

# RB1700 Series Regulator

Medium Duty Commercial & Industrial Regulator

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

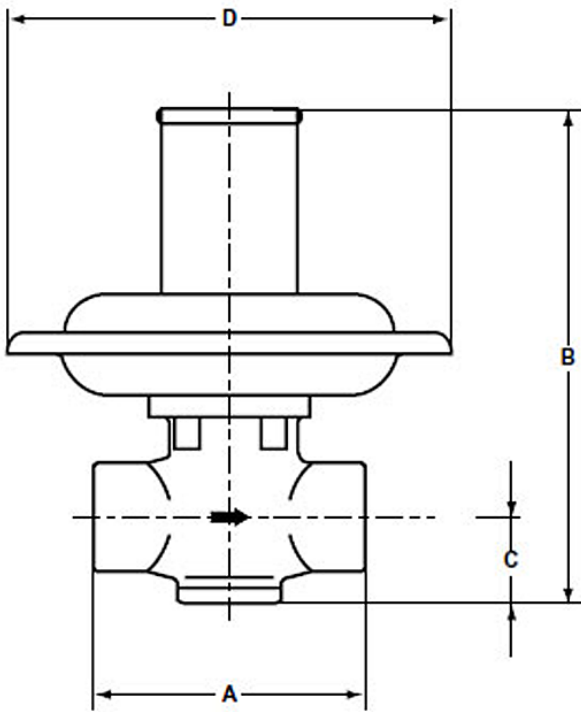
- » Interchangeable adjustment spring
- » Balanced valve design
- » Downstream control
- » Direct acting spring loaded design
- » Over pressure shut-off (OPCO) available
- » Under pressure shut-off (UPCO) available

## SHIPPING WEIGHT

One regulator per box    Box weight: 35 lbs.

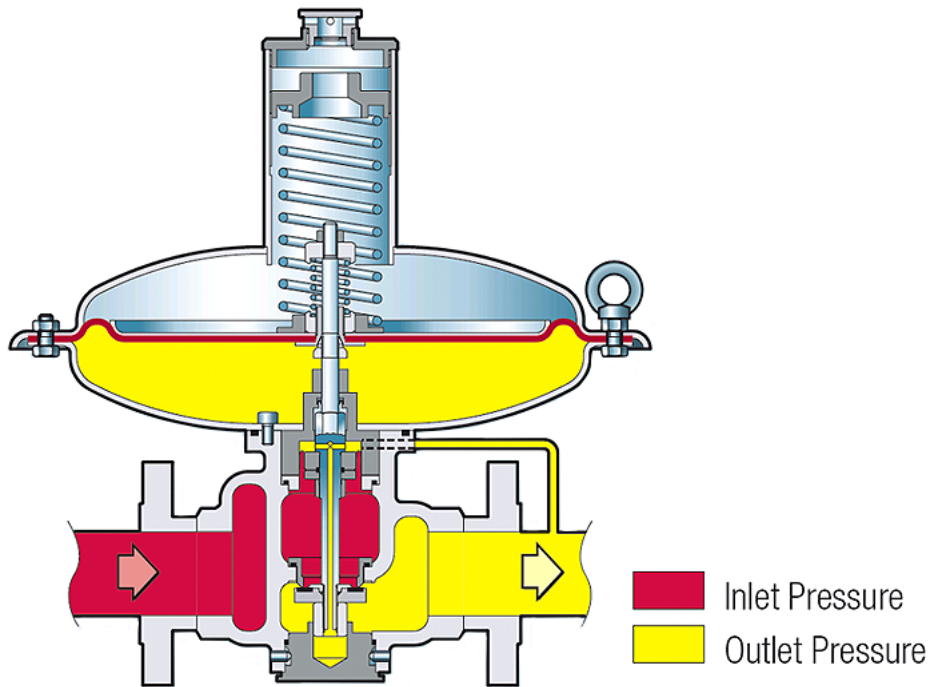
## RB1700 DIMENSIONS (INCHES)

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 - 21.5" w.c.	---	---
Lilac	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 - 24.7 PSIG
Gray	---	---	16.0 - 36.0 PSIG

## OPERATING TEMPERATURE RANGE

- 20°F to 140°F

## ADDITIONAL SPECIFICATIONS

<b>Maximum Inlet Pressure</b>	230 PSIG
<b>Vent Connection</b>	1/4" NPT
<b>Mounting Position</b>	Horizontal or vertical
<b>Pressure Registration</b>	External (control line required, 1/4" NPT)
<b>Other Available Options</b>	Seal wire to indicate unapproved tampering

## MODEL DESIGNATIONS

R	X	X	1	7	X	X	Body Size	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"	Orifice size 1-1/8"

## CONSTRUCTION

Itron takes pride in delivering 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:

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

Where:

SG<sub>1</sub> = Specific gravity of the gas in which the capacity is published.

