

FLOW

Variable Area Flowmeters- Plastic-Indication Only

- 5** MR3000 Molded Variable Area Flowmeter, 1/8" Pipe, Air Ranges to 100 ccm, Water to 300 ccm
- 6** FR2000, FR4000, FR4500 Acrylic Variable Area Flowmeter, 1/8" & 3/4" Air To 4000 ccm, Water to 20 l
- 7** FR4800 Acrylic Variable Area Flowmeter, 3/4", Air to 2200 lpm, Water to 70 lpm
- 8** FR5000 Acrylic Variable Area Flowmeter, 1", Air to 3400 lpm, Water to 75 lpm
- 9** FR5500 Acrylic Variable Area Flowmeter, 1.5" & 2", Air to 11000 lpm, Water to 400 lpm
- 10,11,12** DS15 Flow Indicator, Switch & Transmitter, F.S. Ranges From 24 lph to 50,000 lph

Variable Area Flowmeters- Glass/Metal- Indication Only

- 13,14** GR Glass Tube Flowmeters, Air to 66 lpm, Water to 2 lpm

Variable Area Flowmeters - Plastic-Indication/Alarm/Analog Out

- 10,11,12** DS15 Flow Indicator, Switch & Transmitter, F.S. Ranges From 24 lph to 50,000 lph

Variable Area Flowmeters - Glass/Metal-Indication/Alarm/Analog Out

- 15,16** DS01 Flow Meter With Switch Output, 1/4" to 1-1/4" Pipe, Ranges to 150 l/min Water, 4500 lpm Air, Pressure to 16 Bar
- 17,18** DS02 Flow Switch, 1/4" to 1-1/4" Pipe, Ranges to 150 l/min Water, 4500 lpm Air
- 19,20** DS03 Flow Meter With Switch Output, 1/4" to 1" Pipe, Ranges to 50 l/min Water, 1600 lpm Air, Pressure to 10 Bar
- 21,22** DS04 Flow Meter With Switch Output, 1/4" to 1" Pipe, Ranges to 150 l/min Water, 3000 lpm Air, Pressure to 300 Bar
- 23,24** DS05 Flow Meter With Switch Output, 1/4" to 1-1/4" Pipe, Ranges to 250 l/min Water, Pressure to 10 Bar
- 25,26** DS06 Flow Meter With Switch Output, 1/4" to 1-1/4" Pipe Ranges to 250 l/min Water, Pressure to 300 Bar
- 27,28** DS07 Viscosity Compensated Flow Meter With Switch Output, 1/4" to 1" Pipe, Ranges to 90 l/min, Pressure to 16 Bar
- 29,30** DS08 Viscosity Compensated Flow Meter With Switch Output, 1/4" to 3/4" Pipe, Ranges to 90 l/min, Pressure to 350 Bar
- 31,32** DS20 Variable Area Flowmeter with Analog & Alarm Output, 1/4" to 4" Pipe, Ranges to 250 lpm & 8000 Slph
- 33-36** DS25 Variable Area Flowmeter with Analog & Alarm Output, 1/2" to 4" Pipe, Ranges to 440 GPM & 1100 SCFM

Single-Jet & Multi-Jet Totalizing Water Meters- Indication/Alarm Output

- 37,38** CLXCD-C1, 1/2" & 3/4" Brass Singlejet Totalizing Water Meters , Range 0.25 to 22 GPM
- 39,40,41** CLXCD-P, 1/2" & 3/4" Plastic Singlejet Totalizing Water Meters , Range 0.25 to 22 GPM
- 42,43,44** MJ-SDC 5/8" x 3/4" Multijet Totalizing Water Meters , Range 0.25 to 22 GPM
- 45,46,47** MJ-SDC 1", 1-1/2", 2" Multijet Totalizing Water Meters , Ranges to 160 GPM

Orifice Type Flowmeters- Indication/ alarm & Analog Outputs

- 48,49,50** Series 7000/8000 Orifice Flowmeter with Analog & Alarm Output, 1/4" to 8" Pipe Ranges to 3000 GPM/20000 SCFM
- 51,52** Series 1000 & 2000 Flo-Gard Differential Pressure, Orifice Type Flow Switch, 1/4" to 8" Pipe

53-60 Ultrasonic Flowmeters- Strap-On Transducer Type- Fixed & Portable

- UFM Ultrasonic Flowmeter, 3/8" to 200" Pipe

FLOW

Turbine Flowmeters- Plastic

- 61,62** PFA Turbine Flow Sensor, 1/8", 1/4", 1/2" pipe, F.S. ranges 2, 20 & 40 lpm
- 63,64** PFAD Disposable Turbine Flow Sensor, 4.5 mm, 8.5 mm, 12.5 mm pipe, F.S. ranges 2 & 20 40 lpm
- 65,66** PVDF Disposable Turbine Flow Sensor, 4.5 mm, 8.5 mm, 12.5 mm pipe, F.S. ranges 2 & 20 lpm
- 67,68,69** Turbine Flow Sensor Signal Conditioning Options, Models PFA, PFAD, PVDF, SS

Turbine Flowmeters- Plastic/Metal- Analog/Freq. Outputs

- 70,71** SS Stainless Steel Flow Sensor, 1/8", 1/4", 1/2" pipe, F.S. ranges 2, 20 & 40 lpm
- 72** CFS Series Low Cost OEM Turbine Flow Sensors, 1/4", 3/8", 1/2", flow 0.8 to 25 LPM
- 73-87** Precision Turbine Flow Meter Series G, 1/2 to 2" pipe Sizes, Stainless Steel, Display & Signal Conditioning Options
- 88-108** Turbine Flow Meter Series G2, 1/2 to 2" pipe Sizes, SS, Aluminum, Brass, PVDF, Display & Signal Conditioning Options
- 109-116** Turbine Flow Meter Series A1, 1" & 2" pipe Sizes, Aluminum, Nylon, Display & Signal Conditioning Options
- 117-120** Turbine Flow Meter Series Economy, 1" & 2" pipe Sizes, Aluminum, Nylon, Display & Signal Conditioning Options
- 121-129** Turbine Flow Meter Series TM, 1/2 to 4" pipe Sizes, PVC, Display & Signal Conditioning Option
- 130-133** Series WP Totalizing Turbine Water Meters, 2" to 8" Pipe Size, Total Display and Pulse Output

Impeller Type Flowmeters- Plastic/Metal- Analog/Freq. Outputs

- 134,135** FSI-T00 Impeller Type Flow Sensor, 1", 1 1/2" & 2" Pipe, Pulse Output
- 136,137** FSI-S00 Saddle Mount Impeller Type Flow Sensor, 3" & 4" Pipe, Pulse Output
- 138-141** DP 490 & DP 525 Stainless Steel Insertion Impeller Flow Transmitter, 1.5" to 100" Pipe
- 142,143** IP80 Impeller Flow Transmitter, 1/2" to 8" Pipe, Flow 0.28 to 4700 GPM
- 144,145** IP100/200 Insertion Impeller Flow Transmitter, 2" to 48" Pipe, Flow 1.9 to 17000 GPM

Electromagnetic Type Flowmeters-Analog/Freq. Outputs

- 146,147** EX80 Electromagnetic Liquid Flow Transmitter, 1" to 8" Pipe, Flow 0.54 to 3100 GPM
- 148,149** EX100/200 Insertion Electromagnetic Liquid Flow Transmitter, 1" to 48" Pipe, Flow 2.1 to 25000 GPM
- 150,151** WMX101 Liquid Magnetic Flowmeter, Mounted on 4", 6", 8" or 10" Pipe, F.S. 500-800 GPM
- 152** DM01D Magnetic Inductive Flow Transmitter, F.S. Ranges From 100 ml/min to 200 lpm

Gear/Rotor Type Flowmeters-Analog/Freq. Outputs

- 153** DV01 Gear-Wheel Flowmeter, For Viscous liquids, 20-4000cSt, to 65 lpm, Frequency Output
- 154-174** Gear Wheel Flowmeter Series OM, Aluminum, PPS, Stainless Steel, 1/8" to 4" Pipe, Display & Signal Conditioning Options

Vortex Type Flowmeters-Analog/Freq. Outputs

- 175-180** 200 Series Liquid Vortex Flow Transmitter, 1/4" to 1" Pipe Size, Frequency Output
- 181-186** 210 Series Liquid Vortex Flow Transmitter, 1/4" to 1" Pipe Size, Frequency & Analog Output
- 187-189** RVL Series Vortex Flowmeters Technical Information, Application, Design, Installation
- 190-193** RVL Series Vortex Flowmeters, PVC, CPVC, or PVDF Construction, 1/2" to 3" Pipe Size

Flow Switches

- 17,18** DS02 Flow Switch Output, Ranges to 150 l/min Water, 4500 lpm Air
- 194** 2100 Series Polysulfone Flow Switches, 1/8" & 1/4" Pipe
- 195,196** 1100 Series Bronze & Stainless Steel Flow Switches, 3/4" to 3"
- 197** 1800 Series 1" PVC Flow Switches
- 198** 2600 Series 2" PVC Flow Switches
- 51,52** Series 1000 & 2000 Flo-Gard Differential Pressure, Orifice Type Flow Switch, 1/4" to 8" Pipe

Flow Monitors, Totalizers & Controllers

- 199,200** DS1000 & DS1000X Loop Powered Rate Meter
- 201,202** DS2000 & DS2000X Loop Powered Rate Meter & Totalizer
- 203,204** DS 3000A & DS3000P Dual-line Rate/Totalizer, Analog or Pulse input
- 205,206** DS 5000 Universal Process Controller- Up to 8 Inputs/Outputs

VELOCITY & LIGHT

- 207** CS-800 Portable Air Velocity Meter also measures Temperature, Humidity and Light Intensity
- 208** CS-810 Economical Portable Air Velocity Meter, range 80 to 5910 ft/min
- 209** Kestrel 1000 Portable Air Velocity Meter, range 60 FPM to 7831 FPM
- 210** Kestrel 2000 Portable Air Velocity & Temperature Meter, range 60 FPM to 7831 FPM, 5° to 122°F
- 211** Kestrel 3000 Portable Air Velocity, Temperature and Humidity Meter, range 60 FPM to 7831 FPM, 5° to 122°F, 5-95% RH
- 212** Kestrel 4000 Portable Weather Station Air Velocity, Temperature, Humidity, Barometric Pressure, Altitude, Wind Chill, Wet Bulb, & Heat Index

PRESSURE

Transmitters- Gage Pressure

- 213** Series 100 Pressure Transmitters, 2-Wire, 4-20 mA Output, Ranges Vacuum to 15,000 PSI
- 214,215** 615 Pressure Transmitters, High Accuracy, Vacuum to 120,000 psig & 300 psia
- 216,217** 625 Pressure Transmitters, Hazardous Environments, Vacuum to 120,000 psig & 300 psia
- 218** Series 110 Sanitary Pressure Transmitters, 2-Wire, 4-20 mA Output, Ranges Vacuum to 400 PSI
- 219,220** 506 Series 303 SS Pressure Transmitters for OEM Refrigeration Applications, Ranges to 870 PSI
- 221,222** Series 511 Pressure Transmitter, FS Ranges -14.7 to 7500 PSI

Transmitters- Differential Pressure

- 223,224** Series 401 Differential Pressure Transmitter, Voltage Output, Ranges 1.0-3.1" w.c.
- 225,226** Series 694 Differential Pressure Transmitter, 2-Wire, 4-20 mA Output, Ranges $\pm 0.2"$ to 4.0" w.c.
- 227,228** Series 652 Differential Pressure Transmitter, Voltage & Current Output, Ranges 20" to 15 PSID
- 229,230** Series 692 Differential Pressure Transmitter, 2-Wire, 4-20 mA Output, Ranges 20 to 150 PSID
- 231,232,233** Series 699 Differential Pressure Transmitter/Indicator, F.S Ranges 0.1 to 20" w.c.

Sensors

- 234,235,236** Series 513 Ceramic Pressure Sensor, F.S. Ranges From -14.5 to 2,320 PSI
- 237,238,239** Series 516 Ceramic Pressure Sensor, F.S. Ranges From -14.5 to 232 PSI

Gages

- 240,241** Series 400/500 Stainless Steel Pressure Gages, Vacuum to 30,000 PSI
- 242** Series 2000 Differential Pressure Gage, Ranges 0.25 " w.c. to 30 PSID

Switches

- 243,244** Series 604 Differential Pressure Switch, Switch points From 0.05 to 4.0 " w.c.
- 245,246** Series 605 OEM Differential Pressure Switch, Switch points from 0.05 to 1.6" w.c.
- 247** Series 1800 Differential Pressure Switch, Set Points From 0.07 to 85" w.c., 2% Accuracy
- 248** Series 1900 Differential Pressure Switch, Set Points From 0.07 to 20" w.c., 3% Accuracy
- 249** Series 1950 Explosion Proof Differential Pressure Switch, Set Points From 0.07 to 85" w.c.

- 250,251** Model 24 Differential Pressure Switch, 1-45 PSID
- 252-260** Series 120 Adjustable Explosion Proof Pressure/Diff. Pressure Switches, Ranges From Vacuum to 6000PSI
- 261-266** One Series, 2-Wire Electronic Pressure Switch, Adjustable Deadband & Setpoint, Vac. to 4500 PS
- 267-271** Series 100 Adjustable Pressure/Diff. Pressure Switches, Ranges From Vacuum to 5000PSI
- 272-276** Series 12 Pressure, Diff. Pressure & Temp Switch, 30" VAC to 6000PSI, explosion proof, -130 to 65
- 277-281** Series 400 Adjustable, 1-3 outputs, Pressure/Diff. Pressure Switches, Ranges Vacuum to 6000PSI
- 282** Model SM/LM Pressure Switch, Factory Preset, Set Point Range 2-300 PSI
- 283** Model MM Pressure Switch, Factory Preset, Set Point Ranges From 10 To 120 PSI
- 284** Model SQ Pressure Switch, Field Adjustable, Set Point Ranges From 10 To 120 PSI
- 285** Model NS Pressure Switch, Field Adjustable, Set Point Ranges From 1.5 To 100 PSI
- 286** Model CJ Pressure Switch, Field Adjustable, Set Point Ranges From 3 To 120 PSI
- 287** Model CD Pressure Switch, Field Adjustable, Set Point Ranges From 10 To 4500 PSI
- 288** Model WX Pressure Switch, Field Adjustable, Set Point Ranges From 50 To 5000 PSI
- 289** Model VM Vacuum Switch, Factory Preset, Set Point Range 4 to 30" Hg
- 290** Model NV Vacuum Switch, Field Adjustable, Set Point Range 3 to 30" Hg



pumps, valves,
and instrumentation
solutions

INSTRUMENTATION

CONTINUED

TEMPERATURE

- 291** Therm 2420-1L Temperature Instrument, 7 selectable thermocouple types K, N, L, J, U, T, S
- 292** Model TT Bi-Metal Temperature Switch, Immersion Type, Factory Preset, Set Point Range 40-300°
- 272-276** Series 12 Temp Switch, explosion proof, -130 to 650°F
- 252-260** Series 120 Adjustable Explosion Proof Temperature Switches, Ranges From -180 to 650°F
- 261-266** One Series, 2-Wire Electronic Temperature Switch, Adjustable Deadband & Setpoint, -50 to 450°
- 267-271** Series 100 Adjustable Temperature Switches, Ranges From -180 to 650°F
- 277-281** Series 400 Adjustable, 1-3 outputs, Temperature Switches, Ranges From -180 to 650°F
- 293** Model HT Bellows Temperature Switch, Immersion Type, Factory Preset Set Point Range 40-300°F

LEVEL

- 294** Series L007 Horizontal Mount Float Level Switches, Pressures to 300 PSIG
- 295** Series L070 Horizontal Mount Float Level Switches, Pressures to 1500 PSIG
- 296,297** Series L312 & L500 Custom Float Level Switches
- 298** Series U00X Ultrasonic Level Switch, Level From 1" to 100"
- 299** Echopod Ultrasonic Level Switch/Transmitter/Control, Range to 49.2" (1.25 m)
- 300** EchoSpan Two-Wire Ultrasonic Level Transmitter, Ranges to 32.8' (10 m)
- 301** Model FS00Z Float Level Switch for Heavily Polluted Media & Potable Water
- 302** Model 612 Submersible Pressure Transmitter, 4-20 mA Output, Ranges Vacuum to 15,000 PSI

CONTROLLERS

- 303-306** PXR Single Loop Controller, Thermocouple, RTD, & Analog Input, Alarm & Analog Output

ROTATION, SURFACE SPEED & FORCE

- 307** DT105A & DT107A Contact Type Digital Tachometers, Range 6.0 to 99,999 RPM
- 308** DT205L & DT207L Non-Contact Digital Tachometers, Range 6.0 to 99,999 RPM
- 309** DT5-RL Panel Mount Tachometer, RPM Measurement to 99,999 RPM
- 310** DT5-TG Panel Mount Tachometer With Output Modules, RPM Measurement to 99,999 RPM
- 311,312** Tachometer Sensors and Output Modules
- 313** FG-X Force Gage, Force Measurement to 100 lb
- 314** FG-H Force Gage, Force Measurement to 500 lb
- 315,316** Force Gage Accessories
- 317,318** Series 410 Cantilever Beam Force Cell, F.S. ranges from 53 to 265 cN (0.119 to 0.596 lbs)

ACCESSORIES

- 319,320** CV7500 Manual Control Needle Valves, Air To 68 lpm, Water to 3.55 lpm
- 321,322** Series 400 Hard Seat Manual Valves, Steel & 316 SS, 1/4" NPT to 1-1/2" NPT, 10,000 psi rating

323 CLARK COMMERCIAL TERMS & CONDITIONS

CLARK SOLUTIONS

MR3000 Molded Variable Area Flowmeter

Air ranges from 50 to 100 CCM, water 4 CCM to 40 GPH

DESCRIPTION

MR3000 series molded flowmeters are available with 24 different air and water ranges. These units are supplied with scales in LPM Air, SCFH Air, CCM Water and GPH Water, all with 10:1 turn-down ratios. Molded of high-impact polycarbonate, the MR3000 has been designed to maintain maximum pressures to 100 PSIG and temperatures to 150°F.

These economically engineered units have been designed to provide the highest quality with precision accuracy. The standard unit is supplied with a black body. Custom colored bodies can be ordered upon request. The flowmeters are fitted with 1/8" FNPT inlet and outlet connections. An optional inlet or outlet control valve can be specified.



MR3000

- MOLDED HIGH IMPACT POLYCARBONATE
- HIGH QUALITY CONSTRUCTION
- ECONOMY COMBINED WITH ACCURACY
- MONITOR OR CONTROL AIR AND WATER FLOWS
- SUPPLIED WITH EASY-TO-READ 10:1 TURN-DOWN DIRECT-READING SCALES
- IDEALLY SUITED FOR O.E.M. APPLICATIONS

ACCURACY: ±4% FULL SCALE
 BODY & TUBE: POLYCARBONATE
 FLOATS: BLACK GLASS, CARBIDE OR STAINLESS STEEL
 TEMPERATURE: 150° F / 65° C MAXIMUM
 PRESSURE: 100 P.S.I.G. MAXIMUM
 FITTINGS: BRASS OR STAINLESS STEEL
 VALVE: (OPTIONAL) BRASS OR STAINLESS STEEL CARTRIDGE TYPE
 SEAL MATERIAL: BUNA-N WITH BRASS FITTINGS; VITON® WITH STAINLESS STEEL

SERIES MR3000 FLOW RATES

RANGE SCFH AIR	MODEL CODE	RANGE LPM AIR	MODEL CODE
.1-1	3A00	.05-.5	3A12
.2-2.5	3A01	.1-1.2	3A13
.4-5	3A02	.4-5	3A14
1-11	3A03	.2-2.5	3A23
1-22	3A04	1-10	3A15
4-60	3A06	2-30	3A16
10-110	3A07	4-50	3A17
20-200	3A08	10-100	3A18
GPH WATER		CCM WATER	
.2-2.5	3L28	4-50	3L09
.4-5	3L19	5-110	3L10
1-10	3L20	20-300	3L11
2-25	3L21		
4-40	3L22		

ORDERING INFORMATION

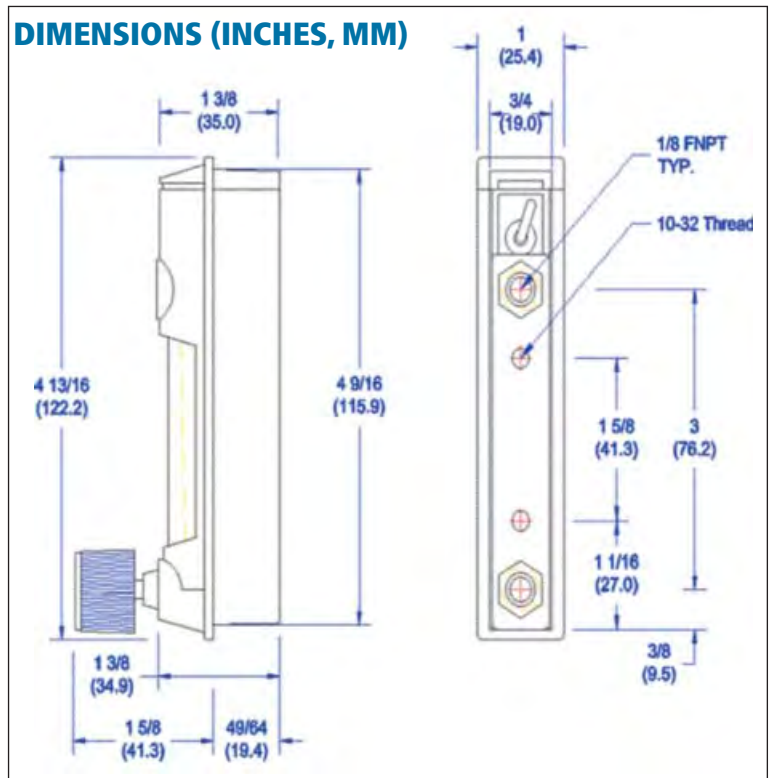
ABCDE

EXAMPLE: MR3A08BVBN

A	B	C	D	E
Model	Model Code	Fittings	Valve	Seals
MR	See Table	B= Brass S=Stainless	N=None V=Valve Inlet O=Valve Outlet	BN=Buna VT=Viton

Most Popular Models:

- MR3A00BVBN- 0.1-1.0 SCFH air, brass valve, buna seals
- MR3A01BVBN- 0.2-2.5 SCFH air, brass valve, buna seals



VITON® is a registered trademark of DuPont Dow Elastomers

CLARK SOLUTIONS

FR2000, 4000 & 4500 Acrylic Variable Area Flowmeters

Air ranges from 50 ccm to 4000 ccm, water 4 ccm to 20 GPM

DESCRIPTION

FR series flowmeters are precision machined acrylic variable area type. A choice of brass or stainless steel connections and valves and Buna or Viton seals are available.

Special calibrations, machining, and private branding are routine for OEM accounts.

ACCURACY: MODEL FR2000 ±5% FULL SCALE, MODEL FR4000 & FR4500 ±3% FULL SCALE

FLOAT: BLACK GLASS, STAINLESS STEEL, ACETAL, ALUMINUM

BODY: CLEAR ACRYLIC

SEALS: BUNA-N "O" RINGS WITH BRASS FITTINGS,

"O" RINGS MADE OF VITON®, WITH STAINLESS STEEL FITTINGS

OPERATING PRESSURE: 100 PSIG(6.89 BAR) MAX

OPERATING TEMPERATURE: 150°F/65°C MAX

FITTINGS: BRASS OR STAINLESS STEEL FNPT PIPE CONNECTORS

VALVES(OPTIONAL): BRASS OR STAINLESS STEEL

SERIES FR2000 FLOW RATES

RANGE SCFH OF AIR	MODEL CODE	RANGE LPM OF AIR	MODEL CODE	RANGE CCM OF WATER	MODEL CODE
.1-1	2A00	.04-5	2A12	5-50	2L09
.2-2	2A01	.1-1	2A13	10-100	2L10
.4-5	2A02	.2-2.5	2A29	20-240	2L11
1-10	2A03	.4-5	2A14	GPH OF WATER	
2-20	2A04	1-10	2A15	.2-2	2L28
3-30	2A05	2-25	2A16	.4-5	2L19
4-50	2A06	4-50	2A17	1-10	2L20
10-100	2A07	10-100	2A18	2-20	2L21
20-200	2A08			4-40	2L22

SERIES FR4000 FLOW RATES

RANGE SCFH OF AIR	MODEL CODE	RANGE LPM OF AIR	MODEL CODE	RANGE GPH OF WATER	MODEL CODE
.4-5	4A30	.4-5	4A40	4-50	4L49
1-10	4A31	1-10	4A41	6-60	4L46
2-20	4A32	2-20	4A42	CCM OF WATER	
4-40	4A33	3-30	4A43	4-50	4L38
10-100	4A34	4-50	4A44	10-120	4L56
14-150	4A35	10-100	4A47	25-225	4L51
20-200	4A36	SCFM OF AIR		40-400	4L50
CCM OF AIR		.3-3	4A37	40-660	4L52
100-100	4A39	GPH OF WATER		100-1500	4L53
		1-10	4L45	200-3000	4L54
		2-25	4L48	300-3700	4L55

SERIES FR4500 FLOW RATES

RANGE SCFH OF AIR	MODEL CODE	RANGE GPM OF WATER	MODEL CODE
.5-5	4A67	.25-2.5	4L64
1-10	4A65	.5-5	4L66
4-20	4A68	LPM OF WATER	
LPM OF AIR		1-10	4L69
14-140	4A72	2-20	4L71
30-280	4A70	Dual scales:	
100-560	4A73	SCFM/SCFH, GPM/GPH, and LPM/LPH	

ORDERING INFORMATION

ABCDE

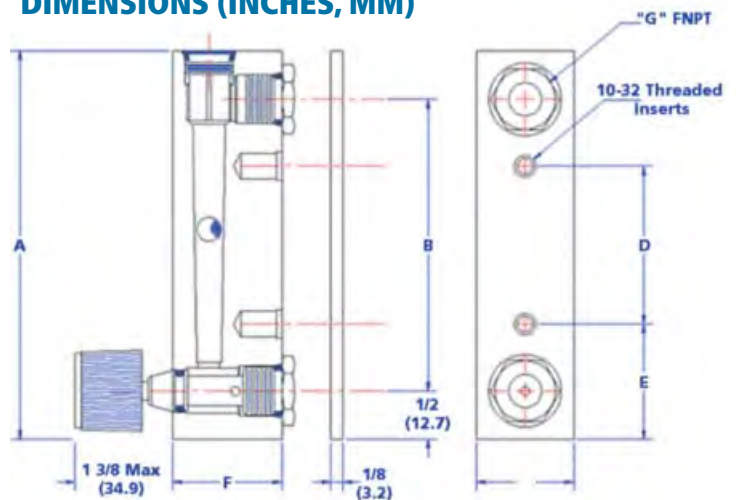
EXAMPLE: FR2A00BNBN

A Model	B Model Code	C Fittings	D Valve	E Seals
FR	See Tables Above	B=Brass S=Stainless	N=None V=Valve Inlet	BN=Buna VT=Viton



FR2000 with metering Valve & FR4000 Flowmeters

DIMENSIONS (INCHES, MM)



MODEL	A	B	C	D	E	F	G
FR2000	4"(102)	3"(76.2)	1"(25.4)	1-5/8"(41.3)	1-3/16"(30.2)	1-1/8"(28.6)	1/8"
FR4000	6-1/2"(165)	5-1/2"(140)	1-3/8"(34.9)	3-1/2"(88.9)	1-1/2"(38.1)	1-1/8"(28.6)	1/8"
FR4500*	6-5/8"(168)	5-1/2"(140)	1-1/8"(28.6)	3-1/2"(88.9)	1-1/2"(38.1)	1-3/8"(34.9)	1/4"

* Does not include 1/8" back plate

CLARK SOLUTIONS

FR4800 Acrylic Variable Area Flowmeter

Air ranges from 6 to 4400 SCFH, water 1 to 1200 GPH

DESCRIPTION

The FR4800 acrylic block flowmeters are available in various ranges in both SAE and SI units for air and water. These direct reading meters are also available for other gases and liquids.

The flowmeters are ideal for monitoring flows in such applications as reverse osmosis, air sampling equipment, aquaculture, desalinization, and chiller/cooler water treatment and distribution systems.

ACCURACY: ±3% FULL SCALE
 FLOAT: STAINLESS STEEL, ALUMINUM
 BODY: CLEAR ACRYLIC
 SEALS: BUNA-N "O" RINGS
 PRESSURE: 100 PSIG / 6.9 BAR MAXIMUM
 TEMPERATURE: 150°F/65°C MAXIMUM
 FITTINGS: 3/4" FNPT PVC



FR4800

FR 4800 FLOW RATES- AIR

AIR RANGES(Dual Scale)		MODEL
SCFM	SCFH	CODE
5-50	300-3000	FR48A01PI
6-70	360-4200	FR48A03PI
10-80	600-4800	FR48A05PI
LPM	LPH	CODE
150-1400	9000-84000	FR48A07PI
200-1800	12000-108000	FR48A09PI
200-2200	12000-132000	FR48A11PI

FR 4800 FLOW RATES- WATER

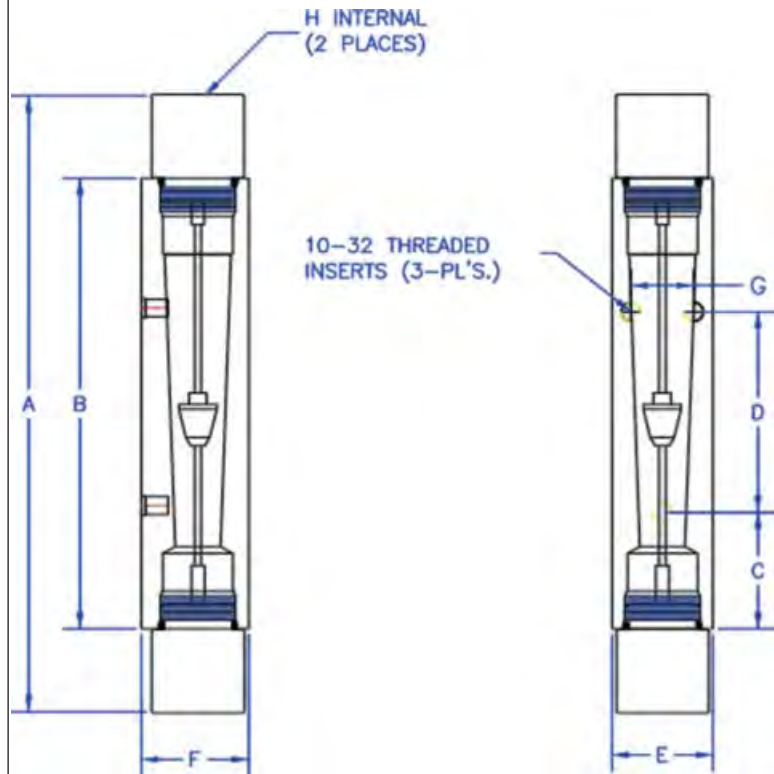
WATER RANGES(Dual Scale)		MODEL
GPM	GPH	CODE
1-12	60-720	FR48L00PI
1.5-15	90-900	FR48L02PI
2-20	120-1200	FR48L04PI
LPM	LPH	CODE
5-45	300-2700	FR48L06PI
6-60	360-3600	FR48L08PI
8-70	480-4200	FR48L10PI

ORDERING INFORMATION

SPECIFY MODEL CODE PER ABOVE TABLES

EXAMPLE: FR48L06PI

DIMENSIONS (INCHES, MM)



A	B	C	D	E	F	G	H
11-1/4" (286)	8-3/4" (222)	1-7/8" (48)	5" (127)	1-1/2" (38)	1-5/8" (41)	1" (25.4)	3/4" FNPT

CLARK SOLUTIONS

FR5000 Acrylic Variable Area Flowmeters

Air ranges from 25 to 100 scfm, water 5 to 20 GPM

DESCRIPTION

FR series flowmeters are precision machined acrylic variable area type. Series FR5000(S,V) has inlet and outlet connections located on the back of the flowmeter and is available with optional metering valve. Model FR5000I has end connections.

Special calibrations, machining, and private branding are routine for OEM accounts.

ACCURACY: +/- 2% FULL SCALE
 FLOAT: STAINLESS STEEL
 BODY: CLEAR ACRYLIC
 SEALS: BUNA - N
 PRESSURE: 100 PSIG MAX
 TEMPERATURE: 150°F/65°C MAX
 FITTINGS: 1" FNPT PVC PIPE CONNECTORS
 VALVES: (OPTIONAL) INTEGRAL VALVE ON "S" MODELS
 IN-LINE GATE VALVE ON "S" OR "I" MODELS

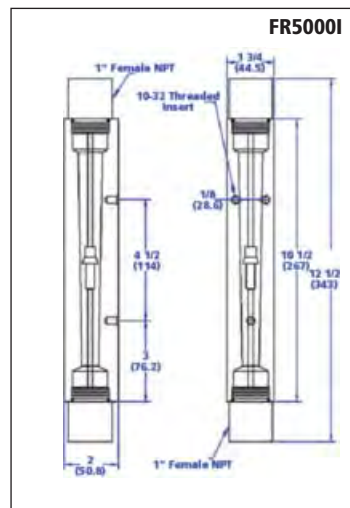
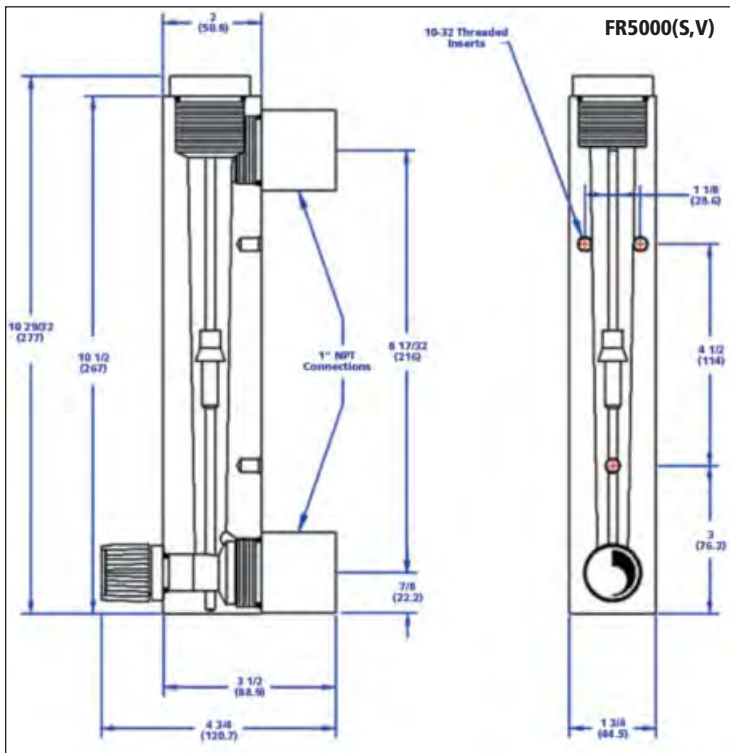
SERIES FR5000 FLOW RATES

RANGE SCFM OF AIR	MODEL CODE	RANGE GPM OF WATER	MODEL CODE
3-25	5A50	.4-5	5L56
4-50	5A51	1-10	5L57
10-100	5A52	2-20	5L58
LPM OF AIR		LPM OF WATER	
100-700	5A53	1-19	5L59
100-1400	5A54	4-36	5L60
400-3400	5A55	5-75	5L61



FR5000V (with metering Valve) & FR5000I Flowmeters

DIMENSIONS (INCHES, MM)



ORDERING INFORMATION

ABCD

EXAMPLE: FR5A50PS

A Model	B Model Code	C Fittings	D Connections
FR	See Tables Above	P=PVC	S=Back Connections (Std.) I=End Connections V=Metering Valve (Back Connections Only)

CLARK SOLUTIONS

FR5500 Acrylic Variable Area Flowmeter

Air ranges from 110 to 400 SCFM, water 30 to 100 GPM

DESCRIPTION

FR5500 series flowmeters have easy-to-read scales for GPM or LPM H₂O and SCFM or LPM air. They have durable one-piece clear acrylic construction and stable, easy-to-read stainless steel floats.

The FR5500 series feature superior quality, CPVC or stainless steel fitting options and easy disassembly and assembly for maintenance.

ACCURACY: ±5% OF FULL SCALE
 METER BODY: MACHINED ACRYLIC METERING TUBE
 FLOAT: STAINLESS STEEL
 FITTINGS: 1-1/2" OR 2" FNPT UNION FITTINGS MADE OF CPVC (FOR H₂O SERVICE) OR STAINLESS STEEL (FOR AIR OR H₂O)
 O-RINGS: VITON®
 PRESSURE: 100 PSIG MAXIMUM
 TEMPERATURE: 150°F/65°C MAXIMUM



FR5500

FR 5500 FLOW RATES- 1 1/2" MODELS

Model	SCFM AIR	Model	LPM AIR
5A75*	10-110	5A87*	300-3000
5A76*	15-160	5A88*	450-4600
5A77*	20-200	5A89*	550-5500
Model	GPM H ₂ O	Model	LPM H ₂ O
5L78	3-30	5L90	10-120
5L79	4-40	5L91	15-150
5L80	5-50	5L92	20-200

FR 5500 FLOW RATES- 2" MODELS

Model	SCFM AIR	Model	LPM AIR
5A81*	25-250	5A93*	700-7000
5A82*	30-330	5A94*	900-9000
5A83*	40-400	5A95*	1000-11000
Model	GPM H ₂ O	Model	LPM H ₂ O
5L84	6-60	5L96	25-230
5L85	8-80	5L97	30-300
5L86	10-100	5L98	40-400

* Air ranges- Stainless Steel Fittings Only

DIMENSIONS (INCHES, MM)

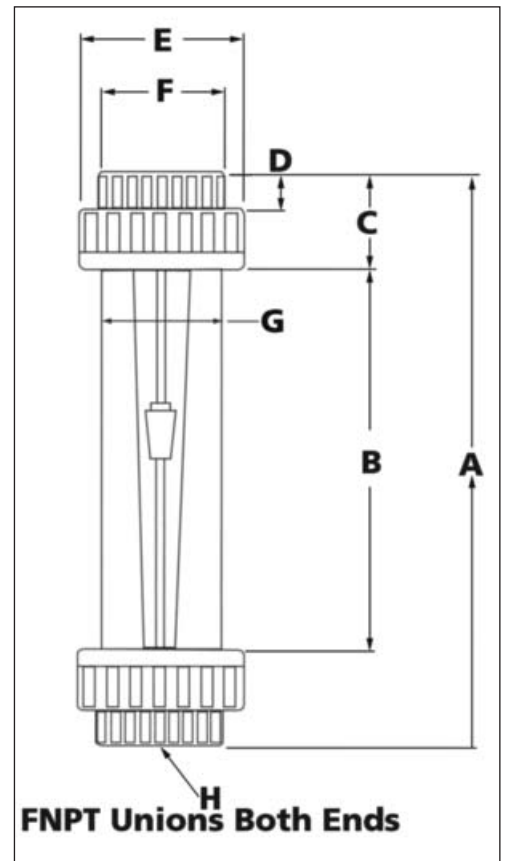
Model	A	B	C	D	E	F	G	H
1 1/2"	13-3/8 (340)	9-1/8 (231.7)	2-1/8 (54)	7/8 (22.2)	3-1/2 (88.9)	2-1/2 (63.5)	2-1/2 (63.5)	1-1/2" FNPT
2"	13-5/8 (346)	8-11/16 (220.7)	2-5/8 (56.7)	1-1/8 (28.6)	4-1/8 (104.8)	3 (76.2)	2-9/10 (73.7)	2" FNPT

ORDERING INFORMATION

ABC

EXAMPLE: FR5A90PI

A Model	B Model Code	C Fittings
FR	See Tables Above	PI=CPVC SI=Stainless Steel



VITON® is a registered trademark of DuPont Dow Elastomers

PKP

DS15 Flow Indicator, Switch, Transmitter

F.S. Flow Ranges from 24 lph to 50,000 lph Water

DESCRIPTION

The model DS15 flow meters work according to the proven variable area principle. The float is moved upward in a tapered tube by the flowing medium and its upper edge indicates the flow rate by means of a scale affixed on to the measuring tube.

By using a float with an integrated magnet, optional alarm contacts or an analog output transducer may be added.

All flow meters have a male thread on the measuring tube and are supplied with two schedule 80 PVC-U pipe couplings. Please call for coupling materials other than PVC .

The variety of materials used and the simple to exchange measuring scales make these meters universally suitable for most liquid and gaseous media.

Applications are in the water treatment industry, wastewater, plating and surface finishing, chemical and food industries and many more.

SPECIFICATIONS

Measuring Tube Material- PVC-U transparent, Polyamide, Polysulfone or PVDF (for use with alarm contacts or analog output transducer only)

Float Material-PVDF, optionally st. steel AISI 304 and PVDF with integrated magnet

O-Rings- EPDM, Viton optional

Pipe Connections- PVC, optionally PP, PVDF

Max Pressure- 10 bar @ 20°C

Max Temperature Flow Tube Only-

PVC: 60°C

Polyamide: 75°C

Polysulfone: 100°C

PVDF: 110°C

Max Temperature with connectors made of:

PVC: 60°C

PP: 80°C Max

PVDF: 110°C

Mounting Position- vertically, flow from bottom to top

Mounting- with straight pipe, 5-7 x pipe dia. upstream and downstream of meter



DS15 Flow Indicator

DS15 Flow Indicator With Alarm Outputs

DS15 Flow Indicator with Analog Output

Measuring Accuracy- $\pm 4\%$ F.S.

Scales-water scales (in LPH) and air scales (in m^3/h) referenced to 0, 1, 2, or 3 bar above atmosphere and 20 °C are standard. For other media, i.e. gases with higher pressures, HCL (30%), NaOH (30 %) as well as other units of measurement (m^3/h , l/sec, GPM) special scales can be supplied.

Accessories

Alarm Contacts- bistable, N/C or N/O contact function on rising flow

Mounting: adjustable on measuring tube

Contact Rating: Max 220 VAC, 0.5A

Max 10A/10VA

Operating Temperature: 0...+55°C

Hysteresis: 3 mm of float height

Electrical Connection: Two wire, independent of polarity

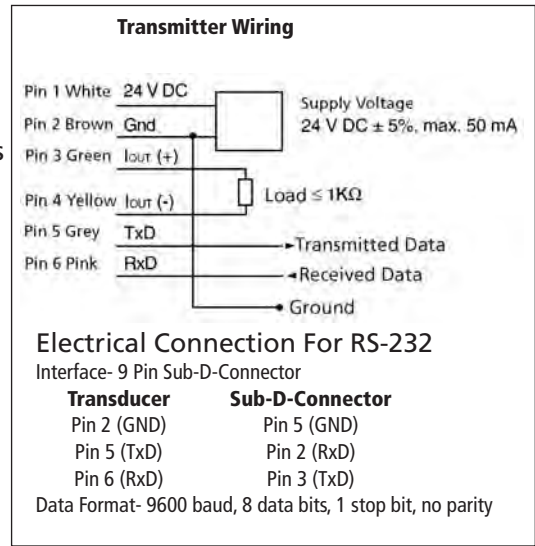
SPECIFICATIONS CONT'D

Analog & RS-232 output-

The optional analog output transducer is mounted onto the measuring tube of the DS15 flowmeter and registers the height of the float by means of an analog Hall sensor. The integrated electronics converts this signal to a 4-20 mA output. Additionally a digital value is available via an RS-232 interface.

To utilize the analog output transducer, the standard float must be exchanged for a float with an integral magnet.

The transducer is equipped with an EPROM which is programmed especially for the application. Therefore it is not possible to field adjust the transducers without consulting the manufacturer.



Electrical connection: 6-pin plug per DIN 45322 (included)

Table 1: Measuring Ranges

Tube	Range Number	Range l/h water	Range Air m³/h Outlet Atmospheric	Range Air m³/h Outlet 1bar	Range Air m³/h Outlet 2 bar	Range Air m³/h Outlet 3 bar
1	101	3-24	0.2-1	0.2-1.2	0.25-1.55	0.3-1.75
	102	5-60	0.2-2.5	0.4-3.2	0.2-3.8	0.3-4.4
	103	10-100	0.6-3.6	0.6-5.0	0.75-6.0	0.8-7.0
	104	25-250	0.5-9.0	1.0-13.0	1.0-16.0	1.5-19.5
2	201	5-50	0.4-2.8	0.2-3.2	0.4-3.6	0.3-4.0
	202	15-150	0.8-6.2	1.0-9.0	1.0-11.0	1.5-12.0
	203	5-250	0.9-9.5	1.0-13.0	1.0-16.0	2.0-20.0
	204	40-400	2.0-15.0	2.0-20.0	3.0-26.0	3.0-30.0
3	301	15-150	0.5-5.5	1.0-9.0	1.0-11.0	1.0-10.5
	302	40-400	2.0-14.0	2.0-20.0	3.0-26.0	3.0-30.0
	303	60-600	2.5-22.0	4.0-31.0	4.0-38.0	5.0-45.0
	304	100-1000	4.0-34.0	5.0-45.0	6.0-58.0	7.5-67.5
4	401	25-250	1.0-8.0	1.5-13.0	1.5-16.0	1.5-19.5
	402	40-400	2.0-14.0	2.0-20.0	3.0-26.0	3.0-30.0
	403	100-1000	4.0-34.0	5.0-45.0	5.0-55.0	6.0-66.0
	404	150-1500	5.0-50.0	6.0-70.0	7.5-86.0	7.5-98.0
5	501	15-150	0.7-5.0	1-7.5	1-9	1.6-10
	502	60-600	2.5-20	3.5-28	4-35	5-40
	503	100-1000	4-34	5-50	8-60	8-70
	504	200-2000	8-70	12-90	10-120	15-130
	505	300-3000	10-90	15-140	20-160	20-190
	506	600-6000	22-190	30-260	40-380	40-400
	507	1000-10000	35-300	50-420	60-510	70-600
	508	2500-25000	80-720	115-1050	140-1240	166-1400
	509	10000-50000	400-1500	500-2100	600-2500	700-2900
6	601	15-150	0.7-5.5	1-7.5	1-9	1.6-10
	602	30-300	1-10	1.5-14	2-18	2.8-20
	603	60-600	2.5-20	3.5-28	4-35	5-40
	604	100-1000	4-34	5-50	8-60	8-70
	605	150-1500	5-50	7.5-67	9.5-83	11-96
	606	250-2500	8.5-76	10-115	14-131	17-152
	607	400-4000	14-125	10-170	24-210	28-245
	608	600-6000	22-190	30-260	40-380	40-400
	609	1000-10000	35-300	50-420	60-510	70-600
	610	1500-15000	50-500	80-700	85-760	102-880
	611	2500-25000	80-720	115-1050	140-1240	166-1400
	612	10000-50000	400-1500	500-2100	600-2500	700-2900

Note: Arbitrary scales and other units of measurement available on request

Conversion Factors

For GPH:
 Multiply l/h by 0.264

For GPM:
 Divide l/h by 227

For SCFH:
 Multiply m³/h by 35.315

For SCFM:
 Multiply m³/h by 0.5886

DIMENSIONS(MM)

Table 2: Dimensions

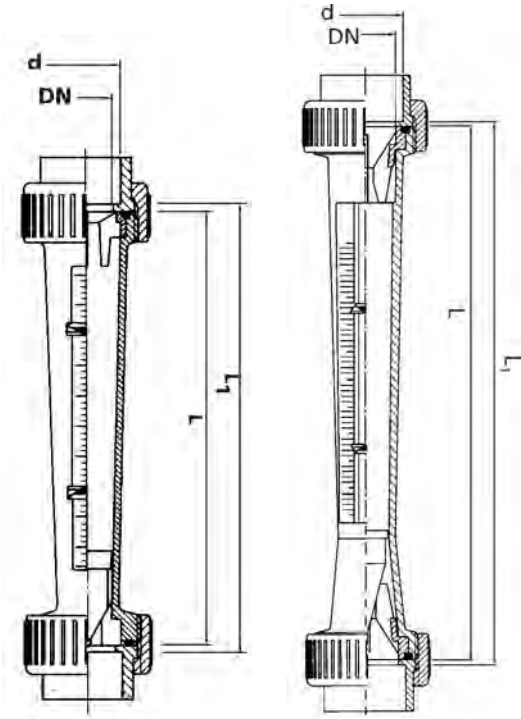
Tube	Range Number	Flow Tube Male Thread (BSP)	*PVC Pipe Adapter	L	L ₁	**d	**DN
1	101...104	3/4"	3/8"	165	171	16	10
2	201...204	1"	1/2"	170	176	20	15
3	301...304	1 1/4"	3/4"	185	191	25	20
4	401...404	1 1/2"	1"	200	206	20	25
5	501...503	1 1/2"	1"	335	341	32	25
	504...505	2 1/4"	1 1/2"	335	341	50	40
	506...507	2 3/4"	2"	335	341	63	50
	508...509	3 1/2"	2 1/2"	335	341	75	65
6	601...604	1 1/2"	1"	350	356	32	25
	605...606	2"	1 1/4"	350	356	40	32
	607...609	2 3/4"	2"	350	356 <td 63	50	
	610...612	3 1/2"	2 1/2"	350	356	75	65

*Two schedule 80 PVC-U pipe adapters/couplings are included with each flow meter. As the thread on the flowmeter body is metric, care in fitting selection must be taken if connectors other than the PVC connectors supplied are to be used.

**Dimension of metric pipe coupling which can be supplied in materials other than PVC. Please consult factory.

MEASURING TUBE 1...4

MEASURING TUBE 5...6



2 ea. Schedule 80 PVC -U pipe adapters/couplings are supplied with each flowmeter. The adapters are for pipe sizes according to table 2.

ORDERING INFORMATION

DS15-A-B-C-D-E-F

EXAMPLE: DS15-1-1-101-PVC-1-00

A= Flow Tube Material	B= Scale	C=Range Number	D=Process Connections	E=Float Material	F=Options
1=PVC-U (standard) 2= Polyamide 3=Polysulfone 4=PVDF	1= Water 2=Air @ Atmos 3=Air@1 bar 4= Air@2 bar 5= Air@3 bar 9= Special Scale	Select From Table 1	PVC= Schedule 80 PVC pipe termination per table 2 N= None S= Special	1= PVDF (standard) 2= 304 SS 3= PVDF with integrated magnet (for meters with alarm or analog outputs)	00= none 11= 1 alarm contact (N.C.) 21= 2 alarm contacts (N.C.) 12= 1 alarm contact (N.O.) 22= 2alarm contacts (N.O.) 50= analog , 4..20 mA & RS232 output

CLARK SOLUTIONS

GR Series Glass Tube Variable Area Flowmeter

Air ranges from 51 CCM to 66 LPM, water 21 CCM to 2 LPM

DESCRIPTION

Series GR variable area type glass tube flowmeters are ideal for measuring low flow rates of liquids and gases. Standard units are supplied in 65 mm and 150 mm scale lengths and have arbitrary scales with flow curves (permitting multiple gas and fluid measurements in a single tube). Many direct reading scales are available on request.

Flow tubes are easily changed and a rotating magnifying lens allows a 180° view. Special OEM requirements are welcome.

ACCURACY: 65 MM SCALE ± 5% FULL SCALE, 150 MM SCALE ± 3% FULL SCALE
 FLOATS: BLACK GLASS, SAPPHIRE, STAINLESS STEEL, CARBOLOY, TANTALUM
 BACK PLATE: ALUMINUM
 END BLOCKS STD. SEALS & FITTINGS: ALUMINUM W/ BUNA-N; SS W/ VITON®
 TUBE: BOROSILICATE GLASS
 CONNECTIONS: 1/8" FNPT BACK INLET & OUTLET
 MOUNTING: VIA INLET & OUTLET PORT SPUDS, 9/16-18 THREADED PANEL NUTS (SEE DIMENSION DRAWING)
 PRESSURE: 200 PSIG
 TEMPERATURE: 200°F/ 93°C



GR 65 mm & 150 mm With & Without Metering Valve

65 MM Tube Size			
Model#	Float	*Air(CCM)	Water (CCM)
GR60110	G	51	-
GR60120	S	82	-
GR60130	ST	153	-
GR60140	C	284	-
GR60150	T	A 310	-
GR60210	G	103	-
GR60220	S	160	-
GR60230	ST	298	-
GR60240	C	498	-
GR60250	T	A 546	-
GR60310	G	400	-
GR60320	S	550	-
GR60330	ST	855	21.4
GR60340	C	1275	35.4
GR60350	T	A 1360	38.4
GR60410	G	900	18.2
GR60420	S	1200	29.6
GR60430	ST	1800	50.1
GR60440	C	2620	76.1
GR60450	T	A 2790	82.4
GR60510	G	2580	55
GR60520	S	A 3350	85
GR60530	ST	5030	140
GR60540	C	7270	215
GR60550	T	B 7710	230
GR60610	G	3930	90
GR60620	S	A 5080	130
GR60630	ST	7510	202
GR60640	C	10700	325
GR60650	T	B 11315	345
GR60710	G	6000	130
GR60720	S	B 7800	200
GR60730	ST	11450	335
GR60740	C	B 16340	500
GR60750	T	C 17250	535

65 MM Tube Size			
Model#	Float	*Air(CCM)	Water (CCM)
GR60910	G	15750	375
GR60920	S	B 20170	545
GR60930	ST	29400	880
GR60940	C	B 41175	1305
GR60950	T	C 43410	1385
GR61010	G	23640	570
GR61020	S	B 30090	825
GR61030	ST	43340	1305
GR61040	C	B 61120	1920
GR61050	T	C 65850	2055
GR60810	G	10100	35
GR60820	S	B 12980	350
GR60830	ST	18960	560
GR60840	C	B 26525	830
GR60850	T	C 28115	885

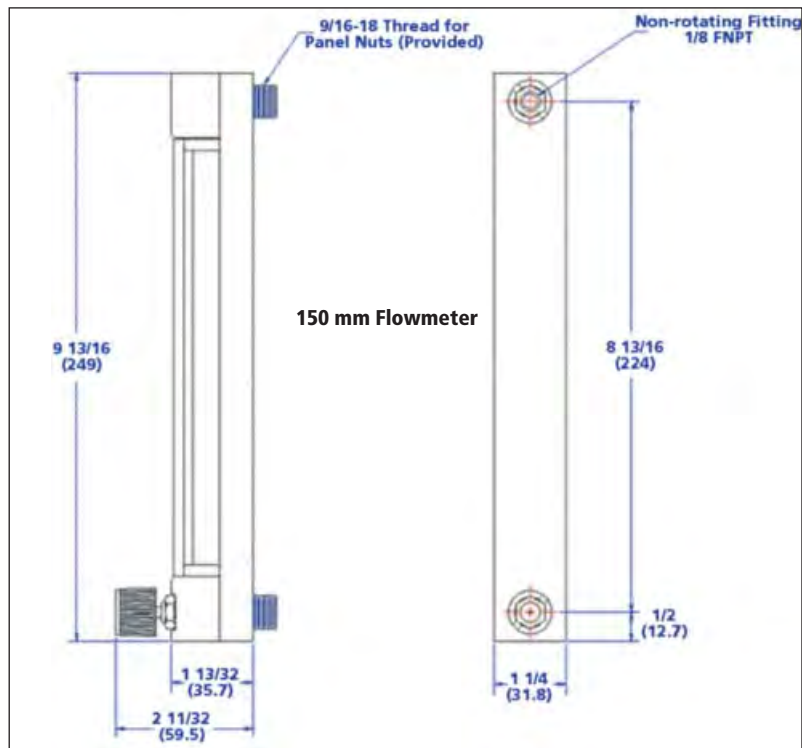
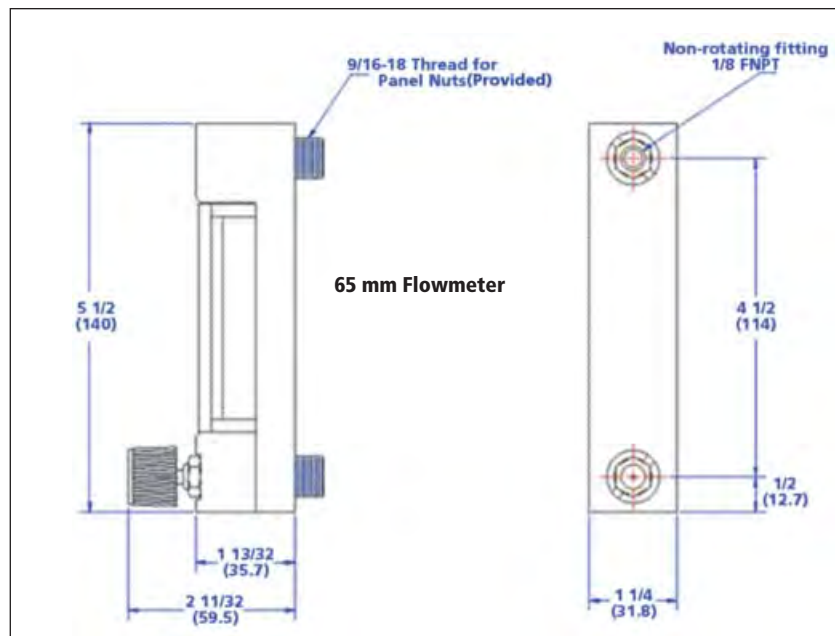
*Note: A,B,C indicate units are somewhat more expensive (than other units) due to the float type & size.

150 MM Tube Size			
Model#	Float	*Air(CCM)	Water (CCM)
GR10110	G	50	-
GR10120	S	78	-
GR10130	ST	152	-
GR10140	C	281	-
GR10150	T	A 315	-
GR10210	G	106	-
GR10220	S	167	-
GR10230	ST	308	-
GR10240	C	497	-
GR10250	T	A 540	-
GR10310	G	400	-
GR10320	S	555	-
GR10330	ST	870	22.2
GR10340	C	1300	36.2
GR10350	T	A 1400	39.5

150 MM Tube Size			
Model#	Float	*Air(CCM)	Water (CCM)
GR10410	G	855	18
GR10420	S	1135	27.6
GR10430	ST	1710	47.5
GR10440	C	2465	73.2
GR10450	T	A 2640	78.8
GR10510	G	2290	50
GR10520	S	A 2980	75
GR10530	ST	4480	125
GR10540	C	6475	190
GR10550	T	B 6805	205
GR10610	G	3425	75
GR10620	S	A 4465	115
GR10630	ST	6600	190
GR10640	C	9475	285
GR10650	T	B 9990	305
GR10710	G	9180	215
GR10720	S	B 11990	315
GR10730	ST	17810	515
GR10740	C	B 24970	765
GR10750	T	C 26170	825
GR10810	G	23740	565
GR10820	S	B 30270	830
GR10830	ST	44050	1335
GR10840	C	B 61410	1950
GR10850	T	C 66370	2080

Float Codes: B= Black Glass, S= Sapphire, ST= Stainless Steel, C= Carboloy, T= Tantalum

DIMENSIONS (INCHES, MM)



ORDERING INFORMATION

ORDER NUMBER
ABCD (GR60330SVV)

A Model	B End Blocks	C Valve	D O-Ring
Select From Charts	A=Aluminum S=316 SS	N=No Valve *V=Standard Valve at Inlet O=Standard Valve at Outlet **P=Precision Valve at Inlet R=Precision Valve at Outlet *Standard valves have approx. 9 turns through flow range **Precision valves have approx. 15 turns through flow range	*B=Buna **V=Viton *Standard with brass & aluminum models **Standard with stainless models

VITON® is a registered trademark of DuPont Dow Elastomers

PKP

DS01 Flow Meter/Switch

F.S. Ranges From 60ml to 150l/min water, 1.8 to 4500 lpm air

DESCRIPTION

The flow meter and switch model DS01 works according to a modified variable area principle. The float is guided in a cylindrical measuring glass by means of a spring. The flowing medium moves the float in the flow direction. The upper edge of the float shows the momentary flow via an etched scale on the measuring glass.

A reed contact is mounted outside the meter in a sealed housing. The float contains a magnet. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reached a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full switching range of the meter.

APPLICATION

The variable area flow meter and switch model DS01 is used for measuring and monitoring the flow of low viscosity liquids and gases, i.e., in cooling loops of welding machines and laser systems, for pump monitoring, compressors and many other applications.

By careful selection of the reed contacts the switch hysteresis can be reduced to only 0.5-1.5 mm float movement.

SPECIFICATIONS

Max Pressure:

DS01.1, DS01.2- 16 bar (232 PSIG)

DS01.3, DS01.4- 10 bar (145 PSIG)

Pressure Drop:

DS01.1- 0.02-0.2 bar (0.3 -2.9 PSI)

DS01.2- 0.02-0.3 bar (0.3-4.3 PSI)

DS01.3, DS01.4- 0.02-0.4 bar (0.3-5.8 PSI)

Max Temperature: 120°C (optionally 160°C) for liquids, 90°C for gases

Materials:

Measuring Glass- Duran 50

Housing- Aluminum

Connections- Brass or Stainless

O-rings- Buna (optionally:Viton,EPDM)

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 10\%$ f.s.

Ranges:

Water- 6-60 ml/min to 60-150 l/min

Air- 0.15-1.8 l/min to 18-4500 l/min

(at 1.013 bar absolute and 20°C)



DS01 Flow Meter/ Switch

FEATURES

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

SCALES FOR WATER AND AIR

UNIVERSAL MOUNTING POSITION

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

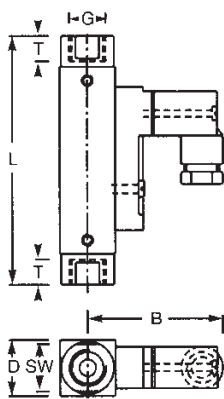
CONTACTS:

Function	DS01.1	DS01.2	DS01.3 / DS01.4
N/O	200 V, 1A, 20VA	220 V, 1A, 100 VA	250 V, 3A, 20 VA
SPDT	200 V, 1A, 20VA	250V, 1,5A, 50 VA	250V, 1,5A, 50 VA
*NO			250V, 2A, 60VA
*SPDT			250V, 1A, 30VA

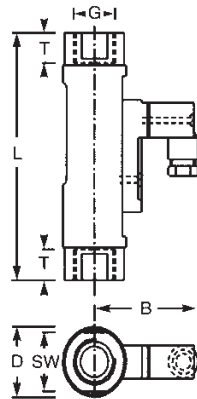
*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

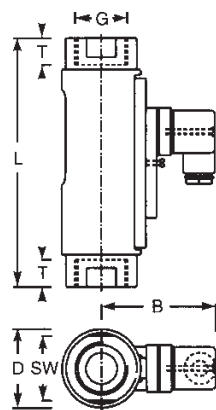
Model	Dimensions in mm						weight (g)
	SW	D	B	G	T	L	
DS01.1	17	20	49	1/4 NPT	10	90	140
DS01.2	27	32	53	1/2 NPT	14	114	300
DS01.3	41	50	72	3/4 NPT	21	139	1000
DS01.4	41	50	72	1.0 NPT	17	158	1000



DS01.1

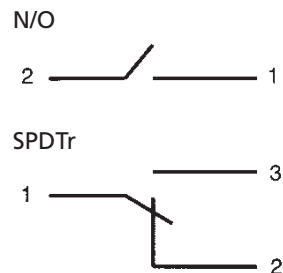


DS01.2



DS01.3 / DS01.4

Electrical Connection



ORDERING INFORMATION:

Order Number
Miniature variable area
flow meter and switch

DS01.1N. 1. 1.W13. 1. 1.

Connection:

1N= 1/4 "female NPT
2N= 1/2" female NPT
3N= 3/4" female NPT
4N= 1" female NPT

Material:

1= brass with 301 stainless steel spring
2= all 316 stainless steel

Scale:

1= for water
2= for air

Measuring Ranges:

	Water	Air
DS01.1:	W101= 5-60 ml/min W102= 25-130 ml/min W106= 0.1-0.6 l/min W11= 0.2-1.2 l/min W12= 0.4-2.0 l/min W13= 0.5-3.0 l/min W15= 1.0-5.0 l/min	L1001= 0.2-1.3 slpm L1002= 0.5-2.0 slpm L1003= 0.8-3.0 slpm L1005= 1.5-5.0 slpm L1008= 2.0-8.0 slpm L1012= 3.0-12.0 slpm L1014= 3.5-14.0 slpm L1020= 5.5-20 slpm L1024= 7.0-24.0slpm L1035= 10-35 slpm L1042= 10-42 slpm
DS01.2	W205= 0.1-0.5 l/min W21= 0.2-1.0 l/min W22= 0.4-1.6 l/min W24= 1.0-4.0 l/min W28= 2.0-8.0 l/min W215= 4.0-15 l/min W220= 5.0-22 l/min W228= 6.0-28 l/min	L2012= 3.0-12.0 slpm L2030= 7.0-30 slpm L2040= 12-40 slpm L2125= 28-125 slpm L2200= 50-200 slpm L2420= 100-420 slpm L2480= 120-480 slpm
DS01.3, DS01.4	W3030= 8.0-30 l/min W3045= 15-45 l/min W3090= 30-90 l/min	L30080= 22.5-80 slpm L30130= 50-130 slpm L30420= 130-420 slpm L30625= 200-625 slpm
DS01.4	W3150= 60-150 l/min	

No. of Contacts:

1= 1 Contact
2= 2 Contacts

Contact Function:

1= N/O
2= SPDT
3S= Ex-N/O (EEx m II T6), DS01.3, DS01.4
3U= Ex-SPDT (EEx m II T6), DS01.3, DS01.4

PKP

DS02 Flow Switch

F.S. Ranges From 60 ml to 150 l/min water, 2.2 to 650 l/min air

DESCRIPTION

The flow switch model DS02 works according to a modified variable area principle. The float is guided in a cylindrical measuring tube by means of a spring. The flowing medium moves the float in the flow direction.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reaches a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full switching range of the meter.

APPLICATION

The variable area flow switch model DS02 is used for monitoring the flow of low viscosity liquids and gases, i.e., in cooling loops of welding machines and laser systems, for pump monitoring, compressors and many other applications.

By careful selection of the reed contacts the switch hysteresis can be reduced to only 0.5-1.5 mm float movement.

SPECIFICATIONS

Max Pressure:

DS02.1- 300 bar (4,350 PSIG)

DS02.2/3/4- 250 bar (3,625 PSIG)

Pressure Drop:

DS02.1- 0.02-0.2 bar (0.3-2.9 PSI)

DS02.2- 0.02-0.3 bar (0.3-4.3 PSI)

DS02.3, DS02.4- 0.02-0.4 bar (0.3-5.8 PSI)

Max Temperature: 100°C (160°C optional)

Materials:

Housing:

Brass Version- nickel plated brass

Stainless Version- 316Ti SS

Electrical Connections- DIN 43650 plug

Mounting- Vertical (upward flow) or horizontal

Accuracy- $\pm 10\%$ f.s.

Ranges:

Water- 5-60 ml/min to 60-150 l/min

Air- 0.6-2.2 l/min to 200-650 l/min

(at 1.013 bar absolute and 20°C)



DS02 Flow Switch

FEATURES

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

SCALES FOR WATER AND AIR

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

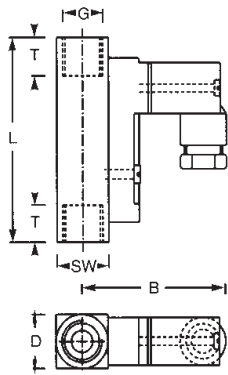
CONTACTS:

Function	DS02.1	DS02.2	DS02.3 / DS02.4
N/O	200 V, 1A, 20VA	220 V, 1A, 100 VA	250 V, 3 A, 20 VA
SPDT	200 V, 1A, 20VA	250V, 1,5A, 50 VA	250V, 1,5 A, 50 VA
*NO			250V, 2A, 60VA
*SPDT			250V, 1A, 30VA

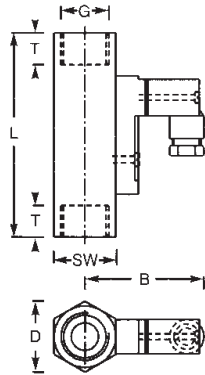
*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

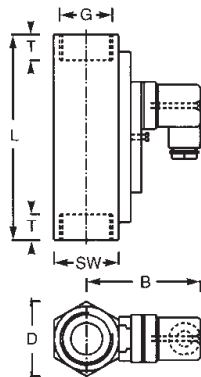
Model	Dimensions in mm						weight (g)
	SW	D	B	G	T	L	
DS02.1	17	17	47	1/4 NPT	10	65	140
DS02.2	27	31	52	1/2 NPT	14	90	350
DS02.3	41	47	72	3/4 NPT	21	152	1100
DS02.4	41	47	72	1 NPT	17	130	1000



DS02.1

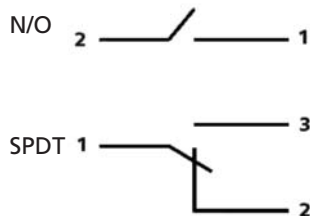


DS02.2



DS02.3 / DS02.4

Electrical Connection



ORDERING INFORMATION

Order Number DS02. 1. 1. 1. 06. 1. 1.
Miniature variable area flow switch

Connection:

1N= 1/4 G*
 2N= 1/2 G*
 3N= 3/4 G*
 4N= 1 G*

Material:

1= brass with 301 stainless steel spring
 2= all 316 stainless steel

Scale:

1= for water
 2= for air

Measuring Ranges:

Water

DS02.1:

W101= 5-60 ml/min
 W102= 40-130 ml/min
 W106= 0.1-0.6 l/min
 W11= 0.2-1.2 l/min
 W12= 0.4-2.0 l/min
 W13= 0.5-3.0 l/min
 W15= 1.0-5.0 l/min

Air

L1002= 0.6-2.2 slpm
 L1006= 1.7-6.0 slpm
 L1008= 2.5-8 slpm
 L1012= 3.0-12 slpm
 L1022= 3.0-22 slpm
 L1024= 7.0-24.0 slpm
 L1034= 12-34 slpm
 L1056= 16-56 slpm
 L1080= 20-80 slpm

DS02.2

W202= 0.02-0.2 l/min
 W206= 0.2-0.6 l/min
 W21= 0.4-1.8 l/min
 W23= 0.8-3.2 l/min
 W27= 2.0-7.0 l/min
 W213= 3.0-13 l/min
 W220= 4.0-20 l/min
 W230= 8.0-30 l/min

L2010= 2.5-10 slpm
 L2020= 5.5-20 slpm
 L2030= 8.0-30 slpm
 L2035= 10-35 slpm
 L2090= 24-90 slpm
 L2220= 55-220 slpm
 L2240= 65-240 slpm
 L2300= 80-300 slpm
 L2525= 140-525 slpm

DS02.3 or DS02.4

W3030= 11-30 l/min
 W3045= 15-45 l/min
 W3060= 20-60 l/min
 W3090= 30-90 l/min

L30180= 60-180 slpm
 L30300= 100-300 slpm
 L30650= 200-650 slpm

DS02.4 Only

W3150= 60-150 l/min

No. of Contacts:

1= 1 Contact
 2= 2 Contacts

Contact Function:

1= N/O
 2= SPDT
 3S= Ex-N/O (EEx m II T6), DS02.3, DS02.4 only
 3U= Ex-SPDT (EEx m II T6), DS02.3, DS02.4 only

Options:

0= Without
 1= Please List

*Connections are a straight thread as a retaining ring is threaded to the base of the connection as part of the flowmeter assembly process. Contact Clark to discuss your connection requirements and we will recommend fittings or adaptors.

PKP

DS03 Flow Meter/Switch

F.S. Ranges From 1.5 to 50 l/min water, 30 to 1600 l/min air

DESCRIPTION

The flow meter and switch model DS03 works according to a modified variable area principle. The float is guided in a cylindrical measuring glass by means of a slotted nozzle. The flowing medium moves the float in the flow direction. The upper edge of the float shows the momentary flow via an etched scale on the measuring glass.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reaches a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full switching range of the meter.

APPLICATION

The variable area flow meter and switch model DS03 is used for measuring and monitoring the flow of low viscosity liquids and gases, i.e., in cooling loops of welding machines and laser systems, for pump monitoring, compressors and many other applications.



DS03 Flow Meter/ Switch

SPECIFICATIONS

Max Pressure: 10 bar (145 PSIG)

Pressure Drop: 0.01-0.2 bar (0.2-2.9 PSI)

Max Temperature: 120°C (160°C optionally) for liquids, 90°C for gases

Materials:

Measuring Glass- Duran 50

Housing- Aluminum

Connections- Brass or Stainless

O-rings-

Brass Version- Buna

Stainless Version- Viton

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 5\%$ f.s.

Ranges:

Water- 0.1-1.5 l/min to 10-150 l/min

Air- 3.0-30 l/min to 350-2750 l/min

(at 1.013 bar absolute and 20°C)

FEATURES

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

SCALES FOR WATER AND AIR

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

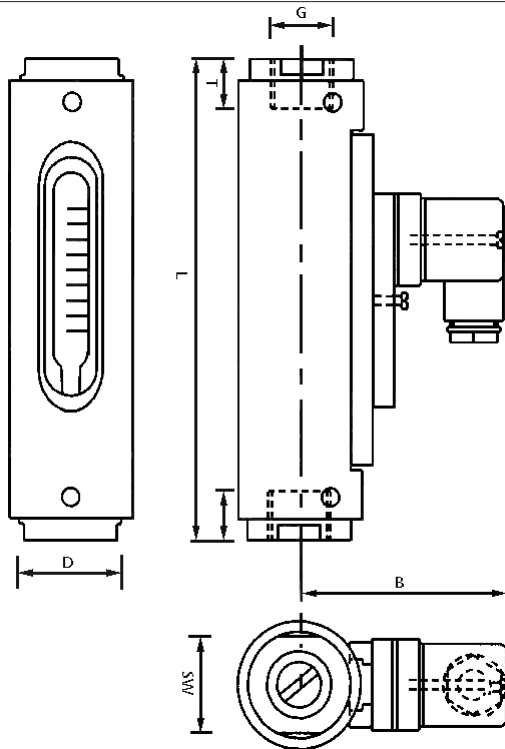
CONTACTS:

N/O: 250V, 3A, 100VA
 SPDT: 250V, 1.5A, 50VA
 *EX-N/O: 250V, 2A, 60 VA
 *EX-SPDT: 250V, 1A, 30VA

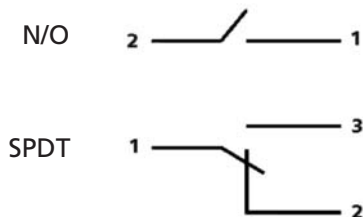
*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

Dimensions in mm							
Model	SW	D	B	G	T	L	(g)
DS03.1.x.x.x	32	43	67	1/4 NPT	14	132	625
DS03.2.x.x.x	32	43	67	1/2 NPT	15	135	625
DS03.2.x.x.05	32	43	67	1/2 NPT	15	163	650
DS03.3.x.x.05	32	43	67	3/4 NPT	16	167	650
DS03.3.x.x.06/07	41	50	70	3/4 NPT	18	164	1000
DS03.4.x.x.06/07	41	50	70	1.0 NPT	19	184	1000
DS03.4.x.x.08	41	50	70	1.0 NPT	20	200	1100
DS03.5.x.x.x	46	55	75	1 1/4 NPT	21	222	1300



Electrical Connection



ORDERING INFORMATION:

Order Number DS03.1.N 1. 1. WA01.1.1.0
Miniature variable area flow meter and switch

Connection:

1N= 1/4 " female NPT
 2N= 1/2" female NPT
 3N= 3/4" female NPT
 4N= 1" female NPT
 5N= 1 1/4 " female NPT

Material:

1= brass with 301 stainless steel spring
 2= all 316 stainless steel

Scale:

1= for water
 2= for air

Measuring Ranges:

Water		Air
DS03.1 & DS03.2:	WA01= 0.1-1.5 l/min	LA01= 3.0-30 slpm
	WA02= 0.2-3.0 l/min	LA02= 6.0-60 slpm
	WA03= 0.3-8.0 l/min	LA03= 6.0-160 slpm
	WA04= 1.0-12 l/min	LA04= 20-220 slpm

DS03.2 & DS03.3

WA05= 2.0-18 l/min LA05= 40-360 slpm

DS03.3 or DS03.4

WA06= 3-35 l/min LA06=60-700 slpm
 WA07= 4-50 l/min LA07=60-825 slpm

DS03.4 Only

LA08= 200-1600 slpm

No. of Contacts:

1= 1 Contact
 2= 2 Contacts

Contact Function:

1= N/O
 2= SPDT
 3S= Ex-N/O (EEx m II T6)
 3U= Ex-SPDT (EEx m II T6)

Options:

0= Without
 1= Please List

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PKP

DS04 Flow Meter/Switch

F.S. Ranges From 1.5 to 150 l/min water, 1 to 1400 l/min air

DESCRIPTION

The flow meter and switch model DS04 works according to a modified variable area principle. The float is guided in a cylindrical measuring tube by means of a slotted nozzle. The flowing medium moves the float in the flow direction. An externally mounted pointer indicator is magnetically coupled to the float. It follows the float position and indicates the flow rate on a scale.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reaches a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full measuring range of the meter.

APPLICATION

The variable area flow meter and switch model DS04 is used for measuring and monitoring the flow of low viscosity liquids and gases, i.e., in cooling loops of welding machines and laser systems, for pump monitoring, compressors and many other applications.

SPECIFICATIONS

Max Pressure:

Brass- 200 bar (2900 PSIG)

Stainless Steel- 300 bar (4,350 PSIG)

Pressure Drop: 0.02-0.4 bar (0.3-5.8 PSI)

Max Temperature: 120°C (160°C optionally) for liquids, 90°C for gases

Materials:

Wetted Parts- Nickel plated brass or 316Ti SS

O-rings-

Brass Version- Buna

SS Version- Viton

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 5\%$ f.s.

Ranges:

Water- 0.1-1.5 l/min to 10-150 l/min

Air- 1.0-28 l/min to 20-1400 l/min

(at 1.013 bar absolute and 20°C)



DS04 Flow Meter/ Switch

FEATURES

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

SCALES FOR WATER AND AIR

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

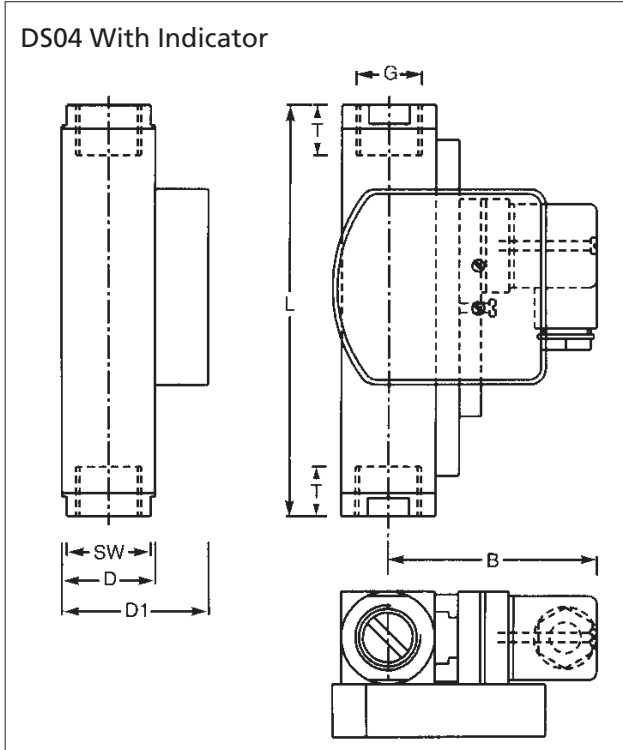
CONTACTS:

N/O: 250V, 3A, 100VA
 SPDT: 250V, 1.5A, 50VA
 *EX-N/O: 250V, 2A, 60 VA
 *EX-SPDT: 250V, 1A, 30VA

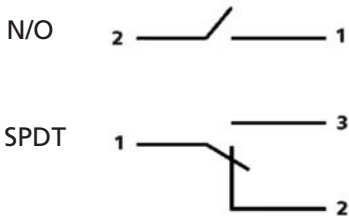
*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

Model	Dimensions in mm							Weight	
	SW	D	D1	B	G	T	L	with	w/O
								Indication	
DS04.1.x.x.x	27	30	47	65	1/4 NPT	14	130	800	850
DS04.2.x.x.x	27	30	47	65	1/2 NPT	15	130	800	850
DS04.2.x.x.05	27	30	47	65	1/2 NPT	15	148	850	900
DS04.3.x.x.x	34	40	57	70	3/4 NPT	18	152	1350	1400
DS04.4.x.x.06/07	40	40	57	70	1.0 NPT	19	156	1050	1100
DS04.4.x.x.08	50	50	67	75	1.0 NPT	20	200	2750	2800
DS04.5.x.x.x	50	50	67	75	1.0 NPT	21	200	2950	3000



Electrical Connection



ORDERING INFORMATION:

Order Number **DS04.1.N 1. 1. WA01.1.1. 2 . 0**
Miniature variable area flow meter and switch

Connection:
 1N = 1/4 " female NPT
 2N = 1/2 " female NPT
 3N = 3/4 " female NPT
 4N = 1 " female NPT
 5N = 1 1/4 " female NPT

Material:
 1= brass with 301 stainless steel spring
 2= all 316 stainless steel

Scale:
 1= for water
 2= for air

Measuring Ranges:

Water	Air
DS04.1 & DS04.2:	
WA01= 0.1-1.5 l/min	LA01= 1.0-28 slpm
WA02= 0.2-3.0 l/min	LA02= 4.0-60 slpm
WA03= 0.3-8.0 l/min	LA03= 6.0-160 slpm
WA04= 1.0-12 l/min	LA04= 20-240 slpm

DS04.2 & DS04.3
 WA05= 2.0-18 l/min LA05= 40-360 slpm

DS04.3 & DS04.4
 WA06= 3.0-35 l/min LA06= 60-700 slpm
 WA07= 4.0-50 l/min LA07= 80-1000 slpm

DS04.4 Only
 LA08= 200-1400 slpm

Version:
 0= Switch only, without flow indication
 1= Flow meter and switch, with side indicator

No. of Contacts:
 1= 1 Contact
 2= 2 Contacts

Contact Function:
 1= N/O
 2= SPDT
 3S= Ex-N/O (EEX m II T6)
 3U= Ex-SPDT (EEX m II T6)

Options:
 0= Without
 1= Please List

PKP

DS05 Flow Meter/Switch

F.S. Ranges From 4 to 250 l/min water

DESCRIPTION

The flow meter and switch model DS05 works according to a modified variable area principle. The float is guided in a cylindrical measuring glass by means of a slotted nozzle. The flowing medium moves the float in the flow direction. The upper edge of the float shows the momentary flow via an etched scale on the measuring glass.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reached a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full switching range of the meter.

APPLICATION

The variable area flow meter and switch model DS05 is used for measuring and monitoring the flow of low viscosity liquids, i.e.. in cooling loops of welding machines and laser systems, for pump monitoring, compressors and many other applications.

SPECIFICATIONS

Max Pressure: 10 bar (145 PSIG)

Pressure Drop: 0.02-0.5 bar (0.3-7.2 PSI)

Max Temperature: 120°C (160°C optionally) for liquids, 90°C for gases

Materials:

Measuring Glass- Duran 50

Housing- Aluminum

Connections- Brass or Stainless

O-rings-

Brass Version- Buna

SS Version- Viton

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 5\%$ f.s.

Ranges:

Water- 0.2-4.0 l/min to 30-250 l/min



DS05 Flow Meter/ Switch

FEATURES

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

SCALES FOR WATER

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

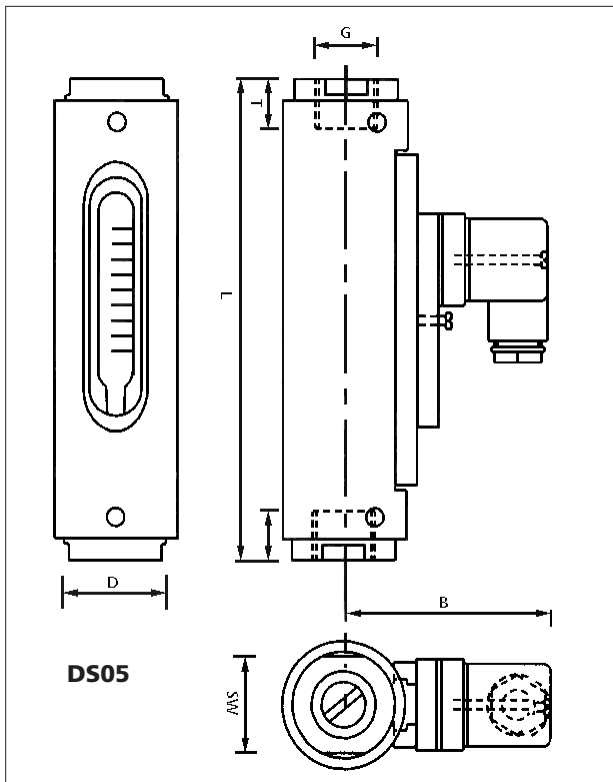
CONTACTS:

N/O: 250V, 3A, 100VA
 SPDT: 250V, 1.5A, 50VA
 *EX-N/O: 250V, 2A, 60 VA
 *EX-SPDT: 250V, 1A, 30VA

*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

Model	Dimensions in mm						Weight (grams)
	SW	D	B	G	T	L	
DS05.1.x.x.x	32	43	67	1/4 NPT	14	132	625
DS05.2.x.x.x	32	43	67	1/2 NPT	15	135	625
DS05.2.x.x.05	32	43	67	1/2 NPT	15	163	650
DS05.3.x.x.06	32	43	67	3/4 NPT	18	167	850
DS05.3.x.x.07	41	50	70	3/4 NPT	18	152	1000
DS05.4.x.x.07	41	50	70	1.0 NPT	19	184	1000
DS05.4.x.x.08/09	41	50	70	1.0 NPT	19	184/200	1000
DS05.5.x.x.10	46	60	75	1 1/4 NPT	21	200	1400
DS05.5.x.x.11	46	55	73	1 1/4 NPT	21	222	1400



ORDERING INFORMATION:

Order Number DS05. 1.1.N 1. 03. 1. 1.
Miniature variable area flow meter and switch

Connection:

1N= 1/4 "female NPT
 2N= 1/2" female NPT
 3N= 3/4" female NPT
 4N= 1" female NPT
 5N= 1 1/4 " female NPT

Material:

1= brass with 301 stainless steel spring
 2= all 316 stainless steel

Scale:

1= for water

Measuring Ranges:

DS05.1 and DS05.2:

01= 0.2 - 4 l/min Water
 02= 0.5 - 6 l/min Water
 03= 0.5 - 8 l/min Water
 04= 0.5 - 14 l/min Water

DS05.2 only:

05A= 2 - 22 l/min Water
 05= 1-28 l/min Water

DS05.3 only:

06= 2 - 45 l/min Water
DS05.3 and DS05.4:
 07= 2 -80 l/min Water
 07A= 6-90 l/min Water

DS05.4 only

08= 6-110 l/min Water

DS05.5 only:

09= 15-150 l/min Water
 10= 30 - 220 l/min Water
 11= 35 - 250 l/min Water

No. of contacts:

0= without contacts
 1= 1 contact
 2= 2 contacts

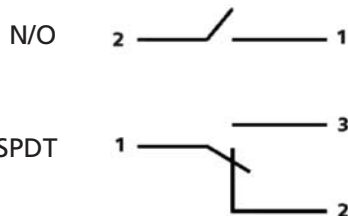
Contact function:

1= N/O
 2= SPDT
 3S= Ex-N/O (EEx m II T6)
 3U= Ex-SPDT (EEx m II T6)

Options:

0- Without
 1= Please List

Electrical Connection



PKP

DS06 Flow Meter/Switch for Water

F.S. Ranges From 4 to 250 l/min water

DESCRIPTION

The flow meter and switch model DS06 works according to a modified variable area principle. The float is guided in a cylindrical measuring tube by means of a spring and slotted nozzle. The flowing medium moves the float in the flow direction. An externally mounted pointer indicator is magnetically coupled to the float. It follows the float position and indicates the flow rate on a scale.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reaches a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full measuring range of the meter.

The built in spring and magnetic float are very reliable. As the spring opposes the float and the flow it is possible to mount the flow meter in any orientation.

APPLICATION

The variable area flow meter and switch model DS06 is used for measuring and monitoring the flow of low viscosity liquids and gases, i.e., in cooling loops of welding machines and laser systems, for pump monitoring, compressors and many other applications.

SPECIFICATIONS

Max Pressure:

Brass- 200 bar (2,900 PSIG)

Stainless Steel- 300 bar (4,350 PSIG)

Pressure Drop: 0.02-0.4 bar (0.3-5.8 PSI)

Max Temperature: 100°C (160°C available as option)

Materials:

Wetted Parts- Nickel plated brass or 316Ti SS

O-rings-

Brass Version- Buna

SS Version- Viton

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 5\%$ f.s.

Ranges:

Water- 0.2-4.0 l/min to 30-250 l/min



DS06 Flow Switch



DS06 Flow Meter/ Switch

FEATURES

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

SCALES FOR WATER

UNIVERSAL MOUNTING POSITION

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

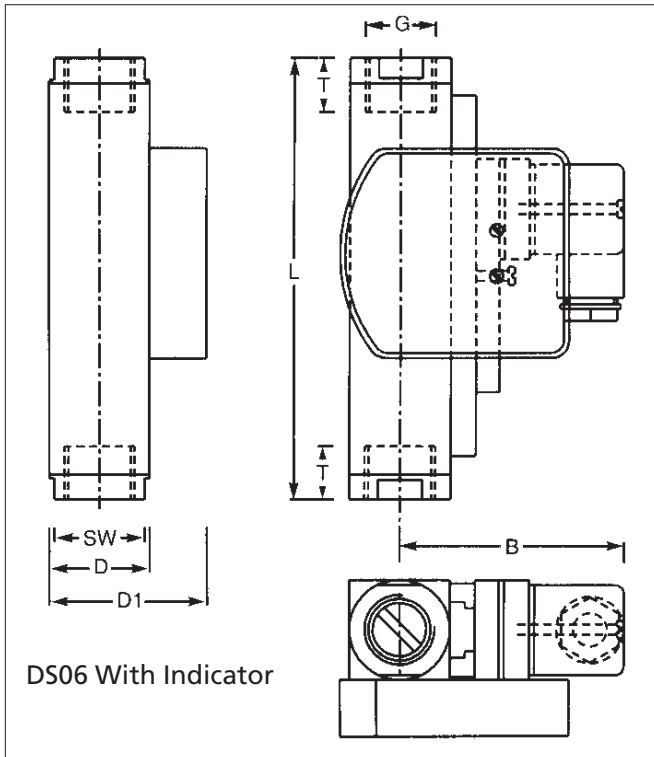
CONTACTS:

N/O: 250V, 3A, 100VA
 SPDT: 250V, 1.5A, 50VA
 *EX-N/O: 250V, 2A, 60 VA
 *EX-SPDT: 250V, 1A, 30VA

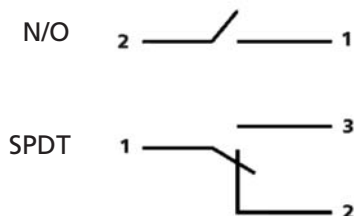
*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

Model	Dimensions in mm							Weight	
	SW	D	D1	B	G	T	L	with W/O Indication	
DS06.1.x.x.x	27	30	47	65	1/4 NPT	14	130	800	850
DS06.2.x.x.x	27	30	47	65	1/2 NPT	14	130	850	900
DS06.2.x.x.07/08	27	30	47	65	1/2 NPT	14	148	900	950
DS06.3.x.x.x	34	40	57	70	3/4 NPT	18	152	1400	1450
DS06.4.x.x.9-11	36	36	53	68	1.0 NPT	19	156	1100	1150
DS06.4.x.x.12	40	40	55	72	1.0 NPT	20	200	2700	2750
DS06.5.x.x.x	50	50	67	75	1 1/4 NPT	21	200	3000	3050
DS06.6.x.x.x	60	60	75	80	1 1/2 NPT	24	200	3800	3850



Electrical Connection



ORDERING INFORMATION:

Order Number DS06. 1N. 1. 1. 06. 1. 1. 2 .
Miniature variable area flow meter and switch

Connection:

1N= 1/4 "female NPT
 2N= 1/2" female NPT
 3N= 3/4" female NPT
 4N= 1" female NPT
 5N= 1 1/4 " female NPT
 6N= 1 1/2" female NPT

Material:

1= brass with 301 stainless steel spring
 2= all 316 stainless steel

Scale:

1= for water

Measuring Ranges: Water

DS06.1 und DS06.2:

01= 0.2 -4 l/min Water
 02= 0.4 -4.5 l/min Water
 03= 0.6 -5 l/min Water
 04= 0.5 -8 l/min Water
 05= 1 -14 l/min Water
 06= 1 -28 l/min Water

DS06.2 only:

07= 2 -40 l/min Water
 08= 4 -55 l/min Water
DS06.3 and DS06.4:
 09= 1 -70 l/min Water
 10= 8 -90 l/min Water
 11= 5 -110 l/min Water

DS06.5 only:

12= 10 -150 l/min Water

DS06.5 & DS06.6 only:

13= 30 -220 l/min Water
 14= 30 -250 l/min Water

Version:

0= switch only, without flow rate indication
 1= flow meter and switch, with side indicator

No. of contacts:

0= without contacts
 1= 1 contact
 2= 2 contacts

Contact function:

1= N/O
 2= SPDT
 3S= Ex-N/O (EEx m II T6)
 3U= Ex-SPDT (EEx m II T6)

PKP

DS07 Viscosity Compensated Flow Meter/Switch

F.S. Ranges From 0.8 to 90 l/min

DESCRIPTION

The flow meter and switch model DS07 works according to a modified variable area principle. The float is guided in a cylindrical measuring glass by means of a spring. The flowing medium moves the float in the flow direction. The upper edge of the float shows the momentary flow via an etched scale on the measuring glass.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reached a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full measuring range of the meter.

The built in spring and magnetic float are very reliable. As the spring opposes the float and the flow, it is possible to mount the flow meter in any orientation. The strong spring, combined with an orifice in the float, limit the effects of viscosity changes to an absolute minimum compared to regular variable area flow meters.

APPLICATION

The variable area flow meter and switch model DS07 is used for measuring and monitoring the flow of viscous liquids, i.e., in central lubricating systems, lubricating circuitry, hydraulics, transformer oils, etc..

SPECIFICATIONS

Max Pressure:

DS07.2- 16 bar (232 PSIG)

DS07.3/4- 10 bar (145 PSIG)

Pressure Drop:

DS07.2- 0.02-0.2 bar (0.3-2.9 PSI)

DS07.3/4- 0.02-0.04 bar (0.3- 5.8 PSI)

Max Temperature: 120°C (160°C available as option)

Materials:

Measuring Glass- Duran 50

Wetted Parts- Nickel plated brass or 316Ti SS

O-rings-

Brass Version- Buna

SS Version- Viton

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 4\%$ f.s.

Ranges: 0.2-0.8 l/min to 30-90 l/min
viscosities to 600 cSt



DS07 Flow Meter/ Switch

FEATURES

FOR VISCOUS MEDIA TO 600 CST

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

UNIVERSAL MOUNTING POSITION

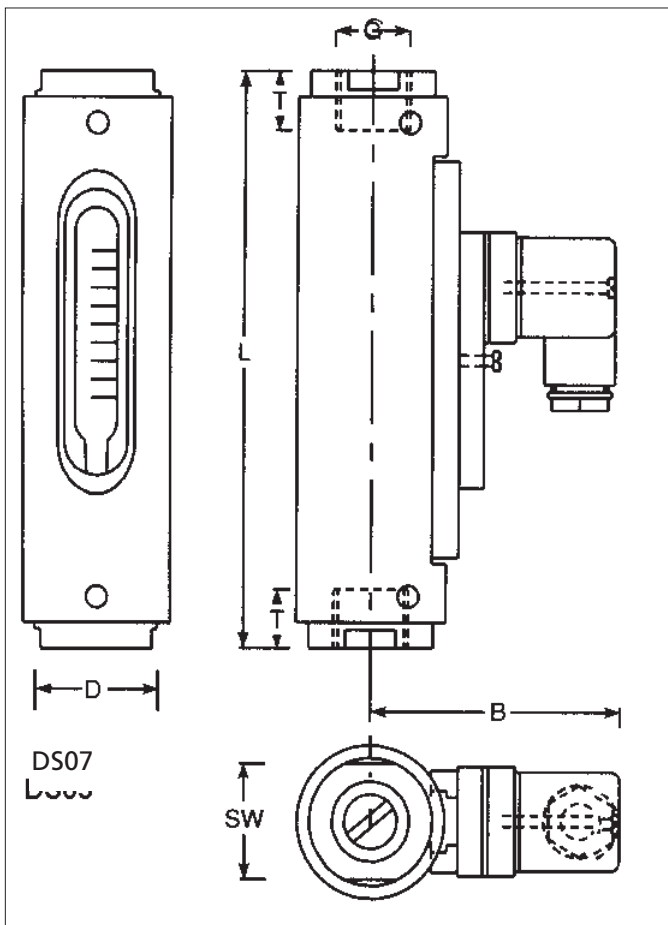
CONTACTS:

N/O: 250V, 3A, 100VA
 SPDT: 250V, 1.5A, 50VA
 *EX-N/O: 250V, 2A, 60 VA
 *EX-SPDT: 250V, 1A, 30VA

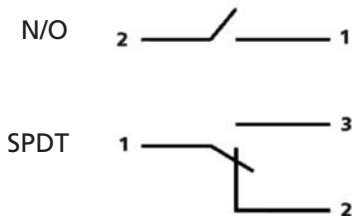
*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

Model	Dimensions in mm						Weight (g)
	SW	D	B	G	T	L	
DS07.2.x.x.x	27	32	50	1/2 NPT	14	114	300
DS07.3.x.x.x	41	50	72	3/4 NPT	17	139	850
DS07.4.x.x.x	41	50	72	1.0 NPT	17	158	850



Electrical Connection



ORDERING INFORMATION:

Order Number **DS07.** 1N. 1. 1. 03. 1. 1.
 Viscosity compensated variable area flow meter and switch

Connection:

2N= 1/2" female NPT
 3N= 3/4" female NPT
 4N= 1" female NPT

Material:

1= brass with 301 stainless steel spring
 2= all 316 stainless steel

Scale:

1= for viscous media

Measuring Ranges:

DS07.2 only:

01= 0.2 - 0.8 l/min
 02= 0.2 - 1 l/min
 03= 0.5 - 1.7 l/min
 04= 1.3 - 4 l/min
 05= 2.5 - 8 l/min

DS07.2, DS07.3 and DS07.4:

06= 0.1 - 0.8 l/min
 07= 0.5 - 1.5 l/min
 08= 1 - 4 l/min
 09= 2 - 8 l/min
 10= 3 - 10 l/min
 11= 5 - 15 l/min
 12= 8 - 24 l/min

DS07.3 and DS07.4:

13= 10 - 30 l/min
 14= 15 - 45 l/min
 15= 20 - 60 l/min
 16= 30 - 90 l/min

No. of contacts:

0= without contacts
 1= 1 contact
 2= 2 contacts

Contact function:

1= N/O
 2= SPDT
 3S= Ex-N/O (EEx m II T6)
 3U= Ex-SPDT (EEx m II T6)

PKP

DS08 Viscosity Compensated Flow Meter/Switch

F.S. Ranges From 0.8 to 90 l/min

DESCRIPTION

The flow meter and switch model DS08 works according to a modified variable area principle. The float is guided in a cylindrical measuring tube by means of a spring. The flowing medium moves the float in the flow direction. An externally mounted pointer indicator is magnetically coupled to the float and thus, following the float position, indicates the flow rate on a scale.

A reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the reed contact the switch will close. With higher flows the float moves further upward until it reaches a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The reed contact is adjustable over the full measuring range of the meter.

The built in spring and magnetic float are very reliable. As the spring opposes the float and the flow, it is possible to mount the flow meter in any orientation. The strong spring, combined with an orifice in the float, limit the effects of viscosity changes to an absolute minimum compared to regular variable area flow meters.

APPLICATION

The variable area flow meter and switch model DS08 is used for measuring and monitoring the flow of viscous liquids, i.e., in central lubricating systems, lubricating circuitry, hydraulics, transformer oils, etc..

SPECIFICATIONS

Max Pressure:

DS08.2 brass- 250 bar (3,625 PSIG)

DS08.4 brass- 250 bar (3,625 PSIG)

DS08.2 stainless- 300 bar (4,350 PSIG)

DS08.4 stainless- 300 bar (4,350 PSIG)

Pressure Drop:

DS08.2- 0.02-0.4 bar (0.3-5.8 PSI)

DS08.4- 0.02-0.2 bar (0.3-2.9 PSI)

Max Temperature: 120°C (160°C available as option)

Materials:

Wetted Parts- Nickel plated brass or 316Ti SS
O-rings-

Brass Version- Buna

SS Version- Viton

Electrical Connections- DIN 43650 plug

Accuracy- $\pm 4\%$ f.s.

Ranges: 0.1-0.8 l/min to 30-90 l/min
viscosities to 600 cSt



DS08 Flow Meter/ Switch

FEATURES

FOR VISCOUS MEDIA TO 600 CST

SMALL MOUNTING DIMENSIONS

BRASS OR STAINLESS STEEL CONNECTIONS

UNIVERSAL MOUNTING POSITION

HIGH SWITCHING ACCURACY

LOW SWITCHING HYSTERESIS

CONTACTS:

N/O: 250V, 3A, 100VA

SPDT: 250V, 1.5A, 50VA

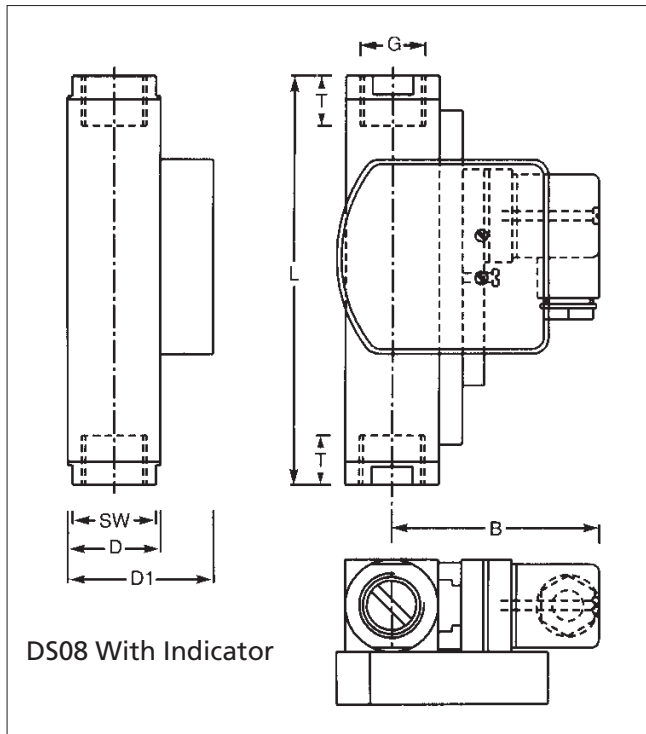
*EX-N/O: 250V, 2A, 60 VA

*EX-SPDT: 250V, 1A, 30VA

*Per ATEX 100aEXII 2 G, EEx m II T6

DIMENSIONS:

Model	Dimensions in mm							Weight (g)	
	SW	D	D1	B	G	T	L	With Indicator	W/O Indicator
DS08.M	27	31	48	48	1/2 NPT	14	90	350	---
DS08.S	40	40	57	68	1.0 NPT	17	130	1000	1050
Special Connections									
DS08.M					1/4 NPT	14	98	400	---
					3/8 NPT	14	108	450	---
DS08.S					1/4 NPT	21	152	1100	1150
					1/2 NPT	21	152	1100	1150
					3/4 NPT	21	152	1100	1150



ORDERING INFORMATION:

Order Number DS08.M. 2N.1. 1. 03. 1. 1. 0
 Viscosity compensated variable area flow meter and switch

Size:

M= Miniature

S= Standard

Connection:

2N= 1/2" female NPT

4N= 1" female NPT

Material:

1= brass with 301 stainless steel spring

2= all 316 stainless steel

Scale:

1= for viscous media

Measuring Ranges:

DS08.2 only:

01= 0.1 - 0.8 l/min

03= 0.5 - 1.6 l/min

04= 0.8 - 3 l/min

05= 2 - 7 l/min

DS08.4 only:

06= 0.1 - 0.8 l/min

07= 0.5 - 1.5 l/min

08= 1 - 4 l/min

09= 2 - 8 l/min

10= 3 - 10 l/min

11= 5 - 15 l/min

12= 8 - 24 l/min

13= 10 - 30 l/min

14= 15 - 45 l/min

15= 20 - 60 l/min

16= 30 - 90 l/min

17= 35 - 110 l/min

12A= 1-20 l/min

13A= 4-40 l/min

14A= 5-50 l/min

15A= 8-60 l/min

16A= 12-70 l/min

17A= 15-80 l/min

No. of contacts:

0= without contacts

1= 1 contact

2= 2 contacts

Contact function:

0= without contact

1= N/O

2= SPDT

3S= Ex-N/O, not for DS08.M

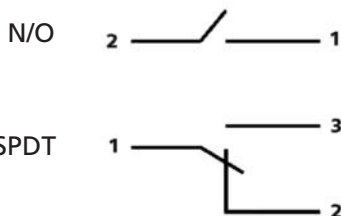
3U= Ex-SPDT, not for DS08.M

Flow Indicator

0= No Flow Indicator

1= Flow Indicator (available for 1", 4N connection size only)

Electrical Connection



PKP

DS20 Compact Variable Area Flowmeter

F.S. Ranges From 1.0 to 250 l/h, Alarm & Analog Output Options

DESCRIPTION

The flowmeter Model DS20 works according to the proven variable area principle.

A float is guided in a cylindrical measuring tube. The flowing medium moves the float in the flow direction. An externally mounted pointer indicator is magnetically coupled to the float and thus, following the float position, indicates the flow rate on a scale.

This indicator assembly is equipped with a scale calibrated to the operating conditions in the system and additionally may contain alarm contacts or an analog output.

Model DS20 is used for measuring and monitoring the flow of low viscosity liquids and gases, i. e. in cooling circuits of welding machines and laser systems, for pump monitoring, compressors and many other applications.

By using only stainless steel AISI 316 Ti for the wetted parts the meter is especially suited for aggressive media.

SPECIFICATIONS

Materials:

Wetted Parts: st. steel AISI 316 Ti

Housing: stainless steel

Mounting Position: vertical, flow from bottom to top
Rated Pressure: 40, 100, or 160 bar depending on process connection

Max. Temperature:

Local Indication: -80°C...+200°C

With Alarm Contacts: -40°C...+150°C

Analog Output: -40°C...+150°C

Electrical Protection: IP 65

Accuracy: +/- 4% of full scale

Alarm Contacts: SJ 3.5-N (NAMUR), inductive
Voltage Rating: 8 VDC (R_i = 1 kOhm)

Supply Voltage: 5...25 VDC

Analog Output:

Output Signal: 4...20 mA

Supply Voltage: 14...30 VDC

Load: Supply voltage-13.5V
.02 A



DS20 Flow Meter

FEATURES

- For Liquids & Gases
- Pressure to 160 bar (2322 PSI)
- Temperature to 200°C
- AISI 316 Ti Stainless Steel Construction
- Individually Calibrated
- Alarm & Analog Outputs Available

VERSIONS

DS20.1 Flowmeter with local indication

DS20.2 Flowmeter with local indication, 1 min. contact

DS20.3 Flowmeter with local indication, 1 max.contact

DS20.4 Flowmeter with local indication, 1 min. contact and 1 max. contact

DS20.5 Flowmeter with local indication and analog output 4-20 mA

Optionally: valve on inlet or outlet(process connections on back)

PROCESS CONNECTIONS

Flowmeter Supplied Without Needle Valve:

All screw connections are in accordance with model code, 100 bar rated pressure is standard.

Flowmeter Supplied With Needle Valve:

All screw connections in accordance with model code, 40 bar rated pressure (standard) or 100 bar rated pressure. Flange connections are not possible.

MEASURING RANGES

Range No.	Water Flow 20°C (l/h)	Air Flow @20°C, 1.013 bar abs. (l/h)	Pressure Drop (mbar)
1	0.1...1	4...40	6
2	0.16...1.6	6...60	6
3	0.25...2.5	10...100	6
4	0.4...4	15...150	6
5	0.6...6	20...200	6
6	1...10	32.5...325	8
7	1.6...16	50...500	8
8	2.5...25	80...800	8
9	4...40	140...1400	11
10	6...60	200...2000	11
11	10...100	325...3250	11
*12	16...160	500...5000	13
*13	25...250	800...8000	13

* Supplied with 3/8" connections unless provided with needle valve when 1/4" connections are provided

Note: All flowmeters are calibrated for the actual working conditions. Virtually any units of measurement can be rendered on the flowmeter scale at no cost addition.

Some commonly ordered units include:

ml/min	ml/h
gph	gpm
scfh	scfm
lpm	lpd

ORDERING INFORMATION:

Order number DS20. 41T6. 03. 1. 5. 0.
Variable area flowmeter

Process connection:

41G4 = G 1/4 female (Pressure rating 40 bar)
 41G6 = G 1/4 female (Pressure rating 100 bar)
 41G7 = G 1/4 female (Pressure rating 160 bar)
 41T4 = 1/4" NPTF (Pressure rating 40 bar)
 41T6 = 1/4" NPTF (Pressure rating 100 bar)
 41T7 = 1/4" NPTF (Pressure rating 160 bar)
 *42T4 = 3/8" NPTF (Pressure rating 40 bar)
 *42T6 = 3/8" NPTF (Pressure rating 100 bar)
 *42T7 = 3/8" NPTF (Pressure rating 160 bar)

*Range code 12 & 13 only

01A1 = ANSI Flange, 1/2", 150 lbs
 02A1 = ANSI Flange, 1.0", 150 lbs
 01A2 = ANSI Flange, 1/2", 300 lbs
 02A2 = ANSI Flange, 1.0", 300 lbs

Measuring ranges:

1...13 = measuring range no. acc. to table
 99 = other (please indicate in writing)

Valve (only for PN40):

0 = without
 1 = valve at inlet, valve seat silver (1/4" connections only)
 2 = valve at inlet, valve seat PCTFE (1/4" connections only)
 3 = valve at outlet, valve seat silver (1/4" connections only)
 4 = valve at outlet, valve seat PCTFE (1/4" connections only)

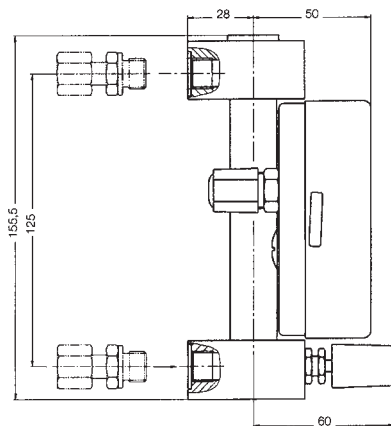
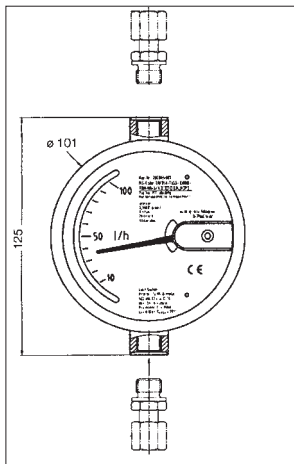
Version:

1 = local indication only
 2 = local indication, 1 min. contact
 3 = local indication, 1 max. contact
 4 = local indication, 1 min. and 1 max. contact
 5 = local indication, analog output
 4...20 mA

Options:

0 = without
 1 = special calibration or other feature(s) needed, provide written details

DIMENSIONS (MM)



PKP

DS25 Flowmeter, Alarm & Analog Output (With Totalizer)

F.S. Ranges 0.01-570 gpm Liquid, 0.44-1100 scfm Gas

DESCRIPTION

Model DS25 flowmeters work according to the proven variable area principle. A float is guided in a conical measuring tube and is nearly independent of the viscosity of the medium. The flowing medium moves the float in the flow direction. An externally mounted pointer indicator is magnetically coupled to the float and thus, following the float position, indicates the flow rate on a scale.

This indicator assembly is equipped with a scale calibrated to the operating conditions in the system and additionally may contain alarm contacts and analog output including totalizer.

The variable area flowmeter model DS25 is used for measuring and monitoring the flow of all kinds of liquids or gases. By using only stainless steel AISI 316 Ti for the wetted parts, the meter is especially suited for aggressive media or for use in food and drink applications (with Tri-Clamp or other hygienic process connections)

SPECIFICATIONS

TECHNICAL SPECIFICATIONS (MEASURING TUBE)

Measurable Media: liquids and gases

Ranges: see Tables 2 and 3

Turndown Ratio: 10:1

Accuracy:

DS25.1: 1.6% f.s.

DS25.2: 2.5% f.s.

Process Connections: see Table 1

Max. Pressure: see Table 1

Media Temperature:

DS25.1: -180°C ... +400°C

DS25.2: -80°C ... +130°C

(the actual operating temperature also depends on the max. permissible temperatures for the indicator and the options utilized in the unit)

Materials:

DS25.1: all wetted parts stainless steel AISI 316 Ti

DS25.2: all wetted parts stainless steel AISI 316 Ti with PTFE coating

Mounting: Vertical

Flow Direction: from bottom to top

Mounting Length: see Table 1

Straight Pipe Run Recommended:

1/2" to 2 1/2": none

3" through 4": min 5 x diameter upstream

Electrical Protection: IP65



DS25 Flow Meter

FEATURES

- For Liquids & Gases
- Pressure to 320 bar (40 & 100 bar standard)
- Temperature to 400°C
- AISI 316 Ti Stainless Steel Construction
- Individually Calibrated
- Alarm & Analog Outputs Available

INDICATOR

The indicator part of the DS25 consists of an aluminum or polyamide housing with a pointer assembly magnetically coupled to the float.

The scale may be calibrated in flow units or in percent. Additionally, transmitters including totalizer and alarm contacts may be mounted in the indicator housing.

Ambient Temperature:

PA housing: -25°C ... +100°C

AL housing: -25°C ... +130°C

(for higher or lower operating temperatures use option "temperature isolation (DS25.A)")

ALARM CONTACTS

Model: inductive proximity switch, SJ3.5-N per DIN 19234 (NAMUR); or SPDT Relay

Rated Voltage: 8 VDC

Output Signal: ≤ 1 mA = in alarm state; ≥ 3 mA = not in alarm state

ALARM CONTACTS CONT'D

Ambient Temperature: -25°C ... +100°C (for higher or lower operating temperatures use option "temperature isolation (DS25.A)")

Explosion Protection: ATEX100 EEx ia IIC T6

Recommended Accessories: KF Transformer isolated barrier with relay output (Converts NAMUR output to SPDT relay)

TRANSMITTER

Output Signal: 4 ... 20 mA

Indication: LCD display, 8 digits (programmable for indication of flow rate or as non-resettable totalizer)

Supply Voltage: see ordering information

Max. Load: 4-wire: >= 500 Ohm

2-wire: (Supply Voltage-13.5 V)
20 mA

Operating Temperature: 0 ... 100°C (for higher or lower operating temperatures use option "temperature isolation (DS25.A)")

Electrical Connection: Cable Gland or PG11

INTRINSICALLY SAFE TRANSMITTER

Technical specifications same as standard unit, except:

Output Signal: 4 ... 20 mA, 2-wire

Operating Temperature: -25°C ... +70°C (for higher or lower operating temperatures use option "temperature isolation (DS25.A)")

Explosion Protection: ATX100 EEx ia IIC T6

Recommended Accessories: intrinsically safe power supply (see "Options")

PNEUMATIC TRANSMITTER

on request

OPTIONS

Temperature isolation (DS25.A):

For media temperatures outside the limits given in the technical specifications for the indicator assembly the measuring tube and the indicator assembly may be temperature isolated by mounting the indicator at a distance of 60 mm from the measuring tube. This ensures that the unit may be operated at media temperatures as high as stated in the specifications for the measuring tube.

Damping (DS25.D):

Float damping is recommended for gas or steam applications to prevent erratic up and down movement of the float.

Oxygen Applications: For use with oxygen the meters may be supplied oil and grease-free.

Certificates: On request

Tags: Stainless steel tags with customer specified text are optionally available

TRANSFORMER ISOLATED BARRIER W/RELAY OUTPUTS

Per DIN 19234 (NAMUR)

Model	Power	No. channels	Contact Rating
KFA5-SR2-EX2.W	103.5-126 VAC	2	AC:253V/2A, DC: 40V/2A
KFD5-SR2-EX2.W	20-30 VDC	2	AC:253V/2A, DC: 40V/2A

POWER SUPPLY FOR INTRINSICALLY SAFE TRANSMITTER

Output Signal: 0 / 4...20 mA, galvanically separated
Supply Voltage:

SE11.2: 24 VAC / DC

Max. Load: 750 Ohm

Control Circuit: intrinsically safe [EEx ia] IIC

STEAM JACKETS

Steam jackets are used to keep the media in the measuring tube at a required temperature. Consult us for available configurations.

Table 1-Connection Chart

Nominal Bore mm (inches)	Description Pressure Rating	Tube number	Connection Code	Length L(mm)
15 (1/2")	Flanges ANSI 1/2", 150 lbs.	1	102	250
	Flanges ANSI 1/2", 300 lbs.	1	103	250
	1/2" NPT female, 580 PSI	1	105	295
	Flanges ANSI 1/2", 150 lbs.	2	207	250
	Flanges ANSI 1/2", 300 lbs.	2	208	250
	1/2" NPT female, 580 PSI	2	210	295
20 (3/4")	Flanges ANSI 3/4", 150 lbs.	1	112	250
	Flanges ANSI 3/4", 300 lbs.	1	113	250
	3/4" NPT female, 580 PSI	1	115	295
	Flanges ANSI 3/4", 150 lbs.	2	217	250
	Flanges ANSI 3/4", 300 lbs.	2	218	250
	3/4" NPT female, 580 PSI	2	220	295
25 (1")	Flanges ANSI 1", 150 lbs.	1	122	250
	Flanges ANSI 1", 300 lbs.	1	123	250
	Tri-Clamp DN25 / 1", 150 PSI	1	127	250
	Flanges ANSI 1", 150 lbs.	2	229	250
	Flanges ANSI 1", 300 lbs.	2	230	250
	Tri-Clamp DN25 / 1", 150 PSI	2	234	250
	Flanges ANSI 1", 150 lbs.	3	336	250
	Flanges ANSI 1", 300 lbs.	3	337	250
1" NPT female, 580 PSI	3	339	310	
32 (1 1/4")	Tri-Clamp DN32, 150 PSI	1	141	250
	Flanges ANSI 1 1/4", 150 lbs.	2	243	250
	Flanges ANSI 1 1/4", 300 lbs.	2	244	250
	Tri-Clamp DN32, 150 PSI	2	245	250
	Flanges ANSI 1 1/4", 150 lbs.	3	347	250
	Flanges ANSI 1 1/4", 300 lbs.	3	348	250
	1 1/4" NPT female, 580 PSI	3	350	310
40 (1 1/2")	Tri-Clamp DN40 / 1 1/2", 150 PSI*	1	151	250
	Tri-Clamp DN40 / 1 1/2", 150 PSI*	2	252	250
	Flanges ANSI 1 1/2", 150 lbs.	3	354	250
	Flanges ANSI 1 1/2", 300 lbs.	3	355	250
	Flanges ANSI 2", 150 lbs.	3	357	250
50 (2")	Flanges ANSI 2", 300 lbs.	3	358	250
	Tri-Clamp DN50 / 2", 150 PSI*	3	360	250
	Flanges ANSI 2", 150 lbs.	4	462	250
	Flanges ANSI 2", 300 lbs.	4	463	250
	2" NPT female, 580 PSI	4	465	325
	2" NPT female, 580 PSI	4	468	325
	Tri-Clamp DN80 / 3", 150 PSI*	4	470	300
	Flanges ANSI 3", 150 lbs.	5	572	250
Flanges ANSI 3", 300 lbs.	5	573	260	
100 (4")	Tri-Clamp DN100 / 4", 150 PSI	5	575	250
	Flanges ANSI 4", 150 lbs.	6	678	250
	Flanges ANSI 4", 300 lbs.	6	679	250
125 (5")	Flanges ANSI 5", 150 lbs.	6	682	250
	Flanges ANSI 5", 300 lbs.	6	683	250
150 (6")	Flanges ANSI 6", 150 lbs.	6	686	250
	Flanges ANSI 6", 300 lbs.	6	687	250

*not available with "steam jacket" option

Table 2
Range Codes, Model DS25.1
Stainless Steel Version

Water @20°C			Max Viscosity (Centipoise) Without Recalibration
Tube No.	Range Code	Range (g/m)	Pressure Drop(PSI)
1	101	0.001-0.01	0.58
	102	0.017-0.176	0.58
	103	0.027-0.277	0.58
	104	0.044-0.44	0.58
	105	0.044-0.44	0.087
2	206	0.044-0.44	0.087
	207	0.07-0.7	0.218
	208	0.07-0.7	0.087
	209	0.1-1.1	0.58
	210	0.1-1.1	0.087
	211	0.17-1.76	0.58
	212	0.17-1.76	0.087
	213	0.27-2.77	0.58
	214	0.27-2.77	0.218
	215	0.44-4.4	0.58
	216	0.44-4.4	0.21
	217	0.7-7.0	0.58
	218	1-10.0	0.653
3	319	0.44-4.4	0.102
	320	0.7-7.0	0.102
	321	1.1-11.0	0.595
	322	1.1-11.0	0.232
	323	1.7-17.0	0.595
	324	2.6-26.0	0.604
4	425	1.1-11.0	0.116
	426	1.7-17.0	0.116
	427	2.2-27.0	0.682
	428	2.7-27.0	0.116
	429	4.4-44.0	0.682
	430	4.4-44.0	0.276
	431	7.0-70.0	0.682
	432	10-100	0.914
5	533	11-110	0.87
	534	17-170	0.87
	535	26-260	0.87
6	638	44-440	1.02

Air/Gases @20°C, 1.013 bar abs.

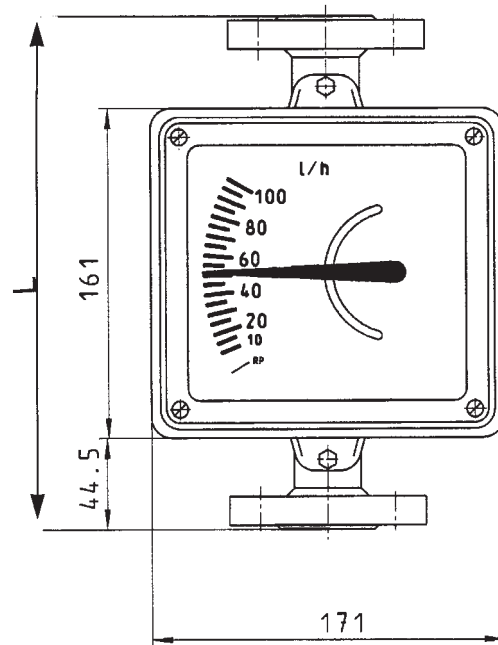
Tube No.	Range Code	Range (SCFM)	Pressure Drop(PSI)
1	101	0.044-0.44	0.653
	102	0.07-0.7	0.653
	103	0.1-1.0	0.653
	104	0.17-1.77	0.653
2	206	0.32-3.2	0.29
	207	0.23-2.3	0.16
	208	0.38-3.8	0.16
	209	0.44-4.4	0.653
	210	0.59-5.9	0.16
	211	0.76-7.6	0.653
	212	0.94-9.4	0.16
	213	1.2-12	0.653
	214	1.5-15	0.16
	215	1.8-18	0.653
	216	2-20	0.29
3	319	2.3-23	0.174
	320	2.9-29	0.319
	321	4.1-41	0.194
	322	5.3-53	0.319
	323	7.7-77	0.682
4	425	5.9-59	0.203
	426	7.7-77	0.363
	427	9.4-94	0.203
	428	12-118	0.363
	429	12-118	0.783
	430	17-170	0.203
	431	21-210	0.363
	432	29-290	0.783
5	533	29-290	0.435
	534	44-440	0.943
	535	50-500	0.435
	536	70-700	0.943
	537	110-1100	0.943

Table 3
Range Codes Model
DS25.2 PTFE Coated

Water @20°C			
Tube No.	Range Code	Range (g/m)	Pressure Drop(PSI)
2	250	0.044-0.44	0.232
	251	0.07-0.7	0.232
	252	0.1-1.1	0.232
	253	0.17-1.76	0.232
	254	0.27-2.77	0.232
	255	0.44-4.4	0.261
3	356	0.7-7.0	0.290
	357	1.1-11.0	0.290
	358	1.7-17.0	0.319
4	459	1.7-17.0	0.290
	460	2.2-27.0	0.290
	461	4.4-44.0	0.290
	462	7.0-70.0	0.319
5	563	7.0-70.0	0.363
	564	11-110	0.363
	565	17-170	0.363
6	666	28-280	0.435

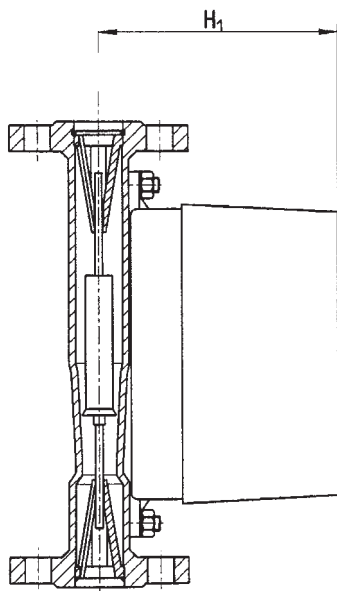
Air/Gases @20°C, 1.013 bar abs.			
Tube No.	Range Code	Range (SCFM)	Pressure Drop(PSI)
2	250	0.2-2.0	0.29
	251	0.3-3.0	0.29
	252	0.5-5.0	0.29
	253	0.76-7.6	0.29
	254	1.2-12	0.29
	255	2-20	0.319
3	356	2.9-29	0.363
	357	5-50	0.363
4	459	8-80	0.363
	460	12-120	0.363
	461	21-210	0.363
5	563	29-290	0.174
	564	52-520	0.319

DIMENSIONS (MM)

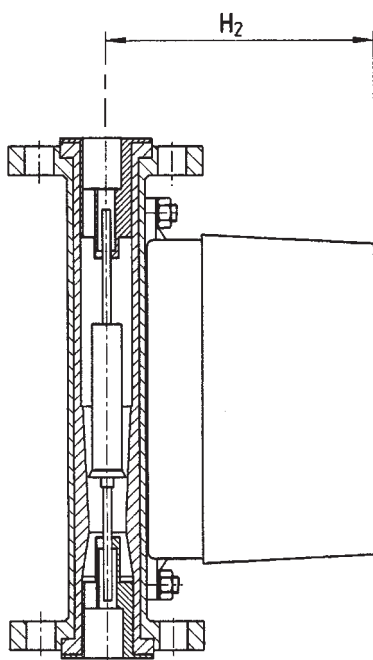


L Dimension- See Conection Chart, Table 1

DIMENSIONS (MM), CONT'D



Stainless Steel Measuring Tube



PTFE Measuring Tube

Meas. Tube	H1(mm)	H2(mm)	Wt(kg)
1	122	122	5
2	123	127	5
3	131	136	6.5
4	147	152	11
5	161	168	16
6	170	176	20

ORDERING INFORMATION

Order no.:	DS25.	1.	105.	1.	104.	1.	0.	000.	CG.
Variable area flowmeter									
Material version:									
1 = stainless steel									
2 = wetted parts PTFE coated									
Process connection:									
101...678 = according to Table 1									
999 = special connection									
Medium:									
1 = water / liquids									
2 = air / gases									
Measuring range:									
101...666 = according to range code tables 2 & 3									
999 = special range									
Indicator housing:									
1 = Polyamide									
2 = Aluminum									
Alarm contacts:									
0 = without									
1 = 1 min contact									
2 = 1 max. contact									
3 = 1 min & 1 max. contact									
4 = 2 min. contacts									
5 = 2 max. contacts									
1S = 1 min contact, SPDT, with SE01.3									
2S = 1 max. contact, SPDT, with SE01.3									
3S = 1 min & 1 max. contact, 2 x SPDT, with SE01.4									
4S = 2 min. contacts, 2 x SPDT, with SE01.4									
5S = 2 max. contacts, 2 x SPDT, with SE01.4									
Analog output and supply voltage:									
1st digit:									
0 = without									
1 = transmitter									
2 = transmitter, intrinsically safe									
3 = pneumatic transmitter									
2nd and 3rd digit:									
00 = without									
02 = 110 VAC, 4-20 mA, 4-wire									
03 = 230 VAC, 4-20 mA, 4-wire									
06 = 24 VAC, 4-20 mA, 4-wire									
08 = 24 VDC, 4-20 mA, 2-wire									
13 = 3-15 psi									
Electrical Connection:									
CG = Cable Gland									
PG11 = PG11									
Options:									
please indicate in writing									

Further Ordering Information

Important: for complete identification of the meter the following information must be specified:

- 1) Order no. according to table above
- 2) Identify desired units of flow
- 3) Identify medium
- 4) Temperature (operational, max.)
- 5) Pressure (operational, max.)
- 6) Viscosity (for liquids only)
- 7) Specific gravity of medium
- 8) For gases only: reference conditions
- 9) Any additional application specific information

CLARK

CLXC-C1 Series Single Jet Totalizing Water Meter

1/2" & 3/4" Sizes, With or Without Reed Switch Output

DESCRIPTION

Model series CLXC-C1 meters are single-jet dry type totalizing water meters. They are an ideal choice for a range of water use monitoring applications as well as many OEM and industrial applications where keeping track of consumed water volume is important for meeting regulatory and environmental requirements.

A pulse output of one pulse per gallon, 10 gallons or 10 liters is available.

CLXC-C1 meters are accurate and reliable. They are produced in an ISO9001 certified production facility and conform to International Standard ISO4064.

SPECIFICATIONS

GENERAL

Measuring Principle: Single Jet

Meter Type: Dry, magnetic coupling between rotor and register movement

Meter Sizes: 1/2", 3/4"

Max Media Temperature:

Cold Water Meter: 122°F (50°C)

Hot Water Meter: 194°F (90°C)

Max Operating Pressure: 150 PSI

Proof Pressure: 300 PSI

Materials:

Main Casing: Brass (CuZn40Pb2)

Register Box Rings: Brass (CuZn40Pb2)

Transparent Cover: Polycarbonate

Measuring Rotor: Polycarbonate

Rotor Spindles: 304 Austenitic Stainless Steel

Upper Plate: Polycarbonate

Bottom Plate: Polycarbonate

Register Gear Trains: POM

Worm Gear: POM

Registration Accuracy, with water <80°F (27°C):

Normal Test Flow Range (Table 1): ±2%

Pressure Drop: 15 PSI Max, see pressure drop curves

Installation: Horizontal orientation recommended

Casing Spud Connections: External straight threads

according to ANSI/ASME B1.20.1. See Dimensions, Connections and Weights (Table 2) for details.

Standard Accessories: Each meter is supplied with meter coupling (tailpiece) sets; includes

2 couplings and 2 gaskets

OPTIONAL PULSE/REED SWITCH OUTPUT:

The pulse emitter consists of a plastic housing with a reed switch that is closed when a magnet mounted on one of the meters register gears comes into its activation proximity.



Table 1- Operating Characteristics

Model	Size	Max. Flow GPM (m ³ /hr)	Nom. Flow GPM (m ³ /hr)	Min. Flow GPM (m ³ /hr)	Normal Test Flow Limits GPM (m ³ /hr)	Min. Reading Gallons (m ³ /hr)	Max. Reading Gallons (m ³ /hr)	Pulse Output Option
CLXC-C1-15D	1/2"	13.20 (3.0)	7.50 (1.7)	0.13 (.03)	1-13.2 (0.23-3.0)	0.01 (0.0001)	9999999 (99999)	1P/1 or 10Gal 1 P/10 Liters
CLXC-C1-20D	3/4"	22 (5.0)	11.00 (2.5)	0.22 (0.05)	1-22 (0.23-5.0)	0.01 (0.0001)	9999999 (99999)	1P/1 or 10Gal 1 P/10 Liters

A 1.5 meter (59") length of 2-conductor wire 3.5 mm inch diameter is standard. One conductor has red insulation and one has black.

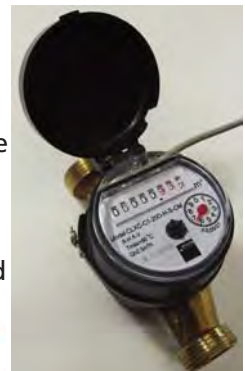
Max Voltage: 24V AC/DC

Max Current: 0.01 A

Output Bounce Time: 0.01 second

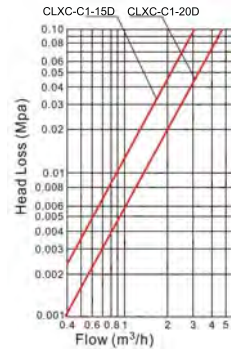
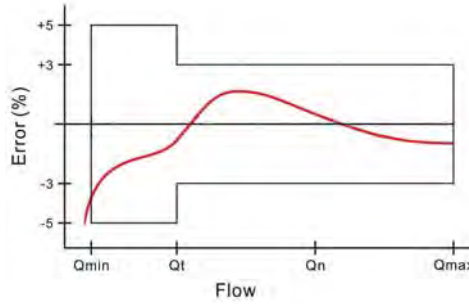
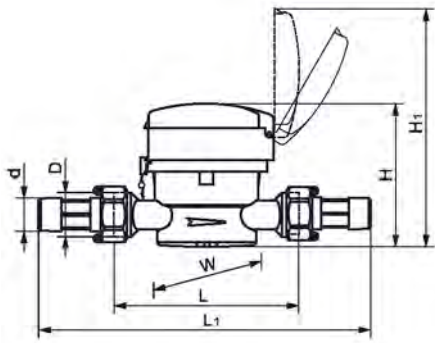


Reed Switch



CLXD-C1 with Reed Switch Output

DIMENSIONS, CONNECTIONS, ACCURACY, PRESSURE DROP



Model	Size	L Length Inches (mm)	L1 Overall Length Inches (mm)	W Width Inches (mm)	H Height Inches (mm)	H1 Working Height Inches	D Body Threads (NPS)	d Connector Threads (NPT)	Weight W/O Couplings lb (kg)	Weight W/Couplings lb (kg)
CLXC-C1-15D	1/2"	4.33 (110)	8.03 (204)	3.15 (80)	2.83 (72)	5.63 (143)	3/4"	1/2" NPT	1.32 (0.6)	1.72 (0.78)
CLXC-C1-20D	3/4"	5.12 (130)	9.21 (234)	3.15 (80)	2.83 (72)	5.63 (143)	1"	3/4" NPT	1.54 (0.70)	2.16 (0.98)

Meter Dial Layout



Cubic Meters with Reed Switch Output



Gallons

ORDERING INFORMATION

CLXC-C1-A-B-C-D-E

EXAMPLE: CLXC-20D-S

A Meter Size	B Hot or Cold water Meter	C Pulse Output	D Units
15D= 1/2" 20D= 3/4"	C= Cold H=Hot	-= None S= 1Pulse per Gal S10= 1Pulse per 10 Gal S10L= 1 Pulse per 10 Liters (.01 m ³)	-= Gallons CM= Cubic meters
Note: Each unit is shipped with a set of two couplings and gaskets			

TWO PIECE METER COUPLINGS (TAILPIECES)

Coupling Part Number	Description	Material	Length of Coupling	Used With Meter Model	Qty needed per meter
C15T-C1	3/4" NPS female nut to 1/2" NPT male union; includes 2 couplings and 2 gaskets	CuZn40Pb2	2-3/8"	CLXC-15D	1
C20T-C1	1" NPS female nut to 3/4" NPT male union includes 2 couplings and 2 gaskets	CuZn40Pb2	2-1/2"	CLXC-20D	1

CLARK

CLXC-P Series Single Jet Totalizing Water Meter

5/8 x 3/4 Size, With or Without Reed Switch Output

DESCRIPTION

Model series CLXC-P meters are single-jet dry type totalizing water meters. They are an ideal choice for a range of sub-metering applications for apartment and commercial buildings as well as marinas, RV and camping parks etc.

An optional pulse/reed switch output is available.

CLXC-P meters are accurate and reliable. They are produced in an ISO9001 certified production facility and are constructed in conformance with AWWA standard C712-10.



CLXC-P & C20-P are certified by Water Quality Association to meet ANSI/NSF 61 for materials safety and ANSI/NSF 372 for lead free compliance.

SPECIFICATIONS

GENERAL

Measuring Principle: Single Jet

Meter Type: Dry, magnetic coupling between rotor and register movement

Meter Sizes: 5/8 x 3/4

Max Media Temperature:

Cold Water Meter: 122°F (50°C)

Hot Water Meter: *149°F (65°C)

*WQA tested & certified 140°F (60°C)

Max Operating Pressure: 150 PSI

Materials:

Meter Body, Inlet filter, coupling: GV-5 FWA is a 50% glass fibre reinforced engineering thermoplastic material

Other Materials: See Table 2

Registration Accuracy, with water <80°F (27°C):

Normal Test Flow Range (Table 1): ±1.5% (The meter will register 98.5% to 101.5% of the water that passes through it)

At Minimum Flow (Table 1): -5%,+1.0% (The meter will register 95% to 101.0% of the water that passes through it)

Pressure Drop:15 PSI Max, see pressure drop curves

Installation: Horizontal orientation recommended

Casing Spud Connections: External straight threads according to ANSI/ASME B1.20.1. See Dimensions, Connections and Weights (Table 2) for details.

Standard Accessories: Each meter is supplied with meter coupling (tailpiece) sets; includes 2 couplings and 2 gaskets



Model	Max. Flow GPM	Nom. Flow GPM	Min. Flow GPM	Normal Test Flow Limits GPM	Min. Major Dial Division Reading	Max. Reading	Pulse Output Option
CLXC-P-20D	22 GPM	11.00	0.22	1-22	0.01G 0.1L .0001m ³	9999999 G 99999999 L 99999 m ³	1P/1G 1P/ 10G 1P/10 L 1P/100L 1P/.01 m ³ 1P/.1 m ³

OPTIONAL PULSE/REED SWITCH OUTPUT:

The pulse emitter consists of a plastic housing with a reed switch that is closed when a magnet mounted on one of the meters register gears or dial indicator comes into its activation proximity.

A 1.5 meter (59") length of 2-conductor wire 3.5 mm inch diameter is standard.



One conductor has red insulation and Reed Switch one has black.

Max Voltage: 24V AC/DC

Max Current: 0.01 A

Output Bounce Time: 0.01 second

**OPTIONAL
PULSE/REED SWITCH
OUTPUT CONT'D**

Reed Switch Location is under the meter lens on the main register in proximity to the least significant tumbler digit for the following:
 1P/10 Gal
 1P/100 Liters
 1P/0.1 m³



Reed Switch Location is on the meter lens on the higher value rotary dial:
 1P/1 Gal
 1P/10 Liters
 1P/0.01 m³



Table 2 Meter Parts				
No.	Description	Material Cold Water Meter	Material Hot Water Meter	Wetted Non-Wetted
1 Lid Assembly				
1.1	Lid	ABS	PP	Non-Wetted
1.2	Pin	Copper		
1.3	Cap	ABS	PP	
2	Register	ABS, Rubber Gasket, POM, Stainless Steel, LDPE, Agate, Magnet	PC, Rubber Gasket, POM, Stainless Steel, Agate, Magnet	Non-Wetted
3	Magnet Protection	Industrial Pure Iron		
4	Magnet Protection			
5	Inner Screw Ring	PPO		
6	Gasket	POM		
7	O=Ring	EPDM		Wetted
8	Pressure Plate	PA		
9 Impeller Assembly				
	Pivot	Stainless Steel		Wetted
	Magnet	Ferrite		
	Impeller	PP		
	Lining	CFPA		
10 Body Parts				
10.1	Pivot	POM, Stainless Steel		Wetted
10.2	Body	PA		
10.3	Inlet Filter	PA		
11 Connector				
11.1	Nut	PA		Non-Wetted
11.2	Coupling	PA		
11.3	Gasket	EPDM		Wetted



DIMENSIONS, CONNECTIONS, ACCURACY, PRESSURE DROP

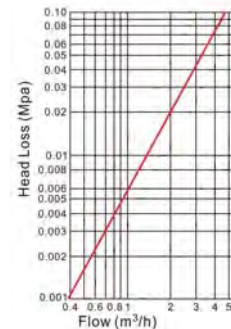
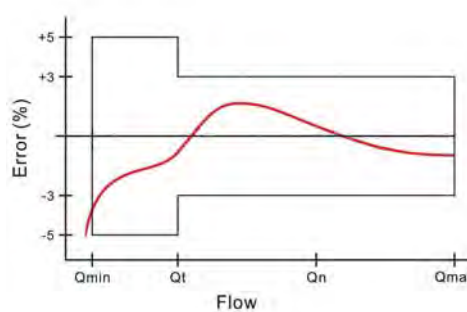
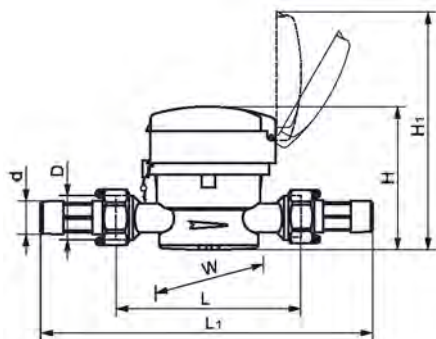
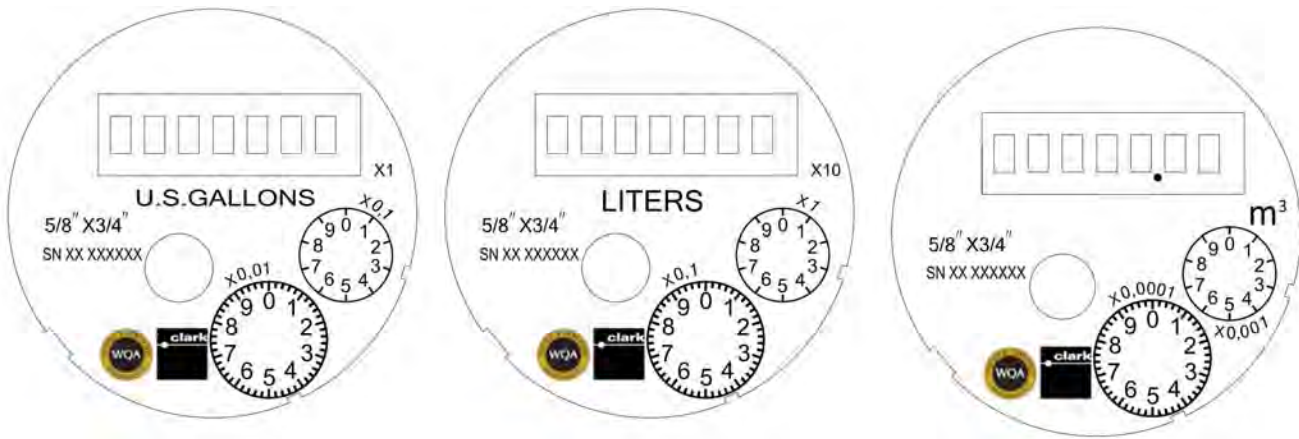


Table 2- Dimensions, Connections & Weights									
Model	L Length Inches (mm)	L1 Overall Length Inches (mm)	W Width Inches (mm)	H Height Inches (mm)	H1 Working Height Inches	D BodyThreads (NPS)	d Connector Threads (NPT)	Weight W/O Couplings lb (kg)	Weight W/Couplings lb (kg)
CLXC-P-20D	5.12 (130)	9.21 (234)	3.15 (80)	2.83 (72)	5.63 (143)	1"	3/4" NPT	.75 (0.34)	.95 (0.43)

Meter Dial Layout



ORDERING INFORMATION

CLXC-P-A-B-C-D-E

EXAMPLE: CLXC-P-20D-C-S10

A Meter Size	B Hot or Cold water Meter	C Pulse Output	D Units
20D= 5/8 x 3/4"	C= Cold H=Hot	-= None S= 1Pulse per 1 Gal S10= 1Pulse per 10 Gal S10L= 1 Pulse per 10 Liters (.01 m ³) Output S100L= 1 Pulse per 100 Liters (0.1m ³)	-= Gallons L= Liters CM= Cubic meters
Bold order combinations are typically in stock Minimum order quantities may apply for non-stock items Note: Each unit is shipped with a set of two couplings and gaskets			

TWO PIECE METER COUPLINGS (TAILPIECES)

Coupling Part Number	Description	Material	Length of Coupling	Used With Meter Model	Qty needed per meter
C20-P	1" NPS female nut to 3/4" NPT male union includes 2 couplings and 2 gaskets	Coupling-PA Gasket- EPDM	2-1/2"	CLXC-20D	1



C20-P

CLARK

MJ-SDC Multi-Jet Totalizing Water Meter

5/8" x 3/4", With or Without Pulse/Reed Switch Output

DESCRIPTION

Model MJ-SDC 5/8 x 3/4" meters are multi-jet, dry type totalizing water meters. They are an ideal choice for a range of municipal, private and industrial water metering applications.

A pulse/reed switch output of one pulse per 0.1, 1.0, 10 or 100 gallons is available.

MJ-SDC meters are accurate and reliable. They are produced in an ISO9001 certified production facility and are constructed in conformance with AWWA C708 standards. The cold water meters are certified by NSF to meet ANSI/NSF 61 for materials safety and ANSI/NSF 372 for lead free compliance and conform with lead free plumbing as defined by California, Vermont, Maryland and Louisiana state laws and the U.S Safe Drinking Water Act.

SPECIFICATIONS

GENERAL

- Measuring Principle: Multi-Jet
- Meter Type: Dry, magnetic coupling between rotor and register movement
- Meter Sizes: 5/8 x 3/4"
- Max Operating Temperature: Cold Water Meter :122°F (50°C); Hot Water Meter 194°F (90°C)
- Max Operating Pressure: 150 PSI
- Proof Pressure: 300 PSI
- Materials:
 - Main Casing: ECO Brass (C87850)
 - Couplings/Tailpieces: C89833
 - Other Materials: See Table 2
- Registration Accuracy, with water <80°F (27°C):
- Normal Test Flow Range (Table 1): The meter will register 98.5% to 101.5% of the water that passes through it.
- At Minimum Test Flow (Table 1): The meter will register 97% to 103% of the water that passes through it.
- Pressure Drop: <15 PSI , see curve (fig. 1)
- Installation: Horizontal orientation recommended



- Inlet Strainer: Internal and can be cleaned without breaking security seal
- Casing Spud Connections: External straight threads according to ANSI/ASME B1.20.1. See Dimensions, Connections and Weights (Table 2) for details.
- Accessories: Meter coupling (tailpiece) sets that include 2 couplings and 2 gaskets, are optionally available.

