INDEX

INTRODUCTION

Tacotherm Ltd have supplied the UK market with our full range of Taconova products for over 50 years along with the Danfoss range of hydronic controls.

Over this period Taconova products have been the preferred choice of specifiers, OEM manufacturers and distributors throughout Europe. All Taconova products are quality engineered within an ISO9001 (EN29001) environment.

Taconova is the trade name for a range of high quality innovative products for controlling and balancing HVAC water circuits which includes:

Balancing

Mini-Flush Flush Bypass Assemblies– These are UK manufactured assemblies for Fan-coil control, each assembly can be bespoke allowing for a multitude of designs and variations.

TacoSetter AV23– These direct reading flow measurement and balancing valves are ideal for heating and cooling circuits, especially fan coil units. The size range DN15 to DN100.

TacoSetter Rondo AV23 – A simple direct reading flow measurement and balancing valve, these are ideal for heating and cooling circuits (fan coils), radiators (replaces the conventional lock shield valve) and underfloor heating manifolds. DN15 straight pattern.

Controls

NovaDrive Actuators – Thermoelectric actuators to replace thermostatic radiator valves or for use on under floor heating manifolds.
These are directly compatible with our TacoSys manifolds and Novastat/ NovaMaster controls

Mixing

Novamix Compact Thermostatic Mixing Valve – this neat valve provides "safe" temperature controlled water to basins or sinks and complies with **WRAS/TMV2** requirements. 15mm compression connections are available.

Novamix Thermostatic Mixing Valves - provide "safe" temperature controlled water to basins, sinks, baths or group showers with either 15mm, 22mm or 28mm connections

Venting

EL43 Airscoop – Cast iron air separator to eliminate air from water in wet systems.DN20 to DN100.
ES42 Hy -Vent – Automatic air vent for the venting of air in heating and cooling systems.
ER40 Vent Valves – Automatic air vent for the venting of small quantities of air in radiators or small bore pipework.

Other Products Available in the UK include:

Danfoss Hydronic Controls:
Tacotherm Ltd supply a range of Danfoss control and balancing valves which includes :

AB-QM - Pressure independent control valves 10mm – 250mm
ASV-PV & ASV-PI – Automatic balancing valves – for variable flow systems. 15mm to 100mm
MSV-O & MSV-F – Manual balancing valves.
AVP – Differential control valves 15mm – 50mm
AFP – Differential pressure control valves 40mm - 250mm
AVDA – Differential pressure relief valves 15mm – 25mm
AVPA – Differential pressure control valves 15mm – 50mm
AFPA – Differential pressure control valves 40mm – 250mm

for use on fan coils and chilled beams are also supplied to customer requirements

Comprehensive technical data sheets are available for all of the above products.

Extensive stocks are held at our Warehouse in Totton, Nr Southampton, Hampshire, ensuring a speedy and efficient delivery services to anywhere in the UK, generally within 24 hours.

Technical sales engineers are available to discuss the product range in detail and to advise on specific applications or projects.

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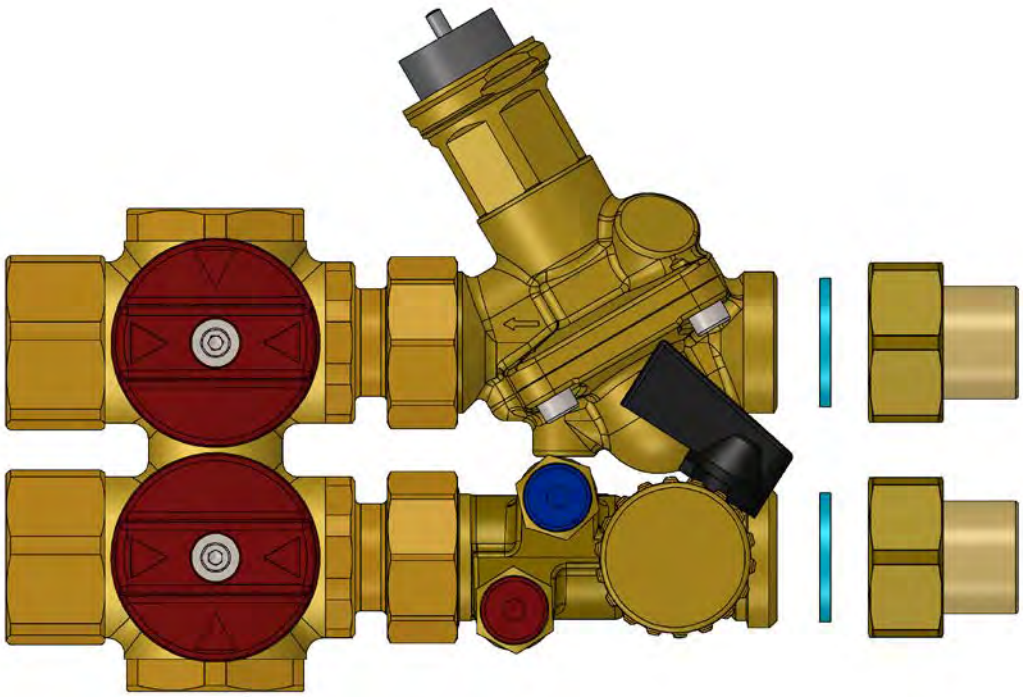
Product Sheet

Pre-Fabricated Flushing Bypass Assembly for Terminal Applications
Mini-Flush 40



Description

Miniflush 40 is a pre-fabricated, flushing bypass arrangement for balance, control, isolation, and operation of terminal devices. It is designed for use with fan coil units, chilled beams, and other terminal devices, where the flow is controlled via a pressure independent control valve, and isolation, drain, flushing bypass, and flow measurement is required.

Key features include:
A compact, pre-fabricated design
Factory pressure tested assembly
Each assembly is labelled with FCU location and Miniflush 40 instructions
High flow DN15 option for direct connection to CHW terminals with flows up to 0.315 l/s
Low flow option for LTHW flow rates down to 0.008 l/s
Left and right-handed versions to prevent clashes within the fan coil
A wide range of connection options, including BSP, compression, and solder connections to the coil
Danfoss AB-QM type pressure independent control valve for balance at full or partial loads
A comprehensive compatible range of actuators to enable it to be connected to a building management system or other controllers
Flow mounted drain for flushing and quick drain-downs
Flow measurement function in all sizes

Tacotherm, Unit 40, Hampshire Business Park, Brunel Road, Totton, Hampshire, SO40 3SA, UK.
T: 02380 663163 E: sales@tacotherm.co.uk

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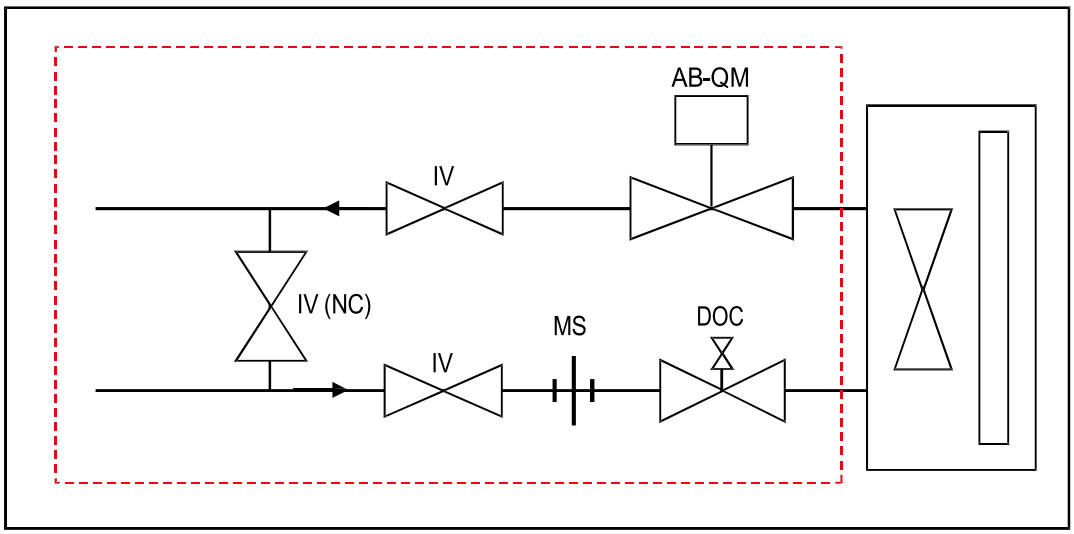
Product Sheet | Pre-Fabricated Terminal Assembly | Type: Mini-Flush 40

Schematic and Design



Schematic Symbol Guide

AB-QM -Pressure Independent Control Valve (actuator supplied separately)
DOC -Drain point
IV -Isolation valve
MS -Measuring station

Ordering

Type	Position of Terminal	Nominal Valve Flow Rate l/h	Recommended Q Max (l/h)	Recommended Q Min (l/h)	Orifice kVs	Connection Size	Connection Type Pipework	Connection Type Terminal	Actuator Type Modulating	Actuator Type 3-Point	Actuator Type Thermic
Miniflush 40 10LF 0.3	Left Handed	150	60	30	0.3	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
Miniflush 40 15LF 0.6	Left Handed	275	90	60	0.6	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
Miniflush 40 15LF 0.9	Left Handed	275	230	90	0.9	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
Miniflush 40 15 2.1	Left Handed	450	450	230	2.1	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
Miniflush 40 15HF 4.0	Left Handed	1135	600	450	4.0	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
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Notes:
-The recommended flow rates are to enable accurate measurement of flow
-Actuators need to be ordered separately
-Options are available for connection to the pipework and terminal. Please discuss with your representative prior to ordering

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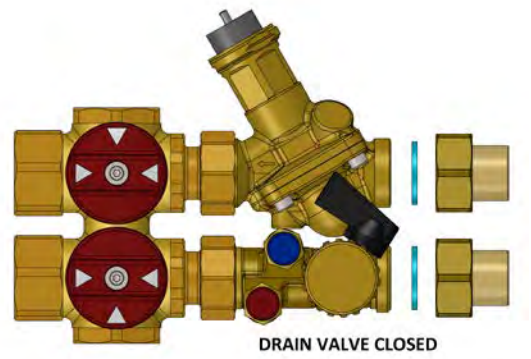
Operational Modes

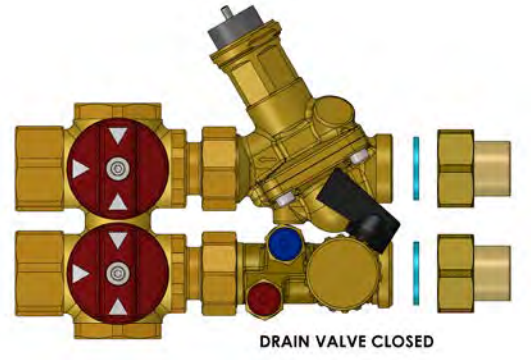
Supply

This is the normal operation of the Mini-flush, with flow going through terminal, and out through the return, back to the system.
The AB-QM valve will balance by limiting the flow to the coil, and the actuator will control flow as per the temperature requirement.



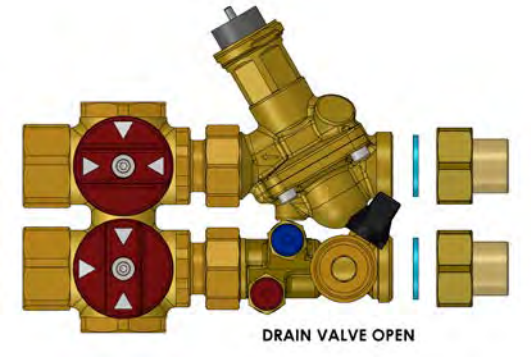
Flushing

During system flushing, the terminal will be isolated, but a flow around the main system is required. To enable bypassing we have positioned a flushing bypass within the Mini- flush assembly, which can open a link between flow and return, to enable mainline system flow for flushing.



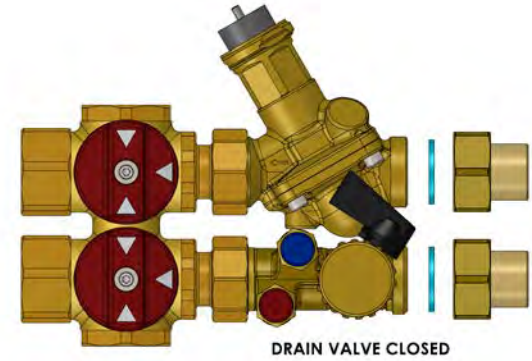
Back Flushing

To enable flushing through the terminal, the return can be opened, with the flow and bypass isolation valves closed. The drain is then opened, to allow flow through the coil, and any coil debris will be released through the flow side drain point.



Isolation

For a variety of reasons, it may be required to completely isolate the terminal. For this we can isolate the flow and return, and close the bypass, to remove all flow through the coil and bypass.



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Product Sheet | Pre-Fabricated Terminal Assembly | Type: Mini-Flush 40

Pressure Independent Control Valve Specification

Description

The precise flow control performance of the AB-QM with a Danfoss actuator provides increased comfort and superior Total Cost of Ownership because of savings made on:

- Efficient energy transfer and minimal pumping costs since there are no overflows at partial loads because of the exact pressure independent flow limitation.
- Smaller pump investments and lower energy consumption as the pump head needed are lower than in the traditional setup. With the built-in test plugs, it is easy to troubleshoot and find the optimal setpoint for the pump.
- Reduced movements of the actuator since the built-in differential pressure controller ensure the pressure fluctuations do not influence the room temperature.
- Achieving a stable temperature in a room leading to a lower average temperature at the same comfort level.
- Minimal flow complains as the valve performs as designed.
- Minimal blockage complains as the membrane design makes AB-QM less susceptible to blockage than a cartridge type constriction.
- Trouble-free segmentation of the building project. When sections of a project are finished, they can normally not be handed over to the customer with a fully functional HVAC installation. However, the AB-QM with a Danfoss actuator will automatically control the flow, even when other parts of the installation are still unfinished. It's not needed to adjust the AB-QM after finalisation of the project.
- Commissioning costs, the costs are close to zero because of a convenient setting procedure without the need for flow charts, calculations, or measuring equipment. The AB-QM valves can be set to a precise design value even when the system is up and running.
- Halved mounting costs as the AB-QM valve covers two functions, Balancing & Control

Operation of the AB-QM Balancing and Control Valve

Differential pressure controller DPC

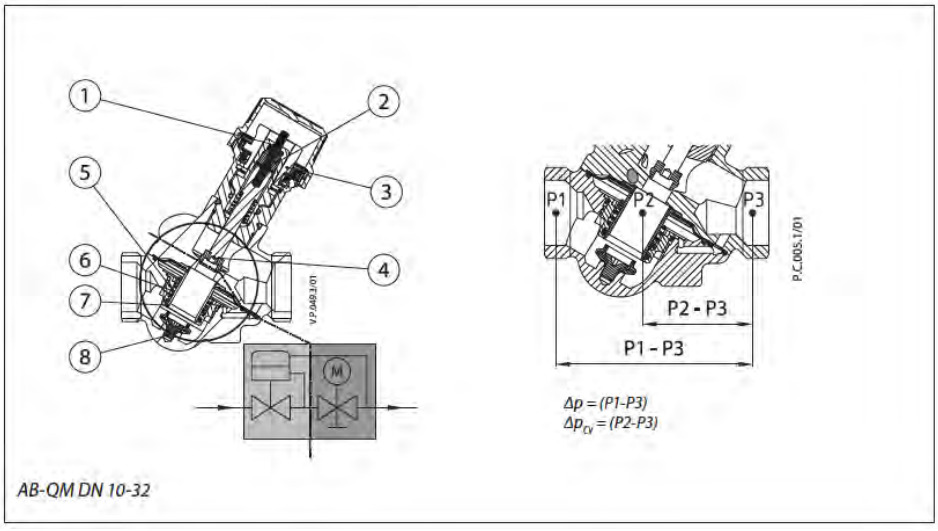
The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference ΔpCv (P2-P3) on the membrane is balanced with the force of the spring. Whenever the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the hollow cone is displaced to a new position which brings a new equilibrium and therefore keeps the differential pressure at a constant level.

Control valve Cv

The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the Kv value. The percentage marked on the scale equals the percentage of 100 % flow marked on the pointer. Changing the stroke limitation is done by lifting the locking mechanism and turning the top of the valve to the desired position, shown on the scale as a percentage. A blocking mechanism automatically prevents unwanted changing of the setting.

Design

1. Spindle
2. Stuffing box
3. Pointer
4. Control valve's cone
5. Membrane
6. Main spring
7. Hollow cone (pressure controller)
8. Vulcanized seat (pressure controller)



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PICV Technical Details

Size		10LF	15LF	15	15HF
Flow Range l/s	Nom	0.042	0.076	0.125	0.315
	Min	0.008	0.015	0.025	0.063
Standard Setting Range	20-100%				
Starting Differential Pressure	kPa	16	16	16	35
Max Differential Pressure	Bar	6	6	6	6
Control Range	1:1000				
Control Characteristic	Linear/Logarithmic with actuator				
Leakage Rate	No visible leakage				
Flow Medium	Water and water mixtures for closed heating and cooling systems according to plant type I for DIN EN14868				
Pressure Rating	PN	16			
Medium Temperature	ºC	-10…+120			
Storage and Transport Temp	ºC	-40…70			
Stroke	mm	2.25			
PICV Connection	Union Threaded/Solder				
Body Material	DZR Brass				
Membrane and O-Ring Material	EPDM				
Control Valve Cone Material	CuZn40Pb3-CW614N				

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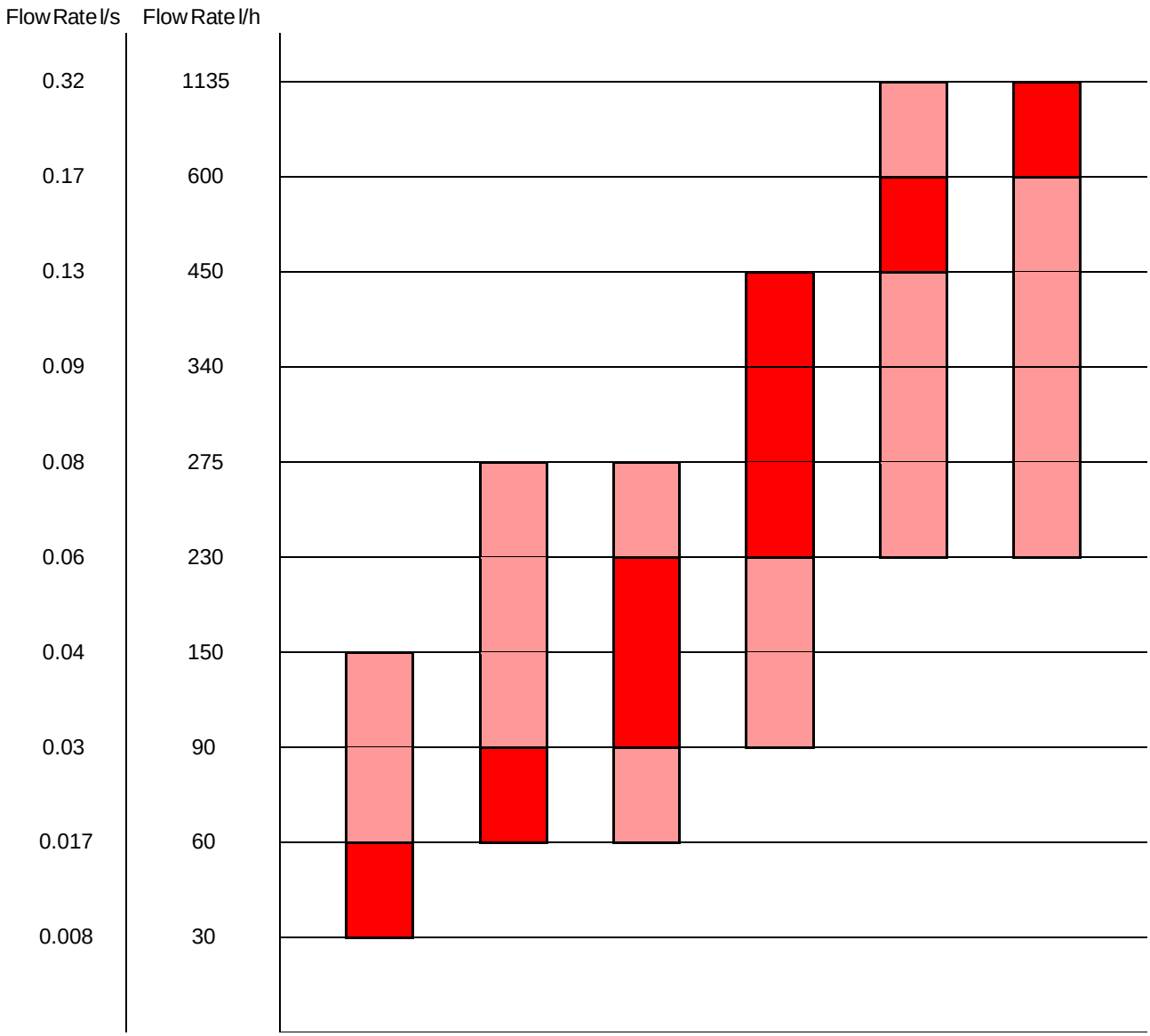
Product Sheet | Pre-Fabricated Terminal Assembly | Type: Mini-Flush 40

Selection Chart



Notes:

This chart is for guidance only. Any selections must be checked with a Tacotherm representative before a final selection can be made.

To select a manifold size take your required design flow rate. Find the flow points it falls between on the flow axis, draw a line horizontally. Select the manifolds in red for optimum selection.

Where you have intersected a manifold in pink, you can select this manifold, but it may not be the optimum selection for accurate flow measurement, and you may experience high orifice pressure loss. PICV flow control performance will not be affected by selection within this range.

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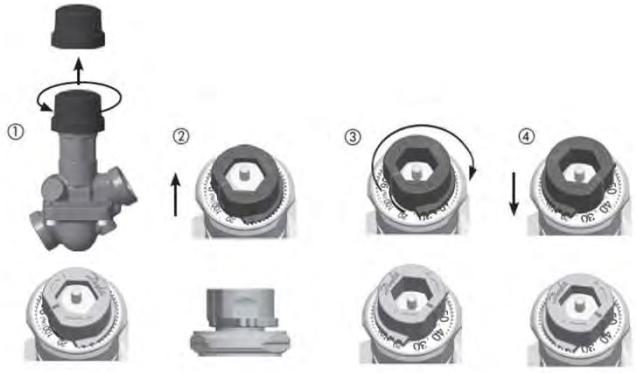
Pressure Independent Control Valve Specification

Setting the AB-QM

The calculated flow can be adjusted easily without using special t



To change the presetting (factory setting is 100 %) follow the four steps below:

① Remove the blue protective cap or the mounted actuator
② Raise the grey pointer
③ Turn (clockwise to decrease) to the new presetting
④ Press grey pointer back into lock position.
After click presetting is locked.

The presetting scale indicates values from 100 % flow to 0 %. Clockwise turning would decrease the flow value, while counter-clockwise would increase it.
If the valve is a DN 15 then the nom flow = 450 l/h =100 % presetting. To set a flow of 270 l/h, you have to set: 270/450 = 60 %.

Tacotherm recommends a presetting/flow from 20 % to 100 %. Factory presetting is 100 %.

Verification of Flow Rate on Mini-Flush

To verify the flow rate, the following steps should be taken:

① Find the kVs of the measuring station on the orifice kVs chart
② Calculate the required pressure drop using the kVs and design flow rate, using the following formula:
Q=Kv x $\sqrt{\Delta P}$
Note Q=m3/h, ΔP=Bar
③ Plug a manometer into the test points on the measuring station
④ If you are getting the required pressure, you have the desired flow rate

A guide to the expected pressure losses can be found in the chart below:

Manifold Type	Nominal Flow Rate l/h	Orifice Kvs	Measuring Station Pressure Drop at PICV Setting (kPa)								
			100%	90%	80%	70%	60%	50%	40%	30%	20%
Miniflush 40 10LF 0.3	150	0.3	25.0	20.3	16.0	12.3	9.0	6.3	4.0	2.3	1.0
Miniflush 40 15LF 0.6	275	0.6	21.0	17.0	13.4	10.2	7.5	5.2	3.4	1.9	
Miniflush 40 15LF 0.9	275	0.9	9.3	7.5	5.9	4.5	3.4	2.3	1.5		
Miniflush 40 15 2.1	450	2.1	4.6	3.7	2.9	2.3	1.7	1.1			
Miniflush 40 15HF 4.0	1135	4.0	8.0	6.5	5.2	3.9	2.9	2.0	1.3		
Miniflush 40 15HF 5.6	1135	5.6	4.1	3.3	2.6	2.0	1.5	1.0			

The highlighted cells indicate the best settings for flow rate measurement

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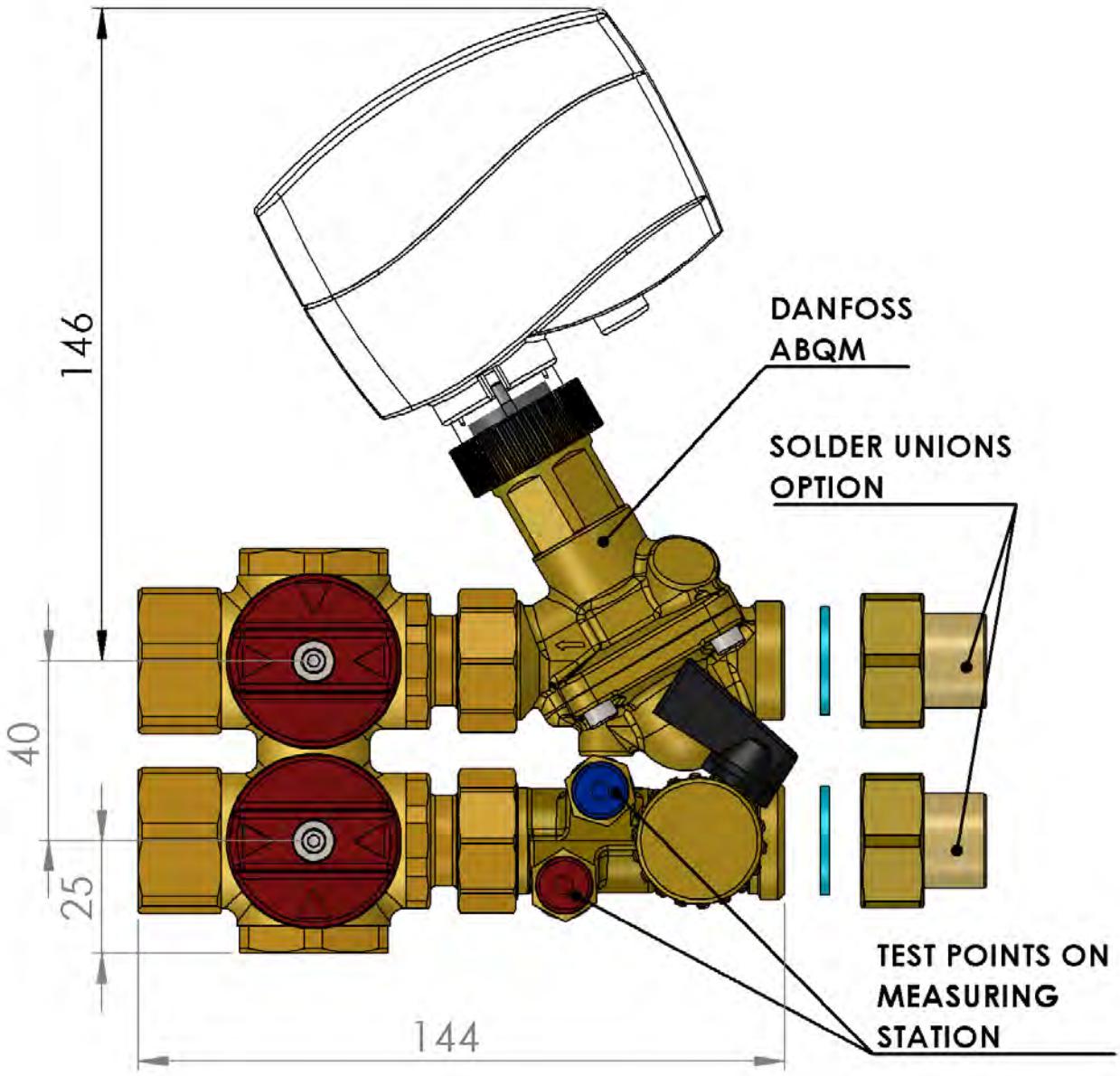
DN15 Mini-Flush Dimensions



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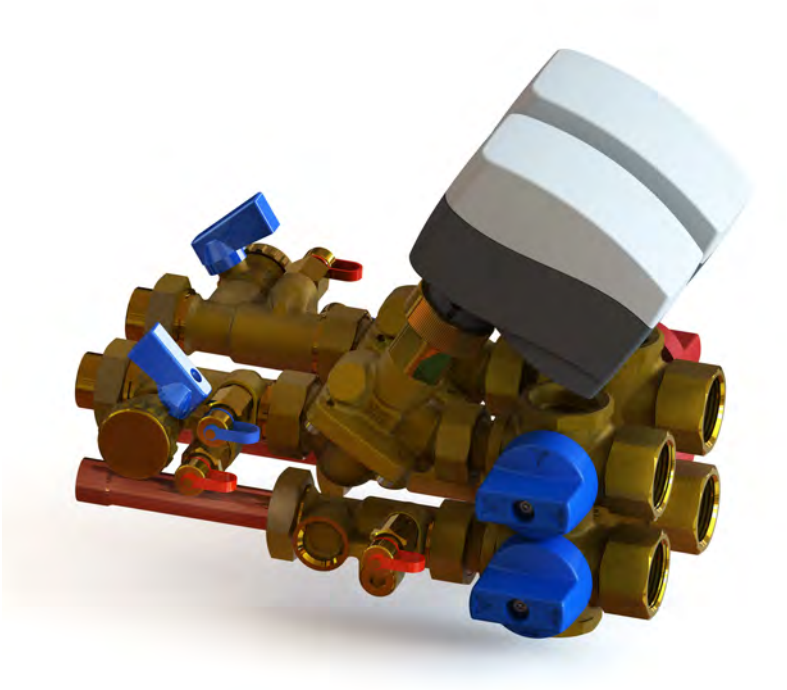
Product Sheet

Pre-Fabricated Flushing Bypass Assembly for Terminal Applications Mini-Flush 40 - **(Compliant to current BSRIA guidelines BG29/2021)**



Description

Miniflush 40 is a pre-fabricated, flushing bypass arrangement for balance, control, isolation, and operation of terminal devices. It is designed for use with fan coil units, chilled beams, and other terminal devices, where the flow is controlled via a pressure independent control valve, and isolation, drain, flushing bypass, and flow measurement is required.

Key features include:

- A compact, pre-fabricated design
- Factory pressure tested assembly
- Each assembly is labelled with FCU location and Miniflush 40 instructions
- High flow DN15 option for direct connection to CHW terminals with flows up to 0.315 l/s
- Low flow option for LTHW flow rates down to 0.008 l/s
- Left and right-handed versions to prevent clashes within the fan coil
- Wide range of connection options, including BSP, compression & solder connections to the coil
- Danfoss AB-QM type pressure independent control valve for balance at full or partial loads
- A comprehensive compatible range of actuators to enable it to be connected to a building management system or other controllers
- Flow mounted drain for flushing and quick drain-downs
- Flow measurement function in all sizes

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 July 2021

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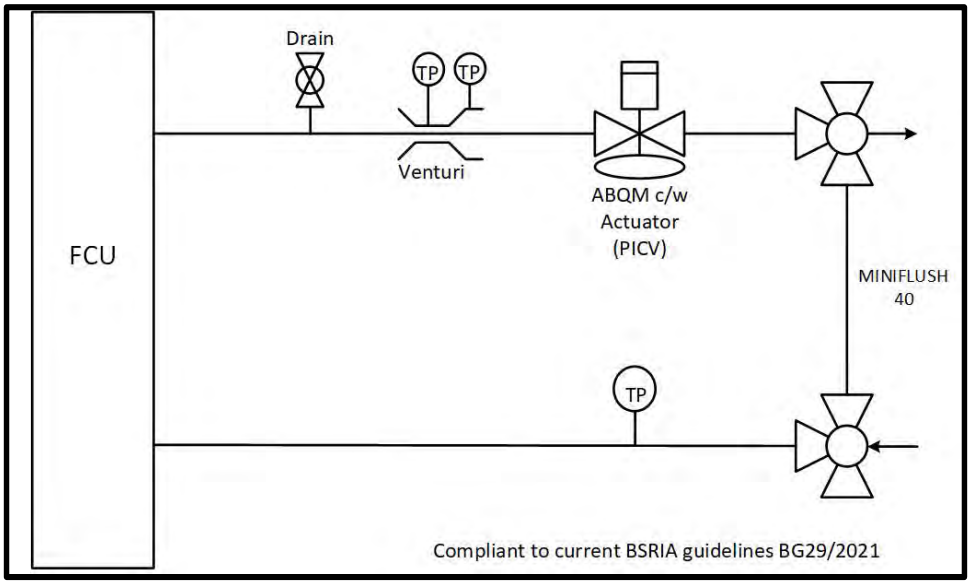
Product Sheet | Pre-Fabricated Terminal Assembly | Type: Mini-Flush 40

Schematic and Design (Compliant to current BSRIA guidelines BG29/2021)



Schematic Symbol Guide

AB-QM	-Pressure Independent Control Valve (actuator supplied separately)
DRAIN	-Drain point (additional DOC on the supply is optional)
MINIFLUSH 40	-Isolation & Flushing valves
VENTURI	-Measuring station
TP	-Test Point

Ordering

Type	Position of Terminal	Nominal Valve Flow Rate l/h	Recommended Q Max (l/h)	Recommended Q Min (l/h)	Orifice kVs	Connection Size	Connection Type Pipework	Connection Type Terminal	Actuator Type Modulating	Actuator Type 3-Point	Actuator Type Thermic
Miniflush 40 10LF 0.3	Left Handed	150	60	30	0.3	3/4" BSP	Internal Threaded	Solder	AME 110NL	AMV 110NL	TWA-Z
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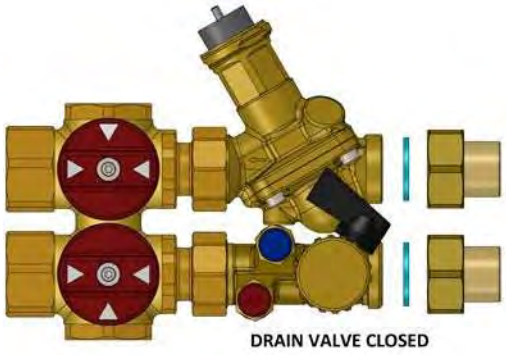
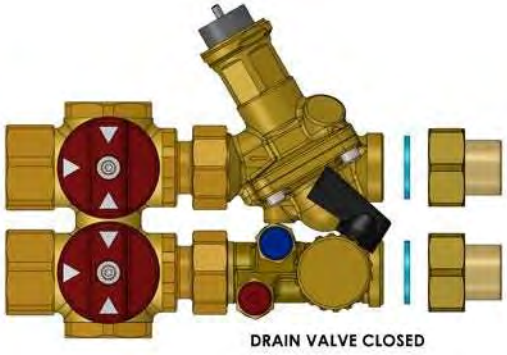
Notes:
-The recommended flow rates are to enable accurate measurement of flow
-Actuators need to be ordered separately
-Options are available for connection to the pipework and terminal. Please discuss with your representative prior to ordering

Operational Modes

Supply
This is the normal operation of the Mini-flush, with flow going through terminal, and out through the return, back to the system. The AB-QM valve will balance by limiting the flow to the coil, and the actuator will control flow as per the temperature requirement.



Flushing
During system flushing, the terminal will be isolated, but a flow around the main system is required. To enable bypassing we have positioned a flushing bypass within the Mini-flush assembly, which can open a link between flow and return, to enable mainline system flow for flushing.



Back Flushing
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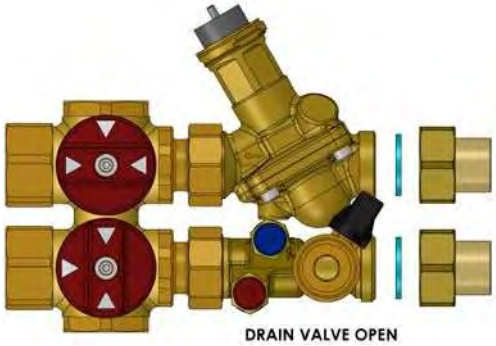

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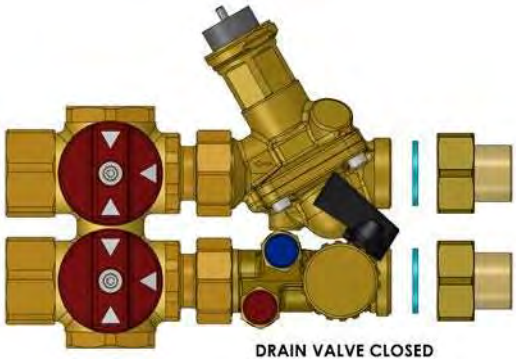

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Product Sheet | Pre-Fabricated Terminal Assembly | Type: Mini-Flush 40

Pressure Independent Control Valve

Specification

Description

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- Efficient energy transfer and minimal pumping costs since there are no overflows at partial loads because of the exact pressure independent flow limitation.
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- Reduced movements of the actuator since the built-in differential pressure controller ensure the pressure fluctuations do not influence the room temperature.
- Achieving a stable temperature in a room leading to a lower average temperature at the same comfort level.
- Minimal flow complains as the valve performs as designed.
- Minimal blockage complains as the membrane design makes AB-QM less susceptible to blockage than a cartridge type constriction.
- Trouble-free segmentation of the building project. When sections of a project are finished, they can normally not be handed over to the customer with a fully functional HVAC installation. However, the AB-QM with a Danfoss actuator will automatically control the flow, even when other parts of the installation are still unfinished. It's not needed to adjust the AB-QM after finalisation of the project.
- Commissioning costs, the costs are close to zero because of a convenient setting procedure without the need for flow charts, calculations, or measuring equipment. The AB-QM valves can be set to a precise design value even when the system is up and running.
- Halved mounting costs as the AB-QM valve covers two functions, Balancing & Control

Operation of the AB-QM Balancing and Control Valve

Differential pressure controller DPC

The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference ΔpCv (P2-P3) on the membrane is balanced with the force of the spring. Whenever the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the hollow cone is displaced to a new position which brings a new equilibrium and therefore keeps the differential pressure at a constant level.

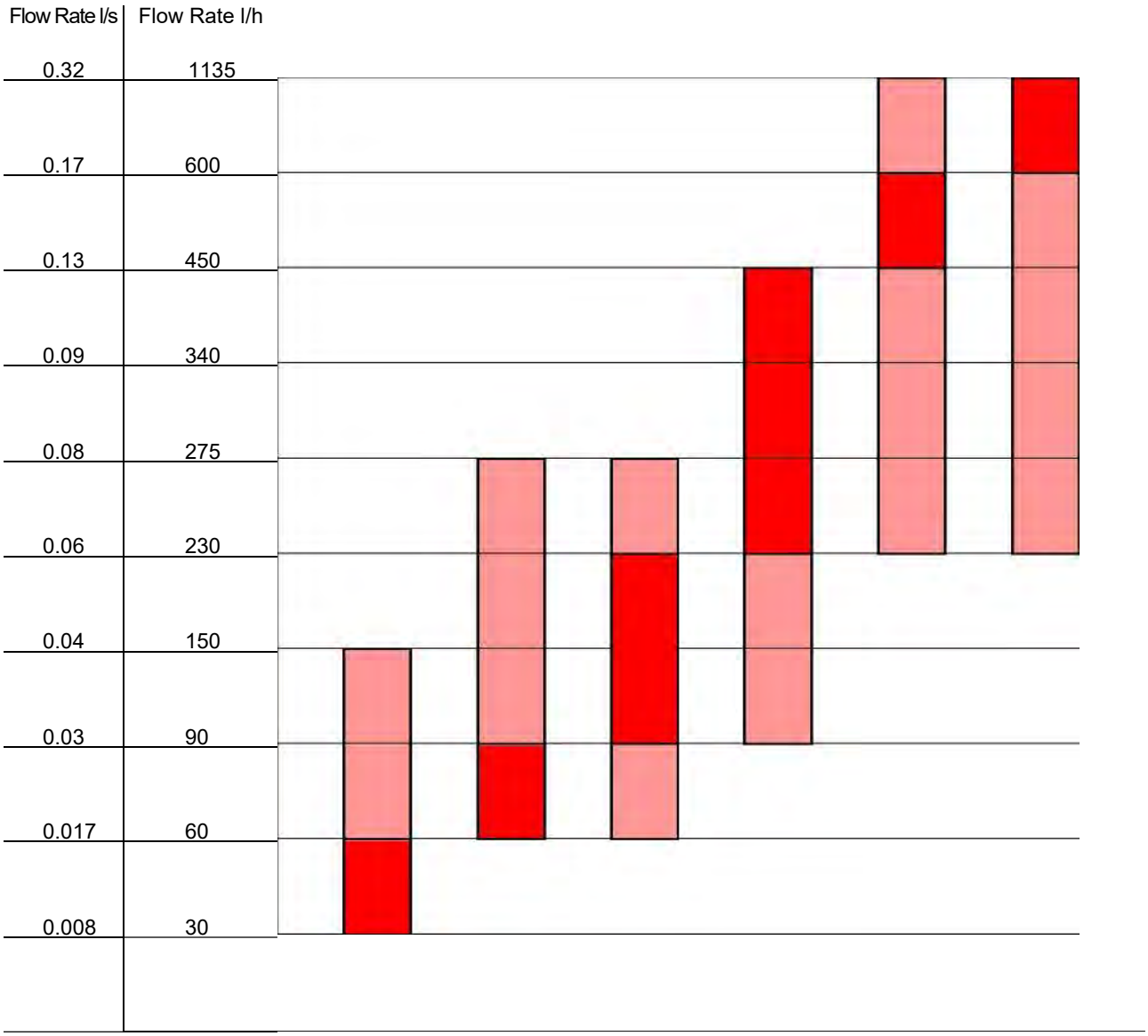
Control valve Cv

The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the Kv value. The percentage marked on the scale equals the percentage of 100 % flow marked on the pointer. Changing the stroke limitation is done by lifting the locking mechanism and turning the top of the valve to the desired position, shown on the scale as a percentage. A blocking mechanism automatically prevents unwanted changing of the setting.

PICV Technical Details

Size		10LF	15LF	15	15HF
Flow Range l/s	Nom	0.042	0.076	0.125	0.315
	Min	0.008	0.015	0.025	0.063
Standard Setting Range	20-100%				
Starting Differential Pressure	kPa	16	16	16	35
Max Differential Pressure	Bar	6	6	6	6
Control Range	1:1000				
Control Characteristic	Linear/Logarithmic with actuator				
Leakage Rate	No visible leakage				
Flow Medium	Water and water mixtures for closed heating and cooling systems according to plant type I for DIN EN14868				
Pressure Rating	PN	10 as Standard (16 is available on request)			
Medium Temperature	° C	-10...+120			
Storage and Transport Temp	° C	-40...70			
Stroke	mm	2.25			
PICV Connection	Union Threaded/Solder				
Body Material	DZR Brass				
Membrane and O-Ring Material	EPDM				
Control Valve Cone Material	CuZn40Pb3-CW614N				

Selection Chart



This chart is for guidance only. Any selections must be checked with a Tacotherm representative before a final selection can be made.

Notes:

To select a manifold size take your required design flow rate. Find the flow points it falls between on the flow axis, draw a line horizontally. Select the manifolds in red for optimum selection.

Where you have intersected a manifold in pink, you can select this manifold, but it may not be the optimum selection for accurate flow measurement, and you may experience high orifice pressure loss. PICV flow control performance will not be affected by selection within this range.

tacotherm

Working in partnership with Danfoss

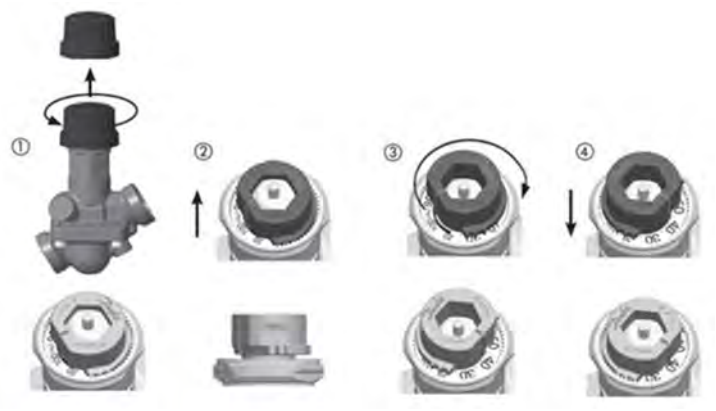
Product Sheet | Pre-Fabricated Terminal Assembly | Type: Mini-Flush 40

Pressure Independent Control Valve Specification

Setting the AB-QM
The calculated flow can be adjusted easily without using special tools.

To change the presetting (factory setting is 100 %) follow the four steps below:

① Remove the blue protective cap or the mounted actuator
② Raise the grey pointer
③ Turn (clockwise to decrease) to the new presetting
④ Press grey pointer back into lock position. After click presetting is locked.



The presetting scale indicates values from 100 % flow to 0 %. Clockwise turning would decrease the flow value, while counter-clockwise would increase it.

If the valve is a DN 15 then the nom flow = 450 l/h =100 % presetting. To set a flow of 270 l/h, you have to set: 270/450 = 60 %.

Tacotherm recommends a presetting/flow from 20 % to 100 %. Factory presetting is 100 %.

Verification of Flow Rate on Mini-Flush

To verify the flow rate, the following steps should be taken:

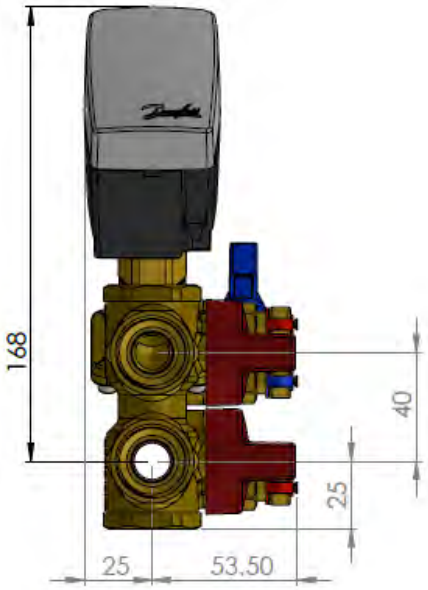
① Find the kVs of the measuring station on the orifice kVs chart
② Calculate the required pressure drop using the kVs and design flow rate, using the following formula:
$Q=Kv \times \sqrt{\Delta P}$
Note Q=m3/h, ΔP=Bar
③ Plug a manometer into the test points on the measuring station
④ If you are getting the required pressure, you have the desired flow rate

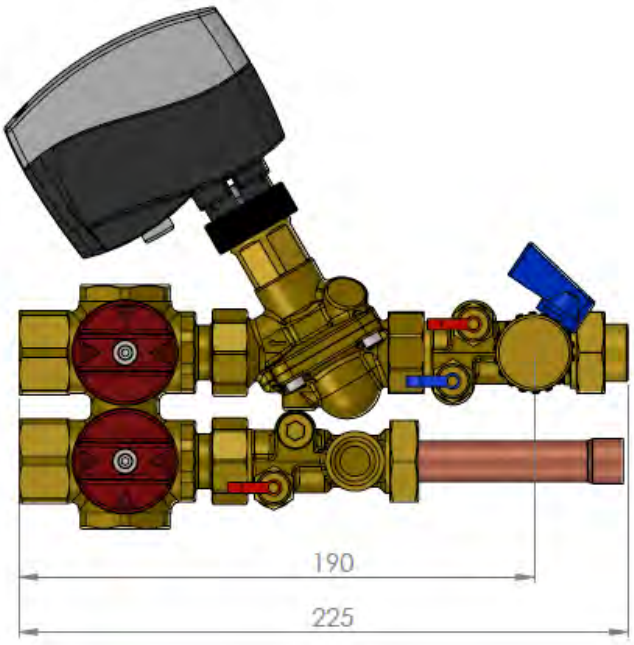
A guide to the expected pressure losses can be found in the chart below:

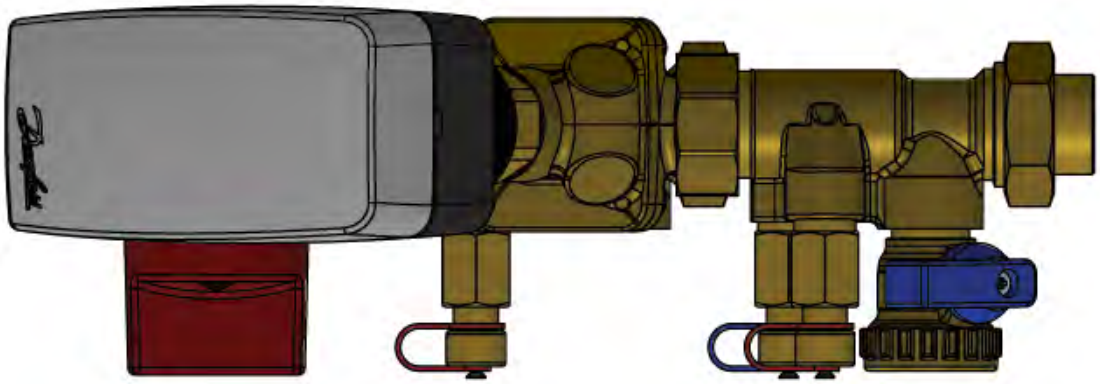
Manifold Type	Nominal Flow Rate l/h	Orifice Kvs	Measuring Station Pressure Drop at PICV Setting (kPa)								
			100%	90%	80%	70%	60%	50%	40%	30%	20%
Miniflush 40 10LF 0.3	150	0.3	25.0	20.3	16.0	12.3	9.0	6.3	4.0	2.3	1.0
Miniflush 40 15LF 0.6	275	0.6	21.0	17.0	13.4	10.2	7.5	5.2	3.4	1.9	
Miniflush 40 15LF 0.9	275	0.9	9.3	7.5	5.9	4.5	3.4	2.3	1.5		
Miniflush 40 15 2.1	450	2.1	4.6	3.7	2.9	2.3	1.7	1.1			
Miniflush 40 15HF 4.0	1135	4.0	8.0	6.5	5.2	3.9	2.9	2.0	1.3		
Miniflush 40 15HF 5.6	1135	5.6	4.1	3.3	2.6	2.0	1.5	1.0			

The highlighted cells indicate the best settings for flow rate measurement

DN15 Mini-Flush Dimensions







Data sheet

Actuators for modulating control
AME 110 NL, AME 120 NL

Description

The actuators are used together with automatically balanced combination valve type AB-QM for DN 10-32.

The actuator can be used with fan coil units, induction units, small reheaters, recoolers and zone applications in which hot/cold water is the controlled medium.

Main data:
- Gap detection at stem up position
- Modulating control
- Force switch-off at stem down position prevents overload of actuator and valve
- No tools required for mounting
- Maintenance-free lifetime
- Low-noise operation
- Self-positioning process
- Halogen free cables

Ordering

Type	Supply voltage (V)	Speed (s/mm)	Cable length (m)	Code No, Single Pack	Code No, Industry Pack
AME 110 NL	24 AC	24	1,5	**082H8057**	**082H8067**
			5,0	**082H8081**	**082H8077**
			10	**082H8098**	**082H8087**
AME 120 NL		12	1,5	**082H8059**	/
			5,0	/	**082H8079**
			10	/	**082H8089**

Note:
Actuators with 5 m and 10 m cable length are produced on request. Please note this increases lead time.

Spare parts

Type	Length (m)	Code No.
Cable (24 V)	5	**082H8052**
	10	**082H8054**

Technical data

Type			AME 110 NL	AME 120 NL
Power supply		V	24 AC; +20 to –15% *	
Power consumption	running	VA	2	
	standby	W	0,5	
Frequency		Hz	50/60	
Control input Y		V	0-10 (2-10) Ri = 110 kΩ	
		mA	0-20 (4-20) Ri = 500 Ω	
Closing force		N	130	
Stroke		mm	5	
Speed		s/mm	24	12
Relative humidity			max. 80 %	
Max. medium temperature		°C	120	
Ambient temperature			0 … 55	
Storage and transport temperature			–40 … 70	
Protection class			III safety extra-low voltage	
Grade of enclosure			IP 42	
Weight		kg	0,3	
CE - marking in accordance with standards			Low Voltage Directive 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EEC: EN 61000-6-2, EN 61000-6-3	

** 24V AC; +10% to –15% if produced before w18y2013*

Installation

Mechanical

The actuator should be mounted with the valve stem in either horizontal position or pointing upwards.

The actuator is fixed to the valve body by means of a mounting ring, which requires no tools for mounting. The ring should be tightened by hand.

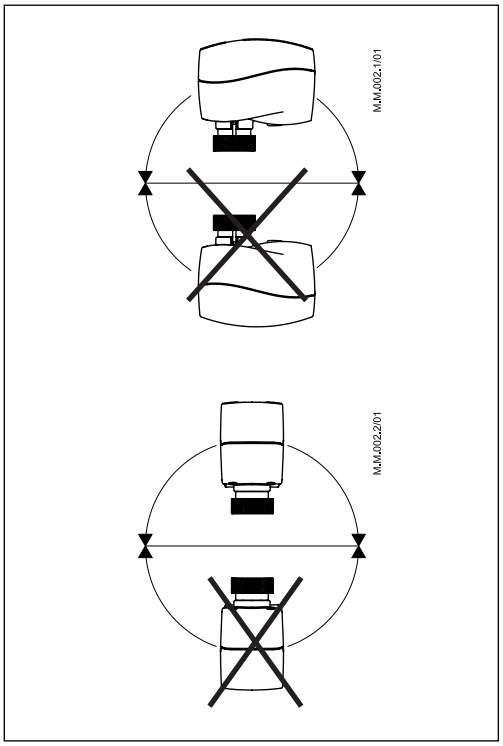
Electrical

Important: *It is strongly recommended that the mechanical installation is completed before the electrical installation.*

Auto sleep mode

1. If actuator AME 110 NL is charged by 24 V supply voltage and if it is not installed on AB-QM valve, it will stop in lower position and switch off all LED indicators after 5 minutes
2. **It is mandatory to drive the spindle of the actuator to upper position before it will be installed on AB-QM valve (please refer to manual override drawings)!**
3. Auto sleep mode switches back to learning mode by pressing RESET button or by cycling power supply

Each actuator is supplied with the connecting cable for the controller.



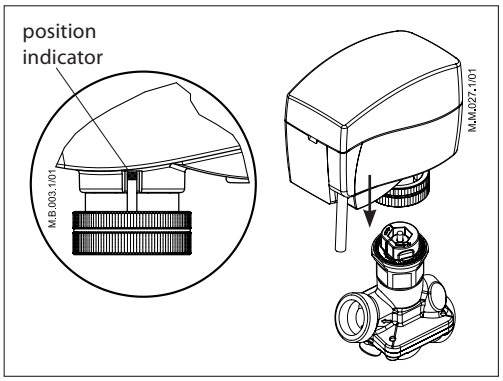
Installation procedure

1. Check the valve neck. The actuator should be in stem up position (factory setting).

   Ensure that the actuator is mounted securely on the valve body

2. Wire the actuator according to the wiring diagram

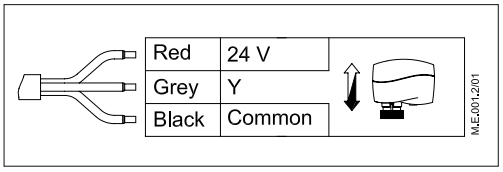
3. The direction of the stem movement can be observed on the position indicator



Disposal

The actuator must be dismantled and the elements sorted into various material groups before disposal.

Wiring



Commissioning

The factory setting of the spindle is the fully stem up position because of easier mechanical connection of the actuator on the valve.

DIP Switch Setting
(for service purposes only)

The actuator has a function selection DIP switch under the removable cover.

The switch provides the following functions:

- SW1:
  U/I - Input signal type selector
  If set to OFF position, voltage input is selected. If set to ON position, current input is selected.

- SW 2:
  0/2 - Input signal range selector
  If set to OFF position, the input signal is in the range from 2-10 V (voltage input) or from 4-20 mA (current input). If set to ON position, the input signal is in the range from 0-10 V (voltage input) or from 0-20 mA (current input).

- SW 3:
  D/I - Direct or inverse acting selector
  If set to OFF position, the actuator is direct acting (stem contracts as voltage increases). If the actuator is set to ON position, the actuator is inverse acting (stem extracts as voltage increases).

- SW 4:
  ---/Seq - Normal or sequential mode selector
  If set to OFF position, the actuator is working in the range 0(2)-10 V or 0(4)-20 mA. If set to ON position, the actuator is working in sequential range; 0(2)-5(6) V or (0(4-0(12) mA) or (5(6)-10 V) or (10(12)-20 mA).

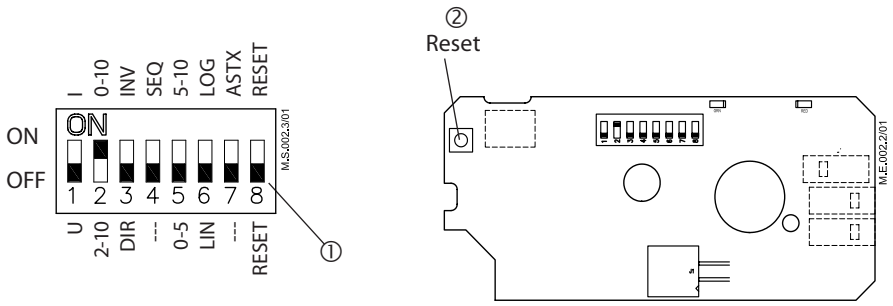
- SW 5:
  0-5/5-10 V - Input signal range in sequential mode
  If set to OFF position, the actuator is working in the sequential range 0(2)-5(6) V or 0(4)-10(12) mA. If set to ON position, the actuator is working in the sequential range; 5(6)-10 V or 10(12)-20 mA.

- SW 6:
  LIN/LOG - Linear or equal percentage flow through valve selector
  If set to ON position, the flow through the valve is equal percentage-wise equals the control signal. If set to OFF position, the valve position is linear acc. to the control signal.

- SW 7:
  ---/ASTK - Anti-blocking function
  Exercises the valve to avoid blocking in periods when the heating/cooling is off.
  If set to ON position (ASTK), the valve motion is switched on. The actuator opens and closes the valve every 7 days.
  If set to OFF position (---), the function is disabled.

- SW 8:
  Reset switch and reset button on PCB
  Changing this switch position will cause the actuator to go through a self stroking cycle.

  Note: Reset switch ① and reset button on PCB ② have the same function. The reset switch must be in OFF position to make reset button function active (press it for 2 sec.).

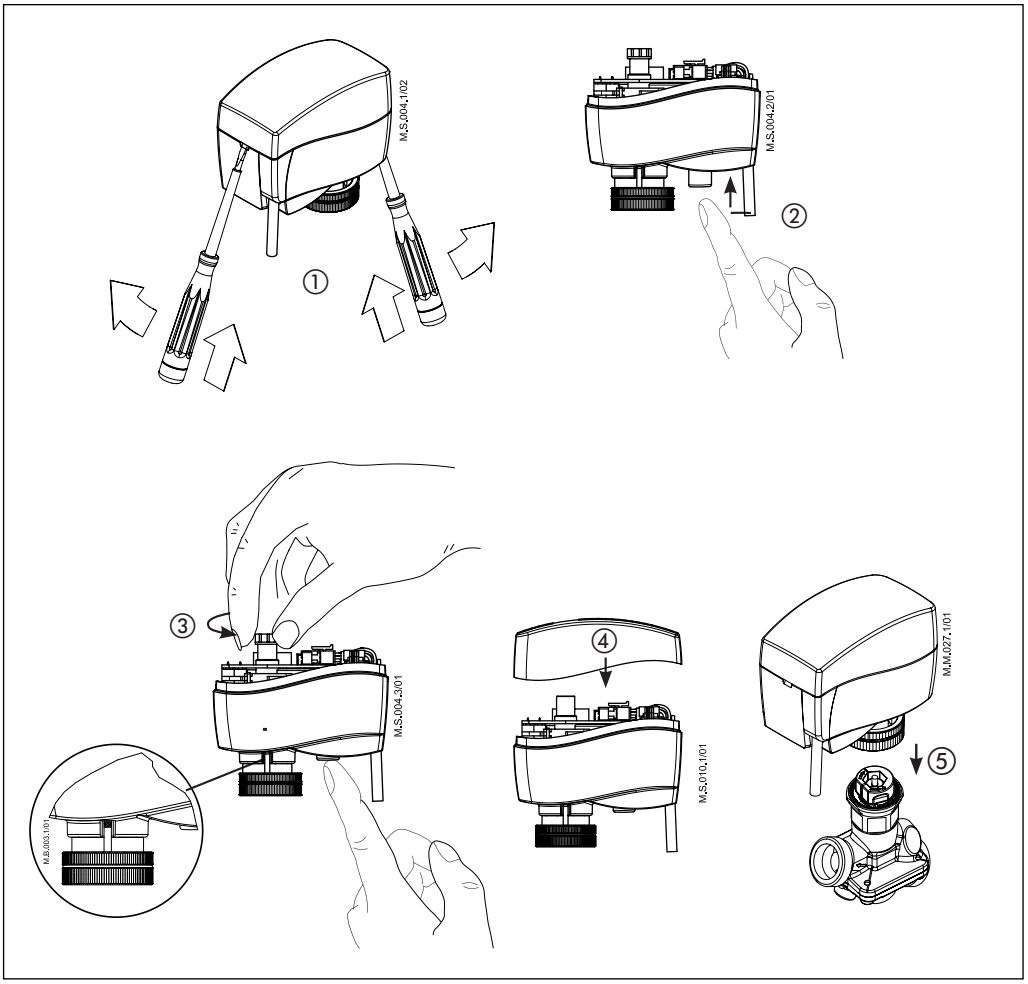


Remark:
Factory setting: All switches (except switch 2 which is in ON position) are in OFF positions.

Manual override
(for service purposes only)

Caution:
Do not manually operate the drive if power is connected!

Do not dismount the actuator from the valve when it is in a stem down position!
If dismounted in a stem down position, there is a high risk that the actuator gets stuck.

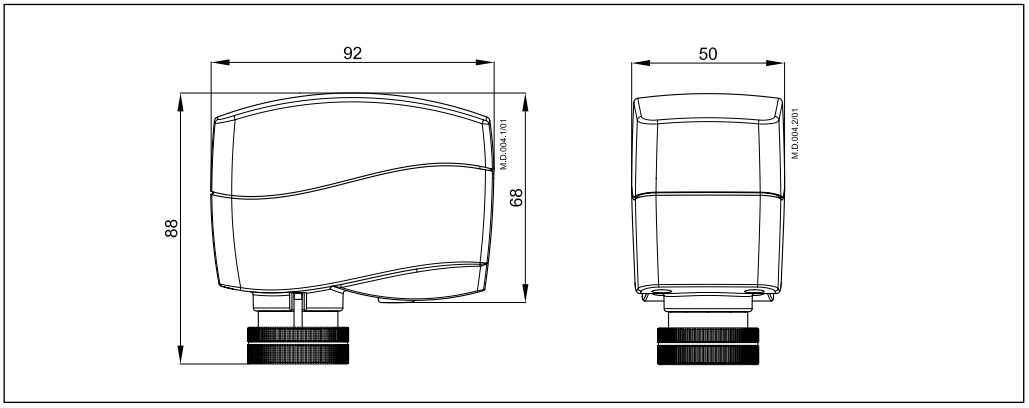


- Remove cover ①
- Press and hold the button ② (on the bottom side of the actuator) during manual override ③
- Replace cover ④
- Install actuator on valve ⑤

Remark:
A 'click' sound after energising the actuator indicates that the gear wheel has jumped into normal position.

If manual override has been used, the Y signal will not be correct until the actuator has reached its end position. If this is not acceptable, reset the actuator.

Dimensions *(mm)*



TACOSETTER INLINE 100

BALANCING VALVE

ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Variable installation position, maintenance-free
- Regulating valve with isolating facility (rest leakage possible)
- Additional types are also available as make resistant to dezincification

Direct regulation, reading and shut-off of flows in systems

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers or in a subsystem.
Balancing valves offer a quick, easy and accurate method of adjusting the flow rates through heating, ventilation, air conditioning and cooling systems.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.
With TacoSetter Inline 100 balancing valves, any qualified fitter can set the appropriate flow rate using the unique flow measurement device, avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

The valve can be installed in a horizontal, vertical or inclined position. Care should be taken that the arrow is pointing in the direction of the flow.

OPERATION

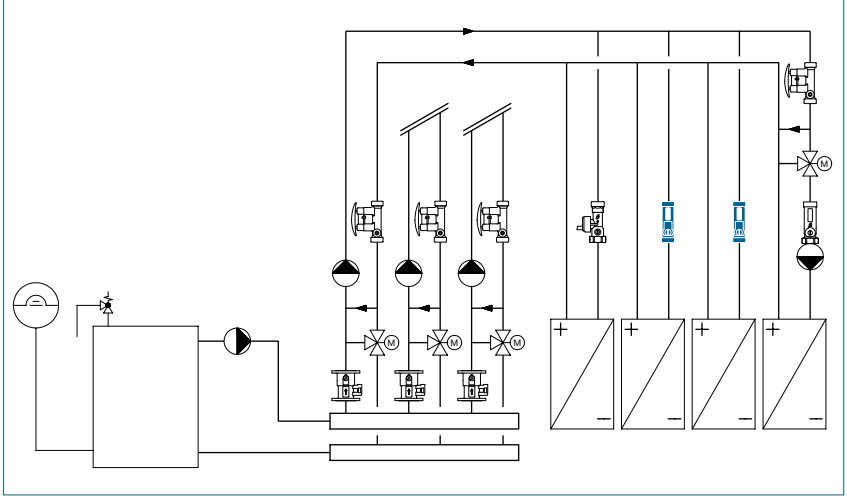
The flow measurement is based on the principle of a baffle float with return spring. The flowmeter is built into the housing.
The balancing can be carried out with a screwdriver at the adjusting screw. The reading position is the bottom line of the baffle float.

BUILDING CATEGORIES

For pipe installations in drinking water, heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 100 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Measuring accuracy: ±10 % of the indicated value
- k_{VS} value and measurement range see «Type overview»
- Connections:
  - ¾" euro cone
  - ½" female thread acc. to DIN 2999
  - 1" thread G (flat–sealing) acc. to ISO 228

Material

- Housing: see «Type overview»
- Sight glass: heat- and impact resistant plastic
- Seals: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)
- Water and proprietary additives used against corrosion and freezing up to 50% (see document «Correction curves»)

APPROVALS / CERTIFICATES

- KTW, W270, ACS

TYPE OVERVIEW

TacoSetter Inline 100 | Balancing valve made of brass with female thread

Order no.	DN	G × Rp	Measuring range	k_{VS} (m³/h)
223.1202.000	15	¾" × ½"	0,3 – 1,5 (l/min)	0,25
223.1203.000	15	¾" × ½"	0,6 – 2,4 (l/min)	0,6
223.1204.000	15	¾" × ½"	1,0 – 3,5 (l/min)	1,35
223.1208.000	15	¾" × ½"	2,0 – 8,0 (l/min)	1,8
223.1209.000	15	¾" × ½"	3,0 – 12,0 (l/min)	1,85

TacoSetter Inline 100 | Balancing valve made of brass with male thread

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.1233.000	15	¾" × ¾"	0,6 – 2,4 (l/min)	0,6
223.1234.000	15	¾" × ¾"	1,0 – 3,5 (l/min)	1,35
223.1238.000	15	¾" × ¾"	2,0 – 8,0 (l/min)	1,8
223.1239.000	15	¾" × ¾"	3,0 – 12,0 (l/min)	1,85
223.1300.000	20	1" × 1"	4,0 – 15,0 (l/min)	5,0
223.1302.000	20	1" × 1"	8,0 – 30,0 (l/min)	5,0
223.1305.000	20	1" × 1"	10,0 – 40,0 (l/min)	5,0

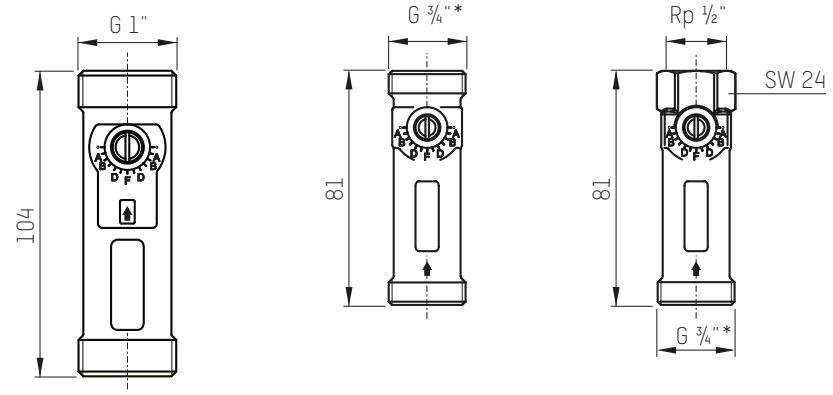
TacoSetter Inline 100 | Balancing valve made of dezincification-resistant (DZR) brass with female thread

Order no.	DN	G × Rp	Measuring range	k_{VS} (m³/h)
223.1204.104	15	¾" × ½"	1,0 – 3,5 (l/min)	1,35
223.1208.104	15	¾" × ½"	2,0 – 8,0 (l/min)	1,8
223.1209.104	15	¾" × ½"	3,0 – 12,0 (l/min)	1,85

TacoSetter Inline 100 | Balancing valve made of dezincification-resistant (DZR) brass with male thread

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.1232.104	15	¾" × ¾"	0,3 – 1,5 (l/min)	0,25
223.1233.104	15	¾" × ¾"	0,6 – 2,4 (l/min)	0,6
223.1234.104	15	¾" × ¾"	1,0 – 3,5 (l/min)	1,35
223.1238.104	15	¾" × ¾"	2,0 – 8,0 (l/min)	1,8

DIMENSIONAL DRAWING



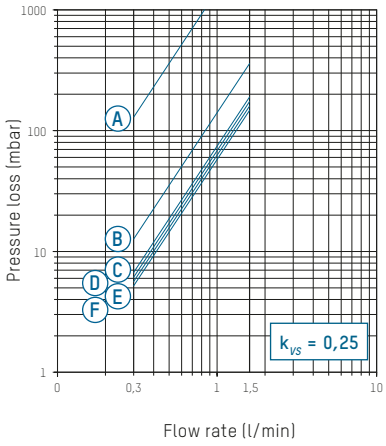
* Euro cone

GLYCOL CORRECTION CURVES

There is a separate diagram for TacoSetter up to DN25 and its flow ranges with nine correction curves for use of anti-frost and anti-corrosion agents.
Corrections are not required for larger dimensions as the deviation lies within the measuring tolerance.
See www.taconova.com

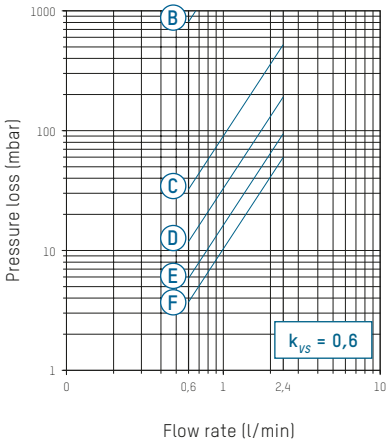
PRESSURE LOSS DIAGRAMS

223.1202.000 (DN 15 | 0,3...1,5 l/min)
223.1232.104 (DN 15 | 0,3...1,5 l/min)



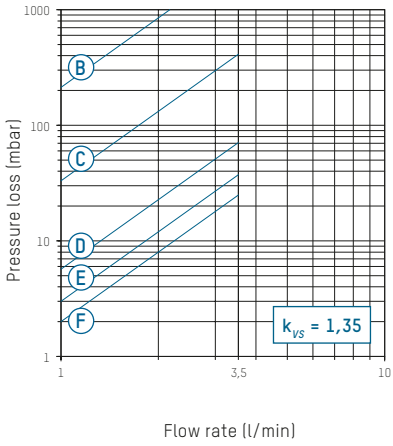
A – F Valve position

223.1203.000 (DN 15 | 0,6...2,4 l/min)
223.1233.XXX (DN 15 | 0,6...2,4 l/min)



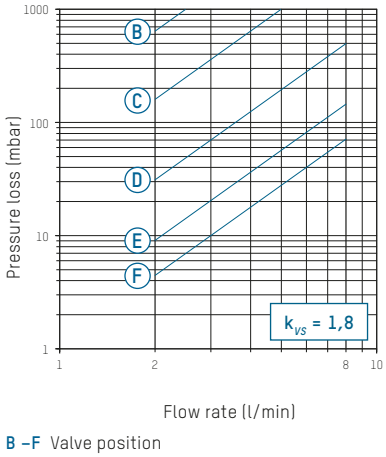
B – F Valve position

223.1204.XXX (DN 15 | 1,0...3,5 l/min)
223.1234.XXX (DN 15 | 1,0...3,5 l/min)



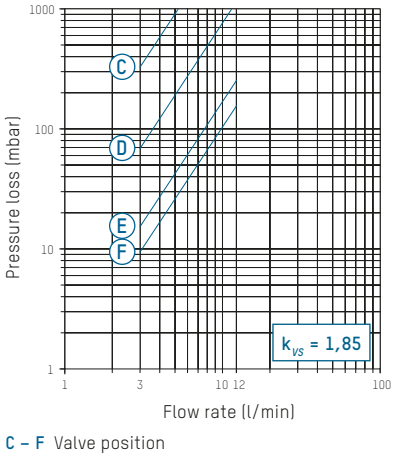
B – D Valve position

223.1208.XXX (DN 15 | 2...8 l/min)
223.1238.XXX (DN 15 | 2...8 l/min)



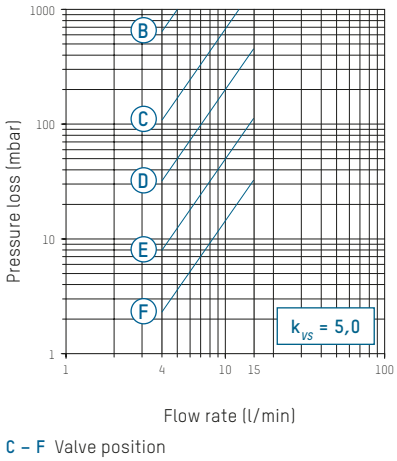
B –F Valve position

223.1209.XXX (DN 15 | 3...12 l/min)
223.1239.000 (DN 15 | 3...12 l/min)



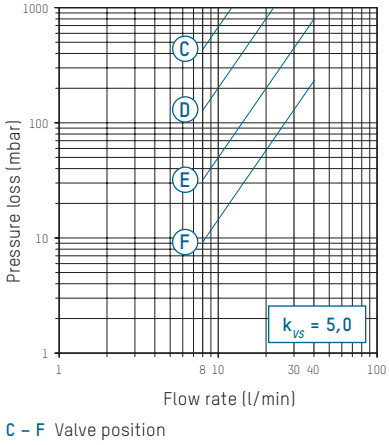
C – F Valve position

223.1300.000 (DN 20 | 4...15 l/min)



C – F Valve position

223.1302.000 (DN 20 | 8...30 l/min)
223.1305.000 (DN 20 | 10...40 l/min)



C – F Valve position

ACCESSORIES

SYSTEM SCREW CONNECTION FITS TO TACOSETTER INLINE

Comprising a cap nut, clamp ring and support sleeve

Order no.	G × mm	Version for	Fits to
210.3325.000	¾" × 15	Copper pipe 15/1 Eurocone	DN 15

Screw connections with cap nut and insert

Order no.	G × R	Version for	Fits to
210.6221.000	¾" × ½"	½" thread, conically sealing, dezincification-resistant	DN 15
210.6632.000	1" × ¾"	¾" thread, flat-sealing	DN 20
210.6633.000	1¼" × 1"	1" thread, flat-sealing	DN 20
210.6222.000	¾" × ½"	½" thread, self-sealing	DN 15

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

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TACOSETTER BYPASS 100

BALANCING VALVE

ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Variable installation position, maintenance-free
- Flow control with setpoint adjuster
- Regulating valve with isolating facility (rest leakage possible)
- Minimal pressure loss

Direct regulation, indication and isolation of flows in systems.

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers or in a subsystem. Balancing valves offer an easy and accurate method of adjusting the flow rates for heating-, ventilation-, air conditioning- and cooling systems.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.

With TacoSetter Bypass balancing valves, any qualified fitter can set the appropriate flow rate using the unique flow measurement device, avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

The TacoSetter Bypass 100 requires a straight section of pipe of the same length and diameter as the system. The valve can be installed in a horizontal, vertical or inclined position. Care should be taken that the arrow is pointing in the direction of the flow.

OPERATION

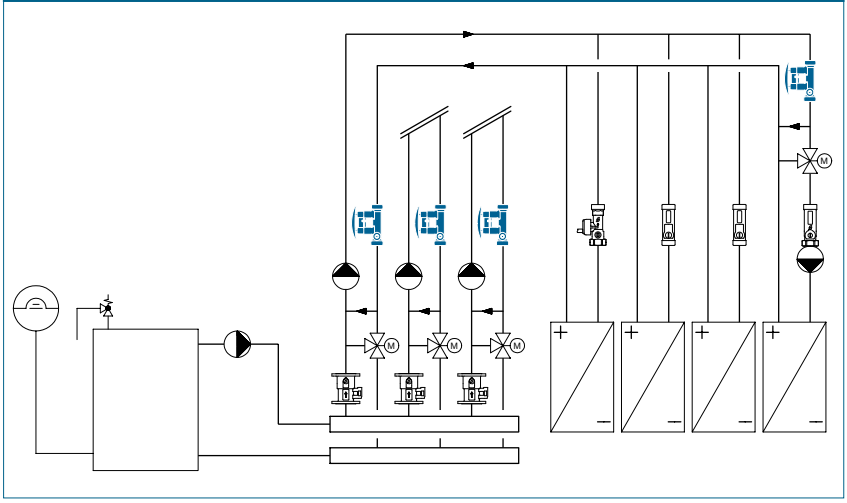
The flow measurement is based on the principle of a baffle float with return spring. The reading position is the bottom line of the baffle float. The measuring device is placed in a bypass to the main flow, isolated from system flow. By demand the bypass, with self locking valves, gets opened / closed by pressing / releasing the clamp. Reading the flow rate has no influence on the main flow rate.

BUILDING CATEGORIES

For pipe installations in drinking water, heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 100 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Measuring accuracy:
  - Measurement range 20 – 80%: ±5% of the indicated value
  - Measurement range <20% / >80%: = ±10% of the indicated value
- k_{VS} value and measurement range see «Type overview»
- Female thread (cylindrical) to DIN 2999 / ISO 7 or male thread G (cylindrical) to ISO 228

Material

- Housing: brass
- Inside: stainless steel, brass, plastic
- Sight glass: heat- and impact resistant plastic
- Seals: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)
- Water and proprietary additives used against corrosion and freezing up to 50% (see document «Correction curves»)

APPROVALS / CERTIFICATES

- ACS

ADDITIONAL MODELS

Setter for solar applications, see data sheets TacoSetter Bypass Solar 130 and TacoSetter Bypass Solar 185. Complete sets with insulation box are available for the TacoSetter Bypass 100 (see our „Range of Products" catalog and our „Price List").

GLYCOL CORRECTION CURVES

There is a separate diagram for TacoSetter up to DN25 and its flow ranges with nine correction curves for use of anti-frost and anti-corrosion agents.
Corrections are not required for larger dimensions as the deviation lies within the measuring tolerance.
See www.taconova.com

TYPE OVERVIEW

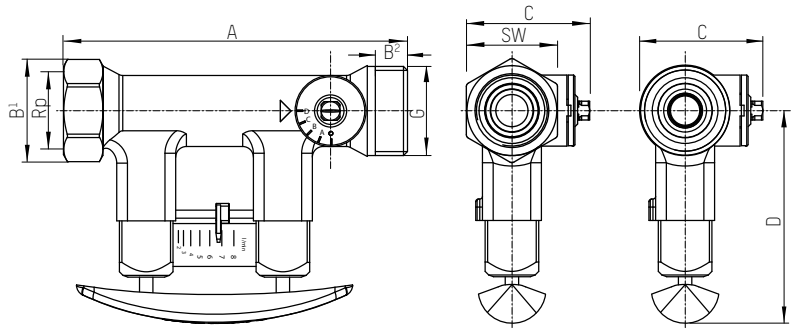
TacoSetter Bypass 100 | Balancing valve with female thread

Order no.	DN	Rp × Rp	Measuring range	k_{VS} (m³/h)
223.2262.000	15	½" × ½"	2 – 8 (l/min)	1,95
223.2361.000	20	¾" × ¾"	2 – 8 (l/min)	1,95
223.2360.000	20	¾" × ¾"	4 – 15 (l/min)	3,3
223.2362.000	20	¾" × ¾"	8 – 30 (l/min)	5,0
223.2460.000	25	1" × 1"	6 – 20 (l/min)	5,1
223.2461.000	25	1" × 1"	10 – 40 (l/min)	8,1
223.2561.000	32	1 ¼" × 1 ¼"	20 – 70 (l/min)	17,0
223.2661.000	40	1 ½" × 1 ½"	30 – 120 (l/min)	30,0
223.2861.000	50	2" × 2"	50 – 200 (l/min)	54,0

TacoSetter Bypass 100 | Balancing valve with male thread

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.2272.000	20	1" × 1"	2 – 8 (l/min)	2,2
223.2370.000	20	1" × 1"	4 – 15 (l/min)	3,3
223.2372.000	20	1" × 1"	8 – 30 (l/min)	5,0
223.2470.000	25	1 ¼" × 1 ¼"	6 – 20 (l/min)	5,1
223.2471.000	25	1 ¼" × 1 ¼"	10 – 40 (l/min)	8,1
223.2571.000	32	1 ½" × 1 ½"	20 – 70 (l/min)	17,0

DIMENSIONAL DRAWING



MEASUREMENT TABLE

TacoSetter Bypass 100 | Balancing valve with female thread

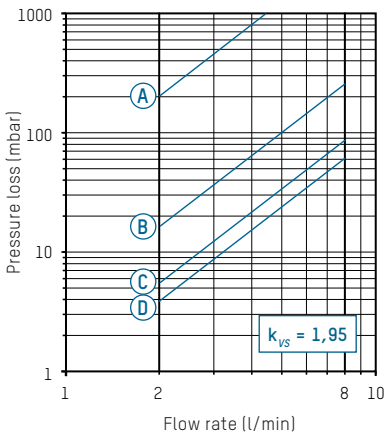
Order no.	DN	A	B¹	C	D	SW	Rp
223.2262.000	15	142	39	46	79	34	½"
223.2361.000	20	129	39	46	79	34	¾"
223.2360.000	20	129	39	46	79	34	¾"
223.2362.000	20	129	39	46	79	34	¾"
223.2460.000	25	152	47	58	82	41	1"
223.2461.000	25	152	47	58	82	41	1"
223.2561.000	32	161	56	65	84	49	1 ¼"
223.2661.000	40	173	64	79	90	59	1 ½"
223.2861.000	50	197	76	91	97	70	2"

TacoSetter Bypass 100 | Balancing valve with male thread

Order no.	DN	A	B²	C	D	G
223.2272.000	20	129	12	46	79	1"
223.2370.000	20	129	12	46	79	1"
223.2372.000	20	129	12	46	79	1"
223.2470.000	25	152	15	58	82	1 ¼"
223.2471.000	25	152	15	58	82	1 ¼"
223.2571.000	32	161	15	65	84	1 ½"

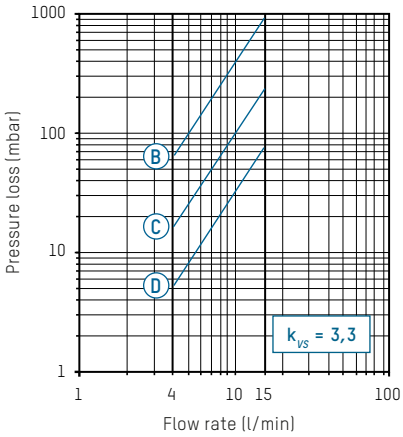
PRESSURE LOSS DIAGRAMS

223.2262.000 (DN 15 | ½" | 2...8 l/min)
223.2361.000 (DN 20 | ¾" | 2...8 l/min)
223.2272.000 (DN 20 | 1" | 2...8 l/min)



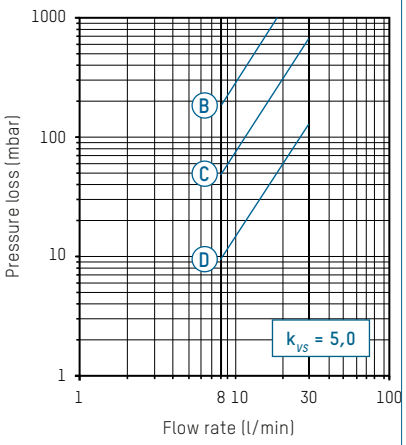
A – D Valve position

223.2360.000 (DN 20 | ¾" | 4...15 l/min)
223.2370.000 (DN 20 | 1" | 4...15 l/min)



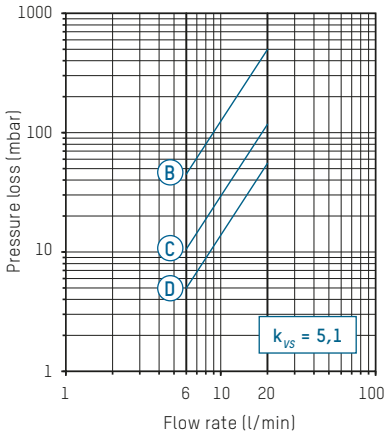
B – D Valve position

223.2362.000 (DN 20 | ¾" | 8...30 l/min)
223.2372.000 (DN 20 | 1" | 8...30 l/min)



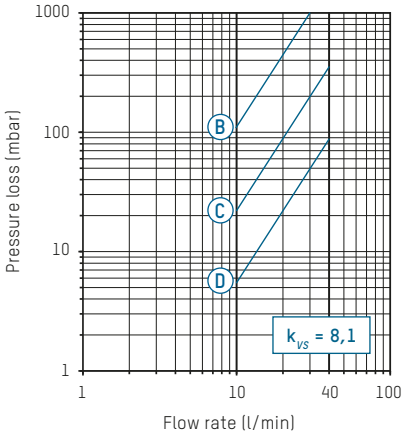
B – D Valve position

223.2460.000 (DN 25 | 1" | 6...20 l/min)
223.2470.000 (DN 25 | 1¼" | 6...20 l/min)



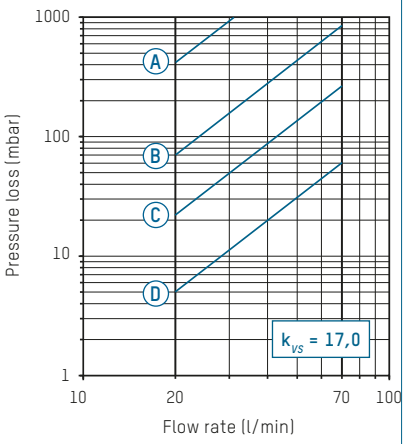
B – D Valve position

223.2461.000 (DN 25 | 1" | 10...40 l/min)
223.2471.000 (DN 25 | 1¼" | 10...40 l/min)



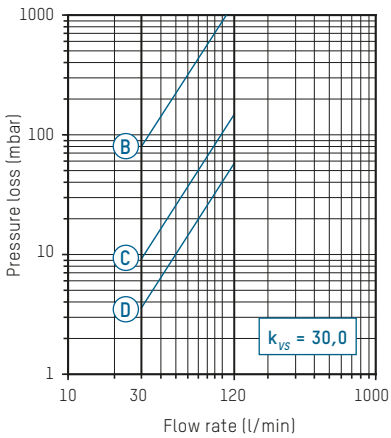
B – D Valve position

223.2561.000 (DN 32 | 1¼" | 20...70 l/min)
223.2571.000 (DN 32 | 1½" | 20...70 l/min)



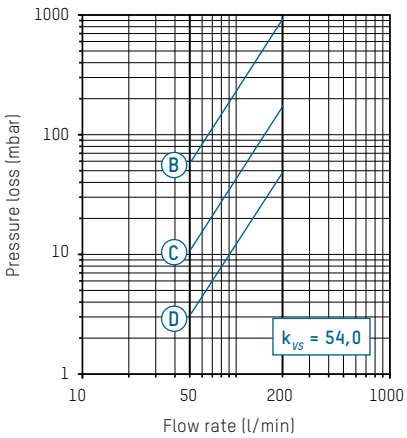
A – D Valve position

223.2661.000 (DN 40 | 1½" | 30...120 l/min)



B – D Valve position

223.2861.000 (DN 50 | 2" | 50...200 l/min)



B – D Valve position

ACCESSORIES

INSULATION BOX

EPP, T_0 -30 – 130 °C, in accordance with EnEV guideline

Order no.	Fits to
296.2321.004	DN 15 + DN 20
296.2322.004	DN 25
296.2323.004	DN 32
296.2324.004	DN 40
296.2325.004	DN 50

SYSTEM SCREW CONNECTION FITS TO TACOSETTER BYPASS

Screw connection with male thread R (conical) as per DIN 2999

Order no.	G × R	Version for	Fits to
210.6630.000	¾" × ½"	Threaded pipe Rp ¾"	DN 15
210.6631.000	1" × ½"	Threaded pipe Rp ¾"	DN 15
210.6632.000	1" × ¾"	Threaded pipe Rp ¾"	DN 20
210.6633.000	1¼" × 1"	Threaded pipe Rp 1"	DN 25

Screw connection with solder connection

Order no.	G x mm	Version for	Fits to
210.5331.019	1" x 18	Copper pipe ø 18 mm	DN 15 (Male)
210.5332.019	1" x 22	Copper pipe ø 22 mm	DN 20 (Male)
210.5334.003	1¼" x 28	Copper pipe ø 28 mm	DN 25 (Male)

SPARE PARTS

SIGHT GLASS (COMPLETE) AND SEAL

Order no.	Range	Fits to
298.2333.020	2 – 8 (l/min)	223.2262.000 / 223.2272.000
298.2334.020	4 – 15 (l/min)	223.2360.000 / 223.2370.000
298.2335.020	8 – 30 (l/min)	223.2362.000 / 223.2372.000
298.2342.020	6 – 20 (l/min)	223.2460.000 / 223.2470.000
298.2343.020	10 – 40 (l/min)	223.2461.000 / 223.2471.000
298.2352.020	20 – 70 (l/min)	223.2561.000 / 223.2571.000
298.2362.020	30 – 120 (l/min)	223.2661.000
298.2382.020	50 – 200 (l/min)	223.2861.000

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOSETTER BYPASS FLANGE

BALANCING VALVE

ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Variable installation position, maintenance-free
- Flow control with setpoint adjuster
- Regulating valve with isolating facility (rest leakage possible)
- Minimal pressure loss

Direct reading and balancing valve with visual flow indication.

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers or in a subsystem. TacoSetter Bypass Flange balancing valves offer an easy and accurate method of adjusting the flow rates for heating-, ventilation-, air conditioning- and cooling systems.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.
With TacoSetter Bypass Flange balancing valves, any qualified fitter can set the appropriate flow rate using the unique flow measurement device, avoiding investments in training and costly measuring devices.

INSTALLATION

To avoid turbulence and obtain maximum accuracy of the required flow it is necessary to install, on the inlet side of the valve, a section of straight pipe, the same diameter and length as the valve body.
The valve may be installed in any position, care should be taken in order to ensure that both the measuring cylinder and adjustment screw are not obstructed and that the arrow is pointing in the direction of the flow.

OPERATION

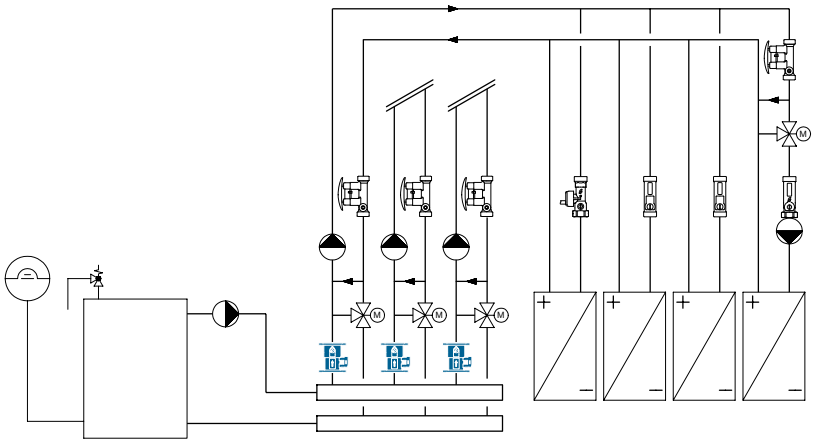
Measurement of the flow rate through the valve can be set by turning the adjustment screw until the required flow rate is read on the front edge of the float, which is situated within the measuring cylinder.
The two check valves must be in the open position but can be closed after commissioning without affecting the set position.

BUILDING CATEGORIES

For pipe installations in heating water and cooling areas:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM / BASIC DIAGRAM



TACOSETTER BYPASS FLANGE | BALANCING VALVE

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

Generally

- Operating temperature $T_{0\,max}$: 100 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Measuring accuracy: ±5% of nominal flow
- k_{VS}-value and measurement range see «Type program»

Material

- Valve body: grey, cast iron
- Valve housing materials: brass
- Sight glass: heat- and impact resistant plastic
- Seals: EPDM

Fluids

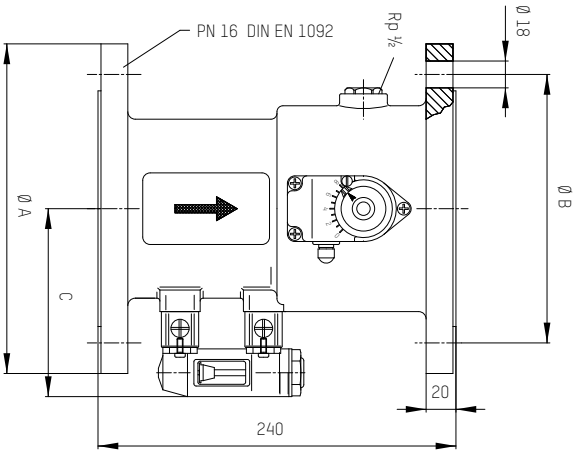
- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Water and proprietary additives used against corrosion and freezing up to 50%

TYPE PROGRAM

TacoSetter Bypass Flange | Balancing valve

Order no.	DN	Measuring range	Weight	k_{VS} (m³/h)
223.2151.000	65	60 – 325 (l/min)	13,9 kg	85,0
223.2251.000	80	75 – 450 (l/min)	16,5 kg	166,0
223.2351.000	100	100 – 650 (l/min)	19,7 kg	208,0

DIMENSIONAL DRAWING



MEASUREMENT TABLE

TacoSetter Bypass Flange | Balancing valve

Order no.	DN	A	B	C	ø 18
223.2151.000	65	185	145	110	4 holes
223.2251.000	80	200	160	118	8 holes
223.2351.000	100	220	180	128	8 holes

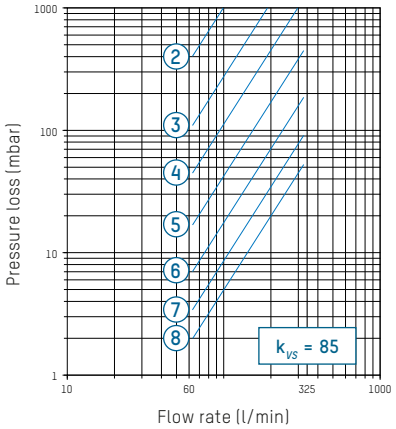
SPARE PARTS

SIGHT GLASS (COMPLETE) AND SEAL

Order no.	Range	Fits to
298.2321.000	60 – 325 (l/min)	223.2151.000
298.2322.000	75 – 450 (l/min)	223.2251.000
298.2323.000	100 – 650 (l/min)	223.2351.000

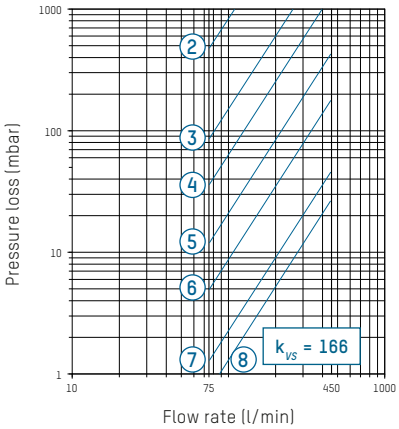
PRESSURE LOSS DIAGRAM

223.2151.000 (DN 65 | 60...325 l/min)



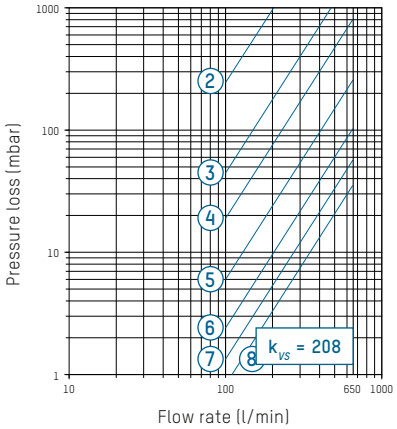
2 – 8 Valve position

223.2251.000 (DN 80 | 75...450 l/min)



2 – 8 Valve position

223.2351.000 (DN 100 | 100...650 l/min)



2 – 8 Valve position

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOSETTER BYPASS SOLAR 130

BALANCING VALVE

ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Temperature-resistant up to 130 °C
- Variable installation position, maintenance-free
- Flow control with setpoint adjuster
- Regulating valve with isolating facility (rest leakage possible)
- Minimal pressure loss

Direct regulation, indication and isolation of flows in solar systems

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers or in a subsystem. TacoSetter Bypass Solar 130 balancing valves offer an easy and accurate method of adjusting the flow rates for heating-, ventilation-, air conditioning- and cooling systems.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.

With TacoSetter Bypass Solar 130 balancing valves, any qualified fitter can set the appropriate flow rate using the unique flow measurement device, avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

The TacoSetter Bypass Solar 130 requires a straight section of pipe of the same length and diameter as the system. The valve can be installed in a horizontal, vertical or inclined position.
Care should be taken that the arrow is pointing in the direction of the flow.

OPERATION

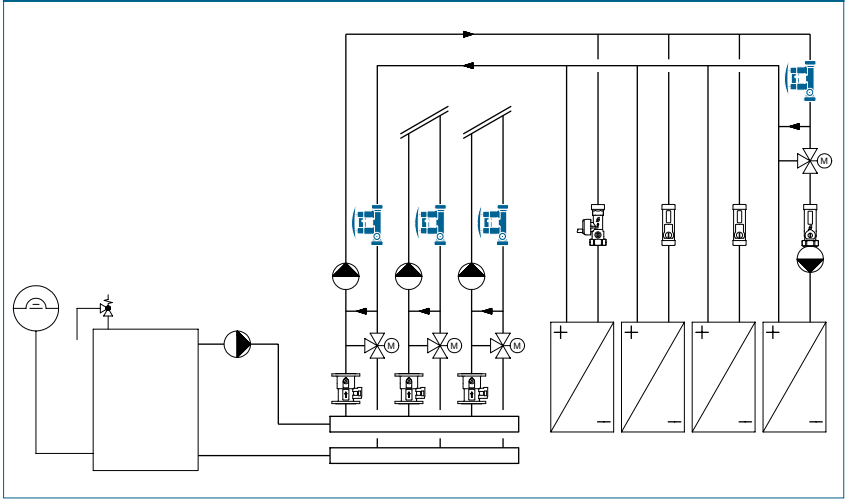
The flow measurement is based on the principle of a baffle float with return spring. The reading position is the bottom line of the baffle float. The measuring device is placed in a bypass to the main flow, isolated from system flow. By demand the bypass, with self locking valves, gets opened / closed by pressing / releasing the clamp. Reading the flow rate has no influence on the main flow rate.

BUILDING CATEGORIES

For pipe installations in drinking water, heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Max. temperature and pressure range: $T_{0\,max}$ and $P_{0\,max}$: See pressure-temperature curve
- Measuring accuracy:
  - Measuring range <25%: ±20% of the indicated value
  - Measuring range >25%: ±10% of the indicated value
- k_{VS} value and measurement range see "Type overview"
- Female thread to DIN 2999 / ISO 7 or male thread G (cylindrical) to ISO 228

Material

- Housing: brass
- Inside: stainless steel, brass, plastic
- Sight glass: plastic
- Seals: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Water and proprietary additives used against corrosion and freezing up to 50% (see document «Correction curves»)

ADDITIONAL MODELS

Balancing valves for other applications, see data sheets TacoSetter Bypass 100 and TacoSetter Bypass Solar 185.

TYPE OVERVIEW

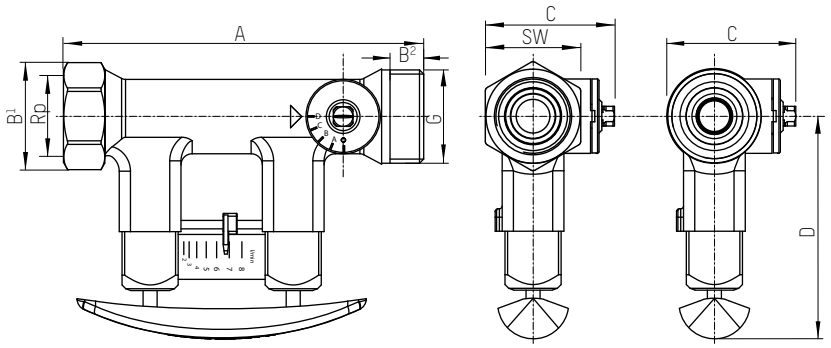
TacoSetter Bypass Solar 130 | Balancing valve with female thread

Order no.	DN	Rp × Rp	Measuring range	k_{VS} (m³/h)
223.2380.000	20	¾" × ¾"	2 – 12 (l/min)	2,2
223.2381.000	20	¾" × ¾"	8 – 20 (l/min)	5,0
223.2482.000	25	1" × 1"	10 – 40 (l/min)	8,1

TacoSetter Bypass Solar 130 | Balancing valve with male thread

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.2380.350	20	1" × 1"	2 – 12 (l/min)	2,2
223.2381.350	20	1" × 1"	8 – 20 (l/min)	5,0
223.2482.350	25	1 ¼" × 1 ¼"	10 – 40 (l/min)	8,1

DIMENSIONAL DRAWING



MEASUREMENT TABLE

TacoSetter Bypass Solar 130 | Balancing valve with female thread

Order no.	DN	A	B¹	C	D	SW	Rp
223.2380.000	20	129	39	46	79	34	¾"
223.2381.000	20	129	39	46	79	34	¾"
223.2482.000	25	152	47	58	82	41	1"

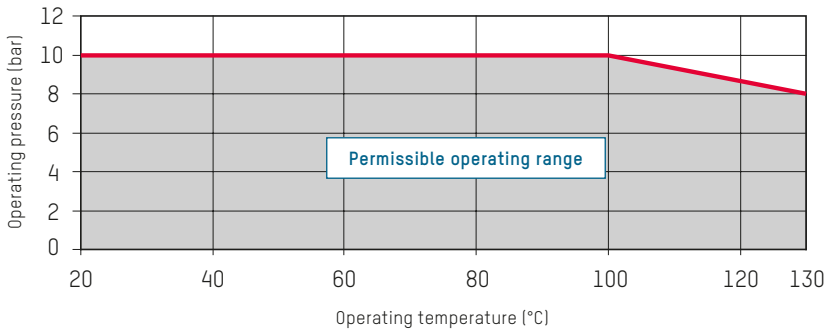
TacoSetter Bypass Solar 130 | Balancing valve with male thread

Order no.	DN	A	B²	C	D	G
223.2380.350	20	129	12	46	79	1"
223.2381.350	20	129	12	46	79	1"
223.2482.350	25	152	15	58	82	1 ¼"

GLYCOL CORRECTION CURVES

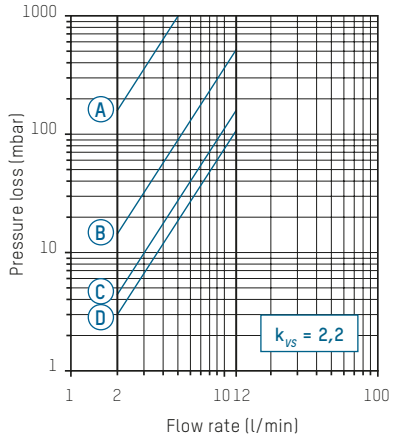
There is a separate diagram for TacoSetter up to DN25 and its flow ranges with nine correction curves for use of anti-frost and anti-corrosion agents.
Corrections are not required for larger dimensions as the deviation lies within the measuring tolerance.
See www.taconova.com

PRESSURE – TEMPERATURE CURVE



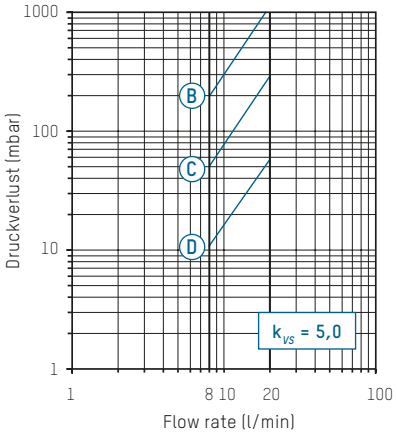
PRESSURE LOSS DIAGRAMS

223.2380.000 (DN 20 | ¾" | 2...12 l/min)
223.2380.350 (DN 20 | 1" | 2...12 l/min)



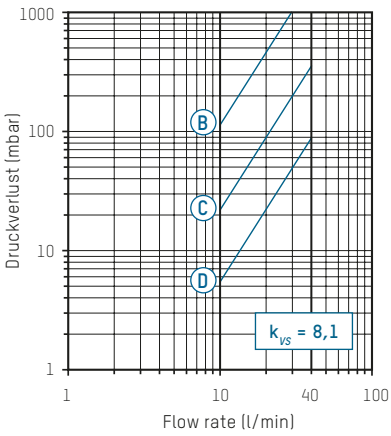
A – D Valve position

223.2381.000 (DN 20 | ¾" | 8...20 l/min)
223.2381.350 (DN 20 | 1" | 8...20 l/min)



B – D Valve position

223.2482.000 (DN 25 | 1" | 10...40 l/min)
223.2482.000 (DN 25 | 1¼" | 10...40 l/min)



B – D Valve position

ACCESSORIES

INSULATION BOX

EPP, T_0 -30 – 130 °C, in accordance with EnEV guideline

Order no.	Fits
296.2321.004	DN 20
296.2322.004	DN 25

SYSTEM SCREW CONNECTION FITS TO TACOSETTER BYPASS SOLAR 130

Screw connection with male thread R (conical) as per DIN 2999

Order no.	G x R	Version for	Fits to
210.6630.000	¾" x ½"	Inner thread Rp ½"	DN 15
210.6631.000	1" x ½"	Inner thread Rp ½"	DN 15
210.6632.000	1" x ¾"	Inner thread Rp ¾"	DN 20
210.6633.000	1¼" x 1"	Inner thread Rp 1"	DN 25

Screw connection with solder connection

Order no.	G x mm	Version for	Fits to
210.5331.019	1" x 18	Copper pipe ø 18 mm	DN 15 (Male)
210.5332.019	1" x 22	Copper pipe ø 22 mm	DN 20 (Male)
210.5334.003	1¼" x 28	Copper pipe ø 28 mm	DN 25 (Male)

SPARE PARTS

SIGHT GLASS (COMPLETE) AND SEALS

Order no.	Range	Fits to
298.2336.020	2 – 12 (l/min)	223.2380.000 / 223.2380.350
298.2337.020	8 – 20 (l/min)	223.2381.000 / 223.2381.350
298.2344.020	10 – 40 (l/min)	223.2482.000 / 223.2482.350

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOSETTER BYPASS SOLAR 185

BALANCING VALVE

ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Temperature-resistant up to 185 °C
- Variable installation position, maintenance-free
- Flow control with setpoint adjuster
- Regulating valve with isolating facility (rest leakage possible)
- Minimal pressure loss

Direct regulation, indication and isolation of flows in solar systems.

