

INSTALLATION & MAINTENANCE

DESCRIPTION / IDENTIFICATION

The GP series control valve is an electronic pressure regulator designed to precisely control the pressure of gaseous media proportional to an electronic signal.

The GP1 operates using two normally closed solenoid valves, a pressure sensor, and a control circuit. One valve is actuated to allow unregulated supply media into the system. The second valve is actuated to allow working media to vent to atmosphere. The pressure sensor provides feedback to the control circuit. The control circuit compares the pressure sensor feedback to the user supplied electronic command signal and actuates the appropriate valve until the two signals match.

The GP series can be teamed with a variety of one-to-one ratio high pressure volume boosters for even greater flow. When using a volume booster, the GP2 can be used to achieve accuracy similar to the GP1 alone with higher flow capacity.

GP series product comes with a monitor output signal. This output is an electrical signal originating from the internal sensor used in the control circuit of the GP1 valve. On GP2 units this signal originates from the external transducer. This allows the system parameters to be monitored and provides a signal for data acquisition needs. This signal can be configured to either 0-10Vdc or 4-20mA sourcing.

The GP2 is similar to the GP1 but uses a double loop control scheme. In addition to the internal pressure transducer, the GP2 also receives a 0-10Vdc feedback signal from an external sensing device. The external signal functions as the primary feedback and is compared to the command signal. A difference between the two comparisons causes one of the two solenoid valves to open allowing flow in or out of the system.

A Proportion-Air DSY or DSTY will work as a second loop feedback to the GP2 (See ordering information).

The GP series has several other beneficial features. An on board split power supply allows true zero for command and monitor even though the GP is powered by a conventional single ended power supply. The GP utilizes advanced on board power management hardware to minimize current draw and heat build up. The GP also features status indicating LEDs for power and TTL. The TTL signal is a conditional on/off signal to use for diagnostic purposes. This signal is LOW when the pressure is within 1% of final setting.



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SPECIFICATIONS

ELECTRICAL

SUPPLY VOLTAGE	15-24 VDC
COMMAND SIGNAL	0-10 VDC 4-20 mA Differential
COMMAND SIGNAL IMPEDANCE	VDC=10 KΩ Current=100 Ω
ANALOGUE MONITOR SIGNAL	
VOLTAGE	0-10 VDC @ 10 mA max
CURRENT	4-20 mA Sourcing (only)

MECHANICAL

PRESSURE RANGES†	Vacuum - 1,000 psig (760 mmHg (Vac) - 69 Bar)
OUTPUT PRESSURE	0-100% of range
MAX FLOW RATE	See Flow Values on page 4
Min CLOSED END VOLUME	3 in ³
PORT SIZE	1/8" NPT
FILTRATION RECOMMENDED	20 Micron (included)
RESOLUTION	<±0.15% F.S.
REPEATABILITY	<±0.20% F.S.
ACCURACY	<±0.25% F.S.
HYSTERESIS	<±0.20% F.S.

WETTED PARTS ‡

ELASTOMERS	Fluorocarbon
MANIFOLD	Nickel Plated Aluminum
VALVES	Stainless Steel
PRESSURE TRANSDUCER	Stainless Steel

PHYSICAL

OPERATING TEMPERATURE	32-158°F (0-70°C)
GP WEIGHT	3.8 lbs. (1.72 Kg)
PROTECTION RATING	IP 65
HOUSING	Aluminum
FINISH	Anodized Aluminum

† Pressure ranges are customer specified. Output pressures other than 100% are available. ‡ Others available

Theoretical Flow Values				
Valve	Orifice	Approx. Cv	Max Press	Peak Flow
1	0.012"	0.004	1100 psi	1.5 SCFM
2	0.025"	0.018	1100 psi	10 SCFM
3	0.040"	0.045	600 psi	26.4 SCFM

GP CONNECTION PROCEDURE

Pneumatic Connections:

1. A typical 20 micron (minimum 40 micron) in-line filter is recommended on the inlet of the GP.
2. Connect supply pressure to the "I" inlet port (figure 1) not to exceed rated supply pressure. (Table 1)
3. Connect one of the "O" outlet port (figure 2 & 3) to the device being controlled and plug the unused one.
4. Proceed with electrical connection.