OPTIONAL PULSE/REED SWITCH OUTPUT:

- The pulse emitter consists of a plastic housing with a reed switch that is closed when a magnet mounted on one of the meters register totalizers comes into its activation proximity. A 1.5 meter (59") length of 2-conductor wire 3.5 mm inch diameter is standard. One conductor has red insulation and one has black.
- Max Voltage: 24V AC/DC
- Max Current: 0.01 A
- Gallons per pulse: 0.1, 1 (standard), 10, 100
- Output Bounce Time: 0.01 second

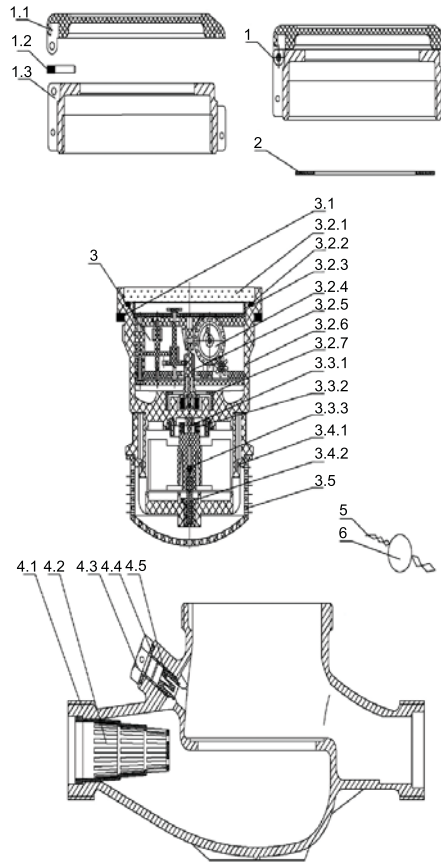
Table 1- Operating Characteristics								
Model	Size	Safe Max. Flow GPM	Recommended Maximum Continuous Flow Rate GPM	Min. Test Flow GPM	Normal Test Flow Limits GPM	Min. Reading Gallons	Max. Reading Gallons	Gallons/Pulse Output Option
MJ-SDC	5/8 x 3/4"	20	10	0.25	1-20	0.005	9,999,999.99	0.1, *1, 10, 100 *Standard



MJ-SDC with Reed Switch Output

Table 2 Meter Parts		
1	Lid-Pin-Cap	
1.1	Lid	ABS
1.2	Pin	Brass
1.3	Head Ring	Brass
2	Sliding Gasket	HDPE
3	Register Assembly	
3.1	Register Chamber Gasket	EPDM
3.2	Register	PET, PC, SS, Rubber, Glass, ABS
3.2.1	Glass	Glass
3.2.2	Gasket	ABS
3.2.3	O-ring	Rubber
3.2.4	Indicator	PC, SS, Rubber, Glass, ABS
3.2.5	Central Gear	POM, Magnet
3.2.6	Register Chamber	PA757, POM, SiO ₂
3.2.7	Upper Protect Ring	Iron
3.3	Impeller Assembly	
3.3.1	Impeller	POM
3.3.2	Magnet	Ferrite
3.3.3	Bearing	SiO ₂
3.4	Measuring Chamber Assembly	
3.4.1	Measuring Chamber	ABS
3.4.2(A)	Measuring Chamber Shaft	SS, POM
3.4.2(B)	Measuring Chamber Shaft Tip	Carbon Fiber Reinforced Polyamide
3.5	Inside Strainer	PP
4	Body Parts	
4.1	Body	C87850
4.2	Inlet Strainer	PP
4.3	Calibration Bolt	PA
4.4	Calibration Gasket	EPDM
4.5	Calibration Screw	POM
5	Copper Wire	Copper
6	Seal	Lead, Plastic

fig. 3 Meter Parts



OPERATION:

Water flows through the meter's strainer (inlet and internal) and into the measuring chamber where it drives the impeller. A driving magnet transmits the movement of the impeller to a driven magnet located within the sealed register. The magnet is connected to a gear train which translates the impeller rotations into volume totalizers displayed on the register dial face.

fig. 1- Pressure Drop

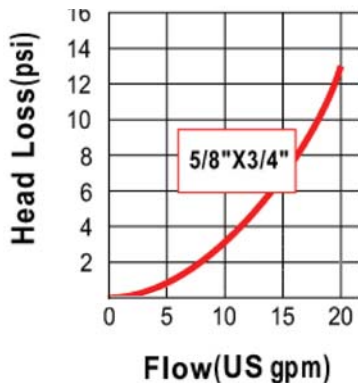
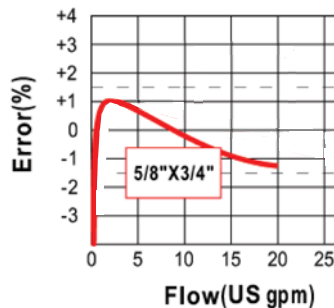
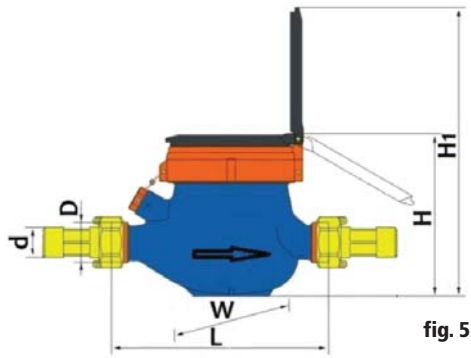


fig. 2- Accuracy



DIMENSIONS, CONNECTIONS & WEIGHT



Model	Size	L Length Inches (mm)	W Width Inches (mm)	H Height Inches (mm)	H ₁ Height Inches (mm)	D Spud Threads (NPS)	d NPT	Weight
MJ-SDC	5/8 x 3/4"	7.5 (190)	3.7 (94)	4.23(107.5)	7.52 (191)	1"	3/4"	3 lbs

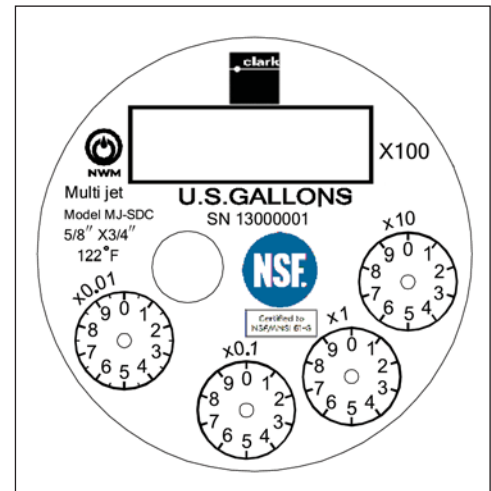
ORDERING INFORMATION

BUILD PART NUMBER FROM BELOW CHART: A-B-C

EXAMPLE: MJ-SDC-5/8X3/4-X0.1

A Model	B Meter Type	C *Pulse Output
MJ-SDC-5/8x3/4	No entry = Cold Water Meter **H-NLB= Hot Water Meter	-- None x0.01= Pulse every .1 gal x0.1= Pulse every 1 gal x1= Pulse every 10 gal x10= Pulse every 100 gal

* Units are standardly available without pulse output and with a pulse output of 1 gallon per pulse. Consult factory for other pulse output values, minimum order quantities may apply.
** Hot water meters have not as yet been third party tested for NSF/ANSI 61 and NSF/ANSI 372 compliance



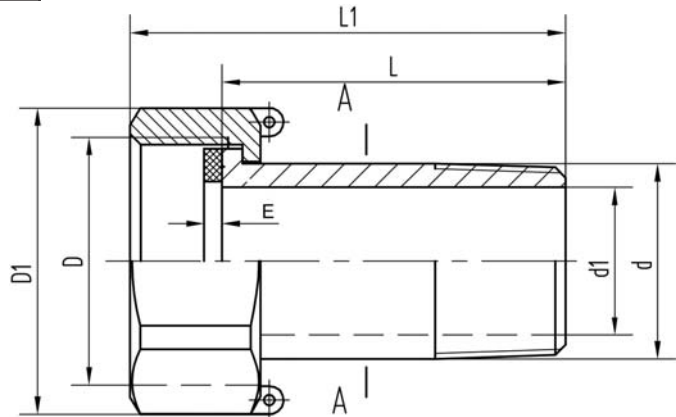
METER COUPLINGS (TAILPIECES)

3/4" Meter Size	Description	Dimension (mm)
d1	Hole Diameter	20
L	Coupling Length	50
L1	Length	62
d	Coupling Thread	3/4-14 NPT
D	Nut Thread	1-11.5 NPSM
D1	Dimension	41
E	Gasket Thickness	3



ECO-Connection tailpiece assemblies are certified by NSF to meet ANSI/NSF 61 for materials safety and ANSI/NSF 372 for lead free compliance

Model	Description	Weight
ECO-Connection 3/4	includes 2 couplings, 2 nuts and 2 EPDM gaskets	0.6 lb



CLARK

MJ-SDC Multi-Jet Totalizing Water Meter

1", 1-1/2" & 2" With or Without Pulse/Reed Switch Output

DESCRIPTION

Model MJ-SDC meters are multi-jet, dry type totalizing water meters. They are an ideal choice for a range of municipal, private and industrial water metering applications.

A pulse/reed switch output of one pulse per 0.1, 1.0, 10 or 100 gallons is available.

MJ-SDC meters are accurate and reliable. They are produced in an ISO9001 certified production facility and are constructed in conformance with AWWA C708 standards. The cold water meters are certified by NSF to meet ANSI/NSF 61 for materials safety and ANSI/NSF 372 for lead free compliance and conform with lead free plumbing as defined by California, Vermont, Maryland and Louisiana state laws and the U.S Safe Drinking Water Act.

SPECIFICATIONS

GENERAL

- Measuring Principle: Multi-Jet
- Meter Type: Dry, magnetic coupling between rotor and register movement
- Meter Sizes: 1", 1-1/2", 2"
- Max Operating Temperature: Cold Water
Meter :122°F (50°C); Hot Water Meter 194°F (90°C)
- Max Operating Pressure: 150 PSI
- Proof Pressure: 300 PSI
- Materials:
 - Main Casing: ECO Brass (C87850)
 - Couplings/Tailpieces: ECO Brass (C87850)
 - Other Materials: See Table 2
- Registration Accuracy, with water <80°F (27°C):
 - Normal Test Flow Range (Table 1): The meter will register 98.5% to 101.5% of the water that passes through it.
 - At Minimum Test Flow (Table 1): The meter will register 97% to 103% of the water that passes through it.
- Pressure Drop: <15 PSI , see curve (fig. 1)
- Installation: Horizontal orientation recommended



- Inlet Strainer: Internal and can be cleaned without breaking security seal
- Casing Spud Connections: External straight threads according to ANSI/ASME B1.20.1. See Dimensions, Connections and Weights (Table 2) for details.
- Accessories: Meter coupling (tailpiece) sets that include 2 couplings and 2 gaskets, are optionally available.

OPTIONAL PULSE/REED SWITCH OUTPUT:

- The pulse emitter consists of a plastic housing with a reed switch that is closed when a magnet mounted on one of the meters register totalizers comes into its activation proximity. A 1.5 meter (59") length of 2-conductor wire 3.5 mm inch diameter is standard. One conductor has red insulation and one has black. Optionally a dual reed switch output with 3-conductor cable is available (consult Factory).
- Max Voltage: 24V AC/DC
- Max Current: 0.01 A
- Gallons per pulse: 0.1, 1, 10 (standard), 100
- Capacitance: 0.2 pF
- Output Bounce Time: 0.01 second

Table 1- Operating Characteristics								
Model	Size	Safe Max. Flow GPM	Recommended Maximum Continuous Flow Rate GPM	Min. Test Flow GPM	Normal Test Flow Limits GPM	Min. Reading Gallons	Max. Reading Gallons	Gallons/Pulse Output Option
MJ-SDC	1"	50	25	.75	3-50	0.005	9,999,999.99	0.1, 1, 10, 100
MJ-SDC	1-1/2"	100	50	1.5	5-100	0.05	99,999,999.9	1, 10, 100
MJ-SDC	2"	160	80	2.0	8-160	0.05	99,999,999.9	1, 10, 100



MJ-SDC with Reed Switch Output

Table 2 Meter Parts		
1	Lid-Pin-Cap	
1.1	Lid	ABS
1.2	Pin	Brass
1.3	Head Ring	Brass
2	Sliding Gasket	
	Sliding Gasket	HDPE
3	Register Assembly	
3.1	Register Chamber Gasket	EPDM
3.2	Register	PET, PC, SS, Rubber, Glass, ABS
3.2.1	Glass	Glass
3.2.2	Gasket	ABS
3.2.3	O-ring	Rubber
3.2.4	Indicator	PC, SS, Rubber, Glass, ABS
3.2.5	Central Gear	POM, Magnet
3.2.6	Register Chamber	PA757, POM, SiO ₂
3.2.7	Upper Protect Ring	Iron

Meter Parts		
3.3	Impeller Assembly	
3.3.1	Impeller	POM
3.3.2	Magnet	Ferrite
3.3.3	Bearing	SiO ₂
3.4	Measuring Chamber Assembly	
3.4.1	Measuring Chamber	ABS
3.4.2(A)	Measuring Chamber Shaft	SS, POM
3.4.2(B)	Measuring Chamber Shaft Tip	Carbon Fiber Reinforced Polyamide
3.4.3	Nut	Stainless Steel
3.4.4	Screw	Stainless Steel
3.4.5	Calibration Plate	ABS
3.5	Inside Strainer	PP
4	Body Parts	
4.1	Body	C87850
4.2	Inlet Strainer	PP
4.3	Calibration Bolt	PA
4.4	Calibration Gasket	EPDM
4.5	Calibration Screw	POM
5	Copper Wire	Copper
6	Seal	Lead, Plastic

fig. 3 Meter Parts

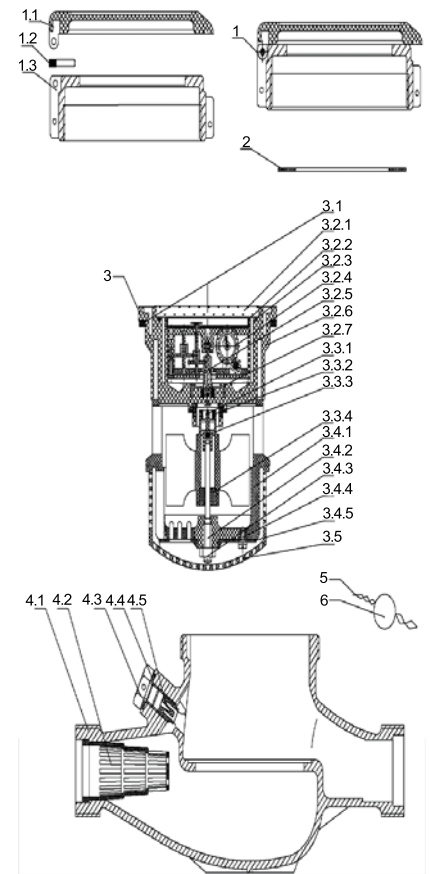


fig. 1- Pressure Drop

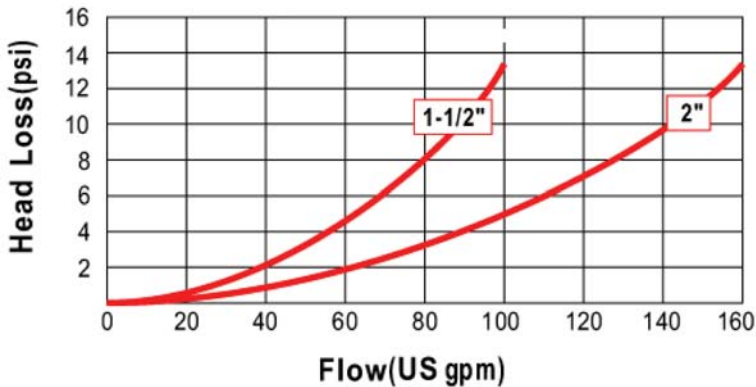
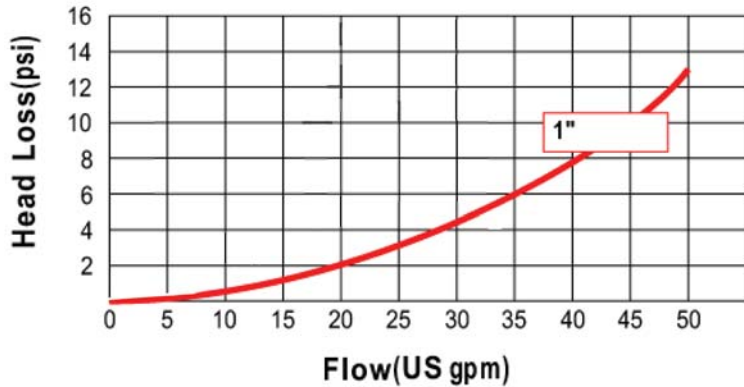
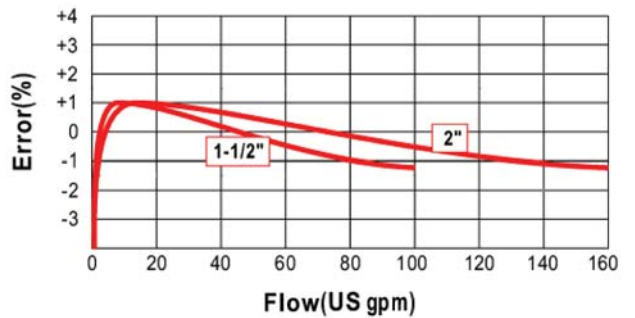
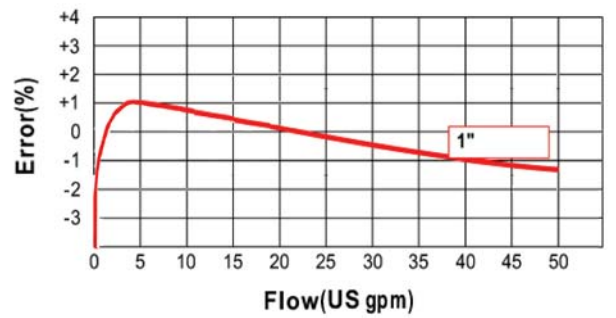


fig. 2- Accuracy



DIMENSIONS, CONNECTIONS & WEIGHT

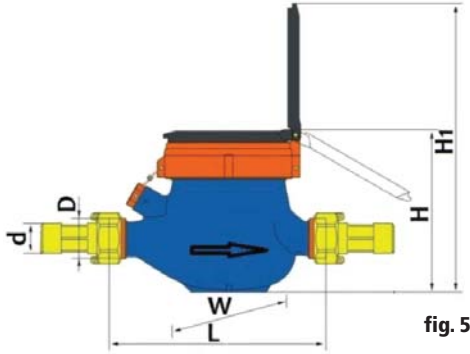


fig. 5



Table 3 Dimensions, Connections & Weight

Model	Size	L Length Inches (mm)	W Width Inches (mm)	H Height Inches (mm)	H ₁ Height Inches (mm)	D Spud Threads (NPS)	d NPT	Weight lbs (kgs)
MJ-SDC-1	1"	10-1/4 (260)	3.86 (98)	4.63 (117.5)	8.13 (206.5)	1-1/4"	1"	5.29 (2.4)
MJ-SDC-1.5	1.5"	11-7/8 (300)	4.80 (122)	5.57 (141.5)	10.10 (256.5)	2"	1-1/2"	11.20 (5.1)
MJ-SDC-2	2.0"	11-7/8 (300)	4.80 (122)	5.57 (141.5)	10.10 (256.5)	2-1/2"	2"	13.7 (6.2)

ORDERING INFORMATION

BUILD PART NUMBER FROM BELOW CHART: A-B-C
EXAMPLE: MJ-SDC-1X1

A Model	B Meter Type	C *Pulse Output
MJ-SDC-1 MJ-SDC-1.5 MJ-SDC-2	No entry = Cold Water Meter **H-NLB= Hot Water Meter	-= None x0.01= Pulse every .1 gal (MJ-SDC-1 Only) x0.1= Pulse every 1 gal x1= Pulse every 10 gal (standard) x10= Pulse every 100 gal

* Units are standardly available without pulse output and with a pulse output of one pulse every 10 gallons. Consult factory for other pulse output values, minimum order quantities may apply.
 ** Hot water meters have not as yet been third party tested for NSF/ANSI 61 and NSF/ANSI 372 compliance

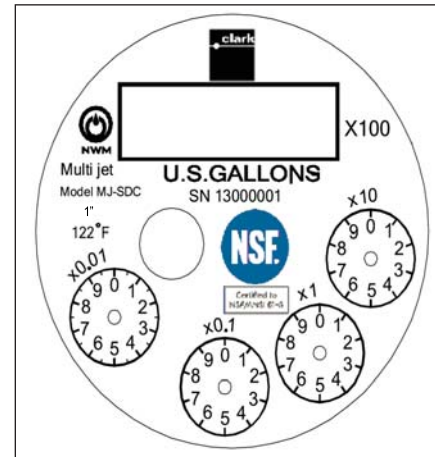
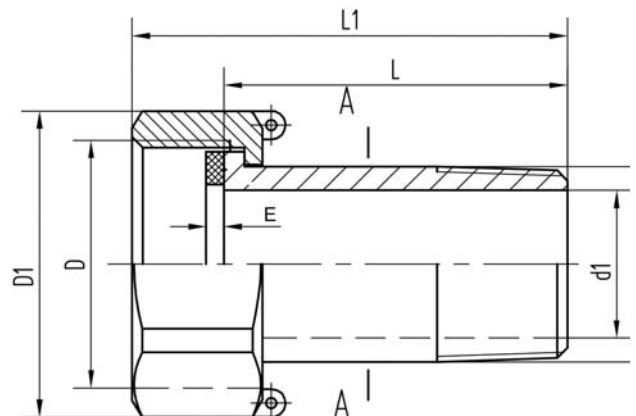


ECO-Connection tailpiece assemblies are certified by NSF to meet ANSI/NSF 61 for materials safety and ANSI/NSF 372 for lead free compliance

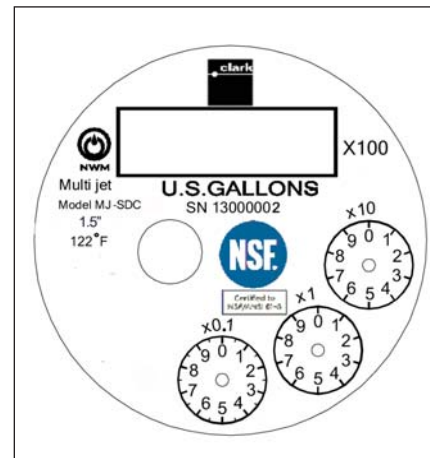
Model	Description	Weight
ECO-Connection 1"	Contractor Coupling Pack includes 2 ea. tailpiece and nut assemblies and 2 ea. EPDM gaskets	1.04 lb
ECO-Connection 1.5"	Contractor Coupling Pack includes 2 ea. tailpiece and nut assemblies and 2 ea. EPDM gaskets	2.32 lb
ECO-Connection 2"	Contractor Coupling Pack includes 2 ea. tailpiece and nut assemblies and 2 ea. EPDM gaskets	4.4 lb

METER COUPLINGS (TAILPIECES)

Dimension	Description	Dimension (mm) 1" Meter	Dimension (mm) 1 1/2" Meter	Dimension (mm) 2" Meter
d1	Hole Diameter	25	40	50
L	Coupling Length	58	62	70
L1	Length	73.5	78	92
d	Coupling Thread	1-11.5 NPT	1 1/2-11.5 NPT	2-11.5 NPT
D	Nut Thread	1 1/4-11.5 NPSM	2-11.5 NPSM	2 1/2-8 NPSM
D1	Dimension	51.8	70	89
E	Gasket Thickness	3	3.5	4



1" Size Meters: 5 Registers, 4 Dials



1-1/2" & 2" Size Meters: 6 Registers, 3 Dials

CLARK SOLUTIONS

7000/8000 Series Flow Meter With Optional Outputs

Differential Pressure Orifice Type, Liquids & Gases

DESCRIPTION

Use the 7000/8000 series flow meters for measuring the flow rate of liquids, gases, compressed air or steam in closed pipes. We also make indicating flow switches and flow transmitters for process indication and control. Meters feature a large easy to read analog dial with 270 degree pointer movement.

Our meters are suited to a wide range of applications where affordability, reliability and ruggedness are important considerations.

Liquid meters are suitable for potable and non-potable water, irrigation water, glycol-water mixtures, fuel oils, lubricating oils, gasoline and many other low and medium viscosity liquids (maximum viscosity 500 centipoise).

Gas meters are suitable for compressed air and most other compressed gases including carbon dioxide, helium and hydrogen, acetylene, nitrogen. Standard pressure rating is to 180 psig. Optional high pressure to 400 psig. Not recommended for toxic gases.

Steam flow meters measure saturated steam flow at pressures up to 120 psig.

Any of our flow meters can be fitted with a flow transmitter for sending a signal to a remote device such as a computer, data logger, chart recorder or remote indicator.

Don't get just a blind flow switch. Get a flow switch that also shows you the flow rate! Any of our flow meters can be fitted with one or two adjustable reed switches to provide an alarm signal of low or high flow rates.



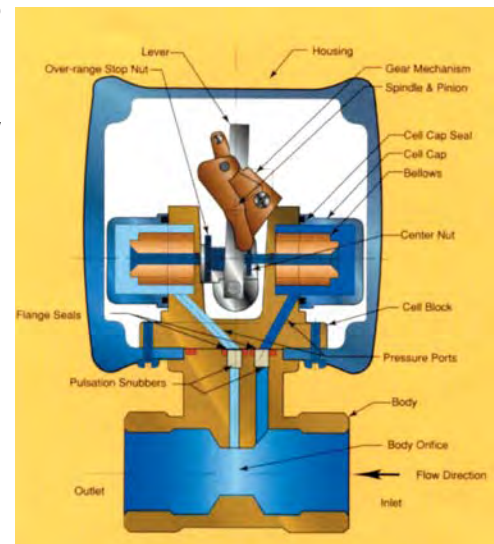
SPECIFICATIONS

GENERAL

Accuracy: $\pm 3\%$ F.S.
Repeatability: $\pm 1\%$ F.S.
Pressure, max: 180 psig (12.6 kg/cm²); 400 psig optional
Pressure, min: 10 psig (0.67 kg/cm²)
Temperature, max: 212°F (100°C); 350°F (177°C) optional
Temperature, min: -30°F (-34°C); -80°F (-62°C) optional
Viscosity, max: 5 centipoise (to 500 cps optionally available)
Pressure Drop: Bronze, max 5 psig; SS & Monel, max 7 psig

TRANSMITTERS

Option:	4-wire (option W, Y, Z)	2-wire (option W2, W3)
Accuracy:		
Horizontal Flow	$\pm 3\%$ F.S. above 30% F.S.	$\pm 3\%$ F.S. above 15% F.S.
Vertical Flow	$\pm 5\%$ F.S. above 30% F.S.	$\pm 3\%$ F.S. above 15% F.S.
Ambient Temp Limit:	120° F (50° C)	120° F (50° C)
Current Output:	4-20 mA, 800 ohms max. (linear with flow)	4-20 mA, 650 ohms max. (350 ohms with option R) (signal proportional to flow rate squared)
Frequency Output (Option Y):	1000 Hz F.S. 5 V peak, 270 μ s on time	n/a
Electrical Rating:	General Purpose	General Purpose (IS applied for)
Power Input:	24 Vdc, 100 mA	24 Vdc, 25 mA

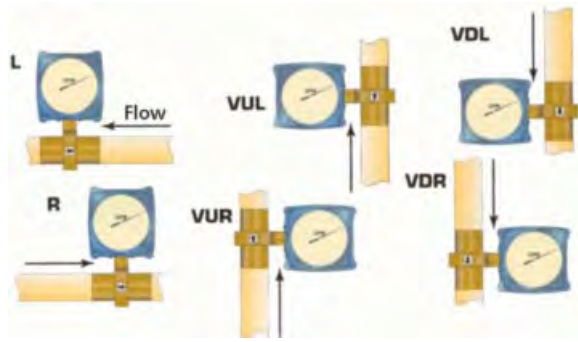
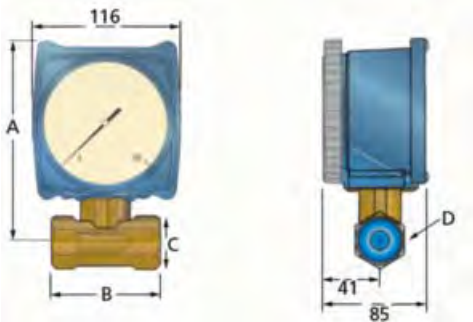


7000 Series Cutaway View

REED SWITCHES

Setability: ±5% F.S.
 Repeatability: ±1% F.S.
 Hysteresis: 7 to 13% F.S.
 Contact Rating: 3 watts
 Voltage: 175 Vdc - max
 245 Vac - max
 Current: 250 mA max switching
 1.0 Amp max carry

DIMENSIONS(MM)



Meter Housing & Indicator Orientation Choices & Designations

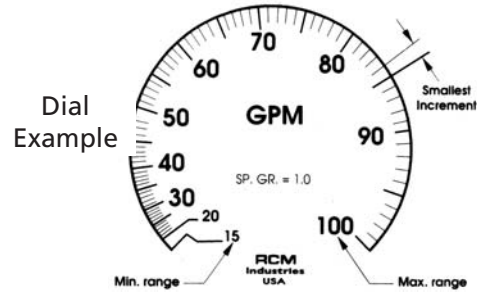


Table 1 Dimensions 7000 Series

Pipe Size	A	B	C	D H-Hex, S-Square	Weight (lbs)
1/4" NPT	151	78	38	32S	4
1/2" NPT	151	78	38	32S	4
3/4" NPT	151	78	38	32H	4
1" NPT	154	78	44	38H	5
1-1/2" NPT	162	78	64	54H	5
2" NPT	172	81	81	70H	7
3" NPT	190	106	117	102H	12

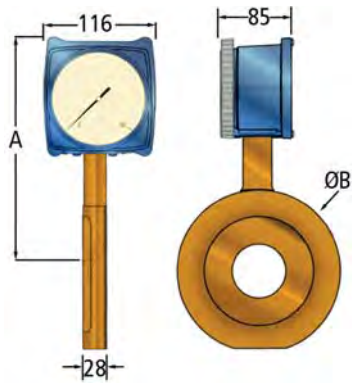
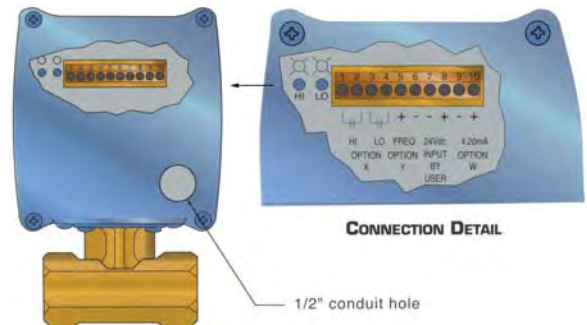


Table 2 Dimensions 8000 Series

Pipe Size	A	B	Weight (lbs)
1/2"	168	43	4
3/4"	179	51	5
1"	184	60	5
1-1/2"	198	79	7
2"	203	95	8
2-1/2"	217	108	9
3"	225	127	11
4"	252	156	15
5"	263	187	20
6"	280	213	24
8"	311	264	33

Table 3 Dials & Scales

Range		Smallest Increment	Range		Smallest Increment
Max	Min		Max	Min	
1	0.15	0.01	100	15	1
2	0.30	0.05	120	15	1
3	0.40	0.05	150	20	2
4	0.50	0.10	200	30	2
6	0.50	0.10	240	30	2
8	1.0	0.10	250	30	5
10	1.5	0.10	300	40	5
15	2.0	0.20	400	50	10
20	3.0	0.50	600	50	10
25	3.0	0.50	800	100	10
30	4.0	0.50	1000	150	10
40	5.0	1.0	1500	200	20
50	6.0	1.0	2000	300	20
60	5.0	1.0	3000	400	50
80	10.0	1.0	4000	500	100



FLOW

Size		Liquid		Gas (Option I)	
Inches	mm	GPM	LPM	SCFM	Nm ³ /h
1/4	08	2	8	10	15
1/4	08	3	15	20	30
1/4	08	4	25	30	50
1/2	15	2	8	10	15
1/2	15	3	10	20	30
1/2	15	4	15	30	50
1/2	15	6	25	40	80
1/2	15	10	40	60	100
3/4	20	6	25	60	100
3/4	20	10	40	100	150
3/4	20	15	60	150	200
3/4	20	20	80	200	300
1	25	15	60	150	250
1	25	20	80	200	400
1	25	30	120	300	500
1	25	40	150	400	600
1-1/2	40	30	120	300	500
1-1/2	40	40	150	400	600
1-1/2	40	60	240	600	1000
1-1/2	40	100	400	800	1200
2	50	40	150	400	600
2	50	60	240	600	1000
2	50	100	400	800	1200
2	50	150	600	1000	1500
2	50	200	800	1200	2000
3	80	200	800	1000	1500
3	80	300	1000	2000	3000
3	80	400	1500	3000	5000
3	80	500	2000	4000	6000

Size		Liquid		Gas (Option I)		
Inches	mm	GPH	LPM	cc/m	SCFH	Nm ³ /h
1/2	15	4	15	200	40	1
1/2	15	6	20	300	60	2
1/2	15	10	40	400	100	3
1/2	15	15	60	600	150	4
1/2	15	20	80	1000	200	6
1/2	15	30	120	2000	300	8
1/2	15	40	150	3000	400	10
1/2	15	60	240	4000	-	-
1/2	15	100	400	6000	-	-

TO ORDER:

- A) Select Size (pipe size at meter inlet)- Tables 4,5,6
- B) Specify model series
 - 7= 7000 Series (NPT Connections)
 - 8= 8000 Series (Wafer Style Flange Mount)
- C) Specify Body Material
 - 1=Bronze 2=Monel 3=316 SS
- D) Specify Flow Direction("Meter Housing & Indicator Orientation" illustration)
- E) Flow Rate & Units (select from Tables 4,5,6) Be sure to designate option I if intended for gas service.
- F) Options (select from options Table 7)
- G) Switches (if required)
 - 1S2= One SPDT reed switch
 - 2S2= Two SPDT reed switches

EXAMPLE: 3/4 7 1 R 20 AD 1S2

Size		Liquid		Gas (Option I)	
Inches	mm	GPM	LPM	SCFM	Nm ³ /h
2-1/2	65	80	240	600	1000
2-1/2	65	100	400	800	1200
2-1/2	65	150	600	1000	1500
2-1/2	65	200	800	1200	2000
4	100	300	1000	1500	50
4	100	400	1500	3000	100
4	100	600	2400	5000	150
4	100	800	3000	6000	200
5	125	300	1000	1500	50
5	125	400	1500	3000	100
5	125	600	2400	5000	150
5	125	800	3000	6000	200
6	150	600	2400	3000	100
6	150	800	3000	5000	150
6	150	1000	4000	8000	250
6	150	2000	8000	15000	400
8	200	600	2400	5000	150
8	200	1000	4000	8000	250
8	200	2000	8000	15000	400
8	200	3000	12000	20000	600

Option	Description
A	Viton seals
B	EPR seals
B2	Teflon seals
C	Calibrate for Sp. Gravity
D	Gasketed case (NEMA-4X)
E	Non-standard flow rate
ES	Low flow (below 2GPM)
G	Custom scale/dial
H	High pressure service (400 psig/Inconel bellows)
I	Compressed Gas Service
IS	Hazardous Reed Switch Rating
J	Peak Flow Indicator (second pointer w/reset)
K	Saturated steam service; EPR seals, SS bellows, inverted housing, max 120 PSI
N	Ammonia Service
P	Panel Mount (1/4 & 1/2")
R	Digital Display (rate & total)
R2	Remote readout, Bronze
R3	Remote readout, SS
T	Expanded Temp. (to 350°F)
V	High Viscosity (5-500 cps)
W	4-20 mA (linear)
W2	4-20 mA w/local mechanical indicator, (requires external square root extractor)
W3	Same as W2, no indicator
IS	Intrinsic Safety for W2 & W3 (consult factory for details)
Y	Frequency Output

CLARK SOLUTIONS

Series 1000 & 2000 FLO-GARD™ Inline Flow Switches

Differential Pressure Orifice Type, Liquids & Gases

DESCRIPTION

FLO-GARD™ flow switches provide economical solutions for equipment protection and automation.

All FLO-GARD™ flow switches provide high reliability design with no paddles or small flow paths to plug or stick. Switches are suitable for measuring oil and water containing contaminants. Switches may also be selected for gases.

A wide range of sizes and materials provides optimal selection. Choose one or two field adjustable switch set points from 0.5 gallons per hour (1/2") to 3000 GPM (8"). All switches are independently adjustable from 15% to 100% of range.

A maintenance-free design, FLO-GARD™ flow switches operate on the differential pressure principle (bellows sensors) and have no bearing or sliding surfaces to corrode and stick. Normal maintenance is NOT required.

The switches have a low installation cost. FLO-GARD™ flow switches include a terminal strip and splash-proof junction box for making field connections, eliminating the cost of providing a field junction box.

SPECIFICATIONS

Pressure: max. 400 psig (28.1 kg/cm²)
 Temperature: max. 212°F (100°C); optional 350°F (177°C)
 Temperature: min. -30°F (-34°C); optional -80°F (-62°C)

Protect from freezing liquids

Pressure drop: 5 psig at max flow
 1.2 psig at 50% of max flow

Mounting: NPT threaded (series 1000) or Wafer style (series 2000) for mounting between any 150 or 300 class flanges or international equivalent

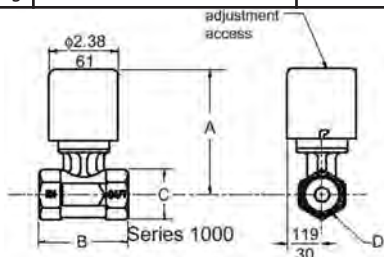
REED SWITCHES

Setability: ±5% F.S.
 Repeatability: ±1% F.S.
 Hysteresis: 7 to 13% F.S.

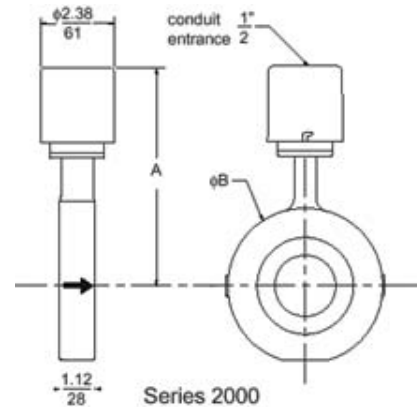


- Housing: Aluminum
Polyester coated
- Pressure Cell: Aluminum, hard anodized
- Body: Bronze
316 SS
- Bellows: Bronze
316 SS
Inconel (high pressure)

	Non-Hazardous	Hazardous (Specify Option IS) CSA / NRTLc: AEx ia IIC: Class I, Division I, Groups A, B, C & D; Class II, Division I, Groups E, F & G
Voltage	175 Vdc max., 125 Vac max.	28V max.
Current	350 mA max. switching	110 mA max.
Contact Rating	10 Watts	1.2 Watts



Pipe Size		Dimensions Series 1000							
		A		B		C		D	
in	mm	in	mm	in	mm	in	mm	in	mm
0.25	0.08	3.46	88	3.06	78	1.06	27	1.06	27
0.5	15	3.46	88	3.06	78	1.06	27	1.06	27
0.75	20	4.18	106	3.06	78	1.50	38	1.25	32
1.0	25	4.30	109	3.06	78	1.75	44	1.50	38
1.5	40	4.68	119	3.06	78	2.50	64	2.12	54
2.0	50	5.05	128	3.19	81	3.19	81	2.75	70
3.0	80	5.74	146	4.19	106	4.62	117	4.00	102



Pipe Size		Dimensions					
		A		B			
in	mm	in	mm	in	mm	in	mm
0.5	15	4.85	123	1.69	43		
.075	20	5.29	134	2.00	51		
1.0	25	5.48	139	2.38	60		
1.5	40	6.04	153	3.12	79		
2.0	50	6.23	158	3.75	95		
2.5	65	6.73	171	4.25	108		
3.0	80	7.10	180	5.0	127		
4.0	100	8.17	207	6.13	156		
5.0	125	8.57	217	7.38	187		
6.0	150	9.29	235	8.38	213		
8.0	200	10.54	267	10.38	264		

FLOW SELECTION CHARTS

Pipe Size- Inches, mm						Maximum Flow Range			
1/4	1/2	3/4	1	1 1/2	2	liquid		gas	
08	15	20	25	40	50	GPM	l/m	SCFM	NM ³ /h
●	●					2	8	10	15
●	●					3	10	20	30
●	●					4	15	30	50
	●	●				6	25	40	80
	●	●				10	40	60	100
		●	●			15	60	100	250
		●	●			20	80	200	400
			●	●		30	120	300	500
			●	●	●	40	150	400	600
				●	●	60	240	600	1000
				●	●	100	400	800	1200
					●	150	600	1000	1500
					●	200	800	1200	2000

Pipe Size- Inches, mm						Maximum Flow Range			
2 1/2	3	4	5	6	8	liquid		gas	
65	80	100	125	150	200	GPM	l/m	SCFM	NM ³ /h
●						60	240	600	1000
●						100	400	800	1200
●						150	600	1000	1500
●	●					200	800	1200	2000
	●	●	●			300	1000	1500	50
	●	●	●			400	1500	3000	100
	●					500	2000	4000	100
		●	●	●	●	600	2400	5000	150
		●	●	●		800	3000	6000	200
				●	●	1000	4000	8000	250
				●	●	2000	8000	15000	400
					●	3000	12000	20000	600

Female threaded connections available 1/4 to 2" and 3" (.08 mm to 50 mm & 80 mm)

Flanged (wafer) connections available 1/2" to 8" (15 mm to 200 mm)

Metric threads are not available in stainless steel

ORDERING INFORMATION

ORDER EXAMPLE-

2-1NPT-1-20GPM-BN-1S2

WATER, MAX TEMP 125°F, MAX PRESSURE 150 PSIG

- 1) Specify Pipe Size- See above Tables
- 2) Specify Connection-
 - 1NPT= Series 1000, NPT connection
 - 1M= Series 1000, FBSP Parallel Threads
 - 2= Series 2000, Flange connection
- 3) Specify Body & Bellows Material-
 - 1= Bronze
 - 3= Stainless Steel
- 4) Specify Maximum Flow Range from tables and Flow Units (GPM, l/m, SCFM etc.)
- 5) Specify Options- See Seals & Options
- 6) Specify Switch Quantity-
 - 1S2= one SPDT switch
 - 2S2= two SPDT switches
- 7) Please advise us of the media, max pressure and max temperature that the switch will see.

Example: A meter with a max flow range of 100 has a useful range from 15 to 100.

Useful Range All Units of Measurement	
Min.	Max.
0.2	1
0.3	2
0.4	3
0.5	4
0.5	6
1.0	8
1.5	10
2	15
3	20
3	25
4	30
6	50
5	60
10	80
15	100
15	120
20	150
30	200
30	240
30	250
40	300
50	400
50	600
100	800
150	1000
200	1500
300	2000
400	3000

Optional Low Flow Rates (Option ES)

Size		Maximum Flow Range			
		liquid		gas	
in	mm	GPH	l/h	cc/m	SCFH
1/2	15	4	15	200	40
1/2	15	6	20	300	60
1/2	15	10	40	400	100
1/2	15	15	60	600	150
1/2	15	20	80	1000	200
1/2	15	30	120	2000	300
1/2	15	40	150	3000	400
1/2	15	60	240	4000	
1/2	15	100	400	6000	

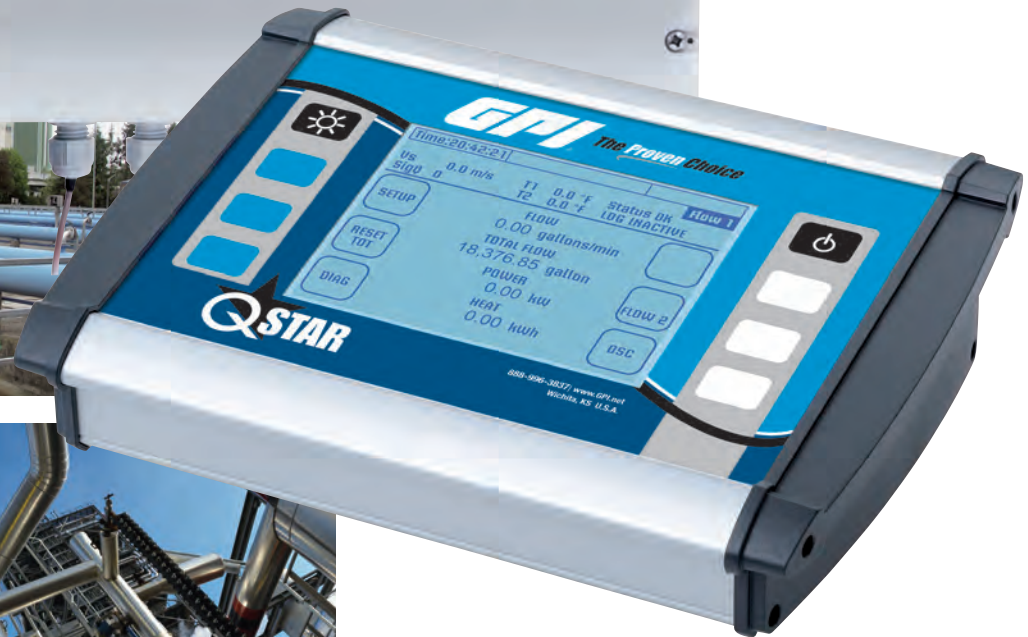
Seals & Options

- A Viton™ Seals
- BN Buna (Standard) Seals**
- B EPR Seals
- B2 TFE Seals
- ES Low Flow Rate (below 2 GPM)
- I Compressed Gas Service (specify gas, temp. & pressure)
- IS Hazardous Reed Switch Rating
- T Expanded Temp. Range (-80 to 350°F), includes option A; consult factory for higher temperatures



UFM Ultrasonic Flowmeters

Fixed & Portable



QSTAR | UFM Contactless flow measurement for liquids

QStar Ultrasonic Flowmeters (UFM) are available in two models: a portable for mobile sampling measurements and a fixed for measuring tasks over an extended period of time for continuous measurements in fixed installations.

Both units use the proven and highly precise ultrasonic transit time difference method. By employing the latest digital signal processors, these robust measurement flowmeters are extremely accurate and drift-free.

Saves installation and operating costs

Clamp-on technology allows for ultrasonic transducers to be installed in a matter of minutes. No need to cut

or penetrate pipes. Together with the elimination of process interruptions, QStar UFMs are the key to optimizing operating costs. The contactless measurement is virtually:

- 100% leak-proof
- 100% pressure-resistant
- 100% drift-free
- 100% wear-free and thus maintenance-free
- 100% free of pressure loss and thus energy-saving

With the Quick Setup option, setting meter parameters takes less than one minute. Online help makes the manual unnecessary for most tasks.

The single-user interface shared by UFMs eliminates the learning curve for anyone already familiar with one of the QStar flowmeters. All menu items and displays are in plain text on the large backlit display. Cryptic abbreviations are unnecessary on the graphics-capable QVGA display. The user-friendly eight key menu enables quick and easy operation.

QStar Fixed



QStar Portable



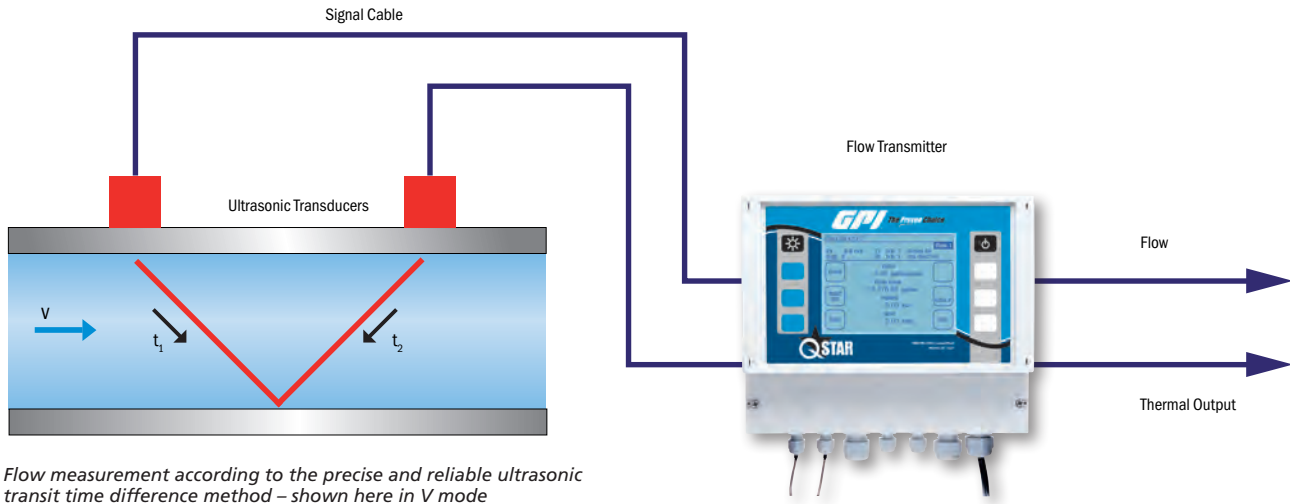
Large QVGA display, simple to use

The display and usage concept are identical for the portable and fixed QStar UFM. This simplifies the operation of both flowmeters and provides the user with a complete overview of the measuring point.



Fast, secure transducer installation thanks to GPI's "Quickmount" technology

Precise and reliable flow measurement



Flow measurement according to the precise and reliable ultrasonic transit time difference method – shown here in V mode

QStar flowmeters operate according to the high-precision ultrasonic transit time difference method. The two ultrasonic transducers are mounted externally on the pipe and connected to the processing electronics.

The ultrasonic transducers operate alternately as transmitters and receivers and transmit ultrasonic signals to one another, whereby the respective signal transit times of the outgoing and return signal (t_1 , t_2) are measured.

The flowmeter measures the transit time difference of the ultrasonic signals

t_1 and t_2 that run with and against the direction of flow. These signals are accelerated (t_1) or delayed (t_2) by the flow of fluid. The resulting difference in the two signal transit times is proportional to the flow velocity and, together with the pipe geometry, is used to precisely calculate the flow.

The use of multiple processors working in parallel means that QStar achieves an extremely high measurement rate. Signal processing takes place in high-performance DSPs which are extremely precise and operate at very high resolution.

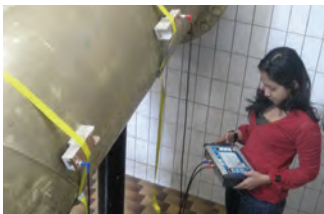
This enables the flowmeter to achieve internal resolution of under 0.03 ft/s flow velocity. And since the transit time measurement is purely digital, the measurement electronics are virtually drift and calibration-free.

In this method, the flowrate is measured many times over, typically from 50-150 times per second. The high number of measurements and the use of modern digital signal processing makes the QStar highly reliable under challenging processing conditions.



Since the ultrasonic transducer does not come into contact with the fluid, the measurement is:

- 100% contamination-free
- 100% hygienically safe



This is particularly advantageous for quantity measurement of food and pharmaceutical products, and simplifies volume measurement of toxic or environmentally harmful liquids. With QStar UFM's there are no additional sealing surfaces or dead volumes!



QSTAR | UFM High-performance for difficult applications

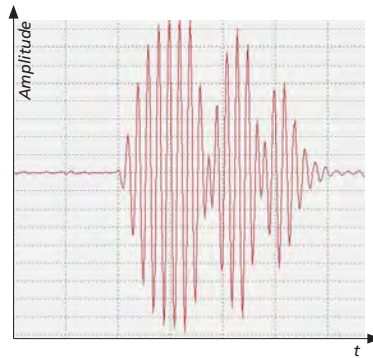
Stable and reliable measurement under extremely difficult conditions

Ultrasonic signals are disturbed by a variety of variables including electromagnetic radiation, the presence of gas or solids, and machine noise. In conventional flowmeters, in order to detect the ultrasonic signals to be evaluated within this “ambient noise” the signal amplitude must be several times that of the noise. An intelligent analysis method was developed for QStar that detects the ultrasonic signals when the amplitude of the noise is several times more than that of the signal amplitude. The advantage for QStar users: absolutely reliable and stable measurements, even in extremely unfavorable conditions.

This enables measurements even under conditions where high particle and gas loads are present – an impossible task for conventional flowmeters.

Verified signal quality ensures reliable measurement

QStar’s integrated oscilloscope function checks and verifies signal quality. This allows graphical signal display and the quick and easy verification of signal quality.



AFC technology for high accuracy under changing process conditions

Encoded signals: Typical signal packet with two 180° phase shifts for reliable signal recognition.

Cross-correlation process tackles the toughest measurement tasks.

To ensure reliable measuring results even under difficult measuring conditions, GPI developed modern and powerful signal processing algorithms. For reliable detection, QStar employs encoded signal packets (bursts) - similar to the GPS satellite navigation system.

The built-in phase shifts and clearly defined number of oscillations, prior to being sent the bursts receive a unique identity, like a fingerprint, prior to being sent. On the receiving end, the digital signal processor (DSP) employs a cross-correlation method to uniquely

determine the time (maximum correlation) at which the transmission signal matches a stored reference signal.

This allows the signal reception times required to calculate the transit time to be determined very precisely. This also permits the clear identification of the desired signals in the event of high noise levels and/or low signal amplitude (e.g. high particle content in the fluid) by means of cross-correlation. The result: reliable and accurate measurements even under difficult conditions.

Automatic Fluid Control (AFC)

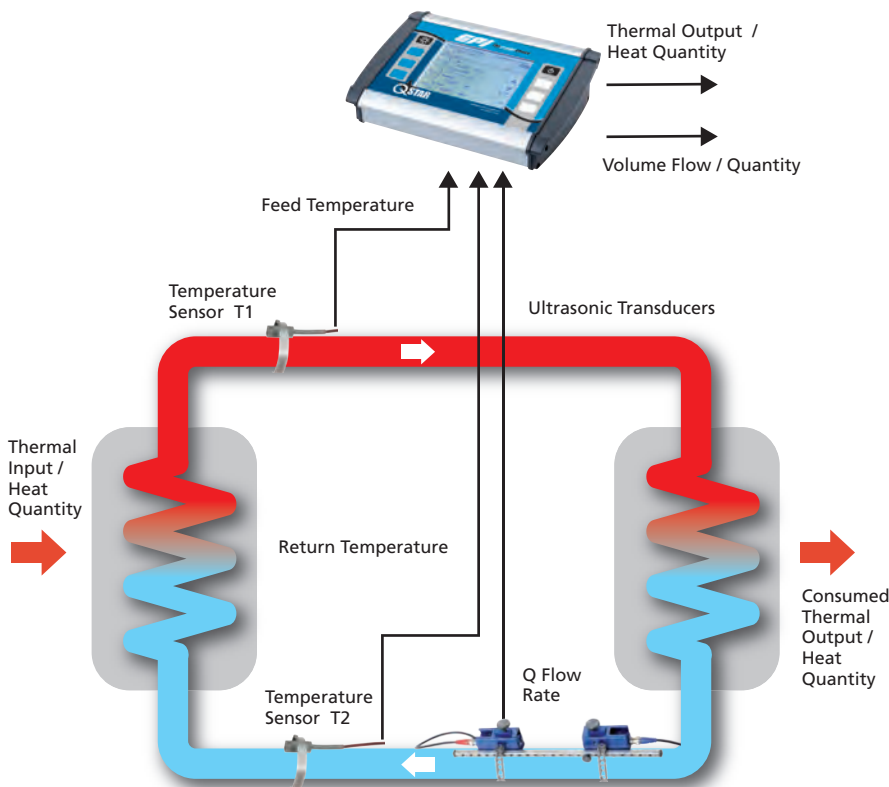
Ultrasonic meters are dependent on the acoustic velocity of the relevant fluid, which varies with the composition and temperature. This is not a problem with proper setup of parameters. However, many conventional flowmeters are programmed for water with a temperature of 68° F. If the temperature changes to 122° F, the transducers would basically have to be repositioned. In everyday measurement practice this would be impractical, and is rarely done. The result is a loss of accuracy.

QStar compensates for this effect by means of AFC technology and newly developed, high-performance algorithms. The advantage is that the transducers need not be repositioned and accuracy is virtually unaffected by typical process fluctuations.

The result is high measurement accuracy even under changing conditions, in temperature or fluid composition.



Integrated heat quantity measurement



QStar is compatible with the most common pipe sizes (1/2" - 240"). QStar UFM includes an integrated heat quantity measuring function. Together with the clamp-on temperature (optional) and ultrasonic transducers, heat and cooling quantities can be recorded and documented with reliability and accuracy.

Rising energy prices and legal requirements regarding environmental protection and plant efficiency necessitate the ongoing optimization of energy flows. Rising energy prices and legal requirements regarding en-

vironmental protection and plant efficiency requires the ongoing optimization of energy flows. Assessing the energy performance of heat flows is important in a variety of applications: Power Stations, Waste and Water management and Building Services Engineering.

QStar's integrated thermal energy measuring function enables rapid and convenient recording of heat flows. External temperature sensors (optional) placed on the feed and return flow are used to measure the temperature difference. QStar measures the volume flow and calculates the heat flow, taking into account the specific heat coefficient of the fluid. The temperature sensors can be matched in pairs on the flowmeter in order to increase measurement accuracy. All this takes place without penetrating the piping system. Temperature and flow sensors are simply clamped onto the pipe from the outside.



QStar's Thermal Energy Metering

Typical applications include:

Power Stations

- Circulating water/service water
- District heating networks
- Pump protection
- Condensate, feed water and light oil measurement

Water and Waste Water Management

- Sewage treatment plant
- Drinking water networks, verification of water meters
- Pump protection
- Distribution and consumption metering
- Leak detection

Building Services Engineering

- Hot and cold water
- Cooling systems and air-conditioning units
- Hydraulic compensation
- Pump control and setup
- Optimization of heating systems

Chemicals and Petrochemicals

- Crude and light oil
- Industrial and Waste Water
- Aggressive and toxic fluid
- Measurement of heat carriers, (thermal oils)

Food and Beverage Industry

- Hygienic, reliable measurement of fluid
- Dosage measurements
- Cleaning solutions
- Water
- Beverages



UFM High-performance ultrasonic transducer

AND technology ensures outstanding signal quality

Anti-Noise Deflector (AND) Technology

With the aid of AND technology, the ultrasonic waves are guided and coupled so unwanted echoes and signal dispersion is avoided, reducing noise and making energy available in the form of useful signal energy.

QStar's Anti-Noise Deflector delivers a signal yield several multiples greater than conventional flowmeters.

QStar's transducers are suitable for applications up to 300° F. This enables many high-temperature applications, such as district heating networks to be realized cost-effectively without special transducers.







Fast, secure transducer mounting

Mounting with the mounting rail is simple. Using the pre-defined hole matrix makes positioning the ultrasonic transducers on pipes a quick, secure and precise affair. This also avoids failed installation.



Transducer Installation: Quick and Easy

Selection of Ultrasonic Transducers for Transit Time Measurement

Type	Temperature	Inner Diameter
QStar Portable: QMP-F21 	-40 - 300° F	3/8" - 4 1/4"
QStar Fixed permanently installed: QMF-F21 		
QStar Portable: QMP-F10 	-40 - 300° F	1 1/4" - 16"
QStar Fixed permanently installed: QMF-F10 		
QStar Portable: QMP-F05 	-40 - 176° F (300)° F	8" - 200"
QStar Fixed permanently installed: QMF-F05 		

All ultrasonic transducers for permanent installation, degree of protection: IP68

Thermal energy metering

QStar ultrasonic transducers – optimum metering performance for your application

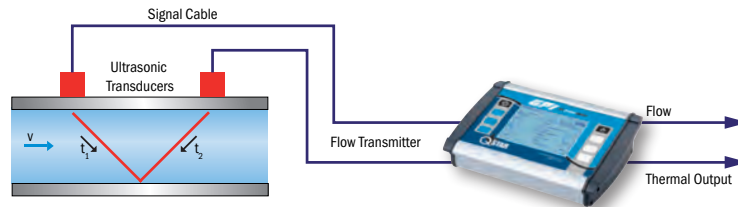
QStar’s ultrasonic transducers are optimized for maximum signal yield and outstanding metering performance. QStar’s three ultrasonic transducer types can be used for most flow applications. All ultrasonic transducers are clamped onto the pipe externally and delivered with practical installation material. Installation is a matter of minutes – with no need to penetrate or open pipe. Your process does not have to be interrupted.

Depending on the application and amount of space available, the sensors can be attached to your piping in the Z, V and W mode.

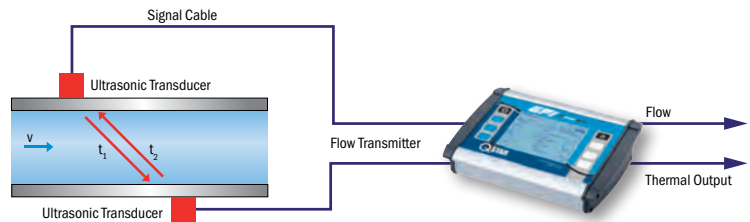
Unique benefits of QStar UFM:

- Quickstart guide makes installation fast and easy.
- Setup is completed in less than five minutes!
- User-friendly menu is displayed on large, backlit LCD screen.
- Parameters Calculator (Proprietary)
Available via USB drive, Smartphone web app and online.
Calculates flowrate accurately based on pipe size and velocity.
Includes Reynolds number calculation
- GPI Toll-Free Technical Support Available 8-5 p.m. CST Monday through Friday
- Heat Resistant (up to 300° F) Transducers Included
- Integrated Heat Quantity Measurement Capabilities (Standard)
- Heat measurement inputs
- Pre-programmed software
- Three sets of Transducers cover ½” to 240” Pipe Sizes

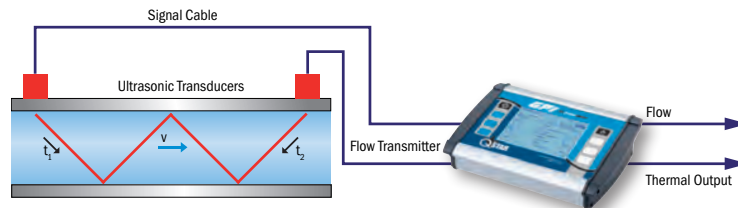
Best value based on features and cost!



Mounting in V mode: standard mode



Mounting in Z mode: typical for large pipes



Mounting in W mode: typical for small pipes



Wall thickness gauge

The QStar wall thickness gauge provides precise and easy measurements of the thickness of pipes and components.

Carrying case included

The portable QStar UFM comes in a robust practical carrying case complete with flow transmitter, ultrasonic transducers, installation material, signal cable, coupling grease, SD memory card and power supply.

(20 x 16 x 16 inches)



QSTAR | UFM Transducer Specifications



Measurement	
Principle:	Ultrasonic transit time difference with AFC technology
Values Measured:	Flow, flow speed, heat flow
Totalizers:	Heat quantity, volume
Measurement Range:	+/- 98 ft/s
Signal Damping:	0 - 100 sec (adjustable)
Diagnostic Functions:	Acoustic velocity, signal strength, SNR, signal quality, amplitude, energy Oscilloscope function allows graphical display and analysis of signals.

Measurement Accuracy		
Inner Diameter Ø	Range	Deviation
.39 - .98 inches	6.56-98.42 ft/s	2.5% of reading
	0-6.56 ft/s	± 0.16 ft/s
.98-1.97 inches	6.56-98.42 ft/s	1.5% of reading
	0-6.56 f/s	± 0.10 ft/s
1.97-11.81 inches	6.56-98.42 ft/s	1% of reading
	0-6.56 f/s	± 0.07 ft/s
11.81-236.22 inches	3.28-98.42 ft/s	1% of reading
	0-3.28 ft/s	± 0.03 ft/s
Repeatability for the vast majority of applications is <0.2%		

	QStar Portable	QStar Fixed
Operation:	Intuitive via 8 main keys (Soft Keys), plain text display	
Languages:	English, Spanish and French	
Units:	Metric / US	
Outputs:	2x 4-20 mA, 1x Relay, 1x MicroUSB 1x Pulse	2x 4-20 mA, 1x Pulse, 1x MicroUSB 1x Relay, RS232 (opt.)
Inputs:	2x PT100	
Integrated Data Logger:	2 GB	N/A
Data Logged:	Measurement and totalizers	N/A
Data Format:	Text format, can be directly exported into standard office programs	N/A
Memory Cycle:	Adjustable, 1 second to 24 hours	N/A
Power Supply:	Integrated rechargeable battery and 110V AC adapter Battery Duration: Approx. 5 hours	85-264VAC, 18-36VDC (opt.) Power Consumption: 10 W
Protection Class:	IP40	IP65, Ex/ATEX
Housing:	Aluminium, PVC	PVC, wall-mounted
Dimensions (LxWxD):	10.4 x 7.5 x 2.7 in.	10.2 x 9.4 x 4.7 in.
Operating Temperature:	-4° F to 140° F	
Transducer Temperature:	-40° F to 300° F	
Weight:	3.3 lbs	2.9 lbs
Display:	QVGA (320x240), black and white, adjustable backlighting	
Carrying Case :	20 x 16 x 16 in.	N/A

EQUFLOW

PFA(0045, 0085, 00125) Turbine Flow Sensor

PFA wetted parts, F.S. ranges of 2, 20, & 40 lpm, Frequency/Analog Output

DESCRIPTION

The PFA flow sensor has low flow sensing capabilities in a wide range of applications, and is suitable for clear, opaque, neutral, corrosive and aggressive liquids including fuel.

An ultra light-weight turbine follows the fluctuation of flow very accurately and generates a high resolution IR reflected digital output signal.

In either flow controlled or monitoring applications, the PFA flowsensor can measure flow rates and totalize. Optional elements built into the circuit include a programmable K factor, flow switch and a programmable batch feedback function for pump control.

External optional electronic packages include model 6100 digital to analog (4-20 mA) converter. Also model S601, a professional, solid batch and flow controller that can be used as a monitor and/or totalizer and model 6300 switch module for use with optional built-in flow switch and batch functions.

Features

- Turbine flowsensor with high resolution output
- Flow measuring by revolutionary IR turbine reflection
- PFA for high chemical and corrosion resistance
- High accuracy and repeatability
- Suitable for opaque liquids
- PFA meets all the requirements of the US Pharmacopeia Class VI
- BSE/ITSE certificate available
- All wetted parts are made of PFA with ruby bearing

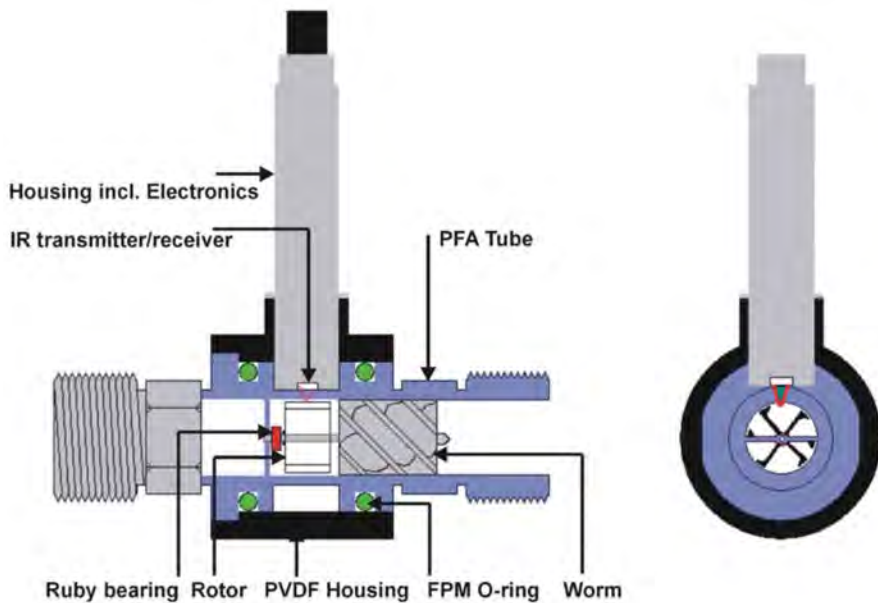


SPECIFICATIONS

Patent No. US5388466

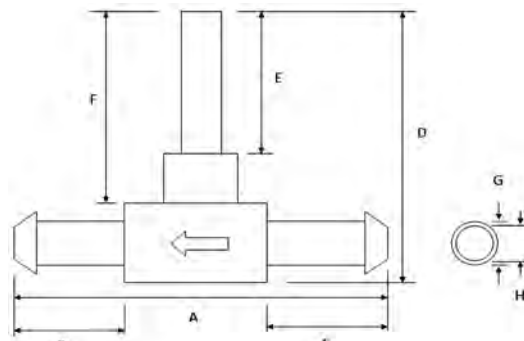
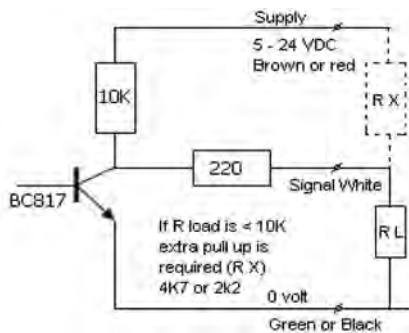
GENERAL

Model	PFA0045	PFA0085	PFA0125
Inner diameter in mm	4.5	8.5	12.5
Flow range	0.06 - 2 L/min	0.5 - 20 L/min	1.5 - 40 L/min
Accuracy	1% of reading	1% of reading	1% of reading
Repeatability	< 0.15 %	< 0.15 %	< 0.15 %
Wetted parts	PFA / Ruby	PFA / Ruby	PFA / Ruby
Tube connection thread/hosebarb	1/8 " NPT / 7 mm	1/4 " NPT/ 12 mm	1/2 " NPT/BSP
Tube length in mm	52	60	72
Liquid temperature in °C	-20 to +80	-20 to +80	-20 to +80
Max. pressure at 20° C in bar (psi)	20 (284)	15 (213)	10 (142)
Viscosity in cSt.	0.8 - 10	0.8 - 10	0.8 - 10
K factor (water) in pulse/Liter	110,000	6,100	2,000
Power supply	5 - 24 Vdc	5 - 24 Vdc	5 - 24 Vdc
Output signal	5 - 24 V sq. wave	5 - 24 V sq. wave	5 - 24 V sq. wave
Power consumption	34 mA at 5 V	34 mA at 5 V	34 mA at 5 V
Electrical lead	PVC 1 meter	PVC 1 meter	PVC 1 meter
Recommended Line filter	100 µm	100 µm	150 µm



Working Principal:
 A static worm forces the passing fluid to spin. The spinning fluid drives a rotor with reflectors into a frictionless rotation. A high resolution infrared sensor determines the rate of flow by counting the passing reflections. The set up even allows the flow of opaque liquids to be determined accurately. The ultra low mass of the rotor guarantees a quick response to changes in the rate of flow

Wiring:
Power Supply 5-30 Vdc or 5 Vdc (low voltage option)
Output All Sensors: NPN square wave



Dim. (MM)	0045- Barb	0045- NPT	0085- Barb	0085- NPT	0125- NPT
A	50.8	51.5	60.3	60.3	71.5
B	14.7	15.8	19.2	19.2	22.3
C	16.6	15.8	19.2	19.2	26.3
D	60.6	60.6	66.8	66.8	71.2
E	36.7	36.7	36.7	36.7	36.7
F	46.5	45.5	44.4	44.4	45.6
G	7.8	9.8	13.2	13.2	14.0
H	4.6	4.7	9.0	9.0	20.3

ORDERING INFORMATION

ABCDEFGH
PFA0045TNP01XL

A Model	B Tube Dia./Range	C Wetted Material	D Connection	E Cable Type	F Cable Length	G Power	H Options
PFA	0045= 4.5 mm/0.1-2 l/min 0085= 8.5 mm/1.0-20 l/min 0125= 12.5 mm/2.0-38 l/min	T=PFA & Ruby	H= Hose Barb N= NPT B= BSP(12.5 mm only)	P= PVC	01= Standard 02= 2 meters	XX= 5-30 VDC XL= 5 VDC	Built-in to Housing Electronics PD= Pulse Divider *F= Flow Switch *B= Batch Function *Requires model 6300 switch

Ask About Our Other Equiflow Products.....

- Stainless Flow Sensor
- Disposable Flow Sensor
- Electronic packages for use with Flow Meters
 - 6100 digital to analog (4-20 mA) converter
 - S601 solid batch and flow controller
 - 6300 switching module for flow switch and batch option



EQUFLOW

PFAD Disposable PFA Turbine Flow Sensor

PFA wetted parts, F.S. ranges of 2 & 20 lpm, Frequency/Analog Output

DESCRIPTION

The PFAD flow sensor has been developed to perform a fast exchange of the flowtube to accommodate hygienic applications in the pharmaceutical industry. It is suitable for clear, opaque, neutral, corrosive and aggressive liquids including fuel.

A field replaceable ultra light-weight turbine assembly follows the fluctuation of flow very accurately and generates a high resolution IR reflected digital output signal.

In either flow controlled or monitoring applications, the PFAD flowsensor can measure flow rates and totalize. Optional elements built into the circuit include a programmable K factor, flow switch and a programmable batch feedback function for pump control.

External optional electronic packages include model 6100 digital to analog (4-20 mA) converter. Also model S601, a professional, solid batch and flow controller that can be used as a monitor and/or totalizer and model 6300 switch module for use with optional built-in flow switch and batch functions.

Features

- Turbine flowsensor with high resolution output
- Flow measuring by revolutionary IR turbine reflection.
- PFA for high chemical and corrosion resistance
- High accuracy and repeatability
- Suitable for opaque liquids
- PFA meets all the requirements of the US Pharmacopeia Class VI
- BSE/TSE certificate available
- All wetted parts are made of PFA with ruby bearing

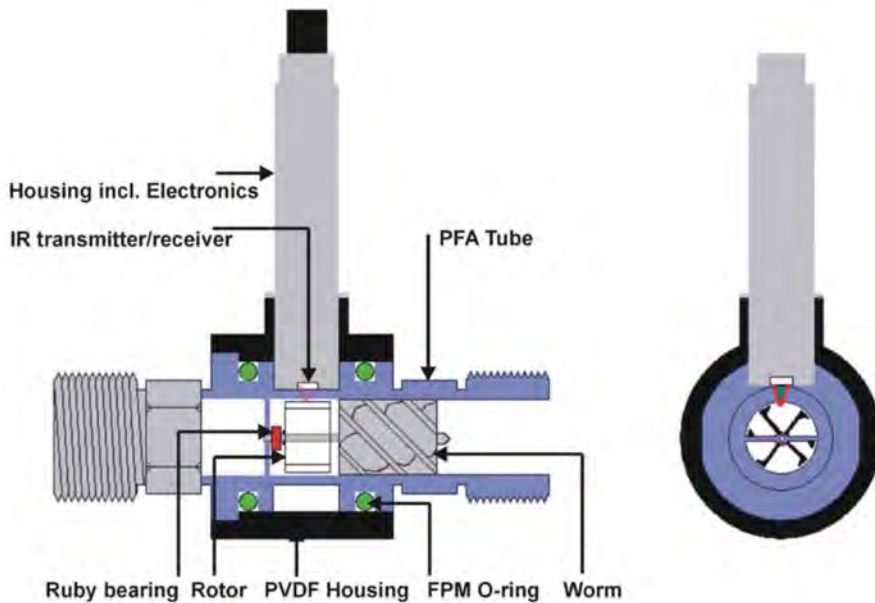


SPECIFICATIONS

Patent No. US5388466

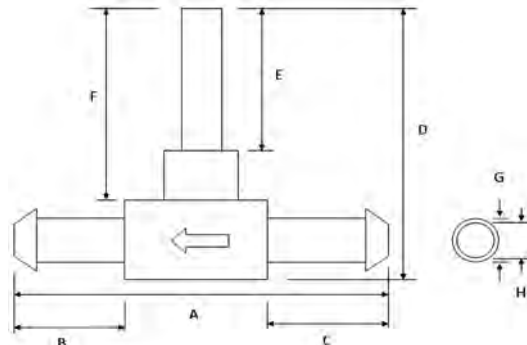
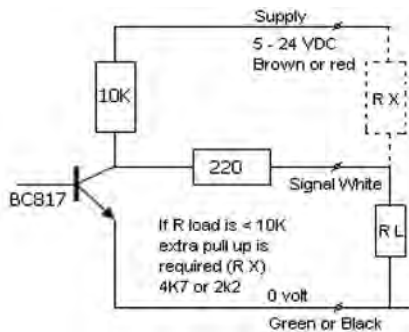
GENERAL

Model	PFAD0045	PFAD0085
Inner diameter in mm	4.5	8.5
Flow range	0.06 - 2 L/min	0.5 - 20 L/min
Accuracy	1% of reading	1% of reading
Repeatability	< 0.15 %	< 0.15 %
Wetted parts	PFA / Ruby	PFA / Ruby
Tube connection thread/hosebarb	1/8 " NPT / 7 mm	1/4 " NPT/ 12 mm
Tube length in mm	52	60
Liquid temperature in °C	-20 to +80	-20 to +80
Max. pressure at 20° C in bar (psi)	20 (284)	15 (213)
Viscosity in cSt.	0.8 - 10	0.8 - 10
K factor (water) in pulse/Liter	110,000	6,100
Power supply	5 - 24 Vdc	5 - 24 Vdc
Output signal	5 - 24 V sq. wave	5 - 24 V sq. wave
Power consumption	34 mA at 5 V	34 mA at 5 V
Electrical lead	PVC 1 meter	PVC 1 meter
Recommended Line filter	100 µm	100 µm



Working Principal:
 A static worm forces the passing fluid to spin. The spinning fluid drives a rotor with reflectors into a frictionless rotation. A high resolution infrared sensor determines the rate of flow by counting the passing reflections. The set up even allows the flow of opaque liquids to be determined accurately. The ultra low mass of the rotor guarantees a quick response to changes in the rate of flow

Wiring:
Power Supply 5-30 Vdc or 5 Vdc (low voltage option)
Output All Sensors: NPN square wave



Dim. (MM)	0045- Barb	0045- NPT	0085- Barb	0085- NPT
A	50.8	51.5	60.3	60.3
B	14.7	15.8	19.2	19.2
C	16.6	15.8	19.2	19.2
D	60.6	60.6	66.8	66.8
E	36.7	36.7	36.7	36.7
F	46.5	45.5	44.4	44.4
G	7.8	9.8	13.2	13.2
H	4.6	4.7	9.0	9.0

ORDERING INFORMATION
ABCDEFGH
PFAD0045TNP01DX

A Model	B Tube Dia./Range	C Wetted Material	D Connection	E Cable Type	F Cable Length	G Power	H Options
PFAD	0045= 4.5 mm/0.1-2 l/min 0085= 8.5 mm/1.0-20 l/min	T=PFA & Ruby	H= Hose Barb N= NPT	P= PVC	01= Standard 02= 2 meters	DL= 5 VDC DA= 5-30 VDC DX= 5-30 VDC w/microchip	Built-in to Housing Electronics ¹ PD= Pulse Divider ^{1,2} F= Flow Switch ^{1,2} B= Batch Function ¹ Requires X power option ² Requires model 6300 switch
Replacement Flow Tubes				Replacement Electronics			
PFAD0045TH000DX- Replacement flow tube, 4.5 mm tube, 7 mm hose barb PFAD0045TN000DX- replacement flow tube, 4.5 mm tube, 1/8" NPT PFAD0085TH000DX- Replacement flow tube, 8.5 mm tube, 12 mm hose barb PFAD0085TNH000DX- Replacement flow tube, 8.5 mm tube, 1/4" NPT				PFAD0045PXP01DX- Replacement electronics, 1m cable, 4.5 mm tube PFAD0045PXP01DX- Replacement electronics, 1m cable, 8.5 mm tube			

Ask About Our Other Equiflow Products.....

- Standard Flow Sensor
- Stainless Steel Flow Sensor
- Electronic packages for use with Flow Meters
 - 6100 digital to analog (4-20 mA) converter
 - S601 solid batch and flow controller
 - 6300 switching module for flow switch and batch option



EQUFLOW

PVDF Disposable Turbine Flow Sensor

PVDF wetted parts, F.S. ranges of 2 & 20 lpm, Frequency Output

DESCRIPTION

The PVDF Turbine Flow Sensor has been developed to perform a fast interchange of the flowtube to accommodate hygienic applications in the medical, pharmaceutical, and bio-technological industries. It has low flow capabilities and high resolution square wave output. The flow tube can be sterilized to 140°C (284°F) and is gamma radiation resistant up to 50 kGy. These features make this model ideal for monitoring and controlling fluid flows in hygienic applications.

A field replaceable ultra light-weight turbine assembly follows the fluctuation of flow very accurately and generates a high resolution IR (Infrared) reflected digital output signal.

In either flow controlled or monitoring applications, the flow sensor can be used to measure and totalize flow rates. Optional elements built into the circuit include a flow switch and a programmable batch feedback function for pump control.

Features

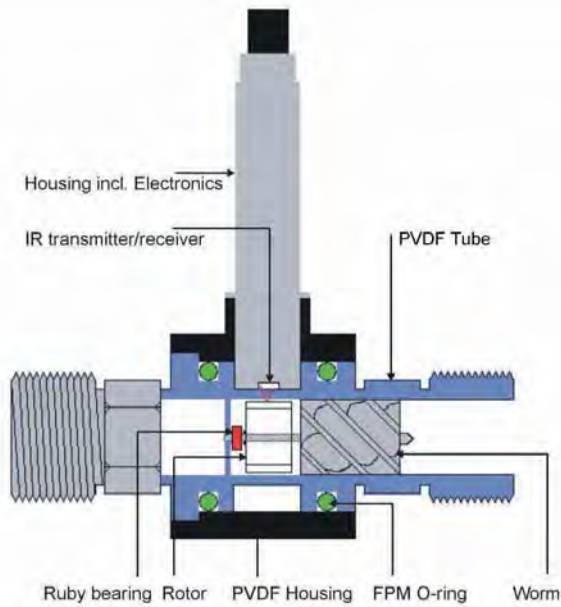
- Turbine flowsensor with high resolution output
- Flow measuring by revolutionary IR turbine reflection.
- PVDF for high chemical and corrosion resistance
- High accuracy and repeatability
- Suitable for opaque liquids
- Meets all the requirements of the US Pharmacopeia Class VI
- BSE/TSE certificate available
- All wetted parts are made of PVDF with ruby bearing
- Low voltage(5v) option available (LV Series)
- PVDF flow tube gamma radiation resistant up to 50kGy



SPECIFICATIONS

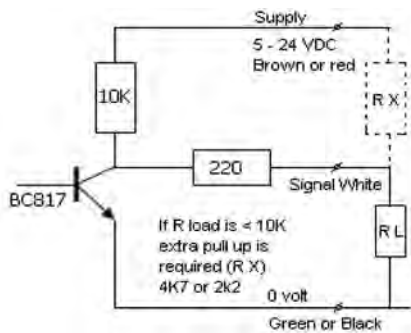
GENERAL	PVDF	
	PVDF0045	PVDF0085
Model		
Inner diameter in mm	4.7	9.3
Flow range (L/min)	0.06 - 2.0	0.3 - 20.0
Hose barb tube connection	7 mm	12 mm
Tube length in mm	53	62
Max. pressure at 20°C in bar (psi)	25 Bar (363 psi)	20 Bar (290 psi)
K factor (water) in pulse/Liter	100,000	4,500
Wetted parts	PVDF / Ruby	
Accuracy	1% of reading	
Repeatability	< 0.15 %	
Liquid temperature in °C	-20 to +80	
Viscosity in cSt.	0.8 - 10	
Power supply	5 - 30 Vdc	
Output signal	5 - 30 V sq. wave	
Power consumption	34 mA at 5 V	
Electrical lead	PVC, 1 meter	
Recommended Line filter	100 µm	
Flow tube sterilizable	up to 140°C	
Gamma radiation resistant	50 kGy	

Available in two different configurations as shown above, the PVDF sensor may be ordered with a tube holder or may be clip mounted.

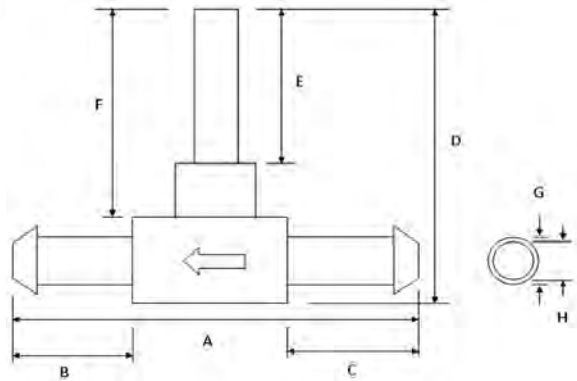


Working Principal:
 A static worm forces the passing fluid to spin. The spinning fluid drives a rotor with reflectors into a frictionless rotation. A high resolution infrared sensor determines the rate of flow by counting the passing reflections. The set up even allows the flow of opaque liquids to be determined accurately. The ultra low mass of the rotor guarantees a quick response to changes in the rate of flow.

WIRING



Wiring:
Power Supply
 5-30 Vdc or 5 Vdc (low voltage option)
Output All
Sensors: NPN
 square wave



Dim. (MM)	PVDF0045	PVDF0085
A	52.6	62.3
B	15.2	20
C	16.9	20
D	60.6	67
E	36.7	36.7
F	46.5	44.4
G	8.1	13.8
H	4.7	9.25

ORDERING INFORMATION

ABCDEFGH
PVDF004501CX

A Model	B Tube Diameter / Range	C PVC Cable	D Configuration	E Power	F Options
PVDF	0045= 4.5 mm/0.03-2 l/min 0085= 8.5 mm/0.3-20 l/min	01= Standard (1m) 02= 2 meters	C=Clip Mount T=Tube Holder	L= 5 VDC A= 5-30 VDC X= 5-30 VDC w/microchip	<u>Built-in to Housing Electronics</u> ¹ PD= Pulse Divider ^{1,2} F= Flow Switch ^{1,2} B= Batch Function ¹ Requires X power option. ² Requires model 6300 switch
Replacement Parts			Additional Electronics		
Clip Mounted: 0045.P.H.0.00.CX PVDF tube only for model 0045 0085.P.H.0.00.CX PVDF tube only for model 0085 0000.P.X.P.01.CX Electronic pick-up; 5-30vdc 0045.X.X.X.00.CX Mounting clip for 0045 flow meter Tube Holder: 0045.C.X.P.01.TX Tubeholder for PVDF 4.5, w/5-30vdc electronics 0085.C.X.P.01.TX Tubeholder for PVDF 8.5, w/5-30vdc electronics 0045.P.H.0.00.TX PVDF disposable tube 4.5 for tube holder 0085.P.H.0.00.TX PVDF disposable tube 8.5 for tube holder			6100.DA.CON.DC.XX Converter D/A 4-20mA 6300.BA.CON.DC.XX Converter Batch or Flowswitch 6700.DD.CON.DC.XF Converter Fiber sen. 6700.DA.CON.DC.XF Converter fiber sen. +D/A 601.B.K.0010 Batchcontroller S/601-B - Batchcontroller 2 flows 601.F.K.0010 Flowcontroller - S/601-F - 2 flows monitor and totalizer More Options Internal Batch function implemented preset batch volume (not for LV series) Cable extension, max 20 meters		

EQUFLOW

Turbine Flow Sensor Signal Conditioning Options

Model Series PFA, PFAD and SS

DESCRIPTION

The Equflow range of flow sensors has low flow sensing capabilities in a wide range of applications, and is suitable for clear, opaque, neutral, corrosive and aggressive liquids including fuel.

An ultra light-weight turbine follows the fluctuation of flow very accurately and generates a high resolution IR reflected digital output signal.



In either flow controlled or monitoring applications, the Series PFA, PFAD and SS flowsensors can measure flow rates and totalize. Optional elements built into the circuit include a programmable K factor/voltage divider, flow switch and a programmable batch feedback function for pump control.

External optional electronic packages include model 6100 digital to analog (4-20 mA) converter and model S601, a professional, solid batch and flow controller that can be used as a monitor and/or totalizer. Model 6300 switching module is required when the internal flow switch or batch option is added to the flow sensor.

INTERNAL CIRCUIT OPTIONS (NEED TO BE ORDERED WITH FLOW SENSOR)

FLOW SWITCH

The PFA turbine flow meter can be modified into a programmable flow switch. The adjustment of the switching point of the flow meter is established with a simple program. When the adjusted switch point is attained, the meter outputs a 24 VDC signal (NPN transistor) to a switching module (Model 6300). As soon as the flow decreases below the switching point, the switching module is turned off. This option is available for 5-30 VDC models only.

Applications:

- * Flow monitoring
- * Piping leakage detection

BATCH CONTROL

The PFA turbine flow meter can be equipped with an adjustable counter (preset function). A programmable microprocessor in the meter is employed to set a prescribed dosing volume. On/Off control via NPN transistor of an external 24V DC solid state relay is accomplished with switching module Model 6300. This option is available for 5-30 VDC models only.

Applications:

Repeat dosing of a fixed volume such as in

- * coffee machines
- * soup machines
- * infusion bags
- * ampules
- * bottles



EXTERNAL CIRCUIT OPTIONS

6100 DA CONVERTER- FREQUENCY TO ANALOG CONVERTER FOR STANDARD FLOW METER WITH ANALOG OUTPUT SIGNAL.

Power supply DC model: 16 to 24 VDC

Output signal: 0 to 5 volt, 0 to 10 volt, 0-20 mA, 4-20 mA

Maximum output signal: adjustable between 500 and 4000 Hz input frequency

Adjustable response time.

Adjustable span: 20 mA

Output 5 volt supply for flow meter

ENVIRONMENTAL DATA

Storage Temperature: -20°C to 70°C (-4°F/158°F)

Operating Temperature: 0°C to 50°C (32°F/122°F)

Relative Humidity: 70% @ 0°C to 50°C

REAL TIME

Response time adjust: 0.01 to 1 seconds

Max. frequency input: 5 kHz

MECHANICAL DATA

35 mm DIN Rail Mount per EN 50022

Height: 75.8 mm (2.98")

Length: 71.4 mm (2.81")



Width: 90.7 mm (3.57")

Weight model DC: 0.154 kg (0.340 lbs)

Weight model AC: 0.309 kg (0.681 lbs)

EN 50081-1, EN 50082-2

FLOW AND BATCH CONTROLLER S601

The S601 is a professional, solid batch and flow controller, that can be used as a monitor and/or totalizer. The distinctive features are:

- * the extremely simple operation
- * the very attractive and compact design
- * clear readable display
- * audible buzzer
- * various casings (synthetic, aluminum, stainless steel)
- * RS232 serial gate (Profibus as option)
- * PID control
- * High accuracy by automatic lagging compensation and adjustable damping factor

Application Flexibility:

The configuration can be determined easily by selecting the pushbutton codes. After pushing the buttons in the selected code, the S601 is changed from batch controller into flow controller or monitor or vice versa. The following functions are available:

- Filling 2 liquids simultaneously Dosing and filling of preset volumes
- Filling 2 liquids sequentially Dosing and filling of preset volumes
- Batch to main stream Flow-proportional dosing in batches to a main stream
- Batch in time Dosing in batches with an adjustable time interval
- Flow process Flow control for one liquid
- Proportional mixing Flow-proportional/in percentage/continuous dosing to a main stream
- Monitoring + totalizing Flow
- Pump control

General

Power supply 24 VDC

Dimensions 140 x 220 x 72 mm (WxHxD)

Casing High grade synthetic; others on request

Environment Temp. - 10 to +70 °C

Type of enclosure IP65

Display 2 x 16 digits

Input signals

2 x flow meters, pulse max. 5 KHz.

3 x analog (0-10V), 1 x analog (4-20mA)

external control for Alarm/Start-Stop/Up-Down

Output signals 1 x analog, 0 - 10 V



FLOW SWITCH AND BATCH CONTROLLER 6300

Model 6300 is an external (to the flow sensor) switching module for use when the flow sensor internal flow switch or internal batch functions are ordered. The output of the module is a solid state switch rated for 110 mA @ 24 VDC

The switch or batch function is programmed via Equflow's "Equ Configurator" software, a windows based software employing a USB connection.

If the flow sensor is set to a batch function mode the output signal will drop to zero after starting model 6300 (powering up the sensor). This also triggers the opto coupler in the 6300 module which in turn powers the 6300 solid state relay. The liquid passing the flow sensor is counted inside the flow sensor and when the preset volume is reached the output will be set high causing the relay to reset.

If the start command to model 6300 is given and for a selected time there is no output measured, the output will be set to high.

The duration of dosing can also be limited with a timer for safety reasons in the event of a turbine failure.



EQUFLOW

SS(0045, 0085, 00125) Stainless Steel Turbine Flow Sensor

SS wetted parts, F.S. ranges of 2, 20, & 40 lpm, Frequency/Analog Output

DESCRIPTION

The SS housing flow sensor has low flow sensing capabilities in a wide range of applications, and is suitable for clear, opaque, neutral, corrosive and aggressive liquids including fuel.

An ultra light-weight turbine follows the fluctuation of flow very accurately and generates a high resolution IR reflected digital output signal.

In either flow controlled or monitoring applications, the stainless steel housed flow sensor can measure flow rates and totalize. Optional elements built into the circuit include a programmable K factor, flow switch and a programmable batch feedback function for pump control.

External optional electronic packages include model 6100 digital to analog (4-20 mA) converter. Also model S601, a professional, solid batch and flow controller that can be used as a monitor and/or totalizer and model 6300 switch module for use with

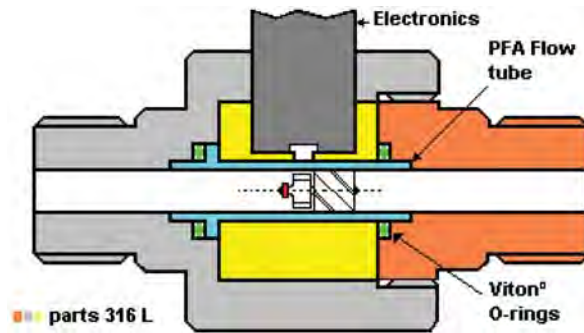
Features

- Turbine flowsensor with high resolution output
- Flow measuring by revolutionary IR turbine reflection
- 316 Stainless Steel & PFA parts for high chemical and corrosion resistance
- High accuracy and repeatability
- Suitable for opaque liquids
- Outstanding performance for high process pressure



SPECIFICATIONS

GENERAL	SS0045	SS0085	SS0125	Patent No. US5388466
Model				
Inner diameter in mm	4.5	8.5	12.5	
Flow range	0.06 - 2 L/min	0.5 - 20 L/min	1.5 - 40 L/min	
Accuracy	1% of reading	1% of reading	1% of reading	
Repeatability	< 0.15 %	< 0.15 %	< 0.15 %	
Wetted parts	316 SS/PFA /Ruby	316 SS/PFA /Ruby	316 SS/PFA /Ruby	
O-ring Seals	Viton or EPDM	Viton or EPDM	Viton or EPDM	
Tube connection thread/hosebarb	1/4 " NPT/BSP	3/8 "NPT/BSP	1/2 " NPT/BSP	
Liquid temperature in °C	-20 to +80	-20 to +80	-20 to +80	
Max. pressure at 20° C in bar (psi)	25 (363)	25 (363)	25 (363)	
Viscosity in cSt.	0.8 - 10	0.8 - 10	0.8 - 10	
K factor (water) in pulse/Litre	110,000	6,350	2,050	
Power supply	5 - 30 Vdc	5 - 30 Vdc	5 - 30 Vdc	
Output signal	5 - 30 V sq. wave	5 - 30 V sq. wave	5 - 30 V sq. wave	
Power consumption	35 mA at 5 V	35 mA at 5 V	35 mA at 5 V	
Electrical lead	PVC 1 meter	PVC 1 meter	PVC 1 meter	
Dimensions incl. housing (mm)	L-72.6, ø 40	L-72.3, ø 40	L-73.6, ø 40	
Recommended Line filter	100 µm	100 µm	150 µm	



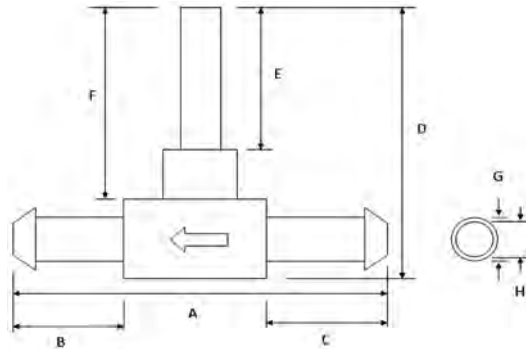
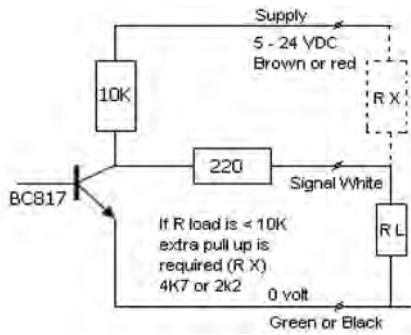
Working Principal:

A static worm forces the passing fluid to spin. The spinning fluid drives a rotor with reflectors into a frictionless rotation. A high resolution infrared sensor determines the rate of flow by counting the passing reflections. The set up even allows the flow of opaque liquids to be determined accurately. The ultra low mass of the rotor guarantees a quick response to changes in the rate of flow

Wiring:

Power Supply 5-30 Vdc or 5 Vdc (low voltage option)

Output All Sensors: NPN square wave



Dim. (MM)	0045- NPT	0045-BSP	0085- NPT	0085- BSP	0125- NPT	0125- BSP
A	72.5	67	72.3	67.2	73.8	71.2
B	14.7	14.4	14.8	12.35	15.5	14.2
C	14.7	14.4	14.8	12.35	15.5	14.2
D	68.5	68.5	71.2	71.2	76	76
E	28.5	28.5	30.3	30.3	30	30
F	12	12	12	12	12	12
G	13.8	13.8	17.2	17.2	21.7	21.7
H	4.5	4.5	8.85	8.85	14	14
I	40	40	40	40	45	45

ORDERING INFORMATION

**ABCDEFGHIH
SS0045TNP01XX**

A Model	B Tube Dia./Range	C Wetted Material	D Connection	E Cable Type	F Cable Length	G Power	H Options
SS	0045= 4.5 mm/0.1-2 l/min 0085= 8.5 mm/1.0-20 l/min 0125= 12.5 mm/2.0-38 l/min	S=316 SS/PFA /Ruby	N= NPT B= BSP	P= PVC	01= Standard 02= 2 meters	XL= 5 VDC XA= 5-30 VDC XX= 5-30 VDC w/microchip	Built-in to Housing Electronics ¹ PD= Pulse Divider ^{1,2} F= Flow Switch ^{1,2} B= Batch Function ¹ Requires X power option ² Requires model 6300 switch h

Ask About Our Other Eqflow Products.....

- Standard Flow Sensor
- Disposable Flow Sensor
- Electronic packages for use with Flow Meters
 - 6100 digital to analog (4-20 mA) converter
 - S601 solid batch and flow controller
 - 6300 switching module for flow switch and batch option



CLARK

Series CFS Turbine Flow Sensors

1/4", 3/8", 1/2" Pipe Size, 0.8-25 LPM, Reed Switch Output

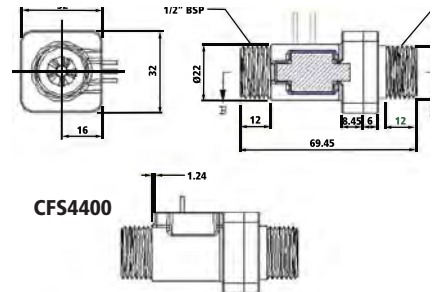
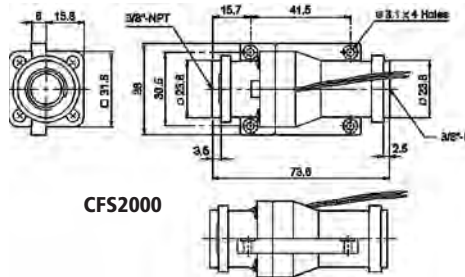
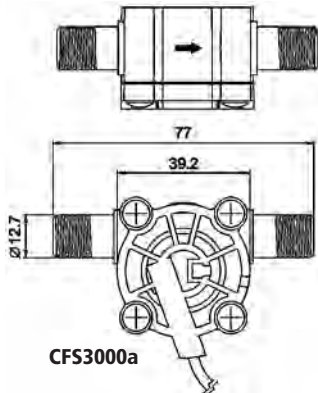
DESCRIPTION

Series CFS Turbine flow sensors are designed for water and compatible clean fluid flow measurement. They are a very economical choice for application where the accuracy, materials of construction and 500,000 liter approximate life rating of the sensors are acceptable.

A magnet imbedded in the turbine (CFS2000 & 3000A) or a PA plastic encased magnet turbine (FS4400) closes a hermetically isolated reed switch when in proximity. Sensor calibration factors are provided to convert pulses to flow rate.

Common applications include water treatment systems, filter monitoring, water dispensing, cooling loops and many other.

Specification	CFS3000A	CFS2000	CFS4400
Connection	1/4" Male NPT	3/8" Female NPT	1/2" BSP
Flow Range	0.8 to 8.0 LPM	1.0 to 14.1 LPM (Verticle Mount) 1.5 to 14.1 LPM (Horizontal Mount)	1.5 to 20 LPM
Temperature Operating Range	0-40°C	0-40°C	0-80°C
Max. Pressure	6 Bar	6 Bar	10 Bar
Accuracy	±5% Measured Value	±10% Measured Value	±10% Measured Value
Wetted Materials			
Sensor Body	Acetal Copolymer, TICONA M90	Acetal Copolymer, TICONA M90	PPS, 40% Glass
Turbine	Acetal Copolymer, TICONA M90	Acetal Copolymer, TICONA M90	PA Coated Magnet
Turbine Shaft	304 SS	304 SS	Ceramic
O-Ring	EPDM	EPDM	EPDM
Reed Contact Rating	10 VDC, 10 mA Max.		
Approx. Sensor Life	Approx. 500,000 Liters		
Mounting Orientation	Horizontal, Max 30° from Horizontal)	Horizontal or Vertical (Up or Down Flow)	Horizontal to Vertical
Mounting	4 ea self tap holes for M3 x 10 mm	4 ea 3.1 mm Dia through holes	Stem Mount Via Pipe Fitting
Weight	50 Grams		
Liters per Pulse	0.8 to 1.0 LPM: 0.0039 LPP	0.0033 LPP (Verticle Mount)	At 1.5 LPM: 0.007 Horz., 0.0036 Vert.
	1.0 to 2.5 LPM: 0.0040 LPP	0.004 LPP (Horizontal Mount)	At 6.0 LPM: 0.0038 Horz., 0.0038 Vert.
	2.5 to 8.0 LPM: 0.0041 LPP		At 15 LPM: 0.004 Horz., 0.0042 Vert.
			At 20 LPM: 0.004 Horz., 0.0043 Vert.



ORDERING INFORMATION

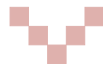
Model	Description
CFS3000A	Flow Sensor, 1/4" Male NPT
CFS2000	Flow Sensor, 3/8" Female NPT
CFS4400	Flow Sensor, 1/2" Male BSP



G SERIES PRECISION METERS

The High Precision Meter line is the most accurate of the GPI Turbine Meters and includes a traditional design. These meters come in a variety of sizes and fitting options including BSP, ISO, NPT and ANSI Flange fittings. The GSCPS in this section carries the 3A Sanitary Rating.



1) Select Your Turbine**Threaded Models****Sanitary Clamp Models****Flange Models****2) Select Your Sensor****Local Pickup Wire Lead****3) Select Your Electronic Choice**

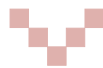
For further details and selections see the Electronics Section.

Remote Models

GA500	R700-R
GG500	R800-R
GX500	SC500

Local Models

GA510	R700-L
GG510	R800-L
GX510	SC510

**4) Do You Want It Assembled?**

GPI will assemble the components you choose into a single unit, configured to your request.

Contact the factory for details on Custom System Assembly.

G SERIES METER NUMBER REFERENCE

G SERIES

USE THIS AS A GUIDE – SIZES VARY BY FITTING TYPE.
(Does not apply to model GSCPS - 3A Meters)

Product Identifier

G = G Series Precision Turbine Meter

Fitting Type

- N** = NPT (Male)
- I** = ISO Taper (Male)
- B** = BSP (Male)
- F** = Flanged
- SC** = Sanitary Clamp

Meter Dimensions listed on page 93.

Shaft / Sleeve Bearing / Thrust Bearing

- T-** = Tungsten Carbide / Tungsten Carbide
- P-** = Stainless Steel / PTFE / Stainless Steel

Turbine Size & Flowrate

- 050S** = 1/2 in. (0.6 - 6 GPM) Low Flow - Turbine Body Only♦
- 051S** = 1/2 in. (0.8 - 6 GPM) Standard - Uses Low Drag Standard Sensor 1
- 051H** = 1/2 in. (0.8 - 6 GPM) High Temp - Turbine Body Only♦
- 075S** = 3/4 in. (1.6 - 16 GPM) Standard - Uses Standard Sensor 2
- 075H** = 3/4 in. (1.6 - 16 GPM) High Temp - Turbine Body Only♦
- 075E** = 3/4 in. (2.32 - 23 GPM) Ext-Range - Uses Standard Sensor 2
- 75EH** = 3/4 in. (2.32 - 23 GPM) Ext-Range High Temp - Turbine Body Only♦
- 100S** = 1 in. (6.7 - 67 GPM) Standard - Uses Standard Sensor 2
- 100H** = 1 in. (6.7 - 67 GPM) High Temp - Turbine Body Only♦
- 150S** = 1-1/2 in. (17.7 - 177 GPM) Standard - Uses Standard Sensor 2
- 150H** = 1-1/2 in. (17.7 - 177 GPM) High Temp - Turbine Body Only♦
- 200S** = 2 in. (33 - 330 GPM) Standard - Uses Standard Sensor 2
- 200H** = 2 in. (33 - 330 GPM) High Temp - Turbine Body Only♦
- 300S** = 3 in. (60-600 GPM) Standard - Uses Standard Sensor 2

Sensor Choice

- 1** = Low Drag Standard Sensor with 12 inch Lead Wires
- 2** = Standard Sensor with 12 inch Lead Wires
- X** = No Sensor - Turbine Body Only

Electronic Choice (Local)*

Turbine Mounted

- 5** = GG510 - Standard Display
- 6** = GX510 - 4-20 mA Transmitter with Display
- 7** = GA510 - 4-20 mA Transmitter
- 8** = SC510 - Scaled Pulse Output
- X** = No Electronics - Turbine Body Only

G + **I** + **T-** + **-075S** + **2** + **-6**

← (Sample Model Number)

* Electronic Choice not available on all models.

GBT, GIT & GNT PRECISION METERS

Model GNT NPT Fitting



GNT shown here
with Local Display



For complete part number,
see "Number Reference" chart on page 81.

ACCURACY: ± 0.5%

Select Your Meter Size:

1/2 inch	1 inch	2 inch
3/4 inch	1-1/2 inch	3 inch



For Your Special Application Needs:

Model GNT HT

For High Temperatures

(This model is not available in 3 inch)



Sensor Options:

- Low Drag Pickup (1/2 in. turbines)
- Standard Pickup (3/4 to 3 in. turbines)

Electronics Options:

- GG510 (Display with Pulse Output)
- GX510 (Display with 4-20 mA Output)
- GA510 (4-20 mA Output)
- SC510 (Scaled Pulse Output)

SPECIFICATIONS

Design Type:	Turbine		
Housing Material:	316 Stainless Steel		
Meter Sizes Available:			
For GNT: NPT Taper (Male)	1/2" 3/4" 1" 1-1/2" 2" 3"		
For GBT: BSPP * (Male)	1/2" 3/4" 1" 1-1/2" 2" 3"		
For GIT: ISO Taper (Male)	1/2" 3/4" 1" 1-1/2" 2" 3"		
For High Temperature*:	1/2" 3/4" 1" 1-1/2" 2" —		
Flow Range:	1/2" (051)	0.8 - 6.0 GPM (3.0 - 22 LPM)	
	3/4" (075)	1.6 - 16 GPM (6.0 - 60 LPM)	
	3/4" (075E)	2.3 - 23 GPM (8.7 - 87 LPM)	
	1" (100)	6.7 - 67 GPM (25.2 - 252 LPM)	
	1-1/2" (150)	17.7 - 177 GPM (67.0 - 670 LPM)	
	2" (200)	33 - 330 GPM (125.0 - 1250 LPM)	
	3" (300)	60 - 600 GPM (227.1 - 2271 LPM)	
Accuracy (Linearity):	± 0.5%		
Repeatability:	± 0.1%		
Pressure Rating:	1/2" to 2" = 5,000 PSI / 340 BAR 3" = 2,500 PSI / 170 BAR		
Operating Temperature Range:	-450° F to +800° F (-268° C to +426° C)		
Typical K-Factor:	1/2" (051)	10,000	
	3/4" (075)	3,750	
	3/4" (075E)	2,608	
	1" (100)	896	
	1-1/2" (150)	340	
	2" (200)	181	
	3" (300)	50	
Wetted Materials:			
Housing:	316 Stainless Steel		
Sleeve Bearings:	Tungsten Carbide		
Thrust Bearing:	Tungsten Carbide		
Shaft:	Tungsten Carbide		
Rotor:	CD4MCu Stainless Steel		
Rotor Supports:	316 Stainless Steel		
Recommended Strainer Size:			
	1/2"	40 mesh	
	3/4"	40 mesh	
	1"	40 mesh	
	1-1/2"	18 mesh	
	2"	14 mesh	
	3"	14 mesh	
Frequency Output:	1/2" (051)	125 - 1000 Hz	
	3/4" (075)	100 - 1000 Hz	
	3/4" (075E)	100 - 1000 Hz	
	1" (100)	100 - 1000 Hz	
	1-1/2" (150)	100 - 1000 Hz	
	2" (200)	100 - 1000 Hz	
	3" (300)	50 - 500 Hz	
Calibration Report	Comes standard with G Series meters. N.I.S.T. – Certification available.		

APPROVALS



- * Requires High Temp Pickup.
- * ISO 228-1 designation is G.

SPECIFICATIONS

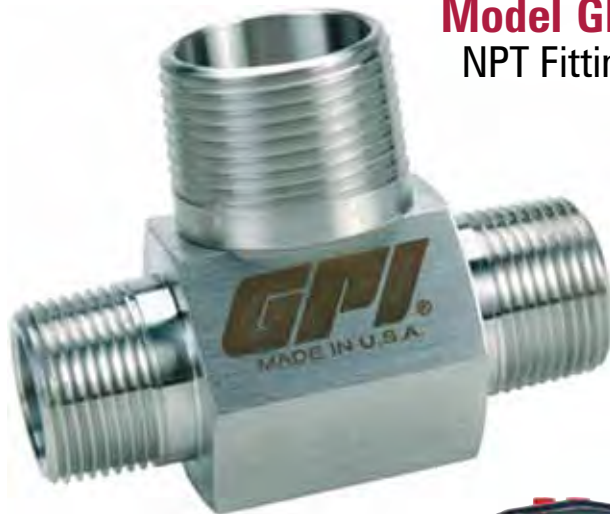
Design Type:	Turbine				
Housing Material:	316 Stainless Steel				
Meter Sizes Available:					
For GNP: NPT (Male)	1/2"	3/4"	1"	1-1/2"	2"
For GBP: BSPP* (Male)	1/2"	3/4"	1"	1-1/2"	2"
For GIP: ISO Taper (Male)	1/2"	3/4"	1"	1-1/2"	2"
Flow Range:	1/2" (050)*	0.6 - 6.0 GPM (2.2 - 22 LPM)			
	1/2" (051)	0.8 - 6.0 GPM (3.0 - 22 LPM)			
	3/4" (075)	1.6 - 16 GPM (6.0 - 60 LPM)			
	3/4" (075E)	2.3 - 23 GPM (8.7 - 87 LPM)			
	1" (100)	6.7 - 67 GPM (25.2 - 252 LPM)			
	1-1/2" (150)	17.7 - 177 GPM (67.0 - 670 LPM)			
	2" (200)	33 - 330 GPM (125.0 - 1250 LPM)			
Accuracy (Linearity):	± 0.5%				
Repeatability:	± 0.1%				
Pressure Rating:	1/2" to 2" = 5,000 PSI / 340 BAR				
Operating Temperature Range:	-450° F to +800° F (-268° C to +426° C)				
Typical K-Factor:	1/2" (050)*	10,000			
	1/2" (051)	10,000			
	3/4" (075)	3,750			
	3/4" (075E)	2,608			
	1" (100)	896			
	1-1/2" (150)	340			
	2" (200)	181			
Wetted Materials:					
Housing:	316 Stainless Steel				
Sleeve Bearings:	PTFE				
Thrust Bearing:	440C Stainless Steel				
Shaft:	316 Stainless Steel				
Rotor:	CD4MCu Stainless Steel				
Rotor Supports:	316 Stainless Steel				
Recommended Strainer Size:					
	1/2"	40 mesh			
	3/4"	40 mesh			
	1"	40 mesh			
	1-1/2"	18 mesh			
	2"	14 mesh			
Frequency Output:	1/2" (051)*	125 - 1000 Hz			
	3/4" (075)	100 - 1000 Hz			
	3/4" (075E)	100 - 1000 Hz			
	1" (100)	100 - 1000 Hz			
	1-1/2" (150)	100 - 1000 Hz			
	2" (200)	100 - 1000 Hz			
Calibration Report	Comes standard with G Series meters. N.I.S.T. – Certification available.				

APPROVALS



* 1/2 in. (050) requires RF Pickup.
* ISO 228-1 designation is G.

Model GNP NPT Fitting



GNP shown here
with Local Display

For complete part number,
see "Number Reference" chart on page 81.

ACCURACY: ± 0.5%

Select Your Meter Size:

1/2 inch	1 inch	2 inch
3/4 inch	1-1/2 inch	



Sensor Options:

- Low Drag Pickup (1/2 in. turbines)
- Standard Pickup (3/4 to 3 in. turbines)

Electronics Options:

- GG510 (Display with Pulse Output)
- GX510 (Display with 4-20 mA Output)
- GA510 (4-20 mA Output)
- SC510 (Scaled Pulse Output)

ANSI FLANGE PRECISION METERS

Model GFT 150# RF ANSI Flange Fitting



GFT shown here
with GX510



For complete part number,
see "Number Reference" chart on page 81.

ACCURACY: ± 0.5%

Select Your Meter Size:

3/4 inch	1-1/2 inch	3 inch
1 inch	2 inch	



For Your Special Application Needs:

Model GFP

For Chemicals

(These models not available in 3 inch)

Model GFT HT

For High Temperatures



Sensor:

- Standard Pickup (3/4 to 3 inch turbines)

Electronics Options:

- GG510 (Display with Pulse Output)
- GX510 (Display with 4-20 mA Output)
- GA510 (4-20 mA Output)
- SC510 (Scaled Pulse Output)

SPECIFICATIONS

Design Type:	Turbine				
Housing Material:	316 Stainless Steel				
Meter Sizes Available:					
For GFT:	3/4"	1"	1-1/2"	2"	3"
For GFP:	3/4"	1"	1-1/2"	2"	—
For High Temperature:	3/4"	1"	1-1/2"	2"	—
Flow Range:	3/4" (075)	1.6 - 16 GPM (6.0 - 60 LPM)			
	3/4" (075E)	2.3 - 23 GPM (8.7 - 87 LPM)			
	1" (100)	6.7 - 67 GPM (25.2 - 252 LPM)			
	1-1/2" (150)	17.7 - 177 GPM (67.0 - 670 LPM)			
	2" (200)	33 - 330 GPM (125.0 - 1250 LPM)			
	3" (300)	60 - 600 GPM (227.1 - 2271 LPM)			
Accuracy (Linearity):	± 0.5%				
Repeatability:	± 0.1%				
Pressure Rating:	Flange Rule				
Operating Temperature Range:					
For Tungsten Carbide:	-450° F to +800° F (-268° C to +426° C)				
For SS/PTFE:	-100° F to +185° F (-74° C to +85° C)				
Typical K-Factor:	3/4" (075)	3,750			
	3/4" (075E)	2,608			
	1" (100)	896			
	1-1/2" (150)	340			
	2" (200)	181			
	3" (300)	50			
Wetted Materials (GFT):					
Housing:	316 Stainless Steel				
Sleeve Bearings:	Tungsten Carbide				
Thrust Bearing:	Tungsten Carbide				
Shaft:	Tungsten Carbide				
Rotor:	CD4MCu Stainless Steel				
Rotor Supports:	316 Stainless Steel				
Wetted Materials (GFP):					
Housing:	316 Stainless Steel				
Sleeve Bearings:	PTFE				
Thrust Bearing:	440C Stainless Steel				
Shaft:	316 Stainless Steel				
Rotor:	CD4MCu Stainless Steel				
Rotor Supports:	316 Stainless Steel				
Recommended Strainer Size:					
	3/4"	40 mesh			
	1"	40 mesh			
	1-1/2"	18 mesh			
	2"	14 mesh			
	3"	14 mesh			
Frequency Output:	3/4" (075)	100 - 1000 Hz			
	3/4" (075E)	100 - 1000 Hz			
	1" (100)	100 - 1000 Hz			
	1-1/2" (150)	100 - 1000 Hz			
	2" (200)	100 - 1000 Hz			
	3" (300)	50 - 500 Hz			
Calibration Report	Comes standard with G Series meters. N.I.S.T. - Certification available.				

APPROVALS



* Requires High Temp Pickup.

SANITARY CLAMP PRECISION METERS

G SERIES

SPECIFICATIONS

Design Type:	Turbine	
Housing Material:	316 Stainless Steel	
Meter Sizes Available (ID):	1" 1-1/2" 2"	
Meter ID:	1"	1-1/2" Fitting
	1-1/2"	1-1/2" Fitting
	2"	2" Fitting
Flow Range:	1" (100)	6.7 - 67 GPM (25.2 - 252 LPM)
	1-1/2" (150)	17.7 - 177 GPM (67.0 - 670 LPM)
	2" (200)	33 - 330 GPM (125.0 - 1250 LPM)
Accuracy (Linearity):	± 0.5%	
Repeatability:	± 0.1%	
Pressure Rating:	Limited by fitting size, clamp size & temp.	
Operating Temperature Range:		
For GSCPS:	-100° F to +225° F (-74° C to +107° C)	
SIP (up to 1 hour):	+285° F (+140° C)	
Typical K-Factor:	1" (100)	896
	1-1/2" (150)	340
	2" (200)	181
Wetted Materials (SIP):		
Housing:	316 Stainless Steel	
Sleeve Bearings:	PEEK	
Thrust Bearing:	PEEK	
Shaft:	316 Stainless Steel	
Rotor:	CD4MCu Stainless Steel	
Rotor Supports:	316 Stainless Steel	
Recommended Strainer Size:		
	1"	40 mesh
	1-1/2"	18 mesh
	2"	14 mesh
Frequency Output:	1" (100)	100 - 1000 Hz
	1-1/2" (150)	100 - 1000 Hz
	2" (200)	100 - 1000 Hz
Calibration Report	Comes standard with G Series meters. N.I.S.T. – Certification available.	

APPROVALS

GSCPS & "L" Option Meters carry a



Sanitary Rating.

Flowmeters for milk and milk products, Number 28-04.



This meter meets the strict 3-A Sanitary Standards using the new "Third Party Verification" (TPV) program. Our methods of design, construction and traceability of components have been reviewed and approved.

The internals of this meter are machined or polished to meet 3-A self-draining and cleaning requirements (Ra 32). The GSCPS Meter meets Clean in Place (CIP), Steam in Place (SIP) and Clean Out of Place (COP) requirements.

Model GSCPS Standard Sanitary Clamp



Model GSCPS Low Profile Sanitary Clamp



For complete part number,
see "Number Reference" chart on page 81.

ACCURACY: ± 0.5%

**GSCPS Stainless Steel
Precision Turbine Meter**



Select Your Meter Size:

- 1 inch Meter with 1-1/2 inch Fitting
- 1-1/2 inch Meter with 1-1/2 inch Fitting
- 2 inch Meter with 2 inch Fitting

Use this meter in pre-process applications where high accuracy is required without 3-A Approval.

Model GSCP Tri-Clover® Clamp



*GSCP shown here
with Local Display*



*For complete part number,
see "Number Reference" chart on page 81*

ACCURACY: ± 0.5%

Select Your Meter Size:

- 1/2 inch Meter with 3/4 or 1 inch Fitting
- 3/4 inch Meter with 1-1/2 inch Fitting
- 1 inch Meter with 1-1/2 inch Fitting
- 1-1/2 inch Meter with 1-1/2 inch Fitting
- 2 inch Meter with 2 inch Fitting



Sensor Options:

- Low Drag Pickup (1/2 in. turbines)
- Standard Pickup (3/4 to 2 in. turbines)

Electronics Options:

- GG510 (Display with Pulse Output)
- GX510 (Display with 4-20 mA Output)
- GA510 (4-20 mA Output)
- SC510 (Scaled Pulse Output)

SPECIFICATIONS

Design Type:	Turbine				
Housing Material:	316 Stainless Steel				
Meter Sizes Available (ID):	1/2"	3/4"	1"	1-1/2"	2"
Meter ID:	1/2"	3/4" Fitting			
	1/2"	1" Fitting			
	3/4"	1-1/2" Fitting			
	1"	1-1/2" Fitting			
	1-1/2"	1-1/2" Fitting			
	2"	2" Fitting			
Flow Range:	1/2" (050) [†]	0.6 - 6 GPM	(2.2 - 22 LPM)		
	1/2" (051)	0.8 - 6 GPM	(3.0 - 22 LPM)		
	3/4" (075)	1.6 - 16 GPM	(6.0 - 60 LPM)		
	3/4" (075E)	2.3 - 23 GPM	(8.7 - 87 LPM)		
	1" (100)	6.7 - 67 GPM	(25.2 - 252 LPM)		
	1-1/2" (150)	17.7 - 177 GPM	(67.0 - 670 LPM)		
	2" (200)	33 - 330 GPM	(125.0 - 1250 LPM)		
Accuracy (Linearity):	± 0.5%				
Repeatability:	± 0.1%				
Pressure Rating:	Limited by fitting size, clamp size & temp.				
Operating Temperature Range:	-100° F to +185° F (-74° C to +85° C)				
Typical K-Factor:	1/2" (050) [†]	10,000			
	1/2" (051)	10,000			
	3/4" (075)	3,750			
	3/4" (075E)	2,608			
	1" (100)	896			
	1-1/2" (150)	340			
	2" (200)	181			
Wetted Materials:					
Housing:	316 Stainless Steel				
Sleeve Bearings:	PTFE				
Thrust Bearing:	440C Stainless Steel				
Shaft:	316 Stainless Steel				
Rotor:	CD4MCu Stainless Steel				
Rotor Supports:	316 Stainless Steel				
Recommended Strainer Size:					
	1/2"	40 mesh			
	3/4"	40 mesh			
	1"	40 mesh			
	1-1/2"	18 mesh			
	2"	14 mesh			
Frequency Output:	1/2" (050)	100 - 1000 Hz			
	1/2" (051)	125 - 1000 Hz			
	3/4" (075)	100 - 1000 Hz			
	3/4" (075E)	100 - 1000 Hz			
	1" (100)	100 - 1000 Hz			
	1-1/2" (150)	100 - 1000 Hz			
	2" (200)	100 - 1000 Hz			
Calibration Report	Comes standard with G Series meters. N.I.S.T. – Certification available.				

[†] GSCP-050 requires RF Pickup.

Magnetic Pickups



When choosing a magnetic pickup, the turbine meter and electronics are generally already known. Electronics can be either Local or Remote. Remote electronics include GPI Remote Displays or output to customer supplied equipment. Follow these 3 steps when choosing a magnetic pickup then see the Specification Table for further details.



1
Select your size:
1/2 inch or
3/4 to 3 inch



2
Choose: Local or Remote/Output
Local uses a wire lead pickup.
Remote/Output requires a connector.



3
What's your signal type:
Sine Wave or Square Wave
Sine Wave - has no sensor power, can be used with battery powered displays.
Square Wave - sensor power is required.

1/2 INCH METER SIZES

Magnetic Pickups work with...

Description	Part Number	Sensor Power	Temperature Range	Cable Type	Connector Required	Cable Length	Thread Size	Local	Remote	Battery Pwr Display
Wire Lead Low Drag	81006001	None	-100° F - +250° F (-73° C - +121° C)	None	None	12 in.	5/8" - 18	X		Yes
Low Drag	81006000	None	-100° F - +250° F (-73° C - +121° C)	S	80001200	N/A	5/8" - 18		X	Yes
High Temp., Low Drag (10 ft. cable)	81007001	None	-450° F - +800° F (-268° C - +426° C)	None	None	10 ft.	5/8" - 18		X	Yes
* RF (required for GNP-050, GTP-050 & GSCP-050)	81005002	7-30 VDC	-40° F - +248° F (-29° C - +120° C)	D	80001202	N/A	5/8" - 18		X	No

3/4 TO 3 INCH METER SIZES

Wire Lead Standard	81003000	None	-100° F - +250° F (-73° C - +121° C)	None	None	12 in.	5/8" - 18	X		Yes
Standard	81001000	None	-100° F - +250° F (-73° C - +121° C)	S	80001200	N/A	5/8" - 18		X	Yes
Herm / High Temperature	81002000	None	-450° F - +258° F (-268° C - +125° C)	S	80001200	N/A	5/8" - 18		X	Yes
High Temperature, Standard	81007000	None	-450° F - +800° F (-268° C - +426° C)	None	None	3 ft.	5/8" - 18		X	Yes
* Digital (Di-Mag)	81004000	5-32 VDC	-40° F - +248° F (-29° C - +120° C)	D	80001202	N/A	5/8" - 18		X	No

* Externally powered pickups for pulse output only.

Pickup Enclosures



Pickup Enclosures are optional on G Series Meters. Choose from four pickup enclosures. Models N4A and N4S are weather-proof enclosures. For explosion-proof enclosures, choose N7A for the enclosure without terminal strip or the N7AT with terminal strip.

ENCLOSURES – PART NUMBERS

Description	Part Number
N4AWP - Weatherproof magnetic pickup steel enclosure	80001101
N4SWP - Weatherproof magnetic pickup 316 S.S. enclosure	80001105
N7AXP - Explosion-proof pickup enclosure (NEMA 7D)	80001100
N7ATXP - Explosion-proof pickup enclosure w/terminal strip (NEMA 7D)	80001102
Optional Spacer	42825524

Connectors



Connectors are included with cable assemblies from GPI. If you need replacement connectors, choose from the following:

CONNECTORS – PART NUMBERS	
Description	Part Number
Standard mating connector (2 pin) used on Type S and T cable assemblies	80001200
Water resistant connector (2 pin) used on Type H cable assembly	80001201
Di-Mag connector (3 pin) used on Type D cable assembly	80001202

Cable Assemblies



GPI Cable Assemblies include the connector.

CABLE ASSEMBLY – PART NUMBERS			
Type “S” Standard Cable (2 Conductor)		Type “H” Water Resistant (2 Conductor)	
Cable Length	Part No.	Cable Length	Part No.
8 inch	83001001	8 inch	83003001
5 feet	83001005	5 feet	83003005
10 feet	83001010	10 feet	83003010
15 feet	83001015	15 feet	83003015
20 feet	83001020	20 feet	83003020
25 feet	83001025	25 feet	83003025
30 feet	83001030	30 feet	83003030
40 feet	83001040	40 feet	83003040
50 feet	83001050	50 feet	83003050
75 feet	83001075	75 feet	83003075
100 feet	83001100		
125 feet	83001125		
Type “D” Di-Mag or RF (3 Conductor)		Type “T” High Temperature (2 Conductor)	
Cable Length	Part No.	Cable Length	Part No.
8 inch	83002001	8 inch	83004001
5 feet	83002005	5 feet	83004005
10 feet	83002010	10 feet	83004010
15 feet	83002015	15 feet	83004015
20 feet	83002020	20 feet	83004020
25 feet	83002025	25 feet	83004025
30 feet	83002030	30 feet	83004030
40 feet	83002040	40 feet	83004040
50 feet	83002050	50 feet	83004050
75 feet	83002075	75 feet	83004075

Display With Pulse Output

GG500
Remote Mount



GG510
Local Mount

The GG500 is a remote mount Pulse-Out Transmitter with battery powered display. Choose the GG510 when a local mount is needed.

GG500/GG510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Open Collector (NPN)
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	9-volt battery or externally powered
Voltage Supply (Min.):	7 VDC
Voltage Supply (Max.):	30 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+14° F to +140° F (-10° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0 - 1000 Hz
High Level Low Freq.:	0 - 150 Hz
High Level High Freq.:	0 - 1000 Hz
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.0 lbs. (.45 kg)
Calibratable:	K-factor Entry

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Industry Standard Output: Unscaled Pulse.
- ✓ Easily mounted on pipe or wall.

GX500/GX510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.1 lbs. (.5 kg)
Calibratable:	K-factor Entry

Display With 4-20 mA Output



GX500
Remote Mount



GX510
Local Mount

The GX500 is a remote mount 4-20 mA Output Transmitter with display. Choose the GX510 when a local mount is needed.

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

4-20 mA Output

GA500
Remote MountGA510
Local Mount

The GA500 is a remote mount 4-20 mA Output Transmitter without display. Choose the GA510 when a local mount is needed.

GA500/GA510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.1 lbs. (.5 kg)

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

SC500/SC510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Power Source:	DC powered 5 to 30 VDC
Input Signal:	Hall Effect, Reed Switch or Open Collector (NPN) or Sine Wave
Output Signal:	Open Collector (NPN)
Frequency Range:	Coil, HF = 0-1500 Hz; LF = 0-150 Hz
Operating Temperature:	-40° F to +185° F (-40° C to +85° C)
Cable:	<i>Remote:</i> 20 ft., 3-conductor, tinned drain wire, 22 AWG, PVC jacket .212 dia. Ref. Belden 9363. <i>Local:</i> No cable provided
Mechanical Connections:	<i>Remote:</i> Wall or pipe mountable with standard U-bolts. <i>Local:</i> Unit is mounted to meter body, 1" NPT.
Electrical Connections:	<i>Remote:</i> Two strain relief ports <i>Local:</i> One strain relief port; one threaded plug

Scaled Pulse Output



SC500
Remote Mount



SC510
Local Mount

The GPI Scaled Pulse Module is a switch-programmable multi-stage counter/divider with multiple inputs. The module provides selectable K-factor to convert input frequency to scaled pulse output. The SC500 connects via a 20 foot input cable. The SC510 connects directly to the 1 inch MNPT conduit connector.

ACCURACY: ±0.1% READING

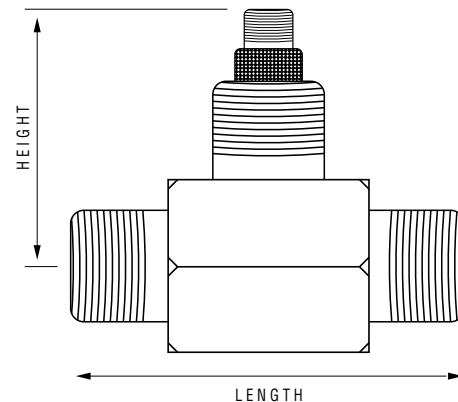
Features and Benefits:

- ✓ Converts input frequency to scaled pulse output.
- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 and A1 Turbine Meters and Oval Gear Meters.
- ✓ Remote model mounts on pipe or wall.

G Series Precision Meters

Size	NPT and Flared Tubing		Sanitary Clamp		Flanged*	
	Length inches (mm)	Height inches (mm)	Length inches (mm)	Height inches (mm)	Length inches (mm)	Height inches (mm)
1/2 in.	2.75 (70)	2.56 (65)	2.75 (70)	2.56 (65)	—	—
3/4 in.	3.25 (82)	2.62 (66)	3.25 (82)	2.62 (66)	5.50 (140)	2.00 (51)
1 in.	3.56 (90)	2.75 (70)	3.56 (90)	2.75 (70)	5.50 (140)	2.12 (54)
1-1/2 in.	4.59 (116)	3.00 (76)	4.59 (116)	3.00 (76)	6.00 (152)	2.50 (63)
2 in.	6.06 (154)	3.25 (82)	6.06 (154)	3.25 (82)	6.50 (165)	3.00 (76)
3 in.	10.00 (254)	3.50 (89)	—	—	10.00 (254)	3.75 (95)

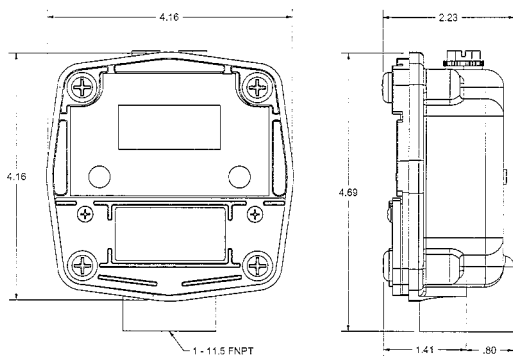
* Height on flange meters, measures from center line to top of flange.



Electronic Choice - Local & Remote

(Dimensions can vary by model.)

Local Model



Length inches (mm)	Height inches (mm)	Width inches (mm)
2.23 (57)	4.69 (119)	4.16 (106)

Remote Model

Length* inches (mm)	Height† inches (mm)	Width* inches (mm)
2.21 (56)	4.67 (119)	5.75 (146)

- * Includes Mounting Bracket
- † Includes Strain Relief

G2 SERIES INDUSTRIAL GRADE METERS

The unique modular approach of the Industrial Grade Meter line allows you to design a meter to match your specific application. Turbine choice depends on flowrate, line size, pressure rating, fitting type, chemical compatibility and temperature range. When choosing a G2 Series Meter, select from our wide variety of materials and sizes. These meters offer high accuracy at a lower cost, are compact and include a self-contained design. G2 Series Meters are field serviceable.



1) Select Your Turbine Material and Size

Turbine choice depends on flowrate, line size, pressure rating, fitting type, chemical compatibility and temperature range.



Stainless Steel



Aluminum
"Look for the blue label!"
(Shown with 09 Computer)



Brass
"Look for the blue label!"
(Shown with 09 Computer)



PVDF



2) Need A Computer?



"Look for the blue label!"
09 Computer



XX No Computer

Or Choose an Electronics
(For further details and selections see the Electronics Section, pg 104-107.)



3) Add a Module?

For further details and selections see page 108-111.



Standard Remote Kit



FM Approved Remote Kit



Conditioned Signal Output Module



FM Approved Sensor Kit



4-20 mA Module



Pulse Access Module



External Power Module
(Pulse Access Module Required)



4) Do You Require Any Accessories?

For further details and selections see pages 112-113.



Conduit Adapter Kit



90° Display Adapter Kit



510 Conversion Kit



Pulse Access Dust Cover



GPI Electronics Programmer

Product Identifier

G2 = Industrial Grade Meter

Turbine Material & Size

Metal Meters:

- S05** = Stainless Steel – 1/2 in.
- S07** = Stainless Steel – 3/4 in.
- S10** = Stainless Steel – 1 in.
- S15** = Stainless Steel – 1-1/2 in.
- S20** = Stainless Steel – 2 in.
- H05** = Stainless Steel High Pressure – 1/2 in.
- H07** = Stainless Steel High Pressure – 3/4 in.
- H10** = Stainless Steel High Pressure – 1 in.
- H15** = Stainless Steel High Pressure – 1-1/2 in.
- H20** = Stainless Steel High Pressure – 2 in.

- A05** = Aluminum – 1/2 in.
- A07** = Aluminum – 3/4 in.
- A10** = Aluminum – 1 in.
- A15** = Aluminum – 1-1/2 in.
- A20** = Aluminum – 2 in.
- B05** = Brass – 1/2 in.
- B07** = Brass – 3/4 in.
- B10** = Brass – 1 in.
- B15** = Brass – 1-1/2 in.
- B20** = Brass – 2 in.

Plastic Meters:

- P05** = PVDF – 1/2 in.
- P10** = PVDF – 1 in.

Meter Dimensions listed on page 114.

Fitting Type

- F** = 150# ANSI Flange - available on S10, S15 and S20 only
- I** = ISO (Female)
- N** = NPT (Female)
- T** = Tri-Clover® Fitting - available on S05 - S20 only
- X** = Electronics Only - for metal meters
- Z** = Electronics Only - for plastic meters

Electronic Choice

Turbine with Local Display

- 09** = 2 Button Computer, Field Configurable (2 Totals and Rate of Flow)
- 19** = Vertical Mount 2-Button Computer, Field Configurable (2 Totals and Rate of Flow)

Pulse Output (Remote)

- 41** = Remote Pulse Out Transmitter & Sine Wave Pickup (Standard Remote Sensor Option)
- 43** = Remote Pulse Out Transmitter & Turbine Mounted Computer (Pulse Out Sensor Option)

GG500 – Display with Pulse Output (Remote)

- 51** = Sine Wave Pickup (Standard Remote Sensor Option)
- 52** = Open Collector Pickup (Conditioned Signal Sensor Option)
- 53** = Turbine Mounted Computer (Pulse Access Sensor Option)

GX500 – Display with 4-20 mA Output (Remote)

- 61** = Sine Wave Pickup (Standard Remote Sensor Option)
- 62** = Open Collector Pickup (Conditioned Signal Sensor Option)
- 63** = Turbine Mounted Computer (Pulse Access Sensor Option)

GA500 – 4-20 mA Output (Remote)

- 71** = Sine Wave Pickup (Standard Remote Sensor Option)
- 72** = Open Collector Pickup (Conditioned Signal Sensor Option)
- 73** = Turbine Mounted Computer (Pulse Access Sensor Option)

No Electronics – Turbine Only

- XX** = No Electronics – Turbine Only

Calibration

- GM** = Gallons / Minute
- LM** = Litres / Minute
- XX** = No Computer

Packaging

- A** = Use for Turbine Only or Turbine w/Display (Sizes 05-10)
- B** = Use for Turbine Only or Turbine w/Display (Sizes 15-20)
- C** = Use for Turbine with Remote Transmitter With or Without Turbine Mounted Display (Sizes 05-20)
- D** = Use for 150# ANSI Flange Turbine Only (Size 10)
- E** = Use for 150# ANSI Flange Turbine Only (Sizes 15-20)
Use for 150# ANSI Flange Turbine with Remote Transmitter (Sizes 10, 15 or 20)

G2 + **S07** + **N** + **09** + **GM** + **A** ← (Sample Model Number)



"Look for the blue label!"

The GPI Stainless Steel Meter line has a proven track record in the industrial market. GPI Stainless Steel Meters are rugged and dependable. Use stainless steel meters for most chemicals: Ammonium, Plating Solutions and Fuel products.

For complete part number, see "Number Reference" chart on page 96.

Select Your Meter Size:

1/2 inch 3/4 inch 1 inch 1-1/2 inch 2 inch



Features and Benefits:

- ✓ Meter is designed for thin fluids < 100 cp.
- ✓ Modular design allows for use with Output Modules, Sensors and Remote Transmitters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ High accuracy meter.
- ✓ Internal parts are simple to replace for easy maintenance.
- ✓ Lithium battery life: 5 years.
- ✓ Accessories easily upgrade meter.

STAINLESS STEEL – SPECIFICATIONS

Fitting Type:	NPT or ISO (Female)		
Housing Material:	316 Stainless Steel		
Meter Sizes Available:	1/2" 3/4" 1" 1-1/2" 2"		
Flow Range:	1/2" (S05)	1 - 10 GPM (3.8 - 37.9 LPM)	
	3/4" (S07)	2 - 20 GPM (7.6 - 75.7 LPM)	
	1" (S10)	5 - 50 GPM (18.9 - 190 LPM)	
	1-1/2" (S15)	10 - 100 GPM (38.0 - 380 LPM)	
	2" (S20)	20 - 200 GPM (76 - 760 LPM)	
Accuracy (% of Reading):	Turbine Only	Turbine w/Computer	
	1/2" (S05)	± 2.0%	± 1.5%
	3/4" (S07)	± 1.5%	± 1.0%
	1" (S10)	± 1.5%	± 1.0%
	1-1/2" (S15)	± 1.0%	± 0.75%
	2" (S20)	± 1.0%	± 0.75%
Repeatability:	± 0.1%		
Pressure Rating:	1,500 PSI / 102 BAR		
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)		
with Computer:	0° F to +140° F (-18° C to +60° C)		
Typical K-Factor:	1/2" (S05)	2,500	
	3/4" (S07)	1,100	
	1" (S10)	565	
	1-1/2" (S15)	215	
	2" (S20)	100	
Wetted Materials:	Housing:	316 Stainless Steel	
	Bearings:	Ceramic	
	Shaft:	Tungsten Carbide	
	Rotor:	PVDF	
	Rings:	316 Stainless Steel	
Frequency Range:	1/2" (S05)	42 - 420 Hz @ 1 - 10 GPM	
	3/4" (S07)	37 - 370 Hz @ 2 - 20 GPM	
	1" (S10)	47 - 470 Hz @ 5 - 50 GPM	
	1-1/2" (S15)	36 - 360 Hz @ 10 - 100 GPM	
	2" (S20)	33 - 330 Hz @ 20 - 200 GPM	
Recommended Strainer Size:	1/2", 3/4" and 1" 55 mesh		
	1-1/2" and 2" 28 mesh		
Maximum Flow:	1/2" (S05)	15 GPM (56.8 LPM)	
	3/4" (S07)	30 GPM (113.6 LPM)	
	1" (S10)	75 GPM (284 LPM)	
	1-1/2" (S15)	150 GPM (568 LPM)	
	2" (S20)	300 GPM (1,136 LPM)	
Wrench Flat Size:	1/2" (S05)	1-1/16 inch (27 mm)	
	3/4" (S07)	1-5/16 inch (33 mm)	
	1" (S10)	1-5/8 inch (41 mm)	
	1-1/2" (S15)	2-3/8 inch (60 mm)	
	2" (S20)	3 inch (75 mm)	
Shipping Weight:	1/2" (S05)	2.3 lbs./1.0 kg - Turbine Only: 2.1 lbs./.95 kg	
	3/4" (S07)	2.5 lbs./1.1 kg - Turbine Only: 2.3 lbs./1.0 kg	
	1" (S10)	3.0 lbs./1.3 kg - Turbine Only: 2.8 lbs./1.2 kg	
	1-1/2" (S15)	4.6 lbs./2.1 kg - Turbine Only: 4.4 lbs./2.0 kg	
	2" (S20)	6.8 lbs./3.0 kg - Turbine Only: 6.6 lbs./3.0 kg	
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.		

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options: See Electronics Section.

APPROVALS



HIGH PRESSURE – SPECIFICATIONS

Fitting Type:	NPT or ISO (Female)		
Housing Material:	316 Stainless Steel		
Meter Sizes Available:	1/2" 3/4" 1" 1-1/2" 2"		
Flow Range:	1/2" (H05)	1 - 10 GPM (3.8 - 37.9 LPM)	
	3/4" (H07)	2 - 20 GPM (7.6 - 75.7 LPM)	
	1" (H10)	5 - 50 GPM (18.9 - 190 LPM)	
	1-1/2" (H15)	10 - 100 GPM (38.0 - 380 LPM)	
	2" (H20)	20 - 200 GPM (76 - 760 LPM)	
Accuracy (% of Reading):	Turbine Only	Turbine w/Computer	
	1/2" (H05)	± 2.0%	± 1.5%
	3/4" (H07)	± 1.5%	± 1.0%
	1" (H10)	± 1.5%	± 1.0%
	1-1/2" (H15)	± 1.0%	± 0.75%
	2" (H20)	± 1.0%	± 0.75%
Repeatability:	± 0.1%		
Pressure Rating:	3,000 PSI / 207 BAR		
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)		
with Computer:	0° F to +140° F (-18° C to +60° C)		
Typical K-Factor:	1/2" (H05)	2,500	
	3/4" (H07)	1,100	
	1" (H10)	565	
	1-1/2" (H15)	215	
	2" (H20)	100	
Wetted Materials:	Housing:	316 Stainless Steel	
	Bearings:	Ceramic	
	Shaft:	Tungsten Carbide	
	Rotor:	PVDF	
	Rings:	316 Stainless Steel	
Frequency Range:	1/2" (H05)	42 - 420 Hz @ 1 - 10 GPM	
	3/4" (H07)	37 - 370 Hz @ 2 - 20 GPM	
	1" (H10)	47 - 470 Hz @ 5 - 50 GPM	
	1-1/2" (H15)	36 - 360 Hz @ 10 - 100 GPM	
	2" (H20)	33 - 330 Hz @ 20 - 200 GPM	
Recommended Strainer Size:			
	1/2", 3/4" and 1"	55 mesh	
	1-1/2" and 2"	28 mesh	
Maximum Flow:	1/2" (H05)	15 GPM (56.8 LPM)	
	3/4" (H07)	30 GPM (113.6 LPM)	
	1" (H10)	75 GPM (284 LPM)	
	1-1/2" (H15)	150 GPM (568 LPM)	
	2" (H20)	300 GPM (1,136 LPM)	
Wrench Flat Size:	1/2" (H05)	1-1/16 inch (27 mm)	
	3/4" (H07)	1-5/16 inch (33 mm)	
	1" (H10)	1-5/8 inch (41 mm)	
	1-1/2" (H15)	2-3/8 inch (60 mm)	
	2" (H20)	3 inch (75 mm)	
Shipping Weight:	1/2" (H05)	2.3 lbs./1.0 kg - Turbine Only: 2.1 lbs./0.95 kg	
	3/4" (H07)	2.4 lbs./1.1 kg - Turbine Only: 2.2 lbs./1.0 kg	
	1" (H10)	3.0 lbs./1.3 kg - Turbine Only: 2.8 lbs./1.2 kg	
	1-1/2" (H15)	4.6 lbs./2.1 kg - Turbine Only: 4.4 lbs./2.0 kg	
	2" (H20)	6.8 lbs./3.0 kg - Turbine Only: 6.6 lbs./3.0 kg	
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.		

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options:	See Electronics Section.
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APPROVALS



"Look for the blue label!"

This is the turbine meter of choice for high pressure applications like spray washers and hydraulic systems. PSIG for the GPI High Pressure Meter is 3,000 compared to 1,500 for the standard stainless steel meter. This proven meter can perform in all kinds of high pressure applications.

For complete part number, see "Number Reference" chart on page 96.

Select Your Meter Size:

1/2 inch 3/4 inch 1 inch 1-1/2 inch 2 inch



Features and Benefits:

- ✓ Meter is designed for thin fluids < 100 cp.
- ✓ Excellent chemical compatibility.
- ✓ Modular design allows for use with Output Modules, Sensors and Remote Transmitters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Internal parts are simple to replace for easy maintenance.
- ✓ Lithium battery life: 5 years.



"Look for the blue label!"

Select stainless steel meters with 150# ANSI Flanges when you need a meter that installs in-line quickly. Flange Meters are easily installed and removed with four bolts. Combine with GPI's Computer Electronics for a complete, accurate, metering system.

For complete part number, see "Number Reference" chart on page 96.

Select Your Meter Size:

1 inch 1-1/2 inch 2 inch



Features and Benefits:

- ✓ Stainless steel meters have excellent chemical compatibility.
- ✓ Modular design allows for use with Output Modules, Sensors and Remote Transmitters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Precision accuracy meter.
- ✓ Internal parts are simple to replace for easy maintenance.
- ✓ Lithium battery life: 5 years.
- ✓ Accessories easily upgrade meter.

ANSI FLANGE – SPECIFICATIONS

Fitting Type:	150# ANSI Flange	
Housing Material:	316 Stainless Steel	
Meter Sizes Available:	1" 1-1/2" 2"	
Flow Range:	1" (S10F)	5 - 50 GPM (18.9 - 190 LPM)
	1-1/2" (S15F)	10 - 100 GPM (38.0 - 380 LPM)
	2" (S20F)	20 - 200 GPM (76 - 760 LPM)
Accuracy (% of Reading):	Turbine Only	Turbine w/Computer
	1" (S10F)	± 1.5%
	1-1/2" (S15F)	± 1.0%
	2" (S20F)	± 1.0%
Repeatability:	± 0.1%	
Pressure Rating:	Flange Rule	
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)	
with Computer:	0° F to +140° F (-18° C to +60° C)	
Typical K-Factor:	1" (S10F)	565
	1-1/2" (S15F)	215
	2" (S20F)	100
Wetted Materials:	Housing:	316 Stainless Steel
	Bearings:	Ceramic
	Shaft:	Tungsten Carbide
	Rotor:	PVDF
	Rings:	316 Stainless Steel
Frequency Range:	1" (S10F)	47 - 470 Hz @ 5 - 50 GPM
	1-1/2" (S15F)	36 - 360 Hz @ 10 - 100 GPM
	2" (S20F)	33 - 330 Hz @ 20 - 200 GPM
Recommended Strainer Size:		
	1" (S10F)	55 mesh
	1-1/2" (S15F)	28 mesh
	2" (S20F)	28 mesh
Maximum Flow:	1" (S10F)	75 GPM (284 LPM)
	1-1/2" (S15F)	150 GPM (568 LPM)
	2" (S20F)	300 GPM (1,136 LPM)
Shipping Weight:	1" (S10F)	7.2 lbs./3.3 kg - Turbine Only: 7.0 lbs./3.2 kg
	1-1/2" (S15F)	11.3 lbs./5.1 kg - Turbine Only: 11.1 lbs./5.0 kg
	2" (S20F)	18.6 lbs./8.4 kg - Turbine Only: 18.4 lbs./8.3 kg
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.	

