Itron

Knowledge to Shape Your Future

RB1700 Series Regulator

Medium Duty Commercial & Industrial Regulator

Applications

The RB1700 regulator is designed for commercial applications: industrial boilers and furnaces, appliance pressure regulation, secondary regulation of plant distribution piping, and all installations with continuous consumption and rapid flow rate variations, such as burners, industrial ovens, boilers, etc. Suitable for installing in cabinets, as a space saving regulator.

Description

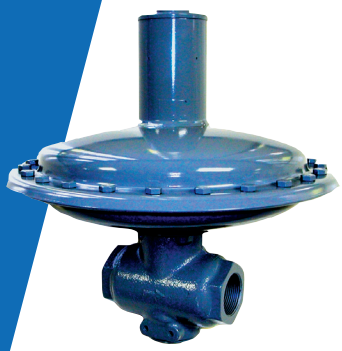
The RB1700 employs a direct-acting, spring-loaded regulator. The balanced valve design ensures a constant outlet pressure when the upstream pressure varies. This eliminates the need for orifice size changes arising from the different inlet pressure ranges.

Benefits

- > Accurate regulation
- > High flow accuracy
- > Fast response
- > Easy maintenance
- > Compact size
- > Rugged construction for durability
- > Balanced valve design eliminates inlet pressure effect
- > Wide range of outlet pressure
- > Horizontal or Vertical mounting

Features

- > Interchangeable adjustment spring
- > Balanced valve design
- > Downstream control
- > Direct acting spring loaded design
- > Over pressure shut-off (OPCO) available
- > Under pressure shut-off (UPCO) available

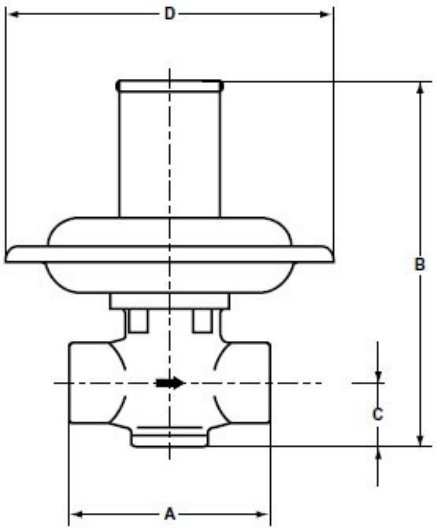


Shipping weight:

1 regulator per box	Box weight: 35 lbs.

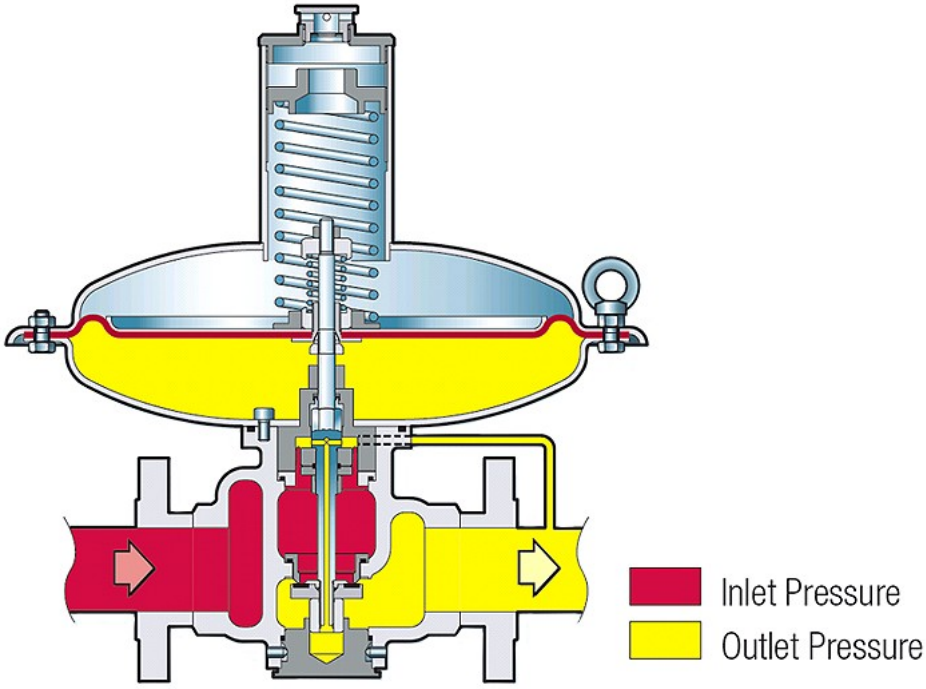
RB1700 Dimensions (inches)

