October 2012

CS800 Series Commercial / Industrial Pressure Reducing Regulators

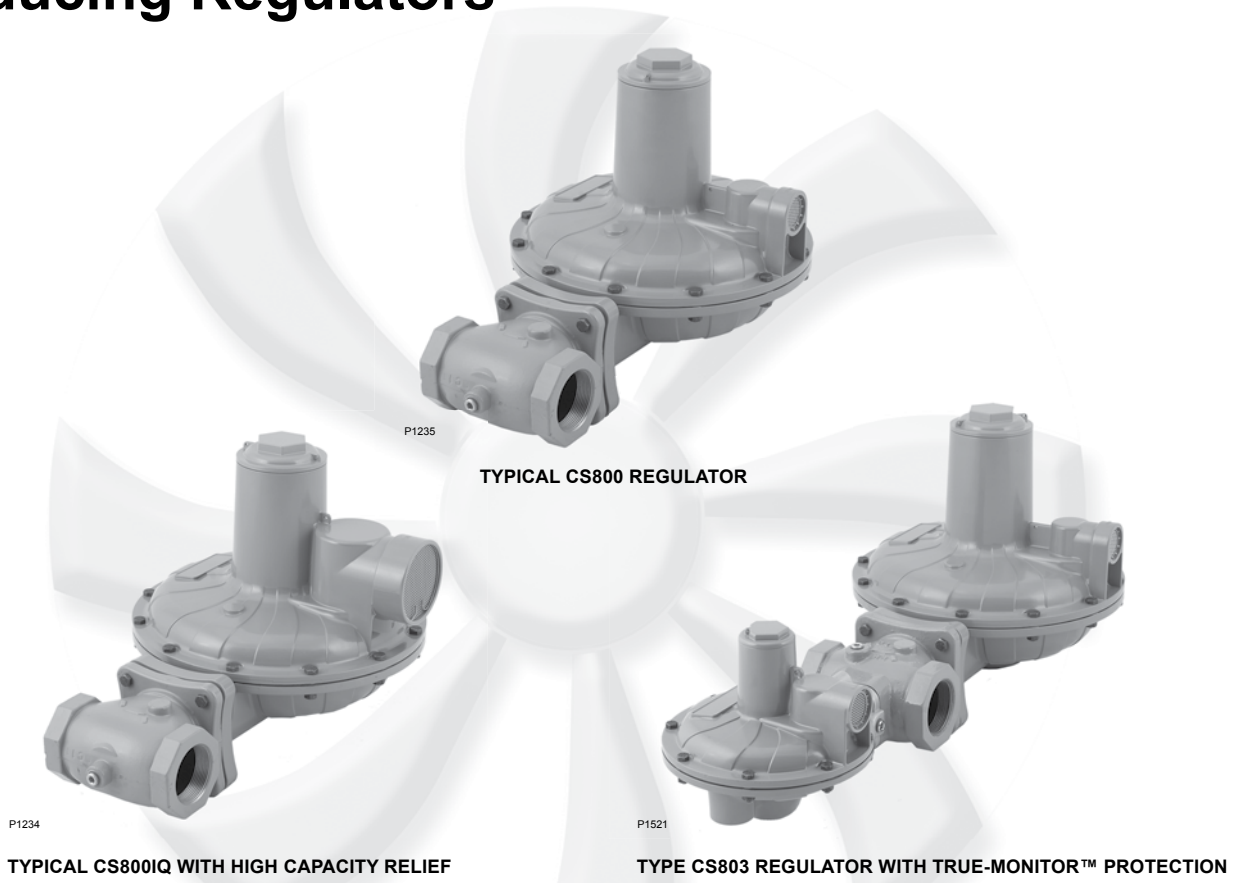

Figure 1. *Typical CS800 Pressure Reducing Regulator*

Features and Benefits

- **Flow Optimized Disks Provide the Maximum Flow for Your Application**
- **Largest Number of Overpressure Protection Offerings in the Industry**
- **Wide Variety of Body Sizes and End Connections**
- **Body Materials Available in Gray Cast Iron, Ductile Iron, and Steel**
- **Fixed Factor/Pressure Factor Measurement (PFM) Accuracy Capabilities**
- **Only Standard Tools Required for Pressure Adjustment and Orifice Removal**
- **Simplified Maintenance**

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Specifications

The Specifications section lists the specifications for the CS800 Series Regulators. The following information is stamped on the nameplate of CS800 Series: Type Number, Maximum Outlet Pressure, and Spring Range.

