CSB400 Series Commercial / Industrial Pressure Reducing Regulators

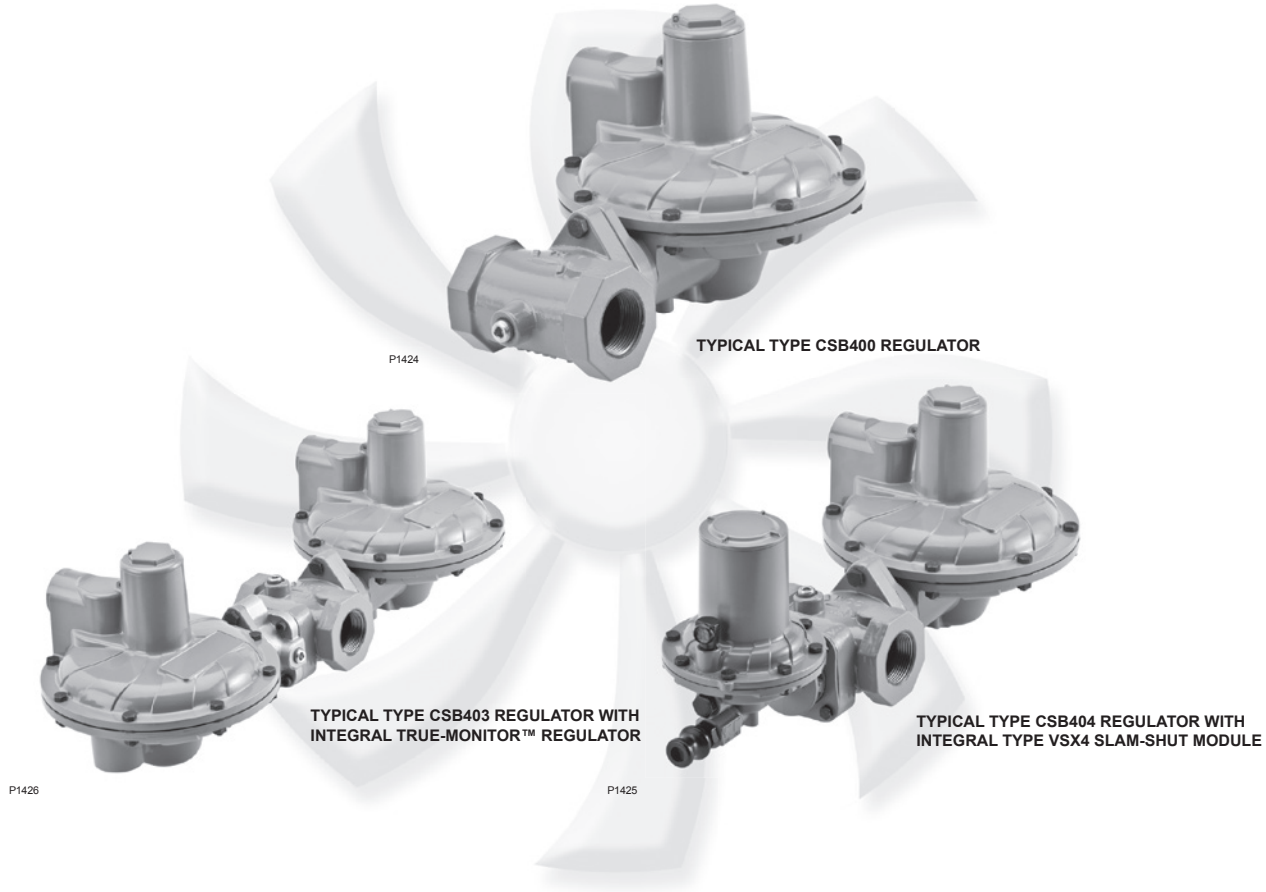

Figure 1. *Typical CSB400 Series Pressure Reducing Regulators*

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Introduction

Scope of the Manual

This Instruction Manual provides installation, maintenance and parts ordering information for the CSB400 Series regulators. Instructions and parts lists for other equipment mentioned in this instruction manual are found in separate manuals.

D103123X012

Specifications

The Specifications section lists the specifications for the CSB400 Series Regulators. The following information is stamped on the nameplate of CSB400 Series: Type and Class, Maximum Outlet Pressure and Spring Range.

Available Configurations

See Table 1

Regulator Type: Differential Strength (DS)

Accuracy Class: Up to AC5
(depending on Outlet Pressure)

Lock-up Class: Up to SG10
(depending on Outlet Pressure)

Failure Mode: Fail Open (FO)

Body Sizes and End Connection Styles

See Table 5

Integral Strength (IS) Pressure Ratings(1)

See Table 3

Differential Strength (DS) Pressure Ratings and Flow and Sizing Coefficients(1)

See Table 4

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Regulator: See Table 6
Integral True-Monitor™ Module: See Table 7
Slam-Shut Module: See Table 8

Maximum Outlet Pressures(1)

Emergency: 4.0 bar / 58 psig
To Avoid Internal Parts Damage:
Type CSB450: 1 bar / 14.5 psig above outlet pressure setting
All other Types: 0.34 bar / 5 psig above outlet pressure setting
Operating: 3.0 bar / 43.5 psig

Spring Case Vent Connection

1 NPT

Orifice Size

17.5 mm / 11/16 inch

Pressure Registration

Internal, External or Dual (Internal and External)

Operating Temperature (TS)(1)(2)

According to PED Standards:
All Types: -20 to 66°C / -4 to 150°F
Non-PED with standard construction:
Types CSB400/CSB404, CSB420/CSB424:
-20 to 66°C / -4 to 150°F
Types CSB450/CSB454(3):
-30 to 66°C / -20 to 150°F
Non-PED with low temperature construction:
Types CSB400F/CSB404F(3), CSB420F/CB424F(3):
-30 to 66°C / -20 to 150°F

Approximate Weights

With Threaded body
Type CSB400: 4.1 kg / 9 pounds
Type CSB403: 9.1 kg / 20 pounds
Type CSB404: 5.0 kg / 11 pounds
With Flanged Body:
Add 4.1 kg / 9 pounds to threaded weights listed above

PED Conformity Statement and Information

The CSB400 Product Series is in conformity with the Pressure Equipment Directive PED 97/23/EC. The exceptions to this previous statement are the Types CSB403 and CSB423. Both of these types are not yet certified to conform with the PED Directive.

Pressure regulator does not require any supplementary upstream safety accessory for protection against overpressure compared with its design pressure PS, when upstream reducing station is sized for a max downstream incidental $MIP_d <= 1.1 P_S$.

PED Related Information

See Table 2

1. The pressure/temperature limits in this Instruction Manual or any applicable standard limitation should not be exceeded.
2. Standard token relief set values listed in Table 8 are based on -20 to 60°C / -4 to 140°F.
3. Product has passed Emerson Process Management Regulator Technologies, Inc. (Regulator Technologies) testing for lockup, relief start-to-discharge and reseal down to -40°.

Table 1. *Available Configurations*

TYPE NUMBER								OPTIONS
C	S	B	4					
								PRESSURE CONSTRUCTION AND UPSTREAM MONITOR APPLICATIONS
				0				Low Pressure Applications *(Outlet Pressure: 17 to 100 mbar / 7 to 40 inches w.c.)*
				1				Low Pressure, Upstream Monitoring Applications[1][3] *(Outlet Pressure: 17 to 100 mbar / 7 to 40 inches w.c.)*
				2				Medium Pressure Applications *(Outlet Pressure: 100 to 517 mbar / 40 to 208 inches w.c.)*
				3				Medium Pressure, Upstream Monitoring Applications[1][3] *(Outlet Pressure: 100 to 517 mbar / 40 to 208 inches w.c.)*
				5				High Pressure Applications[2] *(Outlet Pressure: 0.50 to 3.0 bar / 7 to 43.5 psig)*
								OVERPRESSURE PROTECTION
					0			Without Overpressure Protection Module
					0F			Low Temperature Capability, Without Overpressure Protection Module
					3			With Integral True-Monitor™ Module[4]
					3F			Low Temperature Capability, With Integral True-Monitor Module[4]
					4			With Type VSX4 Slam-shut Module[5]
					4F			Low Temperature Capability, With Type VSX4 Slam-shut Module[5]
								PRESSURE REGISTRATION
						D		Dual Registration (Best solution for quick changing loads)
						E		External Registration
						I		Internal Registration
								RELIEF
							N	No Relief
							T	Internal Token Relief

Example: Type number **CSB424DT:** Type CSB400 regulator constructed for medium pressure applications, with Type VSX4 slam-shut module, Dual pressure registration and Internal Token relief.
1. Not available with Integral True-Monitor option.
2. Not available with Integral True-Monitor or Token Relief option.
3. Available with External Pressure Registration only.
4. Reference Instruction Manual D103126X012 for information regarding the Type TM600 Integral True-Monitor module.
5. Reference Instruction Manual D103127X012 for information regarding the Type VSX4 Slam-Shut module.

⚠ 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 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

CSB400 Series regulators are typically installed on industrial and commercial applications. See Table 1 for Available Configurations. Low, Medium and High outlet pressure constructions are available via Types CSB400, CSB420 and CSB450, respectively, that provide outlet setpoints ranging from 17 mbar to 3.0 bar / 7 inches w.c. to 43.5 psig. Also available are upstream monitoring configurations such as Types CSB410 and CSB430, which are installed upstream of the primary regulator to provide overpressure protection.

