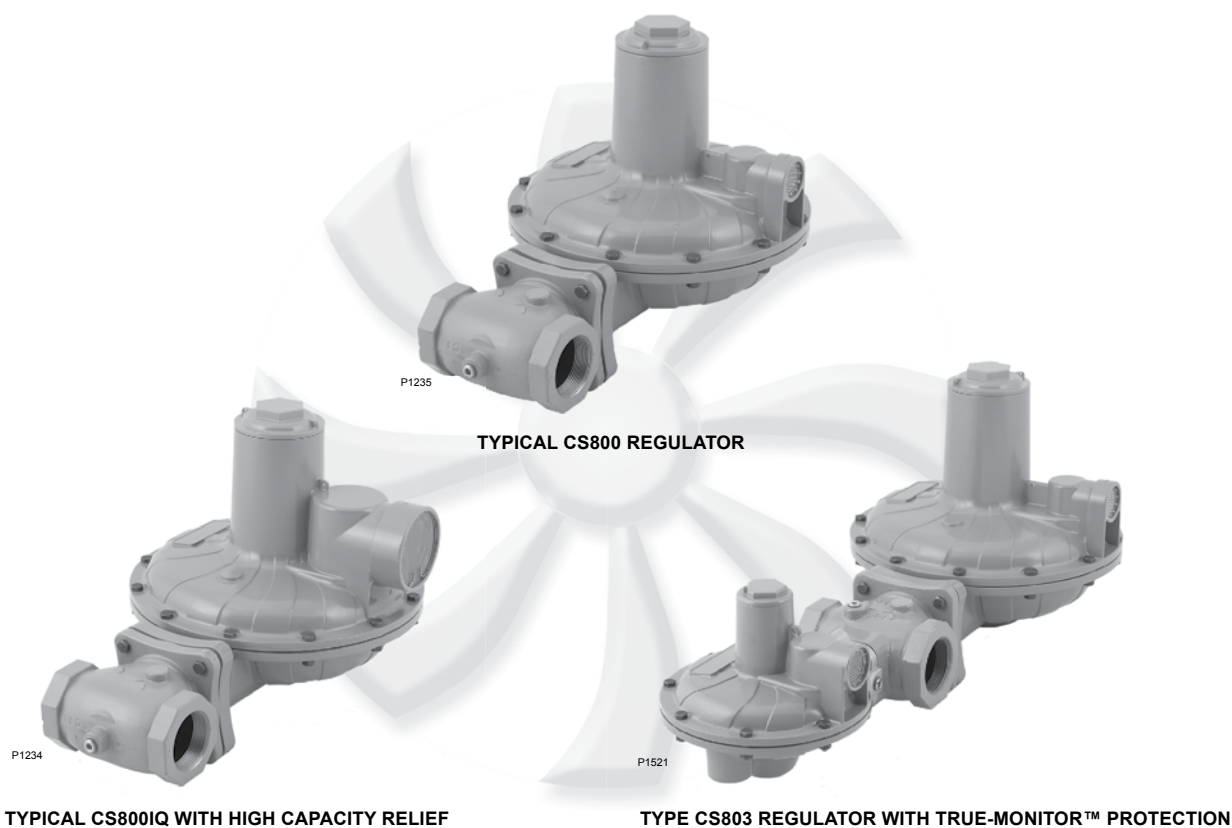


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# CS800 Series Commercial / Industrial Pressure Reducing Regulators



*Figure 1. Typical CS800 Pressure Reducing Regulators*

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## Introduction

### Scope of the Manual

This instruction manual provides instructions for the installation, maintenance, and parts ordering information of CS800 Series service regulators. Instructions and parts list for the Type TM600 Integral True-Monitor are found in Instruction Manual D103126X012.

# CS800 Series



## WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Fisher® regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. (Regulator Technologies) instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Call a gas service person to service the unit. Only a qualified person must install or service the regulator.

## Description

CS800 Series regulators are typically installed on industrial and commercial applications. See Table 1 for available

configurations. Constructions with External Registration, e.g., Type CS800EN, require an external control line.

The CS800 Series offers multiple forms of overpressure protection including:

**Internal Relief** - Minimizes downstream pressure buildup by relieving gas through the diaphragm assembly and out the 1 NPT vent to atmosphere in the event of an overpressure situation.

**High Capacity Relief** - Provides an increase in relief performance over basic internal relief via a 2-1/2 NPT vent thereby offering a significant improvement in the level of overpressure protection to the downstream system in the event of an overpressure occurrence.

**Integral True-Monitor™ Protection** - Provides a monitoring regulator integrally mounted on the inlet side of the valve body that assumes control of flow to the downstream system should the primary regulator cease to regulate flow.

**Secondary Seat™ Protection** - provides a solution to the most common cause of regulators failing to shutoff by employing a secondary seating surface to provide shutoff in the event the primary orifice seating surface becomes damaged or blocked.

Table 1. Available Configurations

TYPE NUMBER						OPTIONS
C	S	8				
						<b>OUTLET PRESSURE CONSTRUCTION</b>
			0			Low Pressure Applications (Outlet Pressure: 3.5 to 30-inches w.c. / 9 to 75 mbar)
			2			Medium Pressure Applications (Outlet Pressure: 1 to 5.5 psig / 70 mbar to 0.38 bar)
			5			High Pressure Applications (Outlet Pressure: 5 to 10 psig / 0.35 to 0.69 bar) <sup>(1)</sup>
						<b>OVERPRESSURE PROTECTION MODULE</b>
				0		Without Overpressure Protection Module
				3		With Integral True-Monitor Module
				5		With Secondary Seat Protection
				6		With Secondary Seat Protection with controlled bleed to indicate Secondary Seat is functioning <sup>(2)</sup>
						<b>PRESSURE REGISTRATION</b>
				I		Internal Registration
				E		External Registration <sup>(3)</sup>
						<b>RELIEF</b>
					N	Non-Relieving
					R	Internal Relief
					Q	High-Capacity Relief
					T	Token Relief
Example: Type Number CS800IR: Type CS800 regulator without Overpressure Protection Module with Internal Pressure Registration, and with Internal Relief. 1. High-pressure Construction is not available with True Monitor Protection, Secondary Seat Protection, or Relief. 2. Available only with Internal Relief or High-Capacity Relief Constructions. 3. Available only with Non-Relieving or Token Relief Constructions.						

## Specifications

The Specifications section lists the specifications for the CS800 Series regulators. The following information is stamped on the regulator at the factory: Type number, date of manufacture, spring range, orifice size, maximum inlet pressure, maximum operating outlet pressure, and outlet pressure which may damage regulator parts.

### Available Configurations

See Table 1

### Body Sizes, Material, End Connections, and Pressure Rating<sup>(1)</sup>

See Table 2

### Maximum Inlet Pressures<sup>(1)</sup>

**Emergency:** 175 psig / 12.1 bar

**Operating:** See Table 3

### Maximum Outlet Pressure<sup>(1)</sup>

#### Emergency

*Regulator Casing:* 15 psig / 1.0 bar

*Integral Monitor Casing:* 25 psig / 1.7 bar

*Integral Slam-shut Casing:* 87 psig / 6.0 bar

**To Avoid Internal Parts Damage:** 3 psig / 0.21 bar differential above outlet pressure setting

### Operating Pressure Ranges<sup>(1)</sup>

**Regulator:** See Table 4

**Integral True-Monitor™:** See Tables 7 and 8

### Secondary Seat™ Protection Outlet Pressures

See Table 6

### Spring Case Vent Connection

**Internal Relief:** 1 NPT

**High Capacity Relief:** 2-1/2 NPT

### Internal Relief Performance

See Table 5

### Token Relief Performance

**Approximate Token Relief Start-to-Discharge:**

See Table 5

### Orifice Sizes, Flow Coefficients, and IEC Sizing Coefficients

See Table 3

### Pressure Registration

Internal or External

### Temperature Capabilities<sup>(1)(2)</sup>

-20° to 150°F / -30° to 66°C

**According to European PED Directive that rates products to a minimum temperature of -4°F / -20°C and a maximum temperature of 140°F / 60°C:**

-4° to 140°F / -20° to 60°C

### Approximate Weight

#### With Threaded Body

*Type CS800/CS820:* 25 pounds / 11 kg

*Type CS803/CS823:* 34 pounds / 16 kg

*Type CS805/CS825:* 26 pounds / 12 kg

*Type CS806/CS826:* 26 pounds / 12 kg

#### High-Pressure Types

For CS85x add 2 pounds / 1 kg to Types listed above

#### With Flanged Body

Add 11 pounds / 5 kg to weights listed above

### PED Conformity Statement and Information

The CS800 Series product range, with the exception of the Types CS803 and CS823, is in conformity with the Pressure Equipment Directive PED 97/23/EC and is classified under Category 1.

Equipment and pipeline situated on outlet side of the regulator are either

- not subject to the PED (PS ≤ 0.5 bar) or
- subject to (PS > 0.5 bar) in which case they should come under category 1 maximum

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.
2. Product has passed Regulator Technologies testing for lockup, relief start-to-discharge, and reseal down to -40 degrees.

**Table 2. Body Sizes, Materials, End Connections, and Pressure Ratings**

TYPES	BODY MATERIAL	END CONNECTION	BODY SIZE		FACE-TO-FACE DIMENSION		BODY INLET PRESSURE RATING	
			NPS	DN	Inches	mm	psig	bar
CS800, CS805, CS806, CS820, CS825, CS826, and CS850	Gray Cast Iron	NPT	1-1/4		6.12	155	175	12.1
			1-1/2		6.12	155		
			2 <sup>(1)</sup>		6.12	155		
		CL125 FF	2	50	7.5	191		
			2	50	10	254		
CS803 and CS823	Gray Cast Iron	NPT	2 <sup>(2)</sup>		6.12	155		
CS803 and CS823	Gray Cast Iron	CL125 FF	2	50	10	254		

1. Standard on Types CS800, CS820, and CS850.
2. Standard on Types CS803 and CS823.

# CS800 Series

**Table 2. Body Sizes, Materials, End Connections, and Pressure Ratings (continued)**

TYPES	BODY MATERIAL	END CONNECTION	BODY SIZE		FACE-TO-FACE DIMENSION		BODY INLET PRESSURE RATING	
			NPS	DN	Inches	mm	psig	bar
CS800 <sup>(3)</sup> , CS820 <sup>(3)</sup> , CS850 <sup>(3)</sup> , CS803, and CS823	Ductile Iron	NPT	1-1/2		6.12	155	290	20
			2		6.12	155		
		Rp	2		6.12	155		
			2	50	7.5	191		
		CL150 FF	2	50	10	254		
			2	50	10.5	267		
			2	50	7.5	191	232	16
		PN 10/16	2	50	10	254		
CS800 <sup>(3)</sup> , CS820 <sup>(3)</sup> , CS850 <sup>(3)</sup> , CS803, and CS823	WCC Steel	NPT	1-1/2		6.12	155	290	20
			2		6.12	155		
		Rp	2		6.12	155		
			2	50	10	254		
		CL150 RF	2	50	10	254	232	16
			2	50	10	254		

3. If a ductile iron or steel body material is selected without an Integral True-Monitor™ Overpressure Protection (OPP) device, the port located at the bottom of the body will receive an aluminum plug.

**Table 3. Inlet Pressure Ratings and Flow and Sizing Coefficients**

ORIFICE SIZE		MAXIMUM OPERATING INLET PRESSURE TO OBTAIN OPTIMUM PERFORMANCE				MAXIMUM EMERGENCY INLET PRESSURE		WIDE-OPEN FLOW COEFFICIENTS			IEC SIZING COEFFICIENTS		
		psig Setpoints		Inches w.c. Setpoints									
Inches	mm	psig	bar	psig	bar	psig	bar	C <sub>g</sub>	C <sub>v</sub>	C <sub>t</sub>	X <sub>T</sub>	F <sub>L</sub>	F <sub>D</sub>
1/4 <sup>(1)</sup>	6.4	125	8.6	125	8.6	175	12.1	67.2	2.8	25.0	0.38	0.89	1.15
3/8	9.5	125	8.6	125	8.6	175	12.1	150	5.1	30.1	0.56	0.89	1.04
1/2	13	100	6.9	100	6.9	175	12.1	279	9.1	31.4	0.61	0.89	1.04
5/8	16	80	6.5	60	4.1	175	12.1	415	12.7	33.6	0.69	0.89	0.98
3/4	19	80	6.5	60	4.1	175	12.1	576	16.1	37.0	0.84	0.89	0.92
7/8	22	60	4.1	50	3.4	175	12.1	746	19.5	39.3	0.95	0.89	0.87
1 <sup>(1)</sup>	25	30	2.1	25	1.7	175	12.1	931	24.0	38.9	0.96	0.89	0.85
1-3/8 <sup>(1)(2)</sup>	35	15	1.0	15	1.0	175	12.1	1383	36.5	39.0	0.93	0.89	0.76
1. Not available on Types CS805, CS806, CS825, and CS826. 2. Not available on Types CS803 and CS823.													

1. Not available on Types CS805, CS806, CS825, and CS826.

2. Not available on Types CS803 and CS823.

**Table 4. Outlet Pressure Ranges**

TYPES	OUTLET PRESSURE RANGE		COLOR CODE	PART NUMBER	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
	Inches w.c.	mbar			Inch	mm	Inch	mm
CS800, CS803, CS805, and CS806	3.5 to 6 <sup>(1)</sup>	9 to 15 <sup>(1)</sup>	Red	GE30337X012	0.15	3.8	6.8	173
	5.5 to 8.5	13 to 21	Black	GE30338X012	0.17	4.3	6.8	173
	5.5 to 8.5	13 to 21	Brown (Use with LIN Option)	GE49043X012 <sup>(2)</sup>	0.16	4.1	8.3	211
	8 to 12	20 to 30	Purple	GE30339X012	0.17	4.3	7.4	188
	10 to 16	25 to 40	White	GE30340X012	0.18	4.6	7.4	188
	14 to 30	35 to 75	Dark Green	GE30341X012	0.20	5.2	7.5	191
CS820, CS823, CS825, and CS826	1 to 2.5 psig	69 to 170	Blue	GE30342X012	0.25	6.4	7.5	191
	1.5 to 3.5 psig	100 to 240	Orange	GE46922X012	0.26	6.6	7.1	180
	2.5 to 5.5 psig	170 to 380	Yellow	GE30343X012	0.29	7.5	6.7	170
CS850 and CS856	5 to 10 psig	345 to 690	Green with White Stripe	GE30344X012	0.39	9.9	7.6	192

1. In order to achieve the complete spring range listed, in some applications it may be required to re-orient the actuator/spring case to point downward to utilize the weight of the internal components.

