

rotork[®] Instruments

Linear Actuator PAX₁ & Motorised Regulators



A **rotork** Brand
FAIRCHILD
precision pneumatic & motion control

Keeping the World Flowing

rotork®

Keeping the World Flowing



**RELIABILITY
IN FLOW CONTROL
CRITICAL
APPLICATIONS**



RELIABLE OPERATION WHEN IT MATTERS

Assured reliability for critical applications and environments. Whether used 24/7 or infrequently, Rotork products will operate reliably and efficiently when called upon.

QUALITY-DRIVEN GLOBAL MANUFACTURING

Products designed with 60 years of industry and application knowledge.

Research and development across all our facilities ensures cutting edge products are available for every application.

CUSTOMER-FOCUSED SERVICE WORLDWIDE SUPPORT

Solving customer challenges and developing new solutions. From initial enquiry through to product installation, long-term after-sales care and client support programmes.

LOW COST OF OWNERSHIP

Long-term reliability prolongs service life. Rotork helps to reduce long term cost of ownership and provides greater efficiency to process and plant.

PAX₁ Range

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COMPREHENSIVE PRODUCT RANGE SERVING MULTIPLE INDUSTRIES

Improved efficiency, assured safety and environmental protection.

Rotork products and services are used in the Power, Oil & Gas, Water & Waste Water, HVAC, Marine, Mining, Food & Beverage, Pharmaceutical and Chemical industries around the world.

GLOBAL PRESENCE LOCAL SERVICE

Global company with local support.

Manufacturing sites, offices and *Centres of Excellence* throughout the world provide unrivalled customer services and fast delivery.

MARKET LEADER TECHNICAL INNOVATOR

The recognised market leader for 60 years.

Our customers have relied upon Rotork for innovative solutions to safely manage the flow of liquids, gases and powders.

CORPORATE SOCIAL RESPONSIBILITY

A responsible business leads to being the best business.

We are socially, ethically, environmentally responsible and committed to embedding CSR across all our processes and ways of working.

rotork[®]

Keeping the World Flowing



Active in every industry and market sector around the world.

Serving customers and working with partners.

Improving efficiency, assuring safety and protecting the environment.

INDUSTRY KNOWLEDGE

Our engineering and application knowledgebase, built over 60 years, allows us to provide innovative and reliable solutions for all flow control applications.

We work across the globe, servicing a diverse range of markets and critical applications.

Our experience of flow control is second to none.



OIL & GAS

Rotork products are used on upstream, midstream and downstream activities, ranging from offshore production facilities, to refining and processing, to transportation, storage and distribution.

- Onshore and offshore production
- Refining and petrochemicals
- Distribution and storage
- Pipelines
- LNG liquefaction and regasification
- Unconventional oil and gas



POWER

Rotork products are found in traditional power stations, including nuclear power stations where its products are certified for use both inside and outside containment. They are also used for renewable energy generation systems such as thermal solar plants, and emission reduction processes such as flue gas desulphurisation.

- Conventional fuels
- Nuclear energy
- Concentrating solar power
- Geothermal and other renewables



WATER

Rotork products are used on modern state-of-the-art water treatment and distribution processes, which maximise existing resources such as, desalination plants and water re-use projects, together with conventional water and wastewater plants.

- Sludge and sewage treatment
- Water treatment, desalination and re-use
- Environmental control
- Dams, reservoirs and irrigation



OTHER INDUSTRIES

- Marine
- Pharmaceutical
- HVAC
- Mining
- Biomedical
- Rail
- Paper & Pulp
- Food & Beverage

PAX₁ Linear Actuator

Rotork Fairchild's all new PAX1 series Linear Actuator can be used alone or it can be paired with a variety of Fairchild time proven pressure regulators enabling remote control of the pneumatic pressure.

Operation

The PAX1 is a flexible low voltage DC powered linear actuator featuring a 25 mm maximum thrust rod stroke moving at speeds up to 60 mm/min and a maximum thrust of 2,890 N all in a flameproof enclosure. The unit is inherently lock in last place as the thrust rod maintains its position upon loss of signal or electrical power.

The PAX1 can be actuated open loop using two optically isolated switch closure inputs (Up and Down) to move the actuator's thrust rod. The actuator will continue to move the thrust rod in response to the inputs until either of the adjustable stroke limits are reached.

The PAX1 also has an isolated 4-20 mA analog input to proportionally position the thrust rod anywhere within its 25 mm stroke. There is also a 1-5 VDC non-isolated analog input as well. In analog control mode, the unit is fail freeze upon loss of either analog signals.

The actuator also features an UP and DOWN push buttons under the cover to facilitate commissioning and to permit local control of the actuator. There is also an 8 mm (⁵/₁₆") female hex motor drive interface under the cover to allow manual actuator movement.

The actuator also includes two fully adjustable SPDT alarm relays (one High and one Low) providing alarm function when the actuator's thrust rod reaches critical positions within its stroke. The relays are magnetically latched so the alarm switch states are maintained when the power is disconnected. This allows accurate alarm function on systems that remove power from the actuator between adjustments to conserve power as is typically done in solar powered installations.

The PAX1 also offers an optional isolated 4-20 mA feedback output. This feedback feature is functional for both the pulse control and analog control configurations. The unit must be powered to facilitate the feedback output function.



