

Pressure sensing and control

Herion 18D Pneumatic pressure switches (diaphragm type), - PSC-2



Medium - neutral, gaseous and liquid fluids
Operation - diaphragm
Mounting position - optional
Ports - 1/4 NPT
Operating pressure - Vac to 435 psi
Electrical connection - DIN 43 650
Switching element - microswitch
Degree of protection - IP 65

Herion 18D Hydraulic pressure switches (piston type), - PSC-4



Medium - hydraulics, lubricating and light fuel oils
Operation - piston
Mounting position - optional
Ports - 7/16-20 UNF, 1/4 NPT
Operating pressure - 70 to 6100 psi
Electrical connection - DIN 43 650
Switching element - Microswitch
Degree of protection - IP 65

Herion 33D Series Solid state switches (pneumatic / all-fluid), - PSC-6



Medium - Pneumatic types: compressed air or neutral gases
All fluid types: gasses or liquids, including aggressive
Operating pressure - Vac to 230 psi (pneumatic)
0 to 9100 psi (hydraulic/allfluid)
Mounting - Sub-base
Maximum pressure - 145 psi (10 bar) VS18S models and VS18G solenoid pilot actuated valves with internal pilot supply
232 psi (16 bar) VS18G solenoid pilot actuated valves with external pilot supply
Ambient temperature - 14°F to 140°F (-10°C to 60°C)
Electrical connection - M12 x 1
Degree of protection to DIN 40 050
IP 65 (with mounted plug)

Herion 18S Allfluid Series Analog pressure sensor for hydraulic/all-fluid, - PSC-8



Medium - For neutral and aggressive gases or fluids
Fluid connection - 1/4 NPT male
Mounting position - optional
Pressure range - 0 to 11,600 psi
Ambient temperature - -4°F to 185°F (-20°C to +85°C)
Degree of protection - IP 65 (acc. to DIN 40050)
Shock protection - 30g, to DIN EN 60068-2-27
Vibration protection - 3g, 5 to 500 Hz, xyz, DIN EN 60068-2-6

PSC-B

Herion 18S Pneumatic Series Analog pressure sensor, - PSC-10

Medium - Filtered compressed air, lubricated or unlubricated, neutral gases
 Mounting position - optional
 Operating pressure - 1.4 to 363 psi (-1 to 25 bar)
 Fluid temperature - 14°F to 185°F (-10°C to +85°C)
 Degree of protection
 IP 65
 Electrical connection
 DIN 43 650 or M12 x 1 short-circuit protected

VP40 Series 3-way proportional pressure control valves, - PSC-12

Medium - Compressed air, filtered to 40 µm, lubricated or unlubricated
 Operation - piston
 Mounting position - Any, preferably vertical
 Flow direction - Fixed
 Ambient temperature - 14°F to 104°F (-10°C to +40°C)
 Hysteresis - < 3% FS*
 Repeatability - < 1% FS*
 Degree of protection - IP 65 with connector
 Response sensitivity - 1% FS*
 * at 20°C
 Degree of protection: - IP 65 with connector

VP60 5/3 Proportional flow control valve (nominal dia. 8 mm), - PSC-14

Medium - Filtered unlubricated air
 Filtration - Recommended 5µ
 Operation - Moving coil
 Connection - 1/4 NPT and G1/4"
 Flow rate - 40 scfm (1200 l/min) for p1: 90 psi and p2: 75 psi
 Mounting position - Any, preferred solenoid on top
 Operating temperature - 32°F to 140°F (0°C to 60°C)

VP10 Electronic Pressure Regulator, - PSC-16

Medium - Oil free, dry air, filtered to 5 micron
 Output pressure - 3-15 psig (0.2-1.0 bar), 3-30 psig (0.2-2.0 bar), 3-60 psig (0.2-4.0 bar), 2-120 psig (0.14-8 bar) three wire version
 Flow capacity - Up to 10 scfm (300 l/min)
 Air consumption - <60 psig (<4 bar): 0.03 scfm (0.85 l/min) typical
 >60 psig (>4 bar): 0.06 scfm (1.75 l/min) typical
 Operating pressure - At least 10 psig (0.7 bar) above maximum required output pressure
 Connections - NPT 1/4" or 1/4" ISO G available
 Operating temperature - 4° to 160°F (-20°C to 70°C)

Pressure sensing and control

VP50 Proportional Pressure Control Valve, - PSC-18



Medium - Compressed air, filtered to 40micron, non-lubricated
Operation - Proportional, direct acting air piloted spool
Output Pressure - See website
Supply Pressure - 200 psig (14 bar) max
Supply Sensitivity - Better than 0.75% span output change per bar supply pressure change
Flow Capacity - Up to 50 scfm (1400 NL/min)
Total Error - Max. error < $\pm 1\%$ of span (independent error includes the combined effect of non-linearity, hysteresis, deadzone and repeatability)
Operating Temperature - 23° to 120°F (-5° to 50°C)

VP51 Programmable proportional pressure control valve, - PSC-20



Medium - Compressed air filtered to 40 µm, non-lubricated
Supply pressure - 205 psig (14 bar) max.
Output pressure - 0 - 145 psig (0 - 10)
Supply sensitivity - <= 50 mbar between 160 and 90 psig (11 and 6 bar) supply
Response time - < 100 ms (from 10 to 90% of output pressure into a 0,1 litre load)
Air consumption - < .177 scfm (5 l/min)
Total error - Maximum error ± 1.45 psig (100 mbar) of total span (independent error includes the combined effect of non-linearity, hysteresis, deadzone and repeatability)
Ambient temperature - -4 to 122°F (-20° to 50°C)

R-27 Series Manostat Precision Air Pressure Regulators, - PSC-22



Medium - Dry, oil free air filter to 25 microns
Operation - Two stage servo mechanized regulator with integral precision measuring capsule
Mounting - Any position. Panel mounting or through mounting holes on the unit (lever, plunger and pilot versions)
Port sizes - G 1/4
Output pressure ranges - See individual details
Supply pressure - Minimum at least 2.9 psig (0.2 bar) above output pressure.
Maximum 145 psig (10 bar)
Flow capacity - Up to 10.6 scfm (300 l/m)

PSC-D

P/I & P/E, - PSC-24

These instruments convert pneumatic pressures into electrical signals for use with data loggers, computers and microprocessors

Type 68 is a two-wire pressure/current device

Type 69 a three-wire pressure/voltage type

Both use only non-critical power supplies and can be supplied weatherproof to IP65

**Type 421 Compact failsafe rail mount I/P converter, - PSC-24**

A rugged, electronic I/P converter designed for high density rail or manifold mounting, at a spacing of only 1" (25mm)

Advanced electronic control using surface mount electronics and a precision pressure transducer and offers excellent performance characteristics

Employs a high sensitivity microminiature Reedex valve for pressure control

Great reliability, long life, freedom from vibration effects, and are significantly less prone to mechanical derangement than older conventional designs

Can be mounted on DIN rail, surface mounted, or mounted onto a high density manifold

**Type 422 and type 423 Failfreeze Electronic Converter, - PSC-24**

A major advance in I/P converter design, offering failfreeze in addition to conventional I/P features

Advanced electronic control and a precision pressure transducer to achieve outstanding performance

Intended for field application in which rugged construction, vibration immunity, weatherproofing and reliability are essential, together with the enhanced system safety gained from its failfreeze characteristic

Two wire operation from a 4-20mA control signal with output pressures up to 120 psig (8 bar) as standard

**Type 425 Electronic I/P Converter, - PSC-25**

For service in demanding industrial and process control applications, normally used to accurately convert a loop control current of 4-20mA to 3-15 psig (0.2-1 bar) pneumatic signal to operate a control valve actuator

Uses the proven Reedex® microminiature solenoid valve avoiding the use of sensitive flapper nozzle electromechanical components.

Provides solid state closed loop control ensuring long term accuracy

For use in adverse environmental conditions giving optimum performance and low cost of ownership

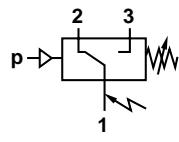


Pressure sensing and control

Herion 18D

Pneumatic pressure switches (diaphragm type)

Vac - 435 psi



DIN 43650

Adjustable setpoint

Gold-plated contacts

Vibration resistant to 15 g

Microswitch approved by UL and CSA

Intrinsically safe operation

Technical data

Medium

Neutral, gaseous and liquid fluids

Operation

Diaphragm

Mounting position

Optional

Operating pressure

Vac to 435 psi

Over pressure

1150 psi

Ambient temperature

-14°F to 175°F (-10°C to +80°C)

Viscosity

Up to 1000 mm²/s (± 450 ssu).

Fluid temperature

-14°F to 175°F (-10°C to +80°C)

Repeatability

$\pm 3\%$, for vacuum $\pm 4\%$

Electrical connection

DIN 43 650

Switching element

Microswitch

Degree of protection

IP 65

Weight

.4 lbs (0.2 kg)

Materials

Housing: aluminum

Seals: Perbunan, Viton

'O'-ring: NBR



Model numbers - pneumatic/lubrication applications

Port size	Type	Pressure range psi (bar)	Switching pressure difference psi* (bar) lower range	upper range	Model	Drawing
1/4 NPT	Female	-14 - 0 (-1 - 0)	2 (0.15)	3 (0.18)	0880120	1
-	Flange	-14 - 0 (-1 - 0)	2 (0.15)	3 (0.18)	0881100	3
1/4 NPT	Female	3 - 30 (0.2 - 2)	2 (0.15)	4 (0.27)	0880220	1
-	Flange	3 - 30 (0.2 - 2)	2 (0.15)	4 (0.27)	0881200	3
1/4 NPT	Female	7 - 120 (0.5 - 8)	4 (0.2)	9 (0.65)	0880320	2
-	Flange	7 - 120 (0.5 - 8)	4 (0.2)	9 (0.65)	0881300	3
1/4 NPT	Female	15 - 230 (1 - 16)	4 (0.2)	13 (0.90)	0880420	2
-	Flange	15 - 230 (1 - 16)	4 (0.2)	13 (0.90)	0881400	3
1/4 NPT	Female	15 - 435 (1 - 30)	15 (1.0)	75 (5.0)	0880620	2

Model numbers - water applications

Port size	Type	Pressure range psi (bar)	Switching pressure difference psi* (bar) lower range	upper range	Model	Drawing
1/4 NPT	Female	3 - 30 (0.2 - 2)	2 (0.15)	4 (0.27)	0880240	1
1/4 NPT	Female	7 - 120 (0.5 - 8)	4 (0.2)	9 (0.65)	0880340	2

Note: Switches are supplied with DIN 43650 mating connector.