Types that include an “F” refer to the cold temperature construction of the base Type number. For example, the Type CSB404F provides a cold temperature construction of the Type CSB404. Refer to the Operating Temperature section found on the following page for additional information regarding temperature capabilities and refer to Table 7 for inlet pressure limitations. For types that include an “F”, refer to the base type number for general information such as Principles of Operation, Maintenance instructions, Warnings and Cautionary notes.

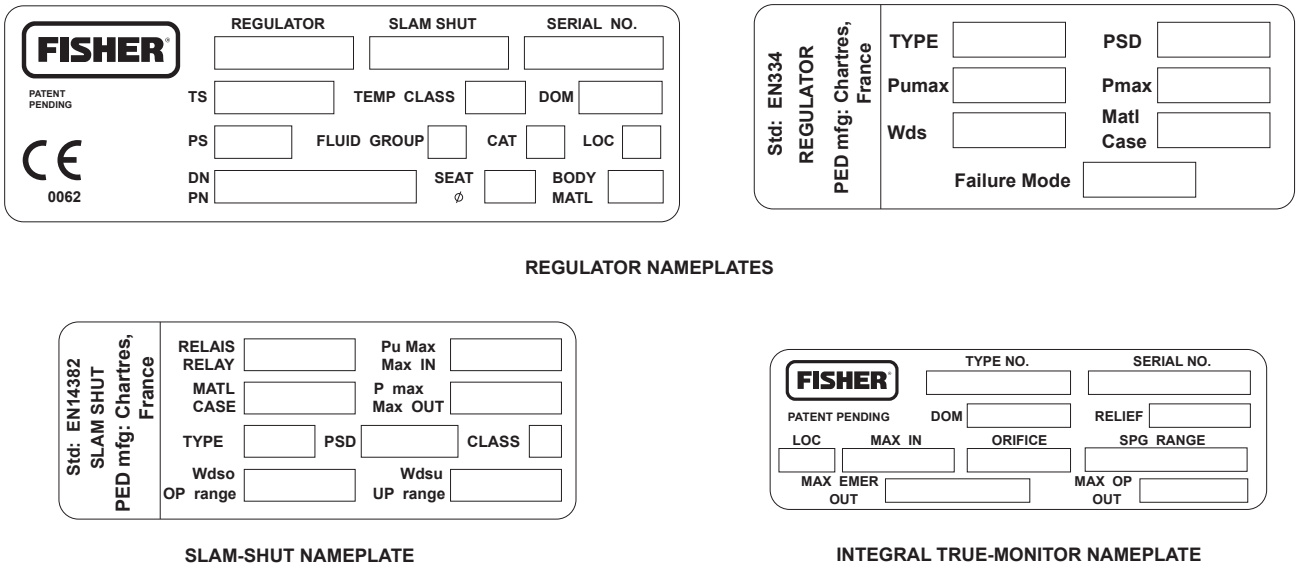


Figure 2. *CSB400 Series Regulator, Slam-shut and Integral True-Monitor™ Nameplates and Labels*

Table 2. *PED Information*

TYPE	DESCRIPTION	PED CATEGORY	FLUID GROUP
CSB400, CSB400F, CSB410, CSB420, CSB420F, CSB430 and CSB450	Base regulator	I	Groups 1 and 2 according to PED 97/23/EC, 1st and 2nd family gas according to EN 437 or other gases (compressed air, nitrogen). The gas must be non-corrosive, clean (filtration on inlet side necessary) and dry.
CSB404, CSB404F, CSB414, CSB424, CSB424F, CSB434 and CSB454	Regulator with Slam-Shut Module	IV	
European EN Reference Standards		EN 334, EN 14382	

Table 3. *Integral Strength (IS) Pressure Ratings*

TYPE	MAXIMUM ALLOWABLE PRESSURE[1] / MAXIMUM EMERGENCY INLET PRESSURE		MAXIMUM OPERATING INLET PRESSURE[1]	
	P_S		P_{umax}	
	bar	psig	bar	psig
CSB400, CSB400F, CSB404 and CSB404F	4.0	58	4.0	58
CSB420, CSB420F, CSB424 and CSB424F				
CSB450 and CSB454				
CSB410 and CSB414				
CSB403, CSB403F, CSB423 and CSB423F				
CSB403 and CSB423				
1. For the Integral Strength (IS) version, the maximum value of P_S and P_{umax} should be similar to the PSD used for the Differential Strength (DS) version.				

Table 4. *Differential Strength (DS) Pressure Ratings and Flow and Sizing Coefficients*

TYPE	SPECIFIC MAXIMUM ALLOWABLE PRESSURE / MAXIMUM EMERGENCY OUTLET PRESSURE		MAXIMUM OPERATING INLET PRESSURE		MAXIMUM EMERGENCY INLET PRESSURE[1]		ORIFICE SIZE		FLOW COEFFICIENTS WIDE OPEN			IEC SIZING COEFFICIENTS		
	PSD		P_{umax}		P_S									
	bar	psig	bar	psig	bar	psig	mm	Inch	C_g	C_v	C_1	X_T	F_D	F_L
CSB400F and CSB404F	4.0	58	6.0	87	12.0	174	17.5	11/16	428	11	43	1.16	0.84	0.90
CSB403F and CSB423F			6.0	87	10.0	145								
CSB403 and CSB423			10.0	145	10.0	145								
CSB410 and CSB414														
CSB430 and CSB434														
CSB400 and CSB404			10.0	145	12.0	174								
CSB420F and CSB424F														
CSB420 and CSB424			16.0	232	20.0	290								
CSB450 and CSB454														
1. If ordered with a PN 16 flanged connection, P_S rating is a maximum of 16.0 bar / 232 psig. P_S rating may be lower than 16.0 bar / 232 psig as indicated by this table.														

Table 5. *Body Sizes, Material, End Connections and Pressure Ratings*

BODY MATERIAL	INLET SIZE, NPS	OUTLET SIZE, NPS	END CONNECTION	FACE-TO-FACE DIMENSION		BODY PRESSURE RATING	
				mm	Inch	bar	psig
Ductile Iron	1	1	NPT	100	4	20.0	290
	1-1/4	1-1/4		114	4.5		
	1-1/2	1-1/2		114	4.5		
	2	2		127	5		
	1	1	Rp	100	4		
	1	1-1/4		114	4.5		
	1-1/4	1-1/4		114	4.5		
	1-1/2	1-1/2		114	4.5		
	2	2		127	5		
	DN 50 / 2	DN 50 / 2	CL150 FF	254	10		
			PN 10/16	254	10	16.0	232
	DN 40 / 1-1/2(1)	DN 40 / 1-1/2(1)	PN 16 Slip-On	184	7.24		
	1	2-1/4	Rp x GAZ	105	4.1	20.0	290
WCC Steel	1	1	NPT	100	4		
	1-1/4	1-1/4		114	4.5		
	1-1/2	1-1/2		114	4.5		
	1	1	Rp	100	4		
	1-1/4	1-1/4		114	4.5		
	1-1/2	1-1/2		114	4.5		

1. Uses Rp 1-1/2 x 1-1/2 threaded body with PN 16 slip-on flanges.

Table 6. *CSB400 Series Primary Regulator Outlet Pressure Ranges*

TYPE	OPERATING PRESSURE RANGES, W_d		PART NUMBER	SPRING COLOR	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
	mbar	Inch w.c.			mm	Inch	mm	Inch
CSB400, CSB400F, CSB403, CSB403F, CSB404, CSB404F, CSB410 and CSB414	17 to 24	6.8 to 9.6	GE30191X012	Pink	2.03	0.080	152	6.00
	24 to 35	9.6 to 14	GE43955X012	Orange Stripe	2.19	0.086	110	4.35
	35 to 60	14 to 24.1	GE30201X012	Dark Green	3.23	0.127	110	4.35
	54 to 100	21.7 to 40	GE30202X012	Tan	2.85	0.112	127	5.00
CSB420, CSB420F, CSB423, CSB423F, CSB424, CSB424F, CSB430 and CSB434	100 to 160	1.45 to 2.3 psig	GE35081X012	Purple Stripe	3.86	0.152	124	4.90
	138 to 300	2.0 to 4.4 psig	GE30192X012	Dark Blue	4.27	0.168	118	4.65
	276 to 517	4 to 7.5 psig	GE33121X012	Red	4.93	0.194	118	4.65
CSB450 and CSB454	500 mbar to 1 bar	7.3 to 14.5 psig	GE30203X012	Light Blue	5.59	0.220	102	4.00
	1 to 3 bar	14.5 to 43.5 psig	GE30204X012	Light Green	6.73	0.265	100	3.95

