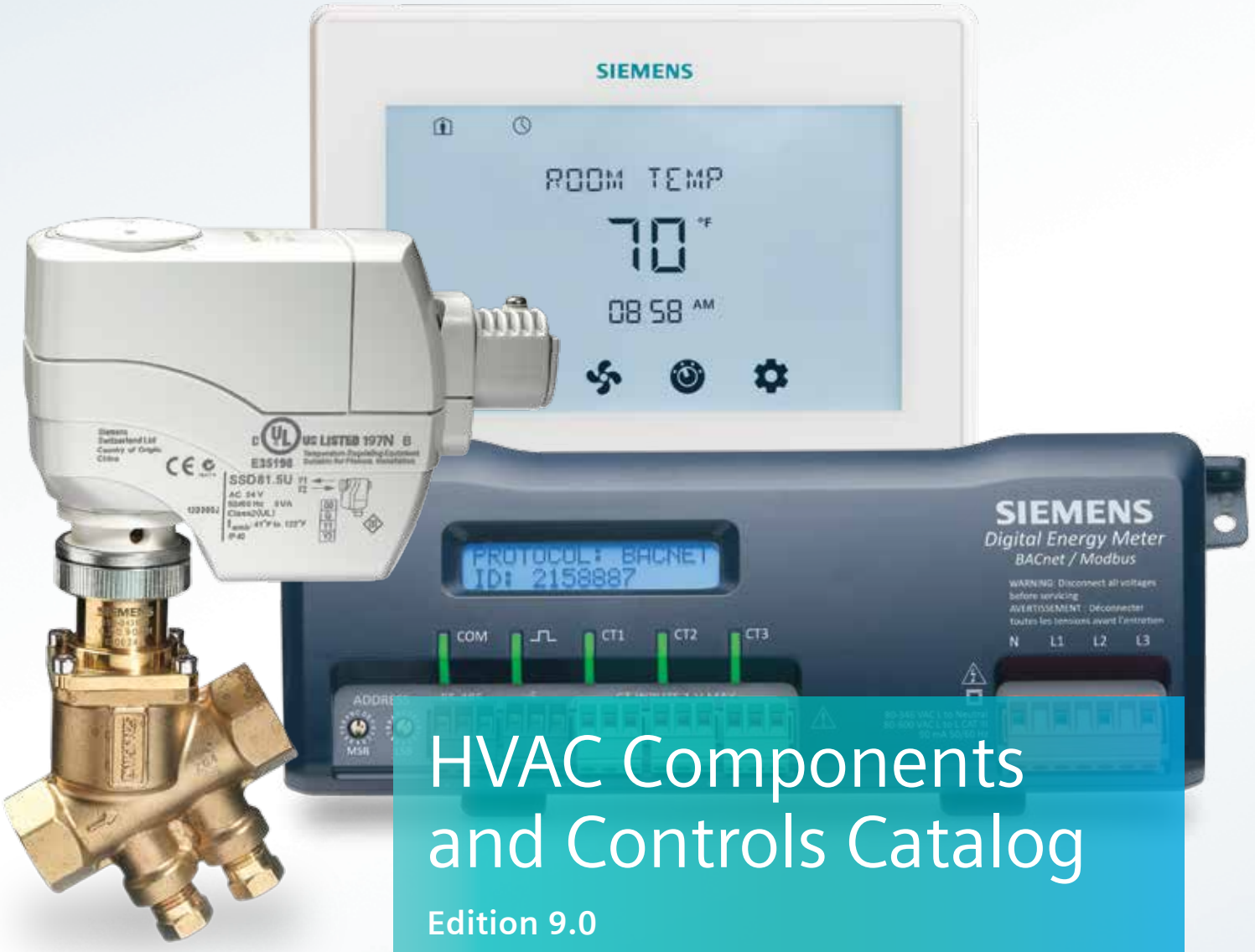
SIEMENS

Ingenuity for life



HVAC Components and Controls Catalog

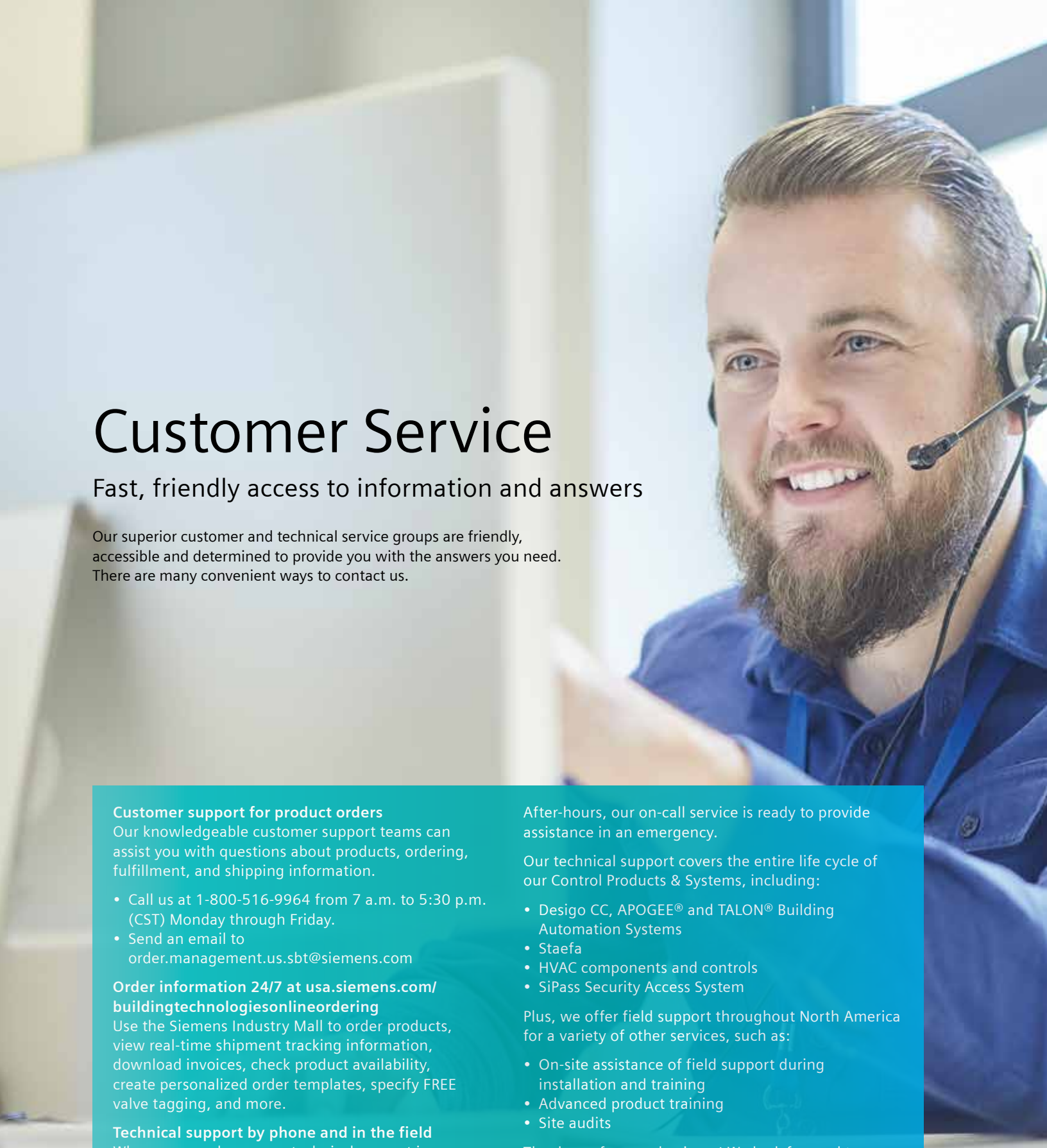
Edition 9.0

We back our products with the Siemens 2-year Product Guard warranty. The key products that you rely on most are covered with an additional 3-year warranty. It all adds up to installing reliability and peace-of-mind.

Siemens Product Guard Warranty

Siemens Product Guard **PLUS 3** Warranty

usa.siemens.com/hvac



Customer Service

Fast, friendly access to information and answers

Our superior customer and technical service groups are friendly, accessible and determined to provide you with the answers you need. There are many convenient ways to contact us.

Customer support for product orders
Our knowledgeable customer support teams can assist you with questions about products, ordering, fulfillment, and shipping information.

- Call us at 1-800-516-9964 from 7 a.m. to 5:30 p.m. (CST) Monday through Friday.
- Send an email to order.management.us.sbt@siemens.com

Order information 24/7 at usa.siemens.com/buildingtechnologiesonlineordering
Use the Siemens Industry Mall to order products, view real-time shipment tracking information, download invoices, check product availability, create personalized order templates, specify FREE valve tagging, and more.

Technical support by phone and in the field
When you need answers, technical support is available 24/7 by calling 800-877-7545, option 2. The Technical Support Center is open from 7:00 a.m. to 6:00 p.m. CST, every day, including holidays.

After-hours, our on-call service is ready to provide assistance in an emergency.

Our technical support covers the entire life cycle of our Control Products & Systems, including:

- Desigo CC, APOGEE® and TALON® Building Automation Systems
- Staefa
- HVAC components and controls
- SiPass Security Access System

Plus, we offer field support throughout North America for a variety of other services, such as:

- On-site assistance of field support during installation and training
- Advanced product training
- Site audits

Thank you for your business! We look forward to assisting you today.

Complete offering of Pressure Independent Control Valves

Meet all types of applications and achieve reliable control of large hydronic systems with our 1/2 to 6-inch PICV family.

Our comprehensive family of 33 different Pressure Independent Control Valves gives you the freedom to apply PICV into all types of applications. Both flanged and threaded versions are available in ANSI 250, flanged are also available in ANSI 125. Plus, our portfolio allows you to meet all control signal and failure mode combinations:

- 1/2 to 2 inch two-way PICVs with SSD spring return and non-spring return and SAY non-spring return actuators
- 2-1/2, 3, 4, 5 and 6-inch two-way flanged with SQV spring return actuators and SAX or SAV non-spring return actuators

PICVs improve system performance and optimize ΔT resulting in less pumping energy and contributing to more efficient loading of boilers and chillers.

Our valves maintain constant flow by automatically adjusting to differential pressure changes in the HVAC system. This significantlyreduces or eliminates "hunting" for the right actuator setting, resulting in better control and increased comfort.

- 3-in-1 device includes a control valve, field adjustable flow limiter, and automatic pressure regulator
- Maximum flow preset is easily field adjustable
- Full stroke regardless of maximum flow setting for the best controllability
- High flow and low flow versions of all flanged valves
- Some of the highest maximum flows available in the market

Siemens Industry, Inc.
Building Technologies Division
1000 Deerfield Parkway
Buffalo Grove, IL 60089-4513
USA
Tel. 847-215-1000

Siemens Building Technologies, Ltd.
2 Kenview Boulevard
Brampton, Ontario L6T 5E4
Canada
Tel. 905-799-6649

Ready to place an order?
Siemens Solution Partners, call **1-800-516-9964**
Canadian Customers, call **1-800-236-2967**
All other customers, call your local Siemens branch.

  153-SBT-509

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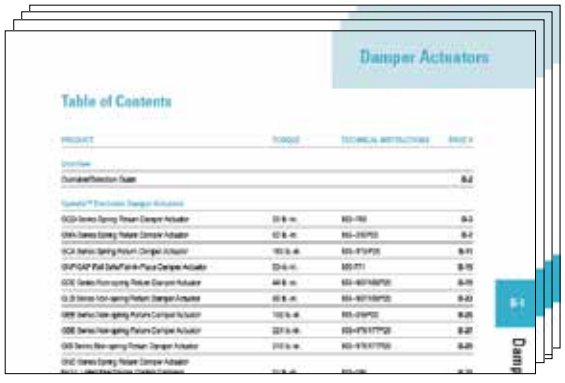
FOLD FOLD

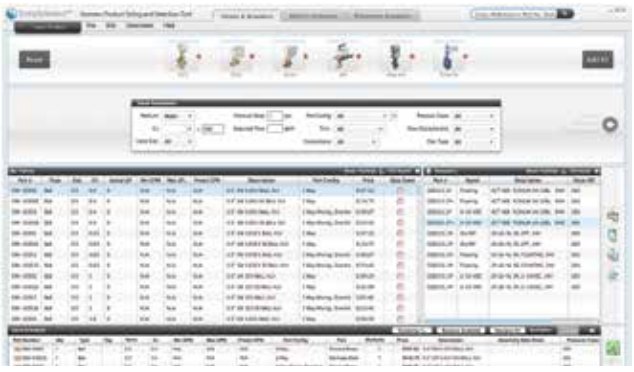
How to use these tabs to bookmark a page:

1. Gently pull up on right, bottom corner of the tab and pull away from adhesive backing.
2. Place half of the tape tab onto the page you wish to bookmark.
3. Fold the other half of the tab over the back of the page.
4. Crease along the dotted line.



SimpleSelect™ Product Sizing and Selection Tool

Quickly and efficiently size and select the right valve, valve actuator, electronic, or pneumatic damper actuator for the job.



SimpleSelect quickly narrows your search from our entire portfolio of PICV, zone, globe, ball, magnetic, and butterfly valves, and electronic and pneumatic damper actuators.

This easy-to-use software tool features intuitive navigation and built-in productivity boosting tools to help you get more done, faster.

- Downloads onto your desktop and notifies you as the latest updates become available
- "Drag and drop" and icon button functionality
- Select products, assemblies, or kits
- Product parameter windows help you determine correct sizing and selection criteria
- Drop down menu options and calculator tools help ensure you meet specific product sizing requirements
- Save product schedules or export into an Excel, PDF, or CSV file to upload to Siemens Online Ordering.

Put the simplicity of our FREE SimpleSelect sizing and selection software tool to work for you today.

Download SimpleSelect onto your desktop today!
Visit usa.siemens.com/simpleselect

Product Highlights

BT300 Variable Frequency Drives

Meets the demands of today's HVAC systems.
An increased focus on energy efficiency of variable flow systems has increased the need for easy-to-use and highly reliable variable frequency drives that reduce the cost of installation and maintenance while maximizing energy savings. The BT300 HVAC drives come standard with unique and industry-leading features and are designed to manage energy consumption and optimize occupant comfort in even the most demanding environments.

> *See page C-5 for more information.*

MD BACnet/Modbus Digital Energy Meter

Perfect for tenant submetering and data center monitoring.
This submetering device is designed to provide real time, accurate electricity metering to enable greater control over energy costs. The meter captures kWh/kW energy and demand data, as well as virtually all relevant energy parameters for diagnostics and monitoring on three-phase or single-phase circuit installations. Its flexibility, size, and ease-of-use make it an ideal tool for gathering detailed consumption information in commercial, industrial, governmental, and retail environments.

> *See page E-55 for complete details.*

Series RDY2000BN Thermostat

Flexibly manages all aspects of room comfort.
The RDY2000BN Commercial Thermostat with BACnet Communication saves energy and optimizes comfort with smart, integrated zone and room control. It cost effectively and seamlessly integrates building zones into BACnet systems for centralized control and monitoring. Designed with the same comfort and control functionality found in direct digital control (DDC) systems, the RDY2000BN offers a simple-to-engineer and easy-to-commission solution to both new construction and retrofit projects.

> *See page D-3 for complete details.*

PICV Portfolio Expansion

Comprehensive portfolio of 1/2 to 6 inch PICVs.
Simplify planning, installation and commissioning – particularly with large hydronic HVAC systems for large air handling units and distribution – while improving control and comfort with 2-1/2 to 6 inch Flanged PICVs. With higher flow capacities, Siemens PICV portfolio dramatically increases your opportunities to apply PICV into many more applications while helping building owners save on energy costs and achieve green goals. Pair them with SSD, SAY, SAX, SAV and SQV Series spring return and non-spring return valve actuators and you have the ideal solution for renovations, expansions, and new construction projects.

> *See pages A-83 through A-111 for complete details.*

Powermite SAS Electronic Valve Actuators

Maintenance-free SAS Electronic Valve Actuators feature a reversible motor and small compact design.
They are perfect for use in small to medium HVAC installations. Options such as floating or proportional control and spring or non-spring return models make these actuators suitable for liquid and low pressure (15 psi) steam applications.

> *See pages A-159 through A-165 for complete details.*

2-Way Ball Valve and Actuator with Low Profile Bracket

Achieve excellent equal percentage flow control with two-way ball valves and OpenAir™ actuators.
They require no special programming or tools, saving on installation time and delivering immediate results when controlling hot or chilled water and up to 50% glycol solution in convectors, fan coil units, unit conditioners, radiation, and reheat coils. For tight spaces, a low profile bracket holds a GDE/GLB Series Non-Spring Return Actuator or GQD Series Spring Return Actuator to a 1/2- or 3/4-inch Two-Way Ball Valve.

> *See page A-209 for complete details.*

EcoView™ Energy Management System

Energy management made easier through centralized control

With Siemens EcoView, you can lower energy consumption and costs while controlling HVAC and lighting from anywhere. The EcoView Energy Management System (EMS) is a wireless system designed to help retail and small commercial facilities manage energy costs.

Continually rising energy prices put real pressure on a retail business. An energy management system helps curtail energy usage, lower energy bills, and optimize customer and employee comfort through advanced scheduling, controlling and monitoring of HVAC and lighting consumption.

Siemens EcoView Energy Management System is an affordable, easy to install and easy to use solution.

Key benefits include:

- Real-time tracking, management, and control of energy consumption
- Remote monitoring and control of HVAC systems and electrical loads, including heating, ventilation, air conditioning, exterior lighting control, and power monitoring
- No monitoring required by on-site personnel

Touchscreen panels and easy-to-use system components

State-of-the-art Siemens field devices install quickly, require only minimal training, and perform reliably to minimize business disruptions. Wireless technology, dependable components, and an intuitive touchscreen interface keep your employees productive and environment comfortable.

- **EcoView Web** – The interface for remotely monitoring and controlling HVAC systems and lighting loads at multiple locations. It maintains historical data on the Internet so that you may access usage and performance reports from any Web-enabled device. A one-year subscription to EcoView Web is included with the initial EcoView equipment purchase. After the first year, you must renew the subscription for each site on your account to continue to use EcoView Web.
- **EcoView Touchscreen** – A full-color 7-inch tactile display device, master controller and Internet gateway built into a single wall-mounted unit. It is used to transmit usage data for the EcoView Web application.
- **EcoView Multi-phase Meter** – Measures real-time energy demand, as well as historical consumption. Delivers usage data to the EcoView Touchscreen in fifteen-second intervals.
- **EcoView Thermostat** – Enables functionality that is not possible with standard 24V HVAC thermostats.

Install scalable and affordable solutions for small commercial and retail customers today.

> *See page D-21 for more details.*

RDY2000BN BACnet Commercial Thermostat

Save energy and optimize comfort with smart, integrated zone and room control

The RDY2000BN commercial thermostat cost effectively and seamlessly integrates building zones into BACnet systems for centralized control and monitoring. Packing the same comfort and control functionality found in direct digital control (DDC) systems, the RDY2000BN offers a simple-to-engineer and easy-to-commission solution to both new construction and retrofit projects.

The RDY2000BN flexibly manages all aspects of room comfort. Onboard temperature and humidity sensors and pre-programmed applications for ventilation, economizer, IAQ, and humidity provide the flexibility to optimize occupant comfort while reducing energy consumption.

A comprehensive solution for all types of applications

- Reduced operating costs – centralized monitoring and control and remote diagnosis capabilities enable faster equipment troubleshooting to minimize downtime and increase productivity
- Lower energy costs – reduce energy consumption by automating schedules based on occupancy
- Healthier buildings – built-in advanced HVAC applications and temperature and humidity sensors help ensure optimized indoor air quality for maximized occupant comfort
- Cost-effective – delivers the powerful benefits of a traditional zone controller at a fraction of the cost
- Faster start-up – Simple remote start-up and commissioning and seamless BACnet integration
- Easy system configuration – one device covers many applications, making it easy for contractors to install and commission and building owners to maintain

A fast return on investment and lower total cost of ownership

The RDY2000BN is an affordable solution for Multi-use Commercial Buildings, Schools, High-rise Residential Buildings, Medical Offices, Hospitals, Hotels, Retail Establishments, and Light Manufacturing facilities.

> *See page D-3 for complete technical specifications and ordering details.*

Terms & Conditions

CPS Terms and Conditions for Sale of Products (Including Software Licenses)

1. **Applicable Terms.** These terms govern the sale of products, equipment, components, parts, and materials provided by Siemens ("Products"). Products include licenses for software products owned or licensable by Siemens ("Software"). Whether these terms are included in an offer or an acceptance by Siemens Industry, Inc., Building Technology Division ("Siemens"), such offer or acceptance is conditioned on Buyer's assent to these terms. Any additional, different or conflicting terms contained in Buyer's request for proposal, specifications, purchase order or any other written or oral communication from Buyer shall not be binding in any way on Siemens. Siemens failure to object to any such additional, different or conflicting terms shall not operate as a waiver of these terms.
2. To the extent that Software is provided for use in an equipment Product deliverable to a Buyer or in a computer owned by Buyer, Buyer agrees to take delivery of any such Software subject to (i) any applicable Siemens or third party end-user license agreement (EULA) accompanying such Software, or (ii), if no EULA accompanies such Software, the EULA posted at www.usa.siemens.com/btcpseula (Siemens' EULA web site) for such Software used in or with the Equipment identified by product model or part number on the Siemens EULA web site. Such Software shall be warranted in accordance with its applicable EULA unless an exception is explicitly identified in this Agreement. Buyer may state an objection to any terms of an applicable EULA prior to issuance of a purchase order for such Software; however, for such objection to stand it shall be subject to Siemens written acceptance of the same.
3. **Pricing & Payment.** The prices are: (a.) as stated in Siemens' proposal or if none are stated, (b.) Siemens' standard price in effect at the time of release for shipment. In the event of a price increase or decrease, the price of Products on order shall be adjusted to reflect such increase or decrease. This does not apply to a shipment held by request of Buyers. Products already shipped are not subject to price increase or decrease. Prices herein are List Prices. Net pricing is determined by annual volume. Contact your local Siemens sales representative for your pricing. Cash discounts are not applicable to notes or trade acceptances, to prepaid transportation charges when added to Siemens' invoices or to discountable items if there are undisputed past due items on the account. Cash discounts shall only be allowed on that portion of the invoice paid within the normal discount period. Published prices do not include any additional services such as design layout, system drawings, installation drawings, jobsite labor, shop labor, air freight, or special delivery charges. All labor and expenses for such services shall be charged at the rates prevailing at the time and place of performance.
   a) Payment – Unless otherwise stated, all payments are net 30 days from invoice date payable in US Dollars.
   b) Credit Approval – All orders are subject to credit approval by Siemens. The amount of credit or terms of payment may be changed or credit withdrawn by Siemens at any time for any reason without advanced notice. Siemens may, in its discretion, withhold further manufacture or shipment; require immediate cash payments for past and future shipments; or require other security satisfactory to Siemens before further manufacture or shipment is made; and may, if shipment has been made, recover the Products from the carrier, pending receipt of such assurances.
   c) Installment Shipment – If these terms require or authorize delivery of Products in separate shipments to be separately accepted by Buyer, Buyer may only refuse such portion of such shipment that fails to comply with the requirements of these terms. Buyer may not refuse to receive any lot or portion of hereunder for failure of any other lot or portion of a lot to be delivered or to comply with the terms hereof. Payment shall be made for the Products without regard to whether Buyer has made or may make an inspection of the Products. Products held for Buyer are at Buyer's sole risk and expense.
   d) Taxes, Shipping, Packing, Handling – Except to the extent expressly stated in these terms, Siemens' prices do not include nay freight, storage, insurance, taxes, excises, fees, duties, or other government charges related to the Product, and Buyer shall pay such amounts or reimburse Siemens for any amounts Siemens pays. If Buyer claims a tax or other exemption or direct payment permit, it shall provide Siemens with a valid exemption certificate or permit and indemnify, defend and hold Siemens harmless from any taxes, costs and penalties arising out of same. Siemens' prices include the costs of its standard domestic packing only. Any deviation from this standard packing (domestic or export), including U.S. Government sealed packing, shall result in extra charges. To determine such extra charges, consult Siemens' sales offices. Any and all increases, changes, adjustments or surcharges (including, without limitation, fuel surcharges) which may be in connection with the freight charges, rates or classification included as part of these terms, shall be for the Buyer's account. Each order is subject to a minimum billing charge of US$50 and orders less than $400 are subject to a US$25 handling fee.
   e) Finances Charge – Buyer agrees to pay FINANCE CHARGES on the unpaid balance of all overdue invoices, less any applicable payments and credits, from the date each invoice is due and payable at an ANNUAL PERCENTAGE RATE of EIGHTEEN PERCENT (18%), or the highest applicable and lawful rate on such unpaid balance, whichever is lower.
   f) Disputed Invoice – In the event Buyer disputes any portion or all of an invoice, it shall notify Siemens in writing of the amount in dispute and the reason for its disagreement within 21 days of receipt of the invoice. The undisputed portion shall be paid when due, and FINANCE CHARGE on any unpaid portion shall accrue, from the date due until the date of payment, to the extent that such amounts are finally determined to be payable to Siemens.
   g) Collection – Upon Buyer's default of these terms, Siemens may, in addition to any other rights or remedies at contract or law, subject to any cure right of Buyer, declare the entire balance of Buyer's account immediately due and payable or foreclose any security interest in Products delivered. If any unpaid balance is referred for collection, Buyer agrees to pay Siemens, to the extent permitted by law, reasonable attorney fees in addition to all damages otherwise available, whether or not litigation is commenced or prosecuted to final judgment, plus any court costs or expenses incurred by Siemens, and any FINANCE CHARGES accrued on any unpaid balance owed by Buyer.
4. **Delivery; Title; Risk of Loss.** Except as provided in this section, Product shall be delivered F.O.B. Siemens point of shipment with title to the Product and risk of loss or damage for the Product passing to Buyer at that point. Buyer shall be responsible for all transportation, insurance and related expenses including any associated taxes, duties or documentation. Siemens may make partial shipments. Shipping dates are approximate only and Siemens shall not be liable for any loss or expense (consequential or otherwise) incurred by Buyer or Buyer's customers if Siemens fails to meet the specified deliver schedule. A 5% handling charge shall be added to the price for all Product furnished from a local branch.

5. **Deferment and Cancellation.** Buyer shall have no deferment rights and Buyer shall be liable for cancellation charges, which shall include without limitation a) payment of the full product price for any finished Product or works in progress; b) payment for raw materials ordered pursuant to a firm purchase order; and c) such other direct costs incurred by Siemens as a result of such cancellation.
6. **Force Majeure / Delays.** If Siemens suffers delay in performance due to any cause beyond its reasonable control, including without limitation acts of God, strikes, labor shortage or disturbance, fire, accident, war or civil disturbance, delays of carriers, failure of normal sources of supply, or acts of government, the time performance shall be extended a period of time equal to the period of the delay and its consequences. Siemens will give to Buyer notice within a reasonable time after Siemens becomes aware of any such delay.
7. **Buyer's Requirements.** Timely performance by Siemens is contingent upon Buyer's supplying to Siemens all required technical information and data, including drawing approvals, and all required commercial documentation.
8. **Limited Warranty.** Except as stated herein, the Siemens Product Guard Warranty warrants that Product purchased from Siemens or its authorized reseller is free from defects in material and workmanship under normal use during the two-year period commencing on the date of purchase. The written proof of purchase is required for such warranty period to apply. In the event a written proof of purchase cannot be supplied to Siemens, the limited warranty period shall commence on the Product's date of manufacture. The date of manufacture is determined from the Product's date code marking. Siemens field devices designated as covered by the Siemens Product Guard Plus 3 Warranty include an additional three-year limited warranty extension, and shall not apply to damage to field devices caused by ordinary wear and tear, improper use, negligence, or other causes beyond Siemens' control. Siemens warrants as follows. The BT300 Siemens Variable Frequency Drives ("VFDs") purchased from it or its authorized reseller to be free from defects in material and workmanship under normal use during the 18-month period commencing on the date of purchase. Siemens warrants the BTE and BTC Bypass units ("Units") purchased from it or its authorized reseller to be free from defects in material and workmanship under normal use during the 18-month period commencing on the date of purchase. A written proof of purchase is required for such warranty period to apply. In the event a written proof of purchase of VFDs cannot be supplied to Siemens, the limited warranty period shall commence on the VFD's date of manufacture. The date of manufacture is determined from the VFD's date code marking. VFDs which have completed a validated Siemens Certified start-up and have an associated validated Siemens Certified start-up form registered with the Siemens Building Technologies Division, of Siemens Industry, Inc. Control Products and Systems, shall be warranted to be free from defects in material and workmanship under normal use during the 36-month period commencing on date of purchase. A written proof of purchase is required for such warranty period to apply. In the event a written proof of purchase of VFDs cannot be supplied to Siemens, the limited warranty period shall commence on the VFD's date of manufacture. The date of manufacture is determined from the VFD's date code marking. Siemens' obligations with respect to software distributed by it under the Siemens name are set forth in the applicable end user license agreement. Siemens has no other obligation to repair or replace software under this Limited Warranty. Any hardware, equipment, software, firmware, or products not manufactured by Siemens or not bearing its nameplate ("Other Products") are provided on an "as is" basis. 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12. **Changes in Work.** Siemens shall not implement any changes in the scope of work unless Buyer and Siemens agree in writing to the details of the change and any resulting price, schedule or other contractual modifications. Any change to any law, rule, regulation, order, code, standard or requirement which requires any change hereunder shall entitle Siemens to an equitable adjustment in the prices and any time of performance.
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14. **Final Written Agreement; Modification of Terms.** These terms, together with any quotation, purchase order or acknowledgement issued or signed by Siemens, comprise the complete and exclusive agreement between the parties (the "Agreement") and supersede any terms contained in Buyer's documents, unless separately signed by Siemens. These terms may only be modified by a written instrument signed by authorized representatives of both parties.
15. **Assignment.** Neither party may assign the Agreement, in whole or in part, nor any rights or obligations hereunder without the prior written consent of the other; provided however that Siemens may assign its rights and obligations under these terms to its affiliates and Siemens may grant a security interest in the Agreement and/or assign proceeds of the Agreement without Buyer's consent.
16. **Applicable Law and Jurisdiction.** These terms is governed and construed in accordance with the laws of the State of Delaware, without regard to its conflict of laws principles. The application of the United Nations Convention on Contracts for the International Sale of Goods is excluded. BUYER WAIVES ALL RIGHTS TO A JURY TRIAL IN ANY ACTION OR PROCEEDING RELATED IN ANY WAY TO THESE TERMS.
17. **Severability.** If any provision of these terms is held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions will not in any way be affected or impaired, and such provision will be deemed to be restated to reflect the original intentions of the parties as nearly as possible in accordance with applicable law.
18. **Export Compliance.** Buyer acknowledges that Siemens is required to comply with applicable export laws and regulations relating to the sale, exportation, transfer, assignment, disposal, and usage of the Products provided under this Agreement, including any export license requirements. Buyer agrees that such Products shall not at any time directly or indirectly be used, exported, sold, transferred, assigned or otherwise disposed of in a manner which will result in non-compliance with such applicable export laws and regulations. It is a condition of the continuing performance by Siemens of its obligations hereunder that compliance with such export laws and regulations be maintained at all times. BUYER AGREES TO INDEMNIFY AND HOLD SIEMENS HARMLESS FROM ANY AND ALL COSTS, LIABILITITES, PENALTIES, SANCTIONS AND FINES RELATED TO NONCOMPLIANCE WITH APPLICABLE EXPORT LAWS AND REGULATIONS.
19. **Returns.** All returns require written authorization that can be obtained by contacting the Siemens Customer Support. All returned goods that are unused must be in the original package, be the current revision of product, be in sellable condition as a new product, and be returned within 90 days from date of sales. A proper Return Material authorization ("RMA") number must be acquired for all returned goods. Only goods returned with a completed RMA form and a copy of the original purchase order will be considered for credit. Unless stated otherwise in writing, all returned goods, except those due to shipping errors by Siemens, are subject to a 15% restocking charge. Returned goods must be sent freight pre-paid.
20. **Credits.** VFDs are built to order. All part numbers beginning with BT300 will be eligible for a credit under unused returns. Such returns will not be allowed for part numbers beginning with BTE or BTC, which are customized VFDs. To be eligible for credit as an unused return the following criteria must be met: (1) the Product must be in its original packaging; (2) the Product must be the current version of the Product; (3) the Product must be in saleable condition as new Product and never been installed; and (4) the request for the return must be received by Siemens no later than 50 days from date of original shipment by Siemens. Returns not meeting the stated criteria will not be accepted and will be returned to the sender at the sender's expense. Unless otherwise agreed by Siemens in writing, VFD unused returns are subject to a 25% restocking charge and must be returned via freight pre-paid.
21. **Product Specific Terms for Desigo CC and Cerberus DMS Software**
    The product specific terms and conditions set for in this section are specific to Siemens' Desigo CC and Cerberus DMS Software and not to any other software offered by Siemens. These terms are additional to the terms in this Agreement and the EULA for Desigo CC and Cerberus DMS Software. To the extent that these product specific terms are in conflict with the terms of this Agreement or the EULA for Desigo CC and Cerberus DMS Software, these terms will take precedence with respect to Desigo CC and Cerberus DMS Software.
    a) Only Desigo CC and Cerberus DMS Software that has not been activated (i.e., when a user has or had someone else enter that software into the Siemens licensing system) by a corresponding license key can be returned.
    b) Return requests must be sent within 6 months of purchase.
    c) A credit to refund must be provided for the cost of the returned licenses.
    d) There is a deduction a $350 restocking charge from the credit for each order returned.
    e) Credits for valid returns to our will be made within a reasonable amount of time from its receipt.

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Overview

Designed for precise regulation and control of water, steam and other media, Siemens valves and actuators are highly dependable. They include:

- Zone Valves for economical control of baseboard, fan coil and radiant heat applications
- Powermite Globe Valves for reliable control of terminal unit and zone equipment
- Flowrite Globe Valves for dependable control of small to medium coils and larger HVAC systems
- Pressure Independent Control Valves automatically adjust to pressure fluctuations to maintain a consistent flow in all applications
- Ball Valves control hot or chilled water in a variety of applications
- Magnetic Valves are quick response, high performance valves for demanding critical applications
- Diverting and 2-port Refrigeration Valves with Magnetic Actuators for refrigeration applications
- Service Valves are excellent for replacing hard to find valves for baseboard, terminal unit and radiant heat applications
- Resilient Seat Butterfly Valves are excellent for isolation and distribution applications

Selection Guide

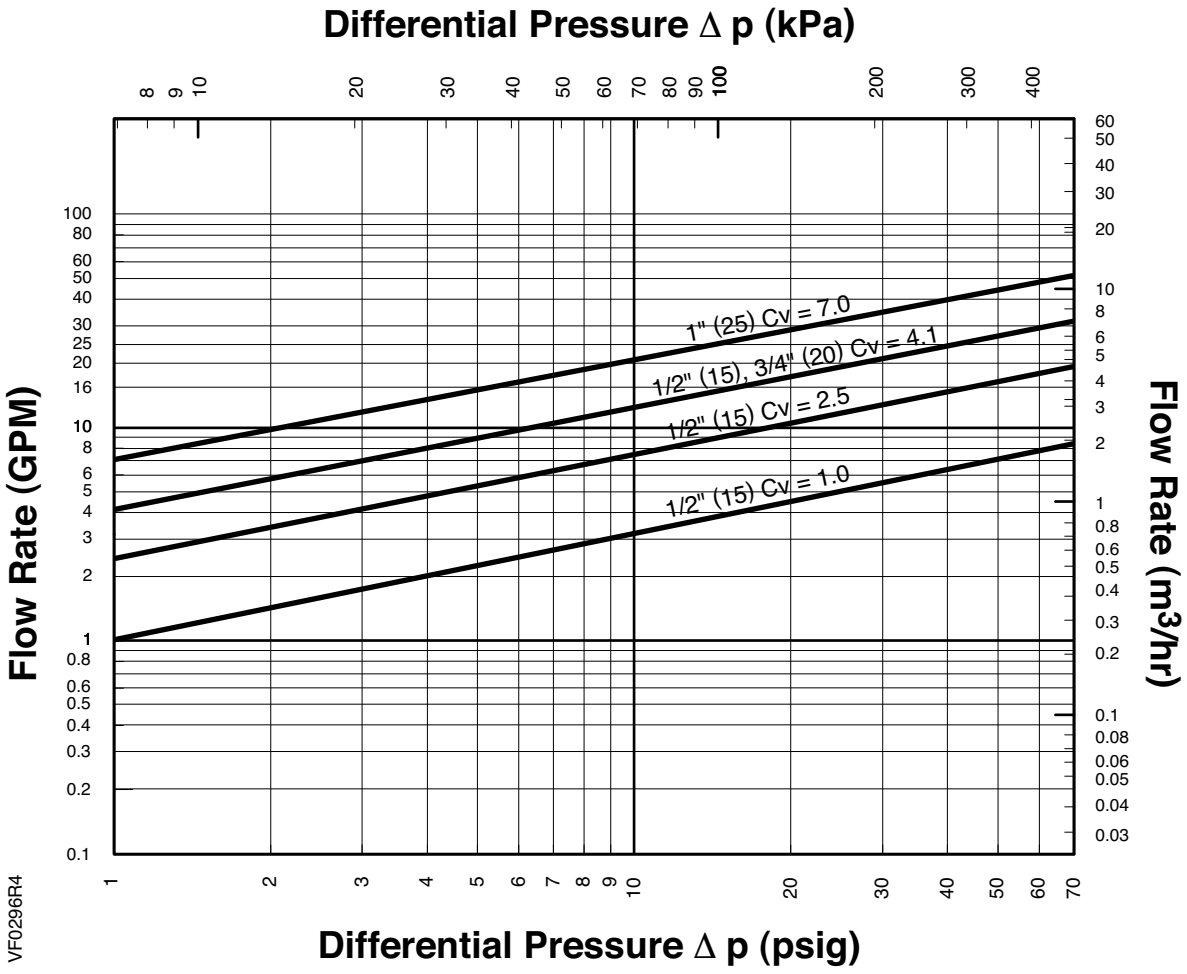
	Valves								
Application	**Zone**	**Powermite Globe**	**Flowrite Globe**	**PICV**	**Ball**	**Magnetic**	**Service**	**Butterfly**	**Refrigeration**
Terminal	•	•		•	•	•	•		
AHU/Unitary		•	•	•	•	•			
Distribution			•	•	•	•		•	
Central Equipment			•	•				•	
Refrigeration									•

Valve Selection Matrix by Application

Application	Controlled Medium	Valve Size	Type of Valve	Refer to Page
Baseboard/Fan Coil/Radiant Heat	Water	1/2 to 1"	PICV, Zone	**A-83, A-113**
Baseboard/Terminal Unit	Water	1/2 to 1"	PICV, Powermite MZ Series	**A-83, A-129**
Terminal Unit	Water and Low Pressure steam[1]	1/2 to 1"	PICV (Water Only), Powermite MT Series	**A-83, A-137**
Unitary/Fan Coil	Water and Low Pressure steam[1]	1/2 to 1"	PICV (Water Only), Powermite MT Series	**A-83, A-137**
Unitary/Fan Coil	Water (Equal Percentage) and High Pressure steam (Linear)	1/2 to 2"	PICV (Water Only), Flowrite Globe	**A-83, A-163**
Air Handling Unit	Water (Equal Percentage) and High Pressure steam (Linear)	1/2 to 2"	PICV (Water Only), Flowrite Globe	**A-83, A-163**
Central Plant	Water (Equal Percentage) and High Pressure steam (Linear)	2-1/2 to 6"	PICV (Water Only), Flowrite Globe	**A-83, A-163**
Fan Coil/VAV/Isolation and Control/AHU	Water	1/2 to 2"	PICV, Ball	**A-83, A-203**
High Performance Control and Domestic Water	Water (including Domestic), Low Pressure Steam and High Pressure Steam	1/2 to 4"	Magnetic	**A-223**
Refrigeration Systems	CO_2 and Commonly Used Safety Refrigerants	1/2 to 5"	Refrigerant with Magnetic Actuator	**A-243**
Baseboard/Terminal Unit/Radiant (Replacement)	Water and Low Pressure Steam	1/2 to 1-1/4"	Service	**A-259**
Central Plant Isolation and Distribution	Water	2 to 20"	Butterfly	**A-271**

Table Notes:
1. Low pressure steam = 15 psi or less

Zone Valves
Water Capacity Graph



Zone Valves
Water Capacity Tables and Close-off Pressure

Water Capacity Tables

Valve Size Inches	Pressure Differential – psi English (AB→A)															
	Cv\1	2	3	4	5	6	8	10	15	20	25	30	40	50	60	75
1/2	1.0	1.4	1.7	2.0	2.2	2.4	2.8	3.2	3.9	4.4	5.0	5.5	6.3	7.1	7.7	8.7
1/2	2.5	3.5	4.3	5.0	5.6	6.1	7.1	7.9	9.7	11.2	12.5	13.7	15.8	17.7	19.4	22.0
1/2 / 3/4	4.1	5.7	7.1	8.2	9.2	10.0	11.6	13.0	15.9	18.3	20.5	22.4	25.9	29.0	31.8	35.5
1	7.0	9.9	12.1	14.0	15.6	17.1	19.8	22.1	27.1	31.3	35.0	38.3	44.3	49.5	54.2	60.6

Table Notes:
Table is expressed in U.S. Gallons per minute (GPM).

Valve Size mm	Pressure Differential – psi Metric (AB→A)													
	1	10	20	30	40	50	60	80	100 (Kvs)	150	200	300	400	500
15	0.09	0.27	0.38	0.47	0.54	0.60	0.66	0.76	0.85	1.04	1.20	1.47	1.70	1.90
15	0.22	0.68	0.96	1.18	1.36	1.52	1.67	1.92	2.15	2.63	3.04	3.72	4.30	4.81
15 / 20	0.35	1.11	1.57	1.92	2.21	2.47	2.71	3.13	3.50	4.29	4.95	6.06	7.00	7.83
25	0.60	1.90	2.68	3.29	3.79	4.24	4.65	5.37	6.00	7.35	8.49	10.39	12.00	13.42

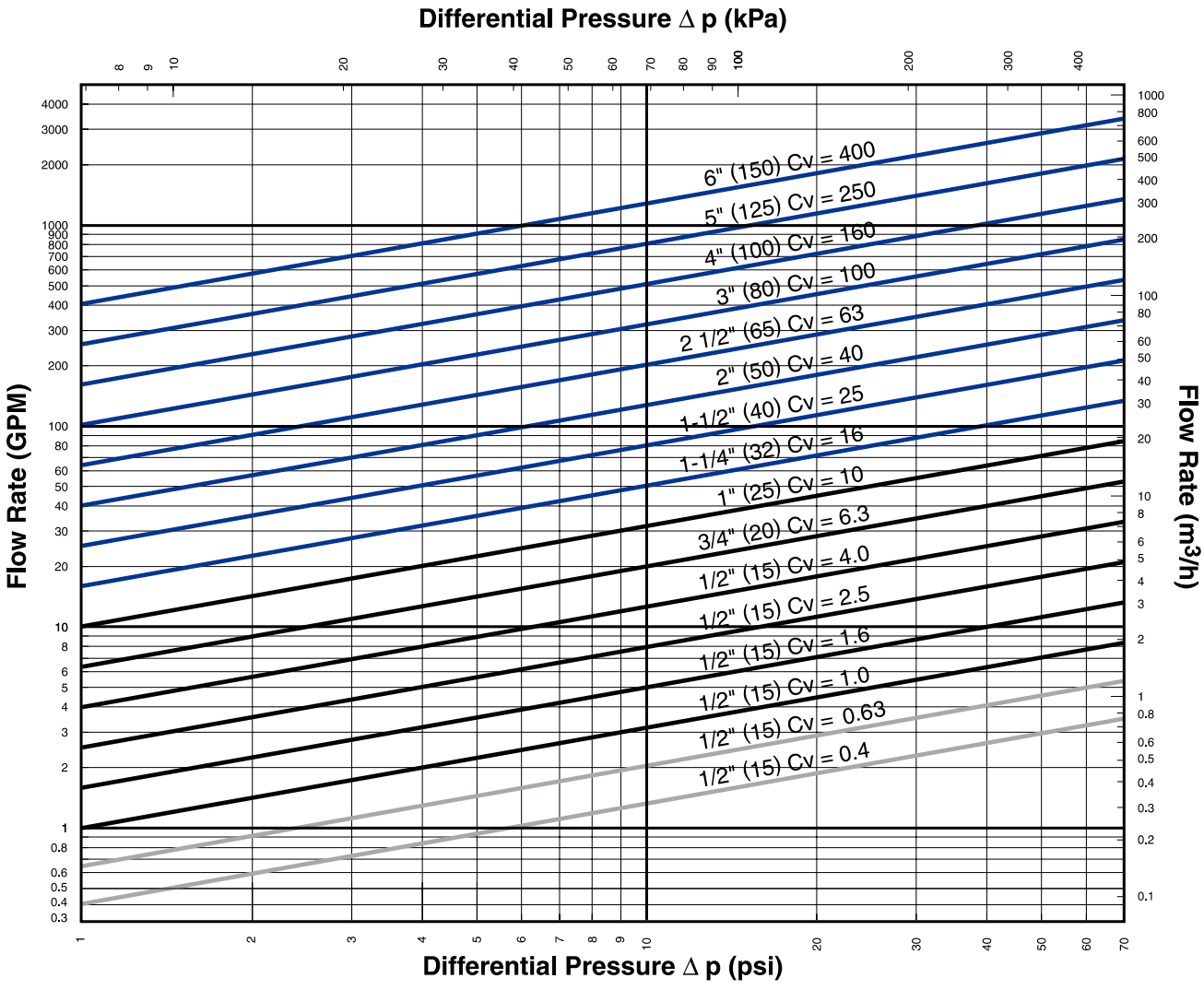
Table Notes:
Table expressed in Cubic Meters per Hour (m^3/hr).

Close-off Pressures

Valve Size Inch	(mm)	Spring Return or Non-Spring Return Actuators							
		Cv	SFA APC 240, 242		SFP APC 241, 243		SSA/SSP APC 244, 245, 248	
1/2	(15)	1.0	87	(600)	80	(552)	94	(648)
		2.5 / 4.0	51	(352)	44	(303)	65	(448)
3/4	(20)	4.1	51	(352)	44	(303)	65	(448)
1	(25)	7.0	29	(200)	25	(172)	36	(248)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Powermite/Flowrite Globe
Water Capacity Graph



Key

- Flowrite 599 Series
- Powermite or Flowrite 599 Series
- Powermite 599 Series

For more precise Valve Sizing, use the Water Capacity tables on the next page.

Powermite/Flowrite Globe Water Capacity Tables

Valve Size Inches	English Pressure Differential															
	Cv\1	2 psi	3 psi	4 psi	5 psi	6 psi	8 psi	10 psi	15 psi	20 psi	25 psi	30 psi	40 psi	50 psi	60 psi	75 psi
1/2	0.4	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.5	1.8	2.0	2.2	2.5	2.8	3.1	3.5
1/2	0.63	0.9	1.1	1.3	1.4	1.5	1.8	2.0	2.4	2.8	3.2	3.5	4.0	4.5	4.9	5.5
1/2	1.0	1.4	1.7	2.0	2.2	2.5	2.8	3.2	3.9	4.5	5.0	5.5	6.3	7.1	7.8	8.7
1/2	1.6	2.3	2.8	3.2	3.6	3.9	4.5	5.1	6.2	7.2	8.0	8.8	10.1	11.3	12.4	13.9
1/2	2.5	3.5	4.3	5.0	5.6	6.1	7.1	7.9	9.7	11.2	12.5	13.7	15.8	17.7	19.4	22
1/2	4	5.7	7	8.0	8.9	10	11.3	12.6	15.5	17.9	20.0	21.9	25	28	31	35
3/4	6.3	8.9	10.9	12.6	14.1	15.4	17.8	20	24	28	32	35	40	45	49	55
1	10	14.1	17.3	20	22	24	28	32	39	45	50	55	63	71	77	87
1-1/4	16	23	28	32	36	39	45	51	62	72	80	88	101	113	124	139
1-1/2	25	35	43	50	56	61	71	79	97	112	125	137	158	177	194	217
2	40	57	69	80	89	98	113	126	155	179	200	219	253	283	310	346
2-1/2	63	89	109	126	141	154	178	199	244	282	315	345	398	445	488	546
3	100	141	173	200	224	245	283	316	387	447	500	548	632	707	775	866
4	160	226	277	320	358	392	453	506	620	716	800	876	1012	1131	1239	1386
5	250	354	433	500	559	612	707	791	968	1118	1250	1369	1581	1768	1936	2165
6	400	566	693	800	894	980	1131	1265	1549	1789	2000	2191	2530	2828	3098	3464

Table Notes:
Table is expressed in U.S. gallons per minute (GPM).

Valve Size mm	Metric Pressure Differential													
	1 kPa	10 kPa	20 kPa	30 kPa	40 kPa	50 kPa	60 kPa	80 kPa	100 (Kvs)	150 kPa	200 kPa	300 kPa	400 kPa	500 kPa
15	0.03	0.11	0.15	0.19	0.22	0.24	0.26	0.30	0.34	0.42	0.48	0.59	0.68	0.76
15	0.05	0.17	0.24	0.30	0.34	0.38	0.42	0.48	0.54	0.66	0.76	0.94	1.08	1.21
15	0.09	0.27	0.38	0.47	0.54	0.60	0.66	0.76	0.85	1.0	1.2	1.5	1.7	1.9
15	0.14	0.43	0.61	0.75	0.87	0.97	1.06	1.23	1.37	1.7	1.9	2.4	2.7	3.1
15	0.21	0.68	0.96	1.17	1.35	1.51	1.66	1.91	2.15	2.6	3.0	3.7	4.3	4.8
15	0.34	1.1	1.5	1.9	2.2	2.4	2.7	3.1	3.4	4.2	4.9	6.0	6.9	7.7
20	0.54	1.7	2.4	3.0	3.4	3.8	4.2	4.9	5.4	6.7	7.7	9.4	10.9	12.1
25	0.86	2.7	3.8	4.7	5.4	6.1	6.7	7.7	8.6	10.5	12.2	14.9	17.2	19.2
32	1.4	4.4	6.2	7.6	8.7	9.8	10.7	12.3	13.8	16.9	19.5	23.9	27.6	30.9
40	2.2	6.8	9.6	11.8	13.6	15.2	16.7	19.2	22	26	30	37	43	48
50	3.4	10.9	15.4	18.8	22	24	27	31	34	42	49	60	69	77
65	5.4	17.1	24	30	34	38	42	48	54	66	76	94	108	121
80	8.5	27	38	47	54	60	66	76	85	104	120	147	170	190
100	14	43	61	75	87	97	106	123	137	168	194	237	274	306
125	21	68	96	117	135	151	166	191	214	262	303	371	428	479
150	34	108	153	187	216	242	265	306	342	419	484	592	684	765

Table Notes:
Table expressed in Cubic Meters per Hour (m^3/hr).
Cv values of 0.4 to 10 are Powermite globe valves; Cv values of 1.0 to 400 are Flowrite globe valves.

Powermite/Flowrite Globe
Maximum Steam Capacity at Various Pressure Differentials

Valve Size Inches	Cv	English Inlet Pressure							
		2 psi		5 psi			10 psi		
		Pressure Differential							
		1 psi	2 psi	3 psi	4 psi	5 psi	6 psi	8 psi	10 psi
1/2	0.4	4.78	6.66	8.78	10	11	14	15	17
	0.63	7.53	11	14	16	17	21	24	26
	1	12	17	22	25	28	34	38	42
	1.6	19	27	35	40	44	54	61	67
	2.5	30	42	55	62	69	85	96	104
	4	48	67	88	100	110	136	153	167
3/4	6.3	75	105	138	157	174	214	241	263
1	10	120	166	219	250	275	339	382	417
1-1/4	16	191	266	351	400	441	542	611	667
1-1/2	25	299	416	549	625	689	847	955	1042
2	40	478	666	878	1000	1102	1356	1529	1667
2-1/2	63	753	1048	1383	1574	1735	2135	2408	2626
3	100	1195	1664	2194	2499	2754	3389	3822	4168
4	160	1913	2663	3511	3998	4407	5422	6115	6669
5	250	2988	4160	5486	6247	6885	8472	9554	10421
6	400	4781	6657	8778	9996	11017	13555	15287	16674

Table Notes:
Table is expressed in pounds per hour (lbs./hr.).

Valve Size Inches	Cv	English Inlet Pressure									
		15 psi			25 psi			50 psi			100 psi	
		Pressure Differential										
		9 psi	12 psi	15 psi	5 psi	15 psi	20 psi	15 psi	30 psi	32.5 psi	50 psi	57.5 psi
1/2	0.4	18	19	22	16	26	29	35	45	47	79	83
	0.63	28	31	34	26	41	46	55	72	74	125	132
	1	45	48	54	41	65	72	87	114	117	198	209
	1.6	72	78	87	65	104	116	139	183	188	318	334
	2.5	112	121	135	101	163	181	217	286	294	497	522
	4	179	194	217	162	261	290	348	458	471	796	835
3/4	6.3	282	305	341	255	411	456	548	722	742	1253	1315
1	10	447	485	542	405	653	724	870	1147	1178	1989	2088
1-1/4	16	716	775	867	648	1044	1158	1392	1835	1885	3182	3340
1-1/2	25	1118	1211	1355	1013	1632	1810	2175	2867	2946	4972	5220
2	40	1789	1938	2168	1620	2611	2895	3480	4587	4713	7956	8351
2-1/2	63	2818	3053	3414	2552	4112	4560	5480	7225	7424	12530	13153
3	100	4473	4845	5419	4050	6527	7238	8699	11468	11784	19889	20878
4	160	7156	7753	8671	6481	10443	11581	13919	18348	18855	31823	33405
5	250	11181	12114	13549	10126	16317	18095	21748	28669	29462	49723	52195
6	400	17890	19382	21678	16201	26108	28953	34797	45870	47139	79556	83512

Table Notes:
Table is expressed in pounds per hour (lbs./hr.).

Powermite/Flowrite Globe Temperature Pressure Ratings

Powermite Valve Bodies

Temperature Range		Pressure
		ANSI Class 250
Bronze/Brass 1/2 to 1"		
-20 to 150°F	-30 to 66°C	400 (2758)
200°F	93°C	385 (2655)
250°F	121°C	365 (2586)
300°F	149°C	335 (2300)
350°F	177°C	300 (2068)

Flowrite Valve Bodies

Temperature Range		Pressure
		ANSI Class 250
Bronze 1/2 to 2"		
-20 to 150°F	-30 to 66°C	400 (2758)
200°F	93°C	385 (2655)
250°F	121°C	365 (2586)
300°F	149°C	335 (2300)
350°F	177°C	300 (2068)

Temperature Range		Pressure	
		ANSI Class 125	ANSI Class 250
Flanged Iron 2-1/2 to 6"			
-20 to 150°F	-30 to 66°C	200 (1387)	500 (3447)
200°F	93°C	190 (1310)	460 (3171)
250°F	121°C	175 (1206)	415 (2861)
300°F	149°C	165 (1137)	375 (2585)
400°F	204°C	140 (965)	290 (1999)
450°F	232°C	125 (861)	250 (1723)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Powermite Globe
Close-off Pressures

MZ Series

Valve Size	Electronic	
	SSB	
	2-Way	3-Way
	Normally Open	
1/2", Cv ≤ 1.6	60 (414)	25 (172)
1/2", Cv ≤ 4	35 (241)	15 (103)
3/4 to 1", Cv ≤ 10	30 (207)	10 (69)
	Normally Closed	
1/2", Cv ≤ 1.6	70 (482)	70 (482)
1/2", Cv ≤ 4	40 (276)	40 (276)
3/4 to 1", Cv ≤ 10	30 (207)	30 (207)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.
For 3-Way valve close-offs, use this chart to determine upper port (NC) and bottom port (NO).

MT Series

2-Way Valve Size	Pneumatic			Electronic	
	599-01088			SAS	SSC
	3 to 8 psi (21 to 55 kPa)	8 to 13 psi (55 to 90 kPa)	10 to 15 psi (69 to 103 kPa)		
	Normally Open				
1/2", Cv ≤ 1.6	95 (655)	45 (310)	20 (138)	160 (1103)	120 (868)
1/2", Cv ≤ 4	45 (310)	25 (172)	15 (103)	85 (586)	65 (448)
3/4 to 1", Cv ≤ 10	35 (241)	10 (69)	—	70 (482)	55 (379)
	Normally Closed				
1/2", Cv ≤ 1.6	40 (276)	95 (655)	95 (655)	95 (655)	95 (655)
1/2", Cv ≤ 4	28 (193)	50 (345)	50 (345)	50 (345)	50 (345)
3/4 to 1", Cv ≤ 10	18 (124)	40 (276)	40 (276)	40 (276)	40 (276)

3-Way Valve Size	Pneumatic			Electronic	
	599-01088			SAS	SSC
	3 to 8 psi (21 to 55 kPa)	8 to 13 psi (55 to 90 kPa)	10 to 15 psi (69 to 103 kPa)		
	Normally Open				
1/2", Cv ≤ 1.6	95 (655)	45 (310)	20 (138)	160 (1103)	95 (655)
1/2", Cv ≤ 4	45 (310)	25 (172)	15 (103)	85 (586)	50 (379)
3/4 to 1", Cv ≤ 10	35 (241)	10 (69)	—	70 (482)	40 (276)
	Normally Closed				
1/2", Cv ≤ 1.6	40 (276)	95 (655)	120 (827)	95 (655)	95 (655)
1/2", Cv ≤ 4	28 (193)	50 (345)	65 (448)	50 (345)	50 (345)
3/4 to 1", Cv ≤ 10	18 (124)	40 (276)	50 (345)	40 (276)	40 (276)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.
For 3-Way valve close-offs, use this chart to determine upper (NC) and bottom port (NO).
Normally open close-off pressures are at 20 psi actuator pressure.
Normally closed close-off pressures are at 0 psi actuator pressure.

Flowrite Globe Close-off Pressures

Pneumatic

Valve Size in. (mm)	Spring Range							
	3 to 8 psi (21 to 55 kPa)					10 to 15 psi (69 to 103 kPa)		
	4" Actuator	8" Actuator		12" Actuator		4" Actuator	8" Actuator	12" Actuator
	15 psi (103 kPa)	15 psi (103 kPa)	30 psi (207 kPa)	15 psi (103 kPa)	30 psi (207 kPa)	0 psi (0 kPa)	0 psi (0 kPa)	0 psi (0 kPa)
	Normally Open					Normally Closed		
1/2 (15)	142 (979)	250 (1724)	250 (1724)	—	—	236 (1627)	250 (1724)	—
3/4 (20)	80 (552)	231 (1593)	250 (1724)	—	—	155 (1069)	250 (1724)	—
1 (25)	52 (359)	150 (1034)	250 (1724)	250 (1724)	250 (1724)	91 (627)	250 (1724)	250 (1724)
1-1/4 (32)	32 (221)	93 (641)	250 (1724)	250 (1724)	250 (1724)	52 (359)	148 (1020)	250 (1724)
1-1/2 (40)	20 (138)	60 (414)	198 (1365)	205 (1413)	250 (1724)	32 (331)	92 (634)	250 (1724)
2 (50)	12 (83)	37 (255)	123 (848)	130 (896)	250 (1724)	20 (138)	55 (379)	185 (1275)
2-1/2 (65)	—	31 (213)	100 (689)	95 (655)	250 (1724)	—	36 (248)	114 (786)
3 (80)	—	20 (138)	66 (444)	63 (434)	200 (1378)	—	23 (158)	74 (610)
4 (100)	—	—	—	40 (275)	129 (889)	—	—	46 (317)
5 (125)	—	—	—	26 (179)	82 (565)	—	—	29 (199)
6 (150)	—	—	—	18 (124)	57 (393)	—	—	20 (137)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.
For 3-Way valve close-offs, use this chart to determine upper port (NC) and bottom port (NO).
Normally open close-off pressures are at 15 psi actuator pressure.
Normally closed close-off pressures are at 0 psi actuator pressure.

Pneumatic High Pressure Close-off

Valve Size in. (mm)	Spring Range			
	3 to 8 psi (21 to 55 kPa)		10 to 15 psi (69 to 103 kPa)	
	8" Actuator	12" Actuator	8" Actuator	12" Actuator
	Normally Open		Normally Closed	
2-1/2 (65)	200 (1378)	—	200 (1378)	—
3 (80)	200 (1378)	—	200 (1378)	—
4 (100)	—	200 (1378)	—	200 (1378)
5 (125)	—	200 (1378)	—	200 (1378)
6 (150)	—	200 (1378)	—	200 (1378)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Flowrite Globe
Close-off Pressures

Electronic

Valve Size in.	(mm)	Rack & Pinion w/GMA NEW!	Rack & Pinion w/GCA APC 298, 299	SAX NSR APC 371, 373	SKD APC 267, 274-276	SKB APC 289-291	SKC APC 292-294
		Normally Open					
1/2	(15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	—
3/4	(20)	174 (1200)	231 (1593)	211 (1456)	250 (1724)	250 (1724)	—
1	(25)	136 (938)	149 (1028)	137 (945)	201 (1386)	250 (1724)	—
1-1/4	(32)	84 (580)	92 (634)	85 (586)	124 (855)	250 (1724)	—
1-1/2	(40)	55 (380)	59 (407)	55 (379)	80 (552)	250 (1724)	—
2	(50)	30 (207)	36 (248)	34 (235)	49 (338)	201 (1386)	—
2-1/2	(65)	—	25 (172)	26 (179)	38 (262)	153 (518)	—
3	(80)	—	18 (124)	17 (117)	25 (172)	101 (342)	—
4	(100)	—	—	—	—	—	65 (448)
5	(125)	—	—	—	—	—	42 (289)
6	(150)	—	—	—	—	—	29 (199)
		Normally Closed					
1/2	(15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	—
3/4	(20)	174 (1200)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	—
1	(25)	136 (938)	173 (1193)	159 (1097)	203 (1400)	250 (1724)	—
1-1/4	(32)	84 (580)	100 (690)	92 (634)	117 (807)	250 (1724)	—
1-1/2	(40)	55 (380)	61 (421)	57 (393)	73 (503)	208 (1434)	—
2	(50)	30 (207)	37 (255)	35 (241)	44 (303)	126 (869)	—
2-1/2	(65)	—	25 (172)	26 (179)	34 (234)	97 (668)	—
3	(80)	—	18 (124)	17 (117)	22 (152)	63 (434)	—
4	(100)	—	—	—	—	—	39 (268)
5	(125)	—	—	—	—	—	25 (172)
6	(150)	—	—	—	—	—	17 (117)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Electronic High Pressure Close-off

Valve Size in.	(mm)	Electro-Hydraulic 24 VAC	
		SKD	SKC
		Normally Open	
2-1/2	(65)	200 (1378)	—
3	(80)	200 (1378)	—
4	(100)	—	200 (1378)
5	(125)	—	200 (1378)
6	(150)	—	200 (1378)
		Normally Closed	
2-1/2	(65)	200 (1378)	—
3	(80)	200 (1378)	—
4	(100)	—	200 (1378)
5	(125)	—	200 (1378)
6	(150)	—	200 (1378)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Ball Valve Flow Coefficients

2-Way, Full-Port (no flow optimizer) Ball Valve Part Nos. and Flow Coefficients

Valve Size in.	Valve Size (mm)	Valve Part No.	Effective (Installed) Cv (Kvs) Supply Line Size in Inches (mm) 1/2 (15)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (40)	2 (50)	2-1/2 (65)	3 (80)
1/2	(15)	599-10307 or 599-10307S	**10.0 (8.62)**	6.94 (5.93)	6.19 (5.29)					
3/4	(20)	599-10311 or 599-10311S		**25.00 (21.55)**	18.66 (15.99)	15.35 (13.12)				
1	(25)	599-10316 or 599-10316S			**63.00 (54.31)**	39.78 (34.00)	33.56 (28.69)			
1-1/4	(32)	599-10321 or 599-10321S				**100.00 (86.21)**	69.19 (5.13)	51.45 (43.98)		
1-1/2	(40)	599-10326 or 599-10326S					**160.00 (137.93)**	93.80 (80.17)	76.34 (65.25)	
2	(50)	599-10329 or 599-10329S						**100.00 (86.21)**	94.30 (80.60)	86.12 (73.61)

3-Way, Full-Port (no flow optimizer) Ball Valve Part Nos. and Flow Coefficients

Valve Size in.	Valve Size (mm)	Valve Part No.	Effective (Installed) Cv (Kvs) Supply Line Size in Inches (mm) 1/2 (15)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (40)	2 (50)	2-1/2 (65)	3 (80)
1/2	(15)	599-10357 or 599-10357S	**10.0 (8.62)**	6.94 (5.93)	6.19 (5.29)					
3/4	(20)	599-10360 or 599-10360S		**16.00 (13.79)**	13.9 (11.98)	12.4 (10.69)				
1	(25)	599-10363 or 599-10363S			**25.00 (21.55)**	22.5 (19.4)	21.2 (18.27)			
1-1/4	(32)	599-10366 or 599-10366S				**40.00 (34.48)**	36.9 (31.81)	33.3 (28.70)		
1-1/2	(40)	599-10369 or 599-10369S					**63.00 (54.31)**	55.3 (47.67)	51.00 (43.96)	
2	(50)	599-10372 or 599-10372S						**100 (86.21)**	94.3 (81.29)	86.1 (74.23)

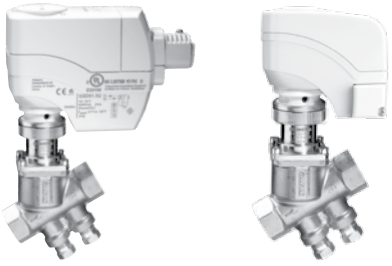
For more information on selecting ball valves, refer to Engineering, Section G.

Key ■ Valve may be oversized ☐ Optimal valve size ■ Valve may be undersized

Two-Way PICV Assemblies

ANSI Class 250
Electronic Spring Return or Non-Spring Return Actuators

- Normally Open
- Field adjustable maximum flow
- 200 psi close-off with ANSI Class IV leakage



NO *1/2 to 1-1/4"* ⋈			Spring Return Actuator		Non-Spring Return Actuator	
			Floating	0-10 V	Floating	0-10 V
2-Way Valve Body Part No.	Valve Size in.	Factory Preset Max. GPM	 SSD81.5U	 SSD61.5U	 SSD81U	 SSD61U
Normally Open						
599-04310-0.5	1/2	0.5	232-04310-0.5	233-04310-0.5	230-04310-0.5	231-04310-0.5
599-04311-1		1.0	232-04311-1	233-04311-1	230-04311-1	231-04311-1
599-04311-1.5		1.5	232-04311-1.5	233-04311-1.5	230-04311-1.5	231-04311-1.5
599-04311-2		2.0	232-04311-2	233-04311-2	230-04311-2	231-04311-2
599-04311-2.5		2.5	232-04311-2.5	233-04311-2.5	230-04311-2.5	231-04311-2.5
599-04312-1	3/4	1.0	232-04312-1	233-04312-1	230-04312-1	231-04312-1
599-04312-1.5		1.5	232-04312-1.5	233-04312-1.5	230-04312-1.5	231-04312-1.5
599-04312-2		2.0	232-04312-2	233-04312-2	230-04312-2	231-04312-2
599-04312-2.5		2.5	232-04312-2.5	233-04312-2.5	230-04312-2.5	231-04312-2.5
599-04312-3		3.0	232-04312-3	233-04312-3	230-04312-3	231-04312-3
599-04312-3.5		3.5	232-04312-3.5	233-04312-3.5	230-04312-3.5	231-04312-3.5
599-04312-4		4.0	232-04312-4	233-04312-4	230-04312-4	231-04312-4
599-04312-4.5		4.5	232-04312-4.5	233-04312-4.5	230-04312-4.5	231-04312-4.5
599-04312-5		5.0	232-04312-5	233-04312-5	230-04312-5	231-04312-5
599-04312-5.5		5.5	232-04312-5.5	233-04312-5.5	230-04312-5.5	231-04312-5.5
NEW! 599-04313-5	1	5	232-04313-5	233-04313-5	230-04313-5	231-04313-5
599-04313-6		6	232-04313-6	233-04313-6	230-04313-6	231-04313-6
599-04313-7		7	232-04313-7	233-04313-7	230-04313-7	231-04313-7
599-04313-8		8	232-04313-8	233-04313-8	230-04313-8	231-04313-8
599-04314-9	1-1/4	9	232-04314-9	233-04314-9	230-04314-9	231-04314-9
599-04314-10		10	232-04314-10	233-04314-10	230-04314-10	231-04314-10
599-04314-11		11	232-04314-11	233-04314-11	230-04314-11	231-04314-11
NEW! 599-04314-12		12	232-04314-12	233-04314-12	230-04314-12	231-04314-12
599-04314-13		13	232-04314-13	233-04314-13	230-04314-13	231-04314-13
599-04314-14		14	232-04314-14	233-04314-14	230-04314-14	231-04314-14
599-04314-15		15	232-04314-15	233-04314-15	230-04314-15	231-04314-15
599-04314-16		16	232-04314-16	233-04314-16	230-04314-16	231-04314-16
599-04314-17		17	232-04314-17	233-04314-17	230-04314-17	231-04314-17
599-04314-18		18	232-04314-18	233-04314-18	230-04314-18	231-04314-18

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard PLUS 3 Warranty

Two-Way PICV Assemblies

NEW!

ANSI Class 250
Electronic Non-Spring Return Actuators

- Normally Open or Closed
- Field adjustable maximum flow
- 100 psi close-off with ANSI Class IV leakage

NO/NC *1-1/2 to 2"* ⋈			Non-Spring Return Actuator	
			Floating	0-10 V and 4-20 mA
2-Way Valve Body Part No.	Valve Size in.	Factory Preset Max. GPM	 SAY81.03U	 SAY61.03U
Normally Open or Closed (See Note Below)				
 599-04315-15	1-1/2	15	334-04315-15	335-04315-15
599-04315-20		20	334-04315-20	335-04315-20
599-04315-25		25	334-04315-25	335-04315-25
599-04315-30		30	334-04315-30	335-04315-30
599-04315-35		35	334-04315-35	335-04315-35
599-04315-40		40	334-04315-40	335-04315-40
 599-04316-20	2	20	334-04316-20	335-04316-20
599-04316-25		25	334-04316-25	335-04316-25
599-04316-30		30	334-04316-30	335-04316-30
599-04316-35		35	334-04316-35	335-04316-35
599-04316-40		40	334-04316-40	335-04316-40
599-04316-45		45	334-04316-45	335-04316-45
599-04316-50		50	334-04316-50	335-04316-50

Table Notes:
Part numbers in red indicate complete assemblies.
SAY actuators can be wired for normally closed operation.
0-10 V actuators require AZX61.1 Function Module, see technical instructions.

Siemens Product Guard **PLUS 3** Warranty

Two-Way PICV Assemblies

ANSI Class 250
Electronic Spring Return or Non-Spring Return Actuators

- Normally Closed
- Field adjustable maximum flow
- 45 psi close-off with ANSI Class IV leakage

NC 1/2 to 3/4"			Spring Return Actuator		Non-Spring Return Actuator	
			Floating	0-10 V	Floating	0-10 V
2-Way Valve Body Part No.	Valve Size in.	Factory Preset Max. GPM	 SSD81.5U	 SSD61.5U	 SSD81U	 SSD61U
Normally Closed						
599-04300-0.5	1/2	0.5	232-04300-0.5	233-04300-0.5	230-04300-0.5	231-04300-0.5
599-04300-1		1.0	232-04300-1	233-04300-1	230-04300-1	231-04300-1
599-04300-1.5		1.5	232-04300-1.5	233-04300-1.5	230-04300-1.5	231-04300-1.5
599-04300-2		2.0	232-04300-2	233-04300-2	230-04300-2	231-04300-2
599-04300-2.5		2.5	232-04300-2.5	233-04300-2.5	230-04300-2.5	231-04300-2.5
599-04301-3		3.0	232-04301-3	233-04301-3	230-04301-3	231-04301-3
599-04301-3.5		3.5	232-04301-3.5	233-04301-3.5	230-04301-3.5	231-04301-3.5
599-04301-4		4.0	232-04301-4	233-04301-4	230-04301-4	231-04301-4
599-04301-4.5		4.5	232-04301-4.5	233-04301-4.5	230-04301-4.5	231-04301-4.5
599-04301-5		5.0	232-04301-5	233-04301-5	230-04301-5	231-04301-5
599-04301-5.5		5.5	232-04301-5.5	233-04301-5.5	230-04301-5.5	231-04301-5.5
599-04301-6		6.0	232-04301-6	233-04301-6	230-04301-6	231-04301-6
599-04301-6.5		6.5	232-04301-6.5	233-04301-6.5	230-04301-6.5	231-04301-6.5
599-04301-7		7.0	232-04301-7	233-04301-7	230-04301-7	231-04301-7
599-04301-7.5		7.5	232-04301-7.5	233-04301-7.5	230-04301-7.5	231-04301-7.5
599-04302-1	3/4	1.0	232-04302-1	233-04302-1	230-04302-1	231-04302-1
599-04302-1.5		1.5	232-04302-1.5	233-04302-1.5	230-04302-1.5	231-04302-1.5
599-04302-2		2.0	232-04302-2	233-04302-2	230-04302-2	231-04302-2
599-04302-2.5		2.5	232-04302-2.5	233-04302-2.5	230-04302-2.5	231-04302-2.5
599-04302-3		3.0	232-04302-3	233-04302-3	230-04302-3	231-04302-3
599-04302-3.5		3.5	232-04302-3.5	233-04302-3.5	230-04302-3.5	231-04302-3.5
599-04302-4		4.0	232-04302-4	233-04302-4	230-04302-4	231-04302-4
599-04302-4.5		4.5	232-04302-4.5	233-04302-4.5	230-04302-4.5	231-04302-4.5
599-04303-5		5.0	232-04303-5	233-04303-5	230-04303-5	231-04303-5
599-04303-5.5		5.5	232-04303-5.5	233-04303-5.5	230-04303-5.5	231-04303-5.5
599-04303-6		6.0	232-04303-6	233-04303-6	230-04303-6	231-04303-6
599-04303-6.5		6.5	232-04303-6.5	233-04303-6.5	230-04303-6.5	231-04303-6.5
599-04303-7		7.0	232-04303-7	233-04303-7	230-04303-7	231-04303-7
599-04303-7.5		7.5	232-04303-7.5	233-04303-7.5	230-04303-7.5	231-04303-7.5
599-04303-8		8.0	232-04303-8	233-04303-8	230-04303-8	231-04303-8
599-04303-8.5		8.5	232-04303-8.5	233-04303-8.5	230-04303-8.5	231-04303-8.5

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard PLUS 3 Warranty

Two-Way PICV Assemblies

ANSI Class 250
Electronic Spring Return or Non-Spring Return Actuators

- Normally Closed
- Field adjustable maximum flow
- 45 psi close-off with ANSI Class IV leakage

NC *1 to 1-1/4"* ⋈			Spring Return Actuator		Non-Spring Return Actuator	
			Floating	0-10 V	Floating	0-10 V
2-Way Valve Body Part No.	Valve Size in.	Factory Preset Max. GPM	 SSD81.5U	 SSD61.5U	 SSD81U	 SSD61U
Normally Closed						
599-04304-1	1	1	232-04304-1	233-04304-1	230-04304-1	231-04304-1
599-04304-2		2	232-04304-2	233-04304-2	230-04304-2	231-04304-2
599-04304-3		3	232-04304-3	233-04304-3	230-04304-3	231-04304-3
599-04304-4		4	232-04304-4	233-04304-4	230-04304-4	231-04304-4
599-04304-5		5	232-04304-5	233-04304-5	230-04304-5	231-04304-5
599-04304-6		6	232-04304-6	233-04304-6	230-04304-6	231-04304-6
599-04304-7		7	232-04304-7	233-04304-7	230-04304-7	231-04304-7
599-04304-8		8	232-04304-8	233-04304-8	230-04304-8	231-04304-8
599-04304-9		9	232-04304-9	233-04304-9	230-04304-9	231-04304-9
599-04305-3	1-1/4	3	232-04305-3	233-04305-3	230-04305-3	231-04305-3
599-04305-4		4	232-04305-4	233-04305-4	230-04305-4	231-04305-4
599-04305-5		5	232-04305-5	233-04305-5	230-04305-5	231-04305-5
599-04305-6		6	232-04305-6	233-04305-6	230-04305-6	231-04305-6
599-04305-7		7	232-04305-7	233-04305-7	230-04305-7	231-04305-7
599-04305-8		8	232-04305-8	233-04305-8	230-04305-8	231-04305-8
599-04305-9		9	232-04305-9	233-04305-9	230-04305-9	231-04305-9
599-04305-10		10	232-04305-10	233-04305-10	230-04305-10	231-04305-10
599-04305-11		11	232-04305-11	233-04305-11	230-04305-11	231-04305-11
599-04305-12		12	232-04305-12	233-04305-12	230-04305-12	231-04305-12
599-04305-13		13	232-04305-13	233-04305-13	230-04305-13	231-04305-13

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged PICV Assemblies

NEW!

ANSI Class 125 and 250
Electronic Spring Return or Non-Spring Return Actuators

- Normally Open or Normally Closed
- Field adjustable maximum flow
- 100 psi close-off with ANSI Class IV leakage

NO/NC *2-1/2 to 6"* ⋈			**Spring Return Actuator**		**Non-Spring Return Actuator**			
			NO	**NC**	**NO or NC (See Note Below)**			
			Floating, 0-10 V, 4-20 mA		**Floating**	**Floating**	**0-10 V**	**0-10 V**
2-Way Valve Body Part No.	**Valve Size in.**	**Maximum Flow**	 SQV91P30U	 SQV91P40U	 SAX81.03U	 SAV81.00U	 SAX61.03U	 SAV61.00U
			ANSI CLASS 125					
599-07310	2-1/2	110	238-07310	239-07310	373-07310	—	371-07310	—
599-07315		154	238-07315	239-07315	373-07315	—	371-07315	—
599-07311	3	150	238-07311	239-07311	373-07311	—	371-07311	—
599-07316		190	238-07316	239-07316	373-07316	—	371-07316	—
599-07312	4	300	238-07312	239-07312	—	379-07312	—	378-07312
599-07317		395	238-07317	239-07317	—	379-07317	—	378-07317
599-07313	5	485	238-07313	239-07313	—	379-07313	—	378-07313
599-07318		595	238-07318	239-07318	—	379-07318	—	378-07318
599-07314	6	650	238-07314	239-07314	—	379-07314	—	378-07314
599-07319		860	238-07319	239-07319	—	379-07319	—	378-07319
			ANSI CLASS 250					
599-07320	2-1/2	110	238-07320	239-07320	373-07320	—	371-07320	—
599-07325		154	238-07325	239-07325	373-07325	—	371-07325	—
599-07321	3	150	238-07321	239-07321	373-07321	—	371-07321	—
599-07326		190	238-07326	239-07326	373-07326	—	371-07326	—
599-07322	4	300	238-07322	239-07322	—	379-07322	—	378-07322
599-07327		395	238-07327	239-07327	—	379-07327	—	378-07327
599-07323	5	485	238-07323	239-07323	—	379-07323	—	378-07323
599-07328		595	238-07328	239-07328	—	379-07328	—	378-07328
599-07324	6	650	238-07324	239-07324	—	379-07324	—	378-07324
599-07329		860	238-07329	239-07329	—	379-07329	—	378-07329

Table Notes:
Part numbers in red indicate complete assemblies.
SAV and SAX actuators can be wired for normally closed operation.
0-10 V actuators require AZX61.1 Function Module, see technical instructions.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Zone Valve Assemblies

Electronic Spring Return or Non-Spring Return Actuators

- Normally Open or Normally Closed
- Brass Trim
- NPT Connection
- Higher close-offs

NO/NC 1/2 to 1"			Spring Return Actuator							
			NO		NC		NO		NC	
			2P 120 Vac				2P 24 Vac			
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 SFP11U		 SFA11U		 SFP71U		 SFA71U	
			NPT Connection							
 599-00210		1.0	80	241-00210	87	240-00210	80	243-00210	87	242-00210
599-00211	1/2	2.5	44	241-00211	51	240-00211	44	243-00211	51	242-00211
599-00214		4.0	44	241-00214	51	240-00214	44	243-00214	51	242-00214
599-00212	3/4	4.1	44	241-00212	51	240-00212	44	243-00212	51	242-00212
599-00213	1	7.0	25	241-00213	29	240-00213	25	243-00213	29	242-00213

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

NO/NC 1/2 to 1"			Non-Spring Return Actuator					
			NC		NO		NC	
			Floating 24 Vac		0-10 Vdc 24 Vac		0-10 Vdc 24 Vac	
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 SSA81U		 SSP61U		 SSA61U	
			NPT Connection					
 599-00210		1.0	94	244-00210	94	248-00210	94	245-00210
599-00211	1/2	2.5	65	244-00211	65	248-00211	65	245-00211
599-00214		4.0	65	244-00214	65	248-00214	65	245-00214
599-00212	3/4	4.1	65	244-00212	65	248-00212	65	245-00212
599-00213	1	7.0	36	244-00213	36	248-00213	36	245-00213

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Three-Way Zone Valve Assemblies

Electronic Spring Return or Non-Spring Return Actuators

- Normally Open or Normally Closed
- Brass Trim
- NPT Connection
- Higher close-offs

Diverting
1/2 to 1"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator AB→A NO 2P 120 Vac		Spring Return Actuator AB→A NC 2P 120 Vac		Spring Return Actuator AB→A NO 2P 24 Vac		Spring Return Actuator AB→A NC 2P 24 Vac	
			SFP11U		SFA11U		SFP71U		SFA71U	
			NPT Connection							
599-00230	1/2	1.0	80	241-00230	87	240-00230	80	243-00230	87	242-00230
599-00231		2.5	44	241-00231	51	240-00231	44	243-00231	51	242-00231
599-00234		4.0	44	241-00234	51	240-00234	44	243-00234	51	242-00234
599-00232	3/4	4.1	44	241-00232	51	240-00232	44	243-00232	51	242-00232
599-00233	1	7.0	25	241-00233	29	240-00233	25	243-00233	29	242-00233

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi. *Flow rate is for AB→A. Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Diverting
1/2 to 1"

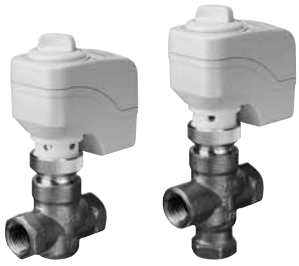
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Non-Spring Return Actuator AB→A NC Floating 24 Vac		Non-Spring Return Actuator AB→A NO 0-10 Vdc 24 Vac		Non-Spring Return Actuator AB→A NC 0-10 Vdc 24 Vac	
			SSA81U		SSP61U		SSA61U	
			NPT Connection					
599-00230	1/2	1.0	94	244-00230	94	248-00230	94	245-00230
599-00231		2.5	65	244-00231	65	248-00231	65	245-00231
599-00234		4.0	65	244-00234	65	248-00234	65	245-00234
599-00232	3/4	4.1	65	244-00232	65	248-00232	65	245-00232
599-00233	1	7.0	36	244-00233	36	248-00233	36	245-00233

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
*Flow rate is for AB→A. Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Two- & Three-Way Globe Valve Assemblies – MZ Series

ANSI Class 250
Electronic Non-Spring Return Actuators



- Normally Open or Normally Closed
- Brass Trim

NO/NC
1/2 to 1"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Non-Spring Return Actuator: Floating 3P SSB81U	Non-Spring Return Actuator: 0-10 V SSB61U
Normally Open					
599-01115	1/2	0.4	60	254-01115	255-01115
599-01117		0.63	60	254-01117	255-01117
599-01119		1	60	254-01119	255-01119
599-01121		1.6	60	254-01121	255-01121
599-01123		2.5	35	254-01123	255-01123
599-01126		4	35	254-01126	255-01126
599-01129	3/4	6.3	30	254-01129	255-01129
599-01131	1	10	30	254-01131	255-01131
Normally Closed					
599-01100	1/2	0.4	70	254-01100	255-01100
599-01102		0.63	70	254-01102	255-01102
599-01104		1	70	254-01104	255-01104
599-01106		1.6	70	254-01106	255-01106
599-01108		2.5	40	254-01108	255-01108
599-01110		4	40	254-01110	255-01110
599-01112	3/4	6.3	30	254-01112	255-01112
599-01114	1	10	30	254-01114	255-01114

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard PLUS 3 Warranty

Water Mixing
1/2 to 1"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Non-Spring Return Actuator: Floating 3P SSB81U	Non-Spring Return Actuator: 0-10 V SSB61U
599-01132	1/2	0.4	70	254-01132	255-01132
599-01133		0.63	70	254-01133	255-01133
599-01134		1	70	254-01134	255-01134
599-01135		1.6	70	254-01135	255-01135
599-01136		2.5	40	254-01136	255-01136
599-01137		4	40	254-01137	255-01137
599-01138	3/4	6.3	30	254-01138	255-01138
599-01139	1	10	30	254-01139	255-01139

Table Notes:
Part numbers in red indicate complete assemblies.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard PLUS 3 Warranty

Two-Way Globe Valve Assemblies – MT Series

ANSI Class 250
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Brass and Stainless Steel Trim

NO/NC *1/2 to 1"* ⋈			Spring Return Actuator					
			3-8 psi (21-55 kPa)		8-13 psi (55-90 kPa)		10-15 psi (69-103 kPa)	
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-01088		 599-01088		 599-01088	
Normally Open								
			Close-off psi – Brass Trim					
599-02030	1/2	0.4	95	257-02030	—		—	
599-02032		0.63	95	257-02032	—		—	
599-02034		1	95	257-02034	—		—	
599-02036		1.6	95	257-02036	—		—	
599-02038		2.5	45	257-02038	—		—	
599-02041		4	45	257-02041	—		—	
599-02044	3/4	6.3	35	257-02044	—		—	
599-02046	1	10	35	257-02046	—		—	
			Close-off psi – Stainless Steel Trim					
599-02047	1/2	0.4	95	257-02047	—		—	
599-02049		0.63	95	257-02049	—		—	
599-02051		1	95	257-02051	—		—	
599-02053		1.6	95	257-02053	—		—	
599-02055		2.5	45	257-02055	—		—	
599-02058		4	45	257-02058	—		—	
599-02061	3/4	6.3	35	257-02061	—		—	
599-02063	1	10	35	257-02063	—		—	
Normally Closed								
			Close-off psi – Brass Trim					
599-02000	1/2	0.4	40	257-02000B	95	258-02000C	95	256-02000
599-02002		0.63	40	257-02002B	95	258-02002C	95	256-02002
599-02004		1	40	257-02004B	95	258-02004C	95	256-02004
599-02006		1.6	40	257-02006B	95	258-02006C	95	256-02006
599-02008		2.5	28	257-02008B	50	258-02008C	50	256-02008
599-02010		4	28	257-02010B	50	258-02010C	50	256-02010
599-02012	3/4	6.3	18	257-02012B	40	258-02012C	40	256-02012
599-02014	1	10	18	257-02014B	40	258-02014C	40	256-02014

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Normally Open Values in chart are for 20 psi supplied to the actuator.
Normally Closed Values in chart are for 0 psi supplied to the actuator.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Globe Valve Assemblies – MT Series

ANSI Class 250
Electronic Spring Return Actuators

- Normally Open or Normally Closed
- Brass and Stainless Steel Trim

NO/NC
1/2 to 1"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator – Floating: SSC81.5U	Spring Return Actuator – Floating: SAS81.33U (NEW!)	Spring Return Actuator – 0-10 V: SSC61.5U	Spring Return Actuator – 0-10 V: SAS61.33U (NEW!)
Normally Open						
			Close-off psi – Brass Trim			
599-02030	1/2	0.4	120 260-02030	160 366-02030	120 262-02030	160 365-02030
599-02032		0.63	120 260-02032	160 366-02032	120 262-02032	160 365-02032
599-02034		1	120 260-02034	160 366-02034	120 262-02034	160 365-02034
599-02036		1.6	120 260-02036	160 366-02036	120 262-02036	160 365-02036
599-02038		2.5	65 260-02038	85 366-02038	65 262-02038	85 365-02038
599-02041		4	65 260-02041	85 366-02041	65 262-02041	85 365-02041
599-02044	3/4	6.3	55 260-02044	70 366-02044	55 262-02044	70 365-02044
599-02046	1	10	55 260-02046	70 366-02046	55 262-02046	70 365-02046
			Close-off psi – Stainless Steel Trim			
599-02047	1/2	0.4	120 260-02047	160 366-02047	120 262-02047	160 365-02047
599-02049		0.63	120 260-02049	160 366-02049	120 262-02049	160 365-02049
599-02051		1	120 260-02051	160 366-02051	120 262-02051	160 365-02051
599-02053		1.6	120 260-02053	160 366-02053	120 262-02053	160 365-02053
599-02055		2.5	65 260-02055	85 366-02055	65 262-02055	85 365-02055
599-02058		4	65 260-02058	85 366-02058	65 262-02058	85 365-02058
599-02061	3/4	6.3	55 260-02061	70 366-02061	55 262-02061	70 365-02061
599-02063	1	10	55 260-02063	70 366-02063	55 262-02063	70 365-02063
Normally Closed						
			Close-off psi – Brass Trim			
599-02000	1/2	0.4	95 260-02000	95 366-02000	95 262-02000	95 365-02000
599-02002		0.63	95 260-02002	95 366-02002	95 262-02002	95 365-02002
599-02004		1	95 260-02004	95 366-02004	95 262-02004	95 365-02004
599-02006		1.6	95 260-02006	95 366-02006	95 262-02006	95 365-02006
599-02008		2.5	50 260-02008	50 366-02008	50 262-02008	50 365-02008
599-02010		4	50 260-02010	50 366-02010	50 262-02010	50 365-02010
599-02012	3/4	6.3	40 260-02012	40 366-02012	40 262-02012	40 365-02012
599-02014	1	10	40 260-02014	40 366-02014	40 262-02014	40 365-02014
			Close-off psi – Stainless Steel Trim			
599-02015	1/2	0.4	95 260-02015	95 366-02015	95 262-02015	95 365-02015
599-02017		0.63	95 260-02017	95 366-02017	95 262-02017	95 365-02017
599-02019		1	95 260-02019	95 366-02019	95 262-02019	95 365-02019
599-02021		1.6	95 260-02021	95 366-02021	95 262-02021	95 365-02021
599-02023		2.5	50 260-02023	50 366-02023	50 262-02023	50 365-02023
599-02025		4	50 260-02025	50 366-02025	50 262-02025	50 365-02025
599-02027	3/4	6.3	40 260-02027	40 366-02027	40 262-02027	40 365-02027
599-02029	1	10	40 260-02029	40 366-02029	40 262-02029	40 365-02029

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Two-Way Globe Valve Assemblies – MT Series

ANSI Class 250
Electronic Non-Spring Return Actuators

- Normally Open or Normally Closed
- Brass and Stainless Steel Trim

NO/NC
1/2 to 1"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Non-Spring Return Actuator: Floating SSC81U		Floating SAS81.03U (NEW!)		0-10 V SSC61U		0-10 V SAS61.03U (NEW!)	
Normally Open										
			Close-off psi – Brass Trim							
599-02030	1/2	0.4	120	259-02030	160	363-02030	120	261-02030	160	364-02030
599-02032		0.63	120	259-02032	160	363-02032	120	261-02032	160	364-02032
599-02034		1	120	259-02034	160	363-02034	120	261-02034	160	364-02034
599-02036		1.6	120	259-02036	160	363-02036	120	261-02036	160	364-02036
599-02038		2.5	65	259-02038	85	363-02038	65	261-02038	85	364-02038
599-02041		4	65	259-02041	85	363-02041	65	261-02041	85	364-02041
599-02044	3/4	6.3	55	259-02044	70	363-02044	55	261-02044	70	364-02044
599-02046	1	10	55	259-02046	70	363-02046	55	261-02046	70	364-02046
			Close-off psi – Stainless Steel Trim							
599-02047	1/2	0.4	120	259-02047	160	363-02047	120	261-02047	160	364-02047
599-02049		0.63	120	259-02049	160	363-02049	120	261-02049	160	364-02049
599-02051		1	120	259-02051	160	363-02051	120	261-02051	160	364-02051
599-02053		1.6	120	259-02053	160	363-02053	120	261-02053	160	364-02053
599-02055		2.5	65	259-02055	85	363-02055	65	261-02055	85	364-02055
599-02058		4	65	259-02058	85	363-02058	65	261-02058	85	364-02058
599-02061	3/4	6.3	55	259-02061	70	363-02061	55	261-02061	70	364-02061
599-02063	1	10	55	259-02063	70	363-02063	55	261-02063	70	364-02063
Normally Closed										
			Close-off psi – Brass Trim							
599-02000	1/2	0.4	95	259-02000	95	363-02000	95	261-02000	95	364-02000
599-02002		0.63	95	259-02002	95	363-02002	95	261-02002	95	364-02002
599-02004		1	95	259-02004	95	363-02004	95	261-02004	95	364-02004
599-02006		1.6	95	259-02006	95	363-02006	95	261-02006	95	364-02006
599-02008		2.5	50	259-02008	50	363-02008	50	261-02008	50	364-02008
599-02010		4	50	259-02010	50	363-02010	50	261-02010	50	364-02010
599-02012	3/4	6.3	40	259-02012	40	363-02012	40	261-02012	40	364-02012
599-02014	1	10	40	259-02014	40	363-02014	40	261-02014	40	364-02014
			Close-off psi – Stainless Steel Trim							
599-02015	1/2	0.4	95	259-02015	95	363-02015	95	261-02015	95	364-02015
599-02017		0.63	95	259-02017	95	363-02017	95	261-02017	95	364-02017
599-02019		1	95	259-02019	95	363-02019	95	261-02019	95	364-02019
599-02021		1.6	95	259-02021	95	363-02021	95	261-02021	95	364-02021
599-02023		2.5	50	259-02023	50	363-02023	50	261-02023	50	364-02023
599-02025		4	50	259-02025	50	363-02025	50	261-02025	50	364-02025
599-02027	3/4	6.3	40	259-02027	40	363-02027	40	261-02027	40	364-02027
599-02029	1	10	40	259-02029	40	363-02029	40	261-02029	40	364-02029

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard **PLUS 3** Warranty

Three-Way Globe Valve Assemblies – MT Series

ANSI Class 250
Pneumatic Spring Return Actuators

• Brass Trim

Mixing *1/2 to 1"*			Spring Return Actuator					
			3-8 psi (21-55 kPa)		8-13 psi (55-90 kPa)		10-15 psi (69-103 kPa)	
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-01088		 599-01088		 599-01088	
			Close-off psi – Brass Trim					
 599-02064		0.4	40	257-02064B	95	258-02064	120	256-02064A
599-02065		0.63	40	257-02065B	95	258-02065	120	256-02065A
599-02066		1	40	257-02066B	95	258-02066	120	256-02066A
599-02067		1.6	40	257-02067B	95	258-02067	120	256-02067A
599-02068		2.5	28	257-02068B	50	258-02068	65	256-02068A
599-02069	1/2	4	28	257-02069B	50	258-02069	65	256-02069A
599-02070	3/4	6.3	18	257-02070B	40	258-02070	50	256-02070A
599-02071	1	10	18	257-02071B	40	258-02071	50	256-02071A

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values in chart are for 0 psi supplied to the actuator.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Three-Way Globe Valve Assemblies – MT Series

ANSI Class 250
Electronic Spring Return Actuators

- Brass and Stainless Steel Trim

Mixing *1/2 to 1"*				Spring Return Actuator			
				Floating		0-10 V	
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	SSC81.5U	SAS81.33U NEW!	SSC61.5U	SAS61.33U NEW!
				Brass Trim			
599-02064	1/2	0.4	95	260-02064	366-02064	262-02064	365-02064
599-02065		0.63	95	260-02065	366-02065	262-02065	365-02065
599-02066		1	95	260-02066	366-02066	262-02066	365-02066
599-02067		1.6	95	260-02067	366-02067	262-02067	365-02067
599-02068		2.5	50	260-02068	366-02068	262-02068	365-02068
599-02069		4	50	260-02069	366-02069	262-02069	365-02069
599-02070	3/4	6.3	40	260-02070	366-02070	262-02070	365-02070
599-02071	1	10	40	260-02071	366-02071	262-02071	365-02071
				Stainless Steel Trim			
599-02072	1/2	0.4	95	260-02072	366-02072	262-02072	365-02072
599-02073		0.63	95	260-02073	366-02073	262-02073	365-02073
599-02074		1	95	260-02074	366-02074	262-02074	365-02074
599-02075		1.6	95	260-02075	366-02075	262-02075	365-02075
599-02076		2.5	50	260-02076	366-02076	262-02076	365-02076
599-02077		4	50	260-02077	366-02077	262-02077	365-02077
599-02078	3/4	6.3	40	260-02078	366-02078	262-02078	365-02078
599-02079	1	10	40	260-02079	366-02079	262-02079	365-02079

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Three-Way Globe Valve Assemblies – MT Series

ANSI Class 250
Electronic Non-Spring Return Actuators

- Brass and Stainless Steel Trim

Mixing
1/2 to 1"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Non-Spring Return Actuator: Floating SSC81U	Floating SAS81.03U NEW!	0-10 V SSC61U	0-10 V SAS61.03U NEW!
				Brass Trim			
599-02064	1/2	0.4	95	259-02064	363-02064	261-02064	364-02064
599-02065		0.63	95	259-02065	363-02065	261-02065	364-02065
599-02066		1	95	259-02066	363-02066	261-02066	364-02066
599-02067		1.6	95	259-02067	363-02067	261-02067	364-02067
599-02068		2.5	50	259-02068	363-02068	261-02068	364-02068
599-02069		4	50	259-02069	363-02069	261-02069	364-02069
599-02070	3/4	6.3	40	259-02070	363-02070	261-02070	364-02070
599-02071	1	10	40	259-02071	363-02071	261-02071	364-02071
				Stainless Steel Trim			
599-02072	1/2	0.4	95	259-02072	363-02072	261-02072	364-02072
599-02073		0.63	95	259-02073	363-02073	261-02073	364-02073
599-02074		1	95	259-02074	363-02074	261-02074	364-02074
599-02075		1.6	95	259-02075	363-02075	261-02075	364-02075
599-02076		2.5	50	259-02076	363-02076	261-02076	364-02076
599-02077		4	50	259-02077	363-02077	261-02077	364-02077
599-02078	3/4	6.3	40	259-02078	363-02078	261-02078	364-02078
599-02079	1	10	40	259-02079	363-02079	261-02079	364-02079

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Globe Valve Assemblies

ANSI Class 250
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Brass and Stainless Steel Trim

NO/NC Equal Percentage 1/2 to 2"			Spring Return Actuator					
			NO 4" 3-8 psi NC 4" 10-15 psi		8"		8" with Positioner	
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-01081 – NO 599-01083 – NC		 599-01050		 599-01050 + 599-00426	
Normally Open								
			Close-off psi – Brass Trim					
599-03162	1/2	1	142	268-03162	—		—	
599-03163		1.6	142	268-03163	—		—	
599-03164		2.5	142	268-03164	—		—	
599-03165		4	142	268-03165	—		—	
599-03166	3/4	6.3	80	268-03166	231	277-03166	231	283-03166
599-03167	1	10	52	268-03167	150	277-03167	150	283-03167
599-03168	1-1/4	16	32	268-03168	93	277-03168	93	283-03168
599-03169	1-1/2	25	20	268-03169	60	277-03169	60	283-03169
599-03170	2	40	12	268-03170	37	277-03170	37	283-03170
			Close-off psi – Stainless Steel Trim					
599-03108	1/2	1	142	268-03108	—		—	
599-03109		1.6	142	268-03109	—		—	
599-03110		2.5	142	268-03110	—		—	
599-03111		4	142	268-03111	—		—	
599-03112	3/4	6.3	80	268-03112	231	277-03112	231	283-03112
599-03113	1	10	52	268-03113	150	277-03113	150	283-03113
599-03114	1-1/4	16	32	268-03114	93	277-03114	93	283-03114
599-03115	1-1/2	25	20	268-03115	60	277-03115	60	283-03115
599-03116	2	40	12	268-03116	37	277-03116	37	283-03116
Normally Closed								
			Close-off psi – Brass Trim					
599-03180	1/2	1	236	270-03180	—		—	
599-03181		1.6	236	270-03181	—		—	
599-03182		2.5	236	270-03182	—		—	
599-03183		4	236	270-03183	—		—	
599-03184	3/4	6.3	155	270-03184	250	277-03184	250	283-03184
599-03185	1	10	91	270-03185	250	277-03185	250	283-03185
599-03186	1-1/4	16	52	270-03186	148	277-03186	148	283-03186
599-03187	1-1/2	25	32	270-03187	92	277-03187	92	283-03187
599-03188	2	40	20	270-03188	55	277-03188	55	283-03188
			Close-off psi – Stainless Steel Trim					
599-03126	1/2	1	236	270-03126	—		—	
599-03127		1.6	236	270-03127	—		—	
599-03128		2.5	236	270-03128	—		—	
599-03129		4	236	270-03129	—		—	
599-03130	3/4	6.3	155	270-03130	250	277-03130	250	283-03130
599-03131	1	10	91	270-03131	250	277-03131	250	283-03131
599-03132	1-1/4	16	52	270-03132	148	277-03132	148	283-03132
599-03133	1-1/2	25	32	270-03133	92	277-03133	92	283-03133
599-03134	2	40	20	270-03134	55	277-03134	55	283-03134

Table Notes:
Part numbers in red indicate complete assemblies.
Black numbers indicate close-off psi.

Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.

Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard PLUS 3 Warranty

Two-Way Globe Valve Assemblies

ANSI Class 250
Electronic and Electro-Hydraulic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Brass and Stainless Steel Trim

NO/NC Equal Percentage 1/2 to 2"			Spring Return Actuator				
			Rack & Pinion 2P	Floating 3P	Rack & Pinion 0-10 Vdc	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-03611	 SKD82.51U	 599-03609	 SKD62U	 SKB62U
Normally Open							
			Close-off psi – Brass Trim				
599-03162	1/2	1	250 299-03162	250 276-03162	250 298-03162	250 274-03162	—
599-03163		1.6	250 299-03163	250 276-03163	250 298-03163	250 274-03163	—
599-03164		2.5	250 299-03164	250 276-03164	250 298-03164	250 274-03164	—
599-03165		4	250 299-03165	250 276-03165	250 298-03165	250 274-03165	—
599-03166	3/4	6.3	231 299-03166	250 276-03166	231 298-03166	250 274-03166	—
599-03167	1	10	149 299-03167	201 276-03167	149 298-03167	201 274-03167	—
599-03168	1-1/4	16	92 299-03168	124 276-03168	92 298-03168	124 274-03168	250 291-03168
599-03169	1-1/2	25	59 299-03169	80 276-03169	59 298-03169	80 274-03169	250 291-03169
599-03170	2	40	36 299-03170	49 276-03170	36 298-03170	49 274-03170	201 291-03170
			Close-off psi – Stainless Steel Trim				
599-03108	1/2	1	—	—	250 298-03108	250 274-03108	—
599-03109		1.6	—	—	250 298-03109	250 274-03109	—
599-03110		2.5	—	—	250 298-03110	250 274-03110	—
599-03111		4	—	—	250 298-03111	250 274-03111	—
599-03112	3/4	6.3	—	—	231 298-03112	250 274-03112	—
599-03113	1	10	—	—	149 298-03113	201 274-03113	—
599-03114	1-1/4	16	—	—	92 298-03114	124 274-03114	250 291-03114
599-03115	1-1/2	25	—	—	59 298-03115	80 274-03115	250 291-03115
599-03116	2	40	—	—	36 298-03116	49 274-03116	201 291-03116
Normally Closed							
			Close-off psi – Brass Trim				
599-03180	1/2	1	250 299-03180	250 276-03180	250 298-03180	250 274-03180	—
599-03181		1.6	250 299-03181	250 276-03181	250 298-03181	250 274-03181	—
599-03182		2.5	250 299-03182	250 276-03182	250 298-03182	250 274-03182	—
599-03183		4	250 299-03183	250 276-03183	250 298-03183	250 274-03183	—
599-03184	3/4	6.3	250 299-03184	250 276-03184	250 298-03184	250 274-03184	—
599-03185	1	10	173 299-03185	203 276-03185	173 298-03185	203 274-03185	250 291-03185
599-03186	1-1/4	16	100 299-03186	117 276-03186	100 298-03186	117 274-03186	250 291-03186
599-03187	1-1/2	25	61 299-03187	73 276-03187	61 298-03187	73 274-03187	208 291-03187
599-03188	2	40	37 299-03188	44 276-03188	37 298-03188	44 274-03188	126 291-03188
			Close-off psi – Stainless Steel Trim				
599-03126	1/2	1	—	—	250 298-03126	250 274-03126	—
599-03127		1.6	—	—	250 298-03127	250 274-03127	—
599-03128		2.5	—	—	250 298-03128	250 274-03128	—
599-03129		4	—	—	250 298--03129	250 274-03129	—
599-03130	3/4	6.3	—	—	250 298-03130	250 274-03130	—
599-03131	1	10	—	—	173 298-03131	203 274-03131	250 291-03131
599-03132	1-1/4	16	—	—	100 298-03132	117 274-03132	250 291-03132
599-03133	1-1/2	25	—	—	61 298--03133	73 274-03133	208 291-03133
599-03134	2	40	—	—	37 298--03134	44 274-03134	126 291-03134

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Two-Way Globe Valve Assemblies

ANSI Class 250
Electronic and Electro-Hydraulic Non-Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Brass and Stainless Steel Trim

NO/NC Equal Percentage 1/2 to 2"			Non-Spring Return Actuator							
			Floating 3P		Floating 3P		0-10 Vdc 4-20 mA		0-10 Vdc 4-20 mA	
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 SAX81.03U		 SKD82.50U		 SAX61.03U		 SKD60U	
Normally Open										
			Close-off psi – Brass Trim							
599-03162	1/2	1	250	373-03162	250	275-03162	250	371-03162	250	267-03162
599-03163		1.6	250	373-03163	250	275-03163	250	371-03163	250	267-03163
599-03164		2.5	250	373-03164	250	275-03164	250	371-03164	250	267-03164
599-03165		4	250	373-03165	250	275-03165	250	371-03165	250	267-03165
599-03166	3/4	6.3	211	373-03166	250	275-03166	211	371-03166	250	267-03166
599-03167	1	10	137	373-03167	201	275-03167	137	371-03167	201	267-03167
599-03168	1-1/4	16	85	373-03168	124	275-03168	85	371-03168	124	267-03168
599-03169	1-1/2	25	55	373-03169	80	275-03169	55	371-03169	80	267-03169
599-03170	2	40	34	373-03170	49	275-03170	34	371-03170	49	267-03170
			Close-off psi – Stainless Steel Trim							
599-03108	1/2	1	—		—		250	371-03108	250	267-03108
599-03109		1.6	—		—		250	371-03109	250	267-03109
599-03110		2.5	—		—		250	371-03110	250	267-03110
599-03111		4	—		—		250	371-03111	250	267-03111
599-03112	3/4	6.3	—		—		211	371-03112	250	267-03112
599-03113	1	10	—		—		137	371-03113	201	267-03113
599-03114	1-1/4	16	—		—		85	371-03114	124	267-03114
599-03115	1-1/2	25	—		—		55	371-03115	80	267-03115
599-03116	2	40	—		—		34	371-03116	49	267-03116
Normally Closed										
			Close-off psi – Brass Trim							
599-03180	1/2	1	250	373-03180	250	275-03180	250	371-03180	250	267-03180
599-03181		1.6	250	373-03181	250	275-03181	250	371-03181	250	267-03181
599-03182		2.5	250	373-03182	250	275-03182	250	371-03182	250	267-03182
599-03183		4	250	373-03183	250	275-03183	250	371-03183	250	267-03183
599-03184	3/4	6.3	250	373-03184	250	275-03184	250	371-03184	250	267-03184
599-03185	1	10	159	373-03185	203	275-03185	159	371-03185	203	267-03185
599-03186	1-1/4	16	92	373-03186	117	275-03186	92	371-03186	117	267-03186
599-03187	1-1/2	25	57	373-03187	73	275-03187	57	371-03187	73	267-03187
599-03188	2	40	35	373-03188	44	275-03188	35	371-03188	44	267-03188
			Close-off psi – Stainless Steel Trim							
599-03126	1/2	1	—		—		250	371-03126	250	267-03126
599-03127		1.6	—		—		250	371-03127	250	267-03127
599-03128		2.5	—		—		250	371-03128	250	267-03128
599-03129		4	—		—		250	371-03129	250	267-03129
599-03130	3/4	6.3	—		—		250	371-03130	250	267-03130
599-03131	1	10	—		—		159	371-03131	203	267-03131
599-03132	1-1/4	16	—		—		92	371-03132	117	267-03132
599-03133	1-1/2	25	—		—		57	371-03133	73	267-03133
599-03134	2	40	—		—		35	371-03134	44	267-03134

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Globe Valve Assemblies

ANSI Class 250
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Linear
- Stainless Steel Trim

NO/NC Linear 1/2 to 2"			Spring Return Actuator									
			NO 4" 3-8 psi NC 4" 10-15 psi		8"		8" High Temp.		8" with Positioner		8" High Temp. with Positioner	
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	599-01081 – NO 599-01083 – NC		599-01050		599-01051		599-01050 + 599-00426		599-01051 + 599-00426	
Normally Open												
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)									
599-03000	1/2	1	142	268-03000	—		—		—		—	
599-03001		1.6	142	268-03001	—		—		—		—	
599-03002		2.5	142	268-03002	—		—		—		—	
599-03003		4	142	268-03003	—		—		—		—	
599-03004	3/4	6.3	80	268-03004	231	277-03004	—		231	283-03004	—	
599-03005	1	10	52	268-03005	150	277-03005	—		150	283-03005	—	
599-03006	1-1/4	16	32	268-03006	93	277-03006	—		93	283-03006	—	
599-03007	1-1/2	25	20	268-03007	60	277-03007	—		60	283-03007	—	
599-03008	2	40	12	268-03008	37	277-03008	—		37	283-03008	—	
			Close-off psi – High-temperature Range is 337° F max. (170° C)									
599-03054	1/2	1	142	268-03054	—		—		—		—	
599-03055		1.6	142	268-03055	—		—		—		—	
599-03056		2.5	142	268-03056	—		—		—		—	
599-03057		4	142	268-03057	—		—		—		—	
599-03058	3/4	6.3	80	268-03058	231	277-03058	231	278-03058	231	283-03058	231	284-03058
599-03059	1	10	52	268-03059	150	277-03059	150	278-03059	150	283-03059	150	284-03059
599-03060	1-1/4	16	32	268-03060	93	277-03060	93	278-03060	93	283-03060	93	284-03060
599-03061	1-1/2	25	20	268-03061	60	277-03061	60	278-03061	60	283-03061	60	284-03061
599-03062	2	40	12	268-03062	37	277-03062	37	278-03062	37	283-03062	37	284-03062
Normally Closed												
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)									
599-03018	1/2	1	236	270-03018	—		—		—		—	
599-03019		1.6	236	270-03019	—		—		—		—	
599-03020		2.5	236	270-03020	—		—		—		—	
599-03021		4	236	270-03021	—		—		—		—	
599-03022	3/4	6.3	155	270-03022	250	277-03022	—		250	283-03022	—	
599-03023	1	10	91	270-03023	250	277-03023	—		250	283-03023	—	
599-03024	1-1/4	16	52	270-03024	148	277-03024	—		148	283-03024	—	
599-03025	1-1/2	25	32	270-03025	92	277-03025	—		92	283-03025	—	
599-03026	2	40	20	270-03026	55	277-03026	—		55	283-03026	—	
			Close-off psi – High-temperature Range is 337° F max. (170° C)									
599-03072	1/2	1	236	270-03072	—		—		—		—	
599-03073		1.6	236	270-03073	—		—		—		—	
599-03074		2.5	236	270-03074	—		—		—		—	
599-03075		4	236	270-03075	—		—		—		—	
599-03076	3/4	6.3	155	270-03076	250	277-03076	250	278-03076	250	283-03076	250	284-03076
599-03077	1	10	91	270-03077	250	277-03077	250	278-03077	250	283-03077	250	284-03077
599-03078	1-1/4	16	52	270-03078	148	277-03078	148	278-03078	148	283-03078	148	284-03078
599-03079	1-1/2	25	32	270-03079	92	277-03079	92	278-03079	92	283-03079	92	284-03079
599-03080	2	40	20	270-03080	55	277-03080	55	278-03080	55	283-03080	55	284-03080

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard PLUS 3 Warranty

Two-Way Globe Valve Assemblies

ANSI Class 250
Electronic and Electro-Hydraulic Spring Return or Non-Spring Return Actuators

- Normally Open or Normally Closed
- Linear
- Stainless Steel Trim

NO/NC Linear 1/2 to 2"			Spring Return Actuator			Non-Spring Return Actuator	
			Rack & Pinion 0-10 Vdc	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	599-03609	SKD62U	SKB62U	SAX61.03U	SKD60U
Normally Open							
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)				
599-03000	1/2	1	250 298-03000	250 274-03000	—	250 371-03000	250 267-03000
599-03001		1.6	250 298-03001	250 274-03001	—	250 371-03001	250 267-03001
599-03002		2.5	250 298-03002	250 274-03002	—	250 371-03002	250 267-03002
599-03003		4	250 298-03003	250 274-03003	—	250 371-03003	250 267-03003
599-03004	3/4	6.3	231 298-03004	250 274-03004	—	211 371-03004	250 267-03004
599-03005	1	10	149 298-03005	201 274-03005	—	137 371-03005	201 267-03005
599-03006	1-1/4	16	92 298-03006	124 274-03006	250 291-03006	85 371-03006	124 267-03006
599-03007	1-1/2	25	59 298-03007	80 274-03007	250 291-03007	55 371-03007	80 267-03007
599-03008	2	40	36 298-03008	49 274-03008	201 291-03008	34 371-03008	49 267-03008
			Close-off psi – High-temperature Range is 337° F max. (170° C)				
599-03054	1/2	1	—	250 274-03054	—	—	250 267-03054
599-03055		1.6	—	250 274-03055	—	—	250 267-03055
599-03056		2.5	—	250 274-03056	—	—	250 267-03056
599-03057		4	—	250 274-03057	—	—	250 267-03057
599-03058	3/4	6.3	—	250 274-03058	—	—	250 267-03058
599-03059	1	10	—	201 274-03059	—	—	201 267-03059
599-03060	1-1/4	16	—	124 274-03060	250 291-03060	—	124 267-03060
599-03061	1-1/2	25	—	80 274-03061	250 291-03061	—	80 267-03061
599-03062	2	40	—	49 274-03062	201 291-03062	—	49 267-03062
Normally Closed							
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)				
599-03018	1/2	1	250 298-03018	250 274-03018	—	250 371-03018	250 267-03018
599-03019		1.6	250 298-03019	250 274-03019	—	250 371-03019	250 267-03019
599-03020		2.5	250 298-03020	250 274-03020	—	250 371-03020	250 267-03020
599-03021		4	250 298-03021	250 274-03021	—	250 371-03021	250 267-03021
599-03022	3/4	6.3	250 298-03022	250 274-03022	—	250 371-03022	250 267-03022
599-03023	1	10	173 298-03023	203 274-03023	—	159 371-03023	203 267-03023
599-03024	1-1/4	16	100 298-03024	117 274-03024	250 291-03024	92 371-03024	117 267-03024
599-03025	1-1/2	25	61 298-03025	73 274-03025	208 291-03025	57 371-03025	73 267-03025
599-03026	2	40	37 298-03026	44 274-03026	126 291-03026	35 371-03026	44 267-03026
			Close-off psi – High-temperature Range is 337° F max. (170° C)				
599-03072	1/2	1	—	250 274-03072	—	—	250 267-03072
599-03073		1.6	—	250 274-03073	—	—	250 267-03073
599-03074		2.5	—	250 274-03074	—	—	250 267-03074
599-03075		4	—	250 274-03075	—	—	250 267-03075
599-03076	3/4	6.3	—	250 274-03076	—	—	250 267-03076
599-03077	1	10	—	203 274-03077	—	—	203 267-03077
599-03078	1-1/4	16	—	117 274-03078	250 291-03078	—	117 267-03078
599-03079	1-1/2	25	—	73 274-03079	208 291-03079	—	73 267-03079
599-03080	2	40	—	44 274-03080	126 291-03080	—	44 267-03080

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Three-Way Globe Valve Assemblies

ANSI Class 250
Pneumatic Spring Return Actuators

• Brass Trim

Mixing *1/2 to 2"*			Spring Return Actuator									
			4" 3-8 psi		4" 5-10 psi		4" 10-15 psi		8"		8" with Positioner	
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-01081		 599-01082		 599-01083		 599-01050		 599-01050 + 599-00426	
			Close-off psi – Brass Trim									
 599-03198	1/2	1	236	268-03198	236	269-03198	236	270-03198	—		—	
599-03199		1.6	236	268-03199	236	269-03199	236	270-03199	—		—	
599-03200		2.5	236	268-03200	236	269-03200	236	270-03200	—		—	
599-03201		4	236	268-03201	236	269-03201	236	270-03201	—		—	
599-03202	3/4	6.3	155	268-03202	155	269-03202	155	270-03202	250	277-03202	250	283-03202
599-03203	1	10	91	268-03203	91	269-03203	91	270-03203	250	277-03203	250	283-03203
599-03204	1-1/4	16	52	268-03204	52	269-03204	52	270-03204	148	277-03204	148	283-03204
599-03205	1-1/2	25	32	268-03205	32	269-03205	32	270-03205	92	277-03205	92	283-03205
599-03206	2	40	20	268-03206	20	269-03206	20	270-03206	55	277-03206	55	283-03206

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Values in chart are for 0 psi supplied to the actuator.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard PLUS 3 Warranty

Three-Way Globe Valve Assemblies

ANSI Class 250
Electronic and Electro-Hydraulic Spring Return Actuators

• Brass and Stainless Steel Trim

Mixing *1/2 to 2"*			Spring Return Actuator				
			Rack & Pinion 2P	Floating 3P	Rack & Pinion 0-10 Vdc	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-03611	 SKD82.51U	 599-03609	 SKD62U	 SKB62U
			Close-off psi – Brass Trim				
599-03198	1/2	1	250 299-03198	250 276-03198	50 298-03198	250 274-03198	—
599-03199		1.6	250 299-03199	250 276-03199	250 298-03199	250 274-03199	—
599-03200		2.5	250 299-03200	250 276-03200	250 298-03200	250 274-03200	—
599-03201		4	250 299-03201	250 276-03201	250 298-03201	250 274-03201	—
599-03202	3/4	6.3	250 299-03202	250 276-03202	250 298-03202	250 274-03202	—
599-03203	1	10	173 299-03203	203 276-03203	173 298-03203	203 274-03203	—
599-03204	1-1/4	16	100 299-03204	117 276-03204	100 298-03204	117 274-03204	250 291-03204
599-03205	1-1/2	25	61 299-03205	73 276-03205	61 298-03205	73 274-03205	208 291-03205
599-03206	2	40	37 299-03206	44 276-03206	37 298-03206	44 274-03206	126 291-03206
			Close-off psi – Stainless Steel Trim				
599-03144	1/2	1	—	—	250 298-03144	250 274-03144	—
599-03145		1.6	—	—	250 298-03145	250 274-03145	—
599-03146		2.5	—	—	250 298-03146	250 274-03146	—
599-03147		4	—	—	250 298-03147	250 274-03147	—
599-03148	3/4	6.3	—	—	250 298-03148	250 274-03148	—
599-03149	1	10	—	—	173 298-03149	203 274-03149	—
599-03150	1-1/4	16	—	—	100 298-03150	117 274-03150	250 291-03150
599-03151	1-1/2	25	—	—	61 298-03151	73 274-03151	208 291-03151
599-03152	2	40	—	—	37 298-03152	44 274-03152	126 291-03152

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values in chart are for 0 psi supplied to the actuator.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Three-Way Globe Valve Assemblies

ANSI Class 250
Electronic and Electro-Hydraulic Non-Spring Return Actuators

- Brass and Stainless Steel Trim

Mixing
1/2 to 2"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Non-Spring Return Actuator: Floating 3P — SAX81.03U		Floating 3P — SKD82.50U		0-10 Vdc 4-20 mA — SAX61.03U		0-10 Vdc 4-20 mA — SKD60U	
			Close-off psi – Brass Trim							
599-03198	1/2	1	250	373-03198	250	275-03198	250	371-03198	250	267-03198
599-03199		1.6	250	373-03199	250	275-03199	250	371-03199	250	267-03199
599-03200		2.5	250	373-03200	250	275-03200	250	371-03200	250	267-03200
599-03201		4	250	373-03201	250	275-03201	250	371-03201	250	267-03201
599-03202	3/4	6.3	250	373-03202	250	275-03202	250	371-03202	250	267-03202
599-03203	1	10	159	373-03203	203	275-03203	159	371-03203	203	267-03203
599-03204	1-1/4	16	92	373-03204	117	275-03204	92	371-03204	117	267-03204
599-03205	1-1/2	25	57	373-03205	73	275-03205	57	371-03205	73	267-03205
599-03206	2	40	35	373-03206	44	275-03206	35	371-03206	44	267-03206
			Close-off psi – Stainless Steel Trim							
599-03144	1/2	1	—		—		250	371-03144	250	267-03144
599-03145		1.6	—		—		250	371-03145	250	267-03145
599-03146		2.5	—		—		250	371-03146	250	267-03146
599-03147		4	—		—		250	371-03147	250	267-03147
599-03148	3/4	6.3	—		—		250	371-03148	250	267-03148
599-03149	1	10	—		—		159	371-03149	203	267-03149
599-03150	1-1/4	16	—		—		92	371-03150	117	267-03150
599-03151	1-1/2	25	—		—		57	371-03151	73	267-03151
599-03152	2	40	—		—		35	371-03152	44	267-03152

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard PLUS 3 Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 125
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Bronze and Stainless Steel Trim

NO/NC
Equal Percentage
Flanged 2-1/2 to 6"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator: 8" 20 mm Stroke	12" 20 mm Stroke	12" 40 mm Stroke	8" w/ Positioner 20 mm Stroke	12" w/ Positioner 20 mm Stroke	12" w/ Positioner 40 mm Stroke
			 599-01050	 599-01010	 599-01000	 599-01050 + 599-00426	 599-01010 + 599-00423	 599-01000 + 599-00423
Normally Open								
			Close-off psi – Bronze Trim					
599-05980	2-1/2	63	31 277-05980	95 279-05980	—	31 283-05980	95 285-05980	—
599-05981	3	100	20 277-05981	63 279-05981	—	20 283-05981	63 285-05981	—
599-05982	4	160	—	—	40 281-05982	—	—	40 287-05982
599-05983	5	250	—	—	26 281-05983	—	—	26 287-05983
599-05984	6	400	—	—	18 281-05984	—	—	18 287-05984
			Close-off psi – Stainless Steel Trim					
599-05960	2-1/2	63	31 277-05960	95 279-05960	—	31 283-05960	95 285-05960	—
599-05961	3	100	20 277-05961	63 279-05961	—	20 283-05961	63 285-05961	—
599-05962	4	160	—	—	40 281-05962	—	—	40 287-05962
599-05963	5	250	—	—	26 281-05963	—	—	26 287-05963
599-05964	6	400	—	—	18 281-05964	—	—	18 287-05964
Normally Closed								
			Close-off psi – Bronze Trim					
599-05990	2-1/2	63	36 277-05990	114 279-05990	—	36 283-05990	114 285-05990	—
599-05991	3	100	23 277-05991	74 279-05991	—	23 283-05991	74 285-05991	—
599-05992	4	160	—	—	46 281-05992	—	—	46 287-05992
599-05993	5	250	—	—	29 281-05993	—	—	29 287-05993
599-05994	6	400	—	—	20 281-05994	—	—	20 287-05994
			Close-off psi – Stainless Steel Trim					
599-05970	2-1/2	63	36 277-05970	114 279-05970	—	36 283-05970	114 285-05970	—
599-05971	3	100	23 277-05971	74 279-05971	—	23 283-05971	74 285-05971	—
599-05972	4	160	—	—	46 281-05972	—	—	46 287-05972
599-05973	5	250	—	—	29 281-05973	—	—	29 287-05973
599-05974	6	400	—	—	20 281-05974	—	—	20 287-05974

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 125
Electro-Hydraulic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Bronze and Stainless Steel Trim

NO/NC
Equal Percentage
Flanged 2-1/2 to 6"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator: Floating 3P — SKD82.51U	Floating 3P — SKB82.51U	Floating 3P — SKC82.61U	0-10 Vdc 4-20 mA — SKD62U	0-10 Vdc 4-20 mA — SKB62U	0-10 Vdc 4-20 mA — SKC62U
Normally Open								
			Close-off psi – Bronze Trim					
599-05980	2-1/2	63	38 276-05980	153 289-05980	—	38 274-05980	153 291-05980	—
599-05981	3	100	25 276-05981	101 289-05981	—	25 274-05981	101 291-05981	—
599-05982	4	160	—	—	65 292-05982	—	—	65 294-05982
599-05983	5	250	—	—	42 292-05983	—	—	42 294-05983
599-05984	6	400	—	—	29 292-05984	—	—	29 294-05984
			Close-off psi – Stainless Steel Trim					
599-05960	2-1/2	63	—	—	—	38 274-05960	153 291-05960	—
599-05961	3	100	—	—	—	25 274-05961	101 291-05961	—
599-05962	4	160	—	—	—	—	—	65 294-05962
599-05963	5	250	—	—	—	—	—	42 294-05963
599-05964	6	400	—	—	—	—	—	29 294-05964
Normally Closed								
			Close-off psi – Bronze Trim					
599-05990	2-1/2	63	34 276-05990	97 289-05990	—	34 274-05990	97 291-05990	—
599-05991	3	100	22 276-05991	63 289-05991	—	22 274-05991	63 291-05991	—
599-05992	4	160	—	—	39 292-05992	—	—	39 294-05992
599-05993	5	250	—	—	25 292-05993	—	—	25 294-05993
599-05994	6	400	—	—	17 292-05994	—	—	17 294-05994
			Close-off psi – Stainless Steel Trim					
599-05970	2-1/2	63	—	—	—	34 274-05970	97 291-05970	—
599-05971	3	100	—	—	—	22 274-05971	63 291-05971	—
599-05972	4	160	—	—	—	—	—	39 294-05972
599-05973	5	250	—	—	—	—	—	25 294-05973
599-05974	6	400	—	—	—	—	—	17 294-05974

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 125
Electro-Hydraulic Non-Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Bronze and Stainless Steel Trim

NO/NC Equal Percentage *Flanged 2-1/2 to 6"*			Non-Spring Return Actuator		
			Floating 3P	Floating 3P	0-10 Vdc 4-20 mA
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 SKD82.50U	 SKC82.60U	 SKD60U
Normally Open					
			Close-off psi – Bronze Trim		
599-05980	2-1/2	63	38 275-05980	—	38 267-05980
599-05981	3	100	25 275-05981	—	25 267-05981
599-05982	4	160	—	65 293-05982	—
599-05983	5	250	—	42 293-05983	—
599-05984	6	400	—	29 293-05984	—
			Close-off psi – Stainless Steel Trim		
599-05960	2-1/2	63	—	—	38 267-05960
599-05961	3	100	—	—	25 267-05961
Normally Closed					
			Close-off psi – Bronze Trim		
599-05990	2-1/2	63	34 275-05990	—	34 267-05990
599-05991	3	100	22 275-05991	—	22 267-05991
599-05992	4	160	—	39 293-05992	—
599-05993	5	250	—	25 293-05993	—
599-05994	6	400	—	17 293-05994	—
			Close-off psi – Stainless Steel Trim		
599-05970	2-1/2	63	—	—	34 267-05970
599-05971	3	100	—	—	22 267-05971

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 125
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Linear
- Stainless Steel Trim

NO/NC Linear ⋈
Flanged 2-1/2 to 6"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator: 8" 20 mm Stroke	8" High-Temp. 20 mm Stroke	12" 20 mm Stroke	12" 40 mm Stroke	8" w/ Positioner 20 mm Stroke	8" High-Temp. w/ Positioner 20 mm Stroke	12" w/ Positioner 20 mm Stroke	12" w/ Positioner 40 mm Stroke
			 599-01050	 599-01051	 599-01010	 599-01000	 599-01050 + 599-00426	 599-01051 + 599-00426	 599-01010 + 599-00423	 599-01000 + 599-00423
Normally Open										
			Close-off psi – Standard-temperature Range 20º F to 250º F (-7º C to 120º C)							
599-06060	2-1/2	63	31 277-06060	—	95 279-06060	—	31 283-06060	—	95 285-06060	—
599-06061	3	100	20 277-06061	—	63 279-06061	—	20 283-06061	—	63 285-06061	—
599-06062	4	160	—	—	—	40 281-06062	—	—	—	40 287-06062
599-06063	5	250	—	—	—	26 281-06063	—	—	—	26 287-06063
599-06064	6	400	—	—	—	18 281-06064	—	—	—	18 287-06064
			Close-off psi – High-temperature Range is 337º F max. (170º C)							
599-06040	2-1/2	63	31 277-06040	31 278-06040	95 279-06040	—	31 283-06040	31 284-06040	95 285-06040	—
599-06041	3	100	20 277-06041	20 278-06041	63 279-06041	—	20 283-06041	20 284-06041	63 285-06041	—
599-06042	4	160	—	—	—	40 281-06042	—	—	—	40 287-06042
599-06043	5	250	—	—	—	26 281-06043	—	—	—	26 287-06043
599-06044	6	400	—	—	—	18 281-06044	—	—	—	18 287-06044
Normally Closed										
			Close-off psi – Standard-temperature Range 20º F to 250º F (-7º C to 120º C)							
599-06070	2-1/2	63	36 277-06070	—	114 279-06070	—	36 283-06070	—	114 285-06070	—
599-06071	3	100	23 277-06071	—	74 279-06071	—	23 283-06071	—	74 285-06071	—
599-06072	4	160	—	—	—	46 281-06072	—	—	—	46 287-06072
599-06073	5	250	—	—	—	29 281-06073	—	—	—	29 287-06073
599-06074	6	400	—	—	—	20 281-06074	—	—	—	20 287-06074
			Close-off psi – High-temperature Range is 337º F max. (170º C)							
599-06050	2-1/2	63	36 277-06050	36 278-06050	114 279-06050	—	36 283-06050	36 284-06050	114 285-06050	—
599-06051	3	100	23 277-06051	23 278-06051	74 279-06051	—	23 283-06051	23 284-06051	74 285-06051	—
599-06052	4	160	—	—	—	46 281-06052	—	—	—	46 287-06052
599-06053	5	250	—	—	—	29 281-06053	—	—	—	29 287-06053
599-06054	6	400	—	—	—	20 281-06054	—	—	—	20 287-06054

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 125
Electro-Hydraulic Spring Return or Non-Spring Return Actuators

- Normally Open or Normally Closed
- Linear
- Stainless Steel Trim

NO/NC Linear *Flanged 2-1/2 to 6"*			Spring Return Actuator						Non-Spring Return Actuator	
			0-10 Vdc 4-20 mA		0-10 Vdc 4-20 mA		0-10 Vdc 4-20 mA		0-10 Vdc 4-20 mA	
2-Way Valve Body Part No.	**Valve Size in.**	**Flow Rate Cv**	 SKD62U		 SKB62U		 SKC62U		 SKD60U	
Normally Open										
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)							
599-06060	2-1/2	63	38	274-06060	153	291-06060	—		38	267-06060
599-06061	3	100	25	274-06061	101	291-06061	—		25	267-06061
599-06062	4	160	—		—		65	294-06062	—	
599-06063	5	250	—		—		42	294-06063	—	
599-06064	6	400	—		—		29	294-06064	—	
			Close-off psi – High-temperature Range is 337° F max. (170° C)							
599-06040	2-1/2	63	38	274-06040	153	291-06040	—		38	267-06040
599-06041	3	100	25	274-06041	101	291-06041	—		25	267-06041
599-06042	4	160	—		—		65	294-06042	—	
599-06043	5	250	—		—		42	294-06043	—	
599-06044	6	400	—		—		29	294-06044	—	
Normally Closed										
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)							
599-06070	2-1/2	63	34	274-06070	97	291-06070	—		34	267-06070
599-06071	3	100	22	274-06071	63	291-06071	—		22	267-06071
599-06072	4	160	—		—		39	294-06072	—	
599-06073	5	250	—		—		25	294-06073	—	
599-06074	6	400	—		—		17	294-06074	—	
			Close-off psi – High-temperature Range is 337° F max. (170° C)							
599-06050	2-1/2	63	34	274-06050	97	291-06050	—		34	267-06050
599-06051	3	100	22	274-06051	63	291-06051	—		22	267-06051
599-06052	4	160	—		—		39	294-06052	—	
599-06053	5	250	—		—		25	294-06053	—	
599-06054	6	400	—		—		17	294-06054	—	

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Three-Way Flanged Globe Valve Assemblies

ANSI Class 125
Pneumatic Spring Return Actuators

- Bronze and Stainless Steel Trim

Mixing
Flanged 2-1/2 to 6"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator: 8" 20 mm Stroke	12" 20 mm Stroke	12" 40 mm Stroke	8" w/ Positioner 20 mm Stroke	12" w/ Positioner 20 mm Stroke	12" w/ Positioner 40 mm Stroke
			599-01050	599-01010	599-01000	599-01050 + 599-00426	599-01010 + 599-00423	599-01000 + 599-00423
			Close-off psi – Bronze					
599-06160	2-1/2	63	36 277-06160	114 279-06160	—	36 283-06160	114 285-06160	—
599-06161	3	100	23 277-06161	74 279-06161	—	23 283-06161	74 285-06161	—
599-06162	4	160	—	—	46 281-06162	—	—	46 287-06162
599-06163	5	250	—	—	29 281-06163	—	—	29 287-06163
599-06164	6	400	—	—	20 281-06164	—	—	20 287-06164
			Close-off psi – Stainless Steel Trim					
599-06165	2-1/2	63	36 277-06165	114 279-06165	—	36 283-06165	114 285-06165	—
599-06166	3	100	23 277-06166	74 279-06166	—	23 283-06166	74 285-06166	—
599-06167	4	160	—	—	46 281-06167	—	—	46 287-06167
599-06168	5	250	—	—	29 281-06168	—	—	29 287-06168
599-06169	6	400	—	—	20 281-06169	—	—	20 287-06169

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard **PLUS 3** Warranty

Three-Way Flanged Globe Valve Assemblies

ANSI Class 125
Electro-Hydraulic Spring Return or Non-Spring Return Actuators

- Mixing
- Bronze and Stainless Steel Trim

Mixing
Flanged 2-1/2 to 6"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator: Floating 3P — SKD82.51U	Floating 3P — SKB82.51U	Floating 3P — SKC82.61U	0-10 Vdc 4-20 mA — SKD62U	0-10 Vdc 4-20 mA — SKB62U	0-10 Vdc 4-20 mA — SKC62U
			Close-off psi – Bronze Trim					
599-06160	2-1/2	63	34 276-06160	97 289-06160	—	34 274-06160	97 291-06160	—
599-06161	3	100	22 276-06161	63 289-06161	—	22 274-06161	63 291-06161	—
599-06162	4	160	—	—	39 292-06162	—	—	39 294-06162
599-06163	5	250	—	—	25 292-06163	—	—	25 294-06163
599-06164	6	400	—	—	17 292-06164	—	—	17 294-06164
			Close-off psi – Stainless Steel Trim					
599-06165	2-1/2	63	—	—	—	34 274-06165	97 291-06165	—
599-06166	3	100	—	—	—	22 274-06166	63 291-06166	—
599-06167	4	160	—	—	—	—	—	39 294-06167
599-06168	5	250	—	—	—	—	—	25 294-06168
599-06169	6	400	—	—	—	—	—	17 294-06169

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values are for the NC upper port. For NO lower port values, refer to Engineering Section G.

Siemens Product Guard **PLUS 3** Warranty

Mixing
Flanged 2-1/2 to 6"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Non-Spring Return Actuator: Floating 3P — SKD82.50U	Floating 3P — SKC82.60U	0-10 Vdc 4-20 mA — SKD60U
			Close-off psi – Bronze Trim		
599-06160	2-1/2	63	34 275-06160	—	34 267-06160
599-06161	3	100	22 275-06161	—	22 267-06161
599-06162	4	160	—	39 293-06162	—
599-06163	5	250	—	25 293-06163	—
599-06164	6	400	—	17 293-06164	—
			Close-off psi – Stainless Steel Trim		
599-06165	2-1/2	63	—	—	34 267-06165
599-06166	3	100	—	—	22 267-06166

Table Notes:
Part numbers in red indicate complete assemblies.
Black numbers indicate close-off psi.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe
High Pressure Close-off Valve Assemblies

ANSI Class 125
Pneumatic and Electro-Hydraulic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Stainless Steel Trim
- Pressure Balanced Plug
- 200 psi Close-off

NO/NC Equal Percentage *Flanged 2-1/2 to 6"*				Spring Return Actuator			
				8" w/ Positioner 20 mm Stroke	12" w/ Positioner 40 mm Stroke	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	 599-01050 + 599-00426	 599-01000 + 599-00423	 SKD62U	 SKC62U
Normally Open							
				Stainless Steel Trim			
 599-06610	2-1/2	63	200	283-06610	—	274-06610	—
599-06611	3	100	200	283-06611	—	274-06611	—
599-06612	4	160	200	—	287-06612	—	294-06612
599-06613	5	250	200	—	287-06613	—	294-06613
599-06614	6	400	200	—	287-06614	—	294-06614
Normally Closed							
				Stainless Steel Trim			
 599-06615	2-1/2	63	200	283-06615	—	274-06615	—
599-06616	3	100	200	283-06616	—	274-06616	—
599-06617	4	160	200	—	287-06617	—	294-06617
599-06618	5	250	200	—	287-06618	—	294-06618
599-06619	6	400	200	—	287-06619	—	294-06619

Table Notes:
Part numbers in red indicate complete assemblies.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe
High Pressure Close-off Valve Assemblies

ANSI Class 250
Pneumatic and Electro-Hydraulic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Stainless Steel Trim
- Pressure Balanced Plug
- 200 psi Close-off

NO/NC Equal Percentage *Flanged 2-1/2 to 6"* ⋈				**Spring Return Actuator**			
				8" w/ Positioner 20 mm Stroke	**12" w/ Positioner 40 mm Stroke**	**0-10 Vdc 4-20 mA**	**0-10 Vdc 4-20 mA**
2-Way Valve Body Part No.	**Valve Size in.**	**Flow Rate Cv**	**Close Off psi**	 599-01050 + 599-00426	 599-01000 + 599-00423	 SKD62U	 SKC62U
Normally Open							
				Stainless Steel Trim			
 **599-06620**	2-1/2	63	200	283-06620	—	274-06620	—
599-06621	3	100	200	283-06621	—	274-06621	—
599-06622	4	160	200	—	287-06622	—	294-06622
599-06623	5	250	200	—	287-06623	—	294-06623
599-06624	6	400	200	—	287-06624	—	294-06624
Normally Closed							
				Stainless Steel Trim			
 **599-06625**	2-1/2	63	200	283-06625	—	274-06625	—
599-06626	3	100	200	283-06626	—	274-06626	—
599-06627	4	160	200	—	287-06627	—	294-06627
599-06628	5	250	200	—	287-06628	—	294-06628
599-06629	6	400	200	—	287-06629	—	294-06629

Table Notes:
Part numbers in red indicate complete assemblies.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 250
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Bronze and Stainless Steel Trim

NO/NC Equal Percentage *Flanged 2-1/2 to 6"*			Spring Return Actuator					
			8" 20 mm Stroke	12" 20 mm Stroke	12" 40 mm Stroke	8" w/ Positioner 20 mm Stroke	12" w/ Positioner 20 mm Stroke	12" w/ Positioner 40 mm Stroke
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	599-01050	599-01010	599-01000	599-01050 + 599-00426	599-01010 + 599-00423	599-01000 + 599-00423
Normally Open								
			Close-off psi – Bronze Trim					
599-05940	2-1/2	63	31 277-05940	95 279-05940	—	31 283-05940	95 285-05940	—
599-05941	3	100	20 277-05941	63 279-05941	—	20 283-05941	63 285-05941	—
599-05942	4	160	—	—	40 281-05942	—	—	40 287-05942
599-05943	5	250	—	—	26 281-05943	—	—	26 287-05943
599-05944	6	400	—	—	18 281-05944	—	—	18 287-05944
			Close-off psi – Stainless Steel Trim					
599-05920	2-1/2	63	31 277-05920	95 279-05920	—	31 283-05920	95 285-05920	—
599-05921	3	100	20 277-05921	63 279-05921	—	20 283-05921	63 285-05921	—
599-05922	4	160	—	—	40 281-05922	—	—	40 287-05922
599-05923	5	250	—	—	26 281-05923	—	—	26 287-05923
599-05924	6	400	—	—	18 281-05924	—	—	18 287-05924
Normally Closed								
			Close-off psi – Bronze Trim					
599-05950	2-1/2	63	36 277-05950	114 279-05950	—	36 283-05950	114 285-05950	—
599-05951	3	100	23 277-05951	74 279-05951	—	23 283-05951	74 285-05951	—
599-05952	4	160	—	—	46 281-05952	—	—	46 287-05952
599-05953	5	250	—	—	29 281-05953	—	—	29 287-05953
599-05954	6	400	—	—	20 281-05954	—	—	20 287-05954
			Close-off psi – Stainless Steel Trim					
599-05930	2-1/2	63	36 277-05930	114 279-05930	—	36 283-05930	114 285-05930	—
599-05931	3	100	23 277-05931	74 279-05931	—	23 283-05931	74 285-05931	—
599-05932	4	160	—	—	46 281-05932	—	—	46 287-05932
599-05933	5	250	—	—	29 281-05933	—	—	29 287-05933
599-05934	6	400	—	—	20 281-05934	—	—	20 287-05934

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 250
Electro-Hydraulic Spring Return or Non-Spring Return Actuators

- Normally Open or Normally Closed
- Equal Percentage
- Bronze and Stainless Steel Trim

NO/NC Equal Percentage *Flanged 2-1/2 to 6"*			Spring Return Actuator			Non-Spring Return Actuator
			0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 SKD62U	 SKB62U	 SKC62U	 SKD60U
Normally Open						
			Close-off psi – Bronze Trim			
599-05940	2-1/2	63	38 274-05940	153 291-05940	—	38 267-05940
599-05941	3	100	25 274-05941	101 291-05941	—	25 267-05941
599-05942	4	160	—	—	65 294-05942	—
599-05943	5	250	—	—	42 294-05943	—
599-05944	6	400	—	—	29 294-05944	—
			Close-off psi – Stainless Steel Trim			
599-05920	2-1/2	63	38 274-05920	153 291-05920	—	—
599-05921	3	100	25 274-05921	101 291-05921	—	—
599-05922	4	160	—	—	65 294-05922	—
599-05923	5	250	—	—	42 294-05923	—
599-05924	6	400	—	—	29 294-05924	—
Normally Closed						
			Close-off psi – Bronze Trim			
599-05950	2-1/2	63	34 274-05950	97 291-05950	—	34 267-05950
599-05951	3	100	22 274-05951	63 291-05951	—	22 267-05951
599-05952	4	160	—	—	39 294-05952	—
599-05953	5	250	—	—	25 294-05953	—
599-05954	6	400	—	—	17 294-05954	—
			Close-off psi – Stainless Steel Trim			
599-05930	2-1/2	63	34 274-05930	97 291-05930	—	—
599-05931	3	100	22 274-05931	63 291-05931	—	—
599-05932	4	160	—	—	39 294-05932	—
599-05933	5	250	—	—	25 294-05933	—
599-05934	6	400	—	—	17 294-05934	—

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 250
Pneumatic Spring Return Actuators

- Normally Open or Normally Closed
- Linear
- Stainless Steel Trim

NO/NC Linear ⋈
Flanged 2-1/2 to 6"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Spring Return Actuator: 8" 20 mm Stroke — 599-01050	12" 20 mm Stroke — 599-01010	12" 40 mm Stroke — 599-01000	8" w/ Positioner 20 mm Stroke — 599-01050 + 599-00426	8" High-Temp. w/ Positioner 20 mm Stroke — 599-01051 + 599-00426	12" w/ Positioner 20 mm Stroke — 599-01010 + 599-00423	12" w/ Positioner 40 mm Stroke — 599-01000 + 599-00423
Normally Open									
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)						
599-06140	2-1/2	63	31 277-06140	95 279-06140	—	31 283-06140	—	95 285-06140	—
599-06141	3	100	20 277-06141	63 279-06141	—	20 283-06141	—	63 285-06141	—
599-06142	4	160	—	—	40 281-06142	—	—	—	40 287-06142
599-06143	5	250	—	—	26 281-06143	—	—	—	26 287-06143
599-06144	6	400	—	—	18 281-06144	—	—	—	18 287-06144
			Close-off psi – High-temperature Range is 337° F max. (170° C)						
599-06120	2-1/2	63	31 277-06120	95 279-06120	—	31 283-06120	31 284-06120	95 285-06120	—
599-06121	3	100	20 277-06121	63 279-06121	—	20 283-06121	20 284-06121	63 285-06121	—
599-06122	4	160	—	—	40 281-06122	—	—	—	40 287-06122
599-06123	5	250	—	—	26 281-06123	—	—	—	26 287-06123
599-06124	6	400	—	—	18 281-06124	—	—	—	18 287-06124
Normally Closed									
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)						
599-06150	2-1/2	63	36 277-06150	114 279-06150	—	36 283-06150	—	114 285-06150	—
599-06151	3	100	23 277-06151	74 279-06151	—	23 283-06151	—	74 285-06151	—
599-06152	4	160	—	—	46 281-06152	—	—	—	46 287-06152
599-06153	5	250	—	—	29 281-06153	—	—	—	29 287-06153
599-06154	6	400	—	—	20 281-06154	—	—	—	20 287-06154
			Close-off psi – High-temperature Range is 337° F max. (170° C)						
599-06130	2-1/2	63	36 277-06130	114 279-06130	—	36 283-06130	36 284-06130	114 285-06130	—
599-06131	3	100	23 277-06131	74 279-06131	—	23 283-06131	23 284-06131	74 285-06131	—
599-06132	4	160	—	—	46 281-06132	—	—	—	46 287-06132
599-06133	5	250	—	—	29 281-06133	—	—	—	29 287-06133
599-06134	6	400	—	—	20 281-06134	—	—	—	20 287-06134

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off values are for 15 psi signal for Normally Open and 0 psi signal for Normally Closed.
Close-off values for Normally Open valves with positioner may be substantially higher based on line supply pressure.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Flanged Globe Valve Assemblies

ANSI Class 250
Electro-Hydraulic Spring Return Actuators

- Normally Open or Normally Closed
- Linear
- Stainless Steel Trim

NO/NC Linear *Flanged 2-1/2 to 6"*			Spring Return Actuator					
			0-10 Vdc 4-20 mA		0-10 Vdc 4-20 mA		0-10 Vdc 4-20 mA	
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	SKD62U		SKB62U		SKC62U	
Normally Open								
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)					
599-06140	2-1/2	63	38	274-06140	153	291-06140	—	
599-06141	3	100	25	274-06141	101	291-06141	—	
599-06142	4	160	—		—		65	294-06142
599-06143	5	250	—		—		42	294-06143
599-06144	6	400	—		—		29	294-06144
			Close-off psi – High-temperature Range is 337° F max. (170° C)					
599-06120	2-1/2	63	38	274-06120	153	291-06120	—	
599-06121	3	100	25	274-06121	101	291-06121	—	
599-06122	4	160	—		—		65	294-06122
599-06123	5	250	—		—		42	294-06123
599-06124	6	400	—		—		29	294-06124
Normally Closed								
			Close-off psi – Standard-temperature Range 20° F to 250° F (-7° C to 120° C)					
599-06150	2-1/2	63	34	274-06150	97	291-06150	—	
599-06151	3	100	22	274-06151	63	291-06151	—	
599-06152	4	160	—		—		39	294-06152
599-06153	5	250	—		—		25	294-06153
599-06154	6	400	—		—		17	294-06154
			Close-off psi – High-temperature Range is 337° F max. (170° C)					
599-06130	2-1/2	63	34	274-06130	97	291-06130	—	
599-06131	3	100	22	274-06131	63	291-06131	—	
599-06132	4	160	—		—		39	294-06132
599-06133	5	250	—		—		25	294-06133
599-06134	6	400	—		—		17	294-06134

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.

Siemens Product Guard PLUS 3 Warranty

Three-Way Flanged Globe Valve Assemblies

ANSI Class 250
Pneumatic Spring Return Actuators

- Mixing
- Bronze and Stainless Steel Trim

Mixing *Flanged 2-1/2 to 6"*			Spring Return Actuator					
			8" 20 mm Stroke	12" 20 mm Stroke	12" 40 mm Stroke	8" w/ Positioner 20 mm Stroke	12" w/ Positioner 20 mm Stroke	12" w/ Positioner 40 mm Stroke
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 599-01050	 599-01010	 599-01000	 599-01050 + 599-00426	 599-01010 + 599-00423	 599-01000 + 599-00423
			Close-off psi – Bronze Trim					
599-06170	2-1/2	63	36 277-06170	114 279-06170	—	36 283-06170	114 285-06170	—
599-06171	3	100	23 277-06171	74 279-06171	—	23 283-06171	74 285-06171	—
599-06172	4	160	—	—	46 281-06172	—	—	46 287-06172
599-06173	5	250	—	—	29 281-06173	—	—	29 287-06173
599-06174	6	400	—	—	20 281-06174	—	—	20 287-06174
			Close-off psi – Stainless Steel Trim					
599-06175	2-1/2	63	36 277-06175	114 279-06175	—	36 283-06175	114 285-06175	—
599-06176	3	100	23 277-06176	74 279-06176	—	23 283-06176	74 285-06176	—
599-06177	4	160	—	—	46 281-06177	—	—	46 287-06177
599-06178	5	250	—	—	29 281-06178	—	—	29 287-06178
599-06179	6	400	—	—	20 281-06179	—	—	20 287-06179

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Close-off valves are for 15 psi signal to NO and 0 psi NC.
Close-off valves for NO valves with positioner may be substantially higher based on line supply pressure.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Three-Way Flanged Globe Valve Assemblies

ANSI Class 250
Electro-Hydraulic Spring Return or Non-Spring Return Actuators

- Mixing
- Bronze and Stainless Steel Trim

Mixing *Flanged 2-1/2 to 6"*			Spring Return Actuator			Non-Spring Return Actuator
			0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA	0-10 Vdc 4-20 mA
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	 SKD62U	 SKB62U	 SKC62U	 SKD60U
			Close-off psi – Bronze Trim			
599-06170	2-1/2	63	34 274-06170	97 291-06170	—	34 267-06170
599-06171	3	100	22 274-06171	63 291-06171	—	22 267-06171
599-06172	4	160	—	—	39 294-06172	—
599-06173	5	250	—	—	25 294-06173	—
599-06174	6	400	—	—	17 294-06174	—
			Close-off psi – Stainless Steel Trim			
599-06175	2-1/2	63	34 274-06175	97 291-06175	—	—
599-06176	3	100	22 274-06176	63 291-06176	—	—
599-06177	4	160	—	—	39 294-06177	—
599-06178	5	250	—	—	25 294-06178	—
599-06179	6	400	—	—	17 294-06179	—

Table Notes:
Part numbers in red indicate complete assemblies. **Black numbers** indicate close-off psi.
Values are for the NC upper port. For NO lower port values, refer to Engineering, Section G.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Ball Valve Assemblies

NEW!

Electronic Spring Return Actuators

- Normally Open
- GQD Damper Actuator Series
- Low profile bracket
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem or stainless steel ball and stem

NO
1/2 to 3/4"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Spring Return Actuator – Normally Open: 2P GQD121.1P	2P w/ Dual Aux. Switches GQD126.1P	2P, 120 V GQD221.1U	Floating GQD131.1P	2-10 Vdc GQD151.1P
				Chrome-Plated Brass Ball and Brass Stem				
599-10300	1/2	0.4	200	171H-10300	—	—	171J-10300	171K-10300
599-10301		0.63	200	171H-10301	—	—	171J-10301	171K-10301
599-10302		1.0	200	171H-10302	—	—	171J-10302	171K-10302
599-10303		1.6	200	171H-10303	—	—	171J-10303	171K-10303
599-10304		2.5	200	171H-10304	—	—	171J-10304	171K-10304
599-10305		4.0	200	171H-10305	—	—	171J-10305	171K-10305
599-10306		6.3	200	171H-10306	—	—	171J-10306	171K-10306
599-10307*		10	200	171H-10307*	—	171L-10307*	171J-10307*	171K-10307*
599-10308	3/4	6.3	200	171H-10308	—	—	171J-10308	171K-10308
599-10309		10	200	171H-10309	—	—	171J-10309	171K-10309
599-10310		16	200	171H-10310	—	—	171J-10310	171K-10310
599-10311*		25	200	171H-10311*	—	171L-10311*	171J-10311*	171K-10311*
				Stainless Steel Ball and Stem				
599-10300S	1/2	0.4	200	171H-10300S	—	—	171J-10300S	171K-10300S
599-10301S		0.63	200	171H-10301S	—	—	171J-10301S	171K-10301S
599-10302S		1.0	200	171H-10302S	—	—	171J-10302S	171K-10302S
599-10303S		1.6	200	171H-10303S	—	—	171J-10303S	171K-10303S
599-10304S		2.5	200	171H-10304S	—	—	171J-10304S	171K-10304S
599-10305S		4.0	200	171H-10305S	—	—	171J-10305S	171K-10305S
599-10306S		6.3	200	171H-10306S	—	—	171J-10306S	171K-10306S
599-10307S*		10	200	171H-10307S*	171N-10307S*	171L-10307S*	171J-10307S*	171K-10307S*
599-10308S	3/4	6.3	200	171H-10308S	—	—	171J-10308S	171K-10308S
599-10309S		10	200	171H-10309S	—	—	171J-10309S	171K-10309S
599-10310S		16	200	171H-10310S	—	—	171J-10310S	171K-10310S
599-10311S*		25	200	171H-10311S*	171N-10311S*	171L-10311S*	171J-10311S*	171K-10311S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard PLUS 3 Warranty

Two-Way Ball Valve Assemblies

Electronic Spring Return Actuators

- Normally Open
- GMA Damper Actuator Series
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem or stainless steel ball and stem

NO
1 to 2"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Spring Return Actuator – Normally Open: 2P GMA121.1P	2P w/ Dual Aux. Switches GMA126.1P	2P, 120 V GMA221.1U	0-10 Vdc GMA161.1P
Chrome-Plated Brass Ball and Brass Stem							
599-10312	1	10	200	171E-10312	—	—	171G-10312
599-10313		16	200	171E-10313	—	—	171G-10313
599-10314		25	200	171E-10314	—	—	171G-10314
599-10315		40	200	171E-10315	—	—	171G-10315
599-10316*		63	200	171E-10316*	—	171M-10316*	171G-10316*
599-10317	1-1/4	16	200	171E-10317	—	—	171G-10317
599-10318		25	200	171E-10318	—	—	171G-10318
599-10319		40	200	171E-10319	—	—	171G-10319
599-10320		63	200	171E-10320	—	—	171G-10320
599-10321*		100	200	171E-10321*	—	171M-10321*	171G-10321*
599-10322	1-1/2	25	200	171E-10322	—	—	171G-10322
599-10323		40	200	171E-10323	—	—	171G-10323
599-10324		63	200	171E-10324	—	—	171G-10324
599-10325		100	200	171E-10325	—	—	171G-10325
599-10326*		160	200	171E-10326*	—	171M-10326*	171G-10326*
599-10327	2	40	200	171E-10327	—	—	171G-10327
599-10328		63	200	171E-10328	—	—	171G-10328
599-10329*		100	200	171E-10329*	—	—	171G-10329*
599-10330*		160	200	171E-10330*	—	171M-10330*	171G-10330*
Stainless Steel Ball and Stem							
599-10312S	1	10	200	171E-10312S	—	—	171G-10312S
599-10313S		16	200	171E-10313S	—	—	171G-10313S
599-10314S		25	200	171E-10314S	—	—	171G-10314S
599-10315S		40	200	171E-10315S	—	—	171G-10315S
599-10316S*		63	200	171E-10316S*	171P-10316S*	171M-10316S*	171G-10316S*
599-10317S	1-1/4	16	200	171E-10317S	—	—	171G-10317S
599-10318S		25	200	171E-10318S	—	—	171G-10318S
599-10319S		40	200	171E-10319S	—	—	171G-10319S
599-10320S		63	200	171E-10320S	—	—	171G-10320S
599-10321S*		100	200	171E-10321S*	171P-10321S*	171M-10321S*	171G-10321S*
599-10322S	1-1/2	25	200	171E-10322S	—	—	171G-10322S
599-10323S		40	200	171E-10323S	—	—	171G-10323S
599-10324S*		63	200	171E-10324S*	—	—	171G-10324S*
599-10325S		100	200	171E-10325S	—	—	171G-10325S
599-10326S*		160	200	171E-10326S*	171P-10326S*	171M-10326S*	171G-10326S*
599-10327S	2	40	200	171E-10327S	—	—	171G-10327S
599-10328S		63	200	171E-10328S	—	—	171G-10328S
599-10329S*		100	200	171E-10329S*	—	—	171G-10329S*
599-10330S*		160	200	171E-10330S*	171P-10330S*	171M-10330S*	171G-10330S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard PLUS 3 Warranty

Two-Way Ball Valve Assemblies

NEW!

Electronic Spring Return Actuators

- Normally Closed
- GQD Damper Actuator Series
- Low profile bracket
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem or stainless steel ball and stem

NC
1/2 to 3/4"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Spring Return Actuator, Normally Closed: 2P GQD121.1P	2P w/ Dual Aux. Switches GQD126.1P	2P, 120 V GQD221.1U	Floating GQD131.1P	2-10 Vdc GQD151.1P
Chrome-Plated Brass Ball and Brass Stem								
599-10300	1/2	0.4	200	172H-10300	—	—	172J-10300	172K-10300
599-10301		0.63	200	172H-10301	—	—	172J-10301	172K-10301
599-10302		1.0	200	172H-10302	—	—	172J-10302	172K-10302
599-10303		1.6	200	172H-10303	—	—	172J-10303	172K-10303
599-10304		2.5	200	172H-10304	—	—	172J-10304	172K-10304
599-10305		4.0	200	172H-10305	—	—	172J-10305	172K-10305
599-10306		6.3	200	172H-10306	—	—	172J-10306	172K-10306
599-10307*		10	200	172H-10307*	—	172L-10307*	172J-10307*	172K-10307*
599-10308	3/4	6.3	200	172H-10308	—	—	172J-10308	172K-10308
599-10309		10	200	172H-10309	—	—	172J-10309	172K-10309
599-10310		16	200	172H-10310	—	—	172J-10310	172K-10310
599-10311*		25	200	172H-10311*	—	172L-10311*	172J-10311*	172K-10311*
Stainless Steel Ball and Stem								
599-10300S	1/2	0.4	200	172H-10300S	—	—	172J-10300S	172K-10300S
599-10301S		0.63	200	172H-10301S	—	—	172J-10301S	172K-10301S
599-10302S		1.0	200	172H-10302S	—	—	172J-10302S	172K-10302S
599-10303S		1.6	200	172H-10303S	—	—	172J-10303S	172K-10303S
599-10304S		2.5	200	172H-10304S	—	—	172J-10304S	172K-10304S
599-10305S		4.0	200	172H-10305S	—	—	172J-10305S	172K-10305S
599-10306S		6.3	200	172H-10306S	—	—	172J-10306S	172K-10306S
599-10307S*		10	200	172H-10307S*	172N-10307S*	172L-10307S*	172J-10307S*	172K-10307S*
599-10308S	3/4	6.3	200	172H-10308S	—	—	172J-10308S	172K-10308S
599-10309S		10	200	172H-10309S	—	—	172J-10309S	172K-10309S
599-10310S		16	200	172H-10310S	—	—	172J-10310S	172K-10310S
599-10311S*		25	200	172H-10311S*	172N-10311S*	172L-10311S*	172J-10311S*	172K-10311S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard PLUS 3 Warranty

Two-Way Ball Valve Assemblies

Electronic Spring Return Actuators

- Normally Closed
- GMA Damper Actuator Series
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem or stainless steel ball and stem

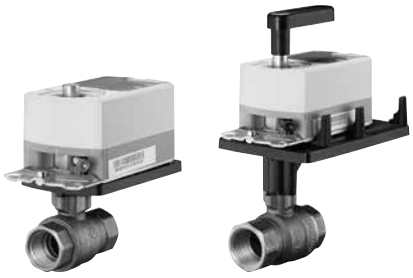
NC *1 to 2"*				Spring Return Actuator			
				Normally Closed			
				2P	2P w/ Dual Aux. Switches	2P, 120 V	0-10 Vdc
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	 GMA121.1P	 GMA126.1P	 GMA221.1U	 GMA161.1P
				Chrome-Plated Brass Ball and Brass Stem			
599-10312	1	10	200	172E-10312	—	—	172G-10312
599-10313		16	200	172E-10313	—	—	172G-10313
599-10314		25	200	172E-10314	—	—	172G-10314
599-10315		40	200	172E-10315	—	—	172G-10315
599-10316*		63	200	172E-10316*	—	172M-10316*	172G-10316*
599-10317	1-1/4	16	200	172E-10317	—	—	172G-10317
599-10318		25	200	172E-10318	—	—	172G-10318
599-10319		40	200	172E-10319	—	—	172G-10319
599-10320		63	200	172E-10320	—	—	172G-10320
599-10321*		100	200	172E-10321*	—	172M-10321*	172G-10321*
599-10322	1-1/2	25	200	172E-10322	—	—	172G-10322
599-10323		40	200	172E-10323	—	—	172G-10323
599-10324		63	200	172E-10324	—	—	172G-10324
599-10325		100	200	172E-10325	—	—	172G-10325
599-10326*		160	200	172E-10326*	—	172M-10326*	172G-10326*
599-10327	2	40	200	172E-10327	—	—	172G-10327
599-10328		63	200	172E-10328	—	—	172G-10328
599-10329*		100	200	172E-10329*	—	—	172G-10329*
599-10330*		160	200	172E-10330*	—	172M-10330*	172G-10330*
				Stainless Steel Ball and Stem			
599-10312S	1	10	200	172E-10312S	—	—	172G-10312S
599-10313S		16	200	172E-10313S	—	—	172G-10313S
599-10314S		25	200	172E-10314S	—	—	172G-10314S
599-10315S		40	200	172E-10315S	—	—	172G-10315S
599-10316S*		63	200	172E-10316S*	172P-10316S*	172M-10316S*	172G-10316S*
599-10317S	1-1/4	16	200	172E-10317S	—	—	172G-10317S
599-10318S		25	200	172E-10318S	—	—	172G-10318S
599-10319S		40	200	172E-10319S	—	—	172G-10319S
599-10320S		63	200	172E-10320S	—	—	172G-10320S
599-10321S*		100	200	172E-10321S*	172P-10321S*	172M-10321S*	172G-10321S*
599-10322S	1-1/2	25	200	172E-10322S	—	—	172G-10322S
599-10323S		40	200	172E-10323S	—	—	172G-10323S
599-10324S		63	200	172E-10324S	—	—	172G-10324S
599-10325S		100	200	172E-10325S	—	—	172G-10325S
599-10326S*		160	200	172E-10326S*	172P-10326S*	172M-10326S*	172G-10326S*
599-10327S	2	40	200	172E-10327S	—	—	172G-10327S
599-10328S		63	200	172E-10328S	—	—	172G-10328S
599-10329S*		100	200	172E-10329S*	—	—	172G-10329S*
599-10330S*		160	200	172E-10330S*	172P-10330S*	172M-10330S*	172G-10330S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Ball Valve Assemblies

Electronic Non-Spring Return Actuators



- Normally Open
- GDE Damper Actuator Series
- 1/2" and 3/4" valves feature low profile bracket
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated ball and brass stem

NO *1/2 to 1-1/4"* ⋈				Non-Spring Return Actuator	
				Normally Open	
				Floating	0-10 Vdc
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	 GDE131.1P 3-foot (.9m) Wires	 GDE161.1P 3-foot (.9m) Wires
				Chrome-Plated Brass Ball and Brass Stem	
NEW! 599-10300	1/2	0.4	200	171A-10300	171C-10300
599-10301		0.63	200	171A-10301	171C-10301
599-10302		1.0	200	171A-10302	171C-10302
599-10303		1.6	200	171A-10303	171C-10303
599-10304		2.5	200	171A-10304	171C-10304
599-10305		4.0	200	171A-10305	171C-10305
599-10306		6.3	200	171A-10306	171C-10306
599-10307*		10	200	171A-10307*	171C-10307*
599-10308	3/4	6.3	200	171A-10308	171C-10308
599-10309		10	200	171A-10309	171C-10309
599-10310		16	200	171A-10310	171C-10310
599-10311*		25	200	171A-10311*	171C-10311*
599-10312	1	10	200	171A-10312	171C-10312
599-10313		16	200	171A-10313	171C-10313
599-10314		25	200	171A-10314	171C-10314
599-10315		40	200	171A-10315	171C-10315
599-10316*		63	200	171A-10316*	171C-10316*
599-10317	1-1/4	16	200	171A-10317	171C-10317
599-10318		25	200	171A-10318	171C-10318
599-10319		40	200	171A-10319	171C-10319
599-10320		63	200	171A-10320	171C-10320
599-10321*		100	200	171A-10321*	171C-10321*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard PLUS 3 Warranty

Two-Way Ball Valve Assemblies

Electronic Non-Spring Return Actuators

- Normally Open
- GDE Damper Actuator Series
- 1/2" and 3/4" valves feature low profile bracket
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Stainless steel ball and stem

NO
1/2 to 1-1/4"

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Non-Spring Return Actuator – Normally Open – Floating: GDE131.1P 3-foot (.9m) Wires	Floating: GDE131.1Q Conduit Adapter & 6-foot (1.8m) Wires	0-10 Vdc: GDE161.1P 3-foot (.9m) Wires	0-10 Vdc: GDE161.1Q Conduit Adapter & 6-foot (1.8m) Wires
				Stainless Steel Ball and Stem			
NEW! 599-10300S	1/2	0.4	200	171A-10300S	173A-10300S	171C-10300S	173C-10300S
599-10301S		0.63	200	171A-10301S	173A-10301S	171C-10301S	173C-10301S
599-10302S		1.0	200	171A-10302S	173A-10302S	171C-10302S	173C-10302S
599-10303S		1.6	200	171A-10303S	173A-10303S	171C-10303S	173C-10303S
599-10304S		2.5	200	171A-10304S	173A-10304S	171C-10304S	173C-10304S
599-10305S		4.0	200	171A-10305S	173A-10305S	171C-10305S	173C-10305S
599-10306S		6.3	200	171A-10306S	173A-10306S	171C-10306S	173C-10306S
599-10307S*		10	200	171A-10307S*	173A-10307S*	171C-10307S*	173C-10307S*
599-10308S	3/4	6.3	200	171A-10308S	173A-10308S	171C-10308S	173C-10308S
599-10309S		10	200	171A-10309S	173A-10309S	171C-10309S	173C-10309S
599-10310S		16	200	171A-10310S	173A-10310S	171C-10310S	173C-10310S
599-10311S*		25	200	171A-10311S*	173A-10311S*	171C-10311S*	173C-10311S*
599-10312S	1	10	200	171A-10312S	173A-10312S	171C-10312S	173C-10312S
599-10313S		16	200	171A-10313S	173A-10313S	171C-10313S	173C-10313S
599-10314S		25	200	171A-10314S	173A-10314S	171C-10314S	173C-10314S
599-10315S		40	200	171A-10315S	173A-10315S	171C-10315S	173C-10315S
599-10316S*		63	200	171A-10316S*	173A-10316S*	171C-10316S*	173C-10316S*
599-10317S	1-1/4	16	200	171A-10317S	173A-10317S	171C-10317S	173C-10317S
599-10318S		25	200	171A-10318S	173A-10318S	171C-10318S	173C-10318S
599-10319S		40	200	171A-10319S	173A-10319S	171C-10319S	173C-10319S
599-10320S		63	200	171A-10320S	173A-10320S	171C-10320S	173C-10320S
599-10321S*		100	200	171A-10321S*	173A-10321S*	171C-10321S*	173C-10321S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard PLUS 3 Warranty

Two-Way Ball Valve Assemblies

Electronic Non-Spring Return Actuators

- GLB Damper Actuator Series
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem or stainless steel ball and stem

NO *1-1/2 to 2"* ⋈				Non-Spring Return Actuator	
				Normally Open	
				Floating	0-10 Vdc
2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	 GLB131.1P 3-foot (.9m) Wires	 GLB161.1P 3-foot (.9m) Wires
				Chrome-Plated Brass Ball and Brass Stem	
599-10322	1-1/2	25	200	171B-10322	171D-10322
599-10323		40	200	171B-10323	171D-10323
599-10324		63	200	171B-10324	171D-10324
599-10325		100	200	171B-10325	171D-10325
599-10326*		160	200	171B-10326*	171D-10326*
599-10327	2	40	200	171B-10327	171D-10327
599-10328		63	200	171B-10328	171D-10328
599-10329*		100	200	171B-10329*	171D-10329*
599-10330*		160	200	171B-10330*	171D-10330*
				Stainless Steel Ball and Stem	
599-10322S	1-1/2	25	200	171B-10322S	171D-10322S
599-10323S		40	200	171B-10323S	171D-10323S
599-10324S		63	200	171B-10324S	171D-10324S
599-10325S		100	200	171B-10325S	171D-10325S
599-10326S*		160	200	171B-10326S*	171D-10326S*
599-10327S	2	40	200	171B-10327S	171D-10327S
599-10328S		63	200	171B-10328S	171D-10328S
599-10329S*		100	200	171B-10329S*	171D-10329S*
599-10330S*		160	200	171B-10330S*	171D-10330S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.

Siemens Product Guard PLUS 3 Warranty

Three-Way Ball Valve Assemblies

Electronic Spring Return Actuators

- GMA Damper Actuator Series
- A → AB Normally Open
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem

Mixing/Diverting *1/2 to 2"*				Spring Return Actuator GMA Series	
				2P	0-10 Vdc
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	 GMA121.1P	 GMA161.1P
				Chrome-Plated Brass Ball and Brass Stem	
599-10350	1/2	0.4	200	171E-10350	171G-10350
599-10351		0.63	200	171E-10351	171G-10351
599-10352		1.0	200	171E-10352	171G-10352
599-10353		1.6	200	171E-10353	171G-10353
599-10354		2.5	200	171E-10354	171G-10354
599-10355		4	200	171E-10355	171G-10355
599-10356		6.3	200	171E-10356	171G-10356
599-10357*		10	200	171E-10357*	171G-10357*
599-10358	3/4	6.3	200	171E-10358	171G-10358
599-10359		10	200	171E-10359	171G-10359
599-10360*		16	200	171E-10360*	171G-10360*
599-10361	1	10	200	171E-10361	171G-10361
599-10362		16	200	171E-10362	171G-10362
599-10363*		25	200	171E-10363*	171G-10363*
599-10364	1-1/4	16	200	171E-10364	171G-10364
599-10365		25	200	171E-10365	171G-10365
599-10366*		40	200	171E-10366*	171G-10366*
599-10367	1-1/2	25	200	171E-10367	171G-10367
599-10368		40	200	171E-10368	171G-10368
599-10369*		63	200	171E-10369*	171G-10369*
599-10370	2	40	200	171E-10370	171G-10370
599-10371		63	200	171E-10371	171G-10371
599-10372*		100	200	171E-10372*	171G-10372*

Table Notes:

Part numbers in red indicate complete assemblies.

*Denotes a full-port valve with no flow optimizer insert.