2. Spring is available only for Types CS800, CS805, and CS806.

**Table 5. Approximate Internal Relief Valve Start-to-Discharge Pressure Above Setpoint**

CONTROL SPRING	SETPOINT		SET RANGE		INTERNAL RELIEF AND HIGH CAPACITY RELIEF				TOKEN RELIEF	
					Start-to-Discharge Pressure Range Above Setpoint	Low Start-to-Discharge Option <sup>(1)</sup>	Start-to-Discharge Pressure Range Above Setpoint	Start-to-Discharge Pressure Range Above Setpoint		
	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar
GE30338X012	7	17	5.5 to 8.5	13 to 21	11 to 18	27 to 42	7 to 14	17 to 35	6 to 14	15 to 35
GE30340X012	14	35	10 to 16	25 to 40	11 to 18	27 to 42	7 to 14	17 to 35	6 to 14	15 to 35
GE30341X012	1 psig	69	14 to 30	35 to 75	7-inches w.c. to 1 psig	17 to 69	----	----	6 to 14	15 to 35
GE30342X012	2 psig	0.14 bar	1 to 2.5 psig	69 mbar to 0.17 bar	7-inches w.c. to 2 psig	17 mbar to 0.14 bar	----	----	0.5 to 1 psig	34 to 69
GE30343X012	5 psig	0.34 bar	2.5 to 5.5 psig	0.17 to 0.38 bar	7-inches w.c. to 2.5 psig	17 mbar to 0.17 bar	----	----	0.5 to 1 psig	34 to 69

1. Low start-to-discharge option is only available on the main control spring ranges up to 10 to 16-inches w.c. / 25 to 40 mbar.

**Table 6. Secondary Seat™ Protection Outlet Pressures**

CONTROL SPRING		SPRING RANGE		SETPOINT		TYPES CS805 AND CS825				TYPES CS806 AND CS826			
						Secondary Seat Shut-off Pressure <sup>(2)</sup>				Downstream Build-up Pressure <sup>(1)(2)(3)</sup>			
						Orifice Size, Inch / mm				Orifice Size, Inch / mm			
						3/8 / 9.5		5/8 / 16		3/8 / 9.5		5/8 / 16	
Color	Part Number	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar	Inches w.c.	mbar
Black	GE30338X012	5.5 to 8.5	13 to 21	7	17	11	27	12	30	25	62	23	57
White	GE30340X012	10 to 16	25 to 40	14	35	19	47	20	50	36	89	33	81
Dark Green	GE30341X012	14 to 30	35 to 75	1 psig	69	1.2 psig	83	1.3 psig	90	2.1 psig	0.14 bar	2 psig	0.14 bar
Blue	GE30342X012	1 to 2.5 psig	69 mbar to 0.17 bar	2 psig	0.14 bar	2.6 psig	0.17 bar	2.6 psig	0.18 bar	3.8 psig	0.26 bar	3.7 psig	0.26 bar
Yellow	GE30343X012	2.5 to 5.5 psig	0.17 to 0.38 bar	5 psig	0.34 bar	6.3 psig	0.43 bar	6.3 psig	0.43 bar	7.4 psig	0.51 bar	8.2 psig	0.56 bar

1. Downstream pressure buildup with Secondary Seat fixed bleed in operation and regulator relief valve relieving to atmosphere.  
2. Outlet pressure values listed are at maximum operating inlet pressure rating per orifice. See Table 3.  
3. If the outlet pressure rises above setpoint exceeds 3 psig / 207 mbar, inspect internal parts and replace if damaged.

**Table 7. Primary Regulator and Integral True-Monitor™ Outlet Pressure Ranges without Token Relief**

PRIMARY REGULATOR						INTEGRAL TRUE-MONITOR						
TYPES	TYPICAL SETPOINT		SPRING PART NUMBER	SPRING RANGE		SPRING COLOR	SETPOINT		SPRING PART NUMBER	SPRING RANGE		SPRING COLOR
	Inches w.c.	mbar		Inches w.c.	mbar		Inches w.c.	mbar		Inches w.c.	mbar	
CS803IN and CS803EN	4	10	GE30337X012	3.5 to 6	9 to 15	Red	14	35	GE30189X012	12 to 21	30 to 52	Blue
							21	52	GE30196X012	18 to 30	45 to 75	Green
							1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
	7	17	GE30338X012	5.5 to 8.5	13 to 21	Black	14	35	GE30189X012	12 to 21	30 to 52	Blue
							21	52	GE30196X012	18 to 30	45 to 75	Green
							1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
	11	27	GE30339X012	8 to 12	20 to 30	Purple	21	52	GE30196X012	18 to 30	45 to 75	Green
							1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
							1.5 psig	103	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
	14	35	GE30340X012	10 to 16	25 to 40	White	21	52	GE30196X012	18 to 30	45 to 75	Green
							1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
							1.5 psig	103	GE30190X012	1.4 to 2.9 psig	97 to 200	Black

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**Table 7. Primary Regulator and Integral True-Monitor™ Outlet Pressure Ranges without Token Relief (continued)**

PRIMARY REGULATOR						INTEGRAL TRUE-MONITOR						
TYPES	TYPICAL SETPOINT		SPRING PART NUMBER	SPRING RANGE		SPRING COLOR	SETPOINT		SPRING PART NUMBER	SPRING RANGE		SPRING COLOR
	Inches w.c.	mbar		Inches w.c.	mbar		Inches w.c.	mbar		Inches w.c.	mbar	
CS803IN and CS803EN	1 psig	69	GE30341X012	14 to 30	35 to 75	Dark Green	1.5 psig	103	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
							2 psig	138	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
							3.5 psig	241	GE35081X012	2.6 to 3.7 psig	179 to 255	Purple
CS823IN and CS823EN	2 psig	138	GE30342X012	1 to 2.5 psig	69 to 170	Blue	2.5 psig	172	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
							3 psig	207	GE35081X012	2.6 to 3.7 psig	179 to 255	Purple
							5 psig	345	GE30192X012	3.6 to 6 psig	248 to 414	Dark Blue
	3 psig	207	GE46922X012	1.5 to 3.5 psig	100 to 240	Orange	3.5	241	GE35081X012	2.6 to 3.7 psig	179 to 255	Purple
							4	276	GE30192X012	3.6 to 6 psig	248 to 414	Dark Blue
							6	414	GE33121X012	4 to 7.5	276 to 517	Red
	5 psig	345	GE30343X012	2.5 to 5.5 psig	170 to 380	Yellow	6	414	GE33121X012	4 to 7.5	276 to 517	Red
							7	483	GE33121X012	4 to 7.5	276 to 517	Red
							7.5	517	GE33121X012	4 to 7.5	276 to 517	Red

**Table 8. Primary Regulator and Integral True-Monitor Outlet Pressure Ranges with Token Relief**

PRIMARY REGULATOR							INTEGRAL TRUE-MONITOR					
TYPES	SETPOINT		SPRING PART NUMBER	SPRING PRESSURE RANGE		SPRING COLOR	SETPOINT		SPRING PART NUMBER	SPRING PRESSURE RANGE		SPRING COLOR
	Inches w.c.	mbar		Inches w.c.	mbar		Inches w.c.	mbar		Inches w.c.	mbar	
CS803IT and CS803ET	4	10	GE30337X012	3.5 to 6	9 to 15	Red	21	52	GE30196X012	18 to 30	45 to 75	Green
							1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
	7	17	GE30338X012	5.5 to 8.5	13 to 21	Black	21	52	GE30196X012	18 to 30	45 to 75	Green
							1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
	11	27	GE30339X012	8 to 12	20 to 30	Purple	1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
							1.5 psig	103	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
	14	35	GE30340X012	10 to 16	25 to 40	White	1 psig	69	GE30225X012	26 to 40	65 to 99	Orange
							1.5 psig	103	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
	1 psig	69	GE30341X012	14 to 30	35 to 75	Dark Green	2 psig	138	GE30190X012	1.4 to 2.9 psig	97 to 200	Black
							3 psig	207	GE35081X012	2.6 to 3.7 psig	179 to 255	Purple
CS823IT and CS823ET	2 psig	138	GE30342X012	1 to 2.5	70 to 170	Blue	3 psig	207	GE35081X012	2.6 to 3.7 psig	179 to 255	Purple
							4 psig	276	GE30192X012	3.6 to 6 psig	248 to 414	Dark Blue
	3 psig	207	GE46922X012	1.5 to 3.5	100 to 240	Orange	5 psig	345	GE30192X012	3.6 to 6 psig	248 to 414	Dark Blue
							6 psig	414	GE33121X012	5.1 to 7.5 psig	352 to 517	Red
	5 psig	345	GE30343X012	2.5 to 5.5	170 to 380	Yellow	7 psig	483	GE33121X012	5.1 to 7.5 psig	352 to 517	Red
							7.5 psig	517	GE33121X012	5.1 to 7.5 psig	352 to 517	Red

## Principle of Operation

### Types CS800, CS820, and CS850 Base Regulators Operation

Refer to Figures 2 and 3. When downstream demand decreases, the pressure under the diaphragm increases. This pressure overcomes the regulator setting (which is set by the regulator control spring). Through the action of the pusher post assembly, lever, and valve stem, the valve disk moves closer to the orifice and reduces gas flow. If demand downstream increases, pressure under the diaphragm decreases. Spring force pushes the pusher post assembly downward, the valve disk moves away from the orifice, and the gas flow increases downstream as the regulator opens in response to the decreased pressure underneath the diaphragm.

The Type CS800IR regulator includes an internal relief valve for overpressure protection. If the downstream pressure exceeds the regulator setting by 7-inches w.c. to 2.5 psig / 17 to 172 mbar (depending on the type number and main spring used), the relief valve opens and excess gas is vented through the stabilizer vent in the upper spring case. Units with standard internal relief valve have 1 NPT vent size, Figure 2, while units with high-capacity relief valve have 2-1/2 NPT vent size, Figure 3.

The Types CS800IT and CS800ET provide a low-capacity/token relief. Token relief provides relief from minor overpressure caused by nicks or dents on the orifice or by thermal expansion of gas in the downstream line. Token relief also provides a token or signal, in the form of odor, that an overpressure situation is occurring.

### Types CS803 and CS823 Integral True-Monitor™ Operation

Types CS803 and CS823 combine the operation of a conventional two-regulator wide-open monitor set into one body, see Figures 4. The Integral True-Monitor is installed on the inlet side of the body and serves to control downstream pressure in the situation where the Primary regulator can no longer regulate downstream pressure.

During normal operation the True Monitor is in a wide-open state as its setpoint is set higher than the primary regulator. See Tables 7 and 8 for guidance regarding the setpoints of the regulator and associated Integral Monitor sets. If the downstream pressure should rise to the setpoint of the True Monitor due to loss of pressure control by the primary regulator, the monitor will assume control and regulate flow to the downstream system. If a Token relief is present, the token relief will relieve a small amount of gas to the atmosphere as an indication that the Integral Monitor is controlling the downstream pressure.

Either internal or external downstream pressure registration is available. External pressure registration requires a downstream sensing line. See the Type TM600 Instruction Manual for additional details of operation.

### Types CS805 and CS825 with Secondary Seat™ Protection

Refer to Figure 5. The CS805 Series provides Secondary Seat Protection. As downstream demand decreases and downstream pressure rises to the regulator pressure lock-up value, the regulator will lock up. If, however, damage has occurred to the primary disk or orifice's seating surface (seat), or debris has become lodged between the primary disk and seat, the outlet pressure will continue to rise. This additional pressure causes the disk to apply additional force to the primary seat, which causes the Secondary Seat to move toward the secondary disk/sealing surface. If downstream demand decreases to zero, then the Secondary Seat will contact the sealing surface to provide lockup. Refer to Table 6 for approximate lock-up values provided by the Secondary Seat.

### Types CS806 and CS826 Secondary Seat Protection with Bleed

When the Secondary Seat is providing lockup, the CS806 Series provides small bleed to the downstream system as an indication that the Secondary Seat is providing lockup. In the event that the primary seat and disk cannot provide lockup, the Secondary Seat will move into contact with a metal disk with a small drilled hole. This metal to metal interface and bleed hole will allow a small amount of gas to bleed downstream thereby increasing outlet pressure until the Internal relief valve begins to discharge gas to the atmosphere. The odor of this discharged gas provides an indication that the regulator is relying on the Secondary Seat for overpressure protection. See Table 6 for the Downstream Pressure Buildup of the Internal relief acting in conjunction with the Type CS806 Secondary Seat Assembly.

### Secondary Seat Protection Limitations



**Overpressure conditions can occur in the downstream piping when the Secondary Seat Protection is installed. The Secondary Seat Protection serves only as a backup to the primary seat for lockup. Refer to the sections on Overpressure Protection and Maintenance.**

Secondary Seat Protection does not provide additional overpressure protection in the event the secondary seat or disk is damaged by debris or contamination in the pipeline, or from conditions that would cause the regulator to go wide-open. When selecting Secondary Seat Protection, it is recommended that:

- Internal relief or high-capacity relief are also selected, or the addition of some other method of overpressure protection be added in the downstream system as discussed in the Overpressure Protection section; and

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- A periodic downstream lock-up pressure test is done to determine if the Secondary Seat™ Protection option is serving as the primary seat for shutoff, thereby indicating that the primary orifice/seat or the disc are no longer providing shutoff. This determination is made by checking if the the regulator lock-up value is elevated to or near the values indicated in Table 6, under the heading Types CS805 and CS825.

## Installation and Overpressure Protection



### WARNING

Personal injury or system damage may result if this regulator is installed, without appropriate overpressure protection, where service conditions could exceed the limits given on the regulator nameplate.

Regulator installations should be adequately protected from physical damage.

All vents should be kept open to permit free flow of gas to the atmosphere. Protect openings against entrance of rain, snow, insects, or any other foreign material that may plug the vent or vent line. For outdoor installations, point the spring case vent downward to allow condensate to drain (See Figure 7). This minimizes the possibility of freezing and of water or other foreign materials entering the vent and interfering with proper operation.

Under enclosed conditions or indoors, escaping gas may accumulate and be an explosion hazard. In these cases, the vent should be piped away from the regulator to the outdoors.

