Model 243 Regulator Brochure

UTILITY SOLUTIONS GROUP

Introduction

Who We Are

Utility Solutions Group is a manufacturer of natural gas regulators and relief valves based in Columbus, OH. All products are made in the USA and compliant with the requirements of the Build America, Buy America Act. Utility Solutions Group's Quality Management System is certified to ISO 9001 by Smithers Quality Assessments.

Model 243 Regulator

These large capacity service regulators are designed and built for commercial, industrial, and gas distribution work. They are right at home in such places as factories and foundries, district regulator stations, commercial laundries and laundromats, motels, hotels and apartments, bakeries, restaurants, schools, churches, and hospitals.

The versatile 243 is used for all kinds of gas fueled equipment such as boilers, burners, furnaces, ovens, heaters, kilns, engines, air conditioners, etc.

Remarkable field versatility results from the union connection between the fully interchangeable bodies and diaphragm case assemblies. They are easy to install, adjust, inspect, and service in all kinds of piping arrangements

While used primarily for natural gas services, Model 243 regulators perform equally well on LPG vapor, air, dry carbon dioxide (CO_2), nitrogen gas (N_2), and other inert gas applications. Contact your representative for special construction which may be available for certain corrosive gases.

Basic Models

243-12 Model Numbers	Variations	243-8 Model Numbers
243-12-1	Standard* Regulator	243-8-1
243-12-2	Regulator with Internal Relief Valve (IRV)	243-8-2
243-12-6	Regulator with both IRV and LPCO	243-8-6
	High-Pressure Regulator	243-8 HP

For additional information on internal relief valve (IRV), refer to Page 4. For LPCO, refer to Page 5.

* The term "standard" refers to non-IRV configurations.

Outlet Pressure Ranges and Springs

Spring Color	Outlet Pressure Range		Spring Part Number
	243-12	243-8	
Red-Black	–	3 ½" to 6 ½" w.c.	143-82-021-00
Blue-Black	–	5" to 8 ½"w.c.	143-82-021-01
Green-Black	–	6" to 14" w.c.	143-82-021-02
Red	3 ½" to 6 ½" w.c.	–	143-16-021-03
Blue	5" to 8 ½"w.c.	–	143-16-021-04
Green	6" to 14" w.c.	12" to 28" w.c.	143-16-021-05
Orange-Black	10" to 18" w.c.	–	143-16-021-11
Orange	12" to 28" w.c.	1 to 2 psi	143-16-021-06
Black	1 to 2 psi	2 to 4 ½ psi	143-16-021-07
Cadmium	1 ½ to 3 psi	3 to 5psi *	143-16-021-08

* The cadmium spring has a spring range of 3 – 5 psi, however it should not be set greater than 5 psi on a 243-8-2. Setting the pressure greater than 5 psi can damage the regulator.

Outlet Pressure Ranges and Springs for 243-8 HP

Spring Color	Outlet Pressure Range	Spring Part Number
Cadmium	3 to 6 ½ psi	143-16-021-08
Cadmium White *	6 to 10 psi	143-16-021-08 143-16-021-13

* White is nested inside of cadmium.

Pipe Sizes

Model	Pipe Size
243-12-1 and 243-12-2	1 ¼", 1 ½", and 2"
243-8-1 and 243-8-2	1 ¼", 1 ½", and 2"
243-8 HP	1 ¼", 1 ½", and 2"

Temperature Limits

Model 122 regulators can be used for temperatures from -20°F to +150°F.

Buried Service

The Model 243 regulator is not suitable for buried (underground) service.

Outlet Pressure Ranges and Springs

Regulator Model and Size	1 ¼" 30°	* 1 ¼" 10°	1" 30°	* 1" 10°	¾" 30°	¾" 10°	½" 10°	⅜" 10°	¼" 10°	.207" 10°
1 ¼", 243-12	15	25	25	40	-	60	100	125	125	-
1 ½", 243-12	15	25	25	40	-	60	100	125	125	-
2", 243-12	15	25	25	40	40	60	100	125	125	-
1 ¼", 243-8	-	-	-	-	-	40	80	100	125	125
1 ½", 243-8	-	-	25	-	-	40	80	100	125	125
2", 243-8	-	-	25	-	40	40	80	100	125	-
1 ¼", 243-8 HP	-	-	-	-	-	40	80	100	125	-
1 ½", 243-8 HP	-	-	25	-	-	40	80	100	125	-
2", 243-8 HP	-	-	25	-	-	40	80	100	125	-

* External Control Regulator Only

Fixed Factor Billing

Regulator accuracy is essential to measurement accuracy. The 243 is so precise, it is ideal for pressure factor measurement, pressure compensated metering, fixed factor billing, etc.

The table below gives the pressure accuracies obtainable with 243-12 and 243-8 regulators at the capacities in the tables on Pages 6 through 22.

The 243 will hold outlet pressure within the indicated percentage limits from set flow (250 standard cubic feet per hour (SCFH)) to the flows given in the capacity tables. Percentages are all based on absolute pressure using 14.4 pounds per square inch (psi) as atmospheric.

As an example, referring to Page 9, an 1 ½-inch Model 243-12-2 with 1-inch orifice, 30° valve, 15 psi inlet, and 11-inch water column (w.c.) set-point (green spring) at 2-inch w.c. droop has a gas capacity of 9800 scfh. As seen in the table below, this regulator in these conditions will hold outlet pressure at 11-inch w.c. ± ½% (2-inch w.c.) from 250 to 9800 SCFH (based on absolute pressure).

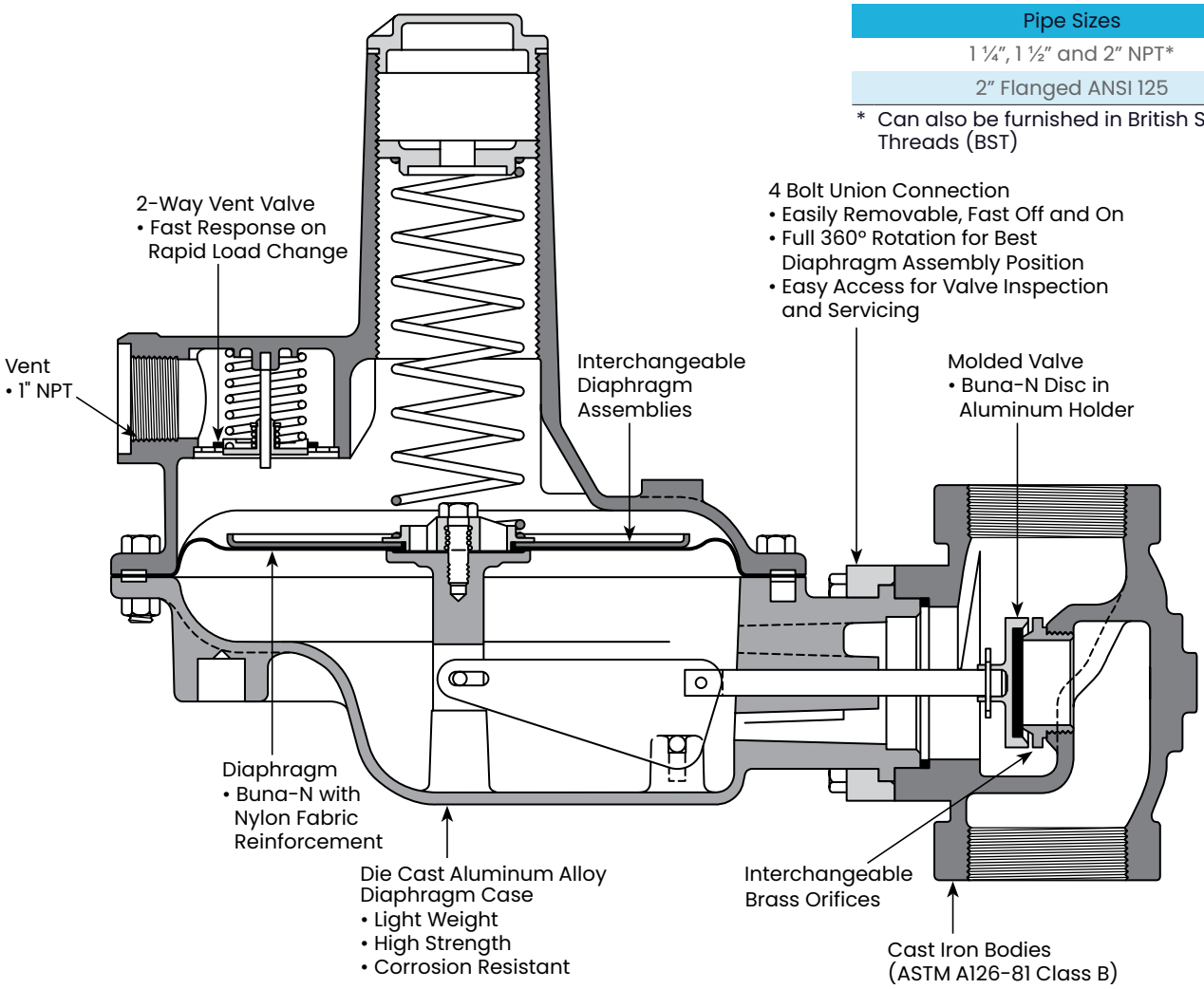
For higher outlet pressures, greater capacities, increased accuracies, and excessive inlet pressure variations, use the 243-RPC pilot operated regulator (see Page 5).