NOTE: Maximum operating differential pressure = 60 psi for 1/2" to 1-1/2", 35 psi for 2"

Siemens Product Guard **PLUS 3** Warranty

Three-Way Ball Valve Assemblies

Electronic Spring Return Actuators

- GMA Damper Actuator Series
- A → AB Normally Open
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Stainless steel ball and stem

Mixing/Diverting
1/2 to 2"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Spring Return Actuator GMA Series 2P GMA121.1P	Floating GMA131.1P	0-10 Vdc GMA161.1P
				Stainless Steel Ball and Stem		
599-10350S	1/2	0.4	200	171E-10350S	171F-10350S	171G-10350S
599-10351S		0.63	200	171E-10351S	171F-10351S	171G-10351S
599-10352S		1.0	200	171E-10352S	171F-10352S	171G-10352S
599-10353S		1.6	200	171E-10353S	171F-10353S	171G-10353S
599-10354S		2.5	200	171E-10354S	171F-10354S	171G-10354S
599-10355S		4	200	171E-10355S	171F-10355S	171G-10355S
599-10356S		6.3	200	171E-10356S	171F-10356S	171G-10356S
599-10357S*		10	200	171E-10357S*	171F-10357S*	171G-10357S*
599-10358S	3/4	6.3	200	171E-10358S	171F-10358S	171G-10358S
599-10359S		10	200	171E-10359S	171F-10359S	171G-10359S
599-10360S*		16	200	171E-10360S*	171F-10360S*	171G-10360S*
599-10361S	1	10	200	171E-10361S	171F-10361S	171G-10361S
599-10362S		16	200	171E-10362S	171F-10362S	171G-10362S
599-10363S*		25	200	171E-10363S*	171F-10363S*	171G-10363S*
599-10364S	1-1/4	16	200	171E-10364S	171F-10364S	171G-10364S
599-10365S		25	200	171E-10365S	171F-10365S	171G-10365S
599-10366S*		40	200	171E-10366S*	171F-10366S*	171G-10366S*
599-10367S	1-1/2	25	200	171E-10367S	171F-10367S	171G-10367S
599-10368S		40	200	171E-10368S	171F-10368S	171G-10368S
599-10369S*		63	200	171E-10369S*	171F-10369S*	171G-10369S*
599-10370S	2	40	200	171E-10370S	171F-10370S	171G-10370S
599-10371S		63	200	171E-10371S	171F-10371S	171G-10371S
599-10372S*		100	200	171E-10372S*	171F-10372S*	171G-10372S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.
NOTE: Maximum operating differential pressure = 60 psi for 1/2" to 1-1/2", 35 psi for 2"

Siemens Product Guard **PLUS 3** Warranty

Three-Way Ball Valve Assemblies

Electronic Non-Spring Return Actuators

- GDE/GLB Damper Actuator Series
- A → AB Normally Open
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Chrome-plated brass ball and brass stem

Mixing/Diverting *1/2 to 2"*				Non-Spring Return Actuator GDE and GLB Series	
				Floating	0-10 Vdc
3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	 GDE131.1P (171A) and GLB131.1P (171B) 3-foot (.9m) Wires	 GDE161.1P (171C) and GLB161.1P (171D) 3-foot (.9m) Wires
				Chrome-Plated Brass Ball and Brass Stem	
599-10350	1/2	0.4	200	171A-10350	171C-10350
599-10351		0.63	200	171A-10351	171C-10351
599-10352		1.0	200	171A-10352	171C-10352
599-10353		1.6	200	171A-10353	171C-10353
599-10354		2.5	200	171A-10354	171C-10354
599-10355		4	200	171A-10355	171C-10355
599-10356		6.3	200	171A-10356	171C-10356
599-10357*		10	200	171A-10357*	171C-10357*
599-10358	3/4	6.3	200	171A-10358	171C-10358
599-10359		10	200	171A-10359	171C-10359
599-10360*		16	200	171A-10360*	171C-10360*
599-10361	1	10	200	171A-10361	171C-10361
599-10362		16	200	171A-10362	171C-10362
599-10363*		25	200	171A-10363*	171C-10363*
599-10364	1-1/4	16	200	171A-10364	171C-10364
599-10365		25	200	171A-10365	171C-10365
599-10366*		40	200	171A-10366*	171C-10366*
599-10367	1-1/2	25	200	171B-10367	171D-10367
599-10368		40	200	171B-10368	171D-10368
599-10369*		63	200	171B-10369*	171D-10369*
599-10370	2	40	200	171B-10370	171D-10370
599-10371		63	200	171B-10371	171D-10371
599-10372*		100	200	171B-10372*	171D-10372*

Table Notes:

Part numbers in red indicate complete assemblies.

*Denotes a full-port valve with no flow optimizer insert.

NOTE: Maximum operating differential pressure = 60 psi for 1/2" to 1-1/2", 35 psi for 2"

Siemens Product Guard **PLUS 3** Warranty

Three-Way Ball Valve Assemblies

Electronic Non-Spring Return Actuators

- GDE/GLB Damper Actuator Series
- A → AB Normally Open
- Part Nos. with * denote a full-port valve with no flow optimizer insert
- Stainless steel ball and stem

Mixing/Diverting
1/2 to 2"

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi	Non-Spring Return Actuator — GDE and GLB Series — Floating: GDE131.1P (171A) and GLB131.1P (171B) 3-foot (.9m) Wires	Floating: GDE131.1Q (173A) and GLB131.1Q (173B) Conduit Adapter & 6-foot (1.8m) Wires	0-10 Vdc: GDE161.1P (171C) and GLB161.1P (171D) 3-foot (.9m) Wires	0-10 Vdc: GDE161.1Q (173C) and GLB161.1Q (173D) Conduit Adapter & 6-foot (1.8m) Wires
				Stainless Steel Ball and Stem			
599-10350S	1/2	0.4	200	171A-10350S	173A-10350S	171C-10350S	173C-10350S
599-10351S		0.63	200	171A-10351S	173A-10351S	171C-10351S	173C-10351S
599-10352S		1.0	200	171A-10352S	173A-10352S	171C-10352S	173C-10352S
599-10353S		1.6	200	171A-10353S	173A-10353S	171C-10353S	173C-10353S
599-10354S		2.5	200	171A-10354S	173A-10354S	171C-10354S	173C-10354S
599-10355S		4	200	171A-10355S	173A-10355S	171C-10355S	173C-10355S
599-10356S		6.3	200	171A-10356S	173A-10356S	171C-10356S	173C-10356S
599-10357S*		10	200	171A-10357S*	173A-10357S*	171C-10357S*	173C-10357S*
599-10358S	3/4	6.3	200	171A-10358S	173A-10358S	171C-10358S	173C-10358S
599-10359S		10	200	171A-10359S	173A-10359S	171C-10359S	173C-10359S
599-10360S*		16	200	171A-10360S*	173A-10360S*	171C-10360S*	173C-10360S*
599-10361S	1	10	200	171A-10361S	173A-10361S	171C-10361S	173C-10361S
599-10362S		16	200	171A-10362S	173A-10362S	171C-10362S	173C-10362S
599-10363S*		25	200	171A-10363S*	173A-10363S*	171C-10363S*	173C-10363S*
599-10364S	1-1/4	16	200	171A-10364S	173A-10364S	171C-10364S	173C-10364S
599-10365S		25	200	171A-10365S	173A-10365S	171C-10365S	173C-10365S
599-10366S*		40	200	171A-10366S*	173A-10366S*	171C-10366S*	173C-10366S*
599-10367S	1-1/2	25	200	171B-10367S	173B-10367S	171D-10367S	173D-10367S
599-10368S		40	200	171B-10368S	173B-10368S	171D-10368S	173D-10368S
599-10369S*		63	200	171B-10369S*	173B-10369S*	171D-10369S*	173D-10369S*
599-10370S	2	40	200	171B-10370S	173B-10370S	171D-10370S	173D-10370S
599-10371S		63	200	171B-10371S	173B-10371S	171D-10371S	173D-10371S
599-10372S*		100	200	171B-10372S*	173B-10372S*	171D-10372S*	173D-10372S*

Table Notes:
Part numbers in red indicate complete assemblies.
*Denotes a full-port valve with no flow optimizer insert.
NOTE: Maximum operating differential pressure = 60 psi for 1/2" to 1-1/2", 35 psi for 2"

Siemens Product Guard PLUS 3 Warranty

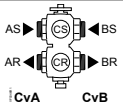
Six-Way Ball Valve Assemblies

NEW!

Electronic Non-Spring Return Actuators

- GDE Damper Actuator Series
- 1/2-Inch Pipe Connections
- Chrome-plated brass balls and stainless steel stem

Changeover
1/2"



6-Way Valve Body Part No.	Valve Size in.	Source A Cv Value	Source B Cv Value	Non-Spring Return Actuator GDE Series 0-10 Vdc  GDE161.1P 3-foot (.9m) Wires
				Chrome-Plated Brass Balls and Stainless Steel Stem
599-10600-0.3-0.3	1/2	0.3	0.3	171C-10600-0.3-0.3
599-10600-0.3-0.5		0.3	0.5	171C-10600-0.3-0.5
599-10600-0.3-0.8		0.3	0.8	171C-10600-0.3-0.8
599-10600-0.3-1.2		0.3	1.2	171C-10600-0.3-1.2
599-10600-0.3-1.5		0.3	1.5	171C-10600-0.3-1.5
599-10600-0.3-1.9		0.3	1.9	171C-10600-0.3-1.9
599-10600-0.5-0.3		0.5	0.3	171C-10600-0.5-0.3
599-10600-0.5-0.5		0.5	0.5	171C-10600-0.5-0.5
599-10600-0.5-0.8		0.5	0.8	171C-10600-0.5-0.8
599-10600-0.5-1.2		0.5	1.2	171C-10600-0.5-1.2
599-10600-0.5-1.5		0.5	1.5	171C-10600-0.5-1.5
599-10600-0.5-1.9		0.5	1.9	171C-10600-0.5-1.9
599-10600-0.8-0.3		0.8	0.3	171C-10600-0.8-0.3
599-10600-0.8-0.5		0.8	0.5	171C-10600-0.8-0.5
599-10600-0.8-0.8		0.8	0.8	171C-10600-0.8-0.8
599-10600-0.8-1.2		0.8	1.2	171C-10600-0.8-1.2
599-10600-0.8-1.5		0.8	1.5	171C-10600-0.8-1.5
599-10600-0.8-1.9		0.8	1.9	171C-10600-0.8-1.9
599-10600-1.2-0.3		1.2	0.3	171C-10600-1.2-0.3
599-10600-1.2-0.5		1.2	0.5	171C-10600-1.2-0.5
599-10600-1.2-0.8		1.2	0.8	171C-10600-1.2-0.8
599-10600-1.2-1.2		1.2	1.2	171C-10600-1.2-1.2
599-10600-1.2-1.5		1.2	1.5	171C-10600-1.2-1.5
599-10600-1.2-1.9		1.2	1.9	171C-10600-1.2-1.9
599-10600-1.5-0.3		1.5	0.3	171C-10600-1.5-0.3
599-10600-1.5-0.5		1.5	0.5	171C-10600-1.5-0.5
599-10600-1.5-0.8		1.5	0.8	171C-10600-1.5-0.8
599-10600-1.5-1.2		1.5	1.2	171C-10600-1.5-1.2
599-10600-1.5-1.5		1.5	1.5	171C-10600-1.5-1.5
599-10600-1.5-1.9		1.5	1.9	171C-10600-1.5-1.9
599-10600-1.9-0.3		1.9	0.3	171C-10600-1.9-0.3
599-10600-1.9-0.5		1.9	0.5	171C-10600-1.9-0.5
599-10600-1.9-0.8		1.9	0.8	171C-10600-1.9-0.8
599-10600-1.9-1.2		1.9	1.2	171C-10600-1.9-1.2
599-10600-1.9-1.5		1.9	1.5	171C-10600-1.9-1.5
599-10600-1.9-1.9		1.9	1.9	171C-10600-1.9-1.9

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard PLUS 3 Warranty

Six-Way Ball Valve Assemblies

NEW!

Electronic Non-Spring Return Actuators

- GDE Damper Actuator Series
- 3/4-Inch Pipe Connections
- Chrome-plated brass balls and stainless steel stem

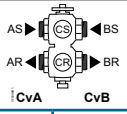
Changeover *3/4"* 				**Non-Spring Return Actuator** **GDE Series** **0-10 Vdc**
6-Way Valve Body Part No.	**Valve Size in.**	**Source A Cv Value**	**Source B Cv Value**	 GDE161.1P 3-foot (.9m) Wires
				Chrome-Plated Brass Balls and Stainless Steel Stem
599-10601-0.8-0.8		0.8	0.8	171C-10601-0.8-0.8
599-10601-0.8-1.2		0.8	1.2	171C-10601-0.8-1.2
599-10601-0.8-1.5		0.8	1.5	171C-10601-0.8-1.5
599-10601-0.8-1.9		0.8	1.9	171C-10601-0.8-1.9
599-10601-0.8-2.9		0.8	2.9	171C-10601-0.8-2.9
599-10601-0.8-4.0		0.8	4.0	171C-10601-0.8-4.0
599-10601-0.8-4.7		0.8	4.7	171C-10601-0.8-4.7
599-10601-1.2-0.8		1.2	0.8	171C-10601-1.2-0.8
599-10601-1.2-1.2		1.2	1.2	171C-10601-1.2-1.2
599-10601-1.2-1.5		1.2	1.5	171C-10601-1.2-1.5
599-10601-1.2-1.9		1.2	1.9	171C-10601-1.2-1.9
599-10601-1.2-2.9		1.2	2.9	171C-10601-1.2-2.9
599-10601-1.2-4.0		1.2	4.0	171C-10601-1.2-4.0
599-10601-1.2-4.7		1.2	4.7	171C-10601-1.2-4.7
599-10601-1.5-0.8		1.5	0.8	171C-10601-1.5-0.8
599-10601-1.5-1.2		1.5	1.2	171C-10601-1.5-1.2
599-10601-1.5-1.5		1.5	1.5	171C-10601-1.5-1.5
599-10601-1.5-1.9	3/4	1.5	1.9	171C-10601-1.5-1.9
599-10601-1.5-2.9		1.5	2.9	171C-10601-1.5-2.9
599-10601-1.5-4.0		1.5	4.0	171C-10601-1.5-4.0
599-10601-1.5-4.7		1.5	4.7	171C-10601-1.5-4.7
599-10601-1.9-0.8		1.9	0.8	171C-10601-1.9-0.8
599-10601-1.9-1.2		1.9	1.2	171C-10601-1.9-1.2
599-10601-1.9-1.5		1.9	1.5	171C-10601-1.9-1.5
599-10601-1.9-1.9		1.9	1.9	171C-10601-1.9-1.9
599-10601-1.9-2.9		1.9	2.9	171C-10601-1.9-2.9
599-10601-1.9-4.0		1.9	4.0	171C-10601-1.9-4.0
599-10601-1.9-4.7		1.9	4.7	171C-10601-1.9-4.7
599-10601-2.9-0.8		2.9	0.8	171C-10601-2.9-0.8
599-10601-2.9-1.2		2.9	1.2	171C-10601-2.9-1.2
599-10601-2.9-1.5		2.9	1.5	171C-10601-2.9-1.5
599-10601-2.9-1.9		2.9	1.9	171C-10601-2.9-1.9
599-10601-2.9-2.9		2.9	2.9	171C-10601-2.9-2.9
599-10601-2.9-4.0		2.9	4.0	171C-10601-2.9-4.0
599-10601-2.9-4.7		2.9	4.7	171C-10601-2.9-4.7

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard PLUS 3 Warranty

Six-Way Ball Valve Assemblies

NEW!

Electronic Non-Spring Return Actuators

- GDE Damper Actuator Series
- 3/4-Inch Pipe Connections
- Chrome-plated brass balls and stainless steel stem

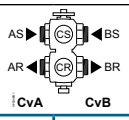
Changeover *3/4"* 				**Non-Spring Return Actuator** **GDE Series** **0-10 Vdc**
6-Way Valve Body Part No.	**Valve Size in.**	**Source A Cv Value**	**Source B Cv Value**	 GDE161.1P 3-foot (.9m) Wires
				Chrome-Plated Brass Balls and Stainless Steel Stem
599-10601-4.0-0.8	3/4	4.0	0.8	**171C-10601-4.0-0.8**
599-10601-4.0-1.2		4.0	1.2	**171C-10601-4.0-1.2**
599-10601-4.0-1.5		4.0	1.5	**171C-10601-4.0-1.5**
599-10601-4.0-1.9		4.0	1.9	**171C-10601-4.0-1.9**
599-10601-4.0-2.9		4.0	2.9	**171C-10601-4.0-2.9**
599-10601-4.0-4.0		4.0	4.0	**171C-10601-4.0-4.0**
599-10601-4.0-4.7		4.0	4.7	**171C-10601-4.0-4.7**
599-10601-4.7-0.8		4.7	0.8	**171C-10601-4.7-0.8**
599-10601-4.7-1.2		4.7	1.2	**171C-10601-4.7-1.2**
599-10601-4.7-1.5		4.7	1.5	**171C-10601-4.7-1.5**
599-10601-4.7-1.9		4.7	1.9	**171C-10601-4.7-1.9**
599-10601-4.7-2.9		4.7	2.9	**171C-10601-4.7-2.9**
599-10601-4.7-4.0		4.7	4.0	**171C-10601-4.7-4.0**
599-10601-4.7-4.7		4.7	4.7	**171C-10601-4.7-4.7**

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard **PLUS 3** Warranty

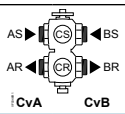
Six-Way Ball Valve Assemblies

NEW!

Electronic Non-Spring Return Actuators

- GDE Damper Actuator Series
- 1-Inch Pipe Connections
- Chrome-plated brass balls and stainless steel stem

Changeover
1"



6-Way Valve Body Part No.	Valve Size in.	Source A Cv Value	Source B Cv Value	Non-Spring Return Actuator GDE Series 0-10 Vdc  GDE161.1P 3-foot (.9m) Wires
				Chrome-Plated Brass Balls and Stainless Steel Stem
599-10602-1.9-1.9	1	1.9	1.9	171C-10602-1.9-1.9
599-10602-1.9-2.9		1.9	2.9	171C-10602-1.9-2.9
599-10602-1.9-4.0		1.9	4.0	171C-10602-1.9-4.0
599-10602-1.9-4.7		1.9	4.7	171C-10602-1.9-4.7
599-10602-2.9-1.9		2.9	1.9	171C-10602-2.9-1.9
599-10602-2.9-2.9		2.9	2.9	171C-10602-2.9-2.9
599-10602-2.9-4.0		2.9	4.0	171C-10602-2.9-4.0
599-10602-2.9-4.7		2.9	4.7	171C-10602-2.9-4.7
599-10602-4.0-1.9		4.0	1.9	171C-10602-4.0-1.9
599-10602-4.0-2.9		4.0	2.9	171C-10602-4.0-2.9
599-10602-4.0-4.0		4.0	4.0	171C-10602-4.0-4.0
599-10602-4.0-4.7		4.0	4.7	171C-10602-4.0-4.7
599-10602-4.7-1.9		4.7	1.9	171C-10602-4.7-1.9
599-10602-4.7-2.9		4.7	2.9	171C-10602-4.7-2.9
599-10602-4.7-4.0		4.7	4.0	171C-10602-4.7-4.0
599-10602-4.7-4.7		4.7	4.7	171C-10602-4.7-4.7

Table Notes:
Part numbers in red indicate complete assemblies.

Siemens Product Guard **PLUS 3** Warranty

Two- & Three-Way Magnetic Valve Assemblies

MX… Control Valves for Hot and Chilled Water – 2-Way (with blanking disc/flange) or 3-Way

Valve Size (in.)	Cv	Close-off psi	Part No.
NPT Unions			
1/2	3.5	44	**MXG461.15-3.0U**
3/4	5.9	44	**MXG461.20-5.0U**
1	9.4	44	**MXG461.25-8.0U**
1-1/4	14.0	44	**MXG461.32-12U**
1-1/2	23.4	44	**MXG461.40-20U**
2	35.1	44	**MXG461.50-30U**
Flange			
2-1/2	58.2	44	**MXF461.65-50U***

Table Notes:
*No blanking flange.

M3P... FY Control Valves for Hot and Chilled Water with ZM Module – 2-Way or 3-Way

Description	Cv	Close-off psi	Part No.
Without Flange Kits			
3" 3-Way	93	44	**M3P80FY**
4" 3-Way	152	29	**M3P100FY**
With Flange Kits			
3" 2-Way	93	44	**M3P80FY/2BN**
4" 2-Way	152	29	**M3P100FY/2BN**
3" 3-Way	93	44	**M3P80FY/3BN**
4" 3-Way	152	29	**M3P100FY/3BN**

Table Notes:
Order with flanges for new installations and without flanges for replacement.

Overall Ordering Note:
The valve body and magnetic actuator assemblies cannot be separated.

Two- & Three-Way Magnetic Valve Assemblies

MVF461H Modulating Control Valves for Hot Water and Steam – 2-Way

Valve Size (in.)	Cv	Close-off psi	Part No.
Without Flange Kits			
1/2	3.5	145	**MVF461H15-3**
3/4	5.9	145	**MVF461H20-5**
1	9.4	145	**MVF461H25-8**
1-1/4	14.0	145	**MVF461H32-12**
1-1/2	23.3	145	**MVF461H40-20**
2	35.0	145	**MVF461H50-30**
With NPT Flange Kits			
1/2	3.5	145	**MVF461H15-3-N**
3/4	5.9	145	**MVF461H20-5-N**
1	9.4	145	**MVF461H25-8-N**
1-1/4	14.0	145	**MVF461H32-12-N**
1-1/2	23.3	145	**MVF461H40-20-N**
2	35.0	145	**MVF461H50-30-N**

MXG461B Modulating Control Valves for Domestic Water – 3-Way

Valve Size (in.)	Cv	Close-off psi	Part No.
1/2	0.7	145	**MXG461B15-0.6**
1/2	1.8	145	**MXG461B15-1.5**
1/2	3.5	145	**MXG461B15-3**
3/4	5.8	116	**MXG461B20-5**
1	9.3	102	**MXG461B25-8**
1-1/4	14	87	**MXG461B32-12**
1-1/2	23	87	**MXG461B40-20**
2	35	87	**MXG461B50-30**

Overall Ordering Note:
The valve body and magnetic actuator assemblies cannot be separated.

Two-Way Refrigerant Valve Assemblies

NEW!

MVL661… Modulating Refrigerant Valves for CO_2 and all Commonly Used Safety Refrigerants – with Magnetic Actuators

Valve Size in.	Cv	Δpmax psi	Part No.
1/2	0.46	363	**MVL661.15-0.4**
1/2	1.2	363	**MVL661.15-1.0**
3/4	2.9	363	**MVL661.20-2.5**
1	7.3	363	**MVL661.25-6.3**
1-1/4	13.9	29	**MVL661.32-12**

Table Notes:

* MVL661.32-12.0 is only approved for suction throttle applications

Cv Nominal flow rate, in gpm, of refrigerant through the fully open valve (H100) at a differential pressure of 1 psi.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

MVS661…N Modulating Refrigerant Valves for Ammonia, CO_2 and all Commonly Used Safety Refrigerants – with Magnetic Actuators

Valve Size in.	Cv	Δpmax psi	Part No.
1	0.18	363	**MVS661.25-016N**
1	0.46	363	**MVS661.25-0.4N**
1	1.16	363	**MVS661.25-1.0N**
1	2.89	363	**MVS661.25-2.5N**
1	7.28	363	**MVS661.25-6.3N**

Table Notes:

Cv Nominal flow rate, in gpm, of refrigerant through the fully open valve (H100) at a differential pressure of 1 psi.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

Two- & Three-Way Refrigerant Valve Assemblies

NEW!

M3FB… LX Modulating Control Valve for Hot Gas Control – with Magnetic Actuators

Line Size in.	Cv 1 → 3	ΔPmax 1 → 3 psi	Part No.
1/2	0.7	319	**M3FB15LX06/A**
1/2	1.8	319	**M3FB15LX15/A**
1/2	3.5	319	**M3FB15LX/A**
3/4	5.9	261	**M3FB20LX/A**
1	9.4	174	**M3FB25LX/A**
1-1/4	14.0	116	**M3FB32LX**

Table Notes:

Cv Flow rate tolerance +/-10%.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

Also requires ZM terminal housing.

M2FP03GX Modulating Pilot Valve – with Magnetic Actuator

For Line Sizes in.	Cv gpm	ΔPmax psi	Part No.
2 – 5	1.3	261	**MF2FP03GX**

Table Notes:

Cv Nominal flow rate, in gpm, of cold water through the fully open valve (H_{100}) at a differential pressure of 1 psi.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

Also requires ZM terminal housing.

Two- & Three-Way
656 Series Service Valves

2-Way Valves

Valve Size	Cv	Close-off	Spring Range	Part No.
Normally Open				
1/2" (15 mm)	0.9	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0004**
1/2" (15 mm)	2.1	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0002**
Normally Closed				
1/2" (15 mm)	2.1	140 psi (965 kPa)	10 to 15 psi (69 to 103 kPa)	**656-0012**

Table Notes:
End connections are S.A.E. flared.

Siemens Product Guard PLUS 3 Warranty

2-Way Angle Union Valves

Valve Size	Cv	Close-off	Spring Range	Part No.
Normally Open				
1/2" (15 mm)	2.1	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0017**
1/2" (15 mm)	2.1	95 psi (655 kPa)	5 to 10 psi (34 to 69 kPa)	**656-0019**
3/4" (20 mm)	4.6	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0018**
3/4" (20 mm)	4.6	95 psi (655 kPa)	5 to 10 psi (34 to 69 kPa)	**656-0021**

Table Notes:
End connections are AFxUM.

Siemens Product Guard PLUS 3 Warranty

3-Way Mixing Valves

Valve Size	Cv	Close-off	Spring Range	Part No.
1/2" (15 mm)	2.5	95 psi (655 kPa)	10 to 15 lb. (69 to 103 kPa)	**656-0009**
1/2" (15 mm)	2.5	95 psi (655 kPa)	3 to 8 lb. (21 to 55 kPa)	**656-0010**
1/2" (15 mm)	1.5	95 psi (655 kPa)	3 to 8 lb. (21 to 55 kPa)	**656-0011**

Table Notes:
End connections are S.A.E. flared.

Siemens Product Guard PLUS 3 Warranty

Two- & Three-Way
658 Series Service Valves

2-Way Angle Union Valves

Valve Size	Cv	Close-off	Spring Range	Part No.
Normally Open				
1" (25 mm)	10	100 psi (689 kPa)	2 to 6 psi (14 to 41 kPa)	**658-0012**
1-1/4" (32 mm)	16	60 psi (413 kPa)	2 to 6 psi (14 to 41 kPa)	**658-0014**

Table Notes:
End connections are AFxUM.

Siemens Product Guard PLUS 3 Warranty

3-Way Sequence and Changeover Valves

Valve Size	Cv	Close-off	Part No.
Sequence			
1/2" (15 mm)	1.5	50 psi (344 kPa)	**658-0050**
1/2" (15 mm)	2.5	50 psi (344 kPa)	**658-0051**
Changeover			
1/2" (15 mm)	2.5	10 psi (68 kPa)	**658-0052**

Table Notes:
End connections are S.A.E. flared.

Siemens Product Guard PLUS 3 Warranty

Two-Way Butterfly Valves

Pneumatic Spring Return Actuators

2 to 12" ⋈		Normally Open (Fail Open)		Normally Closed (Fail Closed)	
		150 psi Close-off	100 psi Close-off – 4-6 50 psi Close-off – 8-12	150 psi Close-off	100 psi Close-off – 4-6 50 psi Close-off – 8-12
Valve Size in.	**Flow Rate Cv**	**Part No.**	**Part No.**	**Part No.**	**Part No.**
		Base Model			
2	60	BV2W02FS2LOXXXX	—	BV2W02FS2LCXXXX	—
2-1/2	151	BV2W25FS2LOXXXX	—	BV2W25FS2LCXXXX	—
3	262	BV2W03FS2LOXXXX	—	BV2W03FS2LCXXXX	—
4	647	BV2W04FS2LOXXXX	BV2W04US2LOXXXX	BV2W04FS2LCXXXX	BV2W04US2LCXXXX
5	1141	BV2W05FS2LOXXXX	BV2W05US2LOXXXX	BV2W05FS2LCXXXX	BV2W05US2LCXXXX
6	1580	BV2W06FS2LOXXXX	BV2W06US2LOXXXX	BV2W06FS2LCXXXX	BV2W06US2LCXXXX
8	1754*	—	BV2W08US2LOXXXX	—	BV2W08US2LCXXXX
10	2524*	—	BV2W10US2LOXXXX	—	BV2W10US2LCXXXX
12	3470*	—	BV2W12US2LOXXXX	—	BV2W12US2LCXXXX
		Positioner			
2	60	BV2W02FS2LOPXXX	—	BV2W02FS2LCPXXX	—
2-1/2	151	BV2W25FS2LOPXXX	—	BV2W25FS2LCPXXX	—
3	262	BV2W03FS2LOPXXX	—	BV2W03FS2LCPXXX	—
4	647	BV2W04FS2LOPXXX	BV2W04US2LOPXXX	BV2W04FS2LCPXXX	BV2W04US2LCPXXX
5	1141	BV2W05FS2LOPXXX	BV2W05US2LOPXXX	BV2W05FS2LCPXXX	BV2W05US2LCPXXX
6	1160*/1580	BV2W06FS2LOPXXX	BV2W06US2LOPXXX	BV2W06FS2LCPXXX	BV2W06US2LCPXXX
8	1754*	—	BV2W08US2LOPXXX	—	BV2W08US2LCPXXX
10	2524*	—	BV2W10US2LOPXXX	—	BV2W10US2LCPXXX
12	3470*	—	BV2W12US2LOPXXX	—	BV2W12US2LCPXXX
		120 V E/P Valve			
2	60	BV2W02FS2LOTXXX	—	BV2W02FS2LCTXXX	—
2-1/2	151	BV2W25FS2LOTXXX	—	BV2W25FS2LCTXXX	—
3	262	BV2W03FS2LOTXXX	—	BV2W03FS2LCTXXX	—
4	647	BV2W04FS2LOTXXX	BV2W04US2LOTXXX	BV2W04FS2LCTXXX	BV2W04US2LCTXXX
5	1141	BV2W05FS2LOTXXX	BV2W05US2LOTXXX	BV2W05FS2LCTXXX	BV2W05US2LCTXXX
6	1160*/1580	BV2W06FS2LOTXXX	BV2W06US2LOTXXX	BV2W06FS2LCTXXX	BV2W06US2LCTXXX
8	1754*	—	BV2W08US2LOTXXX	—	BV2W08US2LCTXXX
10	2524*	—	BV2W10US2LOTXXX	—	BV2W10US2LCTXXX
12	3470*	—	BV2W12US2LOTXXX	—	BV2W12US2LCTXXX
		24 V E/P Valve			
2	60	BV2W02FS2LOUXXX	—	BV2W02FS2LCUXXX	—
2-1/2	151	BV2W25FS2LOUXXX	—	BV2W25FS2LCUXXX	—
3	262	BV2W03FS2LOUXXX	—	BV2W03FS2LCUXXX	—
4	647	BV2W04US2LOUXXX	BV2W04FS2LOUXXX	BV2W04US2LCUXXX	BV2W04FS2LCUXXX
5	1141	BV2W05FS2LOUXXX	BV2W05US2LOUXXX	BV2W05FS2LCUXXX	BV2W05US2LCUXXX
6	1580	BV2W06FS2LOUXXX	BV2W06US2LOUXXX	BV2W06FS2LCUXXX	BV2W06US2LCUXXX
8	1754*	—	BV2W08US2LOUXXX	—	BV2W08US2LCUXXX
10	2524*	—	BV2W10US2LOUXXX	—	BV2W10US2LCUXXX
12	3470*	—	BV2W12US2LOUXXX	—	BV2W12US2LCUXXX

Table Notes:

*6-inch 150 psi and 8-, 10- and 12-inch only rotate to 70° max.

S6 actuator option also available. Contact customer support for part numbers.

High performance valves are special order. Contact customer support for parts and pricing.

Three-Way Butterfly Valves

Pneumatic Spring Return Actuators

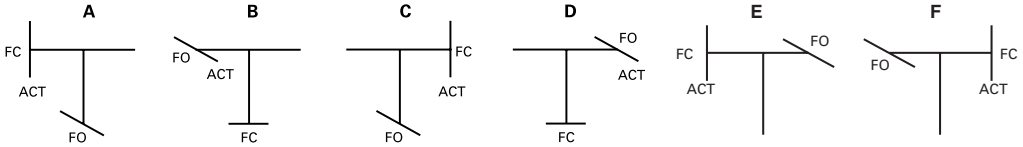
2 to 12"			Normally Open (Fail Open to Port B)		Normally Closed (Fail Closed to Port B)	
			150 psi Close-off	100 psi Close-off – 4-6 50 psi Close-off – 8-12	150 psi Close-off	100 psi Close-off – 4-6 50 psi Close-off – 8-12
Valve Size in.	Cv		Part No.	Part No.	Part No.	Part No.
	Run	Branch				
			Base Model			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FS2LAXXXX	—	BV3W02FS2LBXXXX	—
2-1/2	135	114	BV3W25FS2LAXXXX	—	BV3W25FS2LBXXXX	—
3	165	148*	BV3W03FS2LAXXXX	—	BV3W03FS2LBXXXX	—
4	419	348*	BV3W04FS2LAXXXX	BV3W04US2LAXXXX	BV3W04FS2LBXXXX	BV3W04US2LBXXXX
5	740	600*	BV3W05FS2LAXXXX	BV3W05US2LAXXXX	BV3W05FS2LBXXXX	BV3W05US2LBXXXX
6	1051	867*	BV3W06FS2LAXXXX	BV3W06US2LAXXXX	BV3W06FS2LBXXXX	BV3W06US2LBXXXX
8	1661	1424*	—	BV3W08US2LAXXXX	—	BV3W08US2LBXXXX
10	2439	2132*	—	BV3W10US2LAXXXX	—	BV3W10US2LBXXXX
12	3401	3019*	—	BV3W12US2LAXXXX	—	BV3W12US2LBXXXX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FS2LCXXXX	—	BV3W02FS2LDXXXX	—
2-1/2	135	114	BV3W25FS2LCXXXX	—	BV3W25FS2LDXXXX	—
3	165	148*	BV3W03FS2LCXXXX	—	BV3W03FS2LDXXXX	—
4	419	348*	BV3W04FS2LCXXXX	BV3W04US2LCXXXX	BV3W04FS2LDXXXX	BV3W04US2LDXXXX
5	740	600*	BV3W05FS2LCXXXX	BV3W05US2LCXXXX	BV3W05FS2LDXXXX	BV3W05US2LDXXXX
6	1051	867*	BV3W06FS2LCXXXX	BV3W06US2LCXXXX	BV3W06FS2LDXXXX	BV3W06US2LDXXXX
8	1661	1424*	—	BV3W08US2LCXXXX	—	BV3W08US2LDXXXX
10	2439	2132*	—	BV3W10US2LCXXXX	—	BV3W10US2LDXXXX
12	3401	3019*	—	BV3W12US2LCXXXX	—	BV3W12US2LDXXXX
			Positioner			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FS2LAPXXX	—	BV3W02FS2LBPXXX	—
2-1/2	135	114	BV3W25FS2LAPXXX	—	BV3W25FS2LBPXXX	—
3	165	148*	BV3W03FS2LAPXXX	—	BV3W03FS2LBPXXX	—
4	419	348*	BV3W04FS2LAPXXX	BV3W04US2LAPXXX	BV3W04FS2LBPXXX	BV3W04US2LBPXXX
5	740	600*	BV3W05FS2LAPXXX	BV3W05US2LAPXXX	BV3W05FS2LBPXXX	BV3W05US2LBPXXX
6	1051	867*	BV3W06FS2LAPXXX	BV3W06US2LAPXXX	BV3W06FS2LBPXXX	BV3W06US2LBPXXX
8	1661	1424*	—	BV3W08US2LAPXXX	—	BV3W08US2LBPXXX
10	2439	2132*	—	BV3W10US2LAPXXX	—	BV3W10US2LBPXXX
12	3401	3019*	—	BV3W12US2LAPXXX	—	BV3W12US2LBPXXX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FS2LCPXXX	—	BV3W02FS2LDPXXX	—
2-1/2	135	114	BV3W25FS2LCPXXX	—	BV3W25FS2LDPXXX	—
3	165	148*	BV3W03FS2LCPXXX	—	BV3W03FS2LDPXXX	—
4	419	348*	BV3W04FS2LCPXXX	BV3W04US2LCPXXX	BV3W04FS2LDPXXX	BV3W04US2LDPXXX
5	740	600*	BV3W05FS2LCPXXX	BV3W05US2LCPXXX	BV3W05FS2LDPXXX	BV3W05US2LDPXXX
6	1051	867*	BV3W06FS2LCPXXX	BV3W06US2LCPXXX	BV3W06FS2LDPXXX	BV3W06US2LDPXXX
8	1661	1424*	—	BV3W08US2LCPXXX	—	BV3W08US2LDPXXX
10	2439	2132*	—	BV3W10US2LCPXXX	—	BV3W10US2LDPXXX
12	3401	3019*	—	BV3W12US2LCPXXX	—	BV3W12US2LDPXXX

Table Notes:

*3- through 12-inch valves only rotate 70° max.

S6 actuator option also available. Assemblies E and F also available. Contact customer support for part numbers.

Three-Way Assembly Configurations



Key: **FC** Fail Closed **FO** Fail Open **ACT** Actuator Location

Three-Way Butterfly Valves

Pneumatic Spring Return Actuators

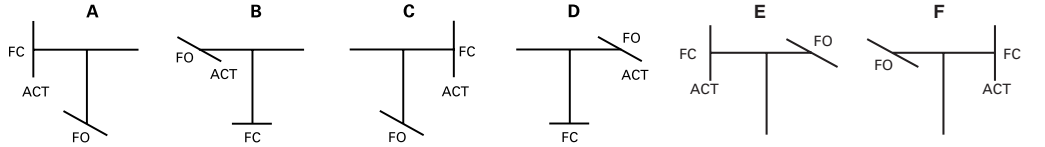
2 to 12"			Normally Open (Fail Open to Port B)		Normally Closed (Fail Closed to Port B)	
			150 psi Close-off	100 psi Close-off – 4-6 50 psi Close-off – 8-12	150 psi Close-off	100 psi Close-off – 4-6 50 psi Close-off – 8-12
Valve Size in.	Cv		Part No.	Part No.	Part No.	Part No.
	Run	Branch				
			120 V E/P Valve			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FS2LATXXX	—	BV3W02FS2LBTXXX	—
2-1/2	135	114	BV3W25FS2LATXXX	—	BV3W25FS2LBTXXX	—
3	165	148*	BV3W03FS2LATXXX	—	BV3W03FS2LBTXXX	—
4	419	348*	BV3W04FS2LATXXX	BV3W04US2LATXXX	BV3W04FS2LBTXXX	BV3W04US2LBTXXX
5	740	600*	BV3W05FS2LATXXX	BV3W05US2LATXXX	BV3W05FS2LBTXXX	BV3W05US2LBTXXX
6	1051	867*	BV3W06FS2LATXXX	BV3W06US2LATXXX	BV3W06FS2LBTXXX	BV3W06US2LBTXXX
8	1661	1424*	—	BV3W08US2LATXXX	—	BV3W08US2LBTXXX
10	2439	2132*	—	BV3W10US2LATXXX	—	BV3W10US2LBTXXX
12	3401	3019*	—	BV3W12US2LATXXX	—	BV3W12US2LBTXXX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FS2LCTXXX	—	BV3W02FS2LDTXXX	—
2-1/2	135	114	BV3W25FS2LCTXXX	—	BV3W25FS2LDTXXX	—
3	165	148*	BV3W03FS2LCTXXX	—	BV3W03FS2LDTXXX	—
4	419	348*	BV3W04FS2LCTXXX	BV3W04US2LCTXXX	BV3W04FS2LDTXXX	BV3W04US2LDTXXX
5	740	600*	BV3W05FS2LCTXXX	BV3W05US2LCTXXX	BV3W05FS2LDTXXX	BV3W05US2LDTXXX
6	1051	867*	BV3W06FS2LCTXXX	BV3W06US2LCTXXX	BV3W06FS2LDTXXX	BV3W06US2LDTXXX
8	1661	1424*	—	BV3W08US2LCTXXX	—	BV3W08US2LDTXXX
10	2439	2132*	—	BV3W10US2LCTXXX	—	BV3W10US2LDTXXX
12	3401	3019*	—	BV3W12US2LCTXXX	—	BV3W12US2LDTXXX
			24 V E/P Valve			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FS2LAUXXX	—	BV3W02FS2LBUXXX	—
2-1/2	135	114	BV3W25FS2LAUXXX	—	BV3W25FS2LBUXXX	—
3	165	148*	BV3W03FS2LAUXXX	—	BV3W03FS2LBUXXX	—
4	419	348*	BV3W04FS2LAUXXX	BV3W04US2LAUXXX	BV3W04FS2LBUXXX	BV3W04US2LBUXXX
5	740	600*	BV3W05FS2LAUXXX	BV3W05US2LAUXXX	BV3W05FS2LBUXXX	BV3W05US2LBUXXX
6	1051	867*	BV3W06FS2LAUXXX	BV3W06US2LAUXXX	BV3W06FS2LBUXXX	BV3W06US2LBUXXX
8	1661	1424*	—	BV3W08US2LAUXXX	—	BV3W08US2LBUXXX
10	2439	2132*	—	BV3W10US2LAUXXX	—	BV3W10US2LBUXXX
12	3401	3019*	—	BV3W12US2LAUXXX	—	BV3W12US2LBUXXX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FS2LCUXXX	—	BV3W02FS2LDUXXX	—
2-1/2	135	114	BV3W25FS2LCUXXX	—	BV3W25FS2LDUXXX	—
3	165	148*	BV3W03FS2LCUXXX	—	BV3W03FS2LDUXXX	—
4	419	348*	BV3W04FS2LCUXXX	BV3W04US2LCUXXX	BV3W04FS2LDUXXX	BV3W04US2LDUXXX
5	740	600*	BV3W05FS2LCUXXX	BV3W05US2LCUXXX	BV3W05FS2LDUXXX	BV3W05US2LDUXXX
6	1051	867*	BV3W06FS2LCUXXX	BV3W06US2LCUXXX	BV3W06FS2LDUXXX	BV3W06US2LDUXXX
8	1661	1424*	—	BV3W08US2LCUXXX	—	BV3W08US2LDUXXX
10	2439	2132*	—	BV3W10US2LCUXXX	—	BV3W10US2LDUXXX
12	3401	3019*	—	BV3W12US2LCUXXX	—	BV3W12US2LDUXXX

Table Notes:

*3- through 12-inch valves only rotate 70° max.

Assemblies E and F also available. Contact customer support for part numbers.

Three-Way Assembly Configurations



Key: **FC** Fail Closed **FO** Fail Open **ACT** Actuator Location

Two-Way Butterfly Valves

Electronic Spring Return Actuators

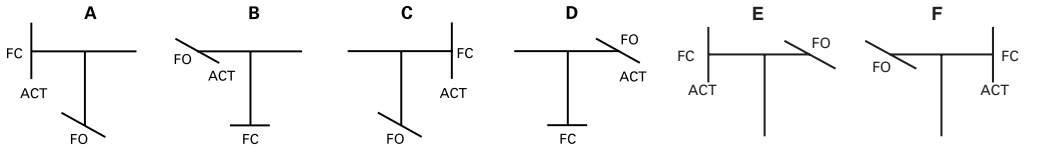
2 to 4" ⋈		Normally Open	Normally Closed
		100 psi Close-off	100 psi Close-off
Valve Size in.	Flow Rate Cv	Part No.	Part No.
		120 Vac On/Off	
2	60	BV2W02UG1LOXXXX	BV2W02UG1LCXXXX
2-1/2	151	BV2W25UG1LOXXXX	BV2W25UG1LCXXXX
3	262	BV2W03UG1LOXXXX	BV2W03UG1LCXXXX
4	647	BV2W04UG1LOXXXX	BV2W04UG1LCXXXX
		24 Vac On/Off	
2	60	BV2W02UG2LOXXXX	BV2W02UG2LCXXXX
2-1/2	151	BV2W25UG2LOXXXX	BV2W25UG2LCXXXX
3	262	BV2W03UG2LOXXXX	BV2W03UG2LCXXXX
4	647	BV2W04UG2LOXXXX	BV2W04UG2LCXXXX
		24 Vac Floating	
2	60	BV2W02UG3LOXXXX	BV2W02UG3LCXXXX
2-1/2	151	BV2W25UG3LOXXXX	BV2W25UG3LCXXXX
3	262	BV2W03UG3LOXXXX	BV2W03UG3LCXXXX
4	647	BV2W04UG3LOXXXX	BV2W04UG3LCXXXX
		24 Vac Modulating 0-10 V	
2	60	BV2W02UG4LOXXXX	BV2W02UG4LCXXXX
2-1/2	151	BV2W25UG4LOXXXX	BV2W25UG4LCXXXX
3	262	BV2W03UG4LOXXXX	BV2W03UG4LCXXXX
4	647	BV2W04UG4LOXXXX	BV2W04UG4LCXXXX
		24 Vac Modulating 4-20 mA	
2	60	BV2W02UG5LOXXXX	BV2W02UG5LCXXXX
2-1/2	151	BV2W25UG5LOXXXX	BV2W25UG5LCXXXX
3	262	BV2W03UG5LOXXXX	BV2W03UG5LCXXXX
4	647	BV2W04UG5LOXXXX	BV2W04UG5LCXXXX

Three-Way Butterfly Valves

Electronic Spring Return Actuators

2 to 4"			Normally Open (Fail Open to Port B)		Normally Closed (Fail Closed to Port B)	
			100 psi Close-off	100 psi Close-off	100 psi Close-off	100 psi Close-off
Valve Size in.	Cv		Part No.	Part No.	Part No.	Part No.
	Run	Branch				
			120 Vac On/Off			
			Assembly A	Assembly C	Assembly B	Assembly D
2	58	54	BV3W02UG1LAXXXX	BV3W02UG1LCXXXX	BV3W02UG1LBXXXX	BV3W02UG1LDXXXX
2-1/2	135	114	BV3W25UG1LAXXXX	BV3W25UG1LCXXXX	BV3W25UG1LBXXXX	BV3W25UG1LDXXXX
3	229	188	BV3W03UG1LAXXXX	BV3W03UG1LCXXXX	BV3W03UG1LBXXXX	BV3W03UG1LDXXXX
4	511	385	BV3W04UG1LAXXXX	BV3W04UG1LCXXXX	BV3W04UG1LBXXXX	BV3W04UG1LDXXXX
			24 Vac On/Off			
2	58	54	BV3W02UG2LAXXXX	BV3W02UG2LCXXXX	BV3W02UG2LBXXXX	BV3W02UG2LDXXXX
2-1/2	135	114	BV3W25UG2LAXXXX	BV3W25UG2LCXXXX	BV3W25UG2LBXXXX	BV3W25UG2LDXXXX
3	229	188	BV3W03UG2LAXXXX	BV3W03UG2LCXXXX	BV3W03UG2LBXXXX	BV3W03UG2LDXXXX
4	511	385	BV3W04UG2LAXXXX	BV3W04UG2LCXXXX	BV3W04UG2LBXXXX	BV3W04UG2LDXXXX
			24 Vac Floating			
2	58	54	BV3W02UG3LAXXXX	BV3W02UG3LCXXXX	BV3W02UG3LBXXXX	BV3W02UG3LDXXXX
2-1/2	135	114	BV3W25UG3LAXXXX	BV3W25UG3LCXXXX	BV3W25UG3LBXXXX	BV3W25UG3LDXXXX
3	229	188	BV3W03UG3LAXXXX	BV3W03UG3LCXXXX	BV3W03UG3LBXXXX	BV3W03UG3LDXXXX
4	511	385	BV3W04UG3LAXXXX	BV3W04UG3LCXXXX	BV3W04UG3LBXXXX	BV3W04UG3LDXXXX
			24 Vac Modulating 0-10 V			
2	58	54	BV3W02UG4LAXXXX	BV3W02UG4LCXXXX	BV3W02UG4LBXXXX	BV3W02UG4LDXXXX
2-1/2	135	114	BV3W25UG4LAXXXX	BV3W25UG4LCXXXX	BV3W25UG4LBXXXX	BV3W25UG4LDXXXX
3	229	188	BV3W03UG4LAXXXX	BV3W03UG4LCXXXX	BV3W03UG4LBXXXX	BV3W03UG4LDXXXX
4	511	385	BV3W04UG4LAXXXX	BV3W04UG4LCXXXX	BV3W04UG4LBXXXX	BV3W04UG4LDXXXX
			24 Vac Modulating 4-20 mA			
2	58	54	BV3W02UG5LAXXXX	BV3W02UG5LCXXXX	BV3W02UG5LBXXXX	BV3W02UG5LDXXXX
2-1/2	135	114	BV3W25UG5LAXXXX	BV3W25UG5LCXXXX	BV3W25UG5LBXXXX	BV3W25UG5LDXXXX
3	229	188	BV3W03UG5LAXXXX	BV3W03UG5LCXXXX	BV3W03UG5LBXXXX	BV3W03UG5LDXXXX
4	511	385	BV3W04UG5LAXXXX	BV3W04UG5LCXXXX	BV3W04UG5LBXXXX	BV3W04UG5LDXXXX

Three-Way Assembly Configurations



Key: **FC** Fail Closed **FO** Fail Open **ACT** Actuator Location

Two-Way Butterfly Valves

Electronic Non-Spring Return Actuators

2 to 12" ⋈		Non-Spring Return Actuator		
		150 psi Close-off	100 psi Close-off	50 psi Close-off, 4-6" 100 psi Close-off, 8-12"
Valve Size in.	Flow Rate Cv	Part No.	Part No.	Part No.
		Floating / 2-position		
2	60	BV2W02FE2LNXXXX	BV2W02UG6LNXXXX	—
2-1/2	151	BV2W25FE2LNXXXX	BV2W25UG6LNXXXX	—
3	262	BV2W03FE2LNXXXX	BV2W03UG6LNXXXX	—
4	647	BV2W04FE2LNXXXX	BV2W04UG6LNXXXX	BV2W04UE2LNXXXX
5	1141	BV2W05FE2LNXXXX	BV2W05UG6LNXXXX	BV2W05UE2LNXXXX
6	1580	BV2W06FE2LNXXXX	BV2W06UG6LNXXXX	BV2W06UE2LNXXXX
8	2892	BV2W08FE2LNXXXX	—	BV2W08UE2LNXXXX
10	4593	BV2W10FE2LNXXXX	—	BV2W10UE2LNXXXX
12	6682	BV2W12FE2LNXXXX	—	BV2W12UE2LNXXXX
		Modulating 0-10 V		
2	60	BV2W02FEMLNXXHX	BV2W02UG7LNXXXX	—
2-1/2	151	BV2W25FEMLNXXHX	BV2W25UG7LNXXXX	—
3	262	BV2W03FEMLNXXHX	BV2W03UG7LNXXXX	—
4	647	BV2W04FEMLNXXHX	BV2W04UG7LNXXXX	BV2W04UEMLNXXHX
5	1141	BV2W05FEMLNXXHX	BV2W05UG7LNXXXX	BV2W05UEMLNXXHX
6	1580	BV2W06FEMLNXXHX	BV2W06UG7LNXXXX	BV2W06UEMLNXXHX
8	2892	BV2W08FEMLNXXHX	—	BV2W08UEMLNXXHX
10	4593	BV2W10FEMLNXXHX	—	BV2W10UEMLNXXHX
12	6682	BV2W12FEMLNXXHX	—	BV2W12UEMLNXXHX
		Modulating 4-20 mA		
2	60	BV2W02FEPLNXXHX	BV2W02UG8LNXXXX	—
2-1/2	151	BV2W25FEPLNXXHX	BV2W25UG8LNXXXX	—
3	262	BV2W03FEPLNXXHX	BV2W03UG8LNXXXX	—
4	647	BV2W04FEPLNXXHX	BV2W04UG8LNXXXX	BV2W04UEPLNXXHX
5	1141	BV2W05FEPLNXXHX	BV2W05UG8LNXXXX	BV2W05UEPLNXXHX
6	1580	BV2W06FEPLNXXHX	BV2W06UG8LNXXXX	BV2W06UEPLNXXHX
8	2892	BV2W08FEPLNXXHX	—	BV2W08UEPLNXXHX
10	4593	BV2W10FEPLNXXHX	—	BV2W10UEPLNXXHX
12	6682	BV2W12FEPLNXXHX	—	BV2W12UEPLNXXHX

Table Notes:

*6-inch 150 psi and 8-, 10- and 12-inch only rotate to 70° max.

Three-Way Butterfly Valves

Electronic Non-Spring Return Actuators

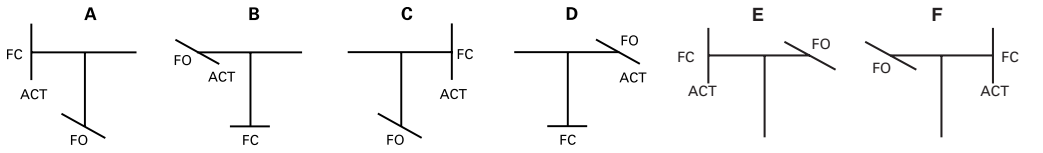
2 to 12"			Normally Open		Normally Closed	
			150 psi Close-off	100 psi Close-off, 2-6" 50 psi Close-off, 8-12"	150 psi Close-off	100 psi Close-off, 2-6" 50 psi Close-off, 8-12"
Valve Size in.	Cv		Part No.	Part No.	Part No.	Part No.
	Run	Branch				
			Floating 2-position			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FE2LAXXXX	BV3W02UG6LAXXXX	BV3W02FE2LBXXXX	BV3W02UG6LBXXXX
2-1/2	135	114	BV3W25FE2LAXXXX	BV3W25UG6LAXXXX	BV3W25FE2LBXXXX	BV3W25UG6LBXXXX
3	229	188	BV3W03FE2LAXXXX	BV3W03UG6LAXXXX	BV3W03FE2LBXXXX	BV3W03UG6LBXXXX
4	511	385	BV3W04FE2LAXXXX	BV3W04UG6LAXXXX	BV3W04FE2LBXXXX	BV3W04UG6LBXXXX
5	870	642	BV3W05FE2LAXXXX	BV3W05UG6LAXXXX	BV3W05FE2LBXXXX	BV3W05UG6LBXXXX
6	1242	935	BV3W06FE2LAXXXX	BV3W06UG6LAXXXX	BV3W06FE2LBXXXX	BV3W06UG6LBXXXX
8	2254	1688	BV3W08FE2LAXXXX	BV3W08UE2LAXXXX	BV3W08FE2LBXXXX	BV3W08UE2LBXXXX
10	3570	2667	BV3W10FE2LAXXXX	BV3W10UE2LAXXXX	BV3W10FE2LBXXXX	BV3W10UE2LBXXXX
12	5240	3938	BV3W12FE2LAXXXX	BV3W12UE2LAXXXX	BV3W12FE2LBXXXX	BV3W12UE2LBXXXX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FE2LCXXXX	BV3W02UG6LCXXXX	BV3W02FE2LDXXXX	BV3W02UG6LDXXXX
2-1/2	135	114	BV3W25FE2LCXXXX	BV3W25UG6LCXXXX	BV3W25FE2LDXXXX	BV3W25UG6LDXXXX
3	229	188	BV3W03FE2LCXXXX	BV3W03UG6LCXXXX	BV3W03FE2LDXXXX	BV3W03UG6LDXXXX
4	511	385	BV3W04FE2LCXXXX	BV3W04UG6LCXXXX	BV3W04FE2LDXXXX	BV3W04UG6LDXXXX
5	870	642	BV3W05FE2LCXXXX	BV3W05UG6LCXXXX	BV3W05FE2LDXXXX	BV3W05UG6LDXXXX
6	1242	935	BV3W06FE2LCXXXX	BV3W06UG6LCXXXX	BV3W06FE2LDXXXX	BV3W06UG6LDXXXX
8	2254	1688	BV3W08FE2LCXXXX	BV3W08UE2LCXXXX	BV3W08FE2LDXXXX	BV3W08UE2LDXXXX
10	3570	2667	BV3W10FE2LCXXXX	BV3W10UE2LCXXXX	BV3W10FE2LDXXXX	BV3W10UE2LDXXXX
12	5240	3938	BV3W12FE2LCXXXX	BV3W12UE2LCXXXX	BV3W12FE2LDXXXX	BV3W12UE2LDXXXX

Table Notes:

4, 5, and 6" undercut with E2 actuators also available.

Assemblies E and F also available. Contact customer support for part numbers.

Three-Way Assembly Configurations



Key: **FC** Fail Closed **FO** Fail Open **ACT** Actuator Location

Three-Way Butterfly Valves

Electronic Non-Spring Return Actuators

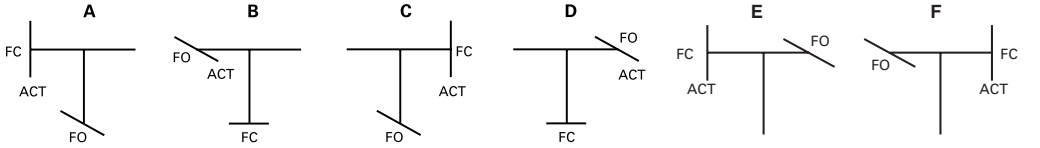
2 to 12"			Normally Open		Normally Closed	
			150 psi Close-off	100 psi Close-off, 2-6" 50 psi Close-off, 8-12"	150 psi Close-off	100 psi Close-off, 2-6" 50 psi Close-off, 8-12"
Valve Size in.	Cv		Part No.	Part No.	Part No.	Part No.
	Run	Branch				
			Modulating 0-10 V			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FEMLAXXHX	BV3W02UG7LAXXXX	BV3W02FEMLBXXHX	BV3W02UG7LBXXXX
2-1/2	135	114	BV3W25FEMLAXXHX	BV3W25UG7LAXXXX	BV3W25FEMLBXXHX	BV3W25UG7LBXXXX
3	229	188	BV3W03FEMLAXXHX	BV3W03UG7LAXXXX	BV3W03FEMLBXXHX	BV3W03UG7LBXXXX
4	511	385	BV3W04FEMLAXXHX	BV3W04UG7LAXXXX	BV3W04FEMLBXXHX	BV3W04UG7LBXXXX
5	870	642	BV3W05FEMLAXXHX	BV3W05UG7LAXXXX	BV3W05FEMLBXXHX	BV3W05UG7LBXXXX
6	1242	935	BV3W06FEMLAXXHX	BV3W06UG7LAXXXX	BV3W06FEMLBXXHX	BV3W06UG7LBXXXX
8	2254	1688	BV3W08FEMLAXXHX	BV3W08UEMLAXXHX	BV3W08FEMLBXXHX	BV3W08UEMLBXXHX
10	3570	2667	BV3W10FEMLAXXHX	BV3W10UEMLAXXHX	BV3W10FEMLBXXHX	BV3W10UEMLBXXHX
12	5240	3938	BV3W12FEMLAXXHX	BV3W12UEMLAXXHX	BV3W12FEMLBXXHX	BV3W12UEMLBXXHX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FEMLCXXHX	BV3W02UG7LCXXXX	BV3W02FEMLDXXHX	BV3W02UG7LDXXXX
2-1/2	135	114	BV3W25FEMLCXXHX	BV3W25UG7LCXXXX	BV3W25FEMLDXXHX	BV3W25UG7LDXXXX
3	229	188	BV3W03FEMLCXXHX	BV3W03UG7LCXXXX	BV3W03FEMLDXXHX	BV3W03UG7LDXXXX
4	511	385	BV3W04FEMLCXXHX	BV3W04UG7LCXXXX	BV3W04FEMLDXXHX	BV3W04UG7LDXXXX
5	870	642	BV3W05FEMLCXXHX	BV3W05UG7LCXXXX	BV3W05FEMLDXXHX	BV3W05UG7LDXXXX
6	1242	935	BV3W06FEMLCXXHX	BV3W06UG7LCXXXX	BV3W06FEMLDXXHX	BV3W06UG7LDXXXX
8	2254	1688	BV3W08FEMLCXXHX	BV3W08UEMLCXXHX	BV3W08FEMLDXXHX	BV3W08UEMLDXXHX
10	3570	2667	BV3W10FEMLCXXHX	BV3W10UEMLCXXHX	BV3W10FEMLDXXHX	BV3W10UEMLDXXHX
12	5240	3938	BV3W12FEMLCXXHX	BV3W12UEMLCXXHX	BV3W12FEMLDXXHX	BV3W12UEMLDXXHX
			Modulating 4-20 mA			
			Assembly A	Assembly A	Assembly B	Assembly B
2	58	54	BV3W02FEPLAXXHX	BV3W02UG8LAXXXX	BV3W02FEPLBXXHX	BV3W02UG8LBXXXX
2-1/2	135	114	BV3W25FEPLAXXHX	BV3W25UG8LAXXXX	BV3W25FEPLBXXHX	BV3W25UG8LBXXXX
3	229	188	BV3W03FEPLAXXHX	BV3W03UG8LAXXXX	BV3W03FEPLBXXHX	BV3W03UG8LBXXXX
4	511	385	BV3W04FEPLAXXHX	BV3W04UG8LAXXXX	BV3W04FEPLBXXHX	BV3W04UG8LBXXXX
5	870	642	BV3W05FEPLAXXHX	—	BV3W05FEPLBXXHX	—
6	1242	935	BV3W06FEPLAXXHX	—	BV3W06FEPLBXXHX	—
8	2254	1688	BV3W08FEPLAXXHX	BV3W08UEPLAXXHX	BV3W08FEPLBXXHX	BV3W08UEPLBXXHX
10	3570	2667	BV3W10FEPLAXXHX	BV3W10UEPLAXXHX	BV3W10FEPLBXXHX	BV3W10UEPLBXXHX
12	5240	3938	BV3W12FEPLAXXHX	BV3W12UEPLAXXHX	BV3W12FEPLBXXHX	BV3W12UEPLBXXHX
			Assembly C	Assembly C	Assembly D	Assembly D
2	58	54	BV3W02FEPLCXXHX	BV3W02UG8LCXXXX	BV3W02FEPLDXXHX	BV3W02UG8LDXXXX
2-1/2	135	114	BV3W25FEPLCXXHX	BV3W25UG8LCXXXX	BV3W25FEPLDXXHX	BV3W25UG8LDXXXX
3	229	188	BV3W03FEPLCXXHX	BV3W03UG8LCXXXX	BV3W03FEPLDXXHX	BV3W03UG8LDXXXX
4	511	385	BV3W04FEPLCXXHX	BV3W04UG8LCXXXX	BV3W04FEPLDXXHX	BV3W04UG8LDXXXX
5	870	642	BV3W05FEPLCXXHX	—	BV3W05FEPLDXXHX	—
6	1242	935	BV3W06FEPLCXXHX	—	BV3W06FEPLDXXHX	—
8	2254	1688	BV3W08FEPLCXXHX	BV3W08UEPLCXXHX	BV3W08FEPLDXXHX	BV3W08UEPLDXXHX
10	3570	2667	BV3W10FEPLCXXHX	BV3W10UEPLCXXHX	BV3W10FEPLDXXHX	BV3W10UEPLDXXHX
12	5240	3938	BV3W12FEPLCXXHX	BV3W12UEPLCXXHX	BV3W12FEPLDXXHX	BV3W12UEPLDXXHX

Table Notes:

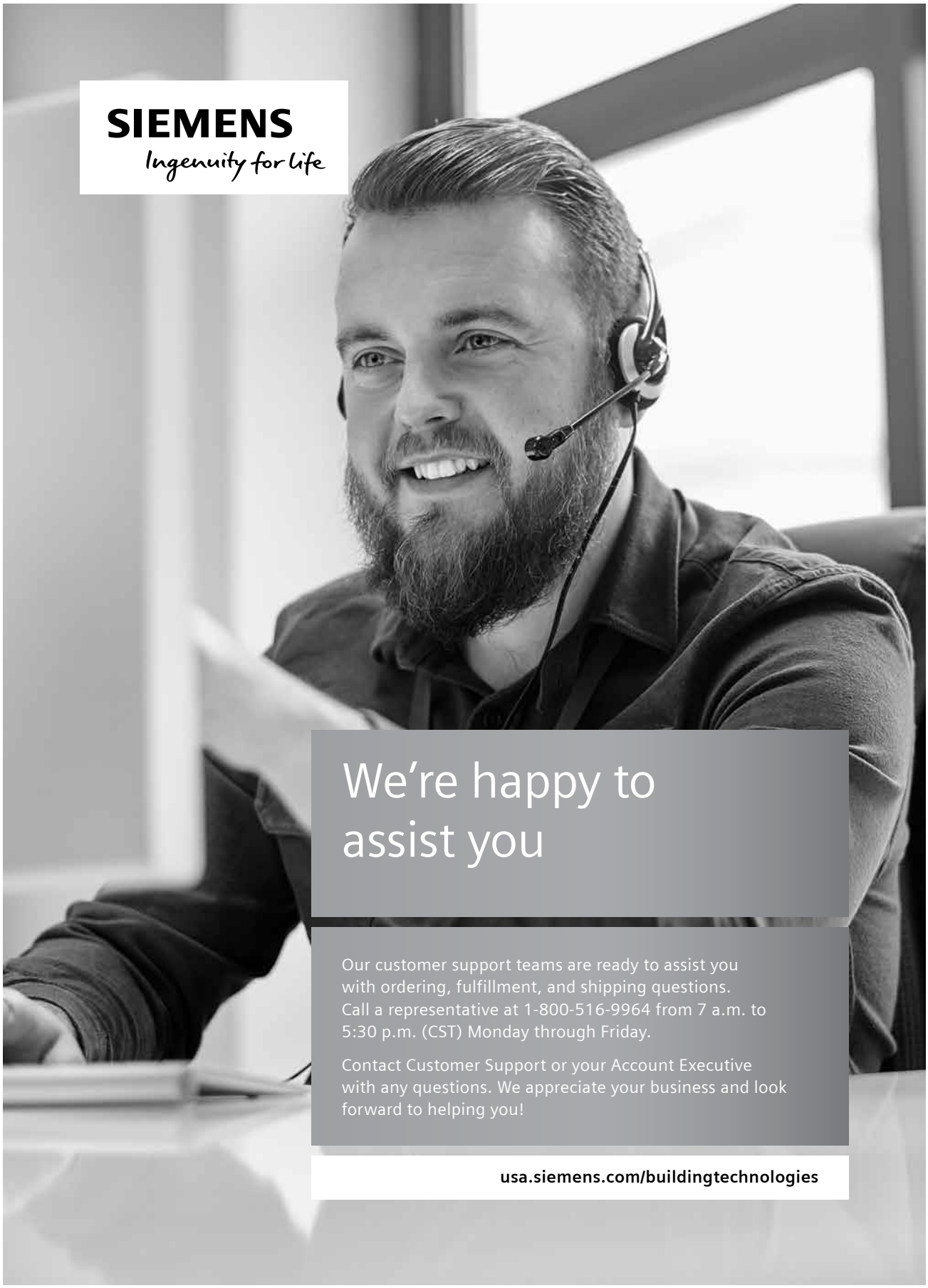
4, 5, and 6" undercut with E2 actuators also available.

Assemblies E and F also available. Contact customer support for part numbers.

Three-Way Assembly Configurations



Key: **FC** Fail Closed **FO** Fail Open **ACT** Actuator Location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Ingenuity for life
We’re happy to assist you
Our customer support teams are ready to assist you with ordering, fulfillment, and shipping questions. Call a representative at 1-800-516-9964 from 7 a.m. to 5:30 p.m. (CST) Monday through Friday.
Contact Customer Support or your Account Executive with any questions. We appreciate your business and look forward to helping you!
usa.siemens.com/buildingtechnologies

Pressure Independent Control Valves NEW!

Three functions in one streamlined device

2-Way Pressure Independent Control Valves are uniquely designed with three functions integrated into one single device: control valve, adjustable flow limiter, and automatic pressure regulator. This 3-in-1 device improves accuracy and reliability – regardless of pressure fluctuations. Install them for an excellent solution when trying to achieve hydronic balancing in room, zone and many other HVAC applications.

The combination of control valve and differential pressure regulator in one valve simplifies installation and makes commissioning fast and easy. Count on them to help prolong maintenance and preserve the life of HVAC equipment, enhance room comfort and optimize energy efficiency. Pair them with SSD, SAY, SAX, SAV and SQV Series spring return and non-spring return valve actuators and you have the ideal solution for renovations, expansions, and new construction projects.

Control Valve Features

- A comprehensive portfolio of 1/2 to 6 inch PICVs
- Threaded valves are ANSI Class 250
- Flanged valves available in ANSI Class 125 and 250
- Low ANSI Class IV leakage
- Brass trim with stainless steel stem
- Automatically adjusts to pressure fluctuations in the system, maintaining consistent flow at any given control setting while providing better comfort and lower energy consumption
- No mutual hydronic interaction between branches with different operational situations, preventing over or undersupply
- Fast commissioning with extremely simplified hydronic balancing

Field Adjustable Flow Limiter Features

- Full stroke always maintained regardless of maximum flow setting enabling higher control accuracy
- Easily adjust maximum flow at any time when usage patterns change
- Presetting prevents oversupply to the coil

Siemens Product Guard **PLUS 3** Warranty

Two-Way PICV NEW!

Control Valve, Adjustable Flow Limiter, and Automatic Pressure Regulator
1/2 to 2" Brass Body
ANSI Class 250
Normally Open or Normally Closed

1/2 to 1-1/4" Two-Way NO
Pressure Independent Control Valve.

1/2 to 1-1/4" Two-Way NC
Pressure Independent Control Valve.

1-1/2 to 2" Two-Way NO
Pressure Independent Control Valve.

Description

Siemens Pressure Independent Control Valves integrate three functions into a single device: control valve, adjustable flow limiter, and automatic pressure regulator. The 1/2-inch Normally Open valves have a 2.5 mm stroke, and a threaded valve bonnet for use with SSD Electronic Valve Actuators. The 3/4- to 1-1/4-inch Normally Open and 1/2 to 1-1/4 inch Normally Closed Valves have a 5 or 5.5 mm stroke, and a threaded valve bonnet for use with SSD Electronic Valve Actuators. The 1-1/2 and 2-inch Normally Open Valves have a 15 mm stroke and use the SAY Electronic Valve Actuators.

Features

- Control valve with integrated pressure regulator and adjustable flow limiter
- Direct-coupled, universal bonnet
- ANSI Class 250 valve body
- ANSI Class IV (0.01%) leakage
  @ 200 psi for 1/2 to 1-1/4 inch normally open valves
  @ 100 psi for 1-1/2 and 2 inch valves
  @ 45 psi for 1/2 to 1-1/4 inch normally closed valves
- Linear Flow Characteristic
- Brass trim with stainless steel stem
- 1-1/2 and 2-Inch valves include P/T ports
- SAY actuators can be wired for normally closed operation; 0-10 V actuators require AZX61.1 Function Module, see technical instructions

Applications

For use in HVAC applications with the Pressure Independent Control SSD or SAY Electronic Actuator, to control hot or chilled water or 50% water-glycol solution in closed loop systems.

Specifications

Valve Specifications

Body Material
1/2 to 1-1/4-inch ..... Brass
1-1/2 and 2-inch ..... Ductile Iron

Stem ..... Stainless Steel

Line Size ..... 1/2-inch to 2-inch (15 mm to 50 mm)

Action 2-Way

Valve Body Rating ..... ANSI 250

Close-off Pressure/Leakage Rate
1/2 to 1-1/4-inch, NO ..... 200 psi/ANSI Class IV (0.01%)
1/2 to 1-1/4-inch, NC ..... 45 psi/ANSI Class IV (0.01%)
1-1/2 and 2-inch ..... 100 psi/ANSI Class IV (0.01%)

Medium Temperature Range ..... 34° to 248°F (1° to 120°C)

Flow Characteristic ..... Linear

Connection ..... NPT threaded

Actuator Specifications

Operating Voltage
SSD81U/SSD81.5U/SSD61.5U ..... 24 Vac
SSD61U/SAY ..... 24 Vac/dc

Frequency ..... 60 Hz

Power Consumption (Normal Operation)
SSD81U ..... 0.8 VA
SSD81.5U ..... 2 VA
SSD61U ..... 2.5 VA
SSD61.5U ..... 2 VA
SAY61.03U ..... 8 VA
SAY81.03U ..... 5 VA

Signal
SSD81U, SSD81.5U, SAY81.03U ..... Floating
SSD61U, SSD61.5U ..... 0 to 10 Vdc
SAY61.03U ..... 0 to 10 Vdc or 4 to 20 mA

Run Time (in seconds)

	2.5 mm Stroke	5/5.5 mm Stroke	15 mm Stroke
SSD81U	75 seconds	150 seconds	—
SSD81.5U	70 seconds	125 seconds	—
SSD61U	45 seconds	90 seconds	—
SSD61.5U	15 seconds	30 seconds	—
SAY	—	—	30 seconds

Force
SSD (NSR) ..... >56 lbs. (250 N)
SSD (SR) ..... >67 lbs. (300 N)
SAY ..... >44 lbs. (200 N)

Agency Certification
UL ..... Meets UL 873
cUL ..... Certified to Canadian Standard C22.2 No. 24.93
Mounting Location ..... NEMA 1 (Interior only)

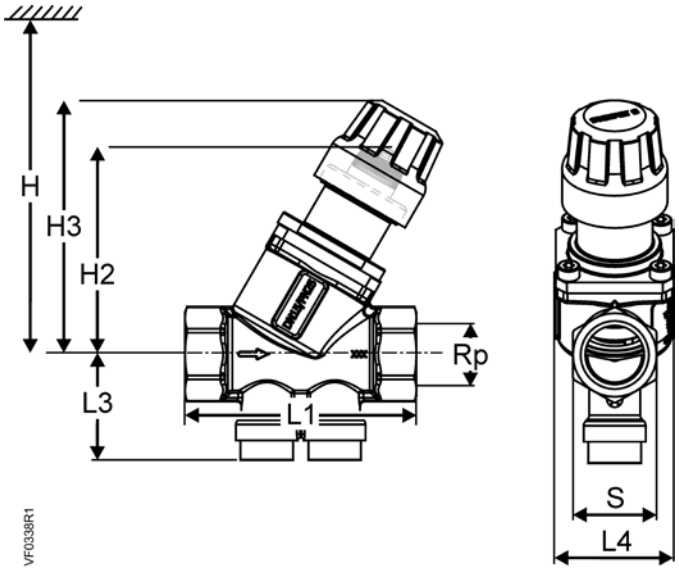
Flow Range

Size in.	Δp min (psi)	Δp max (psi)	GPM Flow Range	NO Valve Body	NC Valve Body
1/2	2.3	58	0.2 to 0.9	**599-04310**	—
	2.7		0.5 to 2.5	**599-04311**	—
	2.3		0.3 to 2.7	—	**599-04300**
	2.6		1.0 to 7.5	—	**599-04301**
3/4	2.3		0.5 to 4.5	—	**599-04302**
	3.1		1.0 to 5.8	**599-04312**	—
	3.2		1.0 to 8.9	—	**599-04303**
1	3.2		1.0 to 8.9	—	**599-04304**
	4.0		1.2 to 8	**599-04313**	—
1-1/4	2.6		2.5 to 13.2	—	**599-04305**
	4.1		3 to 18	**599-04314**	—
1-1/2	3.6		10 to 40	**599-04315**	—
2	5.0		10 to 50	**599-04316**	—

Product Ordering

	Description		Part No.	Actuator Prefix Code
	Electro-Mechanical	Floating, Spring Return	**SSD81.5U**	**232**
		0-10 Vdc, Spring Return	**SSD61.5U**	**233**
		Floating, Non-Spring Return	**SSD81U**	**230**
		0-10 Vdc, Non-Spring Return	**SSD61U**	**231**
	Electro-Mechanical	Floating, Non-Spring Return	**SAY81.03U**	**334**
		0 to 10 V or 4 to 20 mA, Non-Spring Return	**SAY61.03U**	**335**

NO – 1/2 to 2 inch Valves

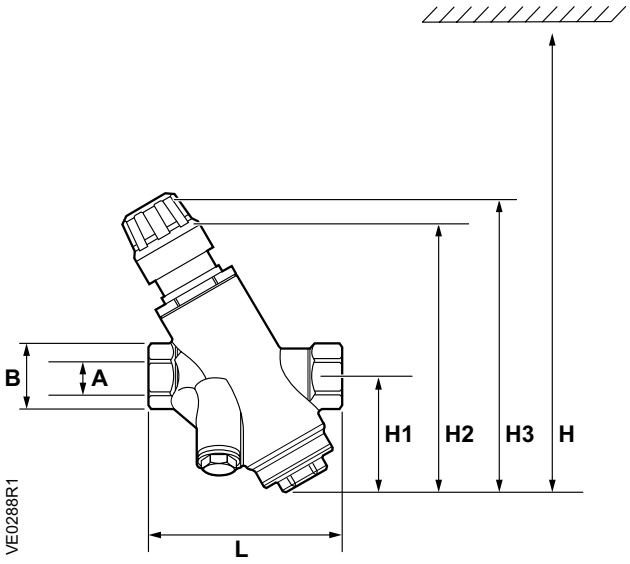


Dimensions shown in inches (mm).

Valve Size Inches Rp	Dimensions																	
	S		L1		L3		L4		H2		H3		H		Weight lb.	(kg)
1/2	1.1	(27)	3.0	(75)	1.6	(41)	1.5	(38)	2.6	(67.3)	3.2	(82.4)	14.6	(371)	1.1	(0.50)
3/4	1.25	(32)	3.1	(79)	1.6	(41)	1.5	(38)	2.7	(67.5)	3.3	(82.5)	14.7	(374)	1.2	(0.53)
1	1.5	(40)	4.0	(100)	1.7	(44)	1.5	(38)	2.8	(71)	3.3	(82.5)	14.7	(374)	2.5	(1.14)
1-1/4	1.8	(46)	4.1	(104)	2.1	(53)	2.5	(65)	3.4	(86)	4.0	(100)	15.4	(391)	2.8	(1.27)
1-1/2	2.3	(58)	5.4	(138)	2.7	(68)	3.7	(94)	5.9	(149)	–		20	(508)	7.2	(3.28)
2	2.8	(72)	5.4	(138)	2.9	(74)	3.7	(94)	5.9	(149)	–		20	(508)	8.2	(3.71)

Dimensions

NC – 1/2 to 1-1/4 Inch Valves



Dimensions shown in inches (mm).

Valve Size in.	Dimensions													
	A		B		L		H1		H2		H3		H		Weight lb.	(kg)
1/2	.50	(15)	1.1	(27)	3.5	(88)	2.1	(53)	4.8	(123)	5.3	(135)	16.3	(414)	2.0	(0.9)
	.50	(15)	1.1	(27)	3.5	(88)	2.1	(53)	4.8	(123)	5.3	(135)	16.3	(414)	2.0	(0.9)
3/4	.75	(20)	1.3	(32)	3.5	(88)	2.1	(53)	4.8	(123)	5.3	(135)	16.3	(414)	2.0	(0.9)
	.75	(20)	1.3	(32)	3.5	(88)	2.1	(53)	4.8	(123)	5.3	(135)	16.3	(414)	2.0	(0.9)
1	1.0	(25)	1.5	(40)	3.6	(92)	2.1	(53)	4.8	(123)	5.3	(135)	16.3	(414)	2.0	(0.9)
1-1/4	1.25	(32)	1.8	(46)	5.0	(125)	2.7	(69)	5.7	(145)	6.2	(158)	19.9	(505)	3.3	(1.5)

SSD Series Electronic Valve Actuators

24 Vac, Floating or 0 to 10 Vdc Control
Spring Return and Non-Spring Return

SSD Series Spring Return Electronic Valve Actuator.

SSD Series Non-Spring Return Electronic Valve Actuator.

Description

Pressure Independent Control Series SSD Electronic Valve Actuators require a 24 Vac power supply and receive a floating control signal (SSD81…) or a proportional 0 to 10 Vdc signal (SSD61…) to control a valve. The 0 to 10V SSD61U actuator also accepts a 24 Vdc power supply.

These actuators are designed to work with 1/2- to 1-1/4-inch Pressure Independent Control Series Valves with a 1/10-inch (2.5 mm), 1/5-inch (5 mm), or 7/32-inch (5.5 mm) stroke and a threaded valve bonnet that fits the actuator.

Features

- Nominal force >56 lbs (250 N)
- Floating or 0 to 10 Vdc control
- Spring return and non-spring return variants
- Automatic stroke calibration on the SSD61…
- Reduced power consumption in holding position
- Direct coupled installation; actuators mount on valves without tools or any adjustments required
- Manual override
- Visual position indication
- UL listed for plenum installation
- Maintenance-free, electromotoric actuator
- Plenum cable or 3/8" flex conduit connections

Applications

For use in heating and cooling HVAC applications with Pressure Independent Control valves. They can be used in chilled/hot water applications or in water-glycol solutions up to 50% in closed loop systems. The Spring Return SSDx1.5U Series actuators accept plenum cable or 3/8-inch flex conduit connections.

Specifications

Operating Voltage
- Vac ..... 24 Vac ±20%
- Vdc (SSD61U only) ..... 24 Vdc ±25%

Frequency ..... 50/60 Hz

Power Consumption (Normal Operation)
- SSD81U ..... 0.8 VA max.
- SSD61U ..... 2.5 VA max.
- SSDx1.5U ..... 2 VA

Control Signal
- SSD81xxx ..... Floating
- SSD61xxx ..... 0 to 10 Vdc

Run Time	**2.5 mm Stroke**	**5 mm Stroke**
SSD81U	75 Seconds	150 Seconds
SSD61U	45 Seconds	90 Seconds
SSD81.5U	70 Seconds	125 Seconds
SSD61.5U	15 Seconds	30 Seconds

Spring Return	**2.5 mm Stroke**	**5 mm Stroke**
SSD81.5U	15 Seconds	30 Seconds
SSD61.5U	15 Seconds	30 Seconds

Nominal Stroke ..... 5 mm

Nominal Force
- SSD81U, SSD61U ..... >56 lbs. (250N)
- SSDx1.5U ..... >67 lbs. (300N)

Agency Approvals
- UL UL873
- cUL ..... Certified to Canadian Standard C22.2 No. 24-93

Ambient Temperature
- Operation ..... 41° to 122°F (5° to 50°C)
- Transport/Storage ..... -13° to 158°F (-25° to 70°C)

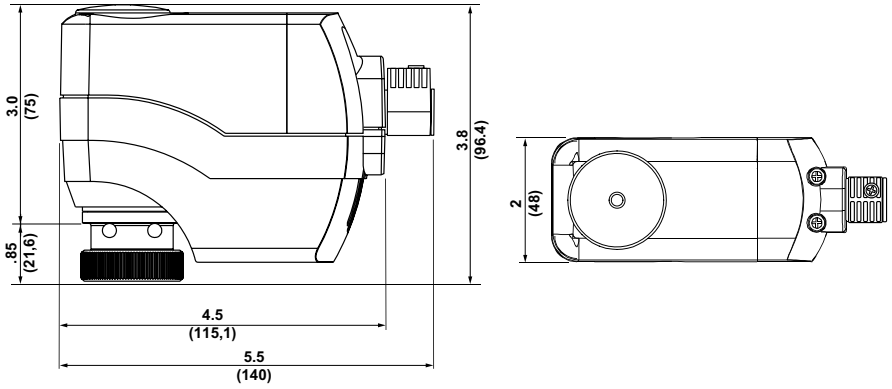
Humidity (Non-condensing)
- Operation ..... 5 to 85% rh
- Transport ..... <95% rh
- Storage ..... 5% to 95% rh

Product Ordering

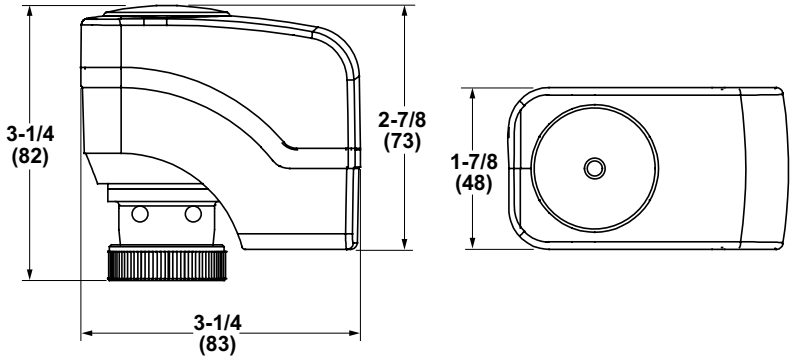
Description	Part No.	Actuator Prefix Code
Spring Return		
Floating	**SSD81.5U**	232
0 to 10 Vdc	**SSD61.5U**	233
Non-Spring Return		
Floating	**SSD81U**	230
0 to 10 Vdc	**SSD61U**	231

Dimensions

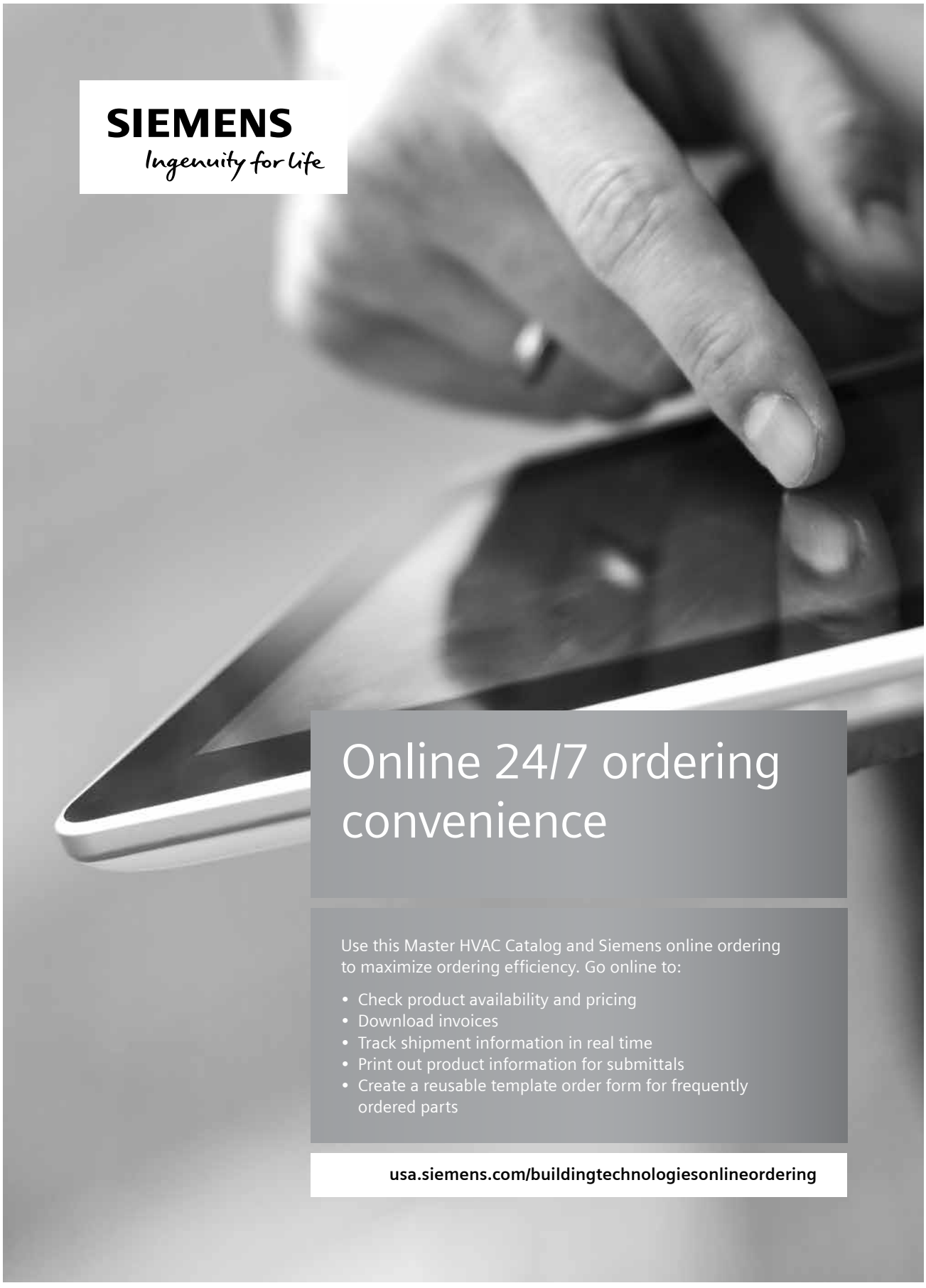
SSD Series Spring Return Actuator



SSD Series Non-Spring Return Actuator



Dimensions shown in inches (mm).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SAY Series Electronic Valve Actuators

NEW!

24 V, Floating or 0 to 10 Vdc Control
Non-Spring Return

SAY Series Electronic Valve Actuator.

Description

Pressure Independent Control Series SAY Non-Spring Return (NSR) Electronic Valve Actuators require a 0 to 10 Vdc or a 4 to 20 mA control signal to proportionally control a valve (SAY61.03U), or a 24 Vac supply to provide three-position control of a valve (SAY81.03U).

SAY actuators are designed to work with 1-1/2- or 2-inch normally open (NO) Siemens Pressure Independent Control Valves with a 5/8-inch (15 mm) stroke.

Features

- 24 Vac/dc operating voltage
- Proportional or floating (3P) control
- Direct-coupled installation requires no special tools or adjustments
- Manual override
- Overload and stall protection
- Visual stroke indication
- Non-spring return (fail-in-place)
- 45 lb (200N) nominal force
- Automatic stroke calibration on SAY61.03U
- LED status on SAY61.03U
- Electronic stroke indication on SAY61.03U
- Maintenance-free
- Optional functions with auxiliary switches, potentiometer (SAY81.03U), function module (SAY61.03U), and stem heater
- Can be wired for normally closed operations; proportional actuators require AZX61.1 function module. See Installation or Technical Instructions.

Applications

Typical applications include control of hot or chilled water or water-glycol solutions up to 50% in closed loop systems. They are ideal for installations requiring quick response and excellent resolution.

Siemens Product Guard **PLUS 3** Warranty

Specifications

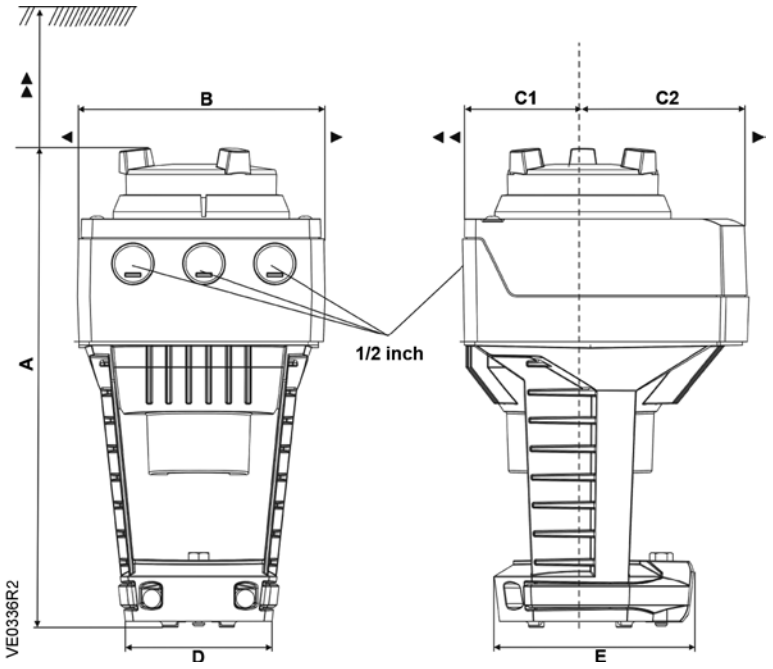
Operating Voltage ..... 24 Vac ±20%, 24 Vdc +20%/-15%
Frequency ..... 45 to 65 Hz
Power Consumption (SAY61.03U) ..... 8 VA
Power Consumption (SAY81.03U) ..... 5 VA
Control Signals (SAY61.03U)
Control Input (Y)
Voltage..... 0 to 10 Vdc
Current..... 4 to 20 mA
Control Input (Z)
Resistance..... 0 to 1000 Ohm
Position Feedback Output (U)..... 0 to 10 Vdc
Control Signal (SAY81.03U) ..... 3-Position (Floating)
Function
Nominal Stroke ..... 5/8" (15 mm)
Run Time ..... 30 sec.
Nominal Force ..... 45 lb. (200 N)

Agency Approvals UL873
CSA C22.2 No. 24-93
Operating and Storage Temperature
Operating Temperature ..... 23° to 131°F (-5° to 55°C)
Storage Temperature ..... 5° to 131°F (-15° to 55°C)
Transport Temperature ..... -13° to 158°F (-25° to 70°C)
Ambient Humidity ..... 5 to 95% RH, Non-condensing
Media Temperature ..... Up to 266°F (130°C)
Conduit Opening ..... 1/2" NPSM
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Floating, Non-Spring Return	**SAY81.03U**	334
0 to 10 Vdc or 4 to 20 mA, Non-Spring Return	**SAY61.03U**	335

Dimensions



Dimensions shown in inches (mm).

	Dimensions									
	A	B	C	C1	C2	D	E	►	►►	Weight lb. (kg)
SAY	9.53 (242)	4.88 (124)	5.91 (150)	2.68 (68)	3.23 (82)	3.15 (80)	3.94 (100)	3.94 (100)	7.87 (200)	4.1 (1.85)
With ASK39.1	10.51 (267)	6.06 (154)	11.81 (300)	7.87 (200)	3.94 (100)	—	—	—	—	4.6 (2.08)

Table Notes:

Service envelope Minimum access space recommended

► 4 inch (100 mm) ►► 8 inch (200 mm)

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Two-Way Flanged PICV

NEW!

Control Valve, Adjustable Flow Limiter, and Automatic Pressure Regulator
2-1/2 to 6"
ANSI Class 125 or 250

Flanged PICV Valve.

Description

Pressure Independent Control Valves automatically adjust to differential pressure changes, providing constant flow in HVAC systems. This reduces “hunting” for the right setting, and results in better control and increased comfort. Overall system performance can be optimized with PICV, requiring less pumping energy and contributing to more efficient loading of boilers and chillers.

Siemens Pressure Independent Control Valves integrate three functions into a single device: control valve, adjustable flow limiter, and automatic pressure regulator. The 2-1/2 and 3 inch valves have a 3/4-inch (20 mm) stroke and use the SAX non-spring return electronic valve actuators and the SQV spring return electronic valve actuators. The 4 to 6 inch valves have a 1-1/2-inch (40 mm) stroke and use the SAV non-spring return electronic valve actuators and the SQV spring return electronic valve actuators.

Features

- 3-in-1 device includes a control valve, field adjustable flow limiter, and automatic pressure regulator
- Full stroke regardless of maximum flow setting
- Maximum flow preset is easily field adjustable
- Choice of low flow ranges: up to 110 gpm for 2.5-inch, up to 150 gpm for 3-inch, up to 300 gpm for 4-inch, up to 485 gpm for 5-inch, and up to 650 gpm for 6-inch
- Choice of high flow ranges: up to 154 gpm for 2.5 inch, up to 190 gpm for 3 inch, up to 395 for 4-inch, up to 595 gpm for 5-inch, and up to 860 gpm for 6-inch
- Available in both ANSI 125 and ANSI 250 pressure classes
- Can be equipped with SAX, SAV, or SQV electromotoric actuators
- Both SQV actuators (normally open and normally closed) can be wired for floating, 0-10V or 4-20 mA control signals

Applications

Typical applications include control of hot or chilled water or water-glycol solutions up to 50% in closed loop systems.

Siemens Product Guard **PLUS 3** Warranty

Specifications

Valve Specifications

Body Material ..... Cast Iron
Plug ..... Brass
Seat ..... Stainless Steel
Stem ..... Stainless Steel
Line size ..... 2-1/2-inch (65 mm), 3-inch (80 mm), 4-inch (100 mm), 5-inch (125 mm), 6-inch (150 mm)
Action 2-way
Valve Body Rating ..... ANSI 125 and 250
Close-off ..... 100 psi (700 kPa)
Leakage Rate ..... < ANSI Class IV (0.01%)
Medium Temperature Range ..... 34° to 250°F (1° to 120°C)
Flow Characteristic ..... Linear
Connection ..... ANSI Flanged

Actuator Specifications

Operating Voltage
SAV ..... 24 Vac ± 20%
24 Vdc +20%/-15%, Class 2
SAX, SQV ..... 24 Vac/dc

Frequency
SAV ..... 45 to 65 Hz
SAX, SQV ..... 50/60 Hz

Power Consumption (Normal Operation)
SAV61.00U ..... Stem retracts/extends 9.5 VA/4.5 W
Holding State 3.75 VA/1.7 5W
SAV81.00U ..... Stem retracts/extends 7 VA/4.5 W
SAX 8 VA/3.75W
SQV 20 VA/7.5W

Control Signal
SAV61.00U ..... Positioning signal "Y" (0 to 10 Vdc)
Current draw < 0.1 mA
Input impedance > 100K Ω
(4 to 20 mA) Current draw DC 4 to 20 mA + 1%
Input impedance < 500 Ω
SAV81.00U ..... Positioning signals "Y1", "Y2" 3-position
Voltage 24 Vac ± 20%/24 Vdc + 20%/-15%
SAX81.03U ..... Floating
SAX61.03U ..... 0 to 10 Vdc
SQV ..... Selectable (Floating, 0 to 10 Vdc, 4 to 20 mA)

Run time
SAV ..... 120 seconds
SAX ..... 30 seconds
SQV ..... 40 to 120 seconds (adjustable)

Force
SAV ..... 360 lb (1600 N)
SAX ..... 180 lb (800 N)
SQV ..... 250 lb (1100 N)

Agency Certification
UL ..... Meets UL 873
cUL ..... Certified to Canadian Standard C22.2 No. 24.93

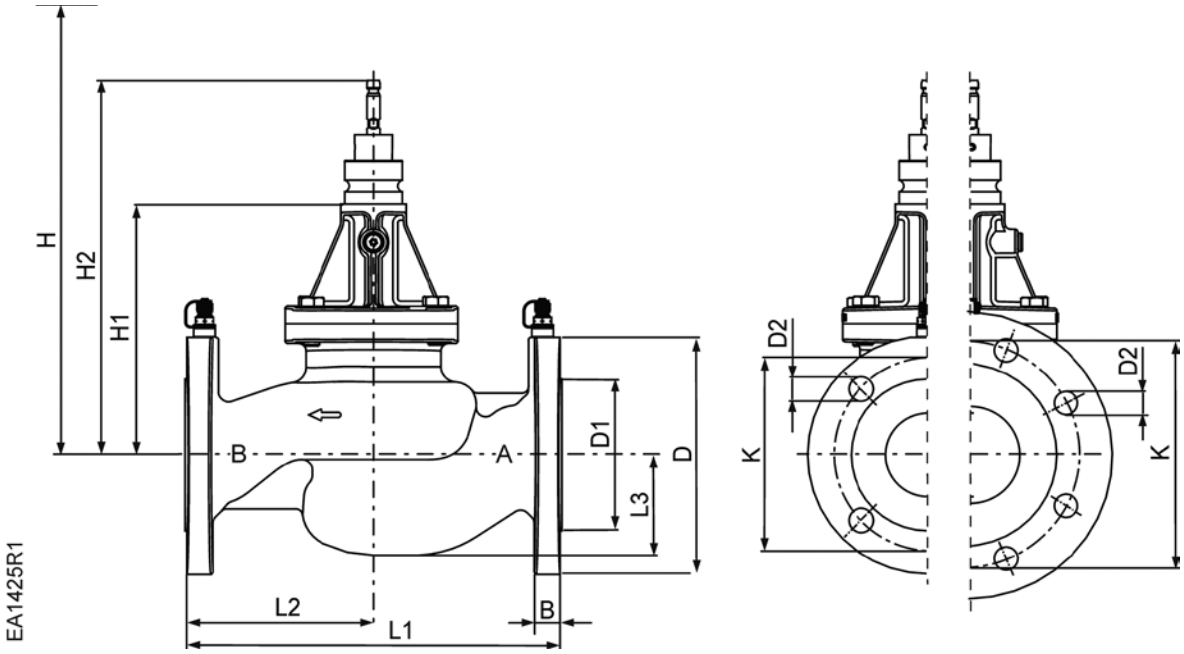
Valve Product Ordering

Line Size Inch (mm)	Maximum GPM Flow Range	Valve Body Part No. ANSI 125	Valve Body Part No. ANSI 250
2-1/2 (65) Low Flow	19 to 110	**599-07310**	**599-07320**
2-1/2 (65) High Flow	26 to 154	**599-07315**	**599-07325**
3 (80) Low Flow	24 to 150	**599-07311**	**599-07321**
3 (80) High Flow	31 to 190	**599-07316**	**599-07326**
4 (100) Low Flow	55 to 300	**599-07312**	**599-07322**
4 (100) High Flow	65 to 395	**599-07317**	**599-07327**
5 (125) Low Flow	85 to 485	**599-07313**	**599-07323**
5 (125) High Flow	105 to 595	**599-07318**	**599-07328**
6 (150) Low Flow	115 to 650	**599-07314**	**599-07324**
6 (150) High Flow	140 to 860	**599-07319**	**599-07329**

Actuator Product Ordering

	Description		Part No.	Actuator Prefix Code
	Electro-Mechanical	Floating, 0-10V or 4 to 20mA, Spring Return, Normally Open	**SQV91P30U**	238
		Floating, 0-10V or 4 to 20mA, Spring Return, Normally Closed	**SQV91P40U**	239
	Electro-Mechanical	Floating, Non-Spring Return	**SAX81.03U**	373
		Proportional Non-Spring Return	**SAX61.03U**	371
	Electro-Mechanical	Floating, Non-Spring Return	**SAV81.00U**	379
		Proportional, Non-Spring Return	**SAV61.00U**	378

Dimensions



Dimensions shown in inches (mm).

Product Number	Valve Size in. (mm)	Dimensions													
												H			Weight lb. (kg)
		B	Ø D	Ø D1	Ø D2	L1	L2	L3	Ø K	H1	H2	SAX	SAV	SQV	
599-07310	2.5 (65)	0.69 (17.5)	7.01 (178)	–	0.75 (19)	10.87 (276)	5.43 (138)	3.11 (79)	5.50 (140)	7.68 (195)	11.42 (290)	25.08 (637)	—	26.93 (684)	42 (19)
599-07315															
599-07320		1.00 (25.4)	7.48 (190)	4.96 (126)	0.88 (22.4)	11.50 (292)	5.75 (146)	3.31 (84)	5.88 (149.4)	7.68 (195)	11.42 (290)	25.08 (637)	—	26.93 (684)	56 (25.4)
599-07325															
599-07311	3 (80)	0.75 (19)	7.50 (191)	–	0.75 (19)	11.75 (298)	5.87 (149)	3.75 (95.3)	6.00 (152)	8.52 (216.5)	12.32 (313)	25.95 (659)	—	23.86 (606)	62 (28.1)
599-07316															
599-07321		1.12 (28.5)	8.25 (210)	5.69 (145)	0.88 (22.4)	12.5 (318)	6.26 (159)	3.88 (98.4)	6.62 (168)	8.52 (216.5)	12.32 (313)	25.95 (659)	—	23.86 (606)	82 (37.2)
599-07326															
599-07312	4 (100)	0.98 (25)	9.00 (228.6)	–	0.75 (19)	13.86 (352)	7.40 (188)	4.49 (114)	7.5 (190.5)	13.07 (332)	19.23 (488.5)	—	31.38 (797)	32.32 (821)	123 (55.6)
599-07317															
599-07322		1.14 (29)	10 (254)	6.94 (176.3)	0.88 (22.4)	14.40 (365.8)	7.63 (193.8)	4.61 (117)	7.88 (200.2)	13.07 (332)	19.23 (488.5)	—	31.38 (797)	32.32 (821)	156 (70.8)
599-07327															
599-07313	5 (125)	0.98 (25)	10 (254)	–	0.88 (22.4)	15.75 (400)	8.07 (205)	5.30 (134.7)	8.50 (215.9)	14.06 (357)	15.63 (397)	—	34.06 (865)	35.00 (889)	170 (77.2)
599-07318															
599-07323		1.52 (38.6)	10.9 (276.9)	8.31 (211.1)	0.88 (22.4)	16.62 (422.2)	8.51 (216.1)	5.50 (139.6)	9.25 (235)	14.06 (357)	15.63 (397)	—	34.92 (887)	35.87 (911)	221 (100)
599-07328															
599-07314	6 (150)	1.05 (26.70)	11 (279.4)	–	0.88 (22.4)	17.76 (451)	9.17 (233)	6.15 (156.3)	9.50 (241.3)	15.79 (401)	17.48 (444)	—	36.06 (916)	37.01 (940)	235 (106)
599-07319															
599-07324		1.58 (40.1)	12.5 (317.5)	9.69 (246.1)	0.88 (22.4)	18.62 (473)	9.61 (244)	6.34 (161.1)	10.63 (270)	15.79 (401)	17.48 (444)	—	36.93 (938)	37.87 (962)	303 (138)
599-07329															

Table Notes:

øD1 = Raised area of flange
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, maintenance, etc.
H1 = Dimension from the pipe center to install the actuator (upper edge)
H 2 = Valve in the «Open» position means that the valve stem is fully extended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SQV Valve Actuator

24 Vac/dc, Floating or Proportional Control
Floating, 0-10 V or 4-20 mA
Spring Return

SQV Series Electro-Motoric Valve Actuators.

Description

Pressure Independent Control Series SQV Electro-Motoric Valve Actuators require a 24 V ac or dc power supply and receive a floating, 0-10 V or 4-20 mA signal to control a valve. The SQV Actuators are available as either fail open or fail closed when used with the Siemens Flanged Pressure Independent Control Valves.

These actuators are designed to work the 2-1/2 to 6-inch Pressure Independent Control Series Valves with a 3/4-inch (20 mm) or 1-1/2-inch (40 mm) stroke and the standard Siemens Flowrite bonnet connection.

Features

- Operating voltage: AC/DC 24V
- Control signals: 3-position, DC 0 to 10V, DC 4 to 20 mA
- Fail-safe function
- Position feedback
- Manual adjuster
- Position and status indication (LED)
- Selectable positioning times from 40 to 240 seconds
- Selection of acting direction and flow characteristic
- Direct mounting on Pressure Independent Control Valves
- UL Listed

Applications

Electromotoric actuators to operate Siemens Pressure Independent Control Valves with 3/4-inch (20 mm) or 1-1/2-inch (40 mm) stroke as control valves for large air handling units and distribution of hot and chilled water.

Specifications

Operating Voltage ..... 24 Vac ±20%
24 Vdc ±15%, Class 2

Frequency ..... 50 to 60 Hz

Fusing of Supply Lines ..... Maximum 10 Amp slow

Power Consumption ..... 20 VA/7.5 W

Operating Data
- Positioning time open/close ..... 40 seconds (default for 3/4 in. (20 mm) stroke)
  Positioning time depends on the DIP switch setting
- Positioning force ..... ≥ 247 lb (1100 N)
- Nominal stroke ..... 3/4-inch (20 mm) to 1-1/2-inch (40 mm)
- Admissible temperature of medium in the valve ..... 34° to 248°F (1° to 120°C)

Signal Inputs
- Terminals G1, G2 ..... 3-position
  - Voltage ..... 24 Vac ±20%
    24 Vdc ±15%
- Terminal Yu
  - Voltage ..... 0 to 10 Vdc
  - Input impedance ..... ≥ 100K Ω
- Terminal Yi
  - Power ..... DC 4 to 20 mA
  - Input impedance ..... 50 Ω

Fail-safe Function
- Terminal G
  - SQV91P30U ..... Loss of operating voltage
    Actuator stem retracted, pressure independent valve fully open (100%)
  - SQV91P40U ..... Loss of operating voltage
    Actuator stem extended, pressure independent valve fully closed (0%)
- Spring return time ..... 15 sec for 3/4-inch (20 mm) stroke
  30 sec for 1-1/2-inch (40 mm) stroke

Position Feedback
- Position feedback U ..... DC 0 to 10V + 1%
- Load impedance ..... >2.5K Ω resistive
- Load ..... Maximum 4 mA

Electrical Connections
- Wire cross-sectional areas ..... 14 to 30 AWG
- Cable entries (1/2" conduit adapter included) ..... 2 openings M20 x 1
  1 opening M16 x 1.5

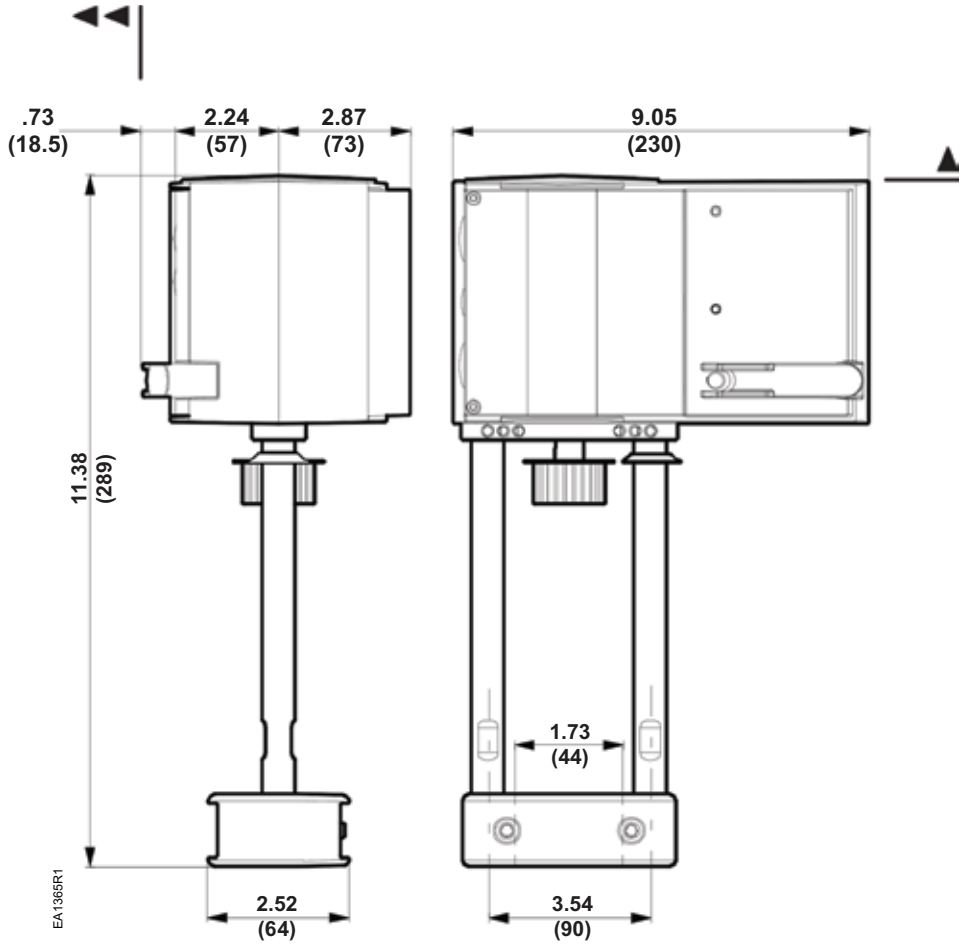
Degree of Protection
- Housing from vertical to horizontal ..... NEMA 4/4X (IP 66)
- Insulating class, AC/DC 24V III

Environmental Conditions
- Operation
  - Mounting location ..... Indoors (weather-protected)
  - Temperature ..... 32° to 122°F (0° to 50°C)
  - Humidity (non-condensing) ..... <95% rh
- Transport
  - Temperature ..... -22° to 158°F (-30° to 70°C)
  - Humidity ..... <95% rh
- Storage
  - Temperature ..... -22° to 149°F (-30° to 65°C)
  - Humidity ..... 5 to 95% rh

Product Ordering

Description	Part No.	Actuator Prefix Code
Floating, 0 to 10V or 4 to 20mA, Normally Open	**SQV91P30U**	238
Floating, 0 to 10V or 4 to 20mA, Normally Closed	**SQV91P40U**	239

Dimensions



Dimensions shown in inches (mm).

*** Height of actuator after fitting on valve**

▲ 4 inches (100 mm) Minimum clearance from wall or ceiling

◄◄ 8 inches (200 mm) for mounting, connection, operation, service, and so on

SIEMENS
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Ball Valves that fit every application

With line sizes ranging from ½" to 2" sizes (Cv ranging from 0.4 to 250), Siemens Ball Valves tightly control hot or chilled water and up to 50% glycol solution in convectors, fan coil units, unit conditioners, radiation, and reheat coils.

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SAX Valve Actuator

24 Vac, Floating or Proportional Control
Floating, 0 to 10Vdc or 4 to 20 mA
Non-Spring Return

SAX Electronic Valve Actuator.

Description

Designed for use with Siemens 2-1/2 and 3-inch flanged Pressure Independent Control Valves with a 3/4-inch (20 mm) stroke. The SAX Electronic Actuator requires either a 24 Vac or 24 Vdc supply, and receives a 0 to 10 Vdc or 4 to 20 mA control signal to proportionally control the valve or a floating control signal to provide floating control of the valve.

Applications

Typical applications include control of hot or chilled water or water-glycol solutions up to 50% in closed loop systems. They are ideal for installations requiring quick response and excellent resolution.

Features

- 24 Vac/dc operating voltage
- Proportional or floating (3P) control
- Direct-coupled installation requires no special tools or adjustments
- Manual override
- Overload and stall protection
- Visual stroke indication
- Non-spring return (fail-in-place)
- 180 lb (800N) nominal force
- Automatic stroke calibration on SAX61.03U
- LED status on SAX61.03U
- Electronic stroke indication on SAX61.03U
- Maintenance-free
- Optional functions with auxiliary switches, potentiometer (SAX81.03U), function module (SAX61.03U), and stem heater
- Can be wired for normally closed operations; proportional actuators require AZX61.1 function module. See Installation or Technical Instructions.

Specifications

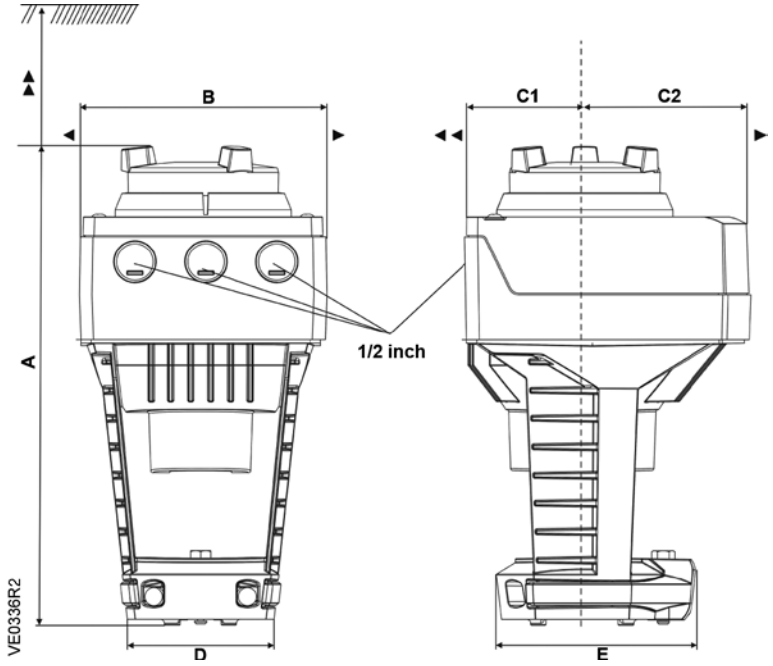
Operating Voltage ..... 24 Vac ±20%, 24 Vdc +20%/-15%
Frequency ..... 45 to 65 Hz
Power Consumption (SAX61.03U) ..... 8 VA
Power Consumption (SAX81.03U) ..... 5 VA
Control Signals (SAX61.03U)
Control Input (Y)
Voltage..... 0 to 10 Vdc
Current..... 4 to 20 mA
Control Input (Z)
Resistance.....0 to 1000 Ohm
Position Feedback Output (U)..... 0 to 10 Vdc
Control Signal (SAX81.03U) ..... 3-Position (Floating)
Function
Nominal Stroke .....3/4" (20 mm)
Run Time .....30 sec.
Nominal Force .....180 lb. (800 N)

Agency Approvals UL873
CSA C22.2 No. 24-93
Operating and Storage Temperature
Operating Temperature ..... 23° to 131°F (-5° to 55°C)
Storage Temperature ..... 5° to 131°F (-15° to 55°C)
Transport Temperature ..... -13° to 158°F (-25° to 70°C)
Ambient Humidity ..... 5 to 95% RH, Non-condensing
Media Temperature ..... Up to 266°F (130°C)
Conduit Opening ..... 1/2" NPSM
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Proportional, Non-Spring Return	**SAX61.03U**	**371**
Floating, Non-Spring Return	**SAX81.03U**	**373**

Dimensions



Dimensions shown in inches (mm).

	Dimensions									
	A	B	C	C1	C2	D	E	►	►►	Weight lb. (kg)
SAX	9.53 (242)	4.88 (124)	5.91 (150)	2.68 (68)	3.23 (82)	3.15 (80)	3.94 (100)	3.94 (100)	7.87 (200)	4.1 (1.85)
With ASK39.1	10.51 (267)	6.06 (154)	11.81 (300)	7.87 (200)	3.94 (100)	–	–	–	–	4.6 (2.08)

Table Notes:

Service envelope Minimum access space recommended

► 4 inch (100 mm) ►► 8 inch (200 mm)

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Siemens is your best choice for easy retrofits!

- Siemens Universal ARK Retrofit Kits conveniently replace Siemens Series 591 and 658 Globe Valve Actuators and JCI, Honeywell, and Siebe Globe Valve Actuators
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SAV Valve Actuator

NEW!

24 Vac/dc, Floating or Proportional Control
Floating, 0 to 10Vdc or 4 to 20 mA
Non-Spring Return

SAV Electronic Valve Actuator.

Description

The SAV Non-spring Return (NSR) Electronic Valve Actuator requires a 24 Vac/dc supply to provide three-position (floating) control of a valve. To proportionally control a valve, the actuator requires a 24 Vac/dc supply and receives a 0 to 10 Vdc or a 4 to 20 mA control signal. SAV actuators are designed to work with Siemens 4 to 6-inch Flanged Pressure Independent Control Valves with a 1-1/2-inch (40 mm) stroke.

Applications

Typical applications include control of hot or chilled water or water-glycol solutions up to 50% in closed loop systems. They are ideal for installations requiring quick response and excellent resolution.

Features

- 24 Vac/dc operating voltage
- Proportional or floating (3P) control
- Direct-coupled installation requires no special tools or adjustments
- Manual override
- Overload and stall protection
- Visual stroke indication
- Non-spring return (fail-in-place)
- 360 lb (1600N) nominal force
- Automatic stroke calibration on SAV61.00U
- LED status on SAV61.00U
- Electronic stroke indication on SAV61.00U
- Maintenance-free
- Optional functions with auxiliary switches, potentiometer (SAV81.00U), function module (SAV61.00U), and stem heater
- Can be wired for normally closed operations; proportional actuators require AZX61.1 function module. See Installation or Technical Instructions.

Specifications

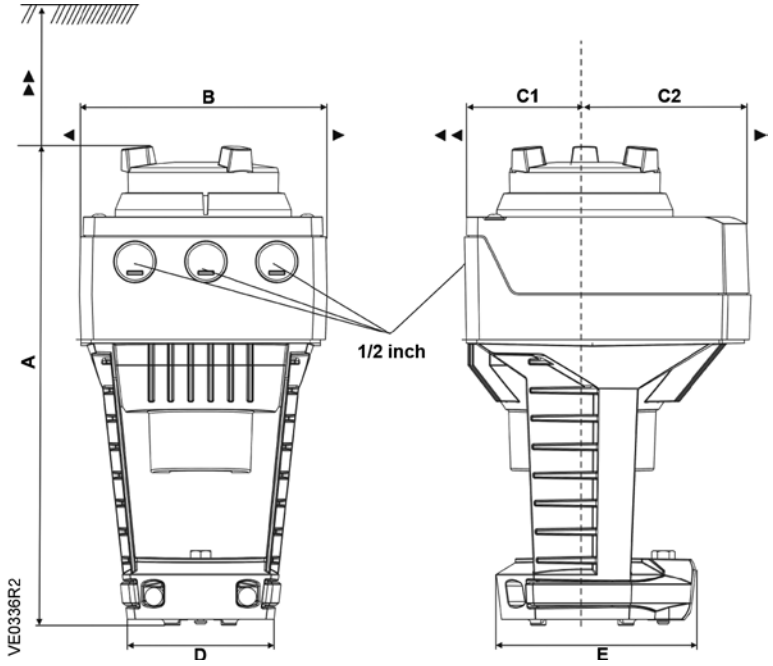
Operating Voltage ..... 24 Vac ±20%, 24 Vdc +20%/-15%
Frequency ..... 45 to 65 Hz
Power Consumption (SAV61.03U) ..... 8 VA
Power Consumption (SAV81.03U) ..... 5 VA
Control Signals (SAV61.03U)
Control Input (Y)
Voltage..... 0 to 10 Vdc
Current..... 4 to 20 mA
Control Input (Z)
Resistance.....0 to 1000 Ohm
Position Feedback Output (U)..... 0 to 10 Vdc
Control Signal (SAV81.03U) ..... 3-Position (Floating)
Function
Nominal Stroke ..... 1-1/2-inch (40 mm)
Run Time .....30 sec.
Nominal Force .....360 lb. (1600 N)

Agency Approvals UL873
CSA C22.2 No. 24-93
Operating and Storage Temperature
Operating Temperature ..... 23° to 131°F (-5° to 55°C)
Storage Temperature ..... 5° to 131°F (-15° to 55°C)
Transport Temperature ..... -13° to 158°F (-25° to 70°C)
Ambient Humidity ..... 5 to 95% RH, Non-condensing
Media Temperature ..... Up to 266°F (130°C)
Conduit Opening ..... 1/2" NPSM
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Proportional, Non-Spring Return	**SAV61.00U**	**378**
Floating, Non-Spring Return	**SAV81.00U**	**379**

Dimensions



Dimensions shown in inches (mm).

	Dimensions									
	A	B	C	C1	C2	D	E	►	►►	Weight lb. (kg)
SAV	10.43 (265)	4.88 (124)	5.91 (150)	2.68 (68)	3.23 (82)	3.15 (80)	3.94 (100)	3.94 (100)	7.87 (200)	4.23 (1.92)
With ASK39.1	11.42 (290)	6.06 (154)	11.81 (300)	7.87 (200)	3.94 (100)	—	—	—	—	4.74 (2.15)

Table Notes:

Service envelope Minimum access space recommended

► 4 inch (100 mm) ►► 8 inch (200 mm)

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More torque, less energy consumption

Siemens damper actuators ship ready to install, with built-in time and cost-saving features such as a patented self-centering shaft adapter, standardized wiring, and brushless motor technology. With torques ranging from 20 to 310 lb-in., this powerful and flexible line-up delivers out-of-the-box performance and long-lasting reliability for all types of HVAC applications.

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Zone Valves

Ranging from 1/2 to 1-inch (15 to 25 mm), the Zone Valves provide excellent control of fan coils, unit ventilators and other applications where on/off, floating or proportional control is required. Featuring direct-coupled technology for quick connection of the valve body and actuator without tools, the Zone Valves and Actuators use all-metal plugs and seat to deliver superior control of water and glycol solutions with NPT connection.

Features

- Metal-to-metal seat/plug design
- Direct coupled installation of actuator to valve without tools
- Low ANSI Class III Leakage
- Choice of interchangeable on/off (2P), floating (3P), and 0-10V proportional actuators
- On/off actuators available in 24V and 120V supply voltages
- Manual override
- Visual position indication

Two- and Three-Way Zone Valves

1/2 to 1" Brass Body
Normally Open/Normally Closed/Diverting

Two-Way NPT Zone Valve.

Three-Way NPT Zone Valve.

Description

Two- and Three-Way Zone Valves have a 1/10-inch (2.5 mm) stroke. The Zone Valves work with any SFA/SFP Series or SSA/SSP Series electric actuator. The actuators accept one of either 24 Vac or 120 Vac power supply signal to provide on/off, floating or 0 to10 Vdc control.

Features

- All metal plug and seat for superior control
- Direct-coupled universal bonnet – install actuators without tools
- NPT end connection
- Order separately or with an actuator as a complete assembly

Applications

Typical applications for Two- and Three-Way Zone Valves are hot or chilled water for zones with radiators; floor heating via manifolds; fan coil units; cooling ceilings; wall-mounted boilers; and VAV applications.

Recommendation:

Use only with Zone Valve Actuators.

Specifications

Line Size ..... 1/2-inch to 1-inch (15 mm to 25 mm)
Body Style ..... Globe
Action
2-way ..... NO/NC Determined by Actuator
3-way ..... Diverting/Mixing (Limited Application)
Valve Body Rating ..... 232 psi
Stem Travel (Stroke) ..... 1/10-inch (2.5 mm)
Materials
Body ..... Brass
Trim ..... Brass
Stem ..... Stainless Steel ASTM A582 Type 303
Packing ..... EPDM O-rings

Controlled Medium ..... Water, Glycol Solutions to 50%
Medium Temperature Range ..... 34° to 230°F (1° to 110°C)
Maximum Inlet Pressure ..... 232 psi
Leakage Rate ..... ANSI Class III
Close-off Ratings ..... According to ANSI/FCI 70-2
Flow Characteristic ..... Linear

Valve Product Ordering

Nominal Valve Size		Flow Rate		Part No.
Inch	mm	Cv	(Kvs)	
Two-Way Valve Bodies				
1/2	15	1.0	(0.85)	**599-00210**
1/2	15	2.5	(2.15)	**599-00211**
1/2	15	4.0	(3.4)	**599-00214**
3/4	20	4.1	(3.5)	**599-00212**
1	25	7.0	(6.0)	**599-00213**
Three-Way Valve Bodies				
1/2	15	1.0	(0.85)	**599-00230**
1/2	15	2.5	(2.15)	**599-00231**
1/2	15	4.0	(3.4)	**599-00234**
3/4	20	4.1	(3.5)	**599-00232**
1	25	7.0	(6.0)	**599-00233**

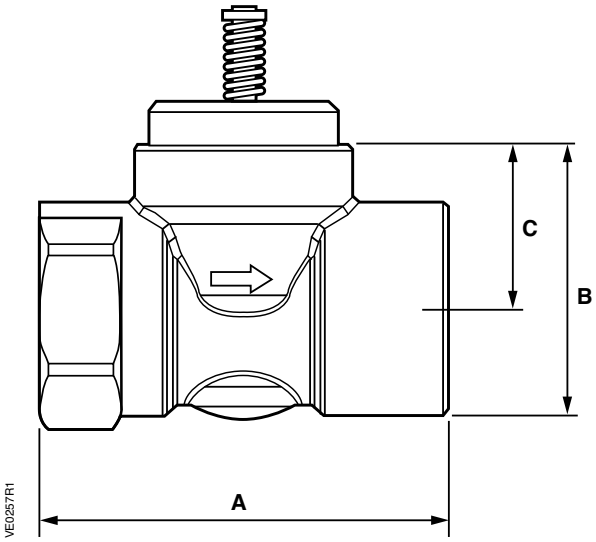
Actuator Product Ordering

Description		Part No.	Actuator Prefix Code
Two-Way Valves	Three-Way Valves		
Normally Open			
24 Vac, 0 to 10 Vdc, Modulating	24 Vac, 0-10 Vdc, Modulating	**SSP61U**	248
24 Vac, 2-Position, Spring Return	24 Vac, 2-Position, Fail AB→A	**SFP71U**	243
120 Vac, 2-Position, Spring Return	120 Vac, 2-Position, Fail AB→A	**SFP11U**	241
208 Vac, 2-Position, Spring Return	208 Vac, 2-Position, Fail AB→A	**SFP208U/25***	**
Normally Closed			
24 Vac, Floating	24 Vac, Floating	**SSA81U**	244
24 Vac, 0 to 10 Vdc, Modulating	24 Vac, 0-10 Vdc, Modulating	**SSA61U**	245
24 Vac, 2-Position, Spring Return	24 Vac, 2-Position, Fail AB→B	**SFA71U**	242
120 Vac, 2-Position, Spring Return	120 Vac, 2-Position, Fail AB→B	**SFA11U**	240
277 Vac, 2-Position, Spring Return	277 Vac, 2-Position, Fail AB→B	**SFA277U/25***	**

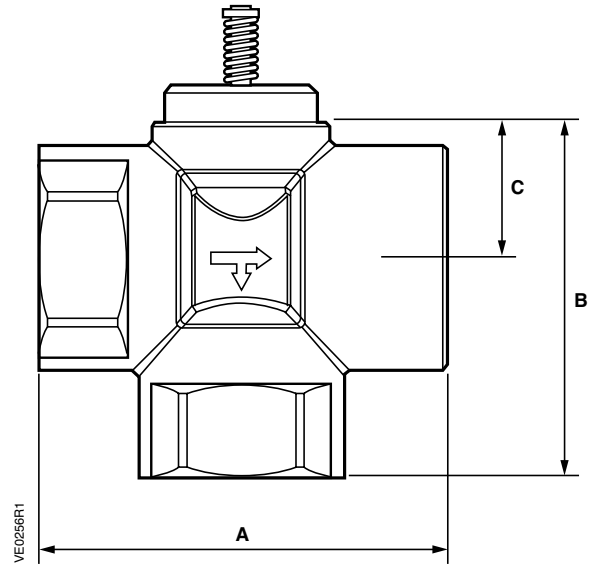
Table Notes:
*Part numbers with /25 come with 8.2 ft. (2.5m) leads.
**Actuator only; not available as an assembly.

Dimensions

Two-Way Zone Valve Body



Three-Way Zone Valve Body



Valve Size in.	(mm)	2-Way Valve A		B		C		Weight lb.	(kg)	3-Way Valve A		B		C		Weight lb.	(kg)
NPT																	
0.5	(15)	2.76	(70)	1.63	(41.5)	1.00	(25.4)	0.82	(0.37)	2.76	(70)	2.34	(59.5)	1.00	(25.4)	1.08	(0.49)
0.75	(20)	2.76	(70)	1.77	(45)	1.00	(25.4)	0.99	(0.45)	2.76	(70)	2.34	(59.5)	1.00	(25.4)	1.26	(0.57)
1.0	(25)	3.50	(89)	2.10	(54)	1.00	(25.4)	1.68	(0.76)	3.50	(89)	2.85	(67.3)	1.00	(25.4)	2.14	(0.97)
Sweat																	
0.5	(15)	2.66	(66)	1.48	(38)	1.00	(25.4)	0.60	(0.27)	2.66	(68)	2.26	(57.5)	1.00	(25.4)	0.71	(0.32)
0.75	(20)	2.76	(70)	1.63	(41.5)	1.00	(25.4)	0.71	(0.32)	2.76	(70)	2.34	(59.5)	1.00	(25.4)	0.86	(0.39)
1.00	(25)	3.50	(89)	1.77	(45)	1.00	(25.4)	1.06	(0.48)	3.50	(89)	2.65	(67)	1.00	(25.4)	1.24	(0.56)

Table Notes:
Table expressed in inches (mm).

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BT300 Variable Frequency Drives

Available in frame sizes up to 250 hp, the BT300 is well-suited for demanding HVAC environments and helps save 20-50% of energy compared to equipment with little or no control. Built-in features – like a real-time clock, energy savings optimization programming, and a sleep function – help measure energy savings. Built-in wizards get HVAC equipment up and running quickly and accurately.

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SFA/SFP Series Electronic Valve Actuator

24, 120, 208, or 277 Vac, Two-Position Control
Spring Return

SFA/SFP Series Electronic Valve Actuator.

Description

The SFA/SFP Series of Electronic Valve Actuators accepts 24, 120, 208, or 277 Vac power supply signal to provide two-position control. This actuator works with Zone Valves with 1/10-inch (2.5 mm) stroke.

Features

- UL listed for plenum installations
- Direct coupled installation without tools
- Manual override with auto unlock
- Visual position indication

Applications

The SFA/SFP Series of Electronic Valve Actuators is for use in heating and cooling HVAC applications with Zone Valves.

Specifications

Power Supply
- Operating Voltage ..... 24 Vac ±20%, 120 Vac ±20%, 208 Vac, 277 Vac
- Frequency
  - 24 Vac ..... 50/60 Hz
  - 120 Vac ..... 60 Hz
- Power Consumption
  - 24/120 Vac ..... 9.8 VA

Function
- Running Time ..... 10 Seconds
- Nominal Stroke ..... 1/10-in. (2.5 mm)
- Nominal Force ..... SFA: 31.5 lb. (140N)
  SFP: 28 lb. (125N)

Agency Certifications ..... UL Listed to UL873
cUL Certified to Canadian Standard C22.2 No. 24-93

Ambient Temperature
- Operation ..... 41° to 122°F (5° to 50°C)
- Transport and Storage ..... -13° to 158°F (-25° to 70°C)

Mounting Location ..... NEMA 1 (Interior Only)

Noise ..... <35 db

Medium Temperature ..... 34° to 230°F (1° to 110°C)

Dimensions ..... 3.4" H x 4.4" W x 2.3" D (85.2 mm H x 111 mm W x 58 mm D)

Shipping Weight ..... 1.18 lb. (0.54 kg)

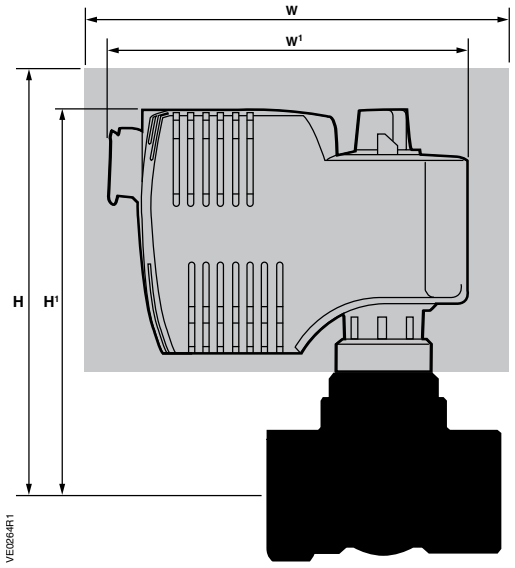
Product Ordering

Description	Part No.	Actuator Prefix Code
Normally Open		
24 Vac	**SFP71U**	243
120 Vac	**SFP11U**	241
208 Vac	**SFP208U/25***	**
Normally Closed		
24 Vac	**SFA71U**	242
120 Vac	**SFA11U**	240
277 Vac	**SFA277U/25***	**

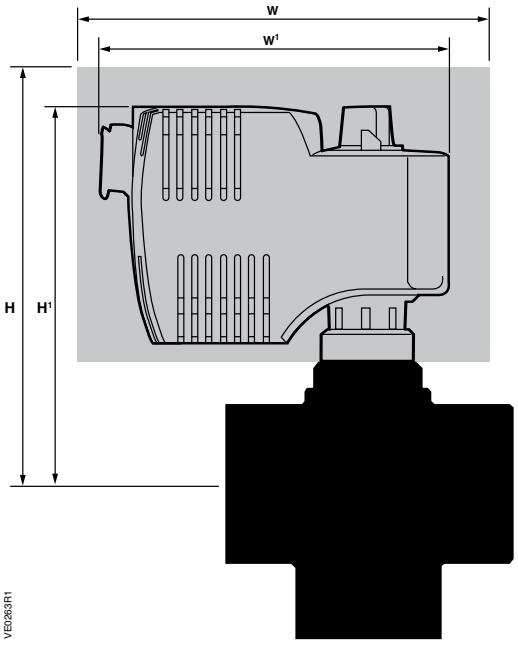
Table Notes:
*Part numbers with /25 come with 8.2 ft. (2.5m) leads.
**Actuator only; not available as an assembly.

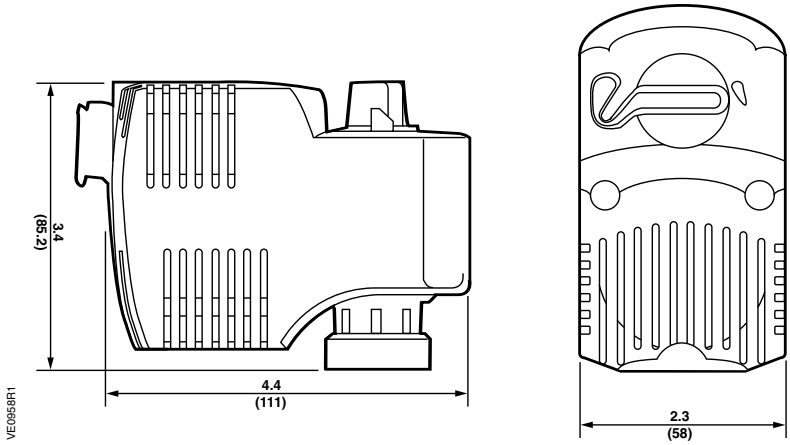
Dimensions

SFA/SFP Series Actuator: Service Envelope for 2-Way Valve Assembly



SFA/SFP Series Actuator: Service Envelope for 3-Way Valve Assembly





Dimensions shown in inches (mm).

Valve Size in.	(mm)	Valve Center Line to Top of Actuator H1		Service Height H		Width or Diameter of Actuator W1		Service Width W	
		2-Way	3-Way	2-Way	3-Way	2-Way	3-Way	2-Way	3-Way
0.5	(15)	4.38 (112)	4.38 (112)	12.38 (315)	12.38 (315)	4.38 (112)	4.38 (112)	12.38 (315)	12.38 (315)
0.75	(20)	4.38 (112)	4.38 (112)	12.38 (315)	12.38 (315)	4.38 (112)	4.38 (112)	12.38 (315)	12.38 (315)
1.00	(25)	4.38 (112)	4.38 (112)	12.38 (315)	12.38 (315)	4.38 (112)	4.38 (112)	12.38 (315)	12.38 (315)

Table Notes:
Table expressed in inches (mm).
Service height and width are the recommended dimensions to allow access to the product.

SSA/SSP Series Electronic Valve Actuator

24 Vac, Floating or 0-10V Control
Non-Spring Return

SSA/SSP Series Electronic Valve Actuator.

Description

The SSA/SSP Electronic Valve Actuator requires a 24 Vac power supply and receives a 0 to 10 Vdc signal or a floating control signal to control a valve. This actuator is designed to work with Zone Control Valves with a 1/10-inch (2.5 mm) stroke and a threaded valve bonnet that fits the actuator.

Features

- UL listed for plenum installations
- Direct-coupled installation without tools
- Manual override with hex wrench
- Visual position indication

Applications

The SSA/SSP Electronic Valve Actuators are for use with heating and cooling HVAC applications with Zone Valves.

Specifications

Power Supply
- Operating Voltage ..... 24 Vac ±20%
- Frequency ..... 50/60 Hz

Power Consumption
- SSA81 ..... 0.8 VA
- SSA/P61 ..... 2.5 VA

Agency Certifications ..... CE Conformance
- EMC Directive 89/336/EEC
- Low Voltage Direction 73/23/EEC
- UL listed UL873
- cUL Certified to Canadian Standard C22.2 No. 24-93

Function
- Running Time
  - SSA/P61 ..... 34 sec.
  - SSA81 ..... 150 sec.
- Nominal Stroke ..... 1/10-inch (2.5 mm)
- Nominal Force ..... 36 lb. (160N)

Ambient Temperature
- Operation ..... 41° to 122°F (5° to 50°C)
- Transport and Storage ..... -13° to 158°F (-25° to 70°C)

Medium Temperature ..... 34° to 230°F (1° to 110°C)

Dimensions ..... 3.26" H x 3.26" W x 1.9" D (82 mm H x 83 mm W x 48 mm D)

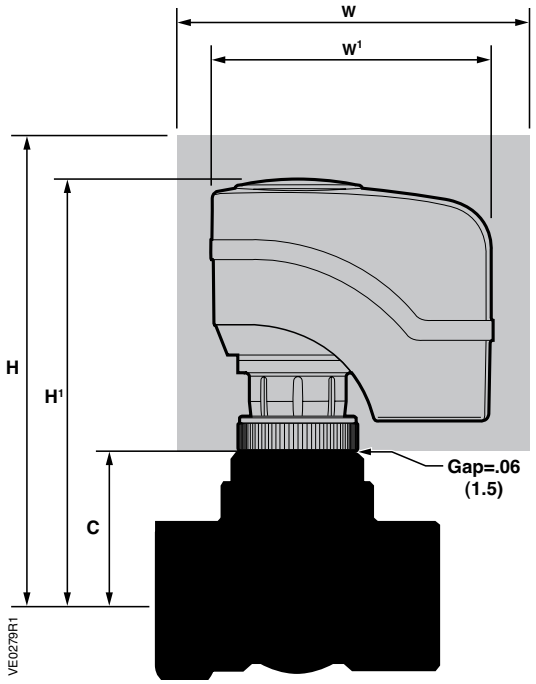
Shipping Weight ..... 9 oz. (0.25 kg)

Product Ordering

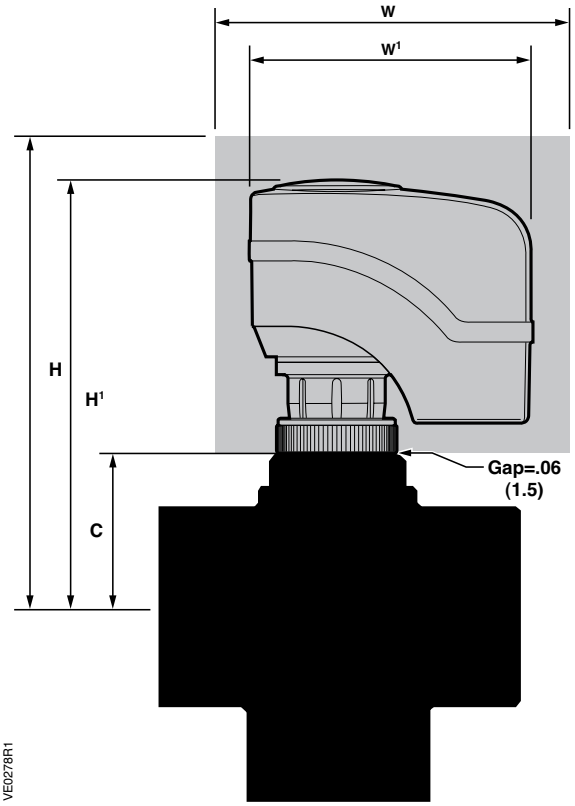
Description	Part No.	Actuator Prefix Code
24 Vac, Floating, Normally Closed	**SSA81U**	244
24 Vac, 0-10 Vdc, AB-A NC	**SSA61U**	245
24 Vac, 0-10 Vdc, AB-A NO	**SSP61U**	248

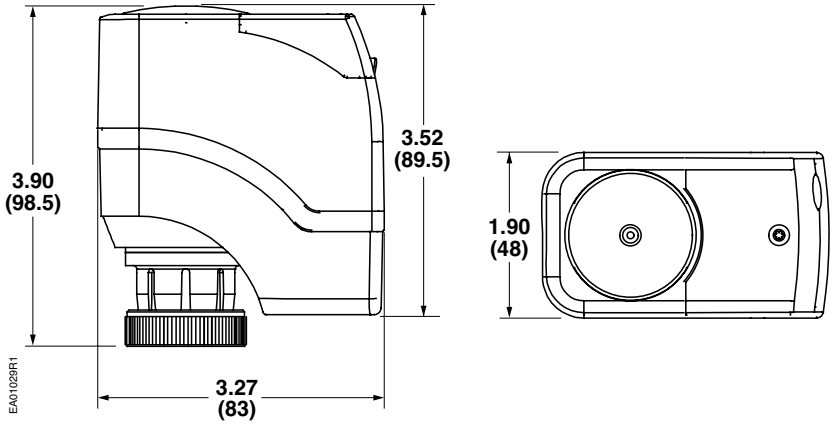
Dimensions

SSA/SSP Series Actuator: Service Envelope for 2-Way Valve Assembly



SSA/SSP Series Actuator: Service Envelope for 3-Way Valve Assembly





Dimensions shown in inches (mm).

Valve Size	Valve Center Line to Top of Actuator H1		Service Height H		Valve Center Line to Actuator Coupling C		Width or Diameter of Actuator W1		Service Width W	
in. (mm)	2-Way	3-Way	2-Way	3-Way	2-Way	3-Way	2-Way	3-Way	2-Way	3-Way
0.5 (15)	4.26 (108.2)	4.26 (108.2)	12.26 (311.4)	12.26 (311.4)	1.00 (25.4)	1.00 (25.4)	3.26 (82.8)	3.26 (82.8)	11.26 (286.0)	11.26 (286.0)
0.75 (20)	4.26 (108.2)	4.26 (108.2)	12.26 (311.4)	12.26 (311.4)	1.00 (25.4)	1.00 (25.4)	3.26 (82.8)	3.26 (82.8)	11.26 (286.0)	11.26 (286.0)
1.00 (25)	4.26 (108.2)	4.26 (108.2)	12.26 (311.4)	12.26 (311.4)	1.00 (25.4)	1.00 (25.4)	3.26 (82.8)	3.26 (82.8)	11.26 (286.0)	11.26 (286.0)

Table Notes:
Table expressed in inches (mm).
Service height and width are the recommended dimensions to allow access to the product.

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Powermite Globe Valves

Ranging from 1/2 to 1 inch (Cv range of 0.4 to 10), Powermite Globe Valves provide more choices for applications, featuring direct-coupled technology for connection of valve body and actuator without tools – other features include a compact housing design, actuators capable of handling a variety of media, and a wide variety of options and end connections. For ease of product selection and ordering, the Powermite valves and actuators follow the same sizing and selection process as the Flowrite.

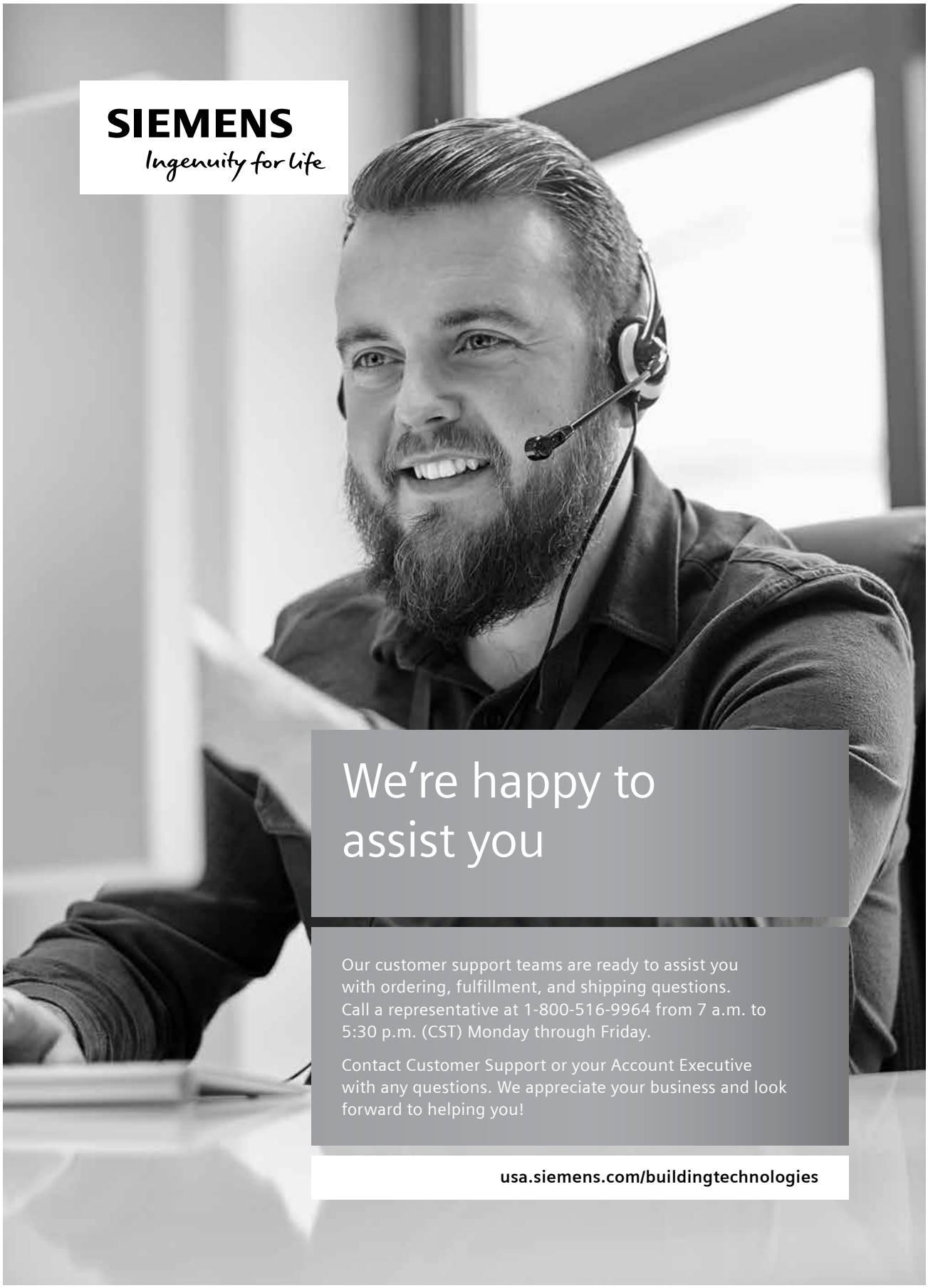
The Powermite Globe Valve line features:

MZ Series

- Close-off up to 70 psi
- Electronic Non-Spring Return actuators only
  - 0 to 10 V
  - Floating control
- Low leakage rate (ANSI Class IV)

MT Series for Terminal Unit Control

- Close-off up to 160 psi
- Pneumatic and Electronic actuators
  - 3 to 8 psig spring range
  - 8 to 13 psig spring range
  - 10 to 15 psig spring range
  - Floating Spring Return or Non-Spring Return electronic actuators
  - 0 to 10 V or 40 to 20 mA Spring Return or Non-Spring Return electronic actuators
  - Low leakage rate (ANSI Class IV)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Two-way Valves

1/2 to 1-inch
Normally Open or Normally Closed

Powermite MZ Series
Two-way Globe Valve.

Description

The Powermite MZ Series Two-way Globe Valves are designed to work with the SSB MZ Series Actuator with a 7/32-inch (5.5 mm) stroke.

Features

- Direct-coupled universal bonnet/no tools required for installation
- ANSI Leakage Class IV (0.01% of Cv)
- ANSI Class 250 body
- Variety of actuators available
  – 0 to 10 V non-spring return
  – Floating control non-spring return
- Choice of end connections
- Greater than 100:1 rangeability for Cv ≥1
- Orderable as a valve only or as a complete valve/actuator assembly

Applications

The Powermite MZ Series Two-way Globe Valves are used for control of hot or chilled water for convectors, fan coil units, unit conditioners, radiation, reheat coils, and similar terminal units requiring an actuator that delivers a minimum of 45 lbf. (200 N) of force.

Recommendation:

Use only with the MZ Series SSB Valve Actuators.

Specifications

Valve Size ..... 1/2 to 1" (15 to 25 mm)
Body Style ..... Globe
Seat Style ..... Metal to Metal
Action ..... NO/NC
Valve Body Rating ..... ANSI Class 250
Stem Travel (Stroke) ..... 7/32" (5.5 mm)
Materials
Body ..... Forged Brass C37700 (1/2 and 3/4 inch) or UNS CA 844 Bronze (1 inch)
Trim ..... Brass
Stem ..... Stainless Steel ASTM A 582 Type 303
Packing ..... EPDM O-rings
Controlled Medium ..... Water, Glycol Solutions up to 50%
Medium Temperature Range ..... 35° to 250°F (2° to 120°C)

Max. Recommended Differential Pressure for Modulating Service ..... 25 psig (173 kPa)
Rangeability
Cv<1 ..... >50:1
Cv≥1 ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Leakage Rate ..... Class IV (0.01% of Cv)
Flow Characteristics ..... Modified Equal Percentage
Mounting Location ..... NEMA 1 (Interior Only)

Refer back to the Selection Charts at the beginning of this section to make sure the configuration is valid.

Valve Product Ordering

Normally Open/Normally Closed, Brass Trim

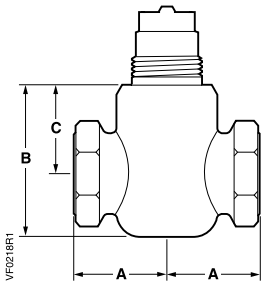
Connection	Valve Size in.	Valve Size (mm)	Flow Rate Cv	Flow Rate (Kvs)	Normally Open Part No.	Normally Closed Part No.
Female x Female	1/2	(15)	0.4	(0.34)	**599-01115**	**599-01100**
	1/2	(15)	0.63	(0.54)	**599-01117**	**599-01102**
	1/2	(15)	1	(0.85)	**599-01119**	**599-01104**
	1/2	(15)	1.6	(1.37)	**599-01121**	**599-01106**
	1/2	(15)	2.5	(2.14)	**599-01123**	**599-01108**
	1/2	(15)	4	(3.42)	**599-01126**	**599-01110**
	3/4	(20)	6.3	(5.38)	**599-01129**	**599-01112**
	1	(25)	10	(8.55)	**599-01131**	**599-01114**
Angle Female x Union Male	1/2	(15)	2.5	(2.14)	**599-01125**	—
	1/2	(15)	4	(3.42)	**599-01128**	—

There are no repair parts for this product. Replace the entire valve body if inoperative.

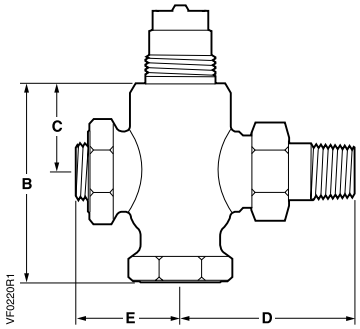
Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
	Electro-Mechanical	24 V, Floating Non-Spring Return	**SSB81U**	**254**
		24 V, 0-10 V Non-Spring Return	**SSB61U**	**255**

Dimensions and Weights

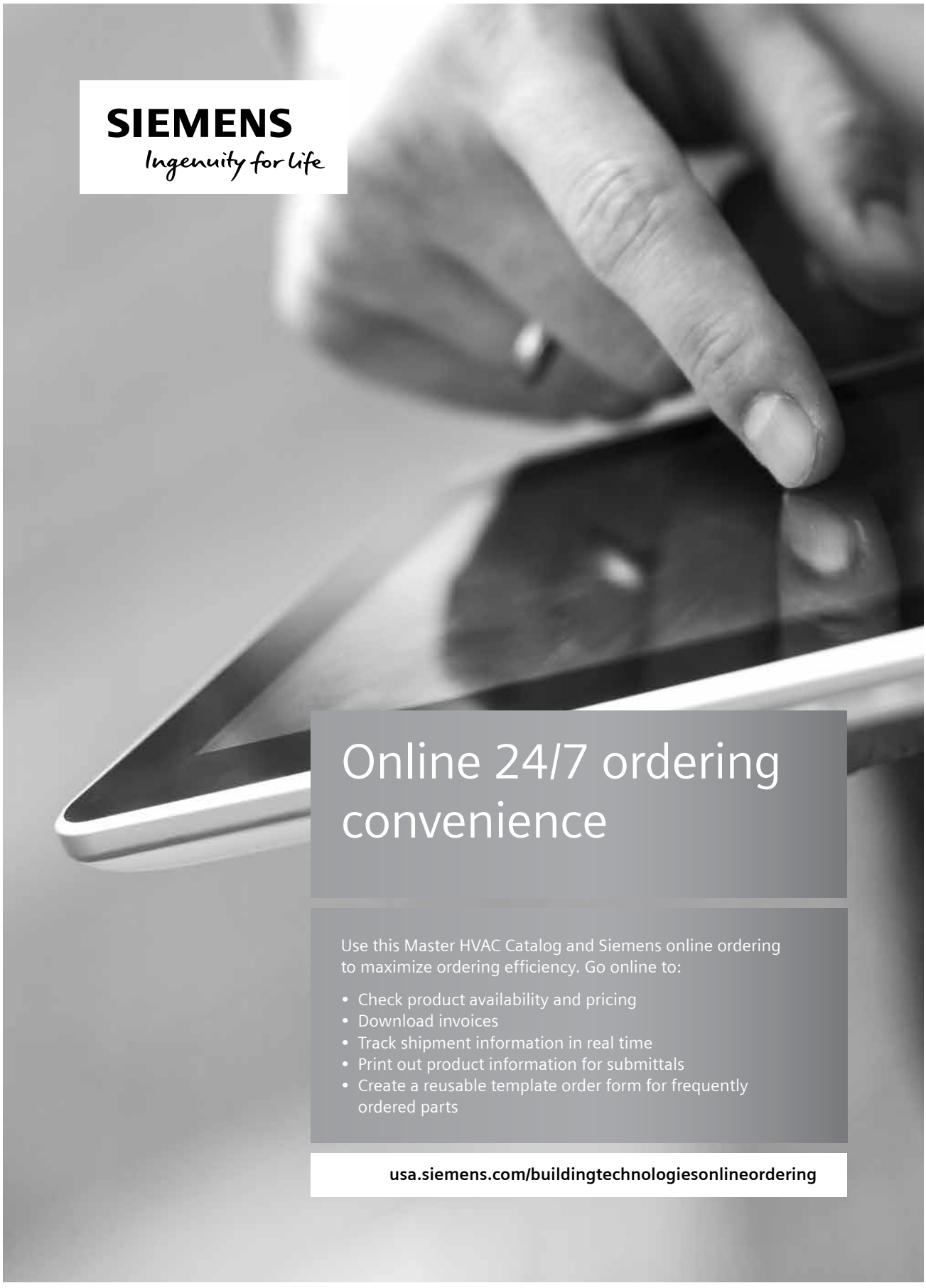


Female NPT by Female NPT
(FxF)



Angle Female by Union Male
(AFxUM)

Valve Size in.	Dimensions						Weight	
	A	B		C	D	E		
		FxF	AFxUM (NO Only)			(NO Only)	FxF	AFxUM
1/2" (15 mm)	1-3/8" (35 mm)	2-1/4" (57 mm)	2-15/16" (74 mm)	1-5/16" (33 mm)	2-5/8" (67 mm)	1-1/2" (38 mm)	1.3 lb. (0.6 kg)	1.8 lb. (0.8 kg)
3/4" (20 mm)	1-5/8" (41 mm)	2-3/8" (59 mm)	—	1-5/16" (33 mm)	3-1/8" (79 mm)	—	1.8 lb. (0.8 kg)	—
1" (25 mm)	1-15/16" (49 mm)	2-3/4" (69 mm)	—	1-9/16" (39 mm)	—	—	2.6 lb. (1.2 kg)	—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Three-way Mixing Valves

1/2 to 1-inch

Powermite MZ Series
Three-way Globe Valve.

Description

The Powermite MZ Series Three-way Globe Valves are designed to work the SSB MZ Series Actuator with a 7/32-inch (5.5 mm) stroke.

Features

- Direct-coupled universal bonnet/no tools required for installation
- ANSI Leakage Class IV (0.01% of Cv)
- ANSI Class 250 body
- Variety of actuators available
  - 0 to 10 V non-spring return
  - Floating control non-spring return
- Choice of end connections
- Greater than 100:1 rangeability for Cv ≥1
- Orderable as a valve only or as a complete valve/actuator assembly

Applications

The Powermite MZ Series Three-way Globe Valves are used for mixing of hot or chilled water for convectors, fan coil units, unit conditioners, radiation, reheat coils, and similar terminal units requiring an actuator that delivers a minimum of 45 lbf. (200 N) force.

Recommendation:

Use only with the MZ Series SSB Valve Actuators.

Specifications

Valve Size ..... 1/2 to 1" (15 to 25 mm)
Body Style ..... Globe
Seat Style ..... Metal to Metal
Action ..... Three-way Mixing
Valve Body Rating ..... ANSI Class 250
Stem Travel (Stroke) ..... 7/32" (5.5 mm)
Materials
Body ..... Forged Brass C37700 (1/2 and 3/4 inch) or UNS CA 844 Bronze (1 inch)
Trim ..... Brass
Stem ..... Stainless Steel ASTM A582 Type 303
Packing ..... EPDM O-rings
Controlled Medium ..... Water, Glycol Solutions up to 50%
Medium Temperature Range ..... 35° to 250°F (2° to 120°C)

Max. Recommended Differential Pressure for Modulating Service ..... 25 psig (173 kPa)
Rangeability
Cv<1 ..... >50:1
Cv≥1 ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Leakage Rate ..... Class IV (0.01% of Cv)
Flow Characteristics
A→AB ..... Modified Equal Percentage
B→AB ..... Linear
Mounting Location ..... NEMA 1 (Interior Only)

Refer back to the Selection Charts at the beginning of this section to make sure the configuration is valid.

Valve Product Ordering

Water Mixing, Brass Trim

Valve Size in.	Valve Size (mm)	Flow Rate Cv	Flow Rate (Kvs)	Part No.
1/2	(15)	0.4	(0.34)	**599-01132**
1/2	(15)	0.63	(0.54)	**599-01133**
1/2	(15)	1	(0.85)	**599-01134**
1/2	(15)	1.6	(1.37)	**599-01135**
1/2	(15)	2.5	(2.14)	**599-01136**
1/2	(15)	4	(3.42)	**599-01137**
3/4	(20)	6.3	(5.38)	**599-01138**
1	(25)	10	(8.55)	**599-01139**

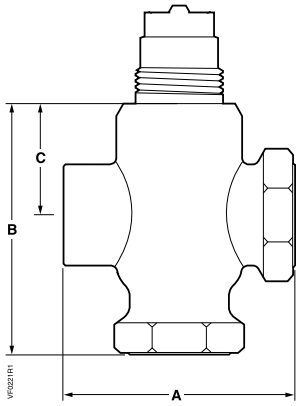
There are no repair parts for this product. Replace the entire valve body if inoperative.

Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
	Electro-Mechanical	24 V, Floating Non-Spring Return	**SSB81U**	**254**
		24 V, 0-10 V Non-Spring Return	**SSB61U**	**255**

Dimensions and Weights

Valve Size in.	Dimensions A	Dimensions B	Dimensions C	Weight
1/2" (15 mm)	2-3/4" (70 mm)	2-15/16" (74 mm)	1-5/16" (33 mm)	1.5 lb. (0.7 kg)
3/4" (20 mm)	3-1/4" (83 mm)	2-3/8" (59 mm)	1-5/16" (33 mm)	2.3 lb. (1.05 kg)
1" (25 mm)	3-7/8" (98 mm)	3-15/16" (99 mm)	1-9/16" (39 mm)	3.3 lb. (1.5 kg)



SSB Valve Actuator

24 Vac, 0-10V Control
Non-Spring Return

Powermite MZ Series
SSB61U Electronic Valve Actuator.

Description

The Powermite SSB61U Electronic Valve Actuator requires a 24 Vac supply and receives a 0 to 10 Vdc control signal to proportionally control a valve. This actuator is designed to work with Powermite MZ Series Valves with a 7/32-inch (5.5 mm) stroke and a threaded valve bonnet that fits the actuator.

Features

- UL-listed for plenum installations
- Direct-coupled for installation without tools
- Close-off up to 70 psi on 1/2-inch valve
- Non-spring return
- Manual override
- Visual position indication
- Orderable as an actuator only or as a complete valve/actuator assembly

Applications

The Powermite SSB61U Electronic Valve Actuator is for use in heating and cooling HVAC applications with Powermite Valves that need 45 lbf. (200 N) of nominal force.

Recommendation:

Use only with the MZ Series valve bodies.

Specifications

Operating Voltage.....24 Vac ±20% or 24 Vdc ±25%
Frequency.....50/60 Hz
Power Supply..... Earth Ground Isolating, Class 2, 24 Vac Transformer
Power Consumption.....2.0 VA
Control Signal (Y)
Voltage.....0 to 10 Vdc
Current.....0.1 mA
Running Time.....75 sec.
Nominal Stroke.....7/32" (5.5 mm)
Nominal Force.....45 lbf. (200 N)

Agency Approvals.....UL/cUL, UL873
CSA C22.2 No. 24-93
Ambient Temperature
Operation.....34° to 122°F (1° to 50°C)
Transport and Storage.....-13° to 158°F (-25° to 70°C)
Ambient Humidity.....0 to 90% RH, Non-condensing
Wiring Connection..... Terminal Block for Plenum Cable
(Accessory Available for 3/8-inch Flex Conduit)
Mounting Location..... NEMA 1 (Interior Only)

Product Ordering

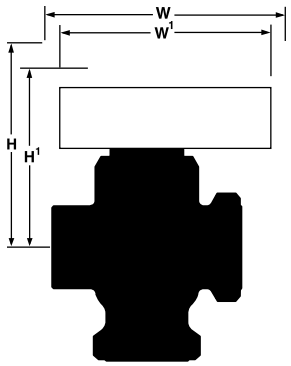
Description	Part No.	Actuator Prefix Code
0 to 10 V	**SSB61U**	**255**

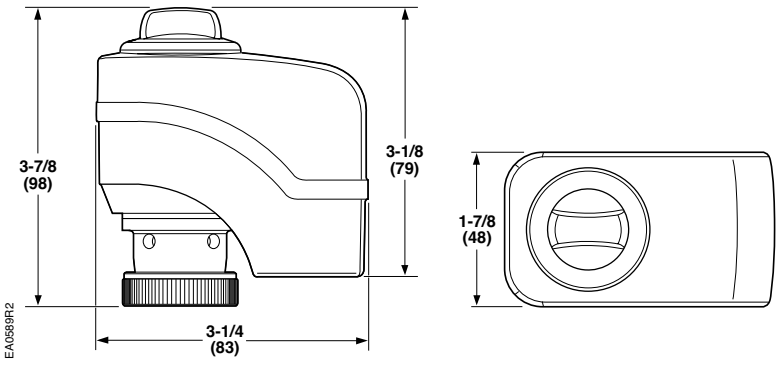
There are no repair parts for this product.
Replace the entire actuator if inoperative.

Dimensions

Valve Size in.	Center Line to Top of Actuator	Service Height	Actual Width	Service Width
	H[1]	H	W[1]	W
1/2" (15 mm)	5-1/8" (130 mm)	13-1/8" (330 mm)	3-1/4" (83 mm)	11-1/4" (282 mm)
3/4" (20 mm)	5-1/8" (130 mm)	13-1/8" (330 mm)	3-1/4" (83 mm)	11-1/4" (282 mm)
1" (25 mm)	5-3/8" (136 mm)	13-3/8" (335 mm)	3-1/4" (83 mm)	11-1/4" (282 mm)

Service height and width are the recommended dimensions to allow access to the product.





Dimensions shown in inches (mm).

SSB Valve Actuator

24 Vac, Floating Control
Non-Spring Return

Powermite SSB81U MZ Series Electronic Valve Actuator.

Description

The Powermite SSB81U Electronic Valve Actuator requires a 24 Vac supply floating control signal to provide three-position control. This actuator is designed to work with Powermite MZ Series Valves with a 7/32-inch (5.5 mm) stroke and a threaded valve bonnet that fits the actuator.

Applications

The Powermite SSB81U Electronic Valve Actuator is for use in heating and cooling HVAC applications with Powermite valves that need 45 lbf. (200 N) of nominal force.

Features

- UL-listed for plenum installations
- Direct-coupled installation without tools
- Close-off up to 70 psi on 1/2-inch valve
- Non-Spring Return
- Manual override
- Visual position indication
- Orderable as an actuator only or as a complete valve/actuator assembly

Specifications

Operating Voltage ..... 24 Vac ±20%
Frequency ..... 50/60 Hz
Power Supply .....Earth Ground Isolating, Class 2, 24 Vac Transformer
Power Consumption ..... 0.8 VA
Running Time ..... (60 Hz) 150 sec.
Nominal Stroke ..... 7/32" (5.5 mm)
Nominal Force ..... 45 lbf. (200 N)

Agency Approvals ..... UL/cUL, UL873
CSA C22.2 No. 24-93

Ambient Temperature
Operation ..... 34° to 122°F (1° to 50°C)
Transport and Storage ..... -13° to 158°F (-25° to 70°C)

Ambient Humidity ..... 0 to 90% RH, Non-condensing

Wiring Connection ..... Terminal Block for Plenum Cable
(Accessory Available for 3/8-inch Flex Conduit)

Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

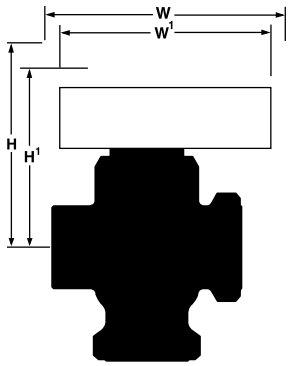
Description	Part No.	Actuator Prefix Code
Floating	**SSB81U**	**254**

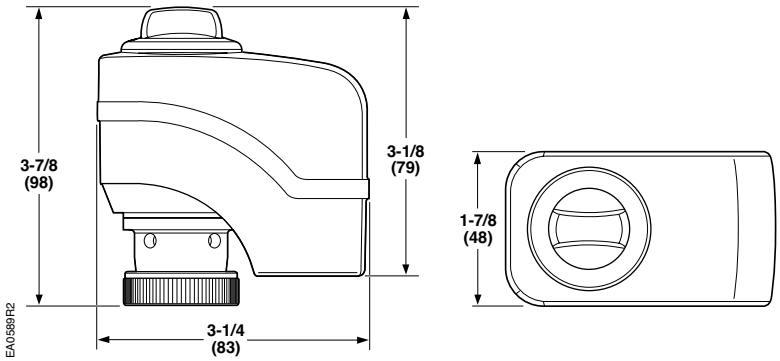
There are no repair parts for this product.
Replace the entire actuator if inoperative.

Dimensions

Valve Size in.	Center Line to Top of Actuator	Service Height	Actual Width	Service Width
	H[1]	H	W[1]	W
1/2" (15 mm)	5-1/8" (130 mm)	13-1/8" (330 mm)	3-1/4" (83 mm)	11-1/4" (282 mm)
3/4" (20 mm)	5-1/8" (130 mm)	13-1/8" (330 mm)	3-1/4" (83 mm)	11-1/4" (282 mm)
1" (25 mm)	5-3/8" (136 mm)	13-3/8" (335 mm)	3-1/4" (83 mm)	11-1/4" (282 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.





Dimensions shown in inches (mm).

Two-way Valves

1/2 to 1-inch
Normally Open or Normally Closed

Powermite MT Series
Two-way Globe Valve.

Description

The Powermite MT Series Two-way Globe Valves are designed to work with either a pneumatic or electronic actuator with a 7/32-inch (5.5 mm) stroke. Compatible actuators deliver a minimum of 67 lbf. (300 N) of force.

Features

- Direct-coupled universal bonnet/No tools required for installation
- Choice of brass or stainless steel trim
- ANSI Leakage Class IV (0.01% of Cv)
- ANSI Class 250 body
- Available in 3 to 8 psig, 8 to 13 psig or 10 to 15 psig spring ranges with pneumatic actuation
- Rated for 15 psig steam with stainless steel trim
- Interchangeable pneumatic or electronic actuators
- Orderable as a valve only or as a complete valve/actuator assembly

Applications

The Powermite MT Series Globe Valves are used for hot or chilled water or low pressure steam (<15 psig with stainless steel trim only) control on convectors, fan coil units, unit conditioners, radiation, reheat coils, and similar terminal units.

Recommendation:

Only use the MT Series Valve Actuators. When using this valve with a pneumatic actuator, note that MT valve bodies have the spring in the body, rather than the actuator. To order the correct valve body, select the proper spring range.

Alternate spring ranges for pneumatic sequencing are available as valve and actuator factory assemblies only.

Specifications

Valve Size ..... 1/2 to 1" (15 to 25 mm)
Body Style ..... Globe
Seat Style ..... Metal to Metal
Action ..... NO/NC
Valve Body Rating ..... ANSI Class 250
Stem Travel (Stroke) ..... 7/32" (5.5 mm)
Materials
Body ..... Forged Brass C37700 (1/2 and 3/4 inch) or UNS CA 844 Bronze (1 inch)
Trim ..... Stainless Steel or Brass
Stem ..... Stainless Steel ASTM A582 Type 303
Packing ..... EPDM O-rings
Controlled Medium ..... Water, Steam, Glycol Solutions up to 50%
Spring Range
Standard
Normally Closed ..... 10 to 15 psig (69 to 103 kPa)
Normally Open ..... 3 to 8 psig (21 to 55 kPa)
Optional
Normally Closed ..... 3 to 8 psig (21 to 55 kPa)
8 to 13 psig (55 to 90 kPa)
Normally Open ..... 8 to 13 psig (55 to 90 kPa)
10 to 15 psig (69 to 103 kPa)

Medium Temperature Range ..... 35° to 250°F (2° to 120°C)
Max. Recommended Differential Pressure for Liquid Modulating Service
Brass Trim ..... 25 psi (173 kPa)
Stainless Steel Trim ..... 50 psi (345 kPa)
Steam Stainless Steel Trim ..... 15 psi (103 kPa)
Rangeability
Cv<1 ..... >50:1
Cv≥1 ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Leakage Rate ..... Class IV (0.01% of Cv)
Flow Characteristics ..... Modified Equal Percentage
Mounting Location ..... NEMA 1 (Interior Only)

Refer back to the Selection Charts at the beginning of this section to make sure the configuration is valid.