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers or in a subsystem. Balancing valves offer an easy and accurate method of adjusting the flow rates for heating-, ventilation-, air conditioning - and solar systems.
The Version TacoSetter Bypass Solar 185 is designed for higher operating temperatures.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.

With TacoSetter Bypass Solar 185 balancing valves, any qualified fitter can set the appropriate flow rate using the unique flow measurement device, avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

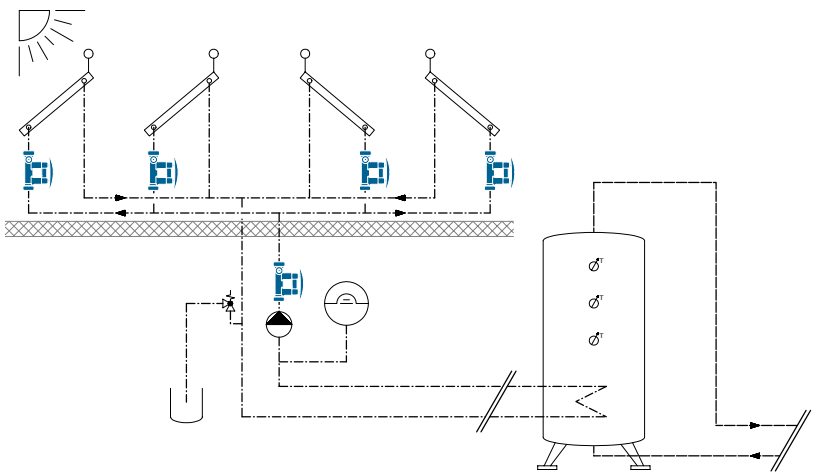
The TacoSetter Bypass Solar 185 requires a straight section of pipe of the same length and diameter as the system. The valve can be installed in a horizontal, vertical or inclined position. Care should be taken that the arrow is pointing in the direction of the flow.

In the case of the high-temperature type, the bypass unit is replaced by the sealing cap set after adjustment.

OPERATION

The flow measurement is based on the principle of a baffle float with return spring. The reading position is the bottom line of the baffle float. The measuring device is placed in a bypass to the main flow, isolated from system flow. By demand the bypass, with self locking valves, gets opened / closed by pressing / releasing the clamp. Reading the flow rate has no influence on the main flow rate.

SYSTEM/BASIC DIAGRAM



BUILDING CATEGORIES

For pipe installations in heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

TACOSETTER BYPASS SOLAR 185 | BALANCING VALVE

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Admissible operating parameters $T_{0\,max}$ und $P_{0\,max}$: see pressure temperature curve
- Measuring accuracy:
  - Measurement range <25%: ±20% of the indicated value
  - Measurement range >25%: ±10% of the indicated value
- k_{VS} value and measurement range: see "Type Program"
- Female thread to DIN 2999 / ISO 7 or male thread G (cylindrical) to ISO 228

Material

- Housing: brass
- Inside: stainless steel, brass, plastic
- Sight glass: heat- and impact-resistant plastic
- Sealing: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Water and proprietary additives used against corrosion and freezing up to 50% (see document «Correction curves»)

ADDITIONAL MODELS

Balancing valves for solar applications, see TacoSetter Bypass 100 and TacoSetter Bypass Solar 130 data sheets.

TYPE OVERVIEW

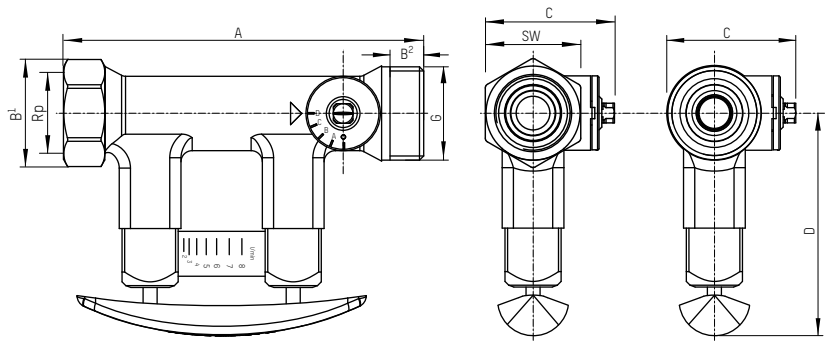
TacoSetter Bypass Solar 185 | Balancing valve with female thread (incl. sealing cap set)

Order no.	DN	Rp × Rp	Measuring range	k_{VS} (m³/h)
223.2382.000	20	¾" × ¾"	2 – 12 (l/min)	2,2
223.2383.000	20	¾" × ¾"	8 – 30 (l/min)	5,0
223.2480.000	25	1" × 1"	10 – 40 (l/min)	8,1
223.2580.000	32	1¼" × 1¼"	20 – 70 (l/min)	17,0

TacoSetter Bypass Solar 185 | Balancing valve with male thread (incl. sealing cap set)

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.2382.385	20	1" × 1"	2 – 12 (l/min)	2,2
223.2383.385	20	1" × 1"	8 – 30 (l/min)	5,0

DIMENSIONAL DRAWING



MEASUREMENT TABLE

TacoSetter Bypass Solar 185 | Balancing valve with female thread

Order no.	DN	A	B¹	C	D	SW	Rp
223.2382.000	20	129	39	46	79	34	¾"
223.2383.000	20	129	39	46	79	34	¾"
223.2480.000	25	152	47	58	82	41	1"
223.2580.000	32	161	56	65	84	49	1"

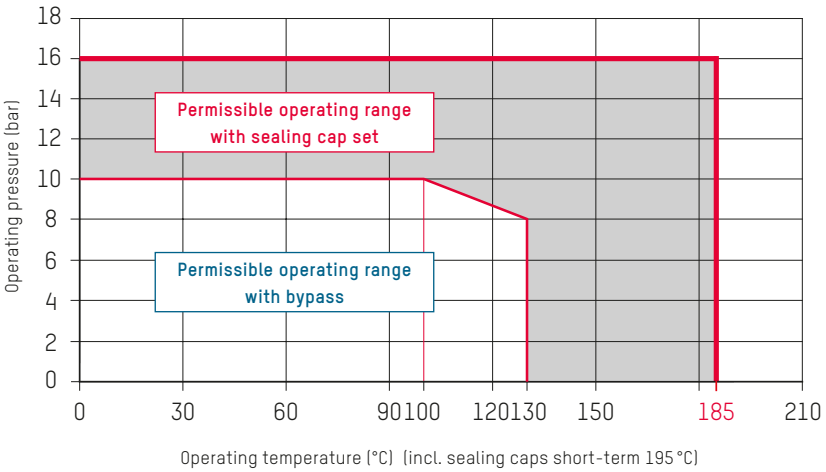
TacoSetter Bypass Solar 185 | Balancing valve with male thread

Order no.	DN	A	B²	C	D	G
223.2382.385	20	129	12	46	79	1"
223.2383.385	20	129	12	46	79	1"

GLYCOL CORRECTION CURVES

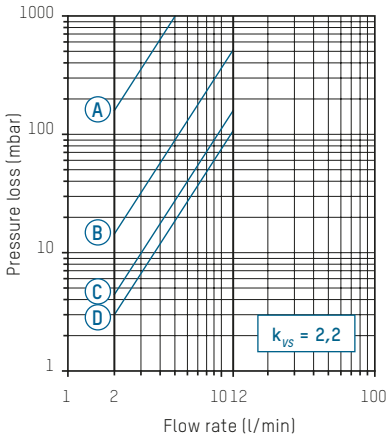
There is a separate diagram for TacoSetter up to DN25 and its flow ranges with nine correction curves for use of anti-frost and anti-corrosion agents.
Corrections are not required for larger dimensions as the deviation lies within the measuring tolerance.
See www.taconova.com

PRESSURE – TEMPERATURE-CHARACTERISTIC



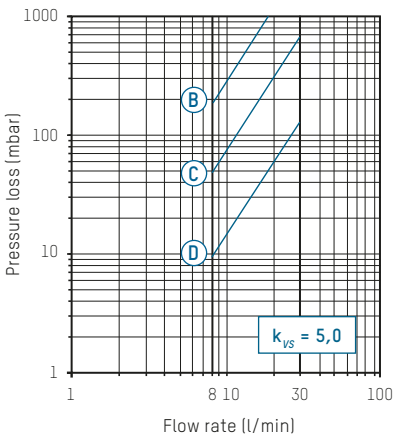
PRESSURE LOSS DIAGRAMS

223.2382.XXX (DN 20 | ¾" | 2...12 l/min)



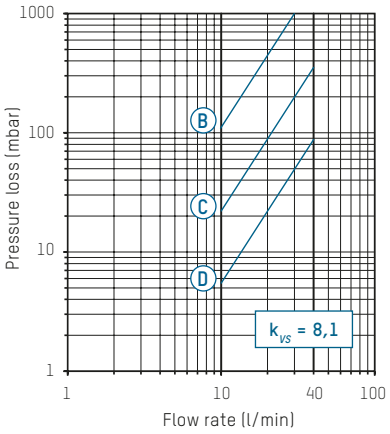
A – D Valve position

223.2383.XXX (DN 20 | ¾" | 8...30 l/min)



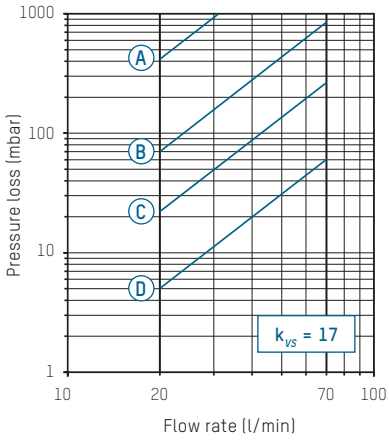
B – D Valve position

223.2480.XXX (DN 25 | 1" | 10...40 l/min)



B – D Valve position

223.2580.000 (DN 32 | 1¼" | 20...70 l/min)



A – D Valve position

ACCESSORIES

SYSTEM SCREW CONNECTION FITS TO TACOSETTER BYPASS

Screw connection with male thread R (conical) as per DIN 2999

Order no.	G x R	Version for	Fits to
210.6630.000	¾" x ½"	Threaded pipe Rp ½"	DN 15
210.6631.000	1" x ½"	Threaded pipe Rp ½"	DN 15
210.6632.000	1" x ¾"	Threaded pipe Rp ¾"	DN 20
210.6633.000	1¼" x 1"	Threaded pipe Rp 1"	DN 25

Screw connection with solder connection

Order no.	G x mm	Version for	Fits to
210.5331.019	1" x 18	Copper pipe ø 18 mm	DN 15 AG
210.5332.019	1" x 22	Copper pipe ø 22 mm	DN 20 AG
210.5334.003	1¼" x 28	Copper pipe ø 28 mm	DN 25 AG

SPARE PARTS

SIGHT GLASS (COMPLETE) AND SEAL

Order no.	Range	Fits to
298.2336.020	2 – 12 (l/min)	223.2380.000 / 223.2380.350
298.2337.020	8 – 20 (l/min)	223.2381.000 / 223.2381.350
298.2338.020	8 – 30 (l/min)	223.2383.000 / 223.2383.385
298.2344.020	10 – 40 (l/min)	223.2482.000 / 223.2482.350

SEALING CAP SET FOR TACOSETTER BYPASS 130/185

Order no.	Fits to
296.2340.003	all versions

Included with delivery for Solar 185 model

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOCONTROL FLOWMETER

FLOW INDICATOR

ADVANTAGES

- The flow rate is displayed directly in l/min
- Accurate and quick indication of flow rates without additional measuring devices
- Low pressure loss
- Eurocone bore hole
- Can be installed in any position
- Compact design

Direct indications of flows in hydraulic systems.

DESCRIPTION

The FlowMeter offers an accurate and convenient indication of flow rates in heating -, ventilation -, air conditioning- and cooling systems.
Due to the compact design of the FlowMeter, the installation of a flow rate indicator is possible, even at most limited space.
The particular connection is suitable for a direct and economic fit to components with eurocone adaptors.
Installed on heating manifolds or on a valve, the FlowMeter forms an economical extension of the function with big benefits.
For example, each throttle valve in addition with a FlowMeter turns into a multi function valve for the balancing and the indication of flow rates.
With the FlowMeter, any qualified fitter can read the appropriate flow rate easily on site, without any additional measuring device or special training

INSTALLATION POSITION

The valve can be installed in a horizontal, vertical or inclined position.
Care should be taken in order to ensure that the arrow is pointing in the direction of the flow
Noise can be avoided by installing a short calming section in front of the flow meter.

OPERATION

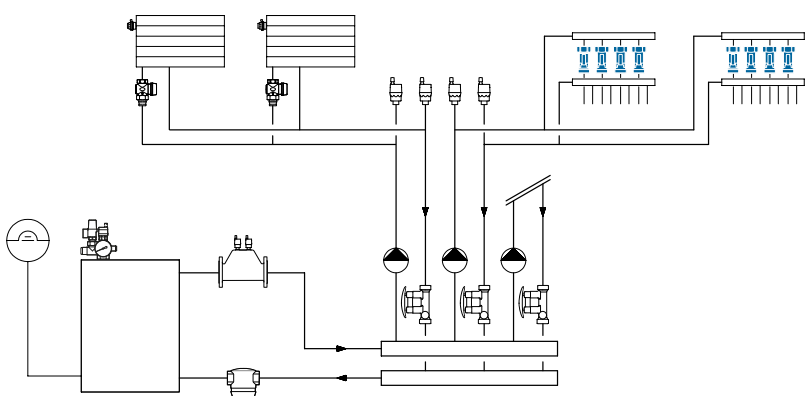
The flow measurement is based on the principle of a baffle float with countersprings.
The flow rate is displayed on a calibrated scale by an integrated flowmeter.
The reading position is the bottom line of the baffle float.

BUILDING CATEGORIES

For pipe installations in heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 100 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Measuring accuracy: ±10 % of the indicated value
- k_{VS} value and measurement range see «Type overview»
- Thread G (cylindrical) to ISO 228
- With 18 mm hole for Taconova and all Eurokonus screw

Material

- Housing: brass
- Inside: stainless steel, brass, plastic
- Sight glass: heat- and impact resistant plastic
- Seals: EPDM

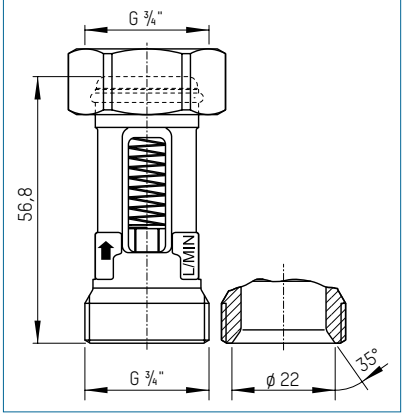
Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)
- Water and proprietary additives used against corrosion and freezing up to 50%

APPROVALS / CERTIFICATES

- Housing parts: KTW, W270, ACS

DIMENSIONAL DRAWING



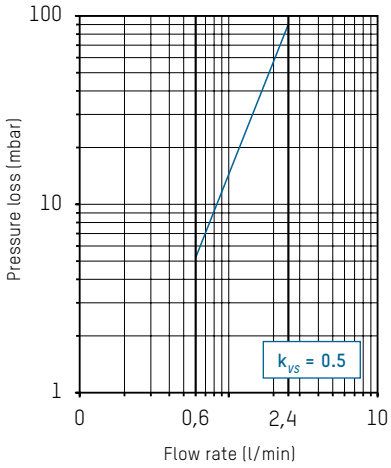
TYPE OVERVIEW

TacoControl FlowMeter | Flow meter with direct indication

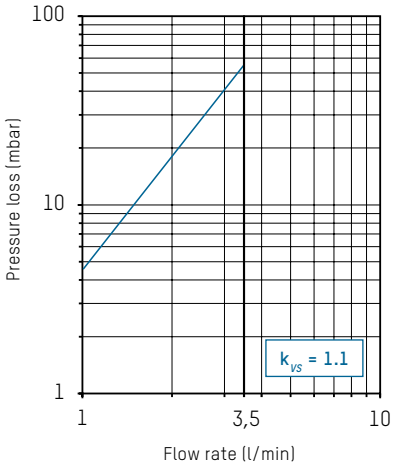
Order no.	DN	G×G	Measuring range	k_{VS} (m³/h)
223.4213.000	15	¾"×¾"	0,6 – 2,4 (l/min)	0.5
223.4214.000	15	¾"×¾"	1,0 – 3,5 (l/min)	1.1
223.4218.000	15	¾"×¾"	2,0 – 8,0 (l/min)	1.6
223.4219.000	15	¾"×¾"	3,0 – 12,0 (l/min)	1.65

PRESSURE LOSS DIAGRAMS

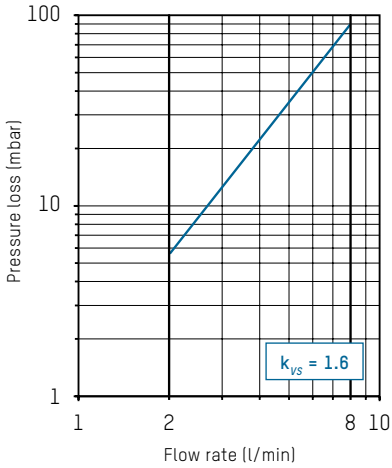
223.4213.000 (DN 15 | ¾" | 0,6...2,4 l/min)



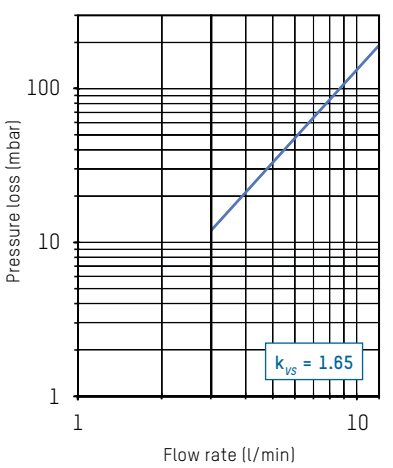
223.4214.000 (DN 15 | ¾" | 1,0...3,5 l/min)



223.4218.000 (DN 15 | ¾" | 2,0...8,0 l/min)



223.4219.000 (DN 15 | ¾" | 3,0...12,0 l/min)



CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

taconova

TACOSETTER INLINE 130

BALANCING VALVE



ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Temperature-resistant up to 130 °C
- Variable installation position, maintenance-free
- Regulating valve with isolating facility (rest leakage possible)

Direct regulation, indication and isolation of flows in systems.

DESCRIPTION

Direct hydraulic balancing and control of flows: TacoSetter Inline 130 balancing valves offer an easy and accurate method of adjusting the flow rates through heating, geothermal, ventilation, air conditioning and cooling systems.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.
With TacoSetter Inline 130 balancing valves, any qualified fitter can set the appropriate flow rate on the premises in question, thus avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

The valve can be installed in a horizontal, vertical or inclined position. Care should be taken to ensure that the arrow is pointing in the direction of the flow.
The ¾" version with union nut and Euro cone can be connected directly to an underfloor heating circuit. The version with 1" union nut directly to a circulation pump.

OPERATION

The flow measurement is based on the principle of a baffle float with return spring. The flowmeter is built into the housing.

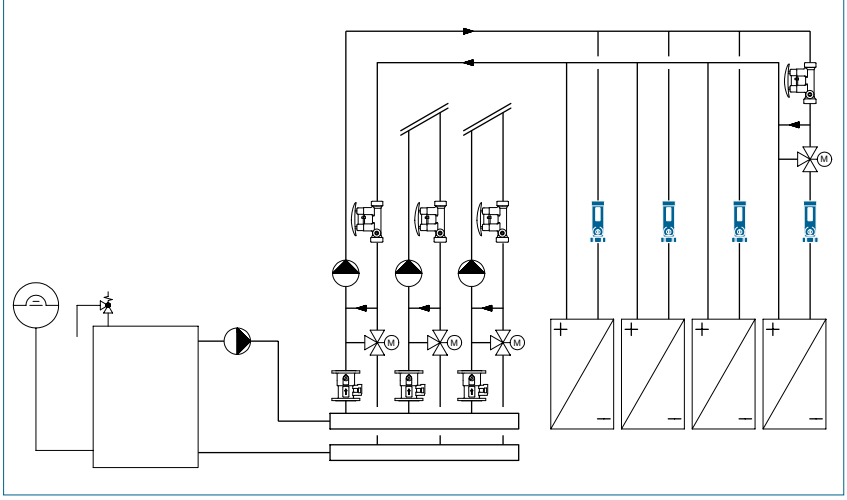
The balancing can be carried out with a screwdriver at the adjusting screw. The reading position is the bottom line of the baffle float.

BUILDING CATEGORIES

For pipe installations in heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



NOTE

Important when using glycol

The system medium must be allowed to flow through the measuring body for at least 2 hours prior to reading the flow rate when performing the initial start-up or refilling the system

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 130 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Measuring accuracy: ±10% of the indicated value
- k_{VS} value and measurement range see «Type overview»
- Connections:
  - ¾" euro cone
  - 1", 1¼", 1½" flat-sealing connector
- Thread G (cylindrical) acc. to ISO 228

Material

- Housing: see «Type overview»
- Inside: stainless steel, brass, plastic
- Sight glass: borosilicate
- Seals: EPDM
- Flat-sealing connections

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195-1)
- Potable water (DIN 1988-200)
- Water and proprietary additives used against corrosion and freezing up to 50%

APPROVALS / CERTIFICATES

- KTW, W270

TYPE OVERVIEW

TacoSetter Inline 130 | Balancing valve made of dezincification-resistant (DZR) brass with male thread and euro cone (**A**)

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.7234.104	15	¾" × ¾"	1,0 – 3,5 (l/min)	1,35
223.7238.104	15	¾" × ¾"	2,0 – 8,0 (l/min)	1,8

TacoSetter Inline 130 | Balancing valve made of brass with lock nut and euro cone (**B**)

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.7318.000	20	¾" × ¾"	2,0 – 8,0 (l/min)	1,6
223.7310.000	20	¾" × ¾"	4,0 – 15,0 (l/min)	5,95
223.7312.000	20	¾" × ¾"	10,0 – 30,0 (l/min)	6,6

TacoSetter Inline 130 | Balancing valve made of brass with cutting ring connection Ø 22 (**C**) (Also suitable for flat-sealing connection)

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.7370.000	20	1" × 1"	4,0 – 15,0 (l/min)	5,95
223.7378.000	20	1" × 1"	10,0 – 45,0 (l/min)	6,85

TacoSetter Inline 130 | Balancing valve made of brass with male thread (**D**)

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.7427.000	25	1" × 1"	20,0 – 90,0 (l/min)	17,0
223.7457.000	25	1¼" × 1¼"	20,0 – 90,0 (l/min)	17,0
223.7467.000	25	1½" × 1½"	20,0 – 90,0 (l/min)	17,0

TacoSetter Inline 130 | Balancing valve made of brass with lock nut and glycol scale (**E**)

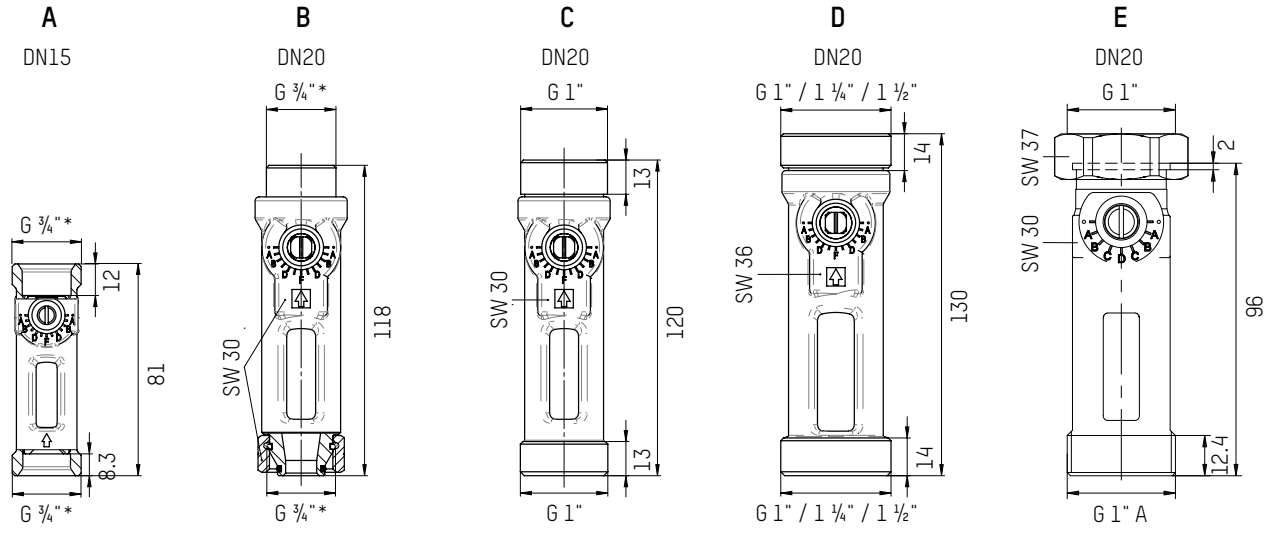
Order no.	DN	G × G	Measuring range *	k_{VS} (m³/h)
223.7556.334	20	1" × 1"	1,5 – 6,0 (l/min)	1,8
223.7566.334	20	1" × 1"	4,0 – 16,0 (l/min)	4,76
223.7576.334	20	1" × 1"	8,0 – 28,0 (l/min)	5,44

* Reading scale for water-glycol mix with υ = 2,3 mm²/s

TacoSetter Inline 130 | Balancing valve made of brass with lock nut and water scale (**E**)

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.7586.000	20	1" × 1"	10,0 – 40,0 (l/min)	5,44

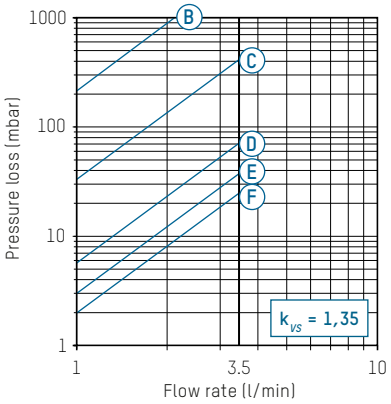
DIMENSIONAL DRAWING



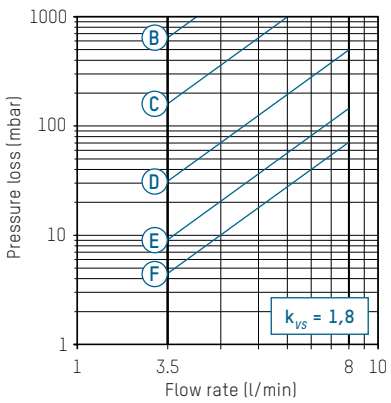
* Euro cone

PRESSURE LOSS DIAGRAMS

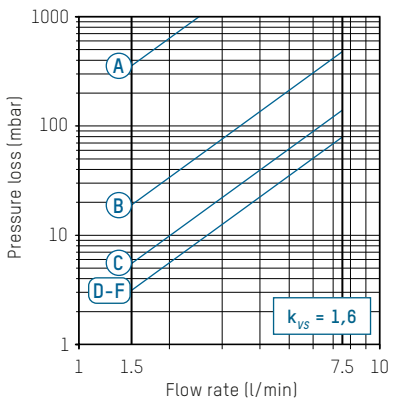
223.7234.104 (DN 15 | ¾" | 1.0...3.5 l/min)



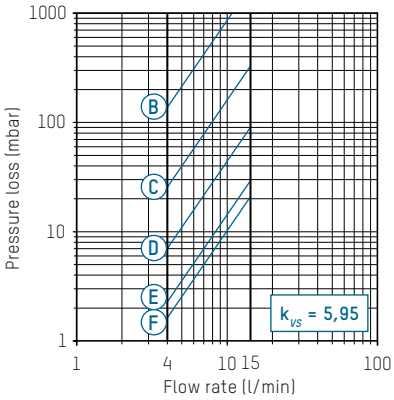
223.7238.104 (DN 15 | ¾" | 2...8 l/min)



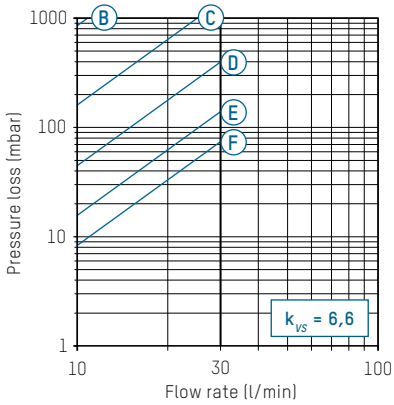
223.7318.000 (DN 20 | ¾" | 1.5...7.5 l/min)



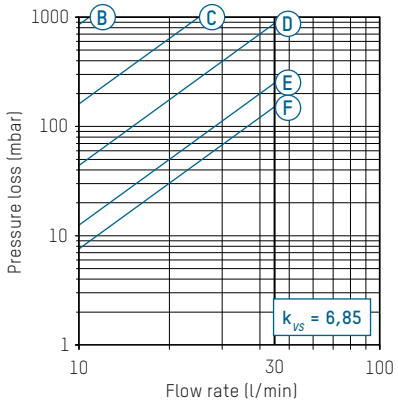
223.7310.000 (DN 20 | ¾" | 4.0...15.0 l/min)
223.7370.000 (DN 20 | 1" | 4.0...15.0 l/min)



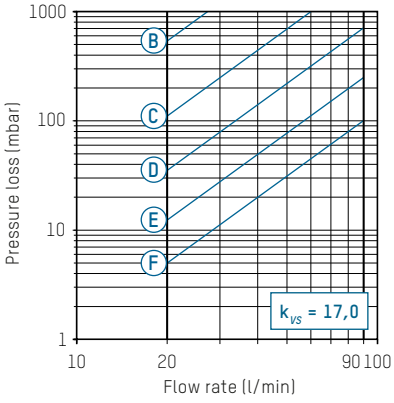
223.7312.000 (DN 20 | ¾" | 10...30 l/min)



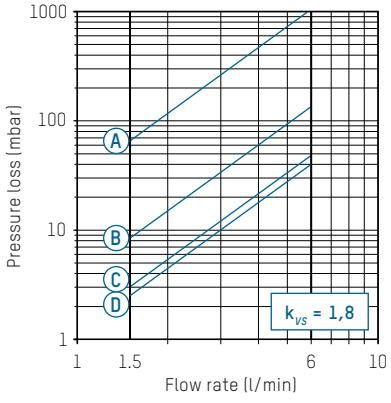
223.7378.000 (DN 20 | 1" | 10...45 l/min)



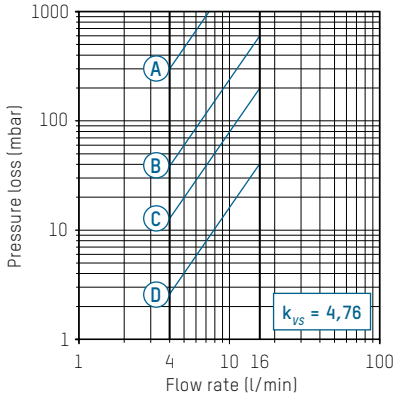
223.7427.000 (DN25 | 1" | 20.0...90.0 l/min)
223.7457.000 (DN25 | 1¼" | 20.0...90.0 l/min)
223.7467.000 (DN25 | 1½" | 20.0...90.0 l/min)



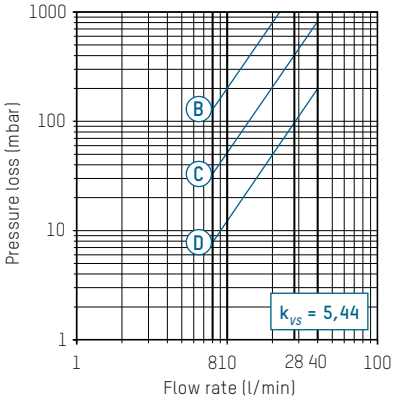
223.7556.334 (DN 20 | 1" | 1,5...6 l/min)



223.7566.334 (DN 20 | 1" | 4...16 l/min)



223.7576.334 (DN 20 | 1" | 8...28 l/min)
223.7586.000 (DN 20 | 1" | 10...40 l/min)



Ⓐ – Ⓕ Valve position

ACCESSORIES

CONNECTORS / ACCESSORIES

Order no.	Description
296.2334.000	Solar seal suitable 1" (glycol-resistant)

SYSTEM SCREW CONNECTION FITS TO TACOSETTER INLINE

Comprising a cap nut, clamp ring and support sleeve

Order no.	G × mm	Version for	Fits to
210.3325.000	¾" × 15	Copper pipe 15/1 Eurocone	DN 15

Screw connections with cap nut and insert

Order no.	G × R	Version for	Fits to
210.6221.000	¾" × ½"	½" thread, conically sealing, dezincification-resistant	DN 15
210.6632.000	1" × ¾"	¾" thread, flat-sealing	DN 20
210.6632.121	1" × ¾"	¾" thread, flat-sealing (glycol-resistant seal)	DN 20
210.6633.000	1¼" × 1"	1" thread, flat-sealing	DN 20
210.3435.003	1" × d22	Cutting ring d22	DN 20
210.3434.003	1" × d18	Cutting ring d18	DN 20
210.6222.000	¾" × ½"	½" thread, self-sealing	DN 15

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TACOSETTER RONDO

BALANCING VALVE

ADVANTAGES

- Accurate and quick balancing without diagrams, tables or measuring devices
- The flow rate is displayed directly in l/min
- Variable installation position, maintenance-free, compact
- Regulating valve with isolating facility (rest leakage possible)
- Self-sealing screw connector
- Valve adjustment tool integrated in protective cover

Direct regulation and indication of flows to consumers.

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers. Balancing valves offer a quick, easy and accurate method of adjusting the flow rates through heating, ventilating and air conditioning systems.
Correct balancing of hydraulic circuits allows for lower flow temperatures, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.
With TacoSetter Rondo balancing valves, any qualified fitter can set the appropriate water distribution, thus avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

The balancing valve requires a straight section of pipe of the same length and diameter TacoSetter Rondo.
The valve can be installed in a horizontal, vertical or inclined position. Care should be taken in order to ensure that the arrow is pointing in the direction of the flow.

OPERATION

The flow measurement is based on the displacement principle of a baffle disk, which is inserted in a measuring tube. The movement of the baffle disc is transformed to the sight glass by a mechanical device. The scale printed on the sight glass allows the flow rate to be read with ease.

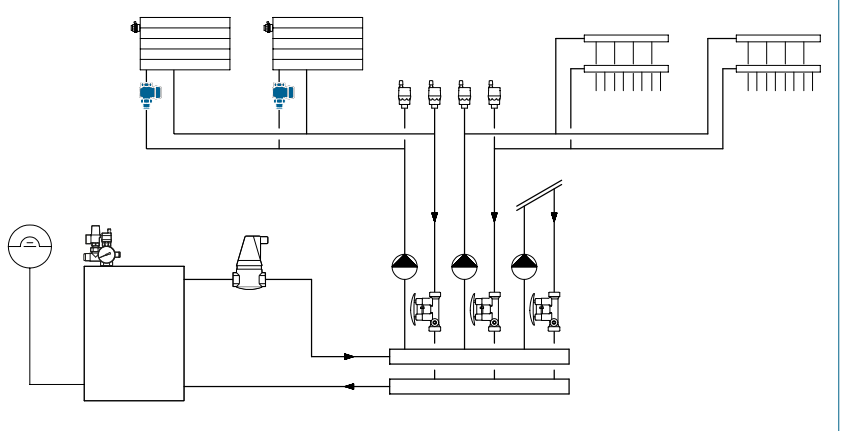
Turning the sight glass changes the opening profile of the valve and allows the desired flow rate to be set.

BUILDING CATEGORIES

For pipe installations in heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Admissible operating parameters $T_{0\,max}$ und $P_{0\,max}$: see pressure temperature curve
- Measuring accuracy:
  - <2 l/min: = ±20% of the indicated value
  - >2 l/min: = ±10% of the indicated value
- Female thread to DIN 2999 / ISO 7 or male thread G (cylindrical) to ISO 228

Material

- Housing: brass
- Inside: plastic
- Sight glass: heat- and impact-resistant plastic
- Sealing: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195-1)
- Water and proprietary additives used against corrosion and freezing up to 50%

TYPE OVERVIEW

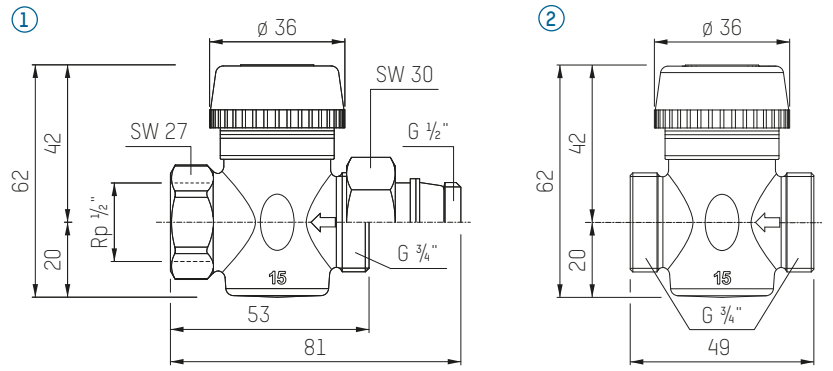
TacoSetter Rondo | Balancing valve with screw connector

Order no.	DN	Thread	Measuring range	k_{VS} (m³/h)
223.3206.000 ①	15	Rp ½" × G ½"	0 – 8 (l/min)	1,0

TacoSetter Rondo | Balancing valve without screw connector

Order no.	DN	Thread	Measuring range	k_{VS} (m³/h)
223.3206.325 ①	15	Rp ½" × G ¾"	0 – 8 (l/min)	1,0
223.3206.341 ②	15	G ¾" × G ¾"	0 – 8 (l/min)	1,0

DIMENSIONAL DRAWING



Protective cover fitted

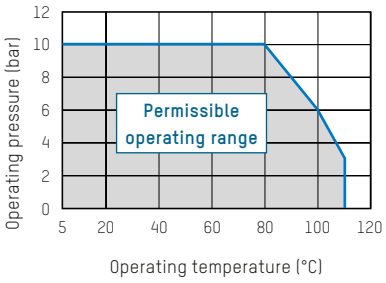
ACCESSORIES

SCREW CONNECTIONS FEMALE THREAD RP

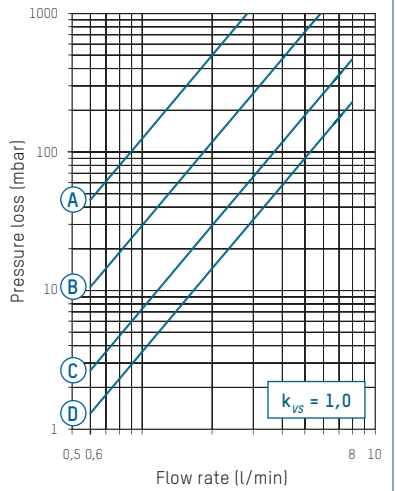
Comprises a cap nut and insert

Order no.	DN	Thread	Version for
210.6221.000	15	G ¾" × R ½"	½" thread, conically sealing
210.6222.000	15	G ¾" × R ½"	½" thread, self-sealing

PRESSURE - TEMPERATURE CURVE



PRESSURE LOSS DIAGRAM



A – D Valve position

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Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOSETTER TRONIC

BALANCING VALVE

ADVANTAGES

- Precise and fast electronic measurement of flow volume and temperature
- High measurement precision
- Measurement range 0...100 °C
- Temperature measurement directly in the medium
- Direct connection to circulating pump, variable installation position
- Glycol resistant
- Regulating valve with isolating facility (rest leakage possible)

W270

Electronic flow volume and temperature measurement

DESCRIPTION

Flow volumes and temperatures can be very easily measured and simultaneously evaluated with the TacoSetter Tronic.
The features of the TacoSetter Tronic include its different options for use in drinking water, solar and heating systems.
The electrical signals for flow and temperature can be used for the control and monitoring of pumps and valves, or for heat quantity metering. A controller, from Sorel for example, can be used to display the measurement data.
The control valve can limit or interrupt the flow.
Hydraulically correct balanced systems ensure optimum energy distribution and in this way maintain economic operation as required by the Energy Saving Regulations.

INSTALLATION POSITION

The valve can be installed in a horizontal, tilted or vertical position.
Only the direction of the arrow indicating the flow of the medium needs to be noted.
For horizontal installation, it is recommendable to position the sensor on the upper side in order to prevent deposits occurring.

OPERATION

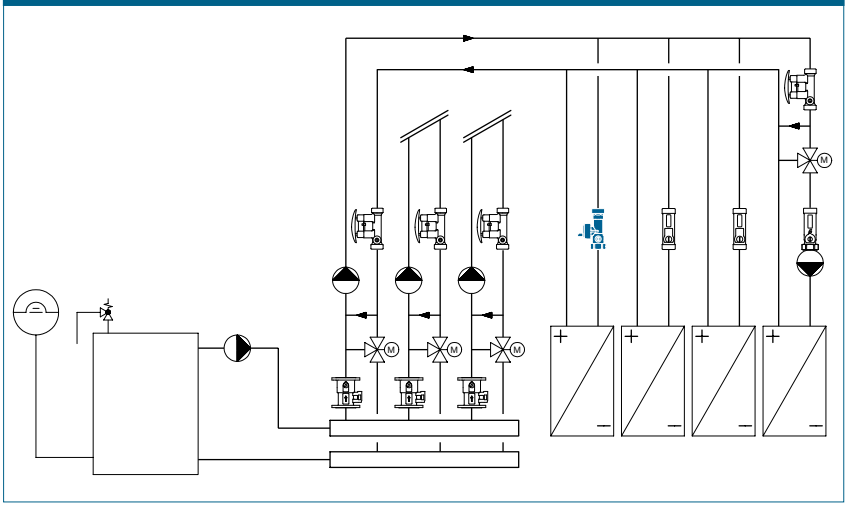
The TacoSetter Tronic was developed for the combined measurement of flow volume and temperature. The flow measurement is based on the vortex principle.
The vortex shredding on the body in the flow is proportional to the flow rate.
The generated vortices are detected by a piezoelectric sensor and evaluated by the integrated electronics.

BUILDING CATEGORIES

For pipe installations in drinking water, heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 120 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Measurement temperature range: 0...100 °C
- Measurement precision and range:
  - 1–12 l/min: <3 % of final value
  - 2–40 l/min: 1,5 % of final value
- Viscosity of medium see «Type overview»
- Thread G (cylindrical) as per ISO 228
- 1" flat-sealed connections
- Protective class: IP44a

Material

- Housing: brass
- Internal parts: brass, stainless steel, plastic
- Sensor: PPS, PPA, PA
- Seals: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)
- Water and proprietary additives used against corrosion and freezing up to 50%

Electrical signals for sensors

1 Temperature: 0.5 to 3.5 V
2 Flow: 0.5 to 3.5 V
3 Ground: 0 V (PE)
4 Supply voltage (+5VDC), PELV

APPROVALS / CERTIFICATES

Sensor

- KTW, W270, ACS, NSF, WRAS

Housing parts

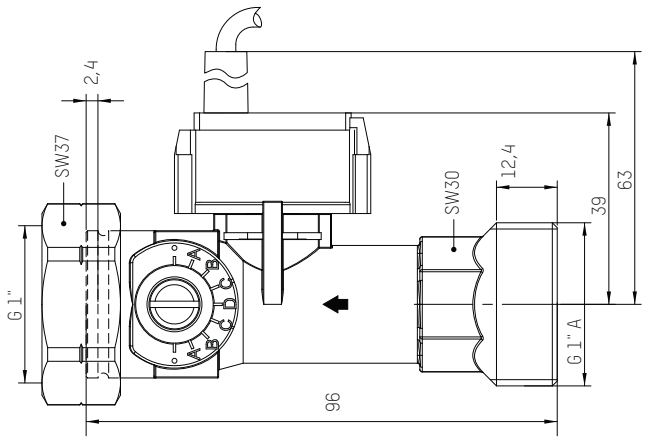
- KTW, W270

TYPE OVERVIEW

TacoSetter Tronic 100 | Balancing and shut-off valve with electronic measurement function

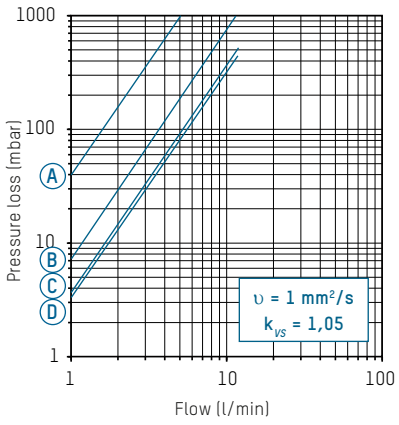
Order no.	DN	G × G	Measuring range	Viscosity
223.7702.000	20	1" × 1" A	1 – 12 (l/min)	≤ 4 mm²/s
223.7704.000	20	1" × 1" A	2 – 40 (l/min)	≤ 2 mm²/s

DIMENSIONAL DRAWING



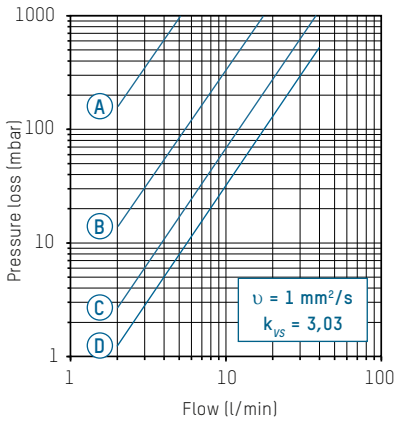
PRESSURE LOSS DIAGRAMS

223.7702.000 (DN 20 | 1" | 1...12 l/min)



A – D Valve position

223.7704.000 (DN 20 | 1" | 2...40 l/min)



A – D Valve position

ACCESSORIES

CONNECTIONS

Order no.	Description
210.6632.121	flat-sealed screw joint with R ¾" Male threads (glycol-resistant seal)
296.2334.000	Solar seal 1" (glycol-resistant)

REMOTE SENSOR PT1000 (FOR HEAT QUANTITY METERING)

Order no.	Length	Version
296.7015.000	0.5 m	Including pipe clamp

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVADRIVE NC/NO

ACTUATOR

ADVANTAGES

- Operating mode NO normally open and NC normally closed
- Valve position visually indicated and tangible
- Bayonet connection audibly engaged with click
- Attractive appearance
- Low power input
- Silent operation
- Available to fit most valve bodies
- Connection cable, pluggable

Electro-thermal actuators in the operating mode normally open and normally closed for heating circuit manifolds and radiator valves.

DESCRIPTION

NovaDrive NC/NO actuators in the new, attractive appearance used in conjunction with room thermostats, time switches and building automation systems offer an efficient means of controlling temperatures in heating and cooling systems to suit individual requirements.
Thanks to the operating mode NO (normally open) and NC (normally closed) as well as the quick-locking, large surface bayonet connection, the actuators can be used in a wide range of applications in all HVAC systems.

These actuators can help eliminate energy wastage in heating as well as in cooling and offer the ideal solution for energy control in buildings with irregular occupancy levels.
Typical installations include apartments, offices, schools, hotels etc.
The standard valve position indicators integrated into the actuators control the system functions during the assembly, commissioning and monitoring stages.

INSTALLATION POSITION

Any.

OPERATION

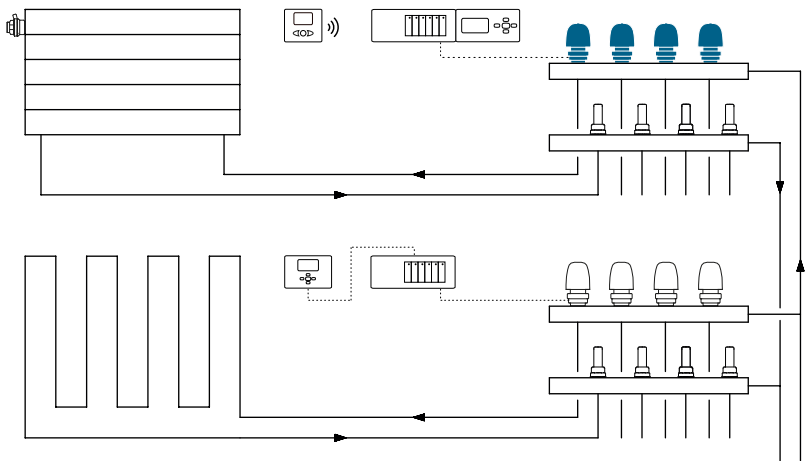
An electrical resistance heats an expansion element. Any deviation from the nominal room temperature value causes the actuator to transmit an appropriate stroke movement to the valve.
The thermostat and actuator operate according to the «ON / OFF» principle. The variable, rhythmic opening and closing, depending on the heat demand, also produces an almost continuous control characteristic.
In the without current state, the valve is open with the type NO and closed with the type NC.

BUILDING CATEGORIES

For installations in the heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Versions:
  - Normally closed NC
  - Normally open NO
- Ambient temperature: 0 ... 50° C
- Opening /closing time: approx. 3 min.
- Nominal stroke: 4 mm
- Nominal closing force 90 N
- Protection mode IP 40
- Protection class II

Electrical specifications

- Rated voltage (AC or DC): 24 V or 230 V
- Permissible voltage deviation: ±10%
- Operating efficiency: 1.6 W
- Inrush current:
  - 24V: 0.2 A for max. 1 min;
  - 230V: 0.6 A for max. 100 ms
- Recommended fuse protection: 0.35 A time delay, according to DIN 41662
- Connecting cable length 1 m

APPROVALS / CERTIFICATES

- CE conformity symbol
- The technical data conforms with the respective EN standards

ACCESSORIES

Various room thermostats and junction modules for wired and wireless applications (see separate data sheets).

TYPE OVERVIEW

NovaDrive NC | Electro-Thermal Actuator, Function NC (Normally Closed)

Order no. 230 V	Connection	Suitable for valves of make*
257.2854.000	M30 × 1,0	Beulco (old type, approx. until march 2005)
257.2855.000	M30 × 1,5	TacoSys/Heimeier/Strawa/Empur Messing/Oventrop/Delphistherm/ Emmeti/Schlösser/Beulco/AC-FIX/ Stramax/Roth/IVR
257.2858.000	M28 × 1,5	Herz (RV 57)
257.2862.000	M30 × 1,5	MNG/Cazzaniga/SBK/Empur-Edelstahl/ SKV-Ventil frontal
257.2864.000	Adapter	Giacomini
257.2880.000	M30 × 1,5	Viega

Order no. 24 V	Connection	Suitable for valves of make*
257.1854.000	M30 × 1,0	Beulco (old type, approx. until march 2005)
257.1855.000	M30 × 1,5	TacoSys/Heimeier/Strawa/Empur Messing/Oventrop/Delphistherm/ Emmeti/Schlösser/Beulco/AC-FIX/ Stramax/Roth/IVR

NovaDrive NO | Electro-Thermal Actuator, Function NC (Normally Open)

Order no. 230 V	Connection	Suitable for valves of make*
257.2554.000	M30 × 1,0	Beulco (old type, approx. until march 2005)
257.2555.000	M30 × 1,5	TacoSys/Heimeier/Strawa/Empur Messing/Oventrop/Delphistherm/ Emmeti/Schlösser/Beulco/AC-FIX/ Stramax/Roth/IVR
257.2562.000	M30 × 1,5	MNG/Cazzaniga/SBK/Empur-Edelstahl/ SKV-Ventil frontal
257.2564.000	Adapter	Giacomini

Order no. 24 V	Connection	Suitable for valves of make*
257.1554.000	M30 × 1,0	Beulco (old type, approx. until march 2005)
257.1555.000	M30 × 1,5	TacoSys/Heimeier/Strawa/Empur Messing/Oventrop/Delphistherm/ Emmeti/Schlösser/Beulco/AC-FIX/ Stramax/Roth/IVR
257.1562.000	M30 × 1,5	MNG/Cazzaniga/SBK/Empur-Edelstahl/ SKV-Ventil frontal

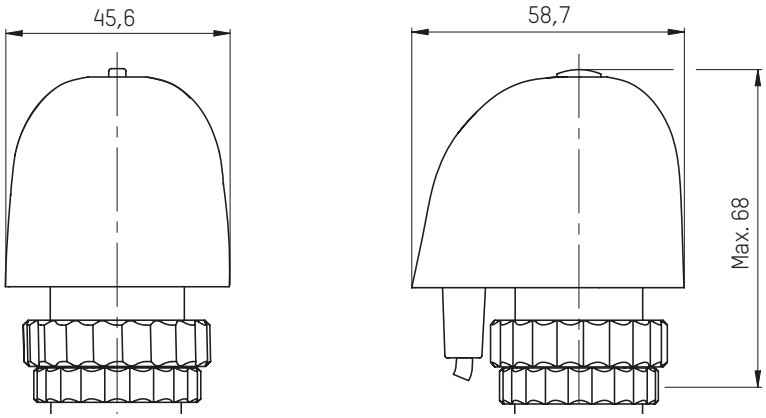
*Further specific customer designs for all types of valve bodies on request. If you are unsure about valve adjustment, please contact customer service.

ECO-TIP

SAVE ENERGY AND MONEY!

To avoid unnecessary hours of operation, the actuator should be switched off via the room thermostat out of the heating period.

DIMENSIONAL DRAWING



OPERATING MODES

Assembled state without current:

Type NC: Valve closed

Type NO: Valve open

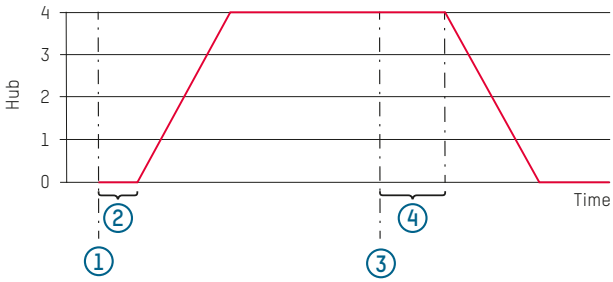
Operated state under current:

Type NC: Valve open

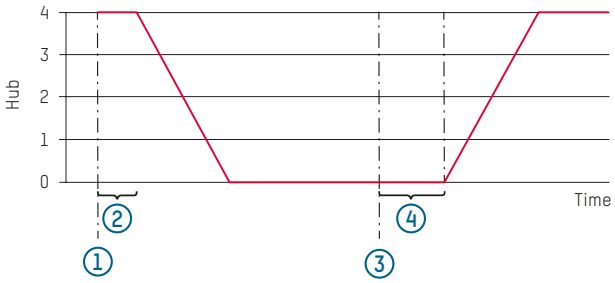
Type NO: Valve closed

CIRCUIT DIAGRAMS

Normally Closed (NC)



Normally Open (NO)



1 Voltage on
2 Dwell time on
3 Voltage off
4 Dwell time off

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TOPDRIVE

ACTUATOR

ADVANTAGES

- Protection against leaking valves
- Protection rating actuator IP 44, CE
- 360° installation
- Compatible to most valve bodies
- Valve position visually indicated and tangible
- Easy installation through bayonet connector

Electro-thermal actuators in the operating mode normally closed for heating circuit manifolds and radiator valves.

DESCRIPTION

TopDrive actuators in the new, great design used in conjunction with room thermostats, time switches and building automation systems offer an efficient means of controlling temperatures in heating and cooling systems to suit individual requirements.
The normally closed (NC) operating mode, the easily and quickly fitted bayonet connection and the possibility of overhead installation (360° installation) ensure that the TopDrive actuators can be used for versatile applications in heating, ventilation, air conditioning and sanitary systems.
Homes, offices, schools, hotels, etc. are typical examples of properties with high saving potential, since heating and cooling systems are consistently used only as and when required.
Internal visual indication of valve position is standard and serves as a functional control feature during installation, commissioning and monitoring.

INSTALLATION POSITION

360° installation

OPERATION

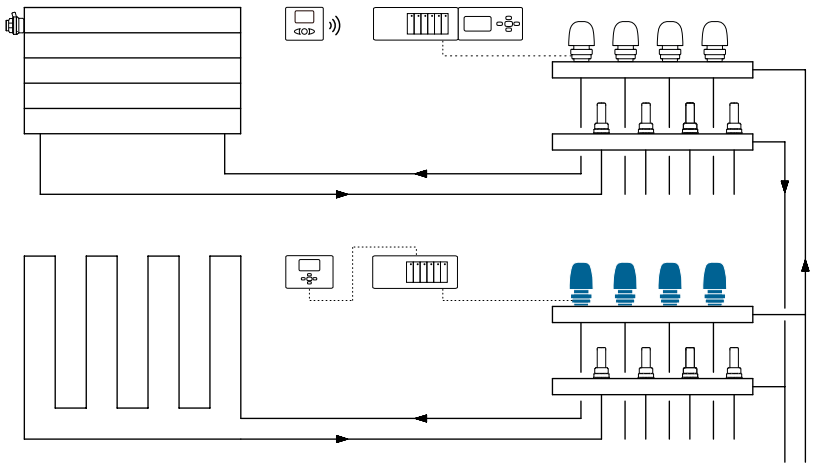
An electric resistance heats an expansion element. Any deviation from the nominal room temperature value triggers the actuator to transmit an appropriate stroke movement to the valve.
The thermostat and actuator operate according to the «ON / OFF» principle. The variable, rhythmic opening and closing, depending on the heat demand, also produces an almost continuous control characteristic.
The valve is normally closed.

BUILDING CATEGORIES

For installations in the heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Type: Normally closed (NC)
- Ambient temperature: 0 ... 60°C
- Opening/closing time: Approx. 3 Min.
- Hub: 4 mm
- Nominal closing force: 100 N ± 7%
- Protection type: IP 44
- Electrical protection class II

Electric connection data

- Operating voltage (AC or DC): 24 V or 230 V
- Permissible voltage deviation: ±10%
- Operating efficiency: 1.6 W
- Inrush current:
  - 24 V: 0.2 A for max. 1 min
  - 230 V: 0.6 A for max. 100 ms
- Recommended fuse protection: 0,35 A time delay, according to DIN 41662
- Connecting cable length: 1 m
- Connection cable: 2 × 0.75 mm², PVC

APPROVALS / CERTIFICATES

- CE conformity symbol
- The technical data conforms with the respective EN standards

ACCESSORIES

Various room thermostats and junction modules for wired and wireless applications (see separate data sheets).

ECO-TIP

SAVE ENERGY AND MONEY!

To avoid unnecessary hours of operation, the actuator should be switched off via the room thermostat out of the heating period.

TYPE OVERVIEW

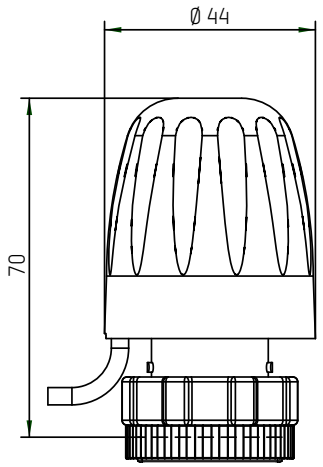
TopDrive | Electro-Thermal Actuator, Function NC (Normally Closed)

Order no. 230 V	Connection	Suitable for valves of make*
257.2055.000	M30 × 1,5	TacoSys/Heimeier/Strawa/Empur Messing/ Oventrop/Delphistherm/Emmeti/Schlösser/ Beulco/AC-FIX/Stramax/Roth/IVR
257.2058.000	M28 × 1,5	Herz (RV 57)
257.2062.000	M30 × 1,5	MNG/Cazzaniga/SBK/Empur-Edelstahl/ SKV-Ventil frontal
257.2064.000	Adapter	Giacomini

Order no. 24 V	Connection	Suitable for valves of make*
257.1055.000	M30 × 1,5	TacoSys/Heimeier/Strawa/Empur Messing/ Oventrop/Delphistherm/Emmeti/Schlösser/ Beulco/AC-FIX/Stramax/Roth/IVR
257.1058.000	M28 × 1,5	Herz (RV 57)
257.1062.000	M30 × 1,5	MNG/Cazzaniga/SBK/Empur-Edelstahl/ SKV-Ventil frontal
257.1064.000	Adapter	Giacomini

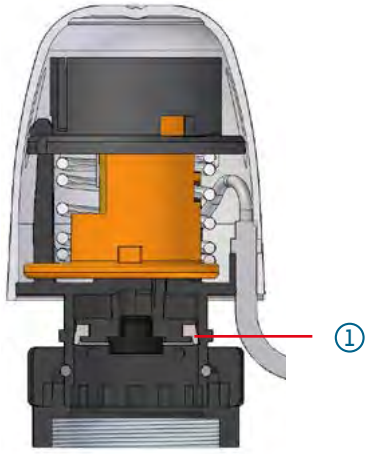
* Further specific customer designs for all types of valve bodies on request. If you are unsure about valve adjustment, please contact customer service.

DIMENSIONAL DRAWING

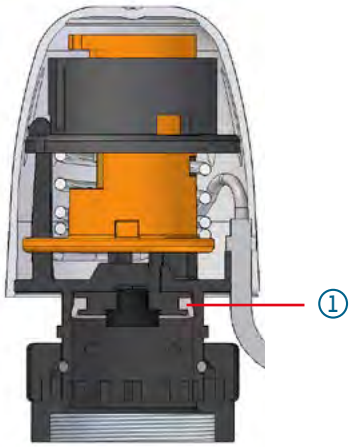


OPERATING MODES

Valve closed (no electric current)



Valve open (energised)



1 Water protection by means of form seal

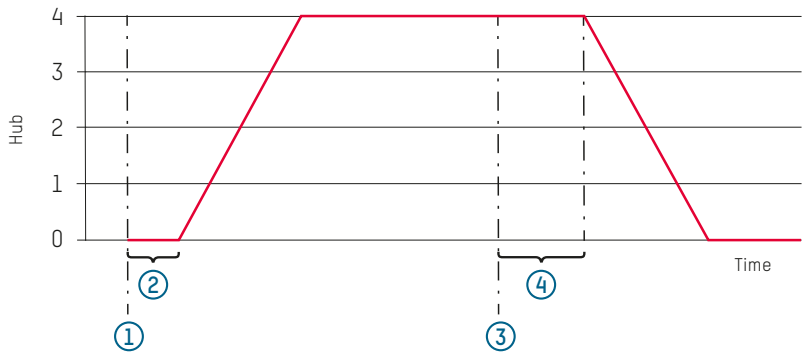
BAYONET CONNECTION

Bayonet connection with four large interlocking faces between bayonet sleeve and nut

1 Bayonet sleeve
2 Threaded bayonet-nut
3 Large contact surface
4 Turn until audible click

CIRCUIT DIAGRAMS

1 Voltage on
2 Dwell time on
3 Voltage off
4 Dwell time off

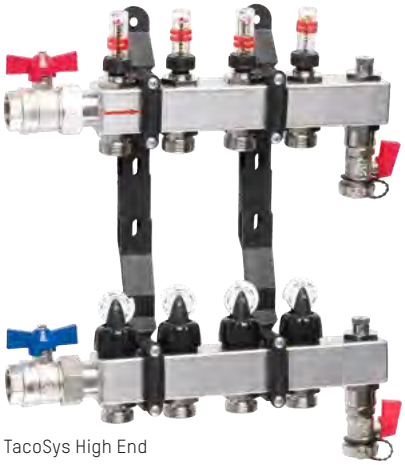


CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOSYS

UNDERFLOOR HEATING MANIFOLD



TacoSys High End

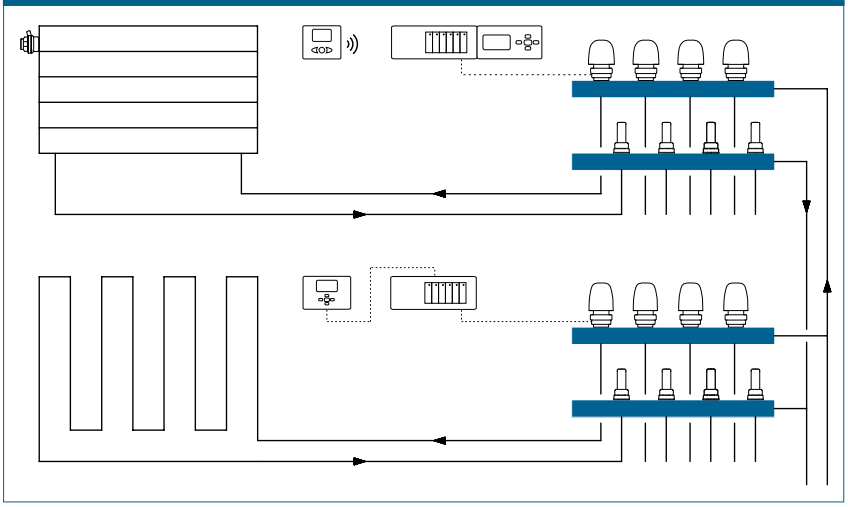
TacoSys Connect

The TacoSys heating circuit manifolds from Taconova ensure the perfect distribution of heat throughout the entire house.

DESCRIPTION

Thanks to their innovative technology, TacoSys heating circuit manifolds work reliably and according to requirements, and are particularly cost-saving.
The manifold valves are ready to accept Taconova actuators.
The manual control valves enable reproducible, manual flow regulation. Different valve settings result in different flow volumes. They thus guaran-tee individual regulation of the room temperature, precisely tailored to the requirements of your customers.
The vent valves TacoVent Vent caters for fully automatic ventilation of supply and return, thus enhancing operating safety and user convenience.
Whether for use with underfloor heating or radiators, TacoSys offers you high-quality manifold systems that satisfy every customer need.
The underfloor heating manifolds are supplied fully pre-assembled and ready-for-connection, in a robust, non-slip cardboard packing case.
The high-quality stainless steel manifold is available in different versions, making it the ideal solution for hea-ting systems of any type. Designed for between two and twelve heating circuits, it meets every requirement in terms of efficiency and durability.

SYSTEM/BASIC DIAGRAM



ADVANTAGES

- Lightweight, modern and robust stainless steel manifold bars
- Balancing with the proven TopMeter in supply circuit
- Cone-shaped valve form for fine flow adjustment
- Handwheel positioning with ratchet function for reproducible flow control
- Ventilation with the fully automatic TacoVent Vent air vent
- Glass-fiber reinforced plastic stay for sound-damping assembly
- 100% leakage test

INSTALLATION POSITION

For riser pipe assembly left, right and overhead.

OPERATION

Manifold supply and return bars are connected to the heating system. The heating/cooling circuits can be connected to the two to twelve Eurocone outlets easily using the optional fittings.
The designed flow volume is set for each circuit at the TopMeter.
Handwheel or room thermostats with actuators ensure comfortable conditions in individual rooms.

BUILDING CATEGORIES

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Medium temperature: -10 °C to + 70 °C
- Operating pressure $P_{0\ max}$:
  - TacoSys High End: 6 bar
  - TacoSys Connect: 8 bar
- Display accuracy: ±10% of final value
- k_{VS} values and measuring range see „pressure loss diagram"
- Heating circuit connections: ¾" eurocone

Material

- Bars: Stainless steel
- Internal parts: Nickel-plated brass, heat-resistant and impact-proof plastics
- Seals: EPDM O-rings
- Securing brackets: Plastic, glass fiber-reinforced

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Water free of chemical additives

SYSTEM COMPONENTS

TopDrive and NovaDrive electro-thermal actuators, room thermostats and distribution cabinets: See separate datasheets.

TYPE OVERVIEW

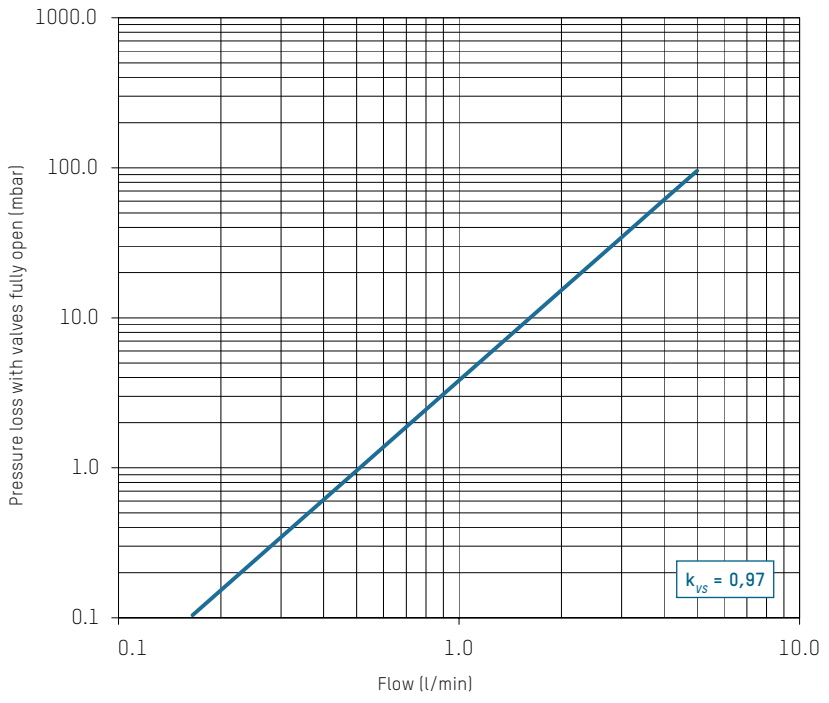
TacoSys | Heating manifolds

Heating circuits	TacoSys High End* (TopMeter Supply)		TacoSys Connect**
	0 – 2.5 l/min	0 – 5 l/min	
2	286.4002.000	286.1002.000	287.1302.000
3	286.4003.000	286.1003.000	287.1303.000
4	286.4004.000	286.1004.000	287.1304.000
5	286.4005.000	286.1005.000	287.1305.000
6	286.4006.000	286.1006.000	287.1306.000
7	286.4007.000	286.1007.000	287.1307.000
8	286.4008.000	286.1008.000	287.1308.000
9	286.4009.000	286.1009.000	287.1309.000
10	286.4010.000	286.1010.000	287.1310.000
11	286.4011.000	286.1011.000	287.1311.000
12	286.4012.000	286.1012.000	287.1312.000

* With ¾" IT x 1" OT ball valves. Versions without ball valves on request (see price list).

** Without ball valve

PRESSURE LOSS DIAGRAM



NOTE

In order to avoid potential flow noise, we recommend that manifolds with 1" ball valves be used if there are eight or more heating circuits and their valves are fully opened (≥ 2.5 l/min).

NOTE

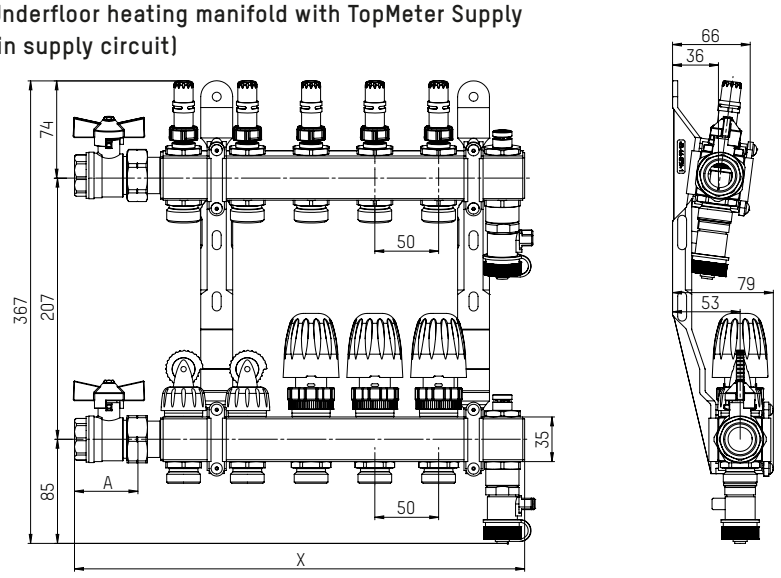
Adjusting the TacoSys manifold

The floor heating circuits are adjusted at the TacoSys stainless steel manifold using the advance or return TopMeter.
The adjustment process is carried out with the circulating pump running. All of the valves in the heating circuit must be fully open for adjustment.
It may be necessary to remove the electro-thermal actuators.

1. Start at the TopMeter of the heating circuit with the smallest flow volume
2. Set the calculated volume flow by rotating the black plastic spindle
3. Read off the settings from the red indicator collar in the porthole
4. Repeat the adjustment process for all of the heating circuits
5. Next, check the first values and re-adjust if necessary
6. Once adjustment is complete, note the corre-sponding flow values on the manifold or in the planning documents

DIMENSIONAL DRAWING

Underfloor heating manifold with TopMeter Supply (in supply circuit)



LENGTH DIMENSIONS

Heating circuits	Length X with ¾" ball valve
2	213 mm
3	263 mm
4	313 mm
5	363 mm
6	413 mm
7	463 mm
8	513 mm
9	563 mm
10	613 mm
11	663 mm
12	713 mm

ACCESSORIES

SCREW CONNECTIONS

Two nickel-plated compression fittings, complete, for plastic and multilayer pipes, with molded seal, slotted compression ring and barrier seal.

Order no.	Dimension	G x mm
210.8614.003	Ø 14 x 2	¾" x 14
210.8616.003	Ø 16 x 2	¾" x 16
210.8617.003	Ø 17 x 2	¾" x 17
210.8618.003	Ø 18 x 2	¾" x 18
210.8620.003	Ø 20 x 2	¾" x 20

SPARE PARTS

MANUAL REGULATOR

The ratchet feature on the manual control valves enables a reproducible valve setting. The valves are preinstalled in the TacoSys High End and TacoSys Value as standard.

Order no.
296.8651.001

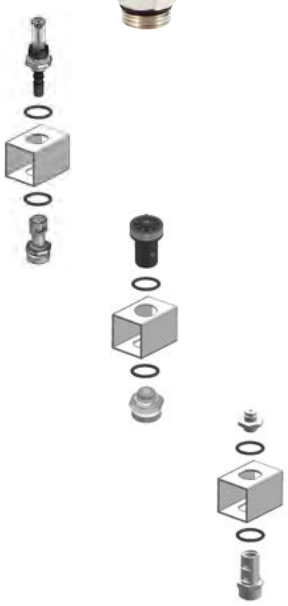
BALL VALVE

Order no.	Dimension	Length	Handle colour
298.8630.001	¾"	50 mm	red
298.8631.001	¾"	50 mm	blue
298.8628.001	1"	65 mm	red
298.8629.001	1"	65 mm	blue

BOILER FILLING AND DRAIN VALVE

The boiler filling and drain valve is only available with red handle

Order no.	Handle colour
296.8653.001	red



VALVE GROUP WITHOUT MANUAL REGULATOR TOPMETER SUPPLY

Order no.	Range
298.8609.001	0 – 2.5 l/min
298.8606.001	0 – 5 l/min

VALVE ASSEMBLY WITHOUT MANUAL REGULATOR

Order no.	Material
298.8613.001	Plastic

AIR VENT GROUP WITHOUT FILLING/DRAINING VALVE

Order no.
298.8604.001

The pipe sections shown are for illustrative purposes only and are not included in the replacement part packs.

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVASTAT / NOVAMASTER EL

ELECTRONIC ROOM THERMOSTATS AND CONNECTOR MODULES





Individual control of room temperature.

ADVANTAGES

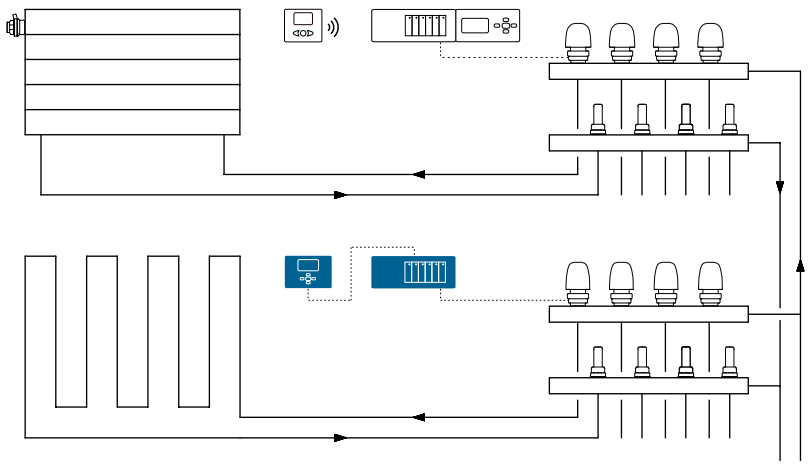
- Easy to operate
- Noiseless Triac circuit
- Units for 230 V and 24 V power supply
- Integrated derivative action control or PI control (adjustable)
- Simple wiring through the NovaMaster EL Basic, Logic and SlaveBox terminal modules

DESCRIPTION

Room thermostats in combination with Taconova NovaDrive or TopDrive actuators provide a constant room temperature in closed and dry rooms. The Taconova room thermostat range, classified according to price/performance, offers the correct solution for individual needs.
The basic version **NovaStat EL Basic** for the control of 230 V NC actuators covers the most common application range.
The **NovaStat EL Digital 2** version displays the set and actual values on a digital display.

Individual heat regulation as required by the operator is achieved by means of the programmable digital **NovaStat EL Week** clock thermostat. The time duration of the lowering mode can be set in the week program by means of the integral timer.
The connection of the room thermostats to the terminal module **NovaMaster EL Basic and/or Logic** is simple and uncomplicated.
Further convenient settings are possible by mean of the optional plug-in **NovaMaster EL Timer**.

SYSTEM/BASIC DIAGRAM



INSTALLATION POSITION

The thermostats are mounted in the respective room while the connector modules are mounted close to the manifold.

OPERATION

By means of an NTC sensor element, the downstream PI or derivative action controller, the room thermostats provide a constant room temperature in combination with actuators.
Switching is via a silent TRIAC element or a floating relay.
Control is by means of the actuator acting on the valve according to the OPEN / CLOSED principle. The PI or derivative action controller integrated into the room thermostat prevents the room temperature from exceeding the desired value set on the room thermostat.

BUILDING CATEGORIES

For installations in the heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

NOVASTAT EL | ELECTRONIC ROOM THERMOSTATS

1 NOVASTAT EL BASIC

Room thermostat for normally closed actuators

230 V room thermostat for controlling NC actuators for underfloor heating systems. Noiseless switching output (Triac) with direct or indirect connection of actuators. Dial with integral adjustment facility for correction of actual temperature integrated into the dial.

TECHNICAL DATA

- Order no.: 206.1650.000
- Operating voltage: 230 VAC 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Adjustment range: 5–30 °C (41–86 °F)
- Switching output: TRIAC 230 VAC, NC max. 75 W
- Type of protection: IP 30, Protection class II
- Type of controller: Static derivative action controller
- Differential gap: ±0,5K
- Temperature sensor: NTC 100 K
- Dimensions / color: H80 × W80 × D31 mm / RAL 9010
- Version without handwheel (NovaStat EL Public, 230 V + 24 V) on request

2 NOVASTAT EL INWALL

Room thermostat for normally closed actuators

Electronic 230 V flush-mounted room thermostat for controlling NC actuators for underfloor heating systems. Relay switching output with direct or indirect connection of actuators. An external timer switch or an additional floor sensor can be fitted. Mode can be set by mean of jumpers.

TECHNICAL DATA

- Order no.: 206.1654.000
- Operating voltage: 230 VAC 50 Hz ± 10 % / 5 VA
- Operating temperature: 0–50 °C (32–122 °F)
- Adjustment range: 5–35 °C (41–86 °F)
- Switching output: Relais 230 VAC / max. 16 A
- Type of protection: IP 21, Protection class II
- Type of controller : Two point control
- Sensor deviation: ±1 K
- Hysterese: 0.75 °C
- Temperature sensor: NTC 10 K
- Frame dimensions: Standard 65 mm

3 NOVASTAT EL DIGITAL 2

Room thermostat for normally closed and normally open actuators

Electronic, battery-operated room thermostat for operating NC/NO actuators, for underfloor heating systems with digital display. Floating relay output for direct or indirect connection of 24 V/230 V actuators. With normal, reduced temperature or frost protection settings. Timer function for temperature reduction or increase. Battery charge status indicator on the display. Keypad lock function. Input for external temperature sensor (NTC 10 K).

TECHNICAL DATA

- Order no.: 206.1660.000
- Operating voltage: 2 × LR6 AAA 1,5 V batteries
- Operating temperature: 0–40 °C (32–104 °F)
- Adjustment range: 5–35 °C in 0,5 °C steps (41–95 °F)
- Switching output: 3 A (250 VAC)
- Type of protection: IP 30, Protection class II
- Type of controller : Static differential action or PWM (proportional)
- Differential gap: ±0,5 K
- Temperature sensor: NTC 10 K, optionally external NTC 10 K
- Dimensions / color: H 83 × W 80 × D 27 mm / RAL 9010

NOVASTAT EL | ELECTRONIC ROOM THERMOSTATS

4 NOVASTAT EL WEEK

Room thermostat for normally closed and normally open actuators

Electronic battery operated and programmable room thermostat for controlling NC / NO actuators, for underfloor heating systems with digital display, floating relay output for direct or indirect connection of 24 V / 230 V actuators. Mode switch for normal and lowering mode or automatic timed programs. Can be programmed for weekly and daily programs and for vacations, frost protection and keyboard lock function. Battery supply to avoid data loss in the event of power failure. Battery charge state shown on the display.

TECHNICAL DATA

- Order no.: 206.1653.000
- Operating voltage: 2 × LR6 AA 1,5 V batteries
- Operating temperature: 0–50 °C (32–122 °F)
- Adjustment range: 5–35 °C (41–95 °F) frost protection 0,5–10 °C (33–50 °F)
- Switching output: Relais floating, NC / NO max. 8 A
- Type of protection: IP 30, Protection class II
- Type of controller: PI controller
- Adjustment bandwidth: 2 °K of proportional band
- Adjustment speed: 7,5 cycles / hour (8 min cycle)
- Temperature sensor: NTC 100 K
- Dimensions / color: H 86 × B 125 × T 32 mm / RAL 9010

NOVAMASTER EL | ELECTRONIC CONNECTOR MODULES

1 NOVAMASTER EL BASIC

Wiring module for connecting electrothermal actuators and room thermostats with terminals marked by symbols

Modular design enables expansion by SlaveBox to provide for further connections. Direct wall mounting or mounting on DIN rail. Control of 24 V actuators by means of optional transformer. Operating status output shown by LEDs

TECHNICAL DATA

- Order no.: 258.9310.000
- Operating voltage: 230 VAC 50 Hz ± 10 % / 24 VAC with transformer
- Operating temperature: 0–50 °C (32–122 °F)
- Number of zones: 6 (max. 4 drives / zones)
- Max. number of drives: 24 × 230 VAC or 18 × 24 VAC
- Number of drives / zones: Max. 4 drives / zones
- Time control line: None
- Type of protection: Protection class II IP 30
- Dimensions / color: H88 × B225 × T58 mm / RAL 9010

2 NOVAMASTER EL LOGIC

Wiring module for connecting electroterminal actuators and room thermostats with terminals marked by symbols.

Modular design enables expansion by NovaMaster EL Timer to provide for further control functions. Switching output for time control of room thermostat.
Two floating switching outputs as a control contact for pump logic.
Direct wall mounting or mounting on DIN rail. Operating status indicated by LEDs.

TECHNICAL DATA

- Order no.: 258.9311.000
- Operating voltage: 230 VAC 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Number of zones: 6 (max. 4 drives / zones)
- Max. number of drives: 24 × 230 VAC
- Time control line: Zones A and B present
- Switching output: 2 x relays, floating, max. 8 A
- Type of protection: Protection class II IP 30
- Dimensions / color: H88 × B225 × T58 mm / RAL 9010

3 NOVAMASTER EL SLAVEBOX

An expansion module for wiring electrothermal actuators and room thermostats with terminals marked by symbols

Plug-in expansion to NovaMaster EL Basic for further connection possibilities. Direct wall mounting or mounting on DIN rail. Control of 24 V actuators by means of optional transformer. Operating status indicated by LEDs.

TECHNICAL DATA

- Order no.: 258.9313.000
- Operating voltage: 24 VAC with transformer / 230 VAC 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Number of zones: 4 (max. 4 drives / zones)
- Max. number of drives: Σ NovaMaster EL Basic + SlaveBox = 24 × 230 VAC oder 18 × 24 VAC
- Time control line: None
- Type of protection: Protection class II IP 30
- Dimensions / color: H88 × W160 × D58 mm / RAL 9010

4 NOVAMASTER EL TIMER

NovaMaster EL Timer expansion module for connection to NovaMaster EL Logic

Programmable timer function for two time group A and B. Integrated application program of which nine are fixed and two are user programmable. Intelligent processor. Digital display for program, time and function display. Direct wall mounting or mounting on DIN rail.

TECHNICAL DATA

- Order no.: 258.9315.000
- Operating voltage: 230 VAC 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Number of zones: 12 Zones, controllable
- Time control line: Zones A and B present
- Operating modes: Automatic; convenience; lowering
- Keyboard lock: Present
- Type of protection: Protection class II IP 30
- Dimensions / color: H88 × W160 × D62 mm / RAL 9010

5 TRANSFORMATOR

Transformer for connection to NovaMaster EL Basic or SB

Enables 24 V actuators to be connected to the respective terminal module.

TECHNICAL DATA

- Order no.: 258.9316.500
- Operating voltage: 230 VAC 50 Hz ± 10%
- Operating temperature: 0–50 °C (32–122 °F)
- Output voltage: 24 VAC max. 60 W
- Type of protection: Protection class II IP 30
- Dimensions / color: H83 × W110 × D61 mm / RAL 9010

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVASTAT / NOVAMASTER RF

WIRELESS ROOM THERMOSTATS AND CONNECTOR MODULES

Individual control of room temperature.

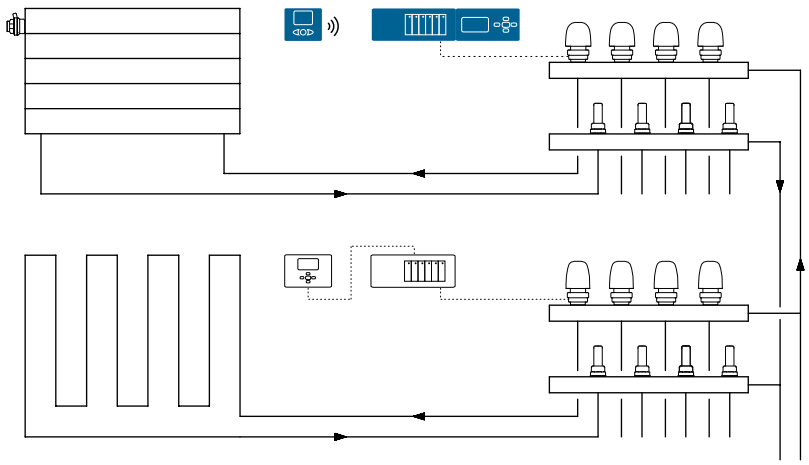
ADVANTAGES

- No wiring effort required
- Optimum positioning within the room
- Own signal encryption for unique assignment of room thermostat
- Simple connection of the actuators to the wiring module
- For actuators normally closed (NC) and normally open (NO)
- Intelligent processor

DESCRIPTION

Room thermostats in combination with Taconova NovaDrive or TopDrive actuators provide a constant room temperature in enclosed and dry rooms.
The room thermostat range, classified according to price/performance, offers the correct solution for individual needs.
The basic version **NovaStat RF Basic** covers the most common range of applications.
The **NovaStat RF Digital** and **NovaStat RF Week** versions display the set and actual values on a digital display.
Individual regulation of temperature in individual rooms as required by the operator is achieved by means of the programmable digital **NovaStat RF Week** clock thermostat or the **NovaMaster RF Logic**. The time duration of the lowering mode can be set in the week program by means of the integral timer.
The individual room thermostats can be assigned to the **NovaMaster RF Logic** receiver module or the **NovaMaster RF Mini** single-channel receiver simply and without complicated wiring.
The connection options for actuators can be expanded with the optional pluggable **NovaMaster RF SlaveBox** module.

SYSTEM/BASIC DIAGRAM



INSTALLATION POSITION

The thermostats are mounted in the respective room while the connector modules are mounted close to the manifold.

OPERATION

By mean of an NTC sensor element, the downstream PI or derivative action controller, the room thermostats provide a constant room temperature in combination with actuators.
The control signal is transmitted to the central receiver by radio (868 MHz).
Control is by means of the actuator acting on the valve according to the OPEN/CLOSED principle.
The PI or derivative action controller integrated into the room thermostat prevents the room temperature exceeding the desired value set on the room thermostat.

BUILDING CATEGORIES

For installations in the heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

NOVASTAT RF | WIRELESS ROOM THERMOSTATS

① 

② 

③ 

1 NOVASTAT RF BASIC

Electronic wireless room thermostat for indirect controlling of NC/NO actuators in underfloor heating systems

Desired values transmitted by radio signal (868 MHz). Each thermostat has its own signal encryption for unique assignment. Correction of the actual temperature is integrated into the adjustment dial.

TECHNICAL DATA

- Order no.: 206.1656.000
- Operating voltage: 2 batteries LRG AAA 1,5 V
- Operating temperature: 0–50 °C (32–122 °F)
- Adjustment range: 5–30 °C (41–86 °F)
- Radio frequency: 868 MHz, < 10 mW
- Certification: CE.EN 300220-1, EN 301489-1
- Type of protection: Protection class II IP 30
- Control behavior: Proportional band 2 ° K (15 min.)
- Temperature sensor: NTC 100 K
- Dimensions: H80 × W80 × D31 mm
- Color: RAL 9010

2 NOVASTAT RF DIGITAL

Electronic wireless room thermostat with digital display for indirect controlling of NC/NO actuators in underfloor heating systems

Desired values transmitted by radio signal (868 MHz). Each thermostat has its own signal encryption for unique assignment. Mode switch for normal and lowering modes. Further userdefined settings possible in system parameter menu.

TECHNICAL DATA

- Order no.: 206.1657.000
- Operating voltage: 2 batteries LRG AAA 1,5 V
- Operating temperature: 0–50 °C (32–122 °F)
- Adjustment range: 5–30 °C (41–86 °F)
- Radio frequency: 868 MHz, < 10 mW
- Certification: CE.EN 300220-1, EN 301489-1
- Type of protection: Protection class II IP 30
- Control behavior: PI controller or static derivative action controller, adjustable
- Temperature sensor: NTC 100 K
- Dimensions: H80 × W80 × D31 mm
- Color: RAL 9010

3 NOVASTAT RF WEEK

Electronic wireless room thermostat with digital display for indirect controlling of NC/NO actuators in underfloor heating systems.

Desired values transmitted by radio signal (868 MHz). Each thermostat has its own signal encryption for unique assignment. Mode switch for normal and lowering mode or automatic timed programs. Can be programmed for weekly and daily programs and for vacations, frost protection and keyboard lock function. Further user-defined settings possible in system parameter menu.

TECHNICAL DATA

- Order no.: 206.1658.000
- Operating voltage: 3 batteries LR6 AA 1,5 V
- Operating temperature: 0–50 °C (32–122 °F)
- Adjustment range: 5–35 °C (41–95 °F) Frost protection 0,5–10 °C (33–50 °F)
- Radio frequency: 868 MHz, < 10 mW
- Certification: CE.EN 300220-1, EN 301489-1
- Type of protection: Protection class II IP 30
- Type of controller: PI controller, cycle 15 min.
- Adjustment bandwidth: 2 ° K of proportional band
- Adjustment speed: 7,5 Cycles / h (8 min cycle)
- Temperature sensor: NTC 100 K
- Dimensions: H86 × W125 × D32 mm
- Color: RAL 9010

NOVAMASTER RF | RADIO RECEIVER

NOVAMASTER RF MINI

Single-channel radio receiver for controlling NC / NO actuators in underfloor heating systems

Desired values transmitted by radio signal (868 MHz). Combinable with room thermostats NovaStat RF Basic, NovaStat RF Digital and NovaStat RF Week

TECHNICAL DATA

- Order no.: 206.1659.000
- Operating voltages: 230 VAC / NC / NO / 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Switching output: Receiver relay 12 A 250 VAC max.
- Quantity of actuators: Max. 2 actuators (parallel)
- Radio frequency: 868 MHz, < 10 mW
- Certification: CE.EN 300220-1, EN 301489-1
- Type of protection: Protection class II IP 30
- Dimensions: H170 × W28 × D14 mm
- Color: RAL 9010

NOVAMASTER RF | RADIO RECEIVER WIRING MODULE

1 NOVAMASTER RF LOGIC

Wiring module in combination with receiver unit Novamaster RF Logic for the wiring of electrothermal actuators and assignment of the individual wireless room thermostats

Expansion possible with Novamaster RF SlaveBox to provide further connection options. Direct wall mounting or mounting on DIN rail. Control of 230 V NC/NO actuators. Operating status indicated by LEDs. 2 separate, floating switching outputs on Novamaster RF Logic wiring module for actuating pumps. Programmable timer function for zone concerned. Integrated user programs, 9 fixed and 12 freely programmable for each individual zone. Digital display for program, time and function.

TECHNICAL DATA

- Order no.: 258.9317.000
- Operating voltage: 230 VAC 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Radio frequency (Timer): 868 MHz, < 10 mW
- Certification: CE.EN 300220-1, EN 301489-1
- Number of zones: 6 (max. 4 drives / zone)
- Max. quantity of actuators: 24 × 230 VAC
- Quantity of actuators / Zone: max. 4 drives / zone
- Type of controller: PI controller proportional bandwidth 2 ° K/1, 2 ° K
- Type of protection: Protection class II IP 30
- Switching outputs: 2 × separate, floating for pump switching max. 8 A
- Dimensions: H88 × W370 × D58 mm
- Color: RAL 9010

2 NOVAMASTER RF SLAVEBOX

Expansion module for the NovaMaster RF Logic module for the extended wiring of electrothermal actuators

Assignment of the room thermostats takes place via the Novamaster EL Timer. Pluggable expansion and direct wall mounting or mounting on DIN rail. Control of 230 V NC/NO actuators. Operating status indicated by LEDs.

TECHNICAL DATA

- Order no.: 258.9319.000
- Operating voltage: 230 VAC 50 Hz ± 10 %
- Operating temperature: 0–50 °C (32–122 °F)
- Number of zones: 4 (max. 4 drives / zone)
- Max. number of actuators:
  Σ Novamaster RF Logic + Novamaster RF SlaveBox = 24 × 230 VAC
- Type of protection: Protection class II IP 30
- Dimensions: H88 × W160 × D58 mm
- Color: RAL 9010

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVAMIX COMPACT 50 TMV2

THERMOSTATIC MIXING VALVE

ADVANTAGES

- Constant temperature of the water at the outlet
- Automatic mixing function without auxiliary power
- Infinite regulation of the mixed water temperature in the range from 30 – 70 °C
- Anti-scalding device
- Pipes and draw-off fittings are protected against calcification and corrosion
- Non-stick coating on valve housing to prevent scale build-up
- No maintenance
- Back-flow preventers (check-valves) built into cold and hot water connections
- Build-Cert, TMV-2, ACS approval for potable water

Limits and maintains constant levels of mixing temperatures in systems.

DESCRIPTION

The autonomous thermostatic mixing valve NovaMix Compact 50 ensures a constant mixed water temperature at the outlet. This gives permanent protection against scalding, even with high storage tank temperatures.
The mixing valve can be used in sanitary applications in both public and private areas. Due to its attractive design, it is also suitable for visible installation directly beneath the wash-basin.
Temperature can be regulated up to 50 °C, thermal disinfection can be carried out.

Backflow preventers are already installed ensuring optimum hydraulic functionality.

INSTALLATION POSITION

Any.

OPERATION

A thermostatic cartridge and a return spring ensure the constant blend temperature at the outlet.
Thanks to the design of the mixing valve, the thermostatic cartridge can be easily replaced in the installed valve if the performance decreases, which occurs due to normal wear and tear.

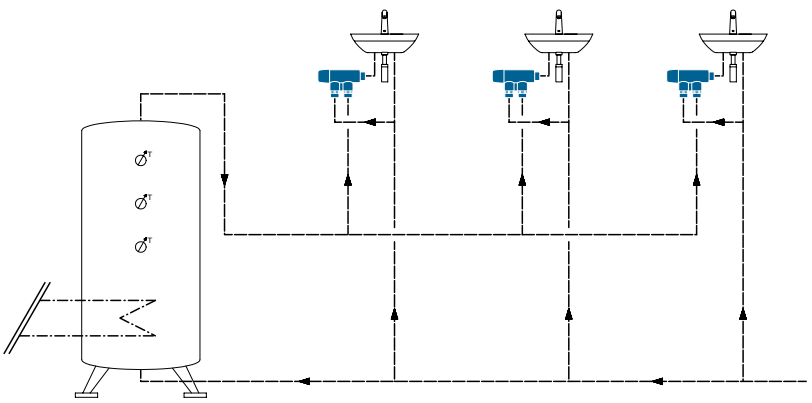
In case of cold water failure, the hot water supply shuts off automatically and hermetically. This ensures full protection against scalding.

BUILDING CATEGORIES

For pipe installations in drinking water and heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



NOVAMIX COMPACT 50 TMV2 | THERMOSTATIC MIXING VALVE

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- k_{VS} values and dimensions as per the relevant tables
- Max. operating temperature $T_{0\,max}$: 90 °C
- Max. operating pressure $P_{0\,max}$: 10 bar
- Min. operating pressure $P_{B\,min}$: 0,5 bar
- Adjustable temp. range: 30 – 50 °C
- Mix temperature stability: max. 3 K (for hot water temp. change 15 K)
- Shut-off function in event of cold water failure
- Noise class 2
- Installation position: any

Material

- Housing: brass (DZR), nickel-plated
- Internal parts: Stainless steel, brass, high-quality plastic
- Seals: EPDM
- Housing with anti-lime scale coating

Flow media

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)

APPROVALS

- Build-Cert, TMV-2, ACS

NOTE

The brochure „NOVAMIX ONE RANGE - NEW APPLICATIONS“ contains additional information on the various applications of Taconova mixing valves.

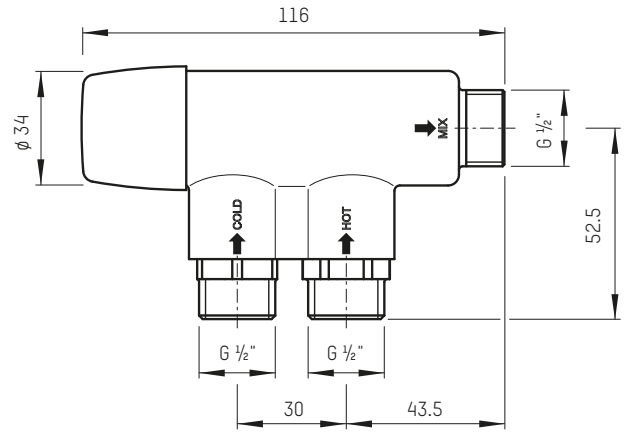
TYPE PROGRAM

NovaMix Compact 50 TMV2 | Thermostatic mixing valve
Temperature range 30 – 70 °C

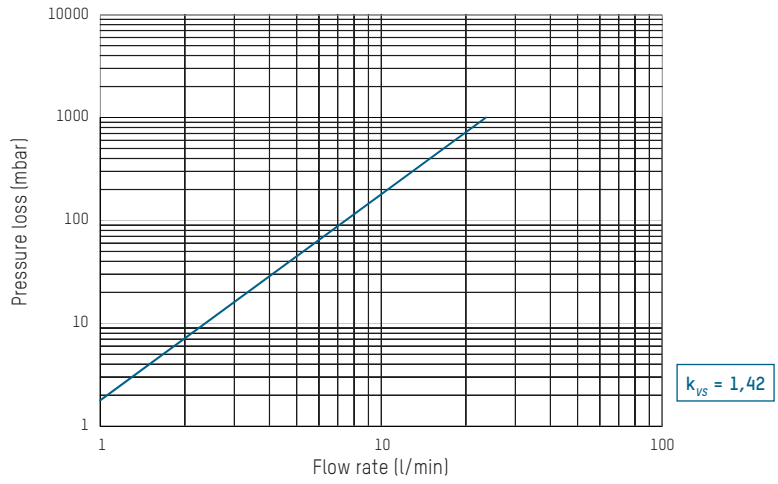
Item no.	DN	G	E (l/min)	k_{VS}
252.6073.107	15	½"	23,7	1,42

E = Extracted outlet quantity at Δp = 1 bar

DIMENSIONAL DRAWING



PRESSURE LOSS DIAGRAM



ACCESSORIES

ADAPTER FOR FLAT SEALING FITTINGS

Item no.
296.5223.004

CONNECTIONS

Compression fitting joint with nut, clamping ring and supporting sleeve

Item no.	G × mm	Version for
210.3222.000	½" × 10	Copper pipe 10/1
210.3223.000	½" × 12	Copper pipe 12/1
210.3225.000	½" × 15	Copper pipe 15/1

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVAMIX STANDARD

THERMOSTATIC MIXING VALVE

W270

ADVANTAGES

- Constant temperature of the water at the outlet
- Automatic mixing function without the need for auxiliary power
- Infinite regulation of the nominal temperature in 2 ranges: 20 – 40 °C / 30 – 70 °C
- Protection against scalding; the NovaMix Standard 70 FS model closes tightly
- Special design with anti-scalding device
- Can be used in panel heating systems and for loading storage tanks by means of solid-fuel boilers

Maintaining constant mixing temperatures and limiting temperatures in hot water systems

DESCRIPTION

The automatic thermostatic mixing valve NovaMix Standard ensures a constant temperature of the mixed water at the outlet when used as the central mixing device.
The NovaMix Standard is mainly used in sanitary applications as a regulating device for reducing the temperature of the water coming out of hot water storage tanks. It can also be used in numerous other applications requiring a constant mixing temperature, For example as a mixing unit for constant water mixing temperatures in panel heating systems and for loading storage tanks by means of solid-fuel boilers.

INSTALLATION POSITION

Any.

OPERATION

Standard design:
A thermostatic cartridge and a return spring ensure the constant blend temperature at the outlet.
Thanks to the design of the mixing valve, the thermostatic cartridge can be easily replaced in the installed valve if the performance decreases, which occurs due to normal wear and tear.

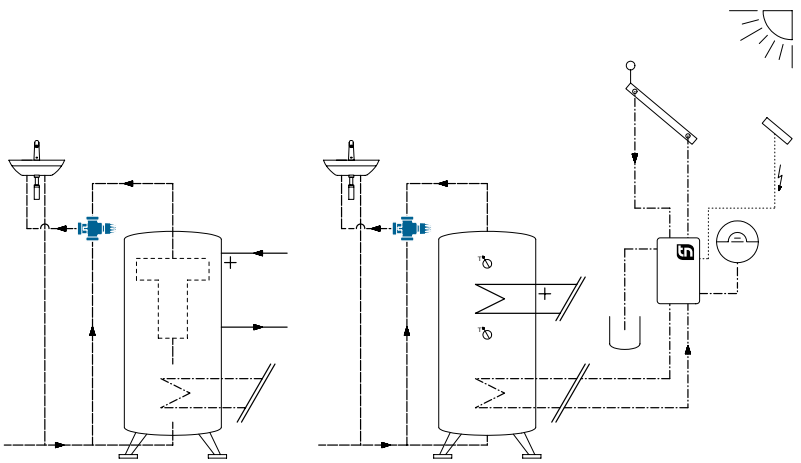
Special design NovaMix Standard 70 / 40 FS (Fail Safe):
In the case of cold water failure, the hot water supply shuts off automatically and hermetically.

BUILDING CATEGORIES

For pipe installations in drinking water and heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



NOVAMIX STANDARD | THERMOSTATIC MIXING VALVE

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$, adjustable temperature ranges, k_{VS} values and dimensions as per the relevant tables
- Operating temperature $T_{0\,max}$ with check-valve (CV): 90 °C
- Max. operating pressure $P_{0\,max}$: 10 bar
- Min. operating pressure $P_{0\,min}$: 0,5 bar
- Working pressure (dynamic): max. 5 bar
- Constant inlet pressure differential: max. 2 bar
- Temperature stability for mixing: max. 3 K (for change in hot water temperature: 15 K)
- Locking function in the event of failure of the cold water supply
- Noise class 2
- Installation position: can be installed in any position

Material

- Housing and inner parts: brass (resistant to dezincification)
- Seals: EPDM
- Housing with lime resistant-coating

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)

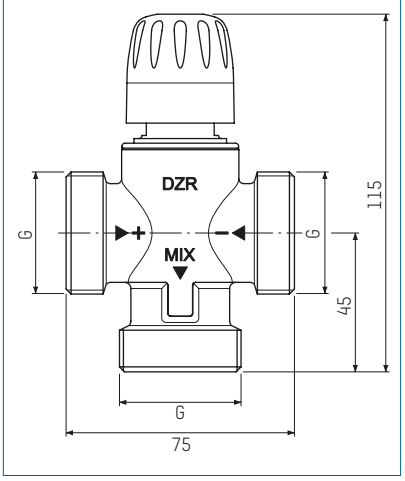
Special application

- Diverting function possible (inflow via a mixing gate)

APPROVALS / CERTIFICATES

- ACS, KTW, W270

DIMENSIONAL DRAWING



TYPE OVERVIEW

NovaMix Standard 70 / 40 | Thermostatic mixing valve for storage water heating unit

Order no.	DN	G	Control range	$T_{0\,max}$	V (l/min)	k_{VS}^1	k_{VS}^2
252.6003.104	20	1"	30 – 70 °C	100 °C	39	1,9	1,65
252.6003.330*	20	1"	30 – 70 °C	100 °C	39	1,9	1,65
252.6004.104	25	1 ¼"	30 – 70 °C	100 °C	53	2,6	2,25
252.6023.104**	20	1"	20 – 40 °C	80 °C	39	1,9	1,65
252.6024.104**	25	1 ¼"	20 – 40 °C	80 °C	53	2,6	2,25

* With integrated check valve

** On request (successor versions see NovaMix Value 20 - 50 °C)

NovaMix Standard 70 FR (Fast Response) | Thermostatic mixing valve for continuous flow water heating

Order no.	DN	G	Control range	$T_{0\,max}$	V (l/min)	k_{VS}^1	k_{VS}^2
252.6043.104	20	1"	30 – 70 °C	100 °C	22	1,1	0,7

NovaMix Standard 70 FS (Fail Safe) | Thermostatic mixing valve | Special design with anti-scalding protection in the event of failure of the cold water supply for storage water heating units

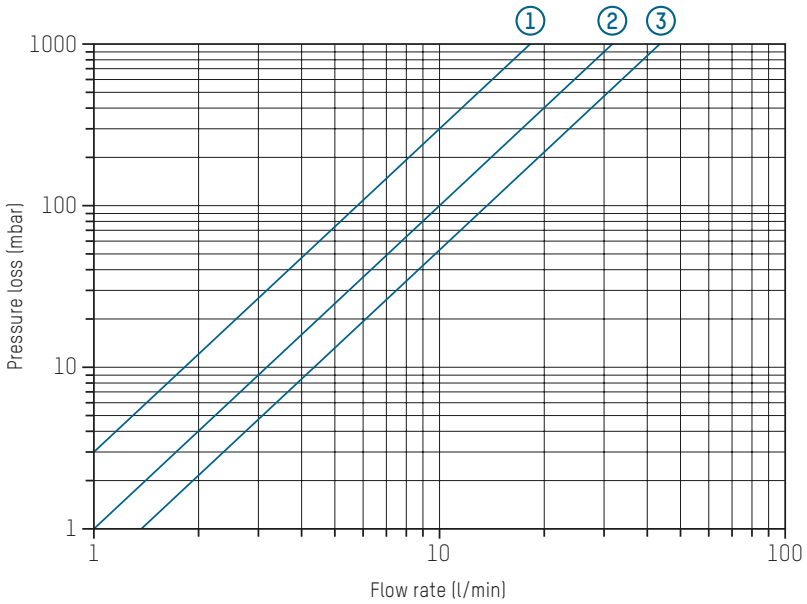
Order no.	DN	G	Control range	$T_{0\,max}$	V (l/min)	k_{VS}^1	k_{VS}^2
252.6003.107	20	1"	30 – 70 °C	100 °C	39	1,9	1,65
252.6004.107	25	1 ¼"	30 – 70 °C	100 °C	53	2,6	2,25

V = Volume obtained at Δp = 1,5 bar k_{VS}^1 = without check-valve k_{VS}^2 = with check-valve

NOTE

The brochure „NOVAMIX ONE RANGE - NEW APPLICATIONS“ contains additional information on the various applications of Taconova mixing valves.