Applications

- Pump stroke control
- Damper systems
- Test equipment

Actuator Features & Benefits

- Linear stroke is 25 mm
- Max force is 2,890 N (650 lb)
- Max linear speed is 60 mm / minute
- Ingress Protection (IP) Type 4X / Type 6P / IP66 / IP68
- Temperature range -40 to +176 °F (-40 to +80 °C)
- Low power consumption less than 1 Watt during standby, which is ideal for installations in isolated locations
- Optional isolated 4-20 mA position feedback
- Overall stroke and alarm limits are defined by end user

Hazardous Area Ratings

FM Explosionproof

Class I Division I Groups ABCD T5/T6

Class II, III Division I, Groups EFG T5/T6

Class 1, Zone 1, AEx db IIC, T5/T6 Gb

Zone 21, AEx tb IIIC T85 °C/100 °C Db

T6 [T85 °C]: Ta = -40 °C to +65 °C

T5 [T100 °C]: Ta = -40 °C to +80 °C

Type 4X/6P, IP66/68

PAX₁ Linear Actuator

Specifications

Electrical Supply

- 11-30 VDC, 18 Watts peak, <1 Watt standby

Analog Control

- 4-20 mA isolated from supply
- 1-5 VDC common to supply

Pulse Control

- Switch closure (2) UP & DN, 4-30 VDC loop isolated from supply

Accuracy

- +/-1% of maximum stroke

Maximum Force

- 2,890 N (650 lbf)

Maximum Linear Speed

- 60 mm/min*

Operating Temp Range

- -40 to +80 °C (-40 to +176 °F) intermittent duty
- -40 to +70 °C (-40 to +158 °F) continuous duty

Analog Feedback (Optional)

- 4-20 mA, isolated from supply

Materials

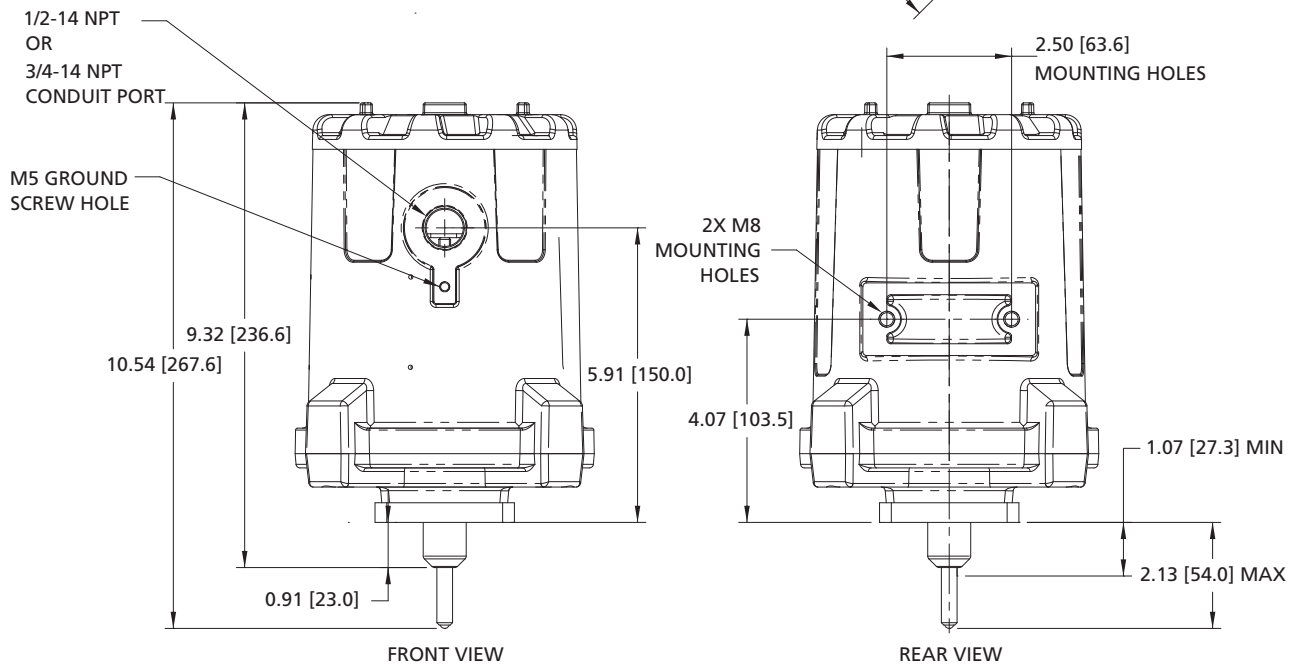
Body and housing: Aluminum

Thrust rod: Stainless steel

Elastomers: Nitrile

Finish: Anodized with polyester powder coat

*At lower supply voltages, slower motor speed may be required to reach maximum force.



Ordering Information

Catalog Number:

PAX1

Approval Agency

Factory Mutual (FM) _____ F

Conduit Port Size

1/2" _____ 4
3/4" _____ 6

Configuration

No Analog Feedback _____ 0
Analog Feedback _____ 1

PAX₁ Motor Set Pressure Regulators

Rotork Fairchild's all new PAX1 Motor Set Pressure Regulator is a flexible low voltage DC powered linear actuator coupled to one of four Fairchild precision pressure regulators capable of controlling pressure ranges of 0-0.5 psig to 0-3,000 psig and housed in a flameproof enclosure. The unit is inherently lock in last place as the actuator will maintain its position upon loss of electrical power.