Valve Product Ordering

Normally Open/Normally Closed, Modified Equal Percentage, Brass Trim

Connection	Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke (in.)	Normally Open Part No.	Normally Closed Part No.
Standard Temperature Packing – 20º to 250ºF (-7º to 120ºC)							
Female x Female	1/2	(15)	0.4	(0.34)	7/32	**599-02030**	**599-02000**
	1/2	(15)	0.63	(0.54)	7/32	**599-02032**	**599-02002**
	1/2	(15)	1	(0.85)	7/32	**599-02034**	**599-02004**
	1/2	(15)	1.6	(1.37)	7/32	**599-02036**	**599-02006**
	1/2	(15)	2.5	(2.14)	7/32	**599-02038**	**599-02008**
	1/2	(15)	4	(3.42)	7/32	**599-02041**	**599-02010**
	3/4	(20)	6.3	(5.38)	7/32	**599-02044**	**599-02012**
	1	(25)	10	(8.55)	7/32	**599-02046**	**599-02014**
Female x Union Male	1/2	(15)	0.4	(0.34)	7/32	**599-02031**	**599-02001**
	1/2	(15)	0.63	(0.54)	7/32	**599-02033**	**599-02003**
	1/2	(15)	1	(0.85)	7/32	**599-02035**	**599-02005**
	1/2	(15)	1.6	(1.37)	7/32	**599-02037**	**599-02007**
	1/2	(15)	2.5	(2.14)	7/32	**599-02039**	**599-02009**
	1/2	(15)	4	(3.42)	7/32	**599-02042**	**599-02011**
	3/4	(20)	6.3	(5.38)	7/32	**599-02045**	**599-02013**
Angle Female x Union Male	1/2	(15)	2.5	(2.15)	7/32	**599-02040**	—
	1/2	(15)	4	(3.44)	7/32	**599-02043**	—
There are no repair parts for this product. Replace the entire valve body if inoperative.							

Valve Product Ordering

Normally Open/Normally Closed, Modified Equal Percentage, Stainless Steel Trim

Connection	Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke (in.)	Normally Open Part No.	Normally Closed Part No.
Standard Temperature Packing – 20º to 250ºF (-7º to 120ºC)							
Female x Female	1/2	(15)	0.4	(0.34)	7/32	**599-02047**	**599-02015**
	1/2	(15)	0.63	(0.54)	7/32	**599-02049**	**599-02017**
	1/2	(15)	1	(0.85)	7/32	**599-02051**	**599-02019**
	1/2	(15)	1.6	(1.37)	7/32	**599-02053**	**599-02021**
	1/2	(15)	2.5	(2.14)	7/32	**599-02055**	**599-02023**
	1/2	(15)	4	(3.42)	7/32	**599-02058**	**599-02025**
	3/4	(20)	6.3	(5.38)	7/32	**599-02061**	**599-02027**
	1	(25)	10	(8.55)	7/32	**599-02063**	**599-02029**
Female x Union Male	1/2	(15)	0.4	(0.34)	7/32	**599-02048**	**599-02016**
	1/2	(15)	0.63	(0.54)	7/32	**599-02050**	**599-02018**
	1/2	(15)	1	(0.85)	7/32	**599-02052**	**599-02020**
	1/2	(15)	1.6	(1.37)	7/32	**599-02054**	**599-02022**
	1/2	(15)	2.5	(2.14)	7/32	**599-02056**	**599-02024**
	1/2	(15)	4	(3.42)	7/32	**599-02059**	**599-02026**
	3/4	(20)	6.3	(5.38)	7/32	**599-02062**	**599-02028**
Angle Female x Union Male	1/2	(15)	2.5	(2.15)	7/32	**599-02057**	—
	1/2	(15)	4	(3.44)	7/32	**599-02060**	—
There are no repair parts for this product. Replace the entire valve body if inoperative.							

Actuator Product Ordering

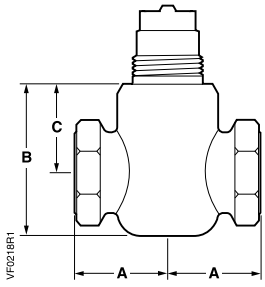
Description			Part No.	Actuator Prefix Code
 2"	Pneumatic*	3-8 psi (21-55 kPa)	**599-01088**	**257**
		8-13 psi (55-90 kPa)	**599-01088**	**258**
		10-15 psi (69-103 kPa)	**599-01088**	**256**
	Electro-Mechanical	24 V, Floating, Spring Return	**SSC81.5U**	**260**
		24 V, Floating, Non-Spring Return	**SSC81U**	**259**
		24 V, 0-10 V, Spring Return	**SSC61.5U**	**262**
		24 V, 0-10 V, Non-Spring Return	**SSC61U**	**261**
	Electro-Mechanical	24 V, Floating, Spring Return	**SAS81.33U**	**366**
		24 V, Floating, Non-Spring Return	**SAS81.03U**	**363**
		24 V, 0-10 V, Spring Return	**SAS61.33U**	**365**
		24 V, 0-10 V, Non-Spring Return	**SAS61.03U**	**364**

Table Notes:

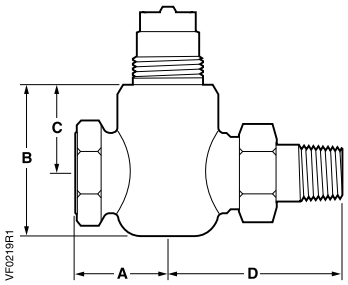
*Powermite MT Series valve bodies have the spring in the body, rather than in the pneumatic actuator. There are different valve part numbers for the different spring ranges.

Refer back to the Selection Chart at the beginning of this section to make sure the configuration is valid.

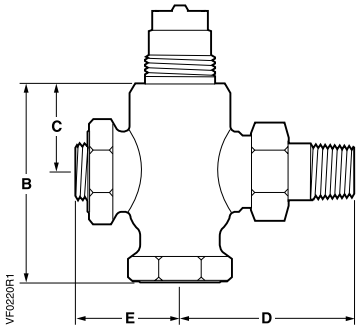
Dimensions and Weights



Female NPT by Female NPT
(FxF)



Female NPT by Union Male
(FxUM)



Angle Female by Union Male
(AFxUM)

Valve Size In.	Dimensions								Weight		
	A	B			C		D	E			
		FxF & FxUM		AFxUM					FxF	FxUM	AFxUM
		NO	NC		NO	NC					
1/2" (15 mm)	1-3/8" (35 mm)	2-1/4" (57 mm)		2-15/16" (74 mm)	1-5/16" (33 mm)		2-5/8" (67 mm)	1-1/2" (38 mm)	1.3 lb. (0.6 kg)	1.5 lb. (0.7 kg)	1.8 lb. (0.8 kg)
3/4" (20 mm)	1-5/8" (41 mm)	2-3/8" (59 mm)		—	1-5/16" (33 mm)		3-1/8" (79 mm)	—	1.8 lb. (0.8 kg)	2.2 lb. (1 kg)	—
1" (25 mm)	1-15/16" (49 mm)	2-3/4" (69 mm)		—	1-9/16" (39 mm)		—	—	2.6 lb. (1.2 kg)	—	—
1-1/4" (32 mm)	2-1/2" (63.5 mm)	4-1/4" (108 mm)	3-7/8" (98.4 mm)	—	2-3/16" (55.6 mm)	1-11/16" (42.9 mm)	—	—	4 lb. (1.8 kg)	—	—
1-1/2" (40 mm)	2-9/16" (65 mm)	4-1/4" (108 mm)	3-7/8" (98.4 mm)	—	2-1/4" (57.2 mm)	1-5/8" (41.3 mm)	—	—	5 lb. (2.3 kg)	—	—

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Three-way Mixing Valves

1/2 to 1-inch

Powermite MT Series
Three-way Globe Valve.

Description

The Powermite MT Series Three-way Globe Valves are designed to work with either a pneumatic or electronic actuator with a 7/32-inch (5.5 mm) stroke.

Features

- Direct-coupled universal bonnet
- No tools required for installation
- Choice of brass or stainless steel trim
- ANSI Leakage Class IV (0.01% of Cv)
- ANSI Class 250 body
- Available in 3 to 8 psig, 8 to 13 psig or 10 to 15 psig spring ranges with pneumatic actuation
- Interchangeable pneumatic or electronic actuators
- Orderable as valve only or complete valve/actuator assembly

Applications

The Powermite MT Series Three-way Globe Valves are used for mixing of hot or chilled water for convectors, fan coil units, unit conditioners, radiation, reheat coils, and similar terminal units requiring water mixing.

Recommendation:
Only use the MT Series Valve Actuators. When using this valve with a pneumatic actuator, note that MT valve bodies have the spring in the body, rather than the actuator. To order the correct valve body, select the proper spring range.

Alternate spring ranges for pneumatic sequencing are available as valve and actuator factory assemblies only.

Specifications

Valve Size ..... 1/2 to 1" (15 to 25 mm)
Body Style ..... Globe
Seat Style ..... Metal to Metal
Action ..... Three-way Mixing
Valve Body Rating ..... ANSI Class 250
Stem Travel (Stroke) ..... 7/32" (5.5 mm)
Materials
Body ..... Forged Brass C37700 (1/2 and 3/4 inch) or UNS CA 844 Bronze (1 inch)
Trim ..... Stainless Steel or Brass
Stem ..... Stainless Steel ASTM A582 Type 303
Packing ..... EPDM O-rings
Spring Ranges
Standard ..... 8 to 13 psig
Optional ..... 3 to 8 psig (21 to 55 kPa) 10 to 15 psig (69 to 103 kPa)
Controlled Medium ..... Water, Steam, Glycol Solutions up to 50%
Medium Temperature Range ..... 35° to 250°F (2° to 120°C)

Max. Recommended Differential Pressure for Modulating Service
Brass Trim ..... 25 psi (173 kPa)
Stainless Steel Trim ..... 50 psi (345 kPa)
Steam Stainless Steel Trim ..... 15 psi (103 kPa)
Rangeability
Cv<1 ..... >50:1
Cv≥1 ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Leakage Rate ..... Class IV (0.01% of Cv)
Flow Characteristics
A→AB ..... Modified Equal Percentage
B→AB ..... Linear
Mounting Location ..... NEMA 1 (interior only)

Refer back to the Selection Charts at the beginning of this section to make sure the configuration is valid.

Valve Product Ordering

Valve Size in.	Valve Size (mm)	Flow Rate Cv	Flow Rate (Kvs)	Stroke (in.)	Part No.
Brass Trim					
1/2	(15)	0.4	(0.34)	7/32	**599-02064**
1/2	(15)	0.63	(0.54)	7/32	**599-02065**
1/2	(15)	1	(0.85)	7/32	**599-02066**
1/2	(15)	1.6	(1.37)	7/32	**599-02067**
1/2	(15)	2.5	(2.14)	7/32	**599-02068**
1/2	(15)	4	(3.42)	7/32	**599-02069**
3/4	(20)	6.3	(5.38)	7/32	**599-02070**
1	(25)	10	(8.55)	7/32	**599-02071**
Stainless Steel Trim					
1/2	(15)	0.4	(0.34)	7/32	**599-02072**
1/2	(15)	0.63	(0.54)	7/32	**599-02073**
1/2	(15)	1	(0.85)	7/32	**599-02074**
1/2	(15)	1.6	(1.37)	7/32	**599-02075**
1/2	(15)	2.5	(2.14)	7/32	**599-02076**
1/2	(15)	4	(3.42)	7/32	**599-02077**
3/4	(20)	6.3	(5.38)	7/32	**599-02078**
1	(25)	10	(8.55)	7/32	**599-02079**

There are no repair parts for this product. Replace the entire valve body if inoperative.

Actuator Product Ordering

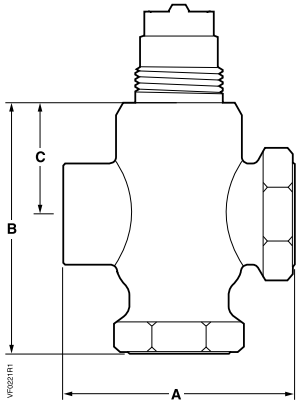
Description			Part No.	Actuator Prefix Code
 2"	Pneumatic*	3-8 psi (21-55 kPa)	**599-01088**	**257**
		8-13 psi (55-90 kPa)	**599-01088**	**258**
		10-15 psi (69-103 kPa)	**599-01088**	**256**
	Electro-Mechanical	24 V, Floating, Spring Return	**SSC81.5U**	**260**
		24 V, Floating, Non-Spring Return	**SSC81U**	**259**
		24 V, 0-10 V, Spring Return	**SSC61.5U**	**262**
		24 V, 0-10 V, Non-Spring Return	**SSC61U**	**261**
	Electro-Mechanical	24 V, Floating, Spring Return	**SAS81.33U**	**366**
		24 V, Floating, Non-Spring Return	**SAS81.03U**	**363**
		24 V, 0-10 V, Spring Return	**SAS61.33U**	**365**
		24 V, 0-10 V, Non-Spring Return	**SAS61.03U**	**364**

Table Notes:

*Powermite MT Series valve bodies have the spring in the body, rather than in the pneumatic actuator. There are different valve part numbers for the different spring ranges.

Dimensions and Weights

Valve Size in.	Dimensions			Weight
	A	B	C	
1/2" (15 mm)	2-3/4" (70 mm)	2-15/16" (74 mm)	1-5/16" (33 mm)	1.5 lb. (0.7 kg)
3/4" (20 mm)	3-1/4" (83 mm)	2-3/8" (59 mm)	1-5/16" (33 mm)	2.3 lb. (1.05 kg)
1" (25 mm)	3-7/8" (98 mm)	3-15/16" (99 mm)	1-9/16" (39 mm)	3.3 lb. (1.5 kg)

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Two-inch Pneumatic Valve Actuator

Powermite MT Series
Two-inch Pneumatic Valve Actuator.

Description

The Powermite Two-inch Pneumatic Valve Actuator is designed for use with the 1/2 to 1-inch Powermite MT Series Terminal Unit Valves with a 7/32-inch (5.5 mm) stroke.

Features

- Low profile
- Freely rotates to aid tubing installation
- Easy installation and removal
- All metal housing
- Orderable as an actuator only or as a complete valve/actuator assembly

Applications

The Powermite Two-inch Pneumatic Valve Actuator is designed to be used on 1/2 to 1-inch Powermite Terminal Unit Valves in liquid and steam service applications.

The pneumatic actuator relies on the spring inside the bonnet assembly of the MT Series valve bodies to return to the “normal” position.

Recommendation:

Use only for MT Series valve bodies, 1/2 to 1-inch only.

Specifications

Effective Diaphragm Area ..... 3.4 in.² (22 cm²)
Diaphragm Material ..... Silicone
Nominal Spring Range ..... Valve Dependent
Span ..... 5 psi (34 kPa)
Nominal Stroke ..... 7/32" (5.5 mm)
Max. Diaphragm Pressure ..... 35 psig (241 kPa)
Air Connection ..... 1/8" NPT Barbed Fitting for 1/4" (6 mm) OD Polyethylene Tubing
Ambient Temperature
Transportation ..... -40° to 180°F (-40° to 82°C)
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

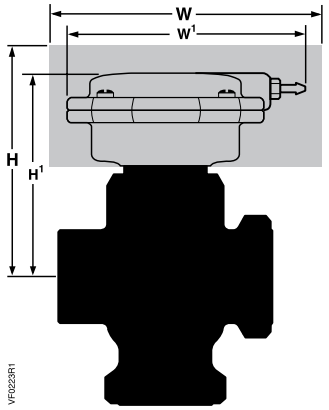
Description	Part No.	Actuator Prefix Code
3-8 psig (21-55 kPa)	**599-01088**	**257**
8-13 psig (55-90 kPa)	**599-01088**	**258**
10-15 psig (69-103 kPa)	**599-01088**	**256**

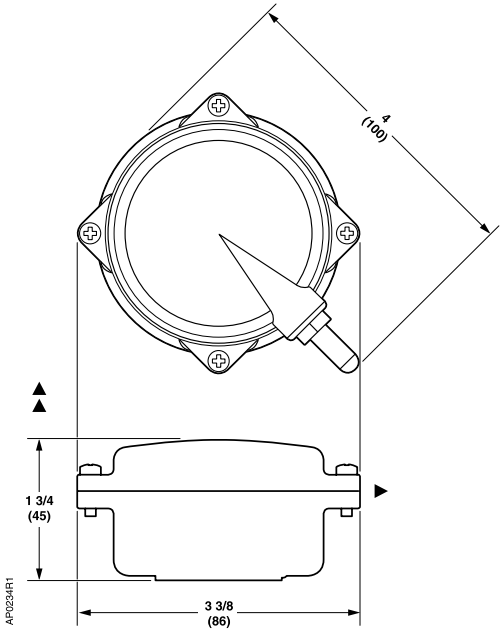
Ordering Note:
Spring is inside bonnet assembly of valve body. Use the Valve Selection Charts at the front of this section on pages A-24 and A-27 to determine spring range.

Dimensions

Valve Size in.	Center Line to Top of Actuator	Service Height	Actual Width	Service Width
	H[1]	H	W[1]	W
1/2" (15 mm)	3-1/16" (78 mm)	11" (280 mm)	4" (100 mm)	10" (250 mm)
3/4" (20 mm)	3-1/16" (78 mm)	11" (280 mm)	4" (100 mm)	10" (250 mm)
1" (25 mm)	3-5/16" (84 mm)	11-1/4" (285 mm)	4" (100 mm)	10" (250 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.





Dimensions shown in inches (mm).

SSC Electronic Valve Actuator

24 Vac, Floating Control
Spring Return or Non-Spring Return

SSC81U Electronic Valve Actuator.

Description

The Powermite SSC81U and SSC81.5U Electronic Valve Actuators require a 24 Vac supply and receive a floating control signal. These actuators control Powermite MT Series Valves with a 7/32-inch (5.5 mm) stroke.

Features

- UL listed for plenum installations
- Direct coupled, one step installation without special tools
- Close off up to 120 psi
- Manual override
- Visual position indication
- Spring return or non-spring return
- Orderable as an actuator only or as a complete valve/actuator assembly

Applications

The Powermite SSC81… Electronic Actuators and MT Series Valves are used in heating and cooling applications in liquid and low pressure steam (<5 psi) applications requiring a minimum of 67 lbs. (300 N) nominal force. The SSC81… accepts plenum cable or 3/8-inch flex conduit connection.

Specifications

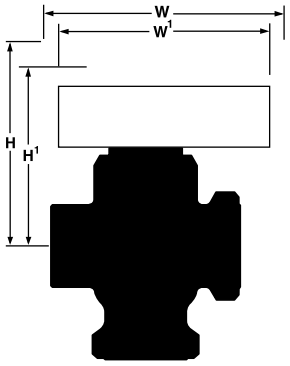
Operating Voltage ..... 24 Vac ± 20%
Frequency ..... 50/60 Hz ± 2 Hz
Power Supply ..... Earth Ground Isolating, Class 2, 24 Vac Transformer
Power Consumption
SSC81U ..... 0.8 VA
SSC81.5U ..... 2 VA
Control Signal
Y2 ..... 24 Vac Retracts Actuator Shaft
Y1 ..... 24 Vac Extends Actuator Shaft
Running Time
SSC81U ..... 125 sec. ±2% at 60 Hz
SSC81.5U ..... 125 sec. ±2% at 50/60 Hz
Spring Return (SSC81.5U only) ..... ~30 sec.

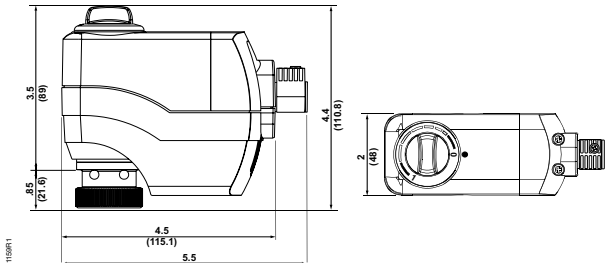
Nominal Stroke ..... 7/32-inch (5.5 mm)
Nominal Force ..... 67 lbs. (300N)
Spring Return (SSC81.5U only) ..... Non-mechanical, Electronic Return Fails to Stem up (0 Position)
Agency Approvals ..... UL/cUL, UL873 Listed, Certified to Canadian Standard C22.2 No. 24-93
Media Temperature in Valve ..... 35° to 230° F (2° to 110° C)
Ambient Temperature
Operation ..... 41° to 122°F (5° to 50°C)
Transport and Storage ..... -13° to 158°F (-25° to 70°C)
Ambient Humidity ..... 0 to 90% RH, Non-condensing
Wiring Connection ..... Plenum Cable or 3/8-inch Flex Conduit
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Spring Return	**SSC81.5U**	**260**
Non-Spring Return	**SSC81U**	**259**

Dimensions





Dimensions shown in inches (mm).

Valve Size in.	Center Line to Top of Actuator	Service Height	Actual Width of Actuator	Service Width
	H1	H	W1	W
1/2" (15 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)
3/4" (20 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)
1" (25 mm)	5-3/4" (146 mm)	13-3/4" (349 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

SSC Electronic Valve Actuator

24 Vac, Proportional Control
Spring Return or Non-Spring Return

SSC61U Electronic Valve Actuator.

Description

The Powermite SSC61U and SSC61.5U Electronic Valve Actuators require a 24 Vac supply and receive a 0 to 10 Vdc control signal to control Powermite MT series valves with a 7/32-inch (5.5 mm) stroke and a threaded valve bonnet that fits the actuators.

Features

- UL listed for plenum installations
- Direct coupled, one step installation without special tools
- Close off up to 120 psi
- Manual override
- Visual position indication
- Spring return or non-spring return
- Orderable as an actuator only or as a complete valve/actuator assembly

Applications

The Powermite SSC61… electronic actuators and MT Series Valves are used in heating and cooling applications to control hot or chilled water or low pressure steam (<5 psi) for convectors, fan coil units, unit conditioners, radiation, reheat coils and similar terminal units requiring a minimum of 67 lbs. (300 N) nominal force. The SSC61… accepts plenum cable or 3/8-inch flex conduit connection.

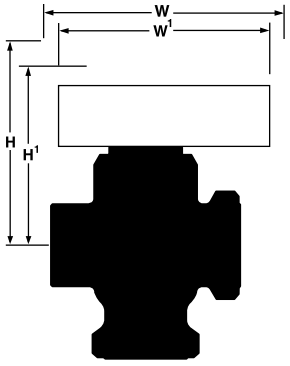
Specifications

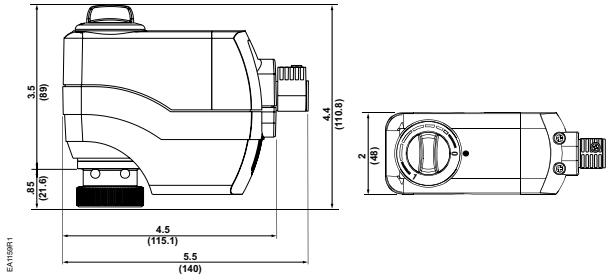
Operating Voltage ..... 24 Vac ±20%
Frequency ..... 50/60 Hz ±2 Hz
Power Supply ..... Earth Ground Isolating Class 2, 24 Vac Transformer
Power Consumption ..... 2 VA
Control Signal (Y)
Voltage ..... 0 to 10 Vdc (default) or 0 to 40 mA with External 500 ohm, 0.2W Resistor
Current ..... 0.1 mA
Running Time
at 50/60 Hz ..... 30 s ±10%
Fail-safe (SSC61.5U only) ..... ~25 sec.
Nominal Stroke ..... 7/32" (5.5 mm)
Nominal Force ..... 67 lbs. (300 N)
Stroke/Signal Relationship ..... Linear
Spring Return (SSC61.5U only) ..... Non-mechanical, Electronic Return Fails to Stem up (0 Position)
Agency Approvals ..... UL873 Listed, Certified to Canadian Standard C22.2 No. 24-93
Media Temperature in Valve ..... 35° to 230° F (2° to 110° C)
Ambient Temperature
Operation ..... 41° to 122°F (5° to 50°C)
Transport and Storage ..... -13° to 158°F (-25° to 70°C)
Ambient Humidity ..... 0 to 90% RH, Non-condensing
Wiring Connection ..... Plenum Cable or 3/8-inch Flex Conduit
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Spring Return	**SSC61.5U**	**262**
Non-Spring Return	**SSC61U**	**261**

Dimensions





Dimensions shown in inches (mm).

Valve Size in.	Center Line to Top of Actuator	Service Height	Actual Width of Actuator	Service Width
	H^1	H	W^1	W
1/2" (15 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)
3/4" (20 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)
1" (25 mm)	5-3/4" (146 mm)	13-3/4" (349 mm)	5-1/2" (140 mm)	13-1/2" (343 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

SAS Electronic Valve Actuator

NEW!

24 Vac, Proportional Control
Spring Return or Non-Spring Return

Powermite MT Series SAS Spring Return Electronic Valve Actuator.

Powermite MT Series SAS Non-Spring Return Electronic Valve Actuator.

Description

The Powermite SAS Electronic Valve Actuators require a 24 Vac supply and receive a 0 to 10 Vdc or a 4 to 20 mA control signal to proportionally control a valve. This actuator is designed to work with Powermite MT Series Valves with a 7/32-inch (5.5 mm) stroke.

Features

- Maintenance-free with reversible motor
- UL listed for plenum installations
- Close off up to 160 psi
- Position output signal 0 to 10 Vdc
- Non-spring return or spring return
- Small, compact design
- Manual adjustment knob with indication of stroke allows for repositioning in power-off condition
- Mechanical spring allows the valve to return to normal position in power-off condition (SAS61.33U actuator only)
- Suitable for low pressure (<15 psi) steam applications
- Orderable as an actuator only or as a complete valve/actuator assembly

Applications

For use in small to medium HVAC installations with Powermite valves with a 7/32-inch (5.5 mm) stroke requiring a minimum of 90 pounds force (400 N). These valves can be used in liquid and low pressure (<15 psi) steam service applications.

Recommendation:

Use only with the MT Series valve bodies. This actuator is not recommended for 2-position or pulse applications.

Specifications

Operating Voltage ..... 24 Vac, ±20%; 24 Vdc, +20%/-15%

Frequency ..... 45 to 65 Hz

Power Supply ..... Earth Ground Isolating, Class 2, 24 Vac Transformer
Do not power more than 10 actuators with one transformer.

Power Consumption (Max.)
SAS61.03U ..... 5.3 VA
SAS61.33U ..... 5.9 VA

Control Signal (Y) ..... 0 to 10 Vdc, 4 to 20 mA

Current Draw ..... ≤0.1 mA for 0 to 10 Vdc control
4 to 20 mA ± 1% for 4 to 20 mA control

Input Impedance ..... >100K ohms

Position Feedback (U)
Voltage ..... 0 to 10 Vdc ± 1%
Load impedence ..... >10K Ω res.
Current load ..... 1 mA max.

Forced control (Z)
Resistance ..... 0 to 1000Ω, stroke proportional to R
Z connected to G ..... Max. stroke 100%
Z connected to G0 ..... Min. stroke 0%
Voltage ..... Max. 24 Vac to 20%,
Max 24 Vdc+20%,-15%
Current draw ..... ≤0.1 mA

Running Time
at 60 Hz ..... 30 sec.
Spring Return (SAS61.33U only) ..... <14 sec.

Nominal Stroke ..... 7/32" (5.5 mm)

Nominal Force ..... 90 lbf. (400 N)

Agency Approvals ..... UL/cUL, UL873
CSA C22.2 No. 24-93

Media Temperature in Valve ..... 34° to 248° F (1° to 120° C)

Ambient Temperature
Operation ..... 23° to 131°F (-5° to 55°C)
Transport and Storage ..... -13°F to 158°F (-25°C to 70°C)

Ambient Humidity ..... 5 to 95% RH, Non-condensing

Wiring Connection ..... Plenum Cable or Conduit via a 1/2" Knockout

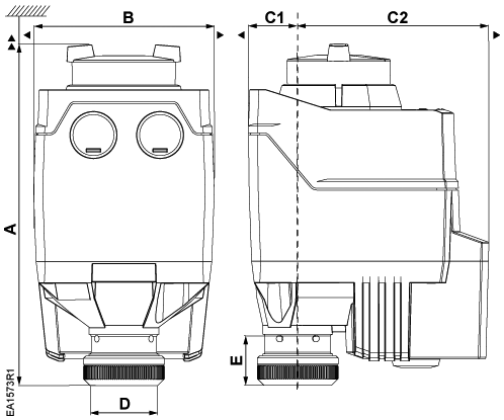
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Spring Return	**SAS61.33U**	**365**
Non-Spring Return	**SAS61.03U**	**364**

Dimensions

SAS Series Spring Return Actuator

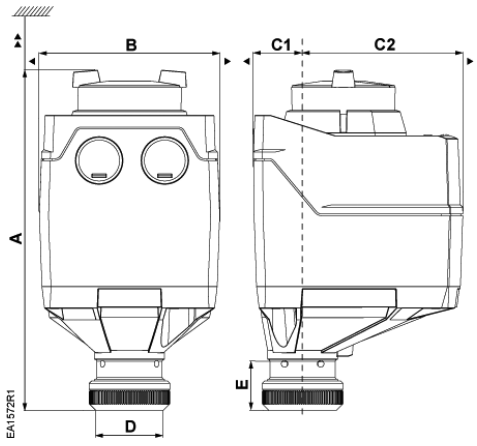


Dimensions shown in inches (mm).

Dimensions							
A	B	C1	C2	D	E	►	►►
5.9 (151 mm)	3.1 (80 mm)	0.9 (21.9 mm)	3.3 (84.6 mm)	1.2 (29.9 mm)	0.9 (21.8 mm)	4 (100 mm)	8 (200 mm)

Table Notes: **Service envelope** Minimum access space recommended
► 4 inch (100 mm) ►► 8 inch (200 mm)

SAS Series Non-Spring Return Actuator



Dimensions shown in inches (mm).

Dimensions							
A	B	C1	C2	D	E	►	►►
5.9 (151 mm)	3.1 (80 mm)	0.9 (21.9 mm)	2.8 (71.1 mm)	1.2 (29.9 mm)	0.9 (21.8 mm)	4 (100 mm)	8 (200 mm)

Table Notes: **Service envelope** Minimum access space recommended
► 4 inch (100 mm) ►► 8 inch (200 mm)

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Ball Valves that fit every application

With line sizes ranging from ½" to 2" sizes (Cv ranging from 0.4 to 250), Siemens Ball Valves tightly control hot or chilled water and up to 50% glycol solution in convectors, fan coil units, unit conditioners, radiation, and reheat coils.

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SAS Electronic Valve Actuator

NEW!

24 Vac, Floating Control
Spring Return or Non-Spring Return

Powermite MT Series SAS Spring Return Electronic Valve Actuator.

Powermite MT Series SAS Non-Spring Return Electronic Valve Actuator.

Description

The Powermite SAS Electronic Valve Actuators require a 24 Vac supply and receive a floating signal to provide three-position control of a valve. This actuator is designed to work with Powermite MT Series Valves with a 7/32-inch (5.5 mm) stroke.

Features

- Maintenance-free with reversible motor
- Small compact design
- UL listed for plenum installations
- Close off up to 160 psi
- Non-spring return or spring return
- Floating control signal input
- Manual adjustment know with indication of stroke allows for repositioning in power off condition
- Mechanical spring returns the valve to its normal (spring return) position in power off condition (SAS81.33U only)
- Suitable for liquid and low pressure (15 psi) steam applications
- Orderable as an actuator only or as a complete valve/actuator assembly

Applications

For use in small to medium HVAC installations with Powermite valves with a 7/32-inch (5.5 mm) stroke requiring a minimum of 90 pounds force (400 N). These valves can be used in liquid and low pressure (<15 psi) steam service applications.

Recommendation:

Use only with the MT Series valve bodies. This actuator is not recommended for 2-position or pulse applications.

Specifications

Operating Voltage ..... 24 Vac, ±20%; 24 Vdc, +20%/-15%

Frequency ..... 45 to 65 Hz

Power Supply ..... Earth Ground Isolating, Class 2, 24 Vac Transformer
Do not power more than 10 actuators with one transformer.

Power Consumption (Max.)
SAS81.03U ..... 2.5 VA
SAS81.33U ..... 3.4 VA

Control signal ..... Floating (3-position)
Y1 ..... Positioning signal extends actuator stem
Y2 ..... Positioning signal retracts actuator stem

Running Time
at 60 Hz ..... 30 sec.
Spring Return (SAS81.33U only) ..... <14 sec.

Nominal Stroke ..... 7/32" (5.5 mm)

Nominal Force ..... 90 lbf. (400 N)

Agency Approvals ..... UL/cUL, UL873
CSA C22.2 No. 24-93

Media Temperature in Valve ..... 34° to 248° F (1° to 120° C)

Ambient Temperature
Operation ..... 23° to 131°F (-5° to 55°C)
Transport and Storage ..... -13° to 158°F (-25° to 70°C)

Ambient Humidity ..... 5 to 95% RH, Non-condensing

Wiring Connection ..... Plenum Cable or Conduit via a 1/2" Knockout

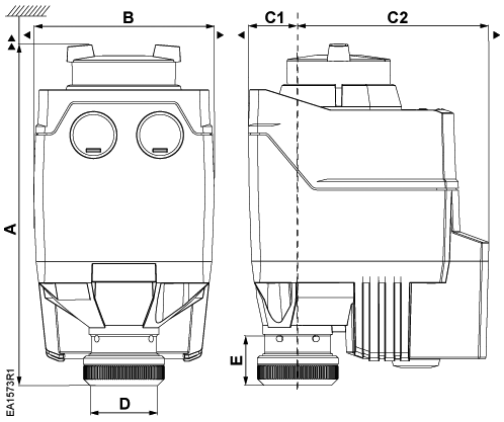
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Spring Return	**SAS81.33U**	**366**
Non-Spring Return	**SAS81.03U**	**363**

Dimensions

SAS Series Spring Return Actuator

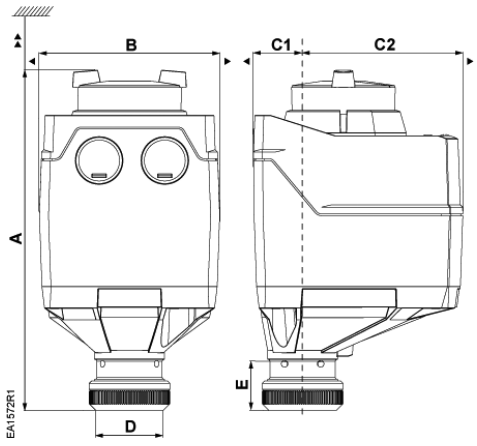


Dimensions shown in inches (mm).

Dimensions							
A	B	C1	C2	D	E	►	►►
5.9 (151 mm)	3.1 (80 mm)	0.9 (21.9 mm)	3.3 (84.6 mm)	1.2 (29.9 mm)	0.9 (21.8 mm)	4 (100 mm)	8 (200 mm)

Table Notes: **Service envelope** Minimum access space recommended
► 4 inch (100 mm) ►► 8 inch (200 mm)

SAS Series Non-Spring Return Actuator



Dimensions shown in inches (mm).

Dimensions							
A	B	C1	C2	D	E	►	►►
5.9 (151 mm)	3.1 (80 mm)	0.9 (21.9 mm)	2.8 (71.1 mm)	1.2 (29.9 mm)	0.9 (21.8 mm)	4 (100 mm)	8 (200 mm)

Table Notes: **Service envelope** Minimum access space recommended
► 4 inch (100 mm) ►► 8 inch (200 mm)

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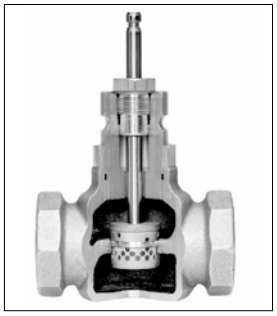
Flowrite Globe Valves



Compatible with piping line sizes ranging from 1/2 to 6-inch (Cv range 1.0 to 400), the Flowrite Globe Valves offer electronic and pneumatic valve actuators. Flowrite valves bodies and actuators feature a unique, direct-coupled design that requires no additional parts to connect the valve and the actuator for time and labor savings.

Nearly 80 Years of Legendary Performance

Since 1934, Flowrite has been recognized as the best globe valve in the HVAC control market. The Flowrite Globe Valve is an excellent choice for small to large air handling units and for central plant applications.

Simple to Specify and Order

The direct-coupled connection provides flexibility and ease of installation. Specify the valve and actuator configuration to meet your specific requirements. In addition, you can select how you would like the components shipped – either as separate components or factory-assembled and tagged at no additional cost.

Save Time

Installation is simple. There is no linkage to assemble or adjust.

Flowrite Features

- Unique caged-plug design improves controllability and reduces noise
- Highest close off pressures in the industry – up to 250 psi
- Low leakage 0.01% (ANSI Class IV)
- Greater than 100:1 rangeability
- Industry leading simplicity in serviceability

Siemens Product Guard **PLUS 3** Warranty

Two-way Globe Valves

1/2 to 2-inch Bronze Body
Normally Open or Normally Closed

Flowrite Two-way Globe Valve.

Description

Designed to work with either a pneumatic or electronic actuator with a 3/4-inch (20 mm) stroke, the Flowrite Two-way Globe Valves are available in ANSI Class 250 for Normally Closed or Normally Open action.

Features

- Direct-coupled bonnet
- Equal percentage or linear flow characteristics
- Brass or stainless steel trim
- Standard- or high-temperature packing
- Close-off up to 250 psi
- Fully serviceable
- Greater than 100:1 rangeability
- Accepts any 3/4-inch stroke Flowrite pneumatic or electronic actuator
- ANSI Leakage Class IV (0.01% of Cv)
- Cartridge-type packing for easy service
- Orderable as a valve only or as a complete valve/actuator assembly

Applications

The Flowrite Two-way Globe Valves are recommended for water, low and high pressure steam, and glycol solutions up to 50 percent.

Specifications

Valve Size ..... 1/2 to 2" (15 to 50 mm)
Body Style ..... Globe Style Control Valve
Seat Style ..... Single Seat, Metal to Metal
Action ..... Normally Closed (NC), Normally Open (NO)
Stem Travel (Stroke) ..... 3/4" (20 mm)
Valve Body ..... ANSI Class 250
Materials
Body ..... UNS CA 844 Bronze
Trim ..... Brass or Stainless Steel
Stem ..... Stainless Steel ASTM A582 Type 303
Packing
Normal Duty ..... EPDM O-rings
Steam ..... PTFE V-rings and EPDM O-ring
Operating
Controlled Medium ..... Saturated Steam, Water, Glycol Solutions up to 50%
Medium Temperature Range
Normal Duty Packing ..... 20° to 250°F (-7° to 120°C)
Steam Packing ..... 337°F (170°C) Max.

Max. Recommended Differential Pressure for Modulating Service
Brass Trim
Liquid ..... 25 psi (173 kPa)
Steam ..... 15 psi (103 kPa)
Stainless Steel Trim
Liquid ..... 50 psi (345 kPa)
Steam ..... 50 psi (345 kPa)
Max. Inlet Pressure
Water ..... Refer to Flowrite Reference Section.
Steam ..... 100 psig (690 kPa)
Rangeability ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Leakage Rate ..... Class IV (0.01% of Cv)
Flow Characteristics ..... Equal Percentage or Linear

Valve Product Ordering

Normally Open/Normally Closed, Equal Percentage

Connection	Valve Size in.	Valve Size (mm)	Flow Rate Cv	Flow Rate (Kvs)	Stroke (in.)	Normally Open Part No.	Normally Closed Part No.
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)							
Brass Trim							
Female x Female	1/2	(15)	1	(0.9)	3/4	**599-03162**	**599-03180**
	1/2	(15)	1.6	(1.4)	3/4	**599-03163**	**599-03181**
	1/2	(15)	2.5	(2.2)	3/4	**599-03164**	**599-03182**
	1/2	(15)	4	(3.4)	3/4	**599-03165**	**599-03183**
	3/4	(20)	6.3	(5.4)	3/4	**599-03166**	**599-03184**
	1	(25)	10	(8.6)	3/4	**599-03167**	**599-03185**
	1-1/4	(32)	16	(14)	3/4	**599-03168**	**599-03186**
	1-1/2	(40)	25	(22)	3/4	**599-03169**	**599-03187**
	2	(50)	40	(34)	3/4	**599-03170**	**599-03188**
Stainless Steel Trim							
Female x Female	1/2	(15)	1	(0.9)	3/4	**599-03108**	**599-03126**
	1/2	(15)	1.6	(1.4)	3/4	**599-03109**	**599-03127**
	1/2	(15)	2.5	(2.2)	3/4	**599-03110**	**599-03128**
	1/2	(15)	4	(3.4)	3/4	**599-03111**	**599-03129**
	3/4	(20)	6.3	(5.4)	3/4	**599-03112**	**599-03130**
	1	(25)	10	(8.6)	3/4	**599-03113**	**599-03131**
	1-1/4	(32)	16	(14)	3/4	**599-03114**	**599-03132**
	1-1/2	(40)	25	(22)	3/4	**599-03115**	**599-03133**
	2	(50)	40	(34)	3/4	**599-03116**	**599-03134**

Valve Product Ordering

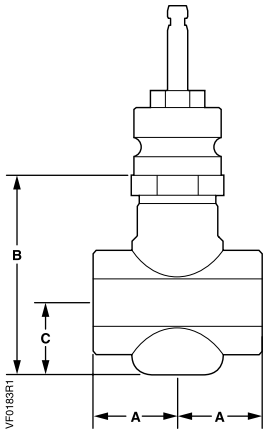
Normally Open/Normally Closed, Linear, Stainless Steel Trim

Connection	Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke (in.)	Normally Open Part No.	Normally Closed Part No.
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)							
Female x Female	1/2	(15)	1	(0.9)	3/4	**599-03000**	**599-03018**
	1/2	(15)	1.6	(1.4)	3/4	**599-03001**	**599-03019**
	1/2	(15)	2.5	(2.2)	3/4	**599-03002**	**599-03020**
	1/2	(15)	4	(3.4)	3/4	**599-03003**	**599-03021**
	3/4	(20)	6.3	(5.4)	3/4	**599-03004**	**599-03022**
	1	(25)	10	(8.6)	3/4	**599-03005**	**599-03023**
	1-1/4	(32)	16	(14)	3/4	**599-03006**	**599-03024**
	1-1/2	(40)	25	(22)	3/4	**599-03007**	**599-03025**
	2	(50)	40	(34)	3/4	**599-03008**	**599-03026**
High-Temperature Packing – 337ºF (170ºC)							
Female x Female	1/2	(15)	1	(0.9)	3/4	**599-03054**	**599-03072**
	1/2	(15)	1.6	(1.4)	3/4	**599-03055**	**599-03073**
	1/2	(15)	2.5	(2.2)	3/4	**599-03056**	**599-03074**
	1/2	(15)	4	(3.4)	3/4	**599-03057**	**599-03075**
	3/4	(20)	6.3	(5.4)	3/4	**599-03058**	**599-03076**
	1	(25)	10	(8.6)	3/4	**599-03059**	**599-03077**
	1-1/4	(32)	16	(14)	3/4	**599-03060**	**599-03078**
	1-1/2	(40)	25	(22)	3/4	**599-03061**	**599-03079**
	2	(50)	40	(34)	3/4	**599-03062**	**599-03080**

Actuator Product Ordering

	Description		Part No.	Actuator Prefix Code
 4"	Pneumatic	3-8 psi (21-55 kPa)	**599-01081**	**268**
		5-10 psi (34-69 kPa)	**599-01082**	**269**
		10-15 psi (69-103 kPa)	**599-01083**	**270**
 8"	Pneumatic	Normal Temp.	**599-01050**	**277**
		High-Temp.	**599-01051**	**278**
 8"	Pneumatic w/ Positioner	Normal Temp. w/Positioner	**599-01050 + 599-00426**	**283**
		High-Temp. w/Positioner	**599-01051 + 599-00426**	**284**
	Electro-Mechanical	Rack & Pinion 2P, Spring Return	**599-03611**	**299**
		Rack & Pinion, 0-10 Vdc, Spring Return	**599-03609**	**298**
		24 V, Floating 3P, Non-Spring Return	**SAX81.03U**	**373**
		24 V, 0-10 V, 4-20 mA, Non-Spring Return	**SAX61.03U**	**371**
	Electro-Hydraulic	24 V, Floating 3P, Spring Return	**SKD82.51U**	**276**
		24 V, Floating 3P, Non-Spring Return	**SKD82.50U**	**275**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKD62U**	**274**
		24 V, 0-10 V, 4-20 mA, Non-Spring Return	**SKD60U**	**267**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKB62U**	**291**

Dimensions and Weights



Female NPT by Female NPT (FxF)

Valve Size	Dimensions			Weight
	A	B	C	
	Normally Open			
1/2" (15 mm)	1-7/16" (36 mm)	2-15/16" (74 mm)	1-1/4" (32 mm)	3 lb. (1.4 kg)
3/4" (20 mm)	1-11/16" (43 mm)	3-15/16" (99 mm)	1-7/16" (36 mm)	4 lb. (1.8 kg)
1" (25 mm)	2" (50 mm)	3-3/4" (96 mm)	1-1/4" (32 mm)	5 lb. (2.3 kg)
1-1/4" (32 mm)	2-1/2" (62 mm)	4-1/4" (109 mm)	2" (50 mm)	7 lb. (3.2 kg)
1-1/2" (40 mm)	2-9/16" (65 mm)	4-1/4" (109 mm)	2" (50 mm)	8 lb. (3.6 kg)
2" (50 mm)	3-1/8" (79 mm)	4-9/16" (116 mm)	2-1/4" (57 mm)	16 lb. (7.3 kg)
	Normally Closed			
1/2" (15 mm)	1-7/16" (36 mm)	3-13/16" (97 mm)	2-13/16" (55 mm)	3 lb. (1.4 kg)
3/4" (20 mm)	1-11/16" (43 mm)	3-13/16" (97 mm)	2-13/16" (55 mm)	4 lb. (1.8 kg)
1" (25 mm)	2" (50 mm)	3-13/16" (97 mm)	2-13/16" (55 mm)	5 lb. (2.3 kg)
1-1/4" (32 mm)	2-1/2" (62 mm)	3-13/16" (97 mm)	2-13/16" (55 mm)	7 lb. (3.2 kg)
1-1/2" (40 mm)	2-9/16" (65 mm)	3-7/8" (99 mm)	2-1/4" (58 mm)	8 lb. (3.6 kg)
2" (50 mm)	3-1/8" (79 mm)	4-1/2" (114 mm)	2-9/16" (65 mm)	16 lb. (7.3 kg)

Three-way Globe Valves

1/2 to 2-inch Bronze Body

Flowrite Three-way Globe Valve.

Description

Designed to work with either pneumatic or electronic actuators with a 3/4-inch (20 mm) stroke, the Flowrite Three-way Globe Valves are available in ANSI Class 250.

Features

- Direct-coupled, universal bonnet
- Equal percentage (NC port) and linear flow (NO port) characteristics
- Brass or stainless steel trim
- Accepts any 3/4-inch stroke Flowrite pneumatic or electronic actuator
- Greater than 100:1 rangeability
- ANSI Leakage Class IV (0.01% of Cv)
- Cartridge-type packing for easy service
- Orderable as a valve only or as a complete valve/actuator assembly

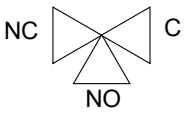
Applications

Flowrite Three-way Globe Valves are recommended for mixing applications. The upper port is closed in the normal stem up, failed position. The lower port is open in the stem up position.

This valve can also be used for throttling or bypass coil control application. However, a pump is recommended on the coil circuit to improve the heat transfer characteristic of the coil and for freeze protection.

To use this valve as a diverting valve, refer to Technical Instructions 155-185P25 for limitations or contact your local representative for more information.

Flow Characteristics



Equal percentage for NC/Linear for NO

Specifications

Valve Size ..... 1/2 to 2" (15 to 50 mm)
Body Style ..... Globe Style Control Valve
Seat Style ..... Metal to Metal
Action ..... Three-way Mixing
Stem Travel (Stroke) ..... 3/4" (20 mm)
Valve Body Rating ..... ANSI Class 250
Material
Body ..... UNS CA 844 Bronze
Trim ..... Brass or Stainless Steel
Stem ..... Stainless Steel ASTIM A582 Type 303
Packing ..... EPDM O-rings

Operating
Controlled Medium ..... Water, Glycol Solutions up to 50%
Medium Temperature Range ..... 20° to 250°F (-7° to 120°C)
Max. Recommended Differential Pressure for Modulating Service
Brass Trim ..... 25 psi (173 kPa)
Stainless Steel Trim ..... 50 psi (345 kPa)
Max. Inlet Pressure ..... Refer to the Flowrite Reference Section
Rangeability ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Leakage Rate ..... Class IV (0.01% of Cv)

Valve Product Ordering

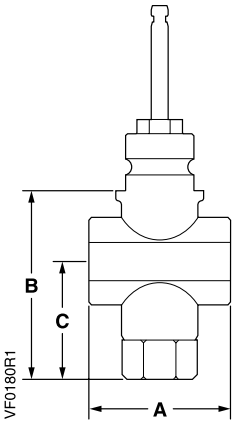
Brass and Stainless Steel Trim

Connection	Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke (in.)	Brass Trim Part No.	Stainless Steel Trim Part No.
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)							
Female x Female	1/2	(15)	1	(0.9)	3/4	**599-03198**	**599-03144**
	1/2	(15)	1.6	(1.4)	3/4	**599-03199**	**599-03145**
	1/2	(15)	2.5	(2.2)	3/4	**599-03200**	**599-03146**
	1/2	(15)	4	(3.4)	3/4	**599-03201**	**599-03147**
	3/4	(20)	6.3	(5.4)	3/4	**599-03202**	**599-03148**
	1	(25)	10	(8.6)	3/4	**599-03203**	**599-03149**
	1-1/4	(32)	16	(14)	3/4	**599-03204**	**599-03150**
	1-1/2	(40)	25	(22)	3/4	**599-03205**	**599-03151**
	2	(50)	40	(34)	3/4	**599-03206**	**599-03152**

Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
 4"	Pneumatic	3-8 psi (21-55 kPa)	**599-01081**	**268**
		5-10 psi (34-69 kPa)	**599-01082**	**269**
		10-15 psi (69 -103 kPa)	**599-01083**	**270**
 8"	Pneumatic	Normal Temp.	**599-01050**	**277**
		High-Temp.	**599-01051**	**278**
 8"	Pneumatic w/ Positioner	Normal Temp. w/Positioner	**599-01050 + 599-00426**	**283**
		High-Temp. w/Positioner	**599-01051 + 599-00426**	**284**
	Electro-Mechanical	Rack & Pinion 2P, Spring Return	**599-03611**	**299**
		Rack & Pinion, 0-10 Vdc, Spring Return	**599-03609**	**298**
		24 V, Floating 3P, Non-Spring Return	**SAX81.03U**	**373**
		24 V, 0-10 V, 4-20 mA, Non-Spring Return	**SAX61.03U**	**371**
	Electro-Hydraulic	24 V, Floating 3P, Spring Return	**SKD82.51U**	**276**
		24 V, Floating 3P, Non-Spring Return	**SKD82.50U**	**275**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKD62U**	**274**
		24 V, 0-10 V, 4-20 mA, Non-Spring Return	**SKD60U**	**267**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKB62U**	**291**

Dimensions and Weights



Female NPT x Female NPT x Female NPT
(FxFxF)

Valve Size	Dimensions			Weight
	A	B	C	
1/2" (15 mm)	2-7/8" (72 mm)	4-5/16" (110 mm)	2-11/16" (68 mm)	3.0 lb. (1.4 kg)
3/4" (20 mm)	3-3/8" (85 mm)	4-5/16" (110 mm)	2-3/4" (69 mm)	4.0 lb. (1.8 kg)
1" (25 mm)	3-15/16" (100 mm)	4-1/2" (114 mm)	2-7/8" (72 mm)	5.0 lb. (2.3 kg)
1-1/4" (32 mm)	4-15/16" (125 mm)	4-5/8" (116 mm)	2-15/16" (74 mm)	7.0 lb. (3.2 kg)
1-1/2" (40 mm)	5-1/8" (130 mm)	4-5/8" (117 mm)	3" (76 mm)	9.0 lb. (4.1 kg)
2" (50 mm)	6-1/4" (158 mm)	5-1/8" (130 mm)	3-3/16" (81 mm)	13.0 lb. (5.9 kg)

Two-way Flanged Iron Globe Valves

2-1/2 to 6-inch
Normally Open or Normally Closed

Flowrite Two-Way Flanged Iron Valve.

Description

Designed to work with either pneumatic or electronic actuators, the Flowrite Two-way Valves are available in both ANSI Class 125 and 250 for normally closed or normally open action.

Features

- Valve flange face-to-face dimensions meet ANSI/ISA S75.03 standards
- Direct-coupled, universal bonnet
- Bronze or stainless steel trim
- Standard- or high-temperature packing
- Close-off up to 250 psi
- Fully serviceable
- Greater than 100:1 rangeability
- Equal percentage or linear flow characteristics
- 2-1/2 and 3-inch sizes available with 3/4-inch stroke only
- 4-, 5-, 6-inch are available with a 1-1/2-inch stroke
- ANSI Leakage Class IV (0.01% of Cv)
- Cartridge-type packing for easy service
- Orderable as a valve only or as a complete valve/actuator assembly

Applications

The Flowrite Two-way valves are recommended for water, steam, and glycol solutions up to 50 percent. Additional specifications include the following:

- Water inlet pressures up to ANSI 125 and ANSI 250 cast iron body rating
- Water modulating differential pressure up to 25 psi (172 kPa) for bronze trim and 50 psi (345 kPa) for stainless steel trim
- Steam inlet to 100 psi with modulating differential pressure up to 50 psi (345 kPa)

Specifications

Valve Size ..... 2-1/2 to 6" (65 to 150 mm)
Body Style ..... Flanged
Seat Style ..... Single seat
Action ..... Normally Closed (NC); Normally Open (NO)
Valve Body Rating ..... ANSI Class 125 or 250
Stem Travel (Stroke)
2-1/2 and 3" ..... 3/4" (20 mm)
4, 5 and 6" ..... 1-1/2" (40 mm)
Materials
Body ..... Cast Iron ASTM A126 Class B
Trim ..... Bronze or Stainless Steel
Stem ..... Stainless Steel ASTM A582 Type 303
Packing
Normal Duty Packing ..... EPDM O-rings
Steam Packing ..... PTFE V-rings and EPDM O-ring
Operating
Controlled Medium ..... Saturated Steam, Water, Glycol Solutions up to 50%
Medium Temperature Range
Normal Duty Packing ..... 20° to 250°F (-7° to 120°C)
Steam Packing ..... 337°F (170°C) max.
Max. Inlet Pressure
Water ..... Refer to Flowrite Reference Section
Steam ..... 100 psig (690 kPa)
Max. Recommended Differential Pressure for Modulating Service
Bronze Trim
Liquid ..... 25 psi (173 kPa)
Steam ..... 15 psi (103 kPa)
Stainless Steel Trim
Liquid ..... 50 psi (345 kPa)
Steam ..... 50 psi (345 kPa)
Rangeability ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Close-off Pressure ..... Refer to the Flowrite Reference Section.
Leakage Rate ..... Class IV (0.01% of Cv)
Flow Characteristics ..... Equal Percentage or Linear
Dimensions
Face-to-face ..... ANSI/ISA S75.03

Valve Product Ordering

Normally Open/Normally Closed, Equal Percentage

Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke (in.)	ANSI Class 125 Normally Open Part No.	ANSI Class 125 Normally Closed Part No.	ANSI Class 250 Normally Open Part No.	ANSI Class 250 Normally Closed Part No.
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)								
Bronze								
2-1/2	(65)	63	(54)	3/4	**599-05980**	**599-05990**	**599-05940**	**599-05950**
3	(80)	100	(86)	3/4	**599-05981**	**599-05991**	**599-05941**	**599-05951**
4	(100)	160	(140)	1-1/2	**599-05982**	**599-05992**	**599-05942**	**599-05952**
5	(125)	250	(215)	1-1/2	**599-05983**	**599-05993**	**599-05943**	**599-05953**
6	(150)	400	(340)	1-1/2	**599-05984**	**599-05994**	**599-05944**	**599-05954**
Stainless Steel								
2-1/2	(65)	63	(54)	3/4	**599-05960**	**599-05970**	**599-05920**	**599-05930**
3	(80)	100	(86)	3/4	**599-05961**	**599-05971**	**599-05921**	**599-05931**
4	(100)	160	(140)	1-1/2	**599-05962**	**599-05972**	**599-05922**	**599-05932**
5	(125)	250	(215)	1-1/2	**599-05963**	**599-05973**	**599-05923**	**599-05933**
6	(150)	400	(340)	1-1/2	**599-05964**	**599-05974**	**599-05924**	**599-05934**

Accessories & Service Kits A-283

Valve Product Ordering

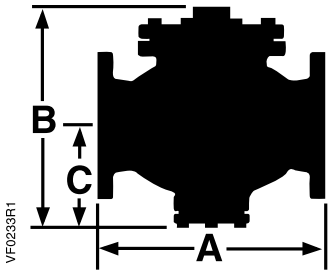
Normally Open/Normally Closed, Linear, Stainless Steel

Valve Size in.	Valve Size (mm)	Flow Rate Cv	Flow Rate (Kvs)	Stroke (in.)	ANSI Class 125 Normally Open Part No.	ANSI Class 125 Normally Closed Part No.	ANSI Class 250 Normally Open Part No.	ANSI Class 250 Normally Closed Part No.
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)								
2-1/2	(65)	63	(54)	3/4	**599-06060**	**599-06070**	**599-06140**	**599-06150**
3	(80)	100	(86)	3/4	**599-06061**	**599-06071**	**599-06141**	**599-06151**
4	(100)	160	(140)	1-1/2	**599-06062**	**599-06072**	**599-06142**	**599-06152**
5	(125)	250	(215)	1-1/2	**599-06063**	**599-06073**	**599-06143**	**599-06153**
6	(150)	400	(340)	1-1/2	**599-06064**	**599-06074**	**599-06144**	**599-06154**
High-Temperature Packing – 337ºF (170ºC)								
2-1/2	(65)	63	(54)	3/4	**599-06040**	**599-06050**	**599-06120**	**599-06130**
3	(80)	100	(86)	3/4	**599-06041**	**599-06051**	**599-06121**	**599-06131**
4	(100)	160	(140)	1-1/2	**599-06042**	**599-06052**	**599-06122**	**599-06132**
5	(125)	250	(215)	1-1/2	**599-06043**	**599-06053**	**599-06123**	**599-06133**
6	(150)	400	(340)	1-1/2	**599-06044**	**599-06054**	**599-06124**	**599-06134**

Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
 8"	Pneumatic	20 mm Stroke/Normal Temp.	**599-01050**	**277**
		20 mm Stroke/Hi-Temp.	**599-01051**	**278**
 12"	Pneumatic	20 mm Stroke	**599-01010**	**279**
		40 mm Stroke	**599-01000**	**281**
 8"	Pneumatic w/ Positioner	20 mm Stroke/Normal Temp.	**599-01050 + 599-00426**	**283**
		20 mm Stroke/Hi-Temp.	**599-01051 + 599-00426**	**284**
 12"	Pneumatic w/ Positioner	20 mm Stroke	**599-01010 + 599-00423**	**285**
		40 mm Stroke	**599-01000 + 599-00423**	**287**
	Electro-Hydraulic	**20 mm Stroke**		
		24 V, Floating 3P, Spring Return	**SKD82.51U**	**276**
		24 V, Floating 3P, Spring Return	**SKB82.51U**	**289**
		24 V, Floating 3P, Non-Spring Return	**SKD82.50U**	**275**
		24 V, 0-10 V, 4-20 mA, Non-Spring Return	**SKD60U**	**267**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKD62U**	**274**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKB62U**	**291**
		40 mm Stroke		
		24 V, Floating 3P, Spring Return	**SKC82.61U**	**292**
		24 V, Floating 3P, Non-Spring Return	**SKC82.60U**	**293**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKC62U**	**294**

Dimensions and Weights



Valve Size	ANSI Class 125				ANSI Class 250			
	Dimensions			Weight	Dimensions			Weight
	A	B	C		A	B	C	
	Normally Open							
2-1/2" (65 mm)	10-7/8" (276 mm)	11" (281 mm)	4-7/8" (123 mm)	60 lb. (27 kg)	11-1/2" (292 mm)	11" (281 mm)	4-7/8" (123 mm)	76 lb. (34 kg)
3" (80 mm)	11-3/4" (299 mm)	12-1/4" (312 mm)	5-5/16" (135 mm)	76 lb. (34 kg)	12-1/2" (318 mm)	12-1/4" (312 mm)	5-5/16" (135 mm)	99 lb. (45 kg)
4" (100 mm)	13-7/8" (352 mm)	13-9/16" (345 mm)	6-5/16" (160 mm)	124 lb. (56 kg)	14-1/2" (368 mm)	13-5/8" (344.7 mm)	6-5/16" (160 mm)	160 lb. (73 kg)
5" (125 mm)	15-3/4" (400 mm)	15-3/16" (385 mm)	7" (177 mm)	155 lb. (70 kg)	16-5/8" (422 mm)	15-3/16" (385 mm)	7" (177 mm)	208 lb. (94 kg)
6" (150 mm)	17-3/4" (451 mm)	16-3/4" (426 mm)	7-7/8" (200 mm)	212 lb. (96 kg)	18-5/8" (473 mm)	16-3/4" (426 mm)	7-7/8" (200 mm)	302 lb. (137 kg)
	Normally Closed							
2-1/2" (65 mm)	10-7/8" (276 mm)	10-5/8" (269 mm)	4-7/8" (125 mm)	58 lb. (26 kg)	11-1/2" (292 mm)	11" (279 mm)	5-3/8" (135 mm)	74 lb. (34 kg)
3" (80 mm)	11-3/4" (299 mm)	11-15/16" (303 mm)	5-5/8" (142 mm)	75 lb. (34 kg)	12-1/2" (318 mm)	12-7/16" (315 mm)	6" (154 mm)	98 lb. (44 kg)
4" (100 mm)	13-7/8" (352 mm)	13-15/16" (354 mm)	6-5/8" (168 mm)	123 lb. (56 kg)	14-1/2" (368 mm)	14-3/8" (364 mm)	7" (178 mm)	159 lb. (72 kg)
5" (125 mm)	15-3/4" (400 mm)	15-1/4" (338 mm)	7-1/2" (185 mm)	153 lb. (69 kg)	16-5/8" (422 mm)	15-3/4" (399 mm)	7-3/4" (196 mm)	207 lb. (94 kg)
6" (150 mm)	17-3/4" (451 mm)	17-1/16" (433 mm)	8-3/16" (207 mm)	209 lb. (95 kg)	18-5/8" (473 mm)	17-1/2" (444 mm)	8-5/8" (218 mm)	299 lb. (136 kg)

High Pressure Close-off Two-Way Flanged Iron Globe Valves

2-1/2 to 6-inch
Normally Open or Normally Closed

Flowrite Two-Way Flanged Iron High Pressure Close-off.

Description

The Flowrite 599 Series high pressure close-off, two-way flanged iron body globe valves, are designed to work with either pneumatic or SK Series electro-hydraulic actuators with 3/4-inch (20 mm) or 1-1/2-inch (40 mm) stroke. They are available in both ANSI Class 125 and 250 for normally open or normally closed action.

Features

- Universal bonnet, for direct-coupled actuators
- Equal percentage flow characteristic
- Stainless steel trim and stems
- Metal-to-metal seats
- 200 psi close-off for all line sizes
- ANSI Class IV leakage (≤ 0.01% of Cv)
- Greater than 100:1 rangeability
- EPDM O-ring packing
- Cartridge-type packing for easy service
- Orderable as a valve only or as a complete valve/actuator assembly

Applications

Typical applications include control of hot or chilled water; or water-glycol solutions up to 50%.

Specifications

Valve Size ..... 2-1/2 to 6" (65 to 150 mm)
Body Style ..... Cast Iron ASTM A126 Class B
Seat Style ..... Metal to Metal
Action ..... Normally Open (NO) or Normally Closed (NC)
Valve Body Rating ..... ANSI Class 125 or 250
Stem Travel
2-1/2 and 3" ..... 3/4" (20 mm) Stroke
4, 5 and 6" ..... 1-1/2" (40 mm) Stroke
Materials
Body ..... Cast Iron ASTM A126 Class B
Trim ..... Stainless Steel
Stem ..... Stainless Steel ASTM A582 Type 303
Packing
Normal Duty Packing ..... EPDM O-ring
Operating
Controlled Medium ..... Water, Glycol Solutions to 50%
Medium Temperature Range ..... 20° to 250°F (-7° to 120°C)
Max. Inlet Pressure
Water ..... Refer to Flowrite Reference Section
Max. Recommended Differential Pressure for Modulating Service
Stainless Steel Trim
Liquid ..... 50 psig (345 kPa)
Rangeability ..... >100:1
Close-off Ratings ..... According to ANSI/FCI 70-2
Close-off Pressure ..... 200 psig
Leakage Rate ..... Class IV (≤ 0.01% of Cv)
Dimensions
Face-to-Face ..... ANSI/ISA S75.03

Valve Product Ordering

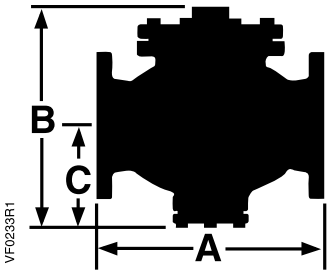
Normally Open/Normally Closed, Equal Percentage

Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke (in.)	ANSI Class 125 Normally Open Part No.	ANSI Class 125 Normally Closed Part No.	ANSI Class 250 Normally Open Part No.	ANSI Class 250 Normally Closed Part No.
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)								
2-1/2	(65)	63	(54)	3/4	**599-06610**	**599-06615**	**599-06620**	**599-06625**
3	(80)	100	(86)	3/4	**599-06611**	**599-06616**	**599-06621**	**599-06626**
4	(100)	160	(140)	1-1/2	**599-06612**	**599-06617**	**599-06622**	**599-06627**
5	(125)	250	(215)	1-1/2	**599-06613**	**599-06618**	**599-06623**	**599-06628**
6	(150)	400	(340)	1-1/2	**599-06614**	**599-06619**	**599-06624**	**599-06629**

Actuator Product Ordering

	Description		Part No.	Actuator Prefix Code
 8"	Pneumatic w/ Positioner	20 mm Stroke	**599-01050 + 599-00426**	**283**
 12"	Pneumatic w/ Positioner	40 mm Stroke	**599-01000 + 599-00423**	**287**
	Electro-Hydraulic	24 V, 0-10 V, 4-20 mA, 3/4" Stroke Spring Return	**SKD62U**	**274**
		24 V, 0-10 V, 4-20 mA, 1-1/2" Stroke Spring Return	**SKC62U**	**294**

Dimensions and Weights



Valve Size	ANSI Class 125				ANSI Class 250			
	Dimensions			Weight	Dimensions			Weight
	A	B	C		A	B	C	
	Normally Open							
2-1/2" (65 mm)	10-7/8" (276 mm)	11" (281 mm)	4-7/8" (123 mm)	62 lb. (28 kg)	11-1/2" (292 mm)	11" (281 mm)	4-7/8" (123 mm)	78 lb. (36 kg)
3" (80 mm)	11-3/4" (299 mm)	12-1/4" (312 mm)	5-5/16" (135 mm)	79 lb. (36 kg)	12-1/2" (318 mm)	12-1/4" (312 mm)	5-5/16" (135 mm)	102 lb. (46 kg)
4" (100 mm)	13-7/8" (352 mm)	13-9/16" (345 mm)	6-5/16" (160 mm)	129 lb. (58 kg)	14-1/2" (368 mm)	13-5/8" (344.7 mm)	6-5/16" (160 mm)	165 lb. (75 kg)
5" (125 mm)	15-3/4" (400 mm)	15-3/16" (385 mm)	7" (177 mm)	172 lb. (73 kg)	16-5/8" (422 mm)	15-3/16" (385 mm)	7" (177 mm)	215 lb. (97 kg)
6" (150 mm)	17-3/4" (451 mm)	16-3/4" (426 mm)	7-7/8" (200 mm)	222 lb. (111 kg)	18-5/8" (473 mm)	16-3/4" (426 mm)	7-7/8" (200 mm)	312 lb. (142 kg)
	Normally Closed							
2-1/2" (65 mm)	10-7/8" (276 mm)	10-5/8" (269 mm)	4-7/8" (125 mm)	60 lb. (27 kg)	11-1/2" (292 mm)	11" (279 mm)	5-3/8" (135 mm)	76 lb. (35 kg)
3" (80 mm)	11-3/4" (299 mm)	11-15/16" (303 mm)	5-5/8" (142 mm)	78 lb. (36 kg)	12-1/2" (318 mm)	12-7/16" (315 mm)	6" (154 mm)	101 lb. (46 kg)
4" (100 mm)	13-7/8" (352 mm)	13-15/16" (354 mm)	6-5/8" (168 mm)	128 lb. (58 kg)	14-1/2" (368 mm)	14-3/8" (364 mm)	7" (178 mm)	164 lb. (74 kg)
5" (125 mm)	15-3/4" (400 mm)	15-1/4" (338 mm)	7-1/2" (185 mm)	160 lb. (72 kg)	16-5/8" (422 mm)	15-3/4" (399 mm)	7-3/4" (196 mm)	214 lb. (97 kg)
6" (150 mm)	17-3/4" (451 mm)	17-1/16" (433 mm)	8-3/16" (207 mm)	219 lb. (100 kg)	18-5/8" (473 mm)	17-1/2" (444 mm)	8-5/8" (218 mm)	309 lb. (141 kg)

SIEMENS
Ingenuity for life

More torque, less energy consumption

Siemens damper actuators ship ready to install, with built-in time and cost-saving features such as a patented self-centering shaft adapter, standardized wiring, and brushless motor technology. With torques ranging from 20 to 310 lb-in., this powerful and flexible line-up delivers out-of-the-box performance and long-lasting reliability for all types of HVAC applications.

usa.siemens.com/hvac

Three-way Flanged Iron Globe Valves

2-1/2 to 6-inch

Flowrite Three-way Flanged Iron Globe Valve.

Description

Designed to work with either a pneumatic or electronic Flowrite actuator, the Flowrite Three-way Globe Valves are available in both ANSI Class 125 and 250.

Features

- Valve flange face-to-face dimensions meet ANSI/ISA S75.03 standards
- Direct-coupled, universal bonnet
- Equal percentage (NC port) and linear (NO port) flow characteristics
- Bronze or stainless steel trim
- Greater than 100:1 rangeability
- 2-1/2 to 3-inch are available with a 3/4-inch stroke
- 4-, 5-, and 6-inch are available with a 1-1/2-inch stroke
- ANSI Leakage Class IV (0.01% of Cv)
- Cartridge-type packing for easy service

Option

- Service flange for easy removal of stem and plug through bottom port

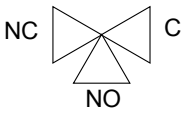
Applications

The Flowrite Three-way Globe Valves are recommended for water and glycol solutions up to 50 percent. Additional specifications include the following:

- Water inlet pressures up to ANSI 125 and ANSI 250 cast-iron body rating
- Water modulating differential pressure up to 25 psi (172 kPa) for bronze trim and 50 psi (345 kPa) for stainless steel trim

To use this valve as a diverting valve, refer to Technical Instructions 155-160P25 for limitations or contact your local representative for more information.

Flow Characteristics



Equal percentage for NC/Linear for NO

Siemens Product Guard **PLUS 3** Warranty

Specifications

Valve Size ..... 2-1/2 to 6"
Body Style ..... Flanged
Action ..... Three-way Water Mix
Stem Travel
2-1/2 and 3" ..... 3/4" (20 mm)
4, 5 and 6" ..... 1-1/2" (40 mm)
Valve Body Rating ..... ANSI Class 125 or 250
Materials
Body ..... Cast Iron, ASTM A 126 Class B
Trim ..... Bronze or Stainless Steel
Stem ..... Stainless Steel, ASTM A582 Type 303
Packing
Liquid Service to 250°F (120°C) ..... EPDM O-rings

Operating
Controlled Medium ..... Water, Glycol Solutions up to 50%
Medium Temperature Range ..... 20° to 250°F (-7° to 120°C)
Max. Recommended Differential Pressure for Modulating Service
Bronze Trim ..... 25 psig (173 kPa)
Stainless Steel Trim ..... 50 psig (345 kPa)
Flow Characteristics
Upper Port ..... Equal Percentage
Lower Port ..... Linear
Rangeability ..... >100:1

Valve Product Ordering

Bronze Trim

Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke	Valve Body ANSI Class 125	Valve Body ANSI Class 250	Service Flange ANSI Class 125	Service Flange ANSI Class 250
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)								
2-1/2	(65)	63	(54)	3/4	**599-06160**	**599-06170**	**599-05011**	**599-05016**
3	(80)	100	(86)	3/4	**599-06161**	**599-06171**	**599-05012**	**599-05017**
4	(100)	160	(140)	1-1/2	**599-06162**	**599-06172**	**599-05013**	**599-05018**
5	(125)	250	(215)	1-1/2	**599-06163**	**599-06173**	**599-05014**	**599-05019**
6	(150)	400	(340)	1-1/2	**599-06164**	**599-06174**	**599-05015**	**599-05020**

Ordering Note:
Service Flange is sold separately.

Stainless Steel Trim

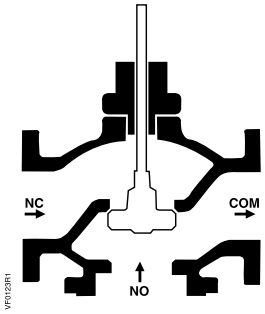
Valve Size in.	(mm)	Flow Rate Cv	(Kvs)	Stroke	Valve Body ANSI Class 125	Valve Body ANSI Class 250	Service Flange ANSI Class 125	Service Flange ANSI Class 250
Standard-Temperature Packing – 20º to 250ºF (-7º to 120ºC)								
2-1/2	(65)	63	(54)	3/4	**599-06165**	**599-06175**	**599-05011**	**599-05016**
3	(80)	100	(86)	3/4	**599-06166**	**599-06176**	**599-05012**	**599-05017**
4	(100)	160	(140)	1-1/2	**599-06167**	**599-06177**	**599-05013**	**599-05018**
5	(125)	250	(215)	1-1/2	**599-06168**	**599-06178**	**599-05014**	**599-05019**
6	(150)	400	(340)	1-1/2	**599-06169**	**599-06179**	**599-05015**	**599-05020**

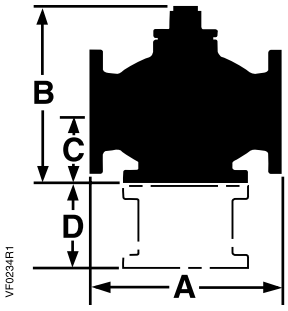
Ordering Note:
Service Flange is sold separately.

Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
 8"	Pneumatic	20 mm Stroke/Normal Temp.	**599-01050**	**277**
		20 mm Stroke/Hi-Temp.	**599-01051**	**278**
 12"	Pneumatic	20 mm Stroke	**599-01010**	**279**
		40 mm Stroke	**599-01000**	**281**
 8"	Pneumatic w/ Positioner	20 mm Stroke/Normal Temp.	**599-01050 + 599-00426**	**283**
		20 mm Stroke/Hi-Temp.	**599-01051 + 599-00426**	**284**
 12"	Pneumatic w/ Positioner	20 mm Stroke	**599-01010 + 599-00423**	**285**
		40 mm Stroke	**599-01000 + 599-00423**	**287**
	Electro-Hydraulic	**20 mm Stroke**		
		24 V, Floating 3P, Spring Return	**SKD82.51U**	**276**
		24 V, Floating 3P, Spring Return	**SKB82.51U**	**289**
		24 V, Floating 3P, Non-Spring Return	**SKD82.50U**	**275**
		24 V, 0-10 V, 4-20 mA, Non-Spring Return	**SKD60U**	**267**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKD62U**	**274**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKB62U**	**291**
		40 mm Stroke		
		24 V, Floating 3P, Spring Return	**SKC82.61U**	**292**
		24 V, Floating 3P, Non-Spring Return	**SKC82.60U**	**293**
		24 V, 0-10 V, 4-20 mA, Spring Return	**SKC62U**	**294**

Dimensions and Weights





Valve Size	Dimensions					Weight	
	A		B	C	D		
	ANSI Class 125	ANSI Class 250			Service Flange	ANSI Class 125	ANSI Class 250
2-1/2" (65 mm)	10-7/8" (276.4 mm)	11-1/2" (292 mm)	9-3/8" (239.2 mm)	3-3/4" (95 mm)	6.5" (165 mm)	50 lb. (23 kg)	63 lb. (29 kg)
3" (80 mm)	11-3/4" (298.5 mm)	12-1/2" (318 mm)	10-3/4" (272 mm)	4-3/8" (111 mm)	7" (178 mm)	65 lb. (30 kg)	82 lb. (37 kg)
4" (100 mm)	13-7/8" (352.4 mm)	14-1/2" (368 mm)	12-1/2" (317.8 mm)	5-1/8" (131.6 mm)	7.5" (191 mm)	110 lb. (50 kg)	134 lb. (61 kg)
5" (125 mm)	15-3/4" (400 mm)	16-5/8" (422 mm)	13-3/4" (349.2 mm)	5-3/4" (146.2 mm)	8.5" (216 mm)	136 lb. (62 kg)	176 lb. (80 kg)
6" (150 mm)	17-3/4" (451 mm)	18-5/8" (473 mm)	15-1/2" (393 mm)	6-5/8" (167 mm)	9.5" (241 mm)	141 lb. (64 kg)	258 lb. (117 kg)

Pneumatic 4-inch Valve Actuator

Flowrite 4-inch Pneumatic Valve Actuator.

Description

Designed for use with the threaded Flowrite valves, the Flowrite 4-inch Pneumatic Valve Actuator has a 3/4-inch (20 mm) stroke and is available in three spring ranges.

Features

- Three spring ranges
  - 3 to 8 psi
  - 5 to 10 psi
  - 10 to 15 psi
- Visual position indication
- 3/4-inch (20 mm) stroke
- Large diaphragm area for control accuracy
- Easy installation and removal
- Rugged, all-metal housing

Applications

The Flowrite 4-inch Pneumatic Valve Actuator is designed to be used with the threaded Flowrite valves in liquid and steam service applications.

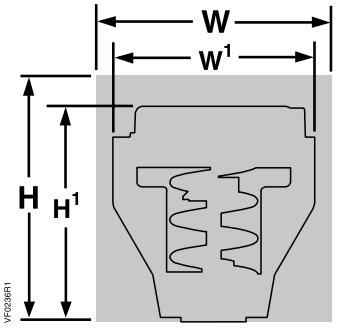
Actuator Specifications

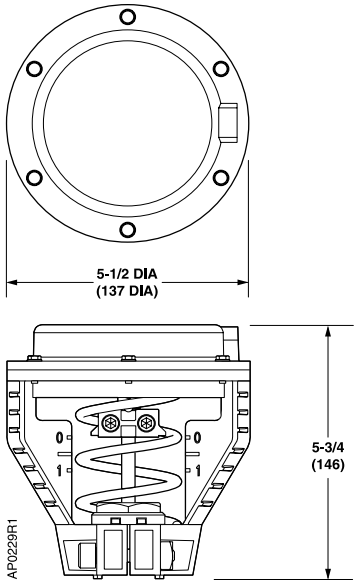
Effective Diaphragm Area ..... 11 in.^{2} (71 cm^2)
Diaphragm Material ..... Silicone
Nominal Stroke ..... 3/4" (20 mm)
Max. Diaphragm Pressure ..... 35 psig (241 kPa)
Air Connection ..... 1/8" NPT
Ambient Operating and Storage Temperature ..... 0° to 225°F (-18° to 107°C)
Mounting Location ..... NEMA 1 (Interior Only)

Actuator Product Ordering

Nominal Spring Range	Part No.	Actuator Prefix Code
3 to 8 psi (21 to 55 kPa)	**599-01081**	**268**
5 to 10 psi (34 to 69 kPa)	**599-01082**	**269**
10 to 15 psi (69 to 103 kPa)	**599-01083**	**270**

Dimensions





Dimensions shown in inches (mm).

Actuator	Height of Actuator H[1]	Service Height H	Width/Diameter of Actuator W[1]	Service Width W
4" (100 mm)	5-3/4" (146 mm)	14" (350 mm)	5-1/2" (134 mm) Dia.	18" (450 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

Pneumatic 8-inch Valve Actuator

Flowrite 8-inch Pneumatic Valve Actuator.

Description

Designed for use with Flowrite valves, the Flowrite 8-inch Pneumatic Valve Actuator has a 3/4-inch (20 mm) stroke and is available with two diaphragm options for normal duty and high-temperature service.

Features

- Completely enclosed actuator housing protects the diaphragm, spring, and start point adjuster
- A positioning relay is available factory-mounted on valve and actuator assemblies or as an accessory
- Field-adjustable start point for sequencing and calibration
- Easy-to-install
- Legendary Flowrite performance

Option

- High-temperature model

Applications

The Flowrite 8-inch Pneumatic Valve Actuator is designed to be used with the Flowrite valves in liquid and steam service applications.

8-inch Pneumatic Actuator Specifications

Effective Diaphragm Area ..... 28 in.^{2} (180 cm^2)

Diaphragm Material
- Standard ..... Buna-N
- High Temp ..... Silicone

Temperature Range
- Normal Duty Service ..... 25° to 300°F (-4° to 149°C)
- High-Temperature Service ..... 25° to 366°F (-4° to 186°C)

Nominal Spring Range
- Fixed Span Standard ..... 5 psig (34 kPa)
- Fixed Span High Temp ..... 10 psig (69 kPa)
- Adjustable Start Point ..... 3 to 10 psig (21 to 69 kPa)
- Factory Setting Standard ..... 3 to 8 psig (21 to 55 kPa)
- Factory Setting High Temp ..... 10 to 20 psig (69 to 138 kPa)

Nominal Stroke ..... 3/4" (20 mm)

Max. Diaphragm Pressure ..... 35 psig (241 kPa)

Air Connection ..... 1/8" NPT

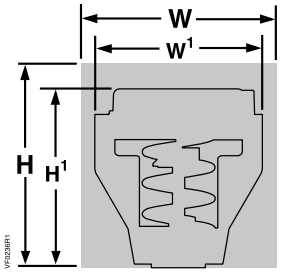
Ambient Operating and Storage Temperature ..... 35° to 180°F (2° to 85°C)

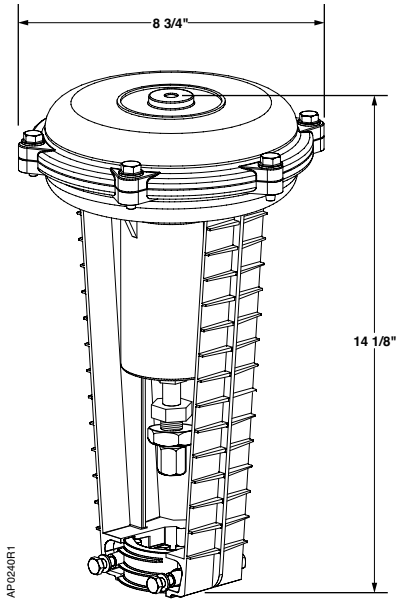
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Span	Part No.	Actuator Prefix Code
Normal Duty			
Actuator	5 psi	**599-01050**	**277**
Actuator and positioner		**599-01050 + 599-00426**	**283**
High-Temperature			
Actuator	10 psi	**599-01051**	**278**
Actuator and positioner		**599-01051 + 599-00426**	**284**

Dimensions





Actuator	Height of Actuator H^1	Service Height H	Width/Diameter of Actuator W^1	Service Width W
8" (171 mm)	14-1/8" (359 mm)	26" (660 mm)	8-3/4" (222 mm) Dia.	21" (450 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

Pneumatic 12-inch Valve Actuator

Flowrite 12-inch Pneumatic Valve Actuator.

Description

Designed for use with Flowrite valves, the Flowrite 12-inch Pneumatic Valve Actuator is available with two stem strokes, 3/4-inch (20 mm) stroke and 1-1/2-inch (40 mm).

Features

- Completely enclosed actuator housing protects the diaphragm, springs, and start point adjuster
- A positioning relay is available factory-mounted on valve and actuator assemblies or as an accessory
- Field-adjustable start point for sequencing and calibration
- Easy-to-install

Applications

The Flowrite 12-inch Pneumatic Valve Actuator is designed to be used with Flowrite valves in liquid and steam service applications.

Specifications

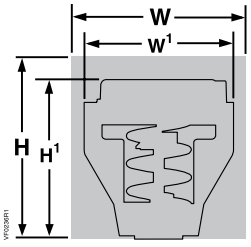
Effective Diaphragm Area ..... 90 in.^{2} (580 cm^2)
Diaphragm Material ..... Buna-N
Nominal Spring Range
Fixed Span ..... 5 psig (34 kPa)
Adjustable Start Point..... 3 to 10 psig (21 to 69 kPa)
Factory Setting ..... 3 to 8 psig (21 to 55 kPa)
Nominal Stroke ..... 3/4 or 1-1/2" (20 or 40 mm)

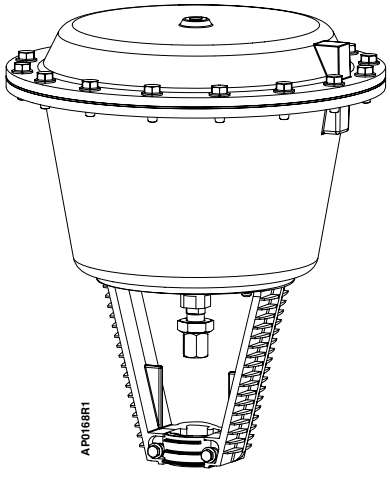
Max. Diaphragm Pressure ..... 35 psig (241 kPa)
Air Connection ..... 1/4" NPT
Medium Temperature ..... 25° to 366°F (-4° to 186°C)
Ambient Operating and Storage Temperature .....35° to 180°F (2° to 85°C)
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
3/4" Stroke		
Actuator	**599-01010**	**279**
Actuator and positioner	**599-01010 + 599-00423**	**285**
1-1/2" Stroke		
Actuator	**599-01000**	**281**
Actuator and positioner	**599-01000 + 599-00423**	**287**

Dimensions





Actuator	Height of Actuator H[1]	Service Height H	Width/Diameter of Actuator W[1]	Service Width W
12" (305 mm)	17-7/8" (454 mm)	30" (762 mm)	15-1/8" (384 mm) Dia.	27" (686 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

SAX Valve Actuator

24 Vac, Floating or Proportional Control
Floating, 0 to 10 Vdc or 4 to 20 mA
Non-Spring Return

Flowrite SAX Valve Actuator.

Description

Designed for use with Flowrite valves with a 3/4-inch (20 mm) stroke. The Flowrite SAX Electronic Actuator requires either a 24 Vac or 24 Vdc supply, and receives a 0 to 10 Vdc or 4 to 20 mA control signal to proportionally control the valve or a floating control signal to provide floating control of the valve.

Applications

The Flowrite SAX Electronic Valve Actuator is designed to be used with the Flowrite and other valves in liquid and low pressure steam service applications. They are ideal for installations requiring quick response and excellent resolution.

Features

- 24 Vac/dc operating voltage
- Proportional or floating (3P) control
- Direct-coupled installation requires no special tools or adjustments
- Manual override
- Overload and stall protection
- Visual stroke indication
- Non-spring return (fail-in-place)
- 180 lb (800N) nominal force
- Automatic stroke calibration on SAX61.03U
- LED status on SAX61.03U
- Electronic stroke indication on SAX61.03U
- Maintenance-free
- Optional functions with auxiliary switches, potentiometer (SAX81.03U), function module (SAX61.03U), and stem heater

Specifications

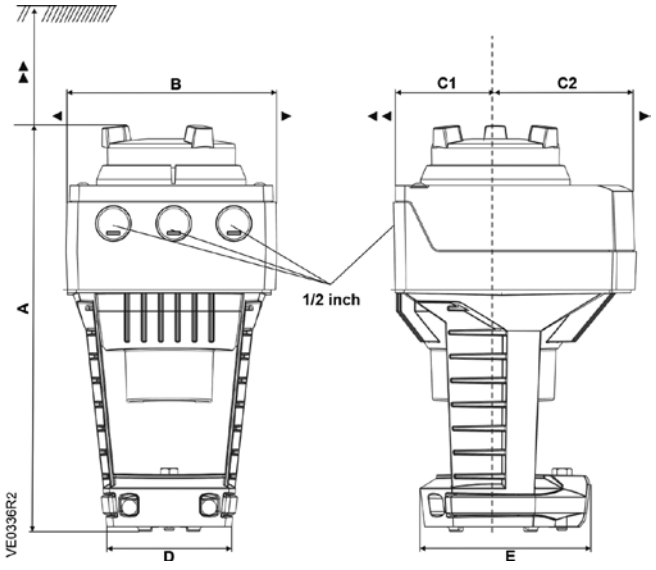
Operating Voltage ..... 24 Vac ±20%, 24 Vdc +20%/-15%
Frequency ..... 45-65 Hz
Power Consumption (SAX61.03U) ..... 8 VA
Power Consumption (SAX81.03U) ..... 5 VA
Control Signals (SAX61.03U)
Control Input (Y)
Voltage ..... 0 to 10 Vdc
Current ..... 4-20 mA
Control Input (Z)
Resistance ..... 0-1000 Ohm
Position Feedback Output (U) ..... 0 to 10 Vdc
Control Signal (SAX81.03U) ..... 3-Position (Floating)
Function
Nominal Stroke ..... 3/4" (20 mm)
Run Time ..... 30 sec.
Nominal Force ..... 180 lb. (800 N)

Agency Approvals UL873
CSA C22.2 No. 24-93
Operating and Storage Temperature
Operating Temperature ..... 23° to 131°F (-5° to 55°C)
Storage Temperature ..... 5° to 131°F (-15° to 55°C)
Transport Temperature ..... -13° to 158°F (-25° to 70°C)
Ambient Humidity ..... 5 to 90% RH, Non-condensing
Media Temperature ..... Up to 266°F (130°C)
Conduit Opening ..... 1/2" NPSM
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
24 Vac Proportional, Non-Spring Return	**SAX61.03U**	**371**
Floating 3P, Non-Spring Return	**SAX81.03U**	**373**

Dimensions



Dimensions shown in inches (mm).

A	B	C	C1	C2	D	E	▶	▶▶
9.5 (242)	5 (125)	6 (150)	2.7 (68)	3.3 (82)	3 (80)	4 (100)	4 (100)	8 (200)

Electro-Mechanical Rack and Pinion Actuator

24 Vac, Proportional or On/Off Control
0 to 10 Vdc or 2-position
Spring Return

Flowrite Electro-Mechanical Rack and Pinion.

Description

The Flowrite Electronic Rack and Pinion is designed for use with 1/2- to 2-inch Flowrite two- and three-way valves with a 3/4-inch stroke. A linkage fastens the actuator and the valve body together and transforms the rotary movement of the actuator output shaft to the linear motion required to position the valve.

Features

- Brushless DC motor technology with stall protection
- Bi-directional fail-safe spring return
- All metal housing
- UL and C-UL listed
- Spring return to fail-safe position

Applications

The Flowrite Valves and Valve Actuators are used to control water and glycol solutions to 50 percent in small to large air handling units and central plant applications.

Specifications

Power Supply
- Operating Voltage ..... 24 Vac, +20%, -15%
- Frequency ..... 50/60 Hz
- Power Consumption
  - 599-03609 assembly (with GCA161.1U actuator) ..... 9 VA running, 5 VA holding
  - 599-03611 assembly (with GCA121.1U actuator) ..... 8 VA running, 3 VA holding
- Equipment Rating ..... Class 2, in accordance with UL/CSA

Control Signal ..... (599-03609 assembly with GCA161.1U actuator)
- Input Signal
  - Voltage Input ..... 0 to 10 Vdc (max. 35 Vdc)
    - Input Resistance ..... 100K Ohms
  - Current Input ..... 4 to 20 mA
    - Input Resistance ..... 500 Ohms
- Position Output Feedback Signal ..... 0 to 10 Vdc, ±1 mA maximum

Mounting
- Nominal Angle of Rotation ..... 90°
- Maximum Angular Rotation ..... 95°
- Noise Level ..... <45 dBA (running)
- Enclosure ..... NEMA 2 in vertical to horizontal 90

Ambient Operating Temperature ..... -25° to 130° F (-32° to 55°C)

Storage and Transport Temperature ..... -25° to 158° F (-32° to 70°C)

Ambient Humidity ..... 95% RH, non-condensing

Agency Certification UL873
C-UL certified to Canadian Standard C22.2 No. 24-93

Pre-connected Cable ..... 18 AWG, 3 ft. (0.9 m)

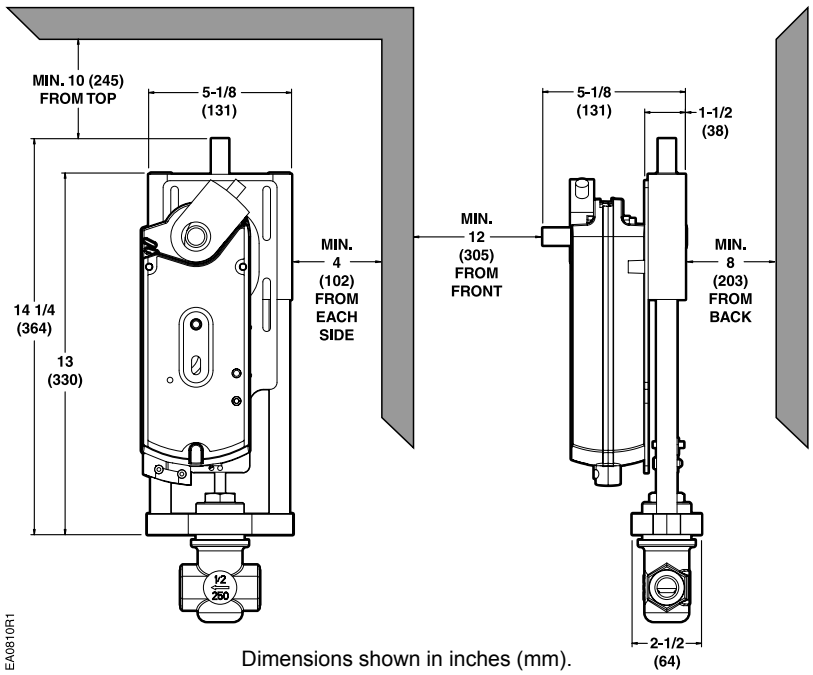
Product Ordering

Description	Part No.	Actuator Prefix Code
0 to 10 Vdc, Spring Return	**599-03609**	**298**
2-position, Spring Return	**599-03611**	**299**
Bracket Only	**599-03610**	**—**

Table Notes:
The linkage, OpenAir Actuator, and Flowrite Valve are available as an assembly. Refer to: *TB 249, Flowrite Valve and Actuator Assembly Selection Technical Bulletin*, 155-304P25 for details and product numbers.

Dimensions

Normal Duty Application as Shipped from Factory



Dimensions shown in inches (mm).

SKD Valve Actuator

24 Vac, Proportional Control
0 to 10 Vdc or 4 to 20 mA
Spring Return or Non-Spring Return

Flowrite SKD Valve Actuator.

Description

Designed for use with the Flowrite and other standard valves with a 3/4" (20 mm) stroke, the Flowrite SKD Electronic Valve Actuator receives a 0 to 10 Vdc or 4 to 20 mA control signal to proportionally control the valve. The spring return actuators are available with standard or advanced functionality.

Applications

The Flowrite SKD Electronic Valve Actuator requires a 24 Vac supply and is designed to be used with Flowrite and other standard valves in liquid and steam service applications.

Features

Standard Features

Part nos. with U suffix have these standard features:

- Direct-coupled installation requires no special tools or adjustments
- Visual and electronic stroke indication
- Die-cast aluminum housing
- 250 lb. (1150 N) nominal force
- 0 to 10 Vdc or 4 to 20 mA
- Integral position feedback
- Manual override
- Spring return or non-spring return
- Maintenance-free

Advanced Features (Spring Return only)

Part nos. with UA suffix have standard features, plus these advanced features:

- Adjustable start and span
- Stroke limit control
- Selectable operation direction (direct or reverse acting)
- Choice of linear or equal percentage flow characteristics
- Designed to be used with other manufacturer's valves with the appropriate Universal Valve Retrofit Kit

Specifications

Operating Voltage ..... 24 Vac ±20%
Frequency ..... 50/60 Hz
Power Consumption ..... 17 VA (12 W)
Control Signals
- Control Input (Y)
  - Voltage ..... 0 to 10 Vdc
  - Current ..... 4 to 20 mA
- Control Input (R)
  - Resistance ..... 0 to 1000 Ohms
  - Voltage ..... 0 to 1.6 V
- Position Feedback Output (U)
  - Voltage ..... 0 to 10 Vdc
  - Max. Current ..... 0.5 mA max.
- Position Feedback Output (U)
  - Current ..... 4 to 20 mA
  - Max. Impedance ..... 250 Ohms

Function
- Nominal Stroke ..... 3/4" (20 mm)
- Run Time with Control Operation (Full Stroke)
  - Pushing Stroke, 0 to 100% ..... 30 sec.
  - Pulling Stroke, 100 to 0% ..... 15 sec.
- Nominal Force
  - NC and 3-way Upper
    - Stroke 0%
    - Force ..... 225 lbs. (1000 N)
  - NO and 3-way By Pass
    - Stroke 100%
    - Force ..... 258 lbs. (1150 N)

Agency Approvals ..... UL873, cUL, CSA C22.2 No. 24-93, CE N474
Operating
- Ambient Temperature ..... 5° to 130°F (-15° to 55°C)
- Media Temperature ..... 14° to 300°F (-10° to 150°C)

Conduit Opening ..... 1/2" NPSM
Housing ..... NEMA 1 (Interior Only)

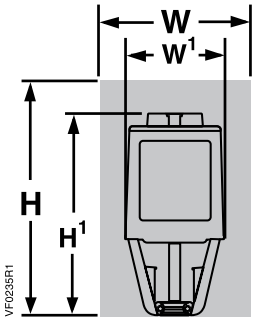
Product Ordering

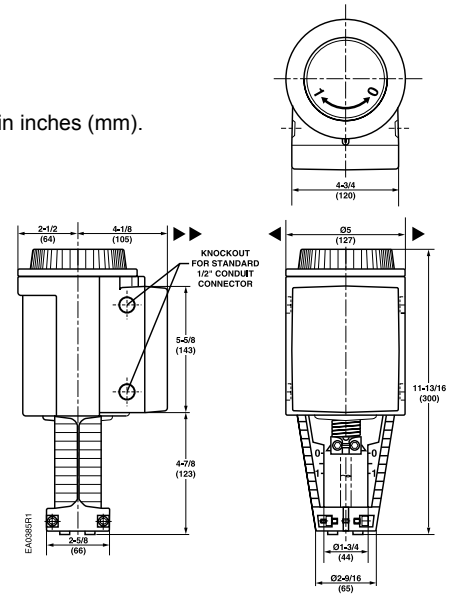
Description	Part No.	Actuator Prefix Code
24 Vac, Proportional Control, Non-Spring Return	**SKD60U**	**267**
24 Vac, Proportional Control, Spring Return	**SKD62U**	**274**
24 Vac, Proportional Control with Advanced Features, Spring Return	**SKD62UA**	**—**

Ordering Note:
The SKD62UA can be used with other manufacturer's valves with the appropriate Universal Valve Linkage Kit.

Dimensions

Dimensions shown in inches (mm).





Height of Actuator H[1]	Service Height H	Width/Diameter of Actuator W[1]	Service Width W
11-13/16" (300 mm)	19-3/4" (430 mm)	6-5/8" (170 mm) Width	14-1/2" (360 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

A-196
Valves
Accessories & Service Kits A-283

SKD Valve Actuator

24 Vac, Floating (3 Position) Control
Spring Return or Non-Spring Return

Flowrite SKD Valve Actuator.

Description

Designed for use with Flowrite and other standard valves with a 3/4-inch (20 mm) stroke, the Flowrite SKD Electronic Valve Actuator requires 24 Vac supply to provide floating control of a valve.

Features

- Direct-coupled installation requires no special tools or adjustments
- Visual stroke indication
- Die-cast aluminum housing
- 250 lb. (1150 N) nominal force
- Position feedback with optional potentiometer
- Manual override
- Spring return available for fail-safe position
- Maintenance-free

Applications

The Flowrite SKD Electronic Valve Actuator with 24 Vac, floating control is designed to be used with Flowrite and other standard valves in liquid and steam service applications.

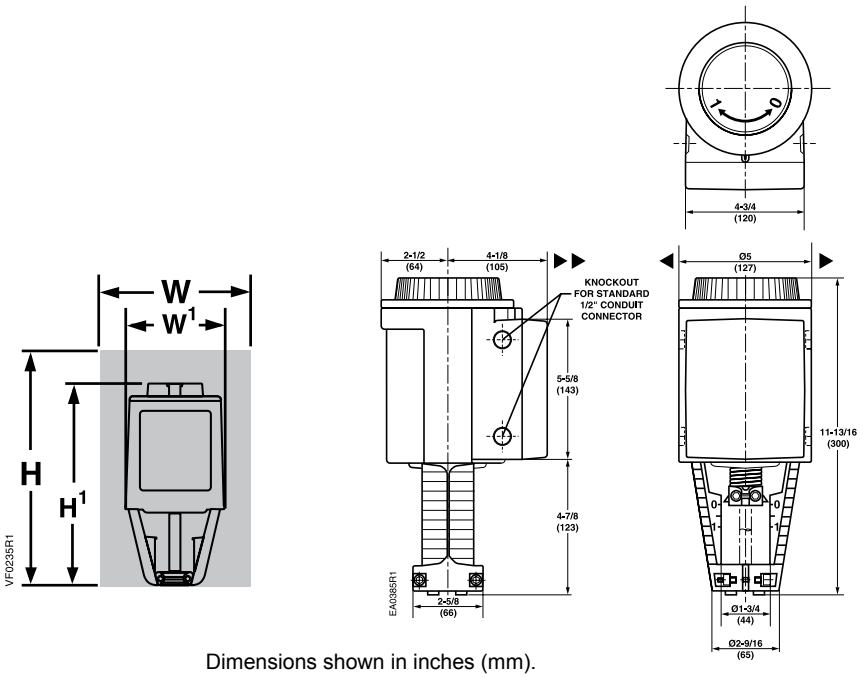
Specifications

Operating Voltage ..... 24 Vac ±20%
Frequency ..... 50/60 Hz
Power Consumption
SKD82.50U ..... 13 VA (8 W)
SKD82.51U ..... 18 VA (11 W)
Control Signal ..... 3 Position (Floating)
Function
Nominal Stroke ..... 3/4" (20 mm)
Run Time with Control Operation (Full Stroke)
Power Stroke, 0 to 100% @ 60 Hz ..... 120 sec.
Return Stroke, 100 to 0% @ 60 Hz ..... 120 sec.
Spring Return (SKD 82.51U Only) ..... 8 sec.
Nominal Force
NC and 3-way Upper
Stroke 0%
Force ..... 225 lbs. (1000 N)
NO and 3-way By Pass
Stroke 100%
Force ..... 258 lbs. (1150 N)
Agency Approvals ..... UL873, CSA C22.2 No. 24-93
Operating
Ambient Temperature ..... 5° to 130°F (-15° to 55°C)
Media Temperature ..... 14° to 300°F (-10° to 150°C)
Conduit Opening ..... 1/2" NPSM
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Description	Part No.	Actuator Prefix Code
Spring Return	**SKD82.51U**	**276**
Non-Spring Return	**SKD82.50U**	**275**

Dimensions



Dimensions shown in inches (mm).

Height of Actuator H[1]	Service Height H	Width/Diameter of Actuator W[1]	Service Width W
11-13/16" (300 mm)	19-3/4" (430 mm)	6-5/8" (170 mm) Width	14-1/2" (360 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

SKB/SKC Valve Actuator

24 Vac, Proportional Control
0 to 10 Vdc or 4 to 20 mA
Spring Return

Flowrite SKB/SKC Valve Actuator.

Description

Designed for use with Flowrite and other standard valves with a 3/4-inch and 1-1/2-inch (20 and 40 mm) strokes, the Flowrite SKB/SKC Electronic Valve Actuator receives a 0 to 10 Vdc or 4 to 20 mA control signal to proportionally control the valve. The actuators are available with standard or advanced functionality.

Features

Standard Models

Part nos. with U suffix have these standard features:

- Direct-coupled installation requires no special tools or adjustments
- Visual and electronic stroke indication
- Die-cast aluminum housing
- Highest close-off in the industry
- 3/4-inch stroke (SKB)
- 1-1/2-inch stroke (SKC)
- 1000 lb. (4400 N) nominal force
- Manual override
- Spring return to fail safe position
- Maintenance-free

Advanced Feature Models

Part nos. with UA suffix have standard features, plus these advanced features:

- Adjustable start and span
- Stroke limit control
- Selectable operation direction (direct or reverse acting)
- Choice of linear or equal percentage flow characteristics
- Designed to be used with other manufacturer's valves with the appropriate Universal Valve Retrofit Kit

Applications

The Flowrite SKB/SKC Electronic Valve Actuator with proportional control is designed to be used with Flowrite and other standard valves with a 3/4-inch and 1-1/2-inch (20 and 40 mm) strokes in liquid and steam service applications.

Specifications

Nominal Stroke
- SKB62U/UA ..... 3/4" (20 mm)
- SKC62U/UA ..... 1-1/2" (40 mm)

Operating Voltage ..... 24 Vac ±20%

Frequency ..... 50/60 Hz

Power Consumption
- SKB62U/UA ..... 17 VA (12 W)
- SKC62U/UA ..... 28 VA (20 W)

Control Signals
- Control Input (Y)
  - Signal ..... 0 to 10 Vdc or 4-20 mA
- Max Impedance
  - 0 to 10 Vdc ..... 100K Ohm
  - 4 to 20 mA ..... 250 Ohm
- Control Input (Z)
  - Resistance ..... 0 to 1000 Ohms
  - Voltage ..... 0 to 1.6 V
- Feedback Output (U)
  - Signal ..... 0 to 10 Vdc or 4 to 20 mA
- Local Impedance
  - 0 to 10 Vdc ..... >500K Ohm
  - 4 to 20 mA ..... <500 Ohm
- Run Time with Control Operation (full stroke)
  - Pushing ..... 120 sec.
- Pulling with Spring
  - SKB62U ..... 10 sec.
  - SKC62U ..... 20 sec.

Conduit Opening ..... 1/2" NPSM

Nominal Force
- NC and 3-way Upper
  - Stroke 0%
  - Force ..... 640 lbs. (2800 N)
- NO and 3-way By Pass
  - Stroke 100%
  - Force ..... 1000 lbs. (4400 N)

Agency Approvals ..... UL873, cUL, CSA C22.2 No. 24-93, CE N474

Enclosure ..... NEMA 1 (Interior Only)

Operating
- Ambient Temperature ..... 5° to 130°F (-15° to 55°C)
- Media Temperature ..... 14° to 428°F (-10° to 220°C)

Mounting Location ..... NEMA 1 (Interior Only)

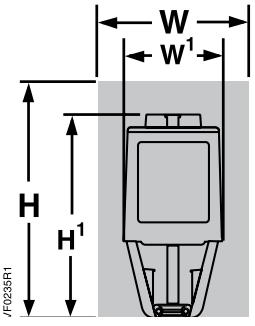
Product Ordering

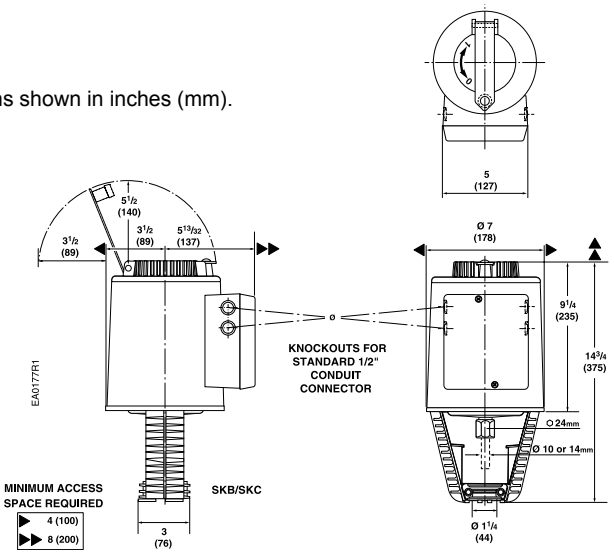
Description	Part No.	Actuator Prefix Code
3/4" Stroke		
Standard Features	**SKB62U**	**291**
Advanced Features	**SKB62UA**	**—**
1-1/2" Stroke		
Standard Features	**SKC62U**	**294**
Advanced Features	**SKC62UA**	**—**

Ordering Note:
The SKB/CUA can be used with other manufacturer's valves with the appropriate Universal Valve Linkage Kit.

Dimensions

Dimensions shown in inches (mm).





Height of Actuator H[1]	Service Height H	Width/Diameter of Actuator W[1]	Service Width W
14-3/4" (375 mm)	22-3/4" (578 mm)	7" (178 mm) Width x 8-15/16" (226 mm) Depth	25" (635 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

SKB/SKC Valve Actuator

24 Vac, Floating Control
Spring Return or Non-Spring Return

Flowrite SKB/SKC Valve Actuator.

Description

Designed for use with Flowrite and other standard valves with 3/4-inch and 1-1/2-inch (20 mm and 40 mm) strokes, the Flowrite SKB/C Electronic Valve Actuator requires a 24 Vac supply to provide floating control of a valve.

Features

- Direct-coupled installation requires no special tools or adjustments
- Visual stroke indication
- Die-cast aluminum housing
- Manual override
- Spring return or non-spring return
- Maintenance-free
- 1000 lb. (4400 N) nominal force

Applications

The Flowrite SKB/SKC Electronic Valve Actuator with floating control is to be used with Flowrite and other standard valves with a 3/4-inch and 1-1/2-inch (20 mm and 40 mm) strokes in liquid and steam service applications.

Specifications

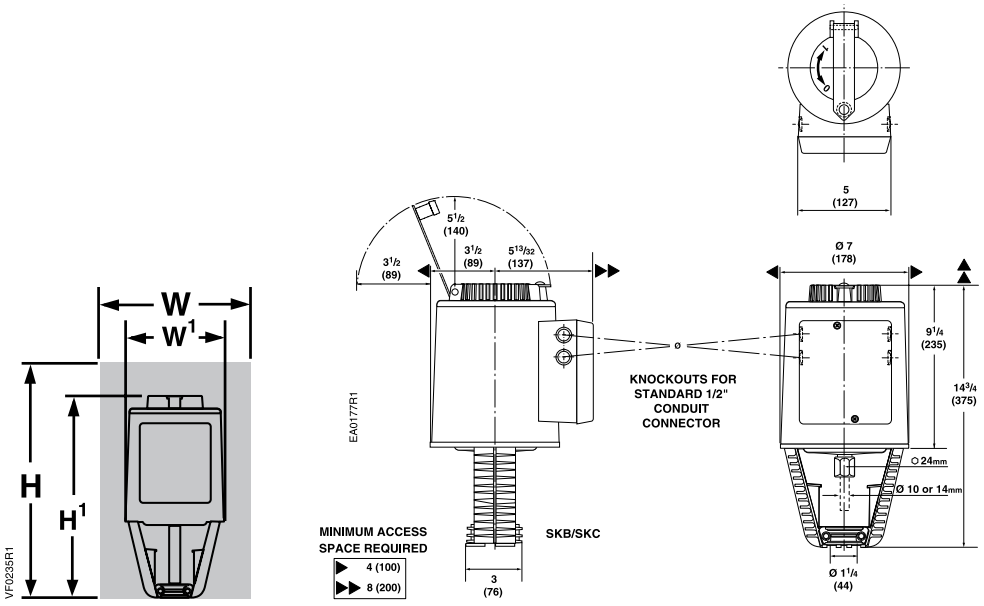
Operating Voltage ..... 24 Vac ±20%
Frequency ..... 50/60 Hz
Power Consumption
SKB82.51U..... 18 VA (11W)
SKC82.60U ..... 19 VA (16W)
SKC82.61U ..... 24 VA (18W)
Control Signal ..... Floating
Nominal Stroke
SKB ..... 3/4" (20 mm)
SKC ..... 1-1/2" (40 mm)

Run Time with Control Operation (full stroke) ..... 120 sec. Pushing and Pulling
Spring Return Time (on power failure)
SKB82.51U..... 10 sec.
SKC82.61U ..... 18 sec.
Nominal Force
NC and 3-way Upper
Stroke 0%
Force ..... 610 lbs. (2684 N)
NO and 3-way By Pass
Stroke 100%
Force ..... 1000 lbs. (4400 N)
Agency Approvals ..... UL873, CSA C22.2 No. 24-93
Enclosure ..... NEMA 1 (Interior Only)
Operating
Ambient Temperature ..... 5° to 130°F (-15° to 55°C)
Media Temperature ..... 14° to 300°F (-10° to 150°C)
Mounting Location ..... NEMA 1 (Interior Only)

Product Ordering

Stroke	Part No.	Actuator Prefix Code
Spring Return		
3/4" (20 mm)	**SKB82.51U**	**289**
1-1/2" (40 mm)	**SKC82.61U**	**292**
Non-Spring Return		
1-1/2" (40 mm)	**SKC82.60U**	**293**

Dimensions



Dimensions shown in inches (mm).

Height of Actuator H¹	Service Height H	Width/Diameter of Actuator W¹	Service Width W
14-3/4" (375 mm)	22-3/4" (578 mm)	7" (178 mm) Width x 8-15/16" (226 mm) Depth	25" (635 mm)

Table Notes:
Service height and width are the recommended dimensions to allow access to the product.

599 Series Two-Way and Three-Way Ball Valves

Siemens 599 Series characterized ball valves and valve actuators deliver comprehensive control solutions. Available in spring return, non-spring return, 2-position, floating, and proportional control to suit a wide variety of control specifications and strategies, Siemens OpenAir™ electronic actuators are known for their reliability. They require no special programming or tools, saving on installation time and delivering immediate results.

Designed to provide excellent equal percentage flow control and so much more:

- Two- and three-way valves available with chrome-plated brass ball and brass stem or stainless steel ball and stem to withstand harsh conditions
- Equal percentage flow characteristic
- 0.4 to 160 Cv range enables better sizing of valves to the job requirements
- 200 psi close-off
- Low ANSI Class IV leakage (0.01% of Cv) at rated close-off pressure reduces energy consumption
- 600 WOG/ANSI 250 pressure rating meets the specifications of more applications
- Blow-out proof stem withstands high pressure
- Double o-ring stem packing prevents leaking and ensures long-lasting performance
- Universal actuator mounting bracket with standoffs provides a thermal barrier between the actuator and the mounting plate
- For tight spaces, a low profile bracket holds an OpenAir® GDE/GLB Series Non-Spring Return Actuator or GQD Series Spring Return Actuator to a 1/2- or 3/4-inch Two-Way Ball Valve

For more information on OpenAir Electronic Damper Actuators, refer to Section B.

Siemens Product Guard **PLUS 3** Warranty

Two-Way Ball Valves

24 Vac, On/Off, Floating or Proportional Control
1/2 to 2-inch
Chrome-plated Ball & Brass Stem or Stainless Steel Ball & Stem
Spring Return or Non-Spring Return

2-Way Ball Valve and Actuator with Low Profile Bracket.

2-Way Ball Valve and Actuator with Standard Bracket.

Description

Designed to provide excellent equal percentage flow control, two-way Ball Valves are available in 1/2 to 2-inch line sizes and are 1/4-turn rotary control valves. These ball valves are designed to couple with an OpenAir actuator.

Features

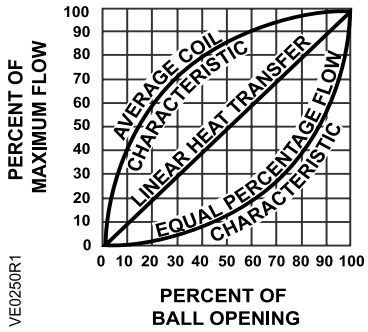
- Universal mounting plate accommodates different actuator sizes
- Variety of ball sizes and flow coefficients minimizes the need for downsizing pipes and accurately controls fluid through coils
- Industry leading close-off
- Actuator and plate can be rotated to facilitate installation and wiring
- Standoffs and mounting plate provide a thermal barrier between the actuator and valve
- Low profile bracket holds a GQD Series Spring Return or GDE/GLB Series Non-Spring Return Actuator to a 1/2- or 3/4-inch Two-Way Ball Valve in tight spaces
- Plastic mounting plate, extensions, and handle do not condensate in chilled or hot water applications
- Operating handle can manually operate valve in the event of a power failure
- Available as on/off (2P), floating (3P), or proportional control
- Spring return or non-spring return
- On/off with dual auxiliary switches available on full port valves with stainless steel ball and stem

Applications

Ball Valves can control hot or chilled water and up to 50% glycol solution in convectors, fan coil units, unit conditioners, radiation, and reheat coils.

Application Drawings

The parabolic shape of the flow optimizer orifice allows a slow opening valve. Equal movements of the valve stem at any point of the flow range changes the existing flow an equal percentage regardless of the existing flow. The ball valve equal percentage flow characteristic mirrors the flow characteristic of a coil, resulting in linear heat transfer.



Ball Valve Equal Percentage Flow Control.

Siemens Product Guard **PLUS 3** Warranty

Specifications

Pressure Class ..... ANSI 250 (600 WOG)
Static Pressure/Temp. 360 psig/250ºF
Controlled Medium ..... Water, Glycol Solutions up to 50%
Media Temperature ..... 35° to 250°F (2° to 121°C)
Materials
Body ..... Forged Brass ASTM B283, C37700
Ball ..... Chrome-plated Brass or Stainless Steel
Ball Seals ..... Glass-filled PTFE with EPDM O-Rings
Flow Optimizer ..... Glass-filled PTFE
Stem ..... Brass or Stainless Steel
Stem Seals ..... EDPM O-rings
End Connections ..... NPT Female
Angle of Rotation ..... 0 to 90 Degrees

Two-Way Ball Valve Body Product Ordering

Valve Size in. (mm)	Flow Rate Cv (Kvs)	Chrome-Plated Brass Ball and Stem Part No.	Stainless Steel Ball and Stem Part No.
1/2 (15)	0.4 (0.34)	599-10300	599-10300S
	0.63 (0.54)	599-10301	599-10301S
	1.0 (0.9)	599-10302	599-10302S
	1.6 (1.4)	599-10303	599-10303S
	2.5 (2.2)	599-10304	599-10304S
	4 (3.4)	599-10305	599-10305S
	6.3 (5.4)	599-10306	599-10306S
	10 (8.6)	599-10307*	599-10307S*
3/4 (20)	6.3 (5.4)	599-10308	599-10308S
	10 (8.6)	599-10309	599-10309S
	16 (14)	599-10310	599-10310S
	25 (22)	599-10311*	599-10311S*
1 (25)	10 (8.6)	599-10312	599-10312S
	16 (14)	599-10313	599-10313S
	25 (22)	599-10314	599-10314S
	40 (34)	599-10315	599-10315S
	63 (54)	599-10316*	599-10316S*
1-1/4 (32)	16 (14)	599-10317	599-10317S
	25 (22)	599-10318	599-10318S
	40 (34)	599-10319	599-10319S
	63 (54)	599-10320	599-10320S
	100 (90)	599-10321*	599-10321S*
1-1/2 (40)	25 (22)	599-10322	599-10322S
	40 (34)	599-10323	599-10323S
	63 (54)	599-10324	599-10324S
	100 (90)	599-10325	599-10325S
	160 (140)	599-10326*	599-10326S*
2 (50)	40 (34)	599-10327	599-10327S
	63 (54)	599-10328	599-10328S
	100 (90)	599-10329*	599-10329S*
	160 (140)	599-10330*	599-10330S*

Ordering Notes:
*Denotes a full-port valve with no flow optimizer insert.

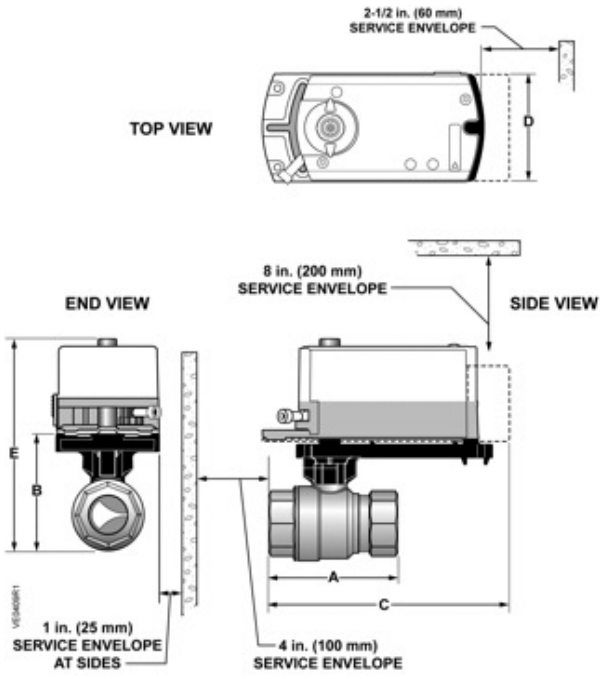
Two-Way Ball Valve Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
	Electronic	Floating, Fail-in-place	**GDE131.1P**	**171A**
		Floating, Fail-in-place	**GLB131.1P**	**171B**
		0 to 10 Vdc, Fail-in-place	**GDE161.1P**	**171C**
		0 to 10 Vdc, Fail-in-place	**GLB161.1P**	**171D**
	Electronic	2-Position, Fail-safe, Normally Open	**GMA121.1P**	**171E**
		Floating, Fail-safe, Normally Open	**GMA131.1P**	**171F**
		0 to 10 Vdc, Fail-safe, Normally Open	**GMA161.1P**	**171G**
	Electronic	2-Position, Fail-safe, Normally Open	**GQD121.1P**	**171H**
		Floating, Fail-safe, Normally Open	**GQD131.1P**	**171J**
		2 to 10 Vdc, Fail-safe, Normally Open	**GQD151.1P**	**171K**
		120V, 2-Position, Fail-safe, Normally Open	**GQD221.1U**	**171L**
	Electronic	120V, 2-Position, Fail-safe, Normally Open	**GMA221.1U**	**171M**
	Electronic	2-Position, Fail-safe, Normally Open, Dual Auxiliary Switches	**GQD126.1P**	**171N**
	Electronic	2-Position, Fail-safe, Normally Open, Dual Auxiliary Switches	**GMA126.1P**	**171P**
		2-Position, Fail-safe, Normally Closed	**GMA121.1P**	**172E**
		0 to 10 Vdc, Fail-safe, Normally Closed	**GMA161.1P**	**172G**
	Electronic	2-position, Fail-safe, Normally Closed	**GQD121.1P**	**172H**
		Floating, Fail-safe, Normally Closed	**GQD131.1P**	**172J**
		2 to 10 Vdc, Fail-safe, Normally Closed	**GQD151.1P**	**172K**
		120V, 2-Position, Fail-safe, Normally Closed	**GQD221.1U**	**172L**
	Electronic	120V, 2-Position, Fail-safe, Normally Closed	**GMA221.1U**	**172M**
	Electronic	2-position, Fail-Safe, Normally Closed, Dual Auxiliary Switches	**GQD126.1P**	**172N**
	Electronic	2-position, Fail-Safe, Normally Closed, Dual Auxiliary Switches	**GMA126.1P**	**172P**
	Electronic	Floating, Fail-in-place	**GDE131.1Q****	**173A**
		Floating, Fail-in-place	**GLB131.1Q****	**173B**
		0 to 10 Vdc, Fail-in-place	**GDE161.1Q****	**173C**
		0 to 10 Vdc, Fail-in-place	**GLB161.1Q****	**173D**

Ordering Notes:
*When ordered as an assembly, the actuator is provided with 3-foot (.9 m) wires.
**When ordered as an assembly, the actuator is provided with conduit adapter and 6-foot (1.8 m) wires.

Dimensions and Weights NEW!

1/2 & 3/4-inch Two-Way Ball Valves Dimensions with Service Envelope

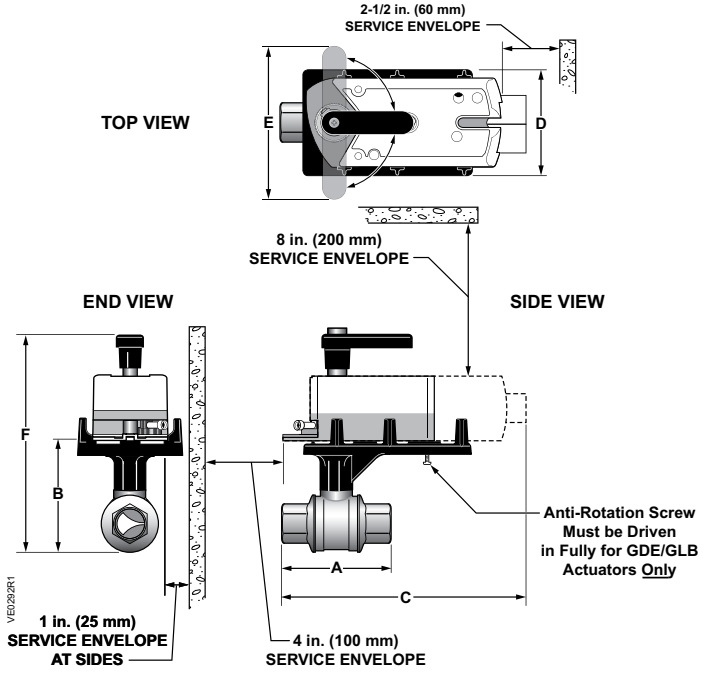


Dimensions shown in inches (mm).

Line Size in. (mm)	Cv Range	A Length	B Height	C Length Actuator Codes			D Width	E Height	Valve and Bracket Weight lbs (kg)
				GDE		GQD			
				171A-D	173A-D	171H, J, K, L, N			
1/2 (15)	0.4 to 10	2-7/16 (61)	2-1/4 (57)	5-1/4 (133)	5-3/4 (146)	5-1/4 (133)	2-3/4 (70)	4-13/16 (123)	1 (0.45)
3/4 (20)	6.3 to 25	2-3/4 (70)	2-5/8 (67)	5-3/8 (136)	6 (153)	5-3/8 (136)		5-1/4 (133)	1.3 (0.60)

Dimensions and Weights

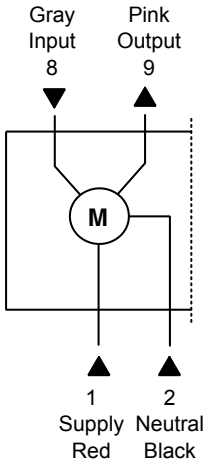
1 to 2-inch Two-Way Ball Valves Dimensions with Service Envelope



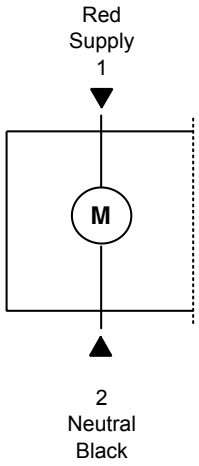
Dimensions shown in inches (mm).

Line Size in. (mm)	Cv Range	A Length	C Length * Actuator Codes			F Height	Valve and Bracket Weight lbs (kg)
			171A-D, 173A-D	171H, J, K, L, N	171E, G, M, P 172E, G, M, P Fail-Safe		
			GDE/GLB	GQD	GMA		
1 (25)	10	3 (77)	6-11/16 (170)	—	8 (203)	8 (203)	1.6 (0.73)
	16, 40, 63	3-1/4 (82)	6-11/16 (170)	—	8-3/8 (213)	8-5/16 (212)	1.8 (0.82)
	25	3-7/8 (98)	7 (178)	—	8-11/16 (221)	8-13/16 (223)	1.8 (0.82)
1-1/4 (32)	16	3-3/8 (86)	6-11/16 (170)	—	8-7/16 (214)	8-3/8 (213)	2.0 (0.91)
	25 to 100	3-11/16 (94)	6-15/16 (176)	—	8-11/16 (221)	8-13/16 (223)	2.5 (1.1)
1-1/2 (40)	25, 63	3-5/8 (92)	6-15/16 (176)	—	8-7/16 (214)	8-13/16 (223)	1.8 (0.82)
	40, 100, 160	3-15/16 (100)	7-1/16 (180)	—	8-3/4 (223)	9-1/4 (235)	3.3 (1.50)
2 (50)	40, 100	4 (102)	7-1/16 (180)	—	8-3/4 (223)	9-3/8 (238)	3.1 (1.41)
	63	4-5/8 (118)	7-1/2 (190)	—	9-1/8 (223)	10-1/16 (255)	5.25 (2.38)
	160	4-5/8 (118)	7-1/2 (190)	—	9-1/8 (223)	10-1/16 (255)	5.3 (2.40)

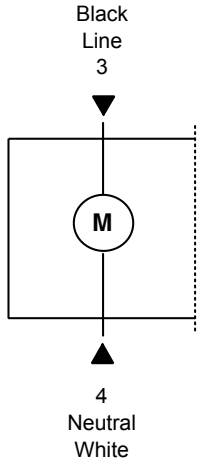
Table Notes:
*Dimension “C” is maximum length, measured from the actuator, end fitting, or mounting plate, whichever extends the furthest.



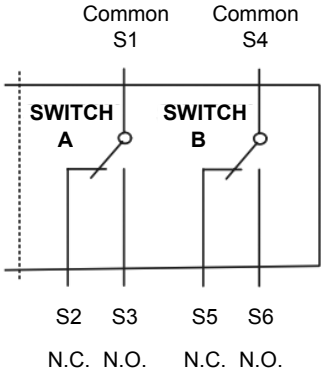
Modulating (0 to 10 Vdc), 24 Vac (Applies to all)



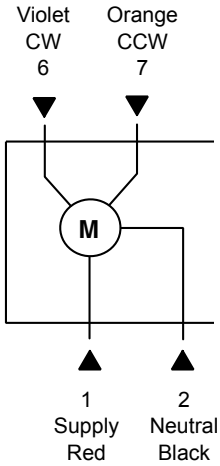
2-position, 24 Vac (GMA, GQD 2-position)



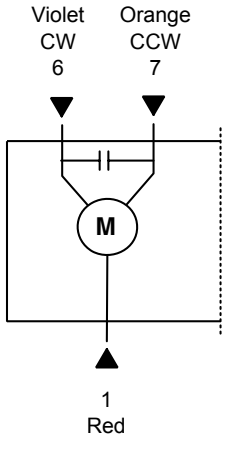
2-position, 120 Vac (GMA, GQD)



Dual Auxiliary Switches (GQDxx6)



3-position, 24 Vac-SR (GMA, GQD)



3-position, 24 Vac-NSR (GDE/GLB)

Three-Way Ball Valves

24 Vac, On/Off, Floating or Proportional Control
1/2 to 2-inch
Chrome-plated Ball & Brass Stem or Stainless Steel Ball & Stem
Spring Return or Non-Spring Return

3-Way Ball Valve and Actuator.

Description

Designed to provide excellent equal percentage flow control, Three-way Ball Valves are available in 1/2 to 2-inch line sizes and are 1/4-turn rotary control valves. These ball valves are designed to couple with an OpenAir actuator.

Features

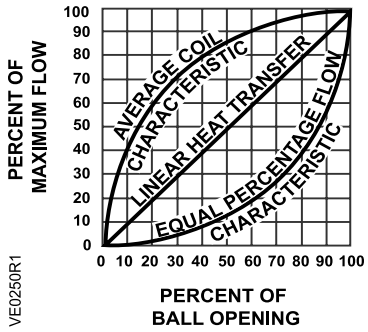
- Universal mounting plate accommodates different actuator sizes
- Variety of ball sizes and flow coefficients minimizes the need for downsizing pipes and accurately controls fluid through coils
- Industry leading close-off
- Actuator and plate can be rotated to facilitate installation and wiring
- Standoffs and mounting plate provide a thermal barrier between the actuator and valve
- Plastic mounting plate, extensions, and handle do not condensate in chilled or hot water applications
- Operating handle can manually operate valve in the event of a power failure
- Available as on/off (2P), floating (3P), or proportional control
- Spring return or non-spring return

Applications

Ball Valves can control hot or chilled water and up to 50% glycol solution in convectors, fan coil units, unit conditioners, radiation, and reheat coils.

Application Drawings

The parabolic shape of the flow optimizer orifice allows a slow opening valve. Equal movements of the valve stem at any point of the flow range changes the existing flow an equal percentage regardless of the existing flow. The ball valve equal percentage flow characteristic mirrors the flow characteristic of a coil, resulting in linear heat transfer.



Ball Valve Equal Percentage Flow Control.

Siemens Product Guard **PLUS 3** Warranty

Specifications

Pressure Class ..... ANSI 250 (600 WOG)
Static Pressure/Temp. 360 psig/250ºF
Controlled Medium ..... Water, Glycol Solutions up to 50%
Media Temperature
1/2 to 1-1/4″ ..... 35° to 250°F (2° to 121°C)
1-1/2 to 2″ ..... 35° to 230°F (2° to 110°C)
Materials
Body ..... Forged Brass ASTM B283, C37700
Ball ..... Chrome-plated Brass or Stainless Steel
Ball Seals ..... Glass-filled PTFE with EPDM O-Rings
Flow Optimizer ..... Glass-filled PTFE
Stem ..... Brass or Stainless Steel
Stem Seals ..... EDPM O-rings

End Connections ..... NPT Female
Angle of Rotation ..... 0 to 90 Degrees
Maximum Operating Differential Pressure
1/2 to 1-1/2″ ..... 60 psi
2″ ..... 35 psi
Close-off Ratings (per ANSI/FCI 70-2)
For A → AB ..... ANSI Class IV (0.01%)
For B → AB ..... ANSI Class III (0.1%)

Three-Way Ball Valve Body Product Ordering

Valve Size in. (mm)	Flow Rate Cv (Kvs)	Chrome-Plated Brass Ball and Stem Part No.	Stainless Steel Ball and Stem Part No.
1/2 (15)	0.4 (0.34)	**599-10350**	**599-10350S**
	0.63 (0.54)	**599-10351**	**599-10351S**
	1.0 (0.9)	**599-10352**	**599-10352S**
	1.6 (1.4)	**599-10353**	**599-10353S**
	2.5 (2.2)	**599-10354**	**599-10354S**
	4 (3.4)	**599-10355**	**599-10355S**
	6.3 (5.4)	**599-10356**	**599-10356S**
	10 (8.6)	**599-10357***	**599-10357S***
3/4 (20)	6.3 (5.4)	**599-10358**	**599-10358S**
	10 (8.6)	**599-10359**	**599-10359S**
	16 (14)	**599-10360***	**599-10360S***
1 (25)	10 (8.6)	**599-10361**	**599-10361S**
	16 (14)	**599-10362**	**599-10362S**
	25 (22)	**599-10363***	**599-10363S***
1-1/4 (32)	16 (14)	**599-10364**	**599-10364S**
	25 (22)	**599-10365**	**599-10365S**
	40 (34)	**599-10366**	**599-10366S**
1-1/2 (40)	25 (22)	**599-10367**	**599-10367S**
	40 (34)	**599-10368**	**599-10368S**
	63 (54)	**599-10369**	**599-10369S**
2 (50)	40 (34)	**599-10370**	**599-10370S**
	63 (54)	**599-10371**	**599-10371S**
	100 (90)	**599-10372***	**599-10372S***

Ordering Notes:
*Denotes a full-port valve with no flow optimizer insert.

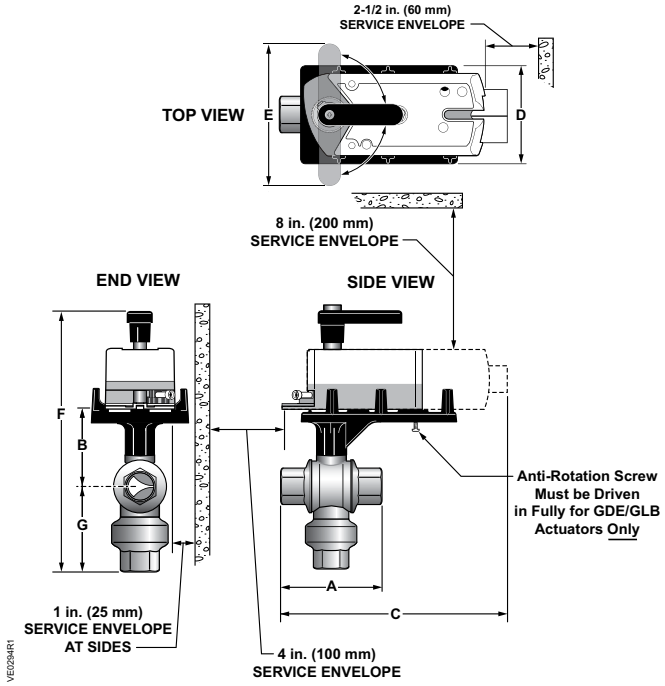
Three-Way Ball Valve Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
	Electronic	3-Position, Fail-in-place	**GDE131.1P**	**171A**
		3-Position, Fail-in-place	**GDE131.1Q*** **	**173A**
		3-Position, Fail-in-place	**GLB131.1P**	**171B**
		3-Position, Fail-in-place	**GLB131.1Q*** **	**173B**
		0 to 10 Vdc, Fail-in-place	**GDE161.1P**	**171C**
		0 to 10 Vdc, Fail-in-place	**GDE161.1Q*** **	**173C**
		0 to 10 Vdc, Fail-in-place	**GLB161.1P**	**171D**
		0 to 10 Vdc, Fail-in-place	**GLB161.1Q*** **	**173D**
	Electronic	2-Position, Fail-safe, Normally Open	**GMA121.1P****	**171E**
		3-Position, Fail-safe, Normally Open	**GMA131.1P****	**171F**
		0 to 10 Vdc, Fail-safe, Normally Open	**GMA161.1P****	**171G**

Ordering Notes:
When ordered as an assembly, the actuator is provided with 3-foot (.9m) wires.
** Fails with A→AB open.
***When ordered as an assembly, the actuator is provided with conduit adapter and 6-foot (1.8m) wires

Dimensions and Weights

Three-Way Ball Valves with Actuator Dimensions and Service Envelope



Dimensions shown in inches (mm).

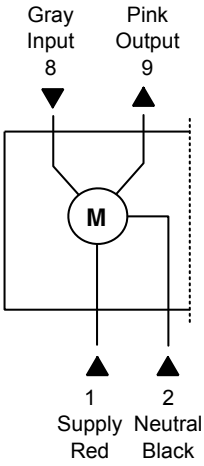
Line Size in. (mm)	A Length	C Length* Actuator Codes 171A-D, 173A-D	C Length* Actuator Codes 171E-G	B Height	G Height	F Height	Weight lbs (kg)
1/2 (15)	2-9/16 (65)	6-11/16 (170)	8-3/8 (213)	3-1/4 (83)	1-3/8 (35)	8-5/8 (219)	1.50 (0.68)
3/4 (20)	2-3/4 (70)	6-11/16 (170)	8-3/8 (213)	3-1/4 (83)	1-3/8 (35)	8-5/8 (219)	1.60 (0.73)
	3-1/8 (79)	6-11/16 (170)	8-3/8 (213)	3-1/4 (83)	1-11/16 (43)	8-5/8 (219)	2.20 (1.00)
1 (25)	3-1/4 (83)	6-11/16 (170)	8-3/8 (213)	3-3/4 (95)	1-11/16 (43)	9-1/8 (232)	2.37 (1.08)
	3-13/16 (77)	6-15/16 (176)	8-5/8 (219)	4 (102)	2 (51)	9-5/8 (244)	2.74 (1.24)
1-1/4 (32)	3-5/8 (92)	6-7/8 (174)	8-9/16 (217)	4 (102)	2-1/8 (54)	9-3/4 (248)	2.85 (1.29)
	3-15/16 (100)	7 (178)	8-11/16 (221)	4 (102)	2-5/16 (59)	10-1/4 (260)	4.30 (1.95)
1-1/2 (40)	3-15/16 (100)	7 (178)	8-11/16 (221)	4 (102)	2-5/16 (59)	10-1/4 (260)	3.90 (1.61)
	4-5/8 (117)	7-1/4 (184)	7-7/8 (200)	4-1/2 (114)	2-13/16 (71)	11 (279)	7.83 (17.16)
2 (50)	4-5/8 (117)	7-1/4 (184)	8-11/16 (221)	4-1/2 (114)	2-7/8 (73)	10-3/8 (264)	6.70 (3.04)
	4-5/8 (117)	7-1/4 (184)	9-1/16 (230)	5-3/4 (146)	2-7/8 (73)	11-3/16 (284)	6.70 (3.04)

Table Notes:

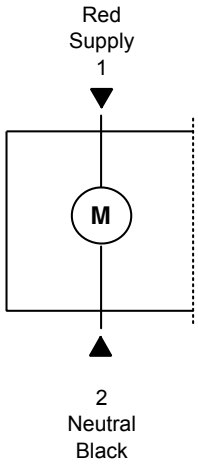
*Dimension “C” is maximum length, measured from the actuator, end fitting, or mounting plate, whichever extends the furthest.

1. All dimensions are in inches (mm) and weights are in pounds (kg).
2. Dimension “D”, Depth, is 3 inches (76 mm).
3. Dimension “E”, Handle, is 4 inches (102 mm).

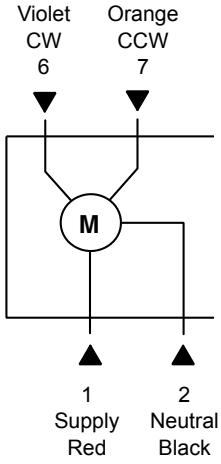
Wiring Diagrams



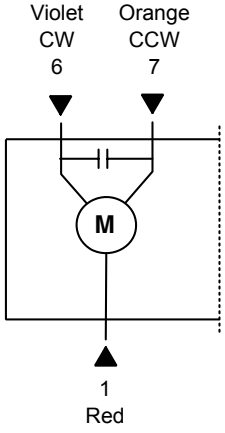
Modulating (0 to 10 Vdc), 24 Vac (Applies to all)



2-position, 24 Vac (GMA)



3-position, 24 Vac-SR (GMA)



3-position, 24 Vac-NSR (GDE/GLB)

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Ingenuity for life

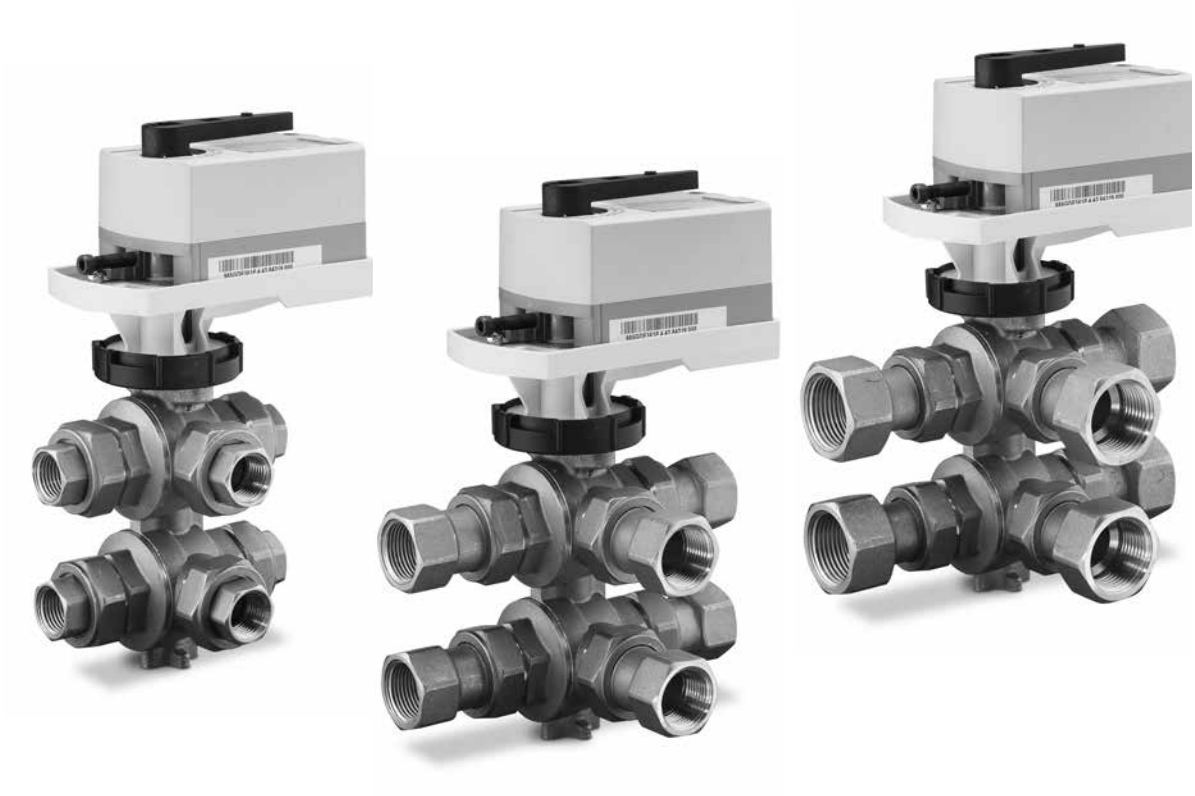
BT300 Variable Frequency Drives

Available in frame sizes up to 250 hp, the BT300 is well-suited for demanding HVAC environments and helps save 20-50% of energy compared to equipment with little or no control. Built-in features – like a real-time clock, energy savings optimization programming, and a sleep function – help measure energy savings. Built-in wizards get HVAC equipment up and running quickly and accurately.

usa.siemens.com/hvac

599 Series Six-Way Ball Valves

NEW!



Because of its special design, a single 6-way ball valve and actuator switches between, and controls, both heating and cooling to a single coil or heated/chilled beam, when a four-pipe system is used. A modulating actuator controls heating in one half of the rotation and cooling in the other half, with the valve closing off both heating and cooling at mid stroke. The heating and cooling supplies are isolated from each other, without mixing in the valve. The valve can be ordered with different Cv for heating and cooling to maximize both heating and cooling transfer capabilities of the coil.

Less effort for installation, commissioning and cabling, as well as decreased space requirements, reduce the complexity of the plant and result in lower costs. Using a single valve, actuator and coil for both heating and cooling reduces equipment and installation costs, simplifies control, and reduces data points in the building automation system.

Six-Way Ball Valves

NEW!

24 Vac, Floating Control
1/2 to 1-inch
Chrome-plated Balls and Stainless Steel Stem
Non-Spring Return Actuator

1/2-inch Six-Way Ball Valve.

Description

The 599 Series 6-Way Ball Valves couple with the GDE161.1P OpenAir™ actuator to provide single valve and actuator changeover and control of hot and chilled water for heated/chilled beam applications or any four-pipe system.

Features

- Control two media sources (hot and chilled water) to a single coil with a one valve and actuator
- Large Cv range (0.3 to 4.7 Cv) for each media source
- 1/2", 3/4" and 1" line size connections
- Built in pressure compensation function
- 0% leakage for no mixing of hot and chilled water
- 232 psi (16 bar) pressure rating
- 50 psi (3.5 bar) close-off
- Chrome plated brass balls and stainless steel stem
- Blow-out proof stem
- Actuator and mounting bracket can easily be rotated (90 degree increments)
- Operating handle for manual operation

Applications

The 6-way ball valves changeover and control hot and chilled water (both similarly treated) in heated/chilled beams and any other four-pipe system utilizing the same coil to heat and cool.

Six-Way Ball Valve Specifications

Materials

- Body ..... Hot-pressed brass CW617N
- Balls ..... Chrome-plated brass
- Stem ..... Stainless steel
- Calibrated washers ..... Stainless Steel
- Stem seals ..... EPDM o-rings
- Ball Seals ..... Low friction PTFE

Operating

- Valve body rating ..... 232 psi (16 bar)
- Media temperature ..... 41° to 194°F (5° to 90°C)
- Controlled medium ..... Water, water/glycol solutions up to 50%
- Angle of rotation ..... 0° to 90°
- Maximum recommended differential pressure ..... 29 psi (2 bar)
- Close-off ..... 50 psi (3.5 bar)
- Leakage 0%
- Flow characteristic ..... Linear
- Line size ..... 1/2-inch to 1-inch (15 mm to 25 mm)
- Connection ..... NPT union, female

Actuator Specifications

- Operating voltage ..... 24 Vac
- Signal ..... 0-10 Vdc
- Failure mode ..... Non-spring return (fail-n-place)
- Manual override ..... Yes
- Run time ..... 90 sec
- Power consumption ..... 2 to 3 VA

Miscellaneous

- Mounting location ..... NEMA 1 (interior only)

Valve Body Product Ordering

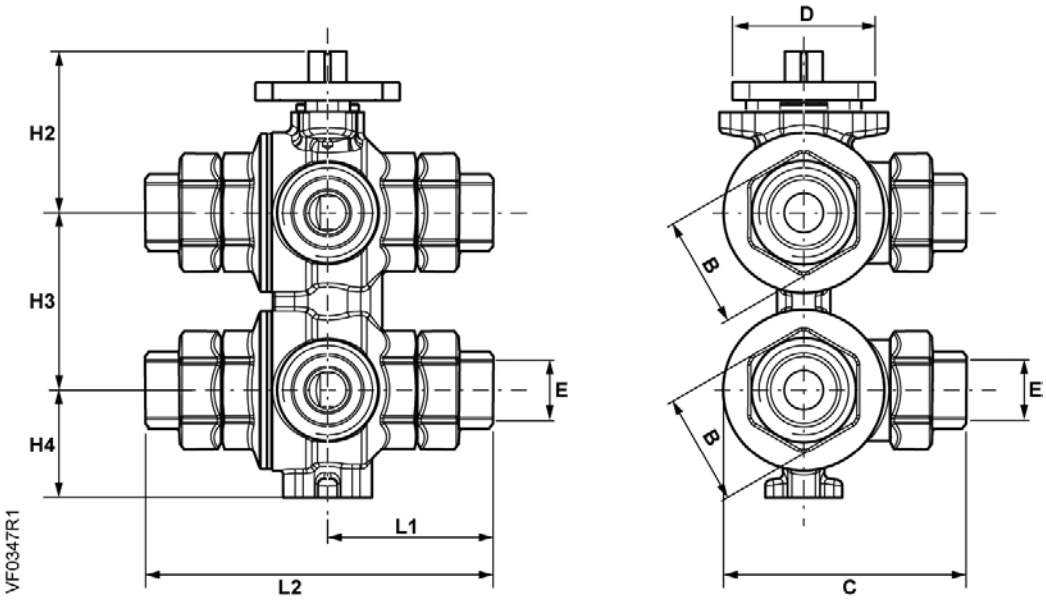
Select from any combination of Source A and B Cv value range. The valve product number consists of a 599 valve prefix code, a hyphen, a 5-digit valve body code, a hyphen, the source A Cv value, a hyphen, and the source B Cv value.

Valve Size in. (mm)	Source A and B Cv Value Range	Valve Body Part No.
1/2 (15)	0.3 to 1.9 for 1/2 inch	**599-10600-0.3-0.3 – 599-10600-1.9-1.9**
3/4 (20)	0.8 to 4.7 for 3/4 inch	**599-10601-0.8-0.8 – 599-10601-4.7-4.7**
1 (25)	1.9 to 4.7 for 1 inch	**599-10602-1.9-1.9 – 599-10602-4.7-4.7**

Actuator Product Ordering

Description			Part No.	Actuator Prefix Code
	Electronic Rotary	0-10V, Non-Spring Return	**GDE161.1P**	**171C**

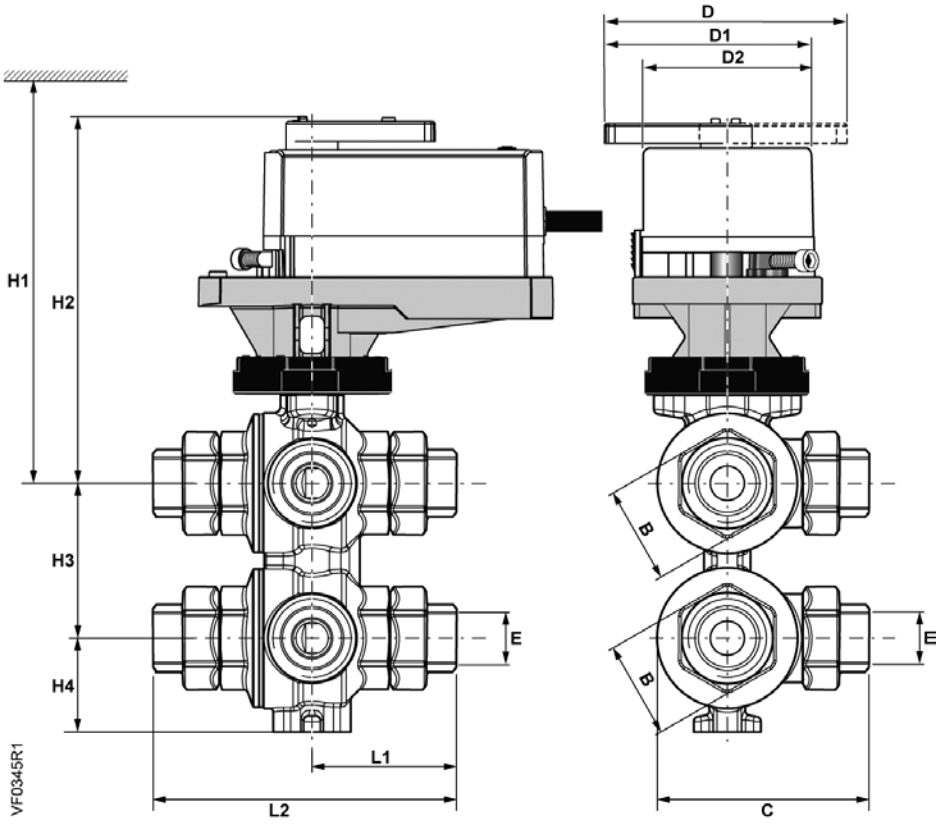
Dimensions and Weights



Dimensions shown in inches (mm).

Line Size in. (mm)	B	C	D	E	L1	L2	H2	H3	H4	Weight lb (kg)
1/2 (15)	1-1/2 (38)	3-3/8 (86)	1.65 (42)	1/2 (15)	2-3/8 (60)	4-3/4 (121)	2.0 (50)	2.36 (60)	1.42 (36)	5.2 (2.36)
3/4 (20)		4-1/4 (108)		3/4 (20)	3-5/16 (84)	6-5/8 (168)				6 (2.72)
1 (25)		4-1/2 (114)		1 (25)	3-1/2 (89)	7 (178)				6.8 (3.08)

Dimensions and Weights



Dimensions shown in inches (mm).

Line Size in. (mm)	B	C	D	D1	D2	E	H1	H2	H3	H4	L1	L2	Weight lb (kg)
1/2 (15)	1-1/2 (38)	3-3/8 (86)	3.98 (101.2)	3.44 (87.5)	2.91 (73.8)	1/2 (15)	13-3/4 (349)	5-3/4 (146)	2.36 (60)	1.42 (36)	2-3/8 (60)	4-3/4 (121)	6.8 (3.08)
3/4 (20)		4-1/4 (108)				3/4 (20)					3-5/16 (84)	6-5/8 (168)	7.6 (3.45)
1 (25)		4-1/2 (114)				1 (25)					3-1/2 (89)	7 (178)	8.4 (3.81)

Magnetic Valves

Magnetic Valves use magnetic actuation to enhance response time and provide stability. Large signal changes switch the actuator to the large signal band, allowing high-gain response to quickly position the valve element. Small signal changes switch the actuator to the small signal band to provide loop stability and precise positioning.

Note: To use any current magnetic valve with phase cut control signal use SEZ91.6 signal converter.

Control Valves for Hot and Chilled Water

MXG461...U
Magnetic Control Valve.

Description

The Magnetic MX.. Mixing Valve uses magnetic actuation to enhance response time and provide stability. Large signal changes switch the actuator to the large signal band, allowing high-gain response to quickly position the valve element. Small signal changes switch the actuator to the small signal band to provide loop stability and precise positioning.

Features

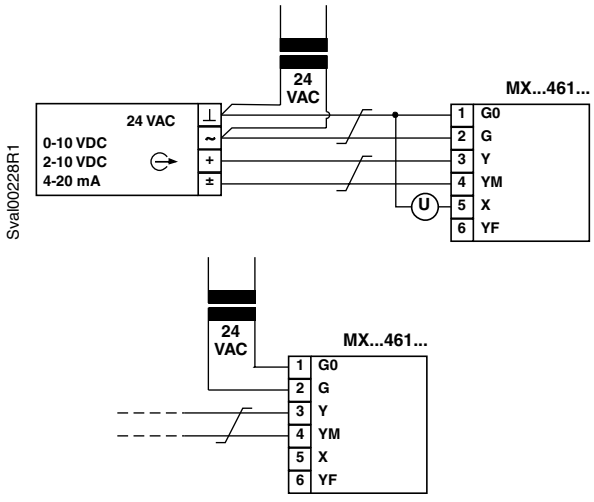
- Fast positioning time (< 2 seconds)
- 1000:1 resolution
- Magnetic actuation
- No maintenance
- Manual override
- Auto calibration
- Dip switch selectable signal input (0 to 10 V or 4 to 20 mA)
- Dip switch selectable flow characteristic
- Built-in position feedback

Applications

The Magnetic MX.. Mixing Valve is designed for modulating control of chilled water and hot water and is well suited for HVAC systems.

The valves can be configured for straight-through or 3-way applications and can be used in closed loop applications. Valves are shipped with NPT screwed fittings. A flanged version is also available in the 2-1/2" line size.

Wiring Diagram



Connection to Controller with Four-wire Output.

Ⓤ = Indication of valve position (only where required).
0 to 10 Vdc → 0 to 100% volumetric flow

Specifications

Operating Voltage ..... 24 Vac +20%, -15%

Typical Power Consumption
- 1/2 - 1-1/4" 5w
- 1-1/2 - 2-1/2" 6w

Frequency ..... 45-65 Hz

Control Signals ..... 0 to 10 Vdc, 2 to 10 Vdc, or 4 to 20 mA

Position Feedback Signal ..... 0 to 10 Vdc; Load Resistance > 500 Ω

Materials
- Body ..... Cast Iron
- Plug ..... CrNi Steel
- Seat ..... Brass
- Bellows ..... Tombac, Bronze, CrNi Steel

Packing
- Normal Duty ..... EDPM (O-ring)

Max. Differential Pressure ..... 44 psi

Temperature of Medium ..... 34° to 266°F (1° to 130°C)

Resolution 1000:1

Position with Actuator De-energized ..... A → AB Closed

Positioning Time ..... <2 Seconds

Agency Approvals ..... UL873, cUL, CSA C22.2 No. 24

Flow Characteristic (Selectable) ..... Equal Percentage or Linear

Environmental Protection ..... NEMA Type 1

Sizing

Part No.	Line Size (in.)	Cv	Max. Close-off Pressure (psi)	Power for Transformer Sizing (VA)	Power Consumption (W)	Fuse Required (A)	Wire Gauge			
							18	16	14	12
							Max. Cable Length (ft.)			
MXG461.15-3.0U	1/2	3.5	44	29	5	3.15	108	213	361	525
MXG461.20-5.0U	3/4	5.8	44	29	5	3.15	108	213	361	525
MXG461.25-8.0U	1	9.3	44	29	5	3.15	108	213	361	525
MXG461.32-12U	1-1/4	14	44	29	5	3.15	108	213	361	525
MXG461.40-20U	1-1/2	23	44	44	6	4.00	66	118	197	328
MXG461.50-30U	2	35	44	44	6	4.00	66	118	197	328
MXF461.65-50U	2-1/2	58	44	46	6	5.00	49	98	164	262

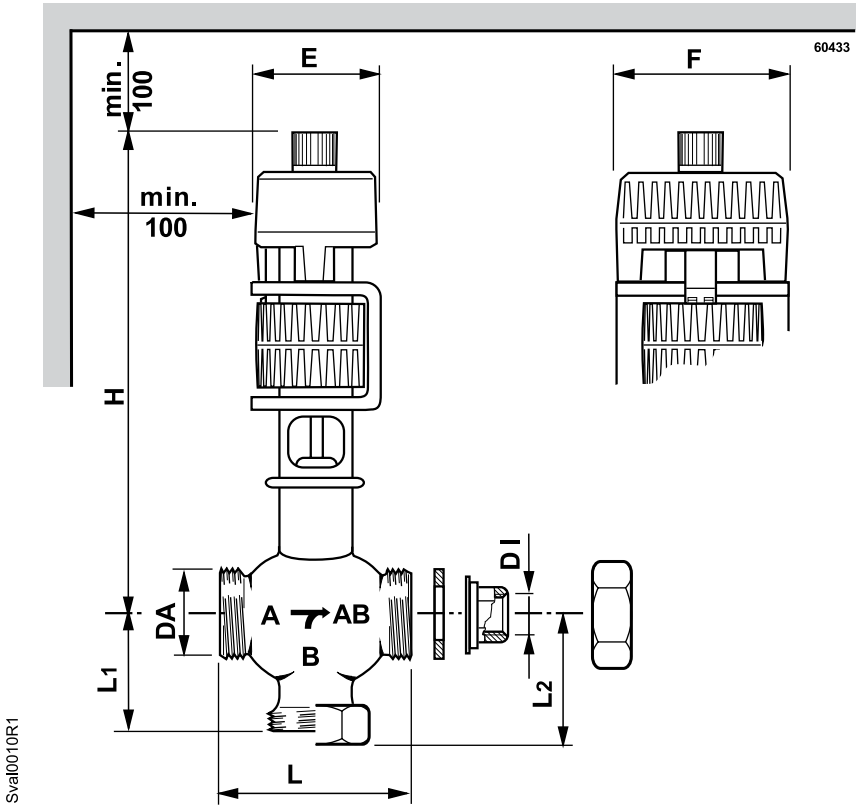
Table Notes:
*All data relates to a supply of 24 Vac.

Product Ordering

Valve Size	Cv	Part No.
NPT Union		
1/2"	3.5	**MXG461.15-3.0U**
3/4"	5.8	**MXG461.20-5.0U**
1"	9.3	**MXG461.25-8.0U**
1-1/4"	14	**MXG461.32-12U**
1-1/2"	23	**MXG461.40-20U**
2"	35	**MXG461.50-30U**
Flanged		
2-1/2"	58	**MXF461.65-50U***

Table Notes:
*No blanking flange

MX.461...U Valves with Electronics Module

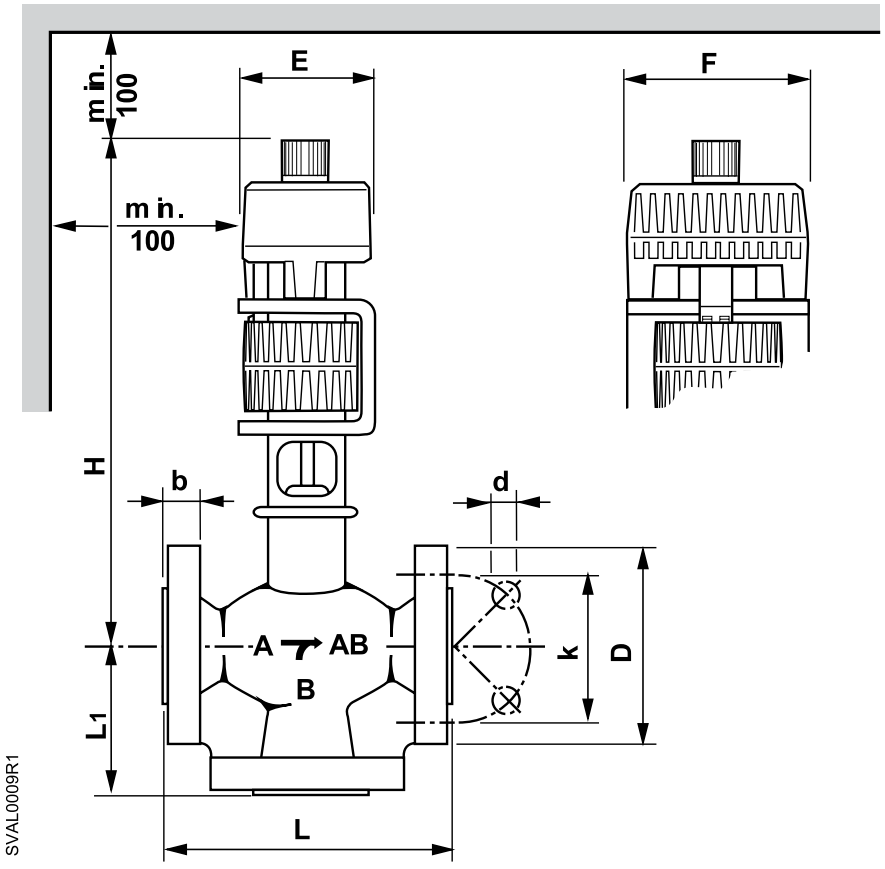


Dimensions shown in inches (mm).

Part No.	DI	DA	L	L1	L2*	H	E	F	Weight lb. (kg)
MXG461.15-3.0U	1/2	1	3.15 (80)	1.67 (42.5)	2.01 (51)	9.45 (240)	3.15 (80)	3.94 (100)	8.4 (3.8)
MXG461.20-5.0U	3/4	1-1/4	3.74 (95)	2.07 (52.5)	2.40 (51)	10.24 (260)	3.15 (80)	3.94 (100)	9.3 (4.2)
MXG461.25-8.0U	1	1-1/2	4.33 (110)	2.22 (56.5)	2.56 (65)	10.63 (270)	3.15 (80)	3.94 (100)	10.4 (4.7)
MXG461.32-12U	1-1/4	2	4.92 (125)	2.66 (67.5)	2.99 (76)	11.22 (285)	3.15 (80)	3.94 (100)	12.3 (5.6)
MXG461.40-20U	1-1/2	2-1/4	5.51 (140)	3.17 (80.5)	3.70 (94)	12.60 (320)	3.94 (100)	4.72 (120)	20.5 (9.3)
MXG461.50-30U	2	2-3/4	6.69 (170)	3.68 (93.5)	4.29 (109)	13.39 (340)	3.94 (100)	4.72 (120)	26.2 (11.9)

Table Notes:
*When used as a straight-through valve

MX.461...U Flanged Valves with Electronics Module



Dimensions shown in inches (mm).

Part No.	L	L1	D	b	k	d 4X	H	E	F	Weight lb. (kg)
MXF461.65-50U	11.42 (290)	4.92 (125)	7.00 (177.8)	0.88 (22.4)	5.50 (139.7)	0.75 (19.05)	15.43 (392)	3.15 (80)	3.94 (100)	63.1 (28.6)

Control Valves for Hot and Chilled Water with ZM Signal Module

Magnetic M3P…FY
Mixing Valve with Actuator.

Description

The Magnetic M3P…FY valve uses a magnetic actuator to positively position with extremely high speed and accuracy. The combination of >1000:1 resolution and full range positioning in less than one second allows exceptional loop stability and reaction time.

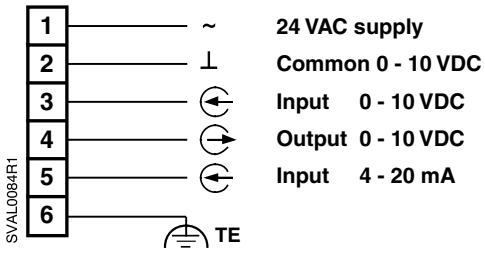
Features

- Fast positioning time (< 1 second)
- >1000:1 resolution
- Magnetic actuation
- No periodic maintenance
- Manual override
- Built-in position control and feedback
- Low friction, heavy-duty and maintenance free

Applications

The Magnetic M3P…FY Mixing Valve is designed for modulating control of chilled water and hot water, especially in HVAC systems. The valves are also configured for straight-through applications. The valves may be shipped with flanged fittings: 2BN is two-way with Companion Flange Kit, and 3BN is three-way with Companion Flange Kit. The valves are used in closed loop applications.

Wiring Diagram



Specifications

Operating Voltage ..... 24 Vac

Nominal Power
- 3" ..... 80 VA (20w)
- 4" ..... 120 VA (30w)

Frequency ..... 50/60 Hz +15/–10%

Control Signals ..... 0 to 10 Vdc or 4 to 20 mA

Position Feedback Signal ..... 0 to 10 Vdc

Materials
- Body ..... Cast Iron
- Plug ..... CrNi Steel
- Seat ..... Brass

Packing
- Normal Duty ..... EDPM (O-ring)

Max. Differential Pressure ..... 44 psi (3 in.)
29 psi (4 in.)

Water Temperature ..... 35° to 248°F (2° to 120°C)

Ambient Temperature ..... 35° to 122°F (2° to 50°C)

Resolution ..... >1000:1

Position with Actuator De-energized ..... A → AB Closed

Positioning Time ..... <1 Second

Agency Approvals ..... UL873, cUL, CSA C22.2 No. 24

Flow Characteristic ..... Linear

Environmental Protection ..... NEMA Type 1

Sizing

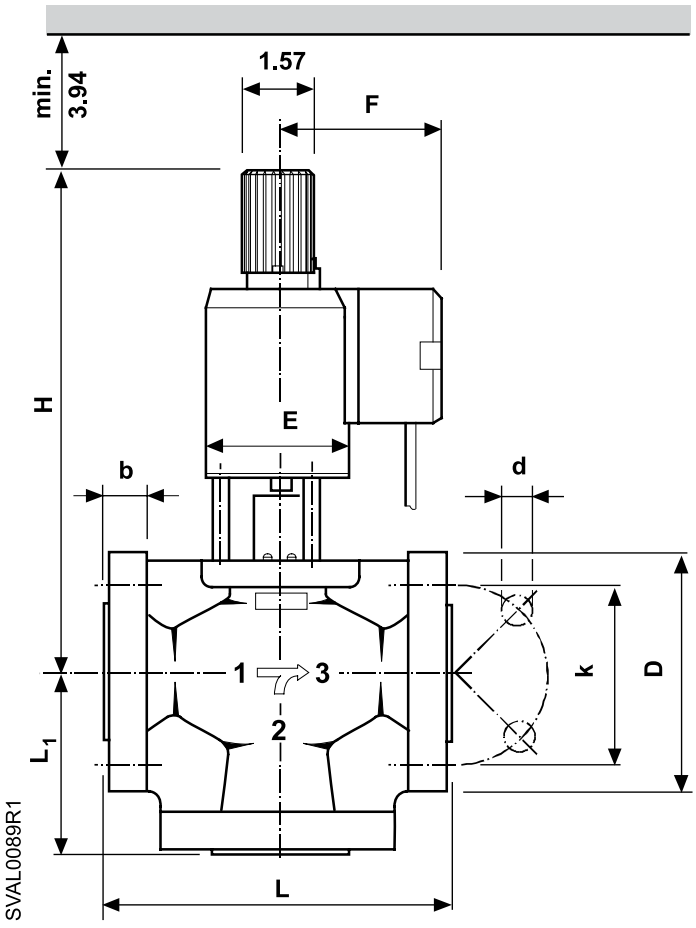
Part No.	Valve Size (in.)	Cv	Max. Differential Pressure and Close-off (psi)	Max. Differential Pressure and Close-off (bar)	Power for Transformer Sizing (VA)	Power Consumption (W)	Wire Gauge (AWG) 16 Max. Wiring Length (ft.)	Wire Gauge (AWG) 14 Max. Wiring Length (ft.)	Wire Gauge (AWG) 12 Max. Wiring Length (ft.)
M3P80FY	3	93	44	3	80	20	33	52	89
M3P100FY	4	152	29	2	120	30	20	33	56

Product Ordering

Description	Cv	Part No.
Without Flanges		
3" 3-way	93	**M3P80FY**
4" 3-way	152	**M3P100FY**
With Flanges		
3" 2-way	93	**M3P80FY/2BN**
4" 2-way	152	**M3P100FY/2BN**
3" 3-way	93	**M3P80FY/3BN**
4" 3-way	152	**M3P100FY/3BN**

Dimensions and Weights

M3P…FY Control Valve



Dimensions shown in inches (mm).