Available Configurations
See Table 1

Body Sizes, Material, End Connection, and Pressure Rating(1)
See Table 2

Maximum Inlet Pressures(1)
Emergency: 175 psig / 12.1 bar
Operating: See Table 3

Maximum Outlet Pressure(1)
Emergency (Casing): 15 psig / 1.0 bar
To Avoid Internal Parts Damage: 3 psig / 0.21 bar differential above outlet pressure setting

Outlet Pressure Ranges(1)
Regulator: 3.5 inches w.c. to 10 psig / 9 mbar to 0.70 bar
See Table 4

Internal Relief Performance
Approximate Internal Relief Start-to-Discharge Point: See Table 5
Relief Performance:
For Standard Internal Relief: See Figures 7, 9, 11, 13, 15, and 17
For High Capacity Internal Relief: See Figures 8, 10, 12, 14, 16, and 18

Flow Capacities
With Standard Construction:
See Tables 10 through 12 and 14 through 47
With Secondary Seat™ Construction:
See Tables 48 through 62
With Low Inlet Option(3):
See Tables 13 and 49

Orifice Sizes, Flow Coefficients, and IEC Sizing Coefficients
See Table 3

Temperature Capabilities(1)(2)
-20 to 150°F / -30 to 66°C

Spring Case Vent Connection
Internal Relief: 1 NPT
High Capacity Relief: 2-1/2 NPT

External Registration Connection
3/4 NPT

Spring Case Vent and Body Orientation
See Figure 19

Token Relief Performance
Approximate Token Relief Start-to-Discharge:
See Table 5

Secondary Seat Approximate Lockup Values and Associated Internal Relief Start-to-Discharge:
See Table 6

TM600 Series True-Monitor™ Performance(1)
Inlet Pressure Ratings
Maximum Operating: Up to 125 psig / 8.6 bar
Maximum Emergency: 175 psig / 12.1 bar
Outlet Pressure Range:
12 inches w.c. to 7.5 psig / 30 mbar to 0.52 bar

Construction Materials
CS800 Series Main Valve and Actuator
Body: Gray Cast Iron, Ductile Iron, or Steel
Body O-ring: Nitrile (NBR)
Closing Cap: Aluminum
Adjusting Screw: Aluminum
Upper and Lower Case and Valve Stem: Aluminum
Diaphragm Head: Plated steel
Orifice:
Standard: Aluminum
Secondary Seat: Brass
Pusher Post or Relief Valve Seat: Aluminum
Diaphragm and Disk: Nitrile (NBR)
Control Spring: Stainless steel
Relief Valve Spring: Stainless steel
Relief Valve Spring Retainer: Aluminum
Vent Screen: Stainless steel
Retaining Ring: Stainless steel
Lever Pin: Stainless steel
Spring Seat, Lever: Plated steel

1. The pressure/temperature limits in this Bulletin or any applicable standard or code limitation should not be exceeded.
2. Product has passed Emerson Process Management Regulator Technologies, Inc. testing for lockup, relief start-to-discharge, and reseal down to -40 degrees.
3. Applies to Capacities with Low Inlet Option, which offers Enhanced Flow Performance at Low Inlet pressures for the NPS 2 / DN 50 body with 5.5 to 8.5 inches w.c. / 13 to 21 mbar spring range.