Applications

- Natural gas distribution systems
- Natural gas pipeline systems
- Pilot operated regulator systems
- Plunger lift systems

Actuator Features & Benefits

- Pressure ranges from 0-0.5 psig to 0-3,000 psig
- Full range actuation speeds down to 10 secs
- Ingress Protection (IP) Type 4X / Type 6P / IP66 / IP68
- Temperature range -40 to +176 °F (-40 to +80 °C)
- Low power consumption less than 1 Watt during standby, which is ideal for installations in isolated locations
- Optional isolated 4-20 mA position feedback
- Overall stroke and alarm limits are defined by end user

Hazardous Area Classifications

FM Explosionproof

Class I Division I Groups ABCD T5/T6

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Class 1, Zone 1, AEx db IIC, T5/T6 Gb

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T6 [T85 °C]: Ta = -40 °C to +65 °C

T5 [T100 °C]: Ta = -40 °C to +80 °C

Type 4X/6P, IP66/68



10
Precision
Regulator

11
Low Pressure
Regulator

4100
Low Pressure
Regulator

HPD
High Pressure
Regulator

Pneumatic Pressure Regulators

Fairchild manufactures a complete line of precision pneumatic regulators including positive pressure, back pressure and vacuum models. Quality engineering and manufacturing excellence assures that our pressure regulators meet all the requirements of a precision device.

Our large selection of pressure ranges and flow capacities lets you select the models that meet your needs for instrument or general industrial control applications.

While we have included our most popular models in this brochure, other pressure regulators and relays are adaptable. Consult the factory for your needs.

PAX₁ Motor Set Pressure Regulators

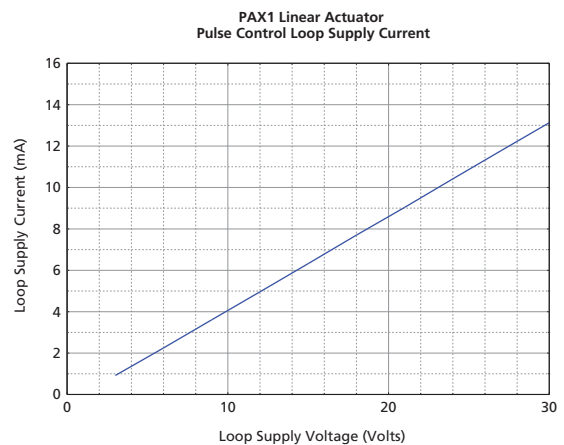
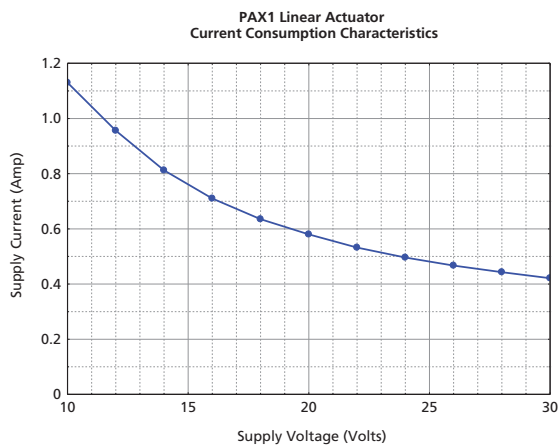


	10 Precision Regulator	11 Low Pressure Regulator	4100A Low Pressure Regulator	HPD High Pressure Regulator	HPP High Pressure Regulator
Flow Capacity: SCFM (m³/HR) Supply = 100 psig	40 (68)	24 (40)	30 (51)	0.06 Cv	0.06 Cv
Exhaust Capacity: SCFM (m³/HR) Downstream pressure 5 psig above 20 psig set point	5.5 (9.4)	0.5 (0.85)	12 (20.4)	0.02 Cv	0.02 Cv
Sensitivity: Inch/WC (cm)	0.125 (0.32)	0.05 (0.13)	0.05 (0.13)	N/A	N/A
Supply Pressure Var: PSIG (kPa) For Supply Change:	<0.1 (<0.7) 100 psig	<0.1 (<0.7) 100 psig	<0.1 (<0.7) 100 psig	0.6 (4) 100 psig	5 (34.5) 100 psig
Supply Pressure Max: PSIG (kPa)	500 (3500)	150 (1000)	150 (1000)	6000 (41400)	6000 (41400)
Dimensions (approx): Inches (mm)	Dia 3 H 6½ (Dia 76 H 165)	Dia 5¼ H 6½ (Dia 133 H 165)	Dia 8½ H 8⅝ (Dia 216 H 219)	Dia 2¼ H 5 ⅜ (Dia 60 H 137)	Dia 2¼ H 5 ⅜ (Dia 60 H 137)
Range PSIG (kPa)	0-2 (0-15) 0-10 (0-70) 0-20 (0-150) 0.5-30 (3-200) 1-60 (10-400) 2-150 (15-1000) 3-200 (20-1500) 5-300 (35-2100) 5-400 (35-2800)	0-2 (0-13.8) 0-4 (0-27.6) 0-6 (0-41.4) 0-12 (0-82.8)	0-0.7 (0-4.8) 0-1.4 (0-9.7) 0-3 (0-21) 0-5 (0-25)	0-25 (0-172) 0-50 (0-344) 1-100 (6.9-689) 2-250 (13-1723) 2-500 (13-3447)	0-1000 (0-6900) 0-2000 (0-13600) 0-3000 (0-20700)
Pipe Size	¼", ⅜", ½"	¼", ⅜", ½"	½", ¾"	¼"	¼"

Power Supply Sizing

12 VDC system: 12 VDC, 2A power supply recommended

24 VDC system: 24 VDC, 1A power supply recommended



Model 10 Precision Pressure Regulator

The Model 10 is designed for applications that require moderate capacity and accurate pressure control. The main supply valve is pressure balanced by utilizing a rolling diaphragm, insures a constant output pressure even during wide supply pressure variations.