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options:	See Electronics Section.
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APPROVALS



TRI-CLOVER® – SPECIFICATIONS

Fitting Type:	Tri-Clover®	
Housing Material:	316 Stainless Steel	
Meter Sizes Available:	1/2" 3/4" 1" 1-1/2" 2"	
Tri-Clover® Fittings Available:	3/4" 1" 1-1/2" 2" 2-1/2"	
Flow Range:	1/2" (S05T)	1 - 10 GPM (3.8 - 37.9 LPM)
	3/4" (S07T)	2 - 20 GPM (7.6 - 75.7 LPM)
	1" (S10T)	5 - 50 GPM (18.9 - 190 LPM)
	1-1/2" (S15T)	10 - 100 GPM (38.0 - 380 LPM)
	2" (S20T)	20 - 200 GPM (76 - 760 LPM)
Accuracy (% of Reading):	Turbine Only	Turbine w/Computer
	1/2" (S05T)	± 2.0%
	3/4" (S07T)	± 1.5%
	1" (S10T)	± 1.0%
	1-1/2" (S15T)	± 1.0%
	2" (S20T)	± 0.75%
Repeatability:	± 0.1%	
Pressure Rating:	Limited by fitting size, clamp size & temp.	
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)	
with Computer:	0° F to +140° F (-18° C to +60° C)	
Typical K-Factor:	1/2" (S05T)	2,500
	3/4" (S07T)	1,100
	1" (S10T)	565
	1-1/2" (S15T)	215
	2" (S20T)	100
Wetted Materials:	Housing:	316 Stainless Steel
	Bearings:	Ceramic
	Shaft:	Tungsten Carbide
	Rotor:	PVDF
	Rings:	316 Stainless Steel
Frequency Range:	1/2" (S05T)	42 - 420 Hz @ 1 - 10 GPM
	3/4" (S07)	37 - 370 Hz @ 2 - 20 GPM
	1" (S10T)	47 - 470 Hz @ 5 - 50 GPM
	1-1/2" (S15T)	36 - 360 Hz @ 10 - 100 GPM
	2" (S20T)	33 - 330 Hz @ 20 - 200 GPM
Recommended Strainer Size:		
	1/2" (S05T)	55 mesh
	3/4" (S07T)	55 mesh
	1" (S10T)	55 mesh
	1-1/2" (S15T)	28 mesh
	2" (S20T)	28 mesh
Maximum Flow:	1/2" (S05T)	15 GPM (56.8 LPM)
	3/4" (S07T)	30 GPM (113.6 LPM)
	1" (S10T)	75 GPM (284 LPM)
	1-1/2" (S15T)	150 GPM (568 LPM)
	2" (S20T)	300 GPM (1,136 LPM)
Shipping Weight:	1/2" (S05T)	2.5 lbs./1.0 kg - Turbine Only: 2.3 lbs./1.0 kg
	3/4" (S07T)	2.9 lbs./1.3 kg - Turbine Only: 2.7 lbs./1.2 kg
	1" (S10T)	3.2 lbs./1.4 kg - Turbine Only: 3.0 lbs./1.3 kg
	1-1/2" (S15T)	4.7 lbs./2.1 kg - Turbine Only: 4.5 lbs./2.0 kg
	2" (S20T)	6.5 lbs./2.9 kg - Turbine Only: 6.3 lbs./2.8 kg
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.	

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options: See Electronics Section.

APPROVALS



ATEX

IP44



"Look for the blue label!"

The GPI Stainless Steel Meters with Tri-Clover® fittings can be used with food and beverage industries in preprocess applications. Built of stainless steel construction, these meters come in five sizes to fit most every application.

For complete part number, see "Number Reference" chart on page 96.

Select Your Meter Size:

- 1/2 inch Meter with 3/4 inch Fitting
- 3/4 inch Meter with 1 inch Fitting
- 1 inch Meter with 1-1/2 inch Fitting
- 1-1/2 inch Meter with 2 inch Fitting
- 2 inch Meter with 2-1/2 inch Fitting



Features and Benefits:

- ✓ Stainless steel meter with Tri-Clover® fittings.
- ✓ Modular design allows for use with Output Modules, Sensors and Remote Transmitters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Internal parts are easy to replace.
- ✓ Lithium battery life: 5 years.
- ✓ Accessories easily upgrade meter.



"Look for the blue label!"

GPI offers a full line of Industrial Meters in a variety of housing materials. Aluminum meters are best suited for petroleum based products. The modular design allows for maximum flexibility in meeting custom applications. Models are available with ISO or NPT fittings.

For complete part number, see "Number Reference" chart on page 96.

Select Your Meter Size:

1/2 inch 3/4 inch 1 inch 1-1/2 inch 2 inch



Features and Benefits:

- ✓ Meter is designed for thin fluids < 100 cp.
- ✓ Modular design allows for use with Output Modules, Sensors and Remote Transmitters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Internal parts are simple to replace for easy maintenance.
- ✓ Lightweight, compact design allows for easy installation.
- ✓ Lithium battery life: 5 years.

ALUMINUM – SPECIFICATIONS

Fitting Type:	NPT or ISO (Female)	
Housing Material:	Aluminum	
Meter Sizes Available:	1/2" 3/4" 1" 1-1/2" 2"	
Flow Range:	1/2" (A05)	1 - 10 GPM (3.8 - 37.9 LPM)
	3/4" (A07)	2 - 20 GPM (7.6 - 75.7 LPM)
	1" (A10)	5 - 50 GPM (18.9 - 190 LPM)
	1-1/2" (A15)	10 - 100 GPM (38.0 - 380 LPM)
	2" (A20)	20 - 200 GPM (76 - 760 LPM)
Accuracy (% of Reading):	Turbine Only	Turbine w/Computer
	1/2" (A05)	± 2.0%
	3/4" (A07)	± 1.5%
	1" (A10)	± 1.5%
	1-1/2" (A15)	± 1.0%
	2" (A20)	± 1.0%
Repeatability:	± 0.1%	
Pressure Rating:	300 PSI / 21 BAR	
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)	
with Computer:	0° F to +140° F (-18° C to +60° C)	
Typical K-Factor:	1/2" (A05)	2,500
	3/4" (A07)	1,100
	1" (A10)	565
	1-1/2" (A15)	215
	2" (A20)	100
Wetted Materials:	Housing:	Aluminum
	Bearings:	Ceramic
	Shaft:	Tungsten Carbide
	Rotor:	PVDF
	Rings:	316 Stainless Steel
Frequency Range:	1/2" (A05)	42 - 420 Hz @ 1 - 10 GPM
	3/4" (A07)	37 - 370 Hz @ 2 - 20 GPM
	1" (A10)	47 - 470 Hz @ 5 - 50 GPM
	1-1/2" (A15)	36 - 360 Hz @ 10 - 100 GPM
	2" (A20)	33 - 330 Hz @ 20 - 200 GPM
Recommended Strainer Size:	1/2", 3/4" and 1"	55 mesh
	1-1/2" and 2"	28 mesh
Maximum Flow:	1/2" (A05)	15 GPM (56.8 LPM)
	3/4" (A07)	30 GPM (113.6 LPM)
	1" (A10)	75 GPM (284 LPM)
	1-1/2" (A15)	150 GPM (568 LPM)
	2" (A20)	300 GPM (1,136 LPM)
Wrench Flat Size:	1/2" (A05)	1-1/16 inch (27 mm)
	3/4" (A07)	1-5/16 inch (33 mm)
	1" (A10)	1-5/8 inch (41 mm)
	1-1/2" (A15)	2-3/8 inch (60 mm)
	2" (A20)	3 inch (75 mm)
Shipping Weight:	1/2" (A05)	1.3 lbs./59 kg - Turbine Only: 1.1 lbs./50 kg
	3/4" (A07)	1.4 lbs./63 kg - Turbine Only: 1.2 lbs./50 kg
	1" (A10)	1.6 lbs./73 kg - Turbine Only: 1.4 lbs./63 kg
	1-1/2" (A15)	2.8 lbs./1.3 kg - Turbine Only: 2.6 lbs./1.2 kg
	2" (A20)	3.9 lbs./1.7 kg - Turbine Only: 3.7 lbs./1.7 kg
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.	

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options: See Electronics Section.

APPROVALS



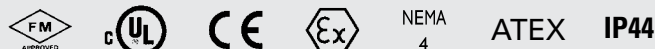
BRASS – SPECIFICATIONS

Fitting Type:	NPT or ISO (Female)				
Housing Material:	Brass				
Meter Sizes Available:	1/2"	3/4"	1"	1-1/2"	2"
Flow Range:	1/2" (B05)	1 - 10 GPM (3.8 - 37.9 LPM)			
	3/4" (B07)	2 - 20 GPM (7.6 - 75.7 LPM)			
	1" (B10)	5 - 50 GPM (18.9 - 190 LPM)			
	1-1/2" (B15)	10 - 100 GPM (38.0 - 380 LPM)			
	2" (B20)	20 - 200 GPM (76 - 760 LPM)			
Accuracy (% of Reading):		Turbine Only	Turbine w/Computer		
	1/2" (B05)	± 2.0%	± 1.5%		
	3/4" (B07)	± 1.5%	± 1.0%		
	1" (B10)	± 1.5%	± 1.0%		
	1-1/2" (B15)	± 1.0%	± 0.75%		
	2" (B20)	± 1.0%	± 0.75%		
Repeatability:	± 0.1%				
Pressure Rating:	300 PSI / 21 BAR				
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)				
with Computer:	0° F to +140° F (-18° C to +60° C)				
Typical K-Factor:	1/2" (B05)	2,500			
	3/4" (B07)	1,100			
	1" (B10)	565			
	1-1/2" (B15)	215			
	2" (B20)	100			
Wetted Materials:	Housing:	Brass			
	Bearings:	Ceramic			
	Shaft:	Tungsten Carbide			
	Rotor:	PVDF			
	Rings:	316 Stainless Steel			
Frequency Range:	1/2" (B05)	42 - 420 Hz @ 1 - 10 GPM			
	3/4" (B07)	37 - 370 Hz @ 2 - 20 GPM			
	1" (B10)	47 - 470 Hz @ 5 - 50 GPM			
	1-1/2" (B15)	36 - 360 Hz @ 10 - 100 GPM			
	2" (B20)	33 - 330 Hz @ 20 - 200 GPM			
Recommended Strainer Size:	1/2" (B05)	55 mesh			
	3/4" (B07)	55 mesh			
	1" (B10)	55 mesh			
	1-1/2" (B15)	28 mesh			
	2" (B20)	28 mesh			
Maximum Flow:	1/2" (B05)	15 GPM (56.8 LPM)			
	3/4" (B07)	30 GPM (113.6 LPM)			
	1" (B10)	75 GPM (284 LPM)			
	1-1/2" (B15)	150 GPM (568 LPM)			
	2" (B20)	300 GPM (1,136 LPM)			
Wrench Flat Size:	1/2" (B05)	1-1/16 inch (27 mm)			
	3/4" (B07)	1-5/16 inch (33 mm)			
	1" (B10)	1-5/8 inch (41 mm)			
	1-1/2" (B15)	2-3/8 inch (60 mm)			
	2" (B20)	3 inch (75 mm)			
Shipping Weight:	1/2" (B05)	2.4 lbs./1.0 kg - Turbine Only: 2.2 lbs./1.0 kg			
	3/4" (B07)	2.6 lbs./1.1 kg - Turbine Only: 2.4 lbs./1.0 kg			
	1" (B10)	3.1 lbs./1.4 kg - Turbine Only: 2.9 lbs./1.3 kg			
	1-1/2" (B15)	3.1 lbs./1.4 kg - Turbine Only: 2.9 lbs./1.3 kg			
	2" (B20)	10.0 lbs./4.5 kg - Turbine Only: 9.8 lbs./4.4 kg			
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.				

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options:	See Electronics Section.
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APPROVALS



"Look for the blue label!"

The G2 Industrial Brass Meter allows another choice for fluid compatibility. The GPI Brass Meter works well with most water applications. Use with glucose, lacquer thinners and vegetable juices for example.

For complete part number, see "Number Reference" chart on page 96.

Select Your Meter Size:

1/2 inch 3/4 inch 1 inch 1-1/2 inch 2 inch



Features and Benefits:

- ✓ Meter is designed for thin fluids < 100 cp.
- ✓ Modular design allows for use with Output Modules, Sensors and Remote Transmitters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Internal parts are simple to replace for easy maintenance.
- ✓ Lithium battery life: 5 years.



"Look for the blue label!"

Looking for a turbine meter that can handle aggressive chemicals? Look at the PVDF Meter for a housing material that resists abrasion and has great chemical compatibility.

Use PVDF Meters with harsh chemicals: Bleach, Ferric Chloride, Phenol, Sulfuric Acid or Phosphoric Acid.

For complete part number, see "Number Reference" chart on page 96

Select Your Meter Size:

1/2 inch

1 inch



Features and Benefits:

- ✓ Meter is designed for thin fluids < 100 cp.
- ✓ Lithium battery life: 5 years.
- ✓ Available with Local Display or Remote Transmitter.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Accessories easily upgrade meter.
- ✓ One field replaceable internal part making maintenance easy.

PVDF – SPECIFICATIONS

Fitting Type:	NPT or ISO (Female)	
Housing Material:	PVDF	
Meter Sizes Available:	1/2" and 1"	
Flow Range:	1/2" (P05)	1.2 - 12 GPM (4.54 - 45.42 LPM)
	1" (P10)	5 - 50 GPM (18.9 - 190 LPM)
Accuracy (% of Reading):	Turbine Only	Turbine w/Computer
	1/2" (P05)	± 2.0%
	1" (P10)	± 1.5%
Repeatability:	± 0.3%	
Pressure Rating:	150 PSI / 10.2 BAR	
Operating Temperature Range:	-20° F to +180° F (-28° C to +82° C)	
with Computer:	0° F to +140° F (-18° C to +60° C)	
Maximum Storage Temperature:	-40° F to +250° F (-40° C to +121° C)	
Typical K-Factor:	1/2" (P05)	2,400
	1" (P10)	540
Wetted Materials:	Housing:	PVDF (15% Carbon Fiber Filled)
	Bearings:	Ceramic - 98% Alumina
	Shaft:	Ceramic - 98% Alumina
	Rotor:	PVDF
	Rings:	Fluorocarbon
Optional O-Ring:	PTFE	
Frequency Range:	1/2" (P05)	48 - 480 Hz @ 1.2 - 12 GPM
	1" (P10)	45 - 450 Hz @ 5 - 50 GPM
Recommended Strainer Size:		
	1/2" (P05)	55 mesh
	1" (P10)	28 mesh
Maximum Flow:	1/2" (P05)	15 GPM (56.8 LPM)
	1" (P10)	75 GPM (284 LPM)
Shipping Weight:	1/2" (P05)	1.3 lbs./0.6 kg - Turbine Only: 1.1 lbs./ .54 kg
	1" (P10)	1.9 lbs./0.8 kg - Turbine Only: 1.7 lbs./ .77 kg
Calibration Report	Comes standard with G2 Series meters. N.I.S.T. – Certification available.	

ELECTRONIC CHOICES

Local Display, Remote Display & Remote Transmitter Options:	See Electronics Section.
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APPROVALS



09 COMPUTER – SPECIFICATIONS

Std. Factory Configuration:	2 Totals (1 Resettable, 1 Cumulative); Factory Calibration in gallons and litres; User Calibration and Rate of Flow Indication.
Computer Electronics:	09 Computer fits all A1, TM & G2 meter sizes and construction. Std. Display fits GM Series Meters.
Totalizing Registers:	0 to 3 available
K-Factor Limits:	Min: .01 pulses/unit Max: 999,999 pulses/unit
Field Calibration:	Field calibrate by user. Standard Method: Correction Factor. Six adjustable digits. Can be reconfigured to K-factor entry.
Readout Totals:	LCD with floating decimal Minimum Display = 0.01 units Maximum Display = 999,999 units (6 digits)
Input Pulse Rate:	Minimum (Pulse-in Input) = DC (0 Hz) Minimum (Coil Input) = Approximately 10 Hz Maximum = Approximately 1,000 Hz
Turbine Display:	
Internal Power Supply:	2 Lithium batteries at 3 volts each
Lithium Battery Life:	5 Years
Optional Power Supply:	7 to 30 VDC
Oval Gear Display:	
Internal Power Supply:	9-volt battery
Optional Power Supply:	10 to 18 VDC
Operating Temperature:	0° F to +140° F (-18° C to +60° C)
Storage Temperature:	-40° F to +158° F (-40° C to +70° C)

APPROVALS



ATEX

Using a password-protected configuration process you can enable additional features. GPI Customer Service can provide the password and instructions to unlock and reset configuration settings. This information is also available on the GPI website. **User Configuration** features include:

- Totalizers/Modes Enabled (Cumulative Total, Batch 2 Total, Flowrate Mode)
- Flowrate Timebase (Units per Minutes, Hours and Days)
- Factory Calibration Curve Units Enabled (Gallons, Imperial Gallons, Litres, Quarts, Ounces, Cubic Feet, Cubic Centimeters, Cubic Meters or Barrels (42 gal.))
- Dispense/Display or K-Factor Entry Calibration

Local Display for Turbine Meter



"Look for the blue label!"

Choose the local display for G2 and GM Series Meters. Commonly used features are preprogrammed in the Computer Display. End-users can enable additional features by using a password available from the factory or on the GPI website. The 09 configuration provides a high degree of customization, matching customers' exact needs.

Features and Benefits:

- ✓ 2 Totals (Batch - Resettable, Cumulative - Not Resettable).
- ✓ Flowrate display updates every 5 seconds, readout is in units/minute.
- ✓ Factory Calibration in gallons and litres is standard. Can be field calibrated to adjust to various fluid thickness.
- ✓ Correction calibration lets end user calibrate by \pm percent off.
- ✓ Small, compact and totally self contained with an internal power supply.
- ✓ Non-volatile totals means amounts are retained when batteries are replaced or power is lost.
- ✓ Lithium battery life: 5 years.

Display With Pulse Output

GG500
Remote Mount



GG510
Local Mount

The GG500 is a remote mount Pulse-Out Transmitter with battery powered display. Choose the GG510 when a local mount is needed.

GG500/GG510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Open Collector (NPN)
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	9-volt battery or externally powered
Voltage Supply (Min.):	7 VDC
Voltage Supply (Max.):	30 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+14° F to +140° F (-10° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0 - 1000 Hz
High Level Low Freq.:	0 - 150 Hz
High Level High Freq.:	0 - 1000 Hz
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.0 lbs. (.45 kg)
Calibratable:	K-factor Entry

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Industry Standard Output: Unscaled Pulse.
- ✓ Easily mounted on pipe or wall.

GX500/GX510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.1 lbs. (.5 kg)
Calibratable:	K-factor Entry

Display With 4-20 mA Output



GX500
Remote Mount



GX510
Local Mount

The GX500 is a remote mount 4-20 mA Output Transmitter with display. Choose the GX510 when a local mount is needed.

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

4-20 mA Output

GA500
Remote MountGA510
Local Mount

The GA500 is a remote mount 4-20 mA Output Transmitter without display. Choose the GA510 when a local mount is needed.

GA500/GA510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	Remote: Belden 9363 (500 Series only) Local: No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	Remote: 2.0 lbs. (.90 kg) Local: 1.1 lbs. (.5 kg)

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

Features and Benefits:

- ✓ Maintains FM Approval.
- ✓ Accommodates fluid temperatures from -40° F to +250° F (-40° C to +121° C) depending on meter.
- ✓ This kit can upgrade an existing GPI meter or can be purchased with a new meter.
- ✓ Battery powered from meter; no additional power required.

SPECIFICATIONS

Magnetic Pickup:	1.3 k Ohm, 90 mH
Signal Type:	Sine Wave
Voltage:	Peak to Peak 10 mV to 500 mV
Frequency:	11 to 750 Hz
Cable:	10 ft. (3 m), 2-conductor shielded, Belden #9501

APPROVALS



FM Approved Remote Kit Assembly (Part No. 113275-1)



FM Approved Remote Kit Assembly Installed



The Factory Mutual (FM) Approved Remote Kit Assembly modifies GPI Electronic Digital Meters for applications in specialized situations including remote indication and high or low fluid temperature metering applications. This kit provides the versatility of panel mounting of the LCD readout up to 100 ft. from the turbine.

This kit consists of a sensor module, a dust cover assembly and 10 ft. of cable. Requires a complete meter with display.

Features and Benefits:

- ✓ Accommodates fluid temperatures from -40° F to +250° F (-40° C to +121° C) depending on meter.
- ✓ This kit can upgrade an existing GPI meter or can be purchased with a new meter.
- ✓ Battery powered from meter; no additional power required.

SPECIFICATIONS

Magnetic Pickup:	1.5 k Ohm, 700 mH
Signal Type:	Sine Wave
Voltage:	Peak to Peak 33 mV to 825 mV
Frequency:	11 to 750 Hz
Cable:	10 ft. (3 m), 2-conductor shielded, Belden #1266A or #8451

Standard Remote Kit Assembly (Part No. 113265-1)



Standard Remote Kit Assembly Installed



The Standard Remote Kit Assembly modifies GPI Electronic Digital Meters for applications in specialized situations including remote indication and high or low fluid temperature metering applications. This kit also provides the versatility of panel mounting of the LCD readout up to 300 ft. from the turbine housing and sensor.

This kit consists of a sensor module, a dust cover assembly and 10 ft. of cable. Requires a complete meter with display.

Conditioned Signal Output Module

(Part No. 113435-1)



This module provides an unscaled, amplified, digital signal capable of transmission up to 5,000 ft. There is no need for additional signal conditioning or amplification devices to achieve the desired digital signal. Use on G2 "Turbine Only" model.

The module is factory assembled for Open Collector signal output and operates from an external 9 to 35 volt power source. By changing terminal connections and adding a battery kit, the module provides a self-powered 6-volt Square Wave signal.

Features and Benefits:

- ✓ Provides two digital signals: Open Collector or 6-volt Square Wave and can communicate with most process control devices.
- ✓ Operating temperature range of -40° F to +212° F (-40° C to +100° C).
- ✓ Can be externally powered or battery powered.

SPECIFICATIONS

Connector:	Hubble PG7
Signal Type:	Open Collector (NPN)
Power:	External 9 to 35 VDC, approximately 1 mA
Connection:	Three wire
Frequency:	0 to 750 Hz
Cable:	10 ft. (3 m) Belden #9363

APPROVALS



FM Approved Sensor Kit

(Part No. 120077-01)



The Factory Mutual (FM) Approved Sensor is designed for use with any G2 Turbine Meter when rotor pulse data is required and the meter is located within a hazardous location. The output signal is compatible with existing GPI remote electronics. Use on G2 "Turbine Only" model.

This kit includes pickup, screws, coverplate and jam nut. Connection Kit sold separately.

Features and Benefits:

- ✓ Mounts to any G2 meter housing via the coverplate.
- ✓ Ideal for indoor or outdoor applications.
- ✓ Factory Mutual (Intrinsic Safe) Class 1, Div. 1, Groups ABCDEFG.

SPECIFICATIONS

Signal Type:	Open Collector (NPN)
Power Source:	8 to 30 VDC
Supply Current:	≤ 15 mA
Frequency:	5 to 10k Hz
Cable:	None provided - 3 conductor required for use
Temperature:	Sensor is capable of operating in the range of -40° F to +248° F (-40° C to +120° C). For Class I, II, III, Division 1: Group ABCDEFG and CSA: Class 1, Div. 1 Group ABCD, the following temperature codes apply: T6 +185° F (+85° C) at +149° F (+65° C) Ambient Temperature T5 +212° F (+100° C) at +186° F (+85° C) Ambient Temperature

APPROVALS



4-20 mA Module

(Part No. 125100-1)



4-20 mA
Module
Installed

Combine the 4-20 mA Module with an Industrial Grade Turbine and Computer Electronics to provide an industry standard analog signal for connection to a wide variety of chart recorders, display equipment and process control equipment.

This module outputs an analog signal which is directly proportional to the frequency of the digital output. With some simple adjustments, you can scale the module to represent whatever range is desired. Kit comes with circuit, assembly, enclosure and screws.

Features and Benefits:

- ✓ Communicates with most analog process control devices.
- ✓ Operating temperature range of +14° F to +140° F (-10° C to +60° C).
- ✓ Module installs on all turbine sizes.
- ✓ Provides external power to computer electronics.

SPECIFICATIONS

Signal Type:	Analog
Power:	Loop Powered
Voltage:	7 to 30 VDC
Strain Relief:	Hubble PG7
Cable:	10 ft. (3 m), Belden #9363

Pulse Access Module

(Part No. 125060-1)



Pulse Access
Module Installed

The Pulse Access Module provides an unscaled, digital signal from your GPI meter by accessing circuitry from the on-board computer readout.

This kit comes complete, ready to install, with a circuit assembly, coverplate assembly and 10 ft. of cable.

The Pulse Access Module requires both a GPI Turbine and an 09 Computer Electronics which are sold separately.

Features and Benefits:

- ✓ Provides a digital Open Collector signal.
- ✓ Operating temperature range of +14° F to +140° F (-10° C to +60° C).
- ✓ Can transmit signal up to 5,000 ft.
- ✓ Communicates with most digital process control devices and its easy to install.

SPECIFICATIONS

Signal Type:	Open Collector (NPN)
Voltage:	0 to 60 VDC
Frequency:	0 to 750 Hz
Strain Relief:	Hubble PG7
Cable:	10 ft. (3 m) Belden #9363

APPROVALS

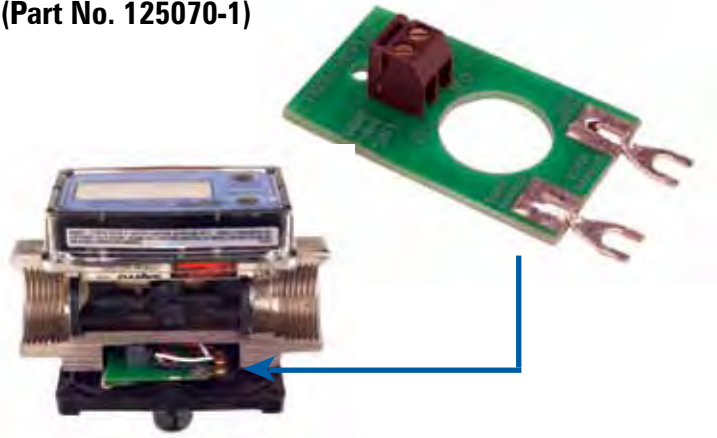


Features and Benefits:

- ✓ Internal batteries become a backup or auxiliary power source.
- ✓ Operating temperature range of +14° F to +140° F (-10° C to +60° C).
- ✓ Input power is 7 to 30 volt external power.

SPECIFICATIONS

Voltage:	7 to 30 VDC @ 1 mA
-----------------	--------------------

APPROVALS**External Power Module****(Part No. 125070-1)**

Combine the External Power Module and the GPI Pulse Access Module to provide external power capabilities to a GPI Electronic Digital Meter.

The module is designed to provide regulated power to the Computer Electronics. The batteries then become a backup or auxiliary power source.

If desired, a pulse output may be accessed. The unscaled, digital signal is capable of transmission up to 5,000 ft.

The Conduit Adapter allows you to enclose wiring from the magnetic pickup. The kit includes a turbine meter cover with a 1 inch male NPT conduit fitting and screws for plastic or metal installation.

*Conduit Adapter
Kit Installed*



Conduit Adapter Kit (Part No. 113437-01)



90° Display Adapter Kit allows for horizontal readout of vertical meters. Includes adapter, O-ring, screws and foam spacers required for installation.

Can be ordered with a meter.
Specify -19 option with meter order.

*Kit Shown Installed
on PVDF Meter*



90° Display Adapter Kit (Part No. 125260-01)



This new kit combines the Conduit Adapter with a magnetic pickup to allow easy installation of the 510 Series Displays or Transmitters to a G2 Meter.

*510 Conversion Kit
Installed*



510 Conversion Kit (Part No. 11344001)



Used with the Remote Kit, this part replaces the dust cover that houses the electronic display. This module provides a digital, open collector (NPN) output signal. Use this combination to communicate to a PLC or other piece of electronic equipment.

*Pulse Access Dust
Cover Installed*



Pulse Access Dust Cover (Part No. 125080-1)



The GPI Electronics Programmer is a system composed of a small USB interface unit, a USB cable, and a software program. This kit is perfect for reconfiguring multiple GPI Electronics for the first time or when changing the configuration over the life of the meter.

Used with your PC, it allows quick, convenient on-screen setting (and reading) of setup options and calibration data from many GPI Electronic Digital Meters (EDMs).

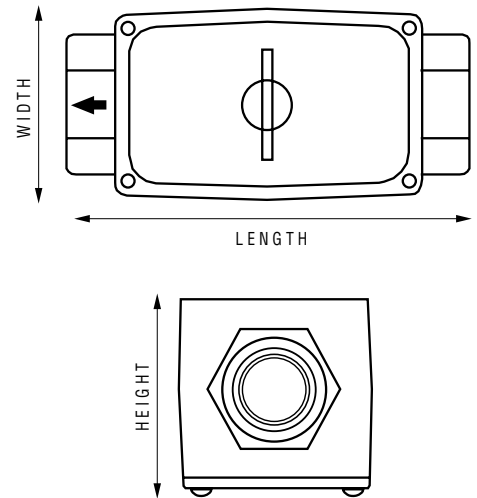
GPI Electronics Programmer (Part No. 113800-06)



G2 Series Industrial Grade Meters

Model	Length inches (mm)	Height inches (mm)	Width inches (mm)	Model	Length inches (mm)	Height inches (mm)	Width inches (mm)
A05	4.2 (107)	1.8 (46)	2.0 (51)	H20	6.3 (160)	3.2 (81)	3.3 (84)
A07	4.3 (109)	2.0 (51)	2.0 (51)	P05	7.3 (185)	3.2 (81)	2.1 (53)
A10	4.5 (114)	2.2 (56)	2.0 (51)	P10	8.1 (206)	3.3 (84)	2.8 (71)
A15	5.3 (135)	2.8 (71)	2.7 (68)	S05	4.2 (107)	1.8 (46)	2.0 (51)
A20	6.3 (160)	3.2 (81)	3.3 (84)	S07	4.3 (109)	2.0 (51)	2.0 (51)
B05	4.2 (107)	1.8 (46)	2.0 (51)	S10	4.5 (114)	2.2 (56)	2.0 (51)
B07	4.3 (109)	2.0 (51)	2.0 (51)	S15	5.3 (135)	2.8 (71)	2.7 (68)
B10	4.5 (114)	2.2 (56)	2.0 (51)	S20	6.3 (160)	3.2 (81)	3.3 (84)
B15	5.3 (135)	2.8 (71)	2.7 (68)	S10F	6.75 (171)	4.25 (108)	4.25 (108)
B20	6.3 (160)	3.2 (81)	3.3 (84)	S15F	8.0 (203)	5.0 (127)	5.0 (127)
C05	7.3 (185)	3.2 (81)	2.1 (53)	S20F	9.50 (241)	6.0 (152)	6.0 (152)
C10	8.1 (206)	3.3 (84)	2.8 (71)	S05T	5.0 (127)	2.0 (51)	1.8 (46)
H05	4.2 (107)	1.8 (46)	2.0 (51)	S07T	5.0 (127)	2.0 (51)	2.0 (51)
H07	4.3 (109)	2.0 (51)	2.0 (51)	S10T	5.5 (140)	2.0 (51)	2.2 (56)
H10	4.5 (114)	2.2 (56)	2.0 (51)	S15T	6.5 (165)	2.7 (68)	2.8 (71)
H15	5.3 (135)	2.8 (71)	2.7 (68)	S20T	7.0 (178)	3.3 (84)	3.2 (81)

NOTE: 09 Display adds 1.1" (28 mm) to height.



NOTE: Dimensions are for reference only and may vary by model.



"Look for the silver label!"

A1 SERIES COMMERCIAL GRADE METERS

Commercial Grade Meters are designed as self-contained, battery powered units. These indicating meters come in Aluminum or Nylon only. A1 Meters are not field serviceable like the popular G2 Series Meters.



"Look for the silver label!"

1) Select Your Turbine



Aluminum



Nylon



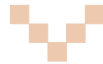
2) Select Your Electronic Choice



"Look for the silver label!"
09 Computer



XX No Computer



3) Select Your Module

For further details see pages 120-121.



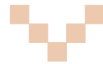
Standard Remote Kit



FM Approved Remote Kit



Conditioned Signal Output Module



4) Do You Require Any Accessories?

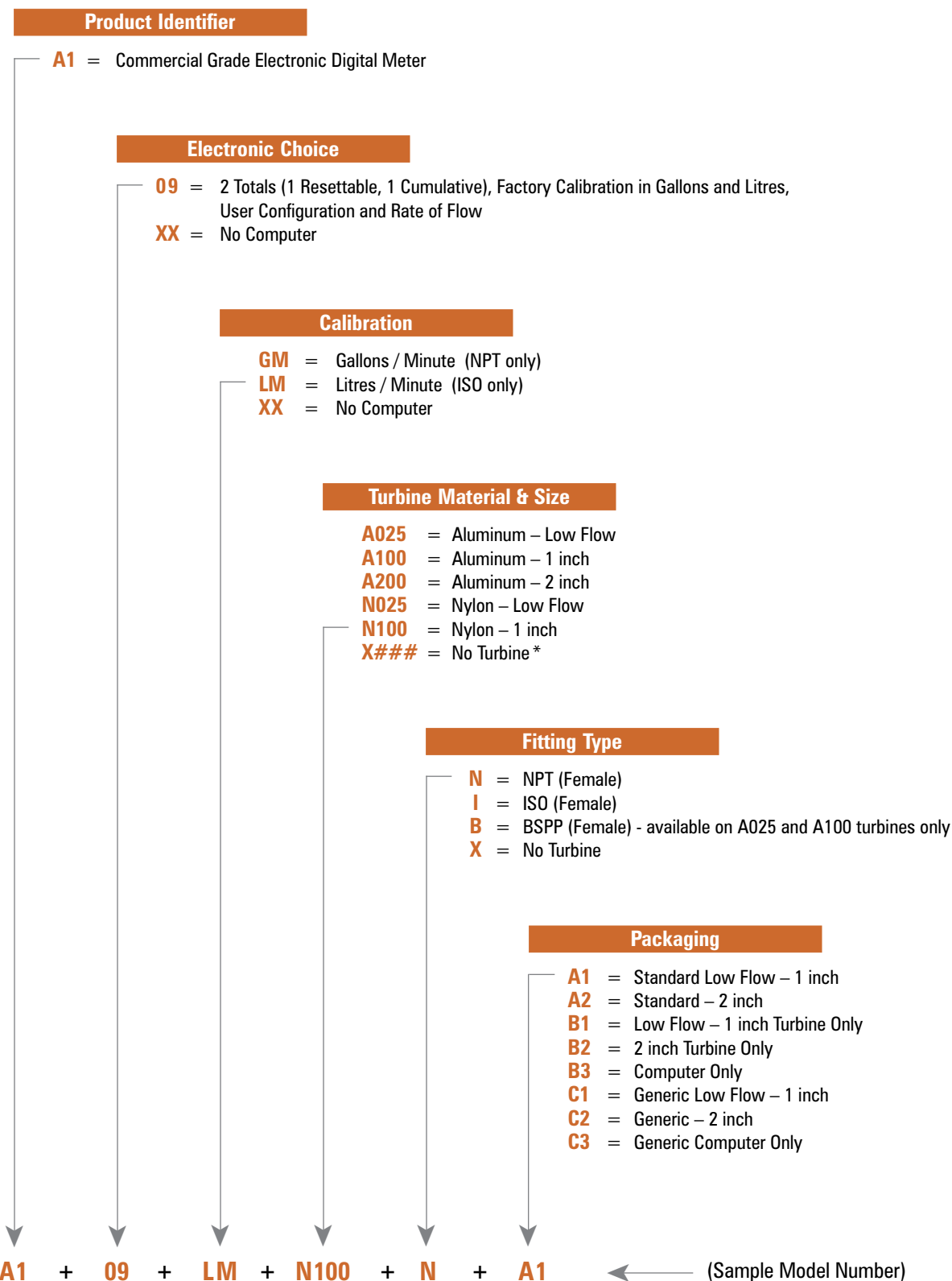
For further details see pages 122.



Display Adapter Kit



GPI Electronics Programmer



* When ordering Computer Assembly Only, specify Turbine Housing size.

A1 COMMERCIAL GRADE METERS

GPI Commercial Grade Meters are identified by an A1 prefix. Commercial Grade Meters are packaged as a self-contained unit. Select this meter when you need an accurate, basic meter. GPI Commercial Grade Meters come in Aluminum or Nylon housing material.

Choose one of three sizes of Aluminum meters for petroleum products. Use the Nylon meters for water or non-aggressive chemicals.



Aluminum

"Look for the silver label!"



Nylon

For complete part number, see "Number Reference" chart on page 117.

ACCURACY: ±1.5% READING
(On models A100, A200 and N100)

Select Your Fitting Size:

Aluminum

Low Flow 1 inch 2 inch

Nylon

Low Flow 1 inch

Features and Benefits:

- ✓ Unique package combines Turbine and LCD into a self-contained, compact, economical meter.
- ✓ Local Display Computer features: 2 Totals (1 Resettable, 1 Cumulative); Factory Calibration in gallons and litres; User Configuration and Rate of Flow.
- ✓ Output capabilities available to communicate with process control equipment.
- ✓ Lightweight, compact design allows for easy installation.
- ✓ Lithium battery life: 5 years.

APPROVALS



ATEX

IP44

A1 METER SPECIFICATIONS

A1 SERIES

	ALUMINUM			NYLON	
	A025 (Low Flow)	A100 (1 inch)	A200 (2 inch)	N025 (Low Flow)	N100 (1 inch)
Design Type:	Paddlewheel	Turbine	Turbine	Paddlewheel	Turbine
Housing Material:	Aluminum	Aluminum	Aluminum	Nylon	Nylon
Fitting Size:	1 inch	1 inch	2 inch	1 inch	1 inch
Fitting Type:	NPT, ISO or BSPP(female)	NPT, ISO or BSPP(female)	NPT or ISO (female)	NPT or ISO (female)	NPT or ISO (female)
Flow Range (GPM):	0.3 - 3 GPM	3 - 50 GPM	30 - 300 GPM	0.3 - 3 GPM	3 - 50 GPM
Flow Range (LPM):	1 - 11 LPM	11 - 190 LPM	114 - 1,135 LPM	1 - 11 LPM	11 - 190 LPM
Accuracy:	N/A *	± 1.5% of reading	± 1.5% of reading	N/A *	± 1.5% of reading
Repeatability:	± 1%	± 0.2%	± 0.2%	± 1%	± 0.2%
Pressure Rating:	300 PSI / 21 BAR	300 PSI / 21 BAR	300 PSI / 21 BAR	150 PSI / 10.2 BAR	150 PSI / 10.2 BAR
Operating Temperature Range:	-40° F to +250° F (-40° C to +121° C)	-40° F to +250° F (-40° C to +121° C)	-40° F to +250° F (-40° C to +121° C)	-40° F to +250° F (-40° C to +121° C)	-40° F to +250° F (-40° C to +121° C)
with Computer:	0° F to +140° F (-18° C to +60° C)	0° F to +140° F (-18° C to +60° C)	0° F to +140° F (-18° C to +60° C)	0° F to +140° F (-18° C to +60° C)	0° F to +140° F (-18° C to +60° C)
Wetted Material - Housing:	Aluminum	Aluminum	Aluminum	Nylon	Nylon
Bearings:	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Shaft:	Tungsten Carbide	Tungsten Carbide	Tungsten Carbide	Tungsten Carbide	Tungsten Carbide
Rotor:	Nylon	Nylon	Nylon	Nylon	Nylon
Signal Generators:	Ferrite	Ferrite	Ferrite	Ferrite	Ferrite
Rings:	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel
Typical K-Factor:	2200	730	72	2200	730
Frequency Range:	11 - 110 Hz @ 0.3 - 3 GPM	36.5 - 608.3 Hz @ 3 - 50 GPM	36 - 360 Hz @ 30 - 300 GPM	11 - 110 Hz @ 0.3 - 3 GPM	36.5 - 608.3 Hz @ 3 - 50 GPM
Recommended Strainer Size:	55 mesh	28 mesh	28 mesh	55 mesh	28 mesh
Shipping Weight:	1.35 lbs. (0.61 kg)	1.35 lbs. (0.61 kg)	3.0 lbs. (1.36 kg)	1.0 lbs. (0.5 kg)	1.0 lbs. (0.5 kg)
Local Display:	09 Computer (See page 63)	09 Computer (See page 63)	09 Computer (See page 63)	09 Computer (See page 63)	09 Computer (See page 63)
Calibration Report	Comes standard with A1 Series Meters. N.I.S.T. – Certification available.				

* Accuracy can vary up to ± 5% depending on installation and fluid type.
Field Calibration is recommended for best accuracy.

FM Approved Remote Kit Assembly (Part No. 113275-1)



*FM Approved
Remote Kit
Assembly Installed*

The Factory Mutual (FM) Approved Remote Kit Assembly modifies GPI Electronic Digital Meters for applications in specialized situations including remote indication and high or low fluid temperature metering applications. This kit provides the versatility of panel mounting of the LCD readout up to 100 ft. from the turbine.

This kit consists of a sensor module, a dust cover assembly and 10 ft. of cable; it also requires a 09 Computer.

Features and Benefits:

- ✓ Maintains FM Approval.
- ✓ Accommodates fluid temperatures from -40° F to +250° F (-40° C to +121° C).
- ✓ This kit can upgrade an existing GPI meter or can be purchased with a new meter.
- ✓ Use this module with GPI Industrial or Commercial Grade Electronic Digital Meters.

SPECIFICATIONS

Magnetic Pickup:	1.3 k Ohm, 90 mH
Signal Type:	Sine Wave
Voltage:	Peak to Peak 10 mV to 500 mV
Frequency:	11 to 750 Hz
Cable:	10 ft. (3 m), 2-conductor shielded, Belden #9501

APPROVALS



Standard Remote Kit Assembly (Part No. 113265-1)



*Standard Remote Kit
Assembly Installed*

The Standard Remote Kit Assembly modifies GPI Electronic Digital Meters for applications in specialized situations including remote indication and high or low fluid temperature metering applications. This kit also provides the versatility of panel mounting of the LCD readout up to 300 ft. from the turbine housing and sensor.

This kit consists of a sensor module, a dust cover assembly and 10 ft. of cable; it also requires a 09 Computer.

Do not use on A1 2-inch meter. Order 113275-1.

Features and Benefits:

- ✓ Accommodates fluid temperatures from -40° F to +250° F (-40° C to +121° C).
- ✓ This kit can upgrade an existing GPI meter or can be purchased with a new meter.
- ✓ Battery powered from meter; no additional power required.

SPECIFICATIONS

Magnetic Pickup:	1.5 k Ohm, 700 mH
Signal Type:	Sine Wave
Voltage:	Peak to Peak 33 mV to 825 mV
Frequency:	11 to 750 Hz
Cable:	10 ft. (3 m), 2-conductor shielded, Belden #1266A or #8451

Features and Benefits:

- ✓ Provides two digital signals: Open Collector or 6-volt Square Wave and can communicate with most process control devices.
- ✓ Operating temperature range of -40° F to +212° F (-40° C to +100° C).
- ✓ Can be externally powered or battery powered.

SPECIFICATIONS

Connector:	Hubble PG7
Signal Type:	Open Collector (NPN)
Power:	External 9 to 35 VDC, approximately 1 mA
Connection:	Three wire
Frequency:	0 to 750 Hz
Cable:	10 ft. (3 m) Belden #9363

APPROVALS



Conditioned Signal Output Module (Part No. 113435-1)



This module provides an unscaled, amplified, digital signal capable of transmission up to 5,000 ft. There is no need for additional signal conditioning or amplification devices to achieve the desired digital signal. Use on G2 "Turbine Only" model.

The module is factory assembled for Open Collector signal output and operates from an external 9 to 35 volt power source. By changing terminal connections and adding a battery kit, the module provides a self-powered 6-volt Square Wave signal.

90° Display Adapter Kit (Part No. 125260-01)



90° Display Adapter Kit allows for horizontal readout of vertical meters. Includes adapter, O-ring, screws and foam spacers required for installation.



*Kit Shown Installed
on PVDF Meter*

GPI Electronics Programmer (Part No. 113800-06)



The GPI Electronics Programmer is a system composed of a small USB interface unit, a USB cable, and a software program. This kit is perfect for reconfiguring multiple GPI Electronics for the first time or when changing the configuration over the life of the meter.

Used with your PC, it allows quick, convenient on-screen setting (and reading) of setup options and calibration data from many GPI Electronic Digital Meters (EDMs).



"Look for the red label!"



ECONOMY ELECTRONIC DIGITAL METERS

GPI offers a variety of economy meters to meet specific applications. These meters are great for monitoring and indication. They provide lower accuracy than our other meters but are an economical choice in many applications. The economy meters are not field serviceable.



Model No.
LM50P

Model No.
LM50D

Model No.
LM50M

Choose from one of the latest positive displacement meters available from GPI. These compact meters are perfect for metering engine oils or transmission fluids (maximum viscosity 1,000 cp). The LM50M Mechanical Meter is suitable for hazardous locations.

Choose the LM50P when Pulse Out without Display meets your application. The LM50D model includes an easy-to-read display. All meters are designed with oval rotors for optimum accuracy.

Features and Benefits:

- ✓ Extremely accurate.
- ✓ Dependable performance.
- ✓ Reliable, trouble-free operation.
- ✓ Total and Flowrate.

LM50P – SPECIFICATIONS

Construction:	Aluminum
Wetted Components:	Acetal, Aluminum, Nitril and Steel
Connections:	1/2 inch NPT or BSPT (Female)
K-Factor:	424 PPG / 112 PPL
Flow Range:	0.26 - 7.8 GPM (1 - 30 LPM) @ 5 - 1,000 cp
Accuracy:	± 0.5% of reading
Max. Working Pressure:	1,500 PSI / 103.5 BAR
Operating Temperature:	+23° F to +131° F (-5° C to +55° C)
Model Numbers:	LM50PB (Lube Meter 1/2" BSPT) LM50PN (Lube Meter 1/2" NPT)

LM50D – SPECIFICATIONS

Construction:	Aluminum
Wetted Components:	Acetal, Aluminum, Nitril and Steel
Connections:	1/2 inch NPT or BSPT (Female)
Flow Range:	0.26 - 7.8 GPM (1 - 30 LPM) @ 5 - 1,000 cp
Accuracy:	± 0.5% of reading
Max. Working Pressure:	1,500 PSI / 103.5 BAR
Operating Temperature:	+23° F to +131° F (-5° C to +55° C)
Battery:	Two AAA Alkaline batteries
Display:	6 digit; Shows Batch, Reset Total, Non-Reset Total and Rate of Flow
Display Units:	User selectable (gallons, litres, pints or quarts)
Model Numbers:	LM50DB (Lube Meter with Display 1/2" BSPT) LM50DN (Lube Meter with Display 1/2" NPT)

LM50M – SPECIFICATIONS

Construction:	Aluminum
Wetted Components:	Acetal, Aluminum, Nitril and Steel
Connections:	1/2 inch NPT or BSPT (Female)
Flow Range:	0.26 - 7.8 GPM (1 - 30 LPM) @ 5 - 1,000 cp
Accuracy:	± 1.0% of reading
Max. Working Pressure:	1,500 PSI / 103.5 BAR
Operating Temperature:	+14° F
Battery:	None required
Model Numbers:	LM50MNG - 1/2" NPT fitting. Calibrated in gallons LM50MNL - 1/2" NPT fitting. Calibrated in litres LM50MBL - 1/2" BSPT fitting. Calibrated in litres LM50MBQ - 1/2" BSPT fitting. Calibrated in quarts LM50MBG - 1/2" BSPT fitting. Calibrated in gallons LM50MNQ - 1/2" NPT fitting. Calibrated in quarts

01N – SPECIFICATIONS

Design Type:	Turbine
Fitting Size:	1 inch
Fitting Type:	NPT or ISO (Female)
Flow Range:	3 - 30 GPM (10 - 100 LPM)
Accuracy:	± 5.0% of reading
Repeatability:	± .5%
Pressure Rating:	150 PSIG (10.2 BAR)
Operating Temperature:	+14° F to +131° F (-10° C to +55° C)
Wetted Material:	
Housing:	Nylon
Bearings:	Ceramic
Shaft:	Tungsten Carbide
Rotor:	Nylon
Signal Generators:	Ferrite
Rings:	316 Stainless Steel
Shipping Weight (approx.):	1.1 lbs. (0.5 kg) (See page 76 for meter dimensions)
Local Display:	Includes: 2 Totals (1 Cumulative, 1 Batch); Permanent factory calibration for water.

APPROVALS



01N Series Water Meter



ACCURACY: ±5.0% OF READING

Features and Benefits:

- ✓ Simple, small and sturdy Electronic Digital Water Meter with rugged nylon housing.
- ✓ Mount on the end of a hose or a pipe, in-line.
- ✓ Complete meter, including turbine assembly, micro-processor and LCD readout.
- ✓ Choice of gallon and litre measurement.
- ✓ Works well on any pump or gravity feed system with at least 3-30 GPM (10-100 LPM) flow range.

01A – SPECIFICATIONS

Design Type:	Turbine
Fitting Size:	1 inch
Fitting Type:	NPT or ISO or BSPP (Female)
Flow Range:	3 - 30 GPM (10 - 100 LPM)
Accuracy:	± 5.0% of reading
Repeatability:	± .5%
Pressure Rating:	300 PSIG (21 BAR)
Operating Temperature:	+14° F to +130° F (-10° C to +54° C)
Wetted Material:	
Housing:	Aluminum
Bearings:	Ceramic
Shaft:	Tungsten Carbide
Rotor:	Nylon
Signal Generators:	Ferrite
Rings:	316 Stainless Steel
Shipping Weight (approx.):	2 lbs. (0.9 kg) (See page 76 for meter dimensions)
Local Display:	Includes: 2 Totals (1 Cumulative, 1 Batch); Permanent factory calibration for gasoline, diesel fuel or kerosene.

APPROVALS



01A Series Fuel Meter



"Look for the red label!"

ACCURACY: ±5.0% OF READING

Features and Benefits:

- ✓ Lightweight, accurate, and reliable turbine meter with rugged aluminum housing and sealed electronic circuitry.
- ✓ Powered by two AAA batteries that are easy to replace.
- ✓ Factory calibrated for petroleum fuel with a choice of gallon and litre measurement.
- ✓ Works well on any pump or gravity feed system with at least 3-30 GPM (10-100 LPM) flow range.

FM-300H/R Chemical Meter



FM-300H/R – SPECIFICATIONS

Design Type:	Nutating Disc with Electronic Display
Fitting Size:	1 inch
Fitting Type:	Inlet: NPT (Female) Outlet: NPT (Male)
Flow Range:	2 - 20 GPM (7 - 75 LPM)
Accuracy:	± 2.0% of reading
Pressure Rating:	50 PSIG (3.4 BAR)
Operating Temperature:	+15° F to +130° F (-9° C to +54° C)
Wetted Material:	
Housing:	PBT Polyester
Fluid Chamber:	PBT Polyester
Signal Generator Kit:	PBT Polyester / Ferrite
Seals:	Fluorocarbon
Clip:	316 Stainless Steel
Shipping Weight (approx.):	3 lbs. (1.4 kg)
Display Options:	Local Display includes: Rate of Flow, Batch and Cumulative Totals. Factory and Field Calibration.

ACCURACY: ±2.0% OF READING

Features and Benefits:

- ✓ Simple, small and sturdy Electronic Digital Disc Meter with rugged PBT housing.
- ✓ Mount on the end of a hose or a pipe, in-line.
- ✓ Complete meter, including disc assembly, micro-processor and LCD readout.
- ✓ Choice of gallon and litre measurement.
- ✓ Factory calibrated for thin and medium fluids. Field calibrate for more viscous fluids.

APPROVALS



TM SERIES WATER METERS

GPI Water Meters are accurate, economical and designed to last. Choose GPI Water Meters for water processing and irrigation applications. The TM Series Water Meters meet Schedule 80 PVC specifications and come standard with the low-profile display. Meters come in seven sizes with three fitting types, offering flowrates from 1 - 800 GPM.



TM SERIES METER NUMBER REFERENCE

Product Identifier

TM = Water Meter

Turbine Size

- 050** = Schedule 80 PVC, 1/2 inch
- 075** = Schedule 80 PVC, 3/4 inch
- 100** = Schedule 80 PVC, 1 inch
- 150** = Schedule 80 PVC, 1-1/2 inch
- 200** = Schedule 80 PVC, 2 inch
- 300** = Schedule 80 PVC, 3 inch
- 400** = Schedule 80 PVC, 4 inch

Meter Dimensions listed on page 135.

Fitting Type

- Blank** = Spigot (Pipe) End
- N** = NPT (Female)
- F** = 150# ANSI Flange (3 in. and 4 in. meters only)

Electronic Choices

- Blank** = Local Display
- P** = Pulse Output
- GA** = 4-20 mA Output, No Display (3 in. and 4 in. meters only)
- GG** = Pulse Output, With Display (3 in. and 4 in. meters only)
- GX** = 4-20 mA Output, With Display (3 in. and 4 in. meters only)
- SC** = Scaled Pulse Output (3 in. and 4 in. meters only)

TM + **300** + **-N** + **-GA** ← (Sample Model Number)

TM SERIES 1/2" - 2" WATER METERS

TM SERIES

TM SERIES – SPECIFICATIONS

Design Type:	Turbine	
Fitting Size:	1/2" 3/4" 1" 1-1/2" 2"	
Fitting Type:	Schedule 80 Spigot (Pipe) End or NPT (Female)	
Flow Range:		
1/2" - TM050:	1 - 10 GPM (3.8 - 38 LPM)	
3/4" - TM075:	2 - 20 GPM (7.6 - 76 LPM)	
1" - TM100:	5 - 50 GPM (19 - 190 LPM)	
1-1/2" - TM150:	10 - 100 GPM (38 - 380 LPM)	
2" - TM200:	20 - 200 GPM (76 - 760 LPM)	
Accuracy:	± 3.0% of reading	
Pressure Rating:	225 PSIG / 15.3 BAR at 73° F (23° C)	
Operating Temperature:	+32° F to +140° F (0° to +60° C)	
Typical K-Factor:		
1/2" - TM050:	2,500	
3/4" - TM075:	1,100	
1" - TM100:	565	
1-1/2" - TM150:	215	
2" - TM200:	100	
Battery Life:	5 Years	
Wetted Materials:		
Housing:	PVC	
Bearings:	Ceramic	
Shaft:	Tungsten Carbide	
Rotor:	PVDF	
Rings:	316 Stainless Steel	
Shipping Weight (approx.):	Spigot	NPT
1/2" - TM050:	.38 lbs. (.172 kg)	.55 lbs. (.249 kg)
3/4" - TM075:	.43 lbs. (.304 kg)	.67 lbs. (.304 kg)
1" - TM100:	.49 lbs. (.222 kg)	.49 lbs. (.381 kg)
1-1/2" - TM150:	.66 lbs. (.299 kg)	1.38 lbs. (.626 kg)
2" - TM200:	.78 lbs. (.354 kg)	1.78 lbs. (.807 kg)
Display Features:	Rate of Flow, Batch and Cumulative Totals, Field Calibration available.	
Pulse Output (-P Elec. Choice):	Open Collector (NPN)	
Calibration Report	Comes standard with -P (Pulse out) TM Models. N.I.S.T. – Certification available.	

APPROVALS



"Look for the blue label!"

Model TM200



Model TM150-N



"Look for the blue label!"

TM Series Meters are designed for use in water applications. The five smallest sizes are shown here. (For 3" and 4" meters, see next page.) Choose either Spigot (pipe end) or NPT fittings.



For complete part number, see "Number Reference" chart on page 128.

ACCURACY: ±3.0% READING

Features and Benefits:

- ✓ Easy to install.
- ✓ Displays in gallons, litres and cubic feet.
- ✓ Indicates Batch, Cumulative Totals and Rate of Flow.
- ✓ Available in NPT or Spigot fittings.
- ✓ Meets Schedule 80 specifications.
- ✓ Lithium battery life: 5 years.
- ✓ Non-volatile totals means amounts are retained when batteries are replaced or power is lost.

Applications:

- OEM water treatment equipment / skids
- Small waste water treatment equipment
- Sub-metering of facility water usage
- Water based cooling systems

Model - TM300-F



"Look for the blue label!"

TM Series Meters are designed for use in water applications. The 3" and 4" models are shown here. Choose Spigot (pipe end), NPT or 150# ANSI Flange fittings.



For complete part number, see "Number Reference" chart on page 128.

TM SERIES – SPECIFICATIONS

Design Type:	Turbine		
Fitting Size:	3" 4"		
Fitting Type:	Schedule 80 Spigot (Pipe) End, NPT (Female) or 150# ANSI Flange		
Flow Range:			
3" - TM 300:	40 - 400 GPM (151 - 1514 LPM)		
Extended Range:	30 - 600 GPM (131 - 2271 LPM)		
4" - TM400:	60 - 600 GPM (227 - 2271 LPM)		
Extended Range:	40 - 800 GPM (151 - 3028 LPM)		
Accuracy:	± 3.0% of reading		
Pressure Rating:	225 PSIG / 15.3 BAR at 73° F (23° C)		
For CE Applications:	135 PSIG / 9.1 BAR at 73° F (23° C)		
Operating Temperature:	+32° F to +140° F (0° to +60° C)		
Typical K-Factor:			
3" - TM 300:	43		
4" - TM400:	17		
Battery Life:	5 Years		
Wetted Materials:			
Housing:	PVC		
Bearings:	PEEK		
Shaft & Thrust Washers:	Stainless Steel		
Rotor & Nose Cone:	Acetal		
Signal Generator:	Ferrite		
Shipping Weight (approx.):	Spigot	NPT	Flange
3" - TM300:	2.4 lbs. (1.09 kg)	3.9 lbs. (1.77 kg)	5.8 lbs. (2.63 kg)
4" - TM400:	3.7 lbs. (1.68 kg)	6.1 lbs. (2.77 kg)	9.2 lbs. (4.17 kg)
Display Features:	Rate of Flow, Batch and Cumulative Totals, Field Calibration available.		
Pulse Output (-P Elec. Choice):	Open Collector (NPN)		
Calibration Report	Comes standard with -P (Pulse out) TM Models. N.I.S.T. – Certification available.		

ACCURACY: ±3.0% READING

Features and Benefits:

- ✓ Available in Spigot, NPT and Flange fittings.
- ✓ Displays in gallons, litres and cubic feet.
- ✓ Indicates Batch, Cumulative Totals and Rate of Flow.
- ✓ One-piece field replaceable turbine assembly.
- ✓ Spigot models may be cut to length.
- ✓ Meets Schedule 80 specifications.
- ✓ Lithium battery life: 5 years.
- ✓ Non-volatile totals means amounts are retained when batteries are replaced or power is lost.

Applications:

- OEM water treatment equipment / skids
- Sub-metering of facility water usage
- Waste water treatment equipment
- Chemical feed systems
- Cooling towers
- Irrigation

ELECTRONIC CHOICES

GG, GX, GA or SC: See Electronics Section.

APPROVALS



Spigot Model - TM400



"Look for the blue label!"

NPT Model - TM300-N



"Look for the blue label!"



"Look for the blue label!"

150# ANSI Flange Model - TM400-N-GX

Display With Pulse Output

GG500
Remote Mount



GG510
Local Mount

The GG500 is a remote mount Pulse-Out Transmitter with battery powered display. Choose the GG510 when a local mount is needed.

GG500/GG510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Open Collector (NPN)
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	9-volt battery or externally powered
Voltage Supply (Min.):	7 VDC
Voltage Supply (Max.):	30 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+14° F to +140° F (-10° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0 - 1000 Hz
High Level Low Freq.:	0 - 150 Hz
High Level High Freq.:	0 - 1000 Hz
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.0 lbs. (.45 kg)
Calibratable:	K-factor Entry

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Industry Standard Output: Unscaled Pulse.
- ✓ Easily mounted on pipe or wall.

GX500/GX510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.1 lbs. (.5 kg)
Calibratable:	K-factor Entry

Display With 4-20 mA Output



GX500
Remote Mount



GX510
Local Mount

The GX500 is a remote mount 4-20 mA Output Transmitter with display. Choose the GX510 when a local mount is needed.

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

4-20 mA Output

GA500
Remote MountGA510
Local Mount

The GA500 is a remote mount 4-20 mA Output Transmitter without display. Choose the GA510 when a local mount is needed.

GA500/GA510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	Remote: Belden 9363 (500 Series only) Local: No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	Remote: 2.0 lbs. (.90 kg) Local: 1.1 lbs. (.5 kg)

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

SC500/SC510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Power Source:	DC powered 5 to 30 VDC
Input Signal:	Hall Effect, Reed Switch or Open Collector (NPN) or Sine Wave
Output Signal:	Open Collector (NPN)
Frequency Range:	Coil, HF = 0-1500 Hz; LF = 0-150 Hz
Operating Temperature:	-40° F to +185° F (-40° C to +85° C)
Cable:	<i>Remote:</i> 20 ft., 3-conductor, tinned drain wire, 22 AWG, PVC jacket .212 dia. Ref. Belden 9363. <i>Local:</i> No cable provided
Mechanical Connections:	<i>Remote:</i> Wall or pipe mountable with standard U-bolts. <i>Local:</i> Unit is mounted to meter body, 1" NPT.
Electrical Connections:	<i>Remote:</i> Two strain relief ports <i>Local:</i> One strain relief port; one threaded plug

Scaled Pulse Output



SC500
Remote Mount



SC510
Local Mount

The GPI Scaled Pulse Module is a switch-programmable multi-stage counter/divider with multiple inputs. The module provides selectable K-factor to convert input frequency to scaled pulse output. The SC500 connects via a 20 foot input cable. The SC510 connects directly to the 1 inch MNPT conduit connector.

ACCURACY: ±0.1% READING

Features and Benefits:

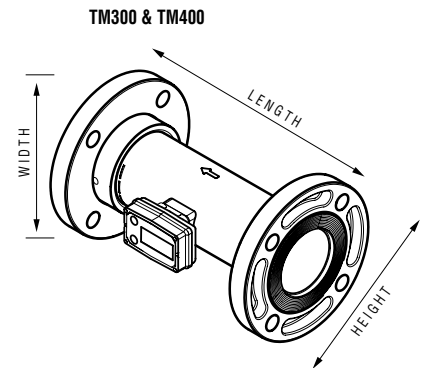
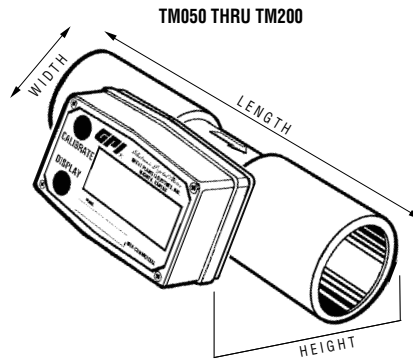
- ✓ Converts input frequency to scaled pulse output.
- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 and A1 Turbine Meters and Oval Gear Meters.
- ✓ Remote model mounts on pipe or wall.

TM Meters

Model	Length* inches (mm)	Height** inches (mm)	Width inches (mm)
TM050	3.8 (96)	2.6 (66)	2.0 (51)
TM050-N	5.8 (147)	2.6 (66)	2.0 (51)
TM075	3.8 (96)	2.7 (68)	2.0 (51)
TM075-N	5.8 (147)	2.7 (68)	2.0 (51)
TM100	4.1 (104)	3.1 (79)	2.0 (51)
TM100-N	6.1 (155)	3.1 (79)	2.0 (51)
TM150	5.4 (137)	3.7 (94)	2.1 (53)
TM150-N	7.4 (188)	3.7 (94)	2.1 (53)
TM200	5.5 (140)	4.2 (107)	2.4 (61)
TM200-N	7.5 (190)	4.2 (107)	2.4 (61)
TM300 (Spigot)	11.5 (292)	5.34 (136)	3.5 (89)
TM400 (Spigot)	13.5 (343)	6.34 (161)	4.5 (114)
TM300 (NPT)	14.7 (373)	5.78 (147)	4.37 (111)
TM400 (NPT)	17.0 (432)	6.76 (172)	5.34 (136)
TM300 (Flange)	12.0 (305)	7.5 (190)	7.5 (190)
TM400 (Flange)	14.0 (356)	9.0 (229)	9.0 (229)

* Length guidelines are estimates; actual length can vary up to $\pm 1/2"$.

** Computer display adds 1.1" (28 mm) to height.



NOTE: Dimensions are for reference only and may vary by model.

CLARK

WP Series Turbine Water Meter

2" to 8" Pipe Size, With or Without Reed Switch

DESCRIPTION

The WP meters are Woltmann type totalizing water meters comprised of a rotor with helical blades inserted axially in the flow stream.

The units feature a magnetic drive for low transmission resistance and a dry dial register insures clear reading. They operate at low pressure loss and offer excellent accuracy in 2" to 8" pipes.

The meter body is made of cast or ductile iron and is epoxy coated. The meter register assembly can be removed for repair or replacement without disrupting the process flow.

SPECIFICATIONS

GENERAL

Measuring Principle: Turbine/Woltman helical bladed rotor

Meter Type: Dry, magnetic coupling between rotor and register movement

Meter Sizes: 2", 3", 4", 6", 8"

Meter Ratings:

Cold Water Meter: Calibrated for water temperatures to 104°F (40°C)

Hot Water Meter: Calibrated for water temperatures to 194°F (90°C)

Max Media Operatng Temperature & Pressure:

Temperature (F°)	Pressure (PSIG)
-20 to 150	200
200	190

Materials Of Construction: See table 4

Accuracy: Cold water meter: ±2% at nominal/intermediate (Q_n) and maximum (Q_{max}) flow, ±5% at minimum flow rate (Q_{min}) to transition flow rate Q_t . See fig 1.

Hot water meter: ±3% at nominal/intermediate (Q_n) and maximum (Q_{max}) flow, ±5% at minimum flow rate (Q_{min}) to transition flow rate (Q_t). See fig 1.

Pressure Drop: See Pressure drop curves fig. 2

Connections: ASME Class 125 Flanges per B16.1

Dimensions and Weights: See table 2 for details

Installation: Clean pipe line before installing meter.

- 1) Horizontal position with register facing upward is recommended however any position is acceptable.
- 2) Meter must be installed with direction of flow as indicated by arrow cast into the meter body.
- 3) Install valve before inlet of meter. A valve at outlet is also recommended.
- 4) Install meter in a location with at least 10 diameters of straight pipe at the inlet and 5 diameters at the outlet to assure proper flow profile to meter.
- 5) Do not use a meter rated for cold water as a hot water meter.



WP- 2" Size



WP- 3" & 4" Sizes



WP-6" & 8" Sizes

OPTIONAL PULSE/REED SWITCH OUTPUT:

The pulse emitter consists of a plastic housing with a reed switch that is closed when a magnet mounted on one of the meters register gears comes into its activation proximity.

A 1.5 meter (59") length of 2-conductor wire 3.5 mm diameter is standard. One conductor has red insulation and one has black.

Max Voltage: 24V AC/DC

Max Current: 0.01 A

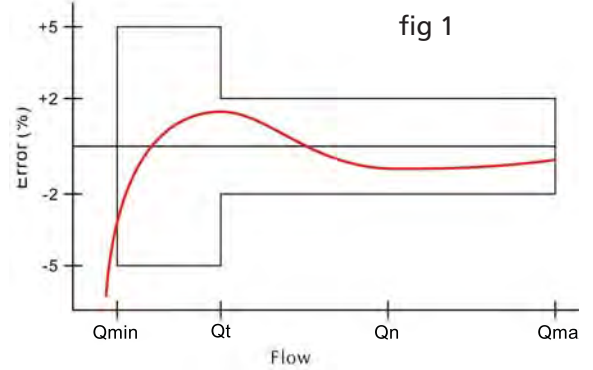


Reed Switch

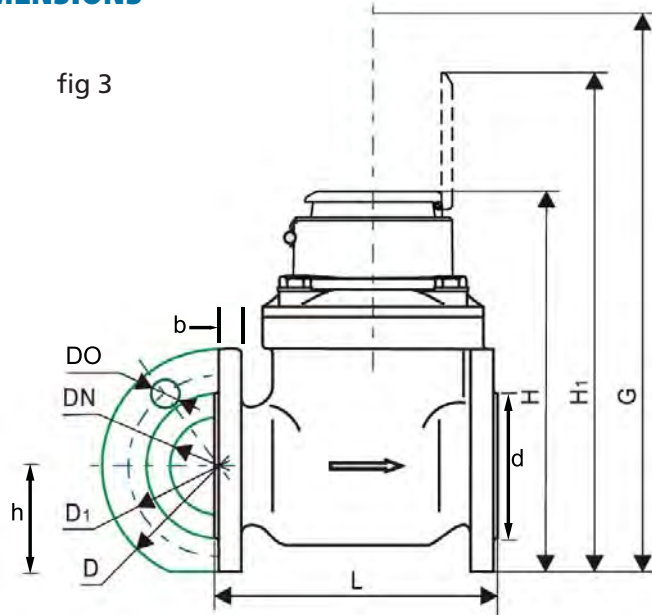


Table 1- Operating Characteristics								
Model	Size	Max. Flow GPM (Q _{max})	Nom. Flow GPM (Q _n)	Min. Flow GPM (Q _{min})	Transition Flow rate (Q _t)	Min. Reading Gallons	Max. Reading Gallons	Pulse Output Option
WP-SDC(1A7)-2	2"	160	25	4	13	0.1	999999999	1 P/100 Gal
WP-SDC(1A7)-3	3"	350	50	8	35	0.1	999999999	1 P/100 Gal
WP-SDC(1A7)-4	4"	530	90	15	53	0.1	999999999	1 P/100 Gal
WP-SDC(1A7)-6	6"	1230	200	30	132	1.0	999999999	1 P/1000 Gal
WP-SDC(1A7)-8	8"	2200	350	50	220	1.0	999999999	1 P/1000 Gal

TYPICAL ACCURACY CURVE



DIMENSIONS



PRESSURE DROP

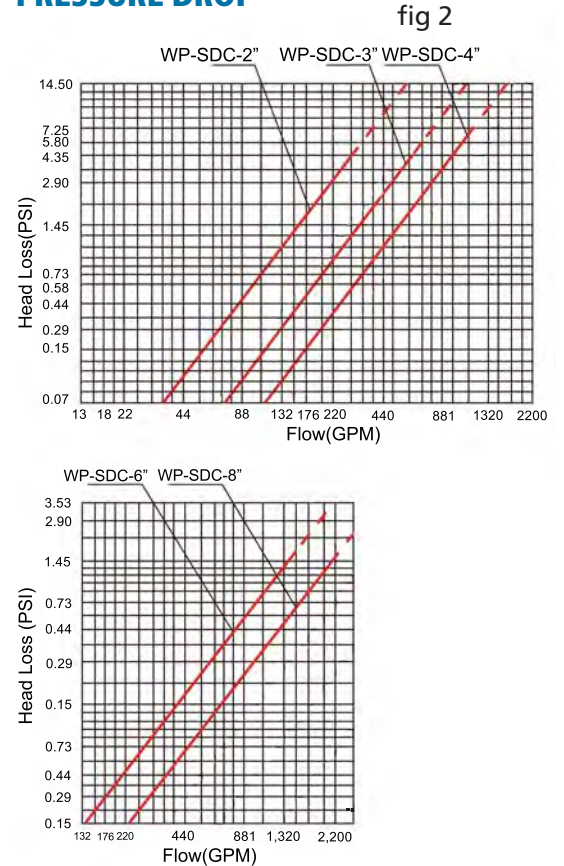
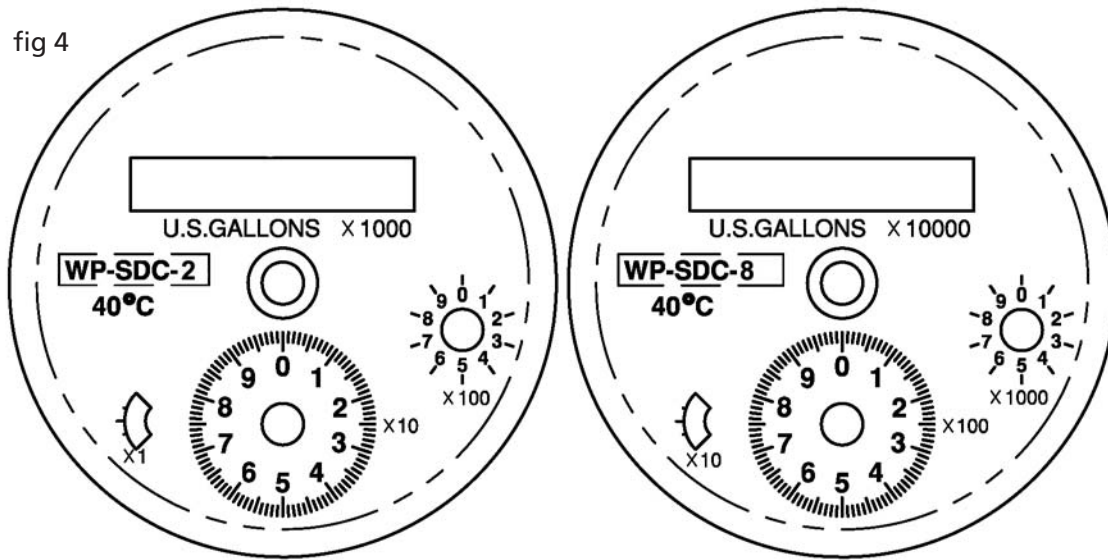


Table 2- Dimensions												
Model	Size	D Inches (mm)	D ₁ Inches (mm)	d Inches (mm)	b Inches (mm)	h Inches (mm)	DO Inches (mm)	L Inches (mm)	H Inches (mm)	H ₁ Inches (mm)	G Inches (mm)	No. Bolt Holes
WP-SDC(1A7)-2	2"	6.50 (165)	4.75 (120.62)	3.62 (92)	0.63 (16)	2.76 (70)	0.748 (19)	7.87 (200)	10.10 (256)	12.90 (328)	15.70 (400)	4
WP-SDC(1A7)-3	3"	7.50 (190.5)	6.00 (152.40)	5.00 (127)	0.748 (19)	3.58 (91)	0.748 (19)	8.86 (225)	10.90 (276)	13.70 (348)	15.70 (400)	4
WP-SDC(1A7)-4	4"	9.00 (228.6)	7.50 (190.50)	6.18 (157)	0.945 (24)	4.29 (109)	0.748 (19)	9.84 (250)	11.30 (286)	14.10 (358)	15.70 (400)	8
WP-SDC(1A7)-6	6"	11.00 (279.4)	9.50 (241.30)	8.50 (216)	0.965 (24.5)	5.31 (135)	0.878 (22.30)	11.80 (300)	13.60 (345.50)	16.40 (417.50)	19.70 (500)	8
WP-SDC(1A7)-8	8"	13.50 (343)	11.80 (298.50)	10.60 (270)	1.12 (28.5)	6.50 (165)	0.878 (22.30)	13.80 (350)	14.70 (372.50)	17.50 (444.50)	19.70 (500)	8

METER DIALS

fig 4



ORDERING INFORMATION

Table 3

Model	Description
Cold Water Meter, No Pulse Output	
WP-SDC(1A7)-2	2" Meter
WP-SDC(1A7)-3	3" Meter
WP-SDC(1A7)-4	4" Meter
WP-SDC(1A7)-6	6" Meter
WP-SDC(1A7)-8	8" Meter
Cold Water Meter, With Pulse Output	
WP-SDC(4A7)-2	2" Meter, 1 Pulse/100 gal
WP-SDC(4A7)-3	3" Meter, 1 Pulse/100 gal
WP-SDC(4A7)-4	4" Meter, 1 Pulse/100 gal
WP-SDC(4A7)-6	6" Meter, 1 Pulse/1000 gal
WP-SDC(4A7)-8	8" Meter, 1 Pulse/1000 gal

Model	Description
Hot Water Meter, No Pulse Output	
WP-SDH(1A7)-2	2" Meter
WP-SDH(1A7)-3	3" Meter
WP-SDH(1A7)-4	4" Meter
WP-SDH(1A7)-6	6" Meter
WP-SDH(1A7)-8	8" Meter
Cold Water Meter, With Pulse Output	
WP-SDH(4A7)-2	2" Meter, 1 Pulse/100 gal
WP-SDH(4A7)-3	3" Meter, 1 Pulse/100 gal
WP-SDH(4A7)-4	4" Meter, 1 Pulse/100 ga
WP-SDH(4A7)-6	6" Meter, 1 Pulse/1000 ga
WP-SDH(4A7)-8	8" Meter, 1 Pulse/1000 ga



Table 4

Part Description & Materials		
No.	Qty	WP-2", 3", 4"
1	1	Hinge Pin Brass
2	1	Lid ABS
3	2	Plug ABS
4	1	Upper Retaining Ring- ABS
5	1	Register Assembly
6	1	Bracket ABS
7	3	Screw 1Cr18Nig
8	4	Screw 1Cr18Nig
9	1	Immovable Plate ABS
10	1	Register House ABS
11	3	Screw 1Cr18Nig
12	1	Screw w/hole 1Cr18Nig
13	4	Gasket 1Cr18Nig
14	1	Measuring Unit Fe,CU,ABS,PA,PPO
15	1	O-ring NBR
16	1	Iron with Epoxy Coating
17	2	Copper Wire Brass
18	2	Seal Lead
19	1	Seal Pin 1Cr18Nig
20	2	Rvet Brass
21	1	Label Brass, Stainless Steel
22	2	Flange Gasket NBR

Part Description & Materials		
No.	Qty	WP-6", 8"
1	1	Hinge Pin Brass
2	1	Lid ABS
3	2	Plug ABS
4	1	Upper Retaining Ring- ABS
5	1	Register Assembly
6	1	Bracket ABS
7	3	Screw 1Cr18Nig
8	4	Screw 1Cr18Nig
9	1	Immovable Plate ABS
10	1	Register House ABS
11	7	Screw 1Cr18Nig
12	1	Screw w/hole 1Cr18Nig
13	8	Gasket 1Cr18Nig
14	2	Screw 20#
15	1	Measuring Unit Fe,CU,ABS,PA,PPO
16	1	Gasket NBR
17	1	Iron with Epoxy Coating
18	2	Copper Wire Brass
19	2	Seal Lead
20	1	Seal Pin 1Cr18Nig
21	2	Rvet Brass
22	1	Label Brass, Stainless Steel
23	2	Flange Gasket NBR

CLARK

FSI-T00-000 Impeller Type Flow Sensor

1", 1 1/2" & 2" Pipe Size, Pulse Output

DESCRIPTION

FSI-T00 flow sensors are designed specifically for flow monitoring and control applications in fluidic systems where the materials of construction and performance specifications are suitable.

The sensor features a square wave digital signal proportional to flow. The characteristics of the output signal duplicate existing impeller flow sensor signals making the FSI series sensor compatible with all manufacturer's control products.

The pulse signal will travel up to 2,000 feet without amplification.

The key elements of this new technology are a proprietary mounting tee, ultra-lightweight impeller and improved processor based electronics giving the FSI series sensor improved performance.



SPECIFICATIONS

Pipe Sizes

1", 1 1/2", 2"

Wetted Materials

Impeller: HDPE (High Density Polyethylene)

Shaft: Tungsten Carbide

O-ring: BUNA N

Tee, Sensor Housing, Retaining Nut: Type 1 PVC

Pressure Rating

Sensor designed to Schedule 40 specifications

Samples tested to working pressure of 240 PSI

Temperature Range

32°F to 140° F (0° to 60° C)

Output Signal

Frequency Range: 0.3 Hz to 200 Hz

Output Pulse: 5 msec +/-25%

Transducer Excitation

Quiescent current 600 uA@8 VDC to 35 VDC max.

Quiescent voltage (VHigh)= Supply Voltage - (600uA X Supply Impedance)

On State (VLow)= Max. 1.2 VDC@50mA current limit, (10 Ohm + 0.7VDC)

Velocity Range (See Table 2)

0.25 to 15 FPS

Electrical Cable

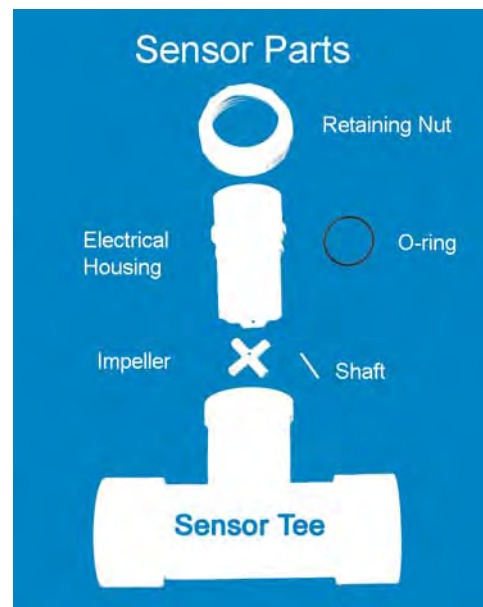
2 single conductor solid copper U.L. listed #18 AWG leads with direct burial insulation

Lead length: 48 inches

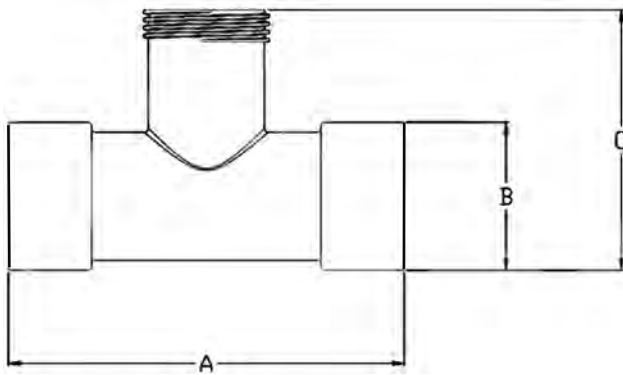
Wiring may be extended up to 2,000 feet with direct burial, twisted pair shielded cable

FEATURES

- **Molded Mounting Tee:** Improved control of dimensions for more consistent measurement and improved performance at low flow.
- **Threaded Retaining Nut Instead of Retaining Pin:** Easier to service in a valve box, more moisture resistance for electronics resulting in longer life.
- **Unique 4 Bladed Lightweight Impeller:** Measures lower flow rates. Detects flow as low as 20% of published minimum rate of other impeller sensors
- **Smart Electronics Detection System:** Sensor electronics contain a micro-processor for better signal filtering and conditioning. Detection circuit also contains superior over-voltage and over-current protection.



DIMENSIONS



Model	Pipe Size	A Length Inches (mm)	B Width Inches (mm)	C Height Inches (mm)	*K Factor (To read flow rate in GPM)	*Offset
FSI-T10-001	1"	5.625 (143)	1.710 (43)	3.487 (88)	0.322	0.20
FSI-T15-001	1 1/2"	6.188 (157)	2.310 (58)	5.097 (130)	0.650	0.750
FSI-T20-001	2"	7.00 (178)	2.875 (73)	4.573 (116)	1.192	0.938

*Frequency = (GPM/K) - Offset or GPM = Frequency x K + Offset

FLOW SENSOR OPERATING RANGE

FST flow sensors use a rotating impeller to sense the water moving through the closed pipe. The speed of the impeller rotation is proportional to the velocity of the liquid. As the impeller turns, it produces digital pulses. The relationship between velocity and volumetric flow rate is dependent on the size of the pipe and may be calculated using the formula $Q_{gpm} = V_{fps} \times D^2 \times 2.45$ where Q is the flow rate in gpm, V is velocity in fps and D is the inside diameter of the pipe in inches. The pipe must be full for the rotational speed of the impeller to accurately reflect flow.

FSI Series flow sensors measure flow over a range from 0.25 fps to 15 fps. Size the flow sensor for the flow rates that need to be measured, not the pipe size. The most common mistake in selecting a flow sensor is to oversize the unit and not be able to measure low flow. The flow sensor will operate at significantly higher velocities than commonly used for sizing pipe. Note: a 2" flow sensor has an operating range high enough for use with 3 or 4 inch diameter pipelines running at lower velocities. If the system flow rate falls below the minimum shown in these tables, use a smaller diameter flow sensor installed in a "meter run"- a section of pipe containing 10 diameters of straight pipe ahead of the sensor and 5 diameters of straight pipe after the sensor.

Model	Flow			
	FSI-T10-001 1"	FSI-T15-001 1 1/2"	FSI-T20-001 2"	
Feet Per Second	GPM	GPM	GPM	
Minimum Flow	0.25	0.86	1.8	2.8
	1	3.5	7.24	11.3
	2	7	14.5	23
	3	10.4	22	34
	5	17	36	57
	7	24	51	79
	10	35	72	113
	12	42	87	136
Maximum Flow	15	52	108	170

ELECTRICAL

- Two conductors are required to connect the flow sensor to the monitor or control device.
- The RED lead from the sensor is the + (Positive) lead and the BLACK lead from the sensor is the - (Negative) lead. Observe polarity when extending these conductors and connect them to the + and - leads or terminals of the FLOW SENSOR INPUT of the monitor or controller. Do not connect flow sensor to Power or Valve circuits!
- Use a shielded Direct Burial cable with at least one twisted pair of conductors. Multiple pair cable may be used. Use #20 AWG or larger stranded copper wire conductors to extend the distance up to 2,000 feet.
- Waterproof the splices. The preferred method is the two part epoxy kit, Scotchlok 3570 as manufactured by 3M. Follow all manufacturer's instructions.
- Make sure that the flow sensor housing is installed in the tee or the retaining nut is on the wire leads before making the splices.
- Provide a service loop in the cable to allow the flow sensor housing to be removed from the tee and brought above grade for servicing.
- Avoid making splices in the direct burial cable.

ORDERING INFORMATION

Model	Size
FSI-T10-001	1"
FSI-T15-001	1 1/2"
FSI-T20-001	2"

CLARK

FSI-500-000 Saddle Mount Impeller Type Flow Sensor

3" & 4" Pipe Size, Pulse Output

DESCRIPTION

FSI-500 flow sensors are designed specifically for flow monitoring and control applications in fluidic systems where the materials of construction and performance specifications are suitable.

The flow sensors are designed specifically for irrigation measurement and control applications. The standard two-wire flow sensor output is a digital square wave proportional to flow. The characteristics of the output signal duplicate existing impeller flow sensor signals making the FSI series sensor compatible with all manufacturer's control products.

The pulse signal will travel up to 2,000 feet without amplification.

The sensor insert mounts in a housing that controls the depth and alignment of the impeller, unlike other insert type sensors that may be mis-aligned or set to the wrong depth. The housing is permanently attached to the PVC saddle therefore no additional mounting hardware is required. They are rated to operate at pressures up to 150 psi.

FEATURES

- **Lower flow measurement** than competitive devices from unique mechanical design
- **Moisture resistant construction** for underground installations
- **Simple installation** – drill the pipe and mount the saddle- no need to measure, align or set depth
- **Easy to service** — single large retaining nut holds the sensor insert in the housing.



SPECIFICATIONS

Pipe Sizes

3", 4"

Wetted Materials

Impeller: HDPE (High Density Polyethylene)

Shaft: Tungsten Carbide

O-ring: BUNA N

Tee, Sensor Housing, Retaining Nut: Type 1 PVC

Working Pressure

150 PSI@90°F

Temperature Range

32°F to 140° F (0° to 60° C)

Output Signal

Frequency Range: 0.3 Hz to 200 Hz

Output Pulse: 5 msec +/-25%

Transducer Excitation

Quiescent current 600 uA@8 VDC to 35 VDC max.

Quiescent voltage (VHigh)= Supply Voltage - (600uA X Supply Impedance)

On State (VLow)= Max. 1.2 VDC@50mA current limit, (10 Ohm + 0.7VDC)

Accuracy:

±2% F.S.

Velocity Range (See Table 2)

0.25 to 12 FPS

3" Saddle: 6-300 GPM

4" Saddle: 10-480 GPM

Electrical Cable

2 single conductor solid copper U.L. listed #18

AWG leads with direct burial insulation

Lead length: 48 inches

Wiring may be extended up to 2,000 feet with direct burial, twisted pair shielded cable

DIMENSIONS

Table 1- Dimensions, K Factors						
Model	Pipe Size	Length Inches (mm)	Width Inches (mm)	H*eight Inches (mm)	**K Factor (To read flow rate in GPM)	**Offset
FSI-S30-001	3"	5.0 (127)	5.5 (140)	6.5 (165)	2.75	1.58
FSI-S40-001	4"	5.0 (127)	5.5 (140)	7.5 (190)	4.53	1.11

*Minimum Clearance Above sensor Required for Removal: 3.75 inches (96 mm)
 **Frequency = (GPM/K) - Offset or GPM = Frequency x K + Offset

FLOW SENSOR OPERATING RANGE

FSI-S30/40 flow sensors use a rotating impeller to sense the water moving through the closed pipe. The speed of the impeller rotation is proportional to the velocity of the liquid. As the impeller turns, it produces digital pulses. The relationship between velocity and volumetric flow rate is dependent on the size of the pipe and may be calculated using the formula $Q_{gpm} = V_{fps} \times D^2 \times 2.45$ where Q is the flow rate in gpm, V is velocity in fps and D is the inside diameter of the pipe in inches. The pipe must be full for the rotational speed of the impeller to accurately reflect flow.

Table 2- Flow			
Model		FSI-S30-001 3"	FSI-40-001 4"
	Feet Per Second	GPM	GPM
Minimum Flow	0.25	6	10
	1	25	40
	2	50	80
	3	75	120
	5	125	200
	7	175	280
	10	250	400
	12	300	480

ELECTRICAL

- Two conductors are required to connect the flow sensor to the monitor or control device.
- The RED lead from the sensor is the + (Positive) lead and the BLACK lead from the sensor is the - (Negative) lead. Observe polarity when extending these conductors and connect them to the + and - leads or terminals of the FLOW SENSOR INPUT of the monitor or controller. Do not connect flow sensor to Power or Valve circuits!
- Use a shielded Direct Burial cable with at least one twisted pair of conductors. Multiple pair cable may be used. Use #20 AWG or larger stranded copper wire conductors to extend the distance up to 2,000 feet.
- Waterproof the splices. The preferred method is the two part epoxy kit, Scotchlok 3570 as manufactured by 3M. Follow all manufacturer's instructions.
- Make sure that the flow sensor housing is installed in the tee or the retaining nut is on the wire leads before making the splices.
- Provide a service loop in the cable to allow the flow sensor housing to be removed from the tee and brought above grade for servicing.
- Avoid making splices in the direct burial cable.

ORDERING INFORMATION

Model	Size
FSI-S30-001	3"
FSI-S40-001	4"



Clark Solutions
 Toll Free: 800-253-2497 Tel: 978-568-3400
 e-mail: sales@clarksol.com www.clarksol.com

DUALPULSE – insertion flowmeters

DP490 & DP525 are cost effective stainless steel flowmeters for measuring the flow of water, fuels & other low viscosity liquids in pipes sizes 1.5"~100" (40~2500mm). Insertion flowmeters are installed with the metering head 1/8th into the pipe resulting in very little pressure drop. They do not require external power when used with the Flomec rate totalizers, however some options such as high temperature & non-magnetic models require external power.

Applications include HVAC, hot & chilled water, fire systems, water distribution (management & treatment), boiler feed water & hydrant flow testing.

FEATURES:

- IP68 (NEMA6) submersible 316SS construction.
- Low cost of ownership, wide flow range.
- Rugged & compact design.
- Intrinsically safe hazardous area versions.
- Integral or remote pre-amplifiers & flow instruments.
- DP525 version suitable for "hot tap" installation.
- Quadrature pulse output option & Bi-Directional Flow Measurement
- Integral 4-20mA output option

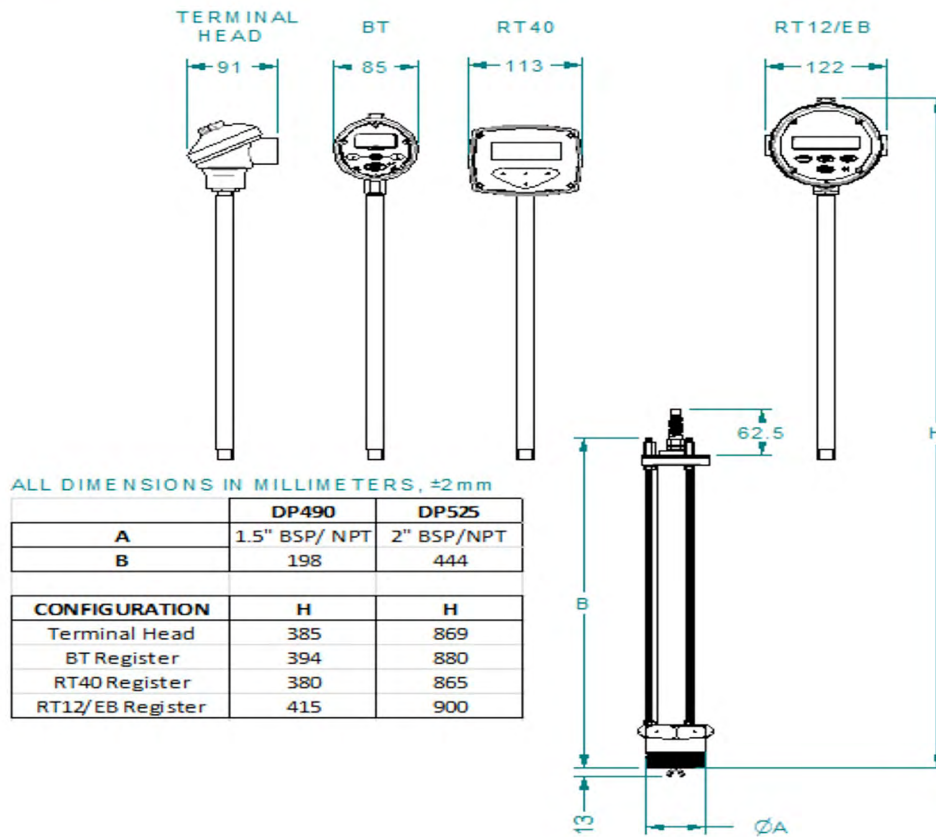


General Specifications

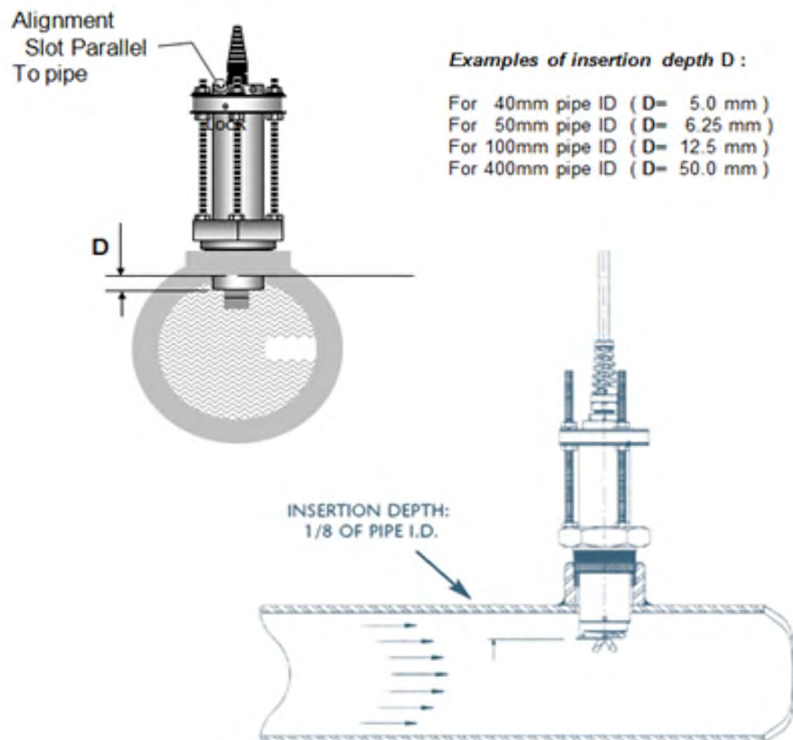
Model Prefix	DP490	DP525
Suit pipe sizes	40~900mm (1.5" ~ 35")	50~2500mm (2"~100")
Pipe connection	1.5" or 2" BSPT or NPT male	2" BSPT or NPT male
Flow range	0.25 ~ 6300 litres/sec (4 ~ 99600 USGM)	0.4 ~ 49000 litres/sec (6 ~ 780000 USGM)
Flow velocity range	0.3 ~ 10 metres/sec (1 ~ 33 feet/sec)	
Linearity	typically ± 1.5% with well-established flow profile	
Temperature range	-40°C ~ +150°C (-40°F ~ +300°F)	
Maximum pressure	80 bar (1160 psig)	
Materials	316ss body & rotor shaft, PVDF rotor (PEEK rotor optional)	
Pulse Outputs		
Reed switch	30Vdc x 200mA (max.), Nom. 0 ~ 80hz*	
Hall effect	3 wire NPN, 5 ~ 24 VDC, 20mA (max.) Nom. 0 ~ 240hz	
Voltage Pulse	Self-Generated voltage. Nom. 0 ~ 240hz	
Non-magnetic sensor	3 wire NPN, 5~24Vdc max., 20mA max. Nom. 0 ~ 240hz	
Optional outputs	4~20mA, scaled pulse, quadrature pulse, flow alarms or two stage batch control	
Protection class	IP68 (NEMA6), integral ancillaries can be supplied I.S. (intrinsically safe)	
Overall dimensions	Refer over page	

* Reed Switch resolution is 1/3rd that of the NPN Hall Effect or Voltage pulse outputs.

Over all Dimensions:



Standard Installation:



Model Coding – Dual Pulse Insertion Flowmeters:



DP490	1.5 to 36" pipes (40 ~ 900mm)
DP525	2 to 100" pipes (50 ~ 2500 mm) suitable for "hot-tap" installations (valve not included)

Body material

S	316 Stainless Steel
---	---------------------

Rotor & bearing materials

1	PEEK high temperature rotor w ith stainless steel rotor shaft; - 150°C (300°F)
2	PVDF rotor with 316 stainless steel rotor shaft (standard); 100°C (212°F)

O-ring materials

1	Viton (standard); -15°C (5°F) minimum
2	EPR (Ethylene Propylene Rubber); -40~+125°C (-40~+260°F)
3	Teflon encapsulated viton or application specific; -15°C (5°F) minimum
4	Buna-N (Nitrile), -40~+100°C (-40~+212°F)

Temperature limits

5	100°C (212°F) standard, (85°C [185°F] maximum for non magnetic output type 4) and FI 4-20mA
2	125°C (260°F) - available with electrical connections 5 & 6 & PEEK rotor only
3	150°C (300°F) - NPN output only (available with electrical connection 5 & PEEK rotor only)

Process connections

- 1	BSPT male thread - 1½" (DP490) 2" (DP525)
- 2	NPT male thread - 1½" (DP490) 2" (DP525)
- 3	2" BSPT male thread on the DP490
- 4	2" NPT male thread on the DP490

Pick-up type

1	NPN open collector & voltage pulse (standard)
2	NPN open collector(s) only (for temp code 3 or QP option)
3	Reed sw itch only (may be used with an I.S. barrier or instrument in hazardous areas)
4	Non magnetic rotor w ith NPN output (for liquids with ferrous impurities, needs power)
8	NPN open collector & Reed Sw itch

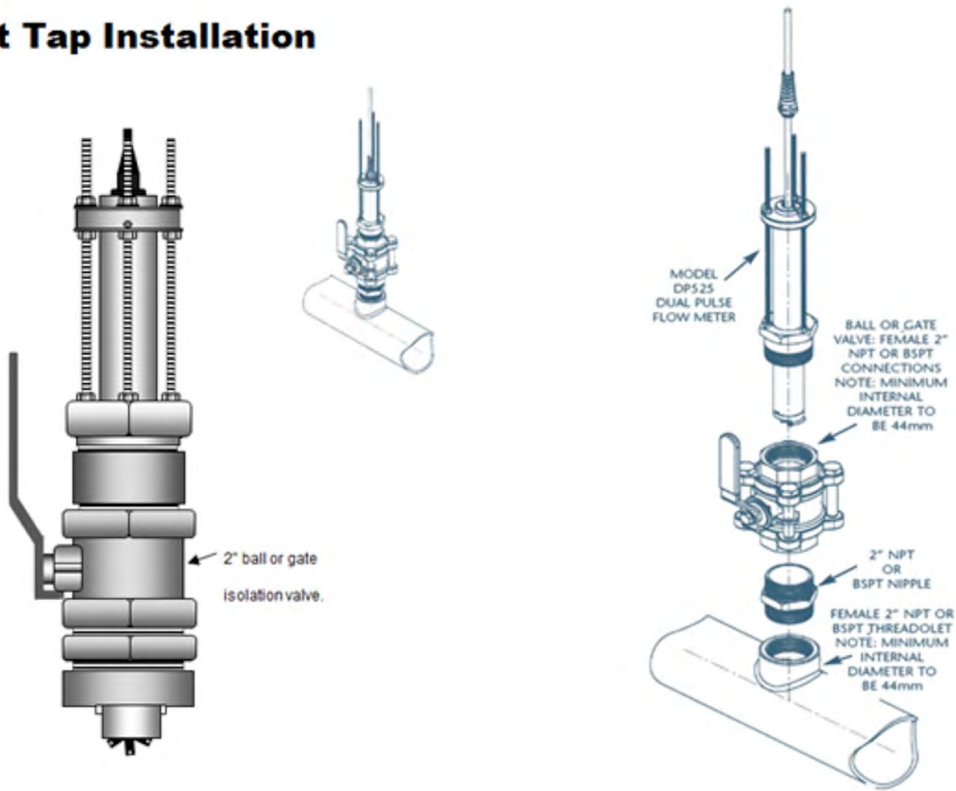
Electrical connections

1	3 metres cable [10ft] (standard)
2	10 metres cable [33ft]
3	20 metres cable [66ft]
4	50 metres cable [164ft] (for longer lengths refer to factory)
5	Terminal box on stem kit (add this for integral output option FI, 4-20mA output)
6	Stem kit (price included with integral options B2, B3, R2, R3 & E0)

Integral options

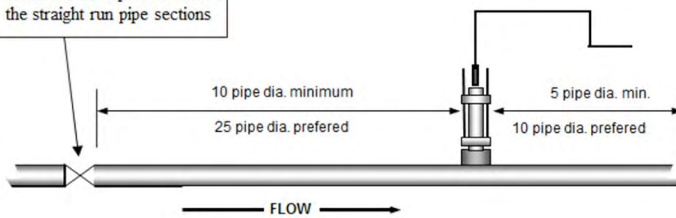
	QP	Quadrature pulse output (requires PD2 for bi-directional flow capability)
with scaleable pulse output	B2	BT11 dual totaliser (with scaleable pulse output)
IECEX & ATEX approved	B3	I.S. intrinsically safe BT11 including output
scaled pulse, alarms & 4-20mA	R0	RT12 rate totaliser w ith all outputs (Alloy housing)
scaled pulse, alarms & 4-20mA	R2	RT12 rate totaliser w ith all outputs
IECEX & ATEX approved	R3	I.S. intrinsically safe RT12 w ith all outputs
scaled pulse + backlighting	R4	* RT40 large LCD flow rate totaliser
	FI	Loop powered 4-20mA analog output (also add elec. connection 5 terminal box on stem kit)
	E0	Ecobatch dc powered two stage batch controller
	SB	Specific build requirement

Hot Tap Installation



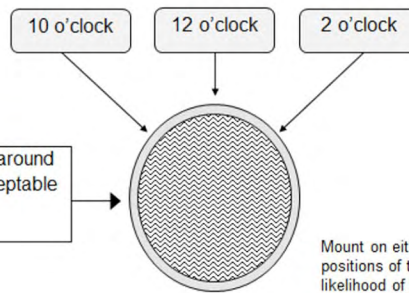
Major obstructions such as pumps, valves, reducers or strainers to be kept well outside the straight run pipe sections

Installation Straight Piping Requirements



Orientation

Other positions around the pipe are acceptable



Mount on either the 2, 10 or 12 o'clock positions of the pipe. If there is any likelihood of air entrainment in a horizontal pipe do not locate the flow transducer in the 12 o'clock position.

CLARK

IP80 Impeller Type Liquid Flow Sensor/Transmitter

Flow rates from 0.28 GPM to 4,700 GPM, Frequency, Analog & Alarm Outputs

DESCRIPTION

The IP80 Series are impeller-type insertion meters designed for use in pipe sizes 1/2" to 8". High-quality jewel bearings and nickel-bound tungsten carbide shaft are used for maximum life and extremely low friction. Bodies are machined from solid rod for maximum precision. Low-flow performance is superior. The rotation of the rotor is detected by a zero-drag Hall-effect sensor. Output is a pulse-type square wave, which can be sent long distances (up to 2,000 feet) without a transmitter. This signal can be connected directly to Clark data logger and control modules, as well as PLC's, counters, and computer cards.

IP meters are ideal for chemical proportioning applications. For rate and total display, as well as pump pacing, the FT415/420 flow indicator can be mounted directly on the IP80 Series, or remotely on a wall or panel. If display is not required for pump pacing, pulse divider PD10 provides adjustable pump pacing.

The IP80 Series come with special fittings, ensuring correct depth placement in the pipe. Fittings are available in PVC, brass, and stainless steel. Sensors are available in brass, 316 stainless steel, PVC, and polypropylene. In plastic pipe 3"-8", use an IP82 sensor, which is 1.00" longer than the IP81 to accommodate the larger fittings.

SPECIFICATIONS

Sensor: Hall effect Sensor, 12 VDC current sinking pulse

Materials:

Sensor Body: PVC, Polypro, Brass, or 316 SS
 Rotor: Kynar (PVDF)
 Shaft: Nickel-bound tungsten carbide, ceramic optional

Bearings: Ruby jewel
 O-ring: Buna-N, Viton® or EPDM optional

Maximum Temperature:

PVC, Polypro (See Temp. Chart): 130°F (55°C)
 Brass, SS: 200°F (93°C)

Maximum Pressure:

PVC & Polypro (See Temp. Chart): 175 PSI (12 bar) at 75°F
 Brass: 200 PSI (14 bar)
 316 SS: 250 PSI (17 bar)

Accuracy: ±1.5% F.S.

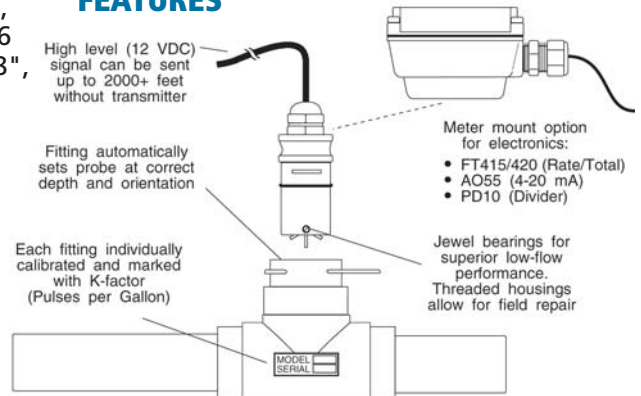
K-factor: IP80 Series meter are factory calibrated in their fittings. The K-factor (meter factor) is indicated on the side of the fitting. This represents the actual number of pulses per gallon the meter produced during the factory flow test.

Cable: 22 AWG 3-conductor, 18'



Flow Sensor Mounted in PVC Pipe Tee

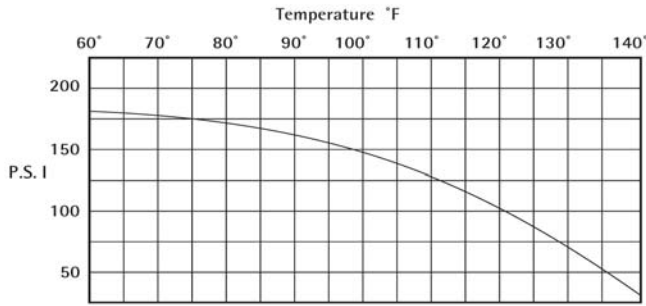
FEATURES



PVC, Polypropylene & 316 SS Sensors

		Table 1-Flow Ranges (GPM)							
	1/2"	3/4"	1"	1-1/2"	2"	3"	4"	6"	8"
Min.	0.28	0.50	0.80	1.90	3.10	6.90	12.00	27.00	47.00
Max.	28	50	80	190	314	691	1200	2700	4700

PVC & POLYPRO WORKING PRESSURE VS TEMPERATURE



OPTIONAL OUTPUT MODULES

These modules mount directly in a meter enclosure (supplied installed) or remote mount on a wall or in a panel.

FT415/420: FT420 indicating transmitter features rate and total display and 4-20 mA output. It also provides scaled pulse output for solenoid driven pump pacing, a pulse pass through for use with a PLC, and a programmable flow rate setpoint. Model FT415 is a battery powered indicating transmitter similar to FT420 except it does not have a 4-20 mA output.



FT420- Meter Mount

Power: 4-20 mA Loop Powered, 12-32 VDC
Rate Display: 6-digit autorange, 1/2" character height.

Pulse Output: 0.1 sec.open collector pulse (scaled); high or low alarm; sensor pulse (unscaled)

Input: pulse frequency, +5 VDC
K Factor Range: 0.050-999999.9
Pulse Output Range: 0.1-200,000 units/pulse
Flow Alarm Output Range: 0.1-999999.99
Enclosure: NEMA 4X die-cast aluminum

A055: 4-20 mA output module is easily scaled using rotary switches to enter the desired top end of range.



FT420- Wall Mount

Power: 12-36 VDC
Temperature: 32°-130°F (0° to 55°C)
Input: open-collector, solid-state
Min Frequency: 10 Hz (@20 mA)
Max. Frequency: 999.9 Hz
Output: Proportional 4-20 mA
Frequency Setting: 4 Rotary DIP switches
Input Averaging: 2-16 seconds, switch selectable
Response Time: 2-60 seconds 90% full scale



A055 Meter Mount

PD10: Output module is easily scaled using rotary switches to enter the desired number of pulses from paddle sensor to equal one pulse output to pump.

Power: 6-18 VDC
Divider: 1-999
Temperature: 32°-130°F (0° to 55°C)
Max. Frequency: 350 Hz (pulses/second)
Output: Open Collector transistor, 100 mS duration



PD10

ORDERING INFORMATION

EXAMPLE: IP81-S-FT420M-MF82W-S

Model	Material	Output	Fitting	Options
IP81 IP82	B= Brass S= 316 SS P= PVC Y= Polypro K= PVDF	-- Pulse Output (standard) FT415 or FT420M= FT415 or FT420 (mounted in meter enclosure) *FT415W or FT420W= FT 415 or FT420 (remote wall mounting) A055M= A055 (mounted in meter enclosure) *A055W= A055 (remote wall mounting) PD10M= PD10 (mounted in meter enclosure) PD10W= PD10 (remote wall mounting) *Supplied with brackets for wall mounting	Select Model & Size Code From Tables 2, 3, or 4	01= Ceramic Shaft 06= LMI connector 16= See Table 3 60= Viton® O-rings E= EPDM O-ring 07= Seametrics connector (to connect wall mount PD10 to meter)

FITTINGS

The following Tee fittings, saddle fittings and weld fittings are available for IP80 series paddle flow meters.

Table 2- Tee Fittings 1/2" to 4"

Model	Material & Style	Size code for pipe size						
		1/2"	3/4"	1"	1-1/2"	2"	3"	4"
MF81T-P	PVC/male stub	050	075	100	150	200	*	*
MF81TC-B	Bronze/female sweat (copper tube)	050	075	100	150	200	300	040
MF81T-B	Bronze/female thread	050	075	100	150	200	300	040
MF81T-S	304 SS/female thread	050	075	100	150	200	-	-
MF81T-C	Carb-Steel female thread	050	075	100	150	200	-	-

*Use MF82S-P with Option-16- see Table 3

Table 3- Saddle Fittings 3" to 8"

Model	Material & Style	Size code for pipe size			
		3"	4"	6"	8"
MF82S-P	**PVC	300	400	600	800
MF82S-F	Ductile Iron	300	400	600	800
MF82S-Y	Polypro	300	400	600	800
MF83S-B	Bronze	300	400	-	-
Option 16	Saddle fitting installed on 16" long pipe stub (PVC only)				

**PVC saddles are supplied with Buna-N O-rings only. For chemical service the o-ring must be removed and the saddle must be glued onto the pipe with PVC cement used as directed.

Table 4- Weld/Braze Fittings 3" to 8"

Model	Material & Style	Size code for pipe size			
		3"	4"	6"	8"
MF82W-B	Bronze	300	400	600	800
MF82W-C	Carbon Steel	300	400	600	800
MF82W-S	316 SS	300	400	600	800

CLARK

IP 100/200 Series Insertion Liquid Flow Transmitters

Flow rates from 3.0 GPM to 170,000 GPM, 3" to 48" Pipe Sizes

DESCRIPTION

Ruby bearings and a non-drag pick-off give these adjustable insertion flow sensors the widest flow range of any of the paddlewheel types. A sensor detects the passage of miniature magnets in the six rotor blades. The resulting square-wave signal can be sent for hundreds of feet without a transmitter, over unshielded cable. This signal can be connected directly to many PLC's and other controls without any additional electronics. Installation fittings are standard 1-1/2" or 2" NPT. A depth adjustment system allows two basic sizes to cover pipe sizes from 2" to 48".

A modular system of electronics can be attached directly to the flow sensor or remotely mounted. The FT415/420 provides full indication of rate and total, plus 4-20 mA output. The AO55 provides a 4-20 mA output, and the PD10 has a programmable pulse output for pump pacing.

The installation fitting of the EX sensor is standard male NPT, and can be directly threaded into ordinary saddles or threaded weld fittings. The IP115 and 215 include an isolation valve, allowing hot-tap installation, or installation and removal under pressure. The standard isolation valve is Bronze, but a 316 Stainless Steel valve is available as an option if needed.

SPECIFICATIONS

Sensor: Hall Effect Sensor, 12 VDC current sinking pulse

Materials:

Sensor: Brass, 316 SS, PVC

Rotor: PVDF

Shaft: Nickel-bound tungsten carbide or zirconia, ceramic optional

Bearings: Ruby

Range: 0.3 - 30 FPS (0.1 - 9 M/s)

Accuracy: $\pm 1\text{-}1/2\%$ FS

Maximum Pressure:

PVC: 150 psi @75° F (10 bar)

Brass & SS: 200 psi (14 bar)

Insertion Force: 0.44 X pressure in pipe

Pipe Size:

IP 101/115: 3" - 10" (50-250mm)

IP 201/215: 10" - 48" (250-1200mm)

Maximum Temperature:

PVC: 130°F (55° C) @ 0 psi

Brass & SS: 200°F (93° C)

Fitting Size: PVC, 2" NPT; Brass & SS, 1-1/2" NPT

Power: 5-24 VDC, 1.5mA

Nominal K-factor: 11 Hz/ FPS (3.6 Hz/M/s)

Cable: #22 AWG 3-con, 18'(6m)

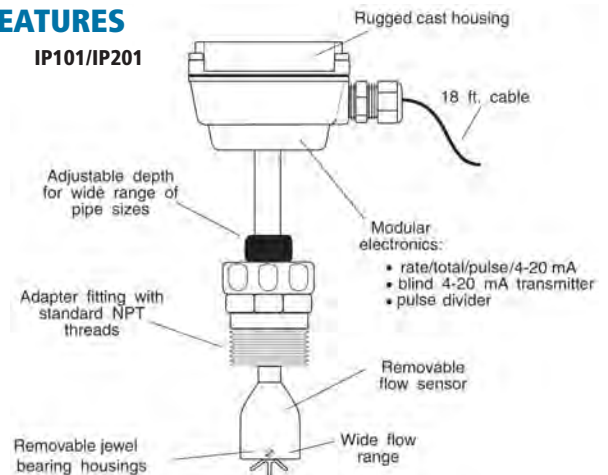
Maximum Cable Run: 2,000' (650m)



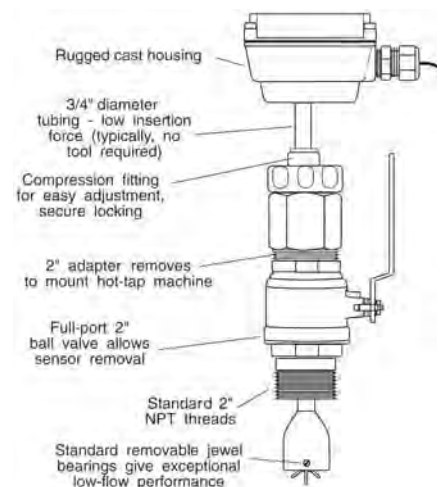
IP101/IP201 & IP115/IP215

FEATURES

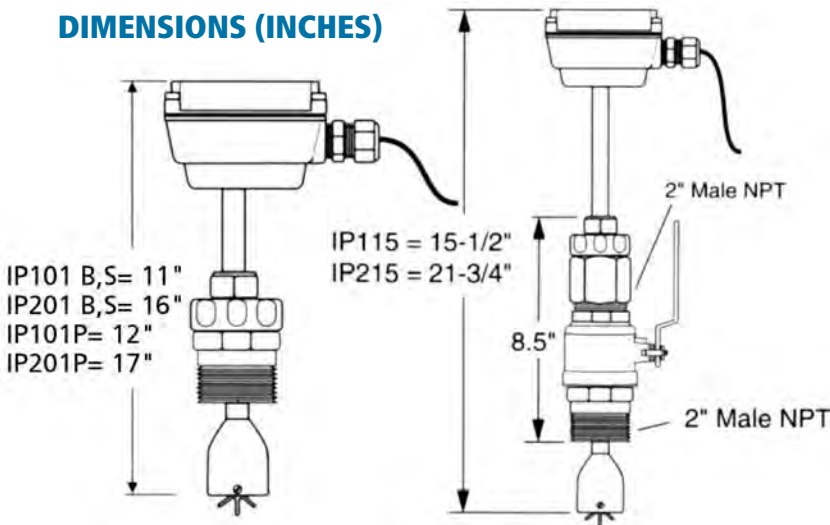
IP101/IP201



IP 115/IP215



DIMENSIONS (INCHES)



Flow Range (GPM)		
Pipe Size	Min. Flow	Max. Flow
3	7	700
4	12	1,100
6	30	2,500
8	50	4,500
10	75	7,000
12	100	10,000
16	175	16,000
24	400	35,000

	IP101-201/115-215 Pipe K Factors (Pulses per Gallon) for Various Pipe Sizes												
	3"	4"	5"	6"	8"	10"	12"	16"	24"	30"	36"	38"	42"
Sch. 40 PVC/Steel	28.92	16.79	10.69	7.40	4.27	2.14	1.51	0.960	0.420	0.250	0.180	0.160	0.135
Sch. 80 PVC/Steel	32.37	18.59	11.75	8.20	4.68	2.35	1.66	1.050	-	-	-	-	-
Stainless Steel (10S)	25.61	15.00	9.71	6.74	3.92	1.98	1.40	-	-	-	-	-	-
Stainless Steel (40S)	28.92	16.79	10.51	7.40	4.27	2.14	1.49	-	-	-	-	-	-
Stainless Steel (80S)	32.37	18.59	11.75	8.20	4.68	2.26	-	-	-	-	-	-	-
Type. K Copper Tubing	32.21	18.12	11.79	8.26	4.73	-	-	-	-	-	-	-	-
Type L Copper Tubing	31.39	17.85	11.46	7.97	-	-	-	-	-	-	-	-	-
Copper Pipe	29.03	17.01	10.62	7.26	4.25	-	-	-	-	-	-	-	-
Class 52 Duct. Iron	25.93	15.28	-	6.90	3.86	1.99	1.39	0.780	-	-	-	-	-

OPTIONAL OUTPUT MODULES

These modules mount directly in a meter enclosure (supplied installed) or remote mount on a wall or in a panel.

FT415/420: FT420 indicating transmitter features rate and total display and 4-20 mA output. It also provides scaled pulse output for solenoid driven pump pacing, a pulse pass through for use with a PLC, and a programmable flow rate setpoint. Model FT415 is a battery powered indicating transmitter similar to FT420 with pulse output except it does not have a 4-20 mA output.

Power: 4-20 mA Loop Powered, 12-32 VDC
Rate Display: 6-digit autorange, 1/2" character height.

Pulse Output: 0.1 sec. open collector pulse (scaled); high or low alarm; sensor pulse (unscaled)

Input: pulse frequency, +5 VDC
K Factor Range: 0.050-999999.9
Pulse Output Range: 0.1-200,000 units/pulse
Flow Alarm Output Range: 0.1-999999.99
Enclosure: NEMA 4X die-cast aluminum



FT420- Meter Mount



A055: 4-20 mA output module is easily scaled using rotary switches to enter the desired top end of range.

Power: 12-36 VDC
Temperature: 32°-130°F (0° to 55°C)
Input: open-collector, solid-state
Min Frequency: 10 Hz (@20 mA)
Max. Frequency: 999.9 Hz
Output: Proportional 4-20 mA
Frequency Setting: 4 Rotary DIP switches
Input Averaging: 2-16 seconds, switch selectable
Response Time: 2-60 seconds 90% full scale

FT420- Wall Mount



A055 Meter Mount

PD10: Output module is easily scaled using rotary switches to enter the desired number of pulses from paddle sensor to equal one pulse output to pump.

Power: 6-18 VDC
Divider: 1-999
Temperature: 32°-130°F (0° to 55°C)
Max. Frequency: 350 Hz (pulses/second)
Output: Open-Collector transistor, 100 mS duration



PD10

ORDERING INFORMATION

EXAMPLE: IP115-S-A055

Model	Material	OUTPUT	OPTIONS
IP101 IP201 IP115 IP215	Models IP101/202 B= Brass S= 316 SS P= PVC Models IP115/215 B= Brass Unit/Bronze Ball Valve S= 316 SS Unit/Bronze Ball Valve P= PVC Unit/PVC Gate Valve	-= Pulse Output (standard) FT415 or FT420M= FT415 or FT420 (mounted in meter enclosure) *FT415W or FT420W= FT 415 or FT420 (remote wall mounting) A055M= A055 (mounted in meter enclosure) *A055W= A055 (remote wall mounting) PD10M= PD10 (mounted in meter enclosure) PD10W= PD10 (remote wall mounting, requires Option 07) *Supplied with brackets for wall mounting	01= Ceramic Shaft 03= Bi-directional output (2 outputs) 06= LMI connector 08= Stainless Valve Assembly (Model IP115/215) 40= Submersible (consult Clark) 60= Viton® O-rings E= EPDM O-ring 07= Seametrics connector (to connect wall mount PD10 to meter)

CLARK

EX 80 Series Electromagnetic Liquid Flow Transmitters

Flow rates from 0.54 GPM to 3100 GPM, 1" to 8" Pipe Sizes

DESCRIPTION

The EX81 is an insertion electromagnetic flowmeter for use with conductive liquids in pipe sizes 1" to 3". The EX82 is for use with pipe sizes 4" to 8". With no moving parts, it is highly suitable for corrosive environments and for difficult applications such as those involving changing viscosities and pulsating flows. It is particularly recommended for metering the output of air-driven diaphragm pumps.

Designed for modularity and versatility, the EX81 has a current-sinking pulse output, which can be combined with the appropriate transmitter or indicator depending on the application. For analog output and display of rate and total, an FT420 can be used. For analog only, the AO55 can be mounted directly onto the meter. The PD10 can be used to divide the pulse for pacing chemical metering pumps. If the EX81 is being used with a programmable controller, the output signal can be fed directly with no other conditioning required.

The EX81 requires a special fitting, since it is not depth-adjustable. Installation in the fitting ensures correct depth placement in the pipe. Fittings and sensors are available in PVC, brass, and stainless steel.

SPECIFICATIONS

Power: 12 - 24 Vdc, 250 mA

Flow Range: 0.2 - 20 ft/sec (0.06 - 6.09 m/sec)

Fittings: Since the EX80-Series sensors are not adjustable, they must be purchased with fittings appropriate to the application. The EX81 is sized for 1" to 3" fittings. The EX82 is for 4" to 8" fittings. Each fitting ensures that the flow sensor is installed at the correct point. Every flow sensor and every tee fitting is wet calibrated. Saddle fittings are normally not wet calibrated, because they are field-installed on a pipe. In PVC however it is possible to order a saddle pre-installed on a standard length of pipe, in which case the entire assembly is wet-calibrated. For all other saddles, the k-factor (pulses per gallon) is established through testing with various standard schedules of pipe and provided with the saddle.

Max. Temperature: PVC, 0° - 130° F (55°C);
Brass & SS, 200° F (93°C)

Pressure: 200 psi (13.8 bar)

Minimum Conductivity: 20 microsiemens/cm

Mechanical Materials: 316 SS, PVC or Brass

Electrodes: Carbon Graphite

Electrode plate: PVDF

Housing: Cast powder-coated aluminum

O-rings: EPDM

Calibration Accuracy: 1% of full scale

Output: Square wave pulse, opto isolated, 500 Hz @ 20 ft/sec is standard. 4-20 mA, rate and totalized rate indicator and alarm output are optional.

Bi-directional: Direction output, opto-isolated

Empty Pipe Detection Software: defaults to zero flow

146



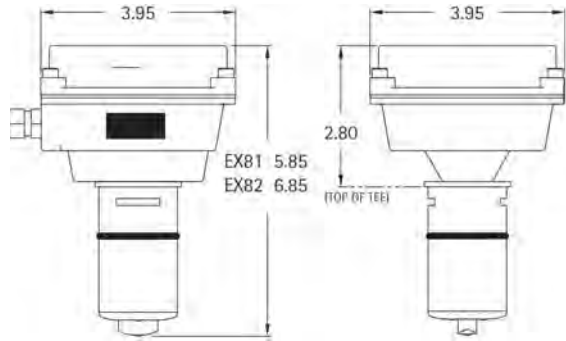
EX81

PARTS



The EX81 is sized for fittings of 1" to 3". The EX82 is for 4" to 8" fittings. Each fitting ensures that the flow sensor is installed at the correct point.

DIMENSIONS (INCHES)



OPTIONAL OUTPUT MODULES

These modules mount directly in a meter enclosure (supplied installed) or remote mount on a wall or in a panel.

FT420: FT420 indicating transmitter features rate and total display and 4-20 mA output. It also provides scaled pulse output for solenoid driven pump pacing, a pulse pass through for use with a PLC, and a programmable flow rate setpoint.



FT420- Meter Mount

Power: 4-20 mA Loop Powered, 12-32 VDC
Rate Display: 6-digit autorange, 1/2" character height.

Pulse Output: 0.1 sec. open collector pulse (scaled); high or low alarm; sensor pulse (unscaled)

Input: pulse frequency, +5 VDC
K Factor Range: 0.050-999999.9
Pulse Output Range: 0.1-200,000 units/pulse
Flow Alarm Output Range: 0.1-999999.99
Enclosure: NEMA 4X die-cast aluminum

A055: 4-20 mA output module is easily scaled using rotary switches to enter the desired top end of range.



FT420- Wall Mount

Power: 12-36 VDC
Temperature: 32°-130°F (0° to 55°C)
Input: open-collector, solid-state
Min Frequency: 10 Hz (@20 mA)
Max. Frequency: 999.9 Hz

Output: Proportional 4-20 mA
Frequency Setting: 4 Rotary DIP switches
Input Averaging: 2-16 seconds, switch selectable
Response Time: 2-60 seconds 90% full scale

PD10: Output module is easily scaled using rotary switches to enter the desired number of pulses from paddle sensor to equal one pulse output to pump.



A055 Meter Mount

Power: 6-18 VDC
Divider: 1-999
Temperature: 32°-130°F (0° to 55°C)
Max. Frequency: 350 Hz (pulses/second)
Output: Open Collector transistor, 100 mS duration



PD10

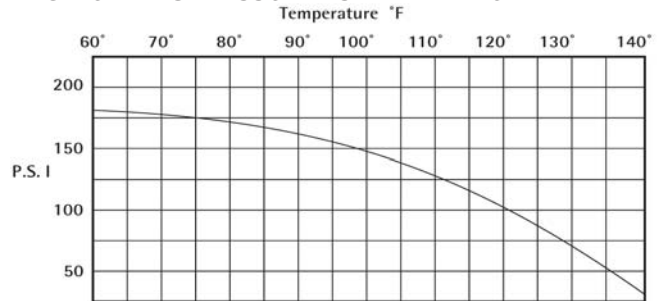
ORDERING INFORMATION

EXAMPLE: EX81-B-FT420M-EF81T-B

Model	Material	Output	Fitting	Options
EX81 IEX82	B= Brass S= 316 SS P= PVC	-- Pulse Output (standard) FT420M= FT420 (mounted in meter enclosure) *FT420W= FT420 (remote wall mounting) A055M= A055 (mounted in meter enclosure) *A055W= A055 (remote wall mounting) PD10M= PD10 (mounted in meter enclosure) PD10W= PD10 (remote wall mounting, requires Option 07) *Supplied with brackets for wall mounting	Select Model & Size Code From Tables 2, 3, or 4	14= 316 SS Fitting 16= See Table 3 125= Viton® O-rings 40= Submersible (consult Clark) 07= Seametrics connector (to connect wall mount PD10 to meter)

Pipe Size	Min. Flow	Max. Flow
1"	0.54	54
1-1/2"	1.3	127
2"	2.0	209
3"	4.5	461
4"	8.0	794
6"	18.0	1800
8"	31.0	3120

PVC WORKING PRESSURE VS TEMPERATURE



FITTINGS

Table 2- Tee Fittings 1" to 4"

Model	Material & Style	Size code for pipe size				
		1"	1-1/2"	2"	3"	4"
EF81T-P	PVC/male stub	100	150	200	*	*
EF81TC-B	Bronze/female sweat (copper tube)	100	150	200	300	040
EF81T-B	Bronze/female thread	100	150	200	300	040
EF81T-S	304 SS/female thread	100	150	200	-	-
EF81T-C	Carb-Steel female thread	100	150	200	-	-
EF81T-CP	CPVC/male stub ends	100	150	200	-	-
Option 14	All 316 SS	Consult Clark				

*Use EF82S-P with Option-16- see Table 3

Table 3- Saddle Fittings 3" to 8"

Model	Material & Style	Size code for pipe size			
		3"	4"	6"	8"
EF82S-P	**PVC	300	400	600	800
EF82S-F	Ductile Iron	300	400	600	800
EF82S-Y	Polypro	300	400	600	800
EF83S-B	Bronze	300	400	-	-
Option 16	Saddle fitting installed on 16" long pipe stub (PVC only)				

**PVC saddles are supplied with Buna-N O-rings only. For chemical service the O-ring must be removed and the saddle must be glued onto the pipe with PVC cement used as directed.

Table 4- Weld/Braze Fittings 3" to 8"

Model	Material & Style	Size code for pipe size			
		3"	4"	6"	8"
EF82W-B	Bronze	300	400	600	800
EF82W-C	Carbon Steel	300	400	600	800
EF82W-S	316 SS	300	400	600	800

CLARK

EX 100/200 Series Electromagnetic Liquid Flow Transmitter

Flow rates from 2.1 GPM to 25000 GPM, 3" to 48" Pipe Sizes

DESCRIPTION

The complete lack of moving parts of this insertion flow sensor is the source of its reliability. There is no rotor to stop turning in dirty water and there are no bearings to wear out. A rapidly reversing magnetic field is produced in the lower housing, and as the fluid moves through this field a voltage is generated. This tiny voltage is measured and translated into a frequency signal which is proportional to flow rate. This square wave signal can be sent directly to a PLC or other control, or can be converted using any of the associated family of indicators and converters.

A modular system of electronics can be attached directly to the flow sensor or remotely mounted. The FT420 provides full indication of rate and total, plus 4-20 mA output. The AO55 provides a 4-20 mA output, and the FS30 can be used as a precise setpoint flow switch.

The installation fitting of the EX sensor is standard male NPT, and can be directly threaded into ordinary saddles or threaded weld fittings. The EX115 and 215 include an isolation valve, allowing hot-tap installation or installation and removal under pressure. The standard isolation valve is Bronze, but a 316 Stainless Steel valve is available as an option if needed.

SPECIFICATIONS

Power: 12 - 24 Vdc, 250 mA

Flow Range: 0.2 – 20 ft/sec (.06 - 6.09 m/sec)

Fitting Size: EX101, 201 = 1-1/2" MNPT; EX115, 215 = 2" MNPT

Installation Pipe Sizes: EX101/EX115, 3" to 10" pipe; EX201/EX215, 10" to 48"

Temperature: Ambient, 0° – 180° F (-17 - 82° C); Fluid, 32° – 212° F (0° - 100° C)

Pressure: 200 psi (13.8 bar)

Minimum Conductivity: 20 microsiemens/cm

Mechanical Materials: 316 SS or Brass

Electrodes: Carbon Graphite

Electrode plate: PVDF

Housing: Cast powder-coated aluminum

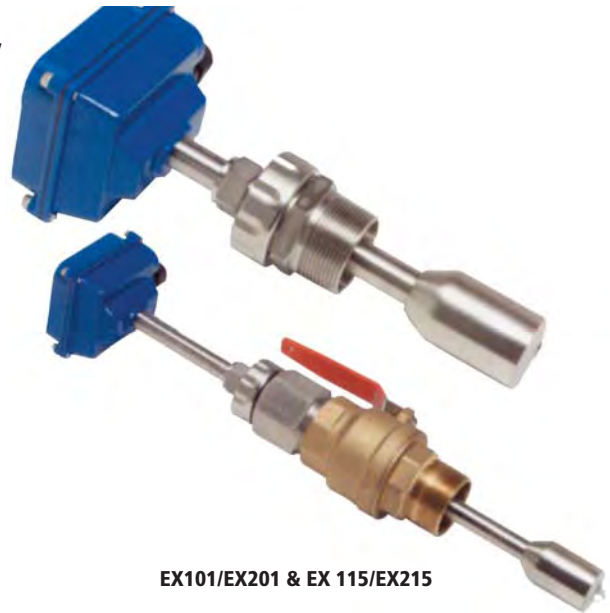
O-rings: EPDM

Calibration Accuracy: 1% of full scale

Output: Square wave pulse, opto-isolated, 500 Hz @ 20 ft/sec is standard. 4-20 mA, rate and total indicator and alarm output are optional.

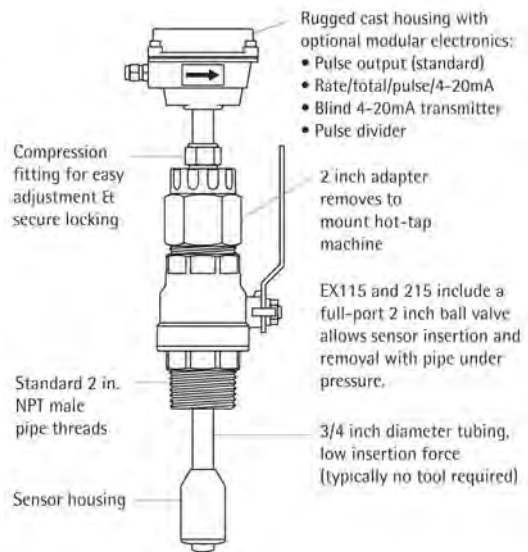
Bi-directional: Direction output, opto-isolated

Empty Pipe Detection Software: defaults to zero flow



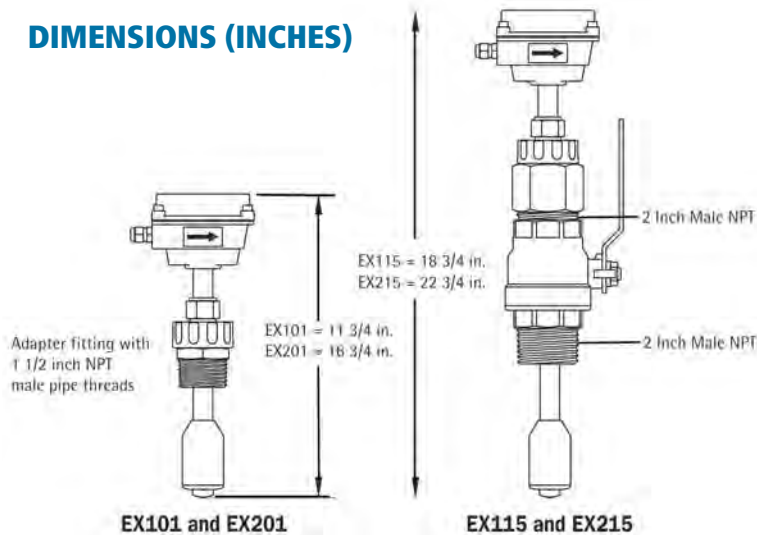
EX101/EX201 & EX 115/EX215

FEATURES



Magmeter Insertion Depth
The meter only extends approximately 1/8th of diameter into the pipe, minimizing the potential for clogging due to debris.

DIMENSIONS (INCHES)



Flow Range (GPM)		
Pipe Size	Min. Flow	Max. Flow
2	2.1	209
3	4.6	461
4	7.9	794
6	18	1,800
8	31.2	3,120
10	49.2	4,920
12	70	6,980
16	110	11,020
24	251	25,060

	Pipe K Factors (Pulses per Gallon) for Various Pipe Sizes																
	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	30"	36"	42"	48"
Sch. 40 PVC/Steel	143.4	65.01	37.80	16.66	9.62	6.10	4.30	3.56	2.72	2.152	1.731	-	1.197	-	0.515	-	-
Sch. 80 PVC/Steel	163.0	72.86	41.86	18.46	10.54	6.70	4.74	3.92	2.99	2.357	1.904	1.571	1.318	0.722	0.497	-	-
Stainless Steel (10S)	131.7	57.66	33.76	16.20	8.83	5.64	3.99	3.30	2.51	1.973	1.601	1.318	1.110	0.710	-	-	-
Stainless Steel (40S)	143.4	65.01	37.80	16.66	9.62	6.10	4.19	3.49	2.63	2.059	1.654	1.357	1.134	0.716	0.493	0.360	0.263
Type L Copper Tubing	155.5	70.65	40.18	17.94	10.27	6.61	4.58	-	-	-	-	-	-	-	-	-	-
Type K Copper Tubing	159.7	72.51	41.19	18.59	10.66	6.86	4.79	-	-	-	-	-	-	-	-	-	-
Copper Pipe	144.3	65.35	38.80	16.33	9.58	6.13	-	-	-	-	-	-	-	-	-	-	-
Class 52 Duct. Iron	-	-	34.41	15.54	8.71	5.65	3.95	2.91	2.22	1.756	1.422	-	0.987	0.635	-	-	-

OPTIONAL OUTPUT MODULES

These modules mount directly on the EX series electrical enclosure or remote mount on a wall or in a panel.

FT420: Indicating transmitter features rate and total display and 4-20 mA output. It also provides scaled pulse output for solenoid driven pump pacing, a pulse pass through for use with a PLC, and a programmable flow rate setpoint.

A055: 4-20 mA output module is easily scaled using rotary switches to enter the desired top end of range.

F30: Converts mag flow sensor to a flow switch. Setting is easy using rotary switches inside the housing. An indicator shows switch status.



FT420

Power: 4-20 mA Loop Powered, 12-32 VDC
 Rate Display: 6-digit autorange, 1/2" character hght.
 Pulse Output: 0.1 sec. open collector pulse (scaled); high or low alarm; sensor pulse (unscaled)
 Input: pulse frequency, +5 VDC
 K Factor Range: 0.050-999999.9
 Pulse Output Range: 0.1-200,000 units/pulse
 Flow Alarm Output Range: 0.1-999999.99
 Enclosure: NEMA 4X



A055

Power: 12-36 VDC
 Temperature: 32°-130°F (0° to 55°C)
 Input: open-collector, solid-state
 Min Frequency: 10 Hz (@20 mA)
 Max. Frequency: 999.9 Hz
 Output: Proportional 4-20 mA
 Frequency Setting: 4 Rotary DIP switches
 Input Averaging: 2-16 seconds, switch selectable
 Response Time: 2-60 seconds 90% full scale

ORDERING INFORMATION

EXAMPLE: EX115-S-A055

Model	Material	Options
EX101		- = Pulse Output (standard)
EX201	B= Brass	FT420M= FT420 (mount in transmitter enclosure)
EX115	S= 316 SS	*FT420W= FT420 (remote wall mounting)
EX215		A055M= A055 (mount in transmitter enclosure)
		*A055W= A055 (remote wall mounting)
		FS30M= FS30 (mount in transmitter enclosure)
		*FS30W= FS30 (remote wall mounting)
		*Supplied with brackets for wall mounting



FS30

Power: 12-36 VDC
 Flow Sensor Power: 5 VDC, 20 mA
 Temperature: 32°-120°F (0° to 48.9°C)
 Output: Form C relay, 10A @ 120Vac or 28 VDC max
 Setting Range: 1-999 Hz
 Accuracy: 1%
 Hysteresis: Adjustable 1-10%
 Modes: High (close on rise), Low (close on fall)
 Switch Response (after 90% change): 2 sec. rise, 3 sec. f
 Indicator: Power on (green), switch (red)

CLARK

WMX101 Flanged Magnetic Flow Transmitter

4" to 10" Pipe, F.S. flow ranges 500 to 1800 GPM

DESCRIPTION

The WMX101 is a flanged electromagnetic flow meter for use in utility or industrial water and wastewater applications. An ingenious economical design makes it an ideal meter for applications where propeller meters have been the norm, but with no moving parts to wear the magnetic flow meter minimizes maintenance costs and dramatically decreases total cost of ownership.

For simplicity, no field programming is required. Large, domed measurement and grounding electrodes discourage fouling. Rate and total indication are standard. There is a solid-state pulse output for connection to standard telemetry systems or to an external 4-20 mA converter.

Power required for the meter is within easy range of a solar panel, which can be ordered as an accessory or obtained locally. A shielded power/pulse output cable with DIN connection is included with the meter. Optional features include immersible electronics for occasional vault flooding. The AO55 pulse to analog converter can be added where a 4-20 mA signal is required.

SPECIFICATIONS

Pipe Sizes: 4", 6", 8", 10"

Flanges: AWWA 150 lb. drilling

Pressure: 150 psi working pressure

Temperature: 10°F to 130°F

Environmental: NEMA 4X standard, short term immersible option available

Accuracy (% of reading): ±1%, 10 to 100%; ±2%, 10% to cutoff

Materials:

Body: Welded steel, epoxy powder coated

Liner: HDPE

Electronics Housing: Diecast Aluminum

Electrodes: T316 stainless steel

Display:

6 Digit Rate of Flow Display Units	8 Digit Totalizer Display Units
Gallons/Minute	Gallons
Million Gallons/Minute	Gallons X 1000
Liters/Second	Cubic Meter
Cubic Feet Per minute	Cubic Feet

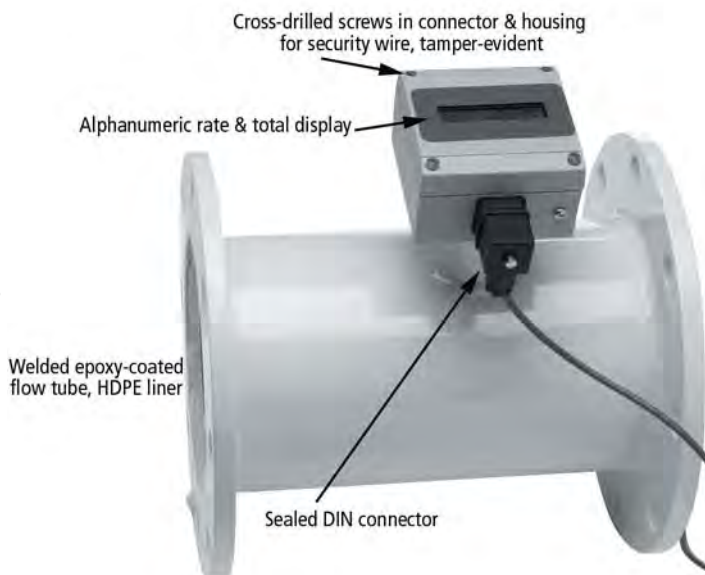
Power: 12-24 VDC, 30 mA max.

Output Signal: Current-sinking pulse, opto-isolated, 24 VDC, 10 mA max

Empty Pipe Detection: Hardware/software, conductivity-based

Flow Range:

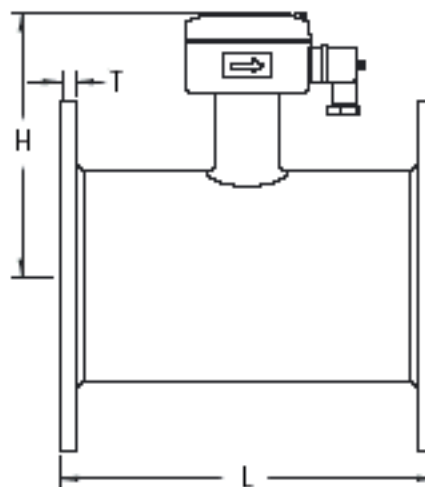
Flow Range (GPM)	Pipe Size			
	4"	6"	8"	10"
Min.	12	32	60	100
Max.	500	1200	1500	1800



FEATURES

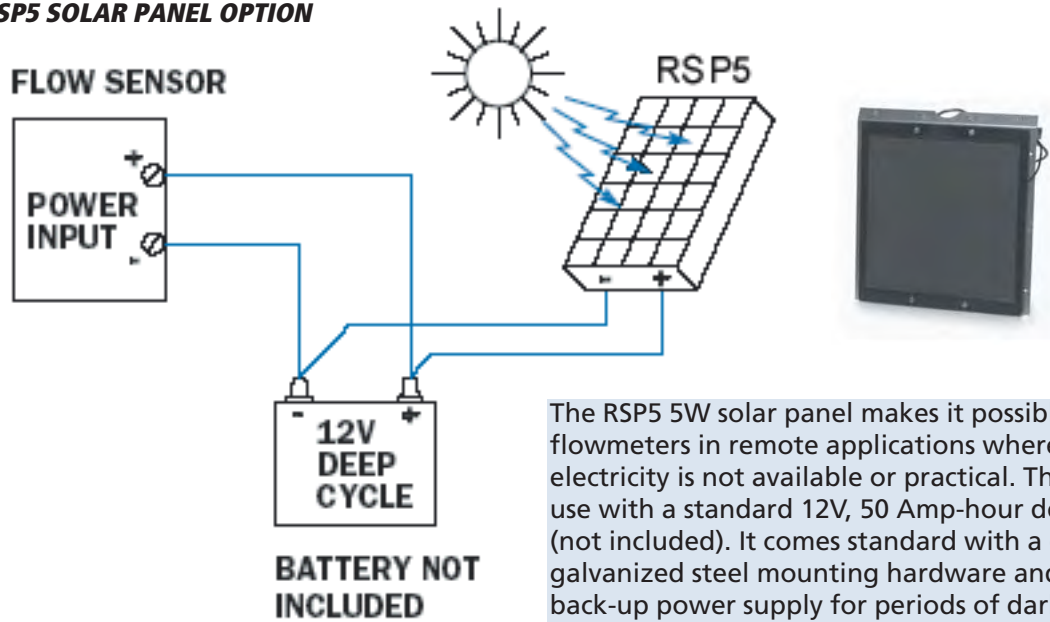
- Economical as mechanical meter
- No moving parts
- Solar-compatible power level
- Telemetry-ready
- Internal grounding electrodes

DIMENSIONS (MM)



Meter Size WMX101	L	H	T	Weight (Kg)
-400	250	188	15.88	10.5
-600	300	216	17.48	14.5
-800	350	241	17.48	21.5
-1000	450	264	17.48	32

RSP5 SOLAR PANEL OPTION



The RSP5 5W solar panel makes it possible to use WMX101 flowmeters in remote applications where a reliable source of electricity is not available or practical. The RSP5 is intended for use with a standard 12V, 50 Amp-hour deep cycle battery (not included). It comes standard with a charge controller and galvanized steel mounting hardware and provides a 90-day back-up power supply for periods of darkness.