Table 7. *Primary Regulator and Integral True-Monitor™ Outlet Pressure Ranges*

TYPE	PRIMARY REGULATOR									INTEGRAL TRUE-MONITOR					
	Factory Setpoint		Set Pressure Range		Color	P/N	Factory Token Relief Set(1)			Factory Setpoint(1)		Spring Range		Color	P/N
	mbar	psig	mbar	psig			% of REG. Set	mbar	psig	mbar	psig	mbar	psig		
CSB403 and CB403F	20	8 in w.c.	17 to 24	6.8 to 9.6 in w.c.	Pink	GE30191X012	No Token Relief			37	15 in w.c.	30 to 52	12 to 21 in w.c.	Blue	GE30189X012
							170%	35	14 in w.c.	52	21 in w.c.	45 to 75	18 to 30 in w.c.	Green	GE30196X012
	30	12 in w.c.	24 to 35	9.6 to 14 in w.c.	Orange Stripe	GE43955X012	No Token Relief								
							150%	45	18 in w.c.	70	1	65 to 99	26 to 40 in w.c.	Orange	GE30225X012
	50	20 in w.c.	35 to 60	14 to 24 in w.c.	Dark Green	GE30201X012	No Token Relief								
							140%	70	1	103	1.5	97 to 200	1.4 to 2.9	Black	GE30190X012
	69	1	54 to 100	0.78 to 1.45	Tan	GE30202X012	No Token Relief								
							130%	90	1.3	138	2	97 to 200			
CSB423 and CB423F	138	2	100 to 160	1.45 to 2.3	Purple Stripe	GE35081X012	No Token Relief			172	2.5	97 to 200			
							130%	180	2.6	241	3.5	197 to 255	2.6 to 3.7	Purple	GE35081X012
	207	3	138 to 300	2.0 to 4.4	Dark Blue	GE30192X012	No Token Relief			276	4	248 to 414	3.6 to 6	Dark Blue	GE30192X012
							125%	260	3.8	345	5				
	345	5	276 to 517	4 to 7.5	Red	GE33121X012	No Token Relief			414	6	352 to 517	5.1 to 7.5	Red	GE33121X012
							125%	430	6.25	448	6.5				

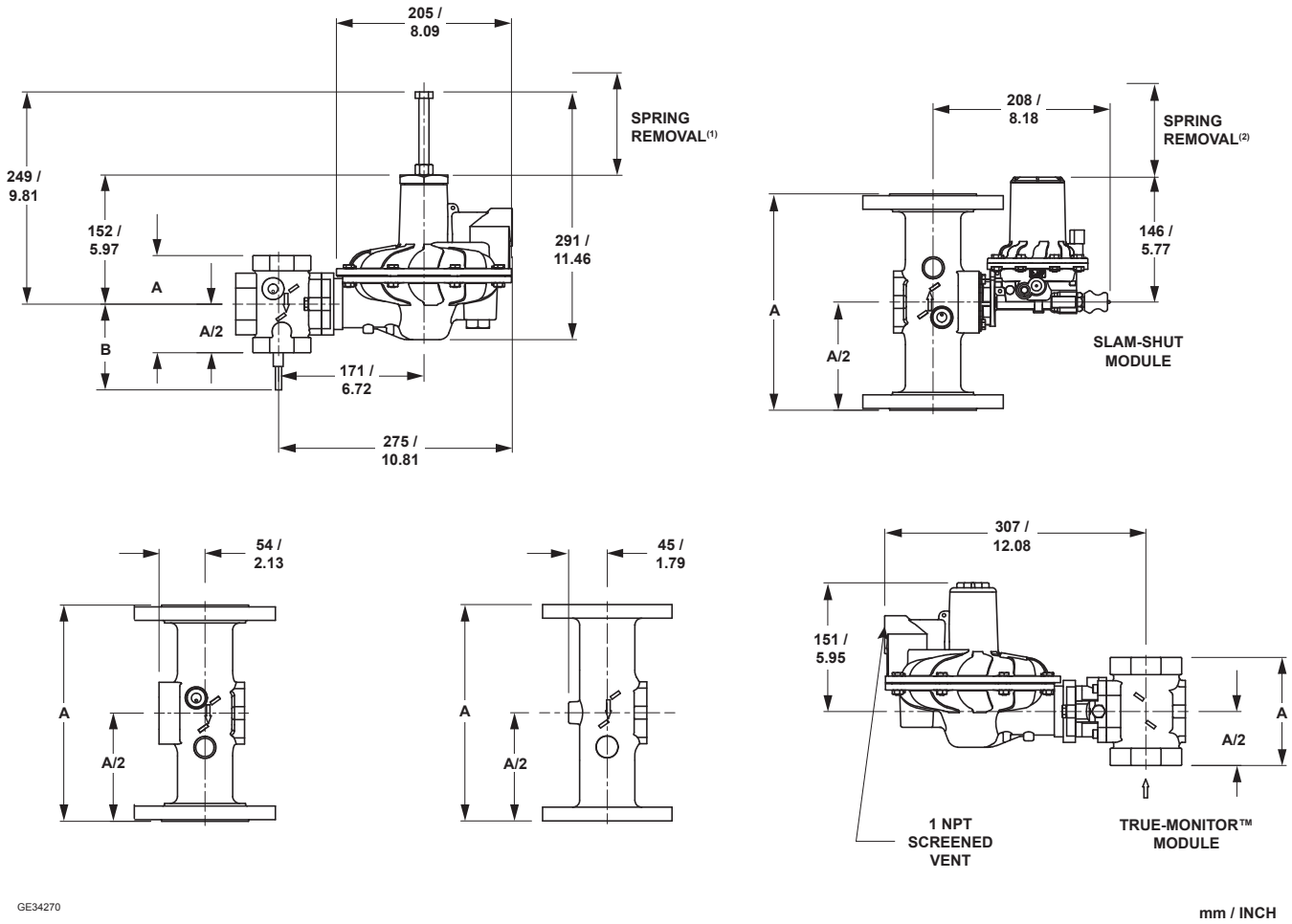
1. Recommended minimum Integral True-Monitor setpoints shown.

Table 8. *Regulator and Slam-shut OPSO and UPSO Pressure Ranges*

TYPE	REGULATOR								SLAM-SHUT MODULE									
	Set Pressure Range		Standard Setpoints		Token Relief Set[1][2]		Available Token Relief Range Shown as a % of Regulator Setpoint		Overpressure Shutoff (OPSO)						Underpressure Shutoff (UPSO)			
									Minimum Required Difference between Token Relief and OPSO Set		Standard OPSO Set Values[1] P_{dso}		OPSO Set Range as a % of Regulator Setpoint		Standard UPSO Set Values[1] P_{dsu}		UPSO Set Range as a % of Regulator Setpoint	
	mbar	psig	mbar	psig	mbar	psig	Min[2]	Max	mbar	psig	mbar	psig	Min	Max	mbar	psig	Min	Max
CSB404, CSB404F and CSB414	17 to 24	0.25 to 0.35	20	0.29	34	0.49	170%	215%	8	0.12	43	0.62	215%	270%	10	0.15	50%	56%
			21	0.30	36	0.52					45	0.65			11	0.16		
	24 to 35	0.35 to 0.51	27	0.39	41	0.59	150%	160%	10	0.14	51	0.74	190%	200%	14	0.20	50%	60%
			30	0.44	45	0.65					57	0.83			15	0.22		
			35	0.50	53	0.76					67	0.96			18	0.26		
	35 to 60	0.51 to 0.87	50	0.70	70	1.0	140%	158%	16	0.23	90	1.3	180%	200%	25	0.36	50%	70%
			60	0.87	84	1.2					108	1.57			30	0.44		
	54 to 100	0.8 to 1.5	75	1.10	98	1.4	130%	140%	20	0.29	128	1.85	170%	190%	38	0.54	50%	70%
			100	1.5	130	1.9					170	2.47			50	0.73		
CSB424, CSB424F and CSB434	100 to 160	1.5 to 2.3	150	2.2	195	2.8	130%	140%	40	0.58	248	3.59	165%	175%	75	1.1	50%	70%
			160	2.3	208	3.0					264	3.83			80	1.2		
	138 to 300	2.0 to 4.4	300	4.4	375	5.4	125%	140%	50	0.73	450	6.53	150%	165%	150	2.2	50%	70%
	276 to 517	4.0 to 7.5	500	7.3	625	9.1	125%	140%	60	0.87	700	10.2	140%	180%	250	3.6	50%	70%
CSB454[3]	500 to 1000	7.3 to 14.5	1000	14.5	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	1320	19.2	112%	140%	500	7.3	50%	70%
	1000 to 3000	14.5 to 43.5	1200	17.4	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	1600	23.2	112%	133%	600	8.7	50%	70%
			1500	21.6	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	1900	27.6	112%	127%	750	10.9		
			2000	29.0	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	2400	34.8	112%	120%	1000	14.5		
			3000	43.5	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	3400	49.3	112%	113%	1500	21.8		

1. Standard factory set shown. Factory set is at the Minimum value of the range indicated. Range indicated is a percentage of Setpoint. Percentage indicated is based on the Set Pressure Range in which that setpoint resides. If non-standard sets are required, adherence must be made to constraints shown in Table 7, including Token Relief Set Range, OPSO and UPSO set range and Minimum Required difference between Token Relief and OPSO Set.
2. Minimum Token Relief values apply to -20 to 60°C / -4 to 140°F service temperatures. For service below -20°C / -4°F, add 8 mbar / 0.12 psig to the minimum Token Relief value listed.
3. Token Relief is not available for the Type CSB454.

Example: *If a non-standard setpoint is needed, see the following example for the proper use of Table 8. Non-standard setpoint = 140 mbar / 2 psig, using the value presented above, the factory set of the token relief will be 1.3 x 140 = 182 mbar / 2.6 psig. The factory OPSO and UPSO set pressures are 165% and 50% of the non-standard setpoint, respectively. The resulting settings are: OPSO = 231 mbar / 3.4 psig and UPSO = 70 mbar / 1 psig.*



1. MAXIMUM SPRING REMOVAL CLEARANCE FOR BOTH THE PRIMARY REGULATOR AND INTEGRAL TRUE-MONITOR IS 158 mm / 6.2 inches.
2. MAXIMUM SPRING REMOVAL CLEARANCE FOR THE SLAM SHUT IS 80 mm / 3.1 inches.