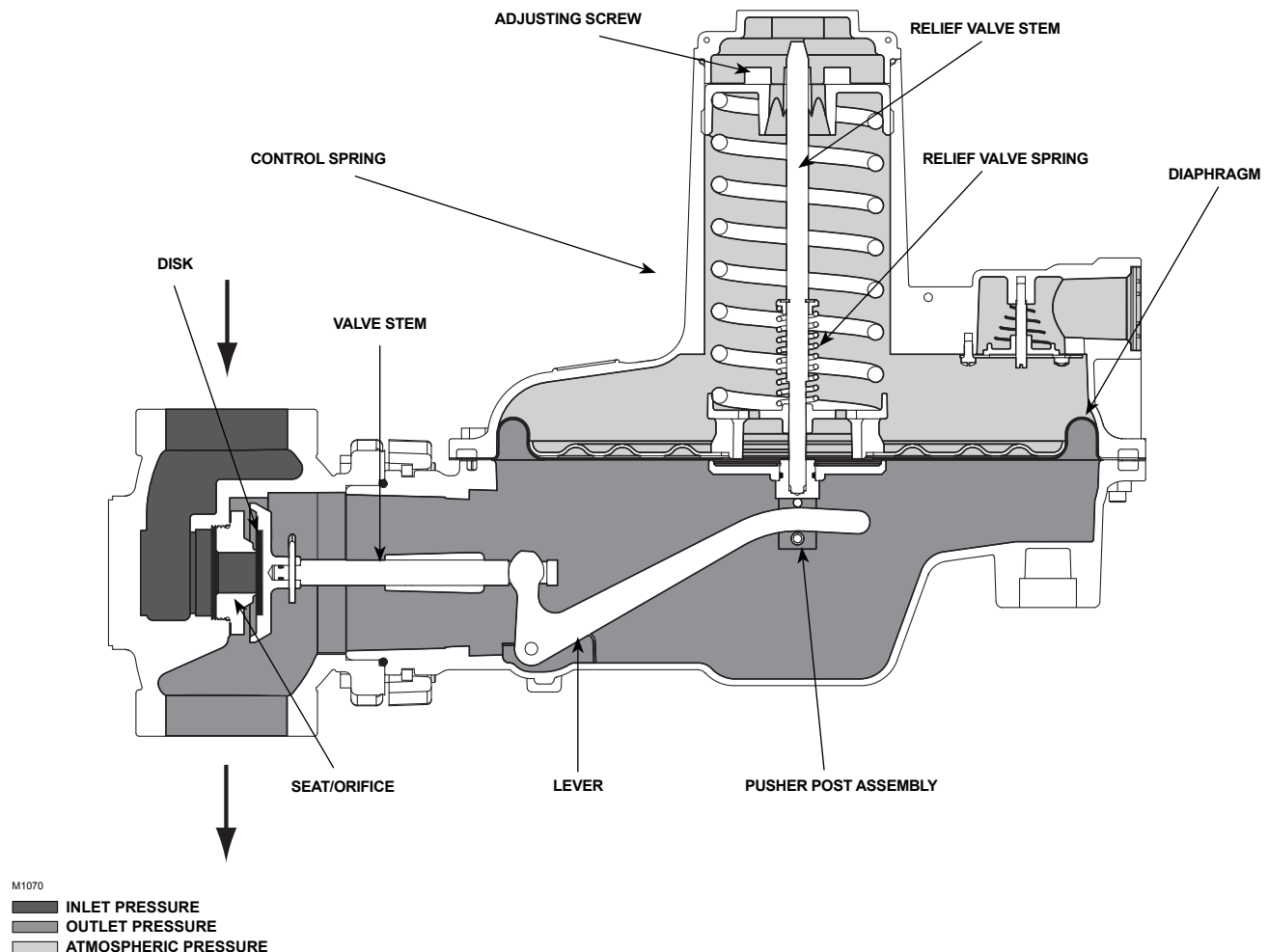
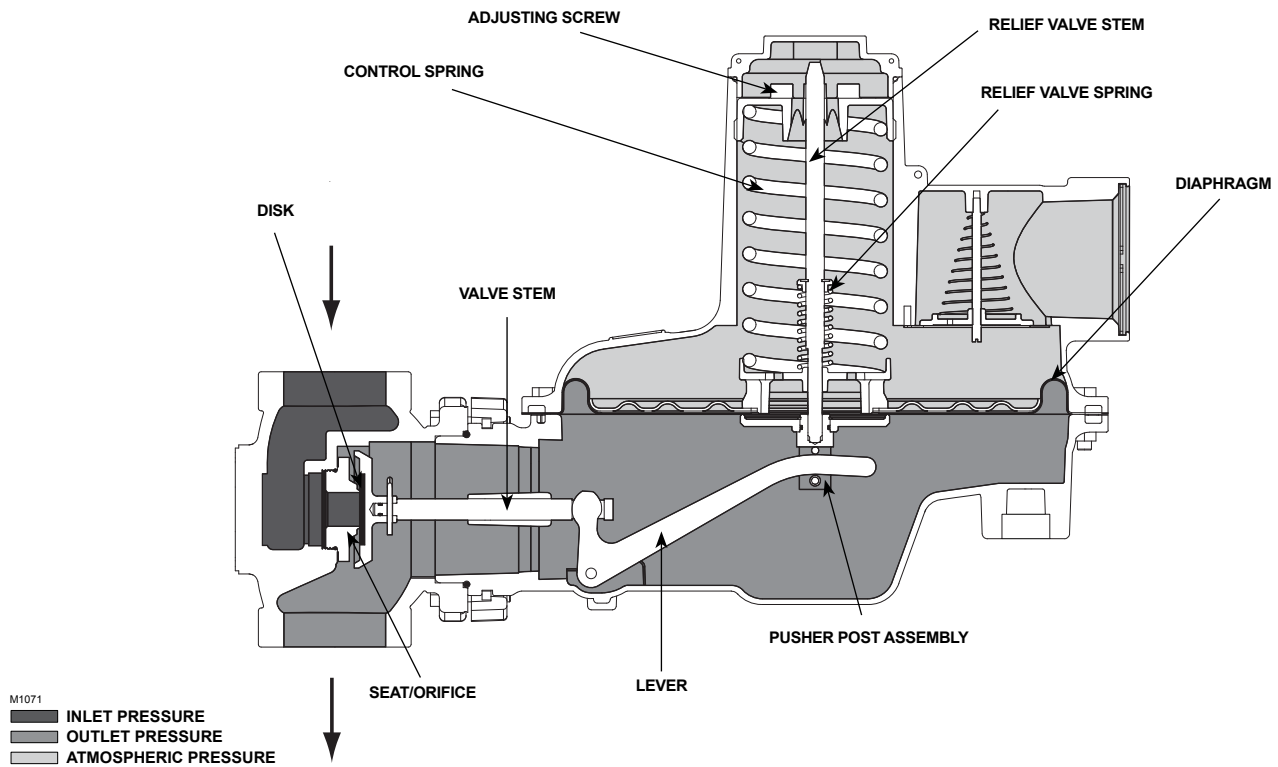
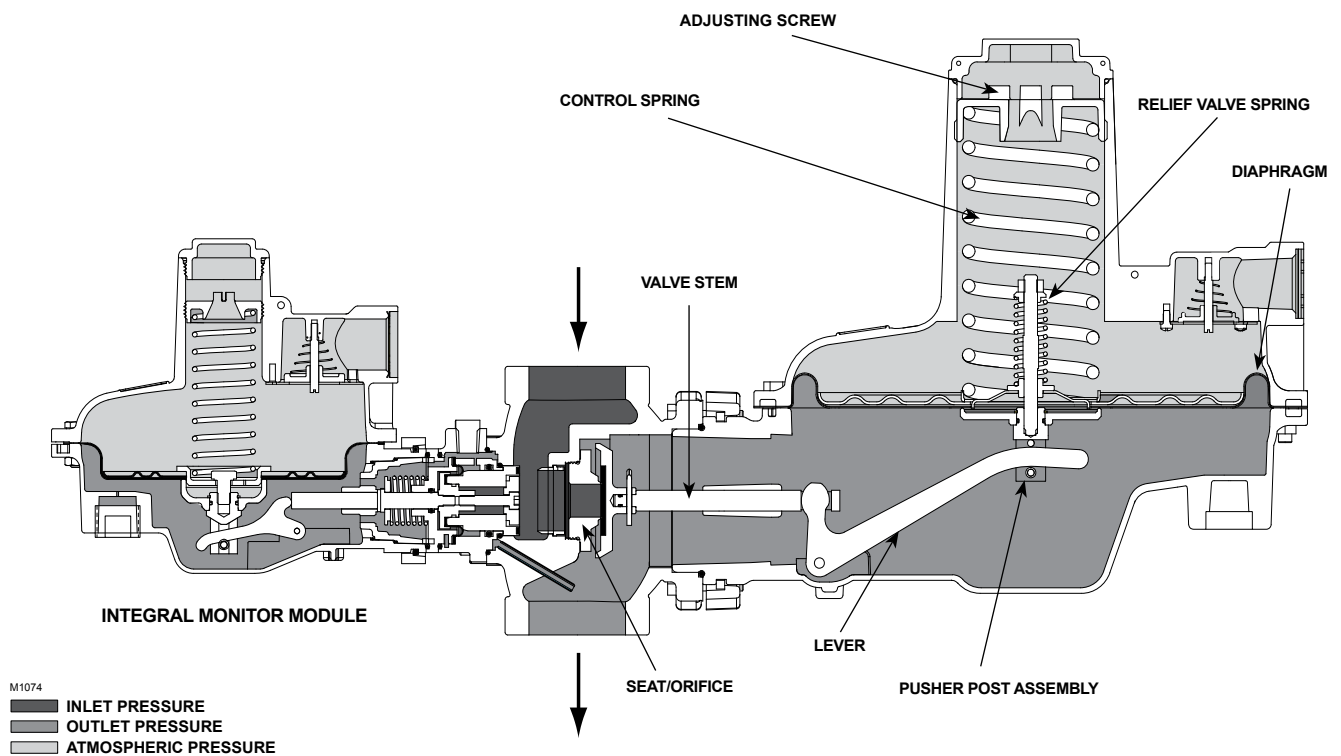


Figure 2. Type CS800IR Internally Registered Regulator with Internal Relief Operational Schematic





**Figure 3.** Type CS800IQ Internally Registered Regulator with High Capacity Relief Operational Schematic



**Figure 4.** Type CS803IT Regulator with Integral Monitor Module Operational Schematic

# CS800 Series

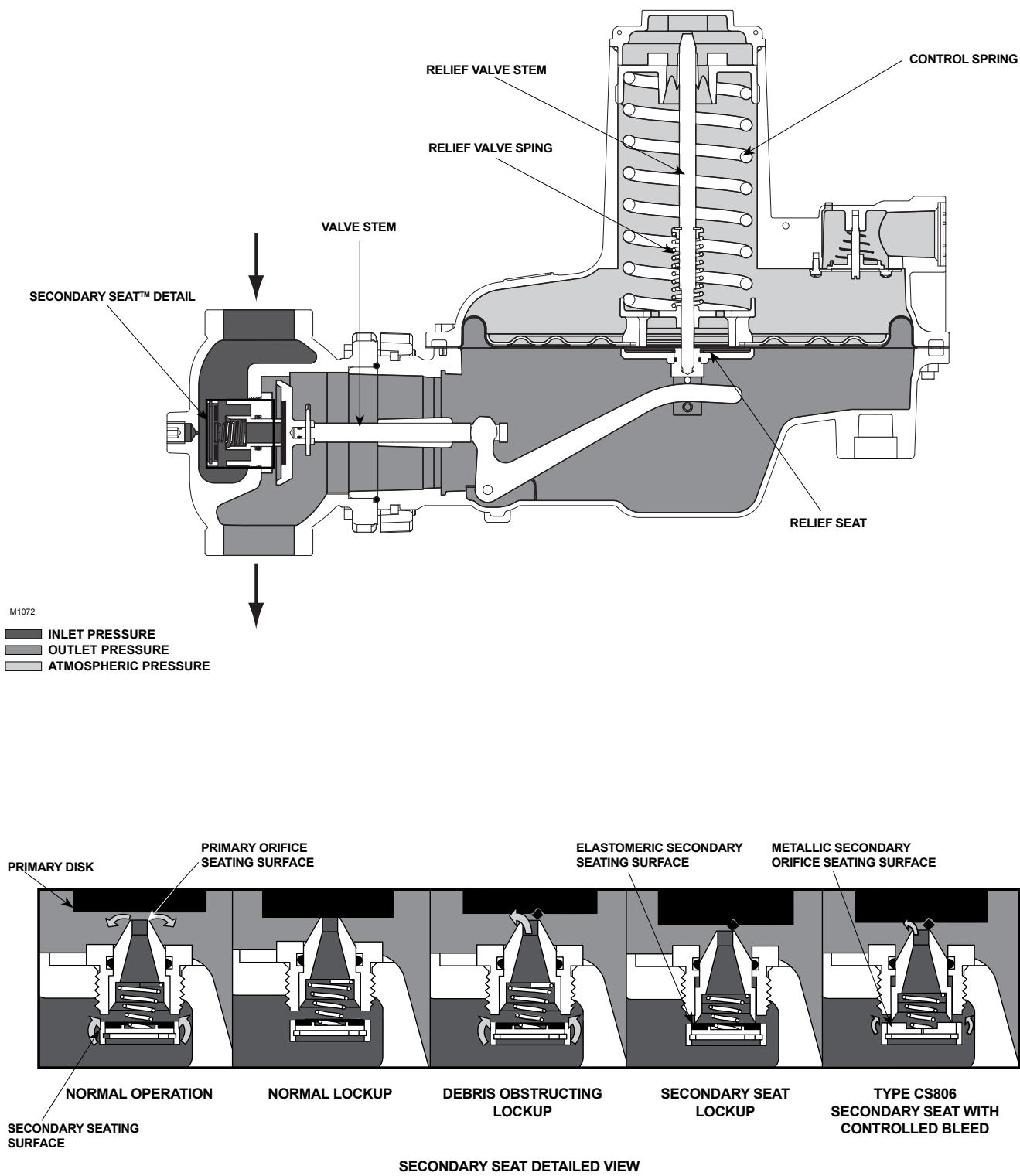
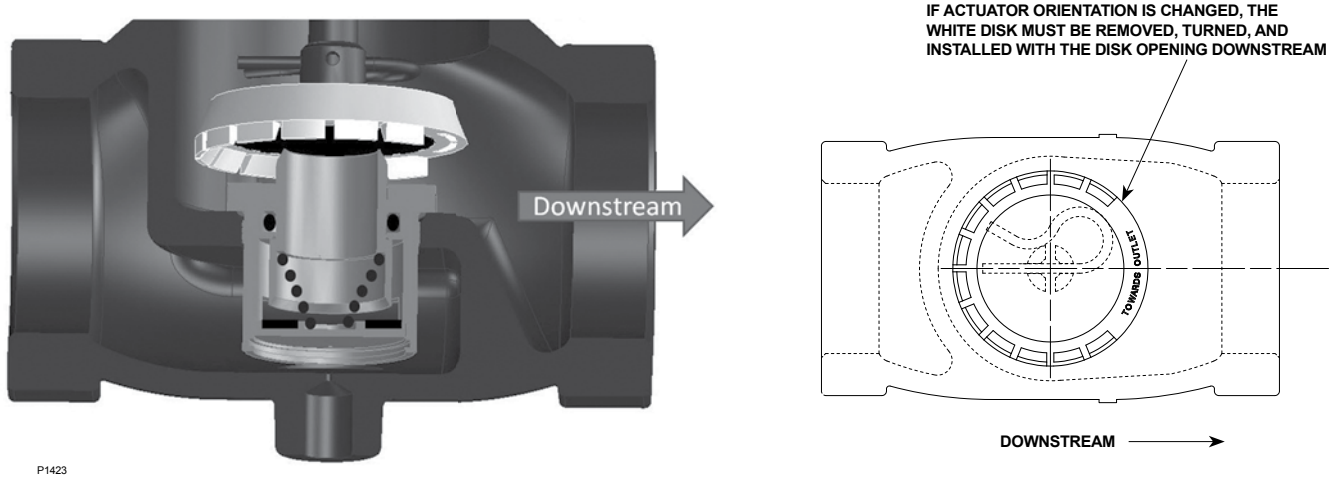
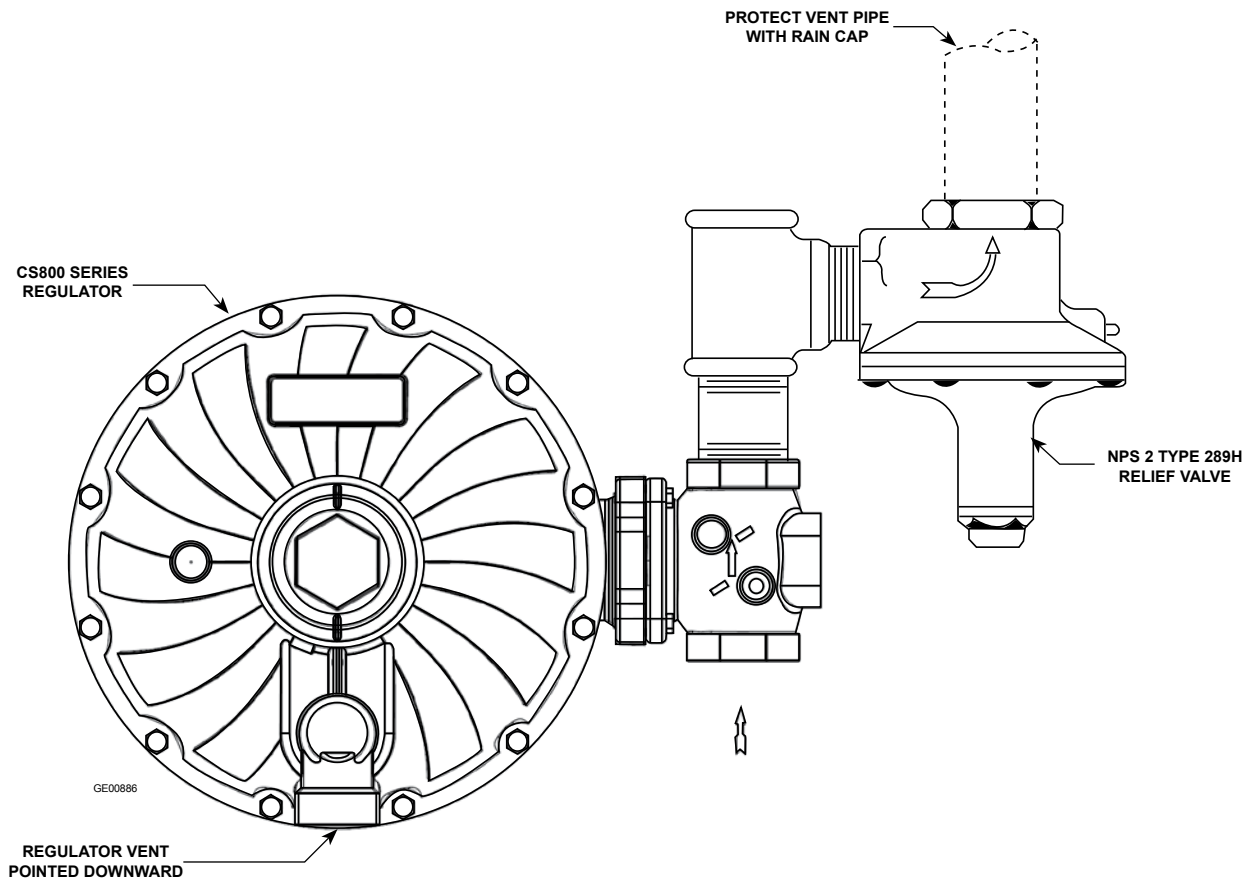