Part No.	L	L1	D	b	k	d	H	E	F	Weight lb. (kg)
M3P80FY	12.20 (310)	5.51 (140)	7.87 (200)	0.87 (22)	6.30 (160)	8x 0.71 (8x18)	20.00 (508)	5.71 (145)	4.88 (124)	100.0 (45.5)
M3P100FY	13.78 (350)	6.30 (160)	8.66 (220)	0.94 (24)	7.09 (180)	8x 0.71 (8x18)	22.44 (570)	5.71 (145)	4.88 (124)	130.0 (59.0)

Table Notes:
Counter flanges are not supplied. Flange dimensions to DIN2533, PN16

Modulating Control Valves

with Magnetic Actuators, Positioning Control and Position Feedback for Hot Water and Steam

MVF461H Series Magnetic Control Valve.

Description

MVF461H Series Modulating Control Valves are control valves with magnetic actuators, for modulating control of hot water, high temperature hot water, and steam.

Features

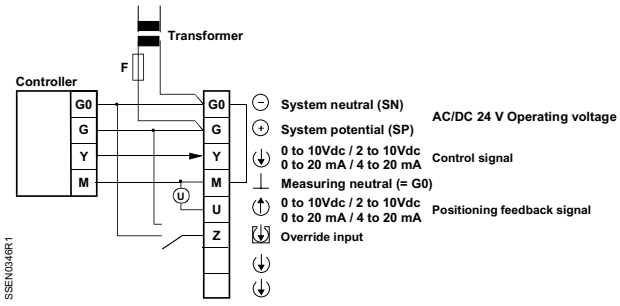
- Fast positioning time (< 2 seconds)
- Selectable valve characteristic: Equal percentage or linear
- Selectable standard interface: 0/2 to 10 Vdc or 0/4 to 20 mA
- High resolution (>1000:1)
- High rangeability
- Wear-free inductive stroke measurement
- Spring return fails closed when de-energized
- Positioning control and position feedback signal
- Low-friction, heavy-duty and maintenance-free

Applications

The MVF461H... Control Valves are through-port valves with magnetic actuators. The actuator is equipped with an electronics module for positioning control and position feedback. If the power is off, the valve fails closed.

The short positioning time, high resolution and high rangeability make these valves ideal for proportional control of district heating stations, and heating applications using high temperature hot water and steam.

Wiring Diagram



Specifications

Electrical
Low-voltage Use Only ..... Class 2 (SELV, PELV)

24 Vac
Operating Voltage ..... 24 Vac +20/-15%
Frequency ..... 45 to 65 Hz
Typical Power Consumption ..... See SizingTable
Standby ..... <1 W (Valve Fully Closed)
Nominal Apparent Power ..... See Sizing Table
Suitable Fuse ..... Slow

24 Vdc
Operating Voltage ..... 20 to 30 Vdc

Functional Data of Actuator
Input
Positioning Signal Y ..... 0/2 to 10 Vdc, 0/4 to 20mA
Impedance
0/2 to 10 Vdc 100 kΩ//5nF
0/4 to 20 mA 240 Ω//5nF

Forced Control
Impedance ..... 22 kΩ
Closing the Valve (Z Connected to G0) ..... <1 Vac; <0.8 Vdc
Opening the valve (Z Connected to G0) ..... >6 Vac; >5 Vdc
No Function (Z Not Wired) ..... Positioning Signal Y Active

Output
Position Feedback Signal Voltage ..... 0/2 to 10 Vdc; Load Resistance > 500Ω
Current ..... 0/4 to 20 mA; Load Resistance < 500Ω
Stroke Measurement ..... Inductive
Nonlinearity ..... ±3% of End Value

Functional Data of Valve
Nominal Pressure ..... ANSI 125 (PN 16)
Perm. Operating Pressure[1] ..... Water up to 248°F (120°C) 232 psig (16 bar)
Water Above 248°F (120°C): 188 psig (13 bar)
Saturated Steam: 130 psig (9 bar)

Pressure Differential Δ pmax/ Δ ps ..... 145 psi (10 bar)

Materials
Body ..... Nodular Cast Iron
Cover Flange ..... Nodular Cast Iron
Seat/Inner Valve ..... Stainless Steel

Packing
Normal Duty ..... EDPM (O-ring)

Electrical Connections
Cable Entries ..... 3 x M20 x 1.5 or PG13.5/G1/2
Connection Terminals ..... Screw Terminals for up to 12 AWG Wires (0.75 mm^2 Min. Cross-sectional Area[3])

Max. Pressure
Max. Differential Pressure ..... 145 psi

Media Temperature ..... 34° to 356°F (1° to 180°C)

Ambient Conditions
Temperature
Operation and Storage ..... 23° to 113°F (-5° to 45°C)
Transport ..... -13° to 158°F (-25° to 70°C)
Humidity ..... 5 to 95% rh (Non-condensing)

Resolution 1000:1

Position with Actuator De-energized ..... Closed

Positioning Time ..... <2 Seconds

Approvals ..... IP31 to IEC 529
Conforms to CE Requirements, UL 873,
Certified to Canadian Standard C22.2, No. 24, C-Tick N-474,
PED 97/23/EC: Pressure-carrying Parts
Par. 1, Section. 2.1.4 / Par. 3, Section 3 Fluid Group 2

Flow Characteristic ..... Equal Percentage or Linear[2]

Environmental Protection ..... NEMA Type 1

Notes:
[1]Tested at 1.5 x PN (24 bar), similar to DIN 3230-3
[2]Can be selected via DIP switch.
[3]In case of strong vibrations, use high-flex stranded wires.

Sizing

Part No.	Line Size (in.)	Cv	Max. Differential Pressure and Close-off (psi)	Power for Transformer Sizing (VA)	Power Consumption (W)	Slow Fuse	Wire Gauge (AWG)		
							16	14	12
							Max. Wiring Length (ft.)		
MVF461H15-3	1/2	3.5	145	33	15	3.15	130	215	360
MVF461H20-5	3/4	5.9	145	33	15	3.15	130	215	360
MVF461H25-8	1	9.4	145	33	15	3.15	130	215	360
MVF461H32-12	1-1/4	14.0	145	43	20	4	100	165	260
MVF461H40-20	1-1/2	23.3	145	65	20	6.3	100	165	260
MVF461H50-30	2	35.0	145	65	26	6.3	65	100	165

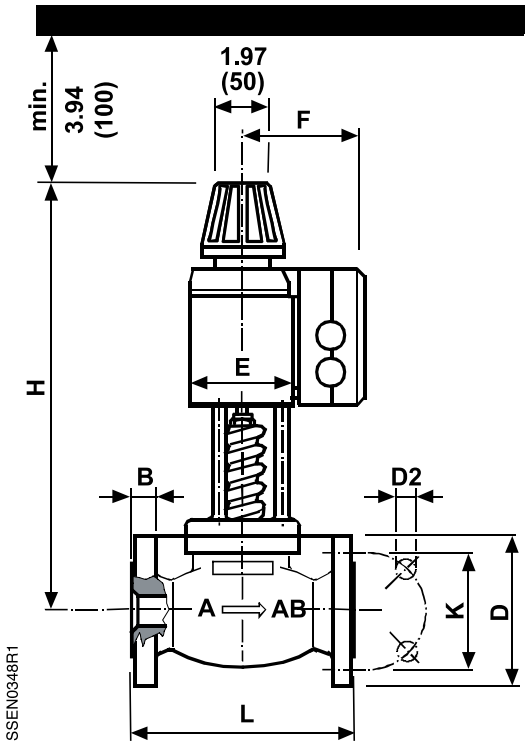
Product Ordering

Valve Size (in)	Cv	Part No.
ISO Flanges Without Adapters		
1/2	3.5	**MVF461H15-3**
3/4	5.9	**MVF461H20-5**
1	9.4	**MVF461H25-8**
1-1/4	14.0	**MVF461H32-12**
1-1/2	23.3	**MVF461H40-20**
2	35.0	**MVF461H50-30**
With NPT Adapter Flanges		
1/2	3.5	**MVF461H15-3-N**
3/4	5.9	**MVF461H20-5-N**
1	9.4	**MVF461H25-8-N**
1-1/4	14.0	**MVF461H32-12-N**
1-1/2	23.3	**MVF461H40-20-N**
2	35.0	**MVF461H50-30-N**

Ordering Notes:

- When placing an order, specify the quantity, product number and description.
- The valve body and magnetic actuator assemblies cannot be separated.

Dimensions and Weights



Dimensions shown in inches (mm).

Part No.	DN	L	D	D2	B	K	H	E	F	Weight lb. (kg)
MVF461H15-0.6	15	5.12 (130)	3.74 (95)	4 x 0.55 (4x14)	0.55 (14)	2.56 (65)	13.4 (340)	3.15 (80)	4.53 (115)	18.3 (8.3)
MVF461H15-1.5	15	5.12 (130)	3.74 (95)	4 x 0.55 (4x14)	0.55 (14)	2.56 (65)	13.4 (340)	3.15 (80)	4.53 (115)	18.3 (8.3)
MVF461H15-3	15	5.12 (130)	3.74 (95)	4 x 0.55 (4x14)	0.55 (14)	2.56 (65)	13.4 (340)	3.15 (80)	4.53 (115)	18.3 (8.3)
MVF461H20-5	20	5.91 (150)	4.13 (105)	4 x 0.55 (4x14)	0.63 (16)	2.95 (75)	13.3 (339)	3.15 (80)	4.53 (115)	19.6 (8.9)
MVF461H25-8	25	6.30 (160)	4.53 (115)	4 x 0.55 (4x14)	0.63 (16)	3.35 (85)	13.6 (346)	3.15 (80)	4.53 (115)	22.1 (10.0)
MVF461H32-12	32	7.09 (180)	5.51 (140)	4 x 0.71 (4x18)	0.71 (18)	3.94 (100)	15.12 (384)	3.94 (100)	4.92 (125)	34.6 (15.7)
MVF461H40-20	40	7.87 (200)	5.91 (150)	4 x 0.71 (4x18)	0.71 (18)	4.33 (110)	15.79 (401)	3.94 (100)	4.92 (125)	39.2 (17.8)
MVF461H50-30	50	9.05 (230)	6.50 (165)	4 x 0.71 (4x18)	0.79 (20)	4.92 (125)	17.58 (449)	4.92 (125)	5.43 (138)	60.0 (27.2)

Table expressed in inches (mm).

Modulating Control Valves

with Magnetic Actuators, Positioning Control and Position Feedback for Domestic Water

MXG461B Series Modulating Control Valve.

Description

The MXG461B Modulating Control Valve is a control valve with magnetic actuator, for modulating control of domestic water, cold water and hot water systems.

Features

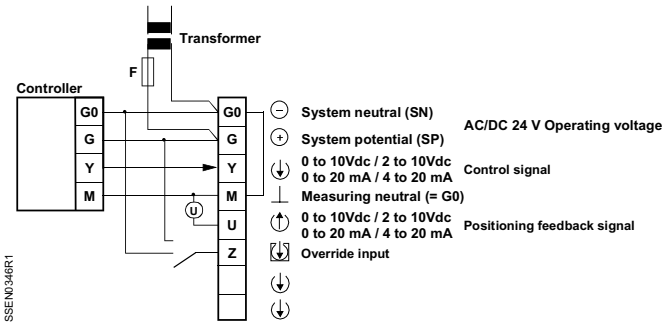
- Fast positioning time (< 2 seconds)
- Selectable valve characteristic: Equal percentage or linear
- Selectable control signal: 0/2 to 10 Vdc or 0/4 to 20 mA
- High resolution (>1000:1)
- High rangeability
- Wear-free inductive stroke measurement
- Spring return A → AB closed when de-energized
- Positioning control and position feedback signal
- Low-friction, heavy-duty and maintenance-free

Applications

The MXG461B... Modulating Control Valves are through-port or mixing valves with magnetic actuators. The actuator is equipped with an electronics module for positioning control and position feedback. If the power is off, the valve control path A → AB is closed.

The short positioning time, high resolution and high rangeability make these valves ideal for modulating control of domestic, hot and cold water systems.

Wiring Diagram



Specifications

Electrical
Low-voltage Use Only ..... Class 2 (SELV, PELV)

24 Vac
- Operating Voltage ..... 24 Vac +20/-15%
- Frequency ..... 45 to 65 Hz
- Typical Power Consumption ..... See Table 1
- Standby ..... <1 W (Valve Fully Closed)
- Nominal Apparent Power ..... See Sizing Table
- Suitable Fuse ..... Slow, See Table 1

24 Vdc
- Operating Voltage ..... 20 to 30 Vdc

Functional Data of Actuator

Input
- Positioning Signal Y ..... 0/2 to 10 Vdc or 0/4 to 20mA
  - Impedance
    - 0/2 to 10Vdc 100 kΩ//5nF
    - 0/4 to 20 mA 240 Ω//5nF
  - Forced Control
    - Impedance ..... 22 kΩ
    - Closing the Valve (Z Connected to G0) ..... <1 Vac; <0.8 Vdc
    - Opening the Valve (Z Connected to G0) ..... >6 Vac; >5 Vdc
    - No Function (Z Not Wired) ..... Positioning Signal Y Active

Output
- Position Feedback Signal Voltage ..... 0/2 to 10 Vdc; Load Resistance > 500Ω
- Current ..... 0/4 to 20 mA; Load Resistance < 500Ω
- Stroke Measurement ..... Inductive
- Nonlinearity ..... ±3% of End Value

Functional Data of Valve
- Nominal Pressure ..... ANSI 125 (PN 16)
- Operating Pressure $p_e$max[1] ..... 232 psi (16 bar)
- Pressure Differential Dp_Vmax ..... See Sizing Table.
- Leakage ..... A → AB Maximum 0.05% Cv; B → AB Depends on Application Data (0.2% Cv)
- Water Temperature[2] ..... -4° to 266°F (-20° to 130°C)
- Valve Characteristic[3] ..... Equal Percentage or Linear, Optimized Near the Closing Point

Resolution 1:1000
- Type of Operation ..... Modulating

Position De-energized ..... A → AB Closed

Orientation ..... Upright to Horizontal

Positioning Time ..... < 2 Seconds

Materials
- Body ..... Red Bronze
- Cover Flange ..... Red Bronze
- Seat/Inner Valve ..... Stainless Steel

Packing
- Normal Duty ..... EPDM (O-ring)

Pipe Connections ..... Screwed Fittings, Bronze/Brass

Electrical Connections
- Cable Entries ..... 3 x M20 x1.5 or PG13.5/G1/2
- Connection Terminals ..... Screw Terminals for 12 AWG Wires
- Min. Cross-sectional Area[4] ..... 18 ga. AWG
- Max. Cable Length ..... Refer to Sizing Table.

Ambient Conditions
- Temperature
  - Operation and Storage ..... 23° to 113°F (-5° to 45°C)
  - Transport ..... -13° to 158°F (-25° to 70°C)
- Humidity ..... 5 to 95% rh

Agency Approvals ..... IP31 to IEC 529
Conforms to CE Requirements, UL 873,
Certified to Canadian Standard C22.2 No. 24, C-Tick N-474,
PED 97/23/EC: Pressure-carrying Parts,
Par. 1, Section. 2.1.4 / Par. 3, Section 3, Fluid Group 2

Flow Characteristics ..... Equal Percentage or Linear

Notes:
[1] Tested at 1.5 x PN (24 bar), similar to DIN 3230-3
[2] For medium temperatures <32°F (0°C), the Z366 stem heating element is required.
[3] Can be selected via DIP switch.
[4] In case of strong vibrations, use high-flex stranded wires.

Sizing

Part No.	Valve Size (in.)	Cv	Max. Close-off Pressure (psi)	Power for Transformer Sizing (VA)	Power Consumption (W)	Slow Fuse	Wire Gauge (AWG)		
							16	14	12
MXG461B15-3	1/2	3.5	145	33	15	3.15	130	215	360
MXG461B20-5	3/4	5.8	116	33	15	3.15	130	215	360
MXG461B25-8	1	9.3	102	33	15	3.15	130	215	360
MXG461B32-12	1-1/4	14	87	43	20	4	100	165	260
MXG461B40-20	1-1/2	23	87	43	20	4	100	165	260
MXG461B50-30	2	35	87	65	22	6.3	65	100	185

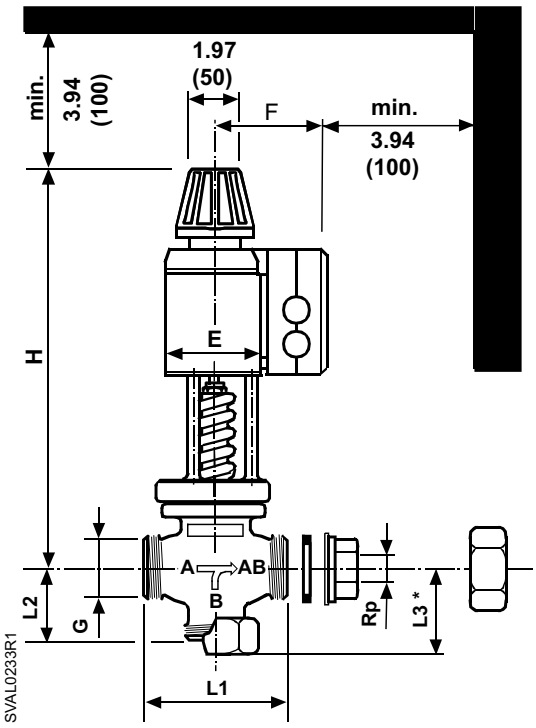
Product Ordering

Valve Size (in)	Cv	Part No.
1/2	3.5	**MXG461B15-3**
3/4	5.8	**MXG461B20-5**
1	9.3	**MXG461B25-8**
1-1/4	14	**MXG461B32-12**
1-1/2	23	**MXG461B40-20**
2	35	**MXG461B50-30**

Ordering Notes:

- When placing an order, specify the quantity, product number and description.
  Example: 1 MXG461B15-3 valve and 1 Z366 stem heater
- The valve body and magnetic actuator assemblies cannot be separated.
- The screwed fittings and gaskets are supplied with these valves.

Dimensions and Weights



Dimensions shown in inches (mm).

Part No.	Line Size In.	(mm)	RP	G (in)	L1		L2		L3		H		E		F		Weight lb.	(kg)
MXG461B15-0.6	1/2	(15)	1/2	G1B	3.15	(80)	1.67	(42.5)	1.97	(50)	13.4	(340)	3.15	(80)	4.53	(115)	15.65	(7.1)
MXG461B15-1.5	1/2	(15)	1/2	G1B	3.15	(80)	1.67	(42.5)	1.97	(50)	13.4	(340)	3.15	(80)	4.53	(115)	16.09	(7.3)
MXG461B15-3	1/2	(15)	1/2	G1B	3.15	(80)	1.67	(42.5)	1.97	(50)	13.4	(340)	3.15	(80)	4.53	(115)	16.09	(7.3)
MXG461B20-5	3/4	(20)	3/4	G1-1/4B	3.74	(95)	2.07	(52.5)	2.36	(60)	13.3	(339)	3.15	(80)	4.53	(115)	16.97	(7.7)
MXG461B25-8	1	(25)	1	G1-1/2B	4.33	(110)	2.22	(56.5)	2.52	(64)	13.6	(346)	3.15	(80)	4.53	(115)	18.73	(8.5)
MXG461B32-12	1-1/4	(32)	1-1/4	G2B	4.92	(125)	2.66	(67.5)	2.95	(75)	15.12	(384)	3.94	(100)	4.92	(125)	28.22	(12.8)
MXG461B40-20	1-1/2	(40)	1-1/2	G2-1/4B	5.51	(140)	3.17	(80.5)	3.66	(93)	15.79	(401)	3.94	(100)	4.92	(125)	32.19	(14.6)
MXG461B50-30	2	(50)	2	G2-3/4B	6.69	(170)	3.68	(93.5)	4.2	(108)	17.58	(449)	3.94	(100)	4.92	(125)	41.00	(18.6)

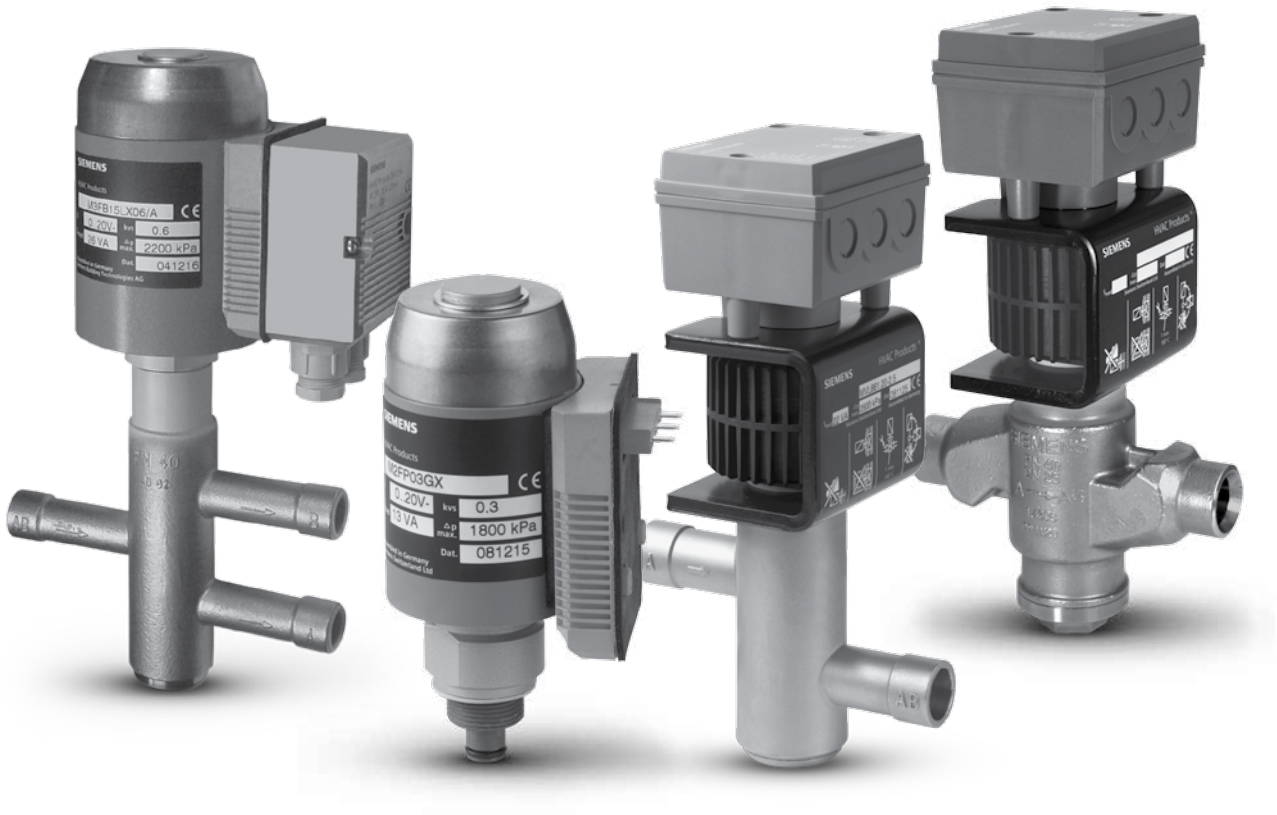
Table Notes:

Table expressed in inches (mm).

- A: External thread G...B to ISO228/1
- DN: Internal thread Rp to ISO7/1
- Fittings to ISO 49/DIN 2950 (supplied complete with flange gaskets)

Refrigeration Valves

NEW!



For over 30 years, Siemens has been developing and producing refrigerant valves with magnetic actuators. Siemens refrigerant valves offer precise control and optimum energy efficiency in refrigeration systems. The one thing they all have in common is the actuator technology: the ultra precise, permanent DC magnetic actuation.

The Siemens refrigeration valve range offers diverting and 2-port valves for refrigeration applications. These include refrigerant valves for expansion, hot gas bypass (indirect or direct) and suction throttle applications. The high maximum permissible differential pressure and maximum permissible operating pressure allow the use of many types of refrigerants and can be used in applications with high pressures in the system.

The valves are not only simple to install and maintenance-free, but also safe for the environment.

Features

- Hermetically sealed for a high degree of environmental compatibility
- High stroke resolution
- Positioning time < 1 second
- Vibration-free operation
- Ease of service and installation

Refrigerants

- Ammonia (M2FP, MVS661)
- CO_2 (MVL661, MVS661)
- Commonly used safety refrigerants

Applications

- Expansion
- Hot Gas Bypass (direct and indirect)
- Suction Throttle
- Diverting or straight through
- Can be used for chillers, heat pumps, air conditioning, supermarket refrigeration systems, air handling plants, etc.
- Modulating pilot valve with magnetic actuator (M2FP03GX) is available as the controlling element for 2 to 5-inch main valves.

Modulating Refrigerant Valves with Magnetic Actuators

NEW!

MVL661... Series Refrigerant Valve.

Description

Control valves with magnetic actuator for modulating control of refrigerant circuits using CO_2 and commonly used safety refrigerants.

Features

- One valve type for expansion, hot-gas and suction throttle applications
- Hermetically sealed towards outside
- Selectable standard interface 0 to 10 Vdc, 2 to10 Vdc, 0 to 20 mA or 4 to 20 mA
- High resolution and control accuracy
- Precise positioning control and position feedback signal
- Short positioning time (<1 second)
- Closed when de-energized
- Robust and maintenance-free
- Five valve sizes with Cv (kvs) values from 0.29 to 13.9 psi (0.25 to 12)
- 4 selectable standard signals for setpoint and measured value
- DIP switch to reduce the Cv (kvs) value to 63% of the nominal value
- Potentiometer for adjustment of minimum stroke for suction throttle applications
- Automatic stroke calibration
- Forced control input for “Valve closed” or “Valve fully open”
- LED for indicating the operating state

Applications

The MVL661...Series refrigerant valves are designed for modulating control of refrigerant circuits including chillers and heat pumps. They can be used in expansion, hot-gas and suction throttle applications as well as with all commonly used safety refrigerants (R22, R134a, R227ea, R404A, R407C, R410A, and so on) and R744 (CO_2). They are not suitable for flammable refrigerants.

Specifications

Operating Voltage
24 Vac ..... 24 Vac ± 20%
Frequency ..... 45 to 65 Hz
Typical Power Consumption
P_{med} 12W
Standby ..... <1 W (valve fully closed)
Apparent Power, S_{NA} ..... 22 VA (for selecting the transformer)
Required Fuse ..... Slow, 1.6 to 4A
24 Vdc ..... 20 to 30 Vdc
Current draw ..... 0.5A/2A (maximum)

Control Signal Y ..... 2 to 10 Vdc, 4 to 20 mA,
Impedance
0/2 to 10 Vdc 100K ohm/5nF
0/4 to 20 mA 240 ohm/5nF
Forced control ZC
Input impedance ..... 22K ohm
Closing the valve (ZC connected to G0) ..... <1 Vac; <0.8 Vdc
Opening the valve (ZC connected to G) ..... >6 Vac; >5 Vdc
No function (ZC not wired) ..... Positioning signal Y active

Position Feedback Signal U
Voltage ..... 2 to 10 Vdc; load resistance ≥ 500 Ω
Current ..... 4 to 20 mA; load resistance ≤ 500 Ω
Stroke Detection ..... Inductive
Nonlinearity ..... Accuracy ±3% full scale

Positioning Time ..... < 1 second

Electrical Connections
Cable Entry Glands ..... 3 × ø × 17 mm (for M16)
Min. Wire Size ..... 20 AWG (0.75 mm²)
Max. Cable Length ..... See Wiring

Nominal Pressure ..... 232 psi (PN 16)

Permissible Operating Pressure [1] ..... max. 652 psi (45 bar)

Max. Differential Pressure Δp_{max} ..... 363 psi (25 bar)
1-1/4-inch (DN32): 29 psi (2 bar)

Valve Characteristic (stroke vs C_V or k_V) ..... Linear (to VDI/VDE2173)

Leakage Rate (Internally Across Seat) ..... Max. 0.002% Cv (Kv) or
Max. 1 Nl/h gas at Δp = 58 psi (4 bar)
Shut/off function, like solenoid
normally closed (NC) function

External Seal ..... Hermetically sealed (fully welded,
no static or dynamic seals)

Permissible Media ..... Commonly used safety refrigerants
(R22, R134a, R227ea, R404A, R407C, R410A,
R422D, and so on) and R744 (CO_2)
Not suitable for flammable refrigerants
Not suitable for ammonia (R717).
For refrigerants belonging to Fluid group 1,
please contact your local Siemens representative.

Media Temperature ..... -40° to 248°F (-40° to 120°C),
Max. 284°F (140°C) for 10 min.

Stroke Resolution ΔH/H100 ..... 1:1000 (H = Stroke)

Hysteresis ..... Typically 3%

Mode of Operation ..... Modulating

Position when de-energized ..... Control path A → AB closed

Orientation ..... Upright to horizontal

Valve Body and Parts ..... Steel/crNi Steel

Seat/Piston ..... CrNi Steel/Brass

Sealing Disk ..... PTFE

Sleeves ..... Internally soldered, CrNi steel

Temperature
Operation ..... -13° to 131°F (-25° to 55°C)
Transport ..... -13° to 158°F (-25° to 70°C)
Storage ..... 23° to 113°F (-5° to 45°C)

Humidity
Operation ..... 10 to 100% rh
Transport ..... < 95% rh
Storage ..... 5 to 95%

Notes:
S_{NA} = Nominal apparent power for selecting the transformer
P_{med} = Typical power consumption
I_F = Required slow fuse
L = Max. cable length; with 4-wire connections, the max. permissible length of the separate 14 AWG (1.5 mm²) copper positioning signal wire is 656 ft (200 m)
1) All information at 24 Vac
2) With 10 AWG (4 mm²) electrical wiring reduce wiring cross-section for connection inside valve to 12 AWG (2.5 mm²).

Wiring

Part No.	Connection Type	(VA)	(W)	(A)	Wire Gauge (AWG) 14 Max. Cable Length ft (m)	12 Max. Cable Length ft (m)	10 Max. Cable Length ft (m)
MVL661…-…	4 wire (preferred)	22	12	1.6 to 4A	213 (65)	361 (110)	525 (160)
	3 wire	22	12	1.6 to 4A	65 (20)	115 (35)	164 (50)

Sizing

Part No.	Valve Size (in.)	Cv	Cv Reduced[1]	Δpmax psi	Q_0 E (kW)	Q_0 H (kW)	Q_0 D (kW)
MVL661.15-0.4	1/2	0.46	—	363	47	9.2	1.7
		—	0.29		29	5.7	1.0
MVL661.15-1.0	1/2	1.2	—	363	117	23	4.2
		—	0.73		74	14	2.6
MVL661.20-2.5	3/4	2.9	—	363	293	57	10
		—	1.8		187	37	6.6
MVL661.25-6.3	1	7.3	—	363	737	144	26
		—	4.6	—	468	92	17
MVL661.32-12	1-1/4	13.9	—	29	*	*	50
		—	9.2	—	*	*	33

Table Notes:

[1]63% of Cv (k_{vs}), see Cv (k_{vs}) *DIP switch setting*.

* MVL661.32-12.0 is only approved for suction throttle applications

Cv Nominal flow rate, in gpm, of refrigerant through the fully open valve (H100) at a differential pressure of 1 psi.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

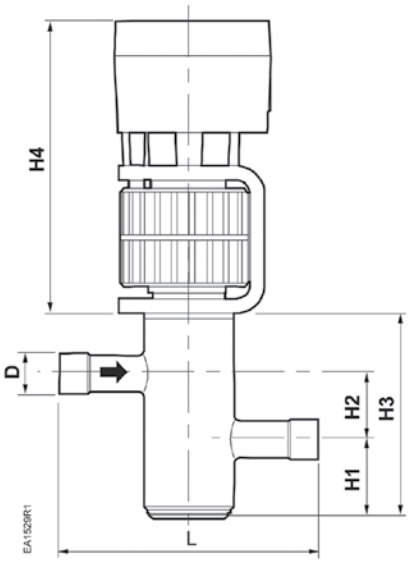
Q_0 E Refrigeration capacity in expansion applications

Q_0 H Refrigeration capacity in hot-gas bypass applications

Q_0 D Refrigeration capacity in suction throttle applications and Δp = 7.25 psi (0.5 bar)

Q_0 With R407C at t_0 = 32°F (0°C), t_c = 4°F (40°C).

Dimensions and Weights



Dimensions shown in inches (mm).

Line Size (in.)	D	L	H1	H2	H3	H4	Depth	Weight lb (kg)
1/2	5/8	5.51 (140)	1.73 (44)	1.42 (36)	4.45 (113)	6.30 (160)	4.05 (103)	9.7 (4.4)
3/4	7/8	5.90 (150)	1.61 (41)	1.61 (41)	4.69 (119)	6.30 (160)	4.05 (103)	9.9 (4.5)
1	1-1/8	6.30 (160)	1.57 (40)	1.85 (47)	4.96 (126)	6.30 (160)	4.05 (103)	10.1 (4.6)
1-1/2	1-3/8	7.5 (190)	1.69 (43)	2.13 (54)	5.59 (142)	6.30 (160)	4.05 (103)	13.4 (6.1)

Table Notes:

D Pipe connections (inch), internal dimension

Modulating Refrigerant Valves for Ammonia and Safety Refrigerants with Magnetic Actuators

NEW!

MVS661..N Series Refrigerant Valve.

Description

The MVS661…N refrigerant valve can be driven by Siemens or third-party controllers that deliver a 0/2...10 Vdc or 0/4…20 mA output signal. The valve stroke is proportional to the control signal. Can be used with ammonia, CO_2 and commonly used safety refrigerants.

Features

- One valve type for expansion, hot-gas and suction throttle applications
- Hermetically sealed
- Selectable standard control signals 0/2 to 10 Vdc or 4 to 20 mA
- High resolution and control accuracy
- Precise positioning control and position feedback signal
- Short positioning time (<1 second)
- Closed when de-energized
- Robust and maintenance-free
- 1-in. (DN 25) with Cv (kvs) values from 0.12 to 7.28 (0.10 to 6.3 m³/h)
- 4 selectable standard signals for setpoint and measured value
- DIP switch to reduce the Cv (kvs) value to 63% of the nominal value
- Potentiometer for adjustment of minimum stroke for suction throttle applications
- Automatic stroke calibration
- Forced control input for "Valve closed" or "Valve fully open"
- LED for indicating the operating state

Applications

The MVS661…N refrigerant valve is designed for modulating control of refrigerant circuits including chillers and heat pumps. It is suitable for use in expansion, hot-gas and suction throttle applications. In addition to ammonia (R717), the valve can handle all standard safety refrigerants, noncorrosive gases / liquids and CO_2 (R744). It is not suited for use with inflammable refrigerants.

Specifications

Operating Voltage
- 24 Vac ..... 24 V ± 20%
  - Frequency ..... 45 to 65 Hz
  - Typical Power Consumption
    - P_{med} 12W
    - Standby ..... <1 W (valve fully closed)
  - Apparent Power, S_{NA} ..... 22 VA (for selecting the transformer)
  - Required Fuse ..... Slow, 1.6 to 4A
- 24 Vdc ..... 20 to 30 Vdc
  - Current draw ..... 0.5A/2A (maximum)

Signal Inputs
- Positioning Signal Y ..... 0/2 to 10 Vdc, 4 to 20 mA
- Impedance
  - 0/2 to 10 Vdc 100K ohm/5nF
  - 0/4 to 20 mA 240 ohm/5nF
- Forced control ZC
  - Input impedance ..... 22K ohm
  - Closing the valve (ZC connected to G0) ..... <1 Vac; <0.8 Vdc
  - Opening the valve (ZC connected to G) ..... >6 Vac; >5 Vdc
  - No function (ZC not wired) ..... Positioning signal Y active

Signal Outputs
- Position Feedback U
  - Voltage ..... 0/2 to 10 Vdc; load resistance > 500 Ω
  - Current ..... 0/4 to 20 mA; load resistance < 500 Ω
- Stroke Detection ..... Inductive
- Nonlinearity ..... Accuracy +3% of end value

Positioning Time ..... <1 second

Electrical Connections
- Connection Terminals ..... Screw terminals for 12 AWG wire

Functional Valve Data
- Permissible Operating Pressure 1) ..... max. 914 psi (63 bar)
- Max. Differential Pressure Δpmax ..... 363 psi (25 bar)
- Valve Characteristic ..... Linear
- Leakage Rate (Internally Across Seat) ..... Max. 0.002% CV (KV) or Max. 1 Nl/h gas at Δp = 58 psi (4 bar) Shut/off function, like solenoid normally closed (NC) function
- External Seal ..... Hermetically sealed
- Permissible Media ..... Ammonia (R717), CO_2 (R744) and all safety refrigerants (R22, R134a, R404A, R407C, R507, etc); Not suited for use with inflammable refrigerants
- Media Temperature ..... -40° to 248°F (-40° to 120°C), Max. 284°F (140°C) for 10 min.
- Stroke Resolution ΔH/H100 ..... 1:1000 (H = Stroke)
- Hysteresis ..... Typically 3%
- Mode of Operation ..... Modulating
- Position when De-energized ..... Closed
- Mounting Position ..... Upright to horizontal

Materials
- Valve Body and Parts ..... Steel/CrNi Steel
- Seat/Piston ..... CrNi Steel

Sealing Disk/O-Rings ..... PTFE/ CR (chloroprene)

Environmental Compatibility
- Environment ..... ISO 14001
- Quality ..... ISO 9001
- Environmentally Compatible Products ..... SN 36350
- RoHS ..... RL 2002/95/EG

Notes:

S_{NA} = Nominal apparent power for selecting the transformer
P_{med} = Typical power consumption
I_F = Required slow fuse
L = Max. cable length; with 4-wire connections, the max. permissible length of the separate 14 AWG (1.5 mm²) copper positioning signal wire is 656 ft (200 m)

1) All information at 24 Vac
2) With 10 AWG (4 mm²) electrical wiring reduce wiring cross-section for connection inside valve to 12 AWG (2.5 mm²).

Wiring

Part No.	Connection Type	(VA)	(W)	(A)	Wire Gauge (AWG) 14 Max. Cable Length ft (m)	12 Max. Cable Length ft (m)	10 Max. Cable Length ft (m)
MVS661…N	4-wire (preferred)	22	12	1.6 to 4A	213 (65)	361 (110)	525 (160)
	3-wire	22	12	1.6 to 4A	65 (20)	115 (35)	164 (50)

Sizing

Part No.	Valve Size (in.)	Cv	Cv Reduced[1]	Δpmax psi	Q_0 E (kW)	Q_0 H (kW)	Q_0 D (kW)	S_{NA} (VA)	P_{med} (W)
MVS661.25-016N	1	0.18	0.12	363	95	10	2	22	12
MVS661.25-0.4N	1	0.46	0.29	363	245	26	5	22	12
MVS661.25-1.0N	1	1.16	0.73	363	610	64	12	22	12
MVS661.25-2.5N	1	2.89	1.85	363	1530	159	29	22	12
MVS661.25-6.3N	1	7.28	4.62	363	3850	402	74	22	12

Table Notes:

[1]63% of Cv (k_{vs}), see Cv (k_{vs}) *DIP switch setting*.

Cv Nominal flow rate, in gpm, of refrigerant through the fully open valve (H100) at a differential pressure of 1 psi.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

Q_0 E Refrigeration capacity in expansion applications.

Q_0 H Refrigeration capacity in hot-gas bypass applications.

Q_0 D Refrigeration capacity in suction throttle applications and Δp = 7.25 psi (0.5 bar).

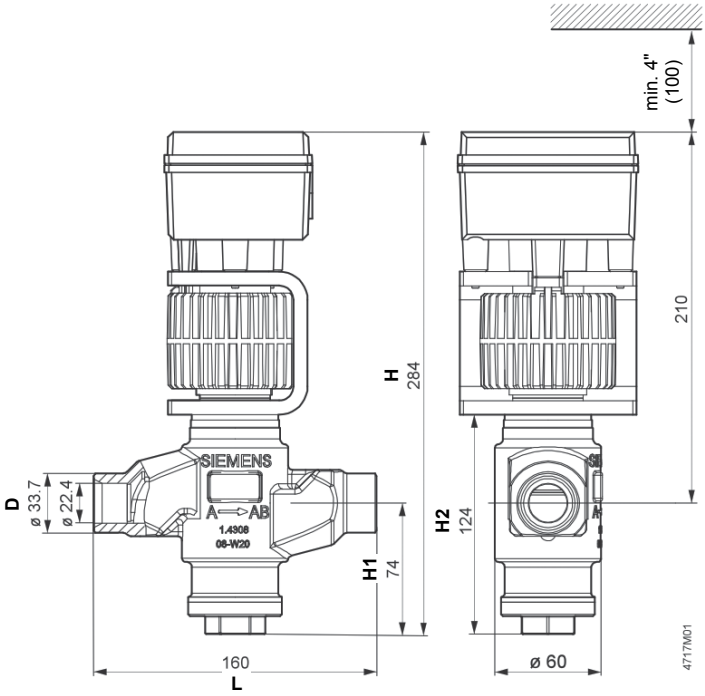
Q_0 With R407C at t0 = 32°F (0°C), tc = 4°F (40°C).

Q_0 With R407C at t0 = 32°F (0°C), tc = 4°F (40°C).

S_{NA} Nominal apparent power for selecting the transformer.

P_{med} Typical power consumption.

Dimensions and Weights



Dimensions shown in inches (mm).

Line Size (in.)	D	L	H1	H2	H	Depth	Weight lb (kg)
1	7/8	6.30 (160)	2.91 (74)	4.88 (124)	6.30 (160)	4.05 (103)	10.1 (4.6)

Table Notes:

D Pipe connections (inch), internal dimension

Modulating Control Valve for Hot Gas Control with Magnetic Actuators

NEW!

M3FB… LX Series 3-Port Valve with Magnetic Actuator.

Description

The M3FB… LX control valve with magnetic actuator is used for modulating capacity control of refrigeration units and heat recovery systems in hot gas applications. For commonly used safety refrigerants.

Features

- For organic safety refrigerants
- 24 Vac operating voltage or power signal; 0 to 20 Vdc Phs (phase cut)
- Selectable electrical interface ZM.. with 0 to 10 Vdc, 4 to 20 mA or 0 to 20 Vdc phase-cut positioning signal
- High stroke resolution (>1:2000) and control accuracy
- Short positioning time (< 1 s)
- Port AB → A closed when de-energized
- Heavy-duty and maintenance-free
- 1/2 to 1-1/4 in. line size (15 to 32 DN) with Cv (kvs) values from 0.7 to 14.0 (0.6 to 12.0 m³/h)

Applications

The M3FB... LX 3-port and 2-port valves with magnetic actuators may be used as hot gas diverting or 2-port valves. Suitable for organic safety refrigerants such as R22, R134a, R404A, R407C, R507, etc. Not suitable for flammable refrigerants or ammonia (R717).

Specifications

Operating Voltage
- 24 Vac ..... 24 V +15%/-10%
- Frequency ..... 50 to 60 Hz
- Required Fuse ..... Slow, 1.6 to 2.5A

Signal Inputs
- Positioning Signal
  - ZM101/A ..... 0 to 10 Vdc or 0 to 20 V phase cut
  - ZM121/A ..... 4 to 20 mA or 0 to 20 V phase cut
  - ZM111 ..... 0 to 20 Vdc phase cut
  - Input Resistance ..... 0 to 10 Vdc >100K Ω; 4 to 20 mA ,150K Ω

Positioning Time ..... < 1 second

Electrical Connections
- Connection Terminals ..... Screw terminals for 12 AWG wire

Functional Valve Data
- Permissible Operating Pressure ..... Max. 623 psi (63 bar)*
- Max. Differential Pressure Δpmax
  - AB→ B ..... 116 psi (8 bar)
- Leakage Rate Δp = 0.1 MPa (1 bar)
  - AB → A ..... Max. 0.05 % of k_{vs}-value
  - AB → B ..... Max. 0.5 % k_{vs}
- Valve Characteristic ..... Linear (to VDI / VDE 2173), optimized in low opening range
- Permissible Media ..... For organic safety refrigerants (R22, R134a, R404A, R407C, R410A, R507 etc.). Not suitable for ammonia (R717) or flammable refrigerants
- Media Temperature ..... -40° to 248°F (-40° to 120°C), Max. 284°F (140°C) for 10 min.
- Stroke Resolution ΔH/H100 ..... >1:200 (H = Stroke)
- Mode of Operation ..... Modulating
- Position when De-energized ..... AB → A Closed

Materials
- Housing Components ..... Steel/CrNi Steel
- Seat/Inner Valve ..... Brass/CrNi Steel
- Pipe Connections ..... PTFE/ CR (chloroprene)

Environmental Compatibility
- Environment ..... ISO 14001
- Quality ..... ISO 9001
- Environmentally Compatible Products ..... SN 36350
- RoHS ..... RL 2002/95/EC

* To EN 12284, checked with 1.43 x operating pressure at 62 bar

Sizing

Part No.	Line Size (in.)	Cv AB → A gpm	ΔPmax AB → A psi	S_{NA} (VA)	Pmed (W)
M3FB15LX06/A	1/2	0.7	319	26	6
M3FB15LX15/A	1/2	1.8	319	26	6
M3FB15LX/A	1/2	3.5	319	26	6
M3FB20LX/A	3/4	5.9	261	26	6
M3FB25LX/A	1	9.4	174	40	10
M3FB32LX	1-1/4	14.0	116	40	10

Table Notes:

Cv Flow rate tolerance ±10%.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

S_{NA} Nominal apparent power for selecting the transformer.

P_{med} Typical power consumption.

ZM… Terminal Housing

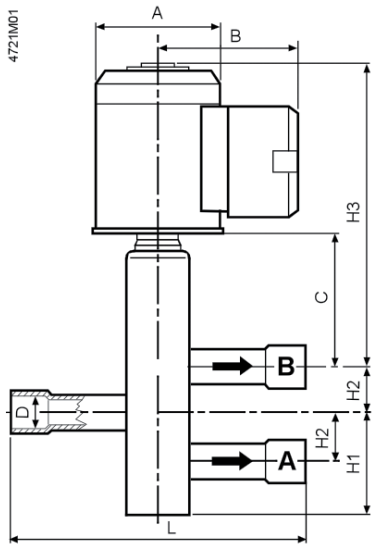
Part No.	Operating Voltage	Positioning Signal	Working Range
ZM101/A	24 Vac	0 to 10 Vdc	4 to 8 Vdc
ZM121/A	24 Vac	4 to 20 mA	8 to 16 mA
ZM111	—	0 to 20 V Phase Cut	0 to 15 V Phase Cut

Product Ordering Example

Part No.	Description
M3FB…	Modulating Refrigerant Valve with Magnetic Actuator
ZM121/A	24 Vac

Table Notes:
Valve body and magnetic actuator form one integrated unit and cannot be separated.

Dimensions and Weights



Dimensions shown in inches (mm).

Product Ordering

Line Size (in.)	ø D (in.)	L	H1	H2	H3	A	B	C	Weight lb. (kg)
1/2	5/8	5.9 (150)	2.6 (65)	1 (25)	7.2 (184)	3.1 (80)	3.3 (84)	2.6 (67)	9.5 (4.3)
3/4	7/8	6.7 (170)	2.7 (69)	1.2 (30)	9.4 (238)	4 (100)	3.7 (94)	3.3 (84)	19.6 (8.9)
1	1-1/8	7.9 (200)	2.8 (72)	1.4 (36)	9.8 (248)	4 (100)	3.7 (94)	3.7 (94)	20.9 (9.5)
1-1/4	1-3/8	9.8 (250)	3.6 (91)	1.7 (43)	9.6 (245)	4 (100)	3.7 (94)	3.9 (98)	25.1 (11.4)

Modulating Pilot Valve with Magnetic Actuator

NEW!

M2FP03GX Pilot Valve with Magnetic Actuator.

Description

The M2FP03GX pilot valve with magnetic actuator is used as the controlling element for 2 to 5 in. main valves for modulating control of chillers, or for direct control of low Cv (kvs) values.

Features

- Short positioning time (approx 1 second)
- High resolution
- Hermetically sealed
- Versatile electrical interface with terminal housing ZM..
- Friction free
- Robust and maintenance-free
- Values from 0.7 to 14.0 (0.6 to 12.0 m³/h)

Applications

Suitable for use with safety refrigerants such as R22, R134a, R404A, R407C, R507 and for ammonia R717. Not suitable for applications with gas/liquid mixtures.

Specifications

Operating Voltage
- 24 Vac ..... 24 V +15%/-10%
- Frequency ..... 50 to 60 Hz
- Typical power consumption Pmed ..... 5 W
- Rated apparent power SNA ..... 13 VA
- Required Fuse ..... Slow, 1A

Signal Inputs
- Positioning Signal
  - ZM101/A ..... 0 to 10 Vdc or 0 to 20 V phase cut
  - ZM121/A ..... 4 to 20 mA or 0 to 20 V phase cut
  - ZM111 ..... 0 to 20 Vdc phase cut
  - Input Resistance ..... 0 to 10 Vdc >100K Ω; 4 to 20 mA, <150 Ω

Positioning Time ..... < 1 second

Electrical Connections
- Connection Terminals ..... Screw terminals for 12 AWG wire

Functional Valve Data
- Permissible Operating Pressure ..... 464 psi (32 bar)
- Max. Differential Pressure Δpmax
  - 1→ 3 ..... 261 psi (18 bar)
- Leakage Rate Δp = 15 psi (1 bar)
  - 1 → 3 ..... Approx. 0.25% Cv
- Valve Characteristic ..... Linear
- Permissible Media ..... For organic safety refrigerants (R22, R134a, R404A, R407C, R410A, R507 etc.) or ammonia (R717)
- Media Temperature ..... -40° to 212°F (-40° to 100°C)
- Mode of Operation ..... Modulating
- Position when De-energized ..... Valve stem retracted (valve control path closed)

Materials
- Body ..... Steel
- Seat/Inner Valve ..... CrNi Steel

Environmental Compatibility
- Environment ..... ISO 14001
- Quality ..... ISO 9001
- Environmentally Compatible Products ..... SN 36350
- RoHS ..... RL 2002/95/EC

Weight ..... 3.6 lb. (1.64 kg)

Sizing

Part No.	Main Valve Line Size (in.)	Cv	Δpmax psi
M2FP03GX	2 - 5	0.35	261

Table Notes:

Cv Nominal flow rate, in gpm, of cold water through the fully open valve (H100) at a differential pressure of 1 psi.

Δpmax Maximum permissible differential pressure across the control path of the valve, valid for the entire actuating range of the motorized valve.

ZM… Terminal Housing

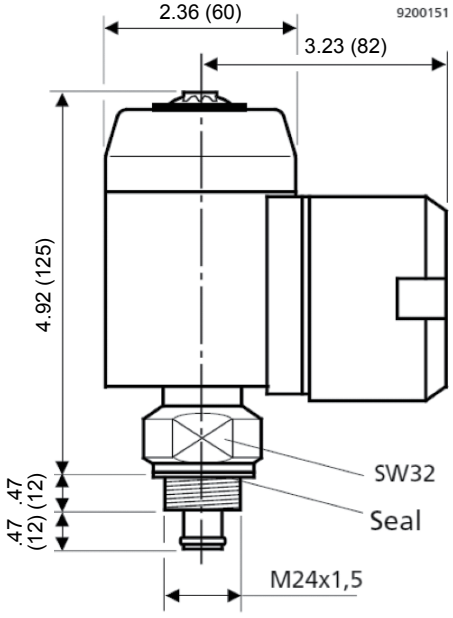
Part No.	Operating Voltage	Positioning Signal	Working Range
ZM101/A	24 Vac	0 to 10 Vdc	4 to 8 Vdc
ZM121/A	24 Vac	4 to 20 mA	8 to 16 mA
ZM111	—	0 to 20 V Phase Cut	0 to 15 V Phase Cut

Product Ordering Example

Part No.	Description
M2FP03GX	Pilot Valve
ZM121/A	Terminal Housing 24 Vac

Table Notes:
Valve body and magnetic actuator form one integrated unit and cannot be separated.

Dimensions and Weights



Dimensions shown in inches (mm).

Angle/Flared/Sequence/Changeover Service Valves

In this section, you will find flared, angled, sequence and changeover valves with pneumatic actuators for use in service applications.

Two-Way Valves

1/2" Flared Type
Normally Open or Normally Closed

656 Powermite
Two-Way Normally Open Valve.

656 Powermite
Two-Way Normally Closed Valve.

Description

Designed to control the flow of both water and steam, the Powermite 656 Series Powermite Two-way Valves are available with normally open or normally closed action.

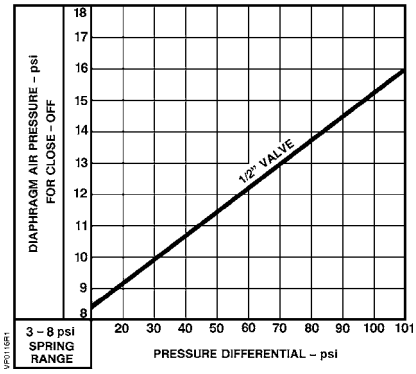
Features

- Modified equal percentage throttling characteristics
- Replaceable disc for tight shutoff
- Dual sealing feature for the valve stem
- Disassembly of the valve top, inspection, and upper packing replacement without system shutdown or valve body removal
- Actuator can be rotated to facilitate piping control air from different directions

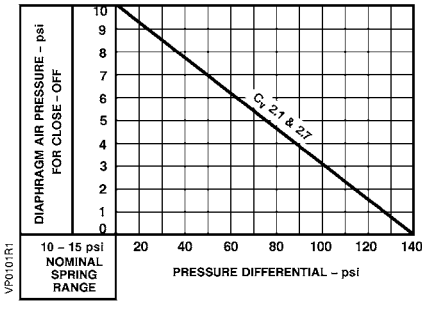
Applications

The Powermite 656 Series Valves are recommended for use with hot or chilled water and steam for control of convectors, fan coil units, radiation, reheat coils, and similar terminal unit applications. The dual sealing packed design is excellent for applications for higher-pressure systems encountered in high rise buildings. The compact size is excellent for use when space is limited.

Nominal Close-off Ratings



Normally Open.



Normally Closed.

Siemens
Product Guard
PLUS 3 Warranty

Specifications

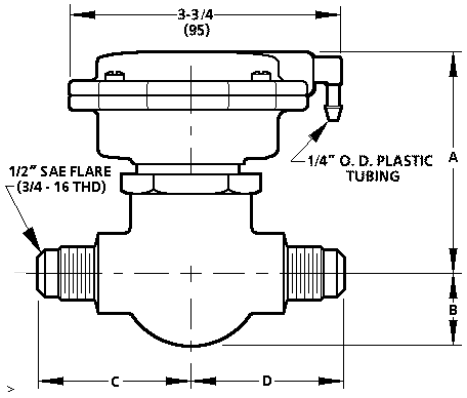
Valve Size ..... 1/2" (15 mm)
Valve Body Style ..... Flared End
Valve Action ..... NO (Direct Action)/NC(Direct Action)
Stem Travel ..... 1/4" (6 mm)
Valve Body Rating ..... ANSI Class 250
Actuator Standard Spring Ranges with 10 psi (69 kPa) △P
Differential Pressure ..... 10 to 15 psi (69 to 103 kPa) NC
3 to 8 psi (21 to 55 kPa) NO
Nominal Spring Span ..... 5 psi (35 kPa)
Effective Diaphragm Area ..... 3.4 in.² (22 cm²)

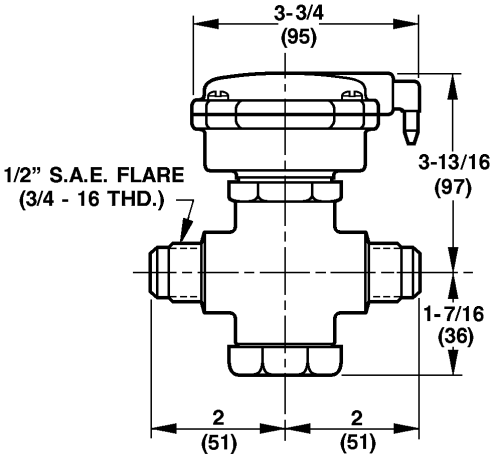
Max. Diaphragm Pressure ..... 30 psi (207 kPa)
Air Connection ..... 1/8" NPT
Controlled Medium ..... Water, Steam, Glycol Solution
Maximum Medium Temperature ..... 250° F (121° C)
Maximum Inlet Pressures
Water ..... Refer to Reference Section
Steam ..... 15 psi (103 kPa)
Maximum Differential Pressure for Modulating Service
Water ..... 20 psi (138 kPa)
Steam ..... 15 psi (103 kPa)

Product Ordering

Valve Size	Cv	Close-offs	Spring Range	Part No.
Normally Open				
1/2" (15 mm)	0.9	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0004**
1/2" (15 mm)	2.1	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0002**
Normally Closed				
1/2" (15 mm)	2.1	140 psi (965 kPa)	10 to 15 psi (69 to 103 kPa)	**656-0012**

Dimensions and Weights





Dimensions shown in inches (mm).

Valve Size	Valve Action	Dimensions				Weight
		A	B	C	D	
1/2"	Normally Open	3-3/16" (81 mm)	1" (25 mm)	2" (51 mm)	2" (51 mm)	2.2 lb.(1.0 kg)
1/2"	Normally Closed	3-13/16" (97 mm)	1-7/16" (36 mm)	2" (51 mm)	2" (51 mm)	2.2 lb.(1.0 kg)

Three-Way Water Mixing Valves

1/2" Flared Type
Mixing

656 Powermite
Three-Way Water Mixing Valve.

Description

Designed for water mixing applications, the 656 Powermite Three-way Mixing Valve is a high-grade bronze body forged with connections for 1/2-inch OD SAE flare fittings.

Features

- Enclosed actuator protects spring, diaphragm
- Compact size
- Actuator can be rotated to facilitate air connection
- Modified equal percentage NO port characteristic
- Dual valve stem packing allows upper packing ring replacement without system shutdown

Applications

The 656 Powermite Three-way Water Mix Valve are recommended for mixing of hot or chilled water for convectors, fan coil units, radiation, reheat coils and similar terminal units which require water mixing. The dual sealing packed design is excellent for applications for higher-pressure systems encountered in high rise buildings. The compact size is excellent for use when space is limited.

Specifications

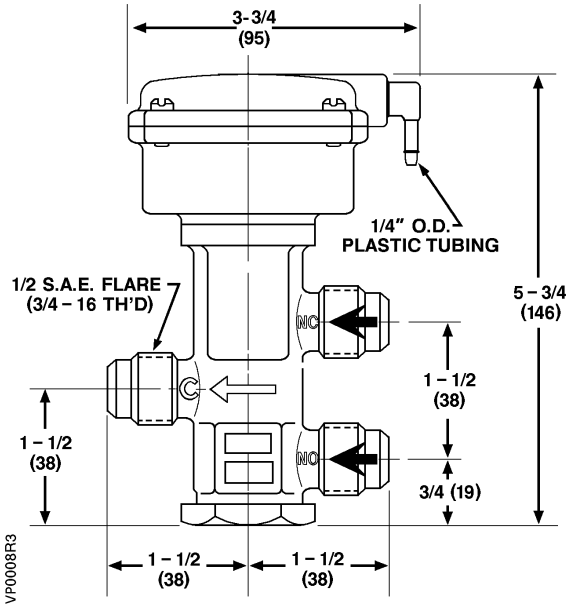
Valve Size ..... 1/2" (15 mm)
Valve Body Style ..... Flared End
Valve Action ..... Upper Seat NC/Lower Seat NO
Stem Travel ..... 3/8" (10 mm)
Valve Body Material ..... Bronze
Valve Body Rating ..... ANSI Class 250
Standard Spring Ranges with 10 psi (69 kPa)
Differential Pressure ..... 3 to 8 psi (21 to 55 kPa)
10 to 15 psi (69 to 103 kPa)
Nominal Spring Span ..... 5 psi (35 kPa)

Effective Diaphragm Area ..... 3.4 in.² (22 cm²)
Max. Diaphragm Pressure ..... 30 psi (207 kPa)
Air Connection ..... 1/8" NPT
Controlled Medium ..... Water, Glycol Solution
Max. Medium Temperature ..... 250°F (121°C)
Max. Differential Pressure for Modulating Service
Between Inlets ..... 25 psi (172 kPa)
Between Inlet & Outlet ..... 25 psi (172 kPa)
Shipping Weight ..... 2.0 lb. (0.9 kg)

Product Ordering

Valve Size	Cv	Spring Range	Part No.
1/2" (15 mm)	2.5	10 to 15 lb. (69 to 103 kPa)	**656-0009**
1/2" (15 mm)	2.5	3 to 8 lb. (21 to 55 kPa)	**656-0010**
1/2" (15 mm)	1.5	3 to 8 lb. (21 to 55 kPa)	**656-0011**

Dimensions and Weights



Dimensions shown in inches (mm).

Two-Way Angle Union Valves

1/2 to 3/4" Angle Female x Union Male
Normally Open

656 Powermite Two-Way Normally Open Valve with Angle Union Outlet.

Description

Designed to control the flow of both water and steam, the Powermite 656 Series Two-way Angle Union Valves are available with normally open action.

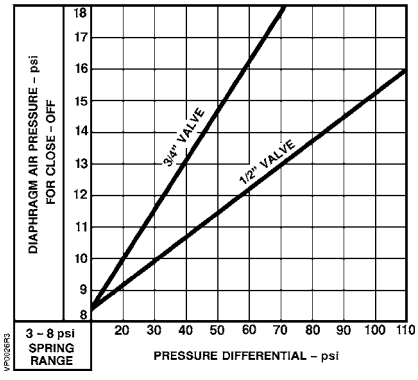
Features

- Enclosed actuator housing to protect components
- Small size allows easier installation in tight spaces
- Replaceable soft disc provides tight shut-off
- Dual sealing feature for the valve stem
- Actuator can be rotated to facilitate piping control from different directions
- Stainless steel valve stem to reduce friction and corrosion

Applications

The Powermite 656 Series Angle Union Valves are recommended for control of hot or chilled water or steam for controlling convectors, fan coil units, radiation, reheat coils, and similar terminal unit applications. Designed with dual sealing packed construction, this valve can be used in systems having relatively high pressures. Typical uses are sites where efficient economical control is desired. The compact size is excellent where space is limited.

Nominal Close-off Ratings



Siemens
Product Guard
PLUS 3 Warranty

Specifications

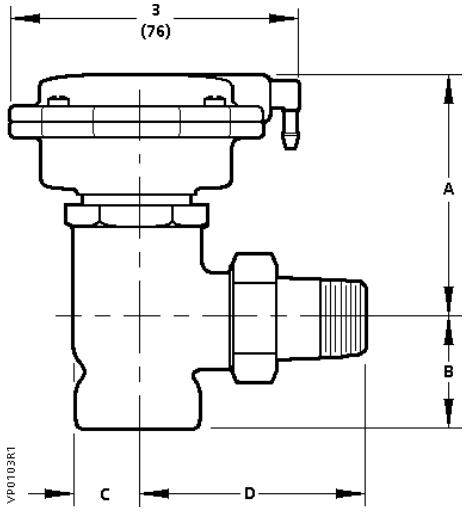
Valve Size ..... 1/2" (15 mm), 3/4" (20 mm)
Valve Body Style ..... Angle Union
Valve Action ..... Normally Open (NO)
Valve Stroke ..... 1/4" (6 mm)
Valve Body Rating ..... ANSI Class 125
Diaphragm
Effective Area ..... 3.4 in.^{2} (22 cm^2)
Material ..... Silicone Rubber
Ambient Temperature Range ..... 30° to 160°F (-1° to 71°C)
Maximum Air Pressure ..... 30 psi (207 kPa)

Maximum Medium Temperature ..... 250°F (121°C)
Controlled Medium ..... Steam, Water, Ethylene Glycol Solution
Maximum Medium Inlet Pressure
Water ..... Refer to Valve Body Rating Table in Reference Section.
Saturated Steam ..... 15 psi (103 kPa)
Maximum Recommended Differential Pressure for Modulating Service
Water ..... 20 psi (138 kPa)
Seam ..... 15 psi (102 kPa)

Product Ordering

Valve Size	Cv	Close-offs	Spring Range	Part No.
1/2" (15 mm)	2.1	95 psi (655 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0017**
1/2" (15 mm)	2.1	60 psi (414 kPa)	5 to 10 psi (34 to 69 kPa)	**656-0019**
3/4" (20 mm)	4.6	50 psi (345 kPa)	3 to 8 psi (21 to 55 kPa)	**656-0018**
3/4" (20 mm)	4.6	35 psi (241 kPa)	5 to 10 psi (34 to 69 kPa)	**656-0021**

Dimensions and Weights



Dimensions shown in inches (mm).

Valve Size	Dimensions				Weight
	A	B	C	D	
1/2" (15 mm)	2-15/16" (75 mm)	1-1/4" (32 mm)	13/16" (21 mm)	2-5/8" (67 mm)	2.2 lb. (1.0 kg)
3/4" (20 mm)	3-1/16" (78 mm)	1-5/16" (33 mm)	1-1/8" (29 mm)	2-7/8" (73 mm)	2.7 lb. (1.2 kg)

Two-Way Angle Union Valves

1 to 1-1/4" Angle Female x Union Male
Normally Open

658 Powertop Two-Way
Normally Open Valve with Angle Union Outlet.

Description

Designed to control the flow of steam, water, and ethylene glycol solutions, the Powertop 658 Series Two-way Angle Union Valves are available with normally open action.

Features

- Replaceable soft disc provides tight shut-off
- Actuator can be rotated to facilitate piping control from different directions
- Stainless steel valve stem to reduce friction and corrosion
- Large diaphragm area for control accuracy and tight close-off
- Equal percentage plugs and long stroke for controllability
- Removable actuator for ease of servicing

Applications

The Powertop 658 Series Angle Union valves are recommended for control of steam, water and ethylene glycol solutions for controlling unit ventilators, reheat coils, fan coil units, induction units, and duct coils.

Specifications

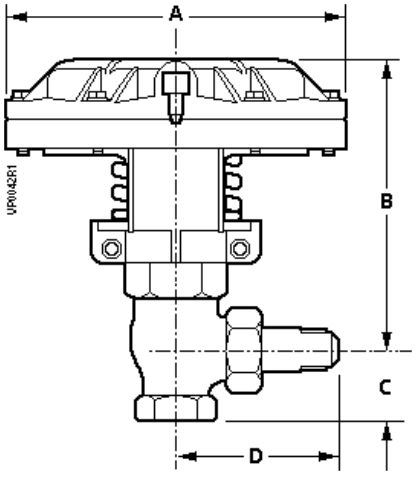
Valve Size ..... 1" (25 mm), 1 1/4" (32 mm)
Valve Body Style ..... Angle Union
Valve Action ..... Normally Open (NO)
Valve Stroke ..... 1/2" (15 mm)
Valve Body Rating ..... ANSI Class 125
Diaphragm
Effective Area ..... 11.2 in.^{2} (71 cm^2)
Material..... EP Rubber
Ambient Temperature Range ..... 35° to 140°F (2° to 60°C)
Maximum Air Pressure ..... 30 psi (207 kPa)

Controlled Medium ..... Steam, Water, Ethylene Glycol Solution
Flow Characterization ..... Equal Percentage
Maximum Medium Temperature ..... 250°F (121°C)
Maximum Medium Inlet Pressure
Water ..... Refer to Valve Body Rating Table in Reference Section.
Saturated Steam ..... 15 psi (103 kPa)
Maximum Recommended Differential Pressure for Modulating Service
Water ..... 25 psi (170 kPa)
Steam ..... 15 psi (103 kPa)

Product Ordering

Valve Size	Cv	Close-offs	Spring Range	Part No.
Normally Open				
1" (25 mm)	10	100 psi (689 kPa)	2 to 6 psi (14 to 41 kPa)	**658-0012**
1-1/4" (32 mm)	16	58 psi (400 kPa)	2 to 6 psi (14 to 41 kPa)	**658-0014**

Dimensions and Weights



Dimensions shown in inches (mm).

Valve Size	Dimensions				Weight
	A	B	C	D	
1" (25 mm)	5-1/2" (140 mm)	4-15/16" (125 mm)	1-3/4" (44 mm)	3-1/8" (79 mm)	5.0 lb. (2.3 kg)
1-1/4" (32 mm)	5-1/2" (140 mm)	5-1/2" (140 mm)	2" (51 mm)	4-3/8" (111 mm)	6.0 lb. (2.7 kg)

Sequence and Changeover Valves

1/2" Flared Type

658 Powertop Sequence Valve.

Description

Designed to select and modulate the flow of either hot or chilled water, without mixing, for radiant panel and similar applications, the 658 Powertop Sequence and Changeover Valves are designed with 2 inlets and one outlet for the sequence valve and with one inlet and 2 outlets in the changeover valve.

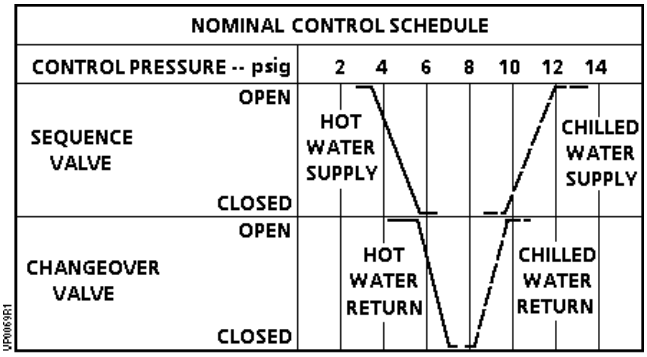
Features

- Stainless steel stem for smooth operation and rugged durability
- Large diaphragm area for control accuracy and tight close-off
- Removable actuator for ease of servicing
- Replaceable disc assemblies
- Matched sequencing of control and changeover

Applications

The 658 Powertop Sequence and Changeover Valves are used for the selection and modulating of hot or chilled water through radiant panels connected to separate hot water and chilled water (4-pipe) systems.

Control Schedule



Siemens Product Guard **PLUS 3** Warranty

Specifications

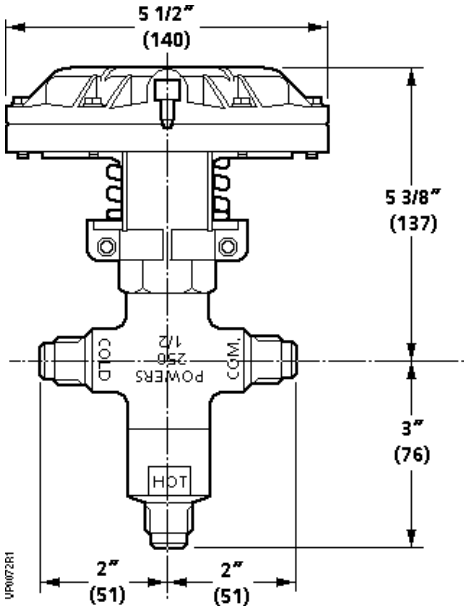
Valve Size ..... 1/2" (15 mm)
Valve Body Style ..... Flared End
Flow Characteristics
Sequence ..... Equal Percentage
Changeover ..... Quick-opening
Valve Type
Sequence ..... 2 Inlets/1 Outlet
Changeover ..... 1 Inlet/2 Outlets
Valve Action ..... NO/Hot to Common
NC/Cold to Common
Stem Travel ..... 13/32" (10 mm)
Valve Body Rating ..... ANSI Class 250

Materials
Valve Body ..... Bronze
Disc ..... Buna-N
Stem ..... Stainless Steel
Packing ..... EP Rubber
Diaphragm Area ..... 11 in.^{2} (71 cm^2)
Max. Diaphragm Pressure ..... 30 psi (207 kPa)
Controlled Medium ..... Water, Glycol Solution
Max. Medium Temperature ..... 250°F (121°C)
Maximum Inlet Pressure ..... Refer to Reference Section
Max. Differential Pressure Between Hot and Cold Ports
Sequence ..... 50 psi (350 kPa)
Changeover ..... 10 psi (69 kPa)
Max. Differential Pressure for Modulating Service
Sequence Valve ..... 25 psi (170 kPa)
Ambient Operating Temperature ..... 35° to 140°F (2° to 60°C)

Product Ordering

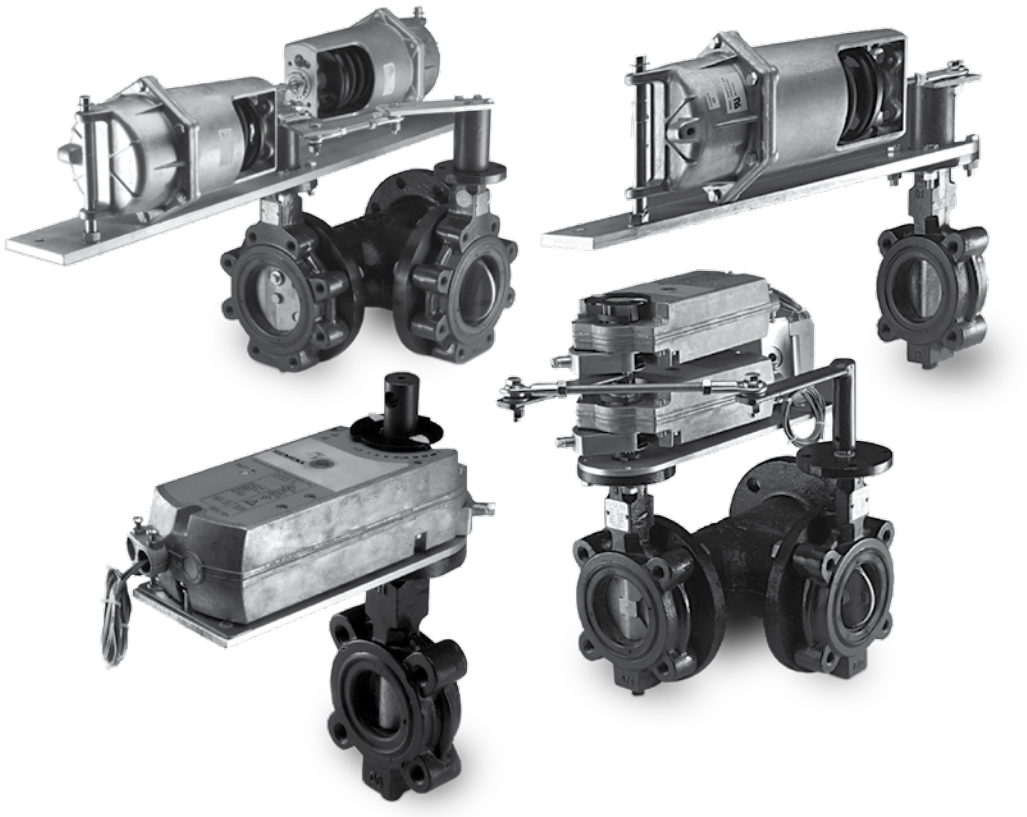
Valve Size	Valve Type	Cv	Close-offs	Part No.
1/2" (15 mm)	Sequence	1.5	50 psi (344 kPa)	**658-0050**
1/2" (15 mm)	Sequence	2.5	50 psi (344 kPa)	**658-0051**
1/2" (15 mm)	Changeover	2.5	10 psi (68 kPa)	**658-0052**

Dimensions and Weights



Dimensions shown in inches (mm).

Resilient Seat Butterfly Valves



Resilient Seat Butterfly Valves are now available in sizes up to 20-inches. Excellent for isolation applications, two-way and three-way Butterfly Valves provide 2-position (On/Off), floating and modulating control. Three-way Butterfly Valves are available in a variety of configurations.

This catalog contains information on sizes 2 through 12-inches. For larger sizes, please contact Customer Care.

Valve Size	2-Way	3-Way	Pneumatic	Spring Return Electronic	Non-spring Return Electronic	In Catalog
2 to 12"	•	•	•	2 to 4"	2 to 12"	•
14 to 20"	•	•	•	•	•	Contact Customer Care.

For sizing information on Butterfly Valves, refer to page G-16 in the Engineering Section.

Two- and Three-Way Resilient Seat Valve Assemblies

Two-Way Butterfly Valve with pneumatic actuator.

Three-Way Butterfly Valve with pneumatic actuators tandem mounted.

Two-Way Butterfly Valve with electronic actuator.

Three-Way Butterfly Valve with electronic actuators tandem mounted.

Description

Available in two-way and three-way arrangements for two-position (On/Off), floating and modulating control, Resilient Seat Butterfly Valve Assemblies provide bubble-tight shutoff for the assemblies' full-rated pressure.

Features

- Molded-in resilient seat provides bubble-tight shutoff up to 150 psi
- Operating temperature up to 250°F (120°C)
- Lugged body is drilled and tapped for isolation and removal of downstream piping at full-rated pressure
- Round, polished disc and hub edge provides 360 degree concentric seating, minimum flow restriction, lower torques and longer seat life
- Upper and lower inboard bronze bearings ensure longer service life with low operating torques
- Thru-stem design provides high strength and positive disc control with standardized end connection for operator interchangeability
- Extended neck allows adequate clearance for flanges and insulation
- Bi-directional, self-adjusting stem seal is suitable for vacuum and pressure while preventing external contamination of the stem area
- Heavy-duty corrosion resistant top bushing, absorbs actuator side thrust
- Cast-in top plate is an integral part of the body and is standardized to allow direct mounting of actuators
- Each valve is factory tested to 110 percent of specified pressure rating
- Available in multiple configurations to match jobsite needs.

Applications

Butterfly Valve assemblies provide excellent flow control of low pressure steam, hot water, chilled water, condenser water, and thermal storage systems applications.

Specifications

Valve Size ..... 2 to 20" (51 to 508 mm)

Body Style ..... Butterfly

Assembly Type 2-Way/3-Way

Materials

Full Cut Disk 2 to 12" / Under Cut Disk 2 to 6":

Body	Cast Iron
Disc	304 Stainless Steel
Stem	416 Stainless Steel
Seat	EPDM
Bearing	Bronze
Upper Stem Bushing	Polyester
Upper Stem Seal	NBR

Full Cut Disk 14 to 20" / Under Cut Disk 8 to 20":

Body	Cast Iron
Disc	Aluminum Bronze
Stem	316 or 18-8 Stainless Steel
Seat	EPDM
Bearing	Sintered Metal
Upper Stem Bushing	Polyester
Upper Stem Seal	NBR

Controlled Medium ..... Chilled Water, Hot Water

Temperatures ..... -40° to 250°F (-40° to 121°C)

Close-off Ratings ..... Refer to Selection Tables

Part Number Configuration

BV	2W	02	F	S2	L	O	X	X	X	X

Add accessories by simply replacing the **X** with the appropriate letter.

Assembly Configuration

2W	2-Way
3W	3-Way

Valve Size

02	2-inch
25	2.5-inch
03	3-inch
20	up to 20-inch

Disc Type

F	Full Cut Disc – Valve sizes 2 to 2 inches
U	Under Cut Disc – Valve sizes 5 to 20 inches

Actuator Type

S2[3]	Pneumatic Spring Return – 20 psi (valve sizes 2 to 12 inches)
S6	Pneumatic Spring Return 60 psi
D6	Pneumatic Double Acting 60 psi, Non-Spring Return
E2	Electronic 2-position/Floating, 100-240 Vac/Vdc, Non-Spring Return
EM	Electronic Modulating 0-10 Vdc, 100-240 Vac/Vdc, Non-Spring Return
EP	Electronic Modulating 4-20 mA, 100-240 Vac/Vdc, Non-Spring Return
G1[1]	Electronic On/Off, 120 Vac, Spring Return
G2[1]	Electronic On/Off, 24 Vac, Spring Return
G3[1]	Electronic Floating, 24 Vac, Spring Return
G4[1]	Electronic Modulating 1-10 Vdc, 24 Vac, Spring Return
G5[1]	Electronic Modulating 4-20 mA, 24 Vac, Spring Return
G6[2]	Electronic Floating, 24 Vac, Non-Spring Return
G7[2]	Electronic Modulating 0-10 Vdc, 24 Vac, Non-Spring Return
G8[1]	Electronic Modulating 4-20 mA, 24 Vac[4], Non-Spring Return

Body Type

L	Lug-Cast Iron (Standard)
W	Wafer-Cast Iron (Non-Standard)

Manual Override

M	Manual Override (Pneumatic Actuator Only – Standard Feature on Electronic Actuators)
X	Not Used

Heater

H	Heater (Electronic Actuator Only.) Used with all EM and EP Electronic Modulating Actuators. Optional for E2 Electronic 2-position Actuators, G1 thru G8 Not Available.
X	Not Used

Accessories/Switches

S	Limit (End) Switch for Pneumatic, Actuators (Standard)
A	Limit (End) Switch for G1, G2, G4, G5, G7, and G8 Actuators
P	Potentiometer + Limit (End) Switches for G3 and G6
X	Not Used

Actuator Accessories/Options

P	Pneumatic Positioner, 20 psi Actuator
Q	Pneumatic Positioner, 60 psi Spring Return Actuator
R	Pneumatic Positioner, 60 psi Direct Acting Actuator
E	Electro/Pneumatic Positioner, 20 psi Actuator (Consult Customer Care)
F	Electro/Pneumatic Positioner, 60 psi Spring Return & Direct Acting Actuator
T	E/P Valve, 120 Vac, 20 psi Spring Return Actuator
U	E/P Valve, 24 Vac, 20 psi Spring Return Actuator
V	E/P Valve, 120 Vac, 60 psi Spring Return Actuator
W	E/P Valve, 24 Vac, 60 psi Spring Return Actuator
Y	E/P Valve, 120 Vac, 60 psi Direct Acting Actuator
Z	E/P Valve, 24 Vac, 60 psi Direct Acting Actuator
X	Not Used

Fail Position/Assembly Configuration

O	Fail Open 2-Way Spring Return
C	Fail Closed 2-Way Spring Return
N	Non Fail Safe 2-Way Non-Spring Return
A-F	3-Way Spring Return
A-F	3-Way Non-Spring Return

Ordering Notes:

[1]2 to 4-inch sizes only [2]2 to 6-inch sizes only [3]2 to 12-inch sizes only [4]Also order 499 Ohm Restrictor Kit, 985-124.

Table Notes:

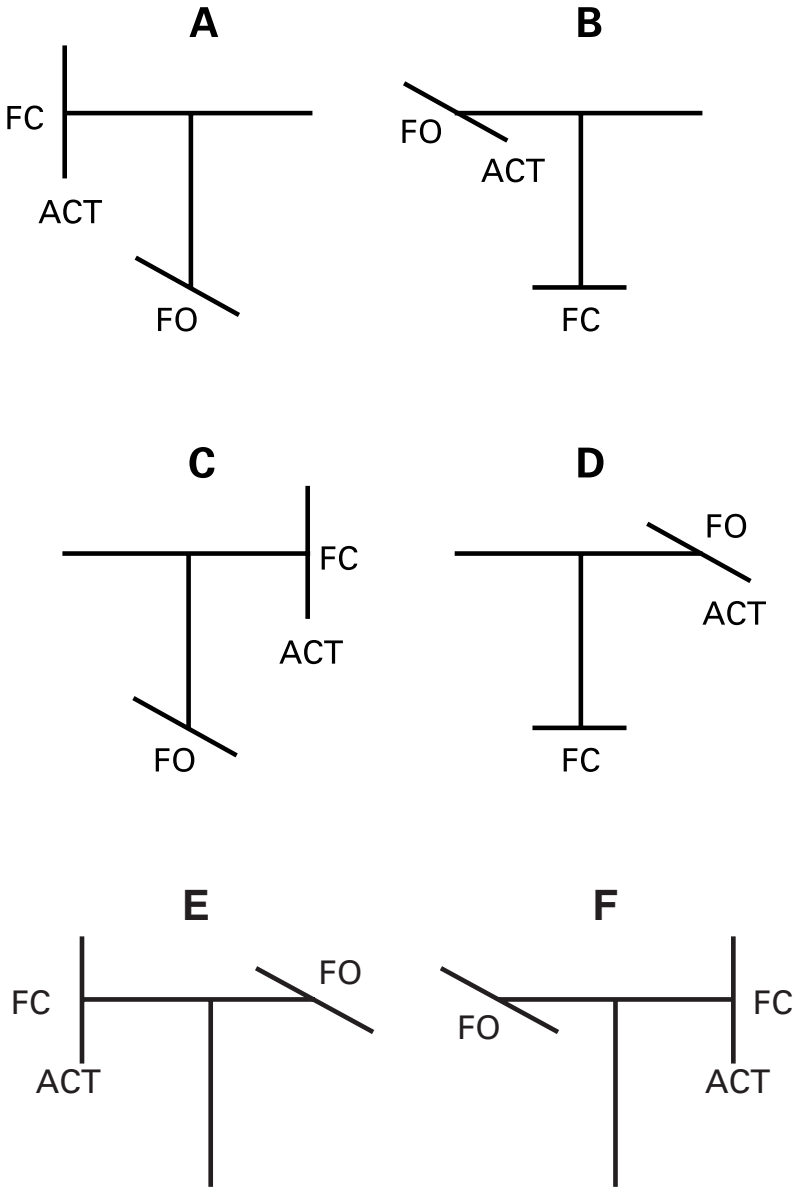
- Not all assembly configurations are available. Consult Customer Care.
- Items marked NON-STD (non-standard) will require factory pricing and may have longer lead times.
- For 3-way valve assemblies with spring return actuators – 1 Port Fail Close (FC). 1 Port Fail Open (FO).
- For 2-way and 3-way valve assemblies with pneumatic non-spring return actuators, fail last position. For 2-way and 3-way valve assemblies with electric non-spring return actuators, fail position will depend on type of failure and controls installed, consult Customer Care.

Part Number Configuration

Three-Way Butterfly Valve Configurations

Key:

FC Fail Closed
FO Fail Open
ACT Actuator Location



View from Top of Valve/Actuator Assembly
(Shaft or Actuator End)

Dimensions – Pneumatic

Figure 1 Two-Way Valve Assemblies with Pneumatic Actuators

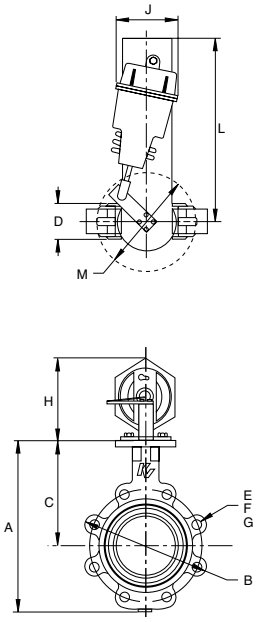
Valve Size	A Valve Height	B Body O.D.	C C_L Pipe To Top Plate	D Face/ Face	E Tap Size	F Bolt Circle	G # Bolts	H Actuator Height	H1 Actuator Removal Clearance	J Actuator Width	L C_L Length	M Stroke Clearance	Notes
2"	8.50" (216 mm)	6.00" (153 mm)	5.31" (135 mm)	1.69" (43 mm)	0.625-11 UNC-2B	4.75" (121 mm)	4	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	1, 2
2.5"	9.31" (236 mm)	6.75" (172 mm)	5.98" (150 mm)	1.81" (46 mm)	0.625-11 UNC-2B	5.50" (140 mm)	4	7.75 (197 mm)	9.75" (248 mm)	7.13 (181 mm)	18.00 (457 mm)	5.0 (127 mm)	1, 2
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	1, 2
4"	11.38" (288 mm)	8.81" (223 mm)	7.13" (180 mm)	2.06" (52 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	1, 2
5"	12.81" (325 mm)	10.00" (254 mm)	7.69" (195 mm)	2.25" (56 mm)	0.750-10 UNC-2B	8.50" (216 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	1, 3
5"	12.81" (325 mm)	10.00" (254 mm)	7.69" (195 mm)	2.25" (56 mm)	0.750-10 UNC-2B	8.50" (216 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	2
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (210 mm)	2.25" (56 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	1, 3, 4
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (210 mm)	2.25" (56 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	5.0" (127 mm)	2
8"	16.19" (411 mm)	13.25" (336 mm)	9.50" (249 mm)	2.50" (64 mm)	0.750-10 UNC-2B	11.75" (298 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	7.5" (191 mm)	2, 3, 4
10"	19.00" (483 mm)	15.88" (403 mm)	10.75" (273 mm)	2.50" (64 mm)	0.875-9-UNC-2B	14.25" (362 mm)	12	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	7.5" (191 mm)	2, 3, 4
12"	21.63" (549 mm)	18.63" (473 mm)	12.25" (311 mm)	3.00" (76 mm)	0.875-9-UNC-2B	17.00" (432 mm)	12	9.25" (235 mm)	11.25" (286 mm)	8.25" (210 mm)	17.75" (451 mm)	7.5" (191 mm)	2, 3, 4

Table Notes:

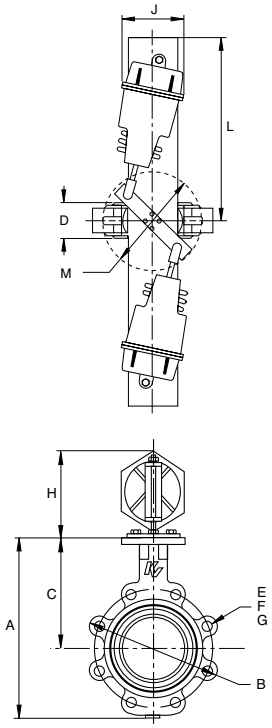
1. Full cut assemblies (150 psi shutoff)
2. Under cut assemblies (100 psi shutoff) 2-6 inches; (50 psi shutoff) 8-12 inches
3. Two actuators included in assembly
4. Maximum angle of disc opening is 70°

S2 Series Pneumatic Actuated
Two-Way Valve Assemblies – 20 psi Pneumatic Spring Return

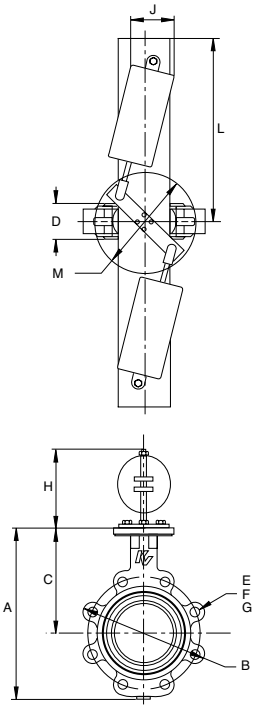
2-inch – 6-inch
5-inch and 6-inch (50 psi close off)



5-inch and 6-inch
8-inch – 10-inch (50 psi close off)



12-inch
(50 psi close off)



Dimensions – Pneumatic

Figure 2 Three-Way Valve Assemblies with Pneumatic Actuators

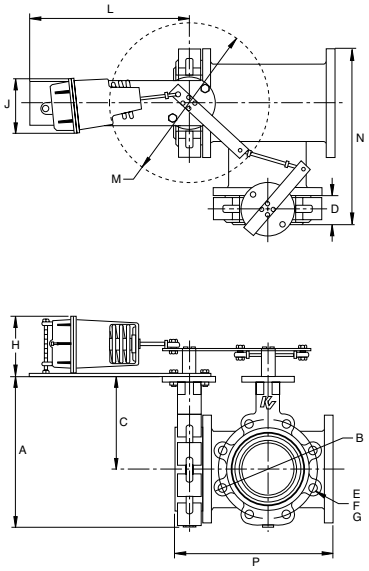
Valve Size	A Valve Height	B Body O.D.	C C_L Pipe To Top Plate	D Face/ Face	E Tap Size	F Bolt Circle	G # Bolts	H Actuator Height	H1 Actuator Removal Clearance	J Actuator Width	L C_L Length	M Stroke Clearance	N Tee Width	P Run Length	Notes
2"	8.50" (216 mm)	6.00" (153 mm)	5.31" (135 mm)	1.69" (43 mm)	0.625-11 UNC-2B	4.75" (121 mm)	4	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	8.38" (213 mm)	9.22" (234 mm)	10.69" (272 mm)	1, 2
2.5"	9.31" (236 mm)	6.75" (172 mm)	5.94" (150 mm)	1.81" (46 mm)	0.625-11 UNC-2B	5.50" (140 mm)	4	7.75 (197 mm)	9.75" (248 mm)	7.13 (181 mm)	18.00 (457 mm)	8.38" (213 mm)	10.31" (262 mm)	12.31" (313 mm)	1, 2
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	10.38" (265 mm)	11.44" (291 mm)	12.88" (327 mm)	1, 2, 4
4"	11.38" (288 mm)	8.81" (223 mm)	7.13" (180 mm)	2.06" (52 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	7.25" (184 mm)	13.13" (333 mm)	15.13" (384 mm)	1, 2, 3, 4
5"	12.19" (310 mm)	10.00" (254 mm)	7.69" (195 mm)	2.25" (56 mm)	0.750-10 UNC-2B	8.50" (216 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	8.69" (221 mm)	14.56" (370 mm)	17.25" (438 mm)	1, 2, 3, 4
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (210 mm)	2.25" (56 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	7.75" (197 mm)	9.75" (248 mm)	7.13" (181 mm)	18.00" (457 mm)	10.38" (264 mm)	15.50" (394 mm)	18.25" (464 mm)	2, 3, 4
6"	13.94" (354 mm)	13.25" (337 mm)	8.31" (210 mm)	2.25" (56 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	9.25" (235 mm)	11.25" (286 mm)	8.25" (210 mm)	20.00" 508 mm)	15.00" (381 mm)	15.50" (394 mm)	18.25" (464 mm)	1, 3, 4
8"	16.19" (411 mm)	13.25" (337 mm)	9.50" (241 mm)	2.50" (64 mm)	0.750-10 UNC-2B	11.75" (298 mm)	8	9.25" (235 mm)	11.25" (286 mm)	8.25" (210 mm)	20.00" (508 mm)	15.00" (381 mm)	17.81" (452 mm)	20.50" (521 mm)	2, 3, 4
10"	19.00" (483 mm)	15.88" (403 mm)	10.75" (273 mm)	2.50" (64 mm)	0.875-9- UNC-2B	14.25" (362 mm)	12	9.25" (235 mm)	11.25" (286 mm)	8.25" (210 mm)	20.00" (508 mm)	15.00" (381 mm)	21.38" (543 mm)	24.25" (622 mm)	2, 3, 4
12"	21.63" (549 mm)	18.63" (473 mm)	12.25" (311 mm)	3.00" (76 mm)	0.875-9- UNC-2B	17.00" (432 mm)	12	9.25" (235 mm)	11.25" (286 mm)	8.25" (210 mm)	20.00" (508 mm)	15.00" (381 mm)	23.41" (595 mm)	27.00" (686 mm)	2, 3, 4

Table Notes:

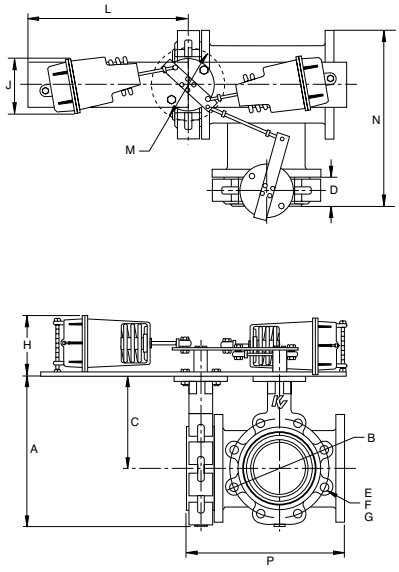
1. Full cut assemblies (150 psi shutoff)
2. Under cut assemblies (100 psi shutoff) 2-6 inches; (50 psi shutoff) 8-12 inches
3. Two actuators included in assembly
4. Maximum angle of disc opening is 70°

S2 Series Pneumatic Actuated Three-Way Valve Assemblies – 20 psi Pneumatic Spring Return

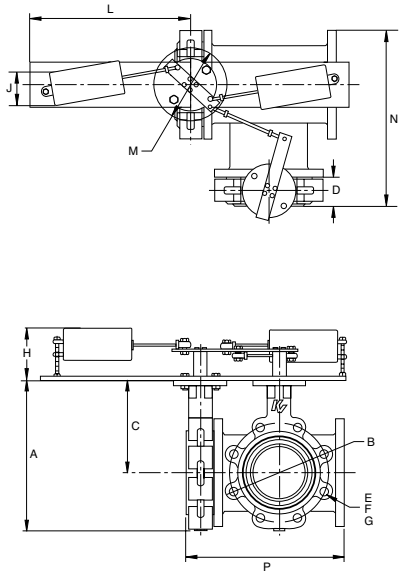
2-inch – 3-inch



4-inch – 6-inch



6-inch – 12-inch



Drawings shown are for Assemblies A & B. For Assemblies C & D, the valve and actuator are on right-hand side of the run of tee and for Assemblies E & F, the valves are on both sides of the run tee.

Dimensions – Electronic

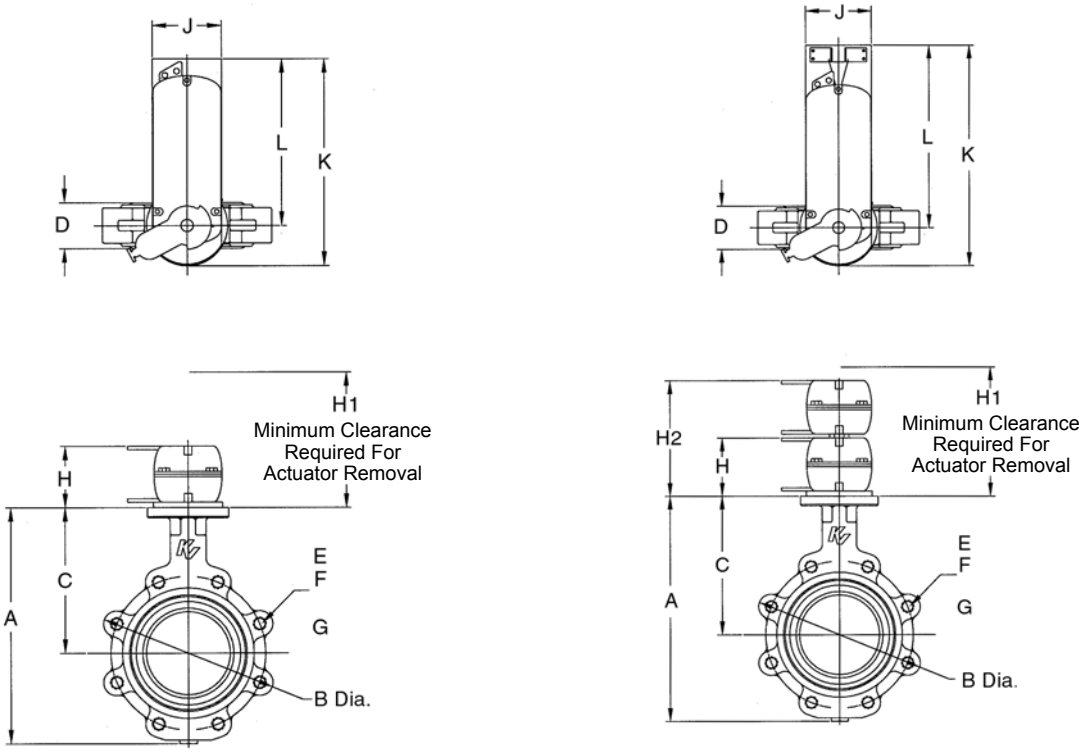
Figure 3 Two-Way OpenAir Electronic Actuator Valve Assemblies

Valve Size	A Valve Height	B Body O.D.	C C_L Pipe To Top Plate	D Face/ Face	E Tap Size	F Bolt Circle	G # Bolts	H Actuator Height	H1 Actuator Removal Clearance	H2 Dual Actuator Height	J Actuator Width	K Actuator Length	L C_L Length	Notes
2"	8.5" (216 mm)	6" (153 mm)	5.31" (135 mm)	1.69" (43 mm)	0.625-11 UNC-2B	4.75" (121 mm)	4	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	10.35" (263 mm)	8.35" (212 mm)	1, 2, 4, 5
2.5"	9.31" (236 mm)	6.75" (172 mm)	5.98" (135 mm)	1.81" (46 mm)	0.625-11 UNC-2B	5.50" (140 mm)	4	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	10.35" (263 mm)	8.35" (212 mm)	1, 2, 4, 5
3"	10" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	10.35" (263 mm)	8.35" (212 mm)	1, 2, 4, 5
4"	11.38" (288 mm)	8.81" (223 mm)	7.14" (180 mm)	2.06" (52 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	10.35" (263 mm)	8.35" (212 mm)	1, 2, 5
4"	11.13" (283 mm)	8.75" (222 mm)	7.00" (178 mm)	2.00" (51 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	14.84" (377 mm)	12.84" (327 mm)	1, 2, 3, 4
5"	12.13" (337 mm)	19" (254 mm)	7.50" (191 mm)	2.13" (54 mm)	0.625-11 UNC-2B	8.50" (216 mm)	8	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	14.84" (377 mm)	12.84" (327 mm)	1, 2, 3, 5
6"	13.25" (337 mm)	11.00" (279 mm)	8.00" (203 mm)	2.13" (54 mm)	0.625-11 UNC-2B	9.50" (241 mm)	8	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	14.84" (377 mm)	12.84" (327 mm)	1, 2, 3, 5

Table Notes:

1. 100 psi shutoff pressure
2. Under cut assemblies
3. Tandem actuators
4. Spring return
5. Non-spring return

G Series Electronic Actuated Two-Way Valve Assemblies



Dimensions – Electronic

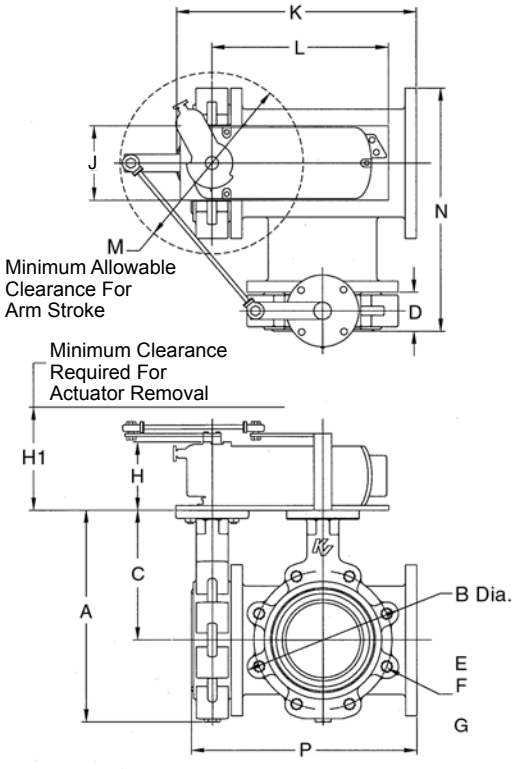
Figure 4 Three-Way OpenAir Electronic Actuator Valve Assemblies

Valve Size	A Valve Height	B Body O.D.	C C_L Pipe To Top Plate	D Face/ Face	E Tap Size	F Bolt Circle	G # Bolts	H Actuator Height	H1 Actuator Removal Clearance	H2 Dual Actuator Height	J Actuator Width	K Actuator Length	L C_L Length	M Arm Stroke Clearance
2"	8.50" (216 mm)	6.00" (153 mm)	5.31" (135 mm)	1.69" (43 mm)	0.625-11 UNC-2B	4.75" (121 mm)	4	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	11.84" (301 mm)	8.35" (212 mm)	7.25" (184 mm)
2.5"	9.31" (236 mm)	6.75" (172 mm)	5.94" (150 mm)	1.81" (46 mm)	0.625-11 UNC-2B	5.50" (140 mm)	4	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	13.41" (341 mm)	8.35" (212 mm)	7.25" (184 mm)
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	3.25" (83 mm)	9.00" (229 mm)	—	4.00" (102 mm)	13.98" (355 mm)	8.35" (212 mm)	7.25" (184 mm)
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	13.98" (355 mm)	8.35" (212 mm)	7.25" (184 mm)
4"	11.38" (288 mm)	8.81" (223 mm)	7.13" (180 mm)	2.06" (52 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	3.25" (83 mm)	5.25" (133 mm)	—	4.00" (102 mm)	16.06" (408 mm)	8.35" (212 mm)	7.25" (184 mm)
4"	11.13" (283 mm)	8.75" (222 mm)	7.00" (178 mm)	2.00" (51 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	16.06" (408 mm)	16.0" (212 mm)	6.36" (184 mm)
5"	12.19" (310 mm)	10.00" (254 mm)	7.50" (191 mm)	2.13" (54 mm)	0.750-10 UNC-2B	8.50" (216 mm)	8	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	18.06" (459 mm)	8.35" (212 mm)	7.25" (184 mm)
6"	13.25" (337 mm)	11.00" (279 mm)	8.00" (203 mm)	2.13" (54 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	3.25" (83 mm)	9.00" (229 mm)	7.00" (178 mm)	4.00" (102 mm)	4.00" (102 mm)	19.06" (484 mm)	7.25" (184 mm)

Valve Size	N B Port Depth	P A – AB Face to Face	Notes
2"	9.22" (234 mm)	10.69" (272 mm)	1, 2, 4, 5
2.5"	10.31" (236 mm)	12.31" (313 mm)	1, 2, 4, 5
3"	11.44" (291 mm)	12.88" (327 mm)	1, 2, 5
3"	11.44" (291 mm)	12.88" (327 mm)	1, 2, 3, 4
4"	13.06" (332 mm)	15.06" (383 mm)	1, 2, 5
4"	13.06" (332 mm)	15.06" (383 mm)	1, 2, 3, 4
5"	14.44" (367 mm)	17.13" (435 mm)	1, 2, 3, 5
6"	15.38" (391 mm)	18.13" (460 mm)	1, 2, 3, 5

Table Notes:
1. 100 psi shutoff pressure
2. Under cut assemblies
3. Tandem actuators
4. Spring return
5. Non-spring return

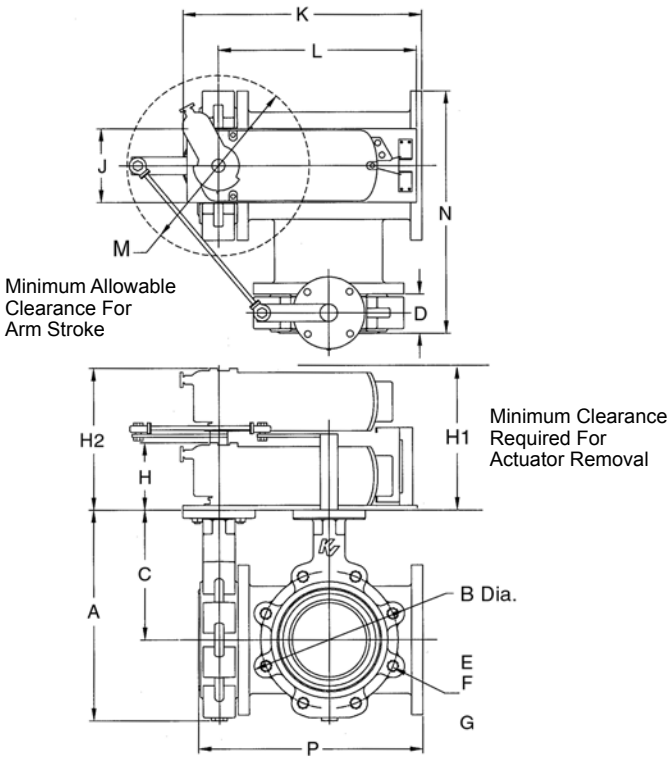
G Series Electronic Actuated Three-Way Valve Assemblies



Drawings shown are for Assemblies A & B. For Assemblies C & D, the valve and actuator are on the left-hand side of the run of tee and for Assemblies E & F, the valves are on both sides of the run tee.

Figure 4 Continued

G Series Electronic Actuated Three-Way Valve Assemblies



Drawings shown are for Assemblies A & B. For Assemblies C & D, the valve and actuator are on the right-hand side of the run of tee and for Assemblies E & F, the valves are on both sides of the run tee.

Dimensions – Electronic

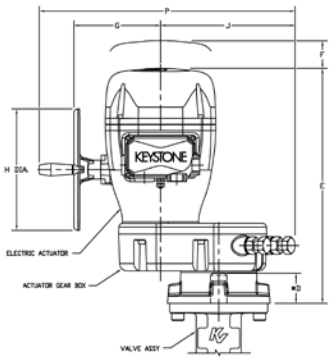
Figure 5 Two-Way EPI$_2$ Electronic Actuator Valve Assemblies

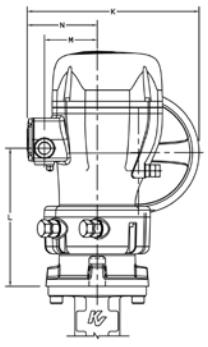
Valve Size	A Valve Height	B Body O.D.	C C_L Pipe To Top Plate	D Face/ Face	E Actuator Height	F Actuator Removal Clearance	G Pipe C_L To H.W.	H H.W. D.A.	J Valve CL To aH.W. Ring	K Total Width	Actuator Model	Notes
2"	8.50" (216 mm)	6.00" (153 mm)	5.31" (135 mm)	1.69" (43 mm)	7.75" (196 mm)	6.38" (162 mm)	4.56" (115 mm)	5.00" (127 mm)	4.94" (125 mm)	7.38" (200 mm)	EPI-3	1, 2, 3, 4
2.5"	9.31" (237 mm)	6.75" (171 mm)	5.94" (151 mm)	1.81" (46 mm)	7.75" (196 mm)	6.38" (162 mm)	4.56" (115 mm)	5.00" (127 mm)	4.94" (125 mm)	7.38" (200 mm)	EPI-3	1, 2, 3, 4
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	7.75" (196 mm)	6.38" (162 mm)	4.56" (115 mm)	5.00" (127 mm)	4.94" (125 mm)	7.38" (200 mm)	EPI-3	1, 2, 3, 4
4"	11.38" (289 mm)	8.81" (224 mm)	7.13" (181 mm)	2.06" (52 mm)	9.63" (244 mm)	6.38" (162 mm)	6.50" (165 mm)	8.00" (203 mm)	7.13" (181 mm)	10.94" (278 mm)	EPI-6	2, 3, 4
4"	11.38" (289 mm)	8.81" (224 mm)	7.13" (181 mm)	2.06" (52 mm)	7.75" (196 mm)	6.38" (162 mm)	4.56" (116 mm)	5.00" (127 mm)	4.94" (125 mm)	7.38" (200 mm)	EPI-3	1
5"	12.81" (325 mm)	10.00" (254 mm)	7.69" (195 mm)	2.25" (56 mm)	9.63" (244 mm)	6.38" (162 mm)	6.50" (165 mm)	8.00" (203 mm)	7.13" (181 mm)	10.94" (278 mm)	EPI-13	3, 4
5"	12.81" (325 mm)	10.00" (254 mm)	7.69" (195 mm)	2.25" (56 mm)	9.63" (244 mm)	6.38" (162 mm)	6.50" (165 mm)	8.00" (203 mm)	7.13" (181 mm)	10.94" (278 mm)	EPI-6	1, 2
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (210 mm)	2.25" (56 mm)	9.63" (244 mm)	6.38" (162 mm)	6.50" (165 mm)	8.00" (203 mm)	7.13" (181 mm)	10.94" (278 mm)	EPI-13	2, 3, 4
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (210 mm)	2.25" (56 mm)	9.63" (244 mm)	6.38" (162 mm)	6.50" (165 mm)	8.00" (203 mm)	7.13" (181 mm)	10.94" (278 mm)	EPI-6	1
8"	16.44" (418 mm)	13.25" (337 mm)	9.50" (241 mm)	2.38" (60 mm)	13.00" (330 mm)	7.88" (200 mm)	8.25" (210 mm)	12.00" (305 mm)	10.31" (262 mm)	4.00" (102 mm)	EPI-36	2, 3,
8"	16.19" (411 mm)	13.25" (337 mm)	9.50" (241 mm)	2.50" (64 mm)	9.63" (244 mm)	6.38" (162 mm)	6.50" (165 mm)	8.00" (203 mm)	7.13" (181 mm)	10.94" (278 mm)	EPI-6	1
10"	19.00" (483 mm)	16.00" (406 mm)	10.88" (276 mm)	2.69" (68 mm)	13.00" (330 mm)	7.88" (200 mm)	8.25" (210 mm)	12.00" (305 mm)	10.31" (262 mm)	4.00" (102 mm)	EPI-36	3, 4
10"	19.00" (483 mm)	15.90" (403 mm)	10.80" (273 mm)	2.50" (64 mm)	13.00" (330 mm)	6.38" (162 mm)	8.25" (210 mm)	12.00" (305 mm)	10.31" (262 mm)	4.00" (102 mm)	EPI-13	1, 2
12"	21.63" (549 mm)	18.75" (476 mm)	12.25" (311 mm)	3.13" (80 mm)	13.00" (330 mm)	7.88" (200 mm)	8.25" (210 mm)	12.00" (305 mm)	10.31" (262 mm)	4.00" (102 mm)	EPI-51	3
12"	21.63" (549 mm)	18.60" (473 mm)	12.30" (311 mm)	3.00" (76 mm)	13.00" (330 mm)	7.88" (200 mm)	8.25" (210 mm)	12.00" (305 mm)	10.31" (262 mm)	4.00" (102 mm)	EPI-36	1, 2
12"	21.63" (549 mm)	18.60" (473 mm)	12.30" (311 mm)	3.00" (76 mm)	17.375" (441 mm)	7.88" (200 mm)	8.25" (210 mm)	12.00" (305 mm)	16.132" (414 mm)	23.375" (594 mm)	EPI-91	4

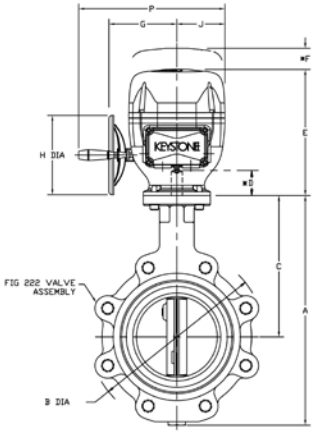
Table Notes:

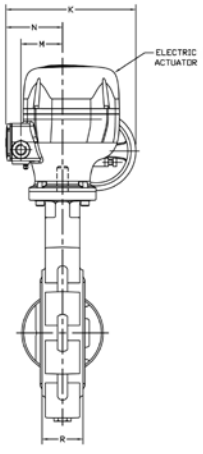
1. Under cut two-position assemblies
2. Under cut modulating assemblies
3. Full cut two-position assemblies
4. Full cut modulating assemblies

Two-Way Electronic Actuated Valves









Dimensions – Electronic

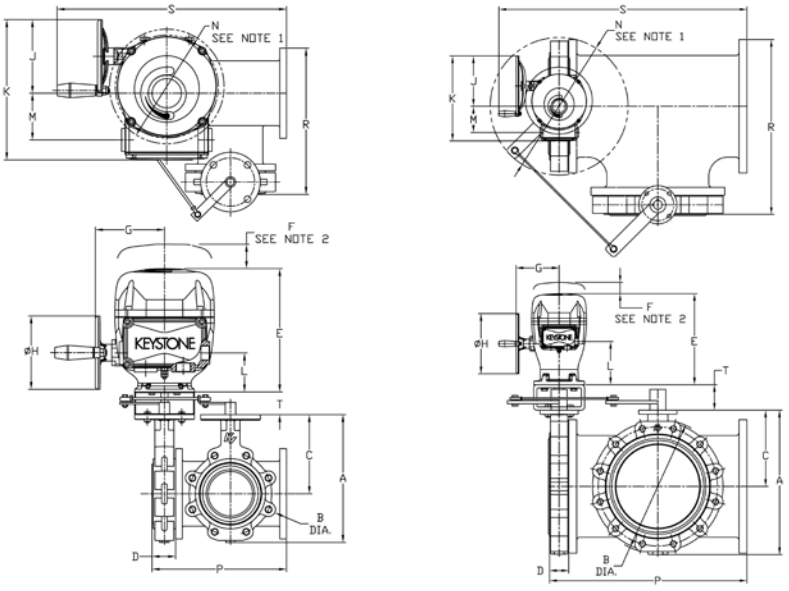
Figure 6 Three-Way EPI$_2$ Electronic Actuator Valve Assemblies

Valve Size	A Valve Height	B Body O.D.	C C_L Pipe To Top Plate	D Face/ Face	Tap Size	Bolt Circle	# Bolts	F Actuator Removal Clearance	P Pipe Run Height	R Total Width	S Bracket Length	T Bracket Height	Actuator Model	Notes
2"	8.50" (216 mm)	6.00" (152 mm)	5.31" (135 mm)	1.69" (43 mm)	0.625-11 UNC-2B	4.75" (121 mm)	4	6.38" (162 mm)	10.69" (272 mm)	9.22" (234 mm)	14.38" (365 mm)	4.00" (102 mm)	EPI-3	1, 3
2"	8.50" (216 mm)	6.00" (152 mm)	5.31" (135 mm)	1.69" (43 mm)	0.625-11 UNC-2B	4.75" (121 mm)	4	6.38" (162 mm)	10.69" (272 mm)	9.22" (234 mm)	14.38" (365 mm)	4.00" (102 mm)	EPI-6	2, 4
2.5"	9.31" (236 mm)	6.75" (171 mm)	5.94" (151 mm)	1.81" (46 mm)	0.625-11 UNC-2B	5.50" (140 mm)	4	6.38" (162 mm)	12.31" (313 mm)	10.31" (262 mm)	15.95" (405 mm)	4.00" (102 mm)	EPI-6	2, 3, 4
2.5"	9.31" (236 mm)	6.75" (171 mm)	5.94" (151 mm)	1.81" (46 mm)	0.625-11 UNC-2B	5.50" (140 mm)	4	6.38" (162 mm)	12.31" (313 mm)	10.31" (262 mm)	15.95" (405 mm)	4.00" (102 mm)	EPI-3	1
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	6.38" (162 mm)	12.88" (327 mm)	11.44" (291 mm)	16.52" (420 mm)	4.00" (102 mm)	EPI-6	2, 3, 4
3"	10.00" (254 mm)	7.25" (184 mm)	6.31" (160 mm)	1.81" (46 mm)	0.625-11 UNC-2B	6.00" (152 mm)	4	6.38" (162 mm)	12.88" (327 mm)	11.44" (291 mm)	16.52" (420 mm)	4.00" (102 mm)	EPI-3	1
4"	11.38" (289 mm)	8.81" (224 mm)	7.13" (181 mm)	2.06" (52 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	6.38" (162 mm)	15.13" (384 mm)	13.13" (334 mm)	20.59" (523 mm)	4.00" (102 mm)	EPI-13	4
4"	11.38" (289 mm)	8.81" (224 mm)	7.13" (181 mm)	2.06" (52 mm)	0.625-11 UNC-2B	7.50" (191 mm)	8	6.38" (162 mm)	15.13" (384 mm)	13.13" (334 mm)	20.59" (523 mm)	4.00" (102 mm)	EPI-6	1, 2, 3
5"	12.81" (325 mm)	10.00" (254 mm)	7.69" (195 mm)	2.25" (57 mm)	0.750-10 UNC-2B	8.50" (216 mm)	8	6.38" (162 mm)	17.25" (438 mm)	14.56" (370 mm)	22.63" (575 mm)	4.00" (102 mm)	EPI-13	1, 2, 3, 4
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (211 mm)	2.25" (57 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	7.88" (200 mm)	18.25" (464 mm)	15.50" (394 mm)	23.63" (600 mm)	4.00" (102 mm)	EPI-36	3, 4
6"	13.94" (354 mm)	11.00" (279 mm)	8.31" (211 mm)	2.25" (57 mm)	0.750-10 UNC-2B	9.50" (241 mm)	8	6.38" (162 mm)	18.25" (464 mm)	15.50" (394 mm)	23.63" (600 mm)	4.00" (102 mm)	EPI-13	1, 2
8"	16.44" (418 mm)	13.25" (337 mm)	9.50" (241 mm)	2.38" (60 mm)	0.750-10 UNC-2B	11.75" (298 mm)	8	7.88" (200 mm)	20.38" (518 mm)	17.69" (449 mm)	25.66" (652 mm)	4.00" (102 mm)	EPI-51	4
8"	16.19" (411 mm)	13.25" (337 mm)	9.50" (241 mm)	2.50" (64 mm)	0.750-10 UNC-2B	11.75" (298 mm)	8	7.88" (200 mm)	20.50" (521 mm)	17.81" (452 mm)	25.69" (652 mm)	4.00" (102 mm)	EPI-36	1, 2, 3
10"	19.00" (483 mm)	16.00" (406 mm)	10.88" (276 mm)	2.69" (68 mm)	0.875-9 UNC-2B	14.25" (361 mm)	12	7.88" (200 mm)	26.69" (678 mm)	23.09" (543 mm)	33.81" (859 mm)	4.00" (102 mm)	EPI-91	3, 4
10"	19.00" (483 mm)	15.88" (403 mm)	10.75" (273 mm)	2.50" (64 mm)	0.875-9 UNC-2B	14.25" (361 mm)	12	7.88" (200 mm)	24.50" (622 mm)	21.38" (543 mm)	31.50" (800 mm)	4.00" (102 mm)	EPI-36	1, 2
12"	21.63" (549 mm)	18.75" (476 mm)	12.25" (311 mm)	3.13" (80 mm)	0.875-9 UNC-2B	17.00" (432 mm)	12	7.88" (200 mm)	27.13" (622 mm)	23.53" (598)	33.81" (859 mm)	4.00" (102 mm)	EPI-91	3, 4
12"	21.63" (549 mm)	18.60" (473 mm)	12.30" (311 mm)	3.00" (76 mm)	0.875-9 UNC-2B	17.00" (432 mm)	12	7.88" (200 mm)	27.00" (686 mm)	23.41" (595 mm)	33.75 (857 mm)	4.00" (102 mm)	EPI-36/51	1, 2

Table Notes:

1. Under cut two-position assemblies
2. Under cut modulating assemblies
3. Full cut two-position assemblies
4. Full cut modulating assemblies

Three-Way Electronic Actuated, Two-Position and Modulating Valve Assemblies



Drawings shown are for Assemblies A & B. For Assemblies C & D, the valve and actuator are on the right-hand side of the run of tee and for Assemblies E & F, the valves are on both sides of the run tee.

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Universal Valve Retrofit Kit

Description

The Universal Valve Retrofit Kit allows you to install a state-of-the-art Siemens Flowrite Electronic Actuators, regardless of the valve's manufacturer. This kit contains the parts needed to adapt a valve to all Flowrite Pneumatic or SKB, SKC, SKD or SAX Actuators. Kit includes: bonnet adaptor, bonnet adaptor insert, stem adaptor jam nut and square head set screws.

Features

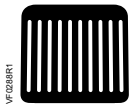
- Easy installation
- Works with electronic or pneumatic actuators
- Installs on most manufacturer's valves

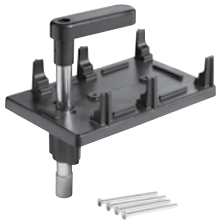
Universal Valve Actuator Retrofit Kit.

Assembling the Universal Valve Retrofit Kit is quick and easy.

Universal Valve Retrofit Kit Product Ordering

Brand	Valve Part No.	Kit Part No.
Siemens	658-XXXX and 339-XXXX	**ARK10**
	591-XXXX and 598-XXXX	**ARK11**
Honeywell	V3XXXX (2-1/2 and 3-in.)	**ARK16**
	V3XXXX (4 through 6-in.)	**ARK18**
	V501X (A, B, C, F, G, N) 1/2 through 3-in.	**ARK17**
	V501X (A, B, C) 4 through 6-in.	**ARK21**
Johnson Controls	VG2XXX	**ARK12**
	VG7XXX (1 thru 2-in.)	**ARK13**
	VG7XXX (1/2 to 3/4-in.)	**ARK19**
Siebe	VB7XXX and VB9XXX (threaded and flanged)	**ARK14**

	Description	Product Group	Quantity	Part No.
All Valves				
	**Weathershield for Zone & Powermite Valves.**	All Zone Valves & Powermite Valves	1	**599-10077**
Pressure Independent Control Valves				
	**Weathershield for Pressure Independent Control Valves.** NEW!	SAV, SAX, SAY	1	**ASK39.1**
	**PT Port Kit.**	PICV	1 Set	**599-10079**
Zone Valves				
	**Actuator Support Ring.**	All Zone Valves	Package of 10	**599-00599**
Powermite Valves				
	**Conduit Connectors.**	SSA, SSP, SSB, SSD61U SSD81U	1	**ASY97**
	**Terminal Plug and Cover.** Labeled Y1-G-Y2. (Cover not shown)	SSB81U, SSA81U, SSD81U	1	**ASY99**
	**Terminal Plug and Cover.** Labeled G-G0-Y. (Cover not shown)	SSB61U, SSA61U, SSP61U, SSD61U	1	**ASY100**
	**Protective Black Knob.** Protects bonnet and threads.	MZ, MT	1	**4 268 8895 0**
	**Diaphragm Kit.** Contains five diaphragms and mounting screws.	MT	Package of 5	**656-736**
	**Powermite Male Union Connection Kit.** • 1/2"	MT	1	**599-02941**
	**Powermite Union Gasket Kit.**	MT		
	• 1/2"		25 Pieces	**698-088**
	• 3/4"		25 Pieces	**599-03394**

	Description	Product Group	Quantity	Part No.
Ball Valves				
	**Low Profile Ball Valve Bracket.** Includes mounting screws. NEW!	Two-Way	1	**599-10088**
	**Ball Valve Bracket Kit.** Includes mounting screws.	Two-Way & Three-Way	1	**599-10078**
	**Ball Valve Weathershield.** Not compatible with 1/2 and 3/4" 2-Way Valves.	Two-Way & Three-Way	1	**599-10080**
	**Actuator Bracket** NEW!	Six-Way	1	**ASK77.3**
	**1/2" Tail Pieces** 1/2" union fittings with NPT female tailpieces and gaskets. NEW!	Six-Way	Package of 6	**599-10661**
	**3/4" Tail Pieces** 3/4" union fittings with NPT female tailpieces and gaskets. NEW!	Six-Way	Package of 6	**599-10662**
	**1" Tail Pieces** 1" union fittings with NPT female tailpieces and gaskets. NEW!	Six-Way	Package of 6	**599-10663**

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**Auxiliary Switch.** Sends a signal to indicate that the valve is in the 0% stroke position; switching point is fixed at the 0% stroke position.	SKB62, SKC62, SKD62	1	**ASC1.6**
	**Double Auxiliary Switch.** Switch has adjustable cams that can be set to give a signal at a desired position.	SKB82, SKC82, SKD82		
	• SKB/C		1	**ASC9.3BCU**
	• SKD		1	**ASC9.3DU**
	**Potentiometer.** NEW!	SK_82_	1	**ASZ7.3**
	**Auxiliary Switch.** Switches on or off when a certain position is reached. The switching point can lie between 0 to 100%.	SAV, SAX, SAY	1	**ASC10.51**
	**Potentiometer.** Potentiometer delivers a resistance value to the controller relative to the exact position of the actuator (continuous position feedback).	SAV81, SAX81, SAY81		
	• 1000 Ω		1	**ASZ7.5/1000**
	• 200 Ω		1	**ASZ7.5/200**
	• 135 Ω		1	**ASZ7.5/135**
	**Function Module.** • Changeover of acting direction • Connection terminals • Sequence control	SAV61, SAX61, SAY81	1	**AZX61.1**
	**Positioning Relay and Mounting Kit.**	Flowrite		
	• 8-inch		1	**599-00426**
	• 12-inch		1	**599-00423**

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**Adaptor for 1/2" Conduit.**	SKD SKB/SKC	1	**544-023**
	**Rack and Pinion/Bracket Only.** Use with OpenAir on Flowrite 1/2-2" (20 mm) stroke valves.	Flowrite	1	**599-03610**
	**Weathershield.**	SKB/SKC	1	**599-10065**
	**Weathershield.**	SKD/SQX	1	**599-10071**
	**Weathershield.**	SAX	1	**ASK39.1**
	**Universal Valve Retrofit Kit.** Contains parts to adapt a valve to Siemens Flowrite 599 Series Actuators.	SKB/SKC, SKD, SQX	1	**See table below**

Brand	Valve and Product No.	Kit Part No.
Siemens	658-XXXX and 339-XXXX	**ARK10**
	591-XXXX and 598-XXXX	**ARK11**
Honeywell	V3XXXX (2-1/2 and 3-in.)	**ARK16**
	V3XXXX (4 thru 6-in.)	**ARK18**
	V501X (A, B, C, F, G, N) 1/2 thru 3-in.	**ARK17**
	V501X (A, B, C) 4 thru 6-in.	**ARK21**
Johnson Controls	VG2XXX	**ARK12**
	VG7XXX (1 thru 2-in.)	**ARK13**
	VG7XXX (1/2 to 3/4-in.)	**ARK19**
Siebe	VB7XXX and VB9XXX (threaded & flanged)	**ARK14**

Note:
The model (M), year (Y) and week (W) of original manufacture of the valve is stamped on the valve tag in MM/YY/WW format.

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**1/2" to 2" 2-way Bronze Valve Body Rebuild/Repack Service Kits.**	Flowrite	1	**See table below**

Valve Part No.				Model 1 Part No.	Model 2 Part No.
FxF	FxUF	UFxUF	FxUM		
599-03000	599-03009	—	599-03216	**599-03300**	**—**
599-03001	599-03010	—	599-03217	**599-03301**	**—**
599-03002	599-03011	—	599-03218	**599-03302**	**—**
599-03003	599-03012	—	599-03219	**599-03303**	**—**
599-03004	599-03013	—	599-03220	**599-03304**	**—**
599-03005	599-03014	—	599-03221	**599-03305**	**—**
599-03006	—	599-03015	—	**599-03306**	**599-09201**
599-03007	—	599-03016	—	**599-03307**	**599-09202**
599-03008	—	599-03017	—	**599-03308**	**599-09203**
599-03018	599-03027	—	599-03225	**599-03309**	**—**
599-03019	599-03028	—	599-03226	**599-03310**	**—**
599-03020	599-03029	—	599-03227	**599-03311**	**—**
599-03021	599-03030	—	599-03228	**599-03312**	**—**
599-03022	599-03031	—	599-03229	**599-03313**	**—**
599-03023	599-03032	—	599-03230	**599-03314**	**—**
599-03024	—	599-03033	—	**599-03315**	**599-09213**
599-03025	—	599-03034	—	**599-03316**	**599-09214**
599-03026	—	599-03035	—	**599-03317**	**599-09215**
599-03054	599-03063	—	599-03234	**599-03318**	**—**
599-03055	599-03064	—	599-03235	**599-03319**	**—**
599-03056	599-03065	—	599-03236	**599-03320**	**—**
599-03057	599-03066	—	599-03237	**599-03321**	**—**
599-03058	599-03067	—	599-03238	**599-03322**	**—**
599-03059	599-03068	—	599-03239	**599-03323**	**—**
599-03060	—	599-03069	—	**599-03324**	**599-09204**
599-03061	—	599-03070	—	**599-03325**	**599-09205**
599-03062	—	599-03071	—	**599-03326**	**599-09206**
599-03072	599-03081	—	599-03243	**599-03327**	**—**
599-03073	599-03082	—	599-03244	**599-03328**	**—**
599-03074	599-03083	—	599-03245	**599-03329**	**—**
599-03075	599-03084	—	599-03246	**599-03330**	**—**
599-03076	599-03085	—	599-03247	**599-03331**	**—**
599-03077	599-03086	—	599-03248	**599-03332**	**—**
599-03078	—	599-03087	—	**599-03333**	**599-09216**
599-03079	—	599-03088	—	**599-03334**	**599-09217**
599-03080	—	599-03089	—	**599-03335**	**599-09218**

Note:
The model (M), year (Y) and week (W) of original manufacture of the valve is stamped on the valve tag in MM/YY/WW format.

Key:

F	Female NPT	**UF**	Union Female
AF	Angle Female	**UM**	Union Male

Continued…

Accessories & Service Kits

Continued…

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**1/2 to 2" 2-way Bronze Valve Body Rebuild/Repack Service Kits.**	Flowrite	1	**See table below**

Valve Part No.				Model 1 Part No.	Model 2 Part No.
FxF	FxUF	UFxUF	FxUM		
599-03108	599-03117	—	599-03252	**599-03336**	**—**
599-03109	599-03118	—	599-03253	**599-03337**	**—**
599-03110	599-03119	—	599-03254	**599-03338**	**—**
599-03111	599-03120	—	599-03255	**599-03339**	**—**
599-03112	599-03121	—	599-03256	**599-03340**	**—**
599-03113	599-03122	—	599-03257	**599-03341**	**—**
599-03114	—	599-03123	—	**599-03342**	**599-09207**
599-03115	—	599-03124	—	**599-03343**	**599-09208**
599-03116	—	599-03125	—	**599-03344**	**599-09209**
599-03126	599-03135	—	599-03261	**599-03345**	**—**
599-03127	599-03136	—	599-03262	**599-03346**	**—**
599-03128	599-03137	—	599-03263	**599-03347**	**—**
599-03129	599-03138	—	599-03264	**599-03348**	**—**
599-03130	599-03139	—	599-03265	**599-03349**	**—**
599-03131	599-03140	—	599-03266	**599-03350**	**—**
599-03132	—	599-03141	—	**599-03351**	**599-09219**
599-03133	—	599-03142	—	**599-03352**	**599-09220**
599-03134	—	599-03143	—	**599-03353**	**599-09221**
599-03162	599-03171	—	599-03270	**599-03354**	**—**
599-03163	599-03172	—	599-03271	**599-03355**	**—**
599-03164	599-03173	—	599-03272	**599-03356**	**—**
599-03165	599-03174	—	599-03273	**599-03357**	**—**
599-03166	599-03175	—	599-03274	**599-03358**	**—**
599-03167	599-03176	—	599-03275	**599-03359**	**—**
599-03168	—	599-03177	599-03276	**599-03360**	**599-09210**
599-03169	—	599-03178	—	**599-03361**	**599-09211**
599-03170	—	599-03179	—	**599-03362**	**599-09212**
599-03180	599-03189	—	599-03279	**599-03363**	**—**
599-03181	599-03190	—	599-03280	**599-03364**	**—**
599-03182	599-03191	—	599-03281	**599-03365**	**—**
599-03183	599-03192	—	599-03282	**599-03366**	**—**
599-03184	599-03193	—	599-03283	**599-03367**	**—**
599-03185	599-03194	—	599-03284	**599-03368**	**—**
599-03186	—	599-03195		**599-03369**	**599-09222**
599-03187	—	599-03196		**599-03370**	**599-09223**
599-03188	—	599-03197		**599-03371**	**599-09224**

Note:
The model (M), year (Y) and week (W) of original manufacture of the valve is stamped on the valve tag in MM/YY/WW format.

Key:

F	Female NPT	**UF**	Union Female
AF	Angle Female	**UM**	Union Male

	Description	Product Group	Quantity	Part No.
Flowrite Valves				

1/2 to 2" 3-way Bronze Valve Body Rebuild/Repack Service Kits.

Flowrite | 1 | **See table below**

FxF	UFxUF	Model 1 Part No.	Model 2 Part No.
599-03144	599-03153	**599-03372**	**—**
599-03145	599-03154	**599-03373**	**—**
599-03146	599-03155	**599-03374**	**—**
599-03147	599-03156	**599-03375**	**—**
599-03148	599-03157	**599-03376**	**—**
599-03149	599-03158	**599-03377**	**—**
599-03150	599-03159	**599-03378**	**599-09225**
599-03151	599-03160	**599-03379**	**599-09226**
599-03152	599-03161	**599-03380**	**599-09227**
599-03198	599-03207	**599-03381**	**—**
599-03199	599-03208	**599-03382**	**—**
599-03200	599-03209	**599-03383**	**—**
599-03201	599-03210	**599-03384**	**—**
599-03202	599-03211	**599-03385**	**—**
599-03203	599-03212	**599-03386**	**—**
599-03204	599-03213	**599-03387**	**599-09228**
599-03205	599-03214	**599-03388**	**599-09229**
599-03206	599-03215	**599-03389**	**599-09230**

Note:

The model (M), year (Y) and week (W) of original manufacture of the valve is stamped on the valve tag in MM/YY/WW format.

Key:

F Female NPT
AF Angle Female
UF Union Female
UM Union Male

2-1/2 to 6" 2-way Flanged Iron Valve Body Rebuild/Repack Service Kits.

Flowrite | 1 | **See table below**

Valve Part No.	Kit Part No.
599-05920	**599-10130**
599-05921	**599-10131**
599-05922	**599-10132**
599-05923	**599-10133**
599-05924	**599-10134**
599-05930	**599-10140**
599-05931	**599-10141**
599-05932	**599-10142**
599-05933	**599-10143**
599-05934	**599-10144**
599-05940	**599-10135**
599-05941	**599-10136**
599-05942	**599-10137**
599-05943	**599-10138**
599-05944	**599-10139**
599-05950	**599-10145**
599-05951	**599-10146**
599-05952	**599-10147**
599-05953	**599-10148**
599-05954	**599-10149**
599-05960	**599-10130**
599-05961	**599-10131**
599-05962	**599-10132**
599-05963	**599-10133**
599-05964	**599-10134**
599-05970	**599-10140**
599-05971	**599-10141**
599-05972	**599-10142**
599-05973	**599-10143**
599-05974	**599-10144**

Continued…

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**2-1/2 to 6" 2-way Flanged Iron Valve Body Rebuild/Repack Service Kits.**	Flowrite	1	**See table below**

Valve Part No.	Kit Part No.
599-05980	**599-10135**
599-05981	**599-10136**
599-05982	**599-10137**
599-05983	**599-10138**
599-05984	**599-10139**
599-05990	**599-10145**
599-05991	**599-10146**
599-05992	**599-10147**
599-05993	**599-10148**
599-05994	**599-10149**
599-06040	**599-10110**
599-06041	**599-10111**
599-06042	**599-10112**
599-06043	**599-10113**
599-06044	**599-10114**
599-06050	**599-10115**
599-06051	**599-10116**
599-06052	**599-10117**
599-06053	**599-10118**
599-06054	**599-10119**
599-06060	**599-10100**
599-06061	**599-10101**
599-06062	**599-10102**
599-06063	**599-10103**
599-06064	**599-10104**
599-06070	**599-10105**
599-06071	**599-10106**
599-06072	**599-10107**
599-06073	**599-10108**
599-06074	**599-10109**
599-06120	**599-10110**
599-06121	**599-10111**
599-06122	**599-10112**
599-06123	**599-10113**
599-06124	**599-10114**
599-06130	**599-10115**
599-06131	**599-10116**
599-06132	**599-10117**
599-06133	**599-10118**
599-06134	**599-10119**
599-06140	**599-10100**
599-06141	**599-10101**
599-06142	**599-10102**
599-06143	**599-10103**
599-06144	**599-10104**
599-06150	**599-10105**
599-06151	**599-10106**
599-06152	**599-10107**
599-06153	**599-10108**
599-06154	**599-10109**

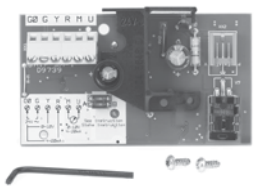
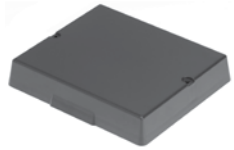
Continued…

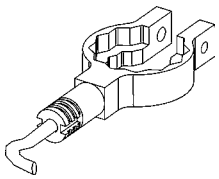
	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**2-1/2 to 6" 3-way Flanged Iron Valve Body Rebuild/Repack Service Kit.**	Flowrite	1	**See table below**

Valve Part No.	Kit Part No.
599-06160	**599-10125**
599-06161	**599-10126**
599-06162	**599-10127**
599-06163	**599-10128**
599-06164	**599-10129**
599-06165	**599-10120**
599-06166	**599-10121**
599-06167	**599-10122**
599-06168	**599-10123**
599-06169	**599-10124**
599-06170	**599-10125**
599-06171	**599-10126**
599-06172	**599-10127**
599-06173	**599-10128**
599-06174	**599-10129**
599-06175	**599-10120**
599-06176	**599-10121**
599-06177	**599-10122**
599-06178	**599-10123**
599-06179	**599-10124**

		Flowrite	1	**See table below**
	**2-1/2 to 6" High Close Off Rebuild/Repack Service Kits (ANSI 125 & 250)**			

Action	Valve Body		Valve Size		Cv	Kit No.
	ANSI 125	ANSI 250	Inch	(mm)		
Normally Open	**599-06610**	**599-06620**	2-1/2	(65)	63	**599-09250**
	599-06611	**599-06621**	3	(80)	100	**599-09251**
	599-06612	**599-06622**	4	(100)	160	**599-09252**
	599-06613	**599-06623**	5	(125)	250	**599-09253**
	599-06614	**599-06624**	6	(150)	400	**599-09254**
Normally Closed	**599-06615**	**599-06625**	2-1/2	(65)	63	**599-09255**
	599-06616	**599-06626**	3	(80)	100	**599-09256**
	599-06617	**599-06627**	4	(100)	160	**599-09257**
	599-06618	**599-06628**	5	(125)	250	**599-09258**
	599-06619	**599-06629**	6	(150)	400	**599-09259**

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**1/2 to 2" Bronze Valve Body Valve Repack Kits (10 mm. dia.).**	Flowrite		
	• Normal Duty		1	**599-03390**
	• Steam		1	**599-03391**
	**2-1/2 to 6" Flanged Iron Valve Body Repack Kit (14 mm dia.).** (Cartridge)	Flowrite		
	• Normal Duty		1	**599-08020**
	• Steam		1	**599-08021**
	**Packing Kits.**	Flowrite 591-598 Series Valves		
	• 1/4" Diameter		1	**591-501**
	• 3/8" Diameter		1	**591-502**
 8" Shown	**Diaphragm Replacement Kits.**	Flowrite		
	• 4-inch Normal Duty		1	**599-01093**
	• 8-inch Normal Duty		1	**599-01060**
	• 8-inch High Temperature		1	**599-01061**
	• 12-inch Normal Duty		1	**599-01070**
	**Stem Retainer Kit.** With interface nut and stem retainer ring. For 8-inch, 12-inch and SKB/C actuators.	Flowrite		
	• 10 mm		1	**599-10048**
	• 14 mm		1	**599-10049**
	**Circuit Board Replacement.**	SKB/C/D62U	1	**466857488**
		SKB/C/D62UA	1	**466857518**
		SKB/C/D60_	1	**466857598**
	**Plastic Wiring Compartment Cover.**	SKD	1	**410456348**
		SKB/SKC	1	**410455828**

	Description	Product Group	Quantity	Part No.
Flowrite Valves				
	**Manual Override Crank Assembly.**	SKB/SKC	1	**426855108**
		SKD	1	**426855048**
	**Stem Heater**	Flowrite	1	**ASZ6.6**
	**Stroke Inverter.** 1/2" - 2.5" valves with .75" max. stroke.	SKD	1	**ASK50**
		SKB	1	**ASK51**
	**Retainer Clamp Kit.**	SKB/C	1	**599-10200**
		8 & 12" pneu	1	**599-00436**
	**3-way Valve Service Flanges.** Allows easy access to the stem and plug assembly without removing the valve.	Flowrite	1	**See table below**
	**Flange Bolts and Gasket Service Kit.** For lower bypass port of 3-way valves. Includes one gasket and the number and size of bolts needed for the replacement.	Flowrite	1	**See table below**
	**Lower Seat Tools for Valve Size:**	Flowrite		
	• 2-1/2"		1	**599-09144**
	• 3"		1	**599-09145**
	• 4"		1	**599-09146**
	• 5"		1	**599-09147**
	• 6"		1	**599-09148**

Valve Size	ANSI Class 125	ANSI Class 250
2-1/2"	**599-05011**	**599-05016**
3"	**599-05012**	**599-05017**
4"	**599-05013**	**599-05018**
5"	**599-05014**	**599-05019**
6"	**599-05015**	**599-05020**

Valve Size	ANSI Class 125	ANSI Class 250
2-1/2"	**599-09236**	**599-09241**
3"	**599-09237**	**599-09242**
4"	**599-09238**	**599-09243**
5"	**599-09239**	**599-09244**
6"	**599-09240**	**599-09245**

	Description	Product Group	Quantity	Part No.
Magnetic Valves				
	**Control Signal Module w/ Feedback, 3-4".**	M3...	1	**ZM250**
	Terminal Housing. Converts 0 to 10 Vdc input to 0 to 20 Vdc phase cut output.			
	• up to 40W, IP54 rated housing	M3.../M2FP	1	**ZM101/A**
	Terminal Housing. Converts 0 to 20 mA/24 Vdc input to 0 to 20 Vdc phase cut output.			
	• to 40W, IP54 rated housing	M3.../M2FP	1	**ZM121/A**
	Blanking Flange.	M3P		
	• 3"		1	**Z155/80**
	• 4"		1	**Z155/100**
	**580 PSI Weld Neck Adaptor Flange.**	MX../M3P/MV..		
	• 1/2"		1	**Z205/15**
	• 3/4"		1	**Z205/20**
	• 1"		1	**Z205/25**
	• 1-1/4"		1	**Z205/32**
	• 1-1/2"		1	**Z205/40**
	• 2"		1	**Z205/50**
	• 2-1/2"		1	**Z205/65**
	• 3"		1	**Z205/80**
	230 PSI Weld Neck Adaptor Flange.	MX../M3P		
	• 4"		1	**Z56/100**
	**580 PSI NPT Adaptor Flange.**	MX../M3P/MV..		
	• 1/2"		1	**Z206/15**
	• 3/4"		1	**Z206/20**
	• 1"		1	**Z206/25**
	• 1-1/4"		1	**Z206/32**
	• 1-1/2"		1	**Z206/40**
	• 2"		1	**Z206/50**
	**Replacement Circuit Board.**	MVF461H/ MXG461B	1	**ASE12**

Accessories & Service Kits

	Description	Product Group	Quantity	Part No.
Magnetic Valves				
	**Repair Module.**			
	• 1/2" to 1-1/4"	MXG461	1	**ASE1**
	• 1-1/2" to 2-1/2"	MXG461/ MXF461	1	**ASE2**
	**Phase Cut to 0 to 10 Vdc Signal Converter.**	MX../M3P/MV..	1	**SEZ91.6**
Refrigeration Valves				
	**Replacement Electronics.** NEW!	MV_661	1	**ASR61**
	**Valve Insert.** 1" (25 mm) NEW!			
	• 0.18 Cv (0,16 k_{vs})	MVS661	1	**ASR0.16N**
	• 0.46 Cv (0,40 k_{vs})	MVS661	1	**ASR0.4N**
	• 1.16 Cv (1,0 k_{vs})	MVS661	1	**ASR1.0N**
	• 2.89 Cv (2,5 k_{vs})	MVS661	1	**ASR2.5N**
	• 7.28 Cv (6,3 k_{vs})	MVS661	1	**ASR6.3N**

Accessories & Service Kits

Part No.	Valve Size in. (mm)	Valve Action	Actuator Spring Range psi (kPa)	Nominal Stem Travel in. (mm)	Cv, USgpm	Diaphragm (Pkg. of 5)	Stem Repack Kit (Pkg. of 6)	Rebuild Kit	Replacement Actuator
VP 656 Powermite Valves									
656-0001	.50 (13)	NO	3-8 (21-55)	.25 (6.4)	2.1	**656-736**	**656-601**	**656-761**	**656-599**
656-0002	.50 (13)	NO	3-8 (21-55)	.25 (6.4)	2.1	**656-736**	**656-601**	**656-761**	**656-599**
656-0003	.50 (13)	NO	3-8 (21-55)	.25 (6.4)	0.9	**656-736**	**656-601**	**656-761**	**656-830**
656-0004	.50 (13)	NO	3-8 (21-55)	.25 (6.4)	0.9	**656-736**	**656-601**	**656-761**	**656-830**
656-0005	.75 (19)	NO	3-8 (21-55)	.25 (6.4)	4.6	**656-736**	**656-601**	**656-762**	**656-600**
656-0009	.50 (13)	3WM	10-15 (69-103)	.375 (9.5)	2.5	**656-736**	**656-601**	—	—
656-0010	.50 (13)	3WM	3-8 (21-55)	.375 (9.5)	2.5	**656-736**	**656-601**	—	—
656-0011	.50 (13)	3WM	3-8 (21-55)	.375 (9.5)	1.5	**656-736**	**656-601**	—	—
656-0012	.50 (13)	NC	10-15 (69-103)	.25 (6.4)	2.1	**656-736**	**656-601**	**656-014**	—
656-0013	.50 (13)	NC	10-15 (69-103)	.25 (6.4)	2.7	**656-736**	**656-601**	**656-014**	—
656-0015	.50 (13)	3WM	10-15 (69-103)	.375 (9.5)	3.1	**656-736**	**656-601**	—	—
656-0017	.50 (13)	NO	3-8 (21-55)	.25 (6.4)	2.1	**656-736**	**656-601**	**656-761**	**656-599**
656-0018	.75 (19)	NO	3-8 (21-55)	.25 (6.4)	4.6	**656-736**	**656-601**	**656-762**	**656-600**
656-0020	.50 (13)	NO	5-10 (34-69)	.25 (6.4)	2.1	**656-736**	**656-601**	**656-761**	—
656-0022	.75 (19)	NO	5-10 (34-69)	.25 (6.4)	4.6	**656-736**	**656-601**	**656-762**	—
656-0028	.50 (13)	NO	3-8 (21-55)	.25 (6.4)	0.5	**656-736**	**656-601**	**656-768**	**656-833**
656-0029	.50 (13)	NO	5-10 (34-69)	.25 (6.4)	0.5	**656-736**	**656-601**	**656-768**	**656-834**

Note: Actuator with trim includes actuator, rebuild kit and bonnet pre-assembled.

Part No.	Valve Size in.	(mm)	Valve Action	Actuator Spring Range psi	(kPa)	Nominal Stem Travel in.	(mm)	Cv, USgpm	Diaphragm (Pkg. of 5)	Stem Repack Kit (Pkg. of 6)	Actuator with Trim	Replacement Actuator
VP 658 Powertop Valves												
658-0001	.50	(13)	NO	2-6	(14-41)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-067**
658-0002	.50	(13)	NO	2-6	(14-41)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-067**
658-0004	.50	(13)	NO	2-6	(14-41)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-067**
658-0005	.50	(13)	NO	2-6	(14-41)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-067**
658-0007	.50	(13)	NO	2-6	(14-41)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-067**
658-0008	.50	(13)	NO	2-6	(14-41)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-067**
658-0009	.75	(19)	NO	2-6	(14-41)	.50	(13)	6.3	**658-166**	**658-167**	**658-071**	**658-067**
658-0010	.75	(19)	NO	2-6	(14-41)	.50	(13)	6.3	**658-166**	**658-167**	**658-071**	**658-067**
658-0011	1	(25)	NO	2-6	(14-41)	.50	(13)	10	**658-166**	**658-167**	**658-072**	**658-067**
658-0012	1	(25)	NO	2-6	(14-41)	.50	(13)	10	**658-166**	**658-167**	**658-072**	**658-067**
658-0013	1.25	(32)	NO	2-6	(14-41)	.50	(13)	16	**658-166**	**658-167**	**658-074**	**658-067**
658-0014	1.25	(32)	NO	2-6	(14-41)	.50	(13)	16	**658-166**	**658-167**	**658-074**	**658-067**
658-0018	.50	(13)	NO	2-6	(14-41)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-067**
658-0019	.50	(13)	NO	2-6	(14-41)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-067**
658-0020	.75	(19)	NO	2-6	(14-41)	.50	(13)	6.3	**658-166**	**658-167**	**658-071**	**658-067**
658-0021	1	(25)	NO	2-6	(14-41)	.50	(13)	10	**658-166**	**658-167**	**658-072**	**658-067**
658-0022	1.25	(32)	NO	2-6	(14-41)	.50	(13)	16	**658-166**	**658-167**	**658-074**	**658-067**
658-0026	50	(13)	3WM	3-7	(21-48)	.50	(13)	2.5	**658-166**	**658-167**	—	**658-069**
658-0027	.50	(13)	3WM	10-14	(69-97)	.50	(13)	2.5	**658-166**	**658-167**	—	**658-068**
658-0028	.75	(19)	3WM	3-7	(21-48)	.50	(13)	6.3	**658-166**	**658-167**	—	**658-069**
658-0029	.75	(19)	3WM	10-14	(69-97)	.50	(13)	6.3	**658-166**	**658-167**	—	**658-068**
658-0030	1	(25)	3WM	3-7	(21-48)	.50	(13)	10	**658-166**	**658-167**	—	**658-069**
658-0031	1	(25)	3WM	10-14	(69-97)	.50	(13)	10	**658-166**	**658-167**	—	**658-068**
658-0032	1.25	(32)	3WM	10-14	(69-97)	.50	(13)	16	**658-166**	**658-167**	—	**658-068**
658-0033	1.25	(32)	3WM	3-7	(21-48)	.50	(13)	16	**658-166**	**658-167**	—	**658-069**
658-0040	.50	(13)	NC	10-14	(69-97)	.50	(13)	2.5	**658-166**	**658-167**	—	**658-068**
658-0041	.75	(19)	NC	10-14	(69-97)	.50	(13)	6.3	**658-166**	**658-167**	—	**658-068**
658-0042	1	(25)	NC	10-14	(69-97)	.50	(13)	10	**658-166**	**658-167**	—	**658-068**
658-0043	.50	(13)	NC	10-14	(69-97)	.50	(13)	2.5	**658-166**	**658-167**	—	**658-068**
658-0050	.50	(13)	SEQ	2-11	(14-76)	.406	(10)	1.5	**658-166**	**658-167**	—	**658-066**
658-0051	.50	(13)	SEQ	2-11	(14-76)	.406	(10)	2.5	**658-166**	**658-167**	—	**658-066**
658-0052	.50	(13)	CHG	2-11	(14-76)	.406	(10)	2.5	**658-166**	**658-167**	—	**658-066**
658-0060	.50	(13)	NO	10-14	(69-97)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-068**
658-0061	.50	(13)	NO	10-14	(69-97)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-068**
658-0062	.50	(13)	NO	10-14	(69-97)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-068**
658-0063	.50	(13)	NO	10-14	(69-97)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-068**
658-0064	.50	(13)	NO	10-14	(69-97)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-068**
658-0065	.50	(13)	NO	10-14	(69-97)	.50	(13)	2.5	**658-166**	**658-167**	**658-070**	**658-068**
658-0066	.75	(19)	NO	10-14	(69-97)	.50	(13)	6.3	**658-166**	**658-167**	**658-071**	**658-068**
658-0067	.75	(19)	NO	10-14	(69-97)	.50	(13)	6.3	**658-166**	**658-167**	**658-072**	**658-068**
658-0068	1	(25)	NO	10-14	(69-97)	.50	(13)	10	**658-166**	**658-167**	**658-072**	**658-068**
658-0069	1	(25)	NO	10-14	(69-97)	.50	(13)	10	**658-166**	**658-167**	**658-072**	**658-068**
658-0070	1.25	(32)	NO	10-14	(69-97)	.50	(13)	16	**658-166**	**658-167**	**658-074**	**658-068**
658-0071	1.25	(32)	NO	10-14	(69-97)	.50	(13)	16	**658-166**	**658-167**	—	**658-068**
658-0085	.50	(13)	NC	10-14	(69-97)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-068**
658-0086	.50	(13)	NC	10-14	(69-97)	.50	(13)	1.0	**658-166**	**658-167**	—	**658-068**
658-0100	.50	(13)	NO	2-6	(14-41)	.50	(13)	0.5	**658-166**	**658-167**	—	**658-067**
658-0101	.50	(13)	NO	2-6	(14-41)	.50	(13)	0.5	**658-166**	**658-167**	—	**658-067**

Table of Contents

Damper Actuators

Damper Actuators provide control, either electronically or pneumatically, for a variety of HVAC applications, including:

- VAV Systems
- Mixing Boxes
- Central Fan Systems
- Exhaust Dampers
- Fire/Smoke Dampers

Selection Guide

Square footage is approximate, based on 4 lb-in/ft²

Application	Electronic														Pneumatic*		
	Spring Return							Non-Spring Return							Spring Return		
	GQD 5 ft²	GPC 8 ft²	GNP 12 ft²	GND 12 ft²	GMA 16 ft²	GGD 36 ft²	GCA 40 ft²	GSD 5 ft²	GDE 11 ft²	GAP 12 ft²	GLB 22 ft²	GEB 32 ft²	GBB 55 ft²	GIB 77 ft²	No. 3 12 ft²	No. 4 16 ft²	No. 6 24 ft²
Terminal Units	•	•			•			•	•		•				•		
Face and Bypass									•		•					•	
Multi-zone Mixing Boxes							•		•		•		•	•			
Bypass Damper									•		•						
Makeup Air Damper									•		•						
Outside Air Dampers	•	•			•		•	•				•	•	•			
Small Rooftop Units (RTU)	•	•			•			•				•					
Rooftop Units (RTU)							•						•	•	•		
Zone Isolation Dampers	•	•			•		•	•				•	•	•			
Vortex Dampers							•						•	•			
Inlet Vane Dampers							•						•	•			•
Return Air Dampers	•	•			•		•	•				•	•	•			
Unit Ventilators	•	•			•			•									
Central VAV Fans							•									•**	
Fire/Smoke Dampers				•		•										•***	•***
Fume Hoods/Supply and Exhaust Dampers			•							•							

**Estimates for pneumatic actuators are based on the maximum stroke of the actuator and a 90° damper rotation*

***LC Model*

****See data sheets for specific types*

Damper Type	Damper Leakage at 1" H_2O (240 Pa) Static Pressure	Damper Torque for Approach Air of 1200 ft./min. (6 m/s) or less
Standard Leakage	More than 10 CFM/ft.² (50.8 l/s per m²)	2.5 lb.-in./ft.² (0.3 Nm/m²)
Low Leakage	5 to 10 CFM/ft.² (25.4 to 50.8 l/s per m²)	5.0 lb.-in./ft.² (0.6 Nm/m²)
Very Low Leakage	Less than 5 CFM/ft.² (Less than 25.4 l/s per m²)	7.0 lb.-in./ft.² (0.8 Nm/m²)

For detailed damper actuator sizing information, please refer to Engineering, Section G.

Electronic Damper Actuators
Spring Return

GQD Series Spring Return
Direct Coupled Electronic Damper Actuator.

Easily Replaces:

- Belimo TF Series

20 lb.-in. Torque
24 Vac/dc, 2-Position (Open/Closed) Control
120 Vac, 2-Position (Open/Closed) Control
24 Vac/dc, Floating Control
24 Vac/dc, 2 to 10 Vdc/10 to 2 Vdc, (Modulating) Control

Description

The OpenAir GQD Series direct-coupled, spring return electronic damper actuators are 24 Vac/dc and 120 Vac rated and available in 2-position, floating and 2 to 10 Vdc control.

Features

- Bi-directional, fail-safe spring return
- Modulating actuators contain built-in feedback
- Pre-cabled
- Plenum rated
- Signal inversion capability on modulating type (2 to 10 Vdc/10 to 2 Vdc)
- Small footprint for installation flexibility
- UL, cUL, CE rated
- Quiet operation

Options

- Available with optional built-in dual auxiliary switches fixed at 5° and 85°

Applications

The small footprint and torque make this actuator ideal for small HVAC dampers, economizer units, or residential zone dampers requiring fail safe operation.

Specifications

Operating Voltage ..... 24 Vac/dc ±20%
120 Vac ±15%

Frequency ..... 50/60 Hz

Power Consumption

GQD121.1P (24 Vac/24 Vdc)
- Running ..... 6.5 VA (4.5 W)
- Holding ..... 4 VA (2.5 W)

GQD131.1P (24 Vac/24 Vdc)
- Running ..... 4 VA (2.5 W)
- Holding ..... 3 VA (1.5 W)

GQD151.1P (24 Vac/24 Vdc)
- Running ..... 4.5 VA (3 W)
- Holding ..... 3.5 VA (2 W)

GQD221.1U (120 Vac)
- Running ..... 10 VA
- Holding ..... 7 VA

Function
- Torque ..... 20 lb.-in. (2 Nm)
- Runtime for 90° ..... 30 sec.
- Spring Return ..... 15 sec. nominal
- Nominal Angle of Rotation ..... 90°

Dual Auxiliary Switches ..... Fixed at 5º and 85º

AC Rating ..... 24 to 250 Vac
AC 6A resistive
AC 2A General Purpose

DC Rating (Standard/Plenum Cable) ..... 12 to 30 Vdc
DC 2A

Shaft Size ..... 3/8 to 1/2-in. (8 to 13.4 mm) round/square

Min. Shaft Length ..... 3/4-in (20 mm)

Conduit Connection ..... (GQD221.1U only) 1/2" NPT

Housing Enclosure ..... NEMA 1

Material ..... Plenum rated rugged plastic

Ambient Temperature
- Operating ..... -25° to 130°F (-32° to 55°C)
- Storage and Transport ..... -40° to 158°F (-40° to 70°C)

Ambient Humidity ..... 95% RH, non-condensing

Agency Approvals ..... UL873, cUL, CE rated

Pre-Cabled Connection ..... AWG 18

Cable Length ..... 3 ft. (0.9m)

Dimensions ..... <4.72" H x <2.75" W x <2.5" D
(<120 mm H x <70 mm W x <63 mm D)

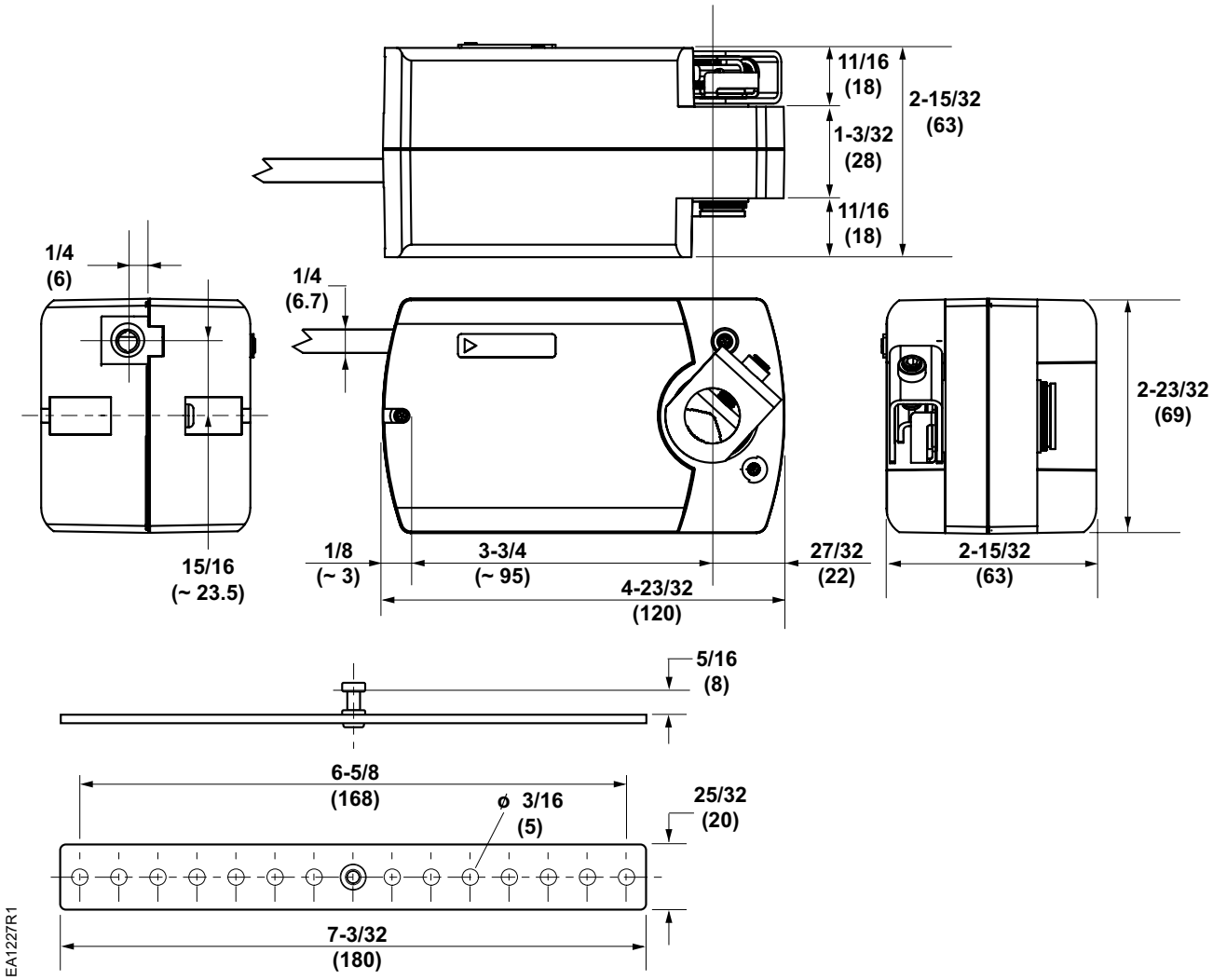
Shipping Weight ..... <1.5 lbs. (<.68 kg)

Product Ordering

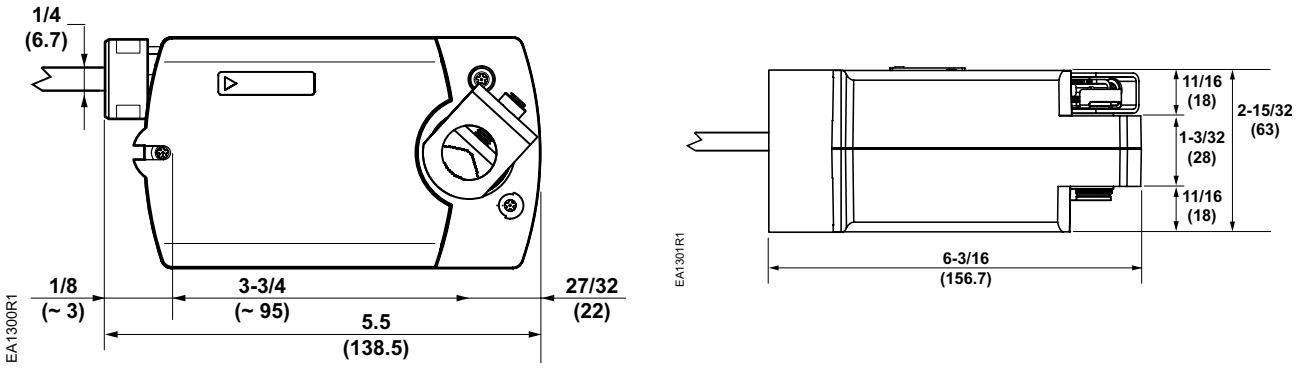
Control Signal	Cabling	Standard	Dual Auxiliary Switches
2-Position (Open/Closed), 24 Vac/dc	Plenum Cable	**GQD121.1P**	**GQD126.1P**
	Plenum Cable/Bulk	**GQD121.1P/B**	**—**
2-Position (Open/Closed), 120 Vac	Standard Cable	**GQD221.1U**	**GQD226.1U**
	Standard Cable/Bulk	**GQD221.1U/B**	**—**
Floating, 24 Vac/dc	Plenum Cable	**GQD131.1P**	**GQD136.1P**
	Plenum Cable/Bulk	**GQD131.1P/B**	**—**
2 to 10 Vdc/10 to 2 Vdc, (Modulating), 24 Vac/dc	Plenum Cable	**GQD151.1P**	**GQD156.1P**
	Plenum Cable/Bulk	**GQD151.1P/B**	**—**

Ordering Notes:
Bulk packages contain 10 actuators unless otherwise noted.

GQD Series Open Air Electronic Damper Actuators



Dimensions shown in inches (mm).

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Electronic Damper Actuators Spring Return

NEW!

GPC Series Spring Return
Direct Coupled Electronic Damper Actuator.

Easily Replaces:

- Belimo LF Series

35 lb.-in. Torque
24 Vac/dc, 2-Position (Open/Closed) Control
100 to 240 Vac, 2-Position (Open/Closed) Control
24 Vac/dc, Floating Control
24 Vac/dc, 0(2) to 10 Vdc/10 to 0(2) Vdc, (Modulating) Control

Description

The OpenAir GPC Series direct-coupled, spring return electronic damper actuators are 24 Vac/dc and 100 to 240 Vac rated. Available in 2-position, floating and 0(2) to 10 Vdc control.

Applications

The small footprint and torque make this actuator ideal for small HVAC dampers, economizer units, or residential zone dampers requiring fail safe operation.

Features

- Bi-directional, fail-safe spring return
- Selectable modulating control (0 to 10 Vdc or 2 to 10 Vdc)
- Modulating actuators contain built-in feedback (0 to 10 Vdc or 2 to 10 Vdc)
- Pre-cabled
- Integral 1/2 inch conduit connection
- Plenum rated
- Manual override with easy lock function
- 24 Vac/dc compatible
- Flexible 2-position line voltage (100 to 240 Vac)
- Signal inversion capability on modulating type (2 to 10 Vdc/10 to 2 Vdc)
- Small footprint for installation flexibility
- UL, cUL, CE rated
- Very energy efficient

Options

- Available with optional built-in dual auxiliary switches fixed at 5° and 85°

Siemens Product Guard **PLUS 3** Warranty

Specifications

Operating Voltage ..... 24 Vac/dc ±20%
100-240 Vac (-15/+10%)

Frequency ..... 50/60 Hz

Power Consumption
- GPC121.1P (24 Vac/24 Vdc)
  - Running ..... 4.2 VA (2.7 W)
  - Holding ..... 2.6 VA (1.6 W)
- GPC131.1P (24 Vac/24 Vdc)
  - Running ..... 4.2 VA (2.7 W)
  - Holding ..... 2.6 VA (1.6 W)
- GPC161.1P (24 Vac/24 Vdc)
  - Running ..... 3.7 VA (2.2 W)
  - Holding ..... 2.7 VA (1.5 W)
- GPC321.1U (120 Vac)
  - Running ..... 6.9 VA
  - Holding ..... 4.8 VA

Function
- Torque ..... 35 lb.-in. (4 Nm)
- Runtime for 90° ..... 60 sec.
- Spring Return ..... 15 sec. nominal
- Nominal Angle of Rotation ..... 90°

Dual Auxiliary Switches
- Fixed at 5º and 85º AC Rating ..... 24 to 250 Vac
  AC 6A resistive
  AC 2A General Purpose
- DC Rating (Standard/Plenum Cable) ..... 12 to 30 Vdc
  DC 2A

Shaft Size ..... 3/8 to 1/2-in. (8 to 13.4 mm) round/square

Min. Shaft Length ..... 3/4-in (20 mm)

Conduit Connection ..... 1/2" NPT

Housing Enclosure ..... NEMA 1

Material ..... Plenum rated rugged plastic

Ambient Temperature
- Operating ..... -25° to 130°F (-32° to 55°C)
- Storage and Transport ..... -40° to 158°F (-40° to 70°C)

Ambient Humidity ..... 95% RH, non-condensing

Agency Approvals ..... UL60730, cUL, CE rated

Pre-Cabled Connection ..... AWG 18

Cable Length ..... 3 ft. (0.9m)

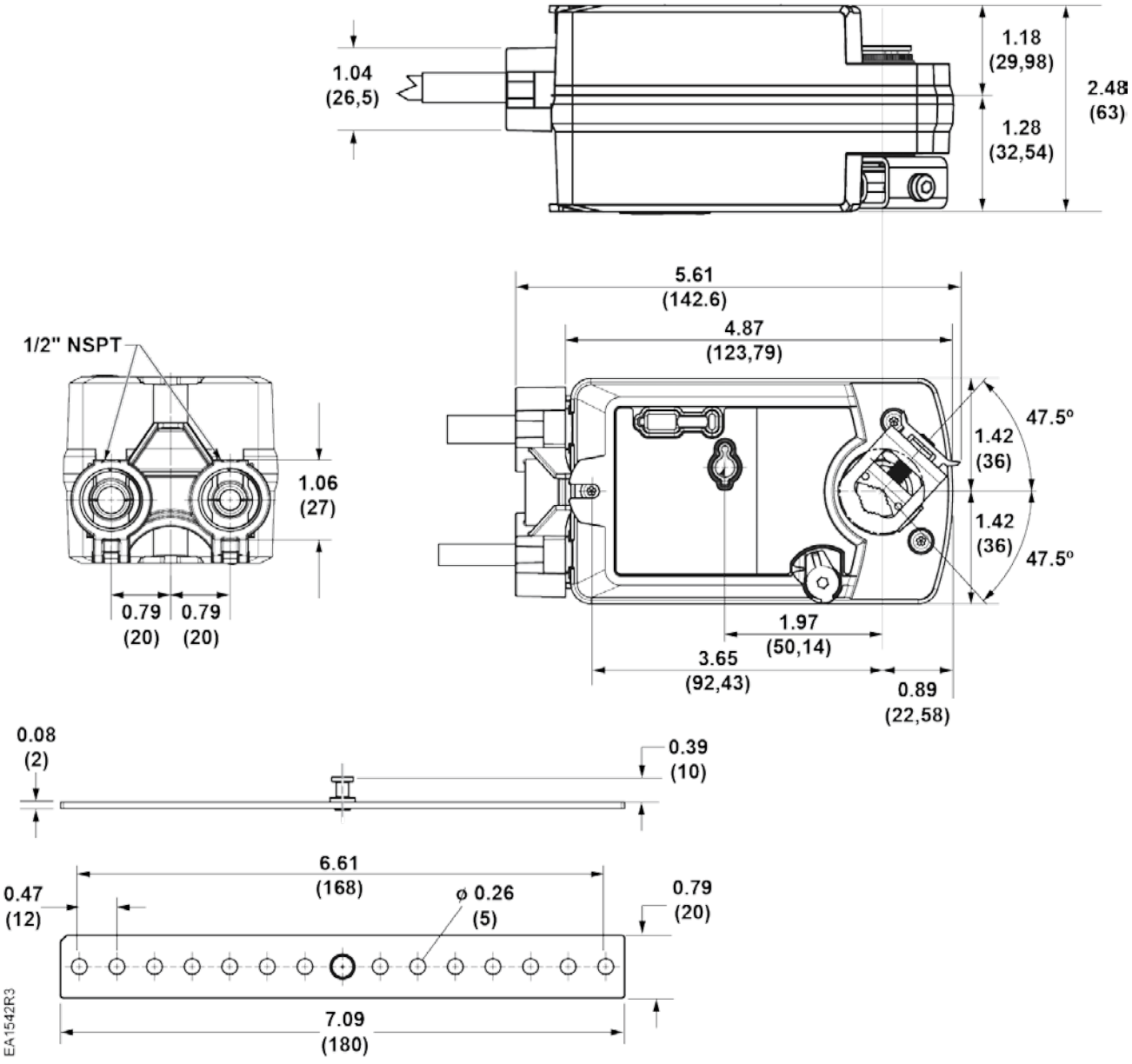
Dimensions ..... <5.6" H x <2.83" W x <2.5" D
(<142 mm H x <72 mm W x <63 mm D)

Shipping Weight ..... <1.5 lbs. (<.68 kg)

Product Ordering

Control Signal	Cabling	Standard	Dual Auxiliary Switches
2-position (Open/Closed), 24 Vac/dc	Plenum Cable	**GPC121.1P**	**GPC126.1P**
Floating, 24 Vac/dc	Plenum Cable	**GPC131.1P**	**GPC136.1P**
0(2) to 10 Vdc/10 to 0(2) Vdc, (Modulating), 24 Vac/dc	Plenum Cable	**GPC161.1P**	**GPC166.1P**
2-position (Open/Closed), 100-240 Vac	Standard Cable	**GPC321.1U**	**GPC326.1U**

GPC Series Open Air Electronic Damper Actuators



Dimensions shown in inches (mm).