SG<sub>2</sub> = Specific gravity of the gas to be controlled.

## Wide Open Flow Calculations

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

$$\text{For } \frac{P_1}{P_2} < 1.89 \text{ use: } Q = K\sqrt{P_2(P_1 - P_2)} \quad \text{For } \frac{P_1}{P_2} > 1.89 \text{ use: } Q = \frac{KP_1}{2}$$

Where: P<sub>1</sub> = Absolute Inlet Pressure (PSIA) P<sub>2</sub> = Absolute Outlet Pressure (PSIA)

Q = Flow Rate (SCFH) K = Orifice Coefficient (SCFH/PSI)

# RB1700 SERIES MEDIUM DUTY COMMERCIAL AND INDUSTRIAL REGULATOR

## Capacity Table

### Typical Capacity Info.

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

Type and model RB1700  
 Manufacturer Itron

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. Droop Yellow Spring	2" w.c. Droop Red Spring	2" w.c. Droop 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
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Notes:

\*Individual regulator performance may vary from data shown.

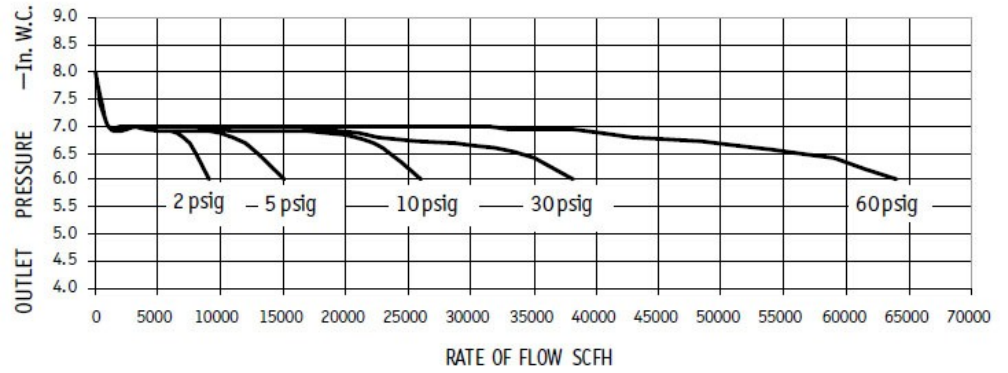
 Do not operate orifice in shaded inlet pressure area.

## 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"

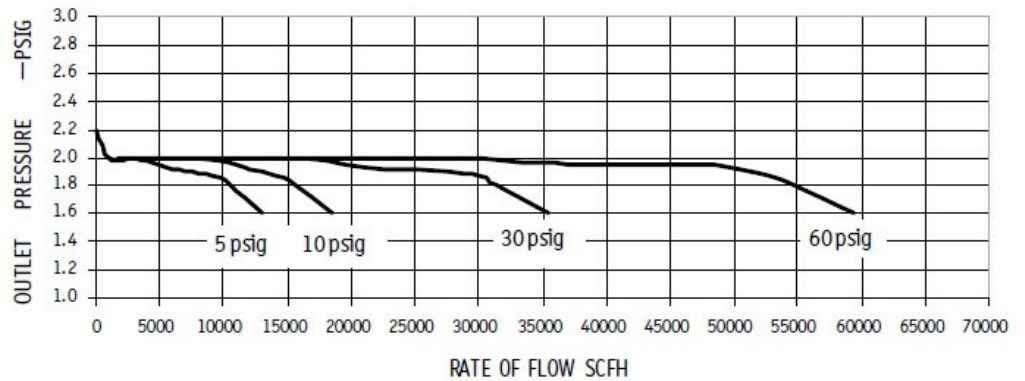
All test results are reported at a base of 14.7 PSIG at 60° F and with 0.6 S.G. gas.