Figure 5. Type CS805IR with Secondary Seat Protection



**Figure 6.** White Disk Orientation for use with Secondary Seat™ Protection



**Figure 7.** CS800 Series Regulator Installed with the Vent Pointed Downward and with a Type 289H Relief Valve for High Capacity Relief



## CAUTION

The CS800 Series regulators have an outlet pressure rating lower than their inlet pressure rating. If actual inlet pressure can exceed the outlet pressure rating, outlet overpressure protection is necessary. However, overpressuring any portion of the regulators beyond the limits in the Specifications section and referenced tables may cause leakage, damage to regulator parts, or personal injury due to bursting of pressure-containing parts.

Some type of external overpressure protection should be provided if inlet pressure will be high enough to damage downstream equipment. Common methods of external overpressure protection include relief valves, monitoring regulators, shut-off devices, and series regulation.

If the regulator is exposed to an overpressure condition, it should be inspected for any damage that may have occurred. Regulator operation below these limits does not preclude the possibility of damage from external sources or from debris in the pipeline.

## General Installation Instructions

Before installing the regulator,

- Check for damage, which might have occurred during shipment.
- Check for and remove any dirt or foreign material, which may have accumulated in the regulator body.
- Blow out any debris, dirt, or copper sulfate in copper tubing and the pipeline.
- Apply pipe compound to the male threads of the pipe before installing the regulator.
- Make sure gas flow through the regulator is in the same direction as the arrow on the body. "Inlet" and "Outlet" connections are clearly marked.

For Types CS805, CS825, CS806, and CS826 equipped with the White colored disk, ensure that the open end of disk is oriented toward the downstream as indicated in Figure 6. If the body direction relative to the actuator is changed during installation, the orientation of the white disk must also be removed, turned, and reinstalled to ensure the open end faces downstream.

## Installation Location

- The installed regulator should be adequately protected from vehicular traffic and damage from other external sources.
- **Install the regulator with the vent pointed vertically down, see Figure 7.** If the vent cannot be installed in a vertically down position, the regulator must be installed under a separate protective cover. Installing the regulator with the vent down allows condensation to drain, minimizes the entry of water or other debris from entering the vent, and minimizes vent blockage from freezing precipitation.
- **Do not install the regulator in a location where there can be excessive water accumulation or ice formation,** such as directly beneath a downspout, gutter, or roof line of building. Even a protective hood may not provide adequate protection in these instances.
- Install the Regulator so that any gas discharge through the vent or vent assembly is over 3 feet / 0.91 m away from any building opening.

## Regulators Subjected to Heavy Snow Conditions

Some installations, such as in areas with heavy snowfall, may require a hood or enclosure to protect the regulator from snow load and vent freeze over.

## Downstream Control Line Installation

A CS800 Series regulator with an EN or ET in the type number has a blocked throat, an O-ring stem seal, and a 3/4 NPT control line tapping in the lower diaphragm casing. A regulator with a downstream control line is used for monitoring installations or other applications where there is other equipment installed between the regulator and the pressure control point.

For types with an EN or ET in the type number, connect downstream control line tubing to the lower casing, and run the tubing a distance of approximately 6 times the outlet piping diameter as shown in Figures 9, 10, and 11. For best results, the outer diameter of the control line tubing should be 3/8-inch / 9.5 mm or larger.

### *Downstream Control Line Installation with Integral True-Monitor™*

Refer to Figure 9. When installing the Types CS803ET and CS803EN regulators, connect downstream control line tubing to the lower casing of the Primary Regulator,

and run the tubing a distance of approximately 6 times the outlet piping diameter downstream of the regulator outlet. Connect a second, separate downstream control line tubing to the lower casing of the Integral Monitor, and run the tubing a distance of approximately 6 times the outlet piping diameter downstream of the Integral Monitor outlet. For best results, the outer diameter of the control line tubing for both the Primary Regulator and the Integral Monitor should be 3/8-inch / 9.5 mm or larger.

## Installation with External Overpressure Protection

If the regulator is used in conjunction with a Type 289H relief valve, it should be installed as shown in Figure 7. The outside end of the vent line should be protected with a rainproof assembly. The Type 289H should be set 10-inches w.c. / 25 mbar higher than the outlet pressure setting of the regulator, up to 30-inches w.c. / 75 mbar outlet pressure. For pressure greater than this, set the Type 289H 0.75 psi / 0.05 bar higher than the outlet pressure setting of the regulator. See the 289 Series Instruction Manual for more information.

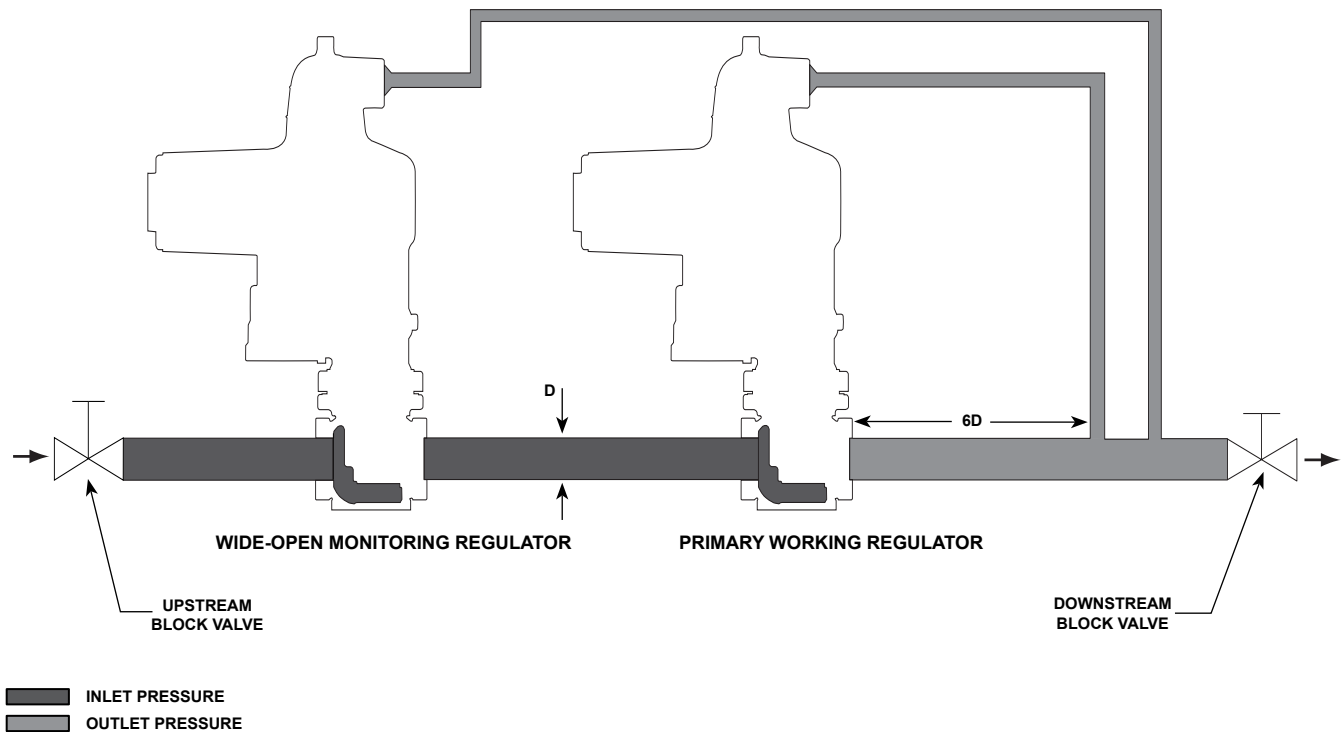
## Vent Line Installation

The CS800 Series regulators have a 1 or 2-1/2 NPT screened vent opening in the spring case. If necessary to vent escaping gas away from the regulator, install a remote vent line in the spring case tapping. Vent piping should be as short and direct as possible with a minimum number of bends and elbows. The remote vent line should have the largest practical diameter. Vent piping on regulators with internal relief must be large enough to vent all relief valve discharge to atmosphere without excessive backpressure and resulting excessive pressure in the regulator. Ensure piping is properly supported to avoid excessive stress on the regulator spring case.

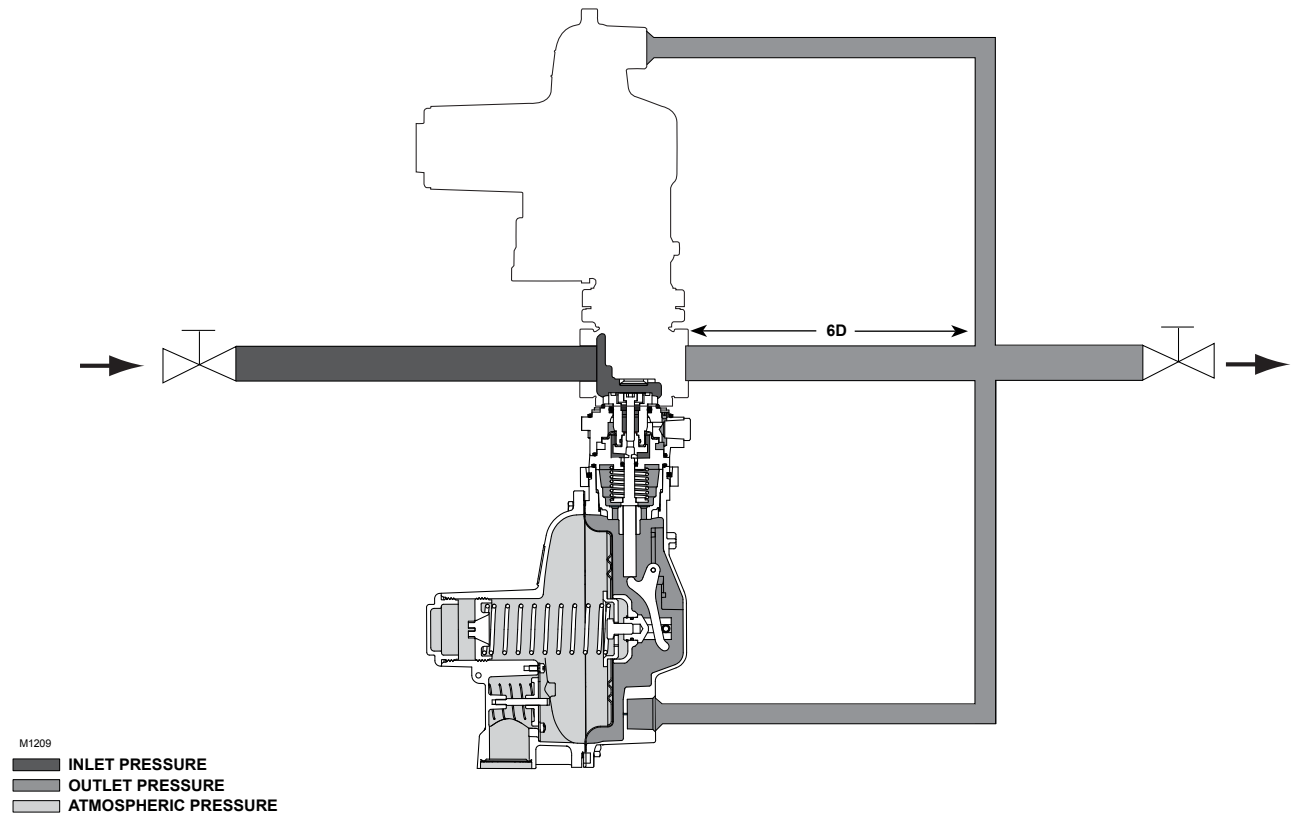
The CS800 Series offers optional Token Relief that provides low capacity relief which is located in the spring case of the Primary Regulator. If necessary to vent escaping gas away, install a remote vent line in the spring case tapping of the Primary Regulator as described above.