Figure 3. *CSB400 Series Dimensions*

Table 9. *CSB400 Series Dimensions*

BODY SIZE, NPS	BODY END CONNECTION STYLE	FACE-TO-FACE DIAMETER (A)		PITOT TUBE (B)	
		mm	Inch	mm	Inch
1	NPT or Rp	100	4	97	3.8
1-1/4		114	4.5		
1-1/2		114	4.5		
2		127	5		
DN 50 / 2	CL150 FF or PN 10/16	254	10		
1 x 1-1/4	Rp	114	4.5		
1 x 2-1/4	Rp x GAZ	105	4.1	20	0.8
DN 40 / 1-1/2	PN 16 Slip-On	184	7.2	97	3.8

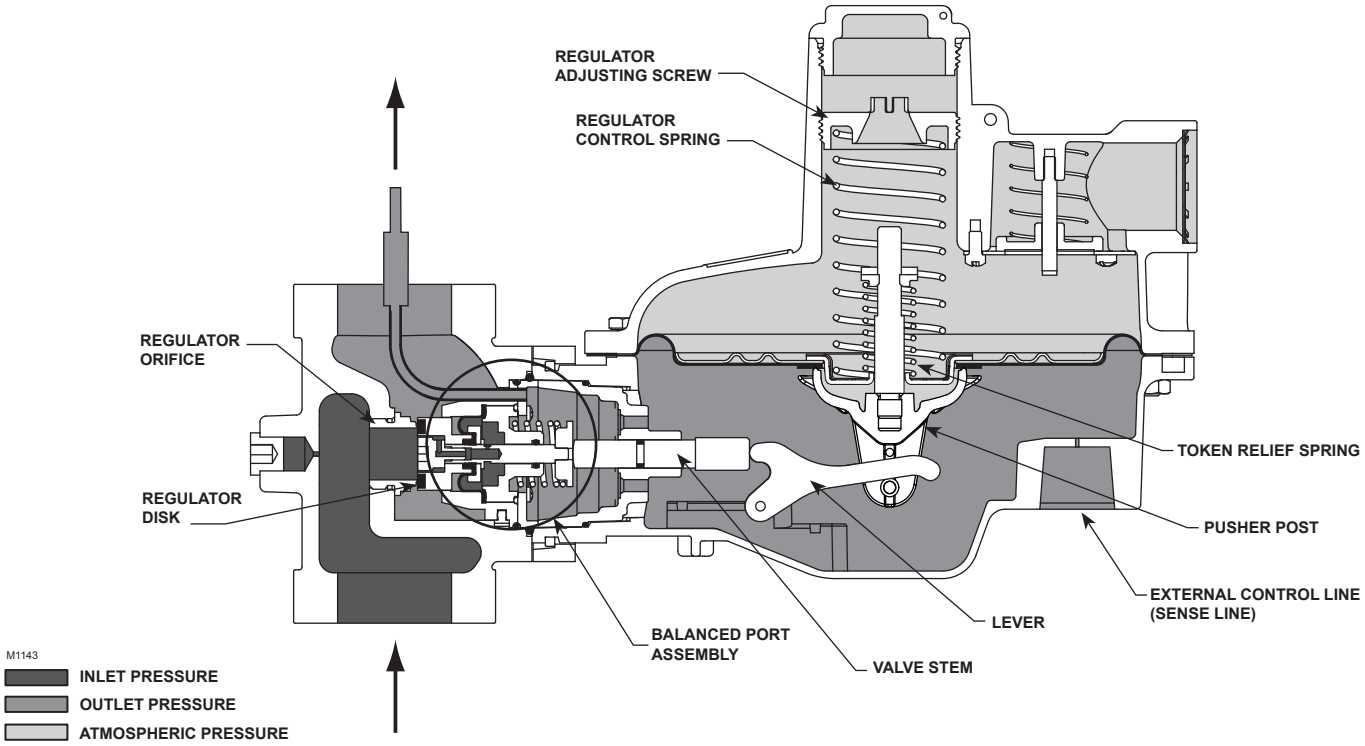


Figure 4. *Type CSB400DT Dual Registered Regulator Operational Schematic*

Additional overpressure protection options include Types CSB403 and CSB423, which offer True-Monitor™ protection provided by an integral monitor module installed on the inlet side of the valve body. This Integral True-Monitor assumes control of the pressure to the downstream system should the primary regulator fail to regulate. The Types CSB404, CSB424 and CSB454 are examples of CSB400 Series configurations that offer a slam-shut module that shuts off the flow of gas to the downstream system in the event of outlet pressure rising above or falling below the predefined levels due to a failure.

Optional token relief is available, which acts as a low-capacity internal relief valve to relieve minor overpressure situations due to nicks or other minor damage to the orifice or disk, or due to thermal expansion of the downstream system.

Internal, external or dual outlet pressure registration is available. Constructions with dual or external registration require an external control line / sense line. For quick changing loads, dual sense is recommended as it provides the quickest response time.

Principle of Operation

Type CSB400 Base Regulator Operation

Refer to Figure 4. When downstream demand decreases, the pressure under the regulator 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 regulator 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 regulator diaphragm.

Type numbers with a “T”, for example, Type CSB400IT, provide a token or low-capacity relief. The 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.

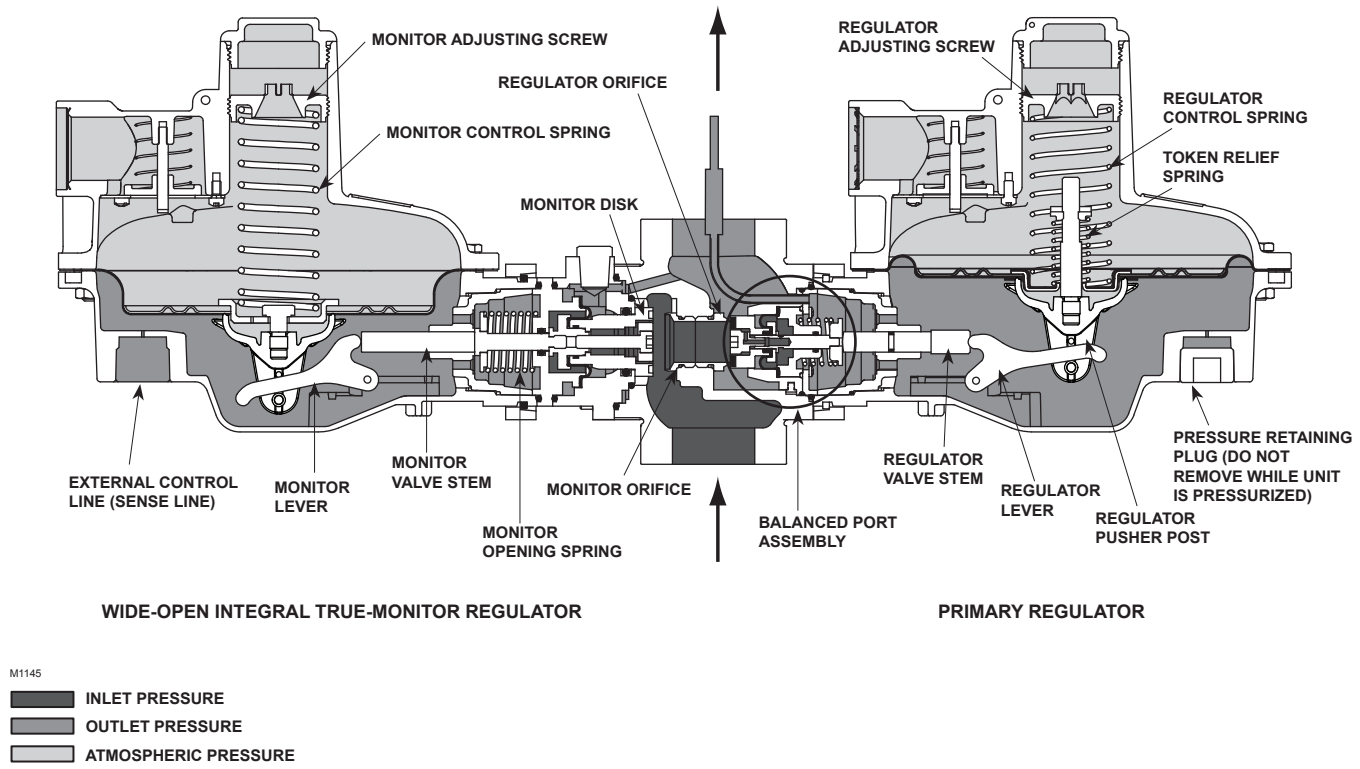


Figure 5. *Type CSB403IT Internally Registered Primary Regulator with Externally Registered Integral True-Monitor™ Operational Schematic*

