

RB1700

The RB 1700 series of regulators is designed for commercial applications, 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.

Advantages

- » Quick response/fast lockup - excellent for all things with a quicker on/off cycle
- » True bubble tight/dead end lock up regulator
- » Horizontally or vertically mounted capability
- » Easy maintenance
- » Rugged construction for durability
- » Balanced valve design eliminates inlet pressure effect
- » Low noise
- » Can be used as an Appliance, Line or service regulator and conforms to ANSI B109.5.



Technical Features

Inlet pressure	230 psi
Outlet pressure	7.7 iwc to 36 psi
Accuracy & lock-up pressure	Up to AC5 / up to SG 10
Operating temperature	-4°F to +140°F
Acceptable gases	Natural gas, town gas, propane, butane, air, nitrogen or any non-corrosive gas
Safety devices	Optional built-in safety shut-off valve Overpressure shut-off (OPSO) and under-pressure shut-off (UPS0)

Materials

Head	Pressed steel UNI EN 10025
Orifice	Stainless Steel
Valve Seat:	Brass with vulcanized Buna-N
Valve Stem:	Stainless Steel
Seals	Nitrile rubber
Diaphragm	Buna-N and nylon reinforcing fabric

Shipping Weight

One regulator per box	Box weight: Varies by Model
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ADDITIONAL SPECIFICATIONS

Maximum Inlet Pressure: 230 PSIG

Outlet Pressure Range: 7.7" w.c. - 36.0 PSIG

Temperature Range: -20 F to + 140F

Acceptable gases: Natural gas, propane, butane, air, nitrogen or any non-corrosive gas

Mounting Position: Horizontal or vertical

Pressure Registration: External (control line required - 1/2" NPT)

Vent Connection: 1/4" NPT

Valve Body sizes: 1-1/2" NPT

Orifice sizes: 1-1/8"

Other available options: 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		Over Pressure Shut Off
						2		Over & Under Pressure Shut Off
							1-1/2"	Orifice size 1-1/8"

Construction materials

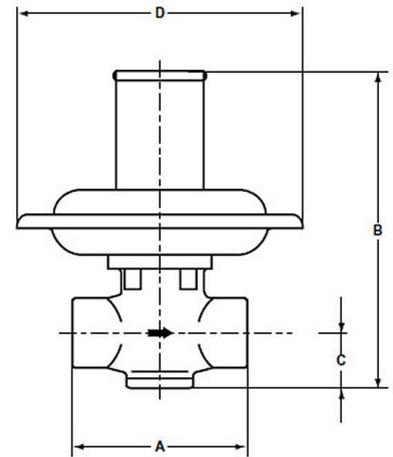
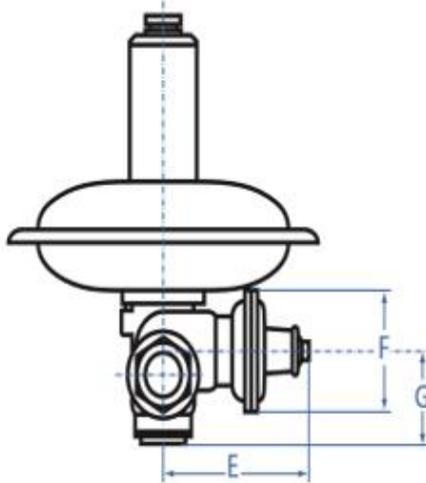
Valve body	Ductile iron
Orifice	Stainless steel
Valve seat	Brass with vulcanized Buna-N
Valve stem	Stainless steel
Valve stem bushings	Nylon
"O" -ring seals	Buna-N Nitrile rubber
Diaphragm	Buna-N and nylon reinforcing fabric
Adjustment screw	Brass
Diaphragm case	Steel

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

Reduce by 5% when a SSV is built into the regulator

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"	8.0"
E	7.3"	7.3"
F	Ø90	Ø90
G	3.35"	3.35"
Weight (lbs.)	33#	28#
W/SSV	35#	30#



