



Regulator Installation and Maintenance Instructions

143-80 Service Regulator

The 143-80 is an excellent general purpose gas pressure regulator. Use it for natural gas, air, dry CO₂, propane, butane, nitrogen, and others.

It can be used for gas services to homes, commercial establishments and small industries, for burners, unit heaters, boilers, and other equipment.

Model 143-80-1 is a standard regulator. The Model 143-80-2 includes an internal relief valve. The 143-80 is also available with a low pressure cut-off — Models 143-80-4 and 143-80-6.

Maximum Inlet Pressures—Standard IRV Models and High-Pressure Models							
Orifice	5/8"	1/2"	3/8"	5/16"	1/4"	3/16"	1/8"
Pressure	10 psi	20 psi	40 psi	40 psi	60 psi	125 psi	125 psi

PIPE SIZES (Inlet x Outlet, NPT)			
3/4" x 3/4"	3/4" x 1"	1" x 1"	1 1/4" x 1 1/4"

Maximum Inlet Pressure – Low Pressure Cut-Off				
ORIFICE SIZE	1/4"	5/16"	3/8"	7/16"
Maximum Inlet Pressure	60 psig	40 psig	25 psig	15 psig

Installation and Start-Up

- Remove the shipping plugs from both the regulator inlet and outlet connections.
- Make certain that the inside of the piping and the regulator inlet and outlet connections are clean — they must be free of dirt, pipe dope and other debris.
- Use pipe joint material only on the male threads of the pipe being connected to the regulator. **Do not** use pipe joint material on the female threads of the regulator.
- Install the regulator in the line. Make certain that the gas flow through the regulator is in the direction as indicated by the arrow on the regulator body.

The regulator may be installed in any position: right side up, upside down, vertical piping, diagonal piping, etc. If required, the diaphragm case may be rotated 360° in 90° increments.

By loosening coupling nut (11), the diaphragm case assembly may be rotated to various positions in relation to the body. Make certain (11) is retightened to hold diaphragm case assembly in new position and to reseal. 35 to 50 ft.-lbs. of torque is recommended.

Diaphragm case vent should be positioned to minimize chances of moisture collecting on vent side of diaphragm. Upper diaphragm case may be rotated to downward position by removing flange screws (6).

The diaphragm case vent must be positioned to protect against flooding, rain water, ice formation, traffic, tampering, etc. The vent must be protected against nest building animals, bees, insects, etc. to prevent vent blockage and minimize the chances for foreign material

from collecting in the vent side of the regulator diaphragm. If required, the upper diaphragm case may be rotated by removing the upper to lower case flange screws and rotating the upper diaphragm case to the desired position. Reinstall the diaphragm flange screws and tighten to hold the upper diaphragm case in position and reseal.

CAUTION

Turn gas on very slowly. If an outlet stop valve is used, it should be opened first. Do not overload the diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload.

- Turn the gas on very slowly.
- Make certain that there are no leaks and that all connections are tight.
- Adjust outlet pressure (set-point) by removing cap (1) or (1a) and turning adjustment spring button (3). Turn clockwise to increase and counter-clockwise to decrease outlet pressure. Only adjust when gas is flowing through regulator. Be sure to reinstall cap (1) or (1a).

CAUTION

It is the user's responsibility to assure that all regulator vents and/or vent lines exhaust to a non-hazardous location away from ANY POTENTIAL sources of ignition. Where vent lines are used, it is the user's responsibility to assure that each regulator is individually vented and that common vent lines ARE NOT used.

- The vent connection is an escape path for flammable gas and it must be located and/or piped so that potential discharge occurs in a safe area away from buildings, open flames, collection areas, arcing devices, etc.

Regulators that are installed indoors or in a non-vented area must be vented to the outside. Simply run vent piping from the regulator vent connection to a non-hazardous location on the outside away from any potential sources of ignition. The vent piping must be connection size or larger and piped to a safe area. The vent discharge must be protected against the potentials outlined in instructions #4, #8, and #9.