Set-Point	Droop	Accuracy
6" w.c	1" w.c.	± ½%
7" w.c	1" w.c.	± ½%
11" w.c	2" w.c.	± ½%
18" w.c	3" w.c.	± 1%
1 psi	0.3 psi	+ 1% and - 2%
1 psi	0.2 psi	+ ½% and - 1 ½%
2 psi	0.6 psi	+ 1% and - 4%
3 psi	0.3 psi	+ 1% and - 2%
3 psi	0.6 psi	+ 1% and - 3 ½%

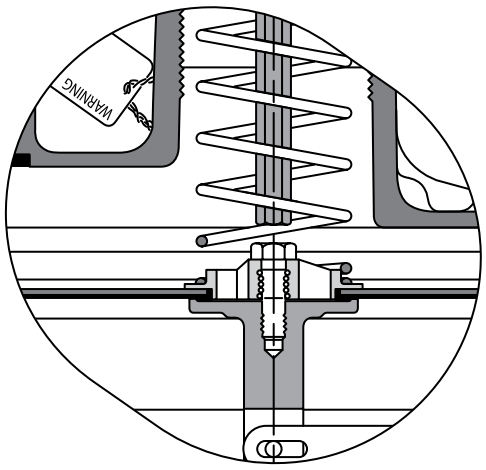
Model 243-8-1

Pipe Sizes
1 ¼", 1 ½" and 2" NPT*
2" Flanged ANSI 125

* Can also be furnished in British Standard Threads (BST)



Model 243-12-1 Travel Stop



A travel stop is located in the 243-12-1 and the 243-12-4 to provide overpressurization protection.

CAUTION

Turn gas on very slowly. If an outlet stop valve is used, it should be opened first. Do not overload diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload. Refer to RM-1306 for more detailed start-up procedures.

Internal Relief Valve Operation

The internal relief valve (IRV) is optional (refer to Basic Models Table, page 1).

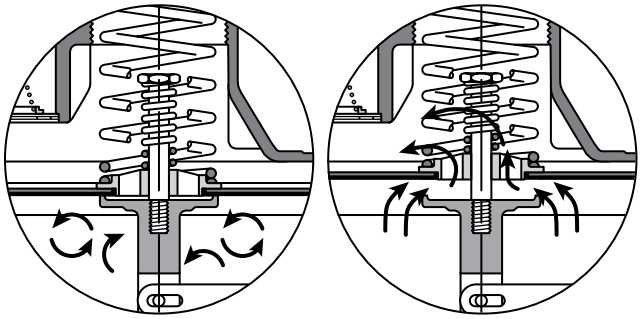
The IRV is built into the center of the diaphragm assembly as shown in the illustration and works in essentially the same way as standard relief valves. A cross-section of a complete 243 with IRV is shown on page 5.

It opens when outlet pressure exceeds the set-point by approximately 9" w.c. thereby allowing excess gas to escape through the vent to atmosphere.

Performance is given on the curves below. The IRV will prevent the outlet pressure from exceeding the value shown by the curves upon regulator failure at the conditions specified.

When the 243-8-2 is used with a cadmium spring, a special internal relief valve spring is required for relieving approximately 20" w.c. above set-point. The higher IRV spring is necessary to prevent the regulator from venting when the regulator locks up. Capacities for this configuration at 5 psi outlet pressure are listed in the 243-8HP Capacity Table.

The IRV is a proven design of quality construction. Within its capacity limits it adds a measure of safety protection to the outstanding and dependable performance of the 243.

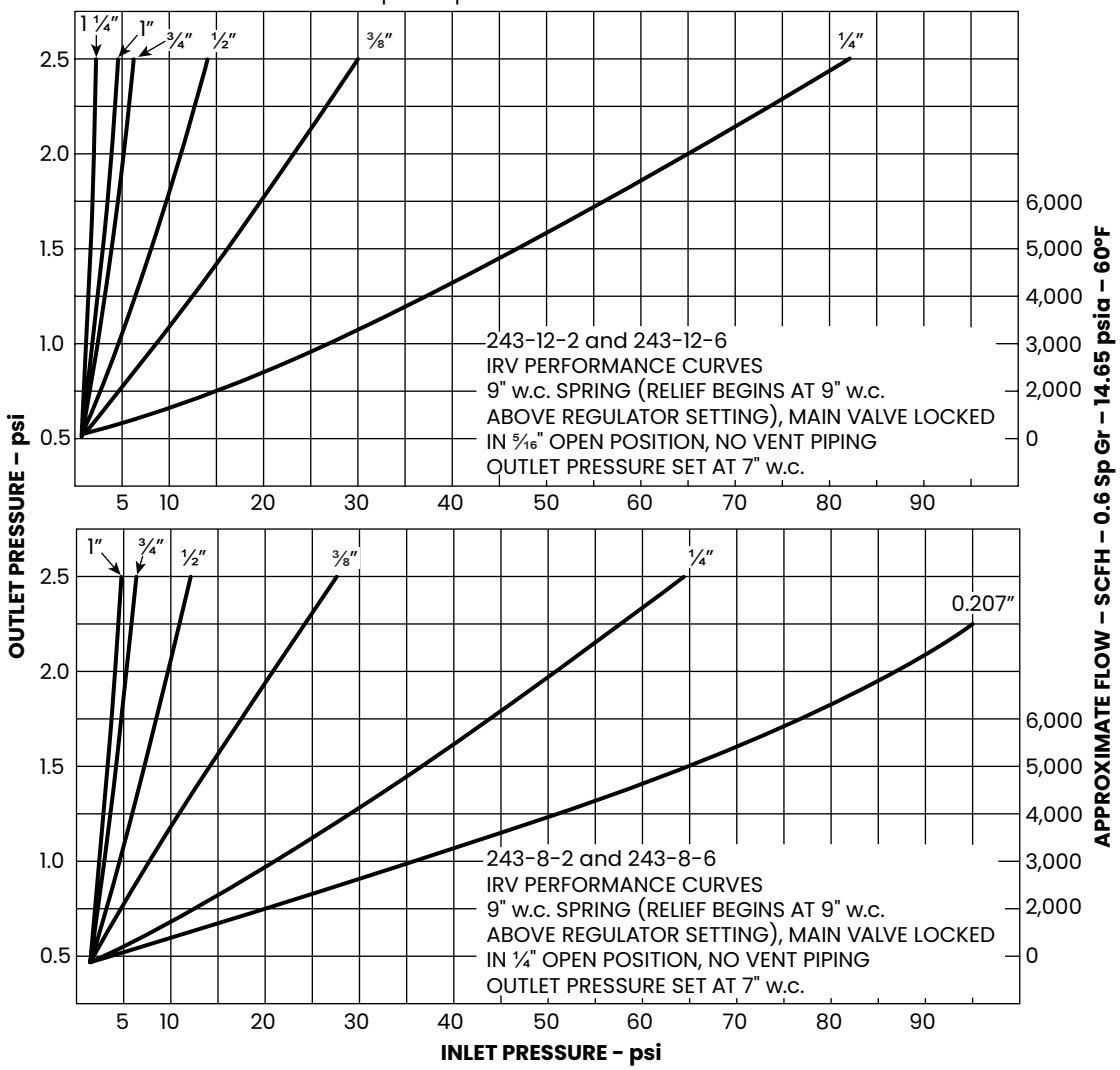


IRV Closed IRV Open

CAUTION

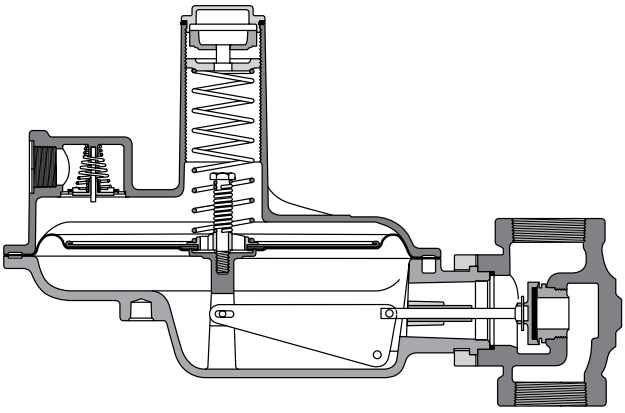
An IRV, like any other relief valve, must be sized carefully. If the curves indicate that outlet pressure can exceed the maximum safe limit, it is essential to provide an additional relief valve sized to handle the difference.