- continued -

Specifications (continued)

Type TM600 True-Monitor™ Actuator
Diaphragm Case, Spring Case, Disk Housing, Diaphragm Upper Retainer, and Diaphragm Plate: Zinc-plated Steel
Valve Stem: Aluminum
Diaphragm: Nitrile (NBR)
Disk holder and Disk Retainer: Brass
Disk/Seat Contact: Nitrile (NBR)
Monitor Stem: Stainless
Middle Diaphragm Retainer: Zinc-plated steel
Control Spring: Stainless steel
Vent Screen: Stainless steel
Vent Retaining Ring: Zinc-plated steel
Closing Cap: Aluminum
Adjusting Screw: Aluminum
O-rings: Nitrile (NBR)

Designed, Tested, and Evaluated Consistent With:
ASME B16, ASME Section VIII DIV I, and ASTM B117 (Corrosion Resistance)

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 / 0.9 kg to Types listed above

With Flanged Body
Add 11 pounds / 5.0 kg to weights listed above

Table 1. *Available Configurations*

TYPE NUMBER							OPTIONS
C	S	8					**OUTLET PRESSURE CONSTRUCTION**
			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 / 69 mbar to 0.38 bar)*
			5				High Pressure Applications *(Outlet Pressure: 5 to 10 psig / 0.35 to 0.69 bar)*[1]
							OVERPRESSURE PROTECTION MODULE
				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[2]
							PRESSURE REGISTRATION
					I		Internal Registration
					E		External Registration[3]
							RELIEF
						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.

