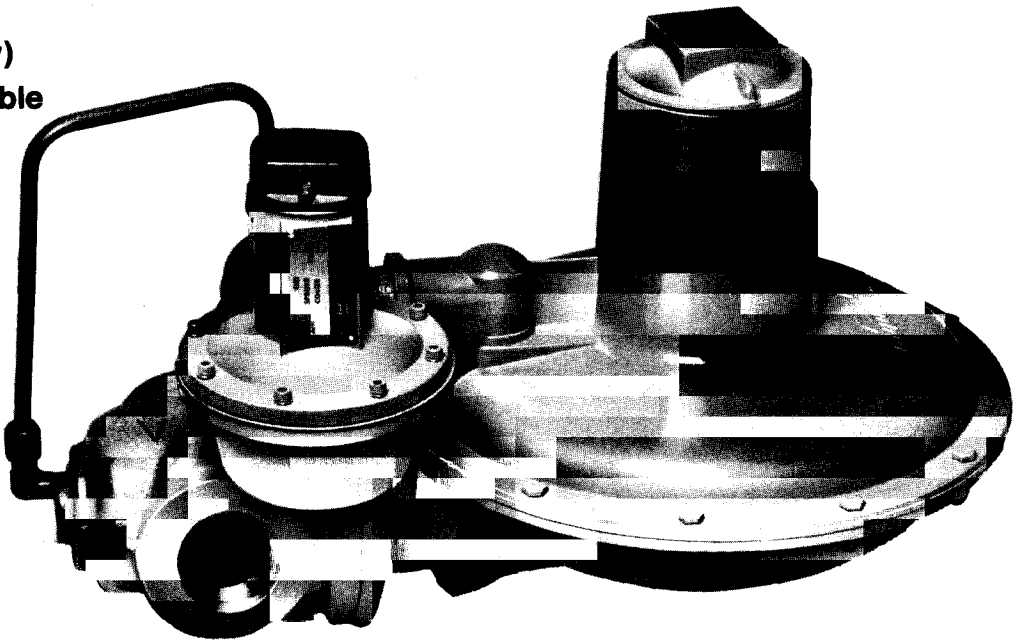
Data Sheet

CL-38 Series Constant Loaded Regulators

- **For accurate psi to psi (fixed factor) regulation on commercial and industrial applications**
- **Downstream control**
- **Monitoring**
- **Internal Relief (Pilot only)**
- **Accurate, versatile, reliable**
- **Large valve body takes up to 1 3/8" orifice for increased capacity**



General Description

The CL-38 is a constant pressure loaded regulator for use when closer psig to psig regulation is desired than can be obtained from conventional spring loaded regulators. Since this model regulator requires an inlet pressure supply of only 1/2 psig above outlet pressure, it can be used where demand type loading will not meet the low pressure differential.

The key feature of the CL-38, compared to other CL series regulators, is the large 2" valve body which is designed to handle the increased gas flows of the larger orifice sizes.

The CL-38 also incorporates the following advantages which for many applications make it a most economical substitute for a pilot loaded regulator.

- Constant pressure loading
- Internal bleed
- Internal lower diaphragm chamber pressure flow control
- Light valve closing spring
- Large diaphragm area

Applications

Simplicity of design combined with high power internal mechanics make the CL-38 a most effective and economical control regulator for a wide variety of commercial and industrial uses.

In the following applications the CL-38 series regulators have produced substantial savings for utilities in (a) lower initial costs (b) lower installation costs and (c) lower maintenance costs.

1. Metering various loads (1500 to *20,000* CFH) without need for expensive instrumentation.
2. As a 1 1/2" or 2" regulator covering the outlet pressure range from 6" W.C. to 30 psig without downstream control.
3. Where very accurate and stable psi to psi regulation (±1% outlet pressure absolute) is desired than is obtainable from conventional spring loaded regulators ahead of a "Fixed Factor Billing" meter or ahead of a "Pressure Compensating Index" meter.

4. As a reliable and accurate replacement (without downstream control) for conventional regulators requiring downstream control.
5. As a dependable and precise Downstream Control Regulator (CL-38-D).
6. As a sensitive, fast closing Monitor Regulator (CL-38-M).

Construction

The construction of the main regulator in the CL-38 is the same as a standard B-38 service regulator (see 38 series General Bulletin for additional details) except the main spring is installed to *close the valve.*

This Main Regulator is the same in either the CL-38-1 or CL-38-2 model. Your selection of either model 1 or model 2 will be determined by the *outlet pressure range of the pilot regulators.*

For CL-38-1 the pilot has an adjustment of 6" W.C. to 5 psig.

For CL-38-2 the pilot has an adjustment range of 1 psig to 30 psig.

The pilots are simple reducing regulators with internal relief. Both pilot regulators are interchangeable at the throat of the pilot valve body without disconnecting any piping.

Adjustment

The only adjustment ever needed on a CL-38 is a possible change in the outlet pressure setting when desired. This is made simply by turning the spring adjustment of the pilot regulator only.

Installation and Dimensions

The CL-38 is supplied as a completely self-contained compact unit. Installation is as simple as any standard 2" service regulator.

You may order the CL-38 factory-assembled in either of 2 basic installation positions — *vertical* or *horizontal* (see photos "V" and "H" on back page of 38 Series General Bulletin).* No downstream control line is needed for the CL-38-1 or CL-38-2 regulators. For field adaptations, the valve body of the main regulator or main diaphragm case can be positioned in any 360° plane. This requires repiping of the pilot supply line in some positions, and the pilot case vent should be in the water drain position for outdoor installations.