NOTE: Measurements on Graphs Depict Orifice Size.



243 Variations

Internal Relief Valve



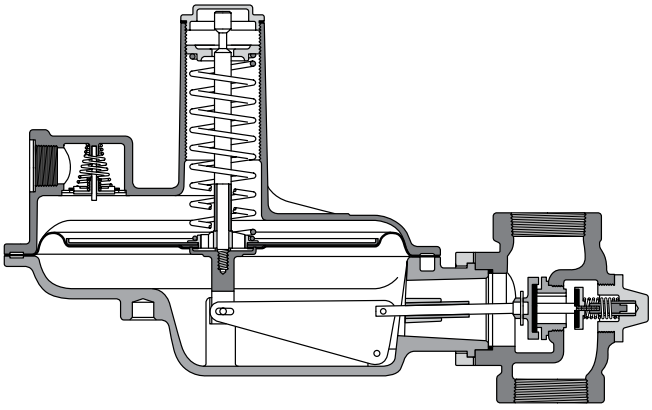
The 243 is available with an internal relief valve (IRV), which is a built-in safety device for providing a limited level of overpressurization protection.

Like any relief valve, an IRV must be carefully sized.

A more complete description plus performance data is given on Page 4. For Basic Models, refer to the table on Page 1.

Internal relief valves are not available in the high-pressure Model 243-8 HP.

Low-Pressure Cut-Off



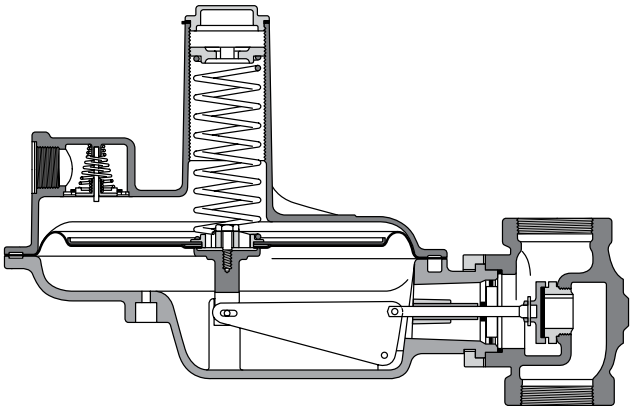
The low-pressure cut-off (LPCO) is used for automatic gas shutoff when inlet pressure is too low for the required gas flow. Once closed, it must be manually reopened and reset.

NOTE: Basic Models are given in the table on Page 1.

NOTE: There is an LPCO version that also includes the internal relief valve.

Outlet pressures range from 4-inch w.c. to 30-inch w.c.. Available orifices include ½-inch, ¾-inch, and 1-inch.

Monitoring and External Control Line

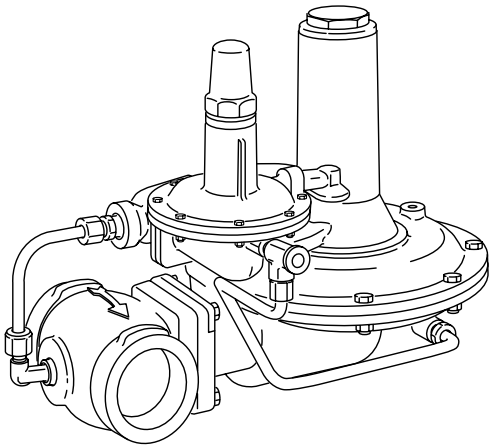


This 243 is used for the first regulator (upstream regulator) in a monitor set or for other applications requiring an external downstream control line.

A throat block with an o-ring stem seal isolates the lower diaphragm chamber which has a ½-inch female national pipe thread (NPT) connection for the external control line.

Use of this regulator for monitoring is shown on Page 23. Capacities with the external control line are provided on Pages 13 and 14.

Pilot Operated Regulator



The 243-RPC is a genuine pilot operated regulator.

Like its bigger brothers, it not only provides remarkably precise pressure regulation but it maintains that high level of accuracy even for wide variations in inlet pressure.

The 243-RPC can be used for any outlet pressure from 3 ½-inch w.c. to 35 psi with capacity ranging as high as 75,000 SCFH.

2" Models 243-12-1 and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle						
		1 ¼"	1"	¾"	¾"	½"	⅜"	¼"
		30°	30°	30°	10°	10°	10°	10°
Set-Point 6" w.c. 1" w.c. Droop Red Spring 3 ½" to 6 ½" w.c. 143-16-021-03	½	2,400	2,200	1,500	1,250	800	500	-
	1	4,000	3,600	2,700	2,100	1,300	850	400
	2	6,400	6,000	4,500	3,800	2,200	1,400	600
	5	11,000	11,000	8,200	6,500	3,800	2,300	1,000
	10	13,000	15,000	12,500	9,000	5,700	3,300	1,500
	15	14,000	15,000	15,000	10,300	7,100	4,000	1,750
	25		15,000	20,000	11,500	9,500	5,300	2,400
	40			20,000	13,000	13,000	7,500	3,300
	60				15,000	13,000	10,000	4,500
	80					13,000	12,000	5,700
	100					13,000	12,000	7,000
	125						12,000	8,000
Set-Point 7" w.c. 1" w.c. Droop Blue Spring 5" to 8 ½" w.c. 143-16-021-04	½	2,000	1,800	1,400	1,100	700	500	-
	1	3,400	3,000	2,200	2,000	1,200	750	400
	2	6,000	5,600	4,000	3,200	2,000	1,250	600
	5	11,000	11,000	8,000	6,000	3,700	2,100	1,000
	10	12,500	14,000	12,000	8,400	5,600	3,300	1,400
	15	14,000	15,000	15,000	10,000	7,100	4,000	1,750
	25		15,000	20,000	11,500	9,500	5,300	2,400
	40			20,000	13,500	12,000	7,500	3,200
	60				15,000	13,000	10,000	4,400
	80					13,000	12,000	5,600
	100					13,000	12,000	7,000
	125						12,000	8,000
Set-Point 11" w.c. 2" w.c. Droop Green Spring 6" to 14" w.c. 143-16-021-05	1	3400	3000	2100	1950	1150	750	400
	2	5600	4700	3700	3400	2000	1,200	600
	5	10500	9000	7800	6900	3500	2,100	1,000
	10	13000	13000	12000	9200	5500	3,200	1,600
	15	14000	14000	15000	10500	7000	4,000	1,800
	25		15000	20000	12000	9500	5,300	2,400
	40			20000	14500	12500	7,500	3,200
	60				15500	13000	10,000	4,400
	80					14000	12,000	5,600
	100					14000	12,000	7,000
	125						12,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

2" Models 243-12-1 and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle						
		1 ¼"	1"	¾"	¾"	½"	⅜"	¼"
		30°	30°	30°	10°	10°	10°	10°
Set-Point 18" w.c. 3" w.c. Droop Orange Spring 12" to 28" w.c. 143-16-021-06	1	2,500	2,000	1,400	1,200	950	650	-
	2	4,200	3,400	2,700	2,400	1,500	1,000	500
	5	8,000	7,100	5,600	4,700	2,800	1,800	950
	10	12,000	12,000	10,500	7,500	4,800	2,900	1,400
	15	13,500	14,500	15,000	9,500	6,500	3,900	1,700
	25		16,500	20,000	11,500	9,200	5,300	2,300
	40			20,000	13,500	12,000	7,500	3,200
	60				15,000	13,000	10,000	4,400
	80					14,000	12,000	5,600
	100					14,000	12,000	7,000
	125						12,000	8,000
Set-Point 1 psi 0.31 psi Droop Orange Spring 12" to 28" w.c. 143-16-021-06	2	6,500	5,000	4,000	4,000	2,000	1,300	500
	5	8,000	7,500	6,000	6,000	4,000	2,200	1,000
	10	9,000	8,500	8,000	8,000	5,500	3,000	1,400
	15	12,000	11,000	10,000	10,000	7,000	4,000	1,800
	25		13,500	12,500	11,500	9,500	5,500	2,400
	40			14,000	13,000	11,000	7,400	3,300
	60				15,000	13,500	10,000	4,500
	80					15,000	13,000	6,000
	100					16,000	14,000	7,000
	125						14,000	8,500
Set-Point 1 psi 0.2 psi Droop Black Spring 1 to 2 psi 143-16-021-07	2	3,350	3,000	2,000	1,900	1,200	1,000	500
	5	6,600	5,900	4,200	3,900	2,400	1,600	1,000
	10	11,000	10,000	7,600	6,500	4,100	2,800	1,450
	15	13,000	12,000	9,300	8,300	5,600	3,800	1,700
	25		15,000	16,500	11,000	8,500	5,300	2,400
	40			20,000	14,000	12,500	7,500	3,400
	60				15,500	13,000	10,000	4,400
	80					14,000	12,000	5,600
	100					14,000	12,000	7,000
	125						12,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