* Switching pressure difference (hysteresis) is not adjustable. Typical valves are shown.

Caution: Observe switching range. Do not subject switch to maximum allowable pressure during normal operation. Even short pressure peaks must not exceed this value.

Herion 18D

Pneumatic pressure switches

Vac - 435 psi

Making And/Or Breaking Capacity

Load Level*	Type of Current	Type of Load	Vmin [V]	Maximum Permanent Current Imax [A] at V			Contact life electrical at Imax	Contact life mechanical at I = 0
				24 V	125 V	250 V		
Standard (relays, solenoids)	AC	Resistive	12	5	5	5	5 x 10 ⁴ switching cycles	approx 10 ⁷ switching cycles
	AC	Inductive PF = .7	12	3	3	3		
	DC	Resistive	12	5	.4	-		
	DC	Inductive L/R = 10 ms	12	3	.05	-		
Low (electronic circuits)	AC	Resistive	5	.34	.08	.04	2 x 10 ⁵ switching cycles	approx 10 ⁷ switching cycles
	DC	Inductive L/R = 10 ms	5	.1	-	-		

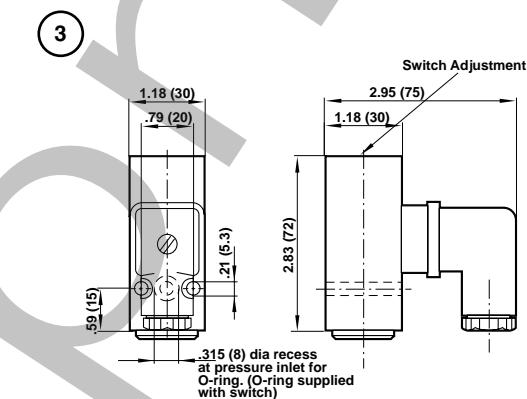
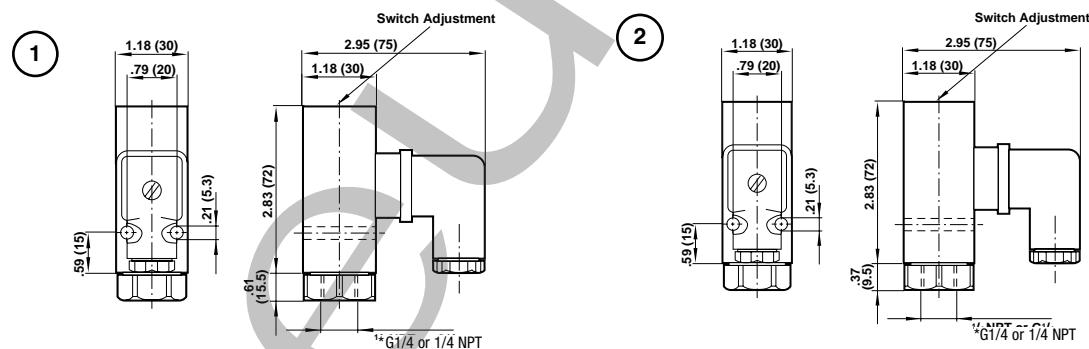
*Load Level Explanation

Series 18D Pressure Switches have microswitch contacts with gold-plating over silver base metal. The gold plating remains intact when "low level" voltage / current levels are observed. This feature assures highly reliable switching in low-level electronic circuits.

Standard applications do not require the gold plating – which will decay naturally when switching larger electrical loads.

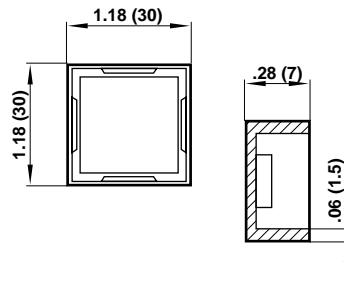
Notes:

1. Reference conditions: 30 cycles per min and 86°F (30°C) ambient.
2. Reducing load current to 50% of I max approximately doubles contact life.
3. Creepage and clearance distances correspond to insulation group B per VDE Reg. 0110 (except contact clearance of microswitch).



Protective Cover

An optional elastomer cover for protection of the switch adjustment against dirt and splashing liquids Part No. 0554737

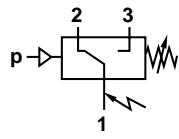


Pressure sensing and control

Herion 18D

Hydraulic pressure switches (piston type)

70 to 6100 psi psi



DIN 43650

Adjustable setpoint**Gold-plated contacts****Vibration resistant to 15 g****Microswitch approved by UL and CSA****Intrinsically safe operation****Technical data****Medium**

Hydraulics, lubricating and light fuel oils

Operation

Piston

Mounting position

Optional

Operating pressure

70 to 6100 psi

Over pressure

5800 psi,

08824xx: 8700 psi

Ambient temperature

-13°F to 175°F (-25°C to +80°C)

ViscosityUp to 1000 mm²/s (± 450 ssu).**Fluid temperature**

-13°F to 175°F (-25°C to +80°C)

Repeatability

±3%

Electrical connection

DIN 43 650

Switching element

Microswitch

Degree of protection

IP 65

Weight

.2 lbs (0.2 kg)

Materials

Housing aluminum

Port: stainless steel

Seals: Teflon/Buna-N

**Model numbers - hydraulic applications**

Port Size	Type	Pressure Range psi (bar)	Switching Pressure Difference (Hysteresis)*		Model	Dimension Drawing No.
			psi (bar) Lower Range	Upper Range		
-	flange	70 – 1015 (5 – 70)	152 (10.5)	218 (15)	0883100	2
7/16-20 UNF	female	70 – 1015 (5 – 70)	152 (10.5)	218 (15)	0882119	1
1/4 NPT	female	70 – 1015 (5 – 70)	152 (10.5)	218 (15)	0882120	1
-	flange	150 – 2320 (10 – 160)	160 (11)	247 (17)	0883200	2
7/16-20 UNF	female	150 – 2320 (10 – 160)	160 (11)	247 (17)	0882219	1
1/4 NPT	female	150 – 2320 (10 – 160)	160 (11)	247 (17)	0882220	1
-	flange	360 – 3600 (25 – 250)	160 (11)	247 (17)	0883300	2
7/16-20 UNF	female	360 – 3600 (25 – 250)	160 (11)	247 (17)	0882319	1
1/4 NPT	female	360 – 3600 (25 – 250)	160 (11)	247 (17)	0882320	1
-	flange	580 – 6100 (40 – 420)	247 (17)	508 (35)	0883400	2
7/16-20 UNF	female	580 – 6100 (40 – 420)	247 (17)	508 (35)	0882419	1
1/4 NPT	female	580 – 6100 (40 – 420)	247 (17)	508 (35)	0882420	1

Note: Switches are supplied with DIN 43650 mating connector

* Switching pressure difference (hysteresis) is not adjustable. Maximum values are shown.

Herion 18D

Hydraulic pressure switches

Vac - 435 psi

Making And/Or Breaking Capacity

Load Level*	Type of Current	Type of Load	Vmin [V]	Maximum Permanent Current Imax [A] at V			Contact life electrical at I _{max}	Contact life mechanical at I = 0
				24 V	125 V	250 V		
Standard (relays, solenoids)	AC	Resistive	12	5	5	5	5 x 10 ⁴ switching cycles	approx 10 ⁷ switching cycles
	AC	Inductive PF = .7	12	3	3	3		
	DC	Resistive	12	5	.4	-		
	DC	Inductive L/R = 10 ms	12	3	.05	-		
Low (electronic circuits)	AC	Resistive	5	.34	.08	.04	2 x 10 ⁵ switching cycles	approx 10 ⁷ switching cycles
	DC	Inductive L/R = 10 ms	5	.1	-	-		

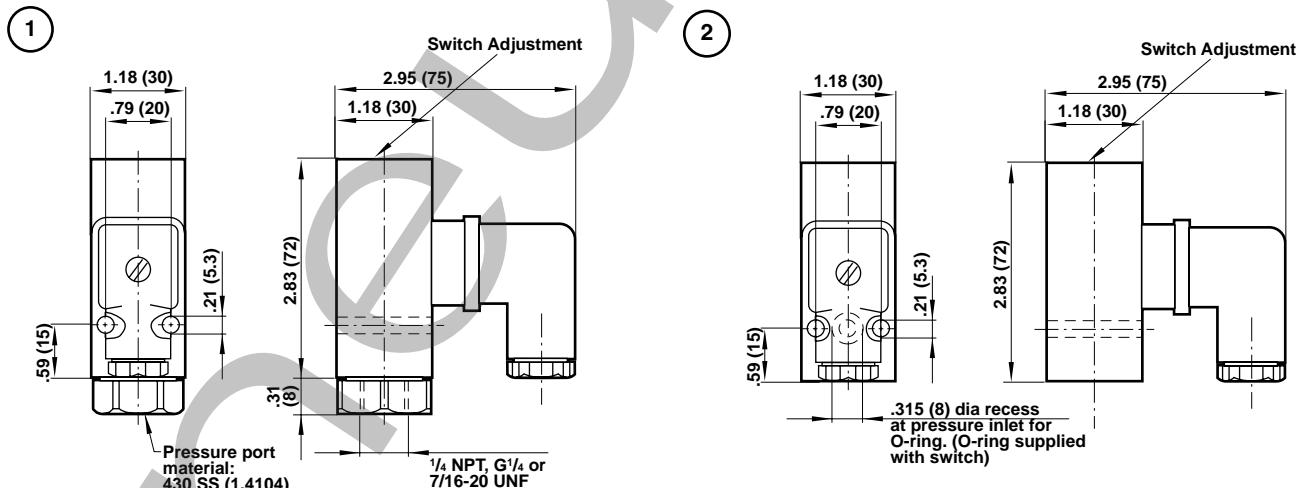
*Load Level Explanation

Series 18D Pressure Switches have microswitch contacts with gold-plating over silver base metal. The gold plating remains intact when "low level" voltage / current levels are observed. This feature assures highly reliable switching in low-level electronic circuits.

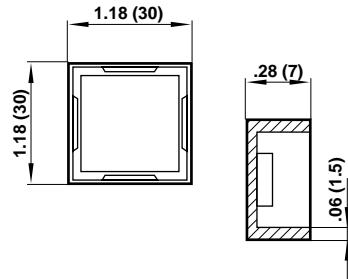
Standard applications do not require the gold plating – which will decay naturally when switching larger electrical loads.