*Special installation positions available on request.

Model Description

For *Downstream Control and Monitor Models* see illustration (Section of lower diaphragm case construction of Main Regulator showing detail of M&D models).

CL-38-D-1 & CL-38-D-2

Constant pressure loaded regulators with identical construction as the CL-38-1 & CL-38-2 models with the exception of a closed throat configuration and tapped boss in the lower diaphragm case of the Main Regulator. These regulators are used as downstream control regulators. A control line is connected to the downsteam piping and the tapped boss in the lower diaphragm case of the Main Regulator.

CL-38-M-1 & CL-38-M-2

Constant pressure loaded regulators with identical construction as the CL-38-1 and CL-38-2 models with the exception of a closed throat configuration and tapped boss in the lower diaphragm case of the Main Regulator for connection of a downstream control line and an "O" ring seal on the round valve stem installed through the throat of the lower diaphragm case. The "M" model would be used as the upstream regulator in a monitor application with standard CL-38 downstream. This configuration can be used as an upstream or downstream monitor set, depending upon customer option.

Principle of Operation (See Schematic Flow Diagram)

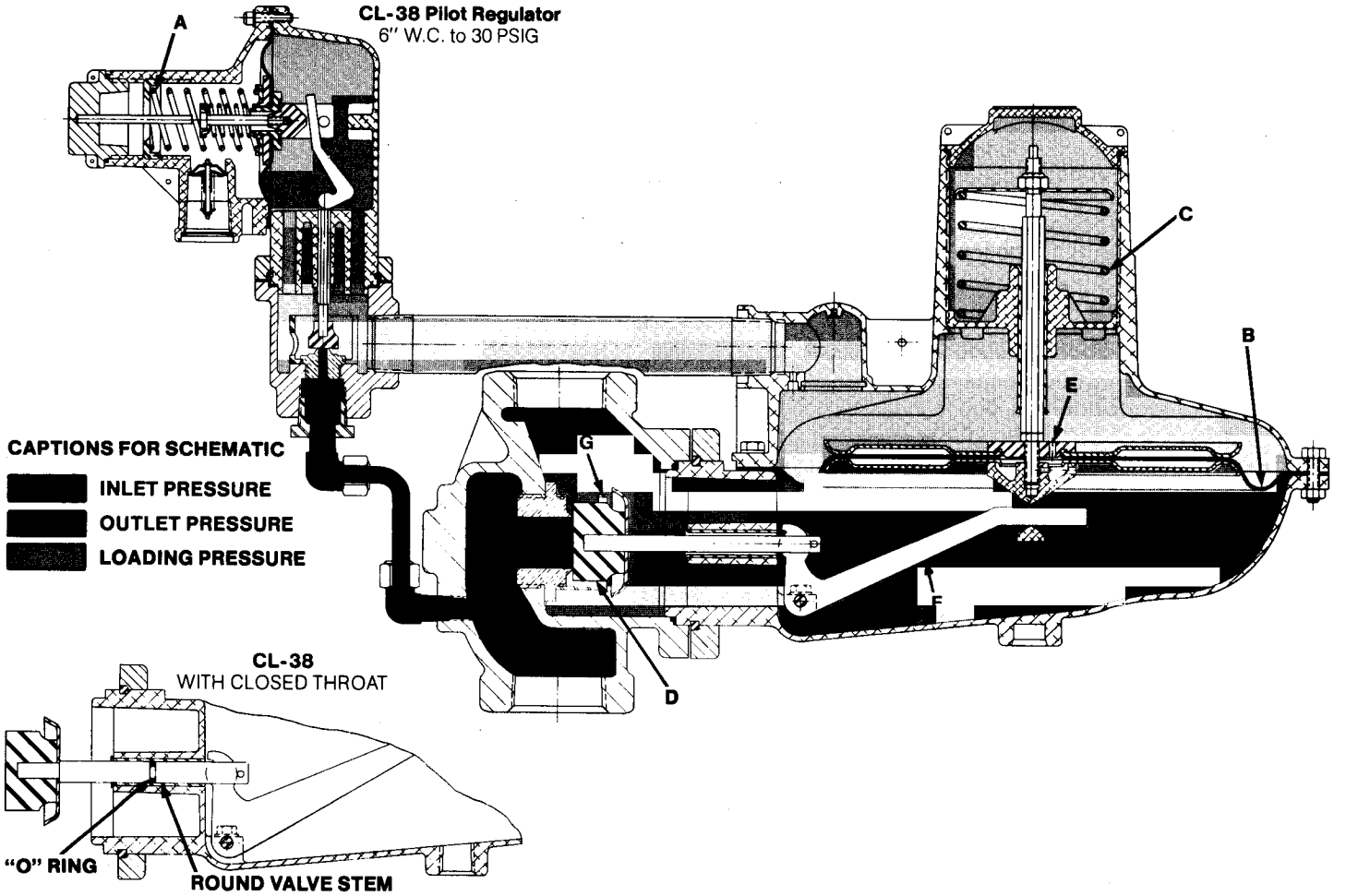
Inlet pressure, (tint 1) connected by tubing to pilot regulator, is utilized as supply pressure for pilot. Setting of pilot regulator spring(A) determines desired outlet pressure (tint 2) of main regulator. Outlet pressure of pilot regulator is applied to top of large diaphragm (B). Loading pressure (tint 3) is a constant pressure equal to desired outlet pressure plus pressure required to counterbalance light closing spring. (C).