Typical current at design operating point: 330 mA
 Typical voltage at design operating point: 15 V
 Weight: 3.63 Kg (8 lb)
 Overall height: 371 mm (14.625")
 Overall Width: 346 mm (13.625")

ORDERING INFORMATION

A-B-C-D-E

EXAMPLE: WMX101-8-00-GPM-GA

A Model	B Size	C Options	D Rate of Flow Units	E Totalizing Units
WMX101	400= 4" 600= 6" 800= 8" 1000= 10"	00= None 45= Immersible 39= Grooved Ends 38= Bi-Directional	GPM= Gallons/Minute MGD= Million Gallons.Day LPS= Liters/Second CFM= Cubic Feet/Minute	GA= Gallons GT= Gallons X 1000 CF= Cubic Feet CM= Cubic Meter

Accessories

- A055W**= Blind 4-20 mA converter, wall mount
- PC42**= Dual power supply, 110-115 VAC, 24 VDC
- PC3**= Power converter, plug-in, 110-115 VAC, 24 VDC
- RSP5W**= Solar panel kit, 5 Watt
- 31051**= Extra cable, specify length
- 31090**= Grounding ring 4"
- 31091**= Grounding ring 6"
- 31092**= Grounding ring 8"
- 31093**= Grounding ring 10"

PKP

DM01D Compact Magnetic Inductive Flow Transmitter

F.S. Liquid Flow Ranges from 100 ml/min to 200 l/min

DESCRIPTION

The compact magnetic inductive flowmeter model DM01D works without moving parts. It is designed especially for low flow rates and tight mounting conditions. Full scale ranges from 100 ml/min to 200 l/min are available.

The magnetic inductive flow meter works according to Faraday's law of induction. The liquid to be measured, (which must be electrically conductive), flows perpendicular to a magnetic field. This induces a voltage in the liquid. This voltage is picked up by means of two electrodes located in the measuring tube. The voltage is fed to a signal conditioning circuit that converts it to a square wave frequency output.

DM01D has no moving parts, therefore no maintenance and no wear and tear. There are no parts obstructing the flow in the measuring pipe and under normal operating conditions, no influence on the output of temperature, viscosity, concentration or pressure changes. A high turndown ratio (up to 50:1) expands the device application. Particles in the medium and viscous or polluted media may be measured without problems.

SPECIFICATIONS

Wetted Parts: measuring tube and electrodes, st. steel;
process connections, Delrin or PVDF

Max. Pressure: 6 bar

Medium Temperature: -10 to +40 °C

Max. Inaccuracy: +/- 1.5% of actual value

Min. Conductivity: 20 µS/cm

Supply Voltage: 24 VDC +/- 10%

Max Current Consumption: 50 mA

Output Signal: flow proportional frequency, square wave

Electrical Protection: IP 65

ORDERING INFORMATION

DM01DABC

EXAMPLE: DM01D0DM

A Range(l.min)	B Connection Material	C Connection
01 = 0.1...5 02 = 1...20 03 = 2...50 04 = 5...100 05 = 10...200	D= Delrin P= PVDF	*N = Female to Male NPT PP Adapter Supplied M = Metric per Table 1 * Ranges 01 & 02, 1/2" NPT; Range 03, 3/4" NPT; Ranges 04 & 05, 1" NPT



DM01D

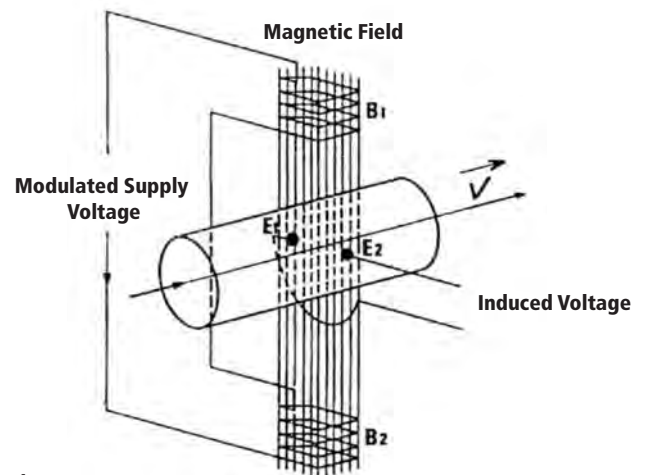


Table 1

measuring range. (l/min)	width x height (mm)	dia. of measuring tube (mm)	process conn.	K-factor (pulses per liter)
0.1...5	84.5 x 123	8	*G 1/2 AG	1000
0.2...20	84.5 x 123	8	*G 1/2 AG	800
0.5...50	90 x 123	14	*G 3/4 AG	400
1...100	90 x 123	18	*G 1 AG	200
2...200	90 x 123	18	*G 1 AG	100

*Note- PP female to male NPT adapters are available (1/2", 3/4" & 1")

PKP

DV01 Gear-Wheel Flowmeter

For Viscous Liquids, 20-4000 cSt, to 65 l/min, Frequency Output

DESCRIPTION

Model DV01 flow meter consists of a pair of steel gear wheels in an aluminum housing that are rotated by flowing liquid. A magnetic proximity sensor and signal conditioning circuit are isolated from the measuring chamber and sense the rotation of the gear wheels. The signal is converted to a pulse train output.

Models DV01-1 and DV01-3 gears have sleeve bearings and model DV01-2 uses ball bearings. They have low pressure drop and are quiet in operation.

The units are particularly well suited to dosing applications as well monitoring lubrication systems.

SPECIFICATIONS

Max. Pressure: DV01-1, 100 bar; DV01-(2,3), 160 bar

Pressure Drop: varies with viscosity and flow rate (consult factory)

Temperature Range: -10...+80°C (optional to 150°C)

Accuracy Of Measured Value: DV01-1, ±3%;

DV01-2, ±0.3%; DV01-3, ± 2.5%

Supply Voltage: 19...28 Vdc

Output Signal: square wave pulses,
min V= 0.8(supply voltage), 50% duty cycle (± 15%)

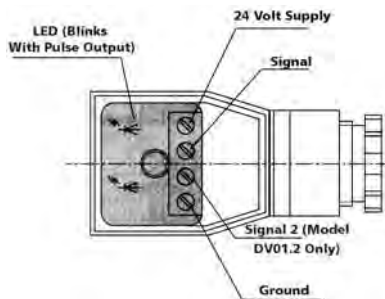
Enclosure Rating: IP 65

Weight: DV01-1, 0.5 kg; DV01-2, 0.7 kg; DV01-3, 1.9 kg

Model	Range l/min	Viscosity cSt	Connection	Meas. Volume ml/pulse	Resolution pulses/l
DV01-1	0.25...10	20...4000	3/8 G*	0.2	5,000
DV01-2	0.16...16	20...3000	3/8 G*	0.25	4,082
DV01-3	1...65	20...4000	3/4 G*	2	500

*Adaptor available for NPT

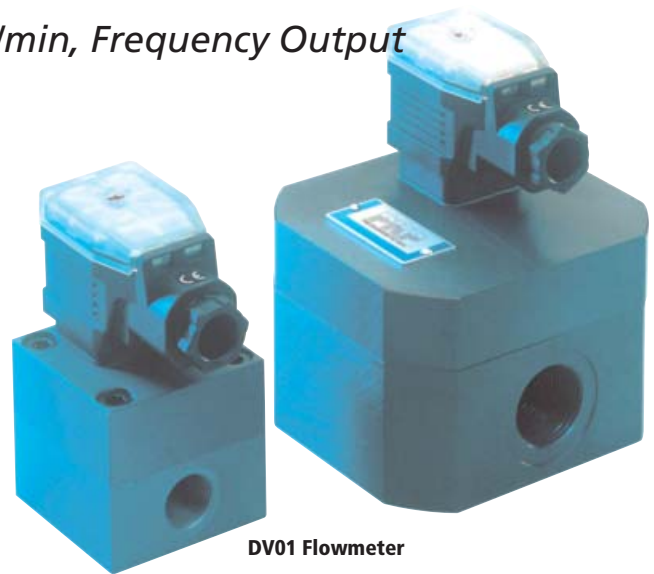
WIRING



ORDERING INFORMATION

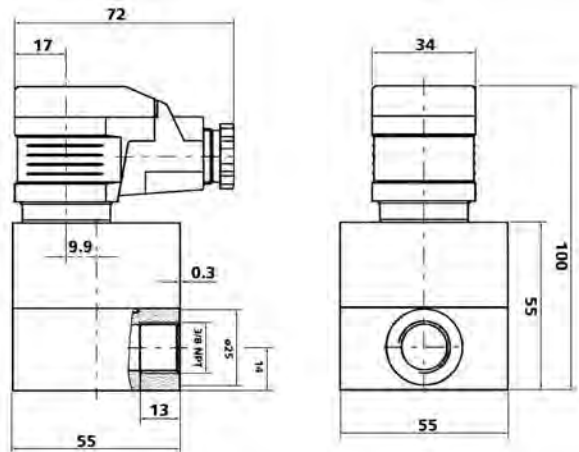
Model	Range
DV01-1	0.25 to 10 l/min
DV01-2	0.16 to 16 l/min
DV01-3	1.0 to 65 l/min

Add Suffix "H" for High Temperature Option

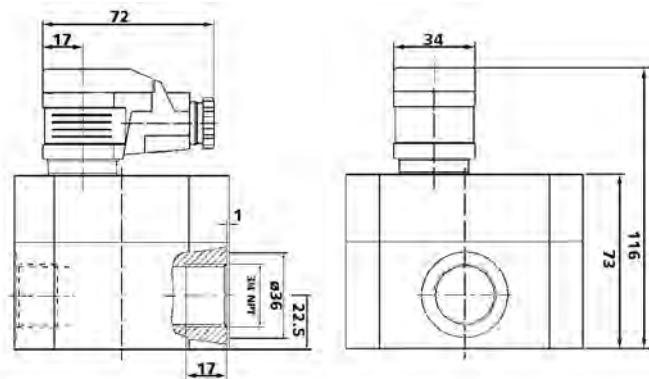


DV01 Flowmeter

DIMENSIONS (MM)



DV01; DV02 same as DV01 except housing is 55 x 65 mm x 108 mm height



DV01-3
Width x Depth : 90 x 100 mm



Series OM Oval Gear Flowmeters



SIZE

OM004	= 1/8 in.	(4mm)	0.13-9.5 GPH	0.5-36 L/hr
OM006	= 1/4 in.	(6mm)	0.5-27 GPH	2-100 L/hr
OM008	= 3/8 in.	(8mm)	4-145 GPH	15-550 L/hr
OM008	= 1/4 in. high pressure	(6 mm)	4-145 GPH	15-550 L/hr
OM015	= 1/2 in.	(15mm)	0.26-10.6 GPM	1-40 L/min
OM025	= 1 in.	(25mm)	2.6-40 GPM	10-150 L/min
OM040	= 1-1/2 in.	(40mm)	4-66 GPM	15-250 L/min
OM050	= 2 in.	(50mm)	8-120 GPM	30-450 L/min
OM080	= 3 in.	(80mm)	10-200 GPM	35-750 L/min
OM080	= 3 in. extended flow	(80mm)	13-260 GPM	50-1000 L/min
OM100	= 4 in.	(100mm)	20-400 GPM	75-1500 L/min

BODY MATERIAL

- A** = Aluminum
- E** = Extended flow aluminum version
- P** = PPS (73 PSI / 5 Bar)
- M** = Intermediate pressure aluminum meter (2000 PSI [138 Bar] max.)
- S** = 316L Stainless Steel
- N** = Intermediate press. 316L SS meters (OM004N-025N = 1450 PSI [100 bar] , OM040N-050N = 725 PSI [50 bar])
- H** = High Pressure 316SS (OM004H-040H = 5580 PSI [400 bar] max. OM050H = 4200 PSI [300 bar])

ROTOR MATERIAL

- 0** = PPS - PTFE filled (Polyphenylene Sulfide)
- 1** = Keishi cutting of PPS rotors (for high viscosity liquids)
- 5** = Stainless steel (standard on OM004 & OM006, optional on other sizes)
- 7** = Keishi cutting of stainless steel rotors (for high viscosity liquids)

BEARING TYPE

- 0** = No Bearing - PPS rotor option only
- 1** = Carbon Ceramic (standard with stainless steel rotors)

O-RING MATERIAL

- 1** = FKM (Viton™) (standard for Alum.) -5° F minimum (-15° C)
- 2** = EPR (Ethylene Propylene Rubber) - for ketones only
- 3** = PTFE encapsulated FKM (Viton™) - (standard for SS)
- 4** = Buna-N (Nitrile), -40° F minimum (-40° C)

MAXIMUM TEMPERATURE LIMIT

- 2** = 250° F (120° C) max.
(reduced to 80° C when fitted with integral instruments)
- 3** = 300° F (150° C) max.
(Hall Effect output only, not available with HP meters)
- 5** = 250° F (120° C) max. (includes integral cooling fin)
- 8** = 176° F (80° C) max.
(applies to Mech. Reg., OM025P & OM008 with PPS rotors)

Continued on next page.

OM SERIES OVAL GEAR METERS **METER NUMBER REFERENCE****PROCESS CONNECTIONS**

- 1** = BSPP (G) female threaded
- 2** = NPT female threaded
- 3** = Sanitary Fittings (Sanitary Fittings are 1/2" larger than the meter size)
- 4** = ANSI-150 RF flanged
- 5** = ANSI-300 RF flanged
- 6** = PN16 DIN flanged

CABLE ENTRIES

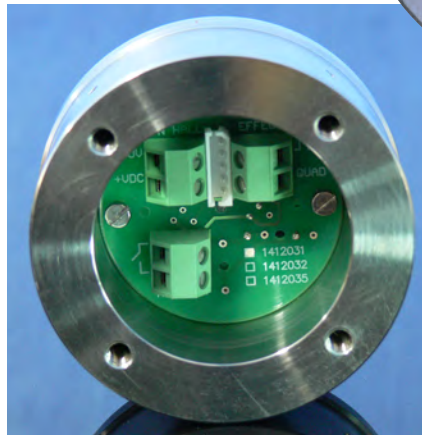
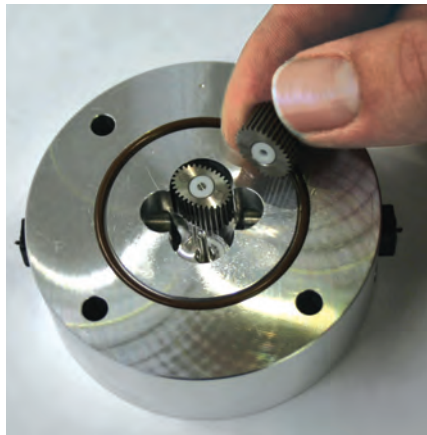
- 0** = 3-6mm cable gland or no cable entry [Exclusive to B2 & B3 options (OM004 to OM008 meter only)]
- 1** = M20 x 1.5 mm
- 2** = 1/2" NPT (OM004-OM008) 1/2" NPT Adaptor used for other sizes

INTEGRAL OPTIONS

- = Combination Reed Switch and Hall Effect Sensor
- G5** = [GG 500] Rate / Total Display with pulse out and optional Ex. Power
[Local Display w/ Pulse (60°C)]
- G6** = [GX 500] Rate / Total Display w/ 4-20mA out [Local Display w/ 4-20mA (60°C)]
- G7** = [GA 500] Loop powered 4-20mA analog output [Local 4-20mA (60°C)]
- RS** = Reed Switch only - to suit Intrinsically safe installations
- E1** = Explosionproof Exd IIB T4/T6 (aluminum & stainless meters) [IECEX & ATEX mines approved]
- E2** = Explosionproof Exd I/IIB T4/T6 (stainless meters only) [IECEX & ATEX mines approved]
- QP** = Quadrature pulse (2 NPN phased outputs) [not available with high press models]
- Q1** = Explosionproof Exd (with quadrature pulse, but not available with high pressure meter)
[IECEX & ATEX approved]
- HR** = High resolution Hall effect output (Hall Effect only) [OM004:11200ppL, OM006:4200ppL]
- H1** = Explosionproof - Exd with HR Hi-res. Hall option [IECEX & ATEX approved]
- PF** = Pulsating flow option (Hall effect output only) [for injected combustion engines]
- P1** = Explosionproof - Exd with PF pulsating flow option [IECEX & ATEX approved]
- B2** = BT11 totaliser with pulse output [with scaleable pulse output]
- B3** = Intrinsically safe BT11 with pulse output [IECEX & ATEX approved]
- R0** = RT12 rate totaliser with all outputs (Alloy housing) [scaled pulse, alarms, 4-20mA]
- R2** = RT12 rate totaliser with all outputs (GRN housing) [scaled pulse, alarms, 4-20mA]
- R3** = Intrinsically safe RT12 with all outputs (GRN housing) [IECEX & ATEX approved]
- R4** = RT40 rate totaliser with backlit large digit LCD [scaleable pulse output, backlight]
- E0** = EB10 batch controller [2 stage DC batcher & totaliser]
- M3** = 4-digit Mechanical Totalizer - litres [Resolution depends on size]
- M4** = 4-digit Mechanical Totalizer - gallon [Resolution depends on size]
- FI** = Loop powered 4-20mA analog output 176° F (- 80° C) max.
[Consult Factory for Availability with High Pressure Meters]

OM Small Capacity Flowmeters

1/8", 1/4", 3/8" Pipe Size



OM small capacity Flowmeters

Volumetric flow measurement of clean liquids or low flows used in automotive, aviation, mining, power, chemical, pharmaceutical, food, paint, petroleum industries and environmental applications. For metering additives for fuel, consumer products, water treatment and flotation cells, corrosion inhibitors, catalysts, emulsifiers, oils, grease, fragrances, adhesives, solvents, ink and insecticides. .

Features / Benefits

- High accuracy and repeatability, direct reading
- No requirement for flow conditioning (straight pipe runs)
- Stainless Steel rotors (Optional PPS Rotor for OM008 meter)
- Measures high and low viscosity liquids
- Quadrature pulse output option and bi-directional flow
- Integral 4-20mA output option
- Optional Exd I/IB approval (ATEX, IECEx)
- PF option available for metering pulsating flows

Meter Selection

- **Aluminium** meters for petroleum products (oils and grease, fuels and fuel oils)
- **Stainless steel** meters for the chemical, cosmetic, food and pharmaceutical industries (water based liquids)
- **Blind pulse** meters available with reed switch and Hall Effect outputs. Optional Quadrature pulse and Integral 4-20mA outputs available

Integral Instruments

Options include integral LCD totalisers, flow rate totalisers and batch controllers (4-20mA, scaled pulse, alarms and batch control)

- BT LCD 5-digit reset, 8-digit cumulative totaliser
- RT12 LCD 6-digit reset, cumulative totaliser and flow rate, analog and pulse outputs
- RT40 LCD 6-digit reset, cumulative totaliser and flow rate. Backlit Display
- EB LCD 6-digit 2 stage batcher and cumulative totaliser

(Available for remote mounting and with I.S. approvals)

General Specification

Flow Rates: 0.16 - 145 US gal/hr. (0.5 - 550 litres / hr.)*

Sizes: 1/8" - 3/8" NB (4 - 8mm)

Materials: Aluminium, 316 Stainless steel

NMI Approved Meters

National Measurement Institute (NMI) Weights and Measures Approval – Australia

Meters 1" and above available with optional NMI pattern approval and quadrature pulse output

* See also [Medium and Large Capacity](#) data sheets for other size meters.

Specifications

Model Prefix:	OM004 (1/8")	OM006 (1/4")	OM008 (3/8")
Nominal size (inches):	1/8" (4mm)	1/4" (6mm)	3/8" (8mm)
*Flow range - (GPH):	(0.13-9.5)	(0.5-27)	(4-145)
- (LPH):	(0.5 - 36)	(2 - 100)	(15 - 550)
**Accuracy @ 3cp:	± 1% of reading (accuracy is ± 0.2% of reading with optional RT12 with non-linearity correction)		
Repeatability:	Typically ± 0.03% of reading		
Temperature range:	-4° F - +250° F (-20° C - +120° C), refer factory for lower temperature		
Maximum pressure:	PSI (Threaded meters)bar		
Aluminium meters:	220 (15)		
316 stainless steel:	495 (34)		
Intermediate press. SS meter:	1450 (100)	1450 (100)	1450 (100)
High pressure models:	5800 (400)	5800 (400)	5800 (400)

Electrical - for pulse meters (see below for optional outputs)

Output pulse resolution:	Pulses / gallon (Pulses / litre) - nominal		
Reed switch:	10600 (2800)	3975 (1050)	1345 (355)
Hall effect:	10600 (2800)	3975 (1050)	2690 (710)
QP-Quadrature Hall option:	10600 (2800)	3975 (1050)	2690 (710)
PF-Pulsating Flow (Hall Effect):	10600 (2800)	3975 (1050)	675 (178)
HR-High resolution Hall effect:	42400 (11200)	15900 (4200)	N/A
Reed switch output:	30Vdc x 200mA max. [maximum thermal shock 18° F (10° C) / minute]		
Hall effect output (NPN):	3 wire open collector, 5-24Vdc max., 20mA max.		
Optional outputs:	4-20mA, scaled pulse, quadrature pulse, flow alarms or two stage batch control		

Physical

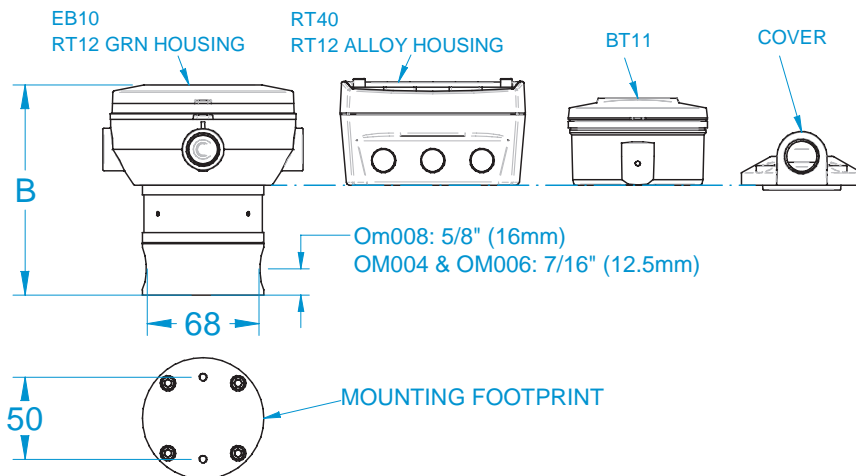
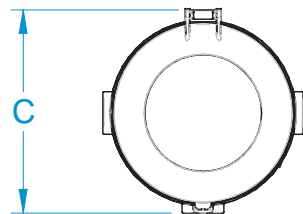
Protection class:	IP66/67 (NEMA4X), optional Exd I / IIB T4/T6, integral ancillaries can be supplied I.S. (intrinsically safe)
Overall dimensions:	Refer Below
Recommended filtration:	200 mesh (75 microns)

* Maximum flow is to be reduced as viscosity increases, see flow de-rating guide. Max. recommended pressure drop is 100Kpa. (14.5 psi)

** OP and PF Options are not available with High Pressure Meters

All dimensions are
inches ± .079 (millimeters ±2mm)

OPTION	B			C
	OM004	OM006	OM008	
EB10 / RT12 GRN HOUSING	4.8 / 122	4.8 / 122	5.0 / 129	4.9 / 124
RT40 / RT12 ALLOY HOUSING	4.9 / 125	4.9 / 125	5.2 / 132	3.8 / 96
BT	4.4 / 113	4.4 / 113	4.7 / 120	3.7 / 94
COVER	3.6 / 92	3.6 / 92	3.9 / 99	2.8 / 72



OM Medium Capacity Flowmeters 1/2", 1", 1-1/2", 2" Pipe Size



OM medium capacity flowmeters

Volumetric flow measurement of clean liquids used in automotive, aviation, mining, power, chemical, pharmaceutical, food, paint, petroleum industries. For distribution of fuels, fuel oils, lubricants, alcohols, solvents, blending of bio and ethanol fuels, metering of chemicals, grease, adhesives, ink, insecticides and pumps or gravity fed non-conductive liquids.

Features / Benefits

- High accuracy and repeatability, direct reading
- No requirement for flow conditioning (straight pipe runs)
- Various rotor material options
- Measures high and low viscosity liquids
- Quadrature pulse output option and bi-directional flow
- Integral 4-20mA output option
- Optional Exd I/IB approval (ATEX, IECEx)

Meter Selection

- **Aluminium** meters for petroleum products (oils and grease, fuels and fuel oils)
- **Stainless steel** meters for the chemical, cosmetic, food and pharmaceutical industries (water based liquids)
- **Blind pulse** meters available with reed switch and Hall Effect outputs. Optional Quadrature pulse and Integral 4-20mA outputs are available

Integral Instruments

Options include integral LCD totalisers, flow rate totalisers and batch controllers (4-20mA, scaled pulse, alarms and batch control)

- BT LCD 5-digit reset, 8-digit cumulative totaliser
- RT12 LCD 6-digit reset, cumulative totaliser and flow rate, analog and pulse outputs
- RT40 LCD 6-digit reset, cumulative totaliser and flow rate. Backlit Display
- EB LCD 6-digit 2 stage batcher and cumulative totalizer
- M/V* = Mechanical registers (see model numbering)

(Available for remote mounting and with I.S. approvals)

General Specification

Flowrates: 0.26 - 150 US gal/min. (1 - 580 litres/min.)*

Sizes: 1/2" - 2" NB (15-50 mm)

Materials: Aluminium, 316 Stainless steel or Ryton (PPS)

NMI Approved Meters

National Measurement Institute (NMI) Weights and Measures Approval – Australia

Meters 1" and above available with optional NMI pattern approval and quadrature pulse output

* See also [Small and Large Capacity](#) data sheets for other size meters.

Specifications

Model Prefix:	OM015 (1/2")	OM025 (1")	OM040 (1.5")	OM050 (2")	OM050 (2")E
Nominal size (inches):	1/2" (15mm)	1" (25mm)	1.5" (40mm)	2" (50mm)	2" (50mm)
*Flow range - (GPM):	0.26 - 10.6	2.6 - 40	2.6 - 66	8 - 120	9-150
- (LPM):	1 - 40	10 - 150	15 - 250	30 - 450	35-580
**Accuracy @ 3cp:	± 0.5% of reading (accuracy is ± 0.2% of reading with optional RT12 with non-linearity correction)				
Repeatability:	Typically ± 0.03% of reading				
Temperature range:	-4°F - +250°F (-20°C - +120°C), refer factory for lower temperature				
Maximum pressure:	PSI (Threaded meters) bar				
Aluminium meters:	990 (68)	990 (68)	435 (30)	285 (20)	285 (20)
Intermediate press. AL	-	2000 (138)	-	-	-
316 stainless steel:	990 (68)	990 (68)	435 (30)	550 (38)	-
Intermediate press. SS meter:	1450 (100)	1450 (100)	725 (50)	725 (50)	-
*** High pressure models:	5800 (400)	5800 (400)	5800 (400)	4350 (300)	-
Max. pressure Mechanical Meter	PSI (Threaded meters) bar				
Aluminium meters	580 (40)	580 (40)	435 (30)	285 (20)	285 (20)
316 stainless steel	580 (40)	580 (40)	435 (30)	285 (20)	-

Electrical - for pulse meters (see below for optional outputs)

Output pulse resolution:	Pulses / gallon (Pulses / litre) - nominal				
Reed switch:	318 (84)	102 (27)	53 (14)	25 (6.5)	18 (4.8)
Hall effect:	636 (168)	405 (107)	212 (56)	99 (26)	73 (19.2)
QP-Quadrature Hall option:	636 (168)	204 (54)	106 (28)	49 (13)	36 (9.6)
Reed switch output:	30Vdc x 200mA max. [maximum thermal shock 50° F (10° C) / minute]				
Hall effect output (NPN):	3 wire open collector, 5-24Vdc max., 20mA max.				
Optional outputs:	4-20mA, scaled pulse, quadrature pulse, flow alarms or two stage batch control				

Physical

Protection class:	IP66/67 (NEMA4X), optional Exd I / IIB T4/T6, integral ancillaries can be supplied I.S. (intrinsically safe)
Overall dimensions:	Refer Below
Recommended filtration:	100 mesh (150 microns)

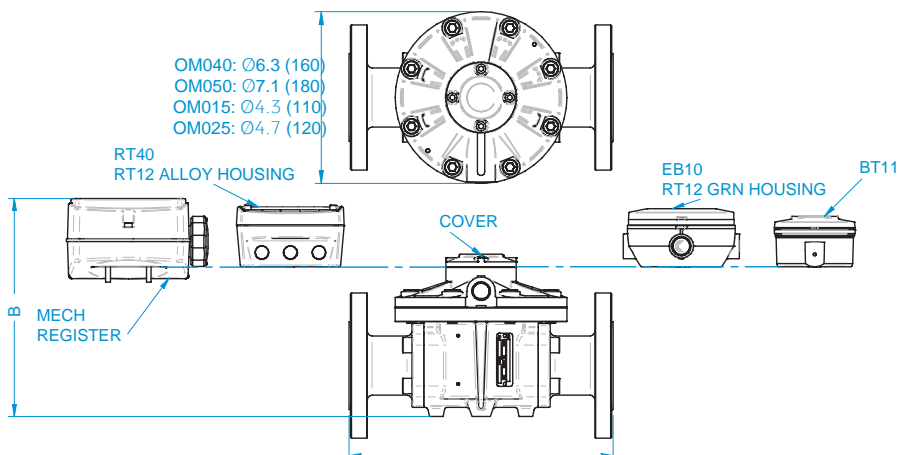
* Maximum flow is to be reduced as viscosity increases, see flow de-rating guide. Max. recommended pressure drop is 100Kpa. (15 psi)

** Accuracy ± 1% of reading with M - Series mechanical registers and accuracy ± 0.5% of reading with V-series mechanical register.

*** QP and PF Options are not available with High Pressure Meters.

All dimensions are inches ± .079 (millimeters ±2mm)

MODULAR FITTING	A						CONFIGURATION	B							
	OM015	OM025A	OM025S	OM040	OM050	OM050E		OM015S	OM025A	OM025S	OM040A	OM040S	OM050	OM050E	
A.N.S.I. 150 DIN16 JIS 10K	7.4 (189)	7.8 (198)	9.3 (237)	9.9 (252)	10.9 (277)	10.9 (277)	EB10/RT12 GRN Housing	6.0 (154)	5.8 (148)	6.6 (168)	6.5 (165)	7.9 (203)	7.6 (194)	8.6 (218)	10.5 (268)
							BT11 Register	5.7 (145)	5.5 (139)	6.3 (160)	6.2 (157)	7.8 (198)	7.3 (186)	8.3 (210)	10.2 (260)
							RT40/RT12 Alloy Housing	6.2 (157)	5.9 (151)	6.7 (171)	6.6 (168)	8.1 (206)	7.8 (197)	8.7 (221)	10.7 (271)
B.S.P N.P.T.	4.3 (110)	5.4 (137)	6.9 (176)	7.4 (188)	8.3 (212)	8.3 (212)	Cover	4.2 (106)	3.9 (100)	4.7 (120)	4.6 (117)	6.1 (155)	5.7 (146)	6.7 (170)	8.6 (220)
							Mech. Register	7.0 (178)	6.9 (176)	7.4 (188)	8.4 (214)	8.9 (227)	8.7 (222)	9.3 (237)	11.3 (286)



OM Large Capacity Flowmeters 3" & 4" Pipe Size



OM large capacity lowmeters

Volumetric flow measurement of clean liquids used in receipt verification, loading, un-loading and distribution management at petroleum plants, mine sites, marine and aviation facilities. For pumped or gravity fed distribution of fuels, oils, solvents, alcohols.

Features / Benefits

- High accuracy and repeatability, direct reading
- No requirement for flow conditioning (straight pipe runs)
- Various rotor material options
- Measures high and low viscosity liquids
- Quadrature pulse output option and bi-directional flow
- Integral 4-20mA output option
- Optional Exd I/IB approval (ATEX, IECEx)

Meter Selection

- **Aluminium** meters for petroleum products (oils and grease, fuels and fuel oils)
- **Stainless steel** meters for the chemical, cosmetic, food and pharmaceutical industries (water based liquids)
- **Blind pulse** meters available with reed switch and Hall Effect outputs. Optional Quadrature pulse and Integral 4-20mA outputs are available

Integral Instruments

Options include integral LCD totalisers, flow rate totalisers and batch controllers (4-20mA, scaled pulse, alarms and batch control)

- BT LCD 5-digit reset, 8-digit cumulative totaliser
- RT12 LCD 6-digit reset, cumulative totaliser and flow rate, analog and pulse outputs
- RT40 LCD 6-digit reset, cumulative totaliser and flow rate. Backlit Display
- EB LCD 6-digit 2 stage batcher and cumulative totalizer
- M/V* = Mechanical registers (see model numbering)

(Available for remote mounting and with I.S. approvals)

General Specification

Flowrates: 10 - 660 US gal/min. (35 - 2500 litres/min.)*

Sizes: 3" - 4" NB (80-100 mm)

Materials: Aluminium, 316 Stainless steel

NMI Approved Meters

National Measurement Institute (NMI) Weights and Measures Approval – Australia

Meters 1" and above available with optional NMI pattern approval and quadrature pulse output

* See also **Small and Medium Capacity** data sheets for other size meters.

Specifications

Model Prefix:	OM080	OM080E	OM100	OM100E
Nominal size (inches):	3" (80mm)	3" (80mm) E	4" (100mm)	4" (100mm) E
*Flow range - (GPM):	10 - 200	13 - 260	20 - 400	40 - 660
- (LPM):	35 - 750	50 - 1000	75 - 1500	150 - 2500
**Accuracy @ 3cp:	± 0.5% of reading (accuracy is ± 0.2% of reading with optional RT12 with non-linearity correction)			
Repeatability:	Typically ± 0.03% of reading			
Temperature range:	-4° F - +250° F (-20° C - +120° C), refer factory for lower temperature			
Maximum pressure:	PSI (Threaded meters) bar			
Aluminium meters	175 (12)	175 (12)	145 (10)	145 (10)
316 stainless steel	175 (12)	-	-	-

Electrical - for pulse meters (see below for optional outputs)

Output pulse resolution:	Pulses / gallon (Pulses / litre) - nominal			
Reed switch:	10 (2.65)	5.68 (1.55)	4.15 (1.1)	2.1 (0.56)
Hall effect:	40.5 (10.65)	22.7 (6.0)	8.3 (4.4)	8.5 (2.24)
Quadrature Hall option:	20 (5.33)	11.36 (3.0)	8.3 (2.2)	4.24 (1.12)
Reed switch output:	30Vdc x 200mA max. [maximum thermal shock 50° F (10° C) / minute]			
Hall effect output (NPN):	3 wire open collector, 5-24Vdc max., 20mA max.			
Optional outputs:	4-20mA, scaled pulse, quadrature pulse, flow alarms or two stage batch control			

Physical

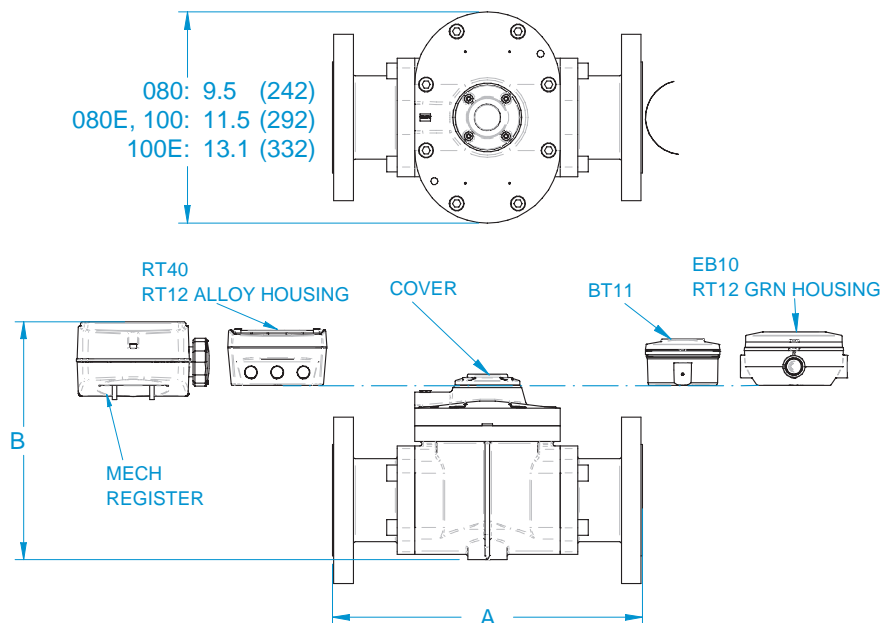
Protection class:	IP66/67 (NEMA4X), optional Exd I / IIB T4/T6, integral ancillaries can be supplied I.S. (intrinsically safe)
Overall dimensions:	Refer Below
Recommended filtration:	40 mesh (350 microns)

* Maximum flow is to be reduced as viscosity increases, see flow de-rating guide. Max. recommended pressure drop is 100Kpa. (15 psi)

** Accuracy ± 1% of reading with M - Series mechanical registers and accuracy ± 0.5% of reading with V-series mechanical register.

All dimensions are inches ± .079 (millimeters ±2mm)

MODULAR FITTING	A				CONFIGURATION	B				
	OM080	OM080E	OM100	OM100E		OM080A	OM080S	OM080E	OM100	OM100E
A.N.S.I. 150 DIN16 JIS 10K	13.9 / 354	15.0 / 382	15.3 / 388	16.3 / 414	EBREGISTER / RT12 GRN HOUSING	10.2 / 260	10.1 / 257	10.9 / 277	12.7 / 322	15.7 / 399
					BT REGISTER	9.9 / 252	10.2 / 259	10.6 / 269	12.3 / 314	15.4 / 391
					RT40 REGISTER / RT12 ALLOY HOUSING	10.3 / 264	10.2 / 260	11.0 / 281	12.8 / 326	15.8 / 403
B.S.P. N.P.T.	10.5 / 266	11.6 / 294	11.6 / 294	12.6 / 320	COVER	8.4 / 213	8.1 / 206	9.0 / 229	10.7 / 274	13.9 / 352
					MECH. REGISTER	10.6 / 270	N/A	11.3 / 288	13.1 / 333	16.4 / 416



Display With Pulse Output

GG500
Remote Mount



GG510
Local Mount

The GG500 is a remote mount Pulse-Out Transmitter with battery powered display. Choose the GG510 when a local mount is needed.

GG500/GG510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Open Collector (NPN)
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	9-volt battery or externally powered
Voltage Supply (Min.):	7 VDC
Voltage Supply (Max.):	30 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+14° F to +140° F (-10° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0 - 1000 Hz
High Level Low Freq.:	0 - 150 Hz
High Level High Freq.:	0 - 1000 Hz
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.0 lbs. (.45 kg)
Calibratable:	K-factor Entry

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Industry Standard Output: Unscaled Pulse.
- ✓ Easily mounted on pipe or wall.

GX500/GX510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Remote Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.1 lbs. (.5 kg)
Calibratable:	K-factor Entry

Display With 4-20 mA Output



GX500
Remote Mount



GX510
Local Mount

The GX500 is a remote mount 4-20 mA Output Transmitter with display. Choose the GX510 when a local mount is needed.

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ 2 Totals (Batch = Resettable, Cumulative = Non-Resettable); Rate of Flow. Factory calibrated in gallons and litres. Field calibratable. Allows user calibration. Includes non-volatile totals.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

4-20 mA Output

GA500
Remote MountGA510
Local Mount

The GA500 is a remote mount 4-20 mA Output Transmitter without display. Choose the GA510 when a local mount is needed.

GA500/GA510 – SPECIFICATIONS

Accuracy:	± 0.1% of reading
Output Options:	
Primary Output:	Loop (4-20 mA or 0-20 mA)
Minimum:	1.5 mA
Maximum:	25 mA
Auxiliary Outputs 0-5 V:	Single Ended
Minimum:	0.1 V
Maximum:	4.9 V
Pulse-Out:	
Max. "OFF" Voltage:	60 V
Max. "ON" Current:	200 mA
Max. "ON" Voltage Drop:	< 0.5 V @ 200 mA
Electrical:	
Strain Relief:	Hubble PG7
Strain Relief Thread:	Female 1/2-20 UNF-2B
Cable:	<i>Remote:</i> Belden 9363 (500 Series only) <i>Local:</i> No cable provided
Cable Length:	20 ft. (6 m) provided (500 Series only)
Power Supply:	2-wire, loop powered
Voltage Supply (Min.):	8.5 VDC
Voltage Supply (Max.):	35 VDC
Input Options:	Hall Effect, Reed Switch, Open Collector or Low Level Sine Wave
Mounting:	Pipe or wall
Operating Temperature:	+32° F to +140° F (0° C to +60° C)
Frequency Input:	
Low Level Coil (LLC):	0.25 - 1000 Hz
High Level Low Freq.:	0.25 - 150 Hz
High Level High Freq.:	0.25 - 1000 Hz
Optically Isolated HLLF:	w/2500 V optical isolation
Optically Isolated HLHF:	w/2500 V optical isolation
Enclosure Rating:	NEMA 4X / IP55
Shipping Weight:	<i>Remote:</i> 2.0 lbs. (.90 kg) <i>Local:</i> 1.1 lbs. (.5 kg)

ACCURACY: ±0.1% READING

Features and Benefits:

- ✓ Provides communication with process control equipment.
- ✓ Works with G Series, G2 Turbine Meters and GM Oval Gear Meters.
- ✓ Now available with Lockout feature.
- ✓ Microprocessor-based electronics have extremely low power requirements.
- ✓ Easy to set 4-20 mA endpoints under actual flow conditions.
- ✓ A signal conditioner with industry standard current loop output.
- ✓ Easily mounted on pipe or wall.

Features

- ▶ Self powered, 8 digit LCD cumulative totalizer and large 5 digit resettable totalizer
- ▶ Robust field or meter mountable housing with protection cover
- ▶ Simple programming
- ▶ PIN protected programming
- ▶ Accepts universal pulse inputs
- ▶ IP66/67 Weatherproof (NEMA 4X)
- ▶ Intrinsically safe version
- ▶ Long battery life
- ▶ Reverse polarity protection
- ▶ Display backlighting option

Outputs

- Pre-amplified pulse
- Scaleable pulse

Also available

- Flow rate totalisers
- Ecobatch batch controllers



Overview

The BT programmable self powered totaliser is specifically designed for computing & displaying totals from flowmeters or machinery with frequency, sine wave or pulse outputs.

The instrument simultaneously displays resettable (batch) total & a cumulative total in engineering units as programmed by the user.

Ultra low power consumption is a result of innovative design which provides as much as 10 years of service from the replaceable 3.6V lithium battery. The BT may also be externally powered by 8~24Vdc.

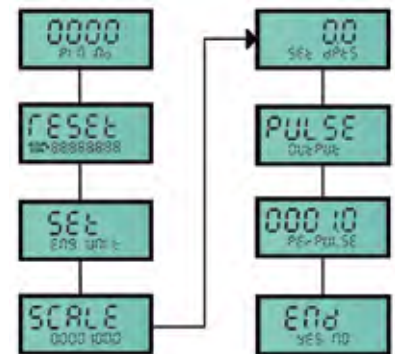
Pulse Outputs

The pulse output can be set as either a scaled or un-scaled pulse & is NPN/ PNP selectable.

The un-scaled pulse serves as a frequency amplifier for turbine or paddle wheel style flowmeters.

Programming

Simple PIN protected flow chart programming with English prompts guide you through the programming routine, greatly reducing the need to refer to the instruction manual.



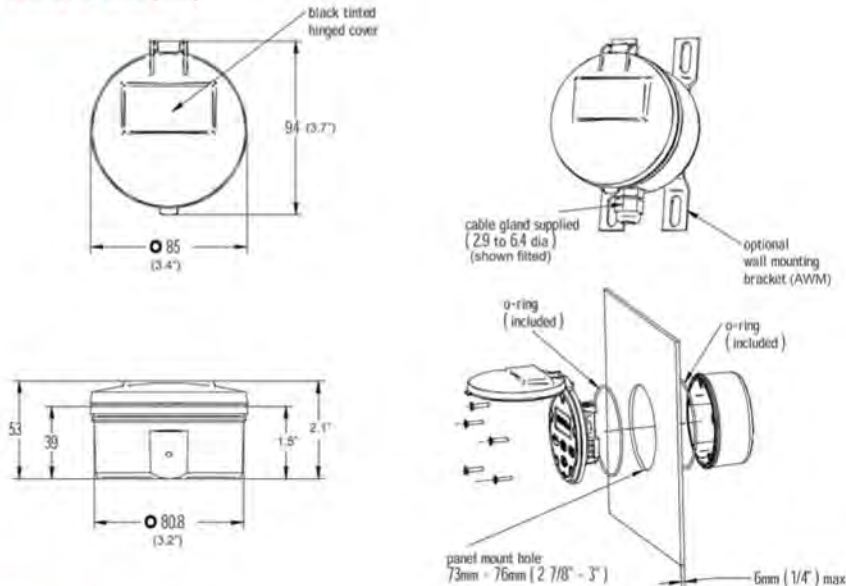
Programming Sequence

Specifications

Liquid crystal display (LCD)	alpha numeric LCD characters
Resettable total	5 digit x 7.5mm high, programmable to 3 decimal places
Accumulated total	8 digit x 3.6mm high, programmable to 3 decimal places
Engineering units displayed	litres, MLitres, gallons, Mgallons m3, lbs, kgs or no engineering units displayed
Input types (pulse & frequency)	reed switch, open collector, coil (15mV P-P min.), voltage, current, namur & other proximities
Max. input frequencies	coil 5Khz, hall 2.5Khz, namur 250hz
Input scaling range	0.001~9,999,999.999 with 3 floating decimal points
Pulse outputs	NPN/PNP selectable, non-scaleable (5Khz max.) or scaleable (8hz max.). The scaleable pulse output has a pulse width of 60msec
Operating temperature	-20~+80°C (-4~176°F), refer factory for higher / lower temp.
Power source	1 x 3.6V lithium battery, can last to 10 yrs.
External powering	8~24Vdc (drives output & backlighting)
Intrinsic safe option	Exia IIB T4
Enclosure	IP66/67 (NEMA 4X) glass reinforced nylon, 175g (0.4lb)
Electrical	supplied with gland to suit 3-6mm (0.1-0.2") Ø cable
Mounting	meter mount, wall, surface, pipe & panel

IN THE INTEREST OF CONTINUED PRODUCT DEVELOPMENT THE DESIGN & SPECIFICATIONS MAY ALTER WITHOUT NOTICE

Dimensions (mm)



Ordering codes

FMBT110D0	cumulative & batch (reset) totalizer with pulse output
<i>Housing type</i>	
FM	universal mount (field, surface, pipe, wall or panel mount)
MM	integral meter mount
<i>Options</i>	
I	intrinsically safe to Exia IIB T4
B	backlighting of LCD display (requires external dc power)

Optional adaptors

AWM	stainless steel wall mount kit	ATM	fixed stem for Turbine meters
APM	stainless steel 2" pipe mount kit	AUS	swivel stem for Turbine meters
ACF	cooling fin for hi temp. flowmeters	ACG	additional cable gland



wall - surface mount



panel mounted



meter mount



meter mount



batch controller

flow rate totaliser

other instruments

FRT12 Flow Rate & Totalizer Display

LCD display FRT12 is a fully programmable self-powered flow rate totalizer specifically designed for computing & displaying flow rates & totals from flow meters with pulse, sine wave or frequency outputs.

The instrument displays resettable (batch) total, cumulative total and instantaneous flow rate in engineering units as programmed by the user.

Outputs (Under external power)

An unscaled pulse output serves as an input signal amplifier ideally suited for coil type inputs from turbine or paddle wheel meters. The output can be transmitted over long distance & is NPN/PNP selectable (current sinking or current sourcing).

Features /Benefits

- Self or external powered, 8 digit LCD total & 8 digit cumulative totalizer, 5 digit rate display
- Robust IP66/67~NEMA 4X universal mount or DIN Panel mount version
- Aluminium/GRN field & panel mountable housing
- Scaled pulse, 4-20mA (Loop Powered) Output, Dual flow inputs (A+B, A-B, A+B), multi point linearization of flow input or frequency inputs
- High & low flow alarms & Low Frequency cutoff
- PIN protected programming
- Simple flow chart touch key programming
- Reverse polarity protection
- Non volatile memory, Long battery life
- Relay board with SPDT outputs (Optional)
- Flowmeter & pipe mount kits available
- Optional Intrinsically safe version to Exia IIB T4 version (IECEX & ATEX approved)

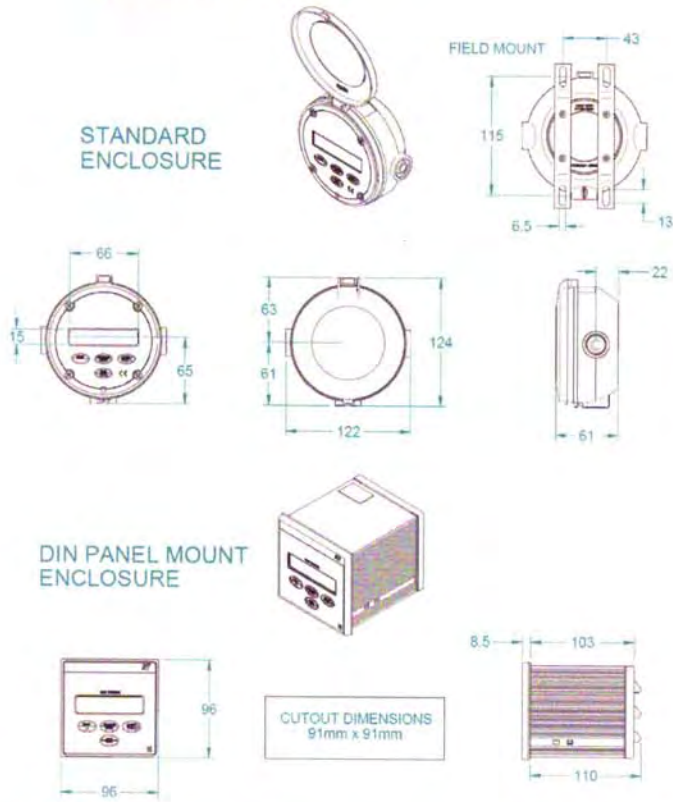


Specifications

Model prefix :	FRT12
Displays	8 digit numeric display with LCD character 8 digit reset & cumulative totalizer 5 digit rate display
Memory	All programmed & accumulative data is stored permanently in non-volatile memory
Temperature range	-20°C ~ +80°C max (-4°F ~ 176°F max)
Signal Input	Pulse/frequency Input with reed switch Hall Effect, Voltage, Current & Coil, dual inputs (A+B,A-B,A+B)
Pulse Output	NPN transistor, Scalable (20hz, 100mA max.)
Rate Outputs	4~20mA into 750 ohms @24Vdc, NPN/PNP solid state & relay options
Linearisation	10-point correction
Intrinsic safe option	Exia IIB T4
Battery power	Life expectancy 5 years* (Unit draws about 70µA under battery)
External Power	Regulated 8~24Vdc x 50mA min (Reverse polarity protected)
Configuring	PIN Protected data entry IP66/67 (NEMA4X)
Protection class	3 x M20 or 1/2" NPT female conduit entries for GRN Hosuing 3 x M16 female conduit entries for Aluminium housing
K-factor range	Scale factor i.g. pulses/litre, gallon etc. programmable range 0.001 ~ 99,999.999
Engineering Units	Selectable Ltr, gal, m ³ ,kgs, lbs (total)/sec, /min, /hr or day (rate)

* Battery life reduces when rate is more often displayed & there is no external power connected.

Over all Dimensions:



Model Code:

FRT12	Flow rate totalizer with 4~20mA, scalable pulse & alarm outputs, dual flow inputs
Electrical access	
1	M120 x 1.5mm (M16 x 1.5 for Aluminium housing) female threaded conduit entry ports
2	1/2" NPT female threaded conduit entry ports (Not available on aluminium housing)
Flow Input type	
D	Digital (pulse or frequency)
Power supply	
0	Self powered (battery) or regulated 8~24 Vdc
Housing type	
FM	Universal mount (field or panel) - GRN Housing
MM	Integral meter mount- GRN Housing*
FA	Universal mount (field or panel) - Aluminium Alloy Housing*
MA	Integral meter mount- Aluminium Alloy Housing*
* Only order MA when retro fitting instrument to OM series pulse meter	
Electrical options	
R	Control output relay board interface with two SPDT relays
I	I.S intrinsically safe to Exia IIB T4 - IECEx & ATEX approved
Mechanical options	
P	Facia protector - for Aluminium housing only (3mm clear polycarbonate protection plate)

Model No.	Example
FRT12	1 D 0 FM - I

Other Instruments also available:

- Battery totalizers (FBT11)
- Automatic batch controllers (FEB10)
- Flow rate totalizer with backlit large digit LCD, alarm & scalable outputs (FRT40)



FRT40 Rate And Totalizer Display

LCD display RT40 battery powered flow rate totaliser is specifically designed for computing & displaying flow rates & totals from flow meters with pulse, sine wave or frequency outputs.

The instrument displays resettable (batch) total, cumulative total and instantaneous flow rate in engineering units as programmed by the user.

Robust field & panel enclosure

Designed for the more rugged applications in mines sites & mobile installations, the RT40 LCD display has a backlight panel & large digits for distance viewing at night.

Features /Benefits

- Battery or external powered, 6 digit large LCD total & 8 digit cumulative totaliser, 5 digit rate display
- Robust IP66/67~NEMA 4X Aluminium field & panel mountable housing
- LCD Backlighting standard
- Scalable universal pulse or frequency inputs
- Scaled pulse output
- PIN protected programming
- Simple flow chart touch key programming
- Reverse polarity protection
- Long battery life
- Heavy duty facia protector shield
- Relay board with SPDT outputs
- Flowmeter & pipe mount kits

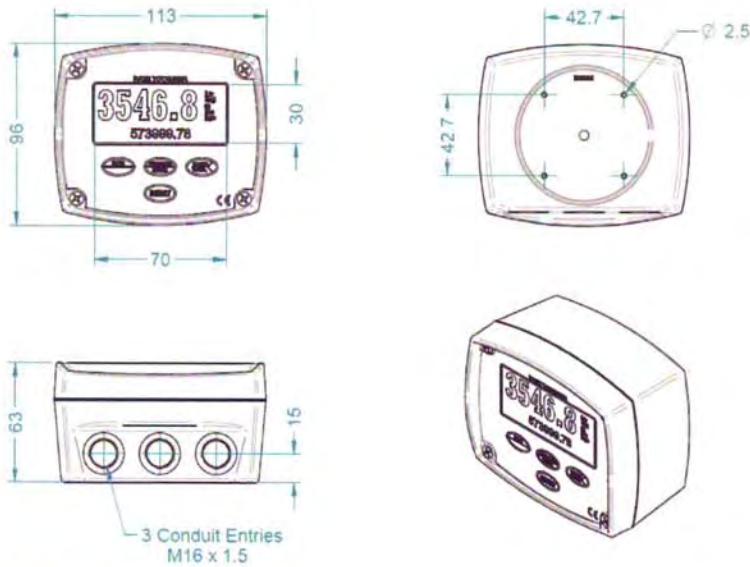


Specifications

Model prefix :	FRT40
Displays	Large backlit 6 digit numeric display with LCD character 8 digit reset cumulative totaliser 5 digit rate display
Memory	All programmed & accumulative data is stored permanently in non-volatile memory
Temperature range	-20°C ~ +80°C max. (-4°F ~ 176°F max.)
Signal Input	Pulse/frequency Input with reed switch Hall Effect, Voltage, Current & Coil
Pulse Output	NPN transistor, Scalable (20hz, 100mA max.)
Battery power	Life expectancy 5 years* (Unit draws about 70µA under battery)
External Power	Regulated 8-24Vdc x 50mA min (Reverse polarity protected)
Configuring	PIN Protected data entry
Protection class	IP66/67 (NEMA4X) 3 x M16 x 1.5 female conduit entries
K-factor range	Scale factor i.g. pulses/litre, gallon etc. programmable range 0.001 ~ 99,999.999
Engineering Units	Selectable Ltr, gal, m ³ ,kgs, lbs (total)/sec, /min, /hr or day (rate)

* Battery life reduces when rate is more often displayed & there is no external power connected.

Over all Dimensions:



Model Code:

FRT40 Flow rate totalizer with backlit large digit LCD, Scalable pulse output

Electrical access

1 M16 x 1.5mm female threaded conduit entry ports

Flow Input type

D Digital (pulse or frequency)

Power supply

0 Self powered (battery) or regulated 8-24 Vdc

Housing type

FA Universal mount (field or panel) - Aluminium Alloy Housing

MA Integral meter mount- Aluminium Alloy Housing*

* Only order MA when retro fitting instrument to OM series pulse meter

Mechanical options

P Facia protector - 3mm clear polycarbonate protection plate

Model No. Example

FRT40 **1** **D** **0** **FA** **P**

Other Instruments also available:

- Battery totalizers (FBT11)
- Automatic batch controllers (FEB10)
- Rate totalizer with 4~20mA, alarm & scalable outputs, dual flow inputs & linearization (FRT12)



EB Series Batch Controllers

Features

- ▶ Large 8 digit batch & cumulative total LCD
- ▶ Robust IP66/67 universal mount or DIN panel mount version
- ▶ Simple programming
- ▶ PIN protected programming
- ▶ Scaleable flow inputs
- ▶ Two stage control
- ▶ Automatic overrun compensation
- ▶ Missing pulse (*no flow*) alarm
- ▶ Maximum batch size limiting
- ▶ Non volatile memory
- ▶ Multiple batcher interlock function
- ▶ Remote Run, Stop, batch set, etc

Also available

- Batching systems
- Self powered totalisers
- Flow rate totalisers



Overview

The EB *Ecobatch* is a fully programmable high speed batch controller specifically designed to operate with common pulse producing flowmeters such as positive displacement, turbine, mass, vortex or magnetic style.

The instrument displays batch value, batch progress & cumulative total in engineering units as programmed by the user, it also logs the total number of batches performed and total volume dispensed.

Ecobatch scrolls messages to prompt the user at each stage of operation. Batch limiting and no-flow detection are "*safeguards*" against erroneously high batch entries, loss of the flow input signal or control valve or pump failure.

Control outputs

Two independent outputs can be programmed to provide stepped control at the start and/or end of each batch. DC powered models have two solid state control outputs, DIN models can be AC or DC powered and have two single pole double throw (SPDT) control 5A relays.

An Automatic Overrun Compensation feature corrects for any batch errors attributed to slow closing valves or flow rate variations.

Network interlocks

As many as 9 *Ecobatch* controllers may be networked together, typical applications are where one liquid is being dispensed to a number of outlets or a number of different liquids are being batched via one common flowmeter. *Ecobatch* will also take an "inhibit start" signal from other control or plant equipment.

Programming

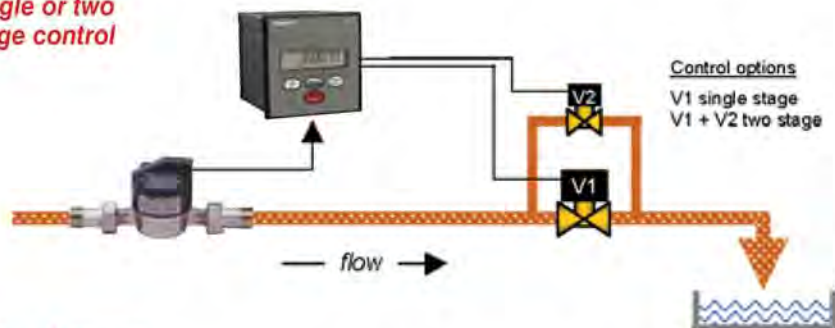
Simple PIN protected flow chart programming with English prompts guide you through the programming routine, greatly reducing the need to refer to the instruction manual.

Specifications

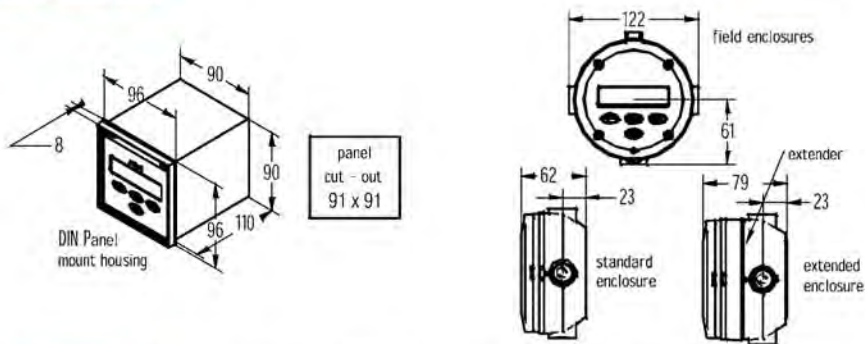
Liquid crystal display (LCD)	9mm high alpha numeric characters + subscripts
Batch & accumulated totals	8 digit, programmable to 3 decimal places
Engineering units displayed	litres, gallons, m3, lbs, kgs or nil eng. units displayed
Input types (pulse & frequency)	reed switch, open collector, coil (15mV P-P min.), current, voltage, namur & other proximities. Max. frequency 10Khz
Input scaling range	0.001~9,999,999.999 with 3 floating decimal points
Control outputs (field mount)	Two 1A NPN open collectors, 24Vdc max.
(panel mount)	Two SPDT 5A relays (with DIN versions)
Alarm output (no flow alarm)	1A open collector (NPN/PNP selectable), 24Vdc max.
Operating temperature	-10~+80°C (14~176°F), refer factory for higher / lower temp.
Power requirements	12~24Vdc, 50mA, 95~260Vac (DIN version)
Status interlocks	Batch status output, batch inhibit input, network looping
Enclosures (two styles)	IP66/67 (NEMA 4X) GRN field mount or DIN panel mount
Mounting	meter mount, wall, surface, pipe or panel mount
Batching systems example (see front page photo)	Ecobatch with flowmeter & control valve eg: UM020 system 1~70 L/min, 10 bar, 90°C (0.3-18 Usgpm, 145psi, 195°F)

IN THE INTEREST OF CONTINUED PRODUCT DEVELOPMENT THE DESIGN & SPECIFICATIONS MAY ALTER WITHOUT NOTICE

Single or two stage control



Dimensions (mm)



Ordering codes (# = electrical entries: 1 = M20, 2 = 1/2" NPT, 0 = DIN housing with terminals)

FMEB10#	Single & two stage high speed batch controller (cumulative & batch totals)		
Input type			
D	digital (pulse or frequency)		
Power supply (*PM version only)			
0	12~24Vdc, 50mA	1	*95~135Vac
		2	*190~260Vac
Housing type			
FM	universal mount (field, surface, pipe, wall, stem or panel mount)		
MM	integral meter mount		
PM	DIN panel mount 91 x 91mm (3.6 x 3.6") cut out		
FE	DIN mount field enclosure IP66 (NEMA 4x)		

Refer factory for mounting accessories.



wall - surface mount



DIN mount field enclosure



meter mount



meter mount



flow rate totaliser

battery totaliser

other instruments

Y STRAINERS FOR OVAL GEAR METERS

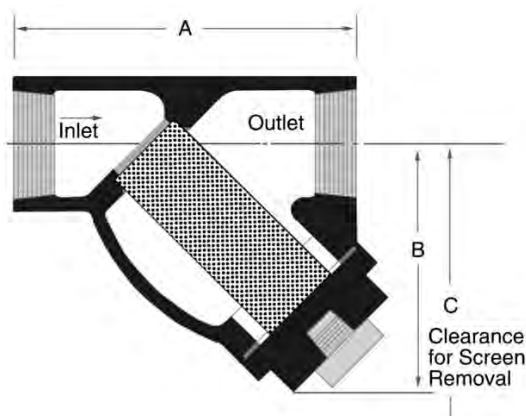
REFERENCE

Y STRAINER – SPECIFICATIONS

Blow-off Fitting:	1/4 inch:	1/4" NPT
	1/2 inch:	1/4" NPT
	3/4 inch:	1/4" NPT
	1 inch:	1/2" NPT
	1-1/4 inch:	1/2" NPT
	1-1/2 inch:	1/2" NPT
	2 inch:	1/2" NPT
Screen Standard:	1/4 inch:	200 mesh
	1/2 inch:	60 mesh
	3/4 inch:	60 mesh
	1 inch:	60 mesh
	1-1/4 inch:	60 mesh
	1-1/2 inch:	60 mesh
	2 inch:	60 mesh
Screen Opening (inch):	1/4 inch:	0.011"
	1/2 inch:	0.032"
	3/4 inch:	0.032"
	1 inch:	0.032"
	1-1/4 inch:	0.032"
	1-1/2 inch:	0.032"
	2 inch:	0.032"
Shipping Weight:	1/4 inch:	4 lbs.
	1/2 inch:	4 lbs.
	3/4 inch:	5 lbs.
	1 inch:	6 lbs.
	1-1/4 inch:	8 lbs.
	1-1/2 inch:	10 lbs.
	2 inch:	18 lbs.

PART NUMBERS & DIMENSIONS

Part Number	Size	A	B	C
125700-01	1/4 inch:	3-1/4"	2-3/16"	3"
125700-02	1/2 inch:	3-1/4"	2-3/16"	3"
125700-03	3/4 inch:	3-5/8"	2-3/4"	3-1/4"
125700-04	1 inch:	4-1/4"	3-3/16"	4-1/8"
125700-05	1-1/4 inch:	5-1/4"	3-7/8"	5"
125700-06	1-1/2 inch:	6-1/4"	4-3/4"	5-7/8"
125700-07	2 inch:	7-5/8"	6"	8-1/8"



Oval Gear Meters work best with clean fluid, free of debris. GPI carries Y Strainers to fit most models of Oval Gear Meters. These strainers range from 1/4 in. to 2 in. models. All sizes come complete with blow-off and plug.

Select Your Strainer Size:

1/4 inch 1/2 inch 3/4 inch 1 inch
1-1/4 inch 1-1/2 inch 2 inch



Features and Benefits:

- ✓ Machined, tapered seat ensures a perfect fit for the removable, 316 Stainless Steel screen.
- ✓ 316 Stainless Steel body and all screens are 316 Stainless Steel.
- ✓ All sizes come complete with blow-off and plug. These can be replaced with ball valve for on-line blow-down of particulate.
- ✓ Rated for up to 1480 PSI at 100° F for water, oil or gas.
- ✓ Female NPT threads.

CLARK

200 Series Vortex Flow Transmitter

Frequency Output, 1/4" to 1.0" Pipe Sizes, Rugged Molded PPA Construction

DESCRIPTION

The series 200 vortex flow transmitters are designed with equipment manufacturers in mind and are an excellent economical choice for system flow monitoring and control.

The transmitters work on the principle of Kármán's vortex trail, named after Theodore von Kármán's mathematical description of the phenomenon. Vortex shedding flowmeters present the flow in a pipe with an obstruction/bluff in the flowmeter body. As velocity increases, alternating vortices are formed on each side of the bluff body and travel downstream.

The 200 series utilize piezoelectric sensors embedded in a ETFE vane located downstream of the bluff to detect the generated vortices. The frequency measured represents the flow velocity. A flow factor is provided to convert frequency to volume flow rate for each model size.

The minimum measured flow rate is dependent on the viscosity of the fluid.

Versions with a 1000 Ohm RTD temperature sensor built-in to the bluff are available.

SPECIFICATIONS

Medium: Suitable for water & water glycol based heat exchange systems with the usual additives and other fluids compatible with the materials of construction (consult factory). For media with viscosity greater than 2 millipascal seconds (2 centipoise), higher flow rates are required to form vortices raising the minimum measurable flow rate value.

Flow ranges: From 0.24 to 39.6 GPM (0.9 ... 150 litres per minute). See Table 2.

Temperature measurement: Optional PT1000 RTD imbedded in flow sensor bluff
Measure range -40°F to +302°F (-40 to > +150 °C)
1000.00 Ohm @ 32°F (0 °C)
1573.25 Ohm @ 302°F (150 °C)

Temperature: Ambient: 5° to 185°F (-15 to + 85 °C)
In storage: -22° to 185°F (-30 to + 85 °C)

Max. pressures and medium temperature:

Table 1

psi	bar	°F	°C	Duration
174	12	104	40	Lifetime
87	6	212	100	Lifetime
58	4	257	125	600 hours
58	4	284	140	2 hours

Max. test pressure: 261 psi/18 bar at 104°F/40 °C

Loss of pressure / cavitation: A minimum inlet pressure of 10.2 psi (0.7 bars) is required to avoid cavitation issues at maximum flow.

Wetted materials:

Sensor vane: ETFE

Sealing material: EPDM

Flow sensor and bluff:

ASTM- PPA, Polyphthalamide

ISO-PA6T/6I, Grivory 40%GF

Power supply: 5 VDC (4.75 to 5.25)



Features

- **Low cost product with high levels of accuracy**
- **Temperature insensitive measuring principle**
- **Excellent media resistance (measuring element not in contact with the media)**
- **Minimal pressure loss**
- **Measuring element not sensitive to debris**
- **Direct temperature measurement in the medium**

Output: Square pulse frequency 0 / 5 VDC (The signal frequency depends on the nominal diameter, see order)

Signal amplitude at $U_{IN}=5.0$ V:

Load > 10 kOhm against IN < 0.1 ... 5.0 V

Current consumption: < 4 mA

Response time: A high accuracy of flow rate is detected within 100 ms.

Electrical connection: 3-pole connector (without temperature output), RAST 2.5 (AMP DUO PLUG 2.5™ is recommended mating connector.) M12x1, 5-pole circular receptacle provided for temperature output option. See accessories for cable assembly offerings

Polarity reversal protection: Mechanically protected

Protection class: IP20, IP65 (M12x1 only)

Mounting position: In principle universal. We recommend that, when the sensor is mounted in horizontal pipe runs that the electrical connection/sensor assembly be mounted off vertical (3 o'clock or 9 o'clock best).

Piping connection fittings: See tables 5, 6 & 7 for standard selection of types & sizes. Special fittings can be produced by Clark or the customer.

Accuracy:

Accuracy specifications are valid for media with a viscosity < 2 centipoise (2 millipascal seconds):
For water in temperature range 41 to 212°F (5 to 100°C) or for water with maximum 20% glycol at ≥ 77°F (> 25°C)

Up to 50% fs: ≤ 1% fs

From 50% fs: ≤ 2% of measured value

Temperature measurement accuracy:

PT 1000 for DIN EN 60751 Class B
 ± 0.8°F @ 68° (± 0.45 °C @ 20 °C)
 ± 1.4°F @ 190°F (± 0.75 °C @ 90 °C)

Packaging:

Packaged singly (standard) or in multiple blister packs
 Blister packs:
 DN 8, 10 and 15 Blister packs each containing 30 pcs
 DN 20 and 25 Blister packs each containing 20 pcs

Table 2- Models

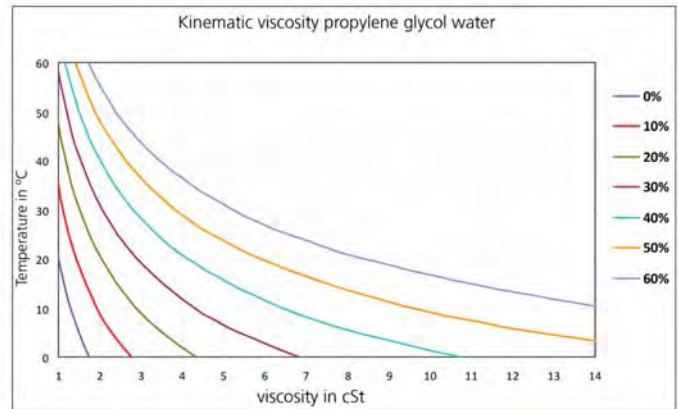
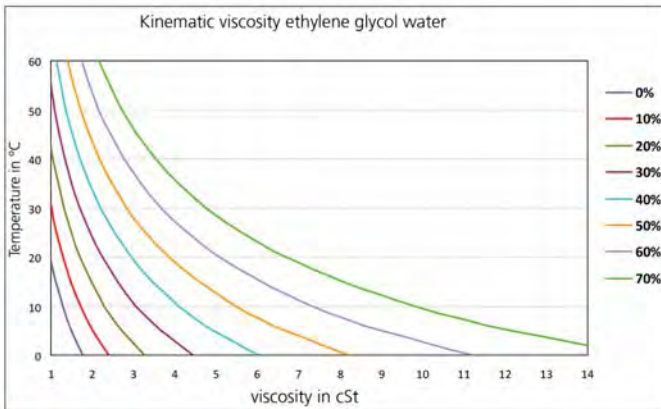
Size	Pipe Size	Full Scale Range (Gal/min)	Full Scale Range (l/min)	Approximate Frequency Range (Hz)	Calibration Factor/Formula Q= volume flow in LPM f=Hz	Approx. Weight
DN8	1/4"	0.238 to 3.96	0.9 to 15.0	31 to 399	Q= 0.0383 *f-0.3	0.1 lbs (47g)
DN10	3/8"	0.476 to 8.45	1.8 to 32.0	24 to 383	Q= 0.0841 *f-0.2	0.13 lbs (57 g)
DN15	1/2"	0.925 to 13.20	3.5 to 50.0	20 to 270	Q= 0.1861 *f-0.2	0.15 lbs (68 g)
DN20	3/4"	1.32 to 22.50	5.0 to 85.0	14 to 227	Q= 0.3751 *f-0.3	0.20 lbs (92 g)
DN25	1"	2.38 to 39.6	9.0 to 150.0	12 to 204	Q= 0.7370 *f-0.2	0.22 lbs (100 g)

Characteristic line Formulas:

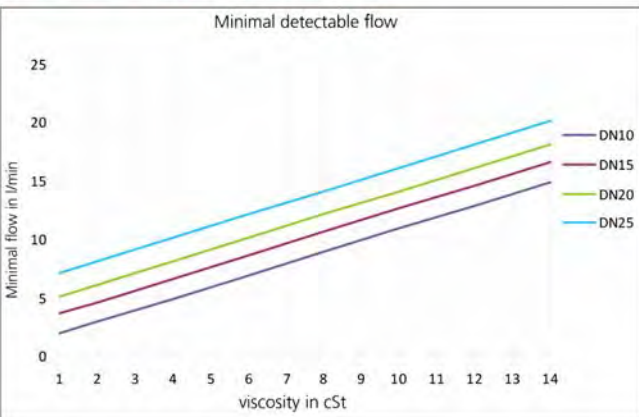
Frequency Output- $Q_v = K_f * f + Q_0$
 Quantity per Pulse (liters/pulse)- Quantity/Pulse= $Q_v * K_f / 60 * (Q_v - Q_0)$
 Current Output- $Q_v = K_i * (I_{out} - 4 \text{ mA})$
 Voltage Output- $Q_v = K_u * U_{out}$

Q_v	Volume Flow Rate	[l/min]
Q_0	Axis Intercept	[l/min]
K_f	Coefficient Frequency Output	[(l/min)/f]
K_u	Coefficient Voltage Output	[(l/min)/V]
K_i	Coefficient Current Output	[(l/min)/f]
f	Frequency	[Hz]
U_{out}	Voltage	[V]
I_{out}	Current	[mA]
Qty/Pulse	Quantity per Pulse	liters/pulse

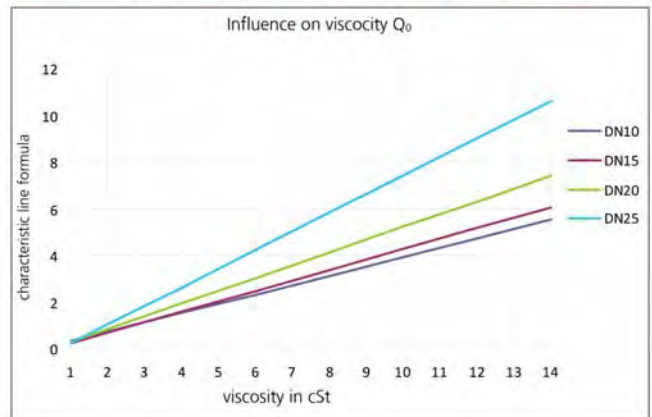
Influence of Glycol: Following definitions correct the influence of media with higher viscosity than water (media viscosity (v) > 1.8 cSt. Corrections result in measuring accuracy of 3% FS in range of 1.8-4 cSt & 4% FS in the range of 4-14 cSt.



Definition of respond threshold Q_{min}



Definition of characteristic line formula $Q = k * f - Q_0$



Response threshold Q_{min} (minimum flow in l/min)

DN 10: $Q_{min} = v + 0.8$
 DN 15: $Q_{min} = v + 2.5$
 DN 20: $Q_{min} = v + 4$
 DN 25: $Q_{min} = v + 6$

(Multiply liters x 0.264 to convert to gallons)

Formula characteristic line for $Q > Q_{min}$ in l/min

Frequency output:
 DN10: $Q = 0.0832 * f - 0.40v + 0.20$
 DN15: $Q = 0.1843 * f - 0.45v + 0.25$
 DN20: $Q = 0.3754 * f - 0.55v + 0.25$
 DN25: $Q = 0.7467 * f - 0.80v + 0.60$
 Voltage output 0 ...10V
 DN10: $Q = 3.2 * U_{out} - 0.40v + 0.40$
 DN15: $Q = 5.0 * U_{out} - 0.45v + 0.45$
 DN20: $Q = 8.5 * U_{out} - 0.55v + 0.55$
 DN25: $Q = 15.0 * U_{out} - 0.80v + 0.80$

Current output 4 ... 20 mA (I in mA)
 DN10: $Q = 2.000 * (I - 4 \text{ mA}) - 0.40v + 0.40$
 DN15: $Q = 3.125 * (I - 4 \text{ mA}) - 0.45v + 0.45$
 DN20: $Q = 5.313 * (I - 4 \text{ mA}) - 0.55v + 0.55$
 DN25: $Q = 9.375 * (I - 4 \text{ mA}) - 0.80v + 0.80$

DIMENSIONS DN 8, 10, 15, 20

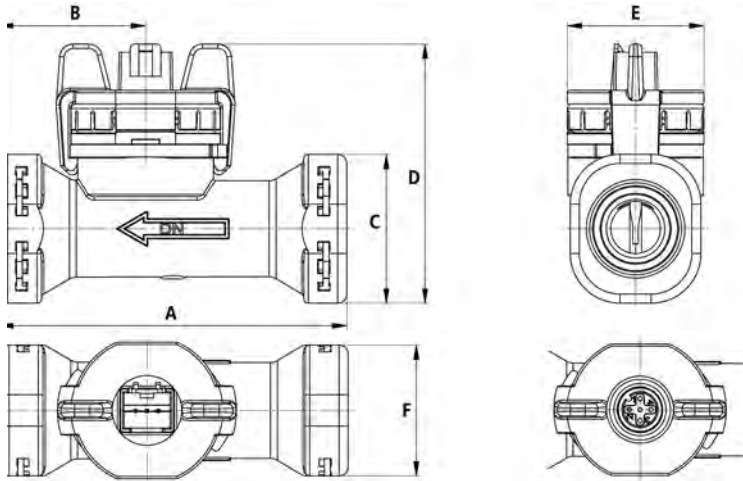


Table 3

Dimensions do not include fittings- see following tables for standard fitting offerings

Size	A inches(mm)	B inches(mm)	C inches(mm)	D inches(mm)	E inches(mm)	f inches(mm)
DN8	2.83 (72)	1.16 (29.5)	1.30 (32.9)	2.32 (59)	1.19 (30.2)	1.14 (28.9)
DN10	3.03 (77)	1.28 (32.5)	1.30 (32.9)	2.26 (57.3)	1.19 (30.2)	1.14(28.9)
DN15	3.23 (82)	1.28 (32.5)	1.54 (39)	2.46 (62.4)	1.19 (30.2)	1.30 (33)
DN20	4.13 (105)	1.55 (39.3)	1.19 (43)	2.61 (66.3)	1.19 (30.2)	1.47 (37.4)

DIMENSIONS DN 25

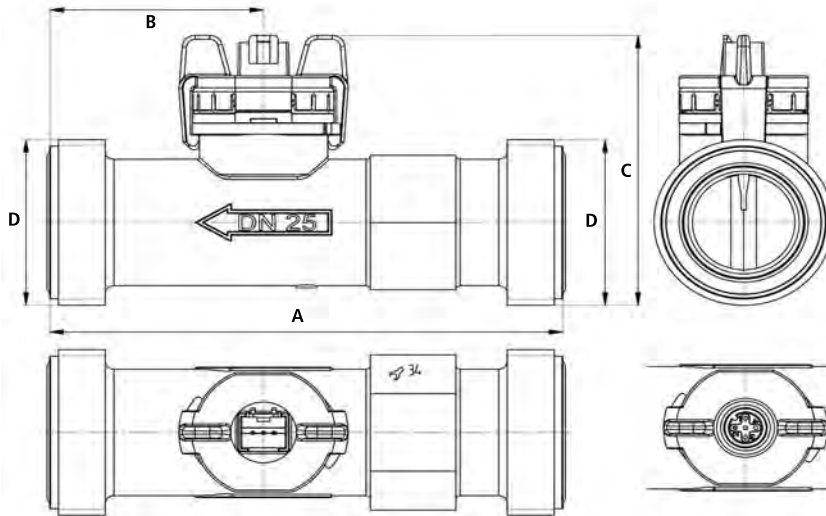


Table 4

Size	A inches(mm)	B inches(mm)	C inches(mm)	D BSPP Male Pipe Thread
DN25	120 (4.72)	1.97 (50)	2.69 (68.3)	G1 1/4

PIPING CONNECTIONS

The 200 series offers great flexibility with respect to piping connections. Inserting and removing fittings for pipe sizes to 3/4" is easy. A clip secures the end fitting to the flow sensor and an o-ring provides the seal. OEM clients may wish to produce fittings according to their own design needs.

The 1" size model (DN25) has metric G1 1/4 male threads molded integral to the sensor body and is supplied with two EPDM sealing o-rings. 1" NPT 303 SS and polypropylene adaptors are available (see Table 7).

THREADED ADAPTERS

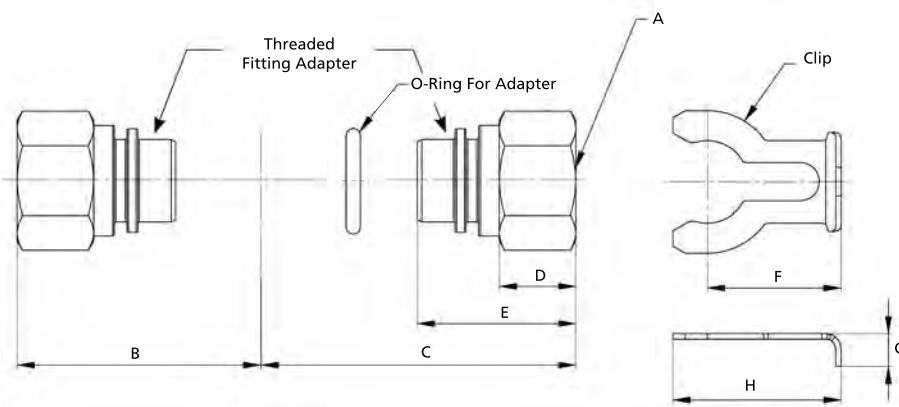


Table 5: Stainless Threaded Adapters (1/4"-3/4" NPT) & Clip Table

Size	Clip Part Number	O-Ring Part Number (Material)	Threaded Adapter Part Number	*Material	A	B inches (mm)	C inches (mm)	**D inches (mm)	E inches (mm)	F inches (mm)	g inches (mm)	H inches (mm)
DN8	C810	R810E (EPDM)	ADS1/4	303 SS	1/4" NPT	1.76 (44.65)	2.27 (57.65)	0.551 (14)	1.14(29)	0.965 (24.5)	0.236 (6)	1.21 (30.8)
DN10	C810	R810E (EPDM)	ADS3/8	303 SS	3/8" NPT	1.87 (47.55)	2.35 (59.65)	0.551 (14)	1.142 (29)	0.965 (24.5)	0.236 (6)	1.21 (30.8)
DN15	C15	R15E (EPDM)	ADS1/2	303 SS	1/2" NPT	1.97 (50.05)	2.64 (67.05)	0.646 (16.4)	1.260 (32)	1.1 (28)	0.191 (4.85)	1.36 (34.5)
DN20	C20	R20E (EPDM)	ADS3/4	303 SS	3/4" NPT	2.32 (58.85)	3.36 (85.25)	0.731(18.6)	1.499 (37.8)	1.1 (28)	0.315 (8)	1.36 (34.5)

*Contact us for other materials or details on how to make your own fittings

**The overall length of the flow sensor is increased by approximately twice this value

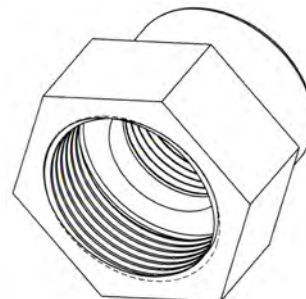
Table 6: Brass Solder Adapters

Size	Clip Part Number	O-Ring Part Number (Material)	Adapter Part Number	Material	Standard Tubing Size (For Use With Type K & Type L Copper Tubing)
DN8	C810	R810E (EPDM)	SADB1/4	360 Brass	1/4"
DN10	C810	R810E (EPDM)	SADB3/8	360 Brass	3/8"
DN15	C15	R15E (EPDM)	SADB1/2	360 Brass	1/2"
DN20	C20	R20E (EPDM)	SADB3/4	360Brass	3/4"



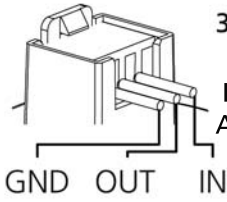
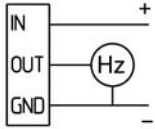
Table 7: DN25 BSP to NPT Adapters

*Size	Description	Material
ADSG1NPT	Adapter G1-1/4 to 1" NPT Female	303 Stainless Steel
ADPG1NPT	Adapter G1-1/4 to 1" NPT Female	Polypropylene
* Two R25E EPDM sealing o-rings are supplied with model DN25		



WIRING

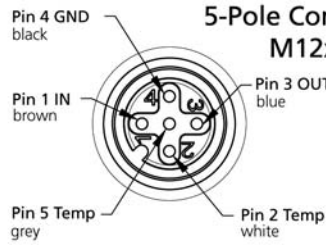
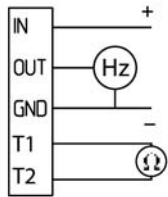
Without RTD Temp Sensor



3-Pole Connector
RAST 2.5 mm
Male Connector:
Amp Duoplug 2.5



Install a 10K Pull-up Resistor
Between "in" & "OUT"

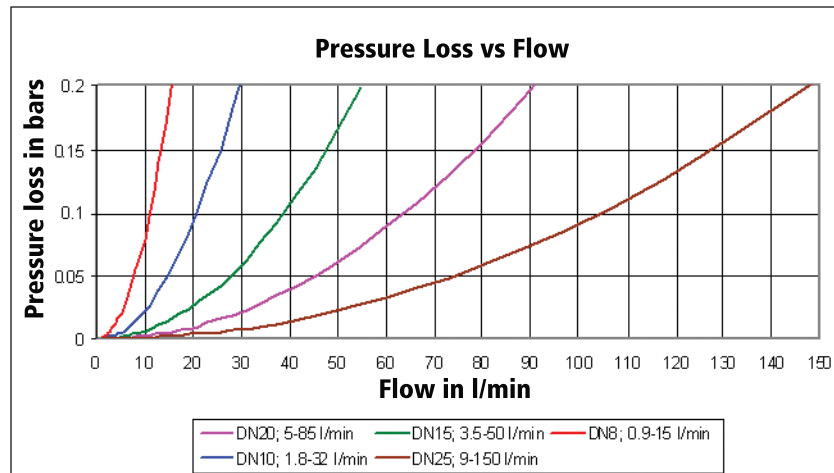
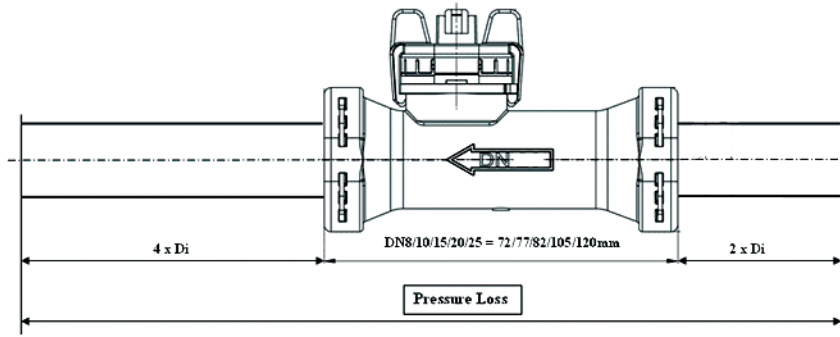


5-Pole Connector
M12x1



With RTD Temp Sensor

PRESSURE LOSS



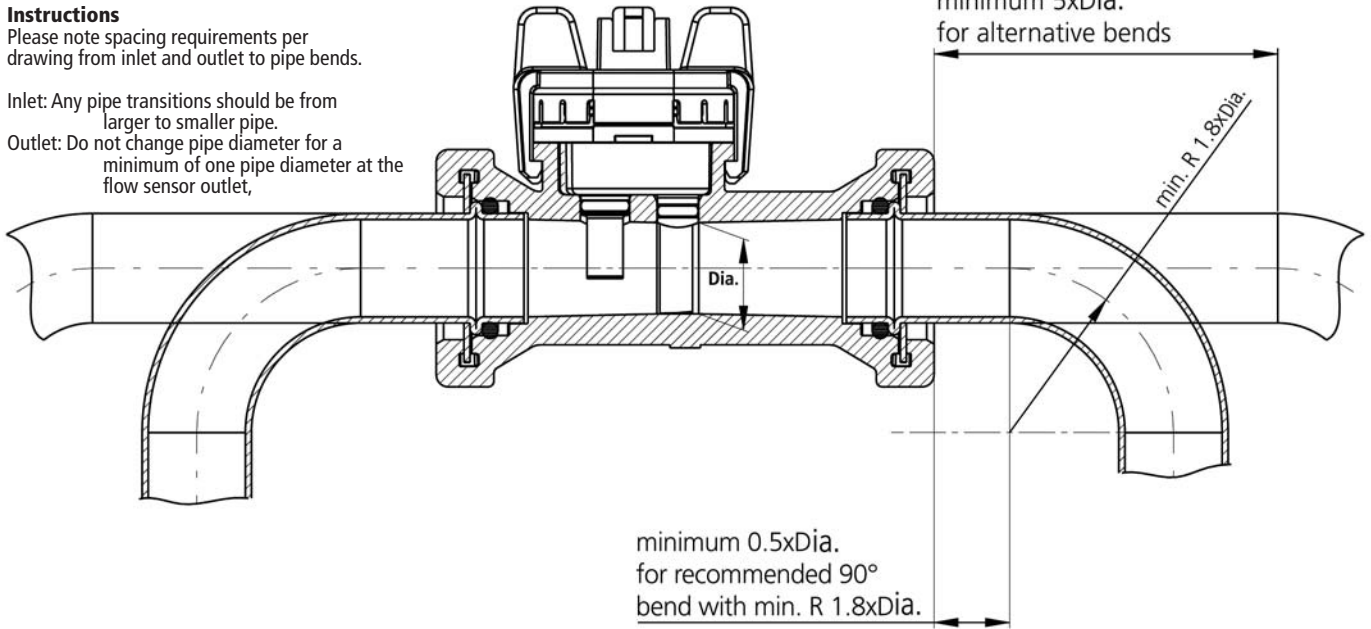
MOUNTING

Instructions

Please note spacing requirements per drawing from inlet and outlet to pipe bends.

Inlet: Any pipe transitions should be from larger to smaller pipe.

Outlet: Do not change pipe diameter for a minimum of one pipe diameter at the flow sensor outlet,



ORDERING INFORMATION

1) Order flow sensor model from table 7 -ABCDEF

Example: 20091000

2) Order End Connection adapters, O-rings and adapter clips

A Model	B Version	C Size	E Electrical Connection	F Seal Material
200	9=Flow	08=DN8	00=3-Pole RAST 2.5 14= 3-Pole M12X1 circular connector 15= 5-Pole M12X1 circular connector	DN8 to DN20- Order Separately from Table 9 1=EPDM (Included with DN25)
	8=Flow & Temperature (1000 Ohm RTD)	10=DN10 15=DN15 20=DN20 25=DN25		

Size	Connection Adapter (Two Required)	O-rings (Two Required)	Adapter Clips (Two Required)
DN8	Select from Table 6 or Table 7	Select from Table 6 or Table 7	Select from Table 6 or Table 7
DN10			
DN15			
DN20			
DN25	Select from Table 8	Two R25E o-rings supplied standard with flow sensor, adapter clips not used on this model	

Part Number	Description
Electrical	
111668	Amp Duoplug 2.5, 3-pole plug with 11.80" (30 cm) cable (Old Part Number ECAD2.530)
101817	Amp Duoplug 2.5, 3-pole plug with 43.3" (110 cm) cable (Old Part Number ECAD2.5110)
114605	M12x1 straight circular connector, 3-pole plug with 78.7" (200 cm) cable
114564	M12x1 straight circular connector, 5-pole plug with 78.7" (200 cm) cable (Old Part Number ECM125)
Fitting Clips	
C810	For DN8 and DN10
C15	For DN15
C20	For DN20
O-Rings	
R810E	EPDM, AS568-113
R15E	EPDM, AS568-909
R20E	EPDM, AS568-118
R25E	EPDM, 31 mm dia. x 3 mm wall

Part Number	Description
Connection Adapter Fittings- Threaded	
ADS1/4	Model DN8 Stainless Steel Adapter, 1/4" NPT Female
ADS3/8	Model DN10 Stainless Steel Adapter, 3/8" NPT Female
ADS1/2	Model DN15 Stainless Steel Adapter, 1/2" NPT Female
ADS3/4	Model DN20 Stainless Steel Adapter, 3/4" NPT Female
ADSG1NPT	Stainless Steel Adapter G1-1/4 to 1" NPT Female
ADPG1NPT	Polypropylene Adapter G1-1/4 to 1" NPT Female
Connection Adpater Fittings- Soldered	
SADB1/4	Model DN8 to 1/4" copper tubing
SADB3/8	Model DN10 to 3/8" copper tubing
SADB1/2	Model DN15 to 1/2" copper tubing
SADB3/4	Model DN20 to 3/4" copper tubing
O-Rings	
R810E	EPDM, AS568-113
R15E	EPDM, AS568-909
R20E	EPDM, AS568-118
R25E	EPDM, 31 mm dia. x 3 mm wall

CLARK

210 Series Vortex Flow Transmitter

Frequency Output , 1/4" to 1.0" Pipe Sizes, Rugged Molded PPA Construction

DESCRIPTION

In comparison to the OEM flow sensor type 200, the type 210 is available with an increased range of power supply and output signals all with and without temperature measurement.

With no moving parts the flow sensor is not sensitive to debris, has marginal pressure loss and high accuracy.

Versions with a 1000 Ohm RTD temperature sensor built-in to the bluff are available.

SPECIFICATIONS

Medium: Suitable for water & water glycol based heat exchange systems with the usual additives and other fluids compatible with the materials of construction (consult factory). For media with viscosity greater than 2 millipascal seconds (2 centipoise), higher flow rates are required to form vortices raising the minimum measurable flow rate value.

Flow ranges: From 0.24 to 39.6 GPM (0.9 ... 150 litres per minute). See Table 3.

Temperature measurement: Optional PT1000 RTD imbedded in flow sensor bluff
 Measure range -40°F to +302°F (-40 to > +150 °C)
 1000.00 Ohm @ 32°F (0 °C)
 1573.25 Ohm @ 302°F (150 °C)

Temperature: Ambient: 5° to 185°F (-15 to + 85 °C)
 In storage: -22° to 185°F (-30 to + 85 °C)

Max. pressures and medium temperature:

Table 1

psi	bar	°F	°C	Duration
174	12	104	40	Lifetime
87	6	212	100	Lifetime
58	4	257	125	600 hours
58	4	284	140	2 hours

Max. test pressure: 261 psi/18 bar at 104°F/40 °C

Loss of pressure / cavitation: A minimum inlet pressure of 10.2 psi (0.7 bars) is required to avoid cavitation issues at maximum flow.

Wetted materials:

Sensor vane: ETFE

Sealing material: EPDM

Flow sensor and bluff:

ASTM- PPA, Polyphthalamide
 ISO-PA6T/6I, Grivory 40%GF

Power/Output Options:

Table 2

	Square Pulse Frequency Output	Voltage Output	Current Output
Power (U _{in})	4.75-33 VDC	11.5-33 VDC	8-33 VDC
Signal	<0.5...>U _{in} -0.5 V	0-10 V	4-20 mA
Load Against GND	<1 mA/<100 nF	<6 mA/<100 nF	<(U _{in} -8 V)/20 mA
Current Consumption	<2 mA	<5 mA	-



Features

- Low cost product with high levels of accuracy
- Temperature insensitive measuring principle
- Excellent media resistance (measuring element not in contact with the media)
- Minimal pressure loss
- Measuring element not sensitive to debris
- Direct temperature measurement in the medium

Response time: A high accuracy of flow rate is detected within 100 ms.

Electrical connection: 3-pole connector (without temperature output), RAST 2.5 (AMP DUO PLUG 2.5™ is recommended mating connector.) M12x1, 5-pole circular receptacle provided for temperature output option. See accessories for cable assembly offerings

Polarity reversal protection: Short circuit, reverse voltage and external voltage protected within the admissible supply voltage.

Protection class: IP20, IP65 (M12x1 only)

Mounting position: In principle universal. We recommend that, when the sensor is mounted in horizontal pipe runs that the electrical connection/sensor assembly be mounted off vertical (3 o'clock or 9 o'clock best).

Piping connection fittings: See tables 6, 7 & 8 for standard selection of types & sizes. Special fittings can be produced by Clark or the customer.

Accuracy:

Accuracy specifications are valid for media with a viscosity <2 centipoise (2 millipascal seconds):

For water in temperature range 41 to 212°F (5 to 100°C) or for water with maximum 20% glycol at ≥77°F (≥25°C)

Up to 50% fs: ≤ 1% fs

From 50% fs: ≤ 2% of measured value

Temperature measurement accuracy:

PT 1000 for DIN EN 60751 Class B
 ± 0.8°F @ 68° (± 0.45 °C @ 20 °C)
 ± 1.4°F @ 190°F (± 0.75 °C @ 90 °C)

Packaging:

Packaged singly (standard) or in multiple blister packs
 Blister packs:
 DN 8, 10 and 15 Blister packs each containing 30 pcs
 DN 20 and 25 Blister packs each containing 20 pcs

Table 3- Model Size Selection

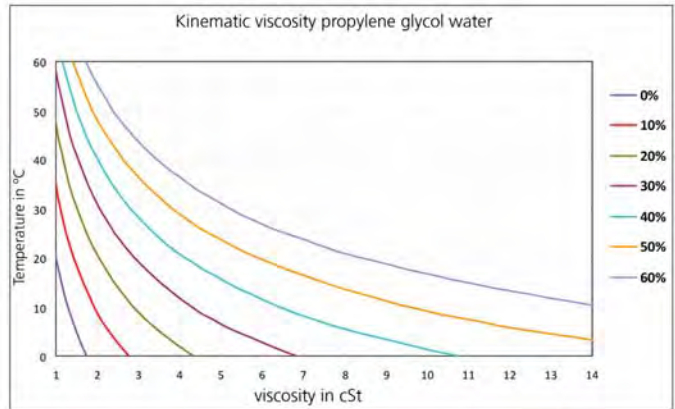
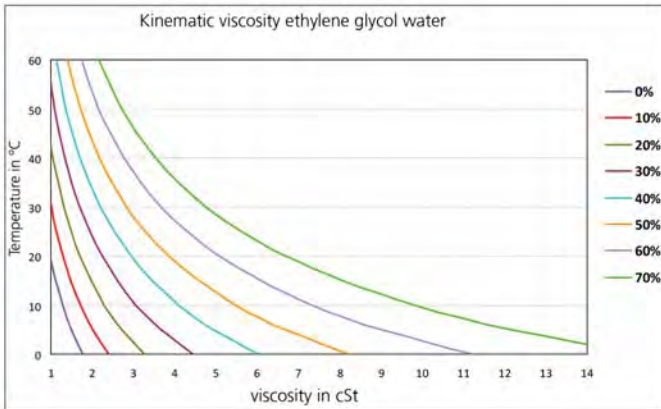
Size	Pipe Size	Full Scale Range (Gal/min)	Full Scale Range (l/min)	Approximate Frequency Range (Hz)	Calibration Factor/Formula Q= volume flow in LPM f=Hz	Approx. Weight (Without End Fittings)
DN8	1/4"	0.238 to 3.96	0.9 to 15.0	31 to 399	Q= 0.0383*f-0.3	0.1 lbs (47g)
DN10	3/8"	0.476 to 8.45	1.8 to 32.0	24 to 383	Q= 0.0841*f-0.2	0.13 lbs (57 g)
DN15	1/2"	0.925 to 13.20	3.5 to 50.0	20 to 270	Q= 0.1861*f-0.2	0.15 lbs (68 g)
DN20	3/4"	1.32 to 22.50	5.0 to 85.0	14 to 227	Q= 0.3751*f-0.3	0.20 lbs (92 g)
DN25	1"	2.38 to 39.6	9.0 to 150.0	12 to 204	Q= 0.7370*f-0.2	0.22 lbs (100 g)

Characteristic line Formulas:

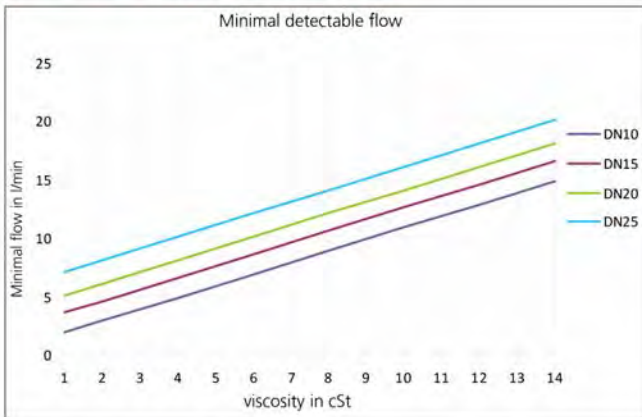
Frequency Output- $Q_v = K_f * f + Q_0$
 Quantity per Pulse (liters/pulse)- Quantity/Pulse= $Q_v * K_f / 60 * (Q_v - Q_0)$
 Current Output- $Q_v = K_i * (I_{out} - 4 \text{ mA})$
 Voltage Output- $Q_v = K_u * U_{out}$

Q_v	Volume Flow Rate	[l/min]
Q_0	Axis Intercept	[l/min]
K_f	Coefficient Frequency Output	[(l/min)/f]
K_u	Coefficient Voltage Output	[(l/min)/V]
K_i	Coefficient Current Output	[(l/min)/f]
f	Frequency	[Hz]
U_{out}	Voltage	[V]
I_{out}	Current	[mA]
Qty/Pulse	Quantity per Pulse	liters/pulse

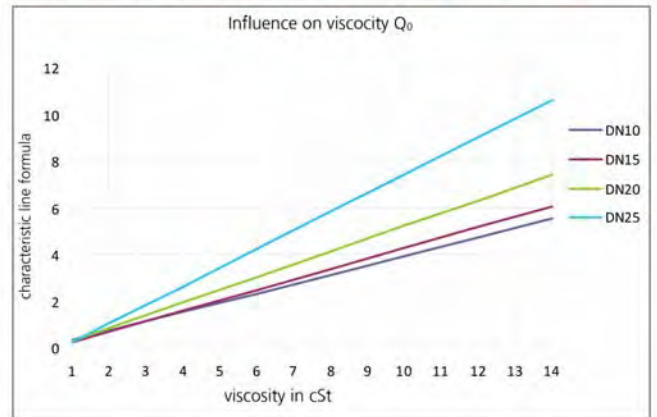
Influence of Glycol: Following definitions correct the influence of media with higher viscosity than water (media viscosity (v) > 1.8 cSt. Corrections result in measuring accuracy of 3% FS in range of 1.8-4 cSt & 4% FS in the range of 4-14 cSt.



Definition of respond threshold Q_{min}



Definition of characteristic line formula $Q = k * f - Q_0$



Response threshold Q_{min} (minimum flow in l/min)

- DN 10: $Q_{min} = v + 0.8$
- DN 15: $Q_{min} = v + 2.5$
- DN 20: $Q_{min} = v + 4$
- DN 25: $Q_{min} = v + 6$

(Multiply liters x 0.264 to convert to gallons)

Formula characteristic line for $Q > Q_{min}$ in l/min

- Frequency output:
- DN10: $Q = 0.0832 * f - 0.40v + 0.20$
 - DN15: $Q = 0.1843 * f - 0.45v + 0.25$
 - DN20: $Q = 0.3754 * f - 0.55v + 0.25$
 - DN25: $Q = 0.7467 * f - 0.80v + 0.60$
- Voltage output 0 ... 10 V
- DN10: $Q = 3.2 * U_{out} - 0.40v + 0.40$
 - DN15: $Q = 5.0 * U_{out} - 0.45v + 0.45$
 - DN20: $Q = 8.5 * U_{out} - 0.55v + 0.55$
 - DN25: $Q = 15.0 * U_{out} - 0.80v + 0.80$
- Current output 4 ... 20 mA (I in mA)
- DN10: $Q = 2.000 * (I - 4 \text{ mA}) - 0.40v + 0.40$
 - DN15: $Q = 3.125 * (I - 4 \text{ mA}) - 0.45v + 0.45$
 - DN20: $Q = 5.313 * (I - 4 \text{ mA}) - 0.55v + 0.55$
 - DN25: $Q = 9.375 * (I - 4 \text{ mA}) - 0.80v + 0.80$

DIMENSIONS DN 8, 10, 15, 20

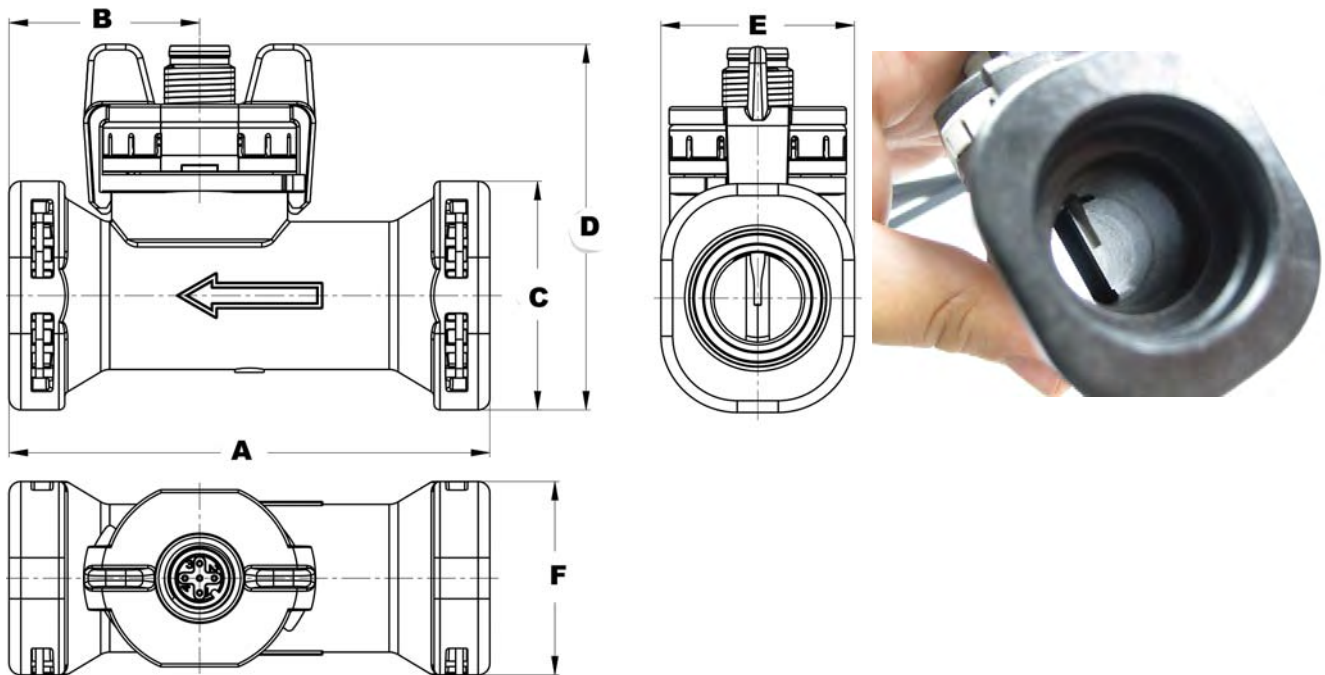


Table 4

Dimensions do not include fittings- see following tables for standard fitting offerings

Size	A inches(mm)	B inches(mm)	C inches(mm)	D inches(mm)	E inches(mm)	f inches(mm)
DN8	2.83 (72)	1.16 (29.5)	1.30 (32.9)	2.32 (59)	1.19 (30.2)	1.14 (28.9)
DN10	3.03 (77)	1.28 (32.5)	1.30 (32.9)	2.26 (57.3)	1.19 (30.2)	1.14(28.9)
DN15	3.23 (82)	1.28 (32.5)	1.54 (39)	2.46 (62.4)	1.19 (30.2)	1.30 (33)
DN20	4.13 (105)	1.55 (39.3)	1.19 (43)	2.61 (66.3)	1.19 (30.2)	1.47 (37.4)

DIMENSIONS DN 25

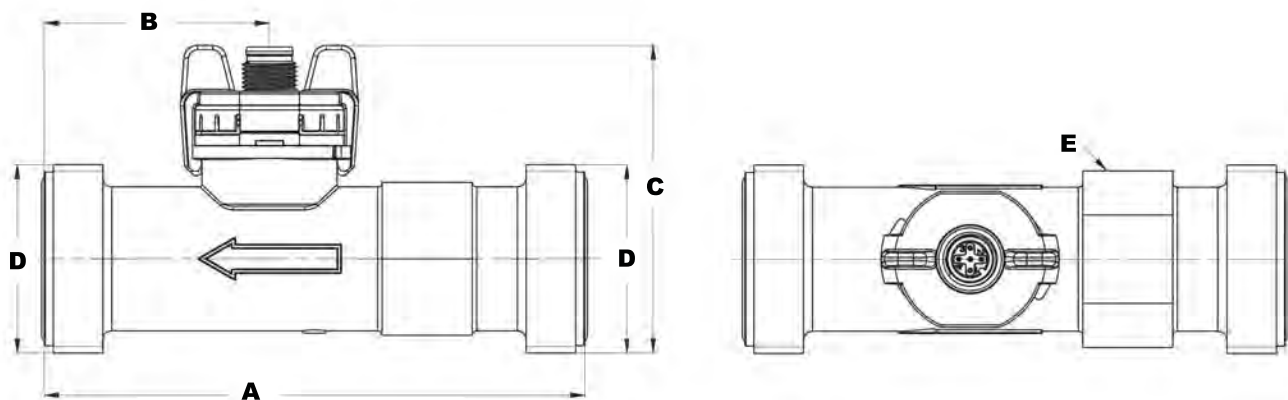


Table 5

Size	A inches(mm)	B inches(mm)	C inches(mm)	D *BSPP Male Pipe Thread	E Wrench Flat	F inches(mm)
DN25	120 (4.72)	1.97 (50)	2.69 (68.3)	G1 1/4	34 mm	1.02 (26)
Minimum Locking Torque- 2.5 Nm Maximum Locking Torque- 15 Nm						

PIPING CONNECTIONS

The 210 series offers great flexibility with respect to piping connections. Inserting and removing fittings for pipe sizes to 3/4" is easy. A clip secures the end fitting to the flow sensor and an o-ring provides the seal. OEM clients may wish to produce fittings according to their own design needs.

The 1" size (DN25) has metric G1 1/4 male threads molded integral to the sensor body and is supplied with two EPDM sealing o-rings. 1" NPT 303 SS and polypropylene adaptors are available (see Table 7).

THREADED ADAPTERS

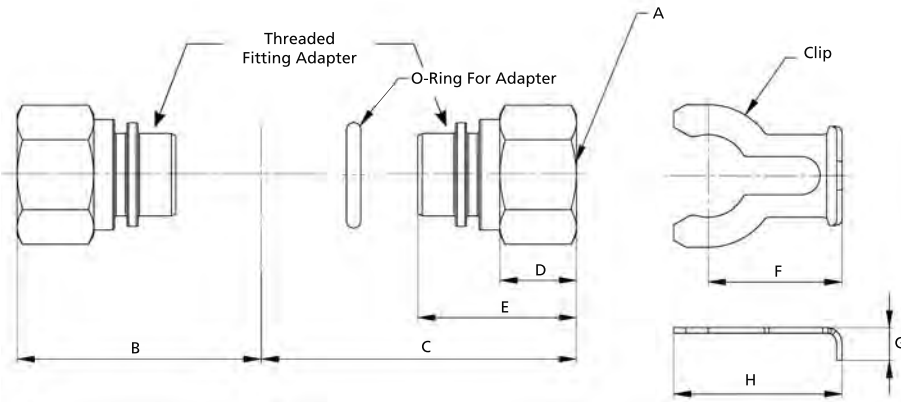


Table 6: Stainless Threaded Adapters (1/4"-3/4" NPT) & Clip Table

Size	Clip Part Number	O-Ring Part Number (Material)	Threaded Adapter Part Number	*Material	A	B inches (mm)	C inches (mm)	**D inches (mm)	E inches (mm)	F inches (mm)	g inches (mm)	H inches (mm)
DN8	C810	R810E (EPDM)	ADS1/4	303 SS	1/4" NPT	1.76 (44.65)	2.27 (57.65)	0.551 (14)	1.14(29)	0.965 (24.5)	0.236 (6)	1.21 (30.8)
DN10	C810	R810E (EPDM)	ADS3/8	303 SS	3/8" NPT	1.87 (47.55)	2.35 (59.65)	0.551 (14)	1.142 (29)	0.965 (24.5)	0.236 (6)	1.21 (30.8)
DN15	C15	R15E (EPDM)	ADS1/2	303 SS	1/2" NPT	1.97 (50.05)	2.64 (67.05)	0.646 (16.4)	1.260 (32)	1.1 (28)	0.191 (4.85)	1.36 (34.5)
DN20	C20	R20E (EPDM)	ADS3/4	303 SS	3/4" NPT	2.32 (58.85)	3.36 (85.25)	0.731(18.6)	1.499 (37.8)	1.1 (28)	0.315 (8)	1.36 (34.5)

*Contact us for other materials or details on how to make your own fittings

**The overall length of the flow sensor is increased by approximately twice this value

Table 7: Brass Solder Adapters

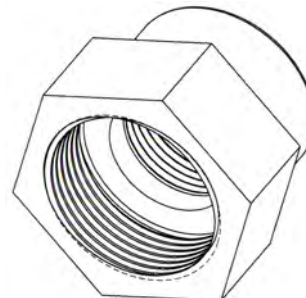
Size	Clip Part Number	O-Ring Part Number (Material)	Adapter Part Number	Material	Standard Tubing Size (For Use With Type K & Type L Copper Tubing)
DN8	C810	R810E (EPDM)	SADB1/4	360 Brass	1/4"
DN10	C810	R810E (EPDM)	SADB3/8	360 Brass	3/8"
DN15	C15	R15E (EPDM)	SADB1/2	360 Brass	1/2"
DN20	C20	R20E (EPDM)	SADB3/4	360Brass	3/4"



Table 8: DN25 BSP to NPT Adapters

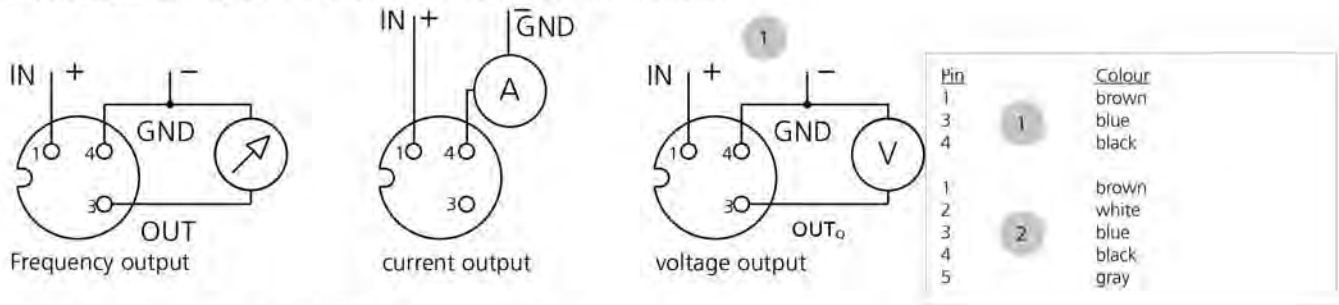
*Model	Description	Material
ADSG1NPT	Adapter G1-1/4 to 1" NPT Female	303 Stainless Steel
ADPG1NPT	Adapter G1-1/4 to 1" NPT Female	Polypropylene

* Two R25E EPDM sealing o-rings are supplied with model DN25

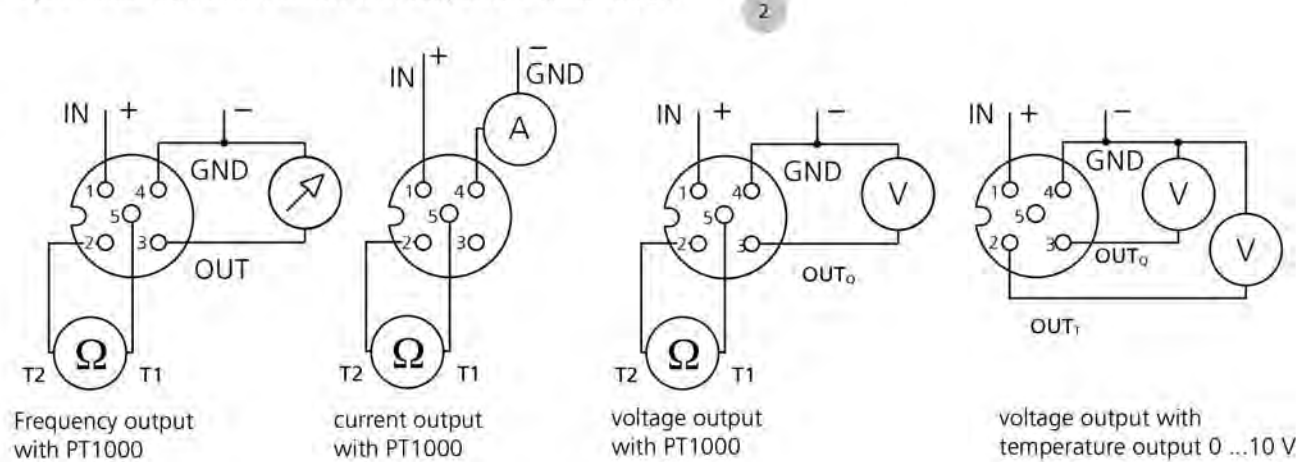


WIRING

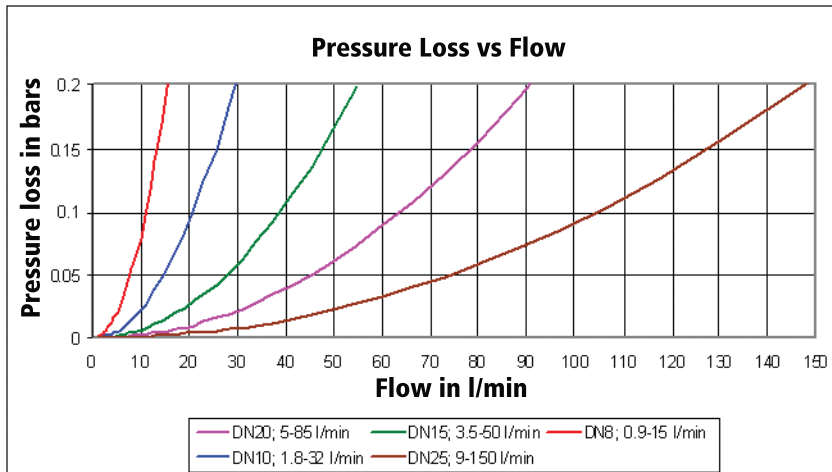
3-pole circular connection M12x1 without temperature measurement



5-pole circular connection M12x1 with temperature measurement



PRESSURE LOSS



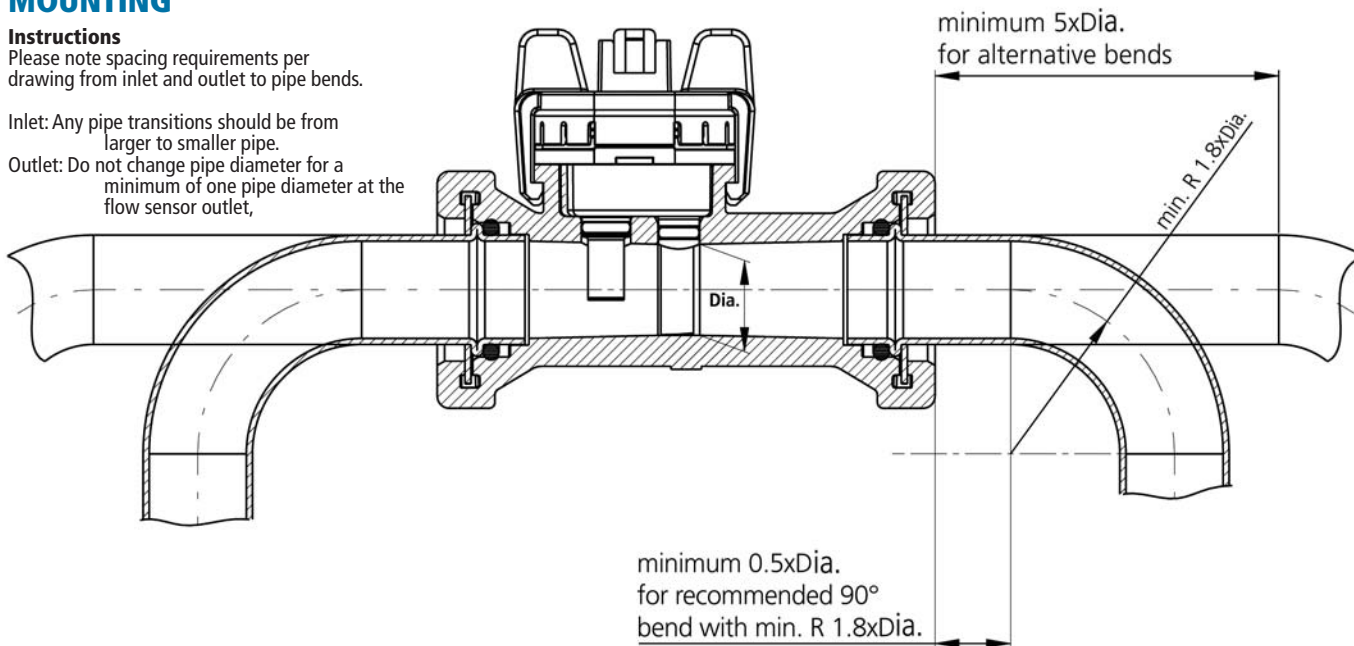
MOUNTING

Instructions

Please note spacing requirements per drawing from inlet and outlet to pipe bends.

Inlet: Any pipe transitions should be from larger to smaller pipe.

Outlet: Do not change pipe diameter for a minimum of one pipe diameter at the flow sensor outlet,



ORDERING INFORMATION

1) Order flow sensor model from table 7 -ABCDEF

Example: 21091044

2) Order End Connection adapters, O-rings and adapter clips

A Model	B Version	C Size	D Output	E Electrical Connection	F Seal Material
210	9=Flow 8=Flow & Temperature (1000 Ohm RTD)	08=DN8 10=DN10 15=DN15 20=DN20 25=DN25	2=Frequency 3= 0-10V 4= 4-20 mA	4= 2 or 3 Pole M12X1 5= 4 or 5 Pole M12X1	DN8 to DN20- Order Separately from Table 10 1=EPDM (Included with DN25)

Size	Connection Adapter (Two Required)	O-rings (Two Required)	Adapter Clips (Two Required)
DN8	Select from Table 6 or Table 7	Select from Table 6 or Table 7	Select from Table 6 or Table 7
DN10			
DN15			
DN20			
DN25	Select from Table 8	Two R25E o-rings supplied standard with flow sensor, adapter clips not used on this model	

Part Number	Description
Electrical	
114604	M12x1 straight circular connector, 3 pole plug with 78.7" (200 cm) cable
114564 (Replaces ECM125)	M12x1 straight circular connector, 5 pole plug with 78.7" (200 cm) cable
Fitting Clips	
C810	For DN8 and DN10
C15	For DN15
C20	For DN20
O-Rings	
R810E	EPDM, AS568-113
R15E	EPDM, AS568-909
R20E	EPDM, AS568-118
R25E	EPDM, 31 mm dia. x 3 mm wall

Part Number	Description
Connection Adapter Fittings- Threaded	
ADS1/4	Model DN8 Stainless Steel Adapter, 1/4" NPT Female
ADS3/8	Model DN10 Stainless Steel Adapter, 3/8" NPT Female
ADS1/2	Model DN15 Stainless Steel Adapter, 1/2" NPT Female
ADS3/4	Model DN20 Stainless Steel Adapter, 3/4" NPT Female
ADSG1NPT	Stainless Steel Adapter G1-1/4 to 1" NPT Female
ADPG1NPT	Polypropylene Adapter G1-1/4 to 1" NPT Female
Connection Adpiter Fittings- Soldered	
SADB1/4	Model DN8 to 1/4" copper tubing
SADB3/8	Model DN10 to 3/8" copper tubing
SADB1/2	Model DN15 to 1/2" copper tubing
SADB3/4	Model DN20 to 3/4" copper tubing

CLARK SOLUTIONS

RVL Vortex Flowmeters

Technical Bulletin: Application, Design, Installation

INTRODUCTION

Selection of the best flow meter for your specific application is a critical step, one that will affect the quality of your process for years. Choosing the wrong meter can lead to inaccurate readings, high maintenance costs, and expensive downtime.

The following section is designed to explain the technology of vortex flow meters and the specifications of the Clark Solutions vortex product line. Our goal is to ensure that the vortex meter you select meets the requirements of your specific application.

HOW VORTEX FLOW METERS WORK

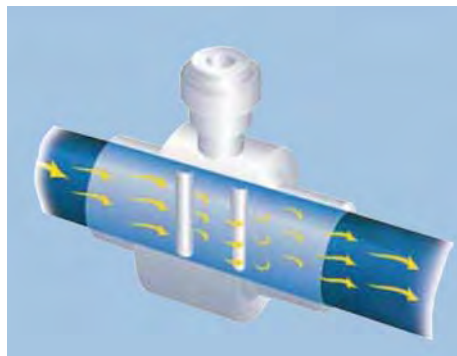
The operation of the RVL vortex flow meter is based on the vortex shedding principle. As fluid moves around a body, vortices (eddies) are formed and move downstream. They form alternately, from one side to the other, causing pressure fluctuations. These are sensed by a piezoelectric crystal in the sensor tube, and are converted to a 4-20 mA or pulse signal. The frequency of the vortices is directly proportional to the flow. This results in extremely accurate and repeatable measurements with no troublesome moving parts.

MATERIAL SELECTION

When choosing the best pipe material for your process, it is necessary to review the fluid to be transported, its concentration, the minimum and maximum operating temperatures, and the pressures to be accommodated. Choosing a flow meter is a similar process, but it is necessary to review a few additional considerations, such as fluid viscosity, suspended particles, density of the fluid and, most importantly, expected flow range. One advantage of utilizing a Universal vortex flow meter is that there are no gaskets or elastomers in the meter. Therefore, you only need to be concerned with the thermoplastic material used for the body construction. In a thermoplastic piping system, the material chosen for the flow meter should match that of the pipe if at all possible. If you are planning to install a meter in a metal pipe system, you must consider three operating conditions: temperature, media, and pressure. Chemical resistance data is available on request from Clark.

FLOW RATE AND RANGE REQUIREMENTS

When choosing a flow meter, it is necessary to verify with the supplier that the unit selected is suited for your specific flow range needs. Most manufacturers state flow range capabilities by publishing maximum allowed flow rates. Then they provide a turndown ratio to determine minimum flow rate. To use the turndown ratio, simply divide the maximum rate by the ratio to determine the minimum rate.



RVL vortex flow meters offered by Clark have a 12:1 turndown ratio (exceptions: RVL025 1/4" unit and RVL050L 1/2" unit; 8:1).

LINE FLUIDS

Many factors may affect the capability of a meter to accurately measure the flow of specific fluids. Different solutions have varying effects on meters. For instance, heavy particle suspension will wear down internal parts on some meters or cause sensing inaccuracies for non-obtrusive metering systems. For vortex flow meters, high viscosities tend to dampen the formation of vortices and reduce the effective range. Particles and internal bubbles do not usually affect vortex meters. PVDF models work very well in slurry services. However, slurries containing grit will wear down the bluff body, although it can withstand a 5% reduction before accuracy is affected. Also, long fibers will catch and build up on the bluff, decreasing accuracy. Standard factory calibration is for 32 SSU (1 CST) viscosity liquid. Viscosity above 1 CST will raise the minimum readable flow rate, reducing rangeability. The effect is linear to viscosity. No adjustments are required for specific gravities up to 2.0. Liquids with high specific gravities will adversely affect the permissible amount and duration of overrange flow. The following chart indicates the reduction of range based on viscosity.

Viscosity	Min.	Max.	Flow Range
1 CST	1	12	12:1
2 CST	2	12	6:1
3 CST	3	12	4:1
4 CST	4	12	3:1
5 CST	5	12	2.4:1
6 CST	6	12	2:1

ACCURACY AND REPEATABILITY

Depending on your application, accuracy and repeatability may be critical. Accuracy is measured as a percentage by which the meter reading could vary from the actual flow. Repeatability is the percentage by which the meter may vary for a specific flow rate from reading to reading. In other words, if you are operating at a flow rate of 50 gpm and the rate increases to 75 gpm and then returns to 50 gpm, repeatability indicates the percentage within which you will now read the 50 gpm flow rate versus the original reading. Accuracy is normally published by the manufacturer in two formats: accuracy of full scale, or accuracy of rate. Accuracy of full scale is a percentage of the maximum flow rate, no matter what the actual flow. Accuracy of rate is a percent of the actual flow rate of the fluid the meter is currently reading.

THE IMPORTANCE OF CALIBRATION

When choosing a meter for an application where accuracy and repeatability are critical, it is necessary to use a meter that is wet calibrated by the manufacturer, and supplied with documentation of that calibration. A meter that is not individually calibrated cannot be relied on as truly accurate to its specification.

Production tolerance differences can and will affect a meter's accuracy. For this reason, meters must be wet calibrated to ensure specified accuracy and functionality for the user.

LINE CONNECTIONS

The next step is planning the installation of the unit into your pipe line. You may prefer to mount the unit permanently by welding it into the line, or you might provide access for meter removal from the line by using a flanged or threaded model. Certain line connections may require the use of a gasket. It is important to choose a gasket material that will not contaminate your media, and to be sure it is chemically resistant to the fluid being transported.

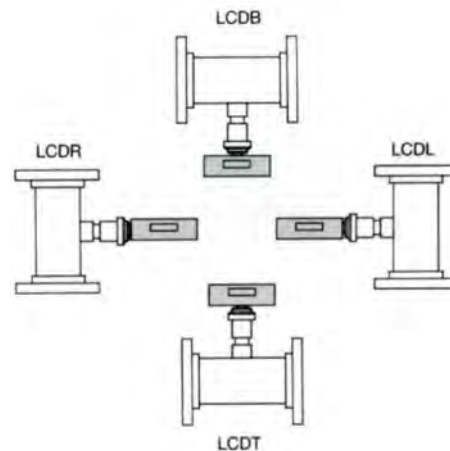
RVL vortex flow meters are available with a wide selection of line connection options. These options include butt, wafer, male thread socket, and threaded flare.

MAXIMUM FLOW RATES

Maximum flow rates are indicated on the RVL specification pages in this catalog. You can safely and accurately measure up to 125% of the maximum flow rates listed, although units with the HT (High Temperature) option cannot be overranged. The signal for 125% overranging would be 24 mA. You must make sure you have sufficient voltage to overrange a meter.

OUTPUT AND DISPLAYS

Universal vortex flow meters come with a variety of output options. The standard output is an analog signal ranging from 4 to 20 mA or 0-5 VDC. Pulse outputs are also available. For remote Indication Clark supplies a range of monitors and controllers. All RVL vortex flow meters are designed to be standalone units if required. Each unit can have its own individual local LCD flow rate display. The readout can be mounted in a variety of positions for convenient readability. For specifications, dimensions, and placement of the LCD, consult the factory. The figure below shows available mounting positions.



PIPING REQUIREMENTS

Turbulence in the pipe line can affect the accuracy of most flow meters. Sources of turbulence are pumps, valves, or changes-in-direction in the line. To avoid these potential problems, it is standard practice to place the meter a certain distance from the turbulence source. Most manufacturers provide the user with minimum distances for their particular products. These distances are indicated in Pipe Diameters (PD). For example, 5 PD means place the flow meter five times its inside diameter away from the source of turbulence. It is also common to provide a minimum distance downstream between a meter and a valve or a change-in-direction.

For optimum accuracy, we recommend at least 20 PD upstream and 5 PD downstream for Universal vortex flow meters. If an upstream elbow is closely coupled to another elbow, 27 PD may be required upstream and 10 PD may be required downstream between the meter and a valve. When the diameter of the meter is smaller than the pipe line, you need at least 15 PD of pipe with the same diameter as the meter upstream, and 5 PD downstream. Overall, 25 PD of straight run prior to the meter is required. If there is a plane change in the installation, this requirement increases to 30 PD upstream. The downstream requirement is now 2 PD of pipe with the same diameter as the meter, and a minimum of 5 PD overall of straight run. The usual 10 PD downstream between the meter and a valve is still required. If the required piping parameters are not met, there will be a corresponding reduction in accuracy.

WIRING

Connect a twisted wire pair (not provided) to the terminals of the transmitter marked + and -. If the twisted wire pair is shielded, do not connect the shield to the transmitter. The shield should be grounded at the receiver only (see Figure 4). The transmitter is reverse-polarity protected. The twisted wire pair should be connected to the receiving equipment. Twisted wire pair lengths of up to 1,000 feet are generally acceptable, and lengths up to 10,000 feet are often usable if the twisted wire pair is kept dry and distant from electrical noise sources. The receiving equipment must accept industry standard "true two wire" or "loop power" 4-20 mA process transmitter inputs. This means that the receiving equipment, such as a recorder or controller, must supply power for the transmitter along the twisted wire pair. If the receiving equipment does not provide power, a separate power supply, typically 24 Vdc at 30 mA, must be used, as shown in Figure below. There are many brands of receivers which provide 24 Vdc for this purpose.

Several receivers may be connected in a series as shown in Figure below, but only one should provide power, and all should have isolated inputs. If the receiver requires 1-5 Vdc, connect a 250 Ohm, 0.1%, 1/2-watt precision resistor across its input. The voltage provided by the receiver must be within the limits shown in the Required DC Voltage Chart below. To use this figure, first add the resistance of all the receivers, indicators, etc., and the wire in the loop. If the wire resistance is unknown, use a value of 50 Ohm for a twisted wire of 1,000 feet or less with a gauge of #22 AWG or heavier. If a 1-5

Vdc receiver is used with a 250 Ohm resistor, its resistance is 250 Ohm. Only one point on the 4-20 mA loop should be grounded. Some receiving equipment inputs are grounded by their manufacturers. This is sufficient. Always follow the receiver manufacturer's recommendations for "loop powered" or "true two wire" process transmitters. Always follow local electrical codes.

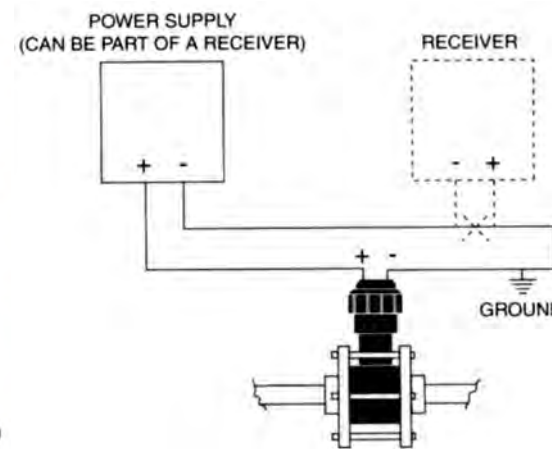
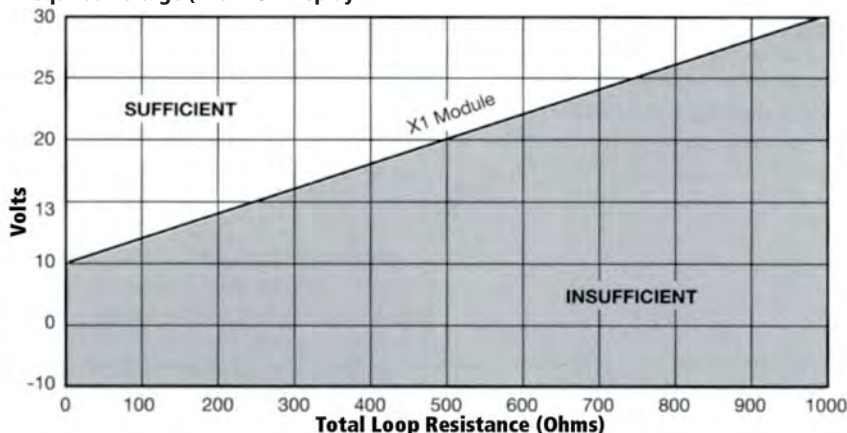
Service: General purpose.

Electrical classification: General purpose, non-hazardous, or NEMA 4X

QUICK SPECIFICATION

All flow meters 1/4" through 9" shall be of the vortex shedding style with no moving parts. Meters shall be constructed of PVC, CPVC, PP, or PVDF. Meters shall have a 12 to 1 turndown ratio with an accuracy of $\pm 1\%$ of full scale, $\pm 1\%$ of rate when used with the Vorsite 2000 flow indicator/controller, and be $\pm 1/4\%$ repeatable of point. All meters shall be wet calibrated at the factory and supplied with calibration records. Line connections for pipe systems shall be thread, metric butt, wafer or flange. Flare and sanitary connections shall be used for tubing systems. Output is either to be linear 4-20 mA or digital pulse to communicate with the Vorsite 2000 Flow Indicator/Controller.

Required Voltage (with LCD Display)



CLARK SOLUTIONS

Series RVL Vortex Flowmeter

1/4" to 3" Pipe Size, PVC, CPVC, or PVDF Construction

DESCRIPTION

The operation of the RVL vortex flow meter is based on the vortex shedding principle. As fluid moves around a body, vortices (eddies) are formed and move downstream. They form alternately, from one side to the other, causing pressure fluctuations. These are sensed by a piezoelectric crystal in the sensor tube, and are converted to a 4-20 mA, 0-5 VDC or pulse signal.

The frequency of the vortices is directly proportional to the flow. This results in extremely accurate and repeatable measurements with no troublesome moving parts.

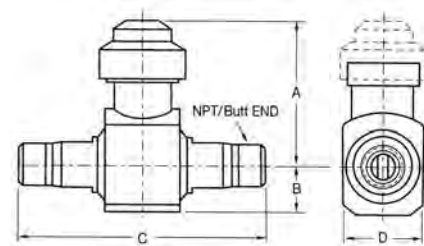
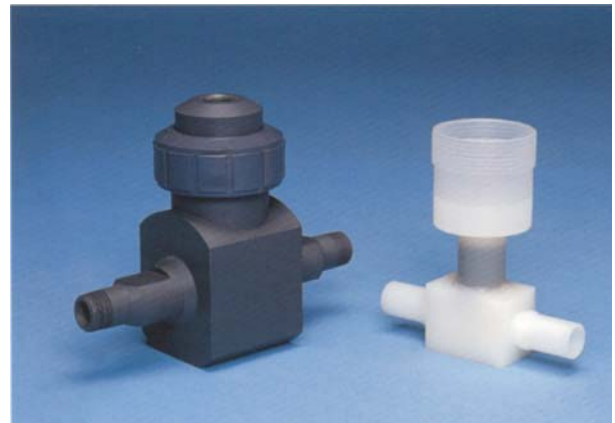
Unlike stainless steel or paddle wheel designs, the vortex sensor is perfect for aggressive or easily contaminated flow media.

Applications include flow monitoring and control of corrosive chemicals and slurries in chemical processing, water/wastewater, and DI water.

SPECIFICATIONS

IN-LINE FLOWMETERS

- Media: Liquids
- Connection: Butt or NPT Male thread
- Turndown Ratio: 12:1 (except 1/4": 8:1)
- Accuracy: $\pm 1\%$ of full scale, 4-20 mA or 0-5 VDC; $\pm 2\%$ of full scale, frequency pulse
- Repeatability: $\pm 0.25\%$ actual flow
- Output Signal: 4-20 mA, 0-5 Vdc or frequency pulse (source-sink driver; 1A source / 1.5A sink; typical output resistance 10 Ohms)
- Power Supply: 13 to 30 Vdc
- Weatherproof: NEMA-4X (IP 66)
- Maximum Overrange: 125% for 1/2 hour, No overrange for Hi-Temp units
- Response Time: 2 seconds minimum, step change in flow
- CSA: CSA File: 215035
CSA Standard C22.2 No. O-M and No. 142-M



Dimensions (Inches)

Size	PVC/CPVC				PVDF (Butt)			
	A	B	C	D	A	B	C	D
1/4"	3.81	1.75	5.25	2.50	5.90	0.63	4.87	1.31
1/2"	3.81	1.75	7.13	2.50	5.75	0.78	4.87	1.31
3/4"	3.81	1.75	7.63	2.50	5.75	0.94	4.87	1.44
1"	3.92	1.75	8.03	2.50	5.88	1.19	5.09	2.00
1 1/2"	3.90	2.00	8.37	2.50	6.21	1.50	6.24	2.50
2"	4.31	2.00	8.37	2.50	6.60	1.88	6.77	3.00

Max. & Min Flow

Size	Weight	Min. Flow	Max Flow
1/4"	1.5 lbs	0.6 GPM	5 GPM
1/2"	1.6 lbs	1.3 GPM	15 GPM
3/4"	1.7 lbs	2.1 GPM	25 GPM
1"	1.8 lbs	4.2 GPM	50 GPM
1 1/2"	2.7 lbs	8.3 GPM	100 GPM
2"	3.1 lbs	16.7 GPM	200 GPM

Max. Fluid Operating Temperature

Temp.	PVC	CPVC	PVDF
203°F	NR	24 PSIG	40 PSIG
150°F	NR	63 PSIG	130 PSIG
100°F	93 PSIG	120 PSIG	150 PSIG
70°F	150 PSIG	150 PSIG	150 PSIG

ORDERING INFORMATION

ORDER NUMBER RVLA-BCDEF

EXAMPLE: RVL050-N4XN1

A Size/Range		B Body Style & End Connections	C Body Material	D Output	E Options ¹	F Display
Size/Range	Line Size					
Symbol	GPM LPM Inches MM					
025	5 19 1/4 6.35	B= Butt End Connection (available with PVDF material only) N= NPT (Male) Thread	1= PVC 2= CPVC 4= PVDF	X= 4-20 mA (standard) P= Frequency Pulse V= 0-5 Vdc	N= None C= Class 1000 Cleaning H= High Temperature rated: 203 °F (95 °C) ² S= Stainless Steel Tag 3= 3-Pin Connector	N= None 1= Top mount LCD 2= Bottom mount LCD 3= Right mount LCD 4= Left mount LCD
050	15 57 1/2 20					
075	25 95 3/4 25					
100	50 189 1 32					
150	100 379 1 1/2 50					
200	200 757 2 63					

¹Multiple options may be selected

²High Temperature option ONLY available with CPVC and PVDF body materials

CLARK SOLUTIONS

Series RVL Vortex Flowmeter

SPECIFICATIONS

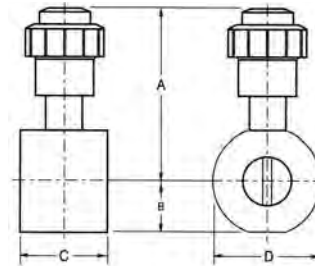
WAFER MOUNTING

Medium: Liquids
 Connection: Wafer
 Turndown Ratio: 12:1 (except 1/4": 8:1)
 Accuracy: $\pm 1\%$ of full scale, 4-20 mA or 0-5 VDC;
 $\pm 2\%$ of full scale, frequency pulse
 Repeatability: $\pm 0.25\%$ actual flow
 Output Signal: 4-20 mA, 0-5 Vdc or frequency pulse
 (source-sink driver; 1A source / 1.5A sink; typical output resistance 10 Ohms)
 Power Supply: 13 to 30 Vdc
 Weatherproof: NEMA-4X (IP 66)
 Maximum Overrange: 125% for 1/2 hour,
 No overrange for Hi-Temp units
 Response Time: 2 seconds minimum, step change in flow
 CSA: CSA File: 215035
 CSA Standard C22.2 No. O-M and No. 142-M



Max. & Min Flow Rates

Size	Weight	Min. Flow	Max Flow
1/2"	0.8	1.3 GPM	15 GPM
3/4"	0.9 lbs	2.1 GPM	25 GPM
1"	1.1 lbs	4.2 GPM	50 GPM
1 1/2"	1.7 lbs	8.3 GPM	100 GPM
2"	2.6 lbs	16.7 GPM	200 GPM
3"	4.8 lbs	25.0 GPM	300 GPM



Max. Fluid Operating Temp./Press.

Temp	PVC (PSIG)	PP (PSIG)	CPVC (PSIG)	PVDF (PSIG)
203°F	NR	NR	CF	CF
150°F	NR	90	100	130
100°F	400	130	130	150
70°F	150	150	150	150

Dimensions (Inches)

Size	PVDF- ANSI 150 Standard			
	A	B	C	D
1/2"	5.85	0.78	2.03	1.75
3/4"	5.90	0.94	2.03	2.13
1"	5.69	1.19	2.25	2.47
1 1/2"	6.00	1.50	2.63	3.25
2"	6.37	1.88	3.22	4.00
3"	6.88	2.50	4.25	5.24

ORDERING INFORMATION

ORDER NUMBER RVLA-BCDEF

EXAMPLE: RVL050-W4XN1

A Size/Range		B Body Style & End Connections	C Body Material	D Output	E Options ¹	F Display
Size/Range	Line Size					
Symbol	GPM LPM					
050	15 57	W= Wafer (mounts between flanges)	1= PVC 2= CPVC 3= Polypropylene 4= PVDF	X= 4-20 mA (standard) P= Frequency Pulse V= 0-5 Vdc	N= None C= Class 1000 Cleaning H= High Temperature rated: 203 °F (95 °C) ² S= Stainless Steel Tag 3= 3-Pin Connector	N= None 1= Top mount LCD 2= Bottom mount LCD 3= Right mount LCD 4= Left mount LCD
075	25 95					
100	50 189					
150	100 379					
200	200 757					
300	300 1136					

¹Multiple options may be selected

²High Temperature option ONLY available with CPVC and PVDF body materials

CLARK SOLUTIONS

Series RVL Vortex Flowmeter

SPECIFICATIONS

IN-LINE FLARE END

Medium: Liquids

Connection: Tube (flare-end), Requires two flare tubing nuts (not included)

Turndown Ratio:

1/2" size = 8:1

3/4" size = 12:1

1" size = 12:1

Accuracy: $\pm 1\%$ of full scale, 4-20 mA or 0-5 Vdc;

$\pm 2\%$ of full scale, frequency pulse

Repeatability: $\pm 0.25\%$ actual flow

Output Signal: 4-20 mA, 0-5 Vdc or frequency pulse
(source-sink driver; 1A source / 1.5A sink; typical output resistance 10 Ohms)

Power Supply: 13 to 30 Vdc

Weatherproof: NEMA-4X (IP 66)

Maximum Overrange: 125% for 1/2 hour,

No overrange for Hi-Temp units

Response Time: 2 seconds minimum, step change in flow

CSA: CSA File: 215035

CSA Standard C22.2 No. O-M and No. 142-M

Max. & Min Flow Rates

Size	Weight	Min. Flow	Max Flow
1/2"	1.5 LBS	0.6 GPM	5 GPM
3/4"	1.6 LBS	1.3 GPM	15 GPM
1"	1.7 LBS	2.1 GPM	25 GPM

Max. Fluid Operating Temp./Press.