For regulators equipped with internal relief valves (IRV), models 143-80-2 and 143-80-2HP, vent piping must be vent connection size or larger. This will assure that the vent piping will be large enough to be able to vent all of the internal relief valve discharge to atmosphere without excessive back pressure that would result in excessive pressure increase in the regulator.

The outlet of the vent piping must allow for the free and unobstructed passage of air and gas and must be protected against the potentials listed in instructions #4, #8, and #9.

- 9** For outdoor installations, it is recommended that the regulator be installed so that the regulator vent faces downward to avoid the potential for water or other foreign matter entering the regulator and interfering with the proper operation of the regulator.

CAUTION

Regulators are pressure control devices with numerous moving parts subject to wear that is dependent upon particular operating conditions. To assure continuous satisfactory operation, a periodic inspection schedule must be adhered to with the frequency of inspection determined by the severity of service and applicable laws and regulations.

Servicing

- 1** For access to valve (14) and orifice (16), loosen coupling nut (11) and remove diaphragm case assembly from body.
- 2** Pull valve off stem to remove (15). Orifice (16) unscrews from body using 1" hex socket wrench "thin-wall" type. Rescrewing orifice must be installed at 50 to 60 ft.-lbs.
- 3** To replace diaphragm assembly: remove spring, remove flange screws and nuts (6) and (7), and disassemble diaphragm assembly. Make certain all parts are reassembled in their correct order and all threads and joints are tightened evenly and firmly.
- 4** Before reassembling coupling nut (11), make certain Tetraseal (13) is in position.
- 5** Upon completing reassembly, make certain that the regulator is free of leaks.

Over Pressurization Protection

Protection must be provided for the downstream piping system and the regulator's low pressure chambers to assure against the potential over-pressurization due to a regulator malfunction or a failure of the regulator to lock-up. The allowable over-pressurization is the lowest of the maximum pressures permitted by federal codes, state codes, Equimeter Bulletin RDS-1498, or other applicable standards. The method of providing over-pressure protection could be a relief valve, a monitor regulator, a shut-off device or any similar device.

Spring Ranges

OUTLET PRESSURE RANGES	SPRING COLOR	SPRING PART NUMBER
3½" to 6½" w.c.	Red	143-62-021-15
5" to 8½" w.c.	Blue	143-62-021-16
6" to 14" w.c.	Green	143-62-021-17
12" to 28" w.c.	Orange	143-62-021-18
½ psi to 2 psi	Black & White	143-62-021-22
½ psi to 3 psi	Cadmium*	173-62-021-02
2 to 6 psi	Black*	139-16-021-01

* For high pressure models only (143-HP and 143-2HP)

Buried Service

The 143-80 Service Regulator *is not* recommended for buried service.

143-80 Regulator Condensed Parts List

ILL. NO.	DESCRIPTION	PART NUMBER
1	Seal Cap	143-08-005-01
	Seal Cap, aluminum*	138-02-005-01
2	Seal Cap Gasket	120-08-066-00
3	Adjustment Spring Button, plastic	143-08-009-00
	Adjustment Spring Button, brass*	143-62-009-02
4	Vent Valve Assembly	143-62-313-00
5	Push Nut	903979
6	Flange Screw, #10-24 x ¾" hex head steel	951038
8	Diaphragm & Pan Assembly, std.	143-80-550-00
	Diaphragm & Pan Assembly, high pressure*	143-62-550-12
8a	Diaphragm, high pressure*, std.	143-62-150-05
8b	Diaphragm Pan, high pressure*, std.	173-62-017-01
8c	Seal Washer, high pressure*, std.	143-62-352-00
9	Springs - See Table	-
10	Diaphragm & Pan Assembly	
	IRV 7" w.c. relief	143-80-550-02
	IRV 9" w.c. relief	143-80-550-04
	IRV High Pressure*	143-62-550-14
11	Coupling Nut	143-62-102-00
12	Snap Ring	143-62-130-02
13	Tetraseal (TS 33-133)	902497
14	Valve, Buna N	143-60-011-00
16	Orifice, ⅛" aluminum	143-62-023-37
	Orifice, ⅜" aluminum	143-62-023-40
	Orifice, ¼" aluminum	143-62-023-42
	Orifice, ⅝" aluminum	143-62-023-43
	Orifice, ⅜" aluminum	143-62-023-44
	Orifice, ½" aluminum	143-62-023-45
	Orifice, ⅝" aluminum	143-62-023-46
	Orifice, ⅛" brass	143-62-023-00
	Orifice, ⅜" brass	143-63-023-01
	Orifice, ¼" brass	143-62-023-02
	Orifice, ⅝" brass	143-62-023-03
	Orifice, ⅜" brass	143-62-023-61
	Orifice, ½" brass	143-62-023-62
	Orifice, ⅝" brass	143-62-023-63
17	Valve Stem	143-60-016-00

