Flow Control

CLOSED LOOP

- “Real time” flow control
- Ideal for use in active flow control
- Differential pressure technology
- Pressure compensated models available
- Flow ranges as low as 2-20 SCFH
- Flow ranges as high as 25-250 SCFM
PROPORTION-AIR’S “REAL TIME” FLOW CONTROL

Proportion-Air, Inc. F-Series flow monitors are the heart of Proportion-Air’s new “Real Time” flow control system.

Proportion-Air’s electro-pneumatic controls, which have been a staple of the industry for over 20 years, can be electronically reconfigured to accept feedback from our F-Series flow monitors. This combination of components provides a complete flow control package for flow ranges as low as 2-20 SCFH (0.016-0.16 L/SEC) to 250 SCFM (118 L/SEC). Because the feedback is “Real Time”, the result are a series of flow controllers that respond instantly to change in command or system fluctuations. This fast response allows manufacturers and machine builders to use flow control in applications using high cycle rates “Real Time” response can even allow for increased cycle rates thus higher productivity.

¹ For complete functional description on the F-Series flow monitor, refer to page 8 & 9 of this brochure.
² Typically < 10ms.

CLOSED LOOP FLOW CONTROL ASSEMBLIES

Three different assemblies of Proportion-Air, Inc. closed loop flow control are available for a variety of different applications: F-Series-FQPV, F-Series-FQB3, and F-Series-FQB2/PSR.

F-Series & FQPV Assembly
F-Series flow monitor coupled with an FQPV, ultra high resolution control valve, to produce a closed loop flow control that is capable of controlling from as high as 60 SCFH (0.47 L/SEC).

F-Series & FQB3 Assembly
F-Series flow monitor coupled to an FQB3, high flow control valve, to produce a closed loop flow control that is capable of controlling flow as high as 25 SCFM (11.8 L/SEC).

F-Series & FQB2/PSR Assembly
F-Series flow monitor coupled to an FQB2 assembled to a PSR, air piloted regulator. The use of the PSR, allows control as high as 250 SCFM (118 L/SEC) and port sizes from 1/4” to 1-1/2” NPT.

Contact one of our “Factory Trained” Distributors or call our Application Specialist for assistance with specifying the components which are exactly suited to your application.

Closed loop electro-pneumatic controls are our only business.
Our competitors are making thousands of products one way,
We manufacture one product thousands of ways.
TYPICAL APPLICATIONS

SPEED CONTROL

QB2 control valve receives feedback from an F-Series flow monitor. By controlling the flow out of the extending cylinder, cylinder speed is controlled.

SPRAYING & COATING

QB2 and F-Series combination rapidly tracks requested flow rates, allowing immediate corrections, on-the-fly changes and spray pattern profiles.
# Flow Assembly General Specifications & Performance Characteristics

## Electrical

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Requirements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Current</td>
<td>15VDC</td>
<td>-</td>
<td>24VDC</td>
</tr>
<tr>
<td>Voltage</td>
<td>1VDC</td>
<td>-</td>
<td>60mA</td>
</tr>
<tr>
<td>Current</td>
<td>5.6mADC</td>
<td>-</td>
<td>80mA</td>
</tr>
<tr>
<td>Analogue Output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>1VDC</td>
<td>-</td>
<td>10VDC</td>
</tr>
<tr>
<td>Sinking Current</td>
<td>5.6mA</td>
<td>-</td>
<td>20mA</td>
</tr>
<tr>
<td>Sourcing Current</td>
<td>5.6mA</td>
<td>-</td>
<td>20mA</td>
</tr>
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</table>