When rate of flow is less than 50 CFH, the only regulator in operation is the pilot regulator. Main valve (D) is closed any time flow rate is less than that supplied by the pilot regulator (through the 5/32" bleed orifice (E) between upper and lower diaphragm case) and the pressure is equalized in both upper and lower diaphragm chambers (tint 3 and 2). No flow, or lock up pressure, is the outlet pressure required to close pilot regulator.

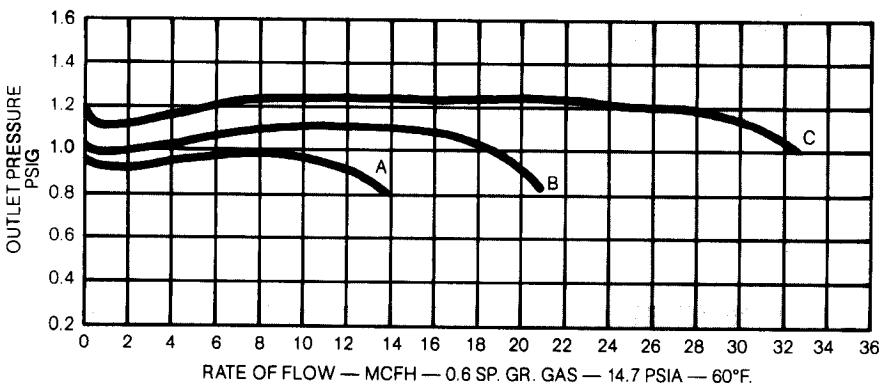
In operation, assuming rate of flow is greater than pilot regulator can supply, outlet pressure (tint 2) in lower diaphragm chamber is reduced and constant pressure (tint 3) above diaphragm forces diaphragm downward. This motion is transmitted through bell crank lever (F) to open the main valve (D) to proper position to meet flow rate and recover desired outlet pressure (tint 2).

The pressure in lower diaphragm chamber (tint 2) is reduced according to the rate of flow by the loading ring (G). The loading ring can be positioned to give straight line regulation, according to orifice size, inlet pressure, and outlet pressure.

When flow rate is decreased, outlet pressure tends to increase. Pressure (tint 2) increase is reflected to lower diaphragm chamber increasing pressure below main diaphragm, (tint 2) thereby decreasing differential in pressure across main diaphragm (B). This allows closing spring (C) to move diaphragm upward, closing the main valve (D) and throttling gas flow.



CL-38 TYPICAL PERFORMANCE CURVE



INLET CONN.	2" NPT
OUTLET CONN.	2" NPT
INLET PRESSURE	20 PSIG @ SET
ORIFICE SIZE	1"
FLOW RATE AT SET	200 SCFH
SPRING RANGE	SIL./WHT. PILOT, GRN, CLOSING
SET PRESSURE	1 PSIG
REGULATOR TYPE	CL-38-1
POSITION NO.	HORIZONTAL
BOLT CIRCLE DIA.	$12\frac{1}{16}$"