* Use aluminum cap on all high pressure models. Use the brass spring button with the black & white spring 143-62-021-22, the cadmium spring 173-62-021-02, or the black spring 139-16-021-01.

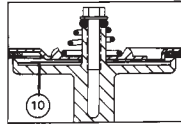
Spring Ranges - Low Pressure Cut-Off

OUTLET PRESSURE RANGES	SPRING COLOR	SPRING PART NUMBER
4½" to 7½" w.c.	Red	143-62-021-15
6½" to 9½" w.c.	Blue	143-62-021-16
7½" to 15" w.c.	Green	143-62-021-17

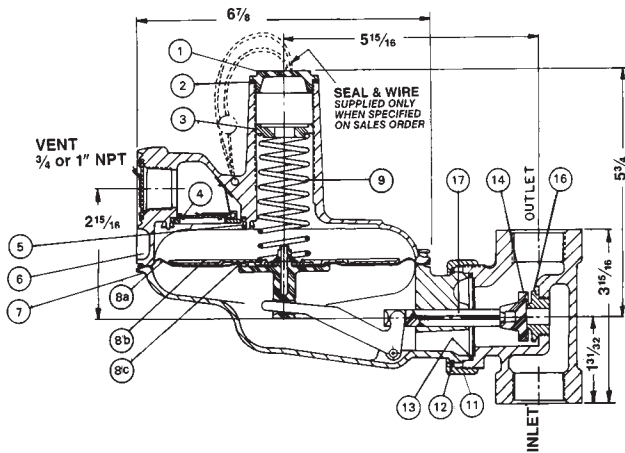
Temperature Limits

The 143-80 Service Regulator can be used for flowing temperatures from -20°F. to 150°F.

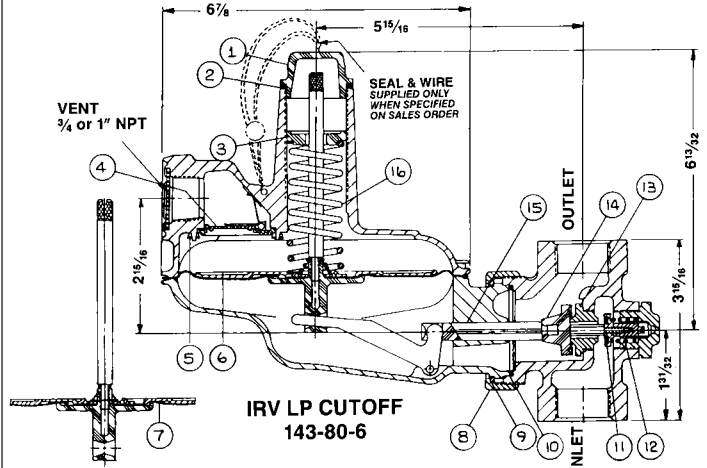
143-80 LPCO Regulator General Assembly



INTERNAL RELIEF VALVE
Used in Model 143-80-2.
Relieves at approx. 7" w.c. above regulator set-point. Refer to Bulletin R 1301 for capacities.