## Mechanical

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Inlet Pressure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibrated Flow Range</td>
<td>-</td>
<td>165 PSIA (11.37 BARA)</td>
<td>-</td>
</tr>
<tr>
<td>FQPV / F-Series</td>
<td>25 SCFH (0.2 L/SEC)</td>
<td>-</td>
<td>1 SCFM (0.47 L/SEC)</td>
</tr>
<tr>
<td>FQB3 / F-Series</td>
<td>1 SCFM (0.47 L/SEC)</td>
<td>-</td>
<td>25 SCFM (11.80 L/SEC)</td>
</tr>
<tr>
<td>QB2-PSR / F-Series</td>
<td>25 SCFM (11.80 L/SEC)</td>
<td>-</td>
<td>250 SCFM (11.8 L/SEC)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>-</td>
<td>+/- 4% F.S.</td>
<td>-</td>
</tr>
<tr>
<td>Repeatability</td>
<td>-</td>
<td>+/- 0.25% F.S.</td>
<td>-</td>
</tr>
<tr>
<td>Response Time</td>
<td>-</td>
<td>&lt; 10 ms</td>
<td>-</td>
</tr>
<tr>
<td>Shock Rating</td>
<td>-</td>
<td>25 G’s</td>
<td>-</td>
</tr>
<tr>
<td>Turndown Ratio</td>
<td>-</td>
<td>10 to 1¹</td>
<td>-</td>
</tr>
<tr>
<td>End Connections (Port Size)</td>
<td>-</td>
<td>1/4”, 3/8”, 1/2”, 3/4”, 1”, 1-1/4”, 1-1/2” NPT or BSPP</td>
<td>-</td>
</tr>
</tbody>
</table>

¹ Turndown ratio of 10:1 allows accuracy of 10 to 100% of flow range. Zero point is at zero flow.

## Physical

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Media Working Temperature Ambient Temperature</strong></td>
<td>32°F (0°C)</td>
<td>-</td>
<td>122°F (50°C)</td>
</tr>
<tr>
<td>32°F (0°C)</td>
<td>-</td>
<td>-</td>
<td>158°F (70°C)</td>
</tr>
<tr>
<td>Temperature Sensitivity</td>
<td>-</td>
<td>0.25% / °C Relative to reference conditions of 21°C</td>
<td>-</td>
</tr>
<tr>
<td>Weight</td>
<td>FQPV / F-Series</td>
<td>-</td>
<td>1.3 LBS (0.59 KG)</td>
</tr>
<tr>
<td>FQB3 / F-Series</td>
<td>-</td>
<td>1.7 LBS (0.77 KG)</td>
<td>-</td>
</tr>
<tr>
<td>QB-PSR / F-Series</td>
<td>-</td>
<td>Varies by port size</td>
<td>IP65</td>
</tr>
<tr>
<td>Actuator Housing Rating</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
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## Materials

<table>
<thead>
<tr>
<th></th>
<th>F-Series</th>
<th>FQPV</th>
<th>FQB3</th>
<th>QB2-PSR</th>
</tr>
</thead>
</table>
DIMENSIONS FQPV & F-SERIES
DIMENSIONS ARE FOR REFERENCE USE ONLY. DIMENSIONS ARE IN INCHES

FQPV ORDERING INFORMATION

FQPV2  T  F  E  E  100  G  X  / F-SERIES
SERIES  MONITOR  COMMAND  MONITOR  INLET  EXHAUST  ASSEMBLE
CONTAINER  INPUT  SIGNAL  VALVE  ORIFICE  VALVE

T = IMPACT ALUM.
E = 0-10 VDC
I = 4-20mA
E = 0-10VDC
C = 4-20mA Sinking
S = 4-20mA Sourcing

MAXIMUM CALIBRATED RANGE
0-150 psi*

EXAMPLE
A = 0.013”
B = 0.025”
C = 0.040”
D = 0.060”

EXAMPLES
015 = 0-15 PSI
100 = 0-100 PSI

PRE-ASSEMBLED POWER CORD
QBT-C-6

Length in feet
(Other lengths are available from 1 to 25 feet, in 1 foot increment)

¹ Inlet valves orifice size and the exhaust valve are factory determined based on the application’s flow and pressure specs.
² Bleed orifice is required when the QPV is used in an application that is static (no flow). Dynamic applications (under flow) do not need a bleed orifice to function properly.
Consult our Application Engineering Department for your specific application needs. We are here to help you.
DIMENSIONS FQB3 & F-SERIES

DIMENSIONS ARE FOR REFERENCE USE ONLY. DIMENSIONS ARE IN INCHES

FQB3 ORDERING INFORMATION

FQB3 | T | F | E | E
---|---|---|---|---
SERIES | MONITOR | COMMAND INPUT | MONITOR SIGNAL | MAXIMUM CALIBRATED RANGE

T = IMPACT ALUM.