CURVES
A 10 PSIG — W.O.R. 14100 SCFH
B 20 PSIG — SET, 20800 SCFH
C 40 PSIG — W.O.R. 32800 SCFH
LOADING RING @ 0°

CAPACITY TABLE CL-38 1 & 2

Orifice Size		3/8	1/2	5/8	3/4	1	1 1/4	1 3/8
Inlet Pressure PSIG	Outlet Pressure	Orifice Constant Factor K						
		290	495	700	910	1240	1500	1725
		Capacity in 1000 SCFH 0.6 Sp. Gr. Gas*						
2	7" W.C.	1.45	2.3	3.2	4.35	6.1	7.5	8.4
	11" W.C.	1.4	2.25	3.15	4.25	5.7	7.3	8.1
	1 PSIG	1.15	1.85	2.7	3.6	4.8	6.1	6.75
	1.5 PSIG	0.9	1.5	2.05	2.75	3.85	5.05	5.6
3	7" W.C.	1.8	2.85	4.05	5.45	7.5	9.45	10.4
	11" W.C.	1.8	2.85	4.0	5.35	7.3	9.3	10.2
	1 PSIG	1.6	2.55	3.55	4.9	7.0	8.35	9.2
	2 PSIG	1.2	2.05	2.8	3.7	4.9	6.35	7.0
5	7" W.C.	2.3	3.85	5.45	7.25	10.0	12.3	13.5
	11" W.C.	2.3	3.8	5.45	7.2	9.9	12.2	13.4
	1 PSIG	2.2	3.55	5.05	6.85	9.45	11.6	12.7
	2 PSIG	2.0	3.2	4.5	6.2	8.5	10.4	11.5
	3 PSIG	1.7	2.75	3.9	5.15	7.15	8.9	9.55
10	7" W.C.	3.4	5.65	7.95	10.4	14.1	17.8	19.6
	11" W.C.	3.4	5.65	7.95	10.4	14.1	17.8	19.6
	1 PSIG	3.4	5.55	7.85	10.2	14.0	17.6	19.3
	2 PSIG	3.2	5.4	7.6	9.9	13.6	17.1	18.8
	5 PSIG	2.8	4.65	6.6	8.6	11.8	14.8	16.3
	8 PSIG	1.9	3.25	4.65	6.05	8.25	10.4	11.5
15	1 PSIG or less	4.2	6.95	10.0	12.9	17.8	21.9	25.2
	2 PSIG	4.2	6.9	10.0	12.8	17.7	21.7	25.0
	5 PSIG	4.0	6.55	9.55	12.2	16.9	20.8	23.9
	8 PSIG	3.6	5.95	8.6	11.0	15.2	18.7	21.6
	10 PSIG	3.2	5.25	7.65	9.8	13.5	16.7	19.2
	13 PSIG	2.25	3.7	5.3	6.85	9.45	11.6	13.3
20	3.5 PSIG or less	4.9	8.15	11.8	15.2	20.8	25.5	29.4
	5 PSIG	4.9	8.05	11.7	15.0	20.6	25.3	29.1
	10 PSIG	4.5	7.4	10.7	13.8	18.9	23.7	26.8
	15 PSIG	3.55	5.85	8.45	10.9	14.9	18.4	21.1
	18 PSIG	2.45	4.05	5.85	7.6	10.4	12.8	14.7
30	9 PSIG or less	6.35	10.6	15.4	19.6	26.8	32.9	37.9
	10 PSIG	6.3	10.5	15.3	19.5	26.7	32.8	37.7
	15 PSIG	6.0	10.0	14.5	18.5	25.4	31.2	35.9
	20 PSIG	5.35	8.95	12.9	16.5	22.6	27.8	31.9
	25 PSIG	4.15	6.9	10.0	12.7	17.4	21.4	24.7
40	14 PSIG or less	7.75	13.1	18.8	24.6	32.8	40.3	46.5
	15 PSIG	7.75	13.0	18.7	24.5	32.7	40.2	46.3
	20 PSIG	7.5	12.6	18.1	23.7	31.7	38.9	44.9
	30 PSIG	6.1	10.2	14.7	19.3	25.8	31.7	36.5
50	19.5 PSIG or less	9.2	15.6	22.3	29.1	38.8	47.7	54.9
	20 PSIG	9.2	15.6	22.2	29.0	38.6	47.5	54.6
	30 PSIG	8.55	14.5	20.6	27.0	36.0	44.3	51.1
60	24.5 PSIG or less	10.6	18.1	25.7	33.6	44.8	55.2	63.4
	25 PSIG	10.6	18.0	25.6	33.4	44.6	55.0	63.1
	30 PSIG	10.4	17.7	25.2	32.9	44.0	54.1	62.4
75	30 PSIG or less	12.7	21.9	31.0	40.3	53.8	66.3	76.2
100	30 PSIG or less	16.3	28.1	39.5	51.6	68.8		
125	30 PSIG or less	19.9	34.2	48.1	62.8			

MAXIMUM RECOMMENDED INLET PRESSURE — PSI TO INCHES REGULATION — LEFT OF HEAVY BLACK LINE

K valves are wide open for each orifice size

Figures below heavy line may show differentials above allowable limits. Check closing spring tables to be sure.

Loading Ring set at 0° for psig outlet pressures. Loading Ring set at 25° for inches w.c. outlet pressures. Exact settings may vary with individual applications of pressures and load conditions.

All capacities at 1% outlet pressure absolute pressure drop.

*Capacities based on 0.6 Sp. Gr. Gas at 14.7 PSIA and 60°F. Set point at each outlet pressure was 200 cfh.

CL-38-1 & 2							
Main Regulator Closing Spring Data							
Closing Spring Color	Orifice Size						
	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 3/8"
	Max. Differential Pressure Across Orifices PSIG*						
Orange	75	50	30	21	10	10	7
Brown	265	140	90	60	30	26	19
Green	—	200	120	80	40	32	25
Black	—	—	245	160	85	61	51

*The Maximum recommended pressure differential and closing spring are based on a 2:1 safety factor.
NOTE: The maximum emergency pressure differential is 75% of two times the values shown in the table above.

Spring Ranges				
CL-38-1				
Pilot Loading Spring	Closing Spring – Outlet Pressure Range			
	Orange	Brown	Green	Black
Grn./Wht.	5.1 - 7.3" W.C.	—	—	—
Blue/Wht.	7.2 - 13.6" W.C.	4.1 - 10.1" W.C.	4.0 - 9.5" W.C.	—
Dark Grn.	13.4 - 18.0" W.C.	10.2 - 13.9" W.C.	9.1 - 13.1" W.C.	6.6 - 7.2" W.C.
Silv./Wht.	0.6 - 1.2 PSIG	0.5 - 1.0 PSIG	0.5 - 1.0 PSIG	11.8 - 24.3" W.C.
Yel./Wht.	1.7 - 2.2 PSIG	1.6 - 2.1 PSIG	1.5 - 2.1 PSIG	1.3 - 2.0 PSIG
Red/Wht.	2.2 - 4.0 PSIG	2.1 - 3.9 PSIG	2.0 - 3.8 PSIG	2.0 - 3.7 PSIG
White	3.1 - 5.0 PSIG	3.0 - 5.0 PSIG	3.0 - 5.0 PSIG	3.0 - 5.0 PSIG