Periodically check all vent openings to be sure that they are not plugged.

CS800 Series outlet pressure ranges are shown in Table 4. Outlet pressure greater than 3 psi / 0.21 bar above setpoint may damage internal parts such as the diaphragm head and valve disk. **The maximum emergency (casing) outlet pressure is 15 psig / 1.0 bar.**



**Figure 8.** CS800 Series Wide-open Monitor Control Line Installation



**Figure 9.** Externally Registered Types CS803 and CS823 Regulator and Integral True-Monitor™ Downstream Control Line Installation

## Startup



**Pressure gauges should always be used to monitor downstream pressure during Startup.**

With the downstream system depressurized, use the following procedure to startup the regulator.

1. Check to see that all appliances are turned off.
2. Slowly open the upstream shut-off valve.
3. Check inlet and outlet pressure for correct values.
4. Check all connections for leaks.
5. Turn on utilization equipment and recheck the pressures.

## Adjustment

### Note

**The range of allowable pressure setting is stamped on the nameplate. If the required setting is not within this range, substitute the**

**correct spring (as shown in Table 4). If the spring is changed, change the nameplate to indicate the new pressure range.**

### Note

**Because of the weight of internal regulator parts, the Red spring, 3.5 to 6-inches w.c. / 9 to 15 mbar spring range (nominal 4-inches w.c. / 10 mbar setting) gives the best pressure control when the regulator spring barrel is pointed down. Spring barrel down orientation may require that vent piping or vent adaptors are installed to keep the vent pointed down.**

### Note

**For Types that include the Integral Monitor module, refer to the instruction manual for Type TM600 Integral Monitor, document D103126X012, for Adjustment and Maintenance of the Integral Monitor.**

A pressure gauge should always be used to monitor downstream pressure while adjustments are being made.

1. Remove the closing cap (key 60, Figure 10).
2. To increase the outlet setting, turn the adjusting screw (key 65, Figure 10) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Replace the closing cap or tighten the hex locknut.

## *Types CS803 and CS823 with Integral True-Monitor™ Module*

When adjusting the Primary Regulator and Integral True-Monitor for operation, ensure that the pressure differences between the Primary Regulator and the integral True-Monitor shown in Tables 7 and 8 are observed. For example, if the Primary Regulator setpoint is set at 7-inches w.c. / 17 mbar, then the Integral Monitor should be set at a minimum of 14-inches w.c. / 35 mbar or higher.

To test the Integral Monitor operation, the Primary regulator setpoint must be adjusted above the Integral Monitor's setpoint to simulate a failure of the primary regulator. If the spring range of the Primary Regulator is sufficiently high, it can simply be adjusted above the Integral Monitor's setpoint by following step 2 above. Otherwise, a different spring with a setpoint higher than the Integral Monitor's setpoint must be installed to check the operation of the Integral Monitor. An alternative to using a higher set spring on the primary regulator is to attach a hand pump and gauge to the primary regulator vent to pressure load it until its setpoint exceeds that of the Integral True-Monitor.



## CAUTION

**When applying pressure to the regulator spring case through the vent, care must be taken not to exceed 3 psig, which is the maximum differential across the diaphragm.**

## Shutdown

Installation arrangements may vary, but in any installation it is important that the valves be opened or closed slowly and that the outlet pressure be vented before venting inlet pressure to prevent damage caused by reverse pressurization of the regulator. The steps below apply to the typical installation as indicated.

1. Open valves downstream of the regulator.
2. Slowly close the upstream shut-off valve.
3. Inlet pressure should be released automatically downstream as the regulator opens in response to the lowered pressure on the diaphragm.
4. Close outlet shut-off valve.

## Maintenance and Inspection



## WARNING

**To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure as described in "Shutdown".**

**Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Regulator Technologies should be used for repairing Fisher® regulators. Restart gas utilization equipment according to normal Startup procedures.**

**Due to normal wear or damage that may occur from external sources, this regulator should be inspected and maintained periodically. The frequency of inspection and replacement of parts depends upon the severity of service conditions or the requirement of local, state, and federal rules and regulations.**

Periodic inspection should be performed on Wide-Open Monitor regulators or Integral True-Monitor to ensure that the monitoring regulator or Integral Monitor overpressure protection, protect the downstream system in the event of a failure to the primary regulator. This inspection must test that the wide open monitor or Integral True-Monitor functions as intended.

## Maintenance on CS800 Series with Secondary Seat Protection

Types CS805 and CS825 regulators do not have any means to alert when the Secondary Seat operates at lockup. Therefore it is recommended that a periodic lock-up test be done on the regulator to determine if the lock-up pressure has elevated to or near the values in Table 6, under the heading Types CS805 and CS825. If so, the regulator primary disk and orifice should be replaced.

Internal relief operation on units equipped with Secondary Seat Protection is an indication that the Secondary Seat Protection on the Types CS805IR and CS805IQ may not be working and that the Types CS806IR and CS806IQ Secondary Seat may have closed. Maintenance should address any potential causes for internal relief operation as well as other regulator malfunctions separate from the Secondary Seat.

# CS800 Series

**Table 9. Adjustment Tools**

KEY NUMBER	PART DESCRIPTION	ADJUSTMENT TOOL
15	Hex Bolt	1/2-inch / 13 mm Socket
16	Nut	1/2-inch / 13 mm Socket
25	Orifice/Seat	2-inch / 50 mm Socket
44	Relief Valve Stem	9mm Socket or Adjustable End Wrench
45	Bolt, Diaphragm Assembly	1/2-inch / 13 mm Socket
60	Closing Cap	2-inch / 50 mm Socket
65	Adjusting Screw, up to 2.5 psig / 0.17 bar spring range	7/8-inch Hex/Allen Wrench
		2-inch / 50 mm Socket
		1/2-inch / 13 mm Socket
		Large Flat head Screw Driver
	Adjusting Screw, 2 to 5.5 psig / 0.17 to 0.38 bar spring range	1/2-inch / 13 mm Socket Driver Extension
	Adjusting Screw, above 5 psig / 0.35 bar spring range	15/16-inch / 24 mm or Adjustable End Wrench
71	Body Bolt	1/2-inch / 13 mm Socket
72	1/4 NPT Pipe Plug	1/4-inch Hex/Allen Wrench
1. Use of Adjustment tool is optional.		

## Disassembly to Replace Diaphragm (See Figures 12, 13, and 15)

1. **See Figure 13. All Types except Type CS850**, remove the closing cap (key 60). Turn the adjusting screw (key 65) counterclockwise to ease spring compression. Remove adjusting screw and spring (key 38).
2. **See Figure 13. Type CS850**, loosen hex locknut (key 107). Turn adjusting screw (key 65) counterclockwise to ease spring compression. Unscrew bonnet (key 104) and remove. Remove spring (key 38).
3. Remove the nuts (key 16) and hex bolts (key 15). Separate the upper spring case (key 1) from the lower casing (key 9).

### Note

**When disassembling a CS800 Series regulator, lift the upper spring case straight up in order to avoid hitting the stem (key 11).**

4. Slide the diaphragm head assembly (key 55) away from the body (key 70) to unhook the pusher post (key 50) from the lever (key 10). Lift off the diaphragm head assembly.
5. **See Figure 11. Non-Relieving units**, unscrew the bolt (key 45). The bolt threads in to the pusher post (key 50) and holds the non-relieving diaphragm assembly together. Unscrewing the bolt will separate the diaphragm retainer (key 47), the lower spring seat (key 43), and diaphragm assembly (key 55), and pusher post (key 50).



## CAUTION

**Use caution when unscrewing the relief valve stem as the relief valve spring is in compression.**

**See Figure 11. Internally Relieving units**, unscrew the relief valve stem (key 44). The relief valve stem threads into the pusher post (key 50) and holds the relieve assembly together. Unscrewing the relief valve stem will separate the E-Ring (key 48), the spring retainer (key 42), the relief spring (key 41), the lower spring seat (key 43), and the diaphragm assembly (key 55) onto the pusher post (key 50).

**See Figure 11. Token Relieving units**, measure and note for reassembly, the distance between the top of the diaphragm stem (key 44) and the top of the token relief hex nut (key 46). Unscrew token relief nut with a 13 mm wrench. Remove the spring seat (key 42), and relief spring (key 41). Unthread the second lower nut (key 46). Pull the pusher post assembly (key 50) through the diaphragm assembly. Replace the pusher post O-ring (key 52) and diaphragm stem O-ring (key 115). Unscrew the pusher post nut (key 110), which allows for separation of the lower spring seat (key 43), diaphragm assembly (key 55), and the pusher post retainer (key 111).

**See Figure 11. Non-Relieving for Types CS800M and CS800M1**, unscrew the retainer screw (key 45). The screw retainer threads in to the pusher post (key 50) and holds the non-relieving diaphragm assembly together. Unscrewing the screw retainer will separate the diaphragm retainer (key 47), the lower spring seat



(key 43), diaphragm and diaphragm assembly (key 55), diaphragm pad (key 113) and pusher post (key 50).

6. Reassemble in the reverse order of step five. For the Token Relief Assembly, ensure the distance from the top of the diaphragm stem (key 44) to the top of the token relief hex nut (key 46) is the same as before disassembly. When assembling the diaphragm (key 55A) onto the diaphragm head (key 55B), apply a small amount of adhesive on the outer flat portion of the diaphragm head that contacts the diaphragm, as indicated in Figure 11. Place the diaphragm head on the diaphragm and check to ensure the hole in the diaphragm head with the hole of the diaphragm are concentrically aligned.
7. Place the diaphragm assembly into position in the lower casing, make sure that the pusher post is hooked on the lever.

## Note

**See Figure 10. To ease in the process of inserting the diaphragm assembly into the lower case (key 9) and hooking it onto the lever (key 10), loosen the four body bolts (key 71). This will allow the lever (key 10) to be rotated upward in order to slide the diaphragm assembly (key 55) onto the lever.**

8. After the diaphragm assembly is hooked to the lever, rotate the diaphragm so that the diaphragm and lower casing holes are aligned.
9. Reassemble the remaining parts by following steps 1 to 3 in reverse order.

## Disassembly to Replace Valve Stem O-ring (For externally registered Types only, e.g., Type CS800EN) (See Figures 12 and 14)

1. See Figure 10. Remove the four body bolts (key 71) and remove the body (key 70).
2. Check the body O-ring (key 19) for wear and replace as necessary.
3. See Figure 13.
  - a. All Types except Type CS850, remove the closing cap (key 60). Turn the adjusting screw (key 65) counterclockwise to ease spring compression. Remove adjusting screw and spring (key 38).
  - b. Types CS850, loosen hex locknut (key 107). Turn adjusting screw (key 65) counterclockwise to ease spring compression. Unscrew bonnet (key 104) and remove. Remove spring (key 38).
4. See Figure 10. Remove the nuts (key 16) and hex bolts (key 15). Separate the upper spring case (key 1) from the lower casing (key 9).

## Note

**When disassembling a CS800 Series regulator, lift the upper spring case straight up in order to avoid hitting the stem (key 11).**

5. Slide the diaphragm head assembly (key 55) away from the body (key 70) to unhook the pusher post (key 50) from the lever (key 10). Lift off the diaphragm head assembly.
6. Remove the two lever retaining screws (key 14). Lift lever up slightly and then slide in the direction away from the body. Once the lever pin (key 13) has cleared the lower actuator the lever can be lowered and at the same time rotated upward to allow it to be removed from the slotted stem (key 11).
7. See Figure 12. Remove the disk retainer clip (key 37) and then remove the disk assembly (key 36). Remove the stem (key 11) by sliding it in the direction away from the body.
8. Replace stem O-ring (key 12) making certain to apply lubricant.
9. Reassemble in the reverse order.

## Note

**When placing the diaphragm assembly into position in the lower casing, make sure that the pusher post is hooked on the lever. After the diaphragm assembly is hooked to the lever, rotate the diaphragm so that the diaphragm and lower casing holes are aligned.**

10. Reassemble the remaining parts by following steps 1 to 3 in reverse order.

## Disassembly to Replace Valve Disk and Orifice (See Figure 10)

1. Remove the four hex bolts (key 71) which hold the lower spring case (key 9) to the body (key 70). Separate the lower spring casing from the body.
2. Check the body O-ring (key 19) for wear and replace as necessary.

## Note

**There are multiple disk assemblies based on construction and identified by color. See Table 10 for direction in selecting appropriate disk color. Product performance will be changed if the incorrect disk assembly is used.**

3. Examine the disk assembly (key 36) for nicks, cuts, and other damage. To replace, remove the disk retainer clip (key 37) and slide the disk assembly off of the stem (key 11).
4. See Figure 15.

# CS800 Series

**Table 10. Disk Color Selection**

PRESSURE REGISTRATION	TYPES	BODY SIZES		BODY MATERIAL	SPRING RANGE <sup>(1)</sup>		DISK COLOR	DISK PART NUMBER	REPAIR KIT	
		NPS	DN		Inches w.c.	mbar				
Internal	CS800	2	50	Gray Cast Iron	5.5 to 8.5 8 to 12	13 to 21 20 to 30	Blue	GE29773X032	RCS800XBLU2	
	CS800 <sup>(3)</sup> and CS803	2	50	All Materials	5.5 to 8.5 8 to 12	13 to 21 20 to 30	Dark Gray	GE29773X082	RCS800XGRY2	
	CS800 and CS803	1-1/4, 1-1/2	32, 40	All Materials	3.5 to 30	9 to 75	Black	GE29773X022	RCS800XBLK2	
		2	50	All Materials	3.5 to 6	9 to 15	Green	GE29773X042	RCS800XGRN2	
					10 to 16	25 to 40				
				14 to 30	35 to 75					
	CS820, CS823, and CS850	All		All Materials	1 to 10 psig	70 to 690	Black	GE29773X022	RCS800XBLK2	
	CS805 and CS806	1-1/4	32	Gray Cast Iron	3.5 to 30	9 to 75	Yellow	GE29773X062	RCS800XYEL2	
		1-1/2	40	Gray Cast Iron	3.5 to 30	9 to 75	Green	GE29773X042	RCS800XGRN2	
		2	50	Gray Cast Iron	3.5 to 30	9 to 75	White <sup>(2)</sup>	GE29773X052	RCS800XWHT2	
	CS825 and CS826	All		Gray Cast Iron	1 to 5.5 psig	70 to 380	Yellow	GE29773X062	RCS800XYEL2	
	External	All	All		All Materials	All		Black	GE29773X022	RCS800XBLK2

1. The 3.5 to 30 inches w.c. / 9 to 75 mbar spring range indicates that all of the springs within this range are applicable.