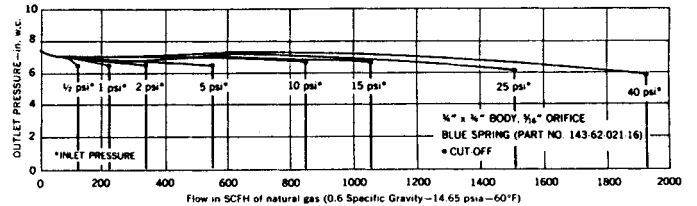
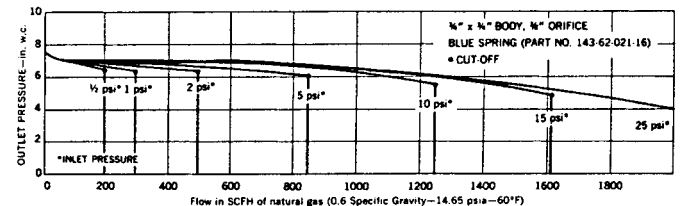
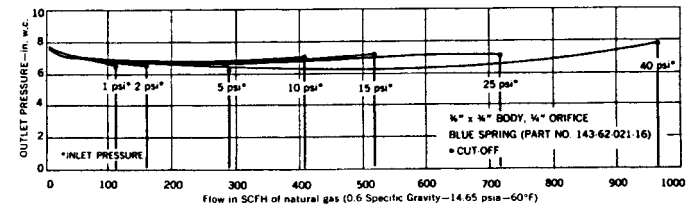
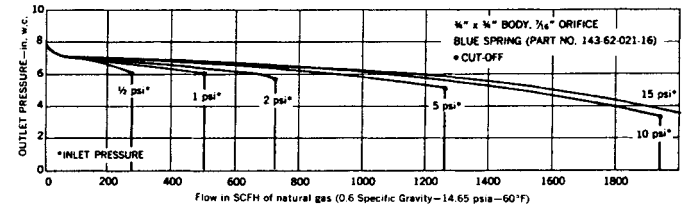
143-80-4 & 6 Regulator General Assembly



143-80 LPCO Regulator Condensed Parts List

ILL. NO.	DESCRIPTION	PART NUMBER
1	Seal Cap, aluminum	138-02-005-01
2	Seal Cap Gasket	120-08-066-00
3	Adjustment Spring Button, plastic	143-08-009-01
	Adjustment Spring Button, brass	143-62-009-02
4	Vent Valve Assembly	143-62-313-00
5	Push Nut	903979
6	Diaphragm & Pan Assembly LPCO IRV 7" w.c. relief	143-80-550-03
	LPCO IRV 9" w.c. relief	143-80-550-05
7	Diaphragm & Pan Assembly LPCO std.	143-80-550-01
8	Coupling Nut	143-62-102-00
9	Snap Ring	143-62-130-02
10	Tetraseal (TS 33-133)	902497
11	Cut-off Valve Assembly	143-62-516-00
12	Cut-off Valve Spring	143-62-021-23
13	Orifice, 1/4" aluminum	143-62-023-49
	Orifice, 5/16" aluminum	143-62-023-51
	Orifice, 3/8" aluminum	143-62-023-52
	Orifice, 7/16" aluminum	143-62-023-53
	Orifice, 1/4" brass	143-62-023-14
	Orifice, 5/16" brass	143-62-023-11
	Orifice, 3/8" brass	143-62-023-12
	Orifice, 7/16" brass	143-62-023-13
14	Valve, Buna N	143-60-011-00
15	Valve Stem	143-72-016-00
16	Springs - See Table	-
17	Flange Screw, #10-24 x 3/4" hex head steel	951038

Typical Performance Curves



143-80 Service Regulator Capacity Table

Flow capacities are in standard cubic feet for 0.6 specific gravity gas. For other gases, multiply the table values by the correction factor corresponding to the gas used. Full open capacity can be

determined by substituting the proper "K" factor for the orifice used into the full open capacity formula. Refer to Equimeter Bulletin R 1301 for additional performance data and calculations.