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Electronic Damper Actuator Spring Return

Easily Replaces:

- Belimo LN/NF Series

62 lb.-in. Torque
24 Vac/Vdc, 2-Position Control
120 Vac, 2-Position Control
24 Vac/dc, Floating Control
0 to 10 Vdc, Modulating Control
2 to 10 Vdc/10 to 2 Vdc, Modulating Control

GMA Series Spring Return
Direct-coupled Electronic Damper Actuator.

Description

The OpenAir GMA Series Direct-coupled, Spring Return Electronic Damper Actuators provide modulating, two-position and floating control of building HVAC dampers.

Features

- 24 Vac/dc compatible
- Integral 1/2-inch conduit connector
- Small actuator footprint with 62 lb.-in. of torque
- Bi-directional fail-safe spring return
- Unique self-centering shaft coupling
- Floating control models available with feedback potentiometer
- Manual override
- Mechanical range adjustment capability
- Easily visible position indicator
- Brushless DC motor technology
- Precabled
- UL60730, cUL (C22.2 No. 24-93), and CE listed
- All modulating types contain built-in feedback
- Assembled in the U.S.A

Options

- Dual independently adjustable auxiliary switch
- Adjustable offset and span
- Signal inversion

Applications

The OpenAir GMA Series Damper Actuators are ideal for constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers that require up to 62 lb.-in. of torque.

The actuators are designed for applications where the damper is required to return to a fail-safe position when there is a power failure.

Models are available with either an appliance cable for wiring in conduit or a plenum-rated cable.

Specifications

Operating Voltage
GMA12x, GMA13x, GMA16x, GMA15x ..... 24 Vac ±20%; 24 Vdc ±15%
GMA22x ..... 120 Vac ±10%

Frequency ..... 50/60 Hz

Power Consumption ..... 24 Vac/dc
Running ..... 5 VA (3.5 W)
Holding ..... 4 VA (3 W)

Equipment Rating ..... Class 2, in accordance with UL/CSA

Control Signal
Input Signal (wires 8-2) GMA16x
Voltage Input
GMA16x ..... 0 to 10 Vdc (max. 35 Vdc)
GMA15x ..... 2 to 10 Vdc (max. 35 Vdc)
Input Resistance ..... >100K Ohms

Control Signal Adjustment
Offset (Start Point) ..... 0 to 5 Vdc
Factory Setting ..... 0 V
Span ..... 2 to 30 Vdc
Factory Setting ..... 30 V

Dual Auxiliary Switch
Contact Rating
AC Rating ..... 24 to 250 Vac
AC 6 A resistive
AC 2A General Purpose
DC Rating ..... 12 to 30 Vdc
DC 2 A

Position Feedback ..... 0 to 1000 Ohm <10 mA

Feedback Signal ..... Position output signal (wires 9-2) GMA16x.xx/ GMA15x.xx

Voltage Output
GMA16x ..... 0 to 10 Vdc
GMA15x ..... 2 to 10 Vdc
Max. Output Current (both) ..... +1 mA, -0.5 mA

Running Torque ..... 62 lb.-in. (7 Nm)
Spring Return Torque ..... 62 lb.-in. (7 Nm)
Max. Torque ..... 186 lb.-in. (21 Nm)

Runtime for 90° operating with motor ..... 90 sec.
Closing on power loss ..... 15 sec. typical
(60 sec. Max. at -25°F)

Nominal Angle of Rotation ..... 90°, 95° max.

Shaft Dimensions ..... 1/4 to 3/4-in. (6 to 20.5 mm) Dia. ●
1/4 to 1/2-in. (6 to 13 mm) Sq. ■

Min. Shaft Length ..... 3/4-in. (20 mm) min. length

Temperature
Operating ..... -25° to 130°F (-32° to 55°C)
Storage ..... -25° to 158°F (-32° to 70°C)

Humidity ..... 95% RH, non-condensing

Agency Approvals ..... UL listed UL60730 (Replacing UL873)
C-UL certified to Canadian Standard C22.2 No. 24-93
CE

Housing
Enclosure ..... NEMA 1
Material ..... Die-cast Aluminum Alloy
Gear Lubrication ..... Silicone free

Pre-cabled Connection ..... 18 AWG, 3 ft. (0.9 m)

Life Cycle ..... Designed for over 60,000 full strokes at rated torque and temperature

Dimensions ..... 8.38" H x 3.25" W x 2.67" D
(212 mm H x 83 mm W x 68 mm D)

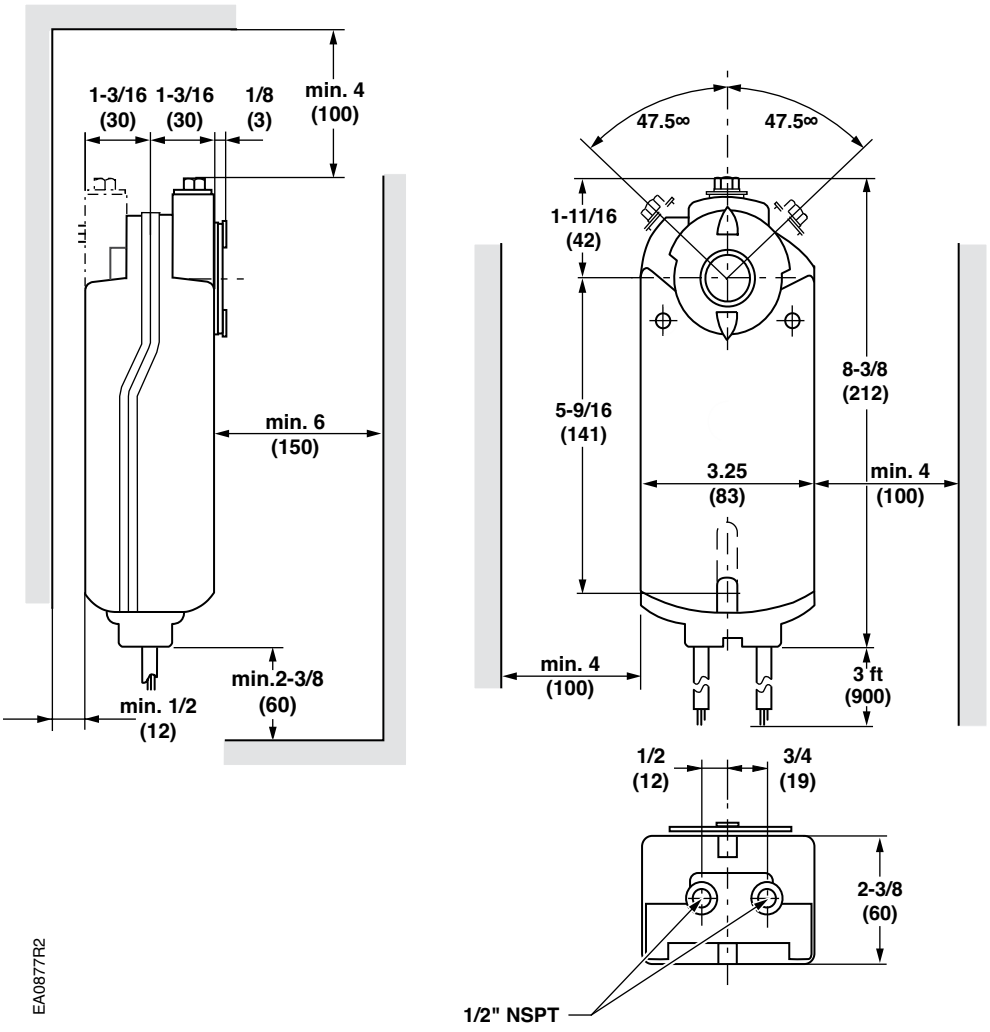
Shipping Weight ..... 2.86 lbs. (1.3 kg)

Product Ordering

Input Signal	Cabling	Part No. Standard	Span/Offset Adjustable	Dual Aux. Switches & Span/Offset Adjustable	Dual Aux. Switches Only	Position Feedback Only
Modulating, 0 to 10 Vdc, 24 Vac/dc	Plenum Cable	**GMA161.1P**	**GMA163.1P**	—	**GMA166.1P**	—
	Plenum Cable/Bulk	**GMA161.1P/B**	—	—	—	—
	Standard	**GMA161.1U**	**GMA163.1U**	**GMA164.1U**	**GMA166.1U**	—
Modulating, 24 Vac/dc 2 to 10 Vdc/10 to 2 Vdc (Signal inversion)	Plenum Cable	**GMA151.1P**	—	—	**GMA156.1P**	—
	Standard	**GMA151.1U**	—	—	**GMA156.1U**	—
2-position, 24 Vac/Vdc	Plenum Cable	**GMA121.1P**	—	—	**GMA126.1P**	—
	Plenum Cable/Bulk	**GMA121.1P/B**	—	—	—	—
	Standard	**GMA121.1U**	—	—	**GMA126.1U**	—
	Standard/Bulk	**GMA121.1U/B**	—	—	—	—
2-position, 120 Vac	Standard	**GMA221.1U**	—	—	**GMA226.1U**	—
	Standard/Bulk	**GMA221.1U/B**	—	—	—	—
Floating, 24 Vac/Vdc	Plenum Cable	**GMA131.1P**	—	—	—	—
	Standard	**GMA131.1U**	—	—	**GMA136.1U**	**GMA132.1U**

Ordering Notes:
Bulk packages contain 10 actuators.

GMA/GEB Series OpenAir Damper Actuator



Dimensions shown in inches (mm).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Electronic Damper Actuator Spring Return

GCA Series Spring Return Electronic Damper Actuator.

Easily Replaces:

- Belimo AF Series

160 lb.-in. Torque
24 Vac/dc, 2-Position Control
120 Vac, 2-Position Control
24 Vac/dc, Floating Control
24 Vac/dc, 0 to 10 Vdc/2 to 10 Vdc, Modulating Control

Description

Designed for control of building HVAC dampers, the OpenAir GCA Series Direct-coupled, Spring Return Electronic Actuators are available in 0 to 10 Vdc or 2 to 10 Vdc modulating, floating and two-position (on/off) control models.

Features

- 24 Vac/dc compatible
- Visible position indication
- Self-centering shaft coupling
- Bidirectional fail-safe spring return
- Rugged all metal housing
- Accepts shaft diameters up to 1" (25 mm)
- Quiet, low-power operation
- Brushless DC motor technology with stall protection
- Assembled in the U.S.A.
- Manual override
- Precabled
- All modulating types contain built-in feedback

Options

- Independently adjustable dual auxiliary switches
- Potentiometer for floating models
- Adjustable span and offset
- Signal inversion

Applications

The OpenAir GCA Series Damper Actuators are ideal for constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers that require up to 160 lb.-in. (18 Nm) torque.

The actuators are designed for applications where the damper is required to return to a fail-safe position when there is a power failure.

Models are available with either an appliance cable for wiring in conduit or a plenum-rated cable for applications where conduit is not required.

Specifications

Operating Voltage (1–2)
GCA1xx ..... 24 Vac ±20%, 24 Vdc ±10%
GCA22x ..... 120 Vac ±10%

Frequency ..... 50 to 60 Hz

Power Consumption
GCA15x.xx & GCA16x.xx
Running ..... 9 VA (7 W)
Holding ..... 5 VA (4 W)
GCA12x.xx AC 24 Vac/dc
Running ..... 8 VA (6 W)
Holding ..... 3 VA (3 W)
GCA22x.xx AC 120 Vac
Running ..... 9 VA (7 W)
Holding ..... 9 VA (7 W)
GCA13x.xx AC 24 Vac/dc
Running ..... 8 VA (6 W)
Holding ..... 5 VA (4 W)

Input Signal (8–2)
GCA16x
Voltage-input ..... 0 to 10 Vdc (max. 35 Vdc)
Input Resistance ..... >100 K Ohms
GCA15x
Voltage-input ..... 0 to 10 Vdc or 2 to 10 Vdc (max. 35 Vdc)
Input Resistance ..... >100 K Ohms

Position Output Signal (9–2)
GCA16x/GCA15x
Voltage-output ..... 0 to 10 Vdc
Max. Output Current ..... ±1 mA

Equipment Rating for Operating Voltage, Input Signal, and Position Output Signal ..... Class 2

Control Signal Adjustment
Offset (start point) ..... 0 to 5 Vdc
Factory setting ..... 0 V
Span ..... 2 to 30 Vdc
Factory setting ..... 10 V

Dual Auxiliary Switch
Contact Rating
Standard Cable ..... 6 A resistive, 2 A General Purpose
Plenum Cable ..... 4 A resistive, 2 A General Purpose
Voltage
Standard Cable ..... 24 to 250 Vac
Plenum Cable ..... 24 Vac
Switch Range
Switch A ..... 0° to 90° with 5° intervals
Recommended Range ..... 0 to 45°
Switch B ..... 0° to 90° with 5° intervals
Recommended Range ..... 45° to 90°
Switching Hysteresis ..... 2°

Position Feedback
GCA132.1x ..... 0 to 1000 Ohm <10 mA

Torque
Running Torque ..... 160 lb.-in. (18 Nm)
Spring Return ..... 160 lb.-in. (18 Nm)
Max. Torque ..... <380 lb.-in. (43 Nm)

Runtime for 90° operating with motor ..... 90 seconds
Closing (on power loss) with Spring Return ..... 15 seconds

Nominal Angle of Rotation ..... 90°

Max. Angular Rotation ..... 95°

Temperature
Operation ..... -25° to 130°F (-32° to 55°C)
Storage and Transport ..... -40° to 158°F (-40° to 70°C)

Humidity ..... 95% RH, non-condensing

Shaft Size ..... 3/8 to 1-in. (8 to 25 mm) Dia. ●
1/4 to 3/4-in. (6 to 18 mm) Sq. ■

Min. Shaft Length ..... 3/4-in. (20 mm)

Housing Enclosure ..... NEMA 2*

Material ..... Die-cast Aluminum alloy

Pre-cabled Connection ..... AWG 18

Cable Length ..... 3 ft. (0.9 m)

Agency Approvals UL60730
cUL C22.2 No. 24-93
CE

Dimensions ..... 12" H x 4.75" W x 2.88" D
(305 mm H x 121 mm W x 73 mm D)

Shipping Weight ..... 4.85 lb. (2.2 kg)

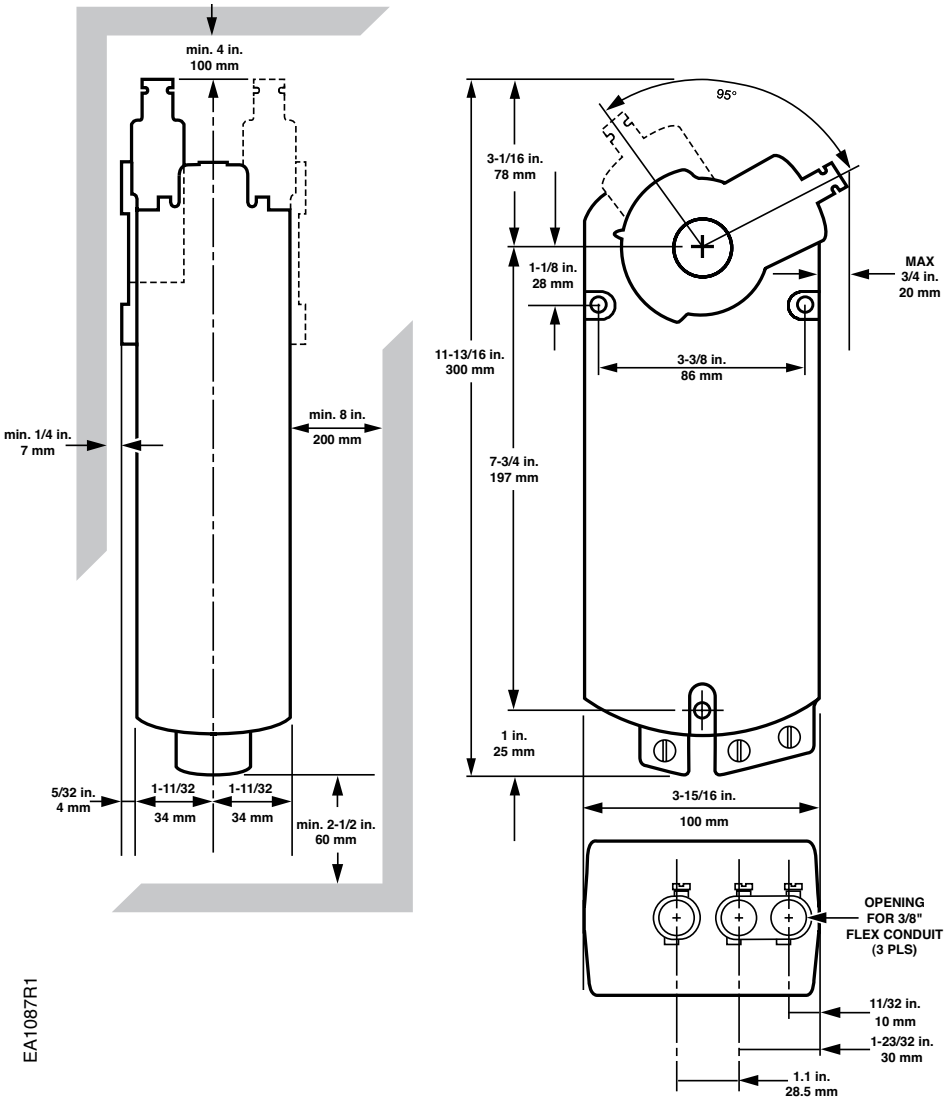
*Refer to Installation Instructions for acceptable mounting positions.

Product Ordering

Input Signal	Cabling	Part No. Standard	Span/Offset Adjustable	Dual Aux. Switches & Span/Offset Adjustable	Dual Aux. Switches Only	Position Feedback Only
0 to 10 Vdc, 24 Vac/dc	Standard	**GCA161.1U**	**GCA163.1U**	**GCA164.1U**	**GCA166.1U**	—
	Plenum Cable	**GCA161.1P**	**GCA163.1P**	**GCA164.1P**	**GCA166.1P**	—
	Plenum Cable/Bulk	**GCA161.1P/B**	—	—	—	—
0 to 10 Vdc or 2 to 10 Vdc Modulating 24 Vac/dc, (Signal Inversion)	Standard	**GCA151.1U**	—	—	**GCA156.1U**	—
	Plenum Cable	**GCA151.1P**	—	—	**GCA156.1P**	—
2-position, 24 Vac/dc	Standard	**GCA121.1U**	—	—	**GCA126.1U**	—
	Standard/Bulk	**GCA121.1U/B**	—	—	—	—
	Plenum Cable	**GCA121.1P**	—	—	**GCA126.1P**	—
2-position,120 Vac	Standard	**GCA221.1U**	—	—	**GCA226.1U**	—
	Standard/Bulk	**GCA221.1U/B**	—	—	—	—
Floating, 24 Vac/dc	Standard	**GCA131.1U**	—	—	**GCA136.1U**	**GCA132.1U**
	Plenum Cable	**GCA131.1P**	—	—	**GCA136.1P**	**GCA132.1P**

Ordering Notes:
Bulk packages contain 8 actuators.

GCA/GIB/GBB Series OpenAir Damper Actuator



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Rotary, Electronic Damper Actuators Fail Safe and Fail-In-Place

53 lb.-in. Torque
2-Position Control
Floating Control
0-10/2-10 Vdc Modulating Voltage Control
(0) 4-20 mA Modulating Current Control

GNP/GAP Series Spring Return and
Non-Spring Return Electronic Damper Actuator.

Description

Designed for control of critical environments, the OpenAir direct-coupled fail safe/fail-in-place electronic actuators are available in modulating, two-position, and floating control for laboratory fume hoods, supply and exhaust units.

Features

- Fast operation, 2 seconds runtime
- One model performs all control signals:
  - 2-position
  - Floating
  - Modulating (0(2) to 10 Vdc and 4 (0) to 20 mA)
- 24 Vac/dc compatible
- Selectable fail-safe position (fail open or closed)
- Feedback standard on all models
- Highly accurate positioning
- Self centering
- Unique self-centering shaft coupling
- Assembled in the U.S.A.
- Plenum rated
- UL and cUL listed, CE certified
- Manual Override
- Precabled

Options

- Available with dual, independently adjustable auxiliary switches

Applications

Used in laboratory fume hoods, constant or variable air volume installations for the control of supply and exhaust air terminals; 53 lb-in (6 Nm) torque.

Models designed for applications that require the damper to return to a fail-safe position when there is a power failure; or models for fail-in-place.

Specifications

Operating Voltage (1–2) ..... 24 Vac/dc ±20%
Frequency ..... 50 to 60 Hz
Power Consumption
GNP19x/GAP19x
Running ..... 28 VA (19 W)
Holding ..... 8 VA (5 W)
Control Signal Y/Y1 (Wires 8-2)
Modulating Input Signal
Voltage Input Signal ..... 0 to 10 Vdc (Max. 35 Vdc)
or 2 to 10 Vdc (Max. 35 Vdc)
Current Input Signal ..... 4-20 mA or 0-20 mA
Input Resistance ..... >100K ohms
Floating Input Signal ..... 0 or 24 Vac/dc Clockwise
Control Signal Y2 (Wires 7-2)
Floating Input Signal ..... 0 or 24 Vac/dc Clockwise
Position Output Signal (Wires 9-2)
Voltage-Output ..... 0 to 10 Vdc
Maximum Output Current DC ..... ± 1 mA
Equipment Rating ..... Class 2, in Accordance with UL/CSA Class III per EN 60730
Dual Auxiliary Switches
Contact Loading ..... 6 A resistive, 2A inductive
Voltage (No Mixed Operation 24 Vac/230 Vac) ..... 24 to 250 Vac
Switch Range ..... 5° to 90°
Step Increments ..... 5°
Feedback Signal (Wires 9-2)
Position Output Signal ..... 0 to 10 Vdc
Maximum Output Current ..... DC ± 1 mA
Torque
Running Torque ..... 53 lb-in (6 Nm)
Maximum Torque ..... 142 lb-in (16 Nm)

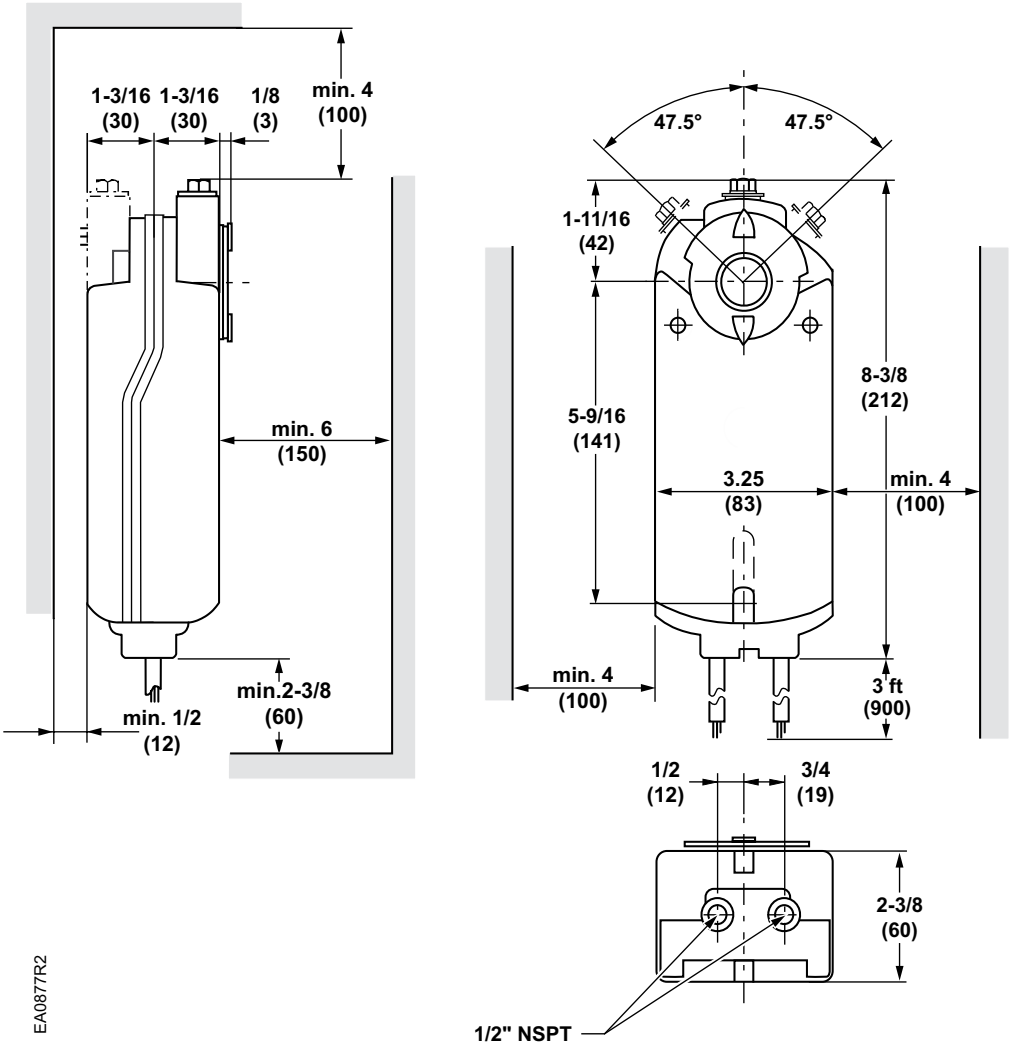
Runtime for 90° Operating with Motor ..... < 2 seconds
Fail-safe position on power loss (for GNP19x only) ..... 2 seconds
Nominal Angle Of Rotation ..... 90°
Maximum Angular Rotation ..... 95°
Fail-Safe Operation
GNP Actuator Series ..... On initial power-up, and after a power-fail event, the GNP actuators require up to 90 seconds for the capacitors to fully charge. During this time the actuator will respond to positioning commands, but will not power-fail until the capacitors are fully charged.
Temperature
Operation ..... -0°F to 122°F (-18°C to 50°C)
Storage and Transport ..... -26°F to 158°F (-32°C to 70°C)
Humidity ..... 95% RH, Non-condensing
Shaft Size ..... 1/4 to 3/4-inch (6.4 to 20.5 mm) dia. ●
1/4 to 1/2-inch (6.4 to 13 mm) square ■
Minimum Shaft Length ..... 3/4-inch (20 mm)
Housing Enclosure ..... NEMA 1 IP54 according to EN 60 529*
Material ..... Die-cast Aluminum Alloy
Cable Length ..... 3 Ft. (0.9 m)
Agency Approvals ..... UL 873
cUL C22, 2 No. 24-93
CE
Dimensions ..... 8-3/8" H x 3-1/4" W x 2-3/8" D
(212 mm H x 83 mm W x 60 mm D)
Shipping Weight ..... 3 lbs 6 oz

*Limited positions; refer to OpenAir™ GNP/GAP Series Installation Instructions, 129-541.

Product Ordering

Input Signal	Standard Model w/Plenum Cable	Dual Adjustable Auxiliary Switches
Fail Safe 2P, Floating, 0-10 Vdc, 2-10 Vdc, 4-20 mA	**GNP191.1P**	**GNP196.1P**
Fail-in-place 2P, Floating, 0-10 Vdc, 2-10 Vdc, 4-20 mA	**GAP191.1P**	**GAP196.1P**

GNP/GAP Series Rotary, Electronic Damper Actuators



Dimensions shown in inches (mm).

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Electronic Damper Actuators Non-Spring Return

NEW!

GSD Series Non-Spring Return
Direct Coupled Electronic Damper Actuator.

Easily Replaces:

- Belimo CM Series

20 lb.-in. Torque
24 Vac/dc, 2-Position (Open/Closed) Control
24 Vac/dc, Floating Control
24 Vac/dc, 2 to 10 Vdc/10 to 2 Vdc, (Modulating) Control

Description

The OpenAir GSD Series direct-coupled, non-spring return rotary electronic damper actuators are 24 Vac/dc rated and available in 2-position, floating, and modulating [0(2) to 10 Vdc or 10 to 0(2) Vdc] control.

Applications

The small footprint and torque make this actuator ideal for VAV boxes, small HVAC dampers, economizers, or residential zone dampers.

Features

- Pre-cabled
- Plenum rated models available
- Optional built-in auxiliary switches with fixed switch points at 5° and 85° rotation
- 30-second run time
- Signal inversion capability on modulating type [0(2) to 10 Vdc or 10 to 0(2) Vdc]
- Small footprint for installation flexibility
- UL and cUL listed; CE certified
- Approved for installation in plenum areas by Underwriters Laboratories, Inc. per UL 2043.
- Low voltage models are 24 Vac/dc compatible
- 100 to 240 Vac models available
- Fixed Dual End Switches
  24 Vac to 250 Vac/12 to 30 Vdc
  6A resistive/2A inductive @ AC
  4A resistive/2A inductive @ 30 Vdc
  0.8A resistive, 0.5A inductive @ 60 Vdc
- 1/2" NPT conduit

Specifications

Operating Voltage
- GSD1x: 24 Vac/dc ±20%
- GSD3x: 100 to 240 Vac ±10%

Frequency: 50/60 Hz

Power Consumption
- GSD14x (24 Vac/dc 60 Hz)
  - Running: 2.2 VA (1.2 W)
  - Holding: 1.0 VA (0.5 W)
- GSD14x (24 Vac/dc 60 Hz)
  - Running: 2.4 VA (1.4 W)
  - Holding: 1.2 VA (0.7 W)
- GSD14x (24 Vac/dc 60 Hz)
  - Running: 4.5 VA (1.8 W)
  - Holding: 2.4 VA (0.9 W)

Function
- Torque: 20 lb.-in. (2 Nm)
- Runtime for 90°: 30 sec.
- Nominal Angle of Rotation: 90°

Auxiliary Switches: Fixed at 5º and 85º
- AC Rating: 24 to 250 Vac
  AC 6A resistive
  AC 2A General Purpose
- DC Rating (Standard/Plenum Cable): 12 to 30 Vdc
  DC 2A

Shaft Size: 3/8 to 1/2-in. (8 to 13 mm) round ●
1/4 to 7/16-in. (6 to 11 mm) square ■

Min. Shaft Length: 3/4-in (20 mm)

Housing Enclosure: NEMA 1

Material: Plenum rated rugged plastic

Ambient Temperature
- Operating: -25° to 130°F (-32° to 55°C)
- Storage and Transport: -25° to 158°F (-32° to 70°C)

Ambient Humidity: 95% RH, non-condensing

Agency Approvals: UL listed per UL 60730,
cUL listed to CSA C22.2 N. 24-93;
CE certified
- 120 through 240 Vac: EMC and Low Voltage Directives

Pre-Cabled Connection: AWG 18

Cable Length: 3 ft. (0.9m)

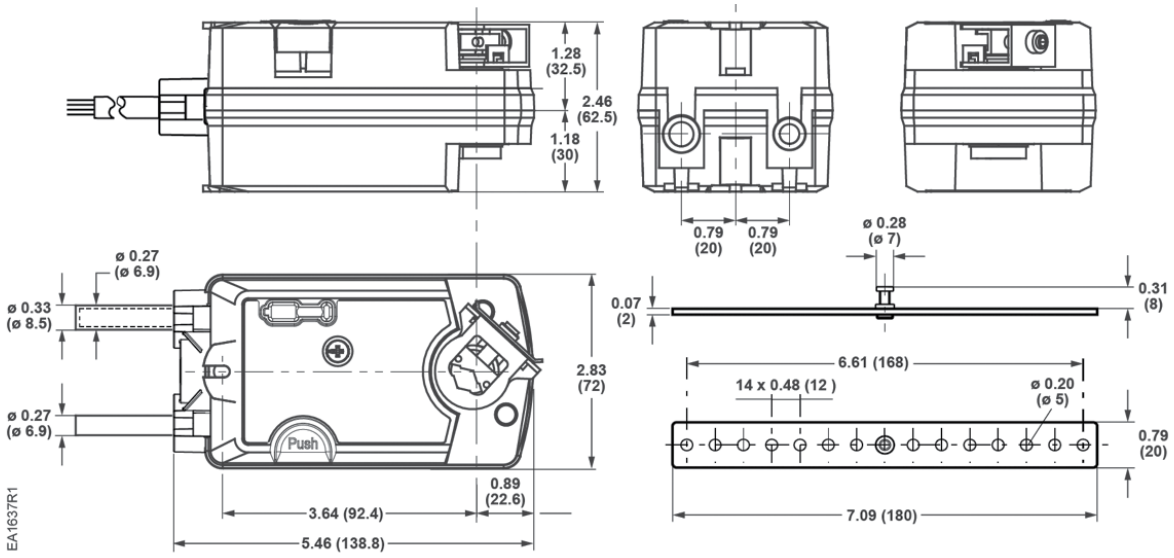
Dimensions: 5.46" H x 2.83" W x 2.45" D
(138.8 mm H x 72 mm W x 62.5 mm D)

Shipping Weight: 1.54 lbs. (0.55 kg)

Product Ordering

Control Signal	Cabling	Part No.	
		Standard	Aux. Switch
2-position/Floating, 24 Vac/dc	Plenum	**GSD141.1P**	**GSD146.1P**
2-position/Floating, 100 to 240 Vac	Appliance	**GSD341.1U**	**GSD346.1U**
0 to 10 Vdc or 2 to 10 Vdc Modulating 24 Vac/dc	Plenum	**GSD161.1P**	**GSD166.1P**

GSD Series Actuators with Mounting Bracket



Dimensions shown in inches (mm).

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Electronic Damper Actuator Non-Spring Return

NEW!

GDE Series Non-Spring Return Electronic Damper Actuator.

Easily Replaces:

- Belimo LM Series

44 lb.-in. Torque
24 Vac/dc, 2-Position/Floating Control
120 Vac, 2-Position/Floating Control
0(2) to 10 Vdc/10 to 0(2) Vdc, Modulating Control

Description

The OpenAir GDE Series Direct-coupled Non-Spring Return Rotary Electronic Actuator is designed for 0 to 10 Vdc or 2-position/floating control of building HVAC dampers.

Features

Enhanced Features

- New 141 models perform both 2-position and floating control
- Selectable modulating control (0 to 10 Vdc or 2 to 10 Vdc)
- 24 Vac/dc compatible
- New line voltage 341 models for 100 to 240 Vac 2-position/floating control
- Integral 1/2 inch conduit connection (No conduit on auxiliary switch types – use ASK76.1U bracket)

Standard Features

- Compact design
- Easy-to-see position indicator
- Self-adapting capability for maximum flexibility in damper positioning
- Energy efficient
- UL, cUL, CE listed
- Quiet operation
- Rated NEMA 2
- Assembled in the U.S.A.
- Manual override
- Modulating actuators contain built-in feedback
- N Versions designed for under floor installation (pluggable cable connections)

Options

- Independently adjustable dual auxiliary switches
- Adjustable start/span
- Standard or plenum cable
- Available in bulk packs for additional savings
- Potentiometer on 2-position/floating control

Applications

The OpenAir GDE Series Damper Actuators are used in Constant or Variable Air Volume installations for the control requiring up to 44 lb.-in. (5 Nm) torque.

Models are available with either a universal cable for wiring in conduit or a plenum-rated cable for applications where conduit is not required.

Siemens Product Guard **PLUS 3** Warranty

Specifications

Operating Voltage ..... 24 Vac/dc
100 to 240 Vac (GDE34x)

Frequency ..... 50/60 Hz

Power Consumption
- GDE14x
  - Running ..... 2 VA (1 W)
- GDE34x
  - Running ..... 5 VA (1.6 W)
- GDE16x
  - Running ..... 2.1 VA (1.2 W)

Input signal (8–2)
- Voltage-Input ..... 0(2) to 10 Vdc
- Input Resistance ..... 100K Ohms

Position Output Signal (9–2)
- Voltage-Output ..... 0(2) to 10 Vdc
- Max. Output Current ..... 1 mA

Equipment Rating for Operating Voltage, Input Signal, and Position Output Signal ..... Class 2

Control Signal Adjustment
- Offset (Start Point) ..... Between 0 to 5 Vdc
- Factory Setting ..... 0 V
- Span ..... Between 2 to 10 Vdc

Dual Auxiliary Switch
- Contact Rating ..... 4 A resistive, 2 A General Purpose
- Voltage ..... 24 Vac
- Switch Range
  - Switch A ..... 0° to 90° with 5° intervals
  - Recommended Range Usage ..... 0 to 45°
  - Factory Setting ..... 5°
  - Switch B ..... 0° to 90° with 5° intervals
  - Recommended Range Usage ..... 45° to 90°
  - Factory Setting ..... 85°
- Switching Hysteresis ..... 3°

Position Feedback
- GDE142.1P ..... 0 to 5000 Ohm <10 mA

Function
- Torque ..... 44 lb.-in. (5 Nm)
  - at 50/60 Hz ..... 90 sec.
- Nominal Angle of Rotation ..... 90°
- Max. Angular Rotation ..... 95°

Shaft Size ..... 3/8 to 5/8-in. (8 to 16 mm) Dia. ●
1/4 to 1/2-in. (6 to 13 mm) Sq. ■

Min. Shaft Length ..... 3/4-in. (20 mm)

Housing Enclosure ..... NEMA Type 2

Material ..... Plenum Rated Rugged Plastic

Temperature
- Operation ..... -25° to 130°F (-32° to 55°C)
- Storage and Transport ..... -25° to 140°F (-30° to 60°C)

Humidity ..... 95% RH, non-condensing

Agency Approvals UL873
cUL C22.2 No. 24-93
CE

Pre-cabled Connection ..... AWG 18

Cable Length ..... 3 ft. (0.9 m)

Dimensions ..... 6.6" H x 2.7" W x 2.3" D
(167 mm H x 68 mm W x 59.2 mm D)

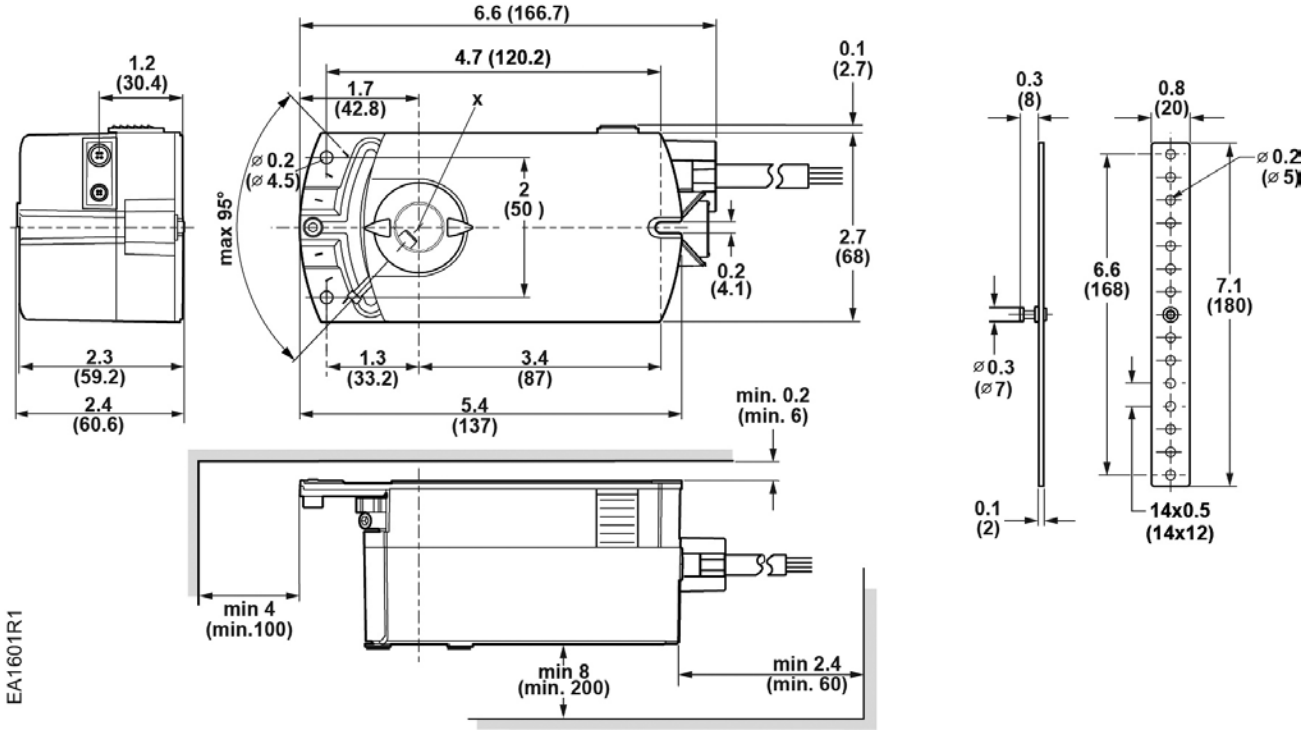
Weight ..... 1.35 lb. (0.61 kg)

Product Ordering

Input Signal	Part No.					Pre-Cabled	No Cables
	Standard	With Potentiometer	Slope/Offset Adjustable	Dual Aux. Switches & Slope/Offset Adjustable	Dual Aux. Switches Only		
Enhanced Models							
2-position/Floating 24 Vac/dc	**GDE141.1U** **GDE141.1U/B**	—	—	—	—	Standard	—
	GDE141.1P **GDE141.1P/B (24 ea)**	**GDE142.1P**	—	—	**GDE146.1P**	Plenum	—
	GDE141.1Q	—			—	6 ft Plenum	
2-position/Floating 100 to 240 Vac	**GDE341.1U**	—	—	—	**GDE346.1U**	Standard	—
Modulating 0(2) to 10 Vdc 24 Vac/dc	**GDE161.1P** **GDE161.1P/B (24 pk)**	—	**GDE163.1P**	**GDE164.1P**	**GDE166.1P**	Plenum	—
	GDE161.1Q	—	—	—	—	6 ft Plenum	—
Standard Models							
Floating 24 Vac	**GDE131.1U** **GDE131.1U/B (24 pk)**	—	—	—	—	Standard	—
	GDE131.1P **GDE131.1P/B (24 pk)**	—	—	—	—	Plenum	—
	GDE131.1N	—	—	—	—	—	Post Header AMP
	GDE131.1T **GDE131.1T/B (24 pk)**	—	—	—	—	—	Terminal Strip
0 to 10 Vdc 24 Vac/dc	**GDE161.1N**	—	—	—	—	—	Post Header AMP
	GDE161.1T **GDE161.1T/B (24 pk)**	—	—	—	—	—	Terminal Strip

Cables compatible with the GDE131.1N and GDE161.1N sold seperately on page B-67.

GDE/GLB Series OpenAir Electronic Damper Actuator and Mounting Bracket



Dimensions shown in inches (mm).

Electronic Damper Actuator Non-Spring Return

NEW!

GLB Series Non-Spring Return Electronic Damper Actuator.

Easily Replaces:

- Belimo NM Series

88 lb.-in. Torque
24 Vac/dc, 2-Position/Floating Control
100 to 240 Vac, 2-Position/Floating Control
0 to 10 Vdc, Modulating Control

Description

The OpenAir GLB Series Direct-coupled Non-Spring Electronic Actuator is designed for 0 to 10 Vdc or floating control of building HVAC dampers.

Features

Enhanced Features

- New 141 models perform both 2-position and floating control
- Selectable modulating control (0 to 10 Vdc or 2 to 10 Vdc)
- 24 Vac/dc compatible
- New line voltage 341 models for 100 to 240 Vac 2-position/floating control
- Integral 1/2 inch conduit connection (No conduit on auxiliary switch types – use ASK76.1U bracket)

Standard Features

- Compact design
- Easy-to-see position indicator
- Self-adapting capability for maximum flexibility in damper positioning
- UL, cUL, CE listed
- Quiet operation
- Rugged all metal housing, rated NEMA 2
- Assembled in the U.S.A.
- Manual override
- Plenum-rated cable
- Modulating actuators contain built-in feedback
- Energy efficient

Options

- Independently adjustable dual auxiliary switches
- Adjustable start/span
- Potentiometer on 2-position/floating control

Applications

The OpenAir GLB Series Damper Actuators are used in constant or variable air volume installations for the control requiring up to 88 lb.-in. (10 Nm) torque.

Siemens Product Guard **PLUS 3** Warranty

Specifications

Operating Voltage ..... 24 Vac/dc
100 to 240 Vac (GLB34x)

Frequency ..... 50 to 60 Hz

Power Consumption
- GLB14x
  - Running ..... 2.2 VA (1.3 W)
- GLB34x
  - Running ..... 5.8 VA (1.9 W)
- GLB16x
  - Running ..... 2.5 VA (1.5 W)

Input Signal (8–2)
- Voltage-Input ..... 0(2) to 10 Vdc
- Input Resistance ..... 100K Ohms

Position Output Signal (9–2)
- Voltage-Output ..... 0(2) to 10 Vdc
- Max. Output Current ..... 1 mA

Equipment Rating for Operating Voltage, Input Signal, and Position Output Signal ..... Class 2

Dual Auxiliary Switch
- Contact Rating ..... 4 A resistive, 2 A General Purpose
- Voltage ..... 24 Vac
- Switch Range
  - Switch A ..... 0° to 90° with 5° intervals
  - Recommended Range Usage ..... 0 to 45°
  - Factory Setting ..... 5°
  - Switch B ..... 0° to 90° with 5° intervals
  - Recommended Range Usage ..... 45° to 90°
  - Factory Setting ..... 85°
- Switching Hysteresis ..... 3°

Function
- Torque ..... 88 lb.-in. (10 Nm)
- at 50/60 Hz ..... 125 sec.
- Nominal Angle of Rotation ..... 90°
- Max. Angular Rotation ..... 95°

Shaft Dimensions ..... 3/8 to 5/8-in. (8 to 16 mm) Dia.
1/4 to 1/2-in. (6 to 13 mm) Sq.

Min. Shaft Length ..... 3/4-in. (20 mm)

Housing Enclosure ..... NEMA 2

Material ..... Plenum Rated Rugged Plastic

Temperature
- Operation ..... -25° to 130°F (-32° to 55°C)
- Storage and Transport ..... -40° to 158°F (-40° to 70°C)

Humidity ..... 95% RH, non-condensing

Agency Approvals UL873
cUL C22.2 No. 24-93
CE

Pre-cabled Connection ..... AWG 18

Cable Length ..... 3 ft. (0.9 m)

Dimensions ..... 6.6" H x 2.7" W x 2.3" D
(167 mm H x 68 mm W x 59.2 mm D)

Weight ..... 1.35 lb. (0.61 kg)

Refer to page B-30 for Dimensions.

Product Ordering

Input Signal	Cabling	Part No. Standard	Part No. Dual Aux. Switches Only
Enhanced Models			
2-position/Floating, 24 Vac/dc	3' Plenum Cable	**GLB141.1P**	**GLB146.1P**
	6' Plenum Cable	**GLB141.1Q**	**—**
2-position/Floating, 100 to 240 Vac	Standard	**GLB341.1U**	**GLB346.1U**
0(2) to 10 Vdc	3' Plenum Cable	**GLB161.1P**	**GLB166.1P**
	6' Plenum Cable	**GLB161.1Q**	**—**

Electronic Damper Actuator Non-Spring Return

Easily Replaces:

- Belimo NM Series

132 lb.-in. Torque
24 Vac, Floating Control
0 to 10 Vdc or 2 to 10 Vdc, Modulating Control

GEB Series Non-Spring Return
Direct-coupled Electronic Damper Actuator.

Description

The OpenAir GEB Series Direct-coupled, Non-Spring Return Electronic Damper Actuators provide modulating and floating control of building HVAC dampers.

Features

- Integral 1/2-inch conduit connector
- Unique self-centering shaft coupling
- All metal housing
- Manual override
- DIP switches GEB16x.1x
  - Direction of rotation
  - Adaptation of rotational angle range
  - Selection of 0 to 10 or 2 to 10 Vdc control signal
- Mechanical range adjustment capability
- Easily visible position indicator
- Precabled
- UL60730, cUL (C22.2 No. 24-93) and CE listed
- Brushless motor technology
- All modulating types contain built-in feedback
- Assembled in the U.S.A.

Options

- Dual independently adjustable auxiliary switches
- Adjustable offset/span
- Floating control models available with feedback potentiometer

Applications

The OpenAir GEB Series Damper Actuators are ideal for Constant or Variable Air Volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers that require up to 132 lb.-in. of torque.

Specifications

Power Supply ..... 24 Vac
Operating Voltage ..... 24 Vac ±20%
Frequency ..... 50/60 Hz
Runtime for 90° ..... 125 seconds (60 Hz)
150 seconds (50 Hz)

Power Consumption GEB16x.1x
Running ..... 5 VA (4 W)
Holding ..... 1 VA

Power Consumption GEB13x.1x
Running ..... 3 VA (3 W)
Holding ..... 1 VA

Equipment Rating (24 Vac) ..... Class 2 per UL/CSA

Control Signal
Input Signal (wires 8-2) GEB16x.xx
Voltage Input ..... 0 to 10 Vdc or 2 to 10 Vdc (max. 35 Vdc)
Input Resistance ..... >100K Ohms

Feedback Signal ..... Position output signal (wires 9-2) GEB16x.xx
Voltage Output ..... 0 to 10 Vdc
Max. Output Current ..... ±1 mA

Control Signal Adjustment
Offset (Start Point) ..... 0 to 5 Vdc
Factory Setting ..... 0 V
Span ..... 2 to 30 Vdc
Factory Setting ..... 30 V

Dual Auxiliary Switch
Contact Rating
AC Rating ..... 24 to 250 Vac
AC 6A Resistive
AC 2A General Purpose
DC Rating ..... 12 to 30 Vdc
DC 2A
Plenum Cable ..... 4A resistive, 2A, General Purpose
Voltage
Standard Cable ..... 24 to 250 Vac
Plenum Cable ..... 24 Vac

Switch Range
Switch A ..... 0 to 90° with 5° intervals
Recommended Range ..... 0 to 45°
Switch B ..... 0 to 90°
Recommended Range ..... 45 to 90°
Switching Hysteresis ..... 2°

Position Feedback
GEB132.1U ..... 0 to 1000 Ohm <10 mA

Torque
Running Torque ..... 132 lb.-in. (16 Nm)
Spring Return Torque ..... 132 lb.-in. (16 Nm)
Max. Torque ..... >265 lb.-in. (30 Nm)

Nominal Angle of Rotation ..... 90°, 95° max.

Shaft Dimensions ..... 1/4 to 3/4-in. (6 to 20.5 mm) Dia.
1/4 to 1/2-in. (6 to 13 mm) Sq.

Min. Shaft Length ..... 3/4-in. (20 mm)

Temperature
Operating ..... -25 to 130°F (-32 to 55°C)
Storage ..... -40 to 158°F (-40 to 70°C)

Humidity ..... 95% RH, non-condensing

Pre-cabled Connection ..... 18 AWG, 3 ft. (0.9 m) long

Housing
Enclosure ..... NEMA 1
Material ..... Die-cast Aluminum alloy
Gear Lubrication ..... Silicone free

Agency Certifications ..... UL60730, (Replaces UL873)
cUL C22.2 No. 24-93
CE

Dimensions ..... 8.38" H x 3.25" W x 2.67" D
(212 mm H x 83 mm W x 68 mm D)

Shipping Weight ..... 2.2 lbs. (1.0 kg)

Refer to page B-13 for Dimensions.

Product Ordering

Input Signal	Cabling	Part No. Standard	Dual Aux. Switches & Offset/Span Only	Position Feedback Only	Dual Aux. Switches Only
Modulating, 0 to 10 Vdc	Plenum Cable	**GEB161.1P**	—	—	—
	Standard	**GEB161.1U**	**GEB164.1U**	—	—
Floating, 24 Vac	Plenum Cable	**GEB131.1P**	—	—	—
	Standard	**GEB131.1U**	—	**GEB132.1U**	**GEB136.1U**

Rotary Electronic Damper Actuator Non-Spring Return

GBB Series Non-Spring Return Electronic Damper Actuator.

Easily Replaces:

- Belimo SM/AM Series

221 lb.-in. Torque
0 to 10 Vdc, Modulating Control
Floating Control

c UL us LISTED

Description

Designed for control of building HVAC dampers, the OpenAir GBB Series Direct-coupled 24 Vac Non-Spring Return Electronic Damper Actuators are available in 0 to 10 Vdc and floating control.

Features

- Brushless motor technology with stall protection
- Self-centering shaft coupling
- Rugged all metal housing
- Quiet, low-power operation
- Accepts shaft diameters up to 1" (25 mm)
- Manual override
- Assembled in the U.S.A.
- UL, cUL and CE listed
- Modulating actuators contain built-in feedback

Options

- Independently adjustable dual auxiliary switches
- Adjustable offset and span
- Potentiometer built in for floating controls

Applications

The OpenAir GBB Series Damper Actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers that require up to 221 lb.-in. (25 Nm) torque.

Models are available with either an appliance cable for wiring in conduit or a plenum-rated cable for applications where conduit is not required.

Specifications

Operating Voltage ..... 24 Vac ± 20%
Frequency ..... 50 to 60 Hz
Power Consumption
0 to 10 Vdc ..... 8 VA
Floating ..... 7 VA
Input Signal (8–2)
Voltage-input ..... 0 to 10 Vdc (max. 35 Vdc)
Input Resistance ..... 100 K Ohms
Position Output Signal (9–2)
Voltage-output ..... 0 to 10 Vdc
Max. Output Current ..... ±1 mA
Equipment Rating for Operating Voltage ..... Class 2
Runtime for 90° Opening or Closing
60 Hz ..... 125 sec.
50 Hz ..... 150 sec.
Nominal Angle of Rotation ..... 90°
Max. Angular Rotation ..... 95°
Dual Auxiliary Switch
Contact Rating
Standard Cable ..... 6 A resistive, 2 A General Purpose
Plenum Cable ..... 4 A resistive, 2 A General Purpose
Voltage
Standard Cable ..... 24 to 250 Vac
Plenum Cable ..... 24 Vac
Switch Range
Switch A ..... 0° to 90° with 5° intervals
Recommended Range ..... 0° to 45°
Switch B ..... 0° to 90° with 5° intervals
Recommended Range ..... 45° to 90°
Switching Hysteresis ..... 2°

Position Feedback ..... 0 to 1000 Ohm <10 mA
Torque ..... 221 lb.-in. (25 Nm)
Temperature
Operating ..... -25° to 130°F (-32° to 55°C)
Storage and Transport ..... -40° to 158°F (-40° to 70°C)
Humidity ..... 95% RH, non-condensing
Agency Approvals UL873
cUL C22.2 No. 24-93
CE
Shaft Size ..... 3/8 to 1-in. (8 to 25 mm) Dia. ●
1/4 to 5/8-in. (6 to 16 mm) Sq. ■
Min. Shaft Length ..... 3/4-in. (20 mm)
Housing Enclosure ..... NEMA 2*
Material ..... Die-cast aluminum alloy
Cable Length ..... 3 ft. (0.9 m)
Dimensions ..... 12" H x 4.75" W x 2.88" D
(305 mm H x 121 mm W x 73 mm D)
Shipping Weight ..... 4.4 lb. (2.0 kg)

*Refer to Installation Instructions for acceptable mounting positions.

Refer to page B-17 for Dimensions.

Product Ordering

Input Signal	Cabling	Part No. Standard	Span/Offset Adjustable	Dual Aux. Switches & Span/Offset Adjustable	Dual Aux. Switches Only	Position Feedback
0 to 10 Vdc	Standard	**GBB161.1U**	**GBB163.1U**	**GBB164.1U**	**GBB166.1U**	**—**
	Plenum Cable	**GBB161.1P**	**GBB163.1P**	**GBB164.1P**	**GBB166.1P**	**—**
Floating	Standard	**GBB131.1U**	**—**	**—**	**GBB136.1U**	**GBB132.1U**
	Plenum Cable	**GBB131.1P**	**—**	**—**	**GBB136.1P**	**GBB132.1P**

Electronic Damper Actuator Non-Spring Return

Easily Replaces:

- Belimo GM Series

310 lb.-in. Torque
0 to 10 Vdc, Modulating Control
Floating Control

GIB Series Non-Spring Return Electronic Damper Actuator.

Description

The OpenAir GIB Series Direct-coupled 24 Vac Non-Spring Return Electronic Actuators are designed for modulating and floating control of building HVAC dampers.

Features

- Visible position indication
- Unique self-centering shaft coupling
- Rugged all metal housing
- Shaft diameters up to 1-inch (25 mm)
- All modulating types include built-in feedback
- Brushless motor technology
- Assembled in the U.S.A.
- Manual Override
- Tandem mount capability with standard GIB actuators
- Modulating actuators contain built-in feedback

Options

- Independently adjustable dual auxiliary switches
- Adjustable offset and span
- Potentiometer built in for floating control

Applications

The OpenAir GIB Series Damper Actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers requiring up to 310 lb.-in. (35 Nm) torque.

Models are available with either an appliance cable for wiring in conduit or a plenum-rated cable for applications where conduit is not required.

Specifications

Operating Voltage (1–2) ..... 24 Vac ±20%

Frequency ..... 50/60 Hz

Power Consumption
- 0 to 10 Vdc ..... 8 VA
- Floating ..... 7 VA

Input signal (8–2)
- Voltage-Input ..... 0 to 10 Vdc
- Input Resistance ..... 100K Ohms

Position Output Signal (9–2)
- Voltage-Output ..... 0 to 10 Vdc
- Max. Output Current ..... 1 mA

Equipment Rating for Operating Voltage, Input Signal, and Position Output Signal ..... Class 2

Control Signal Adjustment
- Offset (Start Point) ..... Between 0 to 5 Vdc
  - Factory Setting ..... 0 V
- Span ..... Between 2 to 30 Vdc

Dual Auxiliary Switch
- Contact Rating
  - Standard Cable ..... 6 A resistive, 2 A General Purpose
  - Plenum Cable ..... 4 A resistive, 2 A General Purpose
- Voltage
  - Standard Cable ..... 24 to 250 Vac
  - Plenum Cable ..... 24 Vac
- Switch Range
  - Switch A ..... 0° to 90° with 5° intervals
  - Recommended Range Usage ..... 0 to 45 °
  - Factory Setting ..... 5°
  - Switch B ..... 0° to 90° with 5° intervals
  - Recommended Range Usage ..... 45° to 90°
  - Factory Setting ..... 85°
- Switching Hysteresis ..... 2°

Position Feedback ..... 0 to 1000 Ohm <10 mA

Function
- Torque ..... 310 lb.-in. (35 Nm)
- Runtime for 90° Opening or Closing
  - 60 Hz ..... 125 sec
  - 50 Hz ..... 150 sec.
- Nominal Angle of Rotation ..... 90°
- Max. Angular Rotation ..... 95°
- Noise Level ..... <45 dBA

Shaft Dimensions ..... 3/8 to 1-in. (8 to 26 mm) Dia. ●
1/4 to 5/8-in. (6 to 16 mm) Sq. ■

Min. Shaft Length ..... 3/4-in. (20 mm)

Housing
- Enclosure ..... NEMA 2*
- Material ..... Die-cast Aluminum alloy

Temperature
- Operation ..... -25° to 130°F (-32° to 55°C)
- Storage and Transport ..... -40° to 158°F (-40° to 70°C)

Humidity ..... 95% RH, non-condensing

Agency Approvals UL873
cUL C22.2 No. 24-93
CE

Pre-cabled Connection ..... AWG 18

Cable Length ..... 3 ft. (0.9 m)

Dimensions ..... 12" H x 4.75" W x 2.88" D
(305 mm H x 121 mm W x 73 mm D)

Shipping Weight ..... 4.4 lb. (2.0 kg)

*Refer to the Installation Instructions for acceptable mounting positions.

Refer to page B-17 for Dimensions.

Product Ordering

Input Signal	Cabling	Part No. Standard	Span/Offset Adjustable	Dual Aux. Switches & Span/Offset Adjustable	Dual Aux. Switches Only	Position Feedback
0 to 10 Vdc	Standard	**GIB161.1U**	**GIB163.1U**	**GIB164.1U**	**GIB166.1U**	—
	Plenum Cable	**GIB161.1P**	**GIB163.1P**	**GIB164.1P**	**GIB166.1P**	—
Floating	Standard	**GIB131.1U**	—	—	**GIB136.1U**	**GIB132.1U**
	Plenum Cable	**GIB131.1P**	—	—	**GIB136.1P**	**GIB132.1P**

Electronic Damper Actuator

Designed for UL Listed Fire/Smoke and Smoke Control Dampers

53 lb.-in. Torque
2-position, 15-second Run Time
15-second Spring Return Time

GND Series Electronic Damper Actuator.

Description

Intended for use on UL listed smoke control dampers and combination fire/smoke rated dampers, the OpenAir GND Series Direct Coupled, Fast-Acting, Two-position, Spring Electronic Actuators are available in 24 Vac/dc, 120 Vac, and 230 Vac models.

Features

- Manual override
- 24 Vac/dc, 120 Vac and 230 Vac models available
- Reversible fail-safe spring return
- All metal housing
- Pre-cabled Teflon® insulated lead wires
- Fifteen-second operation at rated torque, temperature and voltage
- Assembled in the U.S.A.

Options

- Optional built-in auxiliary switches: Fixed switch points at 5° and 85° rotation
- Optional built-in Electronic Fusible Link (EFL) capability with four temperature ratings: 165°F (74°C), 212°F (100°C), 250°F (121°C), 350°F (177°C)

Applications

The GND Series Spring Return Electronic Actuator is used for the control of dampers requiring up to 53 lb-in (6 Nm) driving torque. It is intended for control of UL listed smoke control dampers and combination fire/smoke HVAC dampers. This actuator is designed to meet the 2002 revisions to the UL 555/555S and the AMCA Standard 520 specifications.

Specifications

Operating Voltage ..... 24 Vac ±20%
24 Vdc +20%, -10%
120 Vac ±10%
230 Vac ±10%

Frequency ..... 50/60 Hz

Power Consumption ..... 24 Vac/dc
Running ..... 20 VA (12 W)
Holding ..... 8 VA (6 W)

Power Consumption ..... 120 Vac/230 Vac
Running and Holding 20 VA/9VA

Torque
Running Torque ..... 53 lb.-in. (6 Nm) (minimum)
Stall Torque (minimum) ..... 160 lb.-in. (18 Nm)
Runtime for 90° ..... 15 sec. nominal
Closing (on power loss) with Spring Return ..... 15 sec. Max.
Nominal Angle of Rotation ..... 95°

Life Expectancy ..... Minimum 35,000 full stroke cycles

Mounting
Damper Shaft Size ..... 0.5" (12.7 mm) round
Damper Shaft Length, Minimum ..... 1.4" (36 mm)

Housing
Enclosure ..... NEMA 1
Material ..... Die-cast Aluminum Alloy

Temperature
Operation ..... 0° to 140°F (-18° to 60°C)
One time 350°F (177°C)
Storage and Transport ..... -40° to 158°F (-40° to 70°C)
Humidity ..... Max. 95% RH, non-condensing
Teflon Cable ..... 400°F (200°C)

Agency Certification UL873
cUL C22.2 No. 24-93
AS/NZS 2064 1/2:1997

Conforms to CE requirements for the EMC and low voltage directives

Australian Electromagnetic Compatibility (EMC) per AS/NZS 4251.1/2:1999 (C-tick)

Pre-cabled Connection ..... 18 AWG, 3 ft. (0.9 m)
3/8" (0.5mm) flexible conduit connector

Dimensions ..... 9" H X 3.25" W X 3" D
(229 mm H X 83 mm W X 76 mm D)

Shipping Weight ..... 4 lb. (1.8 kg)

*Refer to the Installation Instructions for acceptable mounting positions.

Product Ordering

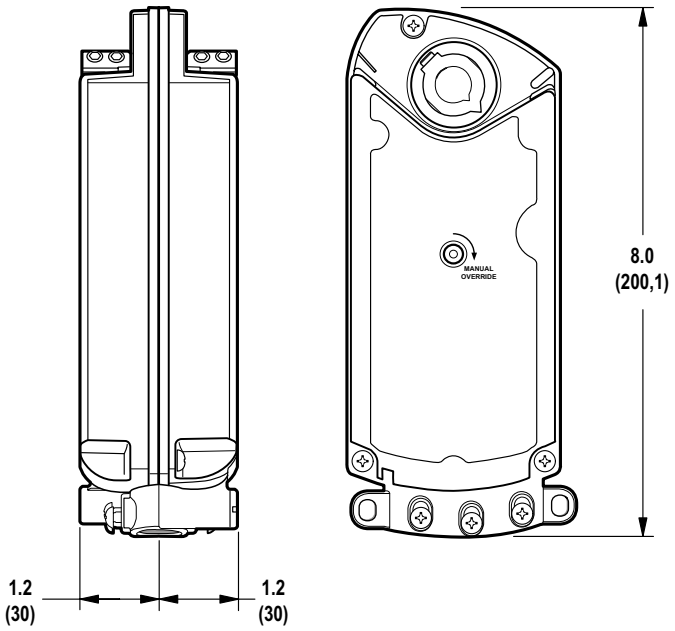
Description	Cabling	Part No.		
		24 Vac/dc	120 Vac	230 Vac
2-position	Standard	**GND121.1U**	**GND221.1U**	**GND321.1U**
	EFL	**GND121.1U/F**	**GND221.1U/F**	**GND321.1U/F**
2-position with aux. switches	Standard	**GND126.1U**	**GND226.1U**	**GND326.1U**
	EFL	**GND126.1U/F**	**GND226.1U/F**	**GND326.1U/F**

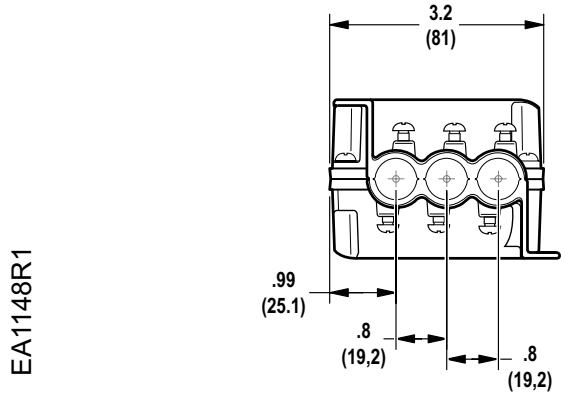
Ordering Notes:
- EFL Electronic Fusible Links must be ordered separately (see table below).
- All products are available in bulk packages of 10. Add **/B** to part number to order a bulk pack.

Electronic Fusible Links

Temperature Range	Part No.
165°F (74°C)	**ASK79.165**
212°F (100°C)	**ASK79.212**
250°F (121°C)	**ASK79.250**
350°F (177°C)	**ASK79.350**

GND Series OpenAir Damper Actuator





EA1148R1

Dimensions shown in inches (mm).

SIEMENS

Ingenuity for life

BT300 Variable Frequency Drives

Available in frame sizes up to 250 hp, the BT300 is well-suited for demanding HVAC environments and helps save 20-50% of energy compared to equipment with little or no control. Built-in features – like a real-time clock, energy savings optimization programming, and a sleep function – help measure energy savings. Built-in wizards get HVAC equipment up and running quickly and accurately.

usa.siemens.com/hvac

Electronic Damper Actuator

Designed for UL Listed Fire/Smoke and Smoke Control Dampers

142 lb.-in. Torque
2-position, 15-second Runtime,
15-second Spring Return Time

GGD Series Electronic Damper Actuator.

Description

Intended for use on UL listed smoke control dampers or combination fire/smoke rated dampers, the OpenAir GGD Series Direct-coupled, Fast Acting, Two-position, Spring Return Electronic Actuators are available in 24 Vac, 115 Vac, and 230 Vac models.

Features

- High temperature rated drive system
- Reversible fail-safe spring return
- All metal housing
- Teflon® insulated lead wires
- Manual override
- Mechanical range adjustment
- Multiple shaft couplings available; will accommodate up to 1.05-inch shafts
- 15-second nominal open time
- 15-second nominal spring return time
- 24, 115 and 230 Vac models
- Assembled in the U.S.A

Options

- Optional built-in Auxiliary Switches: fixed switch points at 5º and 85º rotation

Applications

The GGD Series Spring Return Actuator is used for the control of dampers requiring up to 142 lb.-in. (16 Nm) driving torque. It is intended for control of UL listed smoke control dampers or combination fire/smoke HVAC dampers. This actuator is designed to meet the 2002 revisions to the UL 555S rating up to 350°F (177°C) and AMCA 500-D specifications.

Specifications

Operating Voltage ..... 24 Vac ±20%
115 Vac ±15%
230 Vac ±10%

Frequency ..... 50/60 Hz

Power Consumption
Running ..... 150 VA
Holding ..... 10 VA

Torque
Running ..... 142 lb.-in. (16 Nm)
Spring Return ..... 108 lb.-in. (12 Nm)
Minimum Stall ..... 350 lb.-in. (39 Nm)

Runtime for 90°
Operating with motor at 60 Hz ..... 15 seconds nominal
Closing (on power loss) with spring return ..... 15 seconds maximum

Nominal Angle of Rotation ..... 95°

Life Expectancy ..... Minimum 35,000 full stroke cycles

Damper Shaft Size
Standard ..... 3/8 to 1-in. (8 to 25.6 mm)
Oversized ..... 1.05-in. max. (26.6 mm)

Min. Shaft Length ..... 3/4-in. (20 mm)

Housing
Enclosure ..... NEMA 1
Material ..... Die-cast Aluminum Alloy

Temperature
Operation ..... 0° to 130°F (-18° to 55°C)
One time 350°F (177°C) for 1/2 hour (per UL555S)
Storage and Transport ..... -25° to 158°F (-32° to 70°C)
Humidity ..... Maximum 95% RH, non-condensing

Agency Certifications ..... UL listed to UL873
C-UL certified to Canadian standard C22.2 No. 24-93
Australian EMC Framework (C-tick) with the limits per AS/NZS 2064 1/2:1997

Pre-cabled Connection ..... AWG 18

Dimensions ..... 12" H x 4.76" W x 2.88" D
(305 mm H x 120 mm W x 72 mm D)

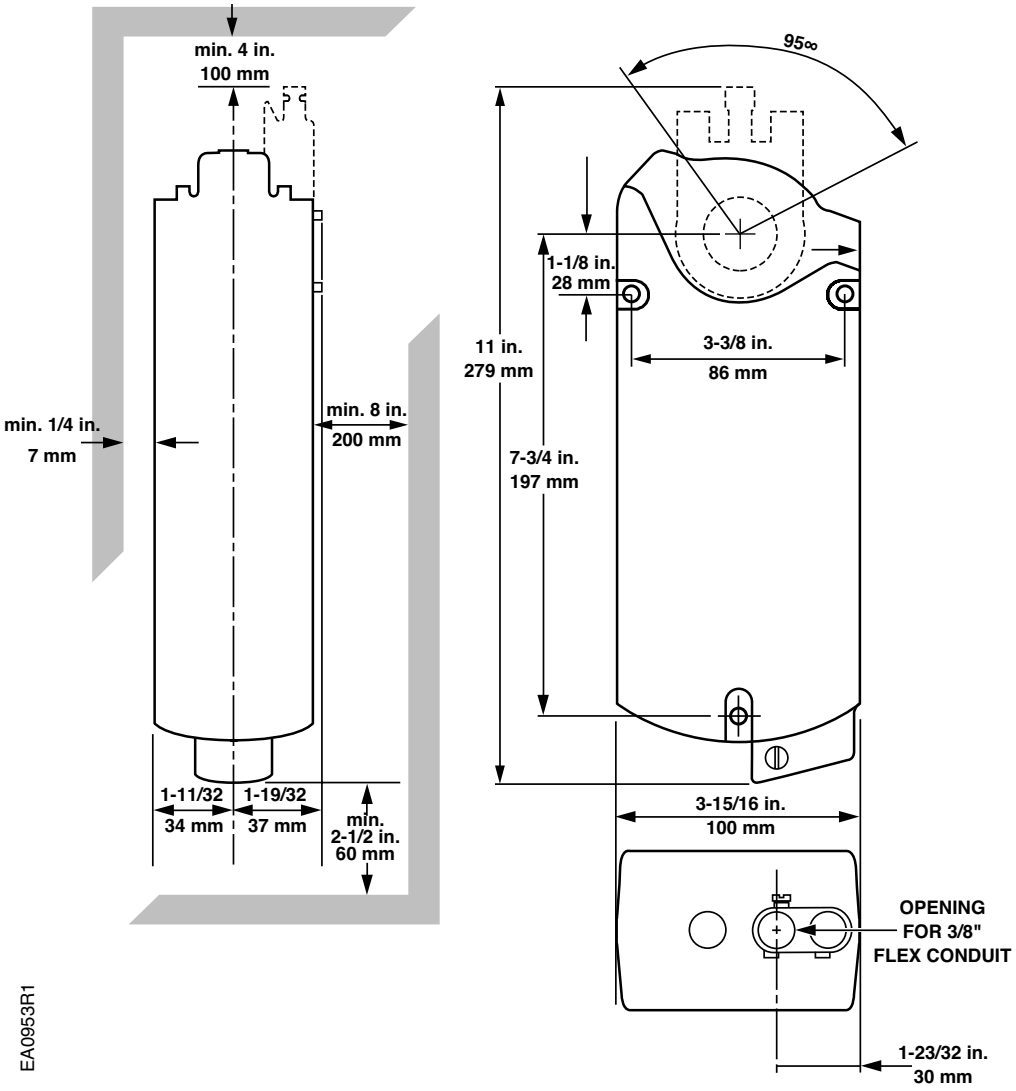
Shipping Weight
Single Pack ..... 7.0 lbs. (3.2 kg)
Bulk Pack ..... 56 lbs. (25.4 kg)

Product Ordering

Description	Shaft Adapter	Part No. 24 Vac	Part No. 115 Vac	Part No. 230 Vac
Standard	Self-centering	**GGD121.1U**	**GGD221.1U**	**GGD321.1U**
Standard/Bulk	Self-centering	**GGD121.1U/B**	**GGD221.1U/B**	**GGD321.1U/B**
Auxiliary Switches 5º and 85º	Self-centering	**GGD126.1U**	**GGD226.1U**	**GGD326.1U**
Standard	Oversized	**—**	**GGD221.3U**	**GGD321.3U**

Ordering Notes:
Bulk packages contain 8 actuators.

GGD Series OpenAir Damper Actuator



OpenAir Part No. Nomenclature

Global Actuator Program		G	B	B	1	6	1	.	1	U
Type										
	Laboratory Fail In Place 53 Lb-in	**A**								
	Non-Spring Return 221 Lb-in	**B**								
	Spring Return 160 Lb-in	**C**								
	Non-Spring Return 44 Lb-in	**D**								
	Non-Spring Return 132 Lb-in	**E**								
	Fire And Smoke 142 Lb-in	**G**								
	Non-Spring Return 310 Lb-in	**I**								
	Non-Spring Return 88 Lb-in	**L**								
	Spring Return 62 Lb-in	**M**								
	Fire And Smoke Or Laboratory Fail Safe 53 Lb-in	**N**								
	Spring Return 35 Lb-in	**P**								
	Spring Return 20 Lb-in	**Q**								
	Non-Spring Return 20 Lb-in	**S**								
Running Time										
	90 Sec. At 50/60 Hz	**A**								
	150(125) Sec At 50/60 Hz	**B**								
	60 Sec At 50/60 Hz	**C**								
	15 Sec/30 Sec. At 50/60 Hz	**D**								
	108(90) Sec. At 50/60 Hz	**E**								
	2 Sec. At 50/60 Hz	**P**								
Voltage										
	24 Vac/Dc SR/ 24Vac NSR	**1**								
	120 Vac	**2**								
	100 to 240 Vac	**3**								
Functionality										
	2Pt	**2**								
	Floating	**3**								
	2Pt, Floating, 24 Vac/dc	**4**								
	Modulating 0-10Vdc/2-10Vdc/Signal Inversion	**5**								
	Modulating 0-10Vdc	**6**								
	2Pt, Floating ,0-10Vdc, 2-10Vdc,4-20Ma, and 0-20Ma	**9**								
Optional Features										
	Standard Version	**1**								
	Potentiometer 1K Ω	**2**								
	Signal Adjustable	**3**								
	Switches+Signal Adjustable	**4**								
	Switches	**6**								
Action										
	Rotary self-cent. Shaft adapter	**1**								
	Linear	**2**								
Cabling										
	Universal Appliance Cable	**U**								
	Plenum Cable	**P**								
	Bulk Packaging	**/B**								
	6' Plenum Cable	**Q**								

No. 3 Pneumatic Actuator

331-4311 Actuator, clevis and rocker arm. Mounting for extended shaft.

331-4312 Actuator with pivot mounting bracket.

331-4314 Actuator with fixed mounting bracket and clevis.

331-4331 Actuator with fixed mounting bracket and ball joint connector.

Description

Designed with a 2-3/8-inch (60 mm) stroke, the No. 3 Pneumatic Actuator is a rugged, metal-fabricated device that provides gradual or positive actuation of HVAC dampers. The actuator is available in a variety of spring ranges for energy optimizing and sequencing with other devices.

Features

- Ozone-resistant rolling rubber diaphragm
- Variety of installation options, including:
  - Fixed bracket mounting
  - Direct front mounting
  - Pivot mounting for extended shaft
- Available with positioning relay

Applications

Recommended for control of mixing box dampers or air valves and damper control for unit ventilators, unit conditioners and small HVAC systems. The No. 3 Pneumatic Actuator is also available with 2-3/4-inch (70 mm) stroke in the three spring ranges.

For more information, contact your local Siemens Building Technologies representative.

Nominal Spring Rating	Max. Thrust lb. (N)				Torque Rating lb.-in (Nm)			
	Full Stroke Forward			Spring Return (No Stroke) 0 psi (0 kPa)	Gradual Operation	2-position Operation or with Positioner		
	15 psi (103 kPa)	18 psi (124 kPa)	25 psi (172 kPa)			15 psi (103 kPa)	18 psi (124 kPa)	25 psi (172 kPa)
3 to 7 psi 21 to 48 kPa)	64 (285)	88 (391)	144 (641)	24 (107)	10 (1.1)	20.2 (2.3)	20.2 (2.3)	20.2 (2.3)
5 to 10 psi (35 to 69 kPa)	40 (178)	64 (285)	120 (534)	40 (178)	10 (1.1)	33.6 (3.8)	33.6 (3.8)	33.6 (3.8)
8 to 13 psi (55 to 90 kPa)	16 (71)	40 (178)	96 (427)	64 (285)	10 (1.1)	53.8 (6.1)	53.8 (6.1)	53.8 (6.1)

With maximum hysteresis of 2.5 psi (17.2 kPa) @ 90° rotation.

Specifications

Effective Diaphragm Area ..... 8 in.² (51.5 cm²)
Stroke ..... 2-3/8-in. (60 mm)
Max. Air Pressure ..... 30 psi (210 kPa)
Nominal Spring Ranges ..... 3 to 7 psi (21 to 50 kPa)
5 to 10 psi (35 to 69 kPa)
8 to 13 psi (55 to 90 kPa)

Ambient Temperature Range
Operating..... -20° to 160°F (-29° to 71°C)
Storage..... -20° to 160°F (-29° to 71°C)

Materials
Housing (totally enclosed) ..... Aluminum
Stem ..... Plated Steel
Diaphragm ..... Ozone-resistant EPT rubber
Spring ..... Steel
Bearing ..... Delrin

Air Connection ..... 1/8" NPT Female with a straight dual barb fitting for 1/4" (6 mm) OD tubing

Type of Mounting ..... Front, bracket, pivot, extended shaft

Shipping Weight (Actuator only) ..... 1.3 lb. (0.58 kg)

Product Ordering

No. 3 Actuator Description	Mounting Style	No. 3 Part Number Nominal Spring Range 3-7 psi (21-48 kPa)	5-10 psi (35-69 kPa)	8-13 psi (55-90 kPa)
Actuator, Basic	Front	**331-4310**[1]	**331-4510**[1]	**331-4810**[1]
Actuator, Basic, for "332" models with Positioning Relay, (difference is elbow air fitting)	Front	—	—	**331-4809**[1]
Actuator, Bracket	Fixed	**331-4313**	**331-4513**	**331-4813**
Actuator, Bracket, Clevis	Fixed	**331-4314**	**331-4514**	**331-4814**
Actuator, Bracket, Ball Joint Connector	Fixed	**331-4331**	**331-4531**	**331-4831**
Actuator, Bracket, Ball Joint Connector with Positioning Relay	Fixed with Positioning Relay	—	—	**332-4831**
Actuator, Integral Pivot	Pivot	**331-4312**	**331-4512**	**331-4812**
Actuator, Integral Pivot with Pivot Post. Mounted on plate for Extended Shaft[2] with Clevis and Crank Arm for 3/8" (10 mm), 7/16" (11 mm), or 1/2" (13 mm) diameter shaft.	Extended Shaft[2]	**331-4311**	**331-4511**	**331-4811**
Actuator, Integral Pivot with Pivot Post. Mounted on plate for Extended Shaft[2] with Clevis and Crank Arm for 3/8" (10 mm), 7/16" (11 mm), 1/2" (13 mm) diameter shaft.	Extended Shaft[2] with Positioning Relay	—	—	**332-4811**

If the actuator is inoperative, replace the entire actuator.

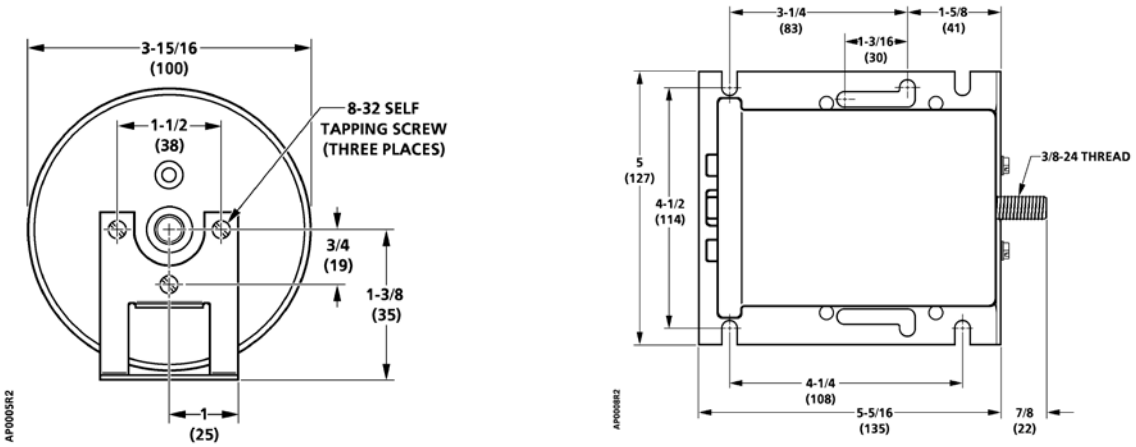
The No. 3 damper actuator part numbers noted above all utilize pneumatic damper actuators that are UL Recognized Components for fire/smoke applications under UL's Damper Actuator category EMKU2, referencing standards UL555 and UL555S. This category covers pneumatic damper actuators used in fire dampers and leakage rated dampers for smoke control.

Ordering Notes:

[1] These No. 3 pneumatic basic damper actuator devices are UL component recognized. These same basic damper actuator devices are used in all of the actuator assemblies following the base model in each column.

[2] When the actuator is ordered with Extended Shaft Mounting, the mounting plate, pivot post and hardware, clevis, damper crank, rocker arm and all screws/nuts are included. Order other frame mounting accessories as required if not supplied by damper manufacturer.

Dimensions



Dimensions shown in inches (mm).

No. 4 Pneumatic Actuator

331-2929 No. 4
Pneumatic Actuator
for frame mounting.

331-2904 No. 4
Pneumatic Actuator with
pivot mounting bracket.

331-2973 No. 4
Pneumatic Actuator with clevis, and crank.
Universal Mounting Plate for extended shaft
or frame mounting.

331-2974 No. 4
Pneumatic Actuator with
non-pivot bracket for unit ventilator.

Description

Designed with a 4-inch (102 mm) stroke, the No. 4 Pneumatic Actuator is a rugged, metal-fabricated device that provides gradual or positive actuation of HVAC and fire/smoke dampers.

Features

- Replaceable diaphragm
- Positioning relay (optional)
- Forward travel stops (optional)
- Hesitation model (provides minimum ventilation without separate damper/actuator)
- Variety of spring ranges for sequencing with other control devices
- Stainless steel actuator shaft

Applications

Recommended for control of outdoor, return air, exhaust, face and bypass, fan discharge, and static pressure control dampers, the No. 4 Pneumatic Actuator also is excellent for controlling specialized dampers and air valves in terminal units, such as unit ventilators and mixing boxes.

The No. 4 actuator hesitation model is frequently used to operate the outdoor air damper on unit ventilators and mixing boxes.

An actuator marked with an asterisk (*) is a component recognized under UL's Damper Actuator category (EMKU2) for use on fire dampers and leakage-related dampers.

Nominal Spring Rating	Max. 121 Thrust lb. (N)				Torque Rating lb.-in (Nm)			
	Full Stroke Forward			Spring Return (No Stroke) 0 psi (0 kPa)	Gradual Operation	2-position Operation or with Positioner		
	15 psi (103 kPa)	18 psi (124 kPa)	25 psi (172 kPa)			15 psi (103 kPa)	18 psi (124 kPa)	25 psi (172 kPa)
3 to 7 psi (21 to 48 kPa)	88 (391)	121 (538)	198 (881)	33 (147)	30 (3.4)	46 (5.2)	46 (5.2)	46 (5.2)
3 to 13 psi (21 to 90 kPa)	22 (198)	55 (245)	132 (587)	33 (147)	30 (3.4)	46 (5.2)	46 (5.2)	46 (5.2)
5 to 10 psi (35 to 90 kPa)	55 (245)	88 (391)	165 (734)	55 (245)	30 (3.4)	77 (8.7)	77 (8.7)	77 (8.7)
8 to 13 psi (55 to 90 kPa)	22 (98)	55 (245)	132 (587)	88 (391)	30 (3.4)	123 (14)	123 (14)	123 (14)
2 to 3, 8 to 13 psi (14 to 20, 55 to 90 kPa) Hesitation	22 (98)	55 (245)	132 (587)	22 (98)	23 (2.6)	—	—	—

Table Notes:
With maximum hysteresis of 2.5 psi (17.2 kPa) @ 90° rotation.

Specifications

Effective Diaphragm Area ..... 11 in.² (71 cm²)
Stroke ..... 4-in. (102 mm)
Stroke (hesitation models) ..... 3-in. (76 mm)
Max. Air Pressure ..... 30 psi (207 kPa)
Nominal Spring Ranges ..... 3 to 7 psi (21 to 48 kPa)
3 to 13 psi (21 to 90 kPa)
5 to 10 psi (35 to 69 kPa)
8 to 13 psi (55 to 90 kPa)
Nominal Spring Range (hesitation model) ..... 2 to 3, 8 to 13 psi (14 to 21, 55 to 90 kPa)

Temperature Range
Operating..... -20° to 200°F (-29° to 93°C)
Storage..... -20° to 200°F (-29° to 93°C)

Materials
Housing (totally enclosed) ..... Steel, electro-coated epoxy
Shaft ..... Stainless Steel
Diaphragm ..... EDPM Rubber
Spring ..... Steel
Bearing ..... Delrin

Air Connection ..... 1/8" NPT Female with a dual barb elbow fitting for 1/4" (6 mm) OD tubing
Type of Mounting ..... Front, bracket, pivot; universal (extended shaft or frame mount)
Shipping Weight (Actuator only) ..... 3.66 lb. (1.66 kg)

Product Ordering

No. 4 Actuator Description[3]	Mounting Style	No. 4 Actuator Part Number — Nominal Spring Range				
		3-7 psi (21-48 kPa)	3-13 psi (21-90 kPa)	5-10 psi (35-69 kPa)	8-13 psi (55-90 kPa)	Hesitation Model 2-3, 8-13 psi (14-21, 55-90 kPa)
Actuator, Basic with Integral Pivot	Pivot	**331-2904**[1]	**331-2905**[1]	**331-2906**[1]	**331-2961**[1]	**331-2909**[1]
Actuator, Basic with Integral Pivot and Positioning Relay	Pivot	—	—	—	**332-2961**	—
Actuator with Integral Pivot, Clevis and Clevis Pin for use with frame mounting accessory	Pivot	**331-2929**	**331-2930**	**331-2931**	**331-2968**	—
Actuator with Integral Pivot, Clevis and Clevis Pin for use with frame mounting accessory. Includes Positioning Relay.	Pivot	—	—	—	**332-2968**	—
Actuator, Mounting Screws (Non-Pivot)	Front	**331-2910**	—	**331-2917**	**331-2963**	—
Actuator, Bracket (Non-Pivot) with 3" (76 mm) stroke for unit ventilator	Fixed	**331-2911**	—	**331-2934**	**331-2966**	**331-2927**
Actuator, Bracket (Non-Pivot) with 2-3/8" (60 mm) stroke for unit ventilator	Fixed	—	—	—	—	**331-2974**
Actuator, Mounting Plate, Ball Joint Connector	Fixed	—	**331-3018**	—	**331-3017**	—
Actuator, Mounting Plate, Ball Joint Connector with Positioning Relay	Fixed with Positioning Relay	—	—	—	**332-3017**	—
Actuator, Integral Pivot with Pivot Post. Mounted on plate for Extended Shaft[2] with Clevis and Crank Arm for 3/8" (9.5 mm), 7/16" (11 mm) or 1/2" (13 mm) diameter shaft. Parts for frame mounting (blade drive) included with kit.	Universal Kit[2]	**331-3000**	**331-3001**	**331-3002**	**331-2973**	**331-3004**
Actuator, Integral Pivot with pivot post and Positioning Relay. Mounted on plate for extended shaft with Clevis and Crank for 3/8" (10 mm), 7/16" (11 mm), 1/2" (13 mm) diameter shaft. Parts for frame mounting (blade drive) included with kit.	Universal Kit[2] with Positioning Relay	—	—	—	**332-2973**	—

If the actuator is inoperative, replace the entire actuator.

The No. 4 damper actuator part numbers noted above all utilize pneumatic damper actuators that are UL Recognized Components for fire/smoke applications under UL's Damper Actuator category EMKU2, referencing standards UL555 and UL555S. This category covers pneumatic damper actuators used in fire dampers and leakage rated dampers for smoke control.

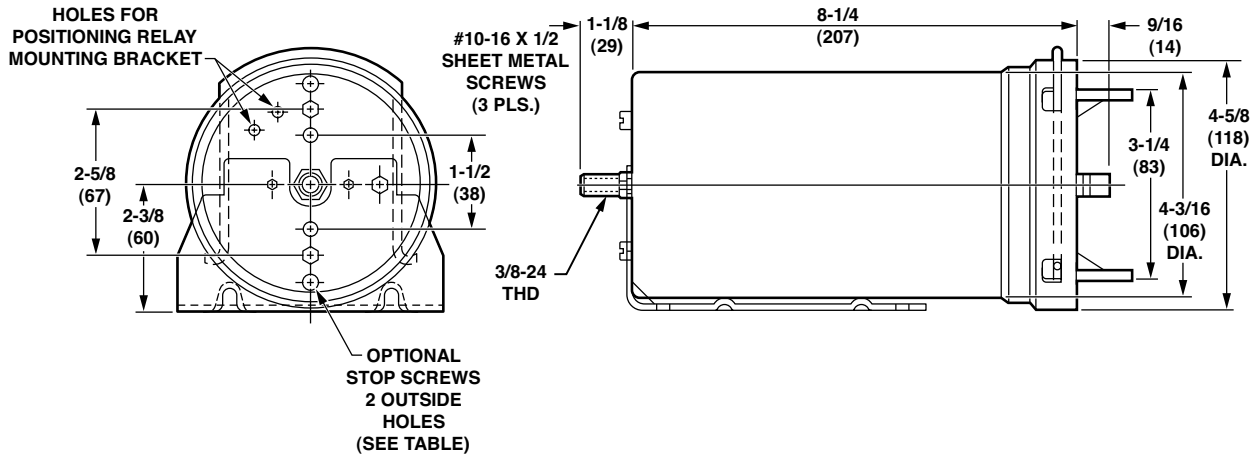
Ordering Notes:

[1] These No. 4 pneumatic basic damper actuator devices are UL component recognized. These same basic damper actuator devices are used in all of the actuator assemblies following the base model in each column.

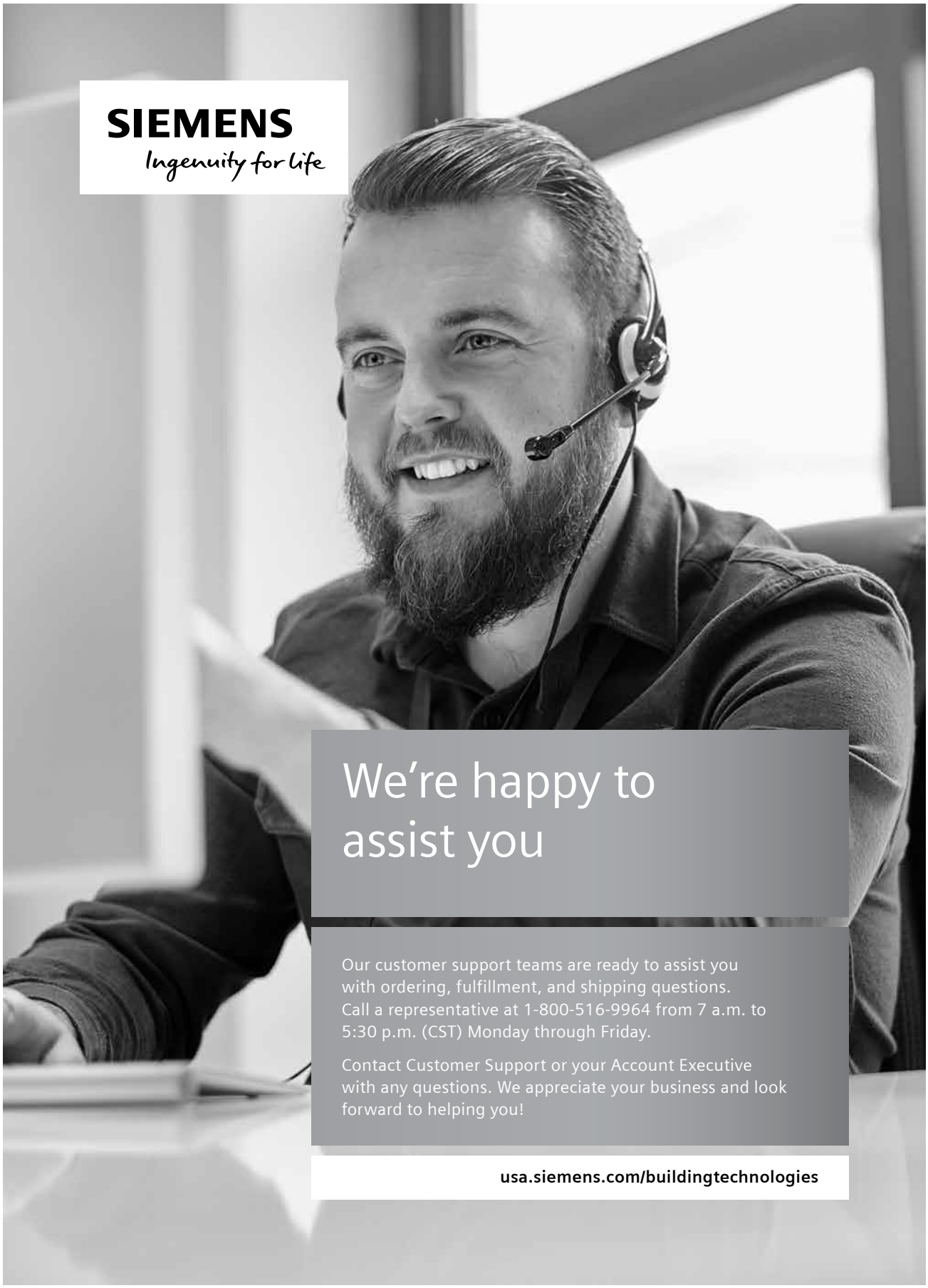
[2] When the actuator is ordered with Universal Kit Mounting, the mounting plate, pivot post and hardware, clevis, damper crank, rocker arm, and all screws/nuts are included. Order other frame mounting accessories as required if not supplied by damper manufacturer.

[3] The No. 4 pneumatic damper actuator contains a replaceable diaphragm with EPDM rubber. See Siemens document #129-089 to replace.

Dimensions



Dimensions shown in inches (mm).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No. 6 Pneumatic Actuator

331-2792 and 331-3060 No. 6 Pneumatic Actuator, pivot mounting type.

331-2856 No. 6 Pneumatic Actuator and clevis for frame mounting.

331-3011 No. 6 Pneumatic Actuator, clevis, crank and rocker arm. Universal mounting for extended shaft or frame mounting.

Description

Designed with a 4-inch (102 mm) stroke, the No. 6 Pneumatic Actuator is a rugged, metal-fabricated device that provides gradual or positive actuation of HVAC and fire/smoke dampers.

Features

- Replaceable diaphragm
- Variety of spring ranges for sequencing with other control devices
- High torque

Options

- Positioning relay
- Forward travel stops

Applications

Recommended for multiple applications, the No. 6 Pneumatic Actuator is excellent for control of outdoor air, return air, mixed air, exhaust, face and bypass, fan discharge, multisection, static pressure control, fan inlet vanes and other special applications.

An actuator marked with an asterisk is recognized under UL's Damper Actuator category (EMKU2) for use on fire dampers and leakage-rated dampers.

Nominal Spring Rating	Max. Thrust lb. (N)				Torque Rating lb.-in (Nm)			
	Full Stroke Forward			Spring Return (No Stroke) 0 psi (0 kPa)	Gradual Operation	2-position Operation or with Positioner		
	15 psi (103 kPa)	18 psi (124 kPa)	25 psi (172 kPa)			15 psi (103 kPa)	18 psi (124 kPa)	25 psi (172 kPa)
3 to 8 psi (21 to 55 kPa)	125 (556)	179 (796)	304 (1352)	54 (240)	50 (5.6)	75 (8.5)	75 (8.5)	75 (8.5)
3 to 13 psi (21 to 90 kPa)	36 (160)	89 (396)	214 (952)	54 (240)	50 (5.6)	75 (8.5)	75 (8.5)	75 (8.5)
8 to 13 psi (55 to 90 kPa)	36 (160)	89 (396)	214 (952)	144 (640)	50 (5.6)	202 (22.8)	202 (22.8)	202 (22.8)

Table Notes:
With maximum hysteresis of 2.5 psi (17.2 kPa) @ 90° rotation.

Specifications

Effective Diaphragm Area ..... 17.9 in.² (115 cm²)
Stroke ..... 4-in. (102 mm)
Max. Air Pressure ..... 30 psi (207 kPa)
Nominal Spring Ranges ..... 3 to 8 psi (21 to 55 kPa)
3 to 13 psi (21 to 90 kPa)
8 to 13 psi (55 to 90 kPa)

Temperature Range
Operating..... -20° to 200°F (-29° to 93°C)
Storage..... -20° to 200°F (-29° to 93°C)

Materials
Housing ..... Aluminum
Stem ..... Type 416 Stainless Steel
Diaphragm..... Silicone Rubber
Spring..... Steel
Bearing..... Bronze Oilite

Air Connection ..... 1/8" NPT Female
Type of Mounting ..... Pivot; Universal (extended shaft or frame mount)
Shipping Weight (Actuator only) .....9.0 lb. (4.08 kg)

Product Ordering

No. 6 Actuator Description[3]	Mounting Style	No. 6 Actuator Part Number Nominal Spring Range 3-8 psi (21-55 kPa)	3-13 psi (21-90 kPa)	8-13 psi (55-90 kPa)
Actuator, Basic, Integral Pivot	Pivot	**331-2793**[1]	**331-2794**[1]	**331-3060**[1]
Actuator, Integral Pivot and Forward Travel Stops	Pivot	—	—	**331-2988**
Actuator with Clevis	Pivot	**331-2857**	**331-2858**	**331-2856**
Actuator with Clevis and Positioning Relay	Pivot	—	—	**332-2856**
Actuator, Integral Pivot with pivot post. Mounted on plate for Extended Shaft[2] mounting with Clevis and Crank for 3/8" (10 mm), 7/16" (11 mm) or 1/2" (13 mm) diameter shaft.	Extended Shaft[2]	**331-3012**	**331-3013**	**331-3011**
Actuator, Integral Pivot with pivot post. Mounted on plate for Extended Shaft[2] mounting with Clevis and Crank for 3/8" (10 mm), 7/16" (11 mm) or 1/2" (13 mm) diameter shaft.	Extended Shaft Kit[2] with Positioning Relay	—	—	**332-3011**

If the actuator is inoperative, replace the entire actuator.

The No. 6 damper actuator part numbers noted above all utilize pneumatic damper actuators that are UL Recognized Components for fire/smoke applications under UL's Damper Actuator category EMKU2, referencing standards UL555 and UL555S. This category covers pneumatic damper actuators used in fire dampers and leakage rated dampers for smoke control.

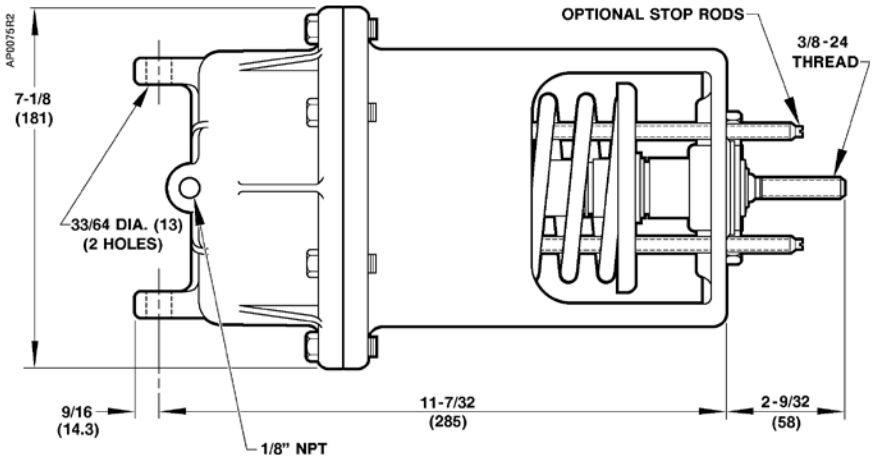
Ordering Notes:

[1] These No. 6 pneumatic basic damper actuator devices are UL component recognized. These same basic damper actuator devices are used in all of the actuator assemblies following the base model in each column.

[2] When the actuator is ordered with universal mounting, the mounting plate, pivot post and hardware, clevis, damper crank, rocker arm, and all screws/nuts are included. Order other frame mounting accessories as required if not supplied by damper manufacturer.

[3] Siemens No. 6 Pneumatic Damper Actuator contains a replaceable diaphragm with silicone rubber. See Siemens document #129-089 for replacement instruction for this diaphragm.

Dimensions



Dimensions shown in inches (mm).

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No. 6 Pneumatic Actuator – Tandem Mounting

331 No. 6 Pneumatic Damper Actuator – Tandem Mounting.

Description

A rugged, metal-fabricated device for tandem mounting, the No. 6 Pneumatic Damper Actuator, is piloted by a positioning relay, mounted on a sturdy angle iron frame.

Features

- Adjustable spring span and start point
- Spring return actuators
- Replaceable diaphragms

Arm Length Versus Rotation

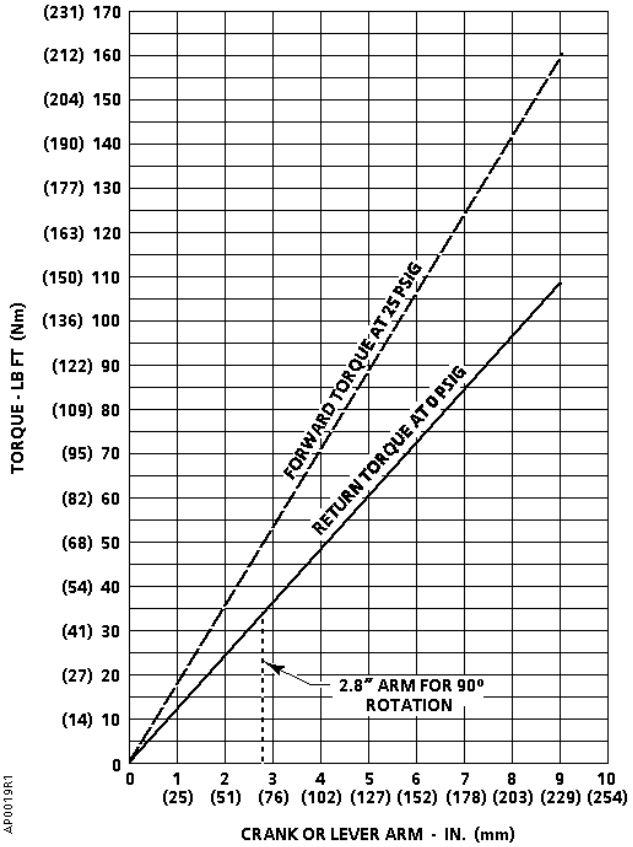
If the damper rotation is other than 90°, use the Arm Length vs. Rotation Chart and the Thrust and Torque Ratings to determine the actuator assembly torque rating. Then divide the actuator assembly torque rating by the damper torque rating per unit of area for job conditions to determine the damper area that can be controlled. Make sure the torque units used are the same.

Lever or Crank Arm Length In. (mm)	Damper Rotation in Degrees
2.3" (58 mm)	120°
2.8" (71 mm)	90°
3" (76 mm)	84°
4" (102 mm)	60°
5" (127 mm)	47°
6" (152 mm)	39°
7" (178 mm)	33°
8" (203 mm)	29°
9" (229 mm)	25°

Applications

The No. 6 Pneumatic Damper Actuator with tandem mounting is recommended to position inlet vanes on fans or large dampers that use a jack shaft.

Torque Rating



Specifications

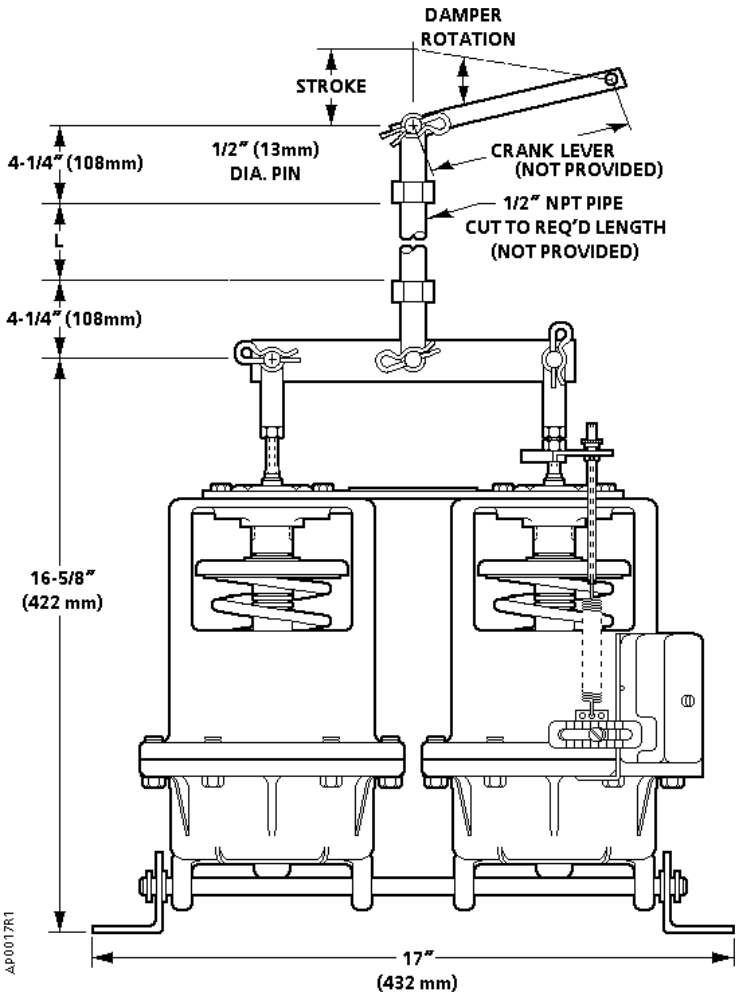
Effective Diaphragm Area ..... 35.8 in.² (230 cm²)
Stroke ..... 4-in. (102 mm)
Max. Air Pressure ..... 30 psi (207 kPa)
Spring Start Point (Adjustable) ..... 3 to 10 psi (21 to 69 kPa)
Spring Span (Adjustable) ..... 3 to 12 psi (21 to 83 kPa)
Spring Range
Factory Setting ..... 8 to 13 psi (55 to 90 kPa)
Temperature Range
Operating..... -20° to 200°F (-29° to 93°C)
Storage..... -20° to 200°F (-29° to 93°C)

Materials
Housing ..... Aluminum
Stem ..... Type 416SS
Diaphragm..... Silicone rubber
Spring..... Steel
Bearing..... Bronze Oilite
Air Connection ..... 1/8" NPT Female
Type of Mounting ..... Pivot; Universal (extended shaft for female)
Shipping Weight ..... 30.0 lb. (13.5 kg)

Product Ordering

Description	Part No.
Damper Actuator with Tandem Mounting	**331-3070**

Dimensions



Dimensions shown in inches (mm).

Large Capacity Pneumatic Actuator

331 Large Capacity Pneumatic Actuator.

Description

Designed to develop very high thrust, the 331 Large Capacity Pneumatic Actuator has the capacity to handle heavy loads.

Features

- Maximum 30 psi (207 kPa) inlet pressure
- All mounting hardware included
- Adjustable start point
- Adjustable span

Applications

The 331 Large Capacity Pneumatic Actuator controls large dampers and equipment that requires high operating thrust.

Caution

Actuator cannot be used when spring return to fail safe position is required.

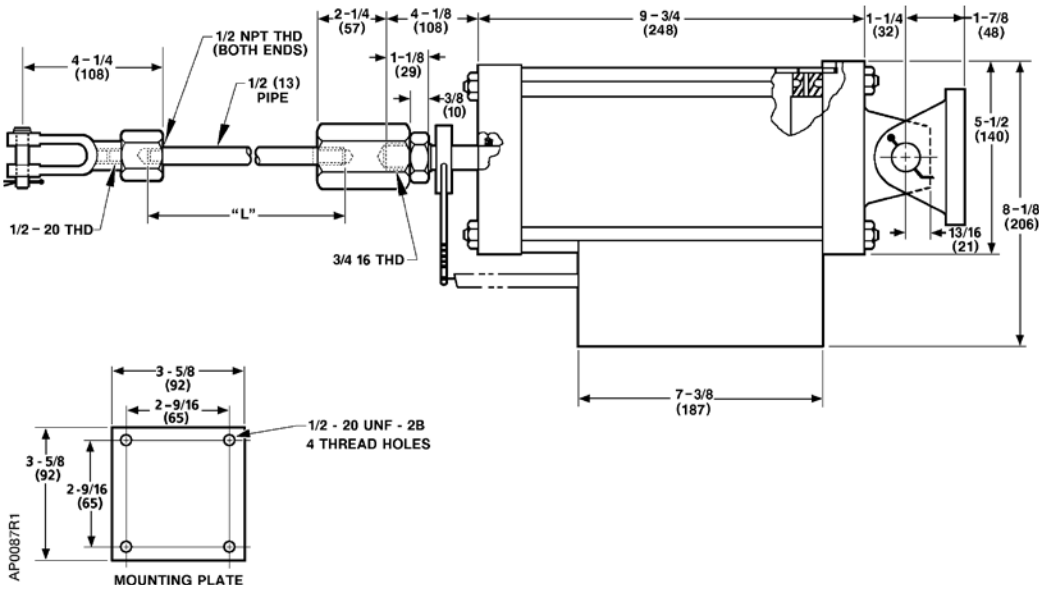
Specifications

Air Supply Pressure ..... 25 psi (172 kPa)
Max. Pressure ..... 30 psi (207 kPa)
Temperature Range
Operating.....50° to 140°F (10° to 60°C)
Storage..... -20° to 160°F (-29° to 71°C)
Effective Piston Area ..... 19.6 in.^{2} (126 cm^2)
Stroke ..... 7-in. (18 cm)
Span (adjustable) ..... 3 to 12 psi (21 to 83 kPa)
Response ..... 0.5 psi (3.4 kPa)
Torque Rating (90° rotation) with 25 psi (172 kPa) air supply .....130 lb.-ft. (176 Nm)
Spring Start Point (adjustable) ..... 3 to 10 psi (21 to 69 kPa)
Mounting .....Pivot
Air Connection ..... 1/8" NPT
Shipping Weight .....35.0 lb. (16.0 kg)

Product Ordering

Description	Part No.
Large Capacity Pneumatic Actuator	**331-2882**

Dimensions

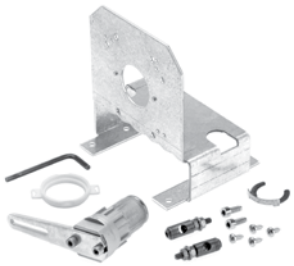


Dimensions shown in inches (mm).

Table of Contents

Refer to Valve Accessories & Service Kits, A-289, for Rack & Pinion Linkage.

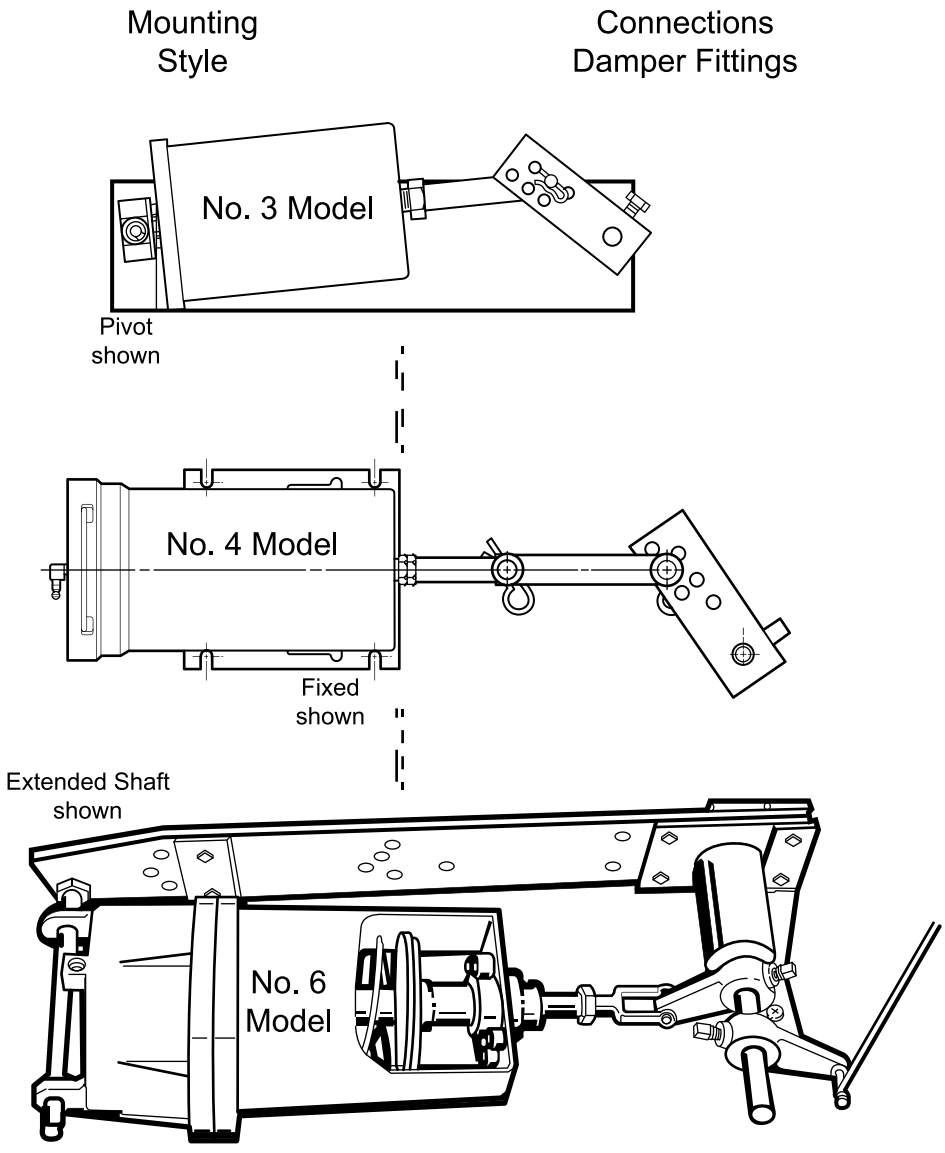
	Description	Series			Quantity	Part No.
		GDE GLB	GEB GMA	GCA GIB GBB		
OpenAir						
	**Actuator Commissioning Tool.** A portable instrument for exercising, calibrating, and testing resistive, proportional (voltage/current), incremental (floating), and On/Off actuators.	•	•	•	1	**985-047**
	**Adjustment Tool.**		•		1	**985-098P10**
	**Hex Key.**	•			Pkg. of 24	**985-054P24**
	**Crank Arm Kit.** Allows a direct-coupled actuator to provide an auxiliary linear drive; can be used to simultaneously drive a set of opposing or adjacent dampers with a single actuator.		•		1	**ASK71.13**
				•	1	**ASK71.3**
	**Crank Arm Kit with Bracket.** For use in applications where the actuator can be rigidly surface-mounted and a linear stroke output is required.		•		1	**ASK71.14**
				•	1	**ASK71.4**
	**Rotary to Linear Kit.**	•			1	**ASK71.5**
	**Rotary to Linear Kit with Universal Mounting Bracket.**	•			1	**ASK71.6**
	**Universal Crank Arm.** For linear applications requiring connection to damper shaft when ball joint connection is not possible. • Shaft sizes 3/8 to 1"	•	•	•	1	**ASK71.9**

	Description	Series GDE GLB	Series GEB GMA	Series GCA GIB GBB	Quantity	Part No.
OpenAir						
	**Tandem Mount Bracket.** Provides an extended anti-rotation pin which allows dual mounting of 2-position, floating and GCA15 actuators, and all GIB actuators.			•	1	**ASK73.1**
	**Tandem Mount Bracket.** For dual mounting of modulating (0 to 10 V) GCA16X actuators.			•	1	**ASK73.2U**
	**Floor Mount Kit.** For airstream applications and where a foot-mounted actuator can be used. Ideal replacement of a Honeywell MOD motor. Includes crank arm, Teflon support-bearing ring, and mounting fasteners.			•	1	**ASK71.1U**
	**Frame Mount Kit.** For direct direct mounting to damper frame. Includes a crank arm to generate a linear stroke, a Teflon support-bearing ring to minimize side-loading on the actuator's output bearing, and other mounting fasteners.			•	1	**ASK71.2U**
	Combined Foot/Frame Mount Kit.		•		1	**ASK71.11**
	**Damper Push Rods.** 5/16" (8 mm) dia.	•	•	•		
	• 12" (30 cm) Length				1	**338-041**
	• 15" (38 cm) Length				1	**338-042**
	• 18" (46 cm) Length				1	**338-043**
	• 24" (61 cm) Length				1	**338-044**
	• 36" (91 cm) Length				1	**338-045**
	• 48" (122 cm) Length				1	**338-046**

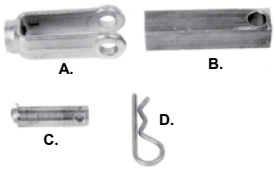
	Description	Series GDE GLB	Series GEB GMA	Series GCA GIB GBB	Quantity	Part No.
OpenAir						
	**Anti-rotation Bracket.**	•			Pkg. of 24	**985-055P24**
	• Mounting Screws	•			Pkg. of 48	**985-053P48**
	Anti-rotation Bracket.			•	1	**985-006**
	Anti-rotation Bracket.		•			**985-092**
	**Standard Shaft Adapter.** Replacement for a standard self-centering shaft adapter. • up to a 1" (25 mm) D			•	1	**985-004**
	• up to 3/4" (20 mm) D		•		1	**985-093**
	**Over-sized Shaft Adapter.** Accepts up to 1.05" (27 mm) diameter shaft and can be used for jackshafts that are slightly oversized. *Note: When used with a GIB, accepts shaft diameters from 3/4 to 1-1/20" (19 to 27 mm).*			•	1	**ASK74.1U**
	**Replacement Shaft Adapter Clip.**		•		Pkg. of 20	**985-242P20**
				•	Pkg. of 20	**985-241P20**
	**5/8 to 3/4" (10 mm to 19 mm) Actuator Shaft Insert.** For use with GIB and Over-sized Shaft Adapter, ASK74.1U.			•	Pkg. of 20	**985-052P20**
	**3/8" (8 to 10 mm) Actuator Shaft Insert.**	•			Pkg. of 10	**ASK78.3U**
	**1/2" (13 mm) Shaft Guide.** Note: This part is factory-installed with all GDE/GLB damper actuators.	•			Pkg. of 25	**985-101P25**
	**Standard Position Indicators.**	•			Pkg. of 10	**985-051P10**
			•		Pkg. of 10	**985-094P10**
				•	Pkg. of 10	**985-003**
	**1/2" (13 mm) Conduit Adapters.**	•			1	**ASK76.1U**
		•			Pkg. of 20	**ASK76.1UP20**
	**1/2" (13 mm) Conduit Adapters.**			•	Pkg. of 20	**985-008P20**
	**1/2" (13 mm) Conduit Adapter – Male.**			•	Pkg. of 25	**985-035P25**

	Description	Series GDE GLB	Series GEB GMA	Series GCA GIB GBB	Series GPC GQD	Quantity	Part No.
OpenAir							
	**NEMA 4X Rated Weathershield.** Includes the NEMA Type 4X Weathershield Enclosure Assembly and NEMA 4X Cover, plus 3 anti-rotation brackets that accommodate all control adaptor types, and all the screws and standoffs needed to mount kit to equipment.	•	•	•	•	1	**ASK75.7U**
	**NEMA 3R Rated Weathershield.** Includes cover, base plate with factory-installed gasketing, 15TEK self-drilling screws, and anti-rotation (mounting) bracket. Knockouts for connection of 1/2" conduit also included; NEMA 3R rated.		•			1	**ASK75.3U**
				•		1	**ASK75.1U**
	**NEMA 3R Rated Heater and Weathershield.** Includes weathershield listed above and heater assembly for operation in temps as low as -58°F; NEMA 3R rated.		•			1	**985-107**
				•		1	**985-106**
	**Heater Assembly.** Includes replacement heater assembly.		•			1	**985-108**
				•		1	**985-105**
	**External Auxiliary Switch Kit.** Includes dual switch package rated to 250 Vac, mounting screws and adapter rings. Mounts to the actuator, not damper shaft.		•	•		1	**ASC77.2U**
	**500 Ohm Restrictor Kit.** Converts 4-20 mA signal to 2 to 10 Vdc.	•	•	•		1	**985-124**
	**Floating Input Cable, 3 ft.** For use with GDE131.1N only.	•				Pkg. of 12	**985-131**
	0 to 10 Vdc Input Cable, 3 ft. For use with GDE161.1N only.	•				Pkg. of 12	**985-133**
	**Daisy Chain Cable, 12 ft.** For use with GDE131.1N and GDE161.1N only.	•				Pkg. of 12	**985-134**
	Daisy Chain Cable, 25 ft. For use with GDE131.1N and GDE161.1N only.	•				Pkg. of 12	**985-135**
	**Universal Indirect Mounting Kit.** Floor or frame mounting with the GQD actuator series.				•	1	**ASK80.1**
	**Rotation Limiter Kit.** Limits the rotation angle of the GQD actuator from the standard 90°.				•	Pkg. of 10	**ASK74.11**

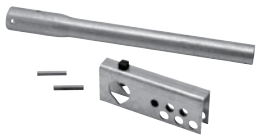
Damper Actuator Accessories Location Diagram

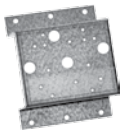


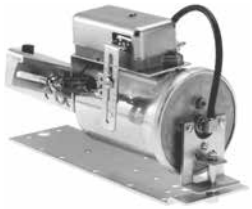
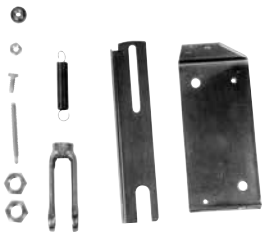
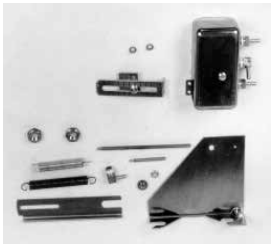
	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Connection Hardware and Damper Fittings								
	**Damper Shaft Crank.** Adjustable radius, 3/4" (19 mm) to 4-5/8" (117 mm), for 3/8" (10 mm) diameter dampershaft.	•	•				1	**331-805**
	**Damper Shaft Crank.** Selectable radius, 45°, 60°, and 90° angular rotation, for 3/8" (10 mm) to 1/2" (13 mm) diameter damper shaft.	•	•					
	• 1/2"						1	**331-941**
	• 5/8"						1	**333-182**
	• 3/4"						1	**333-183**
	• 1"						1	**333-181**
	**Cast Iron Crank and Set Screws.** For 1/2" (6 mm) OD shaft.			•	•	•	1	**333-078**
	**Linkage Kit.** 4" (102 mm) link and crank. For 3/8 inch (10 mm) to 1/2 inch (13 mm) diameter damper shafts.	•	•	•	•		1	**331-958**
	**Linkage Kit.** 4" (102 mm) rod, ball joint and crank. For 3/8 inch (10 mm) to 1/2 inch (13 mm) diameter damper shafts.	•	•	•	•		1	**331-947**
	**Ball Joint Connector.**	•	•				1	**331-656**
	**Pivot Post Kit.** For use with No. 3 actuator. 1/4-28 x 7/16 inch bolt and nut 5/16 inch rod receiver.	•					1	**331-657**

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Connection Hardware and Damper Fittings								
	**Ball Joint Connector Linkage Kit.** For Trane and Nesbitt units • 3/8-24 ball joint connector • 1/4-20 ball joint connector • 8 inch (202 mm) long, 5/16 inch push rod • Bracket, lockwashers, nuts	•	•				1	**331-671**
	**Clevis and Components for Frame Mounting.**	•	•	•	•			
	• Forged Steel Clevis, 2 in. long (A)						1	**331-653**
	• 5/8" Square Steel Clevis, 2.6 in. long (B)						1	**333-207**
	• Clevis Pin (C)						1	**331-293**
	• Hitch Clip Pin (D)						1	**331-807**
	**Steel Pivot Post.** For service replacement only (short length).		•	•			1	**331-547**
	**Steel Pivot Post.** For additional clearance (long length) for actuator. Includes steel pivot post lockwasher, nuts (2), and E-rings (2).		•	•			1	**333-045**
	**Actuator Forward Stroke Stop Kit.** Adjustable 3" (76 mm) to 4" (102 mm) Field-assembled.		•				1	**331-938**
	**Actuator Forward Stroke Stop Kit.** Adjustable 2-3/8" (60 mm) to 4" (102 mm) Field-assembled.		•				1	**331-939**
	**Travel Stop Kit.** For field assembly. Reduce travel from 4" (102 mm) down to 2-29/32"(73 mm). For Model 3 only.	•	•				1	**333-197**

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Actuator Shaft Extensions and Damper Push Rods								
	**Actuator Shaft Extension Kit.** Includes push rod, 1/4"-28 ball joint connector, coupling and screws.	•	•				1	**331-674**
	**Actuator Shaft Extension Kit.** Includes shaft/clevis adapter (2 required), clevis adapter rod and nuts. Field-assembled actuator shaft extension kit with field fabricated 1/2" NPT threaded pipe (not provided). Threaded female adapters are 1/2"-14 NPT and 3/8"-24 UNS threads.		•	•			1	**333-030**
	**Long Actuator Shaft Extension Rod.** 10-1/8" (257 mm)	•	•	•			1	**331-434A**
	**Damper Shaft Extension.** 1/2" (13 mm) diameter damper shaft extension rod. Rod is 2-1/4" (57 mm) long.	•	•	•			1	**331-631**
	**Damper Shaft Extension.** 1/2" (13 mm) diameter damper shaft extension rod. Rod is 9" (229 mm) long.	•	•	•			1	**333-043-03**
	**Adapter.** For 3/8" (10 mm) diameter damper shafts. Use with 333-042, Shaft Extension.	•	•	•			1	**331-632**

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Actuator Shaft Extensions and Damper Push Rods								
	**Long Shaft Extension.** For a 1/2" (13 mm) hollow damper shaft.		•				1	**333-184**
	Shaft Rod for LC Actuator. • 4.5 inches (114 mm) long					•	1	**331-357**
	**Shaft Extension.** 1" (25 mm) diameter shaft extension 11-5/8" (295 mm) long for Ruskin dampers. Includes 1" (25 mm) diameter crank and 2 roll pins for assembly.		•	•			1	**333-194**
	**Flange Bearing.** 1/2" (13 mm) damper shaft bearing for universal mounting plate, 331-623.		•	•			1	**331-862**
	**Damper Push Rods.** 5/16" (8 mm) dia.	•	•	•				
	• 12" (30 cm) Length						1	**338-041**
	• 15" (38 cm) Length						1	**338-042**
	• 18" (46 cm) Length						1	**338-043**
	• 24" (61 cm) Length						1	**338-044**
	• 36" (91 cm) Length						1	**338-045**
	• 48" (122 cm) Length						1	**338-046**
	**Adjustable Yoke End Adapter.** • 1/2–20 thread to 1/2 inch NPT				•	•	1	**331-351**
	**No. 3 Pivot Post Kit.** For extended shaft mounting plate.	•					1	**331-006**
	• E-ring						2	
	• Lockwasher						2	
	• Nut						2	
	**Frame Mounting Lug Kit.**	•	•	•			1	**331-004**
	• Screw						2	
	• Nut						2	

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Actuator Shaft Extensions and Damper Push Rods								
	**Extended Shaft Mounting Plate.** May also require pivot post, clevis, crank and miscellaneous mounting hardware. 3" (76 mm) W x 10-1/2" (267 mm) L.	•					1	**331-033**
	**Offset Mounting Bracket.** For mounting the universal mounting lug, pivot post, clevis, crank, and miscellaneous mounting hardware.		•	•			1	**333-176**
	**Universal Mounting Plate.** May also require frame mounting lug, pivot post, clevis, crank and miscellaneous mounting hardware.		•	•				
	• 3/4" (20 mm)						1	**331-623**
	• 1" (25 mm)						1	**331-623A**
	**Actuator Side Mounting Bracket.** For side mounting of No. 3 or No. 4 actuators.	•	•				1	**331-916**
	**Pivot Mounting Kit.** Pivot mounting bracket and screws included (3).	•					1	**333-148**
	**Remote Mounting Kit.** For use with actuator/clevis assembly. Allows connection to damper shaft when damper shaft and actuator pivot post are mounted on different planes. Field fabricated 3/8" (10 mm) diameter push rod not included. Cut to length as needed.		•	•			1	**331-618**
	**Right Angle Mounting Plate.** For mounting actuator to floor. *Order separately.*		•	•			1	**333-208**
	**Copper to Polyethylene Tubing Adapters.** 24" length. Adapts 1/4 inch (6 mm) OD poly tubing to 1/4 inch (6 mm) OD copper tubing. Eliminates the need for compression fitting.	•	•	•	•	•	Pkg. of 50	**141-426**

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Positioning Relay and Relay Mounting Kits								
	**Positioning Relay.** A compact, pneumatic device designed to provide positive positioning of a pneumatic actuator. The positioned provides supply air pressure against the actuator diaphragm to initiate stem or shaft movement. The actuator spring reverses the stem or shaft movement.	•	•	•	•		1	**147-2000**
	**Positioning Relay Actuator Mounting Kit for No. 3 Damper Actuator.** Can also be factory-assembled to extended shaft mounted actuators. If using cast iron crank, it must be replaced with a **331-941** crank. (mfg. after 1/93)	•					1	**147-104**
	**Positioning Relay Mounting Kit for No. 4 Damper Actuator.**		•				1	**147-314**
	**Positioning Relay Mounting Kit for No. 6 Damper Actuator.**			•			1	**147-276**

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Replacement 147 Feedback Springs for Positioning Relay								
	Small Zinc Plate. Travel Range: 1/4" (6.4 mm) to 3/8" (9.5 mm) • VP 591 8 in. Valve Act. (147-333) • Flowrite 8-inch models 1 and 2 (147-277) • VP 591/3 Flowrite Valve Act. (147-311) • Super Flowrite Valves, 1/2" – 4"						1	**147-289**
	Small Red. Travel Range: 3/4" (19 mm) to 1" (25 mm) • VP 591 8 in. Valve Act. (147-333) • Flowrite Series 599 8-inch (599-00426) • Flowrite Series 599 12-inch (599-00423) • Flowrite 8-inch models 1 and 2 (147-277) • VP 591/3 Flowrite Valve Act. (147-311) • Super Flowrite Valves, 1/2" – 4"						1	**147-290**
	**Long Green.** Travel Range: 1" (25 mm) to 1-1/4" (32 mm) • VP 591 8 in. Valve Act. (147-333) • Flowrite 8-inch models 1 and 2 (147-277) • VP 591/3 Flowrite Valve Act. (147-311) • Super Flowrite Valves, 1/2" – 4"						1	**147-291**
	2" Red. Travel Range: 2-3/8" (60 mm) to N/A • No. 3 Damper Actuator (147-104)	•					1	**147-105**
	Long Zinc Plate. Travel Range: 3" (76 mm) to 3-1/4" (83 mm) • No. 6 Damper Actuator (147-276)			•			1	**147-292**
	3" Red. Travel Range: 3-3/4" (95 mm) to 4" (102 mm) • Relay Mounting Kit (147-300)						1	**147-301**
	Blue. Travel Range: 4" (102 mm) to 4-1/4" (108 mm) • No. 6 Damper Actuator (147-276)			•			1	**147-293**
	Zinc Pl. or Yell. Chr. Travel Range: 4" (102 mm) to 6" (152 mm) • No. 4 Damper Actuator (147-314)		•				1	**147-313**
	Zinc Plate. Travel Range: 7" (178 mm) to 12-1/4" (311 mm) • Large Capacity Pneu. Act. with Positioner (331-2882)					•	1	**147-330**

	Description	Used with Pneumatic Actuator Models					Quantity	Part No.
		No. 3	No. 4	No. 6	No. 6 Tandem	Large Capacity LC		
Actuator Service and Repair Accessories								
	**No. 4 Cast Aluminum Housing, Standard.** Legacy actuators with part numbers lower than or equal to 331-2885.		•				Pkg. of 5	**333-072**
	No. 4 Diaphragm for High Ambient Temperature. For newer models with part numbers 331-2888 and higher (Up to 400ºF diaphragm).		•				Pkg. of 5	**333-071**
	No. 6 Standard Replacement Diaphragm.			•	•		Pkg. of 5	**333-572**

Table of Contents

Variable Frequency Drives

Siemens, a global leader in drives technology, is raising the bar with new BT300 Variable Frequency Drives that are designed specifically for the demands of today's HVAC systems. Increased focus on energy efficiency of variable flow systems has increased the need for easy-to-use and highly reliable variable frequency drives that reduce the cost of installation and maintenance while maximizing energy savings. Siemens Industry's BT300 HVAC drives are designed to meet the demands of today's HVAC systems. An increased focus on energy efficiency of variable flow systems has increased the need for easy-to-use and highly reliable variable frequency drives that reduce the cost of installation and maintenance while maximizing energy savings.

While constantly expected to do more with less, managing energy consumption and optimizing occupant comfort remains of utmost importance to facility managers. They also require products that will integrate seamlessly into existing equipment and building management systems. The highly efficient BT300 delivers all this and more.

The BT300 comes standard with unique and industry-leading features:

- View/Monitor nine parameters at one time – user selectable, users determine the parameters for their applications
- Thin Film Capacitors – eliminate the need to condition or reform the capacitors before applying power
- Smallest Type 12 footprint on the market – lower shipping cost and easy installation
- Motor Switch Ride Through – during maintenance the motor disconnect switch can be opened and closed without stopping or tripping the drive

SIEMENS

Ingenuity for life

BT300 Variable Frequency Drives

Available in frame sizes up to 250 hp, the BT300 is well-suited for demanding HVAC environments and helps save 20-50% of energy compared to equipment with little or no control. Built-in features – like a real-time clock, energy savings optimization programming, and a sleep function – help measure energy savings. Built-in wizards get HVAC equipment up and running quickly and accurately.

usa.siemens.com/hvac

BT300 Variable Frequency Drives

Important Note:
VFD products are only available through authorized distribution channels. To locate an authorized distributor, please contact a Siemens Building Technologies representative at: **1.800.516.9964**.

Description

Siemens Industry's BT300 HVAC drives are designed to meet the unique demands of today's HVAC systems. An increased focus on energy efficient variable flow systems has increased the need for easy-to-use and highly reliable variable frequency drives that reduce the cost of installation and maintenance while maximizing energy savings.

Features

- Motor Switch Ride Through – during maintenance, the motor disconnect switch can be opened and closed without stopping or tripping the drive
- Thin Film Capacitors – eliminate the need to condition or reform the capacitors before applying power
- Intuitive graphical keypad with multilingual display
- Monitor nine user-defined values at one time
- Built-in wizards for faster start-up and easy setup of advanced functions
- Built-in plain text help and maintenance manual shows possible causes and suggested remedies
- Real time clock allows up to five calendar-based schedules and three timer inputs
- Ready to communicate to a Building Management System, embedded RS485 and Ethernet HVAC protocols: BACnet IP, Modbus TCP, Modbus RTU, BACnet MSTP, Metasys N2, APOGEE® FLN
- Two built-in PID controllers enable fast and accurate process control
- Integrated harmonic filters on the DC link reduce noise and interference and eliminate the need for additional filters and reactors
  – Equivalent to 5% impedance
- Built in fire mode controller
- Energy Savings with > 97.5% efficiency
- Optimized cooling fan runs only when needed
- One common interface throughout all power ranges
- Smallest Type 12 footprint on the market – lower shipping cost and easy installation

Options

- LON Interface
- Flange Mounting Kits for Frame Sizes 4-7
- Door Mounting Kits
- PC Cable for NET Tool, USB to RS-485, cable length 9.8 ft. (3 m)
- Real Time Clock Battery Package
- SED2 to BT300 Migration Kits

Applications

Reliable control for a wide range of HVAC applications, including special control option in the event of fire.

Specifications

Input Voltage and Power Ranges (3-phase)
208 V - 240 V, ±10% ..... 1 to 125 HP (0.75 to 90 kW)
380 V - 500 V, ±10% ..... 1.5 to 250 HP (1.1 to 160 kW)
525 V - 600 V, ±10% ..... 3 to 200 HP (2.2 to 132 kW)

Input Frequency ..... 45 to 66 Hz

Output Frequency ..... 0 to 320 Hz

Frequency Resolution ..... 0.01 Hz

Power Factor ..... 0.98 at Nominal Load

Efficiency ..... >97.5%

Overload Capacity ..... 1.1 x Nominal Rated Output Current 110% for 1 Minute/10 Minutes

Peak Overload Capacity ..... 200% for 2 Seconds Every 20 Seconds

PWM (Switching) Frequency
FS4 to FS6 - 1.5 ..... 10 kHz
Default FS4: 6 kHz; FS5: 4 kHz; FS6 = 4 kHz
FS7 to FS9 - 1.5 ..... 6 kHz
Default FS7: 4 kHz; FS8: 3 kHz; FS9: 2kHz
Adjustable in .1 kHz Increments
Automatic Switching Frequency Derating in Case of Overheating

Short Circuit Withstand Rating ..... 100,000 AIC

Frequency Reference Analog Input ..... 0.01 Hz Resolution 0.1% (10-bit)

Field Weakening Point ..... 8 to 320 Hz

Acceleration/Deceleration Time ..... 0.1 to 3000 sec

Ambient Operating Temperature ... 14°F (-10°C) (no Frost) to 104°F (40°C) up to 122°F (50°C) with Derating

Storage Temperature ..... -40ºF (-40ºC) to 158ºF (70ºC)

Relative Humidity ..... 0 to 95% RH, Non-condensing, Non-corrosive

Air Quality ..... IEC 60068-2-60 (H2S [hydrogen sulfide] and SO2 [sulfur dioxide])
Chemical Vapors ..... IEC 60721-3-3, Unit in Operation, Class 3C2
Mechanical Particles ..... IEC 60721-3-3, Unit in Operation, Class 3S3
Altitude ..... 100% Load Capacity (no-derating) up to 3,280 ft (1,000 m)
-1% Derating for Each 328 ft (100 m) Above 3,280 ft (1,000 m)
Maximum Altitude ..... 208…240 Vac: 13,123 ft (4,000 m)
380…500 Vac: 13,123 ft (4,000 m)
525...600 Vac: 6,562 ft (2,000 m)
Voltage for Relay Outputs ..... 240 Vac: ≤ 9,842 ft (3,000 m)
120 Vac: ≤ 13,123 ft (4,000 m)
Corner-grounding (380-500 Vac Systems Only) ..... ≤ 6,562 ft (2,000 m)

Vibration ..... IEC 61800-5-1 and IEC 60068-2-6

Shock ..... IEC 61800-5-1 and IEC 60068-2-27

Enclosure Class ..... UL Type 1/IP 21 Standard in Entire HP/kW Range; UL Type 12/IP 54 Options

EMC Immunity ..... Fulfills IEC 61800-3, First and Second Environment

EMC Emissions ..... EN61800-3 (2004) Category C2 Can be Field Modified for IT Networks for C3 or C4 Ratings

Average Noise Level
Heatsink Cooling Fan Noise Level in db
(Low Speed/High Speed/Average) ..... FS4: 45 / 56 / 65
FS5: 57 / 65 / 70
FS6: 63 / 72 / 77
FS7: 43 / 73 / 77
FS8: 58 / 73 / 86
FS9: 54 / 75 / 87

Heatsink Cooling Fan Output ..... FS4: 49 CFM
FS5: 88 CFM
FS6: 219 CFM
FS7: 159 CFM
FS8: 426 CFM

Agency Approvals ..... UL 508C; CE, UL, cUL, BTL, RoHS compliant, EN61800-5.1 (2007)

Control I/O
Analog Inputs ..... 2 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA)
Resolution 0.1%; Accuracy ±1%
Analog Outputs ..... 1 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA)
<500 W; Resolution 0.1%; Accuracy ±1%
Digital Inputs .... 6 – Programmable and Isolated Positive or Negative Logic;
5 kW; 0...5 Vdc = "0"; 15...30 Vdc = "1"
Relay Outputs ..... 2 – Form C and 1 Normally Open
24 Vdc @ 8A; 250 Vac @ 8A; 125 Vac @ 0.4A

Auxiliary Input Voltage ..... 24 Vdc +/-10% 250 mA Max.

Auxiliary Output Voltage .... 10 Vdc ±3%, 10 mA (Short-circuit Protected)
24 Vdc ±10%, 250 mA (Short-circuit Protected)

Control Method ..... Linear, Parabolic and Programmable V/f; Flux Current Control Low-Power Mode

Fixed Frequencies ..... 7 Programmable

Skip Frequency Bands ..... 3 Programmable

Embedded Resident Protocols
RS-485 ..... APOGEE P1, BACnet MS/TP, Modbus RTU, Metasys N2
Ethernet ..... BACnet IP, Modbus TCP

Over Voltage Trip Limit
208…240 Vac ..... 456 Vdc
380…500 Vac ..... 911 Vdc
525…600 Vac: ..... 1094 Vdc

Under Voltage Trip Limit ..... Depends on supply voltage (0.8775 * supply voltage):
208 Vac ..... 182.5 Vdc
240 Vac ..... 210.6 Vdc
380 Vac ..... 333.5 Vdc
480 Vac ..... 421.2 Vdc
575 Vac ..... 504.6 Vdc

Protection Features ..... Under-voltage Trip Limit
Over-voltage Trip Limit
Ground Fault Protection
Input (Mains) Supervision
Motor Phase Supervision
Over-Current Protection
Unit Over-temperature Protection
Motor Overload Protection
Motor Stall Protection
Motor Underload Protection
Short-Circuit Protection of 10 Vdc and 24 Vdc Reference Voltages

Output Ratings

Voltage (±10%)	Product Number			Output Rating		Rated Continuous Current	Frame Size
	UL Type 1	UL Type 12	UL Type 12 with Drive Disconnect	HP	kW		
208 V (3-Phase)	BT300-001X2-01X	BT300-001X2-12X	BT300-001X2-12D	1.0	0.75	4.8	FS4
	BT300-00152-01X	BT300-00152-12X	BT300-00152-12D	1.5	1.1	6.7	FS4
	BT300-002X2-01X	BT300-002X2-12X	BT300-002X2-12D	2.0	1.5	8.0	FS4
	BT300-003X2-01X	BT300-003X2-12X	BT300-003X2-12D	3.0	2.2	11.0	FS4
	BT300-005X2-01X	BT300-005X2-12X	BT300-005X2-12D	5.0	4.0	18.0	FS5
	BT300-00752-01X	BT300-00752-12X	BT300-00752-12D	7.5	5.5	24.0	FS5
	BT300-010X2-01X	BT300-010X2-12X	BT300-010X2-12D	10.0	7.5	31.0	FS5
	BT300-015X2-01X	BT300-015X2-12X	BT300-015X2-12D	15.0	11.0	48.0	FS6
	BT300-020X2-01X	BT300-020X2-12X	BT300-020X2-12D	20.0	15.0	62.0	FS6
	BT300-025X2-01X	BT300-025X2-12X	BT300-025X2-12D	25.0	18.5	75.0	FS7
	BT300-030X2-01X	BT300-030X2-12X	BT300-030X2-12D	30.0	22.0	88.0	FS7
	BT300-040X2-01X	BT300-040X2-12X	—	40.0	30.0	105.0	FS7
	BT300-050X2-01X	BT300-050X2-12X	—	50.0	37.0	140.0	FS8
	BT300-060X2-01X	BT300-060X2-12X	—	60.0	45.0	170.0	FS8
230 V (3-Phase)	BT300-075X2-01X	BT300-075X2-12X	—	75.0	55.0	205.0	FS8
	BT300-100X2-01X	BT300-100X2-12X	—	100.0	75.0	261.0	FS9
	BT300-125X2-01X	BT300-125X2-12X	—	125.0	90.0	310.0	FS9
380 V to 500 V (3-Phase)	BT300-00154-01X	BT300-00154-12X	BT300-00152-12D	1.5	1.1	3.7	FS4
	BT300-002X4-01X	BT300-002X4-12X	BT300-002X4-12D	2.0	1.5	5.3	FS4
	BT300-003X4-01X	BT300-003X4-12X	BT300-003X4-12D	3.0	2.2	6.2	FS4
	BT300-005X4-01X	BT300-005X4-12X	BT300-005X4-12D	5.0	4.0	10.6	FS4
	BT300-00754-01X	BT300-00754-12X	BT300-00752-12D	7.5	5.5	13.2	FS4
	BT300-010X4-01X	BT300-010X4-12X	BT300-010X4-12D	10.0	7.5	16.0	FS5
	BT300-015X4-01X	BT300-015X4-12X	BT300-015X4-12D	15.0	11.0	23.0	FS5
	BT300-020X4-01X	BT300-020X4-12X	BT300-020X4-12D	20.0	15.0	31.0	FS5
	BT300-025X4-01X	BT300-025X4-12X	BT300-025X4-12D	25.0	18.5	38.0	FS6
	BT300-030X4-01X	BT300-030X4-12X	BT300-030X4-12D	30.0	22.0	46.0	FS6
	BT300-040X4-01X	BT300-040X4-12X	BT300-040X4-12D	40.0	30.0	61.0	FS6
	BT300-050X4-01X	BT300-050X4-12X	BT300-050X4-12D	50.0	37.0	72.0	FS7
	BT300-060X4-01X	BT300-060X4-12X	BT300-060X4-12D	60.0	45.0	87.0	FS7
	BT300-075X4-01X	BT300-075X4-12X	—	75.0	55.0	105.0	FS7
	BT300-100X4-01X	BT300-100X4-12X	—	100.0	75.0	140.0	FS8
	BT300-125X4-01X	BT300-125X4-12X	—	125.0	90.0	170.0	FS8
	BT300-150X4-01X	BT300-150X4-12X	—	150.0	110.0	205.0	FS8
	BT300-200X4-01X	BT300-200X4-12X	—	200.0	132.0	261.0	FS9
	BT300-250X4-01X	BT300-250X4-12X	—	250.0	160.0	310.0	FS9

Output Ratings

Voltage (±10%)	Product Number			Output Rating		Rated Continuous Current	Frame Size
	UL Type 1	UL Type 12	UL Type 12 with Drive Disconnect	HP	kW		
525 V to 600 V	BT300-003X6-01X	BT300-003X6-12X	BT300-003X6-12D	3	2.2	3.9	FS5
	BT300-005X6-01X	BT300-005X6-12X	BT300-005X6-12D	5	4	6.1	FS5
	BT300-00756-01X	BT300-00756-12X	BT300-00756-12D	7.5	5.5	9	FS5
	BT300-010X6-01X	BT300-010X6-12X	BT300-010X6-12D	10	7.5	11	FS5
	BT300-015X6-01X	BT300-015X6-12X	BT300-015X6-12D	15	11	18	FS6
	BT300-020X6-01X	BT300-020X6-12X	BT300-020X6-12D	20	15	22	FS6
	BT300-025X6-01X	BT300-025X6-12X	BT300-025X6-12D	25	18.5	27	FS6
	BT300-030X6-01X	BT300-030X6-12X	BT300-030X6-12D	30	22	34	FS6
	BT300-040X6-01X	BT300-040X6-12X	BT300-040X6-12D	40	30	41	FS7
	BT300-050X6-01X	BT300-050X6-12X	BT300-050X6-12D	50	37	52	FS7
	BT300-060X6-01X	BT300-060X6-12X	BT300-060X6-12D	60	45	62	FS7
	BT300-075X6-01X	BT300-075X6-12X	—	75	55	80	FS8
	BT300-100X6-01X	BT300-100X6-12X	—	100	75	100	FS8
	BT300-125X6-01X	BT300-125X6-12X	—	125	90	125	FS8
	BT300-150X6-01X	BT300-150X6-12X	—	150	110	144	FS9
	BT300-200X6-01X	BT300-200X6-12X	—	200	132	208	FS9

Product Ordering

Your Product Number															
Example Product Number	**B**	**T**	**3**	**0**	**0**	**-**	**0**	**0**	**1**	**X**	**2**	**-**	**0**	**1**	**X**
Example Product Number	**B**	**T**	**3**	**0**	**0**	**-**	**0**	**0**	**1**	**5**	**4**	**-**	**1**	**2**	**D**

Model(s)

BT300 VFD only

Separator

HP

1[1], **1.5**[2], **2**[2], **3**, **5**, **7.5**, **10**, **15**, **20**, **25**, **30**, **40**, **50**, **60**, **75**[3], **100**[3], **125**[3], **150**[4], **200**[4], **250**[5]

X = no fraction, **5** = ½ hp

Voltage

2 208 Vac to 240 Vac

4 380 Vac to 500 Vac

4 525 Vac to 600 Vac

Separator

NEMA

00[6] Chassis Version (IP 00)

01 NEMA Type 1 (IP 21)

12 NEMA Type 12 (IP 54)

Type

X Drive Only

D Disconnect[7]

Table Notes:
[1]Available only with voltage code 2.
[2]Available only with voltage code 2 or 4.
[3]Use with voltages equal to or greater than 230 Vac.
[4]Available only with voltage code 4 or 6.
[5]Available only with voltage code 4.
[6]Available only with 50hp and above @ 208 Vac or 100 hp and above @ 480 Vac (FS8 & FS9).
[7]Available only with NEMA Type 12 with 30hp and below @ 240 Vac or 60hp and below @ 480 Vac or 50hp and below @ 600 Vac.

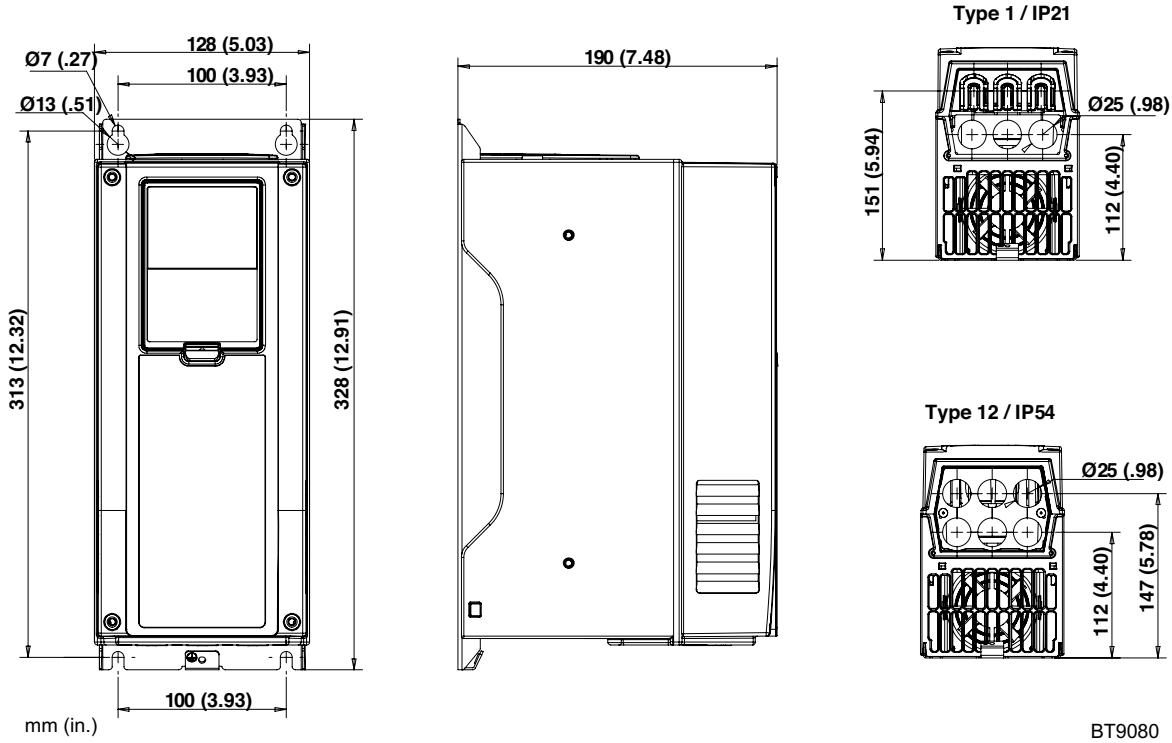
Example Product Numbers:
BT300-001X2-01X = BT300, 1 HP, 208-240Vac, NEMA Type 1, Drive Only.
BT300-00154-12D = BT300, 1.5 HP, 380-500Vac, NEMA Type 12, Drive with Disconnect.

Type 1 and 12 Frame Sizes and Power Range

Input Voltage		HP	1	1.5	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	200	250
		KW	0.75	1.1	1.5	2.2	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
208-240	Frame Size		4				5			6		7			8			9		NA		
380-500			N/A	4				5			6			7			8			9		
525-600			N/A			5			6				7			8			9		NA	

Dimensions

FS4, Wall-Mount



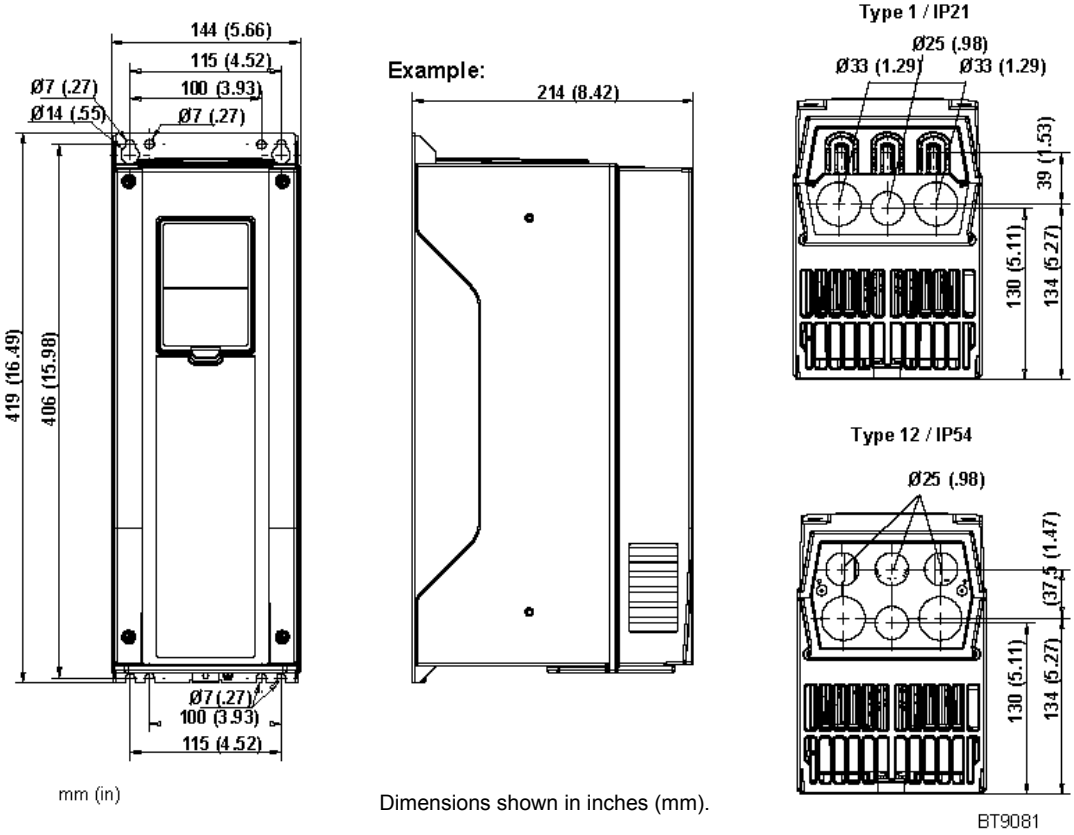
Dimensions shown in inches (mm).

Dimensions and Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (without Disconnect)	Depth in. (mm) (with Disconnect)	Weight lb. (kg)
FS4	12.9 (328)	5.0 (128)	7.5 (190)	10.6 (270)	13.0 (6)

Dimensions

FS5, Wall-Mount



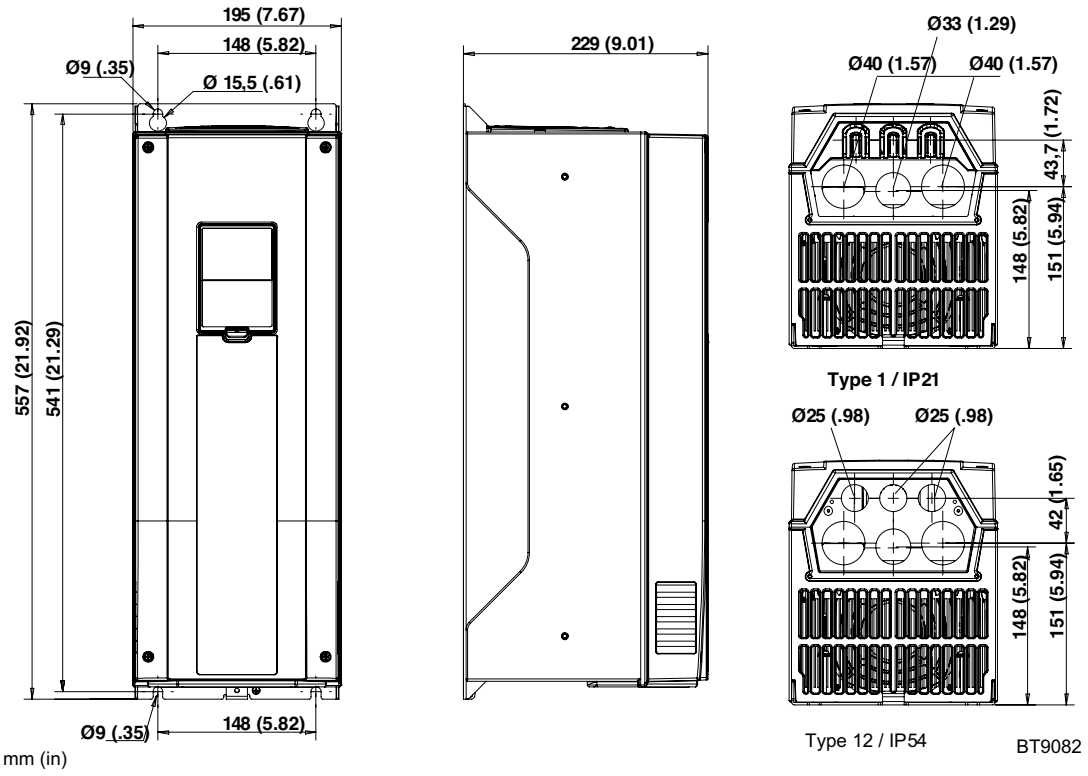
Dimensions shown in inches (mm).

Dimensions and Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (without Disconnect)	Depth in. (mm) (with Disconnect)	Weight lb. (kg)
FS5	16.5 (419)	5.7 (144)	8.4 (214)	11.6 (294)	22.0 (10)

Dimensions

FS6, Wall-Mount



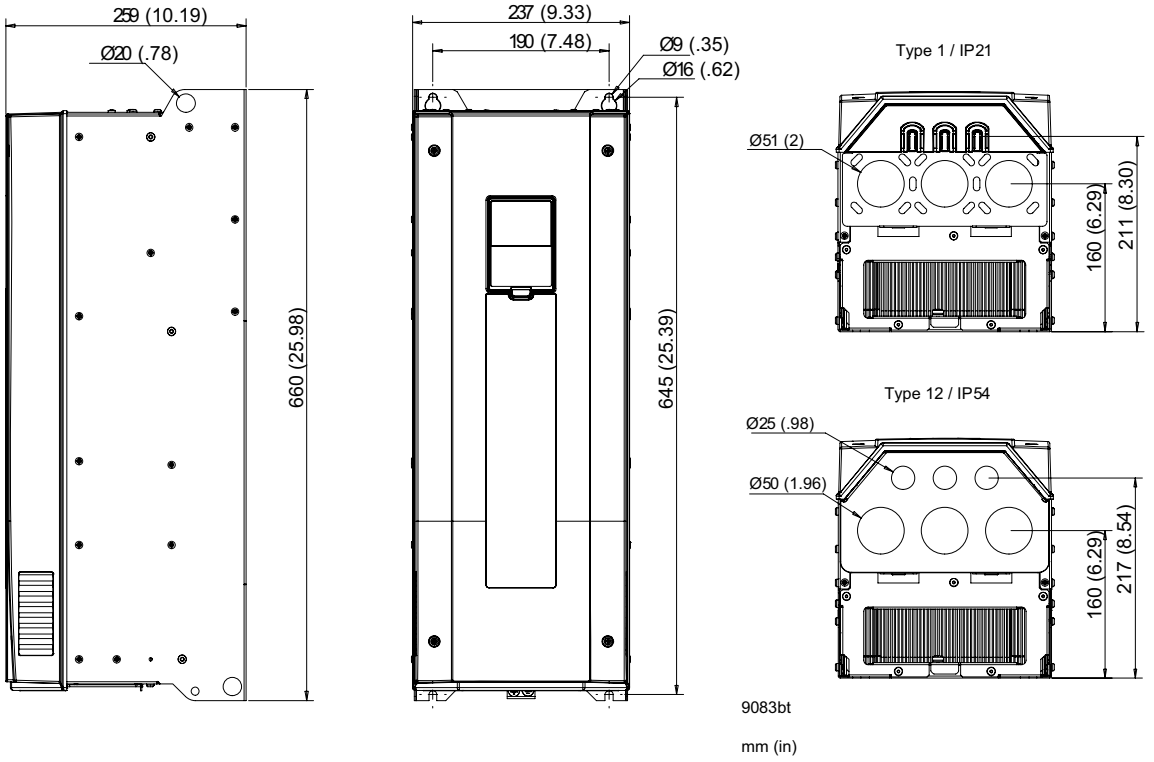
Dimensions shown in inches (mm).

Dimensions and Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (without Disconnect)	Depth in. (mm) (with Disconnect)	Weight lb. (kg)
FS6	21.9 (557)	7.7 (195)	9.0 (229)	11.9 (302)	44.0 (20)

Dimensions

FS7, Wall-Mount



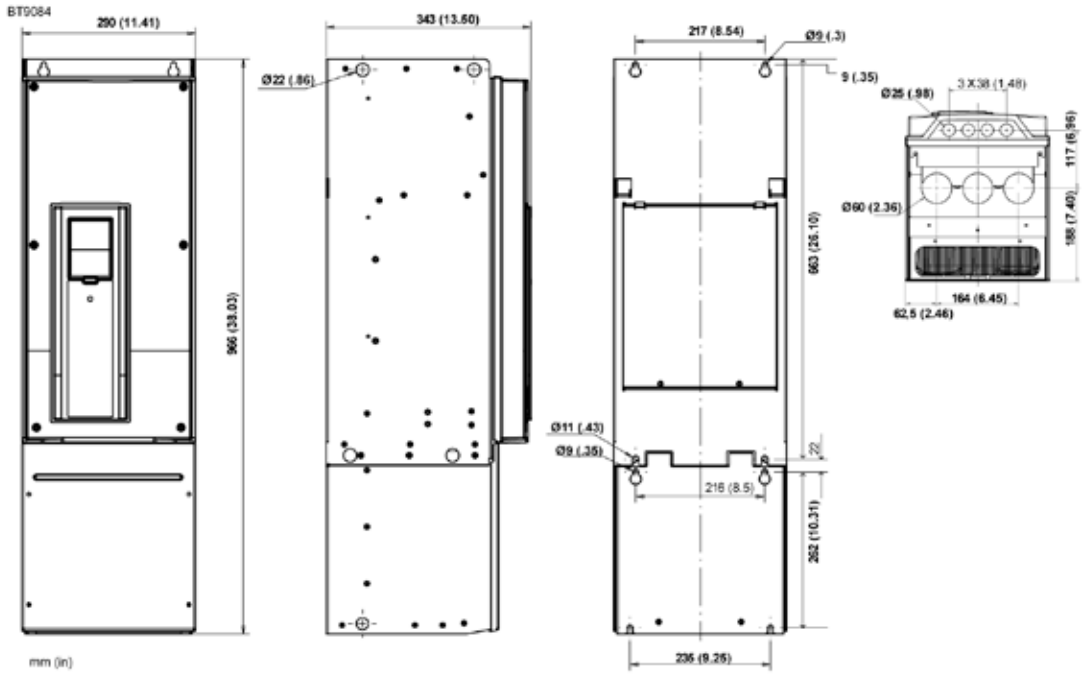
Dimensions shown in inches (mm).

Dimensions and Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (without Disconnect)	Depth in. (mm) (with Disconnect)	Weight lb. (kg)
FS7	26.0 (660)	9.3 (237)	10.2 (259)	13.1 (332)	83.0 (37.5)

Dimensions

FS8, Wall-Mount



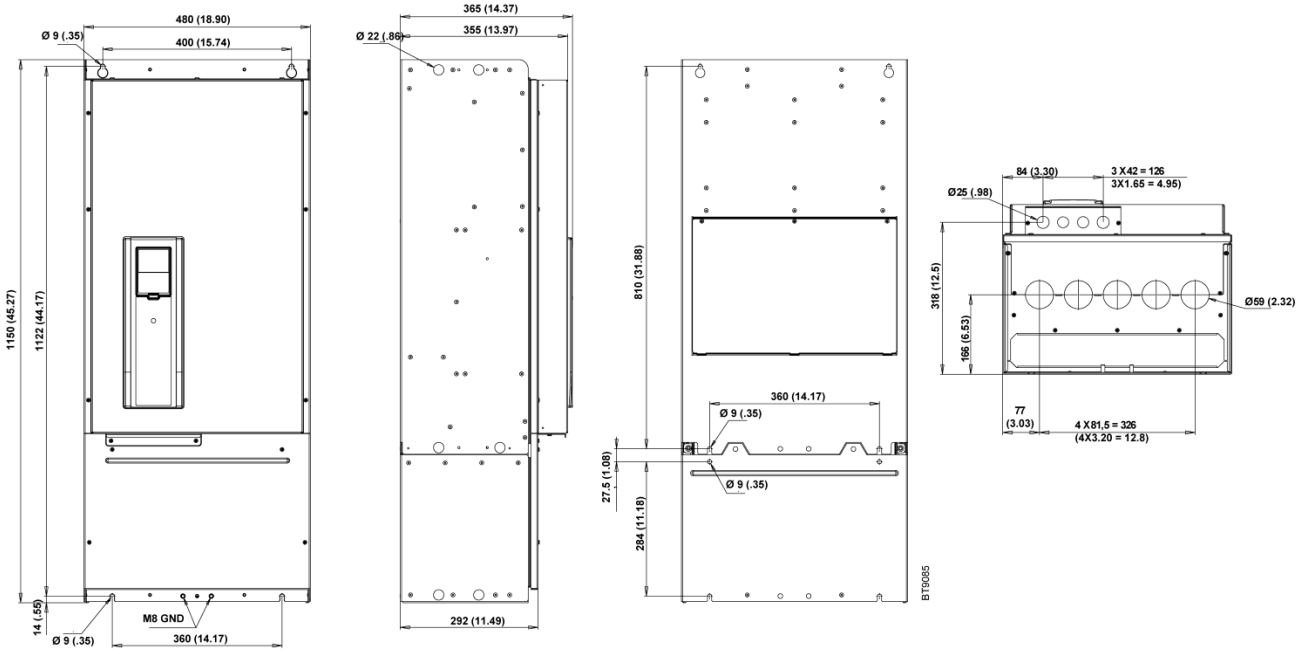
Dimensions shown in inches (mm).