### 2 PSIG Set Point

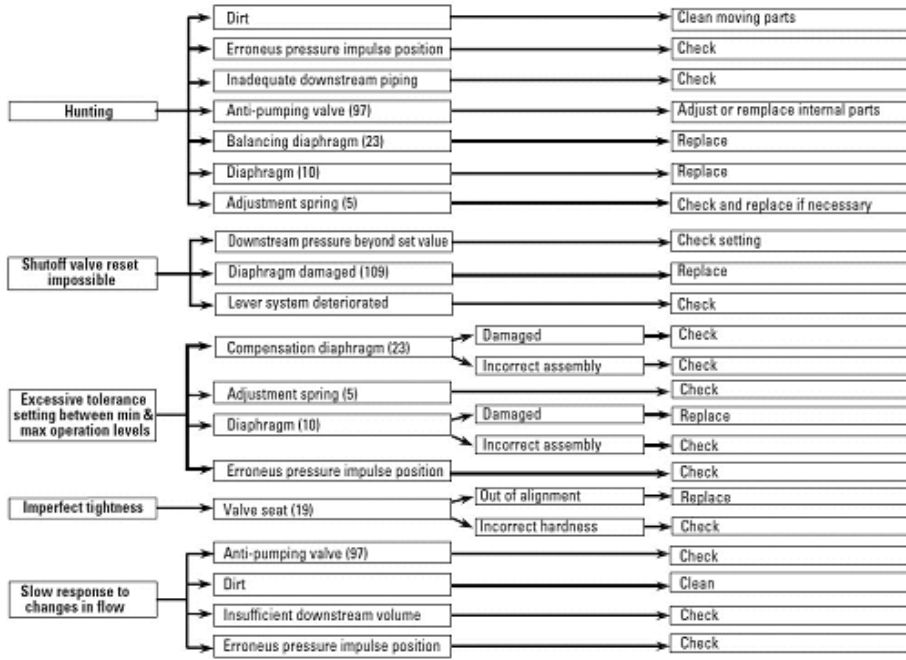
Type and model	RB1700
Inlet size	1-1/2" NPT
Outlet size	1-1/2" NPT
Orifice size	1-1/8"

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

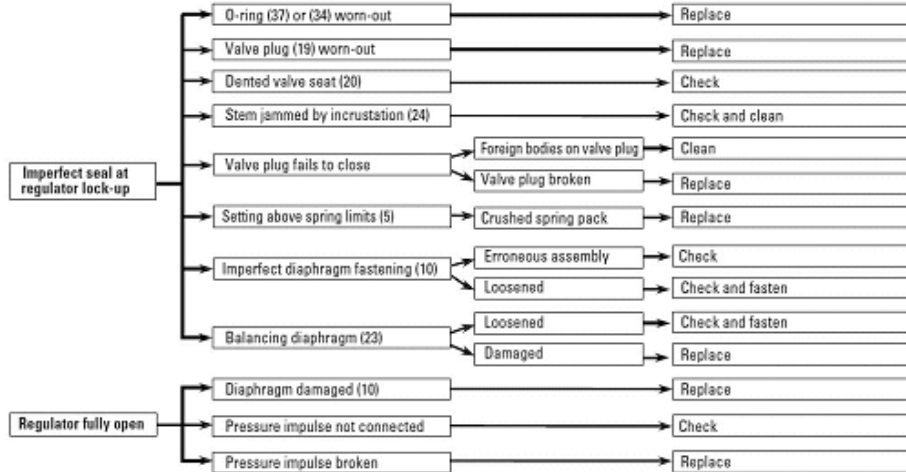


# TROUBLESHOOTING

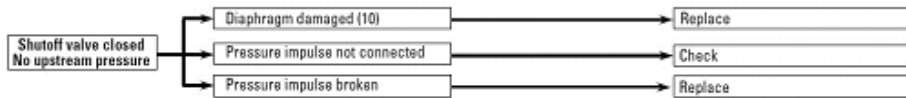
## Malfunction



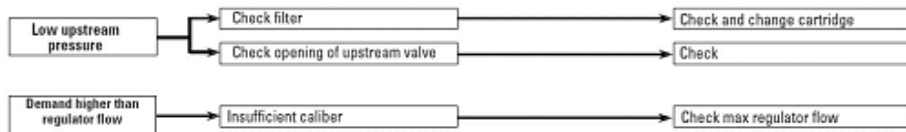
## Pressure Beyond Regulator Setting



## No Flow



## Low Downstream Pressure and Flow





## PARTS LIST

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### Spare Parts Kit RB1710

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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)
45000108	O-ring or 108
45000114	O-ring or 114
45003150	O-ring or 3150
45003181	O-ring or 3181

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### Spare Parts Kit RB1720

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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

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### Spare Parts Kit RB1730

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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