Notes:

1. Reference conditions: 30 cycles per min and 86°F (30°C) ambient.
2. Reducing load current to 50% of I_{max} approximately doubles contact life.
3. Creepage and clearance distances correspond to insulation group B per VDE Reg. 0110 (except contact clearance of microswitch).



Protective Cover
An optional elastomer cover for protection of the switch adjustment against dirt and splashing liquids Part No. 0554737



Pressure sensing and control

Herion 33D Series

Solid state switches (pneumatic / all-fluid)

Vac to 9100 psi

Real time pressure display with
backlight

Compact and robust design

Easy programming of set points and
additional functions

Transistor output signals 1 x PNP,
2 x PNP, or 1 x PNP + 4 to 20 mA

Electronic lock

Switching status indicated by LED

Standard M12x1 electrical connection
(IP 65)

For pneumatic, all fluid and hydraulic
applications

Technical data

Medium

Pneumatic types: compressed air or
neutral gases

All fluid types: gasses or liquids,
including aggressive

Display

LCD 4 digits illuminated, pressure unit
programmable for bar, psi, mpa

Mounting position

Optional

Operating pressure

Vac to 230 psi (pneumatic)
0 to 9100 psi (hydraulic/allfluid)

Temperature sensitivity
(zero point)

0.4% of final value/10 K

Temperature sensitivity
(range)

0.4% FS/10 K

Ambient temperature

14°F to 140°F (-10°C to 60°C)

Fluid temperature

14°F to 75°F (-10°C to 80°C)

Switching point

Adjustable between 0 and 100% FS

Reset point

Adjustable between 0 and 100% FS

Electrical connection

M12 x 1

Linearity

< 0.2% FS ±1 digit

Degree of protection to DIN
40 050

IP 65 (with mounted plug)



Model number - standard pneumatic models*

Port size	Measuring range (psi) (relative pressure)	Maximum overpressure (psi)	Output signal	Model
1/4 NPT	Vac-15	145	1 x PNP	0863014
Flange	Vac-15	145	1 x PNP	0863016
1/4 NPT	Vac-15	145	2 x PNP	0863024
Flange	Vac-15	145	2 x PNP	0863026
1/4 NPT	Vac-15	145	1 x PNP / 4-20 mA	0863044
Flange	Vac-15	145	1 x PNP / 4-20 mA	0863046
1/4 NPT	0 - 230	435	1 x PNP	0863214
Flange	0 - 230	435	1 x PNP	0863216
1/4 NPT	0 - 230	435	2 x PNP	0863224
Flange	0 - 230	435	2 x PNP	0863226
1/4 NPT	0 - 230	435	1 x PNP / 4-20 mA	0863244
Flange	0 - 230	435	1 x PNP / 4-20 mA	0863246

* M12 x 1 connector not included. Please see table on next page.

Options selector

0863***	
Pressure range (pneumatic)	Substitute
Vac-15 psi	0
0 - 230 psi	2
Pressure range (allfluid)	Substitute
0 - 145 psi	1
0 - 580 psi	3
0 - 1450 psi	4
0 - 2300 psi	5
0 - 3600 psi	6
0 - 5800 psi	7
0 - 9100 psi	8
Fluid/electrical connection	Substitute
G1/4, M12 x 1	2
1/4 NPT, M12 x 1	4
Flange, M12 x 1	6
Output signal	Substitute
1 digital out	1
2 digital out	2
1 digital out/4 - 20 mA	4

Materials

Housing: aluminum

Pneumatic version

Seal : viton O-ring (FKM)

Sensor: silicon

Hydraulic/All fluid version

Porting block / sensor: 316 SS welded

Herion 33D Series**Solid state pressure switches (pneumatic / all-fluid)**

Vacuum to 9100 psi

Electrical parameters

Electrical connection	M12 x 1
Power supply	10 – 32 V d.c. (polarity safe) digital models
	15 – 32 V d.c. (polarity safe) analog models
Permissible residual ripple	10% (within 12 to 32 V)
Current consumption	<50 mA (plus load current)

Electromagnetic compatibility

Interference emission	Conforming to EN 50081. Part 1
Interference immunity	Conforming to EN 50082. Part 2

Electrical connection M12 x 1

Pin	Signal	Cable
1	Supply voltage	Brown
2	Out 2 (PNP) / analog 4 – 20 mA	White
3	Common	Blue
4	Out 1 (PNP)	Black
5	Earth ground	Grey

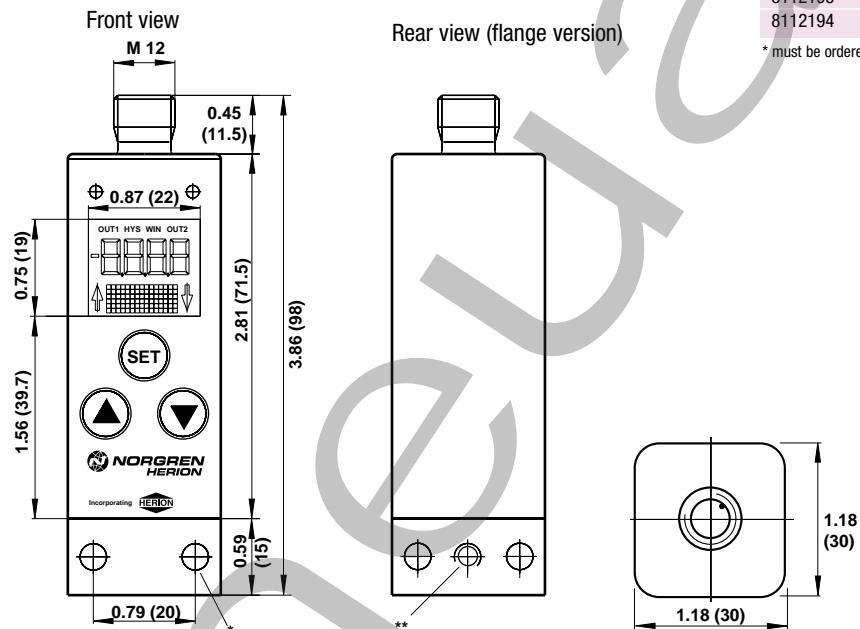
Switching output

Switching mode	PNP sourcing type transistor, suitable for inductive load
Output voltage	Supply voltage -1.5 V
Analog output	4 – 20mA
Contact rating	I _{max} = 500 mA (short-circuit proof)
Switching time	< 10 ms
Damping	5 ms – 0.64 sec programmable
Signal delay:	On/off 0 to 20 sec programmable
Service life	min. 100 million switching cycles
Switching logic	n.o. / n.c. programmable
Operating mode	Standard, hysteresis and window mode Separately selectable for each output

Accessories

Part number	Connectors and cordsets (M12 x 1)*
8112184	Mating connector 5-pin straight w/screw terminals, no cable
8112193	Molded cordset 5-pin straight w/2m cable
8112194	Molded cordset 5-pin 90° w/2m cable

* must be ordered separately



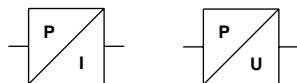
* Suitable for M 5 x 35 or 10-24 screws

** Flange diameter 8 x 1.2 deep, O-ring 4.47 x 1.78 (Viton 90)

Pressure sensing and control

Herion 18S Allfluid Series

Analog pressure sensor for hydraulic / all-fluid applications, 0 - 11,600 psi



Robust sensor for hydraulic applications

Temperature compensated

3-wire technology (0 to 10 V)

2-wire technology (4 to 20 mA)

Excellent long-term stability

Stainless steel measuring element-not oil-filled

Technical data

Medium

For neutral and aggressive gases or fluids

Fluid connection

1/4 NPT male

Mounting position

Optional

Pressure range

0 to 11,600 psi

Fluid temperature:

-4°F to 185°F (-20°C to +85°C)

Ambient temperature

-4°F to 185°F (-20°C to +85°C)

Degree of protection

IP 65 (acc. to DIN 40050)

Shock protection

30g, to DIN EN 60068-2-27

Vibration protection

3g, 5 to 500 Hz, xyz, DIN EN 60068-2-6

Electrical connection

M12 x 1

Supply voltage

$U_B = 12 \text{ to } 30 \text{ V d.c. (current output)}$

$U_B = 15 \text{ to } 30 \text{ V d.c. (voltage output)}$

Output signal

4 to 20 mA (Two-wire technology)

0 to 10 V (Three-wire technology)

Electromagnetic compatibility

Interference immunity acc. to EN 50081. Part 1

Interference immunity acc. to EN 50082. Part 2

Load resistance

See diagram

Polarity

Short-circuit proof

Measuring range

See table below

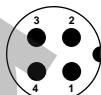
Standard models*

Model	Measuring range (psi) (Relative pressure)**	Value max. (bar) (Over pressure)	Output signal
0862178	0 - 145	580	4 - 20 mA
0862188	0 - 145	580	0 - 10 V
0862378	0 - 360	725	4 - 20 mA
0862388	0 - 360	725	0 - 10 V
0862478	0 - 1450	2900	4 - 20 mA
0862488	0 - 1450	2900	0 - 10 V
0862678	0 - 3625	7250	4 - 20 mA
0862688	0 - 3625	7250	0 - 10 V
0862778	0 - 5800	10,800	4 - 20 mA
0862788	0 - 5800	10,800	0 - 10 V
0862978	0 - 11,600	14,500	4 - 20 mA
0862988	0 - 11,600	14,500	0 - 10 V

* Order mating connector separately



Electrical connection M 12 x 1 (4 pin)



Signal	4 ... 20 mA	0 ... 10 V	Frequency
+ UB (supply)	1	1	
Common	-	3	
Signal	4	4	

Options selector

0862 ★★0

Measuring range relative pressure	Code
0 to 145 psi	1
0 to 360 psi	3
0 to 1450 psi	4
0 to 3625 psi	6
0 to 5800 psi	7
0 to 11,600 psi	9

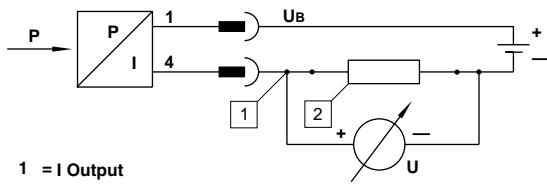
Output signal	Code
4 to 20 mA	7
0 to 10 V	8