Temp	PVDF (PSIG)
203°F	20
150°F	37
100°F	67
70°F	150

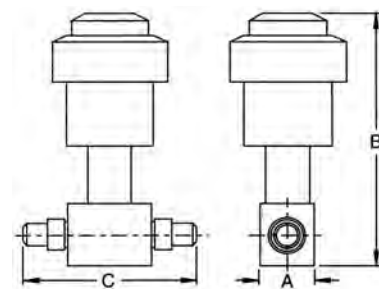
ORDERING INFORMATION

ORDER NUMBER RVLA-BCDE

EXAMPLE: RVL050L-4XN1

A Size/Range		B Body Material	C Output	D Options ¹	E Display
Size/Range	Line Size	4= PVDF	X= 4-20 mA (standard) P= Frequency Pulse V= 0-5 Vdc	N= None C= Class 1000 Cleaning S= Stainless Steel Tag 3= 3-Pin Connector	N= None 1= Top mount LCD 2= Bottom mount LCD 3= Right mount LCD 4= Left mount LCD
Symbol	GPM LPM				
050L	15 57 1/2 20				
075L	25 95 3/4 25				
100L	50 189 1 32				

¹Multiple options may be selected

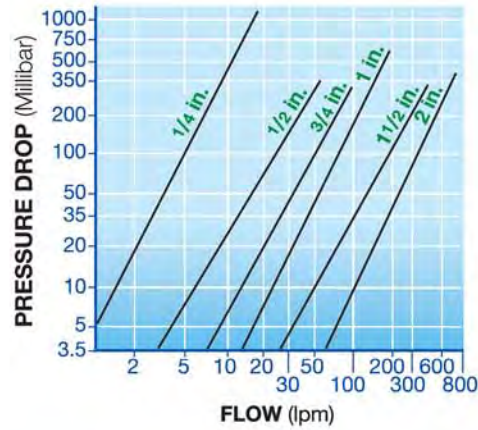
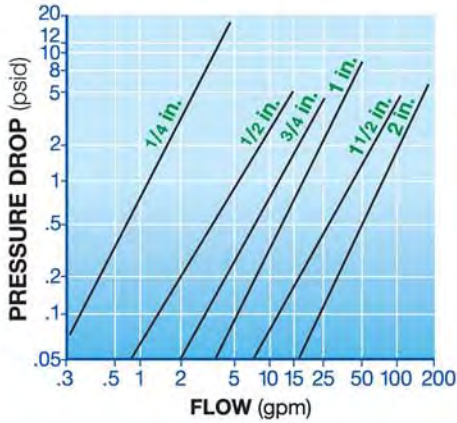


Dimensions (Inches)

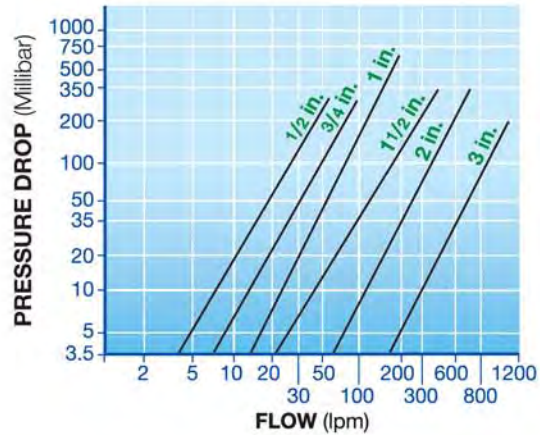
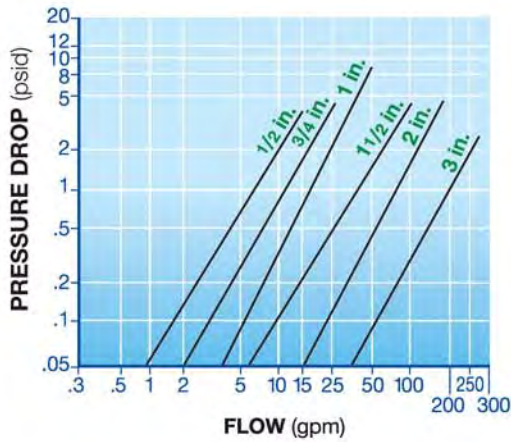
Size	A	B	C
1/2"	1.31	6.25	4.87
3/4"	1.31	6.25	4.66
1"	1.44	6.59	5.42

RVL Series Pressure Drop vs Flow Rate

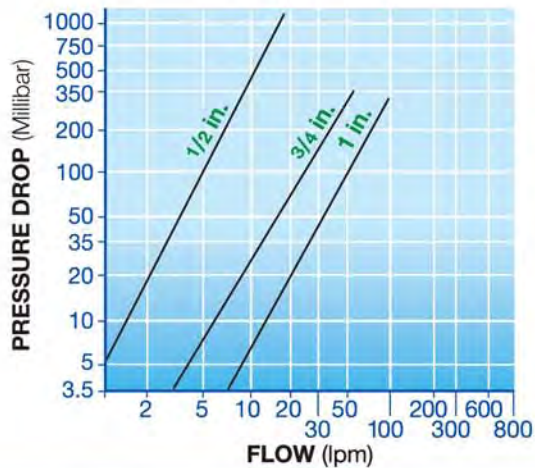
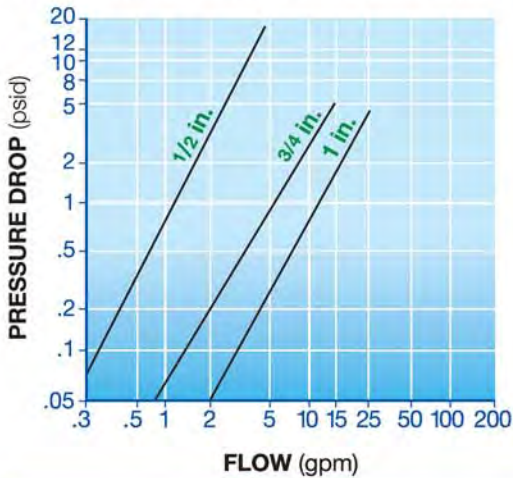
In-Line Flow Meters for Liquids



Wafer Flow Meters for Liquids



In-Line Flare End Flow Meters for Liquids



CLARK Series 2100 Polysulfone Flow Switches

1/8" and 1/4" Pipe Size

DESCRIPTION

Series 2100 flow switches are manufactured to exacting standards and provide accurate flow detection for most applications. Product inspection involves calibrated tools and gages traceable to National Bureau of Standards.

The switches function as a magnet embedded in a spring loaded polysulfone piston is displaced at the proper calibrated flow of liquid to actuate the hermetically sealed reed switch.

The flow switches are broadly used as OEM components and in machine tools, HVAC equipment and any process where the materials of construction and function are suitable.

SPECIFICATIONS

End Connections: 9/16"-18 UNF- 2A Typ.; adapters offered- 1/8" & 1/4" NPT & 1/2" ID Tubing Barb

Housing Material: Polysulfone

Piston Material: Polysulfone

Spring: 316 SS

O-Ring: Viton "A"

Wire: 18 AWG Polymeric 24" Long

Reed Switch: 15 VA SPST (N.O., N.C.), SPDT

Operating Temperature: -20 to 225°F

Operating Pressure: 250 PSI

Set Point Accuracy: 15% Max

Set Point Difference: 20% Max

Repeatability: 1% Max. Deviation

Specialty Options: 1 cc/min set point low flow model

Notes:

-Standard flow calibration is in water@70°F. Calibrated on increasing flow with lead wires up.

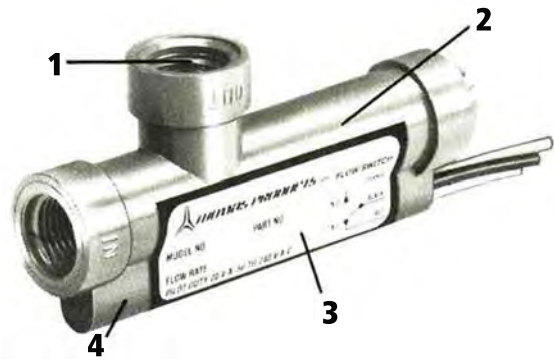
-Set point accuracy will change slightly in other than calibrated position.

-Polysulfone is a FDA approved material

ORDERING INFORMATION

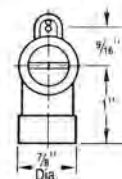
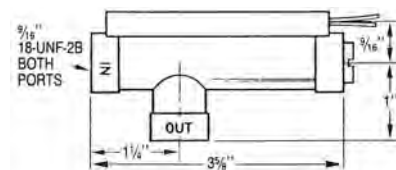
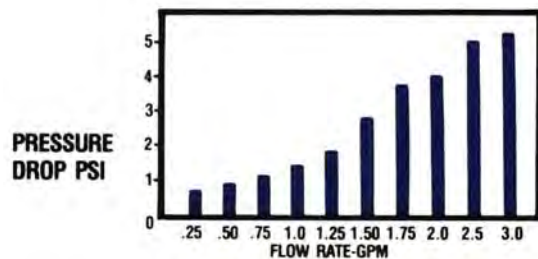
Model	Flow Setting	Switch Type
2100-12686	0.1 GPM	N.O.
2100-12687	0.25 GPM	N.O.
2100-12688	0.5 GPM	N.O.
2100-12589	0.75 GPM	N.O.
2100-12690	1 GPM	N.O.
2100-12691	1.5 GPM	N.O.
2100-12695	0.1 GPM	N.C.
2100-12696	0.25 GPM	N.C.
2100-12697	0.5 GPM	N.C.
2100-12698	0.75 GPM	N.C.
2100-12699	1 GPM	N.C.
2100-12700	1.5 GPM	N.C.
2100-12704	0.1 GPM	SPDT
2100-12705	0.25 GPM	SPDT
2100-12706	0.5 GPM	SPDT

Accessories	
Model	Description
2100-12720	Adapter w/o-ring 9/16"-18 UNF to 1/8" NPT Female
2100-12721	Adapter w/o-ring 9/16"-18 UNF to 1/4" NPT Female
2100-12722	Adapter w/o-ring 9/16"-18 UNF to 1/2" Hose Barb



1. Full size out port minimizes turbulence
2. Unique reverse taper design helps pass particulates.
3. One-piece housing yields burst strength of 1500 PSI @70°F
4. Large full size reed switch silicone potted for shock and vibration deadening

TYPICAL PRESSURE DROP VS FLOW



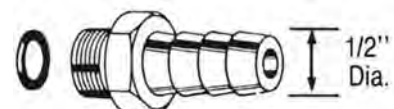
9/16"-18 UNF - 2A TYP.



2100-12720- 1/8" NPT Adapter



2100-12721- 1/4" NPT Adapter



2100-12722- 1/2"

CLARK

Series 1100 Bronze & Stainless Steel Flow Switches

3/4" to 3" Pipe Size

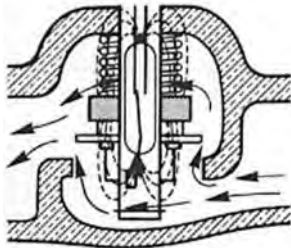
DESCRIPTION

Series 1100 flow switches are manufactured to exacting standards and provide accurate flow detection for most applications. Product inspection involves calibrated tools and gages traceable to National Bureau of Standards.

The flow switches are broadly used in machine tools, HVAC equipment and any process where the materials of construction and function are suitable.

Models are offered in bronze and 316 stainless steel housings with NPT threading. Optionally BSPT, SAE, Silver Braze & Socket connections are available.

FLOW SWITCH OPERATION



A magnet equipped shuttle is displaced at the proper calibrated flow of liquid to actuate the hermetically sealed reed switch. At flow rates under the set point, clearance is provided for the liquid to continue to flow.

When flow rates exceed the

set point the shuttle or piston is displaced even further to reveal a smooth, clear opening for a low pressure drop.

SPECIFICATIONS

Pipe Sizes: 3/4", 2", 1 1/4", 1 1/2", 2", 2 1/2", 3"

End Connections: NPT Standard; BSPT, SAE, Silver Braze, Socket & other available

Housing Material: Bronze or 316 SS, see models table

Shuttle: Teflon®

Spring: 316 SS

Magnet: Ceramic Ring Magnet

O-Ring: Viton "A"

Wire: 18 AWG Polymeric 24" Long

Reed Switch: 20 VA SPDT

Operating Temperature: -20 to 300°F

Operating Pressure: 400 PSI

Proof Pressure: 800 PSI

Burst Strength: 1200 PSI

Set Point Accuracy: ±10% Max

Set Point Difference: ±10%

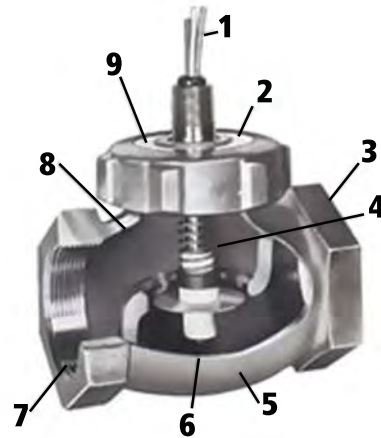
Repeatability: 1% Max. Deviation

Notes:

-Standard flow calibration is in water@70°F. Calibrated on increasing flow.

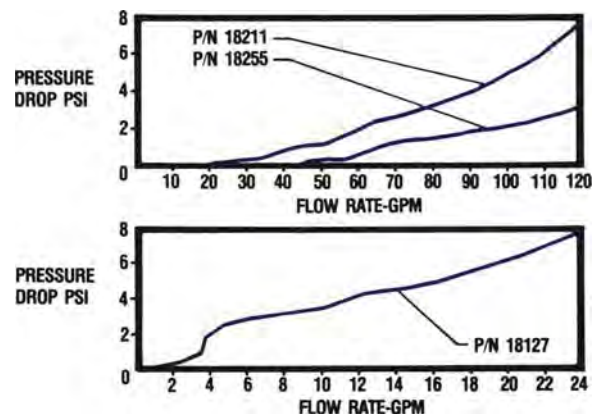
-Strain Reliefs are standard

-Call with special requirements including materials, electrical ratings, high temperature, port connections, special cable requirements etc.



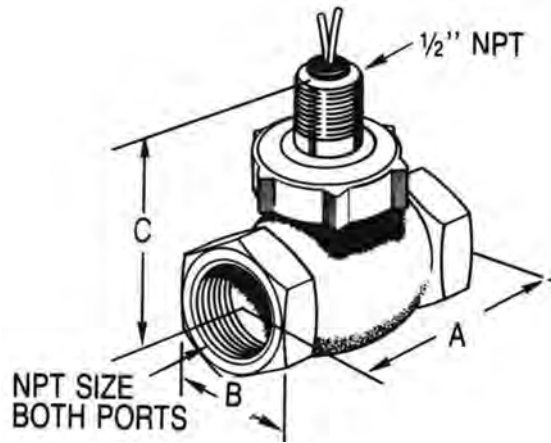
1. Switch capsule.
2. Salt spray and accelerated life tested. Naval Sea Systems Command.
3. 25% heavier wall thickness, published burst strength is derated.
4. Welding: Certified welders under requalification system, performed in low hydrogen environment; process schedules revision controlled. Inspection 100% bubble tight, hydrostatic, fluorescent penetrate.
5. True globe shaped housing yields lower pressure drop and minimizes turbulence
6. High pressure SST welded end plugs.
7. Machining in-house, special modifications available (i.e., NPT, BSPT, SAE, Silver Braze, Socket, etc.). Inspection using calibrated tools and gages traceable to National Bureau of Standards underrecalibration systems.
8. Shock and vibration approved. Listed QPL 16032 shipboard alarm systems.
9. Serialization, documentation retained on purchased materials, processes, inspection, etc. Operational Q.C. systems and manual, MIL I 45208 MIL STD 45662 . Raw materials inventoried in a controlled and segregated department under stock rotation program. Call-outs presented are typical to their respective models.

TYPICAL PRESSURE DROP VS FLOW



DIMENSIONS

Dimensions			
Size NPT	Length A Inches	Hex B Inches	H Height Inches
3/4"	2-7/8	1-3/8	2-3/4
1"	3-1/4	1-25/32	3
1 1/4"	4	3-3/16	3-3/16
1 1/2"	4-1/2	2-1/2	3-1/2
2"	5-3/8	3-3/32	4
2-1/2"	6-5/16	3-5/8	4-1/2
3"	7-3/8	4-3/8	5-5/32



ORDERING INFORMATION

Model	Size NPT	Housing Material	Flow Setting GPM
1100-18100	3/4"	Bronze	0.5
1100-18101	3/4"	Bronze	1.0
1100-18102	3/4"	Bronze	2.0
1100-18103	3/4"	Bronze	3.0
1100-18104	3/4"	Bronze	4.0
1100-18105	3/4"	Bronze	5.0
1100-18106	3/4"	Bronze	6.0
1100-18107	3/4"	Bronze	8.0
1100-18127	1"	Bronze	0.5
1100-18128	1"	Bronze	1.0
1100-18129	1"	Bronze	2.0
1100-18130	1"	Bronze	3.0
1100-18131	1"	Bronze	4.0
1100-18132	1"	Bronze	5.0
1100-18133	1"	Bronze	6.0
1100-18134	1"	Bronze	8.0
1100-18140	1"	316 SS	0.5
1100-18141	1"	316 SS	1.0
1100-18142	1"	316 SS	2.0
1100-18143	1"	316 SS	3.0
1100-18144	1"	316 SS	4.0
1100-18145	1"	316 SS	5.0
1100-18146	1"	316 SS	6.0
1100-18147	1"	316 SS	8.0
1100-18153	1-1/4"	Bronze	1.0
1100-18154	1-1/4"	Bronze	2.0
1100-18155	1-1/4"	Bronze	4.0
1100-18156	1-1/4"	Bronze	6.0
1100-18157	1-1/4"	Bronze	8.0
1100-18158	1-1/4"	Bronze	10
1100-18159	1-1/4"	Bronze	12
1100-18160	1-1/4"	Bronze	16
1100-18161	1-1/4"	Bronze	20
1100-18183	1-1/2"	Bronze	1.5
1100-18184	1-1/2"	Bronze	3
1100-18185	1-1/2"	Bronze	5
1100-18186	1-1/2"	Bronze	7.5
1100-18187	1-1/2"	Bronze	10
1100-18188	1-1/2"	Bronze	15

Model	Size NPT	Housing Material	Flow Setting GPM
1100-18189	1-1/2"	Bronze	20
1100-18190	1-1/2"	Bronze	30
1100-18197	1-1/2"	316 SS	1.5
1100-18198	1-1/2"	316 SS	3
1100-18199	1-1/2"	316 SS	5
1100-18200	1-1/2"	316 SS	7.5
1100-18201	1-1/2"	316 SS	10
1100-18202	1-1/2"	316 SS	15
1100-18203	1-1/2"	316 SS	20
1100-18204	1-1/2"	316 SS	30
1100-18211	2"	Bronze	2
1100-18212	2"	Bronze	4
1100-18213	2"	Bronze	5
1100-18214	2"	Bronze	10
1100-18215	2"	Bronze	15
1100-18216	2"	Bronze	26
1100-18217	2"	Bronze	35
1100-18218	2"	Bronze	50
1100-18239	2 1/2"	Bronze	5
1100-18240	2 1/2"	Bronze	10
1100-18241	2 1/2"	Bronze	15
1100-18242	2 1/2"	Bronze	20
1100-18243	2 1/2"	Bronze	25
1100-18244	2 1/2"	Bronze	30
1100-18245	2 1/2"	Bronze	40
1100-18246	2 1/2"	Bronze	50
1100-18247	2 1/2"	Bronze	60
1100-18248	2 1/2"	Bronze	75
1100-18255	3"	Bronze	5
1100-18256	3"	Bronze	15
1100-18257	3"	Bronze	20
1100-18258	3"	Bronze	25
1100-18259	3"	Bronze	30
1100-18260	3"	Bronze	40
1100-18261	3"	Bronze	50
1100-18262	3"	Bronze	60
1100-18263	3"	Bronze	75
1100-18264	3"	Bronze	100

CLARK Series 1800 PVC Flow Switches

1" Pipe Size

DESCRIPTION

Series 1800 flow switches are manufactured to exacting standards and provide accurate flow detection for most applications. Product inspection involves calibrated tools and gages traceable to National Bureau of Standards.

Switch function involves magnet equipped PVC shuttle that is displaced at the proper calibrated flow of liquid to actuate the hermetically sealed reed switch.

The flow switches are broadly used as OEM components, in water & waste facilities, irrigation, HVAC equipment and any process where the materials of construction and function are suitable.

SPECIFICATIONS

Wetted Materials

End Connections: 1" Slip

Housing Material: PVC

Piston Material: PVC; CPVC available, consult us

Magnet: Ceramic Ring Magnet

Spring: 316 SS

O-Ring: Viton "A"

Wiring: 18 AWG Polymeric 24" Long; with or without 1/2" NPT conduit connection spud (see model table)

Reed Switch: 20 VA SPST, **N.O.**; SPDT available option

Max Flow: 7 GPM

Operating Temperature: -20 to 140°F

Operating Pressure: 150 PSI

Set Point Accuracy: ±20% Max

Set Point Difference: ±20% Max

Notes:

-Standard flow calibration is in water@70°F. Calibrated on increasing flow with lead wires up.

-Flow setpoints available to 6 GPM, consult us

-Use only plastic junction box & flexible conduit if using the 1/2" NPT conduit spud.

ORDERING INFORMATION

Model	Flow Setting	1/2" NPT Conduit Spud
1800-42549	0.5 GPM	No
1800-42545	1.0 GPM	No
1800-42570	0.5 GPM	Yes
1800-42571	1.0 GPM	Yes

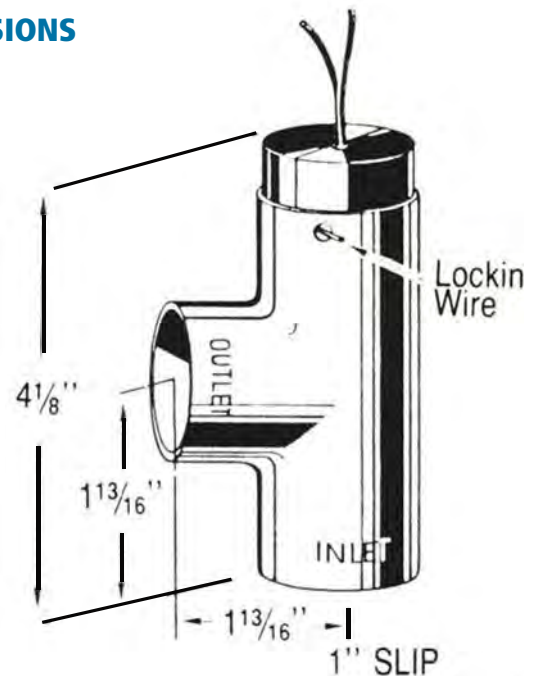
PVC Adapter Fittings	
Model	Description
1800-42751	1" Slip to 3/4" Slip
1800-42752	1" Slip to 1/2" Slip
1800-42753	1" Slip to 3/4" NPT
1800-42754	1" Slip to 1/2" NPT



Model 1800 With & Without 1/2" NPT Conduit Connection

1. Solid one-piece removable bonnet provides safe use to 150 PSI
2. Switch design utilizes a stainless return spring to mount in any attitude
3. **Anti-meniscous** projections on shuttle prevents from drying in place after long machine shutdowns

DIMENSIONS



CLARK Series 2600 PVC Flow Switches

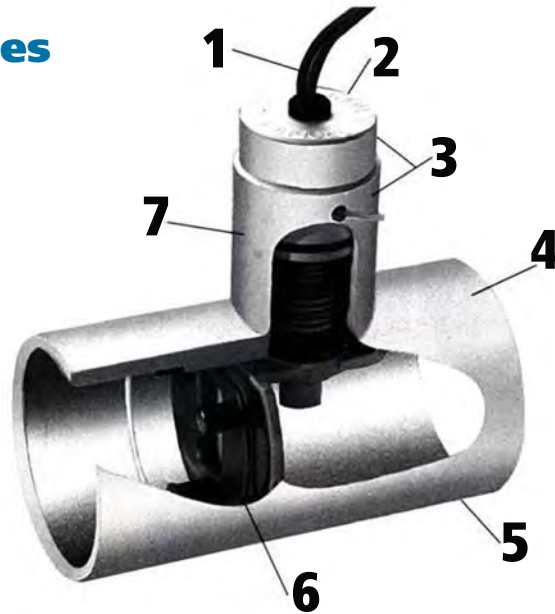
2" Pipe Size

DESCRIPTION

Series 2600 flow switches are manufactured to exacting standards and provide accurate flow detection for most applications. Product inspection involves calibrated tools and gages traceable to National Bureau of Standards.

Switch function involves magnet equipped PVC shuttle that is displaced at the proper calibrated flow of liquid to actuate the hermetically sealed reed switch.

The flow switches are broadly used as OEM components, in water & waste facilities, irrigation, HVAC equipment and any process where the materials of construction and function are suitable.



SPECIFICATIONS

Wetted Materials

- End Connections:** 2" Slip
- Housing Material:** PVC
- Piston Material:** PVC
- Magnet:** Ceramic Ring Magnet
- Clapper:** 316 SS
- Spring:** 316 SS
- O-Ring:** Viton "A"

Wiring: 18 AWG Polymer 24" Long; with or without 1/2" NPT conduit connection spud (see model table)

Reed Switch: 20 VA SPST, N.O.; SPST, N.O. & SPDT are available options, call us

Operating Temp., No 1/2" NPT Conduit Spud: -20 to 140°F

Operating Temp., With 1/2" NPT Conduit Spud: -20 to 122°F (due to different bonnet assembly)

Operating Pressure: 150 PSI

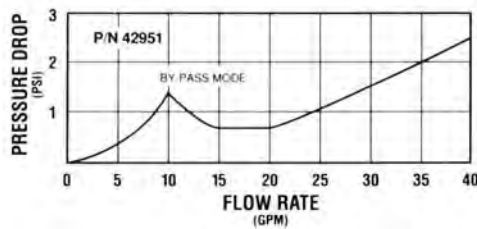
Set Point Accuracy: ±20% Max

Set Point Difference: ±20% Max

1. UL recognized
2. Serialization, documentation, retained on purchased materials, processes, inspection etc.
3. Removable bonnet assembly, replacement parts available.
4. Only virgin materials used and no color concentrate added during molding
5. Periodic destructive testing verifies burst strength ratings
6. Patented stainless steel clapper opens as flow increases. It enables low setpoint values and lowers pressure drop.
7. Accelerated life tested in a variety of fluids



TYPICAL PRESSURE DROP VS FLOW



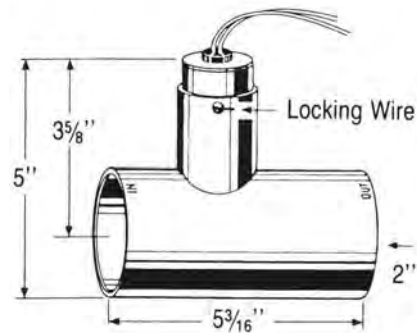
ORDERING INFORMATION

Model	Flow Setting	1/2" NPT Conduit Spud	PVC Adapter Fittings	
			Model	Description
2600-42951	0.5 GPM	No	2600-42954	2" Slip to 1 1/2" Slip
2600-42952	1.0 GPM	No	2600-42955	2" Slip to 1 1/4" Slip
2600-42953	2.0 GPM	No	2600-42956	2" Slip to 1" Slip
2600-42969	0.5 GPM	Yes	2600-42957	2" Slip to 3/4" Slip
2600-42970	1.0 GPM	Yes	2600-42958	2" Slip to 1/2" Slip
2600-42971	2.0 GPM	Yes	2600-42959	2" Slip to 1 1/2" NPT
			2600-42960	2" Slip to 1 1/4" NPT
			2600-42961	2" Slip to 1" NPT
			2600-42962	2" Slip to 3/4" NPT
			2600-42963	2" Slip to 1/2" NPT

Notes:

- Standard flow calibration is in water@70°F. Calibrated on increasing flow with lead wires up.
- Use only plastic junction box & flexible conduit if using the 1/2" NPT conduit spud.

DIMENSIONS



CLARK DS 1000 & DS 1000X

Loop-Powered Rate Meter, Analog Input

DESCRIPTION

With backlit 5 digit LED display, the panel mount meters DS1000 and DS1000X use a 4-20 mA analog input signal. Both the DS1000 for safe areas, and DS1000X for hazardous areas, feature custom engineering units and bargraph, as well as programmable exponent. The bright orange backlight, Nema 4X front panel, and shallow depth case with mounting brackets simplify installation in almost any environment. Simple programming via 4 front panel buttons is stored in non-volatile memory, and secured by means of a password. For hazardous locations, model DS1000X has FM approval and CSA certification.



FEATURES

- 4-20 mA Input
- 5 Digit LCD, 0.6" (15.2 mm) High
- FM Type 4X, IP65 Front
- Shallow Depth Case 3.2" Behind Panel
- 2 V Drop (5.7 V with Backlight)
- Loop-Powered Backlight Standard
- Custom Engineering Units & Bargraph
- Linear, Square Root, or Programmable Exponent
- Maximum & Minimum Display
- Operating Temperature -30 to 65 °C (-22 to 149 °F)
- Model DS1000X- Intrinsically Safe & Non-Incendive
- HART Protocol Transparent

SPECIFICATIONS

GENERAL

Display: 5 digit LCD (-99999 to 99999), 0.60" (15.2 mm) high, 7-segment, automatic lead zero blanking.

Engineering Units: 0.25" (6.4 mm) high, 14-segment

Bargraph: 20-segment, 0-100% indication

Trend Arrows: Up and down trend indication

Backlight: Bright orange LED (intensity varies with signal)

Front Panel: FM Type 4X, IP65; panel gasket provided

Display Update Rate: 2.5/second

Overrange: Display flashes 99999

Underrange: Display flashes -99999

Programming Method: Four front panel buttons

Noise Filter: Programmable from 1 to 199

Recalibration: Recommended at least every 12 months

Max/Min Display: Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.

Password: Programmable password restricts modification of settings.

Non-Volatile Memory: All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

Voltage Drop: 2.0 V max w/o backlight, 5.7 V max with backlight

Equivalent Resistance: 100 ohms @ 20 mA without backlight, 285 ohms @ 20 mA with backlight

Normal Mode Rejection: 64 dB at 50/60 Hz

Operating Temperature Range: -30 to 65 °C (-22 to 149 °F)

Storage Temperature Range: -40 to 85 °C (-40 to 185 °F)

Relative Humidity: 0-90% non-condensing

Connections: Screw terminals accept 12 to 22 AWG wire

Enclosure: 1/8 DIN, high impact plastic, UL 94V-0, color: gray

Mounting: 1/8 DIN panel cutout required. Two panel mounting bracket assemblies provided.

Tightening Torque: 4.5 lb-in (0.5 Nm) Screw terminal connectors

Overall Dimensions: 4.68" x 2.45" x 3.79" (119 x 62 x 96 mm)

Weight: 5.7 oz (162 g)

INPUT

Input Range: 4-20 mA

Accuracy: $\pm 0.03\%$ of span ± 1 count, square root and programmable exponent: 10-100% FS.

Calibration: Scale without signal or calibrate with signal source

Calibration Range: User programmable over entire range of meter

Minimum Span: 0.40 mA between inputs 1 and 2

Input Overload: Over current protection to 2 A maximum

Decimal Point: Up to 4 places

Function: Linear, square root or programmable exponent

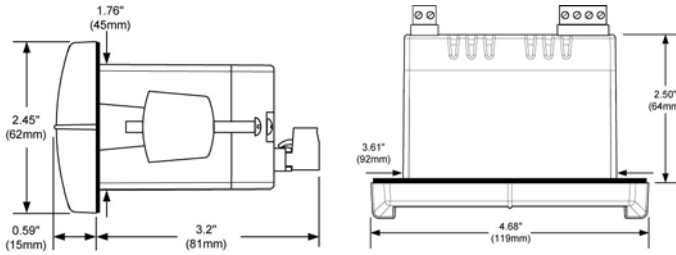
Low-Flow Cutoff: -99999 to 99999 (-99999 disables cutoff function)

Temperature Drift: 50 PPM/°C from -40 to 65 °C (-40 to 149 °F) ambient

INSTALLATION

Installation, wiring, and setup may be completed without having to remove the meter from its case.

Mounting Dimensions - Inches (mm)

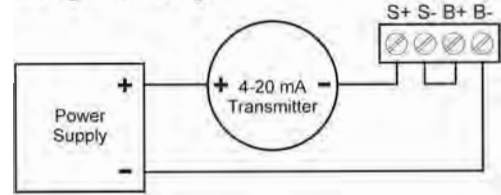


Notes:

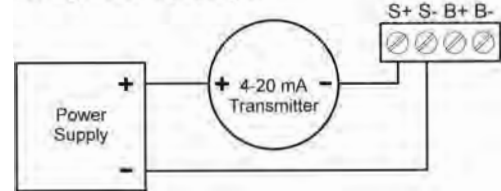
1. Panel cutout required: 3.622" x 1.772" (92 x 45)
2. Panel thickness: 0.040" - 0.250" (1.0 - 6.4)
3. Mounting brackets lock in place for easy mounting

4-20 mA Input Connection

Wiring with Backlight



Wiring without Backlight



ENCLOSURES



DS1000 shown in NEMA 4X enclosure
Order Option - ENC

Additional enclosure options include steel, stainless steel, plastic, and explosion-proof. Enclosures for multiple meters are also available. Consult factory for details.

MODEL DS1000X - APPROVALS FOR HAZARDOUS LOCATIONS

FM Approved & CSA Certified as intrinsically safe with entity for use in Class I, Div 1 Groups ABCD; Class II, Div 1, Groups EFG; Class III, Div 1; Class I, Zone 0, Group IIC; T-code = T4.
Non-incendive: Suitable for use in Class 1, Div 2, Groups ABCD; Class II, Div 2, Groups FG; Class III, Div 2.
Entity Parameters: $U_i=30$ V; $I_i=175$ mA; $C_i=0$; $L_i=0$; $P_i=1.0$ W

ORDERING INFORMATION

EXAMPLE: DS1000-ENC

Model	Description	Option
DS1000	Rate Meter for Safe Area	
DS1000X	Rate Meter for hazardous area - FM & CSA	ENC = plastic NEMA 4X enclosure

CLARK DS 2000 & DS 2000X

Loop-Powered Rate/Totalizer, Analog Input

DESCRIPTION

With backlit 5 digit LED display, the DS2000 and DS2000X totalizer/ratemeters use a 4-20 mA analog input signal. Both the DS2000 for safe areas, and DS2000X for hazardous areas, feature bargraph, open collector output, programmable exponent, and custom engineering units. The bright orange backlight, Nema 4X front panel, and shallow depth case with mounting brackets simplify installation in almost any environment. Simple programming via 4 front panel buttons is stored in non-volatile memory, and secured by means of a password. The DS2000X with FM approval and CSA certification is suitable for hazardous locations.



FEATURES

- 4-20 mA Input
- Programmable Alternating Rate/Total Display
- FM Type 4X, IP65 Front
- Overflow Feature Displays Total up to 8 Digits
- 5 Digit LCD, 0.6" (15.2 mm) High
- Custom Engineering Units & Bargraph
- Linear, Square Root, or Programmable Exponent
- Maximum & Minimum Display
- Operating Temperature -20 to 65 °C (-4 to 149 °F)
- Intrinsically Safe & Non-Incendive - DS2000X
- Open Collector Alarm or Pulse Output

SPECIFICATIONS

GENERAL

Display: 5 digit LCD (-99999 to 99999), 0.60" (15.2 mm) high, 7-segment, automatic lead zero blanking.

Engineering Units: 0.25" (6.4 mm) high, 14-segment

Bargraph: 20-segment, 0-100% indication

Trend Arrows: Up and down trend indication

Backlight: Bright orange LED (intensity varies with signal)

Front Panel: FM Type 4X, IP65; panel gasket provided

Display Update Rate: 2.5/second

Overrange: Display flashes 99999

Underrange: Display flashes -99999

Programming Method: Four front panel buttons

Noise Filter: Programmable from 1 to 199

Recalibration: Recommended at least every 12 months

Max/Min Display: Max/min readings reached by the process are stored until reset by the user or until power to the meter is turned off.

Password: Programmable password restricts modification of settings.

Non-Volatile Memory: All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

Voltage Drop: 2.0 V max w/o backlight, 5.7 V max with backlight

Equivalent Resistance: 100 ohms @ 20 mA without backlight, 285 ohms @ 20 mA with backlight

Normal Mode Rejection: 64 dB at 50/60 Hz

Operating Temperature Range: -20 to 65 °C (-4 to 149 °F)

Allowable Temperature Range: -40 to 65 °C (-40 to 149 °F)
n.b. Below 20 °C the LCD becomes less readable.

Storage Temperature Range: -40 to 85 °C (-40 TO 185 °F)

Relative Humidity: 0-90% non-condensing

Connections: Screw terminals accept 12 to 22 AWG wire

Enclosure: 1/8 DIN, high impact plastic, UL 94V-0, color: gray

Mounting: 1/8 DIN panel cutout required. Two panel mounting bracket assemblies provided.

Tightening Torque: 4.5 lb-in (0.5 Nm) Screw terminal connectors

Overall Dimensions: 4.68" x 2.45" x 3.79" (119 x 62 x 96 mm)

Weight: 5.7 oz (162 g)

INPUT

Input Range: 4-20 mA

Accuracy: ±0.03% of span ±1 count, square root and programmable exponent: 10-100% FS.

Calibration: Scale without signal or calibrate with signal source

Calibration Range: User programmable over entire range of meter

Minimum Span: 0.40 mA between inputs 1 and 2

Input Overload: Over current protection to 2 A maximum

Decimal Point: Up to 4 places

Function: Linear, square root or programmable exponent

Low-Flow Cutoff: -99999 to 99999 (-99999 disables cutoff function)

Temperature Drift: 50 PPM/°C from -40 to 65 °C (-40 to 149 °F) ambient

TOTALIZER FEATURES

Total Display: 0 to 9,9999 main total display plus 0 to 999 total overflow for combined 8 digit total of 99,999,999.

Alternating Display: May be programmed to alternate between rate and total every 10 seconds.

Time Base: Seconds, minutes, hours, or days

Totalizer Conversion Factor: 0.0001 to 99999

Totalizer: Calculates total based on rate, time base, and field programmable multiplier; stored in non-volatile memory upon power loss.

Totalizer Rollover: Total rolls over when total exceeds 99,999,999.

Totalizer Reset: Manual reset or automatic with time delay, or disabled for non-resettable total applications.

OPEN COLLECTOR OUTPUT

Rating: Isolated open collector, 30 VDC @ 175 mA maximum

Alarm Output: Assign to rate or total, high or low rate alarm.

Deadband: 0-100% FS, user selectable

Acknowledge: ACK button resets output and screen indication.

Automatic Reset: Alarm resets automatically when signal reaches reset point.

Pulse Output: K-Factor programmable from 0.0001 to 99999.

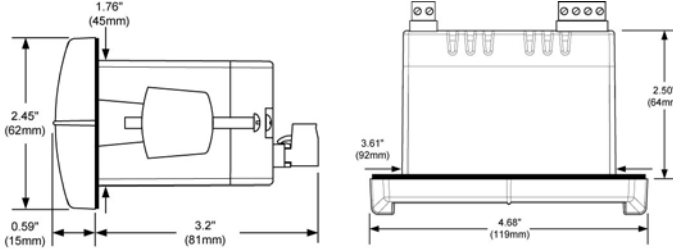
Programmable frequency: 2,4,6,8,16,32,64,128 Hz.

Pulse width: minimum 3.9ms @ 128 Hz; maximum 250 ms @ 2 Hz.

INSTALLATION

Installation, wiring, and setup may be completed without having to remove the meter from its case.

Mounting Dimensions - Inches (mm)

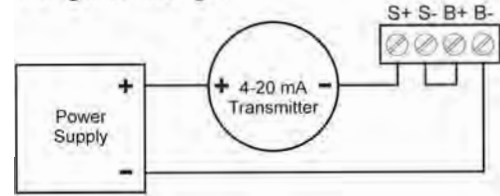


Notes:

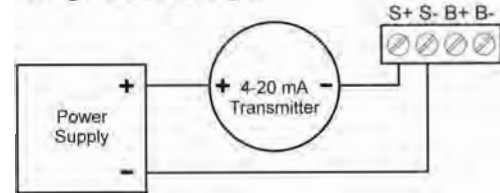
1. Panel cutout required: 3.622" x 1.772" (92 x 45)
2. Panel thickness: 0.040" - 0.250" (1.0 - 6.4)
3. Mounting brackets lock in place for easy mounting

4-20 mA Input Connection

Wiring with Backlight



Wiring without Backlight



ENCLOSURES



Additional enclosure options include steel, stainless steel, plastic, and explosion proof. Enclosures for multiple meters are also available. Consult factory for details.

DS2000 shown in NEMA 4X enclosure
Order Option - ENC

DS2000X APPROVALS FOR HAZARDOUS LOCATIONS

FM Approved & CSA Certified as intrinsically safe with entity for use in Class I, Div 1 Groups ABCD; Class II, Div 1, Groups EFG; Class III, Div 1; Class I, Zone 0, Group IIC; T-code = T4.
Non-incendive: Suitable for use in Class 1, Div 2, Groups ABCD; Class II, Div 2, Groups FG; Class III, Div 2.
Entity Parameters: $U_i=30$ V; $I_i=175$ mA; $C_i=0$; $L_i=0$; $P_i=1.0$ W

ORDERING INFORMATION

EXAMPLE: DS2000-ENC

Model	Description	Option
DS2000	Rate/Totalizer for Safe Area	ENC = plastic NEMA 4X enclosure
DS2000X	Rate/Totalizer for hazardous area - FM & CSA	

CLARK DS 3000A & DS 3000P

Dual-line Rate/Totalizer, Analog or Pulse Input

DESCRIPTION

Simultaneous display of rate and total makes the 2-line DS3000 Rate/Totalizer an ideal choice for flow applications. The DS3000A may be configured for a variety of analog input signals, while the DS3000P will take pulse input signals. Via the UV resistant, Nema 4X front panel, the main and secondary displays may be programmed to display totals, engineering units, custom legends, min/max values or relay setpoints.



FEATURES

- Nema 4X, IP65 Front Panel
- User Configurable, Sunlight Readable Display
- Input Power: 85-365 VAC or 12/24 VDC
- Large, Dual-Line, 6-Digit Display for Simultaneous Rate & Total
- 9-Digit Totalizer; Total Stored in Non-volatile Memory
- 2 or 4 Relays + Isolated 4-20 mA Output Options
- Programmable Displays & Function Keys
- Rates in Units per Second, Minute, Hour, or Day
- Total, Grand Total or Non-Resettable Grand Total
- Password Protection for Total Reset

SPECIFICATIONS

GENERAL

Display: Main display: 0.60" (15 mm) high, second display: 0.46" (12mm) high. Displays are 6 digits (-99999 to 999999), red LEDs, leading zeros suppressed.

Display Intensity: Eight user selectable intensity levels

Overrange: Display flashes 999999 **Underrange:** -99999

Front Panel: NEMA 4X, IP65

Programming Methods: Four front panel buttons, digital inputs, PC and multi-point linearization utility, or cloning using Copy function.

Recalibration: All ranges are calibrated at the factory. Recalibration is recommended at least every 12 months.

Max/Min Display: Max/Min values are stored until reset or power is turned off.

Decimal Point: Up to five decimal places: d.ddddd, d.dddd, d.ddd, d.dd, d.d, d.ddddd

Password: Multiple programmable passwords protect settings and totals.

Non-Volatile Memory: All programmed settings are stored in nonvolatile memory for a minimum of ten years if power is lost.

Power Options: 85-265 VAC 50/60 Hz, 90-265 VDC 20 W max, or jumper selectable 12/24 VDC $\pm 10\%$, 15 W max.

Fuse: Required external fuse: UL Recognized, 5 A max, slow blow; up to 6 meters may share one 5 A fuse.

Isolated Transmitter Power Supply: Terminals P+ & P-: 24 VDC $\pm 10\%$ @ 200 mA max (standard), (12/24 VDC powered models rated @ 100 mA max). 5 or 10 VDC @ 50 mA max, selectable with internal jumper J4.

Isolation: 4 kV input/output-to-power line. 500 V input-to-output or output-to-P+ supply.

Temperature: Operating: -40 to 65°C. Storage temperature range: -40 to 85°C. Relative humidity: 0 to 90% non-condensing.

Connections: Removable screw terminal blocks accept 12 to 22 AWG wire, RJ45 for external relays, digital I/O, and serial communication adapters.

Enclosure: 1/8 DIN, high impact plastic, UL 94V-0, color: black

Mounting: 1/8 DIN panel cutout required: 3.622" x 1.772" (92 mm x 45 mm). Two panel mounting bracket assemblies are provided.

Overall Dimensions: 4.68" x 2.45" x 5.64" (119 mm x 62 mm x 143 mm) (W x H x D); Weight: 9.5 oz (269 g)

ANALOG INPUT (MODEL DS3000A)

Field selectable: 0-20, 4-20 mA, ± 10 VDC (0-5, 1-5, 0-10 V)

Accuracy: $\pm 0.03\%$ of calibrated span ± 1 count, square root & programmable exponent accuracy range: 10-100% of calibrated span

Display Update Rate: 5/second (200 ms)

Temperature Drift: 0.005% of calibrated span/ $^{\circ}$ C max from 0 to 65 $^{\circ}$ C ambient, 0.01% of calibrated span/ $^{\circ}$ C max from -40 to 0 $^{\circ}$ C ambient

Math Function: Linear, square root, programmable exponent, or round horizontal tank volume calculation.

Multi-Point Linearization: 2 to 32 points

Programmable Exponent: 1.0001 to 2.9999

Low-Flow Cutoff: 0-999999 (0 disables cutoff function)

Calibration Range: Input : 4-20 mA, ± 10 V. Minimum span: 0.15 mA or 0.10 V

Input Overload: Current input protected by resettable fuse, 30 VDC max.

Noise Filter: Programmable from 2 to 199 (0 will disable filter)

Filter Bypass: Programmable from 0.1 to 99.9% of calibrated span

Normal Mode Rejection: Greater than 60 dB at 50/60 Hz

PULSE INPUT (MODEL DS3000P)

Field selectable: Pulse or square wave 0-5 V, 0-12 V, or 0-24 V @ 30 kHz; TTL; open collector 4.7 kohm pull-up to 5 V @ 30 kHz; NPN or PNP transistor, switch contact 4.7 kohm pull-up to 5 V @ 40 Hz.

Low Voltage Mag Pickup (Isolated): 40mVp-p to 8Vp-p

Minimum Input Frequency: 0.001 Hz -> Minimum frequency is dependent on high gate setting

Maximum Input Frequency: 30,000 Hz (10,000 for Low Voltage Mag Pickup)

Input Impedance: Pulse input: Greater than 300 kohm @ 1 kHz. Open collector/switch input: 4.7 kohm pull-up to 5 V.

Accuracy: $\pm 0.03\%$ of calibrated span ± 1 count

Display Update Rate: Total: 10/sec, Rate: 10/sec to 1/100 sec

Temperature Drift: Rate display is not affected by changes in temperature.

Multi-Point Linearization: 2 to 32 points

Low-Flow Cutoff: 0-999999 (0 disables cutoff function)

Calibration: May be calibrated using K-factor, scale using internal calibration, or by applying an external calibration signal.

K-Factor: Field programmable K-factor converts input pulses to rate in engineering units. 0.00001 to 999,999 pulses/unit.

Time Base: Second, minute, hour, or day

Gate: Low gate: 0.1-99.9 seconds; High gate: 2.0-999.9 seconds

SPECIFICATIONS (continued)

RATE/TOTALIZER

Display Assignment: Each display may be assigned to rate, total, grand total, alternate R & T, units, or set point.

Alternating Display: Either display may be programmed to alternate between rate and total or rate and grand total every 10 seconds.

Total Conversion Factor: 0.00001 to 59,999

Totalizer Rollover: Totalizer rolls over when display exceeds 999,999,999. Relay status reflects the display value.

Totalizer Presets: Up to eight, user selectable under Setup menu. Any set point can be assigned to total and may be programmed anywhere in the range of the meter for total alarm indication.

Programmable Total Reset Delay: 0.1 to 999.9 seconds; applied to the first relay assigned to total or grand total. If the meter is programmed to reset total to zero automatically when the preset is reached, then a delay will occur before the total is reset.

Total Reset: Via front panel button, external contact closure on digital inputs, automatically via user selectable preset value and time delay, or via serial communications.

Non-Resettable Total: The grand total can be programmed as a nonresettable total by entering the password "050873". Caution: Once the Grand Total has been programmed as "non-resettable" the feature cannot be disabled.

RELAYS

Rating: 2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A @ 30 VDC and 125/250 VAC resistive load; 1/14 HP @ 125/250 VAC for inductive loads

Noise Suppression: Noise suppression is recommended for each relay contact switching inductive loads.

Deadband: 0-100% of span, user programmable

Relay Assignment: Relays may be assigned to rate, total, or grand total.

High or Low Alarm: User may program any alarm for high or low trip point.

Relay Operation: automatic (non-latching), latching (requires manual acknowledge), sampling (based on time), off (disable unused relays), and manual control mode.

Relay Reset: User selectable via front panel buttons, digital inputs, or PC

Time Delay: 0 to 999.9 seconds, on & off relay time delays.

Fail-Safe Operation: Programmable and independent for each relay.

Note: Relay coil is energized in non-alarm condition. In case of power failure, relay will go to alarm state.

4-20 mA TRANSMITTER OUTPUT

Output Source: Rate, total, grand total, max, min, set points 1-8, or manual control

Scaling Range: 1.000 to 23.000 mA for any display range

Calibration: Factory calibrated: 4.000 to 20.000 = 4-20 mA output

Analog Output Programming: 23.000 mA maximum for all parameters: Overrange, underrange, max, min, and break

Accuracy: +/- 0.1% FS +/- 0.004 mA

External Loop Power Supply: 35 VDC maximum

Output Loop Resistance: (Power/Minimum Resistance/Maximum Resistance)
24 VDC / 10 ohm / 700 ohm; 35 VDC external/ 100 ohm / 1200 ohm

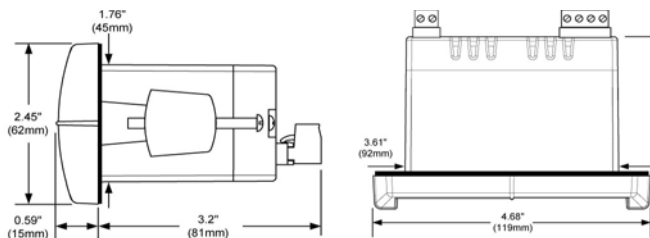
OTHER OPTIONS AVAILABLE (Consult factory for details)

Serial Communication

Digital I/O Expansion Module

4-Relay Expansion Module

MOUNTING DIMENSIONS



Notes:

1. Panel cutout required: 3.622" x 1.772" (92 x 45)
2. Panel thickness: 0.040" - 0.250" (1.0 - 6.4)
3. Mounting brackets lock in place for easy mounting

DS3000P shown in NEMA 4X enclosure Order Option - ENC

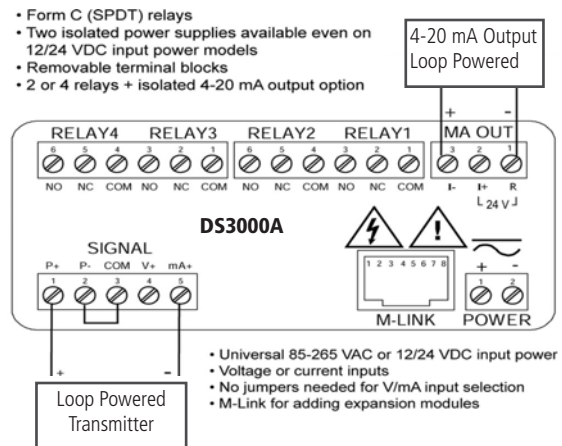
Additional enclosure options include plastic, stainless steel, and painted steel. Enclosures for multiple meters are also available. Consult factory for details.



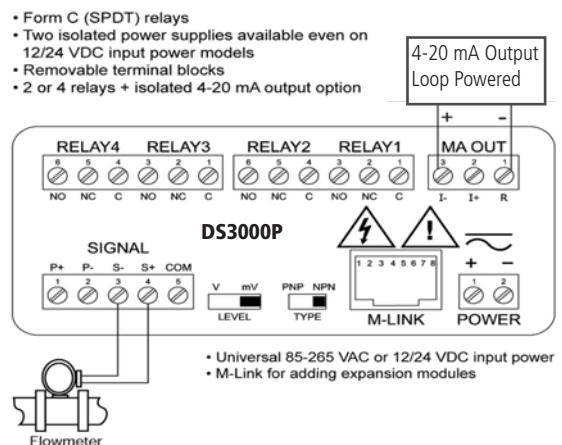
ORDERING INFORMATION

EXAMPLE: DS3000P-ENC

Model	Description	Option
DS3000	A = Rate / Totalizer for Analog Input P = Rate / Totalizer for Pulse / Frequency Input	ENC = plastic NEMA 4X enclosure



CONNECTIONS



CLARK DS 5000

Universal Process Controller - Up to 8 Inputs / Outputs

DESCRIPTION

Suitable for most batching or dosing applications, the DS5000 is a versatile, high quality and reliable microcomputer-based controller. The instrument's user configurable screw-terminal channels enable any mix of up to eight inputs and/or outputs regardless of the signal type.



FEATURES

- Dosing and Proportional Mixing
- Mix Up To Four Independent I/O Channels or Eight I/O Ports
- Input Measurements - Digital, Current, Volts
- Output Controls - Relay, Current, Volts
- Menu Driven Graphic Controls
- Measurement Accuracy to 0.01%
- On-Board Datalogging
- Real-Time Clock-Calendar
- Information Reports and Alarms
- Serial Communication
- User Programmable Units, Rate-Time Base, Scaling
- Keypad Security

SPECIFICATIONS

GENERAL

Control Functions: Monitor, Batch, Blend, PID, Manual

Measure Type Rate: Total, Scalar

Process Input: Digital, Current, Volt

Process Rate: 0.00±9,999,999.99 unit/time-base

Totalize Range: 0-99,999,999.99 units

Process Output: Current, Volt, Relay

Programmable Values:

Port Select: Off, Input, Output

Rate Time: Base scalar (none), sec, min, hrs, day

Rate Set-Point: 0.00±9,999,999.99 units

Batch Set-Point: 0.00±9,999,999.99 units

Blend Set-Point: 0.00±9999999.999%

Rate-Value Filter: 1.0-20 sec 10%-90%

PID Response: 1.0-20 sec

Input Signal Interpolate: Lo-Hi Value=0-10.000/20.000,

Lo-Hi units=0.00±9,999,999.99

Output Interpolate: Lo-Hi Value=0-10.000/20.000,

Lo-Hi units=0.00±9,999,999.99

Pulse Signal Interpolate: 0.00±9,999,999.999 pulse/qty ratio

Measure Units: 5 Chars (a-z, 0-9, A-Z, other)

Quantity 1, 2 Alarm: 0.00-99,999,999.99 units

Rate Hi-Lo Alarm: 0.00±9,999,999.99 units

Service Time Alarm: 0-65,535 hrs

Global Functions:

WAN Addresses: Dual 16 characters

Answer Rings: 0-255 (WAN option only)

Network Address: 0-65,535

Serial Port Functions: Sio-Wan-Lan, Report-Log-Alarms

Date-Time Clock: dd-mm-yy, hrs-min-sec

Report/Log Frequency: 0-999 sec-min-hrs-day-month

Serial Ports

Sio: EIA-TIA232D fdx D9S

Wan: USOC RJ-11 tip-ring FCC Subpart H fdx WAN option

Lan: EIA-TIA485 multidrop master-slave option <or> 10-100 Ethernet option

Self Diagnostics

Memory validities, installation, communication local-remote

Input Interface

Channels Isolation: >85 dbv (nom)

Interface: 1x3 plug signal gnd excitation <or> DA15S option

Excitation: Vr (4.096V±0.01%) +5v Vpwr @ ~25mA max

Digital Pulse: 0-24 V threshold 2.4V (typ) Zi~10K pulled to +5V

>20KHz ±0.001% hall, open collector 5V cmos switch contacts

Analog Voltage: 0-10.000V ±0.10% Zi~10.0K DA15S sense compensated

Analog Current: 0-20.000 mA ±0.10% Zi=100 ohm

Analog Resistance: 0-0.2M ohms

Output Interface

Interface: 1x3 plug signal gnd aux-signal <or> DA15S option

Analog Voltage: 0-10.000V ±0.10% Zo<0.25 ohm DA15S option sense compensated

Analog Current: 0-20.000mA ±0.10% Zo~2M sourcing

Relay Rating: Form C 28 VDC-vac 1.0A Isolated 1KV

Aux Signal: -4.0V to +8V @ +/- 4.0mA

Power Control: 2.0 Amps Max.

Value Memory

Nvram 8Kx8 non-volatile parallel

Eerom 512x8 non-volatile 100 yr retention, Eerom 256Kx8 non-volatile

serial log option

Static ram 1Kx8 parallel, Static ram 32x8 serial battery backed

Power Required

Volts-Power: 12-24 VDC 2.0w (without options)

Jack Unipolar: 2.1<or>2.5mm 2A<or>5A center pos UL/CSA

Plug Bipolar: DE9P 5A rated UL/CSA

Battery: Lithium 3.0V 12mm 35 mA-hr 9 yr operate date-time clock option

Operating Environment

Operation: 0-55°C 0-95% RH non-condensing

Ship-Storage: -20° to +85°C 0-95% RH non-condensing

Warm Up: 3 sec typical to rated accuracy

Enclosure: ABS plastic NEMA 4X front panel

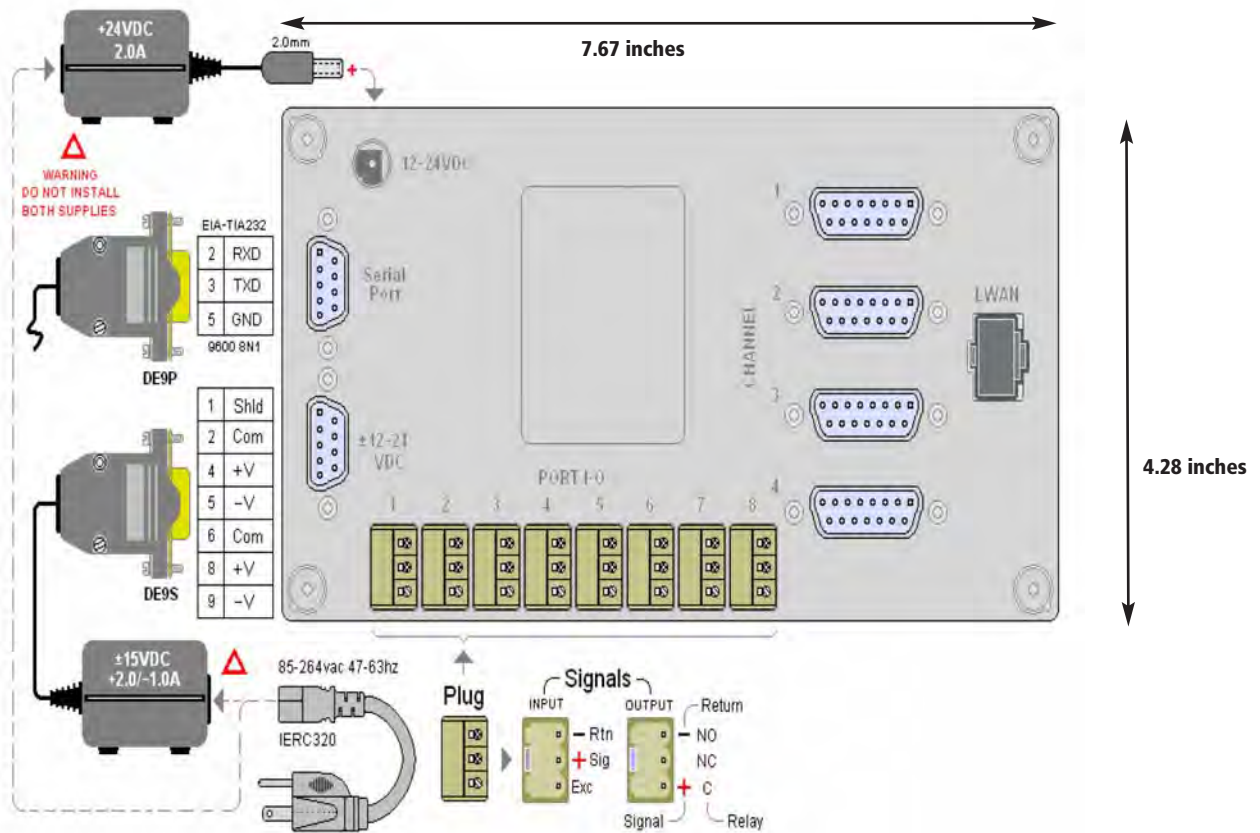
Mounting Frame, panel, desk-top

Panel Cut-Out Rectangular 7.67x4.28, R 0.125 4x (195x109, R 3.0 4x)

Weight: 595gm (without options)

Compliances: CE Mark RoHS FCC15-A FCC68 5TUUSA-23969-DT-E

ELECTRICAL DIAGRAM



ORDERING INFORMATION

EXAMPLE: DS5000-C532A2BC

Model	# Inputs	# Outputs	Communications	Power	Options	Mounting
DS5000	* C[1-9]	* 3[0-7]	A - Serial communication C - WAN modem	0 - No power 2 - 12V to 115 VAC 3 - 24 V to 115 VAC 4 - 95 to 264 VAC	B - Keypad security C - Realtime clock calendar L - Onboard datalogger	A - Frame C - Panel D - Table top

* Total number of Inputs plus Outputs must be less than or equal to 8.

CLARK

CS-800 Multi-Purpose Test Instrument

Air Velocity/Wind Speed, Humidity, Temperature, Light Intensity

DESCRIPTION

The CS-800 is a marvelous and economical service tool for use in the factory and in commercial and industrial buildings as well as laboratories for quick checking of ventilating fume hood and grill velocities, humidity, temperature and lighting levels. It is also useful on the farm for checking ventilation and lighting in enclosed livestock facilities as well as compost and critical equipment temperatures. Quick reference to outdoor wind speed is also of interest to farmers, firefighters, environmentalists, weather studies, and sportsmen.

Measuring units and functions are easily selected using the six button touch pad. Reading hold function and Max-Min data record function are standard features.

SPECIFICATIONS

GENERAL

- Display: 8 mm LCD
- Measurement: Air Velocity, Humidity, Temperature, Light
- Operating Humidity: Max. 80% R.H.
- Operating Temperature: 0 to 50°C (32-122°F)
- Over Range Display: " - - - - "
- Power Supply: 9 VDC Heavy Duty Battery (not included)
- Current Consumption: Approx. 6.2 mA
- Weight: 160g(with battery)
- Dimension: 156H x 60W x 33L mm (6.14" x 2.36" x 1.29")
- Options: Carrying case, type K thermocouple probes

AIR VELOCITY(ROTATING VANE ANEMOMETER)

Unit	Range	Resolution	Accuracy
ft/min	80 to 5910	1 ft/min	
m/s	0.4 to 30.0	0.1 m/s	±3% F.S. < 20 m/s
km/h	1.4 to 108	0.1 km/h	±4%F.S. > 20 m/s
knots	0.8 to 58.3	0.1 knots	

HUMIDITY(THIN FILM CAPACITANCE SENSOR)

Unit	Range	Resolution	Accuracy
% RH	10-95	0.1% RH	±4% reading. < 70% RH ±4% reading. > 70% RH +1.2%

LIGHT(PHOTO DIODE AND COLOR CORRECTION SENSOR)

Unit	Range	Resolution	Accuracy
Lux	0 to 20,000	1 Lux	±5% reading. ±8 digits
Ft-cd	0 to 2000	1 Ft-cd	

TEMPERATURE (BUILT-IN THERMISTOR)

Displays along with Air Velocity or Humidity function

Unit	Range	Resolution	Accuracy
°F	32 to 122	0.1°F	±2.5°F
°C	0 to 50	0.1°C	±1.2°C



External type K probes are supplied with mini thermocouple plug

Unit	Range	Resolution	Accuracy
°F	-148 to 2372	0.1°F	±1% reading +2°F
°C	-100 to 1300	0.1°C	±1% reading +1°C

TP-01



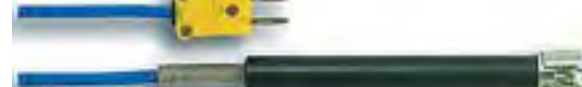
TP-02A



TP-03



TP-04



ORDERING INFORMATION

Model	Description
CS-800	Multi-purpose test Instrument
CA52A	Carrying case with sash for model CS-800
TP-01	Naked bead probe, -40 to 250°C(-40 to 482°F)
TP-02A	General purpose, -50 to 900°C(-50 to 1600°F) 10 cm x 3.2 mm diameter
TP-03	Immersion Probe, -50 to 1200°C(-50 to 2200°F) 10 cm x 8 mm diameter
TP-04	Surface probe, -50 to 400°C(-50 to 752°F) 12 mm L, 15 mm diameter sensing head

CLARK CS-810 Anemometer

Air Velocity & Wind Speed

DESCRIPTION

The CS-810 is an economical service tool for use in the factory and in commercial and industrial buildings as well as laboratories for quick checking of ventilating fume hood and grill velocities. It is also useful on the farm for checking ventilation in enclosed livestock facilities.

Quick reference of outdoor wind speed is also of interest to farmers, firefighters, environmentalists, weather studies, and sportsmen.

Measuring units and functions are easily selected using the four button touch pad. Reading hold function and Max-Min data record function are standard features.

SPECIFICATIONS

GENERAL

- Measurement: Air Velocity & Wind Speed
- Display: 8 mm LCD
- Display Update Time: 1 second
- Operating Humidity: Max. 80% R.H.
- Operating Temperature: 0 to 50°C (32-122°F)
- Over Range Display: "----"
- Power Supply: 9 VDC Heavy Duty Battery (not included)
- Current Consumption: Approx. 6.2 mA
- Auto Power Off: Unit switches off after ten minutes of no buttons being pushed
- Hold Function: The current value displayed is frozen upon pressing the "HOLD" button. Pressing the button again returns the unit to normal operation.
- Data Record Function: Maximum and minimum reading values can be recorded and updated
- Weight: 160g(with battery)
- Dimension: 156H x 60W x 33L mm (6.14" x 2.36" x 1.29")
- Options: Carrying case
- Measuring Units:

Unit	Range	Resolution	Accuracy
ft/min	80 to 5910	1 ft/min	
m/s	0.4 to 30.0	0.1 m/s	±3% F.S. < 20 m/s
km/h	1.4 to 108	0.1 km/h	±4%F.S. > 20 m/s
knots	0.8 to 58.3	0.1 knots	



FEATURES

- LOW FRICTION VANE WHEEL DESIGN IS ACCURATE**
- WRISTLET PROVIDES PROTECTION FOR ONE HAND OPERATION**
- MICROPROCESSOR ASSURES EXCELLENT PERFORMANCE**
- LIGHTWEIGHT & COMPACT SIZE**
- MEMORIZE MAX. & MIN. VALUES WITH RECALL**

ORDERING INFORMATION

- CS-810 Anemometer
- CA-52A Carrying case with sash

CLARK

Kestrel 1000 Wind Meter

Portable Air Velocity/Wind Speed, 70 FPM to 7832 FPM

DESCRIPTION

The NK Kestrel 1000 Pocket Wind Meter is very accurate, very tough and very affordable. You can carry it in a pocket, hold it in one hand, and use it whenever and wherever you need to know air velocity or wind speed. It features a large liquid crystal display which is easy to read under almost any conditions and offers three operating modes - velocity/wind speed, average velocity/wind speed, and maximum velocity/wind speed. The display units can be changed at any time, with choices to suit a wide variety of applications (feet per minute, meters per second, kilometers per hour, miles per hour or knots). To measure wind speed, the Kestrel relies on a precision ultralight impeller mounted in jewel bearings. This impeller yields high accuracy ($\pm 3\%$) and a low startup speed (0.4 M/S). It is shock-mounted in a glass-reinforced plastic housing which can simply be popped out and replaced with a new assembly in the event that the impeller mechanism becomes worn or damaged. The Kestrel is waterproof and floats. The hard case slips on and off easily and protects the display and all moving parts from damage. US Patent No. 5,783,753.



SPECIFICATIONS

PERFORMANCE

On-axis Accuracy: $\pm 3\%$ of reading or \pm least significant digit, whichever is greater.

Minimum Speed: 0.4 M/S (~ 0.6 KT, 1.3KM/H, 0.8 MPH, 70 FPM).

Maximum Speed: 40 M/S (~ 77 KT, 143 KM/H, 89 MPH, 7832 FPM).

Some loss of accuracy from bearing wear may occur with sustained operation over 25 M/S.

DISPLAY SPECIFICATIONS

Operating Modes: Moving three second average (wind speed), average since power on (AV) or maximum three second gust since power turned on (MAX).

Type: Reflective 3 1/2 digit LCD. Digit Height: 9 mm (0.36 in.).

Update: 1 second.

Buttons: Three sealed tactile rubber buttons control all functions.

Auto Shutdown: 45 minutes after last key press.

Battery: User-replaceable CR2032 coin cell. Typical life, 400 hours.

ENVIRONMENTAL SPECIFICATIONS

Sealing: Electronics enclosure IP67 - water resistant to 1 meter (3 feet). Unit floats.

Shock: Drop tested to 2 meters (6 feet).

Temperature: Operating range -15°C to 50°C (5°F to 122°F).

Storage range: -30°C to 80°C (-22°F to 176°F).

PHYSICAL SPECIFICATIONS

Impeller: Diameter 25mm (1in.). High precision jewel bearings. User replaceable impeller assembly.

Case: Slip-on hard case protects display, buttons and impeller.

Dimensions: Unit, 122 x 42 x 14 mm (4.8 x 1.7 x 0.6 in.); case, 117 x 46 x 19 mm (4.6 x 1.8 x 0.7 in.); lanyard, 0.5 m (18 in.).

Weight: Unit, 65 grams (1.3 ounces); case, 37 grams (1.3 ounces).

Full two-year warranty on entire system, covering manufacturing defects.

ORDERING INFORMATION

Model	Description
Kestrel 1000	Portable Anemometer/Wind Meter
Impeller	Replacement Impeller

CLARK Kestrel 2000 Wind Meter

Portable Air Velocity/Wind Speed and Temperature

DESCRIPTION

The Kestrel 2000 Thermo-Anemometer is a pocket-sized precision instrument for measuring wind speed, temperature and wind chill.

The Kestrel 2000 can track maximum and average wind speeds along with current readings, and can display wind speed in your choice of knots, meters per second, kilometers per hour, miles per hour, feet per minute or Beaufort scale.

Temperature and wind chill can be displayed in °C or °F.

Measuring modes and display units can be changed at any time and all functions are controlled with only three buttons.

The Kestrel 2000 relies upon a precision ultralight impeller mounted on jewel bearings to measure wind speed.

It provides excellent accuracy ($\pm 3\%$) and the ability to measure the slightest breeze (0.4 M/S).

For temperature readings, the Kestrel uses a fast-responding thermistor accurate to $\pm 1^\circ\text{C}$.

Wind chill is calculated from wind and temperature data using the U.S. National Weather Service's official tables.

The Kestrel 2000 is waterproof and floats and comes with a convenient neck lanyard.

The battery is easy to replace and provides 400 hours of use.

The protective case prevents damage to the unit.



SPECIFICATIONS

Operating Modes: Moving three-second average (wind speed), average since power on (AVG) or maximum three second gust since power on (MAX).

Update: 1 second.

Units: Knots (KT), meters per second (M/S), kilometers per hour (KM/H), miles per hour (MPH), feet per minute (FPM) and Beaufort (B).

On-axis Accuracy: $\pm 3\%$ of reading or \pm -least significant digit, whichever is greater.

Minimum Speed: 0.4 M/S (~ 0.6 KT, 1.3KM/H, 0.8 MPH, 70 FPM).

Maximum Speed: 40 M/S (~ 77 KT, 143 KM/H, 89 MPH, 7832 FPM). (Note: Extensive operation at or near maximum speed may result in impeller bearing wear and reduced accuracy.)

Operating Modes: Temperature, wind chill.

Update: 1 second.

Units: Degrees Centigrade ($^\circ\text{C}$) and degrees Fahrenheit ($^\circ\text{F}$).

Accuracy: Temperature, $\pm 1^\circ\text{C}$; Wind Chill, $\pm 2^\circ\text{C}$.

Resolution: $\pm 0.1^\circ\text{C}$ temperature, $\pm 0.1^\circ\text{C}$ wind chill.

Buttons: Three sealed tactile rubber buttons control all functions.

Auto Shutdown: 30 minutes after last key press.

Battery: User-replaceable CR2032 coin cell. Typical life, 300 hours.

ENVIRONMENTAL SPECIFICATIONS

Sealing: Electronics enclosure IP67 - water resistant to 1 meter (3 feet). Unit floats.

Shock: Drop tested to 2 meters (6 feet).

Operating Temperature: LCD functional temperature range, -15°C to 50°C (5°F to 122°F).

Storage Temperature: Safe storage temperature range, -30°C to 80°C (-22°F to 176°F).

PHYSICAL SPECIFICATIONS

Impeller: Diameter 25mm (1in.). High precision jewel bearings. User replaceable impeller assembly.

Temperature Sensor: Hermetically sealed thermistor.

Display: 4 digit reflective LCD, 9 mm (0.36 in.) digit height.

Case: Slip-on hard case protects display, buttons and impeller.

Dimensions: Unit, 122 x 42 x 18 mm (4.8 x 1.7 x 0.7 in.); case, 122 x 48 x 28 mm (4.8 x 1.9 x 1.1 in.); lanyard, 0.5 m (18 in.).

Weight: Unit, 65 grams (2.3 ounces); case, 37 grams (1.3 ounces).

TEMPERATURE LIMITATIONS

The Kestrel temperature sensor is able to measure temperatures as low as -30C (-22F) and as high as 70C (158F). The sensor and electronics simply won't measure beyond this range. The Kestrel is able to display wind chill measurements lower than -30C , depending on wind conditions. It is also able to display heat index measurements above 70C , depending on humidity conditions. Furthermore, the Kestrel display will not function if the display itself gets below -15C . However, if the unit is kept in a pack or pocket or other warm area, the display itself should not get this cold. In other words, try not to leave the Kestrel outside in temperatures below -15C .

Full two-year warranty on entire system, covering manufacturing defects.

ORDERING INFORMATION

Model	Description
Kestrel 2000	Portable Anemometer/Wind Meter
Impeller	Replacement Impeller

CLARK

Kestrel 3000 Wind Meter

Velocity, Temperature, Humidity, Wind Chill, Dew Point

DESCRIPTION

The Kestrel 3000 is a unique hand-held instrument for measuring wind speed, temperature, wind chill, relative humidity, heat stress index and dew point temperature. Pocket-sized and easy-to-use, it allows you to take fast, accurate readings of the environmental conditions whenever and wherever you are. It can track maximum and average wind speeds along with current readings, and displays wind speed in your choice of knots, meters per second, kilometers per hour, miles per hour, feet per minute and Beaufort force. Temperature, wind chill, heat index and dew point temperature can be displayed in °C or °F. Relative humidity is expressed as a percentage. Measuring modes and display units can be changed at any time and all functions are controlled with only three buttons. The large liquid crystal display is easy to read, even in low light.

The Kestrel 3000 measures wind speed with a large-diameter precision ultra-light impeller, which turns on sapphire bearings, providing excellent accuracy ($\pm 3\%$), and the ability to measure the slightest breeze (0.3 M/S). The impeller and protective housing pop out without tools for easy and inexpensive replacement, ensuring that the Kestrel's high accuracy can be maintained even if the impeller becomes damaged or worn.

For temperature readings, the Kestrel uses an external thermistor for fast response and accuracy of $\pm 1.0^\circ\text{C}$. The capacitive humidity sensor is factory calibrated to $\pm 3\%$ accuracy. Heat index measurements are accurate to $\pm 3\%$ and dew point temperature to $\pm 2\%$. Wind chill, heat stress index and dew point temperature are automatically calculated using U.S. National Weather Service formulas.

A hard slip-on case protects the Kestrel 3000 display, buttons and impeller from damage. The user-replaceable battery provides 300 hours of use. The Kestrel 3000 is covered by a full one-year warranty and is protected by US patent No. 5,753,784.



Wind Speed

Operating Modes: Moving 3-second average, maximum 3 second gust since power on (MAX) and average since power on (AVG).

Display Update: 1 second.

Units: Knots (KT), meters per second (M/S), kilometers per hour (KM/H), miles per hour (MPH), feet per minute (FPM) and Beaufort force (B).

On-Axis Accuracy: greater of $\pm 3\%$ or \pm least significant digit.

Resolution and Range: KT, M/S, KM/H or MPH: resolution 0.1; max display range 199.9. FPM: resolution 1.0 below 1999, 10 above 2,000 (auto-ranging); display limit 19,990.

Calibration Drift: $< 2\%$ after 100 hours use at 7 M/S

Minimum Speed: 0.4 M/S [~ 0.6 KT, 1.3 KM/H, 0.8 MPH or 70 FPM].

Maximum Speed: 40 M/S [~ 77 KT, 143 KM/H, 89 MPH, 7,832 FPM].

Temperature, Wind Chill, Humidity, Heat Index and Dew Point

Operating Modes: Temperature ; wind chill; relative humidity; heat stress index ; dew point temperature .

Units: Degrees Centigrade ($^\circ\text{C}$) and degrees Fahrenheit ($^\circ\text{F}$).

Accuracy: Temperature, $\pm 1.0^\circ\text{C}$; wind chill, $\pm 2.0^\circ\text{C}$; relative humidity $\pm 3\%$; dew point temperature, $\pm 2^\circ\text{C}$; heat index, $\pm 2^\circ\text{C}$.

Temperature/Wind Chill Display Update: 1 second.

Humidity Sensor Response Time: 1 minute.

Resolution: 0.1.

ORDERING INFORMATION

Model	Description
Kestrel 3000	Portable Anemometer/Thermometer
Impeller	Replacement Impeller

Environmental

Sealing: Electronics enclosure IP67 – water resistant to 1 m. [3 ft.]. Floats.

Shock: Drop tested to 2 m. [6 ft.].

Operating Temperature: LCD readability is lost above 50°C [122°F] and below -15°C [5°F]. Accurate readings may be taken beyond these temperature limits by exposing the unit for the minimum time necessary to take and record measurement.

Storage Temperature: Recommended -20°C to 80°C [-4°F to 176°F].

Physical

Buttons: Three sealed tactile rubber buttons control all functions.

Auto Shutdown: 45 minutes after last key press.

Battery: User-replaceable CR2032 coin cell. Typical life, 300 hrs.

Impeller: 25 mm. [1 in.] diameter, sapphire bearings, light weight. User-replaceable without tools.

Temperature Sensor: Hermetically sealed precision thermistor.

Humidity Sensor: Polymer capacitive sensor.

Display: Reflective 4 digit LCD, 9 mm [0.36 in.] digit height.

Case: Slip-on hard case.

Dimensions: 122 x 42 x 18 mm. [4.8 x 1.7 x 0.7 in.]; case, 122 x 48 x 28 mm. [4.8 x 1.9 x 1.1 in.]; lanyard, 0.5 m. [18 in.].

Weight: Unit, 65 g. [2.3 oz.]; case, 37 g. [1.3 oz.].

CLARK Kestrel 4000

Hand Held Weather Station

DESCRIPTION

The Kestrel® 4000 Pocket Weather™ Tracker™ is the next generation of weather monitoring. You can now measure EVERY major environmental condition, easily and accurately, right in the palm of your hand. The chart mode allows users to recall and graph up to 2000 datapoints for each measurement. Data can be stored in an automatic or manual mode. Barometric Pressure, Altitude, Density Altitude, Temperature, Humidity, Wind Speed, Wind Chill, Dew Point, Wet Bulb, and Heat Index... all in one pocket sized instrument.

SPECIFICATIONS

WIND SPEED

Accuracy ±3%

Response Time 1 second

Calibration Drift <2% after 100 hours use at 7 m/s

Units	Display	Res'n	Range
Knots	KTS	0.1	0.6 to 78
Meters per Second	M/S	0.1	0.3 to 40
Kilometers per Hour	KM/H	0.1	1.0 to 144
Miles per Hour	MPH	0.1	0.8 to 89
Feet per Minute	FPM	1	59 to 7877
Beaufort Force	BEAU	1	0 to 12

TEMPERATURE

Accuracy:

Temperature ± 1°C

Wind Chill ± 1°C

Dew Point ± 2°C

Heat Index ± 3°C

Response Time: approximately 1 minute for most conditions

Units	Display	Res'n	Range
Celsius	°C	0.1	-29 to 70
Fahrenheit	°F	0.1	-20 to 158

RELATIVE HUMIDITY

Accuracy: ±3%

Response Time: approximately 1 minute for most conditions

Calibration Drift: ±2% over 24 months (can be field calibrated)

Units	Display	Res'n	Range
Percent	%	0.1	5 to 95%

BAROMETRIC PRESSURE

Accuracy: ±3hPa (between -10°C and 60°C)

Calibration Drift: ±1hPa over 12 months (can be field calibrated)

Units	Display	Res'n	Range
hectoPascal	(mb) hPa	0.1	870.0 to 1080.0
Inches Mercury	inHg	0.01	8.86 to 32.48

ALTITUDE

Units	Display	Res'n	Range	Accuracy
Meters	M	1	<6000	±98@77°F
Feet	FT	1	<19,700	±30@25°C

DISPLAY

Update: 1 second

Temperature Range: Normal operation from --18°C to 55°C [0°F to 131°F]. Below the limits of this range, the unit must be maintained within range and exposed for minimum time necessary to take reading.

ORDERING INFORMATION

Model	Description
Kestrel 4000	Portable Weather Station, includes fabric carrying pouch
Impeller	Replacement Impeller



o Graph and recall trends

o Easy to read, backlit display

o Automatically store measurements, even when the unit is turned of

o Manually store measurements with the press of a button

o Chart up to 250 measurements

o Includes neck and wrist lanyards, protective pouch and 2 AAA batte

o Waterproof and floats

o 1-year warranty

DISPLAY, CONT'D

Display Digits: Multifunction, multi-digit programmable dot matrix display

Display Languages: English, French, German, Italian, Spanish

Storage Temperature: -30°C to 60°C [-22°F to 140°F].

Auto Shutdown: User selectable, 15 or 60 minutes or disable

PHYSICAL

Sealing: Weatherproof (IP 67 standard)

Battery: Two AAA alkaline batteries (included). Average life 400 hours.

Impeller: 25 mm. [1in.] diameter, sapphire bearings, light weight. User-replaceable impeller/housing assembly.

Temperature Sensor: Hermetically sealed precision thermistor.

Humidity Sensor: Solid state silicone capacitive sensor.

Pressure Sensor: Monolithic Silicon Piezoresistive sensor.

Dimensions: 12.7x 4.5x2.8 cm. [5x1.8x1.1 in.]

Weight: 102 g. [3.6 oz.]

NOSHOK Series 100 Pressure Transmitter

Two-wire, 4-20mA, Vacuum To 15,000 PSIG & PSIA



DESCRIPTION

The 100 series current output pressure transmitters were designed to provide a previously unequalled level of performance, utilizing Piezo Resistive or Thin film sensor technology dependent on pressure range. 100 Series Transducers are highly accurate, shock resistant and extremely stable over a long period of time. EMC, electromagnetic compatibility, to IEC 1000 has been engineered in as a standard feature along with reverse polarity, overvoltage, and short circuit protection.

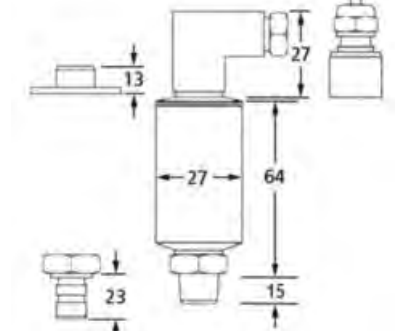
Advanced manufacturing techniques combined with technologically advanced standard features allow NOSHOK to offer a level of performance previously found only on transducers costing hundreds of dollars more.

A final electrical output and calibration inspection is performed on all NOSHOK Transducers and Transmitters after final assembly and prior to shipment to insure 100% "out of the box" reliability.

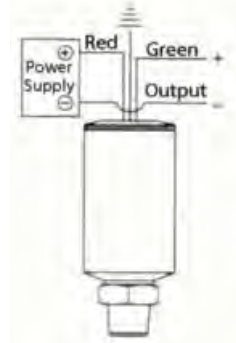
SPECIFICATIONS

- OUTPUT SIGNAL: 4-20 mA, 2 wire
- PRESSURE RANGES: Vacuum and compound through 0 - 15000 PSI; gauge and absolute
- PROOF PRESSURE: 0-5, 0-10, 0-7500 through 0-15000 PSI: 1.5 times range; 0-15 PSI through 0-6000 PSI: 5 times range
- BURST PRESSURE: 0-5, 0-10, 0-7500 through 0-15000 PSI: 2 times range; 0-15 PSI through 0-6000 PSI: 5 times range
- ACCURACY: (BSFL or RSS) (includes repeatability, hysteresis and linearity) 0.5% full scale standard 0.25% full scale optional
- REPEATABILITY: 0.05% full scale
- HYSTERESIS: 0.1% full scale
- STABILITY: 0.2% full scale per year
- INPUT EXCITATION: 12-30 VDC unregulated
- TEMPERATURE RANGES COMPENSATED: 32 to 175 °F (0 to 80 °C)
- EFFECT: 0.02%/°F
- STORAGE: -40 to 212 °F (-40 to 100 °C)
- MEDIUM: -22 to 212 °F (-30 to 100 °C)
- AMBIENT: -40 to 185 °F (-40 to 85 °C)
- RESPONSE TIME: Less than 1 ms (between 10-90% full scale)
- PRESSURE CYCLE LIMIT: 150Hz
- OPERATING LIFE: 100 million cycles
- ADJUSTMENT: 5% full scale of zero and span
- ENVIRONMENTAL PROTECTION: NEMA 4x, DIN IP65 (IEC 529)
- ELECTROMAGNETIC CAPABILITY: per IEC 1000 4-2 - ESD Level 2
 - 4-3 - Fields (RFI) Level 2
 - 4-4 - Burst Level 3
 - 4-5 - Surge Level 2
- ELECTRICAL PROTECTION: Reverse polarity, overvoltage and short circuit protection
- SHOCK: Less than 0.05% full scale effect or 1000g's @ 20 ms on any axis
- VIBRATION Less than 0.05% full scale effect for 30g's @ 5-2000 Hz on any axis
- LOAD LIMITATIONS: $V_{min}=12V + (.022 \times \text{Loop Resistance, ohms})$

DIMENSIONS(MM)



WIRING



TO ORDER: 100-A-B-1-C-D

Example: 100-10-1-1-3-7

A=Range

0-30" HgVAC	30V	30/200PSIG	30/20	0-60PSIG	60	0-600PSIG	600	0-5000PSIG	5000	0-15PSIA	15A
30"/15PSIG	30/15	30"/300PSIG	30/3000	0-100PSIG	100	0-750PSIG	750	0-6000PSIG	6000	0-30PSIA	30A
30"/30PSIG	30/30	0-5PSIG	5	0-150PSIG	150	0-1000PSIG	1000	0-7500PSIG	7500	0-60PSIA	60A
30"/60PSIG	30/60	0-10PSIG	10	0-200PSIG	200	0-1500PSIG	1500	0-10000PSIG	10000	0-100PSIA	100A
30"/100PSIG	30/100	0-15PSIG	15	0-300PSIG	300	0-2000PSIG	2000	0-15000PSIG	15000	0-150PSIA	150A
30"/150PSIG	30/150	0-30PSIG	30	0-500PSIG	500	0-3000PSIG	3000			0-200PSIA	200A
										0-300PSIA	300A

D=Electrical Connection

- 1 36" Cable (connected to option 7)
- 2 4 Pin Bendix
- 3 6 Pin Bendix
- 6 1/2" NPT Conduit (w/36" cable)
- 7 Mini-Hirschmann (w/mating connector)

B=Accuracy

- 1 ±0.5%
- 2 ±0.25%

C=Process Connection

- 2 1/4" NPT MALE
- 3 7/16-20 UNF
- OTHER CONNECTIONS ON REQUEST

NOSHOK

Series 615 Pressure Transmitter

High Accuracy, Vacuum To 120,000 PSIG & 300 PSIA

DESCRIPTION

NOSHOK Series 615 Pressure Transducers are designed for heavy duty applications requiring high accuracy and durability. Utilizing diffused semiconductor or sputtered Thin Film technology, these transducers are stable, accurate, shock resistant, and extremely durable.

The durability is coupled with the mechanical integrity of the case, process connection, and wetted parts constructed of corrosion resistant stainless steel.

Available in a wide variety of electrical and process configurations, the Series 615 Pressure Transducers are the choice for heavy duty applications.

A final electrical output and calibration inspection is performed on all NOSHOK transducers prior to shipment to ensure 100% "out of the box" reliability.



SPECIFICATIONS

Output signals:

4mA to 20mA, 2-wire; 1 Vdc to 5Vdc, 1 Vdc to 6Vdc, 1 Vdc to 11 Vdc, 3-wire; 0Vdc to 5Vdc and 0 Vdc to 10 Vdc, 3-wire; 0 Vdc to 5 Vdc and 0 Vdc to 10 Vdc, 4-wire

Pressure ranges: Standard gauge ranges from vacuum to 120,000 psig; Standard absolute ranges from 15 psia to 300 psia

Proof pressure: 3 times Full Scale for ranges 0 psi to 2psi through 0 psi to 200 psi

1.75 times Full Scale for ranges 0 psi to 300 psi through 0 psi to 10,000 psi

1.5 times Full Scale for 0 psi to 15,000 psi range

1.2 times Full Scale for ranges 0 psi to 20,000 psi through 0 psi to 120,000 psi

Burst pressure: 3.8 times Full Scale for ranges 0 psi to 2 psi through 0 psi to 200 psi

4 times Full Scale for ranges 0 psi to 300 psi through 0 psi to 10,000 psi

3 times Full Scale for 0 psi to 15,000 psi range

1.5 times Full Scale for ranges 0 psi to 20,000 psi through 0 psi to 120,000 psi

Accuracy: $\pm 0.25\%$ Full Scale (best fit straight line); Includes the combined effects of linearity, hysteresis and repeatability; $\pm 0.125\%$ Full Scale (optional)

Repeatability: $\leq \pm 0.05\%$ Full Scale

Hysteresis: $\leq \pm 0.1\%$ Full Scale

Stability: $\leq \pm 0.2\%$ Full Scale for 1 year, nonaccumulating

Power supply: 10Vdc to 30 Vdc for current output, unregulated; 14 Vdc to 30 Vdc for voltage output, unregulated

Load limitations: $\leq (V_{Power} - 10) / 0.020$ Amp for 4mA to 20mA

$\geq 10,000$ Ohms for 0 Vdc to 10Vdc, 3-wire

$\geq 5,000$ Ohms for 0 Vdc to 5Vdc, 3-wire

Wetted materials : 316 stainless steel for vacuum through 300psi; 17-4PH stainless steel sensing diaphragm and 316 stainless steel process connection for higher ranges

FEATURES

- Advanced diffused semi-conductor and sputtered thin film sensor for maximum stability
- High accuracy and long term stability
- Ranges from vacuum to 120,000 psi
- Corrosion resistant stainless steel construction
- Span and zero adjustments

Hydraulic & Pneumatic Systems

Industrial Machinery

Pumps & Compressors

HVAC

Water Management

Laboratory & Test

Medical Equipment

Railroad Equipment

Marine

Power Generation

Housing materials: 316 stainless steel

Temperature ranges: Compensated 32 °F to 175 °F / 0 °C to 80 °C

Effect: $\pm 0.01\%$ / °F for zero and span

Storage: -40 °F to 212 °F / -40 °C to 100 °C

Media: -20 °F to 212 °F / -30 °C to 100 °C

Ambient: -15 °F to 175 °F / -10 °C to 80 °C

Response time: Less than 1ms

(between 10% and 90% Full Scale)

Durability: >100,000,000 Full Scale cycles

Adjustment: $\pm 10\%$ Full Scale for zero and span

Environmental protection: NEMA4X, IP65 (IEC529)

Electromagnetic rating: CE compliant to EMC norm EN61326:1997/A1:1998 RFI, EMI and ESD protection

Electrical protection: Reverse polarity over voltage and short circuit protection

Shock: Less than $\pm 0.05\%$ Full Scale effect or 1000 g's @ 20 ms on any axis

Vibration: Less than $\pm 0.01\%$ Full Scale effect for 15 g's @ 0 Hz to 2000 Hz on any axis

Weight: Approximately 7.2oz.

DIMENSIONS INCHES (MM)



WIRING

2-Wire Wiring				
	Hirschmann	Cable	M12	Bendix
+ Supply	1	Red	1	A
+ Output	2	Black	3	B

3-Wire Wiring				
	Hirschmann	Cable	M12	Bendix
+ Supply	1	Red	1	A
Common	2	Black	3	B
+ Output	3	White	4	C

TO ORDER: 615-A-B-C-D-E

Example: 615-2-1-1-2-8

A= Range											
Range Code	Range	Range Code	Range	Range Code	Range	Range Code	Range	Range Code	Range	Range Code	Range
30V	-30 in. Hg to 0 PSIG	2	0 to 2 PSIG	150	0 to 150 PSIG	3000	0 to 3,000 PSIG	30000	0 to 30,000 PSIG	15A	0 to 15 PSIA
30/15	-30 in. Hg to 15 PSIG	3	0 to 3 PSIG	200	0 to 200 PSIG	4000	0 to 4,000 PSIG	40000	0 to 40,000 PSIG	30A	0 to 30 PSIA
30/30	-30 in. Hg to 30 PSIG	5	0 to 5 PSIG	300	0 to 300 PSIG	5000	0 to 5,000 PSIG	50000	0 to 50,000 PSIG	60A	0 to 60 PSIA
30/60	-30 in. Hg to 60 PSIG	10	0 to 10 PSIG	500	0 to 500 PSIG	6000	0 to 6,000 PSIG	60000	0 to 60,000 PSIG	100A	0 to 100 PSIA
30/100	-30 in. Hg to 100 PSIG	15	0 to 15 PSIG	600	0 to 600 PSIG	7500	0 to 7,500 PSIG	75000	0 to 75,000 PSIG	150A	0 to 150 PSIA
30/150	-30 in. Hg to 150 PSIG	30	0 to 30 PSIG	750	0 to 750 PSIG	10000	0 to 10,000 PSIG	85000	0 to 85,000 PSIG	200A	0 to 200 PSIA
30/200	-30 in. Hg to 200 PSIG	60	0 to 60 PSIG	1000	0 to 1000 PSIG	15000	0 to 15,000 PSIG	100000	0 to 10,000 PSI	300A	0 to 300 PSIA
30/300	-30 in. Hg to 300 PSIG	100	0 to 100 PSIG	2000	0 to 2000 PSIG	20000	0 to 20,000 PSIG	120000	0 to 120,000 PSIG		

B= Accuracy

1 ±0.5% 2 ±0.25%

C= Output Signals

1 4mA to 20mA, 2-wire 4 1 to 6 Vdc, 3-wire*
 2 0 to 5Vdc, 3-wire 5 0 to 10 Vdc, 3-wire
 3 1 to 5Vdc, 3-wire 6 1 to 11 Vdc, 3-wire*
 *Ranges up to 0 psig to 60000 psig

D= Process Connection

2 1/4" NPT Male 8 1/2" NPT Male
 6 9/16"-18 aminco (Std on 30000 to 120000 psig)

E= Electrical Connection

1 3/8" cable (connected to option 8) 8 Hirschmann (DIN EN175301-803 Form A) 25 M12x14-pin
 3 6-pin Bendix 14 Hirschmann type with 1/2" NPT female conduit 36 Integral 3/8" Cable
 6 1/2" NPT conduit w/3/8" cable

NOSHOK

Series 625 Intrinsically Safe Pressure Transmitter

Hazardous Environment Approved, Vacuum To 120,000 PSIG & 300 PSIA

DESCRIPTION

The NOSHOK Series 625 and 626 pressure transmitters combine the reliability and long life of diffused semiconductor and sputtered thin film strain gage sensors with safe electronics for outstanding performance and value. These transmitters were designed for applications that require pressure measurement in hazardous environments. All wetted parts are made of welded stainless steel with no internal O-rings, gaskets or seals.

These transmitters are available with a wide variety of pressure connections, ranges and electrical connections to suit most applications. All units undergo extensive testing during the manufacturing process to ensure that the highest performance is achieved in the demanding environments found in today's applications. The transmitters are available with standard threaded connections and are Factory Mutual and Canadian Standards Association approved. All models incorporate significant levels of RFI, EMI and ESD protection.



SPECIFICATIONS

Output signals:

4mA to 20mA, 2-wire

Pressure ranges: Standard gauge ranges from vacuum to 600,000 psig

Proof pressure: 3 times Full Scale for ranges 0 psi to 5 psi through 0 psi to 200 psi

2 times Full Scale for ranges 0 psi to 300 psi through 0 psi to 10,000 psi

1.5 times Full Scale for 0 psi to 15,000 psi range

1.2 times Full Scale for ranges 0 psi to 25,000 psi and 0 psi to 60,000 psi

Burst pressure: 3.8 times Full Scale for ranges 0 psi to 5 psi through 0 psi to 200 psi

2 times Full Scale for ranges 0 psi to 300 psi through 0 psi to 10,000 psi

2 times Full Scale for 0 psi to 15,000 psi range

2 times Full Scale for ranges 0 psi to 25,000 psi through 0 psi to 60,000 psi

Accuracy: $\pm 0.25\%$ Full Scale (best fit straight line); Includes the combined effects of linearity, hysteresis and repeatability; $\pm 0.125\%$ Full Scale (optional)

Repeatability: $\leq \pm 0.05\%$ Full Scale

Hysteresis: $\leq \pm 0.1\%$ Full Scale

Stability: $\leq \pm 0.2\%$ Full Scale for 1 year, nonaccumulating

Power supply: 10Vdc to 30 Vdc unregulated ;Minimum voltage across transmitter connections is 10 Vdc

Load limitations: $\leq (V_{Power} - 10) / 0.020$ Amp

Wetted materials : 316 stainless steel for ranges up through 0 psi to 300 psi, 316 stainless steel with 17-4PH stainless steel diaphragm for ranges 0 psi to 300 psi and higher:

Housing materials: 316 stainless steel

Response time: Less than 1ms

(between 10% and 90% Full Scale)

Durability: >100,000,000 Full Scale cycles

Adjustment: $\pm 10\%$ Full Scale for zero and span

Environmental Rating: IP65 to IP67 depending upon electrical connection

Electromagnetic rating: Meets EMC norm

EN61326: 1997/A1 1998 RFI, EMI and ESD protected

FEATURES

- Advanced diffused semi-conductor and sputtered thin film sensor for maximum stability
- High accuracy and long term stability
- Ranges from vacuum to 120,000 psi
- Corrosion resistant stainless steel construction
- Span and zero adjustments

Hydraulic & Pneumatic Systems

Industrial Machinery

Pumps & Compressors

HVAC

Water Management

Laboratory & Test

Oil Field

Railroad Equipment

Marine

Power Generation

Temperature ranges: Compensated 32 °F to 175 °F/0 °C to 80 °C

Zero Effect: $\pm 0.011\%$ /°F

Span Effect: $\pm 0.011\%$ /°F

Storage: -40 °F to 212 °F/-40 °C to 100 °C

Media: -25 °F to 212 °F/-32 °C to 100 °C; -58 °F to 220 °F optional

Ambient: -22 °F to 212 °F/-30 °C to 100 °C; -58 °F to 220 °F optional

Electrical protection: Reverse polarity over voltage and short circuit protection

Shock: 1000 g's according to IEC770 for mechanical shock

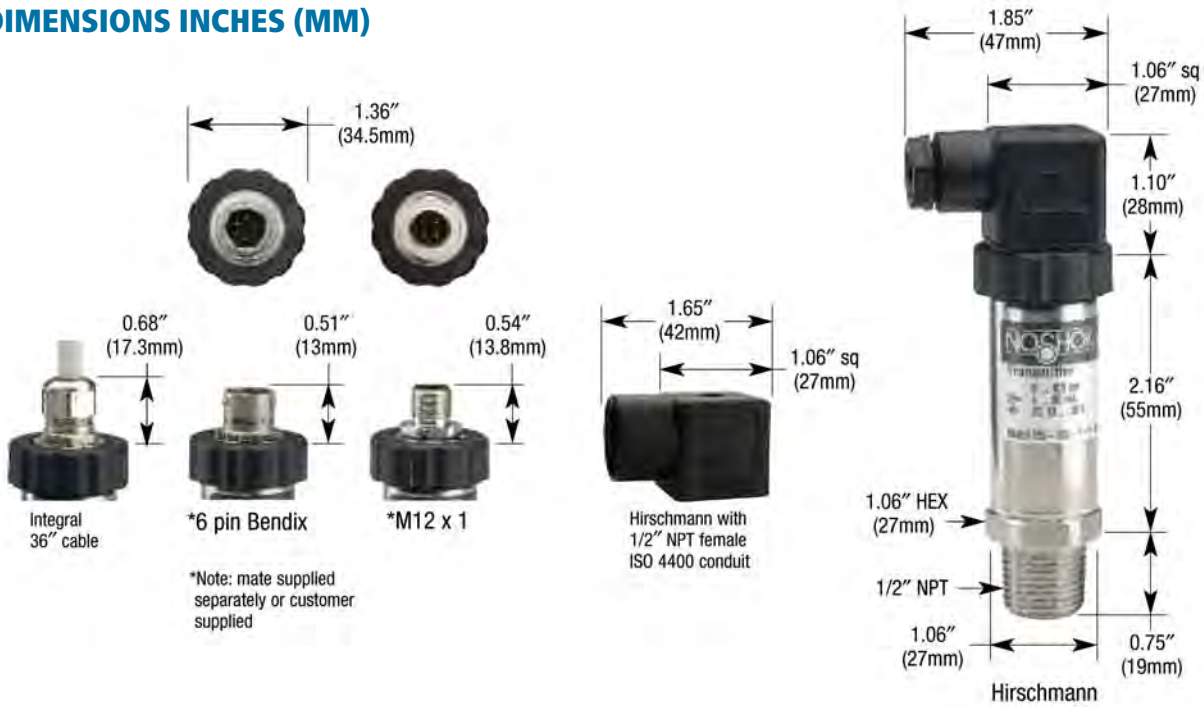
Vibration: 20 g's according to IEC770 under resonance conditions

Hazardous approvals: Factory Mutual and Canadian Standards Association approved as indicated ANSI/ISA-12.27.01-2003, Approved single seal

Intrinsically Safe, entity approval for Class I, II and III, Division 1, Groups A, B, C, D, E, F and G; and Class I, Zone 0 Aex ia IIC Dust Ignition-proof for Class II and III, Division 1, Groups E, F and G Non-incendive for Class I, Division 2, Groups A, B, C and D FMRC 3600, 3610, 3611, 3810 (including supplement #1), ISA-S12.0.01, IEC60529 (including amendment #1)

Weight: Approximately 7.2oz.

DIMENSIONS INCHES (MM)



WIRING

2-Wire Wiring				
	Hirschmann	Cable	M12	Bendix
+ Supply	1	Red	1	A
+ Output	2	Black	3	B

TO ORDER: 625-A-B-C-D-E

Example: 625-200-1-1-2-8

A= Range									
Range Code	Range	Range Code	Range	Range Code	Range	Range Code	Range	Range Code	Range
50IN	0 to 50 inH ₂ O	2	0 to 2 PSIG	200	0 to 200 PSIG	5000	0 to 5,000 PSIG	15A	0 to 15 PSIA
100IN	0 to 100 inH ₂ O	3	0 to 3 PSIG	300	0 to 300 PSIG	8000	0 to 8,000 PSIG	30A	0 to 30 PSIA
30V	-30 in. Hg to 0 PSIG	5	0 to 5 PSIG	500	0 to 500 PSIG	10000	0 to 10,000 PSIG	60A	0 to 60 PSIA
30/30	-30 in. Hg to 30 PSIG	15	0 to 15 PSIG	750	0 to 750 PSIG	15000	0 to 15,000 PSIG	100A	0 to 100 PSIA
30/60	-30 in. Hg to 60 PSIG	30	0 to 30 PSIG	1000	0 to 1000 PSIG	25000	0 to 25,000 PSIG	150A	0 to 150 PSIA
30/100	-30 in. Hg to 100 PSIG	50	0 to 50 PSIG	1500	0 to 1500 PSIG	40000	0 to 40,000 PSIG	200A	0 to 200 PSIA
30/150	-30 in. Hg to 150 PSIG	100	0 to 100 PSIG	2000	0 to 2000 PSIG	60000	0 to 60,000 PSIG	300A	0 to 300 PSIA
30/200	-30 in. Hg to 200 PSIG	150	0 to 150 PSIG	3000	0 to 3,000 PSIG				

B= Accuracy

1 ±0.5% 2 ±0.25%

C= Output Signals

1 4mA to 20mA, 2-wire

D= Process Connection

2 1/4" NPT Male
 3 7/16 -20 UNF SAE #4 male
 8 1/2" NPT Male

E= Electrical Connection

1 36" cable (connected to option 8) 25 M12x14-pin
 3 6-pin bendix- IP65 36 Integral 36" Cable
 8 Hirschmann (DIN EN175301-803 FormA)
 14 Hirschmann type with 1/2" NPT female conduit

CLARK

Series 110 Sanitary Pressure Transmitter

Two & Three-wire, 4-20mA or Voltage output, Vacuum to 400 PSIG

DESCRIPTION

The Series 110 Sanitary Pressure Transmitter is designed for heavy duty sanitary applications where high accuracy and durability are required. Using diffused semiconductor sensor technology these transducers are stable, accurate, shock resistant and extremely durable.

The housing is constructed of 316SS and welded to the process connection for greater strength and integrity. The available 1 1/2 inch or 2 inch Tri-Clamp® connection, with its integral cooling extension, is 316L stainless steel and wetted parts are electro-polished to Ra25 microinch or better.

Series 110 Sanitary Transmitters meet 3A requirements for the food & beverage, dairy, pharmaceutical and biotechnology industries in addition to ASME BPE-2002 and are CE compliant.

A final electrical output and calibration inspection is performed on all transmitters prior to shipment to ensure 100% "out-of-the-box" reliability.



SPECIFICATIONS

Output Signals: 4-20 mA 2-wire; 0V-5 Vdc, 3-wire; 1-5 Vdc, 3-wire; 1-6 Vdc, 3-wire; 0-10 Vdc, 3-wire; 1-11 Vdc, 3-wire
 Pressure Ranges: Standard gauge ranges from vacuum to 400 PSIG
 Proof Pressure: 3 times Full Scale for ranges 0-2 PSIG through 0-200 PSIG; 1.75 times Full Scale for ranges 0-300 PSIG through 0-400 PSIG
 Burst Pressure: 3.8 times Full Scale for ranges 0 -2 PSIG through 0-200 PSIG; 4 times Full Scale for ranges 0-300 PSIG through 0-400 PSIG
 Accuracy: ±0.25% Full Scale (B.F.S.L), ±0.125% Full Scale (optional)
 Repeatability: ±0.05% Full Scale
 Hysteresis: ±0.1% Full Scale
 Stability: ±0.2% Full Scale for 1 year, non-accumulating

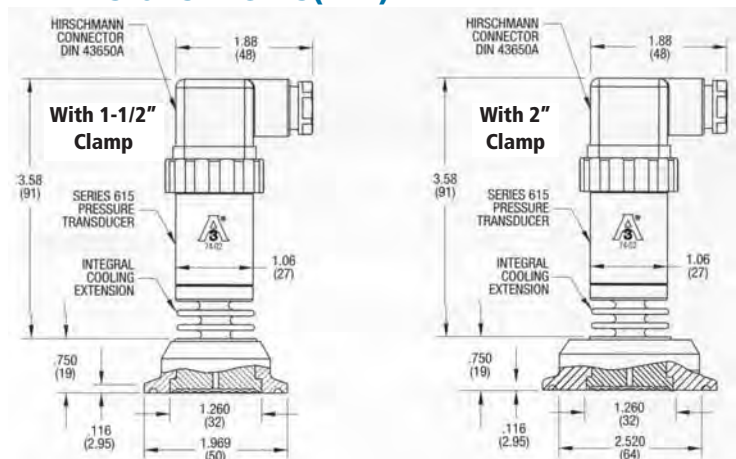
Power Supply: 10-30Vdc for current output 14-30Vdc for voltage output
 Case Materials: 316 stainless steel
 Temperature Ranges: Compensated 32°F to 175°F (0°C to 80°C)
 Effect: ±0.01%/°F for zero and span
 Ambient: -40°F to 176°F (-40°C to 80°C)
 Adjustment: ±10% Full Scale for zero and span
 Environment Protection: NEMA 4X, IP65 (IEC 529)
 Electromagnetic Rating: CE compliant to EMC norm EN61326: 1997/A1: 1998 RFI, EMI, ESD protection
 Electrical Protection: Reverse polarity, overvoltage and short circuit protection
 Process Connection: 1 1/2 inch or 2 inch Tri-Clamp®
 Seal Housing Material: 316L stainless steel
 Diaphragm Material: 316L stainless steel electropolished to Ra25 or better
 Fill Fluid: White Oil (FFL 77), USP grade
 Media Temperature: -40°F to 300°F (-40°C to 150°C)

Model	Clamp Size	Seal Fill Fluid	Inventory ID	Accuracy	Pressure Range	Output Signal	Electrical Connection
110	12=1-1/2" 16=2"	4=FFL77 White Oil	615	1=±0.25% F.S. 2=±0.125% F.S.	40=0-15PSIG 43=0-30PSIG 46=0-60PSIG 49=0-100PSIG 52=0-150PSIG 58=0-200PSIG	1= 4-20mA	1=36" cable attached to Hirschmann 8=Hirschmann (DIN 43650A) 14=1/2" ISO 4400 conduit 23=cable gland with internal junction box 29=1/2" NPT female conduit w/internal junction box 36=integral 36" cable

DIMENSIONS INCHES(MM)

ORDERING INFORMATION

SELECT FROM EACH COLUMN OF ABOVE CHART
 EXAMPLE: 110-12-4-615-1-34-1-1



HUBA

506 Series 303 Stainless Steel Pressure Transmitter

Refrigeration Transmitter for OEM Applications, Ranges to 870 psi (60 bar)

DESCRIPTION

The pressure transmitter type 506 with proven ceramic technology, features calibrated and amplified sensor signals which are available as standard voltage or current outputs.

The transmitters have a high resistance to extreme temperatures and exhibit no mechanical ageing or creeping. They are manufactured in a fully automated assembly line to give an ideal cost-to-performance ratio.

The 506 series are specially developed for original equipment manufacturer applications involving industrial refrigeration technology. Minimum order quantities apply and test samples are available for qualified OEM customers.



SPECIFICATIONS

Pressure Ranges: Relative pressure/Gauge (measurement of pressure relative to ambient pressure) Full scale ranges determined by customer to 870 psi (60 bar)
Lowest f.s. pressure range is 102 psi (7 bar)

Max. Overload:

F.S. ranges to 580 psi (40 bar): 2x measuring range
F.S. ranges 580 to 870 psi (40-60 bar): 1160 psi (80 bar)

Rupture Pressure:

F.S. ranges to 580 psi (40 bar): 3x measuring range
F.S. ranges 580 to 870 psi (40-60 bar): 1310 psi (90 bar)

Accuracy:

Total of linearity, hysteresis and repeatability
< +/- 0.5 % fs (> 10 – 60 bar)
< +/- 1.0 % fs (7 – 10 bar)

Adjustment accuracy zero point and full scale (repeatable)

0 – 5 V ± 50 mV
1 – 6 V ± 50 mV
0 – 10 V ± 100 mV
10 – 90% ± 1%

Materials in Contact with the Fluid Medium:

Ceramic/303 Stainless steel
Sealing material: Neoprene
Housing Cover: Nylon (Pa 6)

Temperature Influences:

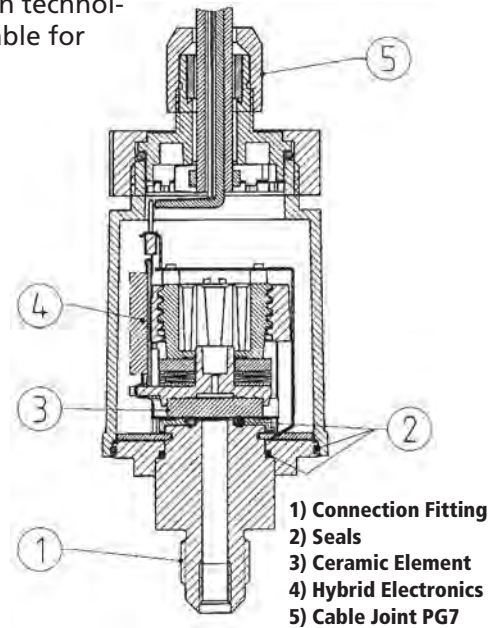
Medium and ambient temperature range:
- 40°C ... + 80°C

Zero 10 ... 60 bar < +/- 0.04% fs/°C
Span 10 ... 60 bar < +/- 0.015% fs/°C
Zero & Span 7 ... 10 bar < +/- 0.02% fs/°C

Load Cycle: < 50 Hz

Dynamic Response: Suitable for static and dynamic measurements.

Response time: < 5 ms



Signal and Power Supply:

0 – 5 V	11 – 33 VDC	3-wire cable
1 – 6 V	11 – 33 VDC	3-wire cable
0 – 10 V	18 – 33 VDC	3-wire cable
4 – 20 mA	11 – 33 VDC	2-wire cable

Short circuit-proof and protected against polarity reversal (to max. +/- supply voltage).

Load & Current Consumption:

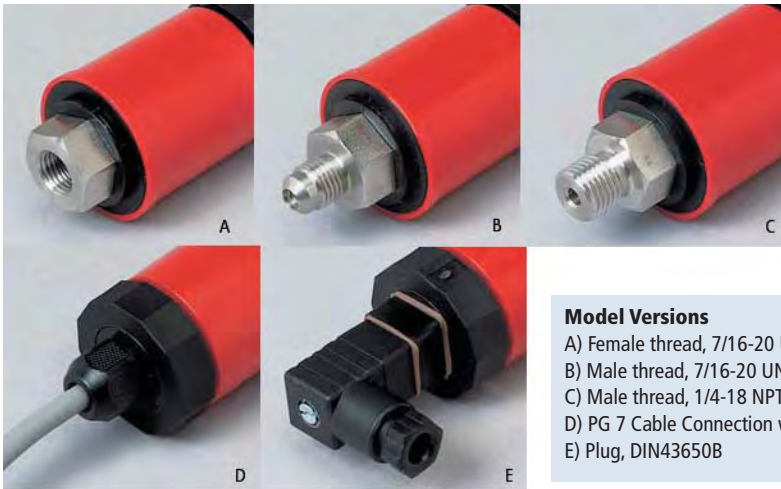
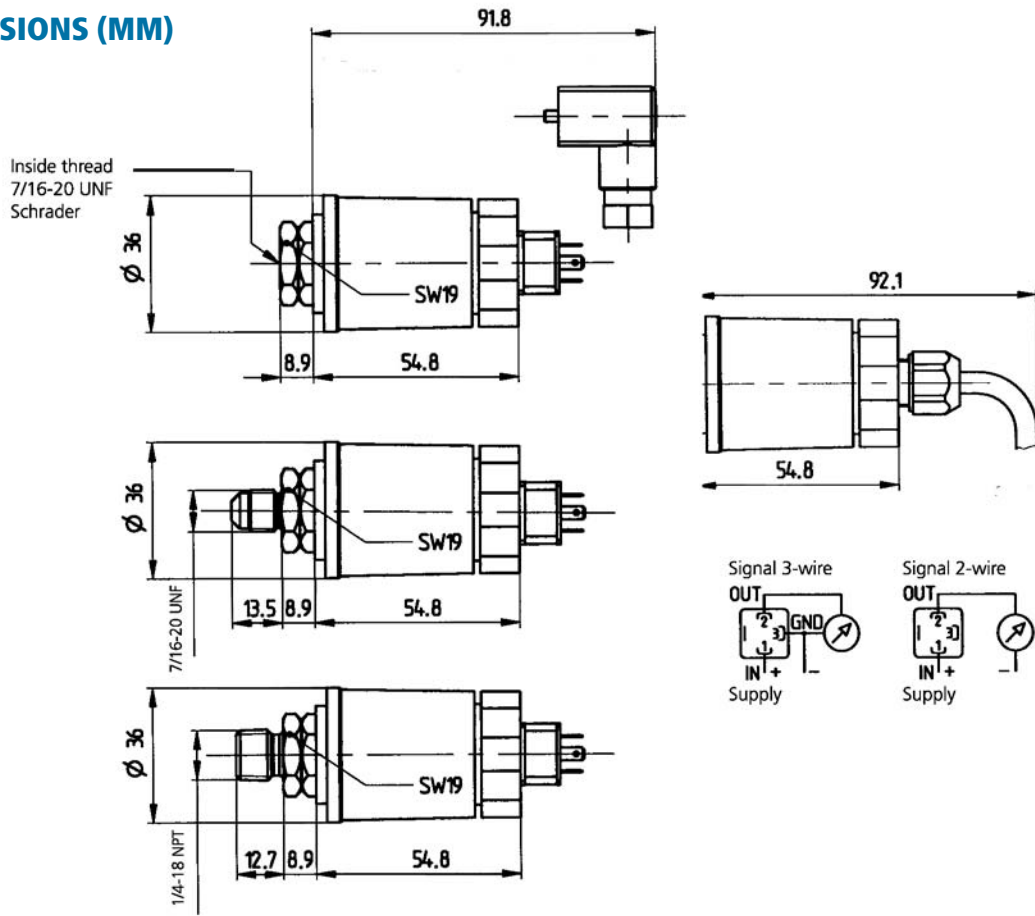
Output	Load	Current
0 – 5 V	> 10 kOhm/<100 nF	2 mA
1 – 6 V	> 10 kOhm/<100 nF	2 mA
0 – 10 V	> 10 kOhm/<100 nF	3 mA
4 – 20 mA	< supply voltage - 11 V [Ohm]	20 mA

0.02 A

Electrical connections / Protection class:

Cable 1.5 m	IP 65
Plug, DIN43650B	IP 65

DIMENSIONS (MM)



Model Versions

- A) Female thread, 7/16-20 UNF Schrader
- B) Male thread, 7/16-20 UNF Schrader
- C) Male thread, 1/4-18 NPT
- D) PG 7 Cable Connection with 1.5 meter cable
- E) Plug, DIN43650B

ORDERING INFORMATION

A-B-C-D-E-F-G-H

EXAMPLE: 506.9XX-A-0-3-0-3-1-0..300 PSI

A Model	B Seal Material	C Calibration	D Output	E Electrical Connections	F Pressure Connections	G Housing Material	H Pressure Range
506.9XX	A= Neoprene	0= Factory Calibrated	1= 0-5 V 6= 1-6 V 2= 0-10 V 3= 4-20 mA	0= Cable, 1.5 m 2= Plug, DIN43650B	0= 7/16-20 UNF female Schrader 2= 7/16-20 UNF male Schrader 3= 1/4 NPT male	1= 303 SS 2= 303 ss with orifice/snubber on pressure port	Customer Specified Contact us F.S. ranges from 102 psi to 870 psi Example: 0..300 psi= 0 to 300 psi

Note: Bulk packaging available

HUBA

511 Series Pressure Transmitter

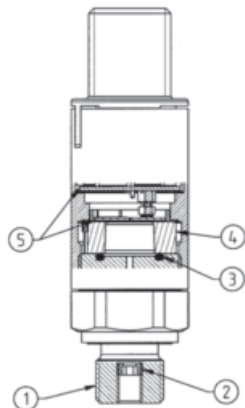
Liquids And Gases, FS Ranges 30" Hg Vacuum to 7500 PSI

DESCRIPTION

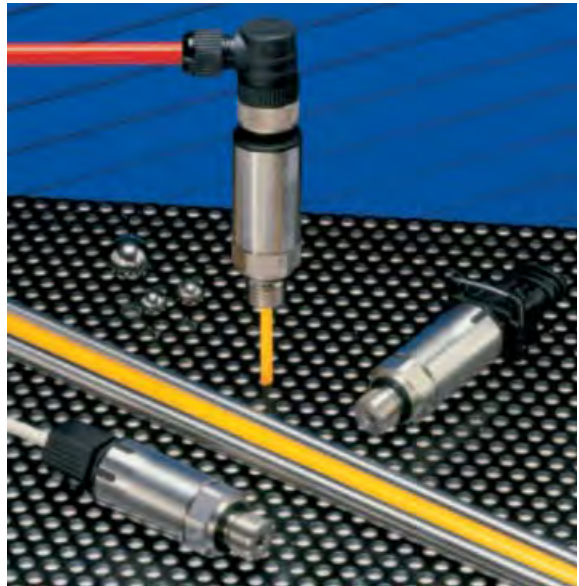
These compact pressure transmitters meet the highest specification for mechanical stress, EMC compatibility, and operational reliability.

Model 511 is particularly suitable for demanding industrial applications. The sensor utilizes a ceramic technology developed by Huba Control of Switzerland. Millions sold over the past 10 years demonstrate the reliability of the ceramic sensor design that utilizes integrated (to the sensor) electronics.

The integrated sensor/electronic design has a high degree of accuracy over wide temperature range.



- 1) Connection Fitting
- 2) Rupture Protection
- 3) Seal
- 4) Ceramic Cell
- 5) Electrical Connection



- **HIGH RESISTANCE TO EXTREME TEMPERATURE**
- **COMPACT, RUGGED CONSTRUCTION**
- **PATENTED RUPTURE SEALING DEVICE IN CONNECTOR PREVENTS MEDIA LEAKAGE IN EVENT OF SENSOR FAILURE**
- **ATTRACTIVE PRICE TO PERFORMANCE RATIO**

SPECIFICATIONS

Pressure Measurement: Absolute pressure & gage pressure (differential measurement of pressure relative to ambient pressure).

F.S. Pressure Ranges: -1 to 600 bar (-14.5 to 8700 PSI)

Maximum/Rupture Pressure:

3.0x Full scale at -1 ... 4 bar

2.5x Full scale at 6 ... 400 bar

2.0x Full scale at 600 bar

Higher rupture pressure on request

A patented media stop system prevents media egress when exceeding rupture pressure range (40 bar nominal value)

Accuracy:

Total of linearity, hysteresis and repeatability:

< +/- 0.3% fs

Adjustment accuracy zero point and full scale:

< +/- 0.3% fs

Casing: Stainless steel 1.4305 (AISI 303)

Materials In Contact With The Medium:

Ceramic Al₂O₃

Stainless steel 1.4305 (AISI 303)

Rupture Seal: PPS

Seal Material: FPM, NBR, others on request

Media Temperature With Sealing Materials:

FPM - 15 ... + 125 °C

NBR - 25 ... + 85 °C

FPM SPEC. - 40 ... + 150 °C

Ambient Temperature: Max. 85 °C

(Versions up to 150 °C on request)

Temperature Influences:

Zero < +/- 0.015% fs/°C

Span < +/- 0.015% fs/°C

Temperature range - 40 ... + 125 °C

Dynamic Response: Suitable for static and dynamic measurements. Response time < 2 ms, typ. 1 ms

Pressure Connections: See order code selection table

Weight: Version inside thread 85 grams

Version outside thread 95 grams

Installation Orientation: Unrestricted

Signal/Power Supply: See order code selection table

Protection: Short circuit-proof and protected against polarity reversal. Each connection is protected against other with max. +/- supply voltage.

Electric strength 500 VDC, on request 1000 VDC

Load:

Voltage outputs: > 10 kOhm / < 100 nF

Current Output: Max 1250 Ohms

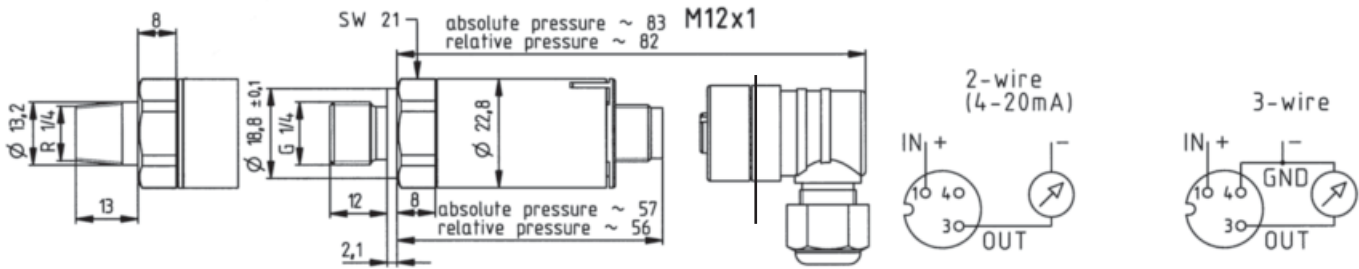
Current Consumption With Max. Signal Output:

Voltage outputs: < 4 mA

4 - 20 mA: < 20 mA

Electrical connections : M12 x 1 or cable, 1.5 meters other connectors available on request

DIMENSIONS (MM) & ELECTRICAL



TESTING

Shock according to IEC 68-2-27: 75 G, 11 ms half sine wave, all 3 directions. Free fall from 1 m on concrete (6x).

Constant shock according to IEC 68-2-29: 40 G for 6 ms, 1000x all 3 directions.

Vibration according to IEC 68-2-6: 20 G, 9 ... 200 Hz, 2 ... 9 Hz with amplit +/- 15 mm, 1 Octave / min. all 3 directions, 50 constant load.

Electromagnetic compatibility: CE conformity (EMC) by application of harmonized standards: Interference stability EN 50082-2, IEC 61000-6-2 and EN 61326-1, interference emit EN 50081-1, EN 55022, CISPR 22, EN 61326-1

Interference stability	Test standard	Effects
Electrostatic discharge (ESD)	EN 61000-4-2 15 kV air discharge, 8 kV contact discharge	No effect
High-frequency electromagnetic radiation (HF)	EN 61000-4-3 200 V/m, 80 ... 1000 Mz	No effect
Conducted HF interference	EN 61000-4-6 30 V, 0.15 ... 80 MHz	No effect
Fast transients (burst)	EN 61000-4-4 4 kV	No effect
Surge	EN 61000-4-5 Line-Line, Line-Case 500 V, 12 Ohm, 9 µF 1 kV, 42 Ohm, 0.5 µF	No failure
Magnetic fields	EN 61000-4-8 30 A/m, 50 Hz	No effect
Insulation voltage	500 VDC (optional 1000 VDC) 350 VAC (optional 700 VAC)	No effect

Interference emit	Test standard	Effects
Conducted interference	EN 55022 0.15... 30 MHz	No emission
Radiation from housing	30...1000 MHz, 10 meters	No emission

ORDERING INFORMATION

MODEL NUMBER = 511.ABCDEFGH

Example: 511.9A1003031

A=Type	*B=Range	C=Seals	D=Output	E=Elect. Connections	F=Press. Connections	G=Connection Orifice
9=Gage pressure	A1= 0 to 30" Hg Vacuum	00=FPM	3=4-20 mA	0=1.5 Meter Cable	3= 1/4-18 NPT	1=Without (ranges to 300 PSI)
8=Absolute pressure	B1= 0 to 15 PSI	20=NBR	(2-wire, 8-33VDC)	1=M12 x 1 (without female connector)	A= 1/8-27 NPT (ranges<500 PSI)	2=With (ranges 500 PSI and gre
	B4= 0 to 30 PSI	60=FPM SPEC	1= 0-5 V	Consult us with special requirements	1=G1/4 female	
	B5= 0 to 60 PSI		2= 0-10 V		5= M12 x 1.5 male	
	B7= 0 to 100 PSI		(3-wire, 8-33VDC)		6= M14 x 1.5 male	
	C1= 0 to 200 PSI					
	C2= 0 to 300 PSI					
	C3= 0 to 500 PSI					
	D0= 0 to 750 PSI					
	D1= 0-1000 PSI					
	D2= 0 to 2000 PSI					
	D3= 0 to 3000 PSI					
	E46= 0 to 5000 PSI (FPM SPEC seal only)					
	E56= 0-7500 PSI (FPM SPEC seal only)					

Accessories & Options:

106975= Female connector for M12 x 1

Packaging

Single= Single Package for each transmitter

Multiple= Packaged in 25 piece lots

**BOLD ITEMS ARE TYPICALLY IN STOCK
(2-3 week delivery for non-stock items)**

Ranges in other units of pressure such as bar are available. Special ranges available on request.

HUBA

401 Series Low Differential Pressure Transmitter

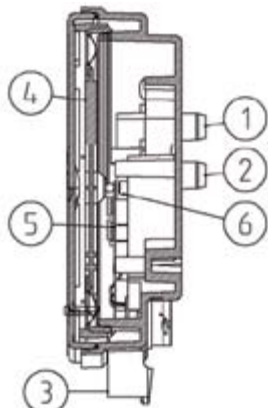
OEM Use, F.S. ranges 3 mbar (1.2" w.c.), 5 mbar (2.01" w.c.), 8 mbar (3.21" w.c.)

DESCRIPTION

The type 401 series pressure transmitters, with its unique proven ceramic fulcrum lever technology, has adjusted, temperature compensated sensor signals, available as a voltage output.

The (VDC) voltage output is an amplified, linear signal suitable for direct processing in electronic control systems.

They are for use with air and non-corrosive gases



- 1) Pressure connection P1 (higher pressure)
- 2) Pressure connection P2 (lower pressure)
- 3) Electrical connection
- 4) Diaphragm
- 5) Ceramic fulcrum lever with amplified electronics
- 6) Over pressure stop

SPECIFICATIONS

Medium: Air, neutral gases

Pressure range: 0-3 / 0-5 / 0-8 mbar (1.2/2.01/3.21" w.c.)

Tolerable overload on one side: 25 mbar (10" w.c.), 100 mbar (1.4 PSI) short period at room temperature

Rupture pressure: 200 mbar (2.9 PSI)

Leak rate: < 5 cm³/h (air), at measuring range

Materials in contact with medium

Cover: Polycarbonate (PC)

Diaphragm: Model 401- LSR (Liquid Silicon Rubber)

Model 403- NBR

Sensor: Ceramic Al₂O₃ / glass

Temperature

Medium and ambient 0 °C to +70 °C (0 to 158°F)

Storage -40 °C to +70 °C (-40 to 158°F)

Power supply / Output

Power supply: 10.4 to 18 VDC

Power supply possible up to 28 VDC (with higher power up drift, see diagram)

Output: 0.5 to 4.5 VDC

Load: > 15 kOhm (against GND)

Current consumption: At nominal voltage without load < 8 mA

Dynamic response: Suitable for static and dynamic measurements

Response time: < 10 ms

Load cycle: < 10 Hz

Electrical connection: 3-pole plug connector RAST 2.5

Suggested Connector: AMP DUOPLUG 2.5™

Enclosure Rating: IP 00

Polarity reversal protection: Mechanically protected



FEATURES

- Optimal feedback for VAV systems
- Diaphragm geometry inherently stable due to homogeneous manufacture with a 2-component injection moulding process (plastic-silicon)
- Tight dimensioning for high sensitivity and long-time stability
- Excellent repeatability even in the lower pressure range

Accuracy

Max. Tolerance zero point: ± 0.5% fs

Max. Tolerance full scale: -1.5 / +0.5% fs

Resolution: 0.1% fs

Max. Total of linearity, hysteresis and repeatability: ± 0.3 % fs

Long term stability acc. to DIN EN 60770: ± 1.0% fs

Typ. Temp. Coeff. zero point: ± 0.2% fs/10°C

Max. Temp. Coeff. zero point: ± 0.3% fs/10°C

Typ. Temp. Coeff. sensitivity: ± 0.1% fs/10°C

Pressure connections: Hose connector ø6.2 mm

Installation Orientation:

Diaphragm horizontal: Pressure connections downward

Diaphragm vertical: Pressure connections lateral, signal approx. 13 Pa below actual pressure

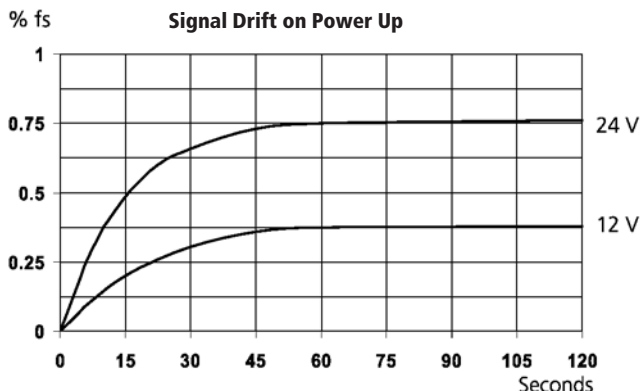
Mounting: Mounting bracket type A / type B

Tests / Admissions: DVGW according to DIN EN 1854

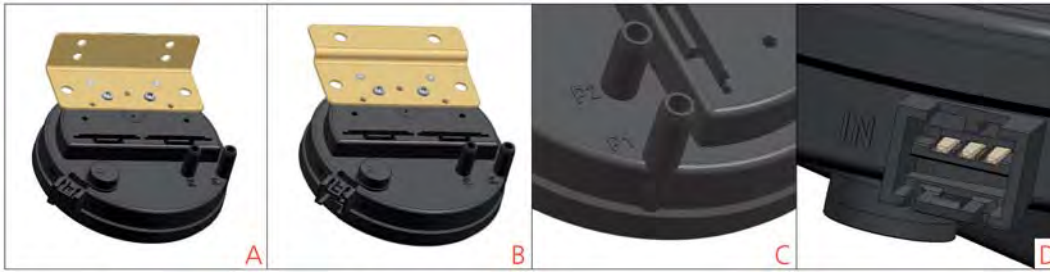
CE-0085BM0306

Weight: approx. 45 g

Packaging: Cardboard boxes with blister-pack inserts

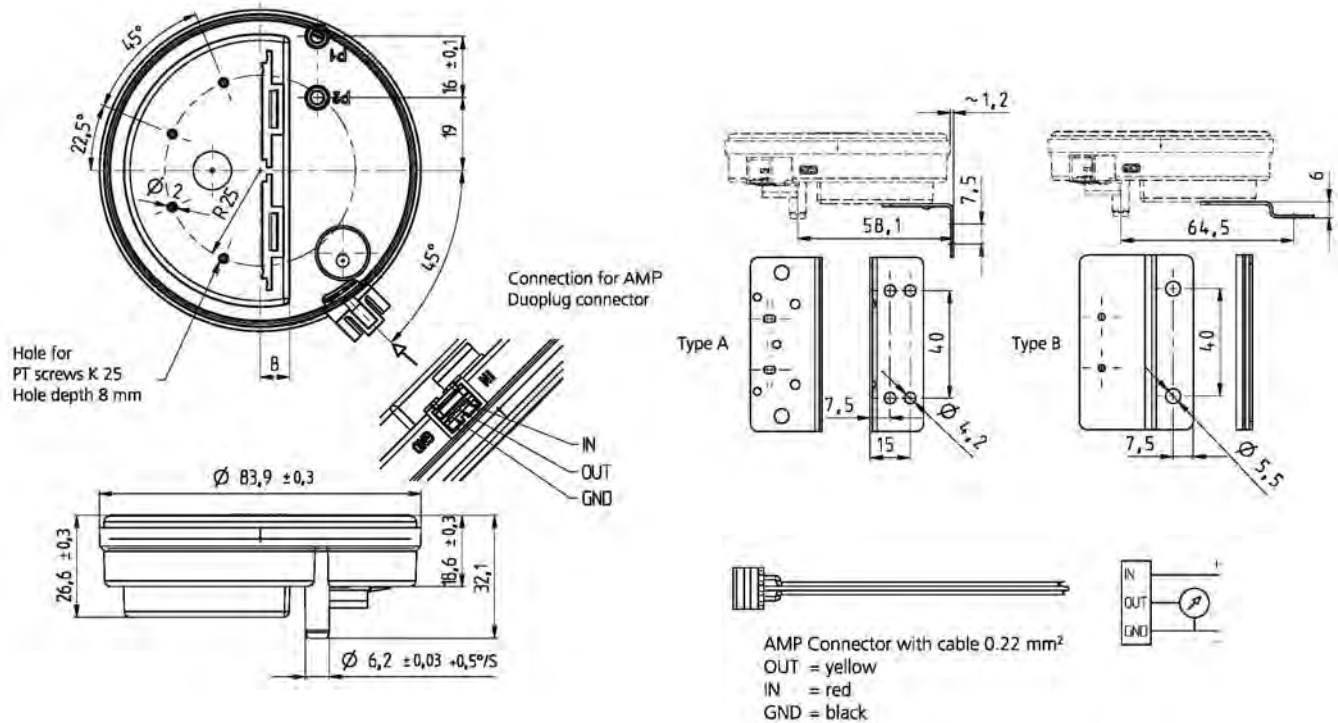


MOUNTING



- A – Mounting bracket type A
- B – Mounting bracket type B
- C – Pressure connection Ø 6.2 mm
- D – Electrical connection RAST 2.5

DIMENSIONS (MM) & ELECTRICAL



ORDERING INFORMATION

Note: This transmitter product is intended for OEM clients. bulk packaging is in box lots of 120 pieces per box. Minimum order is for 3 boxes(360 units). Contact us for evaluation samples.

Model	Description
401-93000	Transmitter, Silicon Diaphragm, 0-3 mbar(1.2" w.c.)
401-95000	Transmitter, Silicon Diaphragm, 0-5 mbar(2.01" w.c.)
401-98000	Transmitter, Silicon Diaphragm, 0-8 mbar(3.21" w.c.)
403-93000	Transmitter, NBR Diaphragm, 0-3 mbar(1.2" w.c.)
403-95000	Transmitter, NBR Diaphragm, 0-5 mbar(2.01" w.c.)
403-98000	Transmitter, NBR Diaphragm, 0-8 mbar(3.21" w.c.)
103460	Bracket type A
100098	Bracket type B
102976	Special screws for fastening transmitter to bracket (2 screws per transmitter required)
100251	Orifice for dampening pulsed pressure
111668	*AMP DUOPLUG 2.5™ Connector with 30 cm cable
101817	*AMP DUOPLUG 2.5™ Connector with 110 cm cable
112282	*AMP DUOPLUG 2.5™ Connector with 150 cm cable
*AMP Connector Part Number is 3-829868-3	

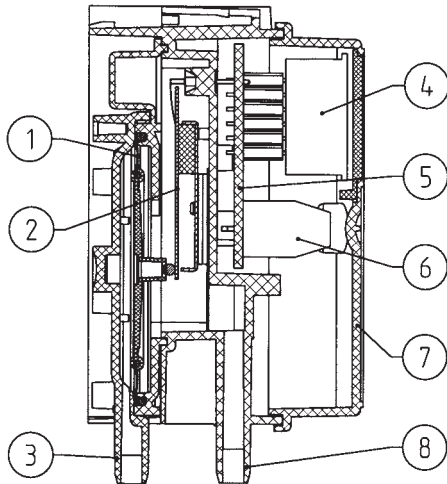
HUBA

694 Series Differential Pressure Transmitter

2-Wire, 4-20 mA output, F.S. Ranges $\pm 0.2''$ w.c. to $4.0''$ w.c.

DESCRIPTION

Type 694 series differential pressure transmitters incorporate a proven diaphragm driven ceramic fulcrum lever technology. They deliver calibrated, temperature-compensated sensor signals, available as standard 4-20 mA current output. They are ideal for registering low static pressures and air flow in air conditioning systems and for the measurement of pressure relationships in environmental, laboratory and clean-room applications.



- 1) Diaphragm
- 2) Ceramic sensor element
- 3) P1 higher pressure/lower vacuum
- 4) Optional Display
- 5) Amplifier electronics
- 6) Connection terminals
- 7) Cover
- 8) P2 lower pressure/higher vacuum



Ceramic sensor element with piezoresistors in a Wheatstone Bridge configuration and built in signal conditioning offers outstanding performance and long term stability.



SPECIFICATIONS

Pressure ranges: See order code selection table.

Max Pressure: See order code selection table.

Burst pressure: 500 mbar (7.25 PSI)

Accuracy Calculation: Terminal point method

Accuracy Including Linearity, Hysteresis &

Repeatability:

F.S. Ranges ± 0.2 and $0.4''$ w.c. - $\leq \pm 2\%$ f.s.

F.S. Ranges above $0.4''$ w.c. - $\leq \pm 1\%$ f.s.

Case Construction: Polycarbonate Lexan 141R, Fire classification to UL94

Cover: ABS Plastic

Diaphragm: Two-component silicone LSR

Operating Temperature: 0°C to $+70^\circ\text{C}$

Storage Temperature -10 to $+70^\circ\text{C}$

Effect of Temperature on Zero: $< \pm 0.04\%$ fs/ $^\circ\text{C}$ *

Effect of Temperature on Span: $< \pm 0.02\%$ fs/ $^\circ\text{C}$ *

*For Ranges to $0.4''$ w.c, multiply values x 2.5

Response time < 10 ms

Resolution: Ranges to $0.4''$ w.c. $< 0.2\%$ fs

Ranges above $0.4''$ w.c.: $< 0.1\%$ fs

Pressure connections: $3/16''$ I.D. Tubing

Weight: 90 grams

Installation Orientation: Vertical (factory calibrated)

Power Supply: 12-33 Vdc

Short circuit proof and protected against polarity reversal

Load Impedance: 1100 Ohms Max

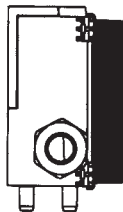
Electromagnetic compatibility: CE conformity to EC directive 89/336 EEC (EMC) by application of harmonized standards IEC 61000-6-3 and EN 61000-6-2.

Electrical Connection: Screw terminals for wire and stranded conductors up to 16 gage .

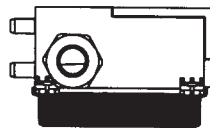
Cable gland with built-in strain relief Pg 11 Thread ($1/2''$ NPT adaptor for conduit connection optional)

Enclosure Rating: IP 54 (NEMA 3, 3S & 13)

Factory Calibrated for Vertical installation with pressure ports down



Horizontal installation with cover down, reading approx. $0.04''$ w.c. higher



Horizontal installation with cover up, reading approx. $0.04''$ w.c. lower



DIMENSIONS (MM) & ELECTRICAL

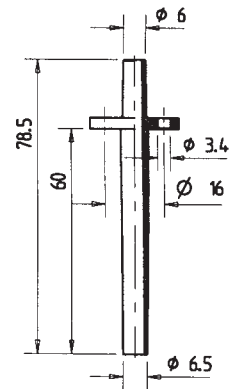
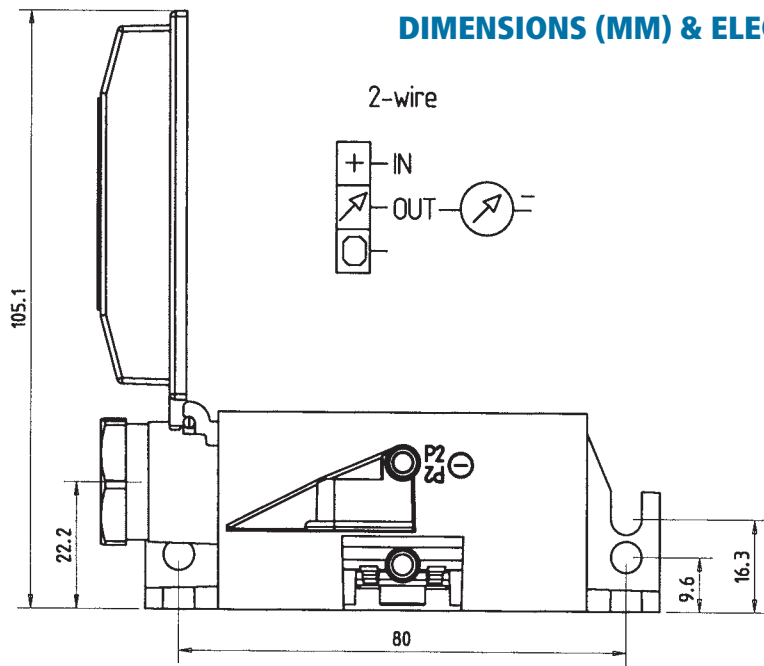
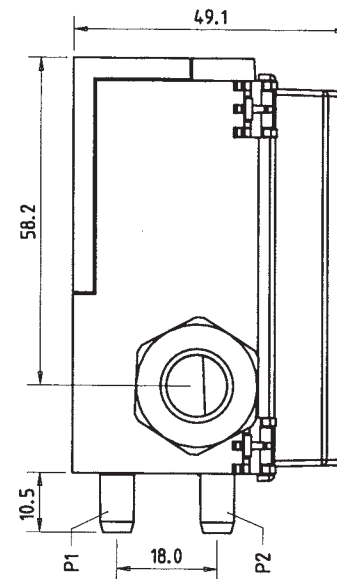
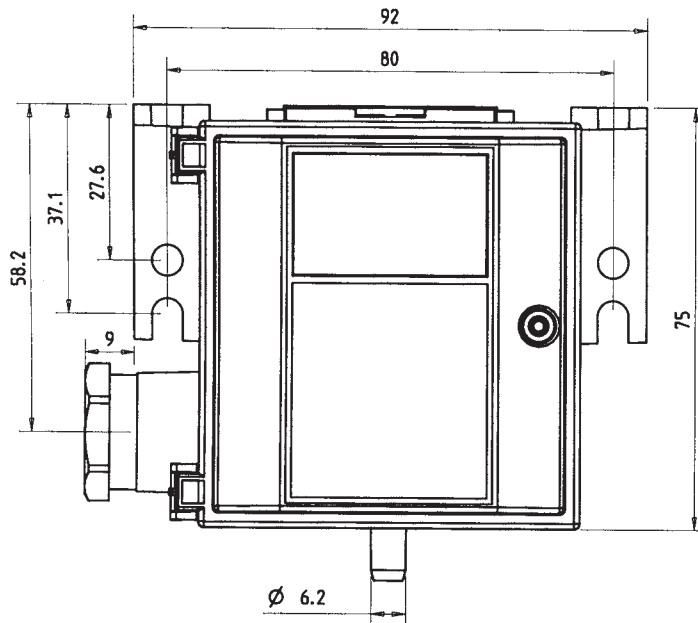


Fig. 1
Plastic Duct Mount
Static Probe



ORDERING INFORMATION

Model	Range	Max Pressure
694.931115010	±0.2 inches w.c.	20.0 inches w.c.
694.911115010	0-0.4 inches w.c.	20 inches w.c.
694.912115010	0-1.20 inches w.c.	20 inches w.c.
694.913115010	0-2.0 inches w.c.	40 inches w.c.
694.914115010	0-4.0 inches w.c.	40 inches w.c.

Accessories & Options:

Higher Ranges: Consult Factory

Integral Digital Display: Consult Factory

Voltage Output: Consult Factory

Square Root Extraction: Consult Factory

104262: Plastic Static Pressure Probe (See Figure 1 Above)

100064: Connection set including two static probes,

A0012: 1/2" NPT Adapter to replace strain relief connector with conduit

Bold Order Items Typically Ship From Stock

HUBA

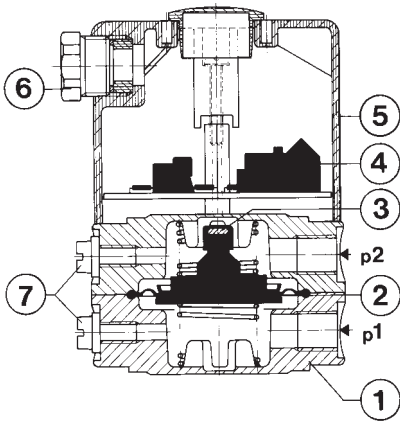
652 Series Differential Pressure Transmitter

Liquids And Gases, F.S. Ranges 20 inches w.c to 15 PSID

DESCRIPTION

The differential pressure transmitter series 652 are especially suited for the continuous level or flow monitoring of neutral and slightly aggressive liquids and gases in heating, ventilation and process applications.

The pressure or differential pressure to be monitored acts on a diaphragm, which in turn acts against a spring. A permanent magnet fastened on the diaphragm moves in the direction of a hall sensor mounted outside the pressure case. This sensor emits an electrical signal which is proportional to the magnetic field. The signal is linearized, compensated and amplified.