Dimensions and Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (without Disconnect)	Depth in. (mm) (with Disconnect)	Weight lb. (kg)
FS8	38.0 (966)	11.4 (290)	13.5 (343)	N/A	145.5 (66)

Dimensions

FS9, Wall-Mount



Dimensions shown in inches (mm).

Dimensions and Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (without Disconnect)	Depth in. (mm) (with Disconnect)	Weight lb. (kg)
FS9	45.3 (1150)	18.9 (480)	14.4 (365)	N/A	238.0 (108)

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BT300 HVAC Drives Conventional Bypass (C-Bypass) Options

BT300 HVAC Drives Conventional Bypass (C-Bypass) Options.

Description

Half of today's drive specifications require bypass functionality. The BT300 Conventional Bypass is designed to meet these growing needs. It offers the same sophisticated features and easy-to-use menu structure found in the BT300 VFD and utilizes selector switches and indicator lights as primary functions. This makes installation and commissioning quick and easy.

Features (BT300 C-Bypass)

- Bypass Start-up Wizard
- Diagnostic board with test points
- Control logic short circuit protection
- 100,000 AIC short circuit rating
- Country of Origin (COO) USA
- IBC 2012 Seismic Certified
- OSHPD Certified
- Compact design

Features (C-Bypass Power)

2-Contactor: Output and Bypass

- Overload protection in bypass mode
- Electrically and mechanically interlocked

Drive Isolation

- Drive Service Switch allows the drive to be disconnected from power during troubleshooting without disrupting bypass operation
- Optional 3-Contactor (Drive Input)
  - Contactors electrically interlocked
  - Drive test function
  - Complete electrical isolation of drive

Input Device

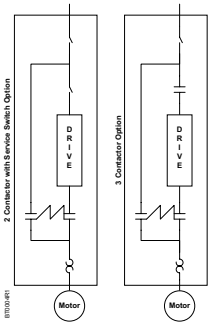
- Disconnect with fuses
- Circuit breaker (optional)
- All doors are interlocked and can be secured with a padlock

5% Input Impedance

- Internal reactors lower harmonics that the drive produces
- BT300 C-Bypass requires no additional input reactors

Reactor Options

- Line reactor (in NEMA 1 enclosure) supplied separately
- Load reactor (in NEMA 1 enclosure) supplied separately



Features (Bypass Control)

Enable Input

- Generally used for safety tie-ins; the motor will not operate the drive or bypass when open

Common Remote Start/Stop

- Common remote start/stop can be used in both drive and bypass mode

Essential Services Mode

- Typically used for smoke purge; the motor goes to bypass regardless of the selected mode
- No call to stop will have an effect, including open safety or stop commands
- Only turning the power off or opening this contact will stop the motor

Bypass – Door Mounted Control Devices

- Drive-Off-Bypass selector
- Bypass pilot light
- Drive Test on/off selector (with third Contactor)

Applications

Mission critical facilities such as laboratories, data centers, airports, and hospitals.

Specifications

Input Voltage and Power Ranges (3-phase)
208…240 Vac (-10%...+10%)..... 1 HP to 125 HP (0.75 kW to 90 kW) 4.2 amps to 301 amps
380…500 Vac (-10%...+10%)..... 1.5 HP to 250 HP (1.1 kW to 160 kW) 3.4 amps to 303 amps

Short Circuit Withstand Rating
Disconnect with fuses..... 100,000 AIC
Circuit Breaker..... 65,000 AIC @ 208/240 Vac 18,000 AIC @ 480 Vac

Control I/O: (Programmable)
Analog Inputs ..... 2 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA); Resolution 0.1%; Accuracy ±1%
Digital Inputs... 6 – Programmable and Isloated; Positive or Negative logic; 5 kW; 0...5 Vdc = "0"; 15...30 Vdc = "1"
Relay Outputs ..... 2 – Form C and 1 Normally Open (programmable); 24 Vdc @ 8A; 250 Vac @ 8A; 125 Vac @ 0.4A

Temperature
Ambient Operating ..... 14°F (-10°C) no frost to 104°F (40°C) without de-rating and 131°F (55°C) with de-rating
Storage ..... -40° to 158°F (-40°C to 70°C)

Relative Humidity ..... 0 to 95% RHJ, non-condensing, non-corrosive

Air Quality ..... IEC 60068-2-60
Chemical Vapors ..... IEC 60721-3-3, unit in operation, class 3C3
Mechanical Particles ..... IEC 60721-3-3, unit in operation, class 3S2

Altitude ..... 100% load capacity (no de-rating) up to 3,280 ft (1,000 m) 1% de-rating for each 328 ft (100 m) above 3,28 ft (1,000 m) Maximum altitude 14,763 ft (4,500

Vibration ..... IEC 61800-5-1 and IEC 60068-2-6

Seismic ..... 2012 International Building Code (IBC); OSHPD

Shock ..... IEC 61800-5-1 and IEC 60068-2-27

Enclosure ..... UL Type 1

Agency Approvals / Conformity ..... UL 508C (FS4 through FS7); UL-508A (FS8 and FS9); UL; cUL; CE; RoHS compliant; EN61800-5-1 (2007); BTL and OSHPD

Country of Origin (COO) ..... United States of America

Auxiliary Input Voltage ..... 24 Vdc

Auxiliary Output Voltage ..... 24 Vdc at 50 mA maximum

Embedded Resident Protocols
RS-485 ..... APOGEE P1, BACnet MS/TP, Modbus RTU, Metasys N2
Ethernet ..... BACnet IP, Modbus TCP

Protection Features ..... Under-voltage Trip Limit
Over-voltage Trip Limit
Ground Fault Protection
Input (Mains) Supervision
Motor Phase Supervision
Over-Current Protection
Unit Over-temperature Protection
Motor Overload Protection
Motor Stall Protection
Motor Underload Protection
Short-Circuit Protection of 10 Vdc and 24 Vdc Reference Voltage

Product Ordering

Your Product Number														
Example Product Number	**B**	**T**	**C**	**-**	**0**	**0**	**1**	**X**	**2**	**-**	**F**	**0**	**1**	**3**
Example Product Number	**B**	**T**	**E**	**-**	**0**	**0**	**7**	**5**	**4**	**-**	**B**	**0**	**1**	**2**

Model(s)
BTC Conventional
BTE Electronic
Separator
HP
1[1], 1.5, 2, 3, 5, 7.5, 10, 15, 20, 25, 30, 40, 50, 60, 75[2], 100, 125, 150[3], 200[3], 250[3]
X = no fract, **5** = 1/2 HP
Voltage
2 208 to 240 Vac
4 380 to 500 Vac
Separator
Disconnect
F Fused Disconnect
B Circuit Breaker
NEMA
01 NEMA Type 1 (IP 21)
Type
2 2 contactors (output and bypass) with service switch
3[4] 3 contactors (input, output and bypass) (for C Bypass only)

Table Notes:
[1]Available only with voltage code 2.
[2]Use with voltages equal to or greater than 230 Vac.
[3]Available only with voltage code 4.
[4]Available only with BTC models.

Example Product Numbers:
BTC-001X2-F013 = Conventional Bypass, 1 HP, 208-240 Vac, Fused Disconnect, NEMA Type 1, with 3 contactors
BTE-00754-B012 = Electronic Bypass, 7.5 HP, 380-500 Vac, Circuit Breaker, NEMA Type 1, with 2 contactors and service switch.

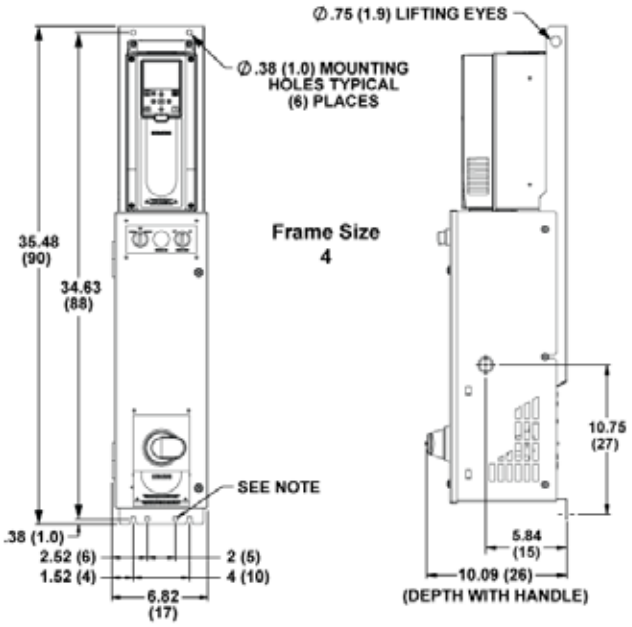
Bypass Frame Sizes and Power Ranges per NEC Motor Tables

		208-240	380-500	208-240	380-500
HP	**kW**	**Frame Size**		**Output Current**	
1	0.75	**4**	**N/A**	4.8	**N/A**
1.5	1.1		**4**	6.7	3.4
2	1.5			8.0	4.8
3	2.2			11.0	5.6
5	4	**5**		18.0	9.6
7.5	5.5			24.2	12.0
10	7.5		**5**	31.0	16.0
15	11	**6**		48.0	23.0
20	15			62.0	31.0
25	18.5	**7**	**6**	75.0	38.0
30	22			88.0	46.0
40	30			105.0	61.0
50	37	**8**	**7**	143.0	72.0
60	45			170.0	87.0
75*	55			208.0	105.0
100*	75	**9**	**8**	261.0	140.0
125*	90			310.0	170.0
150	110	**N/A**		**N/A**	205.0
200	132		**9**		261.0
250	160				310.0

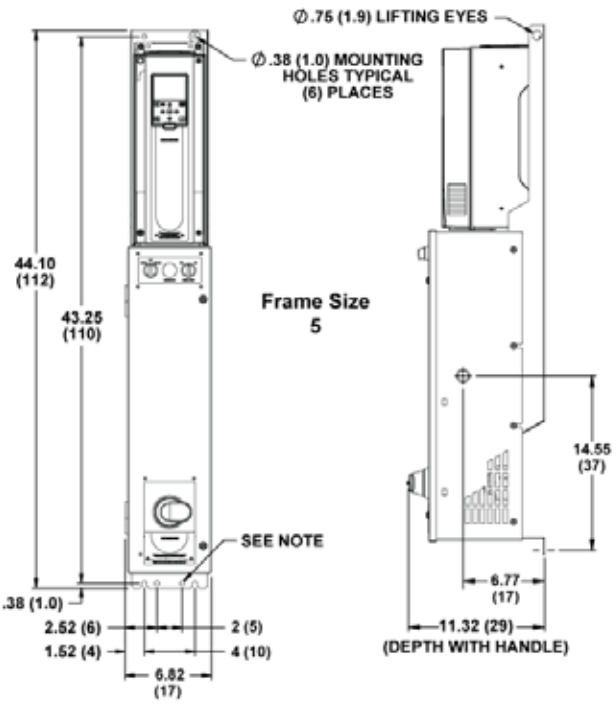
Table Notes:
* Available for 230 Vac and above.
NOTE: Drives are current (amperage) rated devices. Verify that the listed ratings are ≥ the motor full load current rating.

Dimension

Frame Size 4



Frame Size 5



Dimensions shown in inches (mm).

Note: Use mounting holes instead of slots in installations that are prone to seismic activity

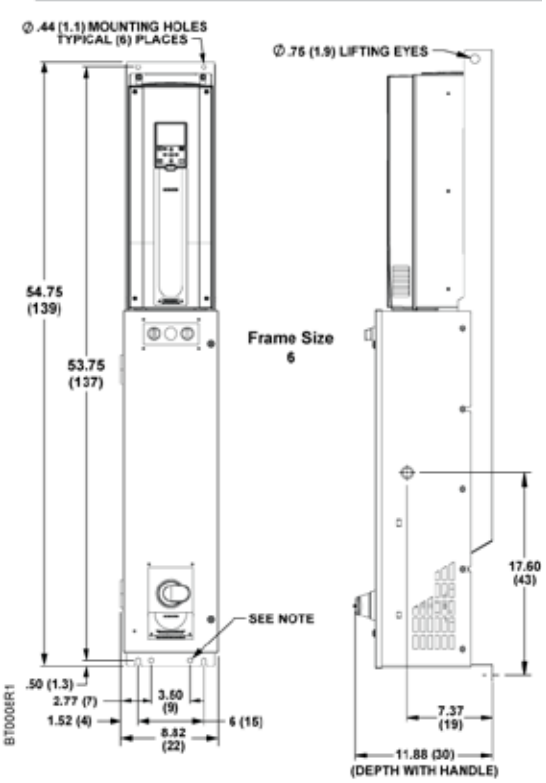
Dimensions and Approximate Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (with Handle)	Weight lb. (kg)
FS4	35.48 (90)	6.82 (17)	10.09 (26)	50 (23)
FS5	44.10 (112)	6.82 (17)	11.32 (29)	69 (31)

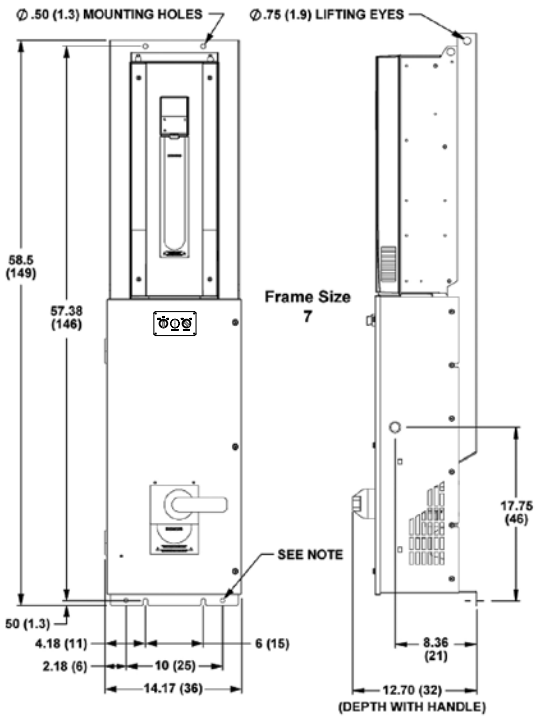
Table Notes:
Exact weight will be affected by actual horsepower/voltage and selected power options.

Dimension

Frame Size 6



Frame Size 7



Dimensions shown in inches (mm).

Note: Use mounting holes instead of slots in installations that are prone to seismic activity

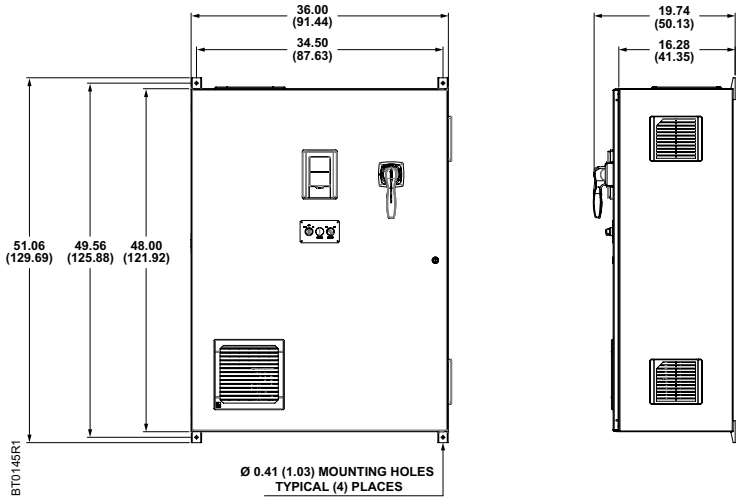
Dimensions and Approximate Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (with Handle)	Weight lb. (kg)
FS6	54.75 (1390.65)	8.82 (22)	11.88 (30)	112 (51)
FS7	58.5 (149)	14.17 (36)	12.70 (32)	187 (85)

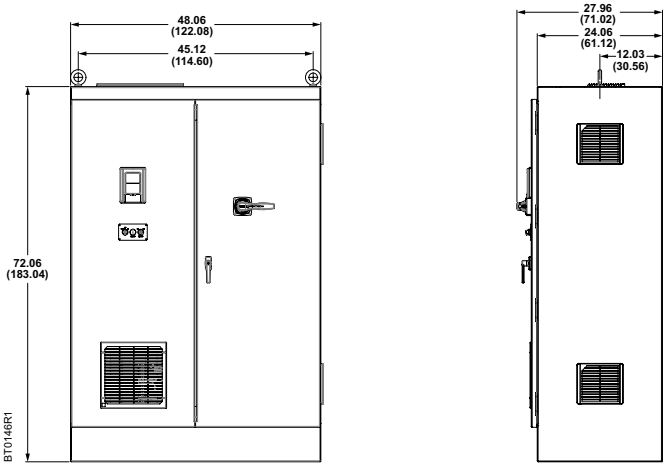
Table Notes:
Exact weight will be affected by actual horsepower/voltage and selected power options.

Dimension

Frame Size 8



Frame Size 9



Dimensions shown in inches (mm).

Note: Use mounting holes instead of slots in installations that are prone to seismic activity

Dimensions and Approximate Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (with Handle)	Weight lb. (kg)
FS8	51.06 (138)	36 (91)	19.74 (50)	400 (181)
FS9	72.06 (183)	48.06 (122)	27.96 (71)	900 (408)

Table Notes:
Exact weight will be affected by actual horsepower/voltage and selected power options.

BT300 HVAC Drives Electronic Bypass (E-Bypass) Options

BT300 HVAC Drives Electronic Bypass (E-Bypass) Options.

Description

Half of today's drive specifications require bypass functionality. The BT300 Electronic Bypass is designed to meet these growing needs. It offers the same sophisticated features and easy-to-use menu structure found in the BT300 VFD and utilizes internal control boards that act as the brains and eliminate the control wiring, relay logic, and terminal blocks. They are replaced with advanced built-in features that are accessible from an electronic keypad. This makes installation and commissioning quick and easy.

Features (BT300 E-Bypass)

- Bypass Start-up Wizard
- Diagnostic Board with Test Points
- Electronic Override
- Control Logic Short Circuit Protection
- 100,000 Aic Short Circuit Rating
- Auto Bypass
- Damper Interlock
- Essential Service Mode
- Remote Bypass
- View/Monitor Bypass Parameters
- Multiple Safeties
- Monitor and Display Which Safety Interlock is Open
- Control External Devices via Serial Communication
- Pass Through I/O Capabilities Command up to 8 Output Points
- View Status of I/O Points
- Supports APOGEE P1, BACnet and Modbus Protocols in Bypass
- Compact Design

Features (E-Bypass Power)

2-Contactor: Output and Bypass

- Overload Protection in Bypass Mode
- Electrically Interlocked

Drive Isolation

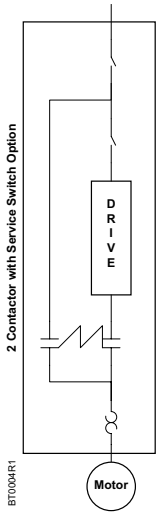
Drive Service Switch allows the drive to be disconnected from power during troubleshooting without disrupting bypass operation.

Input Device

- Disconnect with fuses
- Circuit breaker (optional)
- All doors are interlocked and can be padlocked

5% Input Impedance

- Internal reactors lower harmonics that the drive produces
- BT300 E-Bypass requires no additional input reactors



Features (E-Bypass Control)

Auto Bypass

- Relay logic allows User to send the motor to bypass mode based on the drive's programmable fault list.
- Customer defines the events which will transfer to bypass
- The drive's programmable relay can be set up for applications that run full speed for an extended period of time

Damper Interlock

- Generally used for safety tie-ins; the motor will not operate the drive or bypass when open
- Enables a circuit signaling the system is ready for bypass

Essential Service Mode

- Also used for smoke purge; the motor goes to bypass regardless of the selected mode
- No call to stop will have an effect, including open safety or stop commands
- Only turning the power off or opening this contact will stop the motor

Remote Bypass

Customer-supplied start/stop controls when running in bypass.

Electronic Override

- Industry first
- Full bypass control, even if the control board (intelligence) fails. As long as power is supplied to the bypass, you have full bypass capability
- Maintains all system safeties in bypass

Applications

Mission critical facilities such as laboratories, data centers, airports, and hospitals.

Specifications

Input Voltage and Power Ranges (3-phase)
208…240 Vac (-10%...+10%).....1 HP to 125 HP (0.75 kW to 90 kW) 4.2 amps to 301 amps
380…500 Vac (-10%...+10%).... 1.5 HP to 250 HP (1.1 kW to 160 kW) 3.4 amps to 303 amps

Short Circuit Withstand Rating
Disconnect with Fuses .....100,000 AIC
Circuit Breaker.....65,000 AIC @ 208/240 Vac; 18,000 AIC @ 480 Vac

Control I/O: (Programmable)
Analog Inputs .....2 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA); Resolution 0.1%; Accuracy ±1%
Analog Outputs.....1 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA); <500 W; Resolution 0.1%; Accuracy ±1%
Digital Inputs.....6 – Programmable and Isloated; Positive or Negative logic; 5 kW; 0...5 Vdc = "0"; 15...30 Vdc = "1"
Relay Outputs.....2 – Form C and 2 Normally Open (programmable); 24 Vdc @ 8A; 250 Vac @ 8A; 125 Vac @ 0.4A

Short Circuit Withstand Rating .....100,000 AIC

Temperature
Ambient Operating ..... 14°F (-10°C) no frost to 104°F (40°C) without de-rating and 131° (55°C) with de-rating
Storage..... -40° to 158°F (-40° to 70°C)

Relative Humidity .....0 to 95% RHJ, Non-condensing, Non-corrosive

Air Quality ..... IEC 60068-2-60
Chemical Vapors .....IEC 60721-3-3, Unit in Operation, Class 3C3
Mechanical Particles .....IEC 60721-3-3, Unit in Operation, Class 3S2

Altitude .....100% Load Capacity (no de-rating) Up to 3,280 ft (1,000 m)
1% De-rating for Each 328 ft (100 m) Above 3,28 ft (1,000 m)
Maximum altitude 14,763 ft (4,500

Vibration .....IEC 61800-5-1 and IEC 60068-2-6

Seismic ..... 2012 International Building Code (IBC); OSHPD

Shock .....IEC 61800-5-1 and IEC 60068-2-27

Enclosure ..... UL Type 1

Agency Approvals / Conformity .....UL 508C (FS4 through FS7); UL-508A (FS8 and FS9); UL; cUL; CE; RoHS compliant; EN61800-5-1 (2007); BTL and OSHPD

Country of Origin (COO) .....United States of America

Auxiliary Input Voltage ..... 24 Vdc

Auxiliary Output Voltage .....24 Vdc at 50 mA Maximum

Serial Interface .....RS485 and Ethernet

Embedded Protocols
RS-485 .....APOGEE P1, BACnet MS/TP, Modbus RTU, Metasys N2
Ethernet..... BACnet IP, Modbus TCP

Protection Features..... Under-voltage Trip Limit
Over-voltage Trip Limit
Ground Fault Protection
Input (Mains) Supervision
Motor Phase Supervision
Over-current Protection
Unit Over-temperature Protection
Motor Overload Protection
Motor Stall Protection
Motor Underload Protection
Short-Circuit Protection of 10 Vdc and 24 Vdc Reference Voltages

Product Ordering

Your Product Number														
Example Product Number	**B**	**T**	**C**	**-**	**0**	**0**	**1**	**X**	**2**	**-**	**F**	**0**	**1**	**3**
Example Product Number	**B**	**T**	**E**	**-**	**0**	**0**	**7**	**5**	**4**	**-**	**B**	**0**	**1**	**2**

Model(s)
BTC Conventional
BTE Electronic
Separator
HP
1[1], **1.5, 2, 3, 5, 7.5, 10, 15, 20, 25, 30, 40, 50, 60, 75**[2], **100, 125, 150**[3], **200**[3], **250**[3]
X = no fract, **5** = 1/2 HP
Voltage
2 208 to 240 Vac
4 380 to 500 Vac
Separator
Disconnect
F Fused Disconnect
B Circuit Breaker
NEMA
01 NEMA Type 1 (IP 21)
Type
2 2 contactors (output and bypass) with service switch
3[4] 3 contactors (input, output and bypass) (for C Bypass only)

Table Notes:
[1]Available only with voltage code 2.
[2]Use with voltages equal to or greater than 230 Vac.
[3]Available only with voltage code 4.
[4]Available only with BTC models.

Example Product Numbers:
BTC-001X2-F013 = Conventional Bypass, 1 HP, 208-240 Vac, Fused Disconnect, NEMA Type 1, with 3 contactors
BTE-00754-B012 = Electronic Bypass, 7.5 HP, 380-500 Vac, Circuit Breaker, NEMA Type 1, with 2 contactors and service switch.

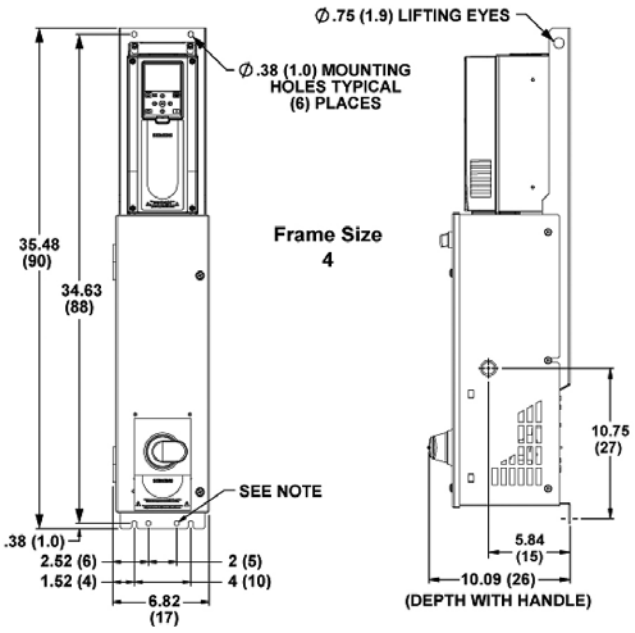
Bypass Frame Sizes and Power Ranges per NEC Motor Tables

		208-240	380-500	208-240	380-500
HP	**kW**	**Frame Size**		**Output Current**	
1	0.75	**4**	**N/A**	4.8	**N/A**
1.5	1.1		**4**	6.7	3.4
2	1.5			8.0	4.8
3	2.2			11.0	5.6
5	4	**5**		18.0	9.6
7.5	5.5			24.2	12.0
10	7.5		**5**	31.0	16.0
15	11	**6**		48.0	23.0
20	15			62.0	31.0
25	18.5	**7**	**6**	75.0	38.0
30	22			88.0	46.0
40	30			105.0	61.0
50	37	**8**	**7**	143.0	72.0
60	45			170.0	87.0
75*	55			208.0	105.0
100*	75	**9**	**8**	261.0	140.0
125*	90			310.0	170.0
150	110	**N/A**		**N/A**	205.0
200	132		**9**		261.0
250	160				310.0

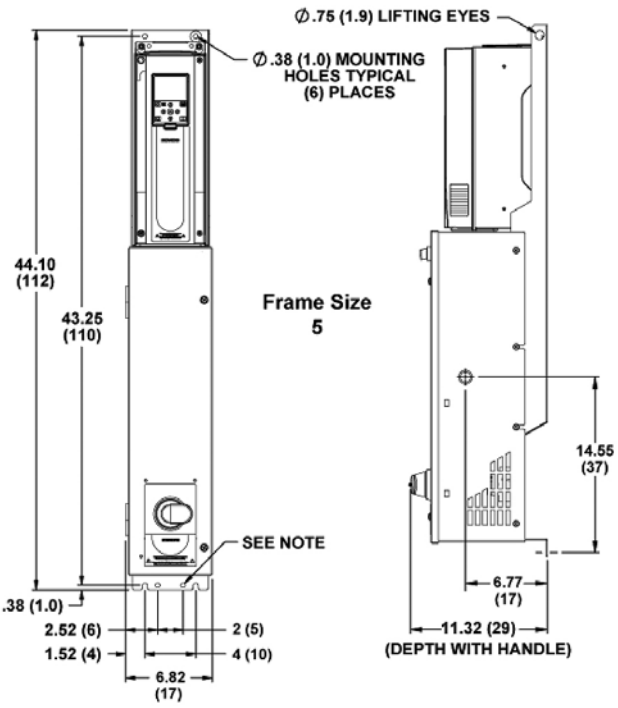
Table Notes:
* Available for 230 Vac and above.
NOTE: Drives are current (amperage) rated devices. Verify that the listed ratings are ≥ the motor full load current rating.

Dimensions

Frame Size 4



Frame Size 5



Dimensions shown in inches (mm).

Note: Use mounting holes instead of slots in installations that are prone to seismic activity

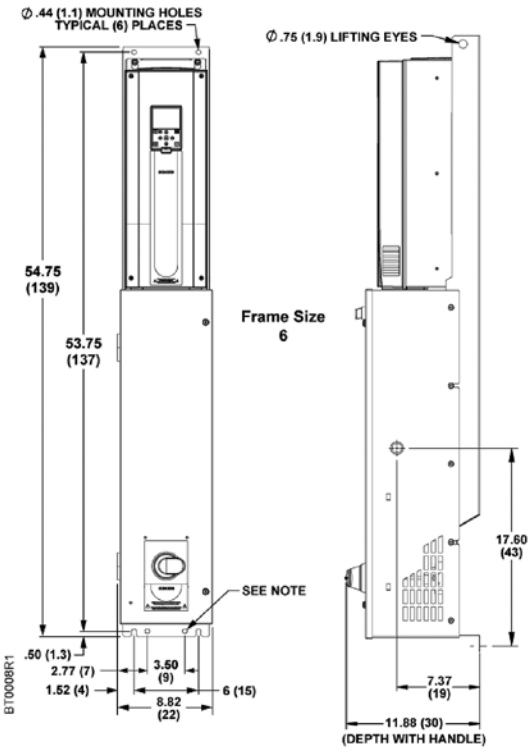
Dimensions and Approximate Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (with Handle)	Weight lb. (kg)
FS4	35.48 (90)	6.82 (17)	10.09 (26)	50 (23)
FS5	44.10 (112)	6.82 (17)	11.32 (29)	69 (31)

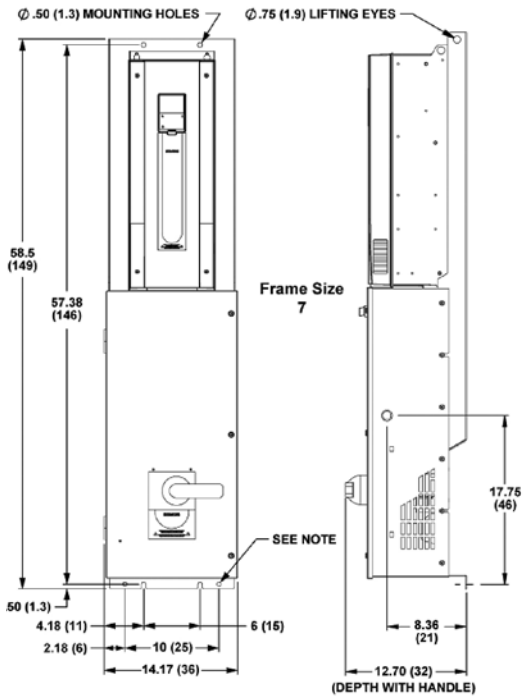
Table Notes:
Exact weight will be affected by actual horsepower/voltage and selected power options.

Dimensions

Frame Size 6



Frame Size 7



Dimensions shown in inches (mm).

Note: Use mounting holes instead of slots in installations that are prone to seismic activity

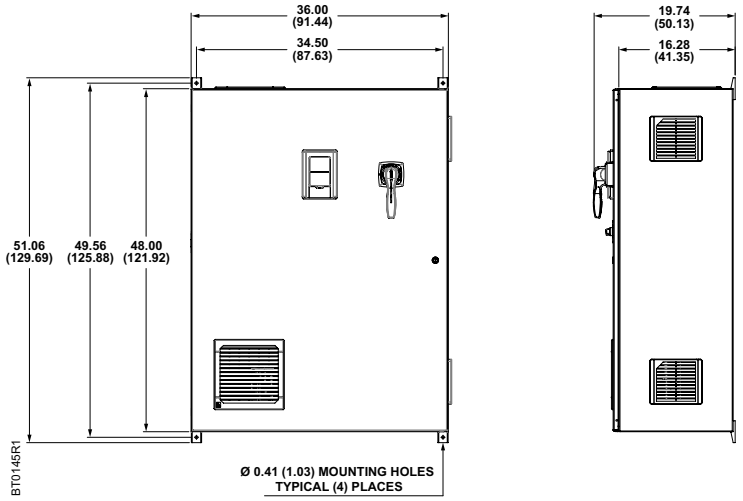
Dimensions and Approximate Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (with Handle)	Weight lb. (kg)
FS6	54.75 (1390.65)	8.82 (22)	11.88 (30)	112 (51)
FS7	58.5 (149)	14.17 (36)	12.70 (32)	187 (85)

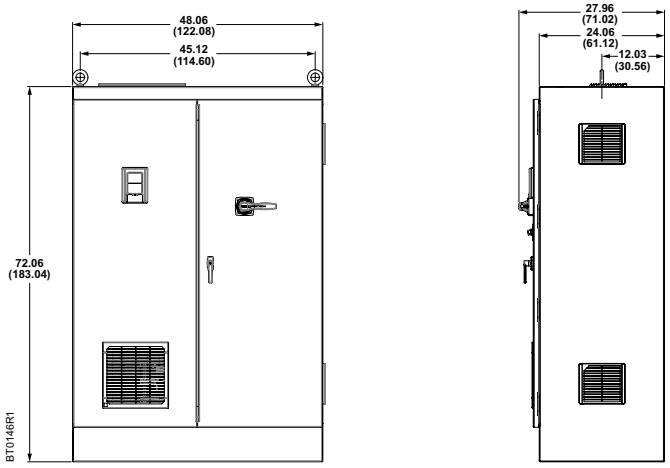
Table Notes:
Exact weight will be affected by actual horsepower/voltage and selected power options.

Dimension

Frame Size 8



Frame Size 9



Dimensions shown in inches (mm).

Note: Use mounting holes instead of slots in installations that are prone to seismic activity

Dimensions and Approximate Weights

Frame Size	Height in. (mm)	Width in. (mm)	Depth in. (mm) (with Handle)	Weight lb. (kg)
FS8	51.06 (138)	36 (91)	19.74 (50)	400 (181)
FS9	72.06 (183)	48.06 (122)	27.96 (71)	900 (408)

Table Notes:
Exact weight will be affected by actual horsepower/voltage and selected power options.

BT300 VFD NEMA Type 3R Drive and Bypass

BT300 VFD NEMA Type 3R Drive and Bypass.

Description

The NEMA Type 3R bypass and NEMA Type 3R drive are companion packages for the family of BT300 Variable Frequency Drives (VFDs).

NEMA Type 3R enclosed are manufactured for outdoor locations. Enclosures with this rating provide a degree of protection to personnel against access to hazardous parts; a degree of protection of the equipment inside to keep out solid foreign objects (falling dirt), and water (rain, sleet, snow); and are undamaged by ice forming on the enclosure.

Each NEMA Type 3R package (drive and drive with bypass) includes:

1. Fused Disconnect
2. Thermostatically controlled exhaust fan
   a. When the drive is on, the fan is on to cool to ambient temperature
3. Separate thermostatically controlled heater
   a. When the drive is off the heater is on to maintain optimal cabinet temperature
4. The fan or heater are not allowed to be run simultaneously

The BT300 Type 3R is designed specifically for HVAC applications and supports a variety of digital and analog I/O and provides built-in PID features to control pumps and fans.

Features (Bypass Power)

3-Contactor: Input, Output and Bypass

- Overload protection in bypass mode
- Step-down transformer with fused primary and secondary
- Contactors electrically and mechanically interlocked.
- Drive test function
- Complete electrical isolation of drive

Input Device

- Fused disconnect
- All doors are interlocked and padlockable

Input/Output Reactor Options

- BT300 drive comes standard with harmonic filtering eqivent to 5% impedance
- Optional line reactor supplied separately
- Load reactor available and supplied separately

Features (Bypass Control)

Enable Input

- Generally used for safety tie-ins; the motor will not operate the drive or bypass when open

Common Remote Start/Stop

- Can be used in both drive and bypass mode

Essential Services Mode

- Typically used for smoke purge; the motor goes to bypass regardless of the selected mode
- No call to stop will have an effect, including open safety or stop commands
- Only turning the power off or opening this contact will stop the motor

Bypass – Door Mounted Control Devices

- Drive-Off-Bypass selector
- Bypass pilot light
- Drive Test On-Off selector

Specifications

Input Voltages and Power Ranges (3-phase)
208…240 Vac (-10%...+10%)..... 1 HP to 60 HP (0.75 kW to 45 kW) 4.2 amps to 170 amps
380…500 Vac (-10%...+10%)..... 1.5 HP to 125 HP (1.1 kW to 160 kW) 3.4 amps to 170 amps

Frequency Reference
Analog Input ..... Resolution 0.01 - 0.1% (10 bit), accuracy ±1%
Keypad ..... Resolution 0.01 Hz

Ambient Operating Temperature..... 14°F (-10°C) (no frost) to 104°F (40°C) up to 122°F (50°C) with derating

Storage Temperature.....-40°F (-40°C) (no frost) to 158°F (70°C)

Relative Humidity .....0 to 95% rh, non-condensing, non-corrosive

Air Quality .....IEC 60068-2-60 (H2S [hydrogen sulfide] and SO2 [sulfur dioxide])
Chemical Vapors .....IEC 60721-3-3, unit in operation, class 3C2
Mechanical Particles .....IEC 60721-3-3, unit in operation, class 3S3

Altitude ..... 100% load capacity (no-derating) up to 3,280 ft (1,000 m) -1% derating for each 328 ft (100 m) above 3,280 ft (1,000 m)
Maximum altitude .....208…240 Vac: 13,123 ft (4,000 m) 380…500 Vac: 13,123 ft (4,000 m)
Voltage for relay outputs..... 240 Vac: ≤ 9,842 ft (3,000 m) 120 Vac: ≤ 13,123 ft (4,000 m)
Corner-grounding (380-500 Vac systems only)..... ≤ 6,562 ft (2,000 m)

Vibration EN61800-5-1 EN60068-2-6

Shock EN61800-5-1 EN60068-2-27

Enclosure Class.....UL Type 3R (NEMA Type 3R)

Agency Approvals / Conformity..... UL-508A; UL; cUL; CE; RoHS compliant; EN61800-5-1 (2007); BTL

Country of Origin (COO) ..... United States of America

Control I/O: (Programmable)
Analog Inputs .....2 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA) Resolution 0.1%; Accuracy ±1%
Analog Outputs.....1 – Voltage (0/2…10 Vdc) or Current (0/4…20 mA) <500 W; Resolution 0.1%; Accuracy ±1%
Digital Inputs... 6 – Programmable and Isloated Positive or Negative logic; 5 kW; 0...5 Vdc = “0”; 15...30 Vdc = “1”
Relay Outputs.....2 – Form C and 1 Normally Open (programmable) 24 Vdc @ 8A; 250 Vac @ 8A; 125 Vac @ 0.4A

Auxiliary Input.....24 Vdc ±10%, 250 mA

Auxiliary Output..... 10 Vdc ±3%, 10 mA (short-circuit protected) 24 Vdc ±10%, 250 mA (short-circuit protected)

Embedded Protocols
RS-485 ..... APOGEE P1, BACnet MS/TP, Modbus RTU, Metasys N2
Ethernet..... BACnet IP, Modbus TCP

Protection Features..... Under-voltage Trip Limit
Over-voltage Trip Limit
Ground Fault Protection
Input (Mains) Supervision
Motor Phase Supervision
Over-current Protection
Unit Over-temperature Protection
Motor Overload Protection
Motor Stall Protection
Motor Underload Protection
Short-Circuit Protection of 10 Vdc and 24 Vdc Reference Voltages

Product Ordering

Your Product Number																	
Example Product Number	**V**	**B**	**A**	**3**	**4**	**0**	**.**	**F**	**3**	**3**	**0**	**X**	**B**	**T**	**3**	**0**	**0**

Model(s)
VBA Factory Designation

Voltage
1 208 Vac to 240 Vac
3 380 Vac to 500 Vac

HP
1.0[1], 1.5, 2.0, 3.0, 5.0, 7.5, 10, 15, 20, 25, 30, 40, 50, 60, 752, 100[2], 125[2]

Separator

Disconnect
F Fused Disconnect

Enclosure/NEMA
3 NEMA Type 3R

Contactor
0 None (Drive only)
3 3 – Contactor Bypass (Input, Output, Bypass)

Series
0XBT300 Factory Designation

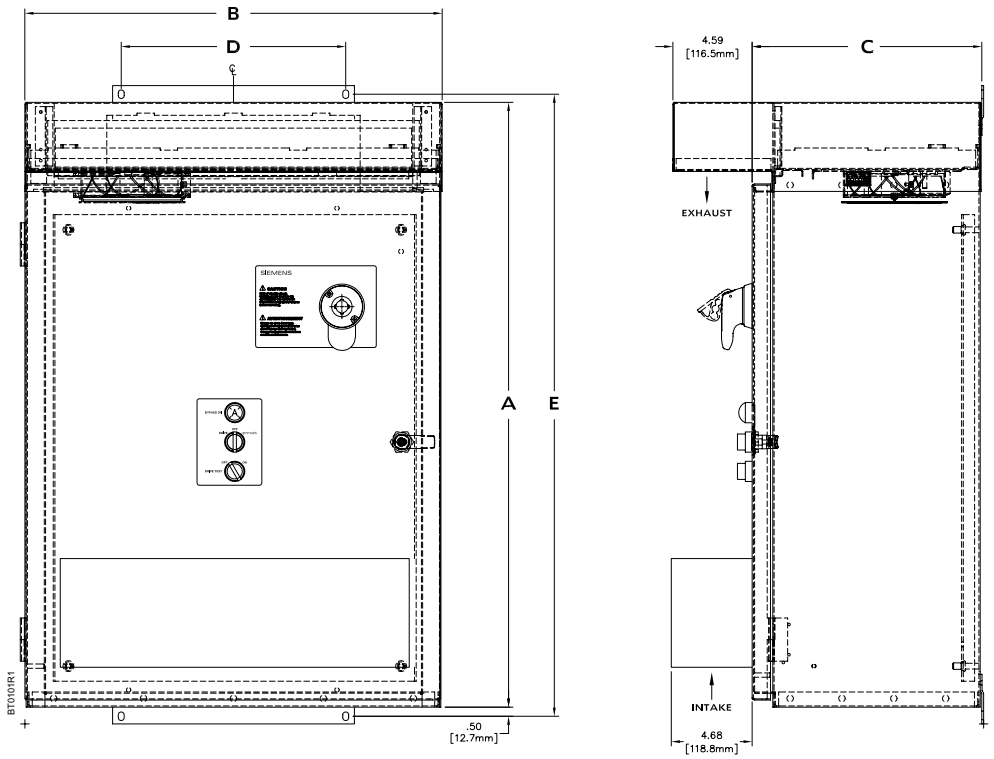
Table Notes:
[1]Available with voltage code 3 bypass option only.
[2]Available only with voltage code 3.

Example Product Numbers:
VBA340.F330XBT300 = Conventional Bypass, 40 HP, 380-500 Vac, Fused Disconnect, NEMA Type 3R, with 3 contactors

Bypass Frame Sizes and Power Ranges per NEC Motor Tables

		Voltage		Voltage		
		208-240	380-500	208	230-240	380-500
HP	**kW**	**Frame Size**		**NEC Motor Rating**		
1	0.75	**4**	**N/A**	4.6	4.2	**N/A**
1.5	1.1		**4**	6.6	6	3
2	1.5			7.5	6.8	3.4
3	2.2			10.6	9.6	4.8
5	4	**5**		16.7	15.2	7.6
7.5	5.5			24.2	22	11
10	7.5		**5**	30.8	28	14
15	11	**6**		46.2	42	21
20	15			59.4	54	27
25	18.5	**7**	**6**	74.8	68	34
30	22			88	80	40
40	30			114	104	52
50	37	**8**	**7**	143	130	65
60	45			169	154	77
75	55	**N/A**		211	192	96
100	75		**8**	273	248	124
125	90			343	312	156

Dimensions



Dimensions shown in inches (mm).

Bypass Dimensions

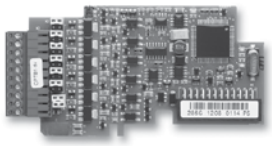
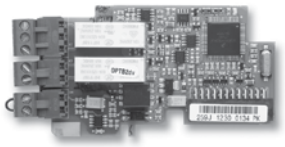
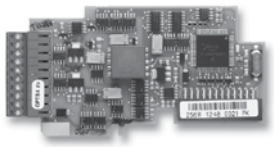
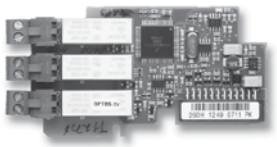
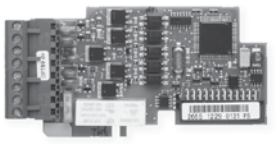
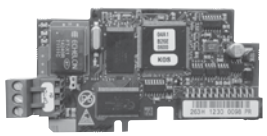
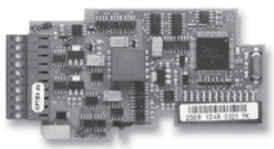
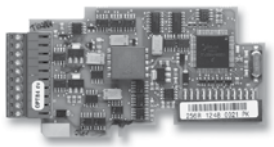
HP Range			Dimensions in Inches (mm)					Approx. Weight	
208/230 V	480 V	Frame Size	A	B	C	D	E	lb	kg
1 - 10	1 - 15	FS4/FS5	35 (889)	24.15 (613)	13.20 (335)	13 (330)	36 (914)	175	79
15 - 20	20 - 40	FS5/FS6	41 (1041)				42 (1067)	215	98
25 - 40	50 - 75	FS7	55 (1397)	36.15 (918)	17.20 (437)	27 (686)	56 (1422)	30	136
50 - 60	100 - 125	FS8	67 (1702)				68 (1727)	350	159

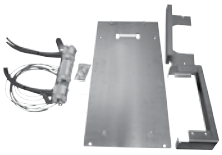
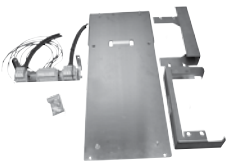
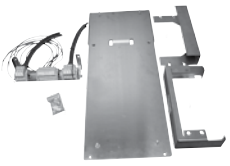
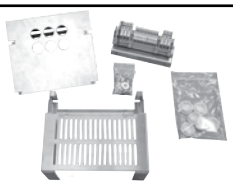
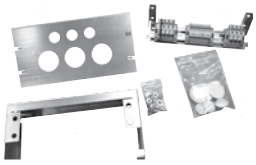
No Bypass Dimensions

HP Range			Dimensions in Inches (mm)					Approx. Weight	
208/230 V	480 V	Frame Size	A	B	C	D	E	lb	kg
1 - 3	1.5 - 7.5	FS4	29 (737)	24.15 (613)	13.20 (335)	13 (330)	30 (762)	130	59
5 - 10	10 - 20	FS5	35 (889)				36 (914)	155	70
15 - 20	25 - 40	FS6	41 (1041)				42 (1067)	195	88
25 - 40	50 - 75	FS7	55 (1397)	36.15 (918)	17.20 (437)	27 (686)	56 (1422)	250	115
50 - 60	100 - 125	FS8	67 (1702)				68 (1727)	300	136

Table of Contents

	Description	Part No.
BT300		
	PC Cable for Software Tools, USB to RS-485, 3m	BT300-CABLE
	Battery package, 5 pcs	BT300-BATTERY
	Door Panel Kit, Drive Side IP54 Protected, 3m	BT300-PANEL-N12
	Hand Held Panel Kit	BT300-HHPANEL
	Flange Mounting Kit, for FS4	BT300-FLG-FS4
	Flange Mounting Kit, for FS5	BT300-FLG-FS5
	Flange Mounting Kit, for FS6	BT300-FLG-FS6
	Flange Mounting Kit, for FS7	BT300-FLG-FS7

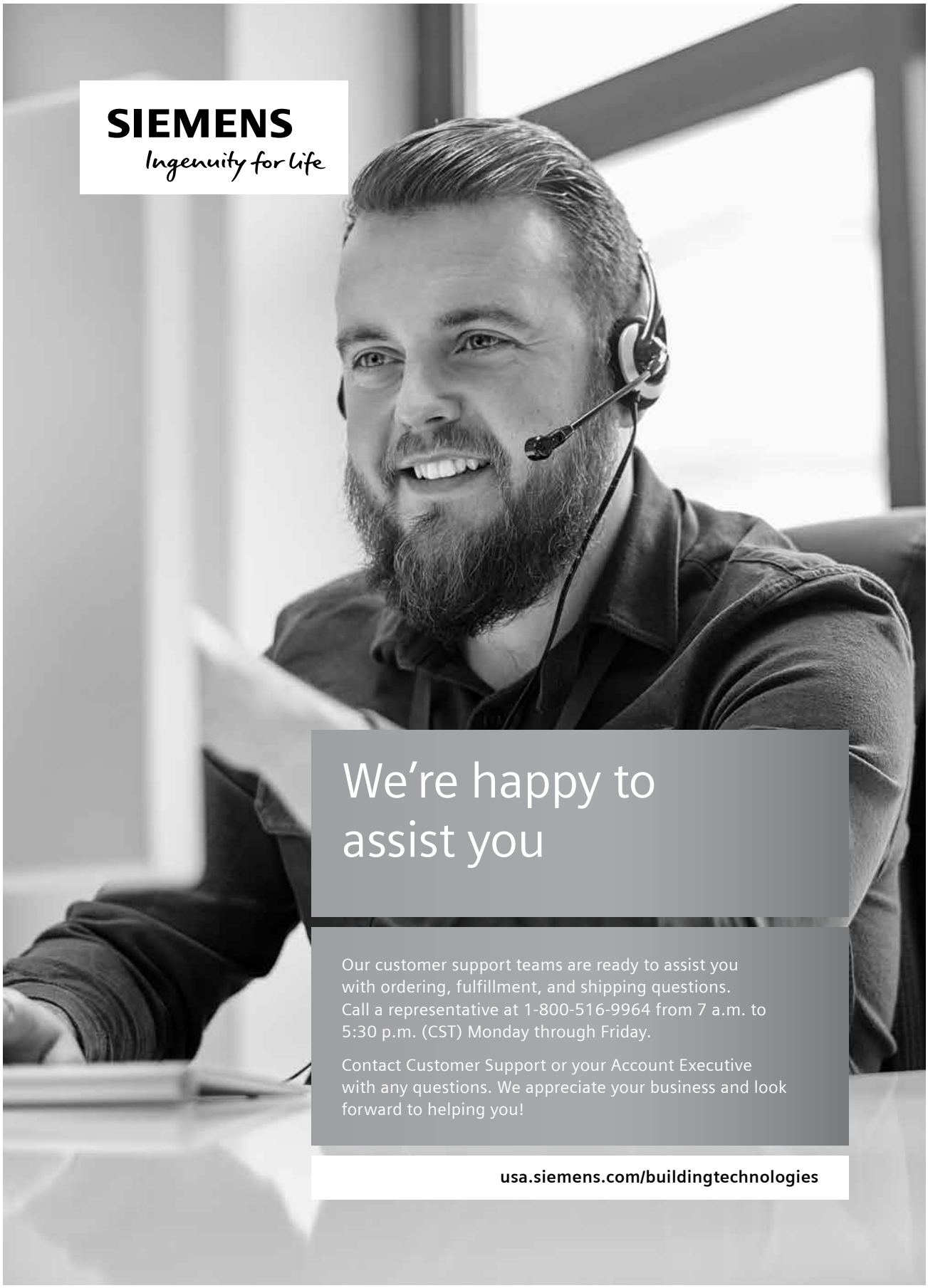
	Description	Part No.
BT300		
	6xDI/DO, Programmable	BT300-OPT-B1-V
	2xRO + Thermistor	BT300-OPT-B2-V
	1xAI, 2xAO (Isolated)	BT300-OPT-B4-V
	3xRO	BT300-OPT-B5-V
	1xRO, 5xDI (42-240VAC)	BT300-OPT-B9-V
	LonWorks	BT300-OPT-C4-V
	1xAO, 1xDO, 1xRO	BT300-OPT-BF-V
	NI1000 Sensor Card	BT300-OPT-BH-V

	Description	Part No.
BT300		
	SED2 208 V to 3 HP, 480 V to 5 HP	SED2-BT300-AB-4
	SED2 208 V to 4 HP, 480 V to 7.5 HP	SED2-BT300-C-4
	SED2 208 V to 10 HP, 480 V to 20 HP	SED2-BT300-C-5
	SED2 208 V 15 to 20 HP, 480 V 25 to 40 HP	SED2-BT300-D-6
	SED2 208 V 25 HP	SED2-BT300-D-7
	SED2 208 V 30 HP, 480 V 50 to 60 HP	SED2-BT300-E-7
	SED2 FSC to BT300 Remote Mount	SED2-BT300-C-R
	SED2 FSD and FSE to BT300 Remote Mount	SED2-BT300-DE-R

	Description	Part No.
BT300		
	SED2 208 V 40 HP, 480 V 75 HP	SED2-BT300-F-7
	SED2 208 V 50 to 60 HP, 480 V 100 to 125 HP	SED2-BT300-F-8
	SED2 Frame Size AB Conv Pre 2009	SED2-BT300-AB-C09
	SED2 208 V to 4 HP, 480 V to 7.5 HP Pre 2009	SED2-BT300-C4-C09
	SED2 208 V to 10 HP, 480 V to 20 HP Pre 2009	SED2-BT300-C5-C09
	SED2 208 V 15 to 20 HP, 480 V 25 to 40 HP Pre 2009	SED2-BT300-D6-C09
	SED2 208 V 25 HP, Pre 2009	SED2-BT300-D7-C09
	SED2 208 V 30 HP, 480 V 50 to 60 HP Pre 2009	SED2-BT300-E7-C09
	Override Switch	BTE-SW-KIT

Notes

Notes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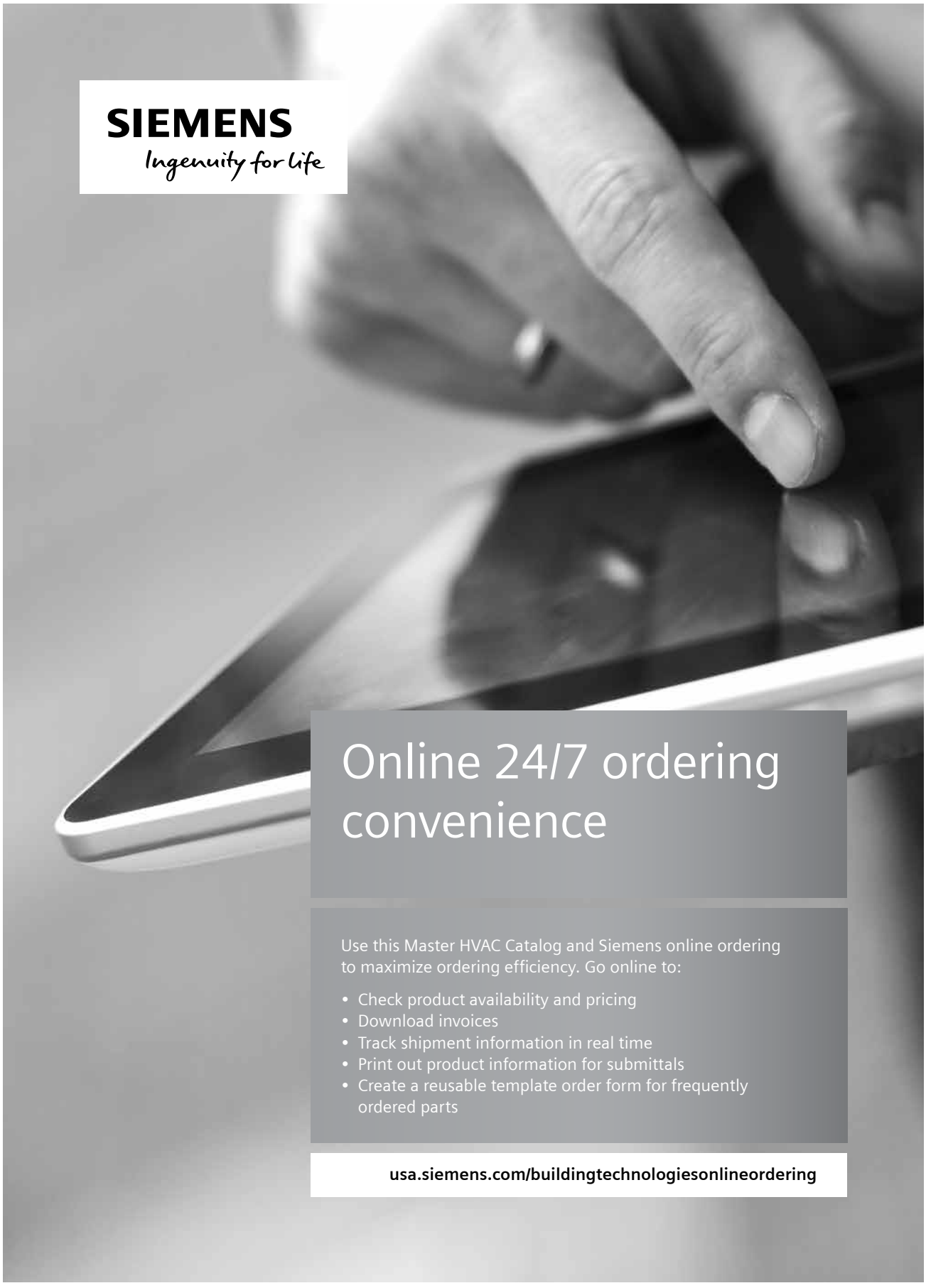

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RDY2000BN Commercial Room Thermostat with BACnet Communication

NEW!

RDY2000BN Commercial Room Thermostat.

Description

Our advanced, yet straightforward, addition to the Siemens controller family affordably automates stand-alone buildings. The Siemens Series RDY2000BN is designed for light commercial HVAC systems applications with 24 Vac control circuitry and features BACnet communication capability. The RDY2000BN extends a building automation system's coverage to packaged rooftop and heat pump HVAC unit systems with the comfort and control functionality found in direct digital control (DDC) systems.

It can operate as a stand-alone unit or networked to perform complex HVAC control, monitoring, and energy management functions as well as communicate with other devices and the management level.

Features

- BTL listed MS/TP ensures compatibility with any BACnet system
- Easy integration into Tridium systems with prebuilt AX graphics
- Seamless integration into Siemens BAS systems with pre-defined application profiles and graphics that help speed up installation
- Built-in flexible control programs for conventional and heat pump applications
- Controls conventional systems with up to 3 stages heating and 3 stages cooling
- Controls heat pumps with 1 or 2 compressors and up to 2-stage auxiliary heat
- Built-in temperature and humidity sensor in addition to configurable inputs enables advanced room controls based on humidity, CO2, occupancy, remote or averaging temperature
- Set-up Wizard enables rapid system configuration
- No special tools required for installation or commissioning
- Seven-day, six-event (2- or 4-event) occupancy scheduling
- Sleek design with backlit 5-inch LCD touch screen

Hardware Features

- Standard 24 Vac HVAC interface: Y1, Y2, G, W1, W2 and O/B
- Three selectable relay outputs enable control strategies for humidity/dehumidity control, ventilation, economizer enable and occupancy notification
- Four configurable inputs*:
  - Digital input
  - Resistive temperature input
  - 0 to 10V input

  *Requires purchase of external sensor(s).

Applications

The RDY2000BN is designed for light commercial HVAC systems with 24 Vac control circuitry. Compatible with forced air, hydronic and steam systems fired by gas, oil or electricity. Built-in temperature and humidity sensor in addition to configurable inputs enables advanced room controls based on humidity, CO2, occupancy, remote or averaging temperature. Selectable relays enable control strategies for humidity/dehumidity control, ventilation, economizer enable and occupancy notification.

- Controls conventional systems with up to 3 stages heating and 3 stages cooling.
- Controls heat pumps with 1 or 2 compressors and up to 2-stage auxiliary heat.

Specifications

Power Supply

Operating Voltage ..... 24 Vac ± 20%, Class 2, 4A maximum

Frequency ..... 50/60 Hz

Power Consumption Including Connected Field Devices ... Max. 96 VA

24 Vac Supply for Field Devices

Output relay ratings ..... Pilot duty, 1A maximum per output, 4A maximum total

Ambient Conditions and Protection Classification

Enclosure ..... NEMA 1

Transport ..... Temperature -13° to 158°F (-25° to 70°C)
Air humidity up to 95% (non-condensing)

Operation ..... Temperature 23° to 122°F (-5° to 50°C)
Air humidity Up to 95% (non-condensing)

Setpoint range ..... 45° to 95°F (7° to 35°C)

Standards, Directives, and Approvals

UL ..... UL 916

cUL ..... CSA C22.2 No. 205

CE ..... EMC Directive

ICES ..... Canada

NOM-NYCE ..... Mexico

Regulatory Compliance Mark ..... Australia

Federal Communications Commission ..... Complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules.

BTL ..... BACnet Testing Laboratory

Shipping Weight ..... 14 ounces (0.4 kg)

Product Ordering

Description	Part No.
Commercial Thermostat with BACnet Communication	**RDY2000BN**
Remote Wall Mounted Temperature Sensor	**QAA2230.EWNN**
Remote Wall Mounted Temperature & Humidity Sensor	**QFA32SS.EWNN**
Duct Mounted Temperature Sensor	**QAM2030.010**
Wall Mounted CO_2 Sensor	**QPA2000**
Wall Mounted Temperature + Humidity + CO_2 Sensor	**QPA2062**
Outdoor Air Temperature Sensor	**QAC2030**
Surface Mount Pipe Temperature Sensor	**QAD2030**

RDY2000 Room Comfort Controller

RDY2000 Room Comfort Controller.

Description

The Siemens Series RDY2000 Room Comfort Controller is designed for light commercial HVAC systems that utilize 24 Vac control circuitry. It is compatible with forced air, hydronic, or steam systems fired by gas, oil or electricity. The thermostat can control up to 3 stages of heating and 3 stages of cooling in a conventional system and heat pumps systems with up to 2 compressors and 2 stages of auxiliary/emergency heat. The RDY2000 is capable of interfacing with remote sensors and devices to completely manage all aspects of room comfort, including temperature, humidity, and air quality.

Hardware Features

- Compatible with conventional and heat pump applications
- Controls conventional systems with up to 3 stages of heating and 3 stages of cooling
- Controls heat pump systems with 1 or 2 compressors and up to 2 stages of auxiliary heat
- On-board temperature & humidity sensors
- Standard HVAC relay outputs
  - Compressor 1 (Y1)
  - Compressor 2 (Y2)
  - Fan (G)
  - Heating 1 (W1)
  - Heating 2 (W2)
  - Reversing Valve (O/B)
- 3 Configurable relay outputs (configurable via installer set-up menu)
  - Humidification
  - De-humidification
  - Economizer
  - Occupancy
  - ERV/HRV activation
- Configurable input #3 is a dry contact – can be powered with 24VAC via jumper
- 4 Configurable inputs (configurable via installer set-up menu)
- Remote temperature sensor
  - Outdoor temperature
  - Supply / return temperature(s)
  - Indoor temperature (remote or averaging)
- Remote humidity sensor
- CO2 sensor
- Occupancy sensor

Control Features

- Set-up Wizard enables rapid system configuration
- Fully programmable scheduling function
  – 5+2 / 5+1+1 / 7-day capability
  – 2 or 4 periods per day
- Multiple options for determining occupancy
  – Scheduled occupancy
  – CO2 level vs. setpoint*
  – Occupancy / motion detection*
- Real time clock retains time & date for up to 48 hours upon loss of input power
- System configuration data is stored indefinitely upon loss of input power
- Interlocks and timers specifically designed for equipment protection
- Password protected installer set-up menu deters unauthorized changes
- Programmable fan enables fresh air circulation when not in heating/cooling mode
- Selectable lockout levels to minimize tampering with setpoints and schedule
- Programmable service reminders for humidifier pad, UV lamp, and air filter

*Requires purchase of external sensor.

General Features

- Sleek, unobtrusive design with backlit 5” LCD resistive touch screen
- Separable backplate with wiring terminals and mounting holes configured to match most conduit box configurations (screws and anchors included for drywall mounting)
- Designed for horizontal layout
  – 5-1/2" W x 4-1/3" H x 1-1/6" D
  – 11.5 oz.

Product Ordering

Description	Part No.
Room Comfort Controller	**RDY2000**

RDG110U and RDG160TU Commercial Fan Coil Room Unit and Heat Pump Thermostats

NEW!

RDG110U Commercial Fan Coil Room Unit and Heat Pump Thermostat.

RDG160TU Commercial 3-speed Fan Coil Room Unit.

Description

The RDG110U and RDG160TU Commercial Fan Coil Room Unit and Heat Pump Thermostats enable various control strategies including Comfort, Energy Saving, or Freeze Protection. A built-in temperature sensor or external room/return air temperature sensor enables room temperature control. Multifunctional inputs can be configured for keycard input, window contacts or external sensors.

The RDG160TU is a Commercial 3-speed Fan Coil Room Unit Thermostat that offers a 7-day program with 8 programmable timers to switch over between Comfort and Economy modes.

Features

- 2 multifunctional inputs, configurable for:
  - Operating mode switchover contact (keycard, window contact, and so on)
  - Sensor for automatic heating/cooling mode changeover
  - External room temperature or return air temperature sensor
  - Supply air temperature sensor (RDG160TU)
  - Dew point sensor
  - Electric heater enable
  - Fault sensing
- 1 digital input, configurable for:
  - Operating mode switchover contact (keycard, window contact, and so on)
  - Sensor for automatic heating/cooling mode changeover
  - Dew point switch
  - Electric heater enable
  - Fault sensing
- Configurable relay function (RDG160TU)
  - Disables external equipment during Protection mode
  - Enables external equipment (for example, pump) during H/C demand
  - Output H/C sequence
- Automatic or manual heating and cooling mode changeover
- SPDT relays for valves and SPST relays for 1- to 3-speed fans (RDG110U)
- Modulating or digital outputs for modulating valves, ECM fans, or 1- to 3-speed fans (RDG160TU)
- Purge function when used with 2-port valve in 2-pipe H/C changeover system
- Simple application configuration using DIP switches
- Minimum and maximum supply air temperature limits (RDG160TU)
- Floor heating temperature limit
- Easy operation mode selection with interactive controls
- Filter reminder
- Backlit display with intuitive layout simplifies user interaction during commissioning and daily operation

Applications

The very versatile, wall-mounted RDG110U and RDG160TU Commercial Fan Coil Room Unit and Heat Pump Thermostats are for low voltage, stand-alone applications, such as in hospitality, dormitory or light commercial facilities.

- 2 pipe Fan Coil with electric heater or radiator
- 4 pipe Fan Coil
- Chilled / heated ceiling with heater or radiator
- Simple DX heat or cool

Specifications

Power Supply

Operating Voltage ..... 24 Vac/24 Vdc, Class 2

Frequency ..... 50/60 Hz

Power Consumption Including Connected Field Devices .... Max. 2 VA

Multifunctional Inputs

X1-M/X2-M

Temperature Sensor Input Type ..... NTC 3K Ω at 77°F (25°C)
(Recommended Temperature Sensor: QAH11.1)
Temperature Range ..... 32° to 120°F (0° to 49°C)
Cable Length ..... Maximum 262 feet (80m)

Digital Input

Operating Action ..... Selectable (NO/NC)
Contact Sensing ..... DC 0 to 5V, Maximum 5 mA

D1-GND

Operating action ..... Selectable (NO/NC)
Contact sensing ..... DC 6 to 15V, 3 to 6 mA

Function Input ..... External Temperature Sensor, Changeover Sensor, Mode Switch Contact, Dew Point Contact, Electric Heater Enable, Fault Contact

Outputs

RDG110U

Fan Control Q1, Q2, Q3-G0 ..... 24 Vac
Current Min., Max. Resistive or Inductive ..... AC 5 mA to 5A (4A)
Control Output ..... 24 Vac
Y11-G0/Y21-G0 ..... AC 5 mA to 5A (3A)

RDG160TU

Q1/Q2/Q3/G-G0 (relay) ..... 24 Vac Class 2
Use as 3-speed fan control
Rating Min., Max. Resistive or Inductive ..... 5 mA to 5A (4A)
Use as actuator control (Q1, Q2)
Q1 Rating Min., Max. Resistive or Inductive ..... 5 mA to 1A
Q2 Rating Min., Max. Resistive or Inductive ..... 5 mA to 5A (4A)
Max. Total Load Current Q1 + Q2 + Q3 ..... 5A
Use as External Load Control (Q1, Q2, Q3)
Rating Min., Max. Resistive Or Inductive Each ..... 5 mA to 1A

ECM Fan Control Y50 – G0 Max. ..... DC 0 to 10V ± 5 mA
Actuator Control Y10-G0/Y20-G0 (G) ..... DC 0 to 10V ± 1 mA

Operational Data

Switching Differential, Adjustable

Heating Mode ..... 4°F (2°C); 1° to 12°F (0.5° to 6°C)
Cooling Mode ..... 2°F (1°C); 1° to 12°F (0.5° to 6°C)

Setpoint Setting and Range

Comfort Mode ..... 70°F (21°C); 41° to 104°F (5° to 40°C)
Energy Saving Mode ..... 59°F (15°C) or 86°F (30°C) OFF; 41° to 104°F (5° to 40°C)
Protection ..... 46°F (8°C) OFF; 41° to 104°F (5° to 40°C)

Multifunctional Inputs X1/X2/D1 ..... Selectable
Input X1 ..... External Temperature Sensor
Input X2 ..... Changeover Sensor
Input D1 ..... Operating Mode Switchover

Built-in Room Temperature Sensor

Measuring Range ..... 32° to 120°F (0° to 49°C)
Accuracy at 77°F (25°C) ..... < ± 1°F (0.5°C)
Temperature Calibration Range ..... ± 6°F (3°C)

Settings and Display Resolution

Setpoints ..... 1°F (0.5°C)
Current Temperature Value Displayed ..... 1°F (0.5°C)

Operation

Climatic conditions ..... Class 3K5

Temperature ..... 32° to 122°F (0° to 50°C)

Humidity ..... < 95% rh

Connection Terminals ..... 1 x 14 Gauge (1 x 0.4 through 2.5 mm^2) or 2 x 16 Gauge (2 x 0.4 through 1.5 mm^2)

Housing Front Color ..... RAL 9003 White

Weight ..... 0.77 lb (0.350 kg)

Agency Standards

EU Conformity (CE) CEIT3181XX

RCM Conformity ..... CEIT3181en_CI

UL Listing ..... UL 916 PAZX

cUL ..... CSA-C22.2 No. 205 PAZX7

Federal Communications Commission ..... Complies with the Limits for a Class B Digital Device, Pursuant to Part 15 of the FCC Rules

Safety Class ..... III as per EN 60529

Degree of Protection Housing ..... IP30 as per EN 60529

Pollution Class ..... Normal

Product Ordering

Description	Part No.
24V Wall-mounted Thermostat Fan Coil Unit and Heat Pump	**RDG110U**
24V Wall-mounted Thermostat Fan Coil Unit, 3-speed/ECM Fan	**RDG160TU**

RDG400 Commercial VAV Thermostat

NEW!

RDG400 Commercial VAV Thermostat.

Description

Siemens RDG400 is a versatile Single Duct VAV Thermostat Controller for low voltage stand-alone applications such as in hospitality, dormitory or light commercial applications.

Multifunctional inputs can be configured for keycard input, window contacts or external sensors. Select from various control strategies including Comfort, Energy Saving, or Freeze Protection. A backlit display with intuitive layout simplifies user interaction during commissioning and daily operation.

Siemens also offers a broad selection of sensors and actuators that comprise cost-efficient application bundles that are compatible with the RDG400.

Features

- Room temperature control using built-in temperature sensor or external room temperature/return air temperature sensor
- Three multifunctional inputs, configurable for:
  - Operating mode switchover contact (keycard, window contact, and so on)
  - Sensor for automatic heating/cooling mode changeover
  - External room temperature or return air temperature sensor
  - Dew point sensor
  - Fault sensing
- Automatic or manual heating and cooling mode changeover
- Supports electric heater
- Simple application configuration using DIP switches
- Minimum and maximum setpoint limitation
- Floor heating temperature limit
- Easy operation mode selection with intuitive controls
- Button lock (automatic or manual)

Applications

Commercial VAV applications include single-duct; single-duct with auxiliary heater; single-duct and radiator/floor heating; and single-duct heating and cooling coil.

- Single-duct:
  DC 0 to 10V damper actuator; 3-position damper actuator
- Single-duct with auxiliary heater:
  DC 0 to 10V damper actuator and ON/OFF, PWM or 3-position auxiliary heater, 3-position damper actuator and DC 0 to 10V auxiliary heater
- Single-duct and radiator/floor heating:
  DC 0 to 10V damper actuator and ON/OFF, PWM or 3-position radiator, 3-position damper actuator, and DC 0 to 10V radiator
- Single-duct heating and cooling coil:
  DC 0 to 10V damper actuator and ON/OFF, PWM or 3-position heating and cooling, 3-position damper actuator, and DC 0 to 10V heating and cooling

Specifications

Power Supply

Operating Voltage ..... 24 Vac/24 Vdc, Class 2

Frequency ..... 50/60 Hz

Power Consumption Including Connected Field Devices .... Max. 2 VA

Multifunctional Inputs

X1-M/X2-M

Temperature Sensor Input Type ..... NTC 3K Ω at 77°F (25°C)
(Recommended Temperature Sensor: QAH11.1)
Temperature Range ..... 32° to 120°F (0° to 49°C)
Cable Length ..... Maximum 262 feet (80m)

Digital Input
Operating Action ..... Selectable (NO/NC)
Contact Sensing ..... DC 0 to 5V, Maximum 5 mA

D1-GND
Operating action ..... Selectable (NO/NC)
Contact sensing ..... DC 6 to 15V, 3 to 6 mA

Function Input ..... External Temperature Sensor, Changeover Sensor, Mode Switch Contact, Dew Point Contact, Electric Heater Enable, Fault Contact

Outputs

Control Output Y10-G0 ..... DC 0 to 10V
Resolution ..... 39 mV
Current ..... Maximum ± 1 mA

Control Y1, Y2-G ..... 24 Vac
Rating ..... 15 mA to 1A

Operational Data

Switching Differential, Adjustable
Heating Mode ..... 6°F (2°C); 1° to 12°F (0.5° to 6°C)
Cooling Mode ..... 2°F (1°C); 1° to 12°F (0.5° to 6°C)

Setpoint Setting and Range
Comfort Mode ..... 70°F (21°C); 41° to 104°F (5° to 40°C)
Energy Saving Mode ..... 59°F (15°C) or 86°F (30°C) OFF; 41° to 104°F (5° to 40°C)
Protection ..... 46°F (8°C)

Multifunctional Inputs X1/X2/D1 ..... Selectable
Input X1 ..... External Temperature Sensor
Input X2 ..... Changeover Sensor
Input D1 ..... Operating Mode Switchover

Built-in Room Temperature Sensor
Measuring Range ..... 32° to 120°F (0° to 49°C)
Accuracy at 77°F (25°C) ..... < ± 1°F (0.5°C)
Temperature Calibration Range ..... ± 6°F (3°C)

Settings and Display Resolution
Setpoints ..... 1°F (0.5°C)
Current Temperature Value Displayed ..... 1°F (0.5°C)

Operation

Climatic Conditions ..... Class 3K5

Temperature ..... 32° to 122°F (0° to 50°C)

Humidity ..... < 95% rh

Connection Terminals ..... 1 × 14 Gauge (1 × 0.4 through 2.5 mm^2) or 2 × 16 Gauge (2 × 0.4 through 1.5 mm^2)

Housing Front Color ..... RAL 9003 White

Weight ..... 0.77 lb (0.350 kg)

Agency Standards

EU Conformity (CE) CEIT3181XX

RCM Conformity ..... CEIT3181en_CI

UL Listing ..... UL 916 PAZX

cUL ..... CSA-C22.2 No. 205 PAZX7

Federal Communications Commission ..... Complies with the Limits for a Class B Digital Device, Pursuant to Part 15 of the FCC Rules

Safety Class ..... III as per EN 60529

Degree of Protection Housing ..... IP30 as per EN 60529

Pollution Class ..... Normal

Product Ordering

Description	Part No.
24V Thermostat VAV/CAV	**RDG400**

Electric Surface Mounted/ High Temperature Limit Control Thermostats

141-0522 Electric Surface Mounted Thermostat.

141-0530 Electric High Temperature Limit Control Thermostat.

Description

The 141 Electric Surface Mounted / High Temperature Limit Control Thermostats are single setpoint electric thermostats for high or low limit control; surface mounted or duct mounted models available.

Features

Electric Surface Mounted Thermostat

- Can be mounted horizontally, vertically or at an angle
- Visual setpoint indication through cover

Electric High Temperature Limit Control Thermostat

- Liquid-filled, rigid bulb sensing unit
- Adjustable high temperature limit stop
- Manual reset to close contacts

Applications

Surface Mounted Thermostat

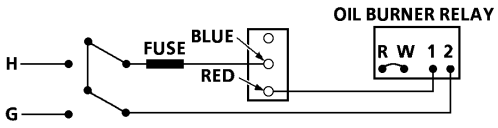
The 141 Surface Mounted Thermostat is ideal as a low or high limit control on unit heaters. Also can be used as a convector or fan coil changeover control for automatically selecting the heating or cooling function based on water temperature.

High Temperature Thermostat

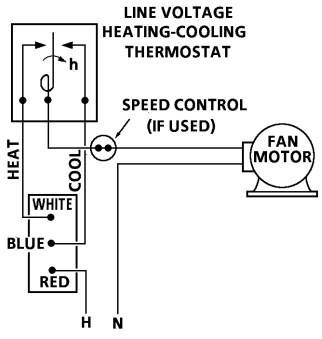
The 141 Electric High Temperature Thermostat is normally located in a duct system and wired to shut down air conditioning or ventilating fans when the air temperature exceeds 125°F (52°C), which would occur during a fire.

This thermostat can also be used as a high limit control for a warm air system when a “lockout” type control is desired or required by code.

Typical Connections



Typical High Limit Wiring.



Typical Changeover Wiring.

Specifications

Surface Mounted Thermostat

Setpoint Range ..... 50° to 150°F (10° to 65°C)

Maximum Bulb Temperature ..... 240°F (116°C)

Switch Action ..... SPDT

Electrical Ratings

Motor Rating ..... 7.4 FLA @ 120 Vac
3.7 FLA @ 240 Vac

Locked Rotor ..... 44.5 A @ 120 Vac
22.2 A @ 240 Vac

Cover Finish ..... Gray Baked Enamel

Dimensions ..... 2.30" W x 5.38" H x 1.84" D
(58 mm W x 173 mm H x 47 mm D)

Shipping Weight ..... 2.0 lb. (0.9 kg)

High Temperature Thermostat

Setpoint Range ..... 25° to 215°F (-4° to 102°C)

Switch Action ..... SPST, open-on-rise

Factory Temperature Setting ..... 125°F (52°C)

Electrical Ratings

Motor Rating ..... 10 FLA @ 120 Vac
6 FLA @ 240 Vac

Noninductive Rating ..... 1 A @ 0.3 to 12 Vac
6 A @ 12-50 Vac

Agency Approvals ..... UL MP3487
CSA LR6246

Cover Finish ..... Gray Baked Enamel

Dimensions ..... 2.94" W x 5.38" H x 2.5" D
(59 mm W x 136 mm H x 64 mm D)

Shipping Weight ..... 1.8 lb. (0.82 kg)

Product Ordering

Description	Part No.
Surface Mounted	**141-0522**
High Temperature Limit Duct Mount	**141-0530**

Electric Line Voltage Remote Bulb Thermostats

141 Electric Line Voltage Remote Bulb Thermostat.

Description

The 141 Electric Line Voltage Remote Bulb Thermostat is a two-position electric line voltage thermostat with remote bulb.

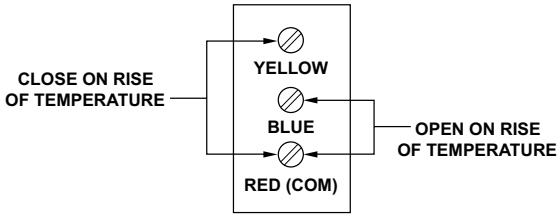
Features

- Temperature sensitive, liquid-filled sensing element
- Single-pole, double-throw snap-acting switches
- Enclosed switches suitable for low or line voltage power switching
- Gray baked enamel case

Applications

The 141 Electric Line Voltage Remote Bulb Thermostat is used for temperature control in heating and cooling application, typically to directly operate two-position damper motor actuators, motor actuated valves, relays and similar equipment. Typical applications includes summer-winter change over and the direct control of liquid or air temperatures where two position (ON-OFF) control is acceptable.

Typical Connections



Specifications

Inductive Amps
- Full Load Amps
  - 120 Vac....7.4
  - 240 Vac....3.7
- Locked Rotor Amps
  - 120 Vac....44.5
  - 240 Vac....22.2

Resistive Amps
- 120 Vac....25
- 240 Vac....20

Dimensions .... 2.5" W x 5.38" H x 2.31" D (64 mm x 136 mm x 59 mm)

Shipping Weight ....1.8 lb. (0.82 kg)

Product Ordering

Temperature Scale Range	Max. Bulb Temp.	Bulb Size	Switch Differential	Part No.
50° to 130°F (10° to 55°C)	130°F (54°C)	.038" Diameter x 4.03" L (9.9 mm Diameter x 102 mm L) Capillary 6' (183 cm)	Adjustable 6° to 30°F (3° to 16°C)	**141-0520**
100° to 240°F (38° to 110°C)	250°F (121°C)	.029" Diameter x 2.33" L (7.4 mm Diameter x 59.2 mm L) Capillary 6' (183 cm)	Adjustable 7° to 45°F (14° to 25°C)	**141-0521**

Electric Low Temperature Detection Thermostats

134 Electric Low Temperature Detection Thermostat.

Description

The 134 Electric Low Temperature Detection Thermostat is a remote bulb instrument with a Single Pole, Double Throw switch. Any one foot of the capillary element actuates the thermostat switch, making this control ideal for the protection of large coils where air stratification could cause localized freezing conditions.

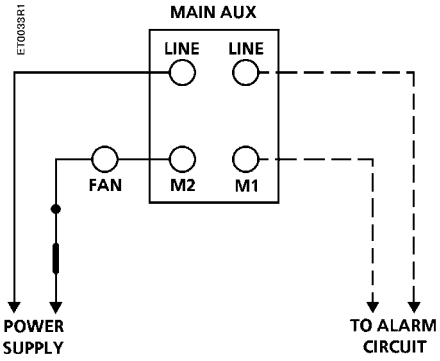
Features

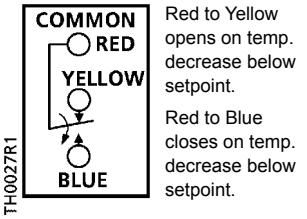
- Compact and durable construction
- Adjustable concealed, low and high range limit stops with a fixed differential
- Available with manual or automatic reset
- Electroplated copper capillary tube for sensitivity and durability
- Switches 120 V or 20 Vac
- Universal mounting bracket included

Applications

The 134 Electric Low Temperature Detection Thermostats are ideally suited for detecting potential freeze-up conditions of heating coils, cooling coils, liquid heating pipes, and similar applications.

Typical Connections

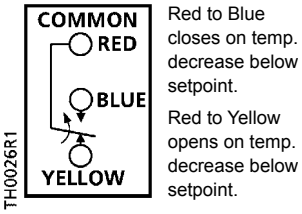




Red to Yellow opens on temp. decrease below setpoint.

Red to Blue closes on temp. decrease below setpoint.

OPEN ON RISE



Red to Blue closes on temp. decrease below setpoint.

Red to Yellow opens on temp. decrease below setpoint.

CLOSE ON RISE

Specifications

Part No. 134-1504

Dimensions ..... 4" W x 3.25" H x 2.5" D
(102 mm W x 83 mm H x 65 mm D)

Shipping Weight .....2.4 lb. (1.1 kg)

Part No. 134-1510

Dimensions ..... 2.31" W x 3.19" H x 2.31" D
(59 mm W x 81 mm H x 59 mm D)

Shipping Weight .....1.8 lb. (0.8 kg)

Part No. 134-1511

Dimensions ..... 2.31" W x 3.19" H x 2.31" D
(59 mm W x 81 mm H x 59 mm D)

Shipping Weight .....1.8 lb. (0.8 kg)

Product Ordering

Temperature Range	Switch Action	Bulb Size	Reset Action	Part No.
15° to 55°F (-9.4° to 12.8°C)	DPST, 4-wire 2 Circuit	1/8" x 20' (3 mm x 6 m)	Manual	**134-1504**
35° to 45°F (1.7° to 7.2°C)	SPDT	1/8" x 20' (3 mm x 6 m)	Automatic	**134-1510**
35° to 45°F (1.7° to 7.2°C)	SPDT	1/8" x 20' (3 mm x 6 m)	Manual	**134-1511**

Electric Line Voltage Room Thermostats Heating/Cooling

134 Electric Line Voltage Room Thermostat – Heating/Cooling.

Description

The 134 Electric Line Voltage Room Thermostat is a line voltage On/Off room thermostat for heating and cooling applications.

Models are available with SPST or SPDT contact action and for standard, nominal 1/4 hp / 10 amps noninductive, or heavy duty, nominal 1 hp / 22 amps noninductive applications.

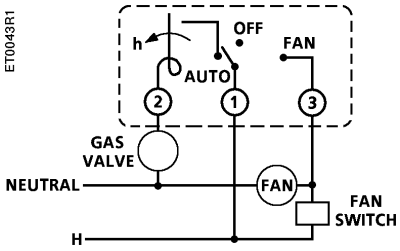
Features

- Single setpoint dial
- Exposed bimetal thermometer
- Temperature range from 50° to 90°F (10° to 30°C)
- High and low limit stops
- Standard or heavy duty models
- Dual Fahrenheit/Celsius scale plate

Applications

The 134 Electric Line Voltage Room Thermostat controls heating and cooling applications or year-round air conditioning units in commercial, industrial, or residential installations.

Typical Connections



Specifications

Part No. 134-1083

Motor Rating
120 Vac ..... 6.0 A
240 Vac ..... 3.7 A

Switch Action ..... SPST with "Auto-Off-Fan" switch

Dimensions ..... 2.78" W x 5.19" H x 1.88" D
(71 mm W x 132 mm H x 48 mm D)

Shipping Weight ..... 1.3 lbs. (0.6 kg)

Part No. 134-1086

Motor Rating
120 Vac ..... 6.0 A
240 Vac ..... 3.0 A

Switch Action ..... SPST

Dimensions ..... 3" W x 4.75" H x 1.44" D
(75 mm W x 120 mm H x 36 mm D)

Shipping Weight .....
1.3 lb. (0.6 kg)

Part No. 134-1084

Motor Rating
120 Vac ..... 6.0 A
240 Vac ..... 3.0 A

Resistive Rating
120 Vac ..... 10.0 amps
240 Vac ..... 10.0 amps

Switch Action ..... SPDT

Dimensions ..... 3" W x 4.75" H x 1.44" D
(75 mm W x 120 mm H x 36 mm D)

Shipping Weight ..... 1.0 lb. (0.6 kg)

Part No. 134-1085

Motor Rating
120 Vac ..... 16.0 Heating/8.0 Cooling
240 Vac ..... 8.0 Heating/8.0 Cooling

Resistive Rating
120 Vac ..... 22.0 Heating
240 Vac ..... 22.0 Heating

Switch Action ..... SPDT

Dimensions ..... 3" W x 4.75" H x 1.44" D
(75 mm W x 120 mm H x 36 mm D)

Shipping Weight ..... 1.0 lb. (0.6 kg)

Product Ordering

Switch Action	Temp. Set Point Range	Temp. Set Point Adjustment	Temperature Difference	Part No.
SPST	40° to 90°F (5° to 30°C)	Concealed	1.8°F (1°C)	**134-1083**
SPST	40° to 90°F (5° to 30°C)	Concealed	1.8°F (1°C)	**134-1086**
SPDT	40° to 90°F (5° to 30°C)	Exposed Knob or Concealed[1]	1.8°F (1°C) Heating 2.31°F (1.3°C) Cooling	**134-1084**
SPDT	40° to 90°F (5° to 30°C)	Exposed Knob or Concealed[1]	3°F (1.7°C) Heating 3.5°F (2°C) Cooling	**134-1085**

Ordering Notes:
1. Each thermostat is shipped with a blank faceplate for use when concealed adjustment is desired.

EcoView™ Energy Management System

NEW!

The EcoView Energy Management System (EMS) is a wireless system designed to help retail and small commercial facilities manage energy costs.

Key benefits include:

- Real-time tracking, management, and control of energy consumption
- Remote monitoring and control of HVAC systems and electrical loads, such as lighting
- No monitoring required by on-site personnel

The System Components

EcoView Web – The interface for remotely monitoring and controlling HVAC systems and lighting loads at multiple locations. It maintains historical data on the Internet so that you may access usage and performance reports from any Web-enabled device. A one-year subscription to EcoView Web is included with the initial EcoView equipment purchase. After the first year, you must renew the subscription for each site on your account to continue to use EcoView Web.

EcoView Touchscreen – A full-color 7-inch tactile display device, master controller and Internet gateway built into a single wall-mounted unit. It is used to transmit usage data for the EcoView Web application.

EcoView Multi-phase Meter – Measures real-time energy demand, as well as historical consumption. Delivers usage data to the EcoView Touchscreen in fifteen-second intervals.

EcoView Thermostat – Enables functionality that is not possible with standard 24V HVAC thermostats.

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EcoView Touchscreen

NEW!

EcoView Touchscreen.

Description

The EcoView Touchscreen is a full-color, 7-inch, tactile display device, master controller and Internet gateway built into a single wall-mounted unit. A single CAT5 cable provides both power and data and makes for a simple and robust field installation.

The touchscreen transmits usage data for the EcoView Web application.

Specifications

Screen

- LCD: Sharp TFT 7” diagonal with LED backlight
- Format: WVGA (800 × 480) at 16 BPP
- Touch 4-wire resistive

Processing

- CPU: Freescale iMX27 (ARM9) at 400 MHz
- RAM: 128 MB
- Flash: 256 MB
- OS: Windows CE 6.0 R3
- Audio: On-board speaker

Power

- Power-over-Ethernet (PoE)
- 48 Vdc, single CAT5 cable for both power and data

Device to Panel Communications: Device Area Network

- ZigBee/802.15.4 MAC/PHY
- Mesh networking data routing
- Point-to-Point range of 75 ft to >300 ft (22.8 m to >91 m) depending on local conditions
- Range boosting available through the EcoView ZigBee Repeater
- Proprietary application software

Internet Communication (Wired)

- 100Base-T Ethernet (RJ45 on back)

General Specifications

Agency Approvals ..... FCC Part 15.247 FCC ID: MCQ-PROS2B
FCC Part 15.247 FCC ID: MCQ-XBEEPRO2
FCC Part 15, Unintentional Radiators, Class B
Industry Canada (IC) IC: 1846A-PROS2B
Industry Canada (IC) IC: 1846A-XBEEPRO2
ICES-003, Issue 4, Class B
CE

Radio PROS2B

Frequency Range ..... ISM 2.4GHz
Channels 15 (11-25)
Equipment Class ..... Digital Modulation System (DTS)

Radio XBEEPRO2

Frequency Range ..... ISM 2.4GHz
Channels 14 (11-24)
Equipment Class ..... Digital Modulation System (DTS)

Product Ordering

Description	Part No.
Ecoview Touchscreen (with Power Injector Module and Cables)	**60-003**
Replacement Ecoview Touchscreen (Screen Only; Power Injector Module and Cables not Included)	**60-099**

EcoView Multi-phase Meter

NEW!

EcoView Multi-phase Meter.

Description

The EcoView Multi-phase Meter is the multi-phase power meter component of the EcoView System. It is capable of measuring three-phase four-wire 240V wye of up to 1200 Amps. The unit also has the ability to interface to third-party water and gas meters through two pulse inputs.

- Measures real-time energy demand, as well as historical consumption
- Delivers usage data to the EcoView Touchscreen in fifteen-second intervals
- Factory calibrated, three-phase Current Transformers (CTs) must be ordered separately

Specifications

Electrical Services Supported

- 120 to 230 Vac three-phase four-wire wye with neutral
- 240 Vac single-phase three-wire

Power and Reference Voltage

- For single-phase and three-phase operation the unit receives its operating power and reference voltage from the ØA and N (Neutral) sense input

Current Transformers

- 200A, 400A, 800A, and 1200A Current Transformers (CTs) supported
- Max 25' run from CTs to Multi-phase Meter
- Split core for easy (no disconnect) installation

Device-to-Panel Communications

- ZigBee 802.15.4 two-way link to Touchscreen
- Range of 75 feet to >300 feet (22.8 m to >91 m) depending on local conditions
- Mesh networking with other EcoView products allowing for greater range
- Range boosting available through the EcoView ZigBee Repeater

Pulse Inputs

- Two optically isolated channels
- 0 to 2000 PPS
- 2.5 to 15V pulses
- Either contact closure or electronic pulses
- Can source power for remote devices

Connectors

- One each: 10-position, 5-pin pluggable connector for reference voltage input
  Phase A (Board Power)
  Phase B
  Phase C
  Neutral
  Ground
- One each: 6-pin pluggable connector for currents
  Phase A, B, C: Two wires each
- Two each: 3-pin pluggable connector for pulse inputs
  12 Vdc Power out (Power to contact closure or remote pulse generator source)
  Pulse
  Common
- One each: Pulse input power
  12 Vdc, supplies power to isolated meter input circuitry for contact sensing

General Specifications

Agency Approvals ..... FCC Part 15.247 FCC ID: MCQ-PROS2B
FCC Part 15.247 FCC ID: MCQ-XBEEPRO2
FCC Part 15, Unintentional Radiators, Class B
Industry Canada (IC) IC: 1846A-PROS2B
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CE

Radio PROS2B

Frequency Range ..... ISM 2.4GHz
Channels 15 (11-25)
Equipment Class ..... Digital Modulation System (DTS)

Radio XBEEPRO2

Frequency Range ..... ISM 2.4GHz
Channels 14 (11-24)
Equipment Class ..... Digital Modulation System (DTS)

Product Ordering

Description	Part No.
EcoView Multi-phase Meter	**56-001**
3-Phase Current Transformer, 200A (Set of 3)	**56-200**
3-Phase Current Transformer, 400A (Set of 3)	**56-400**
3-Phase Current Transformer, 800A (Set of 3)	**56-800**
3-Phase Current Transformer, 1200A (Set of 3)	**56-1200**

EcoView Thermostat

NEW!

EcoView Thermostat.

Description

The Siemens 97-004 Thermostat is designed to control light commercial HVAC systems within the EcoView Energy Management System architecture. The thermostat can control up to three stages of heating and three stages of cooling in a conventional system, and heat pump systems with up to two compressors and two stages of auxiliary heat.

- Enables functionality that is not possible with standard 24V HVAC thermostats
- On-site users may control local setpoints and make adjustments within prescribed limits
- A wireless, digital thermostat, designed to control the majority of HVAC systems
- The unit contains a robust thermostat interface and is designed for use with communicating systems where remote monitoring and/or remote control are desired

Hardware Features

- ZigBee radio designed for interface with the EcoView Energy Management System
- Compatible with HVAC systems utilizing 24 Vac control circuitry:
  - Conventional systems with up to three stages of heating and three stages of cooling
  - Heat pump systems with one or two compressors and up to two stages of auxiliary heat
- On-board temperature and humidity sensors
- Standard HVAC relay outputs:
  - Compressor 1 (Y1)
  - Compressor 2 (Y2)
  - Fan (G)
  - Heating 1 (W1)
  - Heating 2 (W2)
  - Reversing Valve (O/B)
- Additional relay outputs can be configured to manage up to three of the following:
  - Humidification
  - De-humidification
  - Economizer Enable
- Two Configurable inputs*:
  - Remote temperature sensor
- Outdoor temperature
- Supply/return temperature(s)
- Indoor temperature (remote or averaging)
  - Remote humidity sensor

* Requires purchase of external sensor

Control Features

- Set-up Wizard enables rapid system configuration
- Real time clock retains time and date for up to 48 hours upon loss of input power
- System configuration data is stored indefinitely upon loss of input power
- Interlocks and timers specifically designed for equipment protection
- Password protected installer set-up menu deters unauthorized changes
- Programmable fan enables fresh air circulation when not in heating/cooling mode
- Selectable lockout levels minimize tampering with setpoints and schedule
- Programmable service reminders for humidifier pad, UV lamp, and air filter

General Specifications

Power Supply ..... 24 Vac +/-20%, Class 2, 4A max.

Output Relay Ratings ..... Pilot duty, 1A max per output, 4A max total

Ambient Temperature Limitations

Operating ..... 0° to 120°F (-18° to 49°C)

Storage/Shipping ..... -30° to 150°F (-34° to 65°C)

Operating Relative Humidity ..... 5% to 95% (non-condensing)

Enclosure ..... NEMA 1

Agency Approvals ..... UL Certified (UL916)
cUL Certified (CSA C22.2 No. 205)
FCC Part 15.247 (ID: MCQ-XBPS2C)
Industry Canada (IC) (IC: 1846A-XBPS2C)
IFETEL (Mexico)

Shipping Weight ..... 14 ounces (0.4 kg)

Product Ordering

Description	Part No.
Commercial Room Thermostat for use with EcoView™ Energy Management System	**97-004**
Remote Wall-Mounted Temperature Sensor	**97-002**
Duct Mounted Temperature Sensor	**QAM2030.010**
Wall Mounted CO2 Sensor	**QPA2000**
Outdoor Air Temperature Sensor	**QAC2030**

EcoView 8 DO Module

NEW!

EcoView 8 DO Module.

Description

The EcoView 8 DO Module is an eight-channel, pilot-duty controller module that is used to manage lighting, ventilation and any energy-consuming electrical load that would benefit from scheduling.

Relay channels may be accessed through the EcoView Touchscreen or remotely through the EcoView Web application. Each channel can switch 3 amps at up to 24 Vac or 30 Vdc for pilot duty service (pass through). Control is accomplished by a ZigBee 802.15.4 link back to the EcoView Touchscreen.

Functionality

- On Timer: On times are passed to the device. Even with loss of communication to the Touchscreen, the channel will turn off after the set Run (On) time.
- Delay Time: Provides a minimum delay time between relays allowing for load shedding with one schedule point.

Technical Specifications

Input Power

- 12 Vdc at 1 amp supply
- Reverse voltage protected
- Consumption: 30 mA to 240 mA depending on number of channels activated

Communications

- ZigBee 802.15.4 link to Touchscreen
- Range: up to 300' with high power XBee
- Mesh networking with other EcoView products allowing for greater range
- Range boosting available via ZigBee Repeater

Microcontroller/Interface

- Real time clock for program retention if ZigBee network is lost
- Watchdog circuit for reliable operation

Switch Rating

- Eight channels form A contacts (N.O. Contacts)
- Mechanical contacts (>5000V isolation)
- 24 Vac at 3 Amps
- 30 Vdc at 3 Amps
- Greater than 100,000 cycles at 1A or less

General Specifications

Radio PROS2B

Frequency Range ..... ISM 2.4GHz
Channels 15 (11-25)
Equipment Class ..... Digital Modulation System (DTS)

Agency Approvals ..... FCC Part 15.247 FCC ID: MCQ-PROS2B
FCC Part 15, Unintentional Radiators, Class B
Industry Canada (IC) IC: 1846A-PROS2B
ICES-003, Issue 4, Class B
CE

Product Ordering

Description	Part No.
EcoView™ 8 DO Module	**57-002**
ZigBee Repeater	**97-003**

Table of Contents

	Description	Product Group	Quantity	Part No.
RDY2000				
	**Mounting Plate.**	All models	1	**ARG70**
141 & 134				
	**Remote Bulb Duct Mounting Kit.**	141 & 134	1	**808-517**
	**Coil Clip.**	141	1	**356-115**
	**Capillary Clip.**	141 & 134	Box of 100	**7421700060**
	**Well.** For 141-0521. 2-3/8" (60 mm)	141	1	**141-337**
	**Electric Thermostat Guard.** For electric thermostats no larger than 5 1/4" H x 3/4" W x 2" D. (133 mm H x 19 mm W x 51 mm D). Made of cast aluminum. Allen Key included.	134	1	**134-117**
	**Concealed Adjustment Faceplate.**	134	1	**134-034**

Notes


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Table of Contents

Standard Room Temperature Systems

Full HMI.

Blank Front.

Description

Series 2200 Room Temperature Sensors provide a simple and accurate means of monitoring room temperature. Units are offered with a variety of output signal formats for compatibility with any building automation system. Basic units feature a blank front to prevent unauthorized access. Full HMI units enable temperature setpoint and override signals to be transmitted to the receiving controller.

Features

- Universal signal formats for compatibility with any HVAC control system
- Compact, low profile design seamlessly blends into any décor
- Strategically placed ventilation slots optimize airflow for fast response and superior control
- Units with display feature a configurable OLED readout
- Includes installation hardware for mounting on 2" x 4" electrical box or directly to drywall

Applications

Compatible with any Building Automation System (BAS).

Specifications

Measuring Range
Setpoint & Operating.....55° to 95°F (13° to 35°C)

Accuracy
1k Ω Pt RTD (385a).....±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Ni @ 32F RTD.....±0.72°F @ 32°F (±0.4°C @ 0°C)
1k Ω Ni @ 70F RTD.....±0.75°F @ 75°F (±0.4°C @ 24°C)
10k Ω Type 2 Thermistor.....±0.4°F @ 77°F (±0.2°C @ 25°C)
10k Ω Type 3 Thermistor.....±0.4°F @ 77°F (±0.2°C @ 25°C)
100k Ω Thermistor.....±0.36°F @ 77°F (±0.2°C @ 25°C)
Analog..... ±0.9°F (±0.5°C)

Dimensions.....4.5" x 2.75" x 1/18" (115 mm x 70 mm x 30 mm)
Color..... White
Agency Approvals.....UL (916)

Product Ordering

Temp Output	Description	Part No.
1k Ω Pt RTD (385a)	Sensing only	**QAA2212.EWSN**[1]
1k Ω Pt RTD (385a)	Display and Setpoint Adjustment	**QAA2212.FWSN**[1, 4]
1k Ω Ni @ 32F RTD	Sensing only	**QAA2220.EWSN**[1]
1k Ω Ni @ 32F RTD	Display and Setpoint Adjustment	**QAA2220.FWSN**[1, 4]
1k Ω Ni @ 70F RTD	Sensing only	**QAA2221.EWSN**[1]
1k Ω Ni @ 70F RTD	Display and Setpoint Adjustment	**QAA2221.FWSN**[1, 4]
10k Ω Type 2 Thermistor	Sensing only	**QAA2230.EWSN**[1]
10k Ω Type 2 Thermistor	Sensing only with Tool Port	**QAA2230.EWSC**[1, 2]
10k Ω Type 2 Thermistor	Display and Setpoint Adjustment	**QAA2230.FWSN**[1, 4]
10k Ω Type 2 Thermistor	Display, Setpoint Adjustment, with Tool Port	**QAA2230.FWSC**[1, 2, 4]
10k Ω Type 3 Thermistor	Sensing only	**QAA2232.EWSN**[1]
10k Ω Type 3 Thermistor	Display and Setpoint Adjustment	**QAA2232.FWSN**[1, 4]
100k Ω Thermistor	Sensing only	**QAA2235.EWSN**[1]
Analog	Sensing only	**QAA22SS.EWSN**[1, 3]
Analog	Display and Setpoint Adjustment	**QAA22SS.FWSN**[1, 3, 4]

Ordering Notes:
1) For no-logo versions, change "S" in 10th position to "N"
2) For use with Siemens TALON® Controllers
3) Analog output can be configured as 0-10V or 4-20mA
4) Temperature setpoint signal is 0-10V; Override signal is momentary dry contact (1A @ 30 Vdc max.)

Accessories Ordering

Description	Part No.
Wall Gasket Kit – Package of 10	**563-102 GSKT KIT**
Room Sensor Wall Plate (3-3/16" x 4-15/16")	**AQA2200-2x4**
Room Sensor Wall Plate (3-3/16" x 4-15/16") – Package of 10	**AQA2200-INTL**

Standard Room Humidity and Temperature Sensors

Full HMI.

Blank Front.

Description

Series 3200 Room Humidity and Temperature Sensors provide a simple and accurate means of monitoring both room humidity and temperature. Units are offered with a variety of output signal formats for compatibility with any building automation system. Basic units feature a blank front to prevent unauthorized access. Full HMI units enable temperature setpoint and override signals to be transmitted to the receiving controller.

Features

- Single device monitors both relative humidity and temperature
- Universal signal formats for compatibility with any HVAC control system
- Compact, low profile design seamlessly blends into any décor
- Strategically placed ventilation slots optimize airflow for fast response and superior control
- Units with display feature a configurable OLED readout
- Includes installation hardware for mounting on 2" x 4" electrical box or directly to drywall

Applications

Compatible with any Building Automation System (BAS).

Specifications

Measuring Range
Relative Humidity ..... 0 to 100%
Temperature (Setpoint & Operating) .....55° to 95°F (13° to 35°C)

Accuracy
Humidity ..... ±2% between 10-90%

Temperature
1k Ω Pt RTD (385a).....±0.54°F @ 32°F (±0.3°C @ 0°C)
10k Ω Type 2 Thermistor.....±0.4°F @ 77°F (±0.2°C @ 25°C)
10k Ω Type 3 Thermistor.....±0.4°F @ 77°F (±0.2°C @ 25°C)
Analog ..... ±0.9°F (±0.5°C)

Dimensions ..... 4.5" x 2.75" x 1/18" (115 mm x 70 mm x 30 mm)
Color ..... White
Agency Approvals .....UL (916)

Product Ordering

RH Output	Temp Output	Description	Part No.
Analog	1k Ω Pt RTD (385a)	Sensing only	**QFA3212.EWSN**[1]
Analog	1k Ω Pt RTD (385a)	Display and Setpoint Adjustment	**QFA3212.FWSN**[1, 2]
Analog	10k Ω Type 2 Thermistor	Display and Setpoint Adjustment	**QFA3230.FWSN**[1, 2]
Analog	10k Ω Type 3 Thermistor	Display and Setpoint Adjustment	**QFA3232.FWSN**[1, 2]
Analog	0-10 V/4-20 mA	Sensing only	**QFA32SS.EWSN**[1]
Analog	0-10 V/4-20 mA	Display and Setpoint Adjustment	**QFA32SS.FWSN**[1, 2]

Ordering Notes:
1) For no-logo versions, change “S” in 10th position to “N”
2) Temperature setpoint signal is 0-10V; Override signal is momentary dry contact (1A @ 30 Vdc max.)

Accessories Ordering

Description	Part No.
Wall Gasket Kit – Package of 10	**563-102 GSKT KIT**
Room Sensor Wall Plate (3-3/16" x 4-15/16")	**AQA2200-2x4**
Room Sensor Wall Plate (3-3/16" x 4-15/16") – Package of 10	**AQA2200-INTL**
Replacement Humidity Sensing Element	**AQF3060**

Immersion Temperature Sensors – Various Outputs

Liquid Immersion Temperature Sensor with Thermowell.

Description

Siemens Immersion Temperature Sensors include a stainless steel thermowell and are offered in a variety of output signals to ensure compatibility with any HVAC control system.

Features

- Stainless steel well enables sensing element to be removed without draining the system
- Wide variety of output signals available
- Wide operating range makes them suitable for use throughout the HVAC system

Specifications

Operating Range ..... 0° to 250°F (-18° to 120°C)

Accuracy

1k Ω Pt RTD (385a)..... ±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Pt RTD (375a)..... ±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Ni @ 32F RTD ..... ±0.72°F @ 32°F (±0.4°C @ 0°C)
1k Ω Ni @ 70F RTD ..... ±0.75°F @ 75°F (±0.4°C @ 24°C)
10k Ω Type 2 Thermistor..... ±0.4°F @ 77°F (± 0.2°C @ 25°C)
10k Ω Type 3 Thermistor..... ±0.4°F @ 77°F (± 0.2°C @ 25°C)
100k Ω Thermistor..... ±0.36°F @ 77°F (± 0.2°C @ 25°C)
4-20mA..... ±0.54°F @ 32°F (±0.3°C @ 0°C)

System Connection..... ½" – 14 NPT

Thermowell Material.....300 Series Stainless Steel

Product Ordering

Output Signal	Probe Length	Range	Part Number
100k Ω	2.5" (63.5 mm)	0° to 250°F (-18° to 121°C)	**536-777-25**
	4" (101.6 mm)		**536-777-40**
	6" (152.4 mm)		**536-777-60**
10k Ω Type II	2.5" (63.5 mm)		**QAE2030.005**
	4" (101.6 mm)		**QAE2030.010**
	6" (152.4 mm)		**QAE2030.015**
10k Ω Type III	2.5" (63.5 mm)		**QAE2032.005**
	4" (101.6 mm)		**QAE2032.010**
	6" (152.4 mm)		**QAE2032.015**
1k Ω Ni @ 32F	2.5" (63.5 mm)		**QAE2020.005**
	4" (101.6 mm)		**QAE2020.010**
	6" (152.4 mm)		**QAE2020.015**
1k Ω Ni @ 70F	2.5" (63.5 mm)		**QAE2021.005**
	4" (101.6 mm)		**QAE2021.010**
	6" (152.4 mm)		**QAE2021.015**
1k Ω Pt (375a)	2.5" (63.5 mm)		**544-577-25**
	4" (101.6 mm)		**544-577-40**
	6" (152.4 mm)		**544-577-60**
1k Ω Pt (385a)	2.5" (63.5 mm)		**QAE2012.005**
	4" (101.6 mm)		**QAE2012.010**
	6" (152.4 mm)		**QAE2012.015**
4-20 mA	2.5" (63.5 mm)	20° to 70°F (-7° to 21°C)	**536-774-25**
	4" (101.6 mm)	20° to 70°F (-7° to 21°C)	**536-774-40**
	6" (152.4 mm)	20° to 70°F (-7° to 21°C)	**536-774-60**
	2.5" (63.5 mm)	30° to 250°F (-1° to 121°C)	**536-767-25**
	4" (101.6 mm)	30° to 250°F (-1° to 121°C)	**536-767-40**
	6" (152.4 mm)	30° to 250°F (-1° to 121°C)	**536-767-60**
	2.5" (63.5 mm)	32° to 212°F (0° to 100°C)	**544-562-25**
	4" (101.6 mm)	32° to 212°F (0° to 100°C)	**544-562-40**
	6" (152.4 mm)	32° to 212°F (0° to 100°C)	**544-562-60**

Accessories Ordering

Description	Part No.
Immersion Sensor Repair Kit, 4-20mA, 30° to 250°F	**536-767-RK**
Immersion Sensor Repair Kit, 4-20mA, 20° to 70°F	**536-774-RK**
Immersion Sensor Repair Kit, 4-20mA, 20° to 70°F	**544-562-RK**
Immersion Sensor Repair Kit, 100k Ohm	**536-777-RK**
Immersion Sensor Repair Kit, Pt 1k Ohm, (375a)	**544-577-RK**
Immersion Sensor Repair Kit, Pt 1k Ohm, (385a)	**AQE2012**
Immersion Sensor Repair Kit, Ni 1k Ohm @ 32°F	**AQE2020**
Immersion Sensor Repair Kit, 10k Ohm, Type 2	**AQE2030**
Immersion Sensor Repair Kit, 10k Ohm, Type 3	**AQE2032**
Thermowell, 2.5"	**AQE2000.005**
Thermowell, 4"	**AQE2000.010**
Thermowell, 6"	**AQE2000.015**

Note:
Repair kit consists of sensing element, transmitter (4-20 mA models only), and assorted hardware.

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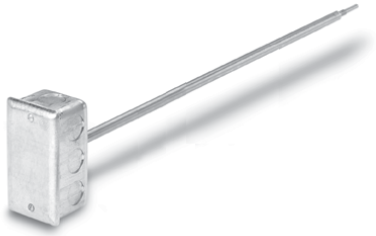
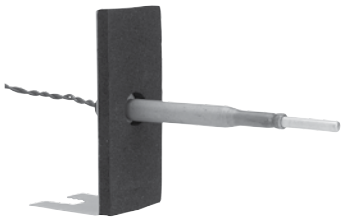
Duct Temperature Sensors – Various Outputs



Duct Sensor
with Rigid Probe.

Duct Sensor
with Flexible Probe.



536-811 Bracket Mounted
Duct Sensor.

Description

Siemens Duct Temperature Sensors are available in lengths from 4 inches to 24 feet. A variety of output signals is available to ensure compatibility with any HVAC control system.

Features

- Wide variety of output signals available
- Wide operating range makes them suitable for use throughout the HVAC system
- Units for large ducts feature flexible probes and probe mounting clips for easy installation

Specifications

Operating Range ..... 0° to 250°F (-18° to 120°C)

Accuracy

1k Ω Pt RTD (385a)	±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Pt RTD (375a)	±0.54°F @ 32°F (±0.3°C @ 0°C)
1k Ω Ni @ 32F RTD	±0.72°F @ 32°F (±0.4°C @ 0°C)
1k Ω Ni @ 70F RTD	±0.75°F @ 75°F (±0.4°C @ 24°C)
10k Ω Type 2 Thermistor	±0.4°F @ 77°F (±0.2°C @ 25°C)
10k Ω Type 3 Thermistor	±0.4°F @ 77°F (±0.2°C @ 25°C)
100k Ω Thermistor	±0.36°F @ 77°F (±0.2°C @ 25°C)
4-20mA	±0.54°F @ 32°F (±0.3°C @ 0°C)

Product Ordering

Output Signal	Sensing Type	Probe Length	Primary MV Range	Part Number
100k Ω Thermistor	Point	4 inches (rigid)	-40° to 180°F (-40° to 82°C)	535-741-4
	Point (Bracket Mount)	4 inches (rigid)		536-811
	Point	8 inches (rigid)		535-741-8
		18 inches (rigid)		535-741-18
	Averaging	18 inches (rigid)		540-244-18
		3 feet (flexible)		540-245-36
		6 feet (flexible)		540-246-72
10k Ω Type II Thermistor	Point	4 inches (rigid)		QAM2030.010
		8 inches (rigid)		QAM2030.020
		18 inches (rigid)		QAM2030.045
	Averaging	8 feet (flexible)		QAM2030.250
		16 feet (flexible)		QAM2030.500
		24 feet (flexible)		QAM2030.750
10k Ω Type III Thermistor	Point	4 inches (rigid)		QAM2032.010
		8 inches (rigid)		QAM2032.020
		18 inches (rigid)		QAM2032.045
	Averaging	8 feet (flexible)		QAM2032.250
		16 feet (flexible)		QAM2032.500
		24 feet (flexible)		QAM2032.750
1k Ω Ni @ 32F RTD	Point	4 inches (rigid)		QAM2020.010
		8 inches (rigid)		QAM2020.020
		18 inches (rigid)		QAM2020.045
	Averaging	16 feet (flexible)		QAM2020.500
		24 feet (flexible)		QAM2020.750
1k Ω Ni @ 70F RTD	Point	8 inches (rigid)		QAM2021.020
		18 inches (rigid)		QAM2021.045
	Averaging	24 feet (flexible)		QAM2021.750
1k Ω Pt (375a) RTD	Point	4 inches (rigid)		544-339-4
		8 inches (rigid)		544-339-8
		18 inches (rigid)		544-339-18
	Averaging	18 inches (rigid)		544-343-18
		2 feet (rigid)		544-343-24
		3 feet (rigid)		544-343-36
		4 feet (rigid)		544-343-48
		8 feet (flexible)		544-342-8
		16 feet (flexible)		544-342-16
		24 feet (flexible)		544-342-24
1k Ω Pt (385a) RTD	Point	4 inches (rigid)		QAM2012.010
		8 inches (rigid)		QAM2012.020
		18 inches (rigid)		QAM2012.045
	Averaging	8 feet (flexible)		QAM2012.250
		16 feet (flexible)		QAM2012.500
		24 feet (flexible)		QAM2012.750
4-20 mA	Point	4 inches (rigid)	20° to 120°F (-7° to 49°C)	533-376-4
		8 inches (rigid)		533-376-8
		18 inches (rigid)		533-376-18
	Averaging	18 inches (rigid)	20° to 120°F (-7° to 49°C)	535-490-18
		2 feet (rigid)		535-490-24
		3 feet (rigid)		535-490-36
		4 feet (rigid)		535-490-48
		8 feet (flexible)		533-380-8
		16 feet (flexible)		533-380-16
		24 feet (flexible)		533-380-24
	Point	4 inches (rigid)	30° to 250°F (-1° to 121°C)	533-377-4
		8 inches (rigid)	30° to 250°F (-1° to 121°C)	533-377-8
		18 inches (rigid)	30° to 250°F (-1° to 121°C)	533-377-18
		4 inches (rigid)	-4° to 122°F (-20° to 50°C)	544-560-4
		8 inches (rigid)	-4° to 122°F (-20° to 50°C)	544-560-8
		18 inches (rigid)	-4° to 122°F (-20° to 50°C)	544-560-18

Flush Mount Room Temperature Sensors – Various Outputs

Plastic Flush Mount Sensor.

Metal Flush Mount Sensor.

Button Sensor with Wall Plate.

Button Sensor without Wall Plate.

Description

Flush Mount Room Temperature Sensors provide a resistance signal to the controller that varies proportionally with temperature. The sensors are available with Platinum 1k Ω 375, NTC 100k Ω Type 2, or NTC 10k Ω Type 2 passive output signals.

The wall plate version is designed to mount to a 2-inch × 4-inch electrical box. The tamper-proof screws used to install the sensor to the utility box protects the sensor from removal by unauthorized personnel. The sensors may be painted after installation.

Features

- Tamper-proof screws
- Can be painted after installation
- Designed for mounting to a 2 x 4 electrical box
- Option of brushed stainless steel finish or beige or white plastic (except for button sensor)

Applications

Flush mount temperature sensors are used to monitor air temperature throughout the facility. Flush mounted sensors are ideally suited to high traffic areas and in facilities where vandalism / tampering is a concern.

Specifications

Output Signals ..... Changing Resistance

10K Ohm Thermistor

Calibration Point Factory Setting ..... 77°F (25°C)
Accuracy ..... ±0.5°F (±0.3°C)
Resistance Value @ Cal. Temp 10k

100K Ohm Thermistor

Calibration Point ..... 77°F (25°C)
Accuracy ..... ±0.36°F (±0.2°C)
Resistance Value @ Cal. Temp ..... 100k Ohm

1K Ohm RTD (375 alpha)

Calibration Point ..... 32°F (0°C)
Accuracy ..... ±0.54°F (±0.3°C)
Resistance Value @ Cal. Temp ..... 1K Ohm

Product Ordering

Application	Description	Output Signal	Part Number	Range
Room Temp	Button Style Room Temp Sensor without Wall Plate	Platinum 1k Ω 375 alpha	**QAA1011.AASU**	32º to 122º F (0º to 50ºC)
	Button Style Room Temp Sensor with Wall Plate		**QAA1011.AATU**	
	Flush Mount Room Temp Sensor Beige Plastic		**544-374A**	
	Flush Mount Room Temp Sensor White Plastic		**544-374B**	
	Flush Mount Room Temp Sensor Metal		**544-973**	
	Flush Mount Room Temp Sensor Beige Plastic	NTC 100k Ω Type 2	**536-784A**	
	Flush Mount Room Temp Sensor White Plastic		**536-784B**	
	Flush Mount Room Temp Sensor Metal		**536-984**	
	Flush Mount Room Temp Sensor Beige Plastic	NTC 10k Ω Type 2	**536-994A**	
	Flush Mount Room Temp Sensor White Plastic		**536-994B**	
	Flush Mount Room Temp Sensor Metal		**540-984**	

Accessories Ordering

Description	Part No.
Metal Guard for Plastic Flush Mount Sensors	**540-538**

Room Units

For Use With Siemens Terminal Equipment Controllers (TEC)*

Full HMI.

Blank Front.

Display.

*Not compatible with non-Siemens controllers/automation systems.

Description

Siemens 2200/3200 Communicating Room Units connect to the Terminal Equipment Controller via a single RJ-11 cable with RJ-11 plugs on either end for simple installation. Data is transferred quickly and reliably via a proven Siemens protocol.

Units are available for temperature only, temperature and humidity, or temperature and humidity and air quality. Full HMI units enable occupant control of temperature setpoint within limits configured by the building management operator, while blank front units prevent users from forcing the system into a potentially inefficient operating strategy.

Features

- Plug & play with Siemens Terminal Equipment Controllers
- Simple installation with RJ-11 ports on room unit and TEC
- Tool Port enables connection of commissioning and configuration tools
- Strategically placed ventilation slots optimize airflow for fast response and superior control
- Units with display feature a configurable OLED readout
- Includes installation hardware for mounting on 2" x 4" electrical box or directly to drywall

Specifications

Measuring Range
- CO2 ..... 0 to 2000 Parts per Million (ppm)
- Relative Humidity ..... 0 to 100%
- Temperature (Setpoint & Operating) .....55° to 95°F (13° to 35°C)

Accuracy
- CO2 ..... ± (50 ppm + 2% of MV)
- Humidity ..... ±2% between 10 to 90%
- Temperature (units without display)..... ±0.50°F (±0.28°C) between 56° to 80°F (15° to 27°C)
- Temperature (units with display)..... ±0.9°F (±0.5°C)

Dimensions ..... 4.5" x 2.75" x 1/18" (115 mm x 70 mm x 30 mm)
Color ..... White
Agency Approvals .....UL (916)

Product Ordering

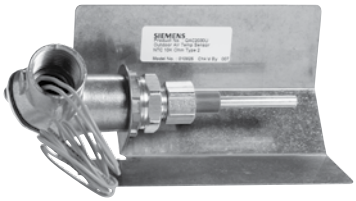
Temp Output	RH Output	CO2 Output	Description	Part No.
RJ-11	—	—	Sensing Only	**QAA2280.EWSC[1]**
RJ-11	—	—	Display	**QAA2280.DWSC[1]**
RJ-11	—	—	Display and Setpoint Adjustment	**QAA2280.FWSC[1]**
RJ-11	RJ-11	—	Sensing Only	**QFA3280.EWSC[1,2]**
RJ-11	RJ-11	—	Display	**QFA3280.DWSC[1,2]**
RJ-11	RJ-11	—	Display and Setpoint Adjustment	**QFA3280.FWSC[1,2]**
RJ-11	—	RJ-11	Sensing Only	**QPA2282.EWSC[1,2,3]**
RJ-11	RJ-11	RJ-11	Sensing Only	**QPA2284.EWSC[1,2,3]**
RJ-11	RJ-11	RJ-11	Display and Setpoint Adjustment	**QPA2284.FWSC[1,2,3]**
Wireless (Mesh)	—	—	Sensing Only	**QAA2290.EWSC[1, 4]**
Wireless (Mesh)	—	—	Display	**QAA2290.DWSC[1, 4]**
Wireless (Mesh)	—	—	Display and Setpoint Adjustment	**QAA2290.FWSC[1, 4]**
Wireless (P2P)	—	—	Sensing Only	**QAA2291.EWSC[1, 4]**
Wireless (P2P)	—	—	Display	**QAA2291.DWSC[1 4]**
Wireless (P2P)	—	—	Display and Setpoint Adjustment	**QAA2291.FWSC[1, 4]**

Ordering Notes:
1) For no-logo versions, change “S” in 10th position to “N”
2) For use with BACnet TECs; P1 TECs cannot process Humidity or CO2 signals.
3) Requires AQM2200 24V Power Dongle
4) For use with Siemens wireless systems only

Accessories Ordering

Description	Part No.
Wall Gasket Kit – Package of 10	**563-102 GSKT KIT**
Room Sensor Wall Plate 3-3/16" x 4-15/16" (81 mm x 125 mm)	**AQA2200-2x4**
Room Sensor Wall Plate 3-3/16" x 4-15/16" (81 mm x 125 mm) – Pkg of 10	**AQA2200-INTL**
Passkey Tool for HMI Configuration	**544-643A**
25 Ft. (7.6 M) Communication Cable	**588-100A**
50 Ft. (15.2 M) Communication Cable	**588-100B**
100 Ft. (30.5 M) Communication Cable	**588-100C**
24V Power Dongle for CO2 units **(REQUIRED FOR QPA2282 and QPA2284)**	**AQM2200**
Replacement Humidity Sensing Element	**AQF3060**

Outdoor and Surface Mount Temperature Sensors – Various Outputs



Outdoor Temperature Sensor – Metal.

Pipe Surface Temperature Sensor.

Cable.

Outdoor Temperature Sensor – Plastic.

Description

Standard temperature Sensors monitor and transmit changes in temperature to the building control system. Specific devices within the range are compatible with most North American building automation systems. All sensors incorporate precision temperature sensing elements to accurately and reliably measure temperature.

Features

- Variety of output signals available
- Outdoor sensors are ruggedly constructed for use in all climates
- Responsive to temperature change
- Accurate and reliable indication of temperature
- Simple installation requires no special tools

Applications

Outdoor temperature sensors are used to monitor the temperature of outdoor air. This variable is often used in a variety of HVAC control strategies, including outdoor reset and building ventilation.

Pipe surface temperature sensors are often used in place of immersion type sensors, particularly in cases where sensor installation occurs after the system if filled.

Cable temperature sensors provide a quick and economical means of measuring temperature in a variety of locations, including ducts and other difficult to reach spaces.

Specifications

Output Signals

Active.....0 to 10 V or 4 to 20 mA
Passive..... Pt 1k Ω (375 alpha)
Pt 1k Ω (385 alpha)
Ni 1k Ω @32F
Ni 1k Ω @70F
NTC 100k Ω
NTC 10k Ω Type II
NTC 10k Ω Type III

Accuracy

NTC Thermistors, mid-range..... ±1.0°F (±0.5°C)
Pt RTD and Ni RTD, mid-range..... ±0.75°F (±0.4°C)

Product Ordering

Mounting Location	Output Signal	Measuring Range	Accuracy	Material	Part Number
Outdoor	0 to 10V	-58° to 122°F (-50° to 50°C)	±1.6°F (±0.89°C)	Plastic	**QAC3161**
	100k Ω	-40° to 150°F (-40° to 65°C)	±0.50°F (±0.28°C) @ 77°F (25°C)	Metal	**536-778**
	10k Ω Type II	-40° to 158°F (-40° to 70°C)	±0.81°F (±0.45°C) @ 77°F (25°C)	Plastic	**QAC2030**
	10k Ω Type II	-40° to 150°F (-40° to 65°C)	±0.4°F (±0.21°C) @ 77°F (25°C)	Metal	**QAC2030U**
	10k Ω Type III	-40° to 150°F (-40° to 65°C)	±0.4°F (±0.21°C) @ 77°F (25°C)	Metal	**QAC2032U**
	1k Ω Ni @ 32F	-40° to 150°F (-40° to 65°C)	±0.72°F (±0.4°C) @ 32°F (0°C)	Metal	**QAC2020U**
	1k Ω Ni @ 32F	-58° to 158°F (-50° to 70°C)	±0.36°F (±0.2°C) @ 32°F (0°C)	Plastic	**QAC22**
	1k Ω Ni @ 70F	-40° to 150°F (-40° to 65°C)	±0.72°F (±0.4°C) @ 32°F (0°C)	Metal	**QAC2021U**
	1k Ω Pt (375a)	-40° to 150°F (-40° to 65°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Metal	**544-578**
	1k Ω Pt (385a)	-40° to 158°F (-40° to 70°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Plastic	**QAC2012**
	1k Ω Pt (385a)	-40° to 150°F (-40° to 65°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Metal	**QAC2012U**
	4 to 20 mA	-58° to 122°F (-50° to 50°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Metal	**536-768**
	4 to 20 mA	-58° to 122°F (-50° to 50°C)	±1.6°F (±0.89°C)	Plastic	**QAC3171**

Mounting Location	Output Signal	Measuring Range	Accuracy	Part Number
Cable	10k Ω Type II	-13° to 203°F (-25° to 95°C)	±0.81°F (±0.45°C) @ 77°F (25°C)	**QAP1030.200**
	Ni 1k Ohm @ 32F		±0.72°F (±0.4°C) @ 32°F (0°C)	**QAP22**
	Pt 1k Ohm (385a)		±1.35°F (±0.75°C) @ 32° to175°F (0° to 80°C)	**QAP2012.150**
	3k Ohm Thermistor	32° to 104°F (0° to 40°C)	±0.54°F (±0.3°C) @ 77°F (25°C)	**QAH11.1***

*For use with RDG Series Room Thermostats

Mounting Location	Output Signal	Measuring Range	Accuracy	Material	Part Number
Surface	100k Ω	-40° to 240°F (-40° to 121°C)	±0.50°F (± 0.28°C) @ 77°F (25°C)	*	**540-258**
	10k Ω Type II	-11° to 257°F (-30° to 125°C)	±0.81°F (±0.45°C) @ 77°F (25°C)	Plastic	**QAD2030**
	10k Ω Type II	-40° to 240°F (-40° to 121°C)	±0.4°F (±0.21°C) @ 77°F (25°C)	Metal	**QAD2030U**
	10k Ω Type III	-40° to 240°F (-40° to 121°C)	±0.4°F (±0.21°C) @ 77°F (25°C)	Metal	**QAD2032U**
	1k Ω Ni @ 32F	-40° to 240°F (-40° to 121°C)	±0.72°F (±0.4°C) @ 32°F (0°C)	Metal	**QAD2020U**
	1k Ω Ni @ 32F	-40° to 240°F (-40° to 121°C)	±0.72°F (±0.4°C) @ 32°F (0°C)	Plastic	**QAD22**
	1k Ω Ni @ 70F	-40° to 240°F (-40° to 121°C)	±0.72°F (±0.4°C) @ 32°F (0°C)	Metal	**QAD2021U**
	1k Ω Pt (375a)	-40° to 240°F (-40° to 121°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Metal	**544-089**
	1k Ω Pt (385a)	-11° to 266°F (-30° to 130°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Plastic	**QAD2012**
	1k Ω Pt (385a)	-40° to 240°F (-40° to 121°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Metal	**QAD2012U**
	4 to 20 mA	30° to 250°F (-1° to 121°C)	±0.54°F (±0.3°C) @ 32°F (0°C)	Metal	**536-780**

*Does not include electrical box

Relative Humidity Sensors for Critical Environments and Outdoor Use

AQY2010
Remote Sensing Cable
Shown with QFA3100.

QFA3100 Series
Outdoor Air Relative Humidity and
Relative Humidity/Temperature Sensor.

AQF3100
Sunshield for Sensor.
Sold Separately.

Description

The QFA Series Outdoor Air Relative Humidity and Relative Humidity/Temperature Sensors monitor and transmit changes in humidity and temperature to the building control systems. Standard models available are 2% and 2% certified, for both humidity only and combination humidity with temperature sensing. Sensors are offered with either 4 to 20 mA or 0 to 10 Volt output signals.

Features

- 4 to 20 mA or 0 to 10 Vdc output signals
- High degree of accuracy
- “D” suffix models include LCD Display*

** Units with display are not intended for outdoor use.*

Applications

The QFA Series Relative Humidity and Relative Humidity/Temperature Sensors are especially suited for applications where precise, stable humidity sensing is required.

For outdoor applications, an AQF3100 sunshield is required (sold separately).

Certified sensors include a calibration certificate meeting United States FDA requirements for pharmaceutical facilities.

Specifications

General

Installation..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max

Connections ..... Screw Terminals

Voltage Requirement..... 13.5 to 35 Vdc and 24 Vac (for sensors with 0-10 Vdc outputs)

Material Type..... Polycarbonate plastic

CE and UL listed.....UL 873 standard for Temperature Indicating and Regulating Equipment

Humidity Element

Operating Range..... 0 to 100% RH

Measurement Range ..... 0 to 95% RH

Accuracy at Room Temperature (73°F, 20°C)..... ±2% RH, 0-95% RH

Operating Temperature ..... -31° to 140°F (-35° to 60°C)

Temperature Effect.....Less than 0.1% per degree C

Sensing Element..... Capacitive humidity sensing element

Output Signal

RH only units.. 4 to 20 mA or 0 to 10 Vdc, 0 -100% Linear, Proportional

RH & T units ... 4 to 20 mA or 0 to 10 Vdc, 0 -100% Linear, Proportional

Polarity Protection.....Yes

Temperature Element (for Combination RH/T Units Only)

Application	Temperature
Operating Temperature Jumper Selectable	32° to 122°F (0° to 50°C) or -31° to 95°F (-35° to 35°C) 32° to 122°F (0° to 50°C) or -31° to 140°F (-35° to 60°C)
Time Constant at 0° to 50°C and 10 to 80% RH	Approx. 20 seconds in moving air
Accuracy	at 59° to 95°F (15° to 35°C): ±0.8 K
	at 31° to 122°F (-35° to 50°C): ±1 K
	at 31° to 140°F (-35° to 60°C): ±1 K
Output Signal	4 to 20 mA or 0 to 10 Vdc, 0 -100% linear, proportional, (terminal U2)
Calibration Adjustments	None

Product Ordering

Application	RH	Description	Part No.
Room/Outdoor Air Humidity	2%	0 to 10 Vdc	**QFA3100**
Room/Outdoor Air Humidity	2%	4 to 20 mA	**QFA3101**
Room/Outdoor Air Humidity & Temperature	2%	0 to 10 Vdc / Temp 0 to 10 Vdc	**QFA3160**
Room Air Humidity & Temperature	2%	0 to 10 Vdc / Temp 0 to 10 Vdc with Display	**QFA3160D**
Room/Outdoor Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA	**QFA3171**
Room Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA with Display	**QFA3171D**
Room/Outdoor Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA (Certified)	**QFA4171**
Room Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA (Certified) with Display	**QFA4171D**
Room Outdoor Air Humidity & Temperature	2%	0 to 10 Vdc, Temp 0 to 10 Vdc (Certified)	**QFA4160**

Accessories Ordering

Description	Part No.
Outdoor Air Sunshield	**AQF3100**
Remote Sensing Cable, 10 Foot	**AQY2010**
Remote Sensing Cable, 30 Foot	**AQY2030**
Replacement Sensing Element	**AQF3150**
Replacement Sensing Element – Certified Units	**AQF4150**
Wall Plate for 2" x 4" Box	**ARG70**
Replacement Filter	**AQF3101**

Duct Relative Humidity / Temperature Sensors

QFM Series Duct Relative Humidity Sensor.

QFM Series Duct Relative Humidity and Relative Humidity/Temperature Sensor.

Description

The QFM Series Duct Relative Humidity and Relative Humidity/Temperature Sensors monitor and transmit changes in humidity and temperature to the building control systems. Several models are available for humidity only (in 5% and 2%) or for humidity and temperature sensing (5%, 2% and 2% certified versions). The humidity only units are available in either 4 to 20 mA or 0 to 10 Volt signal versions. Combination humidity and temperature units are also available in either dual current or voltage versions, transmitting proportional signals back to the controller. Nickel 1000 Ohm (Siemens type) temperature outputs on combination versions are also offered.

Features

- 4 to 20 mA or 0 to 10 Vdc output signals
- High degree of accuracy
- Removable, replaceable sensing tip (2% and 2% certified models)
- Versions with LCD display also available

Applications

The QFM Series Duct Relative Humidity and Relative Humidity/Temperature Sensors are especially suited for applications where precise, stable humidity sensing is required.

Certified sensors include a calibration certificate meeting United States FDA requirements for pharmaceutical facilities.

Specifications

General

Installation..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max

Connections ..... Screw Terminals

Dimensions

Probe..... 0.6" O.D. x 7.2" L (15 mm O.D. x 183 mm L)

Housing ..3.1" L x 2.3" W x 1.5" O.D. (80 mm L x 60 mm W x 40 mm D)

Voltage Requirement..... 13.5 to 35 Vdc and 24 Vac (for sensors with 0-10 Vdc outputs)

Input Impedance (4 to 20 mA versions only) ..... Less than 500 Ohms

Housing Material Type .....Polycarbonate plastic, UL 94-5VB rated, suitable for plenum installations

Housing Protection Class..... IP 65 (QFM3xxx, QFM4xxx types), IP54 (QFM2xxx types), NEMA 1 (all types)

Filter Material and Specification ..... Teflon, 10 micron filter

Agency Certification..... UL listed to UL 873 for Temperature Indicating and Regulating Equipment

CE Conformance ..... EC Directive on electromagnetic compatibility: 89/336/EEC

Humidity Element

Operating Range..... 0 to 100% RH

Measurement Range ..... 0 to 95% RH

Accuracy at Room Temperature ≈ 73°F (20°C):

All types:..... ±5% RH, 0-95% RH (±3% RH, 30-70% RH) ±2% RH, 0-95% RH

Operating Temperature Jumper Selectable.....32° to 122°F (0° to 50°C) or -31° to 95°F (-35° to 35°C) or -31° to 140°F (-35° to 60°C)

Temperature Effect.....Less than 0.1% per degree C

Sensing Element..... Capacitive humidity sensing element

Output Signal

RH only units.....4 to 20 mA and 0 to 10 Vdc, 0-100% Linear, Proportional

RH/T units .....0 to 10 Vdc, 0-100% Linear, Proportional

Polarity Protection.....Yes

Temperature Element Specifications (for Combination RH/T Units Only)

		QFM2120	QFM2160 QFM2171	QFM31xx QFM41xx
Operating Temperature		-31° to 140°F (-35° to 60°C)	-31° to 122°F (-35° to 50°C)	-31° to 158°F (-35° to 70°C)
Time Constant		Approximately 20 seconds in moving air		
Accuracy	±0.6K	—	—	59° to 95°F (15° to 35°C)
	±0.8K	59° to 95ºF (15° to 35ºC)	59° to 95ºF (15° to 35ºC)	31° to 158ºF (-35° to 70ºC)
	±1.0K	31° to 140°F (-35° to 60°C)	-31° to 122°F (-35° to 50°C)	—
Output Signal		—	0 to 10 Vdc (QFMx160)	
		Nickel 1K @ 32°F Ohm RTD (Siemens)	4 to 20 mA (QFMx171)	
Calibration		None		

Product Ordering

Application	Description	Part No.
Duct Humidity 5%	0 to 10 Vdc	**QFM2100**
Duct Humidity 5%	4 to 20 mA	**QFM2101**
Duct Humidity 5% & Temperature	0 to 10 Vdc / Temp 1K Ohm Nickel RTD (L&S Type)	**QFM2120**
Duct Humidity 5% & Temperature	0 to 10 Vdc / Temp 0 to 10 Vdc	**QFM2160U**
Duct Humidity 5% & Temperature	4 to 20 mA / Temp 4 to 20 mA	**QFM2171**
Duct Humidity 2%	0 to 10 Vdc	**QFM3100**
Duct Humidity 2%	4 to 20 mA	**QFM3101**
Duct Humidity 2% & Temperature	0 to 10 Vdc, Temp 0 to 10 Vdc	**QFM3160**
Duct Humidity 2% & Temperature	0 to 10 Vdc, Temp 0 to 10 Vdc, w/Display	**QFM3160D**
Duct Humidity 2% & Temperature	4 to 20 mA / Temp 4 to 20 mA	**QFM3171**
Duct Humidity 2% & Temperature	4 to 20 mA / Temp 4 to 20 mA, w/Display	**QFM3171D**
Duct Humidity 2% & Temperature	0 to 10 Vdc, Temp 0 to 10 Vdc (Certified)	**QFM4160**
Duct Humidity 2% & Temperature	4 to 20 mA / Temp 4 to 20 mA (Certified)	**QFM4171**

Accessories Ordering

Description	Part No.
Replacement Sensing Element	**AQF3150**
Replacement Sensing Element – Certified Units	**AQF4150**
Replacement Filter	**AQF3101**

Electronic Room Hygrostats

QFA1000 Electronic Room Hygrostat with Concealed Setpoint.

QFA1001 Electronic Room Hygrostat with Exposed Setpoint.

Description

The room hygrostats are used for controlling and monitoring relative humidity in ventilation or air conditioning facilities. They ensure room humidity control within the selectable range of 30 to 90% relative humidity by controlling humidification or dehumidification equipment. They can also be used for monitoring minimum or maximum humidity levels.

Features

- Hygrostat with SPDT microswitch
- Setpoint knob for the upper switching point
- Mounts directly on the wall or on a recessed conduit box

Applications

For controlling humidification and dehumidification equipment.

Specifications

Setpoint Range ..... 30 to 90% rh

Temperature
Operating Range ..... 32° to 122°F (0° to 50°C)

Humidity Measuring Element ..... Stabilized Plastic Band

Control Mode ..... Two-position

Time Constant (v = 0.2 m/s)..... Approx. 5 minutes

Setting Accuracy ..... + 5% rh (can be improved by calibrating on site)

Temperature Influence ..... + 0.5% rh/K

Humidity Calibration ..... at 55% rh, 73°F (23°C)

Long-term Stability..... Approximately −1.5% rh/a

Type of Switch ..... Potential-free Microswitch (SPDT)

Contact Rating
Maximum..... 5 (3) A, 24 Vac/Vdc
Minimum..... 100 mA, 24 Vac/Vdc

Degree of Housing Protection..... IP 20 to EN 60 529

Safety Class ..... II to EN 60 730

Electrical Connection
Screw Terminals ..... For Maximum 2 × 16 AWG

Materials and Colors
Base ..... PPS, Fortron, Fiberglass Reinforced, Black
Cover..... PC Lexan 940, Pure White
Humidity Measuring Element ..... Plastic

Agency Approvals ..... UL listed for UL873
cUL Canadian Standard C22.2 No. 24-93
CE conformity
EMC directive 89/336/EEC

Weight ..... 3.17 ounces (0.090 kg)

Product Ordering

Description	Control Range	Type of Control	Part No.
Room	30 to 90% RH	Humidity Switch with Concealed Setpoint	**QFA1000**
Room	30 to 90% RH	Humidity Switch with Exposed Setpoint	**QFA1001**

Accessories Ordering

Description	Part No.
Wall Plate for 2" x 4" Box	**ARG70**

Electronic Duct Hygrostats

QFM81.21 Electronic Duct Hygrostat with Internal Setpoint.

QFM81.2 Electronic Duct Hygrostat with External Setpoint.

Description

On/off hygrostat with microswitch, and temperature-compensated humidity sensor for temperature-independent humidity measurements.

Features

- Stabilized sensing strip
  (good linearity, very stable even at high humidity, insensitive to dust and contaminated air)
- Can be mounted in ventilating ducts or rooms

Applications

For controlling humidification and dehumidification equipment.

Specifications

Setpoint Range ..... 30 to 90% rh
Control Mode ..... On/off
Type of Switch ..... Potential-free Microswitch (SPDT)
Contact Rating
Maximum ..... 5 (3) A, 24 Vac/Vdc
Minimum ..... 100 mA, 24 Vac/Vdc
Temperature Influence ..... Compensated
Long-term Stability ..... Approximately -1.5% rh/a
Balancing ..... At 55% rh, 73°F (23°C)
Time Constant (v = 0.2 m/s) ..... Approx. 3 minutes
Permissible Air Velocity ..... 10 m/s
Permissible Ambient Temperature
Operation ..... 32° to 158°F (0° to 70°C)
Storage/transport ..... -22° to 158°F (-30 to 70°C)
Degree of Housing Protection
FM81.2 ..... IP 30 to EN 60 529
QFM81.21 ..... IP 55 to EN 60 529
Safety Class ..... II to EN 60 730
Electrical Connection
Screw Terminals ..... 20 AWG Minimum
2 x 16 AWG Maximum
Materials and Colors
Sensing Element ..... Polymer
Casing with Stem ..... PPS, Fortron 1140L6, Fiberglass Reinforced
Cover ..... PC Lexan 940
Transparent Cover (QFM81.21) ..... PC Makrolon 2014R
Agency Approvals ..... UL listed for UL873
cUL Canadian Standard C22.2 No. 24-93
Weight ..... Approx. 12 ounces (0.34 kg)

Product Ordering

Description	Control Range	Type of Control	Part No.
Duct	15 to 95% RH	Humidity Switch with External Setpoint	**QFM81.2**
Duct	15 to 95% RH	Humidity Switch with Internal Setpoint	**QFM81.21**

Note:
Includes a mounting flange (for duct or wall mounting) and a sealing ring (for duct mounting).

Condensation Sensors

QXA2100
Condensation Sensor.

QXA2101 Condensation Sensor
with Remote Sensing Element.

Description

The QXA Series Condensation Sensors are used to avoid damage due to condensation on chilled ceilings and in HVAC installations.

On humidity rise, the SPDT contacts switch at approximately 95% RH (+/-4% RH). All feature a fixed switching differential of approximately 5% RH.

All operate on AC/DC 24V and have a NO/NC changeover dry contact relay output.

- 1 Amp @ 24 Vac
- 0.5 Amp @ 24 Vdc

Features

- Come complete with a strap-on band for pipe diameters from 0.5 to 4 inches (12.7 to 102 mm), and thermal conductive paste

Specifications

Power Supply G (G+), G0 (G-)
- Operating Voltage ..... AC/DC 24V + 20%
- Frequency ..... 50/60 Hz
- Power consumption ..... Maximum 1 VA

Switching Point on Humidity Increase ..... 95% ±4% rh

Switching Differential (Fixed) ..... Approximately 5% rh

Response Time in Static Air
- From 80 to 99% rh ..... Maximum 3 minutes
- From 99 to 80% rh ..... Maximum 3 minutes

Condensation ..... Maximum 30 minutes

Output Q11, Q12, Q14
- Relay Output ..... NO/NC Changeover Dry Contact
- Current Range at AC/DC 24V ..... 0.02 to 1 (1) A
- Starting Current at AC/DC 24V ..... < /- 10 A for < /- 20 ms
- Switching Capacity ..... Minimum AC/DC 1V, 1 mA
  Maximum A/DC,48V, 0.5 A

Degree of Protection of Housing ..... IP 40 to EN 60529

Safety Class ..... III to EN 60 730

Connections
- Mechanical ..... Strap-on Band for Pipe Diameter
  0.39 to 3.94 inches (10 to 100 mm)
- Electrical
  - Screw Terminals for ..... (2) 16 AWG or (1) 14 AWG
    (max 2 x 1.5 mm2 or 1 x 2.5 mm2)

Environmental Conditions
- Operation to ..... IEC 60721-3-3
  - Climatic Conditions ..... Class 3K5
  - Temperature (Housing & Electronics) ..... -23° to 122°F (-5° to 50°C)
  - Humidity ..... 5 to 95% rh (Non-condensing)
  - Mechanical Conditions ..... Class 3M2
- Transport to ..... IEC 60721-3-2
  - Climatic Conditions ..... Class 2K2
  - Temperature (Housing & Electronics) ... -13° to 150°F (-25° to 60°C)
  - Humidity ..... <95% rh
  - Mechanical Conditions ..... Class 2M2

Housing Materials and Colors ..... Thermoplastics, pure-white

Product Safety
- Automatic Electrical Controls for
  Domestic Use and Similar Applications ..... EN 60730-1

Electromagnetic Compatibility
- Immunity ..... EN 61000-6-2
- Emissions ..... EN 61000 6-3

CE Conformity
- Electromagnetic Compatibility 2004/108/EC
- Low-voltage Directive 2006/95/EC

Weight ..... 4.4 ounces (0.126 kg) w/Packaging

Product Ordering

Description	Part No.
Condensation Sensor	**QXA2100**
Condensation Sensor with Remote Sensing Element	**QXA2101**

Room CO_2 / VOC / Temperature / RH

QPA2060D Q Series
Room Carbon Dioxide & Temperature Sensor.

Description

The QPA Series Room Carbon Dioxide Sensors monitor and transmit changes in CO_2 to the building control systems. No calibration of the CO_2 sensor is necessary – these microprocessor-based units consist of a non-dispersive infrared CO_2 sensor that experiences less than 1% drift per year for the first two years of operation and negligible drift thereafter.

Features

- LCD display option
- Various models:
  CO_2
  CO_2/VOC
  CO_2/Temp
  CO_2/Temp/RH
- Built-in test function for troubleshooting
- Jumper selectable °C/°F units for temp models w/display

Applications

Combination CO_2 and Volatile Organic Compound (VOC) Sensors (QPA2002 and QPA2002D) measure both CO_2 and VOCs with a single output signal that automatically switches to reflect the higher of the two valves. These sensors seamlessly integrate into any Demand Control Ventilation strategy and help address odorless (CO_2) and odorous (VOCs) air quality issues.

Specifications

General

Installation ..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max
Connections ..... Screw terminals
Dimensions ..... 3.94" H x 3.54" W x 1.65" D (100 mm x 90 mm x 42 mm)
Voltage Requirement ..... 13.5 to 35 Vdc
Housing Protection Class ..... NEMA 1 (all types)

CO_2 Element

Operating Range ..... 0 to 2000 ppm
Accuracy at Room Temperature ≈ 73°F (20°C) ..... +2% mV
Operating Temperature ..... -23° to 113°F (-5° to 45°C)
Temperature Effect ..... Less than 0.1% per degree C
Sensing Element ..... NDIR CO_2 sensing module
Output Signal ..... 0 to 10 Vdc, 0-100% Linear, Proportional
Polarity Protection ..... Yes
Permissible Air Velocity in the Room ..... <26.2 ft./s

Temperature Element (for Combination CO_2/T unit only)

Operating Temperature ..... 23° to 113°F (-5° to 45°C)
Time Constant ..... <1 minute
Accuracy ..... ±0.8K
Output Signal ..... 0-10 volts
Calibration ..... None Required

Humidity Element

Measuring Range ..... 0 to 100% RH
Accuracy ..... ±5% RH

Product Ordering

Application	Description	Part No.
CO_2	0 to 5 V or 0 to 10 V	**QPA2000**
CO_2 and VOC*	0 to 5 V or 0 to 10 V	**QPA2002**
CO_2 and VOC*	0 to 5 V or 0 to 10 V, with Display	**QPA2002D**
CO_2 and Temp (Active)	0 to 5 V or 0 to 10 V	**QPA2060**
CO_2 and Temp (Active)	0 to 5 V or 0 to 10 V, with Display	**QPA2060D**
CO_2, Temp and RH (Active)	0 to 5 V or 0 to 10 V	**QPA2062**
CO_2, Temp and RH (Active)	0 to 5 V or 0 to 10 V, with Display	**QPA2062D**

* VOC sensors are for maintaining comfort and are not for use as safety devices.

Accessories Ordering

Description	Part No.
Wall Plate for 2" x 4" Box	**ARG70**

Duct CO_2 / VOC / Temperature / RH

QPM 2100 CO_2 only Sensor.

Description

The QPM Series Duct CO_2 Sensors monitor and transmit changes in CO_2 to the building control systems. Several models are available for CO_2 only, CO_2/Temp, CO_2/Temp/RH and CO_2/VOC. All variants for CO_2 and combination versions with Temperature or Volatile Organic Compounds (VOCs) deliver 0 to 10 Volt to 5 Volt (field selectable) proportional signals to the controller.

No calibration of the CO_2 sensor is necessary – these microprocessor-based units consist of an NDIR sensor that experiences less than 1% drift per year for the first two years of operation and negligible drift thereafter.

Features

- LCD display option
- Various models:
  CO_2
  CO_2/VOC
  CO_2/Temp
  CO_2/Temp/RH
- Jumper selectable °C/°F units for temp models w/display

Applications

These units are especially suited for applications where precise, stable CO2 sensing is required.

Combination CO_2 and Volatile Organic Compound (VOC) Sensors (QPM2102 and QPM2102D) measure both CO_2 and VOCs with a single output signal that automatically switches to reflect the higher of the two valves. These sensors seamlessly integrate into any Demand Control Ventilation strategy and help address odorless (CO_2) and odorous (VOCs) air quality issues.

Specifications

General

Installation.....18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max.

Connections .....Screw terminals

Voltage Requirement..... 13.5 to 35 Vdc
Q Series sensors with 0-10 Vdc outputs can also operate on 24 Vac

Input Impedance (4 to 20 mA versions only) ..... Less than 500 Ohms

CO_2 Element

Operating Range.....0 to 2000 ppm

Accuracy at Room Temperature ≈ 73°F (20°C) .....+2% mean value

Operating Temperature..... -31° to 113°F (-35° to 45°C)

Temperature Effect.....Less than 0.1% per degree C

Sensing Element.....NDIR CO_2 sensing module

Output Signal..... 0 to 10 Vdc, 0-100% linear, proportional

Polarity Protection.....Yes

Permissible Air Velocity in the Duct .....<26.2 ft./s

Temperature Element (for Combination CO_2/T unit only)

Operating Temperature ..... -31° to 113°F (-35° to 45°C)

Time Constant .....<1 min

Accuracy .....±1K

Output Signal.....0 to 10 Volt

Calibration ..... None Required

Product Ordering

Application	Description	Part No.
Duct Sensor, CO2	0 to 5 or 0 to 10 Vdc	**QPM2100**
Duct Sensor, CO2 and VOC*	0 to 5 or 0 to 10 Vdc	**QPM2102**
Duct Sensor, CO2 and VOC*	0 to 5 or 0 to 10 Vdc with Display	**QPM2102D**
Duct Sensor, CO2 and Temp. (Active)	0 to 5 or 0 to 10 Vdc	**QPM2160**
Duct Sensor, CO2 and Temp. (Active)	0 to 5 or 0 to 10 Vdc with Display	**QPM2160D**
Duct Sensor, CO2, RH and Temp. (Active)	0 to 5 or 0 to 10 Vdc	**QPM2162**
Duct Sensor, CO2, RH and Temp. (Active)	0 to 5 or 0 to 10 Vdc with Display	**QPM2162D**

* VOC sensors are for maintaining comfort and are not for use as safety devices.

Air Differential Pressure Sensors / Switches

QBM3100 Series.

QBM81 Series.

Description

The Siemens QBM Series Air Differential Pressure Devices use a proven sensing technology to delivery accurate and repeatable data in applications that require monitoring of differential pressure.

Features

- Loop powered 4 to 20 mA output signal (QBE3100)
- SPDT contact output (QBM81)
- Compact construction
- Integral mounting bracket and snap-on cover with a single screw for fast and easy installation
- Resettable zero point for different mounting positions (QBM3100)
- Low susceptibility to temperature
- No mechanical aging

Applications

QBM Series Differential Pressure Devices can be used in a wide range of HVAC and general building management applications where differential air pressure monitoring in required.

Typical applications for the QBE3100 include control of variable speed fans in VAV systems and monitoring of pressure differentials in clean room applications.

The QBM81 can be wired NO or NC and provide a digital output with adjustable differential pressure trip point. Common applications include monitoring of air filters and general indication of high/low differential pressure situations.

Note: **QBM81 Series is only available with 6.2 mm metric pressure ports.**

Specifications

QBM3100 Series Sensors (4-20mA Output)

Input Power ..... 8 to 33 Vdc
Accuracy ..... ±1% Full Scale
Maximum Pressure ..... TBD
Permitted Media ..... Air and other non-corrosive gases
Process/Ambient Operating Temp. ..... 32° to 160°F (0° to 71°C)
Ambient Humidity ..... Non-condensing
Enclosure ..... Polycarbonate
Diaphragm ..... Silicone
Measuring Element ..... Ceramic

QBM81 Series Switches (SPDT Relay Output)

Contact Rating ..... AC 250V, 5A max (3A inductive)*
Maximum Pressure ..... 20" WC
Ambient Operating Temp. ..... -22º to 185°F
Humidity (Max) ..... 90% rh, non-condensing
Permitted Media ..... Air and other non-corrosive gases
Mounting Orientation ..... Any
Housing/Cover ..... Polycarbonate
Diaphragm ..... Emission free silicone
Bracket ..... Galvanized Steel

*Consult local codes for voltages over 24V

Product Ordering

Description	Output Signal	Differential Pressure Range	Part Number
Air DP Sensor	4 to 20 mA	-0.25 to +0.25 inches	**QBM3100U025U**
		0 to 1 inch	**QBM3100U1**
		0 to 2.5 inches	**QBM3100U2.5**
		0 to 5 inches	**QBM3100U5**
		0 to 10 inches	**QBM3100U10**
Air DP Switch	SPDT	0.08 to 1.2 inches	**QBM81-3**
		0.2 to 2 inches	**QBM81-5**
		0.4 to 4 inches	**QBM81-10**

Very Low Differential Pressure Transducers

Very Low Differential Pressure Transducers.

Description

The Very Low Differential Pressure Transducers sense differential pressures and convert pressure difference to a proportional electrical output. The 590 Series is offered with a 0 to 10 Vdc output.

Used in Building Energy Management Systems, these transducers are capable of measuring pressures with the accuracy necessary for proper building pressurization and air-flow control.

The 590 Series Transducers are available in five different air pressure ranges. Static accuracy is ±1% full scale in normal ambient temperature environments. The units are temperature compensated to less than ±0.033% FS/°F of thermal error over the temperature range of 0°F to 150°F.

Features

- 10 psi proof pressure on all ranges
- 24 Vac
- Analog output is compatible with all energy management systems
- Fully protected against reverse wiring
- Internal regulation permits use with unregulated DC power supplies
- 1% accuracy, or better, improves variable air volume system performance
- Meet CE conformance standards
- No field calibration or adjustment necessary

Applications

The Very Low Differential Pressure Transducers are used for the following applications:

- Heating, Ventilation and Air Conditioning (HVAC)
- Energy Management Systems
- Variable Air Volume (VAV) and Fan Control
- Environmental pollution control
- Static duct and clean room pressures

Specifications

Temperature

Operating* ..... 0° to 150°F (-18° to 65°C)
Storage ..... -40° to 185°F (-40° to 85°C)

*Operating Temperature limits of the electronics only.
Pressure media temperatures may be considerably higher or lower.

Physical Description

Case Fire Retardant Glass Filled Polyester

Electrical Connection ..... Screw Terminal Strip
Pressure Fitting ..... 1/4" Fitting
Weight ..... 3 ounces

Electrical Data (Voltage)

Circuit ..... 3-wire (Com, Out, Exc)
Excitation/Output** ..... 12 to 30 Vac/0 to 10 Vdc

**Zero output factory-set to within ±50 mV (±25 mV for optional accuracies).

Bi-directional Output at Zero Pressure ..... 2.5 Vdc (±50 mV)
Output Impedance*** ..... 100 Ohms

***Calibrated into a 50K ohm load, operable into a 5000-ohm load or greater.

Pressure Media ..... Typically air or similar non-conducting gases

Product Ordering

Description	Accuracy	Part No.
Differential Pressure Sensor, 5" WC, 10 Vdc Signal	1%	**590-501**
Differential Pressure Sensor, 2" WC, 24 Vac, 10 Vdc Signal	1%	**590-502**
Differential Pressure Sensor, 1" WC, 24 Vac, 10 Vdc Signal	1%	**590-503**
Differential Pressure Sensor, ±0.25" WC, 24 Vac, 10 Vdc Signal	1%	**590-505**
Differential Pressure Sensor In Conduit Box, 5" WC, 24 Vac, 10 Vdc Signal	1%	**590-506**
Differential Pressure Sensor In Conduit Box, 2" WC, 24 Vac, 10 Vdc Signal	1%	**590-507**
Differential Pressure Sensor In Conduit Box, 1" WC, 24 Vac, 10 Vdc Signal	1%	**590-508**
Differential Pressure Sensor In Conduit Box, ±0.25" WC, 24 Vac, 10 Vdc Signal	1%	**590-510**
Differential Pressure Transmitter, 1.0", 0.4%, 4 to 20 mA, Conduit Cover, 24 Vac	0.4%	**590-780**
Differential Pressure Transmitter, .65", 0.4%, 4 to 20 mA, Conduit Cover, 24 Vac	0.4%	**590-781**
Differential Pressure Transmitter, 0.5", 0.4%, 4 to 20 mA, Conduit Cover, 24 Vac	0.4%	**590-782**

Accessories Ordering

Description	Part No.
Sensor Cover with Conduit Connection	**590-500**

Air Velocity Sensor

QVM62.1 Air Velocity Sensor.

Description

This sensor is used to control the air velocity to a constant value, balance out pressure fluctuations (supply or exhaust air control), or to monitor the flow in air ducts. It is designed with a thin film sensing element and its unique, sleek housing guarantees product recognition. This unit is compatible with all Siemens systems and controllers.

Features

- Mounting flange allows the installer to vary the probe insertion length into the duct space for best control
- Mounting flange dampening gasket minimizes vibration
- Graduated probe ensures maximum flow accuracy
- Flow directional arrow provides for the most accurate reading
- Connection cable provides mounting flexibility
- Three jumper selectable flow measuring ranges accommodate any application or environment
- Field selectable output (4 to 20 mA or 0 to 10V)

Applications

This sensor is primarily used to set the basic volumetric flow rate for modulating fan control.

Specifications

Power Supply
- Operating Voltage ..... 24 Vac ± 20%
- Frequency ..... 50/60 Hz
- Power Consumption ..... ≤ 5 VA (maximum 200 mA)
- Output Impedance ..... <20 ohm

Measuring Data
- Measuring Ranges, Adjustable ..... 0 to 16 ft/s (0 to 5 m/s)
  0 to 33 ft/s (0 to 10 m/s)
  (factory setting)
  0 to 49 ft/s (0 to 15 m/s)
- Measuring Accuracy at 68°F (20°C), 45% rh, ... ± 0.7 ft/s
  1013 hPa ..... (0.2 m/s + 3% of measured value)
- Permissible Air Velocity ..... 66 ft/s (20 m/s)
- Direction Dependence ..... < 0.3% of measured value at ≤ + 10°
- Time Constant t_{90} at 10 m/s ..... 4 seconds

Signal Output U1
- Voltage ..... 4 to 20 mA or 0 to 10 Vdc
- Current ..... ± 1 mA

Line Length

Permissible Length to Controller at:
- 20 AWG Copper Cable ..... 164 ft (50 m)
- 18 AWG Copper Cable ..... 492 ft (150 m)
- 16 AWG Copper Cable ..... 984 ft (300 m)
- Line Length to the Sensor Head ..... 3 ft (1 m) (prewired)

Connections
- Mechanical ..... Screw Connection
- Electric ..... Screw Terminal, Maximum 2 x 18 AWG

Degree of Protection

Degree of Protection Provided by Enclosures as per EN 60 529
- Transducer ..... IP 42
- Sensor head ..... IP 20
- Degree of protection as per EN 60 730 III

Climatic Conditions
- Temperature ..... 23° to 113°F (-5° to 45°C)
- Humidity (non-condensing) ..... <95% rh
- Mechanical Conditions ..... Class 3M2
- Chemical Conditions ..... Class 3C2

Storage (Transducer and Immersion Stem)
- Temperature ..... 23° to 113°F (-5° to 45°C)
- Humidity (Non-condensing) ..... <95% rh
- Mechanical Conditions ..... Class 1M2

Weight with Packaging ..... 12 oz (0.352 kg)

Product Ordering

Application	Description	Part No.
Air Velocity Sensor	0 to 3000 FPM	**QVM62.1**

Pitot Tube Sensor Kits

536 Pitot Tube Sensor Kit.

Description

The Pitot Tube Sensor Kit is used with either static or differential air pressure sensing devices, to measure average static or differential pressure across a duct.

Features

- Thin steel construction
- Mounting flange is easily bent to conform to round or oval ducts

Applications

This kit is used in situations where a terminal box manufacturer-supplied sensor (flow pick-up) is not available, or where the existing flow pick-up has been damaged.

Specifications

Material
- Probe ..... 6061 aluminum
- Gasket ..... 1/4-in (6 mm) closed-cell neoprene
- Tubing ..... FR polyethylene
- Mounting Flange ..... 26 GA galvanized sheet steel

Mounting
- Screws ..... #8 self-tapping 1/4-in (6 mm) hex washer head
- Flange Hub ..... #10 pan head, slotted

Dimensions ..... 1.50" x 3.75" (38 mm x 95 mm)

Product Ordering

Duct Size	Maximum Probe Length	Part No.
6" (152 mm)	5.75" (146 mm)	**536-376**
8" (203 mm)	7.75" (197 mm)	**536-378**
10" (254 mm)	9.75" (248 mm)	**536-380**
12" (305 mm)	11.75" (298 mm)	**536-382**
14" (356 mm)	13.75" (349 mm)	**536-384**

Wet Differential Pressure Sensors

QBE3100 Series.

QBE3190 Series
(includes manifold).

Description

QBE Series Wet Differential Pressure Sensors utilize a well-proven ceramic technology making them an ideal choice across a broad spectrum of applications. These sensors can be ordered individually or pre-assembled with an optional three-valve manifold

Features

- Loop powered 4 to 20 mA output signal
- Compatible with water and water/glycol mixtures
- Ultra-low susceptibility to temperature
- Maintenance free

Applications

The QBE Sensor is particularly suitable for use in HVAC systems where continuous monitoring of flow rate or differential pressure across a control valve is required.

Specifications

Input Power ..... 7.5V to 33 Vdc
Output Signal ..... 4 to 20 mA
Long-Term Stability ..... ±0.5% Full Scale
Resolution ..... 0.1% Full Scale
Sum of Linearity, Hysteresis and Repeatability ..... <±0.5% Full Scale
Manifold ..... Aluminum (6061-T6511)
Tubing ..... Copper (UNS C12200)
Fitting ..... Brass (C36000)
Valve Stem ..... High-performance thermoplastic polymer
O-rings ..... Ethylene Propylene Rubber (EPS, EPDM)

Suitable Process Media ..... Air, water, water and glycol mixtures
Process Temperature (Sensor) ..... 5° to 185°F (-15° to 85°C)
Process Temperature (Manifold) ..... 40° to 185°F (5° to 85°C)
Ambient Operating Temperature ..... 5° to 185°F (-15° to 85°C)
Enclosure IP65/NEMA 4
Electrical Connections ..... 1/2" FNPT conduit (kit included for non-conduit installations)
Process Connections ..... 1/4" FNPT
Mounting Orientation ..... Any orientation is allowable (avoid orientations that may be susceptible to air pockets)
Maximum Working Pressure (Sensor) ..... 540 PSIG
Maximum Working Pressure (Manifold) ..... 250 PSIG

Product Ordering

Description	Output Signal	Differential Pressure Range	Part Number
Wet DP Sensor	4 to 20 mA	0 to 25 PSID	**QBE3100UD25**
		0 to 50 PSID	**QBE3100UD50**
		0 to 100 PSID	**QBE3100UD100**
Wet DP Sensor with 3-Valve Manifold	4 to 20 mA	0 to 25 PSID	**QBE3190UD25**
		0 to 50 PSID	**QBE3190UD50**
		0 to 100 PSID	**QBE3190UD100**

Pressure Sensors for Liquid and Gas

Pressure Sensor.

Description

The 7MF Series Pressure Sensors are suitable for the measurement of static and dynamic positive pressure in HVAC facilities, particularly in hydraulic and pneumatic systems using liquid or gaseous media (steam applications).

The 7MF Series Pressure Sensors are available in several different pressure ranges, from 0-15 psid to 0-300 psid.

Features

- Piezo-resistive measuring system
- 0 to 10 Vdc and 4 to 20 mA output signals
- Measurement unaffected by changes in temperature
- High temperature stability
- No mechanical aging or creepage
- Excellent EMC characteristics

Applications

The 7MF Series Pressure Sensors are used for the following applications:

- Heating, Ventilation and Air Conditioning (HVAC)
- Energy Management Systems
- Chiller, Boiler and Steam Applications

Specifications

Power Supply
Supply Voltage ..... DC 16...33 V
Max. Voltage Tolerance ..... ±15 % at AC 24 V
Current Consumption ..... <4 mA

Output Signal
4 to 20 mA ..... two-wire connection; power supply DC 10 to 36V
0 to 10 V ..... three-wire connection; power supply DC 15 to 36V

Application Range ..... 0 to 40 bar, refer to table below.

Accuracy ..... (FS = Full Scale)
Total of linearity, hysteresis and reproducibility ..... <±0.3 % FS
Zero point offset voltage ..... <30 Mv

Temperature Drift
TC zero point ..... <±0.015 % FS/K (typically)
TC sensitivity ..... <±0.015 % FS/K (typically)

Response Time ..... <2 ms

Nominal Pressure ..... Relative pressure as in "Ordering Information" (measurement of difference from ambient pressure)

Max. Admissible Pressure and Rupture Pressure ..... 3 x scale end value of measuring range (FS) <4 bar
2.5 x scale end value of measuring range (FS) >4 bar

Media ..... Neutral and slightly corrosive liquids and gases
Admissible temperature of medium ..... -40° to 239°F (-40° to 125°C)

Maintenance ..... Maintenance-free

Mounting Position ..... Optional

Connecting Cable ..... PVC, length 5 ft., 3 x 0.25 mm^2 stranded wires

Screwed Fitting ..... External thread G1⁄2"

Operation to Climatic Conditions
Temperature ..... -40° to 85°C
Humidity ..... <95% RH

Storage/transport Climatic Conditions
Temperature ..... -40° to 85°C
Humidity ..... <95% RH

CE conformity to EMC Directive 89/336/EEC

N474 Conformity to
Australian EMC Framework ..... Radio Communication Act 1992
Radio Interference Emission Standard ..... AS/NZS 3548

Base ..... Stainless Steel (1.4305)

Measuring Element ..... Ceramics diaphragm

Cover ..... Stainless Steel (1.4305)

Sealant ..... FPM (Viton) spec.

Shipping Weight ..... 0.53 lb. (0.24 kg)

Product Ordering

Pressure Range (psi)	Output Signal	Part No.
0 to 15 PSI	4 to 20 mA	**7MF156544BB005EA1**
	0 to 10 V	**7MF156544BB105EA1**
0 to 30 PSI	4 to 20 mA	**7MF156544BE005EA1**
	0 to 10 V	**7MF156544BE105EA1**
0 to 60 PSI	4 to 20 mA	**7MF156544BF005EA1**
	0 to 10 V	**7MF156544BF105EA1**
0 to 100 PSI	4 to 20 mA	**7MF156544BG005EA1**
	0 to 10 V	**7MF156544BG105EA1**
0 to 150 PSI	4 to 20 mA	**7MF156544CA005EA1**
	0 to 10 V	**7MF156544CA105EA1**
0 to 200 PSI	4 to 20 mA	**7MF156544CB005EA1**
	0 to 10 V	**7MF156544CB105EA1**
0 to 300 PSI	4 to 20 mA	**7MF156544CD005EA1**
	0 to 10 V	**7MF156544CD105EA1**

Liquid Flow Switches

QVE1900U Liquid Flow Switch.

QVE1901U Liquid Flow Switch.

Description

The QVE1900U Flow Switch is for liquids in piping 1-1/4-inch to 8-inch (20 mm to 200 mm) diameter. The QVE1901U Flow Switch is for liquids in piping 3/4-inch to 8-inch (20 mm to 200 mm) diameter.

These two units have the same general principle of operation, although their switching mechanisms are different. Both detect the flow of the medium to be monitored by means of a paddle. If the flow velocity in the piping falls below the adjusted switch-off value, the paddle in the QVE1900U model actuates a micro-switch with a dry contact (SPDT), which closes the contact. When the flow velocity reaches the switch-on value again, the opposite contact closes. In the QVE1901U model, the switching is achieved through a system of two opposite magnets and a reed contact. The switching point is adjustable on both devices.

Features

- Compatible with any device capable of receiving and NO/NC input
- Trimmable paddles provide correct flow measurement based on pipe diameter
- Can be wired NO or NC
- Maintenance-free
- Suitable for all common HVAC applications (not for use with ammonia)
- QVE1901U is a direct replacement for common flow switches from McDonnel & Miller, Taco, and others

Applications

Flow switches are used to monitor the flow of fluids in hydraulic systems, especially in refrigeration and heat pumps, and are for use with condensers, boilers, and heat exchangers.