Herion 18S

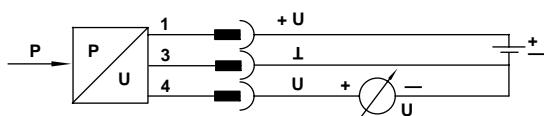
Pressure sensor analog

0 to 11,600 psi

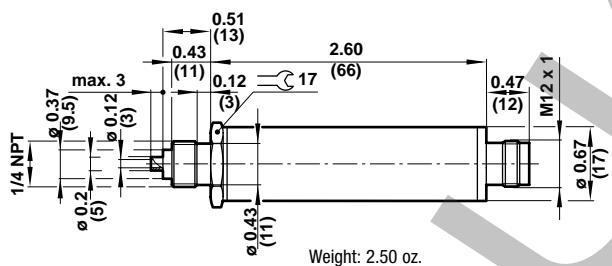
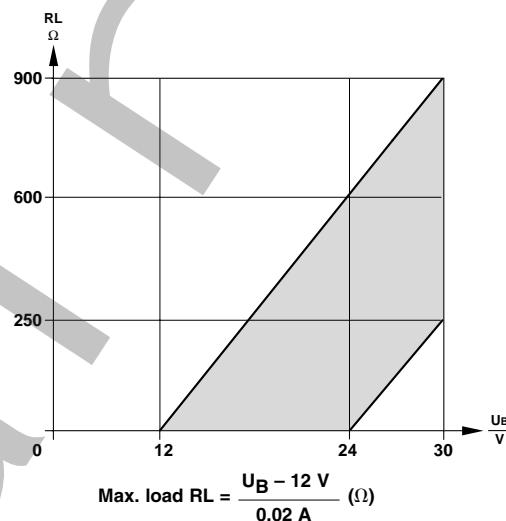
Electrical diagram for 2-wire versions 4 to 20 mA



Electrical diagram for 3-wire versions 0 to 10 V



Characteristic load curve



Accessories

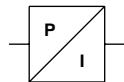
Part number	Connector and cordsets (M12 x 1)
0523055	mating connector, 4-pin straight w/screw terminals, no cable
0523057	molded cordset, 4-pin straight, 2 meter
0523052	molded cordset, 4-pin straight, 5 meter
0523058	molded cordset, 4-pin 90°, 2 meter
0523053	molded cordset, 4-pin 90°, 5 meter

Pressure sensing and control

Herion 18S Pneumatic Series

Analog pressure sensor for pneumatic applications

-14.5 to 360 psi



Temperature compensated

Robust design for pneumatic and industrial applications

Technical data

Medium:

Filtered compressed air, lubricated or unlubricated, neutral gases

Mounting

Optional

Operating pressure

1.4 to 363 psi (-1 to 25 bar)

Fluid temperature

14°F to 185°F (-10°C to +85°C)

Ambient temperature

14°F to 185°F (-10°C to +85°C)

Degree of protection

IP 65

Electrical connection

DIN 43 650 or M12 x 1 short-circuit protected

Output signal

4 to 20 mA (Two-wire technology)

Linearity

< ±0.5% final scale

Hysteresis

< 0.15%

Temperature sensitivity (zero point)

Zero point < ± 0.4% FS/10K

Range < ± 0.2% FS/10K

Weight:

0.3 oz. (0.15 kg)

Materials

Housing: aluminum

Sensor: Silicon

O-rings: NBR

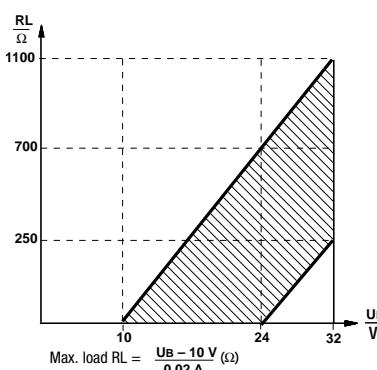


Model numbers*

Port size	Measuring range (bar) (Relative pressure)	Value max. (bar) (Over pressure)	Model DIN 43650	Model M12x1*
1/4 NPT	-14.5 to 14.5	145	0862083	0862084
Flange	-14.5 to 14.5	145	0862085	0862086
1/4 NPT	0 to 145	435	0862183	0862184
Flange	0 to 145	435	0862185	0862186
1/4 NPT	0 to 360	580	0862383	0862384
Flange	0 to 360	580	0862385	0862386

* M12 x 1 connector not included. Please see table below.

Characteristic curve of load

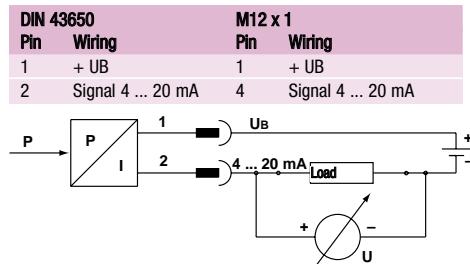


Herion 18S

Pressure sensor analog

-1 to 25 bar

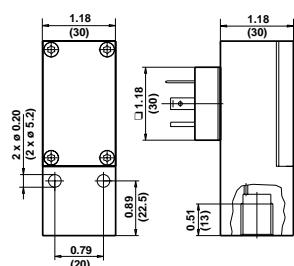
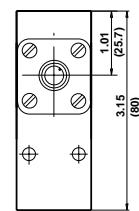
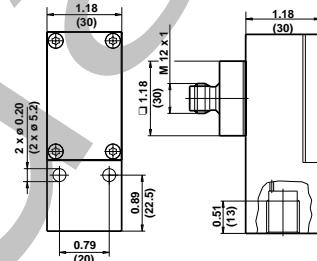
Electrical connection



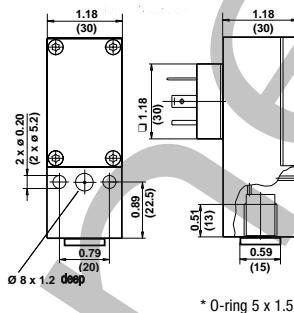
Accessories

Connector cordsets (M12 x 1)

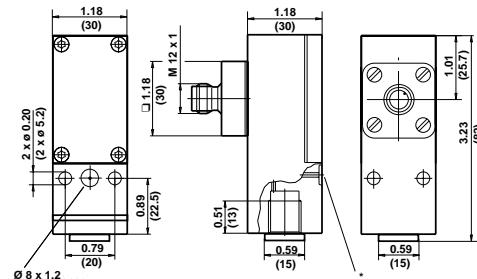
Model	Description
0523055	Straight, without cable
0523057	Straight, 2 m cable, 4-pin
0523052	Straight, 5 m cable, 4-pin
0523058	90° 2 m cable, 4-pin
0523053	90° 5 m cable, 4-pin

DIN 43650
1/4 NPTM12 x 1
1/4 NPT

Flange



Flange

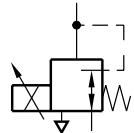


* O-ring 5 x 1.5

Proportional valves

VP40 Series

3-way proportional pressure control valves
1/8, 1/4, and 3/8"



Low hysteresis
Good repeatability
High flow capacity at exhaust
Manifold mountable
Compact design

Technical data

Medium:

Compressed air, filtered to 40 µm,
lubricated or unlubricated

Mounting position:

Any, preferably vertical

Flow direction:

Fixed

Ambient temperature:

14°F to 104°F (-10°C to +40°C)

Hysteresis:

< 3% FS*

Repeatability:

< 1% FS*

Linearity:

See characteristic curves

Response sensitivity:

1% FS*

* at 20°C

Degree of protection:

IP 65 with connector

Materials

Body: aluminum alloy

Seals: NBR

Orifice (mm)	Port size	Outlet pressure P2 (psi)	Maximum inlet pressure P1 (psi)	Rated current (mA)	Model
4	1/8 NPT	0 to 145	145	0 to 1600 (1800)	4088119.7053
4	1/8 NPT	0 to 190	230	0 to 1600 (1800)	4088217.7053
6	1/4 NPT	0 to 30	100	0 to 1600 (1800)	4088201.7053
6	1/4 NPT	0 to 145	175	0 to 1600 (1800)	4088211.7053
8	3/8 NPT	0 to 100	145	0 to 1600 (1800)	4088311.7071

Drive electronics pQ11

Model	Rated current mA	Type of connection	Remarks
5980081	0 to 2400	Connector according to DIN 43651	Suitable for 4088xxx.xxxx valves
5980085	0 to 2400	2 m cable	



Drive electronics pQ12

Model	Rated current mA	Remarks
5980126	0 to 2400	Suitable for 4088xxx.xxxx, 4090020.7093 and 4090021.7093 valves

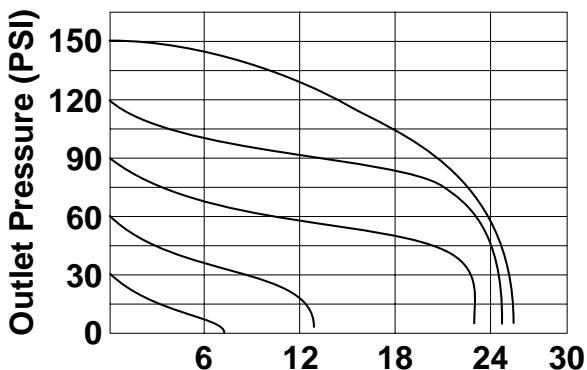


Electrical information for proportional solenoids

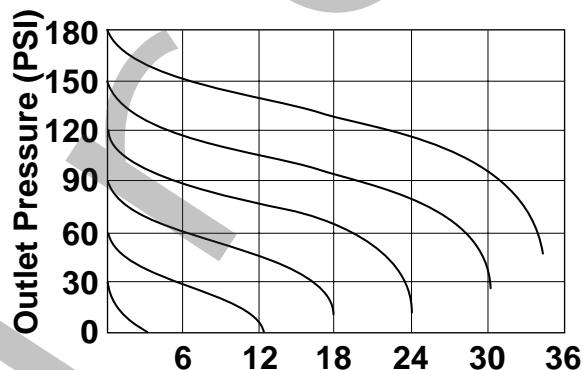
Nominal diameter	Limiting current IN	Rated power PN	Resistance R20	Duty cycle
4, 6 & 8	1600 mA	22 W	6.5 ohms + 3%	100%