PRESSURE LOSS DIAGRAM



1 252.6043.104
2 252.6003.104 | 252.6023.104 | 252.6003.107
3 252.6004.104 | 252.6024.104 | 252.6004.107

ACCESSORIES

INSULATION BOX

Order no.	DN
296.2326.000	20
296.2327.000	25

CHECK-VALVE

Operating temperature $T_{0\,max}$: 95 °C, operating pressure $P_{0\,max}$: 10 bar
For insertion in the screw connection at the cold and hot water inlets.

Order no.	Fits to order no.
296.5203.003	252.6003.XXX | 252.6023.104 | 252.6043.104
296.5204.003	252.6004.XXX | 252.6024.104

SCREW CONNECTIONS

You will find various suitable screw connections in our „Range of Products“ catalog and our „Price List“.

SPARE PARTS

THERMAL ELEMENT WITH REGULATING PISTON

Order no.	Description
298.5263.000	20 – 40 °C for NovaMix Standard 40
298.5262.000	30 – 70 °C for NovaMix Standard 70/70 FR
298.5264.109	30 – 70 °C for NovaMix Standard 70 FS

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVAMIX VALUE

THERMOSTATIC MIXING VALVE

W270

Maintaining constant mix temperatures and limiting temperatures in hot water systems

DESCRIPTION

The automatic thermostatic mixing valve NovaMix Value ensures a constant temperature of the mixed water at the outlet when used as the central mixing device.
This prevents scalding at the outlet, even with high storage tank temperatures.
Wide area of possible application thanks to three different valve dimensions. Available with ¾" (DN15), 1" (DN20) and 1¼" (DN25) connection.
Special valve seals at the regulator piston keep undesired admixtures to a minimum*, resulting in maximum utilisation of the storage tank temperature.

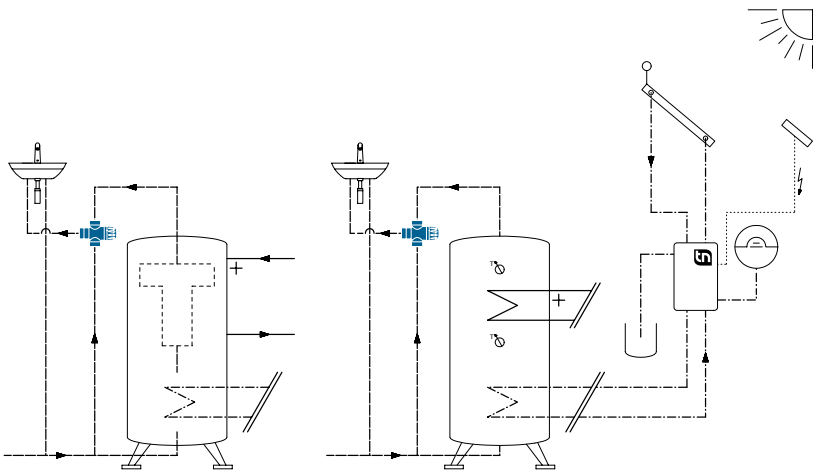
The NovaMix Value is mainly used in sanitary applications as a regulating device for reducing the temperature of the water coming out of hot water storage tanks. For example as a mixing unit for constant water mixing temperatures in panel heating systems and for loading storage tanks by means of solid-fuel boilers.

* If the hot water lies 3K below the set mixing temperature, the cold water leak rate = 0. Otherwise, the maximum value for admixtures is 3K.

INSTALLATION POSITION

Any.

SYSTEM/BASIC DIAGRAM



ADVANTAGES

- Constant temperature of the water at the outlet
- Automatic mixing function without the need for auxiliary power and infinite regulation of the mixed water temperature
- High regulation precision
- Protection against scalding
- High k_{VS} values
- Valve housing with non-stick coating to protect against lime scale deposits
- Mechanism to prevent adjustment of the nominal value
- No additional seals required when using the check valves (CV)
- Can be used in panel heating systems and for loading storage tanks by means of solid-fuel boilers

OPERATION

The mixing valve is supplied with hot water from the storage tank and cold water from the mains network.
The temperature of the mixed water is detected by the thermostatic expansion element. If the mixed water temperature diverges from the target value, the thermostatic expansion element moves the regulator piston, thus regulating the hot and cold water intake quantity accordingly, until the mixed water temperature corresponds to the target value.

BUILDING CATEGORIES

For pipe installations in drinking water and heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Adjustable temperature ranges:
  - 20 – 50 °C
  - 45 – 65 °C
  - 35 – 70 °C
- k_{vs} values and dimensions as per the relevant tables
- Operating temperature $T_{0\,max}$: 100 °C
- Operating temperature $T_{0\,max}$ with check-valve (CV): 90 °C
- Max. operating pressure $P_{0\,max}$: 10 bar
- Min. operating pressure $P_{0\,min}$: 0,5 bar
- Working pressure (dynamic): max. 5 bar
- Constant inlet pressure differential: max. 2 bar
- Temperature stability for mixing: max. 3 K (for change in hot water temperature: 15 K)
- Locking function in the event of failure of the cold water supply
- Noise class 2
- Installation position: can be installed in any position

Material

- Housing: brass (resistant to dezincification)
- Internal parts: High-quality plastic
- Seals: EPDM
- Housing with lime resistant-coating

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)

Special application

- Diverting function possible (inflow via a mixing gate)
- DN 15 and DN 20 are also suitable for flow water heating units

APPROVALS / CERTIFICATES

- ACS, KTW, W270, TÜV

TYPE OVERVIEW

NovaMix Value 50 FS (Fail Safe) | Thermostatic mixing valve
Temperature range 20 – 50 °C

Order no.	DN	G	Built-in check valve	A	E (l/min)	k_{vs}
253.3002.000	15	¾"	no	76	26	1.6
253.3003.000	20	1"	no	77	36	2.2
253.3004.000	25	1 ¼"	no	77	56	3.4
253.3102.000	15	¾"	yes	76	25	1.5
253.3103.000	20	1"	yes	77	35	2.1
253.3104.000	25	1 ¼"	yes	77	55	3.3

NovaMix Value 65 FS (Fail Safe) | Thermostatic mixing valve
Temperature range 45 – 65 °C (compliant with EN15092)

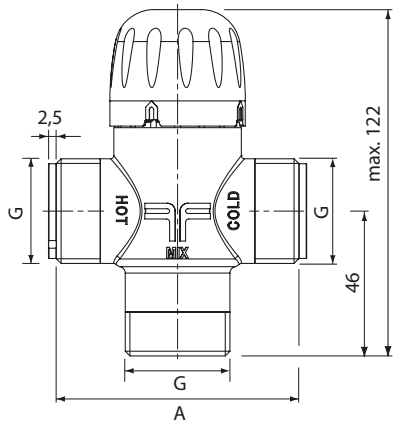
Order no.	DN	G	Built-in check valve	A	E (l/min)	k_{vs}
253.1002.000	15	¾"	no	76	26	1.6
253.1003.000	20	1"	no	77	36	2.2
253.1004.000	25	1 ¼"	no	77	56	3.4
253.1102.000	15	¾"	yes	76	25	1.5
253.1103.000	20	1"	yes	77	35	2.1
253.1104.000	25	1 ¼"	yes	77	55	3.3

NovaMix Value 70 FS (Fail Safe) | Thermostatic mixing valve
Temperature range 35 – 70 °C (75 °C for Legionella flushing)

Order no.	DN	G	Built-in check valve	A	E (l/min)	k_{vs}
253.2002.000	15	¾"	no	76	26	1.6
253.2003.000	20	1"	no	77	36	2.2
253.2004.000	25	1 ¼"	no	77	56	3.4
253.2102.000	15	¾"	yes	76	25	1.5
253.2103.000	20	1"	yes	77	35	2.1
253.2104.000	25	1 ¼"	yes	77	55	3.3

A = Housing without check valves
E = Extracted (outlet) quantity at Δp = 1,0 bar
No additional seals required when using the check valves

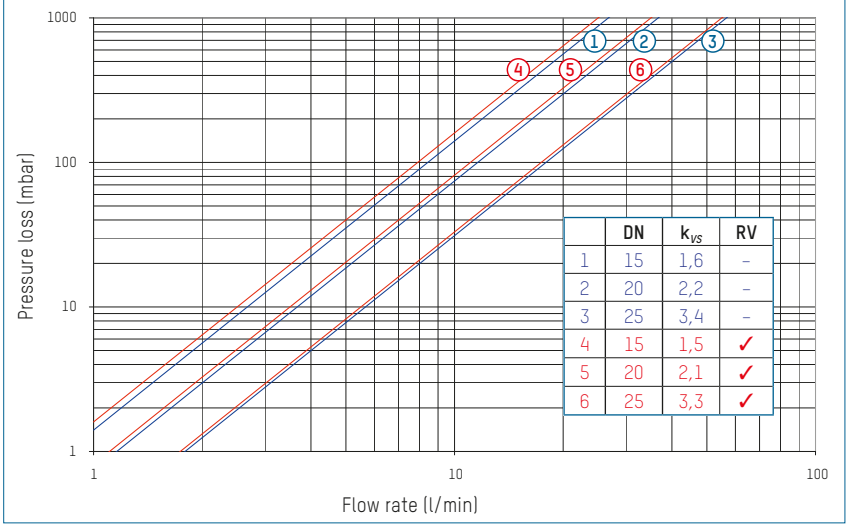
DIMENSIONAL DRAWING



NOTE

The brochure „NOVAMIX ONE RANGE - NEW APPLICATIONS“ contains additional information on the various applications of Taconova mixing valves.

PRESSURE LOSS DIAGRAM



	DN	k_{VS}	RV
1	15	1,6	–
2	20	2,2	–
3	25	3,4	–
4	15	1,5	✓
5	20	2,1	✓
6	25	3,3	✓

ACCESSORIES

INSULATION BOX

Order no.	DN
296.2329.000	15
296.2330.000	20
296.2331.000	25

CONNECTION SET FOR THREADED PIPE

Order no.	DN	G x R
210.6630.004	15	¾" x ½"
210.6631.004	20	1" x ½"
210.6632.004	20	1" x ¾"
210.6633.004	25	1¼" x 1"

CHECK VALVE

Order no.	DN	G
296.5210.003	15	¾"
296.5211.003	20	1"
296.5212.003	25	1¼"

SPARE PARTS

REGULATING PISTON WITH THERMOSTATIC ELEMENT

Order no.	Control range
298.5280.000	for all versions

CAP AND SPINDEL

Order no.	Control range	G
298.5281.000	45 – 65 °C	¾"
298.5282.000	45 – 65 °C	1"
298.5283.000	45 – 65 °C	1¼"
298.5284.000	35 – 70 °C	¾" + 1"
298.5285.000	35 – 70 °C	1¼"

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

NOVAMIX HIGH CAPACITY

THERMOSTATIC MIXING VALVE

W270

Maintaining constant mix temperatures and limiting temperatures in hot water systems

DESCRIPTION

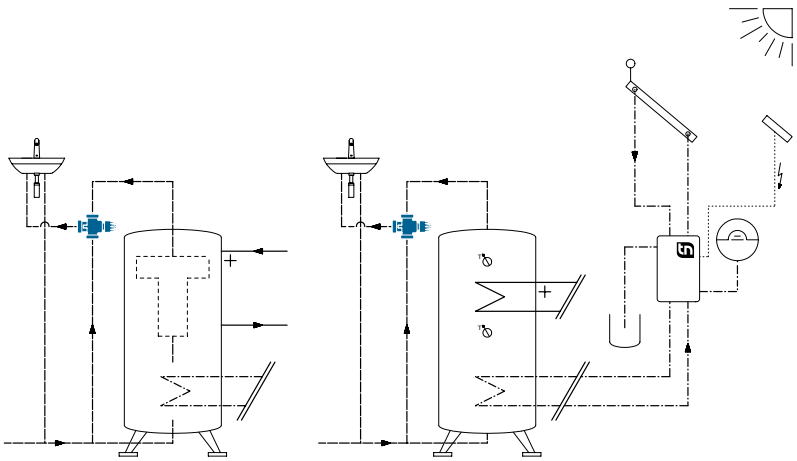
The automatic thermostatic mixing valve NovaMix High Capacity ensures a constant temperature of the mixed water at the outlet when used as the central mixing device. This prevents scalding at the outlet, even with high storage tank temperatures.
The large valve cross sections in the NovaMix High Capacity reduce the valve's intrinsic pressure loss (high k_{VS}), permitting high flow rates even at peak times. Special valve seals on the controller piston reduce unwanted mixtures to a minimum (very low internal cold water leakage rate), which provides maximum utilization of the storage temperature.

The NovaMix High Capacity is mainly used in sanitary applications (SVGW approval) as a regulating device for reducing the temperature of the water coming out of hot water tanks. It can also be used in numerous other applications requiring a constant mixing temperature. For example as a mixing unit for constant water mixing temperatures in panel heating systems and for loading storage tanks by means of solid-fuel boilers.

INSTALLATION POSITION

Any.

SYSTEM/BASIC DIAGRAM



ADVANTAGES

- Constant temperature of the water at the outlet
- Automatic mixing function without the need for auxiliary power
- Infinite regulation of the mixed water temperature in the range from 20 – 70 °C
- Protection against scalding; the NovaMix High Capacity model closes tightly
- Special design with anti-scalding device
- Can be used in panel heating systems and for loading storage tanks by means of solid-fuel boilers

OPERATION

The mixing valve is supplied with hot water from the storage tank and cold water from the mains network.
The temperature of the mixed water is detected by the thermostatic expansion element. If the mixed water temperature diverges from the target value, the thermostatic expansion element moves the regulator piston, thus regulating the hot and cold water intake quantity accordingly, until the mixed water temperature corresponds to the target value.

BUILDING CATEGORIES

For pipe installations in drinking water and heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Adjustable temperature range: 20 – 70 °C
- k_{VS} values and dimensions as per the relevant tables
- Operating temperature $T_{0\,max}$: 90 °C
- Max. operating pressure $P_{0\,max}$: 10 bar
- Temperature stability for mixing: max. 4 K (for change in hot water temperature: 20 K)
- Locking function in the event of failure of the cold water supply
- Weight: 0.9 kg
- Recommended minimum tap flow rate: 5 l/min
- Male thread G (cylindrical) to ISO 228
- Noise class 2
- Installation position: can be installed in any position

Material

- Housing and inner parts: brass (resistant to dezincification)
- Seals: EPDM, NBR
- Housing with lime resistant-coating

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)

Special application

- Diverting function possible (inflow via a mixing gate)

APPROVALS / CERTIFICATES

- ACS, KTW, W270

NOTE

The brochure „NOVAMIX ONE RANGE - NEW APPLICATIONS“ contains additional information on the various applications of Taconova mixing valves.

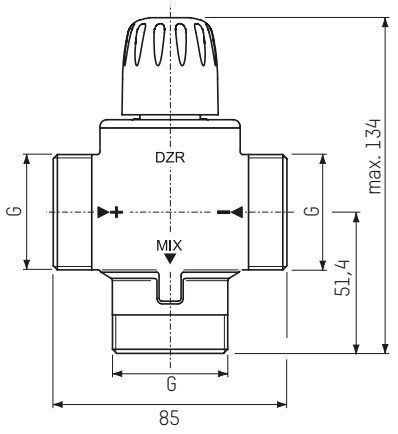
TYPE OVERVIEW

NovaMix High Capacity | Thermostatic mixing valve for storage water heating unit, temperature range 20 – 70 °C

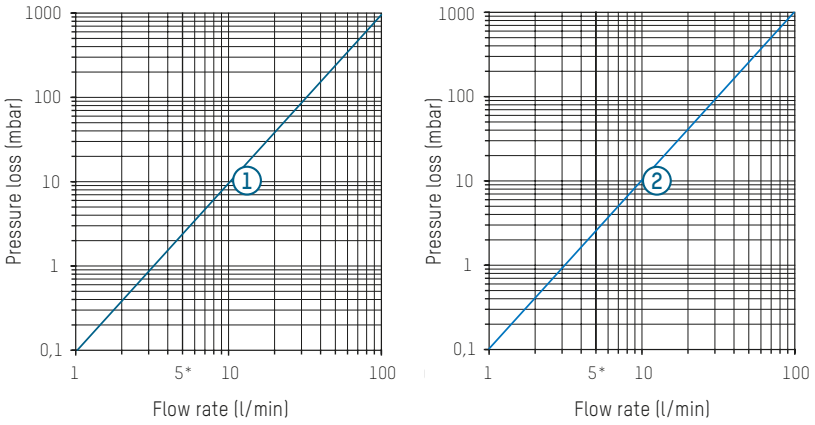
Order no.	DN	G	E (l/min)	k_{VS} 1	k_{VS} 2
252.6034.107	25	1 ¼"	102	6,1	5,9

E = Extracted (outlet) quantity at Δp = 1,0 bar
k_{VS} 1 = without check valve
k_{VS} 2 = with check valve

DIMENSIONAL DRAWING



PRESSURE LOSS DIAGRAMS



1 252.6034.107 without check valve: k_{VS} = 6,1
2 252.6034.107 with check valve: k_{VS} = 5,9
* Recommended minimum tap flow rate

ACCESSORIES

INSULATION BOX

Order no.	DN
296.2328.000	25

CONNECTION SET FOR THREADED PIPE

Order no.	DN	G x R
210.6633.000	25	1¼" x 1"

CONNECTION SET FOR THREADED PIPE WITH CHECK VALVE

Order no.	DN	G x R
296.5205.003	25	1¼" × 1"

SPARE PARTS

REGULATING PISTON WITH THERMOSTATIC ELEMENT

Order no.
298.5268.000

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOVENT HYVENT

FLOAT AIR VENTILATOR

ADVANTAGES

- Automatic air venting of systems during filling or normal operation
- Automatic aerating at draining
- Trouble-free replacement of the float vent valve under full system pressure thanks to a check valve
- Time saving installation of the float vent valve with the automatic check valve

Permanent and automatic venting and aerating.

DESCRIPTION

The valve automatically vents and provides air from and to hydraulic systems such as heating, cooling, air conditioning and sanitary equipment on a continual basis.
The combination of an air separator with the aerating and venting greatly increases the efficiency of the venting operation. The automatic self-sealing check valve prevents water from escaping from the mains should the vent valve need to be replaced.

INSTALLATION POSITION

Vertically upwards.

OPERATION

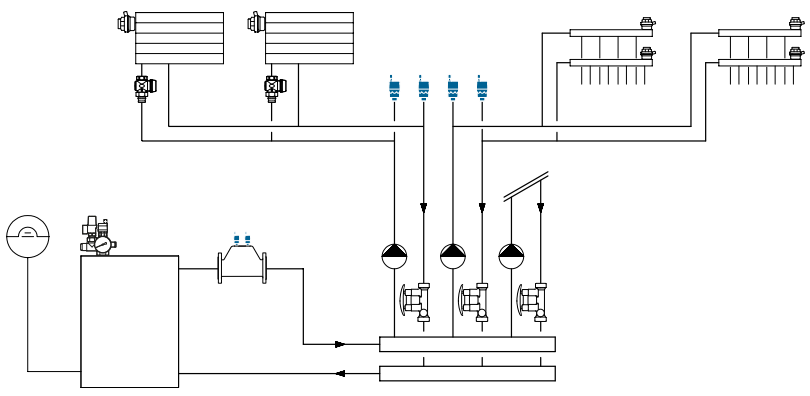
The ventilation valve is closed by means of a float. If air collects in the cup, the float sinks and releases the ventilation valve.
The accumulated air escapes until the (inflowing) water pushes the floater down again and the valve closes.
The water once more presses the float against the ventilation valve, and closes the latter. In combination with an upstream TacoVent AirScoop, this guarantees efficient separation of the air-water mixture, and the system is rapidly and automatically vented.

BUILDING CATEGORIES

For pipe installations in heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



TACOVENT HYVENT | FLOAT AIR VENTILATOR

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 115 °C
- Operating pressure $P_{0\,max}$: 10 bar
- Exterior threads:
  G ⅜" and G ½" as per ISO 228

Material

- Internal parts: Plastic, stainless steel
- Housing: Brass
- Seals: EPDM, NBR, silicone

Fluids

- Heating water
  (VDI 2035; SWKI BT 102-01;
  ÖNORM H 5195–1)

TYPE OVERVIEW

TacoVent HyVent | Float air ventilator DN10

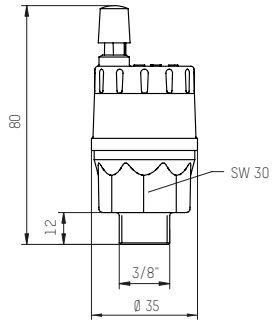
Order no.	G¹	Automatic check valve
242.5072.001	⅜"	-
242.5072.002	⅜"	⅜"
242.5072.021	⅜"	½"

Automatic check valve DN10

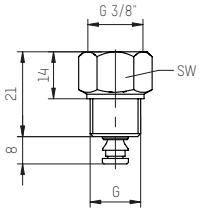
Order no.	G¹ × G²	To be used with
220.5235.000	⅜" × ⅜"	242.5072.001, 242.5072.002
220.5236.000	⅜" × ½"	242.5072.001, 242.5072.021

DIMENSIONAL DRAWING

Float air ventilator DN10



Automatic check valve DN10

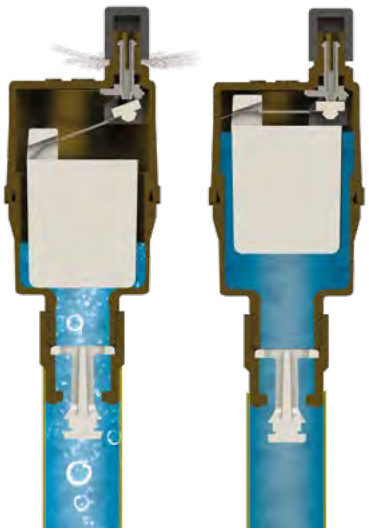


MEASUREMENT TABLE

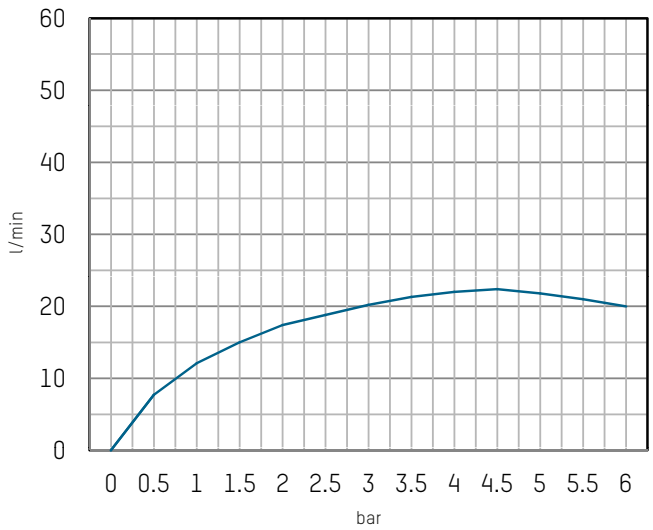
Check valve DN10

Order no.	G	SW
220.5235.000	⅜"	19
220.5236.000	½"	21

OPERATION PRINCIPLE



VENTING CAPACITY (DRY VENTING)



CONTACT AND FURTHER INFORMATION

TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

taconova

TACOVENT VENT

HEATING RADIATOR VENT VALVES

ADVANTAGES

- Reliable, long-life operation
- Versatile application in water-ducting systems
- Additional manual quick-venting
- Built-in automatic check valve requires no draining of the system in case of replacement of the valve insert
- Small and compact design
- Saving of energy by optimal vented system

Permanent and automatic venting.

DESCRIPTION

The TacoVent Vent valves can be used in all systems of water.
The valve automatically vents hydraulic systems such as heating radiators, pipe manifolds, pipes, boilers, reservoirs and underfloor heating manifolds on a continuous basis.
This automatic function improves operational safety (corrosion reduction) and enhances the user's comfort (no airborne noises).
The manual quick-venting allows the fast filling in of the system due to the venting capacity.

INSTALLATION POSITION

Vertically upwards and horizontally.

OPERATION

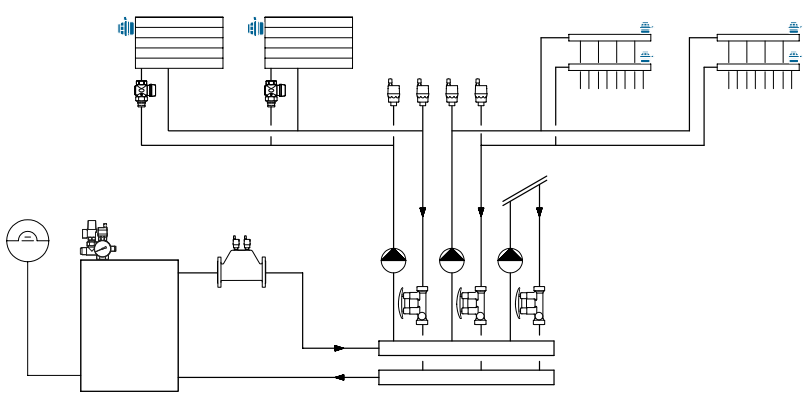
The automatic operation of the vent valve relies on the special swelling discs built in the valve insert.
In dry conditions, the swell discs allow air and gas to escape. The immediate swelling prevents water leakage.
Manual air venting is achieved by undoing the knurled screw and allowing air and gas to escape.
Replacement of the valve insert (including seal and swelling discs) is possible due to the automatic check valve integrated in the vent valve.
At the first start of operation, it's possible that a few drops come out as long as the swelling discs are dry. This doesn't occure in operation.

BUILDING CATEGORIES

For pipe installations in heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 115 °C
- Operating pressure $P_{0\,max}$: 8.5 bar
- Nominal width:
  - 1/8" – 3/8"
  - ½" self-sealing (O-ring)

Material

- Valve body: brass nickel-plated
- Valve insert: brass nickel-plated
- Automatic check valve: stainless steel
- Seals: silicone, EPDM

Fluids

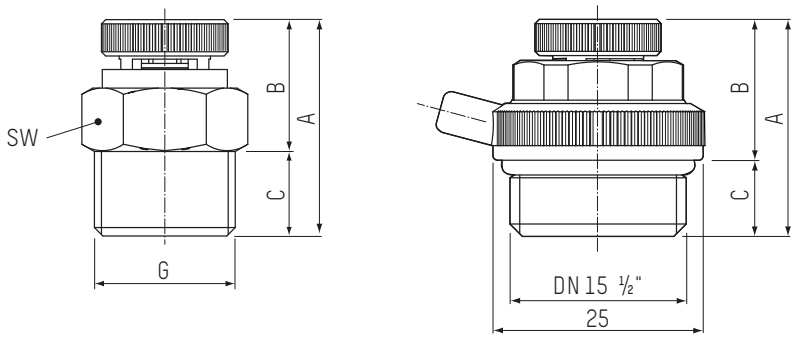
- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Water free of chemical additives

TYPE OVERVIEW

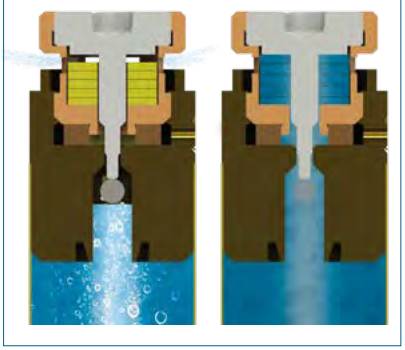
TacoVent Vent | Heating Radiator Vent Valves

Order no.	DN	G	Self-sealing
240.5417.000	6	1/8"	-
240.5418.000	8	¼"	-
240.5419.000	10	3/8"	-
240.5420.000	15	½"	✓

DIMENSIONAL DRAWING



OPERATION PRINCIPLE

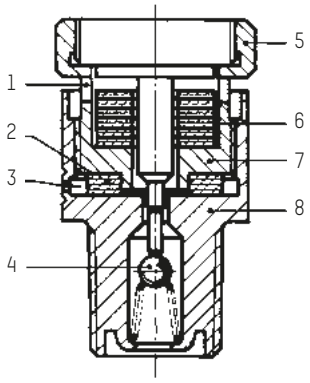


MEASUREMENT TABLE

TacoVent Vent | Heating Radiator Vent Valves

Order no.	G	A	B	C	SW
240.5417.000	1/8"	26	16	10	14
240.5418.000	¼"	26	16	10	14
240.5419.000	3/8"	26	16	10	17
240.5420.000	½"	26	17	9	19

SECTIONAL DRAWING



1 Air outlet of automatic venting
2 Seal
3 Air outlet of manual venting
4 Automatic check valve
5 Head of valve insert for manual venting
6 Swelling discs
7 Valve insert
8 Valve body

SPARE PART

COMPLETE VALVE INSERT

Order no.	Version
298.4001.000	Including seal and swelling discs

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

TACOVENT AIRSCOOP D

AIR SEPARATOR

ADVANTAGES

- High air separation capacity
- Strong robust design
- Service and maintenance-free structure
- Two models for horizontal or vertical installation
- Additional connection for safety valve available from dimension 3"

Permanent air separation.

DESCRIPTION

The air separator is fitted in the inlet pipe immediately behind the heating source. This is the point with the highest concentration of air and gas driven out of the water.
The expansion occurring inside the AirScoop and the built-in deflectors speed up the process of separating air and water.
When combined with the float air vent TacoVent HyVent, this system ensures air separation as well as elimination.

TacoVent AirScoop DV is recommended for venting in vertical pipes. The air separated from the medium and collected in the bottle can be vented sporadically via the vent valve.

INSTALLATION POSITION

The horizontal variant may only be installed horizontally and the vertical variant may only be installed vertically. The direction of flow must be kept in mind.

OPERATION

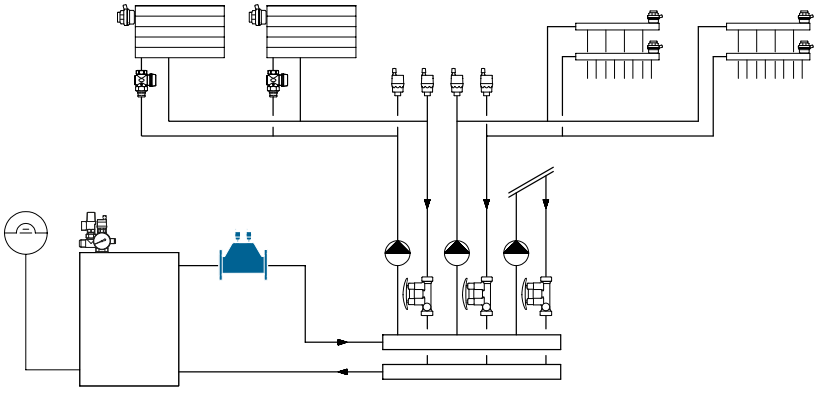
The air expelled from the water into the heating circuit enters the air separator device as air bubbles. The flow-deflector in the housing drives the air bubbles to the top. The collected air is either automatically vented via the TacoVent HyVent (AirScoop horizontal) or manually via the vent valve (AirScoop vertical). The air-separation capacity can be increased by installing a straight piece of piping of approx. 0.5 m in length upstream the separator.

BUILDING CATEGORIES

For pipe installations in heating area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities, hospitals
- Administration and service buildings
- Hotels and restaurants
- School buildings and sports facilities
- Commercial and industrial buildings

SYSTEM/BASIC DIAGRAM



AIRSCOOP HORIZONTAL

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\ max}$: 135 °C with float vent valve $T_{0\ max}$: 115 °C
- Operating pressure $P_{0\ max}$: 10 bar

Material

- Housing in cast iron GG 25, lacquered

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)

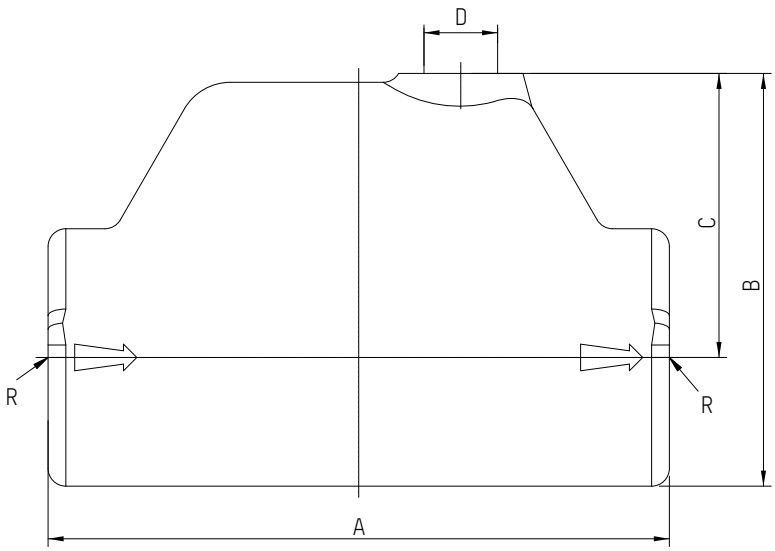
TYPE OVERVIEW

TacoVent AirScoop DH | Air separator (horizontal), thread connection

Order no.	DN	Rp	Zeta ζ	k_v (m³/h)	Weight
243.5001.000	20	¾"	1,1	17,1	0,6 kg
243.5002.000	25	1"	1,0	28,8	0,8 kg
243.5003.000	32	1¼"	1,0	50,4	1,6 kg
243.5004.000	40	1½"	1,1	64,4	3,2 kg
243.5005.000	50	2"	0,84	114,0	3,2 kg
243.5006.000	65	2½"	0,67	237,0	6,8 kg

OPERATION PRINCIPLE

DIMENSIONAL DRAWING



MEASUREMENT TABLE

TacoVent AirScoop DH | Air separator (horizontal)

Order no.	R	A	B	C	D
243.5001.000	Rp ¾"	110	69	48	Rp ⅜"
243.5002.000	Rp 1"	120	79	55	Rp ⅜"
243.5003.000	Rp 1¼"	140	93	64	Rp ⅜"
243.5004.000	Rp 1½"	160	96	64	Rp ⅜"
243.5005.000	Rp 2"	228	120	80	Rp ⅜"
243.5006.000	Rp 2½"	235	144	95	Rp ⅜"

ACCESSORIES

TACOVENT HYVENT

See separate data sheet

Order no.	DN	G	Version
242.5072.001	10	⅜"	without automatic check valve
242.5072.002	10	⅜"	with automatic check valve

AIRSCOOP VERTICAL

SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\,max}$: 160 °C
- Operating pressure $P_{0\,max}$: 8 bar

Material

- Black steel, stove enamelled

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Water and proprietary additives used against corrosion and freezing up to 50%

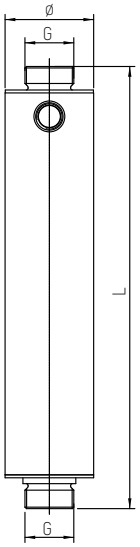
OPERATION PRINCIPLE

TYPE OVERVIEW

TacoVent AirScoop DV | Ventilating flask (vertical)

Order no.	DN	G	k_V (m³/h)
296.7043.000	25	1"	11,1

DIMENSIONAL DRAWING



MEASUREMENT TABLE

TacoVent AirScoop DV | Ventilating flask, vertical

Order no.	G × G	ø	L
296.7043.000	1"×1"	60,3 mm	301

CONTACT AND FURTHER INFORMATION TACONOVA.COM

Taconova Group AG | Neunbrunnenstrasse 40 | CH-8050 Zurich | T +41 44 735 55 55 | F +41 44 735 55 02 | group@taconova.com

ENGINEERING
TOMORROW

Data sheet

Pressure independent balancing and control valve AB-QM DN 10-250

The AB-QM valve equipped with an actuator is a control valve with full authority and an automatic balancing function / flow limitation. Typical applications are: Temperature control with permanent automatic balancing on terminal units (chillers, air-handling units, fan coils, induction units, radiation panels and heat exchangers).

Description

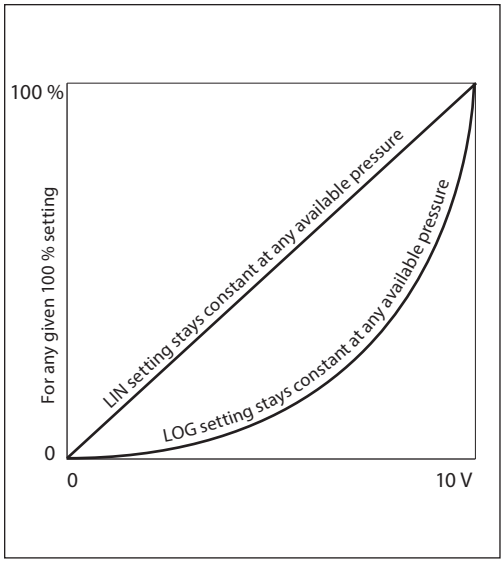
The **precise flow control performance** of the AB-QM with a Danfoss actuator provides increased comfort and **superior Total Cost of Ownership** because of savings made on:

- Efficient energy transfer and minimal pumping costs since there are no overflows at partial loads because of the exact pressure independent flow limitation.
- Smaller pump investments and lower energy consumption as the pump head needed is lower than in the traditional setup. With the built in test plugs it is easy to troubleshoot and find the optimal setpoint for the pump.
- Reduced movements of the actuator since the built-in differential pressure controller ensure the pressure fluctuations do not influence the room temperature.
- Achieving a stable temperature in a room leading to a lower average temperature at the same comfort level.
- Minimal flow complains, as the valve performs as designed.
- Minimal blockage complains, as the membrane design makes AB-QM less susceptible to blockage than a cartridge type constriction.
- Trouble-free segmentation of the building project. When sections of a project are finished they can normally not be handed over to the customer with a fully functional HVAC installation. However the AB-QM with a Danfoss actuator will automatically control the flow, even when other parts of the installation are still unfinished. It's not needed to adjust the AB-QM after finalisation of the project.
- Commissioning costs, the costs are close to zero because of a convenient setting procedure without the need for flow charts, calculations or measuring equipment. The AB-QM valves can be set to a precise design value even when the system is up and running.
- Halved mounting costs as the AB-QM valve covers two functions, Balancing & Control

Control performance

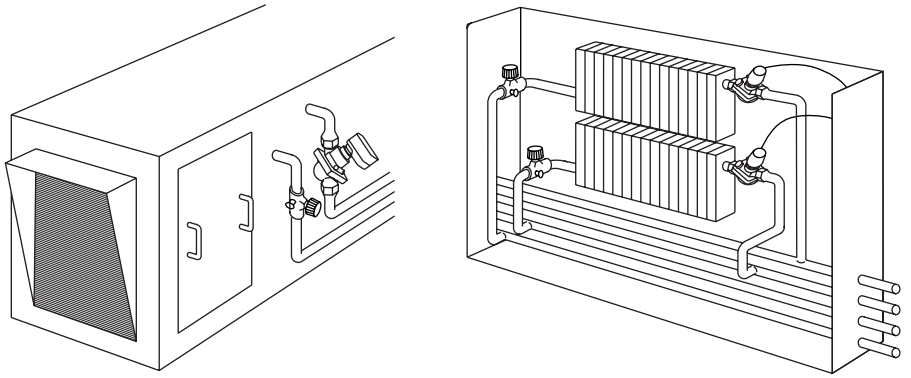
The AB-QM has a linear control characteristic. The AB-QM is pressure independent which means that the control characteristic is independent from the available pressure and is not influenced by a low authority.
The flow limitation on the AB-QM is achieved by limiting the stroke and the Danfoss actuators calibrate to the stroke of the valves. This means that the AB-QM keeps its linear characteristic independent of the setting or differential pressure.

Because of the predictable characteristic the actuators on the AB-QM can be used to change the response from linear to logarithmic (equal percentage). That makes the AB-QM suitable for all applications, including AHUs, where the equal percentage characteristic is needed to get a stable control loop. The actuators can be switched from linear to logarithmic by changing a dipswitch setting on the actuator.



Applications

- variable flow systems

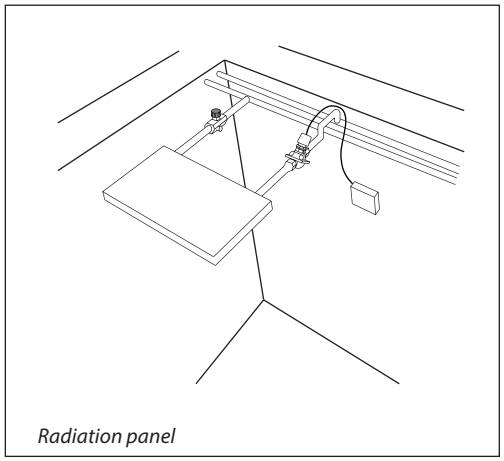


Air handling unit (AHU) / fan coil unit (FCU)

An AB-QM with a Danfoss actuator is used as a control valve for terminal units, like an AHU (Air Handling Unit), FCU (Fan Coil Unit) or radiation panel. The AB-QM ensures and control the required flow on every terminal unit and maintains Hydronic balance in the system.

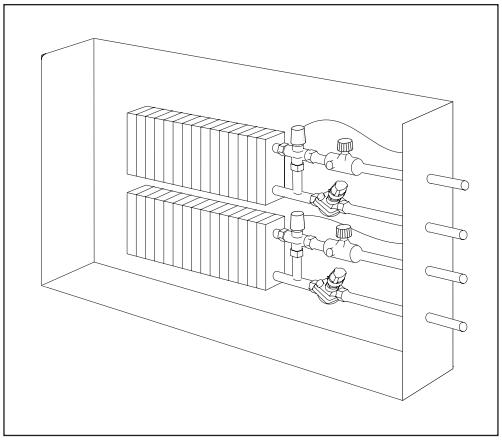
Because of the integrated differential pressure controller the control valve always has 100 % authority and therefore offers always stable control. At partial load there is no overflow, contrary to conventional solutions, because the AB-QM will always limit the flow to exactly what is needed. By installing the AB-QM the whole system is divided in completely independent control loops.

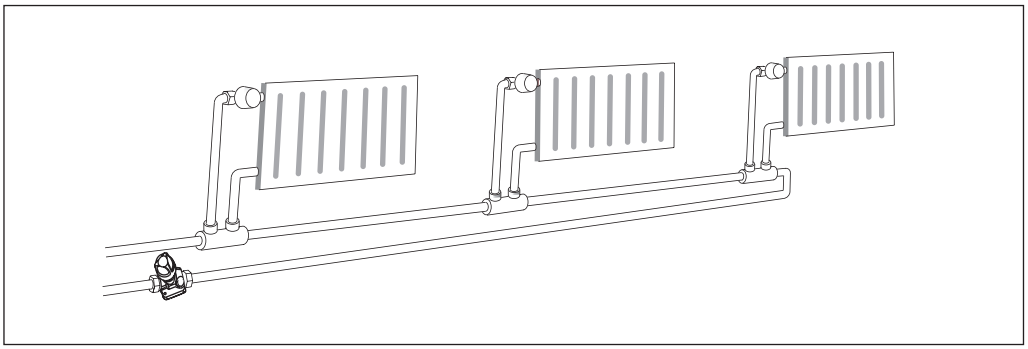
There is a full range of Danfoss actuators available for the AB-QM, suitable for every control strategy. Actuators are available for On/Off, 0-10 Volt, 4-20 mA or floating point.



Radiation panel

Applications
- constant flow systems





In constant flow system with FCUs or in a one pipe heating system the AB-QM can be installed as an automatic balancing valve in every riser. The AB-QM limits the flow to the set value, thus automatically achieving hydronic balance in the system.

There are numerous applications in which AB-QM can be used. Every time you need an automatic flow limiter or a control valve you can take advantage of the cost-saving properties of the AB-QM. That includes systems with (floor) heating/cooling, concrete core activation or radiation panels.

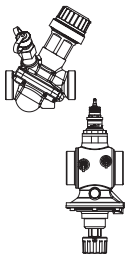
Note: For more application examples please contact your local Danfoss organization.

Easy implementation

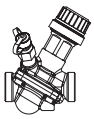
- No Kv or authority calculations needed. Flow is the only parameter to be considered when designing.
- The AB-QM always fits the application because the maximum setting of the AB-QM corresponds with international standards for flow velocity in pipes.
- The AB-QM can be used for all HVAC applications since it can have a linear or logarithmic characteristic when combined with thermal electric or gear actuators.
- Compact design, essential when only limited space is available. For example in fan-coil units.
- Easy commissioning. No specialized staff or measuring equipment needed.
- Easy trouble shooting.
- Fast start-up because AB-QM valves don't need to be flushed or de-aired before use.
- Trouble-free segmentation of the building project. The AB-QM will automatically control the flow, even when parts of the installation are still unfinished. It's not needed to adjust the AB-QM after finalisation of the building project.

Ordering

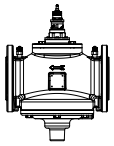
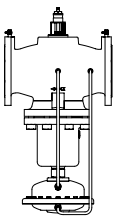
AB-QM threaded version (with test plugs and without test plugs)

Picture	DN	$Q_{nom.}$ (l/h)	Ext. thread (ISO 228/1)	Code No.	AB-QM	Ext. thread (ISO 228/1)	Code No.
	10 LF	150	G ½A	**003Z1261**		G ½A	**003Z1251**
	10	275		**003Z1211**			**003Z1201**
	15 LF	275	G ¾A	**003Z1262**		G ¾A	**003Z1252**
	15	450		**003Z1212**			**003Z1202**
	15 HF	1,135					**003Z1222**
	20	900	G 1A	**003Z1213**		G 1A	**003Z1203**
	20 HF	1,700					**003Z1223**
	25	1,700	G 1 ¼A	**003Z1214**		G 1 ¼A	**003Z1204**
	25HF	2,700					**003Z1224**
	32	3,200	G 1 ½A	**003Z1215**		G 1 ½A	**003Z1205**
	32 HF	4,000					**003Z1225**
	40	7,500	G 2A	**003Z0770**	*AB-QM (DN 10-32) can not be upgraded to AB-QM with test plugs!*		
	50	12,500	G 2 ½A	**003Z0771**			

AB-QM industry pack (with test plugs and without test plugs)

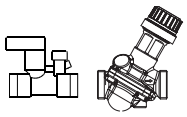
Picture	DN	$Q_{nom.}$ (l/h)	Ext. thread (ISO 228/1)	Code No.	AB-QM	Ext. thread (ISO 228/1)	Code No.
	10 LF	150	G ½A	**003Z1761**		G ½A	**003Z1751**
	10	275		**003Z1711**			**003Z1701**
	15 LF	275	G ¾A	**003Z1762**		G ¾A	**003Z1752**
	15	450		**003Z1712**			**003Z1702**
	20	900	G 1A	**003Z1713**		G 1A	**003Z1703**

AB-QM flanged version

Picture	DN	$Q_{nom.}$ (l/h)	Flange connection	Code No.
	50	12,500	PN 16	**003Z0772**
	65	20,000		**003Z0773**
	65 HF	25,000		**003Z0793**
	80	28,000		**003Z0774**
	80 HF	40,000		**003Z0794**
	100	38,000		**003Z0775**
	100 HF	59,000		**003Z0795***
	125	90,000		**003Z0705**
	125 HF	110,000		**003Z0715**
	150	145,000		**003Z0706**
	150 HF	190,000		**003Z0716**
	200	200,000		**003Z0707**
	200 HF	270,000		**003Z0717**
	250	300,000		**003Z0708**
	250 HF	370,000		**003Z0718**

* Will be available in April 2017

Set-pack (one MSV-S and one AB-QM without test plugs)

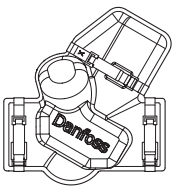
Picture	DN	$Q_{nom.}$ (l/h)	Ext. thread (ISO 228/1)	Code No.
	15 LF	275	G ¾ A	**003Z1238**
	15	450		**003Z1242**
	20	900	G 1 A	**003Z1243**
	25	1,700	G 1 ¼ A	**003Z1244**
	32	3,200	G 1 ½ A	**003Z1245**

Ordering *(continuous)*

Accessories & spare parts

Type	Comments		Code No.
	To pipe	To valve	
Union connection (CW617N) (1 pcs.) 	R 3/8	DN 10	003Z0231
	R 1/2	DN 15	003Z0232
	R 3/4	DN 20	003Z0233
	R 1	DN 25	003Z0234
	R 1 1/4	DN 32	003Z0235
	R 1 1/2	DN 40	003Z0279
	R 2	DN 50	003Z0278
Tailpiece welding (W. Nr. 1.0308) (1 pcs.) 	Weld.	DN 15	003Z0226
		DN 20	003Z0227
		DN 25	003Z0228
		DN 32	003Z0229
		DN 40	003Z0270
		DN 50	003Z0276
Tailpiece welding - INOX (W. Nr. 1.4404) (1 pcs.) 	Weld.	DN 15	003Z1271
		DN 20	003Z1272
		DN 25	003Z1273
		DN 32	003Z1274
		DN 40	003Z1275
		DN 50	003Z1276
Tailpieces for soldering (CW614N) (2 nuts, 2 gaskets, 2 soldering plugs	12×1 mm	DN 10	065Z7016
	15×1 mm	DN 15	065Z7017
Shut-off & protection piece (max. closing pressure 16 bar)		DN 10-32	003Z1230
Shut-off - plastic (max. closing pressure 1 bar)			003Z0240
Handle AB-QM (necessary accessory if installing valve without actuator)		DN 40-100	003Z0695
		DN 125-150	003Z0696
		DN 200-250	003Z0697
Adapter for AB-QM DN 10, G ½ internal thread for AB-QM, G 3/8 internal thread (1 pcs.)			003Z3954
Adapter for AB-QM DN 15, G ¾ internal thread for AB-QM, G ¾A external thread (1 pcs.)			003Z3955
Adapter for AB-QM DN 20, G 1 internal thread for AB-QM, G 1A external thread (1 pcs.)			003Z3956
Adapter for AB-QM DN 25, G 5/4 internal thread for AB-QM, G 5/4A external thread (1 pcs.)			003Z3957
Adapter AMV(E) 25/35 (AB-QM DN 40-100, 2nd. generation)			003Z0694
Adapter AME 435 for AB-QM DN 40-100 (1st. generation)			065Z0313
Locking ring AB-QM DN10-32 (5 pcs.)			003Z1236
Stroke limiter - TWA (5 pcs. in a bag)			003Z1237
Adapter AME 13 SU for AB-QM (1st. generation)			003Z3959
Adapter AME 13 SU for AB-QM (2nd. generation)			003Z3960
Stem heater for AB-QM DN 40-100 / AME 15 QM			065B2171
Stem heater for AB-QM DN 40-100 / AME 435 QM			065Z0315
Stem heater for AB-QM DN 125, 150 / AME 55 QM			065Z7022

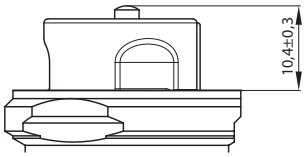
Type	Code No.
AB-QM heating insul. cap DN10	003Z4730
AB-QM heating insul. cap DN15	003Z4731
AB-QM heating insul. cap DN20	003Z4732
AB-QM heating insul. cap DN25	003Z4733
AB-QM heating insul. cap DN32	003Z4734
AB-QM heating insul. cap DN40	003Z4735
AB-QM heating insul. cap DN50	003Z4736



Type	Comments	Code No.
Refrig. instalation ABQM DN15_ABNM/TWA-Z	DN15	003Z4787
Refrig. instalation ABQM DN20_ABNM/TWA-Z	DN20	003Z4788
Refrig. instalation ABQM DN25_ABNM/TWA-Z	DN25	003Z4789
Refrig. instalation ABQM DN32_ABNM/TWA-Z	DN32	003Z4790

Type	Code No.
Set of needle plug (1 pcs.)	003Z0100
Set of ext. plug (1 pcs.)	003Z0106
Set of measuring needle (1 pcs.)	003Z0107
Elbow test plug extension (1 pcs.)	003Z3944
Straight test plug extension (1 pcs.)	003Z3945
Straight plug extension set (1 pcs.)	003Z3946

Ordering *(continuous)*



Closing point (measure) for DN 10-32

Combinations AB-QM with electrical actuators (AB-QM DN 10-100) [1]

Valve type	Stroke (mm)	TWA-Z [3]	AMI 140	ABNM	AMV 110/120 NL AME 110/120 NL	NovoCon™	AME 435 QM
		Recommended ordering code numbers (for details refer to data sheets for these actuators)					
		082F1266 NC, 230 V	**082H8048** AMI 140 24 V, 12 s/mm, 2-point control	**082F1160** Thermal act. LOG 24 V (0-10 V) **082F1161** Thermal act. LIN 24 V (0-10 V)	**082H8056** AMV 110 NL 24 V, 24 s/mm, 3-point control **082H8057** AME 110 NL 24 V, 24 s/mm, 0-10 V	**003Z8502** NovoCon® S Digital & Hybrid 24V AC/DC **003Z8503** NovoCon® S CO6, Energy, I/O 24V AC/DC	**082H0171** AME 435 QM 24 V
DN 10-20	2.25	✓	✓	✓	✓	✓	-
DN 25, 32	4.50	✓ [2]	✓	✓ [4]	✓	✓	-
DN 40, 50	10	-	-	-	-	-	✓
DN 65-100	15	-	-	-	-	-	✓

[1] Minimum recommended AB-QM setting is 20 %
[2] up to 60 % of Q_{nom}
[3] Please be aware that only this type of TWA actuator is to be used with AB-QM
[4] up to 90 % of Q_{nom}
Additional actuator's functionality available, for more info please contact your local Danfoss organization.

Combinations AB-QM with electrical actuators (AB-QM, DN 125-250)

Valve type	Stroke (mm)	AME 55 QM	AME 85 QM
		Recommended ordering code numbers (for details refer to data sheets for these actuators)	
		082H3078 24 V, 8 s/mm, 0-10 V	**082G1453** 24 V, 8 s/mm, 0-10 V
DN 125	30	✓	-
DN 150		✓	-
DN 200		-	✓
DN 250		-	✓

Operational pressure for all AB-QM valves is 6 bar. Closing pressure for all actuators is 16 bar.
Additional actuator's functionality available, for more info please contact your local Danfoss organization.

Technical data

AB-QM (*thread version)*

Nominal diameter		**DN**	**10 LF**	**10**	**15 LF**	**15**	**15 HF**	**20**	**20 HF**	**25**	**25 HF**	**32**	**32 HF**	**40**	**50**
Flow range	Q_{nom} (100 %)[1]	l/h	150	275	275	450	1,135	900	1,700	1,700	2,700	3,200	4,000	7,500	12,500
	Q_{high}[3]		180	330	330	540	1,250[4]	1,080	1,870[4]	1,870[4]	2,970[4]	3,520[4]	4,400[4]	7,500	12,500
Setting range [1, 2]		%	20-120				20-110	20-120	20-110[4]					40-100	
Diff. pressure [3, 5]	Δp_{min}	kPa	16 (18)				35 (40)	16 (18)	35 (40)	20 (25)	35 (40)	25 (30)	35 (40)	30	
	Δp_{max}		600												
Pressure stage		PN	16												
Control range			1:1000												
Control valve's characteristic			Linear (could be converted by actuator to equal percentage)												
Leakage rate with recommended actuators			No visible leakage							max. 0.05 % of Q_{nom}					
For shut off function			Acc. to ISO 5208 class A - no visible leakage												
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.												
Medium temperature		°C	–10 ... +120												
Storage and transport temp.			–40 … 70												
Stroke		mm	2.25				4	2.25	4	4.5				10	
Connection	ext. thread (ISO 228/1)		G ½ A		G ¾ A			G 1 A		G 1¼ A		G 1½ A		G 2 A	G 1½ A
	actuator		M30 × 1.5											Danfoss standard	
Materials in the water															
Valve bodies			DZR Brass (CuZn36Pb2As - CW 602N)											Grey iron EN-GJL-250 (GG25)	
Membranes and O-rings			EPDM												
Springs			W.Nr. 1.4568, W.Nr. 1.4310												
Cone (Pc)			W.Nr. 1.4305											CuZn40Pb3 - CW 614N, W.Nr. 1.4305	
Seat (Pc)			EPDM											W.Nr. 1.4305	
Cone (Cv)			CuZn40Pb3 - CW 614N												
Seat (Cv)			DZR Brass (CuZn36Pb2As - CW 602N)											W.Nr. 1.4305	
Screw			Stainless Steel (A2)												
Flat gasket			NBR												
Sealing agent (only for valves with test plugs)			Dimethacrylate Ester												
Materials out of the water															
Plastic parts			PA											POM	
Insert parts and outer screws			CuZn39Pb3 - CW 614N; W.Nr. 1.4310; W.Nr. 1.4401											-	

[1] Factory setting of the valve is done at nominal setting range.
[2] Regardless of the setting, the valve can modulate below 1 % of set flow.
[3] When set above 100 %, minimum starting pressure needed is higher, see figures in the ().
[4] Actuator with compatible stroke must be selected.
[5] At min differential pressure valve reaches at least 90% of nominal flow. Declaration of performance is available upon request.

According suitability and usage especially in not oxygen tight systems please mind the instructions given by the coolant producer.

Pc - pressure controller part
Cv - Control valve part

Technical data *(continuous)*

AB-QM (flange version)

Nominal diameter		DN	50	65	65 HF	80	80 HF	100	100 HF
Flow range	Q_{nom} (100 %) [1]	l/h	12,500	20,000	25,000	28,000	40,000	38,000	59,000
	Q_{high}		12,500	20,000	25,000	28,000	40,000	38,000	59,000
Setting range [1), 2)]		%	40-100						
Diff. pressure [3), 5)]	Δp_{min}	kPa	30		60	30	60	30	60
	Δp_{max}		600						
Pressure stage		PN	16						
Control range			Acc. to standard IEC 534 control range is high as Cv characteristic is linear. (1:1000)						
Control valve's characteristic			Linear (could be converted by actuator to equal percentage)						
Leakage rate with recommended actuators			max. 0.05 % of Q_{nom}						
For shut off function			Acc. to ISO 5208 class A - no visible leakage						
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.						
Medium temperature		°C	–10 ... +120						
Storage and transport temp.			–40 … 70						
Stroke		mm	10	15					
Connection	flange		PN 16						
	actuator		Danfoss standard						
Materials in the water									
Valve bodies			Grey iron EN-GJL-250 (GG25)						
Membranes/ Bellow			EPDM						
O-rings			EPDM						
Springs			W.Nr. 1.4568, W.Nr. 1.4310						
Cone (Pc)			CuZn40Pb3 - CW 614N, W.Nr. 1.4305						
Seat (Pc)			W.Nr. 1.4305						
Cone (Cv)			CuZn40Pb3 - CW 614N						
Seat (Cv)			W.Nr. 1.4305						
Screw			Stainless Steel (A2)						
Flat gasket			NBR						

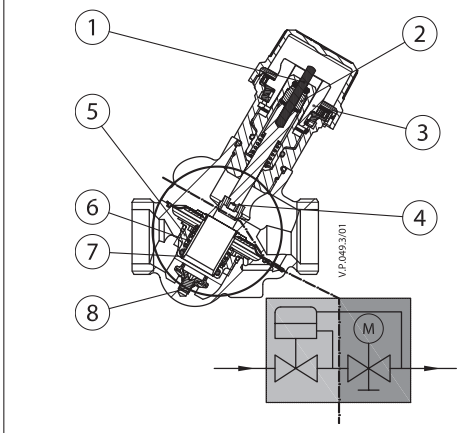
Nominal diameter		DN	125	125 HF	150	150 HF	200	200 HF	250	250 HF
Flow range	Q_{nom} (100 %) [1]	l/h	90,000	110,000	145,000	190,000	200,000	270,000	300,000	370,000
	Q_{high} [3]		100,000	120,000	160,000	209,000	220,000	300,000	330,000	407,000
Setting range [2)]		%	40-110							
Diff. pressure [3), 4), 5)]	Δp_{min}	kPa	40 (60)	60 (80)	40 (60)	60 (80)	45 (65)	60 (80)	45 (65)	60 (80)
	Δp_{max}		600	600	600	600	600	600	600	600
Pressure stage		PN	16							
Control range			1:1000							
Control valve's characteristic			Linear (could be converted by actuator to equal percentage)							
Leakage rate with recommended actuators			max.0.01 % of Q_{nom}							
Flow medium			Water and water mixture for closed heating and cooling systems according to plant type I for DIN EN 14868. When used in plant Type II for DIN EN 14868 appropriate protective measures are taken. The requirements of VDI 2035, part 1 + 2 are observed.							
Medium temperature		°C	–10 ... +120							
Storage and transport temp.			–40 … 70							
Stroke		mm	30							
Connection	flange		PN 16							
	actuator		Danfoss standard							
Materials in the water										
Valve bodies			Grey iron EN-GJL-250 (GG 25)							
Membranes/ Bellow			W.Nr.1.4571	EPDM						
O-rings			EPDM							
Springs			W.Nr.1.4401	W.Nr.1.4310						
Cone (Pc)			W.Nr.1.4404NC	W.Nr.1.4021						
Seat (Pc)			W.Nr.1.4027							
Cone (Cv)			W.Nr.1.4404NC	W.Nr.1.4021						
Seat (Cv)			W.Nr.1.4027							
Screw			W.Nr.1.1181							
Flat gasket			Graphite gasket	Non asbestos						

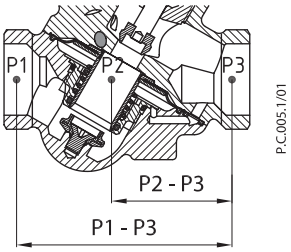
1) *Factory setting of the valve is done at nominal setting range.*
2) *Regardless of the setting, the valve can modulate below 1 % of set flow.*
3) *When set above 100 %, minimum starting pressure needed is higher, see figures in the ().*
4) *In case AB-QM is used above 400 kPa differential pressure contact Danfoss design center to assure proper design.*
5) *At min differential pressure valve reaches at least 90% of nominal flow. Declaration of performance is available upon request.*

Pc - pressure controller part
Cv - Control valve part

Design

1. Spindle
2. Stuffing box
3. Pointer
4. Control valve's cone
5. Membrane
6. Main spring
7. Hollow cone (pressure controller)
8. Vulcanized seat (pressure controller)





$\Delta p = (P1-P3)$
$\Delta p_{cv} = (P2-P3)$

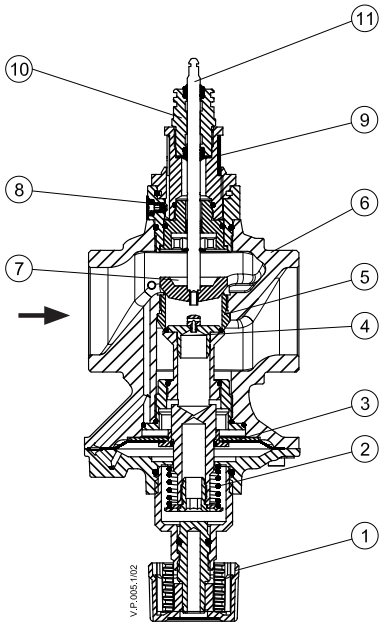
AB-QM DN 10-32

Function:
The AB-QM valve consists of two parts:
1. Differential pressure controller
2. Control valve

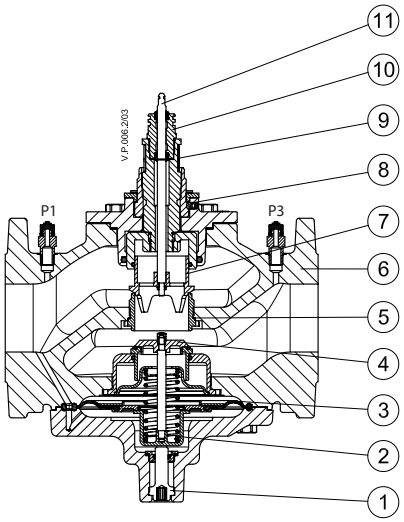
1. Differential pressure controller DPC
The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference Δp_{Cv} (P2-P3) on the membrane is balanced with the force of the spring. Whenever the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the hollow cone is displaced to a new position which brings a new equilibrium and therefore keeps the differential pressure at a constant level.

2. Control valve Cv
The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the Kv value. The percentage marked on the scale equals the percentage of 100 % flow marked on the pointer. Changing the stroke limitation is done by lifting the blocking mechanism and turning the top of the valve to the desired position, showed on the scale as a percentage. A blocking mechanism automatically prevents unwanted changing of the setting.

1. Shut off screw
2. Main spring
3. Membrane
4. DP cone
5. Seat
6. Valve body
7. Control valves cone
8. Locking screw
9. Scale
10. Stuffing box
11. Spindle



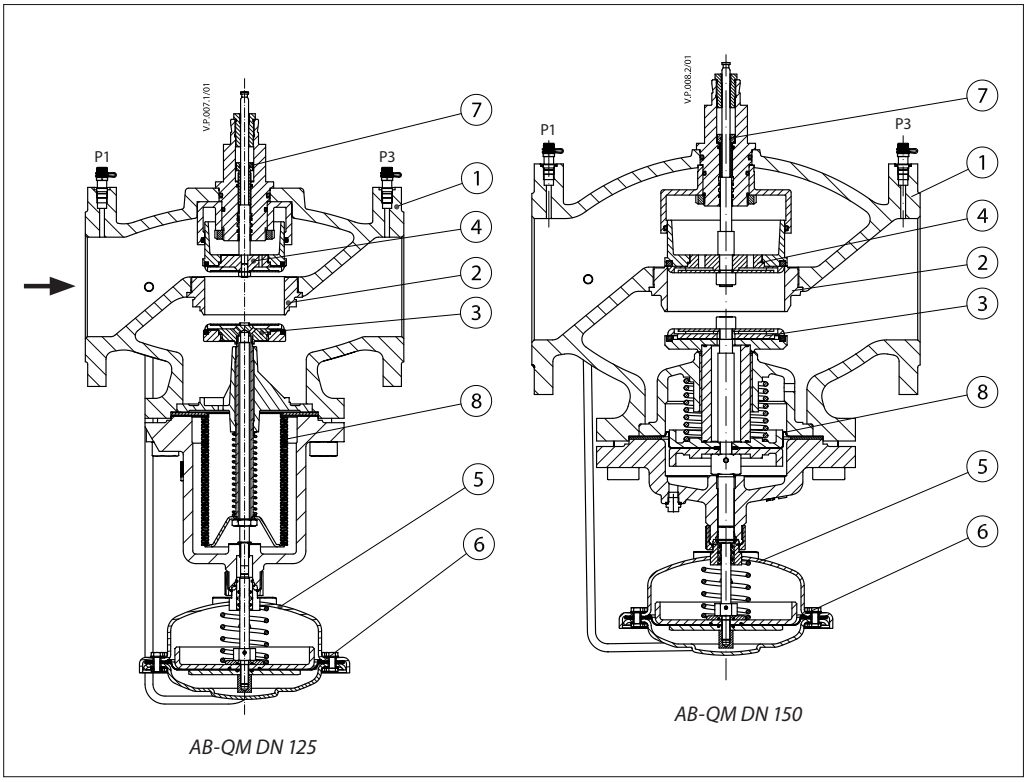
AB-QM DN 40, 50



AB-QM DN 50-100

Design *(continuous)*

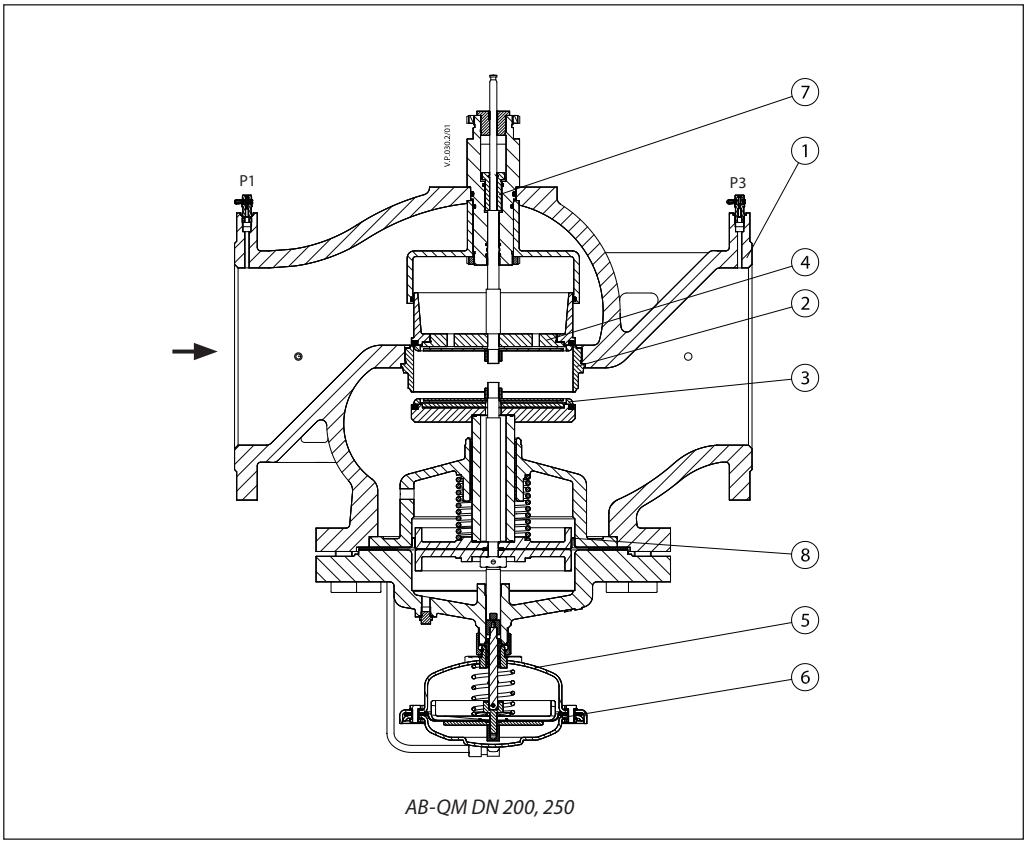
1. Valve body
2. Valve seat
3. DPC cone
4. CV cone
5. Controller casting
6. Rolling diaphragm
7. Adjusting screw
8. Bellow for pressure relief on DPC cone



AB-QM DN 125

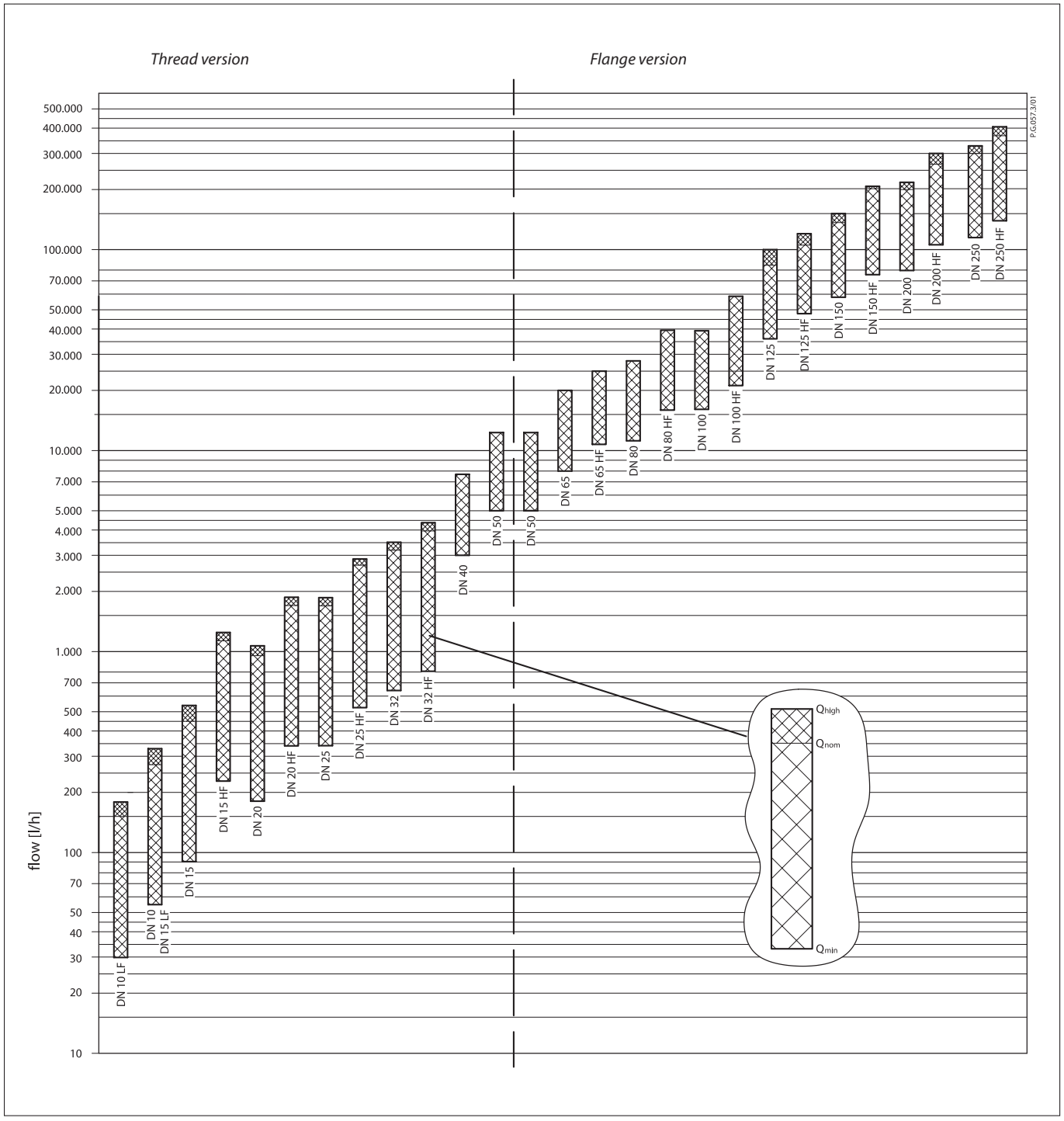
AB-QM DN 150

1. Valve body
2. Valve seat
3. DPC cone
4. CV cone
5. Controller casting
6. Rolling diaphragm
7. Adjusting screw
8. Bellow for pressure relief on DPC cone



AB-QM DN 200, 250

Sizing



Sizing *(continuous)*

Example 1: Variable flow system

Given:
Cool requirement per unit : 1000 W
Flow temperature in the system: 6 °C
Return temperature in the system: 12 °C

*Required - **control and balancing valves:***
AB-QM and actuators type for BMS system.
Solution:
Flow in the system: Q (l/h)
Q = 0.86×1000/(12–6) = 143 l/h

Selected:
AB-QM DN 10 mm with Q_{nom} = 275 l/h presetting on 143/275 = 0.52 = 52 % of nominal opening.
Actuators: AMV 110NL - 24 V
Remarks:
required minimum differential pressure across the AB-QM DN 10: 16 kPa.

Example 2: Constant flow system

Given:
Cool requirement per unit : 4000 W
Flow temperature in the system : 6 °C
Return temperature in the system : 12 °C

*Required - **automatic flow limiter:***
AB-QM and presetting.

Solution:
Flow in the system : Q (l/h)
Q = 0.86 × 4000 / (12 – 6) = 573 l/h

Selected:
AB-QM DN 20 mm with Q_{nom} = 900 l/h presetting on 573/900 = 0.64 = 64 % of maximum opening.

Remarks:
required minimum differential pressure across the AB-QM DN 20: 16 kPa.

Example 3: Sizing AB-QM according pipe dimension

Given:
Flow in system 1.4 m^3/h (1400 l/h = 0.38 l/s), pipe dimension DN 25 mm

*Required - **automatic flow limiter:***
AB-QM and presetting.

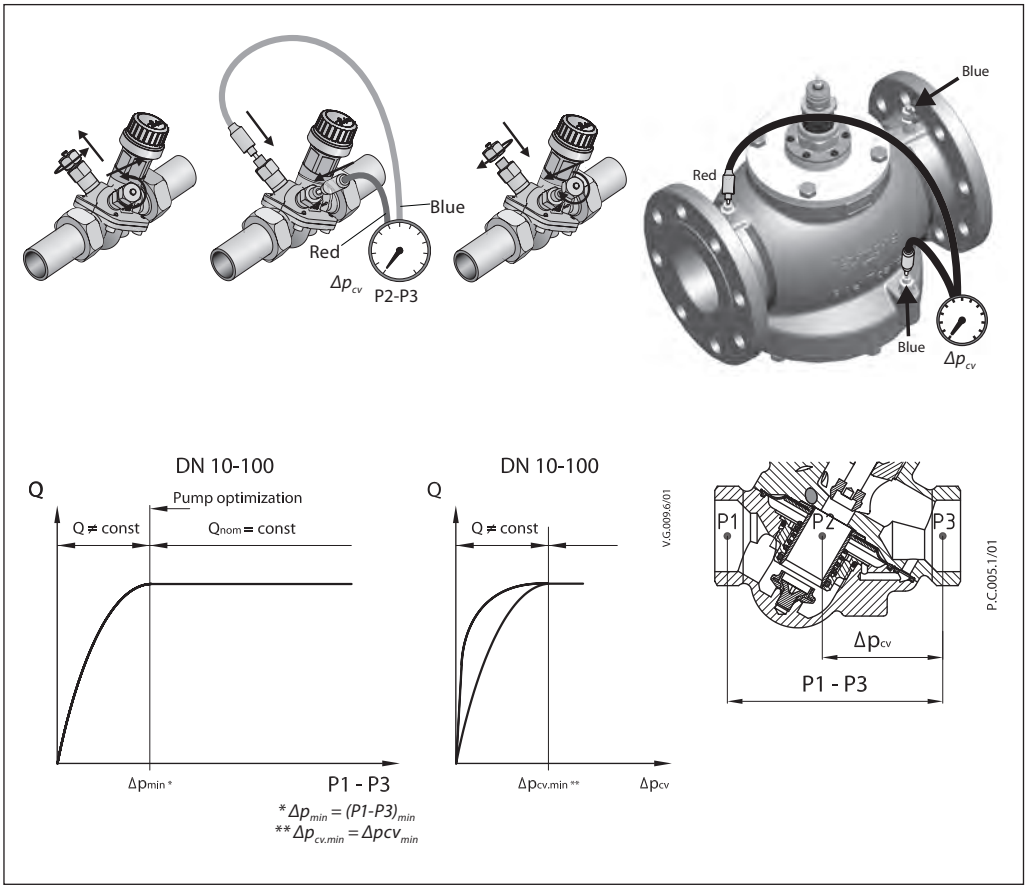
Solution:
In this case we can selected AB-QM DN 25 mm with Q_{nom} = 1700 l/h

In this case it will be recommended to check the maximum velocity in the pipe. For this we calculate velocity in the pipe for condition:
DN 25 mm – Di 27.2 mm

Dimension and condition acceptable, veloscity below 1.0 m/s.

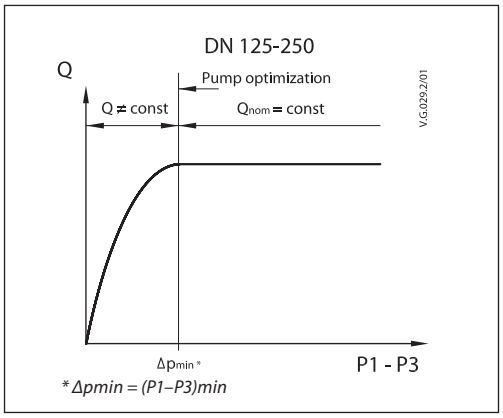
Preseting on the valve AB-QM DN 25 mm
1400/1700 = 0.82 = 82 % of nominal opening.
Remarks:
required minimum differential pressure across the AB-QM DN 25: 20 kPa.

Pump optimising / Trouble shooting



The AB-QM (DN 10-100) features test plugs that allow measuring of the pressure difference Δpcv across the control valve. If the pressure difference exceeds the minimal required pressure is operational and the flow limitation is achieved. The measuring function can be used to verify if enough pressure difference is available and thus verify the flow or measure the flow directly. For detail information how to measure flow on DN 40-250 please refer to Flow checker document.

It can also be used to optimize the pump head. The pump head can be decreased until no more than the minimal required pressure is available on the most critical valve (in terms of hydronic). This optimal point is to be found when proportionality between pump head and measured differential pressure cease to exist. Verifying the pressure can be done by using for example Danfoss PFM device (for more details please refer to AB-QM Tech Note).



Presetting

The calculated flow can be adjusted easily without using special tools.

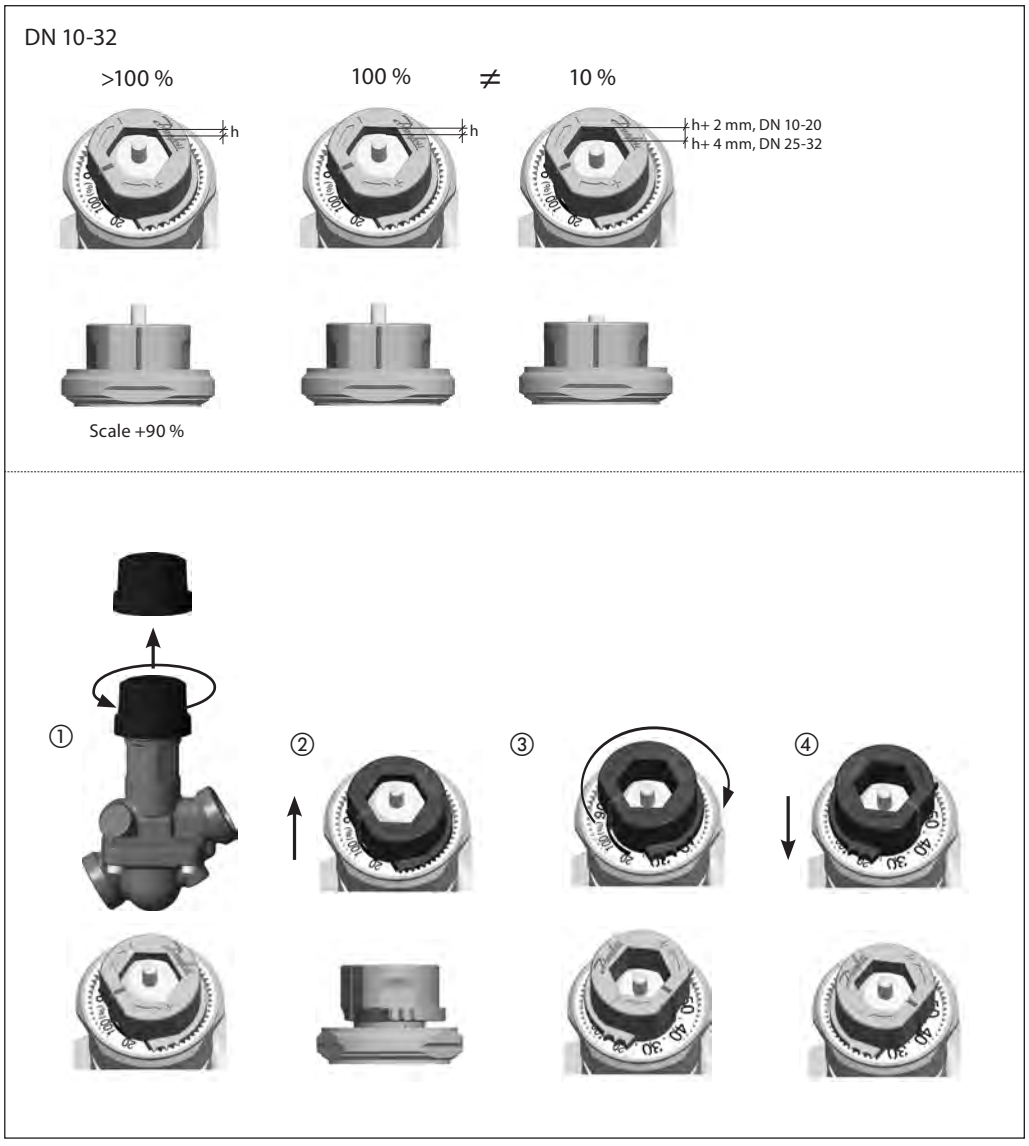
To change the presetting (factory setting is 100 %) follow the four steps below:

① Remove the blue protective cap or the mounted actuator
② Raise the grey pointer
③ Turn (clock wise to decrease) to the new presetting
④ Press grey pointer back into lock position. After click presetting is locked.

The presetting scale indicates values from 100 % flow to 0 %. Clock wise turning would decrease the flow value while counter clock wise would increase it.

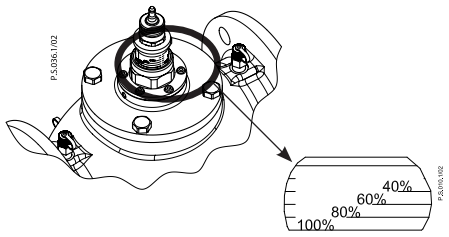
If the valve is a DN 15 then the nom flow = 450 l/h =100 % presetting. To set a flow of 270 l/h you have to set: 270/450 = 60 %.

Danfoss recomends a presetting/flow from 20 % to 100 %. Factory presetting is 100 %.



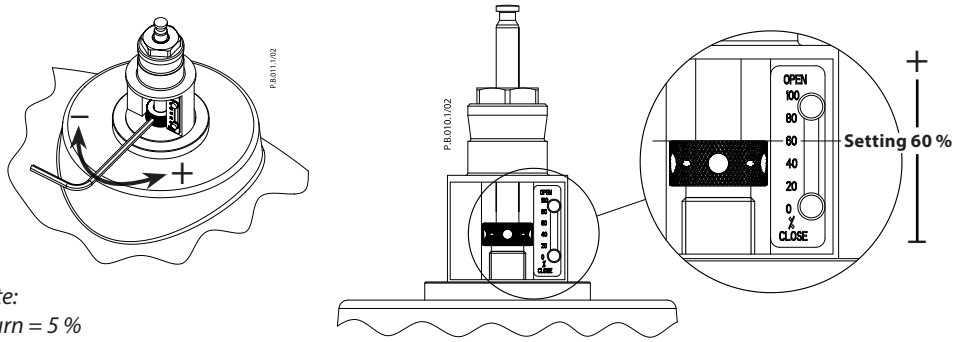
Presetting *(continuous)*

DN 40-100



Note: 1 turn = 10 %

DN 125-250



Note:
1 turn = 5 %

Service

DN 10-32
For the service shut off function, it is recommended to install the valve in the supply water pipe.

Valves are equipped with plastic protection cap. When closing against higher differential pressure please use accessory - shut-off & protection piece (003Z1230) or set the value to 0 %.

DN 40-100
For the service shut-off function, the valve can be installed in either supply or return pipe.

Valves are equipped with manual shut-off for isolating function up to 16 bar.

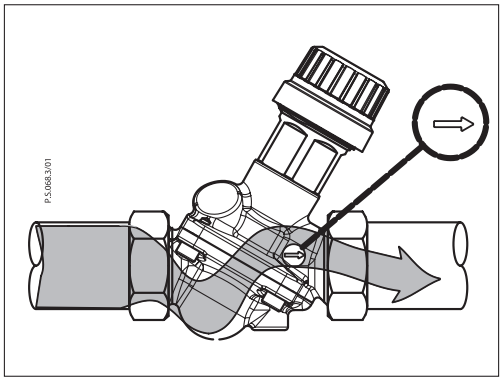
DN 125-250
For the service shut-off function, the valve can be installed in either supply or return pipe.

For shut-off set the valve to 0%.

Installing

AB-QM valve is mono-directional meaning that the valve operates when arrow on the valve body is aligned with flow direction. When this rule is disobeyed the valve acts like variable orifice that cause water hammer at sudden closing when available pressure has increased or valve have been set to lower value.

In case when system condition allows backflows it is strongly recommended to use backflow preventer in order to avoid possible water hammer that can damage the valve as well as other elements in the system.



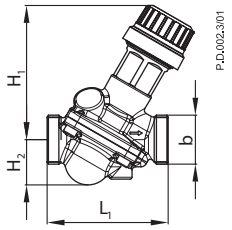
Tender text

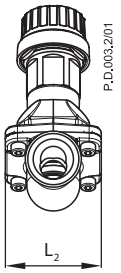
The pressure independent balancing and control valve which means that the control characteristic is independent from the available pressure. The precise flow control performance of the AB-QM with a Danfoss actuator provides increased comfort and superior Total Cost of Ownership. The AB-QM ensures and control the required flow on every terminal unit and maintains Hydronic balance in the system.

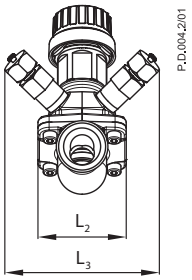
AB-QM has following features:

- Flow limitation function
- Modulating below 1% of set flow, regardless of the setting,
- Authority of 1 at all settings
- Able to close against 16 bar of differential pressure.
- Linear control characteristic
- Scale in percentage of flow
- Control ratio 1:1000
- Test plugs for pump optimization and flow verification for DN 10-250. Available in the range from DN 10 – 250 from one supplier.
- Characteristic changed from linear to equal percentage characteristic at all sizes by adjusting actuator settings.
- Lockable setting
- Leakage rate of no visible leakage for DN 10 - DN 20 in combination with recommended actuator
- Leakage of 0.05 % of the Qnom for DN 25 - DN 100 in combination with recommended actuator
- Leakage of 0.01 % of the Qnom for DN 125 - DN 250 in combination with recommended actuator

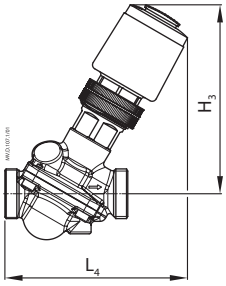
Dimensions



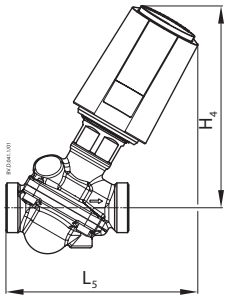




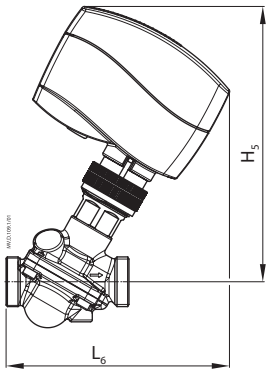
AB-QM DN 10-32



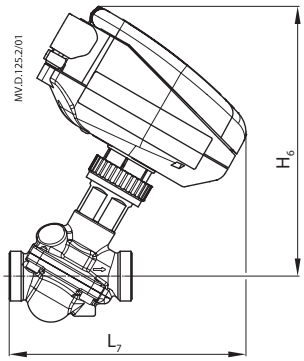
TWA-Z + AB-QM



ABNM + AB-QM

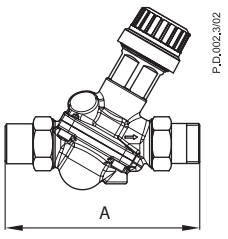


AMV (E) 110 NL + AB-QM
AMI 140 + AB-QM



NovoCon™ + AB-QM

Type	L_1	L_2	L_3	L_4	L_5	L_6	L_7	H_1	H_2	H_3	H_4	H_5	H_6	b	Valve weight
	mm													ISO 228/1	(kg)
DN 10	53	36	79	92	104	109	119	69	20	100	104	138	140	G ½	0.38
DN 15	65	45	79	98	110	116	126	72	25	102	108	141	143	G ¾	0.48
DN 20	82	56	79	107	120	125	134	74	33	105	112	143	145	G 1	0.65
DN 25	104	71	79	124	142	142	149	82	42	117	124	155	153	G 1 ¼	1.45
DN 32	130	90	79	142	154	160	167	93	50	128	136	166	164	G 1 ½	2.21

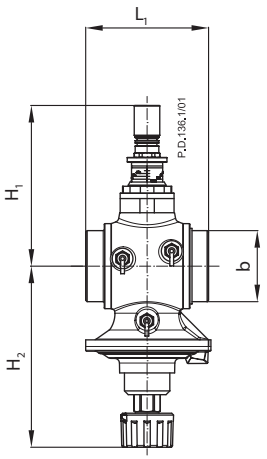


AB-QM DN 10-50

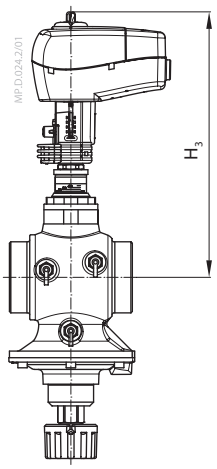
DN	Union connection A* [mm]	Tailpiece welding A* [mm]	Talpieces for soldering A* [mm]
10	79		70
15	92.5	102	87
20	112.5	124	
25	139	146	
32	168.5	172	
40	155	157	
50	187	182	

** Length is decreased with installation due to deforamtion of the gasket.*

Dimensions *(continuous)*

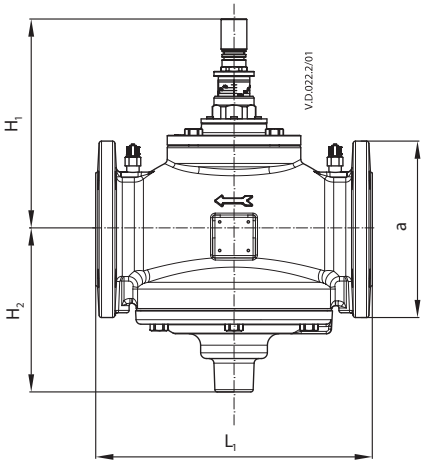


AB-QM DN 40, 50

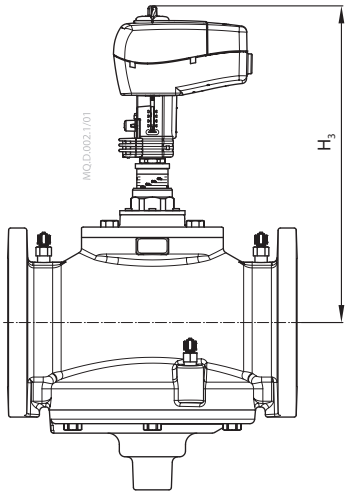


AME 435 QM + AB-QM

Type	L_1	H_1	H_2	H_3	b	Weight
	mm				ISO 228/1	kg
DN 40	110	170	174	280	G 2	6.9
DN 50	130	170	174	280	G 2 ½	7.8



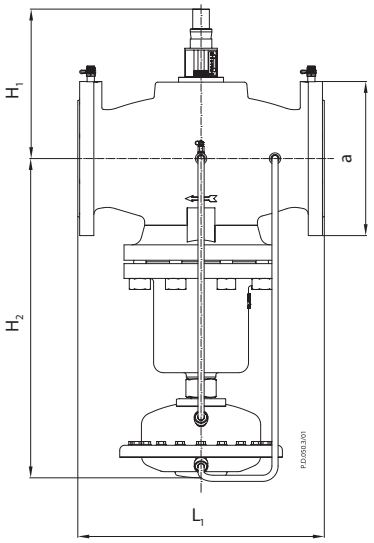
AB-QM DN 50-100



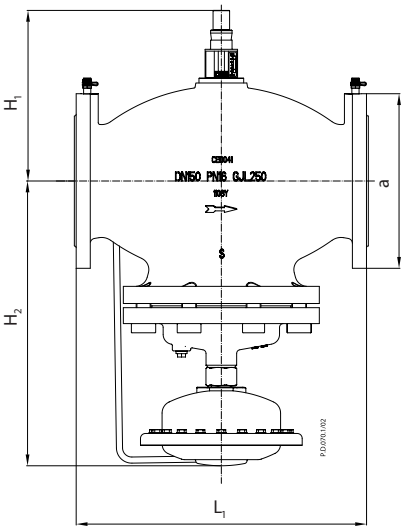
AME 435 QM + AB-QM

Type	L_1	H_1	H_2	H_3	a	Weight
	mm				(EN 1092-2)	(kg)
DN 50	230	170	174	280	165	14.2
DN 65	290	220	172	330	185	38.0
DN 80	310	225	177	335	200	45.0
DN 100	350	240	187	350	220	57.0

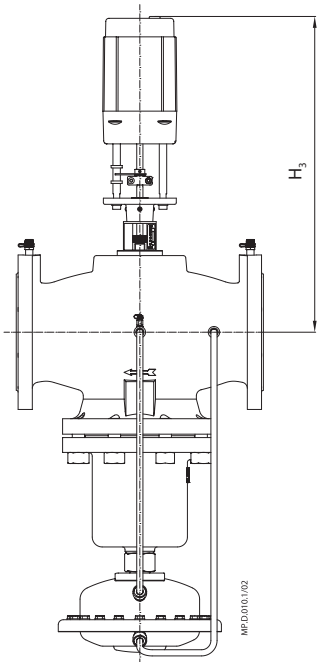
Dimensions *(continuous)*



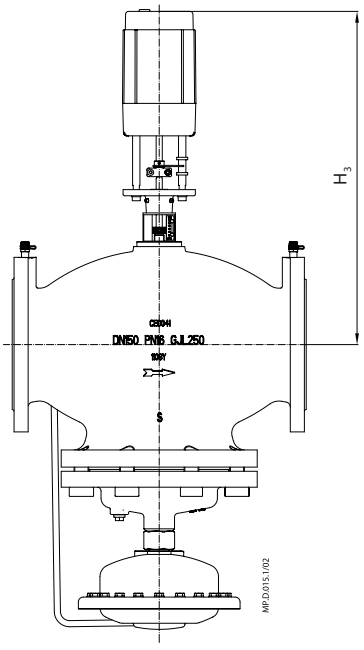
AB-QM DN 125



AB-QM DN 150



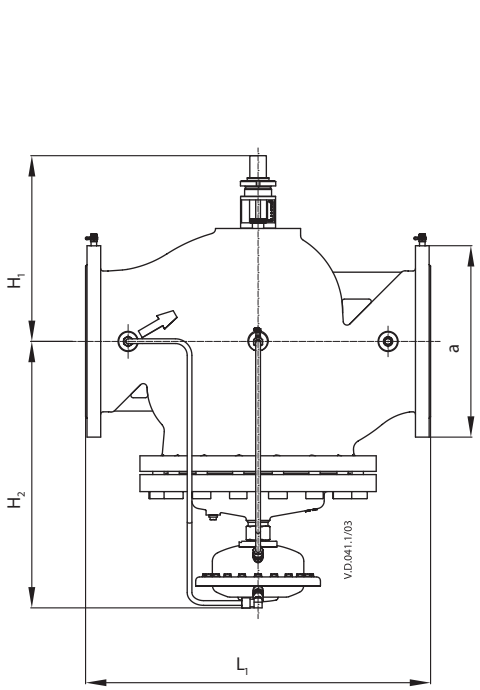
AME 55 QM + AB-QM DN 125



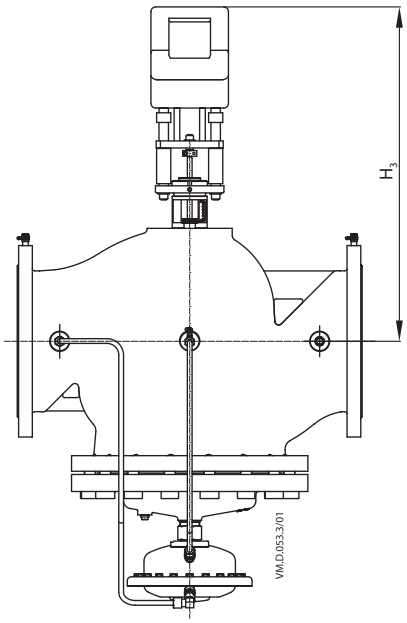
AME 55 QM + AB-QM DN 150

Type	L_1	H_1	H_2	H_3	a	Weight
	mm				(EN 1092-2)	(kg)
DN 125	400	272	518	507	250	85.3
DN 150	480	308	465	518	285	138

Dimensions *(continuous)*



AB-QM DN 200, 250



AME 85 QM + AB-QM DN 200, 250

Type	L_1	H_1	H_2	H_3	a	Weight
	mm				(EN 1092-2)	(kg)
DN 200	600	434	483	618	340	219
DN 250	730	430	533	708	405	342

Data sheet

Differential pressure controller with flow limitation and with integrated control valve (PN 16)

AHPBM-F – flow mounting, fixed setting

Description

AHPBM-F is a self-acting differential pressure controller with flow limitation primarily for use in direct-connected district heating systems ***with mixing loop only***. The controller closes on rising differential pressure or when set max. flow is exceeded.

It can be combined with Danfoss electrical actuators AMV(E) and controlled by ECL electronic controllers.

The controller has a control valve with adjustable flow restrictor, connection neck for electrical actuator, and an actuator with one control diaphragm.

Controllers are used together with Danfoss electrical actuators:
- AMV(E) 10
- AMV(E) 13 with spring return function
- AMV(E) 130, AMV(E) 140
- AMV(E) 130H, AMV(E) 140H with manual override knob

AHPBM-F combined with AMV(E) 13 has been approved according to DIN EN 14597.

Main data:
- DN 15-32
- k_{vs} 1.0-6.3 m³/h
- PN 16
- Fixed Δp setting:
  - 0.12 bar for DN 15-20
  - 0.14 bar for DN 25-32
- Temperature:
  - Circulation water / glycolic water up to 30%: 2 … 120 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)

Ordering

Example:
Differential pressure controller with flow limitation (fixed setting) and integrated control valve, DN 15, k_{vs} 1.6, PN 16, flow restrictor Δp 0.12 bar, t_{max} 120 °C, ext. thread

- *1× AHPBM-F DN 15 controller*
  Code No.: ***003L3582***

Option:
- *1× Impulse tube set AH, 1.5 m*
  Code No: ***003L8152***
- *1× Fitting for imp. tube*
  Code No: ***003L5042***
- *1× Weld-on tailpieces*
  Code No.: ***003H6908***

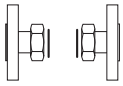
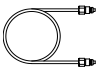
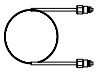
External impulse tube (AH), nipple for impulse tube and electrical actuators AMV(E) must be ordered separately.

AHPBM-F Controller

Picture	DN (mm)	k_{vs} (m³/h)	Connection		Δp setting range (bar)	Code No.
	15	1.0	Cylin. ext. thread acc. to ISO 228/1	G ¾ A	0.12	**003L3580**
		1.25				**003L3581**
		1.6				**003L3582**
	20	2.5		G 1 A		**003L3583**
	25	4.0		G 1¼ A	0.14	**003L3584**
	32	6.3		G 1¾ A		**003L3585**

Ordering *(continuous)*

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**
	Impulse tube set AH	Description: - 1× copper tube Ø 3 × 1 mm - 2× fitting for imp. tube connection to actuator and pipe G 1/16		1.5 m	**003L3561**
				2.5 m	**003L5043**
				5 m	**003L3562**
	Impulse tube set AH for pressure reduction	Description: - 1× stainless steel tube Ø 0.8 × 0.2 mm - 2× fitting for imp. tube connection to actuator and pipe G 1/16		0.8 m	**003L3560**
	Fitting for impulse tube connection to pipe			G 1/16-R 3/8	**003L5042**
				G 1/16-R ¼	**003L8151**
	10 EPDM o-rings for impulse tube				**003L8175**

Technical data

Valve

Nominal diameter	**DN**	**15**			**20**	**25**	**32**
k_{VS} value	m³/h	1.0	1.25	1.6	2.5	4.0	6.3
Q_{min}		0.035	0.11	0.2	0.25	0.43	0.65
Q_{nom}*		0.43	0.7	1.0	1.2	2.2	3.4
Stroke	mm	5.5			5		
Control ratio		> 1:30		> 1:50		> 1:100	
Control characteristic		Linear					
Cavitation factor z **		≥ 0.6					
Leakage acc. to standard IEC 60534		0.05					
Nominal pressure	PN	16					
Min. differential pressure	bar	See remark ***					
Max. differential pressure		4					
Medium		Circulation water / glycolic water up to 30%					
Medium pH		Min. 7, max. 10					
Medium temperature	°C	2 … 120					
Connections		External thread					
Materials							
Valve body /valve seat / valve cone		Dezincing free brass CuZn36Pb2As					
Sealing		EPDM					

* *At differential pressure across the controller* $\Delta p_{AHPBM-F} \geq 0.5$ *bar*

** $k_v / k_{VS} \leq 0.5$ *at DN 25 and higher*

*** *Depends on the flow rate and valve* k_{VS} ; $\Delta p_{min} = \left(\frac{Q_{nom}}{k_{vs}}\right)^2 + 0.12(0.14)$ [1)]

1) *Depends on DN*

Technical data *(continuous)*

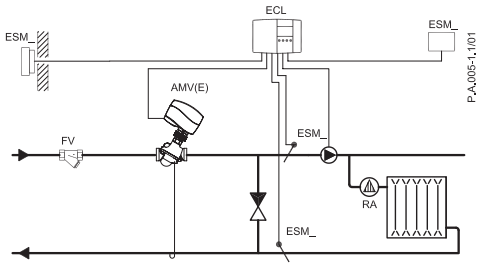
Actuator

Type	DN	15	20	25	32
Actuator size	cm^2	8.5	13	20	32
Nominal pressure	PN	16			
Flow restrictor differential pressure (AHQM) Fixed differential pressure setting (AHPBM-F)	bar	0.12		0.14	
Materials					
Housing*		Dezincing free brass CuZn36Pb2As			
Diaphragm		EPDM			
Impulse tube		Copper tube Ø 3 × 1 mm			
		Stainless steel tube Ø 0.8 × 0.2 × 800 mm			

* *Actuator housing is part of valve body*

Application principles

AHPBM-F controller must be installed in the flow pipeline only.

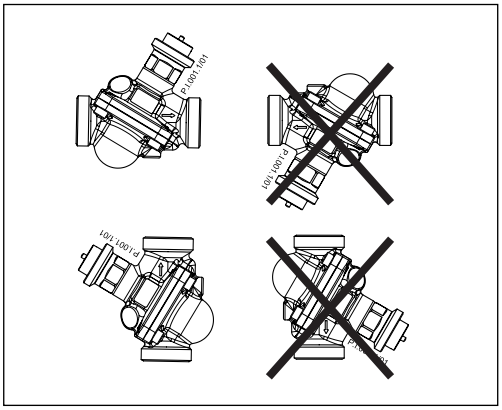


*Direct-connected district heating system **with mixing loop only***

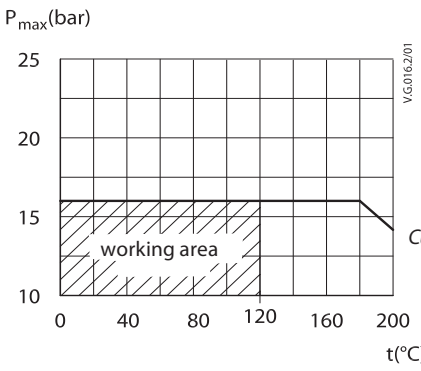
Installation positions

The controllers can be installed in horizontal or vertical pipes with (connection neck for) electrical actuator oriented upwards.