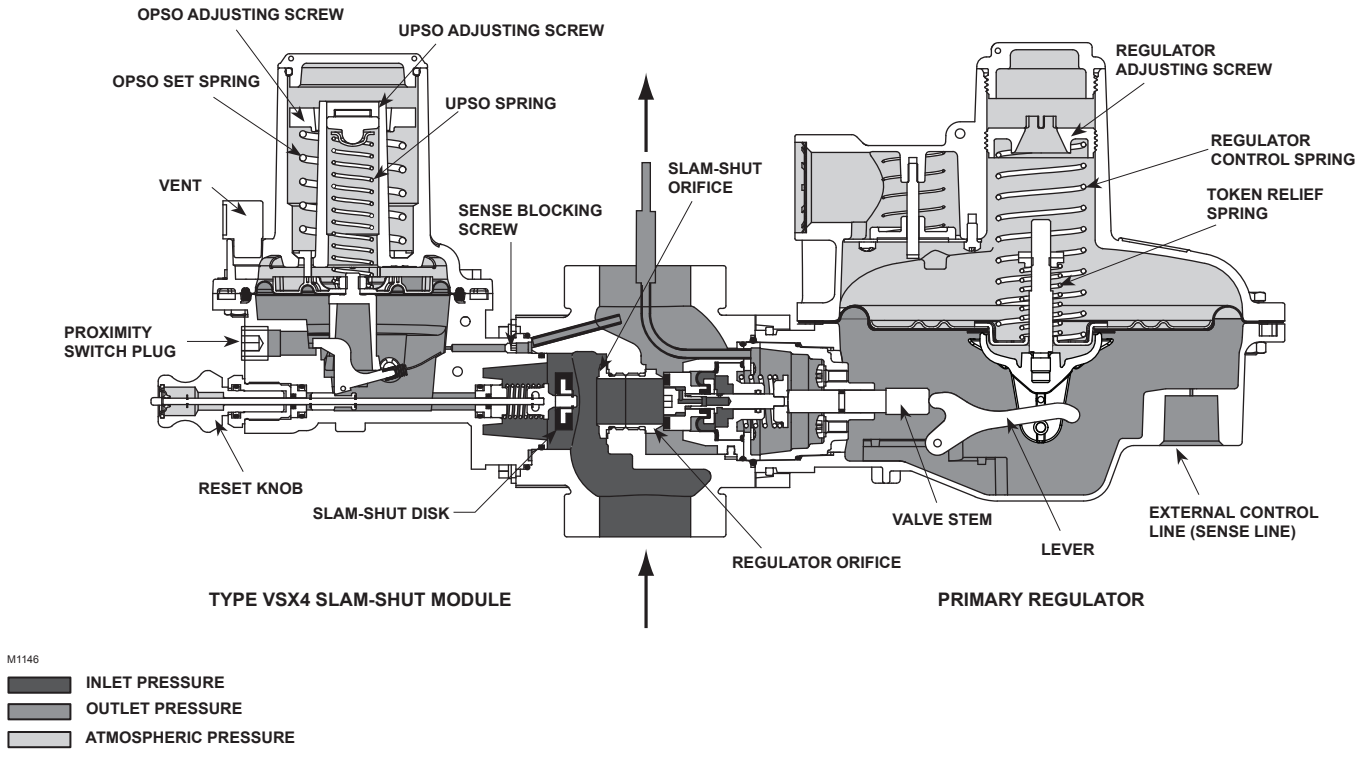


Figure 6. *Type CSB404ET Externally Registered Regulator and Slam-shut Operational Schematic*

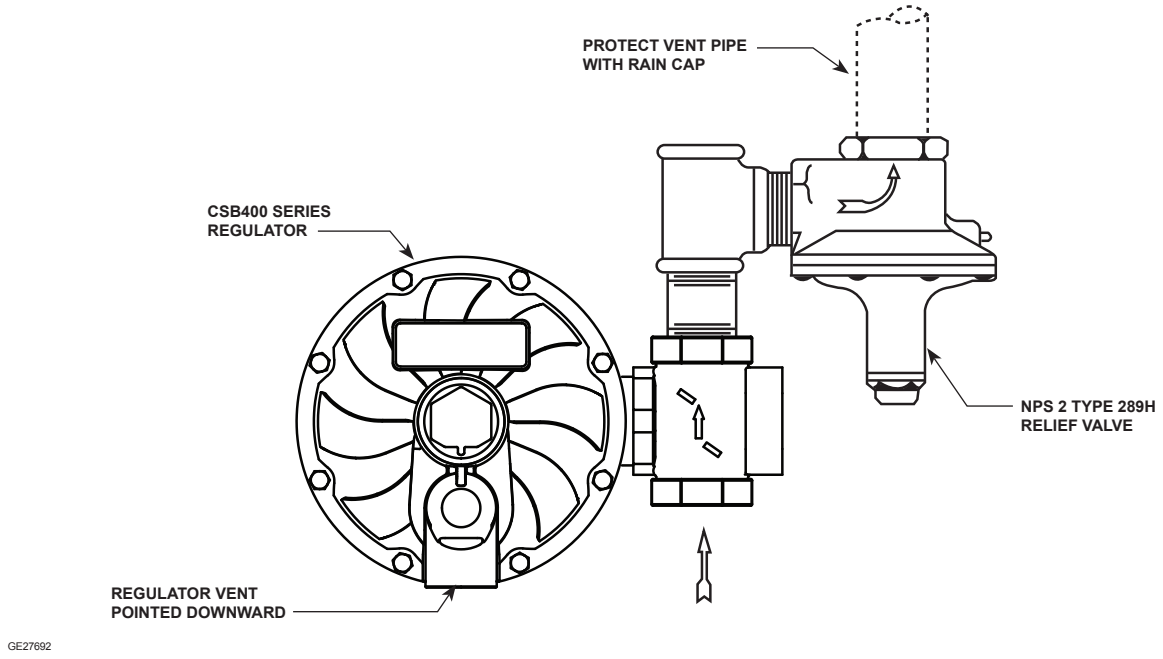


Figure 7. *CSB400 Series Regulator Installed with the Vent Pointed Downward and with a Type 289H Relief Valve for High Capacity Relief*

Type CSB403 Integral True-Monitor™ Operation

Type CSB403 combines the operation of a conventional two-regulator wide-open monitor set into one body, see Figure 5. The Integral True-Monitor is installed on the inlet side of the body and serves to throttle flow and maintain an acceptable downstream pressure in the case where the primary regulator ceases to regulate downstream pressure. During normal operation the Integral True-Monitor is in a wide-open state as its setpoint is set higher than the primary regulator. See Table 7 for guidance regarding the setpoints of the regulator and associated Integral True-Monitor sets. If the downstream pressure should rise to the setpoint of the Internal Monitor due to a loss of pressure control by the primary regulator, the Integral True-Monitor will assume control and regulate the flow to the downstream system. If token relief is present, it will relieve a small amount of gas to the atmosphere as an indication that the Integral True-Monitor is controlling the downstream pressure.

The Type CSB403 provides the option of internal or external downstream pressure registration. External registration requires a downstream sensing line. See Figure 9 for guidance regarding installation of the downstream control line. Refer to the Type TM600 Instruction Manual for additional details of Integral True-Monitor operation.

Type CSB404 Slam-shut Operation

The Type VSX4 slam-shut module on the Type CSB404 regulator is a fast acting shut-off device that provides overpressure (OPSO) or over and underpressure (OPSO / UPSO) protection by completely shutting off the flow of gas to the downstream system. See Table 8 for guidance regarding the typical setpoints of the regulator and associated slam-shut OPSO and also the combined OPSO and UPSO setpoints. The Type VSX4's actions are independent of the Type CSB404 regulator and of variations to the inlet pressure. The Type VSX4 comes standard with external downstream pressure registration, with the option for internal registration only on the Rp 1 x 2-1/4 GAZ body. External registration requires a downstream sensing line. See Figure 10 for guidance regarding installation of the downstream control line.

The Type VSX4 shut-off disk is normally in the open (reset) position, see Figure 6. If the downstream pressure below the slam-shut diaphragm increases (or decreases) until it reaches the slam-shut setpoint, this diaphragm moves upward (or downward) to release the trip mechanism which allows the spring force on the stem to push the disk against the seat, shutting off all gas flow. To reset the slam shut after gas has been shut off, refer to the Type VSX4 Instruction Manual for additional details.

In order for the Underpressure Shutoff (UPSO) of any slam shut to be triggered, the downstream pipe pressure must drop below the UPSO setpoint. In the case of a downstream line break, numerous factors can prevent the downstream pipe pressure from decreasing below the slam-shut UPSO setpoint. These factors include the distance of pipe to the break, the diameter of the pipe, size of the break and the number of restrictions, such as valves, elbows and bends, downstream of the regulator and/or slam-shut device. Due to these factors additional protections should be installed to stop flow in the event of a line break.

Installation and Overpressure Protection

Install in accordance with provisions of EN 12186 / EN 12279.

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 in the Specifications section and/ or regulator nameplate. Regulator and equipment installation 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. On outdoor installations, point the spring case vent downward to allow condensate to drain, see Figures 7 through 10. This minimizes the possibility of freezing and of water or other foreign materials entering the vent and interfering with proper operation.

For the Type CSB403 with Integral True-Monitor™ or the Type CSB404 with Slam shut, point the vents of both the primary regulator and Integral True-Monitor or slam shut downward to allow condensate to drain. From the factory, the Integral True-Monitor or slam shut will always point in the same direction as that of the primary regulator.

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.

In case of complete disassembly of the equipment (body included) from the pipeline, care must be taken not to bend, hit or otherwise damage the pitot tube (key 83 Figure 15) that protrudes beyond the body outlet. Damage to the pitot tube could result in inaccurate internal pressure registration and loss of regulation quality.