VP40 Series

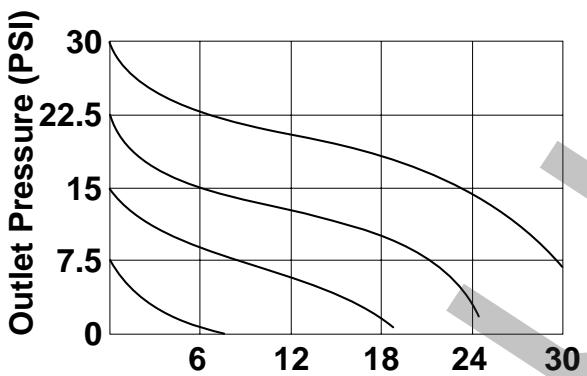
3-way proportional pressure control valves

NPT $\frac{1}{8}$, NPT $\frac{1}{4}$, NPT $\frac{3}{8}$,**Characteristic curves**

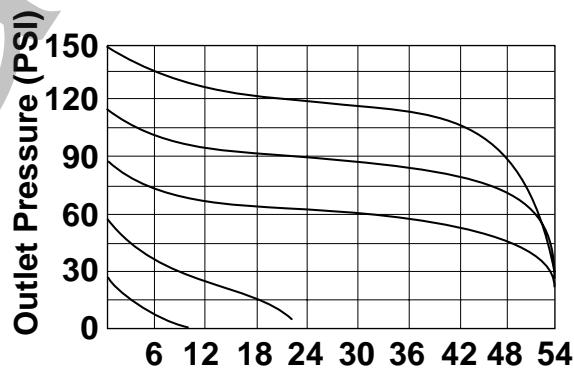
Flow (SCFM)
Fig. 3 Valve 40-881-19



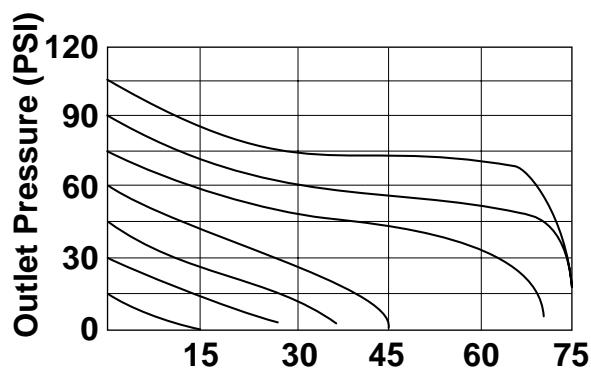
Flow (SCFM)
Fig. 4 Valve 40-882-17



Flow (SCFM)
Fig. 5 Valve 40-882-01



Flow (SCFM)
Fig. 6 Valve 40-882-17



Flow (SCFM)
Fig. 8 Valve 40-883-11

Proportional valves

VP60

5/3 Proportional flow control valve (nominal dia. 8 mm)

Directly operated spool valve with μ P-electronics

Microprocessor control electronics

High dynamic regulation

On-board diagnostics

CE conformance

Technical data

Medium

Filtered unlubricated air.

Note: Using lubricated air may affect dynamic response and lifespan of the valve.

Filtration

Recommended 5 μ

Operation

Moving coil

Connection

1/4 NPT and G1/4"

Flow rate

40 scfm (1200 l/min)

for p1: 90 psi and p2: 75 psi

Mounting position

Any, preferred solenoid on top

Flow direction

1→4+2→3; 1→2+4→5

Operating temperature: 32°F to 140°F (0°C to 60°C)

No condensation permissible

Materials

Electronic housing: plastic (PAA)

valve housing: aluminum alloy

seals: NBR

solenoid surface: steel

Degree of protection

IP65

Operating pressure [p1]

0 to 175 psi

Leakage

For center position 35 scfh with p1: 145 psi

Reaction time

At p1 = 90 psi and 100% stroke free exhausting:

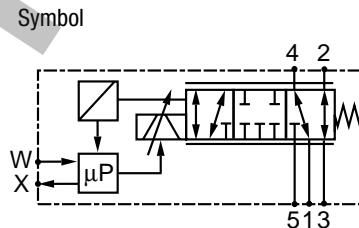
Dead time: 3 ms

Rise time (10% - 90%): 5ms

Electromagnetic compatibility

The valve conforms to the EC requirements EN50081-2 (emission) and EN50082-2 (disturbance noise).

For this specification shielded cables have to be used.



Electrical information

Power supply requirements

Supply voltage	U_B [VDC]	18...32
Current consumption with max. stroke 50 Hz (A)		2.0 at 24 VDC
Current consumption in steady state [A]		0.1 at 24 VDC

Input signal

Analog (single ended types)

Voltage signal	U_E [V]	0...10
Input resistance	R_I [k Ω]	110
Current signal	I_E [mA]	(0) 4...20
Load resistance	[Ω]	500

Analog (differential types)

Voltage signal	U_E [V]	0...10
		-5...+5
Input resistance	R_I [k Ω]	110
max. Input voltage range	[V]	-10...40

Output signal

Spool position feedback (voltage)

Voltage signal slide position	U_A [V]	0...10 V = min....max. stroke
Max. output current	I_A [mA]	1

Spool position feedback (current)

Current signal slide position	I_A [mA]	0...20 mA = min....max. stroke
Current signal slide position	I_A [mA]	4...20 mA = min....max. stroke
Load resistance	R_L [Ω]	recommended 500

VP60**5/3 Proportional control valve**Directly operated spool valve with
μP-electronic position control

Order information

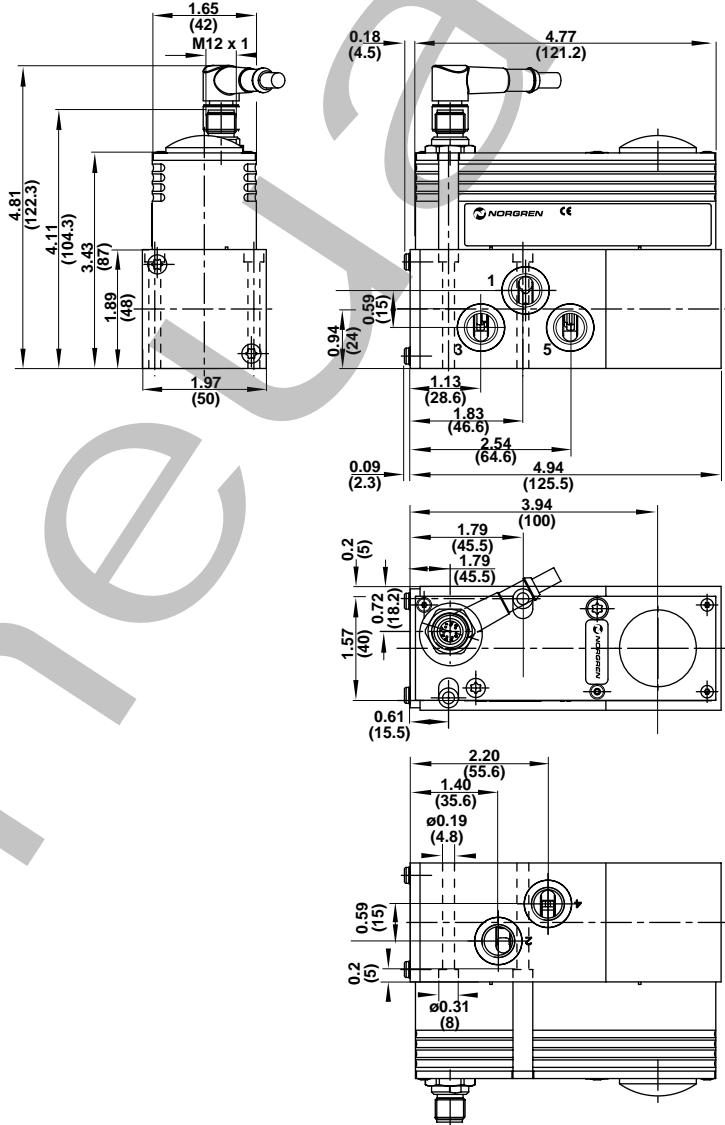
VP Proportional valve	60 Family code	xx Flow range	x Unit	x Port size	x Input signal*	x Feedback**	x Power supply	x Electrical connector	xxxx Certification/Options
VP	60	10 = 1000	L = liter/ min	J = G 1/4" K = G 1/4 NPT	1 = 0-10V 4 = 4-20 mA 6 = -5V to +5V 7 = 0-10V	6 = 0-10V and 4-20mA	1 = required	M = M12 x 1 8-pin	0000 = no options A100 = LCD display with buttons B200 = Serial interface (RS232)

*Input signal codes 6 and 7 are differential input versions.

** Both 0-10V and 4-20 mA feedback signals are available simultaneously.

Accessories

Description	Specification	Type
cordset	M12 x 1, 8-pin, 5m, straight	0250811
cordset	M12 x 1, 8-pin, 5m, 90° angle	0250813



Pressure sensing and control

VP10

Electronic Pressure Regulator

Reliable, rugged proportional I/P and E/P converters

Suitable for a wide range of applications

Excellent accuracy

High flow versions

NEMA4 environmental protection in normal operation

Technical data

Medium:

Oil free, dry air, filtered to 5 micron

Output pressure:

3-15 psig (0.2-1.0 bar), 3-30 psig (0.2-2.0 bar), 3-60 psig (0.2-4.0 bar),
2-120 psig (0.14-8 bar) three wire version

Flow capacity:

Up to 10 scfm (300 l/min)

Air consumption

<60 psig (<4 bar): 0.03 scfm (0.85 l/min) typical

>60 psig (>4 bar): 0.06 scfm (1.75 l/min) typical

Operating pressure:

At least 10 psig (0.7 bar) above maximum required output pressure

Connections:

NPT 1/4" or 1/4" ISO G available

Operating temperature:

-4° to 160°F (-20°C to 70°C)

Response time

<30 psig (<2 bar): less than 0.5 seconds for 10-90% step change

>30 psig (>2 bar): 2 seconds for 10-90% step change

Total error:

±0.5% of span (typical, independent error includes the combined effect of non-linearity, hysteresis, deadzone and repeatability)

Temperature effect:

Typically 0.1% of span/°F for span and zero over operating range

Supply sensitivity:

>0.025% span output change per % supply pressure change



Part Number	Pressure range and input signal options			Thread form*
	Control signal	Output pressure	Calibration	
VP1001PK100A00	0-10 V	3-15 psi (0.2-1 bar)	PSIG	1/4" NPT
VP1001PK400A00	4-20 mA	3-15 psi (0.2-1 bar)	PSIG	1/4" NPT
VP1002PK100A00	0-10 V	3-30 psi (0.2-2 bar)	PSIG	1/4" NPT
VP1002PK400A00	4-20 mA	3-30 psi (0.2-2 bar)	PSIG	1/4" NPT
VP1004PK100A00	0-10 V	3-60 psi (0.2-4 bar)	PSIG	1/4" NPT
VP1004PK400A00	4-20 mA	3-60 psi (0.2-4 bar)	PSIG	1/4" NPT
VP1006PK101A00	0-10 V	3-90 psi (0.2-6 bar)	PSIG	1/4" NPT
VP1006PK401A00	4-20 mA	3-90 psi (0.2-6 bar)	PSIG	1/4" NPT
VP1008PK101A00	0-10 V	3-120 psi (0.2-8 bar)	PSIG	1/4" NPT
VP1008PK401A00	4-20 mA	3-120 psi (0.2-8 bar)	PSIG	1/4" NPT

Electrical Information

Electromagnetic compatibility

This is a passive electromagnetic instrument and is unaffected by interfering high frequency signals

Electrical signal

Two wire version 4-20 mA or 0-10 V for 60< PSIG

Three wire version requires 12-24 V d.c. supply

Connections

30 mm square connector DIN 43650 provided, mountable

in four directions (alternative connections available)

* Replace PK w/BJ for calibration in Bar and 1/4 ISO G thread form.