The regulated output pressure is maintained at a constant value under varying flow conditions through the use of an aspirator tube which adjusts the supply valve in accordance with the flow demand.



Features

- Control sensitivity of 1/8" water column allows use in precision processes
- Pressure balanced supply valve prevents supply pressure changes from affecting the setpoint
- Separate control chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing
- An aspirator tube compensates downstream pressure drop under flow conditions
- Non relieving option available for applications requiring containment of gas

Specifications

Supply Pressure

- 500 psig, [35.0 bar], (3500 kPa) maximum

Flow Capacity

- 40 SCFM (68 m³/hr) @ 100 psig, [7.0 bar], (700 kPa) supply and 20 psig, [1.5 bar], (150 kPa) setpoint

Exhaust Capacity

- 5.5 SCFM (9.35 m³/hr) where downstream pressure is 5 psig, [0.35 bar], (35 kPa) above 20 psig, [1.5 bar], (150 kPa) setpoint

Supply Pressure Effect

- Less than 0.1 psig, [0.007 bar], (0.7 kPa) for 100 psig, [7.0 bar], (700 kPa) change in supply pressure

Sensitivity

- 1/8 in water column [0.31 mbar] (0.031 kPa)

Materials of Construction

Body and housing: Aluminum

Diaphragms: Nitrile or Fluorocarbon

Trim: Brass, Zinc plated steel

Model 10 Precision Pressure Regulator

Model Code: PAX1 xxx – **10** **2** **3** **2** **N** **N** **R**

Series _____ 10

Revision _____ 2

Pressure Range

0-2 psig _____ 1
 0-10 psig _____ 2
 0-20 psig _____ 0
 0.5-30 psig _____ 3
 1-60 psig _____ 4
 2-150 psig _____ 6
 3-200 psig _____ 7
 5-300 psig _____ 8
 5-400 psig _____ 9

Port Size

1/4" _____ 2
 3/8" _____ 3
 1/2" _____ 4

Port Thread

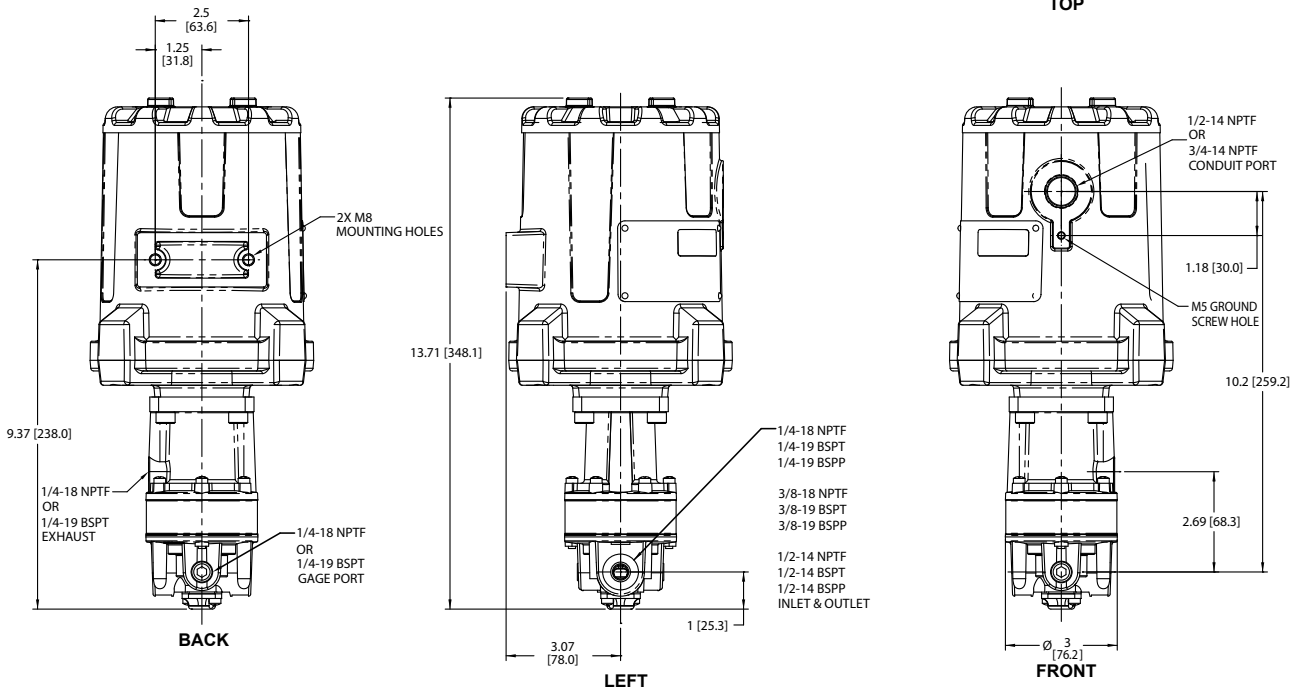
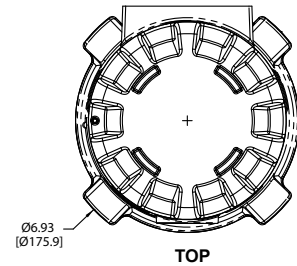
NPTF _____ N
 BSPT _____ U
 BSPP _____ H