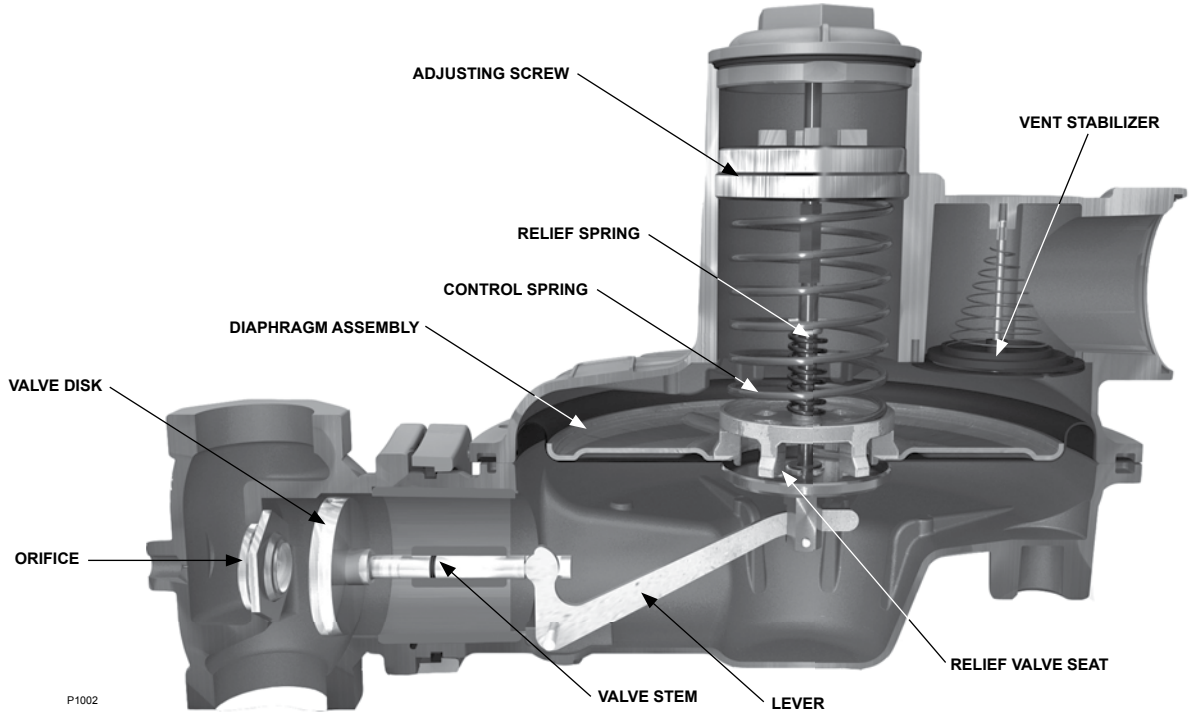

Figure 2. *Internal View of CS800 Series with High Capacity Relief*

Introduction

The CS800 Series direct-operated, spring-loaded regulators have been engineered to fit a multitude of commercial and industrial pressure-reducing applications. This flexibility is provided by the numerous body sizes and end connections, outlet pressure settings, orifice sizes, as well as the option for internal or external pressure registration.

In addition to application flexibility, the CS800 Series offers multiple overpressure protection options:

Overpressure Protection Options Available

- **Internal Relief –** Provides overpressure protection to the downstream system by relieving gas through the diaphragm assembly to atmosphere in the event of an overpressure situation.
- **High-Capacity Internal Relief –** Provides an increase in relief performance over internal relief thereby offering a significant improvement in the level of overpressure protection to the downstream system in the event of an overpressure occurrence.
- **True-Monitor™ Protection –** Combines the operation of a conventional two-regulator wide-open monitor set into one body. Provides a second monitoring regulator to control downstream pressure. In event of loss of downstream pressure control by the primary regulator due to damage to the lever, downstream sense line, orifice, disk, diaphragm, etc., the monitoring regulator will assume control of the downstream pressure and regulator 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. See page 7 for additional information.

Overpressure Relief

- **Token Relief –** Provides overpressure relief via a small capacity or token relief that relieves minor overpressure caused by thermal expansion or minor nicks in the orifice or disk.

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

TYPE	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[1]		6.12	155		
		CL125 FF	2	50	7.5	191		
			2	50	10	254		
CS803 and CS823	Gray Cast Iron	NPT	2[2]		6.12	155	175	12.1
CS803 and CS823	Gray Cast Iron	CL125 FF	2	50	10	254	175	12.1
CS800[3], CS820[3], CS850[3], CS803, and CS823	Ductile Iron	NPT	1-1/2		6.12	155	290	20
			2		6.12	155		
		Rp	2		6.12	155		
		CL125 FF / CL150 FF	2	50	7.5	191		
			2	50	10	254		
			2	50	10.5	267		
		PN 10/16	2	50	7.5	191	232	16
			2	50	10	254		
	WCC Steel	NPT	1-1/2		6.12	155	290	20
			2		6.12	155		
		Rp	2		6.12	155		
		CL150 RF	2	50	10	254		
		PN 16	2	50	10	254	232	16

1. Standard on Types CS800, CS820, and CS850.
2. Standard on Types CS803 and CS823.
3. If a ductile iron or steel body material is selected as an optional body for products 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_g	C_v	C_1	X_T	F_L	F_D
1/4[1]	6.4	125	8.6	125	8.6	175	12.1	50	2.1	24.6	0.38	0.89	0.99
3/8	9.5	125	8.6	125	8.6	175	12.1	110	3.8	29.5	0.55	0.89	0.90
1/2	13	100	6.9	100	6.9	175	12.1	210	7.2	29.5	0.55	0.89	0.93
5/8	16	80	6.5	60	4.1	175	12.1	320	10.1	31.8	0.64	0.89	0.88
3/4	19	80	6.5	60	4.1	175	12.1	450	13.3	34	0.73	0.89	0.84
7/8	22	60	4.1	50	3.4	175	12.1	600	16.7	36	0.82	0.89	0.81
1[1]	25	30	2.1	25	1.7	175	12.1	765	20.1	38.1	0.92	0.89	0.77
1-3/8[1][2]	35	15	1.0	15	1.0	175	12.1	1125	29.8	37.7	0.90	0.89	0.76

1. Not available on the Types CS805, CS806, CS825, and CS826.
2. Not available on the Types CS803 and CS823.