Specifications

Piping Diameter
QVE1900U ..... 1.25" (32) to 8.00" (200)
QVE1901U ..... .75" (20) to 8.00" (200)

Type of Switch
QVE1900U ..... Micro Switch with Single-Pole Changeover, Potential Free
QVE1901U ..... Reed Contact

Contact Rating
QVE1900U ..... 24 Vac, 15 (8) A
QVE1901U ..... 24 Vac, 1 A/24 Vdc, 1 A

Adjustment of Switching Point ..... Manual, Supplied with Minimum Switch On/Off Values

Permissible Medium Temperature ..... -4° to 248°F (-20° to 120°C) (Medium must be Antifreeze)

Degree of Protection
Housing ..... IP 65 per EN 60 529

Safety Class
QVE1900U ..... I per EN 60 730
QVE1901U ..... III per EN 60 730

Operation and Storage
QVE1900U ..... -4° to 158°F (-20° to 85°C)
QVE1901U ..... -4° to 176°F (-20° to 80°C)

Ambient Humidity (QVE1901U) ..... <95% rh

Agency Listings ..... UL Listed for UL 873 XAPX
cUL C22.2 No. 24-93 XAPX7

Housing Material
QVE1900U ..... Bayblend T85/Color RAL 7015
QVE1901U ..... Polyamide, Black

Base Material
QVE1900U ..... Screw-in body Brass
QVE1901U ..... Screw-in body Brass

Paddle Material
QVE1900U ..... High Grade Steel
QVE1901U ..... Plastic

Flow Switch, Overall (QVE1900U) ..... Silicone-free

System Connections
QVE1900U ..... 1" MNPT
QVE1901U ..... 3/4" NNPT

Pressure Rating
QVE1900U ..... 160 PSIG
QVE1901U ..... 365 PSIG

Product Ordering

Description	Part No.
SPDT, 15A, 1-1/4" to 8" pipe, 160 psi	**QVE1900U**
SPST, 1A, 3/4" to 8" pipe, 365 psi	**QVE1901U**

Solar Impact Sensor

QLS60 Solar Impact Sensor.

Description

The outdoor wall-mounted Solar Impact Sensor (QLS60) is used as a demand sensor for heating, ventilation and air-conditioning in facilities where compensation of solar radiation is required or desired. Solar compensation is necessary where buildings or building sections with large window areas are subjected to strong solar radiation, especially in installations where thermostatic radiator valves cannot be used.

To determine the impact of solar radiation, the sensor uses a solar cell that acquires the level of radiation. That cell generates an electrical current depending on the extent of radiation, which is then evaluated by the sensor. As a result, the sensor delivers an output signal of 4 to 20 mA or 0 to 10 Vdc, which is proportional to the solar radiation range.

Features

- Configurable 0-10 Vdc, 4-20 mA output signal
- 24 Vac or 18-30 Vdc power source
- Output signal linear over entire measuring range
- Measuring range of 0-93 w/ft2 (0-1000 w/m2)
- Rain- and moisture-resistant NEMA 4 enclosure
- Compact housing (2" x 3.62" x 1.8")

Applications

This sensor can be used in connection with all types of systems and devices capable of acquiring and handling the sensor's 4 to 20 mA or 0 to 10 Vdc output signal.

Specifications

Rated Voltage Range ..... 24 Vac (± 20% SELV)
or 24 Vdc (18 to 30V)

Power Supply (G+, M)
Rated Frequency at 24 Vac 50/60Hz
Rated Power Consumption ..... Max. 2.5 VA (1 W)

Measuring Range ..... 0 to 1000 W/m^2

Time Constant t_{63} ..... </- 2 seconds

Measured Value Outputs (U, I)
Voltage Signal Output (U) ..... 0 to 10 Vdc 0 = 1000 W/m^2
Current Signal Output (I) ..... 4 to 30 mA 0 to 1000 W/m^2

Permissible Cable Lengths With Copper Cable
18 AWG ..... 164 feet (50 m)
16 AWG ..... 492 feet (150 m)
12 AWG ..... 984 feet (300 m)

Electrical Connections
Screw Terminals for ..... 2 x 16 AWG or 1 x 12 AWG

Degree of Protection of Housing ..... IP 65 to IEC 60 529

Insulation Class ..... III to EN 60 730

Environmental Conditions
Operation to ..... IEC 60 721-3
Climatic Conditions ..... Class 3K5
Temperature ..... -13° to 131°F (-25° to 55°C)
Humidity (Non-condensing) ..... 5 to 95% rh
Mechanical Conditions ..... Class 3M2
Transportation to ..... IEC 60 721-3-2
Climatic Conditions ..... Class 2K3
Temperature ..... -13° to 158°F (-25° to 70°C)
Humidity ..... <95% rh
Mechanical Conditions ..... Class 2M2

Agency Standards ..... UL Listed to UL873
cUL Listed to Canadian Standard C22.2 No. 24-93
CE conformity to EMC directive 2004/108/EC

Product Ordering

Description	Output Signal	Part No.
Solar Impact Sensor	4 to 20 mA or 0 to 10 Vdc	**QLS60**

Temperature & Humidity Sensors

Series 1000 Room
Temperature Sensor
with all Available Options.

Siemens 4 to 20 mA
and 100K Ohm
Room Temperature Sensor.

QFA Series Room
Relative Humidity and Relative
Humidity/Temperature Sensor.

QFA Series Room
Relative Humidity and Relative
Humidity/Temperature Sensor.

Description

Siemens legacy room temperature & relative humidity sensors are available in a variety of configurations with a selection of output signals make them compatible with many building automation systems.

These devices are intended primarily for like-for-like replacement of existing units. For more modern aesthetics, users may consider the Series 2200/3200 sensors which are direct functional replacements (except as noted on the ordering table).

Product Ordering

Legacy Part No.	Description	2200/3200 Replacement Part No.
Relative Humidity		
QFA3000.BU	0 to 10 V, Beige	**QFA32SS.EWSN**[1]
QFA3000.DBU	0 to 10 V, Display, Beige	**QFA32SS.FWSN**[1]
QFA3000.DWU	0 to 10 V, Display, White	**QFA32SS.FWSN**
QFA3000.WU	0 to 10 V, White	**QFA32SS.EWSN**
QFA3001.BU	4 to 20 mA, Beige	**QFA32SS.EWSN**[1]
QFA3001.WU	4 to 20 mA, White	**QFA32SS.EWSN**
Relative Humidity & Temperature		
QFA3060.BU	0 to 10 V, Beige	**QFA32SS.EWSN**[1]
QFA3060.FBU	0 to 10 V, Setpoint & Override, Display, Beige	**QFA32SS.FWSN**[1]
QFA3060.FWU	0 to 10 V, Setpoint & Override, Display, White	**QFA32SS.FWSN**
QFA3060.WU	0 to 10 V, White	**QFA32SS.EWSN**[1]
Room Temperature Sensor		
536-752A	4 to 20 mA (40° to 90°F), Beige	**QAA22SS.EWSN**[1]
536-752B	4 to 20 mA (40° to 90°F), White	**QAA22SS.EWSN**
536-753A	4 to 20 mA (20° to 120°F), Beige	**QAA22SS.EWSN**[1]
536-753B	4 to 20 mA (20° to 120°F), White	**QAA22SS.EWSN**
536-983A	100k Ω Thermistor, Beige	**QAA2235.EWSN**[1]
536-983B	100k Ω Thermistor, White	**QAA2235.EWSN**
540-660A	For TEC, Tool Port, Beige	**QAA2280.EWSC**[1]
540-660B	For TEC, Tool Port, White	**QAA2280.EWSC**
540-670A	For TEC, Setpoint & Override, Tool Port, Beige	**QAA2280.FWSC**[1]
540-670B	For TEC, Setpoint & Override, Tool Port, White	**QAA2280.FWSC**
540-680CA	For TEC, Setpoint & Override, Display (°C), Tool Port, Beige	**QAA2280.FWSC**[1]
540-680CB	For TEC, Setpoint & Override, Display (°C), Tool Port, White	**QAA2280.FWSC**
540-680FA	For TEC, Setpoint & Override, Display (°F), Tool Port, Beige	**QAA2280.FWSC**[1]
540-680FB	For TEC, Setpoint & Override, Display (°F), Tool Port, White	**QAA2280.FWSC**
544-760A	1k Pt RTD (375a), Beige	**QAA2212.EWSN**[1, 2]
544-760B	1k Pt RTD (375a), White	**QAA2212.EWSN**[2]
544-770A	1k Pt RTD (375a), Setpoint & Override, Beige	**QAA2212.FWSN**[1, 2]
544-770B	1k Pt RTD (375a), Setpoint & Override, White	**QAA2212.FWSN**[2]
544-780CA	1k Pt RTD (375a), Display (°C), Setpoint & Override, Beige	**QAA2212.FWSN**[1, 2]
544-780CB	1k Pt RTD (375a), Display (°C), Setpoint & Override, White	**QAA2212.FWSN**[2]
544-780FA	1k Pt RTD (375a), Display (°F), Setpoint & Override, Beige	**QAA2212.FWSN**[1, 2]
544-780FB	1k Pt RTD (375a), Display (°F), Setpoint & Override, White	**QAA2212.FWSN**[2]
QAA2062.FWU	0 to 10 V (55° to 95°F), Setpoint & Override, Display, White	**QAA22SS.FWSN**
QAA2062.WU	0 to 10 V (55° to 95°F), White	**QAA22SS.EWSN**
QAA2072.FWU	4 to 20 mA (55° to 95°F), Setpoint & Override, Display, White	**QAA22SS.FWSN**
QAA2072.WU	4 to 20 mA (55° to 95°F), White	**QAA22SS.EWSN**

Table Notes:
1) Replacement is white
2) Replacement is 385a

MD Series Power Metering

MD-BMS Series.

MD-BMED Series.

Description

The Siemens MD-BMS and MD-BMED Model Power Meters are submetering devices designed to provide real time, accurate electricity metering to enable proper control over energy costs. The meter can capture kWh/kW energy and demand data, as well as virtually all relevant energy parameters for diagnostics and monitoring on three-phase or single-phase circuit installations. The meters' flexibility, size, and ease-of-use make them ideal tools for gathering detailed consumption information in commercial, industrial, governmental, and retail environments.

The meters use direct connections to each phase of the voltage and various interchangeable current transformer (CT) options such as split-core CTs or flexible Rogowski Coils (for large loads or large cables and buss bars) to monitor current on each phase. All of Siemens' current transformers are internally shunted for intrinsically safe operation on energized conductors.

The power meters make over 85 total electrical measurements which are derived from the voltage and current inputs. Electrical load diagnostic parameters such as power factor and line frequency are captured in addition to energy and demand values.

The Siemens MD-BMS and MD-BMED Power Meters require no external power and the power supplies can accommodate service voltages ranging from 80 to 600V (phase-to-phase). The simple installation is accomplished by connecting the color-coded voltage leads and clearly labeled CTs. A three-LED indicator display confirms proper CT-to-phase installation. The meters automatically verify CT phase wiring – greatly reducing set-up time and all but eliminating installation errors.

Features

- Works with single phase, three phase WYE, three phase DELTA services (use on 120/240V, 480/277V, 580/355V, or 380/220V services); 50/60 Hz
- Meter has three voltage channels: 80 to 346V line-to-neutral, 600V line-to-line, and CAT III
- Automatically checks for CT phase orientation, reducing set-up time and all but eliminating installation errors
- ANSI C12-20-2010 Class 0.2 revenue grade meter supports submetering application
- Includes a digital pulse output port to support pulse accumulators to collect energy data
- Data updates occur every 0.5 seconds
- Monitors over 85 voltage, current, power, energy, and power factor on single- and three-phase power systems
- Communicates via BACnet MS/TP protocol (default) or Modbus RTU protocol, allowing flexible integration to any BAS or control system
- MD-BMED series adds Ethernet capability via BACnet IP or Modbus TCP, and features a backlit LCD display

Applications

Its flexibility, size, and ease-of-use make it an ideal tool for gathering detailed consumption information in commercial, industrial, governmental, and retail environments. Perfect for tenant submetering and data center monitoring.
This unit supports LEED 4.0 energy consumption data gathering demands and is useful in meeting the new ASHRAE 90.1 2013 metering objectives.

Specifications

Technical

Service type..... Single Phase, Three Phase-Four Wire (WYE), Three Phase-Three Wire (Delta)

Power .....From L1 Phase to L2 Phase, 80 to 600Vac CAT III, 50/60Hz, 90 mA maximum. Non-user replaceable 0.5A internal fuse protection

Voltage channels.....80 to 346V AC Line-to-Neutral, 600V Line-to-Line, CAT III

Current channels.....3 channels, 0.525 VAC max, 333 mV CTs, 0 to 4,000+ Amps, depending on CT

Max. current input.....158% of current transducer rating (mv CTs) to maintain accuracy. Measure up to 4000 Amps with RoCoil CTs.

Measurement rating .....True RMS using high-speed digital signal processing (DSP)

Line frequency.....50/60 Hz

Waveform sampling..... 12 kHz for voltage and current

Parameter update rate .....500 milliseconds

Measurements.....Volts, Amps, kW, kWh, kVAR, kVARh, kVA, kVAh, aPF, dPF

Accuracy.....Rated to ANSI, C12-20-2010 Class 0.2. Better than 0.2% (<0.1% typical) for V, A, kW, kVAR, kVA, and PF, excluding sensor.

Resolution .....0.01 Amp, 0.1 Volt, 0.01 watt, 0.01 VAR, 0.01 VA, 0.01 Power Factor depending on scalar setting

LED indicators.....Bi-color LEDs (red and green): 1 LED to indicate communication, 3 LEDs for correct CT-to-phase installation. 1 pulse output LED, yellow IP port LED* on side

Pulse output .....Open Collector, 5 mA maximum current, 30V maximum open voltage. Optically isolated

Communications

Direct..... BACnet MS-TP (default) or Modbus RTU (option), User selectable BACnet IP or Modbus TCP *

Maximum distance .....1200 meters with Data Range of 100K bits/second or less

Baud rate (serial).....BACnet: 9600, 19200, 38400, 76800 Modbus 9600, 19200, 38400, 57600, 76800, 115200

Data bits 8

Parity .....None, Even, Odd

Stop bit 1, 2, 0

Data formats..... BACnet or Modbus

Display (MD-BMED models only)

Display type..... Backlit LCD, 2 line by 16 character with automatic or manual modes *

Mechanical

Operating temperature ..... 20° to 140°F (-7° to 60°C)

Humidity .....5% to 95% non-condensing

Enclosure ..... ABS Plastic, 94-V0 flammability rating

Weight .....12 ounces (340 g) exclusive of CTs

Dimensions.....9.5" x 3.6" x 1.6" (24.2 cm x 8.5 cm x 4.0 cm)

ViewPoint Software

Operating system .....Windows® 10/8/7 (32/64-bit), Windows® Vista (32/64 bit) or Windows® XP

ViewPoint communications .....One USB port (type AB cable req'd)

Safety

Certifications.....UL Listed to UL Standard 61010-1, IEC 61010-2-030, cUL certified to CAN/CSA Standard C22.2 No. 61010-1, BACnet Testing Labs certified smart sensor (B-SS)

CE Conformity ..... CE Low Voltage and EMC Directives

* Available on MD-BMED model only

Kits Product Ordering

These metering kits include one meter and three current transformers (CTs) for the current range selected. Meters are factory pre-configured to the current range selected, saving installation time. BACnet MS-TP is the default communications selection, but this can be easily changed to other options using the ViewPoint™ software provided with each order.

CT Rating	Description	MD-BMS Power Meter Kit (No Display) Part No.	MD-BMED Power Meter Kit (Ethernet & Display) Part No.
100 Amps	Meter bundled with three 100-Amp, 333mV midi hinged CTs with 1" window	**MD-BMS-3-CTSC-100A**	**MD-BMED-3-CTSC-100**
200 Amps	Meter bundled with three 200-Amp, 333mV midi hinged CTs with 1" window	**MD-BMS-3-CTSC-200A**	**MD-BMED-3-CTSC-200**
400 Amps	Meter bundled with three 400-Amp, 333mV medium split-core CTs with 1.25" window	**MD-BMS-3-CTSC-400A**	**MD-BMED-3-CTSC-400**
600 Amps	Meter bundled with three 600-Amp, 333mV large split-core CTs with 2" window	**MD-BMS-3-CTSC-600A**	**MD-BMED-3-CTSC-600**
4000 Amps	Meter bundled with three 4000-Amp, 131mV 16" Rogowski coils with 5" dia. window	**MD-BMS-3-RC-16**	**MD-BMED-3-RC-16**
4000 Amps	Meter bundled with three 4000-Amp, 131mV 36" Rogowski coils with 10.4" dia. window	**MD-BMS-3-RC-36**	**MD-BMED-3-RC-36**

Individual Meter Product Ordering

These are individual meters with no CTs. Using these may require some field configuration to the MD series CT you select as factory default. Configuration is for Rogowski coils..

CT Rating	Description	MD-BMS Power Meter (No Display) Part No.	MD-BMED Power Meter (Ethernet & Display) Part No.
Any MD Series CT	Individual Meter Only, No CTs. Factory set for BACnet MS/TP, Rogowski coil CTs, and 200A CTs. Can be changed with Viewpoint™ software.	**MD-BMS**	**MD-BMED**

Current Transformers for MD Series Power Meters

SCT-HSC Series
SCT-HMC Series.

SCT-SCS Series
SCT-SCM Series
SCT-SCL Series.

SCT-Rxx Series
Rogowski Coils.

Description

Siemens MD Series Current Transformers provide current sensing for many current ranges used for a variety of applications including building automation, tenant submetering, performance verification, energy management, and new technology assessment. These devices are targeted for use with the Siemens MD Series Power Meters.

Siemens MD Series Current Transformers provide linear output voltage that is directly proportional to the input current. These transformers are safely and easily installed over existing electrical power lines without disconnecting the lines or interrupting service.

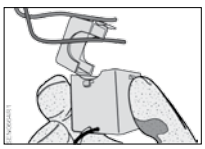
Siemens SCT-HSC and HMC series are Midi and Mini Hinged Split-Core Current Transformers (CTs). small, low-cost devices with high accuracy over a wide dynamic range with excellent phase shift. These current transformers are ideal where space is limited such as when metering multiple loads within a panel board.

Siemens SCT-SCx series Split-Core CTs provide linear output voltage that is directly proportional to the input current. These transformers are safely and easily installed over existing electrical power lines without disconnecting the lines or interrupting service.

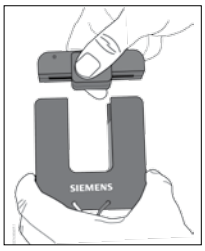
Siemens SCT-Rxx series Rogowski Coil Flexible Current Transformers (CTs) have been designed for accurate, non-intrusive measurement of AC current, pulsed DC or distorted waveforms. These types of sensors may be used to measure AC current over a wide dynamic range and from 20 Hz to 5 kHz. Their flexibility in use, with wide 4000-Amp sensing range makes them a popular selection.

Features

- Small window sizes and low cost are a key attribute of the SCT-HSC and SCT-HMC mini and midi CTs.



- Many current ranges are available with these 333mV split-core current transducer SCT-SCx products. Three sizes of CTs are available to meet your current range or wiring window requirements.



- Ease in installation, wide current measurement range and highly repeatable measurement makes these Rogowski Coil CTs popular for use in tightly packed electrical panels and for buss bars. With lengths from 16" to 36", they can meet most any installation requirement.

Specifications

Specifications	SCT-HSC, SCT-HMC Series Mini-Midi CTs	SCT-SCx Series Split Core CTs	SCT-Rxx Series Rogowski Coils
Electrical			
Output signal	333 mV at rated current	333 mV @ rated current	131 mV@1000A (60 hz) 109.17 mV@1000A (50 hz)
Current Range	1 A to 1.5x rated current	5A to 1.3x rated current	5 to 4000A AC
Frequency Range	50-400 hz	50-400 hz	20-5,000 hz
Phasing Orientation	Arrow on case toward load	Arrow on case toward load	Arrow on clip toward load
Wire Colors	White (+), Black (-)	White (+), Black (-)	White (+), Brown (-), Shield wire
Wire Length	8 feet (2.4m), 20 AWG twisted pair with ferrules on leads	8 feet (2.4m), 20 AWG twisted pair with ferrules on leads	80 inches (2.0m) shielded wire with ferrules on leads[1]
Working Voltage	600 Vac, Category III	600 Vac, Category III	1000 Vrms, maximum
Mechanical			
Case Material, Coil Material	White Nylon, UL 94 V-0	Epoxy encapsulated housing	Blue thermoplastic rubber, flame retardant UL 94 V-0 rated
Operating Temperature	5° to 140°F (-15° to 60°C)	-4° to 131°F (-20° to 55°C)	-4° to 158°F (-20° to 70°C)
Weight	SCT-HSC: 3.2 oz (91 g) SCT-HMC: 7.8 oz (221 g)	SCT-SCS: 4.8 oz (136 g) SCT-SCM: 12.0 oz (340 g) SCT-SCL: 26.0 oz (748 g)	SCT-R16: 5 oz (136 g) SCT- R24: 6 oz (181 g) SCT-R36: 8 oz (227 g)
Safety			
Certifications	UL Recog. to Standard 61010-1 UL certified to CAN/CSA Standard C22.2 No. 61010-1	ETL certified to UL Std 61010-1 cETL certified to CAN/CSA Standard C22.2 No. 61010-1	UL Recog. to Standard 61010-1 UL certified to CAN/CSA Standard C22.2 No. 61010-1
CE Conformity	CE Low Voltage Directive 2006/95/EC	CE Low Voltage Directive 2006/95/EC	CE Low Voltage Directive 2006/95/EC

Table Notes:
1) Special order longer wire length Rogowski coils are available. Contact your Siemens sales manager for details.

Product Ordering

CT Style	Description	Current Transformers for MD Series Power Meter Part No.
	CT, Mini Hinged, 50-Amp with 0.4 in. window	**SCT-HSC-0050-U**
	CT, Midi Hinged, 100-Amp with 1.0 in. window	**SCT-HMC-0100-U**
	CT, Midi Hinged, 200-Amp with 1.0 in. window	**SCT-HMC-0200-U**
	CT, Small Split Core, 50-Amp with 0.75 in. window	**SCT-SCS-0050-U**
	CT, Small Split Core, 100-Amp with 0.75 in. window	**SCT-SCS-0100-U**
	CT, Medium Split Core, 100-Amp with 1.25 in. window	**SCT-SCM-0100-U**
	CT, Medium Split Core, 200-Amp with 1.25 in. window	**SCT-SCM-0200-U**
	CT, Medium Split Core, 400-Amp with 1.25 in. window	**SCT-SCM-0400-U**
	CT, Medium Split Core, 600-Amp with 1.25 in. window	**SCT-SCM-0600-U**
	CT, Large Split Core, 600-Amp with 2.0 in. window	**SCT-SCL-0600-U**
	CT, Large Split Core, 1000-Amp with 2.0 in. window	**SCT-SCL-1000-U**
	CT, Rogowski Coil, 16 in. Length, 4000-Amp with 5 in. diameter window	**SCT-R16-A4-U**
	CT, Rogowski Coil, 24 in. Length, 4000-Amp with 7 in. diameter window	**SCT-R24-A4-U**
	CT, Rogowski Coil, 36 in. Length, 4000-Amp with 10 in. diameter window	**SCT-R36-A4-U**

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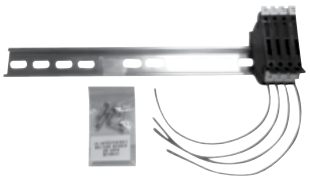
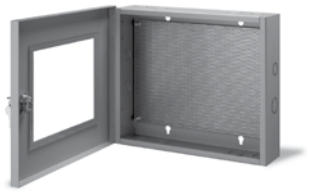
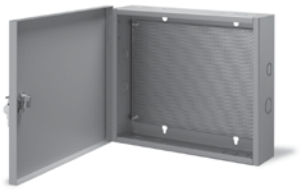
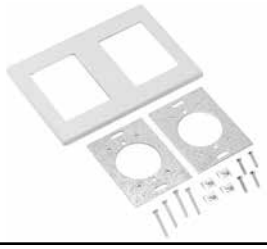
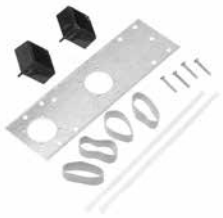
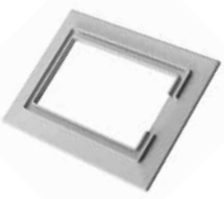
	Description	Product Group	Quantity	Part No.
MD Series Power Metering Accessories				
	**MD Meter Mounting, Fuse Protection Module.** • 12" DIN rail for meter mounting in panel • Four 600V rated fuse blocks with 0.5A fuses • Pre-wired for connection to MD meter • Bag of spare fuses and mounting screws (see technical specification #A6V10877204)	MD Series Power Metering	1	**567-090-01**
	**Small Control Panel with "Windowed" Door.** • Small size optimized for MD power meters • NEMA 1, 12" H x 14" W x 4" D (nominal) • Includes perforated mounting plate, keylock • Door has polycarbonate window • Siemens label for optional application (see technical instruction #155-272P25) (see submittal sheet #A6V10877207)	MD Series Power Metering CP567 Control Panels	1	**567-556**
	**Small Control Panel with Blank Door.** • Small size optimized for MD power meters • NEMA 1, 12" H x 14" W x 4" D (nominal) • Includes perforated mounting plate, keylock • Blank door • Siemens label for optional application (see technical instruction #155-272P25) (see submittal sheet #A6V10877207)	MD Series Power Metering CP567 Control Panels	1	**567-551**
Legacy Room Sensor Accessories				
	**Lockable Thermostat or Sensor Guard.** • 10 × 6-1/4 × 3-3/4 inches (254 × 158.75 × 95.25 mm) • Desert beige mounting base • One key and mounting screws included	Any Siemens T-Stat or Sensor	1	**141-570**
	**Metal Gym Guard.** Desert Beige	Legacy Room Sensors	1	**182-621**
	**Single Adapter Base Kit.**	Legacy Room Sensors	1	**544-782A** (Beige) **544-782B** (White)

	Description	Product Group	Quantity	Part No.
Legacy Room Sensor Accessories				
	**Double Adapter Base Kit.**	Legacy Room Sensors	1	**544-783A** (Beige) **544-783B** (White)
	**Extender Ring Kit.**	Legacy Room Sensors	1	**544-785A** (Beige) **544-785B** (White)
	**Non-Conduit Rough-in Kit.**	Legacy Room Sensors	1	**544-784**
	**Electrical Box (2 x 4) Adapter Plate Kit.**	Legacy Room Sensors	Pkg. of 5	**192-506**
	**Electrical Box (2 x 4) Adapter Base.**	Legacy Room Sensors	Pkg. of 5	**192-507**
	**Adapter Base.**	Legacy Room Sensors	1	**192-307**
	**Adapter Frame.**	Legacy Room Sensors	1	**192-308**

	Description	Product Group	Quantity	Part No.
Legacy Sensors Repair Parts				
	Replacement Occupancy/ Override Buttons.	540, 544, 550 and 587 Series Room Sensors	Pkg of 25	**544-480A** (Beige) **544-480B** (White)
	Replacement Setpoint Door.	540, 544, 550 and 587 Series Room Sensors	Pkg of 25	**544-481A** (Beige) **544-481B** (White)
	Replacement Front Bezel.	540, 544, 550 and 587 Series Room Sensors	Pkg of 25	**544-482A** (Beige) **544-482B** (White)
	Repair Kit. Containing slide switch components, reset & override buttons, setpoint door, and bezels. Repairs one sensor.	540, 544, 550 and 587 Series Room Sensors	1	**544-483A** (Beige) **544-483B** (White)
	Replacement Blanking Buttons.	540, 544, 550 and 587 Series Room Sensors	Pkg of 25	**544-484A** (Beige) **544-484B** (White)
	Rear Cover Mounting Kit.	540, 544, 550 and 587 Series Room Sensors	1	**544-781A** (Beige) **544-781B** (White)
	Replacement RH Sensing Element.	QFA30xx and QFA20xx Sensors	1	**AQF3051**

Notes

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Siemens is your best choice for easy retrofits!

- Siemens Universal ARK Retrofit Kits conveniently replace Siemens Series 591 and 658 Globe Valve Actuators and JCI, Honeywell, and Siebe Globe Valve Actuators
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(Continued on next page)

Powerstar™ Room Thermostats

Proven to provide fast response and highly accurate temperature control, Powerstar Pneumatic Room Thermostats are designed to control heating and/or cooling by operating a variety of pneumatic devices such as valves or damper actuators.

Powerstar thermostats are factory calibrated to control pneumatic devices over a 3 to 15 psi (103 to 207 kPa) range.

Powerstar pneumatic room thermostats are available for the following applications:

- Single Temperature
- Day/Night
- Day/Night/Vent
- Heating/Cooling
- Free Energy Band
- Free Energy Band with Hesitation

Covers are available with concealed or exposed setpoint adjustment, room temperature indication, and setpoint indicator.

192 DN/DNV Dual Setpoint (Day/Night). 192 S Single Setpoint. 192 HC Heating/ Cooling Setpoint.

Selection Guide

Air Supply	Applications	Control Outputs	Control Setpoints	Control Actions	Air Output Capacity		Model
					Low (1-pipe)	High (2-pipe)	
15 to 30 psi (103 to 207 kPa)	• Heat or Cool	Single	Single	Direct/Reverse	•	•	**192 S**
Cool 18 psi (124 kPa) Heat 25 psi (172 kPa)	• Heat and Cool (auto changeover) • Factory calibrated (194 HC) for Honeywell or Johnson retrofit	Single	Dual	Direct/Direct		•	**192 HC**
				Reverse/Reverse		•	**194 HC**
				Direct/Reverse		•	
				Reverse/Direct		•	
Day 18 psi (124 kPa) Night 25 psi (172 kPa)	• Day and Night (auto changeover) • Factory calibrated (194 DN) for Honeywell or Johnson retrofit • R2 vent (“0”) day, full supply night (DNV only, 3-pipe) • Night override selector switch	Single	Dual (Day/Night)	Direct/Direct		•	**192 DN 194 DN**
				Reverse/Reverse		•	
Day 18 psi (124 kPa) Night 25 psi (172 kPa)	• Day and Night (auto changeover) • Factory calibrated (194 DN for Honeywell or Johnson retrofit) • R2 vent (“0”) day, full supply night (DNV only, 3-pipes) • Night override selector switch	Dual	Dual (Day/Night with Vent)	None	•	•	**192 DNV 194 DNV**
15 to 30 psi (103 to 207 kPa)	• Heat and Cool • Sequence-controlled devices with two control lines (same or different range)	Dual	Dual (Heat/Cool)	Direct/Direct	•	•	**193 HC Free Energy Band**
				Reverse/Reverse	•	•	
				Direct/Reverse	•	•	
				Reverse/Direct	•	•	
15 to 30 psi (103 to 207 kPa)	• Heat and Cool • Sequence-controlled devices with one control line (different spring ranges)	Single	Dual (Heat/Cool)	Direct/Direct		•	**193 HC Free Energy Band (Hesitation)**

SIEMENS
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More torque, less energy consumption

Siemens damper actuators ship ready to install, with built-in time and cost-saving features such as a patented self-centering shaft adapter, standardized wiring, and brushless motor technology. With torques ranging from 20 to 310 lb-in., this powerful and flexible line-up delivers out-of-the-box performance and long-lasting reliability for all types of HVAC applications.

usa.siemens.com/hvac

Powerstar™ Single Setpoint Pneumatic Room Thermostat

192 S Thermostat chassis.

Typical wall plate and screws.

Description

Providing proportional single output, single setpoint, 1-pipe for low air capacity or 2-pipe for high air capacity pneumatic room temperature control, the 192 S Powerstar Single Setpoint Pneumatic Room Thermostat is the most economical model. Refer to the Retroline® Retrostats on page F-15 to replace competitive models.

Features

- Single setpoint dial available in Fahrenheit or Celsius scales
- Available in direct or reverse acting models
- Sensitive bimetal responds to temperature changes
- Integral, field adjustable limit stops
- Wall mounting plate for connection to a variety of rough-in terminal boxes included
- Large volume air capacity relay in 2-pipe models only
- Test port for fast check of output pressure without removing the cover
- Field replaceable thermometer, setpoint dial, restrictor and filters for decreased maintenance cost

Options

- Quick-connect air connections for ease of installation and service
- Fixed limit stops to meet government specifications
- Large, 1/2" setpoint knob for convalescent homes

Applications

Designed for heating and cooling applications for control of pneumatic valves and damper actuators. The 192 S Powerstar Single Setpoint Pneumatic Room Thermostat is excellent for commercial and institutional facilities.

Recommendation

1-pipe: Use when limited output air capacity is required to operate a single valve and/or actuator; requires external restrictor, 20 scim (5.4 ml/s) air supply.

2-pipe: Use for high output capacity for control of multiple valves and actuators, used with or without high/low limiting controls.

Application Drawings

Dotted lines are alternative control schemes.

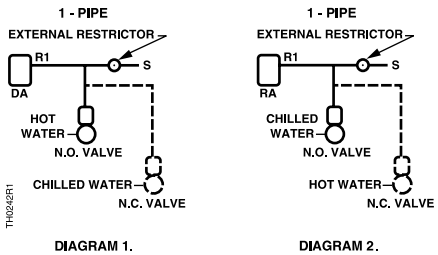


DIAGRAM 1.

DIAGRAM 2.

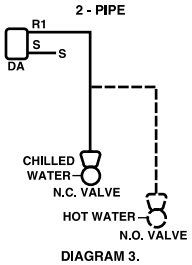


DIAGRAM 3.

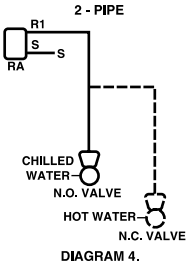


DIAGRAM 4.

Specifications

Scale; Range
Major (minor) Divisions.....45° to 85°F, 10(2)°F (7° to 30°C, 5(1)°C)
Factory Calibration .....72°F, 7.5 psi ±0.3 (22°C, 52 kPa @ 1.8)
Sensitivity Adjustment Range .....1 to 4 psi/°F (12 to 50 kPa/°C)
Factory Setting .....2.5 psi/°F (31 kPa/°C)
Limit Stop
Field Adjustment Range ..... 45/85°F (7/30°C)
Fixed Limit Stop Range..... 55/75°F (13/24°C)
Temperature
Storage.....-10° to 140°F (-23° to 60°C)
Ambient Operating .....40° to 140°F (4° to 60°C)
Accuracy at Factory
Calibration ..... ±2°F (±1.1°C)
Response ..... 0.1°F (0.06°C)
Supply Air Pressure
Recommended..... 25 psi (172 kPa)
Maximum..... 30 psi (207 kPa)

Nominal Air Consumption for Air Compressor Sizing
1-pipe ..... 25 scim (6.8 ml/s)
2-pipe ..... 20 scim (5.5 ml/s)
Nominal Air Capacity for Air Main Sizing
1-pipe ..... 25 scim (6.8 ml/s)
2-pipe ..... 20 scim (5.5 ml/s)
Nominal Chassis Air Capacity
1-pipe Supply ..... 25 scim (6.8 ml/s)
2-pipe Supply ..... 230 scim (63 ml/s)
1-pipe Exhaust ..... 30 scim (8 ml/s)
2-pipe Exhaust ..... 150 scim (41 ml/s)
Air Connections .....5/32" (4 mm) OD tubing
Dimensions (with cover) ..... 2.16" W x 3.34" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)
Shipping Weights (with cover)
Thermostat Chassis and Wall Plate .....0.53 lb. (0.24 kg)
Plastic Cover/Metal Cover.....0.07 lb. (0.04 kg)/0.27 lb. (0.12 kg)

Product Ordering

Model #	Thermostat Chassis Type: Output	Setpoint	Air Output Capacity	Thermometer & Setpoint Scales	Thermostat Chassis & Wall Plate: Control Action: Direct	Reverse
192 S 1-pipe	Single	Single (Heat or Cool)	Low (No Relay)	°F	**192-200**	**192-201**
				°C	**192-220**	**192-221**
192 S 2-pipe	Single	Single (Heat or Cool)	High (Integral Relay)	°F	**192-202**	**192-203**
				°C	**192-222**	**192-223**

For complete conversion kits, refer to the Retroline® Retrostats starting on page F-15.

Powerstar™ Heating/Cooling Pneumatic Room Thermostats

192 HC Thermostat chassis.

Typical wall plate and screws.

192 HC Thermostat with plastic cover. Chassis wall plate with easy maintenance plug-in adapters shown (optional).

Description

Providing proportional single output, dual setpoint with 2-pipe for high air capacity pneumatic room temperature control, the 192 HC Powerstar Heating/Cooling Pneumatic Room Thermostat provides two thermostats under one cover; one side for heating and the other for cooling. Switchover is accomplished by changing the air pressure to the thermostat.

Features

- Dual setpoint dial available in Fahrenheit or Celsius scales
- Available in direct or reverse acting models
- Sensitive bimetal responds to temperature changes
- Integral, field adjustable limit stops
- Adjustable changeover pressure
- Large volume air capacity relay
- Wall mounting plates provides connection to a variety of rough-in terminal boxes
- Test port for fast check of output pressure without removing the cover
- Field replaceable thermometer, setpoint dials, restrictor and filters

Options

- Fixed limit stops to meet government specifications
- Quick-connect air connections for ease of installation and service
- Large, 1/2" setpoint knob for convalescent homes

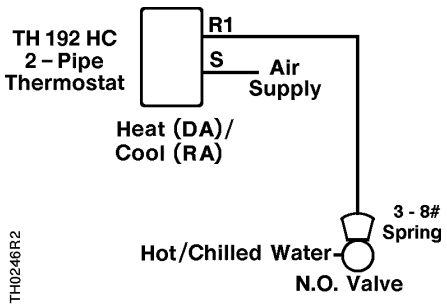
Applications

Designed for temperature control of heating and cooling applications, the 192 HC Powerstar Heating/Cooling Pneumatic Room Thermostat controls valves and damper actuators in cooling equipment. Providing energy management and occupant comfort, the thermostat automatically adjusts to seasonal changes from heating setpoint to cooling setpoint in commercial and institutional facilities.

Recommendation

For control of multiple valves and actuators, use with or without high/low limiting controls.

Application Drawing



Specifications

Scale; Range
Major (minor) Divisions ..... 45° to 85°F, 10(2)°F (7° to 30°C, 5(1)°C)
Factory Calibration ..... 72°F, 7.5 psi ± 0.3 (22°C, 52 kPa @ 1.8)
Sensitivity Adjustment Range ..... 1 to 4 psi/°F (12 to 50 kPa/°C)
Factory Setting ..... 2.5 psi/°F (31 kPa/°C)
Limit Stop
Field Adjustment Range ..... 45/85°F (7/30°C)
Fixed Limit Stop Range ..... 55/75°F (3/24°C)
Temperature
Storage ..... -10° to 140°F (-23° to 60°C)
Ambient Operating ..... 40° to 140°F (4° to 60°C)
Accuracy at Factory
Calibration ..... ±2°F (±1.1°C)
Response ..... 0.1°F (0.06°C)
Supply Air Pressure
Two Pressure (Recommended) Cooling/Heating ..... 18 psi (124kPa)/(124 kPa)/25 psi (172 kPa)
Supply Air Pressure
Two Pressure (Range)
Cooling ..... 15 to 19 psi (103 to 131 kPa)
Heating ..... 23 to 30 psi (159 to 207 kPa)
Two Pressure, Honeywell Competitive Model
Cooling/Heating ..... 13 psi (90 kPa)/18 psi (124 kPa)
Two Pressure, Johnson Competitive Model[1]
Cooling/Heating ..... 15 psi (103 kPa)/20 psi (138 kPa)
Nominal Air Consum. for Air Compressor Sizing ..... 25 scim (6.8 ml/s)
Nominal Air Capacity for Air Main Sizing ..... 40 scim (11 ml/s)
Nominal Air Capacity
Supply/Chassis Exhaust ..... 150 scim (41 ml/s)/150 scim (41 ml/s)
Air Connections ..... 5/32" (4 mm) OD tube
Dimensions (with cover) ..... 2.16" W x 3.34" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)
Shipping Weights
Thermostat Chassis and Wall Plate ..... 0.53 lb. (0.24 kg)
Plastic Cover ..... 0.07 lb. (0.04 kg)
Metal Cover (single/dual) ..... 0.27 lb. (0.12 kg)/0.7 lb. (0.3 kg)

1. Some Johnson Controls heat/cool thermostats have a cooling supply pressure of 20 psi (138 kPa) and a heating supply pressure of 15 psi (103 kPa). For this application, the heating and cooling actions must be reversed. If exposed setpoint is required, order special cover, **192-773**.

Product Ordering

Model #	Thermostat Chassis Type				Thermostat Chassis & Wall Plate	
					Control Action	
	Output	Setpoint	Air Output Capacity	Thermometer & Setpoint Scales	Heat Direct	Heat Reverse
192 HC 2-pipe	Single	Dual (Heat and Cool)	High (Integral Relay)	°F	**192-207** Cool (DA)	**192-209** Cool (DA)
				°F	**192-208** Cool (RA)	**192-210** Cool (RA)
				°C	**192-227** Cool (DA)	**192-229** Cool (DA)
				°C	**192-228** Cool (RA)	**192-230** Cool (RA)

For complete conversion kits, refer to the Retroline® Retrostats starting on page F-15.

Powerstar™ Day/Night/Vent Pneumatic Room Thermostats

192 DN Thermostat chassis.

Typical wall plate and screws.

192 DN Thermostat with plastic cover. Chassis wall plate with easy maintenance plug-in adapters shown (optional).

Description

Providing proportional dual setpoint, 2-pipe or 3-pipe high air capacity pneumatic room temperature control, the 192 DN or DNV Powerstar Pneumatic Room Thermostat automatically resets the room temperature setpoint during unoccupied hours by changing the air pressure to the thermostat. A manual override feature allows occupants to switch to day mode. The override returns to night mode the following night.

Features

- Dual setpoint dial available in Fahrenheit or Celsius scales
- Available in direct or reverse acting models
- Sensitive bimetal responds to temperature changes
- Manual override selector for off-hour occupant comfort
- Adjustable changeover pressure
- Large volume air capacity relay
- Integral, field adjustable limit stops
- Wall mounting plate for connection to a variety of rough-in terminal boxes included
- Test port for fast check of output pressure without removing the cover
- Field replaceable thermometer, setpoint dial, restrictor and filters

Options

- Fixed limit stops to meet government specifications
- Quick-connect air connections for ease of installation and service
- Large, 1/2" setpoint knob for convalescent homes

Applications

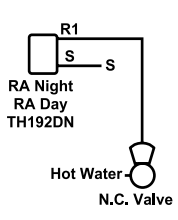
The 192 DN and DNV Powerstar Pneumatic Room Thermostat controls valves and damper actuators in cooling equipment, automatically performing setback changes from day to night. The 192 DNV also performs a purge sequence at night to bring in “vent” outside air to cool the building. A manual override selector switch allows individual room or zone “day” control locally during the night cycle.

During the night control cycle, the 192 DNV models provide a separate output signal (full air supply) allowing ventilation control. Periodic resetting to the “night” control mode during evening or weekend periods using time clocks ensures optimal energy management.

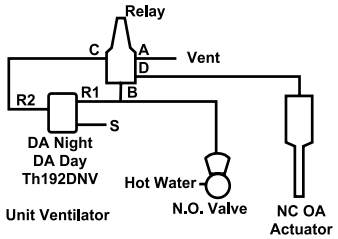
Recommendation

Use 192 DN or DNV for multiple valves and actuators, with or without high/low limiting controls.

Application Drawings



Day/Night.



Day/Night/Vent.

Chassis Port R2 Pressure	Operation Mode (Air Supply)	Switching Relay Connection
Full Air Supply	Night (S=25 psi)	A-D
0 psi	Night Occupied	B-D
0 psi	Day (S=18 psi)	B-D

Specifications

Scale; Range
Major (Minor) Divisions....45° to 85°F, 10(2)°F (7° to 30°C, 5(1)°C)

Factory Calibration ....72°F, 7.5 psi (22°C, 31 kPa)

Sensitivity Adjustment Range ....1 to 4 psi/°F (12 to 50 kPa/°C)

Factory Setting ....2.5 psi/°F (31 kPa/°C)

Limit Stop
Field Adjustment Range .... 45/85°F (7/30°C)
Fixed Limit Stop Range.... 55/75°F (3/24°C)

Temperature
Storage....-10° to 140°F (-23° to 60°C)
Ambient Operating ....40° to 140°F (4° to 60°C)

Accuracy at Factory
Calibration .... ±2°F (±1.1°C)
Response .... 0.1°F (0.06°C)

Supply Air Pressure
Two Pressure
Day (recommended) .... 18 psi (124 kPa)
Night (recommended) .... 25 psi (172 kPa)
Vent-Day/Night.... 0 psi (0 kPa)/25 psi (172 kPa)
Two Pressure
Day (range) .... 15 to 19 psi (103 to 131 kPa)
Night (range) .... 23 to 30 psi (159 to 207 kPa)
Two Pressure (Honeywell Competitive Model)
Day/Night .... 13 psi (90 kPa)/18 psi (124 kPa)
Two Pressure (Johnson Controls Competitive Model)
Day/Night .... 15 psi (103 kPa)/20 psi (138 kPa)

Nominal Air Consumption for Air Compressor Sizing .... 25 scim (6.8 ml/s)

Nominal Air Capacity for Air Main Sizing .... 40 scim (11 ml/s)

Nominal Chassis Air Capacity
Supply .... 230 scim (63 ml/s)
Exhaust .... 150 scim (41 ml/s)

Air Connections .... 5/32" (4 mm) OD tube

Dimensions (with cover)
192 DN .... 2.16" W x 3.34" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)
192 DNV.... 2.5" W x 3.34" H x 1.59" D (64 mm W x 85 mm H x 40 mm D)

Shipping Weights
Thermostat Chassis and Wall Plate ....0.53 lb. (0.24 kg)
Plastic Cover ....0.07 lb. (0.04 kg)
Metal Cover (dual)....0.27 lb. (0.12 kg)

Product Ordering

Model #	Thermostat Chassis Type				Thermostat Chassis & Wall Plate		
					Control Action		
	Output	Setpoint	Air Output Capacity	Thermometer & Setpoint Scales	D (DA) / N (DA)	D (RA) / N (RA)	D (DA) / N (DA) (with Night Vent)
192 DN	Single	Dual (Day and Night)	High (Integral Relay)	°F	**192-204**	**192-205**	**192-206**
192 DNV 3-pipe				°C	**192-224**	**192-225**	**192-226**

For complete conversion kits, refer to the Retroline® Retrostats starting on page F-15.

Powerstar™ Free Energy Band Heating/Cooling Pneumatic Room Thermostats

193 HC Thermostat chassis.

Typical wall plate and screws.

193 HC Thermostat with plastic cover. Chassis wall plate with easy maintenance plug-in adapters shown (optional).

Description

Providing proportional, dual output, dual setpoint, 2-pipe (dual 1-pipe low air capacity) or 3-pipe (dual 2-pipe high air capacity) pneumatic room temperature control, the 193 HC Powerstar Free Energy Band Pneumatic Room Thermostat creates a deadband so that no heating or cooling occurs during the Free Energy Band.

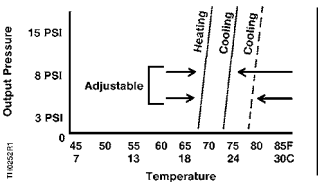
Features

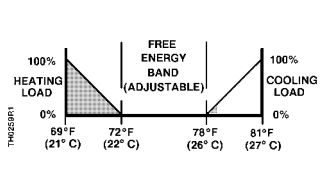
- Dual setpoint dials available in Fahrenheit or Celsius scales
- Integral, field adjustable limit stops
- Sensitive bimetal responds to temperature changes
- Adjustable Free Energy Band
- Test port for fast check of output pressure without removing the cover
- Wall mounting plates for connection to a variety of rough-in terminal boxes included
- Field replaceable thermometer, setpoint dials, restrictors and filters
- Competitive adapter mounting kits available

Options

- Fixed limit stops to meet government specifications
- Quick-connect air connections for ease of installation and service
- Large, 1/2" setpoint knob for convalescent homes

Input/Output Characteristics





Applications

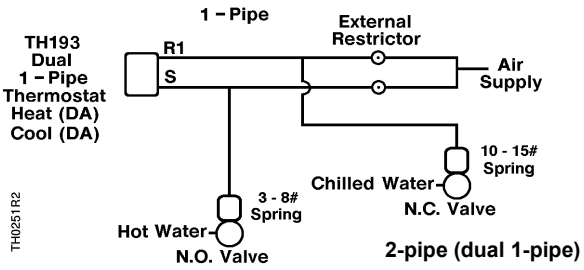
Designed for buildings with early morning heat requirements and mid-morning to afternoon cooling requirements, the Powerstar Free Energy Band Pneumatic Room Thermostat two temperature thermostat controls valves, damper actuators and mechanical heating and cooling equipment. Providing energy management and occupant comfort, the thermostat automatically reduces heating load and increases cooling load.

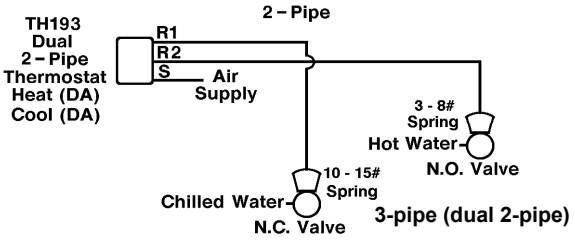
Recommendation

2-pipe (dual 1-pipe): Use when a limited air capacity is required to operate a single valve and/or actuator.

3-pipe (dual 2-pipe): Use for multiple valves and actuators with or without high/low limiting controls which require higher air capacities.

Application Drawings





Specifications

Scale; Range
Major (minor) Divisions ..... 45° to 85°F, 10(2)°F (7° to 30°C, 5(1)°C)
Factory Calibration .....72°F, 7.5 psi ±0.3 (22°C, 52 kPa @ 1.8)
Sensitivity Adjustment Range .....1 to 4 psi/°F (12 to 50 kPa/°C)
Factory Setting .....2.5 psi/°F (31 kPa/°C)
Limit Stop
Field Adjustment Range..... 45/85°F (7/30°C)
Fixed Limit Stop Range..... 55/75°F (13/24°C)
Temperature
Storage .....-10° to 140°F (-23 to 60°C)
Ambient Operating .....40° to 140°F (4 to 60°C)
Accuracy at Factory
Calibration..... ±2°F (±1.1°C)
Response..... 0.1°F (0.06°C)
Supply Air Pressure
Two Pressure (recommended)..... 25 psi (172 kPa)
Maximum ..... 30 psi (207 kPa)

Nominal Air Consumption for Air Compressor Sizing
1-pipe.....50 scim (14 ml/s)
2-pipe..... 40 scim (11 ml/s)
Nominal Air Capacity for Air Main Sizing
1-pipe.....50 scim (14 ml/s)
2-pipe..... 40 scim (11 ml/s)
Nominal Chassis Air Capacity
1-pipe Supply..... 25 scim (6.8 ml/s) per side
2-pipe Supply..... 230 scim (63 ml/s) per side
1-pipe Exhaust..... 30 scim (8 ml/s) per side
2-pipe Exhaust..... 150 scim (41 ml/s) per side
Air Connections .....5/32" (4 mm) OD tubing
Dimensions (with cover) ..... 2.16" W x 3.34" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)
Shipping Weights
Thermostat Chassis and Wall Plate.....0.53 lb. (0.24 kg)
Plastic Cover .....0.07 lb. (0.04 kg)
Metal Cover (dual) .....0.27 lb. (0.12 kg)

Product Ordering

Model #	Thermostat Chassis Type				Thermostat Chassis & Wall Plate	
					Control Action	
	Output	Setpoint	Air Output Capacity	Thermometer & Setpoint Scales	Heat Direct	Heat Reverse
193 HC 1-pipe	Single	Dual (Heat and Cool)	Low (No Relay)	°F °F	**193-211** Cool (DA) **193-212** Cool (RA)	**193-213** Cool (DA) **193-214** Cool (RA)
193 HC 2-pipe		Dual (Heat and Cool)	High (Integral Relay)	°F °F °C	**193-215** Cool (DA) **193-216** Cool (RA) **193-235** Cool (DA)	**193-217** Cool (DA) **193-218** Cool (RA) —

For complete conversion kits, refer to the Retroline® Retrostats starting on page F-15.

Powerstar™ (Hesitation) Free Energy Band Heating/Cooling Pneumatic Room Thermostats

193 HC Thermostat chassis.

Typical wall plate and screws.

193 HC Thermostat with plastic cover. Chassis wall plate with easy maintenance plug-in adapters shown (optional).

Description

Providing proportional, single output, dual setpoint, 2-pipe pneumatic room temperature control, the 193 HC Powerstar (Hesitation) Free Energy Band Heating/Cooling Pneumatic Room Thermostat is designed to sequence a heating device or a cooling device.

The hesitation feature keeps the output pressure constant through a 6°F (10.8°C) range (typical), causing a deadband.

Features

- Dual setpoint dials available in Fahrenheit or Celsius scales
- Sensitive bimetal responds to temperature changes
- Integral, field adjustable limit stops
- Adjustable Free Energy Band
- Wall mounting plate for connection to a variety of rough-in terminal boxes included
- Test port for fast check of output pressure without removing the cover
- Field replaceable thermometer, setpoint dials, restrictors, and filters

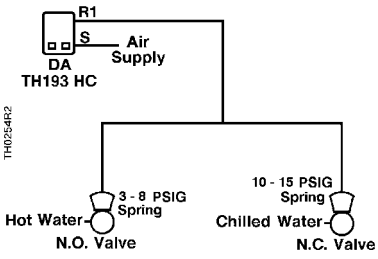
Options

- Fixed limit stops to meet government specifications
- Quick-connect air connections for ease of installation and service
- Large, 1/2" setpoint knob for convalescent homes

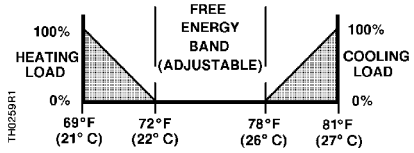
Applications

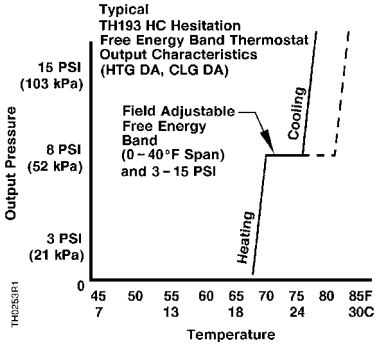
The 193 HC Powerstar (Hesitation) Free Energy Band Heating/Cooling Pneumatic Room Thermostat is an excellent choice for saving energy by sequencing heating and cooling valves. In most heat/cool pneumatic applications, a 3 to 8 psi (21 to 55 kPa) heating valve and a 10 to 14 psi (69 to 103 kPa) cooling valve is used. By design, this provides a 2 psi (14 kPa) deadband where no heating or cooling is occurring. The hesitation feature allows you to change the deadband range to a 3, 4 or 5 psi (21, 28, or 34 kPa) range to save energy. Refer to the Input/Output chart below for more information.

Application Drawing



Input/Output Characteristics





Specifications

Scale; Range
Major (minor) Divisions.....45° to 85°F, 10(2)°F/ (7° to 30°C, 5(1)°C)

Factory Calibration
"FEB" Output Pressure..... 7.5 psi (52 kPa)
Temperature ..... 72°F (22°C)
Sensitivity .....2.5 psi/°F (31 kPa/°C)

Sensitivity Adjustment Range ..... 1 to 4 psi/°F (12 to 50 kPa/°C)

Limit Stop, Field Adjustment Range ..... 55/75°F (13/24°C)

Temperature
Storage.....-10° to 140°F (-23° to 60°C)
Ambient Operating .....40° to 140°F (4° to 60°C)

Accuracy at Factory
Calibration ..... ±2°F (±1.1°C)
Response ..... 0.1°F (0.06°C)

Supply Air Pressure
Recommended..... 25 psi (172 kPa)
Maximum..... 30 psi (207 kPa)

Free Energy Band
Output Pressure Adjustment ..... 1 to 15 psi (7 to 103 kPa)
Range..... 0 to 40°F (0 to 20°C)

Nominal Air Capacity for Compressor Sizing ..... 40 scim (11 ml/s)

Nominal Air Capacity for Air Main Sizing ..... 40 scim (11 ml/s)

Nominal Chassis Air Capacity
Supply ..... 150 scim (41 ml/s)
Exhaust ..... 150 scim (41 ml/s)
Supply/2-pipe Exhaust ..... 150 scim (41 ml/s) per side

Air Connections .....5/32" (4 mm) OD tubing

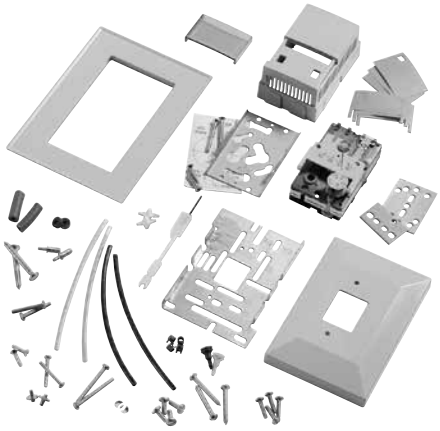
Dimensions (with cover) ..... 2.16" W x 3.34" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)

Shipping Weights
Thermostat Chassis and Wall Plate .....0.53 lb. (0.24 kg)
Plastic Cover .....0.07 lb. (0.04 kg)
Metal Cover (dual).....0.27 lb. (0.12 kg)

Product Ordering

Model #	Thermostat Chassis Type				Thermostat Chassis & Wall Plate	
					Control Action	
	Output	Setpoint	Air Output Capacity	Thermometer & Setpoint Scales	Heat (DA) / Cool (DA)	Heat (RA) / Cool (RA)
193 HC Hesitation	Single	Dual (Heat and Cool)	High (Integral Relay)	°F	**193-219**	**193-220**

RETROLINE® Powerstar™ Retrostat Pneumatic Room Thermostats



192/194 Dual Setpoint Pneumatic Room Thermostat Kit.

RETROLINE®

easily replaces:

- Barber-Colman (Siebe, Invensys, Schneider)
- Johnson Controls
- Honeywell
- Robertshaw (Siebe, Invensys, Schneider)

Description

The Powerstar Retroline Retrostat Pneumatic Room Thermostat converts most existing pneumatic room thermostats to a Powerstar 192/194 direct or reverse acting, 2-pipe, single or dual setpoint unit.

Day/Night or Heat/Cool Retrostat is factory calibrated to match the appropriate changeover pressure of the competitive thermostat.

Features

- Complete kit including Retrostat cover kit with exposed or concealed setpoint adjustment
- Setpoint dials available in Fahrenheit or Celsius scales
- Factory calibrated for accuracy
- All installation hardware and calibration wrench provided.
- Fits into large format wall openings, using included “goof plate.”
- Integral, field adjustable limit stops
- Test port for fast check of output pressure without removing the cover
- Field replaceable thermometer, setpoint dial(s), restrictor(s), and filter(s)

Options

- Quick-connect air connections for ease of installation and service
- Large, 1/2" setpoint knob for convalescent homes

Applications

Retroline Retrostat kits are available for most 2-pipe applications in direct and reverse acting models, including:

- Single Temperature
- Day/Night
- Heat/Cool

Refer to the Powerstar products to select the appropriate application.

Specifications

Single Setpoint			
Description	Thermometer & Setpoint Scales	Control Action	
		Direct	Reverse
Single Temperature	°F	192-840	192-841
	°C	192-850	192-851

Table Notes:
Kits include covers.
If a different cover is required, refer to the Accessories and Service Kit section.

Dual Setpoint			
Action/Changeover Pressure	Manufacturer	Thermometer & Setpoint Scales	Kit Part No. (Desert Beige)
Day/Night			
Day (DA) 13 psi (90 kPa) / **Night** (DA) 18 psi (124 kPa)	Honeywell	°F	194-3042
Day (DA) 13 psi (90 kPa) / **Night** (DA) 18 psi (124 kPa)	Honeywell	°C	194-3142
Day (DA) 15 psi (103 kPa) / **Night** (DA) 20 psi (138 kPa)	Johnson/B-C	°F	194-3043
Day (DA) 15 psi (103 kPa) / **Night** (DA) 20 psi (138 kPa)	Johnson/B-C	°C	194-3143
Day (DA) 18 psi (124 kPa) / **Night** (DA) 25 psi (172 kPa)	Siemens	°F	192-3044
Day (DA) 18 psi (124 kPa) / **Night** (DA) 25 psi (172 kPa)	Siemens	°C	192-3144
Day (RA) 13 psi (90 kPa) / **Night** (RA) 18 psi (124 kPa)	Honeywell	°F	194-3052
Day (RA) 15 psi (103 kPa) / **Night** (RA) 20 psi (138 kPa)	Johnson/B-C	°F	194-3053
Day (RA) 18 psi (124 kPa) / **Night** (RA) 25 psi (172 kPa)	Siemens	°F	192-3054
Day (RA) 18 psi (124 kPa) / **Night** (RA) 25 psi (172 kPa)	Siemens	°C	192-3154*
Heat/Cool			
Heat (DA) 18 psi (124 kPa) / **Cool** (RA) 13 psi (90 kPa)	Honeywell	°F	194-3082
Heat (DA) 20 psi (138 kPa) / **Cool** (RA) 15 psi (103 kPa)	Johnson/B-C	°F	194-3083*
Heat (DA) 25 psi (172 kPa) / **Cool** (RA) 18 psi (124 kPa)	Siemens	°F	192-3084*
Heat (DA) 25 psi (172 kPa) / **Cool** (RA) 18 psi (124 kPa)	Siemens	°C	192-3184

Table Notes:
- For detailed specifications on Day/Night, refer to 192 DN or DNV.
- For detailed specifications on Heat/Cool, refer to 193 HC.
- The changeover pressures for RobertShaw thermostats are 16 psi Day/25 psi Night.
- All kits include covers.

Product Ordering

Manufacturer Part No.	Manufacturer	Control Action/Temperature Scale	Retroline Part No.	
			Kit	Replace. Chassis
T-4002-201[1]	Johnson Controls	Single Temperature, Direct Acting	**192-840**	**192-202**
T-4002-202[1]	Johnson Controls	Single Temperature, Reverse Acting	**192-841**	**192-203**
T-4002-203	Johnson Controls	Single Temperature, Direct Acting	**192-840**	**192-202**
T-4002-204	Johnson Controls	Single Temperature, Reverse Acting	**192-841**	**192-203**
T-4506-201[1]	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-202	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-203[1, 2]	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-204[2]	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-201[1]	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-202	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-203[1, 2]	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-204[2]	Johnson Controls	Day (DA) 15 psi (103 kPa) changeover / Night (DA) 20 psi (138 kPa)	**194-3043**	**194-2043**
T-4506-209[1]	Johnson Controls	Day (RA) 15 psi (103 kPa) changeover / Night (RA) 20 psi (138 kPa)	**194-3053**	**194-2053**
T-4506-217[1, 2]	Johnson Controls	Day (RA) 15 psi (103 kPa) changeover / Night (RA) 20 psi (138 kPa)	**194-3053**	**194-2053**
T-4756-205[1]	Johnson Controls	Heat (DA) 20 psi (138 kPa) changeover / Cool (RA) 15 psi (103 kPa)	**194-3083**	**194-2083**
T-4756-206	Johnson Controls	Heat (DA) 20 psi (138 kPa) changeover / Cool (RA) 15 psi (103 kPa)	**194-3083**	**194-2083**
TP970A1002	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A1012	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A1035	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A1038	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A1053	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A1061	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A2004	Honeywell	Single Temperature, Direct Acting	**192-840**	**192-202**
TP970A1002	Honeywell	Single Temperature, Reverse Acting	**192-841**	**192-203**
TP970B1028	Honeywell	Single Temperature, Reverse Acting	**192-841**	**192-203**
TP970B1036	Honeywell	Single Temperature, Reverse Acting	**192-841**	**192-203**
TP970B1044	Honeywell	Single Temperature, Reverse Acting	**192-841**	**192-203**
TP971A1003	Honeywell	Day (DA) 13 psi (90 kPa) changeover / Night (DA) 18 psi (124 kPa)	**194-3042**	**194-2042**
TP971A1029	Honeywell	Day (DA) 13 psi (90 kPa) changeover / Night (DA) 18 psi (124 kPa)	**194-3042**	**194-2042**
TP971A1037	Honeywell	Day (DA) 13 psi (90 kPa) changeover / Night (DA) 18 psi (124 kPa)	**194-3042**	**194-2042**
TP971A1045	Honeywell	Day (DA) 13 psi (90 kPa) changeover / Night (DA) 18 psi (124 kPa)	**194-3042**	**194-2042**
TP971A1086	Honeywell	Day (DA) 13 psi (90 kPa) changeover / Night (DA) 18 psi (124 kPa)	**194-3042**	**194-2042**
TP971B1001	Honeywell	Day (RA) 13 psi (90 kPa) changeover / Night (RA) 18 psi (124 kPa)	**194-3052**	**194-2052**
TP971B1004	Honeywell	Day (RA) 13 psi (90 kPa) changeover / Night (RA) 18 psi (124 kPa)	**194-3052**	**194-2052**
TP972A1002	Honeywell	Heat (DA) 18 psi (124 kPa) changeover / Cool (RA) 13 psi (90 kPa)	**194-3082**	**194-2082**
TP972A1028	Honeywell	Heat (DA) 18 psi (124 kPa) changeover / Cool (RA) 13 psi (90 kPa)	**194-3082**	**194-2082**
TP972A1036	Honeywell	Heat (DA) 18 psi (124 kPa) changeover / Cool (RA) 13 psi (90 kPa)	**194-3082**	**194-2082**
TP972A1101	Honeywell	Heat (DA) 18 psi (124 kPa) changeover / Cool (RA) 13 psi (90 kPa)	**194-3082**	**194-2082**

Ordering Notes:

1. Suggested Retrofit Kit converts horizontal thermostat to vertical position.
2. Suggested Retrofit Kit has an additional manual changeover switch, not provided on the original.

Product Ordering

Manufacturer Part No.	Manufacturer	Control Action/Temperature Scale	Retroline Part No.	
			Kit	Replace. Chassis
TK-18	Barber-Colman	Single Temperature, Direct Acting	**192-840**	**192-202**
TK-19	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
TK-19-1	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
TK-19-19	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
TK-1001	Barber-Colman	Single Temperature, Direct Acting	**192-840**	**192-202**
TK-1101	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
TK-1001-116	Barber-Colman	Single Temperature, Direct Acting	**192-850**	**192-222**
TK-1002	Barber-Colman	Single Temperature, Direct Acting	**192-840**	**192-202**
TK-1002	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
TK-5001-116	Barber-Colman	Single Temperature, Direct Acting	**192-850**	**192-222**
TKR-18	Barber-Colman	Single Temperature, Direct Acting	**192-840**	**192-202**
TKR-18-91	Barber-Colman	Single Temperature, Direct Acting	**192-840**	**192-202**
TKR-19	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
TKR-1001	Barber-Colman	Single Temperature, Direct Acting	**192-840**	**192-202**
TKR-1101	Barber-Colman	Single Temperature, Reverse Acting	**192-841**	**192-203**
2212-118	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
2212-119	Robertshaw	Single Temperature, Reverse Acting	**192-841**	**192-203**
2212-128	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
2212-129	Robertshaw	Single Temperature, Reverse Acting	**192-841**	**192-203**
2212-418	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
2212-419	Robertshaw	Single Temperature, Reverse Acting	**192-841**	**192-203**
2212-518	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
2212-519	Robertshaw	Single Temperature, Reverse Acting	**192-841**	**192-203**
T15-101	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
T18-101	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
T18-201	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
T18-301	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
T18-3011	Robertshaw	Single Temperature, Direct Acting	**192-840**	**192-202**
192-202	Powers	Single Temperature, Direct Acting	**192-840**	**192-202**
192-203	Powers	Single Temperature, Reverse Acting	**192-841**	**192-203**
192-204	Powers	Day (DA) 18 psi (124 kPa)/Night (DA) 25 psi (172 kPa) changeover	**192-3044**	**192-204**
192-205	Powers	Day (RA) 18 psi (124 kPa)/Night (RA) 25 psi (172 kPa) changeover	**192-3054**	**192-205**
192-208	Powers	Heat (DA) 25 psi (172 kPa)/Cool (RA) 18 psi (124 kPa) changeover	**192-3084**	**192-208**
192-222	Powers	Single Temperature, Direct Acting	**192-850**	**192-222**
192-223	Powers	Single Temperature, Reverse Acting	**192-851**	**192-223**
192-224	Powers	Day (DA) 18 psi (124 kPa) changeover/Night (DA) 25 psi (172 kPa)	**192-3144**	**192-224**
192-225	Powers	Day (RA) 18 psi (124 kPa) changeover/Night (RA) 25 psi (172 kPa)	**192-3154**	**192-225**
192-228	Powers	Heat (DA) 25 psi (172 kPa) changeover/Cool (RA) 18 psi (124 kPa)	**192-3184**	**192-228**

Pneumatic Room Thermostats

832 D Pneumatic Room Thermostat and screws.

Description

The single setpoint, direct acting thermostat provides gradual acting pneumatic room temperature control for heating and cooling applications. The 832 D Thermostat is ruggedly constructed for dependable, long-term service.

Features

- All metal construction
- Rapid response to temperature change
- Unique design of supply and exhaust air valves prevents waste
- Quiet operation
- Easy-to-calibrate and service
- Tamper-proof cover screws
- Exposed remote changeover control
- Calibrated thermometer

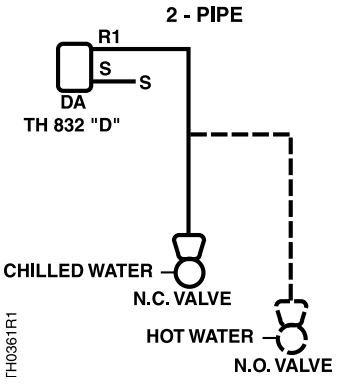
Applications

Designed for controlling rooms heated or cooled by radiation, ventilation, or an air conditioning system, the 832 D Pneumatic Room Thermostat is versatile and responsive for individual room control.

Other applications include room control of radiant panels, finned radiation, and unit ventilators.

Application Drawing

Dotted lines are alternative control schemes.



Specifications

Control Action ..... Direct
Operating Range ..... 60° to 85°F (15° to 30°C)
Sensitivity Fixed ..... 2.5 psi/°F (31 kPa/°C)
Temperature Response ..... 0.5°F (0.3°C)
Maximum Ambient Temperature ..... 110°F (43°C)
Dial Graduations ..... 2°F (1.1°C)
Normal Air Supply Pressure ..... 18 psi (124 kPa)
Maximum Operating Pressure ..... 30 psi (207 kPa)
Dimensions ..... 2.88" W x 5.63" H x 2.19" D (73 mm W x 143 mm H x 56 mm D)
Air Consumption for Compressor Sizing ..... 10 scim (2.7 ml/s)
Cover Style ..... Key or concealed setpoint adjustment
Cover Finish ..... Silver; Special order other finishes.
Shipping Weight ..... 3.0 lb. (1.36 kg)

Product Ordering

Description	Thermostat Part No.[2]	Cover Assembly
Concealed Adjustment with Thermometer	**832-0120**	**856-036**
Concealed Adjustment without Thermometer	**832-0490**	**856-046**[1]
Exposed Key Adjustment with Thermometer	**832-0500**	**856-044**
Exposed Knob Adjustment with Thermometer	**832-1260**	**856-044**

Ordering Notes:
1. Blind cover, **856-046,** does not include mounting screws, **856-014,** that are required for installation.
2. Does not include adjustment key, **856-055,** that is required for installation.

Thermostat comes complete with cover.

Order the Calibration Kit in the Accessories and Service Kits section.

TECH TIP

To calibrate any pneumatic thermostat, perform the following:

1. Remove the cover.
2. Measure the ambient temperature.
3. Set the setpoint dial to the ambient temperature.
4. Measure the controller output pressure (branch pressure).
5. Turn the calibration screw(s) until the branch pressure equals the midpoint of the control span [usually 8 psi (55 kPa)].
6. Reposition the cover.

Limitem™ Rigid Bulb Thermostats

356 Limitem Rigid Bulb Thermostat.

Description

The 356 Limitem™ Rigid Bulb Thermostat is a pneumatically operated, duct-mounted thermostat, which is available in either direct or reverse acting in a variety of ranges.

Features

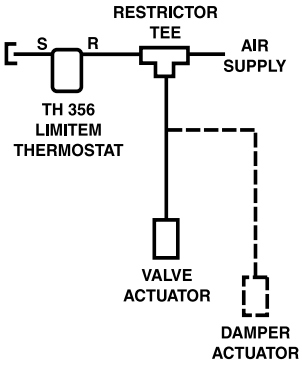
- Durable copper motor tube and steel rod temperature sensing element
- Two-valve design reduces air waste
- Duct mounting hardware included
- All metal construction
- 18" (46 cm) sensing tube

Applications

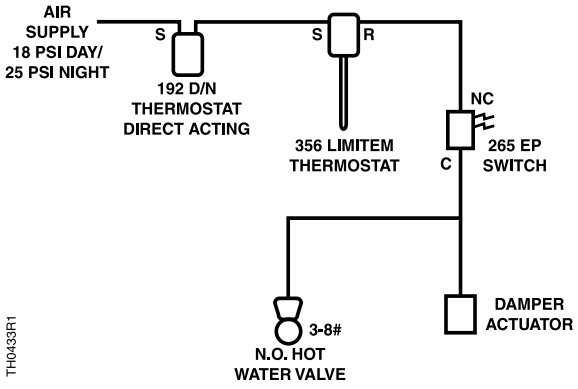
The 356 Limitem Rigid Bulb Thermostat provides primary control for unit ventilators, fan coils and other air handling units. Can also be used as low limit control for air flow to a controlled space.

Application Drawings

Dotted lines are alternative control schemes.



1-pipe.



2-pipe.

Specifications

Control Action ..... Direct or Reverse
Maximum Supply Air Pressure ..... 30 psi (207 kPa)
Sensitivity Range (adjustable) ..... 0.25 to 2 psi/°F (3 to 25 kPa/°C)
Factory Sensitivity Setting ..... 1.25 psi/°F (15 kPa/°C)
Temperature Response ..... 0.50°F (0.9°C)
Dial Graduations ..... 5°F (2.7°C) /2°C (3.6°F)
Maximum Ambient Temperature
Case ..... 200°F (93°C)
Bulb (Direct Acting)..... 225°F (107°C)
Bulb (Reverse Acting)..... 250°F (121°C)
Nominal Air Supply Pressure ..... 18 to 25 psi (124 to 172 kPa)
Maximum External Pressure (on bulb) ..... 250 psi (1722 kPa)
Mounting ..... Flange or 3/8" NPT
Air Connections ..... 1/8" NPT
Dimensions
Bulb Length ..... 18" (457 mm)
Flange OD ..... 2.56" (65 mm)
Case ..... 1.5" Diameter x 3" L (33 mm Diameter x 76 mm L)
Shipping Weight ..... 2.0 lb. (0.91 kg)

Product Ordering

Control Action	Temperature Operating Range	Part No.
Direct Acting	0° to 100°F (-18° to 38°C)	**356-0012**
Direct Acting	30° to 180°F (-1.11° to 82.2°C)	**356-0750**
Reverse Acting	0° to 100°F (-18° to 38°C)	**356-0013**
Reverse Acting	30° to 180°F (-1.11° to 82.2°C)	**356-1005**
Reverse Acting	100° to 250°F (37.8° to 121°C)	**356-1006**

TECH TIP

When using the Limitem as a one-pipe device, a 40 scim (11 ml/s) restrictor will limit your output to 80% of supply. A 20 scim (5 ml/s) restrictor will limit your output to 60% of supply.

Example: With a 20 scim (5 ml/s) restrictor and 25 psi (11.3 kPa) supply, your maximum output is 15 psi (6.8 kPa).

Limitem™ Remote Bulb Thermostats

357 D Limitem Remote
Thermostat with an average bulb.

Description

The 357 D Limitem™ Remote Bulb Thermostat is a pneumatically-operated thermostat that is gradual, direct acting with a remote or averaging bulb.

Features

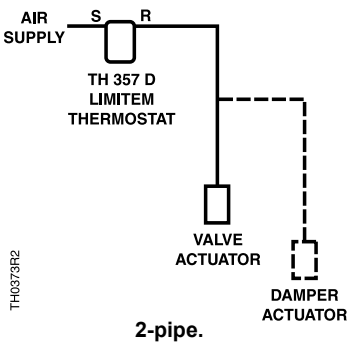
- Direct acting only
- Remote or averaging bulbs for flexibility in installation
- Liquid-filled sensing element for rapid response to temperature changes
- Two-valve design reduces air waste
- Adjustable sensitivity

Applications

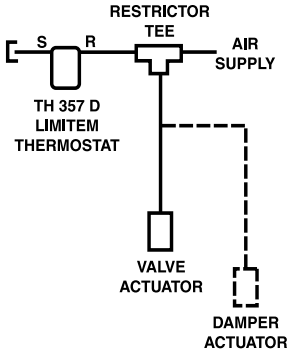
The 357 D Limitem Remote Bulb Thermostat provides primary monitoring and control for air handling units or a low limit control.

Application Drawings

Dotted lines are alternative control schemes.



2-pipe.



1-pipe.

Specifications

Control Action.....Direct
Maximum Supply Air Pressure.....30 psi (207 kPa)
Sensitivity Range (adjustable).....0.33 to 3.5 psi/°F (4 to 43 kPa/°C)
Factory Sensitivity Setting.....1.25 psi/°F (15 kPa/°C)
Bulb.....Liquid-filled
Temperature Response.....0.5°F (0.3°C)
Dial Graduations.....5°F (2.7°C), 2°C (3.6°F)
Maximum Ambient Temperature (case).....180°F (82°C)
Nominal Air Supply Pressure.....18 to 25 psi (124 to 172 kPa)
Mounting.....Bracket supplied
Air Connection.....1/8" NPT
Dimensions (Case).....1.75" Diameter x 3.5" H (44.5 mm Diameter x 88.9 mm H)
Shipping Weight.....2.0 lb. (0.9 kg)

Product Ordering

Sensing Element	Temperature Operating Range	Capillary	Bulb	Maximum Ambient Temp.	Part No.
Remote Bulb	20° to 100°F (-6.7° to 37.8°C)	8' (2.4 m)	3/8" x 4' (0.95 mm x 10.2 cm)	201°F (94°C)	**357-0003**
Averaging Bulb	5° to 145°F (1.7° to 62.8°C)	40' (12.2 m)	3/32" x 15' (0.24 mm x 457 cm)	210°F (99°C)	**357-0004**
Remote Bulb	120° to 230°F (48.9° to 110°C)	40' (12.2 m)	3/8" x 4" (0.95 mm x 10.2 cm)	261°F (127°C)	**357-0005**
Averaging Bulb	35° to 145°F (1.7° to 62.8°C)	6" (15 cm)	3/32" x 8' (0.24 mm x 244 cm)	211°F (99.4°C)	**357-0001**

Unit Mounted Thermostats

188 Unit Mounted Thermostat.

Description

The 188 Unit Mounted Thermostat is a gradual acting thermostat with a remote bulb operating on the force-balance principle, using pneumatic feedback to obtain linearity and maintain selected room temperature by positioning pneumatic devices to control heating or cooling.

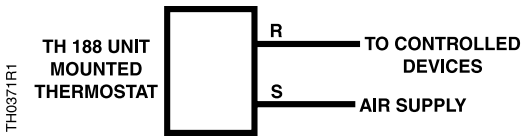
Features

- Liquid-filled thermal system temperature sensing element
- Durable die-cast metal case with rugged setpoint knob
- Adjustable sensitivity
- Universal mounting bracket for easy installation
- Integral adjustable limit stops
- Available as:
  – Direct Acting only (Heating)
  – Reverse Acting only (Cooling)
  – Heat or Cool depending on supply air pressure

Applications

The 188 Unit Mounted Thermostats are designed primarily for use in fan coil induction units and unit ventilators to control the temperature within an occupied space. The thermostat's temperature range is limited to applications at ambient temperatures.

Typical Connections



Specifications

Control Action ..... Heating/Cooling, Direct and Reverse; Direct only; Reverse only

Operating Range ..... 60° to 85°F (15.5° to 29.4°C)

Operating Pressure ..... 30 psi (207 kPa) max.

Adjustment Sensitivity ..... 1 to 5.25 psi/°F (12 to 65 kPa/°C)

Factory Sensitivity Setting ..... 2.25 psi/°F (28 kPa/°C)

Temperature Response ..... 0.2°F (0.1°C)

Maximum Ambient Temperature
- Case ..... 135°F (57.2°C)
- Bulb ..... 231°F (111°C)

Scale Graduations ..... 1°F (0.55°C)

Nominal Air Supply Pressure
- Direct or Reverse Acting..... 25 psi (172 kPa)
- Heating/Cooling..... 25 psi (172 kPa)/18 psi (124 kPa)

Average Air Usage
- 20 scim Restrictor..... 25 scim (6.8 ml/s)
- 40 scim Restrictor..... 45 scim (12.2 ml/s)

Air Connections ..... 1/4" (6 mm) Brass barbed for polyethylene tubing

Bulb Size ..... 3/8" Diameter x 3-1/2" L (9.5 mm Diameter x 89 mm L)

Capillary Length ..... 48" (121.9 cm) approx.

Finish ..... Corrosion-resistant Zinc Chromate

Dimensions (case)
- Heating/Cooling, Reverse Acting..... 3.1" W x 2.4" H x 2.13" D (100 mm W x 61 mm H x 54 mm D)
- Direct Acting ..... 3.1" W x 2.4" H x 1.38" D (100 mm W x 61 mm H x 35 mm D)

Shipping Weight ..... 3.0 lb. (1.36 kg)

Product Ordering

	Control Action	Changeover Pressure	Average Air Usage	Part No.
Single Setpoint	Direct Acting / 25 psi (172 kPa)	—	40 scim (11 ml/s)	**188-0031**
Single Setpoint	Reverse Acting (Cooling) 25 psi (172 kPa)	—	20 scim (5 ml/s)	**188-0024**
Heat/Cool	Direct Acting (Heating) / Reverse Acting (Cooling) 18 psi (124 kPa)	21 psi (145 kPa)	40 scim (11 ml/s)	**188-0030**
Heat/Cool	Retroline Direct Acting/Reverse Acting 18 psi (124 kPa) / 13 psi (90 kPa). Retroline replacement for **Honeywell LP916BXXXX.**	15 psi (103 kPa)	40 scim (11 ml/s)	**188-0033**
Heat/Cool	Retroline Direct Acting/Reverse Acting 25 psi (172 kPa) / 15 psi (103 kPa). Retroline replacement for **Johnson Controls T-3300-2.**	17 psi (117 kPa)	40 scim (11 ml/s)	**188-0034**

Pneumatic High and Low Temperature Detection Thermostats

134 Pneumatic Low Temperature Detection Thermostat.

Description

The 134 High and Low Temperature Detection Pneumatic Thermostats automatically “lockout” at setpoint and require manual reset.

Features

- Snap-acting pneumatic switch
- Sight-set calibrated setpoint scale
- No leakage of air prior to reset of switch
- Easily adjustable settings
- Normally closed air valve; bleeds to less than 2 psi (14 kPa) when supplied through a restrictor
- Barb fitting for push-on connection of 1/4" (6 mm) OD polyethylene tubing
- Holds dead-ended line to approximately 22 psi (152 kPa) air pressure

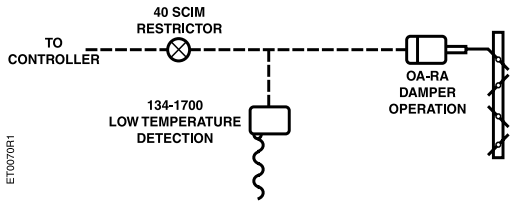
Applications

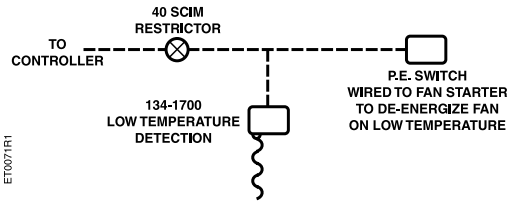
The 134 Pneumatic High and Low Temperature Detection Thermostats are used on pneumatic heating and cooling systems in areas protected from the weather.

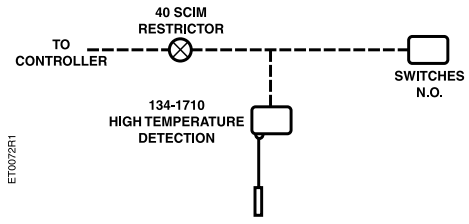
On a typical high limit application, the thermostat shuts down air conditioning or ventilating fans when the duct temperature becomes excessively high. A normally closed switch opens at setpoint.

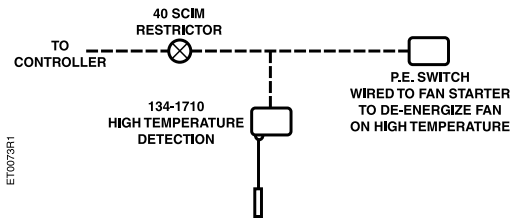
On a typical low temperature application, the thermostat stops the fan or closes a damper when the temperature drops to the setpoint at any one foot (30.5 cm) or more of the sensing element.

Application Drawings









Specifications

Part No. 134-1700

Ambient Temperature Range ..... Greater than setpoint to 140°F (60°C)

Pneumatic Switch ..... NC, 0.020" (0.6 mm) diameter bleed

Control Point Low Temperature Thermostat ..... Lowest temperature at any one foot section of the sensing bulb

Case Finish ..... Gray Baked Enamel

Shipping Weight ..... 2.45 lb. (1.11 kg)

Part No. 134-1710

Ambient Temperature Range ..... -40° to 140°F (-40° to 60°C)

Pneumatic Switch ..... NC, 0.02" (0.6 mm) diameter bleed

Control Point Low Temperature Thermostat ..... Lowest temperature at any one foot section of the sensing bulb

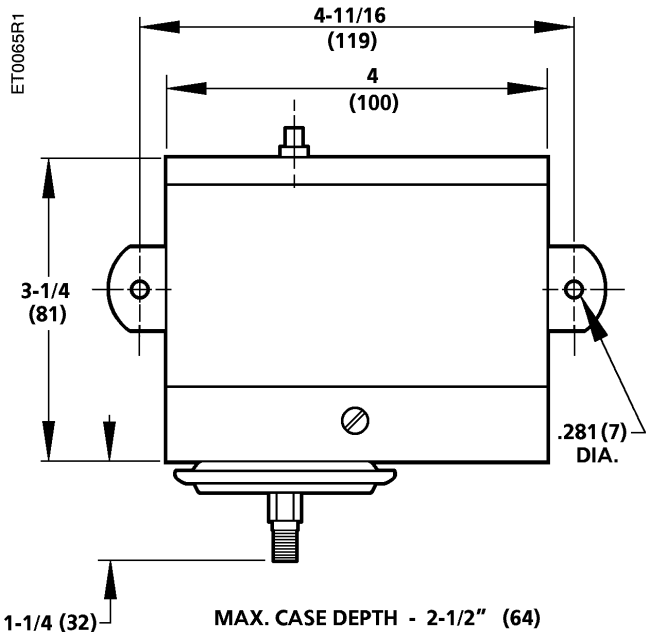
Case Finish ..... Gray Baked Enamel

Shipping Weight ..... 2.38 lb. (1.08 kg)

Product Ordering

Temp.	Temperature Range	Differential	Max. Bulb Temp.	Bulb & Capillary Length	Switch Reclose	Part No.
Low	15° to 55°F (-9° to 12.8°C) with stop at 35°F (1.67°C)	5°F (2.8°C) Non-Adjustable	400°F (204°C)	20' (6 m)	Temperature must increase by 5°F (2.8°C) before pneumatic switch can be reclosed.	**134-1700**
High	100° to 170°F (38° to 77°C)	10°F (5.6°C) Non-Adjustable	250°F (121°C)	2.7" (69 mm) Dia. x 10" (25.4 cm) L bulb with 6' (183 mm) capillary	Temperature must drop 10°F (5.6°C) before pneumatic switch can be reclosed.	**134-1710**

Dimensions



Dimensions shown in inches (mm).

Single Input Receiver-Controller

Powers RETROLINE®
easily replaces:

- Barber-Colman
- Johnson Controls
- Honeywell
- Robertshaw
- Seibe

195 Single Input Receiver-Controller.

Description

The 195 Single Input Receiver-Controller is a pneumatic controller which receives one pneumatic input, and produces a pneumatic output signal based on the net pneumatic input and the mechanical settings of the setpoint and percent proportional band. This controller can be easily changed from direct to reverse acting.

Powers Retroline Receiver-Controller (195-1000) includes decals and installation instructions to replace competitive models.

Features

- Rugged proven design
- Plug-in air connections for ease of installation, calibration, and service
- Internal restrictors for transmitter inputs
- Stick-on scales included for setpoint dial in standard transmitter ranges
- Large, easy-to-read scales on all adjustments
- Calibration card for converting transmitter range to 3 to 15 psi (21 to 103 kPa) signal
- Tamper-resistant cover

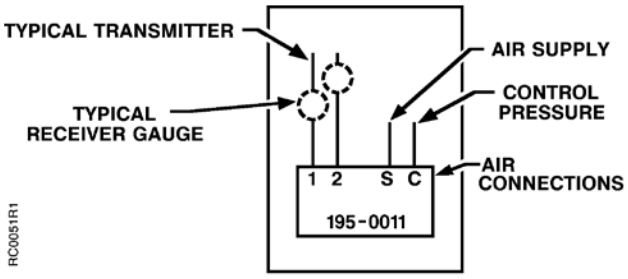
Options

- Retroline products for replacing competitive products

Applications

The 195 Single Input Receiver-Controller is a one-input, direct/reverse acting instrument used to control temperatures, humidity, and pressure of mechanical equipment in commercial and industrial facilities.

Typical Connections



Specifications

Action
Input #1 ..... Direct
Input #2 ..... Reverse

Pneumatic Inputs ..... 3 to 15 psi (21 to 103 kPa)

Control Output .....0 psi (0 kPa) to supply pressure 22 psi (152 kPa)

Operating Ambient Temperature Range .....40° to 120°F (4° to 49°C)

Supply Pressure
Operating..... 22 psi (152 kPa)
Maximum Safe ..... 30 psi (207 kPa)

% Proportional Band Adjustment Range .....2 to 20% for a 5 psi (34 kPa) control pressure change

Air Consumption ..... 60 scim (17 ml/s)

Air Capacity ..... 2 psi (14 kPa) Pressure Change at 9 psi (62 kPa) control pressure
Supply ..... 640 scim (175 ml/s)
Exhaust ..... 590 scim (161 ml/s)

Mounting ..... Surface

Air Connections.....Barb fittings for 1/4" (6 mm) OD polyethylene tubing. Two plug-in connectors are provided; one for the direct acting and the reverse acting transmitter inputs and one for supply and control lines. 1/8" NPT connection provided for control pressure gauge (gauge not included)

Case Material .....Lexan, 20% glass-filled

Dimensions ..... 6.75" W x 5.69" H x 3.5" D (171 mm W x 144 mm H x 89 mm D)

Shipping Weight .....3.1 lb. (1.4 kg)

Product Ordering

Description	Part No.
Single Input Receiver-Controller	**195-0011**

RETROLINE®

Manufacturer	Manufacturer Part No.	Part No.[1]
Barber-Colman	RKS-1001	**195-1000**
Barber-Colman	RKS-2001	**195-1000**
Barber-Colman	RKS-5001	**195-1000**
Honeywell	RP908A	**195-1000**
Honeywell	RP920A	**195-1000**
Johnson Controls	T-5800-1	**195-1000**

Ordering Notes:
1. Includes **195-0011** plus decals to replace any competitive single input receiver-controller.

Multiple Input Receiver-Controller

Powers RETROLINE®
easily replaces:

- Barber-Colman
- Johnson Controls
- Honeywell
- Robertshaw
- Seibe

195 Multiple Input Receiver-Controller with Control Pressure Gauge.

Description

The 195 Multiple Input Receiver-Controller is a pneumatic controller that receives up to three pneumatic inputs and produces a pneumatic output signal based on the net pneumatic input and the setpoint, percent proportional band, and authority settings. The Controller can be easily changed from direct to reverse acting.

Powers Retroline Receiver-Controller (195-1000) includes decals and installation instructions to replace competitive models.

Features

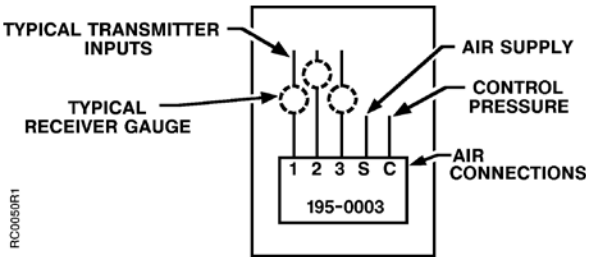
- Rugged proven design
- Plug-in air connections for ease of installation, calibration, and service
- Internal restrictors for transmitter inputs
- Stick-on scales included for setpoint dial in standard transmitter ranges
- Large, easy-to-read scales on all adjustments
- Calibration card for converting transmitter range to 3 to 15 psi (21 to 103 kPa) signal
- 0 to 30 psi (0 to 200 kPa) Pressure Gauge
- Retroline products for replacing competitive products

Applications

The 195 Multiple Input Receiver-Controller is commonly used when the setpoint needs to be automatically reset based on a separate input; can also be used as a single input device.

Example: Change hot water supply temperature setpoint based on outside air temperature.

Typical Connections



Specifications

Action
Input #1 ..... Direct
Input #2 ..... Reverse

Reset
Input #3 ..... Direct reset relative to Input #2
Reverse reset relative to Input #1

Pneumatic Inputs ..... 3 to 15 psi (21 to 103 kPa)

Control Output ..... 0 psi (0 kPa) to supply pressure 22 psi (152 kPa)

Operating Ambient Temperature Range ..... 40° to 120°F (4° to 49°C)

Supply Pressure
Operating ..... 22 psi (152 kPa)
Maximum Safe ..... 30 psi (207 kPa)

% Proportional Band Adjustment Range ..... 2 to 20% for a 5 psi (34 kPa) control pressure change

% Authority Adjustment Range ..... 20 to 200%

Air Consumption ..... 60 scim (17 ml/s), *not including transmitters*

Air Capacity ..... @ 2 psi (14 kPa) Pressure Change and 9 psi (62 kPa) control pressure
Supply ..... 640 scim (175 ml/s)
Exhaust ..... 590 scim (161 ml/s)

Mounting ..... Surface, vertical

Air Connections ..... Barb fittings for 1/4" (6 mm) OD polyethylene tubing. Two plug-in connectors are provided; one for the three transmitter inputs and one for supply and control lines. 1/8" NPT connection provided for control pressure gauge.

Case Material ..... Lexan, 20% glass-filled

Dimensions ..... 6.75" W x 5.69" H x 3.5" D (171 mm W x 144 mm H x 89 mm D)

Shipping Weight ..... 3.1 lb. (1.4 kg)

Product Ordering

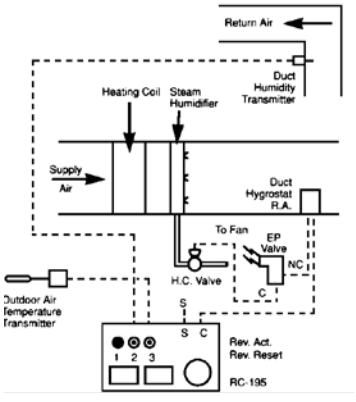
Description	Part No.
Multiple Input Receiver-Controller	**195-0003**

RETROLINE®

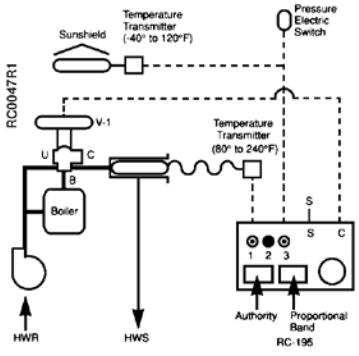
Manufacturer	Manufacturer Part No.	Part No.[1]
Barber-Colman	RKS-3002	**195-2000**
Barber-Colman	RKS-4002	**195-2000**
Johnson Controls	T-5800-3	**195-2000**
Robertshaw	P-341	**195-2000**
Robertshaw	P-541	**195-2000**
Honeywell	RP908B	**195-2000**
Honeywell	RP920B	**195-2000**

Ordering Notes:
1. Includes **195-0003** plus decals to replace competitive receiver-controllers.

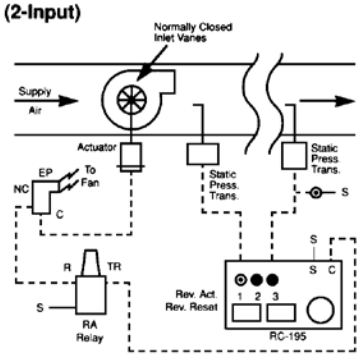
Dimensions/Engineering Drawings



Humidity Control



Temperature Control



Static Pressure Control

Temperature Transmitters

Powers RETROLINE®
easily replaces:

- Barber-Colman
- Johnson Controls
- Honeywell
- Robertshaw
- Seibe

184-0340 Room Temperature Transmitter.

184-0005 Temperature Transmitter with Remote Bulb.

184 Temperature Transmitter with Averaging Bulb.

184 Temperature Transmitter with Rigid Bulb.

Description

The 184 Temperature Transmitters are direct acting, one-pipe instruments that sense temperature and transmit a proportional 3 to15 psi (21 to 103 kPa) pneumatic signal to a remotely located receiver gauge and/or receiver controller. Temperature Transmitters operate on the force-balance principle, using internal feedback for excellent linearity and accuracy.

Powers Retroline transmitters easily replace any competitive model. Refer to the appropriate product to locate the Retroline replacement.

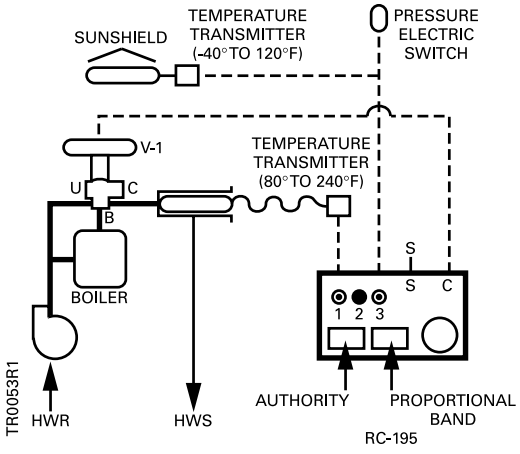
Features

- 1-pipe, direct acting
- Rapid response to temperature changes over their full range
- Available in a variety of sensing elements and temperature ranges
- Available with rigid bulb, remote averaging bulb, and room transmitter
- Internal feedback for excellent linearity and accuracy

Applications

The 184 Temperature Transmitters can be used for a variety of applications to monitor temperature and are ideal for those requiring indication with a receiver-controller.

Application Drawing



Hot water temperature setpoint reset.

Specifications

Action ..... Direct
Output Air Pressure ..... 3 to 15 psi (21 to 103 kPa)
Ambient Temperature Range ..... 40° to 120°F (4.4° to 49°C)
Input (supply) Air Pressure
Restrictor Size ..... 40 scim (11 ml/s)
Calibration Pressure ..... 22 ± 1.0 psi (152 ± 6.9 kPa)
Maximum ..... 30 psi (207 kPa)
Thermal System
Room ..... Bimetal
Rigid Bulb ..... Rod and tube
Remote Bulb ..... Liquid-filled
Air Consumption ..... 35 scim (10 ml/s)
Air Connections ..... 1/8" NPT (Except for room type)
Mounting
Room ..... Wall terminal
Rigid Bulb ..... Mounting flange
Remote Bulb ..... Mounting flange or well bracket mounting kit
Averaging Bulb ..... Mounting flange
Cover Finish
Room ..... Desert Beige, plastic
Rigid, Averaging and Remote Bulb ..... Gray
Dimensions
Room ..... 2.16" W x 3.35" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)
Averaging Bulb/Remote Bulb ..... 1.875" W x 3" H x 1.69" D (48 mm W x 76 mm H x 33 mm D)

Product Ordering

Description	Temperature Range	Part No.
Rigid Bulb Transmitter 9" bulb (229 mm)	35° to 135ºF (2° to 57ºC)	**184-0001**
	50° to 100ºF (10° to 38ºC)	**184-0002**
	80° to 240ºF (27° to 116ºC)	**184-0003**
	0° to 100ºF (-18° to 38ºC)	**184-0028**
Remote Averaging Bulb Transmitter 3/32" Dia. x 20' L (2 mm x 6.1 m L) w/ 12" (305 mm) capillary	35° to 135ºF (2° to 57ºC)	**184-0004**
	0° to 100ºF (-18° to 38ºC)	**184-0048**
Remote Bulb Transmitter 1/4" Dia. x 4' L (6 mm x 102 mm L), 3' (0.92 mm) armored capillary	-40° to 120ºF (-18° to 38ºC)	**184-0005**
	50° to 100ºF (10° to 38ºC)	**184-0018**
	80° to 240ºF (27° to 116ºC)	**184-0014**
	0° to 100ºF (-18° to 38ºC)	**184-0036**
	-10° to 65ºF (-23° to 18ºC)	**184-0015**
	35° to 135ºF (2° to 57ºC)	**184-0034**
	30° to 190ºF (-1° to 88ºC)	**184-0041**
Remote Bulb Transmitter 1/4" Dia. x 4' L (6 mm x 102 mm L), 3' (0.92 mm) armored capillary	-40° to 120ºF (-40° to 49ºC)	**184-0006**
Room Temperature Transmitter With cover and wall plate	50° to 100ºF (10° to 38ºC)	**184-0340**

Manufacturer Cross-Reference

Manufacturer Part No.	Description	Temperature Range	Part No.
Honeywell			
LP914A1052	**Rigid Bulb Transmitter** 6" bulb (152 mm)	40° to 240°F (4° to 116°C)	**184-0121**
Johnson Controls			
T5210-1004	**Remote Bulb Transmitter** 1/4" x 7-5/8" bulb (6 mm x 194 mm) w/ 8" (203 mm) capillary	40° to 240°F (4° to 116°C)	**184-0122**
T5210-1007	**Averaging Bulb Transmitter** 3/32" x 18-3/4' bulb 2.4 mm x 5.7 m) w/ 12" (0.305 m) capillary	50° to 150°F (10° to 38°C)	**184-0129**
T5210-1113	**Remote Bulb Transmitter** 1/4" x 7-5/8" bulb (6 mm x 194 mm) w/ 50" (1.27 m) capillary	-40° to 160°F (-40° to 71°C)	**184-0124**

Pneumatic Room and Duct Hygrostats

186 Room Hygrostat.

186 Duct Hygrostat.

Description

The 186 Room and Duct Hygrostats are pneumatic instruments sensitive to slight changes in relative humidity.

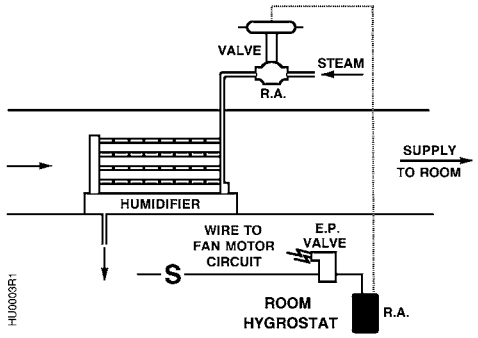
Features

- Adjustable sensitivity
- Sensitive hygroscopic membrane
- Includes temperature compensation
- Galvanized steel housing standard on duct model
- Models available for normal comfort range and high limit range
- Room type comes complete with standard cover and wall plate
- Duct type comes mounted inside a duct mounting box

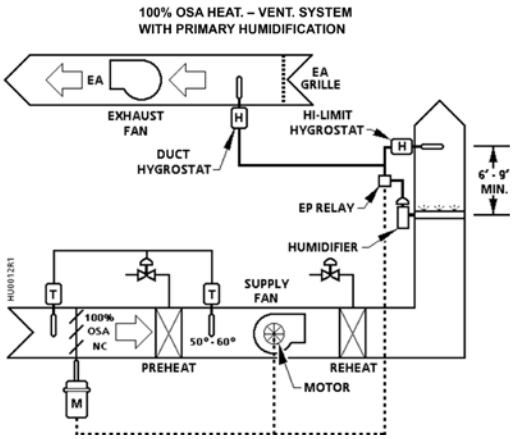
Applications

The 186 Room and Duct Hygrostats provide control of relative humidity for comfort control in hospitals, schools and office buildings.

Application Drawings



Room Application.



Duct Application.

Specifications

Sensitivity .....1/4 to 4 psi/% RH
Normal Supply Pressure ..... 15 to 25 psi (103 kPa to 172 kPa)
Maximum Supply Pressure .....30 psi (207 mm)
Air Consumption ..... 20 scim (5.5 ml/s)
Effect of 10°F Temperature Change .....Shift of 1% RH
Effect of 5 psi Supply Pressure Change (mid sensitivity) ..... 7.0 min./vol unit
Duct Box ..... Extends 6" (152 mm) into duct
Air Connections
Duct..... Barb fitting for 1/4" (64 mm) OD polyethylene tubing
Room..... 5/32" (4 mm) OD polyethylene tubing

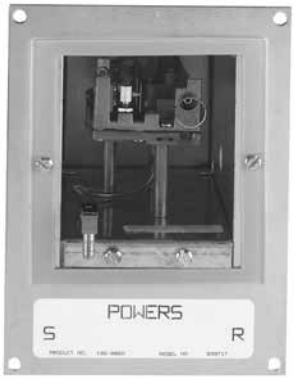
Dimensions
Chassis..... 2.9" H x 1.75" W x 1.13" D (73.66 mm W x 44.45 mm H x 28.70 mm D)
Room..... 2.16" W x 3.34" H x 1.59"D (55 mm W x 85 mm H x 40 mm D))
Duct..... 4.5" W x 5.88" H x 6" D (114 mm x W 149 mm H x 152 mm D)
Standard Room Cover .....Desert Beige, plastic
Shipping Weights
186-0013 & 186-0019..... 0.84 lb. (0.38 kg)
186-0087; 186-0088; 186-0090; 186-0091 .....3.3 lb. (1.5 kg)

Product Ordering

Description	Control Range	Type of Control	Part No.	
			Direct Control Action	Reverse Control Action
Room	20 to 90% RH	Humidification/Dehumidification	**186-0013**	**186-0019**
Duct	20 to 90% RH	Humidification/Dehumidification	**186-0087**	**186-0088**
Duct	55 to 95% RH	High Limit	—	**186-0090**
Duct	25 to 65% RH	Room Comfort	—	**186-0091**

Room and Duct Humidity Transmitters

186-0043 Room Humidity Transmitter.



186-0089 Duct Humidity Transmitter.

Description

The 186 Room and Duct Transmitters are one-pipe, direct acting pneumatic instruments that sense space humidity and transmit a 3 to 15 psi (21 to 103 kPa) pneumatic signal to a remote receiver gauge and/or receiver-controller to read percent relative humidity.

Features

- Inorganic sensing element for rapid response to humidity changes
- Bimetal temperature compensation minimizes temperature effects
- Cover included with Room Transmitter
- Available for room mounting (vertical) and duct mounting that is at least 6-inches (152 mm) high and 6-1/2-inches (165 mm) deep

Applications

The 186 Room and Duct Humidity Transmitters operate on a force-balance principle with internal feedback to obtain linearity to accurately sense relative humidity.

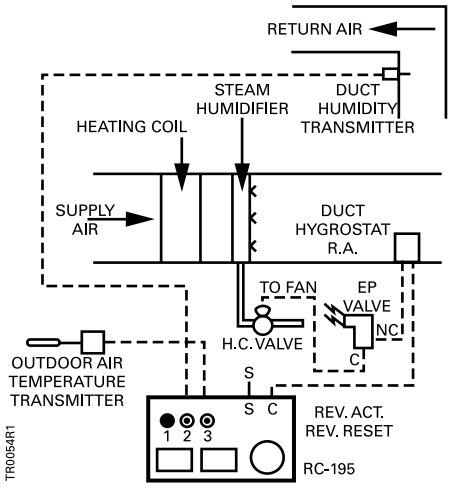
The transmitter output can be sent to a receiver-controller for control of an air conditioning or process control system

Recomendation

Room: Air velocity must be at least 30 FPM (0.15m/s) and the transmitter should be located where it senses actual *room conditions* (away from doors, equipment, etc.).

Duct: Duct transmitters should be used whenever possible in the return air duct.

Application Drawing



Typical Application of Return Air Duct

Specifications

Action ..... Direct
RH Range ..... 20 to 80% RH
Maximum Operating Temperature ..... 135°F (57°C)
Supply Pressure
Maximum ..... 30 psi (207 kPa)
Normal Operating..... 22 ± 1.0 psi (152 ± 6.89 kPa)
Effect of 10°F (5.6°C) Temperature Change ..... Shift of 1% RH
Air Consumption ..... 35 scim (9.6 ml/s)
Output Pressure ..... 3 to 15 psi (21 to 103kPa)
Air Connections ..... 1/8" (3 mm)
Mounting
Room ..... Wall terminal
Duct..... Duct at least 6" H x 6.5" D (152 mm H x 165 mm D)
Standard Room Cover Finish ..... Desert Beige, plastic
Duct Box
Material ..... Galvanized Steel
Air Connections ..... 1/4" (6 mm) barbed connection
Dimensions
Room ..... 2.06" W x 3.19" H x 1.37 D (53 mm W x 81 mm H x 35 mm D)
Duct..... 4.5" W x 5.87" W x 6" D (114 mm W x 149 mm W x 152 mm D)
Shipping Weights
Room ..... 0.84 lb. (0.38 kg)
Duct..... 3.14 lb. (1.42 kg)

Product Ordering

Description	Part No.
Duct Humidity Transmitter	**186-0089**
Room Humidity Transmitter	**186-0043**

Air Station Equipment

201-1000 Single-stage,
Compressed Air Pressure Reducing Valve.

656-0009
High Capacity, 3-way Pilot Valve.

908-051
Compressed Air Filter.

Description

Providing pneumatic control, Air Station Equipment, which includes Single- and Dual-stage Pressure Reducing Valves and High Capacity, 3-way Pilot Valves, responds rapidly to large volume demands and supply pressure variations. The Compressed Air Filter removes water or oil to 0.025 particle size.

Features

Pressure Reducing Valve

- 200 mesh stainless strainer
- Locking handle
- Dual tappings for right or left-hand gauge (201-1000)
- Gauge plug and bushing
- 2-1/2" (64 mm) gauge with 0 to 30 psig (0 to 207 kPa) (201-1001, 201-1002)

Compressed Air Filter

- 20 scfm (33.9 m^3/hr) capacity
- Manual drain port
- Replaceable cartridge

Applications

Air Station Equipment and compressor systems are available for schools, hospitals, commercial office and industrial buildings, and other facilities.

Compressed air systems include:

- Single (low) pressure
- Dual (low and high) pressure
- Dual, low pressure for two pressure systems

Your local Siemens Building Technologies representative can assist you in selecting the appropriate air compressors and accessories for optimum efficiency and duty cycling.

Specifications

Single-stage, Compressed Air Pressure Reducing Valve, 201-1000

Capacity ..... 8 scfm (17 m^3/hr)
Maximum Inlet Pressure ..... 250 psig (1734 kPa)
Reducing Pressure Range ..... 3 to 60 psig (21 to 430 kPa)
Inlet/Outlet Connections ..... 1/4" NPT Female
Gauge Port ..... 1/4" NPT Male x 1/8" NPT Female bushing
Shipping Weight ..... 1.7 lb. (0.8 kg)

Compressed Air Filter, 908-051

Capacity ..... 20 scfm (33.9 m^3/hr) @ 100 psig
Maximum Pressure ..... 300 psig (2068 kPa)
Inlet/Outlet Ports ..... 3/8" NPT Female
Shipping Weight ..... 4.2 lb. (1.9 kg)

High Capacity, 3-way Pilot Valve, 656-0009

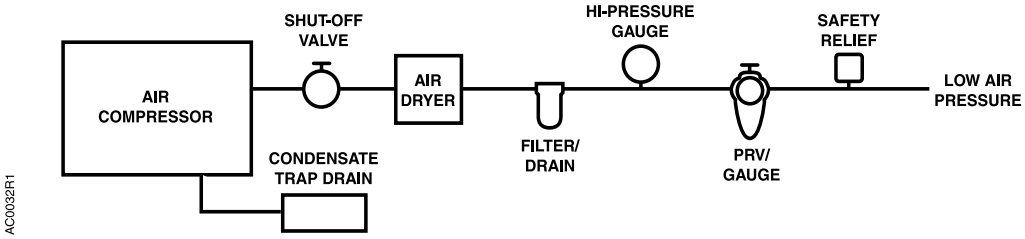
Application ..... Two-pressure systems/ Day-Night or Heat-Cool
Inlet/Outlet Ports ..... 1/2" (12 mm) O.D. SAE flare
Pilot Port ..... 1/8" NPT Female
Actuator ..... 3 to 8 psi, 10 to 15 psi (69 to 103 kPa)
Valve Specifications ..... Cv=2.5, 14 scfm (24 m^3/s) based on 18 psig (124 kPa) with a 1 psi (7 kPa) pressure drop
Shipping Weight ..... 2.0 lb. (0.9 kg)

High Capacity, 3-way Pilot Valve, 656-0010

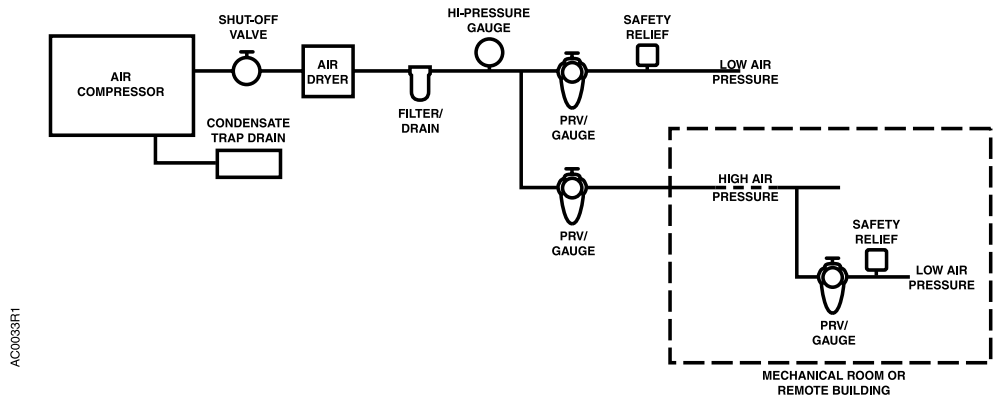
Application ..... Two-pressure systems/ Day-Night or Heat-Cool
Inlet/Outlet Ports ..... 1/2" (13 mm) O.D. SAE flare
Pilot Port ..... 1/8" NPT Female
Actuator ..... 3 to 8 psi (21 to 55 kPa)
Valve Specifications ..... Cv=2.5, 14 scfm (24 m^3/s) based on 18 psig (124 kPa) with a 1 psi (7 kPa) pressure drop
Shipping Weight ..... 2.0 lb. (0.9 kg)

Product Ordering

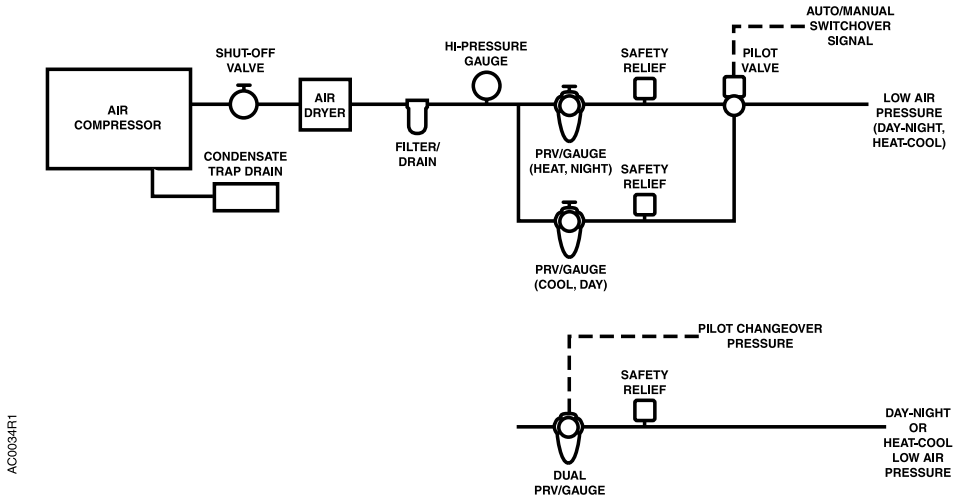
Description	Part No.
Single-stage, Compressed Air Pressure Reducing Valve	**201-1000**
Compressed Air Filter	**908-051**
High Capacity, 3-way Pilot Valve (10 to 15 psi)	**656-0009**
High Capacity, 3-way, Pilot Valve (3 to 8 psi)	**656-0010**



Single Pressure.



Low and High Pressure.



Dual Pressure.

SIEMENS

Ingenuity for life

BT300 Variable Frequency Drives

Available in frame sizes up to 250 hp, the BT300 is well-suited for demanding HVAC environments and helps save 20-50% of energy compared to equipment with little or no control. Built-in features – like a real-time clock, energy savings optimization programming, and a sleep function – help measure energy savings. Built-in wizards get HVAC equipment up and running quickly and accurately.

usa.siemens.com/hvac

External Restrictors

In-line Threaded Restrictor.

In-line Barbed Restrictor.

Tee Barbed Restrictor.

Description

Restrictors are available in a variety of orifice sizes and connection types.

Features

External Types 1, 2 and 3

- Air filter
- 1/8-inch NPT threaded connection (Type 1)
- Barbed connection for 1/4-inch (6 mm) plastic tubing (Types 2 and 3)
- Color-coded (Types 2 and 3)
- Air flow direction arrow to minimize installation errors
- Air flow restrictor capacity molded (Types 2 and 3) or stamped (Type 1) on body

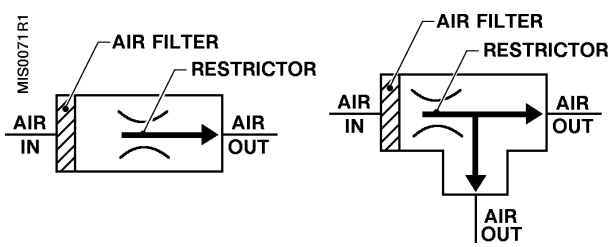
Applications

External restrictors are used:

- For 1-pipe room thermostats, 20 scim (5.5 ml/s), refer to Figure 3.
- For 1-pipe transmitters, 40 scim (11 ml/s), refer to Figures 1 and 2.
- When installed tubing lengths exceed maximum recommended values, refer to Figure 2.
- With check valves to provide air flow time delays:
  – Slow to supply, fast to exhaust, refer to Figure 4.
  – Fast to supply, slow to exhaust, refer to Figure 5.
- VAV vortex control. Use 80 scim (22 ml/s) restrictor in positioning relay control pressure line to prevent cycling.
- When other air capacities, 10 scim (2.7 ml/s), 80 scim (22 ml/s), or 320 scim (87 ml/s) are required to compensate for tubing size or response time.

Figures are on page F-45.

Typical Connections



Specifications

Materials
Type 1 ..... Brass
Type 2 and 3 ..... Plastic

Ambient Temperature
Minimum ..... 40°F (4°C)
Maximum ..... 140°F (60°C)

Air Connections
Type 1 ..... 1/8" NPT thread
Type 2 and 3 ..... Barb for 1/4" (6 mm) OD polyethylene tubing

Mounting ..... In-line

Flow Capacity at Various Air Pressure Drop

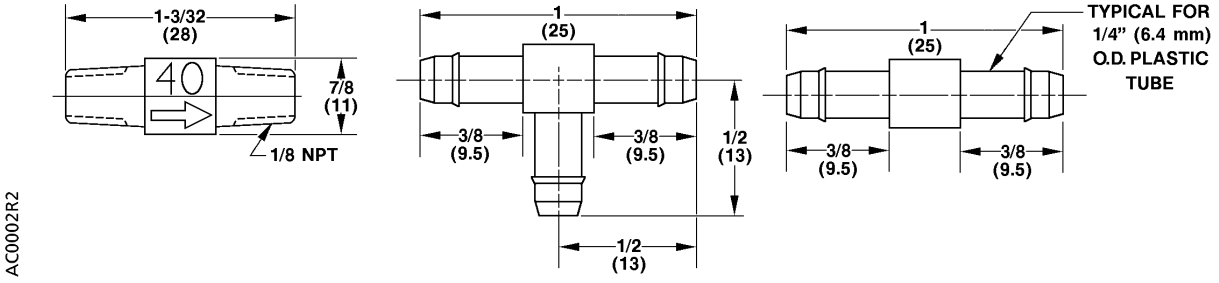
Air Pressure	% of Max. Flow Capacity	Nominal Capacity				
		10	20	40	80	320
22 psi (152 kPa)	100%	10 scim (2.7 ml/s)	20 scim (5.5 ml/s)	40 scim (11 ml/s)	80 scim (87 ml/s)	320 scim (87 ml/s)
10 psi (69 kPa)	70%	7 scim (1.9 ml/s)	14 scim (3.8 ml/s)	28 scim (7.6 ml/s)	56 scim (15 ml/s)	224 scim (61 ml/s)
5 psi (34 kPa)	50%	5 scim (1.4 ml/s)	10 scim (2.7 ml/s)	20 scim (5.5 ml/s)	40 scim (11 ml/s)	160 scim (44 ml/s)
2.5 psi (17 kPa)	35%	3.5 scim (1.0 ml/s)	7 scim (1.9 ml/s)	14 scim (3.8 ml/s)	28 scim (7.6 ml/s)	112 scim (31 ml/s)

Product Ordering

Nominal Air Capacity	Orifice Diameter	Part No.			Barbed Restrictor Body Color
		Type 1 In-line Threaded *(Pkg. of 1)*	Type 2 In-line Barbed *(Pkg. of 5)*	Type 3 Tee Barbed *(Pkg. of 5)*	
10 scim (2.7 ml/s)	0.0035" (0.09 mm)	—	**184-115**	**184-112**	Red
20 scim (5.5 ml/s)	0.0051" (0.13 mm)	**184-040**	**184-116**	**184-113**	Yellow
40 scim (11 ml/s)	0.0074" (0.19 mm)	**184-041**	**184-117**	**184-114**	Green
80 scim (22 ml/s)	0.0098" (0.25 mm)	**184-042**	—	—	—
320 scim (87 ml/s)	0.0201" (0.51 mm)	**184-052**	—	—	—

If inoperative, replace the unit.

Dimensions



Dimensions shown in inches (mm).

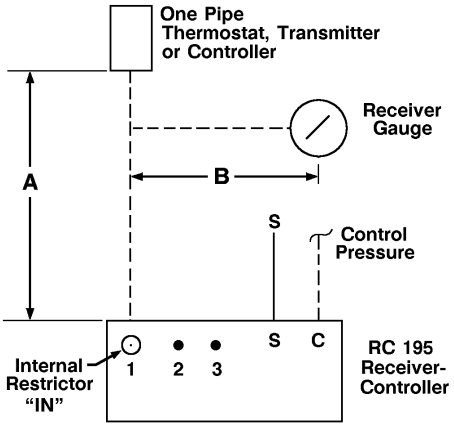


Figure 1.

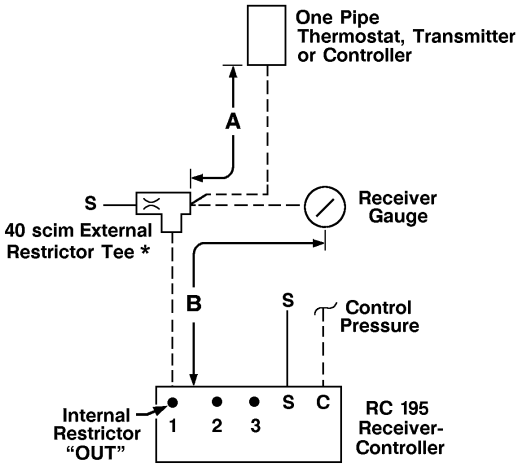


Figure 2.

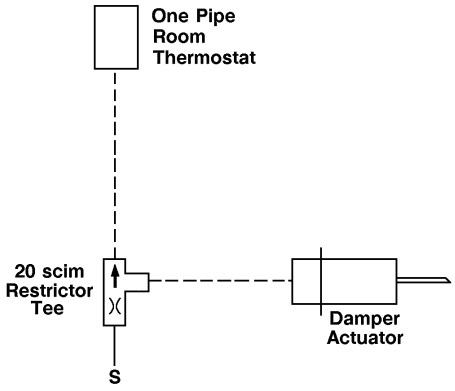


Figure 3.

* Use External Restrictor with RC195 when "A" length exceeds 300 ft. (91 m) or when "A & B" length exceeds 1,000 ft. (305 m).

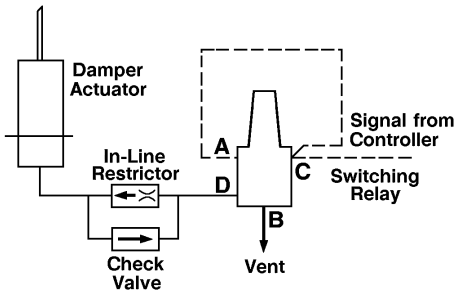


Figure 4.

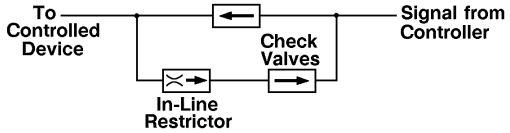


Figure 5.

Pneumatic Tube Fitting Kit

141-0601 Pneumatic Tube Fitting Kit.

141-464 Case.

Description

The Pneumatic Tube Fitting Kit provides the service or installation mechanic with a compact and convenient source of the most commonly used brass barbed fittings for 1/4-inch (6 mm), 3/8-inch (10 mm) and 1/2-inch (13 mm) OD polyethylene tubing.

Features

- Rustproof, odor and oil resistant case
- Translucent lid for easy identification of fittings
- Double positive latches
- 15 dividers for configuring up to 24 compartments
- Lower cost for fittings
- Representative quantities of commonly used 1/4-inch (6 mm), 3/8-inch (10 mm) and 1/2-inch (13 mm) brass fittings

Applications

The Pneumatic Tube Fitting Kit is useful for servicing, modifying, or adding to pneumatic control systems. Purchasing in quantity reduces material costs. Labor savings is the major reason to have this convenient kit in your service shop or van.

Specifications

Case Material ..... Copolymer Resin

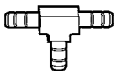
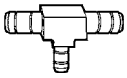
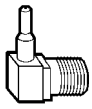
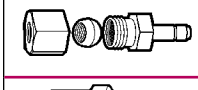
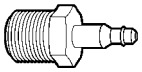
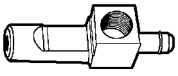
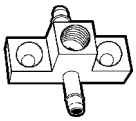
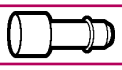
Dimensions ..... 15" L x 11.75" W x 2.5" D
(381 mm L x 298 mm W x 64 mm D)

Shipping Weight
Case .....3.0 lb. (1.4 kg)
Case and Fittings .....7.0 lb. (3.2 kg)

Other Supplies and Equipment

The fittings in this kit represent most of the commonly used polyethylene tube fittings required by HVAC mechanics.

Kit Includes:

	Description	Quantity
	**Barbed Tee.**	
	• 1/4" (6 mm)	12
	• 3/8" (10 mm)	6
	• 1/2" (13 mm)	6
	**1/4" (6 mm) Barbed Reducing Tee.**	
	• 3/8" (10 mm)	6
	• 1/2" (13 mm)	6
	**90° Elbow.**	
	• 1/4" (6 mm)	12
	• 3/8" (10 mm)	6
	• 1/2" (13 mm)	6
	**1/8" NPT Male x 90° Elbow.** • 1/4" (6 mm) or 5/32" (4 mm)	12
	**1/4" (6 mm) OD Copper Coupling.** • 1/4" (6 mm)	10
	**1/8" NPT Male.** • 1/4" (6 mm)	10
	**Gauge Tee 1/8" NPT Male/NPT Female.** • 1/4" (6 mm)	10
	**Gauge Tee 1/8" NPT Female.** • 1/4" (6 mm)	5
	**Plug.** • 1/4" (6 mm)	10
	**Reducer Coupling OD.** • 1/4" (6 mm)	10
	**Coupling.**	
	• 1/4" (6 mm)	12
	• 3/8" (10 mm)	10
	• 1/2" (13 mm)	10

Product Ordering

Description	Part No.
Complete Kit with 159 fittings	**141-0601**
Case only	**141-464**

Controls Cabinet/Enclosure

567-556 Small Panel with Window.

567-351 Exposed Panel Assembly.

Description

Designed to conveniently group control system components, 567 Controls Cabinets are available in two styles, exposed and flush mount.

With the exposed panels, the control components can be mounted in the door or mounted within the enclosure using the perforated panel. The cabinet housing, door, and perforated mounting plate may be ordered as a unit or separately.

The flush mount panel is designed to recess the panel into a wall. The controls are mounted within the enclosures on a perforated panel. Order both the cabinet and the mounting kit.

Features

- Panels are symmetrical, and can be mounted with door hinge on left or right-hand side
- Removable door with lock and keys
- Removable perforated subpanel permits mounting controls without drilling holes
- Attractive gray finish permits use in occupied areas
- Support kit is available for floor mounting (medium and large exposed cabinets only)
- Variety of mounting methods available
- Knockouts are provided for electrical or pneumatic piping
- Panels listed under UL508 Industrial Control Panel Enclosures
- CSA listed under LR 84214
- NEMA Type 1
- Exposed Panels available in 6" or 9" depth

Applications

The 567 Controls Cabinets provide a convenient central location for equipment mounting, termination of piping, wiring adjustment, and calibration.

Panels may be used with DDC and/or pneumatic systems using either copper or polyethylene tubing for transmission lines, with wired electric/electronic systems, or with a combination of both. Within the panel enclosure, use polyethylene pneumatic tubing for easy installation and arrangement and for a flexible connection to hinged door components.

The empty panel can be installed at the job to permit early rough-in of conduit. Since the door and subpanel can be separated from the cabinet, controls may be mounted to the door subpanel either at the job site or at the field office and connected to the cabinet at your convenience. After reassembly, final connections are then made.

Specifications

Exposed Panel

Dimensions – 9" Depth

Size 3: ..... 24.94" H x 24.38" W x 9.38" D (633 mm H x 619 mm W x 238 mm D)

Size 4: ..... 36.5" H x 24.38" W x 9.38" D (927 mm H x 619 mm W x 238 mm D)

Dimensions – 6" Depth

Size 1: ..... 19.5" H x 16.38" W x 5.75" D (495 mm H x 416 mm W x 146 mm D)

Size 2: ..... 20.0" H x 20.0" W x 6.0" D (508 mm H x 508 mm W x 152 mm D)

Size 3: ..... 24.94" H x 24.38" W x 6.0" D (633 mm H x 619 mm W x 152 mm D)

Size 4: ..... 36.5" H x 24.38" W x 6.0" D (927 mm H x 619 mm W x 152 mm D)

Dimensions – 3.5" Depth

Size 0: ..... 12" H x 14" W x 3.5" D (305 mm H x 356 mm W x 89 mm D)

Shipping Weights – 9" Depth

Size 3: ..... 39.0 lb. (18 kg)

Size 4: ..... 72.0 lb. (33 kg)

Shipping Weights – 6" Depth

Size 1: ..... 20.0 lb. (9 kg)

Size 2: ..... 28.0 lb. (13 kg)

Size 3: ..... 38.0 lb. (17 kg)

Size 4: ..... 63.0 lb. (29 kg)

Shipping Weights – 3.5" Depth

Size 0: ..... 12.0 lb. (5.5 kg)

Flush Mount Panel – 567-391

Dimensions ..... 19.5" H x 16.13" W x 5.13" D (495 mm H x 410 mm W x 130 mm D)

Shipping Weight ..... 20.0 lb. (9 kg)

Panel Door

Shipping Weights

Size 1: ..... 8.0 lb. (3.6 kg)

Size 3: ..... 13.0 lb. (5.9 kg)

Size 4: ..... 20.0 lb. (9 kg)

Size 0: ..... 13.0 lb. (5.9 kg)

Product Ordering

Size	Part No. – 9"	Part No. – 6"
Exposed Panel Assembly		
Size 1	—	**567-351**
Size 2	—	**567-454**
Size 3	**567-352**	**567-452**
Size 4	**567-353**	**567-453**
Panel Door Only		
Size 1	**567-361**	—
Size 3	**567-362**	—
Size 4	**567-363**	—
Panel Enclosure		
Size 1	**567-371**	—
Size 3	**567-372**	—
Size 4	**567-373**	—
Mounting Plate Only		
Size 1	**567-381**	—
Size 3	**567-382**	—
Size 4	**567-383**	—
Flush Mount Panel & Kit		
Flush Mount Panel	**567-391**	—
Flush Mount Kit contains escutcheon, hinged locking door and two keys	**567-390**	—
Small Panel with Mounting Plate, Key Lock		
Size 0 with blank door	**567-551**	
Size 0 with window door	**567-556**	

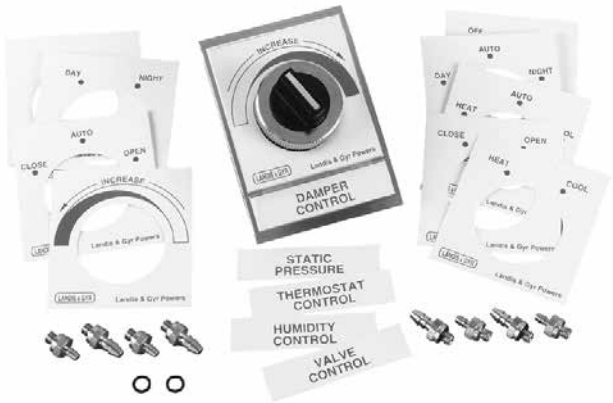
Accessories

Description	Part No.
Replacement Door Lock & Key Assembly	**567-225**
Floor Mount Support Kit (Size 3)	**567-334**
Floor Mount Support Kit (Size 4)	**567-335**

Literature

For additional details, see Siemens technical instruction #155-272P25 for CP567 Control Cabinets.

Selector Switches



786 Floating Selector Switch.

Description

The 786 Selector Switch is used to deliver or stop the flow of compressed air to selected controllers valves, or dampers in commercial applications.

The common port may be connected to two or three ports depending on the switch model.

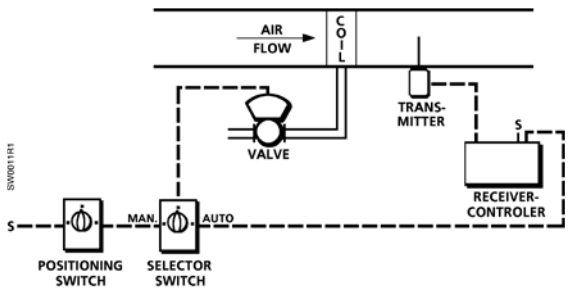
Features

- Compact design and lightweight construction
- Click stop for positive positioning
- Easy panel mounting through 1-7/32-inch (31 mm) diameter knockout
- 10-32 Female connection ports
- Dial label and nomenclature sheets for most applications
- Barb fitting for 5/32-inch (4 mm) OD tubing for port connections

Applications

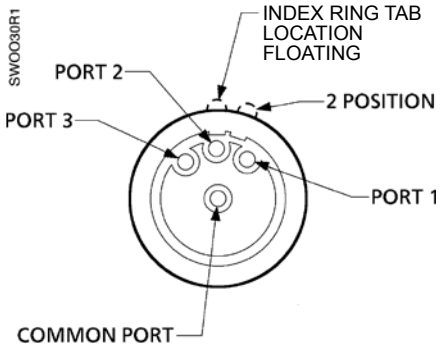
The 786 floating Selector Switch is used in compressed air systems to connect and direct supply and signal pressures. Typical applications are OPEN/CLOSE damper position, DAY/NIGHT thermostat operation, and ON/OFF/AUTO system operation. The compact design makes these especially adaptable to panel groupings.

Application Drawing



Standard and Large Capacity.

Typical Connections



2- and 3-position Selector Switch.

Specifications

Medium ..... Air

Air Connections
- Standard Switch ..... 1/16" NPT
- LC Switch ..... 1/8" NPT

Inlet Pressure
- Nominal ..... 30 psi (206 kPa)
- Maximum ..... 125 psi (858 kPa)

Operating Temperature ..... 35º to 150ºF (2º to 66ºC)

Capacity at 1 psi (7 kPa) Differential
- 5/32" (4 mm) OD tubing ..... 250 scim (68 ml/s)
- 1/4" (3 mm) OD tubing ..... 480 scim (130 ml/s)

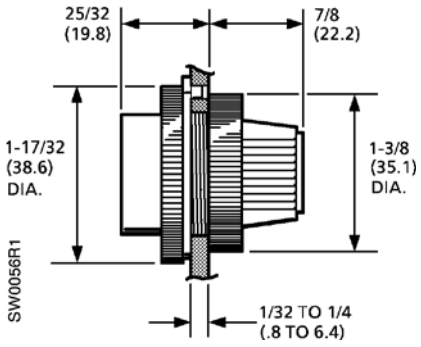
Port Threads ..... 10-32 NPT female

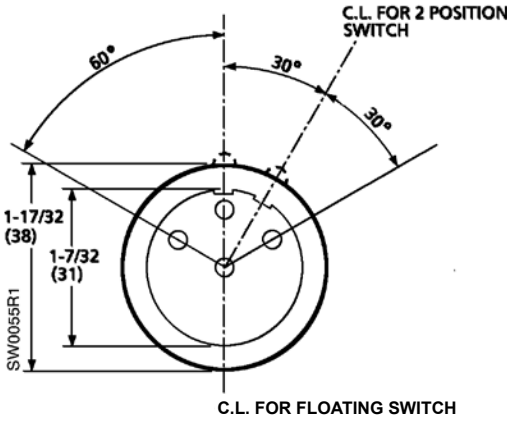
Materials
- Body ..... Acetal
- O-rings ..... Buna N

Product Ordering

Description	Part No.
2-position	**786-0600**
Floating	**786-0610**

Dimensions





Dimensions shown in inches (mm).

Positioning Switch

141 Positioning Switch.

Description

The 141 Positioning Switch is used to deliver any manually selected pressure over a range of 0 to 30 psi (0 to 207 kPa) to air-operated equipment. The adjustment knob can be left free to rotate or held in position by snapping the locking ring.

Features

- Compact design and lightweight construction
- Non-rising low torque pressure adjustment knob with snap-action locking ring for maintaining pressure setting
- Available in manual select or bleed type models
- Easy to surface or panel mount
- Easy panel mounting through 1-7/32" (31 mm) diameter knockout
- Includes dial label and nomenclature sheet for most applications

Applications

The 141 Positioning Switch is used in compressed air systems to maintain a uniform outlet pressure despite changes in the inlet pressure and changes in downstream flow requirements; especially suited for installations where space is limited and where panel mounting with a flush mount knob is desired.

Specifications

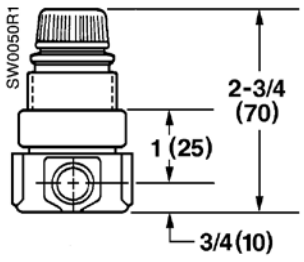
Medium ..... Air
Air Connections ..... 1/8" NPT female
Inlet Pressure
Nominal ..... 30 psi (206 kPa)
Maximum ..... 400 psi (2745 kPa)

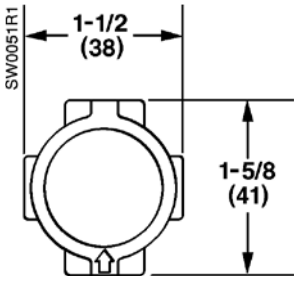
Operating Temperature ..... 0º to 150ºF (-18º to 66ºC)
Capacity at 1 psi (7 kPa) Differential
5/32" (4 mm) OD tubing ..... 500 scim (140 ml/s)
1/4" (6 mm) OD tubing ..... 650 scim (180 ml/s)
Shipping Weight ..... 0.5 lb. (0.23 kg)

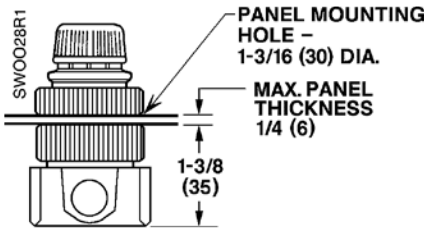
Product Ordering

Description	Part No.
Positioning Switch	**141-0600**

Dimensions







Dimensions shown in inches (mm).

Electric Enthalpy Control Switch

141 Enthalpy Control Switch.

Description

The 141 Electric Enthalpy Control Switch is designed to sense the BTU heat content of ventilation air. A SPST, snap-acting electric switch automatically initiates corrective damper control or alarm circuitry whenever the sensed air condition either rises above or falls below desired settings.

Features

- SPST, snap-acting switch
- Direct mount on ventilation duct
- Mounting template and screws provided
- Factory-calibrated
- Adjustable

Applications

The 141 Electric Enthalpy Control Switch senses outdoor ventilation air on air conditioning systems to automatically reduce ventilation whenever the outdoor air has a higher than desired heat content.

Reduction of outdoor air, when it has a higher heat content than return air from the interior space, provides significant load reduction and energy savings for summer air conditioning systems.

Reduction of system load also tends to improve system performance by allowing more effective space dehumidification (improved latent heat removal under light load) or by reducing the time span required to cool a space on initial starting.

Specifications

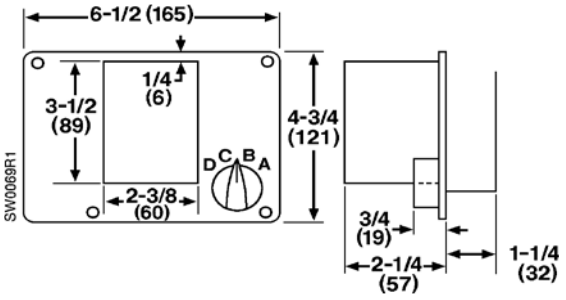
Electrical Rating ..... 2.5 amps max. @ 24 Vac
Electrical Connection ..... Metal enclosure with 1/2" (13 mm) conduit opening
Switching Action ..... SPDT
Differential ..... Approx. 8% RH and 2°F (-29°C)
Shipping Weight ..... 1.5 lb. (0.7 kg)

Product Ordering

Description	Part No.
Electric Enthalpy Control Switch	**141-0566**

Dimensions

Electric Enthalpy Control Switch



Dimensions shown in inches (mm).

Differential Static Pressure Airflow Switches

141 Differential Static Pressure Airflow Switches.

Description

The 141 Airflow Switch senses static differential pressure and at setpoint open/closes a set of electrical contacts.

Features

- Available in ranges:
  – 0.05 to 1" W.C. (12.45 to 249 Pa)
  – 1 to 12" W.C. (249 to 2988 Pa)
- Available with auto reset
- Can be used in multiple applications:
  – Proof of flow
  – High limit cut out
  – Filter 'dirty' indication

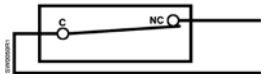
Applications

The 141 Airflow Switch actuates electrical circuits (positive pressure), fan inlet (negative pressure), or across the fan (differential pressure) to detect excessively high positive pressures or low negative pressures and turn off the fan before damage occurs to ducts or dampers.

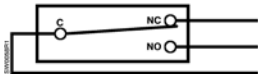
The manual reset switch (141-0575) should be used for applications that require safety lock out (shut down) of the fan. The switch can be used on the fan discharge.

The auto reset switch should be used for applications that require positive proof of airflow (or fan operation) or detect high differential pressures associated with dirty air filters or similar maintenance alarms that do not require safety lock or (shut down) of the fan.

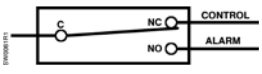
Typical Connections



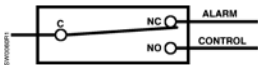
141-0575 Manual Reset Switch.



141-0518 and 141-0574 Auto Reset Switches.



Auto Reset Switches to Prove Excessive Airflow or Pressure.



Auto Reset Switches to Prove Insufficient Airflow or Pressure.

Specifications

Medium ..... Air

Switch Action Manual Reset
(must be manually rest by operator)..... NC; only opens on increasing pressure signal

Ambient Temperature Range ..... -40° to 180°F (-40° to 82°C)

Maximum Overpressure ..... 0.5 psi (3.4 kPa)

Mounting Position ..... Diaphragm in any vertical plane

Body ..... Zinc-plated Steel with blue erudite dip

Electrical Ratings
Non-inductive ..... 15 amps @ 120 to 277 Vac
Pilot Duty ..... 300 VA @ 120 to 277 Vac

Conduit Opening ..... 1/2" (13 mm) conduit size

Sample Line Connectors ..... 2 connectors, complete with nuts and ferrules, which accept 1/4" (6 mm) OD copper or polyethylene tubing

Material ..... Aluminized Steel

Agency Approvals ..... UL MFHX File MH9888
CSA 1811M25

Dimensions ..... 6.13" H x 3.88" W x 3.19" D
(156 mm H x 98 mm W x 81 mm D)

Shipping Weight ..... 1.0 lb. (0.45 kg)

Product Ordering

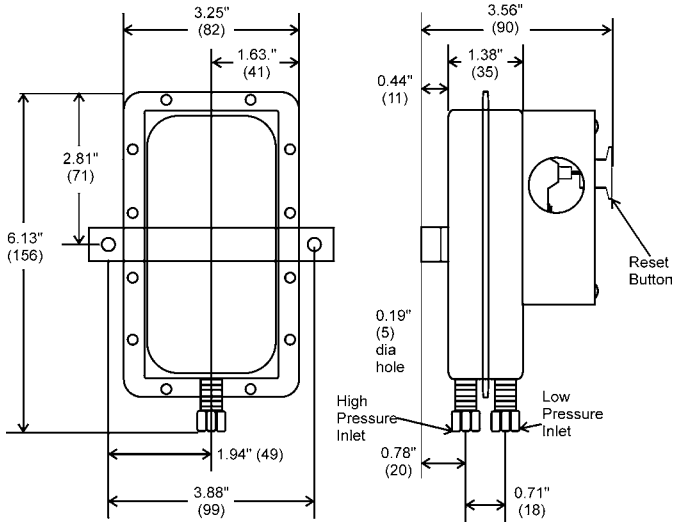
Setpoint Range (Field Adjustable)	Switching Action/Reset	Factory Setpoint Accuracy*	Differential*	Part No.
1" to 12" W.C. (250 to 3000 kPa)	SPDT/Auto Reset	@ 12" ± 1.5" W.C. (3000 Pa ± 375 Pa)	Approx. 0.6" to 1.5" W.C. (150 Pa to 375 Pa)	**141-0518**
1" to 12" W.C. (250 to 3000 kPa)	SPST/ Manual Reset	1" ± 0.1" W.C. (250 Pa ± 25 Pa) to 12" ± 1.2" W.C. (3000 Pa ± 300 Pa)	Not Applicable	**141-0575**
0.05" to 1.0" W.C. (12.5 to 250 kPa)	SPDT/ Auto Reset	@ 1" ± 0.2" W.C. (250 Pa ± 50 Pa)	Approx. 0.06" to 0.6" W.C. (15 Pa to 150 Pa)	**141-0574**

*Setpoint accuracy tolerance and switching differential decrease proportional to setpoint decrease.

Accessories Ordering

Description	Part No.
High Accuracy Static Pressure Sensor	**269-062**
Static Pressure Sensing Kit	**189-142**

Dimensions



Dimensions shown in inches (mm).

Pressure Electric Switch

134-1450 Pressure Electric Switch.

134-1460 Pressure Electric Switch.

Description

The 134 Pressure Electric Switches are heavy duty pressure-actuated, mechanical contact type switches used to open or close electrical circuits from pressure signals in pneumatic control systems.

Features

- DPST or SPDT snap-acting
- External adjustment and indication of setpoint and differential
- Screw terminals are easily accessible for field wiring
- Long life, heavy duty contact mechanism
- Normally open or normally closed contacts models available
- Not position sensitive, can be mounted in any position
- Mounting bracket included

Applications

The 134 Pressure Electric Switches are used wherever it is necessary to close (or open) an electrical circuit on the basis of a predetermined air pressure signal. This switch is to be used in areas protected from the weather. Typical applications include the control of air compressors, fans, pilot lights, resistance heating elements, control of electric heating loads or motors on fans, pumps or small air compressors.

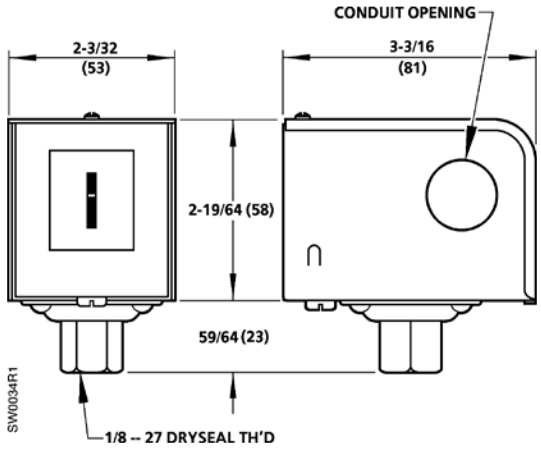
Specifications

Medium ..... Compressed air
Setpoint Range ..... 3 to 30 psi (20 to 200 kPa)
Differential ..... Adjustable from 1.5 to 20 psi (10 to 138 kPa)
Maximum Pressure ..... 50 psi (345 kPa)
Pressure Connection ..... 1/8" male NPT
Conduit Opening .....1/2" (13 mm) nominal conduit
Ambient Temperature .....32° to 140°F (0° to 60°C)
Pilot Duty
134-1450, 134-1451 .....125 VA @ 600 Vac
134-1460 .....125 VA @ 24 to 277 Vac
Agency Approval (for 134-1450 only) ..... UL file E 35198
Shipping Weight .....2.0 lb. (0.9 kg)

Product Ordering

Description	Switch Action	Electrical Rating	Part No.
Pressure Differential, Adjustable Switch, 1.5 to 10 psi	DPST (NO)	**IND:** 12 A @ 120, 208 & 240 Vac	**134-1450**
	DPST	**Non-IND:** 12 A @ 120 to 277 Vac	**134-1451**
Fixed Differential Switch 2.0 psi	SPDT (NC)	**IND:** 16 A @ 120 Vac;8 A @ 240 Vac **Non-IND:** (SPDT) 16 A @ 120 to 277 Vac (SPST) 24 A @ 120 to 277 Vac	**134-1460**

Dimensions



Dimensions shown in inches (mm).

Three-way EP Valves

265-1027
3 EP Valve.

265-1021
3 EP Valve.

Description

A general purpose, electrically operated, two-position three-way valve designed to control air flow, the 265 Three-Way Valve can be used for interlock between an electrical system and a pneumatic control system; available in open frame (yoke) and junction box (splice box) types.

Features

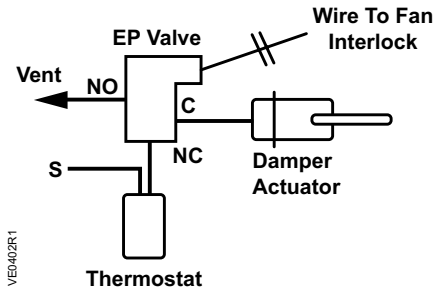
- UL and cUL recognized per UL429
- Valve may be mounted in any position
- Mounting holes provided in the yoke
- Wide selection of AC voltages
- Junction box and open frame types available

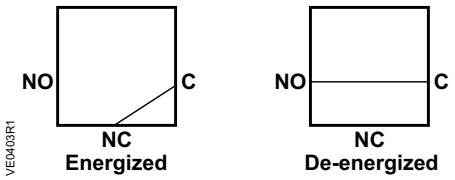
Applications

The 265 EP Three-way Valves are commonly-used to alternately apply pressure to and exhaust pressure from pneumatically-controlled devices, such as valves and damper actuators, by an electrical input energizing or de-energizing the solenoid of the valve.

A standard method is shown in the Application Drawings below. The input air is connected to port 1 (normally closed) and the output is connected to port 3 (common). Thus when the solenoid is energized, port 1 connects to port 3 permitting the thermostat to control the damper actuator. When the solenoid is de-energized, port 2 (normally open) is connected to port 3, exhausting air from the actuator permitting it to return to its normal position.

Application Drawings





Specifications

Ambient Temperature
- Junction Box Type ..... 0° to 100°F (0° to 38°C)
- Open Frame Type ..... 0° to 110°F (0° to 43°C)

Controlled Medium ..... Air only

Maximum Air Pressure ..... 50 psi (207 kPa)

Air Flow Capacity
- Inlet Pressure ..... 20 psi (138 kPa)
- Differential Pressure ..... 1 psi (7 kPa)
- Air Flow ..... 600 scim (164 cm^3/s)

Cv Flow Factor 0.06

Electrical Ratings
- Voltages ..... 24 to 240 Vac
- Power Consumption ..... 6 VA

Mounting Bracket ..... 1 oval and open-ended hole; part of the yoke.

Junction Box ..... NEMA 1 Enclosure

Air Connections ..... Barbed fittings for 1/4" (6 mm) OD tubing

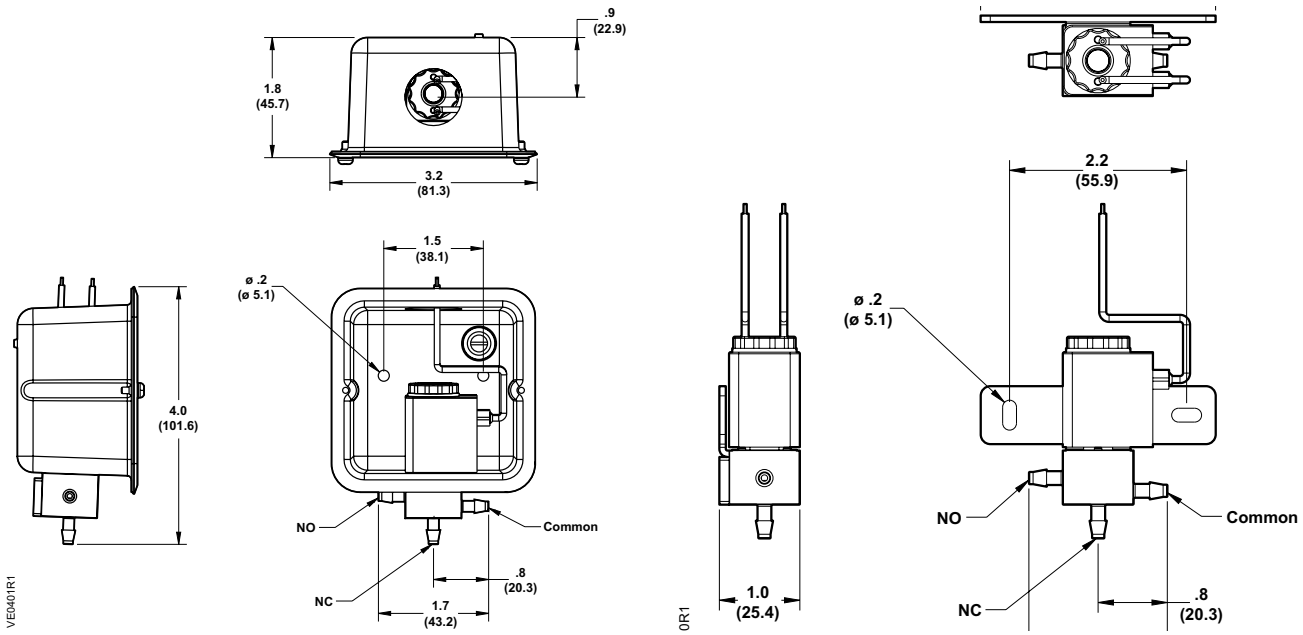
Materials
- Body ..... Glass Filled Thermoplastic
- Internal ..... Buna N, Copper, Stainless Steel

Shipping Weight
- Open Frame Type ..... 0.25 lb. (0.11 kg)
- Junction Box Type ..... 0.50 lb. (0.23 kg)

Product Ordering

AC Voltage		
60 Hz	**50 Hz**	**Part No.**
Junction Box		
24	—	**265-1021**
120	110	**265-1022**
240	220	**265-1024**
Open Frame		
24	—	**265-1027**
120	110	**265-1028**

Dimensions



Dimensions shown in inches (mm).

Multipurpose Relay

243-0009
Multi-purpose Relay.

Description

The 243 Multipurpose Relay is pneumatic auxiliary devices designed to provide a variety of pneumatic control functions for the typical control system.

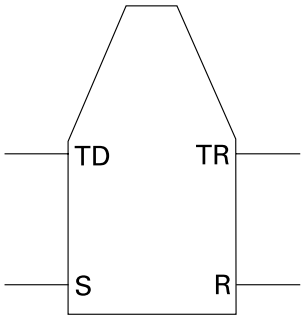
Features

- Use for your most common applications
- High accuracy/repeatability
- Two-valve design prevents constant air loss
- Internal relief mechanism for fail safe operation

Applications

The 243 Multipurpose Relay is used as direct and reverse acting, amplifying, signal advancing, minimum pressure relay, and lower pressure transfer.

Typical Connections



R = output
TD = direct acting input
TR = reverse acting input
S = air supply

For more detailed information on applications, refer to page G-27 in the Engineering section.

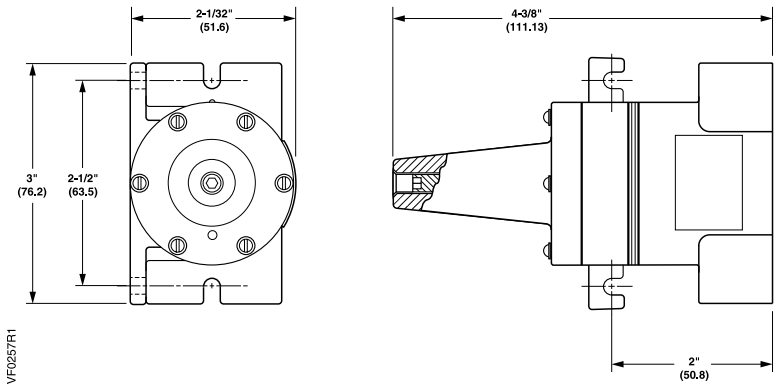
Specifications

Ambient Temperature Range
Operational....40° to 120°F (4° to 49°C)
Storage....-20° to 120°F (-29° to 49°C)
Hysteresis .... 0.25 psi (1.7 kPa)
Relief Valve Differential .... 1.0 psi (6.9 kPa)
Air Capacity .... 400 scim (109 ml/s)
Air Consumption (max.) .... 7 scim (2 ml/s)
Spring Range .... 0 to 25 psi (0 to 172 kPa)
Air Connections.... 1/8" NPT
Spring Adjustment Range .... 25 psi (0 to 172 kPa)
Supply Air
Normal.... 25 psi (172 kPa)
Maximum.... 30 psi (207 kPa)
Shipping Weight ....1.5 lb. (1.35 kg)

Product Ordering

Description	Part No.
Multipurpose Relay	**243-0009**

Dimensions



Dimensions shown in inches (mm).

Balance-retard Relay

243-0010
Balance-retard Relay.

Description

The 243 Balance-retard Relay is gradual-acting, pneumatic devices designed to provide special functions such as balancing, signal retard, hesitation, and pressure limiting.

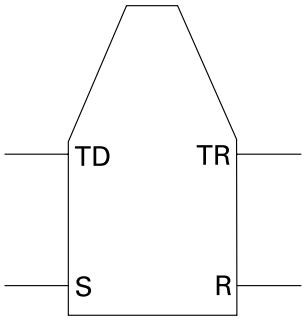
Features

- Internal relief valve for fail-safe operation
- Adjustable retard setting

Applications

The 243 Balance-retard Relay is adjustable and the ports can be pneumatically piped in a variety of different combinations. Each combination represents a relay application that can be used to perform a specific function in a control loop. The relay is factory set for balancing action.

Typical Connections



R = output
TD = direct acting input
TR = reverse acting input
S = air supply

For more detailed information on applications, refer to page G-27 in the Engineering section.

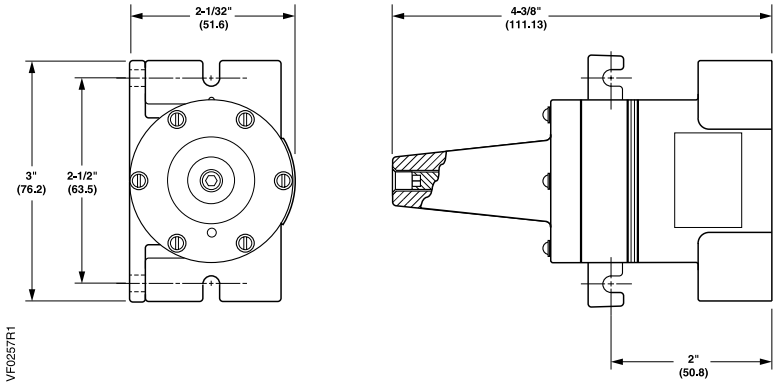
Specifications

Ambient Temperature Range
Operational....40° to 120°F (4° to 49°C)
Storage....-20° to 120°F (-29° to 49°C)
Hysteresis ....0.25 psi (1.7 kPa)
Relief Valve Differential ....1.0 psi (6.9 kPa)
Air Capacity ....400 scim (109 ml/s)
Air Consumption (max.) ....7 scim (2 ml/s)
Spring Range ....0 to 25 psi (0 to 172 kPa)
Air Connections....1/8" -27 Female NPT
Spring Adjustment Range
Balance ....0 to 15 psi (0 to 103 kPa)
Retard....0 to 10 psi (0 to 69 kPa)
Supply Air
Normal....25 psi (172 kPa)
Maximum....30 psi (207 kPa)
Shipping Weight ....1.5 lb. (1.35 kg)

Product Ordering

Description	Part No.
Balance-retard Relay	**243-0010**

Dimensions



Dimensions shown in inches (mm).

Analog Relay

243-0011 Analog Relay.

Description

The 243 Analog Relays are pneumatic auxiliary devices designed to assist the engineer in obtaining specialized control action within a pneumatic control system.

Features

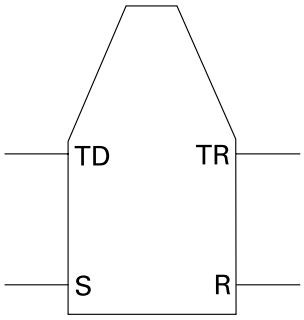
- Multi-function
- Lightweight commercial model with molded barb fittings for 1/8" (3 mm) polyetheylene tubing
- Heavy duty die-cast model with 1/8" NPT ports
- Mounting bracket included with both models; can be mounted in any position

Applications

The 243 Analog Relay is used for amplifying, summing, differential pressure, ratio control higher pressure and signal characterization control. The relay has a two-valve design to ensure stability and prevent unnecessary air consumption.

This relay does not require any adjustment or calibration and can be mounted in any position. An internal relief is provided to assure fail-safe operation on loss of air supply.

Typical Connections



R = output
TD = direct acting input
TR = reverse acting input
S = air supply

For more detailed information on applications, refer to page G-27 in the Engineering section.

Specifications

Air Supply
Normal..... 0 to 25 psi (0 to 172 kPa)
Maximum..... 30 psi (207 kPa)

Ambient Temperature Range
Operating.....40° to 120°F (4° to 49°C)
Storage.....-20° to 120°F (-29° to 49°C)

Hysteresis ..... 0.25 psi (1.7 kPa)

Relief Valve Differential ..... 1.0 psi (6.9 kPa)

Air Capacity ..... 400 scim (109 ml/s)

Air Consumption (max.) ..... 7 scim (2 ml/s)

Mounting .....Integral brackets for wall or panel

Spring Adjustment Range Action .....Gradual

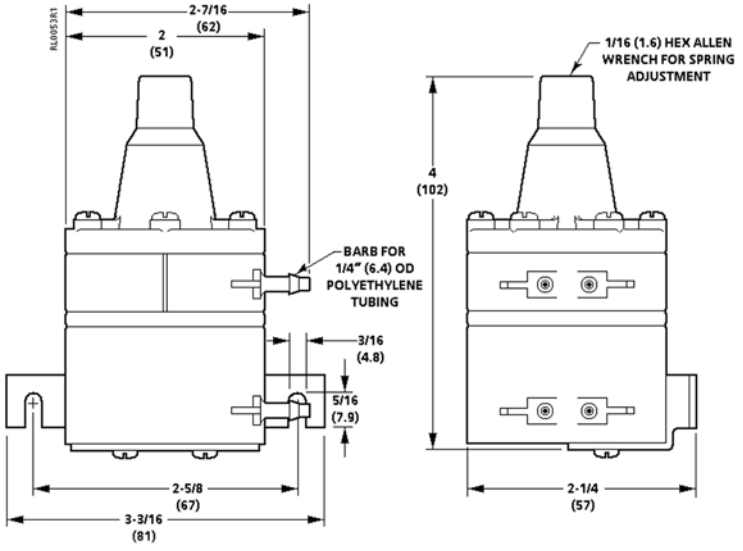
Supply Air
Normal..... 25 psi (172 kPa)
Maximum..... 30 psi (207 kPa)

Shipping Weight .....1.5 lb. (1.35 kg)

Product Ordering

Description	Part No.
Analog Relay	**243-0011**

Dimensions



Dimensions shown in inches (mm).

Switching Relay

243 Switching Relay.

Description

The 243 Switching Relay is a compact three-way air valve that can be used to perform a variety of switching and diverting functions.

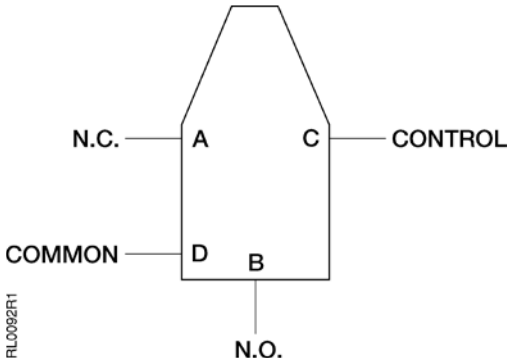
Features

- Adjustable changeover pressure
- Factory calibrated at 9 psi (62 kPa) for most applications
- 1/8" NPT threaded ports

Applications

The 243 Switch Relay action connects common port to either of two other ports.

Typical Connections



When air pressure to the C port is increased, ports A and D are connected. When air pressure to the C port is decreased, ports B and D are connected.

For more detailed information on applications, refer to page G-27 in the Engineering section.

Specifications

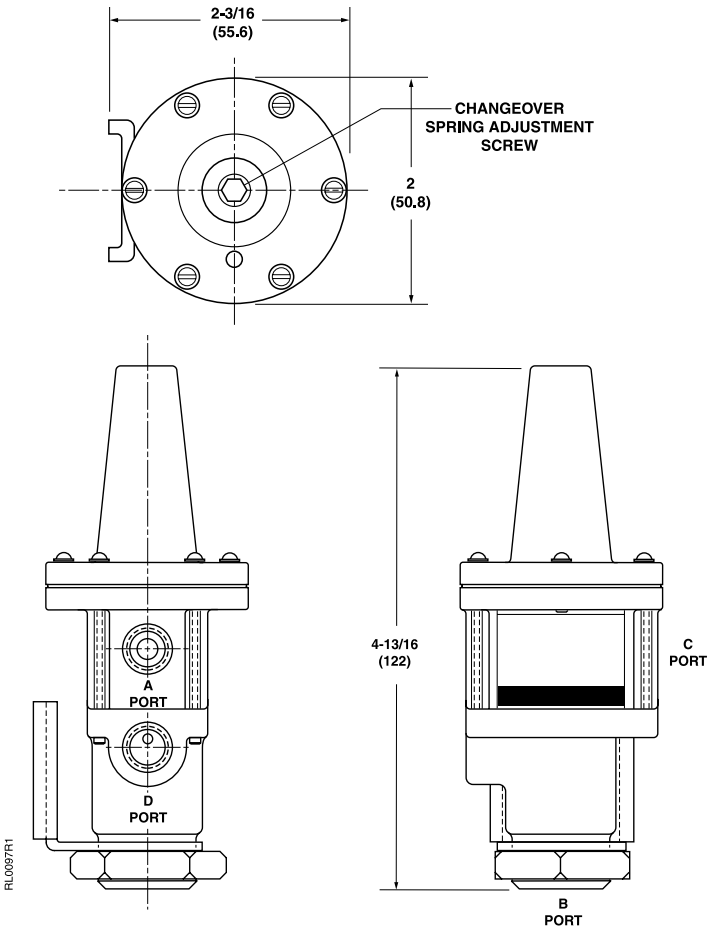
Maximum Instrument Air Supply ..... 30 psi (207 kPa)
Changeover Range ..... 3 to 25 psi (21 to 172 kPa)
Standard Changeover Setting ..... 9 psi (62 kPa)
Changeover Differential (nominal) ..... 1.5 psi (10.3 kPa)
Ambient Temperature
Maximum..... 160°F (71.1°C)
Minimum ..... -20°F (-28.8°C)
Air Connection ..... 1/8" NPT

Adjustable Changeover Range ..... 0 to 25 psi (0 to 172 kPa)
Changeover Differential .....1.5 psi (10 kPa) nominal
Standard Changeover Settings ..... 9 psi (62 kPa)
Nominal Capacity @ 2 psi ΔP
A Port ..... 800 scim
B Port ..... 1100 scim
Shipping Weight .....2.0 lb. (0.9 kg)

Product Ordering

Description	Part No.
Switching Relay	**243-0001**

Dimensions



Dimensions shown in inches (mm).

Reverse Acting Relay

243 Reverse Acting Relay.

Description

The 243 Reverse Acting Relay provides a proportional output signal that varies inversely with the input signal. A spring adjustment is provided to allow setting a desired reverse acting schedule required by a particular application.

Features

- Lightweight and compact
- Can be mounted in any position
- Mounting bracket and screws included
- Field adjustable spring range
- Can be used as a signal inverting relay
- Force-balance operation minimizes air consumption
- Internal relief provides fail-safe operation
- Amplifies air volume to minimize system lag

Applications

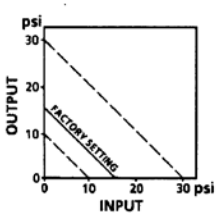
The 243 Reverse Acting Relay has two applications. For both, the supply air pressure must be equal to or greater than the spring setting.

Signal Reverse Acting Relay Application: The relay reverses a controller signal to match the operation of a control element. An increase in input pressure causes equivalent decrease in output pressure.

Signal Inverting Application: A typical application reverses the action of a face and bypass damper actuator on a coil used for both heating and cooling. The output pressure is directly proportional to the input pressure until one-half the spring setting is reached. After this point, the output pressure is inversely proportional to the input until the output reaches zero.

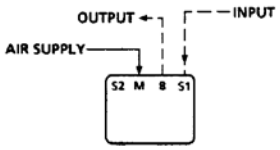
Typical Input/Output Drawings

Reverse Acting Relay Application

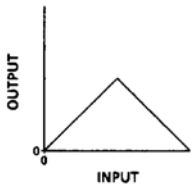


An increase in input pressure causes equivalent decrease in output pressure.

Input S1	Input B
0	15
5	10
10	5
15	0

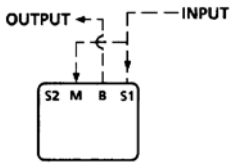


Signal Inverting Application



The output pressure is directly proportional to the input pressure until one-half the spring setting is reached. After this point, the output pressure is inversely proportional to the input until the output reaches zero.