CAPACITY*

PIPE SIZE (Inches)	INLET† PRESSURE (psig)	ORIFICE SIZE (Inches)						
		1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
3/4" x 3/4"	1/2	—	—	—	—	340	450	510
	1	—	—	—	480	500	510	530
	2	—	—	530	560	570	580	600
	3	—	420	600	620	630	650	670
	5	250	560	700	720	730	770	790
	7 1/2	310	700	840	860	880	900	900
	10	370	830	950	970	1000	1020	1020
	20	530	1200	1220	1240	1250	1270	—
	40	860	1570	1330	1340	1450	—	—
	60	1200	1660	1520	—	—	—	—
	80	1500	1710	—	—	—	—	—
	125	1800	1900	—	—	—	—	—
	3/4" x 1" 1" x 1"	1/2	—	—	—	—	350	460
1		—	—	—	480	550	600	650
2		—	—	530	700	840	880	780
3		—	420	650	870	1000	920	810
5		250	560	890	1120	1160	950	970
7 1/2		310	700	1140	1340	1270	1140	1060
10		370	840	1360	1500	1330	1200	1180
20		530	1230	2000	1600	1480	1400	—
40		860	1700	2000	1640	1900	—	—
60		1200	1900	2000	—	—	—	—
80		1540	2000	—	—	—	—	—
125		2100	2100	—	—	—	—	—
3/4" x 1/4" 1" x 1/4" 1 1/4" x 1 1/4"		1/2	—	—	—	—	350	460
	1	—	—	—	480	550	680	760
	2	—	—	530	700	840	1020	1030
	3	—	420	650	870	1030	1200	1050
	5	250	560	890	1180	1350	1490	1050
	7 1/2	310	700	1140	1500	1610	1560	1060
	10	370	840	1360	1700	1710	1800	1180
	20	530	1230	1600	1800	1900	1900	—
	40	860	1800	2200	1900	2000	—	—
	60	1200	2100	2400	—	—	—	—
	80	1550	2200	—	—	—	—	—
	125	2250	2400	—	—	—	—	—

*Capacities are based on maximum outlet pressure variations as follows:

RED and BLUE Springs—1" w.c. droop GREEN Spring—2" w.c. droop ORANGE Spring—3" w.c. droop BLACK/WHITE and CADMIUM Springs—1/4 psig droop
BLACK Spring—10% droop

†1/2 psig, 1 psig and 2 psig Inlet Pressures apply only to RED and BLUE Springs.

Last capacity figure in each column indicates maximum allowable inlet pressure (except for emergency conditions).

NOTE: These capacities do not apply to the GREEN, ORANGE, and BLACK Springs.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

Maximum Emergency Pressure

The maximum pressure the regulator inlet may be subjected to under abnormal conditions without causing damage to the regulator is:

143-80-1	143-80-2	} Maximum Inlet Pressure + 50 psi
143-80-21	143-80-22	
143-80-1HP	143-80-2HP	
143-80-4	143-80-24	} Maximum Inlet Pressure + 10 psi
143-80-6	143-80-26	

The maximum pressure to which the 143-80 diaphragm case may be subjected under abnormal conditions without causing damage to the internal parts of the regulator is the set-point + 3 psi. If the outlet pressure exceeds this pressure, the regulator must be removed from service and carefully inspected. Damaged or otherwise unsatisfactory parts must be replaced before returning the regulator to service.

The maximum outlet pressure that can be safely contained in the 143-80 diaphragm case is 10 psi (safely contained means no leakage as well as no bursting).

Other Gases

The Service Regulator is mainly used on natural gas services; however, this regulator will perform equally well on other gases. When using the Service Regulator on other gases, the regulator capacities must be adjusted using the following correction factors.

Type of Gas	Correction Factor
Air (specific gravity 1.0)	0.77
Propane (specific gravity 1.53)	0.63
1350 BTU Propane-Air Mixture (specific gravity 1.20)	0.71
Nitrogen (specific gravity 0.97)	0.79
Dry CO ₂ (specific gravity 1.52)	0.63

For other non-corrosive gases use the following formula:

$$\text{Correction Factor} = \sqrt{\frac{0.60}{\text{Specific gravity of the gas}}}$$

For use with gases not listed above, please contact your Equimeter representative or Industrial Distributor for recommendations.



143-80-4 Service Regulator with low pressure cut-off 143-80-6 Service Regulator with low pressure cut-off and internal relief

This is the low pressure cut-off version of the 143-80 domestic service regulator.