The maximum recommended outlet pressure from a CL-38-1 is 5 PSIG

CL-38-2				
Pilot Loading Spring	Closing Spring – Outlet Pressure Range			
	Orange	Brown	Green	Black
Brown	0.75 - 2.25 PSIG	0.75 - 2.1 PSIG	0.75 - 2.0 PSIG	0.75 - 1.8 PSIG
Green	1.5 - 10.2 PSIG	1.5 - 9.8 PSIG	1.5 - 9.6 PSIG	1.5 - 9.2 PSIG
Black	5.0 - 12.8 PSIG	5.0 - 12.6 PSIG	5.0 - 12.4 PSIG	5.0 - 11.6 PSIG
Blue	9.0 - 29.3 PSIG	9.0 - 29.0 PSIG	9.0 - 28.7 PSIG	9.0 - 28.2 PSIG
Silver	25 - 30 PSIG	25 - 30 PSIG	25 - 30 PSIG	25 - 30 PSIG

The maximum recommended outlet pressure from a CL-38-2 is 30 PSIG

CL-38-1 & -2 MONITOR SPECIFICATIONS

Orifice Diameter	Inlet Press. PSIG	Capacity, SCFH Drop in Pressure Across Orifice, PSIG								
		0.1	0.2	0.3	0.4	0.5	1.0	2.0	3.0	5.0
1 3/8" K = 1725	1	2150	3000	3700	4250	4750				
	2	2200	3100	3800	4400	4900	6800			
	3	2250	3200	3900	4500	5050	7000	9650		
	5	2400	3400	4150	4750	5300	7450	10200	12200	
	8	2550	3650	4450	5150	5700	8000	11000	13200	16200
	10	2700	3800	4650	5350	6000	8350	11600	13900	17100
	15	2950	4150	5100	5900	6550	9200	12800	15400	19100
	25	3400	4800	5900	6800	7600	10700	14900	18100	22700
	35	3800	5400	6600	7650	8550	12000	16800	20400	25700
	50	4350	6150	7550	8700	9750	13700	19300	23400	29800
	75	5150	7250	8900	10300	11500	16200	22800	27800	35400
	100	5800	8250	10100	11600	13000	18300	25800	31500	40300
1 1/4" K = 1500	1	1850	2600	3200	3700	4100				
	2	1900	2700	3300	3800	4250	5900			
	3	1950	2800	3400	3900	4350	6100	8400		
	5	2100	2950	3600	4150	4600	6450	8900	10600	
	8	2250	3180	3850	4450	4950	6950	9650	11500	14100
	10	2350	3320	4050	4650	5200	7300	10100	12100	14800
	15	2550	3600	4450	5100	5700	8000	11100	13400	16600
	25	2950	4200	5150	5900	6600	9300	13000	15700	19700
	35	3300	4700	5750	6650	7400	10400	14600	17700	22400
	50	3800	5350	6550	7600	8450	11900	16700	20400	25900
	75	4450	6300	7750	8950	10100	14100	19800	24100	30800
	100	5050	7150	8750	10100	11300	15900	22500	27400	35100
1" K = 1240	1	1500	2150	2650	3050	3400				
	2	1550	2250	2750	3150	3500	4900			
	3	1600	2300	2800	3250	3600	5050	6900		
	5	1700	2400	2950	3400	3800	5350	7350	8750	
	8	1850	2600	3200	3700	4100	5750	7950	9500	11600
	10	1900	2700	3350	3850	4300	6000	8350	10000	12300
	15	2100	3000	3650	4200	4700	6600	9200	11000	13700
	25	2450	3450	4250	4900	5450	7700	10700	13000	16300
	35	2760	3900	4750	5500	6150	8650	12100	14600	18500
	50	3150	4450	5450	6250	7000	9850	13800	16800	21400
	75	3700	5200	6400	7400	8250	11600	16400	19900	25500
	100	4150	5900	7250	8350	9350	13200	18600	22600	29000

How to use the tables for sizing CL38 regulators

Typical Problems

Problem No. 1

Max. Flow: 26 MSCFH
Inlet Pressure Range: 30-60 PSIG
Outlet Pressure: 10 PSIG

Select Model CL38-2 based on 10 PSIG outlet pressure requirement.

1. Select correct ORIFICE size based on lowest inlet pressure (30 psig), required outlet pressure (10 psig) and 26 MSCFH.
   Orifice = 1"
2. Select correct MAIN REGULATOR Closing Spring based on maximum differential pressure across the 1" orifice.
   60 psig − 10 psig = 50 psig. Correct Closing Spring = Black. The Black Spring will close against a differential pressure of 85 psig through a 1" orifice.
3. Select correct PILOT SPRING for a CL38-2 using a Black Closing Spring. Correct Pilot Spring = Black with a range of 5.0 to 11.6 psig.

Problem No. 2
Downstream Monitor Installation

Max. Flow: 26 MSCFH
Inlet Pressure Range: 30-60 PSIG
Outlet Pressure: 10 PSIG

Select Model CL38-2*M* as the *First* or *Upstream* Regulator and it will be the *Operating Regulator.*
Select Model CL38-2 as the *Second* or *Downstream* Regulator and it will be the *Monitor Regulator.*