- 1) Pressure case
- 2) Diaphragm
- 3) Permanent magnet
- 4) Printed Circuit board
- 5) Cover
- 6) PG9 Strain Relief
- 7) Vent
- P1 Higher Pressure, Lower Vacuum
- P2 Lower pressure, Higher Vacuum



- **HIGH OVERPRESSURE SAFETY PROTECTION**
- **RUGGED MECHANICS WITH HIGH OPERATING RELIABILITY**
- **COMPATIBLE WITH SLIGHTLY AGGRESSIVE LIQUIDS AND GASES**
- **ATTRACTIVE PRICE TO PERFORMANCE RATIO**

SPECIFICATIONS

Pressure Ranges: See ordering information
Max Pressure:

- 145 PSI range 20.0" w.c.
- 290 PSI range 7 PSID and higher

Rupture pressure: 435 PSI

Linearity: < +/- 1.5 % fs

Hysteresis: < +/- 1.5 % fs

Zero point offset < +/- 1.0 % fs

Pressure case: Anodized black aluminium, brass or nickel-plated brass

Cover: plastic

Diaphragm: NBR-based, EPDM, Viton

Materials Coming Into Contact With Media:

- 430F SS
- 304 SS
- 301 SS
- AISI A2 Alloy screws
- Polyacetate-C / Polyamide

Operating Temperature: NBR-based, 32-176°F(0-80°C);
FPM, 14-176°F(-10-80°C); EPDM, 14-176°F(-10-80°C)

Operating Temperature PC Board: -13-140°F(-25-60°C)

Temperature Drift: 0.08% fs / degree from Calibration Temperature (20°C)

Response Time: < 10 ms

Pressure connections: 1/8 NPT female thread

Weight Aluminium Pressure Case :13 oz

Weight Brass/Nickel-Plated Brass Case: 1.9 lbs

Installation: The transmitter is calibrated in the factory with the diaphragm positioned vertically. In the case of liquid media, vent screw should be oriented up and the pressure connections down.

Outputs: 0 - 10 V, 3-wire cable ; 4-20 mA 3-wire cable

Installation Warmup Time: 15 minutes

Power supply: 20 - 30 VDC

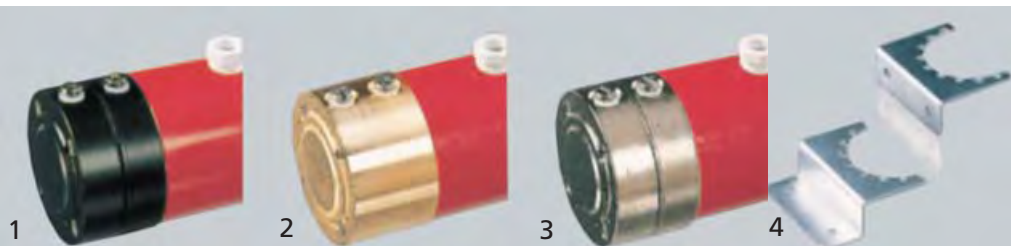
Current load: ≤ 300 Ohm

Voltage load: ≤ 10 KOhm

Current Consumption:

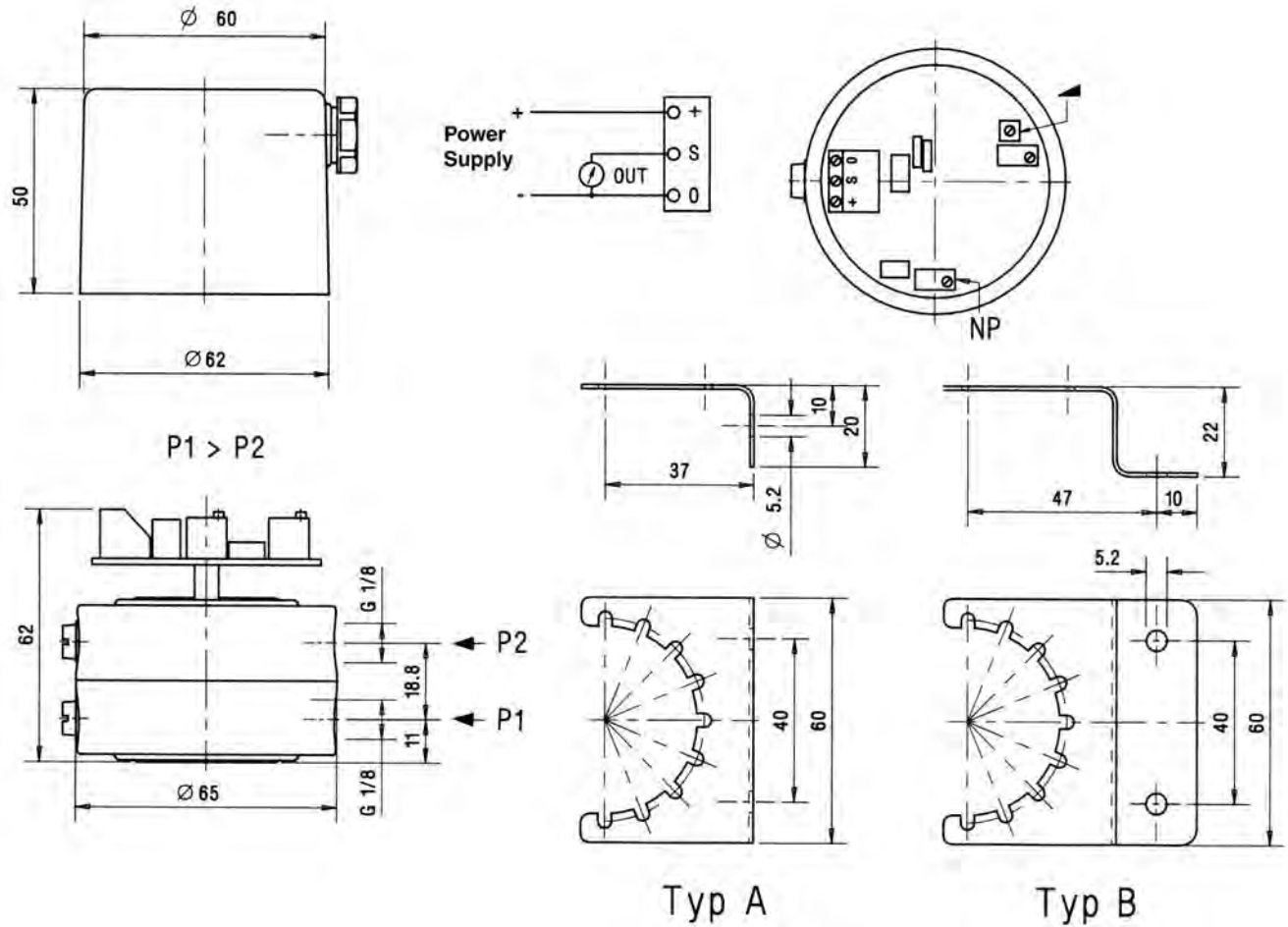
0 - 10 V- 35 mA

4 - 20 mA- max. 55 mA



- Case material
- 1) Anodized Aluminum
 - 2) Brass
 - 3) Nickel Plated Brass
 - 4) Mounting brackets

DIMENSIONS (MM) & ELECTRICAL



ORDERING INFORMATION

MODEL NUMBER = 652.9ABCDEFGHIJ

A=Range	B=Output	C=Linearity	D=Power	E=Elect. Connections	F=Press. Connections	G=Case	H=Diaphragm
1=0-20" w.c.	4=4-20mA	1=±1.5% fs	0=20-30VDC	0=Screw Terminals	N=1/8 FNPT	2=Nickel Plated Brass 0=Anodized Aluminum 1=Brass	0=NBR-Based 1=FPM 2=EPDM

Accessories & Options:

A01: Type A mounting bracket
A02: Type B mounting bracket
Higher accuracies on request
Special Ranges Available On Request

HUBA

692 Series Differential Pressure Transmitter

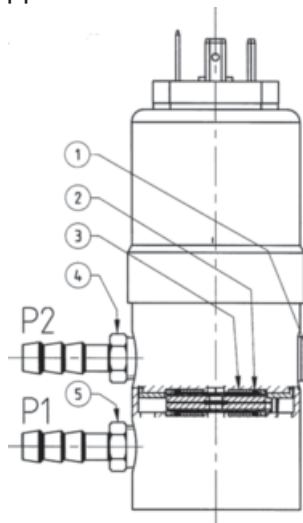
Liquids And Gases, FS Ranges 20 PSID to 150 PSID

DESCRIPTION

The differential pressure transmitter series 692 incorporates proven, unique ceramic sensor technology. The units feature calibrated and amplified sensor signals that are available as standard voltage or current outputs.

The housing is stainless steel or PVDF and a variety of seal elastomers are offered to accommodate different liquid and gas media.

Series 692 transmitters are ideal for monitoring pumps and pressure drops in HVAC chilled water and process systems as well as various other tank level monitoring and control applications.



- 1) Set Screw
- 2) Seals
- 3) Ceramic Element
- 4) P2 Pressure Port, Lower pressure, Higher Vacuum
- 5) P1 Pressure Port, Higher Pressure, Lower Vacuum



SPECIFICATIONS

Max Common Mode Pressure:

362 PSI to pressure range 60 PSID
725 PSI on pressure range 100 & 150 PSID

*Max Differential Pressure One Port To The Other:

Range 0-25 PSID- 43 PSI
Range 0-35 PSID- & 0-60 PSID- 174 PSI
Range 0-100 PSID & 0-150 PSID- 290 PSI
on P1, 174 PSI on P2

Rupture pressure: 1.5 x common mode pressure

Accuracy

Total of linearity, hysteresis and repeatability:

< +/- 0.5 % fs at common mode 2x pressure range
< +/- 0.8 % fs at common mode 3x pressure range
< +/- 1.3 % fs at common mode 5x pressure range

Zero point residual current (0 - 20 mA):

100 μ A at 2x nominal pressure
150 μ A at 3x nominal pressure
250 μ A at 5x nominal pressure

Materials of housing in Contact With Media:

Ceramic/303 Stainless Steel
Sealing material: FPM, contact us for EPDM or NBR

Medium And Ambient Temperature: 4 to 176°F (-15 °C to +80 °C)

* Use an equalizing manifold for installations where the process common mode pressure is greater than the stated max port to port differential pressure.

• **HIGH RESISTANCE TO EXTREME TEMPERATURE**

• **NO MECHANICAL AGING OR CREEPAGE**

• **COMPATIBLE WITH SLIGHTLY AGGRESSIVE LIQUIDS AND GASES**

• **ATTRACTIVE PRICE TO PERFORMANCE RATIO**

Effect of Temperature (% fs/°C): <0.1%, add following values for higher operating pressures,
< +/- 0.015 at 2x nominal pressure
< +/- 0.022 at 3x nominal pressure
< +/- 0.037 at 5x nominal pressure

Suitable for static and dynamic measurements

Response Time: < 5 ms

Pressure Connections: 1/8 FNPT (standard or 1/8" Barb (optional, contact us)

Weight: approx. 15 oz(430 grams)

Signal: 2-wire, 4 - 20 mA,

Power supply: 11 - 33 VDC

Short circuit proof and protected against polarity reversal.

Electromagnetic Compatibility: CE conformity to EC directive 89/336, EEC (EMC) according to harmonized standards EN 50081-1, EN 50081-2 and EN 50082-2.

Load Impedance: 1100 Ohms Max.

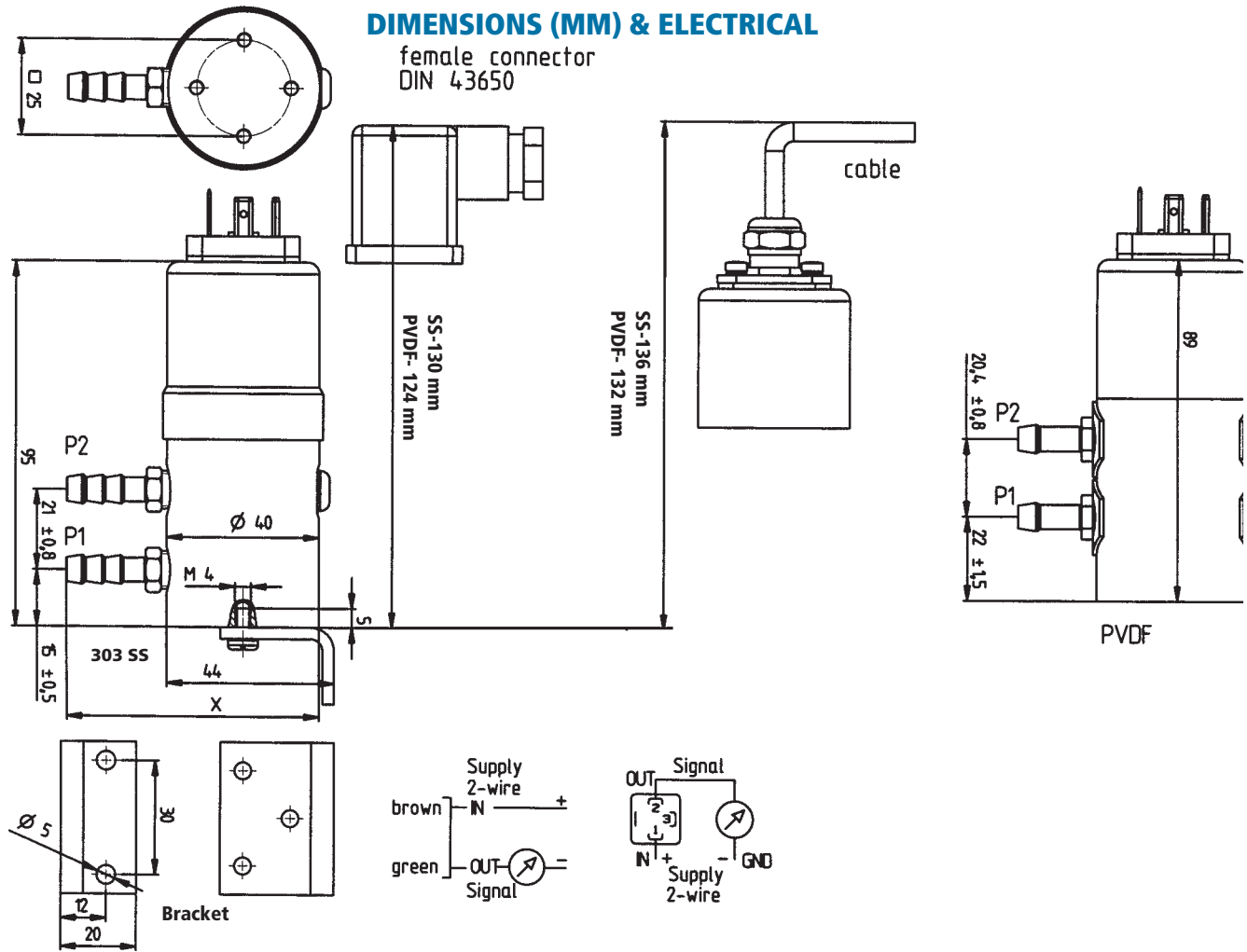
Current Consumption at Maximum Signal Output:
4 - 20 mA < 25 mA

Electrical Connections:

Connector: DIN 43650-A, NEMA 4 (IP 65)
or, optionally (contact us):

Cable: 4.5 ft, NEMA 4 (IP 65), with cable gland

DIMENSIONS (MM) & ELECTRICAL



ORDERING INFORMATION

MODEL NUMBER = 692-33-004-A

Example: 692-33-004-18

A=Range

25=0-25 PSID.
25=0-35 PSID
60=0-60 PSID
100=0-100 PSID
200=0-200 PSID

Accessories & Options:

PVDF Housing(Ranges to 100PSI Max): Consult factory
Voltage Signal Outputs: Consult Factory
Special Ranges & Higher Ranges Available On Request

101999= Mounting Bracket

103510= Female Connector, DIN43650-A with seal,
NEMA 4 (IP65) when secured by screw

HUBA

699 Series Differential Pressure Indicator & Transmitter

Field Selectable Voltage and Current Outputs, F.S. Ranges From 0.1 to 20" W.C.

DESCRIPTION

Series 699 measures low differential pressures typically found in air conditioning applications such as air flow measurement, fan static pressures and specialty room pressure measurements in clean rooms and other low pressure space monitoring applications.

The 699 series incorporates time proven ceramic fulcrum lever technology. They deliver adjusted and temperature-compensated sensor signals, available as standard voltage or current outputs.

The 699 is available in three configurations offering different levels of function and cost.

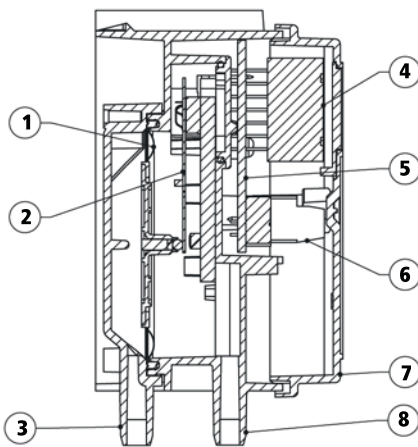
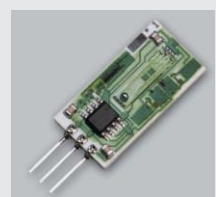
Configuration 1 is a transmitter with field selectable ranges and factory preset output signal and zero offset configurations.

Configuration 2 incorporates a 10 position DIP switch allowing field selection of range, output signal & response time. A potentiometer allows further adjustment of span within the selected range.

Configuration 3 incorporates an LED display and full field function programming via programming button including setting of range and fine tuning of span, output signal, zero offset, units of measurement, response time, square root extraction and display light settings.



Ceramic sensor element with piezoresistors in a Wheatstone Bridge configuration and built in signal conditioning offers outstanding performance and long term stability.



Cross-section Drawing Legend	
1	Diaphragm
2	Sensor element
3	P1 (Higher Pressure) Pressure connection
4	LCD-Display (option)
5	Amplification Circuit
6	Connection terminals
7	Cover
8	P2 (Lower Pressure) Pressure connection

SPECIFICATIONS

- Medium: Air and neutral gases
- Pressure ranges: F.S. from ± 0.1 to 20" w.c.
See order table for field selectable ranges offered for each model
- Units of pressure measurement: Inches w.c., mm w.c.
- Tolerable overload on one side of diaphragm:
Pressure: 40" w.c. at P1, 1.6" w.c. at P2
Vacuum: 40" w.c. at P2, 1.6" w.c. at P1
- Rupture pressure:
2 x overload at ambient temperature
1.5 x overload at 70 °C
- Zero Adjustment: Zero point resettable by reset button
- Materials in contact with medium:
Housing: Polycarbonate PC
Diaphragm: Silicone
Sensor: Al₂O₃ (96%) / glass
- Temperature:
Medium and ambient: 32 to 158°F (0 to +70 °C)
Storage: 14 to 158°F (10 to +70 °C)
No condensation
- Output/Power Supply:
Three-Wire
0 to 10 V, 13.5 to 33 VDC / 24 VAC $\pm 15\%$
0 to 20 mA, 13.5 to 33 VDC / 24 VAC $\pm 15\%$
4 to 20 mA, 13.5 to 33 VDC / 24 VAC $\pm 15\%$
Two-Wire
4 to 20 mA, 8.0 to 33 VDC

SPECIFICATIONS

Output/Power Supply (Cont'd):
 Additional adjustable by software (with LCD-
 Display, configuration 3 only): 0-5.0V, 6.5 to
 33 VDC / 24 VAC ±15%

Load:
 3-wire:
 0-10 V > 10 kOhm
 0-20 mA < 500 Ohm
 4-20 mA < 500 Ohm
 2-wire:
 4-20 mA < $\frac{\text{supply voltage} - 8 \text{ V}}{0.02 \text{ A}}$ Ohms

Current Consumption:
 3-wire:
 0-10 V < 10 mA
 0-20 mA < 30 mA
 4-20 mA < 30 mA
 2-wire:
 4-20 mA 20 mA

Backlight LCD-Display: 30 mA

Dynamic response:
 Response time: < 20 ms
 Load cycle: < 10 Hz

Response time Filter: Filter response time switchable
 for configuration 2: off or 1 second;
 Filter response time programmable for
 configuration 3: 0.2 / 1 / 5 / 20 seconds

Electrical connection: Screw terminals for wire and
 stranded conductors up to 16 AWG, PG11 cable
 gland with built-in strain relief
 Polarity reversal protection: Short circuit proof and
 protected against polarity reversal. Each
 connection is protected against crossover up to
 max. supply voltage.

Protection standard:
 Without cover: IP 00
 With cover: IP 54 or IP 65

Pressure connections:
 Hose barb: .244" (6.2 mm)

Installation: Recommended and factory adjustment
 vertical, with pressure connections downward
 Mounting: Mounting bracket (integrated in case)
 Display, configuration 3: LCD display, double spaced
 per 8 digit alphanumeric (3-wire with backlight)

Tests: CE conform

Weight:
 With Display: approx. 100 g
 Without Display: 90 g

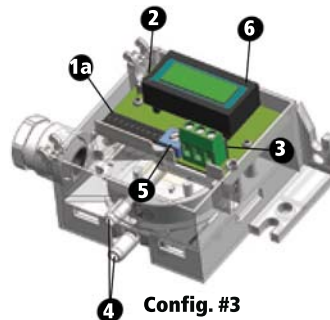
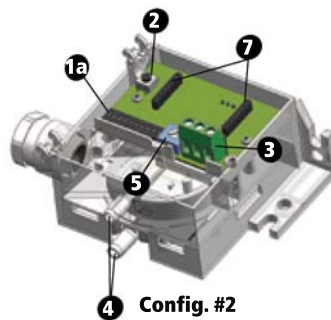
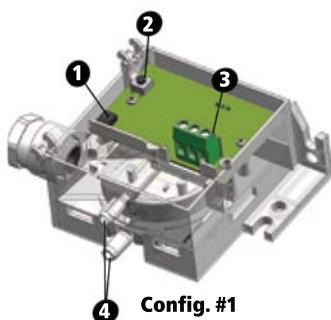
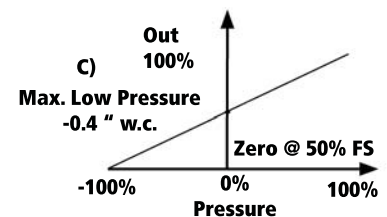
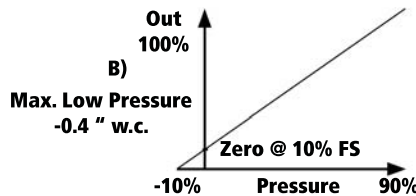
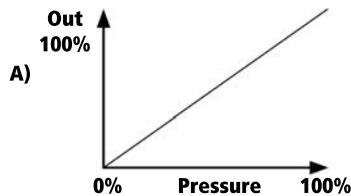
Packaging: Individually boxed

Options: Modbus RTU RS485, duct probes, DIN
 mounting adaptor

Accuracy					
	0.2" w.c.	0.4" w.c.	1.2" w.c.	2.0" w.c.	4 to 20" w.c.
Tolerance zero point (max.).	±1.0% fs	±1.0% fs	±0.7% fs	±0.7% fs	±0.7% fs
Tolerance full scale	±1.0% fs	±1.0% fs	±0.7% fs	±0.7% fs	±0.7% fs
Resolution	±0.2% fs	±0.2% fs	±0.1% fs	±0.1% fs	±0.1% fs
Total of linearity, hysteresis and repeatability (max.)	±1.0% fs	±1.0% fs	±1.0% fs	±1.0% fs	±0.6% fs
Long term stability acc. to DIN IEC 60770	±1.0% fs	±1.0% fs	±1.0% fs	±1.0% fs	±1.0% fs
Temp. Coeff. zero point (typ.)	±0.2% fs/10K	±0.2% fs/10K	±0.2% fs/10K	±0.1% fs/10K	±0.1% fs/10K
TC Temp. Coeff. zero point (max.)	±1.0% fs/10K	±1.0% fs/10K	±0.5% fs/10K	±0.4% fs/10K	±0.4% fs/10K
Temp. Coeff. sensitivity (typ.)	±0.3% fs/10K	±0.3% fs/10K	±0.2% fs/10K	±0.1% fs/10K	±0.1% fs/10K
Temp. Coeff. sensitivity (max.)	±0.6% fs/10K	±0.6% fs/10K	±0.5% fs/10K	±0.5% fs/10K	±0.2% fs/10K

Test conditions: 25 °C, 45%RH, Power Supply 24 VDC; Temperature Coefficient Zero Point 32 to 158°F (0 ... 70 °C)

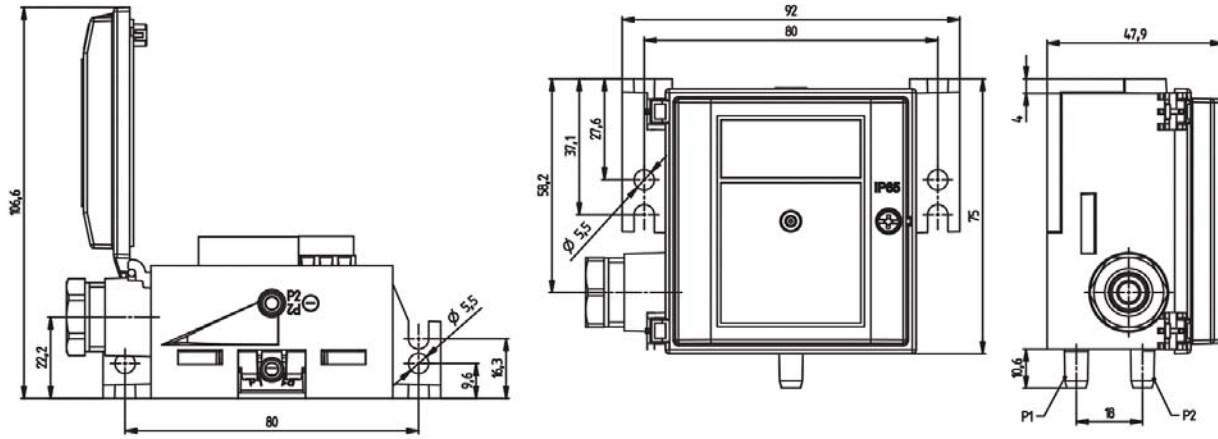
PRESSURE RANGE ZERO OFFSETS Factory preset for configurations 1 & 2; Field programmable for configuration 3



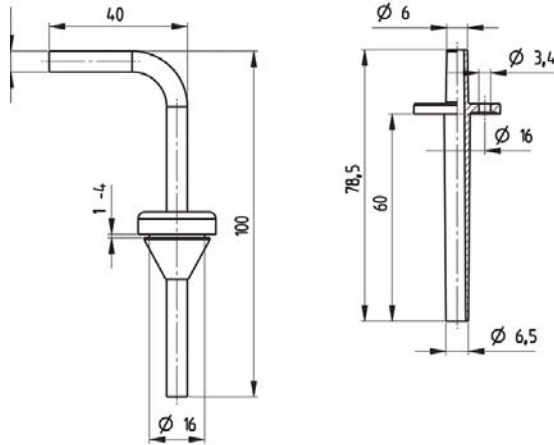
Legend	
1	Dual DIP Switch
1a	10 Position DIP Switch
2	Zero Point Reset
3	Terminal Connection
4	P1 & P2 Pressure Ports
5	Signal Amplification Potentiometer
6	LCD
7	LCD Receptacle

Configuration Major Differences			
Parameter	Config. 1	Config. 2	Config. 3
LCD Display	No	No	Yes
Field Select Output Signals	No	Yes	Yes
Field Select Response Time	No	Std. or 1 sec.	0.2, 1, 5 or 20 sec.
Display Program Menu & Program Button	No	No	Yes

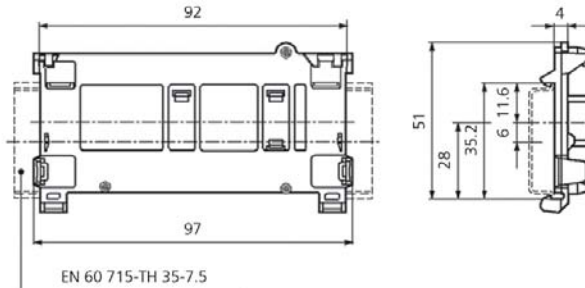
Dimensions mm



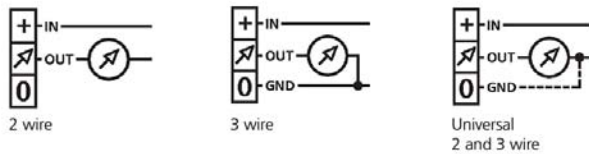
Duct Probes



Optional DIN Rail Mounting Plate



Wiring



ORDERING INFORMATION ABCDEFGHI (699.911321113)

A Model	B Pressure Range Zero Offset	C F.S. Pressure Range Field Selectable as Designated	D Units of Measure	*E Output Signal/ Adjustment	F Output & Power Supply	**G Display
699.9	1= 0-100% 2= -10% to 0 to 100% 3=-100% to 0 to+100%	0= 0.1/0.2 inches w.c. 1= 0.1/0.2/0.3 inches w.c 2=0.3/0.6/1 inches w.c 3=0.5/1/2 inches w.c 4= 1/2/3 inches w.c 5=2/3/5 inches w.c 6=3/5/10 inches w.c 7= 5/10/20 inches w.c	6= inches of water 3= mm w.c	1= Linear w/o filter 2=Linear w/ filter (Config 2&3) 4= Square root extracted w/o filter 3= Square root extracted w/filter (Config 2&3)	1= 0-10 V, three-wire 2= 0-20 mA- three-wire 4= 4-20 mA, three-wire 5= 4-20 mA, 2-wire	0= None 1= In Eng. Units Ordered 2= In % F.S.
*For Configuration 2 Select Output Signal 2 or 3 ** For Configuration 3 Select Display 1 or 2						

H Connection	I Environmental
1= 6.2 mm Tube Connection 2= 6.2 mm Tube Connection, Orifice in P1 3= 6.2 mm Tube Connection, Orifice in P2 4= 6.2 mm Tube Connection, Orifice in P1 & P2	0= IP54 3= IP65

Option P/N	Description
117305	MODBUS module
104312	Quantity 2 90° Duct probe with 2m (6.5') connecting tubing
100064	Quantity 2 Static pressure duct probe with 2m (6.5') connecting tubing
112854	DIN rail mounting adaptor

HUBA

513 Series Pressure Sensor

OEM Ceramic Pressure Sensor, F.S. Ranges from -1 to 160 bar (-14.5 to 2320 psi)

DESCRIPTION

This pressure-measuring cell is based on time proven ceramic technology.

Due to the very robust design of the ceramic cell there are no significant changes in the sensor characteristics when packaged by the customer.

This technology with an amplified ratiometric output signal, supports direct assembly without the need for the user to adjust for temperature or pressure.

- **NEGLIGIBLE TEMPERATURE INFLUENCE ON ACCURACY**
- **NO CUSTOMER SPECIFIC ADJUSTMENT OF ZERO POINT AND TEMPERATURE COMPENSATION NECESSARY**
- **INTEGRATED AMPLIFIER ELECTRONICS**
- **EASY MOUNTING**

SPECIFICATIONS

Medium: Liquids and neutral gases

Pressure ranges:

Absolute: 0 to 1 to 25 bar (0 to 14.5 to 363 psia)

0.8 to 1.4 bar (bar. sensor. 23.6 to 41.3 " Hg)

Relative/Gauge: -1 to 0 - 160 bar (-14.5 to 0 to 2,320 psig)

Overload / Rupture pressure:

3.0 x Measuring range at -1 to 4 bar (-14.5 to 58 psi)

2.5 x Measuring range at 6 to 60 bar (87 to 870 psi)

2.0 x Measuring range at 100 to 160 bar (1,450 to 2,320 psi)

Higher overload, higher rupture pressure on request

Material in contact with the medium:

Measuring cell: Ceramic Al₂O₃ (96%)

Sealing material: FPM, NBR, FPM spec.

Temperature Medium and ambient with sealing:

FPM -15 to +125 °C (5 to +257 °F)

NBR -25 to +85 °C (-13 to +185 °F)

FPM spec. -30 to +150 °C (-22 to +302 °F)

Storage -40 to +130 °C (-40 to +266 °F)

Storage In packaging -40 to +65 °C (-40 to +149 °F)

Accuracy:

Resolution: 0.1% fs

Long-term stability acc. DIN IEC 60770: ±0.5% fs

Total of linearity, hysteresis and repeatability:

max. ±0.3% fs

Barometrical sensor max. ±0.5% fs

Versions with full scale adjustment:

Tolerance zero point: max. ±0.5% fs

Tolerance full scale: max. ±0.5% fs

Versions without full scale adjustment:

Zero point: 0.5 V ±0.02 V

Full scale: 3.0 V ±1.2 V

Power supply / Output:

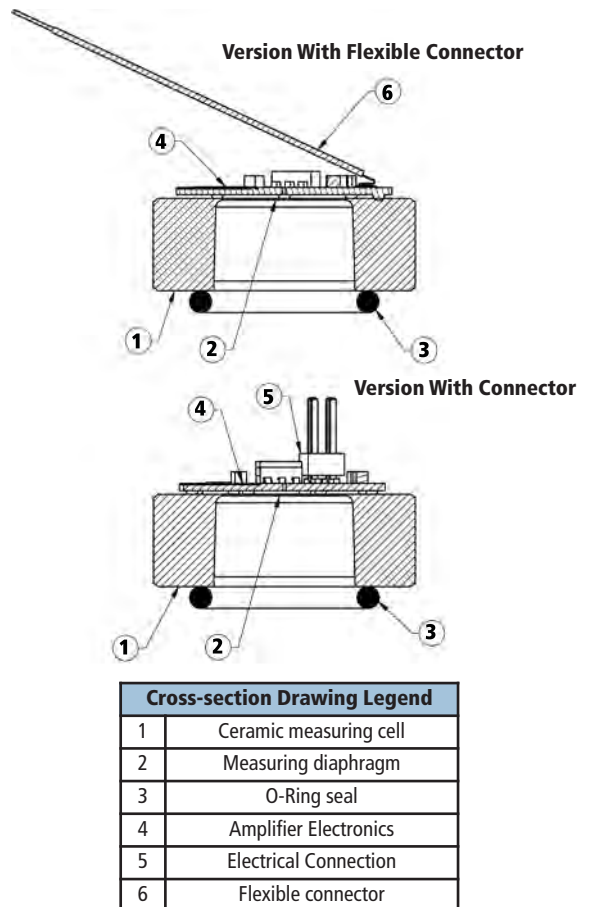
Power supply: 5 VDC (4.75 to 5.25 V)

Output with full scale adjustment:

ratiom. 0.5 to 4.5 V, 10 to 90% of power supply

Output without full scale adjustment:

0.5 to 3 ±1.2 V

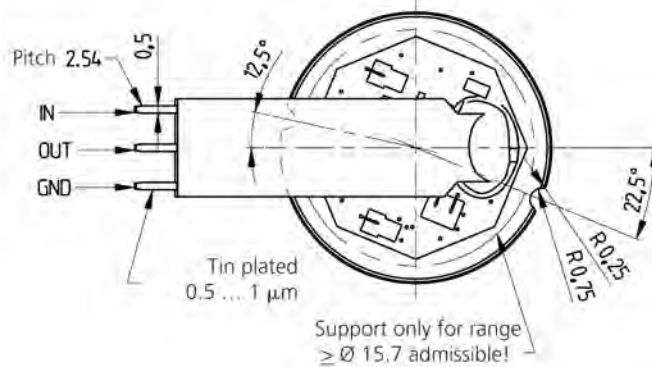
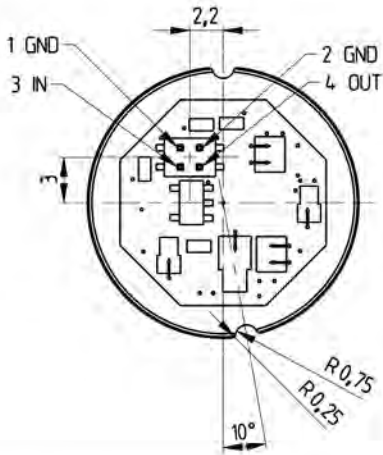
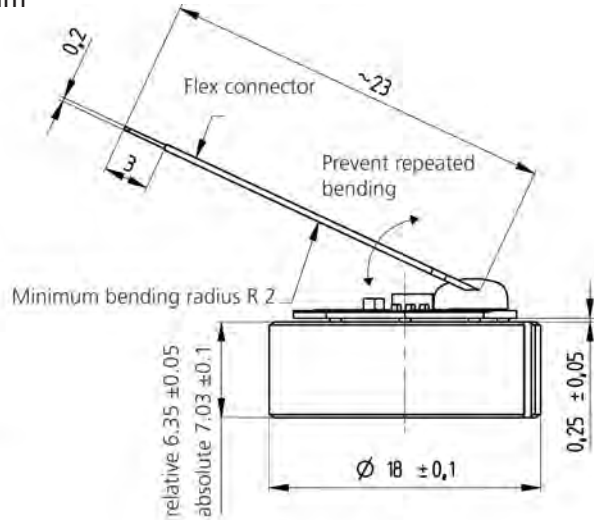
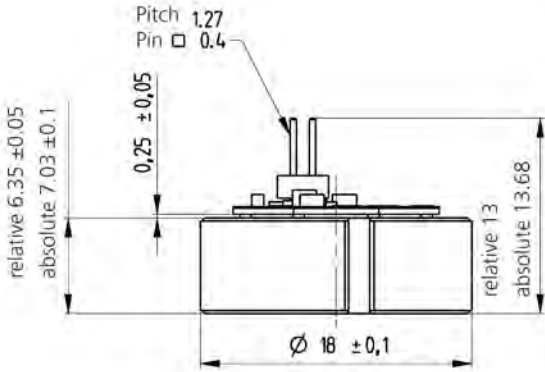


SPECIFICATIONS

Load: > 10 kOhm / < 100 nF
 Current consumption: At nominal pressure without load < 4 mA
 Temperature influences In the range -30 ... +125 °C:
 Zero point: max. Max. $\pm 0.15\%$ fs/10K
 Span: Max. $\pm 0.15\%$ fs/10K
 Dynamic response: Suitable for static and dynamic measurements
 Response time: < 2 ms, 1 ms Typ.
 Load cycle: < 100 Hz
 Electrical connection:
 Connector Contact Spacing: 1.27 mm (50 mil)
 Flexible connector Contact Spacing: 2.54 mm (100 mil)

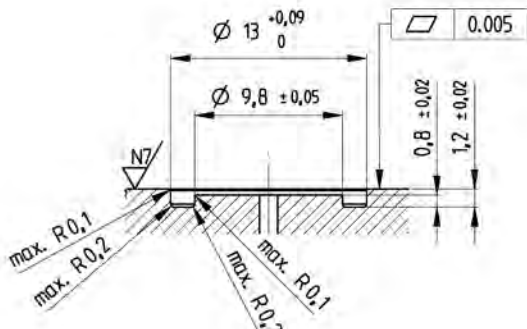
Optional Humidity protection: KFW, 20 days acc. DIN 50017
 Assembly / housing: According to recommendation of factory with special assembly instructions
 ESD-handling: Necessary
 Weight: Approx. 5 g
 Packaging :
 Cells with connector: 5 blisters (480 pcs) in covering box
 Cells with flexible connector: 5 blisters (400 pcs) in covering box

DIMENSIONS MM



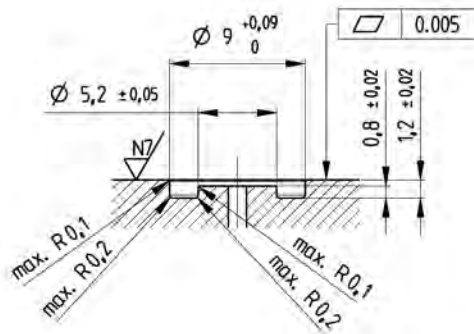
≤ 60 bar

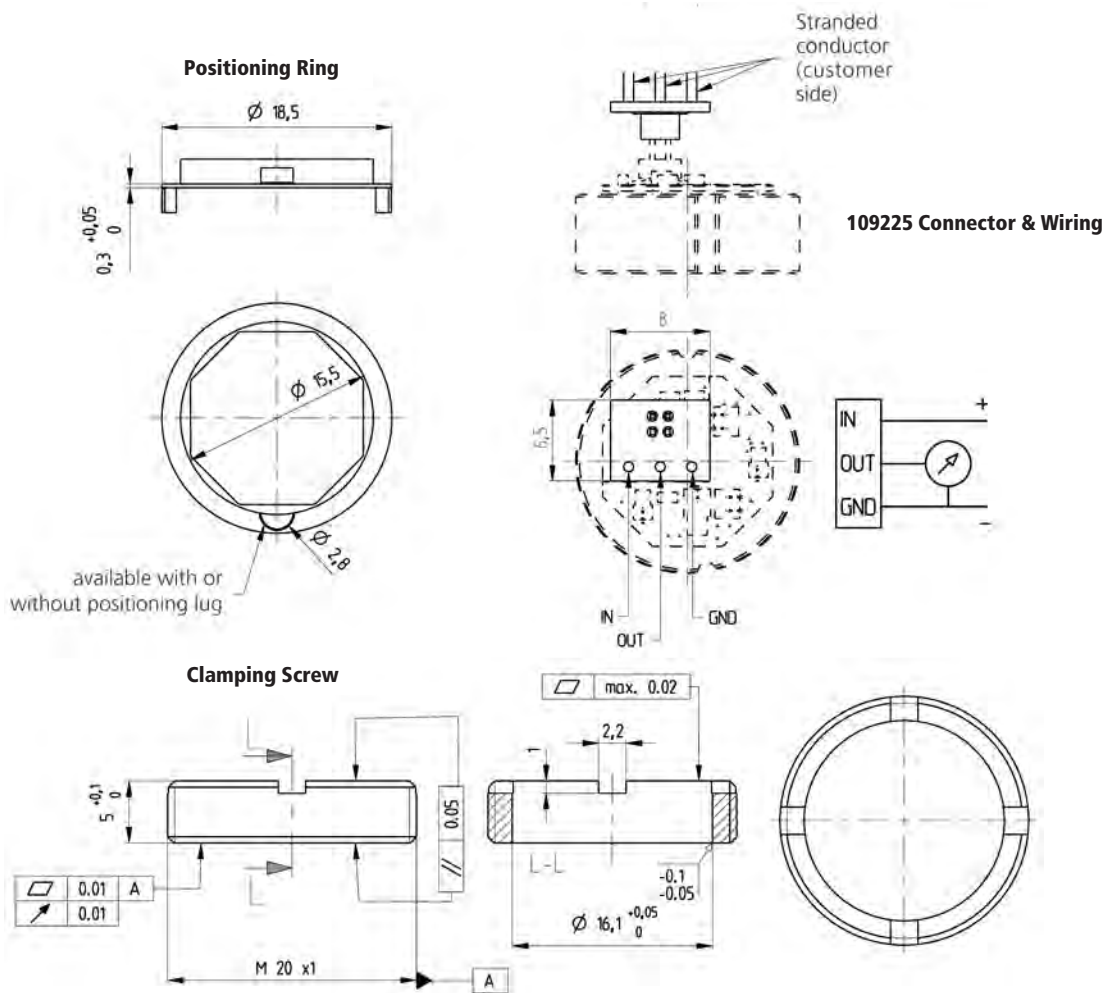
Recommended groove dimensions for o-ring Ø 10 x 1.5



≥ 100 bar

Recommended groove dimensions for o-ring Ø 6 x 1.5



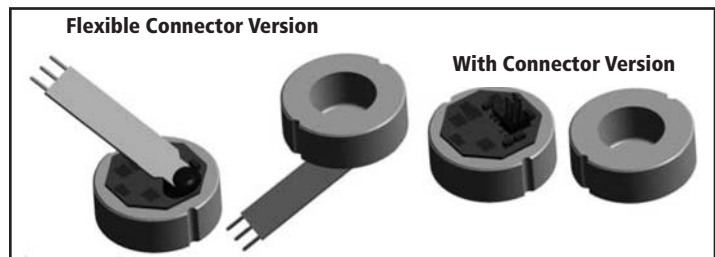


ORDERING INFORMATION A-B-C-D-E (513-9-17-0-0H)

A Model	B Pressure	C Pressure Range	D Calibration	E Output & Power Supply
513	9= Relative/ Gauge 8= Absolute	00= -1 to 0 bar (Relative/Gauge Only) 10= 0.8 to 1.4 bar (Barometric Sensor-Absolute Only) 11= 0 to 1 bar 12= 0 to 1.6 bar 14= 0 to 2.5 bar 15= 0 to 4 bar 17= 0 to 6 bar 30= 0 to 10 bar 31= 0 to 16 bar 32= 0 to 25 bar (Relative/Gauge Only) 33= 0 to 40 bar (Relative/Gauge Only) 40= 0 to 60 bar (Relative/Gauge Only) 41= 0 to 100 bar (Relative/Gauge Only)	0= Factory Adjusted Zero Point & Full Scale 1= Factory Adjusted Zero Point Only (Relative Models Only)	04= 0.5 ... 4.5 V ratiom. with connector without humidity protection; 5 VDC (4.75 ... 5.25) 0F= 0.5 ... 4.5 V ratiom. with connector with humidity protection 5 VDC (4.75 ... 5.25) 0H= 0.5 ... 4.5 V ratiom. with flexible connector without humidity protection 5 VDC (4.75 ... 5.25) 0J= 0.5 ... 4.5 V ratiom. with flexible connector with humidity protection 5 VDC (4.75 ... 5.25)

Accessory Part Numbers

105598= O-ring FPM, -15 to +125 °C, -1 to 60 bar
 105145= O-ring NBR, -25 to +85 °C, -1 to 60 bar
 109338= O-ring FPM spec., -30 to +150 °C, -1 to 60 bar
 105285= O-ring FPM, -15 to +125 °C, 100 to 160 bar
 104952= O-ring NBR, -25 to +85 °C, 100 to 160 bar
 109339= O-ring FPM spec., -30 to +150 °C, 100 to 160 bar
 107397= Positioning ring (PPS) with cam
 107926= Positioning ring (PPS) without cam
 109225= Female Connector with three solder pads
 112151= Clamp screw M20x1
 112187= Insertion tool for clamp screw



HUBA

516 Series Pressure Sensor

OEM Ceramic Pressure Sensor, F.S. Ranges from -1 to 16 bar (-14.5 to 232 psi)

DESCRIPTION

This pressure transmitter is based on ceramic technology, developed by Huba Control and used for the last 10 years, in millions of applications.

Used in combination with a unique integrated electronic design, this gives the type 516 series a high degree of accuracy for all temperature ranges.

This technology with an amplified ratiometric output signal, supports direct assembly without the need for the user to adjust for temperature or pressure.

- **NEGLIGIBLE TEMPERATURE INFLUENCE ON ACCURACY**
- **NO CUSTOMER SPECIFIC ADJUSTMENT OF ZERO POINT AND TEMPERATURE COMPENSATION NECESSARY**
- **INTEGRATED AMPLIFIER ELECTRONICS**
- **EASY PC BOARD MOUNTING**



SPECIFICATIONS

Medium: Liquids and neutral gases

Pressure ranges:

Absolute: 0 to 1 to 16 bar (0 to 14.5 to 232 psia)
0.8 to 1.4 bar (bar. sensor. 23.6 to 41.3 " Hg)

Relative/Gauge: -1 to 0 to 16 bar (-14.5 to 0 to 232 psig)

Overload / Rupture pressure:

3.0 x Measuring range at -1 to 4 bar (-14.5 to 58 psi)
2.5 x Measuring range at 6 to 16 bar (87 to 232 psi)

Material in contact with the medium:

Measuring connection: PA
Measuring cell: Ceramic Al₂O₃ (96%)
Sealing material: NBR, FPM spec.

Temperature Medium and ambient with sealing:

NBR -25 to +80 °C (-13 to +176 °F)
FPM spec. -30 to +80 °C (-22 to +176 °F)
Storage -40 to +80 °C (-40 to +176 °F)
Storage In packaging -40 to +65 °C (-40 to +149 °F)

Accuracy:

Resolution: 0.1% fs
Long-term stability acc. DIN IEC 60770: ±0.5% fs
Total of linearity, hysteresis and repeatability:
max. ±0.5% fs

Barometrical sensor: max. ±0.8% fs

Temp.Coeff. Zero point: Max. ±0.3% fs/10K
Temp.Coeff. Sensitivity: Max. ±0.2% fs/10K
Test Conditions: 25 °C, 45% RH, Power Supply
5 VDC; Temp. Coeff. -15 to 80 °C

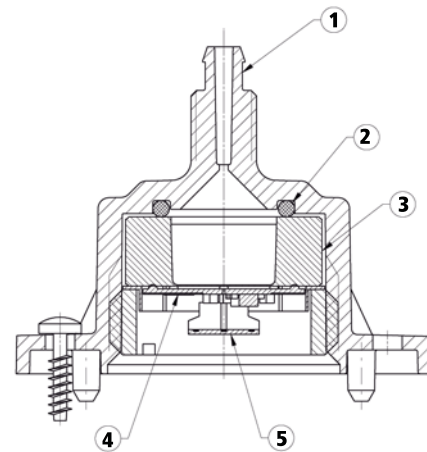
Power supply / Output:

Power supply: 5 VDC (4.75 to 5.25 V)
Output with full scale adjustment:
ratiometric 0.5 to 4.5 V
10 to 90% of power supply

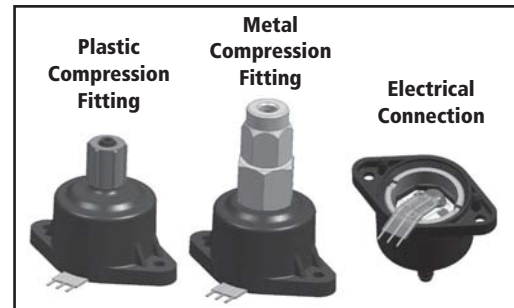
Output without full scale adjustment:
0.5 to 3 ±1.2 V

Load: > 10 kOhm / < 100 nF

Current consumption: At nominal pressure
without load: < 4 mA



Cross-section Drawing Legend	
1	Pressure Connections
2	O-Ring Seal
3	Ceramic Measuring Cel
4	Amplifier Electronics
5	Electrical Connection



SPECIFICATIONS

Dynamic response: Suitable for static and dynamic measurements

Response time: < 2 ms, 1 ms Typ.

Load cycle: < 100 Hz

Electrical connection:

Flexible connector Contact Spacing: 2.54 mm (100 mil)

Tests: Vibration acc. DIN IEC 600-68-2-620 g, 2 ... 2000 Hz with amplitude ± 15 mm, 10 Octave/min. all 3 directions, 3 constant load

Protection standard: IP 00

Pressure connection: Plastic quick fitting or Metal quick fitting

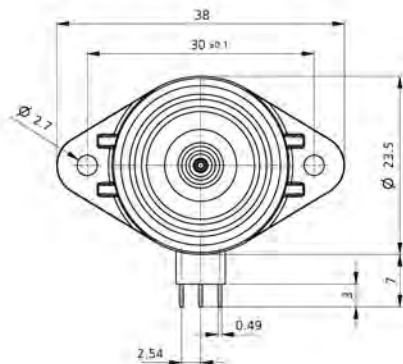
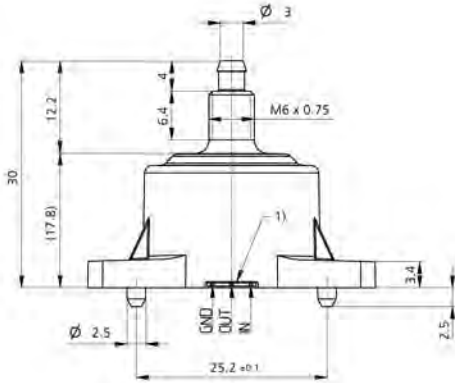
ESD-handling: Necessary

Weight: With plastic quick fitting approx. 15 g; With metal quick fitting approx. 25 g

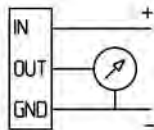
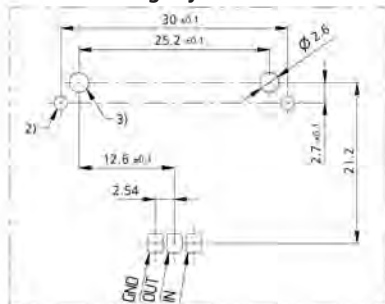
Packaging:

Multiple packaging: 4 blisters in covering box (140 pcs)

DIMENSIONS MM

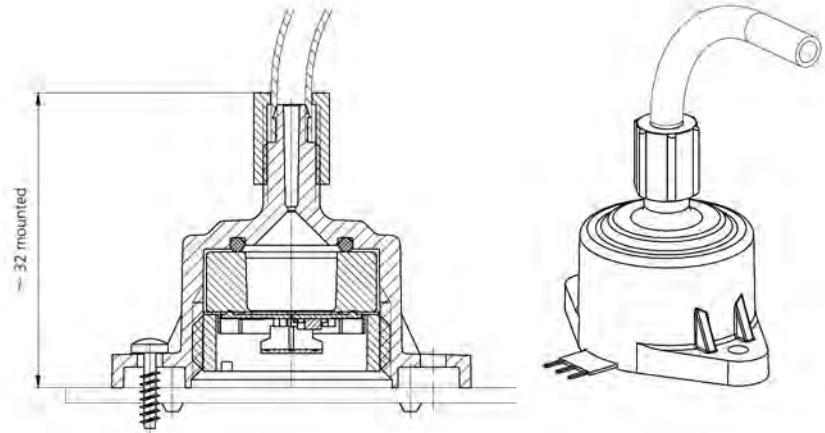


PCB Drilling Layout

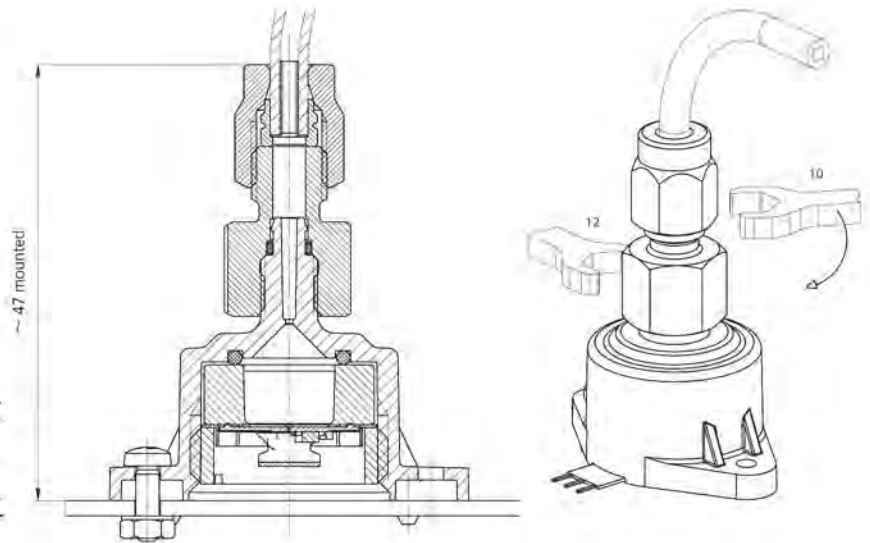


- 1) Keep the space at the flex cable open for relative/gauge pressure for the pressure compensation. Do not seal or cover it.
 - 2) Securing holes :
 - for self tapping screw (K22) [1.75 mm
 - for metric screw (M2.5) [2.7 mm
- We recommend metric screws with nut instead of self tapping screws for higher pressure or eventual mechanical loads.

Pressure connection: Plastic compression fitting for higher pressure / higher temperature



Pressure connection: Metal compression fitting for higher pressure / higher temperature



Installation of metal compression fitting:

- 1) It is essential to connect the tube to the sensor before mounting on the pcb.
- 2) Assemble finger tight, final adjustment 1.5 turn with spanner 10.

ORDERING INFORMATION				
A	B	C	D	E
Model	Pressure	PressureRange	O-Ring/Connection Type	Calibration
516	9= Relative/ Gauge 8= Absolute	00= -1 to 0 bar (RelativeOnly) 10= 0.8 to 1.4 bar (Barometric Sensor-Absolute Only) 11= 0 to 1 bar 12= 0 to 1.6 bar 14= 0 to 2.5 bar 15= 0 to 4 bar 17= 0 to 6 bar 30= 0 to 10 bar 31= 0 to 16 bar	2= NBR/Plastic Compression Fitting 6= FPM Spec./Plastic Compression Fitting 3= NBR/Metal Compression Fitting (brass) 7= FPM Spec./Metal Compression Fitting (brass)	0= Factory Adjusted Zero Point & Full Scale 1= Factory Adjusted Zero Point Only (Relative Models Only)

Accessory Part Numbers	
108436	Self tapping filister head screw WN 1412, KA22x8
111423	Mounting set for 35 pieces (screws, serrated lock washers, nuts) M 2.5 x 10
104551	Calibration certificate

NOSHOK

Series 400/500 Stainless Steel Pressure Gages

1 1/2", 2 1/2", 4" & 6" Dry & Liquid filled, F.S. Ranges Vacuum to 30,000 PSI

DESCRIPTION

Noshok 400 (dry) and 500 (liquid filled) series all stainless steel gages are the ultimate in corrosion resistant, heavy duty, vacuum and pressure gauges. They are used in corrosive service world-wide where ruggedness and reliability are critical. Typical applications include chemical and petroleum refineries, pharmaceutical, off-shore drilling and production, papermills, fertilizer, etc.

MODELS

Table 1

Model	Dial Size	Connection	Dry/Glycerine Filled
15.400	1 1/2"	1/8" NPT Bottom	D
15.410	1 1/2"	1/8" NPT Center Back	D
25.400	2 1/2"	1/4" NPT Bottom	D
25.410	2 1/2"	1/4" NPT Center Back	D
25.500	2 1/2"	1/4" NPT Bottom	G
25.510	2 1/2"	1/4" NPT Center Back	G
40.400	4"	1/2" NPT Bottom	D
40.410	4"	1/2" NPT Lower Back	D
40.500	4"	1/2" NPT Bottom	G
40.510	4"	1/2" NPT Lower Back	G
60.400	6"	1/2" NPT Bottom	D
60.410	6"	1/2" NPT Lower back	D
60.500	6"	1/2" NPT Bottom	G
60.510	6"	1/2" NPT Lower back	G

SPECIFICATIONS

SIZES: 1 1/2, 2 1/2, 4 and 6 inch sizes

CONNECTION: 1/8" NPT on 1 1/2" sizes, 1/4" NPT on 2 1/2" sizes, 1/2" NPT on 4" and 6" sizes. Available in bottom and back configurations.

CASE: 304 Stainless Steel

LENS: Instrument glass on 1 1/2" and 4" sizes, Trogamide on 2 1/2" size, Safety glass on 6" size.

BOURDON TUBE: 316 Stainless Steel "C" tube to 600 PSI, coiled safety tube above 600 PSI

MOVEMENT: Stainless Steel

ACCURACY: 2.5% Full Scale on 1 1/2" size; 1.5% Full Scale on 2 1/2" size; 1% Full Scale on 4" and 6" sizes.

AVAILABLE RANGES: Vacuum and Compound through 30,000 PSI. Dependent on model and size.

SAFETY: Models 40.400, 40.410, 40.500, 40.510, safety relief disk on back and top of case; model 60.400, 60.410 safety relief disk on rear of case.

OPTIONS AND ACCESSORIES: Panel mounting options, orifices, adjustable pointers, max indicating pointers, rubber case protectors, special dials, metric dials, special connections and more.

WORKING PRESSURE DYNAMIC: 60% of dial range

STATIC: 90% of dial range

TEMPERATURE: 400 SERIES: 40 Degrees F to 260 Degrees F (-40 Degrees C to 127 Degrees C) 500 SERIES: 0 Degrees to 160 Degrees F (-18 Degrees to 71 Degrees C)



60.400 & 60.410 Dry Pressure Gage



60.400 & 60.410 Liquid Filled Pressure Gage

OPTIONS

Flanges for Panel Mounting: Polished stainless steel front flanges (**SS FF**) are available for flush panel mounting on models 25.510, 25.510 40.400, 40.410, 60.400, 60.410, 40.500, 40.510, 60.500, 60.510.

Panel Mount Clips(**PMC**): Available for flush mounting models 25.410 & 25.510. The PMC is easily field installed on the gage diameter into pre-formed grooves in the case. The narrow gage bezel or an optional polished flange ring (**FR**) which is 20 % larger in size than the gage bezel is on the front of the panel.

Maximum Indicating pointers(**MIP**): Useful to identify system spikes. MIP's add 1% error to the gage (2% for ranges under 60 PSI) due to the added load on the bourdon tube. Available on most models except 1 1/2".

Solid Front Safety Gages: Available option for all 2 1/2", 4" & 6" sizes.

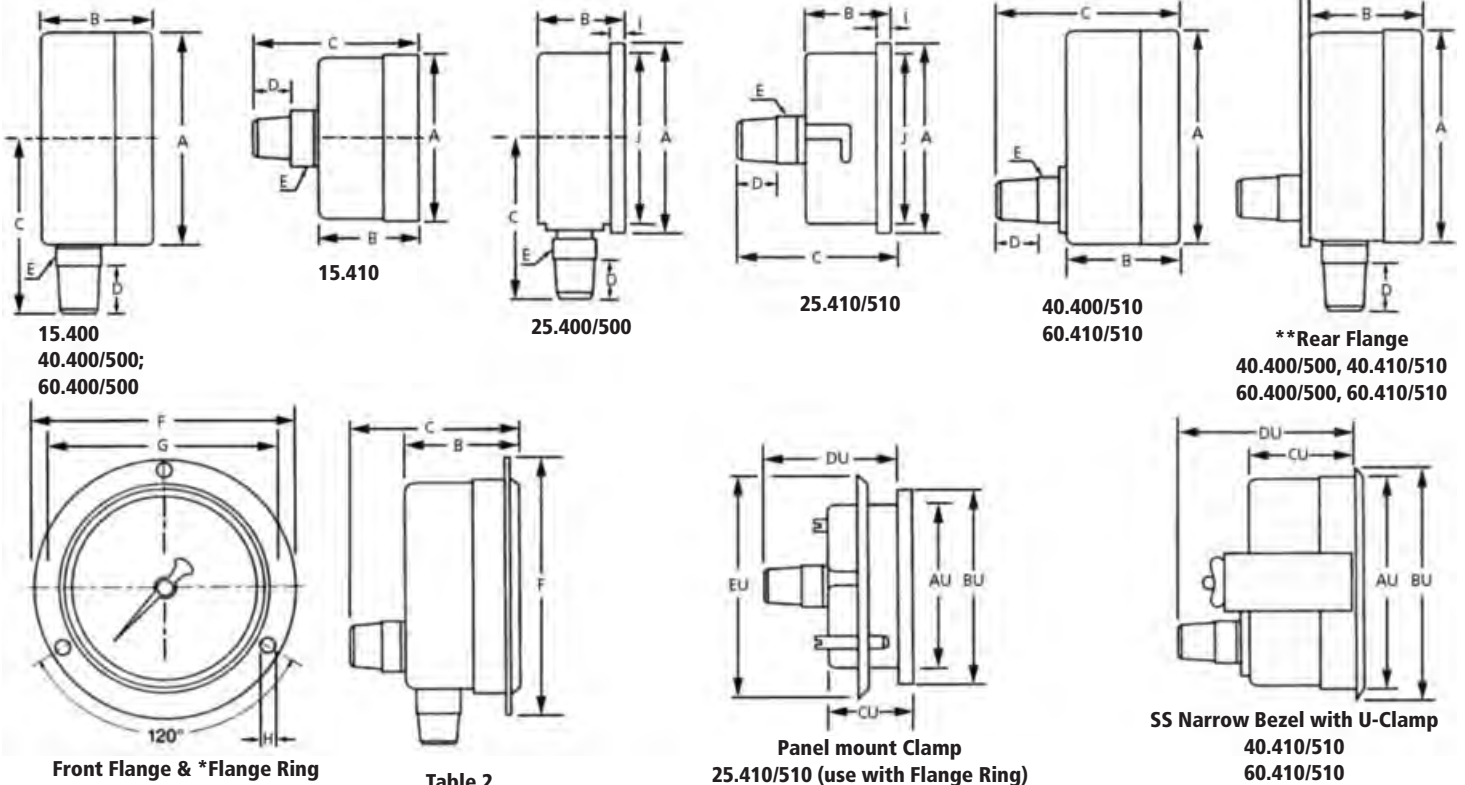
Ammonia Gages: Ammonia Refrigeration Gages with dials reading in both pressure and temperature are available in 2 1/2" and 4" sizes.

Metric Dials: Dual scale metric dials in PSI/BAR, PSI/kPa & PSI/kg/cm² are available for most models.

Special Connections: Consult factory for metric threads, female threads, straight threads (flare or swivel type), high pressure connections and special o-ring type connections.

Orifices: Threaded 316SS orifices (.032" I.D.) are available on all 400 and 500 series gages. They restrict the flow of rapidly increasing and decreasing pressures, thereby lessening the immediate effect of pulsations and pressure spikes.

DIMENSIONS (MM)



*The Flange Ring (FR) is only for use with models 25.410/510 and must be used in conjunction with the panel Mount Clamp (PMC). It does not have mounting holes.

Table 2

Model	A	B	C	D	E	F	G	H	I	J
15.400	40	26	38	12	14	-	-	-	-	-
15.410	40	26	41	10	14	-	-	-	-	-
25.400	69	32	57	14	14	-	-	-	5	62
25.500	69	32	57	14	14	-	-	-	5	62
25.410	69	32	57	14	14	85	-	-	5	62
25.510	69	32	57	14	14	85	-	-	5	62
40.400	101	51	87	20	22	132	116	4.8	-	-
40.500	101	51	87	20	22	132	116	4.8	-	-
40.410	101	51	85	20	22	132	116	4.8	-	-
40.510	101	51	85	20	22	132	116	4.8	-	-
60.400	160	60	118	20	22	196	178	5.8	-	-
60.500	160	60	118	20	22	196	178	5.8	-	-
60.410	160	61	93	20	22	196	178	5.8	-	-
60.510	160	61	93	20	22	196	178	5.8	-	-

Table 3

GAGES WITH PANEL MOUNT CLAMP OR NARROW BEZEL WITH U-CLAMP					
Model	AU	BU	CU	DU	EU
25.410	62	69	27	52	75
25.510	62	69	27	52	75
40.410	101	105	47	81.5	-
40.510	101	105	47	81.5	-
60.410	160	174	55.5	87.5	-
60.510	160	174	55.5	87.5	-

ORDERING INFORMATION

ORDER NUMBER A-B-C

- 1) A= Specify Model (Table 1)
- 2) B= Specify Range (Table 4)
- 3) C= Specify Options (See Bolded items under "Options")

EXAMPLE:

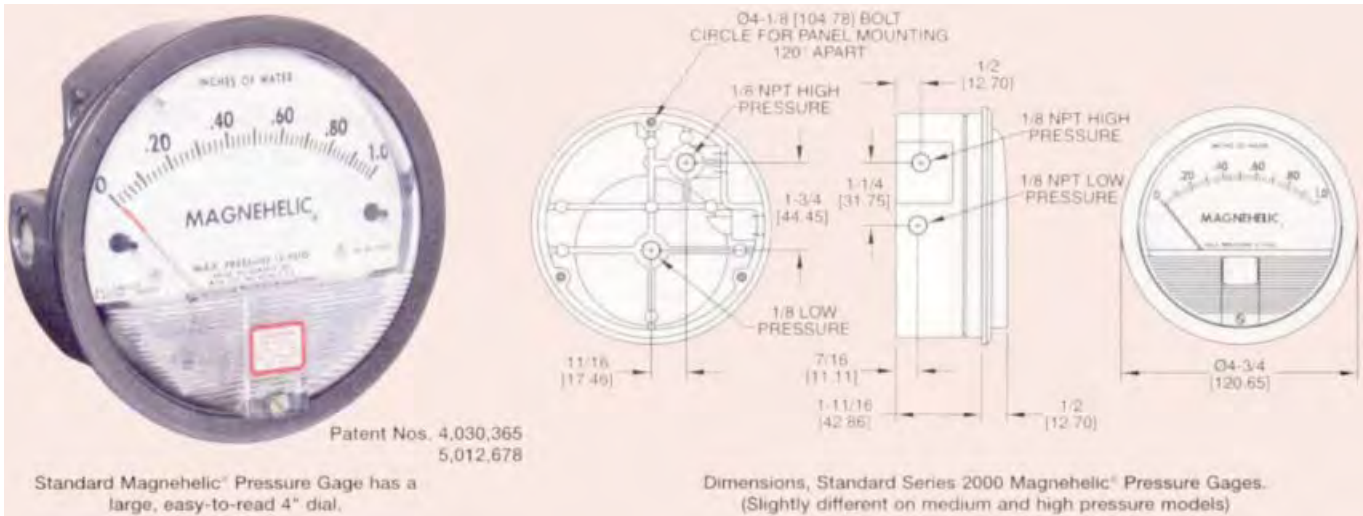
60.500-160PSI

Table 4	MODEL							
	15.400/410		25.400/410 25.500/510		40.400/410 40.500/510		60.400/410 60.500/510	
RANGE	Fig. Int.	Grad. Int.	Fig. Int.	Grad. Int.	Fig. Int.	Grad. Int.	Fig. Int.	Grad. Int.
30" Hg Vac	-	-	5" Hg	0.5 PSI	5" Hg	0.2 PSI	5" Hg	0.5" Hg
30"VAC/15 PSI	-	-	10"/5 PSI	1"/0.5 PSI	10"/5 PSI	1"/0.5 PSI	10"/5 PSI	1"/0.5 PSI
30"VAC/30PSI	-	-	10"/10 PSI	1"/0.5 PSI	10"/10 PSI	1"/0.5 PSI	10"/10 PSI	1"/0.5 PSI
30"VAC/60PSI	-	-	10"/10 PSI	1"/1 PSI	10"/10 PSI	1"/1 PSI	10"/10 PSI	1"/1 PSI
30"VAC/100PSI	-	-	30"/10 PSI	2"/1 PSI	30"/10 PSI	2"/1 PSI	30"/10 PSI	2"/2 PSI
30"VAC/160PSI	-	-	30"/20 PSI	5"/2 PSI	30"/20 PSI	5"/2 PSI	30"/20 PSI	5"/2 PSI
30"VAC/200PSI	-	-	30"/20 PSI	5"/2 PSI	30"/20 PSI	5"/2 PSI	30"/20 PSI	5"/5 PSI
30"VAC/300PSI	-	-	30"/50 PSI	10"/5 PSI	30"/50 PSI	10"/5 PSI	30"/50 PSI	10"/5 PSI
0-15 PSI	-	-	1 PSI	0.1 PSI	1 PSI	0.1 PSI	1 PSI	0.1 PSI
0-30 PSI	5	1	5 PSI	0.2 PSI	5 PSI	0.2 PSI	5 PSI	0.2 PSI
0-60 PSI	5	0.5	5 PSI	0.5 PSI	10 PSI	0.5 PSI	10 PSI	0.5 PSI
0-100 PSI	10	1	10 PSI	1 PSI	10 PSI	1 PSI	10 PSI	1 PSI
0-160 PSI	20	1	20 PSI	1 PSI	20 PSI	2 PSI	20 PSI	2 PSI
0-300 PSI	50	2	50 PSI	2 PSI	50 PSI	2 PSI	50 PSI	2 PSI
0-600 PSI	50	5	50 PSI	5 PSI	100 PSI	5 PSI	100 PSI	5 PSI
0-1,000 PSI	-	-	100 PSI	10 PSI	100 PSI	10 PSI	100 PSI	10 PSI
0-2,000 PSI	-	-	200 PSI	20 PSI	200 PSI	20 PSI	200 PSI	20 PSI
0-3,000 PSI	-	-	500 PSI	20 PSI	500 PSI	20 PSI	500 PSI	20 PSI
0-5,000 PSI	-	-	500 PSI	50 PSI	500 PSI	50 PSI	500 PSI	50 PSI
0-10,000 PSI	-	-	1000 PSI	100 PSI	1000 PSI	100 PSI	1000 PSI	100 PSI
0-15,000 PSI	-	-	3000 PSI	100 PSI	3000 PSI	100 PSI	3000 PSI	100 PSI
0-20,000 PSI	-	-	-	-	2000 PSI	200 PSI	2000 PSI	200 PSI
0-30,000 PSI	-	-	-	-	5000 PSI	200 PSI	5000 PSI	200 PSI

CLARK SOLUTIONS

Series 2000 Magnehelic® Differential Pressure Gage

Indicate Positive, Negative, or Differential Pressure



DESCRIPTION

Select the Magnehelic® gage for high accuracy - guaranteed within 2% of full scale and for the wide choice of ranges available to suit your needs precisely. Using the simple, frictionless Magnehelic® movement, it quickly indicates low air or non-corrosive gas pressures - either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too. Widely used to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

SPECIFICATIONS

Ambient temperature range: 20° to 140°F* (-7° to 60°C).
 Rated total pressure: -20" Hg. to 15 psig† (-68 kPa to 103 kPa).
 Overpressure: Relief plug opens at approximately 25 psig (172 kPa).
 Connections: 1/8" NPT(F) high and low pressure taps, duplicated - one pair side and one pair back.
 Housing: Die cast aluminum. Case and aluminum parts iridite-dipped to withstand 168 hour salt spray test. Exterior finish is dark gray.
 Accuracy: Plus or minus 2% of full scale (3% on -0 and 4% on -00 ranges), throughout range at 70°F (21°C).
 Standard accessories: Two 1/8 " NPT plugs for duplicate pressure taps, two 1/8 " pipe thread to rubber tubing adapters and three flush mounting adapters with screws. (Mounting ring and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)
 Weight: 1 lb. 2 oz. (460 g)

Mounting: A single case size is used for most ranges of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. With the optional A-610 Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1 1/4 " -2" pipe.

*Low temperature models available as special option.
 †For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options.

Although calibrated for vertical position, many ranges above 1" may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4 9/16 " hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument. Flush ...Surface...or Pipe Mounted.

ORDER INFORMATION

Model Number	Range Inches Of Water	Model Number	Range Zero Center Inches Of Water
2000-0†	0-.25	2300-†	.25-0-.25
2000-0†	0-.50	2301	5-0-.5
2001	0-1.0	2302	1-0-1
2002	0-2.0	2304	2-0-2
2003	0-3.0	2310	5-0-5
2004	0-4.0	2320	10-0-10
2005	0-5.0	2330	15-0-15
2006	0-6.0		
2008	0-8.0	Model Number	Range PSI
2010	0-10	2201	0-1
2015	0-15	2202	0-2
2020	0-20	2203	0-3
2025	0-25	2204	0-4
2030	0-30	2205	0-5
2040	0-40	2210*	0-10
2050	0-50	2215*	0-15
2060	0-60	2220*	0-20
2080	0-80	2230**	0-30
2100	0-100		
2150	0-150		

†calibrated for vertical scale position
 *rated to 35 PSIG internal pressure
 **rated to 80 PSIG internal pressure

Accessories

A-310A, 3-Way Vent Valve
 A-321, Safety Relief Valve
 A-432, Portable Kit
 A-605, Air Filter Kit
 A-610, Pipe Mount Kit

Options

- To order, add suffix: I.E. 2001-ASF
 ASF (Adjustable Signal Flag)
 HP (High Pressure Option)- 80 PSI
 LT (Low Temperatures to -20°F)
 MP (Med. Pressure Option)-35 PSI
 SP (Setpoint Indicator)

HIGH AND MEDIUM PRESSURE MODELS: Installation is similar to standard gages except that a 4 13/16 " hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available in all ranges. Weight 1 lb., 10 oz (Installation of the A-321 safety relief valve on standard Magnehelic® gages often provides adequate protection against infrequent overpressure.

HUBA

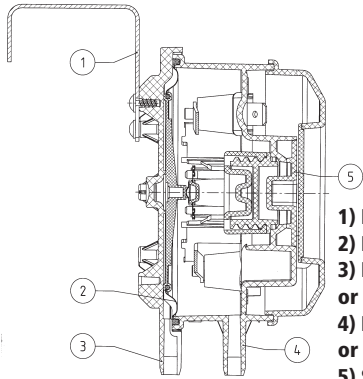
604 Series Differential Pressure Switch

Switch Points From 0.05" w.c. to 20" w.c.

DESCRIPTION

The 604 differential pressure switch is typically used for system interlock and alarm in ventilation ducts for monitoring of filter and fan pressures. They are also used to protect heating coils from overheating and for monitoring liquid level, laboratory and clean room pressures, fume hood and paint spray booth pressures and other commercial and industrial differential pressure relationships.

They are for use with air and non-corrosive gases



- 1) Mounting Bracket
- 2) Diaphragm
- 3) P1 Connection of Higher Pressure or Lower Vacuum
- 4) P2 Connection of Lower Pressure or Higher Vacuum
- 5) Scale (Switch Point Setting)



SPECIFICATIONS

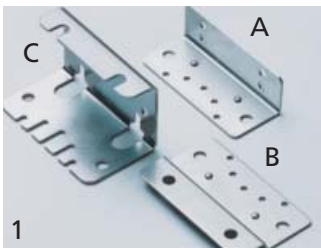
Pressure Ranges: See order code selection table.
 Overpressure: 20.0 inches w.c. at medium and ambient temperature -22 to 185°F (-30 to +85 °C)
 Overpressure: 30 inches w.c. at medium and ambient temperature -22 to 167°F (-30 to +75 °C)
 Storage Temperature: -40 to 185°F (-40 to +85 °C)
 Dead Band: Factory set
 Lowest Actuation Pressure: 0.08 inches w.c.
 Repeatability:
 In the range 0.1 to 1.2 inches w.c. < +/- 0.01 inches w.c.
 In the ranges 0.4 to 4.0 inches w.c. < +/- 0.02 inches w.c.
 Case construction, Main case: fiberglass-reinforced plastic
 Cover: plastic
 Weight: 120 grams without bracket, 144 grams with bracket type C
 Installation Orientation: Standard diaphragm vertical (factory calibration) When the switch is rotated to horizontal the switching points will change by 0.044 inches w.c. (higher when cover is up, lower when cover is down)

- **AUTOMATED CALIBRATION PROCESS FOR HIGH ACCURACY**
- **INTEGRATED CABLE STRAIN RELIEF**
- **TRAPEZOIDAL BEAD DIAPHRAGM DESIGN INSURES LONG TERM SET POINT STABILITY**
- **MULTI PLATED BRASS, SILVER PALADIUM, GOLD CONTACTS SUITABLE FOR LOGIC LEVEL SWITCHING TO 2A**

Pressure Connections: Tubing Connector for 3/16 ID Tub
 Diaphragm: Silicone LSR, Tempered 392°F (200 °C), free of gas emissions
 Electrical Connections: Screw terminals
 Cable Gland: Pg 11 with cable strain relief
 Switch Type: SPDT
 Option : N/O contact
 Contact: Multi-layer contact (suitable for DDC)
 5 A 250 VAC, resistive
 2 A 30 VDC, resistive
 Approval Marking: UL, MFHX2.MH49692

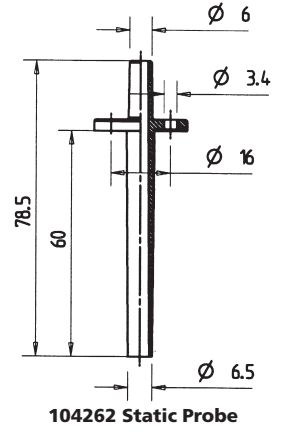
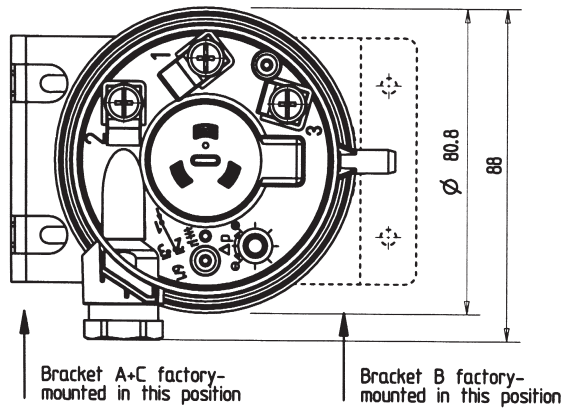
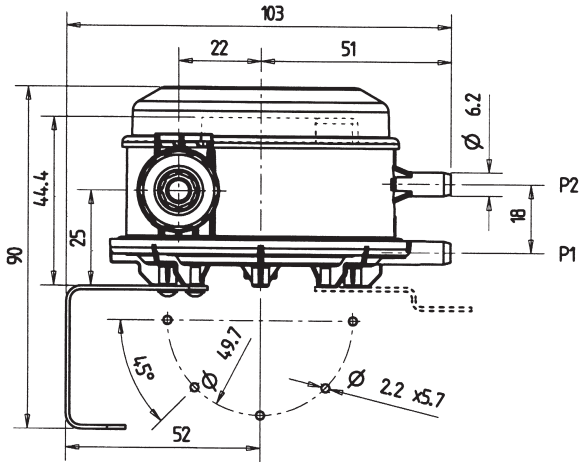


EU conformity:
 Low voltage directive 73/23/EWG
 Gas appliance directive 90/396/EWG
 CE 0085 A P0918
 Protection Class: IP 00 without cover, IP 54 with cover
 Service Life: Mechanical, > 10⁶ switching cycles



- 1) Mounting Bracket Types A, B, C
- 2) Mounting Clip
- 3) Plastic Duct Mount Static Tips

DIMENSIONS (MM) & ELECTRICAL

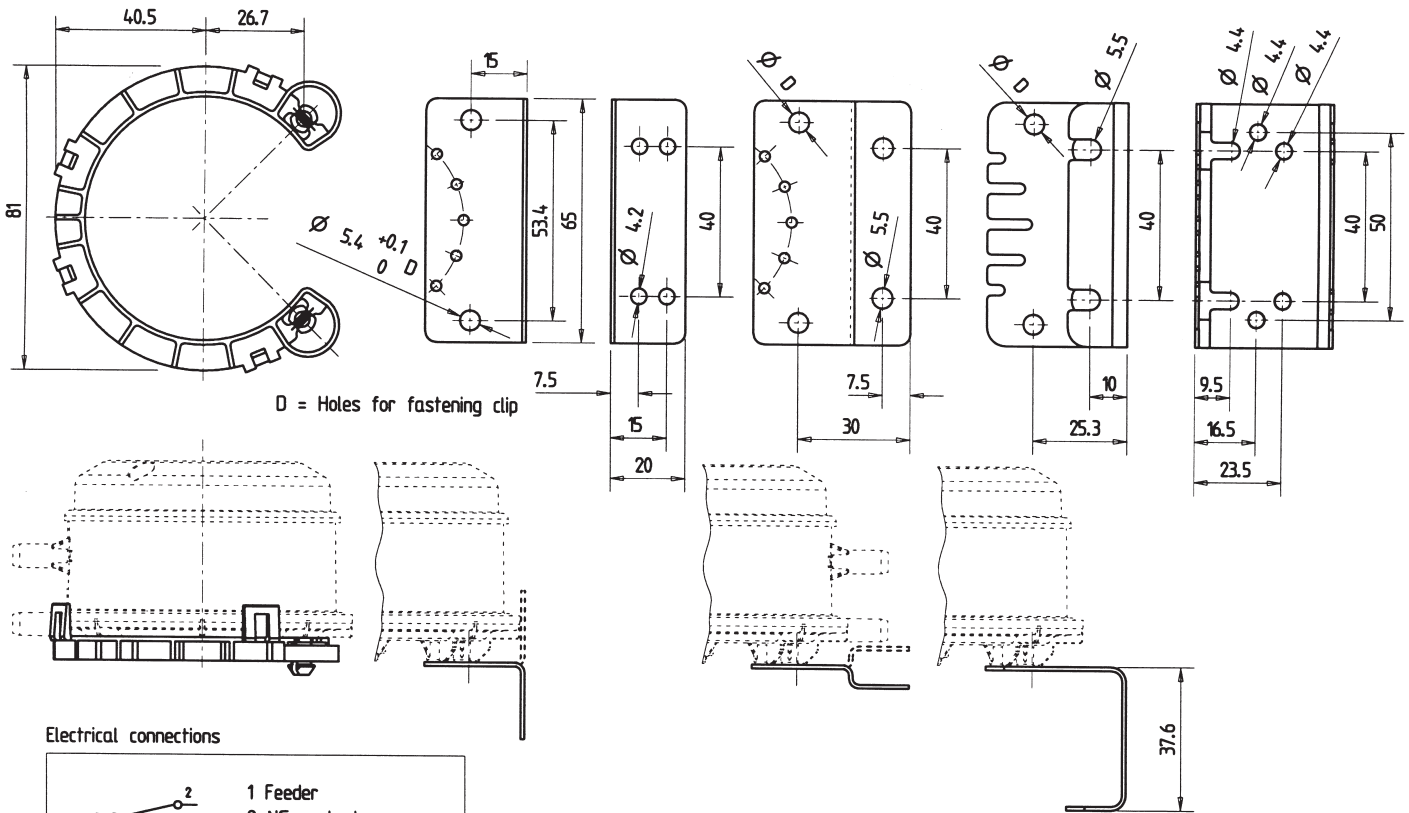


Mounting the switch with fastening clip

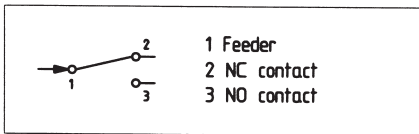
Bracket type A

Bracket type B

Bracket type C



Electrical connections



ORDERING INFORMATION

Model	Range
604.S020030	0.08-1.2 inches w.c.
604.S220030	0.4-4.0 inches w.c.
604.S420030	2.0-8.0 inches w.c.
604.S520030	4-20 inches w.c.

Switch Kits including Type C Mounting Bracket & Model 100064 Conn. Set

604.S020032	0.08-1.2 inches w.c.
604.S220032	0.4-4.0 inches w.c.
604.S420032	2.0-8.0 inches w.c.
604.S520032	4-20 inches w.c.

Accessories & Options:

- Special Dead band Setting: Consult factory
- 104262: Plastic Static Pressure Probe (See Figure 1 Above)
- 100064: Connection set including two static probes, 6ft of tubing
- 100295: Type A mounting bracket
- 100098: Type B mounting bracket
- 100106: Type C mounting bracket
- 102976: Bracket mounting screw (use three per bracket)
- 100294: Fastening clip

HUBA

605 Series Differential Pressure Switch

Switch Points From 0.05" w.c. to 1.6" w.c.

DESCRIPTION

The 605 differential pressure switch is designed for OEM differential pressure alarm or interlock applications.

Typical applications are in appliances and HVAC systems for fan, room pressure, draft, and level monitoring.

They are for use with air and non-corrosive gases.

Minimum order quantities apply to this product.

SPECIFICATIONS

Pressure Switch Point: Factory Set, 0.05-1.6" w.c. (12.45-400 Pa)

Dead Band: Factory set, see tables D & E

Max. Overpressure: 20" w.c. (5000 Pa)

Media & Ambient Temperature: -22 to 176°F (-30 to 80°C)

Storage Temperature: -22 to 185°F (-30 to +85 °C)

Lowest Actuation Pressure: 0.05" w.c. (12.45 Pa)

Switch Point Tolerance: See table A

Switch Point Repeatability: ±.004" w.c. (1.0 Pa)

Case construction:

Main case: fiberglass-reinforced plastic

Cover: plastic

Weight: 60 grams without bracket

Installation Orientation: Vertical or horizontal (with electrical connections facing downward). Must be specified.

Pressure Connections: Tubing Connector for 3/16 ID Tubes

Diaphragm: Silicone LSR

Electrical Connections: AMP connectors, 6.3 or 4.8 mm per DIN 46244

Switch Type: SPDT

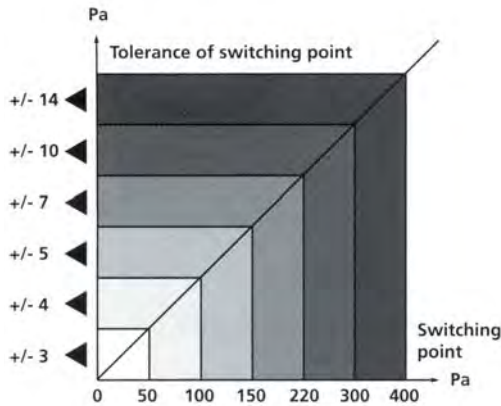
Contact Rating: See Tables D & E

Approval: UL, MFHX2.MH49692

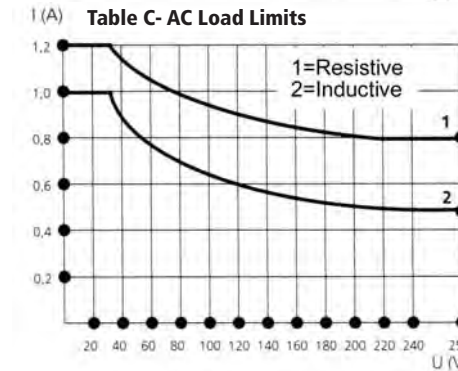
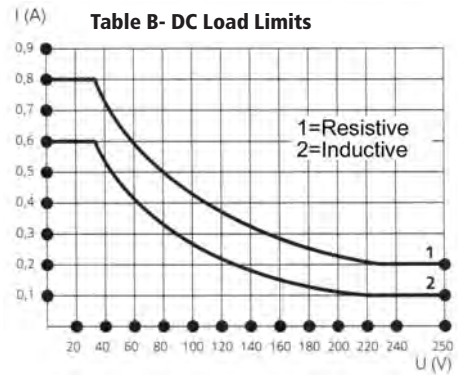


Protection Class: IP 00 without cover, IP 30 with contact safety guard, IP 54 with cover, with PG9/11, IP 65 with cover, with PG9/11 and seal.

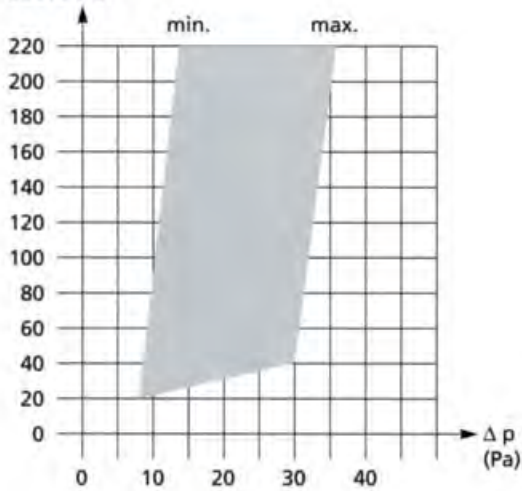
Service Life: > 10⁶ switching cycles



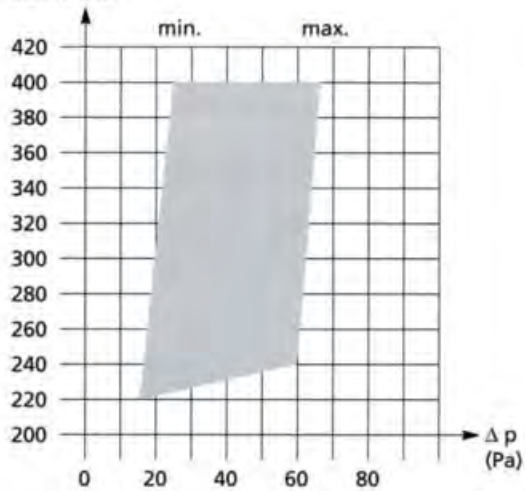
- **AUTOMATED CALIBRATION PROCESS FOR HIGH ACCURACY**
- **INTEGRATED CABLE STRAIN RELIEF**
- **TRAPEZOIDAL BEAD DIAPHRAGM DESIGN INSURES LONG TIME SET POINT STABILITY**
- **SELF-CLEANING CONTACT DESIGN HAS LONG LIFE**



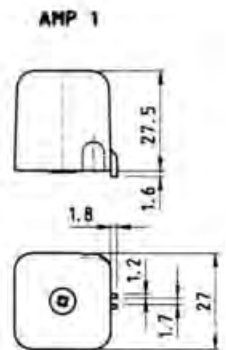
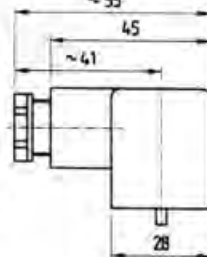
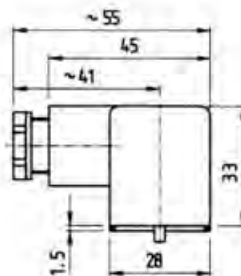
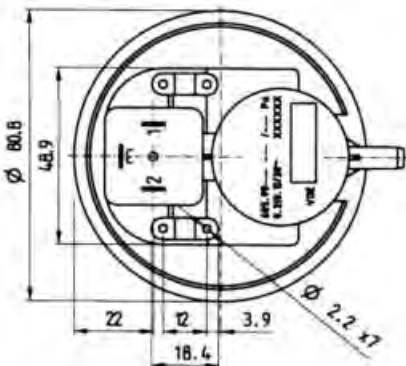
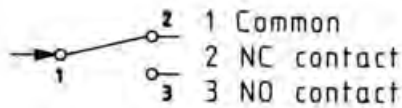
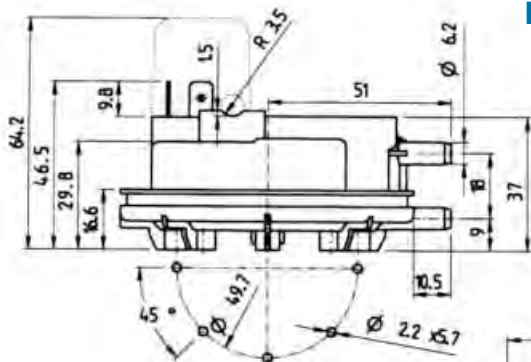
Switching point above (Pa) **Table D-Adjustable Dead Band**



Switching point above (Pa) **Table E-Adjustable Dead Band**



DIMENSIONS (MM) & ELECTRICAL



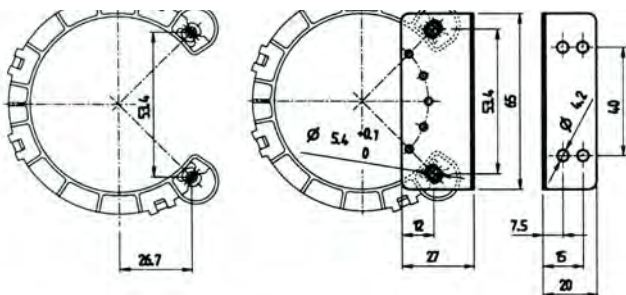
Fastening Clip

Cover with seal and PT screw
Order no. 100306

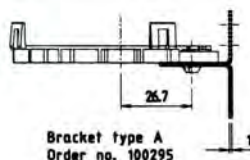
Cover without seal with PT screw
Order no. 100307

Contact safety guard with PT screw

Cable exit AMP2
Order no. 100300



Fastening clip
Order no. 100294 s=0.8-1.1
Order no. 100293 s=1.8-2.1



Bracket type A
Order no. 100295

ORDERING INFORMATION

Model Number:

Consult Factory but in General

- 1) Specify Model 605.S
- 2) Specify Switch Point
- 3) Specify Dead Band
- 4) Specify Mounting Position
- 5) Specify Electrical Connection

Accessories & Options:

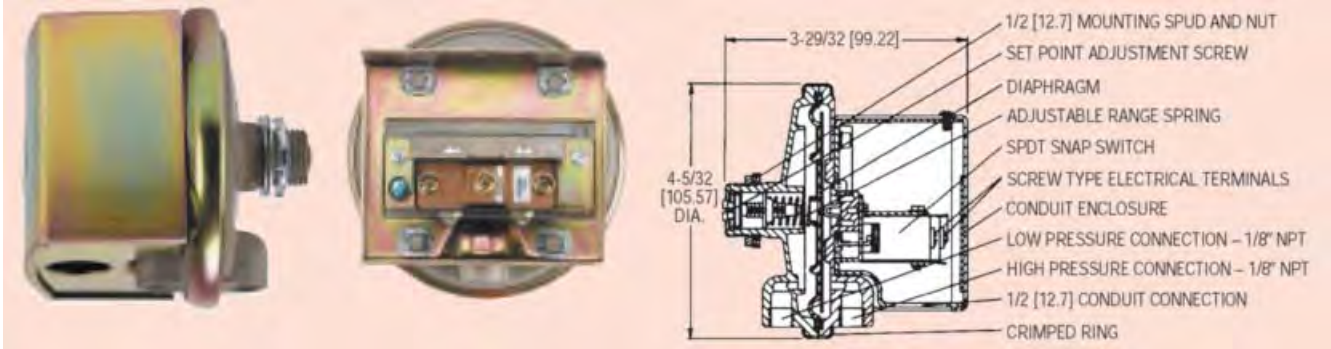
- Switch points above 1.6" w.c.- Consult Factory
- 100294: Fastening clip
 - 100293: Fastening Clip
 - 100295: Type A mounting bracket

Typically an OEM product, please call us to discuss your application.

CLARK SOLUTIONS

1800 Series Compact Low Differential Pressure Switches

Set points from 0.07" to 85" W.C. Repetitive accuracy within 2%.



DESCRIPTION

One of our most popular pressure switches. Combines small size and low price with 2% repeatability for enough accuracy for all but the most demanding applications. Set point adjustment inside the mounting spud permits mounting switch on one side of a wall or panel with adjustment easily accessible on the opposite side. U.L. and C.S.A. listed, F.M and CENELEC approved

SPECIAL MODELS AND ACCESSORIES

No. A-389 Mounting bracket is 16 ga. steel, zinc plated and dichromate dipped for corrosion resistance. Provides rugged, permanent mounting and speeds installation.

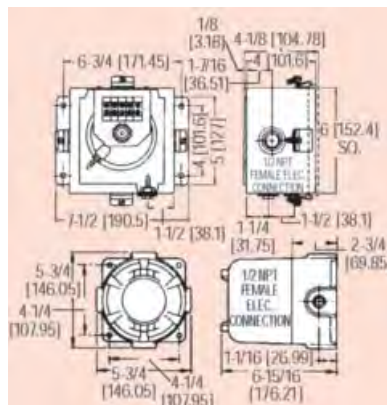
MIL Environmental Construction - Unlisted Model 1820 can be furnished with a special sealed snap switch for protection against high humidity, fungus and/or military applications. Similar to Model 1823 except dead band is slightly greater and some lower setpoints may not be possible. To order, add suffix -MIL. Example: 1820-2-MIL.

Weatherproof Housing

16 ga. steel enclosure with gasketed cover (NEMA 4) for wet or oily conditions. Withstands 200 hour salt spray test. Wt. 5 1/2 lbs. (2.5 kg). Switch must be factory installed. Change 1823 base number to 1824 and add -WP suffix. Example: 1824-1-WP

Explosion-Proof Housing

Cast iron base with aluminum cover. Rated Class I, Div. 1 & 2, Groups C, D; Class II, Div. 1 & 2, Groups E, F, G; Class III and NEMA 7 CD, 9 EFG. Wt. 7 1/2 lbs. (3.4kg). Switch must be factory installed. Change base number to 1824 and add -EXPL suffix. Example: 1824-1-EXPL



SPECIFICATIONS

Temperature Limits: -30°F (-34°C) for dry air or gas to 180°F (82°C). 1823-00, -20 to 180°F (-29 to 82°C).
 Maximum surge pressure: 25 psig (1.7bar).
 Rated pressure: 10 psig (0.7 bar).
 Pressure connections: 1/8" NPT
 Electrical rating: 15 amps, 120- 480 volts, 60 Hz. AC. Resistive 1/8 H.P. @125 volts, 1/4 H.P. @ 250 volts, 60Hz A.C. Derate to 10 amps for operation at high cycle rates.
 Wiring connections: 3 screw type, common, normally open and normally closed.
 Set point adjustment: Screw type inside mounting spud.
 Housing: Aluminum die casting. Steel fittings zinc plated, dichromate dipped for 200 hour salt spray test.
 Diaphragm: Molded silicone rubber with aluminum support plate.
 Calibration Spring: Stainless Steel.
 Mounting spud: 1/2" pipe thread.
 Weight: 1 lb., 5 oz. (596g)
 Installation: Diaphragm vertical.

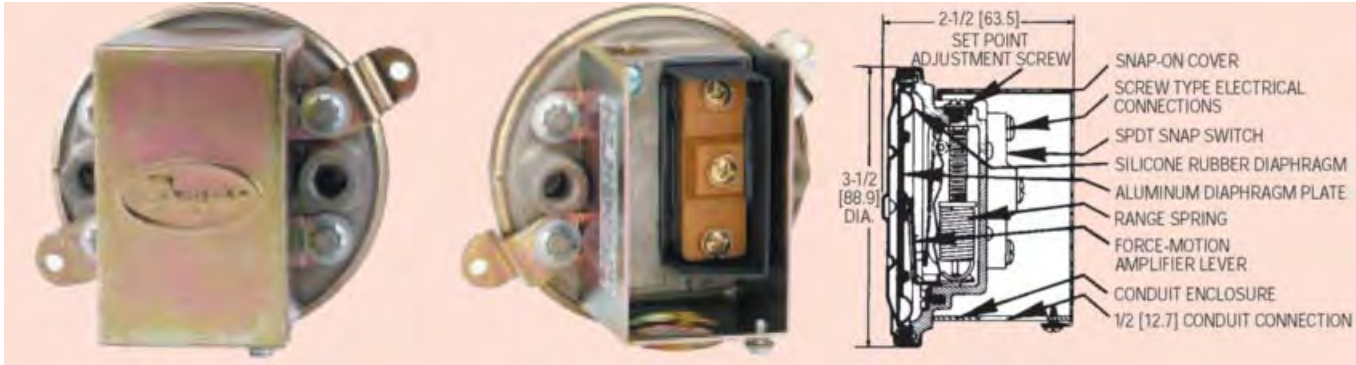
ORDER INFORMATION

Model	Operating Range, in w.c.	Approximate Dead Band	
		Min Set	Max Set
1823-00	0.07 to 0.22	0.05	0.05
1823-0	0.15 to 0.5	0.06	0.06
1823-1	0.3 to 1.0	0.08	0.08
1823-2	0.5 to 2.0	0.10	0.12
1823-5	1.5 to 5.0	0.14	0.28
1823-10	2.0 to 10	0.18	0.45
1823-20	3 to 22	0.35	0.70
1823-40	5 to 44	0.56	1.10
1823-80	9 to 85	1.30	3.0

CLARK SOLUTIONS

1910 Compact Low Differential Pressure Switches

Set points from 0.07" to 20" W.C., Repetitive accuracy within 3%.



DESCRIPTION

The 1900 series combines advanced design and precision construction to make these switches able to perform many of the tasks of larger, costlier units. Designed for air conditioning service, they also serve many fluidics, refrigeration, oven and dryer applications. For air and non combustible compatible gases, series 1900 switches have set points from 0.07 to 20 inches (1.8 to 508 mm) w.c. Set point adjustment is easy with range screw located inside conduit enclosure. Internal location helps prevent tampering. U.L. and C.S.A. listed, FM and CENELEC approved (unlisted model 1911-CE).

SPECIAL MODELS AND ACCESSORIES

1900-5-MR-DPK DUCT PRESSURE MONITOR includes special 1.4 to 5.50" (35 to 140 mm) w.c. range 1900 pressure switch with manual reset snap switch. Unit prevents duct blowout by shutting down blower when excess pressure occurs. Won't allow blower restart until condition is corrected and switch is manually reset. Includes switch, duct pressure sensor, tubing and adapters.

MANUAL RESET MODEL 1900 MR includes special snap switch which latches on pressure increase above the setpoint. Switch must be manually reset after pressure drops below the setpoint. To order, change base model to 1900 and add MR suffix after range number. Example: 1900-10-MR. Available on -1, -5, -10 or -20 ranges only. Option is not UL, CSA or FM listed.

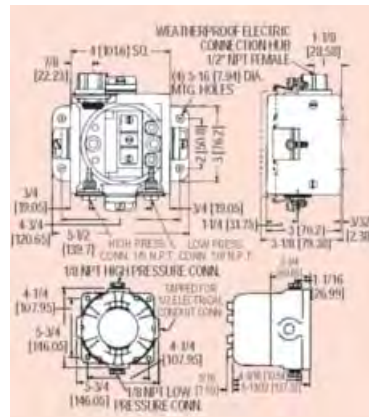
A-329 STREET ELL - Brass adapter for applications requiring right angle connections. Two required for differential pressures.

Weatherproof Housing

16 ga. steel enclosure with gasketed cover (NEMA 4) for wet or oily conditions. Withstands 200 hour salt spray test. Wt. 5 lbs. (2.3 kg). Switch must be factory installed. Change 1910 base number to 1911 and add -WP suffix. Example: 1911-1-WP.

Explosion-Proof Housing

Cast iron base with brass cover. Rated Class I, Div. 1 & 2, Groups C, D; Class II, Div. 1 & 2, Groups E, F, G; Class III and NEMA 7 CD, 9 EFG. (7 lbs). Switch must be factory installed. Change model to 1911 and add -EXPL suffix. Example: 1911-1-EXPL.



SPECIFICATIONS

PHYSICAL DATA

Temperature limits: -30°F(-34°C) for dry air or gas) to 180°F(82.2°C).

Maximum surge pressure: 10 psig (0.7 bar)

Rated pressure: 45" (114 cm) w.c.

Pressure connections: 1/8" NPT.

Electrical rating: 15 amps, 120-480 volts, 60 Hz. A.C. Resistive 1/8H.P. @ 125 volts, 1/4 H.P. @ 250 volts, 60 Hz. A.C. Derate to 10 amps for operation at high cycle rates.

Wiring connections: 3 screw type, common, normally open and normally closed.

Set point adjustment: Screw type inside conduit enclosure.

Housing: Aluminum die casting with chemical conversion coating for corrosion protection; zinc plated steel stamping.

Diaphragm: Molded Silicone rubber.

Aluminum diaphragm plate.

Calibration spring: Stainless steel.

Weight: 1lb. (454 g)

Installation: Diaphragm vertical.

ORDER INFORMATION

Model	Operating Range, in w.c.	Approximate Dead Band	
		Min Set	Max Set
1910-00	0.7 to 0.15	0.04	0.04
1910-0	0.15 to 0.55	0.10	0.10
1910-1	0.40 to 1.6	0.15	0.16
1910-5	1.4 to 5.5	0.30	0.30
1910-10	3.0 to 11.75	0.40	0.40
1910-20	4.0 to 20.0	0.40	0.50

CAUTION: FOR USE ONLY WITH AIR OR COMPATIBLE GASES

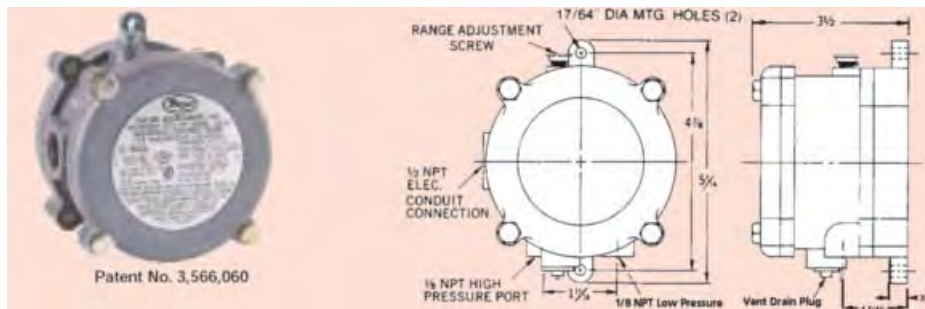
CLARK SOLUTIONS

1950 Series Explosion-Proof Differential Pressure Switches

Set points from 0.07" to 85" W.C. Repetitive accuracy within 2%.

DESCRIPTION

Model 1950 Explosion-Proof Differential Pressure Switch combines the best features of the popular series 1900 with an integral explosion-proof and weather-proof housing, making it an exceptional value for either application. It is C.E., U.L. and C.S.A. Listed, F.M. approved for use in Class I Groups C and D, Class II Groups E, F, and G and Class III hazardous atmospheres (NEMA 7 & 9). Weather-proof features include a drain plug and O-ring seal in cover. Electrical connections are easily made by removing front cover. For convenience the set point adjustment screw is located on the outside of the housing. Twelve models offer set points from 0.03 to 209 (0.8 to 508 mm) w.c. and from 0.5 to 50 psi (3.4 to 345 kPa). The unit is very light and compact, about half the weight and bulk of other explosion-proof or weather-proof switches with separate enclosures.



ORDER INFORMATION

Model	Operating Range, in w.c.	Approximate Dead Band	
		Min Set	Max Set
1950-02-2S	.03 to .10	.025	.05
1950-00-2F	.07 to .15	.04	.05
1950-0-2F	.15 to .50	.10	.15
1950-1-2F	.4 to 1.6	.15	.20
1950-5-2F	1.4 to 5.5	.30	.40
1950-10-2F	3 to 11	.40	.50
1950-20-2F	4 to 20	.40	.60

Model	Operating Range, PSID	Approximate Dead Band	
		Min Set	Max Set
1950P-2-2F	0.5 to 2	.3	.3
1950P-8-2F	1.5 to 8	1.0	1.0
1950P-15-2F	3 to 15	.9	.9
1950P-25-2F	4 to 25	.7	.7
1950P-50-2F	15 to 50	1.0	1.5

SPECIFICATIONS

Temperature Limits: -40°F to 140°F (-40°C to 60°C). 0°F to 140°F (-18°C to 60°C) for 1950P-8, 15, 25, and 50. -30°F to 130°F (-34°C to 54°C) for 1950-02

Maximum Surge Pressure: 1950-10 psi (0.7 bar), 1950P - 50 psi (3.4 bar)
1950P-50 only - 90 psi (6.2 bar)

Rated Pressure: 1950 - 45" (0.1 bar) w.c., 1950P - 35 psi (2.4 bar), 1950P-50 only - 70 psi (4.8 bar)

Pressure Connection: 1/8" NPT(F).

Electrical Rating: 15 amps, 125, 250, 480 volts, 60 Hz. AC. Resistive, 1/8 H.P. @125 volts, 1/4 H.P. @ 250 volts, 60 Hz. A.C.

Wiring Connections: 3 screw type; common, norm. open and normally closed.

Conduit Connection: 1/2" NPT(F).

Set Point Adjustment: Screw type on top of housing. Field adjustable.

Housing: Anodized cast aluminum.

Diaphragm: Molded fluorosilicone rubber. '-02 model, silicone on nylon.

Calibration Spring: Stainless steel.

Installation: Mount with diaphragm in vertical position.

Weight: 3 1/4 lbs. (1.5 kg), '- 02 model, 4 lbs., 7 oz. (2 kg)

CAUTION: For use only with air or compatible gases. Applications with hazardous atmospheres and a single positive pressure may require special venting.

Patent No. 3,566,060

Natural Gas Compatibility- Model 1950G is supplied with a Buna-N diaphragm for natural gas service. Ranges available are from 0.10 to 20 inches w.c. Consult us for specification details.

CLARK SOLUTIONS

Model 24, Differential Pressure Switch

Brass or Polysulfone®, Adjustable Ranges 1 to 45 PSID

DESCRIPTION

The 24 Series differential pressure and vacuum switches offer a unique blend of compact size, excellent performance, environmental protection and attractive price. Available with brass or polysulfone® pressure connections, the Model 24 will stand up in your most corrosive applications. The precision snap-acting switch and sensitive diaphragms combine to provide a narrow deadband and repeatability of approximately ±1% of range span. The convenient, externally accessible adjustment screw is multi-turn to provide easy set point adjustability. The force-balanced design gives the Model 24 excellent vibration resistance.

The Model 24 was designed to be a compact, cost-effective differential pressure switch for applications such as proof-of-flow, filter monitoring, etc. It depends on two opposing diaphragms to sense pressure on the "High" and "Low" pressure outputs of a system. The resulting pressure differential is transmitted through a linkage to a snap-action electrical switch, providing an output when a pre-set difference is exceeded. This set point can be easily modified while under pressure via an external adjusting screw. This adjustment "pre-loads" the actuation mechanism, which results in excellent vibration-resistance. Straight pressure and vacuum versions, with a single diaphragm, are also available.



UL Listed, cUL Certified
 Pressure: UL 508; CSA C22.2 No.14-M95 --File #E42272
 CENELEC/TÜV certified to PED (97/23/EC), Category IV, Mo
 H1, Certificate #USA 02/04/38/001 thru USA 02/07/38/033
 Compliant to LVD (73/23/EC & 93/68/EEC)



SPECIFICATIONS

GENERAL

- Storage Temperature: -20 ° to 180 °F (-29 ° to 82 °C)
- Ambient Temperature: 30 ° to 160 °F (-1 ° to 71 °C). Set point typically shifts less than ±0.6% of range for a 50 °F (28 °C) ambient temperature change; consult factory for special ratings
- Max Media Temperature: 200 °F (93 °C) at 100 psi working pressure; 160 °F (71 °C) at 100 psi working pressure for models 030, 031
- Shock: Set point repeats after 15G, 10 millisecond duration. (MIL-STD-810)
- Vibration: Set point repeats after 2.5 G, 5-500 Hz. (MIL-STD-810)
- Enclosure Classification: Complies with enclosure NEMA 4 requirements with optional water tight conduit connector. Reinforced polyester body, stainless steel cover with neoprene gasket. All external hardware Teflon® coated on models 030 and 031
- Set Point Repeatability: Typically ± 1% of span. Application dependent.
- Switch Output: SPDT precision snap-acting design with mechanical contact life of 10 million cycles. Actual life depends on electrical load and cycle frequency

Electrical Rating: Rated to 5 A resistive and 5 A inductive (75%PF) at 125 VAC and 250 VAC, 1/4 HP; 5 A resistive and 3 A inductive at 30 VDC and 0.5 A resistive and 0.25 inductive at 125 VDC. Gold clad silver contacts for minimum loads of 5 mA at 6 VDC, 2 mA at 12 VDC and 1 mA at 24 VDC

- Weight: 6.5 oz.
- Electrical Connection: 7/8" hole for optional 1/2" NPT conduit connector. Terminal block with screw terminals. Max wire size 16 AWG
- Pressure Connection: 1/4" NPT (female) Brass; 1/4" NPS (female) FDA approved polysulfone®, non-tapered to minimize connection stress with 1/4" NPT (male) fittings, Max. torque 2 ft. lbs.
- Mounting & Installation: Surface mount with two screws through clearance holes, or mount by pressure connections

Polysulfone® is a registered trademark of Amoco.

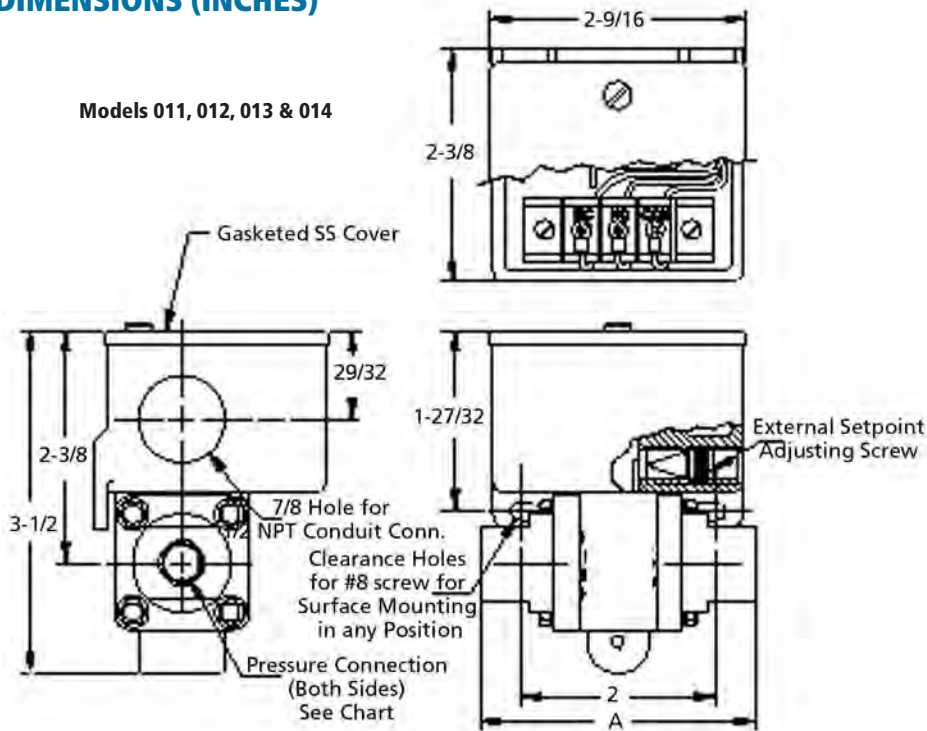
Range/Material Code	Adjustable Range		Typical Deadband		*Max Working Pressure		**Proof Pressure	
	psid	bar	psid	bar	psi	bar	psi	bar
Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPT (female) brass pressure connection								
013	1 to 10	70 mbar to 0.7	0.75	0.05	150	10	150	10
014	4 to 45	0.3 to 3.0	1.0	0.07	150	10	150	10
Polyurethane (polyether) diaphragm, ethylene propylene O-Ring, 1/4" NPS (female) (mechanical) polysulfone® pressure connection								
011	1 to 10	70 mbar to 0.7	0.75	0.05	150	10	150	10
012	4 to 45	0.3 to 3.0	1.0	0.07	150	10	150	10

* Working Pressure: The pressure range within which two opposing sensors can be safely operated and still maintain set point adjustability provided the difference in pressure between them does not exceed the designated adjustable range.

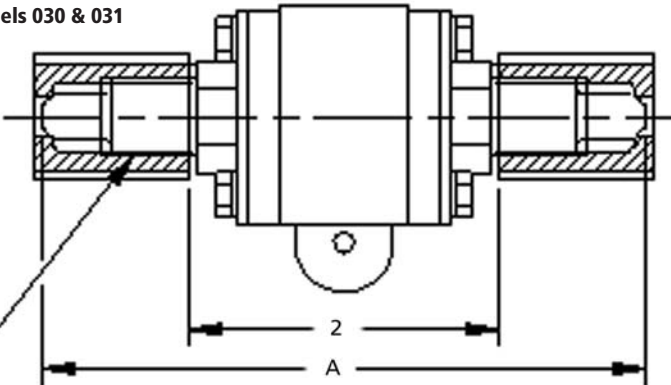
**Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. The unit may require calibration (e.g. start-up testing)

DIMENSIONS (INCHES)

Models 011, 012, 013 & 014



Models 030 & 031



Model	Dimension A	Pressure Connection
011, 012	2.75	1/4" NPS (F) Polysulfone
013, 014	3.13	1/4" NPT (F) Brass

1/4" Flaretek® Style, Pressure Connections and Nuts
2 Places

ORDERING INFORMATION

SPECIFY ABC (FROM TABLE BELOW)

EXAMPLE: 24012

A Model	B Range/Material Code	C Options
24= Model 24	013=013 014= 014 011=011 012=012 1	= None M020= Red status light, 115VAC only. Specify whether light turns on or off with increasing or decreasing pressure M201= Factory set switch; specify increasing or decreasing and set point M540= Viton® construction (deadbands & low end of range may increase slightly). Wetted parts include Viton® diaphragm and/or O-Ring plus standard connection material. M900= Water tight conduit fitting; converts 7/8" hole to 1/2" NPT fitting; must specify for compliance to NEMA 4

CLARK SOLUTIONS

120 Series, Pressure, Vacuum, Diff. Pressure & Temp. Switches

Explosion Proof, Adjustable Ranges 30" Vac to 6000 PSI, -180 to 650°F

DESCRIPTION

As safety requirements become more stringent, the determining factor in specifying an industrial pressure, differential pressure and/or temperature switch rests upon that switch protecting equipment, processes and personnel. Meeting hazardous location requirements through adherence to UL, CSA, and ATEX standards, the 120 Series is the choice where potentially explosive or highly corrosive atmospheres exist.

The 120 Series offers a variety of pressure, differential pressure, vacuum and temperature ranges, as well as port connections, wetted materials and sensor types. With common, flexible "platforms", models can quickly be adapted at the factory for special requirements, such as ranges, process connections and electrical ratings. Typical industries using 120 Series switches include chemical, petrochemical, refinery, oil and gas pipelines & production and pharmaceuticals.



SPECIFICATIONS

GENERAL

Storage Temperature: -65° to 160°F (-54 to 71°C)

Ambient Temperature: -58 to 160°F (-50 to 71°C); ranges 36-39, 520-525, 540-548, 701-705: 0 to 160°F (-17 to 71°C); Models 820E, 822E: -40 to 160°F (-40 to 71°C) set point typically shifts less than 1% of range for a 50°F (28°C) ambient temperature change; less than 2% for types E121 & E122

Set Point Repeatability: Temperature models: ±1% of adjustable range
Pressure model ranges 126-164, S126B-S164B, 171-174, 270-274, 358-376, 520-535, 540-543, 560-564, 701-705: ±1% of adjustable range; ranges 450-559: ±1/2% of adjustable range; ranges 36-39, 183-194, 483-494, 544-548, 565-567, 612-680: ±1 1/2% of adjustable range

Shock: Set point repeats after 15 G, 10 millisecond duration

Vibration: Set point repeats after 2.5 G, 5-500 Hz

Enclosure: Die cast aluminum (max. 0.4% copper), epoxy powder coated; gasketed; coverlock; internal set point lock standard on types J, C, F; gasketed aluminum tamper-resistant dial cover on types B, H, E; aluminum name plate

Enclosure Class: Certified to enclosure type 4X. Types 820E, 822E; designed to meet NEMA 4 requirements with option M300; Class I, Division 1 product meet enclosure type 7; Class II, Division 1 products meet enclosure type 9. Certified to IP66 requirements

Switch Output: One, two or three SPDT; switches may be separated up to 100% of range; except ranges 521-524, 531-534 (50%); ranges 520, 525, 530, 535, 570-572 (30%); Two SPDT hermetic sealed switches available on H122P models

Electrical Rating: 15 A 125/250/480 VAC resistive except Pressure model H122P; 11A 125/250 VAC resistive; Temperature range code HTFF: 22A 480VAC resistive

Weight: 3-7.5 lbs; Varies with model

Reference Scales: Types B, E & H: external dial. Scale divisions vary with range.

Electrical Connection: Type H, B, E: one 3/4" NPT; Type J, C, F, 820E, 822E: two 3/4" NPT; terminal block standard

Pressure Connection: Ranges S126B-S164B, 171-194, 483-494, 520-535: 1/2" NPT (female); ranges 560-564: 2" sanitary connection; ranges 565-567: 1 1/2" sanitary connection; ranges 540-548: 1/8" NPT (female); all others: 1/4" NPT (female)

Temperature Assembly: Bulb and capillary: 6 feet 304 stainless steel (standard) except for E121-13273 and E122-13321: 10 feet; Immersion stem: nickel-plated brass (standard) except for B121-13272 and B122-13322: stainless steel. Fill: Range 1BS: solvent filled; ranges 2BS-8BS: non-toxic oil filled

Temperature Deadband: Models F120, 820E, 822E: typically 1%; B-, C-, and E- 121 and 122: typically 2% of range under laboratory conditions (70°F [21°C] ambient circulating bath at rate of 1/2°F per minute change)

Pressure Deadband: See model charts

FEATURES

- **APPROVALS INCLUDE cULus, ATEX & SAA; COMPLIANCE WITH CE AND NACE STANDARDS**
- **INTERNAL ADJUSTMENT OR EXTERNAL ADJUSTMENT VIA CALIBRATED DIALS WITH TAMPER RESISTANT COVER**
- **SINGLE OR DUAL OUTPUT**
- **WIDE VARIETY OF SENSOR MATERIALS**
- **OPTIONAL HASTELLOY®, MONEL® AND TANTALUM SENSOR MATERIAL FOR CORROSIVE MEDIA**
- **FLUSH MOUNT SANITARY SENSORS**
- **STAINLESS STEEL, HASTELLOY®, MONEL® FLANGES CONFORMING TO ANSI STANDARDS**
- **INDICATING DIFFERENTIAL PRESSURE MODULE**
- **MOST MODELS AVAILABLE FOR IMMEDIATE DELIVERY!**

Differential Pressure Indication: Differential pressure indication available models H121K and H122K with option M210; accuracy approximately ±1% mid 50% of range, ±3% at ends; window is plexiglass and gasketed; indicator may be field adjusted for approximately ±1% accuracy at any set point within range

Temperature Indication: Temperature indication available models 820E and 822E. Indication accuracy is +1% of adjustable range

Approvals:

Class I, Division 1 & 2, Groups B, C & D
Class II, Division 1 & 2, Groups E, F & G
Class III
Class I, Zone 1, Group IIB + H2 T6

UL Listed, cUL Certified
Pressure: UL 50, 698; CSA C22.2 No. 25-1966, 30-M1986, CEC Part 1 – File #E40857
Temperature: UL 50, 698; CSA C22.2 No. 25-1966, 30-M1986, CEC Part 1 – File #E43374

CENELEC/DEMKO A/S (N.B. #0539)
Demko A/S certified to ATEX Directive (94/9/EC)
II 2 G EEx d IIC T6, Tamb.= -40 °C to +71 °C (-40 °F to +160 °F), IP 66
II 2 D T+85°C, Tamb.= -40 °C to +71 °C (-40 °F to +160 °F), IP 66
EN 50 014, EN 50 018, EN 50 281, EN 60529
Certificate #DEMKO 03 ATEX 0305048

CENELEC/TÜV Süddeutschland Bau und Betrieb GmbH (N.B. #0036)
TÜV certified to PED (97/23/EC)
Category IV, Module H1 (must select option M407)
Certificate #USA 02/04/38/001 thru USA 02/07/38/033
UEC Compliant to LVD (73/23/EC & 93/68/EEC)
Products rated lower than 50 VAC and 75 VDC are outside of the scope of the LVD The Low Voltage Directive does not apply to products for use in hazardous locations

PRESSURE MODEL J120, SINGLE SWITCH WITH INTERNAL ADJUSTMENT, DUAL CONDUITS

Range/Material Code	Adjustable Set Point Range		Deadband		*Over Range Pressure		**Proof Pressure			
	" w.c.	mbar	" w.c.	mbar	psi	bar	psi	bar		
Buna-N diaphragm & O-Ring with 1/2" NPT (female) aluminum pressure connection (other wetted materials available, see Order Info)										
520	300 Vac to 0	-746.7 to 0	0.2 to 8	0.5 to 19.9	200	13.8	400	27.6		
521	10 Vac to 10	-24.9 to 24.9	0.1 to 0.6	0.2 to 1.5	200	13.8	400	27.6		
522	50 Vac to 50	-124.5 to 124.5	0.1 to 3	0.2 to 7.5	200	13.8	400	27.6		
523	0.5 to 5.0	1.2 to 12.4	0.1 to 0.3	0.2 to 0.70	200	13.8	400	27.6		
524	2.5 to 50	6.2 to 124.5	0.1 to 0.8	0.2 to 2.0	200	13.8	400	27.6		
525	10 to 250	24.9 to 622.3	0.1 to 6	0.2 to 14.9	200	13.8	400	27.6		
Welded 316L stainless steel diaphragm with 1/2" NPT (female) 316L pressure connection										
530	300 Vac to 0	-746.7 to 0	0.2 to 15	0.5 to 37.3	50	3.4	100	6.9		
531	10 Vac to 10	-24.9 to 24.9	0.1 to 0.6	0.2 to 1.5	50	3.4	100	6.9		
532	50 Vac to 50	-124.5 to 124.5	0.1 to 3	0.2 to 7.5	50	3.4	100	6.9		
533	0.5 to 5.0	1.2 to 12.4	0.1 to 0.3	0.2 to 0.70	50	3.4	100	6.9		
534	2.5 to 50	6.2 to 124.5	0.1 to 0.8	0.2 to 2.0	50	3.4	100	6.9		
535	10 to 250	24.9 to 622.3	0.1 to 10	0.2 to 24.9	50	3.4	100	6.9		
	psi	bar	psi	bar	psi	bar	psi	bar		
Welded stainless steel diaphragm with 1/2" NPT (female) pressure connection, large 0.72" orifice for clean-out purposes										
171	1 to 20	0.07 to 1.4	0.1 to 1.0	0.01 to 0.1	500	34.5	1000	68.9		
172	2 to 50	0.14 to 3.4	0.1 to 1.5	0.01 to 0.1	500	34.5	1000	68.9		
173	4 to 100	0.3 to 6.9	0.1 to 2.5	0.01 to 0.2	500	34.5	1000	68.9		
174	8 to 200	0.6 to 13.8	0.1 to 3.5	0.01 to 0.2	500	34.5	1000	68.9		
2" sanitary welded 316L stainless steel diaphragm and pressure connection. Mates with Tri-Clamp® fitting systems										
560	0.5 to 15	0.03 to 1.0	0.1 to 1	0.01 to 0.1	200	13.8	300	20.7		
561	1 to 25	0.07 to 1.7	0.1 to 1.5	0.01 to 0.1	200	13.8	300	20.7		
562	2 to 50	0.14 to 3.4	0.1 to 2.5	0.01 to 0.2	200	13.8	300	20.7		
563	4 to 100	0.03 to 6.9	0.1 to 4	0.01 to 0.3	200	13.8	300	20.7		
564	8 to 200	0.6 to 13.8	0.1 to 5	0.01 to 0.3	200	13.8	300	20.7		
1.5" sanitary welded 316L stainless steel diaphragm and pressure connection. Mates with Tri-Clamp fitting systems										
565	5 to 30	0.3 to 2.1	1 to 5	0.1 to 0.3	1000	68.9	1500	103.4		
566	10 to 100	0.7 to 6.9	1 to 12	0.1 to 0.8	1000	68.9	1500	103.4		
567	15 to 300	1.0 to 20.7	3 to 22	0.2 to 1.5	1000	68.9	1500	103.4		
316L stainless steel diaphragm (optional Hastelloy® C, Monel® or Tantalum); Viton® GLT O-Ring (optional Kalrez®, Silicone, Ethylene Propylene, or Aflas®); 316 stainless steel 1/2" NPT (female) pressure connection (optional Hastelloy® B or C, or Monel®), large 0.72" orifice for clean-out purposes. Models 188 & 189 have a 316L stainless steel 1/2" NPT (female) pressure connection										
183	1 to 20	0.07 to 1.4	0.3 to 2.5	0.021 to 0.2	500	34.5	1000	68.9		
184	2 to 50	0.14 to 3.4	0.3 to 3	0.021 to 0.2	500	34.5	1000	68.9		
185	4 to 100	0.3 to 6.9	0.5 to 6	0.03 to 0.4	500	34.5	1000	68.9		
186	8 to 200	0.6 to 13.8	1 to 11	0.07 to 0.8	500	34.5	1000	68.9		
188	50 to 1000	3.45 to 68.9	25 to 125	1.7 to 8.6	2000	137.9	7000	482.6		
189	250 to 3500	17.3 to 241.3	50 to 300	3.4 to 20.7	4000	275.8	7000	482.6		
316L stainless steel diaphragm (optional Hastelloy®C, Monel® or Tantalum) Viton® GLT O-Ring (optional Kalrez®, Silicone, ethylene propylene or Aflas®), 316 stainless steel 1/2" NPT (female) pressure connection (optional Hastelloy® B, or C, or Monel®), 0.06" orifice. Models 488 & 489 have a 316L stainless steel 1/2" NPT pressure connection.										
483	1 to 20	0.07 to 1.4	0.3 to 2.5	0.021 to 0.2	500	34.5	1000	68.9		
484	2 to 50	0.14 to 3.4	0.3 to 3	0.021 to 0.2	500	34.5	1000	68.9		
485	4 to 100	0.3 to 6.9	0.5 to 6	0.03 to 0.4	500	34.5	1000	68.9		
486	8 to 200	0.6 to 13.8	1 to 11	0.07 to 0.8	500	34.5	1000	68.9		
488	50 to 1000	3.4 to 68.9	25 to 125	1.7 to 8.6	2000	137.9	7000	482.6		
489	250 to 3500	17.2 to 241.3	50 to 300	3.4 to 20.7	4000	275.8	7000	482.6		
Welded 316L stainless steel bellows with 1/2" NPT (female) pressure connection										
S126B	30" to 3" Hg Vac	-1 to 0	0.2 to 0.6" Hg	0.01 to 0.02	80"wc	0.2	5	0.3		
S134B	30" Hg Vac to 20	-1 to 1.4	0.2 to 0.6" Hg	0.01 to 0.02	20	1.4	25	1.7		
S137B	15 to 80"wc	0.04 to 0.2	2 to 6"wc	0.01 to 0.02	80"wc	0.2	5	0.3		
S144B	0.5 to 20	0.04 to 1.4	0.1 to 0.3	0.01 to 0.02	20	1.4	25	1.7		
S152B	1 to 50	0.07 to 3.4	0.1 to 0.5	0.01 to 0.03	50	3.4	75	5.2		
S156B	2 to 100	0.14 to 6.9	0.2 to 0.6	0.01 to 0.04	100	6.9	125	8.6		
S164B	4 to 200	0.28 to 13.8	0.2 to 1	0.01 to 0.01	200	13.8	200	13.8		
Range/Material Code	Adjustable Set Point Range		Deadband				*Over Range Pressure		**Proof Pressure	
	psi	bar	Lower 75% range		Top 25% Range		psi	bar	psi	bar
Welded stainless steel diaphragm with 1/2" NPT (female) pressure connections, large 0.072" orifice for clean-out purposes										
190	5 to 30	0.3 to 2.1	1 to 3	0.07 to 0.2	6 max	0.4	1500	103.4	2500	172.4
191	10 to 100	0.7 to 6.9	1 to 8	0.07 to 0.6	15 max	1.0	1500	103.4	2500	172.4
192	15 to 300	1 to 20.7	3 to 18	0.2 to 1.2	25 max	1.7	1500	103.4	2500	172.4
193	20 to 500	1.4 to 34.5	4 to 30	0.3 to 2.1	45 max	3.1	1500	103.4	2500	172.4
194	80 to 1700	5.5 to 117.2	5 to 120	0.3 to 8.3	150 max	10.3	2000	138.9	2500	172.4
Welded 316 stainless steel diaphragm with 1/2" NPT (female) pressure connection, 0.06" orifice to dampen pulsations										
490	5 to 30	0.3 to 2.1	1 to 3	0.07 to 0.2	6 max	0.4	1500	103.4	2500	172.4
491	10 to 100	0.7 to 6.9	1 to 8	0.07 to 0.6	15 max	1.0	1500	103.4	2500	172.4
492	15 to 300	1 to 20.7	3 to 18	0.2 to 1.2	25 max	1.7	1500	103.4	2500	172.4
493	20 to 500	1.4 to 34.5	4 to 30	0.3 to 2.1	45 max	3.1	1500	103.4	2500	172.4
494	80 to 1700	5.5 to 117.2	5 to 120	0.3 to 8.3	150 max	10.3	2000	138.9	2500	172.4

*Over Range Pressure: The maximum pressure that may be applied continuously without causing damage and maintaining set point repeatability

** Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. Unit may require calibration.

PRESSURE MODEL J120, SINGLE SWITCH WITH INTERNAL ADJUSTMENT, DUAL CONDUITS (CONT'D)

Range/Material Code	Adjustable Set Point Range		Deadband		*Over Range Pressure		**Proof Pressure	
	High end of range on rise, low end on fall		psi Unless noted	bar	psi	bar	psi	bar
	psi Unless noted	bar						
Brass bellows with 1/4" NPT (female) nickel-plated brass pressure connection; Models 126 & 134 have zinc-plated steel spring exposed to media								
126	30 to 3" Hg Vac	-1 to 0.1	0.2" to 0.6" Hg	0.01 to 0.02	80"wc	0.2	5	0.3
134	30" Hg Vac to 20 psi	-1 to 1.4	0.2" to 6" Hg	0.01 to 0.02	20	1.4	25	1.7
137	15 to 80"wc	0.04 to 0.19	2 to 6"wc	0.01 to 0.02	80"wc	0.2	5	0.3
144	0.5 to 20	0.04 to 1.4	0.1 to 0.3	0.01 to 0.02	20	1.4	25	1.7
152	1 to 50	0.07 to 3.4	0.1 to 0.5	0.01 to 0.03	50	3.4	75	5.2
156	2 to 100	0.14 to 6.9	0.2 to 0.6	0.01 to 0.04	100	6.9	125	8.6
164	4 to 200	0.3 to 13.8	0.2 to 1	0.01 to 0.01	200	13.8	200	13.8
Phosphor bronze bellows with 1/4" NPT (female) nickel-plated brass pressure connection								
270	4 to 200	0.3 to 13.8	1 to 4	0.07 to 0.3	200	13.8	250	17.2
274	6 to 300	0.4 to 20.7	1 to 5	0.07 to 0.3	300	20.7	350	24.1
Welded 316L stainless steel bellows and 1/4" NPT (female) pressure connection								
356	15 to 100	1.0 to 6.9	0.7 to 1.8	0.05 to 0.1	100	6.9	800	55.2
358	15 to 200	1.0 to 13.8	1 to 3	0.07 to 0.2	200	13.8	800	55.2
361	20 to 300	1.4 to 20.7	1 to 4	0.07 to 0.3	300	20.7	800	55.2
376	25 to 500	1.7 to 34.5	1.5 to 5	0.1 to 0.3	500	34.5	800	55.2
303 stainless steel piston and Buna-N O-Ring with 1/4" (female) pressure connection (not recommended for gas service since drying of the O-Ring seal can allow bleeding of medium into the atmosphere)								
612	125 to 3,000	8.6 to 206.8	40 to 250	2.8 to 17.2	6,000	413.7	10,000	689.5
616	700 to 5000	48.3 to 344.7	40 to 375	2.8 to 25.9	6,000	413.7	10,000	689.5
316 stainless steel bellows and 1/4" NPT (female) pressure connection (not recommended for rapid or high cycling pressure changes)								
680	100 to 1700	6.9 to 117.2	9 to 40	0.6 to 2.8	1700	117.2	2500	172.4
Buna-N diaphragm and O-Ring with 1/4" NPT (female) nickel-plated brass pressure connection; Optional Viton® diaphragm & O-Ring available for code 704-705								
701	1.5 to 30	0.1 to 2.1	1 to 2	0.07 to 0.14	500	34.5	1000	68.9
702	3 to 100	0.2 to 6.9	1 to 4	0.07 to 0.3	500	34.5	1000	68.9
703	9 to 300	0.6 to 20.7	1 to 5	0.07 to 0.3	500	34.5	1000	68.9
704	15 to 500	1.0 to 34.5	2 to 8	0.14 to 0.6	1500	103.4	2500	172.4
705	30 to 1000	2.1 to 68.9	3 to 20	0.21 to 1.4	1500	103.4	2500	172.4
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connection and cap								
450	30" to 3" Hg Vac	-1.0 to -0.1	0.1 to 0.3" Hg	0.003 to 0.1	80"wc	0.2	225	15.5
451	2 to 80"wc	0.005 to 0.2	0.8 to 2"wc	0.002 to 0.005	80"wc	0.2	225	15.5
452	30" Hg Vac to 20 psi	-1 to 1.4	0.1 to 0.4" Hg	0.003 to 0.01	20	1.4	225	15.5
453	0.5 to 20	0.03 to 1.4	0.05 to 0.1	0.003 to 0.01	20	1.4	225	15.5
454	0.8 to 30	0.06 to 2.1	0.05 to 0.2	0.003 to 0.014	30	2.1	225	15.5
Teflon® diaphragm and O-Ring with 1/4" NPT (female) 316L stainless steel pressure connection and cap								
550	30" to 3" Hg Vac	-1 to 0.1	0.1 to 0.4" Hg	0.003 to 0.01	80"wc	0.2	225	15.5
551	2 to 80"wc	0.005 to 0.2	1 to 4"wc	0.003 to 0.01	80"wc	0.2	225	15.5
552	30" Hg Vac to 20 psi	-1 to 1.4	0.2 to 0.5" Hg	0.007 to 0.02	20	1.4	225	15.5
553	0.5 to 20	0.03 to 1.4	0.1 to 0.2	0.007 to 0.014	20	1.4	225	15.5
554	0.8 to 30	0.06 to 2.1	0.1 to 0.3	0.007 to 0.02	30	2.1	225	15.5
555	2 to 100	0.14 to 6.9	0.2 to 0.4	0.014 to 0.03	100	6.9	225	15.5

MODEL H121, SINGLE SWITCH WITH EXTERNAL ADJUSTMENT VIA REFERENCE DIAL, 1 CONDUIT

MODEL H121, DUAL SWITCH WITH EXTERNAL ADJUSTMENT VIA REFERENCE DIAL, 1 CONDUIT

MODEL H122P, TWO HERMETICALLY SEALED SINGLE SWITCHES, EXTERNAL REFERENCE DIAL ADJUSTMENT, 1 CONDUIT

Range/Material Code	Adjustable Set Point Range		Deadband		**Proof Pressure		Dial Divisions
	psi	bar	psi	bar	psi	bar	psi
Welded 316L stainless steel bellows with 1/2" NPT (female) pressure connection							
S126B	30" Hg Vac to 0	-1 to 0	0.2 to 0.9" Hg	7 to 30.5 mbar	5	0.3	0.5" Hg
S134B	30" Hg Vac to 20	-1 to 1.4	0.2 to 1.2" Hg	7 to 40.6 mbar	25	1.7	1" Hg & 0.5 psi
S137B	2 to 80"wc	0.005 to 0.2	2 to 10"wc	5 to 20 mbar	5	0.3	2"wc
S144B	0 to 20	0 to 1.4	0.1 to 0.5	7 to 34.5 mbar	25	1.7	0.5
S146B	0 to 30	0 to 2.1	0.1 to 0.6	6.9 to 41.4 mbar	40	2.78	0.5
S156B	0 to 100	0 to 6.9	0.2 to 0.8	13.8 to 55.2 mbar	125	8.6	2
S164B	0 to 200	0 to 13.8	0.3 to 2	20.7 to 138 mbar	200	13.8	5
Brass bellows with 1/4" NPT (female) nickel-plated brass pressure connection; Models 126 & 134 have zinc-plated steel spring exposed to media							
126	30" Hg Vac to 0	-1 to 0	0.2" to 0.9" Hg	7 to 30.5 mbar	5	0.3	0.5" Hg
134	30" Hg Vac to 20 psi	-1 to 1.4	0.2" to 1.2" Hg	7 to 40.6 mbar	25	1.7	1" Hg & 0.5 psi
137	2 to 80"wc	0.005 to 0.2	2 to 10"wc	5 to 20 mbar	5	0.3	2"wc
144	0 to 20	0 to 1.4	0.1 to 0.5	6.9 to 34.5 mbar	25	1.7	0.5
146	0 to 30	0 to 2.1	0.1 to 0.6	6.9 to 41.4 mbar	40	2.8	0.5
156	0 to 100	0 to 6.9	0.2 to 0.8	13.8 to 55.2 mbar	125	8.6	2
164	0 to 200	0 to 13.8	0.3 to 2.0	20.7 to 138 mbar	200	13.8	5
Welded 316L stainless steel bellows and 1/4" NPT (female) pressure connection							
358	0 to 200	0 to 13.8	1.5 to 8	0.1 to 0.6	250	17.2	5
361	0 to 300	0 to 20.7	2 to 9	0.1 to 0.6	350	24.1	10
376	0 to 500	0 to 34.5	3 to 12	0.2 to 0.8	575	39.6	10
303 stainless steel piston and Buna-N O-Ring with 1/4" (female) pressure connection (not recommended for gas service since drying of the O-Ring seal can allow bleeding of medium into the atmosphere)							
612	200 to 3000	13.8 to 207	40 to 250	2.8 to 17.2	10000	689.5	50
614	500 to 6000	34.5 to 413.7	50 to 400	3.4 to 27.6	10000	689.5	100

*Over Range Pressure: The maximum pressure that may be applied continuously without causing damage and maintaining set point repeatability

** Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. Unit may require calibration.

MODEL H121, SINGLE SWITCH WITH EXTERNAL ADJUSTMENT VIA REFERENCE DIAL, 1 CONDUIT
MODEL H122, DUAL SWITCH WITH EXTERNAL ADJUSTMENT VIA REFERENCE DIAL, 1 CONDUIT
MODEL H122P, TWO HERMETICALLY SEALED SINGLE SWITCHES, EXTERNAL REFERENCE DIAL ADJUSTMENT, 1 COND

Range/Material Code	Adjustable Set Point Range		Deadband		**Proof Pressure		Dial Divisions
	psi	bar	psi	bar	psi	bar	psi
Phosphor bronze bellows with 1/4" NPT (female) nickel-plated brass pressure connection							
270	0 to 200	0 to 13.8	1.5 to 8	0.1 to 0.6	250	17.2	5
274	0 to 300	0 to 20.7	2 to 10	0.1 to 0.7	350	24.1	10
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connection and cap							
450	30" Hg Vac to 0	-1 to 0 mbar	0.1 to 0.4"wc	0.003 to 0.01	225	15.5	0.5" Hg
452	30" Hg Vac to 20 psi	-1 to 1.4 mbar	0.1 to 1" Hg	0.003 to 0.03	225	15.5	1" & 0.5 psi
453	0 to 20	0 to 1.4 mbar	0.05 to 0.2	0 to 0.01	225	15.5	0.5
454	0 to 30	0 to 2.1 mbar	0.05 to 0.3	0 to 0.02	225	15.5	0.5
Teflon® diaphragm and O-Ring with 1/4" NPT (female) 316L stainless steel pressure connection and cap							
550	30" Hg Vac to 0	-1 to 0	0.1 to 0.6" Hg	0.003 to 0.02	225	15.5	0.5" Hg
552	30" Hg Vac to 20 psi	-1 to 1.4	0.2 to 1" Hg	0.007 to 0.03	225	15.5	1" & 0.5 psi
553	0 to 20	0 to 1.4	0.05 to 0.3	0 to 0.02	225	15.5	0.5
554	0 to 30	0 to 2.1	0.1 to 0.4	0.01 to 0.03	225	15.5	0.5
555	0 to 100	0 to 6.9	0.25 to 0.75	0.02 to 0.05	225	15.5	2
Buna-N diaphragm and O-Ring with 1/4" NPT (female) nickel-plated brass pressure connection; Optional Viton® diaphragm & O-Ring available for code 701 & 703							
701	3 to 30	0.2 to 2.1	1 to 3	0.07 to 0.2	1000	68.9	0.5
702	10 to 100	0.7 to 6.9	1 to 5	0.07 to 0.3	1000	68.9	2
703	30 to 300	2.1 to 20.7	2 to 7	0.14 to 0.5	1000	68.9	10
704	50 to 500	3.4 to 34.5	3 to 12	0.2 to 0.8	2500	172.4	10
705	200 to 1000	13.8 to 68.9	5 to 25	0.3 to 1.7	2500	172.4	25

DIFFERENTIAL PRESSURE MODEL J120K SINGLE SWITCH WITH INTERNAL ADJUSTMENT, DUAL CONDUIT

Range/Material Code	Adjustable Set Point Range		Deadband		***Working Pressure		**Proof Pressure	
	High end of range on rise, low end on fall		"wc/psi	mbar/bar	psi	bar	psi	bar
Welded 316L bellows with 1/2" NPT (female) pressure connections								
S147B	3 to 30 psid	0.2 TO 2.1 bar	0.3 TO 1.5 psi	0.02 to 0.1bar	30" Hg Vac to 100	-1 to 6.9	300	20.7
S157B	10 to 100 psid	0.7 TO 6.9 bar	0.5 TO 2 psi	0.03 to 0.14 bar	30" Hg Vac to 180	-1 to 12.4	300	20.7
Brass bellows with 1/4" NPT (female) nickel-plated brass pressure connections								
147	3 to 30 psid	0.2 to 2.1 bar	0.3 to 1.5 psi	0.02 to 0.1bar	30" Hg Vac to 100	-1 to 6.9	180	12.4
157	10 to 100 psid	0.7 to 6.9 bar	0.5 to 2 psi	0.03 to 0.14 bar	30" Hg Vac to 150	-1 to 10.3	180	12.4
316L stainless steel bellows and 1/4" NPT (female) pressure connections								
367	10 to 100 psid	0.7 to 6.9	4 to 10	0.3 to 0.7	0 to 350	0 to 24.1	500	34.5
Buna-N diaphragm and O-Ring with stainless steel 1/4" NPT (female) pressure connections								
36	3 to 30 psid	0.2 to 2.1	1 to 5	0.07 to 0.3	0 to 350	0 to 24.1	1000	68.9
37	10 to 100 psid	0.7 to 6.9	2 to 8	0.1 to 0.6	0 to 500	0 to 34.5	1000	68.9
38	30 to 300 psid	2.1 to 20.7	2 to 15	0.1 to 1.0	0 to 1000	0 to 68.9	2500	172.4
39	50 to 500 psid	3.4 to 34.5	3 to 20	0.2 to 1.4	0 to 1000	0 to 68.9	2500	172.4
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connections								
455	5 to 80 "wcd	12.4 to 200 mbar	1 to 4" wcd	2 to 10 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
456	2 to 20 psid	0.1 to 1.4 bar	0.1 to 0.3 psi	6.9 to 20.7 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
457	3 to 30 psid	0.2 to 2.1 bar	0.1 to 0.4 psi	6.9 to 27.6 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
Kapton® diaphragm, Buna-N sealing diaphragms and epoxy coated aluminum 1/8" NPT (female) pressure connections								
540	0.2 to 7" wcd	0.5 to 17.4 mbar	0.05 to 0.4"wc	0.1 to 0.1 mbar	200	13.8	400	27.6
541	1 to 20" wcd	2.5 to 49.7 mbar	0.1 to 0.7"wc	0.2 to 1.7 mbar	200	13.8	400	27.6
542	5 to 50" wcd	12.4 to 124.4 mbar	0.2 to 2.0"wc	0.5 to 5.0 mbar	200	13.8	400	27.6
543	10 to 200" wcd	24.9 to 497 mbar	0.5 to 6.0"wc	1.2 to 14.9 mbar	200	13.8	400	27.6
544	2 to 20 psid	0.1 to 1.4 bar	0.1 to 0.8 psi	6.9 to 55.2 mbar	1200	82.7	2500	172.4
545	5 to 50 psid	0.3 to 3.4 bar	0.2 to 1.6 psi	0 to 0.1 bar	1200	82.7	2500	172.4
546	0 to 125 psid	0.7 to 8.6 bar	0.4 to 3.5 psi	0 to 0.2 bar	1200	82.7	2500	172.4
547	50 to 250 psid	3.4 to 17.2 bar	1.5 to 7.2 psi	0.1 to 0.5 bar	1200	82.7	2500	172.4
548	100 to 500 psid	6.9 to 34.5 bar	2.0 to 12.0 psi	0.1 to 0.8 bar	1200	82.7	2500	172.4
Teflon® and Buna-N diaphragms, Buna-N O-Ring with 1/4" (female) aluminum pressure connections								
559	10 to 100 psid	0.7 to 6.9 bar	0.2 to 1 psi	14 to 69 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5

DIFFERENTIAL PRESSURE MODEL H121K SINGLE SWITCH WITH EXTERNAL ADJUSTMENT VIA REFERENCE DIAL
DIFFERENTIAL PRESSURE MODEL H122K DUAL SWITCH WITH EXTERNAL ADJUSTMENT VIA REFERENCE DIAL

Welded 316L bellows with 1/2" NPT (female) pressure connections								
S147B	3 TO 30 psid	0.2 TO 2.1 bar	0.3 TO 2 psi	20 to 140 mbar	30" Hg Vac to 100	-1 to 6.9	300	20.7
S157B	10 TO 100 psid	0.7 TO 6.9 bar	0.5 TO 3 psi	30 to 200 mbar	30" Hg Vac to 180	-1 to 12.4	300	20.7
Brass bellows with 1/4" NPT (female) nickel-plated brass pressure connections								
147	3 to 30 psid	0.2 to 2.1 bar	0.3 TO 2 psi	20 to 140 mbar	30" Hg Vac to 100	-1 to 6.9	180	12.4
157	10 to 100 psid	0.7 to 6.9 bar	0.5 TO 3 psi	30 to 200 mbar	30" Hg Vac to 150	-1 to 10.3	180	12.4
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connections								
456	2 to 20 psid	0.1 to 1.4 bar	0.1 to 0.3 psi	0.01 to 0.02	30" Hg Vac to 225	-1 to 15.5	225	15.5
457	3 to 30 psid	0.2 to 2.1 bar	0.1 to 0.4 psi	0.01 to 0.03	30" Hg Vac to 225	-1 to 15.5	225	15.5
Teflon® and Buna-N diaphragms, Buna-N O-Ring with 1/4" (female) aluminum pressure connections								
559	10 to 100 psid	0.7 to 6.9 bar	0.2 to 1 psi	0.01 to 0.07	30" Hg Vac to 225	-1 to 15.5	225	15.5

*Over Range Pressure: The maximum pressure that may be applied continuously without causing damage and maintaining set point repeatability

** Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. Unit may require calibration.

TEMPERATURE MODEL CHART

Model B121, B121-13272 (HTFP), single switch, immersion stem, external adjustment via reference dial, single conduit

Model B122, B122-13322 (HTFP), dual switch, immersion stem, external adjustment via reference dial, single conduit

Model C120, single switch, immersion stem, internal adjustment, dual conduits

Model E121, E121-13273 (HTFP), single switch, bulb and capillary***, external adjustment via reference dial, single conduit

Model E122, E122-13321 (HTFP), dual switch, bulb and capillary***, external adjustment via reference dial, single conduit

Model F120, single switch, bulb and capillary***, internal adjustment, dual conduits

Range/Material Code	Adjustable Set Point		Max. Temp		Scale Division		Stem/Bulb Size OD x Length
	°F	°C	°F	°C	°F	°C	
Model B121, single switch, immersion stem, external adjustment via reference dial. Model B122, dual switch, immersion stem, external adjustment via reference dial. Model C120, single switch, immersion stem, internal adjustment							
120*	0 to 225	-17.8 to 107.2	275	135	5	5	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
121*	200 to 425	93.3 to 218.3	475	246.1	5	5	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
HTFP (Freeze Protection, Heat Tracing) 13272=Immersion Stem(FP) 13322=Immersion Stem(FP) 13273= Bulb & Capillary(HT) 13321= Bulb & Capillary(HT)	15 to 140	-9.4 to 60	160	71.1	2	2	9/16" x 2-11/16" stainless steel
Model E121, single switch, bulb and capillary***, external adjustment via reference dial. Model E122, dual switch, bulb and capillary***, external adjustment via reference dial							
2BSA	-120 to 100	-84.4 to 37.8	150	65.5	5	5	3/8 x 2-5/8"
2BSB	30 to 250	1.1 to 121.1	300	148.9	5	5	3/8 x 2-5/8"
3BS	100 to 400	37.8 to 204.4	450	232.2	5	5	3/8 x 2-1/8"
4BS	25 to 100	-3.9 to 37.8	150	65.5	2	1	3/8 x 6-3/4"
5BS	-20 to 80	-28.9 to 26.7	130	54.4	2	2	3/8 x 5"
8BS	350 to 640	176.7 to 337.8	690	365.6	5	5	3/8 x 3-1/4"
Model F120, single switch, bulb and capillary***, internal adjustment							
Stainless steel bulb & capillary							
1BS	-180 to 120	-117.8 to 48.9	170	76.6	-	-	3/8 x 3-3/4"
2BS	-125 to 350	-87.2 to 176.7	400	204.4	-	-	3/8 x 2-5/8"
3BS	-125 to 500	-87.2 to 260	550	287.8	-	-	3/8 x 2-1/8"
4BS	-40 to 120	-40 to 48.9	170	76.6	-	-	3/8 x 6-3/4"
5BS	-40 to 180	-40 to 82.2	230	110	-	-	3/8 x 5"
6BS	0 to 250	-17.8 to 121.1	300	148.8	-	-	3/8 x 4-1/2"
7BS	0 to 400	-17.8 to 204.4	450	232.2	-	-	3/8 x 3"
8BS	50 to 650	10 to 343.3	700	371.1	-	-	3/8 x 3-1/4"

*Optional immersion stem lengths and capillary lengths are available

**Optional stainless steel immersion stem and capillary covering available.

***Standard capillary lengths are 6ft

EXPLOSION-PROOF INDICATING TEMPERATURE CONTROLS

Model 820E, single switch, external adjustment and temperature indication, dual conduits

Model 822E, dual switch, external adjustment and temperature indication, dual conduits

Range/Material Code	Adjustable Set Point		Max. Temp		Scale Division		Stem/Bulb Size OD x Length
	°F	°C	°F	°C	°F	°C	
1BS	-180 to 120	-117.8 to 48.9	170	76.6	5	5	3/8 x 3-3/4"
2BS	-125 to 350	-87.2 to 176.7	400	204.4	10	5	3/8 x 2-5/8"
3BS	-125 to 500	-87.2 to 260	550	287.8	10	5	3/8 x 2-1/8"
4BS	-40 to 120	-40 to 48.9	170	76.6	5	2	3/8 x 6-3/4"
5BS	-40 to 180	-40 to 82.2	230	110	5	2	3/8 x 5"
6BS	0 to 250	-17.8 to 121.1	300	148.8	5	2	3/8 x 4-1/2"
7BS	0 to 400	-17.8 to 204.4	450	232.2	10	5	3/8 x 3"
8BS	50 to 650	10 to 343.3	700	371.1	10	10	3/8 x 3-1/4"

Standard capillary length is 6ft., optional lengths available



ORDERING INFORMATION

SPECIFY MODEL NUMBER, RANGE CODE (FROM CHARTS) THEN OPTIONS IF REQUIRED

EXAMPLE: J120-274-0140-M201(100 PSI RISING)

Model- Pressure

Model J120 - One SPDT; epoxy coated enclosure; internal adjustment with no reference scale, dual conduits

Model H121 - One SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model H122 - Two SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model H122P - Two SPDT hermetically sealed switches; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model- Differential Pressure

Model J120K - One SPDT; epoxy coated enclosure; internal adjustment with no reference scale, dual conduits

Model H121K - One SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model H122K - Two SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model H402K - Two SPDT outputs; internal adjustment with reference dial

Model- Temperature

Model B121 - Immersion stem; one SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model B122 - Immersion stem; two SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model C120 - Immersion stem; one SPDT; epoxy coated enclosure; internal adjustment with no reference scale, dual conduits

Model E121 - Bulb and capillary; one SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model E122 - Bulb and capillary; two SPDT; epoxy coated enclosure; external adjustment with reference dial, single conduit

Model F120 - Bulb and capillary; one SPDT; epoxy coated enclosure; internal adjustment with no reference dial, dual conduits

Model 820E - Bulb and capillary; one SPDT; external adjustment and temperature indication, dual conduits

Model 822E - Bulb and capillary; two SPDT; external adjustment and temperature indication, dual conduits

Switch Options

0140	Gold contacts, 1 amp 125 VAC resistive, NOT AVAILABLE MODELS H122P, 820E, & 822E
0500	Close deadband, 5 amp 125/250 VAC resistive. NOT AVAILABLE MODEL H122P Ranges 520-535
1010	DPDT switch, 10 amp 125/250 VAC resistive. NOT AVAILABLE TEMPERATURE VERSIONS; MODELS H122, H122P H122K; OR J120K RANGES 36-39, 367, AND 540-548; OR J120 RANGES 171-194, 483-494, 520-535, 560-567, 680
1070	10 amp 125 VDC or VAC resistive; deadband and minimum set point will increase. NOT AVAILABLE MODELS 820E, 822E, H122P, H122K, B122, AND J120K RANGES 36-39; J120 RANGES 171-194, 483-494, 520-535
1180	Hermetically sealed SPDT, 11 amp 125/250 VAC resistive, must be specified with model H122P. NOT AVAILABLE MODELS B122, E122, H122, H121K and H122K, 820 AND 822E; deadband and minimum set point will increase.
1190	Hermetically sealed DPDT, 11 amp 125/250 VAC; products set on rising pressure or temperature due to inherent separation of circuits on falling pressure or temperature; specify option 1195 if setting on fall is required; deadband and minimum set point will increase. Not available models 820E, 822E, B121, B122, E121, E122, H121, H122, H121K, H122K, H122P or ranges 523, 533
1195	Hermetically sealed DPDT, 11 amp 125/250 VAC; products set on falling pressure or temperature due to inherent separation of circuits on rising pressure or temperature; specify option 1190 if setting on rise is required; deadband and minimum set point will increase. Not available models 820E, 822E, B121, B122, E121, E122, H121, H122, H121K, H122K, H122P or ranges 523, 533
1519*	Adjustable deadband, 15 amp 125/250/480 VAC resistive; adjustable wheel changes rise setting only; if adjustment of fall setting is required use primary adjustment; deadband and minimum set point will increase. Not available models 820E, 822E, B121, B122, E121, E122, H121, H122, H121K, H122K, H122P or ranges 171-194, 483-494, 520-535, 612-616
1530	External manual reset, 15 amp 125/250/480 VAC resistive; latches on rise only. Not available models 820E, 822E, B121, B122, E121, E122, H121, H122, H121K, H122K, H122P ranges 520-535 or with ATEX certification
1535	High ambient, 15 amp 125/250 VAC resistive; temperatures up to 250°F (120°C). Not available models 820E, 822E, H122P ranges 520-535
1537	Vapor sealed switch, 15 amp 125/250 VAC resistive. Not available models 820E, 822E, H122P or ranges 520-535
1539	Fungus resistant case, 15 amp 125/250 VAC resistive. Not available models 820E, 822E, H122P or ranges 520-535
2000	20 amp 125/250 VAC resistive. Not available ranges 520-535, 540-548
3000	30 amp 125/250/300 VAC resistive. Not available models 820E, 822E, B121, B122, H121, H122, H121K, H122K, H122P for ranges 36-39, 171-193, 483-493, 520-535, 540-548, 560-567

*Please note: In order to accommodate free movement of adjustable wheel, left hand electrical conduit is permanently sealed.