Dimensions	Model	
	1710	1720 1730
A	5.9	5.9
B	15.7	13.8
C	2.4	2.4
D	14.0	8.0
Weight (lbs.)	33	28



Operational Schematic

Shown with N-type pilot



Note: valve shown in closed position.

Spring Data - Spring Color Outlet Pressure Range

Spring Color	Model Number		
	RB1710 (14" diaphragm)	RB1720 (8" diaphragm)	RB1730 (8" diaphragm)
Yellow	7.8 – 10.1" w.c.	---	---
Red	9.8 – 13.0" w.c.	---	---
White	11.0 - 21.5" w.c.	---	---
Purple	0.8 - 1.5 PSIG	1.7 - 5.3 PSIG	---
Orange	1.3 - 3.0 PSIG	3.3 - 8.7 PSIG	---
Brown	---	4.5 - 9.4 PSIG	7.3 - 14.5 PSIG
Green	---	5.8 - 13.0 PSIG	8.7 - 19.5 PSIG
Black	---	---	16.0 - 21.7 PSIG
Gray	---	---	16.0 - 36.0 PSIG

Operating Temperature Range

- -20°F to 140°F

Additional Specifications

Vent Connection:	1/4" NPT
Mounting Position:	Horizontal or vertical
Pressure Registration:	External (control line required - 1/4" NPT)
Other Available Options:	Seal wire to indicate unapproved tampering

Model Designations

R	X	X	1	7	X	X	Options
	B						Balanced valve design
		E					External registration
					1		Low pressure (7"w.c. -3.0 PSIG)
					2		Medium pressure (1.7 -13.0 PSIG)
					3		High pressure (7.3 -36.0 PSIG)
						0	No safety devices
						1-1/2"	1-1/2" body – orifice size: 1-1/8"

Itron takes pride in delivering American made products with the utmost concern for safety, quality, and customer satisfaction.

Construction materials:

Valve body	Ductile Iron
Orifice	Stainless Steel
Valve seat	Brass with vulcanized Buna-N
Valve stem	Stainless Steel
Valve stem bushings	Nylon
"O" -ring seals	Buna-N Nitrile Rubber
Diaphragm	Buna-N and nylon reinforcing fabric
Adjustment screw	Brass
Diaphragm case	Steel

Valve Body Size (inches)

Inlet	Outlet	Orifice Diameter	Wide Open Flow Coefficient (K-Factor)
1-1/2"	1-1/2"	1-1/8"	1120

Correction factors for non-natural gas applications

The RB1700 may be used to control gases other than natural gas. To determine the capacity for gases other than natural gas, multiply the values within the capacity tables by a correction factor. The table below lists the correction factors for some of the more common gases:

Gas Type	Specific Gravity	Correction Factor (CF)
Air	1.00	0.77
Butane	2.01	0.55
Carbon Dioxide (Dry)	1.52	0.63
Carbon Monoxide (Dry)	0.97	0.79
Natural Gas	0.60	1.00
Nitrogen	0.97	0.79
Propane	1.53	0.63
Propane-Air-Mix	1.20	0.71

To calculate the correction factor for gases not listed in the table above, use the gases' specific gravity and insert it in the formula listed below:

Correction Factor (CF) = $\sqrt{\frac{SG_1}{SG_2}}$

Where:

SG_1 = Specific gravity of the gas in which the capacity is published.

SG_2 = Specific gravity of the gas to be controlled.