Electrical actuator
Note!
Installation positions for electrical actuator AMV(E) have to be observed as well. Please see relevant Data Sheet.



Pressure temperature diagram



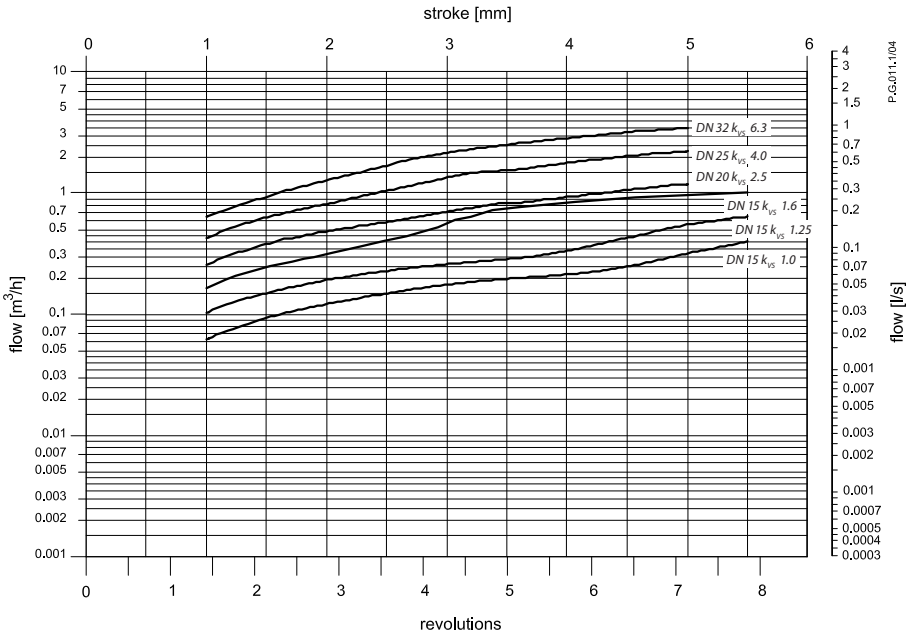
CuZn36Pb2As (DZR) PN 16

Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-3).

Flow diagram

Sizing and setting diagram

Relation between actual flow and number of revolutions on flow restrictor. Values given are approximate.



Flow can be adjusted by turning flow restrictor screw counter-clockwise as shown in this diagram

Water flow shown at differential pressure across the controller from 0.5 bar (50 kPa) to 4 bar (400 kPa).

Sizing

- *Directly connected heating system*

Example AHPBM-F
(flow mounting only)

Motorised control valve (MCV) for mixing circuit in direct-connected heating systems requires differential pressure of 0.12 bar (12 kPa) and flow less than 600 l/h.

Given data:
Q_{max} = 0.6 m³/h (600 l/h)
Δp_{min} = 0.8 bar (80 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.12 bar (12 kPa) selected

* Remark:
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AHPBM-F.

The total (available) pressure loss across the controller is:
$\Delta p_{AHPBM-F,A} = \Delta p_{min}$
$\Delta p_{AHPBM-F,A}$ = 0.8 bar (80 kPa)

Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

Select controller from flow diagram, page 5, with the smallest possible k_{VS} value considering available flow ranges.

k_{VS} = 1.6 m³/h

The min. required differential pressure across the selected controller is calculated from the formula:

$$\Delta p_{AHPBM-F,MIN} = \left(\frac{Q_{max}}{k_{VS}}\right)^2 + \Delta p_{MCV}$$

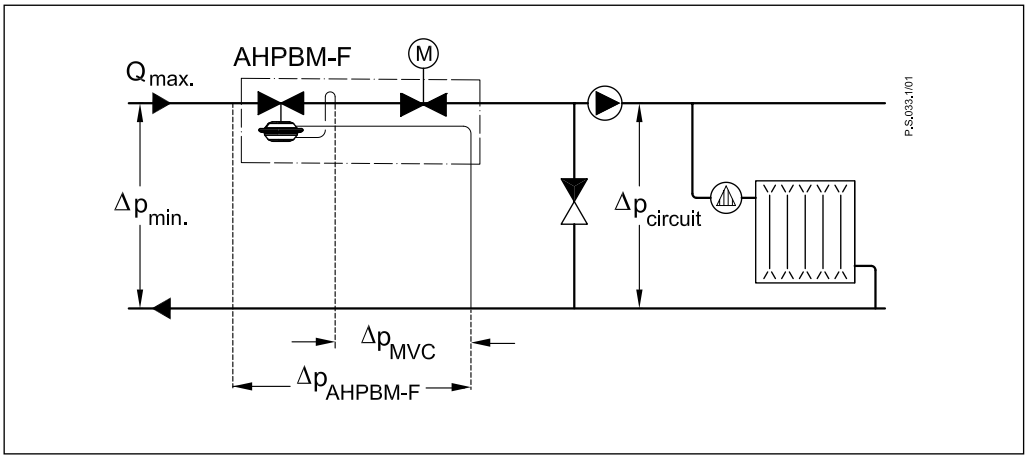
$$\Delta p_{AHPBM-F,MIN} = \left(\frac{0.6}{1.6}\right)^2 + 0.12$$

$\Delta p_{AHPBM-F,MIN}$ = 0.26 bar (26 kPa)

$\Delta p_{AHPBM-F,A} > \Delta p_{AHPBM-F,MIN}$

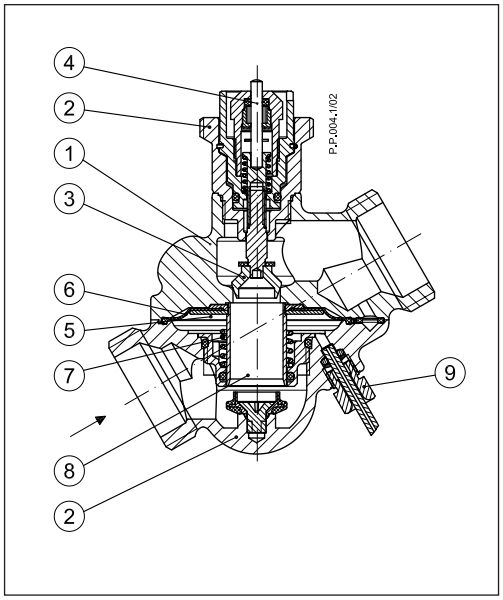
0.8 bar > 0.26 bar

Solution:
The example selects AHPBM-F DN 15, k_{VS} value 1.6, flow setting range 0.06-0.79 m³/h.



Design

1. Valve body
2. Control valve insert
3. Adjustable flow restrictor
4. Control valve stem
5. Differential pressure actuator
6. Control diaphragm
7. Built-in spring for flow rate control
8. Pressure relieved valve cone
9. Impulse tube



Function

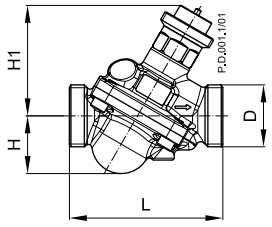
Pressure changes from the flow and return pipeline are being transferred through the impulse tube and control drain to the actuator chambers and act on control diaphragm. Control valve closes on rising differential pressure and opens on falling differential pressure to maintain constant differential pressure. Flow volume is controlled and limited by means of the flow restrictor.

Additionally the electrical actuator will operate from zero to set max. flow according to the load.

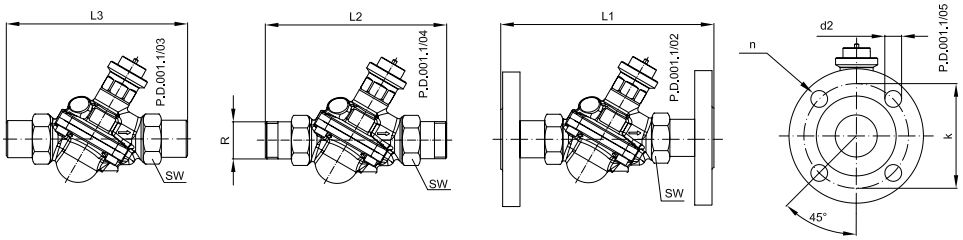
Settings

Flow setting
Flow setting is being done by the adjustment of the flow restrictor position. The adjustment can be performed on the basis of flow adjustment diagram (see relevant instructions) and/or by the means of heat meter.

Dimensions



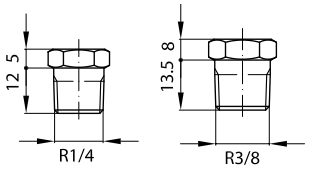
DN		15	20	25	32
L	mm	65	82	104	130
H		24	31	39	49
H_1		57	59	72	84
D (ISO 228/1)		G ¾A	G 1A	G 1¼A	G 1¾A
Valve weight	kg	0.51	0.67	1.47	2.23



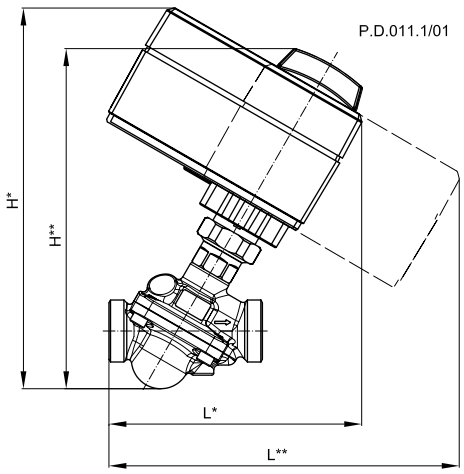
DN		15	20	25	32
SW	mm	32 (G ¾A)	41 (G 1A)	50 (G 1¼A)	63 (G 1¾A)
d		21	26	33	42
R [1]		½	¾	1	1 ¼
L_1 [2]		130	150	160	-
L_2		131	144	160	177
L_3		139	154	159	184
k		65	75	85	-
d_2		14	14	14	-
n		4	4	4	-

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*

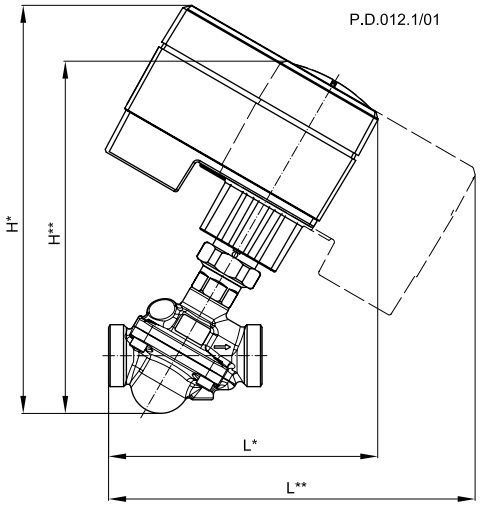
Fittings



Dimensions *(continuous)*

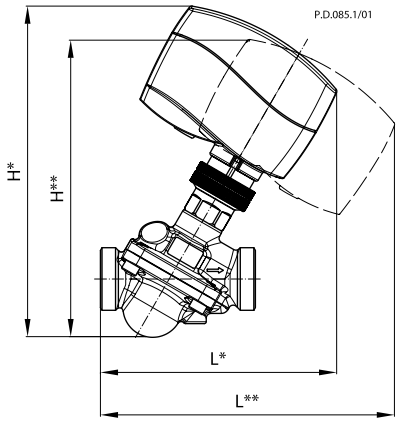


AMV(E) 10 + AHPBM-F



AMV(E) 13 + AHPBM-F

DN			15	20	25	32
L*	AMV(E) 10	mm	137	137	153	172
	AMV(E) 13		147	147	164	183
L**	AMV(E) 10		178	186	204	224
	AMV(E) 13		188	196	214	234
H*	AMV(E) 10		195	201	223	245
	AMV(E) 13		210	216	238	260
H**	AMV(E) 10		174	184	202	222
	AMV(E) 13		180	190	208	228



AMV(E) 130(H)/140(H) + AHPBM-F

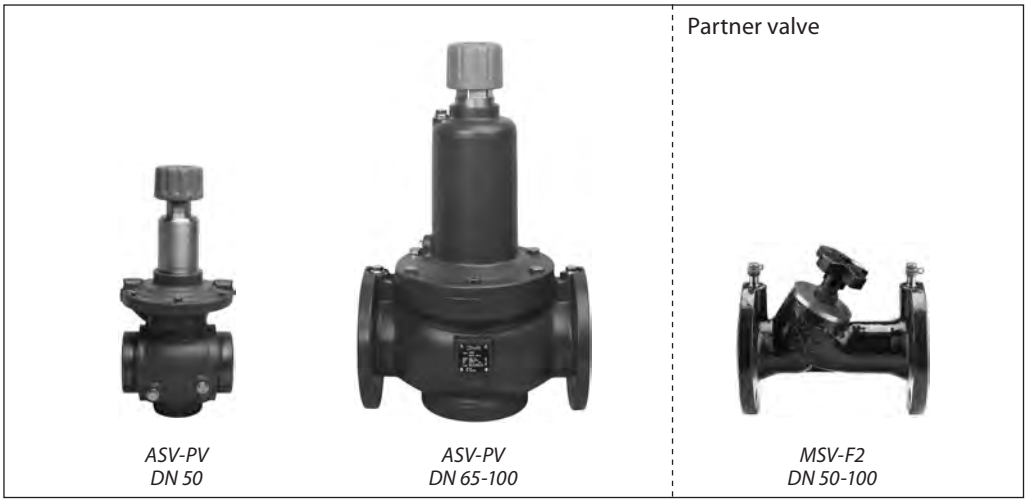
DN		15	20	25	32
L*	mm	118	125	141	160
L**		148	156	174	194
H*		168	178	196	216
H**		152	162	180	200

ENGINEERING
TOMORROW

Data sheet

Automatic balancing valves
ASV-PV DN 50 -100 (3rd gen.)

Description / Application



ASV-PV DN 50

ASV-PV DN 65-100

MSV-F2 DN 50-100

ASV balancing valves are used for dynamic hydronic balance in heating and cooling systems. One of the major challenges in heating and cooling systems is a lack of good hydronic balancing, caused by differential pressure, which is changing constantly and unpredictably in the system. This often results in complaints about poor indoor comfort, noise and high energy bills.

ASV automatic balancing valves ensure an optimal pressure differential for control valves as well as the correct flow within the individual risers at all times. The ASV automatically creates an optimal hydronic balance within the installation, whether under full or partial load. This balance is never disrupted.

Flow limitation
By using combination of pressure controller ASV and settable terminal's unit valve, flow limitation is established.

Flow limitation for each terminal unit prevents underflows on distant units and overflows on others thus allows efficient pumping.

Lower noise emission
Differential pressure limitation provides the pressure over the control valve not to increase at partial loads thus noise emission will be lower. (This is the reason why DIN 18380 requires control of differential pressure by partial load.)

No balancing method needed
Flow limitation is achieved by adjusting each hydronic loop separately without influencing others, which consequently results in one time adjusting process. No special balancing method is needed so commisioning cost can be saved.

Control valve authority
Controlling differential pressure over the control valve means that authority is high – which allows an accurate and stable control as well as energy saving.

Zone balancing
By installing the ASV sets you can divide the piping system in pressure independent zones. This allows a gradual connection of zones to the main in new constructions or at renovation without using an additional balancing method. There is no need to perform a new commissioning every time the system is changed because the hydronic balance is done automatically.

ASV-PV valves are settable in different ranges:
- 5-25 kPa setting is mostly used for radiator application,
- 20-40 kPa setting is used for fan coil, chilled beam and flat station applications,
- 35-75 kPa setting is used for flat station and fan coil, chilled beam application,
- 60-100 kPa setting is used for large terminal unit application (air handling units, fan coils, etc.).

Using ASV valves it is possible to optimize pump head while independent pressure zones allow to keep authority of terminal unit's valve high.

ASV balancing valves are designed to guarantee high quality of the automatic balancing by:
- a pressure released cone,
- an adapted membrane for every valve dimension which provide constant quality performance for all sizes,
- spring with linear characteristic that makes setting required Δp easy.

Description / Application (*continuous*)

ASV valves DN 50 is supplied with external thread only. Threaded or weld tail pieces can be supplied as an accessory. Dimensions DN 65-100 are supplied as flanged valves.

ASV balancing valves have integrated service functions such as shut-off.

ASV-PV can be equipped with plug for flow measuring. In that case measuring plugs need to be ordered separately and mounted on the valve as follows:

- on top of drain connection (DN 50),
- on the flange connection before the valve is filled with water (DN 65-100).

ASV-PV valves are to be mounted in return pipe, in combination with partner valves mounted in flow pipe. As a partner valve MSV-F2 is recommended.

There are two basic configurations when using ASV partner valves (MSV-F2):

- partner valve outside the control loop (Fig. 1). Recommended configuration: it results in best performance since whole controlled pressure range is available to the riser. Flow limitation is done on each terminal unit in the riser.

MSV-F2, by connecting impulse tube to down-flow test plug.

- partner valve inside control loop (Fig. 2). Offers flow limitation on the riser however part of the controlled pressure range is used by pressure drop on partner valve (Δp_i). It is recommended when flow limitation on each terminal units is not possible.

MSV-F2, by connecting impulse tube to up-flow test plug.

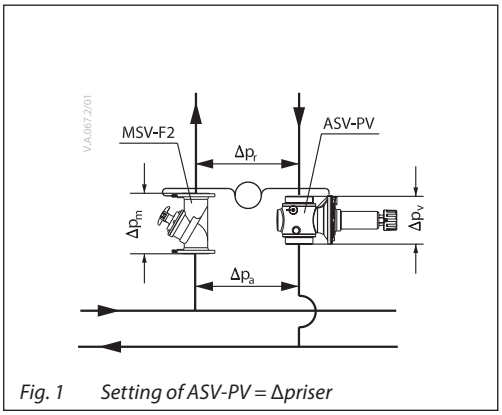


Fig. 1 Setting of ASV-PV = Δpriser

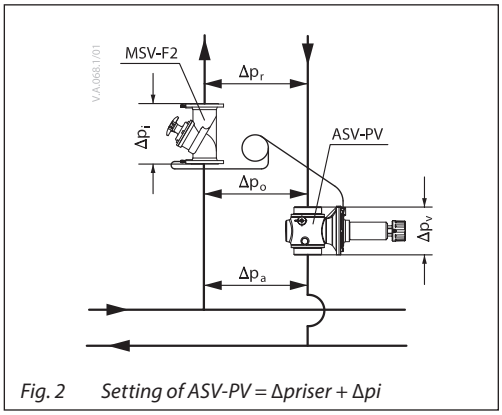


Fig. 2 Setting of ASV-PV = Δpriser + Δpi

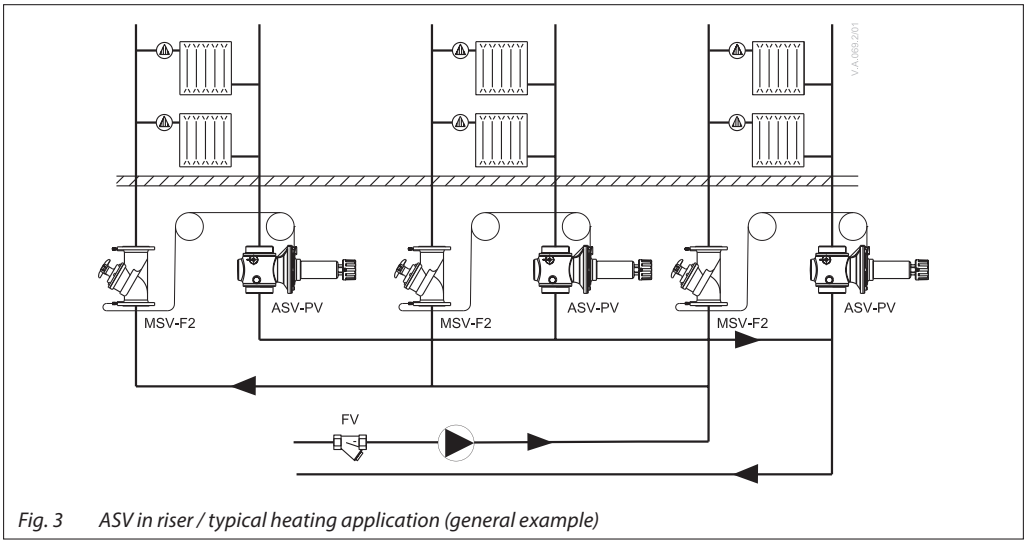


Fig. 3 ASV in riser / typical heating application (general example)

ASV valves are to be used in heating systems to control the differential pressure in risers. To limit the flow for every radiator, the thermostatic radiator valve with pre-setting facilities (feature) is used together with a constant pressure provided by the ASV, thus providing balanced heat distribution.

Controlling differential pressure over the riser means also that the valve authority over the thermostatic radiator valves is high – which allows an accurate and stable temperature control and saves energy.

Description / Application
(*continuous*)

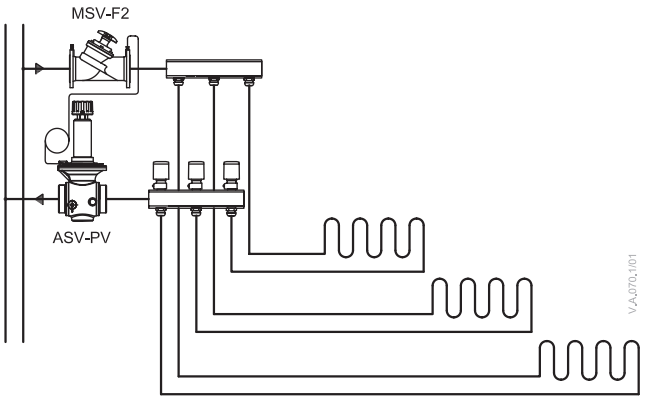


Fig. 4 ASV in manifold for floor heating system

ASV valves are to be used in floor heating systems. To limit the flow for every loop valves with an integrated flow limiting or presetting function should be used together with a constant pressure provided by an ASV-PV valve.

ASV-PV valves can control the differential pressure in several ranges if different pressure is needed.

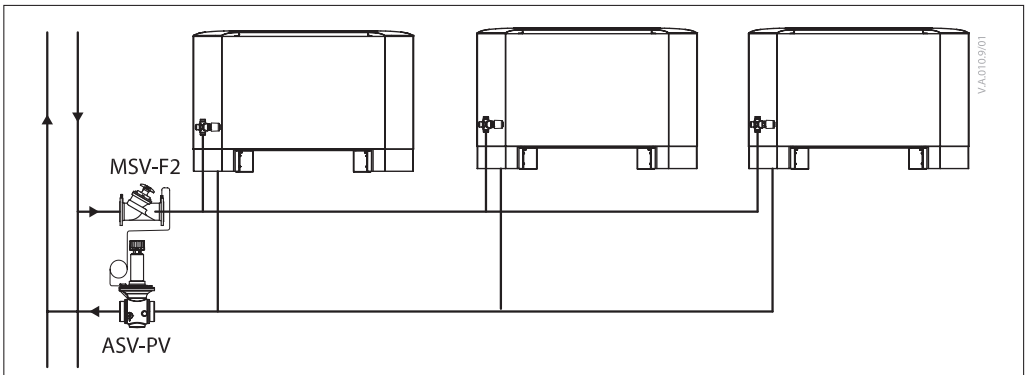


Fig. 5 ASV with fan coil

The ASV valves are to be used in systems with fan coils, induction devices and air-heaters to secure an automatic hydronic balance by the means of differential pressure control in branches or at every coil.

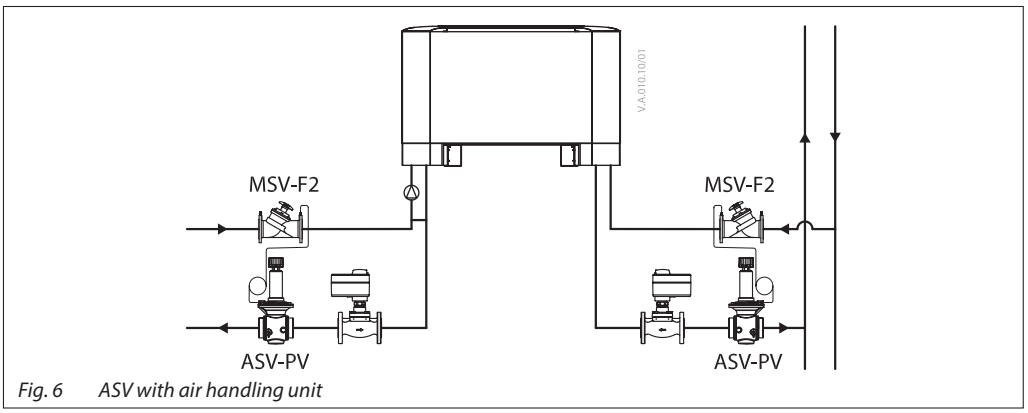


Fig. 6 ASV with air handling unit

The ASV valves are to be used in air handling units to secure an automatic hydronic balance by the means of differential pressure control at every unit.

Sizing

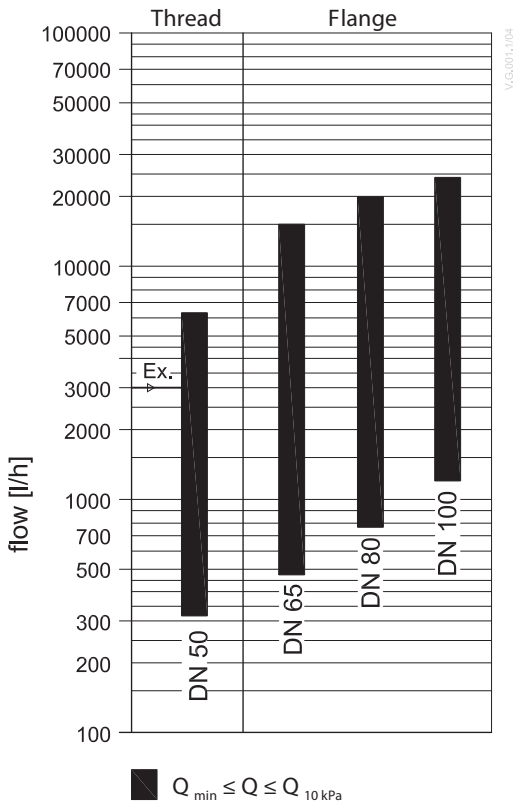


Fig. 7 Column diagram for sizing ASV valves at Δp_v = 10 kPa. For different Δp_v values use diagram A in Appendix.

We recommend to size the diameter of ASV-PV valves by using Fig 7. Maximum flow rates are based on 10 kPa differential pressure over the valve which allows effcient pumping and saves energy.

After ASV-PV valves have been sized the same dimension of partner valve MSV-F2 valve should be selected.

Example:

Given:
Pipe flow 3000 l/h, pipes DN 50

Solution:
Horizontal line intersects the column for the valve DN 50 which can therefore be selected as required size.

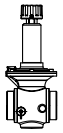
For detailed sizing see examples on pages 9. For different Δp_v (differential pressure over the valve) see diagrams in Appendix A.

Connection between valves size and pipe size
K_v values per particular dimension were designed to cover flow range according to VDI 2073 with water velocity of up 0.8 m/s, at differential pressure of 10 kPa over the valve. As long as the water velocity in the pipe is between 0.3 and 0.8 m/s dimension of the valve should be equal to pipe dimension.

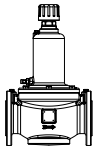
This rule is derived out of the fact that K_v values per particular dimension were designed to cover flow range according to VDI 2073 at differential pressure of 10 kPa over the valve.

Ordering

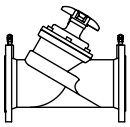
ASV-PV balancing valve, inclusive in the box:
2.5 m impulse tube (G 1/16 A) drain connection (G 3/4 A) and adapter **003L8151**

Type	DN	k_{VS} (m³/h)	Connection		Δp setting range (kPa)	Code No.
	50	20	External thread ISO 228/1	G 2 1/2	5-25	**003Z0611**
					20-40	**003Z0621**
					35-75	**003Z0631**
					60-100	**003Z0641**

ASV-PV balancing valve, inclusive in the box:
2.5 m impulse tube (G 1/16 A), adapter ASV large **003Z0691** and **003L8151**

Type	DN	k_{VS} (m³/h)	Connection	Δp setting range (kPa)	Code No.
	65	48	Flange EN 1092-2	20-40	**003Z0623**
	80	63			**003Z0624**
	100	76.0			**003Z0625**
	65	48		35-75	**003Z0633**
	80	63			**003Z0634**
	100	76.0			**003Z0635**
	65	48		60-100	**003Z0643**
	80	63			**003Z0644**
	100	76.0			**003Z0645**

MSV-F2 Partner valve with shut-off, flowlimitation and test plugs. [1)]

Type	DN	k_{VS} (m³/h)	$T_{MAX.}$ (°C)	DN20 (bar)	Code No.
	15	3.1	130	16	**003Z1085**
	20	6.3			**003Z1086**
	25	9.0			**003Z1087**
	32	15.5			**003Z1088**
	40	32.3			**003Z1089**
	50	53.8			**003Z1061**
	65	93.4			**003Z1062**
	80	122.3			**003Z1063**
	100	200.0			**003Z1064**

[1)] *For more information see MSV-F2 datasheeet*

Accessories and spare parts

Description	Comments/connection	Code No.
Shut off knob for MSV-F2	DN 50	**003Z0179**
	DN 65-100	**003Z0180**
Differential pressure measuring connector 	For drain connection	**003L8143**
Impulse tube, with O-rings 	1.5 m	**003L8152**
	2.5 m	**003Z0690**
	5 m	**003L8153**
Plastic impulse tube with connectors and adapters	For making set of 10 pieces [4)]	**003Z0689**
Adapter large ASV [1)] 	G 1/4-R 1/4; G 1/16	**003Z0691**
Plug for connecting impulse tube [2)] 	G 1/16-R 1/4	**003L8151**
O-ring for impulse tube [3)]	2.90 × 1.78	**003L8175**

[1)] *Recommended for use with MSV-F2, connected to measuring hole, it allows connection of impulse tube from ASV while retaining measurement functionality.*
[2)] *Recommended for use with MSV-F2, connected to measuring hole. Can also be used for connecting impulse tube directly on the pipe.*
[3)] *Set of 10 pieces.*
[4)] *Total 15 meter of impulse tube*

Fitting

For valves with external thread Danfoss offers threaded or welded tailpieces as accessory.

Materials	
Nut	brass
Tailpiece welding	steel
Tailpiece threaded	brass

Type	Comment	to pipe	to valve	Code No.
	Tailpiece threaded (1 pcs.)	R2	DN 50 (2 1/4")	**003Z0274**
			DN 50 (2 1/2")	**003Z0278**
	Tailpiece welding (1 pcs.)	DN 50	DN 50 (2 1/4")	**003Z0272**
			DN 50 (2 1/2")	**003Z0276**

Technical data

Type		ASV-PV	MSV-F2[1]
Nominal diameter	DN	50-100	50-100
Max. pressure	bar	16 (PN 16)	16 (PN 16)
Test pressure		25	25
Differential pressure over the valve	kPa	10-250 [2]	10-150
Temperature	°C	–10 … 120	-10 … 130
Material of parts in contact with water			
Valve body		Grey cast iron EN-GJL-250 (GG 25)	Cast iron EN-GJL 250 (GG 25)
Cone		Stainless steel	CW602N
Membrane / O-rings		EPDM	
Spring		Stainless steel	-

[1] *For more information see MSV-F2 datasheet.*

[2] *Please note that the maximum admissible differential pressure across the valve 250 kPa should also not be exceeded at partial load.*

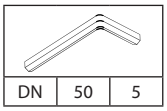
Design

1. Shut-off knob
2. Differential pressure setting spindle
3. O-ring
4. Reference spring
5. Impulse tube connection
6. Diaphragm element
7. Control diaphragm
8. Pressure-relieved valve cone
9. Valve body
10. Seat

n (turns)	5-25 (kPa)	20-40 (kPa)	35-75 (kPa)	60-100 (kPa)
0	25	40	75	100
1	24	39	73	98
2	23	38	71	96
3	22	37	69	94
4	21	36	67	92
5	20	35	65	90
6	19	34	63	88
7	18	33	61	86
8	17	32	59	84
9	16	31	57	82
10	15	30	55	80
11	14	29	53	78
12	13	28	51	76
13	12	27	49	74
14	11	26	47	72
15	10	25	45	70
16	9	24	43	68
17	8	23	41	66
18	7	22	39	64
19	6	21	37	62
20	5	20	35	60

Factory presetting

Δp setting range (kPa)	kPa
5-25	10
20-40	30
35-75	60
60-100	80



DN	50	5

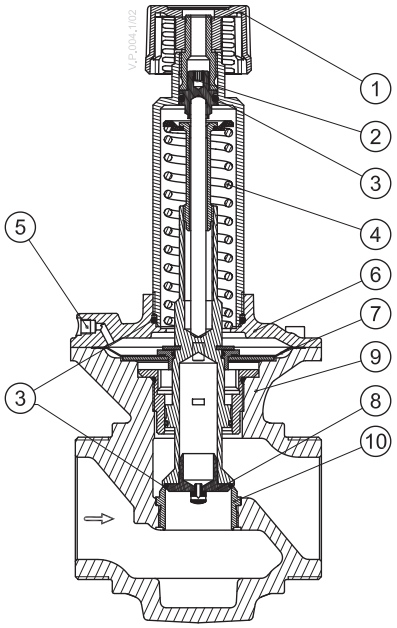


Fig. 8 ASV-PV (DN 50)

ASV-PV is designed to maintain a constant set differential pressure. Via an internal connection and together with the reference spring (4), pressure in the return pipe acts on the underside of the control diaphragm (7) while via an impulse tube (5), pressure in the flow pipe acts on the top of the diaphragm. In this way the balancing valve maintains adjusted differential pressure.

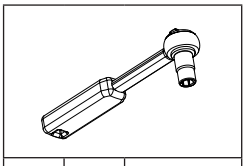
The ASV-PV valves are sold in four different Δp setting ranges. The valves are factory–set to a defined value as described on Factory presseting table on Fig. 8 and 9.

Use the following procedure to set the desired differential presure:
the setting on ASV-PV can be changed by turning the setting spindle (2).
Turning the spindle clockwise increases the setting; turning it counter clockwise reduces the setting.

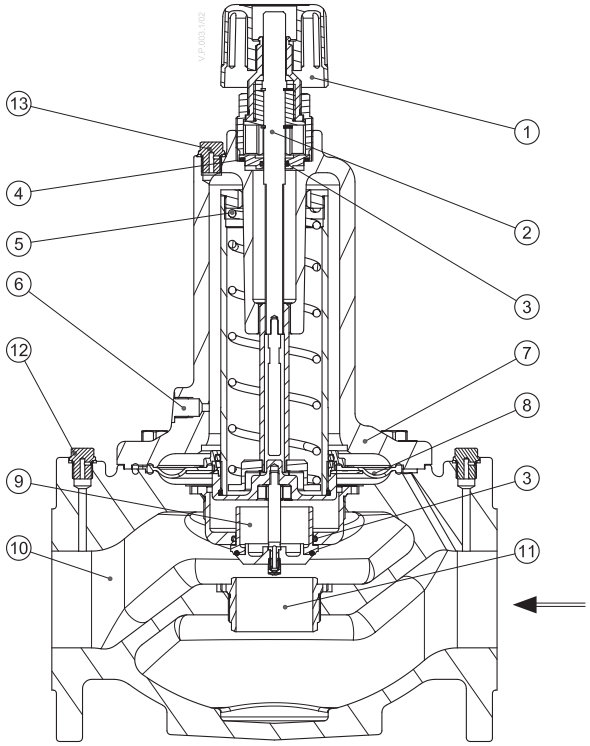
If the setting is not known, turn the spindle fully clockwise. With this the setting on ASV-PV is at maximum value within setting range. Now turn the spindle a number of times (n) as described in Fig. 6, 7 or 8 until the required differential pressure setting is obtained.

Design *(continuous)*

1. Shut-off knob
2. Differential pressure setting spindle
3. O-ring
4. Flat gasket
5. Reference spring
6. Impulse tube connection
7. Diaphragm element
8. Control diaphragm
9. Pressure-relieved valve cone
10. Valve body
11. Seat
12. Measuring holes-plugged
13. Air-vent



DN	65	13
	80	13
	100	13



Factory presetting

Δp setting range (kPa)	kPa
20-40	30
35-75	60
60-100	80

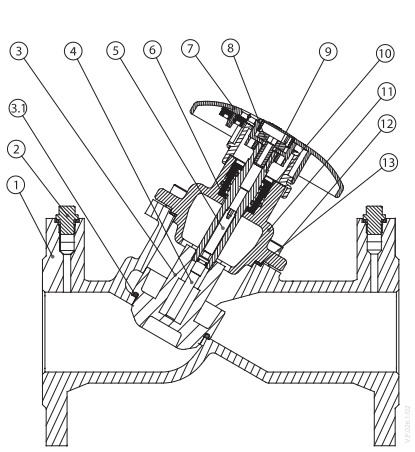
n (turns)	20-40 (kPa)	35-75 (kPa)	60-100 (kPa)
0	40	75	100
1	39	74	99
2	38	73	98
3	37	72	97
4	36	71	96
5	35	70	95
6	34	69	94
7	33	68	93
8	32	67	92
9	31	66	91
10	30	65	90
11	29	64	89
12	28	63	88
13	27	62	87
14	26	61	86
15	25	60	85
16	24	59	84
17	23	58	83
18	22	57	82
19	21	56	81
20	20	55	80

n (turns)	20-40 (kPa)	35-75 (kPa)	60-100 (kPa)
21		54	79
22		53	78
23		52	77
24		51	76
25		50	75
26		49	74
27		48	73
28		47	72
29		46	71
30		45	70
31		44	69
32		43	68
33		42	67
34		41	66
35		40	65
36		39	64
37		38	63
38		37	62
39		36	61
40		35	60

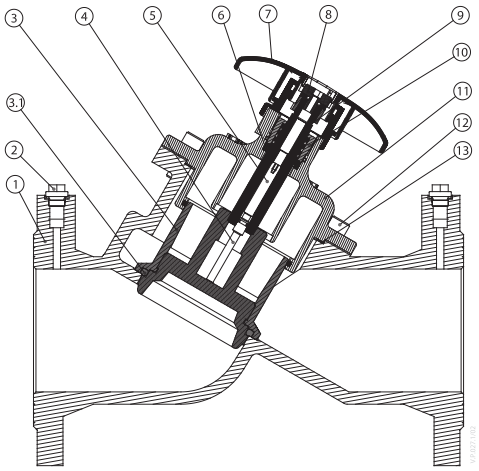
Fig. 9 ASV-PV (DN 65-100)

Design *(continuous)*

1. Body EN-GJL250
2. Plug
3. Valve cone
3.1 . Seat soft sealing
4. Rod
5. Stroke limiter/Allen screw
6. Gasket
7. Handwheel with display - DN 50-100 plastic
8. Fixed screw
9. Spindle
10. Stuffing box
11. Bonnet
12. Allen screw /Hexagon screw
13. Flat gasket



MSV-F2 DN 50-80



MSV-F2 DN 100

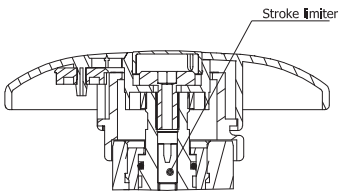
Fig. 10 MSV-F2 DN 50-100

Partner valves MSV-F2 [1] are to be used together with the automatic balancing valves ASV-PV to control differential pressure in the risers.

Impulse tube connection
The impulse line must be connected to impulse tube connection piece (2) (adaptor sold as accessory). In working position,
one of test plugs needs to be open while other closed. There are two possible configurations, with partner valve inside or outside control loop. It can be chosen by impulse tube connection side:

- Partner valve outside controlled loop: opened outlet test plug
- Partner valve inside controlled loop: opened inlet test plug

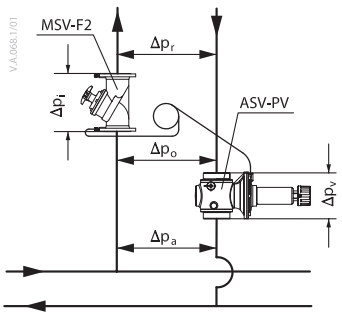
MSV-F2 is manual presetting and shut-off valves. The valves have position indicator and stroke limiter as standard. Hood of spindle is integrated with stroke limiter. Setting can be locked.



Valves have built in flow limitation

[1] *For more information see MSV-F2 datasheet*

Sizing-design examples



$$\Delta p_a = \Delta p_m + \Delta p_r + \Delta p_v$$

Δp_v	*Pressure drop across ASV-PV valve*
Δp_i	*Pressure drop across MSV-F2*
Δp_o	*Pressure drop across the riser including MSV-F2*
Δp_a	*Pressure drop across the riser*
Δp_r	*Pressure drop in the riser excluding MSV-F2*

Fig. 11

1. Example (AHU - air handling unit)

Given:
Desired flow for the riser (Q):.....15 m³/h
Minimal available pressure
for that riser (Δp_a).....100 kPa
Estimated pressure drop over the riser
at the desired flow (Δp_0).....40 kPa

Wanted:
- Valve type
- Valve size

Selection and sizing of automatic balancing valves for air handling unit. The customer have choosen ASV-PV with partner valve MSV-F2 inside the control loop is choosen. Since the calculated pressure drop over the riser is 40 kPa ASV-PV with setting range between 35-75 kPa is selected. The minimal available pressure for the riser is 100 kPa and pressure drop across ASV-PV (Δpv) will following be 60 Kpa

$\Delta p_v = \Delta p_a - \Delta p_0 = 100 - 40 = 60$ kPa

$$k_{v=} \frac{Q}{\sqrt{\Delta p_v}} = \frac{15}{\sqrt{0.6}} = 19.36 \ m^3/h$$

Based on this calculation ASV-PV DN 65 is selected with partner valve MSV-F2 also DN65. Set the valve to 40 kPa, see figure 11 (40kPa = 35 turns). Selection can also be made by reading from diagram Appendix A. fig A

2. Example (continued AHU - air handling unit)

Given:
Correcting the flow with the differential pressure setting.

Desired flow for the riser (Q_2): .....15 m³/h
Measured flow for the riser (Q_1) .....18 m³/h

Estimated pressure drop over the
riser at desired flow (Δp_r) .....40 kPa

Required:
Correct flow to 15 m³/h for the riser.

Solution:
Measuring the flow show that it is higher then what is desired for the riser, this could be caused by the real pressure drop over the riser is higher than the estimated 40 kPa, following setting on the ASV-PV valve can be adjusted to limit the flow.

$$P_2 = P_1 \times \left(\frac{Q_2}{Q_1}\right)^2 = 40 \times \left(\frac{15}{18}\right)^2 = 28 \text{ kPa}$$

If we decrease the setting from 40 to 28 kPa flow will be decreased to 15 m³/h.

Alternatively, flow limitation inside the loop can also be done with MSV-F2 by adjusting the setting of the valve.

Measurement of flow and differential pressure

MSV-F2 is equipped with two test plugs so that the differential pressure across the valve can be measured using Danfoss measuring equipment or any other measuring device. Valve can be converted to actual flow.

Note: *When measuring sized flow, all radiator valves must be fully open (nominal flow).*

Measurement of differential pressure (Δp_r) across riser.
Fit a measuring connector (Danfoss code no. **003L8143**) on the ASV-PV balancing valve drain connection (DN 50) or threaded connection closer to the terminal unit (TU). Measurements must be taken between the test plug at MSV-F2 valve port B and the measuring connector on the ASV-PV.

Installation

ASV-PV must be installed in the return pipe with flow in the direction of the arrow on thevalve body. Partner valves (MSV-F2) must be installed in the flow pipe, with flow in the direction of the arrow on the valve body. The impulse tube must be installed between partner valve and ASV-PV.

The impulse tube must be flushed through before installation. ASV-PV and MSV-F2 must in addition be installed as determined by installation conditions.

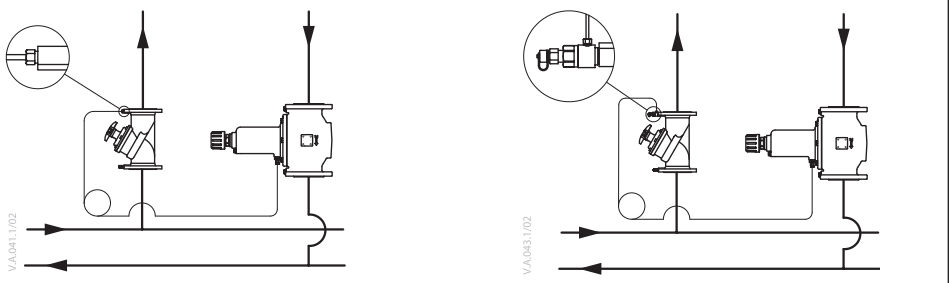


Fig. 13

Pressure testing

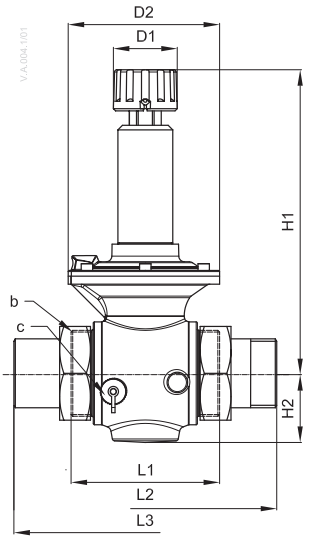
Max. test pressure ..... 25 bar

When pressure testing the system you must secure that both sides of the membrane have the same static pressure to prevent damage of the pressure controller. That means the impulse tube must be connected and any needle valves must be open.

Starting

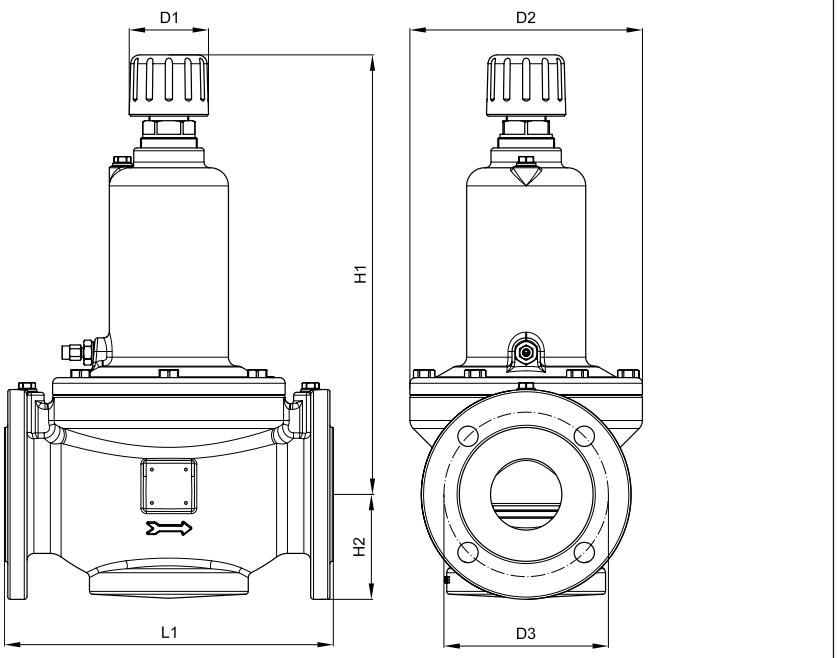
During system start – opening the shut-off on ASV-PV and partner valve-please secure that there is the same static pressure on both sides or higher pressure on upper side of the membrane. If filling is done by opening ASV-PV and partner valve, please make sure there is a pressure on the upper side of the membrane by opening partner valve first before ASV-PV is opened.

Dimensions



ASV-PV

DN	Δp setting range	L1	L2	L3	H1	H2	D1	D2	b	c
	kPa	mm							ISO 228/1	
50	5-25	130	244	234	232	61	55	133	G 2½	G ¾ A
	20-40									
	35-75				273					
	60-100									



ASV-PV

DN	L1	H1	H2	D1	D2	D3
	mm					
65	290	385	93	68	205	145
80	310	390	100	68	218	160
100	347	446	112	68	248	180

Fig. 14

Appendix A-*Sizing diagram*

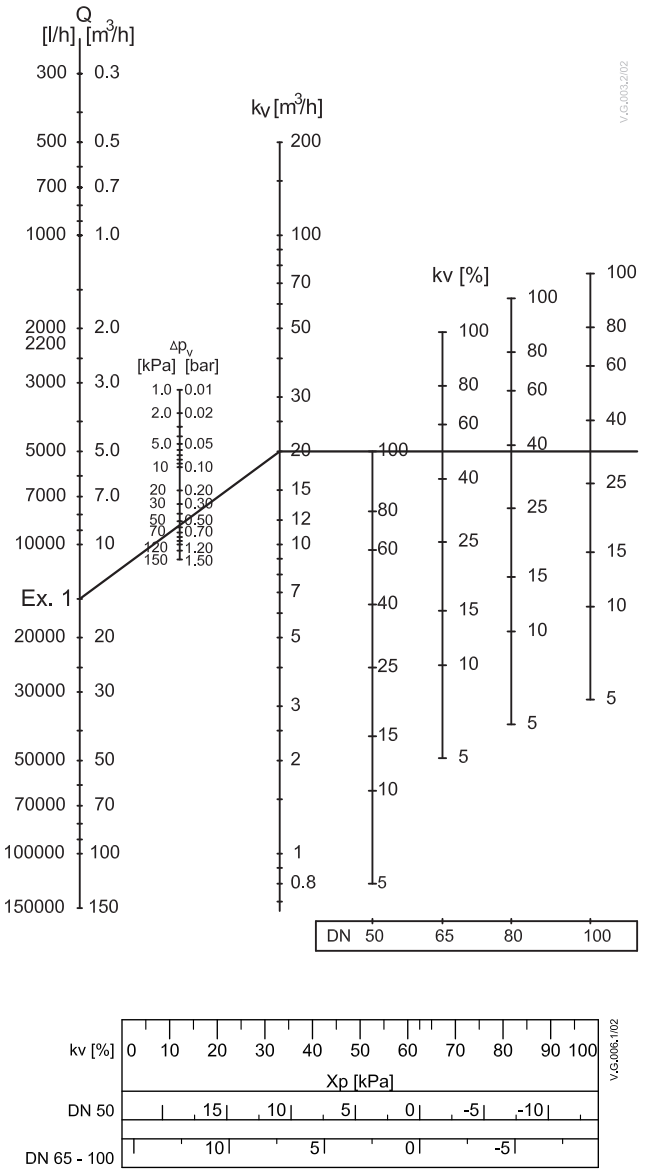


Fig. A Sizing diagram ASV-PV DN 50-100

Appendix A-*Sizing diagram*

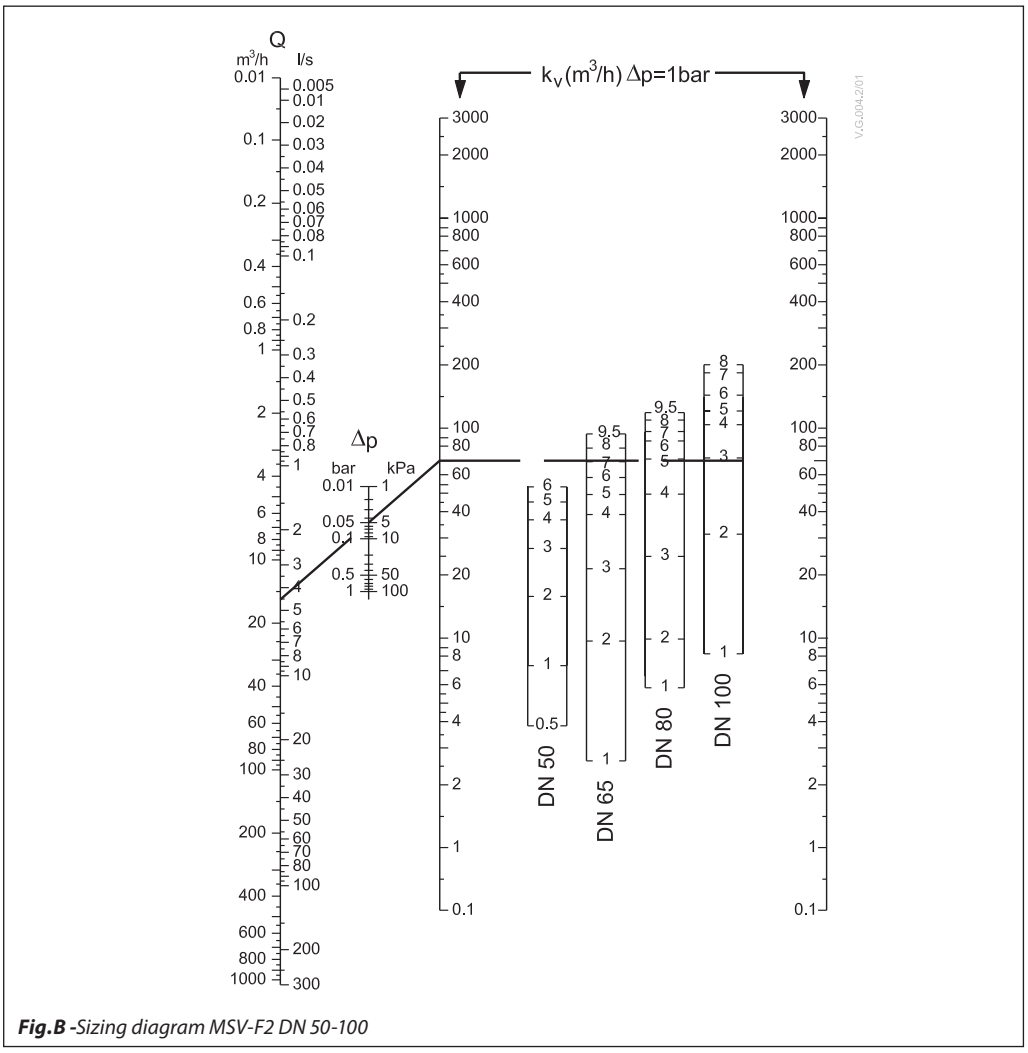
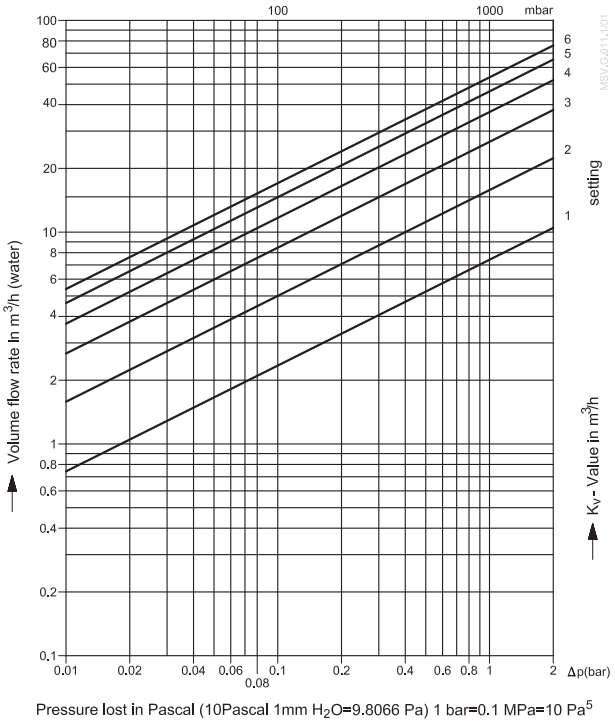


Fig.B -*Sizing diagram MSV-F2 DN 50-100*

Appendix B
MSV-F Flow diagrams



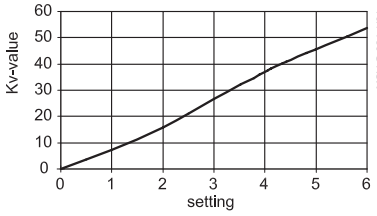
DN 50 / PN 16 / PN 25

Setting	k_v-value
1	7.4
2	15.8
3	26.7
4	36.9
5	46.2
6	53.8

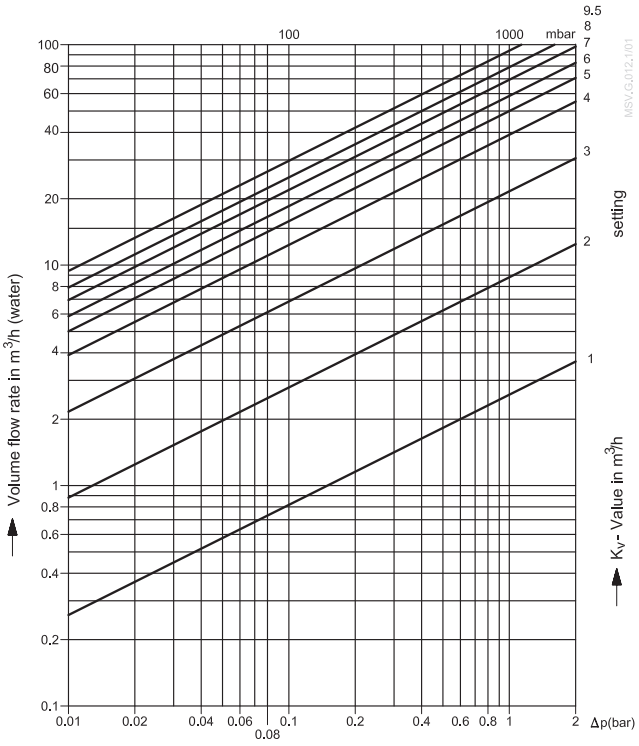
Max. permissible differential pressure in throttling function 1.5 /2.0 bar.
Max. permissible flow speed: ≤ 4 m/s
Condition:

- The flow must be free of cavitation.

Flow characteristic



Appendix B *(continued)*
MSV-F Flow diagrams



Pressure lost in Pascal (10Pascal 1mm H_2O=9.8066 Pa) 1 bar=0.1 MPa=10 Pa^5

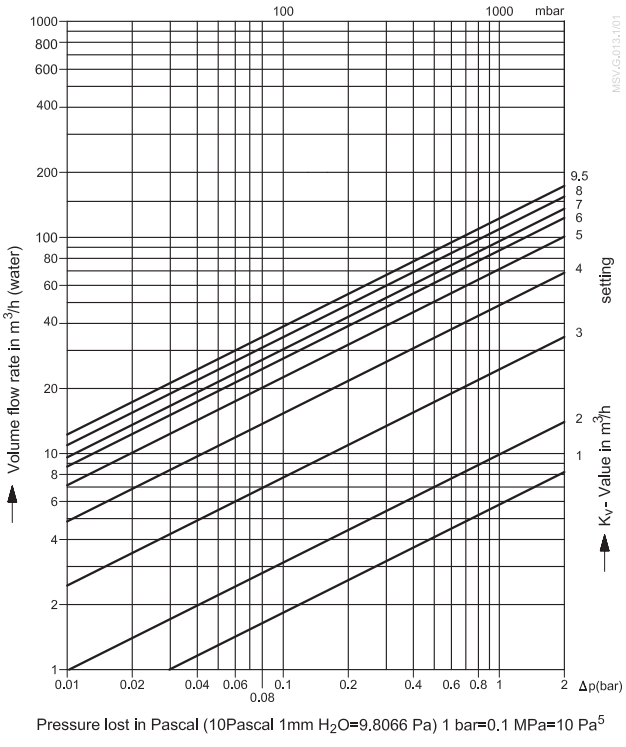
DN 65 / PN 16 / PN 25

Setting	k_v-value
1	2.6
2	8.8
3	21.6
4	39.0
5	49.8
6	58.5
7	69.3
8	79.0
9	87.8
9.5	93.4

Max. permissible differential pressure in throttling function 1.5 /2.0 bar.
Max. permissible flow speed: ≤ 4 m/s
Condition:

- The flow must be free of cavitation.

Flow characteristic



Pressure lost in Pascal (10Pascal 1mm H_2O=9.8066 Pa) 1 bar=0.1 MPa=10 Pa^5

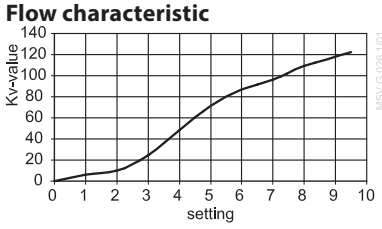
DN 80 / PN 16 / PN 25

Setting	k_v-value
1	5.8
2	9.9
3	24.5
4	48.5
5	71.3
6	87.0
7	96.4
8	109.3
9.5	122.3

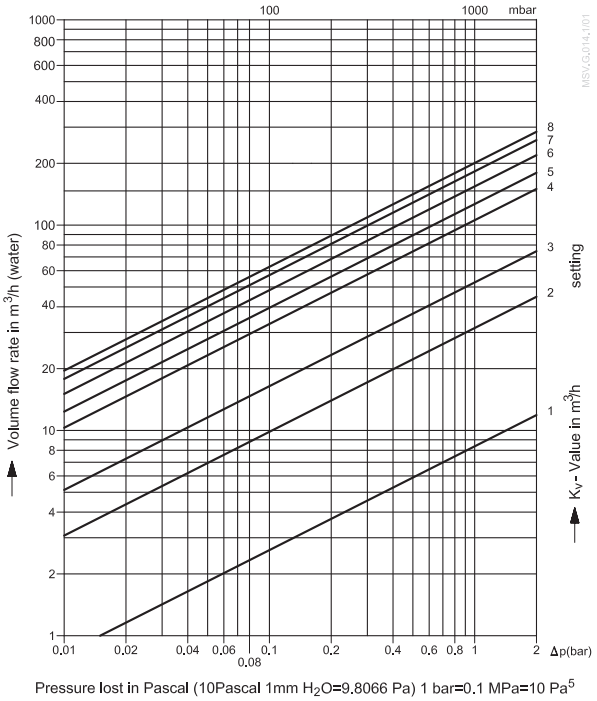
Max. permissible differential pressure in throttling function 1.5 /2.0 bar.
Max. permissible flow speed: ≤ 4 m/s
Condition:

- The flow must be free of cavitation.

Flow characteristic



Appendix B *(continued)*
MSV-F Flow diagrams



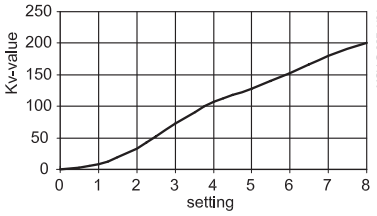
DN 100 / PN 16 / PN 25

Setting	k_v-value
1	8.3
2	32.4
3	72.9
4	107.2
5	128.2
6	152.8
7	180.0
8	200.0

Max. permissible differential pressure in throttling function 1.5 /2.0 bar.
Max. permissible flow speed: ≤ 4 m/s
Condition:

- The flow must be free of cavitation.

Flow characteristic



ASV-PV tender text

1. Tender text

a. Product is differential pressure controller for automatic hydronic balance of heating and cooling systems.
b. The differential pressure controller should be based on integrated membrane element.
c. Valves should have shut-off function separated from the setting mechanism. Shut-off service function should be possible with a hand knob.
d. The setting of differential pressure should be hidden to prevent unauthorized change of setting.
e. The differential pressure setting should be linear throughout the setting range (1 turn 1 kPa or 1 turn 2 kPa depending on dimension).
f. Packaging of differential pressure controller should contain impulse tube (1.5 m)
g. Valve should be delivered in reliable packaging for safe transport and handling.

2. Product characteristics:

a. Pressure class: PN 16
b. Temperature range: –10 … +120 °C.
c. Connection size: DN 50-100
d. Connection type (depending on dp setting range): External thread ISO 228/1 (DN15-50) and Flange EN 1092-2 (DN 65-100)
e. Δp setting range: 5-25 kPa (DN 50), 20-40 kPa (DN 50-100), 35-75 kPa (DN 50-100) and 60-100 kPa (DN 65-100).
f. Installation: differential pressure controller should mounted on return pipe with connection via impulse tube to supply pipe.

Nominal diameter:	_ _ _ _ _ _
Connection:	_ _ _ _ _ _
Adjustment range from-to:	_ _ _ _ _ _ kPa
Produced by: Danfoss Type:	ASV-PV
Ordering no.:	**003L**_ _ _

ENGINEERING
TOMORROW

Data sheet

Automatic balancing valve ASV-P (DN 15-40)

Description

ASV-P valves are automatic balancing valves with fixed setting (10 kPa) for creating optimal hydronic balance in residential heating systems.

The setting can be increased to 20 or 30 kPa by spring replacement. Spring can be replaced under pressure.

ASV balancing valves are designed to guarantee high quality of the automatic balancing by:
- a pressure released cone,
- an adapted membrane for every valve dimension which provide constant quality performance for all sizes.

A 90° angle between all service features (shut-off, draining, measuring) allows an easy access under any installing condition.

ASV valves (DN 15-40) are packaged in styropore (EPS) which can be used for insulation at temperatures up to 80 °C. An insulation cap is available as an accessory for insulation at higher temperatures (up to 120 °C).

ASV-P valves are to be mounted in return pipe, in combination with partner valves mounted in flow pipe. As a partner valve ASV-M/I/BD are recommended.

Ordering

ASV-P balancing valve, inclusive in the box: 1.5 m impulse tube (G 1/16 A) and drain cock (G 3/4 A)
Constant differential pressure 10 kPa ; **can be upgraded to 20 or 30 kPa setting respectively**

Type	DN	k_{VS} (m^3/h)	Internal thread (ISO 7/1)	Code No.	Type	External thread (ISO 228/1)	Code No.
	15	1.6	Rp ½	003L7621		G ¾ A	003L7626
	20	2.5	Rp ¾	003L7622		G 1 A	003L7627
	25	4.0	Rp 1	003L7623		G 1¼ A	003L7628
	32	6.3	Rp 1¼	003L7624		G 1½ A	003L7629
	40	10	Rp 1½	003L7625		G 1¾ A	003L7630

Note: *for whole range of ASV partner valves, spare parts and accessories please refer to ASV datasheet.*

Accessories and spare parts

Type	Description	Comments/connection	Code No.
	Impulse tube, with O-rings	1.5 m	**003L8152**
		2.5 m	**003Z0690**
		5 m	**003L8153**
	ASV-P 20 kPa spring (yellow)	DN 15	**003L8182**
		DN 20	**003L8183**
		DN 25	**003L8184**
		DN 32 / DN 40	**003L8185**
	ASV-P 30 kPa spring (green)	DN 15	**003L8192**
		DN 20	**003L8193**
		DN 25	**003L8194**
		DN 32 / DN 40	**003L8195**

Technical data

Nominal diameter	DN	15-40
Max. pressure	bar	16 (PN 16)
Test pressure		25
Differential pressure over the valve	kPa	10-150 [1]
Temperature	°C	–20 … 120
Material of parts in contact with water		
Valve body		Brass
Cone ASV-P		DZR brass
Membrane / O-rings		EPDM
Spring		Stainless steel

[1] *Please note that the maximum admissible differential pressure across the valve 150 kPa should also not be exceeded at partial load.*

Application

There are two basic configurations when using ASV partner valves (ASV-BD, ASV-I, ASV-M, MSV-F2):

- partner valve outside the control loop (Fig. 1). Recommended configuration: it results in best performance since whole controlled pressure range is available to the riser. Flow limitation is done on each terminal unit in the riser (for example, RA-N with presetting on radiator, etc).
- partner valve inside control loop (Fig. 2). Offers flow limitation on the riser however part of the controlled pressure range is used by pressure drop on partner valve (Δp_i). It is recommended when flow limitation on each terminal units is not possible.

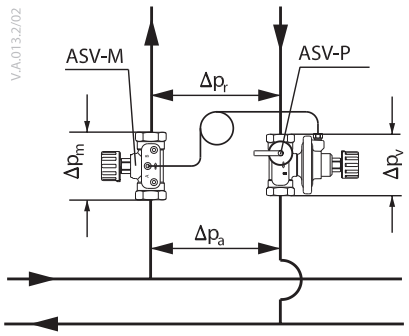


Fig. 1 Setting of ASV-P = Δpriser

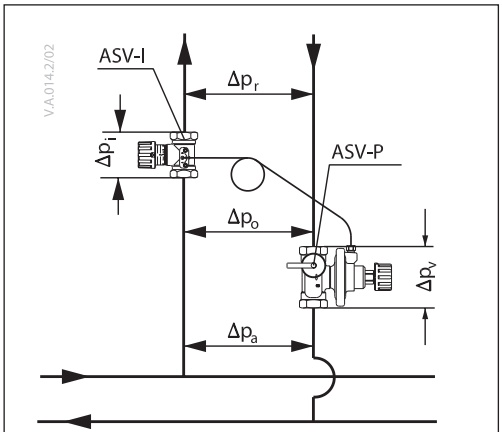


Fig. 2 Setting of ASV-P = Δpriser + Δp_i

ASV-BD can be used outside or inside control loop by choice of which measuring nipple is open. To be used outside control loop, blue measuring nipple needs to be open. In this position, flow verification can be done (default position). To be used inside control loop, red measuring nipple needs to be open. In this position, flow verification & flow verification can be done.

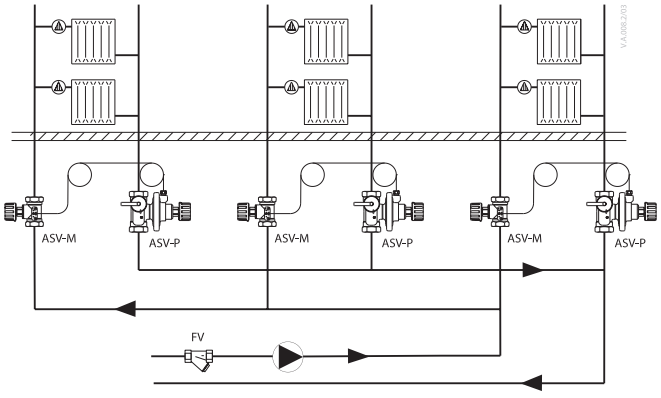
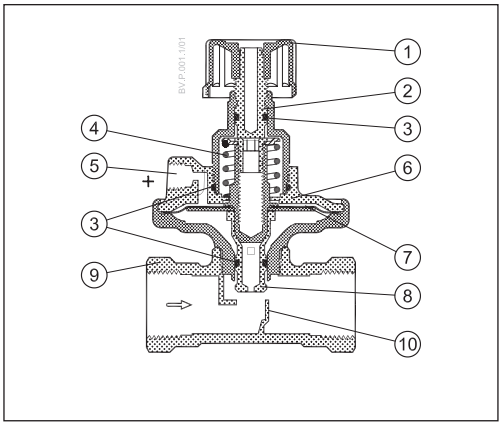


Fig. 3 ASV in riser / typical heating application (general example)

Design

1. Shut-off knob
2. Shut-off spindle
3. O-ring
4. Reference spring
5. Impulse tube connection
6. Diaphragm element
7. Control diaphragm
8. Pressure-relieved valve cone
9. Valve body
10. Seat



The ASV-P is designed to maintain constant differential pressure across a riser. Via an internal connection and together with the reference spring, pressure in the return pipe acts on the underside of the control diaphragm ⑦ while via an impulse tube ⑤, pressure in the flow pipe acts on the top of the diaphragm. In this way the balancing valve maintains a fixed differential pressure of 10 kPa.
The setting can be increased to 20 or 30 kPa by spring replacement. Spring can be replaced under pressure. The ability to increase the setting is especially useful in case of trouble shooting. It gives insurance that design flow can be achieved even if calculation doesn't match actual installation.

Dimensions - insulation

ASV-P must be installed in the return pipe with flow in the direction of the arrow on the valve body. Partner valves (ASV-M/I/BD, MSV-F2 must be installed in the flow pipe, with flow in the direction of the arrow on the valve body. The impulse tube must be installed between partner valve and ASV-P. The impulse tube must be flushed through before installation.

Pressure testing

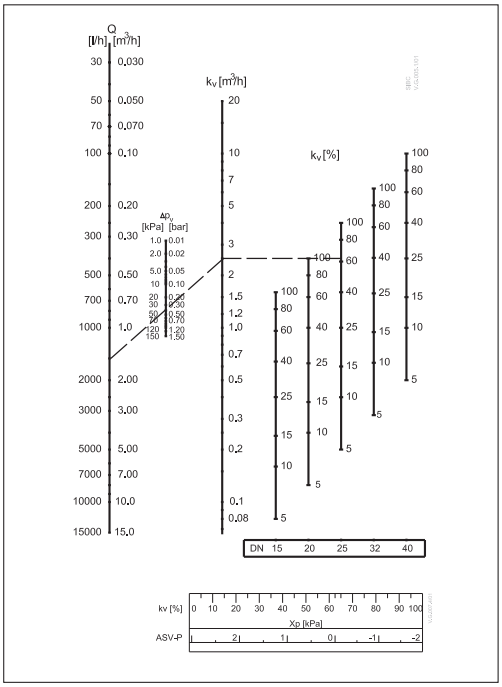
Max. test pressure is 25 bar. When pressure testing the system you must secure that both sides of the membrane have the same static pressure to prevent damage of the pressure controller. That means the impulse tube must be connected and any needle valves must be open. If ASV-P is installed in combination with ASV-M both valves must be open or closed (both valves must be in the same position!). If ASV-P is installed in combination with ASV-I /ASV-BD both valves must be open. During this operation (closing or opening the valves) please make sure that there is never lower pressure on upper side of the membrane to prevent damaging it.

Starting

During system start – opening the shut-off on ASV and partner valve-please secure that there is the same static pressure on both sides or higher pressure on upper side of the membrane.

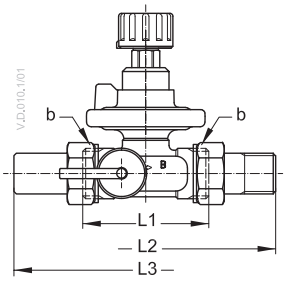
If filling is done by opening ASV-P and partner valve, please make sure there is a pressure on the upper side of the membrane by opening partner valve first before ASV-P is opened.

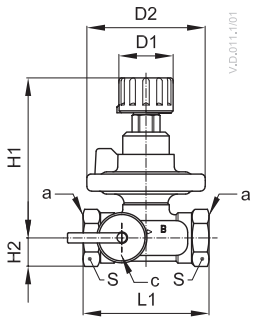
Appendix A-*Sizing diagram*



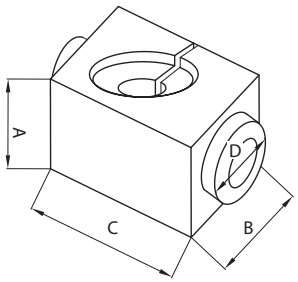
Data sheet **Automatic balancing valves ASV-P**

Dimensions





DN	L1	L2	L3	H1	H2	D1	D2	S	a	b	c
	mm								ISO 7/1	ISO 228/1	
15	65	120	139	82	15	28	61	27	Rp ½	G ¾ A	
20	75	136	159	103	18	35	76	32	Rp ¾	G 1 A	
25	85	155	169	132	23	45	98	41	Rp 1	G 1¼ A	G ¾ A
32	95	172	179	165	29	55	122	50	Rp 1¼	G 1½ A	
40	100	206	184	170	31	55	122	55	Rp 1½	G 1¾ A	



Insulation

DN	A	B	C	D
	mm			
15	61	110	111	37
20	76	120	136	45
25	100	135	155	55
32	118	148	160	70
40	118	148	180	70

ENGINEERING
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Data sheet

Automatic balancing valve ASV-I (DN 15-50)

Description

ASV-I is a partner valve to be used together with the automatic balancing valves ASV-PV/P to control differential pressure in the risers where the radiator valves have no presetting facilities. It is a combined adjustment and shut-off valve designed for installation in the flow pipe. It incorporates flow limitation so that it can be set for required maximum flow in the riser.
ASV-I is supplied with rectus measuring nipples so that flow in the pipe can be measured.
The valve (DN 15-40) is packaged in styropore (EPS) which can be used for insulation at temperatures up to 80 °C. An insulation cap is available as an accessory for insulation at higher temperatures (up to 120 °C).

Ordering

NOTE: *for whole range of ASV partner valves, spare parts and accessories please refer to ASV datasheet.*

ASV-I adjustment valve, inclusive two measuring nipples

Type	DN	k_{vs} (m^3/h)	Internal thread (ISO 7/1)	Code No.	Type	External thread (ISO 228/1)	Code No.
	15	1,6	R_p ½	**003L7641**		G ¾ A	**003L7646**
	20	2,5	R_p ¾	**003L7642**		G 1 A	**003L7647**
	25	4,0	R_p 1	**003L7643**		G 1¼ A	**003L7648**
	32	6,3	R_p 1¼	**003L7644**		G 1½ A	**003L7649**
	40	10	R_p 1½	**003L7645**		G 1¾ A	**003L7650**
	50	16				G 2¼ A	**003L7652**

Accessories and spare parts

Type	Description	Comments/connection	Code No.
	Shut-off knob for ASV-I (black)	DN 15	**003L8155**
		DN 20	**003L8156**
		DN 25	**003L8157**
		DN 32 / DN 40 / DN 50	**003L8158**
	Two test plugs and one locking plate	For ASV-I and ASV-M, rectus type (DN 15-40)	**003L8145**
	Plug for impulse tube connection ASV-I/M	Set of 10 pieces / G 1/16 A	**003L8174**

Technical data

Nominal diameter	DN	15-50
Max. pressure	bar	16 (PN 16)
Test pressure		25
Differential pressure over the valve	kPa	10-150 [1]
Temperature	°C	–20 … 120
Material of parts in contact with water		
Valve body		Brass
Membrane / O-rings		EPDM
Spring		Stainless steel

[1] *Please note that the maximum admissible differential pressure across the valve 150 kPa should also not be exceeded at partial load.*

Application

ASV-I has to be used as partner valve inside control loop (Fig. 1). ASV-I and ASV-P(V) is connected via an impulse tube, and there by giving a constant differential pressure across the riser and ASV-I.

This configuration offers flow limitation on the riser however part of the controlled pressure range is used by pressure drop on partner valve (Δp_i). It is recommended when flow limitation on each terminal units is not possible.

This way it is possible to control the maximum flow for each riser, and ensuring distribution between them.

- partner valve inside control loop (Fig. 1). Offers flow limitation on the riser however part of the controlled pressure range is used by pressure drop on partner valve (Δp_i). It is recommended when flow limitation on each terminal units is not possible.

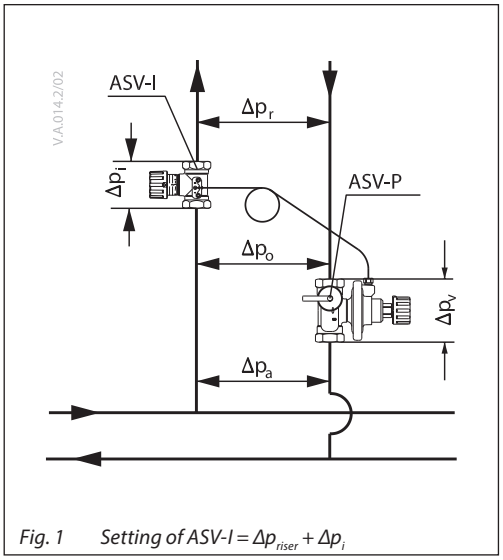
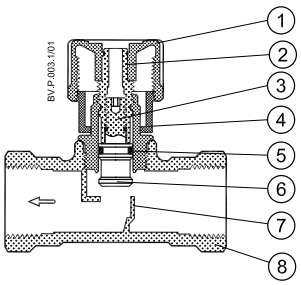
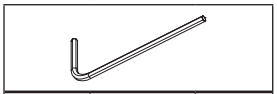


Fig. 1 Setting of ASV-I = $\Delta p_{riser} + \Delta p_i$

Design

1. Shut-off knob
2. Shut-off spindle
3. Setting spindle
4. Scale disc
5. O-rings
6. Valve cone
7. Seat
8. Valve body





DN		
	15	2.5
	20	3
	25	4
	32/40/50	5

ASV-I incorporates a double cone able to give maximum stroke limitation, thus achieving flow limitation. It also incorporates shut off function. ASV-I is equipped with the nipples for the flow measurement and a connection for the ASV-I/ ASV-PV impulse tube.

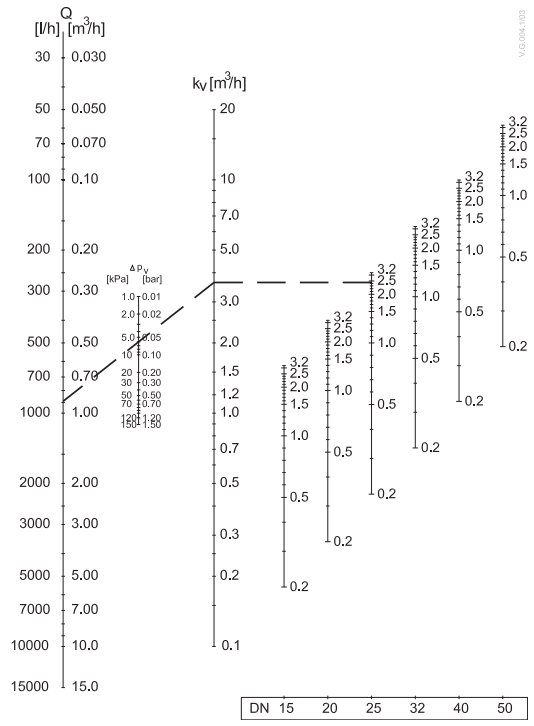
Use the following procedure to limit the flow: turn the valve knob fully counter clockwise to open the valve. The mark on the knob will now be opposite »0« on the scale. Turn the valve knob clockwise to the required setting (e.g. for setting 2.2 the knob must be rotated two full turns and then forward to »2« on the scale. Hold the knob to keep the setting (e.g. 2.2) and using a hexagon socket key turn the spindle fully counter clockwise (until a stop can be felt). Turn the valve knob fully counter clockwise so that the mark on the knob is opposite »0« on the scale.

The valve is now open as many turns from the closed position (2.2) as indicated by the conversion from required flow. To annul the setting, turn the hexagon socket key fully clockwise (until a stop can be felt).

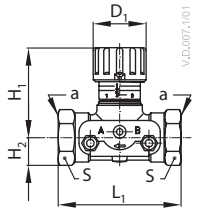
Remember, at the same time the knob must be held on its »0« setting.

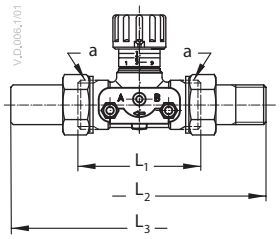
To read presetting valve has to be closed.

Sizing

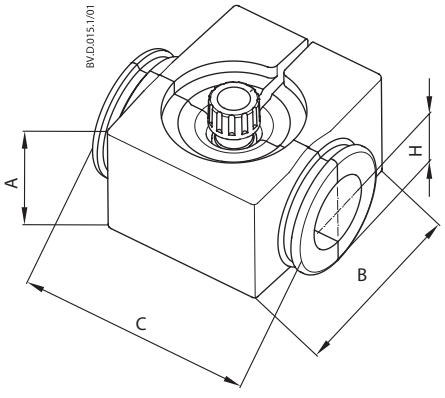


Dimensions





DN	L_1	L_2	L_3	H_1	H_2	D_1	S	a ISO 7/1	b ISO 228/1
	mm								
15	65	120	139	48	15	28	27	Rp ½	G ¾ A
20	75	136	159	60	18	35	32	Rp ¾	G 1 A
25	85	155	169	75	23	45	41	Rp 1	G 1¼ A
32	95	172	179	95	29	55	50	Rp 1¼	G 1½ A
40	100	206	184	100	31	55	55	Rp 1½	G 1¾ A
50	130	246	214	106	38	55	67	-	G 2¼ A



Insulation [1)]

DN	A	B	C	H
	mm			
15	61	110	111	30
20	76	120	136	38
25	100	135	155	50
32	118	148	160	60
40	118	148	180	60

1) Insulation available for sizes DN 15-40

ENGINEERING
TOMORROW

Data sheet

Manual presetting valves LENO™ MSV-BD

Description

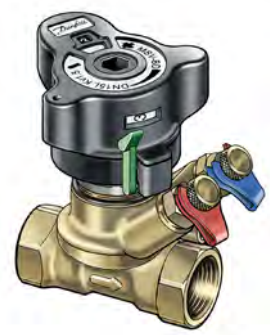
LENO™ MSV-BD is a range of manual valves for balancing flow in heating and cooling systems.

LENO™ MSV-BD is a combined presetting and shut off valve with a range of unique features:

- Removable hand wheel for easy mounting.
- 360° turnable measuring station for convenient measuring and draining.
- Numeric presetting scale, visible from more angles.
- Easy locking of presetting.
- Built-in test plugs for Ø 3 mm needles.
- Drain connection with separate draining of inlet and outlet side of valve.
- Open-close with Allen key for extra force.
- Open-closed colour indicator.

It is recommended to use LENO™ MSV-BD in constant flow systems. The valve may be mounted in flow or return.

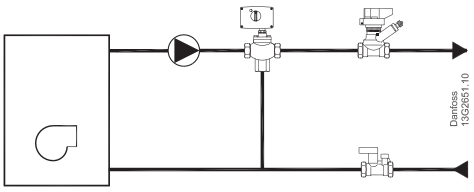
DN 15 and 20 valves are available with internal or external thread. Other dimensions with internal thread.



Danfoss PFM 1000/PFM 100 measuring instruments contain valve data for LENO™ MSV-BD in memory.

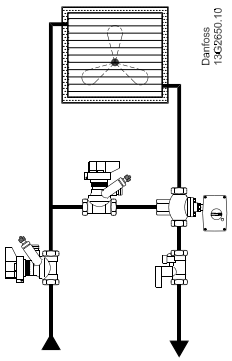
Application

Boiler, flat station or heat pump in 1-family houses



- For balancing.
- Shut-off function for service/repair.

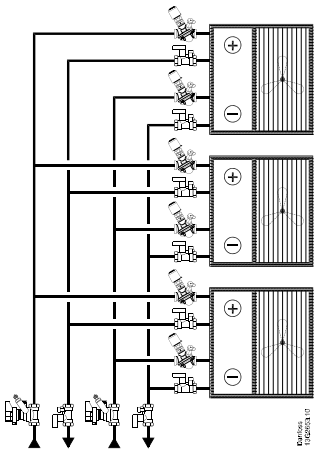
Air handling unit



- For constant flow.
- For balancing.
- Shut-off function for service/repair.

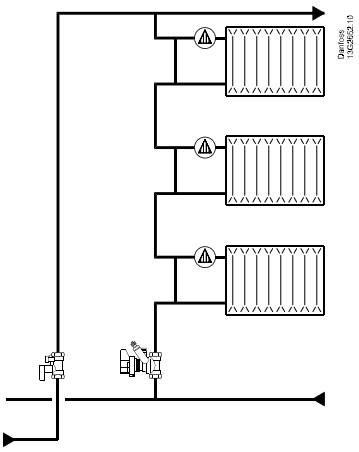
Application

Fan coils



- For flow verification.
- Shut-off function for service/repair.

1-pipe system



- For balancing.
- Shut-off function for service/repair.

DOMESTIC HOT WATER SYSTEMS: *Depending on local legislation it can be used in Domestic hot water applications.*

Ordering

LENO™ MSV-BD valve with internal thread

Type	Material	Size (mm)	k_{vs} (m^3/h)	Connection	Quantity	Code No.
	DZR brass [1]	DN 15 LF	2.5	½"	1	**003Z4000**
		DN 15	3.0	½"	1	**003Z4001**
		DN 20	6.0	¾"	1	**003Z4002**
		DN 25	9.5	1"	1	**003Z4003**
		DN 32	18	1¼"	1	**003Z4004**
		DN 40	26	1½"	1	**003Z4005**
		DN 50	40	2"	1	**003Z4006**
		DN 15	3.0	½"	8	**003Z4261**
		DN 20	6.6	¾"	8	**003Z4262**
		DN 25	9.5	1"	8	**003Z4263**

LENO™ MSV-BD valve with external thread

Type	Material	Size (mm)	k_{vs} (m^3/h)	Connection	Code No.
	DZR brass [1]	DN 15 LF			**003Z4100**
		DN 15	3.0	G ¾ A [2]	**003Z4101**
		DN 20	6.0	G 1 A	**003Z4102**

LENO™ MSV-BD/S set solution

Type	Material	Size (mm)	k_{vs} (m^3/h)	Drain flow [3] (l/h)	Connection	Code No.
	DZR brass [1]	DN 15	3.0	281	½"	**003Z4051**
		DN 20	6.0	277	¾"	**003Z4052**
		DN 25	9.5	316	1"	**003Z4053**
		DN 32	18	305	1¼"	**003Z4054**
		DN 40	26	208	1½"	**003Z4055**
		DN 50	40	308	2"	**003Z4056**

[1] *Corrosion resistant brass*
[2] *Eurocone DIN V 3838*
[3] *Drain flow is measured at 1 bar static pressure and 0.1 bar differential pressure.*

Ordering (continued)

Accessories

Type	Code No.
Standard test plugs, 2 pcs.	**003Z4662**
Measuring test plugs, 53 mm, red and blue	**003Z3946**
Operating handle	**003Z4652**
Drain connection, ½" thread	**003Z4096**
Drain connection, ¾" thread	**003Z4097**
Flow measuring instrument PFM 1000 (10 bar)	**003Z8260**
Flow measuring instrument PFM 1000 (20 bar)	**003Z8261**
Identification tag & strips, 10 pcs.	**003Z4660**
MSV-BD insulation, DN 15	**003Z4781**
MSV-BD insulation, DN 20	**003Z4782**
MSV-BD insulation, DN 25	**003Z4783**
MSV-BD insulation, DN 32	**003Z4784**
MSV-BD insulation, DN 40	**003Z4785**
MSV-BD insulation, DN 50	**003Z4786**

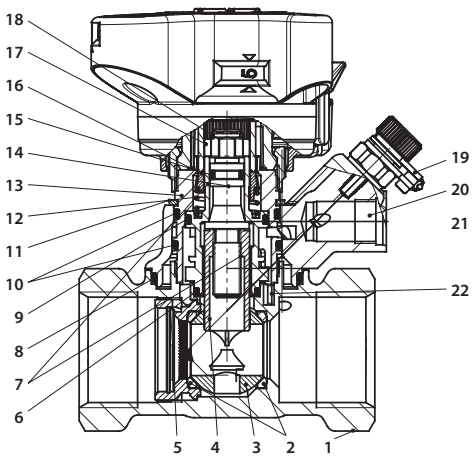
LENO™ MSV-BD valve with external thread

Pipe (mm)	Valve thread	PEX fittings, Code no.	Alupex fittings, Code no.
12 x 1.1	G ¾	**013G4150**	
12 x 2	G ¾	**013G4152**	**013G4182**
13 x 2	G ¾	**013G4153**	
14 x 2	G ¾	**013G4154**	**013G4184**
15 x 1.7	G ¾	**013G4165**	
15 x 2.5	G ¾	**013G4155**	**013G4185**
16 x 1.5	G ¾	**013G4157**	
16 x 2	G ¾	**013G4156**	**013G4186**
16 x 2.25	G ¾		**013G4187**
17 x 2	G ¾	**013G4162**	
18 x 2	G ¾	**013G4158**	**013G4188**
18 x 2.5	G ¾	**013G4159**	
20 x 2	G ¾	**013G4160**	**013G4190**
20 x 2.5	G ¾	**013G4161**	**013G4191**

Compression fittings for valves with external thread

Steel/copper pipes	Dimension	Code no.
	G ¾ x 15	**013G4125**
	G ¾ x 16	**013G4126**
	G ¾ x 18	**013G4128**
	G 1 x 18	**013U0134**
	G 1 x 22	**013U0135**

Design



1. Valve body
2. Ball seat
3. Ball
4. Throttle bush
5. Support screw
6. O-ring
7. Shut-off bush
8. O-ring
9. O-ring
10. O-ring
11. Retaining ring (corrosion protected)
12. Spring
13. Valve top
14. Spindle
15. O-ring
16. Rotation lock
17. Spindle head
18. Retaining ring, corrosion protected
19. Strips, 2 pcs.
20. Test plugs protection screw
21. Hose connection
22. Stop plug

Materials and parts in contact with water

Valve body	DZR brass
O-rings	EPDM
Ball	Brass/chromium plated
Ball sealing	Teflon

Technical data

Max. static working pressure	20 bar
Static test pressure	30 bar
Max. differential pressure across valve	2.5 bar (250 kPa)
Max. flow temperature	120 °C
Min. temperature	-20 °C
Cooling liquids	Ethylene glycol / propylene glycol and HYCOOL (max. 30 %)

Fitting

Before fitting the valve the installer must ensure that the pipe system is clean and:

1. the valve can be turned 360 degrees (if threaded pipe is used).
2. the valve is fitted according to the flow direction arrow.

Removal of the handle

1. Set the handle at 0.0.
2. Release the setting lock (green).
3. Unscrew the union nut.

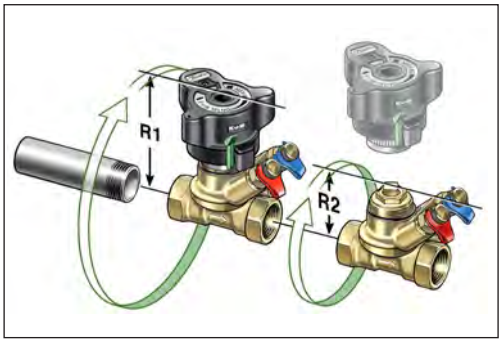
Calibration of the handle

Before refitting, ensure that the handle setting is 0.0.

For DN 15 - 20 valves with external thread

Danfoss offers a complete range of compression fittings for steel, cobber and PEX pipes.

DN	R1/R2 (mm)
15	86/67
20	89/69
25	91/71
32	118/84
40	118/84
50	124/90

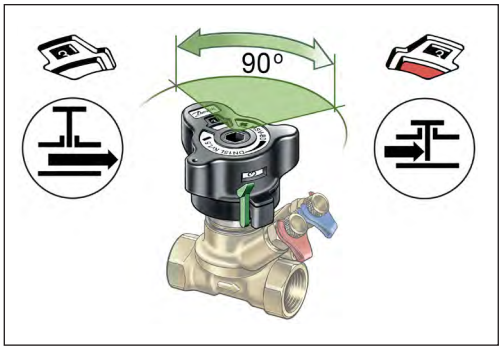


Shut-off

In order to shut-off the valve the handle must be pressed down.

The shut-off function features a ball valve, which only requires a 90 degree turn to shut the valve completely.

An indicator window shows the actual setting:
- red = closed
- white = open

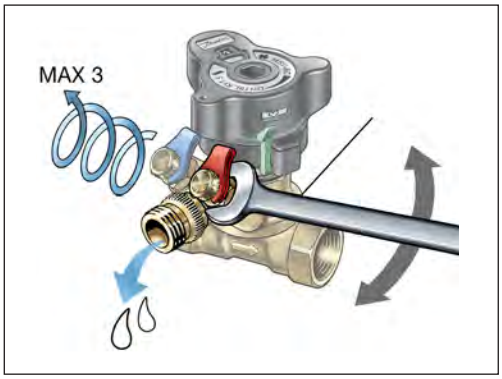


Draining

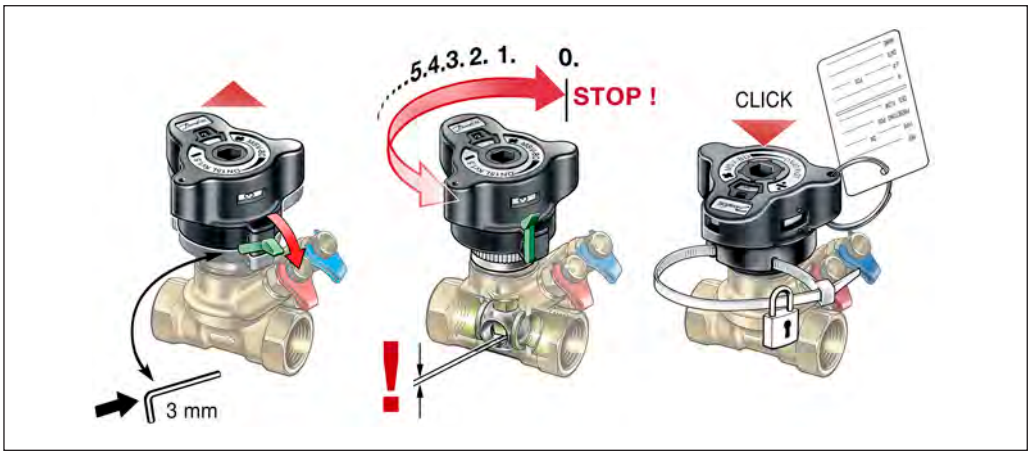
Note!
The drain connection is an accessory and must be purchased separately.

The drain tap can rotate 360 degrees for convenient operation.

Draining the system pipes can be done selectively:
When the red test plug is opened, the valve inlet pipe is drained.
Opening the blue test plug will drain the pipe on the valve outlet side. Test plugs unscrewing protection screw is located between valve test plugs.



Setting and sealing



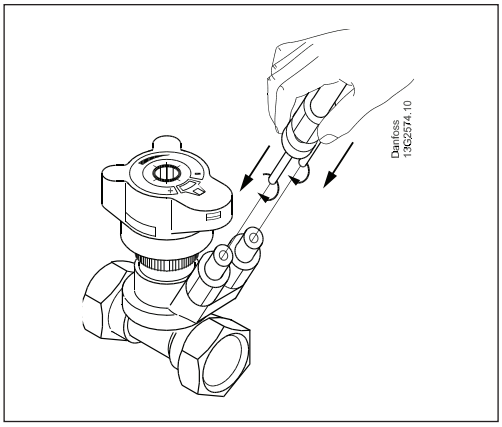
The valve has a presetting feature for setting/ adjusting flow ratings.

Setting the required flow is made in 5 steps:
1. In open position, release the lock using the green lever or a 3 mm Allen key.
2. The handle pops up automatically.
3. The calculated value can now be set.
4. The setting is locked when the handled is pressed to click.
5. The setting can be sealed by using a strip as shown.

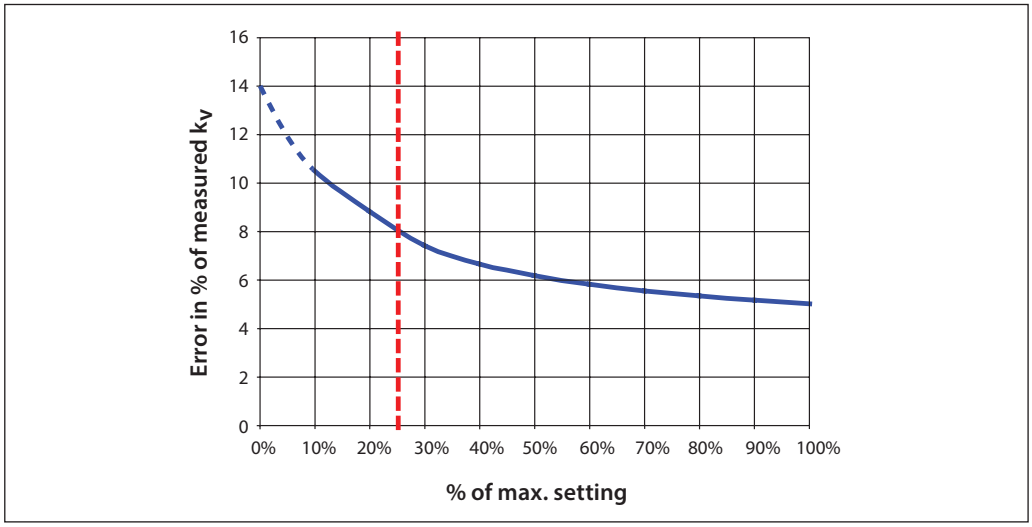
Measuring

The flow through the LENO™ MSV-BD valve can be measured using Danfoss PFM 1000 or other brands of measuring instruments.
The LENO™ MSV-BD valve is supplied with two test plugs for Ø3 mm needles.
A twin bracket enables the user to connect both needles simultanously.

Procedure for flow measuring:
1. Select flow measuring.
2. Select valve brand.
3. Select valve type and dimension.
4. Enter presetting.
5. Connect valve and instrument.
6. Calibrate static pressure.
7. Measure the flow.



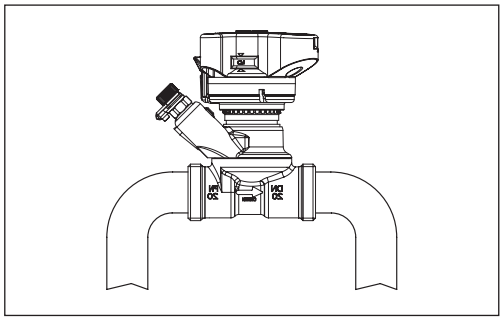
Measuring accuracy



LENO™ MSV-BD is very accurate, due to the separate functions for presetting and shut-off. Valve can be mounted everywhere in the system (closed to T-pieces, elbows, pumps, etc.), since it is unaffected by turbulence in any setting or instalation.

The red line indicates 25% of max. flow.

According to BS7350:1990 flow rates must be within following values:
± 18% at 25% open position
± 10% at fully open position



Kv-signal

kv-signal values are used for non-Danfoss measuring instruments. Danfoss PFM 1000 have all data in memory, and the instruments are using this formula:

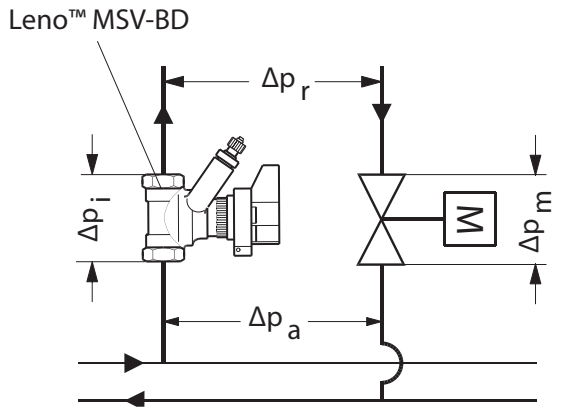
$$\Delta P_{val} = \Delta P_{sig} \left(\frac{k_{v\text{-}sig}}{k_{v\text{-}val}} \right)^2$$

Δp across the test plugs (k_v-sig) and Δp across the valve (k_v-val) is not the same due to turbulence influence for pressure measuring.

K_V-signal values

Setting	DN 15LF	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
0.0	0.07	0.10	0.12	0.34	0.51	1.05	1.75
0.1	0.08	0.11	0.16	0.44	0.73	1.20	2.01
0.2	0.09	0.12	0.20	0.53	0.92	1.36	2.25
0.3	0.11	0.13	0.26	0.61	1.10	1.55	2.47
0.4	0.12	0.14	0.32	0.67	1.26	1.74	2.69
0.5	0.13	0.16	0.38	0.73	1.43	1.95	2.91
0.6	0.15	0.19	0.45	0.79	1.60	2.17	3.12
0.7	0.16	0.21	0.53	0.84	1.78	2.40	3.35
0.8	0.17	0.24	0.60	0.90	1.97	2.64	3.58
0.9	0.19	0.26	0.67	0.95	2.18	2.88	3.82
1.0	0.20	0.29	0.74	1.01	2.39	3.13	4.07
1.1	0.21	0.32	0.82	1.08	2.62	3.39	4.33
1.2	0.23	0.34	0.89	1.14	2.87	3.64	4.60
1.3	0.25	0.37	0.96	1.22	3.12	3.90	4.89
1.4	0.27	0.40	1.03	1.29	3.38	4.16	5.18
1.5	0.30	0.44	1.09	1.37	3.64	4.43	5.49
1.6	0.32	0.47	1.16	1.46	3.92	4.69	5.80
1.7	0.35	0.51	1.23	1.55	4.19	4.96	6.13
1.8	0.37	0.54	1.30	1.65	4.48	5.24	6.46
1.9	0.40	0.58	1.38	1.75	4.76	5.51	6.80
2.0	0.43	0.61	1.45	1.85	5.05	5.80	7.14
2.1	0.46	0.65	1.53	1.96	5.35	6.08	7.49
2.2	0.49	0.69	1.61	2.07	5.65	6.38	7.84
2.3	0.52	0.73	1.69	2.18	5.96	6.68	8.19
2.4	0.56	0.77	1.78	2.29	6.27	6.99	8.55
2.5	0.59	0.80	1.87	2.41	6.60	7.30	8.91
2.6	0.62	0.85	1.97	2.53	6.94	7.63	9.27
2.7	0.66	0.89	2.07	2.65	7.29	7.98	9.64
2.8	0.69	0.93	2.17	2.77	7.67	8.33	10.00
2.9	0.73	0.97	2.29	2.89	8.06	8.70	10.37
3.0	0.76	1.01	2.40	3.01	8.48	9.08	10.74
3.1	0.80	1.04	2.52	3.13	8.92	9.48	11.11
3.2	0.83	1.08	2.65	3.25	9.38	9.90	11.49
3.3	0.87	1.12	2.78	3.37	9.87	10.33	11.88
3.4	0.90	1.16	2.91	3.49	10.38	10.79	12.27
3.5	0.94	1.20	3.05	3.62	10.91	11.26	12.67
3.6	0.97	1.25	3.19	3.74	11.46	11.74	13.09
3.7	1.01	1.30	3.33	3.87	12.02	12.25	13.51
3.8	1.06	1.35	3.47	4.00	12.58	12.77	13.95
3.9	1.10	1.41	3.61	4.13	13.12	13.30	14.41
4.0	1.14	1.47	3.75	4.26	13.64	13.85	14.88
4.1	1.18	1.53	3.89	4.39	14.12	14.41	15.38
4.2	1.23	1.59	4.02	4.53	14.52	14.98	15.89
4.3	1.27	1.66	4.15	4.68	14.84	15.55	16.44
4.4	1.31	1.73	4.28	4.82		16.13	17.00
4.5	1.35	1.81	4.40	4.98		16.69	17.59
4.6	1.39	1.91	4.52	5.13		17.25	18.21
4.7	1.43	2.00	4.62	5.29		17.80	18.86
4.8	1.47	2.08	4.72	5.46		18.32	19.54
4.9	1.51	2.16	4.82	5.64		18.80	20.24
5-0	1.54	2.23	4.90	5.81		19.25	20.97
5.1	1.60	2.30	4.97	6.00		19.65	21.73
5.2	1.66	2.36	5.04	6.19		19.98	22.51
5.3	1.72	2.41		6.38		20.24	23.30
5.4	1.79	2.46		6.57		20.41	24.12
5.5	1.87	2.50		6.77		20.48	24.94
5.6	1.93	2.54		6.96			25.76
5.7	1.99	2.57		7.15			26.58
5.8	2.04			7.34			27.38
5.9	2.09			7.52			28.16
6.0	2.14			7.69			28.90
6.1	2.18			7.85			29.59
6.2	2.22			7.98			30.21
6.3	2.26						30.74
6.4							31.17
6.5							31.47
6.6							31.61

Valve size and presetting



Δpi Pressure drop across LENO™ MSV-BD valve
Δpm Pressure drop across valve
Δpr Necessary pressure for the riser
Δpa Available pressure for the riser

Example

Given:
Max. pipe flow Q .....2.0 m^3/h
Δp_r.....15 kPa
Δp_a .....45 kPa
Δp_m .....10 kPa
Δp_i.....$\Delta p_a - \Delta p_v - \Delta p_m$

$\Delta p_i = 45\ kPa - 15\ kPa - 10KPa = 20\ kPa$

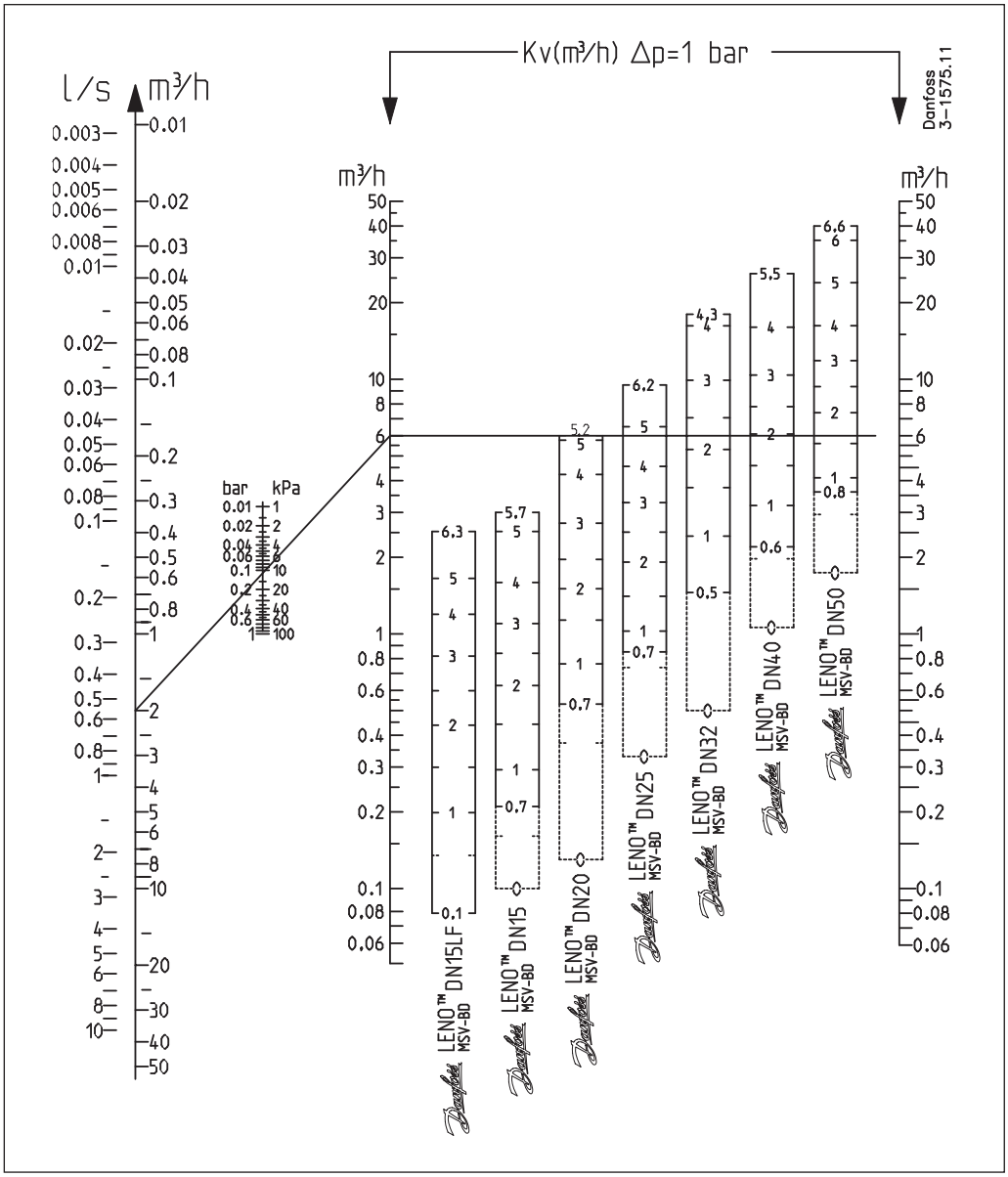
Correct valve size and presetting is found in the sizing and flow diagrammes, p 9.