1. Select largest available ORIFICE for *Monitor* Regulator.
   Orifice = 1⅜" K = 1725.
2. Since Monitor Regulator will be normally wide open, calculate the pressure drop required to pass 26 MSCFH.
   $Q = K\sqrt{P_{out}\,\Delta P}$ Below Critical Velocity
   where Q = SCFH
   K = Regulator Flow Constant
   Pout = Outlet Pressure PSIA
   ΔP = Differential pressure PSI

$$\sqrt{\Delta P} = \frac{Q}{\sqrt{P_{out}} \times K}$$

$$\sqrt{\Delta P} = \frac{26{,}000}{\sqrt{24.4} \times 1725} = 3.05$$

$$\Delta P = 9.31 \text{ PSI}$$

3. Select correct Main Regulator Closing Spring for the Monitor Regulator based on possible maximum differential pressure across the 1⅜" orifice. 60 psig −10 psig = 50 psig. Correct Closing Spring = BLACK. The Black Spring will close against a differential pressure of 51 psig through a 1⅜" orifice.
4. Select correct Pilot Spring for the Monitor Regulator using a Black Closing Spring.
   Correct Pilot Spring = Black if up to 11.6 psig outlet setting is desired or Blue if greater than 11.6 psig monitor pressure is desired.
5. Select correct OPERATING REGULATOR ORIFICE. Since the downstream monitor regulator requires 9.31 psi drop to flow 26,000 scfh, the outlet pressure from the operating regulator or inlet pressure to the monitor must be at least 19.31 psig. Select smallest orifice for 30 psig inlet and 19.31 psig (20 psig) outlet and flow a minimum of 26 MSCFH.
   Correct orifice = 1¼"
   Check by Calculation

$$Q = K\sqrt{P_{out}\,\Delta P}$$
$$= 1500\sqrt{(19.31+14.4) \times 10.69}$$
$$= 28{,}475 \text{ SCFH (more capacity than required)}$$

6. Select correct Operating Regulator Closing Spring based on possible maximum differential pressure across the 1¼" orifice.
   60 psig − 19.31 psig = 40.69 psi.
   Correct Closing Spring = BLACK. The Black Spring will close against a differential pressure of 61 psig through a 1¼" orifice.
7. Select correct Pilot Spring for the Operating Regulator using a Black Closing Spring.
   Correct Pilot Spring = BLACK. The Black Pilot Spring will be set for 10.0 psig outlet pressure with a spring range of 5.0 to 11.6 psig.

Problem No. 3
Upstream Monitor Installation

Max. Flow: 26 MSCFH
Inlet Pressure Range: 30-60 PSIG
Outlet Pressure: 10 PSIG

Select Model CL38-2*M* as the *First* or *Upstream* Regulator and it will be the *Monitor Regulator.*
Select Model CL38-2 as the *Second* or *Downstream* Regulator and it will be the *Operating Regulator.*

1. Select largest available ORIFICE for the *Monitor* Regulator.
   ORIFICE = 1⅜" K = 1725
2. Since Monitor Regulator will be normally wide open, the capacity must be calculated assuming a mimimum ΔP to produce the capacity. Assume ΔP = 6 psi or 24 psig outlet pressure.

$$Q = K\sqrt{P_{out}\,\Delta P}$$
$$= 1725\sqrt{(30-6+14.4)\,(6)}$$
$$= 1725\sqrt{38.4 \times 6}$$
$$= 26{,}184 \text{ SCFH}$$

See *Monitor SPECS*
A 1⅜" orifice with 35 psig inlet, ΔP = 5.0 will pass 25,700. It was then assumed that a ΔP = 6.0 and a 30 psig inlet pressure may meet the flow requirement of 26,000 SCFH, and it does.

3. Select correct Main Regulator Closing Spring for the

Monitor Regulator based on possible maximum differential pressure of 60 psig inlet and 10 psig outlet pressure across a 1 3/8" orifice. Correct Closing Spring = BLACK. The Black Closing Spring will close against a differential pressure of 51 psig through a 1 3/8" orifice.

4. Select correct Pilot Spring for the Monitor Regulator using a Black Closing Spring.
   Correct Pilot Spring = BLACK with a range of 5.0 to 11.6 psig, or Blue if a greater than 11.6 psig monitor pressure is desired.
5. Select correct Operating Regulator Orifice based on 24 psig inlet pressure, 10 psig outlet pressure and 26,000 scfh. Since the Capacity and Monitor Specs. do not exactly meet the pressure requirements it is suggested to calculate the flow rate by assuming an orifice size.
   Assume 1" orifice K = 1240
   $Q = K\sqrt{Pout\ \Delta P}$
   $= 1240\sqrt{(10+14.4)\ (24-10)}$
   = 22,918 scfh not large enough
   Try 1 1/4" orifice K = 1500
   $Q = 1500\sqrt{24.4 \times 14}$
   = 27,724 scfh
   Correct orifice = 1 1/4"
6. Select correct Operating Regulator Closing Spring based on possible maximum differential pressure across the 1 1/4" orifice of 54 psig inlet and 10 psig outlet, ΔP = 44 psi.
   Correct Closing Spring = BLACK. The Black Spring will close against a differential pressure of 61 psig through a 1 1/4" orifice.
7. Select correct Pilot Spring for the Operating Regulator using a Black Closing Spring. Correct Pilot Spring = BLACK with a range of 5.0 to 11.6 psig.