Wide Open Flow Calculations

For wide-open orifice flow calculations, use the following equations:

For $P_1/P_2 < 1.89$ use: $Q = K\sqrt{P_2(P_1 - P_2)}$

For $P_1/P_2 > 1.89$ use: $Q = \frac{KP_1}{2}$

Where: P_1 = Absolute Inlet Pressure (PSIA)

P_2 = Absolute Outlet Pressure (PSIA)

Q = Flow Rate (SCFH)

K = Orifice Coefficient (SCFH/PSI)

RB1700 Series Commercial Regulator

Capacity Table

Typical Capacity Info. Capacities in SCFH of 0.6 S.G. gas; base conditions of 14.7 PSIA and 60° F.

Manufacturer Itron
Type and model RB1700

Inlet Pressure PSIG	Model RB1710						Model RB1720	
	Outlet Pressure							
	7" w.c.	11" w.c.	14" w.c.	1 PSIG	2 PSIG	5 PSIG	10 PSIG	
	1" w.c. Yellow Spring	2" w.c. Red Spring	2" w.c. White Spring	0.1 PSIG Droop (0.2 PSIG Droop) Purple Spring	0.2 PSIG Droop (0.4 PSIG Droop) Orange Spring	0.5 PSIG Droop (1 PSIG Droop) Purple Spring	1 PSIG Droop (2 PSIG Droop) Green Spring	
8" w.c.	2300							
10" w.c.	2800							
12" w.c.	3000	3000						
14" w.c.	3700	3600						
16" w.c.	4300	4000	3900					
18" w.c.	5100	4400	4200					
24" w.c.	5600	4900	4600					
1	6000	5500	5300					
2	9000	9500	9200	7000 (9200)				
3	11500	12000	11500	10500 (12000)	5500 (8000)			
5	15000	16000	15300	13500 (15000)	10500 (13000)			
10	26000	24500	23600	18500 (22000)	15500 (18500)	13500 (19500)		
20	33000	31500	30500	29500 (31000)	27000 (34000)	24000 (32500)	22000 (29000)	
30	38100	38000	36900	34000 (38000)	31300 (35500)	33000 (38700)	30500 (39000)	
40	47000	46500	45000	41650 (46500)	38300 (43500)	36100 (47300)	36000 (46800)	
50	55200	55000	53000	49300 (55000)	45500 (51400)	42700 (56000)	42500 (55300)	
60	63800	63500	61500	56900 (63500)	52300 (59400)	49300 (64600)	49100 (63900)	
70	72300	72000	69500	64500 (72000)	59600 (67300)	55900 (73300)	55700 (72400)	
80	80800	80500	78500	72100 (80500)	66000 (75000)	62500 (82000)	62300 (81000)	
90	89400	89000	86300	79700 (89000)	73500 (83200)	69100 (90500)	68900 (89500)	
100	97900	97500	95000	87300 (97500)	80000 (91100)	75700 (99200)	75400 (98100)	
125	119200	118700	114000	106000 (118700)	98000 (111000)	92200 (120800)	91800 (119400)	
Lock-up Pressure	8.2" w.c.	11.9" w.c.	14.7" w.c.	1.3 PSIG	2.2 PSIG	5.1 PSIG	10.3 PSIG	

Notes:

*Individual regulator performance may vary from data shown.

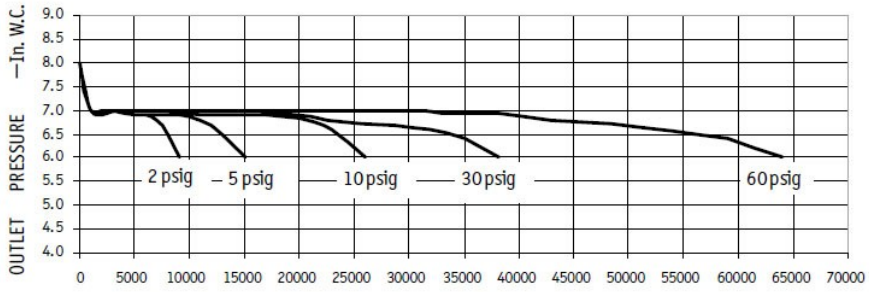
Do not operate orifice in shaded inlet pressure area.

RB1700 Performance Curves

7" w.c. Set Point

Type and model	RB1700
Inlet size	1-1/2" NPT
Outlet size	1-1/2" NPT
Orifice size	1-1/8"

All test results are reported at a base of 14.7 PSIG at 60º F and with 0.6 S.G. gas.