Elastomers

Nitrile _____ N
 Fluorocarbon _____ J

Relief Valve

Relieving, Normal Bleed _____ R
 Relieving, No Bleed _____ D
 Non Relieving _____ N



Model 11 Precision Low Pressure Regulator

The Model 11 is designed for applications that require moderate capacity and accurate low pressure control.

The main supply valve is pressure balanced by utilizing a rolling diaphragm, insures a constant output pressure even during wide supply pressure variations. The regulated output pressure is maintained at a constant value under varying flow conditions through the use of an aspirator tube which adjusts the supply valve in accordance with the flow demand.



Features

- Large area, high sensitivity diaphragm provides control sensitivity of $\frac{1}{8}$ " water column, allows use in precision applications
- Pressure balanced supply valve prevents supply pressure changes from affecting the setpoint
- Separate control chamber isolates the diaphragm from the main flow to eliminate hunting and buzzing
- An aspirator tube compensates downstream pressure droop for flow demand
- Non relieving option available for applications requiring containment of gas

Specifications

Supply Pressure

- 150 psig, [10 bar], (1000 kPa) maximum

Flow Capacity

- 20 SCFM (34 m³/hr) @ 100 psig, [7 bar], (700 kPa) supply and 1.0 psig setpoint

Exhaust Capacity

- 0.5 SCFM (0.85 m³/hr) where downstream pressure is 0.1 psig, [0.007 bar], (0.7 kPa) above 1.0 psig setpoint

Supply Pressure Effect

- <0.01 psig for 100 psig change in supply

Sensitivity

- 0.05" water column

Materials of Construction

Body and housing: Aluminum

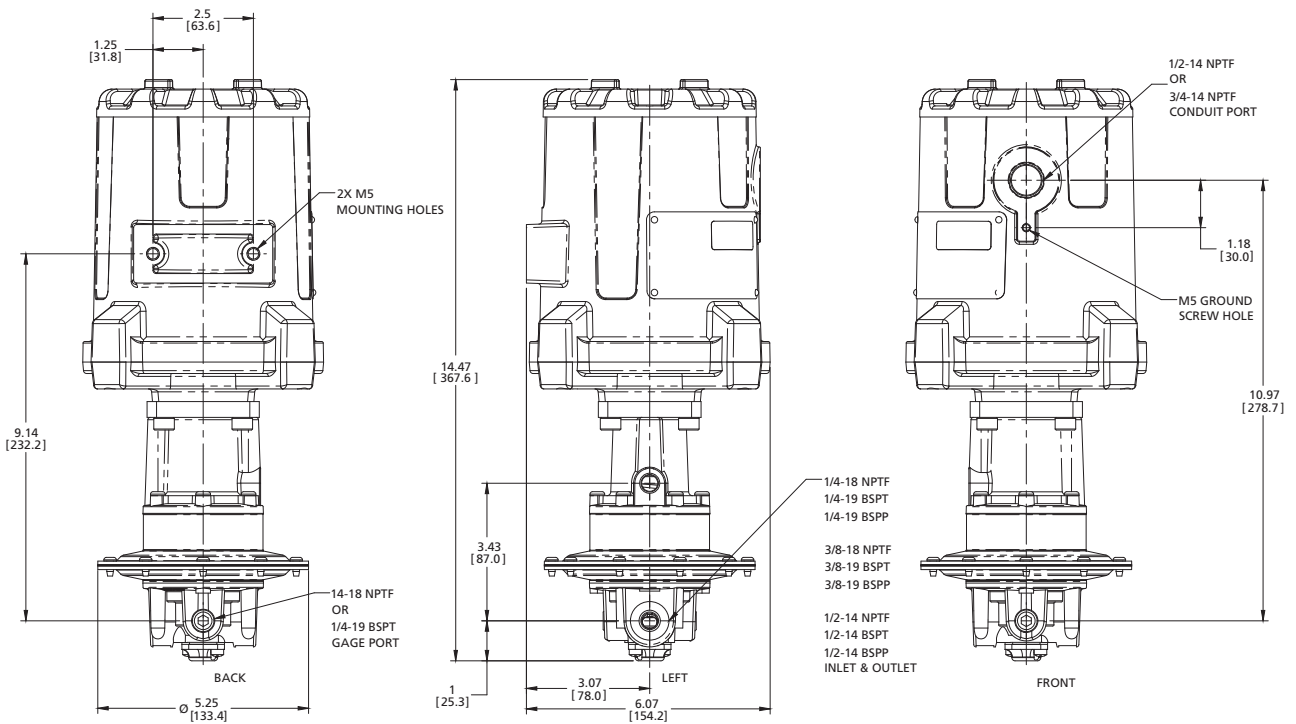
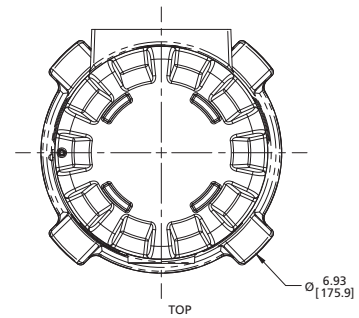
Diaphragm: Nitrile or Fluorocarbon