Problem No. 4
Upstream Monitor Installation

Max. Flow 7,000 SCFH
Inlet Pressure Range: 10 - 20 PSIG
Outlet Pressure: 2 PSIG

Select Model CL38-1*M* as the *First* or *Upstream* Regulator and it will be the *Monitor Regulator.*

Select Model CL38-1 as the *Second* or *Downstream* Regulator and it will be the *Operating Regulator.*

1. Select the largest practical orifice for the *Monitor Regulator* and produce a reasonable pressure drop. See Monitor Specs. With 10 psig inlet pressure and 7,000 scfh, the 1" orifice will have a ΔP of about 1.5 psig, a 1 1/4" orifice will have a ΔP of just under 1 psig and a 1 3/8" orifice will have a ΔP between .5 and 1 psig. Select the 1 1/4" orifice with a differential pressure of about 1 psig. The outlet pressure of the Monitor Regulator will then be 9 to 19 psig.
2. Select correct Main Regulator Closing Spring for the Monitor Regulator based on 18 psi possible maximum differential pressure and a 1 1/4" orifice.
   Correct Closing Spring = BROWN. The Brown Closing Spring will close against a differential pressure of 26 psig through a 1 1/4" orifice.
3. Select correct Pilot Spring for the Monitor Regulator using a Brown Closing Spring.
   Correct Pilot Spring = RED/WHITE with a range of 2.1 to 3.9 psig.
4. Select correct Operating Regulator Orifice based on 9 psig inlet and 2 psig outlet pressure and 7,000 scfh.
   Correct smallest orifice = 5/8" K = 700
   Check $Q = K\sqrt{Pout\ \Delta P}$
   $= 700\sqrt{(2+14.4)\ 7}$
   = 7,500 scfh
5. Select correct Main Regulator Closing Spring for the Operating Regulator based on possible maximum differential pressure of 19 psig inlet and 2 psig outlet pressure across a 5/8" orifice.
   Correct Closing Spring = ORANGE. The Orange Closing Spring will close against a differential pressure of 30 psig through a 5/8" orifice.
6. Select correct Pilot Spring for the Operating Regulator using an Orange Closing Spring.
   Correct Pilot Spring = YELLOW/WHITE with a range of 1.7 to 2.2 psig.

CL 38 Specifications

Inlet Pressure:
150 PSIG max. — 3/8", 1/2", 5/8", 3/4" orifice
115 PSIG max. — 1" orifice
90 PSIG max. — 1 1/4" orifice
80 PSIG max. — 1 3/8" orifice

Caution: DO NOT EXCEED MAXIMUM DIFFERENTIAL ACROSS ORIFICE. SEE MAIN REGULATOR CLOSING SPRING DATA.

Outlet Pressure:
5" W.C. to 5 PSIG for CL38-1
1 PSIG to 30 PSIG for CL38-2

Connection Sizes:

	Inlet	Outlet
Straight Valve Body, Screwed C.I. ASA	1 1/2 1 1/2 2	1 1/2 2 2
ASA Flanged Valve Body	2 3*	2 3*

*with 2" bore.

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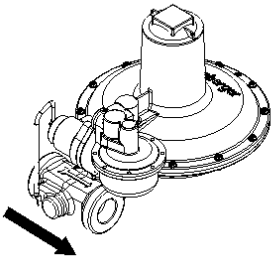

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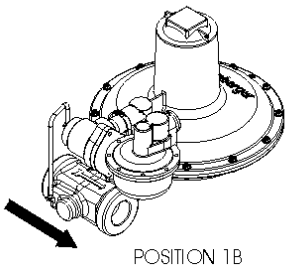
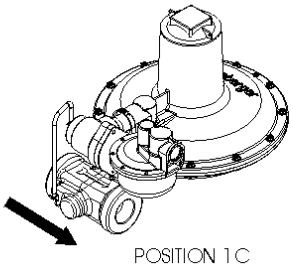


POSITION 1B



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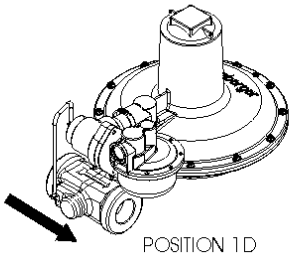

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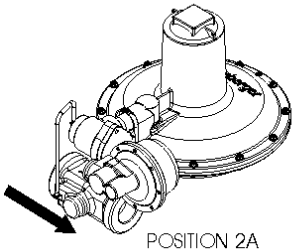

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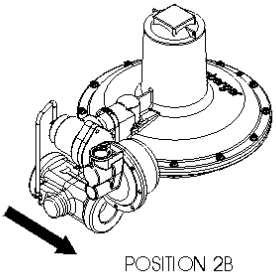

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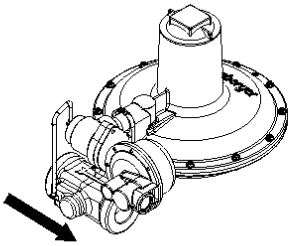

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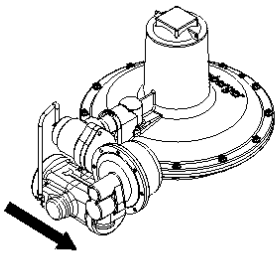

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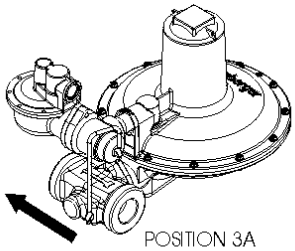

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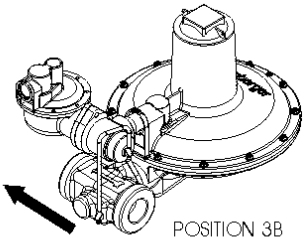

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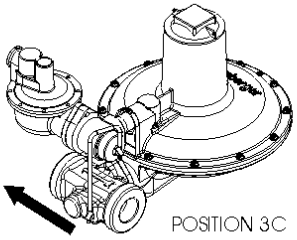

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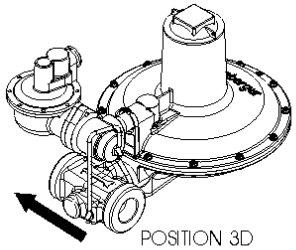