$Q = 2.0\ m^3/h$ and $\Delta p_i = 20\ kPa$

Setting can be also calculated from the formula:

$$k_v = \frac{Q[m^3/h]}{\sqrt{\Delta p_i}[bar]} = \frac{2.0}{\sqrt{0.20}} = 4.5\ m^3/h$$

Sizing



Correction factors

Medium: Ethylene glycol / propylene glycol percentage (max. 30 %).

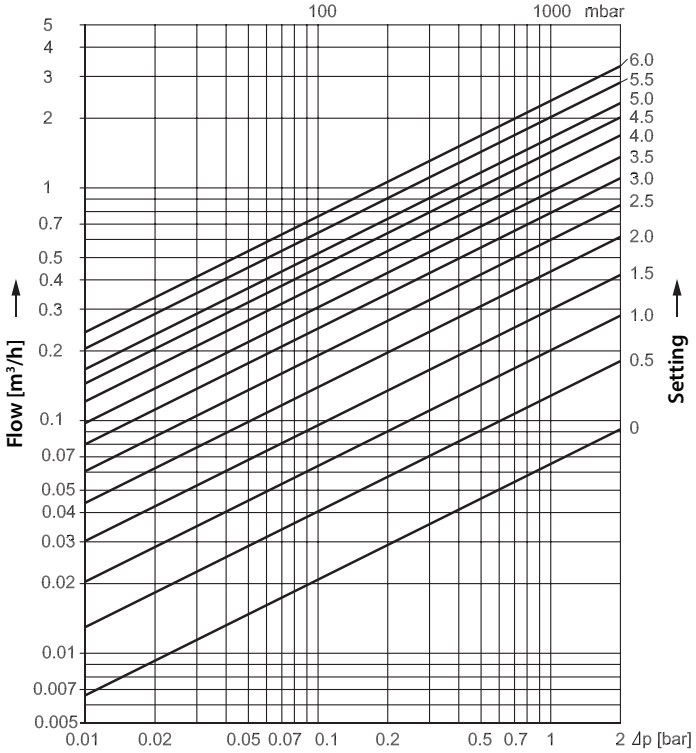
Temp. °C	Flow, m³/h						
	25	30	40	50	60	65	100
-40.0	1)	1)	1)	1)	0.89	0.88	1)
-17.8	1)	1)	0.93	0.91	0.90	0.89	0.86
4.4	0.95	0.95	0.93	0.92	0.91	0.90	0.87
26.6	0.96	0.95	0.94	0.93	0.92	0.91	0.88
48.9	0.97	0.96	0.95	0.94	0.93	0.92	0.90
71.1	0.98	0.98	0.96	0.95	0.94	0.94	0.95
93.3	1.00	0.99	0.97	0.96	0.95	0.95	0.92
115.6	2)	2)	2)	2)	2)	2)	0.94

1) Below freezing point
2) Above boiling point

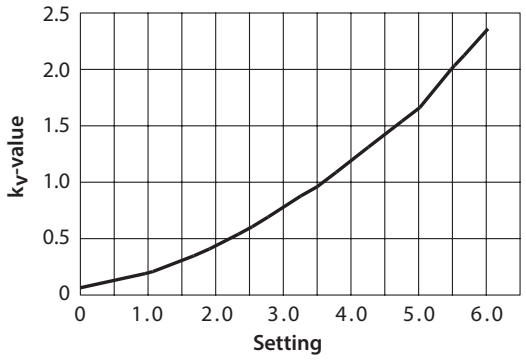
Example
Flow needed .....30 m³/h
Flow after correction .....30 x 0.95 = 28 m³/h

Flow diagrammes, DN 15 LF

LENO™ MSV-BD DN 15 LF



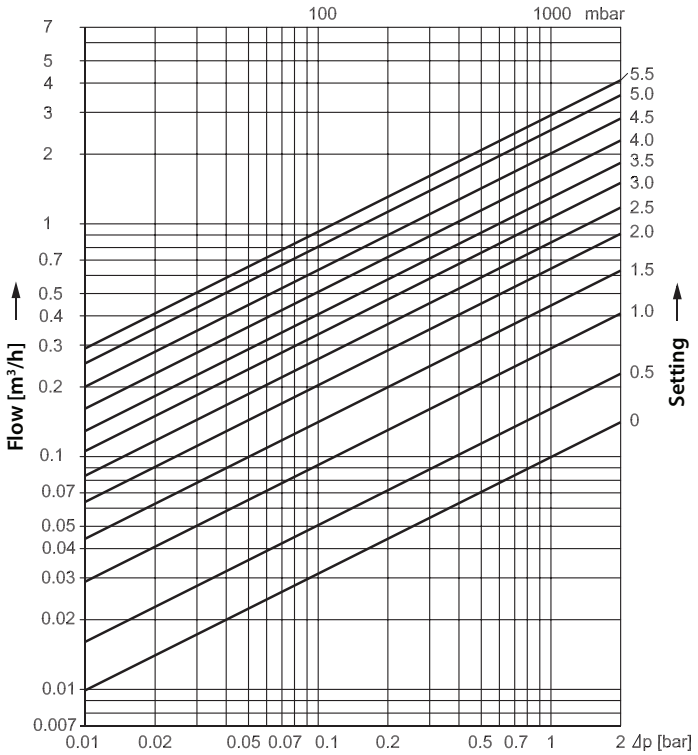
Flow characteristics



Setting	k_V-value
0.0	0.07
0.1	0.08
0.2	0.09
0.3	0.11
0.4	0.12
0.5	0.13
0.6	0.15
0.7	0.16
0.8	0.17
0.9	0.19
1.0	0.20
1.1	0.22
1.2	0.23
1.3	0.25
1.4	0.28
1.5	0.30
1.6	0.32
1.7	0.35
1.8	0.38
1.9	0.41
2.0	0.44
2.1	0.47
2.2	0.50
2.3	0.53
2.4	0.56
2.5	0.60
2.6	0.63
2.7	0.67
2.8	0.71
2.9	0.74
3.0	0.78
3.1	0.82
3.2	0.86
3.3	0.89
3.4	0.93
3.5	0.97
3.6	1.01
3.7	1.05
3.8	1.10
3.9	1.15
4.0	1.19
4.1	1.24
4.2	1.29
4.3	1.33
4.4	1.38
4.5	1.43
4.6	1.48
4.7	1.52
4.8	1.56
4.9	1.61
5.0	1.65
5.1	1.72
5.2	1.78
5.3	1.86
5.4	1.94
5.5	2.03
5.6	2.10
5.7	2.17
5.8	2.23
5.9	2.30
6.0	2.36
6.1	2.42
6.2	2.47
6.3	2.53

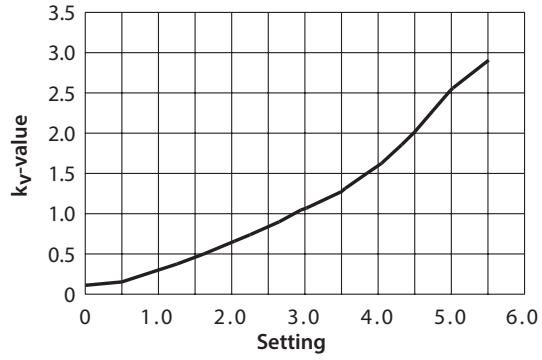
Flow diagrammes, DN 15

LENO™ MSV-BD DN 15



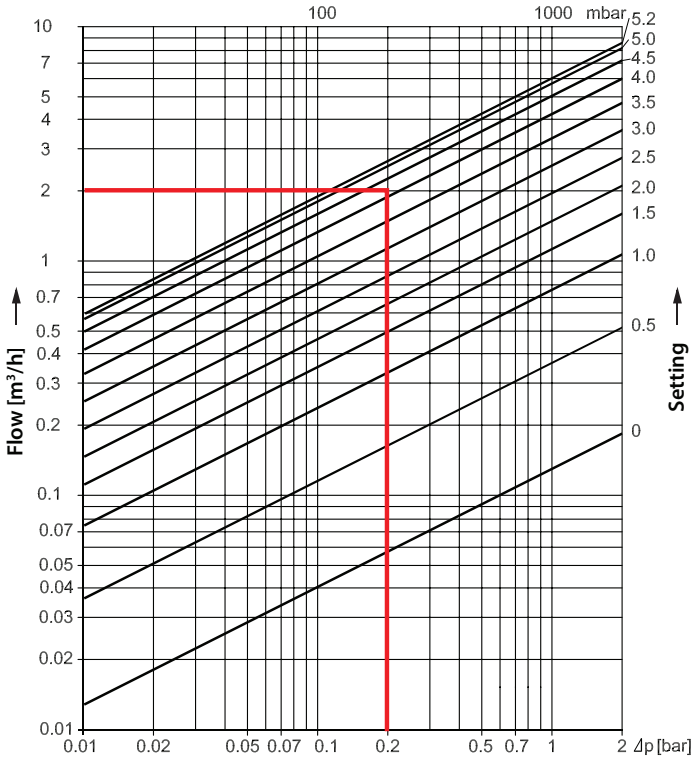
Setting	k_V-value
0.0	0.10
0.1	0.11
0.2	0.12
0.3	0.13
0.4	0.14
0.5	0.16
0.6	0.19
0.7	0.21
0.8	0.24
0.9	0.27
1.0	0.29
1.1	0.32
1.2	0.35
1.3	0.38
1.4	0.41
1.5	0.44
1.6	0.48
1.7	0.51
1.8	0.55
1.9	0.59
2.0	0.63
2.1	0.67
2.2	0.71
2.3	0.75
2.4	0.80
2.5	0.84
2.6	0.88
2.7	0.93
2.8	0.97
2.9	1.02
3.0	1.06
3.1	1.10
3.2	1.14
3.3	1.19
3.4	1.23
3.5	1.28
3.6	1.34
3.7	1.40
3.8	1.46
3.9	1.52
4.0	1.59
4.1	1.66
4.2	1.74
4.3	1.82
4.4	1.91
4.5	2.00
4.6	2.12
4.7	2.23
4.8	2.33
4.9	2.43
5.0	2.53
5.1	2.61
5.2	2.70
5.3	2.77
5.4	2.84
5.5	2.90
5.6	2.95
5.7	3.00

Flow characteristics



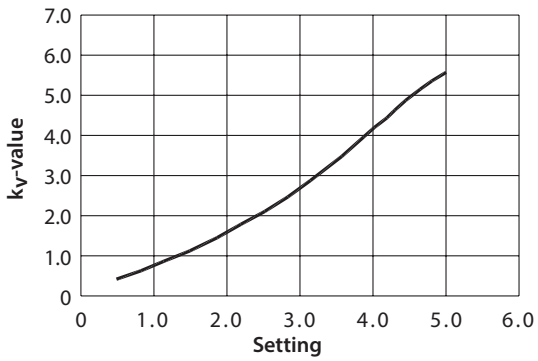
Flow diagrammes, DN 20

LENO™ MSV-BD DN 20



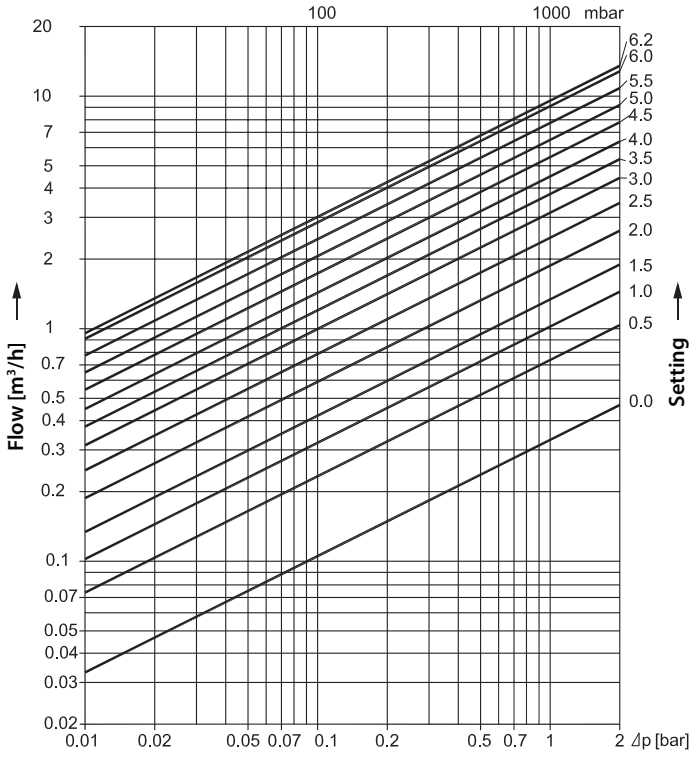
Setting	k_V-value
0.0	0.13
0.1	0.15
0.2	0.19
0.3	0.24
0.4	0.30
0.5	0.37
0.6	0.45
0.7	0.53
0.8	0.61
0.9	0.68
1.0	0.76
1.1	0.84
1.2	0.92
1.3	0.99
1.4	1.06
1.5	1.13
1.6	1.21
1.7	1.28
1.8	1.35
1.9	1.43
2.0	1.50
2.1	1.59
2.2	1.67
2.3	1.76
2.4	1.86
2.5	1.96
2.6	2.07
2.7	2.19
2.8	2.31
2.9	2.44
3.0	2.58
3.1	2.72
3.2	2.87
3.3	3.03
3.4	3.19
3.5	3.36
3.6	3.53
3.7	3.70
3.8	3.87
3.9	4.05
4.0	4.23
4.1	4.40
4.2	4.58
4.3	4.75
4.4	4.91
4.5	5.07
4.6	5.22
4.7	5.37
4.8	5.51
4.9	5.64
5.0	5.77
5.1	5.88
5.2	6.00

Flow characteristics

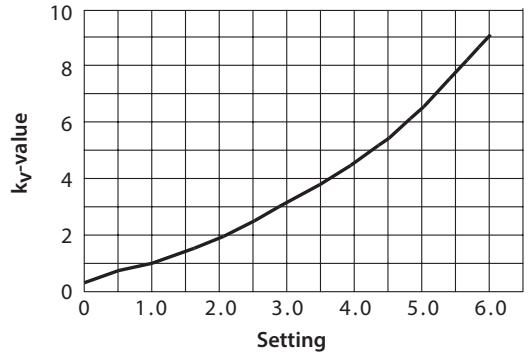


Flow diagrammes, DN 25

LENO™ MSV-BD DN 25



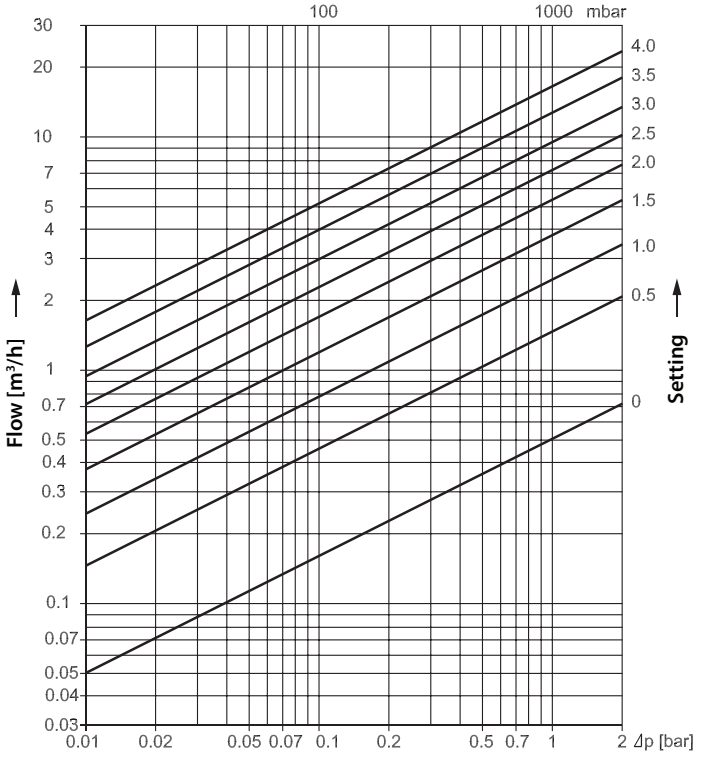
Flow characteristics



Setting	k_V-value
0.0	0.33
0.1	0.44
0.2	0.53
0.3	0.61
0.4	0.68
0.5	0.74
0.6	0.79
0.7	0.85
0.8	0.91
0.9	0.96
1.0	1.03
1.1	1.09
1.2	1.16
1.3	1.24
1.4	1.32
1.5	1.41
1.6	1.50
1.7	1.60
1.8	1.70
1.9	1.80
2.0	1.91
2.1	2.03
2.2	2.15
2.3	2.26
2.4	2.39
2.5	2.51
2.6	2.64
2.7	2.76
2.8	2.89
2.9	3.02
3.0	3.15
3.1	3.28
3.2	3.41
3.3	3.54
3.4	3.68
3.5	3.81
3.6	3.95
3.7	4.09
3.8	4.24
3.9	4.39
4.0	4.55
4.1	4.71
4.2	4.88
4.3	5.05
4.4	5.23
4.5	5.42
4.6	5.62
4.7	5.83
4.8	6.05
4.9	6.27
5.0	6.51
5.1	6.75
5.2	7.00
5.3	7.26
5.4	7.53
5.5	7.80
5.6	8.06
5.7	8.33
5.8	8.59
5.9	8.84
6.0	9.08
6.1	9.30
6.2	9.50

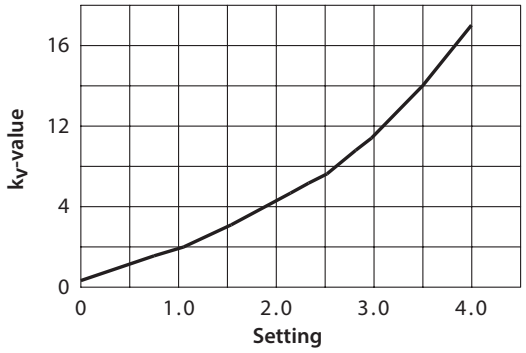
Flow diagrammes, DN 32

LENO™ MSV-BD DN 32



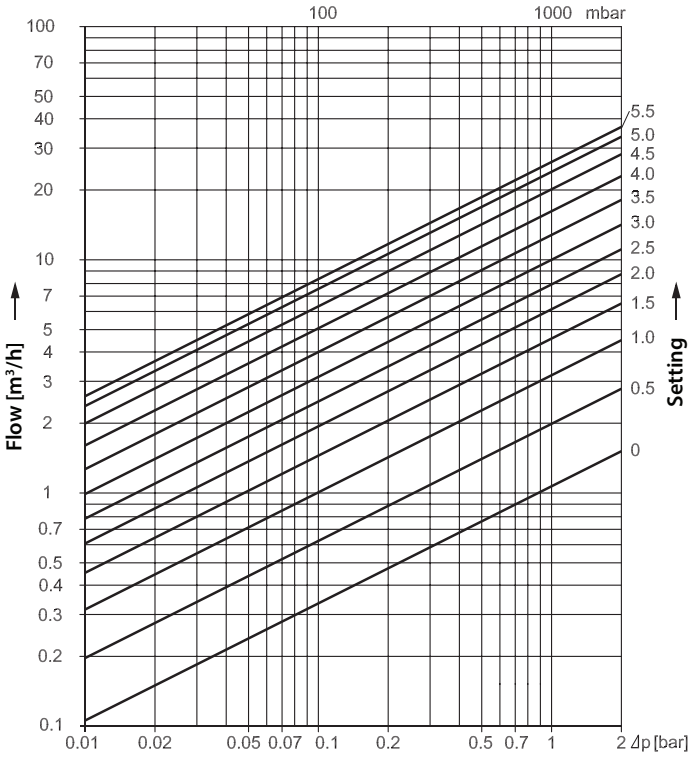
Setting	k_v-value
0.0	0.50
0.1	0.75
0.2	0.95
0.3	1.13
0.4	1.29
0.5	1.45
0.6	1.62
0.7	1.80
0.8	1.99
0.9	2.20
1.0	2.42
1.1	2.66
1.2	2.92
1.3	3.19
1.4	3.47
1.5	3.75
1.6	4.05
1.7	4.36
1.8	4.67
1.9	4.98
2.0	5.30
2.1	5.63
2.2	5.97
2.3	6.32
2.4	6.68
2.5	7.06
2.6	7.46
2.7	7.89
2.8	8.34
2.9	8.83
3.0	9.35
3.1	9.92
3.2	10.52
3.3	11.16
3.4	11.85
3.5	12.51
3.6	13.23
3.7	13.98
3.8	14.74
3.9	15.49
4.0	16.23
4.1	16.91
4.2	17.51
4.3	18.00

Flow characteristics

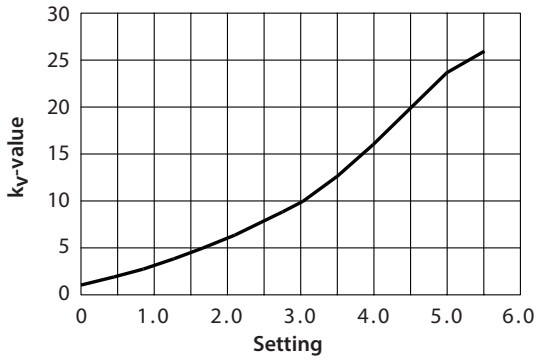


Flow diagrammes, DN 40

LENO™ MSV-BD DN 40



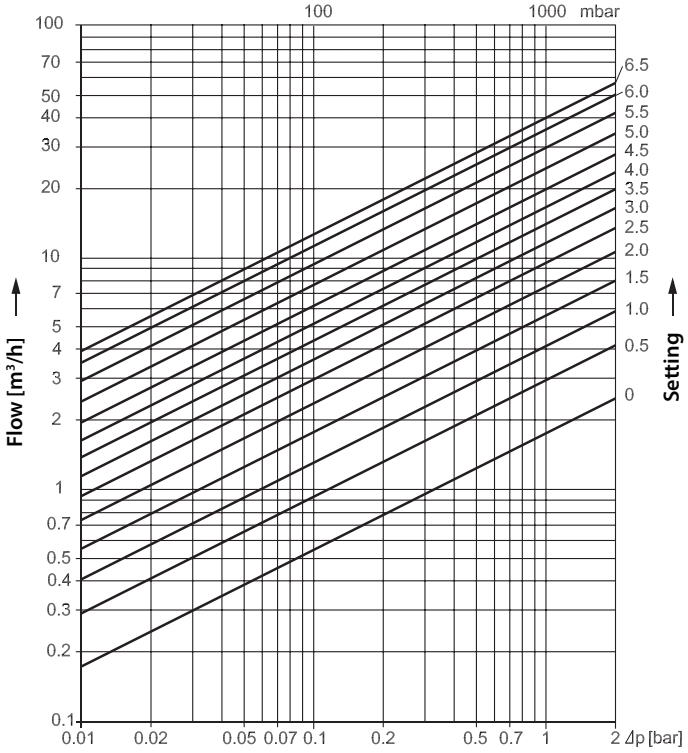
Flow characteristics



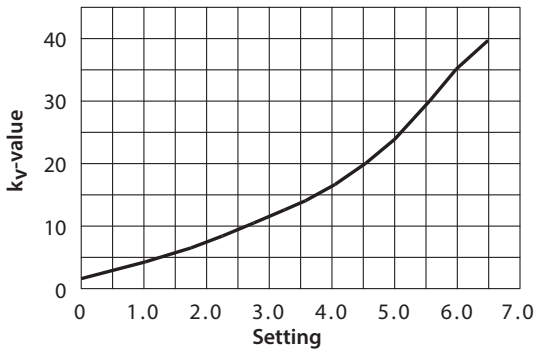
Setting	k_v-value
0.0	1.06
0.1	1.21
0.2	1.38
0.3	1.56
0.4	1.76
0.5	1.97
0.6	2.20
0.7	2.43
0.8	2.68
0.9	2.93
1.0	3.19
1.1	3.46
1.2	3.73
1.3	4.01
1.4	4.29
1.5	4.58
1.6	4.87
1.7	5.17
1.8	5.47
1.9	5.78
2.0	6.09
2.1	6.41
2.2	6.74
2.3	7.09
2.4	7.44
2.5	7.80
2.6	8.18
2.7	8.58
2.8	9.00
2.9	9.44
3.0	9.90
3.1	10.38
3.2	10.89
3.3	11.43
3.4	12.00
3.5	12.60
3.6	13.22
3.7	13.88
3.8	14.56
3.9	15.28
4.0	16.02
4.1	16.79
4.2	17.57
4.3	18.38
4.4	19.19
4.5	20.02
4.6	20.82
4.7	21.61
4.8	22.38
4.9	23.12
5.0	23.81
5.1	24.44
5.2	25.00
5.3	25.46
5.4	25.80
5.5	26.00

Flow diagrammes, DN 50

LENO™ MSV-BD DN 50

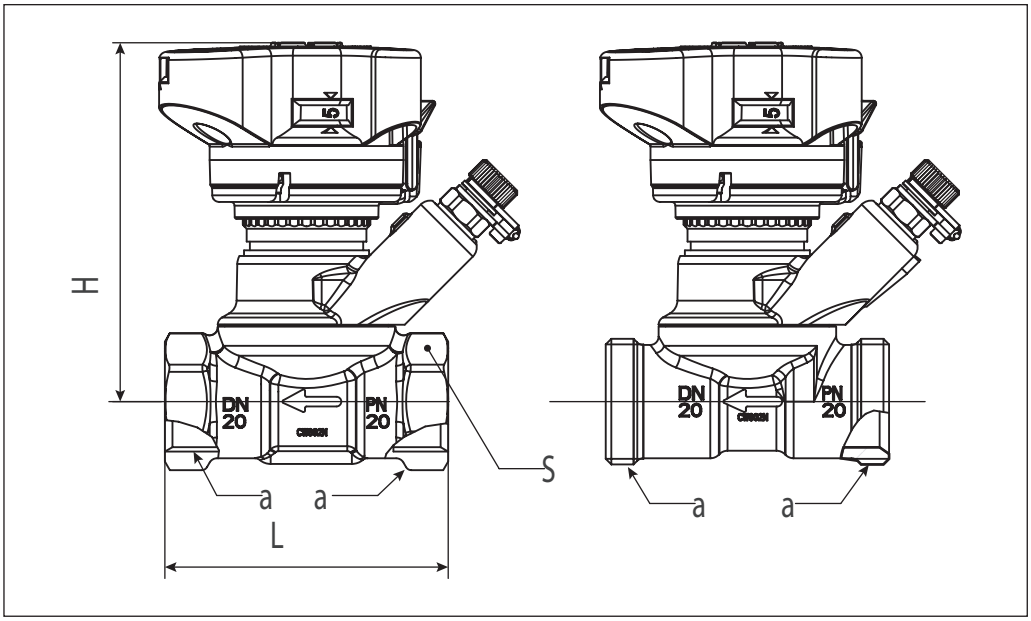


Flow characteristics



Setting	k_V-value
0.0	1.74
0.1	2.03
0.2	2.28
0.3	2.51
0.4	2.73
0.5	2.95
0.6	3.16
0.7	3.38
0.8	3.61
0.9	3.85
1.0	4.10
1.1	4.37
1.2	4.65
1.3	4.95
1.4	5.26
1.5	5.59
1.6	5.93
1.7	6.28
1.8	6.64
1.9	7.01
2.0	7.39
2.1	7.78
2.2	8.17
2.3	8.56
2.4	8.96
2.5	9.36
2.6	9.76
2.7	10.17
2.8	10.58
2.9	10.99
3.0	11.41
3.1	11.84
3.2	12.27
3.3	12.71
3.4	13.16
3.5	13.62
3.6	14.10
3.7	14.60
3.8	15.12
3.9	15.66
4.0	16.23
4.1	16.84
4.2	17.47
4.3	18.14
4.4	18.84
4.5	19.59
4.6	20.38
4.7	21.21
4.8	22.08
4.9	23.00
5.0	23.96
5.1	24.96
5.2	26.00
5.3	27.07
5.4	28.17
5.5	29.30
5.6	30.44
5.7	31.64
5.8	32.83
5.9	34.01
6.0	35.14
6.1	36.23
6.2	37.24
6.3	38.14
6.4	38.93
6.5	39.56
6.6	40.00

Dimensions



MSV-BD	Size	a Thread ISO 228-1	L (mm)	H (mm)	S (mm)
003Z4000	DN 15 LF	G ½	65	92	27
003Z4001	DN 15	G ½	65	92	27
003Z4002	DN 20	G ¾	75	95	32
003Z4003	DN 25	G 1	85	98	41
003Z4004	DN 32	G 1¼	98	121	50
003Z4005	DN 40	G 1½	100	125	55
003Z4006	DN 50	G 2	130	129	67
003Z4100	DN 15 LF	G ¾ A	70	92	-
003Z4101	DN 15	G ¾	70	92	-
003Z4102	DN 20	G 1 A	75	95	-

Tender specifications

LENO™ MSV –BD can be used in heating and cooling systems.

Features	LENO™ MSV-BD
Balancing / Commissioning	•
Presetting	•
Fixed orifice	
Self sealing test plugs	•
Digital visible scale from more sides	•
Shut-off function (ball valve)	•
Draining / filling	•
Draining / filling on both sides of the valve	•
Removable handle	•
Closing indicator	•
Allen key for ball valve	•
Parallel test plugs	•
360° rotating measuring station (drain tap and test plugs)	•

Presetting values are visible on top of the valve and from all sides.
Presetting is locked by pressing down the handle. When locked, the shut-off function can be used without changing the presetting.
The handle is released with the green key or with a 3 mm Allen key.
To prevent unintended changes of the presetting, the handle can be sealed by using a strip.

The system can be drained and filled on both sides of the ball valve.

External thread versions comes in sizes DN 15 and DN 20 and are prepared for Danfoss standard fittings. DN 15 is designed with Euro cone, according to DIN V 3838.

LENO™ MSV-BD has a leakage rate A according to ISO 5208, the ball valve is 100% tight.

The LENO™ MSV-BD measuring accuracy is 8% at 25% of max. setting.
Accuracy is according to BS 7350 : 1990.

Measuring instruments must be equipped with Ø3 mm measuring needles. Danfoss measuring instruments PFM 1000 contain all relevant valve data.

Valve sizes. . . . . DN 15 (LF) – DN 50
Pressure class. PN20
Static test pressure . . . . . 30 bar
Working temperature. . . . . -20°C to 120°C
Working area . . . . . 10-100% of the k_{VS}-value

The valve body is made of DZR brass.
The ball is made of chromium plated brass.
O-rings are made from EPDM rubber.

Data Sheet

Manual Presetting Valves LENO™ MSV-O

Description

LENO™ MSV-O is a new generation of manual valves for balancing flow in heating, cooling and domestic hot water systems.

LENO™ MSV-O is a combined presetting and shut off valve with a range of unique features:

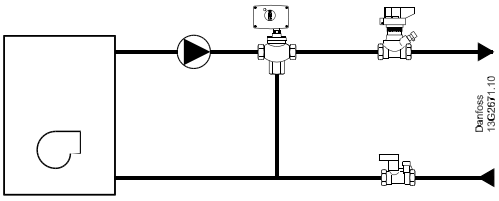
- Fixed venturi orifice.
- Removable hand wheel for easy mounting.
- Numeric presetting scale, visible from more angles.
- Easy locking of presetting.
- Built-in measuring nipples for 3mm needles.
- Open-close with Allen key in emergency.
- Open-closed colour indicator.

It is recommended to use LENO™ MSV-O in constant flow systems in front of boilers, flat stations or heat pumps in one-family houses for balancing, shut-off function for service and repair, flow verification, one pipe systems. The valve may be mounted in flow or return.

All dimensions are available with internal thread.

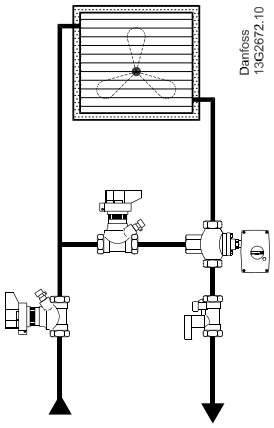
Danfoss PFM 5000/100 measuring instruments contain valve data for LENO™ MSV-O in memory.

Application



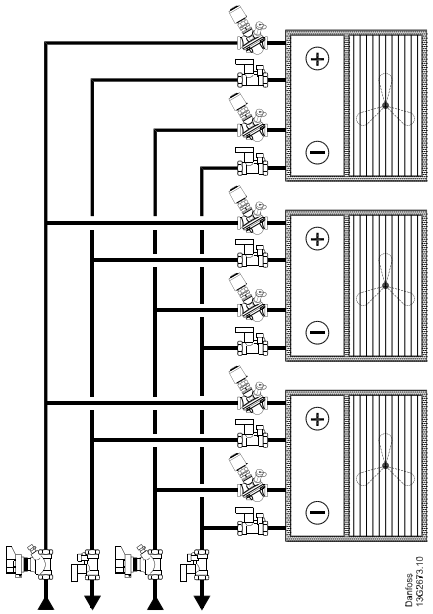
Boiler, flat station or heat pump in 1-family houses.

- For balancing.
- Shut-off function for service/repair.



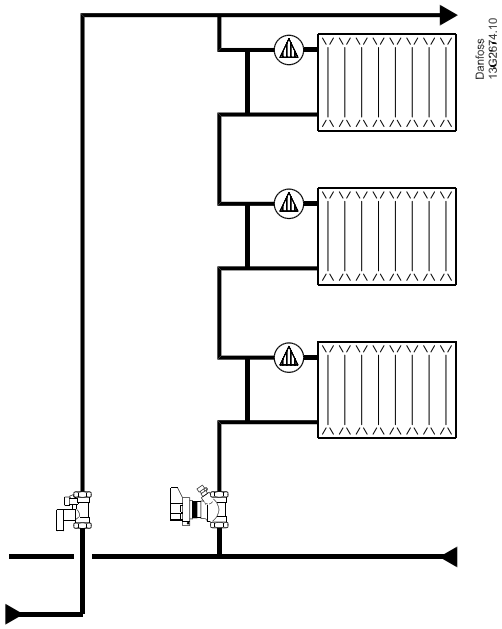
Air handling unit

- For constant flow.
- For balancing.
- Shut-off function for service/ repair.



Fan coils

- For flow verification.
- Shut-off function for service/ repair.



1-pipe system

- For balancing.
- Shut-off function for service/repair.

Ordering

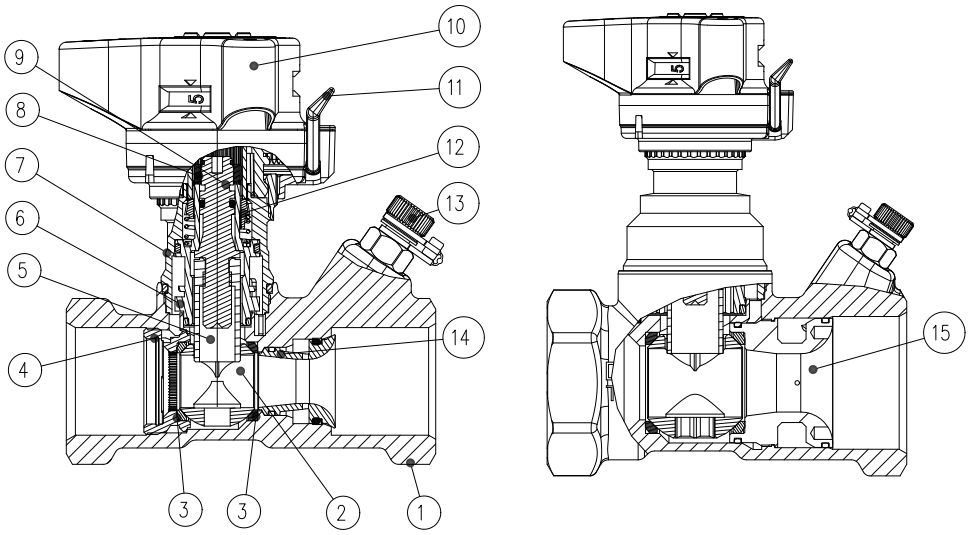
LENO™ MSV-O valve with internal thread

Type	Material	Size	k_{vs} (m^3/h)	Connection	Code no.
	DZR* Brass	DN 15 LF	0.63	R_p ½"	**003Z4020**
		DN 15	2.8	R_p ½"	**003Z4021**
		DN 20	5.7	R_p ¾"	**003Z4022**
		DN 25	9.7	R_p 1"	**003Z4023**
		DN 32	16.6	R_p 1¼"	**003Z4024**
		DN 40	25.4	R_p 1½"	**003Z4025**
		DN 50	37.9	R_p 2"	**003Z4026**

Accessories

Type	Code no.
Standard measuring nipples, 2 pcs.	**003Z4662**
Extended measuring nipples, 60 mm, 2 pcs.	**003Z4657**
Operating handle	**003Z4652**
Flow measuring instrument PFM 100	**003L8260**
Flow measuring instrument PFM 5000, PN10	**003L8331**
Flow measuring instrument PFM 5000 Multi Source, PN10	**003L8333**
Identification tag & strips, 10 pcs.	**003Z4660**

Design



1. Valve house
2. Ball
3. Ball seat
4. Suppert screw
5. Throttle
6. Closing bush
7. Valve top
8. Spindle head
9. Spindle
10. Handle
11. Release lever
12. Rotation lock
13. Measuring nipple
14. Venturi
15. Suppert screw with venturi

Technical Data

Materials and parts in contact with water

Valve body	DZR brass
O-rings	EPDM
Ball	Brass/chromium plated
Ball sealing	Teflon

Max. static working pressure	20 bar
Static test pressure	30 bar
Max. differential pressure across valve	2.5 bar (250 kPa)
Max. flow temperature	120 °C
Min. temperature	-20°C
Cooling liquids	Ethylene glycol / propylene glycol and HYCOOL (max. 30 %)

Fitting

Before fitting the valve the installer must ensure that the pipe system is clean and:

1. the valve can be turned 360 degrees (if threaded pipe is used).
2. the valve is fitted according to the flow direction arrow.

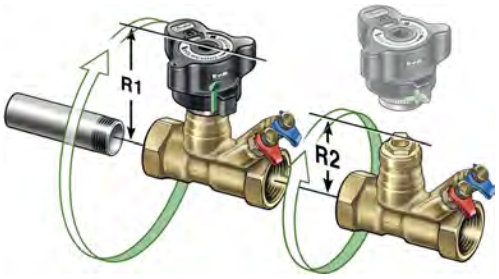
Removal of the handle

1. Set the handle at 0/0.
2. Release the setting lock (green).
3. Unscrew the union nut.

Calibration of the handle

Before refitting, ensure that the handle setting is 0/0.

DN	R1/R2 (mm)
15	96/58
20	99/60
25	101/63
32	124/87
40	127/90
50	131/94



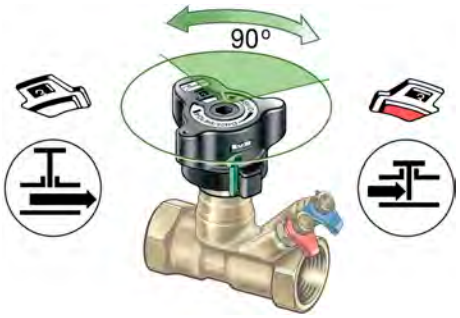
Shut-Off

In order to shut-off the valve the handle must be pressed down.

The shut-off function features a ball valve, which only requires a 90 degree turn to shut the valve completely.

An indicator window shows the actual setting:

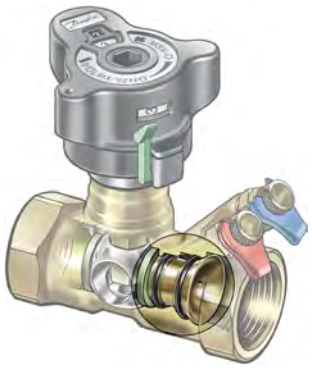
- red = closed
- white = open



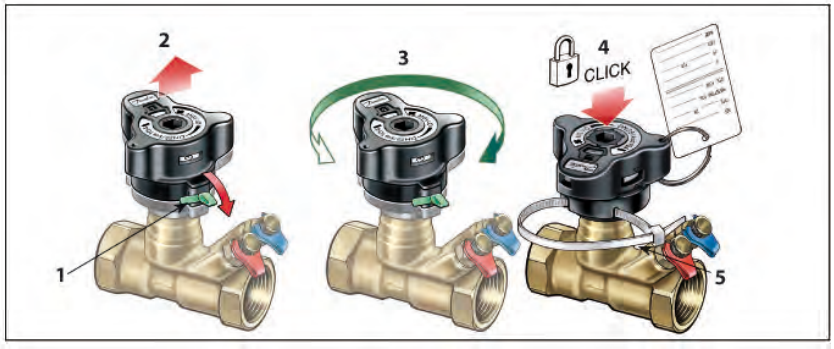
Fixed Orifice

LENO™ MSV-O has a fixed venturi orifice in the valve body with constant k_{vs}-value. This feature makes it possible to read flow on the measuring device, without typing in presetting.

This feature saves time for commissioning for each valve installed.



Setting and Locking



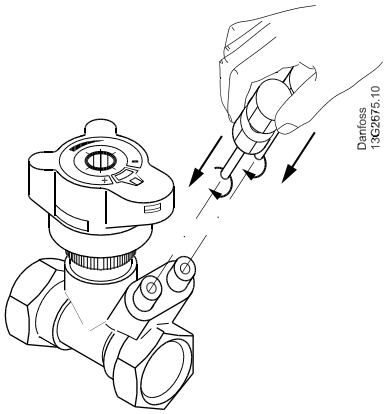
The valve has a built-in presetting feature for accurate flow ratings.

Setting the required flow is made in 5 steps:

1. Release the lock using the green lever or a 3 mm Allen key.
2. The handle pops up automatically.
3. The calculated value can now be set.
4. The setting is locked when the handled is pressed to click.
5. Seal - the setting can be protected by using a strip as shown.

Measuring

The flow through the LENO™ MSV-O valve can be measured using Danfoss PFM 5000/100 or other brands of measuring instruments.
The LENO™ MSV-O valve is supplied with two measuring nipples for 3 mm needles. A twin bracket enables the user to connect both needles simultanously.

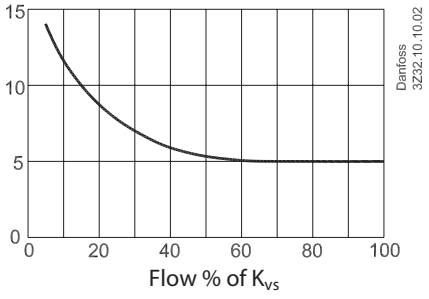


Procedure for flow measuring:

1. Select flow measuring
2. Select valve brand
3. Select valve type and dimension
4. Connect valve and instrument
5. Calibrate static pressure
6. Measure the flow

Measuring Accuracy

Maximum error in measured flow [%]



The red line indicates 25% of max. flow.

According to BS7350:1990 flow rates must be within following values:
± 18 % at 25 % open position
± 10 % at fully open position

LENO™ MSV-O is very accurate, due to the separate functions for presetting and shut-off.

K_v-Signal

K_v-signal values are used for non-Danfoss measuring instruments. Danfoss PFM 3000*/4000 have all data in memory, and the instruments are using this formula:

$$\Delta P_{val} = \Delta P_{sig} \left(\frac{k_{v-sig}}{k_{v-val}} \right)^2$$

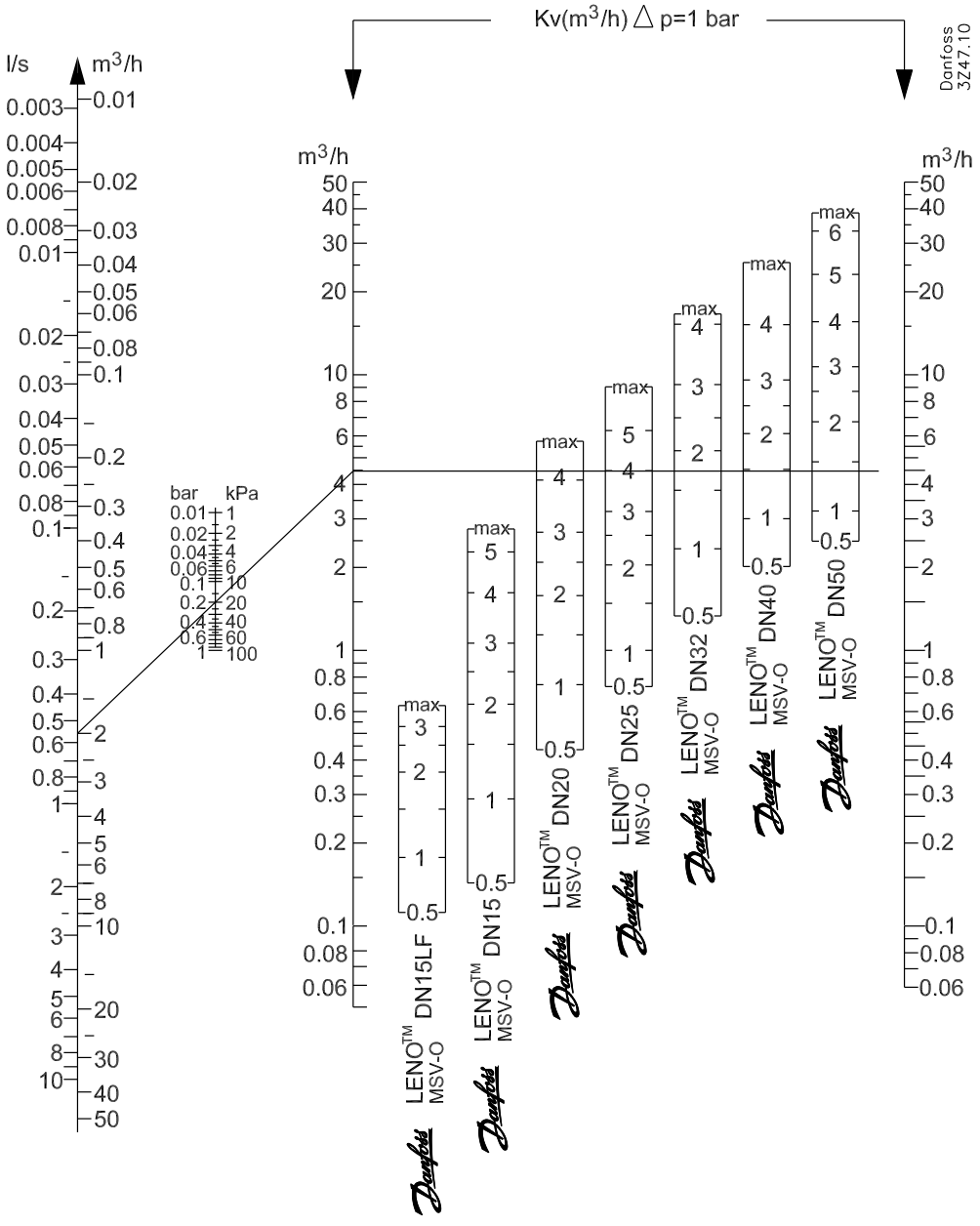
Δp across the measuring nipples ($k_{v\text{-}sig}$) and Δp across the valve ($k_{v\text{-}val}$) is not the same due to turbulence influence for pressure measuring.

** with software 9.4 or higher*

K_v-Signal Values

DN 15LF	DN 15	DN20	DN25	DN32	DN40	DN50
0.356	1.434	3.453	5.80	10.33	14.72	22.94

Sizing



Correction Factors

Temp. °C	Correction factors, ethylene glycol / propylene glycol percentage (max. 30 %)						
	25	30	40	50	60	65	100
-40.0	1)	1)	1)	1)	0.89	0.88	1)
-17.8	1)	1)	0.93	0.91	0.90	0.89	0.86
4.4	0.95	**0.95**	0.93	0.92	0.91	0.90	0.87
26.6	0.96	0.95	0.94	0.93	0.92	0.91	0.88
48.9	0.97	0.96	0.95	0.94	0.93	0.92	0.90
71.1	0.98	0.98	0.96	0.95	0.94	0.94	0.95
93.3	1.00	0.99	0.97	0.96	0.95	0.95	0.92
115.6	2)	2)	2)	2)	2)	2)	0.94

1) Below freezing point
2) Above boiling point

Example: Flow needed = 30 m^3/h
Flow after correction:
30 x 0.95 = 28 m^3/h

Valve Size and Presetting

Example:

Given

Max. pipe flow Q = 2.0 m^3/h

Δp_r = 15 kPa

Δp_a = 45 kPa

Δp_m = 10 kPa

Δp_i = Δpa – Δpv – Δpm

Δp_i = 45 kPa – 15 kPa – 10KPa = 20 kPa

Correct valve size and presetting is found in flow diagramme, page 7.

Q= 2.0 m^3/h and Δp_i = 20 kPa

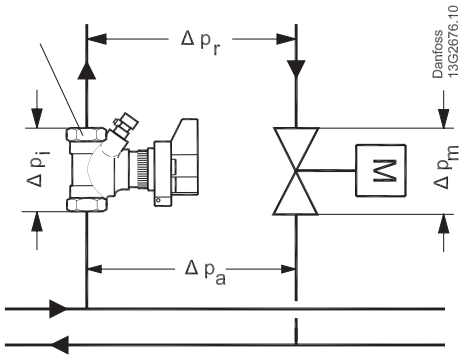
On page 11 intersect guides and presetting is found to be 4.2 (DN 20 valve)

Setting can be also calculated from the formula:

$$k_v = \frac{Q\ [m^3/h]}{\sqrt{\Delta p_i\ [bar]}} = \frac{2.0}{\sqrt{0.20}} = 4.5\ m^3/h$$

which corresponds to presetting 4.2 as shown on pages 7 and 11.

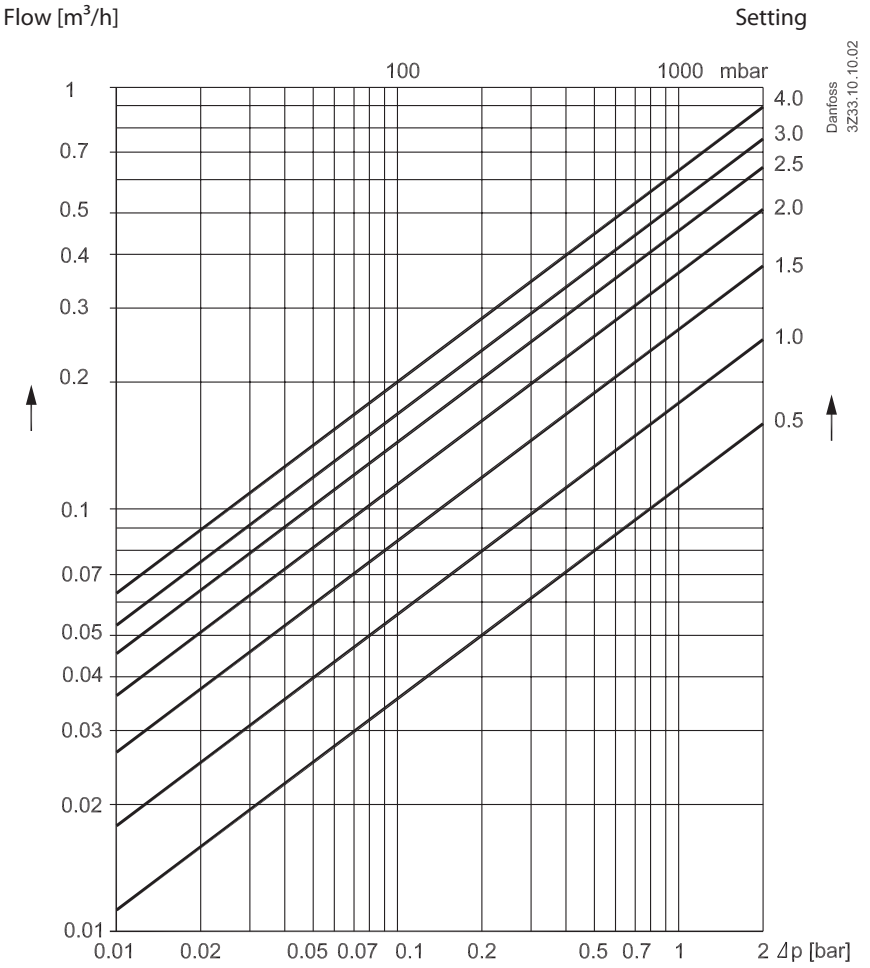
MSV-O



Δp_i Pressure drop across LENO™ MSV-O valve
Δp_m Pressure drop across valve
Δp_r Necessary pressure for the riser
Δp_a Available pressure for the riser

Flow Diagrammes, DN 15 LF

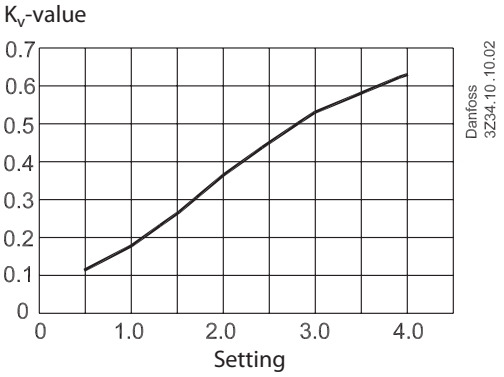
LENO™ MSV-O DN 15 LF



Setting	DN15LF
0.5	0.11
0.6	0.12
0.7	0.13
0.8	0.15
0.9	0.16
0.10	0.18
1.1	0.19
1.2	0.21
1.3	0.23
1.4	0.25
1.5	0.27
1.6	0.28
1.7	0.30
1.8	0.32
1.9	0.34
2.0	0.36
2.1	0.38
2.2	0.40

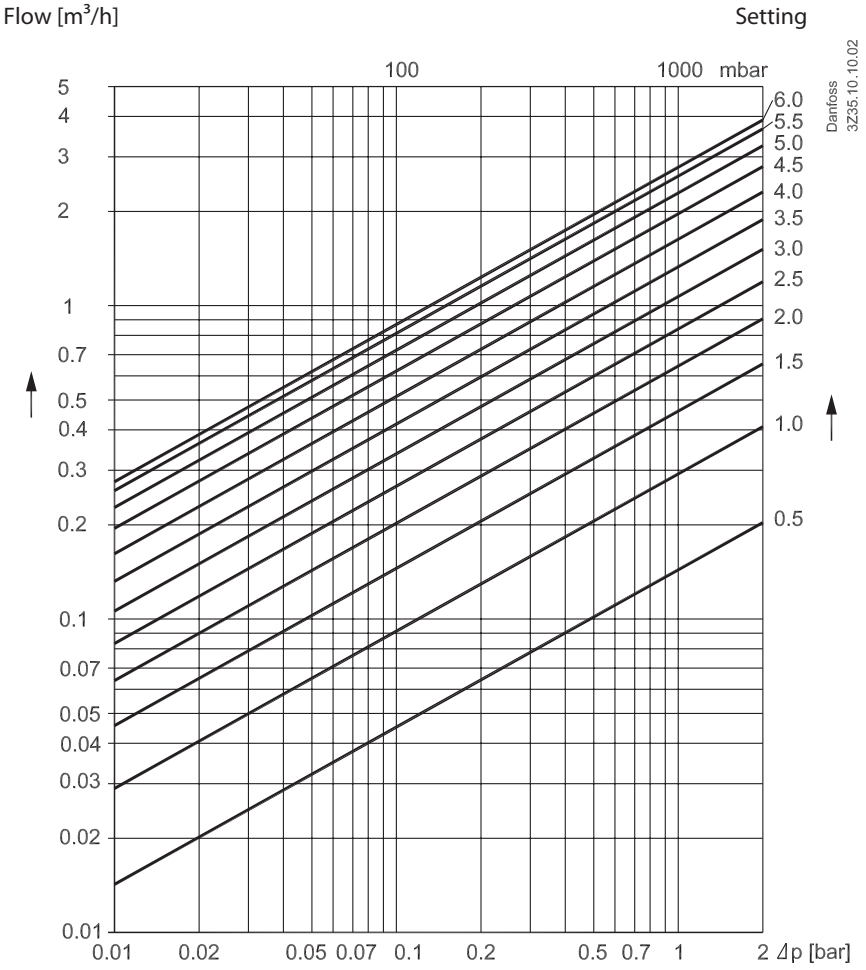
Setting	DN15LF
2.3	0.42
2.4	0.44
2.5	0.45
2.6	0.47
2.7	0.49
2.8	0.50
2.9	0.52
3.0	0.53
3.1	0.54
3.2	0.55
3.3	0.57
3.4	0.58
3.5	0.59
3.6	0.59
3.7	0.60
3.8	0.61
3.9	0.62
4.0	0.62
4.1	0.63

Flow characteristics



Flow Diagrammes, DN 15

LENO™ MSV-O DN 15

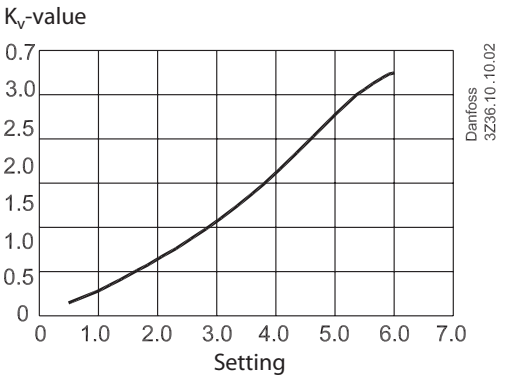


Setting	DN15
0.5	0.14
0.6	0.17
0.7	0.20
0.8	0.23
0.9	0.26
0.10	0.29
1.1	0.32
1.2	0.35
1.3	0.39
1.4	0.42
1.5	0.46
1.6	0.49
1.7	0.53
1.8	0.56
1.9	0.60
2.0	0.64
2.1	0.68
2.2	0.72
2.3	0.75
2.4	0.80
2.5	0.84

Setting	DN15
2.6	0.88
2.7	0.92
2.8	0.97
2.9	1.01
3.0	1.06
3.1	1.11
3.2	1.16
3.3	1.21

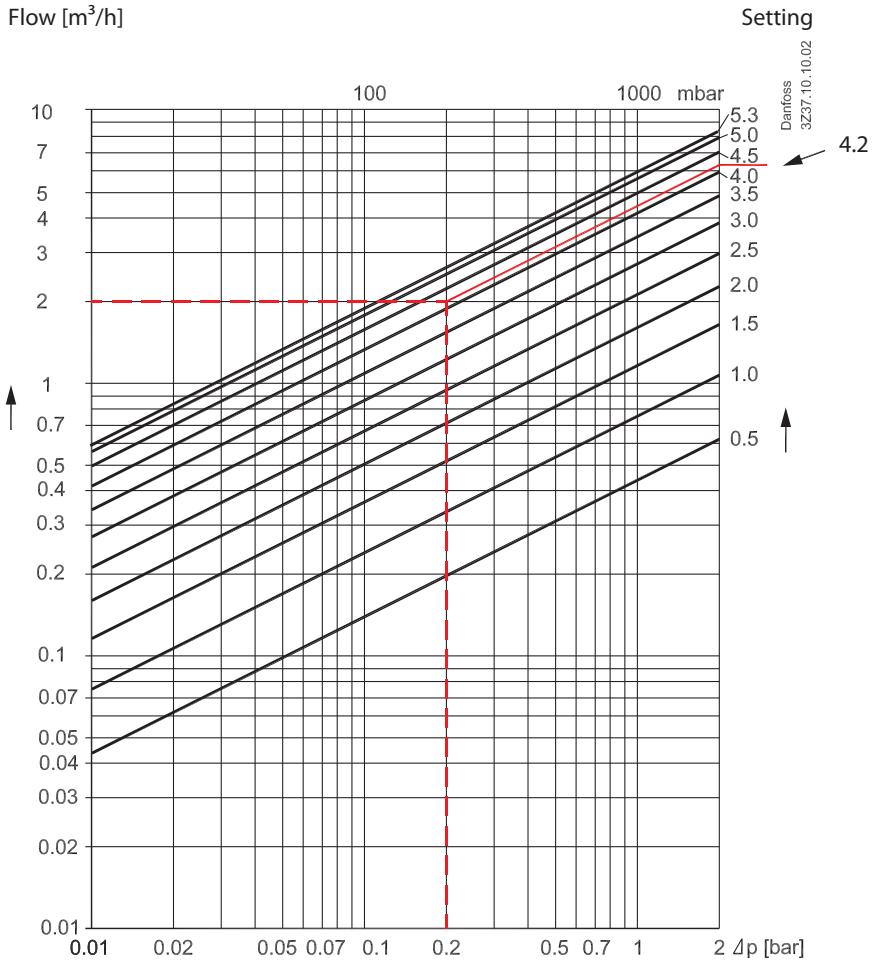
Setting	DN15
3.4	1.27
3.5	1.32
3.6	1.38
3.7	1.44
3.8	1.50
3.9	1.56
4.0	1.62
4.1	1.68
4.2	1.75
4.3	1.81
4.4	1.88
4.5	1.94
4.6	2.01
4.7	2.08
4.8	2.15
4.9	2.21
5.0	2.28
5.1	2.34
5.2	2.40
5.3	2.46
5.4	2.51
5.5	2.57
5.6	2.61
5.7	2.65
5.8	2.69
5.9	2.72
6.0	2.74
6.1	2.75
6.2	2.80

Flow characteristics



Flow Diagrammes, DN 20

LENO™ MSV-O DN 20

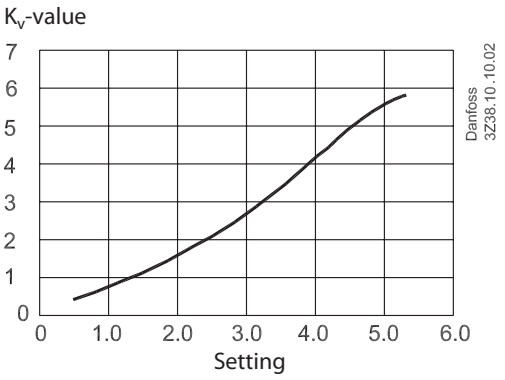


Setting	DN20
0.5	0.44
0.6	0.49
0.7	0.55
0.8	0.61
0.9	0.68
0.10	0.75
1.1	0.82
1.2	0.90
1.3	0.98
1.4	1.06
1.5	1.14
1.6	1.22
1.7	1.31
1.8	1.40
1.9	1.49
2.0	1.58
2.1	1.68
2.2	1.77
2.3	1.88
2.4	1.98
2.5	2.09
2.6	2.20

Setting	DN20
2.7	2.31
2.8	2.43

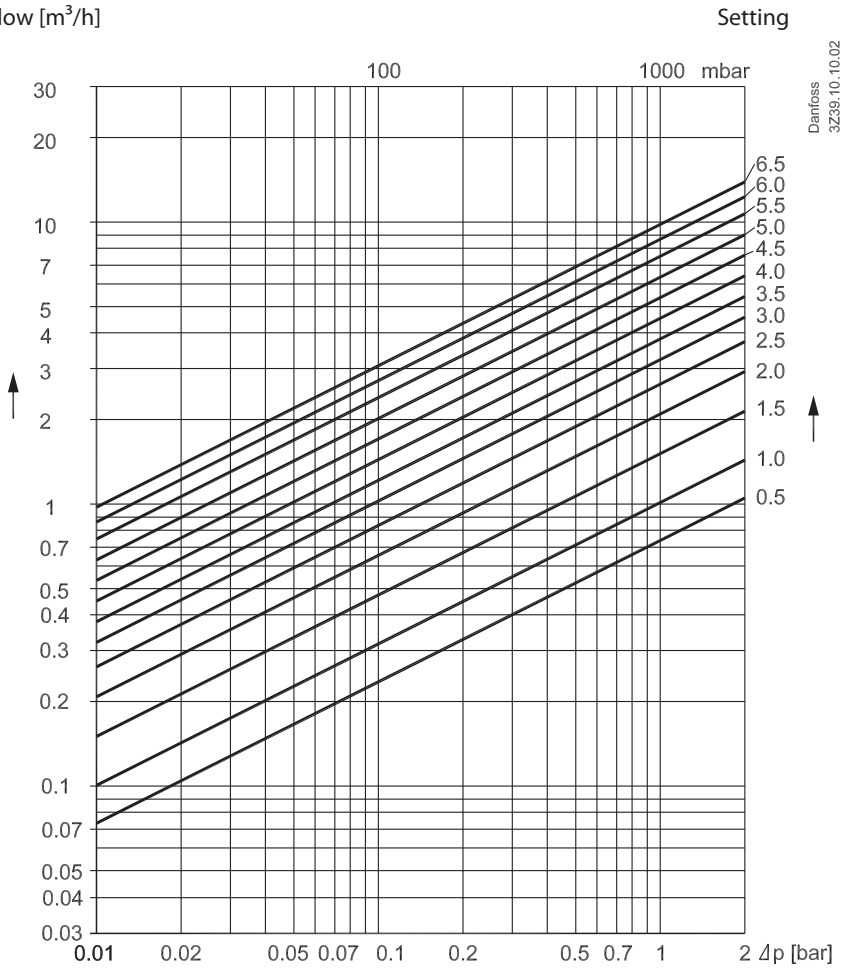
Setting	DN20
2.9	2.56
3.0	2.68
3.1	2.81
3.2	2.95
3.3	3.09
3.4	3.23
3.5	3.38
3.6	3.53
3.7	3.68
3.8	3.83
3.9	3.99
4.0	4.15
4.1	4.31
4.2	**4.47**
4.3	4.62
4.4	4.78
4.5	4.93
4.6	5.07
4.7	5.21
4.8	5.34
4.9	5.46
5.0	5.57
5.1	5.61
5.2	5.66
5.3	5.70

Flow characteristics



Flow Diagrammes, DN 25

LENO™ MSV-O DN 25

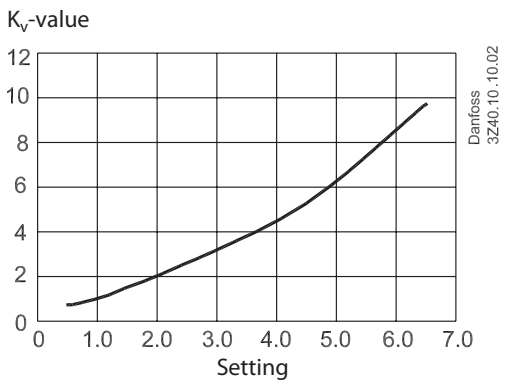


Setting	DN25
0.5	0.74
0.6	0.76
0.7	0.80
0.8	0.86
0.9	0.92
0.10	1.00
1.1	1.08
1.2	1.18
1.3	1.27
1.4	1.38
1.5	1.48
1.6	1.59
1.7	1.70
1.8	1.81
1.9	1.93
2.0	2.04
2.1	2.16
2.2	2.27
2.3	2.39
2.4	2.50
2.5	2.61

Setting	DN25
2.6	2.73
2.7	2.84
2.8	2.96
2.9	3.07
3.0	3.19
3.1	3.31
3.2	3.43
3.3	3.55
3.4	3.67

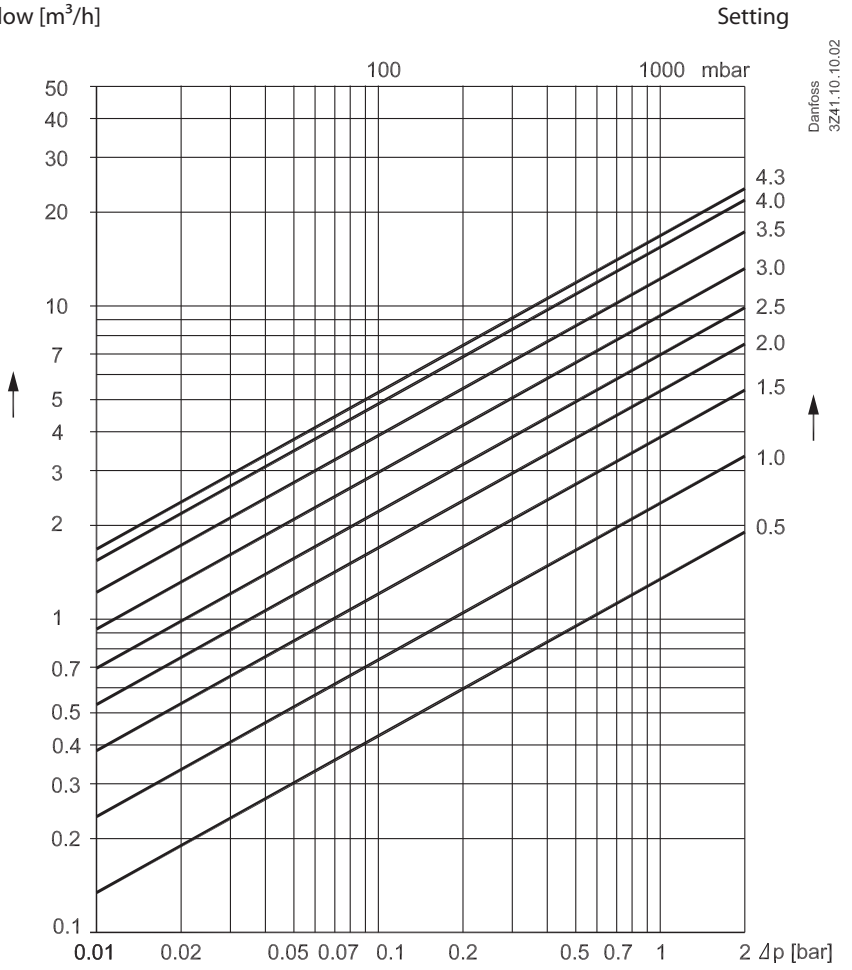
Setting	DN25
3.5	3.80
3.6	3.93
3.7	4.06
3.8	4.20
3.9	4.34
4.0	4.49
4.1	4.64
4.2	4.80
4.3	4.96
4.4	5.13
4.5	5.30
4.6	5.49
4.7	5.67
4.8	5.87
4.9	6.07
5.0	6.27
5.1	6.49
5.2	6.70
5.3	6.93
5.4	7.16
5.5	7.39
5.6	7.62
5.7	7.86
5.8	8.10
5.9	8.34
6.0	8.57
6.1	8.81
6.2	9.04
6.3	9.26
6.4	9.48
6.5	9.70

Flow characteristics



Flow Diagrammes, DN 32

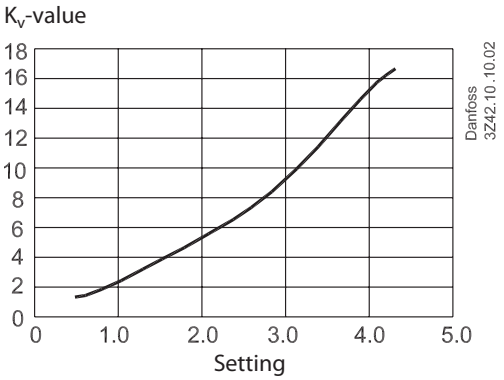
LENO™ MSV-O DN 32



Setting	DN32
0.5	1.33
0.6	1.44
0.7	1.61
0.8	1.82
0.9	2.07
0.10	2.34
1.1	2.62
1.2	2.91
1.3	3.21
1.4	3.51
1.5	3.81
1.6	4.11
1.7	4.40
1.8	4.70
1.9	5.00
2.0	5.30
2.1	5.61
2.2	5.93
2.3	6.26

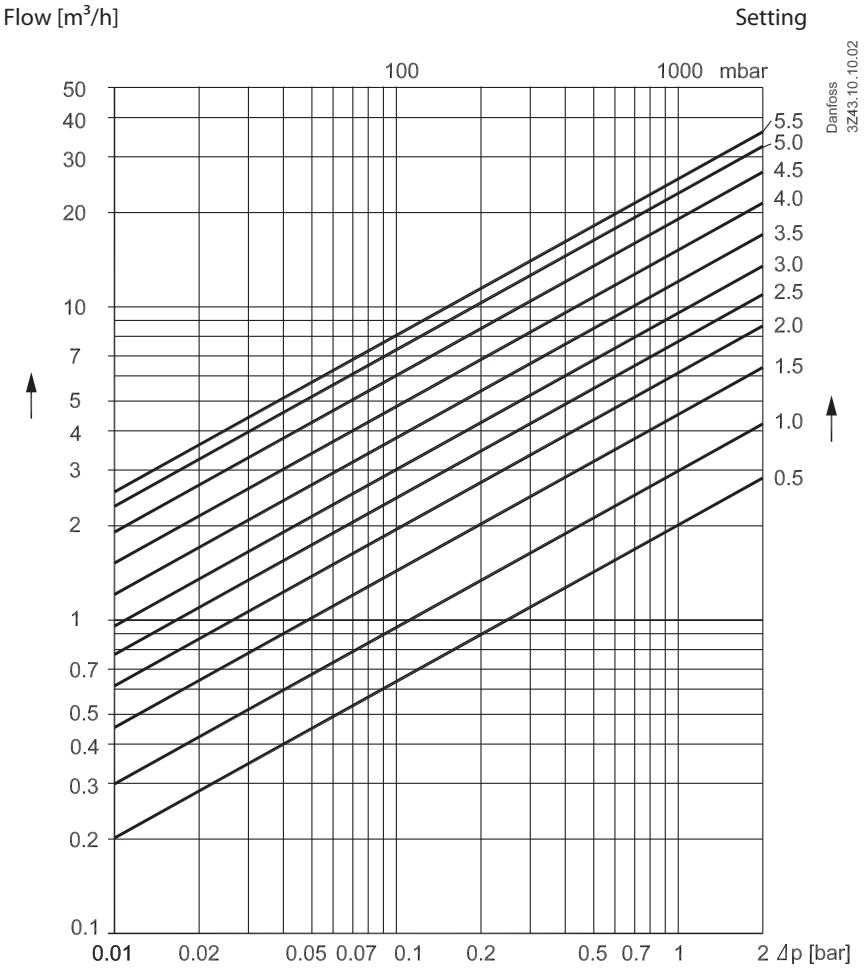
Setting	DN32
2.4	6.61
2.5	6.98
2.6	7.37
2.7	7.79
2.8	8.23
2.9	8.71
3.0	9.21
3.1	9.75
3.2	10.31
3.3	10.90
3.4	11.51
3.5	12.14
3.6	12.78
3.7	13.42
3.8	14.05
3.9	14.67
4.0	15.25
4.1	15.78
4.2	16.24
4.3	16.60

Flow characteristics



Flow Diagrammes, DN 40

LENO™ MSV-O DN 40

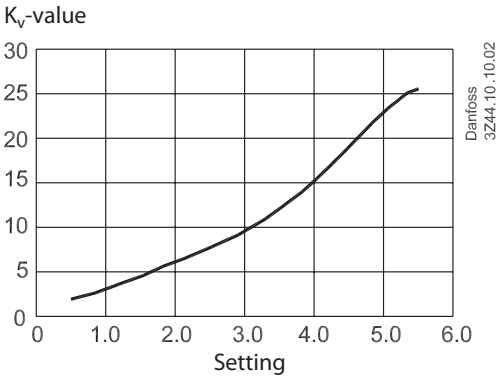


Setting	DN40
0.5	2.02
0.6	2.13
0.7	2.29
0.8	2.50
0.9	2.74
0.10	3.00
1.1	3.29
1.2	3.59
1.3	3.90
1.4	4.22
1.5	5.54
1.6	5.85
1.7	5.17
1.8	5.49
1.9	5.80
2.0	6.12
2.1	6.43
2.2	6.75
2.3	7.06
2.4	7.39
2.5	7.72

Setting	DN40
2.6	8.06
2.7	8.41
2.8	8.78
2.9	9.17

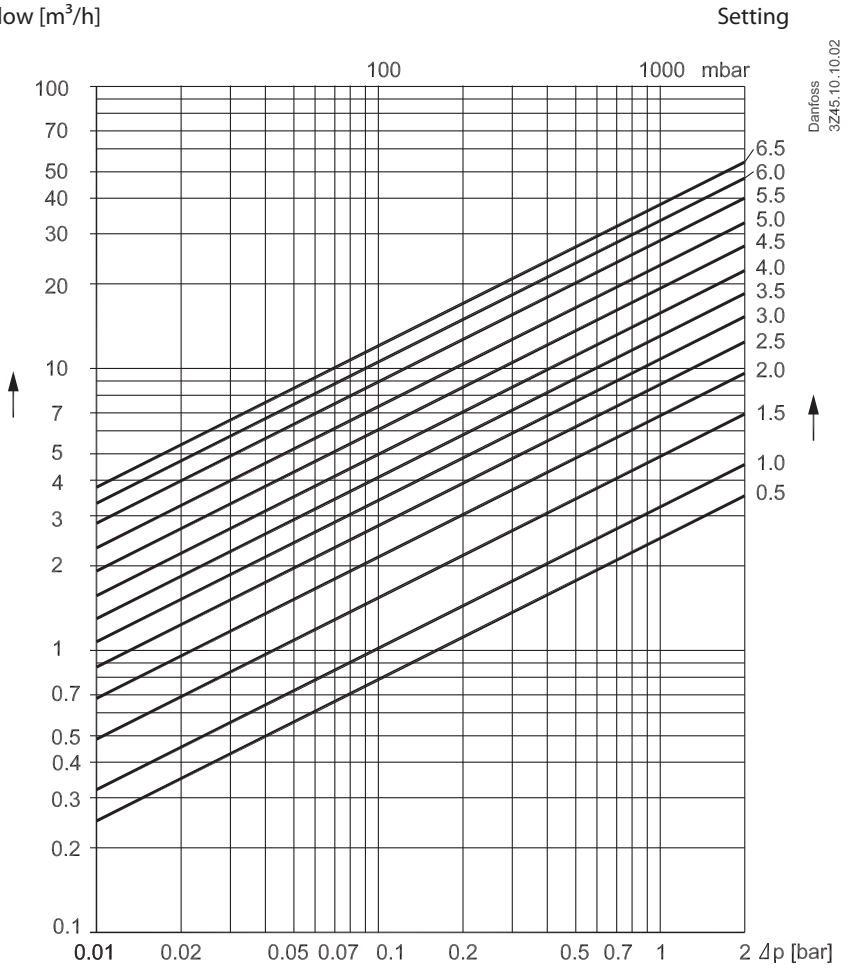
Setting	DN40
3.0	9.57
3.1	10.00
3.2	10.46
3.3	10.94
3.4	11.46
3.5	12.00
3.6	12.57
3.7	13.18
3.8	13.82
3.9	14.49
4.0	15.19
4.1	15.92
4.2	16.67
4.3	17.45
4.4	18.24
4.5	19.04
4.6	19.84
4.7	20.64
4.8	21.43
4.9	22.19
5.0	22.92
5.1	23.60
5.2	24.22
5.3	24.76
5.4	25.20
5.5	25.40

Flow characteristics



Flow Diagrammes, DN 50

LENO™ MSV-O DN 50

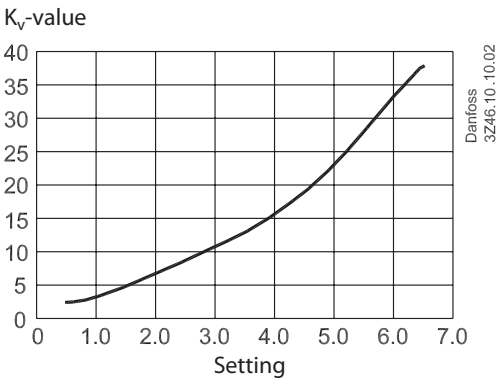


Setting	DN50
0.5	2.49
0.6	2.52
0.7	2.61
0.8	2.76
0.9	2.96
0.10	3.20
1.1	3.48
1.2	3.79
1.3	4.12
1.4	4.47
1.5	4.83
1.6	5.21
1.7	5.59
1.8	5.97
1.9	6.36
2.0	6.75
2.1	7.14
2.2	7.53
2.3	7.92
2.4	8.31
2.5	8.70

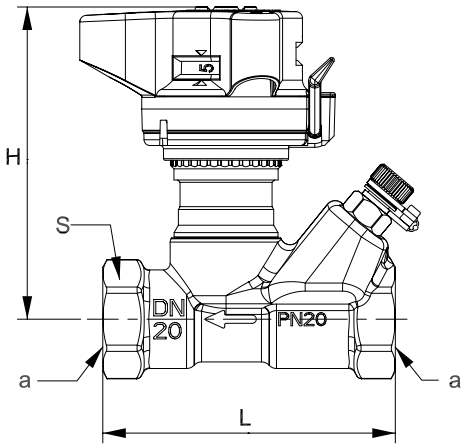
Setting	DN50
2.6	9.09
2.7	9.49
2.8	9.88
2.9	10.28
3.0	10.69
3.1	11.11
3.2	11.54
3.3	11.97
3.4	12.43

Setting	DN50
3.5	12.90
3.6	13.39
3.7	13.90
3.8	14.43
3.9	14.99
4.0	15.57
4.1	16.18
4.2	16.83
4.3	17.50
4.4	18.2
4.5	18.94
4.6	19.71
4.7	20.52
4.8	21.35
4.9	22.22
5.0	23.12
5.1	24.05
5.2	25.01
5.3	25.99
5.4	27.00
5.5	28.02
5.6	29.05
5.7	30.09
5.8	31.14
5.9	32.18
6.0	33.21
6.1	34.22
6.2	35.20
6.3	36.15
6.4	37.04
6.5	37.90

Flow characteristics



Dimensions



Size (DN)	ISO 228-1 a (mm)	L (mm)	H (mm)	S (mm)
15	G ½	82	92	27
20	G¾	89	95	32
25	G 1	104	98	41
32	G 1¼	122	121	50
40	G 1½	122	125	55
50	G2	151	129	67

ENGINEERING
TOMORROW

Data sheet

Differential pressure controller (PN 16)

AVP - return and flow mounting, adjustable setting

AVP-F - return mounting, fixed setting

Description

AVP AVP-F

AVP(-F) is a self-acting differential pressure controller primarily for use in district heating systems. The controller closes on rising differential pressure.
The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting (fixed setting version is without handle).

Main data:

- DN 15-32
- k_{VS} 0.4-10 m³/h
- PN 16
- Setting range (AVP):
  0.05-0.5 bar / 0.2-1.0 bar / 0.8-1.6 bar
- Fixed setting (AVP-F): 0.2 bar / 0.3 bar / 0.5 bar
- Temperature:
  - Circulation water / glycolic water up to 30%:
    2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)

Ordering

AVP Controller (return mounting)

Picture	DN (mm)	k_{VS} (m³/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	1.6	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.05-0.5	**003H6200**	0.2-1.0	**003H6206**	0.8-1.6	**003H6212**
		2.5				**003H6201**		**003H6207**		**003H6213**
		4.0				**003H6202**		**003H6208**		**003H6214**
	20	6.3		G 1 A		**003H6203**		**003H6209**		**003H6215**
	25	8.0		G 1¼ A		**003H6204**		**003H6210**		**003H6216**
	32	10		G 1¾ A		**003H6205**		**003H6211**		**003H6217**

Example 1:
Differential pressure controller; return mounting; DN 15; k_{VS} 1.6; PN 16; setting range 0.2-1.0 bar; T_{max} 150 °C; ext. thread;

- *1× AVP DN 15 controller*
  *Code No: **003H6206***
- *1× Impulse tube set AV, R ⅜*
  *Code No: **003H6852***

Option:
- *1× Weld-on tailpieces*
  *Code No: **003H6908***

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator. External impulse tube (AV) must be ordered separately.

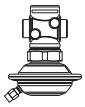
AVP Controller (flow mounting)

Picture	DN (mm)	k_{VS} (m³/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.05-0.5	-	0.2-1.0	**003H6947** [1]
		1.0				-		**003H6948** [1]
		1.6				**003H6238**		**003H6244**
		2.5				**003H6239**		**003H6245**
		4.0				**003H6240**		**003H6246**
	20	6.3		G 1 A		**003H6241**		**003H6247**
	25	8.0		G 1¼ A		**003H6242**		**003H6248**
	32	10		G 1¾ A		**003H6243**		**003H6249**

[1] *This version of controller can be mounted in return or in flow pipe. When ordering 2 impulse tube sets AV (instead of 1) should be ordered (see ordering example 2).*

Ordering *(continuous)*

AVP-F Controller (return mounting)

Picture	DN (mm)	k_{vs} (m^3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	1.6	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2	**003H6218**	0.3	**003H6224**	0.5	**003H6230**
		2.5				**003H6219**		**003H6225**		**003H6231**
		4.0				**003H6220**		**003H6226**		**003H6232**
	20	6.3		G 1 A		**003H6221**		**003H6227**		**003H6233**
	25	8.0		G 1¼ A		**003H6222**		**003H6228**		**003H6234**
	32	10		G 1¾ A		**003H6223**		**003H6229**		**003H6235**

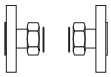
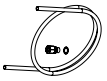
Example 2:
Differential pressure controller; flow mounting; DN 15; k_{VS} 0.4; PN 16; setting range 0.2-1.0 bar; T_{max} 150 °C; ext. thread;

- *1× AVP DN 15 controller*
  *Code No: **003H6947***
- *1× Impulse tube set AV, R ⅛*
  *Code No: **003H6852***

Option:
- *1× Weld-on tailpieces*
  *Code No: **003H6908***

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator. External impulse tube (AV) must be ordered separately.

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**
	Impulse tube set AV	Description: - 1× copper tube Ø 6 × 1 × 1500 mm - 1× compression fitting [1] for imp. tube connection to pipe Ø 6 × 1 mm		R ⅛	**003H6852**
				R ⅜	**003H6853**
				R ½	**003H6854**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø 6 × 1 mm R ⅛				**003H6857**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø 6 × 1 mm R ⅜				**003H6858**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø 6 × 1 mm R ½				**003H6859**
	[1] 10 compression fittings for imp. tube connection to actuator, Ø 6 × 1 mm G ⅛				**003H6931**
	Shut off valve Ø 6 mm				**003H0276**

[1] *Compression fitting consists of a nipple, compression ring and nut.*

Service kits

Picture	Type designation	DN	k_{vs} (m^3/h)	Code No. AVP(-F) return	Code No. AVP(-F) flow
	Valve insert	15	0.4	-	**003H6869**
			1.0	-	**003H6870**
			1.6	**003H6863**	**003H6871**
			2.5	**003H6864**	**003H6872**
			4.0	**003H6865**	**003H6873**
		20	6.3	**003H6866**	**003H6874**
		25	8.0	**003H6867**	**003H6875**
		32	10		

Picture	Type designation	Δp setting range (bar)	Code No. AVP(-F) return	Code No. AVP(-F) flow
	Actuator with adjustable handle (AVP)	0.05-0.5	**003H6821**	**003H6823**
		0.2-1.0	**003H6822**	**003H6824**
		0.8-1.6		
	Actuator without adjustable handle (AVP-F)	0.2	**003H6825**	-
		0.3		
		0.5		

Technical data

Valve

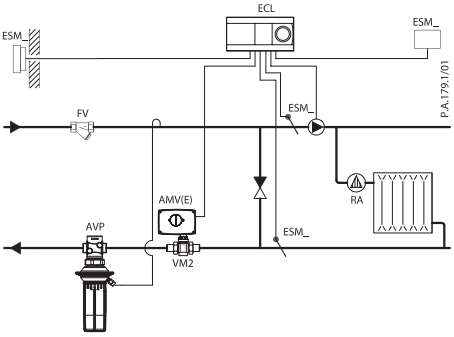
Nominal diameter		**DN**	**15**					**20**	**25**	**32**
k_{VS} value		m^3/h	0.4	1.0	1.6	2.5	4.0	6.3	8.0	10
Cavitation factor z			≥ 0.6						≥ 0.55	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02							≤ 0.05
Nominal pressure		PN	25							
Max. differential pressure		bar	12							
Medium			Circulation water / glycolic water up to 30%							
Medium pH			Min. 7, Max. 10							
Medium temperature		°C	2…150							
Connections	valve		Extternal thread							
	tailpieces		Weld-on and external thread							
			Flange							-
Materials										
Valve body			Red bronze CuSn5ZnPb (Rg5)							
Valve seat			Stainless steel, mat. No. 1.4571							
Valve cone			Dezincing free brass CuZn36Pb2As							
Sealing			EPDM							
Pressure relieve system			Piston							

Actuator

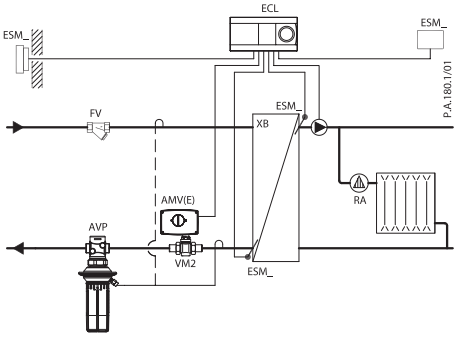
Type		**AVP**			**AVP-F**		
Actuator size	cm^2	39					
Nominal pressure	PN	16					
Diff. pressure setting ranges and spring colours	bar	0.05-0.5	0.2-1.0	0.8-1.6	0.2	0.3	0.5
		grey	black		(fixed setting)		
Materials							
Actuator housing		Zinc plated, DIN 1624, No. 1.0338					
Diaphragm		EPDM					
Impulse tube		Copper tube Ø 6 x 1 mm					

Application principles

- Return mounting



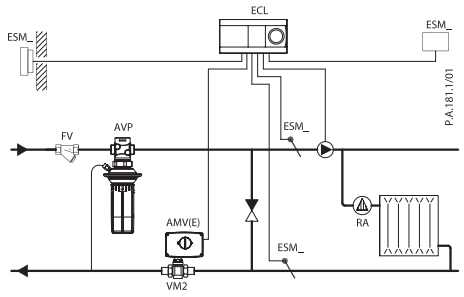
Direct-connected heating system



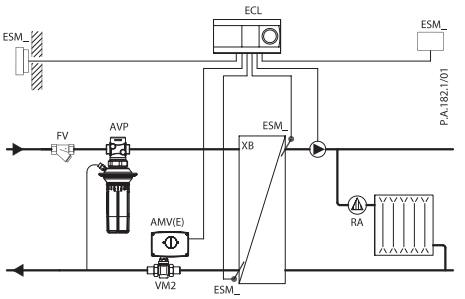
Indirectly connected heating system

Application principles

- Flow mounting



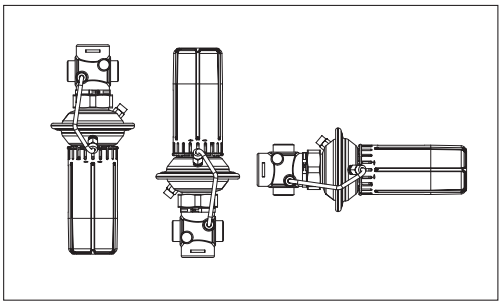
Direct-connected heating system



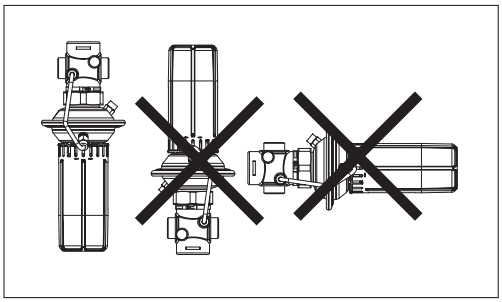
Indirectly connected heating system

Installation positions

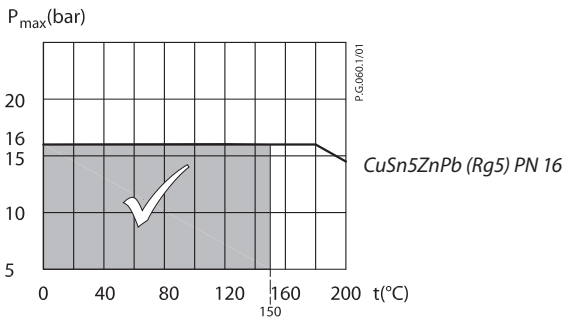
Up to medium temperature of 100 °C the controllers can be installed in any position.



For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.



Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-3).

Sizing

- *Directly connected heating system*

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating system requires differential pressure of 0.2 bar (20 kPa).

Given data:
Q_{max} = 1.3 m³/h (1300 l/h)
Δp_{min} = 0.7 bar (70 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.2 bar (20 kPa) selected

*Remark
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AVP

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{MCV}$
$\Delta p_{set\ value}$ = 0.2 bar (20 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{MCV} = 0.7 - 0.2$
Δp_{AVP} = 0.5 bar (50 kPa)

Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

k_v value is calculated according to formula:

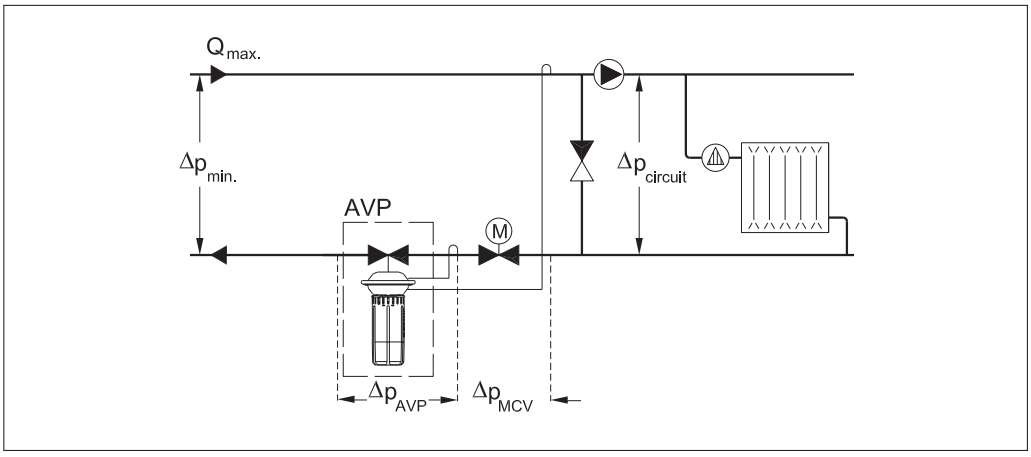
$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1.3}{\sqrt{0.5}}$$

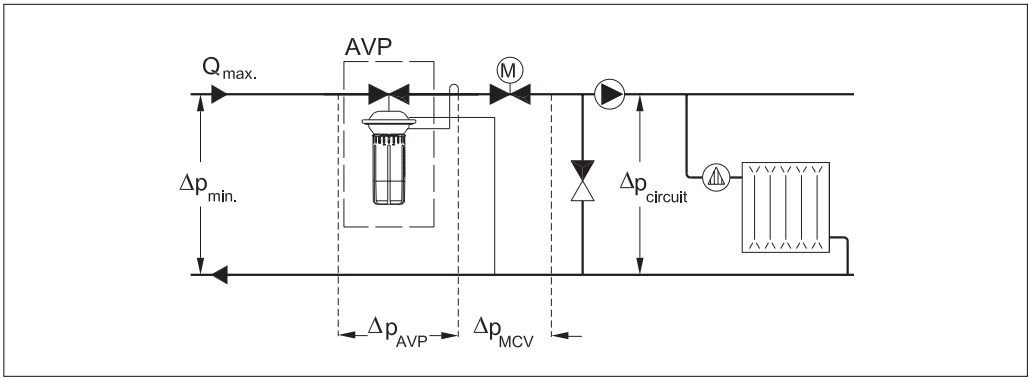
k_v = 1.8 m³/h

or read from the sizing diagram, page 7, by taking a line from Q-scale (1.3 m³/h) through Δp_v-scale (0.5 bar) to intersect k_v-scale at 1.8 m³/h.

Solution:
The example selects AVP DN 15, k_{VS} value 2.5, with differential pressure setting range 0.05-0.5 bar.

The P-band (Xp) can also be read from the sizing diagram. Take a horizontal line from the k_v-scale (1.8 m³/h) to the right to intersect the X_p-scale (0.04 bar). At a set value of 0.2 bar and a X_p of 0.04 bar the AVP controller controls between 0.2 bar with open motorised control valve and 0.2 + 0.04 = 0.24 bar at almost closed motorised control valve (i.e. total pressure loss across the motorised control valve).





Sizing *(continuous)*

- *Indirectly connected heating system*

Example 2
Motorised control valve (MCV) for indirectly connected heating system requires differential pressure of 0.3 (30 kPa) bar.

Given data:
Q_{max} = 0.8 m³/h (800 l/h)
Δp_{min} = 0.8 bar (80 kPa)
$\Delta p_{exchanger}$ = 0.05 bar (5 kPa)
Δp_{MCV} = 0.3 bar (30 kPa) selected

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{exchanger} + \Delta p_{MCV} = 0.05 + 0.3$
$\Delta p_{set\ value}$ = 0.35 bar (35 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{exchanger} - \Delta p_{MCV}$
$= 0.8 - 0.05 - 0.3$
Δp_{AVP} = 0.45 bar (45 kPa)

Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

k_v value is calculated according to formula:

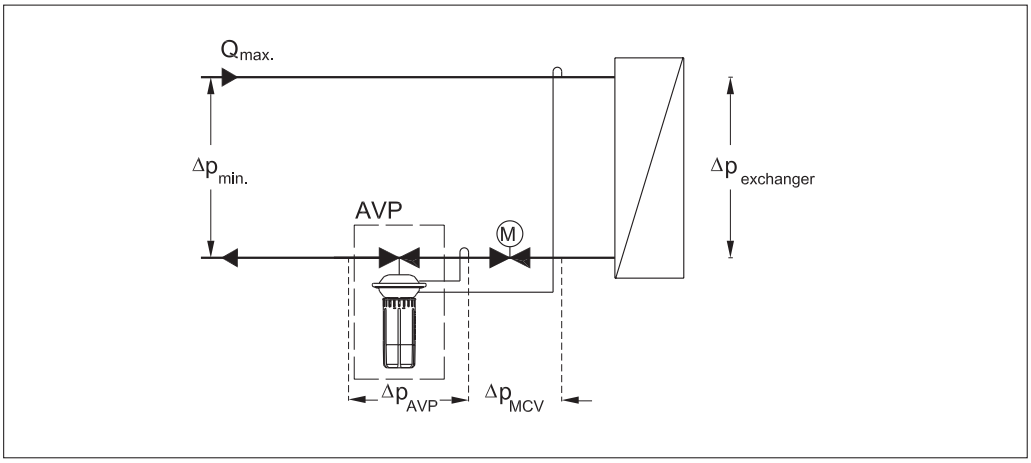
$$k_V = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{0.8}{\sqrt{0.45}}$$

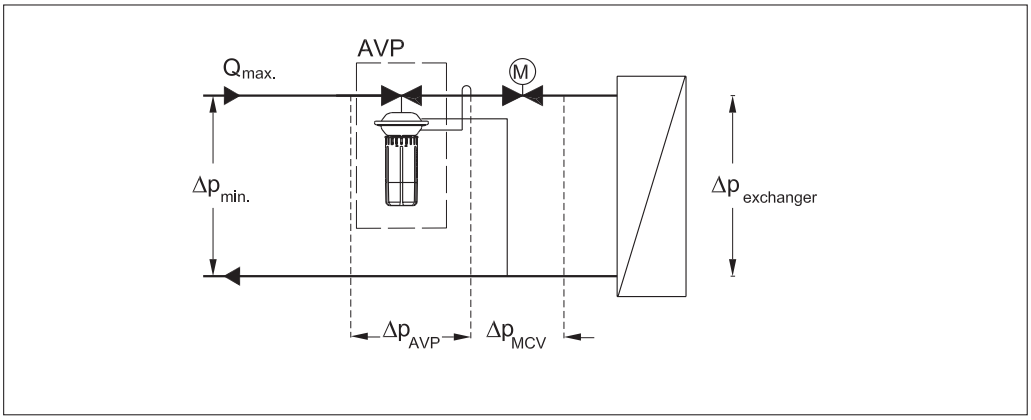
k_v = 1.2 m³/h

or read from the sizing diagram, page 7, by taking a line from Q-scale (0.8 m³/h) through Δp_v-scale (0.45 bar) to intersect k_v-scale at 1.2 m³/h.

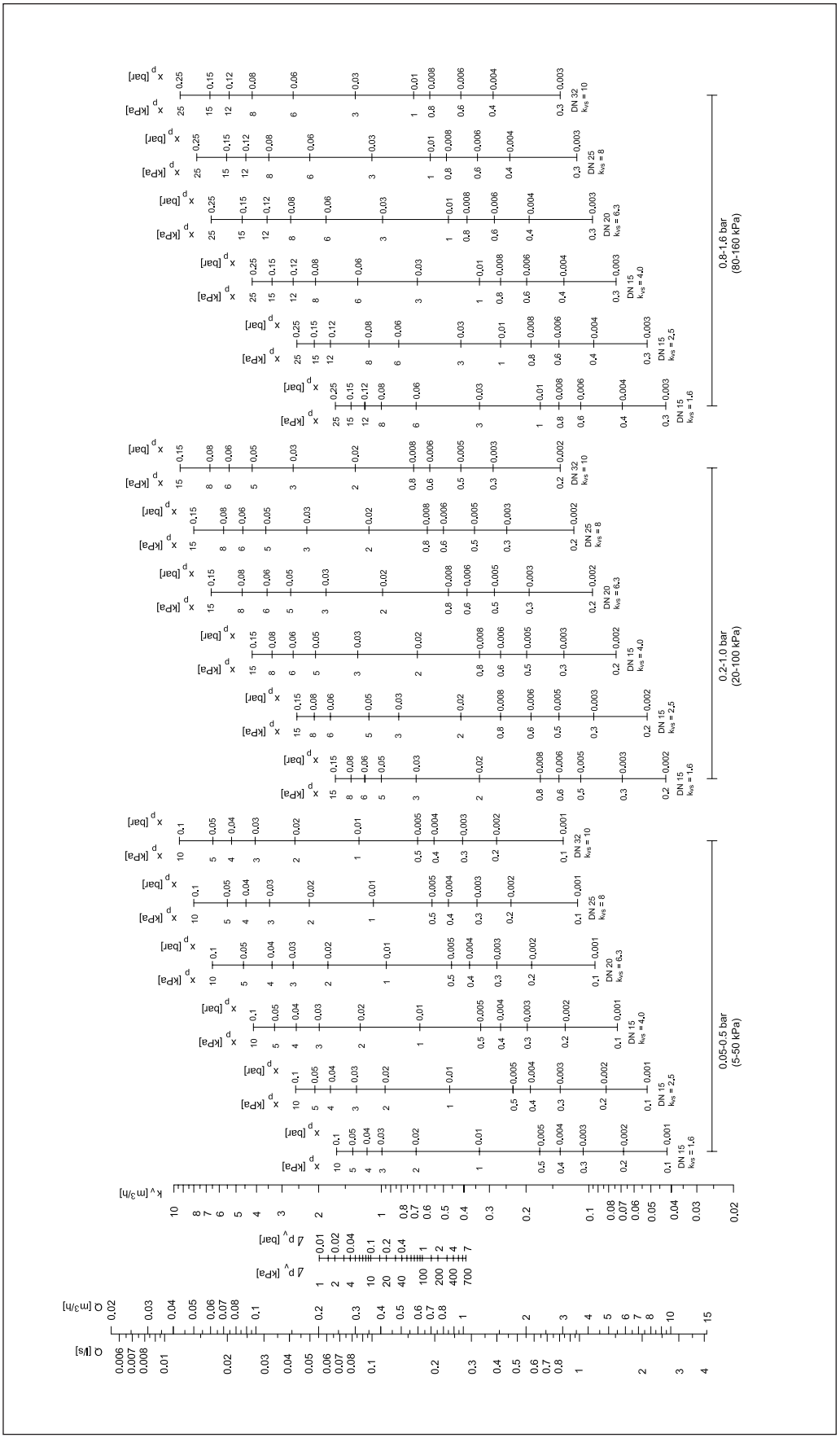
Solution:
The example selects AVP DN 15, k_{VS} value 1.6, with differential pressure setting range 0.05-0.5 bar.

The P-band (X_P) can also be read from the sizing diagram. Take a horizontal line from the k_v-scale (1.2 m³/h) to the right to intersect the X_P-scale (0.04 bar). At a set value of 0.35 bar and a X_P of 0.04 bar the AVP controller controls between 0.35 bar with open motorised control valve and 0.35 + 0.04 = 0.39 bar at almost closed motorised control valve (i.e. total pressure loss across the motorised control valve).