Failure mode:

Signal falls to bleed pressure when electrical supply fails

Mounting:

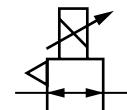
Integral surface mounting bracket provided for preferred vertical mounting. 50 mm pipe mounting kit available

Material of construction:

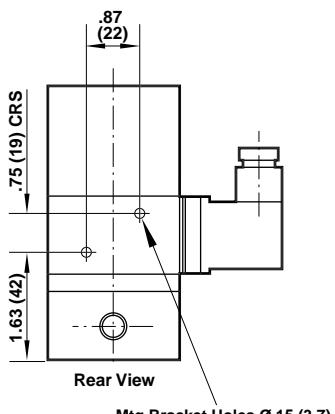
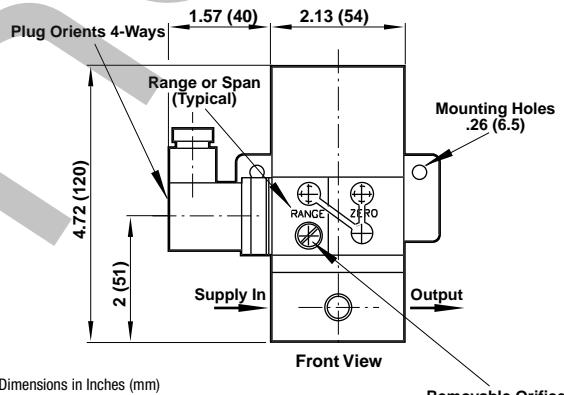
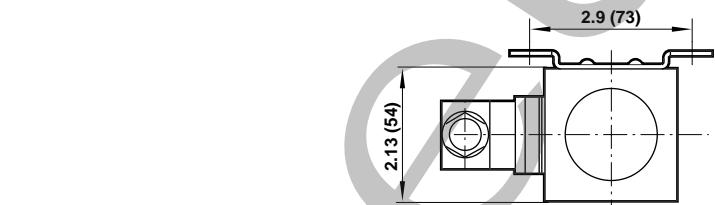
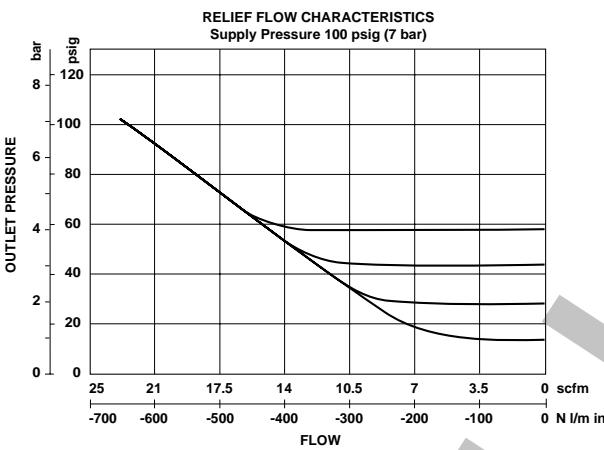
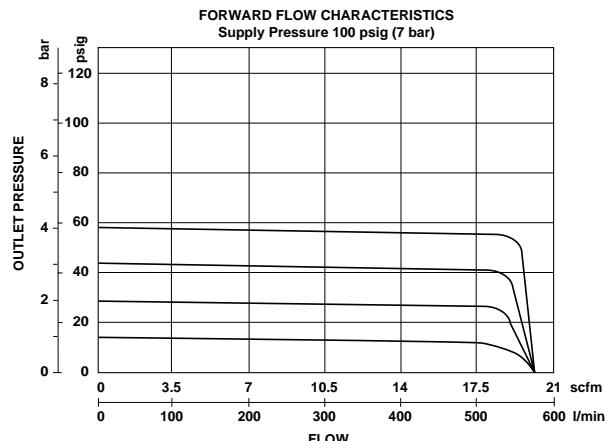
Zinc die-casting passivated and epoxy paint, nitrile diaphragms, stainless steel/nylon flapper nozzle and supply valve

Mass: 3.3 lbs (1500g) approx.

ISO Symbols



Typical Performance Characteristics



NC = Normally closed, NO = Normally open, APB = All ports blocked, COE = Center open exhaust, COP = Center open pressure
 **** Insert coil connector code from Connectors table.

For manual override options, substitute 'x' as follows: 1 = without manual override, 2 = locking, 3 = non-locking,

VP10

Electronic Pressure Regulator

Pressure sensing and control

VP50

Proportional Pressure Control Valve

Air piloted proportional pressure control valve

Fully user adjustable for a wide range of applications

High speed

Lower power consumption

High flow capacity

Optional manifold mount utilizes the ISO Size 2 subbase

Technical Data

Medium:

Compressed air, filtered to 40micron, non-lubricated

Operation:

Proportional, direct acting air piloted spool

Output Pressure:

See website

Supply Pressure:

200 psig (14 bar) max

Supply Sensitivity:

Better than 0.75% span output change per bar supply pressure change

Flow Capacity:

Up to 50 scfm (1400 NL/min)

Response Time:

< 80 mS (from 10-90% of output pressure into a 0.1 litre load)

Air Consumption:

< .177 scfm (5 l/min)

Port Size:

1/4" PTF (G1/4)

Total Error:

Max. error < ±1% of span (independent error includes the combined effect of non-linearity, hysteresis, deadzone and repeatability)

Operating Temperature:
23° to 120°F (-5° to 50°C)

Temperature Effect:

Typically better than 0.03% of span/°C for span and zero over operating range

Degree of protection:

NEMA 4 (IP65) in normal operation

Vibration Immunity:

< 3% output shift for 3g 10-2000Hz

Mounting Position:

Any screw mounting or manifold mount



Part Number*	Pressure Range and Input Signal Options Control Signal	Output Pressure in psig (bar)	Port Size
VP5010PK11H00	0-10V	0-145 (0-10)	1/4" PTF
VP5010PK411H00	4-20mA	0-145 (0-10)	1/4" PTF
VP5006PK11H00	0-10V	0-90 (0-6)	1/4" PTF
VP5006PK411H00	4-20mA	0-90 (0-6)	1/4" PTF
VP5002PK11H00	0-10V	0-30 (0-2)	1/4" PTF
VP5002PK411H00	4-20mA	0-30 (0-2)	1/4" PTF

* To specify regulator calibration in BAR use "B" in the 7th position For 1/4" ISO G ports use "J" in the 8th position.

To order the VP50 with interface for manifold mounting, indicate an "X" in the 8th position of the part number.

All units shipped with M12 five pin electrical connector

Electrical information

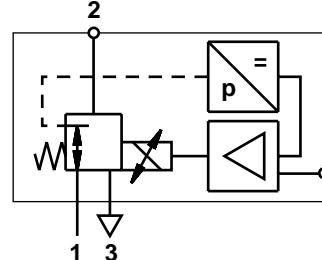
Electromagnetic Compatibility	CE marked: conforms to E.C. requirements EN 50081-2 (1994) and EN 50082-2 (1995)
Electrical Input Signal	4-20mA or 0-10V factory set
Electrical Power Input	24V dc ±25% (power consumption < 1W)
Output Pressure Feedback Signal	0-10V full range
Connections	DIN 43650 or Brad Harrison connection for feedback output

Material of Construction:

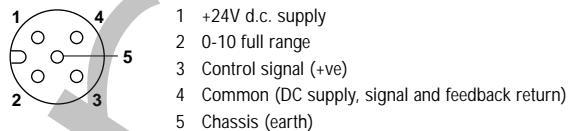
Aluminium body, zinc diecast lid and end cover

Weight: 1.76 lbs. (800g)
approx

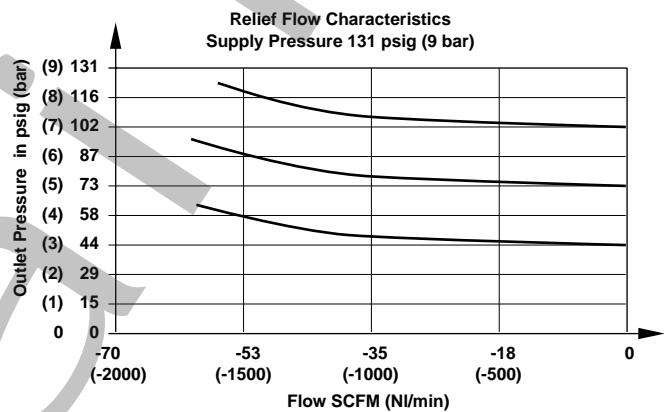
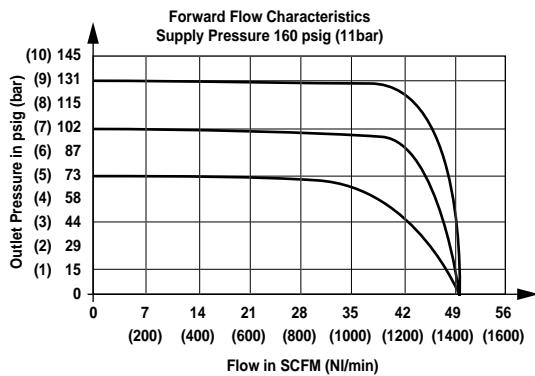
Symbol