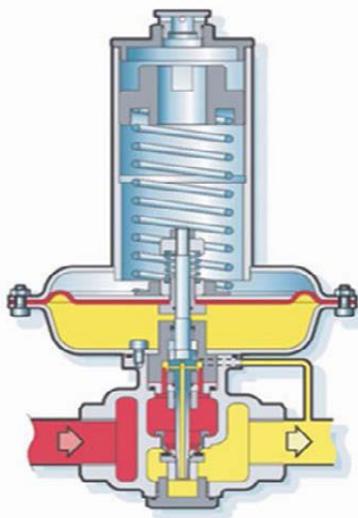
Vent and Sensing Lines

- » Regulator sensing line: 1/4" with compression fitting for 10 mm pipe
- » SSV sensing line:
 - » Rp 1/4 with compression fitting for 10 mm pipe
- » SSV vent line: Rp 1/8

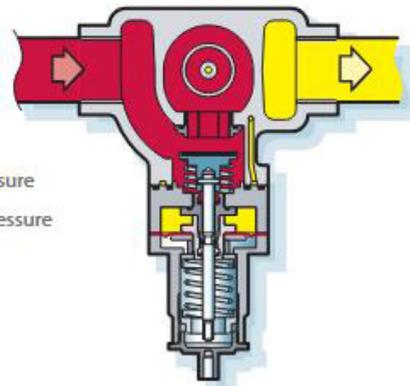
OPERATIONAL SCHEMATIC

SAFETY SHUT-OFF VALVE

■ Inlet Pressure
■ Outlet Pressure



■ Inlet Pressure
■ Outlet Pressure



Note: valve shown in closed position.

The RB 1700 series of regulators can be fitted with safety shut-off valve for overpressure (OPSO) or combined under-and-over pressure (UPSO/OPSO) protection. The SSV trip pressure can easily be adjusted independently of the regulator set point. The closing plug of the SSV controller is used as pulling tool to relatch the valve. A built-in bypass, for balancing pressure before relatching the safety shut-off valve, is operated by pulling the valve stem.

Minimal difference between regulator and SSV settings (ΔP_w):

- » 15% of set point with a minimum difference of .15 psi to UPSO, .29 psi to OPSO

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_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:

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

Where:

P_1 = Absolute Inlet Pressure (PSIA)

P_2 = Absolute Outlet Pressure (PSIA)

Q = Flow Rate (SCFH)

K = Orifice Coefficient (SCFH/PSI)

Outlet Pressure Range

Spring Code	Spring Characteristic				Color	Spring Range		
	d (in)	Di (in)	Lo (in)	Lt		1710/11/12 (Ø 480)	1720/21/22 (Ø 360)	1730/31/32 (Ø 360/TR)
20567075	0.14	1.69	7.87	0.61	Yellow	7.7-10" WC	-	
20567076	0.14	1.69	7.87	0.42	Red	9.7-12.7" WC	-	
20567662	0.18	1.69	6.30	0.43	White	10.8-21.3" WC	-	
20567663	0.22	1.69	6.30	0.41	Lilac	20.8-40.1" WC	1.74 – 5.37 psi	
20567664	0.22	1.69	6.30	0.41	Orange	1.31 – 3.05 psi	3.34 – 8.70 psi	
20567665	0.28	1.69	5.51	0.41	Brown	-	4.50 – 9.43 psi	7.25 – 14.50 psi
20567666	0.30	1.69	6.30	0.41	Green	-	5.80 – 13.05 psi	8.70 – 19.58 psi
20567761	0.31	1.69	5.51	0.35	Black	-	-	15.95 – 24.66 psi
20567762	0.35	1.69	5.51	0.35	Grey	-	-	16.95 – 36.26 psi

Over Pressure Shut-off Springs (OPSO)

Spring Code	Spring Characteristic				Spring Range		
	d (in)	Di (in)	Lo (in)	Lt	1811 - 1812 (Ø 120)	1821 - 1822 (Ø 90)	1831 - 1832 (Ø90 TR)
20563022	0.06	0.98	1.38	0.22	12.7-24.1" WC	-	
20563023	0.07	0.98	1.38	0.22	18.5-32.1" WC	-	
20563014	0.07	0.98	1.38	0.22	1.02 – 1.81 psi	-	
20563124	0.09	0.98	1.38	0.22	1.81 – 3.19 psi	-	
20563121	0.10	0.98	1.38	0.20	3.05 – 5.37 psi	-	
20565225	0.08	1.38	1.97	0.24	-	2.18 – 2.32 psi	
20565125	0.10	1.38	1.97	0.24	-	2.32 – 5.51 psi	
20565126	0.12	1.38	1.97	0.24	-	5.51 – 11.60 psi	9.43 – 18.42 psi
20565127	0.14	1.38	1.97	0.24	-	11.60 – 23.21 psi	18.13 – 37.71 psi
20565128	0.16	1.38	1.97	0.24	-	-	33.36 – 60.92 psi