Sensor Options

M504	316L stainless steel stem. Available temperature models 120 and 121 only
M540	Viton® construction; (deadbands and low end of range may increase slightly) wetted parts include Viton® diaphragm and O-Ring. Available ranges 36-39, 450-457, 540-548 (Kapton® diaphragm, Viton® O-ring and sealing diaphragms), 612-616 (O-ring only) with standard pressure connection. Available MODEL J120 RANGES 701-705 and MODEL H121 and H122 RANGES 701-703 with stainless steel pressure connection.

Optional Sensor For "WC Ranges. Available for range codes 52-525

XC001	Aluminum pressure connection, Viton® diaphragm, Viton® O-Ring
XC002	Aluminum pressure connection, Kapton® diaphragm, Buna-N O-Ring
XC003	Aluminum pressure connection, Kapton® diaphragm, Viton® O-Ring
XC004	316L Stainless steel pressure connection, 316L Stainless steel diaphragm, Viton® O-Ring (Over range pressure is limited to 100 psi)
XC005	316L Stainless steel pressure connection, Viton® diaphragm, Viton® O-Ring
XC006	316L Stainless steel pressure connection, Kapton® diaphragm, Viton® O-Ring
XC007	316L Stainless steel pressure connection, Teflon® diaphragm, Viton® O-Ring

Optional Sensor Material For Corrosive Media, Available Range Codes 183-189, 483-489

XD002	Hastelloy® C diaphragm
XD003	Monel® diaphragm
XD004	Tantalum diaphragm
XP111	Hastelloy® B pressure connection
XP112	Hastelloy® C pressure connection
XP113	Monel® pressure connection
XR211	Kalrez® O-Ring
XR212	Silicone O-Ring. Not available models 188-189, 488-489
XR213	Ethylene propylene O-Ring
XR214	Aflas® O-Ring

Other Options

M201	Factory set one switch
M202	Factory set two switches. Not available single switch versions
M210	Differential pressure indication. Available on H121K, H122K, RANGES 147, 157, S147B, S157B only
M277	Range indicated on nameplate in kPa or MPa. Not available on temperature versions
M278	Range indicated on nameplate in Kg/cm ² . Not available on temperature versions
M300	NEMA 4 construction, available models 820E & 822E only
M320	Tamper resistant cover for indication portion of control, internal adjustment, available models 820E & 822E only
M407	CE Compliance to Pressure Equipment Directive (category IV). Not available on ranges 126, 137, 520-524, 530-534, 550, 551, S126B, S137B and all temperature models.
M440	Cover chain
M444	Paper ID tag
M446	Stainless steel ID tag & wire attachment
M450	Breather drain. Not available with options 1530, M210, M415 or with ATEX certification
M550	Oxygen service cleaning; internal construction may change
6361-704	Surface and pipe mounting hardware. (required for ranges 520-535, 540-548 when surface mounting)

Also Available

Separable thermowells, optional immersion stem and capillary lengths; armor cable to protect capillaries; union connectors; 150# and 300# flanges (consult factory for part numbers)

OPTIONS FOR TEMPERATURE MODELS

UNION CONNECTORS

Option	Replacement Number	Description
Brass		
W027	SD6213-27	1/2" NPT w/ 3/4" bushing
W045	SD6213-45	3/4" NPT
W051	SD6213-51	1/2" NPT
304 Stainless Steel		
W028	SD6213-28	1/2" NPT w/ 3/4" bushing
W046	SD6213-46	3/4" NPT
W050	SD6213-50	1/2" NPT

THERMOWELLS

For all bulb & capillary switches, all 1/2" NPT Internal

Brass		
W075	SD6225-75	3/4" NPT bushing adapter, 4" BT
W191	SD6225-191	1/2" NPT, 4" BT
W118	SD6225-118	3/4" NPT bushing adapter, 7" BT
W192 S	D6225-192	1/2" NPT, 7" BT
316 Stainless Steel		
W076 S	D6225-76	3/4" NPT, 4.5" BT
W193	SD6225-193	1/2" NPT, 4.5" BT
W119	SD6225-119	3/4" NPT, 7.5" BT
W177	SD6225-177	1/2" NPT, 7.5" BT
For all immersion stem switches		
W139	SD6225-139	3/4" NPT X 1 23/32" BT, BRASS
W140	SD6225-140	3/4" NPT X 1 23/32" BT, 316 SS

W000 IMMERSION STEM AND THERMOWELLS

Note: Option W000 is a special Immersion Stem construction that has no external thread. This option fits inside a special thermowell and is secured with a set-screw; available 100, 105 (except Model 119), 117, 120 and 400 Series.

Option Description

W000 Immersion stem only, BRASS

W097 Immersion stem and thermowell. Includes W000 stem and 1/2" NPT x 1 23/32" BT BRASS thermowell

W099 Immersion stem and thermowell. Includes W000 stem and 1/2" NPT x 1 23/32" BT 316 SS thermowell

OPTIONAL LENGTHS

Optional immersion stem lengths to 15" available in brass, with or without 316 SS thermowell. Consult Clark for additional information.

Optional capillary length to *50' available in copper or 304 SS. Armor or Teflon® capillary protection available to lengths less than or equal to capillary length. Consult Clark for additional information.

*Consult Clark regarding repeatability and ambient effects on capillary lengths over 30'.

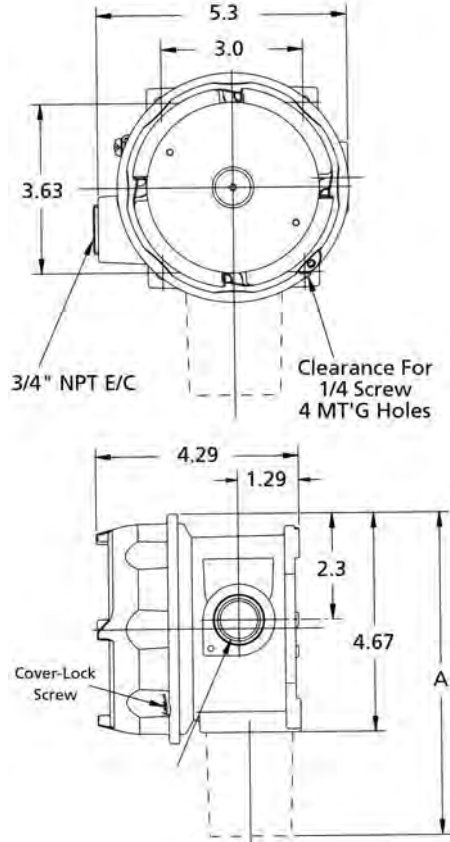
DIMENSIONS (INCHES)

120 Series, Explosion Proof

Internal set point adjustment, dual contacts

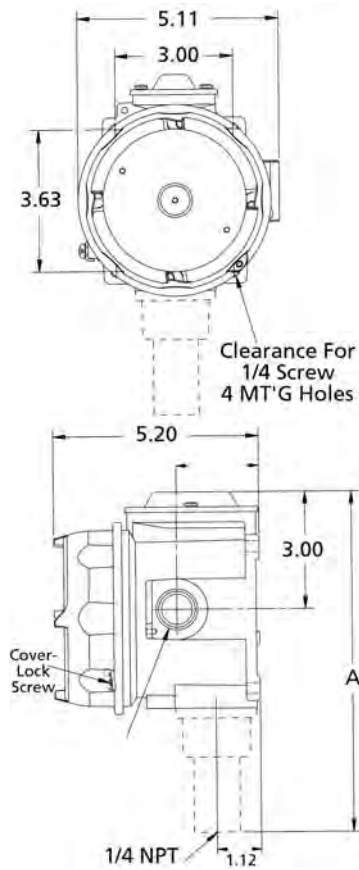
Models J120, J120K, C120, F120

Dimension A		
Range Code	Inches	NPT
Pressure		
126-124	7.30	1/4
S126B-S164B	7.70	1/2
171-174	8.53	1/2
183-186, 483-486	8.53	1/2
188-189, 488-489	7.53	1/2
190-194, 490-494	7.53	1/2
270-376, 680	8.20	1/4
450, 452	8.95	1/4
451, 453, 454	8.20	1/4
520-525	9.40	1/2
530-535	9.00	1/2
550, 552	8.95	1/4
551, 553-555	8.40	1/4
560-564	7.63	2" Sanitary
565-567	7.63	1-1/2" Sanitary
612, 616	7.90	1/4
701-705	7.53	1/4
Differential Pressure		
36-39, 367	7.63	1/4
147-157	7.63	1/4
S147B-S157B	7.63	1/2
455-559	8.55	1/4
540-543	9.60	1/8
544-548	9.70	1/8
Temperature		
120, 121	9.07	Immersion Stem
1BS-8BS	9.03	Bulb & Capillary

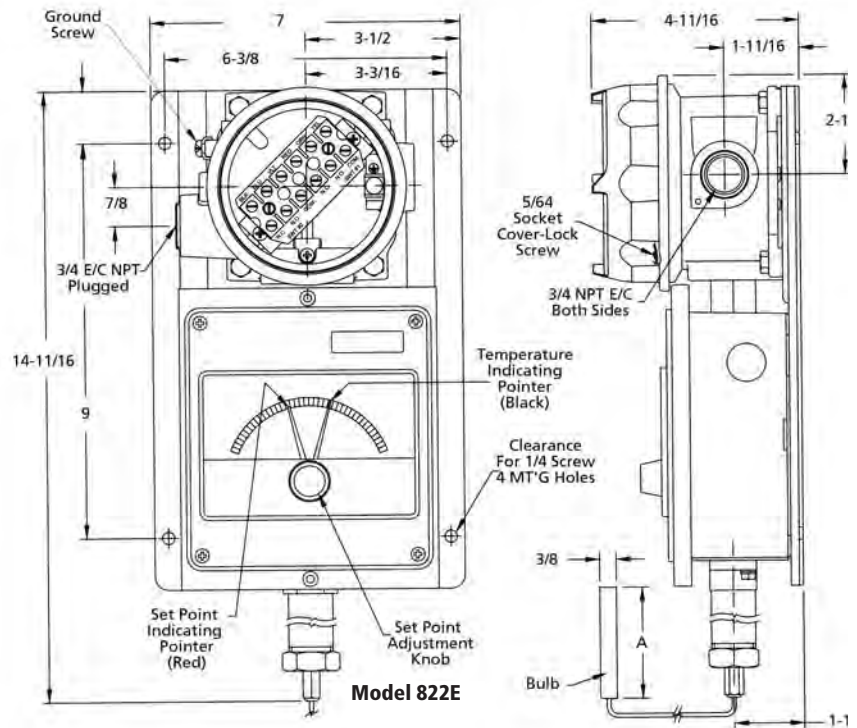
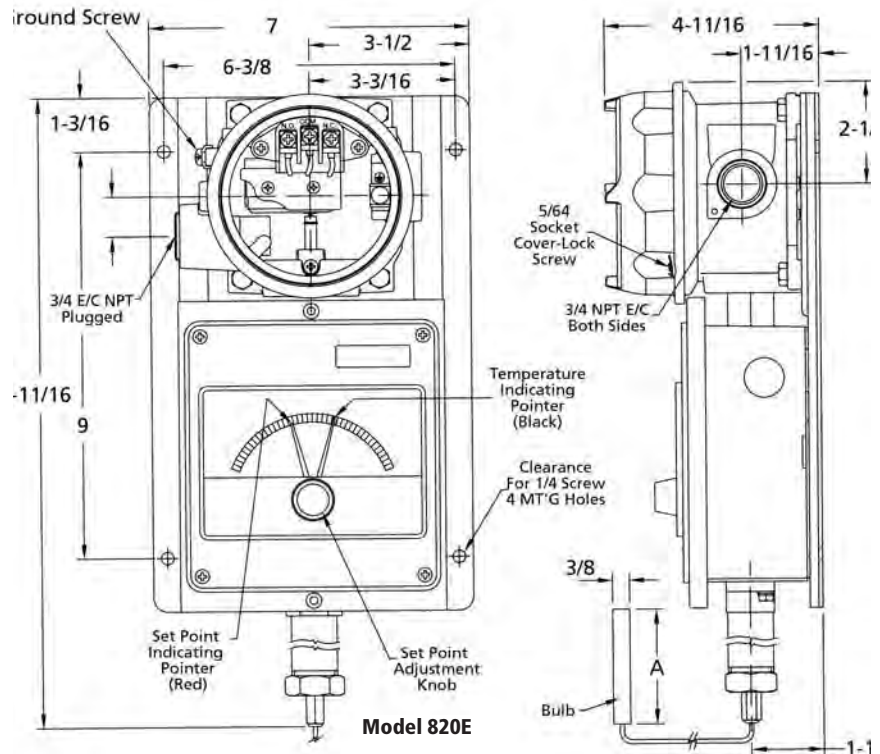


DIMENSIONS (INCHES)

120 Series, Explosion Proof
Internal set point adjustment, dual contacts
Models J120, J120K, C120, F120



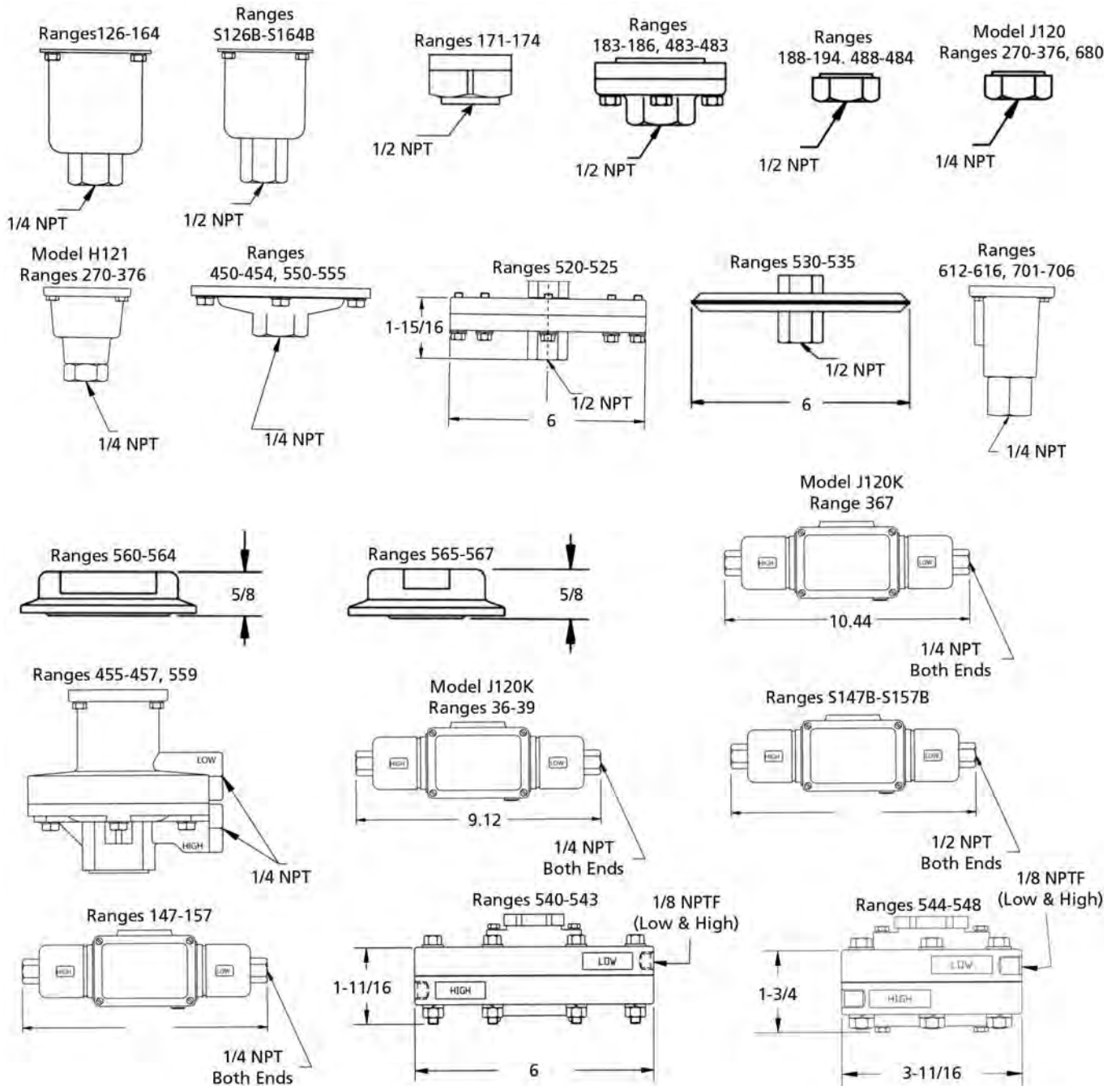
Explosion-Proof Indicating Temperature Controls
Model 820E, single switch, external adjustment and temperature indication, dual conduits
Model 822E, dual switch, external adjustment and temperature indication, dual conduits



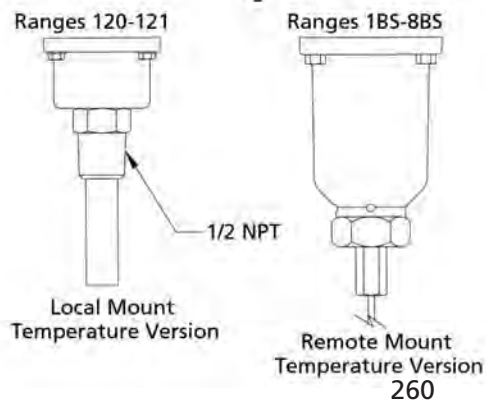
Dimension A		
Range Code	Inches	NPT
126-124	8.13	1/4
S126B-S164B	8.58	1/2
270-376	7.85	1/4
450, 452	9.80	1/4
453, 454	9.10	1/4
550, 552	9.75	1/4
553-555	9.25	1/4
612, 616	8.65	1/4
701-705	8.31	1/4
Differential Pressure		
147-157	8.44	1/4
S147B-S157B	8.44	1/2
456-559	9.40	1/4
Temperature		
120, 121	10.00	Immersion Stem
2B5-8B5	9.90	Bulb & Capillary
13272, 13322	-	Immersion Stem (Freeze Protection)
13273, 13321	-	Bulb & Capillary (Heat Tracing)

DIMENSIONS (INCHES)

Pressure Sensors (See drawings on previous pages for complete dimensions)



Temperature Sensors (See drawings on previous pages for complete dimensions)



CLARK SOLUTIONS

One Series, 2-Wire Electronic Pressure & Temperature Switches

F.S. Ranges 5 to 4500 PSI, -50 to 450°F, 100% F.S. Deadband & Set Point Adjustment

DESCRIPTION

The One Series 2-Wire electronic switch is both an evolutionary and a revolutionary solution to alarm and shutdown applications. It is the only electronic switch to operate on a single pair of wires, similar to a traditional mechanical switch. It combines the simplicity and low cost features of a switch and the reliability features of a transmitter, at less than half the price of the transmitter. In addition, many features have been added that provide more control and information than any other switch!

OPERATION

The One Series 2-Wire derives its operating power from the discrete input to which it is connected. Unlike a transmitter, it will do this on a digital channel, not a more expensive analog channel. In most applications this will be the input of a Programmable Logic Controller (PLC), a Distributed Control System (DCS) or an interposing relay. When operating in an "OPEN" condition, One Series 2-Wire draws less than 750 uA of current, which the host device interprets as an open condition. When operating in a "CLOSED" state the switch will pass enough current to be interpreted by the host as a closed condition. Whether its internal switch is open or closed, the One Series 2-Wire obtains a minute but sufficient amount of power to operate continuously - directly from the discrete input. No separate power wiring is required. The PLC/DCS input interprets the One Series 2-Wire connection as if it were mechanical contacts - JUST LIKE A SWITCH!



FEATURES

The One Series 2-Wire has a large, easy-to-read display, showing the process condition and the status of the switch. Set point, deadband and minimum/maximum process values can be easily accessed from the keypad while in operation. One Series 2-Wire also contains patented IAW® self-diagnostic software for assurance that it will switch when needed. With PLUGGED PORT detection enabled, it will watch for process conditions which are evidence of a plugged sensing port, and alert the user to potential problems, locally and remotely. Also, the switch output can be configured for manual reset, requiring the user to manually acknowledge the alarm. Field adjustments can be made to OFFSET and SPAN for calibrating to user instrument and system requirements. Transients and spurious impulses can be filtered using the One Series 2-Wire DELAY feature.

One Series 2-Wire is designed for intrinsic safety, and meets cULus, CENELEC and CE requirements. The NEMA 4X die-cast enclosure is rugged, gasketed and epoxy coated with an all-stainless steel welded sensor.

- Powered from PLC/DCS discrete input
- Local LCD display of process and programming values
- All solid state; no moving parts
- No regular calibration required; extended service life
- Field adjustments for offset and span
- Set point and deadband adjustable up to 100% of range
- Digital accuracy and 0.1% repeatability over wide temperature range
- 3-year warranty

ADVANCED FEATURES:

- 2-Wire design (Patented)

The One Series 2-Wire innovative design allows the unit to power itself and switch using the same two wires. The electronic switch's low power requirements allow the One Series 2-Wire to operate using residual current from the PLC discrete input, totally undetected during an open switch condition.

- Easy wiring

The One Series 2-Wire is a direct drop-in replacement for a switch that is attached to a PLC, using the same two wires. No other wiring is necessary. Power and switching signals are accommodated over the same (existing) wire pair. The terminal block wiring is effective for either new construction or field replacement.

- Intrinsically safe (with IS barrier, 24 VDC model only)

The One Series 2-Wire is approved for use in intrinsically safe applications. Galvanically-isolated barrier, part no. 62169-29, is custom-designed for use with the One Series. The One Series is also compatible with standard 28 volt diode barriers supplied from most major manufacturers including MTL 7087+ and Pepperl+Fuchs Z787.

ADVANCED FEATURES(CONT'D):

- IAW®(I Am Working) diagnostics

One Series 2-Wire contains the patented IAW® self-diagnostics feature, giving the user peace-of-mind that the instrument is operating properly and will switch when required. Locally, a series of rotating arrows and display messages inform the operator of reliable operation. Remotely, the switch output can be configured to alert the operator to the IAW® status.

- Plugged Port detection (Patent pending Pressure Models only)

One Series 2-Wire IAW® includes an algorithm for detecting a plugged or isolated pressure sensor port, where the medium is viscous or contains particulate matter. When Plugged Port detection is enabled, the One Series 2-Wire display will alert the user locally and remotely, using its IAW® indications.

- Datalogging of minimum and maximum process readings

A very useful feature of the One Series 2-Wire is its ability to record and store the minimum and maximum process "extremes" in non-volatile memory. The values remain in memory until they are manually reset, using a key sequence on the keypad.

- Latching or automatic reset

The switch output can be field-configured for either automatic reset or latching. The latching feature provides a "manual reset" requirement, making it necessary for the operator to intervene and determine why the alarm occurred.

- Delay (nuisance trip) filtering

The One Series 2-Wire is designed to react quickly to very small process variations. Certain short-duration events (pressure spikes) can cause nuisance trips and shut down a process unnecessarily. Delay (event) filtering can be enabled by choosing the maximum time duration (1/4, 1/2, 1 or 2 seconds) within which the One Series 2-Wire will ignore (filter out) the process variation. With this feature disabled, the One Series 2-Wire reacts within 50 mS to all process variations.

- Certified to Enclosure Type 4X/IP66

Corrosion resistant enclosure is epoxy-coated aluminum with a gasketed, Lexan® faceplate to withstand harsh and dirty environments and plant wash-downs.

- Agency Certifications: cULus, CENELEC, and CE approvals

The One Series 2-Wire has been rigorously tested by independent agencies to ensure adherence to required industrial specifications, manufacturing practices and quality. Each One Series 2-Wire is backed by a limited 3-year warranty.

APPLICATIONS

In the past, there were two choices for alarm and/or shutdown applications: an electro-mechanical switch, or a transmitter. The switch had the advantages of low cost and simple operation. The transmitter was higher cost, but offered diagnostic information through its "live zero" and perceived higher reliability. The customer had to choose.

Then came the One Series, a family of rugged electronic switches with the combination of low cost, reliability and diagnostics. It was the cost-effective answer for many applications which required the combination of "switch" function and "health" information. It has achieved widespread usage in the process and energy industries. However, for some applications, with mechanical switch wiring already in place, it was challenging to accommodate the additional third wire required to power the One Series.

The One Series 2-Wire is the next evolutionary stage in the One Series revolution.

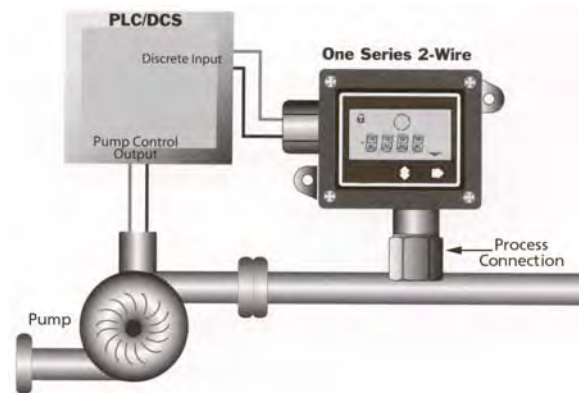
REPLACING MECHANICAL SWITCHES

By utilizing residual current from the host, the One Series 2-Wire can provide digital switching on a single pair of wires. This allows the user to retrofit existing mechanical switches with no wiring changes, as long as the circuit is low power discrete input (such as a PLC or DCS input).

REPLACING TRANSMITTERS

The One Series 2-Wire versatility also makes it the ideal solution for alarm and shutdown applications previously accomplished by transmitters. Typically, transmitters are used in switching applications when a "live-zero" is desired- to confirm that the device is working. However, transmitters have two weaknesses - they are typically slow-reacting to process changes, and they are expensive. The One Series 2-Wire provides the IAW® diagnostics for similar peace-of-mind to the transmitter's 4-20 signal, but is typically much faster-responding to process upsets, and can use less-expensive digital channels, reducing cost. The \$1200 installed cost of a transmitter can be reduced by \$600 to \$800 per unit!

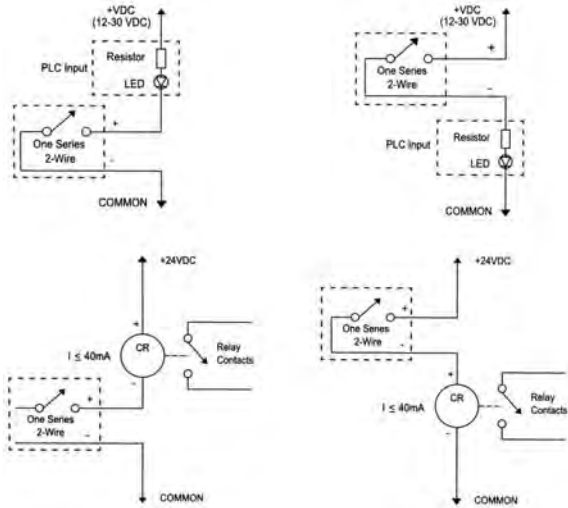
Applications include pressure and temperature measurements for rotating equipment protection, process line and tank monitoring, and boiler/burner alarms. With adjustable deadband from 0-100% of range, the One Series 2-Wire is the perfect solution to operate and protect pumps! The One Series is field-proven in many process industries including chemical, food, pharmaceutical, energy, wastewater and refinery applications.



TECHNOLOGY

SWITCH DESIGN

The One Series 2-Wire is a microprocessor-based pressure instrument with an extremely low power (patented) design. A digital display gives real-time information and simplifies programming. Because of its unique 2-wire interface and low power design, the One Series 2-Wire can be attached to a PLC, DCS, or many common relays, using only 2 wires.



OPERATION

The One Series 2-Wire uses a stainless steel pressure transducer or temperature sensor to provide input to a micro-controller for making switch decisions. Programming and interrogating the One Series 2-Wire is done through two buttons on the faceplate. A sequence of key strokes for programming provides tamper resistance.

- The input is filtered, as programmed by the user.
- The value is compared to the programmed set point and deadband information.
- The output state is changed if required.
- The digital display is updated.
- The value is recorded, with a new maximum or minimum reading, for later interrogation by the user.
- The Plugged Port feature may be activated.

I AM WORKING (IAW® DIAGNOSTICS)

One Series 2-Wire contains patented IAW® algorithm, providing both local and remote assurance of switch health, switch status, and fault conditions. Remotely, the switch output can be configured

to operate in either the IAW® (diagnostic) or simple on-off manner. When programmed for IAW® operation, the contacts have three possible states:

1. remain closed when the switch is functioning properly, and no alarm exists;
2. open for diagnostic fault or power loss; and
3. 25 mS or 100 mS on-off cycling (pulsing) for proper functioning during an alarm condition.

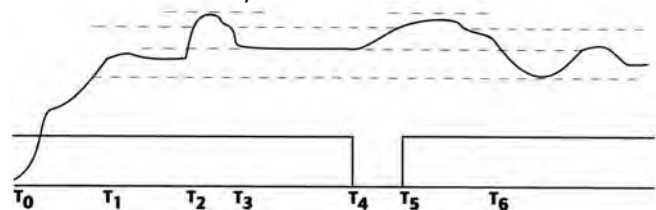
PLUGGED PORT DETECTION (Pressure Models only)

The Plugged Port Detection feature, if enabled by the user, monitors the changes in the process variable over time. As long as there is sufficient fluctuation in the process variable the unit will operate normally. If the process variable does not change over the specified time period a Plugged Port condition will be displayed. The user can program the amount of variation and the window of time to be monitored.

The Plugged Port feature records the present value of the process variable. Two thresholds will be calculated (+/- n) as specified by the user and the timer will be enabled. If the process variable stays within the calculated thresholds and the timer expires, a Plugged Port condition is reported. If either of the thresholds are crossed, the timer will be reset and new thresholds will be calculated.

The graph below depicts a typical sequence of events.

- T₀ Process variable ramp up
- T₁ Process variable stabilizes, new thresholds calculated
- T₂ Threshold exceeded, new thresholds calculated, timer reset
- T₃ Low threshold exceeded, new thresholds calculated, timer reset
- T₄ Plugged Port timer expires, Plugged port condition reported
- T₅ Plugged Port condition cleared, new thresholds calculated, timer reset
- T₆ Low threshold exceeded, new thresholds calculated, timer reset



During a plugged port condition the display will read "PLUG" and the switch will be set in the "OPEN" state.

SPECIFICATIONS

Power input: 12-30 VDC or 90-130 VAC or VDC (derived from PLC/DCS discrete input or through a suitable series load). Refer to Installation and Maintenance Sheet IM2W for additional information

Accuracy: 0.5% of full range span, under nominal conditions

SPECIFICATIONS (CONT'D)

Repeatability: 0.1% of full range span

Ambient operating temperature range: -40 to 85°C; -20 to 70°C (Full display visibility)

Temperature drift: 300 ppm/°C

Switch response time: "Change-of-output" response within 50 mS (for detection of full step change and change of output state, delay feature off)

Display response time: 400 mS

Response time filtering (Delay): Software-configurable between 250 mS and 2 seconds in 2x increments

Diagnostics (IAW®): Open or shorted sensor; plugged port; power supply out of range; over and under-range conditions; microprocessor faults/failure; keypad short; switch fault

Output states: Field selectable for 2-state or 3-state operation.

For 3-state operation: Output will remain in closed state during normal ("inside threshold") operation; change to open state to indicate a fault/failure; and change between closed and open (pulse) state on a 25 mS or 100 mS cycle (user defined) during "at and outside threshold" conditions

For 2-state operation: Output will remain in one state (open or close) during normal ("inside threshold") operation; change to the opposite state for "at and outside threshold" conditions. Unit must be configured as normally closed (Open rise or Open fall) in order to achieve "fail-safe" condition so that a diagnostic or other failure will produce an open output state

Control modes: Field configurable for change of state above or below set point value. Software configurable for automatic or manual reset

Switch output: SPST solid state device, to interface with 12-30 VDC or 90-130 VAC input from PLC, DCS or relay. May be wired for either sourcing or sinking operation

Electrical characteristics: Model 2W2D- Switch open: 12-30 VDC @ 750 µA maximum; Switch closed: 4.7VDC @ 40mA, maximum.

Model 2W3A- Switch open: 90-130 VAC or VDC @ 1mA maximum, switch closed: 13 VAC or VDC @ 100 mA, maximum

Enclosure: Designed to meet NEMA 4X/IP66, epoxy-coated aluminum

Faceplate: UV-resistant Lexan® (polycarbonate) with 2-button membrane switch and overlay

Wiring terminations: Terminal block with 3 screw connections (2 for switch output and one to ground chassis). Accepts 14-22 AWG wire.

Conduit: 1/2" NPT (female)

Display: Local 4 digit x 0.5" LCD

I Am Working (IAW®) status arrows

Process Variable

Units of measure

Switch status

Latch status

Set point value

Deadband value

Min/Max values

Fault codes

Set point & deadband: User-configured, 100% adjustable over entire sensor range

Pressure sensor: 316 stainless steel, welded diaphragm, 1/2" NPT (female) connection, micromachined piezoresistive silicon element

Media temperature: -40 to 257°F (-40 to 125°C) Pressure Sensors

Temperature sensors: 304 stainless steel, 100 ohm 4-wire RTD, 0.25" OD epoxy filled sheath(Local and Remote models), powder packed sheath (High-temperature models)

Media range: -50 to 1000°F (-45 to 538°C) Temperature Sensors

EMI/RFI: Compliance to CE EMC requirements EN5011:1998:A1, EN61000-6-2:1999

Emission: EN55011 class A; Radiated emissions

Immunity: EN61000-4-2 Immunity to Electrostatic Discharge

EN61000-4-3 Immunity to Continuous Radiated Disturbances

EN61000-4-4 Immunity to Electrical Fast Transients

EN61000-4-5 Immunity to Surges

EN61000-4-6 Immunity to Continuous Conducted Disturbances

EN61000-4-8 Immunity to Power Frequency Magnetic Field

Memory: Programming and data protected by Non-Volatile EEPROM

Effective transmission distance: 2,000 feet at rated voltage

Lexan® is a registered trademark of General Electric Co.

IAW® is a registered trademark of United Electric Controls Co.

Configuration Selection Guide Power and Switch Options			
Input Type	Input Voltage Range	Max. Switch Output Capacity	Model Number
24 VDC PLC/DCS/PC	12-30 VDC	30 VDC@ 40 mA	2W2D00
24 VDC Relay or Solenoid Coil	12-30 VDC	30 VDC@ 40 mA	2W2D00
115 VAC PLC/DCS/PC	90-130 VAC	130 VDC@ 100 mA	2W3A00
115 VAC Relay or Solenoid Coil	90-130 VAC	130 VDC@ 100 mA	2W3A00
125 VAC PLC/DCS/PC	90-130 VAC	130 VDC@ 100 mA	2W3A00
115 VAC Relay or Solenoid Coil	90-130 VAC	130 VDC@ 100 mA	2W3A00

APPROVALS & RATINGS

Midel	N. America UL Listed, cUL Certified UL50, 508, 913, 1604 & 60079-15; CSA No. E79-0, E79-11, E60079-15, C22.2 No. 14, 157 & 213 File#E226592
2W2D Intrinsically safe when used with a safety barrier (option M036)	Class I, Div 1, Groups A, B, C & D Class II, Div 1, Groups E, F & G Class III Class I, Zone 0, AEx ia IIC T5 Class I, Zone 0, Ex ia IIC T5 Per UE drawing # A-62174-19
2W2D Non-incendive	Class I, Div 2 Groups A, B, C & D Class II, Div 2 Groups F & G Class III Class I, Zone 2, AEx nC IIC T5 Class I, Zone 2 Ex nC IIC T5
2W3A Non-incendive	Class I, Div 2 Groups A, B, C & D Class II, Div 2 Groups F & G Class III Class I, Zone 2, AEx nC IIC T5 Class I, Zone 2 Ex nC IIC T5

ORDERING INFORMATION

BUILD A PART NUMBER BY SELECTING APPROPRIATE CODE FOR EACH FEATURE CATEGORY

EXAMPLE:2W2DOOP10-M276

2W2D00	P	10	M276
2-Wire	Sensor	Range	Option
Electronic Switch	Type	Configuration	Codes
12-30 VDC	Pressure	0-5 psi	Units-mbar

MODEL

2W2D00

2W3A00

SENSOR TYPE

P	Pressure, gage, 316L stainless steel welded diaphragm, 1/2" NPT (female)
K	Differential Pressure, piezo-resistive strain gage, silicone oil fill, 316L stainless wetted materials, 1/4" NPT (male) process connections,
T	Temperature, 100 ohm RTD, 304 stainless steel sheath, 0.25" OD

SENSOR RANGE AND CONFIGURATION

PRESSURE	Ranges ¹		Maximum Over Range ²		Max Working Pressure ³	
	psi	bar	psi	bar	psi	bar
10	0-5	0-0.345	7.5	0.515		
11	0-15	0-0.103	22.5	1.550		
12	0-30	0-0.207	45	3.100		
13	0-50	0-0.345	75	5.170		
14	0-100	0-0.690	150	10.3		
15	0-300	0-20.68	450	31		
16	0-500	0-34.47	750	51		
17	0-1000	0-68.95	1500	103		
18	0-3000	0-206.8	4500	310		
19	0-4500	0-310.3	6750	465		
DIFFERENTIAL PRESSURE	psid	bar	psid	bar	psi	bar
K11	0-50.0	0-3.447	100	6.895	500	34.47
K12	0-100	0-6.90	200	13.8	1500	103.4
K13	0-200	0-13.8	400	27.6	1500	103.4

1 - The pressure range that the sensor will perform within specified tolerances.

2 - The maximum pressure that can be applied without affecting sensor performance.

3 - The maximum pressure that can be applied to both ports simultaneously without affecting sensor performance. Pressure on the "H" sensor port must be greater than or equal to pressure on the "L" sensor port.

TEMPERATURE – 4-wire RTD, 100 ohm platinum, DIN 0.00385, 0.25" OD sensor sheath, 316 stainless steel construction

L1 Local mount sensor, 4" probe length, -50 to 450°F (-45 to 232°C)

L2 Local mount sensor, 6" probe length, -50 to 450°F (-45 to 232°C)

L3 Local mount sensor, 10" probe length, -50 to 450°F (-45 to 232°C)

R1 Remote mount sensor, 6" probe length, 6' Teflon extension wire, -50 to 450°F (-45 to 232°C)

RC Remote mount sensor, 6" probe length, up to 30' Teflon extension wire, -50 to 450°F (-45 to 232°C)

H1 Remote mount sensor, 2.5" probe length, 6' MI extension wire, -50 to 1000°F (-45 to 538°C)

HC Remote mount sensor, 2.5" probe length, up to 30' MI extension wire, -50 to 1000°F (-45 to 538°C)

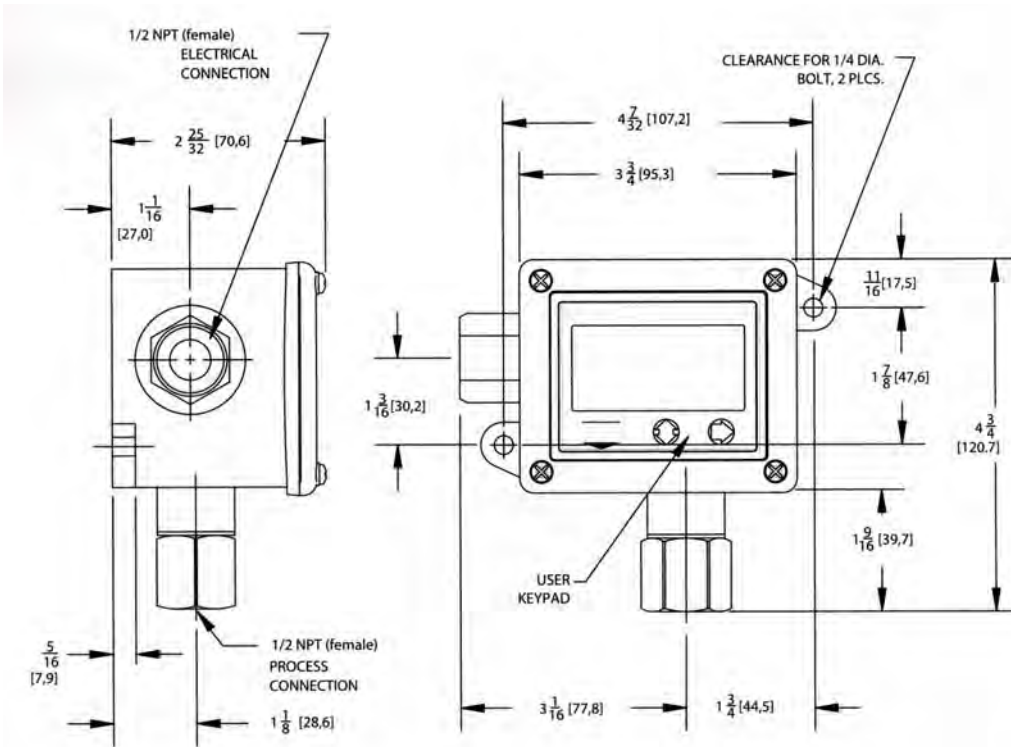
OPTION CODES

- HL1 Hazardous location certificate
- M036 Transformer isolated IS barrier (Use 62169-29 if ordered separately)
- M041 Secondary pressure barrier, pressure models only
- M201 Factory set parameters (set point, deadband, switch operating mode)

- M270 Display units, degrees C for temperature
- M276 Display units, bar or mbar
- M277 Display units, kPa or MPa
- M278 Display units, kg/cm²
- M319 Diaphragm seal
- M407 PED CE category IV compliance
- M444 Paper tag
- M446 Stainless steel tag
- M550 Oxygen cleaning service
- PF73 1/2" NPT compression fitting kit (temperature models L1-L3 only)
- SA6213-348 1/2" union connector kit (temperature models R1 & RC, H1 & HC only)

Display Resolution		Options					
Range psi	Decimal Places	Range (mbar)	Decimal Places	Range (kPa) MPa	Decimal Places	Range kg/cm	Decimal Places
0-5	2	(344.7)	1	(34.47)	2	0.352	3
0-15	2	(1034)	0	(103.4)	1	1.055	3
0-30	2	(2068)	0	(206.8)	1	2.109	3
0-50	1	(3447)	0	(344.7)	1	3.516	3
0-100	1	(6895)	0	(689.5)	1	7.031	3
0-300	1	20.68	2	(2068)	0	21.09	2
0-500	1	34.47	2	(3447)	0	35.16	2
0-1000	0	68.95	2	(6895)	0	70.31	2
0-3000	0	206.8	1	20.68	2	210.9	1
0-4500	0	310.3	1	31.03	2	316.4	1

DIMENSIONS INCHES (MM)



CLARK SOLUTIONS

100 Series, Pressure, Vacuum, Diff. Pressure & Temp. Switches

Adjustable Ranges 30" Vac to 5000 PSI, -180 to 650°F

DESCRIPTION

The 100 Series is a cost-effective pressure and temperature control for process plants and OEM equipment. The rugged, one piece enclosure features a slanted cover for wiring accessibility. A wide variety of electrical and process-connection options make this series ideal for many applications, where weather-proof, ruggedness and versatility are required.

Various applications utilize the 100 Series: heat tracing, freeze protection, processing equipment (pumps, compressors), inputs for annunciator panels and fire suppression systems.



SPECIFICATIONS

GENERAL

Storage Temperature: -65° to 160°F (-54 to 71°C)

Ambient Temperature: -40° to 160°F (-40 to 71°C); models 520-548, 700-706: 0 to 160°F (-18 to 71°C); Set point typically shifts less than 1% of range for a 50°F (28°C) ambient temperature change

Set Point Repeatability: Temperature models: ± 1% of adjustable range
 Pressure models 171-174, 218, 270-376, 520-535, 540-543, 700-706, 560-564: ± 1% of adjustable range; models 190-194, 183-189, 483-494, 544-548, 565-567, 610-680: ± 1.5% of adjustable range
 Internal set point lock on all pressure models

Shock: Set point repeats after 15 G, 10 millisecond duration

Vibration: Set point repeats after 2.5 G, 5-500 Hz

Enclosure: Die cast aluminum, epoxy powder coated, gasketed, captive cover screws

Enclosure Class: Designed to meet NEMA 4X requirements

Switch Output: One SPDT snap action switch

Electrical Rating: 15 A 125/250/480 VAC resistive

Weight: 2-7 lbs; Varies with model

Electrical Connection: 1/2" NPT (female); Two 7/8" diameter knockouts

Pressure Connection: Models 218, 270-376, 610-680, 701-706: 1/4" NPT (female);

Models: 171-194, 483-494, 520-535: 1/2" NPT (female);

Models 540-548: 1/8" NPT (female); Models 560-564: 2" Sanitary

Fitting; Models 565-567: 1.5" Sanitary Fitting (Sanitary fittings mate with Tri-Clamp® fitting systems)

Temperature Assembly: Bulb and capillary: 6 feet 304 stainless steel
 Immersion stem: nickel-plated brass (standard length only); optional 316L stainless steel

Fill: Models 1BS/BC are solvent filled, models 2-8 non-toxic oil filled

Temperature Deadband: Type F typically 1% and type B, C, and E typically 2% of range under laboratory conditions (70°F ambient circulating bath at rate of 1/2°F per minute change)

Heat Tracing or Freeze Protection: Thermostats designed specifically for heat tracing and freeze protection ambient sensing applications are available with types B100 and E100; specifications are the same as above except: type B100-13546 includes: 22 A/480 VAC switch; type E100-13545 includes: 22 A/480 VAC switch and 10 feet of stainless steel capillary

Approvals: UL listed, Temperature: C22.2, no. 24 file # LR7814

UL listed, Pressure: C22.2, no. 14 file # LR39690

CSA certified, Temperature: C22.2, no. 14 file # LR39690

CSA certified, Pressure: C22.2, no. 14 file # LR39690

CE Compliance with Low Voltage Directive (LVD)

CE Compliance with Pressure Equipment Directive (PED 97/23/EC)

PRESSURE MODEL H100 CHART

Range/Material Code	Adjustable Set Point Range		Deadband		*Over Range Pressure		**Proof Pressure	
	" w.c.	mbar	" w.c.	mbar	psi	bar	psi	bar
Buna-N diaphragm & O-Ring with 1/2" NPT (female) aluminum pressure connection (other wetted materials available, see Order Info)								
520	300 Vac to 0	-746.7 to 0	0.2 to 8	0.5 to 19.9	200	13.8	400	27.6
521	10 Vac to 10	-24.9 to 24.9	0.1 to 0.6	0.2 to 1.5	200	13.8	400	27.6
522	50 Vac to 50	-124.5 to 124.5	0.1 to 3	0.2 to 7.5	200	13.8	400	27.6
523	0.5 to 5.0	1.2 to 12.4	0.1 to 0.3	0.2 to 0.75	200	13.8	400	27.6
524	2.5 to 50	6.2 to 124.5	0.1 to 0.8	0.2 to 2.0	200	13.8	400	27.6
525	10 to 250	24.9 to 622.3	0.1 to 6	0.2 to 24.9	200	13.8	400	27.6
Welded 316L stainless steel diaphragm with 1/2" NPT (female) 316L pressure connection								
530	300 Vac to 0	-746.7 to 0	0.2 to 15	0.5 to 37.3	50	3.4	100	6.9
531	10 Vac to 10	-24.9 to 24.9	0.1 to 0.6	0.2 to 1.5	50	3.4	100	6.9
532	50 Vac to 50	-124.5 to 124.5	0.1 to 3	0.2 to 7.5	50	3.4	100	6.9
533	0.5 to 5.0	1.2 to 12.4	0.1 to 0.3	0.2 to 0.7	50	3.4	100	6.9
534	2.5 to 50	6.2 to 124.5	0.1 to 0.8	0.2 to 2.0	50	3.4	100	6.9
535	10 to 250	24.9 to 622.3	0.1 to 10	0.2 to 24.9	50	3.4	100	6.9
	psi	bar	psi	bar	psi	bar	psi	bar
Welded stainless steel diaphragm with 1/2" NPT (female) pressure connection, large 0.72" orifice for clean-out purposes								
171	1 to 20	0.07 to 1.4	0.1 to 1.0	0.01 to 0.07	500	34.5	1000	68.9
172	2 to 50	0.14 to 3.4	0.1 to 1.5	0.01 to 0.10	500	34.5	1000	68.9
173	4 to 100	0.3 to 6.9	0.1 to 2.5	0.01 to 0.17	500	34.5	1000	68.9
174	8 to 200	0.6 to 13.7	0.1 to 3.5	0.01 to 0.24	500	34.5	1000	68.9
2" sanitary welded 316L stainless steel diaphragm and pressure connection. Mates with Tri-Clamp® fitting systems								
560	0.5 to 15	0.03 to 1.03	0.1 to 1	0.01 to 0.07	200	13.8	300	20.7
561	1 to 25	0.07 to 1.72	0.1 to 1.5	0.01 to 0.10	200	13.8	300	20.7
562	2 to 50	0.14 to 3.45	0.1 to 2.5	0.01 to 0.17	200	13.8	300	20.7
563	4 to 100	0.03 to 6.9	0.1 to 4	0.01 to 0.2	200	13.8	300	20.7
564	8 to 200	10.6 to 13.8	0.1 to 5	0.01 to 0.3	200	13.8	300	20.7

PRESSURE MODEL H100

Range/Material Code	Adjustable Set Point Range		Deadband		*Over Range Pressure		**Proof Pressure	
	psi	bar	psi	bar	psi	bar	psi	bar
1.5" sanitary welded 316L stainless steel diaphragm and pressure connection. Mates with Tri-Clamp fitting systems								
565	5 to 30	0.3 to 2.1	1 to 5	0.07 to 0.3	1000	68.9	1500	103.4
566	10 to 100	0.7 to 6.9	1 to 12	0.07 to 0.8	1000	68.9	1500	103.4
567	15 to 300	1.0 to 20.7	3 to 22	0.21 to 1.5	1000	68.9	1500	103.4
Buna-N diaphragm and O-Ring with 1/4" NPT (female) nickel-plated brass pressure connection; Option M540 Viton® diaphragm & O-Ring available for code 704-705								
701	1.5 to 30	0.1 to 2	1 to 2	0.07 to 0.14	500	34.5	600	41.4
702	3 to 100	0.2 to 6.9	1 to 4	0.07 to 0.28	500	34.5	600	41.4
703	9 to 300	0.7 to 20.7	1 to 5	0.07 to 0.34	500	34.5	600	41.4
704	15 to 500	1.0 to 34.5	2 to 8	0.14 to 0.55	1500	103.4	2500	172.4
705	30 to 1000	2.1 to 69	3 to 20	0.21 to 1.38	1500	103.4	2500	172.4
706	100 to 1700	6.9 to 117	10 to 30	0.07 to 2.07	2000	137.9	2500	172.4
316L stainless steel diaphragm (optional Hastelloy® C, Monel® or Tantalum); Viton® GLT O-Ring (optional Kalrez®, Silicone, Ethylene Propylene, or Atlas®); 316 stainless steel 1/2" NPT (female) pressure connection (optional Hastelloy® B or C, or Monel®), large 0.72" orifice for clean-out purposes. Models 188 & 189 have a 316L stainless steel 1/2" NPT (female) pressure connection								
183	1 to 20	0.07 to 1.4	0.3 to 2.5	0.021 to 0.17	500	34.5	1000	68.9
184	2 to 50	0.14 to 3.4	0.3 to 3	0.021 to 0.2	500	34.5	1000	68.9
185	4 to 100	0.3 to 6.9	0.5 to 6	0.03 to 0.4	500	34.5	1000	68.9
186	8 to 200	0.6 to 13.8	1 to 11	0.07 to 0.8	500	34.5	1000	68.9
188	50 to 1000	3.45 to 68.9	25 to 125	1.7 to 8.6	2000	137.9	7000	482.6
189	250 to 3500	17.3 to 241.3	50 to 300	3.4 to 20.7	4000	275.8	7000	482.6

Range/Material Code	Adjustable Set Point Range		Deadband				*Over Range Pressure		**Proof Pressure	
	psi	bar	Lower 75% range		Top 25% Range		psi	bar	psi	bar
Welded stainless steel diaphragm with 1/2" NPT (female) pressure connections, large 0.072" orifice for clean-out purposes										
190	5 to 30	0.3 to 2.1	1 to 3	0.07 to 0.2	6 max	0.4	1500	103.4	2500	172.4
191	10 to 100	0.7 to 6.9	1 to 8	0.07 to 0.6	15 max	1.0	1500	103.4	2500	172.4
192	15 to 300	1 to 20.7	3 to 18	0.2 to 1.2	25 max	1.7	1500	103.4	2500	172.4
193	20 to 500	1.4 to 34.5	4 to 30	0.3 to 2.1	45 max	3.1	1500	103.4	2500	172.4
194	80 to 1700	5.5 to 117.2	5 to 120	0.3 to 8.3	150 max	10.3	2000	137.9	2500	172.4
Welded 316 stainless steel diaphragm with 1/2" NPT (female) pressure connection, 0.06" orifice to dampen pulsations										
490	5 to 30	0.3 to 2.1	1 to 3	0.07 to 0.2	6 max	0.4	1500	103.4	2500	172.4
491	10 to 100	0.7 to 6.9	1 to 8	0.07 to 0.6	15 max	1.0	1500	103.4	2500	172.4
492	15 to 300	1 to 20.7	3 to 18	0.2 to 1.2	25 max	1.7	1500	103.4	2500	172.4
493	20 to 500	1.4 to 34.5	4 to 30	0.3 to 2.1	45 max	3.1	1500	103.4	2500	172.4
494	80 to 1700	5.5 to 117.2	5 to 120	0.3 to 8.3	150 max	10.3	2000	137.9	2500	172.4

Range/Material Code	Adjustable Set Point Range		Deadband		*Over Range Pressure		**Proof Pressure	
	psi	bar	psi	bar	psi	bar	psi	bar
316L stainless steel diaphragm (optional Hastelloy®C, Monel® or Tantalum) Viton® GLT O-Ring (optional Kalrez®, Silicone, ethylene propylene or Atlas®), 316 stainless steel 1/2" NPT (female) pressure connection (optional Hastelloy® B, or C, or Monel®), 0.06" orifice. Models 488 & 489, 316L pressure connection.								
483	1 to 20	0.07 to 1.4	0.3 to 2.5	0.02 to 0.17	500	34.5	1000	68.9
484	2 to 50	0.14 to 3.4	0.3 to 3	0.02 to 0.2	500	34.5	1000	68.9
485	4 to 100	0.3 to 6.9	0.5 to 6	0.03 to 0.4	500	34.5	1000	68.9
486	8 to 200	0.6 to 13.8	1 to 11	0.07 to 0.8	500	34.5	1000	68.9
488	50 to 1000	3.4 to 68.9	25 to 125	1.7 to 8.6	2000	137.9	7000	482.6
489	250 to 3500	17.2 to 241.3	50 to 300	3.4 to 20.7	4000	275.8	7000	482.6
Phospher bronze bellows with 1/4" NPT (female) nickel-plated brass pressure connection. Model 218 has 300 series stainless steel spring in media								
218	30" Hg Vac to 0	-1 to 0	1 to 2" Hg	0.03 to 0.07	0	0	30	2.07
270	4 to 200	0.3 to 13.8	1 to 8	0.07 to 0.6	200	13.8	250	17.2
274	6 to 600	0.4 to 20.7	1 to 10	0.07 to 0.7	300	20.7	350	24.1
Welded 316L stainless steel bellows with 1/4" NPT (female) pressure connections								
358	15 to 200	1 to 13.8	1 to 3	0.07 to 0.2	200	13.8	800	55.2
361	20 to 300	1.38 to 20.7	1 to 4	0.07 to 0.3	300	20.7	800	55.2
376	25 to 500	1.8 to 34.5	1.5 to 5	0.10 to 0.3	500	34.5	800	55.2
303 stainless steel piston, Buna-N O-Ring with 1/4" NPT (female) 303 stainless steel pressure connection(not recommended for gas service since drying of O-Ring seal can allow bleeding of medium into the atmosphere)								
610	75 to 1000	5.2 to 68.9	30 to 150	2.07 to 10.3	6000	413.7	10,000	689.5
612	125 to 3000	8.6 to 206	40 to 250	2.76 to 17.2	6000	413.7	10,000	689.5
616	700 to 5000	48.5 to 344	40 to 375	2.76 to 25.9	6000	413.7	10,000	689.5
316 stainless steel bellows with 1/4" NPT (female) pressure connection (not recommended for gas applications or for rapid or high cycling pressure changes)								
680	100 to 1700	6.9 to 117.2	9 to 40	0.6 to 2.8	1700	117.2	2500	172.4

DIFFERENTIAL PRESSURE MODEL H100K

Range/Material Code	Adjustable Set Point Range		Deadband		***Working Pressure		**Proof Pressure	
	"wcd/psid	mbar/bar	psi	mbar/bar	psi	bar	psi	bar
Kapton® diaphragm, Buna-N sealing diaphragms and epoxy coated aluminum 1/8" NPT (female) pressure connections								
540	0.2 to 7" wcd	0.5 to 17.4 mbar	0.05 to 0.6" wc	0.1 to 1.5 bar	200	13.8	400	27.6
541	1 to 20" wcd	2.5 to 49.7 mbar	0.1 to 1.0" wc	0.2 to 2.5 bar	200	13.8	400	27.6
542	5 to 50" wcd	12.4 to 124.4 mbar	0.2 to 2.5" wc	0.5 to 6.2 bar	200	13.8	400	27.6
543	10 to 200" wcd	24.9 to 497.0 mbar	0.5 to 8" wc	1.2 to 19.9 bar	200	13.8	400	27.6
544	2 to 20 psid	0.1 to 1.4 bar	0.1 to 1.3 psi	6.9 to 89.6 bar	1200	82.7	2500	172.4
545	5 to 50 psid	0.3 to 3.4 bar	0.2 to 2.2 psi	0 to 0.15 bar	1200	82.7	2500	172.4
546	10 to 125 psid	0.7 to 8.6 bar	0.4 to 5.0 psi	0 to 0.34 bar	1200	82.7	2500	172.4
547	50 to 250 psid	3.4 to 17.2 bar	0.8 to 10 psi	0.1 to 0.69 bar	1200	82.7	2500	172.4
548	100 to 500 psid	6.9 to 34.5 bar	2.0 to 15 psi	0.1 to 1.03 bar	1200	82.7	2500	172.4

Application Notes:The use of metallic diaphragms where higher pressure shock or heavy cycling is expected should be avoided. Models 171-174 should not be used where system or start-up vacuum pressure might exceed 26" Hg Vac (-0.9 bar). Use of optional diaphragm materials for models 483-489 may increase deadband.
Deadband Note: Models 190-194, 490-494 are expressed as the lower 75% and top 25% of the range span because of the operating characteristics of the diaphragm sensor and switch.

*Over Range Pressure: The maximum pressure that may be applied continuously without causing damage and maintaining set point repeatability.
 **Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. The unit may require calibration (e.g., start-up, testing).
 ***Working Pressure Range: The pressure range within which two opposing sensors can be safely operated and still maintain set point adjustability provided the difference in pressure between them does not exceed the designated adjustable range.

TEMPERATURE MODEL B100 INTERNAL ADJUSTMENT VIA REFERENCE DIAL & C100 NO REFERENCE DIAL, RANGE 13546 NOT AVAILABLE FOR MODEL C100

Range/Material Code	Adjustable Set Point		Max. Temp		Scale Division		Stem/Bulb Size OD x Length
	°F	°C	°F	°C	°F	°C	
120	0 to 225	-17.8 to 107.2	275	135	10	5	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
121	200 to 425	93.3 to 218.3	475	246.1	10	5	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
13546	15 to 140	-9.4 to 60	60	71.1	5	2	9/16" x 2-11/16" long stainless steel (Freeze Protection)

TEMPERATURE MODEL E100 INTERNAL ADJUSTMENT VIA REFERENCE DIAL

Stainless steel bulb & capillary							
2BSA	-120 to 100	-84.4 to 37.8	150	65.5	10	5	3/8 x 2-5/8"
2BSB	30 to 250	-1.1 to 121.1	300	148.9	10	5	3/8 x 2-5/8"
3BS	100 to 400	37.8 to 201.1	450	232.2	10	5	3/8 x 2-1/8"
4BS	25 to 100	-3.9 to 37.8	150	65.5	2	1	3/8 x 6-3/4"
5BS	-20 to 80	-28.9 to 26.7	130	54.4	5	2	3/8 x 5"
8BS	350 to 640	176.7 to 337.8	690	365.6	10	5	3/8 x 3-1/4"
13545	25 to 325	-3.9 to 162.8	360	182.2	10	5	1/8 x 11-5/8" (Heat Tracing)
Copper bulb & capillary							
2BCA	-120 to 100	84.4 to 37.8	150	65.5	10	5	3/8 x 2-5/8"
2BCB	30 to 250	-1.1 to 121.1	300	18.9	10	5	3/8 x 2-5/8"
3BC	100 to 400	37.8 to 204.4	450	232.2	10	5	3/8 x 2-1/8"
4BC	25 to 100	-3.9 to 37.7	150	65.5	2	1	3/8 x 6-3/4"
5BC	-20 to 80	-28.9 to 26.7	130	54.4	5	2	3/8 x 5"
8BC	350 to 640	176.7 to 337.8	690	365.5	10	5	3-3/8" 3-1/4"

TEMPERATURE MODEL F100 NO REFERENCE DIAL

Stainless steel bulb & capillary							
1BS	-180 to 120	-117.8 to 48.9	170	76.6	-	-	3/8 x 3-3/4"
2BS	-125 to 350	-87.2 to 176.7	400	204.4	-	-	3/8 x 2-5/8"
3BS	-125 to 500	-87.2 to 260	550	287.8	-	-	3/8 x 2-1/8"
4BS	-40 to 120	-40 to 48.9	170	76.6	-	-	3/8 x 6-3/4"
5BS	-40 to 180	-40 to 82.2	230	110	-	-	3/8 x 5"
6BS	0 to 250	-17.8 to 121.1	300	148.8	-	-	3/8 x 4-1/2"
7BS	0 to 400	-17.8 to 204.4	450	232.2	-	-	3/8 x 3"
8BS	50 to 650	10 to 343.3	700	371.1	-	-	3/8 x 3-1/4"
Copper bulb & capillary							
1BC	-180 to 120	-117.8 to 48.9	170	76.6	-	-	3/8 x 3-3/4"
2BC	-125 to 350	-87.2 to 176.7	400	204.4	-	-	3/8 x 2-5/8"
3BC	-125 to 500	-87.2 to 260	550	287.8	-	-	3/8 x 2-1/8"
4BC	-40 to 120	-40 to 48.9	170	76.6	-	-	3/8 x 6-3/4"
5BC	-40 to 180	-40 to 82.2	230	110	-	-	3/8 x 5"
6BC	0 to 250	-17.8 to 121.1	300	148.8	-	-	3/8 x 4-1/2"
7BC	0 to 400	-17.8 to 204.4	450	232.2	-	-	3/8 x 3"
8BC	50 to 650	10 to 343.3	700	371.1	-	-	3/8 x 3-1/4"

ORDERING INFORMATION

SPECIFY MODEL NUMBER, RANGE CODE (FROM CHARTS) THEN OPTIONS IF REQUIRED

EXAMPLE: H100-483-0140-M201(10 PSI RISING)

Model

H100 -One SPDT output; epoxy coated enclosure; internal adjustment with "High-Low" reference scale
 H100K -One SPDT output; epoxy coated enclosure; internal adjustment with "High-Low" reference scale
 B100 -Immersion stem; one SPDT output; internal adjustment with reference dial
 C100 -Immersion stem; one SPDT output; internal adjustment with no reference scale
 E100 -Bulb and capillary; one SPDT output; internal adjustment with reference dial
 F100 -Bulb and capillary; one SPDT output; internal adjustment with no reference scale

Switch Options

0140- Gold contacts, 1 A 125 VAC resistive
 0500- Close deadband, 5 A 125/250 VAC resistive. NOT AVAILABLE RANGES 520-535

1010- DPDT switch, 10 A 125/250 VAC resistive; deadband and minimum set point will increase. NOT AVAILABLE TEMPERATURE VERSIONS, TYPE H100K OR RANGES 171-194, 483-567 AND RANGE 680
 1070- 10 A 125 VDC resistive; deadband and minimum set point will increase. NOT AVAILABLE RANGES 171-194, 483-567
 1519- Adjustable deadband, 15 A 125/250/480 VAC resistive; adjustment wheel char rise setting only. If adjustment on fall setting is required, use primary adjustment NOT AVAILABLE MODELS B100, E100 OR RANGES 171-194, 483-567, 610-616
 1530- External manual reset, 15 A 125/250/480 VAC resistive; latches on rise. NOT AVAILABLE RANGES 520-535
 1535- High ambient, 15 A 125/250 VAC resistive; temperatures up to 250 °F (145 °C) NOT AVAILABLE ON RANGES 520-535
 1537- Vapor sealed switch, 15 A 125/250 VAC resistive. NOT AVAILABLE ON RANGES 520-535
 2000- 20 A 125/250/300 VAC resistive. NOT AVAILABLE MODEL H100K OR RANGES 535
 3000- 30 A 125/250/300 VAC resistive. NOT AVAILABLE MODEL H100K OR RANGES 171-194, 483-567, 680

Other Options

M020- Red status light,115 VAC only."Field Wired "

M201- Factory set one switch; specify increasing or decreasing pressure or temperature and setpoint

M276- Range indicated on nameplate in bars/mbars. NOT AVAILABLE ON TEMPERATURE VERSIONS

M278- Range indicated on nameplate in Kg/cm2. NOT AVAILABLE ON TEMPERATURE VERSIONS

M405- Intrinsic safety compliance per EN50014, EN50020, EEx i2 II T6

M407- CE compliance to Pressure Equipment Directive (category IV)

M444- Paper ID tag

M446- Stainless steel ID tag & wire attachment

M504- 316L stainless steel immersion stem. AVAILABLE ON RANGES 120,121 ONLY

6361-704- Surface and Pipe Mounting Hardware (required for ranges 520-535,540-548 when surface mounting)

M540- Viton® construction (deadband and low end range may increase slightly); wetted parts include Viton® diaphragm and O-ring plus stainless steel pressure connection. ON RANGES 610-616 (O-RING ONLY), 701-705,Kapton® diaphragm, Viton® O-Ring and sealing diaphragms and aluminum pressure connections ON RANGES 540-548

M550- Oxygen service cleaning; internal construction may change

Optional Sensor Material for "WC Ranges. Available Ranges 520-525

XC001- Aluminum pressure connection, Viton® diaphragm, Viton® O-ring

XC002- Aluminum pressure connection, Kapton® diaphragm, Buna-N O-ring

XC003- Aluminum pressure connection, Kapton® diaphragm, Viton® O-ring

XC004- 316L Stainless steel pressure connection, 316L stainless steel diaphragm, Viton® O-ring. (Over range pressure is limited to 100 psi)

XC005- 316L Stainless steel pressure connection, Viton® diaphragm, Viton® O-ring

XC006- 316L Stainless steel pressure connection, Kapton® diaphragm, Viton® O-ring

XC007- 316L Stainless steel pressure connection, Teflon® diaphragm, Viton® O-ring

OPTIONS FOR TEMPERATURE MODELS

UNION CONNECTORS

Option	Replacement Number	Description
<u>Brass</u>		
W027	SD6213-27	1/2" NPT w/3/4" bushing
W045	SD6213-45	3/4" NPT
W051	SD6213-51	1/2" NPT
<u>304 Stainless Steel</u>		
W028	SD6213-28	1/2" NPT w/3/4" bushing
W046	SD6213-46	3/4" NPT
W050	SD6213-50	1/2" NPT

THERMOWELLS

For all bulb & capillary switches, except Model 13545

<u>Brass</u>		
W075	SD6225-75	1/2" NPT with 3/4" NPT adapter bushing, 4" BT
W191	SD6225-191	1/2" NPT, 4" BT
W118	SD6225-118	1/2" NPT with 3/4" NPT adapter bushing, 7" BT
W192	SD6225-192	1/2" NPT, 7" BT 316 Stainless Steel
W076	SD6225-76	3/4" NPT, 4.5" BT
W193	SD6225-193	1/2" NPT, 4.5" BT
W119	SD6225-119	3/4" NPT, 7.5" BT
W177	SD6225-177	1/2" NPT, 7.5" BT

For all immersion stem switches; except Model 13546

W139	SD6225-139	3/4" NPT X 1 23/32" BT, BRASS
W140	SD6225-140	3/4" NPT X 1 23/32" BT, 316 SS

W000 IMMERSION STEM AND THERMOWELLS

Note: Option W000 is a special Immersion Stem construction that has no external thread. This option fits inside a special thermowell and is secured with a set-screw.

Option	Description
W000	Immersion stem only, Brass
W097	Immersion stem and thermowell. Includes W000 stem and 1/2" NPT x 1 23/32" BT Brass thermowell
W099	Immersion stem and thermowell. Includes W000 stem and 1/2" NPT x 1 23/32" BT 316 SS thermowell.

OPTIONAL LENGTHS:

Optional immersion stem lengths to 15" available in brass, with or without 316 SS thermowell. Consult Clark for additional information.

Optional capillary length to *50' available in copper or 304 SS Armor or Teflon® capillary protection available to lengths less than or equal to capillary length. Consult Clark for additional information.

*Consult Clark regarding repeatability and ambient effects on capillary lengths over 30'.

OPTIONAL SENSOR MATERIALS FOR CORROSIVE MEDIA AVAILABLE RANGES 183-189,483-489

XD002- Hastelloy C diaphragm

XD003- Monel diaphragm

XD004- Tantalum diaphragm

XP111- Hastelloy B pressure connection

XP112- Hastelloy C pressure connection

XP113- Monel pressure connection

XR211- Kalrez® O-ring

XR212- Silicone O-ring. NOT AVAILABLE RANGES 188-189,488-489

XR213- Ethylene propylene O-ring

XR214- Aflas® O-ring

OPTIONAL FLUSH MOUNT FLANGES AVAILABLE RANGES 560-567

F196- Flush mounted flange, 150#, 1" lap joint, raised face
AVAILABLE RANGES 565-567 ONLY

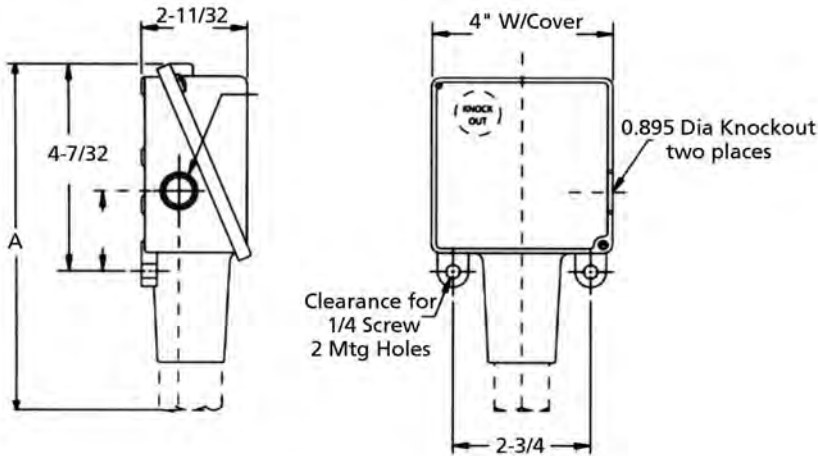
F197- Flush mounted flange, 150#, 2" lap joint, raised face
AVAILABLE RANGES 560-564 ONLY

F198- Flush mounted flange, 300#, 1" lap joint, raised face
AVAILABLE RANGES 565-567 ONLY

F199- Flush mounted flange, 300#, 2" lap joint, raised face
AVAILABLE RANGES 560-564 ONLY

DIMENSIONS (INCHES)

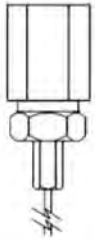
MODELS B100, C100, E100, F100, H100, H100K



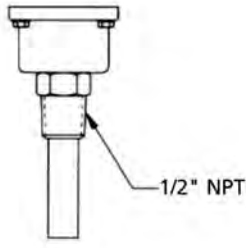
Dimension A		
Range Code	Inches	NPT
171-174	7.5	1/2
183-186	7.56	1/2
188, 189	6.63	1/2
190-194	6.63	1/2
218-274	6.56	1/2
358-376	7.03	1/2
483-486	7.56	1/2
488,489	6.63	1/2
490-494	6.63	1/2
520-525	8.44	1/2
530-535	8.00	1/2
560-564	6.62	2" Sanitary Fitting
565-567	6.62	1-1/2" Sanitary Fitting
610-616	7.00	1/4
680	6.97	1/4
701-706	6.56	1/4
Temperature		
120,121, 13546	10.44	Imersion Stem
1BC-8BC, 1BS-8BS, 13545	8.75	Bulb & Capillary
Differential Pressure		
540-548	8.34	1/8

Temperature Sensors

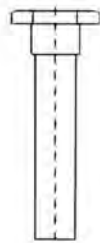
Ranges 1 BC-8BC,
1 BS-8BS, 13545



Ranges 120, 121

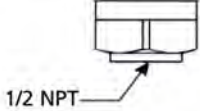


Range 13546

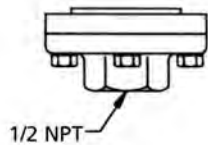


Pressure Sensors

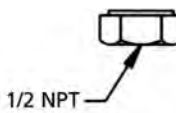
Ranges 171-174



Ranges 183-186, 483-486



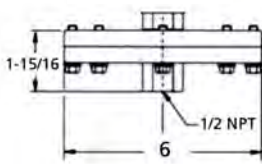
Ranges 188-194, 488-494



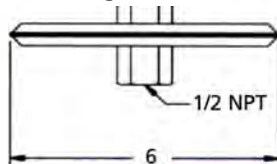
Ranges 218-376, 610-706



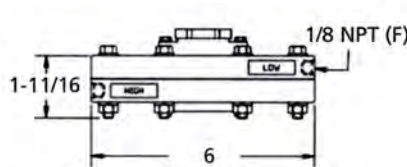
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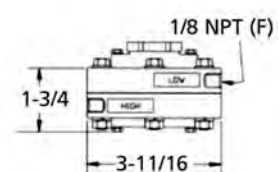
Ranges 530-535



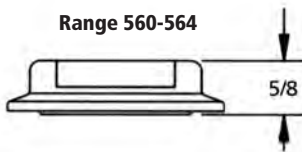
Ranges 540-543



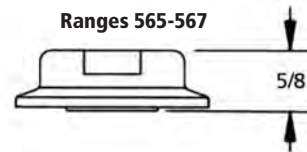
Ranges 544-548



Range 560-564



Ranges 565-567



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CLARK SOLUTIONS

12 Series: Pressure, Diff. Pressure & Temp. Switches

Explosion Proof, Adjustable Ranges 30" Vac to 6000 PSI, -130 to 650°F

DESCRIPTION

12 Series switches are ideal for operation in harsh explosive environments where space is at a premium. A snap-action Belleville spring assembly is used to provide vibration resistance and prolonged switch life. A hermetically sealed switch and stainless steel enclosure provide ruggedness and protection from the environment. The 12 Series is approved for use in hazardous locations worldwide, from offshore oil rigs to process and energy applications, to protection of capital equipment.

Triple approval (UL, cUL and ATEX) means the 12 Series meets the demanding requirements of hazardous locations. It can be used in a wide variety of applications where space is at a premium. Ambient temperatures can be as low as -58°F (-50°C) or as high as 203°F (95°C). All metal wetted parts comply with NACE MR-0175. The stainless steel design and enclosure type 4X rating assure long-term performance in the toughest applications.

SPECIFICATIONS

GENERAL

STORAGE TEMPERATURE: -58° to 203°F (-50 to 95°C)

OPERATING AMBIENT TEMPERATURE: -58 to 203°F (-50 to 95°C). Set point shifts less than 1% of range for a 50°F (28°C) ambient temperature change. Slight ambient effects for 25-50' extra capillary length on temperature switch models, consult factory.

MEDIA TEMPERATURE: Pressure models: Sensor types 2, 7, 9: -50 to 400°F (-45 to 204°C), Sensor types 3, 4, 8: -20 to 200°F (-28 to 93°C), Sensor types 5, 6: 0 to 320°F (-18 to 160°C), Sensor type P: 0 to 200°F (-18 to 93°C), 20 to 250°F (-7 to 121°C) for optional Viton sensor. Differential pressure models: Sensor type K: 0 to 180°F (-18 to 82°C), 20 to 250°F (-7 to 121°C) for optional Viton sensor, Temperature models: See model chart.

SET POINT REPEATABILITY: Temperature models: ±1% of adjustable range
Pressure models: Sensor types 2, P: ±1.5% of adjustable range, Sensor types 3-9: ±1% of adjustable range, Differential pressure models: K1 to K3: ±1%, K4 to K6: ±1.5% of adjustable range

SHOCK: Differential pressure and temperature models: set point repeats after 15 G's, 10 millisecond duration, Pressure models: Set point repeats after 75 G's, 10 milliseconds

VIBRATION: Differential pressure and temperature models: Set point repeats after 2.5 G's, 10-2000 Hz. Pressure models: Set point repeats after 15 G's, 10-2000 Hz

ENCLOSURE: 300 series stainless steel

ENCLOSURE CLASSIFICATION: Certified to Enclosure Type 4X, Class I, Division 1 product meets enclosure Type 7; Class II, Division I product meets enclosure type 9. Certified to IP66 requirements

SWITCH OUTPUT: Code S: One SPDT, hermetically sealed, Code D: Two SPDT for DPDT action, hermetically sealed

ELECTRICAL RATINGS: Code H: 5 A at 250 VAC, 5 A resistive and 3 A inductive at 28 VDC. Silver contacts, Code L: 1 A at 125 VAC, 1 A resistive and 0.5 A inductive at 28 VDC, Bifurcated gold contacts

ELECTRICAL CONNECTION: Code N: 1/2" NPT (male) with 72" leadwires, Code M: M20 metric threads, 72" leads, Option M515, 4 terminal DIN connector (DIN 43650 Form A) available SPDT only

WEIGHT: Temperature models: approximately 1 lb 14 oz. (0,85 kg)

Pressure models: approximately 12 ounces (0,34 kg)

Differential models: approximately 3 lb (1,4 kg)

TEMPERATURE ASSEMBLY: Non-toxic oil fill; 6 feet 304 stainless steel. Optional lengths available

TEMPERATURE DEADBAND: Typically 2% of range under laboratory conditions (70°F ambient circulating bath at a rate of 1/2°F per minute change)

PRESSURE CONNECTION: 1/2" NPT (female) or 1/4" NPT (female). Option M511: 1/4" NPT (male), Differential pressure: 1/8" NPT (female), Piston models: 1/4" NPT (female)

MOUNTING: Pressure: May be pipe mounted or bracket mounted using kit 62169-13
Differential Pressure: Should be mounted using 2 mounting holes on sensor bracket



FEATURES

- Compact stainless steel construction
- Convenient field setting and adjustment
- UL, cUL and ATEX approved for Div. 1 or Zone 1 hazardous locations
- SPDT or DPDT hermetically sealed switches
- Snap-acting Belleville spring for long life, vibration resistance and stability
- Mounting bracket available for retrofit applications
- 3 year warranty
- 72" leadwires with strain relief

Approvals:

Class I, Division 1 and 2, Groups A, B, C & D
Class II, Division 1 and 2, Groups E, F & G
Class III
Class I, Zone 1, Group IIC
Enclosure Type 4X

UL Listed, cUL Certified
Pressure: UL 508 & 698; CSA C22.2 No. 14, 25 & 30
File # E40857
Temperature: UL 873, 1203;
CSA C22.2 No. 24, 25 & 30 - File # E43374

ATEX Directive (94/9/EC)
II 2 G EEx d IIC T6
II 2 D T+85°C
Tamb = -50°C to +80°C
IP 66

UL International DEMKO A/S (N.B.# 0539)
Certificate # DEMKO 03 ATEX 0252466X
EN 50014, 50018, 50281-1-1 & 60529

TECHNOLOGY

At the heart of the 12 Series is a Belleville spring assembly. The spring is a small conical washer that transfers motion to a hermetically sealed 1 or 5 amp microswitch. Its "snap-action" provides fast, positive contact transfer. The Belleville spring snaps over when pressure is applied and snaps back upon pressure release.

ADVANTAGES:

- Set point stability: The switch performs under challenging environmental conditions such as vibration and temperature changes. In addition, minimal movement of components reduces sensor fatigue thereby increasing life and accuracy.
- High over-pressures: The Belleville spring mechanism limits over-travel, thus extending pressure limits.
- Resistance to vibration: Preloading of the electrical switch helps reduce contact chatter.
- Maximum life: The Belleville spring enhances cycle life with a short stroke movement to minimize fatigue.
- Small size: Belleville springs are simple in appearance, but can deliver a heavy load with a relatively small deflection, contributing to an overall compact product envelope.
- Deadbands: The Belleville is a negative-rate snap acting device, so on-off deadband values are wider at the low end of the range. To minimize deadbands, select a model with a set point at the higher end of the range whenever possible.

12 SERIES MODEL CHART

Sensor Type/Range Code	Adjustable Range Lower end of range on fall; Higher end on rise		Deadband		Over Range Pressure		Proof Pressure	
Sensor Type 2, 316 stainless steel 1/2" NPT (female) pressure connection and welded diaphragm, 23/32" orifice for clean out purposes.								
Range Code	psi	bar	psi	bar	psi	bar	psi	bar
A	10 to 25	0.7 to 1.7	2 to 7	0.1 to 0.5	1000	68.9	2500	172.4
B	15 to 45	1.0 to 3.1	3 to 10	0.2 to 0.7	1000	68.9	2500	172.4
C	25 to 85	1.7 to 5.9	5 to 20	0.3 to 1.4	1000	68.9	2500	172.4
D	50 to 130	3.4 to 9.0	7 to 25	0.5 to 1.7	1500	103.4	2500	172.4
E	100 to 210	6.9 to 14.5	8 to 30	0.6 to 2.1	1500	103.4	2500	172.4
F	160 to 400	11.0 to 27.6	10 to 50	0.7 to 3.4	1500	103.4	2500	172.4
G	275 to 850	19.0 to 58.6	40 to 125	2.8 to 8.6	1500	103.4	2500	172.4
Sensor Type 4, 316L stainless steel 1/4" NPT (female) pressure connection, Teflon® coated Polyimide (Kapton®) diaphragm, Buna N O-ring, 1/8" orifice.								
Sensor Type 3, 316L stainless steel 1/2" NPT (female) pressure connection, Teflon® coated Polyimide (Kapton®) diaphragm, Buna N O-ring, 1/2" orifice for clean out purposes.								
Range Code	psi	bar	psi	bar	psi	bar	psi	bar
A	8 to 30	0.6 to 2.1	2 to 6	0.1 to 0.4	600	41.4	1000	68.9
B	15 to 55	1.0 to 3.8	3 to 8	0.2 to 0.6	600	41.4	1000	68.9
C	30 to 170	2.1 to 11.7	5 to 15	0.3 to 1.0	600	41.4	1000	68.9
D	100 to 370	6.9 to 25.5	15 to 50	1.0 to 3.4	600	41.4	1000	68.9
E	200 to 700	13.8 to 48.3	40 to 90	2.8 to 6.2	1500	103.4	3000	206.8
F	400 to 1500	27.6 to 103.4	100 to 250	6.9 to 17.2	3000	206.8	4500	310.3
G	1000 to 3200	68.9 to 220.6	100 to 500	6.9 to 34.5	6000	413.7	10000	689.5
H	2000 to 6000	137.9 to 413.7	400 to 800	27.6 to 55.2	8000	551.6	10000	689.5
Sensor Type 5, 316L stainless steel 1/2" NPT (female) 1/2" pressure connection and diaphragm, Viton® O-ring, 1/2" orifice for clean out purposes.								
Sensor Type 6, 316L stainless steel 1/4" NPT (female) pressure connection and diaphragm, Viton® O-ring, 1/8" orifice.								
Range Code	psi	bar	psi	bar	psi	bar	psi	bar
A	9 to 35	0.6 to 2.4	2 to 7	0.1 to 0.5	600	41.4	1000	68.9
B	25 to 65	1.7 to 4.5	3 to 10	0.2 to 0.7	600	41.4	1000	68.9
C	50 to 150	3.4 to 10.3	5 to 15	0.3 to 1.0	600	41.4	1000	68.9
D	100 to 350	6.9 to 24.1	15 to 50	1.0 to 3.4	600	41.4	1000	68.9
E	250 to 700	17.2 to 48.3	40 to 95	2.8 to 6.6	1500	103.4	3000	206.8
F	400 to 1500	27.6 to 103.4	100 to 300	6.9 to 20.7	3000	206.8	4500	310.3
G	1000 to 3200	68.9 to 220.6	100 to 500	6.9 to 34.5	6000	413.7	10000	689.5
H	2000 to 6000	137.9 to 413.7	400 to 1000	27.6 to 68.9	8000	551.6	10000	689.5
Sensor Type 7, 316L stainless steel 1/2" NPT (female) pressure connection and welded diaphragm. Large 23/32" orifice for clean out purposes.								
Range Code	psi	bar	psi	bar	psi	bar	psi	bar
A	3 to 15	0.2 to 1.0	1 to 4	0.1 to 0.3	300	20.7	500	34.5
B	10 to 35	0.7 to 2.4	1 to 6	0.1 to 0.4	300	20.7	500	34.5
C	25 to 85	1.7 to 5.9	3 to 11	0.2 to 0.8	300	20.7	500	34.5
D	65 to 125	4.5 to 8.6	6 to 18	0.4 to 1.2	300	20.7	500	34.5

Sensor Type/Range Code	Adjustable Range Lower end of range on fall; Higher end of rise		Deadband		Over Range Pressure		Proof Pressure	
Sensor Type 8, 316L stainless steel 1/4" NPT (female) pressure connection, Teflon® coated Polyimide (Kapton®) diaphragm, Buna N O-ring, 1/8" orifice. Non-Belleville actuation.								
Range Code	psi	bar	psi	bar (unless noted)	psi	bar	psi	bar
A	2 to 25	0.14 to 1.7	0.5 to 4	34.5 mbar to 0.3 bar	600	41.4	1000	68.9
B	15 to 75	1.0 to 5.2	1 to 7	0.1 to 0.5	600	41.4	1000	68.9
C	25 to 150	1.7 to 10.3	1 to 12	0.1 to 0.8	600	41.4	1000	68.9
D	50 to 450	3.4 to 31.0	3 to 28	0.2 to 1.9	2000	137.9	3000	206.8
E	100 to 900	6.9 to 62.1	10 to 60	0.7 to 4.1	2000	137.9	3000	206.8
F	500 to 2500	34.5 to 172.4	20 to 140	1.4 to 9.7	6000	413.7	7500	517.1
G	700 to 4000	48.3 to 275.8	40 to 250	2.8 to 17.2	6000	413.7	7500	517.1

Sensor Type 9, 316L stainless steel 1/2" NPT (female) pressure connection and welded diaphragm. Large 23/32" orifice for clean-out purposes. Non-Belleville actuation.								
Range Code	psi	bar	psi	mbar	psi	bar	psi	bar
A	1 to 15	0.1 to 1.0	0.5 to 2	34.5 to 137.9	300	20.7	500	34.5
B	3 to 50	0.2 to 3.4	0.5 to 4	34.5 to 275.8	300	20.7	500	34.5
C	5 to 100	0.3 to 6.9	1.0 to 8	0.1 to 0.6 bar	300	20.7	500	34.5

Sensor Type P, 303 stainless steel piston and 1/4" NPT (female) pressure connection, Buna N O-Ring. Non-Belleville actuation.								
Range Code	psi	bar	psi	bar	psi	bar	psi	bar
A	300 to 1200	20.7 to 82.7	30 to 200	2.1 to 13.8	6000	413.7	10000	689.5
B	600 to 2600	41.4 to 179.3	50 to 350	3.4 to 24.1	6000	413.7	10000	689.5

DIFFERENTIAL PRESSURE MODEL CHART

Sensor Type/Range Code	Adjustable Range Lower end of range on fall; Higher end on rise		Deadband		Over Range Pressure		Proof Pressure	
Sensor Type K, epoxy coated aluminum pressure housing with Kapton® diaphragm, Buna N sealing diaphragms and 1/8" NPT (female) pressure connections. Non-Belleville actuation. 303/304 stainless steel mounting bracket attached.								
Range Code	wcd	mbar	wcd	mbar	psi	bar	psi	bar
1	0.7 to 10	1.7 to 24.9	0.2 to 1	0.5 to 2.5	30 Hg Vac to 200	-1.0 to 13.8	400	27.6
2	3 to 20	7.5 to 49.8	0.3 to 1.5	0.7 to 3.7	30 Hg Vac to 200	-1.0 to 13.8	400	27.6
3	10 to 150	24.9 to 373.4	0.3 to 5	0.7 to 12.4	30 Hg Vac to 200	-1.0 to 13.8	400	27.6
Range Code	psid	bar	psi	bar	psi	bar	psi	bar
4	2 to 20	0.1 to 1.4	0.3 to 1.5	20.7 to 103.4 mbar	30 Hg Vac to 1200	-1.0 to 82.7	2500	172.4
5	5 to 80	0.3 to 5.5	1 to 8	0.1 to 0.6	30 Hg Vac to 1200	-1.0 to 82.7	2500	172.4
6	10 to 150	0.7 to 10.3	1 to 10	0.1 to 0.7	30 Hg Vac to 1200	-1.0 to 82.7	2500	172.4

Sensor Type K, epoxy coated aluminum pressure housing with Kapton® diaphragm, Buna N sealing diaphragms and 1/8" NPT (female) pressure connections. Non-Belleville actuation. 303/304 stainless steel mounting bracket attached. DPDT Switch (double pole double throw)								
Range Code	wcd	mbar	wc	mbar	psi	bar	psi	bar
1	0.7 to 10	1.7 to 24.9	0.2 to 1.5	0.5 to 3.7	30 Hg Vac to 200	-1.0 to 13.8	400	27.6
2	3 to 20	7.5 to 49.8	0.3 to 2	0.7 to 5.0	30 Hg Vac to 200	-1.0 to 13.8	400	27.6
3	10 to 150	24.9 to 373.4	0.3 to 8	0.7 to 19.9	30 Hg Vac to 200	-1.0 to 13.8	400	27.6
Range Code	psid	bar	psi	bar	psi	bar	psi	bar
4	2 to 20	0.1 to 1.4	0.3 to 3	20.7 to 206.8 mbar	30 Hg Vac to 1200	-1.0 to 82.7	2500	172.4
5	5 to 80	0.3 to 5.5	1 to 10	0.1 to 0.7	30 Hg Vac to 1200	-1.0 to 82.7	2500	172.4
6	10 to 150	0.7 to 10.3	1 to 15	0.1 to 1.0	30 Hg Vac to 1200	-1.0 to 82.7	2500	172.4

TEMPERATURE MODEL CHART

Sensor Type R, Standard Capillary: 6ft, 304 SS						
Range Code	Adjustable Range		Max Temperature		Bulb Size	
	°F	°C	°F	°C		
R1	-130 to 120	-90 to 48.9	170	76.7	3/8 O.D. x 4-7/8"	
R2	0 to 150	-17.8 to 65.6	200	93.3	3/8 O.D. x 7-1/4"	
R3	50 to 300	10 to 148.9	350	176.7	3/8 O.D. x 4-7/8"	
R4	150 to 650	65.6 to 343.3	700	371.1	3/8 O.D. x 4"	

ORDERING INFORMATION

BUILD PART NUMBER PER BELOW TABLE

Model Number Reference		12	S	L	S	N	2	A	M201
12	12 Designates the 12 Series								
S	S Stainless Steel HOUSING MATERIAL								
L	L 1 amp H 5 amp All switches have limited DC capabilities. Consult factory for details. ELECTRICAL RATING								
S	S SPDT D DPDT TYPE OF SWITCHES								
N	N 1/2" NPT male M M20 metric thread ELECTRICAL CONDUIT								
2	2 Welded 316 stainless steel diaphragm, 1/2" NPT (female) pressure connection 3 Teflon® coated Polyimide (Kapton®) diaphragm, Buna N O-ring, 1/2" NPT (female) pressure connection 4 Teflon® coated Polyimide (Kapton®) diaphragm, Buna N O-ring, 1/4" NPT (female) pressure connection 5 316L stainless steel diaphragm, Viton® O-ring, 1/2" NPT (female) pressure connection 6 316L stainless steel diaphragm, Viton® O-ring, 1/4" NPT (female) pressure connection 7 Welded 316L stainless steel diaphragm, 1/2" NPT (female) pressure connection 8 Kapton® diaphragm, Buna N O-ring, 1/4" NPT (female) pressure connection* 9 316L stainless steel welded diaphragm, 1/2" NPT (female) pressure connection* P 303 stainless steel piston, Buna N O-ring, 1/4" NPT (female) pressure connections* K Kapton® diaphragm, Buna N sealing diaphragm, 1/8" NPT (female) pressure connections* R Remote bulb & capillary, temperature * (non-Belleville actuation) SENSOR TYPE (See Tables)								
A	A, B, C, D, E, F, G, H, 1, 2, 3, 4, 5, 6 RANGE (See tables)								
M201	OPTIONS M201 Factory set switch, specify increasing or decreasing pressure M277 Range in kPa or mPa on nameplate, factory selected. NOT AVAILABLE ON TEMPERATURE VERSIONS M278 Range in kg/cm2 on nameplate. NOT AVAILABLE ON TEMPERATURE VERSIONS M404 Flameproof compliance for Ukraine per Gosnadzorohrantruda standards M405 European ATEX intrinsic safety compliance M406 Flameproof and intrinsic safety compliance per Russian Gosgortekhnadzor standards M407 CE compliance to Pressure Equipment Directive (category IV). NOT AVAILABLE ON TEMPERATURE VERSIONS M421 Gosgortekhnadzor flameproof junction box, pre-wired (not UL approved or ATEX certified) M423 ATEX flameproof compliant junction box, pre-wire (not UL approved) M430 Cover lock M444 Paper ID tag M446 Stainless steel ID tag and wire attachment M460 External ground screw; required for non-metallic conduit systems (ATEX installations only) M480 316 Stainless steel construction, enclosure and pressure connection(s) only, sensor material cannot be changed. Must order with option code M516 for sensor type P M511 1/4" NPT (male) pressure connection for sensor types 3, 4, 5, 6 and 8 only M513 UL/CSA approved, explosion proof junction box, pre-wired (not approved for ATEX or as enclosure type 4X). NOT AVAILABLE ON METRIC THREAD ELECTRICAL CONDUIT VERSION M515 DIN Connector-4 terminal; conforms to DIN 43650 Form A, (not approved for Class I Div. 1 & 2 or ATEX flame proof requirements). NOT AVAILABLE ON DPDT OR METRIC THREAD ELECTRICAL CONDUIT VERSIONS M516 316 Stainless steel 1/4" NPT (female) pressure connection and piston. AVAILABLE SENSOR TYPE P ONLY M540 Viton® construction (deadband and low end of range will increase slightly); wetted parts include Kapton diaphragm, Viton® O-ring and sealing diaphragm. AVAILABLE SENSOR TYPES K AND P ONLY M550 Oxygen service cleaning; internal construction and materials may change (includes Viton® diaphragm and/or O-ring when applicable). NOT AVAILABLE ON SENSOR TYPES 3, 4, AND 8 NC1 NACE certificate								

OPTIONS FOR TEMPERATURE MODELS

UNION CONNECTORS:

Option Replacement Number Description
 304 Stainless Steel
 W028 SD6213-28 1/2" NPT w/ 3/4" bushing
 W046 SD6213-46 3/4" NPT
 W050 SD6213-50 1/2" NPT

THERMOWELLS

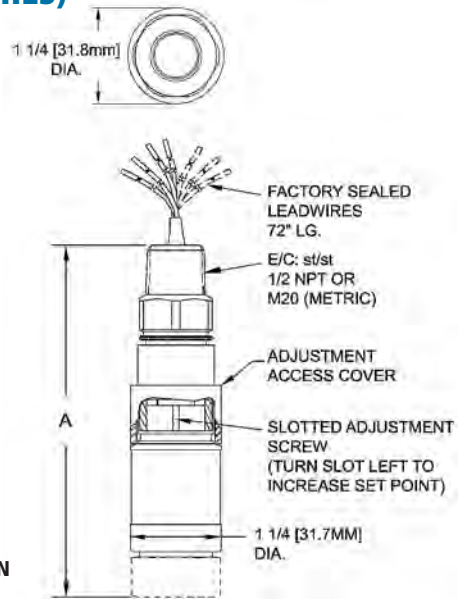
For all bulb & capillary switches
 316 Stainless Steel
 W076 SD6225-76 3/4" NPT, 4.5" BT
 W193 SD6225-193 1/2" NPT, 4.5" BT
 W119 SD6225-119 3/4" NPT, 7.5" BT
 W177 SD6225-177 1/2" NPT, 7.5" BT

OPTIONAL LENGTHS

Optional capillary length to 50' available in copper or 304 SS. Armor or Teflon® capillary protection available to lengths less than or equal to capillary length.

DIMENSIONS (INCHES)

Dimension A			
Types	Inches	mm	NPT
Pressure			
2	4.88	123.9	1/2"
3	4.88	123.9	1/2"
4	4.88	123.9	1/4"
5	4.88	123.9	1/2"
6	4.88	123.9	1/4"
7	5.41	137.5	1/2"
8	4.88	123.9	1/4"
9	5.41	137.5	1/2"
P1-P3	5.38	136.5	1/4"
K1-K3	6.69	169.9	1/8"
K4-K6	6.94	176.2	1/8"
R1-R4	5.00	126.9	

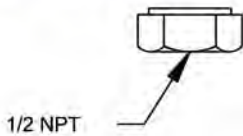


12 Series, Explosion Proof STANDARD CONFIGURATION

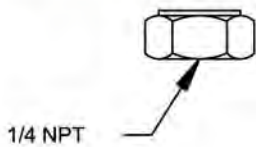
Pressure, Differential, and Temperature Sensors

Pressure

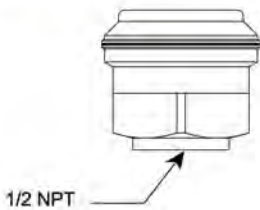
TYPES 2, 3, 5 SENSOR



TYPES 4, 6, 8 P1-P3

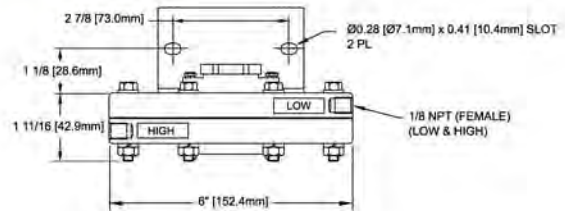


TYPES 7, 9 SENSOR

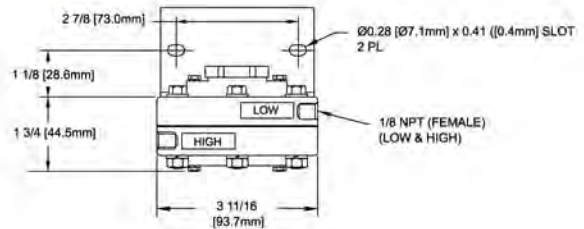


BULB DIMENSIONS		
Dimension A		
Types	Inches	mm
R1	4-7/8 "	123.8
R2	7-1/4 "	184.2
R3	4-7/8 "	123.8
R4	4 "	101.6

Differential Pressure
TYPE K1-K3*



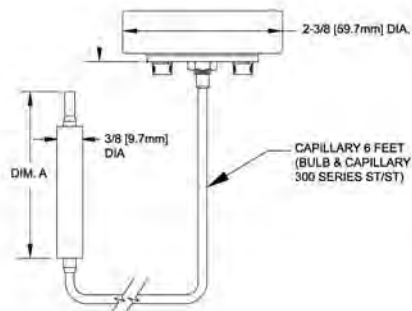
TYPES K4-K6*



*Shown with mounting bracket attached

Temperature

TYPES R1-R4



CLARK SOLUTIONS

400 Series, Pressure, Vacuum, Diff. Pressure & Temp. Switches

1,2 & 3 Switch output, Adjustable Ranges 30" Vac to 6000 PSI, -180 to 650°F

DESCRIPTION

The 400 Series is a versatile family of pressure, differential pressure and temperature switches for applications which require single or multiple switching capabilities. Dual or triple switch versions provide multi-output in applications such as alarm and shutdown, pre-alarm and alarm, high/low limit or level staging functions. They are available in both hex screw adjustment and dial set point adjustment versions, and have a wide variety of available options.

Triple switch J403's may be used for liquid level control. In this application, three pressure settings correspond to "pumping out" elevations in a sump pump. The 400 Series continues to be widely used throughout the process industries, from industrial gas production, energy generation, and pulp and paper, to applications involving pumps, turbines, compressors and heavy equipment, where threshold protection and control of functions is required.



SPECIFICATIONS

GENERAL

Storage Temperature: -65° to 160°F (-54 to 71°C)
 Ambient Temperature: -40° to 160°F (-40 to 71°C); Set point typically shifts less than 1% of range for a 50°F (28°C) ambient temperature change
 Set Point Repeatability: Temperature models: ± 2% of adjustable range
 Pressure: models 126-376, 520-535, 540-547, 570-572: ± 2 % of adjustable range; models 440-457, 550-559: ± 1% of adjustable range; models 610-614: ± 3% of adjustable range
 Shock: Set point repeats after 15 G, 10 millisecond duration
 Vibration: Set point repeats after 2.5 G, 5-500 Hz
 Enclosure: Die cast aluminum, epoxy powder coated, gasketed, captive cover screws
 Enclosure Class: Designed to meet NEMA 4X requirements with option M900 (watertight electrical connection)
 Switch Output: One, two or three SPDT; switches may be separated up to 100% of range; except ranges 521-524, 531-534: 50% and ranges 520, 525, 530, 535, 570-572: 30%
 Electrical Rating: 15 A 125/250/480 VAC resistive
 Weight: 3-7.5 lbs, varies with model
 Electrical Connection: Three 7/8" diameter knockouts
 Pressure Connection: All models 1/4" NPTF except ranges S126B-S164B, 520-535: 1/2" NPTF; ranges 540-547: 1/8" NPTF

Temperature Assembly: 'E' types use the same assemblies as 'F' types; however, range spans are limited due to use of reference dials
 Bulb and capillary: 6 feet 304 stainless steel
 Immersion stem: nickel-plated brass; optional 316L stainless steel
 Fill: Models 1BS are solvent filled, models 2-8 are non-toxic oil filled
 Temperature Deadband: Type F typically 1% and type E typically 2% of range under laboratory conditions (70°F ambient circulating bath at rate of 1/2°F per minute change)
 Approvals: UL listed
 Temperature: UL 873, file #E10667
 Pressure: UL 508, file #E42272 (available types 400 and 402)
 UL Recognized
 Temperature: UL 873, file #E10667
 Pressure: UL 508, file #E42272 (available type 403)
 CSA certified
 Temperature: CSA C22.2, no.24 file #LR7814
 Pressure: CSA C22.2, no.14 file #LR39690
 FM Approval 3510, 3530, 3531 (not all models approved, see the next page for a detailed listing of approved models)
 CE Compliance with Low Voltage Directive (LVD)
 CE Compliance to Pressure Equipment Directive (PED 97/23/EC)

PRESSURE MODEL H400, H402, H403 DIAL ADJUSTMENT VERSIONS

Range/Material Code	Adjustable Set Point Range		Deadband (x2 for 2 & 3 switch types)		**Proof Pressure		Scale Division
	High end of range on rise, low end on fall				psi	bar	psi
Welded 316L stainless steel bellows with 1/2" NPT (female) pressure connection							
S126B	30" Hg Vac to 0	-1 to 0	0.2 to 0.9" Hg	7 to 30.5 mbar	30" Hg Vac	-1	0.5" Hg
S134B	30" Hg Vac to 20	-1 to 1.4	0.2 to 1.2" Hg	7 to 40.6 mbar	25	1.7	1" Hg & 0.5 psi
S137B	0 to 80"wc	0 to 200 mbar	2 to 6"wc	5 to 15 mbar	5	0.3	2"wc
S144B	0 to 20	0 to 1.4	0.1 to 0.5	6.9 to 34.5 mbar	25	1.7	0.5
S146B	0 to 30	0 to 2.1	0.1 to 0.6	6.9 to 41.4 mbar	40	2.78	0.5
S156B	0 to 100	0 to 6.9	0.2 to 0.8	13.8 to 55.2 mbar	200	13.8	2
S164B	0 to 200	0 to 13.8	0.3 to 2	20.7 to 138 mbar	200	13.8	5
Welded 316L stainless steel bellows with 1/4" NPT (female) pressure connection							
358	0 to 200	0 to 13.8	1.5 to 8	0.1 to 19.9	250	17.2	5
361	0 to 300	0 to 20.7	2 to 9	0.1 to 22.4	350	24.1	10
376	0 to 500	0 to 34.5	3 to 12	0.2 to 29.9	575	39.6	10
Brass bellows with 1/4" NPT (female) nickel plated brass pressure connection; Models 126& 134 have zinc-plated steel spring in media							
126	30" Hg to 0 psi	-1 to 0	0.2 to 0.9" Hg	7 to 35 mbar	30" Hg Vac	-1	0.5" Hg
134	30" Hg to 20 psi	-1 to 1.4	0.2 to 1.2" Hg	7 to 40.6 mbar	25	1.7	1" Hg & 0.5 psi
137	0 to 80"wc	0 to 200 mbar	2 to 6"wc	5 to 15 mbar	5	0.3	2"wc
144	0 to 20	0 to 1.4	0.1 to 0.5	6.9 to 34.5 mbar	25	1.8	0.5
146	0 to 30	0 to 2.1	0.1 to 0.6	6.9 to 41.4 mbar	40	2.8	0.5
156	0 to 100	0 to 6.9	0.2 to 0.8	13.8 to 55.2 mbar	125	8.6	2
164	0 to 200	0 to 13.8	0.3 to 2	20.7 to 138 mbar	200	13.8	5
Phospher Bronze bellows with 1/4" NPT (female) nickel plated brass pressure connection							
270	0 to 200	0 to 13.8	1.5 to 8	0.1 to 19.9	250	17.2	5
274	0 to 300	0 to 20.7	2 to 10	0.1 to 24.9	350	24.1	10

FM Approved Models:

Range Code

126, 134, 137, 144, 146
 S126B, S134B, S137B, S144B, S146B
 358
 440-443
 448
 449
 570, 571, 572
 350-454
 520-525
 530-535
 550, 552-555
 551
 610-612

Model

J400, J402, J403, H400, H402, H403
 J400, J402, J403, H400, H402, H403
 J400, J402, J403, H400, H402, H403
 J400, H400
 J400, J402, J403, H400
 J400, J402, J403
 J400, J402, J403
 J400, J402, J403, H400, H402, H403
 J402
 J402
 J400, J402, J403, H400, H402, H403
 J400, J402, J403, H400
 J400, J402, J403

PRESSURE MODEL H400, H402, H403 DIAL ADJUSTMENT VERSIONS

Range/Material Code	Adjustable Set Point Range High end of range on rise, low end on fall		Deadband (x2 for 2 & 3 switch types)		**Proof Pressure		Scale Division
	psi Unless noted	bar	psi Unless noted	mbar	psi	bar	psi
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connection and cap							
440†	0 to 2" wc	0 to 5 mbar	0.07 to 0.25" wc	0.2 to 0.6	225	15.5	0.1" wc
441†	0 to 10" wc	0 to 25 mbar	0.15 to 0.3" wc	0.4 to 0.7	225	15.5	0.5" wc
442†	0 to 20" wc	0 to 50 mbar	0.2 to 0.5" wc	0.5 to 0.12	225	15.5	1" wc
443†	0 to 80" wc	0 to 200 mbar	0.5 to 1.8" wc	1.2 to 4.5	225	15.5	5" wc
448	80" wc Vac to 0	-200 to 0 mbar	1 to 3" wc	2.5 to 7.5	225	15.5	5" wc
450	30" Hg Vac to 0	-1 to 0	0.1 to 0.4" Hg	3.4 to 13.5	225	15.5	0.5" Hg
452	30" Hg Vac to 20	-1 to 1.4	0.2 to 1" Hg	6.8 to 33.9	225	15.5	0.5" Hg & 0.5 psi
453	0 to 20	0 to 1.4	0.05 to 0.2	3.4 to 13.8	225	15.5	0.5
454	0 to 30	0 to 2.1	0.05 to 0.3	3.4 to 20.7	225	15.5	0.5
Teflon® diaphragm, O-Ring with 1/4" NPT (female) 316L stainless steel pressure connection and cap							
550	30" Hg Vac to 0	-1 to 0	0.1 to 0.6" Hg	3.4 to 20.3	225	15.5	0.5" Hg
551	0 to 80" wc	0 to 200 mbar	1.5 to 3.5" wc	3.7 to 8.7	225	15.5	5" wc
552	30" Hg Vac to 20	-1 to 1.4	0.2 to 1" Hg	6.8 to 33.9	225	15.5	0.5" Hg & 0.5 psi
553	0 to 20	0 to 1.4	0.05 to 0.3	3.4 to 20.7	225	15.5	0.5
554	0 to 30	0 to 2.1	0.1 to 0.4	6.9 to 27.6	225	15.5	0.5
555	0 to 100	0 to 6.9	0.25 to 0.75	17.2 to 51.7	225	15.5	2

† No Switch Options Are Available For These Models

PRESSURE MODEL J400, J402, J403 HEX SCREW ADJUSTMENT VERSIONS

Range/Material Code	Adjustable Set Point Range High end of range on rise, low end on fall		Deadband (x2 for 2 & 3 switch types)		*Over Range Pressure		**Proof Pressure	
	"wc	mbar	"wc	mbar	psi	bar	psi	bar
Buna-N diaphragm and O-Ring with 1/2" NPT (female) epoxy coated aluminum pressure connection								
520	-300 to 0	-746.7 to 0	0.2 to 12	0.5 to 29.9	200	13.8	400	27.6
521	-10 to 10	-24.9 to 24.9	0.1 to 1	0.2 to 2.5	200	13.8	400	27.6
522	-50 to 50	-124.5 to 124.5	0.1 to 5	0.2 to 12.4	200	13.8	400	27.6
533	0.5 to 5.0	1.2 to 12.4	0.1 to 0.3	0.2 to 0.7	200	13.8	400	27.6
524	2.5 to 50	6.2 to 124.5	0.1 to 2	0.2 to 5.0	200	13.8	400	27.6
525	10 to 250	24.9 to 622.3	0.1 to 10	0.2 to 24.9	200	13.8	400	27.6
Welded 316L stainless steel diaphragm with 1/2" NPT (female) 316L pressure connection								
530	-300 to 0	-746.7 to 0	0.2 to 15.0	0.5 to 37.3	50	3.4	100	6.9
531	-10 to 10	-24.9 to 24.9	0.1 to 1	0.2 to 2.5	50	3.4	100	6.9
532	-50 to 50	-124.5 to 124.5	0.1 to 6	0.2 to 14.9	50	3.4	100	6.9
533	0.5 to 5.0	1.2 to 12.4	0.1 to 0.3	0.2 to 0.7	50	3.4	100	6.9
534	2.5 to 50	6.2 to 124.5	0.1 to 2.5	0.2 to 6.2	50	3.4	100	6.9
535	10 to 250	24.9 to 622.3	0.1 to 10.0	0.2 to 24.9	50	3.4	100	6.9
	psi	bar	psi	bar	psi	bar	psi	bar
316L stainless steel diaphragm, Viton® O-Ring with 1/4" (female) 316L stainless steel pressure connection								
570	0 to 20	0 to 1.4	0.2 to 4	14 to 275 mbar	20	1.4	225	15.5
571	0 to 50	0 to 3.4	0.7 to 6	48 to 410 mbar	50	3.4	225	15.5
572	0 to 100	0 to 6.9	1 to 7	69 to 480 mbar	100	6.9	225	15.5
Welded 316L stainless steel diaphragm with 1/2" NPT (female) pressure connection								
S126B	30" Hg Vac to 0	-1 to 0	0.2 to 0.9" Hg	7 to 30.5 mbar	0	0	30" Hg Vac	-1
S134B	30" Hg Vac to 20 psi	-1 to 1.4	0.2 to 1.2" Hg	7 to 40.6 mbar	20	1.4	25	1.7
S137B	0 to 80" wc	0 to 200 mbar	2 to 6" wc	5 to 15 mbar	80" wc	200 mbar	5	0.3
S144B	0 to 20	0 to 1.4	0.1 to 0.5	6.9 to 34.5 mbar	20	1.4	25	1.7
S146B	0 to 30	0 to 2.1	0.1 to 0.6	6.9 to 41.4 mbar	30	2.1	40	2.8
S156B	0 to 100	0 to 6.9	0.2 to 0.8	13.8 to 55.2 mbar	100	6.9	200	13.8
S164B	0 to 200	0 to 13.8	0.3 to 2	20.7 to 138 mbar	200	13.8	200	13.8
Welded 316L stainless steel diaphragm with 1/4" NPT (female) pressure connection								
358	0 to 200	0 to 13.8	1.5 to 8	0.1 to 19.9	200	13.7	250	17.2
361	0 to 300	0 to 20.7	2 to 9	0.1 to 22.4	300	20.7	350	24.1
376	0 to 500	0 to 34.5	3 to 12	0.2 to 29.9	500	34.5	575	39.6
303 stainless steel piston and Buna-N O-Ring with 1/4" (female) pressure connection (not recommended for gas service since drying of the O-Ring seal can allow bleeding of medium into the atmosphere)								
610	100 to 1,000	6.9 to 68.9	30 to 150	2.1 to 10.3	1,000	68.9	10,000	690
612	200 to 3,000	13.8 to 207	40 to 250	2.8 to 17.2	3,000	207	10,000	690
614	500 to 6,000	34.5 to 414	50 to 400	3.4 to 27.6	6,000	414	10,000	690

PRESSURE MODEL J400, J402, J403 HEX SCREW ADJUSTMENT VERSIONS

Range/Material Code	Adjustable Set Point Range High end of range on rise, low end on fall		Deadband (x2 for 2 & 3 switch types)		*Over Range Pressure		**Proof Pressure	
	psi Unless noted	bar	psi Unless noted	bar	psi	bar	psi	bar
Brass bellows with 1/4" NPT (female) nickel-plated brass pressure connection; Models 126 & 134 have zinc-plated steel spring exposed to media								
126	30" Hg Vac to 0	-1 to 0	0.2" to 0.9" Hg	7 to 30.5 mbar	0	0	30" Hg	-1
134	30" Hg Vac to 20 psi	-1 to 1.4	0.2" to 1.2" Hg	7 to 40.6 mbar	20	1.4	25	1.7
137	0 to 80" w/c	0 to 200 mbar	2 to 6" w/c	5 to 15 mbar	80" w/c	200 mbar	5	0.3
144	0 to 20	0 to 1.4	0.1 to 0.5	6.9 to 34.5 mbar	20	1.4	25	1.8
146	0 to 30	0 to 2.1	0.1 to 0.6	6.9 to 41.4 mbar	30	2	40	2.8
156	0 to 100	0 to 6.9	0.2 to 0.8	13.8 to 55.2 mbar	100	6.9	125	8.6
164	0 to 200	0 to 13.8	0.3 to 2.0	20.7 to 138 mbar	200	13.8	200	13.8
Phosphor bronze bellows with 1/4" NPT (female) nickel-plated brass pressure connection								
270	0 to 200	0 to 13.8	1.5 to 8	0.1 to 19.9	200	13.8	250	17.2
274	0 to 300	0 to 20.7	2 to 10	0.1 to 24.9	300	20.7	350	24.1
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connection and cap								
440†	0 to 2" w/c	0 to 5 mbar	0.07 to 0.25" w/c	0.2 to 0.6 mbar	3	0.2	225	15.5
441†	0 to 10" w/c	0 to 25 mbar	0.15 to 0.3" w/c	0.4 to 0.7 mbar	3	0.2	225	15.5
442†	0 to 20" w/c	0 to 50 mbar	0.2 to 0.5" w/c	0.5 to 1.2 mbar	3	0.2	225	15.5
443†	0 to 80" w/c	0 to 200 mbar	0.5 to 1.8" w/c	1.2 to 4.5 mbar	3	0.2	225	15.5
448	80 to 0" w/c Vac	-200 to 0 mbar	1 to 3" w/c	2.5 to 7.5 mbar	3	0.2	225	15.5
449	0 to 20" w/c	0 to 50 mbar	1 to 2" w/c	2.5 to 5.0 mbar	3	0.2	225	15.5
450	30" Hg Vac to 0	-1 to 0 mbar	0.1 to 0.4" w/c	3.4 to 13.5 mbar	3	0.2	225	15.5
451	0 to 80" w/c	0 to 200 mbar	1 to 3" w/c	2.5 to 7.5 mbar	3	0.2	225	15.5
452	30" Hg Vac to 20 psi	-1 to 1.4 mbar	0.2 to 1" Hg	6.8 to 33.9 mbar	20	1.4	225	15.5
453	0 to 20	0 to 1.4 mbar	0.05 to 0.2	3.4 to 13.8 mbar	20	1.4	225	15.5
454	0 to 30	0 to 2.1 mbar	0.05 to 0.3	3.4 to 20.7 mbar	30	2.1	225	15.5
Teflon® diaphragm and O-Ring with 1/4" NPT (female) 316L stainless steel pressure connection and cap								
550	30" Hg Vac to 0	-1 to 0	0.1 to 0.6" Hg	3.4 to 20.3	0	0	225	15.5
551	0 to 80" w/c	0 to 200 mbar	1.5 to 3.5" w/c	3.7 to 8.7	80" w/c	200 mbar	225	15.5
552	30" Hg Vac to 20 psi	-1 to 1.4	0.2 to 1" Hg	6.8 to 33.9	20	1.4	225	15.5
553	0 to 20	0 to 1.4	0/05 to 0.3	3.4 to 20.7	20	1.4	225	15.5
554	0 to 30	0 to 2.1	0.1 to 0.4	6.9 to 27.6	30	2.1	225	15.5
555	0 to 100	0 to 6.9	0.25 to 0.75	17.2 to 51.7	100	6.9	225	15.5

† no switch options available for these models

DIFFERENTIAL PRESSURE MODEL J400K, J402K HEX SCREW ADJUSTMENT VERSIONS

Range/Material Code	Adjustable Set Point Range High end of range on rise, low end on fall		Deadband (x2 for 2 & 3 switch types)		***Working Pressure		**Proof Pressure	
	"wcd/psid	mbar/bar	"w/c/psi	mbar/bar	psi	bar	psi	bar
Welded 316L bellows with 1/2" NPT (female) pressure connections								
S147B	3 TO 30 psid	0.2 TO 2.1 bar	0.5 TO 2 psi	34.5 to 138 mbar	30" Hg Vac to 100	-1 to 6.9	300	20.7
S157B	10 TO 100 psid	0.7 TO 6.9 bar	0.5 TO 3 psi	34.5 to 207 mbar	30" Hg Vac to 180	-1 to 12.4	300	20.7
Brass bellows with 1/4" NPT (female) nickel-plated brass pressure connections								
147	3 to 30 psid	0.2 to 2.1 bar	0.5 to 2 psi	34.5 to 138 mbar	30" Hg Vac to 100	-1 to 6.9	180	12.4
157	10 to 100 psid	0.7 to 6.9 bar	0.5 to 3 psi	34.5 to 207 mbar	30" Hg Vac to 150	-1 to 10.3	180	12.4
Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connections								
455	5 to 80 "wcd	12 to 100 mbar	1 to 4" wcd	2.5 to 10 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
456	2 to 20 psid	0.1 to 1.4 bar	0.1 to 0.3 psi	6.9 to 20.7 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
457	3 to 30 psid	0.2 to 2.1 bar	0.1 to 0.4 psi	6.9 to 27.6 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
Kapton® diaphragm, Buna-N sealing diaphragms and epoxy coated aluminum 1/8" NPT (female) pressure connections								
540	1 to 7" wcd	2.5 to 17.4 mbar	0.1 to 0.5" w/c	0.2 to 1.2 mbar	200	13.8	400	27.6
541	2 to 20" wcd	5 to 49.8 mbar	0.5 to 5.0" w/c	1.2 to 5 mbar	200	13.8	400	27.6
542	5 to 50" wcd	12.4 to 124.4 mbar	0.5 to 2.5" w/c	1.2 to 12.4 bar	200	13.8	400	27.6
543	15 to 100" wcd	37.3 to 249 mbar	0.5 to 7" w/c	1.2 to 17.4 mbar	200	13.8	400	27.6
544	2 to 20 psid	0.1 to 1.4 bar	1 to 2.5 psi	0.1 to 0.2 bar	1200	82.7	2500	172.4
545	5 to 50 psid	0.3 to 3.4 bar	1 to 3 psi	0.1 to 0.2 bar	1200	82.7	2500	172.4
546	10 to 100 psid	0.7 to 6.9 bar	1 to 5.0 psi	0.1 to 0.3 bar	1200	82.7	2500	172.4
547	20 to 200 psid	1.4 to 13.8 bar	1 to 7 psi	0.1 to 0.5 bar	1200	82.7	2500	172.4
Teflon® and Buna-N diaphragms, Buna-N O-Ring with 1/4" (female) aluminum pressure connections								
559	10 to 100 psid	0.7 to 6.9 bar	0.2 to 1 psi	14 to 69 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5

DIFFERENTIAL PRESSURE MODEL H400K, H402K DIAL ADJUSTMENT VERSIONS

Buna-N diaphragm and O-Ring with 1/4" NPT (female) aluminum pressure connections								
455	5 to 80" wcd	12 to 100 mbar	1 to 4" w/c	2 to 10 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
456	2 to 20 psid	0.1 to 1.4 bar	0.1 to 0.3 psi	7 to 21 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
457	3 to 30 psid	0.2 to 2.1 bar	0.1 to 0.4 psi	7 to 28 mbar	30" Hg Vac to 225	-1 to 15.5	225	15.5
Teflon® and Buna-N diaphragms, Buna-N O-Ring with 1/4" NPT (female) aluminum pressure connections								
559	10 to 100 psid	0.7 to 6.9 bar	0.2 to 1 bar	14 to 69 bar	30" Hg Vac to 225	-1 to 15.5	225	15.5

*Over Range Pressure: The maximum pressure that may be applied continuously without causing damage and maintaining setpoint repeatability.

**Proof Pressure: The maximum pressure to which a pressure sensor may be occasionally subjected, which causes no permanent damage. The unit may require calibration (e.g., start-up, testing).

***Working Pressure Range: The pressure range within which two opposing sensors can be safely operated and still maintain set point adjustability provided the difference in pressure between them does not exceed the designated adjustable range.

Range/Material Code	Adjustable Set Point		Max. Temp		Scale Division		Stem/Bulb Size OD x Length
	°F	°C	°F	°C	°F	°C	
TEMPERATURE MODEL B400, B402, B403 INTERNAL ADJUSTMENT VIA REFERENCE DIAL							
120	0 to 225	-17.8 to 107.2	275	135	5	5	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
121	200 to 425	93.3 to 218.3	475	246.1	5	5	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
TEMPERATURE MODEL C400, C402, C403 INTERNAL ADJUSTMENT, NO REFERENCE DIAL							
120	0 to 225	-17.8 to 107.2	275	135	-	-	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
121	200 to 425	93.3 to 218.3	475	246.1	1-	-	9/16" x 1-7/8" below 1/2" NPT thread (nickel-plated brass)
TEMPERATURE MODEL E400, E402, E403 INTERNAL ADJUSTMENT VIA REFERENCE DIAL							
2BSA	-120 to 100	-84.4 to 37.8	150	65.5	10	5	3/8 x 2-5/8"
2BSB	30 to 250	1.1 to 121.1	300	148.9	10	5	3/8 x 2-5/8"
3BS	100 to 400	37.8 to 204.4	450	232.2	10	10	3/8 x 2-1/8"
4BS	25 to 100	-3.9 to 37.8	150	65.5	5	2	3/8 x 6-3/4"
5BS	-20 to 80	-28.9 to 26.7	130	54.4	5	2	3/8 x 5"
8BS	350 to 640	176.7 to 337.8	690	365.6	10	10	3/8 x 3-1/4"
TEMPERATURE MODEL F400, F402, F403 INTERNAL ADJUSTMENT, NO REFERENCE DIAL							
Stainless steel bulb & capillary							
1BS	-180 to 120	-115 to 48.9	170	76.6	-	-	3/8 x 3-3/4"
2BS	-125 to 350	-87.2 to 176.7	400	204.4	-	-	3/8 x 2-5/8"
3BS	-125 to 500	-87.2 to 260	550	287.7	-	-	3/8 x 2-1/8"
4BS	-40 to 120	-40 to 48.9	170	76.6	-	-	3/8 x 6-3/4"
5BS	-40 to 180	-40 to 82.2	230	110	-	-	3/8 x 5"
6BS	0 to 250	-17.8 to 121.1	300	148.8	-	-	3/8 x 4-1/2"
7BS	0 to 400	-17.8 to 204.4	450	232.2	-	-	3/8 x 3"
8BS	50 to 650	10 to 343.3	700	371.1	-	-	3/8 x 3-1/4"

ORDERING INFORMATION

SPECIFY MODEL NUMBER, RANGE CODE (FROM CHARTS) THEN OPTIONS IF REQUIRED
EXAMPLE: J400-570-0140-M201(10 PSI RISING)

Model- Pressure

J400- One SPDT output; internal adjustment with no reference dial
J402- Two SPDT outputs; internal adjustment with no reference dial
J403- Three SPDT outputs; internal adjustment with no reference dial
H400- One SPDT output; internal adjustment with reference dial
H402- Two SPDT outputs; internal adjustment with reference dial
H403- Three SPDT outputs; internal adjustment with reference dial

Model- Differential Pressure

J400K- One SPDT output; internal adjustment with no reference dial
J402K- Two SPDT outputs; internal adjustment with no reference dial
H400K- One SPDT output; internal adjustment with reference dial
H402K- Two SPDT outputs; internal adjustment with reference dial

Model- Temperature

B400- Immersion stem; one SPDT output; internal adjustment with reference dial
B402- Immersion stem; two SPDT outputs; internal adjustment with reference dial
B403- Immersion stem; three SPDT outputs; internal adjustment with reference dial
C400- Immersion stem; one SPDT output; internal adjustment with no reference dial
C402- Immersion stem; two SPDT outputs; internal adjustment with no reference dial
C403- Immersion stem; three SPDT outputs; internal adjustment with no reference dial
E400- Bulb and capillary; one SPDT output; internal adjustment with reference dial
E402- Bulb and capillary; two SPDT outputs; internal adjustment with reference dial
E403- Bulb and capillary; three SPDT outputs; internal adjustment with reference dial
F400- Bulb and capillary; one SPDT output; internal adjustment with no reference dial
F402- Bulb and capillary; two SPDT outputs; internal adjustment with no reference dial
F403- Bulb and capillary; three SPDT outputs; internal adjustment with no reference dial

Switch Options

NO SWITCH OPTIONS ARE AVAILABLE FOR PRESSURE RANGES 440 TO 443

0140- Gold contacts, 1A 125 VAC resistive

0500- Close deadband, 5A 125/250 VAC resistive

1010- DPDT switch, 10 A 125/250 VAC resistive NOT AVAILABLE TEMPERATURE VERSIONS OR MODEL J403 AND RANGE CODES 448-449, 520-535, 540-547, 570-572

1070- 10 A 125 VDC resistive; deadband and minimum set point will increase.

NOT AVAILABLE ON MODELS B & E OR RANGE CODES 448-449, 520-535, 540-547, 570-572

1520- Adjustable deadband, 15 A 125/250/277 VAC resistive. NOTE: FOR MODEL J403, NOT AVAILABLE ON MIDDLE SWITCH. NOT AVAILABLE ON MODEL TYPES B,E,H,C403,F403 OR RANGE CODES 520-535, 540-547, 570-572, 610-614

1530- External manual reset, 15 A 125/250/480 VAC resistive; latches on rise only.

NOT AVAILABLE ON MODEL 403 OR RANGE CODES 520-535, 570-572

1535- High ambient, 15 A 125/250 VAC resistive; temperatures up to 250 °F (145 °C).

NOT AVAILABLE ON MODELS 520-535

1537- Vapor sealed switch, 15 A 125/250 VAC resistive. NOT AVAILABLE ON RANGE CODES 520-535

1539- Fungus resistant case, 15 A 125/250 VAC resistive. NOT AVAILABLE ON RANGE CODES 520-535

2000- 20 A 125/250/300 VAC resistive. NOT AVAILABLE ON RANGE CODES 520-535, 540-

547, 570-572

Other Options

M020- Red status light, 115 VAC only. Specify whether light goes on or off with increasing or decreasing pressure or temperature.

M201- Factory set one switch; specify increasing or decreasing pressure or temperature and setpoint

M202- Factory set two switches. NOT AVAILABLE SINGLE SWITCH VERSIONS

M203 Factory set three switches; note: the third or middle switch must always be set highest pressure or temperature when switches are set apart. NOT AVAILABLE SINGLE OR DUAL SWITCH VERSIONS

M276- Range indicated on nameplate in bars/mbars. NOT AVAILABLE ON TEMPERATURE VERSIONS

M278- Range indicated on nameplate in Kg/cm2. NOT AVAILABLE ON TEMPERATURE VERSIONS

M321- Gasketed Lexan ® window. NOT AVAILABLE ON J,C,F TYPES

M444- Paper ID tag

M446- Stainless steel ID tag & wire attachment

M504- 316L stainless steel immersion stem. AVAILABLE ON MODELS 120,121 ONLY

M540- Viton® construction (deadband and low end range may increase slightly); wetted parts include Viton® diaphragm and O-ring plus standard connection material. Deadbands increase approximately 15% and low end of range will increase 10%. AVAILABLE MODELS 448-457,610-614,540-5

M550- Oxygen service cleaning; internal construction may change. NOT AVAILABLE (C MODELS 440-443

M900- Watertight conduit fitting; converts 7/8" hole to 1/2" NPT fitting. Required for product to meet NEMA 4X

6361-704- Surface Mounting Hardware required for models 520-535, 540-547

Optional Sensor Material for "WC Ranges. Available Models 520-525

XC001- Aluminum pressure connection, Viton® diaphragm, Viton® O-ring

XC002- Aluminum pressure connection, Kapton® diaphragm, Buna-N O-ring

XC003- Aluminum pressure connection, Kapton® diaphragm, Viton® O-ring

XC004- 316L Stainless steel pressure connection, 316L stainless steel diaphragm,

Viton® O-ring. (Over range pressure is limited to 100 psi)

XC005- 316L Stainless steel pressure connection, Viton® diaphragm, Viton® O-ring

XC006- 316L Stainless steel pressure connection, Kapton® diaphragm, Viton® O-ring

XC007- 316L Stainless steel pressure connection, Teflon® diaphragm, Viton® O-ring

Viton® is a registered trademarks of DuPont Dow Elastomers.

Kapton® and Teflon® are registered trademarks of E.I.DuPont.

Lexan® is a registered trademark of General Electric Company

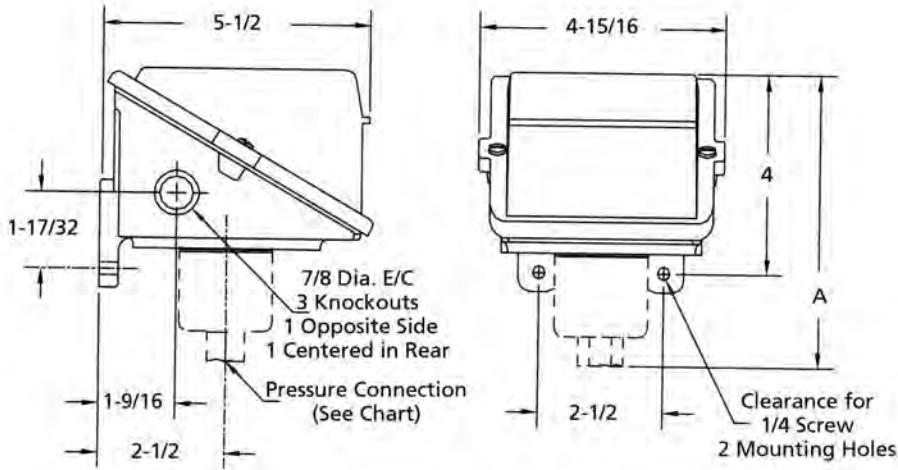
DIMENSIONS (INCHES)

Set Point Adjustment via Reference Dial

Types H400, H402, H403, H400K, H402K, B400, B402, B403, E400, E402, E403

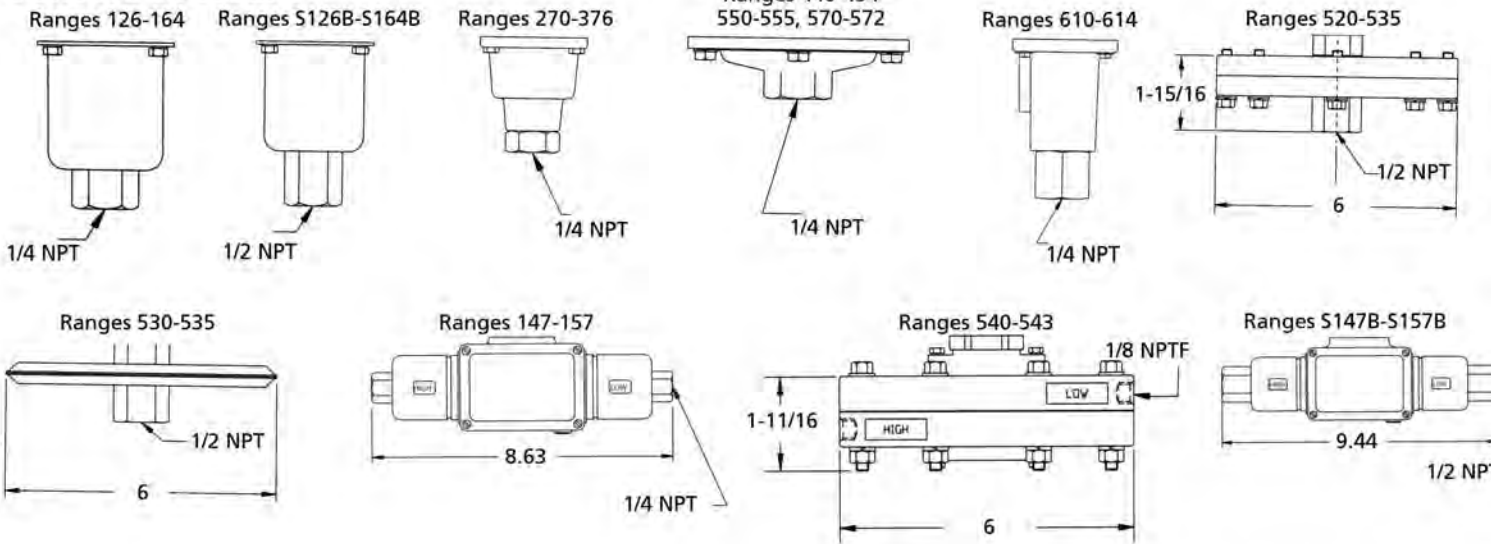
Internal Set Point Adjustment

Types J400, J402, J403, J400K, J402K, C400, C402, C403, F400, F402, F403

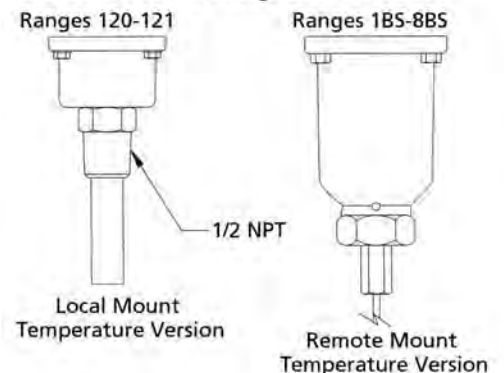


Dimension A		
Range Code	Inches	NPT
126-124	5.81	1/4
S126B-S164B	6.19	1/2
270-376	5.50	1/4
440-443, 449 451, 453, 454	4.28	1/4
448, 450, 452	5.03	1/4
520-525	8.25	1/2
530-535	8.12	1/2
551, 553-555	4.56	1/4
550, 552	5.03	1/4
570-572	4.56	1/4
610-614	6.44	1/4
Differential Pressure		
147-157	6.13	1/4
S147B-S157B	6.13	1/2
455-559	7.00	1/4
540-543	7.97	1/8
544-547	8.03	1/8
Temperature		
120, 121	10.88	Immersion Stem
1BS-8BS	7.00	Bulb & Capillary

Sensors-Pressure



Sensors-Temperature



CLARK SOLUTIONS

SM/LM Pressure Switch

Set Point Range, 2-300 PSI

DESCRIPTION

Model SM/LM is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard however a selection of other diaphragm materials are optionally available.