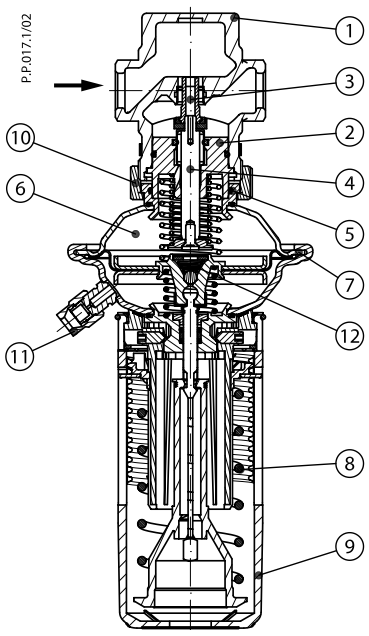
Sizing *(continued)*



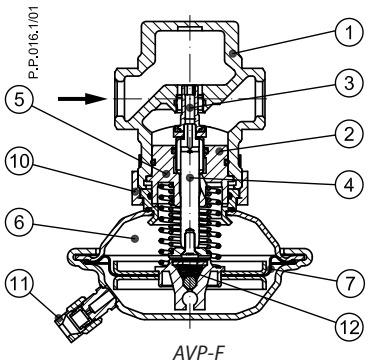
Select suitable controller size. Xp should not exceed 50% of the controller differential pressure setting.

Design

1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control drain
6. Actuator
7. Control diaphragm for diff. pressure control
8. Setting spring for diff. pressure control
9. Handle for diff. pressure setting, prepared for sealing
10. Union nut
11. Compression fitting for impulse tube
12. Excess pressure safety valve



AVP



AVP-F

Function

Pressure changes from flow and return pipes are being transferred through the impulse tubes and/or control drain in the actuator stem to the actuator chambers and act on control diaphragm for diff. pressure control. The diff. pressure is controlled by means of setting spring for diff. pressure control. Control valve closes on rising differential pressure and opens on falling differential pressure to maintain constant differential pressure.

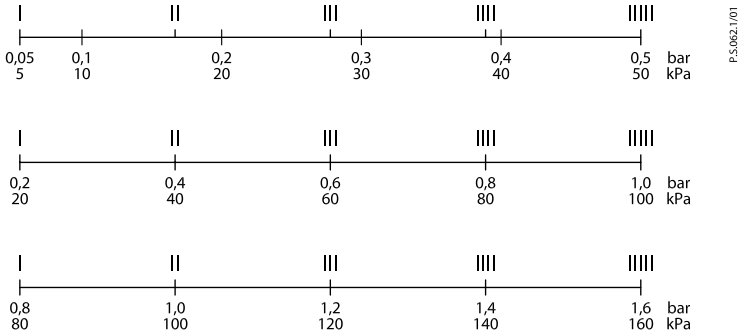
Controller is equipped with excess pressure safety valve, which protects control diaphragm for diff. pressure control from too high differential pressure.

Settings

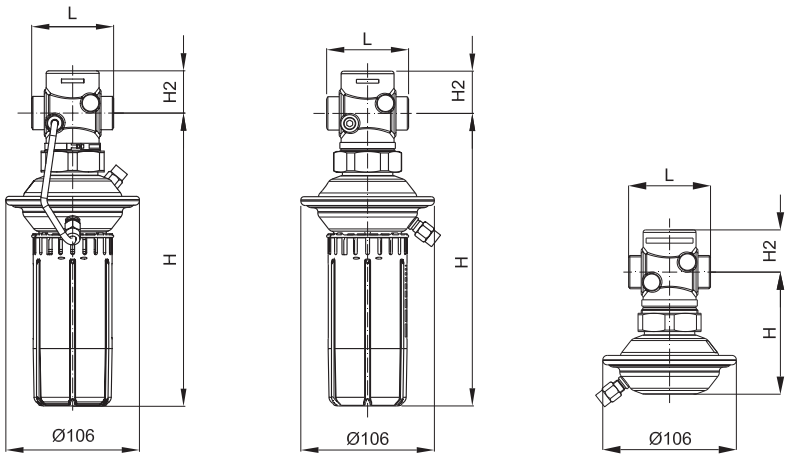
Differential pressure setting
Differential pressure setting (valid for AVP controller only) is being done by the adjustment of the setting spring for diff. pressure control. The adjustment can be done by means of handle for diff. pressure setting and/or pressure indicators.

Adjustment diagram

Relation between scale figures and differential pressure. Values given are approximate.



Dimensions

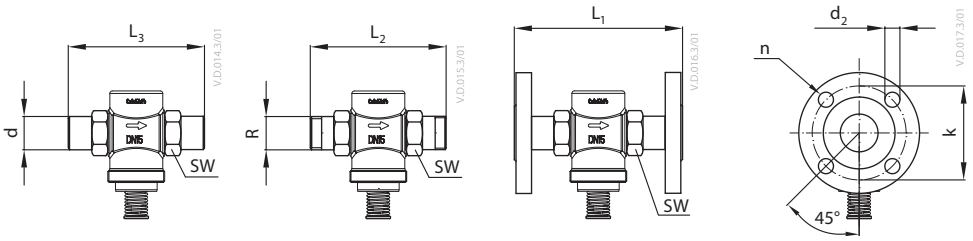


AVP (flow, return)

DN	L	H	H2	Weight (kg)
	mm			
15	65	232	34	1.7
20	70	232	34	1.8
25	75	232	38	1.9
32	100	232	38	2.2

AVP-F (return)

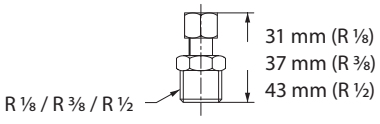
DN	L	H	H2	Weight (kg)
	mm			
15	65	97	34	1.3
20	70	97	34	1.4
25	75	97	38	1.5
32	100	97	38	1.8



DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4
32	1¼	63 (G 1 ¾A)	42	-	177	184	-	-	-

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*

Compression fittings



ENGINEERING
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Data sheet

Differential pressure controller (PN 25)
AVP - return and flow mounting, adjustable setting

Description

AVP(-F) is a self-acting differential pressure controller primarily for use in district heating systems. The controller closes on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting (fixed setting version (available on special request) is without handle).

Main data:
- DN 15-50
- k_{VS} 0.4-25 m^3/h
- PN 25
- Setting range (AVP): 0.2-1.0 bar / 0.3-2.0 bar
- Fixed setting (AVP-F) [1]: 0.2 bar / 0.5 bar
- Temperature:
  -Circulation water / glycolic water up to 30%: 2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange

[1] *On special request*

Ordering

Example 1:
Differential pressure controller; return mounting; DN 15; k_{VS} 1.6; PN 25; setting range 0.2-1.0 bar; T_{max} 150 °C; ext. thread

- *1× AVP DN 15 controller Code No:* ***003H6283***
- *1× Impulse tube set AV, R ⅜ Code No:* ***003H6852***

Option:
- *1× Weld-on tailpieces Code No:* ***003H6908***

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator. External impulse tube (AV) must be ordered separately.

AVP Controller (return mounting)

Picture	DN (mm)	k_{VS} (m^3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2-1.0	**003H6281**	0.3-2.0	**003H6291**
		1.0				**003H6282**		**003H6292**
		1.6				**003H6283**		**003H6293**
		2.5				**003H6284**		**003H6294**
		4.0				**003H6285**		**003H6295**
	20	6.3		G 1 A		**003H6286**		**003H6296**
	25	8.0		G 1¼ A		**003H6287**		**003H6297**
	32	12.5		G 1¾ A		**003H6288**		-
	40	16		G 2 A		**003H6289**		-
	50	20		G 2½ A		**003H6290**		-
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6345**		**003H6351**
	20	6.3				**003H6346**		**003H6352**
	25	8.0				**003H6347**		**003H6353**
	32	12.5				**003H6348**		**003H6354**
	40	20				**003H6349**		**003H6355**
	50	25				**003H6350**		**003H6356**

Note: *other controllers available on special request.*

Ordering *(continued)*

*Example 2 - **AVP** controller without predefined impulse tube:*

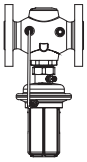
Differential pressure controller; flow mounting; DN 15; k_{VS} 4.0; PN 25; setting range 0.2-1.0 bar; T_{max} 150°C; flange

- *1× AVP DN 15 controller Code No: **003H6369***
- *2× Impulse tube set AV, R ⅛ Code No: **003H6852***

Option:
- *1× Weld-on tailpieces Code No: **003H6908***

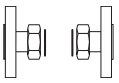
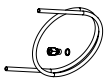
The controller will be delivered completely assembled, without impulse tube between valve and actuator. External impulse tubes (AV) must be ordered separately.

AVP Controller (flow mounting)

Picture	DN (mm)	k_{VS} (m^3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2-1.0	**003H6313**	0.3-2.0	**003H6323**
		1.0				**003H6314**		**003H6324**
		1.6				**003H6315**		**003H6325**
		2.5				**003H6316**		**003H6326**
		4.0				**003H6317**		**003H6327**
	20	6.3		G 1 A		**003H6318**		**003H6328**
	25	8.0		G 1¼ A		**003H6319**		**003H6329**
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6369** [1]		**003H6375** [1]
	20	6.3				**003H6370** [1]		**003H6376** [1]
	25	8.0				**003H6371** [1]		**003H6377** [1]
	32	12.5				**003H6372**		**003H6378**
	40	20				**003H6373**		**003H6379**
	50	25				**003H6374**		**003H6380**

Note: other controllers available on special request.
[1] Controller is without predefined impulse tube (see ordering example 2)

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
		40			**003H6912**
		50			**003H6913**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
		40		R 1½	**065B2004**
		50		R 2	**065B2005**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**
	Impulse tube set AV	Description: - 1× copper tube Ø6 × 1 × 1500 mm - 1× compression fitting [1] for imp. tube connection to pipe Ø6 × 1 mm		R ⅛	**003H6852**
				R ⅜	**003H6853**
				R ½	**003H6854**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ⅛				**003H6857**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ⅜				**003H6858**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ½				**003H6859**
	[1] 10 compression fittings for imp. tube connection to actuator, Ø6 × 1 mm G ⅛				**003H6931**
	Shut off valve Ø6 mm				**003H0276**

[1] *Compression fitting consists of a nipple, compression ring and nut.*

Service kits

Picture	Type designation	DN (mm)	k_{VS} (m^3/h)	Code No.	
				AVP return	AVP flow
	Valve insert	15	1.6	**003H6863**	**003H6871**
			2.5	**003H6864**	**003H6872**
			4.0	**003H6865**	**003H6873**
		20	6.3	**003H6866**	**003H6874**
		25	8	**003H6867**	**003H6875**
		32 / 40 / 50	12.5 / 20 / 25	**003H6868**	**003H6876**

	Type designation	Δp setting range (bar)	AVP return	AVP flow
	Actuator with adjustable handle (AVP)	0.2-1.0	**003H6829**	**003H6834**
		0.3-2.0	**003H6830**	**003H6835**

Technical data

Valve

Nominal diameter		**DN**	**15**					**20**	**25**	**32**	**40**	**50**
k_{VS} value		m^3/h	0.4	1.0	1.6	2.5	4.0	6.3	8.0	12.5	20	25
Cavitation factor z			≥ 0.6						≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02							≤ 0.05		
Nominal pressure		PN	25									
Max. differential pressure		bar	20							16		
Medium			Circulation water / glycolic water up to 30%									
Medium pH			Min. 7, max. 10									
Medium temperature		°C	2 … 150									
Connections	valve		Extternal thread									
			-				Flange					
	tailpieces		Weld-on and external thread									
			Flange							-		
Materials												
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)							Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
	flange		-				Ductile iron EN-GJS-400-18-LT (GGG 40.3)					
Valve seat			Stainless steel, mat. No. 1.4571									
Valve cone			Dezincing free brass CuZn36Pb2As									
Sealing			EPDM									
Pressure relieve system			Piston									

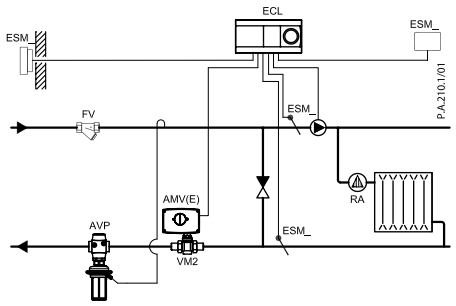
AVP Actuator

Type			**AVP, AVP-F** [1]	
Actuator size		cm^2	54	
Nominal pressure		PN	25	
Diff. pressure setting ranges and spring colours		bar	0.2-1.0	0.3-2.0
			yellow	red
Materials				
Actuator housing	Upper casing of diaphragm		Stainless steel, mat. No.1.4301	
	Lower casing of diaphragm		Dezincing free brass CuZn36Pb2As	
Diaphragm			EPDM	
Impulse tube			Copper tube Ø6 × 1 mm	

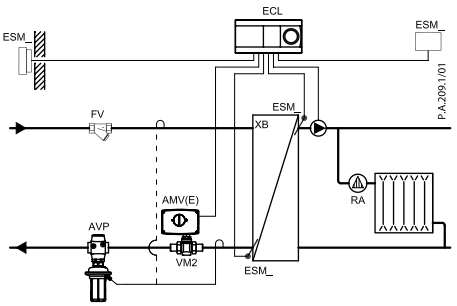
[1] *On special request.*

Application principles

- Return mounting

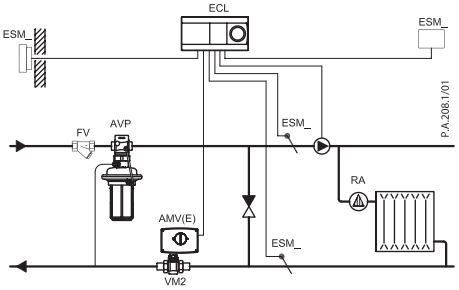


Direct-connected heating system

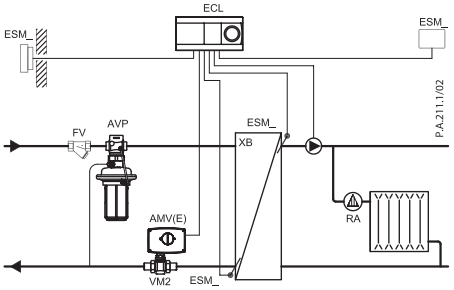


Indirectly connected heating system

- Flow mounting



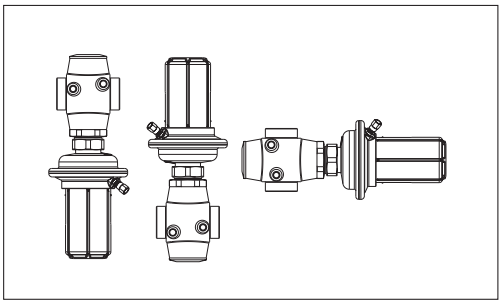
Direct-connected heating system



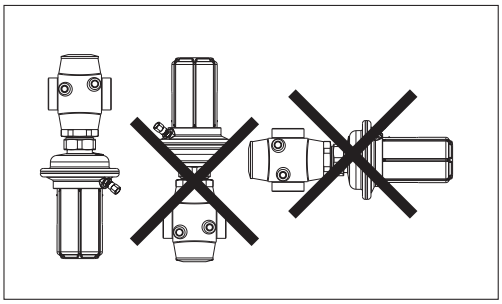
Indirectly connected heating system

Installation positions

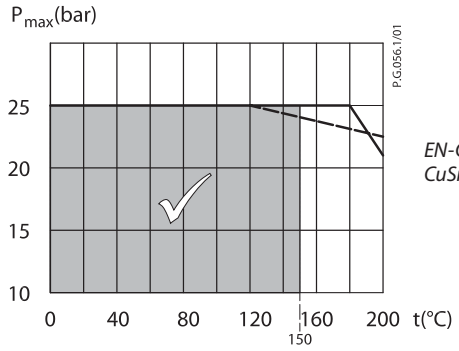
Up to medium temperature of 100 °C the controllers can be installed in any position.



For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.



Pressure temperature diagram



EN-GJS-400-18-LT (GGG 40.3) PN 25
CuSn5ZnPb (Rg5) PN 25

Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Sizing

- Directly connected heating system

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating system requires differential pressure of 0.3 bar (30 kPa).

Given data:
Q_{max} = 1.2 m³/h (1200 l/h)
Δp_{min} = 0.7 bar (70 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.3 bar (30 kPa) selected

*Remark
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AVP.

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{MCV}$
$\Delta p_{set\ value}$ = 0.3 bar (30 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{MCV} = 0.7 - 0.3$
Δp_{AVP} = 0.4 bar (40 kPa)

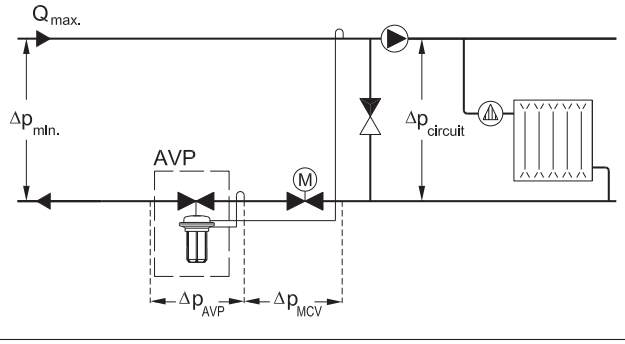
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

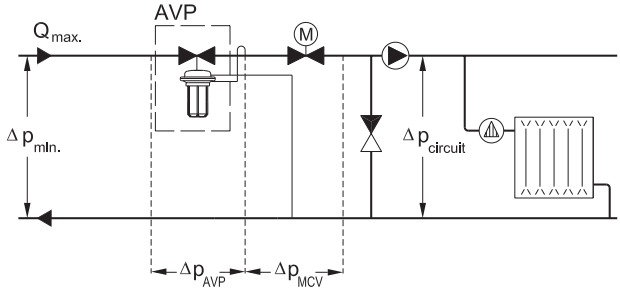
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1,2}{\sqrt{0,4}}$$

k_v = 1.9 m³/h

Solution:
The example selects AVP DN 15, k_{VS} value 2.5, with differential pressure setting range 0.2-1.0 bar.





Sizing *(continuous)*

- Indirectly connected heating system

Example 2
Motorised control valve (MCV) for indirectly connected heating system requires differential pressure of 0.4 (40 kPa) bar.

Given data:
Q_{max} = 1.25 m³/h (1250 l/h)
Δp_{min} = 1.0 bar (100 kPa)
$\Delta p_{exchanger}$ = 0.05 bar (5 kPa)
Δp_{MCV} = 0.4 bar (40 kPa) selected

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{exchanger} + \Delta p_{MCV} = 0.05 + 0.4$
$\Delta p_{set\ value}$ = 0.45 bar (45 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{exchanger} - \Delta p_{MCV} = 1.0 - 0.05 - 0.4$
Δp_{AVP} = 0.55 bar (55 kPa)

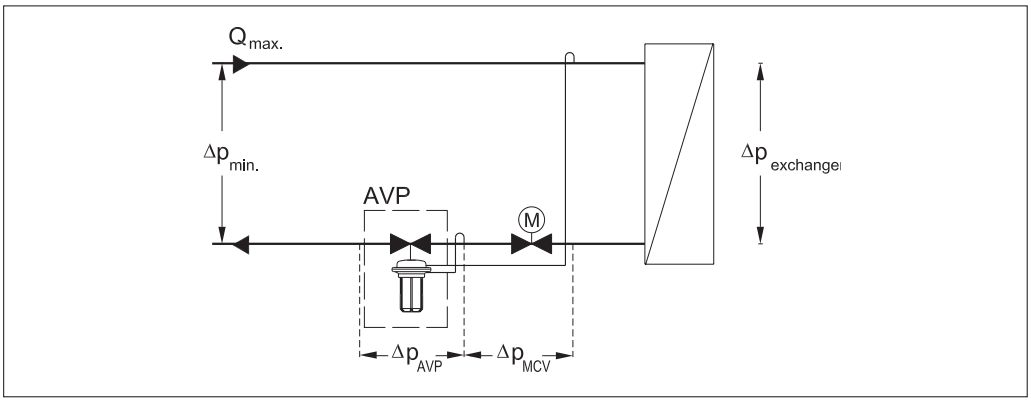
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

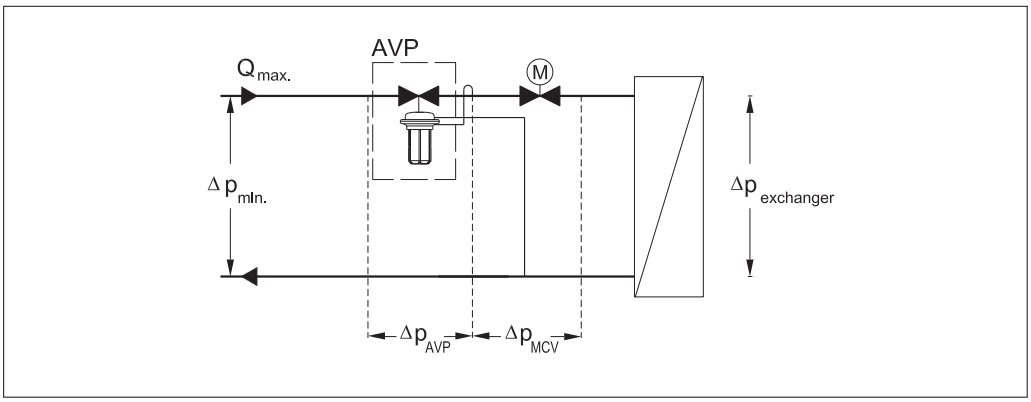
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1{,}25}{\sqrt{0{,}55}}$$

k_v = 1.7 m³/h

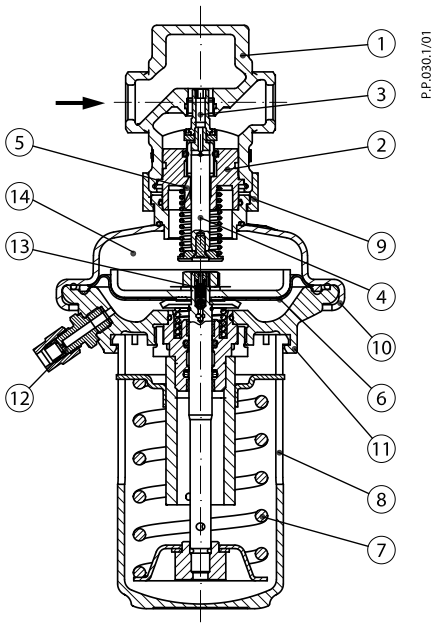
Solution:
The example selects AVP DN 15, k_{VS} value 2.5, with differential pressure setting range 0.2-1.0 bar.





Design

1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control drain
6. Control diaphragm for diff. pressure control
7. Setting spring for diff. pressure control
8. Handle for diff. pressure setting, prepared for sealing
9. Union nut
10. Upper casing of diaphragm
11. Lower casing of diaphragm
12. Compression fitting for impulse tube
13. Excess pressure safety valve
14. Actuator



Function

Pressure changes from flow and return pipes are being transferred through the impulse tubes and/or control drain in the actuator stem to the actuator chambers and act on control diaphragm for diff. pressure control. The diff. pressure is controlled by means of setting spring for diff. pressure control. Control valve closes on rising differential pressure and opens on falling differential pressure to maintain constant differential pressure.

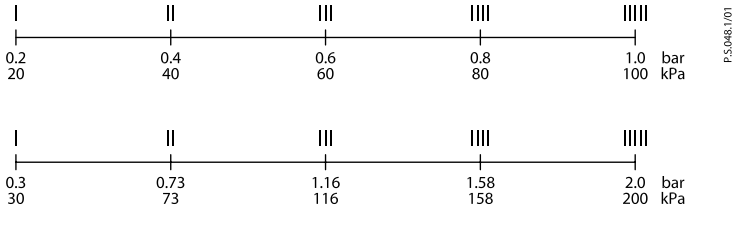
Controller is equipped with excess pressure safety valve, which protects control diaphragm for diff. pressure control from too high differential pressure (not implemented at AVP-F flow mounting version).

Settings

Differential pressure setting
Differential pressure setting (valid for AVP controller only) is being done by the adjustment of the setting spring for diff. pressure control. The adjustment can be done by means of handle for diff. pressure setting and/or pressure indicators.

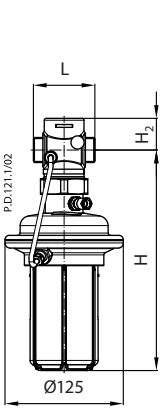
Adjustment diagram

Relation between scale figures and differential pressure. Values given are approximate.

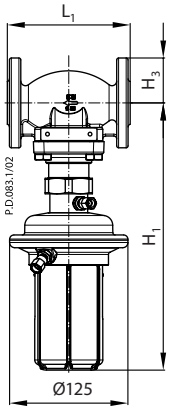


Data sheet **Differential pressure controller (PN 25) AVP**

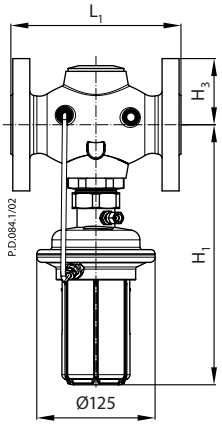
Dimensions



DN 15-50



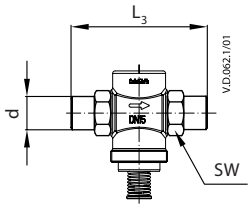
DN 15-25

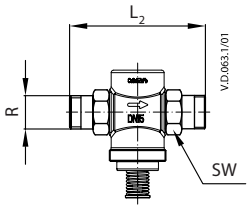


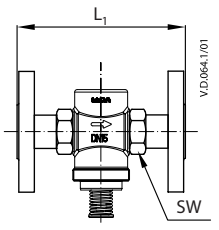
DN 32-50

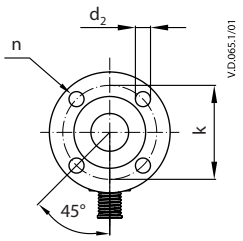
DN		15		20		25		32		40		50	
		flow	return	flow	return	flow	return	flow	return	flow	return	flow	return
L	mm	65		70		75		-	100	-	110	-	130
L_1		130		150		160		180		200		230	
H		233	220	233	220	233	220	-	275	-	275	-	275
H_1		285	269	285	269	285	269	275	261	275	261	275	261
H_2		34		34		37		-	62	-	62	-	62
H_3		47		52		57		70		75		82	
Weight (thread)	kg	3.5		3.5		3.7		-	5.8	-	5.9	-	6.6
Weight (flange)		6.1		6.8		7.4		10.2		11.7		13.9	

Note: *Other flange dimensions - see table for tailpieces.*





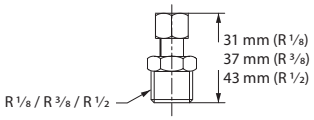




DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	200	204	110	18	4
50	2	82 (G 2½A)	60	-	244	234	125	18	4

[1] Conical ext. thread acc. to EN 10226-1
[2] Flanges PN 25, acc. to EN 1092-2

Compression fittings



Danfoss A/S
Climate Solutions • climatesolutions.danfoss.com • +45 7488 2222 • E-Mail: climatesolutions@danfoss.com

Data sheet

Differential pressure controller (PN 25)

AVP - return and flow mounting, adjustable setting

AVP-F - return and flow mounting, fixed setting

Description

AVP

AVP-F

AVP(-F) is a self-acting differential pressure controller primarily for use in district heating systems. The controller closes on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting (fixed setting version is without handle).

Main data:

- DN 15-50
- k_{vs} 0.4 - 25 m^3/h
- PN 25
- Setting range (AVP): 0.2 - 1.0 bar / 0.3 - 2.0 bar
- Fixed setting (AVP-F): 0.2 bar / 0.5 bar
- Temperature:
  - Circulation water / glycolic water up to 30%: 2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange

Ordering

*Example 1 - **AVP** controller with predefined impulse tube:*

Differential pressure controller; return mounting; DN 15; k_{vs} 1.6; PN 25; setting range 0.2 - 1.0 bar; t_{max} 150 °C; ext. thread

- *1x AVP DN 15 controller*
  *Code No: **003H6283***

Option:
- *1x Impulse tube set AV, R ⅛*
  *Code No: **003H6852***
- *1x Weld-on tailpieces*
  *Code No: **003H6908***

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator. External impulse tube (AV) must be ordered separately.

AVP Controller (return mounting)

Picture	DN (mm)	k_{vs} (m3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2 - 1.0	**003H6281**	0.3 - 2.0	**003H6291**
		1.0				**003H6282**		**003H6292**
		1.6				**003H6283**		**003H6293**
		2.5				**003H6284**		**003H6294**
		4.0				**003H6285**		**003H6295**
	20	6.3		G 1 A		**003H6286**		**003H6296**
	25	8.0		G 1¼ A		**003H6287**		**003H6297**
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6345**		**003H6351**
	20	6.3				**003H6346**		**003H6352**
	25	8.0				**003H6347**		**003H6353**
	32	12.5				**003H6348**		**003H6354**
	40	20				**003H6349**		**003H6355**
	50	25				**003H6350**		**003H6356**

***Note:** other controllers available on request.*

Ordering *(continuous)*

*Example 2 - **AVP** controller without predefined impulse tube:*

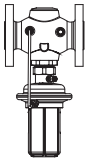
Differential pressure controller; flow mounting; DN 15; k_{vs} 4.0; PN 25; setting range 0.2 - 1.0 bar; t_{max} 150°C; flange

- *1x AVP DN 15 controller Code No: **003H6369***

Option:
- *2x Impulse tube set AV, R ⅛ Code No: **003H6852***
- *1x Weld-on tailpieces Code No: **003H6908***

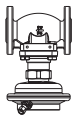
The controller will be delivered completely assembled, without impulse tube between valve and actuator. External impulse tubes (AV) must be ordered separately.

AVP Controller (flow mounting)

Picture	DN (mm)	k_{vs} (m3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2 - 1.0	**003H6313**	0.3 - 2.0	**003H6323**
		1.0				**003H6314**		**003H6324**
		1.6				**003H6315**		**003H6325**
		2.5				**003H6316**		**003H6326**
		4.0				**003H6317**		**003H6327**
	20	6.3		G 1 A		**003H6318**		**003H6328**
	25	8.0		G 1¼ A		**003H6319**		**003H6329**
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6369** [1]		**003H6375** [1]
	20	6.3				**003H6370** [1]		**003H6376** [1]
	25	8.0				**003H6371** [1]		**003H6377** [1]
	32	12.5				**003H6372**		**003H6378**
	40	20				**003H6373**		**003H6379**
	50	25				**003H6374**		**003H6380**

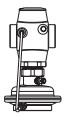
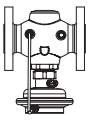
***Note:** other controllers available on request.*
[1] Controller is without predefined impulse tube (see ordering example 2)

AVP-F Controller (return mounting)

Picture	DN (mm)	k_{vs} (m^3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	4.0	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2	**003H6301**	0.5	**003H6307**
	20	6.3		G 1 A		**003H6302**		**003H6308**
	25	8.0		G 1¼ A		**003H6303**		**003H6309**
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6357**		**003H6363**
	20	6.3				**003H6358**		**003H6364**
	25	8.0				**003H6359**		**003H6365**
	32	12.5				**003H6360**		**003H6366**
	40	20				**003H6361**		**003H6367**
	50	25				**003H6362**		**003H6368**

***Note:** other controllers available on request.*

AVP-F Controller (flow mounting)

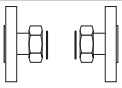
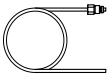
Picture	DN (mm)	k_{vs} (m^3/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	4.0	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2	**003H6333**	0.5	**003H6339**
	20	6.3		G 1 A		**003H6334**		**003H6340**
	25	8.0		G 1¼ A		**003H6335**		**003H6341**
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6381** [1]		**003H6387** [1]
	20	6.3				**003H6382** [1]		**003H6388** [1]
	25	8.0				**003H6383** [1]		**003H6389** [1]
	32	12.5				**003H6384**		**003H6390**
	40	20				**003H6385**		**003H6391**
	50	25				**003H6386**		**003H6392**

***Note:** other controllers available on request.*

[1] Controller is without predefined impulse tube (see ordering example 2)

Ordering *(continuous)*

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		003H6908
		20			003H6909
		25			003H6910
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	003H6902
		20		R ¾	003H6903
		25		R 1	003H6904
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		003H6915
		20			003H6916
		25			003H6917
	Impulse tube set AV	Description: - 1× copper tube Ø6 × 1 × 1500 mm - 1× compression fitting *) for imp. tube connection to pipe Ø6 × 1 mm		R ⅛	003H6852
				R ⅜	003H6853
				R ½	003H6854
	* 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ⅛				003H6857
	* 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ⅜				003H6858
	* 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ½				003H6859
	* 10 compression fittings for imp. tube connection to actuator, Ø6 × 1 mm G ⅛				003H6931
	Shut off valve Ø6 mm				003H0276

*) *Compression fitting consists of a nipple, compression ring and nut.*

Service kits

Picture	Type designation	DN (mm)	k_{vs} (m^3/h)	Code No. AVP(-F) return	Code No. AVP(-F) flow
	Valve insert	15	1.6	003H6863	003H6871
			2.5	003H6864	003H6872
			4.0	003H6865	003H6873
		20	6.3	003H6866	003H6874
		25	8	003H6867	003H6875
		32 / 40 / 50	12.5 / 20 / 25	003H6868	003H6876

Picture	Type designation	Δp setting range (bar)	AVP(-F) return	AVP(-F) flow
	Actuator with adjustable handle (AVP)	0.2 - 1.0	003H6829	003H6834
		0.3 - 2.0	003H6830	003H6835
	Actuator without adjustable handle (AVP-F)	0.2	003H6841	003H6839
		0.5		003H6840

Technical data

Valve

Nominal diameter	DN	15					20	25	32	40	50
k_{vs} value	m^3/h	0.4	1.0	1.6	2.5	4.0	6.3	8.0	12.5	20	25
Cavitation factor z *1)*		≥ 0.6									
Nominal pressure	PN	25									
Max. differential pressure	bar	20							16		
Medium		Circulation water / glycolic water up to 30%									
Medium pH		Min. 7, max. 10									
Medium temperature	°C	2 … 150									
Connections	valve	Ext. thread and flange							Flange		
	tailpieces	Weld-on, external thread and flange							-		
Materials											
Valve body	thread	Red bronze CuSn5ZnPb (Rg5)							-		
	flange	Ductile iron EN-GJS-400-18-LT (GGG 40.3)									
Valve seat		Stainless steel, mat. No. 1.4571									
Valve cone		Dezincing free brass CuZn36Pb2As									
Sealing		EPDM									

1) $k_v/k_{vs} \leq 0.5$ at DN 25 and higher

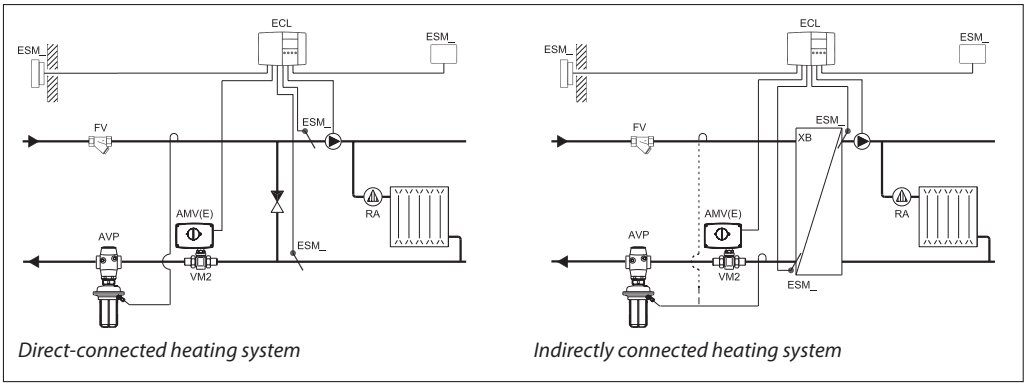
Technical data *(continuous)*

Actuator

Type			AVP		AVP-F	
Actuator size		cm^2	54			
Nominal pressure		PN	25			
Diff. pressure setting ranges and spring colours		bar	0.2 - 1.0	0.3 - 2.0	0.2	0.5
			yellow	red	(fixed setting)	
Materials						
Actuator housing	Upper casing of diaphragm		Stainless steel, mat. No.1.4301			
	Lower casing of diaphragm		Dezincing free brass CuZn36Pb2As			
Diaphragm			EPDM			
Impulse tube			Copper tube Ø6 × 1 mm			

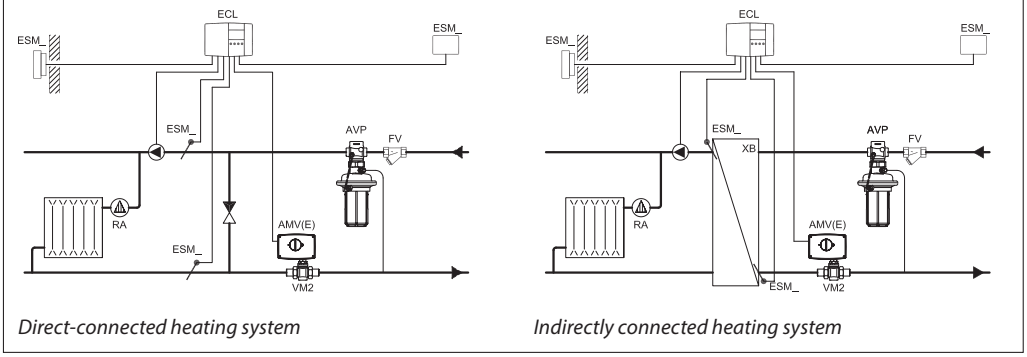
Application principles

- Return mounting



Direct-connected heating system *Indirectly connected heating system*

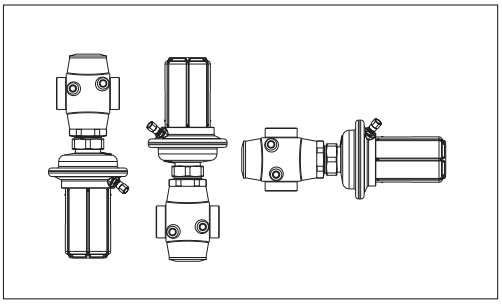
- Flow mounting



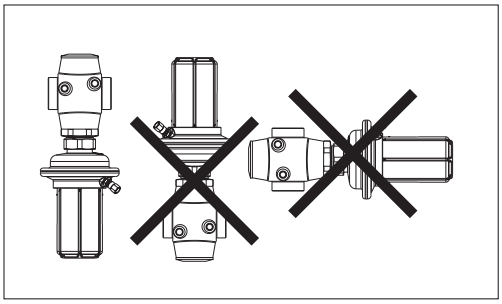
Direct-connected heating system *Indirectly connected heating system*

Installation positions

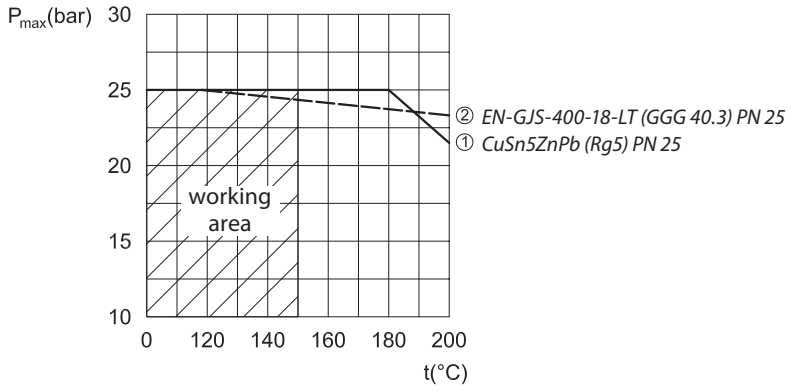
Up to medium temperature of 100 °C the controllers can be installed in any position.



For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.



Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Sizing

- *Directly connected heating system*

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating system requires differential pressure of 0.3 bar (30 kPa).

Given data:
Q_{max} = 1.2 m³/h (1200 l/h)
Δp_{min} = 0.7 bar (70 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.3 bar (30 kPa) selected

*Remark
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AVP.

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{MCV}$
$\Delta p_{set\ value}$ = 0.3 bar (30 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{MCV} = 0.7 - 0.3$
Δp_{AVP} = 0.4 bar (40 kPa)

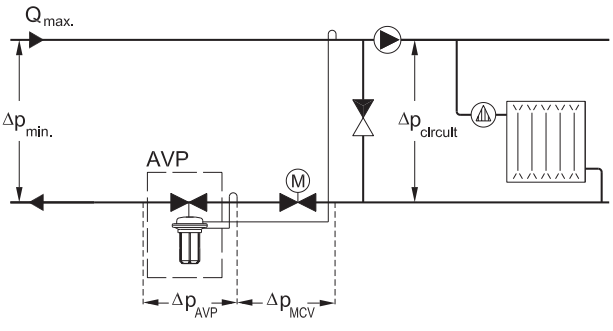
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

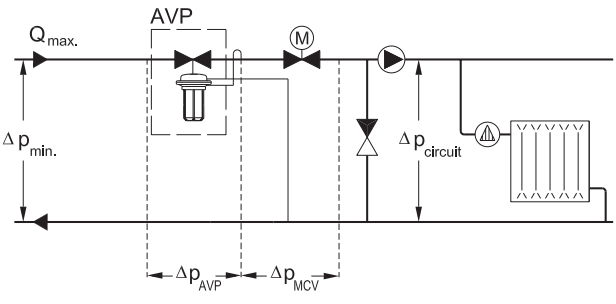
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1.2}{\sqrt{0.4}}$$

k_v = 1.9 m³/h

Solution:
The example selects AVP DN 15, k_{vs} value 2.5, with differential pressure setting range 0.2 - 1.0 bar.





Sizing *(continuous)*

- *Indirectly connected heating system*

Example 2
Motorised control valve (MCV) for indirectly connected heating system requires differential pressure of 0.5 (50 kPa) bar.

Given data:
Q_{max} = 1.25 m³/h (1250 l/h)
Δp_{min} = 1.0 bar (100 kPa)
$\Delta p_{exchanger}$ = 0.05 bar (5 kPa)
Δp_{MCV} = 0.4 bar (40 kPa) selected

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{exchanger} + \Delta p_{MCV} = 0.05 + 0.4$
$\Delta p_{set\ value}$ = 0.45 bar (45 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{exchanger} - \Delta p_{MCV} = 1.0 - 0.05 - 0.4$
Δp_{AVP} = 0.55 bar (55 kPa)

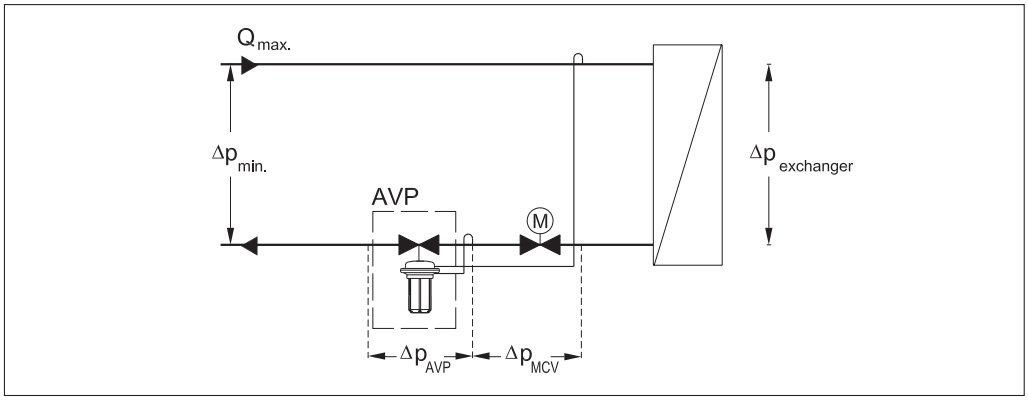
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

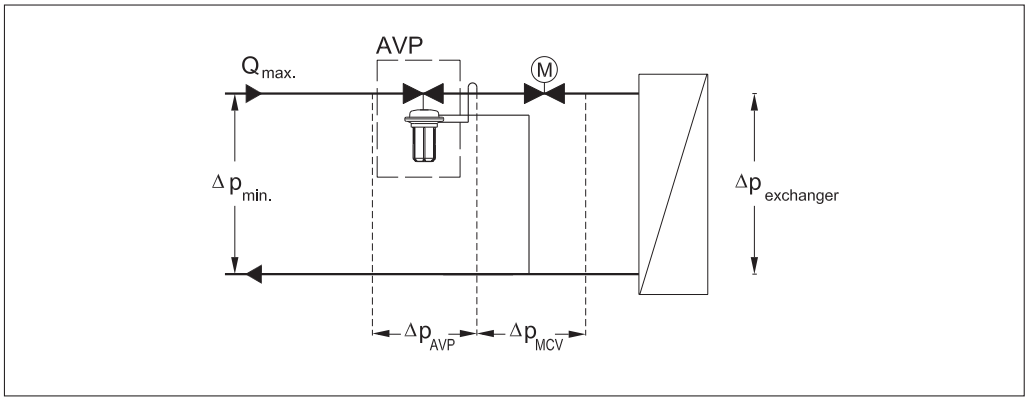
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1.25}{\sqrt{0.55}}$$

k_v = 1.7 m³/h

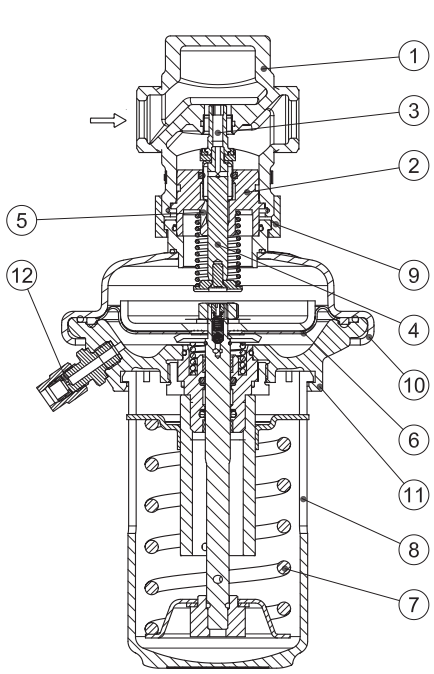
Solution:
The example selects AVP DN 15, k_{vs} value 2.5, with differential pressure setting range 0.2 - 1.0 bar.



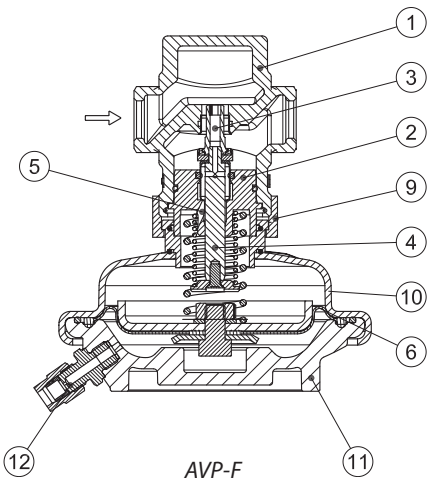


Design

1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control drain
6. Control diaphragm
7. Setting spring for diff. pressure control
8. Handle for diff. pressure setting, prepared for sealing
9. Union nut
10. Upper casing of diaphragm
11. Lower casing of diaphragm
12. Compression fitting for impulse tube
13. Excess pressure safety valve



AVP



AVP-F

Function

Pressure changes from the flow and return pipeline are being transferred through the impulse tubes and/or control drain in the actuator stem to the actuator chambers and act on control diaphragm. Control valve closes on rising differential pressure and opens on falling differential pressure to maintain constant differential pressure.

Controller with adjustable setting is equipped with excess pressure safety valve, which protects actuator from too high differential pressure.

Settings

Differential pressure setting
Differential pressure setting is being done by the adjustment of the setting spring for diff. pressure control. The adjustment can be performed on the basis of diff. pressure adjustment diagram (see relevant instructions) and/or pressure indicators.

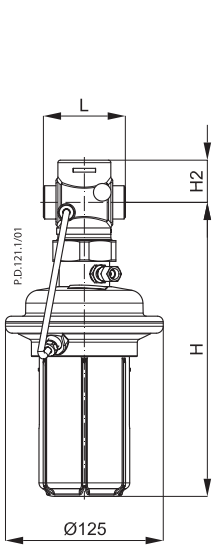
Adjustment

Relation between scale figures and differential pressure. Values given are approximate.

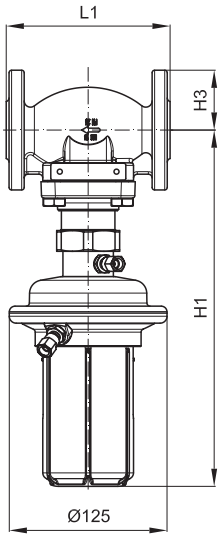
I	II	III	IIII	IIIII	
0,2	0,4	0,6	0,8	1,0	bar
20	40	60	80	100	kPa

I	II	III	IIII	IIIII	
0,3	0,73	1,16	1,58	2,0	bar
30	73	116	158	200	kPa

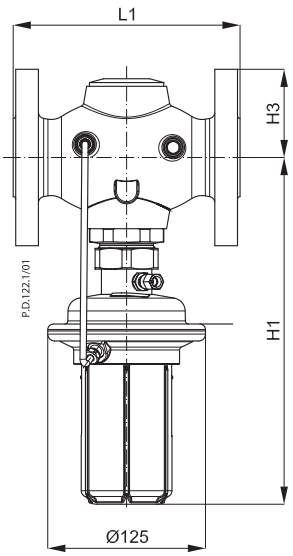
Dimensions



DN 15-25



DN 15-25



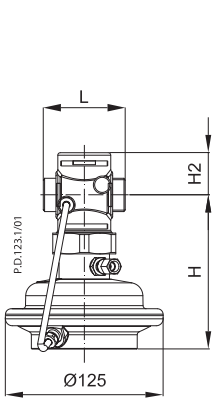
DN 32-50

AVP

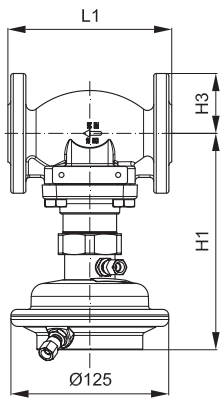
DN		15		20		25		32		40		50	
		flow	return	flow	return	flow	return	flow	return	flow	return	flow	return
L	mm	65		70		75		-		-		-	
L1		130		150		160		180		200		230	
H		233	220	233	220	233	220	-	-	-	-	-	-
H1		223	269	223	269	223	269	275	261	275	261	275	261
H2		34		34		37		-		-		-	
H3		47		52		57		70		75		82	
Weight (thread)	kg	3.5		3.5		3.7		-		-		-	
Weight (flange)		6.1		6.8		7.4		10.2		11.7		13.9	

Note: *Other flange dimensions - see table for tailpieces.*

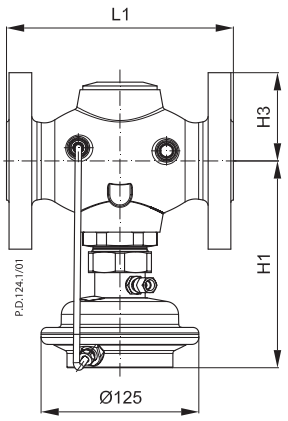
Dimensions *(continuous)*



DN 15-25



DN 15-25

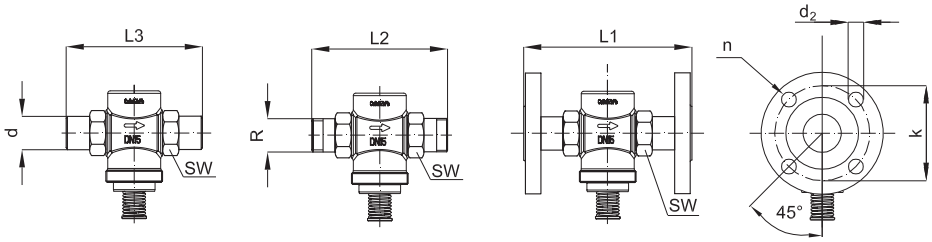


DN 32-50

AVP-F

DN		15		20		25		32		40		50	
		flow	return	flow	return	flow	return	flow	return	flow	return	flow	return
L	mm	65		70		75		-		-		-	
L1		130		150		160		180		200		230	
H		122	108	122	108	122	108	-	-	-	-	-	-
H1		172	158	172	158	172	158	164	150	164	150	164	150
H2		34		34		37		-		-		-	
H3		47		52		57		70		75		82	
Weight (thread)	kg	2.5		2.5		2.7		-		-		-	
Weight (flange)		5.1		5.8		6.4		9.2		10.8		12.9	

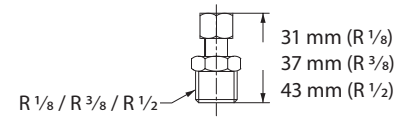
Note: *Other flange dimensions - see table for tailpieces.*



DN		15	20	25	32	40	50
SW	mm	32 (G ¾A)	41 (G 1A)	50 (G 1¼A)			
d		21	26	33			
R [1]		½	¾	1			
L1[2]		130	150	160			
L2		131	144	160			
L3		139	154	159			
k		65	75	85	100	110	125
d_2		14	14	14	18	18	18
n		4	4	4	4	4	4

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*

Compression fittings



Data sheet

Differential pressure controller (PN 16, 25, 40)

AFP(-9) / VFG 2(1) – return and flow mounting, adjustable setting

Description

The controller is a self-acting differential pressure controller primarily for use in district heating systems. The controller closes on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and spring for differential pressure setting.

Further on two valve versions are available:
– VFG 2 with metallic sealing cone
– VFG 21 with soft sealing cone

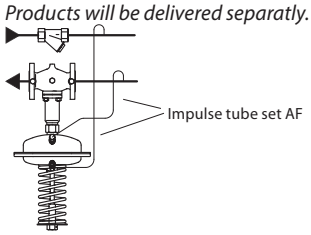
Main data:
- DN 15-250
- k_{VS} 4.0-400 m³/h
- PN 16, 25, 40
- Setting range:
  – AFP: 0.05-0.35 bar / 0.1-0.7 bar / 0.15-1.5 bar
  – AFP-9: 0.5-3 bar / 1-6 bar
- Temperature:
  – Circulation water / glycolic water up to 30 %: 2 … 150 / 200 °C
- Connections:
  – Flange

Ordering

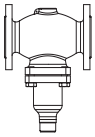
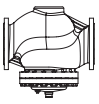
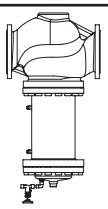
Example 1:
Differential pressure controller; return mounting; DN 15; k_{VS} 4.0; PN 16; metallic sealing; setting range 0.15-1.5 bar; T_{max} 150 °C; flange;

– 1× VFG 2 DN 15 valve
*Code no: **065B2388***
– 1× AFP actuator
*Code no: **003G1016***
– 2× Impulse tube set AF
*Code no: **003G1391***

Products will be delivered separatly.



VFG 2 Valves (metallic sealing cone)

Picture	DN (mm)	k_{VS} (m³/h)	Connections	$T_{max.}$ (°C)	Code No. PN 16	$T_{max.}$ (°C)	Code No. PN 25	Code No. PN 40
	15	4.0	Flanges acc. to EN 1092-1	150	**065B2388**	200 [1]	**065B2401**	**065B2411**
	20	6.3			**065B2389**		**065B2402**	**065B2412**
	25	8.0			**065B2390**		**065B2403**	**065B2413**
	32	16			**065B2391**		**065B2404**	**065B2414**
	40	20			**065B2392**		**065B2405**	**065B2415**
	50	32			**065B2393**		**065B2406**	**065B2416**
	65	50			**065B2394**		**065B2407**	**065B2417**
	80	80			**065B2395**		**065B2408**	**065B2418**
	100	125			**065B2396**		**065B2409**	**065B2419**
	125	160			**065B2397**		**065B2410**	**065B2420**
	150	280		150	**065B2398**	150	–	**065B2421**
	200	320			**065B2399**		–	**065B2422**
	250	400			**065B2400**		–	**065B2423**
	150	280		200 [1]	**065B2424**	200 [1]	–	**On request**
	200	320			**065B2425**		–	**On request**
	250	400			**065B2426**		–	**On request**

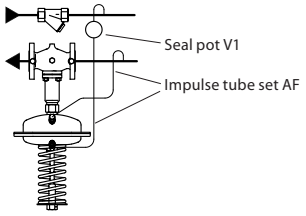
[1] *at temperatures above 150 °C only with seal pots (see Accessories)*

Ordering *(continuous)*

Example 2:
Differential pressure controller; return mounting; DN 15; k_{VS} 4.0; PN 25; metallic sealing; setting range 0.15-1.5 bar; T_{max} 200 °C; flange;

– 1× VFG 2 DN 15 valve
Code no: ***065B2401***
– 1× AFP actuator
Code no: ***003G1016***
– 2× Impulse tube set AF
Code no: ***003G1391***
– 1× Seal pot V1
Code no: ***003G1392***

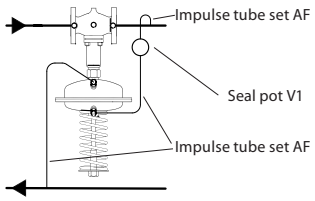
Products will be delivered separatly.



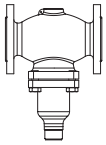
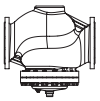
Example 3:
Differential pressure; flow mounting; DN 15; k_{VS} 4.0; PN 25; metallic sealing; setting range 0.15-1.5 bar; T_{max} 200 °C; flange;

– 1× VFG 2 DN 15 valve
Code no: ***065B2401***
– 1× AFP actuator
Code no: ***00G1016***
– 2× Impulse tube set AF
Code no: ***003G1391***
– 1× Seal pot V1
Code no: ***003G1392***

Products will be delivered separatly.

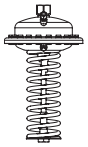


VFG 21 Valves (soft sealing cone)

Picture	DN (mm)	k_{VS} (m^3/h)	Connections	$T_{max.}$ (°C)	Code No. PN 16
	15	4.0	Flanges acc. to EN 1092-1	150	**065B2502**
	20	6.3			**065B2503**
	25	8.0			**065B2504**
	32	16			**065B2505**
	40	20			**065B2506**
	50	32			**065B2507**
	65	50			**065B2508**
	80	80			**065B2509**
	100	125			**065B2510**
	125	160			**065B2511**
	150	280		150	**065B2512**
	200	320			**065B2513**
	250	400			**065B2514**

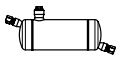
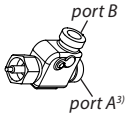
Note: *other valves available on special request.*

AFP / AFP-9 Actuators

Picture	Type	Δp setting range (bar)	for DN	Code No.
	AFP-9[1]	1-6	15-125	**003G1014**
		0.5-3		**003G1015**
	AFP	0.15-1.5	15-250	**003G1016**
		0.1-0.7		**003G1017**
		0.05-0.35		**003G1018**

[1] *actuator does not have excess pressure safety valve*

Accessories

Picture	Type designation	Description	Connections	Code No.
	Impulse tube set AF	– 1× Copper tube Ø10 × 1 × 1500 mm – 1 × compression fitting for imp. tube connection to pipe (G ¼) – 2 × socket	–	**003G1391**
	Seal pot V1[1]	Capacity 1 liter; with compression fittings for imp. tube Ø10	–	**003G1392**
	Seal pot V2[1]	Capacity 3 liter; with compression fittings for imp. tube Ø10, for actuator size 630 cm^2	–	**003G1403**
	Compression fitting[2]	For impulse tube Ø10 connections to controller	G ¼	**003G1468**
 *port B* *port A[3]*	Combination piece KF3	For combination with pressure actuators. Electrical actuator connected on side (port B) only for ON/OFF function.	G 1¼ / 2× G 1¼	**003G1441**
	Combination piece KF2	For combination with thermostat - side connection to port B		**003G1440**
	Shut off valve	For impulse tube Ø10	–	**003G1401**
	Throttle valve			**065B2909**

[1] *Seal pot has to be used on impulse tubes always when $T_{max} \geq 150$ °C*
[2] *Consist of a nipple, compression ring and nut*
[3] *Port A - for connection of any type of actuator*

Ordering *(continuous)*

Service kits

Picture	Type designation	DN (mm)	k_{VS} (m^3/h)	Code No. for VFG 2	Code No. for VFG 21
	Valve insert	15	4.0	**065B2796**	**065B2790**
		20	6.3	**065B2797**	**065B2791**
		25	8	**065B2798**	**065B2792**
		32	16		
		40	20	**065B2799**	**065B2793**
		50	32		
		65	50	**065B2800**	**065B2794**
		80	80		
		100	125	**065B2801**	**065B2795**
		125	160		
		150	280	**065B2964**	**065B2966**
		250	400	**065B2965**	–
	Stuffing cone (with EPDM O-rings)			**003G1464**	

Technical data

Valve

Nominal diameter		**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
k_{VS} value		m^3/h	4.0	6.3	8.0	16	20	32	50	80	125	160	280	320	400
Cavitation factor z			0.6	0.6	0.6	0.55	0.55	0.5	0.5	0.45	0.4	0.35	0.3	0.2	0.2
Leakage acc. to standard IEC 534 (% of k_{VS})	VFG 2		≤ 0.03										≤ 0.05		
	VFG 21		≤ 0.01												
Nominal pressure		PN	16, 25, 40												
Max. differential pressure	PN 16	bar	16								15		12	10	
	PN 25, 40		20												
Media			Circulation water / glycolic water up to 30 %												
Media pH			Min. 7, max. 10												
Media temperature	VFG 2	°C	2 … 150 / 2 … 200 [1]										2 … 150 (200 [2])		
	VFG 21		2 … 150												
Connections			Flange												
Materials															
Valve body	PN 16		Grey cast iron EN-GJL-250 (GG-25)												
	PN 25		Ductile iron EN-GJS-400(GGG-40.3)												
	PN 40		Cast steel GP240GH (GS-C 25)												
Valve seat			Stainless steel, mat. No. 1.4021										Stainless steel, mat. No. 1.4313		
Valve cone			Stainless steel, mat. No. 1.4404										Stainless steel, mat. No. 1.4021		
Sealing	VFG 2		Metal												
	VFG 21		EPDM												
Pressure relieve system			Bellows (Stainless steel, mat. No. 1.4571)										Diaphragm (EPDM)		

[1] *at temperatures above 150 °C only with seal pots (see Accessories)*
[2] *on request*

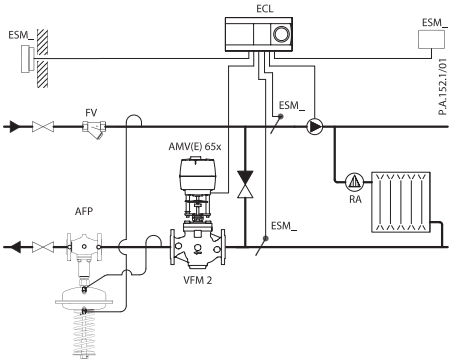
Actuators

Type		**AFP-9**[1]		**AFP**		
Actuator size	cm^2	80		250		630
Max. operating pressure	bar	25		25		16
Diff. pressure setting ranges and spring colours	bar	red	yellow	red	yellow	yellow
		1-6	0.5-3	0.15-1.5	0.1-0.7	0.05-0.35
Materials						
Actuator housing		Steel, mat. No. 1.0338, zinc plated				
Control diaphragm		EPDM (Rolling; fibre enforced)				

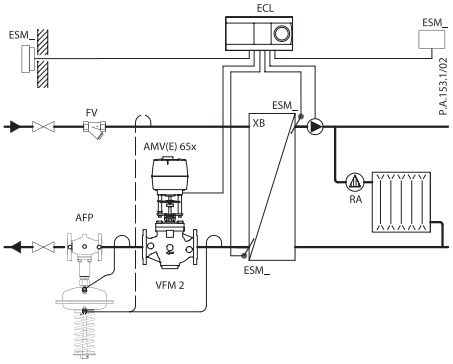
[1] *Actuator does not have excess pressure safety valve*

Application principles

– Return mounting

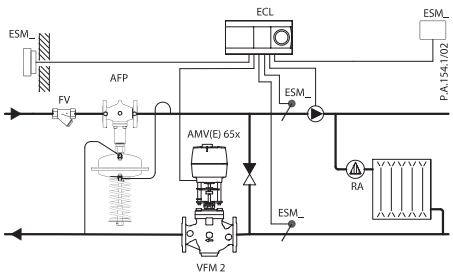


Direct-connected heating system

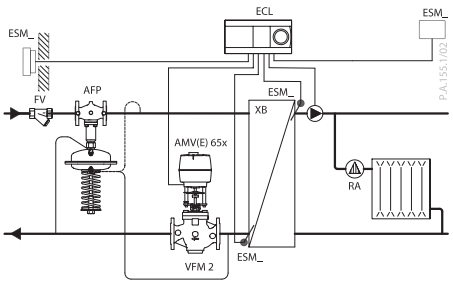


Indirectly connected heating system

– Flow mounting



Direct-connected heating system



Indirectly connected heating system

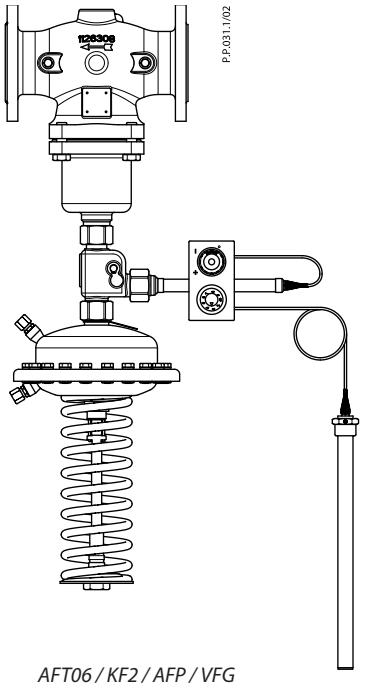
Combinations

Example
Differential pressure and temperature controller AFP / AFT06 / VFG 2; DN 15; PN 16; k_{VS} 4.0; $T_{max.}$ 150 °C; 0.15-1.5 bar; range 20 … 90 °C;

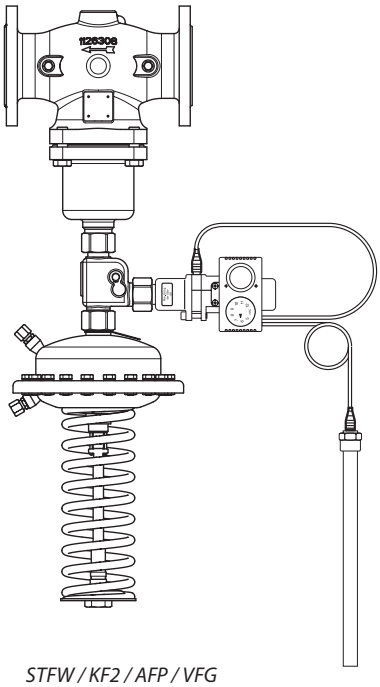
– 1× VFG 2 DN 15 valve
Code no: ***065B2388***
– 1× AFP actuator
Code no: ***003G1016***
– 1× AFT06 thermostat
Code no: ***065-4391***
– 1× Combination piece KF2
Code no: ***003G1398***
– 2× Impulse tube set AF
Code no: ***003G1391***

Parts will be delivered separately.

Note:
For AFT 06 and STFW thermostats data see relevant data sheets



AFT06 / KF2 / AFP / VFG



STFW / KF2 / AFP / VFG

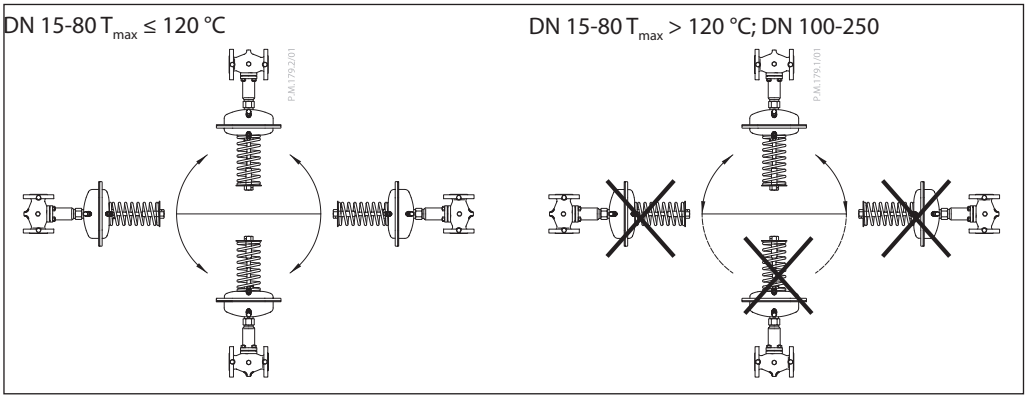
Installation position

DN 15-80 T_{max} ≤ 120 °C

The controllers can be installed in any position.

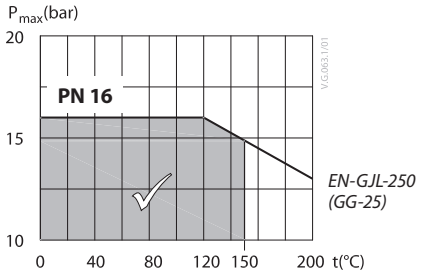
DN 15-80 T_{max} > 120 °C; DN 100-250

The controllers can be installed in horizontal pipes only, with a pressure actuator oriented downwards.

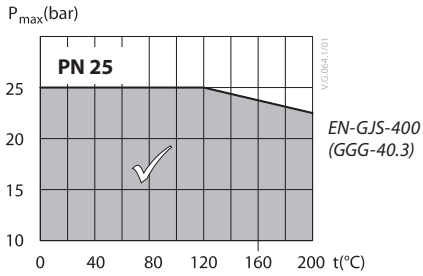


Pressure temperature diagram

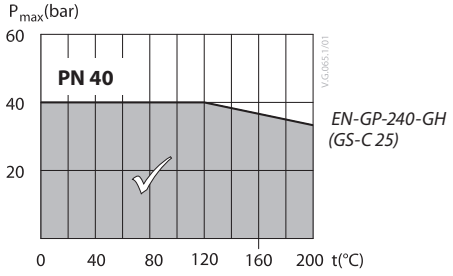
Working area is below P-T line and it ends at Tmax for each valve



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-1)

Sizing

– *Directly connected heating system*

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating system requires differential pressure of 0.3 bar (30 kPa).

Given data:
Q_{max} = 2.2 m³/h (1200 l/h)
Δp_{min} = 0.7 bar (70 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.3 bar (30 kPa) selected

*Remark
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AFP.

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{MCV}$
$\Delta p_{set\ value}$ = 0.3 bar (30 kPa)

The total pressure loss across the controller is:
$\Delta p_{AFP} = \Delta p_{min} - \Delta p_{MCV} = 0.7 - 0.3$
Δp_{AFP} = 0.4 bar (40 kPa)

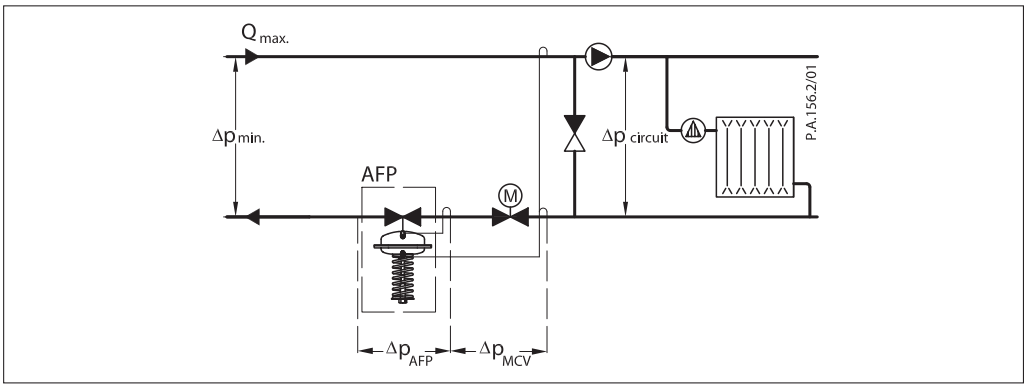
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

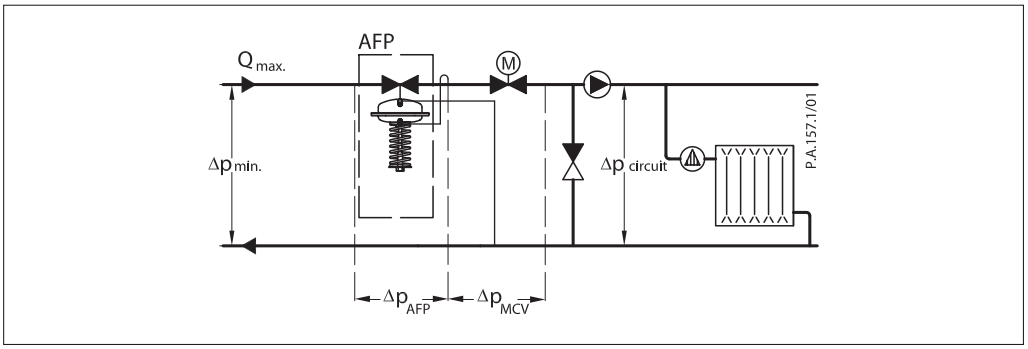
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AFP}}} = \frac{2{,}2}{\sqrt{0{,}4}}$$

k_v = 3.5 m³/h

Solution:
The example selects AFP DN 15, k_{VS} value 4.0, with differential pressure setting range 0.15-1.5 bar.





Sizing *(continuous)*

– *Indirectly connected heating system*

Example 2
Motorised control valve (MCV) for indirectly connected heating system requires differential pressure of 0.5 (50 kPa) bar.

Given data:
Q_{max} = 2.4 m³/h (1250 l/h)
Δp_{min} = 1.0 bar (100 kPa)
$\Delta p_{exchanger}$ = 0.05 bar (5 kPa)
Δp_{MCV} = 0.4 bar (40 kPa) selected

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{exchanger} + \Delta p_{MCV} = 0.05 + 0.4$
$\Delta p_{set\ value} = 0.45$ bar (45 kPa)

The total pressure loss across the controller is:
$\Delta p_{AFP} = \Delta p_{min} - \Delta p_{exchanger} - \Delta p_{MCV} = 1.0 - 0.05 - 0.4$
$\Delta p_{AFP} = 0.55$ bar (55 kPa)

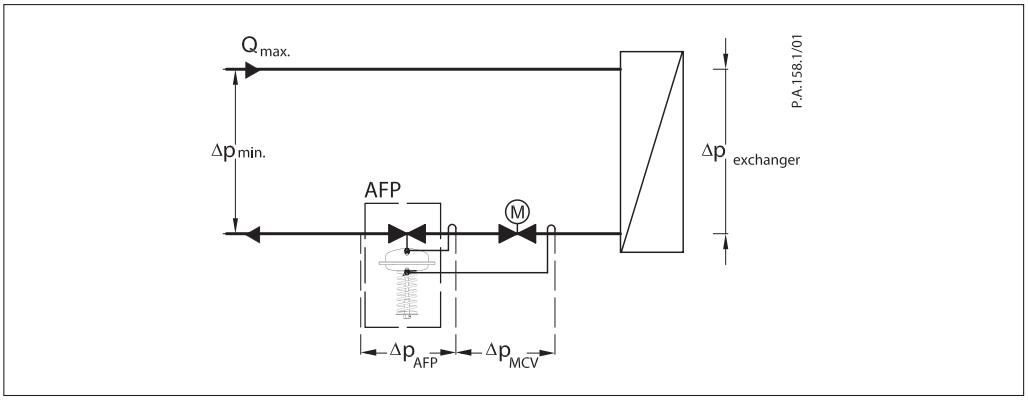
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

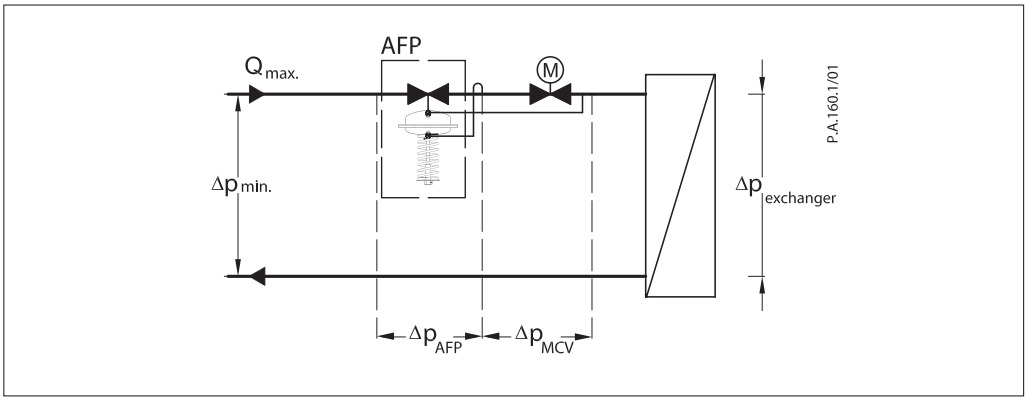
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AFP}}} = \frac{2,4}{\sqrt{0,55}}$$

k_v = 3.2 m³/h

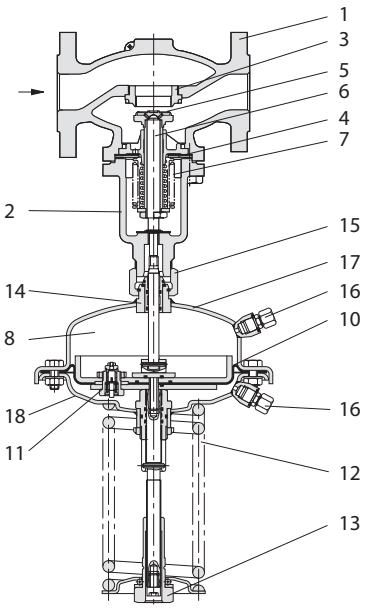
Solution:
The example selects AFP DN 15, k_{VS} value 4.0, with differential pressure setting range 0.15-1.5 bar.



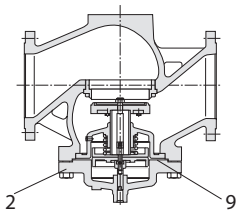


Design

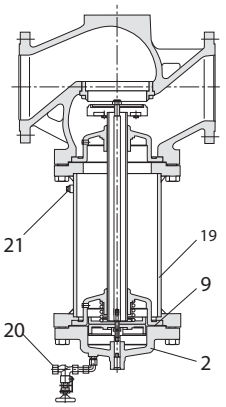
1. Valve body
2. Cover
3. Valve seat
4. Valve insert
5. Pressure relieved valve cone
6. Valve stem
7. Bellows for pressure relief of valve cone
8. Actuator
9. Diaphragm for pressure relief of valve cone
10. Control diaphragm for differential pressure control
11. Excess pressure safety valve
12. Setting spring for diff. pressure control
13. Adjuster for diff. pressure setting, prepared for sealing
14. Stuffing cone
15. Union nut
16. Compression fitting for impulse tube
17. Upper casing of diaphragm
18. Lower casing of diaphragm
19. Valve body extension
20. Shut off valve for water filling
21. Closing plug



AFP / VFG 2 DN 15-125



VFG 2 DN 150-250, T_{max} 150 °C



VFG 2 DN 150-250, T_{max} 200 °C

Function

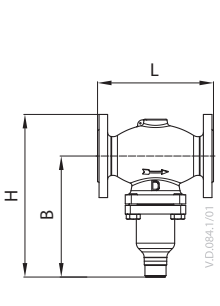
Pressure changes from flow and return pipes are being transferred through the impulse tubes to the actuator chambers and act on control diaphragm for diff. pressure control. The diff. pressure is controlled by means of setting spring for diff. pressure control. Control valve closes on rising differential pressure and opens on falling differential pressure to maintain constant differential pressure.

Controller is equipped with excess pressure safety valve (not AFP-9), which protects control diaphragm for diff. pressure control from too high differential pressure.

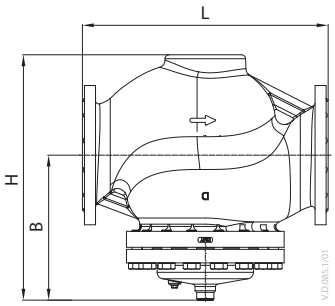
Settings

Differential pressure setting
Differential pressure setting is being done by the adjustment of the setting spring for diff. pressure control. The adjustment can be done by means of spring for diff. pressure setting and/or pressure indicators.

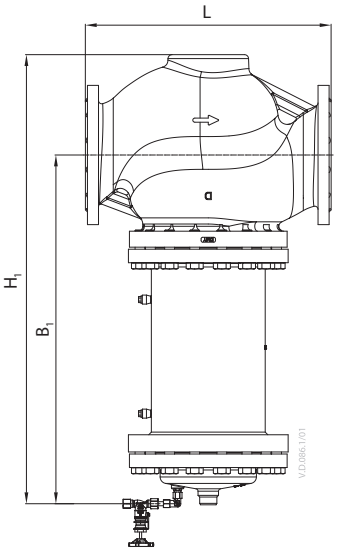
Dimensions



VFG DN 15-125



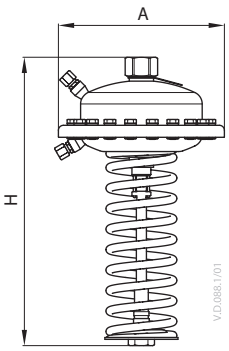
VFG DN 150-250

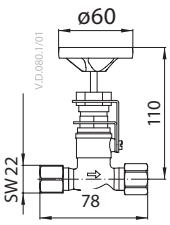


VFG DN 150-250
with valve body extension up to 200 °C

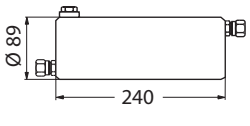
VFG 2, VFG 21 Valves

DN			15	20	25	32	40	50	65	80	100	125	150	200	250
L		mm	130	150	160	180	200	230	290	310	350	400	480	600	730
B		mm	213	213	239	239	241	241	276	276	381	381	326	354	401
H		mm	267	267	304	304	323	323	370	370	505	505	505	591	661
Weight	PN 16 / 25	kg	7.5	8.5	10	12	15	18	27.5	30	58	68	115	185	323
	PN 40	kg							30	32.5	60.5	69	141	253	333
B_1		mm											620	852	1199
H_1		mm											799	1089	1459
Weight (valve with body extension)	PN 16 / 25	kg											154	301	469
	PN 40	kg											179	336	505

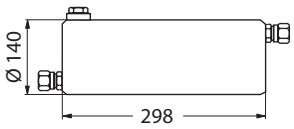




Shut off valve



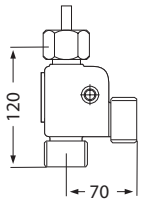
Seal pot V1



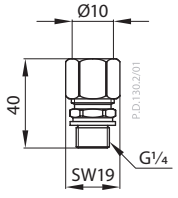
Seal pot V2

AFP Actuator

Actuator size	cm²	80	250	630
A	mm	172	263	380
H	mm	430	470	520
Weight	kg	7.5	13	28



Comb. piece KF2, KF3



Compression fitting

Data sheet

Diff. pressure relief controller (PN 10)
AVDA - internal thread

Description

AVDA is self-acting differential pressure relief controller used for constant flow control or bypass control. Controller opens on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting.

For apartment block heating, district heating plant and central heating systems.

Main data:

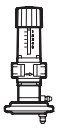
- DN 15, 20, 25
- k_{VS} 1.9, 3.4, 5.5
- PN 10
- Setting range:
  0.1 - 1.2 bar
- Temperature:
  - Circulation water / glycolic water up to 30%:
    -25 … 130 °C
- Connections: Int. thread

Ordering

Example:
Differential pressure relief controller, DN 15, k_{VS} 1.9, PN 10, setting range 0.1 - 1.2, t_{max} 130°C, int. thread

- *1x AVDA DN 15 controller*
  Code No: ***003N0038***

AVDA Controller

Picture	DN	k_{VS} (m³/h)	PN	Setting range (bar)	Connection-valve (Int. thread ISO 7/1)	Connection - Impulse tube flare	Code No.[1)]
	15	1.9	10	0.1 - 1.2	Rp ½	7/16-20 UNF	**003N0038**
	20	3.4			Rp ¾		**003N0039**
	25	5.5			Rp 1		**003N0040**

[1)] *The code no. includes 2 impulse tubes (0.5 and 1.5 m) with compression fitting.*

Service kits

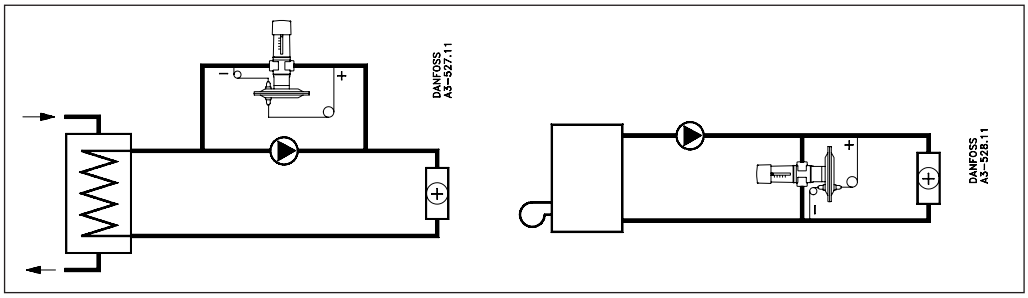
Picture	Type designation	DN	Code No.
	Repair set Two diaphragms, two O-rings, one rubber cone, one tube of grease and eight valve cover screws	15	**003N4006**
		20	**003N4007**
		25	**003N4008**
	Valve body (int. thread)	15	**003N2030**
		20	**003N2040**
		25	**003N2050**
	Nipple for impulse tube connection to pipe		**631X4700**
	Valve stuffing box		**065F0006**
	Diaphragm housing		**003N0065**

Differential pressure relief controller AVDA (PN 10)

Technical data

Nominal diameter	DN	15	20	25
k_{vs} value	m^3/h	1.9	3.4	5.5
Cavitation factor z		0.4		
Nominal pressure	PN	10		
Max. differential pressure	bar	7		
Medium		Circulation water / glycolic water up to 30%		
Medium pH		Min. 7, max. 10		
Medium temperature	°C	-25 … +130 °C		
Connections (valve)		Internal thread		
Materials				
Valve body		MS 58, hot-pressed, DIN 17660, W.No. 2.0402, CuZn40Pb2		
Valve seat		Cr Ni steel, DIN 17660, W.No. 1.4301		
Valve cone		NBR-rubber		
Spindle		Dezincing-free brass, BS 2874/CZ132		
Diaphragm housing		Zinc-cromated steel, DIN 1624, W.No. 1.0338		
Diaphragm		EPDM-rubber		

Application principles



Installation positions

The valve body can be installed in any position. A Danfoss FV strainer is recommended.

Impulse tubes have to be installed vertically or horizontally onto the main pipe, never downwards.

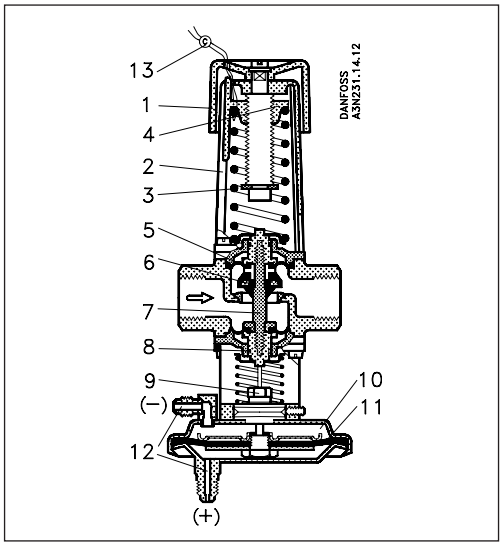
Needle valve can be installed between main pipe and impulse tube, if necessary.

(+) impulse tube has to be connected to flow line, (-) impulse tube has to be connected to return line. Setting can be simplified by using pressure indicators (manometers) placed close to impulse tube connections.

By turning diaphragm housing downwards the letter “RA” on valve housing must be oriented upright.

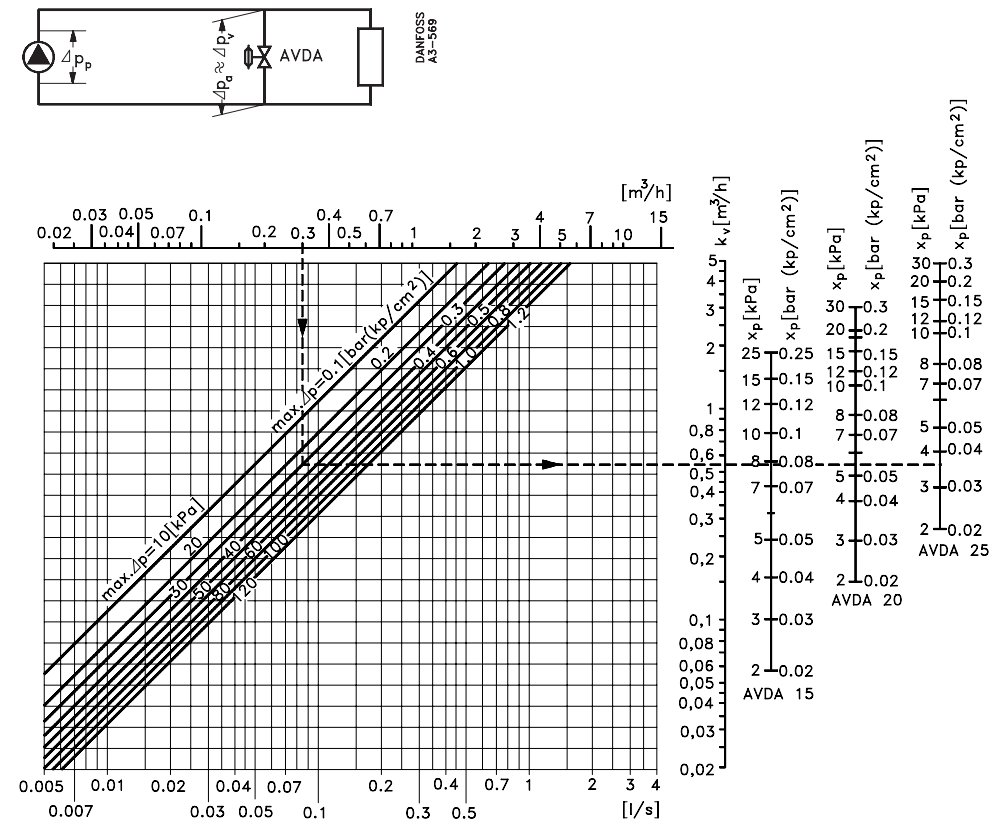
Design

1. Handle for differential pressure setting
2. Spring housing
3. Setting spring
4. Spring guide
5. Diaphragm
6. Valve cone
7. Spindle
8. O-ring
9. O-ring gland
10. Diaphragm housing
11. Control diaphragm
12. Nipple for impulse tube
13. Lead seal



Sizing

Constant flow control



Example

Given
Assuming a pressure drop in the line from the pump to and from the valve connections of nil so that $\Delta p_p = \Delta p_a = \Delta p_v$, the plant differential pressure at max. load = 0.25 bar.

Condition
Maximum plant differential pressure with closed radiator valves limited to 0.3 bar. Pump water volume (Q) for this condition = 0.3 m³/h.

Required
A pressure relief control able to circulate a water volume of at least 0.3 m³/h at Δp_a = 0.3 bar and which will remain closed under max. plant load, Δp_a = 0.25 bar.

Method
Locate the necessary water volume, Q = 0.3 m³/h, on the horizontal axis in the nomogram.

From the 0.3 m³/h point, take a vertical line up to intersect the curve that gives the pressure at which the valve must be completely open (here, 0,3 bar). From the intesection, take a horizontal line to intersect the vertical axes on the right. These axes give the pressure rise X_P that is necessary across the valve before it can give the required capacity Q.

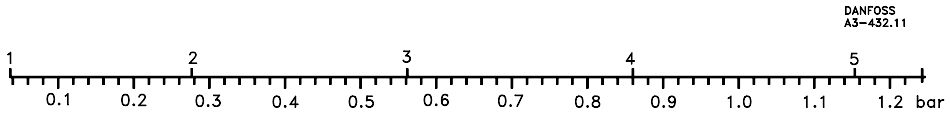
Since the pressure rise in this example is 0.3 - 0.25 = 0.05 bar, a valve where $X_P \leq 0.05$ bar could be used, i.e. an AVDA 25.

This setting is therefore 0.25 bar, i.e. the valve is closed when the differential pressure across it is 0.25 bar.

A pressure gauge can be used in making the setting, or an approximate setting can be made as shown in the associated installation example.

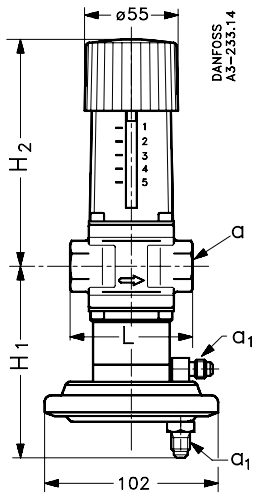
Settings

AVDA 0.1 - 1.2 bar
Scale setting

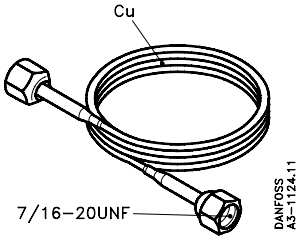


Relation between scale numbers and differential pressure. The values given are indicative only.

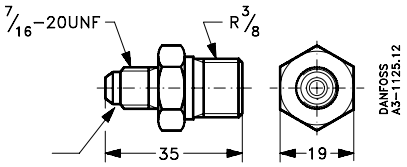
Dimensions



Type	H_1 mm	H_2 mm	L mm	a ISO 7/1	a_1 flare
DN 15	112	133	72	R_p½	7/16-20 UNF
DN 20	112	133	90	R_p¾	7/16-20 UNF
DN 25	117	138	95	R_p1	7/16-20 UNF



Impulse tube



Nipple

ENGINEERING
TOMORROW

Data sheet

Differential pressure relief controller AVPA (PN 16 and PN 25)

Description

AVPA (PN 16) AVPA (PN 25)

AVPA is a self-acting differential pressure relief controller primarily for use in district heating systems. The controller is normally closed and opens on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting.

Main data:
- DN 15-50
- k_{VS} 4.0-25 m³/h
- PN 16, 25
- Setting range:
  0.05-0.5 bar / 0.2-1.0 bar / 0.3-2.0 bar
- Temperature:
  - Circulation water / glycolic water up to 30 %:
    2 … 150 °C
- Connections:
  - External thread (weld-on, thread and flange tailpieces)
  - Flange

Ordering

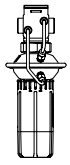
Example:
Differential pressure relief controller, DN 15, k_{VS} 4.0; PN 25; setting range 0.2-1.0 bar; T_{max} 150 °C; ext. thread

- *1× AVPA DN 15 controller*
  Code no: ***003H6602***

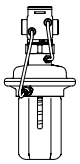
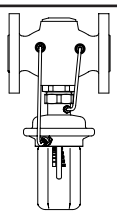
Option:
- *1× Weld-on tailpieces*
  Code no: ***003H6908***

The controller will be delivered completely assembled, inclusive impulse tubes between valve and actuator.

AVPA PN 16 Controller

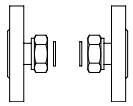
Picture	DN (mm)	k_{VS} (m³/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	4.0	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.05-0.5	**003H6593**	0.2-1.0	**003H6596**
	20	6.3		G 1 A		**003H6594**		**003H6597**
	25	8.0		G 1¼ A		**003H6595**		**003H6598**

AVPA PN 25 Controller

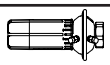
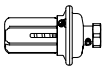
Picture	DN (mm)	k_{VS} (m³/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	4.0	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	0.2-1.0	**003H6602**	0.3-2.0	**003H6605**
	20	6.3		G 1 A		**003H6603**		**003H6606**
	25	8.0		G 1¼ A		**003H6604**		**003H6607**
	32	12.5		G 1¾ A		**003H6599**		-
	40	16		G 2 A		**003H6600**		-
	50	20		G 2½ A		**003H6601**		-
	32	12.5	Flanges PN 25, acc. to EN 1092-2			**003H6608**		**003H6611**
	40	20				**003H6609**		**003H6612**
	50	25				**003H6610**		**003H6613**

Ordering *(continuous)*

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
		40			**003H6912**
		50			**003H6913**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½″	**003H6902**
		20		R ¾″	**003H6903**
		25		R 1″	**003H6904**
		32		R 1¼″	**003H6905**
		40		R 1½	**065B2004**
		50		R 2	**065B2005**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**

Service kits

Picture	Type designation	Δp setting range (bar)	Code No.
	Actuator with adjustable handle PN 16	0.05-0.5	**003H6823**
		0.2-1.0	**003H6824**
	Actuator with adjustable handle PN 25	0.2-1.0	**003H6834**
		0.3-2.0	**003H6835**

Technical data

Valve (for AVPA PN 16)

Nominal diameter		DN	15	20	25
k_{VS} value		m^3/h	4.0	6.3	8.0
Cavitation factor z			≥ 0.6		
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.2		
Nominal pressure		PN	25		
Max. differential pressure		bar	12		
Medium			Circulation water / glycolic water up to 30%		
Medium pH			Min. 7, max. 10		
Medium temperature		˚C	2 … 150		
Connections	valve		External thread		
	tailpieces		Weld-on, external thread and flange		
Materials					
Valve body			Red bronze CuSn5ZnPb (Rg5)		
Valve seat			Stainless steel, mat. No. 1.4571		
Valve cone			Dezincing free brass CuZn36Pb2As		
Sealing			EPDM		
Pressure relieve system			Piston		

Actuator (for AVPA PN 16)

Type		AVPA PN 16	
Actuator size	cm^2	39	
Nominal pressure	PN	16	
Diff. pressure setting ranges and spring colours	bar	0.05-0.5	0.2-1.0
		grey	black
Materials			
Actuator housing		Zinc plated, DIN 1624, No. 1.0338	
Diaphragm		EPDM	
Impulse tube		Copper tube Ø6 × 1 mm	

Technical data *(continuous)*

Valve (for AVPA PN 25)

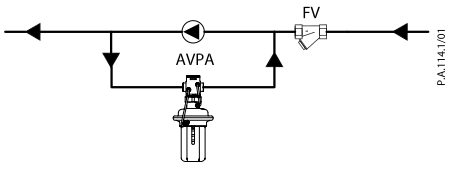
Nominal diameter		DN	15	20	25	32	40	50
k_{VS} value		m³/h	4.0	6.3	8.0	12.5	16/20 [1]	20/25 [1]
Cavitation factor z			≥ 0.6		≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02			≤ 0.05		
Nominal pressure		PN	25					
Max. differential pressure		bar	20			16		
Medium			Circulation water / glycolic water up to 30 %					
Medium pH			Min. 7, max. 10					
Medium temperature		°C	2 …150					
Connections	valve		Thread			Thread and flange		
	tailpieces		Weld-on and external thread					
			Flange			-		
Materials								
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)			Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
	flange		-					
Valve seat			Stainless steel, mat. No. 1.4571					
Valve cone			Dezincing free brass CuZn36Pb2As					
Sealing			EPDM					
Pressure relieve system			Piston					

[1] *Flange valve body*

Actuator (for AVPA PN 25)

Type			**AVPA PN 25**	
Actuator size		cm^2	54	
Nominal pressure		PN	25	
Diff. pressure setting ranges and spring colours		bar	0.2-1.0	0.3-2.0
			yellow	red
Materials				
Actuator housing	Upper casing of diaphragm		Stainless steel, mat. No.1.4301	
	Lower casing of diaphragm		Dezincing free brass CuZn36Pb2As	
Diaphragm			EPDM	
Impulse tube			Copper tube Ø6 × 1 mm	

Application principle

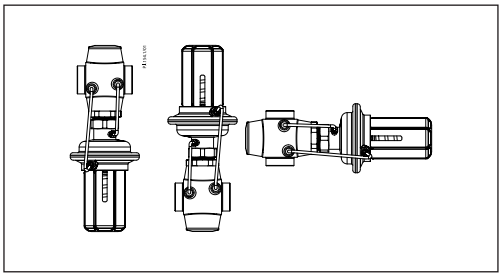


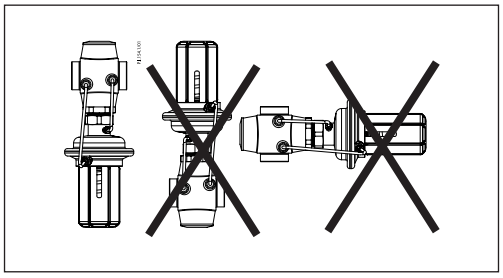
Differential pressure control for a pump in bypass

Installation positions

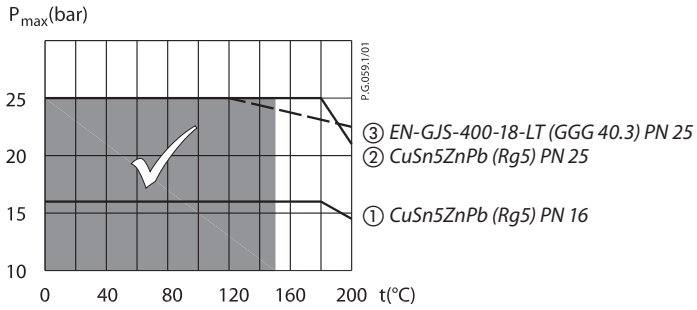
Up to medium temperature of 100 °C the controllers can be installed in any position.

For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.





Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Sizing

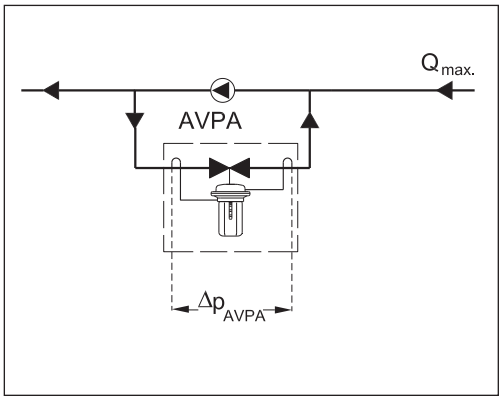
Given data:
Q_{max} = 4.5 m³/h
Δp_{AVPA} = 1.4 bar
Nominal pressure PN 25

k_v value is calculated according to formula:

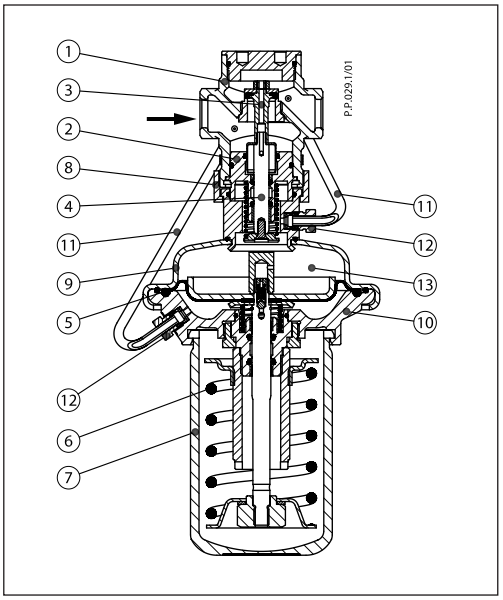
$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVPA}}} = \frac{4.5}{\sqrt{1.4}}$$

k_v = 3.8 m³/h

Solution:
The example selects AVPA PN 25 DN 15, k_{VS} value 4.0 with differential pressure setting range 0.3-2.0 bar.



Design



1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control diaphragm for diff. pressure control
6. Setting spring for diff. pressure control
7. Handle for diff. pressure setting, prepared for sealing
8. Union nut
9. Upper casing of diaphragm
10. Lower casing of diaphragm
11. Impulse tube
12. Compression fitting for impulse tube
13. Actuator

Function

The pressures in front and behind of the control valve are being transferred through the impulse tubes to the actuator chambers and act on control diaphragm. Control valve is normally closed. It opens on rising differential pressure and closes on falling differential pressure to maintain constant differential pressure.

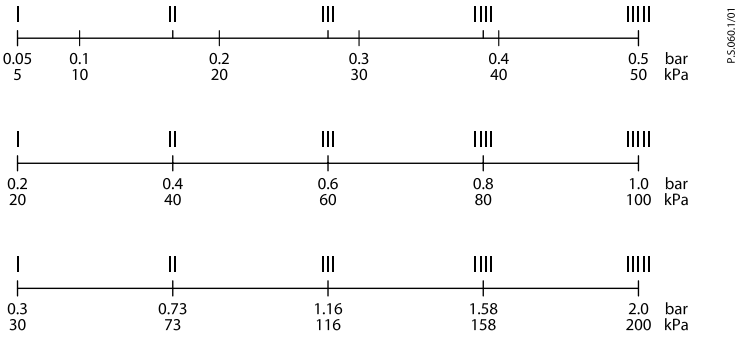
Controller is equipped with excess pressure safety valve, which protects control diaphragm for diff. pressure control from too high differential pressure.

Settings

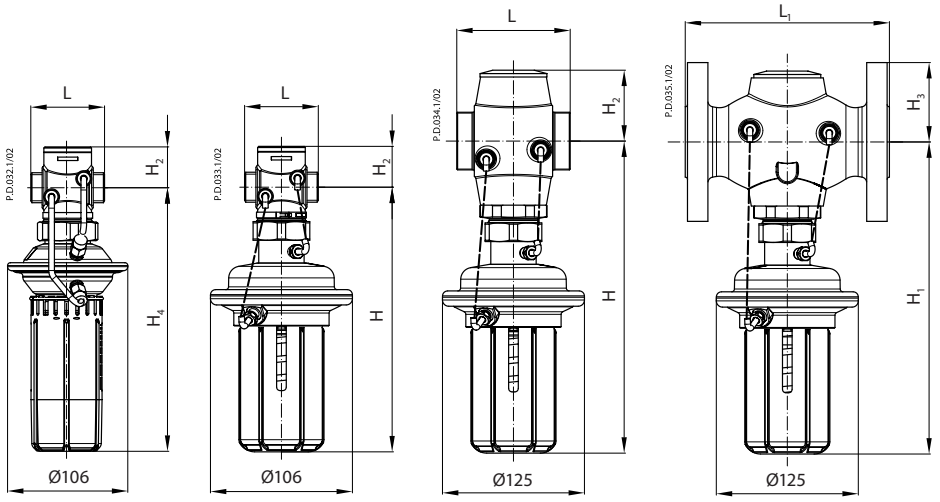
Differential pressure setting
Differential pressure setting is being done by the adjustment of the setting spring for differential pressure control. The adjustment can be done by means of spring for differential pressure setting and/or pressure indicators

Adjustment

Relation between scale figures and differential pressure. Values given are approximate.



Dimensions



PN 16
DN 15 - 25

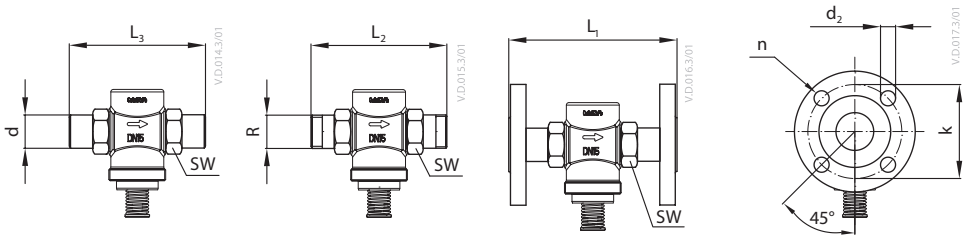
PN 25
DN 15 - 25

PN 25
DN 32 - 50

PN 25
DN 32 - 50

DN	L	L_1	H	H_1	H_2	H_3	H_4	Weight (kg)		
	mm							PN 16	PN 25	
									thread	flange
15	65	-	233	-	34	-	232	1.8	3.5	-
20	70	-	233	-	34	-	232	1.8	5.5	-
25	72	-	233	-	37	-	232	2.0	3.7	-
32	100	180	275	275	62	70	-	-	5.8	10.4
40	110	200	275	275	62	75	-	-	5.9	11.9
50	130	230	275	275	62	82	-	-	6.6	13.9

Note: *other flange dimensions - see table for tailpieces*



DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	200	204	110	18	4
50	2	82 (G 2½A)	60	-	244	234	125	18	4

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*

Data sheet

Differential pressure relief controller (PN 16, 25, 40) AFPA / VFG 2(1)

Description

The controller is a self-acting differential pressure relief controller primarily for use in district heating systems. The controller is normally closed and opens on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and spring for differential pressure setting.