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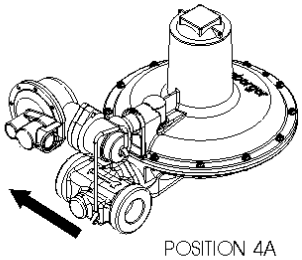

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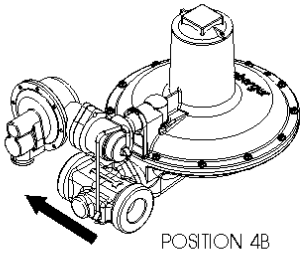

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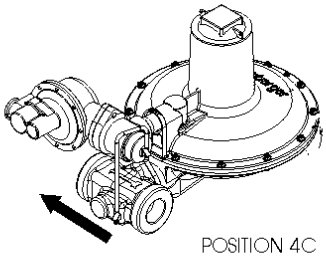

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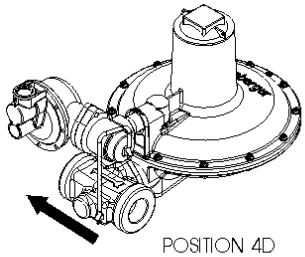

POSITION 4D

CL-34 & CL-38 Assembly Positions

INSTALLATION:

a. Make certain all shipping plugs are removed from the inlet, outlet, and vent of any regulator before installation.

b. When installing the regulator, the inside of the piping and the regulator inlet and outlet are to be clean, free of dirt, pipe dope and other debris to prevent entry into the regulator which could cause loss of pressure control.

c. The pipe joint sealant should be applied on the male threads of the pipe. Do not use any pipe joint material on the female threads of the regulator or it will become lodged in the regulator causing possible loss of pressure control.

d. Gas must flow through the valve body of the regulator in the same direction as the arrow cast on the body, or the outlet side of the regulator may be overpressured and damaged.

e. The diaphragm casing may be mounted in any position relative to the body through a full 360° swing.

f. The vent must be positioned to minimize the entry of water or other matter. Our recommendation is that the vent should be positioned to face downward so as to avoid entry of water or other matter which could interfere with the proper operation of the regulator.

g. When the regulator is installed INDOORS, the vent must be piped to the outside atmosphere and we recommend the use of a pipe having the shortest length, least number of elbows and bends, and having as large a diameter as the vent size or larger. ANYTHING smaller restricts the operation of the internal relief valve. The outlet end of the pipe must be protected from moisture and the entrance or foreign particles. The regulator should be specified by the user with the size vent and pipe threads desired to make the vent pipe connection.

   When the regulator is installed OUTDOORS, the vent must always be positioned so that rain, snow, moisture or foreign particles cannot enter the vent opening. The vent shoud be located away from building eaves, window openings and above the expected snow level at the site.

   Vent openings should be inspected by the user periodically to be sure they have not become blocked by foreign material. A stainless screen is provided to prevent the entry of insects.

START-UP:

a. A pressure gauge should be mounted downstream of the regulator to monitor the downstream pressure.

b. With the downstream valve closed, slowly open the inlet valve. The outlet pressure should rise to slightly greater than the set point.

c. Be absolutely sure there are no leaks and all connections are tight.

d. CL-series regulators are preset at the factory to match specifications given when ordered. Outlet pressure may be changed by adjusting the PILOT spring ONLY. DO NOT REMOVE THE SEAL CAP FROM THE MAIN REGULATOR UNLESS ALL GAS IS SHUT OFF AND ALL PRESSURE RELEASED FROM THE REGULATOR. FAILURE TO DO THIS WILL ALLOW PRESSURIZED GAS TO ESCAPE FROM THE REGULATOR.

e. After the desired outlet pressure is achieved, replace the adjustment cap, recheck for leaks, and the regulator is ready for operation.

SPECIAL NOTES:

a. The maximum inlet pressure for this regulator is dependent upon the size of the orifice and model designation. The non-relief models are limited to 60 pounds per square inch gauge maximum inlet pressure unless additional safeguards are used as outlined in the DOT code, OPS, Part 192, section 192.197.

b. This regulator should not be used for temperatures exceeding 150° Fahrenheit.

c. If regulator is to be used in temperatures that are consistently 10° below zero, contact the factory as special parts are available for low temperature operation.

d. When these models are used on liquid petroleum gases, they should be restricted to secondary control purposes and can only be used for second stage pressure reduction in the gaseous phase.

e. Customer inquiries as to the selection, application and recommended instructions for gas service regulators can be directed to area service and sales representatives or to the factory.

SAFETY WARNING:

This product, as of the date of its manufacture, is designed and tested to conform to all governmental or industry safety standards then existing as may apply to the manufacturer.

The purchaser and user of this product are warned that compliance with the manufacturer's instructions and procedures is required in order to avoid the hazards of leaking gas resulting from improper installation, start-up or use of this product, and further, that all area fire control, building codes or other safety regulations established under public laws which regulate or concern the application, installation, operation or general use of this product, should be complied with.

In order to ensure the safe and proper operation of this product, the manufacturer recommends that this product be installed by a qualified installer.

Schlumberger Gas

Gas Division, 970 Highway 127 North, Owenton, Kentucky 40359-9302
Phone: (502) 484-5747, FAX: (502) 484-6222, Customer Service: (800) 490-0657

Measurement Division, 7275 West Credit Avenue, Mississauga, Ontario L5N 5M9
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