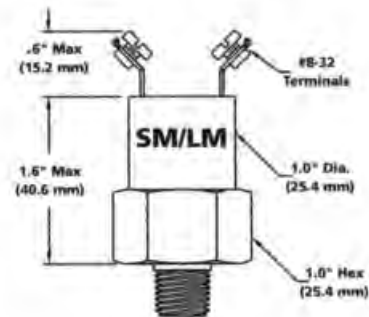
In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.



SPECIFICATIONS

	SM	LM
Set Point Range-	2-120 PSI (0.14-8.3 bar)	10-300 PSI (0.69-20 BAR)
Set Point Tolerance-	±1 PSI or 5% (0.07 bar)	
Max Operating pressure-	250 PSI (17 bar)	2000 PSI (137 BAR)
Proof Pressure-	750 PSI (51 bar)	6000 PSI (413 BAR)
Switch Deadband (differential)-	8-16%	12-24%
Current Rating-	3 A	5A
	(to 24Vdc, to 240Vac), resistive (10 amp contact available as well as gold contact for low current applications, consult us please)	
Media Connection-	1/8" NPT, 1/4" NPT	
Circuit Form-	SPST-NO, SPST-NC, SPDT	
Electrical Connections-	8-32 screw terminals	
Machined Switch Body-	Brass	
Diaphragm-	Buna-N (consult us for other materials)	

DIMENSIONS



ORDERING INFORMATION

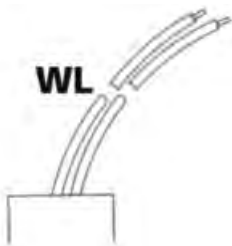
ORDER NUMBER (SEE TABLE)

(SM,LM)-A-B-C-D-E

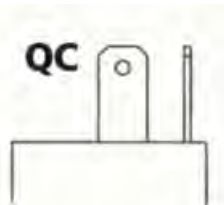
EXAMPLE- SM-1-90-C-R-WL

A=Connection	B=Circuit	C=Set Point	D=Set Direction	E=Electrical Connection
1=1/4" NPT 2=1/8" NPT Consult us for other connections	A=SPST-NO B=SPST-NC C=SPDT	Specify between 2-300 PSI	R=Rising F=Falling	WL=Wire Leads, 18" QC=1/4" Spade WP=Weather Pack MP=Metri-Pack

ELECTRICAL CONNECTIONS



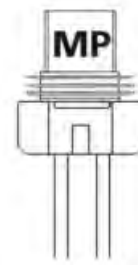
18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Quick Connects
1/4" Spades



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length

CLARK SOLUTIONS

MM Pressure Switch

Set Point Range, 2-120 PSI

DESCRIPTION

Model MM is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard however a selection of other diaphragm materials are optionally available.

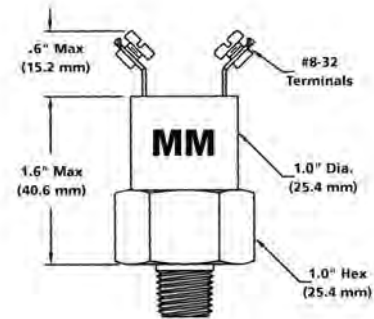
In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.

SPECIFICATIONS

- Set Point Range- 2-120 PSI (0.14-8.3 bar)
- Set Point Tolerance- ± 1 PSI or 5% (0.07 bar)
- Max Operating pressure- 600 PSI (41bar)
- Proof Pressure- 1800 PSI (124 bar)
- Switch Deadband (differential)- 8-16%
- Current Rating- 5A (to 24Vdc, 240Vac),resistive
- Media Connection- 1/8" NPT or 1/4" NPT
- Circuit Form- SPST-NO, SPST-NC, SPDT
- Electrical Connections- 8-32 screw terminals
- Machined Switch Body- Brass
- Diaphragm- Buna-N (consult us for other materials)



DIMENSIONS



ORDERING INFORMATION

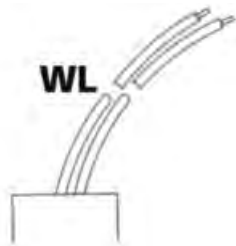
ORDER NUMBER (SEE TABLE)

(MM)-A-B-C-D-E

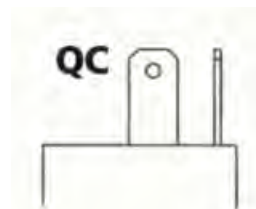
EXAMPLE- MM-1-C-90-R-WL

A=Connection	B=Circuit	C=Set Point	D=Set Direction	E=Electrical Connection
1=1/4" NPT	A= SPST-NO	Specify	R=Rising	WL=Wire Leads, 18"
2=1/8" NPT	B=SPST-NC	between	F=Falling	QC=1/4" Spade
Consult us for other connections	C=SPDT	2-120 PSI		WP=Weather Pack
				MP=Metri-Pack

ELECTRICAL CONNECTIONS



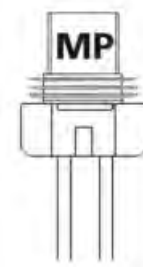
18 AWG wire, 18" long
Black-common; Red, normally
open; Blue, normally closed



Quick Connects
1/4" Spades



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length

CLARK SOLUTIONS

SQ Pressure Switch

FS Adjustable Set Point Ranges, 10-120 PSI

DESCRIPTION

Model SQ is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm as the sensing element. Brass connections and Buna-N diaphragm are standard. The switch point is field adjustable against a visible reference scale.

In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.

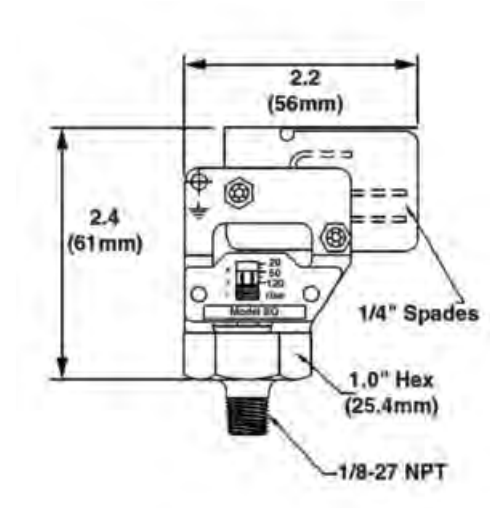


SQ

SPECIFICATIONS

- Set Point Range- 2-120 PSI (0.14-8.3 bar)
- Set Point Tolerance- ± 1 PSI or 5% (0.07 bar)
- Max Operating Pressure- 250 PSI (17 bar)
- Proof Pressure- 750 PSI (51 bar)
- Switch Deadband (Differential)- 10-20%
- Current Rating- 10 Amp
- Media Connection- 1/8" NPT Male Brass
- Circuit Form- SPDT
- Electrical Connections- 1/4" Spade,
- Diaphragm- Buna-N

DIMENSIONS (MM)



ORDERING INFORMATION

Model	Adjustment Range
SQ-1	2-10 PSI
SQ-2	6-30 PSI
SQ-3	20-120 PSI

CLARK SOLUTIONS

NS Pressure Switch

Set Point Range, 1.5-100 PSI

DESCRIPTION

Model NS is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard however a selection of other diaphragm materials are optionally available. The switch point can be factory preset or field adjustable.

In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.



NS With 8-32 Terminals

SPECIFICATIONS

- Set Point Range- 2-100 PSI (0.13-6.9 bar)
- Set Point Tolerance- ± 1 PSI or 5% (0.07 bar)
- Max Operating pressure- 250 PSI (17 bar)
- Proof Pressure- 750 PSI (51 bar)
- Switch Deadband (differential)- 8-16%
- Current Rating- 5 A (to 24Vdc, to 240Vac), resistive (10 amp contact available as well as gold contact for low current applications, consult us please)
- Media Connection- 1/8" NPT, 1/4" NPT
- Circuit Form- SPST-NO, SPST-NC, SPDT
- Electrical Connections- 18" wire leads, 1/4" Spade, Weather Pack, Metri-pack, 1/2" Conduit
- Machined Switch Body- Zinc
- Diaphragm- Buna-N (consult us for other materials)

ORDERING INFORMATION

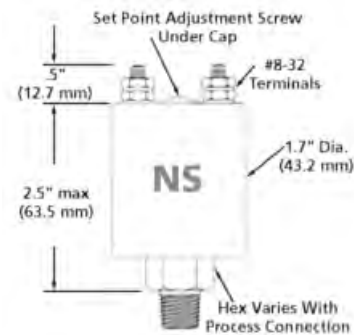
ORDER NUMBER (SEE TABLE)

NS-A-B-C-D-E

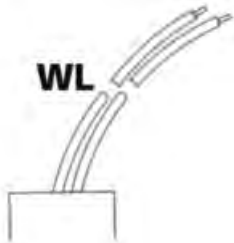
EXAMPLE- NS-1-A-C-R-WL

A=Connection	B=Circuit Form	c=Adj. Range	D=Set Direction	E=Electrical Connection
1=1/4" NPT	A= SPST-NO	A=1.5-5 PSI	RJ=Rising	PE=8-32 Terminals
2=1/8" NPT	B=SPST-NC	B=6-15 PSI	FG=Falling	WL=Wire Leads, 18"
Consult us for other connections	C=SPDT	C=16-40 PSI		QC=1/4" Spade
		D=41-100PSI		WP=Weather Pack
				MP=Metri-Pack
				EL=1/2" Conduit

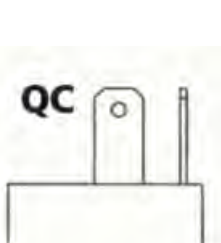
DIMENSIONS



ELECTRICAL CONNECTIONS



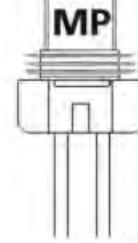
18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Quick Connects
1/4" Spades



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length



1/2-14 Male Conduit
Includes WL Option

CLARK SOLUTIONS

CJ Pressure Switch

Adjustable Set Point Range, 3-120 PSI

DESCRIPTION

Model CJ is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard.

In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.

SPECIFICATIONS

- Set Point Range: 3 – 120 PSI (.21 – 8.3 Bar)
- Set Point Tolerance: ± 1 PSI or 5% (.07 Bar)
- Maximum Operating Pressure: 250 PSI (17 Bar)
- Proof Pressure: 750 PSI (51 Bar)
- Differential: 10 – 20%
- Current Rating: 3 A @ 125 VAC
2 A @ 30 VDC (Resistive)

- Media Connection: Brass, See Order Chart Below for Options
- Circuit Form: SPST-NO or SPST-NC
- Electrical Connection: See Order Chart Below for Options
- Diaphragm Material: Buna N
- Cycle Life: 1 Million
- Housing: NEMA 4, 13

ORDERING INFORMATION

ORDER NUMBER (SEE TABLE)
CJ-ABCDEF

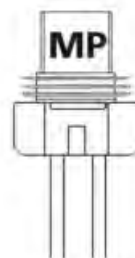
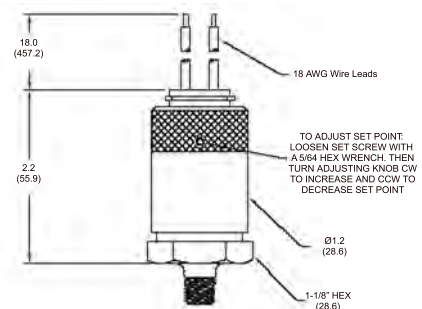
EXAMPLE- CJ-2A2020IW

A Media Connection	B Circuit Form	C Range	D Desired Set Point
1= 1/4" – 18 NPT Male 2= 1/8" – 27 NPT Male 17= 1/4" – 19 BSPP Male 28= 1/8" – 28 BSPP Male	A= SPST-NO B= SPST-NC C= SPDT	1= 3 – 10 PSI 2= 6 – 30 PSI 3= 20 – 120 PSI	3 – 120 PSI Examples: 4PSI= 004 90 PSI= 090 110 PSI= 110

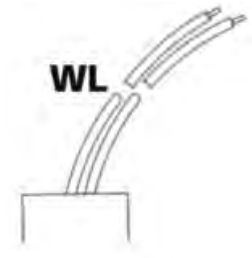
E Set Point Direction	F Electrical Options
J= Rising Adjustable G= Falling Adjustable	WL= Wire Leads 18" QC= 1/4" Spade Connection WP= Weather Pack HM=Mini-DIN Connector MP= Metri-Pack AT= 10 A @ 125/250 VAC 5 A @ 30 VDC GG= Internal Ground AU= Gold Contacts, 50 mA @ 30 VDC



DIMENSIONS INCHES (MM)



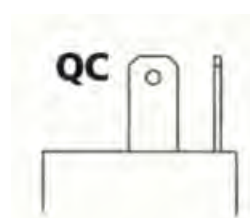
Female 280 Series
18 AWG Wire
6" complete length



18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Female Tower Type
18 AWG wire
6" complete length



Quick Connects
1/4" Spades

CLARK SOLUTIONS

CD Pressure Switch

Adjustable Set Point Range, 10-4500 PSI

DESCRIPTION

Model CD is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm or a stainless steel piston as the sensing element. A Buna-N diaphragm is standard for ranges to 200 PSI and a stainless steel piston is used for higher ranges.

In operation, the diaphragm/piston actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.



UL US

SPECIFICATIONS

- Set Point Range: 10 – 4500 PSI (.69 – 289 Bar)
- Set Point Tolerance: ± 5 PSI or 5% (.34 Bar)
- Maximum Operating Pressure: 5000 PSI (344 Bar)
- Proof Pressure: 15000 PSI (1034 Bar)
- Differential: 10 – 20%
- Current Rating: 5 A @ 250 VAC
5 A @ 30 VDC (Resistive)

- Media Connection: See Order Chart Below for Options
- Circuit Form: SPST-NO or SPST-NC
- Electrical Connection: See Order Chart Below for Options
- Diaphragm Material: Buna (Ranges 1 – 3)
- Stainless Steel Piston: (Ranges 4 – 7)
- Cycle Life: 1 Million
- Housing: NEMA 4, 13

ORDERING INFORMATION

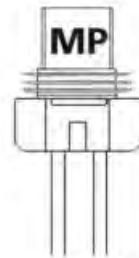
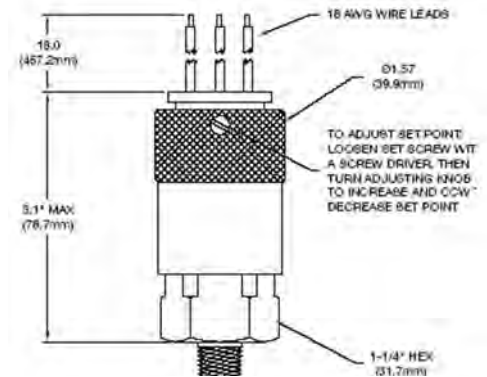
ORDER NUMBER (SEE TABLE)
CD-ABCDEF

EXAMPLE- CD-3A60600GWL

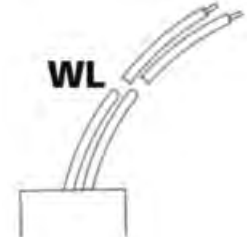
A Media Connection	B Circuit Form	C Range	D Desired Set Point
Piston 1= 1/4" – 18 NPT Male 3= 3/4" – 16 SAE Male 11= 9/16" – 18 SAE Male Diaphragms 1= 1/4" – 18 NPT Male 3= 3/4" – 16 SAE Male 9= 3/8" – 18 NPT Male 11= 9/16" – 18 SAE Male	A= SPST-NO B= SPST-NC C= SPDT	1= 10 – 40 PSI 2= 25 – 100 PSI 3= 50 – 200 PSI 4= 100 – 400 PSI 5= 250 – 1000 PSI 6= 500 – 2000 PSI 7= 1200 – 4500 PSI	10 – 4500 PSI Examples: 15PSI= 0015 35000 PSI= 3500

E Set Point Direction	F Electrical Connections
J= Rising Adjustable G= Falling Adjustable	WL= Wire Leads 18" EL= Male Conduit 1/2 – 14 With Wire Leads 18" EF= Female Conduit 1/2 – 14, With Wire Leads 18" HR= DIN43650A With Receptacle HH= DIN43650A Without Receptacle QC= 1/4" Spade Connection WP= Weather Pack MP= Metri-Pack AT= 10 A @ 125/250 VAC, 5 A @ 30 VDC AU= Gold Contacts, 50 mA @ 30 VDC

DIMENSIONS INCHES (MM)



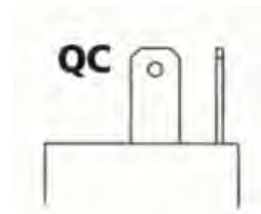
Female 280 Series
18 AWG Wire
6" complete length



18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Female Tower Type
18 AWG wire
6" complete length



Quick Connects
1/4" Spades

CLARK SOLUTIONS

WX Pressure Switch

Set Point Range, 50 to 5000 PSI

DESCRIPTION

Model WX is a simple, reliable low cost pressure switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard however a selection of other diaphragm materials are optionally available. The switch point can be factory preset or field adjustable.

In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.

SPECIFICATIONS

- Set Point Range- 50-5000 PSI (1.38-289 bar)
- Set Point Tolerance- ± 5 PSI or 5% (0.34 bar)
- Max Operating pressure- 5000 PSI (344 bar)
- Proof Pressure- 15000 PSI (1034 bar)
- Switch Deadband (differential)- 5-10%
- Current Rating- 5 A (to 24Vdc, to 240Vac),resistive (10 amp contact available as well as gold contact for low current applications, consult us please)
- Media Connection- 1/8" NPT, 1/4" NPT
- Circuit Form- SPST-NO, SPST-NC, SPDT
- Electrical Connections- 8-32 terminals, 18" wire leads, 1/4" Spade, Weather Pack, Metri-pack, 1/2" Conduit
- Machined Switch Body- Zinc
- Diaphragm- Buna-N (consult us for other materials)

ORDERING INFORMATION

ORDER NUMBER (SEE TABLE)

WX-AB-CD-E-ADJ

EXAMPLE- WX-1A-CA-J-WL-ADJ

A=Connection	B=Circuit Form	C=Adj. Range	D=Set Direction	E=Electrical Connection
1=1/4" NPT	A= SPST-NO	A=50-150 PSI	J=Rising	PE=8-32 Terminals
2=1/8" NPT	B=SPST-NC	B=140-400 PSI	G=Falling	WL=Wire Leads, 18"
Consult us for other connections	C=SPDT	C=300-800 PSI		QC=1/4" Spade
		D=700-2500 PSI		WP=Weather Pack
		E=2000-5000		MP=Metri-Pack
				EL=1/2" Conduit

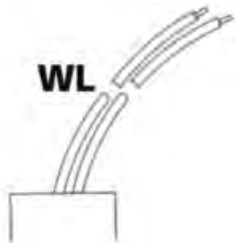


WX With 8-32 Terminals

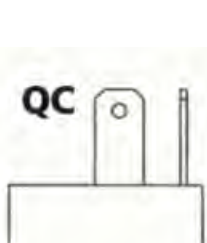
DIMENSIONS



ELECTRICAL CONNECTIONS



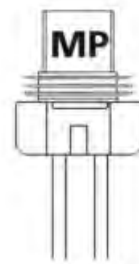
18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Quick Connects
1/4" Spades



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length



1/2-14 Male
Includes WL Option

CLARK SOLUTIONS

VM Vacuum Switch

Set Point Range, 4-30" Hg, Factory Preset

DESCRIPTION

Model VM is a simple, reliable low cost Vacuum switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard however a selection of other diaphragm materials are optionally available.

In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.



VM With 8-32 Terminal Connections

SPECIFICATIONS

- Set Point Range- 4-30" Hg (102-762 mm Hg)
- Set Point Tolerance- ± 1 " Hg or 5% (25 mm Hg)
- Max Operating pressure- 250 PSI (17 bar)
- Switch Deadband (differential)- 20-40%
- Current Rating- 5 A (to 24Vdc, to 240Vac), resistive (10 amp contact available as well as gold contact for low current applications, consult us please)
- Media Connection- 1/8" NPT, 1/4" NPT
- Circuit Form- SPST-NO, SPST-NC, SPDT, DPDT
- Electrical Connections- 18" wire leads, 1/4" Spade, Weather Pack, Metri-pack, 8-32 Terminals, DIN 43650A
- Machined Switch Body- Brass
- Diaphragm- Buna-N (consult us for other materials)

ORDERING INFORMATION

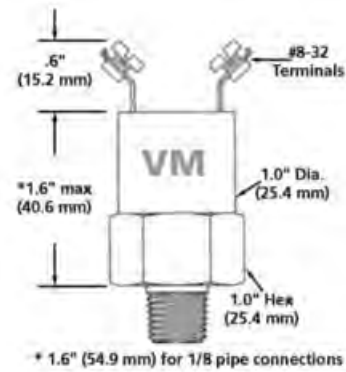
ORDER NUMBER (SEE TABLE)

VM-AB-CD/E

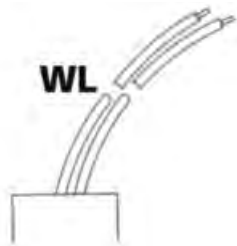
EXAMPLE- VM-1C-20R/WL

A=Connection	B=Circuit	C=Set Point	D=Set Direction	E=Electrical Connection
1=1/4" NPT 2=1/8" NPT Consult us for other connections	A= SPST-NO B=SPST-NC C=SPDT D=DPDT	Specify between 4-30" Hg	R=Rising F=Falling	PE=8-32 Terminals WL=Wire Leads, 18" QC=1/4" Spade WP=Weather Pack MP=Metri-Pack HR=DIN 43650A

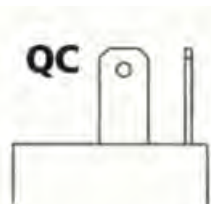
DIMENSIONS



ELECTRICAL CONNECTIONS



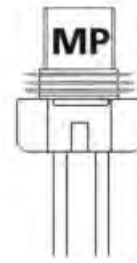
18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Quick Connects
1/4" Spades



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length



DIN 43650-A Type
Plug & Receptacle Included

CLARK SOLUTIONS

NV Vacuum Switch

Set Point Range, 3-30" Hg, Field Adjustable

DESCRIPTION

Model NV is a simple, reliable low cost Vacuum switch that uses a spring loaded diaphragm as the sensing element. A Buna-N diaphragm is standard however a selection of other diaphragm materials are optionally available.

In operation, the diaphragm actuates a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.

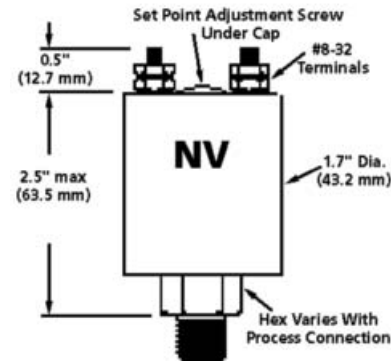


NV With 8-32 Terminal Connections

SPECIFICATIONS

- Set Point Range- 3-30" Hg (76-762 mm Hg)
- Set Point Tolerance- ± 1 " Hg or 5% (25 mm Hg)
- Max Operating pressure- 250 PSi (17 bar)
- Switch Deadband (differential)- 20-40%
- Current Rating- 5 A (to 24Vdc, to 240Vac), resistive (10 amp contact available as well as gold contact for low current applications, consult us please)
- Media Connection- 1/4" NPT
- Circuit Form- SPST-NO, SPST-NC, SPDT
- Electrical Connections- 18" wire leads, 1/4" Spade, Weather Pack, Metri-pack, DIN 43650A, 8-32 Terminals
- Machined Switch Body- Brass
- Diaphragm- Buna-N (consult us for other materials)

DIMENSIONS



ORDERING INFORMATION

ORDER NUMBER (SEE TABLE)

NV-AB-CD/E

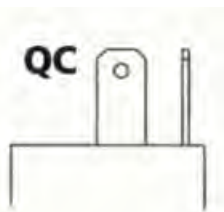
EXAMPLE- NV-1A-BJ-WL

A Connection	B Circuit Form	C Range	D Set Direction	E Electrical Connection
1=1/4" NPT Consult us for other connections	A= SPST-NO B=SPST-NC C=SPDT	A= 3-12" Hg B=8-30" Hg	Rxx=Rising, factory preset, specify switch point Fxx=Falling, factory preset, specify switch point J=Rising Adjustable G=Falling Adjustable	PE=8-32 Terminals WL=Wire Leads, 18" QC=1/4" Spade WP=Weather Pack MP=Metri-Pack HR=DIN 43650A EL=1/2" Conduit

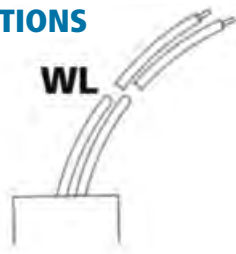


1/2-14 Male Conduit Includes WL Option

ELECTRICAL CONNECTIONS



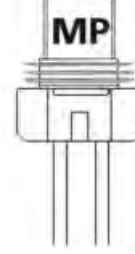
Quick Connects
1/4" Spades



18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length



DIN 43650-A Type
Plug & Receptacle Included

AMR

THERM 2420-1L Portable Temperature Instrument

For Thermocouple Types K, N, L, J, U, T, S

DESCRIPTION

Model MA2420 is a handy temperature measurement instrument with built in display. It features 7 selectable measuring ranges for thermocouple types K, N, L, J, U, T & S.

The unit is easy to operate by means of 7 keys. It incorporates a generously dimensioned 2-row 7/16 segment display including units.

The unit of measure is °F or °C. Measuring functions include measured value with cold junction compensation, thermal voltage mV, zero setting, saving of maximum and minimum values, and hold function.

Test functions include segment monitoring, range monitoring, sensor breakage indication, battery voltage check and display.

SPECIFICATIONS

Measuring input: For thermocouple via miniature flat connector

A/D converter: delta-sigma, 15-bit resolution Measuring ranges:

NiCr-Ni(K)	-200...+1370°C
NiCroSil-NiSil(N)	-200...+1300°C
Fe-CuNi(L)	-200...+900°C
Fe-CuNi(J)	-200...+950°C
CCu-CuNi(U)	-200...+600°C
CCu-CuNi(T)	-200...+400°C
PtRh10-Pt(S)	0 ...1760 °C

Resolution: 0.1 °C

Linearization Accuracy: for thermocouples, types K, N, L, J, U, T: ±0.05 °C ±0.05% of measured value; type S: ±0.3 °C

Measuring Rate: 2.5 mops (measuring operations per second)

System Accuracy: ±0.1% of measured value ±3 digits

Nominal Temperature: 22°C ±2 °C

Temperature Drift: 0.01% / °C

Cold junction compensation: effective in range -30 to +80 °C (accuracy ± 0.2 °C ± 0.01 °C / °C)

LC display:

7 segments: Measured value	5 char., 15 mm
Function	4½ characters, 9 mm
16 segments: Units	2 characters, 9 mm
	7 symbols

Keypad: 7 silicone keys

Power Supply: 3 AA alkaline batteries

Current Consumption: approx. 10mA

Housing: LxWxH 127 x 83 x 42 mm ABS (maximum 70 °C)

Operating Temperature: -10 ... +60 °C

Atmospheric Humidity: (ambient)10 ... 90 % r.H. (non-condensing)

ORDERING INFORMATION

Model

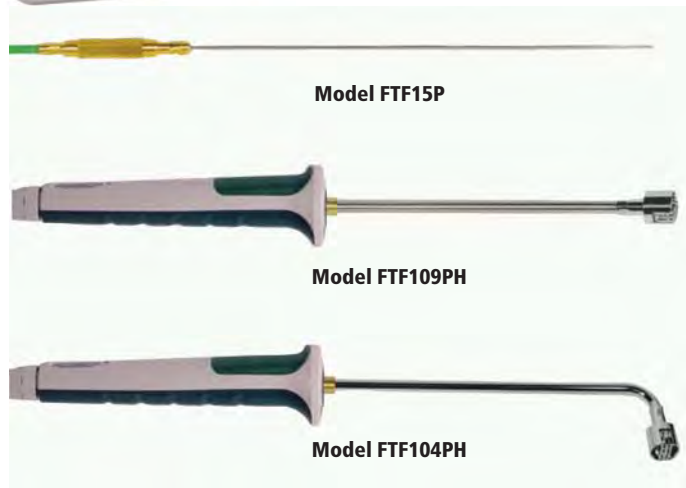
MT24201L Temperature measuring instrument including 3 AA Batteries, Instructions & test certificate

Accessories

FTF15P Temperature sensor for liquids and gases

FTF109PH Temperature sensor for surfaces

FTF104PH Temperature sensor for surfaces, angled head



	Probe Model		
	FTF15P	FTF109PH	FTF104PH
Meas. Element	NiCr-Ni (Type K)	NiCr-Ni (Type K)	NiCr-Ni (Type K)
Probe Length	200 mm	180 mm	180 mm
Meas. Head	1.5 mm	15 mm Dia.	15 mm Dia.
Meas. Range	-200 to 1100 oC	-50 to 500 oC	-50 to 500 oC
Response Time	1.5 s	1 s	1 s
Cable Length	1.4 m PVC	1.5 m PVC	1.5 m PVC
Connector	Mini Flat	Mini Flat	Mini Flat
Notes	Sheathed line, Inconel	Tip is thermal ribbon, not elect. isolated	

CLARK SOLUTIONS

TT Bi-Metal Temperature Switch

Set Point Range, 40-300°F, Factory Preset

DESCRIPTION

Model TT is a simple, reliable low cost immersion temperature switch that uses a bi-metal sensing element.

In operation, the bi-metal element acts directly on a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.

SPECIFICATIONS

Set Point Range- 40-300°F

Set Point Tolerance- $\pm 5^\circ$

Max External Pressure- 5000 PSI

Current Rating- 6A/120V, 4A/240V. 4A/12Vdc, 2A/24Vdc

Media Connection- 1/4" NPT, 3/8" NPT, 1/2" NPT, M-16 x 1.5

Circuit Form- SPST-NO, SPST-NC

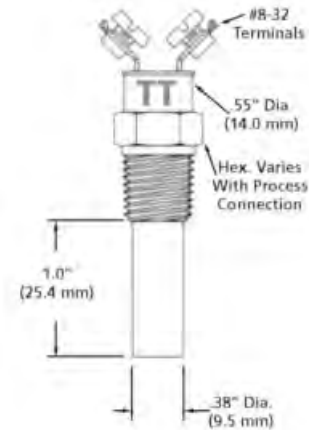
Electrical Connections- 4" wire leads, 1/4" Spade,
Weather Pack, Metri-pack, 8-32 Terminals

Machined Thermowell- Brass



TT With 8-32 Terminal Connections

DIMENSIONS



ORDERING INFORMATION

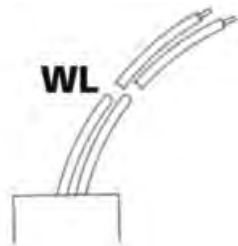
ORDER NUMBER (SEE TABLE)

TT-ABC-DE/F

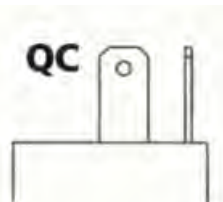
EXAMPLE- TT-E1A-150J/WL

A=Probe Length	B=Connection	C=Circuit Form	D=SET Point	E=Set Direction	F=Electrical Connection
D= 1/2"	1=1/2" NPT	A= SPST-NO	State value	R=Rising	PE=8-32 Terminals
E=3/4"	2= 3/8" NPT	B=SPST-NC	between	F=Falling	WL=Wire Leads, 4"
F=1"	3= 1/4" NPT		40°F to 300°F		QC=1/4" Spade
H=1.5"	6= M-16 x 1.5				WP=Weather Pack
J=2"					MP=Metri-Pack

ELECTRICAL CONNECTIONS



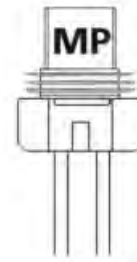
18 AWG wire, 4" long
Black-common; Red, normally open; Blue, normally closed



Quick Connects
1/4" Spades



Female Tower Type
18 AWG wire
6" complete length



Female 280 Series
18 AWG Wire
6" complete length

CLARK SOLUTIONS

HT Bellows Immersion Temperature Switch

Set Point Range, 40-300°F, Factory Preset

DESCRIPTION

Model HT is a simple, reliable low cost immersion temperature switch that uses a bellows sensing element.

In operation, the bellows element acts directly on a snap action electrical switch that insures a positive, instantaneous electrical contact under all operating conditions.



HT With 8-32 Terminal Connections

SPECIFICATIONS

Set Point Range- 40-300°F

Set Point Tolerance- $\pm 3^\circ$

Max External Pressure- 5000 PSI

Current Rating- 10A (to 24Vdc, to 240Vac), resistive (25 amp contact available as well as gold contact for low current applications, consult us please)

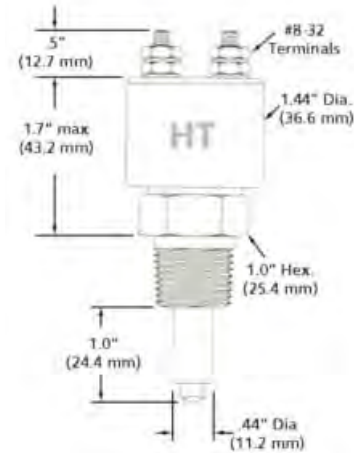
Media Connection- 3/8" NPT, 1/2" NPT, M-16 x 1.5

Circuit Form- SPST-NO, SPST-NC, SPDT

Electrical Connections- 18" wire leads, 1/4" Spade, Weather Pack, Metri-pack, 8-32 Terminals, 1/2" Conduit

Machined Thermowell- Brass

DIMENSIONS



ORDERING INFORMATION

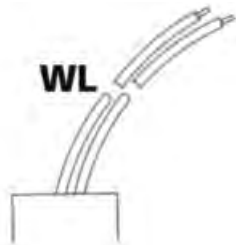
ORDER NUMBER (SEE TABLE)

HT-A-B-C-D-E

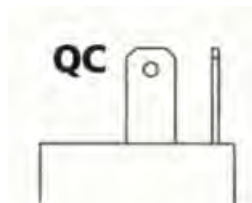
EXAMPLE- HT-1-A-100-R-PE

A=Connection	B=Circuit Form	C=SET Point	D=Set Direction	E=Electrical Connection
1= 1/2" NPT	A= SPST-NO	State value	R=Rising	PE=8-32 Terminals
2= 3/8" NPT	B=SPST-NC	between	F=Falling	WL=Wire Leads, 18"
6= M-16 x 1.5	C=SPDT	40°F to 300°F		QC=1/4" Spade
				WP=Weather Pack
				MP=Metri-Pack
				EL=1/2" Conduit
				HR=DIN43650A

ELECTRICAL CONNECTIONS



18 AWG wire, 18" long
Black-common; Red, normally open; Blue, normally closed



Quick Connects
1/4" Spades



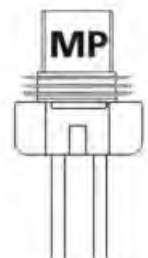
Female Tower Type
18 AWG wire
6" complete length



1/2-14 Male Conduit
Includes WL Option



DIN 43650-A Type
Plug & Receptacle Included



Female 280 Series
18 AWG Wire
6" complete length

CLARK

Series L007 Horizontal Mount Level Switches

Compact, Low Cost

DESCRIPTION

The L007 series horizontal mount level switches have a no-leak construction and are ideal for small tanks.

The units side-wall mount internally or externally and offer a broad range of media compatibility due to the selection of construction materials.

Model L007 operates on falling or rising level. Normally open or normally closed switch operation is easily defined by the mounting position of the switch. When normally open the float lowers with the fluid level and, conversely, when the float is mounted to rise with the fluid level, it is in a normally closed configuration.

High temperature applications can be accommodated using stainless steel construction.



L007- Stainless Steel

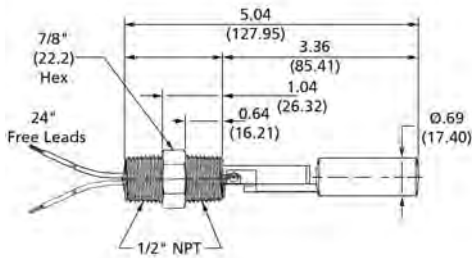


L007- PVDF

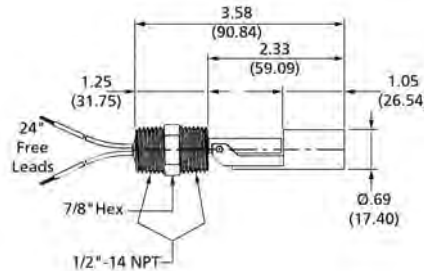


L007-Polypropylene

DIMENSIONS INCHES (MM)



L007- Stainless Steel



L007-Plastic, 1/2" NPT

Contact Rating: 240V AC/DC Max, 0.5 A, resistive; 1 A available as option

ORDERING INFORMATION

SELECT MODEL NUMBER

Model	Mounting	Wetted Materials	SG	Temperature	Pressure
L007-0404-0403	1/2" NPT	PVDF	0.85	-13 TO 240°F	100 PSIG
L007-0402-0203	1/2" NPT	PP	0.85	-13 TO 120°F	100 PSIG
L007-0405-0503	1/2" NPT	PVC	0.85	-13 TO 140°F	50 PSIG
L007-0408-0803	1/2" NPT	SS	0.85	-13 TO 300°F	300 PSIG

CLARK

Series L070 Horizontal Mount Level Switches

Compact, Stainless Steel Construction

DESCRIPTION

The L070 level switch is mounted in the horizontal orientation to monitor high and low liquid levels. The L070 provides a switch closure to activate alarms, send signals to an I/O card or PLC, and many other level monitoring and control functions.

The L070 level switch operates by the rising and falling liquid moving a magnet into close proximity of a hermetically sealed reed switch. The magnet is encapsulated in a float device. The float mechanism has an operating specific gravity of 0.40 but can be modified to monitor the interface levels between two fluids of different specific gravities with a minimum 0.10 specific gravity differential.

The switch can be installed in either Normally-Open or Normally-Closed orientation.



L070

FEATURES

- ALL STAINLESS STEEL
- OPERATES ON FALLING OR RISING LEVEL
- RELIABLE REED SWITCH ACTION
- UL & FM APPROVED
- NEMA 4 CONSTRUCTION WITH J-BOX

SPECIFICATIONS

Process Connection: 1 1/2" NPT (other connections available)

Electrical Connection: 1/2" NPT

Electrical Rating: 100 VA SPST (240 V AC/DC maximum voltage), resistance load (optional 20 VA SPDT 240V AC/DC maximum switching)

Temperature Rating: -40°F to 300°F

Min. Media Sp.Gr.: 0.40

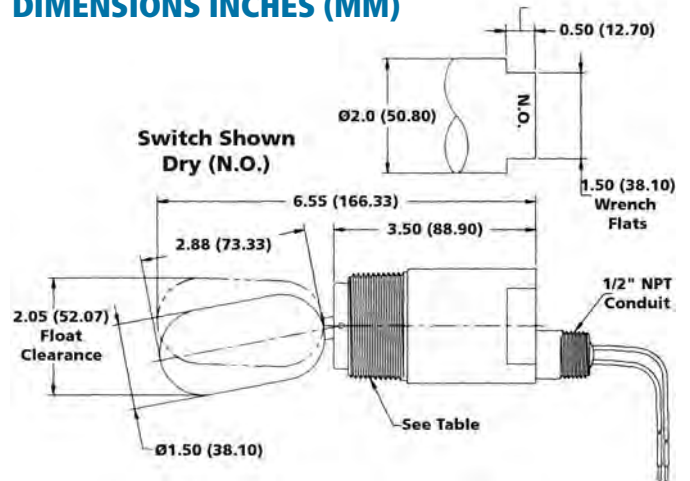
Wetted Materials: 316 SS Housing, float assembly and pivot spacers; 18-8 SS float pivot pin

Max. Pressure: 1500 PSIG

Approvals: UL & CUL

FM-EP (CL I,II, III, Div 1, Groups C, D, E, F, & G)

DIMENSIONS INCHES (MM)



ORDERING INFORMATION

SELECT MODEL NUMBER

Mounting	Wetted Materials	SG	Temperature	Pressure	Model Number
1 1/2" NPT	SS	0.40	-40° to 300°F	1500 PSIG	L070-0808-0803
2" NPT	SS	0.40	-40° to 300°F	1500 PSIG	L070-0908-0803
2" 150#FL	SS	0.40	-40° to 300°F	230 PSIG	L070-7308-0803
2 1/2" 150#FL	SS	0.40	-40° to 300°F	230 PSIG	L070-7408-0803
3" 150#fl	SS	0.40	-40° to 300°F	230 PSIG	L070-7508-0803
4" #150FL	SS	0.40	-40° to 300°F	230 PSIG	L070-7608-0803
2" 300#FL	SS	0.40	-40° to 300°F	600 PSIG	L070-8408-0803
2 1/2" 300#FL	SS	0.40	-40° to 300°F	600 PSIG	L070-8508-0803
3" 300#FL	SS	0.40	-40° to 300°F	600 PSIG	L070-8608-0803
4" 300#FL	SS	0.40	-40° to 300°F	600 PSIG	L070-8708-0803

CLARK

Series L312 & L500 Custom Level Switches

Compact, 1-6 Reed Switch Outputs

DESCRIPTION

The L312 series level switches are individually designed from over 360 component parts to create a custom switch available in lengths from one foot (304mm) to four feet (1.2m). Switch point tolerance is +/- 1/8" (3mm).

The L500 series level switches are individually designed from over 1,400 component parts to create a custom switch available in lengths from one foot (304mm) to 11 feet (3.3m). Switch point tolerance is +/- 1/8" (3mm).

To specify, review the choices in mounting types, stem material, float size and material, switching points, and electrical specifications. Fax or call us to review.



L500



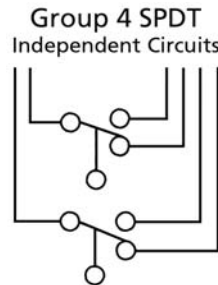
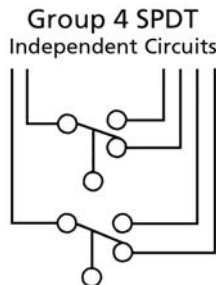
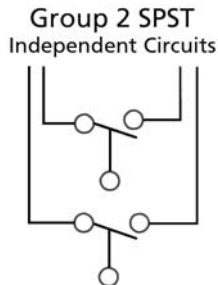
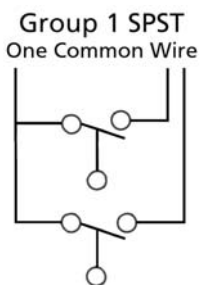
L312

Table 1, Mounting Types Model L312		Model L500	
Code	Mounting	Code	Mounting
00	No Mounting	04	1/2" NPT
01	1/8" NPT	07	1/4" NPT
02	1/4" NPT	09	2" NPT
03	3/8" NPT	75	3" 150# ANSI Flange
05	3/4" NPT		
06	1" NPT		
07	1 1/4" NPT		

Table 2, Stem Materials Model L312		Model L500	
Code	Material	Code	Material
BR	Brass	BR	Brass
PV	PVC	SS	316SS
SS	316SS		
TF	Teflon (max. 24")		
PS	Polysulfone		

Table 3, Float Materials and Dimensions Model L312			Model L500		
Code	Material	Dimensions	Code	Material	Dimensions
1010BN	Buna N	1"x1"	1217BN	Buna N	1.25"x1.875"
1010PV	PVC	1"x1"	1817BN	Buna N	1.875"x1.75"
1010STD	316SS	1"x1"	2000	316SS	2" Sphere
1410	316SS	1.5"x1"	1513	316SS	1.5"x1.3"
1000LW	316SS	1" Sphere			
0815LSG	316SS	0.9"x1.5"			

Table 4, Reed Switch Electrical Specifications Model L312		Model L500	
Code	Description	Code	Description
G1	SPST switches, share a common wire, max 5 switch points	G1	SPST switches, circuits share a common wire, max 6 switch points
G2	SPST switches, independent circuits, max 3 switch points	G2	SPST switches, independent circuits, max 6 switch points
		G3	SPDT switches, circuits share a common wire, max 6 switch points
		G4	SPDT switches, independent circuits, max 6 switch points



Only two actuation points are shown

Each reed switch requires one float except in certain special applications (consult factory). For special applications, a single float can be used to activate two switch points, though these points must have a minimum separation of 1/4" (6 mm). The maximum number of actuation levels depends on the wiring type selected.

Ratings:

L312: 20 VA@120VAC SPST

50VA@240 VAC SPST

L500: 20,50 or 100 VA@120 VAC SPDT

50VA @240 VAC SPST

Connection: 24" Free Leads #22 AWG

Mounting Attitude: Vertical ±30°

Table 5, Operating Specifications for Material Combinations									
Model L312					Model L500				
Float Code	Mounting Code	Temperature	Pressure	*SG	Float Code	Mounting Code	Temperature	Pressure	*SG
1010BN	00, 01, 02, 03, 06, 07	-40 to +180°F	150 PSIG	0.80	1217BN	04, 07, 09, 75	-40 to +180°F	150 PSIG	0.65
1010PV	00, 01, 02, 03, 06, 07	-40 to +140°F	50 PSIG	0.95	1817BN	04, 09, 75	-40 to +180°F	150 PSIG	0.65
1010STD	00, 01, 02, 03, 06, 07	-40 to +300°F	600 PSIG	0.95	2000	04, 09, 75	-40 to +300°F	750 PSIG	0.75
1410	00, 01, 02, 03	-40 to +300°F	100 PSIG	0.70	1513	04, 09, 75	-40 to +300°F	120 PSIG	0.85
1000LW	00, 01, 02, 03, 06, 07	-40 to +300°F	275 PSIG	0.80					
0815LSG	00, 01, 002, 03, 05, 06, 07	-40 to +300°F	200 PSIG	0.85					

*SG refers to recommended minimum liquid specific gravity

ACTUATION LEVEL DIMENSIONS

- A= Minimum distance from actuation point to bottom of mounting.
 B= Minimum distance between actuation levels.
 C= Minimum distance from end of unit to lowest actuation point.
 D= Minimum distance between actuation point when a single float is used to actuate two switches.

Notes:

- 1) A, B, and C dimensions are based on a specific gravity of 1.0.
- 2) One float for two actuation levels can be used only with a 20VA switch.
- 3) Actuation levels are calibrated on descending fluid level, with water as the fluid, unless otherwise specified.
- 4) Standard tolerance on actuation levels is $\pm 1/8"$ (3mm).

Dimensions									
Model L312					Model L500				
Float Code	A	B	C	D	Float Code	A	B	C	D
1010BN	1"	1 3/4"	1"	1/8"	1217BN	1 1/2"	3"	2"	1/4"
1010PV	1"	1 3/4"	1"	1/8"	1817BN	1 1/2"	3"	2"	1/4"
1010STD	1"	1 3/4"	1"	1/8"	2000	1 1/2"	3"	2"	1/4"
1410	1"	1 3/4"	1"	1/8"	1513	1 1/2"	3"	2"	1/4"
1000LW	1"	1 13/16"	1"	1/8"					
0815LSG	1"	2 7/16"	1 7/16"	1/8"					

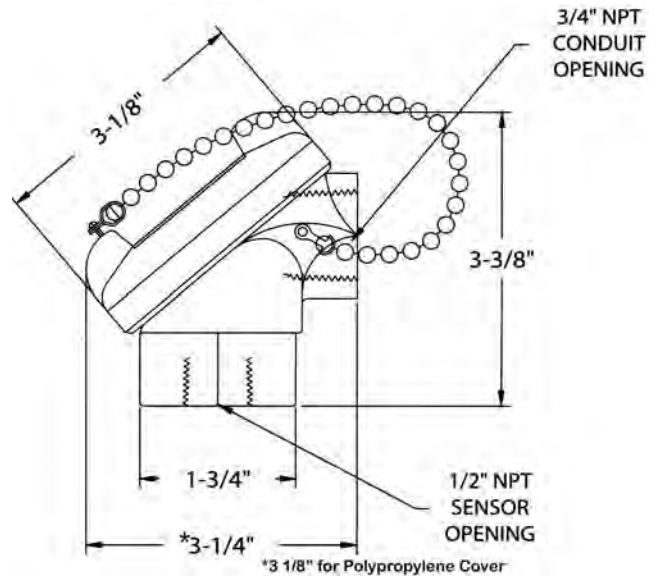
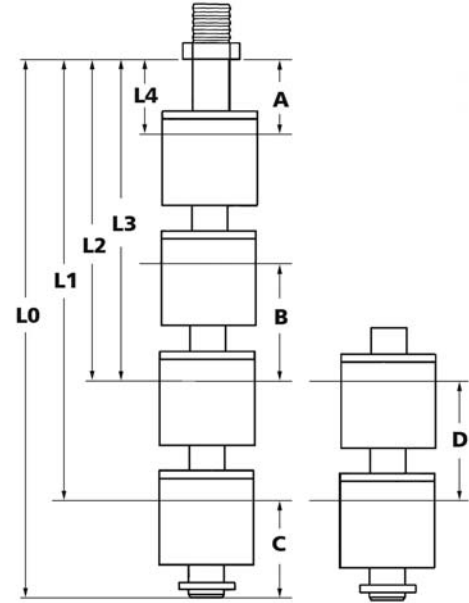
ORDERING INFORMATION

- 1) Select Model Series: L312 or L500
- 2) Select Mounting Type: Table 1
- 2) Select Stem Material: Table 2
- 4) Select Float Material: Table 3
- 5) Select Wiring Type: Table 4
- 6) Select Switch Rating:

L312	L500
3 VA SPDT	30 VA SPDT
20 VA SPST	50 VA SPST
50 VA SPST	100 VA SPST
- 7) Select Lead Wire Length: 12", 24" or other (specify)
- 8) Advise Switch Actuation Levels:

Level	Distance to Actuation level (Inches)*	SPST Switch Operation** (Check Type)	
		N.O.	N.C.
L6			
L5			
L4			
L3			
L2			
***L1			
****L0			

* Measured from the bottom of the mounting plug or flange
 ** Switch position is "normal" with unit dry (empty tank)
 *** L1 is the distance to the lowest actuation level with mounting "up" and is the distance to the highest actuation level with mounting "down"
 **** L0= length overall, measured from the bottom of the mounting plug or flange to the end of the unit



White Polypropylene & Die Cast Aluminum Junction Boxes

- 9) Specify if junction box option required:
 - WP= White Polypropylene rated NEMA 4X (excellent resistance to acids, alkalines and many process chemicals. Temperature rating is 198°F).
 - AL= Die cast Aluminum rated NEMA 4, 7, & 9

CLARK

Series U00X Ultrasonic Level Switch

316 Stainless Steel Construction, Actuation Lengths 1 to 100 Inches

DESCRIPTION

The U00X Series Solid-State Level Switches are reliable, low-cost liquid level controls for use in installations where mechanical float-type switches are impractical. U00X models are compatible with many liquids, regardless of the fluid's density or conductivity. The units require no calibration, withstand pressures up to 2,000 PSIG and their compact, 7/8" diameter probes install in any orientation. U00X models are constructed from durable and easy-to-clean 316 stainless steel with probe lengths available up to 100". Optional materials include CPVC, PVDF and Hastelloy C.

An ultrasonic transmitter and receiver detect the presence of fluid between two piezoelectric crystals sealed within the sensing gap. As the gap fills with liquid, an ultrasonic wave signal passes between the crystals and either results in an output shift from 8 mA to 16 mA (U002), or activates a relay (U003 & U004).



FEATURES

-NO MOVING PARTS: PULSED 2 MHZ ULTRASONIC SIGNAL

-HORIZONTAL OR VERTICAL MOUNTING

-NO CALIBRATION REQUIRED

SPECIFICATIONS

MEASUREMENT PRINCIPLE: Ultrasonic Sound Waves Converted to Output Signal

MEASURED VARIABLE: Wet or Dry Gap Actuation

INDICATION LENGTH: 2 1/8" to 100" (5.39 cm to 254 cm)

POWER: U002: 12 to 35 VDC

U003: 12 to 35 VDC

U004: 12 to 16 VDC

SIGNAL: U002 Current Shift: Dry Gap: 8 mA (± 1 mA)

Wet Gap: 16 mA (± 1 mA)

U003 Relay Output: SPDT: 1 Amp at 30 VDC; 0.5 Amp at 150/125 VAC/DC

U004 Relay Output: SPDT: 1 Amp at 30 VDC; 0.5 Amp at 150/125 VAC/DC

"Fail-Safe" Operation on Power Loss to Normal Dry Wired Position of SPDT Switch

CABLING: 12" (305 mm) Flying Leads of 18 AWG Wire

OPERATING TEMPERATURE: -40° to +185° F (-40° to +85° C)

AMBIENT TEMPERATURE: -40° to +185° F (-40° to +85° C)

PRESSURE: 316 Stainless Steel: 2,000 PSIG (138 bar)

INGRESS PROTECTION: NEMA 4X

ENCLOSURE (OPTIONAL): Die-Cast Aluminum

MOUNT, EXT. TUBE & SENSOR TIP: 316 Stainless Steel Standard, Other Materials Available

EXPLOSION -PROOF MODELS: Call for available models U002E, U003E & U004E,

FM Approved Class1, Div1, Groups C & D; Class II/III Groups E, F & G

ORDERING INFORMATION

MODEL NUMBER : A-B-CDE

ORDER EXAMPLE: U003-55-316SS-3/4

APPLICATIONS

Water & Wastewater

Light Slurries

Food/Dairy

Oils

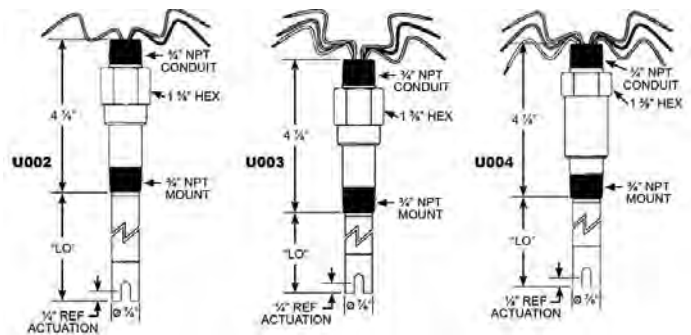
Pump Control & Protection

Fill-Line Monitoring

Level Monitoring

Leak Detection

DIMENSIONS INCHES (MM)



A Model	B Insertion Length ("LO") Inches	C Stem & Probe Material	D Junction Box	E Process Connection
U002 U003 U004	Specify Between 2 1/8" to 100"	316SS= 316 Stainless Steel	- = None (Standard) JB= Die-Cast Aluminum Enclosure	3/4= 3/4" NPT (Standard) Call for other: Up to 4" NPT Up to 4" Sanitary Flange Up to 4" 150 and 300 ANSI Flanges

CLARK

EchoPod® Ultrasonic Level Switch/Transmitter/Controller

Loop Powered 4-20 mA Output, Range To 49.2" (1.25 m)

DESCRIPTION

EchoPod is an innovative level sensor that replaces floats, conductance and pressure sensors that fail due to dirty, sticking and scaling media in small tanks 49.2" (1.25m) or less. EchoPod, a general purpose sensor, combines non-contact switch, controller and transmitter capabilities in one package. Combining 4 relays, 4-20mA output and pump/valve control in one small sensor allows EchoPod to be a solution. Maintenance free, EchoPod reduces tank system hardware through simplicity and consolidation. Additionally, EchoPod is well suited for corrosive and dirty applications with its non-metallic housing and transducer. EchoPod provides a total solution for fluid handling and automation.

The rugged PVDF enclosure is well suited for a wide range of corrosive, waste or slurry type media, and can be broadly selected for atmospheric day tank, process vessel or dispenser, pump lift station and waste sump applications. Level indication can be monitored via a local display or controlled through a PLC.

SPECIFICATIONS

GENERAL

Range: 49.2" (1.25 m)

Accuracy: 0.125" (3mm)

Resolution: 0.019" (0.5 mm)

Beam Width: 2" (5 cm)

Dead Band: 2" (5 cm)

Supply Voltage: 24VDC (loop)

Loop Resistance: 400 Ohm Max.

Consumption: 35 mA Maximum

Signal Output: 4-20 mA (When loop powered)

Contact Type: (4) SPST, 1A relays

Loop Fail Safety: 4 mA, 20 mA, 21 mA, 22 mA or hold last

Relay Fail Safety:

Power Loss: Hold Last

Power On: Open, close or hold last

Hysteresis: Selectable

Configuration: WebCal® Windows® software interface

Temperature Compensation: Automatic over range

Operating Temperature: 20 to 140°F (-7 to 60°C)

Operating Pressure: Atmospheric

Enclosure: NEMA 4X, encapsulated, corrosive resistant & submersible

Enclosure Material: PC/ABS FR

Strain Relief: Santoprene

Transducer Material: PVDF

Cable Length: 48" (1.2 m)

Cable Jacket Material: Polyurethane

Process Mount: 1" NPT or 1" G

ORDERING INFORMATION

Model	Description
DL14-NPT	EchoPod, 1" NPT Process Connection
DL14-G	EchoPod, 1" G (Metric) Process Connection
L199-1001	USB Interface Tool to Program EchoPod (One unit can be used to program multiple EchoPods)

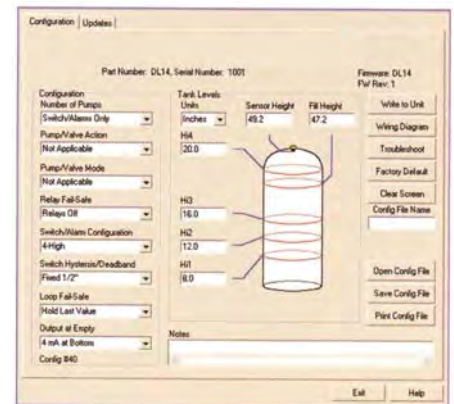
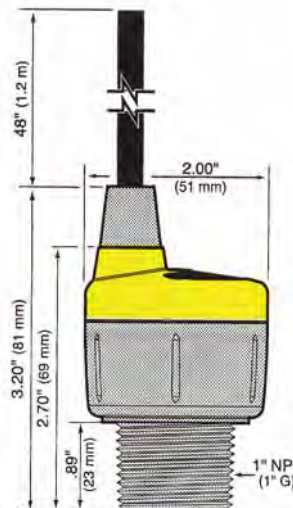
For a demonstration and download of WebCal™ goe to <http://www.flowline.com/webcal>



FEATURES

- ~ Provides switch, controller and transmitter capabilities
- ~ Replacement of multi-point float, conductivity and pressure level switches
- ~ WebCal™, an innovative PC user interface that provides fast and accurate configuration
- ~ Compact sensor with 2" dead band and beam width optimized for small tank applications 49.2" (1.25m) or less

DIMENSIONS



Simple software configuration through WebCal™, using USB connectivity enables flexible system integration or retrofit for suitable applications. WebCal's user interface makes configuration quick and simple for even novice computer users. By entering your application requirements through pre-programmed menus, WebCal will accurately configure EchoPod to your application requirements every time. Additionally, WebCal provides a printed wiring schematic management system that saves your configuration for back-up, technical assistance or additional applications.

CLARK

EchoSpan® Two-Wire Ultrasonic Level Transmitter

4-20mA Output, Ranges to 32.8' (10 m)

DESCRIPTION

The general purpose two-wire ultrasonic transmitter provides non-contact level measurement up to 32' or 10m, and is ideally suited for challenging ultrapure, corrosive or waste liquids. Push button calibrated, the transmitter is broadly selected for atmospheric bulk storage, day tank and waste pump applications. Media examples include wastewater and sodium hydroxide.



EchoSpan

SPECIFICATIONS

GENERAL

Range: LU81: 4" to 16.4' (10 cm to 5m)
 LU83: 8" to 26.2' (20 cm to 8m)
 LU84: 12" to 32.8' (30 cm to 10m)

Accuracy: ± 0.2% of span in air

Resolution: LU81/83: 0.039" (1 mm)
 LU84: 0.078" (2 mm)

Beam Width: 3" (7.6 cm) dia.

Dead Band: LU81: 4" (10 cm)
 LU83: 8" (20 cm)
 LU84: 12" (30 cm)

Display type: LCD, 6-digit

Display units: Inch, cm or percent

Display mode: Air gap or liquid height

Memory: Non-volatile

Supply voltage: 12-28 VDC

Loop resist.: 500 Ohms @ 24 VDC

Signal output: 4-20 mA, two-wire

Signal invert: 4-20 mA or 20-4 mA

Calibration: Push button

Fail-safe: Select 4mA, 20mA, 21 mA, 22 mA or hold

Process temp.: -4°F to 140°F (-20°C to 60°C)

Temp. comp.: Automatic

Electronics temp.: -40°F to 160°F (-40°C to 71°C)

Pressure: 30 psi (2 bar) @ 25° C., derated @ 1.667 psi (.113 bar) per °C. above 25° C.

Enclosure rating: NEMA 4X (IP65)

Enclosure vent: Water tight membrane

Encl. material: PC/ABS FR

Trans. material: PVDF

Process mount: 2" NPT (2" G)

Mount. gasket: Viton®

Conduit entrance: Dual, 1/2" NPT

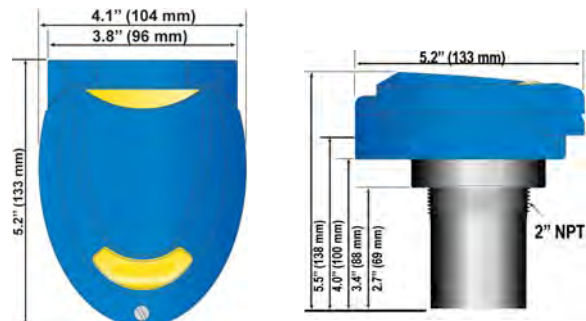
Mounting Gasket: Viton

Approvals: CE, RoHS Compliant

FEATURES

- ~ Setup is fast and simple with push button calibration and LCD display
- ~ Offered in three measurement ranges up to 10m with 2" transducer
- ~ 6-segment LCD display indicates level in inch or centimeter values
- ~ 7.6 cm minimum beam width for applications with restricted space
- ~ Selectable display indicates level in air gap or liquid height
- ~ PC/ABS enclosure rated NEMA 4X with rugged PVDF transducer
- ~ Fail-safe intelligence with diagnostic feedback for easy troubleshooting

DIMENSIONS



ORDERING INFORMATION

A Model	B Sensor Range	C Factory	D Process
LU	81= 16.4' (5 m) 83= 26.2' (8 m) 84= 32.8' (10m)	51	0 = NPT 6 = G (metric)

Options	
Model	Description
LM50-1001 (2" NPT) or LM50-1061(2" G) LM90-1001	Side mount bracket for open tanks A liquid tight cable connector

PKP

FS00Z Float Switch

Float Level Switch With Micro Switch, For Polluted And Other Media

DESCRIPTION

The FS00Z level switch consists of a polypropylene housing with an integrated watertight and position dependent electromechanical microswitch. The unit works according to the lift principle. The hollow float is raised (lowered) by the rising (falling) liquid until it reaches an angle of 45° from horizontal when switching takes place. The mercury free float switch can be mounted to the tank/container via a through hole such as a 1/2" cable gland from the tank top.

The switch point is defined by manipulating placement of a supplied ballast weight on the connecting cable or by inserting cable through a tube of desired length.

The FS00Z level switch is suitable for level monitoring of compatible liquids and, due to the high contact rating of 10 (8) Amps, 250V, for direct pump control. It is well applied for potable water applications as well as heavily polluted media.

SPECIFICATIONS

Contact Rating: SPST- N/O, 10A resistive (8A inductive),250V;
 SPST- N/C 10A resistive (8A inductive), 250 V;
 SPDT, 6A (4 A inductive), 250 VAC

Cable Material: Neoprene (black), Polyurethane (yellow), LAPP-Therm (olive) and special cable on request

Cable Connection to Float: Polyamide cap nut

Cable Length: 5, 10 or 20 meters (special lengths available)

Connection: 3-wire (comm., signal, ground) for SPST, N/O and N/C versions, four wire for SPDT version

Configuration: N/O closes on rise in fluid level (opens on fall);
 N/C opens on rise in level (closes on fall); SPDT for N/O or N/C operation

Electrical Protection: IP68

Max Pressure: 2 bar (29 PSI)

Max Media Temperature: 60°C or, with LAPP-Therm cable, 95°C

Storage Temperature: 95°C max.

Float Material: Polypropylene, mirror welded

Float Dimensions: 40 mm x 95 mm x 68 mm

Ballast Material: cast iron, plastic coated (Levasit)

Ballast Dimensions: 30 x 30 x 190 mm

Weight: Float, 110g; Ballast, 700g

Media Density: Minimum 0.55 g/cm³

Switching Angle: ±45° from horizontal

Rated Life: Minimum 50,000 switch cycles

ORDERING INFORMATION

ABCDE

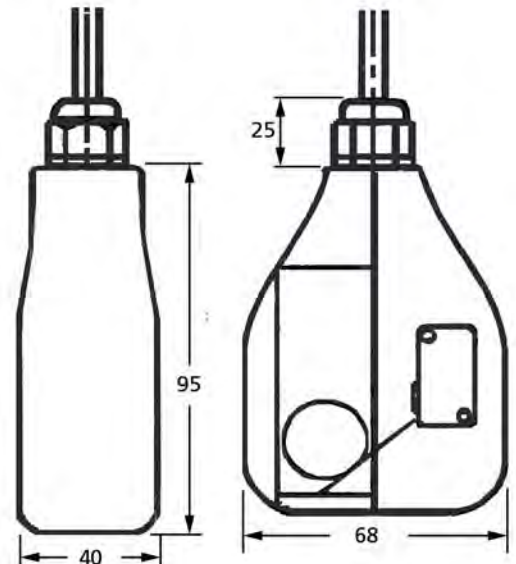
EXAMPLE FS00ZWN51

A Model	B Contact Function	C Cable Material	D Cable Length	E Ballast Weight
FS00Z	W= SPDT S= N/O O= N/C	L=LAPP-Therm N= Neoprene P= Polyurethane	5= 5m 10= 10m 20= 20m 99= Other	0= Without 1= With



- Low Cost
- Vertical or Horizontal Mounting
- Simple Installation
- General Use, Oils, Chemicals, Gasoline, Grease

DIMENSIONS (MM)



CLARK SOLUTIONS

612 Submersible Pressure Transmitter

Two-wire, 4-20mA, Vacuum To 15,000 PSIG & PSIA

DESCRIPTION

Series 612 submersible pressure transmitters were designed to provide a previously unequalled level of performance. Utilizing Piezoresistive Sensor Technology, Series 612 Transducers are accurate, shock resistant and extremely stable over long periods of time. Reverse polarity protection, short circuit protection and lightning protection have been engineered in as standard features.

Advanced manufacturing techniques combined with technologically advanced standard features allow the 612 to offer a level of performance previously found on transducers costing hundreds of dollars more.

A final electrical output and calibration inspection is performed on all Transducers and Transmitters after final assembly to insure 100% "out of the box" reliability.

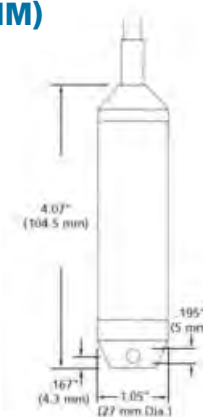


Model 612

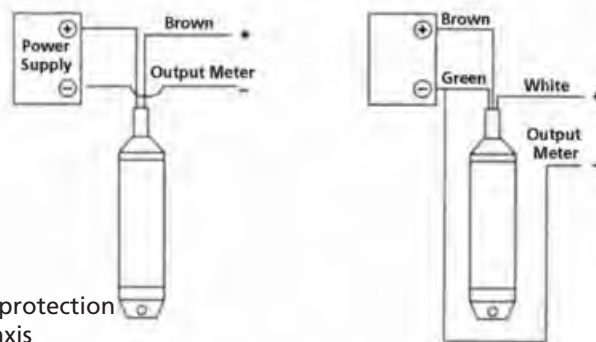
SPECIFICATIONS

- Output Signal: 4-20 mA, 2 wire; 0-5V and 0-10V, 3 wire
- Pressure Ranges: 0-300 PSI
- Wetted Materials: 316 SS
- Proof Pressure: 2 times range
- Burst pressure: 4 times range
- Accuracy: (BSFL or RSS) (includes repeatability, hysteresis and linearity):
 $\pm 0.25\%$ full scale standard, 0.12% full scale optional
- Repeatability: 0.05% full scale
- Hysteresis: 0.05% full scale
- Input Excitation: 2 wire, 12-30 Vdc unregulated; 3 wire, 14-30Vdc;
 Field Service Unit, 6 Vdc
- Temperature Ranges:
 Compensated: 32 to 122 °F (0 to 50°C)
 Effect: 0.2%/50°F
 Storage: -22 to 175°F (-30 to 80°C)
 Medium: -14 to 175°F (-30 to 80°C)
- Response Time: Less than 1 ms (between 10-90% full scale)
- Operating life: 100 million cycles
- Adjustment: 5% full scale of zero and span
- Environmental Protection: NEMA 6, IP68
- Electromagnetic Capability: per IEC 801 (EN50081, EN50082):
 Part 2 - ESD Level 2
 Part 3 - Fields (RFI) Level 2
 Part 4 - Burst Level 3
 Part 5- Surge Level 2
- Electrical Protection: Reverse polarity, overvoltage and short circuit protection
- Shock: Less than $\pm 0.05\%$ full scale effect or 100g's @ 20 ms on any axis
- Vibration: Less than 0.01% full scale effect for 20g's @ 0-2000 Hz on any axis

DIMENSIONS(MM)



WIRING



ORDERING INFORMATION

ABCDE (ORDER CABLE SEPARATELY)
EXAMPLE 6121511N

A Model	B Range (PSIG)	C Accuracy	D Output Signal	E End Fitting
612	2=0-2.0	3=0-3.0	1=4-20 mA	N=Nose cone
	5=0-5.0	10=0-10	2=0-5VDC, 3-wire	NW=Nose cone with added weight
	15=0-15	30=0-30	5=0-10 VDC, 3-wire	
	60=0-60	100=0-100	12=0.5-2.5 VDC, 3-wire	
	150=0-150	200=0-200		

Cable (includes integral vent tube for sensor reference to atmosphere)

Model	Cable Length
612Cable-5	5ft
612Cable-15	15ft
612Cable-25	25ft
612Cable-50	50ft
612Cable-100	100ft
612Cable-150	150ft

CLARK SOLUTIONS

PXR Series Temperature & Process Controllers

Fuji Electric PID Controllers with Fuzzy Control of Self-Tuning

The new PXR series controllers are the newest additions to Fuji Electric's trusted line of temperature and process controllers. They are now packed with features and options and come in several sizes – 1/32 DIN, 1/16DIN, 1/8 DIN and 1/4 DIN.

These controllers have all the standard features that you expect from Fuji Electric's superior controllers, and more. In addition to auto-tuning and fuzzy control, they now come with self-tuning — an innovation in the control field. It automatically retunes the controller under certain conditions, without the need to revert to auto-tuning. The standard 8-segment ramp/soak feature has been expanded to include two patterns that can be linked to create a 16-step profile. The PXR accepts temperature and process inputs and offers a choice of three kinds of outputs to meet a wide variety of needs in the process industries.

Low-cost options include dual outputs, programmable alarms, remote setpoint, RS485 communications, analog retransmission, digital input, timer function, heater burnout alarm and 24V AC/DC supply voltage. One of the most impressive features is the large LED display. The faceplate, designed for NEMA 4X (IP66 equivalent), is watertight and corrosion-resistant. The easy-to-use 3-button keypad allows for programming similar to the popular PXW controller. The screw-terminal on the back further reduces the cost by eliminating the need for sockets. The PXR3 can be DIN-rail mounted with the optional adapter. Remote monitoring of up to 31 controllers at a time is possible with the RS485 option that uses the industry-standard Modbus™ protocol. The communications option comes with our free Windows®-based software, PXR-LITETM. The software allows you to program the controller from the PC and view real-time data and trend graph while logging the data into a text file. A powerful tool for the OEM customer is the Program Loader option with Windows®-based software. Programs for different applications can be saved to and from the controller.



SPECIFICATIONS

Power supply voltage: 100 (-15%) to 240V (+10%) AC, 50/60Hz; 24V (±10%) AC/DC
Power consumption: PXR3: 6VA (100 VAC), 8VA (220V, 24V). PXR4: 8VA (100V),
10VA (220V), 12VA (24V). PXR5, 9: 10VA(100V), 12VA (220V, 24V)
Reference junction compensation: accuracy ±1°C at 23°C

Input

Input signal Thermocouple: J, K, R, B, S, T, E, N, PL2. RTD: Pt100. Voltage, current.
For 1 to 5V/4 to 20 mA DC, 0 to 5V/0 to 20 mA DC, use 250 ohm shunt resistor included

Input filter: 0 to 900.0 sec set in 0.5 sec steps

Burnout: For thermocouple or RTD input, control output direction (upper or lower) is selectable

Control Function

Control action On/Off; PID control (with auto-tuning, self-tuning); Fuzzy Control (with auto-tuning)

Proportional band (P): 0 to 999.9% of measuring range set in 0.1% steps

Integral time: (I) 0 to 3200 sec set in 1 sec steps

Differential time: (D) 0 to 999.9 sec set in 1 sec steps

Proportional cycle: 1 to 150 sec set in 1 sec steps

Hysteresis width: 0 to 50% of measuring range; For on/off action only

Input sampling cycle: 0.5 sec

Control Output 1 (select one)

Relay contact: PXR4, 5, 9: SPDT, 220 V AC/30 V DC, 3A (resistive load). PXR3: SPST contact, 220 V AC/30 V DC, 3A (resistive load)

SSR: PXR4, 5, 9: ON—17 to 25 V DC; OFF—0.5 V DC or less. PXR3: 12 to 16 V DC. Max. current: 20mA or less

4 to 20 mA DC: PXR4, 5, 9: Allowable load resistance 600 ohms or less. PXR3: 100 to 500 ohms

Control Output 2 (Heating/Cooling Control) (select one)

Relay contact: SPST, 220 V AC/30 V DC, 3A (resistive load)

SSR: PXR4, 5, 9: ON—17 to 25 V DC; OFF—0.5 V DC or less. PXR3: 12 to 16 V DC. Max. current: 20mA or less

4 to 20 mA DC: PXR4, 5, 9: Allowable load resistance 600 ohms or less. PXR3: 100 to 500 ohms

Operation and Display Section

Parameter setting method: Digital setting by 3 keys; Key lock function provided

Display unit: Process value/set value displayed individually 4 digits, 7-segment LED

Status display LED: Control output, process alarm output, heater burnout alarm output

Indication accuracy (at 23°C): Thermocouple: ± (0.5% of measuring range) ± 1 digit ± 1°C. For thermocouple R at 0 to 500°C: ± (1% of measuring range) ± 1 digit ± 1°C. For thermocouple B at 0 to 400°C: ± (5% of measuring range) ± 1 digit ± 1°C. RTD, voltage/current: ±(0.5% of measuring range) ± 1 digit

FEATURES

- Advanced control functions PID Plus Self Tuning; PID Plus Fuzzy Control; Autotuning
- NEMA 4X faceplate with large LED display 4-digit, red and green display; Waterproof faceplate conforms to NEMA-4X/IP66
- Multiple inputs Choose between thermocouple/RTD and 4-20mA/0-5V inputs
- Single or dual control outputs Relay, SSR driver or 4-20mA
- Ramp/soak function Up to 16 ramp/soak segments or two 8-segment patterns, a standard feature
- Programmable alarms option 2 programmable SPST relays with On/Off delay function
- Remote setpoint option Change setpoint with a 1-5V signal
- Analog retransmission option 4-20mA retransmission of PV, SV, MV, DV
- Digital input option Change between 2 setpoints; Change between ramp/soak and standby; Start/reset the ramp/soak; Start/stop the auto tuning; Cancel the alarm latch; Start the incorporated timer
- Timer function On-delay or off-delay timer activated with digital input; Up to 2 timer outputs can be obtained
- Heater burnout alarm option If heater burns out, alarm goes off
- Communications option RS485 (Modbus™ protocol) interface permits remote monitoring of up to 31 units from a PC. Comes with free Windows®-based software, PXR-LITETM
- Warranty Manufactured in a ISO 9001 facility and backed by a 3-year warranty

SPECIFICATIONS CONT'D

Alarm (option)

Alarm type: Absolute alarm, deviation alarm, zone alarm with upper and lower limits for each; hold function available; alarm latch function provided

Alarm ON-delay: Delay setting 0 to 9999 sec set in 1 sec steps

Process alarm output: Relay contact: SPST, 220 V AC/30 V DC, 1A (resistive load); Max. 2 points (PXR3), max. 3 points (PXR4, 5, 9)

Heater burnout option: (not available on PXR3) Alarm setting range: 1 to 50A Available only when control output is relay or SSR drive.

Heater burnout alarm: output Relay contact: SPST, 220 V AC/30 V DC, 1A (resistive load); 1 output point

Current detector: CTL-6-S for 1 to 30 A; CTL-12 for 20 to 50 A

Digital Input (option)

Points: 1 or 2; contact closure. 5 V DC, approx. 2mA

Function (select one): Set value (SV, SV1 to 3) changeover, start/stop control action, start/reset ramp/soak action, start/stop auto-tuning, cancel alarm latch, start incorporated timer

Retransmission Output (option)

Output signal: 4-20 mA DC

Load resistance: 500 ohms or less

Output accuracy: $\pm 0.3\%$ FS

Output selection: PV, SV, MV, DV (SV-SV)

Timer Function (option)

Start: By digital input option

Setting: 0 to 9999 sec set in 1 sec steps

Action: Event ON-delay or OFF-delay

Signal output: Alarm output relays used; 2 points are available

Communication Function (option)

Physical specifications: EIA RS485

Communication protocol: Modbus (RTU). Free Windows®-based software, PXR-LITETM

Communication method: 2-wire method; half-duplex, bit serial, start-stop sync type

Data type: 8 bits; Parity: odd/even/none

Communication rate: 9600 bps

Connection aspect: Multi-drop up to 31 controllers

Communication distance: Total extension 500m or less

RS232C/RS485 signal converter: RSFC24 (recommended, see ordering information)

Remote Setpoint Option

Input signal: 1 to 5 V DC, 1 point

Accuracy: $\pm 0.5\%$ ± 1 digit

Input sampling cycle: 0.5 sec

Display of remote mode: LED on front panel

Input impedance: 1M ohms or more

Other Functions

Parameter mask function: Parameter display can be disabled from keypad

Ramp/soak function: 8 ramps and 8 soaks; 1 or 2 program patterns; digital input allows start/reset of the action

Operating and Storage Conditions

Ambient operating temperature: 14 to 122°F (-10 to 50°C)

Ambient operating humidity: Less than 90% RH (no condensation)

Storage temperature: -4 to 140°F (-20 to 60°C)

Structure

Mounting method: Panel flush mounting. PXR3 can be DIN-rail mounted using the optional adapter

External terminal: Screw terminal

Dimensions: PXR3: 1 x 2 x 4 in. (24 x 48 x 98mm). PXR4: 1.89 x 1.89 x 3.37 in. (48 x 48 x 79.8 mm). PXR5: 2.07 x 3.96 x 3.77 in. (52.5 x 100.5 x 95.8 mm). PXR9: 3.96 x 3.96 x 3.77 in. (100.5 x 100.5 x 95.8 mm)

Protective structure: Front panel NEMA4X (IEC standard IP66 equivalent) (when mounted on panel with supplied gasket). Rear case: IEC IP20

Outer color: Black (front panel, case)

Agency approvals: UL, c-UL recognized (UL873), CSA (C22.2 No.24-93), CE certified (LVD:EN61010-1, EMC:1326-1)

Optional Items

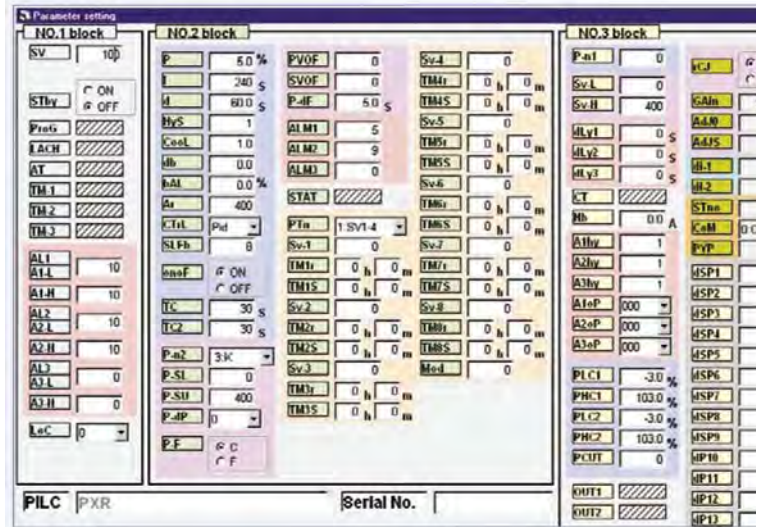
Current transformer: For 1 to 30 A: CTL-6-S. For 20 to 50 A: CTL-12

Signal converter for communication function: RSFC24

DIN Rail adapter: For PXR3 only

Terminal cover: For PXR4 only

Program Loader Interface

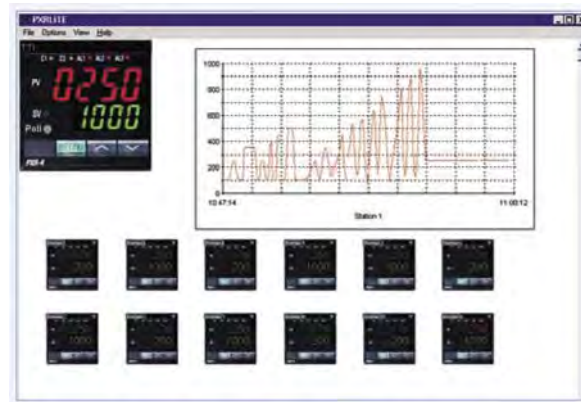


FEATURES

The Program Loader for Fuji Electric's PX and PXR series controllers is a powerful tool for the OEM customer. Using the PXR4 Loader Assembly, the controller can be configured from a PC running on Windows environment.

- Retrieve or store controller data
- Selectively mask or unmask parameters for viewing on the controller
- Clone settings to other controllers from saved files
- Print data report

PXR LITE Communication Software



FEATURES

PXR-LITETM is free Windows®-based software that is supplied with the communications option on a PXR controller. It is the latest in control and monitoring of Fuji Electric's PXR series controllers. It provides continuous remote monitoring of single or multiple controllers using a single half-duplex RS485 line.

- Monitor and control up to 31 controllers from a PC via RS485! RS232 signal converter
- Real-time charting and data-logging
- Remote setpoint adjustment
- Set control modes, alarms and other control parameters
- Remote auto-tuning and ramp-soak programming
- Live display of process and set point values, alarm annunciations
- View single-station or multi-station data
- Comprehensive help file included
- Runs on Windows environment version 3.1 or later

ORDERING INFORMATION

PXR3

EXAMPLE PXR3BEY14VOA1

P	X	R	A	B	C	D	1	E	F	G	A	1
---	---	---	---	---	---	---	---	---	---	---	---	---

Box A: Front Panel Size

3 = 1/32 DIN (24x48mm)

Box B: Input Signal

T = Thermocouple (°C)

R = Thermocouple (°F)

N = RTD, Pt100 ohm, 3-wire type (°C)

S = RTD, Pt100 ohm, 3-wire type (°F)

B = 4-20mA DC, 1-5V DC

A = 0-20mA DC, 0-5V DC

Box C: Control Output 1

A = Relay contact output

C = SSR or SSC drive output

E = 4-20mA DC output

Box D: Control Output 2

Y = None

A = Relay contact output

C = SSR or SSC drive output

E = 4-20mA DC output

Box E: Alarm Options

4 = None

5 = High/low alarm 1 point

G = High/low alarm 2 points¹

Box F: Power Supply

V = Standard (100-240 VAC, 50/60Hz)

B = 24V AC/DC (50/60Hz)

Box G: Additional Functions

0 = None

M = RS485 communication (Modbus)

Q = Retransmission + DI 1 point

R = Retransmission (4-20mA DC)

T = Digital Input (DI) x 2

V = RS485 communications (Modbus)+ DI



PXR4 Terminal Cover (option)

PXR3 DIN Rail Adapter

Note: RS485 option comes with Free software, PXR-LITE. RS485 requires signal converter to connect to PC, P/N RSFC24 recommended.

¹High/low alarm 2 points not available when control output 2 is selected.

ORDERING INFORMATION

PXR4, PXR5, PXR9

EXAMPLE PXR4BEY14VOA1

P	X	R	A	B	C	D	1	E	F	G	A	1
---	---	---	---	---	---	---	---	---	---	---	---	---

Box A: Front Panel Size

4 = 1/16 DIN (48x48mm)

5 = 1/8 DIN (48x96mm)

9 = 1/4 DIN (96x96mm)

Box B: Input Signal

T = Thermocouple (°C)

R = Thermocouple (°F)

N = RTD, Pt100 ohm, 3-wire type (°C)

S = RTD, Pt100 ohm, 3-wire type (°F)

B = 4-20mA DC, 1-5V DC

A = 0-20mA DC, 0-5V DC

Box C: Control Output 1

A = Relay contact output

C = SSR or SSC drive output

E = 4-20mA DC output

Box D: Control Output 2

Y = None

A = Relay contact output

C = SSR or SSC drive output

E = 4-20mA DC output

R = Retransmission (4-20mA DC)

Box E: Alarm Options

4 = None N/C

6 = Heater break alarm^{1,2}

G = High/low alarm 2 points

H = High/low alarm 2 points + heater break alarm^{1,2}

M = Alarm 3 points

D = Remote setpoint³

P = Remote setpoint + alarm 2 points³

Box F: Power Supply

V = Standard (100-240 VAC, 50/60Hz)

B = 24V AC/DC (50/60Hz)

Box G: Additional Functions

0 = None N/C

M = RS485 communication (Modbus)

S = Digital Input (DI) x 1

T = Digital Input (DI) x 2¹

V = RS485 communications (Modbus) + DI^{1,3}

Note: RS485 option comes with Free software, PXR-LITE. RS485 requires signal converter to connect to PC, P/N RSFC24 recommended.

¹Heater break option not available with 4-20mA output, or with 2 digital inputs, or with RS485 +1 digital input.

²Must order current transformer CTL-6-S or CTL-12 with heater break option.

³ Remote setpoint option not available with RS485 +1 digital input.

Accessories

CTL-6-S- Current transformer for 1-30A

CTL-12- Current transformer for 20-50A

RSFC24- RS485 to RS232 signal converter

PXR4- Loader Assembly Program loader for PXR4 (can be used for PX series also)

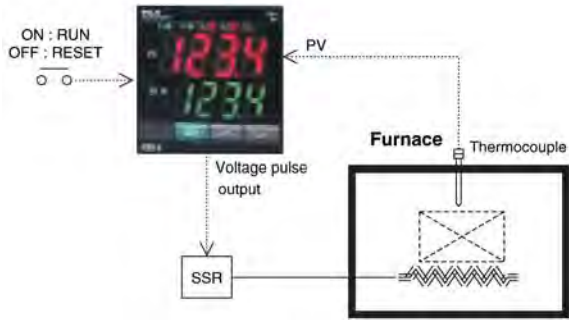
PXR3- Rail Adapter Mounting adapter for DIN rail installation

PXR4- Terminal Cover Terminal block protective cover

TYPICAL APPLICATIONS

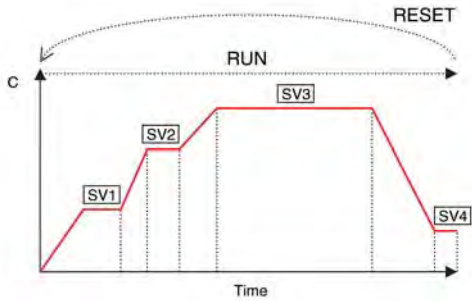
Furnace Heat Pattern Control Ramp/Soak Function

Digital Input
Ramp/Soak Control

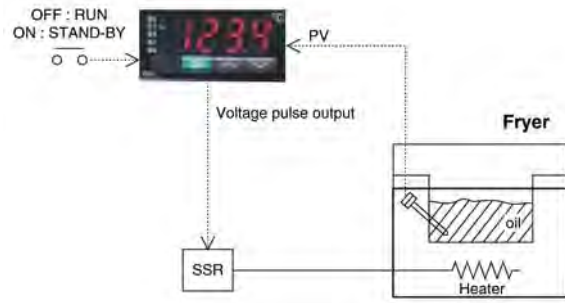


Ramp/Soak Function

- Control Temp. according to "Heat pattern with ramp"
- Keep temp. stable for a certain period with "Heat pattern" and then cool down/
- "Heat pattern" can be Started(Run)/Reset by an external digital input.

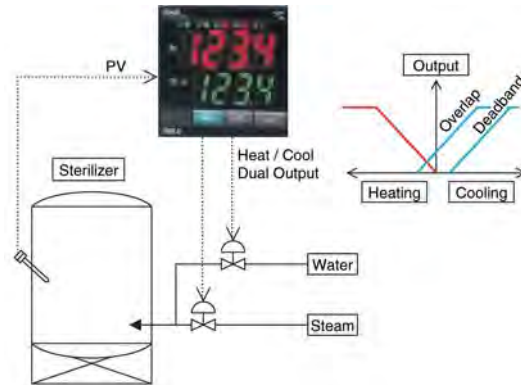


Fryer Control To Keep Oil Temp. Stable



Control Run/Stand-by selectable through external input

Cooling-Heating Control



Cooling output and heating output can be overlapped or a "Dead Band" set between them

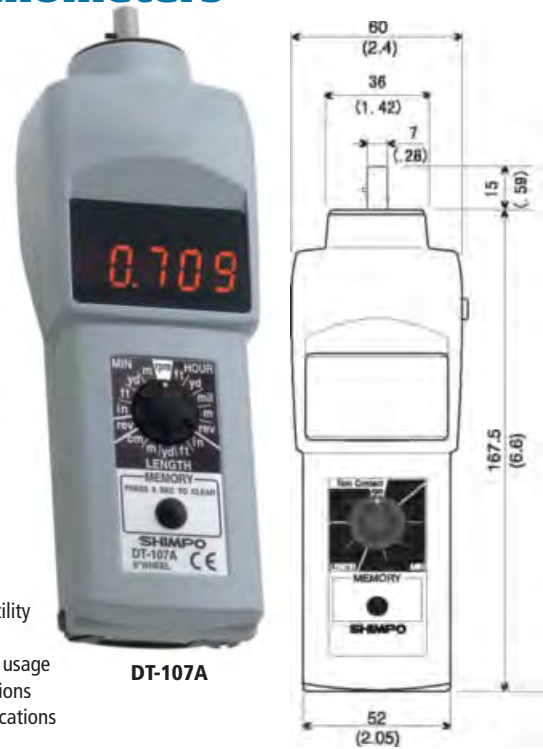
CLARK SOLUTIONS DT105A (LCD) & DT107A (LED) Tachometers

Rotational & Surface Speed

DESCRIPTION

The DT series microprocessor technology has heralded a superior standard in tachometer accuracy and capabilities for measuring and recording rotational/linear/surface speeds and total length.

Offering unprecedented confidence via new improvements, the legendary DT-105A and DT-107A battery-operated tachometers still feature the same rugged, high quality components that have made them the benchmark in the industry. These user-friendly, value-packed units feature expanded memory storage, added length functions, free N.I.S.T. certificate and many standard accessories.



DT-107A

Features

- Multi-mode speed selection**► Features 16 selections for optimum versatility
- Outstanding accuracy (±0.006% of reading)**.....► Provides reliable measurement results
- Rugged aluminum construction**► Built to stand the test of time and rugged usage
- Direct length measurement**► Offers value/versatility via added applications
- Extensive speed range (0.10 - 25,000 RPM)**.....► Maximizes usage in almost limitless applications
- Large 5 digit display**► Allows easy reading of numbers
- Lengthy battery life (40 - 60 hours)**.....► Advanced power management enables longer operating times
- Large 10 test memory capacity (selectable)**► Stores last/min/max and 10 additional readings for thorough equipment and process inspection to 5 minutes or more)
- Total revolution display**.....► Enables rotation counting during process analysis
- Free N.I.S.T. certificate**► Permits easy compliance with regulations
- CE mark**► Compliant with applicable EU directives
- Minimum shaft loading overspeed protection**.....► Prevents potential instrument damage

Benefits

Model	DT-105A	DT-107A
Measuring Range	0.10 - 25,000 RPM with floating decimal	
Accuracy	±0.06 RPM : 0.10 - 999.99 RPM; ±0.6 RPM : 1,000.0 - 9,999.9 RPM ±0.006 % of reading ±1 digit (or 3 RPM max.) : 10,000 - 25,000 RPM	
Display	5 digit 0.47" (12 mm) high LCD	5 digit 0.4" (10 mm) high LED
Measuring Units	Revolutions : RPH,RPM Feet : FPH,FPM Miles : MPH Yards : YPH,YPM Inches : IPM Meters : mPH, mPM Length : m, cm, inches, feet, yards Total Revolutions : REV	
Memory	13 readings are stored in memory and retained for 5 minutes (last, max., min. and 10 extra measurements)	
Display Update Time	1 second (typical)	
Detection	Optical coupler, 60 pulses/rev.	
System Control	Single-chip C-MOS microprocessor	
Over Range Indicator	Flashing numerals	
Voltage Requirement	2 AA 1.5 V batteries	
Low Battery Indicator	Flashing "LO BAT" display	"B" display
Auto Power Shut-Off	Yes	
Battery Life	65 hrs approx.	40 hrs approx.
Operating Temperature Range	32° - 113° F (0 - 45° C)	
Decimal Point	Floating	
Construction	Die-cast aluminum housing	
Weight	0.9 lb (400 g)	
Dimensions	7.2" L x 2.4" W x 1.8" H (182.5 mm x 60 mm x 46 mm)	
Warranty	1 year	
Standard Accessories	2 cone adapters, 1 funnel adapter, 1 3-1/2" extension shaft, NIST certificate, carrying case, 1 master wheel (6" cir.)	
OPTIONAL ACCESSORIES	Wire/yarn fixture, 6" circumference grooved wheel	

Note: For models calibrated for use with a 12" circumference wheel (for measuring surface speeds) instead of 6", add suffix S12 to part number. Use a 12" wheel for high surface speed applications. Example: DT-105A-S12

CLARK SOLUTIONS DT205L (LCD) & DT207L (LED) Tachometers

Precise RPM Measurement From 14 Feet

DESCRIPTION

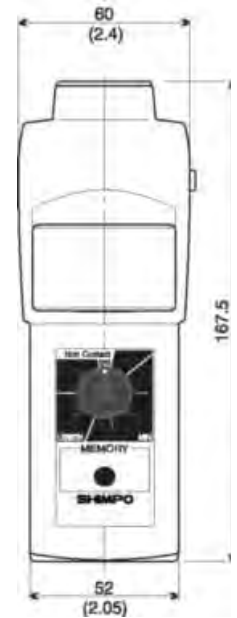
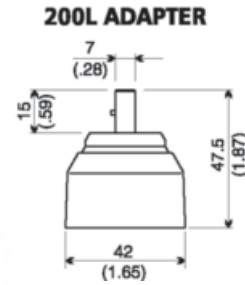
Our DT-205L and DT-207L tachometers incorporate laser technology and retain our hallmark rugged construction and reliable quality components.

Both models offer incredible value and versatility as they perform non-contact and contact applications (via the included contact adapter).

We're confident you'll agree that these fine units are the most advanced handheld tachometers on the market!



DT-205L



Features

- Sophisticated laser beam detection**> Safely allows RPM detection in hard-to-reach or dangerous areas
- Exceptional accuracy**> Assures reliable measurement results ($\pm 0.0006\%$ of reading)
- Length and rate functions**> Offer expanded measurement capabilities
- Multi-mode speed selection**> 9 selections allow optimum versatility
- Broad speed range**> Covers a wide range of applications (up to 99,999 RPM)
- Rugged aluminum construction**> Assures maintenance-free performance for many years
- Large 5 digit display**> Numbers are easily readable
- Expansive 10 test memory capacity**> Stores last/min/max readings (selectable to 5 minutes or more) for thorough equipment/process inspection
- Extended battery life**> Advanced power management for (25 - 40 hours) longer operating times/increased productivity
- Free N.I.S.T. certificate**> Permits easy compliance with regulations
- CE mark**> Compliant with applicable EU directives

Benefits

Model	DT-205L	DT-207L
Measuring Range	6 - 99,999 RPM	
Accuracy	± 1 RPM : 6 - 8,300 RPM ± 2 RPM : 8,301 - 25,000 RPM $\pm 0.006\%$ of reading ± 1 digit (or 7 RPM max.) : 25,001 - 99,999 RPM	
Display	5 digit 0.47" (12 mm) high LCD	5 digit 0.4" (10 mm) high LED
Measuring Units	RPM (on contact using adapter, included) For rate : YPM, mPM, FPM, IPM and length : YRD, m, FT, IN use 6" cir. wheel with 200L adapter	
Memory	13 readings are stored in memory and retained for 5 minutes (last, max., min. and 10 extra measurements)	
Display Update Time	1 second (typical)	
Detection	Laser diode	
System Control	Single-chip C-MOS microprocessor	
Over Range Indicator	Flashing numerals	
Voltage Requirement	2 AA 1.5 V batteries	
Low Battery Indicator	Flashing "LO BAT" display	"B" display
Auto Power Shut-Off	Yes	
Battery Life	40 hrs approx.	25 hrs approx.
Operating Temperature Range	32° - 113° F (0 - 45° C)	
Decimal Point	Floating	
Construction	Die-cast aluminum housing	
Weight	0.8 lb (365 g)	
Dimensions	6.6" L x 2.4" W x 1.8" H (167.5 mm x 60 mm x 46 mm)	
Warranty	1 year	
Standard Accessories	Reflective tape, cone adapter, carrying case, NIST certificate, 1 master wheel (6" cir.) and 200L adapter	

Note: For models calibrated for use with a 12" circumference wheel (for measuring surface speeds) instead of 6", add suffix S12 to part number. Use a 12" wheel for high surface speed applications. Example: DT-205L-S12

CLARK SOLUTIONS DT-5RL Panel Mount Tachometers

RPM Measurement to 99,999 RPM

DESCRIPTION

Our DT-5RL panel mount tachometer offers a high accuracy rate (0.01% F.S.) usually found in more expensive models. With a 5 digit LED display, this unit is designed to fit a 1/8 DIN panel cutout. The DT-5RL is scalable, enabling it to read and display rotational (RPM) and linear speeds.

The economical choice!

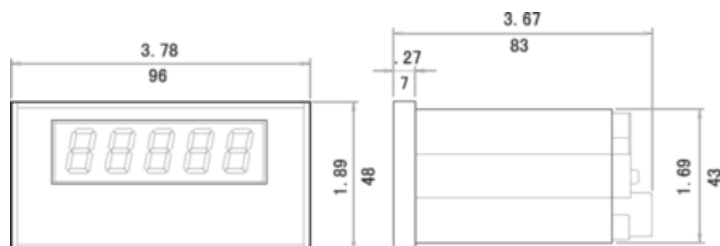


Features

- Fully scalable**> Allows selection of RPM or linear speeds through the front panel buttons
- Selectable PPR (1-9999 pulses per revolution)**> Accommodates all sensors commonly used with panel meters
- Available in 110 or 220VAC (50/60)Hz**> Eliminates the need to stock low and high voltage versions to change transformers
- Provides DC power supply to power various sensors**> Saves money by eliminating the need for a dedicated power supply
- Highly accurate (0.01% F.S.)**> Assures reliable results
- Rugged construction**> Durability built in

Benefits

DIMENSIONS (INCHES, MM)



Model	DT-5RL
Display Range	0 - 99,999 RPM
Accuracy	0.01 % F.S.
Display Update Time	1 second
Display	5 digit 0.56" (14.22 mm) high LED
Decimal Point	Selectable
Input No. of P/R	1 - 9999
Input Signal Characteristics	DT-5RL-1 accepts TTL signal DT-5RL-2 accepts NPN open collector signal DT-5RL-3 accepts 1-60 VAC signal
Input Frequency	5 kHz max.
Sensor Power Supply	12 VDC (40 mA max.)
Voltage Requirement	120 VAC or 220 VAC \pm 10 %, 50/60 Hz (12, 24, 48 VDC at 1 W also available)
Ambient Temperature	32° - 120° F (0 - 50° C)
Weight	0.7 lb (320 g)
Dimensions	3.67" L x 3.78" W x 1.89" H (83 mm x 96 mm x 48 mm)
Warranty	1 year
OPTIONAL ACCESSORIES	Sensors (see "Panel Mount Tachometer Sensors and Options" sales bulletin.

CLARK SOLUTIONS DT-5TG Panel Mount Tachometers

RPM Measurement to 99,999 RPM

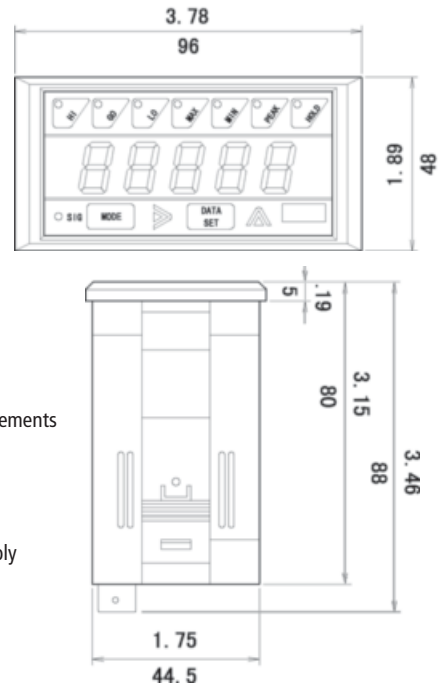
DESCRIPTION

Model DT-5TG is a multi-purpose instrument capable of displaying not only RPM, but also surface speed, flow rate, elapsed time and other units. The DT-5TG accepts a variety of modules, enabling it to perform different output functions such as 0-10vdc and 4-20ma, set points (relay closures), RS232C signals, etc. Minimum, maximum and peak values may be displayed at will. A non-volatile memory stores all setup parameters and modes during power losses. Fits standard 1/8DIN cutouts with no extra hardware required; it simply snaps into place. Special feature modules may be ordered to enable functions like relay closures (DOP-CP) at Hi, Lo or Go signal levels, and RS-232C output (DOP-SD). Additional modules like the DOP-RM (ratio) for measurements in percent, absolute ratio of two rate functions (B/A), dispersion ratio (B/A-1) or the difference of two rates (B-A) are available. Analogue output modules (DOP-FV) for voltage or current (proportional to the input signal frequency range) are also available.



DT-5TG With Optional Output Modules

DIMENSIONS (INCHES, MM)



Features	Benefits
Fully scalable	➤ Select almost any unit of measure
Accepts various modules; works with a variety of sensors	➤ Many output options to select; can match unit with virtually any sensor in the field
Highly accurate	➤ Ideal for applications requiring high precision measurements
Direct programming	➤ Eliminates need to memorise mathematical formulas
Tolerates wide voltage range (85-264VAC 50/60Hz)	➤ Does not require line voltage rewiring
Selectable update time	➤ A must for accelerating/decelerating applications
Provides DC voltage to power various sensors	➤ Saves money; does not require a separate power supply
Easy mounting	➤ Saves time; no hardware required
Convenient front panel programming	➤ Parameters are easily visible
Self-testing ability	➤ Provides peace of mind

Model	DT-5TG-0 (no output module), DT-5TG-1 (accepts one output module), DT-5TG-2 (accepts two output modules)
Display Range	0.0000 - 9.9999, 0.000 - 99.999, 0.00 - 999.99, 0.0 - 9999.9, 0 - 99999
Measuring Range	10 - 99,999 RPM (at 1 p/r), 0.2 - 30,000 RPM (at 60 p/r)
Accuracy	± 0.008 % ± 1 digit
Display Update Time	0.25, 0.5, 1, 2, 4, 8, and 16 seconds (selectable)
Time Base	Controlled by a 4.194304 MHz crystal
Display	5 digit 0.56" (14.2 mm) high LED
Input No. of P/R	1 to 9,999 (programmable)
Input Signal Characteristics	Sine wave. max. frequency 10 kHz Square wave. max. frequency 30 kHz Contact closure. max. frequency 20 Hz Open collector with 20 msec minimum
Input Signal Amplitude	Sine wave (0.3 - 30 VP-P depending on frequency) Square wave LO : 0 - 1.5 V, HI : 4 - 30 V
Input Impedance	10 KOhms for magnetic pickup, rotary encoder and proximity switch only
Sensor Power Supply	12 VDC ± 5 % (50 mA max.)
Voltage Requirement	85 - 264 VAC (50/60 Hz) (9 - 35 VDC at 1 W also available)
Power Consumption	1 W (5 W when optional modules are used)
Ambient Temperature	32° - 113° F (0 - 45° C)
Weight	0.55 lb (250 g)
Dimensions	3.46" L x 3.78" W x 1.89" H (88 mm x 96 mm x 48 mm)
Warranty	1 year
OPTIONAL ACCESSORIES	Sensors, modules (see "Panel Mount Tachometer Sensors and Options" sales bulletin.

CLARK SOLUTIONS

Panel Mount Tachometer Sensors and Output Modules

Accessories for Models DT-5TG & DT-5RL

OUTPUT MODULES FOR MODEL DT-5TG

DOP-FV Module (0 - 10VDC, 4 - 20mA DC Output)

This unit provides analog output (voltage or current) proportional to the input signal frequency. A micro-processor and 12-bit A/D converter provides full span analog output regardless of input signal range.

Weighs 3.5 oz (100 g).

DOP-CP Module (Set Points)

The DOP-CP uses three independent relays that work in conjunction with the display functions "HI", "GO", and "LO" of the DT-5TG. It also features a current-sinking transistor, which is activated when the monitored rate reaches zero. Weighs 3.5 oz (100 g).

DOP-SD Module (RS232C Output)

Provides an RS232C/MTI output signal for long line transmission and processing with the DT-5TG. The baud rate, parity and data bit lengths are adjustable to fit any electronic device capable of accepting RS232C signals. For statistical analysis this module can be interfaced with Mitutoyo's Digimatic processors. Weighs 3.5 oz (100 g).



Output Modules For Model DT-5TG

DOP-RM Module (Ratio Input)

Allows the DT-5TG to be used as a ratio meter; it measures and displays in percent, absolute ratio of two rate functions (B/A), dispersion ratio (B/A-1) and the difference of the two rates (B-A). Weighs 3.5 oz (100g).

SENSORS

PROXIMITY SENSORS

B12-S12

The B12-S12 is a 3 wire DC inductive proximity sensor. Features include short circuit, overload protection and output LED. Meets NEMA ratings 1, 3, 4, 6, 13, and IEC IP67.

SE-G

A solid state 3 wire proximity (switching) sensor specially designed for gear sensing. Provides a square wave output signal and indicates detection via LED indicator (gear pitch must be between 16.93 and 25.4).

MCS-3109

Complimentary (NPN-NO and NPN-NC) proximity sensor normally used in high-vibration areas and where a greater sensing distance is required.

MAGNETIC PICK-UP SENSORS

MP-10 Magnetic Pick-Up Sensor

General-purpose economy model. The unit is designed to mount in a 5/8"-18 threaded hole with included securing jam nut. 10 foot cable included.



MAGNETIC PICK-UP SENSORS, CONT'D

3030AN Magnetic Pick-Up Sensor

Magnetic pick-up with Amphenol connector; requires sensor cable assembly. This general-purpose unit is designed to mount in a 5/8"-18 threaded hole and is provided with a jam nut for sensor securing.



3070A Magnetic Pick-Up Sensor

Specifically engineered for use in the oil and petrochemical industries, this stainless steel sensor is completely sealed and explosion-proof. Low impedance allows for transistor circuit input. When mated with conduit, it provides positive protection against damage due to water, high humidity, oil, dirt, dust, or corrosive liquids. UL and CSA listed for Class I-Group C & D hazardous locations. Class II-Group E, F, & G.



MEASURING SENSORS

LSL-3 Series Linear Speed and Length Measuring Sensors

This series of continuous-use compact steel sensors (in conjunction with the proper meter or counter) measure length in meters, yards and rate in different engineering units by changing only the wheel assembly.



RETRO-REFLECTIVE SENSORS

RS-220HR Retro-Reflective Sensor

A general purpose sensor, featuring an operating range up to 500Hz. Consists of an LED infrared light source sensing device and amplifier contained in a heavy-duty housing. Includes an indicator lamp for initial alignment purposes.



MCS-625 Retro-Reflective Sensor

The MCS-625 consists of an LED infra-red light source sensing device and amplifier contained in a heavy-duty housing. For initial alignment purposes, a small indicator lamp is mounted in the top of the sensor housing. The MCS-625 has an open collector output and requires a pull up resistor.



MCS-655 Retro-Reflective Sensor

Incorporates a complimentary switching voltage output (light/dark activated) that operates up to 333Hz. An LED is mounted in the back of the unit with sensitivity adjustment for alignment purposes.



ROTARY PULSE GENERATORS

RE1B-60C Rotary Pulse Generator

60 digital output pulses per shaft revolution.
Maximum speed: 5000 RPM

RE1B-600C Rotary Pulse Generator

600 digital output pulses per shaft revolution.
Maximum speed: 3000 RPM

RE1B-1000C Rotary Pulse Generator

1000 digital output pulses per shaft revolution.
Maximum speed: 1800 RPM



RE2B-30C, RE2B-60C, RE2B-600C Rotary Pulse Generators

Dual (90° out of phase) digital pulses for quadrature applications. Also a zero position (third output) is available to mark the reference position of the shaft. Maximum speed: 3000 RPM and 5000 RPM, respectively.

CLARK SOLUTIONS FGV-X & FGE-X Force Gages

Force Measurement to 100 lb

DESCRIPTION

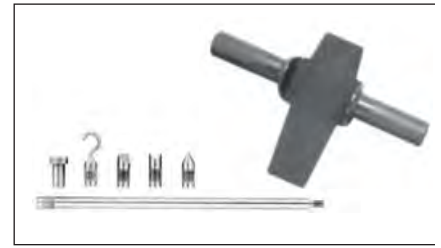
The FGE/FGV-X gauges are ergonomically designed to fit in the palm of your hand. They have an internal update rate of 1000Hz and the ability to read and display both Peak Tension and Peak Compression as a push pull gauge. The rugged, all metal construction of the microprocessor-controlled FGV-X and FGE-X series permits accurate measurement of compression and tension forces up to 100 pounds. The FGV-X and FGE-X feature a unique, push-button inverted digital display, permitting the user to read the display in a right side-up fashion. For handheld or test stand mounting use, the FGV-X and FGE-X are ideal for R&D, OEM and production floor applications.

The FGV series includes all FGE features plus RS232C and analog outputs and an overload output signal.



CE

- | Features | Benefits |
|--|--|
| Reversible display | Permits inverting the gauge for test stand or handheld operation without disassembly of case |
| Highly accurate ($\pm 0.2\%$ F.S.) | Perfect for even the strictest tolerances |
| Peak measurement | Captured with the push of a button |
| Rechargeable batteries | Operates continuously for 20 hours when fully charged |
| Field calibration through keypad | Eliminates down time |
| Overload capacity: 200% F.S. | High capacity overload protection safeguards force gauge |
| Heavy-duty load sensor | Designed for over one million operations |
| RS232C and analog outputs (FGV models) | Allows flexibility in data collection and function analysis |
| Overload output signal (FGV models) | Prevents load cell damage by automatically terminating test stand operation |
| Variable units of measure (lbs, kgs or N) | Easily selected with the touch of a button |
| Included hanger | Enables gauge to be used as a scale |
| Rugged die-cast aluminum housing | Exceptional durability; production floor capable |
| Measures both compression and tension forces | Conveniently determined with the same sensing shaft |
| Auto power shut-off | Prolongs battery life |
| Low battery indicator | Provides ample warning to complete testing (3 hours or more) |
| Ergonomically designed | Fits in the palm of your hand |
| One year warranty | Peace of mind |



Standard Accessories & Optional Handle

FGV-X Model	FGV-05X	FGV-1X	FGV-2X	FGV-5X	FGV-10X	FGV-20X	FGV-50X	FGV-100X
FGE-X Model	FGE-05X	FGE-1X	FGE-2X	FGE-5X	FGE-10X	FGE-20X	FGE-50X	FGE-100X
Capacity	8 oz 200 g 2 N	16 oz 500 g 5 N	2 lb 1000 g 10 N	5 lb 2 kg 20 N	10 lb 5 kg 50 N	20 lb 10 kg 100 N	50 lb 20 kg 200 N	100 lb 50 kg 500 N
Resolution	0.01 oz 0.1 g 0.001 N	0.01 oz 0.1 g 0.001 N	0.001 lb 1g 0.01 N	0.001 lb 0.001 kg 0.01 N	0.01 lb 0.001 kg 0.01 N	0.01 lb 0.01 kg 0.1 N	0.01 lb 0.01 kg 0.1 N	0.1 lb 0.01 kg 0.1 N
Accuracy	$\pm 0.2\%$ F.S. + 1/2 digit at 73°F (23°C)							
Display	Four digit LCD, 0.47" high (12 mm) with various indicators including tension and low battery indication (reversible)							
Average/Peak Mode	Selectable							
Display Update	50, 100, 200, 300 msec, 0.5, 1 sec							
Sampling Rate	1000/sec							
Overload Capacity	200% of F.S.							
Power	Rechargeable NiCad batteries (included) last approximately 20 hours in continuous operation when fully charged. AC adapter/charger (included) for continuous use							
Auto Power Shut Off	Yes (not active if adapter/charger is in use)							
Operating Temperature	32° - 104°F (0° - 40°C)							
Dimension / Weight	5.79" L x 2.9" W x 1.5" H (147 mm x 75 mm x 38 mm) / 1 lb (450 g)							
Standard Accessories	AC adapter/charger, carrying case and 8 attachments (Metric to English threaded adapter, flat head, hook, chisel, notched head, cone head, extension rod and hanger). The FGV-X also includes an RS232C output cable (see "FGV-X OUTPUT SPECIFICATIONS" below)							
OPTIONAL ACCESSORIES	Handle and additional attachments (SEE "Series FG Accessory Bulletin"), LOADMETER software is available for the FGV							
FGV-X Output Specifications	RS232 Output Port: Baud Rate 19200,9600, 4800,2400 bps selectable; Data Length, 8 bits; 1 Stop Bit; Parity, none; Software Flow Control, none Analog Output Port: ± 1 Vdc output (through a 12 bit D/A converter) Overload Output: One NPN OC transistor for tension, one NPN OC transistor for compression							

CLARK SOLUTIONS FGE-H & FGV-H Force Gages

Force Measurement to 500 lb

DESCRIPTION

The FGE/FGV-H gauges are ergonomically designed to fit in the palm of your hand. They have an internal update rate of 1000Hz and the ability to read and display both Peak Tension and Peak Compression as a push pull gauge. The rugged, all metal construction of the microprocessor-controlled FGE-H and FGV-H series permits accurate measurement of compression and tension forces up to 500 pounds. The FGE-H and FGV-H feature a unique, push-button inverted digital display, permitting the user to read the display in a right side-up fashion. For handheld or test stand mounting use, the FGE-H and FGV-H are ideal for R&D, OEM and production floor applications.

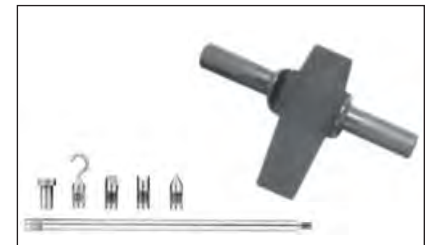
The FGV series includes all FGE features plus RS232C and analog outputs and an overload output signal.



Features

- Reversible display**.....> Permits inverting the gauge for test stand or handheld operation without disassembly of case
- Highly accurate ($\pm 0.2\%$ F.S.)**.....> Perfect for even the strictest tolerances
- Peak measurement**.....> Captured with the push of a button
- Rechargeable batteries**.....> Operates continuously for 20 hours when fully charged
- Field calibration through keypad**.....> Eliminates down time
- Overload capacity: 200% F.S.**.....> High capacity overload protection safeguards force gauge
- Heavy-duty load sensor**.....> Designed for over one million operations
- RS232C and analog outputs (FGV models)**.....> Allows flexibility in data collection and function analysis
- Overload output signal (FGV models)**.....> Prevents load cell damage by automatically terminating test stand operation
- Variable units of measure (lbs, kgs or N)**.....> Easily selected with the touch of a button
- Removable hanger**.....> Enables gauge to be used as a scale
- Rugged die-cast aluminum housing**.....> Exceptional durability; production floor capable
- Measures both compression and tension forces**.....> Conveniently determined with the same sensing shaft
- Auto power shut-off**.....> Prolongs battery life
- Low battery indicator**.....> Provides ample warning to complete testing (3 hours or more)
- Ergonomically designed**.....> Fits in the palm of your hand
- One year warranty**.....> Peace of mind

Benefits



Standard Accessories





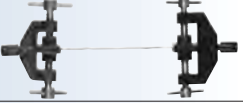
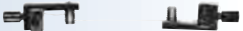




Model	FGE-200HX	FGE-500HX	FGV-200HX	FGV-500HX
Capacity	200 lb 100 Kg 1000 N	500 lb 250 Kg 2500 N	200 lb 100 Kg 1000 N	500 lb 250 kg 2500 N
Resolution	0.1 lb/0.1KG/1N			
Accuracy	$\pm 0.2\%$ F.S. + 1/2 digit at 73°F (23°C)			
Display	Four digit LCD, 0.47" high (12 mm) with various indicators including tension and low battery indication (reversible)			
Average/Peak Mode	Selectable			
Display Update	300 msec			
Sampling Rate	35/sec			
Overload Capacity	200% of F.S. for 200H, 150% of F.S. for 500H			
Power	Rechargeable NiCad batteries (included) last approximately 20 hours in continuous operation when fully charged. AC adapter/charger (included) for continuous use			
Auto Power Shut Off	Yes (not active if adapter/charger is in use)			
Operating Temperature	32° - 104°F (0° - 40°C)			
Dimension / Weight	8.5" L x 3.4" W x 2.2" H (214 mm x 82 mm x 55 mm) / 2 lb (900 g)			
Standard Accessories	AC adapter/charger, carrying case and 6 attachments (flat head, hook, chisel, notched head, cone head, extension rod). The FGV-X also includes an analog output cable (see "FGV-H OUTPUT SPECIFICATIONS" below)			
Optional Accessories	Test Stands and additional attachments (SEE "Series FG Accessory Bulletin"), RS232 cable is available for the FGV-H			
FGV-H Output Specifications	RS232 Output Port: Baud Rate 19200,9600, 4800,2400 bps selectable; Data Length, 8 bits; 1 Stop Bit; Parity, none; Software Flow Control, none			
	Analog Output Port: ± 1 Vdc output (through a 12 bit D/A converter)			
	Overload Output: One NPN OC transistor for tension, one NPN OC transistor for compression			





CLARK SOLUTIONS

Series FG Force Gage Accessories

Attachments for Force Gage Model Type FG

This full line of gage attachments enables precise and accurate testing results for small and hard-to-hold items. With various width and load capacities available, we offer a wide variety of attachments for all testing requirements.

ATTACHMENT	DESCRIPTION	CAPACITY	
Small Pin Grips FG-M4PIN05 FG-M4PIN1 FG-M4PIN2 FG-M6PIN05 FG-M6PIN1 FG-M6PIN2	Ideal for gripping fine wires and filaments; three ranges for checking samples of .02", .04", .08" (0.5, 1 and 2 mm) thick.	22 lb (11 kg)	
Fine Point Grips FG-M4FPG3 FG-M4FPG8 FG-M6FPG3 FG-M6FPG8	Perfect for testing fine and medium gauge wire, ribbon tape and paper. Two jaw widths and load capacities are available; both can handle material thickness up to .04" (1 mm).	30 lb (15 kg), .12" (3 mm) 60 lb (30 kg), .31" (8 mm)	
Film Grips FG-M46FLM20 FG-M6FLM20 FG-M6FLM50U FG-FLM50B (test stand mount)	These heavy-duty, spring-loaded grips have serrated jaws for handling samples up to .39" (10 mm) thick and .79" (20 mm) or 1.97" (50 mm) wide.	100 lb (50 kg)	
Jacob's Chuck Grips FG-M6JAC5U FG-JAC5B (test stand mount)	Designed for testing low gauge wire and rigid rods; accepts material diameters from .02" (.05 mm) to .20" (5 mm).	100 lb (50 kg)	
Flat Chuck Tensile Grips FG-M6FTG20U FG-FTG20B (test stand mount)	Each serrated gripping face is .79" (20 mm) square and can accept samples up to .79" (20 mm) thick.	100 lb (50 kg)	
Spool Grips FG-M6SP010U FG-SPO10B (test stand mount)	Ideal for hard-to-hold items like thread, filaments, etc. The sample is wrapped around the spool, anchored by friction.	100 lb (50 kg)	
Tape Grips FG-M6TAP30U FG-TAP30B (test stand mount)	Self tightening lever action makes this fixture perfect for testing rubber, tape and paper.	100 lb (50 kg)	
Wedge Grips FG-M6WDG50U FG-M10WDG500U	Two capacities for lighter and heavier loads; spring loaded jaws automatically close on the specimen and tighten as tension is applied. Ideal for testing wires, strip material and plastic tape or films.	100 lb (50 kg) 500 lb (250 kg)	
Heavy-Duty Tensile Grip FG-M10TEN7U FG-TEN7B (test stand mount)	Manually tightened jaw faces can accept samples 1.25" (31.75 mm) wide and .25" (6.35 mm) thick. Contact faces are serrated hardened tool steel.	500 lb (250 kg)	
Clevis Grips FG-M10CLV10U FG-CLV10B (test stand mount)	Odd shaped parts, punched samples or tension springs are easily secured and tested. Concave shape to pins assures centering under load. Throat clearance with pin is .5" (12.7 mm) and can easily accept samples up to .375" (9.65 mm) wide.	500 lb (250 kg)	

Cord and Twine Grips FG-M10TWN500U FG-TWN500B (test stand mount)	A unique figure 8 wrap of specimen assures a center break and non locking pins permit quick installation and release. Throat and pin clearance is .375" (9.65 mm) wide with the throat width being .5" (12.7 mm).	500 lb (250 kg)	
Fabric Grips FG-M10FAB80U FG-FAB80B (test stand mount)	Eccentrically mounted, serrated roller grips allow for self tightening of specimens up to 3" (76.20 mm) wide and .25" (6.4 mm) thick.	500 lb (250 kg)	
Adhesive Test Plates FG-M10ADHE3	Samples up to 3" (76.20 mm) in diameter can be tested with hardened tool steel detachable faceplates. Ball socket mounting screws in both grips assure parallelism and perpendicularity to force when load is applied.	100 lb (50 kg)	
Wire Terminal Test Fixture FG-M6WTER100	Designed specifically to test the strength of wire/terminal connections. The upper grip consists of a self-aligning wheel with nine equally spaced slots of various terminal shank sizes; an eccentrically mounted, self-tightening bottom grip secures the wire on the other end.	100 lb (50 kg)	
Compression Plates FG-M6COMP50U FGM6COMP100U	Hardened compression plates available. 50mm and 100mm available in M6 and M10 threads	100 lb (50 kg) 500 lb (250 kg)	

ASK US ABOUT OUR MOTORIZED TEST FIXTURES.....



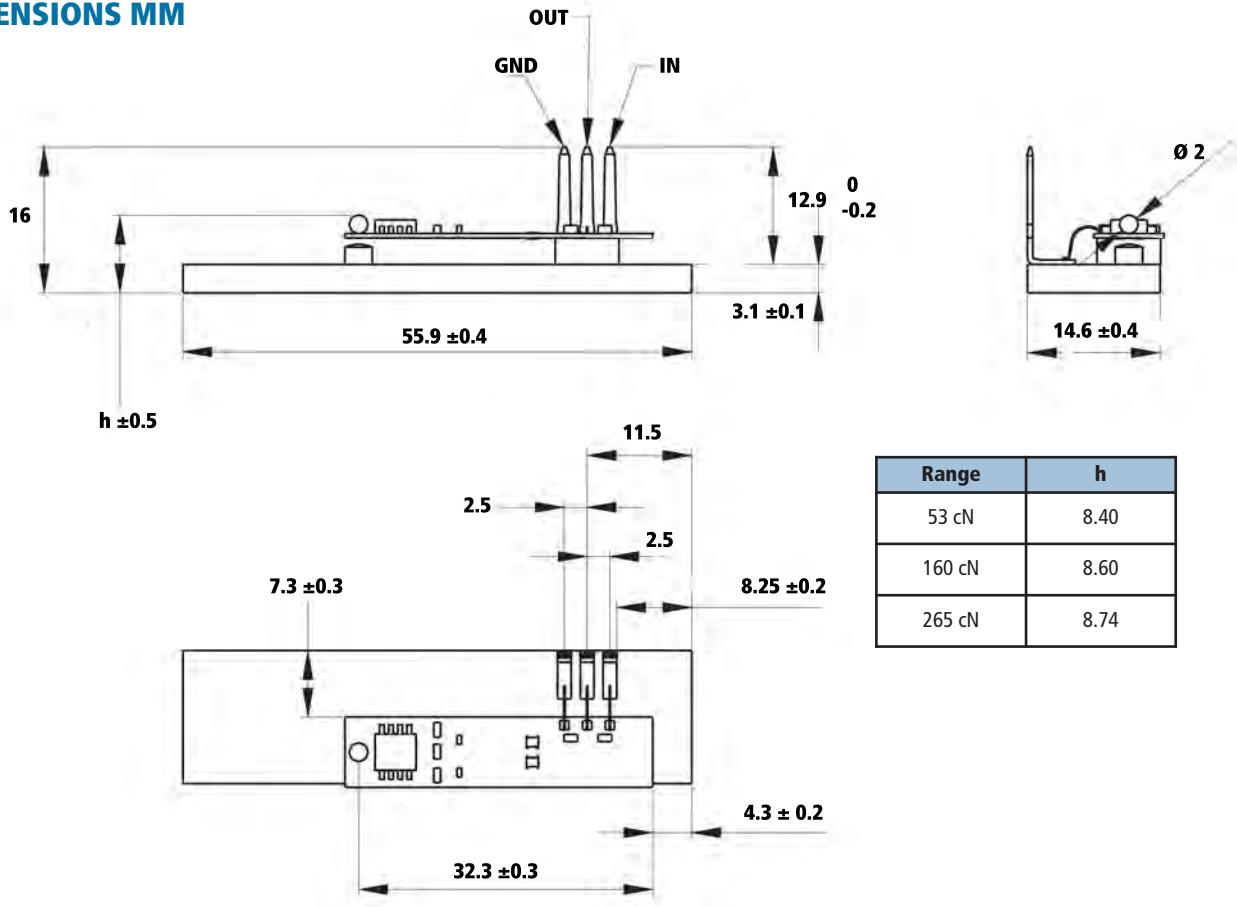
FGS-50PXH horizontal motorized test stand



FGS-50PVH motorized test stand

ACCESSORY	DESCRIPTION
FGV-HANDLE	Fits models FGE, FGV and DFS; 100 lb (50 kg) capacity
FGV-CTRLCABLE	Protects load cell of force gauge when used with a motorized test stand
FGV-RS232	Permits communication between FGV force gauge and a PC
FGV-FGS250P	Interface cable, from FGV to FGS-250PV FLEX STAND series test stand
FGS250PV-RS232	Interface cable from FGS-250PV Flex Stand to PC/data
FGV-Analog	Facilitates an analog output for recording purposes (amplitude of signal is ±1VDC)
Uni-Plate	Allows other manufacturers' force gauges to be mounted on test stands
SO-100	Software Wedge™ for Windows® provides a platform for transferring RS232 serial data via keystrokes or DDE to popular programs like Excel®, Lotus®, Access® and FoxPro®. Allows you to add date stamping to data strings.
LOADMETER	Software for Windows® allows data from FGV force gauge to be viewed and recorded graphically.

DIMENSIONS MM



ORDERING INFORMATION <i>A-BCDE (4109-2111)</i>				
A Model	B Force Range	C Output/Power Supply	D Electrical Connection	E Compensation
4109	2= 0 to 53 cN (0.119 lbs) 4= 0 to 160 cN (0.36 lbs) 5= 0 to 265 cN (0-0.596 lbs)	1= Output 0.3 to 2.8 V, Power supply 5 VDC	1= PIN-Connection, Rast 2.5	1= Temperature Compensated

CLARK SOLUTIONS

CV7500 Manual Control Valves

Air ranges to 68 LPM, water to 3.55 LPM

DESCRIPTION

CV7500 control valves are for low flow OEM, laboratory instrumentation, or bench top flow control applications. The valve designs and material make them suitable for use with a variety of gases and fluids. Complete valves are available in straight through or 90 degree angle body configurations and are constructed of brass or stainless steel. All valves are supplied with 1/8" FNPT inlet and outlet ports.

The economical cartridge valve (CVS) is available in three different needle tapers which cover our entire flow range. These units have a rising stem and provide nine turns from closed to full open.

Standard & Precision Valve Cartridge

The precision control valve (CVP) features a non-rising stem and is available in six different needle tapers, for fine control of very low flows. This valve offers sixteen turns from closed to full open. Its design eliminates saw-toothing and is virtually hysteresis free. All materials are matched for similar coefficients of expansion.



CVS Standard Control Valve



CVP Precision Control Valve

FEATURES

- All designs are panel-mountable
- Positive shutoff
- Straight-through (180°) or right angle (90°) flow paths
- Interchangeable needle tapers
- 316 stainless steel or brass
- Flow ranges from 5 CCM to 68 LPM of air
- Standard valve 9 turns to full open
- Precision valve 16 turns to full open

MATERIALS OF CONSTRUCTION

Body Materials	Valve Stem	Seals	Orifice	Max. Temp	Max. Pressure
Nickel Plated Brass	316 Stainless Steel	Nitrille	316 Stainless Steel	130° F	250 PSIG
316 Stainless Steel	316 Stainless Steel	Fluorocarbon	Kel-F	250° F	250 PSIG

Call us to discuss applications for higher pressures. We have unlisted product to 10,000 PSI

PRECISION VALVE (CVP)

MODEL NUMBER	TAPER SIZE	MAXIMUM FLOW CCM**		
		AIR	WATER	CV
CVP	1	253	17	.0006
CVP	2	470	28	.0011
CVP	3	1100	74	.0029
CVP	4	3800	219	.0110
CVP	5	11900	722	.0328
CVP	6	21300	1255	.0494

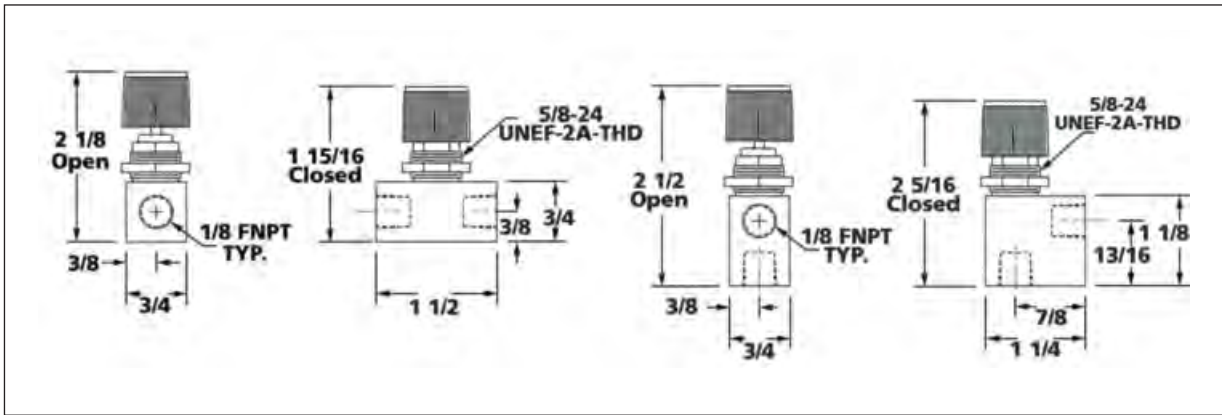
STANDARD VALVE (CVS)

MODEL NUMBER	TAPER SIZE	MAXIMUM FLOW CCM**		
		AIR	WATER	CV
CVS	1	13000	760	.0320
CVS	2	46000	2150	.0912
CVS	3	68000	3550	.1653

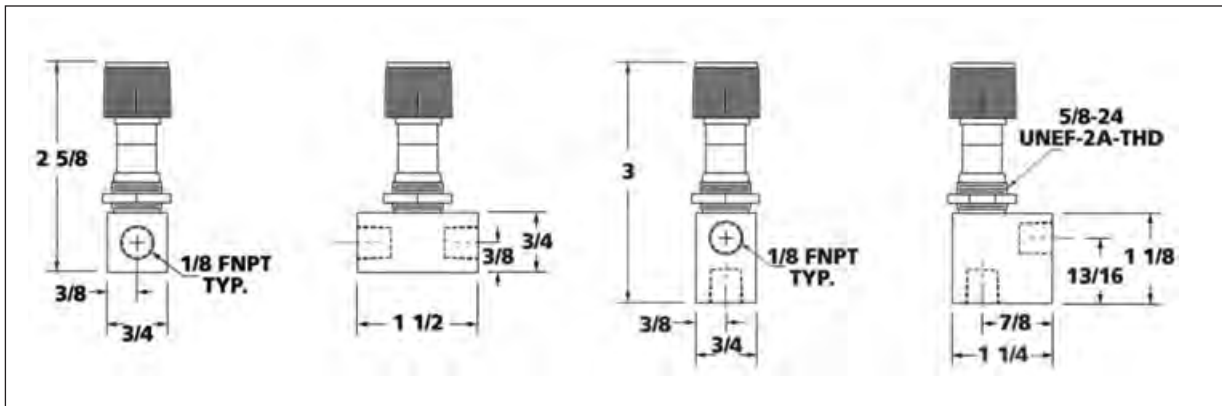
**Based on 10 psig inlet pressure of air, exhausting to atmosphere.

DIMENSIONS (INCHES)

STANDARD CONTROL VALVES (CVS)



PRECISION CONTROL VALVES



ORDERING INFORMATION

ORDER NUMBER

CVABCD (CVPS2S)

A Valve Type	B Valve Body	C- Taper Size		D Flow Configuration
		CVP	CVS	
P=Precision S=Standard	S=Stainless Steel B=Brass	1=1 2=2 3=3 4=4 5=5 6=6	1=1 2=2 3=3	S=Straight A=Angle

NOSHOK

Series 400 Hard Seat Valves

Steel or 316 SS, 1/4" NPT to 1-1/2" NPT, 10,000 PSI Pressure Rating

- Metal to metal hard seat design is 100% Helium leak tested to 1 x 10⁻⁴ml/s.
- 10,000 psi pressure rating (@200°F maximum).
- Blow out proof stem that provides a secondary stem seal in the full open position.
- Stem packing below the threads prevents thread galling & corrosion.
- Viton O-Ring & Teflon back-up ring stem seals.
- All 316SS stems (even in steel valves) for longer life.
- Stem and bonnet threads are rolled for greater strength and smoother operation.
- Angled stem for precise flow metering.
- One piece bonnet with a metal to metal seal to the valvebody below the bonnet threads.
- Bonnet lock pin to prevent accidental loosening.



- Optional panel mount bonnet and panel nuts.
- Electroless Nickel plated finish on carbon steel valves.
- Electropolish finish on stainless steel valves.
- Vinyl bonnet & stem dust cap.

SPECIFICATIONS

Models 402-404, 602-604 Hard Seat Technical Data (See Table 1)

Maximum Pressure Rating:
 Steel: 10,000 psi
 Stainless Steel: 10,000 psi
 Standard O-Ring: Viton®
 Standard Back-up Ring: Teflon®
 Orifice size: 0.187"
 Flow Coefficient: 0.44

Model 406-412 Hard Seat Technical Data (See Table 1)

Maximum Pressure Rating:
 Steel: 10,000 psi Flow
 Stainless Steel: 10,000 psi
 Standard O-Ring: Viton®
 Standard Back-up Ring: Teflon®
 Orifice size: 0.438"
 Flow Coefficient: 2.70

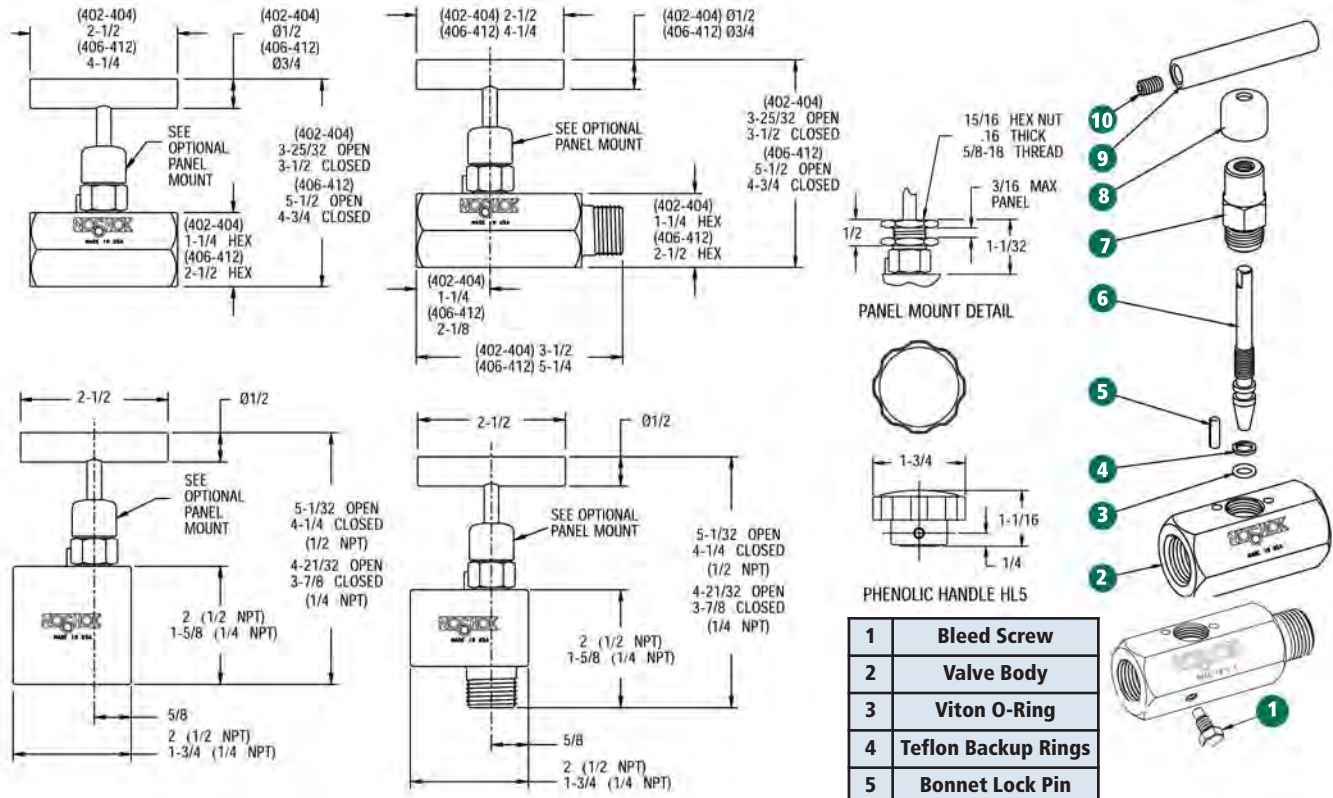
Table 1- Part Numbers

Part Number	P/N W/Bleed Screw	Connection	Material
402 MFC	602 MFC	1/4 NPT Male-Female	Steel
404 MFC	604 MFC	1/2 NPT Male-Female	Steel
406 MFC	-	3/4 NPT Male-Female	Steel
408 MFC	-	1 NPT Male-Female	Steel
410 MFC	-	1-1/4 NPT Male-Female	Steel
412 MFC	-	1-1/2 NPT Male-Female	Steel
402 MFS	602 MFS	1/4 NPT Male-Female	Stainless Steel
404 MFS	604 MFS	1/2 NPT Male-Female	Stainless Steel
406 MFS	-	3/4 NPT Male-Female	Stainless Steel
408 MFS	-	1 NPT Male-Female	Stainless Steel
410 MFS	-	1-1/4 NPT Male-Female	Stainless Steel
412 MFS	-	1-1/2 NPT Male-Female	Stainless Steel
402 FFC	602 FFC	1/4 NPT Female-Female	Steel
403 FFC	604 FFC	3/8 NPT Female-Female	Steel
404 FFC	-	1/2 NPT Female-Female	Steel
406 FFC	-	3/4 NPT Female-Female	Steel
408 FFC	-	1 NPT Female-Female	Steel
410 FFC	-	1-1/4 NPT Female-Female	Steel

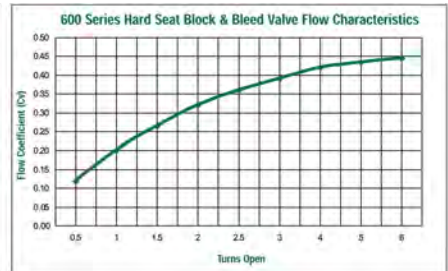
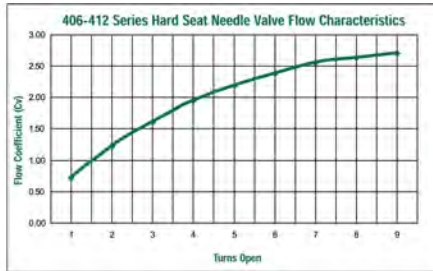
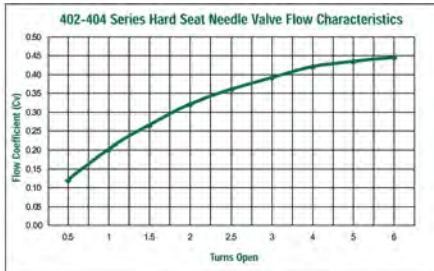
Part Number	P/N W/Bleed Screw	Connection	Material
412 FFC	-	1-1/2 NPT Female-Female	Steel
442 FFC	-	*7/16-20 unf-28 Female-Female	Steel
402 FFS	602 FFS	1/4 NPT Female-Female	Stainless Steel
403 FFS	-	3/8 NPT Female-Female	Stainless Steel
404 FFS	604 FFS	1/2 NPT Female-Female	Stainless Steel
406 FFS	-	3/4 NPT Female-Female	Stainless Steel
408 FFS	-	1 NPT Female-Female	Stainless Steel
410 FFS	-	1-1/4 NPT Female-Female	Stainless Steel
412 FFS	-	1-1/2 NPT Female-Female	Stainless Steel
442 FFS	-	*7/16-20 unf-28 Female-Female	Stainless Steel
402 MFAC	-	1/4 NPT Male-Female Angle	Steel
404 MFAC	-	1/2 NPT Male-Female Angle	Steel
402 MFAS	-	1/4 NPT Male-Female Angle	Stainless Steel
404 MFAS	-	1/2 NPT Male-Female Angle	Stainless Steel
402 FFAC	-	1/4 NPT Female-Female Angle	Steel
404 FFAC	-	1/2 NPT Female-Female Angle	Steel
402 FFAS	-	1/4 NPT Female-Female Angle	Stainless Steel
404 FFAS	-	1/2 NPT Female-Female Angle	Stainless Steel

*SAE J1926-4 O-Ring Port

DIMENSIONS INCHES



FLOW CHARACTERISTICS



TO ORDER:

A-BCD

Example 1: 408 MFS

Example 2: 408 MFS-PM2-HL3

A	B	C	D
Part Number	Panel Mount Option	O-Ring Options	Handle Options
Select From Table 1	-- none PM1=Panel Mount (1 nut) PM2=Panel Mount (2 nut)	-- Viton (Standard) EM1= EPDM 80 KZ1= Kalrez® 3018	-- T Handle (Standard) HL3= Round Knurled HL4= 1-3/8 Phenolic HL5= 113/4 Penolic

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Teflon® is a registered trademark of the DuPont Company

Sale Terms and Conditions

- 1. Prices and Specifications** are subject to change without notice.
- 2. Shipping dates** are approximate. They are dependent upon credit approval and subject to delays beyond our control.
- 3. Terms:** Net 30 days to companies with established credit rating. In the event Buyer fails to fulfill previous terms of payment, or in case Seller shall have any doubt at any time as to Buyer's financial responsibility, Seller may decline to make further deliveries except upon receipt of cash in advance or other special arrangements.
- 4. Liability Point and Title:** All material is sold F.O.B. Factory (Domestic)/FCA Free Carrier (International). Title to all material sold shall pass to buyer upon delivery by Seller to carrier at shipping point.
- 5. State and Local Taxes:** Any taxes which the Seller may be required to pay or collect upon or with respect to the sale, purchase, delivery, use or consumption of any of the material covered hereby shall be for the account of the Buyer and shall be added to the purchase price.
- 6. Special tooling,** dies, silk screens and molds acquired specially to produce goods for Buyer remain the property of Clark or Clark's suppliers and may not be removed unless by mutual agreement
- 7. Export Orders:** Terms, discounts and conditions of sale for purchase orders originating or for shipment to final destinations outside the U.S.A. will be furnished upon request.
- 8. Limited Warranty:** The Seller warrants all instruments and equipment to be free from defects in workmanship or material under normal use and service in accordance with the manufacturers' warranty statement. Liability under this warranty is limited to repair or replacement F.O.B. Factory (Domestic)/FCA Free Carrier (International) of any parts which prove to be defective within that time or credit of the purchase price at the Seller's option provided the instruments have been returned, transportation prepaid, within the specified time frame from date of purchase. All technical advice, recommendations and services are based on technical data and information which the Seller believes to be reliable and are intended for use by persons having skill and knowledge of the business, at their own discretion. In no case is Seller liable beyond replacement of equipment F.O.B. Factory (Domestic)/FCA Free Carrier (International) or the full purchase price. This warranty does not apply if the maximum ratings label is removed or if the instrument or equipment is abused, altered, used at ratings above the maximum specified, or otherwise misused in any way.
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- 9. Buyer's Remedies:** THE BUYER'S EXCLUSIVE AND SOLE REMEDY ON ACCOUNT OF OR IN RESPECT TO THE FURNISHING OF NON-CONFORMING OR DEFECTIVE MATERIAL SHALL BE TO SECURE REPLACEMENT THEREOF AS AFORESAID. THE SELLER SHALL NOT IN ANY EVENT BE LIABLE FOR THE COST OF ANY LABOR EXPENDED ON ANY SUCH MATERIAL OR FOR ANY SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES TO ANYONE BY REASON OF THE FACT THAT IT SHALL HAVE BEEN NON-CONFORMING OR DEFECTIVE.
- 10. Acceptance:** All orders shall be subject to the terms and conditions contained or referred to in the Seller's quotation, acknowledgement, and to those listed here and to no others whatsoever. No waiver, alteration or modification of these terms and conditions shall be binding unless in writing and signed by an executive officer of the Seller. Prices are exclusive of any taxes. Cancelled orders may be subject to cancellation charges.