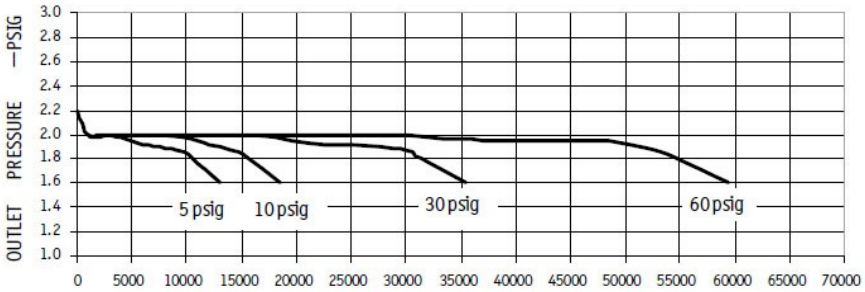


Rate of flow SCFH

2 PSIG Set Point

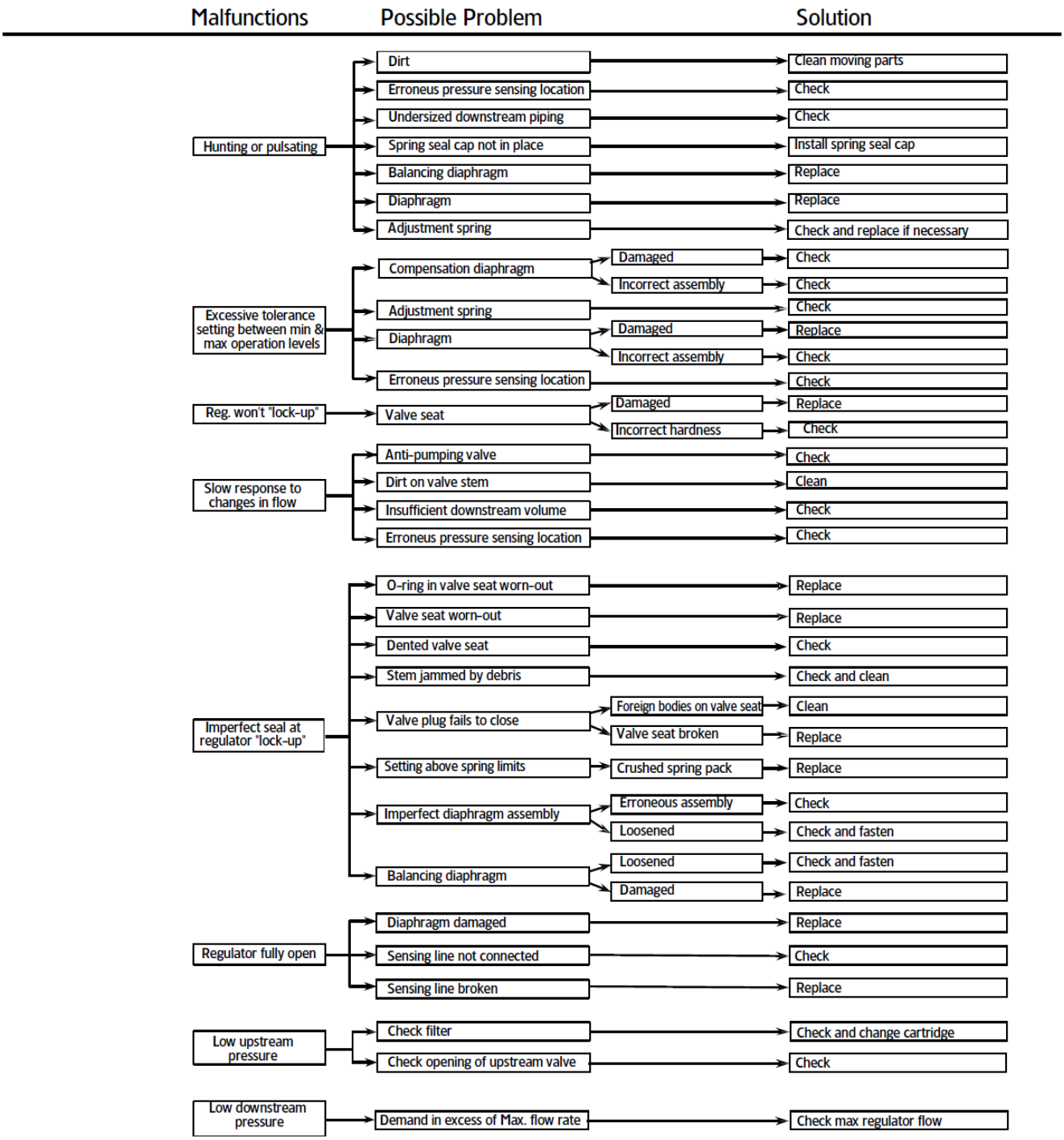
Type and model	RB1700
Inlet size	1-1/2" NPT
Outlet size	1-1/2" NPT
Orifice size	1-1/8"