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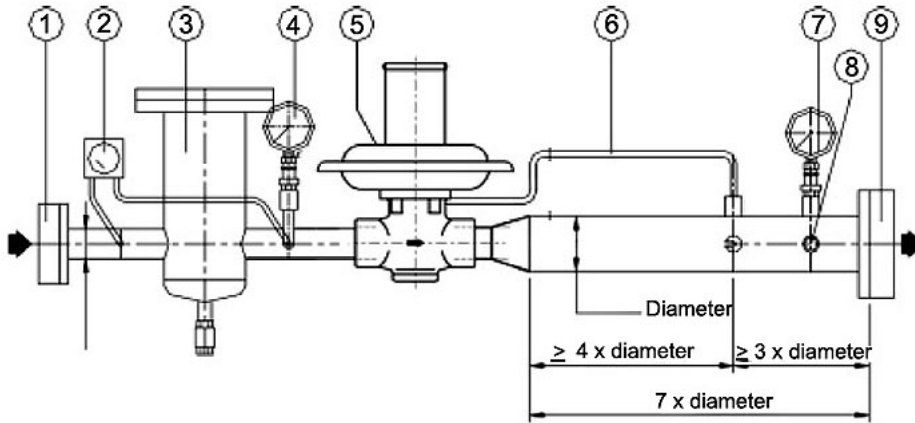
## VENT LINES FOR REGULATORS

When constructing vent lines to be attached 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 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 verify the vent line is exhausting to a safe environment.

## INSTALLATION DIAGRAM



No.	Description
1.	Upstream valve
2.	Differential pressure gauge
3.	Strainer/filter
4.	Upstream pressure gauge
5.	Regulator/monitor
6.	Monitor regulator impulse
7.	Downstream pressure gauge
8.	Discharge vent pipe
9.	Downstream valve

**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.

## INSTALLATION

Before installing the pressure regulator in the piping, remove all shipping plugs from the regulator inlet, outlet, and vent. Verify the following:

- The completed pressure regulator installation cannot cause undue stress to the valve body.
- Clean all impurities from the upstream piping (sand, welding slag, etc.)
- The pressure regulator is not visibly damaged.
- The inlet and outlet chambers of the pressure regulator are completely clean.

After verifying the above requirements, install the unit in the piping. Confirm the gas flow direction corresponds to the arrow on the pressure regulator's body.

**Note** Itron recommends installing the valve body in horizontal alignment.

For optimum regulator operation, Itron also recommends:

- An electrically insulating joint upstream and downstream in installations where the incoming and outgoing piping is made with ferrous material.
- An ON/OFF valve upstream and downstream of the pressure regulator.
- A manometer or pressure gauge upstream and downstream of the pressure regulator.
- An upstream filter.
- A relief valve downstream for start-up and changes in pressure settings.
- A relief valve for accidental over-pressure (for example, the downstream piping is exposed to direct sunlight at zero flow).

- Allow enough clearance around the regulator to perform maintenance operations
- In the case of an ON/OFF gas load, the downstream volume must be greater than 1 ft<sup>3</sup> per 1000 ft<sup>3</sup>/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 (see the installation diagram below). Weld the control line connections on the piping's upper part to prevent impurities and condensation from collecting and obstructing gas passage. Verify the control line piping slopes slightly downwards to the pipe.

For adequate operation, the gas velocity at the pipe's control line position must not exceed:

- 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, verify the upstream valve (1), downstream valve (9), and the discharge vent pipe (8) are closed.

After verifying the valves and discharge vent pipe are closed, complete the following tasks:

- Open the upstream on/off valve (1) slowly, just enough to allow a very small amount of gas to pass.
- Verify the pressure rises slowly on the upstream (4) and downstream (7) pressure gauges. 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 stabilizes, open the on/off valve (1) completely.
- Slowly open the downstream on/off valve (9) until the piping completely fills.

The pressure regulator is now ready for operation.

### Outlet Pressure Adjustment

Itron delivers the pressure regulator adjusted to the order specifications. If the set pressure must be modified, it is important to set the value within the installed spring's setting range. Before performing an outlet pressure adjustment, verify the suitability of the installed spring to achieve the desired setting value, and complete one of the following:

Increase the set pressure value by rotating the spring adjustment ferrule nut clockwise using the adjustment wrench until the desired value is reached.

**Note** Model RB1710 requires a 1" socket for adjustment. Models RB1720 and RB1730 require adjustment tool Part #799056.

Decrease the set pressure value by rotating the spring adjustment ferrule nut counterclockwise using the adjustment wrench until the desired value is reached.

## 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. 2111 North Molter Road Liberty Lake, WA 99019, 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.

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- » 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., 2111 North Molter Road Liberty Lake, WA 99019. 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.



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