Further on two valve versions are available:
– VFG 2 with metallic sealing cone
– VFG 21 with soft sealing cone

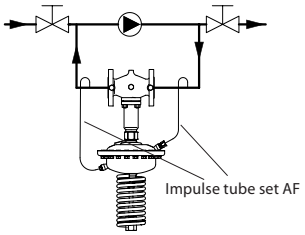
Main data:
- DN 15-250
- k_{VS} 4.0-400 m^3/h
- PN 16, 25, 40
- Setting range:
  – 0.05-0.3 bar / 0.1-0.6 bar / 0.15-1.2 bar / 0.5-2.5 bar / 1-5 bar
- Temperature:
  – Circulation water / glycolic water up to 30 %: 2 … 150/200 °C
- Connections:
  – Flange

Ordering

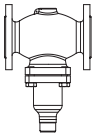
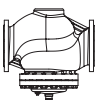
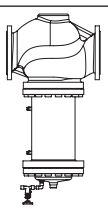
Example 1:
Differential pressure relief controller;
DN 15; k_{VS} 4.0; PN 16; metallic sealing; setting range 0.15-1.2 bar; T_{max} 150 °C; flange;

– *1× VFG 2 DN 15 valve*
  Code no: ***065B2388***
– *1× AFPA actuator*
  Code no: ***003G1021***
– *2× Impulse tube set AF*
  Code no: ***003G1391***

Products will be delivered separatly.



VFG 2 Valves (metallic sealing cone)

Picture	DN (mm)	k_{VS} (m^3/h)	Connections	T_{max} (°C)	Code No. PN 16	T_{max} (°C)	Code No. PN 25	Code No. PN 40
	15	4.0	Flanges acc. to EN 1092-1	150	**065B2388**	200 [1]	**065B2401**	**065B2411**
	20	6.3			**065B2389**		**065B2402**	**065B2412**
	25	8.0			**065B2390**		**065B2403**	**065B2413**
	32	16			**065B2391**		**065B2404**	**065B2414**
	40	20			**065B2392**		**065B2405**	**065B2415**
	50	32			**065B2393**		**065B2406**	**065B2416**
	65	50			**065B2394**		**065B2407**	**065B2417**
	80	80			**065B2395**		**065B2408**	**065B2418**
	100	125			**065B2396**		**065B2409**	**065B2419**
	125	160			**065B2397**		**065B2410**	**065B2420**
	150	280			**065B2398**	150	–	**065B2421**
	200	320			**065B2399**		–	**065B2422**
	250	400			**065B2400**		–	**065B2423**
	150	280			–	200 [1]	–	**On request**
	200	320			–		–	**On request**
	250	400			–		–	**On request**

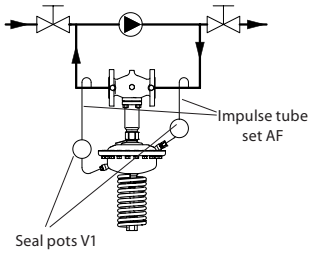
[1] *at temperatures above 150 °C only with seal pots (see Accessories)*

Ordering *(continuous)*

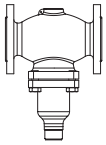
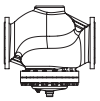
Example 2:
Differential pressure relief controller;
DN 15; k_{VS} 4.0; PN 25; metallic sealing; setting range 0.15-1.2 bar; T_{max} 200 °C; flange;

- *1× VFG 2 DN 15 valve*
  Code no: ***065B2401***
- *1× AFPA actuator*
  Code no: ***003G*1021**
- *2× Impulse tube set AF*
  Code no: ***003G1391***
- *2× Seal pot V1*
  Code no: ***003G1392***

Products will be delivered separatly.

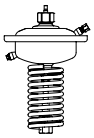


VFG 21 Valves (soft sealing cone)

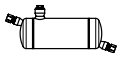
Picture	DN (mm)	k_{VS} (m^3/h)	T_{max} (°C)	Connections	Code No. PN 16
	15	4.0	150	Flanges acc. to EN 1092-1	**065B2502**
	20	6.3			**065B2503**
	25	8.0			**065B2504**
	32	16			**065B2505**
	40	20			**065B2506**
	50	32			**065B2507**
	65	50			**065B2508**
	80	80			**065B2509**
	100	125			**065B2510**
	125	160			**065B2511**
	150	280			**065B2512**
	200	320			**065B2513**
	250	400			**065B2514**

Note: *other valves available on special request.*

AFPA Actuators

Picture	Δp setting range (bar)	for DN	Code No.
	1-5	15-125	**003G1019**
	0.5-2.5		**003G1020**
	0.15-1.2	15-250	**003G1021**
	0.1-0.6		**003G1022**
	0.05-0.3		**003G1023**

Accessories

Picture	Type designation	Description	Connections	Code No.
	Impulse tube set AF	– 1× Copper tube Ø10 × 1 × 1500 mm – 1 × compression fitting for imp. tube connection to pipe (G ¼) – 2 × socket	–	**003G1391**
	Seal pot V1 [1]	Capacity 1 liter; with compression fittings for imp. tube Ø10	–	**003G1392**
	Seal pot V2 [1]	Capacity 3 liter; with compression fittings for imp. tube Ø10, for actuator size 630 cm^2	–	**003G1403**
	Compression fitting [2]	For impulse tube Ø10 connections to controller	G ¼	**003G1468**
	Shut off valve	For impulse tube Ø10	–	**003G1401**
	Throttle valve			**065B2909**

[1] *Seal pot has to be used on impulse tubes always when $T_{max} \geq 150$ °C*
[2] *Consist of a nipple, compression ring and nut*

Ordering *(continuous)*

Service kits

Picture	Type designation	DN (mm)	k_{vs} (m^3/h)	Code No. for VFG 2	Code No. for VFG 21
	Valve insert	15	4.0	**065B2796**	**065B2790**
		20	6.3	**065B2797**	**065B2791**
		25	8	**065B2798**	**065B2792**
		32	16		
		40	20	**065B2799**	**065B2793**
		50	32		
		65	50	**065B2800**	**065B2794**
		80	80		
		100	125	**065B2801**	**065B2795**
		125	160		
		150	280	**065B2964**	**065B2966**
		250	400	**065B2965**	–
	Stuffing cone (with EPDM O-rings)			**003G1464**	

Technical data

Valve

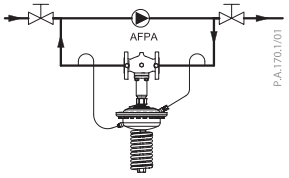
Nominal diameter		**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
k_{vs} value		m^3/h	4.0	6.3	8.0	16	20	32	50	80	125	160	280	320	400
Cavitation factor z			0.6	0.6	0.6	0.55	0.55	0.5	0.5	0.45	0.4	0.35	0.3	0.2	0.2
Leakage acc. to standard IEC 534 (% of k_{vs})	VFG 2		≤ 0.03										≤ 0.05		
	VFG 21		≤ 0.01												
Nominal pressure		PN	16, 25, 40												
Max. differential pressure	PN 16	bar	16								15		12	10	
	PN 25, 40		20												
Media			Circulation water / glycolic water up to 30 %												
Media pH			Min. 7, max. 10												
Media temperature	VFG 2	°C	2 … 150 / 2 … 200 [1]										2 … 150 (200 [2])		
	VFG 21		2 … 150												
Connections			Flange												
Materials															
Valve body	PN 16		Grey cast iron EN-GJL-250 (GG-25)												
	PN 25		Ductile iron EN-GJS-400(GGG-40.3)												
	PN 40		Cast steel GP240GH (GS-C 25)												
Valve seat			Stainless steel, mat. No. 1.4021										Stainless steel, mat. No. 1.4313		
Valve cone			Stainless steel, mat. No. 1.4404										Stainless steel, mat. No. 1.4021		
Sealing	VFG 2		Metal												
	VFG 21		EPDM												
Pressure relieve system			Bellows (Stainless steel, mat. No. 1.4571)										Diaphragm (EPDM)		

[1] *at temperatures above 150 °C only with seal pots (see Accessories)*
[2] *on request*

Actuator

Type		**AFPA**				
Actuator size	cm^2	80		250		630
Max. operating pressure	bar	25		25		16
Diff. pressure setting ranges and spring colours	bar	silver	yellow	silver	yellow	yellow
		1-5	0.5-2.5	0.15-1.2	0.1-0.6	0.05-0.3
Materials						
Actuator housing		Steel, mat. No. 1.0338, zinc plated				
Control diaphragm		EPDM (Rolling; fibre enforced)				

Application principles



Differential pressure control for a pump in bypass

Installation position

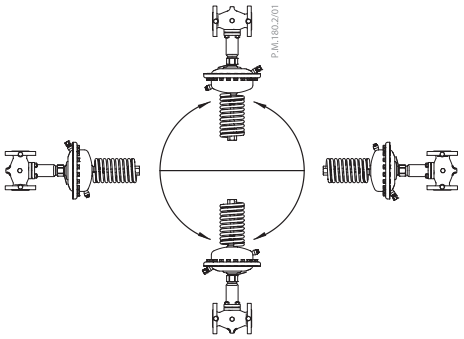
DN 15-80 T_{max} ≤ 120 °C

The controllers can be installed in any position.

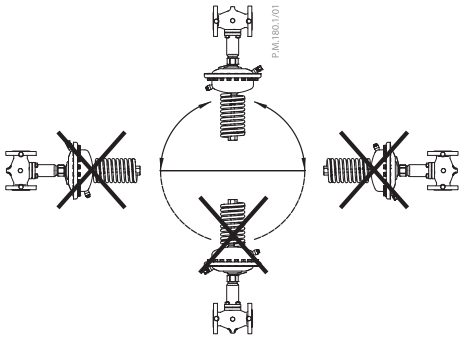
DN 15-80 T_{max} > 120 °C; DN 100-250

The controllers can be installed in horizontal pipes only, with a pressure actuator oriented downwards.

DN 15-80 T_{max} ≤ 120 °C

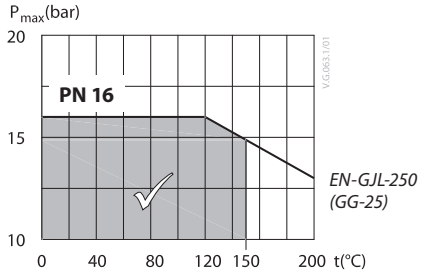


DN 15-80 T_{max} > 120 °C; DN 100-250

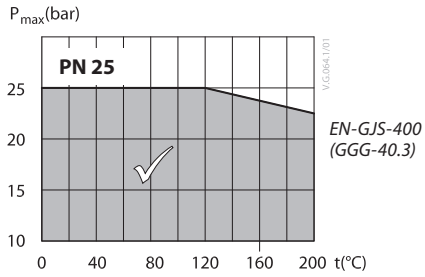


Pressure temperature diagram

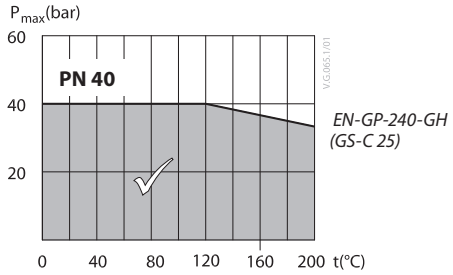
Working area is below P-T line and it ends at T_{max} for each valve



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-1)

Sizing

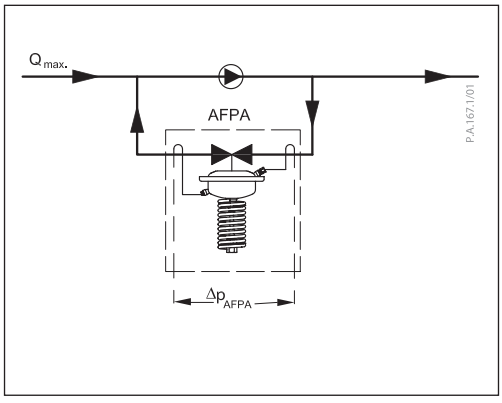
Given data:
Q_{max} = 4.5 m³/h
Δp_{AFPA} =1.4 bar
Nominal pressure PN 16

k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AFPA}}} = \frac{4,5}{\sqrt{1,4}}$$

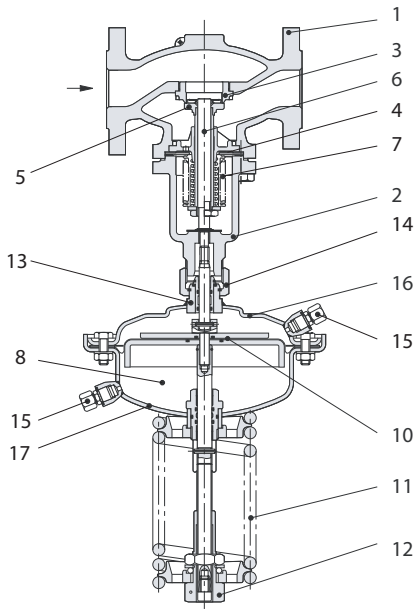
k_v = 3.8 m³/h

Solution:
The example selects AFPA VFG 2 PN 16 DN 15, k_{VS} value 4.0 with differential pressure setting range 0.5-2.5 bar.

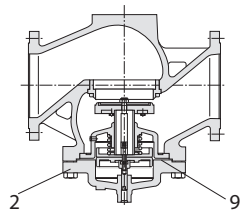


Design

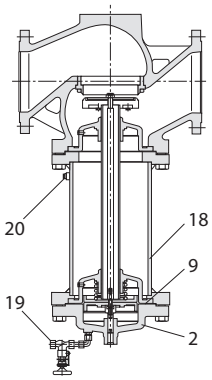
1. Valve body
2. Cover
3. Valve seat
4. Valve insert
5. Pressure relieved valve cone
6. Valve stem
7. Bellows for pressure relief of valve cone
8. Actuator
9. Diaphragm for pressure relief of valve cone
10. Control diaphragm for differential pressure control
11. Setting spring for diff. pressure control
12. Adjuster for diff. pressure setting, prepared for sealing
13. Stuffing cone
14. Union nut
15. Compression fitting for impulse tube
16. Upper casing of diaphragm
17. Lower casing of diaphragm
18. Valve body extension
19. Shut off valve for water filling
20. Closing plug



AFPA / VFG 2 DN 15 – 125



VFG 2 DN 150-250, T_{max} 150 °C



VFG 2 DN 150-250, T_{max} 200 °C

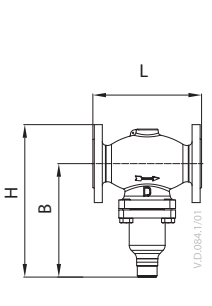
Function

The pressures in front and behind of the control valve are being transferred through the impulse tubes to the actuator chambers and act on control diaphragm for diff. pressure control. The controller became normally closed after commissioning (stretching the spring). It opens on rising differential pressure and closes on falling differential pressure to maintain constant differential pressure.

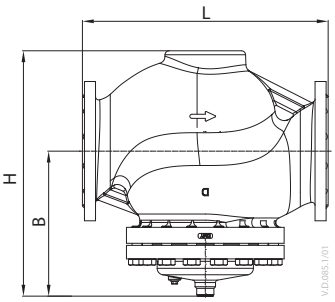
Settings

Differential pressure setting
Differential pressure setting is being done by the adjustment of the setting spring for differential pressure control. The adjustment can be done by means of spring for differential pressure setting and pressure indicators.

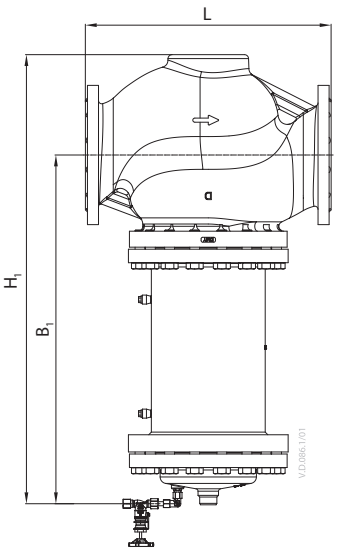
Dimensions



VFG DN 15-125



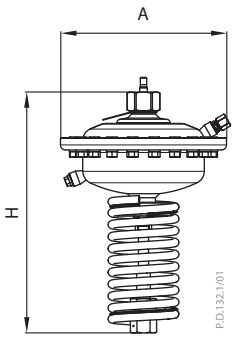
VFG DN 150-250



VFG DN 150-250
with valve body extension up to 200 °C

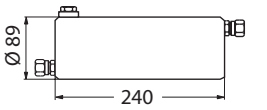
VFG 2, VFG 21 Valves

DN			15	20	25	32	40	50	65	80	100	125	150	200	250
L		mm	130	150	160	180	200	230	290	310	350	400	480	600	730
B			213	213	239	239	241	241	276	276	381	381	326	354	401
H			267	267	304	304	323	323	370	370	505	505	505	591	661
Weight	PN 16 / 25	kg	7.5	8.5	10	12	15	18	27.5	30	58	68	115	185	323
	PN 40								30	32.5	60.5	69	141	253	333
B_1		mm											620	852	1199
H_1													799	1089	1459
Weight (valve with body extension)	PN 16 / 25	kg											154	301	469
	PN 40												179	336	505

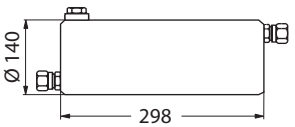


AFPA Actuator

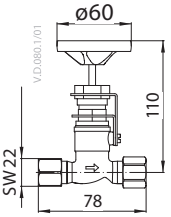
Actuator size	cm^2	80	250	630
A	mm	172	263	380
H	mm	430	470	520
Weight	kg	7.5	13	28



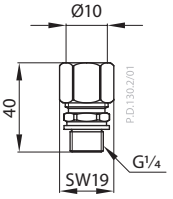
Seal pot V1



Seal pot V2



Shut off valve



Compression fitting

ENGINEERING
TOMORROW

Data sheet

Pressure relief controller AVA (PN 25)

Description

AVA is a self-acting pressure relief controller primarily for use in district heating systems. The controller is normally closed and opens on rising pressure.

The controller has a control valve, an actuator with one control diaphragm and a spring(s) for pressure setting.

Main data:
- DN 15-50
- k_{VS} 4.0-25 m^3/h
- PN 25
- Setting range:
  1.0-4.5 bar / 3.0-11 bar
- Temperature:
  - Circulation water / glycolic water up to 30 %:
    2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange

Ordering

Example:
Pressure relief controller; DN 15;
k_{VS} 4.0; PN 25; setting range
1.0-4.5 bar; T_{max} 150 °C; ext. thread

- AVA DN 15 controller
Code No: ***003H6614***

Option:
- Weld-on tailpieces
Code No: ***003H6908***

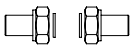
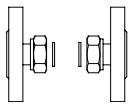
The controller will be delivered completely assembled, inclusive impulse tubes between valve and actuator.

AVA Controller

Picture	DN (mm)	k_{VS} (m^3/h)	Connection		Pressure setting range (bar)	Code No.	Pressure setting range (bar)	Code No.
	15	4.0	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	1.0-4.5	**003H6614**	3-11	**003H6620**
	20	6.3		G 1 A		**003H6615**		**003H6621**
	25	8.0		G 1¼ A		**003H6616**		**003H6622**
	32	12.5	Flanges PN 25, acc. to EN 1092-2			**003H6626**		**003H6629**
	40	20				**003H6627**		**003H6630**
	50	25				**003H6628**		**003H6631**

Note: *other controllers available on special request.*

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**

Ordering *(continuous)*

Service kits

Picture	Type designation	Pressure setting range (bar)	Code No.
	Actuator with setting spring	1.0-4.5	**003H6844**
		3-11	**003H6845**

Technical data

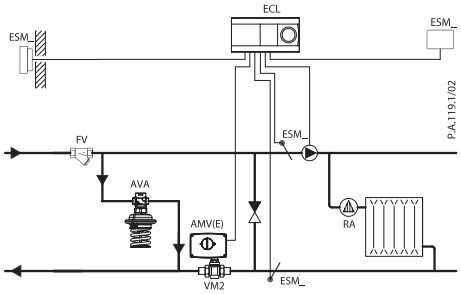
Valve

Nominal diameter		**DN**	**15**	**20**	**25**	**32**	**40**	**50**
k_{VS} value		m^3/h	4.0	6.3	8.0	12.5	20	25
Cavitation factor z			≥ 0.6		≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02			≤ 0.05		
Nominal pressure		PN	25					
Max. differential pressure		bar	20			16		
Medium			Circulation water / glycolic water up to 30 %					
Medium pH			Min. 7, max. 10					
Medium temperature		°C	2 …150					
Connections	valve		External thread			Flange		
	tailpieces		Weld-on, external thread and flange			-		
Materials								
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)			-		
	flange		-			Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
Valve seat			Stainless steel, mat. No. 1.4571					
Valve cone			Dezincing free brass CuZn36Pb2As					
Sealing			EPDM					
Pressure relieve system			Piston					

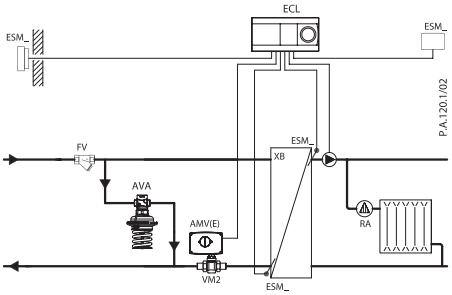
Actuator

Type			**AVA**	
Actuator size		cm2	54	
Nominal pressure		PN	25	
Pressure setting ranges and spring colours		bar	1.0-4.5	3-11
			blue	black, green
Materials				
Actuator housing	Upper casing of diaphragm		Stainless steel, mat. No.1.4301	
	Lower casing of diaphragm		Dezincing free brass CuZn36Pb2As	
Diaphragm			EPDM	
Impulse tube			Copper tube Ø6 × 1 mm	

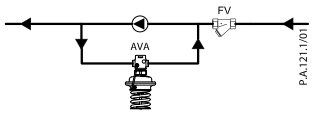
Application principles



Direct-connected heating system



Indirectly connected heating system

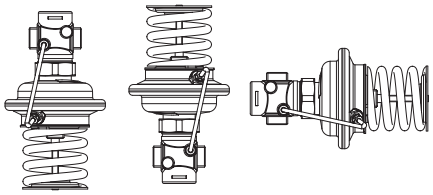


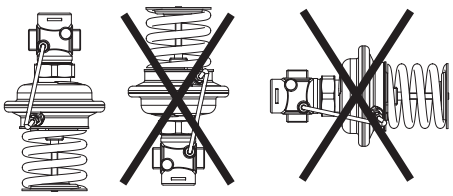
Pressure control for a pump in bypass

Installation positions

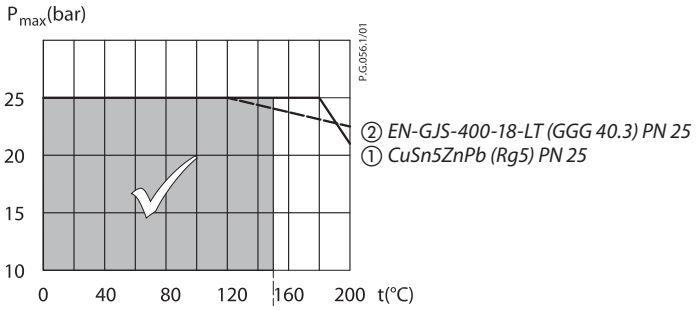
Up to medium temperature of 100 °C the controllers can be installed in any position.

For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.





Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Sizing

Given data:
Q_{max} = 1.9 m³/h
Δp_{min} = 1.3 bar

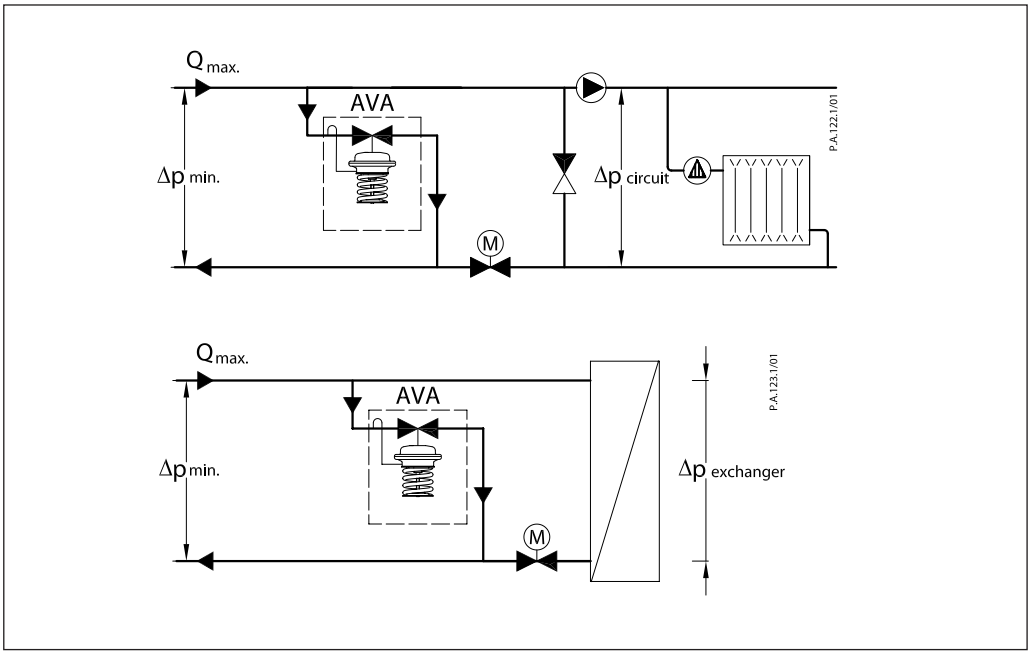
Nominal pressure PN 25

k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{min}}} = \frac{1,9}{\sqrt{1,3}}$$

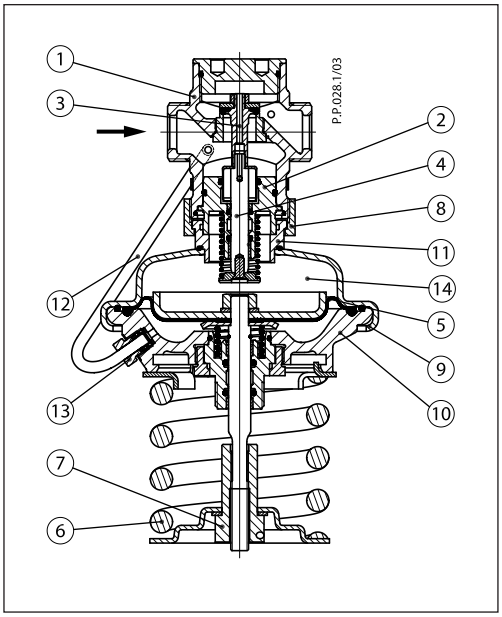
k_v = 1.7 m³/h

Solution:
The example selects AVA DN 15, k_{VS} value 4.0,
with pressure setting range 1.0-4.5 bar.



Design

1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control diaphragm
6. Setting spring for pressure control
7. Adjuster for pressure setting, prepared for sealing
8. Union nut
9. Upper casing of diaphragm
10. Lower casing of diaphragm
11. Air space bore
12. Impulse tube
13. Compression fitting for impulse tube
14. Actuator



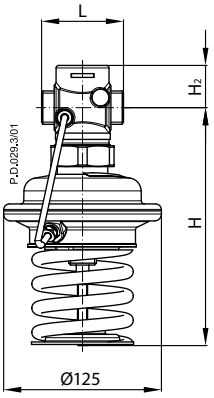
Function

The pressure in front of the control valve is being transferred through the impulse tube to the actuator chamber and act on control diaphragm. On the other side of the diaphragm atmospheric pressure is acting (through air space bore). Control valve is normally closed. It opens on rising pressure and closes on falling pressure to maintain constant pressure.

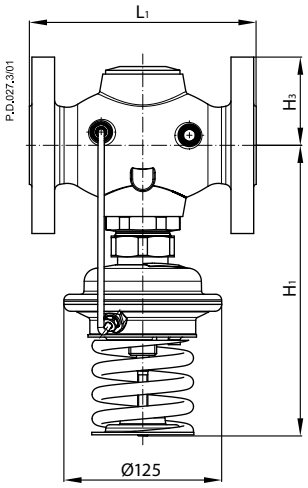
Settings

Pressure setting
Pressure setting is being done by the adjustment of the setting spring for pressure control. The adjustment can be done by means of spring for pressure setting and/or pressure indicators.

Dimensions



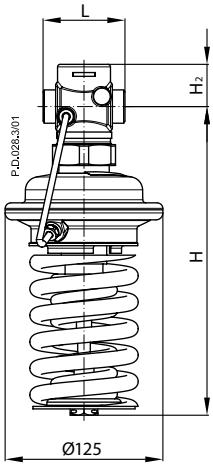
DN 15-25
Δp = 1.0-4.5 bar



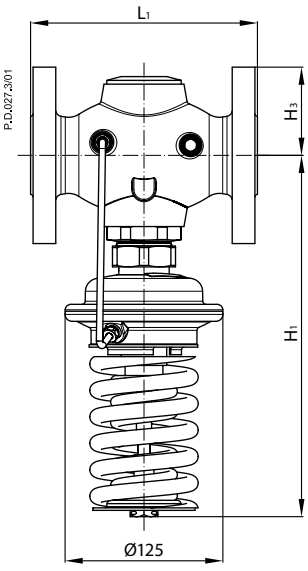
DN 32-50
Δp = 1.0-4.5 bar

DN	L	L_1	H	H_1	H_2	H_3	Weight (kg)
	mm						
15	65		215		34		3.5
20	70	-	215	-	34	-	3.5
25	75		215		37		3.7
32		180		250		70	10.4
40	-	200	-	250	-	75	12.0
50		230		250		82	13.9

Note: *Other flange dimensions - see table for tailpieces.*



DN 15-25
Δp = 3.0-11 bar

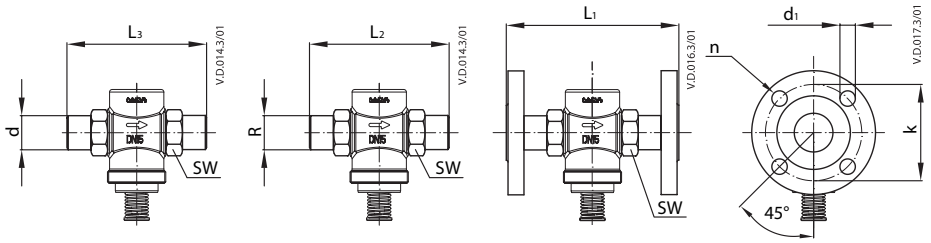


DN 32-50
Δp = 3.0-11 bar

DN	L	L_1	H	H_1	H_2	H_3	Weight (kg)
	mm						
15	65		275		34		3.7
20	70	-	275	-	34	-	3.7
25	75		275		37		3.9
32		180		320		70	10.5
40	-	200	-	320	-	75	12.1
50		230		320		82	14.0

Note: *Other flange dimensions - see table for tailpieces.*

Dimensions *(continuous)*



DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	131	139	65	14	4
20	¾	41 (G 1A)	26	150	144	154	75	14	4
25	1	50 (G 1¼A)	33	160	160	159	85	14	4
32							100	18	4
40							110	18	4
50							125	18	4

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*

Data sheet

Temperature controller AVTB (PN 16)

Description

AVTB is self-acting temperature controller used to control the water temperature in hot water tanks, heat exchangers, oil preheaters, etc. Controller closes on rising temperature.

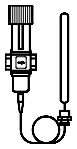
The controller has a control valve, thermostatic actuator and handle for temperature setting. Thermostatic actuator consist of a bellows, capillary tube and sensor.

Main data:

- DN 15, 20, 25
- k_{VS} 1.9, 3.4, 5.5 m^3/h
- PN 16
- Setting range: 0…30 °C / 20…60 °C / 30…100 °C
- Temperature:
  - Circulation water / glycolic water up to 30%: -25 … +130 °C
- Connections:
  - Int. thread
  - Ext. thread (weld-on and ext. thread tailpieces)
- Flow or return mounting, depending on sensor type.

Ordering

AVTB Controller

Picture	DN	Setting range (°C)	k_{VS} (m^3/h)	Max. sensor temp. (°C)	Internal thread		External thread	
					Connection ISO 7/1	Code No.[1]	Connection ISO 228/1	Code No.[1]
	15	0 … 30	1.9	55	R_p ½	**003N2232**[4]	G ¾ A	**003N5101**[4]
		20 … 60		90		**003N8229**[2]		**003N5114**[2]
		30 … 100		130		**003N8141**[3]		**003N5141**[3]
	20	0 … 30	3.4	55	R_p ¾	**003N3232**[4]	G 1 A	**003N5102**[4]
		20 … 60		90		**003N8230**[2]		**003N5115**[2]
		30 … 100		130		**003N8142**[3]		**003N5142**[3]
	25	0 … 30	5.5	55	R_p 1	**003N4232**[4]	G 1¼ A	**003N5103**[4]
		20 … 60		90		**003N8253**[2]		**003N5116**[2]
		30 … 100		130		**003N8143**[3]		**003N5143**[3]

Capillary tube length: 2 m.

[1] *Complete controller including sensor stuffing box. The immersion pocket is an accessory.*

[2] *Including small sensor Ø 9.5 × 180. The sensor is to be mounted where the system temperature is warmer than the temperature in the valve housing. Insulaton disk is factory mounted on the controller.*

[3] *Including small sensor Ø 9.5 × 150. Capillary tube length 2.3 m.*

[4] *Including sensor Ø 18 × 210; available on request*

Example:
Temperature controller, DN 15, k_{VS} 1.9, PN 16, setting range 30 … 100 °C, t_{max} 130 °C, ext. thread

- *1× AVTB DN 15 Controller*
  Code No: ***003N5141***

Option:
- *1× Imm. pocket, brass*
  Code No: ***013U0290***
- *1× Weld-on taipieces*
  Code No: ***003H6908***

Accessories

Picture	Type designations	DN	Connection		Code No.
	Weld-on taipieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
	External thread taipieces	15	Con. ext. thread acc. to EN 10226-1	R ½"	**003H6902**
		20		R ¾"	**003H6903**
		25		R 1"	**003H6904**
	Immersion pocket	R_p ½ × M14 × 1 mm, brass 182 mm, without sens.stuff. box			**013U0290**
		R_p ½ × M18 × 1,5 mm, st. steel 182 mm, with sens.stuff. box			**003N0196**
		R_p ¾ × M22 × 1 mm, brass 220 mm, with sens.stuff. box			**003N0050**
		R_p ¾ × M22 × 1 mm, st. steel 220 mm, with sens.stuff. box			**003N0192**
	Insulation disk [1]				**003N4022**

[1] *For details see "Installation positions" section*

Ordering *(continuous)*

Service kits

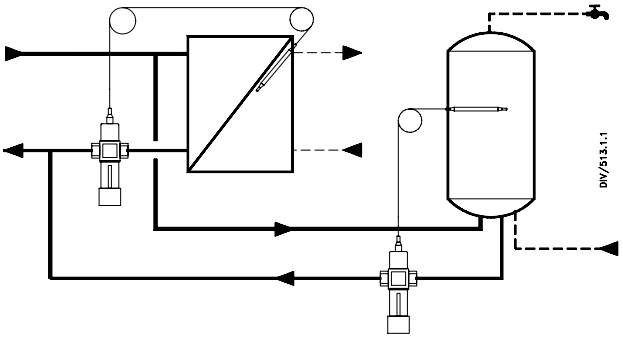
Picture	Type designation	for	Code No.
	Repair set Two diaphragms, two O-rings, one rubber cone, one tube of grease and eight valve cover screws	DN 15	**003N4006**
		DN 20	**003N4007**
		DN 25	**003N4008**
	Thermostatic actuator 0 … 30 °C, sensor Ø 18 × 210, 2m		**003N0075**
	Thermostatic actuator 20 … 60 °C, sensor Ø 9.5 × 180, 2m		**003N0130**
	Thermostatic actuator 30 … 100 °C, sensor Ø 9.5 × 150, 2.3m		**003N0131**
	Housing of sensor stuffing box, R ½ × M14 × 1 mm, rubber EPDM Ø 12.6 × 4 × 6 mm		**013U8102** [1]

[1] *For thermostatic actuators 20 ... 60°C and 30 ... 100°C; code includes housing and gasket of sensor stuffing box*

Technical data

Nominal diameter		DN	**15**	**20**	**25**
k_{VS} value		m^3/h	1.9	3.4	5.5
Cavitation factor z			0.4		
Nominal pressure		PN	16		
Max. differential pressure		bar	10		
Medium			Circulation water / glycolic water up to 30%		
Medium pH			Min. 7, max. 10		
Medium temperature		°C	-25 … +130		
Connections		valve	Internal and external thread		
		tailpieces	Weld-on and external thread		
Materials					
Valve body	internal thread		MS 58, hot-pressed, DIN 17660, W.No. 2.0402, CuZn40Pb2		
	external thread		Dezincing-free brass, BS 2872/CZ132		
Valve seat			Cr Ni steel, DIN 17440, W.No. 1.4301		
Valve cone			NBR-rubber		
Spindle			Dezincing-free brass, BS 2872/CZ132		
Other metal parts			Dezincing-free brass, BS 2874/CZ132		
Diaphragms, O-rings			EPDM-rubber		
Temperature sensor			Copper		
Sensor charge			0 … 30 °C	R 152 A, C2H4F2	
			20 … 60 °C	Butane R600, C4H10	
			30 … 100 °C	Carbon dioxide, CO2	

Application principle



Slow control system, setting range 30 …100 °C
Fast control system, setting range 0 … 30 °C/20 … 60 °C

Installation positions

Temperature controller
The controller can be installed in any position, with flow in the direction of the cast-in arrow.

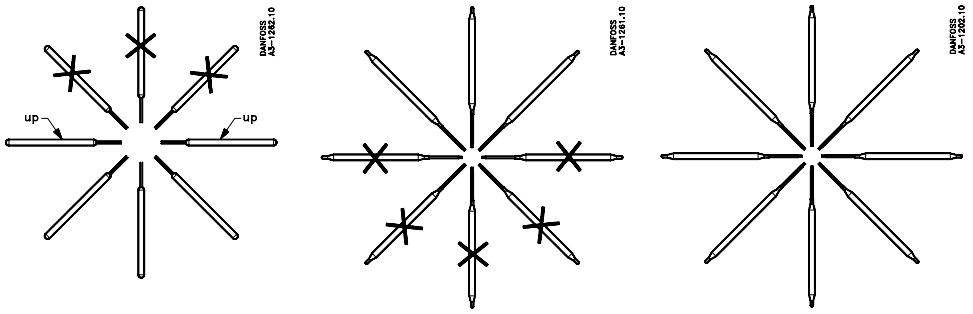
AVTB 20 … 60 must always be installed in the return line (sensor warmer than valve).

If AVTB 20 … 60 has been installed in the return line from a service water heat exchanger (where for certain periods the return temperature approaches the sensor temperature) the installation of insulation disk is recommended (**003N4022**). **Insulation disk is factory mounted on the product.**

AVTB 0 … 30 and 30 …100 can be installed either in flow or in return line.

With AVTB 30 … 100, if temperature variations of more than 20 °C occur at the valve, insulation disk (**003N4022**) must be installed between thermostatic actuator and valve body.

Temperature sensor



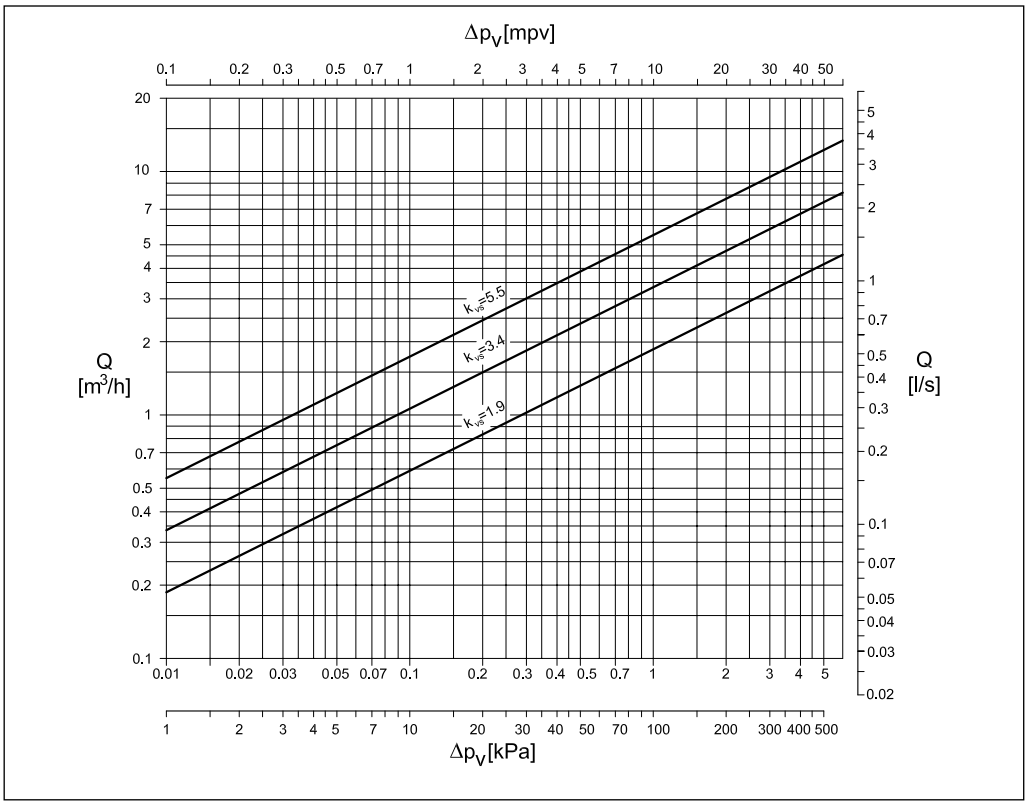
Sensor Ø 18 × 210 mm [2] (AVTB 0 … 30 °C)

Sensor Ø 9.5 × 180 mm [1] (AVTB 20 … 60 °C)

Sensor Ø 9.5 × 150 mm [2] (AVTB 30 … 100 °C)

[1] *The sensor is to be mounted where the system temperature is warmer than the temperature in the valve body*
[2] *The sensor can be mounted where the system temperature is either warmer or colder than the temperature in the valve body*

Sizing



Sizing *(continuous)*

Example
Hot water temperature control in hot water tanks.

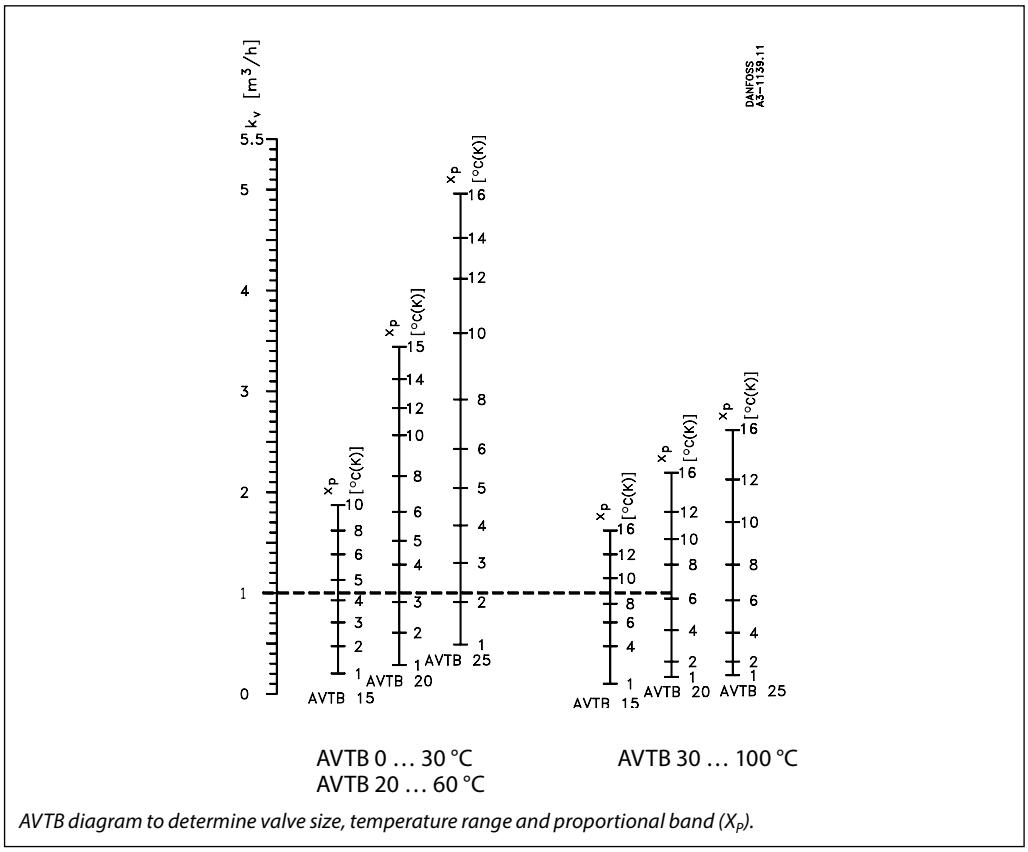
Primary medium:	Water
Given:	
Load:	31 kW (26500 kcal/h)
Primary temperature drop Δt:	20 K
Differential pressure Δp across the valve:	1.7 bar
Max. hot water temperature:	55 °C
Water volume Q:	$\frac{31 \times 0.86}{20} = 1.3\,m^3/h$

Required:
The correct valve size

$$k_v = \frac{Q}{\sqrt{\Delta p}} = \frac{1.3}{\sqrt{1.7}} = 1.0\,m^3/h$$

Temperature range and P-band
Calculated k_v value is 1 m³/h.
From this value on the k_V scale in the AVTB diagram, take a line horizontally to intersect the columns for recommended sizing range. Select the smallest possible valve, here an AVTB 15. A temperature range of 30 …100 °C can be assumed as suitable for this example.
The P-band (X_P) and final temperature range can also be read from the AVTB diagram. The required closing temperature can be read from the scale for the valve selected. However, there are two temperature ranges that meet the requirement for a closing temperature of 55 °C. X_P is 9 K for the range 30 …100 °C, which means that the controller will yield the calculated capacity at a sensor temperature of 55 °C minus 9 K = 46 °C. For the range 20 … 60 °C X_P = 4 K. This means that the controller will yield the calculated capacity at 55 °C minus 4 K = 51 °C.

To ensure the most stable control an AVTB 15 with a range 30 … 100 °C should be chosen. The water in the hot water tank will reach the closing temperature (55 °C) only when there has been no hot water demand for some time.

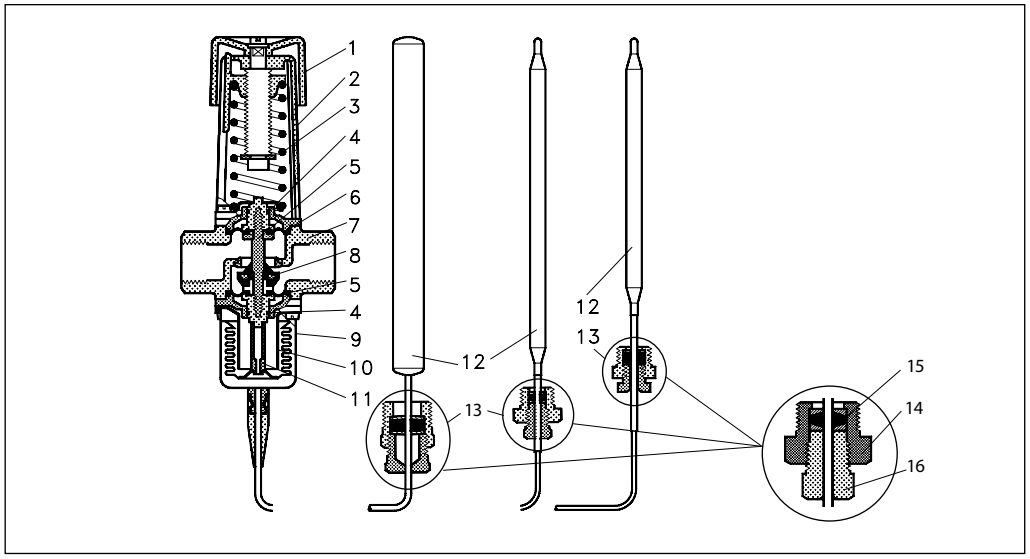


AVTB diagram to determine valve size, temperature range and proportional band (X_P).

Note: The values stated are mean values

Design

1. Handle for temperature setting
2. Spring housing
3. Setting spring
4. O-ring
5. Diaphragm
6. Spindle
7. Valve body
8. Valve cone
9. Bellows
10. Bellows stop
11. Pressure stem
12. Temperature sensor
13. Sensor stuffing box
14. Housing of sensor stuffing box
15. Gasket of sensor stuffing box
16. Sealing bolt of sensor stuffing box



Settings

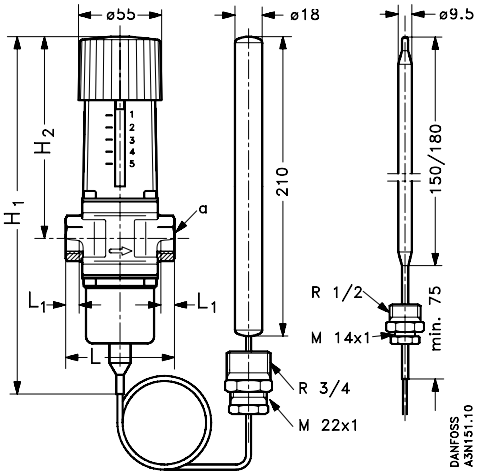
Temperature setting
Relation between scale numbers 1-5 and the closing temperature.

The values given are approximate.

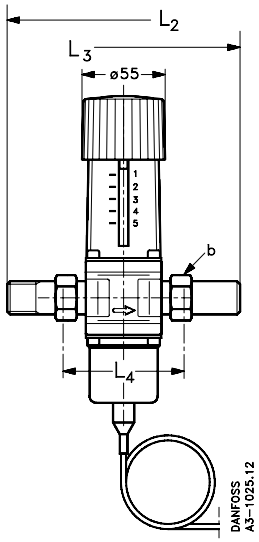
Scale setting	1		2	3	4	5	
Closing temperature							
(0 … 30 °C)		0	3	15	23	30	°C
(20 … 60 °C)	20		35	50	60	70	
(30 … 100 °C)	30	35	55	75	95	120	

Dimensions

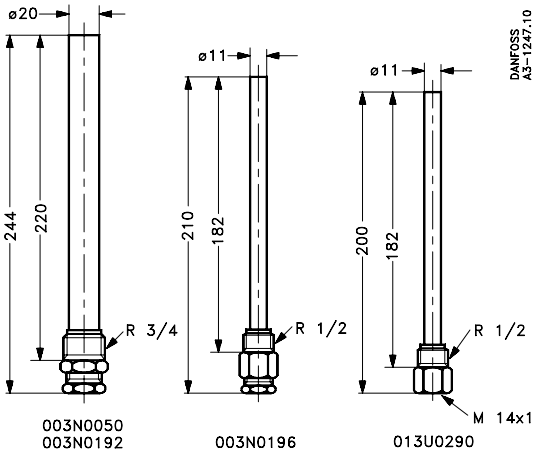
AVTB with internal thread



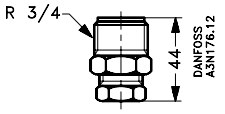
AVTB with external thread



Type	H_1 mm	H_2 mm	L mm	L_1 mm	L2 mm	L3 mm	L4 mm	a ISO 7/1 (int. thread)	b ISO 228/1 (ext. thread)
AVTB 15	217	133	72	14	141	149	75	R_p ½	G ¾A
AVTB 20	217	133	90	16	154	164	80	R_p ¾	G 1A
AVTB 25	227	138	95	19	168	167	83	R_p 1	G 1¼A

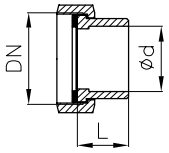


Immersion pockets

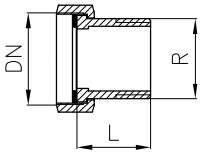


Sensor stuffing box

Weld-on tailpieces



External thread tailpieces



G (mm)	Ød (mm)	L (mm)	Weight (kg)
15	15	35	0.18
20	20	40	0.26
25	27	40	0.38

G (“)	R (“)	L (mm)	Weight (kg)
¾	½	25.5	0.17
1	¾	27.5	0.27
1 ¼	1	32.5	0.45

ENGINEERING
TOMORROW

Data sheet

Multifunctional Thermostatic Circulation Valve MTCV - Lead free brass

Introduction

Fig. 1
Basic version - A

***Fig. 2** **
Self-acting version with automatic disinfection function - "B"
*** thermometer is an accessory*

Fig. 3
Version with electronically controlled disinfection process - "C"

The MTCV is a multifunctional thermostatic balancing valve used in domestic hot water installations with circulation.

The MTCV provides a thermal balance in hot water installations by keeping a constant temperature in the system, thus limiting the flow in the circulation pipes to the minimum required level.

To meet the increasing demands placed on the quality of drinking water, Danfoss MTCV valves are made from corrosion resistant and Lead Free materials:

- Valve body made from rg5 bronze material
- Components made from no Lead Brass
- Main cone made from advanced engineering polymere POM-C.

Simultaneously, the MTCV can realize a disinfection process by means of 2 features:

- An automatic (self-acting) disinfection module - thermo-element (*fig.2*).
- An electronic controller with thermal actuator TWA and temperature sensors PT1000 (*fig.3*).

Main functions of the MTCV

- Thermostatic balancing of hot water systems within the temperature range of 35 - 60 °C - version A.
- Automatic (self-acting) thermal disinfection at temperatures above 68°C with safety protection of the installation to prevent the temperature rising above 75 °C (automatically shuts-off circulation flow) - version "B".
- Automatic disinfection process, electronically controlled, with the possibility of programming the disinfection temperature and duration - version "C".
- Automatic flushing of the system by temporarily lowering the temperature setting to fully open the MTCV valve for a maximum flow.
- Temperature measurement possibility.
- Preventing of unwanted tampering.
- Constant temperature measurement and monitoring - version "C".
- Shut-off function of the circulation riser by means of optional fittings with a built-in ball valve.
- Modular upgrading of the MTCV valve during operation, under pressurized conditions.
- Servicing - when necessary the calibrated thermo-element can be replaced.

Function

Fig. 4 *MTCV basic version - A*

The MTCV - is a thermostatic self-acting, proportional valve. A thermo-element (*fig. 6 elem. 4*) is placed in the valve cone (*fig. 6 elem. 3*) to react to temperature changes.

When increases the water temperature above the set point value, the thermo-element expands and the valve's cone moves towards the valve seat, thus limiting circulation flow.

When decreases the water temperature below the set point value, the thermo-element will open the valve and allow more flow in the circulation pipe. The valve is in equilibrium (nominal flow = calculated flow) when the water temperature has reached the value set on the valve.

The MTCV regulating characteristic is shown in fig. 13, version A.

When the water temperature is 5 °C higher than the set point value, the flow through the valve stops.

A special sealing of the thermo-element protects it against direct contact with water, which prolongs the durability of the thermo-element and at the same time secures a precise regulation.

A safety spring (*fig. 6 elem. 6*) protects the thermo-element from being damaged when the water temperature exceeds the value on the set point.

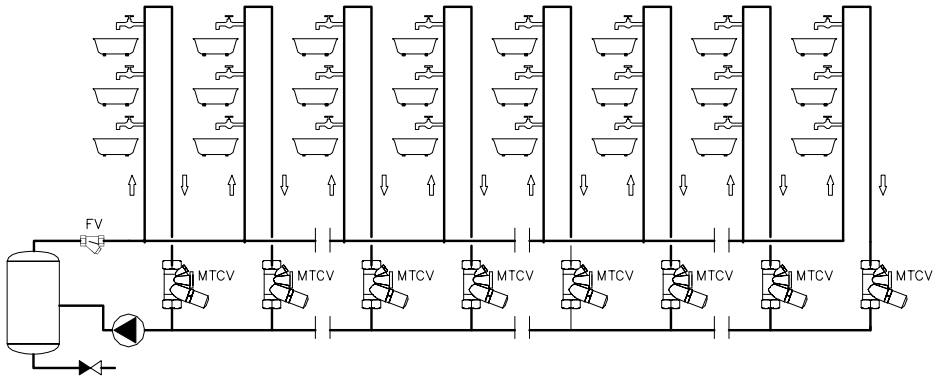


Fig. 5 *Example of MTCV / basic version / placement in domestic hot water system*

Design

1. Valve body
2. Spring
3. Cone
4. Thermo-element
5. O-ring
6. Safety spring
7. Setting ring
8. Setting knob
9. Plug for covering the setting
10. Cone for disinfection module
11. Safety spring
12. Plug for thermometer
13. Plug for disinfection module

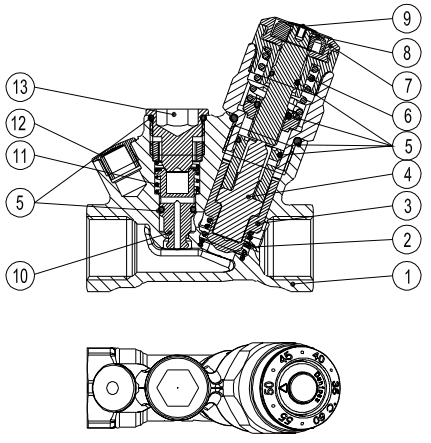


Fig. 6 *Design - basic version - A*

Function

Fig.7 *MTCV self-acting version with automatic thermal disinfection function - B*
** thermometer is accessory*

The MTCV standard version - A can easily and quickly be upgraded to the thermal disinfection function against the Legionella bacteria in hot water systems.

After removing the plug from the disinfection plug (*fig. 6 elem. 13*)-(this can be done during working conditions, under pressure) the thermostatic disinfection module can be mounted (*fig. 9 elem. 17*).

The disinfection module will control the flow according to its regulating characteristics, (*fig. 13, version B*) thus performing a thermal disinfection of the hot water installation.

The mounted disinfection module automatically opens a by-pass of Kv min = 0.15 m^3/h, which allows flow for the disinfection. In the A version of the MTCV this by-pass is always closed in order to avoid sedimentation of dirt and calcium. The MTCV can thus be upgraded with the disinfection module even after a long period of working in the A version without risking blocking the bypass.

The regulation module in basic version A works within the temperature range 35-60 °C. When the temperature of the hot water increases above 65°C the disinfection process starts - meaning the flow through the main seat of the MTCV valve stops and the bypass opens for the "disinfection flow". The regulating function is now performed by the disinfection module, which opens the bypass when the temperature is above 65 °C.

The disinfection process is performed until a temperature of 70 °C is reached. When the hot water temperature is increased further, the flow through the disinfection bypass is reduced (the process of thermal balancing of the installation during disinfection) and when reaching 75 °C the flow stops. This is to protect the hot water installation against corrosion and sedimentation of calcium as well as to lower the risk of scalding.

A thermometer can optionally be mounted in both version A and B in order to measure and control the temperature of the circulating hot water.

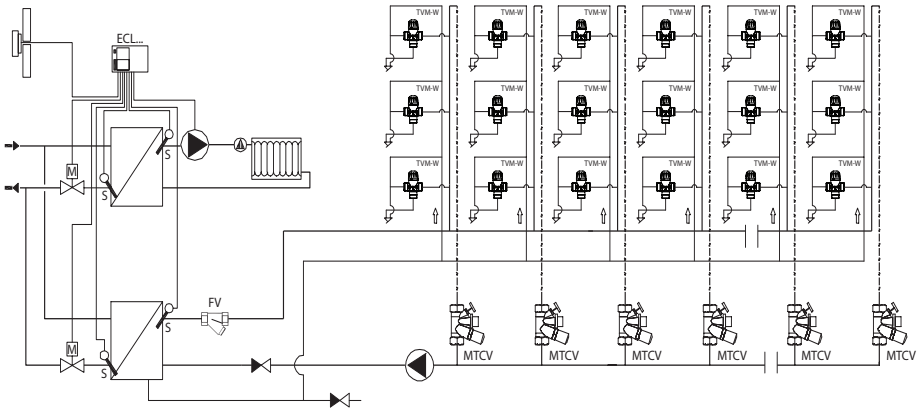


Fig. 8 *Scheme of hot water installation with circulation - self acting version.*

Design

1-13 As described in fig. 6
14 Bypass for disinfection
15 Thermometer
16 Gasket Cu
17 Disinfecting module

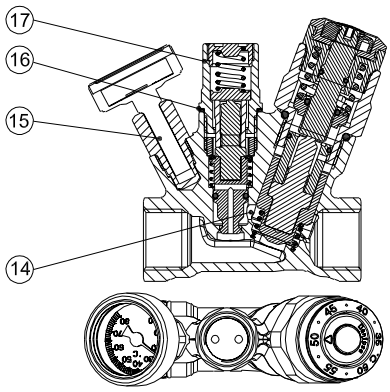


Fig. 9 *Design - self-acting version with automatic thermal disinfection function - B*

Function

Fig.10 *Version with electronically controlled disinfection process - C*

The MTCV version "A" and "B" can be upgraded to an electronic regulated disinfection process (version C).

After removing the disinfection plug (*fig. 6 elem. 13*) the adapter can be mounted (*fig. 12 elem. 21*) and the thermo actuator TWA can be mounted.

A temperature sensor PT 1000 has to be mounted in the thermometer head (*fig. 12 elem. 19*). Thermo-actuator and sensor are connected to the electronic regulator CCR2+ which allows an efficient and effective disinfection process in each circulation riser. The main regulation module works within the temperature range 35-60 °C. When the disinfection process/thermal-water treatment starts CCR2+ controls the flow through MTCV via thermo-actuators TWA. Benefits of an electronic regulated disinfection process with CCR2+ are:

- Providing full control over the disinfection process in each individual riser.
- Optimisation of total disinfection time.
- Optional choice of temperature for the disinfection.
- Optional choice of time for the disinfection.
- On-line measurement and monitoring of the water temperature in each individual riser.
- Enabling the possibility of connecting to the controller in the heat substation or boiler room (i.e. Danfoss ECL) or to a BMS (Modbus).

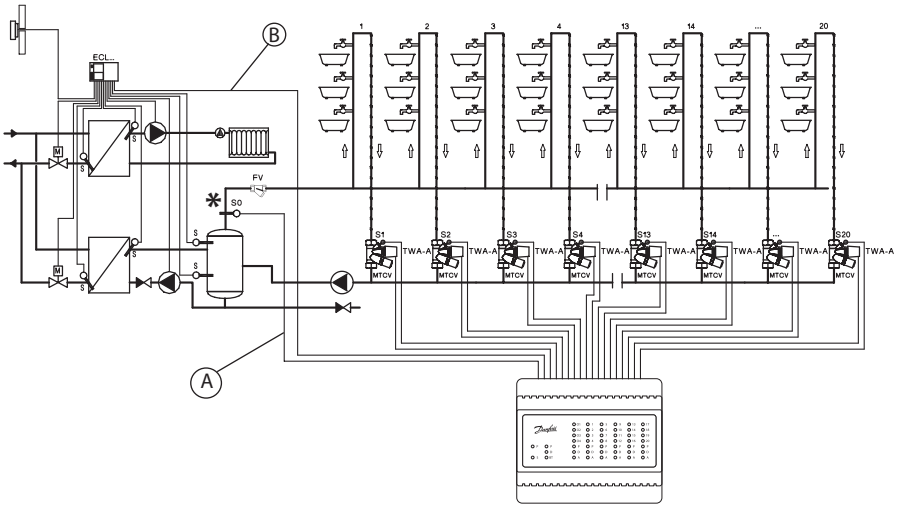


Fig. 11 *- scheme of installation for disinfection and registration temperature*

A) independent system (only sensor S0 needed)

B) dependent system (sensor S0 and connection to weather or another control needed)

Design

1-13 As described in fig. 6
18 Bypass; (position closed)
19 Temperature sensor PT 1000
20 Gasket Cu
21 Adapter to connect thermo-actuator TWA

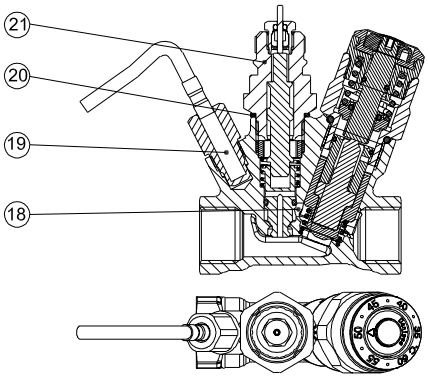


Fig.12 *Version with electronically controlled disinfection process - C*

Technical data

Max. working pressure ..... 10 bar
Test pressure ..... 16 bar
Max. flow temperature ..... 100 °C
k_{VS} at 20 °C:
- DN20 ..... 1.8 m^3/h
- DN15 ..... 1.5 m^3/h

Hysteresis ..... 1.5 K

Material of parts in contact with water:
Valve body Rg5
Spring housing, etc. ..... Cuphin alloy (CW724R)
O-rings ..... EPDM
Spring, bypass cones ..... Stainless steel
Cone ..... POM-C (Acetal Homopolymer)

Ordering

Valve - basic version A	Code No.
DN 15	**003Z4515**
DN 20	**003Z4520**

Accessories and spare parts

Accessory		Comments	Code No.
Thermostatic disinfection module - B		DN 15/DN 20	**003Z2021**
Fittings with shut-off ball valve (for allen key 5 mm), DN 15		G ½ × Rp ½	**003Z1027**
		G ¾ × Rp ¾	**003Z1028**
Thermometer with adapter		DN 15/DN 20	**003Z1023**
Socket for ESMB PT1000		DN 15/DN 20	**003Z1024**
Adapter for thermo-actuator		DN 15/DN 20	**003Z1022**
CCR2+ Controller		also see enclosure **VD.D3.K1.02**	**003Z3851**
CCR+ Slave Unit		also see enclosure **VD.D3.K1.02**	**003Z3852**
Temperature sensor ESMB Universal		also see enclosure **VD.D3.K1.02**	**087B1184**
Temperature sensor ESMC contact			**087N0011**
Fittings for soldering Cu 15 mm		DN 15 int. R 1/2"	**003Z1034**
Fittings for soldering Cu 18 mm			**003Z1035**
Fittings for soldering Cu 22 mm		DN 20 int. R 3/4"	**003Z1039**
Fittings for soldering Cu 28 mm			**003Z1040**
Thermoactuator TWA-A/NC, 24V		also see enclosure **VD.57.U4.02**	**088H3110**

Regulating characteristics

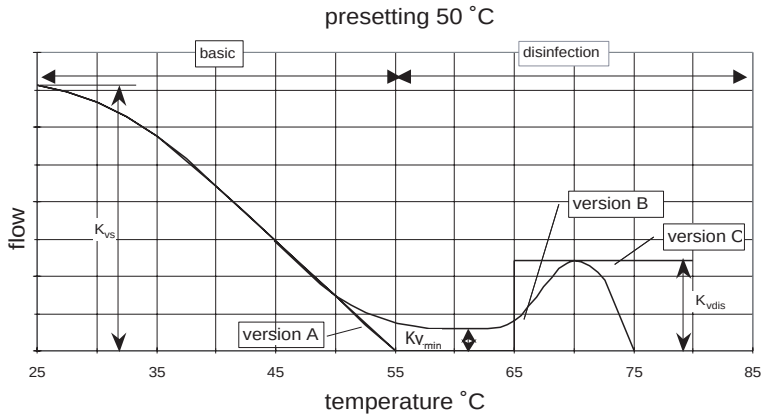


Fig.13 *The MTCV regulating characteristics*

- Basic version A
- Version B:
  Kv_{min} = 0.15 m³/h - min. flow through the bypass when main regulation module is closed.
  *Kv_{dis} = 0.60 m³/h for DN 20,
  *Kv_{dis} = 0.50 m³/h for DN 15 - max. flow of the disinfection process by a temperature of 70 °C.
- Version C:
  * Kv_{dis} = 0.60 m³/h for DN 20 and DN 15 - flow through the MTCV when the disinfection module is fully opened (regulation at thermo-actuator TWA-NC).

** Kv_{dis} - Kv during disinfection process*

Main function setting

1	Setting ring
2	Ring with a reference point
3	Plastic cover - unwanted tampering protection
4	Hole for screwdriver
5	Temperature setting screw - Allen-key 2.5 mm
6	References temperature setting point

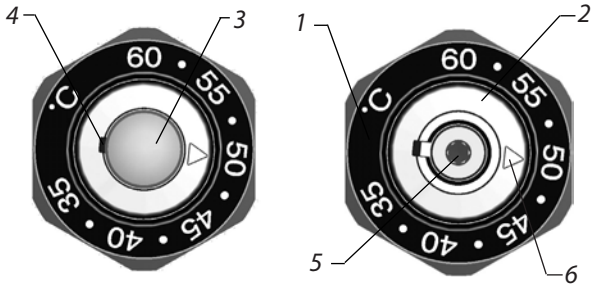


Fig.14 *MTCV setting of the temperature*

Temperature range: 35-60 °C
MTCV´s factory pre-setting 50 °C

The temperature setting can be made after removing the plastic cover (3), by lifting it with a screwdriver using the hole (4). The temperature setting screw (5) must be turned with an allen-key to match the wanted temperature on the scale with the reference point. The plastic cover (3) must be pressed back into place after the setting has been made.

It is recommended to control the set temperature with a thermometer. The temperature of the hot water from the last tapping point on the riser must be measured*. The difference between the measured temperature at the last tapping point and the temperature set on the MTCV is due to heat losses in the circulation pipe between the MTCV and the tapping point.

** where TVM valves (thermostatic mixing valves) are installed the temperature must be measured before the TVM valve.*

Setting procedure

The required temperature setting of the MTCV depends on the required temperature at the last tap and the heat losses from the tap to MTCV in the same riser.

Example:
Required temperature at the last tap: 48 °C
Heat losses from the last tap to the MTCV: 3 K

Required:
correct setting of MTCV

Solution:
Correct setting of MTCV: 48 - 3 = 45 °C

Note:
After new setting use the thermometer to check if the required temperature at the tap is reached and correct the MTCV setting accordingly.

Pressure and flow chart MTCV - DN 15

Differential pressure 1 bar, DN 15

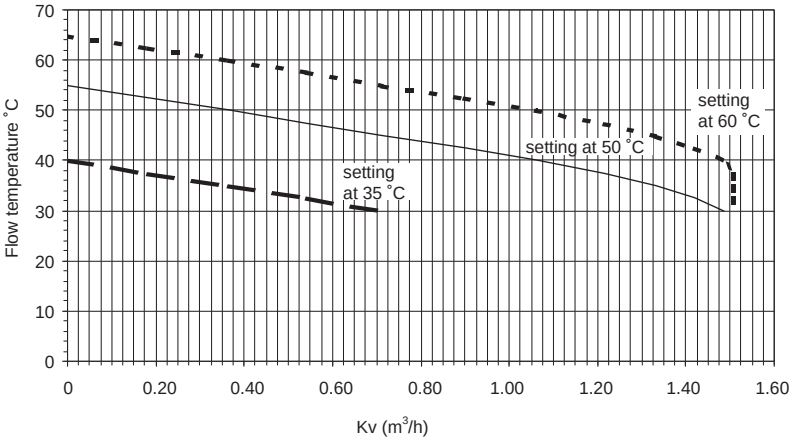


Fig. 15

Table 1

Flow temperature °C	preset 60 °C	preset 55 °C	preset 50 °C	preset 45 °C	preset 40 °C	preset 35 °C	kv (m³/h)
	65	60	55	50	45	40	0
	62.5	57.5	52.5	47.5	42.5	37.5	0.238
	60	55	50	45	40	35	0.427
	57.5	52.5	47.5	42.5	37.5	32.5	0.632
	55	50	45	40	35	30	0.795
	52.5	47.5	42.5	37.5	32.5		0.963
	50	45	40	35	30		1.087
	47.5	42.5	37.5	32.5			1.202
	45	40	35	30			1.283
	42.5	37.5	32.5				1.351
	40	35	30				1.394
	37.5	32.5					1.437
	35	30					1.469
	32.5						1.500
	30						1.500

Differential pressure 1 bar, DN 15 - disinfection process

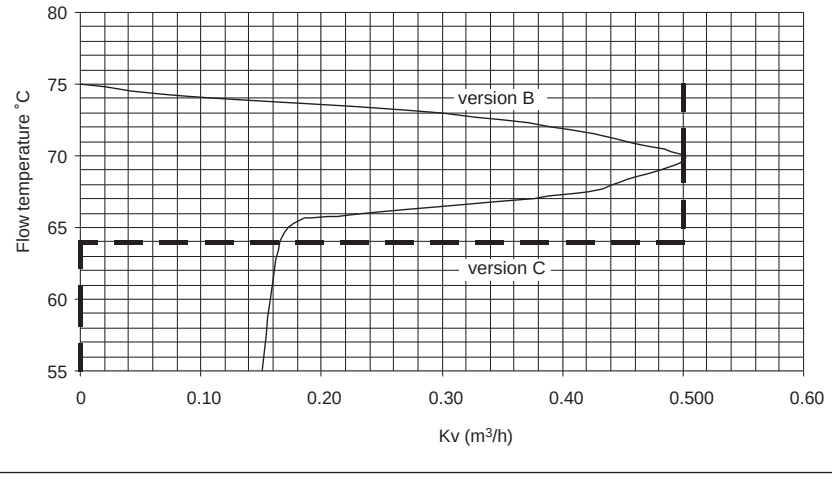


Fig. 16

Pressure and flow chart MTCV - DN 20

Differential pressure 1 bar, DN 20

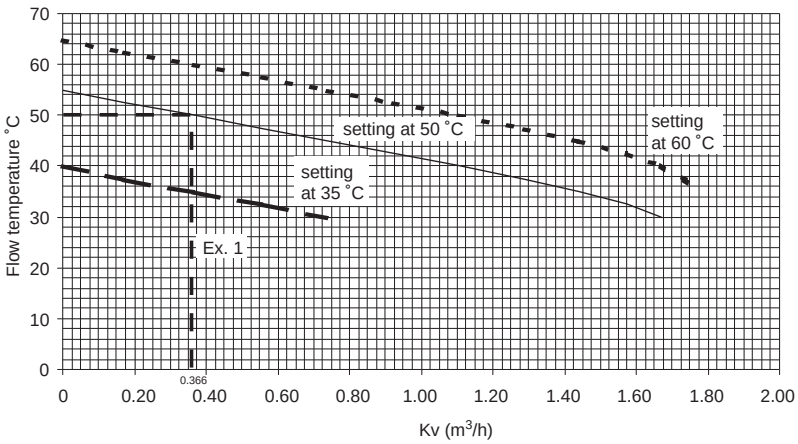


Fig. 17

Table 2

Flow temperature °C	preset 60 °C	preset 55 °C	preset 50 °C	preset 45 °C	preset 40 °C	preset 35 °C	kv (m³/h)
	65	60	55	50	45	40	0
	62.5	57.5	52.5	47.5	42.5	37.5	0.251
	60	55	50	45	40	35	0.442
	57.5	52.5	47.5	42.5	37.5	32.5	0.645
	55	50	45	40	35	30	0.828
	52.5	47.5	42.5	37.5	32.5		1.000
	50	45	40	35	30		1.164
	47.5	42.5	37.5	32.5			1.322
	45	40	35	30			1.462
	42.5	37.5	32.5				1.577
	40	35	30				1.667
	37.5	32.5					1.733
	35	30					1.753
	32.5						1.761
	30						1.761

Differential pressure 1 bar, DN 20 - disinfection process

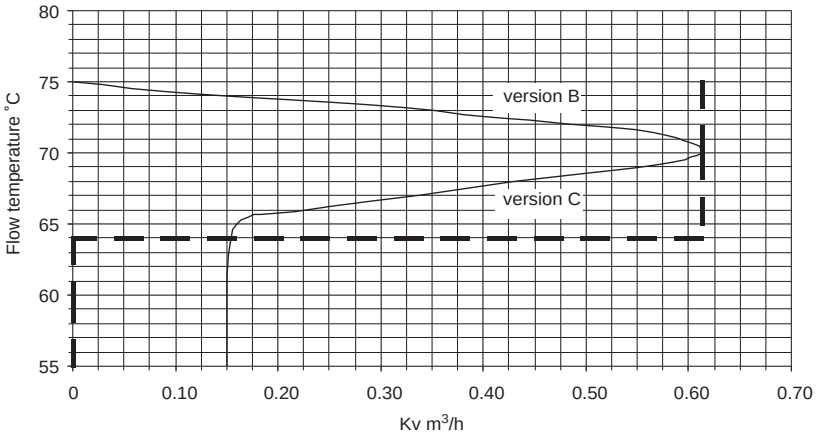


Fig. 18

Example of calculation

Example:
The calculation is done for a 3-storey building with 8 risers.

The following assumptions were used in order to simplify calculation:
- *Heat losses per meter of the pipe, q_1 =10 W/m **

** during calculation it is required to calculate heat losses according to the country-specific standards.*

Usually the calculated heat loses are dependent on :
- The dimension of the pipe
- The materials used in insulations
- The ambient temperature where the pipe is located
- The efficiency and condition of insulation

- Inlet of hot water temperature, T_{sup} = 55 °C
- Temperature drop through the system, ΔT= 5 K
- Distance between risers, L = 10 m
- Height of the risers, l = 10 m
- Installation scheme as shown below:

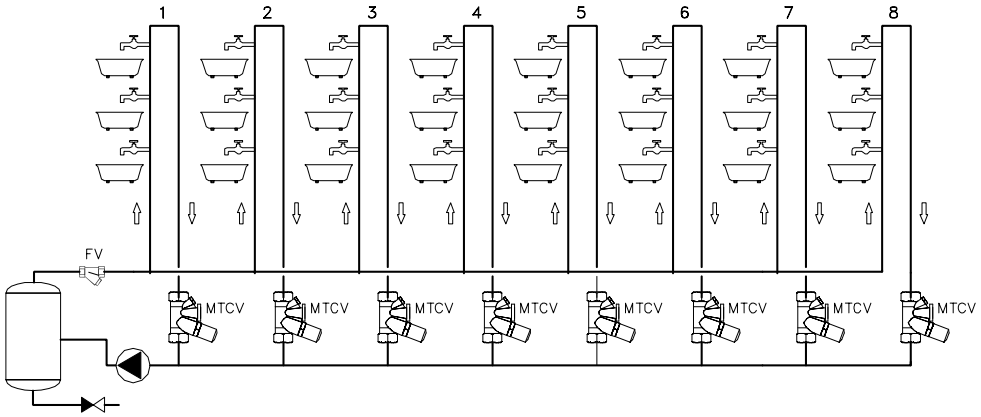


Fig. 19 *Scheme of installation*

I Basic operation

Calculation:
- calculation of heat losses in each riser (Qr) and header (Qh)
  Qr = l riser x q = (10 + 10) x 10 = 200 W
  Qh = l horiz. x q = 10 x 10= 100 W
- The table 3 shows the results of the calculations:

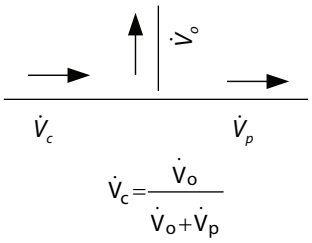


Table 3

riser	heat losses				Factor risers	Flow in each part	Total flow
	In risers	In header	Total in each part (W)	ΣQ total (W)		Flow in each part	Total flow
	Qr (W)	Qh (W)				Vo (l/h)	Vc (l /h)
1	200	100	300	**2400**	-	36	**412**
2				2100	0.09	38	376
3				1800	0.1	40	339
4				1500	0.12	43	299
5				1200	0.14	47	256
6				900	0.18	52	210
7				600	0.25	63	157
8				300	0.4	94	94

Example of calculation
(continuous)

- The total flow in the hot water circulation system is calculated using formula:

$$\dot{V} = \frac{\sum \dot{Q}}{r \quad c_w \quad \Delta t_{hw}}$$

ΣQ - total heat loses in installation, (kW)

thus:

$$\dot{V}_C^{total} = \frac{2.4}{1 \times 4.18 \times 5}$$

$$= 0.114 \text{ l/s} = 412 \text{ l/h}$$

The total flow in hot water circulation system is: 412 l/h - the circulation pump shall be sized for this flow.

- The flow in each riser is calculated using formula:

Flow in the riser number 1:

$$\dot{V}_o = \dot{V}_c \times \frac{Q_o}{Q_o + Q_p}$$

thus:

$$\dot{V}_0^1 = 412 \times \frac{200}{200 + 2100}$$

$$= 35.84 \text{ l/h} \cong 36 \text{ l/h}$$

Flow in remaining risers should be calculated in the same way.

- The pressure drop in the system
Following assumptions were made to simplify calculation:
  - Linear pressure drop, $p_l = 60$ Pa/m
  (Linear pressure is the same for all pipes)
  - Local pressure drop is equal to 33 % of total linear pressure drop, $p_r = 0.33\ p_l$

thus:
$p_r = 0.33 \times 60 = 19.8$ Pa/m ≅ 20 Pa/m
  - For the calculation used
  $p_{basic} = p_r + p_l = 60 + 20 = 80$ Pa/m
  - Local pressure drop across the MTCV is calculated on the basis of:

$$\Delta p_{MTCV} = \left(\frac{0.01 \times \dot{V}_0}{Kv} \right)^2$$

where:
Kv - according to fig. 19 page 10
in this case
Kv = 0.366 m³/h for preset 50 °C
$\dot{V}_0$ - flow through the MTCV at the flow temperature 50 °C (l/h)

- When designed flow have been calculated, use the fig. 17 on page 9.

Please note:
during pressure drop calculation across the valve the temperature of circulation water has to be observed. MTCV - Multifunction Thermostatic Circulation Valve has variable Kv value which is dependent on two values: the preset temperature and the temperature of the flow temperature.

When the $\dot{V}_0$ and Kv are known, the pressure drop across MTCV is calculated using the following formula:

$$\Delta p_{MTCV} = \left(\frac{0.01 \times \dot{V}_0}{Kv} \right)^2$$

thus:

$$\Delta p_{MTCV} = \left(\frac{0.01 \times 94}{0.366} \right)^2 = 6.59 \text{ kPa}$$

$$\Delta p_{MTCV} = (0.01 \times 94 / 0.366)^2 = 6.59 \text{ kPa}$$

- Differential pressure across the pump:

$$^*p_{pump} = \Delta p_{circuit} + \Delta p_{MTCV}$$

$$= 14.4 + 6.59 = 21 \text{ kPa}$$

Where:
$\Delta p_{circuit}$ - pressure drop in critical circuit (table 4)
$^*p_{pump}$ - includes pressure drop across all devices in circulation installation like: boiler, strainer etc.

Table 4

riser	pressure drop			across the MTCV		Total pressure pump (kPa)
	In risers (kPa)	In header (kPa)	$p_{circuit}$ (kPa)	V_0-flow (l/h)	ΔmMTCV pressure drop (kPa)	
1	1.6	1.6	14.4	36	0.97	**21**
2			12.8	38	1.07	
3			11.2	40	1.19	
4			9.6	43	1.38	
5			8.0	47	1.64	
6			6.4	52	2.01	
7			4.8	63	2.96	
8			3.2	94	6.59	

Example of calculation
(continuous)

II Disinfection

The heat losses and pressure drop should be calculated according to new conditions.

- inlet hot water temperature during disinfection T_{dis} = 70 °C
- ambient temperature *T_{amb} = 20 °C
(*T_{amb} - according to standard and norm obligatory)

1. The heat losses are calculated from the formula:
$q_1 = K_j \times l \times \Delta T_1 \rightarrow K_j \times l = q_1/\Delta T_1$ for basic process

$q_2 = K_j \times l \times \Delta T_2 \rightarrow K_j \times l = q_2/\Delta T_2$

for disinfection process
Thus :

$$q_2 = q_1 \frac{\Delta T_2}{\Delta T_1} = q_1 \left(\frac{T_{dis} - T_{amb}}{T_{sup} - T_{amb}} \right)$$

for given case:

$$q_2 = 10\,(W/m) \left(\frac{70\,°C - 20\,°C}{55\,°C - 20\,°C} \right) = 14.3\,W/m$$

In this case during disinfection process heat losses increase for around 43 %.

2. Required flow
Due to sequence disinfection process (step by step) only critical circuit should be calculated.

For given case:

$Q_{dis} = Q_r + Q_h$
$Q_{dis} = ((10+10) + (8 \times 10)) \times 14.3\ W/m =$
$1430\ W = 1.43\ kW$

The flow:

$$\dot{V}_{dis} = \frac{1.43}{4.18 \times 5} = 0.0684\,l/s = 246\,l/h$$

3. The required pressure
The required pressure during the disinfection process should be checked
$p_{dispump} = p_{dis(circuit)} + \Delta p_{MTCV}$
where:

$$\Delta p_{MTCV} = \left(\frac{0.01 \times \dot{V}_0}{Kv} \right)^2$$

thus:

$$\Delta p_{MTCV} = \left(\frac{0.01 \times 246}{0.6} \right)^2 = 16.81 kPa$$

Due to lower flow comparing to basic condition (412 l/h), pressure drop in the installation, $p_{circuit}$ should be recalculated.

$$\Delta p = \xi \frac{\rho w^2}{2}$$

where :
w - velocity of the water (m/s)

By comparing conditions during basic operation and disinfection one can estimate:

$$p_{dis} = p_{basic} \times \frac{V_{dis}^2}{V_c^2}$$

where :
V_{dis} - disinfection flow (l/h)
V_C - basic flow (l/h)

Thus:
- for first part of installation

$$p_{dis}^1 = 80 \times \left(\frac{246}{412} \right)^2 = 29\,Pa/m$$

This calculation should be done for all critical circuit. The table 5 shows the result of calculation.

For the critical circuit:
$p_{dis(circuit)}$ = 0.57 + 0.68 + 0.84 + 1.08 + 1.48
+ 2.20 + 3.93 + 21.92 = 32.70 kPa

$p_{dispump} = p_{dis(circuit)} + \Delta p_{MTCV}$
= 32.70 + 16.81 = 49.51 kPa

The pump should be chosen to cover both requirements:

• basic operation,
$\dot{V}_0$ = 412 l/h and p_{pump} = 21 kPa

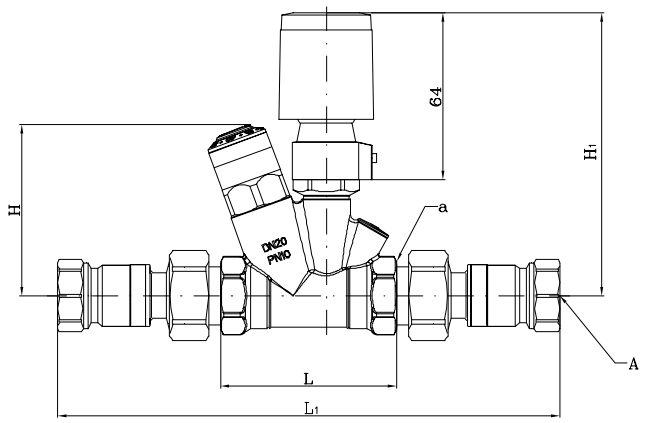
• disinfection operation
$\dot{V}_0$ = 246 l/h and P_{pump} = 49.51 kPa

Table 5

pressure drop the circuit during disinfection process					Total pressure drop in critical circuit
flow (l/h)		new pressure drop (Pa/m)	length (m)	pressure drop (kPa)	
basic	disinfection				
412	246	29		0.57	
376	246	34		0.68	
339	246	42		0.84	
299	246	54	20	1.08	**32.70**
256	246	74		1.48	
210	246	110		2.20	
157	246	196		3.93	
94	246	548	40	21.92	
				Σ 32.70	

Data sheet **MTCV - Lead free brass**

Dimensions



Internal thread	A	a	H	H1	L	L1	Weight (kg)
	ISO 7/1		mm				
DN 15	R_p ½	R_p ½	79	129	75	215	0.56
DN 20	R_p ¾	R_p ¾	92	129	80	230	0.63

Fig. 20

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ENGINEERING
TOMORROW

Data sheet

Temperature controller for heating (PN 25)

AVT / VG - external thread
AVT / VGF - flange

Description

DIN Geprüft TR(TW)700

The AVT / VG(F) controller is a self-acting proportional temperature controller developed primarily for domestic hot water (DHW) production:
- Hot water tanks
- Storage charge systems
- Instantaneous domestic hot water production (AVT 255 mm version)

It can be used in mixing loops and room heating systems as well.

Controller closes on rising temperature.

The controller has a control valve VG(F), thermostatic actuator and handle for temperature setting. Thermostatic actuator consist of bellows, capillary tube and sensor.

The temperature controller is type-tested according to EN 14597 and can be used in combinations with safety temperature monitors STM and safety temperature limiters STL.

Main data:
- DN 15-50
- k_{VS} 0.4 -25 m³/h
- PN 25
- Setting ranges:
  –10 … 40 °C / 20 … 70 °C / 40 … 90 °C / 60 … 110 °C
  and
  10 … 45 °C / 35 … 70 °C / 60 … 100 °C / 85 … 125 °C
- Temperature:
  - Circ. water / glycolic water up to 30 %:
    2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange
- Flow and return mounting.

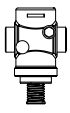
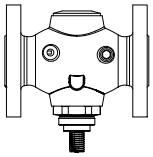
Ordering

Example:
Temperature controller, DN 15;
k_{VS} 1.6 ; PN 25; setting range 40 … 90 °C;
T_{max} 150 °C; ext. thread

- *1× VG DN 15 valve*
  *Code No: **065B0772***
- *1× AVT thermostatic actuator,*
  40 … 90 °C
  *Code No: **065-0598***

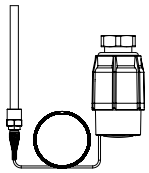
Option:
- *1× Weld-on tailpieces*
  *Code No: **003H6908***

VG, VGF valve

Picture	DN (mm)	k_{VS} (m³/h)	Connection		Code No.
	15	0.4	Cylindrical external thread acc. to ISO 228 / 1	G ¾ A	065B0770
		1.0			065B0771
		1.6			065B0772
		2.5			065B0773
		4.0			065B0774
	20	6.3		G 1 A	065B0775
	25	8.0		G 1¼ A	065B0776
	32	12.5		G 1¾ A	065B0777
	40	16		G 2 A	065B0778
	50	20		G 2½ A	065B0779
	15	4.0	Flanges PN 25, acc. to EN 1092-2		065B0780
	20	6.3			065B0781
	25	8.0			065B0782
	32	12.5			065B0783
	40	20			065B0784
	50	25			065B0785

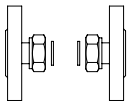
Ordering *(continuous)*

AVT thermostatic actuator

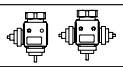
Picture	For valves	Setting range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-25	–10 … +40	170 mm, R ½ [1]	**065-0596**
		20 … 70		**065-0597**
		40 … 90		**065-0598**
		60 … 110		**065-0599**
	DN 32-50	–10 … +40	210 mm, R ¾ [1]	**065-0600**
		20 … 70		**065-0601**
		40 … 90		**065-0602**
		60 … 110		**065-0603**
	DN 15-50	10 … 45	255 mm, R ¾ [1] [2]	**065-0604**
		35 … 70		**065-0605**
		60 … 100		**065-0606**
		85 … 125		**065-0607**

[1] *conic male thread EN 10226*
[2] *without immersion pocket*

Accessories for valves

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
		40			**065B2006**
		50			**065B2007**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
		40		R 1½	**065B2004**
		50		R 2	**065B2005**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**

Accessories for thermostats

Picture	Type designation	PN	For valves	Material	Code No.
	Immersion pocket	25	DN 15-25	Brass	**065-4414** [1]
				Stainless steel, mat. No. 1.4571	**065-4415** [1]
			DN 32-50	Brass	**065-4416** [1]
				Stainless steel, mat. No. 1.4435	**065-4417** [1]
	Combination piece K2				**003H6855**
	Combination piece K3				**003H6856**

[1] *Not for AVT thermostatic actuator code numbers: 065-0604, 065-0605, 065-0606, 065-0607*

Service kits

Picture	Type designation	**DN** (mm)	k_{VS} (m³/h)	Code No.
	Valve insert	15	0.4	**003H6869**
			1.0	**003H6870**
			1.6	**003H6871**
			2.5	**003H6872**
			4.0	**003H6873**
		20	6.3	**003H6874**
		25	8.0	**003H6875**
		32 / 40 / 50	125 / 16 / 20 / 25	**003H6876**
	Housing of sensor stuffing box		**for sensors**	**Code No.**
			AVT 170 R ½	**065-4420**
			AVT 210, 255 R ¾	**065-4421**

Technical data

Valves

Nominal diameter		DN	15					20	25	32	40	50
k_{VS} value		m³/h	0.4	1.0	1.6	2.5	4.0	6.3	8	12.5	16 / 20 [1]	20 / 25 [1]
Stroke		mm	3		5					10		
Control ratio			> 1:50									
Control characteristic			linear									
Cavitation factor z			≥ 0.6						≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02							≤ 0.05		
Nominal pressure		PN	25									
Max. differential pressure		bar	20							16		
Medium			Circulation water / glycolic water up to 30 %									
Medium pH			Min. 7, max. 10									
Medium temperature		°C	2 … 150									
Connections	valve		External thread									
			-					Flange				
	tailpieces		Weld-on and external thread									
			Flange							-		
Materials												
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)							Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
	flange		-					Ductile iron EN-GJS-400-18-LT (GGG 40.3)				
Valve seat			Stainless steel, mat. No. 1.4571									
Valve cone			Dezincing free brass CuZn36Pb2As									
Sealing			EPDM									
Pressure relieve system			Piston									

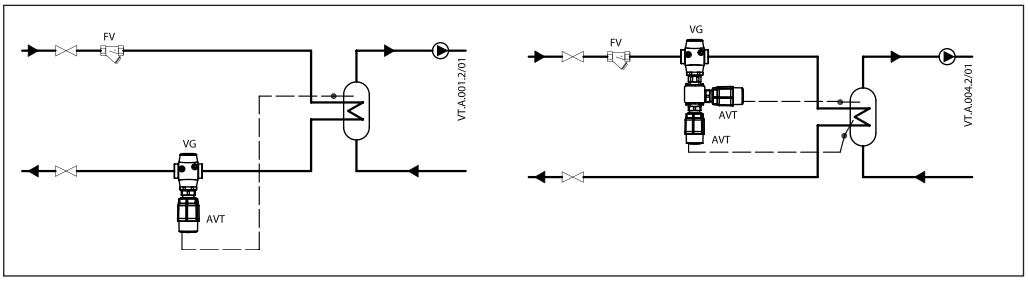
[1] *Flange valve body*

Thermostatic actuator

Setting range X_s	°C	–10 … 40 / 20 … 70 / 40 … 90 / 60 … 110 10 … 45 / 35 … 70 / 60 … 100 / 85 … 125
Time constant T acc. to EN 14597	s	max. 50 (170 mm, 210 mm), max. 30 (255 mm)
Gain K_s	mm / °K	0.2 (170 mm), 0.3 (210 mm), 0.7 (255 mm)
Max. adm. temperature at sensor		50 °C above maximum setpoint
Max. amb. temperature at sensor	°C	0 … 70
Nominal pressure sensor	PN	25
Nominal pressure immersion pocket		
Capillary tube length		5 m (170 mm, 210 mm), 4 m (255 mm)
Materials		
Temperature sensor		Cooper
Immersion pocket [1]	Ms design	Brass, nickel-plated
	Stainless steel design	Mat. No. 1.4571 (170 mm), mat. No. 1.4435 (210 mm)
Handle for temp. setting		Polyamide, glass fiber-reinforced
Scale carrier		Polyamide

[1] *for sensor 170 and 210 mm*

Application principles



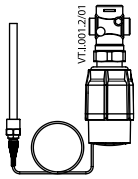
Combinations

Example:
Temperature controller with safety temperature monitor, DN 15; k_{VS} 1.6 ; PN 25; setting range 40 … 90 °C; T_{max} 150 °C; ext. thread

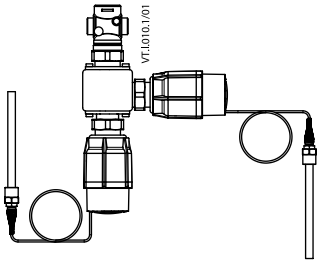
- *1× VG DN 15 valve*
  Code No: ***065B0772***
- *1× AVT thermostatic actuator, 40 … 90 °C*
  Code No: ***065-0598***
- *1× STM thermostat, 30 … 110 °C*
  Code No: ***065-0608***
- *1× K2 combination piece*
  Code No: ***003H6855***

Products will be delivereed separatly

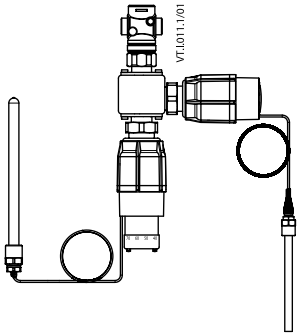
Note:
For safety temperature monitor STM / VG(F) data and safety temperature limiter STLV data see relevant data sheet.



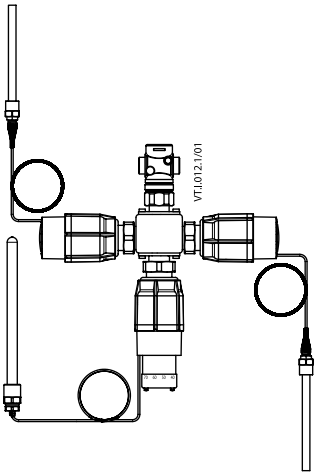
AVT / VG
- *temperature controller*



AVT / AVT / VG
- *two temperature controllers*



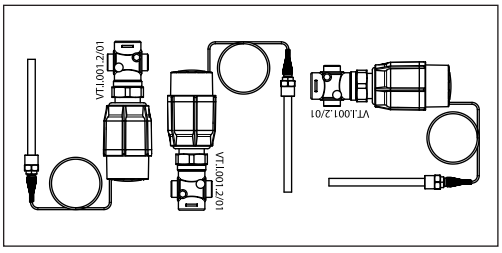
STM / AVT / VG
- *temperature controller with safety temperature monitor*



STM / AVT / AVT / VG
- *two temperature controllers with safety temperature monitor*

Installation positions

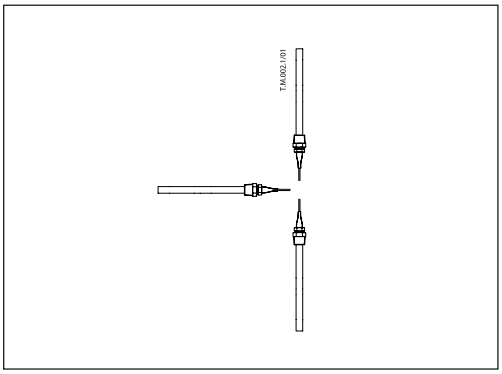
Temperature controller
Temperature controller AVT / VG(F) can be installed in any position.



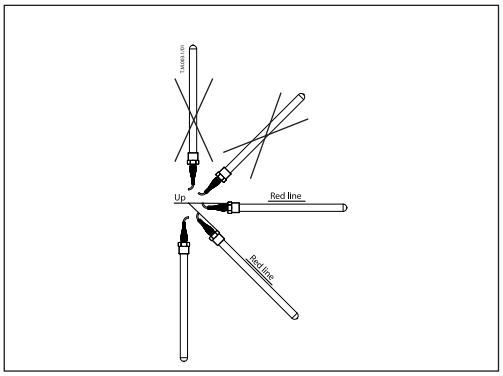
Installation positions
(continuous)

Temperature sensor
The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

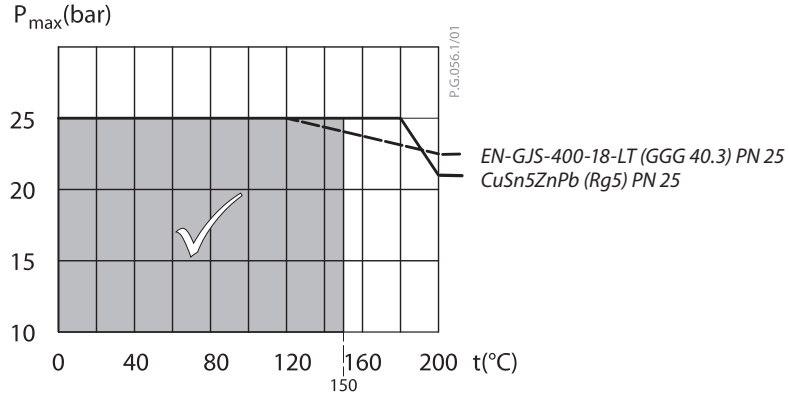
Temperature sensors 170 mm R ½ and 210 mm R ¾
- The temperature sensor may be installed in any position.



Temperature sensor 255 mm R ¾
- The temperature sensor must be installed as shown on the picture.

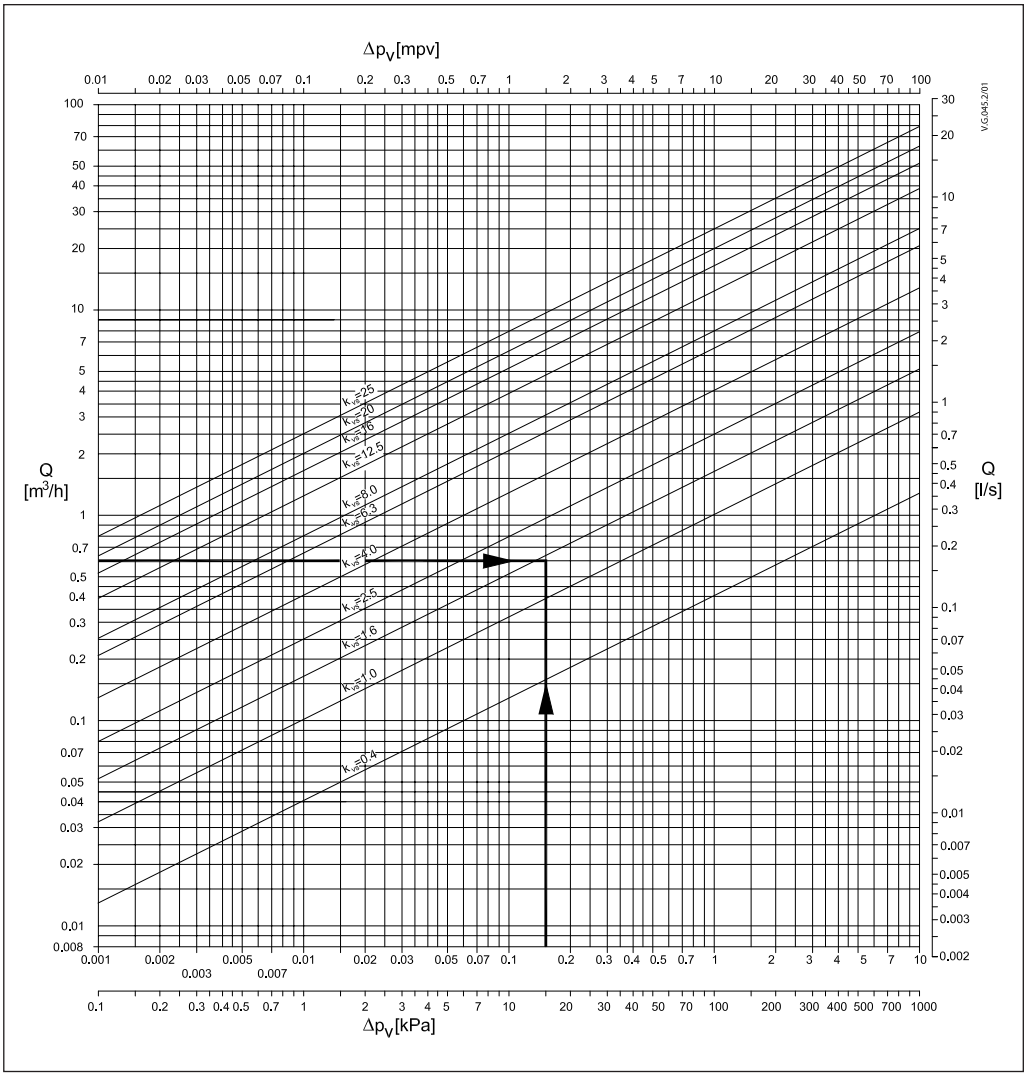


Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Valve sizing



Given data:
P_{max} = 14 kW
Δt = 20 K
Δp_v = 0.15 bar

P_{max} - heating power (kW)
Δt -temperature difference (K)
Δp_v - differential pressure across the valve

Maximum flow Q_{max} (m^3/h) through the valve is calculated according to formula:

$$Q_{max} = \frac{P_{max} \times 0{,}86}{\Delta t} = \frac{14 \times 0{,}86}{20}$$

Q_{max} = 0.6 m^3/h

k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_V}} = \frac{0{,}6}{\sqrt{0{,}15}}$$

k_v = 1.5 m^3/h

Chosen k_{VS} = 1.6 m^3/h

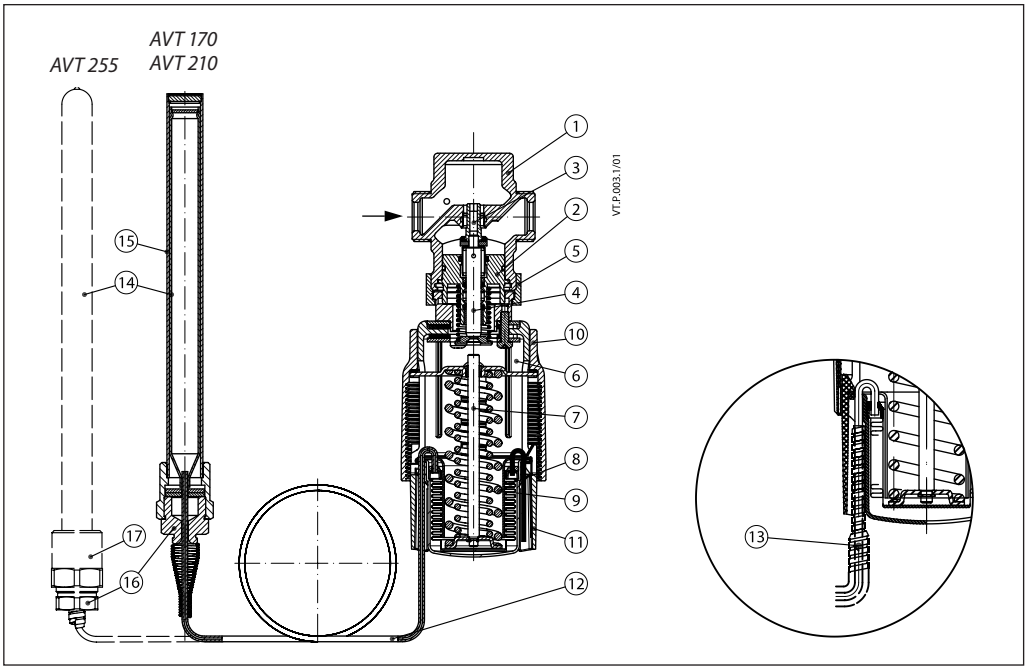
or read from the sizing diagram by taking a line through Q scale (0.6 m^3/h) and Δp_v scale (0.15 bar) to intersect k_v-scale at 1.5 m^3/h

Chosen k_{VS} = 1.6 m^3/h

Solution:
The example selects
1) ext. thread valve VG DN 15, k_{VS} value 1.6 or
2) flange valve VGF DN 15, k_{VS} value 1.6

Design

1. Valve VG(F)
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Union nut
6. Thermostatic actuator AVT
7. Thermostat stem
8. Bellows
9. Setting spring for temperature control
10. Handle for temperature setting, prepared for sealing
11. Scale carrier
12. Capillary tube
13. Flexible protected pipe (only at AVT 255 mm)
14. Temperature sensor
15. Immersion pocket
16. Sensor stuffing box
17. Housing of sensor stuffing box



Function

Medium temperature changes cause pressure changes in temperature sensor. Resulting pressure is being transferred through the capillary tube to the bellows. Bellows moves thermostat stem and opens or closes the valve.