All test results are reported at a base of 14.7 PSIG at 60º F and with 0.6 S.G. gas.



Rate of flow SCFH

Troubleshooting Guide



Parts List

Spare Parts Kit - RB1710	
Part Number	**Description**
20554590	Balancing diaphragm RBE 1700 DN 1-1/2” (Rev.0)
20554790	Diaphragm RBE 4010 DN 25 (Rev.0)
20603360	Valve plug ShA55 RBE 1710 DN 1-1/2” (Rev.C)
20492760	Adjustment ferrule
45000108	O-Ring or 108
45000114	O-Ring or 114
45003150	O-Ring or 3150
45003181	O-Ring or 3181

Spare Parts Kit - RB1720	
Part Number	**Description**
20552490	Diaphragm RBE 4020 DN 25 (Rev.A)
20554590	Balancing diaphragm RBE1700 DN 1-1/2” (Rev.O)
20604360	Valve plug ShA75 RBE1720 DN 1-1/2” (Rev.B)
45000108	O-Ring or 108
45000114	O-Ring or 114
45003150	O-Ring or 3150
45003181	O-Ring or 3181

Spare Parts Kit - RB1730	
Part Number	**Description**
20554590	Balancing diaphragm RBE1700 DN 1-1/2” (Rev.O)
20556490	Valve plug ShA75 RBE1720 DN 1-1/2” (Rev.B)
45000108	O-Ring or 108
45000114	O-Ring or 114
45003150	O-Ring or 3150
45003181	O-Ring or 3181

Vent Lines for Regulators

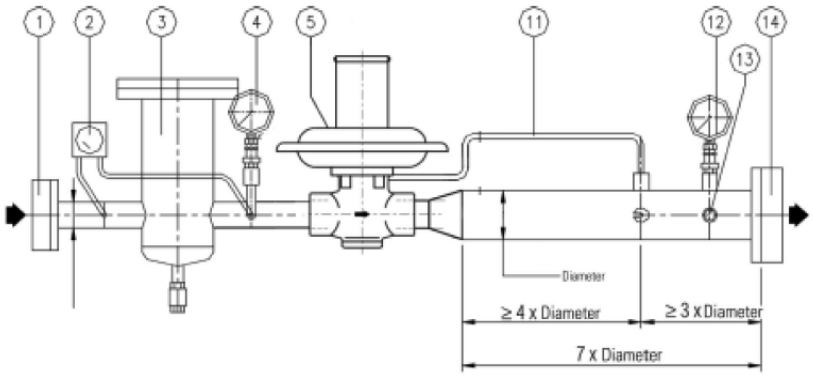
When constructing vent lines to attach to regulators installed indoors, follow a few basic rules:

a. Never use pipe sizes smaller than the vent size; smaller pipe sizes restrict the gas flow. If a long gas run must be used, Itron advises increasing the pipe one nominal size every ten feet to keep the flow restriction as low as possible.
b. Keep the vent line length as short as possible to minimize the restriction and reduce the vent's tendency to cause regulator pulsation.
c. Support the vent pipe to eliminate strain on the regulator diaphragm case.
d. Always point outdoor vent pipes in the downward position to reduce the possibility of rain, snow, sleet, and other moisture entering the pipe. Install a bug screen in the end of the pipe.
e. Do not locate the vent line terminus near windows, fans, or other ventilation equipment. See the installation instructions furnished with the regulator.
f. Adhere to all applicable codes and regulations.
g. If your vent pipe causes regulator pulsation, consult your sales representative or manufacturer.
h. Itron strongly recommends running a separate vent line for each regulator. Headers with various installed devices can cause regulator malfunction.