2. White disk requires the open end to be directed downstream with the direction of flow. See Figure 6.

3. Type CS800 with Ductile Iron or Steel body material requires Gray Disk for indicated spring ranges.

- If the seating edge of the CS800 Series orifice (key 25) is nicked or rough, remove the orifice from the body using a 2-inch / 50 mm socket wrench.
- If equipped with a CS805/CS806 Series Secondary Seat™ orifice assembly, see the following section "Disassembly to Replace Valve Disk and Secondary Seat orifice assembly" for maintenance instructions.

## Note

**If the orifice is replaced with a different size, change the nameplate to state the new size and maximum inlet pressure.**

- Replace O-ring (key 82). Apply anti-seize lubricant to the external threads of the new orifice/orifice assembly, and reassemble into the body. Install the orifice per Figure 15 and tighten the orifice or orifice subassembly into the body per Figure 7.
- Reassemble the regulator in reverse order of the above steps. O-ring (key 28) on end of stem (key 11) should be lubricated before replacing the disk assembly. This O-ring is not a pressure retaining part.

## Disassembly to Replace Valve Disk and Secondary Seat Orifice Assembly (See Figure 10)

- Remove the four hex bolts (key 71) which hold the lower spring case (key 9) to the body (key 70). Separate the lower spring casing from the body.

- Check the body O-ring (key 19) for wear and replace as necessary.

## Note

**There are multiple disk assemblies based on construction and identified by color.**

**See Table 10 for direction in selecting appropriate disk color. Product performance will be changed if the incorrect disk assembly is used.**

**If the White disk is selected, the open side of the disk must be directed toward the outlet of the body as indicated in Figure 5.**

- Examine the disk assembly (key 36) for nicks, cuts, and other damage. To replace, remove the disk retainer clip (key 37) and slide the disk assembly off of the stem (key 11).
- See Figure 15. Remove the orifice assembly from the body using a 2-inch / 50 mm socket wrench.  
  
Inspect the primary seating surface as well as the secondary seating surface and sealing surface. If nicks or other damage are present, start to disassemble the Secondary Seat assembly by removing the internal retaining ring (key 25D) with retaining ring pliers. Use care when removing the internal retaining ring as the spring (key 25F) is compressed and will exert force on the Secondary Seat disk (key 25C).
- Remove the Secondary Seat disk (key 25C), spring (key 25F), and double sided orifice (key 25B). Finally, remove the orifice O-ring (key 25E). Lubricate O-ring

with Dow Corning 33 lubricant, or similar lubricant that maintains its lubrication properties at cold temperatures, and replace O-ring. Insert the new double-sided orifice (key 25B), then the spring (key 25F), ensuring that the larger diameter opening is contacting the shelf of the orifice.

6. Replace the Secondary Seat™ disk (key 25C)
  - a. For Types CS805 and CS825 ensure that the rubber/Nitrile (NBR) sealing surface is facing the Secondary Seating surface of the orifice.
  - b. For Types CS806 and CS826, ensure that the hole in the center of the disk that acts as the spring seat is facing the spring.
7. Press the disk inside the housing (key 25A) to allow the internal retaining ring to be reinserted.

## Note

**If the orifice is replaced with a different size, change the nameplate to state the new size and maximum inlet pressure.**

8. Replace O-ring (key 82). Apply anti-seize lubricant to the external threads of the new orifice/orifice assembly, and reassemble into the body. Install and tighten the orifice per Figure 10.
9. Reassemble the regulator in reverse order of the above steps. O-ring (key 28) on end of stem (key 11) should be lubricated before replacing the disk assembly. The O-ring is not a pressure retaining part but keeps the disk holder from rattling on the stem.

## Regulator Reassembly

It is recommended that a good quality pipe thread sealant be applied to pressure connections and fittings and a good quality lubricant be applied to all O-rings. Also apply an anti-seize compound to the adjusting screw threads and other areas as needed.

When reassembling, torque bolts and fasteners per torque values are indicated on Figures 12 through 18. Some relaxation from initial torque values may occur.

## Parts Ordering

The type number, orifice size, spring range, and date of manufacture are stamped on the nameplate. Always provide this information in any correspondence with your local Sales Office regarding replacement parts or technical assistance.

When ordering replacement parts, reference the key number of each needed part as found in the following parts list. Separate repair part kits containing all recommended elastomer spare parts are available.

\*Recommended spare part

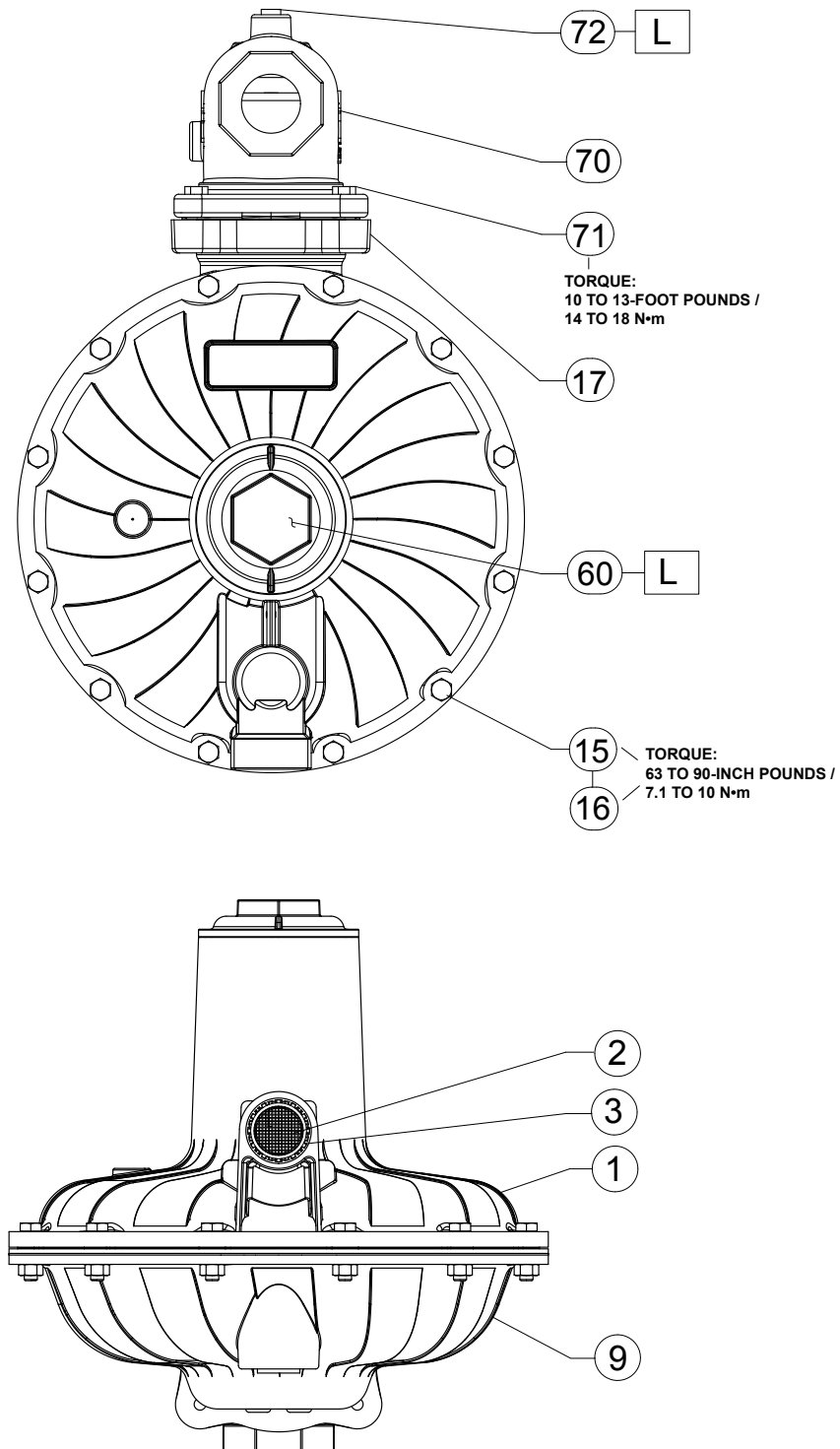
## Parts List

Key	Description	Part Number
	Regulator Repair Kit [Repair Parts kit includes keys 19, 36, and 62. Orifice is not included in repair kit. If orifice replacement is required, select orifice (key 25) and orifice O-ring (key 82).]	See Table 10
	True-Monitor™ Repair Kit [When ordering repair kits for Types CS803 and CS823, it is necessary to order both a Primary Regulator Repair Kit found on Table 10, and a True Monitor Repair Kit. See the Type TM600 Instruction Manual for details on which parts are included.]	RTM600X0012
	Secondary Seat Orifice Assembly Repair Kit [Repair Parts kit includes keys 25C, 25E, and 82. Orifice is not included. If orifice replacement is required, order orifice (key 25) and orifice O-ring (key 82) separate for the repair kit.]	
	Types CS805 and CS825 Secondary Seat Orifice Assembly without bleed For use with 3/8 to 1/2-inch / 9.5 to 13 mm orifice sizes	RCS805X0022
	For use with 5/8 to 7/8-inch / 16 to 22 mm orifice sizes	RCS805X0032
	Types CS806 and CS826 Secondary Seat Orifice Assembly with bleed For use with 3/8 to 1/2-inch / 9.5 to 13 mm orifice sizes	RCS806X0022
	For use with 5/8 to 7/8-inch / 16 to 22 mm orifice sizes	RCS806X0032
1	Upper Spring Case, Aluminum 1 NPT vent size 2-1/2 NPT vent size	GE26101X012 GE26102X012
2	Screen, SST 1 NPT vent size 2-1/2 NPT vent size	T1121338982 GE29700X012
3	Retaining Ring 1 NPT vent size, Zinc-plated steel 2-1/2 NPT vent size, 302 SST	T1120925072 GE29714X012
4	Flapper Guide, 302 SST 1 NPT vent size 2-1/2 NPT vent size	GE27061X012 GE27028X012
5	Flapper 1 NPT vent size 2-1/2 NPT vent size	GE46735X012 GE27034X012
6	Spring, 302 SST 1 NPT vent size 2-1/2 NPT vent size	GE35010X012 GE29718X012
7	Flapper Retainer Ring, SST 1 NPT vent size 2-1/2 NPT vent size	GE46526X012 GE46547X012
8	Screw-Flapper, Steel (3 required)	GE29724X012
9	Lower Spring Case, Steel Internal Sensing External Sensing	GE26104X012 GE46833X012
10	Lever, Steel	GE27408X012
11	Stem, Aluminum	GE27021X012
12*	O-ring, Nitrile (NBR) (external only)	GE29753X012
13	Lever Pin, SST	GE29701X012
14	Lever Screw, Steel (2 required)	GE30039X012

# CS800 Series

Key	Description	Part Number	Key	Description	Part Number
15	Hex Hd-Flange Bolt, Steel (12 required)	GE29973X012	28	O-ring, Nitrile (NBR)	GE01439X012
16	Nut, Steel (10 required)	GE30042X012	36*	Disk Assembly (See Table 10, Disk Color Selection)	
17	Union Ring, Aluminum	GE26416X012		Black	GE29773X022
18	Snap Ring, Music wire	GE27018X012		Blue	GE29773X032
19*	O-ring, Nitrile (NBR)	GE29755X012		Green	GE29773X042
25	Orifice Standard (without Overpressure Protection), Aluminum/Nitrile (NBR)			White	GE29773X052
	1/4-inch / 6.4 mm	GE29702X012		Yellow	GE29773X062
	3/8-inch / 9.5 mm	GE29703X012		Gray	GE29773X082
	1/2-inch / 13 mm	GE29704X012	37	Disk Retainer Clip	GE33709X012
	5/8-inch / 16 mm	GE29705X012	38	Spring	See Table 4
	3/4-inch / 19 mm	GE29706X012	41	R.V. Spring, 302 SST (Token and High-capacity)	GE30347X012
	7/8-inch / 22 mm	GE29707X012	42	Spring Retainer, Steel	
	1-inch / 25 mm	GE29708X012		Token	GE46956X012
	1-3/8-inch / 35 mm	GE29710X012		High-capacity	GE27059X012
25	Orifice Assembly Secondary Seat™ Assembly, For Types CS805 and CS825 Without Bleed, Brass/Nitrile (NBR)		43	Spring Seat	
	3/8-inch / 9.5 mm	GE29965X012		Token, Steel	GE27025X012
	1/2-inch / 13 mm	GE29968X012		Standard, High Capacity, Aluminum	GE26111X012
	5/8-inch / 16 mm	GE29985X012	44	R.V. Diaphragm Stem, Steel	
	3/4-inch / 19 mm	GE29986X012		Token	GE32556X012
	7/8-inch / 22 mm	GE29987X012		High-capacity	GE27058X012
	For Types CS806 and CS826 With Bleed, Brass/Nitrile (NBR)		45	Bolt, Steel	
	3/8-inch / 9.5 mm	GE29970X012		Types CS800 and CS820	GE32061X012
	1/2-inch / 13 mm	GE29972X012		Type CS850	GE29974X012
	5/8-inch / 16 mm	GE29989X012	46	Hex Nut, SST (Token Relief Only)	GE30042X012
	3/4-inch / 19 mm	GE29990X012	47	Diaphragm Retainer, Aluminum Alloy	
	7/8-inch / 22 mm	GE29991X012		Types CS800 and CS820	GE27027X012
25A	Housing, Brass			Type CS850	GE47664X012
	3/8-inch / 9.5 mm	GE29940X012	48	E-Ring (Standard and High-capacity)	GE33106X012
	1/2-inch / 13 mm	GE29940X012	50	Pusher Post, Aluminum	
	5/8-inch / 16 mm	GE29947X012		No Relief	GE44924X012
	3/4-inch / 19 mm	GE29947X012		Standard/High-Capacity Relief	GE44947X012
	7/8-inch / 22 mm	GE29947X012		Token Relief	GE46958X012
25B	Orifice, Brass		52*	Pusher Post O-ring, Nitrile (NBR)	
	3/8-inch / 9.5 mm	GE29941X012		Token Relief Only	GE47389X012
	1/2-inch / 13 mm	GE29942X012	53	Pin, 302 SST	GE29761X012
	5/8-inch / 16 mm	GE29948X012	54	Roller Pin, 302 SST	GE27060X012
	3/4-inch / 19 mm	GE29949X012	55	Diaphragm Assembly	
	7/8-inch / 22 mm	GE29950X012		Types CS800 and CS820	GE29775X012
25C*	Disk		55A*	Diaphragm, Nitrile (NBR)	GE29721X012
	Types CS805 and CS825 without bleed	GE29943X012	55B	Diaphragm Head, Zinc-plated steel	GE27019X012
	Types CS806 and CS826 with bleed	GE32017X012		Type CS850	GE47296X012
25D	Internal Ring, Zinc-plated steel	GE29945X012	55A*	Diaphragm, Nitrile (NBR)	GE29721X012
25E	O-ring, Nitrile (NBR)		55B	Diaphragm Head, Zinc-plated steel	GE46996X012
	3/8-inch / 9.5 mm	GE29958X012		Type CS800M	GE47297X012
	1/2-inch / 13 mm	GE29958X012	55A*	Diaphragm, Nitrile (NBR)	GE29721X012
	5/8-inch / 16 mm	GE29756X012	55B	Diaphragm Heads,	
	3/4-inch / 19 mm	GE29756X012		Zinc-plated steel (2 required)	GE27019X012
	7/8-inch / 22 mm	GE29756X012	56	Pusher Post Retaining Ring	GE33772X012
25F	Spring		57	Spring Pin (Token Relief Only)	GE33668X012
	3/8-inch / 9.5 mm	GE29944X012	60	Closing Cap, Aluminum	GE26109X012
	1/2-inch / 13 mm	GE29944X012	62*	O-ring, Nitrile (NBR)	GE29750X012
	5/8-inch / 16 mm	GE29951X012	65	Adjusting Screw	
	3/4-inch / 19 mm	GE29951X012		For Types CS800 and CS820, Aluminum	
	7/8-inch / 22 mm	GE29951X012		Spring ranges up to 2.5 psig / 170 mbar	GE26108X012
				For Type CS820, Brass	
				Spring ranges above 2.5 psig / 170 mbar	GE47294X012
				For Type CS850, Zinc-plated steel	GE27026X012