Trim: Zinc plated steel, Stainless steel

Model 11 Precision Low Pressure Regulator

Model Code: PAX1 xxx - **11** **1** **3** **2** **N** **N** **R**

Series	11
Revision	1
Pressure Range	
0-0.5 psig	1
0-2 psig	2
0-4 psig	3
0-6 psig	4
0-12 psig	5
Port Size	
1/4"	2
3/8"	3
1/2"	4
Port Thread	
NPTF	N
BSPT	U
BSPP	H
Elastomers	
Nitrile	N
Fluorocarbon	J
Relief Valve	
Relieving, Normal Bleed	R
Relieving, No Bleed	D
Non Relieving	N



Model 4100A High Capacity Low Pressure Regulator

The Model 4100A is designed for applications requiring high flow capacity and accurate low pressure control.

The large area, high sensitivity diaphragm assembly provides high sensitivity and accurate low pressure control. The main supply valve is pressure balanced by utilizing a rolling diaphragm, insures a constant output pressure even during extreme supply pressure variations. The regulated output pressure is maintained at a constant value under varying flow conditions through the use of an aspirator tube which compensates the supply valve in accordance with the flow demand.



Features

- Large area, high sensitivity diaphragm provides control sensitivity of 0.05" WC for precision control in low pressure applications
- Pressure balanced supply valve prevents supply pressure changes from affecting the setpoint
- Large relief valve provides high exhaust flow capacity
- Soft seat valves minimizes air consumption
- Aspirator tube compensates for downstream pressure droop during flow demand

Specifications

Supply Pressure

- 150 psig (10 bar) maximum

Flow Capacity

- 70 SCFM (119 m³/hr) @ 50 psig (3.44 bar) supply, and 3 psig (0.2 bar) setpoint

Exhaust Capacity

- 13 scfm (22 m³/hr), where downstream pressure is 0.2 psig (0.014 bar) above 3 psig (0.2 bar) setpoint

Sensitivity

- Low as 0.05" WC (0.12 mbar)

Supply Pressure Effect

- None detected

Materials of Construction

Body and Housing: Aluminum

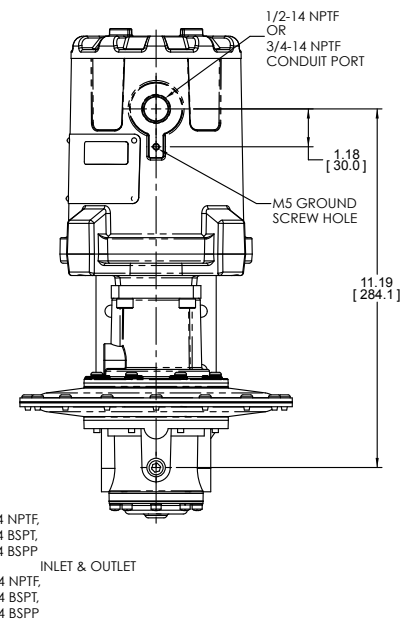
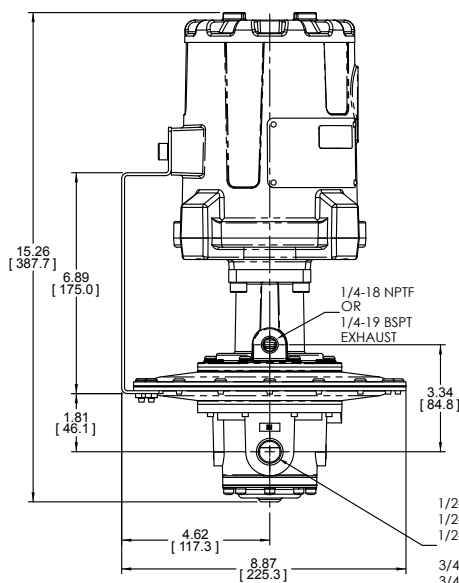
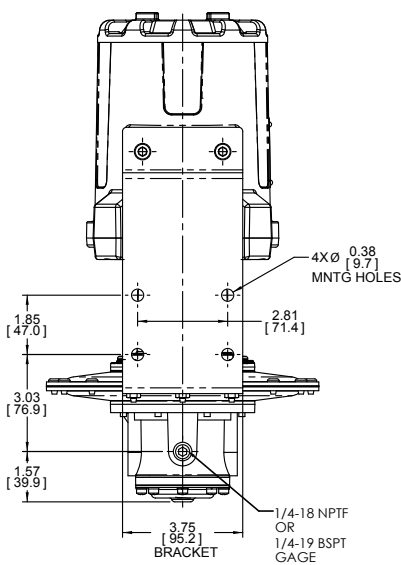
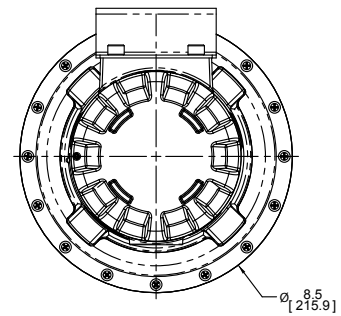
External Trim: Zinc plated steel, Stainless steel