Instrument pin configuration



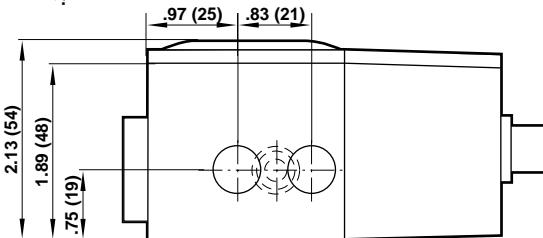
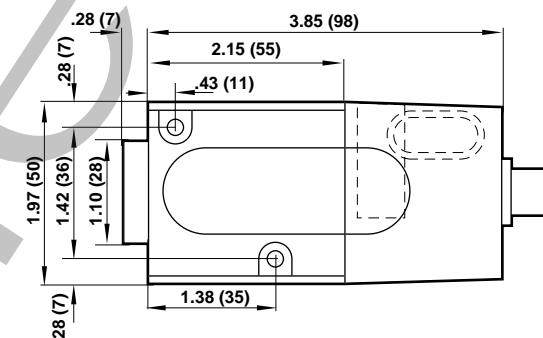
Characteristic Curves



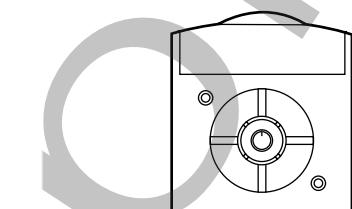
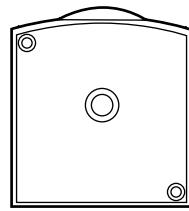
Accessories

Designation	Specification	Type
Connectors with cable	M12 x 1.5 pin; 16 ft (5m) 5 x 0.34 mm ²	0250081
	M12 x 1.5 pin; 30 ft (10 m) 5 x 0.34 mm ²	0250472
Manifold Mounting Kit	Interface plate, gasket, mounting screws	53ZZ5M00

NOTE: Refer to website to select an ISO 2 size base and accessories.



Dimensions in inches (mm)



Pressure sensing and control

VP51

Programmable proportional pressure control valve G1/4, 1/4 NPT

**Fully programmable with on-board
diagnostics**

Multi-option language display

**Password protection option at first
level functionality**

Instant LED warning functions

Application specific set-up

**Pressure output display; no gauge
necessary**

High speed response

**Optional manifold mount utilizes
the ISO Size 2 subbase**

Technical data

Medium

Compressed air filtered to 40 µm,
non-lubricated

Supply pressure

205 psig (14 bar) max.

Output pressure

0 - 145 psig (0 - 10)

Supply sensitivity

<= 50 mbar between 160 and 90
psig (11 and 6 bar) supply

Flow capacity

See chart

Response time

< 100 ms (from 10 to 90% of output
pressure into a 0,1 litre load)

Air consumption

< .177 scfm (5 l/min)

Total error

Maximum error ± 1.45 psig (100
mbar) of total span (independent error
includes the combined effect of non-
linearity, hysteresis, deadzone and
repeatability)

Ambient temperature

-4 to 122°F (-20° to 50°C)

Temperature effect

Typically .04 psig (3 mbar)/°C for full
scale and zero over operating range

Degree of protection

NEMA 4 in normal operation

Vibration immunity

<3% output shift for 3 g ~ 10 to 150
Hz

Weight

1.76 lbs (0.8 kg)

Mounting position

Any screw mounting or ISO 2 subbase
manifold mount

Materials

Body: aluminum

Lid and end cover: zinc diecast



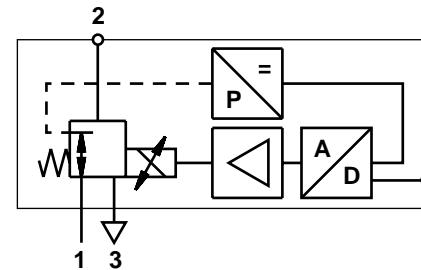
General information

Control signal	Output pressure range psig (bar)	Model	Connection	Output units
0-10 V	0 to 145 (10)	VP5110PK111H00	1/4 NPT	psig
4-20 mA	0 to 145 (10)	VP5110PK411H00	1/4 NPT	psig
0-10 V	0 to 145 (10)	VP5110BJ111H00	ISO G 1/4 bar	bar
4-20 mA	0 to 145 (10)	VP5110BJ411H00	ISO G 1/4 bar	bar

*To order the VP50 with interface for manifold mounting, indicate "X" in the 8th position of the part number.

All units shipped with M12 five pin electrical connectors with interface for manifold mounting.

Symbol



Electromagnetic compatibility

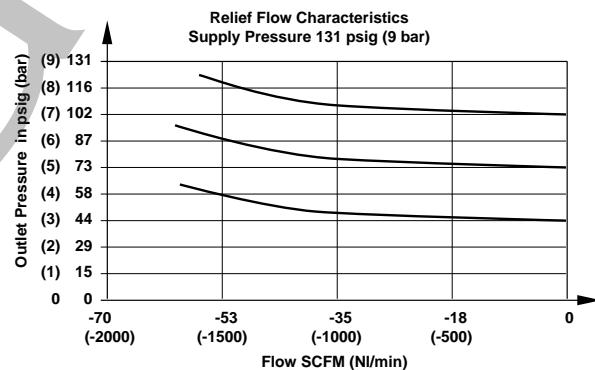
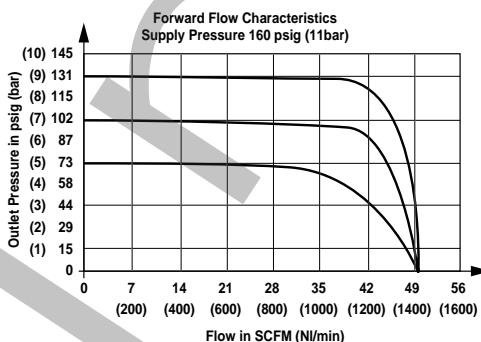
The valve conforms to the EC requirements EN50081-2 (emission) and EN50082-2 (disturbance noise). For this specification shielded cables have to be used

User functionality options

Password protection

Display set-up	Display language
	Pressure units
	Offline set-up
	Online set-up
Speed set-up	0 fastest to 7 slowest
Monitor set-up	Analogue 0 ... 10 V
Monitor output	Hi = P2 > x psi
	Hi = P2 OK
Local control	Manual control
	Max./min. ramp
	Max./min. stairs
Device database	Read only data: unit specific
	Tag number
	Help display
Factory defaults	Restore factory defaults

Characteristic curves



Electrical information

Electromagnetic compatibility

CE marked: conforms to EC requirements EN 50081-2 (1994) and EN 50082-2 (1995)

Electrical input signal

4 ... 20 mA or 0 ... 10 V factory set

Electrical power input

24 V d.c. ±25% (power consumption < 1 W)

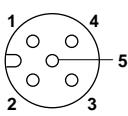
Output pressure feedback signal

0 ... 10 V full range. User configurable

Connections

Plug connector, 5 pin, M12, female PL500 01

Instrument pin configuration



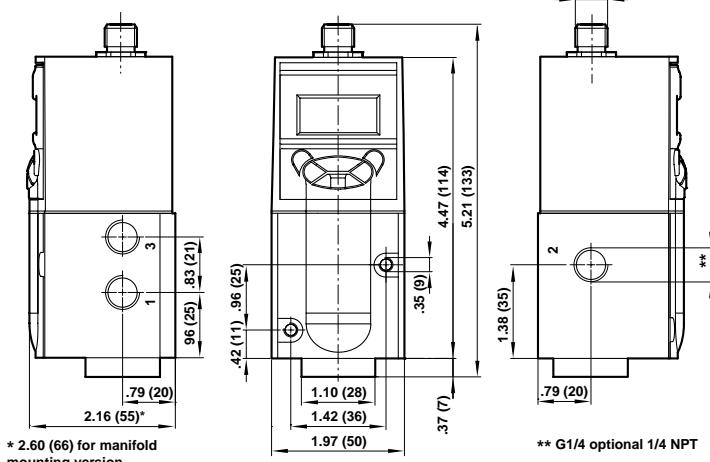
Pin	Designation	Color*
1	+24V d.c. supply	brown/red
2	1 v/bar monitor output	white
3	Control signal (+ve)	blue
4	Common (d.c. supply, signal and feedback return)	black
5	Chassis (earth)	grey/green/yellow

Accessories

Designation	Specification	Type
Connectors with cable	M12 x 1.5 pin; 16 ft (5m) 5 x 0.34 mm ²	0250081
	M12 x 1.5 pin; 30 ft (10 m) 5 x 0.34 mm ²	0250472
*Manifold Mounting Kit	Interface plate, gasket, mounting screws	53ZZ5M00

For ISO 2 Manifold see website

General dimensions



Pressure sensing and control

R-27 Series

Manostat Precision

Air Pressure Regulators

High precision pressure regulators

Suitable for dead end or flow applications

Excellent long term stability

Handwheel, lever, plunger or pilot operated

Technical Data

Medium:

Dry, oil free air filter to 25 microns

Operation:

Two stage servo mechanized regulator with integral precision measuring capsule

Mounting:

Any position. Panel mounting or through mounting holes on the unit (lever, plunger and pilot versions)

Port sizes:

G 1/4

Output pressure ranges:

See individual details

Supply pressure:

Minimum at least 2.9 psig (0.2 bar) above output pressure.