**TABLE 1
RATED PRESSURE FOR GP VALVES**

MAX calibrated pressure of:	Max inlet pressure is:
Vacuum up to 15 psig (Vac. to 1.03 bar)	30 psig (2.07 bar)
16 up to 30 psig (1.1 to 2.07 bar)	60 psig (4.14 bar)
31 up to 50 psig (2.14 to 2.45 bar)	100 psig (6.89 bar)
51 up to 100 psig (3.52 to 6.89 bar)	200 psig (13.79 bar)
101 up to 250 psig (6.96 to 17.24 bar)	500 psig (34.47 bar)
251 up to 500 psig (17.31 to 34.47 bar)	600 psig (41.37 bar)
501 up to 1000 psig (34.54 to 68.95 bar)	1100 psig (75.84 bar)

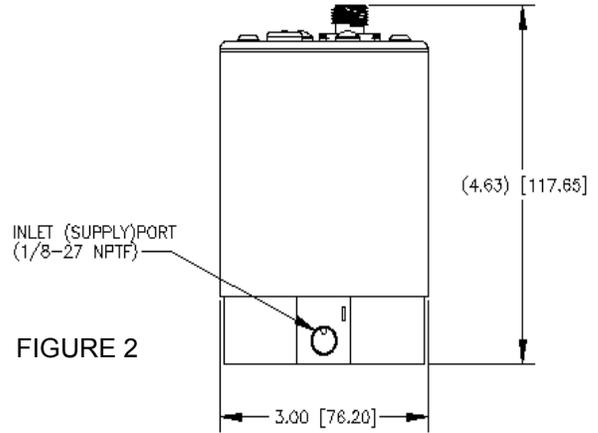


FIGURE 2

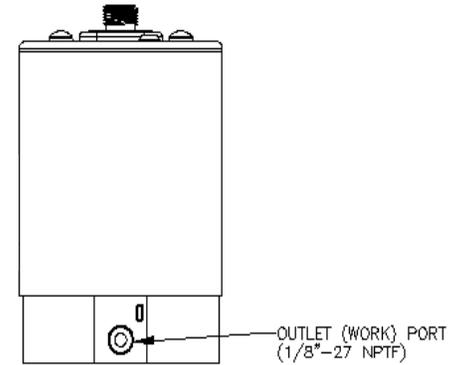


FIGURE 3

Electrical connections:

1. Ensure all power is off before making any electrical connections.
2. Figure 2 shows the location of the GP electrical connector and figure 3 shows the connector. Table 2 identifies the color codes

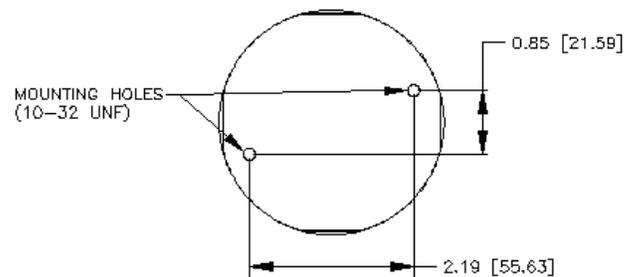
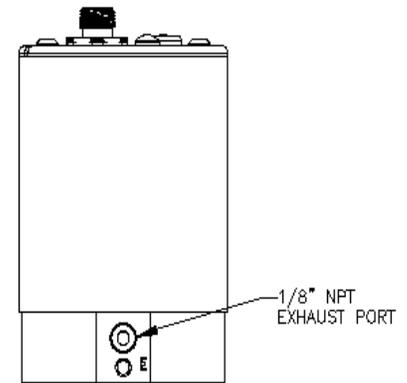
Note: Both current and voltage command units require that both the command (+) and command (-) pins be connected.

3. See figure 4 and 5 for second loop connections.

TABLE 2

WIRE COLOR*	FUNCTION
WHITE	COMMAND (+)
RED	ANALOG OUTPUT
GREEN	DC COMMON
ORANGE	TTL OUT
BLACK	15-24 VDC POWER
BLUE	COMMAND (-)

* H6DC6 POWER CORD COLORS



GP2 SECOND LOOP CONNECTIONS:

For GP2 valves to work properly a 0-10Vdc second loop input source must be connected to the GP2.

1. Make electrical connections according to the section titled "Voltage command valves" for a voltage command unit or "Current command valves" for a current command unit
2. If Proportion-Air DS series transducer is used as the external feedback source, attach it to the auxiliary receptacle on the GP2 unit. (Figure 4)
3. If another source of transducer is used, H23 cable must be ordered to facilitate connection of that source to the GP2. (Figure 5)

Note: Power & common connections on the 2nd loop receptacle are fed through from the main connector and are provided to facilitate wiring of the 2nd loop sensor.