E = 0-10 VDC
I = 4-20 mA

EXAMPLES
050 = 0-50 PSI
100 = 0-100 PSI

PRE-ASSEMBLED POWER CORD

QBT-C-6

LENGTH IN FEET
(Other lengths are available from 1 to 25 feet, in 1 foot increment)

QBT-C-6

MAXIMUM CALIBRATED RANGE
0-150 psig*

ASSEMBLE

FOR COMPLETE ORDERING INFORMATION SEE PAGE 11
DIMENSIONS QB2-PSR & F-SERIES

DIMENSIONS ARE FOR REFERENCE USE ONLY. DIMENSIONS ARE IN INCHES

Assembly shown in 1/2" NPT model. For other port size assemblies, please consult factory.

QB2-PSR ORDERING INFORMATION

FQB2  T  F  E  E  100  /  PSR - 4  /  F-SERIES
SERIES  MONITOR  MONITOR  ASSEMBLE  VOLUME  ASSEMBLE
INPUT  SIGNAL
COMMAND  MAXIMUM  CALIBRATED
E = 0-10 VDC  RANGE  0 -150psig*
I = 4-20 mA
CONTAINER
 E = 0-10VDC  EXAMPLES
C = 4-20mA Sinking  050 = 0-50 PSI
S = 4-20mA Sourcing  100 = 0-100 PSI

T = IMPACT ALUM.
PRE-ASSEMBLED POWER CORD
QBT-C-6

Length in feet
(Other lengths are available from 1 to 25 feet, in 1 foot increment)
THE INSIDE STORY OF THE F-SERIES:

- Low Pressure Drop
- Available in five Different Pipe Sizes NPT or BSPP
- Pressure Compensated Option Available
- Many Connector Options
- Flow Ranges as low as 20 SCFH & as high as 250 SCFM
- Analog Differential Pressure Sensor for Real Time Measurement
- IP65 Housing
- Venturi Style Orifice
- No Lead in Pipe Required
- Wide range of inert gases
- No Moving Parts
- Mounts in Any Position
- Response Time < 10ms
- Analog Output = Measured Flow

FUNCTIONAL DESCRIPTION

The Proportion-Air, Inc. F-series is a line of flow transducers designed specially to provide real time flow measurement of compressed gasses for many demanding applications. The Proportion-Air, Inc. F-series design utilizes differential pressure technology to sense the pressure change across an internal venturi. This differential pressure (DP) measurement is fed into an onboard electronic circuit that converts the DP signal into a linear analog output signal which represents the flow through the F-series. The DP sensor and circuit are completely analog to offer the fastest possible response time and eliminate digital stepping often seen in flow transducers of other technologies.
The Proportion-Air, Inc. F-series product is available in flow ranges from as low as 2 to 20 scfh and as high as 25 to 250 scfm. Pipe sizes range from ¼ “ to 1 ½”. Both NPT and BSP threads are available.

The differential pressure technology incorporated in the Proportion-Air, Inc. F-series flow transducer is ideally suited for rugged commercial and industrial applications. This technology allows measurements of flows from 10% to 100% of the maximum calibrated range. The benefits of real time measurement make the F-series a must in many rapid sequence applications. For example, in the chart below, the 0.1% accurate thermal mass flow meter output isn't even close while the F-series has been providing a 96% accurate signal for over four seconds! This makes the real accuracy of the F-series far superior in many fast paced applications.

The Proportion-Air, Inc. F-series flow transducer is rugged for today’s demanding environments. It has an IP65 housing, 25G rating, and its large venturi can digest contaminants and moisture. The F-series is also insensitive to mounting position and vibration.

F-SERIES MODELS

Three models of Proportion-Air, Inc. F-series flow transducer are available for a variety of different applications: Regulated, Pressure Compensated, and Atmosphere models.