Under Pressure Shut-off Springs (UPS0)

20560515	0.03	0.39	1.18	0.39	4.2-5.5"WC	-	
20560518	0.04	0.39	1.18	0.39	5.5-12.7" WC	-	
20560516	0.04	0.39	1.18	0.39	12.7-22.4" WC	-	
20561022	0.05	0.59	1.38	0.31	-	20.2-22.1"WC	
20560815	0.05	0.59	1.38	0.31	-	22.1-34 "WC	
20561023	0.06	0.59	1.38	0.31	-	1.16 – 2.61 psi	
20561024	0.07	0.59	1.38	0.30	-	2.18 – 5.37 psi	3.63 – 8.70 psi
20561121	0.08	0.59	1.38	0.29	-	4.64 – 5.37 psi	6.09 – 15.81 psi
20561122	0.10	0.59	1.38	0.29	-	-	15.66 – 39.16 psi

Spring characteristics:

d: wire diameter Lo: height
 De: external diameter Lt: no. of spires
 Di: internal diameter

RB1700 SERIES MEDIUM DUTY COMMERCIAL AND INDUSTRIAL REGULATOR

Typical Capacity Info.

Manufacturer	Actaris
Type and model	RB1700

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

Inlet Pressure (PSIG)	Model RB1710				Model RB1720			
	Outlet Pressure Setting							
	8" 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 SERIES MEDIUM DUTY COMMERCIAL AND INDUSTRIAL REGULATOR

Typical Capacity Info.

Manufacturer	Actaris
Type and model	RB1700

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

Inlet Pressure (PSIG)	Model RB1730					
	Outlet Pressure Setting					
	15 PSIG		20 PSIG		35 PSIG	
	1.45 psig Droop	2.9 psi Droop	2 psig Droop	4.35 psig Droop	3.6 psig Droop	7.25 psig Droop
15	6,710	14,126	-	-	-	-
20	9,888	19,423	-	-	-	-
25	13,420	28,252	9,888	-	-	-
30	15,538	31,783	12,713	24,720	-	-
35	17,657	35,315	16,951	33,549	-	-
40	19,423	38,846	19,423	35,315	6,003	12,713
50	24,720	38,846	24,720	38,846	19,423	38,846
60	26,486	38,846	28,252	38,846	22,955	38,846
70	31,783	38,846	33,549	38,846	30,017	38,846
80	35,315	38,846	35,315	38,846	33,549	38,846
90	38,846	38,846	38,846	38,846	35,315	38,846
100	38,846	38,846	38,846	38,846	38,846	38,846
115	38,846	38,846	38,846	38,846	38,846	38,846
125	38,846	38,846	38,846	38,846	38,846	38,846
130	38,846	38,846	38,846	38,846	38,846	38,846
135	38,846	38,846	38,846	38,846	38,846	38,846
145	38,846	38,846	38,846	38,846	38,846	38,846
230	38,846	38,846	38,846	38,846	38,846	38,846
Lock-up Pressure	15.4 PSIG		20.5 PSIG		35.6 PSIG	

Notes:

*Individual regulator performance may vary from data shown.

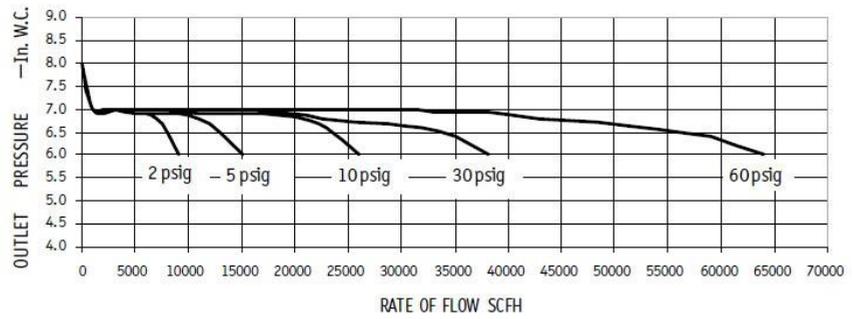
Do not operate orifice in shaded inlet pressure area.