Input S1+M	Output B
3	3
7.5	7.5
12	3
15	0



Key

B	Output Pressure	**S2**	Not Used
M	Supply Air	**SP**	Spring Setting
S1	Input Pressure		

Specifications

Operating Range ..... 0 to 30 psi (0 to 207 kPa)

Adjustment Using 5/64" (2 mm) Hex Wrench
Range Adjustment ..... 10 to 30 psi (69 to 207 kPa)
Factory Setting ..... 15 psi (103 kPa)

Maximum Ambient Temperature ..... 104°F (60°C)

Maximum Air Pressure ..... 30 psi (207 kPa)

Air Capacity ..... 230 scim (63 ml/s)

Air Consumption for Air Compressor Sizing ..... 29 scim (8 ml/s)

Material
Housing ..... Glass-filled Nylon

Air Connections ..... Barbed nipple for 1/4" (6 mm) OD polyethylene tubing

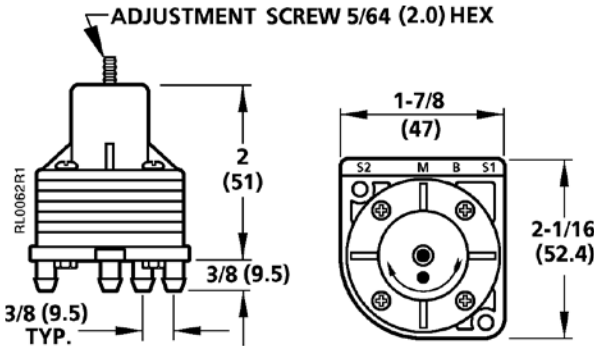
Mounting ..... Mounting bracket included

Shipping Weight ..... 0.27 lb. (0.13 kg)

Product Ordering

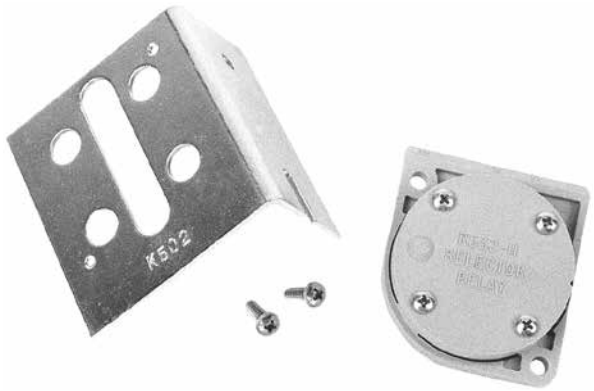
Description	Part No.
Reverse Acting Relay	**243-0024**

Dimensions



Dimensions shown in inches (mm).

Highest Pressure Signal Selector



243 Highest Pressure Signal Selector and Mounting Bracket.

Description

A dual input, single output logic device, the 243 Highest Pressure Signal Selector, is used in pneumatic control systems to compare pressure signals.

Features

- Selects the highest of two input signals
- Small, lightweight
- Mounting bracket provided

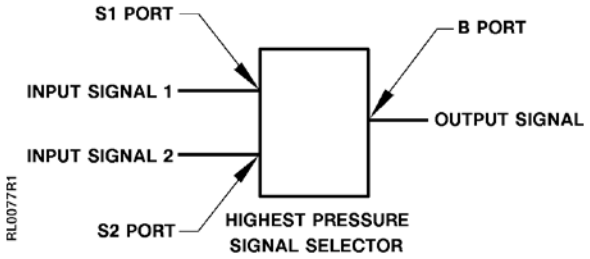
Applications

The 243 Highest Pressure Signal Selector is used where two proportional high capacity air signals (2-pipe thermostat) must be compared and the highest of the two signals transmitted to another logic or final control device.

Recommendation

Use 243-0019 selector to compare more than two inputs.

Typical Connections



Input Signal 2	Input Signal 1	Output Signal
3 psi	15 psi	15 psi
15 psi	3 psi	15 psi
9 psi	9 psi	9 psi

Specifications

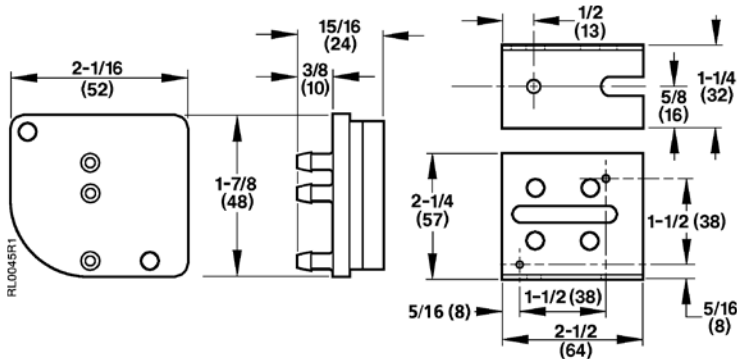
Action ..... Direct
Maximum Air Pressure ..... 30 psi (207 kPa)
Adjustments ..... None
Connections ..... 1/4" (6 mm) OD polyethylene tubing
Operating Ambient Temperature
Minimum ..... 40°F (4°C)
Maximum ..... 140°F (60°C)

Air Consumption ..... None
Air Capacity @ P = 2 psi ..... 130 scim (35 ml/s)
Materials ..... Glass-filled Nylon
Shipping Weight ..... 0.25 lb. (0.10 kg)

Product Ordering

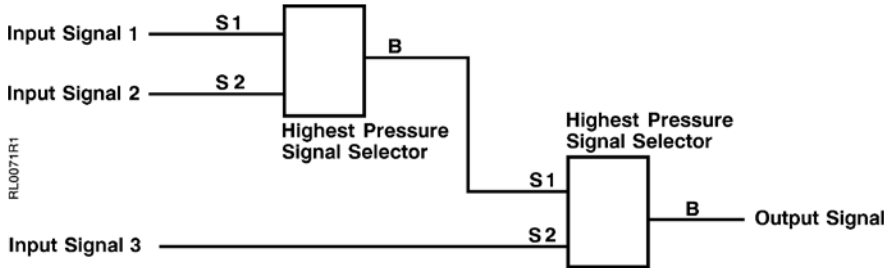
Description	Part No.
Highest Pressure Signal Selector	**243-0018**
If inoperative, replace the unit.	

Dimensions and Engineering Drawings

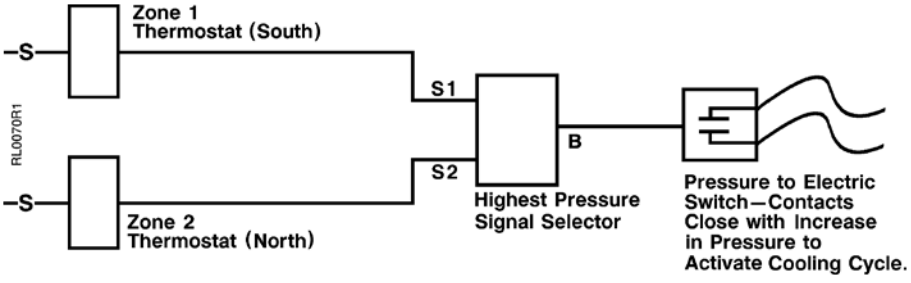


Dimensions shown in inches (mm).

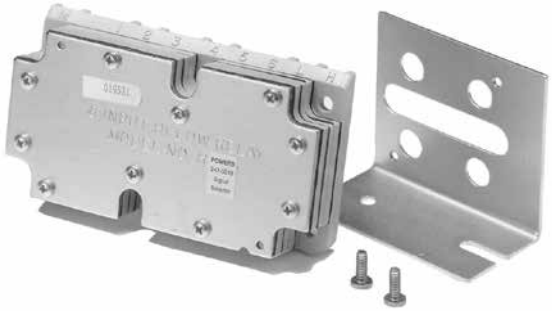
Highest of the Three Signal Pressures.



Single Fan Cooling Control from Two Zone Direct Acting Thermostats.



Lowest and Highest Signal Selector



243 Lowest and Highest Pressure
Signal Selector and Mounting Bracket.

Description

The 243 Lowest and Highest Signal Selector is a six-input, dual output logic device for use in pneumatic control systems.

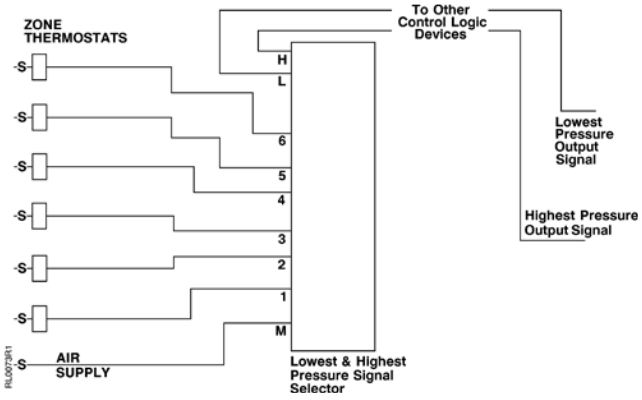
Features

- Accepts up to 6 inputs
- Selects both or highest/lowest signal
- Easily supported in-line or mounted using provided hardware
- Small, lightweight

Applications

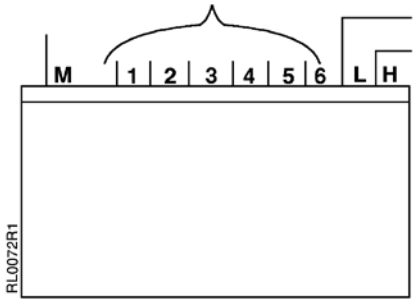
The 243 Lowest and Highest Signal Selector is used where up to six input air signals must be compared and the lowest and/or highest of the signals transmitted to another logic or final control device. Unused input ports must be connected to the highest numbered input port being used. This is a low capacity output device, therefore, an amplifying relay will be required for many applications.

Application Drawing



Typical Connections

Input Port #	Input Signal	Lowest Pressure Output Signal	Highest Pressure Output Signal
1	3 psi	—	—
2	6 psi	—	—
3	9 psi	—	—
—	—	3 psi	15 psi
4	10 psi	—	—
5	13 psi	—	—
6	15 psi	—	—



Specifications

Action ..... Direct

Air Supply Pressure
- Normal Operating ..... 20 psi (138 kPa)
- Maximum ..... 30 psi (207 kPa)

Adjustments ..... None

Connections ..... 1/4" (6 mm) OD polyethylene tubing

Operating Ambient Temperature
- Minimum ..... 40°F (4°C)
- Maximum ..... 140°F (60°C)

Air Consumption ..... 44 scim (12 ml/s)

Air Capacity @ P = 2 psi
- Highest ..... 5 scim (1.4 ml/s)
- Lowest ..... 10 scim (2.7 ml/s)

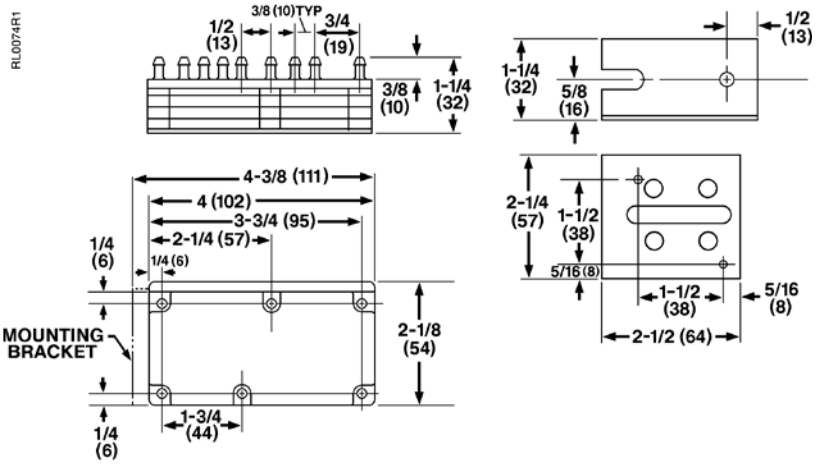
Material ..... Glass-filled Nylon

Shipping Weight ..... 0.63 lb. (0.295 kg)

Product Ordering

Description	Part No.
Lowest and Highest Signal Selector	**243-0019**
If inoperative, replace the unit.	

Dimensions



Dimensions shown in inches (mm).

Lowest Pressure Signal Selector

243 Lowest Pressure Signal Selector.

Description

The 243 Lowest Pressure Signal Selector is a dual input, single output logic device for use in pneumatic control systems.

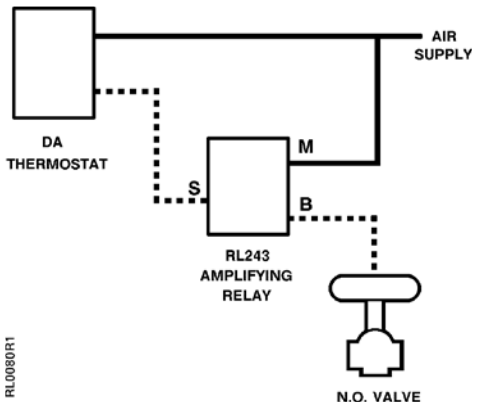
Features

- Small, lightweight
- Can be mounted in any position
- Can be supported by the 1/4-inch (6 mm) poly tubing connected to the input and output fittings
- Can be used as volume amplifying relay
- Cascade multiple selectors for more than two inputs

Applications

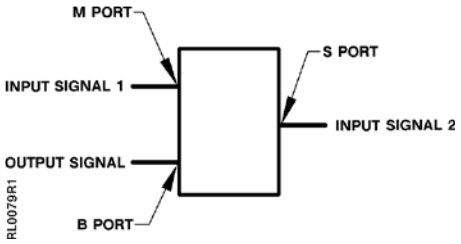
The 243 Lowest Pressure Signal Selector is used where two input air signals must be compared and the lowest of the two signals transmitted to another logic or final control device. The 243 Lowest Pressure Signal Selector can also be used as a direct acting amplifying relay.

Application Drawing



Direct Acting Amplifying Relay.

Typical Connections



Specifications

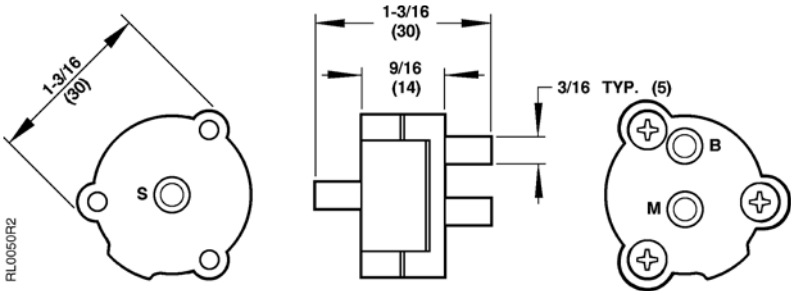
Action ..... Direct
Maximum Pressure ..... 30 psi (207 kPa)
Adjustments ..... None
Connections ..... 1/4" (6 mm) OD polyethylene tubing
Operating Ambient Temperature
Minimum..... 40°F (4°C)
Maximum..... 140°F (60°C)

Air Consumption ..... 29 scim (8 ml/s)
Air Capacity @ P = 2 psi ..... 82 scim (22 ml/s)
Material ..... Glass reinforced nylon
Diaphragm ..... Nylon reinforced fairprene
Mounting ..... In-line
Shipping Weight ..... 0.31 lb. (0.01 kg)

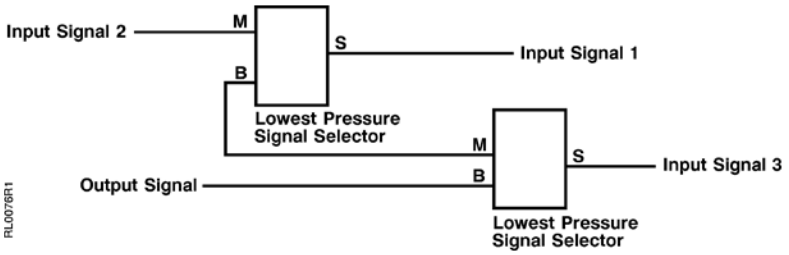
Product Ordering

Description	Part No.
Lowest Pressure Signal Selector	**243-0020**
If inoperative, replace the unit.	

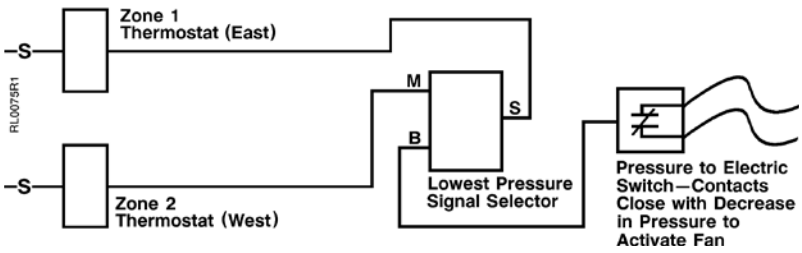
Dimensions and Engineering Drawings



Dimensions shown in inches (mm).

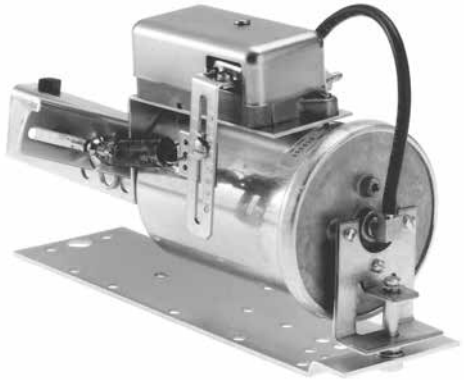


Input Signal 2	Input Signal 1	Output Signal
3 psi	15 psi	3 psi
15 psi	3 psi	3 psi
9 psi	9 psi	9 psi



Lowest of Three Signal Pressures.

Positioning Relay



147 Positioning Relay and Mounting Kit shown on a No. 3 Damper Actuator.

Description

The 147 Positioning Relay is a compact pneumatic auxiliary device designed to provide positive positioning of a pneumatic valve or damper actuator.

Features

- Designed to operate at a very low bleed rate to minimize air consumption
- Provides simplified adjustment of both starting pressure and operating span
- Adjustable start point
- Adjustable span
- Rapid response
- Good repeatability
- Consistency of operation

Applications

The 147 Positioning Relay accurately positions damper actuator in response to a control air signal change. Damper actuators that are equipped with a Positioning Relay can use full control air pressure at any point in stem travel to initiate stem movement or to maintain stem position. However, the actuator spring still provides the necessary force to move the stem in the opposite direction.

A mounting kit is required for direct attachment of the relay to a pneumatic damper actuator or valve actuator.

NOTE: Refer to pages B-47 – B-61 for a complete line of pneumatic damper actuators.

Specifications

Ambient Temperature Range
Operating.....35° to 160°F (2° to 71°C)
Storage.....-20° to 160°F (-29° to 72°C)
Maximum Pilot Signal Pressure ..... 30 psi (207 kPa)
Maximum Supply Air Pressure ..... 60 psi (413 kPa)
Start Point Adjustment Range ..... 3 to 10 psi (21 to 69 kPa)
Operating Span Adjustment Range ..... 3 to 12 psi (21 to 83 kPa)
Response ..... 0.10 psi (0.689 kPa) input change

Air Capacity @ ΔP ..... 410 scim (112 ml/s)
Air Consumption .....40 scim (11 ml/s
Air Connections ..... 1/8" NPT
Materials
Body .....Zinc
Cover ..... Steel
Shipping Weight (with mounting kit) .....2.0 lb. (0.9 kg)

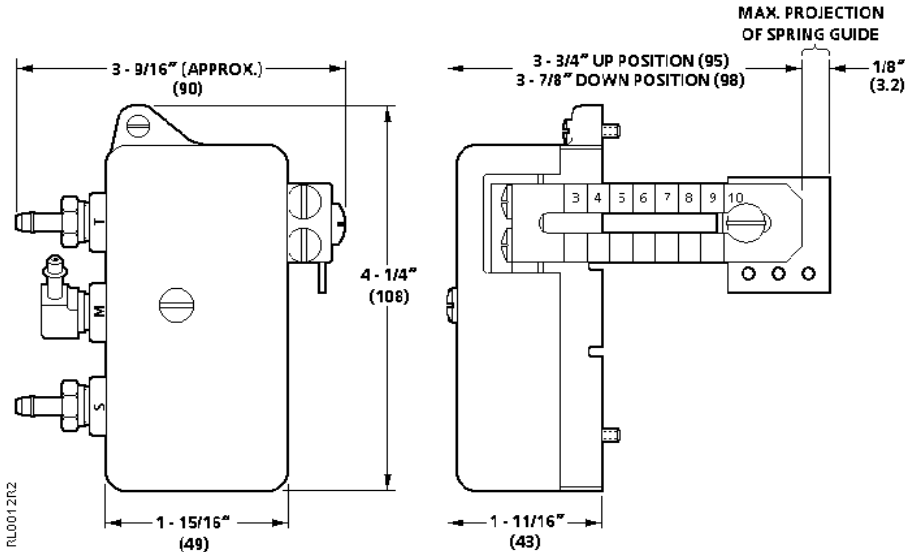
Product Ordering

Description	Part No.	
	Positioning Relay	Mounting Kit
Positioner		
Field mount positioner for No. 3 Damper Actuator mfg. after 1/93	**147-2000**	**147-104**
Field mount positioner for No. 4	**147-2000**	**147-314**
Field mount positioner for No. 6	**147-2000**	**147-276**
8-inch Valve Actuator		
For 599 Series Flowrite actuators mfg. after 3/96	**599-00426**[1]	
For Model 3 Flowrite actuators mfg between 3/93 and 1/96	**147-2000**	**—**
For Models 1 and 2 Flowrite actuators.[2]	**147-2000**	**—**
12-inch Valve Actuator		
For 599 Series Flowrite actuators mfg. after 1/96	**599-00423**[1]	
For Flowrite actuators mfg. between 3/78 and 1/96	**147-2000**	**—**

Ordering Note:

1. Relay and mounting hardware included.
2. Also order spring arm, **147-307**, for use with 591 5 and 6-inch balanced valves.

Dimensions



Dimensions shown in inches (mm).

Electronic-to-Pneumatic Transducer

545-208 Electronic-to-Pneumatic Transducer.

545-113 Electronic-to-Pneumatic Transducer.

Description

The 545 Electronic-to-Pneumatic (AO-P) Transducer converts an electronic signal into a linear pneumatic signal; available in remote mount and panel mount.

Features

- Insensitive to vibration and mounting position to allow mounting directly on equipment
- Hand-Auto switch and override dial allow for manual control of output pressure for troubleshooting and emergencies
- Accurate and repeatable output pressure signal
- Easy-to-install, no setup or calibration is required
- Wall-mount without an additional enclosure to reduce cost
- Factory-installed 0 to 30 psi (0 to 207 kPa) gauge included
- High capacity, non-bleed device

Options

- Electrical connections to remotely monitor Hand-Auto switch position and output pressure

Applications

The 545 Electronic-to-Pneumatic Transducers are used for accurate positioning of valve and damper actuators.

Specifications

Supply Voltage ..... 19 to 26 Vac (24 Vac typical)
Power Consumption ..... 1 VA max.
Input Signal/Impedance ..... 0 to 10 Vdc/20 K Ohm
Output Signal ..... 0 to 20 psi (0 to 138 kPa)
Output Capacity ..... 500 scim (135 ml/s) min. @ 5 psi (34.5 kPa) Drop (20 psi input, 15 psi output)
Output Repeatability .....0.05 psi (0.35 kPa) max. (includes hysteresis)
Output Fail-safe .....0 psi (0 kPa) in response to sustained power loss
Output Fail-safe Exhaust Capacity ..... 100 scim (27 ml/s) @ 5 psi (34.5 kPa) drop (unpowered)
Air Supply Pressure .....30 psi (207 kPa) max. safe pressure, clean, dry, (instrument quality air required)
Air Consumption for Compressor Sizing ..... 8 scim (2.2 ml/s)
Tubing Connection ..... Two-1/4" (6 mm) OD nominal, barbed fitting
Conduit Connections ..... Remote mount model has Two - 1/2" (13 mm) conduit connections

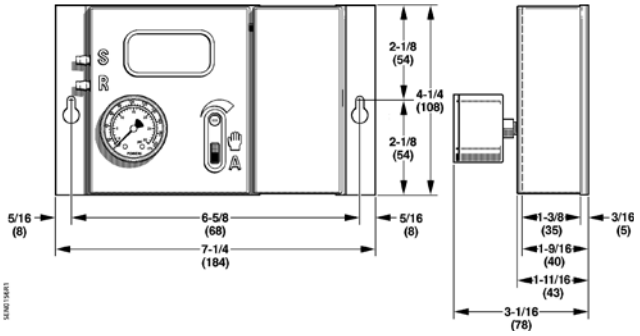
Output Accuracy .....@ 77°F (25°C) ± 0.25 psi (1.72 kPa) max.
@ 32° to 122°F (0° to 50°C) ± 0.50 psi (3.45 kPa) max.
@ -40° to 185°F (-40° to 85°C) ± 1.0 psi (6.90 kPa) max.
Ambient Temperature Range
Operating and Storage..... -40° to 185°F (-40° to 85°C)
Operating Humidity ..... 10% to 95% RH, non-condensing
Vibration .....Tested to EIA STD, RS-152B FEB 71
Override Controls .....Continuous variable output override (does not function without power)
Override Monitoring
Hand-Auto ..... A dry contact indicates the position of the Hand-Auto Switch to an external device.
Hand-Auto Override
Dry Contact Rating..... 30 Vac @ 100 mA, 42 Vdc
Override Monitoring Output Pressure ..... Optional 0 to 5 Vdc linear signal monitors output pressure
Dimensions
Remote Mount ..... 4.25" H x 7.25" W x 3.06" D (108 mm H x 184 mm W x 78 mm D)
Panel Mount ..... 4.25" H x 5.75" W x 3.06" D (108 mm H x 146 mm W x 78 mm D)
Shipping Weight .....2.0 lb. (0.9 kg)

Product Ordering

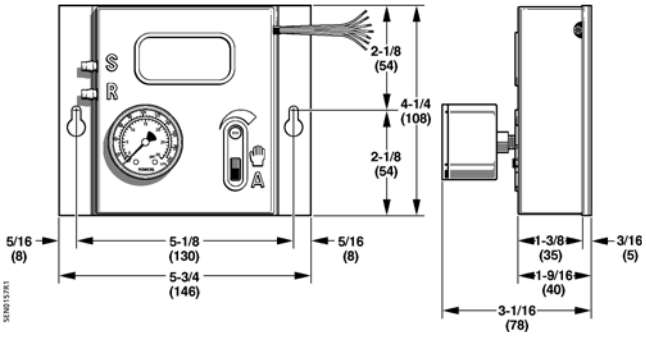
Description	Part No.
Remote Mount	
AO-P Transducer with Integral Enclosure	**545-208**
Panel Mount	
AO-P Transducer	**545-113**

Dimensions and Engineering Drawings

545 AO-P Transducer with Integral Enclosure



545 AO-P Transducer



Dimensions shown in inches (mm).

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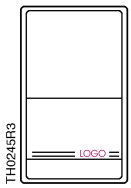
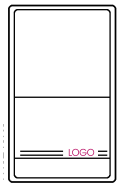
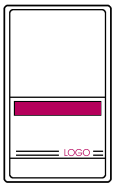
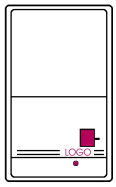
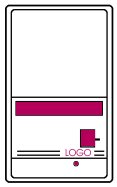
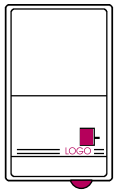
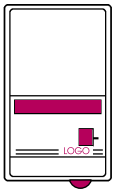
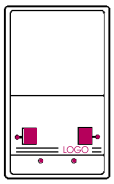
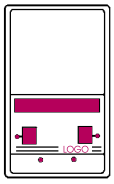
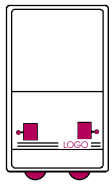
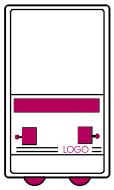
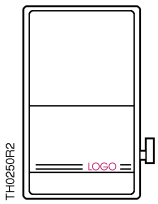
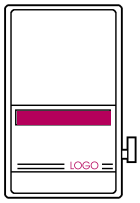
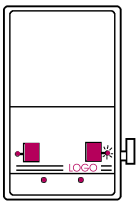
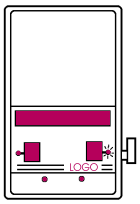
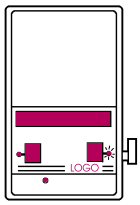
(Continued on next page)

Accessories & Service Kits

Accessories & Service Kits

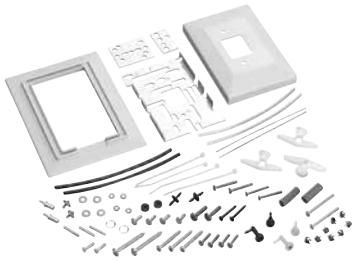
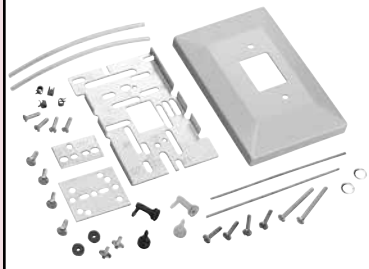
	Pneumatic Thermostat Cover Feature Description *(Sold Separately)*	Fits Models			Part No. Quantity 1 (each)		
		192 S	192 HC	193 HC	Plastic Beige	Plastic White	Metal Beige
Single Setpoint 192 Series Pneumatic Thermostat Covers							
 TH0245R3	**"No-Access" Blank Cover without Logo.** • Setpoint Adjustment Knob – Concealed • Setpoint Key Adjustment Port – Concealed • Setpoint Indicator Dial – Concealed • Thermometer on Thermostat – Concealed • Logo – None	•	•	•	192-257	192-257W	192-357
	**"No-Access" Blank Cover with Logo.** • Setpoint Adjustment Knob – Concealed • Setpoint Key Adjustment Port – Concealed • Setpoint Indicator Dial – Concealed • Thermometer on Thermostat – Concealed • Logo – POWERS	•	•	•	192-256	192-256W	192-356
	**"No-Access" Cover with Thermometer.** • Setpoint Adjustment Knob – Concealed • Setpoint Key Adjustment Port – Concealed • Setpoint Indicator Dial – Concealed • Thermometer on Thermostat – Exposed • Logo – POWERS	•	•	•	192-254	192-254W	192-354
	**Key Setpoint Adjust with Setpoint Indicator.** • Setpoint Adjustment Knob – Concealed • Setpoint Key Adjustment Port – Exposed • Setpoint Indicator Dial – Exposed • Thermometer on Thermostat – Concealed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•			192-265	192-265W	192-365
	**Key Setpoint Adjust, Setpoint Indicator, Thermometer.** • Setpoint Adjustment Knob – Concealed • Setpoint Key Adjustment Port – Exposed • Setpoint Indicator Dial – Exposed • Thermometer on Thermostat – Exposed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•			192-266	192-266W	192-366
	**Full Access, Setpoint Adjust Knob, Setpoint Indicator.** • Setpoint Adjustment Knob – Exposed • Setpoint Key Adjustment Port – Concealed • Setpoint Indicator Dial – Exposed • Thermometer on Thermostat – Concealed • Logo – POWERS	•			192-250	192-250W	192-350
	**Full Access, Setpoint Adj Knob, Indicator, Thermometer.** • Setpoint Adjustment Knob – Exposed • Setpoint Key Adjustment Port – Concealed • Setpoint Indicator Dial – Exposed • Thermometer on Thermostat – Exposed • Logo – POWERS	•			192-252	192-252W	192-352

	Pneumatic Thermostat Cover Feature Description *(Sold Separately)*	Fits Models		Part No. Quantity 1 (each)		
		192 HC	193 HC	Plastic Beige	Plastic White	Metal Beige
Dual Setpoint 192 Series Pneumatic Thermostat Covers						
	**Key Setpoint Adjust with Setpoint Indicator.** • Setpoint Adjustment Knobs – Concealed • Setpoint Key Adjustment Ports (both) – Exposed • Setpoint Indicator Dials (both) – Exposed • Thermometer on Thermostat – Concealed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•	•	192-267	192-267W	192-367
	**Key Setpoint Adjust, Setpoint Indicator, Thermometer.** • Setpoint Adjustment Knobs – Concealed • Setpoint Key Adjustment Ports (both) – Exposed • Setpoint Indicator Dials (both) – Exposed • Thermometer on Thermostat – Exposed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•	•	192-268	—	192-368
	**Full Access, Setpoint Adjust Knob, Setpoint Indicator.** • Setpoint Adjustment Knobs (both) – Exposed • Setpoint Key Adjustment Ports – Concealed • Setpoint Indicator Dials (both) – Exposed • Thermometer on Thermostat – Concealed • Logo – POWERS	•	•	192-258	—	—
	**Full Access, Setpoint Adj Knob, Indicator, Thermometer.** • Setpoint Adjustment Knobs (both) – Exposed • Setpoint Key Adjustment Ports – Concealed • Setpoint Indicator Dials (both) – Exposed • Thermometer on Thermostat – Exposed • Logo – POWERS	•	•	192-260	192-260W	192-360

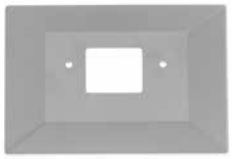
	Pneumatic Thermostat Cover Feature Description *(Sold Separately)*	Fits Model	Part No. Quantity 1 (each)		
		192 DN, DNV	Plastic Beige	Plastic White	Metal Beige
Day-Night-Vent 192 Series Pneumatic Thermostat Covers					
 TH0250R2	**"No-Access" Blank Cover with D/N Switch.** • Setpoint Adjustment Knobs – Concealed • Setpoint Key Adjustment Ports – Concealed • Setpoint Indicator Dials – Concealed • Thermometer on Thermostat – Concealed • Logo – POWERS	•	**192-262**	**192-262W**	**192-362**
	**"No-Access" Cover with Thermometer and D/N Switch.** • Setpoint Adjustment Knobs – Concealed • Setpoint Key Adjustment Ports – Concealed • Setpoint Indicator Dials – Concealed • Thermometer on Thermostat – Exposed • Logo – POWERS	•	**192-264**	**—**	**192-364**
	**Key Setpoint Adjust with Setpoint Indicator, D/N Switch.** • Setpoint Adjustment Knobs – Concealed • Setpoint Key Adjustment Ports (both) – Exposed • Setpoint Indicator Dials (both) – Exposed • Thermometer on Thermostat – Concealed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•	**192-269**	**—**	**—**
	**Key Setpoint Adjust with Indicator, Thermometer, D/N.** • Setpoint Adjustment Knobs – Concealed • Setpoint Key Adjustment Ports (both) – Exposed • Setpoint Indicator Dials (both) – Exposed • Thermometer on Thermostat – Exposed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•	**192-270**	**–**	**192-370**
	**Key Setpoint Adjust, Indicator, Thermometer, D/N Switch.** • Setpoint Adjustment Knob – Concealed • Setpoint Key Adjustment Port (night only) – Exposed • Setpoint Indicator Dial (both day & night) – Exposed • Thermometer on Thermostat – Exposed • Logo – POWERS *Use with 1/2" diameter setpoint knob stats ("K" suffix)*	•	**192-271**	**—**	**—**

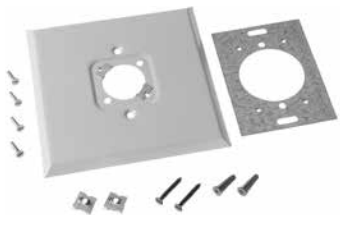
	Description	Product Group	Quantity	Part No.
All Models				
	**Calibration Gauge.** • 0 to 30 psi (0 to 207 kPa) • Dual scale in psi/kPa • 1% accuracy (ANSI grade 1A) • 2-1/2" (64 mm) dial face • 1/8" NPT bottom connection *(See POWERS™ installation guide #144-133)*	All models	1	**142-0455**
	**Calibration Thermometer.** • 40 to 140°F (4 to 60°C), 1% accuracy • With pocket case and clip *(See POWERS™ installation guide #144-133)*	All models	1	**141-0573**
	**Lockable Thermostat Guard.** • Clear cover locking guard • Clear plastic locking ring base • Desert beige locking mounting base • One key and mounting screws included *(See technical instruction # 155-723)*	Any Siemens Thermostat	1	**141-570**
POWERSTAR™				
	**Pressure Gauge.** • Dual scale 0 to 30 psi (0 to 200 kPa) • Compound gauge • Back connected 1/8" NPT male *(See technical instruction #155-025)*	19X 356 184 195	1	**142-0373**
	**Pressure Gauge.** • 0 to 30 psi compound gauge • Bottom connected 1/8" NPT male • Replacement gauge or use with #192-633 *(See technical instruction #155-025)*	19X 356	1	**142-0426**
	**Needle Probe Kit.** • 1-1/2" (38 mm) diameter gauge • 0 to 30 psi (0 to 200 kPa) • Calibration cover wrench *(See POWERS™ installation guide #144-133)*	19X 356	1	**192-633**
	Needle Probe Only. • No gauge or cover wrench	19X 356	Pkg of 5	**192-759**
	**Pneumatic Thermostat Calibration Kit.** Contains thermometer, gauge squeeze bulb, and fittings for testing room and duct thermostats, pneumatic valve and damper actuators. Includes convenient carrying case. Includes tools contained in 832-178. *(See technical bulletin # 155-253P25)* *(See POWERS™ installation guide #144-133)*	19X 180 182 832	1	**832-177**

	Description	Product Group	Quantity	Part No.
POWERSTAR™				
	**Calibration Tools.** Special tools for calibrating 180, 182, 192, and 832 thermostats. Packed in polyethylene box that fits into carrying case of kit, 832-177 *(See technical bulletin # 155-253P25)* *(See POWERS™ installation guide #144-133)*	192 180 182 832	1	**832-178**
	**Test Head Kit.** Used for testing 1-pipe transmitters, thermostat air lines for leakage. Packed in polyethylene box that fits into carrying case of kit, 832-177. *(See technical bulletin #155-255P25)* *(See POWERS™ installation guide #144-133)*	192 180 182 832	1	**832-179**
	**192 Series Pneumatic Thermostat Calibration and Cover Screw Wrench.** • With pocket clip • 1/16” hex with ball end	19X	Pkg of 5	**192-632**
	**Wall Box Rough-In.** For 2-pipe dual 1/8" (3 mm) OD copper with plaster plate. 8' (2 m) long belled to 3/16" (5 m) OD. With thermostat chassis plug-in adapters for easy maintenance. *(See technical bulletins #155-244P25, #155-210P25)*	19X 832 186	1	**192-478**
	**Wall Box Rough-In.** For 1 or 2-pipe dual 1/4" (6 mm) OD poly tubing with plaster plate. 10' (2 m) long. With thermostat chassis plug-in adapters for easy maintenance. *(See technical bulletins #155-244P25, #155-210P25)*	19X 186	1	**192-480**
	**Stud Mounting Bracket.** • 6' (2 m) L. Cut to required length	192	1	**141-098**
	**Stud Mounting Bracket and Dual Copper Tubing.** Belled to 3/16" (5 mm) OD with plug-in adapters for easy maintenance. *(See technical bulletins #155-244P25, #155-210P25)* *(See installation instruction #129-072)*	19X 186	1	**192-482**

	Description	Product Group	Quantity	Part No.
POWERSTAR™				
	**Metal/Wood Stud Bracket.** • Drywall rough-in *(See technical bulletins #155-244P25, #155-210P25)* *(See installation instruction #129-072)*	19X 186	Pkg of 5	**182-683**
	**Universal Kit.** • Retrofit thermostats including Honeywell, Johnson Controls, and others • Desert beige color	19X	1	**192-300**
	Universal Kit in White Color. *(See technical bulletins #155-231P25, #155-244P25)* *(See installation instruction #129-116)*	19X	1	**192-300W**
	**Honeywell Kit.** • Fits Honeywell and others • Desert Beige color *(See technical bulletins #155-231P25, #155-244P25, #155-210P25)* *(See installation instruction #129-116)*	19X	1	**192-483**
	**Johnson Kit.** • Retrofit to 19X thermostat. Fits Johnson Controls and others • Desert beige *(See technical bulletins #155-231P25, #155-244P25)*	19X	1	**192-484**
	**Aspirator Conversion Kit.** For 2-pipe thermostat chassis only. Converts existing 18XAP installed aspirator wall box for use with chassis. Kit includes plate, gasket, hardware, and instruction sheet. Order 19X chassis separately. *(See technical bulletin #155-244P25* *(See installation instruction #129-102)*	19X	1	**192-648**

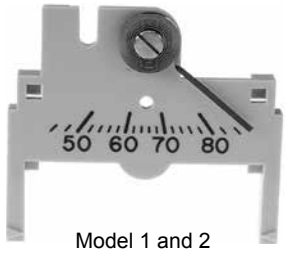
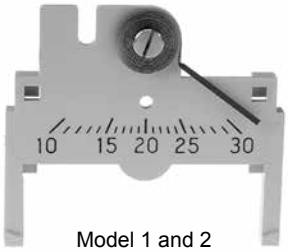
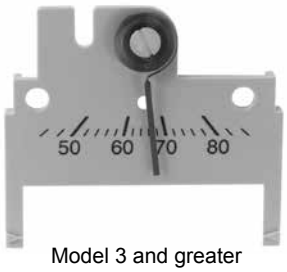
	Description	Product Group	Quantity	Part No.
POWERSTAR™				
	**1- or 2-pipe; split for 3-pipe.** Dual 1/4" (6 mm) OD polyethylene with plug-in adapters. 10' (2 m) long.	19X	1	**192-600**
	1- or 2-pipe. Dual 1/4" (6 mm) OD polyethylene with plug-in adapters. 40' (12 m) long.	19X	1	**192-755**
	(See technical bulletin #155-244P25 for products 192-600, 192-755 and 192-750)			
	**Preassembled Plastic Tubing Loop.** 8" (203 mm) long, with anti-kink spring, plug-in thermostat adapter. Mates to 1/4" (6.4 mm) OD polyethylene tube barbed fitting. *(See technical bulletin #155-244P25)* *(See installation instruct. #129-072, #129-056)*	19X	Pkg of 10	**192-481**
	**Preassembled Plastic Tubing Loop.** 8" (203 mm) long, with anti-kink spring, thermostat plug-in adapter. Mates to 5/32" (4 mm) OD polyethylene tubing. *(See technical bulletin #155-244P25)*	19X	Pkg of 10	**192-505**
	**Preassembled Plastic Tubing Loop.** 8" (203 mm) long, with anti-kink spring. Cut and attach directly to thermostat chassis. Attach compression rings to prevent air leakage. Mates to 1/4" (6 mm) OD polyethylene tubing. *(See technical bulletin #155-244P25)* *(See installation instruction #129-131)*	19X 184	Pkg of 10	**180-896**
	**20 scim (5 ml/sec) Restrictors.** For 1-pipe systems. 1/4" (6 mm) OD polyethylene barb unless noted. Brass coupling, 1/8" NPT. *(See technical instructions #155-213)*	192 (1-pipe) 184	1	**184-040**
	**20 scim (5 ml/s) In-line Restrictors.** *(See technical instructions #155-213)*	192 184	Pkg of 5	**184-116**
	**20 scim (5 ml/s) Restrictor Tee.** *(See technical instructions #155-213)*	192 184	Pkg of 5	**184-113**
	**External Restrictor Installation Kit.** For dual 1-pipe systems. Supply, thermostat and two-controlled devices. *(See technical instructions #155-213)*	19X	1	**184-130**

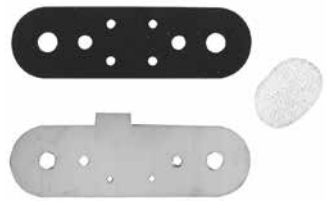
	Description	Product Group	Quantity	Part No.
POWERSTAR™				
	**Adapter Base.** • 3.38" W x 5.69" H (86 mm W x 18 mm H)			
	• Desert Beige (standard)	19X	1	**192-307**
	• White *(See technical bulletin #155-244P25)*	19X	1	**192-307W**
	**Adapter Frame.** • 4.38" W x 5.31" H x 0.09" D (111 mm W x 151 mm H x 2 mm D)			
	• Desert Beige (standard)	19X	1	**192-308**
	• White *(See technical bulletin #155-244P25)* *(See installation instructions #129-116)*	19X	1	**192-308W**
	**Multi-Slotted Plate.** Use with adapter bases. Not for use with thin profile adapter base.	19X	1	**192-301**
	**Thin Profile Adapter Base.** • Measures 3.38" x 4.97" H (86 mm x 126 mm) • Desert Beige (standard) *(See technical bulletin #155-244P25)*	19X	Pkg of 5	**192-507**
	**Extra Wall Plate and Mounting Screws.** Order only if required for repair or advance mounting prior to factory delivery for chassis (chassis P/N includes wall plate and screws). *(See technical bulletin #155-244P25)*	19X	1	**192-644**
	**Mounting Clips, Spacer and Template.** • For finished drywall *(See technical bulletin #155-244P25)* *(See installation instructions #129-056, #129-131)*	19X	Pkg of 10	**182-685**
	**Terminal Wall Box Cover Kit.** Covers abandoned thermostat locations with blank plate. Dimensions 3.13" x 3.25" (54 mm x 84 mm). Desert Beige (standard).	19X	1	**192-320**

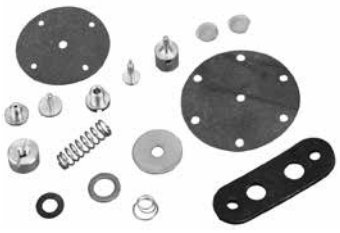
	Description	Product Group	Quantity	Part No.
POWERSTAR™				
	**Retrostat Plastic Thermostat Cover Kit.** With dial plates that expose or conceal the setpoint indicator and/or thermometer. Thumb wheel covers to conceal setpoint adjustment. Snap-out tab for Day/Night lever.			
	• Desert Beige (standard)	19X	1	**192-868**
	• White *(See installation instructions #129-144)*	19X	1	**192-868W**
	**Gym Guards.** • Desert Beige *(See technical instructions #155-222P25)*	19X DN or DNV	1	**182-624**
	**Lockable Wall Box.** *(See installation instructions #129-450)* *(See technical instructions #155-222P25, #155-723)*	Any Siemens Thermostat	1	**141-570**
	**Finish Plate.** Mounts on 4" x 4" (102 mm x 102 mm) electrical box. Pneumatic thermostat mounts to finish plate. 1/2" (13 mm) diameter hole provided for electrical switch. Stainless steel finish. *(See installation instructions #129-103)* *(See technical bulletin #155-252P25)*	19X	1	**192-729**
	**Finish Plate.** • 1 gang[1], 1 room thermostat[3]			
	• Brushed Finish	19X	1	**192-860**
	• Desert Beige	19X	1	**192-861**
	**Finish Plate.** • 2 gang[2], 1 room thermostat[3]			
	• Brushed Finish	19X	1	**192-731**
	• Desert Beige *(See installation instructions #129-103)* *(See technical bulletin #155-252P25)*	19X	1	**192-732**

Ordering Notes:

1. 1 gang: 3.75" (95 mm) W x 5" (127 mm) H.
2. 2 gang: 5" (127 mm) W x 5" (127 mm) H.
3. For use with pneumatic or automation room sensors and pneumatic or commercial light switches; comes in brushed, stainless steel finish.

	Description	Product Group	Quantity	Part No.
POWERSTAR™				
 Model 1 and 2	**Thermostat Thermometer Kits.** • Scale Range: 45 to 85°F • Use with Model 1 and 2	19X	Pkg of 5	**192-775**
 Model 1 and 2	**Thermostat Thermometer Kits.** • Scale Range: 10 to 30°C • Use with Model 1 and 2	19X	Pkg of 5	**192-776**
 Model 3 and greater	**Thermostat Thermometer Kits.** • Scale Range: 45 to 85°F • Use with Model 3 and greater	19X	Pkg of 5	**192-786**
	• Scale Range: 10 to 30°C • Use with Model 3 and greater	19X	Pkg of 5	**192-785**
 	**Setpoint Dials.**			
	Fahrenheit of D.A. Right Side	19X	Pkg of 10	**192-779**
	Fahrenheit of R.A. Right Side	19X	Pkg of 10	**192-780**
	Celsius of D.A. Right Side	19X	Pkg of 10	**192-783**
	Celsius of R.A. Right Side	19X	Pkg of 10	**192-784**
	Fahrenheit of D.A. Left Side	19X	Pkg of 10	**192-777**
	Fahrenheit of R.A. Left Side	19X	Pkg of 10	**192-778**
	**Replacement Chassis Tube Connector and Mounting Screws.** Also provides access to filters and restrictor plate (10 thermostats). *(See installation instructions #129-085)*	19X	Material for 10 thermostats	**192-525**

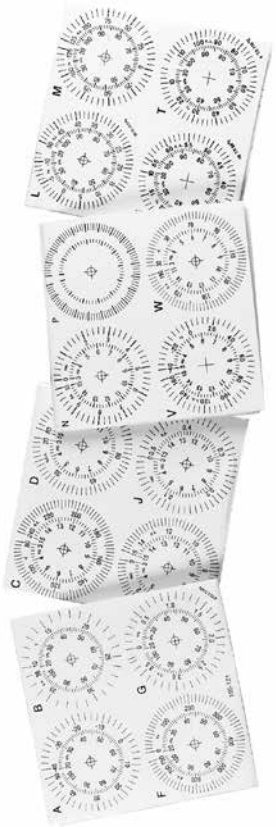
	Description	Product Group	Quantity	Part No.
POWERSTAR™				
	**Plug-in Adapters.** For quick thermostat removal. Fits on 5/32" (4 mm) OD polyethylene tubing. Use with compression rings, listed below.			
	• Straight, blue	19X	Pkg of 20	**192-485**
	• Straight, white	19X	Pkg of 20	**192-486**
	(See technical bulletin #155-244P25, #155-210P25)			
	**Plug-in Adapters (Elbow).**			
	• Blue (provides quick thermostat removal)	19X	Pkg of 20	**192-487**
	• White (provides quick thermostat removal)	19X	Pkg of 20	**192-488**
	(See technical bulletin #155-244P25)			
	**Restrictor Plate Replacement Kit.** Contains replacement filters, restrictor plates, and gaskets. *(See technical instructions #155-213)* *(See installation instructions #129-067, #129-085)*	19X	Material for 10 thermostats	**192-321**

	Description	Product Group	Quantity	Part No.
POWERS™ Pneumatic Room Thermostats				
	**Adjustment Key.** • Opens Powers cover and changes setpoint *(See technical instructions #155-072P25)* *(See installation instructions #129-427)*	832D 832DN	1	**856-055**
	**"D" Base Kit.** For mounting "D" thermostat with exposed tubing. Black base with cutout on top. *(See technical instructions #155-072P25)* *(See installation instructions #129-427)*	832D 832DN	1	**832-034**
	**"D" Thermostat Friction Knob.** *(See technical instructions #155-072P25)*	832	1	**833-033**
	**"D" Thermostat Replacement Unit.** • Contains chassis only *(See installation instructions #129-427)* *(See technical instructions #155-072P25)*	832D	1	**832-040**
	**Exhaust and Supply Valve Repair Kit.** Contains parts for replacement of supply and exhaust valves in one thermostat. *(See installation instructions #129-427)* *(See technical instructions #155-072P25)*	832	1	**832-164**

	Description	Product Group	Quantity	Part No.
POWERS™ Pneumatic Room Thermostats				
	**Pneumatic Thermostat Calibration Kit.** Contains thermometer, gauge squeeze bulb, and fittings for testing room and duct thermostats, pneumatic valve and damper actuators. Includes convenient carrying case. Includes tools contained in 832-178. *(See technical bulletin #155-253P25)* *(See installation instructions #129-427)*	832 19X	1	**832-177**
	**Calibration Tools.** Special tools for calibrating 180, 182, 192, and 832 thermostats. Packed in polyethylene box that fits into carrying case of kit, 832-177. *(See installation instructions #129-427)* *(See technical bulletin #155-253P25, #155-254P25)*	832 19X	1	**832-178**
	**Test Head Kit.** Used for testing 1-pipe transmitters, thermostat air lines for leakage. Packed in polyethylene box that fits into carrying case of kit, 832-177. *(See technical bulletin #155-255P25)*	832 19X	1	**832-179**
	**Wall Box Rough-In.** For 2-pipe dual 1/8" (3 mm) OD copper with plaster plate. 8' (2 m) long belled to 3/16" (5 m) OD with thermostat chassis plug-in adapters for easy maintenance. *(See technical bulletin #155-331, #155-210P25, #155-244P25)*	832 19X 186	1	**192-478**

	Description	Product Group	Quantity	Part No.
POWERS CONTROLS™ Unit Mounted, High/Low Detection Thermostats				
	**Remote Bulb Duct Mounting Kit.** *(See technical instructions #155-071P25)* *(See installation instructions #129-323)*	188 134	1	**808-517**
	**Restrictor Plate Replacement Kit.** • Restrictor plates and gaskets for 20 scim (5.4 ml/s) restriction • Restrictor plates and gaskets for 40 scim (11 ml/s) restriction *(See technical instructions #155-033, #155-213, #155-064P25)*	188	5 sets of each	**188-159**
	**Capillary Clip.** *(See installation instructions #129-166)* *(See technical instructions #155-071P25)*	134 357	Box of 100	**7421700060**
	**Concealed Adjustment Faceplate.** *(See technical instructions #155-017P25)*	134	1	**134-034**
	**Electric Thermostat Guard.** For electric thermostats no larger than 5-1/4" H x 3/4" W x 2" D. (133 mm H x 19 mm W x 51 mm D). Made of cast aluminum. Allen Key included. *(See technical instructions #155-017P25)*	134	1	**134-117**
	**Lockable Thermostat Guard.** *(See technical instruction # 155-723)*	Any Siemens Thermostat	1	**141-570**

	Description	Product Group	Quantity	Part No.
LIMITEM™ Rigid Duct and Remote Bulb Thermostats				
	**Coil Clip.**	357	1	**356-115**
	**Capillary Clip.** *(See installation instructions #129-166)* *(See technical instructions #155-071P25)*	134 357	Box of 100	**7421700060**
	**Swivel Flange Mounting Kit.** *(See technical instructions #155-070P25)* *(See installation instructions #129-166)*	356	1	**356-090**
	**Flange Kit.** *(See technical bulletin #155-209P25)* *(See installation instructions #129-166)*	356	1	**808-412**
	**Copper Well**. For 357-0003 and 357-0005; Models 1 and 4. *(See installation instructions #129-166)* *(See technical instructions #155-071P25)*	357	1	**134-061**
	**Allen Wrench Kit.** (pack of 5)	356 357	5	**192-623**
	**Pressure Gauge.** • 0 to 30 psi compound gauge • Bottom connected 1/8" NPT male • Replacement gauge or use with #192-633 *(See technical instruction #155-025)*	19X 356	1	**142-0426**
	**Pressure Gauge.** • Dual scale 0 to 30 psi (0 to 200 kPa) • Compound gauge • Back connected 1/8" NPT male *(See technical instruction #155-025)*	356 19X 184 195	1	**142-0373**
	**Needle Probe Kit.** • 1-1/2" (38 mm) diameter gauge • 0 to 30 psi (0 to 200 kPa) • Calibration cover wrench *(See POWERS™ installation guide #144-133)*	19X 356	1	**192-633**
	Needle Probe Only. • No gauge or cover wrench	19X 356	Pkg of 5	**192-759**

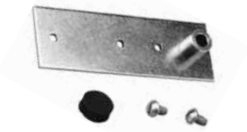
	Description	Product Group	Quantity	Part No.
POWERS™ Receiver-Controllers				
	**Setpoint Dial Sheets.** • Direct Acting and Reverse Acting	195	4 Sheets	**195-130**

English Units	Metric Units	Scale ID
-40 to +120°F	-40 to +50°C	**A**
50 to 100°F	10 to 38°C	**B**
80 to 240°F	26 to 117°C	**C**
20 to 80% RH	-18 to +38°C	**D**
0 to 100°F	1 to 58°C	**E**
35 to 135°F	0 to 750 Pa	**F**
0 to 3 W.G.	0 to 3.75 kPa	**G**
0 to 15 W.G.	20 to 80% RH	**H**
0 to 0.5 W.G.	0 to 125 Pa	**J**
Blank 10 divisions	Blank 9 divisions	**K (DA)**
Blank 16 divisions	Blank 11 divisions	**K (RA)**
-0.05 to ±0.2" W.G.	-12.5 to +50 Pa	**L**
-0.5 to +0.5" W.G.	-125 to +125 Pa	**M**
0 to 10" W.G.	0 to 2.5 kPa	**N**
Blank 20 divisions	Blank 15 divisions	**P**
0 to 50 psi	0 to 345 kPa	**R**
50 to 150°F	10 to 66°C	**S**
40 to 240°F	4 to 116°C	**T**
-40 to +160°F	-40 to +71°C	**V**
30 to 190°F	-1 to +88°C	**W**

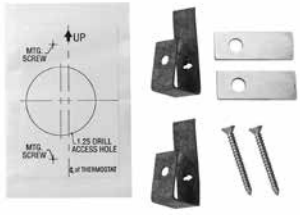
Ordering Notes:
• Add Scale ID as suffix to Part No. • Indicate English or Metric units

(See technical instructions #155-036P25) *(See installation instructions #129-122)*

	**Receiver-Controller Restriction Kit.** Includes three input restriction plates, one pilot relay restriction plate, gaskets, and two screws. *(See technical instructions #155-213)* *(See installation instructions #129-084)*	195	1 Kit	**195-066**
	**Receiver-Controller Connector Kit.** Includes two plug-in connector assemblies, one 3-barb input connector assembly. Multiple-Input. *(See installation instructions #129-084)* *(See technical instructions #155-036P25)*	195	1 Kit	**195-067**
	**Termination Strip.** For numbered ports 1 through 10, straight through connections for 1/4" (6 mm) OD polyethylene tubing. *(See installation instructions #129-122, 129-082)*	195	1	**195-082**
	**In-Line Air Filter.** *(See technical instructions #155-004P25)*	195	1	**908-033**
	**Pressure Gauge.** • Dual scale 0 to 30 psi (0 to 200 kPa) • Compound gauge • Back connected 1/8" NPT male *(See technical instruction #155-025)*	195 19X 356 184	1	**142-0373**

	Description	Product Group	Quantity	Part No.
POWERS RETROLINE™ Pneumatic Temperature Transmitters				
	**Well Mounting Bracket Kit.** *(See installation instructions #129-131)* *(See technical instructions #155-077P25)*	184	1	**184-105**
	**Copper Well.** • 1/4" D x 4" L (6 mm D x 102 mm L) *(See installation instructions #129-131)* *(See technical instructions #155-077P25)*	184	1	**184-119**
	**Stainless Steel Well.** • 1/4" D x 4" L (6 mm D x 102 mm L) *(See installation instructions #129-131)* *(See technical instructions #155-077P25)*	184	1	**184-118**
	**Outdoor Bulb Shield.** • 9" (229 mm) L	184	1	**134-084**
	**20 scim (5 ml/sec) Restrictors.** For 1-pipe systems. 1/4" (6 mm) OD polyethylene barb unless noted. Brass coupling, 1/8" NPT.	184 192 (1-pipe)	1	**184-040**
	**20 scim (5 ml/s) In-line Restrictors.** *(See technical instructions #155-213)*	192 184	Pkg of 5	**184-116**
	**20 scim (5 ml/s) Restrictor Tee.** *(See technical instructions #155-213)*	192 184	Pkg of 5	**184-113**
	**Preassembled Plastic Tubing Loop.** 8" (203 mm) long, with anti-kink spring. Cut and attach directly to thermostat chassis. Attach compression rings to prevent air leakage. Mates to 1/4" (6 mm) OD polyethylene tubing. *(See technical bulletin #155-244P25)* *(See installation instruction #129-131)*	184 19X	Pkg of 10	**180-896**
	**Pressure Gauge.** • Dual scale 0 to 30 psi (0 to 200 kPa) • Compound gauge • Back connected 1/8" NPT male *(See technical instruction #155-025)*	184 19X 356 195	1	**142-0373**

	Description	Product Group	Quantity	Part No.
Static Pressure Sensor Probe Accessories				
	**Static Pressure Sensor Probe.** *(See technical instructions #155-052P25)*	141	1	**269-062**
	**Static Pressure Probe Kit.** *(See technical instructions #155-061P25)*	SW269	1	**189-142**
Multiple Applications				
	**Check Valve.** Connections for 1/4" (6 mm) OD polyethylene tubing. Capacity is 30 scim (8.2 ml/sec) at 1 psi (7 kPa) drop. 450 scim (123 ml/sec) at 8 psi (55 kPa) drop. *(See technical instructions #155-048P25)*	Multiple Applications	Package of 10	**380-024**
	**Copper to Polyethylene Tubing Adapters.** 24" length. Adapts 1/4" (6 mm) OD polyethylene tubing to 1/4" (6 mm) OD copper tubing. Eliminates the need for compression fitting. *(See installation instructions #129-192)*	Multiple Applications	Package of 50	**141-426**
Air Station Equipment				
	**Air Filter Replacement Element.** • For use with 908-051 *(See installation instructions #129-288)* *(See technical instructions #155-312P25)*	Air Station Equipment	1	**908-052**
	**Cartridge Kit.** For use with 1 908-046 Filter. 500 scim (137 ml/sec) with 25 psi (127 kPa) supply for oil removal.	Air Station Equipment	1	**908-042**
SW786 Selector Switches				
	**Flush Mounting Bracket.** *(See technical instructions #155-117P25, #155-118P25)*	SW786	1	**786-131**

	Description	Product Group	Quantity	Part No.
Pneumatic Room and Duct Hygrostats				
	**Hygrostat Restrictor Repair Kit.** Includes enough restrictor for plates and upper and lower Hygrostats gaskets. *(See installation instructions #129-060)* *(See technical instructions #155-213, #155-027P25)*	186	Material for 10 Hygrostats	**180-893**
	**Membrane Element Kit.** Replaces membrane element. Contains one element assembly, screws, nuts, and lock washers. *(See technical instructions #155-027P25)*	186	1	**186-062**
	**Wall Box Rough-In.** For 2-pipe dual 1/8" (3 mm) OD copper with plaster plate. 8' (2 m) long, belled to 3/16" (5 m) OD. With thermostat chassis plug-in adapters for easy maintenance. *(See technical bulletins #155-244P25, #155-210P25)*	19X 832 186	1	**192-478**
	**Wall Box Rough-In.** For 1- or 2-pipe dual 1/4" (6 mm) OD polyethylene with plaster plate. 10' (2 m) long. With thermostat chassis plug-in adapters for easy maintenance. *(See technical bulletins # 155-244P25, #155-210P25)*	19X 186	1	**192-480**
	**Mounting Clips, Spacer and Template for Finished Drywall.** *(See technical bulletin #155-244P25)* *(See installation instructions #129-056, #129-131)*	19X	Package of 10	**182-685**

	Description	Product Group	Quantity	Part No.
Pneumatic Room and Duct Hygrostats				
	**Stud Mounting Bracket and Dual Copper Tubing.** • Belled to 3/16" (5 mm) OD with plug-in adapters for easy maintenance *(See technical bulletins #155-244P25 and #155-210P25)* *(See installation instruction #129-072)*	19X 186	1	**192-482**
	**Metal/Wood Stud Bracket.** • Drywall rough-in *(See technical bulletins #155-244P25, #155-210P25)* *(See installation instruction #129-072)*	19X 186	Package of 5	**182-683**
	**Dual 1/8" (3 mm) OD Copper Tubing with Plug-in Adapters.** • For 1- or 2-pipe. Split for 3-pipe *(See technical bulletin #155-210P25, #155-244P25)*	186	1	**192-479**
	**Plug-in Adapter.** • Includes Tee 20 scim restrictor for 1-pipe	186	Package of 10	**192-875**

Notes

Notes

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Table of Contents

Globe and Ball Valves

Selecting Valves: Globe vs. Ball

The control valve is the most important single element in any fluid handling system, because it regulates the flow of fluid to the process. To properly select a control valve, a general knowledge of the process and components is usually necessary. This reference section can help you select and size the control valve that most closely matches the process requirements.

The sizing of a valve is very important if it is to render good service. If it is undersized, it will not have sufficient capacity. If it is oversized, the controlled variable may cycle, and the seat, and plug will be subject to wire drawing because of the restricted opening.

Systems are designed for the most adverse conditions expected (i.e., coldest weather, greatest load, etc.). In addition, system components (boiler, chiller, pumps, coils, etc.) are limited to sizes available and frequently have a greater capacity than system requirements. Correct sizing of the control valve for actual expected conditions is considered essential for good control.

A basic rule of control valve sizing is:

The higher the percentage of drop across the wide open valve in relation to the percentage of pressure drop through the line and process coil, the better the control.

Technical Comparison Between Globe and Ball Valves

Technically, the globe valve has a stem and plug, which strokes linearly, commonly referred to as “stroke” valves. The ball valve has a stem and ball, which turns horizontally, commonly referred to as “rotational” valves.

Early ball valves used a full port opening, allowing large amounts of water to pass through the valve. This gave HVAC controls contractors the ability to select a ball valve two to three pipe sizes smaller than the piping line size. Compared to traditional globe valves that would be only one pipe size smaller than the line size, this was often a more cost-effective device-level solution. In addition, the ball valve could be actuated by a damper actuator, rather than expensive box-style “Mod” motors.

Pricing Comparison

Today, with equivalent pricing between ball and globe valves, the full port ball valve is falling out of favor for most HVAC control applications. This is also due to its poor installed flow characteristic that leads to its inability to maintain proper control. New “flow optimized” or characterized ball valves, specifically designed for modulating applications, have been developed. Characterized ball valves are sized the same way as globe valves. They provide an equal percentage flow characteristic, enabling stable control of fluids. Additionally, there are more cost-effective valve actuators now available for globe valves. Better control and more-competitive pricing now puts globe valves on the same playing field as characterized ball valves.

Selection Guidelines

Globe Valve

- High differential pressure across valve
- Rebuilding of the valve is desired
- Better control performance
- Better low flow (partial load) performance
- Use for steam, water or water/glycol media
- Smaller physical profile than a comparable ball valve

Characterized Ball Valve

- Tight shutoff or high close offs of around 100 psi* are required
- Isolation or two position control**
- Use for water or water/glycol solution only

* This equates to a pump head pressure of approximately 230 ft. Not very common HVAC applications.
** Valve can be line sized to minimize pressure losses; butterfly valves are also used for these applications.

Sizing a Valve

Pressure Drop for Water Flow

A pressure drop must exist across a control valve if flow is to occur. The greater the drop, the greater the flow at any fixed opening. The pressure drop across a valve also varies with plug position – from minimum when fully open, to 100% of the system drop when fully closed.

To size a valve properly, it is necessary to know the full flow pressure drop across it. The pressure drop across a valve is the difference in pressure between the inlet and outlet under flow conditions. When it is specified by the engineer and the required flow is known, the selection of a valve is simplified. When this pressure drop is not known, it must be computed or assumed.

If the pressure drop across the valve when fully open is not a large enough percentage of the total system drop, there will be little change in fluid flow until the valve actually closes, forcing the valve's characteristic toward a quick opening form.

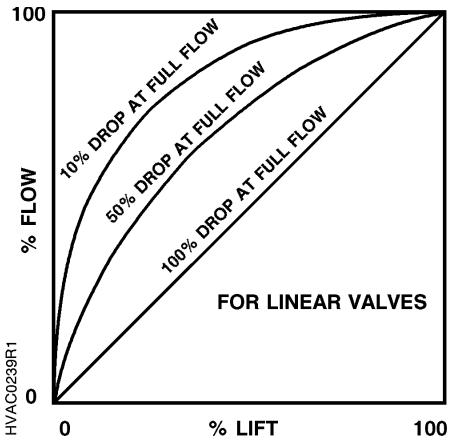


Figure 1.

Figure 1 shows flow-lift curves for a linear valve with various percentages of design pressure drop. Note the improved characteristic as pressure drop approaches 100% of system pressure drop at full flow.

It is important to realize that the flow characteristic for any particular valve, such as the linear characteristic shown in Figure 1 is applicable only if the pressure drop remains nearly constant across the valve for full stem travel. In most systems, however, it is impractical to take 100% of the system drop across the valve.

A good working rule is, "at maximum flow, 25 to 50% of the total system pressure drop should be absorbed by the control valve." Although this generally results in larger pump sizes, it should be pointed out that the initial equipment cost is offset by a reduction in control valve size, and results in improved controllability of the system. Reasonably good control can be accomplished with pressure drops of 15 to 30% of total system pressures. A drop of 15% can be used if the variation in flow is small.

Recommended Pressure Drops for Valve Sizing – Water

1. With a differential pressure less than 20 psi, use a pressure drop equal to 5 psi.
2. With a differential pressure greater than 20 psi, use a pressure drop equal to 25% of total system pressure drop (maximum pump head), but not exceeding the maximum rating of the valve.

Sizing a Valve

Pressure Drop for Steam

The same methodology should be applied for selecting a valve for steam with the most important consideration is the pressure drop.

First, the correct maximum capacity of the coil must be determined. Ideally, there should be no safety factor in this determination and it should be based on the actual BTU heating requirements. The valve size must be based on the actual supply pressure at the valve. When the valve is fully open, the outlet pressure will assume a valve such that the valve capacity and coil condensing rate are in balance. If this outlet valve pressure is relatively large (small pressure drop), then as the valve closes, there will be no appreciable reduction in flow until the valve is nearly closed. To achieve better controllability, the smallest valve (largest pressure drop) should be selected. With the valve outlet pressure much less than the inlet pressure, a large pressure drop results. There will now be an immediate reduction in capacity as the valve throttles. For steam valves, generally the largest possible pressure drop should be taken, without exceeding the critical pressure ratio. Therefore, the steam pressure drop should approach 80% of the system differential pressure.

Examining the pressure drops under “Recommended Pressure Drops for Valve Sizing – Steam” , you might be concerned about the steam entering the coil at 0 psi when a large drop is taken across the control valve. Steam flow through the coil will still drop to vacuum pressures due to condensation of the steam. Consequently, a pressure differential will still exist. In this case, proper steam trapping and condensation piping is essential.

Recommended Pressure Drops for Valve Sizing – Steam

1. With gravity flow condensate removal and inlet pressure less than 15 psi, use a pressure drop equal to the inlet gauge pressure.
2. With vacuum return system up to 7" Hg vacuum and an inlet pressure less than 2 psi, a pressure drop of 2 psi should be used. With an inlet pressure of 2 to 15 psi, use a pressure drop equal to the inlet gauge pressure.
3. With an inlet pressure greater than 15 psi, use a pressure drop equal to 80% of system differential pressure. Example: Inlet pressure is 20 psig (35 psia) and a gravity return at atmospheric pressure 0 psig (14.7 psia), use a pressure drop of 16 psi.
4. When a coil size is selected on the basis that line pressure and temperature is available in the coil of a heating and ventilating application, a very minimum pressure drop is desired. In this case, use the following: pressure drop:

Initial Pressure	Pressure Drop
15 psi	5 psi
50 psi	7.5 psi
100 psi	10 psi
Over 100 psi	10% of line pressure

(typically on/off applications)

Sizing a Valve

Valve Sizing Formulas

The Most Important Variables to Consider When Sizing a Valve:

1. What medium will the valve control? Water? Steam? What effects will specific gravity and viscosity have on the valve size?
2. What will the inlet pressure be under maximum load demand? What is the inlet temperature?
3. What pressure drop (differential) will exist across the valve under maximum load demand?
4. What maximum capacity should the valve handle?
5. What is the maximum pressure differential the valve must close against?

When these are known, a valve can be selected by formula (Cv method) or water and steam capacities tables which can be found in the Valves section, pages A-6 through A-10. The valve size should not exceed the line size.

The following definitions apply in the following formulas:

Cv	Valve flow coefficient, U.S. GPM with P = 1 psi
P_1	Inlet pressure at maximum flow, psia (abs.)
P_2	Outlet pressure at maximum flow, psia (abs.)
ΔP	P_1 — P_2 at maximum flow, psi
Q	Fluid flow, U.S. ΔM
W	Steam flow, pounds per hour (lb./hr.)
S	Specific gravity of fluid relative to water @ 60°F
K	1 + (0.0007 x °F superheat), for steam
K_r	Viscosity correction factor for fluids (See Page G-6)

Formulas:	Remarks:
1. For liquids (water, oil, etc.):	
$Cv = Q\sqrt{\frac{S}{\Delta P}}$	Specific gravity correction is negligible for water below 200°F (use S=1.0). Use actual specific gravity S of other liquids at actual flow temperature.
$Cv = K_r Q\sqrt{\frac{S}{\Delta P}}$	Use this for fluids with viscosity correction fact. Use actual specific gravity S for fluids at actual flow temperature.
2. For steam (saturated or superheated):	
$Cv = \frac{WK}{2.1\sqrt{\Delta P\,(P_1 + P_2)}}$	Use this when P_2 is *greater* than $1/2P_1$
$Cv = \frac{WK}{1.82\,P_1}$	Use this when P2 is *less than* or *equal to* $1/2P_1$

Sizing a Valve

Sizing Formulas and Tables

Viscosity Factors

The relationship between kinematic and absolute viscosity:

$$\text{Centistoke} = \frac{\text{Centipoise}}{\text{Specific Gravity}}$$

Saybolt* Univ Seconds (S.S.U.)	Engler Time Seconds	Kinematic Viscosity	Correction Factors (K_1)
46,350	—	10,000	—
37,080	—	8,000	—
27,810	—	6,000	—
18,540	—	4,000	—
13,900	—	3,000	—
11,590	—	2,500	—
9,270	—	2,000	1.93
6,950	10,800	1,500	1.90
4,635	7,100	1,000	1.82
3,708	5,700	800	1.78
2,781	4,250	600	1.74
1,854	2,820	400	1.67
1,390	2,120	300	1.63
1,159	1,760	250	1.61
927	1,400	200	1.57
695	1,050	150	1.43
464	700	100	1.45
371	555	80	1.42
278	420	60	1.37
186	290	40	1.30
141	225	30	1.25
119	191	25	1.22
97.8	157	20	120
77.4	127	15	1.16
58.9	97	10	1.11
52.1	85.5	8	1.08
45.6	76.0	6	1.07
39.1	67.5	4	1.05
36.0	62.5	3	1.03
32.6	58.0	2	—
31.6	55.5	1.5	—
31.3 ←PURE WATER AT 60°F→ 1.1			—

Chart Note:
*Redwood time (seconds) approximately same as S.S.U.

Specific Gravity of Water

Temp T(°F)	Abs. Pressure	Specific Gravity — S (W=62.4 lb./ft.^{3} @ 60°F)	$\sqrt{S}$
60	—	1.000	1.000
100	—	0.993	0.999
150	—	0.981	0.985
200	—	0.963	0.981
250	30	0.942	0.971
300	67	0.920	0.959
350	135	0.891	0.944
400	247	0.860	0.927
450	423	0.827	0.910

Process Formulas

For Heating or Cooling Water:

$$\text{GPM} = \frac{\text{Btu/hr.}}{(\text{°F water temp. rise or drop} \times 500)}$$

$$\text{GPM} = \frac{\text{CFM} \times .009 \times \text{H}}{\text{°F water temperature change}}$$

(H = change in enthalpy of air expressed in Btu/lb. of air)

For Heating Water with Steam:

lbs. steam/hr. = 0.50 x GPM x (°F water temp. rise)

For Heating or Cooling Water:

$$\text{GPM}_1 = \text{GPM}_2 \times \frac{(\text{°F water}_2 \text{ temp. rise or drop})}{\text{°F water}_1 \text{ temp. drop}}$$

For Heating Air with Steam Coils:

$$\text{lbs. steam/hr.} = 1.08 \times (\text{°F air temp. rise}) \times \frac{\text{CFM}}{1000}$$

For Heating Air with Water Coils:

$$\text{GPM} = 2.16 \times \frac{\text{CFM} \times (\text{°F air temp. rise})}{1000 \times (\text{°F water}_1 \text{ temp. drop})}$$

For Radiation:

lbs. steam/hr. = 0.24 x ft.² EDR (Low pressure steam)

EDR = Equivalent Direct Radiation

1 EDR (steam) = 240 BTU/Hr. (Coil Temp. = 215°F)

1 EDR (water) = 200 BTU/Hr. (Coil Temp. = 197°F)

$$\text{GPM} = \frac{\text{ft.}^2 \text{ EDR}}{50}$$ (Assume 20°F water TD)

Sizing a Valve

Valve Sizing and Selection Example

Select a valve to control a chilled water coil that must have a flow of 35 GPM with a valve differential pressure (ΔP) of 5 psi.

Determine the valve Cv using the formula for liquids.

$$Cv = Q\sqrt{\frac{S}{P}} = 35\ GPM\sqrt{\frac{1}{5\ psi}} = 15.6$$

Select a valve that is suitable for this application and has a Cv as close as possible to the calculated value.

One choice is 277-03186: a 1-1/4" NC valve with a Cv of 16. Refer to Flowrite Valves Reference section.

Valve Selection Criteria

1. Flow characteristic — Modified Equal Percentage which provides good control for a water coil.
2. Body rating and material — Suitable for water.
3. Valve type and action — A single seat NC valve with an adjustable spring range which can be sequenced with a NO valve used for heating.
4. Valve actuator — Actuator close-off rating is higher than the system differential pressure.
5. Valve line size — Its Cv is close to and slightly larger than the calculated Cv (15.6).
6. For Ball Valves — use the same selection criteria.

Valve Body Rating

The temperature-pressure ratings for ANSI Classes 125 and 250 valve bodies made of bronze or cast iron are shown below.

Description	Temperature	Pressure	
		ANSI Class 125	ANSI Class 250
Bronze Screwed Bodies			
Specification #B16.15-1978 ANSI Amer. Std.; USA; ASME	-20 to + 150°F (-30 to + 66°C)	200 psi (1378 kPa)	400 psi (2758 kPa)
	-20 to + 200°F (-30 to + 93°C)	190 psi (1310 kPa)	385 psi (2655 kPa)
	-20 to + 250°F (-30 to + 121°C)	180 psi (1241 kPa)	365 psi (2586 kPa)
	-20 to + 300°F (-30 to + 149°C)	165 psi (1138 kPa)	335 psi (2300 kPa)
	-20 to + 350°F (-30 to + 177°C)	150 psi (1034 kPa)	300 psi (2068 kPa)
	-20 to + 400°F (-30 to + 204°C)	125 psi (862 kPa)	250 psi (1724 kPa)
Cast Iron Flanged Bodies			
Class B-sizes 1 to 12 Specification #B16.1 1975 ANSI Amer. Std.; USA; ASME	-20 to + 150°F (-30 to + 66°C)	200 psi (1378 kPa)	500 psi (3445 kPa)
	-20 to + 200°F (-30 to + 93°C)	190 psi (1310 kPa)	460 psi (3169 kPa)
	-20 to + 225°F (-30 to + 106°C)	180 psi (1241 kPa)	440 psi (3032 kPa)
	-20 to + 250°F (-30 to + 121°C)	175 psi (1206 kPa)	415 psi (2859 kPa)
	-20 to + 275°F (-30 to + 135°C)	170 psi (1171 kPa)	395 psi (2722 kPa)
	-20 to + 300°F (-30 to + 149°C)	165 psi (1138 kPa)	375 psi (2584 kPa)
	-20 to + 325°F (-30 to + 163°C)	155 psi (1069 kPa)	355 psi (2448 kPa)
	-20 to + 350°F (-30 to + 177°C)	150 psi (1034 kPa)	335 psi (2308 kPa)
	-20 to + 375°F (-30 to + 191°C)	145 psi (1000 kPa)	315 psi (2170 kPa)
	-20 to + 400°F (-30 to + 204°C)	140 psi (965 kPa)	290 psi (1998 kPa)
	-20 to + 425°F (-30 to + 218°C)	130 psi (896 kPa)	270 psi (1860 kPa)
	-20 to + 450°F (-30 to + 232°C)	125 psi (862 kPa)	250 psi (1734 kPa)

Refer to Conversion Factors on page G-32.

Close-off Pressures

MZ Series

Valve Size	Electronic	
	2-Way	3-Way
	Normally Open	
1/2", Cv ≤ 1.6	60 (414)	25 (172)
1/2", Cv ≤ 4	35 (241)	15 (103)
3/4 to 1", Cv ≤ 10	30 (207)	10 (69)
	Normally Closed	
1/2", Cv ≤ 1.6	70 (482)	70 (482)
1/2", Cv ≤ 4	40 (276)	40 (276)
3/4 to 1", Cv ≤ 10	30 (207)	30 (207)

Table Note:
All close-off values within table are in psi (kPa) unless otherwise indicated.

For 3-Way valve close-offs, use this chart to determine upper port (NC) and bottom port (NO).

MT Series

2-Way Valve Size	Pneumatic			Electronic	
	599-01088			SQS	SSC
	3 to 8 psi (21 to 55 kPa)	8 to 13 psi (55 to 90 kPa)	10 to 15 psi (69 to 103 kPa)		
	Normally Open				
1/2", Cv ≤ 1.6	95 (655)	45 (310)	20 (138)	160 (1103)	120 (868)
1/2", Cv ≤ 4	45 (310)	25 (172)	15 (103)	85 (586)	65 (448)
3/4 to 1", Cv ≤ 10	35 (241)	10 (69)	—	70 (482)	55 (379)
	Normally Closed				
1/2", Cv ≤ 1.6	40 (276)	95 (655)	95 (655)	95 (655)	95 (655)
1/2", Cv ≤ 4	28 (193)	50 (345)	50 (345)	50 (345)	50 (345)
3/4 to 1", Cv ≤ 10	18 (124)	40 (276)	40 (276)	40 (276)	40 (276)

3-Way Valve Size	Pneumatic			Electronic	
	599-01088			SQS	SSC
	3 to 8 psi (21 to 55 kPa)	8 to 13 psi (55 to 90 kPa)	10 to 15 psi (69 to 103 kPa)		
	Normally Open				
1/2", Cv ≤ 1.6	95 (655)	45 (310)	20 (138)	160 (1103)	95 (655)
1/2", Cv ≤ 4	45 (310)	25 (172)	15 (103)	85 (586)	50 (379)
3/4 to 1", Cv ≤ 10	35 (241)	10 (69)	—	70 (482)	40 (276)
	Normally Closed				
1/2", Cv ≤ 1.6	40 (276)	95 (655)	120 (827)	95 (655)	95 (655)
1/2", Cv ≤ 4	28 (193)	50 (345)	65 (448)	50 (345)	50 (345)
3/4 to 1", Cv ≤ 10	18 (124)	40 (276)	50 (345)	40 (276)	40 (276)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

For 3-Way valve close-offs, use this chart to determine upper (NC) and bottom port (NO).

Normally open close-off pressures are at 20 psi actuator pressure.

Normally closed close-off pressures are at 0 psi actuator pressure.

Close-off Pressures

Electronic

Valve Size in.	(mm)	Rack & Pinion w/GMA NEW!	Rack & Pinion w/GCA APC 298, 299	SAX NSR APC 371, 373	SKD APC 267, 274-276	SKB APC 289-291	SKC APC 292-294
		Normally Open					
1/2	(15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	—
3/4	(20)	174 (1200)	231 (1593)	211 (1456)	250 (1724)	250 (1724)	—
1	(25)	136 (938)	149 (1028)	137 (945)	201 (1386)	250 (1724)	—
1-1/4	(32)	84 (580)	92 (634)	85 (586)	124 (855)	250 (1724)	—
1-1/2	(40)	55 (380)	59 (407)	55 (379)	80 (552)	250 (1724)	—
2	(50)	30 (207)	36 (248)	34 (235)	49 (338)	201 (1386)	—
2-1/2	(65)	—	25 (172)	26 (179)	38 (262)	153 (518)	—
3	(80)	—	18 (124)	17 (117)	25 (172)	101 (342)	—
4	(100)	—	—	—	—	—	65 (448)
5	(125)	—	—	—	—	—	42 (289)
6	(150)	—	—	—	—	—	29 (199)
		Normally Closed					
1/2	(15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	—
3/4	(20)	174 (1200)	250 (1724)	250 (1724)	250 (1724)	250 (1724)	—
1	(25)	136 (938)	173 (1193)	159 (1097)	203 (1400)	250 (1724)	—
1-1/4	(32)	84 (580)	100 (690)	92 (634)	117 (807)	250 (1724)	—
1-1/2	(40)	55 (380)	61 (421)	57 (393)	73 (503)	208 (1434)	—
2	(50)	30 (207)	37 (255)	35 (241)	44 (303)	126 (869)	—
2-1/2	(65)	—	25 (172)	26 (179)	34 (234)	97 (668)	—
3	(80)	—	18 (124)	17 (117)	22 (152)	63 (434)	—
4	(100)	—	—	—	—	—	39 (268)
5	(125)	—	—	—	—	—	25 (172)
6	(150)	—	—	—	—	—	17 (117)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Electronic High Pressure Close-off

Valve Size in.	(mm)	Electro-Hydraulic 24 VAC	
		SKD	SKC
		Normally Open	
2-1/2	(65)	200 (1378)	—
3	(80)	200 (1378)	—
4	(100)	—	200 (1378)
5	(125)	—	200 (1378)
6	(150)	—	200 (1378)
		Normally Closed	
2-1/2	(65)	200 (1378)	—
3	(80)	200 (1378)	—
4	(100)	—	200 (1378)
5	(125)	—	200 (1378)
6	(150)	—	200 (1378)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Close-off Pressures

Pneumatic

Valve Size in. (mm)	Spring Range							
	3 to 8 psi (21 to 55 kPa)					10 to 15 psi (69 to 103 kPa)		
	4" Actuator	8" Actuator		12" Actuator		4" Actuator	8" Actuator	12" Actuator
	15 psi (103 kPa)	15 psi (103 kPa)	30 psi (207 kPa)	15 psi (103 kPa)	30 psi (207 kPa)	0 psi (0 kPa)	0 psi (0 kPa)	0 psi (0 kPa)
	Normally Open					Normally Closed		
1/2 (15)	142 (979)	250 (1724)	250 (1724)	—	—	236 (1627)	250 (1724)	—
3/4 (20)	80 (552)	231 (1593)	250 (1724)	—	—	155 (1069)	250 (1724)	—
1 (25)	52 (359)	150 (1034)	250 (1724)	250 (1724)	250 (1724)	91 (627)	250 (1724)	250 (1724)
1-1/4 (32)	32 (221)	93 (641)	250 (1724)	250 (1724)	250 (1724)	52 (359)	148 (1020)	250 (1724)
1-1/2 (40)	20 (138)	60 (414)	198 (1365)	205 (1413)	250 (1724)	32 (331)	92 (634)	250 (1724)
2 (50)	12 (83)	37 (255)	123 (848)	130 (896)	250 (1724)	20 (138)	55 (379)	185 (1275)
2-1/2 (65)	—	31 (213)	100 (689)	95 (655)	250 (1724)	—	36 (248)	114 (786)
3 (80)	—	20 (138)	66 (444)	63 (434)	200 (1378)	—	23 (158)	74 (610)
4 (100)	—	—	—	40 (275)	129 (889)	—	—	46 (317)
5 (125)	—	—	—	26 (179)	82 (565)	—	—	29 (199)
6 (150)	—	—	—	18 (124)	57 (393)	—	—	20 (137)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.
For 3-Way valve close-offs, use this chart to determine upper port (NC) and bottom port (NO).
Normally open close-off pressures are at 15 psi actuator pressure.
Normally closed close-off pressures are at 0 psi actuator pressure.

Pneumatic High Pressure Close-off

Valve Size in. (mm)	Spring Range			
	3 to 8 psi (21 to 55 kPa)		10 to 15 psi (69 to 103 kPa)	
	8" Actuator	12" Actuator	8" Actuator	12" Actuator
	Normally Open		Normally Closed	
2-1/2 (65)	200 (1378)	—	200 (1378)	—
3 (80)	200 (1378)	—	200 (1378)	—
4 (100)	—	200 (1378)	—	200 (1378)
5 (125)	—	200 (1378)	—	200 (1378)
6 (150)	—	200 (1378)	—	200 (1378)

Table Notes:
All close-off values within table are in psi (kPa) unless otherwise indicated.

Close-off Pressures

Close-off Pressure – 599 Series Ball

2-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi
599-10300 / 599-10300S	1/2	0.4	200
599-10301 / 599-10301S		0.63	200
599-10302 / 599-10302S		1.0	200
599-10303 / 599-10303S		1.6	200
599-10304 / 599-10304S		2.5	200
599-10305 / 599-10305S		4.0	200
599-10306 / 599-10306S		6.3	200
599-10307* / 599-10307S*		10	200
599-10308 / 599-10308S	3/4	6.3	200
599-10309 / 599-10309S		10	200
599-10310 / 599-10310S		16	200
599-10311* / 599-10311S*		25	200
599-10312 / 599-10312S	1	10	200
599-10313 / 599-10313S		16	200
599-10314 / 599-10314S		25	200
599-10315 / 599-10315S		40	200
599-10316* / 599-10316S*		63	200
599-10317 / 599-10317S	1-1/4	16	200
599-10318 / 599-10318S		25	200
599-10319 / 599-10319S		40	200
599-10320 / 599-10320S		63	200
599-10321* / 599-10321S*		100	200
599-10322 / 599-10322S	1-1/2	25	200
599-10323 / 599-10323S		40	200
599-10324 / 599-10324S		63	200
599-10325 / 599-10325S		100	200
599-10326* / 599-10326S*		160	200
599-10327 / 599-10327S	2	40	200
599-10328 / 599-10328S		63	200
599-10329* / 599-10329S*		100	200
599-10330* / 599-10330S*		160	200

** Denotes a full-port valve with no flow optimizer insert.*
S suffix denotes Stainless Steel Ball and Stem

Close-off Pressure – 599 Series Ball

3-Way Valve Body Part No.	Valve Size in.	Flow Rate Cv	Close Off psi
599-10350 / 599-10350S	1/2	0.4	200
599-10351 / 599-10351S		0.63	200
599-10352 / 599-10352S		1.0	200
599-10353 / 599-10353S		1.6	200
599-10354 / 599-10354S		2.5	200
599-10355 / 599-10355S		4	200
599-10356 / 599-10356S		6.3	200
599-10357* / 599-10357S*		10	200
599-10358 / 599-10358S	3/4	6.3	200
599-10359 / 599-10359S		10	200
599-10360* / 599-10360S*		16	200
599-10361 / 599-10361S	1	10	200
599-10362 / 599-10362S		16	200
599-10363* / 599-10363S*		25	200
599-10364 / 599-10364S	1-1/4	16	200
599-10365 / 599-10365S		25	200
599-10366* / 599-10366S*		40	200
599-10367 / 599-10367S	1-1/2	25	200
599-10368 / 599-10368S		40	200
599-10369* / 599-10369S*		63	200
599-10370 / 599-10370S	2	40	200
599-10371 / 599-10371S		63	200
599-10372* / 599-10372S*		100	200

** Denotes a full-port valve with no flow optimizer insert.*
S suffix denotes Stainless Steel Ball and Stem

Flow Coeffiecients

2-Way, Full-Port (no flow optimizer) Ball Valve Part Nos. and Flow Coefficients

Valve Size in.	Valve Size (mm)	Valve Part No.	Effective (Installed) Cv (Kvs) Supply Line Size in Inches (mm) 1/2 (15)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (40)	2 (50)	2-1/2 (65)	3 (80)
1/2	(15)	599-10307 or 599-10307S	**10.0 (8.62)**	6.94 (5.93)	6.19 (5.29)					
3/4	(20)	599-10311 or 599-10311S		**25.00 (21.55)**	18.66 (15.99)	15.35 (13.12)				
1	(25)	599-10316 or 599-10316S			**63.00 (54.31)**	39.78 (34.00)	33.56 (28.69)			
1-1/4	(32)	599-10321 or 599-10321S				**100.00 (86.21)**	69.19 (5.13)	51.45 (43.98)		
1-1/2	(40)	599-10326 or 599-10326S					**160.00 (137.93)**	93.80 (80.17)	76.34 (65.25)	
2	(50)	599-10329 or 599-10329S						**100.00 (86.21)**	94.30 (80.60)	86.12 (73.61)

3-Way, Full-Port (no flow optimizer) Ball Valve Part Nos. and Flow Coefficients

Valve Size in.	Valve Size (mm)	Valve Part No.	Effective (Installed) Cv (Kvs) Supply Line Size in Inches (mm) 1/2 (15)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (40)	2 (50)	2-1/2 (65)	3 (80)
1/2	(15)	599-10357 or 599-10357S	**10.0 (8.62)**	6.94 (5.93)	6.19 (5.29)					
3/4	(20)	599-10360 or 599-10360S		**16.00 (13.79)**	13.9 (11.98)	12.4 (10.69)				
1	(25)	599-10363 or 599-10363S			**25.00 (21.55)**	22.5 (19.4)	21.2 (18.27)			
1-1/4	(32)	599-10366 or 599-10366S				**40.00 (34.48)**	36.9 (31.81)	33.3 (28.70)		
1-1/2	(40)	599-10369 or 599-10369S					**63.00 (54.31)**	55.3 (47.67)	51.00 (43.96)	
2	(50)	599-10372 or 599-10372S						**100 (86.21)**	94.3 (81.29)	86.1 (74.23)

Key Valve may be oversized | Optimal valve size | Valve may be undersized

Steam Saturation Pressure

Gauge/Temperature

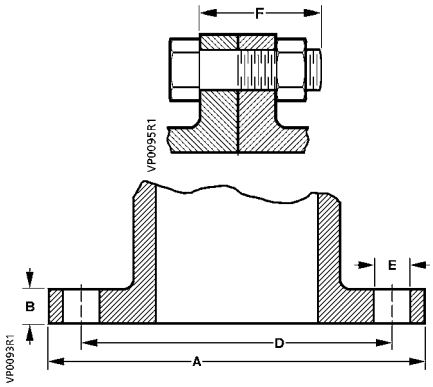
Gauge Pressure psi	Absolute Pressure psi	Temperature Degrees Fahrenheit
0.0	14.70	212.0
0.3	15	213.0
1.3	16	216.3
2.3	17	219.4
3.3	18	222.4
4.3	19	225.2
5.3	20	228.0
6.3	21	230.6
7.3	22	233.1
8.3	23	235.5
9.3	24	237.8
10.3	25	240.1
11.3	26	242.2
12.3	27	244.4
13.3	28	246.4
14.3	29	248.4
15.3	30	250.3
16.3	31	252.2
17.3	32	254.1
18.3	33	255.8
19.3	34	257.6
20.3	35	259.3
21.3	36	261.0
22.3	37	262.6
23.3	38	264.2
24.3	39	265.8
25.3	40	267.3
26.3	41	268.7
27.3	42	270.2
28.3	43	271.7
29.3	44	273.1
30.3	45	274.5
31.3	46	275.8
32.3	47	277.2
33.3	48	278.5
34.3	49	279.8
35.3	50	281.0
36.3	51	282.3
37.3	52	283.5
38.3	53	284.7
39.3	54	285.9
40.3	55	287.1
41.3	56	288.2
42.3	57	289.4
43.3	58	290.5
44.3	59	291.6
45.3	60	292.7
46.3	61	293.8
47.3	62	294.9
48.3	63	295.9
49.3	64	297.0
50.3	65	298.0
51.3	66	299.0
52.3	67	300.0
53.3	68	301.0
54.3	69	302.0
55.3	70	302.9
56.3	71	303.9
57.3	72	304.8
58.3	73	305.8
59.3	74	306.7
60.3	75	307.6
61.3	76	308.5
62.3	77	309.4
63.3	78	310.3
64.3	79	311.2
65.3	80	312.0
66.3	81	312.9
67.3	82	313.8
68.3	83	314.6
69.3	84	315.4
70.3	85	316.3
71.6	86	317.1
72.3	87	317.9
73.3	88	318.7
74.3	89	319.5
75.3	90	320.3
76.3	91	321.1
77.3	92	321.8
78.3	93	322.6
79.3	94	323.4
80.3	95	324.1
81.3	96	324.9
82.3	97	325.6
83.3	98	326.4
84.3	99	327.1
85.3	100	327.8
87.3	102	329.3
89.3	104	330.7
91.3	106	332.0
93.3	108	333.4
95.3	110	334.8
97.3	112	336.1
99.3	114	337.4
101.3	116	338.7
103.3	118	340.0
105.3	120	341.3
107.3	122	342.5
109.3	124	343.8
111.3	126	345.0
113.3	128	346.2
115.3	130	347.4
117.3	132	348.5
119.3	134	349.7
121.3	136	350.8
123.3	138	352.0
125.3	140	353.1
127.3	142	354.2
129.3	144	355.3
131.3	146	356.3
133.3	148	357.4
135.3	150	358.5
137.3	152	359.5
139.3	154	360.5
141.3	156	361.6
143.3	158	362.6
145.3	160	363.6
147.3	162	364.6
149.3	164	365.6
151.3	166	366.5
153.3	168	367.5
155.3	170	368.5
157.3	172	369.4
159.3	174	370.4
161.3	175	371.3
163.3	178	372.2
165.3	180	373.1
167.3	182	374.0
169.3	184	374.9
171.3	186	375.8
173.3	188	376.7
175.3	190	377.6
177.3	192	378.5
179.3	194	379.3
181.3	196	380.2
183.3	198	381.0
185.3	200	381.9
190.3	205	384.0
195.3	210	386.0
200.3	215	388.0
205.3	220	389.9
210.3	225	391.9
215.3	230	393.8
220.3	235	395.6
225.3	240	397.4
230.3	245	399.3
235.3	250	401.1
245.3	260	404.5
255.3	270	407.9
265.3	280	411.2
275.3	290	414.4
285.3	300	417.5

Vacuum/Temperature

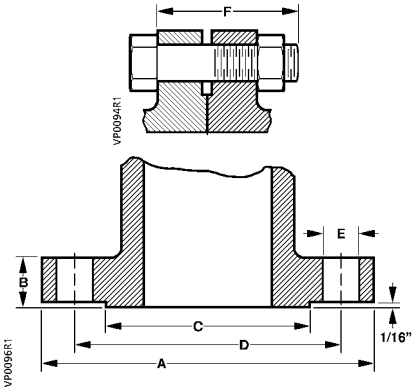
Vacuum Inches Hg	Absolute Pressure psi	Temperature Degrees Fahrenheit
29.74	0.0886	32
29.67	0.1217	40
29.56	0.1780	50
29.40	0.2562	60
29.18	0.3626	70
28.89	0.505	80
28.50	0.696	90
28.00	0.946	100.00
27.88	1	101.83
25.85	2	126.15
23.81	3	141.52
21.78	4	153.01
19.74	5	162.28
17.70	6	170.06
15.67	7	176.85
13.63	8	182.86
11.60	9	188.27
9.56	10	193.22
7.52	11	197.75
5.49	12	201.96
3.45	13	205.87
1.42	14	209.55

Flanged Cast Iron Dimensions

2-1/2 to 6-inch Cast Iron Flange Dimensions (as defined by ANSI standard B16.1)



ANSI Class 125.



ANSI Class 250.

ANSI Class 125

Nominal Pipe Size	Flanges		Drilling		Bolting		Length of Machine Bolts
	Flange Diameter	Flange Thickness	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	
	A	B	D	E			F
2-1/2"	7"	11/16"	5-1/2"	3/4"	4	5/8"	2-1/2"
3"	7-1/2"	3/4"	6"	3/4"	4	5/8"	2-1/2"
4"	9"	15/16"	7-1/2"	3/4"	8	5/8"	3"
5"	10"	15/16"	8-1/2"	7/8"	8	3/4"	3"
6"	11"	1"	9-1/2"	7/8"	8	3/4"	3-1/4"

ANSI Class 250

Nominal Pipe Size	Flanges			Drilling		Bolting		Length of Machine Bolts
	Flange Diameter	Flange Thickness	Diameter of Raised Face	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	
	A	B	C	D	E			F
2-1/2"	7-1/2"	1"	4-15/16"	5-7/8"	7/8"	8	3/4"	3-1/4"
3"	8-1/4"	1-1/8"	5-11/16"	6-5/8"	7/8"	8	3/4"	3-1/5"
4"	10"	1-1/4"	6-15/16"	7-7/8"	7/8"	8	3/4"	3-3/4"
5"	11"	1-3/8"	8-5/16"	9-1/4"	7/8"	8	3/4"	4"
6"	12-1/2"	1-7/16"	9-11/16"	10-5/8"	7/8"	12	3/4"	4"

Sizing and Selecting Pressure Independent Control Valves (PICV)

Just two pieces of information are needed to size a PICV:

1. Line size where the valve will be installed
2. Design flow, in gpm, of the coil being controlled

Then find the valve size of the PICV, closest to the line size, which has a preset maximum flow setting greater than or equal to the design flow of the coil being controlled. It is that easy!

Because the valves are pressure independent, within a certain differential pressure range, the differential pressure is not required for "sizing calculations."

In order for the valve to function as a pressure independent valve, you must ensure that the minimum differential pressure across the valve will always be greater than the start pressure of the pressure regulator in the PICV, or Δp_{min} of the pressure independence range of the PICV.

Please refer to the start pressures listed below and on G-16, and refer to the product data sheets for more information.

Threaded

Part Number	Line Size Inches (mm)	ANSI Pressure Class	Maximum Flow Range (GPM)	Close-off Pressure (psi)	ANSI Leakage Class	Pressure Independence Range (psi)	
						Δp min	Δp max
Normally Open							
599-04310-X	1/2 (15)	250	0.2 to 0.9	200	Class IV (0.01%)	2.5	58
599-04311-X	1/2 (15)		0.5 to 2.5			3	
599-04312-X	3/4 (20)		1 to 5.8			3.5	
599-04313-X	1 (25)		1.2 to 8			4.0	
599-04314-X	1-1/4 (32)		3 to 18			4.1	
599-04315-X	1-1/2 (40)		10 to 40	100		3.6	
599-04316-X	2 (50)		10 to 50			5.0	
Normally Closed							
599-04300-X	1/2 (15)	250	0.3 to 2.7	45	Class IV (0.01%)	2.3	58
599-04301-X	1/2 (15)		1.0 to 7.5			2.6	
599-04302-X	3/4 (20)		0.5 to 4.5			2.3	
599-04303-X	3/4 (20)		1.0 to 8.9			3.2	
599-04304-X	1 (25)		1.0 to 8.9			3.2	
599-04305-X	1-1/4 (32)		2.5 to 13.2			2.6	

Table Notes:
X suffix represents the various factory preset maximum flow GPM settings that are orderable

Sizing and Selecting Pressure Independent Control Valves (PICV)

Flanged

Part Number	Line Size Inches (mm)	ANSI Pressure Class	Maximum Flow Range (GPM)	Close-off Pressure (psi)	ANSI Leakage Class	Pressure Independence Range (psi)	
						Δp min	Δp max
Normally Open*							
599-07310	2-1/2 (65)	125	19 to 110	100	Class IV (0.01%)	3.6	90
599-07315	2-1/2 (65)		26 to 154			8	
599-07311	3 (80)		24 to 150			3.6	
599-07316	3 (80)		31 to 190			8	
599-07312	4 (100)		55 to 300			5	
599-07317	4 (100)		65 to 395			10	
599-07313	5 (125)		85 to 485			5	
599-07318	5 (125)		105 to 595			8	
599-07314	6 (150)		115 to 650			5	
599-07319	6 (150)		140 to 860			9	
599-07320	2-1/2 (65)	250	19 to 110			3.6	
599-07325	2-1/2 (65)		26 to 154			8	
599-07321	3 (80)		24 to 150			3.6	
599-07326	3 (80)		31 to 190			8	
599-07322	4 (100)		55 to 300			5	
599-07327	4 (100)		65 to 395			10	
599-07323	5 (125)		85 to 485			5	
599-07328	5 (125)		105 to 595			8	
599-07324	6 (150)		115 to 650			5	
599-07329	6 (150)		140 to 860			9	

Table Notes:

* Flanged valves are normally open but SQV spring return actuators fail open (SQV91P30U, 238 actuator prefix code) or fail closed (SQV91P40U, actuator prefix code 239); SAV and SAX actuators can be wired for normally closed operation.

Butterfly Valves

Introduction

When selecting a butterfly valve for water applications you must first determine the requirements of the valve assembly. The first question to ask is, “Will the valve be used for “Isolation” or “Proportional Control” of the fluid?” and “Does the application require a 2-way or 3-way assembly?”

2-Way and 3-Way Isolation Valves

When selecting a valve for isolation purposes, it is seldom necessary to calculate flow requirements beyond the published Cvs (flow coefficients)* of the valve. These valves are typically line size and require the lowest pressure drop available in the full open position. It may be possible to supply a valve smaller than the actual line size and still obtain a low-pressure drop. However, the cost of reducing flanges will typically offset any savings incurred by reducing the valve size. The 2- and 3-way Flow Coefficient charts, below and on G-16, provide Cv values for Siemens butterfly valves.

2-Way and 3-Way Proportional Control Valves

Control Valves are the most important element of a fluid handling system and proper selection of these valves is crucial for efficient operation of the process. When sizing butterfly valves for control, it is imperative to have certain requirements of the system.

You must have:

- **Maximum flow requirement:** This would be equivalent to the design flow and provided or converted to gallons per minute.
- **Maximum pressure drop allowed:** The Consulting Engineer usually provides this factor and are typically 3 to 5 psi max. However, the pressure drop should never exceed one half of the inlet pressure.

Without these two factors, selection of a control valve would be simply a guess.

2-Way Flow Coefficients (Cvs)

Size	Degrees Open								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
2"	1	7	16	27	43	61	84	114	144
2-1/2"	1.5	11	24	43	67	107	163	223	282
3"	2	15	35	61	96	154	267	364	461
4"	3	27	62	109	171	274	496	701	841
5"	5	43	98	170	268	428	775	1,146	1,376
6"	6	56	129	225	354	567	1,025	1,542	1,850
8"	12	102	241	421	680	1,081	1,862	2,842	3,316
10"	19	162	382	667	1,076	1,710	2,948	4,525	5,430
12"	27	235	555	1,005	1,594	2,563	4,393	6,731	8,077
14"	34	299	756	1,320	2,149	3,384	5,939	9,914	10,538
16"	45	397	1,001	1,749	2,847	4,483	7,867	11,761	13,966
18"	58	507	1,281	2,237	3,643	5,736	10,062	14,496	17,214
20"	72	632	1,595	2,786	4,536	7,144	12,535	18,812	22,339

Table Note:
Flow Coefficients (Cv) = The amount of water in gallons per minute, at 60°F that will pass through a given orifice with a one pound pressure drop.

Butterfly Valves

3-Way Flow Coefficients (Cvs)

Size	Angle of Disc Opening									
Run	**0°**	**10°**	**20°**	**30°**	**40°**	**50°**	**60°**	**70°**	**80°**	**90°**
Branch	**90°**	**80°**	**70°**	**60°**	**50°**	**40°**	**30°**	**20°**	**10°**	**0°**
2"	130	102	79	66	63	66	67	84	110	139
2-1/2"	213	175	142	107	79	97	113	155	207	252
3"	331	277	226	153	79	136	161	252	327	403
4"	500	445	373	270	131	257	297	449	574	664
5"	774	688	559	416	200	406	466	689	909	1,049
6"	1,095	967	766	566	335	541	627	929	1,255	1,454
8"	1,935	1,874	1,512	1,155	721	1,064	1,242	1,763	2,376	2,584
10"	3,153	3,058	2,490	1,886	1,155	1,704	2,003	2,849	3,833	4,221
12"	4,760	4,674	3,822	2,889	1,792	2,543	3,041	4,306	5,782	6,334
14"	5,384	6,055	4,683	3,164	2,377	3,433	3,973	5,577	7,959	7,559
16"	7,235	7,037	6,200	4,885	3,267	4,574	5,245	7,381	9,329	10,109
18"	8,664	8,431	8,018	6,302	4,486	5,847	6,740	9,492	11,302	12,227
20"	11,402	11,041	9,971	7,840	5,541	7,237	8,383	11,813	14,746	16,013

Table Notes:
Three-way valve assemblies Cvs are corrected from published two-way Cvs to account for line losses generated by the tee, and are calculated values only. The pipe friction losses are a function of fluid velocity through the pipe and the three-way Cvs listed are apparent for full flow through the pipe. Operation at less than full capacity (lower velocity) will increase the actual Cvs

Sizing Example

With this information and assuming the media is water or a similar media (glycol/water mix), a control valve can be properly sized for the application by following these steps:

1. **Calculate the required Cv:** Using the following formula and the information required above, you could calculate the flow coefficient (Cv) of the control valve.

$$Cv = \frac{GPM}{\sqrt{\Delta P}}$$

Whereas: GPM = The maximum flow requirement
P = The max. pressure drop (5 psi)

Example

The line size is 6" and the required flow is 600 GPM with a maximum pressure drop of 5 psi. The square root of 5 is equal to 2.236. When divided into 600, the required Cv for this application is: 268.336.

2. **Select your valve size:** Using the Flow Coefficients (Cvs), select the appropriate valve size. If your required Cv is in between valve sizes, choose the larger size valve. When selecting a 3–way assembly, the Cv of the run should be selected.

Example

The line size is 6" and the calculated required Cv is 268.336. The valve selected is a 4" with a rated Cv of 647.

Butterfly valves are high capacity valves and require very little pressure drop to control flow, which allows for reduction from the line size when sizing valves. This pipe reduction affects the flow characteristics and will reduce the effective Cv of the valve. This phenomenon is known as the piping geometry factor (Fp), which brings us to the final step in valves sizing.

Butterfly Valves

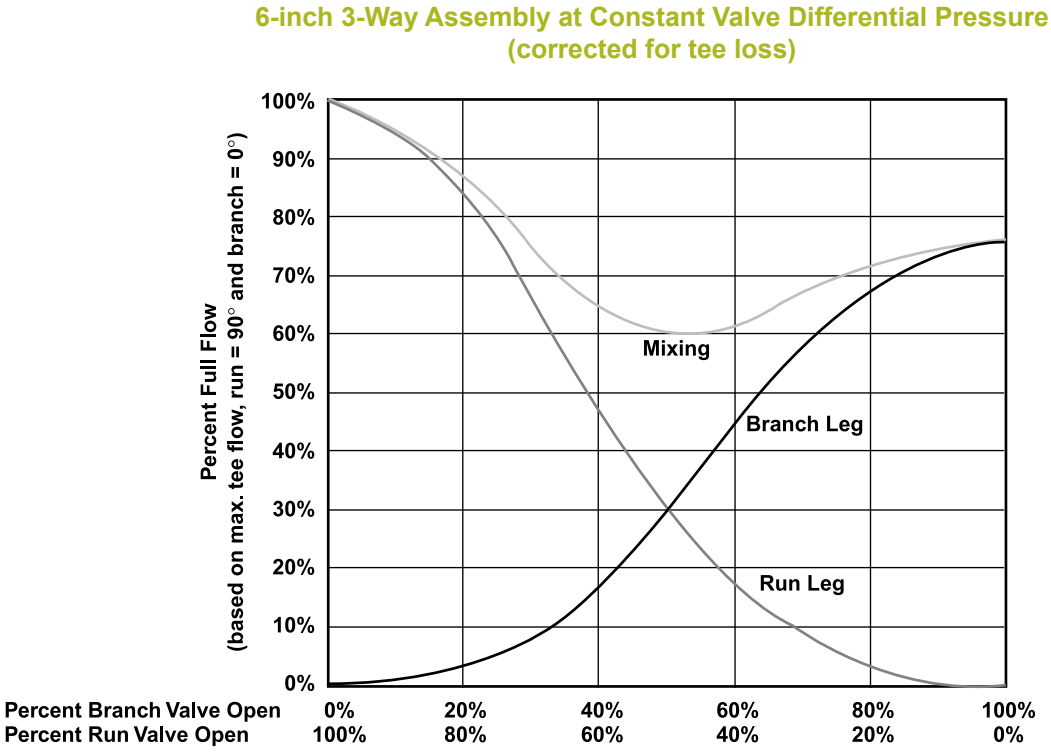
3. **Piping Geometry Factor**: Reducing pipe sizes for installation of a smaller than pipe size valves will reduce the effective Cv of the valve. The greater the pipe reduction, the greater loss of Cv. Using the Adjusted Cvs for Piping Geometry Factors chart, verify that the corrected Cv, for the valve size selected, meets or exceeds the required Cv calculated in step 2.
   Note: 3-Way Cvs have already been adjusted.

Adjusted Cvs for Piping Geometry Factors (Modulating @ 60 Degree Rotation)

Size	Pipe Size															
	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"
2"	61	59	57	55	54											
2-1/2"		107	104	98	94	92										
3"			154	147	140	136	131									
4"				274	265	255	242	235								
5"					428	418	393	378	370							
6"						567	545	524	510	501						
8"							1,081	1,048	1,008	980						
10"								1,710	1,671	1,617	1,572					
12"									2,563	2,516	2,441	2,374				
14"										3,384	3,338	3,258	3,182			
16"											4,483	4,432	4,340	4,246		
18"												5,736	5,682	5,577	5,466	
20"													7,144	7,087	6,971	6,843

Adjusted Cvs for Piping Geometry Factors (On-Off @ 90 Degree Rotation)

Size	Pipe Size															
	2"	2-1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"
2"	144	127	111	96	90											
2-1/2"		282	245	187	165	154										
3"			461	340	274	246	223									
4"				841	664	538	442	406								
5"					1,376	1,132	808	700	649							
6"						1,850	1,360	1,101	988	929						
8"							3,316	2,633	2,142	1,898						
10"								5,430	4,487	3,667	3,219					
12"									8,077	3,892	5,590	4,974				
14"										10,538	9,360	7,942	6,998			
16"											13,966	12,640	10,872	9,607		
18"												17,214	15,902	13,962	12,454	
20"													2,239	20,756	18,296	16,308


6-inch 3-Way Assembly at Constant Valve Differential Pressure
(corrected for tee loss)
Percent Full Flow
(based on max. tee flow, run = 90° and branch = 0°)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Mixing
Branch Leg
Run Leg
Percent Branch Valve Open 0% 20% 40% 60% 80% 100%
Percent Run Valve Open 100% 80% 60% 40% 20% 0%

Terminology

Absolute Pressure — Absolute pressure is referenced to a theoretical perfect vacuum. At standard atmospheric pressure, absolute pressure may be calculated by adding 14.7 psi to the observed gauge pressure.

Ambient Temperature Rating — Ambient temperature refers to the temperature of the air surrounding the device.

Angled Body — A two way valve body that has connection points at right angles to each other.

Booster Pump — A pump used in secondary loops of hydronic systems to provide additional flow for that section of the system.

Butterfly Valve — A valve utilizing a disk rotating on a shaft to provide control and close off. Alternately, a check valve utilizing two semi-circular hinged plates to permit flow in one direction only.

Cavitation — The forming and imploding of cavities in a liquid due to rapid pressure changes, producing shock waves and cyclic stresses that can lead to undesirable noise and/or surface fatigue damage.

Close-off Rating — The maximum differential pressure, inlet to outlet, that a valve will close off against while fluid is flowing to a given leakage rate (tightness) criteria. In a stroke valve, the primary determinants are the force available from the actuator, the diameter of the plug, and the valve design. In a rotary valve, such as a ball valve, the primary determinant is typically the seal design as the torque of the actuator has little effect.

Close-off Rating of Three Way Valves — The maximum pressure difference between either of the two inlet ports and the outlet port for mixing valves, or the pressure difference between the inlet port and either of the two outlet ports for diverting valves.

Contoured Plug — In a globe valve, a contoured plug uses its peripheral shape to affect a desired flow characteristic. This is typically linear, equal percentage, or a modification of these. These are differentiated from V-plugs, basket plugs, cage plugs, and the like by the fact that the media flows around the plug and not through it.

Controlled Medium — The controlled medium is the material that is being conveyed and controlled though the device. In typical HVAC systems this includes air, water, and/or steam. It may also include fuel oil, natural gas, refrigerants, etc.

Critical Pressure Drop — The maximum pressure drop across a valve at which gasses and vapors will follow standard flow calculations. Pressure drops greater than this produced what is known as “choked flow” and sizing criteria will no longer accurately predict the volumetric flow.

Design Conditions — The assumed environmental variables that define the performance limits required of a HVAC system. This may include maximum and minimum outside air temperatures, expected solar and other thermal loads, occupancy levels, etc.

Differential Pressure Regulator — A differential pressure regulator is a device used to maintain consistent flow regardless of differential pressure changes. A differential pressure regulator can be an independent device, but is part of a Pressure Independent Control Valve (PICV) resulting in consistent flow corresponding to the given position of the control valve portion of the device and a pressure independent maximum flow corresponding to the flow limiter setting of the device.

Direction of Flow — The flow of a controlled fluid through the valve is usually represented by an arrow on the valve body. If the flow of the fluid goes against the indicated direction, the disk can slam into the seat as it approaches the closed position. The result is excessive wear, hammering, and oscillations. Additionally the actuator must work harder to reopen the closed valve since it must overcome the pressure exerted by the fluid on top of the disc, rather than have the fluid assist in opening the valve by exerting pressure under the disc.

Diverting Valve — A three way valve that has one inlet and two outlets. Water entering the inlet port is diverted to either of the two outlet ports in any proportion desired by moving the valve stem. These valves are not commonly use in modern control loops.

End Fitting — The part of the valve body that connects to the piping. Union, screwed, flared, sweat and flanged are typical examples of end fittings.

Equalinear Flow — Valve Cv vs travel position is approximately mid-way between that of linear and equal percentage.

Equal Percentage Flow Characteristic — An equal percentage flow characteristic is one in which a flow rate change is proportional to the flow rate just prior to the change in valve position. Equal increments of valve travel result in equal percentage changes to the existing flow rate. Flow capacity increases exponentially with valve stem travel.

Terminology

Flanged End Connections — A valve that connects to a pipe by bolting a flange on the valve to a flange on the pipe. Flanged connections are often used on larger valves, typically over 2".

Flashing — In the context of control valves, flashing is related to cavitation, but the mechanics are slightly different. Flashing occurs when a liquid's environment causes a rapid phase change from liquid to gaseous phases. With flashing, the volume of vapor is much greater than the volume of liquid, and rapidly accelerates the remaining liquid droplets, which forcefully impact the mechanical components of the valve and pipes, causing damage. This situation can be calculated by knowing the pressures and temperatures involved, as well as the vapor pressure of the liquid at those temperatures. Cavitation often occurs in environments that have not yet reached the point of flashing, due to fluid flow dynamics and velocities.

Flow Characteristic — The relation between volumetric flow and valve position.

Flow Coefficient — The flow coefficient is the constant that relates volumetric flow, differential pressure, and specific gravity of a fluid through a metering device. Cv is the flow coefficient in imperial units. For liquids through a standard orifice it is calculated to be equal to the volumetric flow in gallons per minute times the square root of the specific gravity divided by the square root of the differential pressure in psi. For water systems the specific gravity can be assumed to be 1, therefore it is often simplified to GPM divided by the square root of ΔP. For HVAC applications, a control valve closely follows this orifice model.

Flow Limiter — A flow limiter is a device used for limiting the maximum flow. This can be accomplished using a manual balancing valve or with the field adjustable flow limiter integrated in the Siemens Pressure Independent Control Valves (PICV).

Flow Rate — The volume of media conveyed per unit of time. Typical US units are gallons per minute (GPM) for water and pounds per hour (#/hr) for steam.

FPM — Feet per minute.

Full Port — Maximum flow capacity possible for a particular ball valve orifice. In a ball valve, this typically refers to a valve with no flow characterizer or restrictor.

Gauge Pressure — Pounds per square inch (PSI) as read on a gauge face. This differs from Absolute Pressure in that it is relative to the current ambient pressure, not a fixed reference such as absolute vacuum. Gauge pressure, therefore, uses the local ambient pressure as its zero point (14.7 psia at sea level and standard conditions).

GPM — Gallons per minute.

Incompressible — Description of liquids, because their change in volume due to pressure is negligible.

Laminar Flow — Also known as viscous or streamlined flow. A non-turbulent flow regime in which the stream filaments glide along the pipe axially with essentially no transverse mixing. This is usually associated with viscous liquids. The area inside a valve is typically turbulent — the opposite of laminar.

Linear Flow Characteristic — A flow characteristic in which the percentage of maximum flow is equal to the percentage of maximum stroke of the valve. For example, 50% stroke would provide 50% of the maximum flow of the valve. In other words, "Linear valves produce equal flow increments per equal stem travel throughout the travel range of the stem." (2012 ASHRAE Handbook, 13.14)

Load — A demand on the mechanical equipment in an HVAC system.

Load Change — A change in the building cooling or heating requirements as a result of air temperature variations, caused by wind, occupants, lights, machinery, solar effect, etc.

Mixing Valve — A three way valve having two inlets and one outlet. The proportion of fluid entering each of the two inlets can be varied by moving the valve stem. These valves are typically not suitable for diverting applications.

Normally Closed (N.C.) — Condition of the valve upon loss of power or control signal to the actuator. Also as relates to a stroke valve body that has been manufactured as a N.C. valve body. In stroke valves, this is typically the valve's state when the stem is in the "up" position.

Normally Open (N.O.) — Condition of the valve upon loss of power or control signal to the actuator. Also as relates to a stroke valve body that has been manufactured as a N.O. valve body. In stroke valves, this is typically the valve's state when the stem is in the "up" position.

NPT — A pipe thread standard describing tapered pipe threads, common in North America (National Pipe thread – Tapered).

Packing — Seals used around the valve stem so that the controlled medium will not leak outside the valve.

PICV — A Pressure Independent Control Valve is a control valve and automatic differential pressure regulator in a single device. The differential pressure regulator automatically adjusts to changes in differential pressure in the system to maintain a consistent flow corresponding to the given position of the control valve portion of the device.

Port — Opening (inlet or outlet) that allows flow through a valve body.

Positive Positioner — A device that eliminates the actuator shaft positioning error due to load on the valve body. This device is closed loop, and applies the necessary force required to positively position the valve stem to a referenced (commanded) position.

Presetting — Presetting is the part of the adjustable flow limiter in Siemens Pressure Independent Control Valves used to set the maximum flow of the valve. It can also refer to the setting of the flow limiter that the valve was set to at the factory.

Pressure Drop — The difference in pressure between the inlet and outlet ports of the control valve, commonly refered to as ΔP (delta P).

PSI — Pounds per square inch.

PSIA — Pounds per square inch absolute. (Also see Absolute Pressure.)

PSIG — Pounds per square inch gauge. (Also see Gauge Pressure.)

Rangeability — The ratio of the maximum controllable flow to the minimum controllable flow. As an example, a valve with a rangeability of 50 to 1 having a total flow capacity of 100 GPM, fully open, will be able to control flow accurately down to 2 GPM.

Reduced port — A smaller flow capacity that is possible for the particular end fitting.

Reducer — A pipe fitting that is used to couple a pipe of one size to a pipe of a different size. An increaser may be used when the pipe sizes are reversed.

Resolution — Resolution applies to the valve actuator. The resolution of an actuator defines the smallest discrete increment the actuator can position to relative to the total control signal range. For example, with a modulating actuator that controls to a tenth of a volt, and has a 0 to 10 Volt control signal, can control to within 1/100th of the entire control range, therefore a resolution of 100:1.

Saturated Steam — Steam which is at its lowest possible temperature at a given pressure without a phase change to liquid.

Screwed- end connection — A valve body with a threaded pipe connection, usually female NPT threads, in valve bodies through 2".

Seat — The stationary portion of the valve which seals the valve, thus prevents flow, when in full contact with the movable ball, plug or disc.

Static Pressure rating — The maximum pressure that the valve body will tolerate per a defined standard. The standards may define the pressure at temperatures other than that observed, so one must understand the standard to understand the actual pressure rating for the given application. Common pressure standards for HVAC valves in North America include ANSI (125, 250) and WOG (300, 600), but others such as CWP are sometimes used.

Stem — The cylindrical shaft of a control valve moved by an actuator, to which the throttling plug, ball or wafer disc is attached.

Stroke — The total distance that a linear valve stem travels or moves. It is also known as lift.

Superheated Steam — Steam at a temperature higher than saturation temperature at the given pressure.

System Pressure Drop — The sum of all pressure drops in a Hydronic system.

Three Way Valve — A valve body with one inlet and two outlets or two inlets and one outlet.

Tight Shut-off — A valve body with no flow or leakage in a closed position. This is relative to the defined tightness of the seal, usually defined by a measurement standard. The most common standard is ANSI/FCI 70 -2, which classifies "tightness" from Class I to Class VI. Class I is non-defined leakage, Class II through Class IV are descriptive based on leakage as a percent of total capacity, and Class V and Class VI are descriptive based on leakage as a finite rate per inch of orifice diameter. Since the criteria and testing method for Class II – IV are significantly different than Class V – VI, these groups cannot be directly compared.

Terminology

Trim — All parts of the valve which are in contact with the flowing media, but are not part of the valve shell or casting. Ball, stem, disc, plug, and seat are all considered trim components.

Turndown — Ratio between the maximum usable flow and the minimum controllable flow. Turndown is usually less than Rangeability, and cannot be applied to a valve exclusive of the specific application it is placed in, It is a function of the valve, actuator, piping, coil, and all other system parameters that determine the maximum usable flow. Since the valve only has reasonable control over one part of the ratio, the minimum controllable flow, this is not a good criteria for evaluating
valve quality.

Two-way Valve — A valve body with a single flow path — one inlet and one outlet.

Valve — A control device which will vary the rate of flow of a medium such as water or steam.

Valve Actuator — A device that uses a source of power to position or operate a valve, sometimes also called a valve operator. The source of power may be anything, examples include manual (via a hand wheel), pneumatic, or electronic.

Valve Authority — Valve authority is measured as the percentage of the differential pressure across the valve divided by the differential pressure of the entire loop or branch controlled by the valve, multiplied by 100. As a rule of thumb, valve authority should be between 25% and 50% for good control of the loop/branch. Alternatively, from the 2012 ASHRAE Handbook, "Using flow coefficient analysis, however, results in a slightly modified definition for authority, comparing the flow coefficient of the valve (Cv) to the coefficient of the remaining system components (Cs)." (2012 ASHRAE Handbook, 13.14) Valve authority using this definition would ideally have the flow coefficient of the valve matching the flow coefficient of the rest of the system, resulting in an ideal value of 1. It is therefore important when discussing valve authority to be clear on which definition is being used.

Valve Body — The portion of the valve casting through which a controlled medium flows.

Valve Disc — The movable part of a butterfly valve which makes contact with the seat when the valve is closed.

Valve Flow Characteristic — The relationship between the stem travel, expressed in percent of travel, and the flow of the fluid through the valve, expressed in percent of full flow or gallons per minute.

Valve Guide — The part of a globe valve throttling plug that keeps the disc aligned with the valve seat.

Velocity — The rate of movement for air or water, distance per unit time.

Viscous — Having a relatively high resistance to flow.

Volumetric Air Flow — Area x Velocity.

Wire Draw — The process where high velocity media erodes a path across the mechanical components of a valve. This typically occurs in a stroke valve when the valve is operated primarily with the plug very close to the seat , causing very high velocities of media across the plug and seat. The damage appears as if a wire has been drawn across the components. This differs from the other typical valve mechanical damage modes – cavitation and flashing – where the surface appears to have been pulled away as or struck by very small particles, respectively.

Damper Actuators

Introduction

The size and quantity of actuators required depends on several damper torque factors:

- Type of damper seals (Standard, low or very low leakage)
- Quality of damper installation
- Number of damper sections
- Approach air velocity
- Static pressure

The following procedures can be used to determine the damper torque, actuator size and quantity of actuators required to operate a damper.

Determing Damper Torque

1. From the damper manufacturer get the Damper Torque Rating (DTR) for the damper at the most severe operating conditions.

   If the damper torque rating is not available, **Table 1** can be used for estimating purposes only on an interim basis. However, it is very important to get the damper torque rating from the manufacturer as soon as possible to assure accurate torque calculations.
2. Calculate the damper area (DA) in square feet from the damper dimensions.
3. Calculate the Total Damper Torque (TDT) in lb-in using the following formula:

   TDT = DTR X DA
4. If the damper torque rating is not available, use a torque wrench on the damper shaft while air is moving through the duct to measure the TDT.

Actuator Size

1. From the actuator literature select the actuator type and size whose actuator torque rating (ATR) in lb-in is most appropriate for the application.
2. The ATR is normally based on 90° rotation of the damper. For torque ratings of other than 90°f rotation, use the following formula:

   $$\text{ATR @ X° rotation} = \text{ATR @ 90° rotation} \times \left(\frac{\text{Crank Radius @ X°}}{\text{Crank Radius @ 90°}}\right)$$
3. If the actuator is rated in pounds of thrust, it can be converted to torque using the following formula:

   Torque = (*Crank arm length x 0.707) x Thrust

   *The crank arm length is for 90° shaft rotation at nominal actuator stroke.

Quantity of Actuators

1. Calculate the number of actuators required using the following formula:

   $$\text{Number of actuators} = \frac{\text{Total Damper Torque}}{\text{SF} \times \text{Actuator Torque Rating}}$$

   SF = Safety Factor: When calculating the number of actuators required, a safety factor should be included for unaccountable variables such as slight misalignments, aging of the damper, etc. A suggested factor is 0.8 or 80% of the rated torque.
2. If the number of actuators calculated is too large to be practical, select a more powerful actuator or consider using a positioning relay if it is a pneumatic actuator.

Table 1

Damper Type	Damper Leakage at 1" H_2O Static Pressure Drop	Damper Torque for Approach Air Velocities of 1200 ft./min. or less
Standard leakage	More than 10 CFM/ft.²	2.5 lb.-in./ft.²
Low leakage	5 to 10 CFM/ft.²	5.0 lb.-in./ft.²
Very low leakage	Less than 5 CFM/ft.²	7.0 lb.-in./ft.²

Contact your local customer service representative for additional application assistance when specific damper factors are known.

NEMA Ratings

Type	Intended Use and Description	Requirements or Qualification Tests, Paragraph or Section Numbers
1	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt	Corrosion Protection 5.3; Rust Resistance Section 38
2	Indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.	Corrosion Protection 5.3; Rust Resistance Section 38; Drip Section 31; Gaskets Section 14; Gasket Tests Section 43
3	Outdoor use primarily to provide a degree of protection against rain, sleet, wind blown dust and damage from external ice formation.	Rain Section 30; Outdoor Dust or Hose Section 32 or 35; Icing Section 34; Protective Coating Section 15; Gaskets Section 14; Gasket Tests Section 43
3R	Outdoor use primarily to provide a degree of protection against rain, sleet, and damage from external ice formation.	Rain Section 30; Icing Section 34; Protective Coating Section 15; Gaskets Section 14; Gasket Tests Section 43
3S	Outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust and to provide for operation of external mechanisms when ice laden.	Rain Section 30; Outdoor Dust or Hose Section 32 or 35; Icing Section 34; Protective Coating Section 15; Gaskets Section 14; Gasket Tests Section 43
4	Indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.	Hosedown Section 35; Protective Coating Section 15; Icing Section 34; Gaskets Section 34; Gasket Tests Section 43
4X	Indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water, and damage from external ice formation.	Hosedown Section 35; Protective Coating Section 15; Corrosion Resistance Section 39; Icing Section 34; Gaskets Section 14; Gasket Tests Section 43
5	Indoor use primarily to provide a degree of protection against setting airborne dust, falling dirt, and dripping noncorrosive liquids.	Corrosion Protection Section 5.3; Rust Resistance Section 38; Drip Section 31; Indoor Setting Airborne Dust or Atomized Water Method B Section 32 or 33; Gaskets Section 14; Gasket Tests Section 43
6	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, and the entry of water during occasional temporary submersion at a limited depth	Hosedown Section 35; Icing Section 34; Submersion Section 36; Protective Coating Section 15; Gaskets Sections 14; Gasket Tests Section 43
6P	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formation.	Hosedown Section 35; Icing Section 34; Protective Coating Section 15; Air Pressure Section 40; Gaskets Section 14; Gasket Tests Section 43
12, 12K	Indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids.	Corrosion Protection Section 5.3; Rust Resistance Section 38; Protective Coating Section 15; Drip Section 31; Indoor Setting Airborne Dust or Atomized Water Method B Section 32 or 33; Gaskets Sectios 14; Gasket Tests Section 43
13	Indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.	Corrosion Protection Section 5.3; Rust Resistance Section 38; Oil Section 37; Gaskets Section 14; Gasket Tests Section 43

Table Notes:

Refer to specific sections in the UL Standard *UL50 Enclosures for Electrical Equipment*.

NEMA Ratings can be applied by the manufacturer through a “self-certification” process or through an independent testing house, such as UL. The term, *Type*, indicates to an inspector that the certification was performed independently.

Multi-purpose, Balance-retard and Analog Relays

Relay Piping

Application Index

In the list below, locate the application and type of relay required to locate the appropriate connections diagram.

Application	Type of Relay	Figure
Reverse Acting	Multi-purpose	1
Reverse Acting	Analog	2
Minimum Pressure	Multi-purpose	3
Minimum Pressure with Characterized Output	Multi-purpose	4
Minimum Pressure with Characterized Output	Analog	5
Characterized Minimum Pressure	Analog	6
Minimum Pressure with Hesitation	Balance-retard	7
Adjustable Minimum Pressure	Analog	8
Highest Pressure Signal Selector	Analog	8
Direct Acting	Multi-purpose	9
Direct Acting	Analog	10
Direct Acting with Positive Positioning Override	Analog	11
Signal Advancing	Multi-purpose	12
Adjustable Advancing	Analog	13
Summing	Analog	13
Signal Retard	Balance-retard	14
Signal Retard	Analog	15
Balancing	Balance-retard	16
Hesitation	Balance-retard	17
Averaging	Analog	18
Ratio 1 in = 2 out	Analog	19
Ratio 2 in = 1 out	Analog	20
Signal Inverting	Multi-purpose	21
Signal Inverting	Analog	22
Lowest Pressure Signal Selector	Multi-purpose	23
Lowest Pressure Signal Selector	Analog	24
Differential Pressure	Analog	25
Limit Control Direct Acting	Multi-purpose	26
Pressure Limiting in Dual Pressure Systems	Balance-retard	27
Limit Control Reverse Acting	Multi-purpose	28

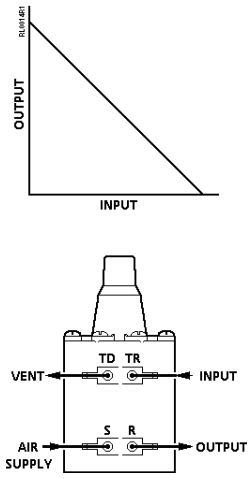
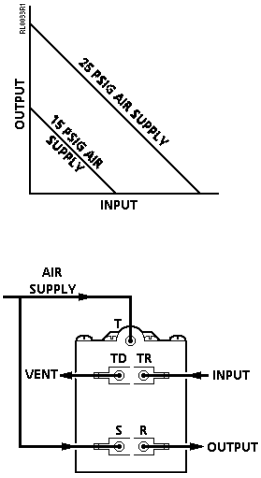


Figure 1.



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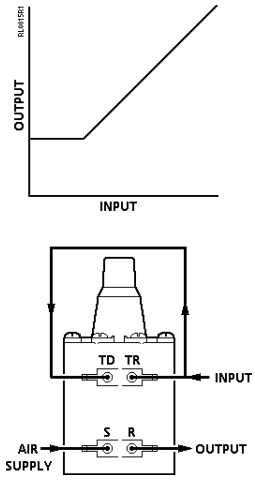

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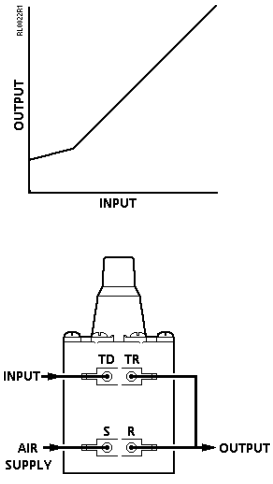
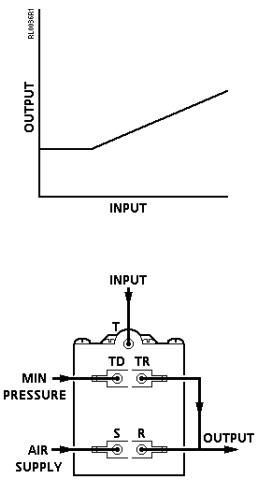


Figure 4.

Key

R	Output signal port	S	Air supply port
TD	Direct acting input signal port	SP	Setting of the adjustable screw
TR	Reverse acting input port	T	Direct acting input port

(Continued on next page)



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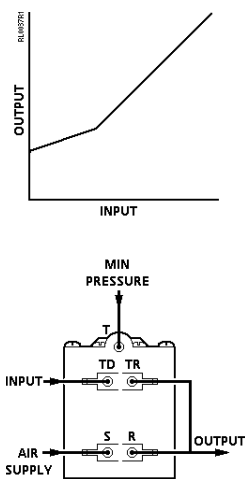

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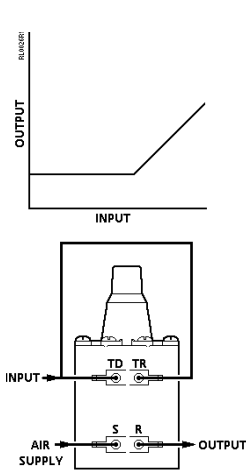

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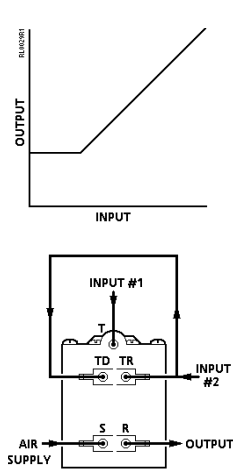

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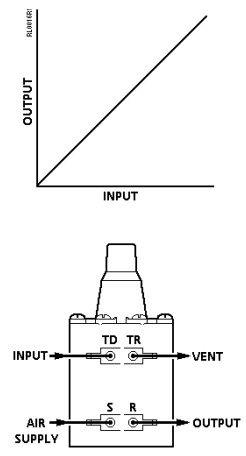

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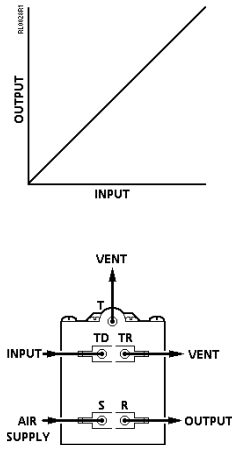

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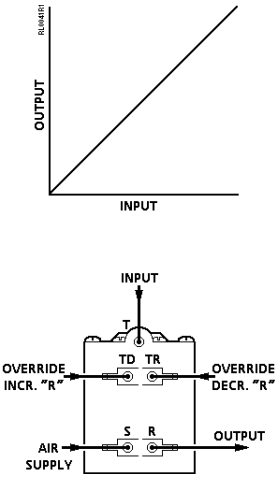

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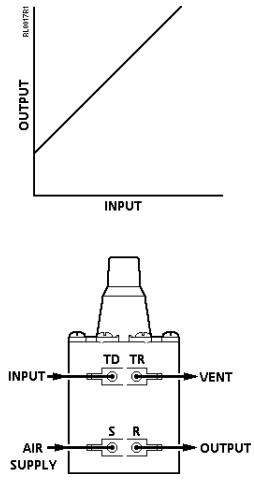

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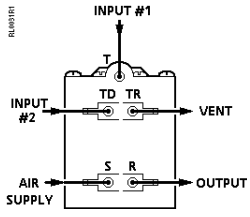

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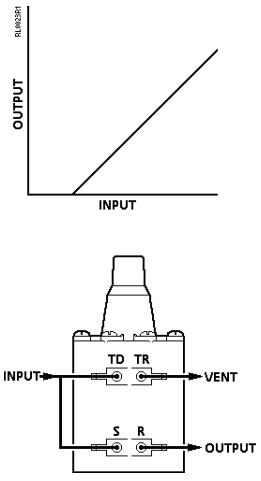

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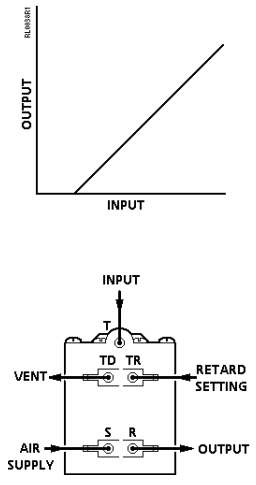

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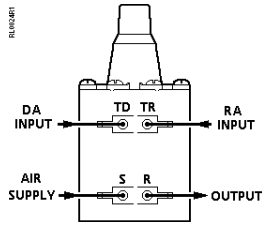
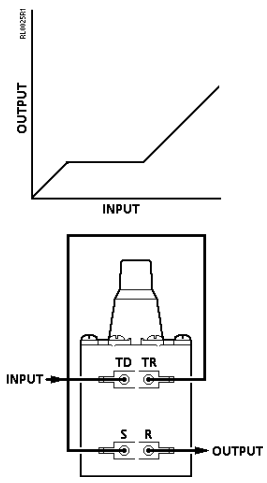


Figure 16.

Relay Piping *(Continued — Refer to chart on G-27)*



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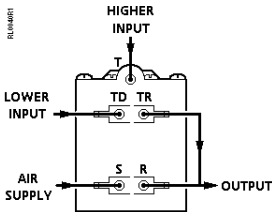

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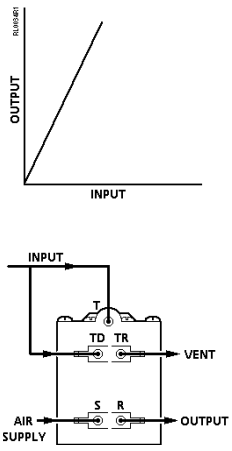

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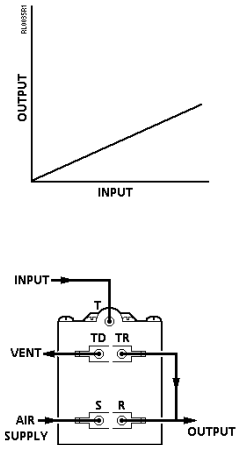

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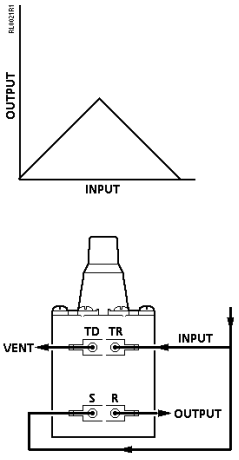

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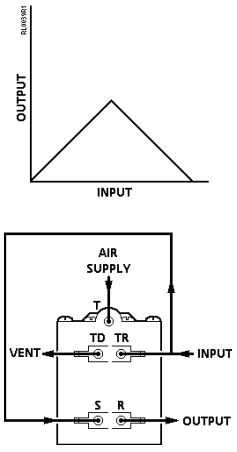

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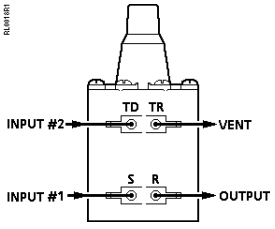

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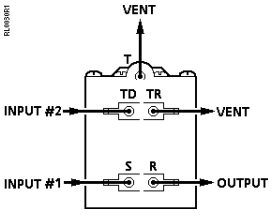

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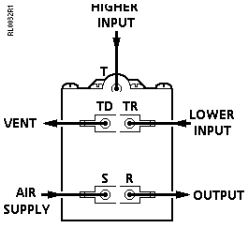

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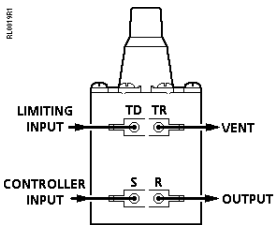


Figure 26.

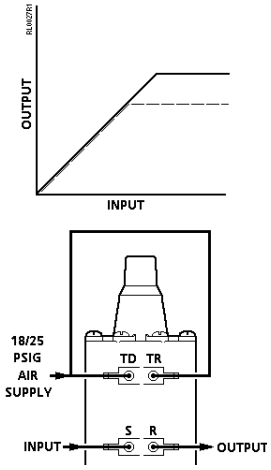


Figure 27.

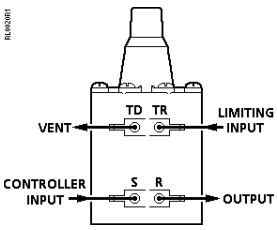
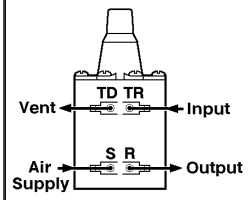
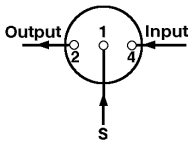
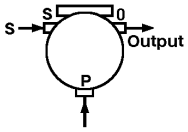
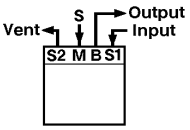
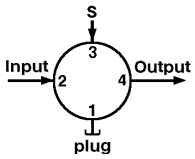
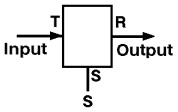
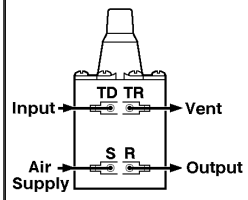
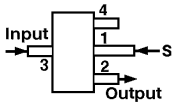
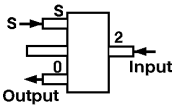
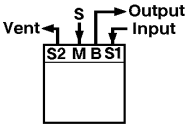
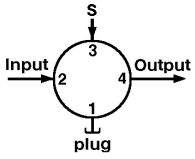
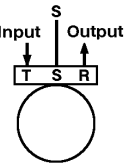
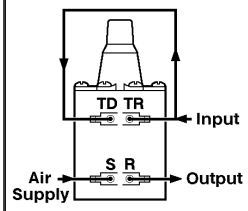
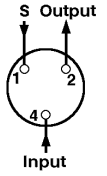
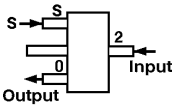
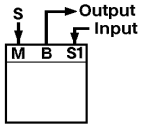
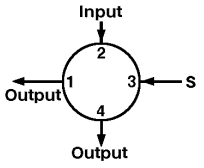
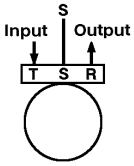
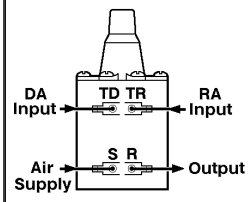
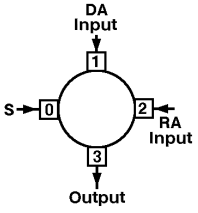
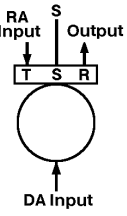
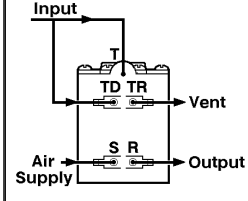
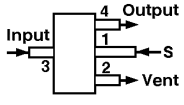
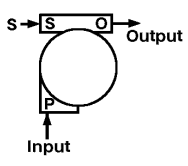
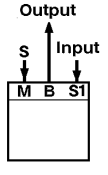
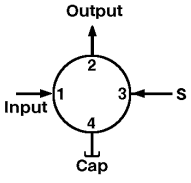
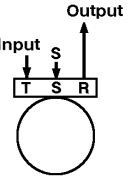


Figure 28.

Retrofit Cross Reference

Siemens	Honeywell	Johnson	Robertshaw	Barber-Colman	Discontinued Siemens (Powers)
 243 – 0009 243 – 0046 Reverse Acting	 RP 972 A Reverse Acting	 C – 208 Reverse Acting	 R 516 Reverse Acting	 AK 50613 Reverse Acting	 TYPE 783 Reverse Acting
 243 – 0009 243 – 0046 Direct Acting	 RP 970 A Direct Acting	 C 5230 Direct Acting	 R 532-L Direct Acting	 AK - 50603 Direct Acting	 Type 782 Direct Acting
 243 – 0009 243 – 0046 Minimum Pressure	 SP 970 A Minimum Pressure	 C 5230 Minimum Pressure	 S 511 – 5 Minimum Pressure	 AK - 50605 Minimum Pressure	 Type 782 Minimum Pressure
 243 – 0010 243 – 0047 Balancing Relay	NONE	 C 130 – 1 Balancing Relay	NONE	NONE	 310 – 0010 Balancing Relay
 243 – 0011 243 – 0048 Ratio Relay 1 In = 2 Out	 RP 971 A 1007 Sequencing Relay (Setpoint + 3 psig)	 C 202 – 1 1 In = 2 Out	 R 539 1 In = 2 Out	 AK – 50703 1 In = 2 Out	 Type 782 – 0070 1 In = 2 Out

RL0042R1

General Conversions

To Convert From	Into	Multiply By
atmospheres	feet of water (at 4°C)	**33.90**
atmospheres	inch of mercury (at 0°C)	**29.92**
atmospheres	pounds/square inch	**14.70**
Btu	foot-pounds	**778.3**
Btu	horsepower-hours	**3.931×10^{-4}**
Btu	kilowatt-hours	**2.928×10^{-4}**
Btu/hour	foot-pounds/second	**0.2162**
Btu/hour	horsepower-hours	**3.929×10^{-4}**
Btu/hour	watts	**0.2929**
Btu/minute	foot-pounds/second	**12.96**
Btu/minute	horsepower	**0.02356**
Btu/minute	kilowatts	**0.01757**
Btu/minute	watts	**17.57**
Btu/minute	tons of refrigeration	**1/200**
Btu/hour	tons of refrigeration	**1/12,000**
Btu/ft.^{2}/minute	Watts/square inch	**0.1221**
Btu/pound air	Kilojoules/kilogram	**2.33**
Candle/in.^{2}	Laberts	**0.4870**
Candle/ft.^{2}	Candle meters	**0.0929**
cubic feet	cubic inches	**1,728.0**
cubic feet	cubic yards	**0.03704**
cubic feet	gallons (U.S. liquid)	**7.48052**
cubic feet	pints (U.S. liquid)	**59.84**
cubic feet	quarts (U.S. liquid)	**29.92**
cubic feet/min.	gallons/second	**0.1247**
cubic feet/min.	pounds of water/minute	**62.43**
cubic feet/min.	liters per second	**0.4719**
cubic feet/sec.	millions gallons/day	**0.646317**
cubic feet/sec.	gallons/minute	**448.831**
cubic inches	cubic feet	**5.787×10^{-4}**
cubic inches	cubic yards	**2.143×10^{-5}**
cubic inches	gallons	**4.329×10^{-3}**
cubic yards	cubic feet	**27.0**
cubic yards	cubic inches	**46,656.0**
cubic yards	gallons (U.S. liquid)	**202.0**
cubic yards	pints (U.S. liquid)	**1,615.9**
cubic yards	quarts (U.S. liquid)	**807.9**
cubic yards/min.	cubic feet/second	**0.45**
cubic yards/min.	gallons/second	**3.367**
degrees (angle)	seconds	**3,600.0**
degrees/second	revolutions/minute	**0.1667**

To Convert From	Into	Multiply By
feet of water	atmospheres	**0.02950**
feet of water	inch of mercury	**0.8826**
feet of water	pounds/square foot	**62.43**
feet of water	pounds/square inch	**0.4335**
feet/min.	feet/second	**0.01667**
feet/min.	miles/hour	**0.01136**
feet/sec.	miles/hour	**0.6818**
feet/sec.	miles/min.	**0.01136**
Foot-candle	Lumen/square meter	**10.764**
foot-pounds	Btu	**1.286×10^{-3}**
foot-pounds	horsepower-hour	**5.050×10^{-7}**
foot-pounds	kilowatt-hour	**3.766×10^{-7}**
foot-pounds/min.	Btu/min.	**1.286×10^{-3}**
foot-pounds/min.	foot-pounds/second	**0.01667**
foot-pounds/min.	horsepower	**3.030×10^{-5}**
foot-pounds/min.	kilowatts	**2.260×10^{-5}**
foot-pounds/sec.	Btu/hour	**4.6263**
foot-pounds/sec.	Btu/min.	**0.07717**
foot-pounds/sec.	horsepower	**1.818×10^{-3}**
foot-pounds/sec.	kilowatts	**1.356×10^{-3}**
gallons	cubic feet	**0.1337**
gallons	cubic inches	**231.0**
gallons	cubic yards	**4.951 x 10**
gallons	liters	**3.785**
gallons (liq. Br. Imp.)	gallons (U.S. liquid)	**1.20095**
gallons (U.S.)	gallons	**0.83267**
gallons of water	pounds of water	**8.3453**
gallons/min.	cubic feet/sec.	**2.228×10^{-3}**
gallons/min.	cubic feet/hour	**8.0208**
US gallons/min.	liters per second	**0.06309**
US gallons/min.	liters per second	**3.7854**
gallons/hour	cubic meters/hour	**1.434×10^{-3}**
horsepower	Btu/minute	**42.44**
horsepower	foot-pounds/min.	**33,000.0**
horsepower	foot-pounds/sec.	**550.0**
horsepower	kilowatts	**0.7457**
horsepower	Watts	**745.7**
horsepower (boiler)	Btu/hour	**33.479**
horsepower (boiler)	kilowatts	**9.803**
horsepower-hours	Btu	**2,547.0**
horsepower-hours	foot-pounds	**1.98×10^{6}**
horsepower-hours	kilowatt-hours	**0.7457**

Conversion Factors

To Convert From	Into	Multiply By
inch	Pa	**248.84**
inches	yards	**2.778×10^{-2}**
inches of mercury	atmospheres	**0.03342**
inches of mercury	feet of water	**1.133**
inches of mercury	pounds/square feet	**70.73**
inches of mercury	pounds/square feet	**0.4912**
inches of water	atmospheres	**2.458×10^{-3}**
inches of water	inches of mercury	**0.07355**
in. of water (at 4°C)	ounces/square inches	**0.5781**
inches of water	pounds/square feet	**5.204**
inches of water	pounds/square inches	**0.03613**
kilometers	miles	**0.6214**
kilometers	yards	**1,094.0**
kilowatts	Btu/minutes	**56.92**
kilowatts	foot-pounds/minutes	**4.426×10^{4}**
kilowatts	foot-pounds/second	**737.6**
kilowatts	horsepower	**1.341**
kilowatts	Watt	**1,000.0**
kilowatts	Btu	**3,413.0**
kilowatts-hour	foot-pounds	**2.655×10^{6}**
kilowatts-hour	horsepower-hour	**1.341**
kilowatts-hour	pounds of water evaporated from and at 212°F	**3.53**
liters per sec.	US gal/min.	**15.85**
lumens/square feet	foot-candles	**1.0**
Lumen	Spherical candle power	**0.07958**
Lumen	Watt	**0.001496**
Lumen/square feet	Lumen/square meters	**10.76**
lux	foot-candles	**0.0929**
lux	btu/hr.	**1000**
meter	inches	**39.372**
meters	feet	**3.281**
meters	yards	**1.094**
miles/hour	feet/minute	**88.0**
miles/hour	feet/second	**1.467**
miles/hour	miles/minute	**0.1667**
miles/minute	feet/second	**88.0**
miles/minute	miles/hour	**60.0**

To Convert From	Into	Multiply By
OHM (international)	OHM (absolute)	**1.0005**
ounces	pounds	**0.0625**
pounds	ounces	**16.0**
pounds of water	cubic feet/second	**0.01602**
pounds of water	cubic inches	**27.68**
pounds of water	gallons	**0.1198**
pounds of water/min.	cubic feet/second	**2.670×10^{-4}**
pounds/cubic feet	pounds/cubic inches	**5.787×10^{-4}**
pounds/cubic inches	pounds/cubic feet	**1,728.0**
pounds/square feet	atmospheres	**4.725×10^{-4}**
pounds/square feet	feet of water	**0.01602**
pounds/square feet	inches of mercury	**0.01414**
pounds/square feet	pounds/square inches	**6.944×10^{-3}**
pounds/square inch	atmospheres	**0.06804**
pounds/square inch	feet of water	**2.307**
pounds/square inch	inches of mercury	**2.036**
pounds/square inch	pounds/square feet	**144.0**
revolutions	degrees	**360.0**
square feet	square inches	**144.0**
Watts	Btu/hour	**3.4129**
Watts	Btu/minute	**0.05688**
Watts	foot-pounds/minute	**44.27**
Watts	foot-pounds/second	**0.7378**
Watts	horsepower	**1.341×10^{-3}**
Watts	kilowatts	**0.001**
Watt-hours	Btu	**3,413.0**
Watt-hours	foot-pounds	**2,656.0**
Watt-hours	horsepower-hour	**1.341×10^{-3}**
Watt-hours	kilowatt-hour	**0.001**

English to Metric Conversion Guide

Quantity	To Convert From	Into	Multiply By
Area	Square Inches (in.^{2})	Square Centimeters (cm^2)	**6.4516**
	Square Feet (ft.^{2})	Square Meters (m^2)	**9.2903 x 10^{-2}**
Enthalpy/Heat	BTU Per Pound-Mass—°F (BTU/lb. x °F)	Kilojoule Per Kilogram—Kelvin (kJ/kg.K)	**4.1840**
Flow[1]	Cubic Inches Per Minute (in.^{3}/min.)	Cubic Centimeters Per Second (cm^3/s)	**0.2731**
	Cubic Feet Per Minute (ft.^{3}/min.)	Cubic Centimeters Per Second (cm^3/s)	**471.9474**
	Cubic Feet Per Minute (ft.^{3}/min.)	Cubic Decimeters Per Second (dm^3/s)=ls)^3	**0.4719**
	Cubic Feet Per Minute (ft.^{3}/min.)	Cubic Meters Per Second (m^3/s)	**0.4719 x 10^{-3}**
	Cubic Feet Per Minute (ft.^{3}/min.)	Cubic Meters Per Hour (m^3/h)	**1.6990**
	Standard Cubic Feet Per Minute SCFM 60°F, 14.7 psia	Cubic Meters Per Hour (m^3/h 0°C, 1.01325 bar)	**1.695 1.607**
	Standard Cubic Feet Per Minute SCFM 60°F, 14.7 psia	Cubic Meters Per Hour (m^3/h 15°C, 1.01325 bar)	**1.695**
	Gallons Per Minute (U.S. liquid) (GPM)	Cubic Decimeters Per Seconds (dm^3/s)=l/s)	**0.0631**
Force	Pound (Force) (lb.)	Newtons (N)	**4.4482**
Length	Inches (in.)	Millimeters (mm)	**25.4000**
	Inches (in.)	Centimeters (cm)	**2.5400**
	Feet (ft.)	Centimeters (cm)	**30.4800**
	Feet (ft.)	Meters (m)	**0.3048**
Mass (Weight)[2]	Pound (lb.)	Kilogram (kg)	**0.4536**
Power	BTU Per Hour (BTU/hr.)	Watts (W)	**0.2929**
	Horsepower (hp)	Watts (W)	**746.0000**
Pressure (Stress)	Pounds Per Square Inch (psi)	Kilopascals (kPa)	**6.8947**
	Kilograms Per Square Centimeters (Kg/cm^2)	Kilopascals (kPa)	**98.0665**
	Inches of Water (“ W.G.) @ 60°F	Pascals (Pa)	**248.84**
	Inches of Mercury (“ H.G.) @ 60°F	Pascals (Pa)	**3376.85**
Toruqe (Bending)	Degrees Fahrenheit (°F)	Degrees Celcius (t°C)	**t°C = $\frac{(t°F-32)}{1.8}$**
	Degrees Fahrenheit (°F)	Kelvin (tK)	**tK = $\frac{(t°F+459.67)}{1.8}$**
Torque	Pound Force-Inch (lb.-in.)	Newton-Meter (Nm)	**0.1129**
	Pound Force-Foot (lb.-ft.)	Newton-Meter (Nm)	**1.3558**
Velocity	Feet Per Second (ft./sec.)	Meters Per Second (m/s)	**0.3048**
	Feet Per Minute (ft./min.)	Meters Per Second (m/s)	**5.0800 x 10^{-3}**
	Miles Per Hour (MPH)	Meters Per Seond (m/s)	**0.4470**
Volume	Cubic Inches (in.^{3})	Cubic Centimeters (cm^3)	**16.3871**
	Cubic Feet (ft.^{3})	Cubic Meters (m^3) = Stere	**2,8317 x 10^{-2}**
	Gallons U.S. (gal.)	Cubic Meters (m^3) = Stere	**3.7854 x 10^{-3}**
	Ounce (oz.)	Cubic Meters (m^3) = Stere	**2.9573 x 10^{-5}**
Work (Energy)	BTU (BTU)	Kilojoule (kJ)	**1.0551**
	Foot Pound (ft.-lb.)	Joule (J)	**1.3558**
	Watthour (W-hr.)	Kilojoule (kJ)	**3.6000**

Chart Notes:

1. Since standard and normal cubic meters (STD m^3 and Nm^3) do not have a universally accepted definition, their reference pressure and temperature should always be spelled out.
2. In commercial and everyday use, the term weight almost always means mass.
3. Air consumption for pneumatic control devices should be expressed in milliliters per second (ml/s).
   Allowable leakage rates for pneumatic control devices should be expressed in milliliter per second (ml/s) or microliters per second (ul/s).

Pressure Conversion Table

Instructions

The index numbers in **bold face** refer to the pressure either in **psi** or **kilopascals** (kPa) which it is desired to convert into the other scale. If converting from psi to kPa the equivalent pressure will be found in the left column, while if converting from kPa to psi, the equivalent pressure will be found in the column on the right.

Example: Index 15 15 psi = 103.421 kPa. 15 kPa = 2.176 psi

By manipulation of the decimal point, this table may be extended to values below or above 100.

kPa	Index	psi	kPa	Index	psi	kPa	Index	psi	kPa	Index	psi
0.000	**0**	0.000									
6.895	**1**	0.145	179.264	**26**	3.771	531.633	**51**	7.397	524.001	**76**	11.023
16.789	**2**	0.290	186.058	**27**	3.916	358.527	**52**	7.542	530.896	**77**	11.168
20.684	**3**	0.435	193.053	**28**	4.061	365.422	**53**	7.687	537.791	**78**	11.313
27.579	**4**	0.580	199.948	**29**	4.206	372.317	**54**	7.832	544.686	**79**	11.458
34.474	**5**	0.725	206.843	**30**	4.351	379.212	**55**	7.977	551.581	**80**	11.603
41.368	**6**	0.870	213.737	**31**	4.496	386.106	**56**	8.122	558.475	**81**	11.748
48.263	**7**	1.015	220.632	**32**	4.641	393.001	**57**	8.267	565.370	**82**	11.893
55.158	**8**	1.160	227.527	**33**	4.786	399.896	**58**	8.412	572.265	**83**	12.038
62.053	**9**	1.305	234.422	**34**	4.931	406.791	**59**	8.557	579.160	**84**	12.183
68.948	**10**	1.450	241.316	**35**	5.076	413.685	**60**	8.702	586.054	**85**	12.328
75.842	**11**	1.595	248.211	**36**	5.221	420.580	**61**	8.847	592.949	**86**	12.473
82.737	**12**	1.740	255.106	**37**	5.366	427.475	**62**	8.992	599.844	**87**	12.618
89.632	**13**	1.885	262.001	**38**	5.511	434.370	**63**	9.137	606.739	**88**	12.763
96.527	**14**	2.030	268.895	**39**	5.656	441.264	**64**	9.282	613.633	**89**	12.908
103.421	**15**	2.176	275.790	**40**	5.801	448.159	**65**	9.427	621.528	**90**	13.053
110.316	**16**	2.321	282.685	**41**	5.946	455.054	**66**	9.572	627.423	**91**	13.198
177.211	**17**	2.466	289.580	**42**	6.092	431.949	**67**	9.717	634.318	**92**	13.343
124.106	**18**	2.611	296.475	**43**	6.237	468.843	**68**	9.862	641.212	**93**	13.488
131.000	**19**	2.756	303.369	**44**	6.382	475.738	**69**	10.008	648.107	**94**	13.633
137.895	**20**	2.901	310.264	**45**	6.527	482.633	**70**	10.153	655.002	**95**	13.778
144.790	**21**	3.046	317.459	**46**	6.672	489.528	**71**	10.298	661.897	**96**	13.924
151.685	**22**	3.191	324.054	**47**	5.617	496.422	**42**	10.443	668.791	**97**	14.069
158.579	**23**	3.336	330.948	**48**	6.962	503.317	**73**	10.588	675.686	**98**	14.214
165.474	**24**	3.481	337.843	**49**	7.107	510.212	**74**	10.733	682.581	**99**	14.359
172.369	**25**	3.626	344.729	**50**	7.252	517.107	**75**	10.878	689.476	**100**	14.504

All values rounded to 0.001.

Temperature Conversion Table

Instructions

The numbers in **bold face** refer to the temperature either in degrees Celsius (°C) or Fahrenheit (°F) to convert into the other scale. If converting from °F to °C, the equivalent temperature will be found in the left column. If converting from degrees °C to degrees °F, the answer will be found in the column to the right.

°C	50 to 45	°F
-45.6	**-50**	-58
-40.0	**-40**	-40
-34.4	**-30**	-22
-28.9	**-20**	-4
-23.3	**-10**	14
-17.8	**0**	32
-17.2	**1**	33.8
-16.7	**2**	35.6
-16.1	**3**	37.4
-15.6	**4**	39.2
-15.0	**5**	41.0
-14.4	**6**	42.8
-13.9	**7**	44.6
-13.3	**8**	46.4
-12.8	**9**	48.2
-12.2	**10**	50.0
-11.7	**11**	51.8
-11.1	**12**	53.6
-10.6	**13**	55.4
-10.0	**14**	57.2
-9.44	**15**	59.0
-8.89	**16**	60.8
-8.33	**17**	62.6
-7.78	**18**	64.4
-7.22	**19**	66.2
-6.67	**20**	68.0
-6.11	**21**	69.8
-5.56	**22**	71.6
-5.00	**23**	73.4
-4.44	**24**	75.2
-3.89	**25**	77.0
-3.33	**26**	78.8
-2.78	**27**	80.6
-1.67	**28**	82.4
-1.67	**29**	84.2
-1.11	**30**	86.0
-0.56	**31**	87.8
0	**32**	89.6
0.56	**33**	91.4
1.11	**34**	93.2
1.67	**35**	95.0
2.22	**36**	96.8
2.78	**37**	98.6
3.33	**38**	100.4
3.89	**39**	102.2
4.44	**40**	104.0
5.00	**41**	105.8
5.56	**42**	107.6
6.11	**43**	109.4
6.67	**44**	111.2
7.22	**45**	113.0

°C	46 to 96	°F
7.78	**46**	114.8
8.33	**47**	116.6
8.89	**48**	118.4
9.44	**49**	120.2
10.0	**50**	122.0
10.6	**51**	123.8
11.1	**52**	125.6
11.7	**53**	127.4
12.2	**54**	129.2
12.8	**55**	131.0
13.3	**56**	132.8
13.9	**57**	134.6
14.4	**58**	136.4
15.0	**59**	138.2
15.6	**60**	140.0
16.1	**61**	141.8
16.7	**62**	143.6
17.2	**63**	145.4
17.8	**64**	147.2
18.3	**65**	149.0
18.9	**66**	150.8
19.4	**67**	152.6
20.0	**68**	154.4
20.6	**69**	156.2
21.1	**70**	158.0
21.7	**71**	159.8
22.2	**72**	161.6
23.8	**73**	163.4
23.3	**74**	165.2
23.9	**75**	167.0
21.1	**76**	168.8
25.0	**77**	170.6
25.6	**78**	172.4
26.1	**79**	174.2
26.7	**80**	176.0
27.2	**81**	177.8
27.8	**82**	179.6
28.3	**83**	181.4
28.9	**84**	183.2
29.4	**85**	185.0
30.0	**86**	186.8
30.6	**87**	188.6
31.1	**88**	190.4
31.7	**89**	192.2
32.2	**90**	194.0
32.8	**91**	195.8
33.3	**92**	197.6
33.9	**93**	199.4
34.4	**94**	201.2
35.0	**95**	203.0
35.6	**96**	204.8

°C	97 to 1000	°F
36.1	**97**	206.6
36.7	**98**	208.4
37.2	**99**	210.2
37.8	**100**	212.0
43	**110**	230
49	**120**	248
54	**130**	266
60	**140**	284
66	**150**	302
71	**160**	320
77	**170**	338
82	**180**	356
88	**190**	374
93	**200**	392
99	**210**	410
100	**212**	413
104	**220**	426
110	**230**	443
116	**240**	464
121	**250**	482
127	**260**	500
132	**270**	518
138	**280**	536
143	**290**	554
149	**300**	572
154	**310**	590
160	**320**	608
166	**330**	626
171	**340**	644
177	**350**	662
182	**360**	680
188	**370**	698
193	**380**	716
199	**390**	734
204	**400**	752
210	**410**	770
216	**420**	788
221	**430**	806
227	**440**	824
232	**450**	842
238	**460**	860
243	**470**	878
249	**480**	896
254	**490**	914
260	**500**	932
316	**600**	1112
371	**700**	1292
427	**800**	1472
482	**900**	1652
538	**1000**	1832

MIS0087R1

PSYCHROMETRIC CHART

Normal Temperatures

Barometric Pressure
29.92 Inches of Mercury

Air Conditions/Quantity

O.A._____ DB_____ WB_____ CFM
R.A._____ DB_____ WB_____ CFM

Total CFM = _____

$$t_{ea} = \frac{(CFM\ OA \times t_{OA}) + (CFM\ RA \times t_{RA})}{Total\ CFM}$$

Ent. Air_____ DB_____ WB_____ h
Lvg. Air_____ DB_____ WB_____ h

Δt = _____ ° F Δh = _____ BTU/lb.

Heat Gain Equations:

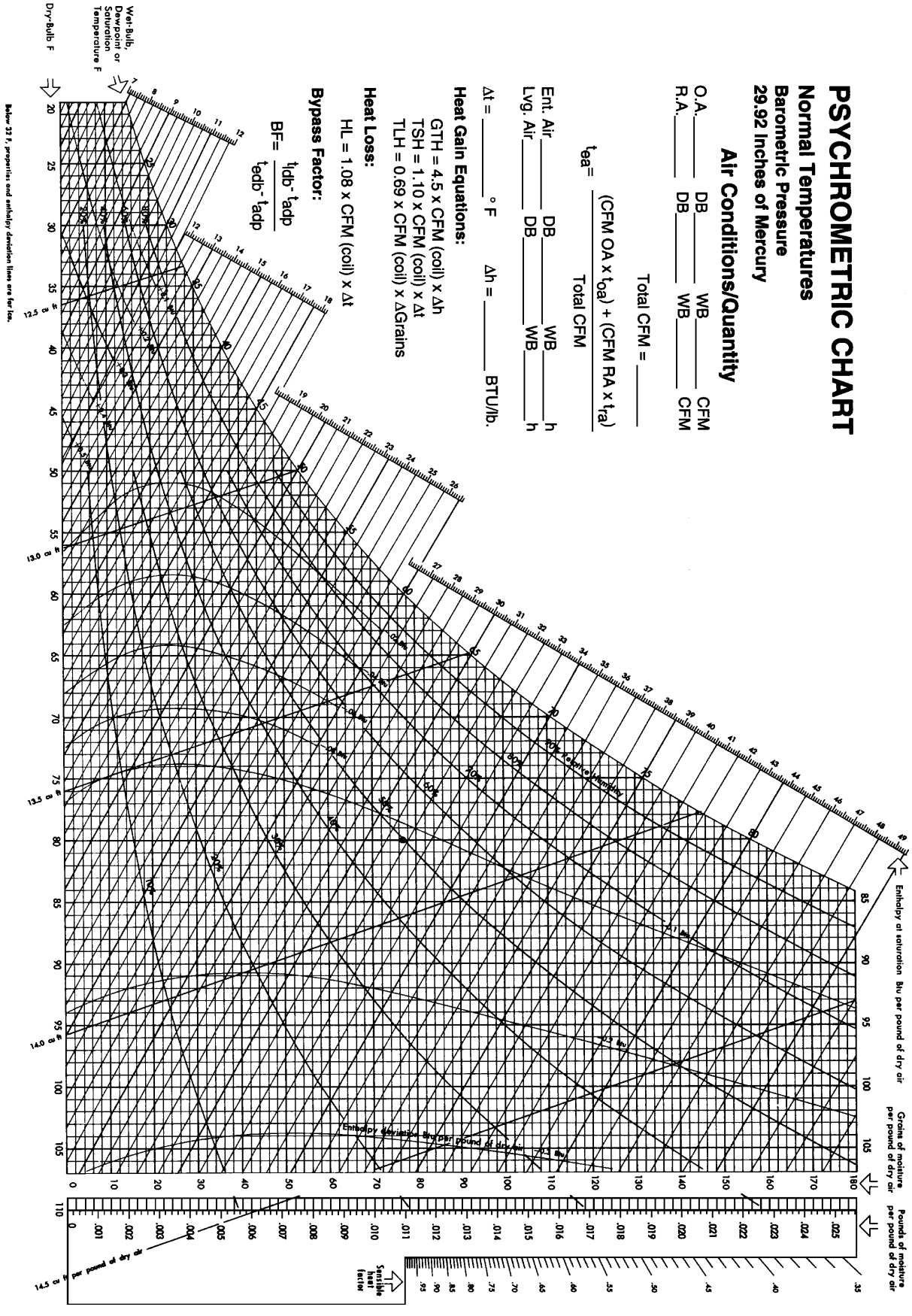
GTH = 4.5 x CFM (coil) x Δh
TSH = 1.10 x CFM (coil) x Δt
TLH = 0.69 x CFM (coil) x ΔGrains

Heat Loss:

HL = 1.08 x CFM (coil) x Δt

Bypass Factor:

$$BF = \frac{t_{db} - t_{adp}}{t_{edb} - t_{adp}}$$



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