FR MODEL

The FR model is a regulated flow monitor that uses only differential pressure to calculate the compressed gas flow. When the supply pressure of a compressed gas is regulated the compressible effect of the gas on gas density can be compensated for allowing the output signal to indicate implied mass flow.

FP MODEL

FP model is a pressure compensated flow monitor. In addition to a differential pressure sensor, the FP model also uses an absolute pressure sensor to measure the incoming pressure of the compressed gas flow. This absolute pressure allows the FP to mathematically correct the output signal for changes in gas density due to pressure. This model is used in applications where the incoming gas supply pressure varies and cannot be regulated or when there may be an advantage to eliminating a regulator.

FA MODEL

The FA model is an atmosphere flow monitor that is used where the compressed gas flow is venting to atmosphere. Atmospheric pressure becomes the standard against which the DP signal is compared allowing the DP signal to be mathematically converted to implied mass flow.
PERFORMANCE CHARACTERISTICS

LINEARITY

This chart shows linear characteristics of the F-series flow monitor with a signal output of 1-10 volts. Characteristics would be similar for 5.6-20 mA units.

PRESSURE COMPENSATED GRAPH

The pressure compensated graph shows the effect of the pressure compensated model at different pressures. If the supply pressure of the application is constant, a non-pressure compensated model can be used. (see “PRESSURE COMPENSATED GRAPH”)

NON-PRESSURE COMPENSATED GRAPH

The non-pressure compensated graph represents the error in reading at different pressures. If the supply pressure in the application is not regulated or it fluctuates, we would recommend a pressure compensated model. (see “PRESSURE COMPENSATED GRAPH”)
DIMENSIONS F-SERIES

DIMENSIONS ARE FOR REFERENCE USE ONLY. DIMENSIONS ARE IN INCHES (MILLIMETERS)

<table>
<thead>
<tr>
<th>ORDERING INFORMATION</th>
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</thead>
</table>

**DIMENSION LEGEND/PER PORT SIZE**

<table>
<thead>
<tr>
<th>DIM &quot;A&quot;</th>
<th>DIM &quot;B&quot;</th>
<th>DIM &quot;C&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCHES/MM</td>
<td>INCHES/MM</td>
<td></td>
</tr>
<tr>
<td>1/4 NPTF/BSPP</td>
<td>1.00/25.4</td>
<td>.375/9.5</td>
</tr>
<tr>
<td>3/8 NPTF/BSPP</td>
<td>1.50/38.1</td>
<td>.75/19.1</td>
</tr>
<tr>
<td>1 NPTF/BSPP</td>
<td>2.00/50.8</td>
<td>1.00/25.4</td>
</tr>
<tr>
<td>&gt;1-1/4 NPTF/BSPP</td>
<td>CONSULT FACTORY FOR DIMENSIONS</td>
<td></td>
</tr>
</tbody>
</table>

**DIGITAL DISPLAY**

D = Digital display
BLANK = No display

**F SERIES**

A = Atmosphere
P = Pressure Compensated
R = Regulated Pressure

**PORT SIZE**

2 = 1/4"
3 = 3/8"
4 = 1/2"
6 = 3/4"
8 = 1"
A = 1-1/4"
B = 1-1/2"

**THREAD**

N = NPTF
B = BSPP

**OUTPUT SIGNAL**

E = 1-10 VDC
C = 5.6-20 MA
S = 5.6-20 MA

**SET PRESSURE**

A = Atmosphere
P = Pressure Compensated
R = Regulated Pressure

**FLOW UNITS**

A = SCFM
B = SCFH
C = SLPM
D = SLPH

**ELECTRICAL CONNECTION**

A = 3 Pin, 3 FT female molded cord
C = 3 Wire flying leads (18")
D = 3 Pin male connector
E = 6 Pin Hirshman connector
G = 3 Pin, 6 FT female shielded cord
H = 4 Pin Hirshman connector

Note: DIMENSIONS ARE FOR REFERENCE USE ONLY. DIMENSIONS ARE IN INCHES (MILLIMETERS).
“REAL TIME” FLOW MEASUREMENT
See F-Series Brochure