Caution Ensure the end of the vent line is away from ANY potential ignition sources. It is the installer's responsibility to ensure the vent line is exhausting to a safe environment.

Installation Diagram

Figure #4



▶ Key

No.	Description
1.	Upstream valve
2.	Differential pressure gauge
3.	Strainer/Filter
4.	Upstream pressure gauge
5.	Regulator
11.	Regulator control line
12.	Downstream pressure gauge
13.	Discharge vent pipe
14.	Downstream valve

Installation

Warning Itron does not endorse or warrant the completeness or accuracy of any third party regulator installation procedures or practices, unless otherwise provided in writing by Itron. Follow your company's standard operating procedures regarding the use of personal protection equipment (PPE). Adhere to guidelines issued by your company in addition to those given in this document when installing regulators.

Before installing the pressure regulator in the piping, check the following:

- The pressure regulator must be installed without undue stress to the valve body.
- Clean all impurities from the upstream piping from all impurities (sand, welding slag, etc.)
- The pressure regulator must not show visible damage.
- The inlet and outlet chambers of the pressure regulator must be completely clean.

After these checks are made, install the unit in the piping. Verify that the direction of gas flow corresponds to the arrow on the pressure regulator's body.

Note: Install valve body in horizontal alignment.

Itron recommends the following:

- An electrically insulating joint upstream and downstream, if the incoming and outgoing piping is ferrous material.
- An ON/OFF valve upstream and downstream of the pressure regulator.
- A manometer or pressure gauge upstream and downstream from the pressure regulator.
- An upstream filter.
- A relief valve downstream for start-up and changes in pressure setting
- A relief valve for accidental over-pressure (example: the exposure of the downstream piping to direct sunlight at zero flow).
- Allow enough clearance around the regulator to perform maintenance operations
- If the case of an ON/OFF gas load, the downstream volume must be greater than 1 ft³ per 1000 ft³/hr. of flow rate.
- All variations in diameter downstream must be performed progressively in order to prevent negative turbulence.
- Avoid locating the control line piping:
  - Near sources of heat
  - Direct sun light.
- The pressure regulator's control line must be connected to the downstream pipe. These connections must be inserted in a straight section of the downstream piping as indicated in the installation diagram (Figure 4).
- Weld the control line connections on the upper part of the piping in order to prevent impurities and condensation from collecting and obstructing the passage of the gas. Check that the control line piping slopes slightly downwards to the pipe.
- For adequate operation, the gas velocity at the control line position in the pipe must not exceed those given below.
  - Low pressure
    2.9 psig: 50-65 ft/s
  - Med/high pressure
    2.9 psig: 65-130 ft/s

Start-Up Procedure

After the pressure regulator has been installed, check the following:

- The on/off valve upstream (1) and downstream (14) and the bleeder valve (13) are closed

After checks are made, proceed as follows:

- Partially open the upstream on/off valve (1) slowly just enough to make sure that a very small amount of gas passes;
- Check that the pressure rises slowly on the gauges (4) and (12); the downstream pressure should stabilize around the pre-set value or a value slightly higher (if the pressure continues to rise, discontinue the starting procedure by closing the upstream on/off valve (1) and consult the troubleshooting diagram to identify the cause of the malfunction);
- After the upstream pressure valve has stabilized, open the on/off valve (1) completely;
- Then slowly open the downstream on/off valve (14) until the piping is completely filled.

The pressure regulator is now ready for operation.

Outlet Pressure Adjustment

The pressure regulator is usually delivered adjusted to the specifications indicated in the order. Whenever the set pressure must be modified, the value must be set within the setting range of the spring installed.