\*Recommended spare part

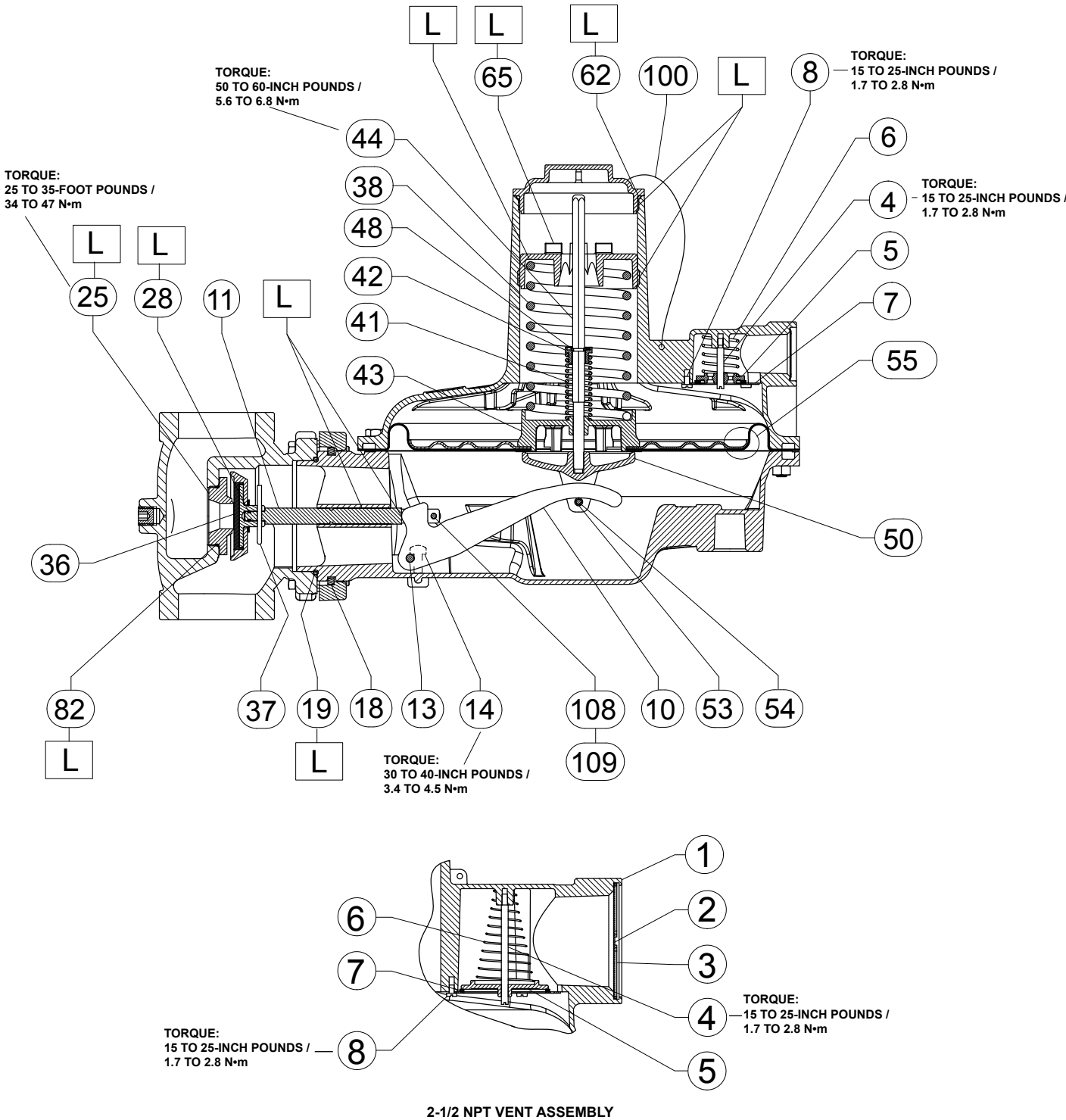


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□ APPLY LUBRICANT (L)

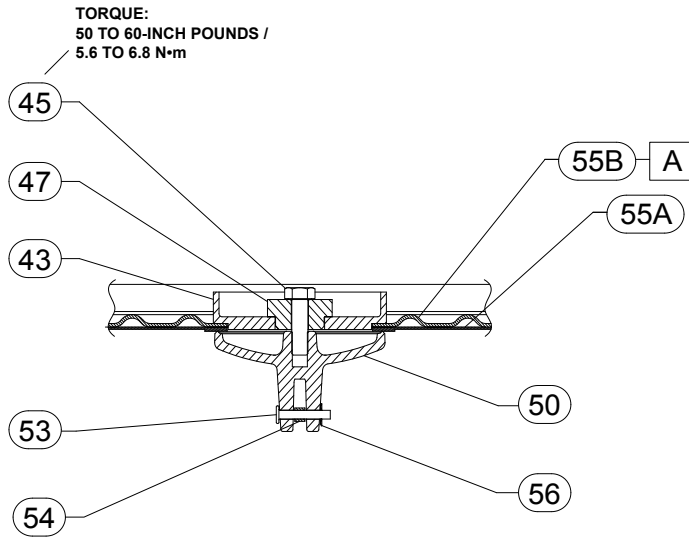
**Figure 10. CS800 Series Regulator Assemblies**

# CS800 Series

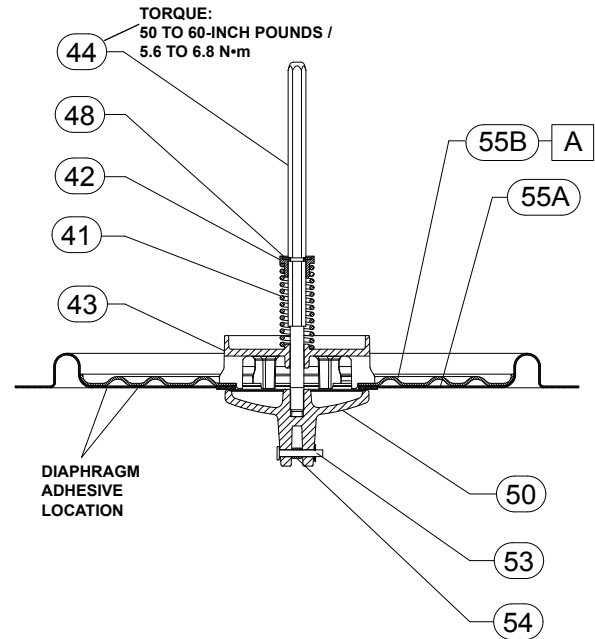


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Figure 10. CS800 Series Regulator Assemblies (continued)



TYPE CS800/CS820 NON-RELIEF



TYPE CS800/CS820 STANDARD/HIGH CAPACITY RELIEF

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☐ APPLY ADHESIVE (A)

NOTE: APPLY ADHESIVE ON THE FLAT SURFACE OF THE DIAPHRAGM PLATE THAT CONTACTS THE DIAPHRAGM, TOWARD THE OUTER PERIMETER, AND AWAY FROM THE CENTER HOLE.

Figure 11. CS800 Series Diaphragm and Relief Assemblies

Key	Description	Part Number	Key	Description	Part Number
70	Body		81	Spring Pin	GE32722X012
	Cast Iron		82*	O-ring	GE30397X012
	1-1/4 NPT	GE25859X012	90	Nameplate	-----
	1-1/2 NPT	GE26296X012	91	Warning Label	GE32073X012
	2 NPT	GE26300X012	92	Instruction Manual	GE32067X012
	NPS 2 / DN 50, CL125 FF <sup>(1)</sup>	GE26301X012	93	Information Label	GE34432X012
	NPS 2 / DN 50, CL125 FF <sup>(2)</sup>	GE26303X012	100	Lockwire	T12315T0022
	Ductile Iron		103	Thrust Washer	GE47292X012
	1-1/2 NPT	GE26308X012	104	Bonnet, Steel (Type CS850 only)	GE26812X012
	2 NPT	GE48290X012	105	Upper Spring Seat, Plated Steel (Type CS850 only)	GE26809X012
	2 Rp	GE48291X012	106	Ball Bearing (Type CS850 only)	GE29715X012
	NPS 2 / DN 50, CL150 FF <sup>(1)</sup>	GE48292X012	107	Locknut (Type CS850 only)	GE49038X012
	NPS 2 / DN 50, CL150 FF <sup>(2)</sup>	GE48293X012	108	Stem Rivet, 18-8 Stainless steel	-----
	NPS 2 / DN 50, CL150 FF <sup>(3)</sup>	GE48294X012	109	Retaining Ring	GE33772X012
	NPS 2 / DN 50, PN 10/16 <sup>(1)</sup>	GE48296X012	110	Pusher Post Nut, Zinc-plated steel (Token Relief Only)	GE46959X012
	NPS 2 / DN 50, PN 10/16 <sup>(2)</sup>	GE48297X012	111	Pusher Post Retainer, Aluminum Alloy (Token Relief Only)	GE46957X012
	Steel		112	Label Overlay	GE15307T012
	1-1/2 NPT	GE26308X022	113	Diaphragm Pad	GE47693X012
	2 NPT	GE48290X022	115	Diaphragm Stem O-ring	GE49041X012
	2 Rp	GE48291X022			
	NPS 2 / DN 50, CL150 FF <sup>(2)</sup>	GE48295X012			
	NPS 2 / DN 50, PN 10/16 <sup>(2)</sup>	GE48297X022			
71	Bolt, Steel (4 required)	GE29974X012			
72	Pipe Plug				
	Steel	1C333528992			
	SST	1C3335X0012			

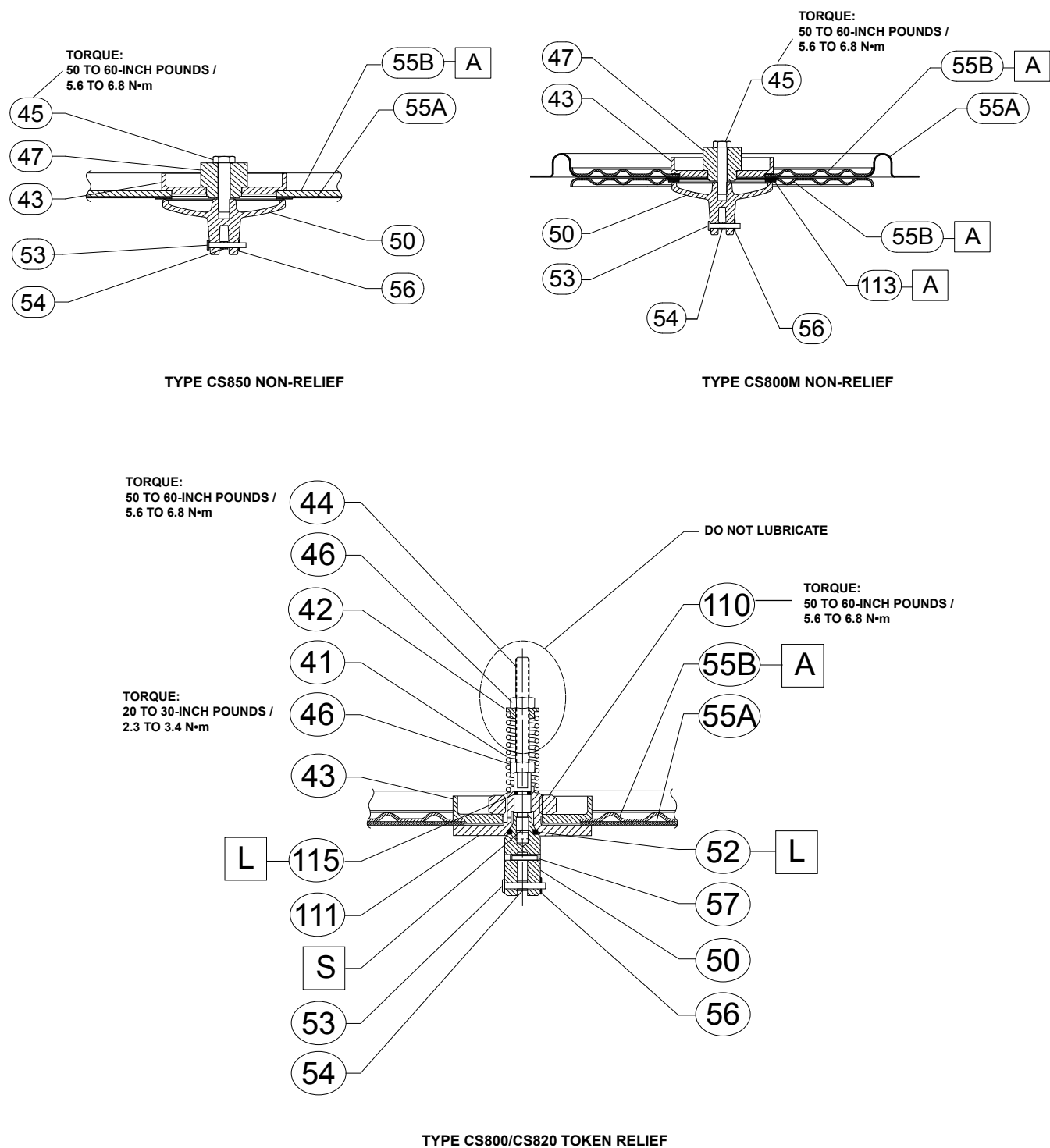
\*Recommended spare part

1. 7.5-inches / 191 mm Face-to-face dimension

2. 10-inches / 254 mm Face-to-face dimension

3. 10.5-inches / 267 mm Face-to-face dimension

# CS800 Series



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□ APPLY ADHESIVE (A) / SEALANT (S) / LUBRICANT (L)