It is a safety device which stops the inlet gas supply if the outlet pressure drops below a certain point.

Hazardous conditions sometimes develop as a result of a loss in service pressure. A good example of this would be flame or pilot outage resulting from a line break, an interruption in the gas supply, or an excessive demand. The low pressure cut-off acts as a safety device for the gas service.

The cut-off unit consists of an extra valve which seats against the inlet side of the orifice. As the main valve moves away from its seat to increase flow, in response to a decreasing outlet pressure signal, the cut-off valve moves toward its seat. If the main valve movement becomes excessive, the cut-off valve will take over and go closed. At this point the gas supply is shut off and cannot be resumed until the cut-off unit is manually reset.

Basically, cut-off is triggered by an excessive drop in outlet pressure. However, the specific outlet pressure at which cut-off occurs also depends on the size of the orifice and the inlet pres-

sure. Cut-off points are shown on the performance curves on the reverse side of this sheet, along with the capacity table.

As mentioned previously, once the cut-off closes, it must be manually opened to put the regulator back into operation. It must also be manually opened when put into service initially or when returned to service after being shut down. This is easily done by removing the cover cap and pulling upwards on the diaphragm post extension.

Installation is simple and quick. It is the same as for other standard types of domestic service regulators. The control line is internal.

Adjustment for the outlet pressure set-point is simple. Just remove the cover cap and screw the adjustment ferrule down or up to raise or lower pressure.

The 143-80 regulator with low pressure cut-off can be furnished WITH OR WITHOUT INTERNAL RELIEF. If it is used on LP and manufactured gas as well as natural gas, and in addition, also can be used on air, dry CO₂, nitrogen, and others.

For information on the basic 143 regulator, please refer to Bulletin R 1301.

143-80 Service Regulator with low pressure cut-off Capacity Table CAPACITY in SCFH Natural Gas

PIPE CONNECTIONS	INLET PRESSURE (psig)	OUTLET PRESSURE Red Spring* 4½" to 7½" w.c. Blue Spring* 6½" to 9½" w.c.				OUTLET PRESSURE Green Spring* 7½" to 15" w.c.			
		ORIFICE SIZE				ORIFICE SIZE			
		7/16"	3/8"	5/16"	1/4"	7/16"	3/8"	5/16"	1/4"
3/4" x 3/4"	1/2	240	180	90	—	140	120	90	—
	1	400	300	200	100	250	200	160	90
	2	580	420	300	140	370	320	240	140
	5	800	750	500	230	580	530	460	220
	10	1050	990	740	380	780	720	700	370
	15	1140	1050	950	460	920	850	800	480
	25	—	1100	1100	640	—	900	1000	660
	40	—	—	1300	870	—	—	1300	910
	60	—	—	—	1160	—	—	—	1160
3/4" x 1" 1" x 1"	1/2	270	210	90	—	160	120	90	—
	1	430	310	210	100	260	230	160	90
	2	650	420	300	140	410	350	270	140
	5	1100	750	510	230	800	730	470	220
	10	1300	1120	760	380	1220	1090	740	370
	15	1300	1300	960	460	1300	1300	930	480
	25	—	1300	1300	640	—	1300	1160	660
	40	—	—	1300	870	—	—	1300	910
	60	—	—	—	1160	—	—	—	1160
1 1/4" x 1 1/4"	1/2	270	210	90	—	160	120	90	—
	1	430	310	210	100	260	230	160	90
	2	650	420	300	140	430	350	270	140
	5	1100	750	510	230	870	730	470	220
	10	1300	1120	760	380	1300	1090	740	370
	15	1300	1300	960	460	1300	1300	930	480
	25	—	1300	1300	640	—	1300	1160	660
	40	—	—	1300	870	—	—	1300	910
	60	—	—	—	1160	—	—	—	1160

NOTE: Last figure in each column is the maximum capacity for each orifice at recommended inlet pressure within the optimum performance range.

*RED Spring is Part No. 143-62-021-15, BLUE Spring is Part No. 143-62-021-16, GREEN Spring is Part No. 143-62-021-17.

NOTE: The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

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