2" Models 243-12-1 and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle						
		1 ¼"	1"	¾"	¾"	½"	⅜"	¼"
		30°	30°	30°	10°	10°	10°	10°
Set-Point 2 psi 0.6 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	5	8,200	7,400	5,200	4,800	2,900	1,900	900
	10	12,500	11,300	8,700	7,800	4,800	3,000	1,400
	15	15,500	14,500	11,500	10,000	6,500	3,800	1,700
	25		18,000	16,500	13,500	9,000	5,300	2,400
	40			20,000	16,500	12,500	7,600	3,400
	60				16,500	15,500	10,000	4,600
	80					16,000	12,000	5,600
	100					16,000	12,000	7,000
	125						12,000	8,000
Set-Point 3 psi 0.35 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	5	3,500	3,000	2,000	1,800	1,400	1,100	750
	10	8,000	7,000	5,500	5,000	3,000	2,000	1,100
	15	10,500	10,000	8,000	7,000	4,000	3,000	1,600
	25		11,500	9,800	9,000	5,600	4,500	2,000
	40			21,500	20,000	10,500	7,500	3,500
	60				21,000	14,500	10,500	4,500
	80					18,000	13,500	6,000
	100					20,500	16,400	7,500
	125						19,000	9,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ½" Models 243-12-1 and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1 ¼"	1"	¾"	½"	⅜"	¼"
		30°	30°	10°	10°	10°	10°
Set-Point 6" w.c. 1" w.c. Droop Red Spring 3 ½" to 6 ½" w.c. 143-16-021-03	½	2,000	1,600	1,300	700	500	-
	1	2,800	2,500	2,100	1,200	800	400
	2	4,000	3,500	3,200	2,100	1,300	600
	5	6,100	5,600	4,800	3,700	2,200	1,000
	10	8,200	7,700	6,500	5,600	3,100	1,400
	15	9,300	9,300	7,400	6,800	3,900	1,750
	25		11,000	9,100	8,100	5,100	2,400
	40			10,500	9,800	7,100	3,200
	60			12,000	11,000	9,300	4,400
	80				12,000	10,500	5,600
	100				12,000	11,000	7,000
	125					11,000	8,000
Set-Point 7" w.c. 1" w.c. Droop Blue Spring 5" to 8 ½" w.c. 143-16-021-04	½	1,800	1,550	1,100	600	500	-
	1	2,600	2,300	1,850	1,100	750	400
	2	3,800	3,300	2,600	1,900	1,250	600
	5	5,700	5,100	4,200	3,300	2,100	1,000
	10	8,200	7,600	6,000	5,400	3,100	1,400
	15	9,300	9,100	7,000	6,600	3,900	1,750
	25		11,000	8,400	7,800	5,100	2,400
	40			10,000	9,500	7,100	3,200
	60			10,500	10,500	9,300	4,400
	80				11,500	10,500	5,600
	100				12,000	11,000	7,000
	125					11,000	8,000
Set-Point 11" w.c. 2" w.c. Droop Green Spring 6" to 14" w.c. 143-16-021-05	1	2,700	2,300	1,900	1,100	750	400
	2	4,000	3,500	2,700	1,900	1,200	600
	5	6,000	5,600	4,500	3,500	2,100	1,000
	10	8,800	8,200	6,500	5,500	2,900	1,400
	15	10,000	9,800	7,700	6,800	3,800	1,750
	25		11,500	9,700	8,100	5,100	2,400
	40			11,500	9,700	7,100	3,200
	60			12,500	11,500	9,300	4,400
	80				12,000	10,500	5,600
	100				12,500	11,000	7,000
	125					11,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ½" Models 243-12-1 and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1 ¼"	1"	¾"	½"	⅜"	¼"
		30°	30°	10°	10°	10°	10°
Set-Point 18" w.c. 3" w.c. Droop Orange Spring 12" to 28" w.c. 143-16-021-06	1	1,800	1,300	1,100	8,00	500	-
	2	3,000	2,800	2,200	1,500	1,000	500
	5	5,600	5,200	4,200	2,600	1,800	950
	10	8,600	7,700	6,000	4,300	2,900	1,400
	15	10,000	9,300	7,400	5,800	3,800	1,750
	25		11,500	9,100	7,800	5,100	2,400
	40			11,000	9,500	7,100	3,200
	60			12,500	11,000	9,300	4,400
	80				12,500	10,500	5,600
	100				13,000	11,000	7,000
	125					11,000	8,000
Set-Point 1 psi 0.31 psi Droop Orange Spring 12" to 28" w.c. 143-16-021-06	2	6,500	5,000	4,000	2,000	1,300	500
	5	8,000	7,500	6,000	4,000	2,200	1,000
	10	9,000	8,500	8,000	5,500	3,000	1,400
	15	12,000	11,500	10,000	7,000	4,000	1,800
	25		13,500	11,500	9,500	5,500	2,400
	40			13,000	11,000	7,400	3,300
	60			15,000	13,500	10,000	4,500
	80				15,000	13,000	6,000
	100				16,000	14,000	7,000
	125					14,000	8,500
Set-Point 1 psi 0.2 psi Droop Black Spring 1 to 2 psi 143-16-021-07	2	2,800	2,450	1,500	1,200	850	500
	5	5,500	5,100	3,700	2,400	1,600	950
	10	8,000	7,500	5,700	4,000	2,700	1,400
	15	10,000	9,100	7,100	5,300	3,700	1,750
	25		11,000	9,300	7,300	5,100	2,400
	40			11,000	9,300	7,100	3,200
	60			12,500	11,000	9,300	4,600
	80				12,500	10,500	5,600
	100				13,000	11,000	7,000
	125					11,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ½" Models 243-12-1 and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1 ¼"	1"	¾"	½"	⅜"	¼"
		30°	30°	10°	10°	10°	10°
Set-Point 3 psi 0.35 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	5	3,500	3,000	2,000	1,400	1,100	500
	10	7,000	6,000	5,000	2,500	2,000	1,000
	15	9,000	8,000	7,000	3,500	2,500	1,500
	25		10,000	8,000	4,800	4,500	1,900
	40			11,500	6,500	6,000	3,500
	60			14,000	8,000	7,500	4,500
	80				9,000	8,000	6,000
	100				12,000	11,000	7,000
	125					12,000	8,500
Set-Point 2 psi 0.6 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	5	6,000	5,300	4,100	2,700	1,700	900
	10	10,000	9,300	7,100	4,700	2,900	1,400
	15	13,000	12,000	8,800	6,200	3,800	1,700
	25		14,500	11,000	8,600	5,200	2,400
	40			13,500	11,000	7,100	3,200
	60			15,000	13,500	10,000	4,600
	80				15,000	12,000	5,600
	100				16,000	12,000	7,000
	125					12,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ¼", 1 ½", and 2" Models 243-12-1 with External Control Line

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		*1 ¼"	1"	¾"	½"	⅜"	¼"
		10°	10°	10°	10°	10°	10°
Set-Point 6" w.c. 1" w.c. Droop Red Spring 3 ½" to 6 ½" w.c. 143-16-021-03	½	2,200	1,900	1,600	800	500	-
	1	3,600	3,200	2,300	1,300	850	400
	2	5,600	4,700	3,500	2,000	1,400	600
	5	10,500	8,200	5,700	3,500	2,200	1,000
	10	15,000	12,000	8,900	5,200	3,000	1,500
	15	19,000	16,000	12,000	6,700	4,000	1,750
	25	22,000	20,000	16,000	9,000	5,200	2,400
	40		24,000	21,000	12,000	7,500	3,200
	60			27,000	15,500	10,000	4,400
	80				17,000	12,000	5,700
	100				19,000	13,500	7,000
	125					15,000	8,000
Set-Point 7" w.c. 1" w.c. Droop Blue Spring 5" to 8 ½" w.c. 143-16-021-04	½	2,000	1,700	1,500	700	450	-
	1	3,100	2,600	2,000	1,100	750	400
	2	5,000	3,800	3,000	1,700	1,200	600
	5	7,800	6,500	5,000	3,100	2,000	1,000
	10	13,000	10,000	7,000	4,800	2,900	1,500
	15	15,000	14,000	9,400	6,400	4,000	1,750
	25	20,000	17,000	13,500	8,500	5,200	2,400
	40		21,000	17,000	11,500	7,500	3,200
	60			19,000	15,000	10,000	4,400
	80				17,000	12,000	5,700
	100				19,000	13,500	7,000
	125					15,000	8,000
Set-Point 11" w.c. 2" w.c. Droop Green Spring 6" to 14" w.c. 143-16-021-05	1	3,200	2,500	1,900	1,100	700	350
	2	5,200	4,200	3,200	1,800	1,300	550
	5	8,500	7,200	5,200	3,200	2,000	1,000
	10	13,500	11,000	8,000	5,000	3,000	1,500
	15	16,000	14,000	11,000	6,500	4,000	1,750
	25	20,000	17,000	14,000	9,000	5,200	2,400
	40		24,000	21,000	12,000	7,000	3,200
	60			25,000	15,000	9,800	4,400
	80				17,000	12,000	5,700
	100				19,000	13,500	7,000
	125					15,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

* 2-inch body only.