Figure 11. CS800 Series Diaphragm and Relief Assemblies (continued)



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□ APPLY LUBRICANT (L)

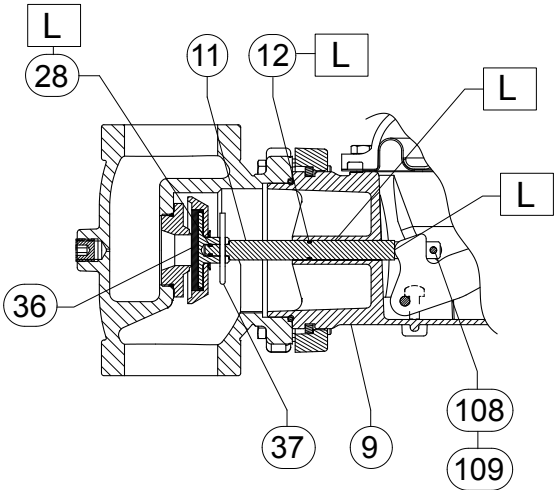
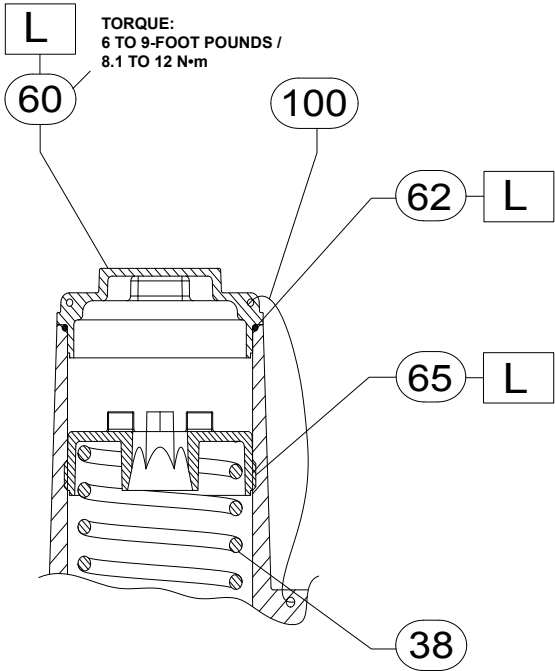
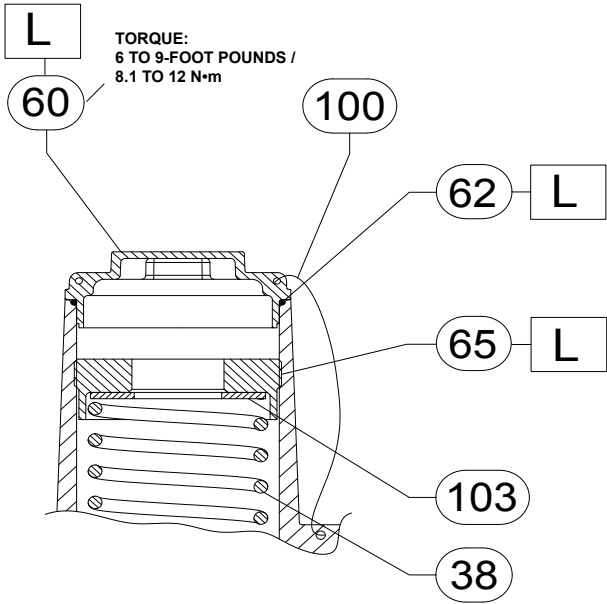


Figure 12. CS800 Series External Registration



TYPE CS800/CS800M



TYPE CS820

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□ APPLY LUBRICANT (L)

Figure 13. CS800 Series Control Spring Adjustment Assemblies

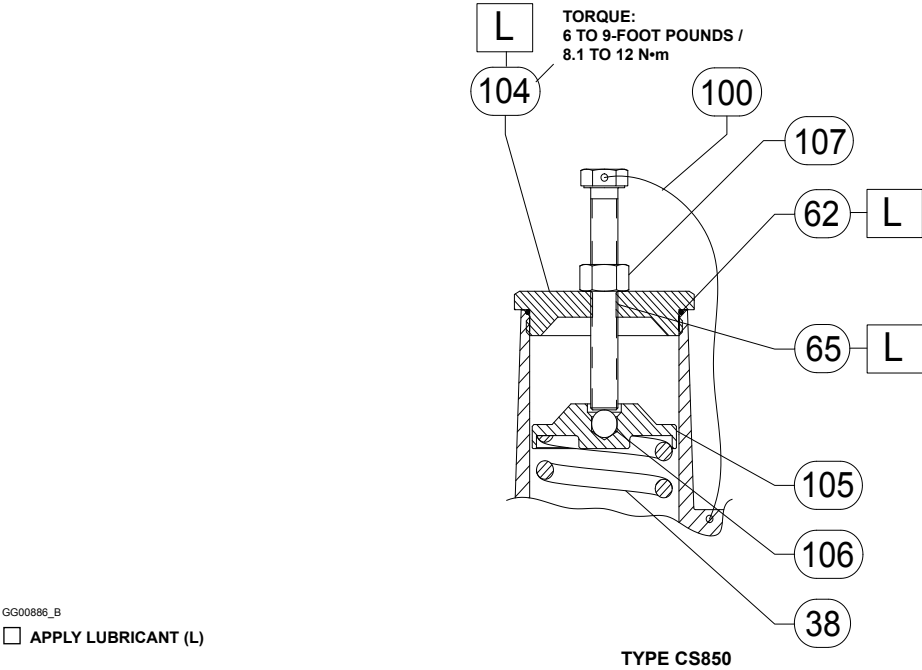


Figure 13. CS800 Series Control Spring Adjustment Assemblies (continued)

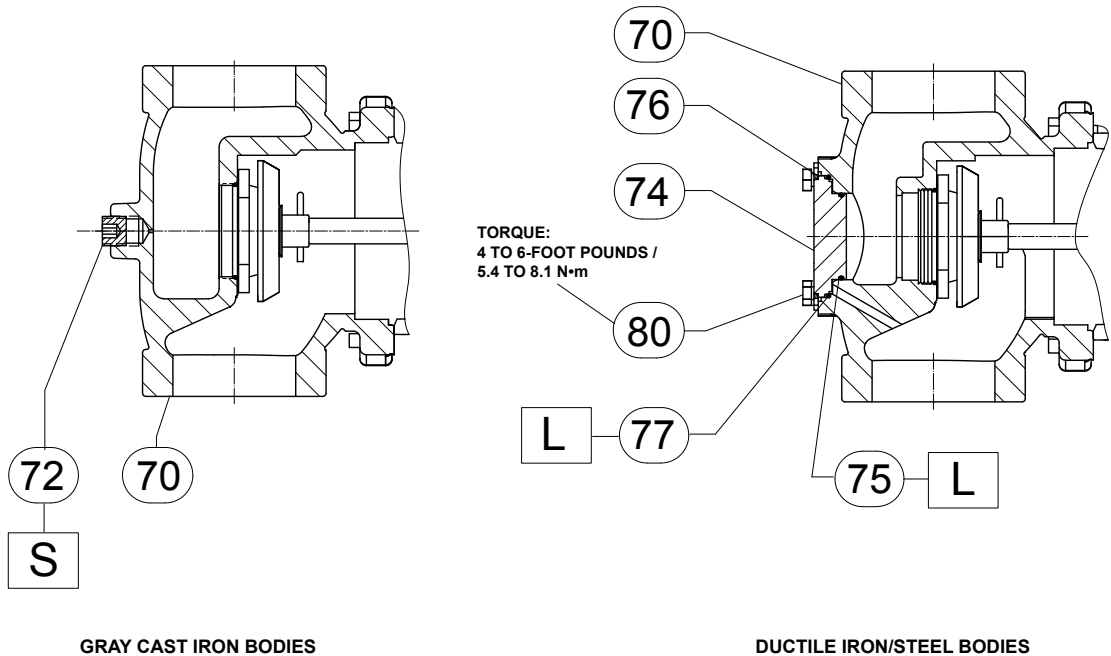
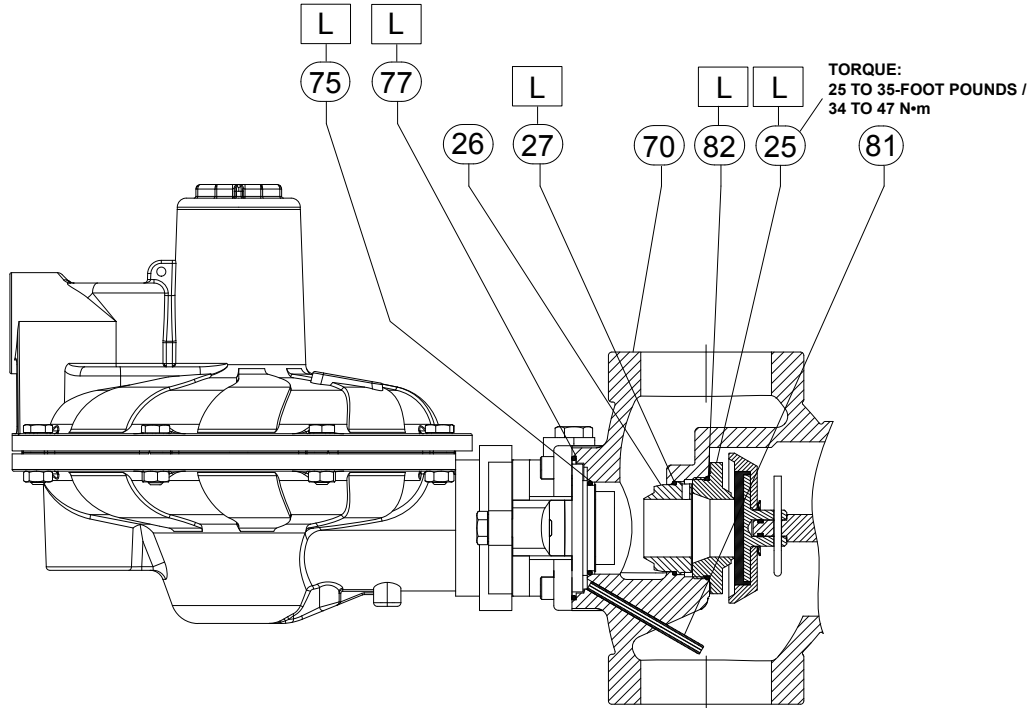
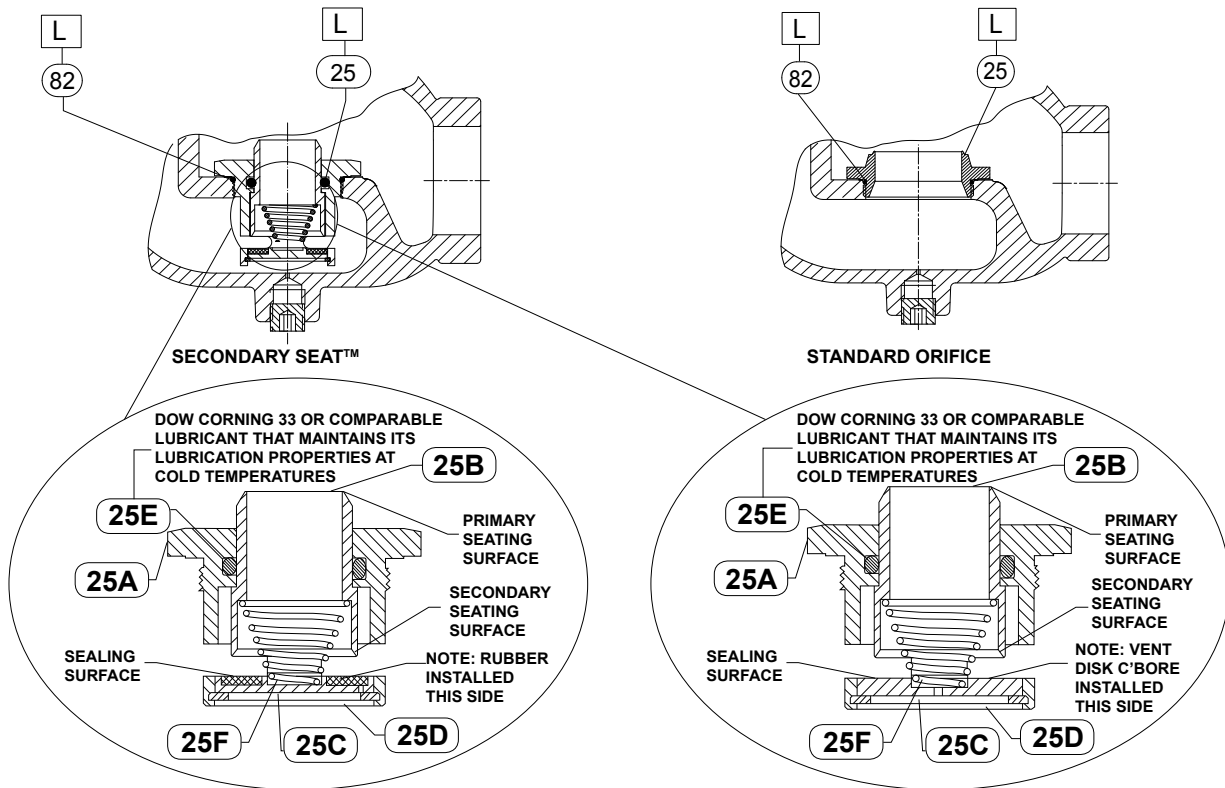


Figure 14. CS800 Series Body Configurations



**Figure 15.** CS800 Series Integral True-Monitor™ Module and Orifice Assembly



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□ APPLY LUBRICANT (L)

TYPE CS805 SECONDARY SEAT ORIFICE ASSEMBLY (DETAILED VIEW)

TYPE CS806 SECONDARY SEAT ORIFICE ASSEMBLY (DETAILED VIEW)

**Figure 16.** CS800 Series Base Orifice and Secondary Seat (For Types CS805 and CS806) Assemblies

# CS800 Series

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