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"

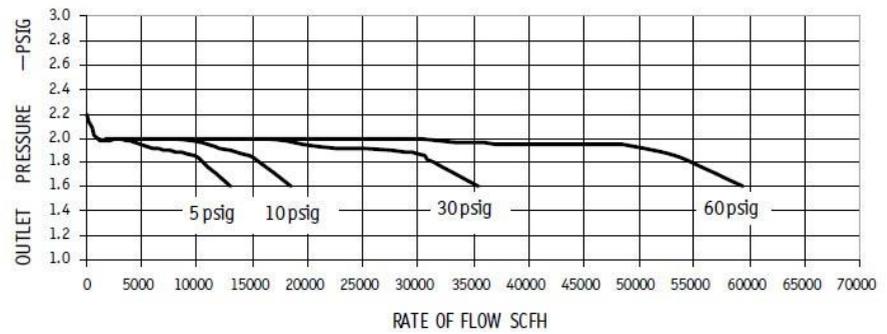
All test results are reported at a base of 14.7 PSIG at 60° F and with 0.6 S.G. gas.



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.

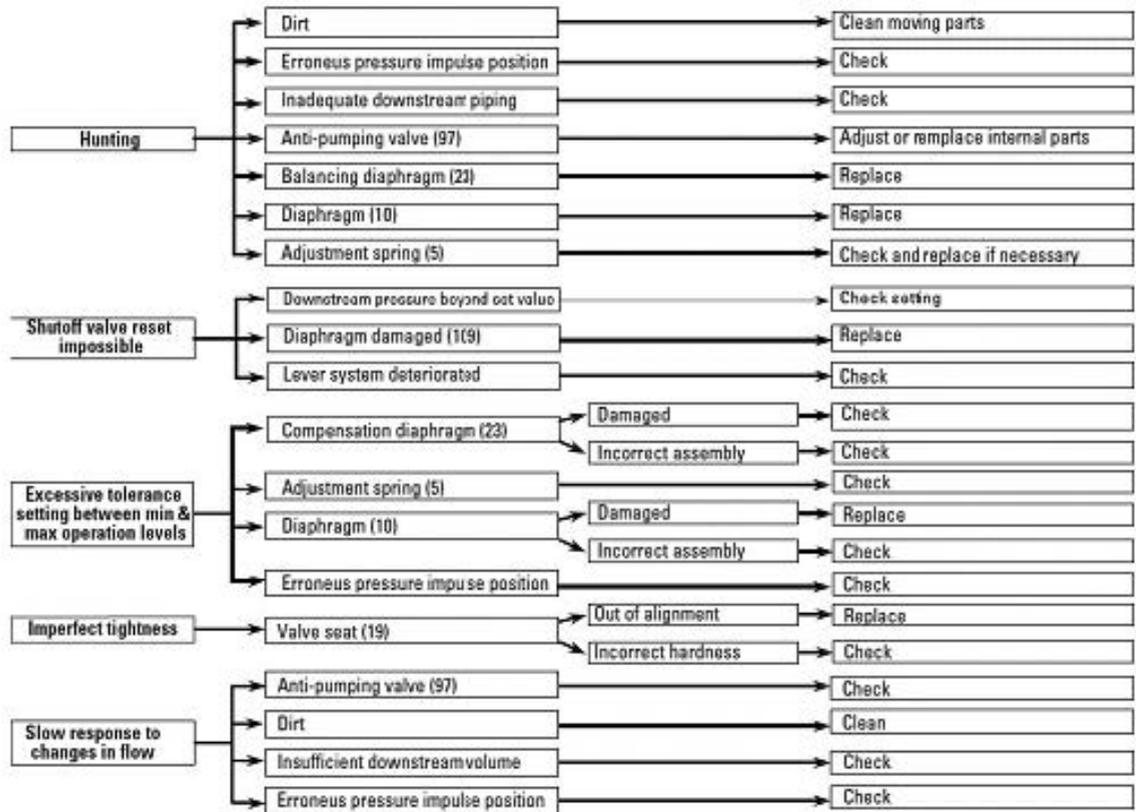


Relief Valve

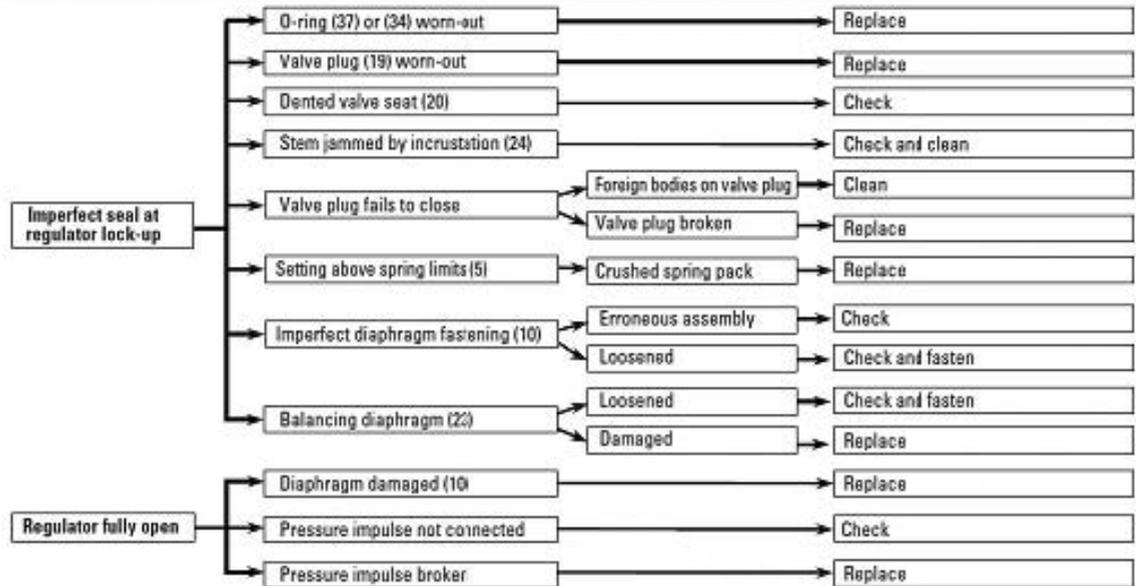
The built-in token relief valve is set .15 psi above the outlet pressure setting.

TROUBLESHOOTING

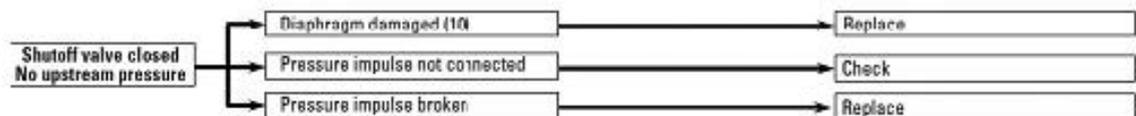
Malfunction



Pressure Beyond Regulator Setting



No Flow



Low Downstream Pressure and Flow



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)
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

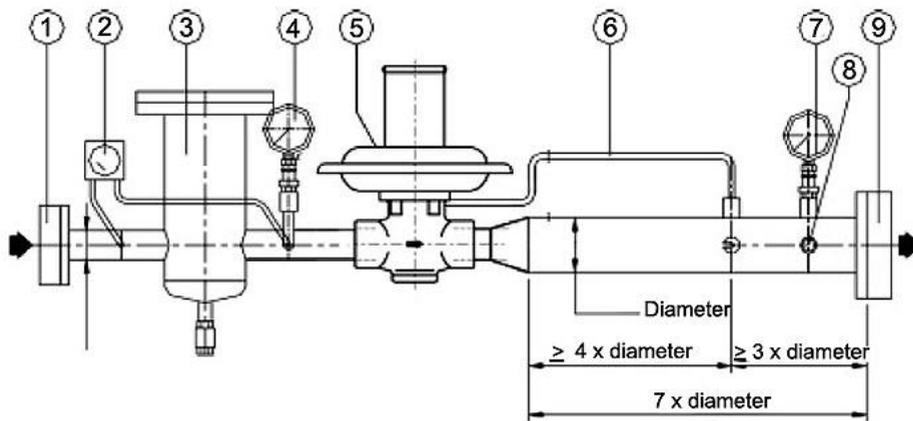
VENT LINES FOR REGULATORS

When constructing vent lines to 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, Actaris/Roots 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. Actaris/Roots 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



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 Actaris/Roots does not endorse or warrant the completeness or accuracy of any third party regulator installation procedures or practices, unless otherwise provided in writing by Actaris/Roots. 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 Actaris/Roots recommends installing the valve body in horizontal alignment.

For optimum regulator operation, Actaris/Roots 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 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 (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.

ROOTS Regulators

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Outlet Pressure Adjustment

Actaris/Roots 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.

Actaris/Roots 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.



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