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

1 ¼", 1 ½", and 2" Models 243-12-1 with External Control Line

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		*1 ¼"	1"	¾"	½"	⅜"	¼"
		10°	10°	10°	10°	10°	10°
Set-Point 18" w.c. 3" w.c. Droop Orange Spring 12" to 28" w.c. 143-16-021-06	1	2,400	2,000	1,200	900	600	300
	2	4,200	3,200	2,000	1,500	1,000	500
	5	6,500	5,500	4,100	2,700	1,600	950
	10	11,000	8,000	6,200	4,200	2,800	1,500
	15	14,500	11,000	8,000	5,800	3,800	1,750
	25	18,000	15,000	11,500	8,000	5,000	2,400
	40		21,000	15,000	11,000	7,000	3,200
	60			20,000	15,000	9,800	4,400
	80				17,000	12,000	5,700
	100				19,000	13,500	7,000
	125					15,000	8,000
Set-Point 1 psi 0.2 psi Droop Black Spring 1 to 2 psi 143-16-021-07	2	3,500	2,900	1,700	1,300	850	500
	5	7,000	5,400	4,000	2,600	1,600	950
	10	10,500	8,500	5,800	4,000	2,800	1,500
	15	14,500	10,500	7,600	5,400	3,800	1,750
	25	18,000	14,500	10,500	7,500	5,000	2,400
	40		20,000	15,000	10,500	7,000	3,200
	60			20,000	15,000	9,800	4,400
	80				17,000	12,000	5,700
	100				19,000	13,500	7,000
	125					15,000	8,000
Set-Point 2 psi 0.6 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	5	8,600	6,800	5,300	2,700	1,900	850
	10	13,000	10,500	7,500	4,500	2,900	1,400
	15	17,500	13,500	10,500	6,000	3,800	1,750
	25	25,000	20,000	14,000	8,500	5,000	2,400
	40		25,000	20,000	12,000	7,000	3,200
	60			25,000	15,000	10,000	4,400
	80				17,000	12,000	5,700
	100				19,000	13,500	7,000
	125					15,000	8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

* 2-inch body only.

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

1 ½" and 2" Models 243-8-1 and 243-8-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1"	¾"	½"	⅜"	¼"	0.207"
		30°	10°	10°	10°	10°	10°
Set-Point 6" w.c. 1" w.c. Droop Red-Black Spring 3 ½" to 6 ½" w.c. 143-82-021-00	½	1,100	900	700	500	-	-
	1	1,950	1,600	1,050	750	350	-
	2	3,200	2,400	1,550	1,000	550	350
	5	5,200	3,900	2,700	1,900	950	550
	10	7,400	5,800	4,500	3,000	1,350	900
	15	9,100	7,100	5,800	3,800	1,700	1,150
	25	12,500	8,700	7,200	5,100	2,400	1,500
	40		10,500	9,200	7,100	3,200	2,100
	60			11,000	9,300	4,400	2,900
	80			11,500	10,500	5,600	3,700
	100				11,000	7,000	4,500
	125					8,000	5,600
Set-Point 7" w.c. 1" w.c. Droop Blue-Black Spring 5" to 8 ½" w.c. 143-82-021-01	½	1,000	750	650	400	-	-
	1	1,600	1,150	900	650	300	-
	2	2,700	1,800	1,350	950	450	350
	5	4,800	3,500	2,350	1,600	770	500
	10	7,000	5,400	3,900	2,500	1,250	900
	15	9,100	7,000	5,000	3,500	1,700	1,150
	25	12,500	8,700	6,600	5,100	2,400	1,500
	40		10,500	9,000	7,100	3,200	2,100
	60			11,000	9,300	4,400	2,900
	80			11,500	10,500	5,600	3,700
	100				11,000	7,000	4,500
	125					8,000	5,600
Set-Point 11" w.c. 2" w.c. Droop Green-Black Spring 6" to 14" w.c. 143-82-021-02	1	1,650	1,150	1,000	650	300	-
	2	2,700	2,000	1,400	1,000	450	350
	5	4,800	3,800	2,600	1,750	900	600
	10	7,000	5,400	4,200	2,800	1,300	900
	15	9,000	7,400	5,500	3,600	1,700	1,100
	25	11,000	8,800	7,500	5,100	2,400	1,500
	40		11,000	9,600	7,100	3,200	2,100
	60			11,000	9,300	4,400	2,900
	80			11,500	10,500	5,600	3,700
	100				11,000	7,000	4,500
	125					8,000	5,600

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ½" Models 243-8-1 and 243-8-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1"	¾"	½"	⅜"	¼"	0.207"
		30°	10°	10°	10°	10°	10°
Set-Point 18" w.c. 3" w.c. Droop Green Spring 12" to 28" w.c. 143-16-021-05	1	1,500	1,100	800	550	-	-
	2	2,100	1,700	1,300	900	450	350
	5	4,500	3,400	2,000	1,350	850	600
	10	6,600	5,700	3,500	2,400	1,300	850
	15	8,800	7,100	5,000	3,400	1,700	1,050
	25	11,500	9,100	7,100	5,100	2,400	1,500
	40		11,000	9,300	7,100	3,200	2,100
	60			11,000	9,400	4,400	2,900
	80			12,000	10,500	5,600	3,700
	100				11,000	7,000	4,500
	125					8,000	5,600
Set-Point 1 psi 0.31 psi Droop Green Spring 12" to 28" w.c. 143-16-021-05	2	4,000	3,500	1,800	1,200	500	-
	5	6,000	5,000	3,500	2,200	1,000	-
	10	7,500	7,000	5,000	3,000	1,500	-
	15	9,000	8,000	6,500	4,000	1,850	-
	25	12,000	10,000	8,000	5,000	2,000	-
	40		12,500	9,500	7,000	3,000	-
	60			11,500	9,500	4,500	-
	80			12,500	11,500	6,000	-
	100				12,500	7,000	-
	125					800	-
Set-Point 1 psi 0.2 psi Droop Orange Spring 1 to 2 psi 143-16-021-06	2	2,100	1,650	1,200	850	450	-
	5	4,000	3,200	2,100	1,300	850	550
	10	6,500	5,200	3,100	2,200	1,300	800
	15	8,400	6,500	4,400	3,000	1,700	1,000
	25	11,000	8,600	6,500	4,400	2,400	1,500
	40		11,000	8,600	6,700	3,200	2,100
	60			10,500	9,000	4,400	2,900
	80			11,500	10,500	5,600	3,700
	100				11,000	7,700	4,500
	125					8,000	5,600

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ½" Models 243-8-1 and 243-8-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1"	¾"	½"	⅜"	¼"	0.207"
		30°	10°	10°	10°	10°	10°
Set-Point 3 psi 0.35 psi Droop Black Spring 2 to 4¼ psi 143-16-021-07	5	3,000	1,800	1,200	1,100	900	-
	10	4,000	2,500	1,800	1,500	1,000	-
	15	5,200	4,000	2,850	2,000	1,400	-
	25	7,000	5,200	3,600	3,100	1,800	-
	40		9,000	5,000	4,200	2,200	-
	60			8,300	6,500	3,000	-
	80			10,000	8,500	5,000	-
	100				9,000	6,000	-
	125					8,000	-
Set-Point 3 psi 0.6 psi Droop Black Spring 2 to 4¼ psi 143-16-021-07	5	4,400	3,400	2,400	1,600	800	-
	10	7,100	5,900	3,600	2,400	1,300	750
	15	9,600	7,500	4,800	3,400	1,700	1,000
	25	12,500	10,500	6,500	5,000	2,400	1,500
	40		13,000	9,600	7,000	3,200	2,100
	60			12,500	9,300	4,400	2,900
	80			13,500	11,000	5,600	3,700
	100				12,000	7,000	4,500
	125					8,000	5,600