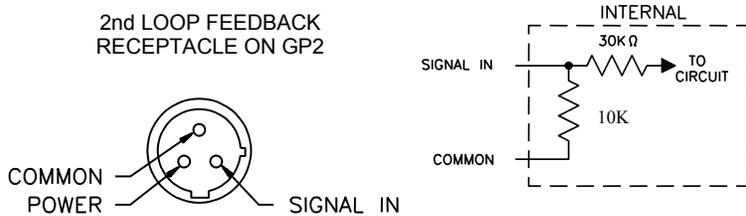


Figure 4

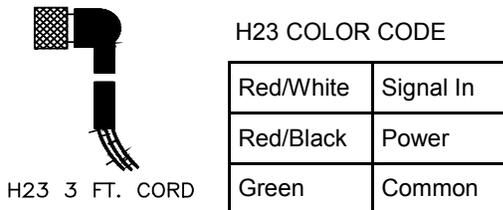


Figure 5

RE-CALIBRATION PROCEDURE

All GP valves come pre-calibrated from the factory using precision calibration equipment. If the GP valve needs re-calibration, use the procedure described below:

GP1 VALVES:

1. Wire servo according to the section titled "Electrical Connections."
2. Connect a precision measuring gage or pressure transducer to the unplugged outlet port of the GP.

NOTE: There must be a closed volume of at least **3 cu.in.** (49cc) between the valve outlet and the measuring device for the valve to be stable.

3. Provide supply pressure to the inlet port of the GP. (See figure 1). Make sure supply pressure does not exceed the rating for the valve. (see table 1)

4. Locate the calibration access cap on top of the GP valve and locate the ZERO and SPAN adjustment potentiometers (figure 6).

NOTE: Only use this step if your device is totally out of calibration. If it is slightly out of calibration, omit this step and move on to paragraph 7. Using a small screwdriver, turn both potentiometers 15 turns clockwise. Then turn them 7 turns counter clockwise. This will put the GP roughly at mid scale.

5. With a digital voltmeter connected to the monitor line, adjust the ZERO potentiometer until 0% monitor signal is achieved (0.0 VDC for E monitor, 4.0 mA for S monitor).
6. Set the electrical command input to 10 percent of full value (1Vdc for 0-10Vdc unit or 5.6mA for 4-20mA unit).

NOTE: If at any time during the calibration procedure the servo oscillates or becomes unstable for more than one second, turn the hysteresis potentiometer "HW" (see figure 12 for location) clockwise until the oscillation stops, then turn it one more complete turn (same direction).

7. Set the command signal to 100% (10 VDC for E command, 20 mA for I command).
8. Adjust the SPAN potentiometer until 100% pressure output is achieved (CW increases pressure).
9. Set the command signal to 10% (1 VDC for E command, 5.6 mA for I command).
10. Adjust the ZERO potentiometer until 10% pressure output is achieved (CW increases pressure).
11. Repeat steps 7-10 until no further adjustment is required.

GP2 VALVES:

This calibration procedure assumes there is a properly scaled and calibrated transducer for use as 2nd loop feedback signal. (The GP series accepts a 0-10Vdc 2nd loop signal.)

Follow, in order, steps 1-11 as noted in the section titled GP1 VALVES. Make sure the 2nd loop is connected before you start the calibration.

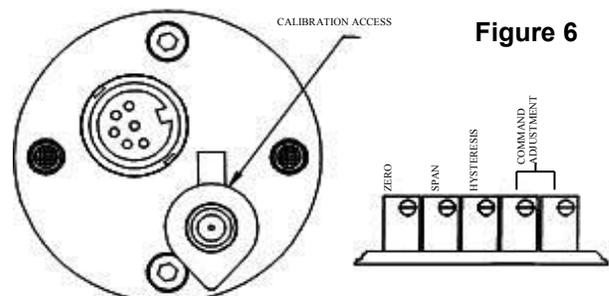


Figure 6

GP	2	S	N	I	S	Z	P	69	BR	G	1	3D	TF
1	2	3	4	5	6	7	8	9	10	11	12	OPTIONS	

ACCURACY	±0.25% F.S.	PRESSURE	Full Vac to 1000 PSIG (69 Bar)
PORT SIZE	1/8"	MAX FLOW	10 SCFM (283 SLPM)

Section Reference

1	Type	2	Manifold Material
1	Single Loop	B	Brass (standard)
2	Dual Loop	S	Stainless Steel

3	Thread Type
N	NPT
P	BSPP

4	Input Signal Range	5	Output Signal Range
E	0 to 10 VDC	X	No Monitor
I	4 to 20 mA DC	E	0 to 10 VDC
K	0 to 5 VDC	K	0 to 5 VDC*
V	1 to 5 VDC*	V	1 to 5 VDC* [†]
*Requires V for Monitor Signal (#5)		*Requires E, I or K for Input Signal Range (#4)	
		* [†] Requires V for Input Signal Range (#4)	

6	Zero Offset
N	0% Pressure is Below Zero
P	0% Pressure is Above Zero
Z	0% Pressure is Zero (Typical)

7	Zero Offset Pressure
Typical is 0* - If greater than 30% of full scale pressure (#9 below), please consult factory.	
*If Z for Zero Offset, Please Leave this Section (#7) Blank	