Maximum 145 psig (10 bar)

Flow capacity:

Up to 10.6 scfm (300 l/m)

Hysteresis and repeatability:

Less than 0.005% setting at midrange

Sensitivity:

Better than 0.3 mbar

Air consumption:

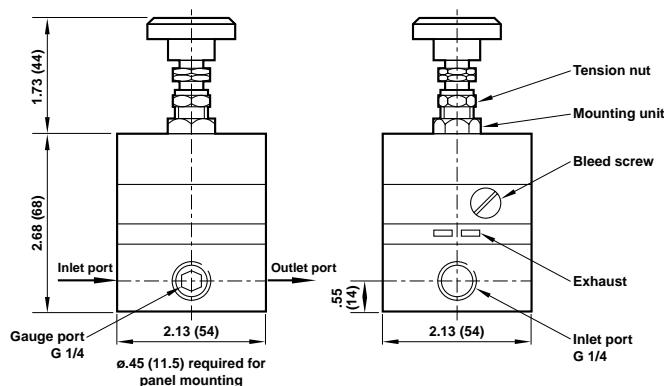
See individual details



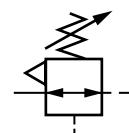
Ordering Information

Description	Model	Control Type	Output Pressure Range psig (bar)	Air Consumption scfm (l/m)	Weight lbs (kg)
Standard regulator	53-1002-00R	Handwheel 2.5-3 turns	2-25 (.14-2)	.01 (.3)	1.59 (.72)
Standard regulator	53-1003-00R	Handwheel 2.5-3 turns	2-60 (.14-4)	.02 (.6)	1.59 (.72)
Standard regulator	53-1004-00R	Handwheel 2.5-3 turns	2-120 (.14-8)	.04 (1.2)	1.59 (.72)
Lever operated regulator	53-1802-00R	Lever control 125° Rotation	2-25 (.14-2)	.01 (.3)	1.59 (.72)
Lever operated regulator	53-1803-00R	Lever control 125° Rotation	2-60 (.14-4)	.02 (.6)	1.59 (.72)
Lever operated regulator	53-1804-00R	Lever control 125° Rotation	2-120 (.14-8)	.04 (1.2)	1.59 (.72)
Plunger operated regulator	53-1404-00R	Plunger travel .065 (1.65)	2-60 (.14-4)	.02 (.6)	1.59 (.72)
Plunger operated regulator	53-1604-00R	Plunger travel .065 (1.65)	2-120 (.14-8)	.04 (1.2)	1.59 (.72)
Pilot operated relay	53-1904-00R	Pilot pressure signal	2-120 (.14-8)	.04 (1.2)	1.59 (.72)
Pilot operated relay	53-2204-00R	Pilot pressure signal with manual bias	2-120 (.14-8) Handwheel controlled bias bias of up to 30 (2)	.04 (1.2)	1.59 (.72)

Handwheel Operated

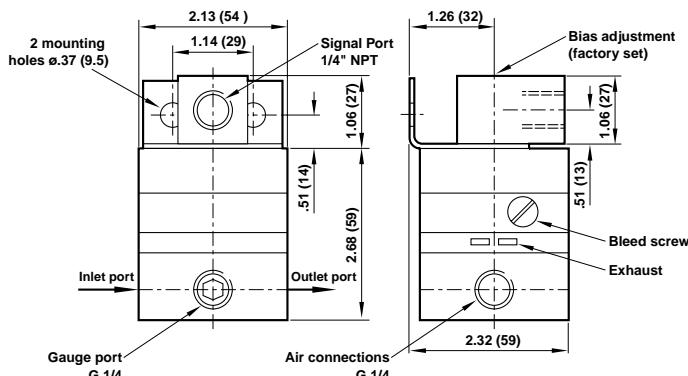


ISO Symbols

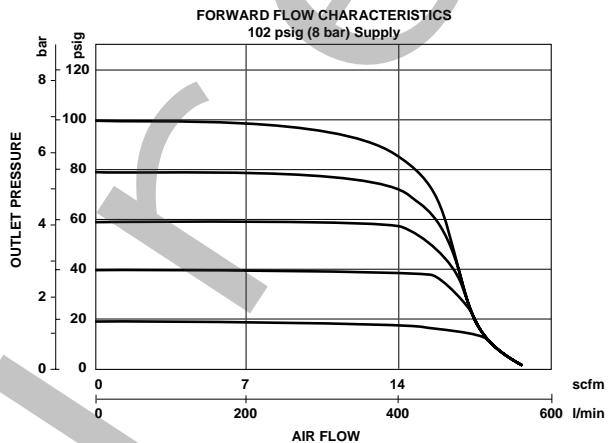


All Dimensions in Inches (mm)

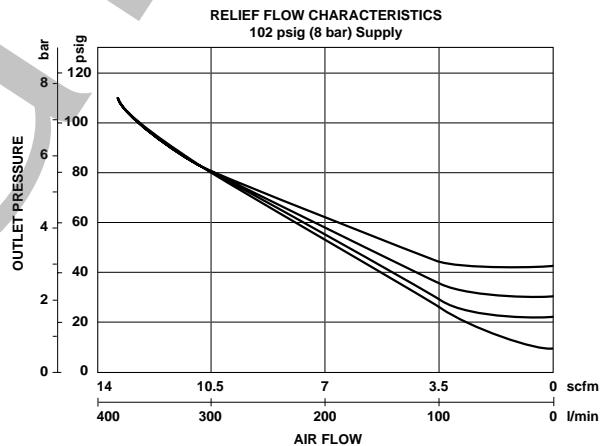
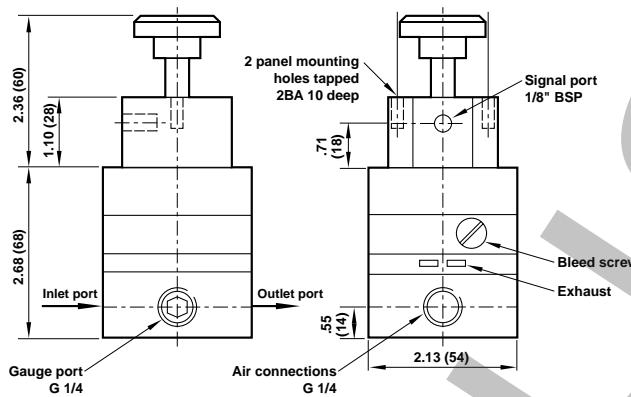
Pilot Operated



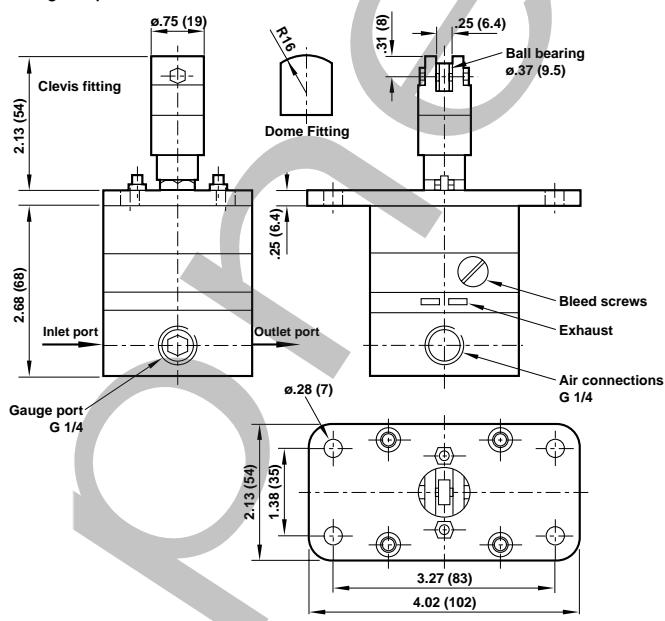
Typical Performance Characteristics



Pilot Operated with Bias



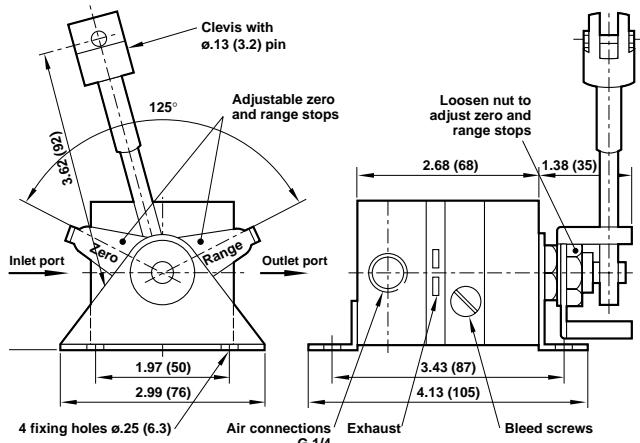
Plunger Operated



Diaphragm Repair Kits

Type	Part number
Units up to 25 psig	53-1000-95R
Units up to 60 psig	53-1000-99R
Units up to 120 psig	53-1000-98R
Tamperproof Nut	53-1000-97R
Wall Mounting Bracket	53-ABR-00700

Lever Operated



Pressure sensing and control

Additional Valve Products

P/I & P/E

Transmitters and converter types 68 and 69

These instruments convert pneumatic pressures into electrical signals for use with data loggers, computers and microprocessors

Type 68 is a two-wire pressure/current device

Type 69 a three-wire pressure/voltage type

Both use only non-critical power supplies

and can be supplied weatherproof to IP65



Type 421

Compact failsafe rail mount I/P converter

A rugged, electronic I/P converter designed for high density rail or manifold mounting, at a spacing of only 1" (25mm)

Advanced electronic control using surface mount electronics and a precision pressure transducer and offers excellent performance characteristics

Employs a high sensitivity microminiature Reedex valve for pressure control

Great reliability, long life, freedom from vibration effects, and are significantly less prone to mechanical derangement than older conventional designs

Can be mounted on DIN rail, surface mounted, or mounted onto a high density manifold



Type 422

Failfreeze Electronic Converter

A major advance in I/P converter design, offering failfreeze in addition to conventional I/P features

Advanced electronic control and a precision pressure transducer to achieve outstanding performance

Intended for field application in which rugged construction, vibration immunity, weatherproofing and reliability are essential, together with the enhanced system safety gained from its failfreeze characteristic

Two wire operation from a 4-20mA control signal with output pressures up to 120 psig (8 bar) as standard



Type 423

Failsafe Electronic I/P Converter

For field mount process control applications

State-of-art electronics, precision internal pressure measurement, digital pressure control and excellent environmental and vibration characteristics

Rugged high sensitivity Reedex Valve for pressure control

Extreme reliability, freedom from vibration effect and long life, together with very low air consumption and hysteresis.

Allows an output capacity of up to 10 scfm, so that no volume booster is necessary for high flow applications such as large valves

**Type 425**

Electronic I/P Converter

For service in demanding industrial and process control applications, normally used to accurately convert a loop control current of 4-20mA to 3-15 psig (0.2-1 bar) pneumatic signal to operate a control valve actuator

Uses the proven Reedex® microminiature solenoid valve avoiding the use of sensitive flapper nozzle electromechanical components.

Provides solid state closed loop control ensuring long term accuracy

For use in adverse environmental conditions giving optimum performance and low cost of ownership



pneu