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

1 ¼" Models 243-8-1, 243-8-2, 243-12-1, and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring 243-12	Outlet Pressure and Spring 243-8	Inlet Pressure psi	Orifice Size and Valve Angle				
			¾"	½"	⅜"	¼"	0.207"
			10°	10°	10°	10°	10°
Set-Point 6" w.c. 1" w.c. Droop Red Spring 3 ½" to 6" w.c. 143-16-021-03	Set-Point 6" w.c. 1" w.c. Droop Red-Black Spring 3 ½" to 6 ½" w.c. 143-82-021-00	½	900	700	500	-	-
		1	1,600	1,050	750	350	-
		2	2,250	1,500	1,000	550	350
		5	2,500	2,200	1,900	950	550
		10	3,100	2,900	2,650	1,350	900
		15	3,550	3,600	2,700	1,700	1,050
		25	4,200	3,800	3,300	2,400	1,500
		40	4,200	4,100	3,800	3,200	2,100
		60		4,800	4,400	4,400	2,900
		80		5,600	5,600	5,600	3,700
		100			6,000	6,000	4,500
		125				6,000	5,600
Set-Point 7" w.c. 1" w.c. Droop Blue Spring 5" to 8 ½" w.c. 143-16-021-04	Set-Point 7" w.c. 1" w.c. Droop Blue-Black Spring 5" to 8 ½" w.c. 143-82-021-01	½	750	650	400	-	-
		1	1,150	900	650	300	-
		2	1,700	1,300	950	450	350
		5	2,300	1,900	1,600	770	500
		10	2,900	2,600	2,200	1,250	900
		15	3,500	3,100	2,500	1,700	1,050
		25	4,200	3,600	3,300	2,400	1,500
		40	4,800	4,000	3,800	3,200	2,100
		60		4,600	4,400	4,400	2,900
		80		5,600	5,600	5,600	3,700
		100			6,000	6,000	4,500
		125				6,000	5,600
Set-Point 11" w.c. 2" w.c. Droop Green Spring 6" to 14" w.c. 143-16-021-05	Set-Point 11" w.c. 2" w.c. Droop Green-Black Spring 6" to 14" w.c. 143-82-021-02	1	1,050	1,000	650	300	-
		2	1,850	1,350	1,000	450	350
		5	2,500	2,200	1,750	800	550
		10	2,900	2,700	2,450	1,300	900
		15	3,700	3,950	2,600	1,700	1,100
		25	4,250	4,000	3,300	2,400	1,500
		40	5,300	4,200	3,800	3,200	2,100
		60		4,850	4,400	4,400	2,900
		80		5,850	5,600	5,600	3,700
		100			6,000	7,000	4,500
		125				8,000	5,600

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

NOTE: 1-inch x 30° and 1 ¼-inch x 30° orifice and valve angle are available on the 1 ¼-inch 243-12-1 and 243-12-2 models.

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

1 ¼" Models 243-8-1, 243-8-2, 243-12-1, and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring 243-12	Outlet Pressure and Spring 243-8	Inlet Pressure psi	Orifice Size and Valve Angle				
			¾"	½"	⅜"	¼"	0.207"
			10°	10°	10°	10°	10°
Set-Point 18" w.c. 3" w.c. Droop Orange Spring 12" to 28" w.c. 143-16-021-06	Set-Point 18" w.c. 3" w.c. Droop Green Spring 12" to 28" w.c. 143-16-021-05	1	1,100	800	500	-	-
		2	1,900	1,250	900	450	350
		5	2,250	1,700	1,350	750	550
		10	2,950	2,250	2,100	1,300	850
		15	3,450	3,600	2,450	1,700	1,050
		25	4,400	3,750	3,300	2,400	1,500
		40	5,300	4,100	3,800	3,200	2,100
		60		4,800	4,400	4,400	2,900
		80		4,850	5,600	5,600	3,700
		100			6,000	7,000	4,500
		125				8,000	5,600
Set-Point 1 psi 0.31 psi Droop Orange Spring 12" to 28" w.c. 143-16-021-06	Set-Point 1 psi 0.31 psi Droop Green Spring 12" to 28" w.c. 143-16-021-05	2	3,000	1,800	1,200	500	-
		5	4,000	3,000	2,000	1,000	-
		10	5,000	4,000	3,000	1,500	-
		15	6,000	5,100	3,900	1,900	-
		25	7,500	6,400	4,500	2,200	-
		40	8,000	7,400	6,100	2,600	-
		60		8,000	7,350	4,000	-
		80		8,500	8,000	5,100	-
		100			8,500	6,500	-
		125				7,000	-
Set-Point 1 psi 0.2 psi Droop Black Spring 1 to 2 psi 143-16-021-07	Set-Point 1 psi 0.2 psi Droop Orange Spring 1 to 2 psi 143-16-021-06	2	1,850	1,150	850	450	-
		5	2,100	1,700	1,350	750	500
		10	2,700	2,000	1,950	1,300	800
		15	3,150	3,100	2,050	1,700	1,000
		25	4,150	3,250	2,850	2,400	1,500
		40	5,300	3,800	3,600	3,200	2,100
		60		4,600	4,250	4,400	2,900
		80		4,650	5,600	5,600	3,700
		100			6,000	7,000	4,500
		125				8,000	5,600

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

NOTE: 1-inch x 30° and 1 ¼-inch x 30° orifice and valve angle are available on the 1 ¼-inch 243-12-1 and 243-12-2 models.

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

1 ¼" Models 243-8-1, 243-8-2, 243-12-1, and 243-12-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring 243-12	Outlet Pressure and Spring 243-8	Inlet Pressure psi	Orifice Size and Valve Angle				
			¾"	½"	⅜"	¼"	0.207"
			10°	10°	10°	10°	10°
Set-Point 3 psi 0.35 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	Set-Point 3 psi 0.35 psi Droop Black Spring 2 to 4 ¼ psi 143-16-021-07	5	1,200	1,000	800	500	-
		10	2,000	1,800	1,400	1,000	-
		15	3,300	2,800	1,800	1,400	-
		25	4,700	3,300	2,300	1,650	-
		40	6,300	4,900	2,800	2,000	-
		60		5,800	5,000	2,800	-
		80		6,500	6,400	4,600	-
		100			6,500	4,750	-
		125				5,000	-
Set-Point 3 psi 0.6 psi Droop Cadmium Spring 1 ½ to 3 psi 143-16-021-08	Set-Point 3 psi 0.6 psi Droop Black Spring 2 to 4 ¼ psi 143-16-021-07	5	2,200	1,950	1,650	700	-
		10	3,600	2,300	2,150	1,300	750
		15	3,800	3,400	2,350	1,700	1,000
		25	5,000	3,900	3,250	2,400	1,500
		40	6,300	4,300	3,700	3,200	2,100
		60		5,500	4,400	4,400	2,900
		80		5,500	5,850	5,600	3,700
		100			6,550	7,000	4,500
		125				8,000	5,600

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

NOTE: 1-inch x 30° and 1 ¼-inch x 30° orifice and valve angle are available on the 1 ¼-inch 243-12-1 and 243-12-2 models.

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

2" Models 243-8-1 and 243-8-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1"	¾"	½"	⅜"	¼"	0.207"
		30°	10°	10°	10°	10°	10°
Set-Point 18" w.c. 3" w.c. Droop Green Spring 12" to 28" w.c. 143-16-021-05	1	1,500	1,200	1,100	800	600	-
	2	2,400	1,800	1,700	1,250	950	500
	5	5,500	3,700	3,500	2,300	1,400	900
	10	9,400	8,400	6,000	3,700	2,400	1,400
	15	12,000	12,000	8,100	5,600	3,800	1,700
	25	14,500	17,500	10,000	8,200	5,600	2,400
	40		20,000	12,000	11,500	7,400	3,400
	60				13,500	10,000	4,600
	80				14,000	11,000	5,600
	100					12,000	7,000
	125						8,000
Set-Point 1 psi 0.31 psi Droop Green Spring 12" to 28" w.c. 143-16-021-05	2	5,000	4,000	4,000	3,000	1,000	500
	5	8,000	7,000	7,000	4,000	1,900	1,000
	10	14,000	12,800	10,000	5,500	3,000	1,500
	15	16,500	14,000	13,900	7,750	4,500	1,800
	25	17,700	16,900	15,000	9,000	5,500	2,500
	40		18,000	16,500	11,500	7,400	3,200
	60				15,000	10,000	4,600
	80				17,000	13,800	6,100
	100					14,000	7,000
	125						9,000
Set-Point 1 psi 0.2 psi Droop Orange Spring 1 to 2 psi 143-16-021-06	2	2,400	1,800	1,700	1,200	850	450
	5	4,000	3,400	3,300	2,200	1,300	900
	10	7,000	6,000	5,400	3,500	2,200	1,400
	15	11,000	9,000	7,000	4,600	3,100	1,700
	25	14,500	15,000	10,000	7,400	4,800	2,400
	40		17,500	12,000	10,500	7,000	3,400
	60				12,500	9,500	4,600
	80				13,500	10,500	5,600
	100					11,000	7,000
	125						8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

2" Models 243-8-1 and 243-8-2

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F) (Continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1"	¾"	½"	⅜"	¼"	0.207"
		30°	10°	10°	10°	10°	10°
Set-Point 3 psi 0.35 psi Droop Black Spring 2 to 4 ¼ psi 143-16-021-07	5	2,000	1,600	1,600	1,400	1,000	500
	10	4,000	3,000	3,000	2,000	1,400	1,000
	15	5,800	4,200	4,000	2,600	1,800	1,500
	25	7,500	5,200	5,000	3,900	2,750	2,300
	40		9,100	9,000	6,500	5,800	3,100
	60				10,000	7,500	4,600
	80				14,000	10,000	6,000
	100					12,000	7,000
	125						9,000
Set-Point 3 psi 0.6 psi Droop Black Spring 2 to 4 ¼ psi 143-16-021-07	5	4,400	3,400	3,300	2,400	1,600	800
	10	7,600	6,000	5,800	3,600	2,400	1,300
	15	11,000	9,000	7,500	4,800	3,500	1,700
	25	15,000	15,000	10,500	8,000	5,100	2,400
	40		17,500	13,000	11,000	7,000	3,400
	60				14,000	9,600	4,600
	80				15,000	11,000	5,600
	100					12,000	7,000
	125						8,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

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

Model 243-8 HP

Measurements in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psi - 60°F)

NOTE: The capacities in the first row for an outlet pressure of 5 psi also apply to the 243-8-2 with a cadmium spring.