8	Full Scale Pressure Type
N	100% Pressure is Below Zero
P	100% Pressure is Above Zero
Z	100% Pressure is Zero

9	Full Scale Pressure
Must be less than or equal to 1,000 psig	

10	Pressure Unit (no additional fee - all)		
PS	PSI	Inches Hg	IH
MB	Millibars	Inches H ₂ O	IW
BR	Bar	Millimeters H ₂ O	MW
KP	Kilo-pascal	Kilograms/cm ²	KG
MP	Mega-pascal	Torr (Requires A for Unit of Measure #11)	TR
MH	Millimeters Hg	Centimeters H ₂ O	CW
PA	Pascal		

11	Pressure Unit of Measure
A	Absolute Pressure
G	Gauge Pressure

12	Valve Size
1	0.012"
2	1/32" (0.031")
3	3/64" (0.047")

Safety Precautions



Please read all of the following Safety Precautions before installing or operating any Proportion-Air, Inc. equipment or accessories. To confirm safety, be sure to observe 'ISO 4414: Pneumatic Fluid Power - General rules relating to systems' and other safety practices.

Warning

Improper operation could result in serious injury to persons or loss of life!

- PRODUCT COMPATIBILITY**
Proportion-Air, Inc. products and accessories are for use in industrial pneumatic applications with compressed air media. The compatibility of the equipment is the responsibility of the end user. Product performance and safety are the responsibility of the person who determined the compatibility of the system. Also, this person is responsible for continuously reviewing the suitability of the products specified for the system, referencing the latest catalog, installation manual, Safety Precautions and all materials related to the product.
- EMERGENCY SHUTOFF**
Proportion-Air, Inc. products cannot be used as an emergency shutoff. A redundant safety system should be installed in the system to prevent serious injury or loss of life.
- EXPLOSIVE ATMOSPHERES**
Products and equipment should not be used where harmful, corrosive or explosive materials or gases are present. Unless certified, Proportion-Air, Inc. products cannot be used with flammable gases or in hazardous environments.
- AIR QUALITY**
Clean, dry air is not required for Proportion-Air, Inc. products. However, a 40 micron particulate filter is recommended to prevent solid contamination from entering the product.
- TEMPERATURE**
Products should be used with a media and ambient environment inside of the specified temperature range of 32°F to 158°F. Consult factory for expanded temperature ranges.
- OPERATION**
Only trained and certified personnel should operate electronic and pneumatic machinery and equipment. Electronics and pneumatics are very dangerous when handled incorrectly. All industry standard safety guidelines should be observed.
- SERVICE AND MAINTENANCE**
Service and maintenance of machinery and equipment should only be handled by trained and experienced operators. Inspection should only be performed after safety has been confirmed. Ensure all supply pressure has been exhausted and residual energy (compressed gas, springs, gravity, etc.) has been released in the entire system prior to removing equipment for service or maintenance.

Caution

Improper operation could result in serious injury to persons or damages to equipment!

- PNEUMATIC CONNECTION**
All pipes, pneumatic hose and tubing should be free of all contamination, debris and chips prior to installation. Flush pipes with compressed air to remove any loose particles.
- THREAD SEALANT**
To prevent product contamination, thread tape is not recommended. Instead, a non-migrating thread sealant is recommended for installation. Apply sealant a couple threads from the end of the pipe thread to prevent contamination.
- ELECTRICAL CONNECTION**
To prevent electronic damage, all electrical specifications should be reviewed and all electrical connections should be verified prior to operation.

Exemption from Liability

- Proportion-Air, Inc. is exempted from any damages resulting from any operations not contained within the catalogs and/or instruction manuals and operations outside the range of its product specifications.
- Proportion-Air, Inc. is exempted from any damage or loss whatsoever caused by malfunctions of its products when combined with other devices or software.
- Proportion-Air, Inc. and its employees shall be exempted from any damage or loss resulting from earthquakes, fire, third person actions, accidents, intentional or unintentional operator error, product misapplication or irregular operating conditions.
- Proportion-Air, Inc. and its employees shall be exempted from any damage or loss, either direct or indirect, including consequential damage or loss, claims, proceedings, demands, costs, expenses, judgments, awards, loss of profits or loss of chance and any other liability whatsoever including legal expenses and costs, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.

Warranty

Proportion-Air, Inc. products are warranted to the original purchaser only against defects in material or workmanship for one (1) year from the date of manufacture. The extent of Proportion-Air's liability under this warranty is limited to repair or replacement of the defective unit at Proportion-Air's option. Proportion-Air shall have no liability under this warranty where improper installation or filtration occurred.