Diaphragms and seals: Nitrile on Dacron, optional Fluorocarbon on Dacron

Model 4100A High Capacity Low Pressure Regulator

Model Code: PAX1 xxx - **41** **3** **2** **A** **N** **N** **D**

Series	41
Pressure Range	
0-0.7 psig	1
0-1.4 psig	2
0-3 psig	3
0-5 psig	4
Port Size	
1/2"	4
3/4"	5
Revision	A
Port Thread	
NPTF	N
BSPT	U
BSPP	H
Elastomers	
Nitrile	N
Fluorocarbon	J
Relief Valve	
Relieving, No Bleed	D



Model HPD High Pressure Regulator

The Model HPD is a metal diaphragm sensed low capacity stainless steel high pressure regulator. A stainless steel supply valve which seats with a polymer seat insures accurate and reliable sealing of the valve providing trouble free operation.

The fatigue resistant Inconel diaphragm resists cracking from repeated operations and provides long life and leak free operation. Metal to metal seals and Teflon seals ensures regulator does not contaminate the media with rubber type elastomers.



Features

- Three seat material choices for a wide range of chemical compatibility, (PEEK, CTFE, and Vespel)
- High maximum supply pressure of 6,000 psig to allow more through put of gas

Specifications

Supply Pressure

- 6000 psig, [414 bar], (41,400 kPa) maximum
- *Consult seat material chart for maximum supply pressure

- **Supply Valve Cv** 0.06
- **Exhaust Valve Cv** 0.02

Supply Pressure Effect

- <0.6 psig (4 KPa) change for 100 psig change in supply pressure

Materials of Construction

Body and housing: Alloy 316L stainless steel

Valve: 316L stainless steel

Seal: Teflon

Installation

Refer to the *Fairchild Model HPD Installation, Operation and Maintenance Instructions*, IS-10000HPD.

Gauges

See cataloge for high pressure gauges.

Model HPD High Pressure Regulator

Model Code: PAX1 xxx – **HPD** **1** **3** **2** **N** **A** **P** **R**

Series _____ HPD

Valve
0.06 Cv _____ 1

Pressure Range
0-25 psig _____ 3
0-50 psig _____ 4
1-100 psig _____ 5
2-250 psig _____ 7
5-500 psig _____ 9

Port Size
1/4" _____ 2

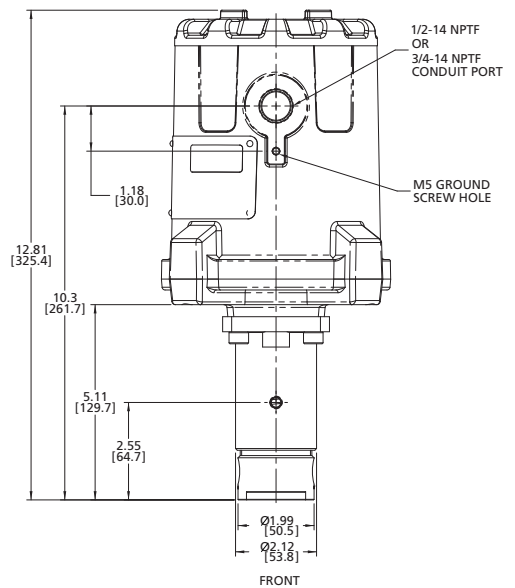
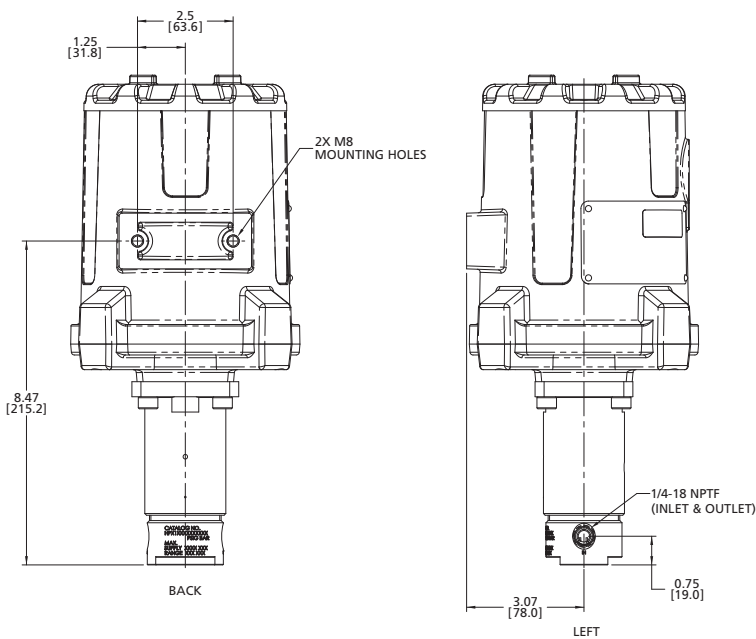
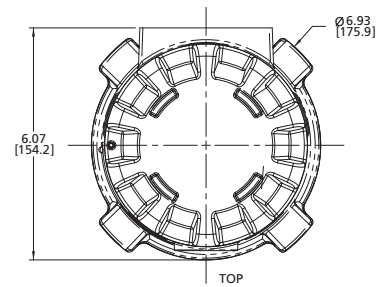
Port Thread
NPTF _____ N
BSPT _____ U

Port Configuration
2 Port _____ A
4 Port _____ B

Seat Material
PEEK _____ P
CTFE _____ T
Vespel _____ V

Relief Valve
Relieving, Normal Bleed _____ R
Non Relieving _____ N

Seat Material	Max. Supply (psig)
PEEK	6,000
CTFE	3,500
Vespel	6,000



Model HPP High Pressure Regulator

The Model HPP is a piston sensed low capacity stainless steel high pressure regulator. A stainless steel supply valve which seats with a polymer seat insures accurate and reliable sealing of the valve providing trouble free operation and provides long life and leak free operation.