CAUTION

CSB400 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 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 to the CSB400 Series 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 the limits specified in the Specifications section and regulator nameplate does not preclude the possibility of damage from external sources or from debris in the pipeline.

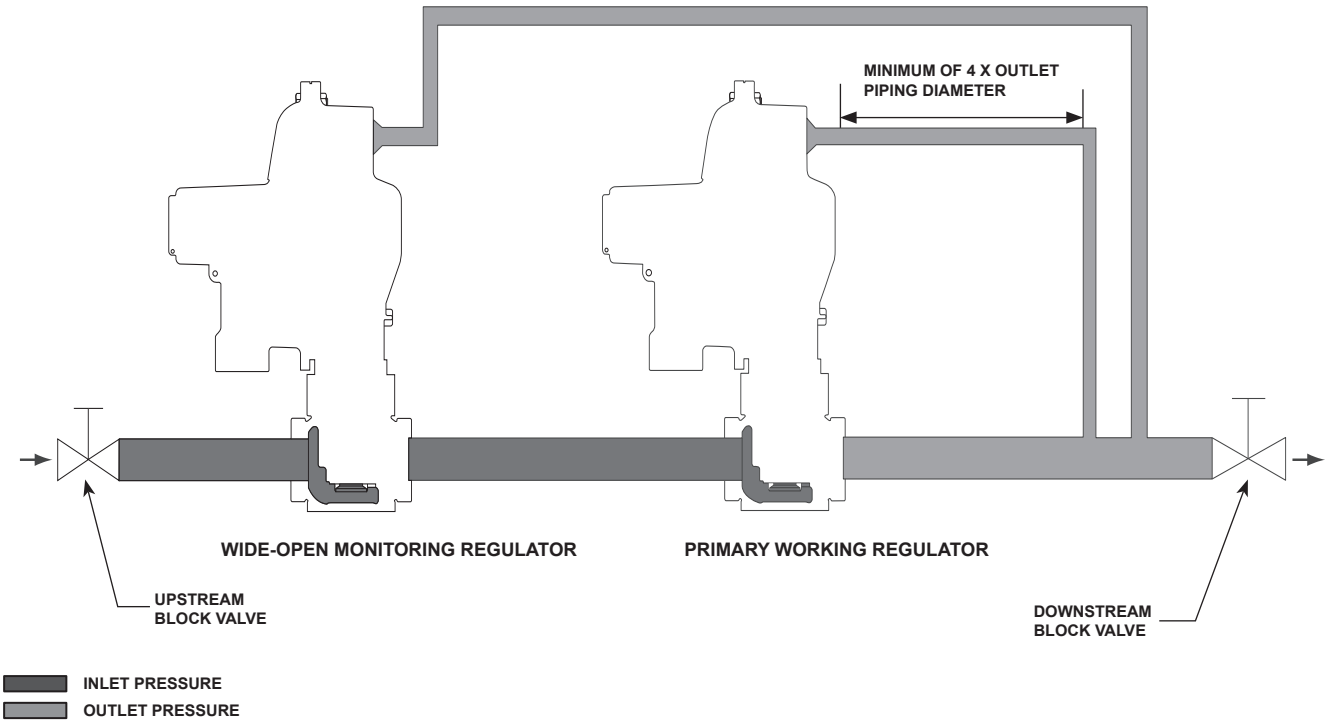


Figure 8. *Type CSB400 "Series Monitor" Regulator Downstream Control Line Installation*

Before installing the regulator, check for damage which might have occurred in shipment. Also check for dirt or foreign matter which may have accumulated in the regulator body or in the pipeline. Apply pipe compound to the external threads of the pipeline and install the regulator so that flow is in the direction of the arrow cast on the body. The diaphragm casing assembly can be rotated to any position relative to the body. Loosen the two cap screws (key 71, Figure 11) in order to rotate the diaphragm casing assembly.

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 the copper tubing and the pipeline.
- Apply pipe compound to the external 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.
- Verify that:
  - Equipment limits of utilization (PS, TS) corresponds to the desired operating conditions.
  - The inlet is protected by an appropriate device(s) to avoid exceeding the allowable limits (PS, TS).
- When designing a pressure reducing station using a CSB regulator, make an analysis if it is necessary to take into account the effects of wind, snow and temperature to avoid unnecessary load and movement to the flanges of the equipment.
- If needed, a support may be used under the piping and regulator/slam-shut body to avoid excessive pressure force on the regulator/slam shut.