Outlet Pressure and Spring	Inlet Pressure psi	1 ¼" Model 243-8HP				1 ½" Model 243-8HP					2" Model 243-8HP				
		Orifice Size and Valve Angle													
		¾"	½"	⅜"	¼"	1"	¾"	½"	⅜"	¼"	1"	¾"	½"	⅜"	¼"
		10°	10°	10°	10°	30°	10°	10°	10°	10°	30°	10°	10°	10°	10°
Set-Point 5 psi 1 psi Droop Cadmium Spring 3 to 6 ½ psi 143-16-021-08	10	3,300	2,050	2,000	1,300	6,000	5,500	3,200	2,300	1,300	6,000	5,500	3,200	2,400	1,300
	15	3,400	3,100	2,200	1,700	8,600	6,500	4,400	3,200	1,700	8,600	6,000	4,400	3,200	1,700
	25	4,400	3,650	3,050	2,400	12,000	9,300	6,100	4,800	2,400	13,000	8,200	6,100	4,800	2,400
	40	5,800	3,800	3,200	3,200		12,000	8,500	6,100	3,200		12,000	8,700	6,100	3,400
	60		4,400	5,300	5,600			10,000	8,700	4,400			10,000	8,700	4,600
	80		4,500	5,300	5,600			11,000	10,000	5,600			11,500	10,000	5,600
	100			6,000	7,000				11,000	7,000				11,000	7,000
	125				8,000					8,000					8,000
Set-Point 7 psi 1 psi Droop Cadmium-White Springs † 6 to 10 psi	10	2,300	2,000	1,800	1,000	2,500	2,300	2,000	1,600	1,000	2,700	2,500	2,100	1,600	1,000
	15	3,000	2,800	2,200	1,400	5,000	4,000	2,500	2,200	1,500	5,900	4,300	2,800	2,400	1,500
	25	5,400	4,100	3,300	2,000	8,500	6,500	4,300	3,500	2,000	8,600	6,600	4,600	3,600	2,000
	40	7,600	5,600	4,800	2,800		9,500	6,500	5,000	3,000		10,000	7,200	5,600	3,000
	60		7,500	6,200	3,800			9,000	6,500	4,000			9,700	7,000	4,500
	80		8,800	7,200	5,200			11,000	8,500	5,000			12,000	9,000	5,500
	100			8,600	5,800				10,500	5,500				11,500	7,000
	125				7,000					5,500					5,500
Set-Point 7 psi 2 psi Droop Cadmium-White Springs† 6 to 10 psi	10	5,400	3,500	2,500	1,400	8,000	5,500	3,500	2,500	1,300	8,600	6,000	4,300	2,700	1,400
	15	7,400	5,000	3,500	1,800	10,500	8,000	5,000	3,500	1,700	12,700	8,900	5,700	3,800	1,800
	25	10,000	7,600	5,500	2,500	15,000	12,000	8,000	5,000	2,300	18,600	13,500	8,600	5,700	2,400
	40	12,500	10,000	7,500	3,500		16,000	11,500	7,500	3,300		19,000	12,500	8,000	3,500
	60		12,500	9,500	4,800			15,000	9,500	4,500			17,000	10,000	4,800
	80		14,000	11,500	6,100			17,500	12,500	5,500			20,000	13,500	6,200
	100			13,500	7,200				15,500	7,000				16,500	7,300
	125				8,800					7,000					8,100
Set-Point 10 psi 1 psi Droop Cadmium-White Springs† 6 to 10 psi	15	2,500	2,200	1,800	1,200	3,500	3,000	2,000	1,300	1,000	3,600	3,000	2,000	1,800	1,000
	25	4,800	3,500	2,800	1,900	6,500	5,000	3,500	2,500	1,900	6,800	5,700	4,000	3,000	1,900
	40	7,200	5,000	4,000	2,500		8,000	5,500	4,300	2,500		8,600	5,700	4,600	2,800
	60		6,700	5,700	3,500		10,500	7,500	6,000	3,500			8,600	6,400	4,300
	80		7,800	6,600	4,600			9,000	7,500	4,500			10,500	8,400	5,200
	100			7,800	5,400				9,500	6,000				10,700	6,500
	125				6,500					7,000					8,000
Set-Point 10 psi 2 psi Droop Cadmium-White Springs† 6 to 10 psi	15	6,000	4,000	2,800	1,700	8,500	6,500	4,000	2,500	1,500	9,000	6,600	4,800	3,000	1,500
	25	9,000	6,500	5,000	2,500	12,000	10,500	7,000	4,500	2,300	15,500	11,000	7,400	5,000	2,400
	40	12,000	9,000	7,000	3,500		15,000	10,000	7,500	3,000		16,500	11,000	7,700	3,200
	60		12,000	9,400	4,700			14,000	10,000	4,500			15,000	10,700	4,800
	80		13,000	11,000	6,000			17,000	12,000	5,500			18,500	13,000	6,000
	100			13,000	7,000				15,000	7,000				16,000	7,300
	125				8,800					9,000					9,000

The last capacity figure in each group indicates the maximum allowable inlet pressure (except for emergency conditions). The stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the optimum performance range.

† See "Outlet Pressure Ranges and Springs" table on Page 1 for part number of spring.

NOTE: The 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

NOTE: The use of an internal or external relief valve is recommended for installations subjected to no-flow for extended periods of time, such as pilot-less ignition systems. A travel stop stem is located in the 243-12-1 to provide over-pressurization protection to internal components during over-pressurization.

The maximum pressure the regulator inlet may be subjected to under abnormal conditions without causing damage to the regulator is the maximum allowable inlet pressure (from the capacity tables, Pages 6 through 22) plus 50 psi.

The maximum pressures the diaphragm may be subjected to without causing damage to the internal parts of the regulator are:

243-12-1 ..... set-point + 3 psi
243-12-2, 243-8-1, and 243-8-2 ..... set-point + 5 psi
243-8 HP ..... set-point + 5 psi

NOTE: Set-point is defined as the outlet pressure the regulator is adjusted to deliver.

CAUTION

If any of the pressure limits are exceeded, the regulator must be taken out of service and inspected. All damaged or otherwise unsatisfactory parts must be repaired or replaced.

The maximum pressures that can be safely contained by the diaphragm case are:

243-12-1 and 243-12-2 ..... 15 psi
243-8-1 and 243-8-2 ..... 15 psi
243-8 HP ..... 25 psi

NOTE: "Safely contained" means no leakage as well as no bursting.

Before using any of the above data, make sure this entire section is clearly understood.

Over-pressurization Protection

The method of protection can be a relief valve, monitor regulator, shutoff device, or similar mechanism. These protect the downstream piping system and the regulators low-pressure chambers against over-pressurization due to the possible regulator malfunction or failure to achieve complete lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal and state codes, Utility Solutions Group document USG-IG-038, or other applicable standards.

CAUTION

Regulators are pressure control devices with numerous moving parts subject to wear that is independent upon particular operating conditions. To ensure 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.

Monitoring

A monitor set consists of two regulators in series as shown in the figure. The monitor is the standby. It takes control if a failure in the operating regulator causes outlet pressure to exceed normal.

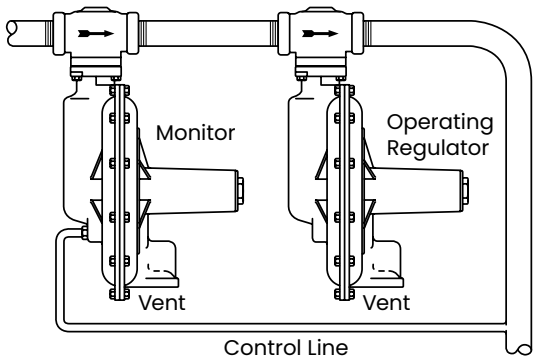
Either regulator may be used as the monitor. In both cases, the upstream regulator must have a blocked throat and external control line as shown for the 243 on Page 5. Also, the control line for the upstream regulator connects into the outlet piping all the way downstream, which means downstream of the downstream regulator.