Features

- Three seat material choices for a wide range of chemical compatibility, (PEEK, CTFE, and Vespel).
- High maximum supply pressure of 6000 PSIG to allow more through put of gas.

Specifications

Maximum Supply Pressure

- 6000 psig, [414 bar], (41400 kPa) maximum
- *Consult seat material chart for maximum supply pressure

- **Supply Valve Cv** 0.06
- **Exhaust Valve Cv** 0.02

Supply Pressure Effect

- <5 psig (34.5 KPa) change for 100 psig change in supply pressure

Materials of Construction

Body and Housing: Alloy 316L stainless steel

Valve: 316L stainless steel

Seal: Viton A

Installation

Refer to the *Fairchild Model HPP Installation, Operation and Maintenance Instructions*, IS-10000HPP.

Gauges

See cataloge for high pressure gauges

Model HPP High Pressure Regulator

Model Code: PAX1 xxx – **HPP** **1** **3** **2** **N** **A** **P** **R**

Series _____ HPP

Valve
0.06 Cv _____ 1

Pressure Range
0-1000 psig _____ 2
0-2000 psig _____ 4
0-3000 psig _____ 5

Port Size
1/4" _____ 2

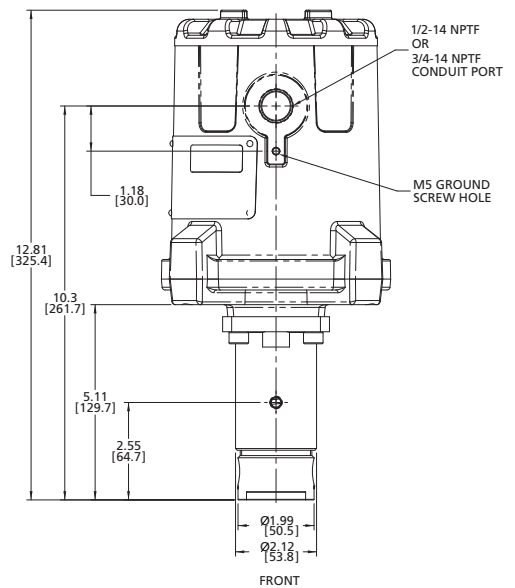
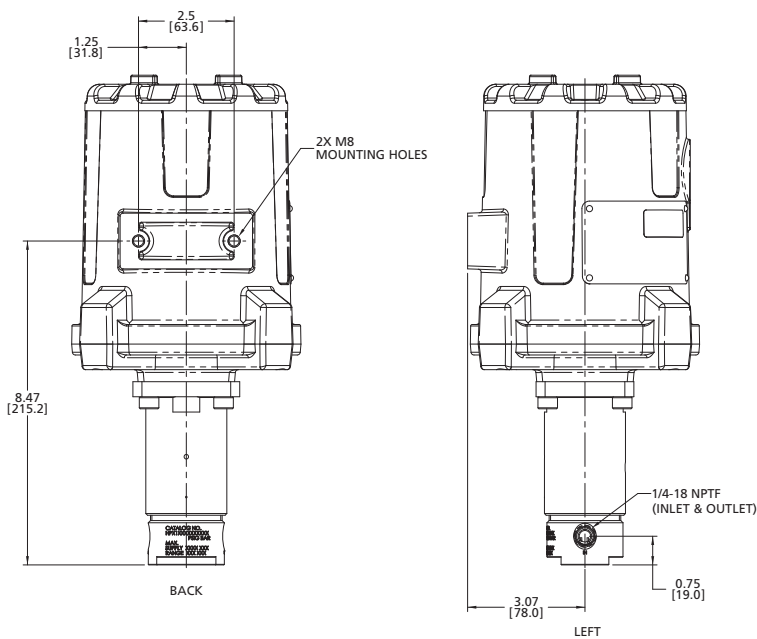
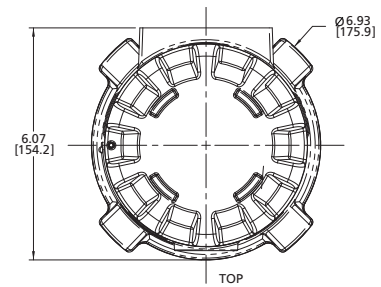
Port Thread
NPTF _____ N
BSPT _____ U

Port Configuration
2 Port _____ A
4 Port _____ B

Seat Material
PEEK _____ P
CTFE _____ T
Vespel _____ V

Relief Valve
Relieving, Normal Bleed _____ R
Non Relieving _____ N

Seat Material	Max. Supply (psig)
PEEK	6,000
CTFE	3,500
Vespel	6,000



rotork®

Keeping the World Flowing



www.rotork.com

A full listing of our worldwide sales and service network is available on our website.

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