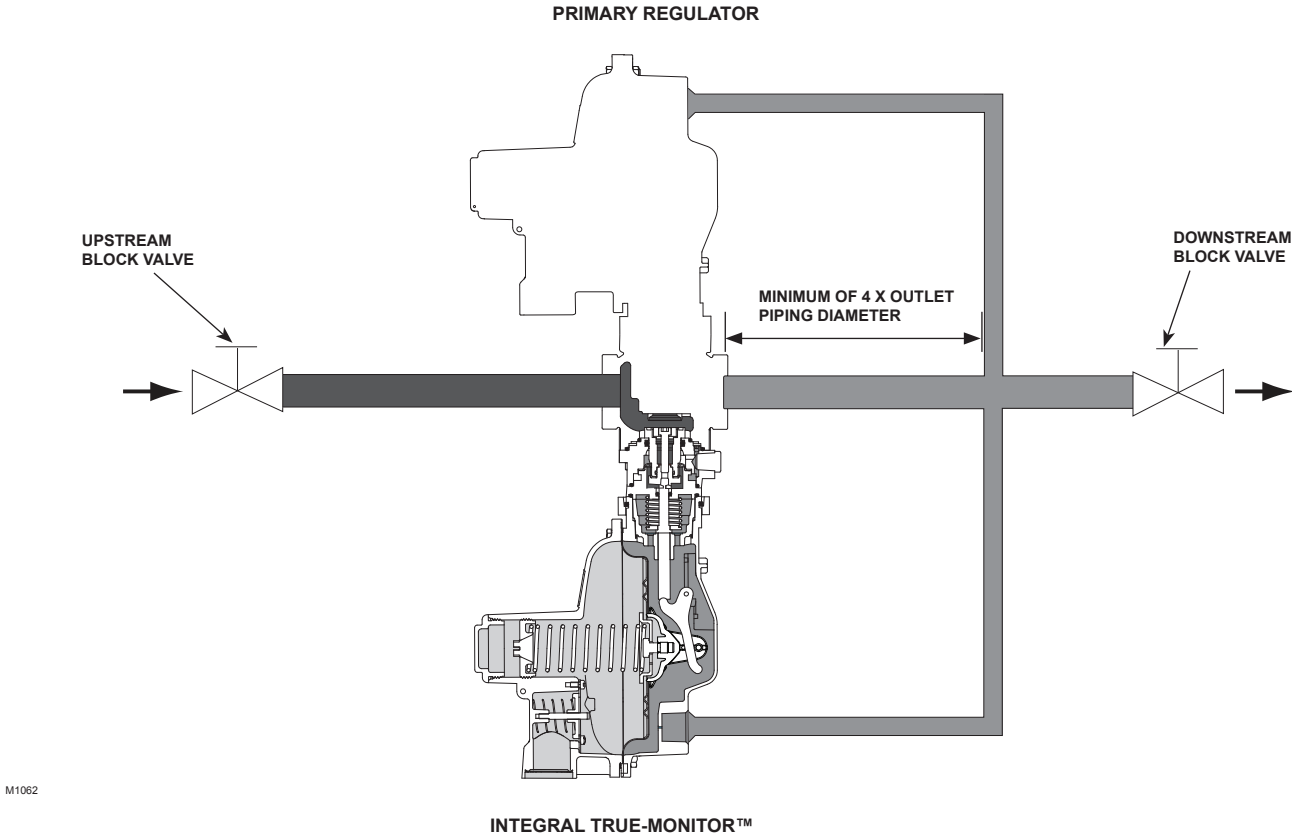


Figure 9. *Type CSB403 Downstream Control Line Installation*

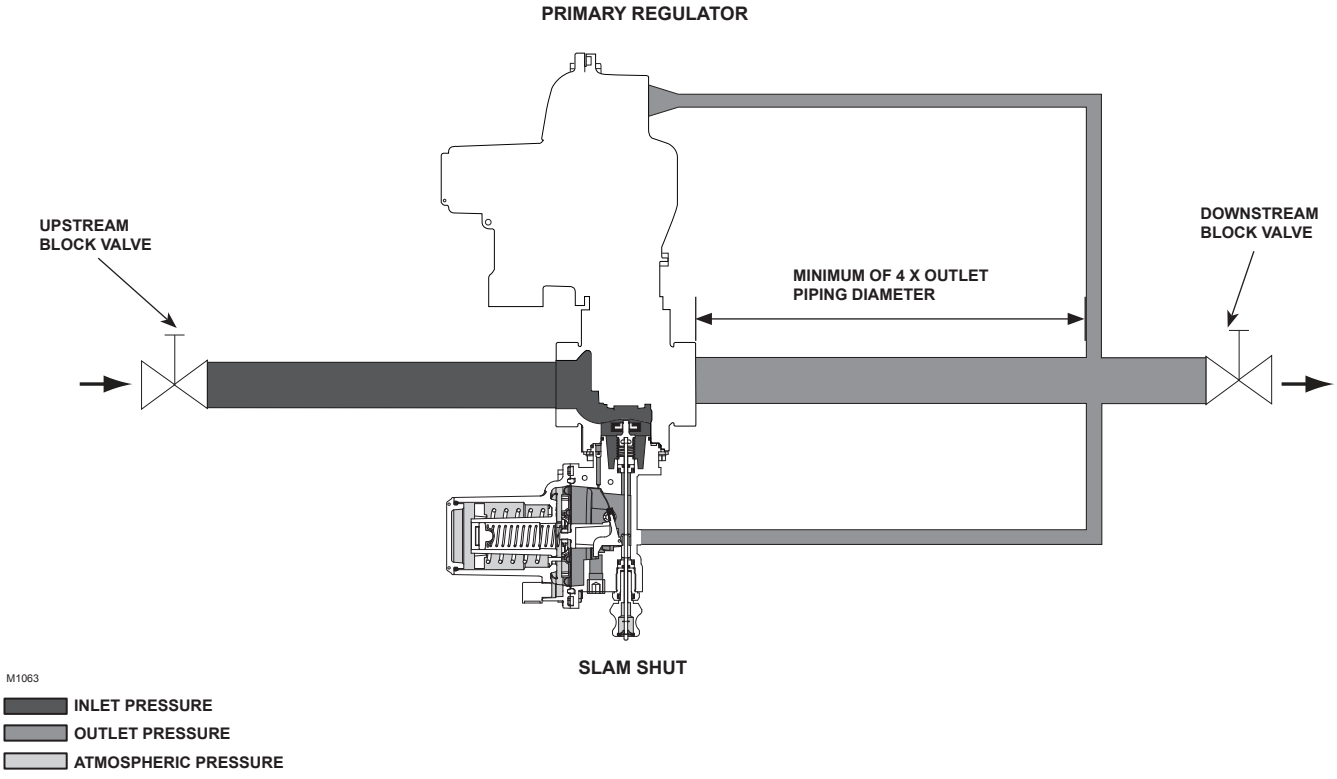


Figure 10. *Type CSB404 Downstream Control Line Installation*

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 Figures 7 through 10. 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 0.91 m / 3 feet 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

⚠ WARNING

Failure to install a downstream control line could result in a hazardous condition. Install downstream control line(s) to the slam-shut device when construction uses external pressure registration.

The regulator and slam-shut device will not control pressure or shutoff if a downstream control line is not installed on those constructions where external pressure registration is required.

CSB400 Series regulators with an “ET” or “EN” in the type number use external pressure registration. To communicate the downstream pressure to the regulator, connect a downstream control line tubing to the 3/4 NPT control line tapping in the lower diaphragm casing and connect the other end of the tubing downstream of the regulator outlet with a minimum distance of 4 times the outlet pipe diameter.

For Types CSB400 and CSB404 with external control lines, use tubing with an outer diameter of 9.5 mm / 0.375 inch or larger. For Types CSB420, CSB424, CSB450 and CSB454 with external control lines, use tubing with an outer diameter of 13 mm / 0.5 inch or larger.

The Types CSB410, CSB414, CSB430 and CSB434 are dedicated wide-open monitoring regulators and are installed upstream of a primary working regulator. Refer to Figure 8 for installation of the downstream control line. To communicate the downstream pressure to the wide-open monitor regulator, connect a downstream control line tubing to the 3/4 NPT control line tapping in the lower diaphragm casing of the monitor regulator and connect the other end of the tubing downstream of the regulator outlet with a minimum distance of 4 times the outlet pipe diameter.

For Types CSB410 and CSB414, use tubing with an outer diameter of 9.5 mm / 0.375 inch or larger.

For Types CSB430 and CSB434, use tubing with an outer diameter of 13 mm / 0.5 inch or larger.

Downstream Control Line Installation with Integral True-Monitor™

Refer to Figure 9. When installing the Types CSB403 and CSB423 regulators, connect downstream control line tubing to the lower casing of the primary regulator, and run the tubing downstream of the regulator outlet with a minimum distance of 4 times the outlet pipe diameter. Connect a second, separate downstream control line tubing to the lower casing of the Integral True-Monitor, and run the tubing downstream of the regulator outlet with a minimum distance of 4 times the outlet pipe diameter.

For Type CSB403 with external control lines, use tubing with an outer diameter of 9.5 mm / 0.375 inch or larger for both the primary regulator and Integral True-Monitor.

For Type CSB423 with external control lines, use tubing with an outer diameter of 13 mm / 0.5 inch or larger for both the primary regulator and Integral True-Monitor™.

Downstream Control Line Installation with Slam shut

Refer to Figure 10. When installing the Types CS404ET, CS404EN, CSB424ET, CSB424EN and CSB454EN regulators, connect downstream control line tubing to the lower casing of the regulator and run the tubing downstream of the regulator outlet with a minimum distance of 4 times the outlet pipe diameter. Connect a second, separate downstream control line tubing to the lower casing of the slam shut and run the tubing downstream of the regulator outlet a minimum distance of 4 times the outlet pipe diameter.

For Type CSB404 with external control lines, use tubing with an outer diameter of 9.5 mm / 0.375 inch or larger for the primary regulator and 6.4 mm / 0.25 inch or larger for the slam shut.

For Types CSB424 and CSB454 with external control lines, use tubing with an outer diameter of 13 mm / 0.5 inch or larger for the primary regulator and 6.4 mm / 0.25 inch or larger for the slam shut.

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 is typically set 25 mbar / 10 inches w.c. higher than the outlet pressure setting of the regulator, up to 75 mbar / 30 inches w.c. outlet pressure. For pressure greater than this, set the Type 289H 0.05 bar / 0.75 psi higher than the outlet pressure setting of the regulator.

Vent Line Installation

The CSB400 Series regulators have a 1 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 token relief must be large enough to vent all relief valve discharge to atmosphere without excessive backpressure and resulting excessive pressure in the regulator.

For types with optional Token relief, this low capacity relief 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 or obstructed.

CSB400 Series outlet pressure ranges are shown in Table 6. Outlet pressure higher than 0.34 bar / 5 psig above the setpoint may damage internal parts such as the diaphragm head and valve disk. **The maximum emergency (casing) outlet pressure is 4.0 bar / 58 psig.**

Commissioning

CAUTION

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

With the downstream system depressurized, use the following procedure to start up 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

For types that include the Integral True-Monitor module, refer to the Instruction Manual for Type TM600 Integral True-Monitor for adjustment and maintenance of the Integral True-Monitor. For the types that include the slam-shut module, refer to the Instruction Manual for Type VSX4 slam shut for adjustment and maintenance of the slam shut.

The range of allowable pressure settings for the primary regulator is stamped on the nameplate. If the required setting is not within this range, substitute the correct spring (as shown in Table 6). If the spring is changed, re-stamp the nameplate to indicate the new pressure range.

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

For Types CSB400 and CSB420

1. Remove the closing cap (key 60, Figure 16).
2. To increase the outlet setting, turn the adjusting screw (key 65) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Replace the closing cap.

For Type CSB450

1. Loosen the hex nut (key 58, Figure 16).
2. To increase the outlet setting, turn the adjusting screw (key 65, Figure 16) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Tighten the hex nut.

CSB400 Series with Integral True-Monitor™

When adjusting the primary regulator and Integral True-Monitor for operation, ensure that the pressure differences between the primary regulator and the integral monitor shown in Table 7 are observed. For example, if the primary regulator setpoint is set at 20 mbar / 8 inches w.c., then the Integral True-Monitor should be set at a minimum of 35 mbar / 14 inches w.c. or higher.

To test the Integral True-Monitor operation, the primary regulator setpoint must be adjusted above the Integral True-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 True-Monitor's setpoint by following step 2 above. Otherwise, a different spring with a setpoint higher than the Integral True-Monitor's setpoint must be installed to check the operation of the Integral True-Monitor.

CSB400 Series with Slam shut

When adjusting the primary regulator and slam shut for operation, refer to Table 8 for the OPSO setpoints and also the combined OPSO and UPSO setpoints of the slam shut for a given regulator spring ranges.

CAUTION

Equipment installed downstream the Type VSX slam shut device can be damaged if the following procedure for resetting the Type VSX slam shut device is not followed. This equipment includes the integral Type VSX or regulator configurations.

Step 1:

- To properly reset the Type VSX slam shut after it has been tripped to the closed position, a flat-head screwdriver must be inserted into the position shown in Figure 8 on the backside of the reset button (refer to Type VSX4 Instruction Manual, key 30, Figure 8).