By increasing of medium temperature valve cone moves towards the seat (valve closes), by decreasing of medium temperature valve cone moves away from the seat (valve opens).

Handle for temperature setting can be sealed.

Settings

Temperature setting
Temperature setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for temperature setting and/or temperature indicators.

Adjustment diagram

Temperature setting
Relation between scale numbers 1-5 and closing temperature.

Note: *The values given are approximate*

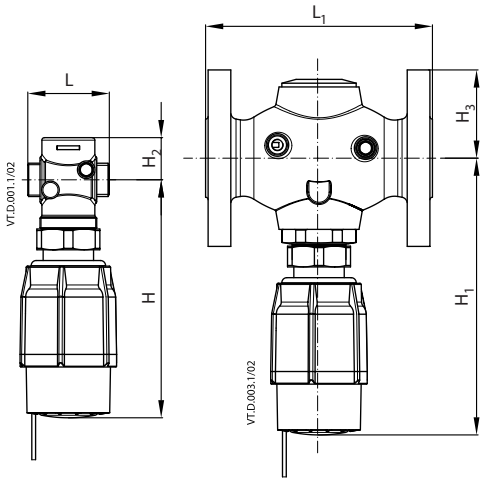
AVT Thermostat ... 170 mm, 210 mm

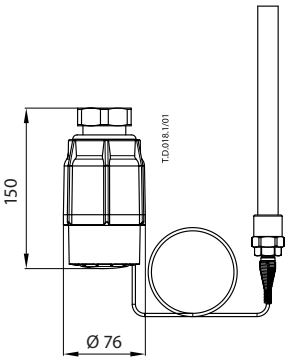
I	II	III	IIII	IIIII	
-10	3	15	28	40	°C
20	33	45	58	70	
40	53	65	78	90	
60	73	85	98	110	

AVT Thermostat ... 255 mm

I	II	III	IIII	IIIII	
10	19	28	36	45	°C
35	44	53	61	70	
60	70	80	90	100	
85	95	105	115	125	

Dimensions



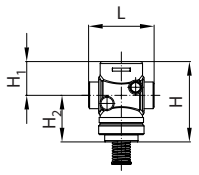


AVT

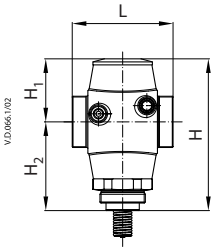
DN	L	L_1	H	H_1	H_2	H_3
	mm					
15	65	130	180	229	34	47
20	70	150	180	229	34	52
25	75	160	180	229	37	57
32	100	180	221	221	62	70
40	110	200	221	221	62	75
50	130	230	221	221	62	82

Note: *other flange dimensions - see table for tailpieces*

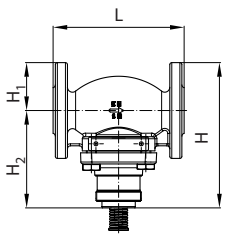
Type		Weight
sensor 170 mm	kg	1.3
sensor 210 mm		1.5
sensor 255 mm		1.6



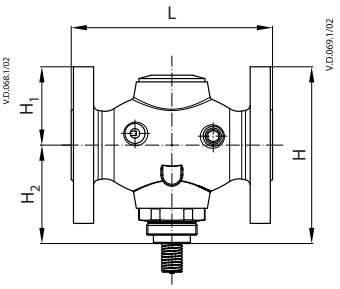
VG DN 15-25



VG DN 32-50



VGF DN 15-25



VGF DN 32-50

VG

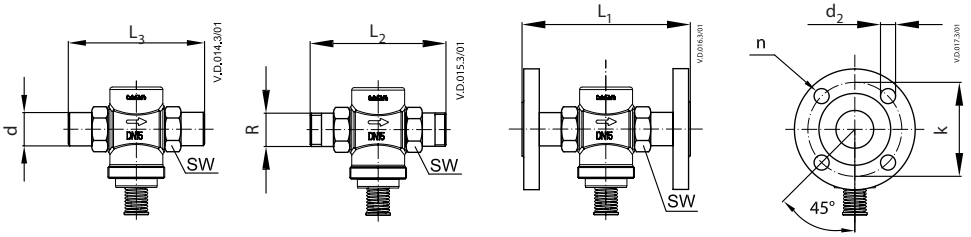
DN	L	H	H1	H2	Weight (kg)
	mm				
15	65	80	34	46	0.7
20	70	80	34	46	0.8
25	75	83	37	46	0.9
32	100	151	63	88	3.0
40	110	151	63	88	3.1
50	130	151	63	88	3.8

VGF

DN	L	H	H1	H2	Weight (kg)
	mm				
15	130	144	48	96	3.3
20	150	149	53	96	4.1
25	160	154	58	96	4.7
32	180	158	70	88	7.5
40	200	163	75	88	9.0
50	230	171	83	88	11.1

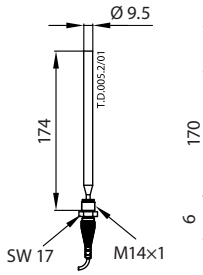
Note*: other flange dimensions - see table for tailpieces*

Dimensions *(continuous)*

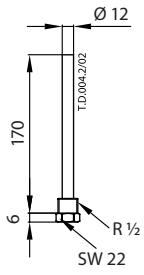


DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	131	139	65	14	4
20	¾	41 (G 1A)	26	150	144	154	75	14	4
25	1	50 (G 1¼A)	33	160	160	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	195	204	110	18	4
50	2	82 (G 2½A)	60	-	252	234	125	18	4

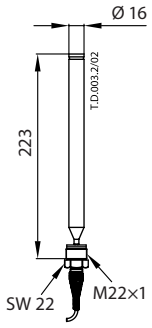
[1] Conical ext. thread acc. to EN 10226-1
[2] Flanges PN 25, acc. to EN 1092-2



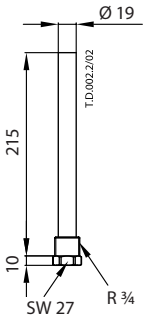
AVT 170



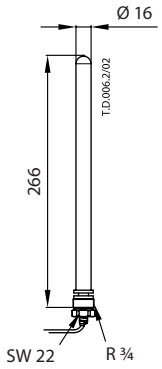
AVT 170
Immersion pocket



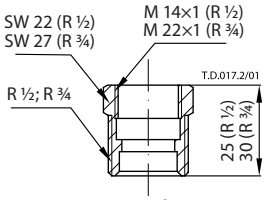
AVT 210



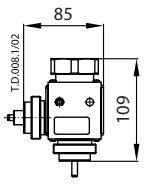
AVT 210
Immersion pocket



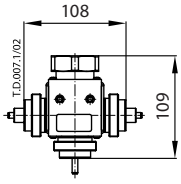
AVT 255



Housing of sensor stuffing box



Combination piece K2



Combination piece K3

ENGINEERING
TOMORROW

Data sheet

Temperature controller for steam (PN 25)

AVT/VGS - external thread

Description

DIN Geprüft TR(TW)700

The AVT/VGS controller is a self-acting proportional temperature controller developed primarily for steam or hot water applications for temperatures up to 200 °C. Controller closes on rising temperature.

The controller has a control valve VGS, thermostatic actuator and handle for temperature setting. Thermostatic actuator consist of bellows, capillary tube and sensor.

The temperature controller is type-tested according to EN 14597 and can be used in combinations with safety temperature monitors STM and safety temperature limiters STL.

Main data:

- DN 15-25
- k_{VS} 1.0-6.3 m^3/h
- PN 25
- Setting ranges:
  –10… 40 °C/20… 70 °C/40… 90 °C/60 …110 °C
  and
  10… 45 °C/35… 70 °C/60… 100 °C/85… 125 °C
- Temperature:
  - Steam/circ. water/glycolic water up to 30%:
    2… 200 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flow and return mounting.

Ordering

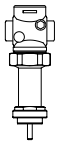
Example:
Temperature controller for steam, DN 15; k_{VS} 1.6; PN 25; setting range 40… 90 °C; T_{max} 200 °C; ext. thread

- *1× VGS DN 15 valve*
  Code No: ***065B0787***
- *1× AVT thermostatic actuator, 40… 90 °C*
  Code No: ***065-0602***

Option:
- *1× Weld-on tailpieces*
  Code No: ***003H6908***

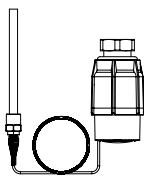
The valve will be delivered (assembled) together with an adapter M34 × M45.

VGS Valve [1)]

Picture	DN (mm)	k_{VS} (m^3/h)	Connection		Code No.
	15	1.0	Cylindrical external thread acc. to ISO 228/1	G ¾ A	065B0786
		1.6			065B0787
		3.2			065B0788
	20	4.5		G 1 A	065B0789
	25	6.3		G 1¼ A	065B0790

[1)] *Adapter M34 × M45 for connection to AVT thermostat is factory assembled on the valve.*
(info: Adapter M34 × M30 for connection to AMV(E) electrical actuators is part of the valve delivery too.)

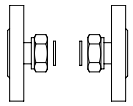
AVT Thermostatic actuator

Picture	For valves	Setting range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-25	–10… +40	210 mm, R ¾ [1)]	065-0600
		20… 70		065-0601
		40… 90		065-0602
		60… 110		065-0603
		10… 45	255 mm, R ¾ [1) 2)]	065-0604
		35… 70		065-0605
		60… 100		065-0606
		85… 125		065-0607

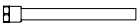
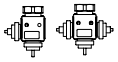
[1)] *conic male thread EN 10226-1*
[2)] *without immersion pocket*

Ordering *(continuous)*

Accessories for valves

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**

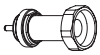
Accessories for thermostats

Picture	Type designation	PN	Material	Code No.
	Immersion pocket	25	Brass	**065-4416** [1]
			Stainless steel, mat. No. 1.4435	**065-4417** [1]
	Adapter [2]		M34 × 1.5 mm/M45 × 1.5 mm	**003H6927**
	Combination piece K2			**003H6855**
	Combination piece K3			**003H6856**

[1] *Not for AVT thermostatic actuator code numbers:* ***065-0604***, ***065-0605***, ***065-0606***, ***065-0607***

[2] *Adapter for VGS combinations with thermostatic actuators AVT, temperature monitors STM and temperature limiters STL*

Service kits

Picture	Type designation	for valves DN	k_{VS}	Code No.
	Valve body extension with stuffing box	15	3.2	**003H6877**
		20	4.5	
		25	6.3	
	Housing of sensor stuffing box	**for sensors**		**Code No.**
		AVT R ¾		**065-4421**

Technical data

Valves

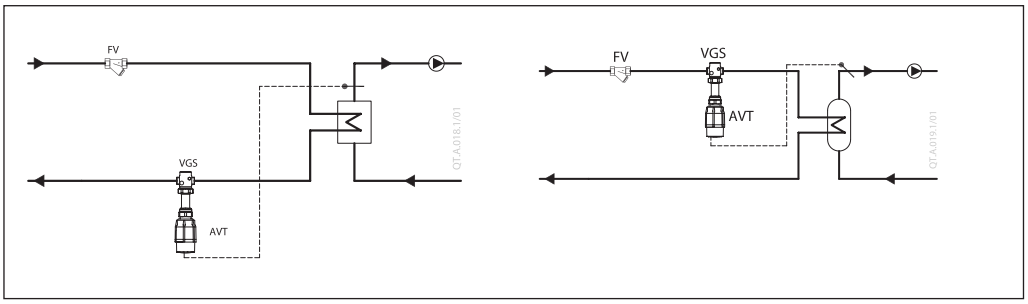
Nominal diameter	**DN**	**15**			**20**	**25**
k_{VS} value	m^3/h	1.0	1.6	3.2	4.5	6.3
Stroke	mm	3			5	
Control ratio		>1:50				
Control characteristic		linear				
Cavitation factor z		≥ 0.6				≥ 0.55
Leakage acc. to standard IEC 534	% of k_{VS}	≤ 0.05				
Nominal pressure	PN	25				
Max. differential pressure	bar	10				
Media		Steam/Circulation water/glycolic water up to 30%				
Media pH		Min. 7, max. 10				
Media temperature	°C	2… 200				
Connections	valve	External thread				
	tailpieces	Weld-on, external thread and flange				
Materials						
Valve body		Red bronze CuSn5ZnPb (Rg5)				
Valve seat		Stainless steel, mat. No. 1.4571				
Valve cone		Stainless steel, mat. No. 1.4122				
Pressure relieve system		Bellows				

Thermostatic actuator

Setting range X_s	°C	–10… 40/20… 70/40… 90/60… 110 10… 45/35… 70/60… 100/85… 125
Time constant T acc. to EN 14597	s	max. 50 (210 mm), max. 30 (255 mm)
Gain K_s	mm/°K	0.3 (210 mm), 0.7 (255 mm)
Max. adm. temperature at sensor		50 °C above maximum setpoint
Max. amb. temperature at thermostat	°C	0… 70
Nominal pressure sensor	PN	25
Nominal pressure immersion pocket		
Capillary tube length		5 m (210 mm), 4 m (255 mm)
Materials		
Temperature sensor		Cooper
Immersion pocket [1]	Ms design	Brass, nickel-plated
	Stainless steel design	Mat. No. 1.4435 (210 mm)
Handle for temp. setting		Polyamide, glass fiber-reinforced
Scale carrier		Polyamide

[1] *for sensor 210 mm*

Application principles



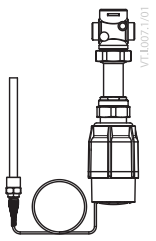
Combinations

Example:
Temperature controller with safety temperature monitor for steam, DN 15, k_{VS} 1.6, PN 25, setting range 40… 90 °C, T_{max} 200 °C, ext. thread

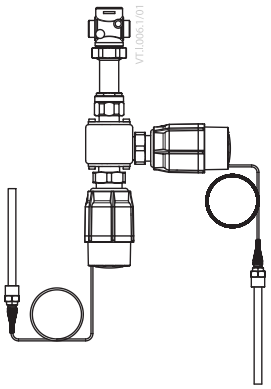
- *1× VGS DN 15 valve*
  Code No: 065B0787
- *1× AVT thermostatic actuator, 40… 90 °C*
  Code No: ***065-0602***
- *1× STM thermostat, 30… 110 °C*
  Code No: ***065-0608***
- *1× K2 combination piece*
  Code No: ***003H6855***

Products will be delivered seperatly.

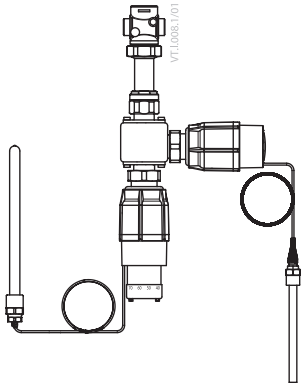
Note:
For safety temperature monitor STM/VGS data and safety temperature limiter STLS data see relevant data sheet



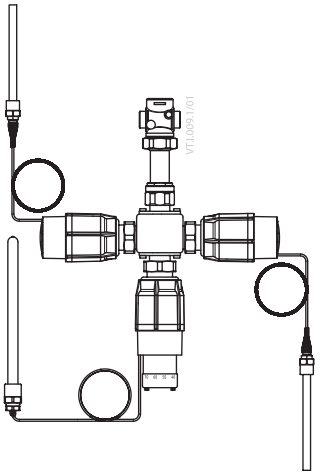
AVT/VGS
- temperature controller



AVT/AVT/VGS
- two temperature controllers



STM/AVT/VGS
- temperature controller with safety temperature monitor for steam

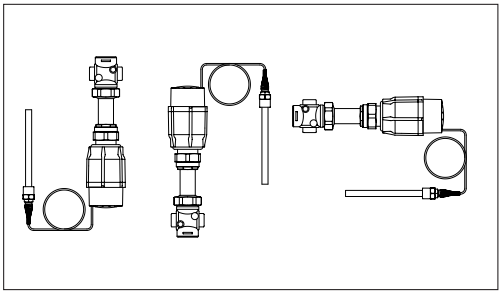


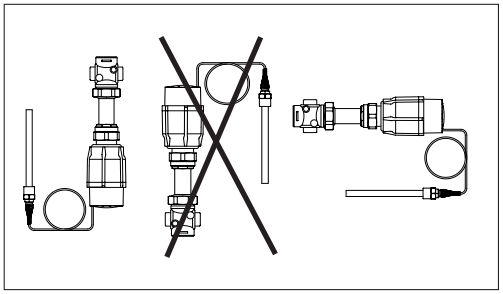
STM/AVT/AVT/VGS
- two temperature controllers with safety temperature monitor for steam

Installation positions

Temperature controller
Up to media temperature of 160 °C the controllers AVT / VGS can be installed in any position.

For higher temperatures the controllers AVT / VGS have to be installed horizontal and in horizontal pipes with the actuator oriented downwards.

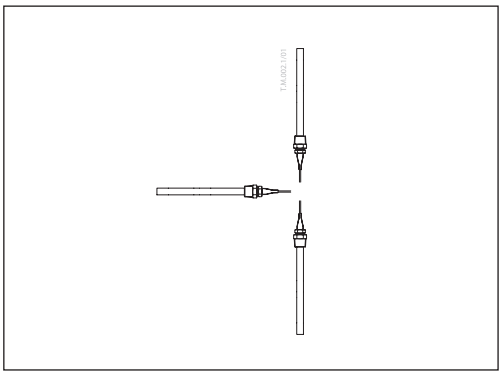




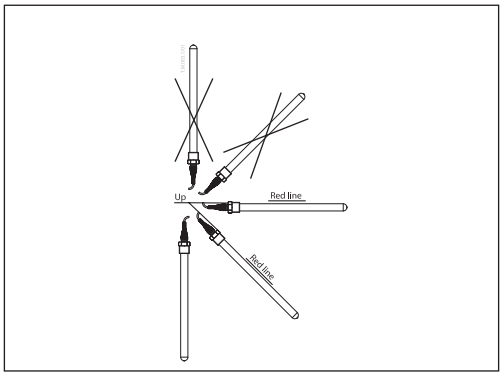
Installation positions
(continuous)

Temperature sensor
The place of installation must be chosen in a way that the temperature of the media is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the media in its full length.

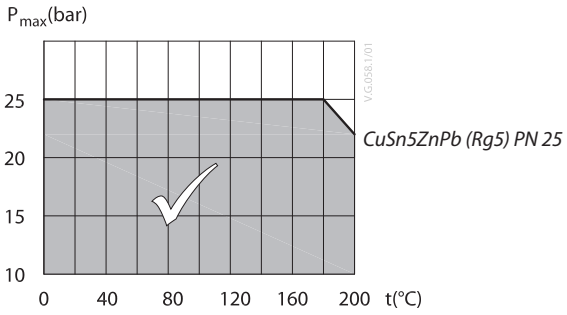
Temperature sensor 210 mm R¾":
- The temperature sensor may be installed in any position.



Temperature sensor 255 mm R¾":
- The temperature sensor must be installed as shown on the picture.

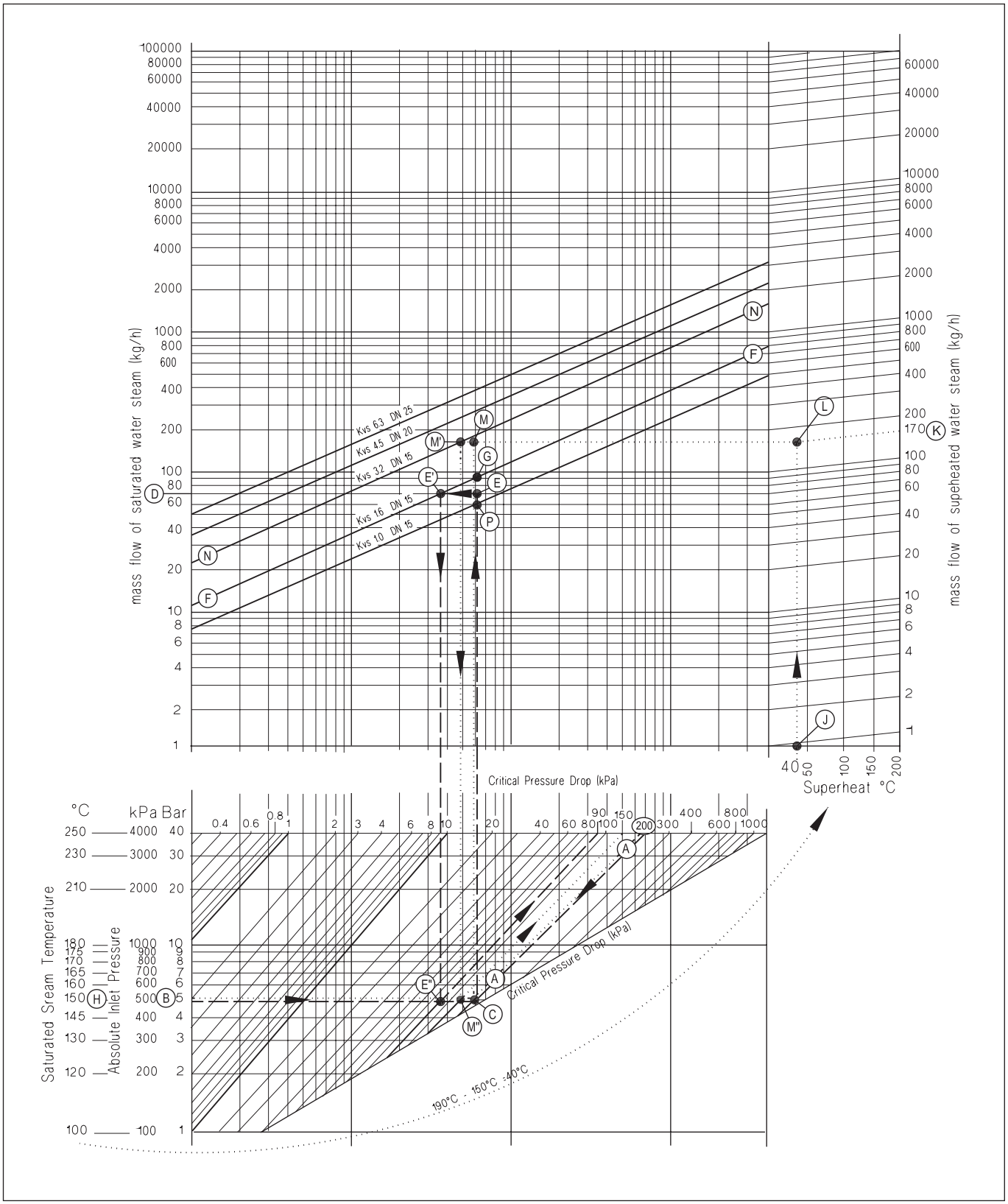


Pressure temperature diagram



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-3).

Valve sizing



Steam valve sizing is based on 40% drop of the steam pressure across the valve when fully open. At this condition the steam is travelling at or close to its critical velocity (approx. 300 m/s) and throttling would occur over the full valve stroke.

If the steam is travelling slower than this, then the first part of the valve stroke would merely increase the velocity of the steam without reducing the volumetric flow.

Valve sizing *(continuous)*

1. For saturated steam

Given data:
Flow rate: 70 kg/h
Absolute inlet pressure: 5 bar (500 kPa)

Remark:
For this example follow dashed line

The absolute inlet pressure is 500 kPa. Critical pressure drop (40% of 500 kPa) is 200 kPa. Locate the diagonal line corresponding to the pressure drop of 200 kPa (line A-A).

Read the absolute inlet pressure on the lower left hand scale (point B), and draw a horizontal line across until it meets the pressure drop diagonal A-A at point C.

From this point C extend a vertical line upwards until it meets the horizontal line representing the steam flow of 70 kg/h from point D. The intersection of this is point E.

The nearest diagonal k_{VS} line above this is line F-F with a k_{VS} of 1.6. If the ideal valve size is not available the next largest size should be selected to ensure design flow.

The pressure drop through valve at the flow rate is found by the intersection of the 70 kg/h line with F-F (point E') and dropping a vertical line downwards; this actually hits the horizontal line for 500 kPa absolute inlet pressure (point E'') at a pressure drop diagonal of 90 kPa. This is only 18 % of the pressure drop accross the valve and the control quality will not be good until the valve has partially closed. As with all steam valves this compromise is necessary since the next smaller valve would not pass the required flow (maximum flow would be about 60 kg/h; point P).

The maximum flow for the same inlet pressure is found by extending the vertical line (C-E) through point E until it crosses the k_{VS} 1.6 line F-F (point G) and reading off the flow (90 kg/h).

2. For superheated steam

Given data:
Flow rate: 170 kg/h
Absolute inlet pressure: 5 bar (500 kPa)
Steam temperature: 190 °C

Remark:
For this example follow dotted line
The procedure for superheated steam is much the same as for saturated steam, but uses a different flow scale which slightly elevates the readings according to the degree of superheat.

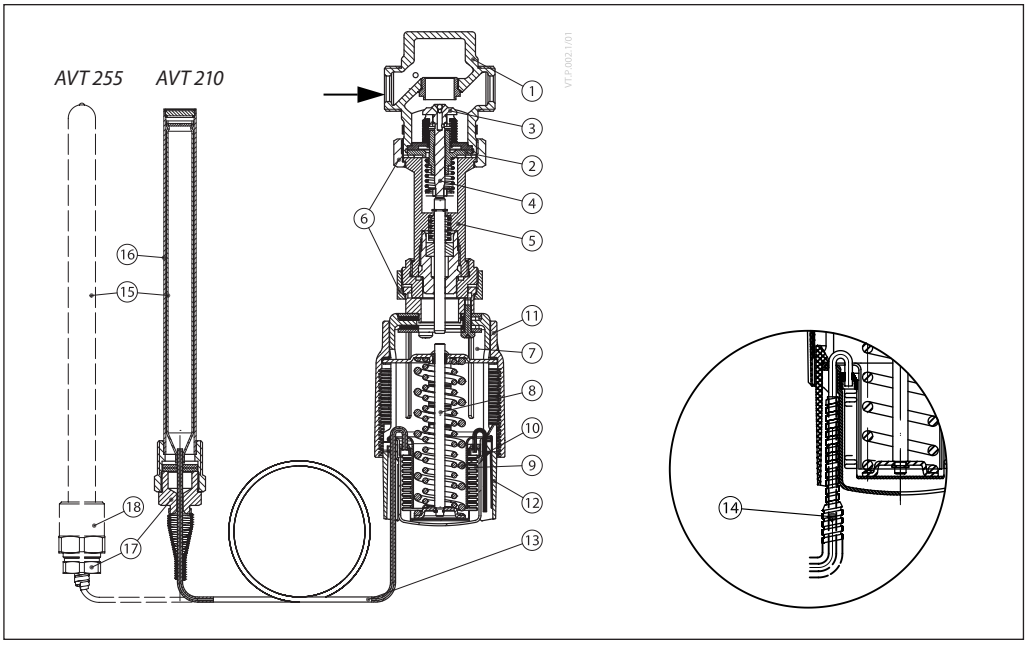
As before, the diagonal critical pressure drop line A-A is located at 40% of 500 kPa (200 kPa). The horizontal inlet pressure line through point B is now extended to the left to read off the corresponding saturated steam temperature at point H (150 °C). The difference between the saturated steam temperature and the superheated steam temperature is 190 °C – 150 °C = 40 °C (see point J).

The superheated steam flow 170 kg/h is found on the upper right hand scale (point K). From here the diagonal line is followed down until it meets a vertical line from the steam temperature elevation (40 °C, point J) at point L.

As before, the horizontal line through point B is drawn to cut line A-A at point C. The point where the vertical line from point C meets the horizontal line from point L is the operating point (point M). This horizontal line, L-M, is the corrected flow line. The nearest diagonal line above this is line N-N with a k_{VS} 3.2. A vertical line dropped from the intersection of L-M line with line N-N (point M') intersects the 500 kPa absolute inlet pressure line (point M'') at a pressure drop diagonal of about 150 kPa. This is about 30% of the pressure drop accross the valve which will give reasonable control quality (compared to recommended ratio of 40 %).

Design

1. Valve VGS
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Valve body extension
6. Union nut
7. Thermostatic actuator AVT
8. Thermostat stem
9. Bellows
10. Setting spring for temperature control
11. Handle for temperature setting, prepared for sealing
12. Scale carrier
13. Capillary tube
14. Flexible protected pipe (only at AVT 255 mm)
15. Temperature sensor
16. Immersion pocket
17. Sensor stuffing box
18. Housing of sensor stuffing box



Function

Media temperature changes cause pressure changes in temperature sensor. Resulting pressure is being transferred through the capillary tube to the bellows. Bellows moves thermostat stem and opens or closes the valve.

By increasing of media temperature valve cone moves towards the seat (valve closes), by decreasing of media temperature valve cone moves away from the seat (valve opens).

Handle for temperature setting can be sealed.

Settings

Temperature setting
Temperature setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for temperature setting and/or temperature indicators.

Adjustment diagram

Temperature setting
Relation between scale numbers 1-5 and closing temperature.

Note: *The values given are approximate*

AVT Thermostat ... 210 mm

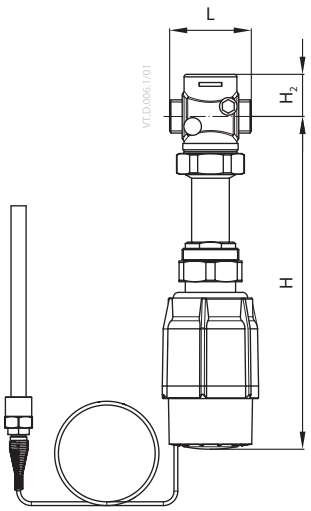
I	II	III	IIII	IIIII	
-10	3	15	28	40	°C
20	33	45	58	70	
40	53	65	78	90	
60	73	85	98	110	

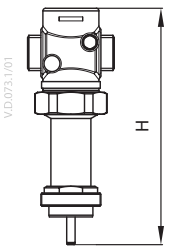
AVT Thermostat ... 255 mm

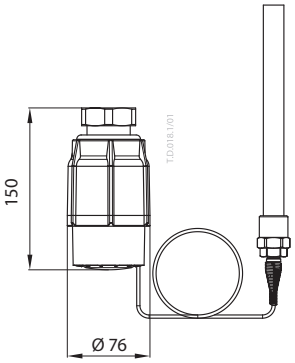
I	II	III	IIII	IIIII	
10	19	28	36	45	°C
35	44	53	61	70	
60	70	80	90	100	
85	95	105	115	125	

Note:
STM Safety temperature monitor (actuator):
temperature scale is already written on the product

Dimensions







AVT/VGS

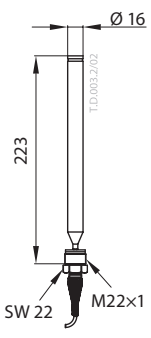
DN	L	H	H_2
	mm		
15	65	257	34
20	70	257	34
25	75	257	37

VGS

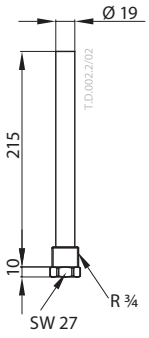
DN	H (mm)	Weight (kg)
15	178	1.3
20	178	1.4
25	178	1.6

AVT

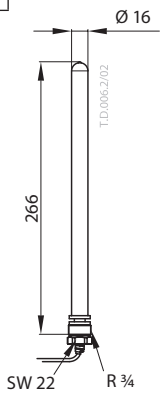
Type		Weight
sensor 210 mm	kg	1.5
sensor 255 mm		1.6



AVT 210

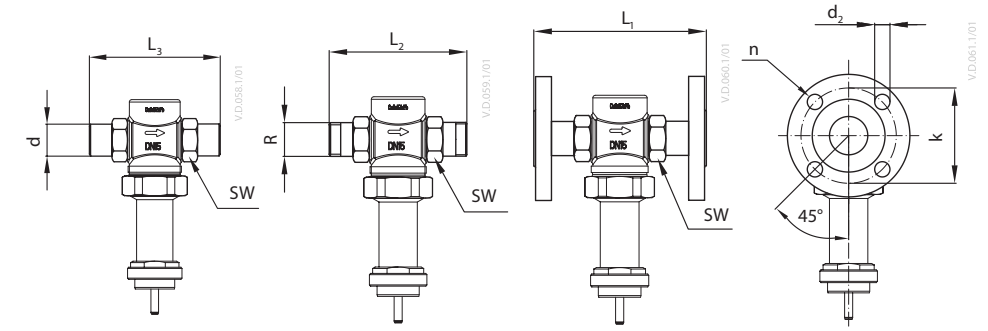


AVT 210
Immersion pocket



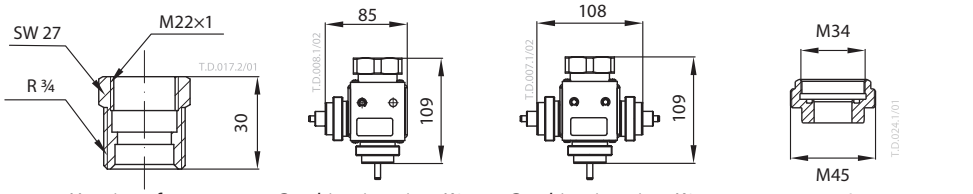
AVT 255

Dimensions *(continuous)*



DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4

[1] Conical ext. thread acc. to EN 10226-1
[2] Flanges PN 25, acc. to EN 1092-2



Housing of sensor stuffing box

Combination piece K2

Combination piece K3

Adapter M34 × 1.5 mm/ M45 × 1.5 mm

ENGINEERING
TOMORROW

Data sheet

Temperature controller (NC) (PN 25)

AVT / VGU - external thread

AVT / VGUF - flange

Description

DIN Geprüft TR(TW)700

AVT / VGUF

AVT / VGU

The AVT / VGU(F) is a self-acting proportional temperature controller developed primarily for cooling applications.

Controller opens on rising temperature.

The controller has a control valve VGU(F), thermostatic actuator and handle for temperature setting. Thermostatic actuator consist of bellows, capillary tube and sensor.

The temperature controller is type-tested according to EN 14597.

Main data:

- DN 15-50
- k_{VS} 4.0 -25 m³/h
- PN 25
- Setting ranges:
  –10 … 40 °C / 20 … 70 °C / 40 … 90 °C / 60 … 110 °C
- Temperature:
  - Circ. water / glycolic water up to 30%: 2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange
- Flow and return mounting.

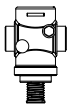
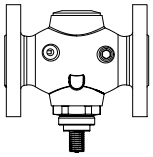
Ordering

Example:
Temperature controller for cooling, DN 15; k_{VS} 4.0 ; PN 25; setting range –10 … 40 °C; T_{max} 150 °C; ext. thread

- *1× VGU DN 15 valve*
  Code No: ***065B0791***
- *1× AVT thermostatic actuator, –10 … 40 °C*
  Code No: ***065-0596***

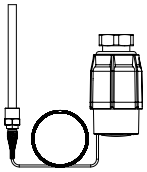
Option:
- *1× Weld-on tailpieces*
  Code No: ***003H6908***

VGU, VGUF valve

Picture	DN (mm)	k_{VS} (m³/h)	Connection		Code No.
	15	4.0	Cylindrical external thread acc. to ISO 228/1	G ¾ A	**065B0791**
	20	6.3		G 1 A	**065B0792**
	25	8.0		G 1¼ A	**065B0793**
	32	12.5		G 1¾ A	**065B0794**
	40	16		G 2 A	**065B0795**
	50	20		G 2½ A	**065B0796**
	32	12.5	Flanges PN 25, acc. to EN 1092-2		**065B0797**
	40	20			**065B0798**
	50	25			**065B0799**

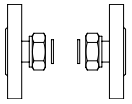
Ordering *(continuous)*

AVT thermostatic actuator

Picture	For valves	Setting range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-25	–10 … +40	170 mm, R ½ [1]	**065-0596**
		20 … 70		**065-0597**
		40 … 90		**065-0598**
		60 … 110		**065-0599**
	DN 32-50	–10 … +40	210 mm, R ¾ [1]	**065-0600**
		20 … 70		**065-0601**
		40 … 90		**065-0602**
		60 … 110		**065-0603**
	DN 15-50	10 … 45	255 mm, R ¾ [1] [2] [3]	**065-0604**
		35 … 70		**065-0605**
		60 … 100		**065-0606**
		85 … 125		**065-0607**

[1] *conic male thread EN 10226*
[2] *without immersion pocket*
[3] *setting range is for aprox. 5-10 °C higher as stated (see Adjustment diagram section)*

Accessories for valves

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
		40			**003H6912**
		50			**003H6913**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
		40		R 1½	**065F6061**
		50		R 2	**065F6062**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**
	Adapter [1]		M45 × 1.5 mm / M30 × 1.5 mm		**003H6928**

[1] *Adapter for VGU(F) combinations with electrical actuators type AMV(E) 20, 23, 30, 33.*

Accessories for thermostats

Picture	Type designation	PN	For valves	Material	Code No.
	Immersion pocket	25	DN 15-25	Brass	**065-4414** [1]
				Stainless steel, mat. No. 1.4571	**065-4415** [1]
			DN 32-50	Brass	**065-4416** [1]
				Stainless steel, mat. No. 1.4435	**065-4417** [1]

[1] *Not for AVT thermostatic actuator code number:* ***065-0604, 065-0605, 065-0606, 065-0607***

Service kits

Picture	Type designation	for sensors	Code No.
	Housing of sensor stuffing box	AVT R ½	**065-4420**
		AVT R ¾	**065-4421**

Technical data

Valves

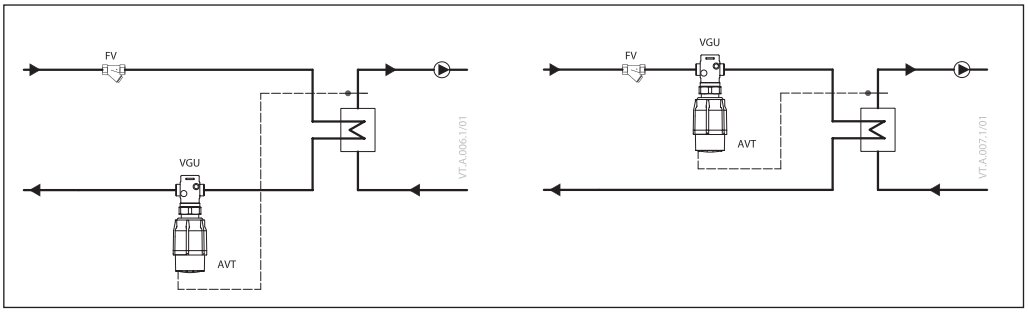
Nominal diameter	DN	15	20	25	32	40	50
k_{VS} value	m^3/h	4.0	6.3	8.0	12.5	20	25
Stroke	mm	5					
Control ratio		>1:50					
Control characteristic		linear					
Cavitation factor z		≥ 0.6		≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534	% of k_{VS}	≤ 0.02			≤ 0.05		
Nominal pressure	PN	25					
Max. differential pressure	bar	20			16		
Medium		Circulation water / glycolic water up to 30%					
Medium pH		Min. 7, max. 10					
Medium temperature	°C	2 … 150					
Connections – valve		External thread			External thread and flange		
Connections – tailpieces		Weld-on and external thread					
		Flange			-		
Materials							
Valve body		Red bronze CuSn5ZnPb (Rg5)			Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
Valve seat		Stainless steel, mat. No. 1.4571					
Valve cone		Dezincing free brass CuZn36Pb2As					
Sealing		EPDM					
Pressure relieve system		Piston					

Thermostatic actuator

Setting range X_s	°C	–10 … 40 / 20 … 70 / 40 … 90 / 60 … 110 10 … 45 / 35 … 70 / 60 … 100 / 85 … 125
Time constant T acc. to EN 14597	s	max. 50 (170 mm, 210 mm), max. 30 (255 mm)
Gain K_s	mm / °K	0.2 (170 mm), 0.3 (210 mm), 0.7 (255 mm)
Max. adm. temperature at sensor		50 °C above maximum setpoint
Max. amb. temperature at sensor	°C	0 … 70
Nominal pressure sensor	PN	25
Nominal pressure immersion pocket	PN	25
Capillary tube length		5 m (170 mm, 210 mm), 4 m (255 mm)
Materials		
Temperature sensor		Cooper
Immersion pocket [1] – Ms design		Brass, nickel-plated
Immersion pocket [1] – Stainless steel design		Mat. No. 1.4571 (170 mm), mat. No. 1.4435 (210 mm)
Handle for temp. setting		Polyamide, glass fiber-reinforced
Scale carrier		Polyamide

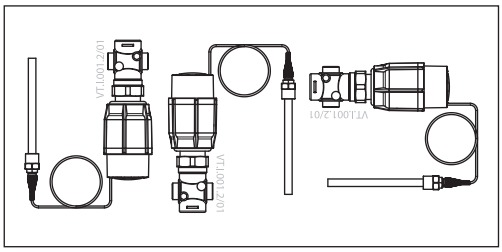
[1] for sensor 170 and 210 mm

Application principles



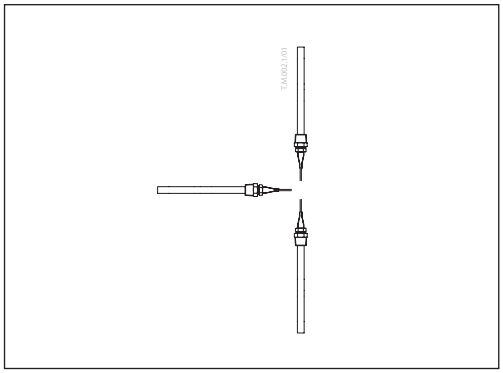
Installation positions

Temperature controller
Temperature controller AVT / VGU(F) can be installed in any position.

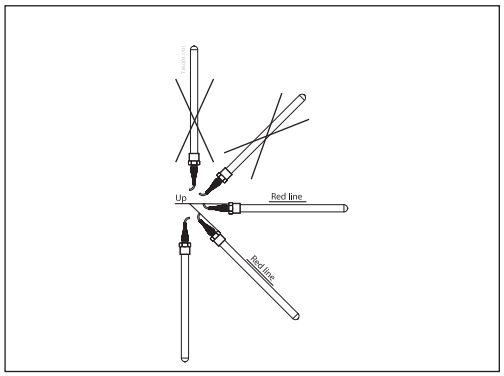


Temperature sensor
The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

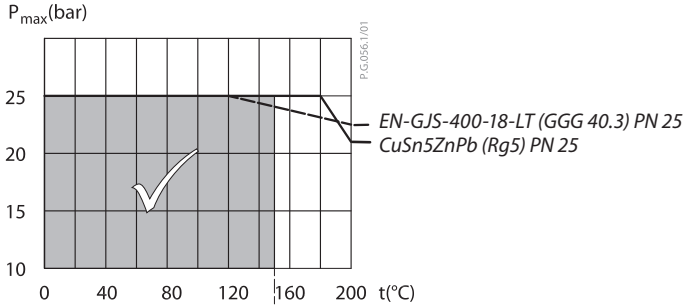
Temperature sensors 170 mm R ½ and 210 mm R ¾
- The temperature sensor may be installed in any position.



Temperature sensor 255 mm R ¾
- The temperature sensor must be installed as shown on the picture.

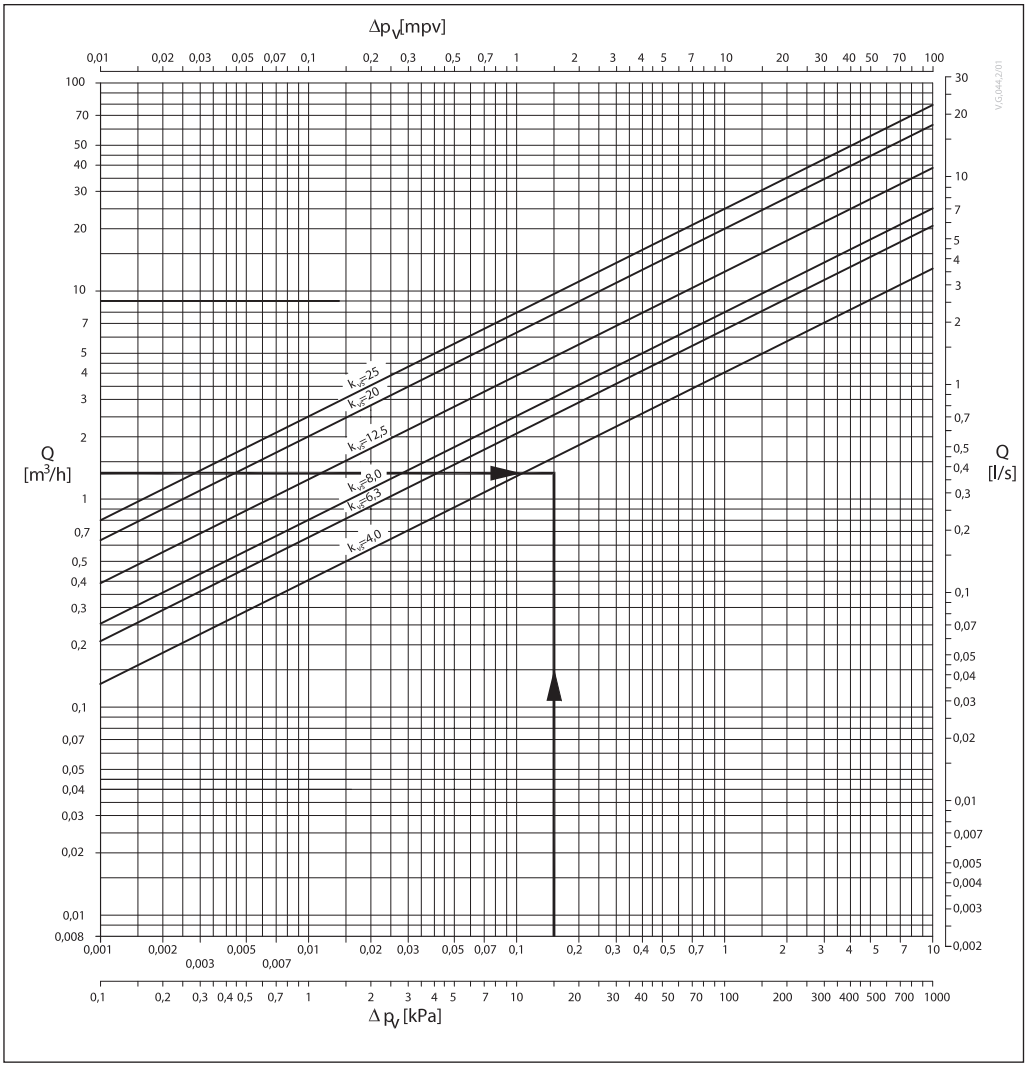


Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Valve sizing



Given data:
P_{max} = 10 kW
Δt = 6 K
Δpv = 0.15 bar

P_{max} - cooling power (kW)
Δt - temperature difference (K)
Δp_v - differential pressure across the valve

Maximum flow Q_{max} (m^3/h) through the valve is calculated according to formula:

$$Q_{max} = \frac{P_{max} \times 0.86}{\Delta t} = \frac{10 \times 0.86}{6}$$

Q_{max} = 1.43 m^3/h

k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_V}} = \frac{1.43}{\sqrt{0.15}}$$

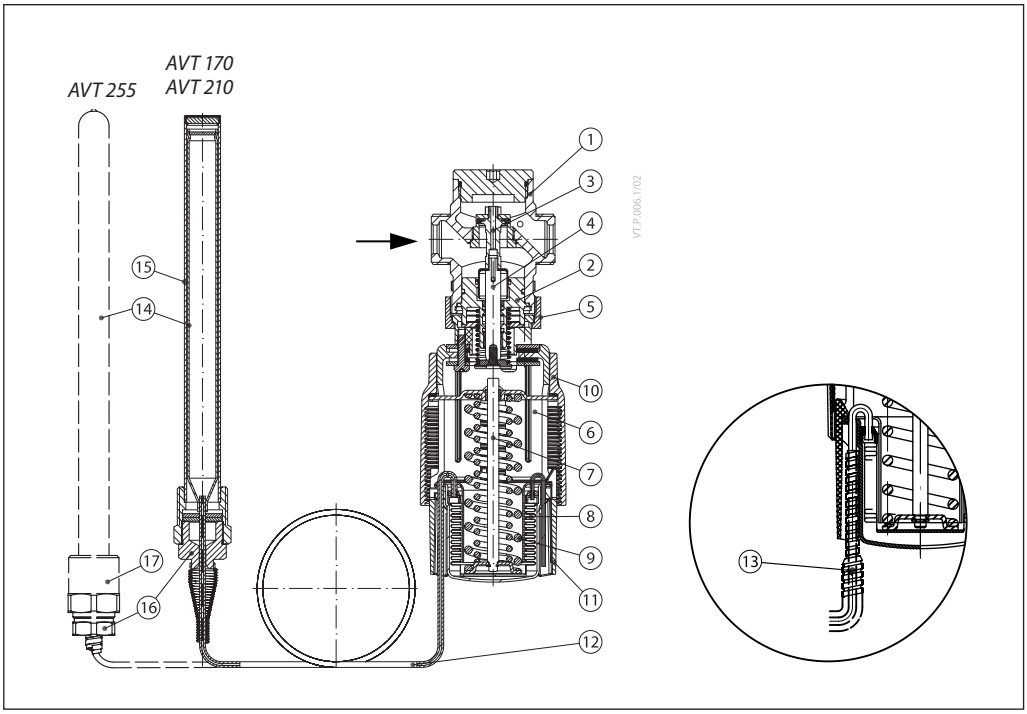
k_v = 3.7 m^3/h

Chosen k_{VS} = 4.0 m^3/h
or
read from the sizing diagram by taking a line through Q scale (1.43 m^3/h) and Δp_v scale (0.15 bar) to intersect k_v-scale at 3.7 m^3/h
Chosen k_{VS} = 4.0 m^3/h

Solution:
The example selects ext. thread valve VGU DN 15, k_{VS} value 4.0 .

Design

1. Valve VGU(F)
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Union nut
6. Thermostatic actuator AVT
7. Thermostat stem
8. Bellows
9. Setting spring for temperature control
10. Handle for temperature setting, prepared for sealing
11. Scale carrier
12. Capillary tube
13. Flexible protected pipe (only at AVT 255 mm)
14. Temperature sensor
15. Immersion pocket
16. Sensor stuffing box
17. Housing of sensor stuffing box



Function

Medium temperature changes cause pressure changes in temperature sensor. Resulting pressure is being transferred through the capillary tube to the bellows. Bellows moves thermostat stem and opens or closes the valve.

By increasing of medium temperature valve cone moves away the seat (valve opens by decreasing of medium temperature valve cone moves towards from the seat (valve closes).

Handle for temperature setting can be sealed.

Settings

Temperature setting
Temperature setting is being done by the adjustment of the setting spring for temperature control.

The adjustment can be done by means of handle for temperature setting and/or temperature indicators.

Adjustment diagram

Temperature setting
Relation between scale numbers 1-5 and closing temperature.

Note: *The values given are approximate*

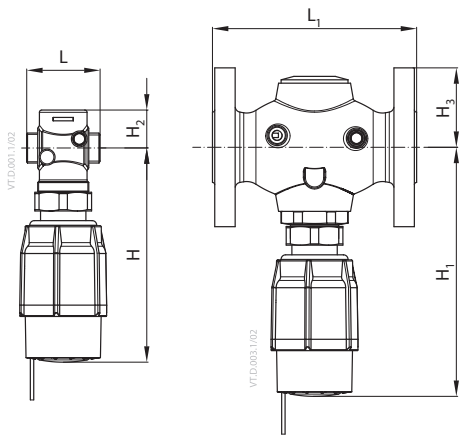
AVT Thermostat ... 170 mm, 210 mm

I	II	III	IIII	IIIII	
-10	3	15	28	40	°C
20	33	45	58	70	
40	53	65	78	90	
60	73	85	98	110	

AVT Thermostat ... 255 mm

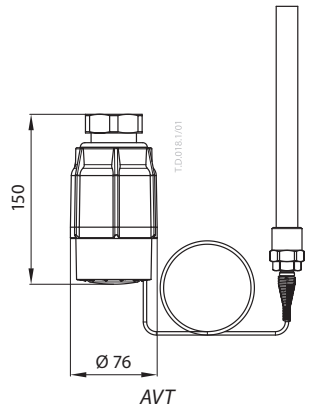
I	II	III	IIII	IIIII	
10	19	28	36	45	°C
35	44	53	61	70	
60	70	80	90	100	
85	95	105	115	125	

Dimensions



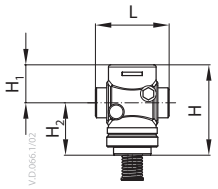
DN	L	L_1	H	H_1	H_2	H_3
	mm					
15	65	-	180	-	34	-
20	70	-	180	-	34	-
25	75	-	180	-	37	-
32	100	180	221	221	63	70
40	110	200	221	221	63	75
50	130	230	221	221	63	82

Note: *other flange dimensions - see table for tailpieces*

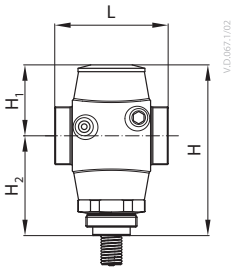


AVT

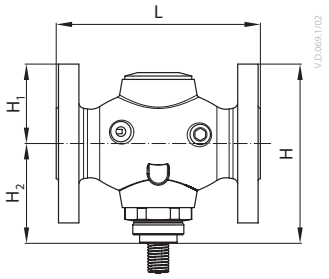
Type		Weight
sensor 170 mm	kg	1.3
sensor 210 mm		1.5
sensor 255 mm		1.6



VGU DN 15-25



VGU DN 32-50



VGUF DN 32-50

VGU

DN	L	H	H_1	H_2	Weight (kg)
	mm				
15	65	80	34	46	0.7
20	70	80	34	46	0.8
25	75	83	37	46	0.9
32	100	154	63	91	3.2
40	110	154	63	91	3.3
50	130	154	63	91	4.1

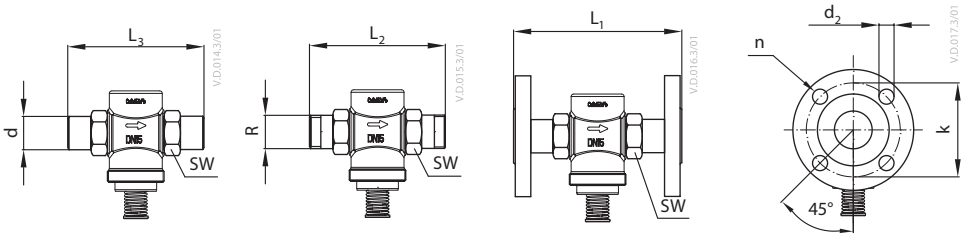
VGUF

DN	L	H	H_1	H_2	Weight (kg)
	mm				
32	180	158	70	88	7.5
40	200	163	75	88	9.0
50	230	171	83	88	11.1

Note*: other flange dimensions - see table for tailpieces*

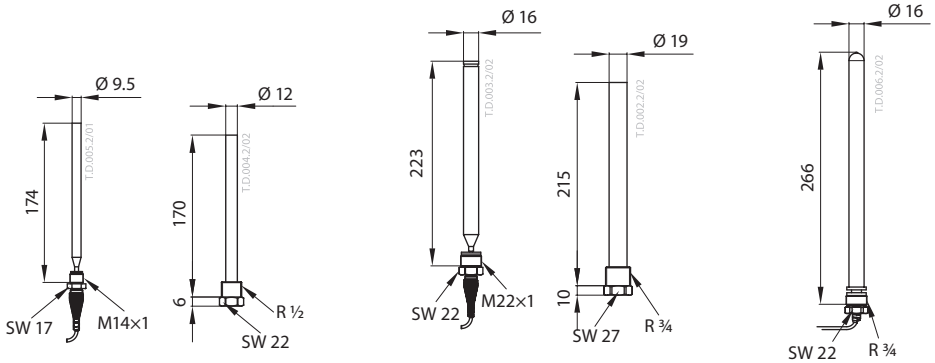
Data sheet — Temperature controller AVT / VGU(F) (PN 25)

Dimensions *(continuous)*

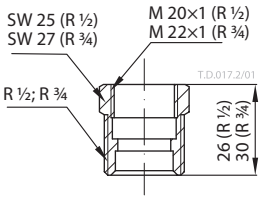


DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	131	139	65	14	4
20	¾	41 (G 1A)	26	150	144	154	75	14	4
25	1	50 (G 1¼A)	33	160	160	159	85	14	4
32	-	-	-	-	-	-	100	18	4
40	-	-	-	-	-	-	110	18	4
50	-	-	-	-	-	-	125	18	4

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*



AVT 170 | *AVT 170 Immersion pocket* | *AVT 210* | *AVT 210 Immersion pocket* | *AVT 255*



Housing of sensor stuffing box

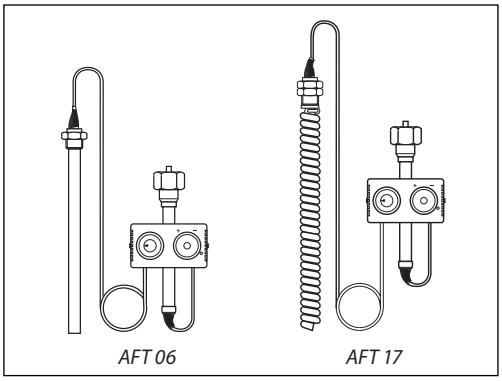
ENGINEERING
TOMORROW

Data sheet

Thermostats AFT 06, AFT 17

Description

DIN Geprüft TR(TW)761



AFT 06 *AFT 17*

The thermostats operate according to the liquid expansion principle. The set point adjuster is directly fitted to the actuator.

There are two sensor designs with different time constants:
- AFT 06 smooth sensor ~120 sec
- AFT 17 spiral sensor ~20 sec

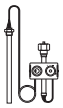
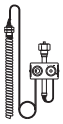
Temperature control of domestic hot water systems with storage tanks and restriction of the return flow temperature in district heating transfer station are the main fields of application. Combinations: temperature controller, safety temperature monitor type STFW, see page 4.

Type-tested according to EN 14597 in connection with the following valves:
VFG 2, VFG 21, VFGS 2, VFG 33 and VFU 2.

Main data (thermostat & valve):
- Setting ranges:
  - AFT 06: -20 ... 50 °C / 20 … 90 °C / 40 … 110 °C / 60 … 130 °C / 110 … 180 °C
  - AFT 17: -20… 50 °C / 20 … 90 °C / 40 … 110 °C / 60 … 130 °C
- Valves: VFG 2, VFG 21, VFGS 2, VFG 33 and VFU
- DN: 15-125
- PN: 16, 25 and 40
- Connection: Flange EN 1092-2

Ordering

AFT Thermostat

Picture	Type	Set-point[1] (°C)	Sensor / time constant [2]	Code No.
	AFT 06	–20 … 50	Sensor with immersion pocket bronze, Ø24×386/120 s	**065-4390**
		20 … 90		**065-4391**
		40 … 110		**065-4392**
		60 … 130		**065-4393**
		110 … 180		**065-4394**
	AFT 17	–20 … 50	Spiral sensor, Ø30×500/20 s	**065-4400**
		20 … 90		**065-4401**
		40 … 110		**065-4402**
		60 … 130		**065-4403**

[1] *Thermostats are proportional controllers, thus certain deviation from set point can be expected and varies from valve DN:*
AFT../VFG.. closing point can deviate up to +/- 10 %
AFT../VFU.. opening point can deviate up to +/- 15 %
More details in sizing example on page 3

[2] *acc. to EN 14597*

Accessories

Picture	Type designation	For thermostat	Material	Code No.
	Immersion pocket	AFT 06	Stainless steel mat. No. 1.4571	**003G1412**
	Combination piece KF2			**003G1440**
	ZF4 Stem extension			**003G1394**

Spare parts

Picture	Type designation	For thermostat	Material	Code No.
	Immersion pocket	AFT 06	Bronze	**003G1399**

Technical data

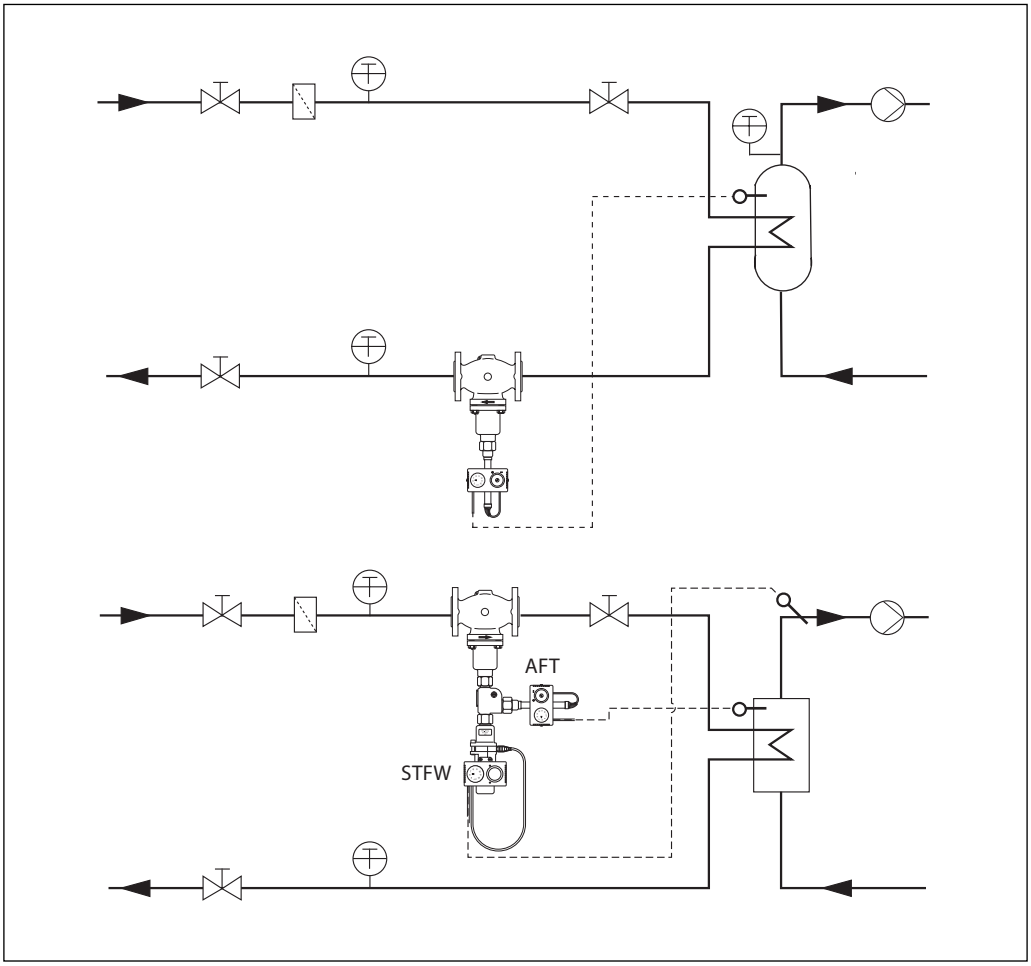
Thermostat

Type		AFT 06	AFT 17
Setting range X_s	°C	–20 … 50, 20 … 90, 40 … 110, 60 … 130, 110 … 180	–20 … 50, 20 … 90, 40 … 110, 60 … 130
Time constant T	s	120 (with immersion pocket)	20 (without immersion pocket)
Gain K_s	mm/°C	0.8	
Max. temperature at sensor		100 °C above the adjusted set-point	
Max. amb. temperature	°C	0 … 70	
Nominal pressure sensor	PN	40	
Nominal pressure immersion pocket			
Capillary tube length	m	5	
Materials			
Temperature sensor		Smooth sensor Ø24 × 386	Spiral sensor Ø30 × 500
Sensor medium		Silicon oil	
Sensor material		Brass, bronze	Cu spiral, nickel-plated
Immersion pocket material		Nickel-plated	No immersion pocket
		Stainless steel Mat. No. 1.4571	
Weight	kg	3.0	3.5

Valves

Nominal diameter	DN	15	20	25	32	40	50	65	80	100	125
k_{VS} value	m^3/h	4	6.3	8	16	20	32	50	80	125	160

Application principles



Sizing

To get the valve DN two parameters are needed:
1. the system k_v and
2. the acceptable temperature deviation Xp.

Given data:

Capacity:	600 kW
Hot water temperature:	50 °C
Primary temperature difference ΔT:	40 °C
Differential pressure ΔPv:	0.8 bar

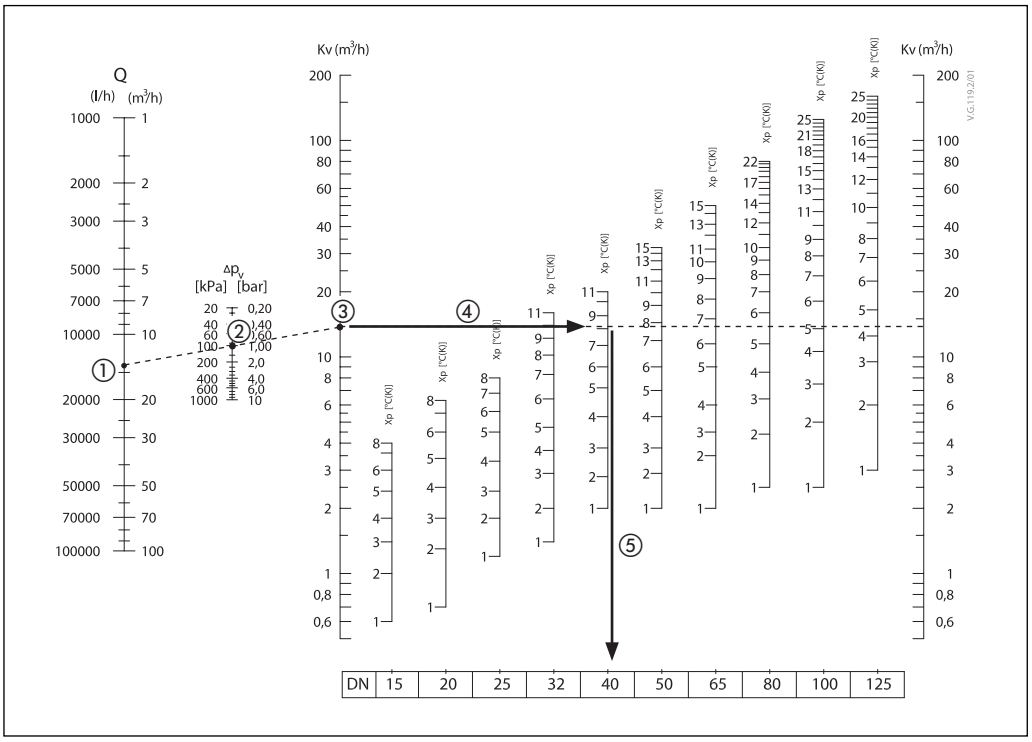
Flow as data or calculated:

$$\text{Flow} = \frac{\text{Capacity (kW)}}{\text{Primary temp. diff. (°C)}} 0.86 = \frac{600}{40} 0.86 = 12.9\,\text{m}^3/\text{h}$$

1. The system k_v can be calculated or read from a graph.

$$k_v = \frac{\text{Flow}\,(\text{m}^3/\text{h})}{\sqrt{\text{Diff. presure (bar)}}} = \frac{12.9}{\sqrt{0.8}} = 14.4\,\text{m}^3/\text{h}$$

   k_v readout from a graph:
   from the Q scale ① draw a straight line through a Δp ② to a k_v scale ③.
2. The acceptable temperature deviation:
   From the needed k_v draw a horizontal line ④ over the graph. Choose the acceptable temperature deviation and read the valve DN below the reading ⑤.



Example:
Xp = 8 °C –>DN 40, AFT 20 … 90 °C, setting 50 °C

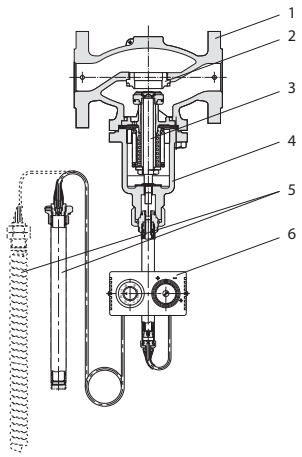
VFG:
The sensor has:
a) 50 °C: the valve is **fully closed**
b) 50 °C–Xp=42 °C: the valve is max. opened

VFU:
The sensor has:
a) 50 °C: the valve **starts opening**
b) 50 °C+Xp=58 °C: the valve is max. opened

Data sheet **Thermostats AFT 06, AFT 17**

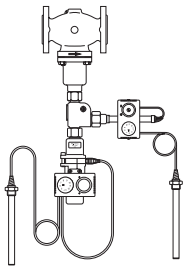
Design

1. Valve body
2. Valve seat
3. Trim
4. Bonnet
5. Sensor
6. Set- point adjuster



Sensor: AFT 06, AFT 17
Valve: VFG2, VFG 21, VFU 2, VFGS 2, VFG 33

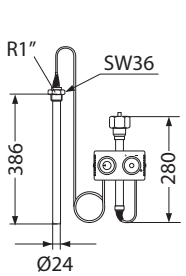
Combinations



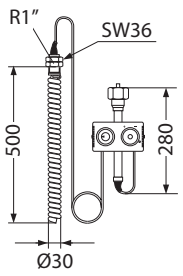
AFT.. / STFW / VFG

Valve type	VFG 2/21	VFU 2	VFGS 2	VFG 33
DN	15-125	15-125	15-125	25-125
Medium	Water		Steam	Water
Max. temp. (°C)	200 (VFG 2) 150 (VFG 21)	200	200 350 (with ZF4)	200 350 (with ZF4)
PN	16, 25, 40			25
Remark	NO valve	NC valve	Steam valve	3-way valve mixing valve

Dimensions

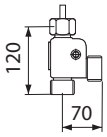


AFT 06

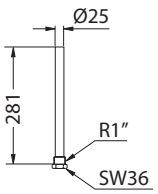


AFT 17

Accessories



Comb. piece KF2



Stainless steel

Danfoss A/S
Climate Solutions • danfoss.com • +45 7488 2222

ENGINEERING
TOMORROW

Data sheet

Temperature controller AVT with safety temperature monitor STM/VG(F) (PN25)

Description

DIN Geprüft TR(TW)700

DIN Geprüft STW871

STM / VGF

STM/VG(F) and STM/AVT/VG(F) are self-acting proportional temperature controllers used for temperature control and temperature monitoring of drinking water, water and water glycol mixtures for heating and district heating systems.

VG - valve with external thread
VGF - valve with flange

Controller closes on rising temperature.

The controllers are:
- Type-tested acc. to EN 14597 and protect against exceeding temperatures:
  Applications:
  - District heating systems acc. to DIN 4747
  - Heating systems acc. to EN 12828 (DIN 4751) and EN 12953-6 (DIN 4752)
  - Water heating systems for drinking and industrial waters acc. to DIN 4753

Main data:
- DN 15-50
- k_{VS} 0.4 -25 m³/h
- PN 25
- Setting ranges:
  - STM monitor:
    20 … 75 °C / 40 … 95 °C / 30 … 110 °C
  - AVT thermostatic actuator:
    –10 … 40 °C / 20 … 70 °C /
    40 … 90 °C / 60 … 110 °C
    and
    10 … 45 °C / 35 … 70 °C /
    60 … 100 °C / 85 … 125 °C
- Temperature:
  - Circ. water/glycolic water up to 30 %:
    2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange
- Flow and return mounting

Ordering

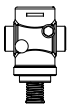
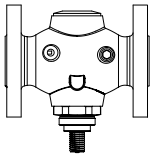
Example 1 - **STM / VG(F)** *controller:*
Safety temperature monitor;
DN 15; k_{VS} 1.6 , PN 25;
limit range 30 …110 °C;
T_{max} 150 °C; ext. thread

- *1×* *VG DN 15 valve*
  Code No: ***065B0772***
- *1×* *STM monitor, 30 … 110 °C*
  Code No: ***065-0608***

Option:
- *1×* *Weld-on tailpieces*
  Code No: ***003H6908***

All products will be delivered separately.

VG, VGF valve

Picture	DN (mm)	k_{VS} (m³/h)	Connection		Code No.
	15	0.4	Cylindrical external thread acc. to ISO 228/1	G ¾ A	**065B0770**
		1.0			**065B0771**
		1.6			**065B0772**
		2.5			**065B0773**
		4.0			**065B0774**
	20	6.3		G 1 A	**065B0775**
	25	8.0		G 1 ¼ A	**065B0776**
	32	12.5		G 1 ¾ A	**065B0777**
	40	16		G 2 A	**065B0778**
	50	20		G 2 ½ A	**065B0779**
	15	4.0	Flanges PN 25, acc. to EN 1092-2		**065B0780**
	20	6.3			**065B0781**
	25	8.0			**065B0782**
	32	12.5			**065B0783**
	40	20			**065B0784**
	50	25			**065B0785**

Ordering *(continuous)*

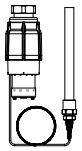
Example 2- **STM/AVT/ VG(F)** *controller:*
Temperature controller with safety temperature monitor; DN 15, k_{VS} 1.6 ; PN 25; limit range 30 … 110 °C; setting range 40 … 90 °C; T_{max} 150 °C; ext. thread

- *1× VG DN 15 valve*
  Code No: ***065B0772***
- *1× STM monitor, 30 … 110 °C*
  Code No: **065-0608**
- *1x AVT thermostatic actuator, 40 … 90 °C*
  Code No: ***065-0598***
- *1× K2 Combination piece*
  Code No: **003H6855**

Option:
- *1× Weld-on tailpieces*
  Code No: **003H6908**

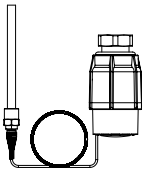
All products will be delivered separately.

STM Safety temperature monitor (actuator)

Picture	For valves	Limit range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-50	30 … 110	210 mm, R ¾ [1]	065-0608
		20 … 75		065-0609
		40 … 95		065-0610

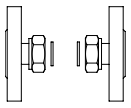
[1] *conic male thread EN 10226-1*

AVT Thermostatic actuator

Picture	For valves	Setting range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-25	–10 … +40	170 mm, R ½ [1]	065-0596
		20 … 70		065-0597
		40 … 90		065-0598
		60 … 110		065-0599
	DN 32-50	–10 … +40	210 mm, R ¾ [1]	065-0600
		20 … 70		065-0601
		40 … 90		065-0602
		60 … 110		065-0603
	DN 15-50	10 … 45	255 mm, R ¾ [1] [2]	065-0604
		35 … 70		065-0605
		60 … 100		065-0606
		85 … 125		065-0607

[1] *conic male thread EN 10226-1*
[2] *without immersion pocket*

Accessories for valves

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		003H6908
		20			003H6909
		25			003H6910
		32			003H6911
		40			065B2006
		50			065B2007
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	003H6902
		20		R ¾	003H6903
		25		R 1	003H6904
		32		R 1¼	003H6905
		40		R 1½	065B2004
		50		R 2	065B2005
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		003H6915
		20			003H6916
		25			003H6917

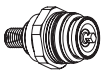
Accessories for thermostats

Picture	Type designation	PN	For controllers	Material	Code No.
	Immersion pocket	25	AVT/VG(F) DN 15-25	Brass	065-4414 [1]
				Stainless steel, mat. No. 1.4571	065-4415 [1]
			AVT/VG(F) DN 32-50 STM/VG(F) DN 15-50	Brass	065-4416 [1]
				Stainless steel, mat. No. 1.4435	065-4417 [1]
	Combination piece K2				003H6855
	Combination piece K3				003H6856

[1] *Not for AVT thermostatic actuator code numbers:* ***065-0604, 065-0605, 065-0606, 065-0607***

Ordering *(continuous)*

Service kits

Picture	Type designation	DN (mm)	k_{VS} (m^3/h)	Code No.
	Valve insert	15	0.4	**003H6869**
			1.0	**003H6870**
			1.6	**003H6871**
			2.5	**003H6872**
			4.0	**003H6873**
		20	6.3	**003H6874**
		25	8.0	**003H6875**
		32 / 40 / 50	12.5 / 16 / 20 / 25	**003H6876**
	Housing of sensor stuffing box	**for sensors**		
		AVT 170 R ½		**065-4420**
		AVT 210, 255 R ¾		**065-4421**

Technical data

VG, VGF valves

Nominal diameter		DN	15					20	25	32	40	50
k_{VS} value		m^3/h	0.4	1.0	1.6	2.5	4.0	6.3	8	12.5	16/20 [1]	20/25 [1]
Stroke			3		5					10		
Control ratio			> 1:50									
Control characteristic			linear									
Cavitation factor z			≥ 0.6						≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02							≤ 0.05		
Nominal pressure		PN	25									
Max. differential pressure		bar	20							16		
Medium			Circulation water / glycolic water up to 30 %									
Medium pH			Min. 7, max. 10									
Medium temperature		°C	2 … 150									
Connections	valve		External thread									
			-					Flange				
	tailpieces		Weld-on and external thread									
			Flange							-		
Materials												
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)							Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
	flange		-					Ductile iron EN-GJS-400-18-LT (GGG 40.3)				
Valve seat			Stainless steel, mat. No. 1.4571									
Valve cone			Dezincing free brass CuZn36Pb2As									
Sealing			EPDM									
Pressure relieve system			Piston									

[1] *Flange valve body*

STM Safety temperature monitor (actuator)

Limit range X_s		°C	20 … 75 / 40 … 95 / 30 … 110
Time constant T acc. to EN 14597		s	max. 100
Gain K_s		mm/°K	0.3
Max. adm. temperature at sensor			80 °C above maximum setpoint
Max. amb. temperature at thermostat		°C	0 … 70
Nominal pressure sensor		PN	25
Nominal pressure immersion pocket			
Capillary tube length		m	5
Materials			
Temperature sensor			Cooper
Immersion pocket	Ms design		Brass, nickel-plated
	Stainless steel design		mat. No. 1.4435
Handle for temp. setting			Polyamide, glass fiber-reinforced
Scale carrier			Polyamide

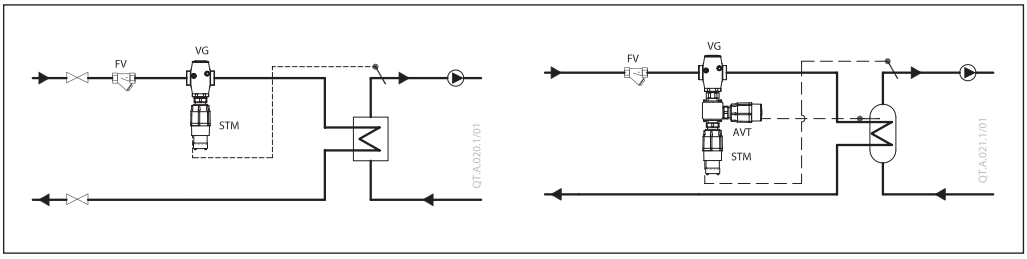
Technical data *(continuous)*

AVT Thermostatic actuator

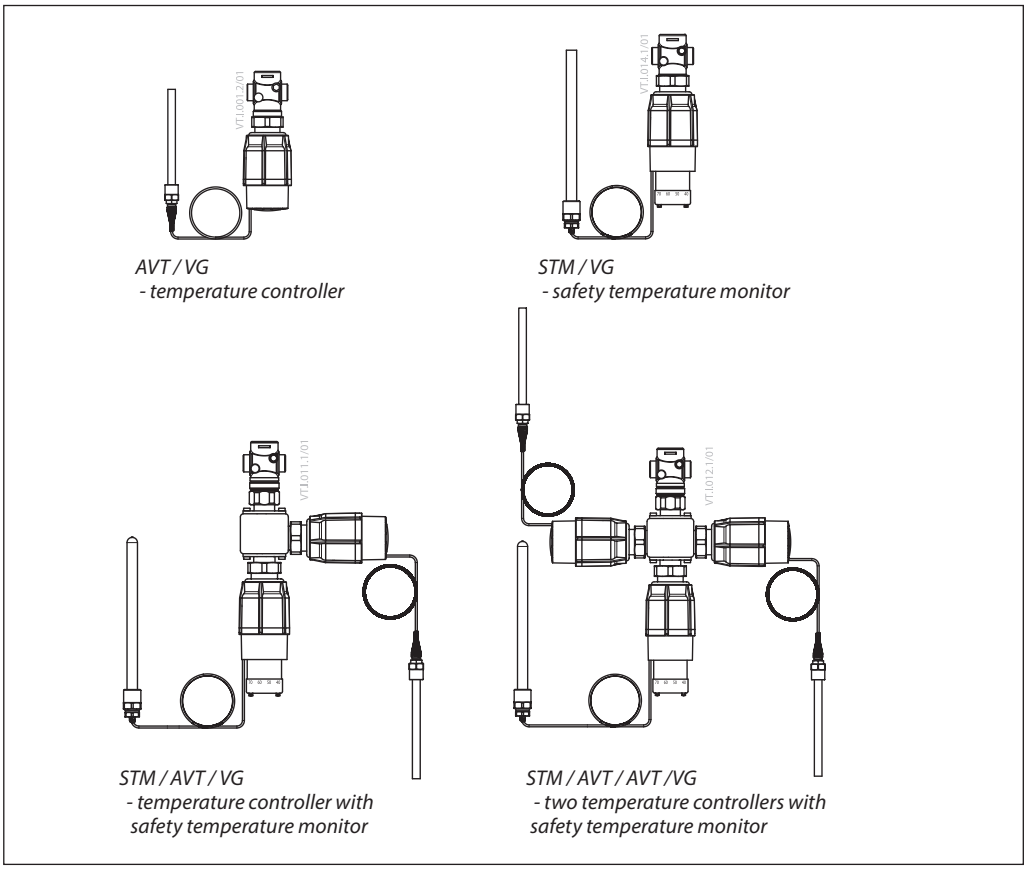
Setting range X_s		°C	–10 … 40 / 20 … 70 / 40 … 90 / 60 … 110 10 … 45 / 35 … 70 / 60 … 100 / 85 … 125
Time constant T acc. to EN 14597		s	max. 50 (170 mm, 210 mm), max. 30 (255 mm)
Gain K_s		mm/°K	0.2 (170 mm); 0.3 (210 mm); 0.7 (255 mm)
Max. adm. temperature at sensor			50 °C above maximum setpoint
Max. amb. temperature at thermostat		°C	0 … 70
Nominal pressure sensor		PN	25
Nominal pressure immersion pocket			
Capillary tube length		m	5 (170 mm, 210 mm), 4 m (255 mm)
Materials			
Temperature sensor			Cooper
Immersion pocket [1]	Ms design		Brass, nickel-plated
	Stainless steel design		Mat. No. 1.4571 (170 mm), mat. No. 1.4435 (210 mm)
Handle for temp. setting			Polyamide, glass fiber-reinforced
Scale carrier			Polyamide

[1] *for sensor 170 and 210 mm*

Application principles



Combinations



AVT / VG
- temperature controller

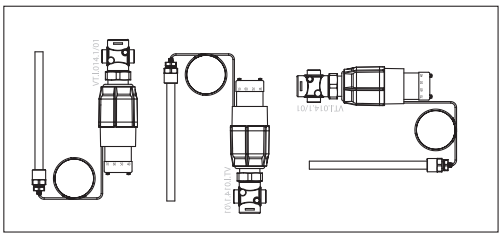
STM / VG
- safety temperature monitor

STM / AVT / VG
- temperature controller with safety temperature monitor

STM / AVT / AVT /VG
- two temperature controllers with safety temperature monitor

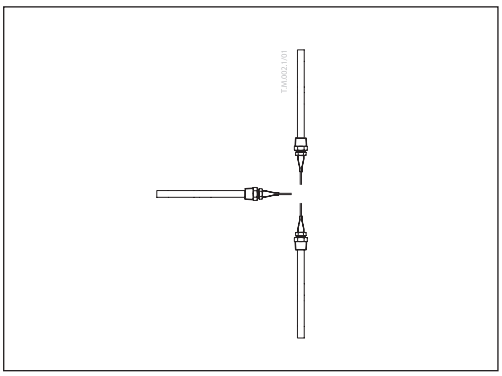
Installation positions

Temperature controller and safety temperature monitor
Temperature controller AVT / VG(F) and safety temperature monitor STM / VG(F) can be installed in any position.

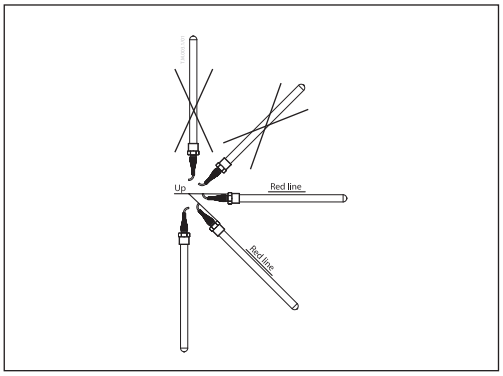


Temperature sensor
The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

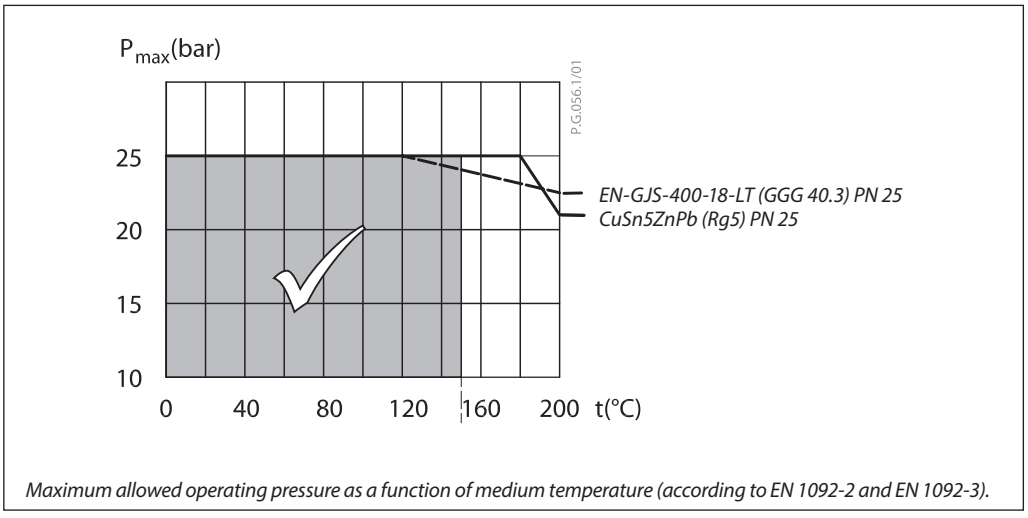
Temperature sensors 170 mm R½ and 210 mm R¾
- The temperature sensor may be installed in any position.



Temperature sensor 255 mm R¾
- The temperature sensor must be installed as shown on the picture.

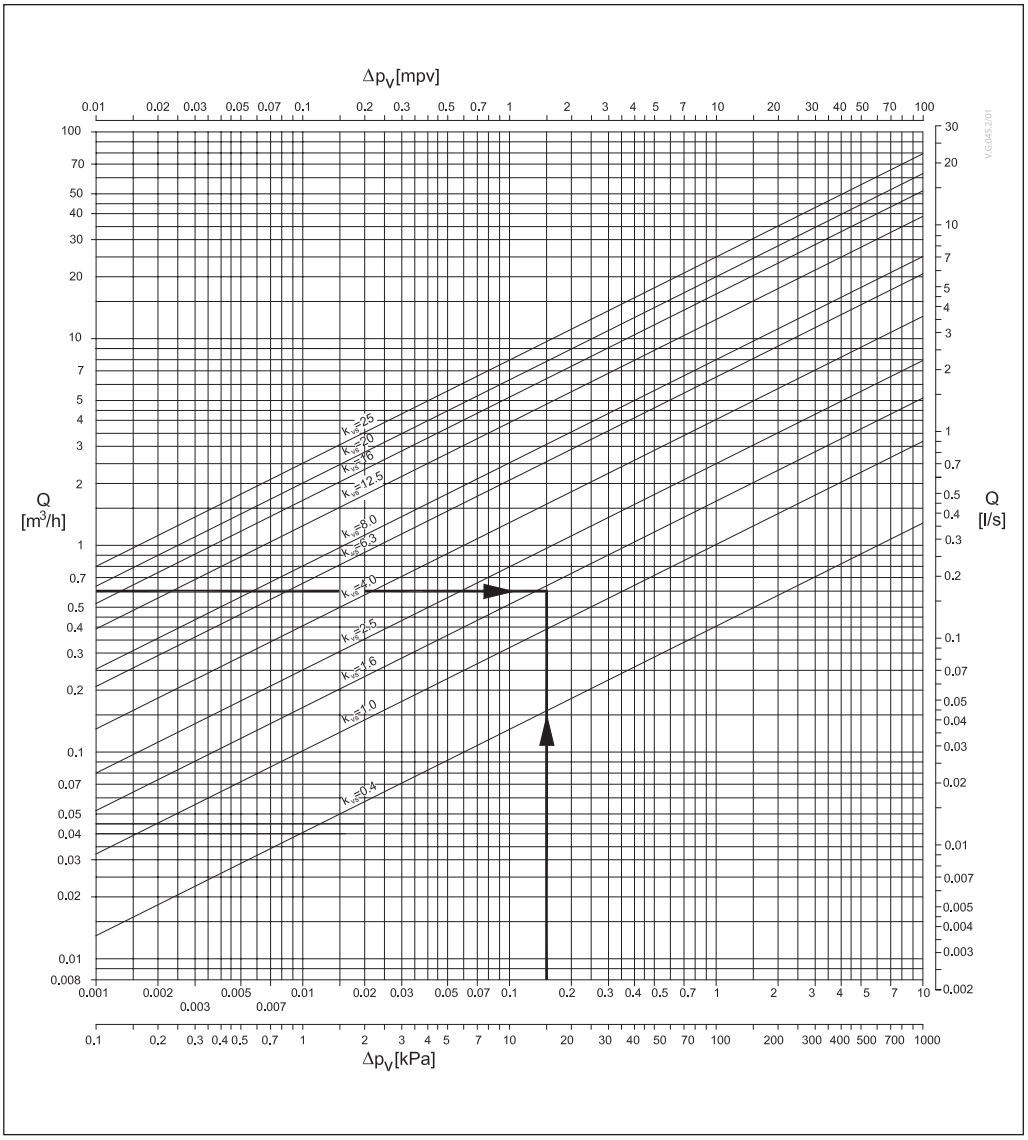


Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Valve sizing



Given data:
P_{max} = 14 kW
Δt = 20 K
Δp_v = 0.15 bar

P_{max} - heating power (kW)
Δt -temperature difference (K)
Δp_v - differential pressure across the valve

Maximum flow Q_{max} (m³/h) through the valve is calculated according to formula:

$$Q_{max} = \frac{P_{max} \times 0.86}{\Delta t} = \frac{14 \times 0.86}{20}$$

Q_{max} = 0.6 m³/h

k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_V}} = \frac{0.6}{\sqrt{0.15}}$$

k_v = 1.5 m³/h

Chosen k_{VS} = 1.6 m³/h

or read from the sizing diagram by taking a line through Q scale (0.6 m³/h) and Δp_v scale (0.15 bar) to intersect k_v-scale at 1.5 m³/h

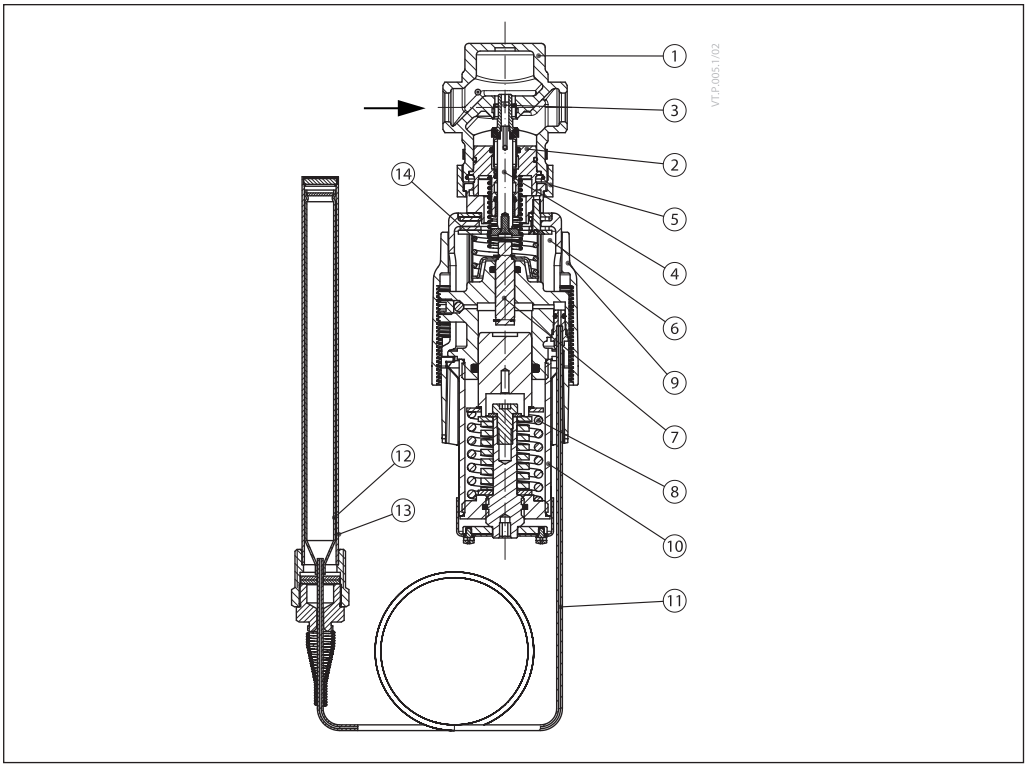
Chosen k_{vs} = 1.6 m³/h

Solution:
The example selects:
1) ext. thread valve VG DN 15, k_{VS} value 1.6 or
2) flange valve VGF DN 15, k_{VS} value 1.6

Design

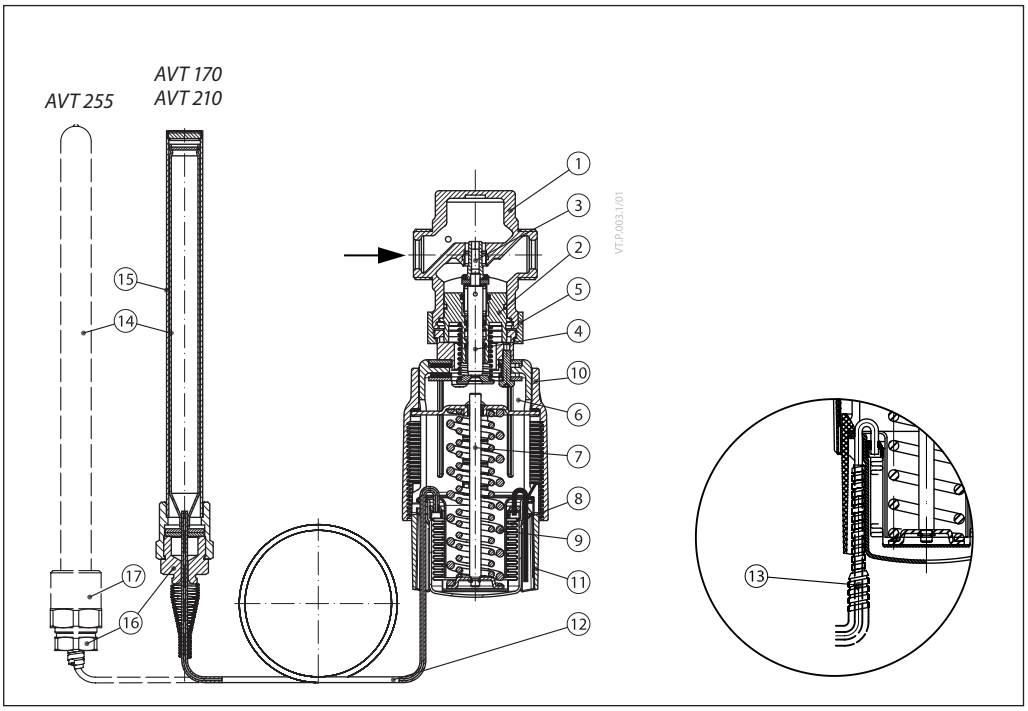
STM / VGF

1. Valve VG(F)
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Union nut
6. Safety temp. monitor STM
7. Thermostat stem
8. Setting spring for temperature control
9. Handle for limit setting, prepared for sealing
10. Scale carrier
11. Capillary tube
12. Temperature sensor
13. Immersion pocket
14. Safety spring



AVT / VG(F)

1. Valve VG(F)
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Union nut
6. Thermostatic actuator AVT
7. Thermostat stem
8. Bellows
9. Setting spring for temperature control
10. Handle for temperature setting, prepared for sealing
11. Scale carrier
12. Capillary tube
13. Flexible protected pipe (only at AVT 255 mm)
14. Temperature sensor
15. Immersion pocket
16. Sensor stuffing box
17. Housing of sensor stuffing box



Function

Mode of Operation

The safety temperature monitor is proportional temperature controller which controls temperature and protects the system against exceeding temperatures. The valve cone is soft sealed and pressure relieved.

Safety Temperature Monitor (STM/VG(F))

- Function
  In case the temperature at the temperature sensor exceeds the adjusted set point, safety temperature monitor interrupts energy supply by closing the valve. As soon as the temperature at the temperature sensor drops, the valve opens automatically.

  Handle for limit setting can be sealed.

- Extended safety function
  If there is a leakage in the area of the temperature sensor, the capillary tube, or the thermostat, the valve closes by a safety spring in the safety thermostat. In this case safety temperature monitor (actuator) must be replaced.
- Physical Function Principle
  The safety temperature monitor operates in accordance with the liquid expansion principle. The temperature sensor, the capillary tube and the bellows are filled with liquid. As the temperature at the temperature sensor rises, the liquid expands, the thermostat stem moves out and closes the valve.

Temperature Controller (AVT/VG(F))

- Function
  By increasing of medium temperature valve cone moves towards the seat (valve closes), by decreasing of medium temperature valve cone moves away from the seat (valve opens).

  Handle for temperature setting can be sealed.

- Physical Function Principle
  Medium temperature changes cause pressure changes in temperature sensor. Resulting pressure is being transferred through the capillary tube to the bellows. Bellows moves thermostat stem and opens or closes the valve.

Settings

Temperature setting (AVT)
Temperature setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for temperature setting and/or temperature indicators.

Limit setting (STM / VG(F)
Limit setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for limit setting and/or temperature indicators.

Adjustment diagram

Temperature setting
Relation between scale numbers 1-5 and closing temperature.

Note: *The values given are approximate*

AVT Thermostat ... 170 mm, 210 mm

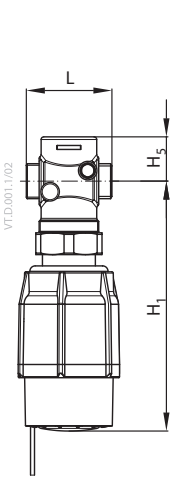
I	II	III	IIII	IIIII	
-10	3	15	28	40	°C
20	33	45	58	70	
40	53	65	78	90	
60	73	85	98	110	

AVT Thermostat ... 255 mm

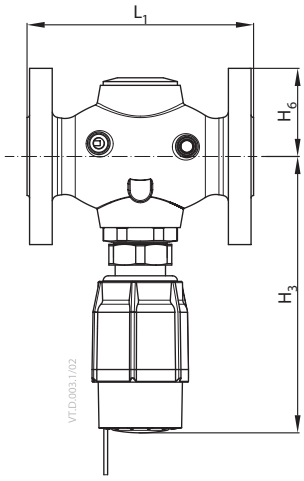
I	II	III	IIII	IIIII	
10	19	28	36	45	°C
35	44	53	61	70	
60	70	80	90	100	
85	95	105	115	125	

Note:
STM Safety temperature monitor (actuator):
temperature scale is already written on the product

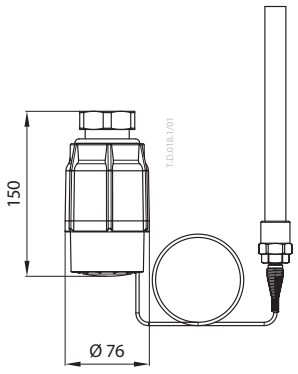
Dimensions



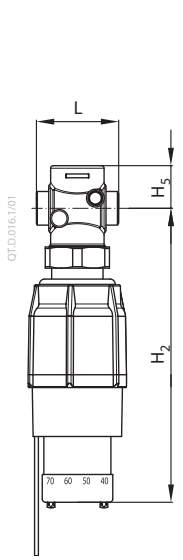
AVT/VG DN15-50



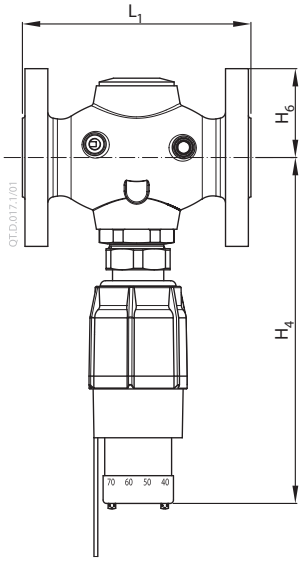
AVT/VGF DN 15-50



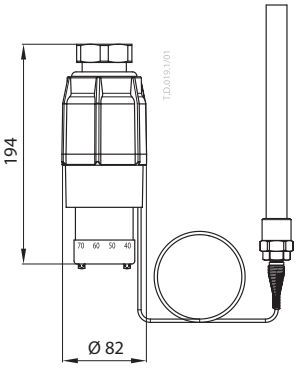
AVT



STM/VG DN15-50



STM/VGF DN15-50

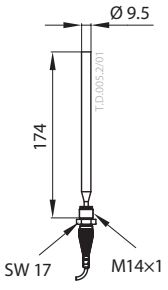


STM

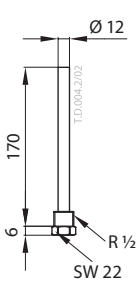
DN	L	L_1	H_1	H_2	H_3	H_4	H_5	H_6
15	65	130	180	224	229	274	34	47
20	70	150	180	224	229	274	34	52
25	75	160	180	224	229	274	37	57
32	100	180	221	266	221	266	62	70
40	110	200	221	266	221	266	62	75
50	130	230	221	266	221	266	62	82

AVT, STM

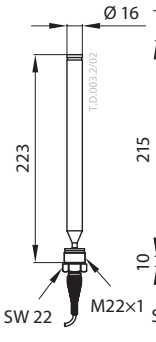
Type		Weight	
		AVT	STM
sensor 170 mm	kg	1.4	-
sensor 210 mm		1.5	2.6
sensor 255 mm		1.6	-



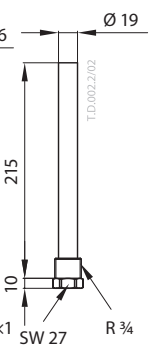
AVT 170



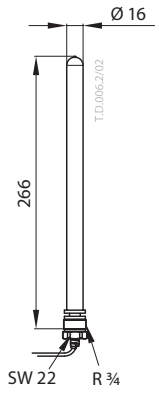
AVT 170
Immersion pocket



AVT 210 / STM

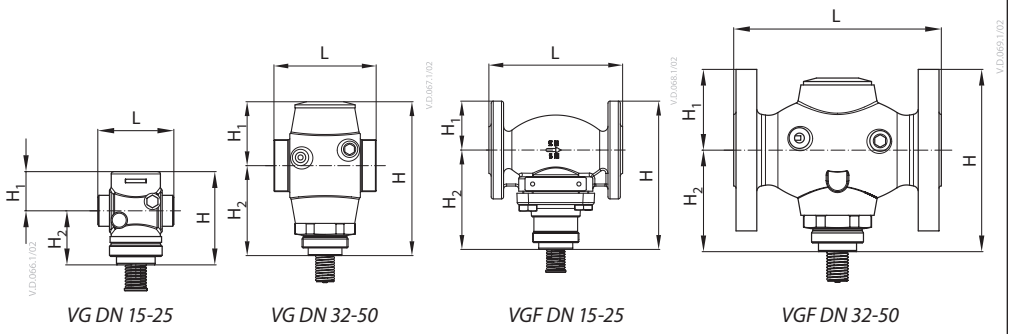


AVT 210 / STM
Immersion pocket



AVT 255

Dimensions *(continuous)*



VG DN 15-25 *VG DN 32-50* *VGF DN 15-25* *VGF DN 32-50*

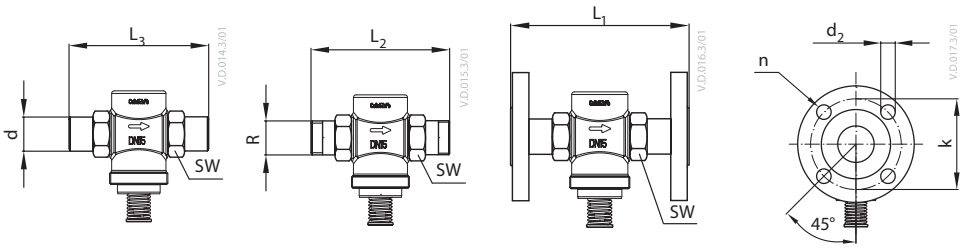
VG

DN	L	H	H_1	H_2	Weight (kg)
	mm				
15	65	80	34	46	0.7
20	70	80	34	46	0.8
25	75	83	37	46	0.9
32	100	151	63	88	3.0
40	110	151	63	88	3.1
50	130	151	63	88	3.8

VGF

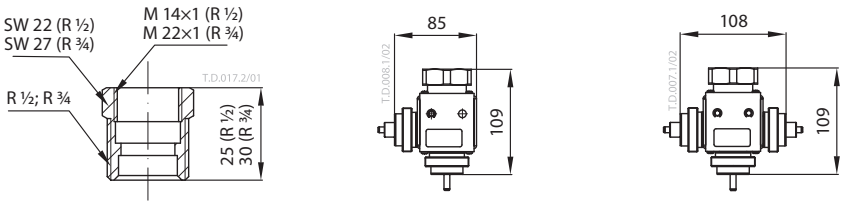
DN	L	H	H_1	H_2	Weight (kg)
	mm				
15	130	144	48	96	3.3
20	150	149	53	96	4.1
25	160	154	58	96	4.7
32	180	158	70	88	7.5
40	200	163	75	88	9.0
50	230	171	83	88	11.1

***Note**: other flange dimensions - see table for tailpieces*



DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	131	139	65	14	4
20	¾	41 (G 1A)	26	150	144	154	75	14	4
25	1	50 (G 1¼A)	33	160	160	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	195	204	110	18	4
50	2	82 (G 2½A)	60	-	252	234	125	18	4

[1] Conical ext. thread acc. to EN 10226-1
[2] Flanges PN 25, acc. to EN 1092-2



Housing of sensor stuffing box *Combination piece K2* *Combination piece K3*