First check the suitability of the spring installed to achieve the desired setting value, and then proceed as follows:

- To increase the value of the set pressure:
  Rotate the spring adjustment ferrule nut clockwise using the adjustment wrench until the desired value is reached. (Note: Model RB1710 required a 1" socket for adjustment; Models RB1720 and RB1730 required adjustment tool Part #799056)
- To decrease the value of the set pressure:
  Proceed as above, rotating the spring adjustment ferrule counter-clockwise.

Start-up Procedure

a. Mount a pressure gauge downstream of the regulator to monitor the downstream pressure.
b. With the downstream pressure valve closed, slowly open the inlet valve. The outlet pressure should rise to slightly more than the set point. Verify there are no leaks and all connections are tight.
c. The regulator was pre-set at the factory to match order specifications. If necessary, adjust the outlet pressure by removing the seal cap on the top of the spring housing and adjusting the ferrule or screw inside the spring housing using a large flat-head screwdriver. With a small amount of gas flowing through the regulator, rotate the pilot ferrule clockwise to raise the outlet pressure or counter-clockwise to lower the outlet pressure.
d. Replace the seal cap and check for leaks after the desired outlet pressure is achieved.

The regulator is ready for operation.

Safety Warning

This product, as of the date of manufacture, is designed and tested to conform to all governmental and industry safety standards as they may apply to the manufacturer. The purchaser/user of this product must comply with all fire control, building codes, and other safety regulations governing the application, installation, operation, and general use of this regulator to avoid leaking gas hazards resulting from improper installation, startup or use of this product.

Itron strongly recommends installation by a qualified professional and periodic inspection of pressure regulators (inspections may be required by local applicable codes or regulations).

Inspections should include checking for gas quality, cycle numbers, external environmental changes, and operating conditions that impact wear on the regulator's moving parts. To ensure safe and efficient operation of this product, replace worn or damaged parts found during inspection.

Limited Warranty

Itron, Inc. 970 Highway 127 North, Owenton, Kentucky 40359-9302, warrants this gas product against defects in materials and workmanship for the earlier of one (1) year from the date the product is shipped by Itron or a period of one year from the date the product is installed by Itron at the original purchaser's site. During such one-year period, provided that the original purchaser continues to own the product, Itron will, at its sole option, repair any defects, replace the product or repay the purchase price.

- This warranty will be void if the purchaser fails to observe the procedures for installation, operation or service of the product as set forth in the Operating Manual and Specifications for the product or if the defect is caused by tampering, physical abuse or misuse of the product.
- ITRON SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES INCLUDING THOSE OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES WILL ITRON BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER.
- Itron's liability for any claim of any kind, including negligence and breach of warranty for the sale and use of any product covered by or furnished, shall in no case exceed the price allocable to the product or part thereof which gives rise to the claim.
- In the event of a malfunction of the product, consult your Itron Service Representative or Itron Inc., 970 Highway 127 North, Owenton, Kentucky 40359-9302. See Itron Terms and Conditions of Sale for the full and complete terms of the Limited Warranty.

Ordering Information

Specify:

1. Inlet and Outlet Connection Size and Type
2. Model Number
3. Outlet pressure desired
4. Pilot needed
5. Inlet pressure range
6. Type of gas and maximum capacity required
7. Assembly position number (see chart below)
8. Special requirements such as tagging, 1/8" pipe plug tap, seal wire, etc.

About Itron Inc.

At Itron, we're dedicated to delivering end-to-end smart grid and smart distribution solutions to electric, gas and water utilities around the globe. Our company is the world's leading provider of smart metering, data collection and utility software systems, with nearly 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water. Our offerings include electricity, gas, water and heat meters; network communication technology; collection systems and related software applications; and professional services. To realize your smarter energy and water future, start here: www.itron.com

Itron Gas
970 Highway 127 North
Owenton, Kentucky 40359
USA
Phone: 1.800.490.0657
1.502.484.5747
fax: 1.502.484.6223

Corporate Headquarters
2111 North Molter Road
Liberty Lake, WA 99019
USA
Phone: 1.800.635.5461
Fax: 1.509.891.3355
www.itron.com

© Copyright 2010, Itron Inc. All Rights Reserved. - Itron reserves the right to change these specifications without prior notice.

Publication 101082SP-01 10/10