The illustration shows a typical 243 monitor set. While the downstream regulator is shown as operating and the upstream regulator is shown as the monitor, the two can be reversed. There are reasons for doing it either way depending on the user's practice. Stop and bypass valves (which are not shown) likewise would depend on the user's preference and practice.

Either way, the operating regulator is adjusted for the normal outlet pressure. The monitor is adjusted somewhat higher so it is normally full open. If a failure in the operating regulator causes excessive increase in outlet pressure, the monitor will go into operation to hold outlet pressure at its set-point.

Monitoring is an effective and dependable method of providing overpressure protection. A significant advantage is that it provides the protection without wasting gas to atmosphere.

When a 243 is used to monitor another 243 with an identical orifice size, the total maximum capacity through both can be figured at 70% of the rated capacity for one regulator. This applies with the monitor located upstream or downstream.



Mounting Positions

The 243 Service Regulator can be provided in any of the positions shown. Specify by position number when ordering.

CAUTION

The diaphragm case vent must be positioned to protect against flooding, drain 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 of foreign materials collecting in the vent.

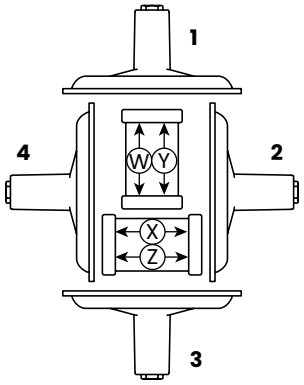
CAUTION

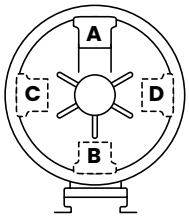
It is the user's responsibility to ensure that all regulator vents and/or vent lines exhaust to a non-hazardous location away from ANY POTENTIAL sources of ignition.

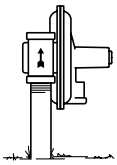
NOTE: If desired position is not shown, use this diagram below as a guide to specify vent, diaphragm case, and body arrangement.

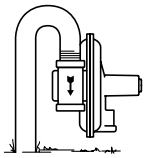
Example;

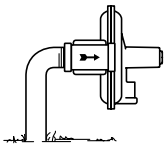
Position 105 would be D - 4 - Y






Position 101


Position 102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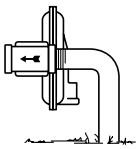
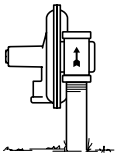
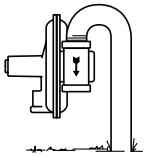
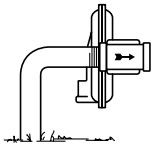
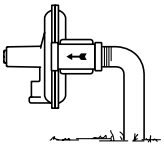
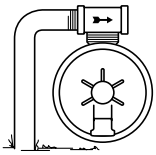

Position 104

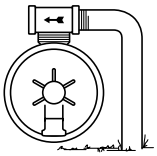

Position 105

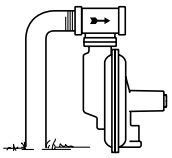

Position 106

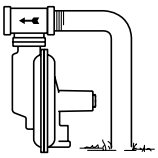

Position 107


Position 108


Position 109


Position 110


Position 111


Position 112

Full Open Capacity

Use the following formula for the full open capacity of 243 regulators:

$Q = K\sqrt{P_o(P_i - P_o)}$ ..... (for P_i/P_o less than 1.894)

$Q = \frac{K P_i}{2}$ ..... (for P_i/P_o less than 1.894)

Q = Full open capacity in SCFH of 0.6 specific gravity natural gas

P_i = absolute inlet pressure (psi)

P_o = absolute outlet pressure (psi)

Orifice Size	0.207"	¼"	⅜"	½"	¾"	1"	1 ¼"
K	90	132	292	520	1,100	1,800	2,480

NOTE: When sizing relief valves for use with 243 regulators, use full open capacity. Do not use capacity from capacity tables Pages 6 through 22.

Other Gases

243 regulators are mainly used on natural gas. However, they perform equally as well on liquid propane gas (LPG), nitrogen gas (N_2), dry carbon dioxide (CO_2), air and others. For capacities, multiply the table values on Pages 6 through 22 by 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 Mix (Specific Gravity 1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63

For other non-corrosive gases, use the following formula:

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

While used primarily on natural gas services, Model 243 regulators perform equally as well on LPG vapors, air, CO_2, N_2, and other inert gas applications. Please contact your Utility Solutions Group representative for special construction which may be available for certain corrosive gases.

Pilot Loaded Regulators

Pilot loaded regulators are offered for intermediate and high-pressure applications that require precise pressure reduction, with minimal droop. They are ideal for standard and high-capacity flows on burners, driers, dehydrators, and compressor lines. These regulators are the appropriate option for fixed factor billing.

Model 243-RPC (1 ¼", 1 ½", and 2")

Inlet pressures ..... up to 150 psi

Outlet pressures ..... 3 ½" w.c. to 35 psi

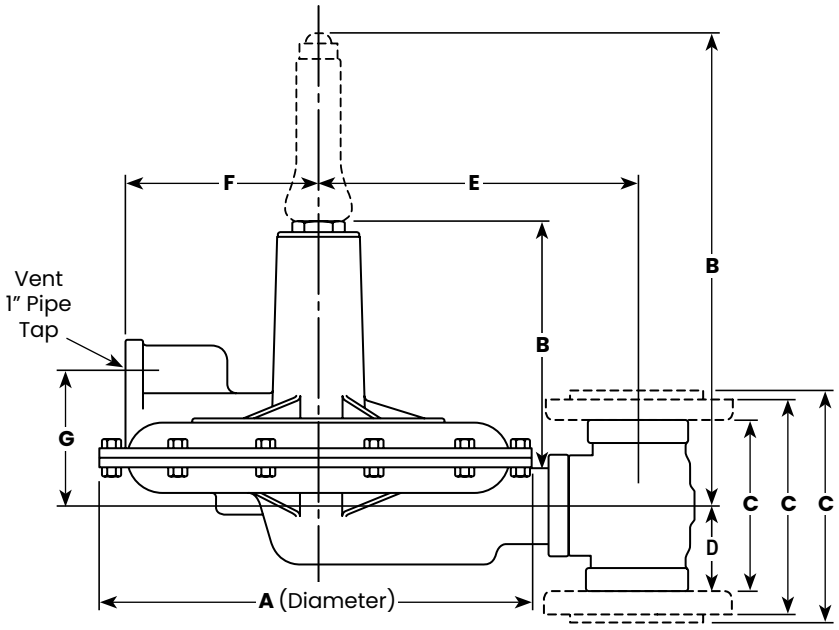
These models offer capacities up to 76,000 SCFH

Utility Solutions Group also produces industrial and combustion regulators, high-pressure and high-capacity regulators, as well as safety relief valves. Detailed information is available upon request.

Construction Materials

Component	Materials Used
Body	Cast Iron
Diaphragm Case	Die Cast Aluminum Alloy
Diaphragm	Buna-N with Nylon Fabric Insert
Diaphragm Pans	Zinc Plated Steel
Diaphragm Coupling	Zinc Die-Casting
Orifice	Brass
Valve	Buna-N Soft Seat in Aluminum Holder
Stem	Brass
Lever	Zinc Plated Steel
O-rings and Tetraseals	Buna-N
Adjustment Spring Button and Seal Cap, Std.	Zinc Die-Casting
Adjustment Screw, 243-8 HP	Zinc Plated Steel
Cover, 243-8 HP	Cast Iron
Seal Cap, 243-8 HP	Cast Iron

Dimensions



Model	A	**B	B¹	C	***C¹	C²	D	E	F	G	Shipping Weight*
243-12	14"	9 ¾"	-	5 ¾"	7 ½"	7 ⅞"	2 ⅞"	10 13/32"	6 1/32"	4 11/32"	27 lb
243-8	10 3/16"	9 ¾"	-	5 ¾"	7 ½"	7 ⅞"	2 ⅞"	8 19/32"	4 27/32"	4 5/32"	25 lb
243-8 HP	10 3/16"	-	12 ¾"	5 ¾"	7 ½"	7 ⅞"	2 ⅞"	8 19/32"	4 27/32"	4 5/32"	29 lb

* Add 9 pounds for flanges on 2-inch body

** 10-inch for 243-12-1 and 243-12-4, which include travel stop

*** American national standard institute (ANSI) Flanges

How to Order

Specify:

1. Pipe size and model number (Page 1)
2. Screwed or flanged connections
3. Mounting position
4. Orifice size and valve angle
5. Inlet pressure (also maximum and minimum if available)
6. Outlet pressure setting
7. Capacity required (SCFH)
8. Type of gas (natural gas, propane, etc.)
9. Spring part number

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