Step 2:

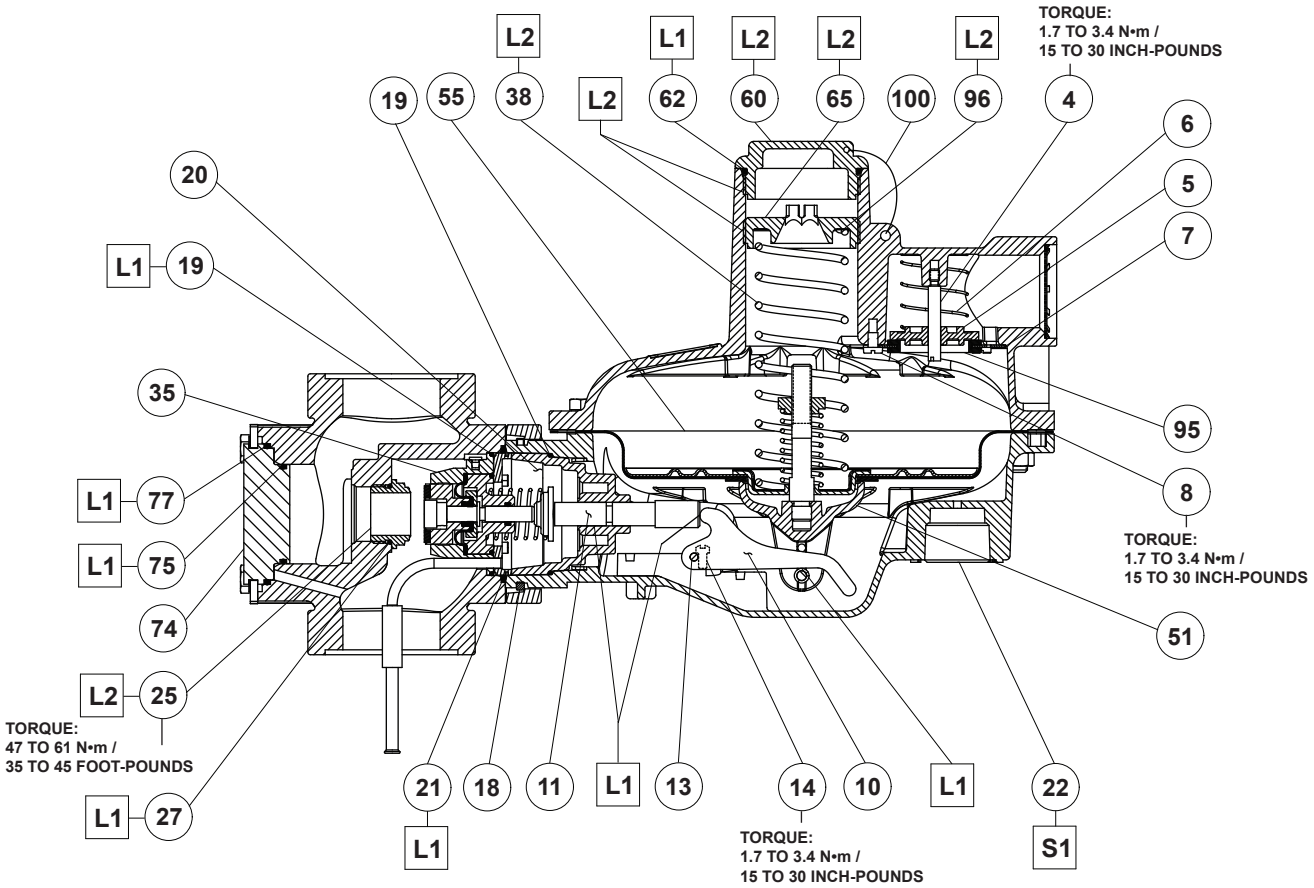
- The screwdriver should be slowly rotated to gradually pull the reset button (refer to Type VSX4 Instruction Manual, key 30) away from the Type VSX device. This slow movement allows for a slow bleed of the pressure across the Type VSX slam shut's disk and seat area. The operator should be able to hear the pressure bleeding through the system.

Step 3:

- When the pressure has equalized and the air bleeding sound has dissipated, the reset button (refer to Type VSX4 Instruction Manual, key 30) should be pulled completely away from the Type VSX slam shut device by hand until the internal shut-off mechanism has been re-latched.

Step 4:

- Once the operator feels the click of the re-latch occurring, the reset button (refer to Type VSX4 Instruction Manual, key 30) should be pushed completely back into its original position.



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☐ **APPLY LUBRICANTS (L) / SEALANT (S)[1]:**

L1 = DOW CORNING® 33 OR COMPARABLE EXTREME LOW TEMPERATURE LUBRICANT
L2 = ANTI-SEIZE LUBRICANT
S1 = MULTI-PURPOSE POLYTETRAFLUOROETHYLENE (PTFE) THREAD SEALANT

1. Lubricants and sealant must be selected such that they meet the temperature requirements.

Figure 11. *CSB400 Series Regulator Assembly*

⚠ WARNING

In the case of a downstream line break, numerous factors affect the capability to evacuate gas from the pipeline. These factors include the distance of pipe to the break, the diameter of the pipe, size of the break and the number of restrictions, such as valves, elbows and bends, downstream of the regulator and/or slam-shut device. Due to these factors additional protections should be installed to stop flow in the event of a line break.

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 following steps 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 automatically be released downstream as the regulator opens in response to the lowered pressure underside of the diaphragm.
4. Close outlet shut-off valve.

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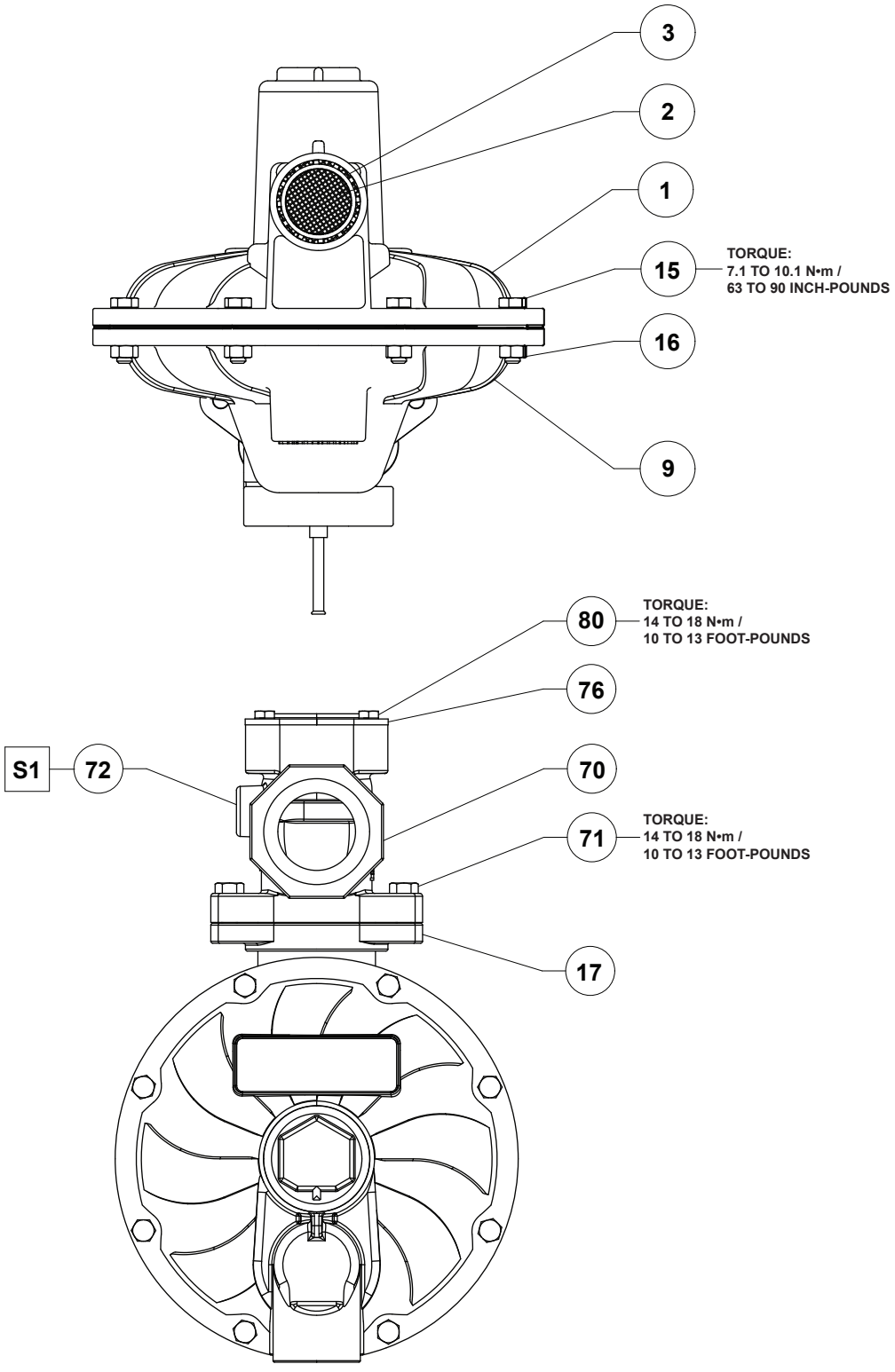

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☐ **APPLY SEALANT (S)[1]:**

S1 = MULTI-PURPOSE POLYTETRAFLUOROETHYLENE (PTFE) THREAD SEALANT

1. Sealant must be selected such that it meets the temperature requirements.
2. The torque range as specified is initial assembly torque. Due to elastomeric compression, the torque values indicated may decrease. Minimum inspection torque is 4 N•m / 35 inch-pounds.

Figure 11. *CSB400 Series Regulator Assembly (continued)*

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 depends on the severity of service conditions, test results found during the annual test, and on applicable codes and regulations. In accordance with applicable National or Industry codes, standards and regulations/recommendations, all hazards covered by specific tests after final assembly, before applying the CE marking, shall also be covered after every subsequent reassembly at installation site in order to ensure that the equipment will be safe throughout its intended life.

Periodic inspection must be performed on the CSB400 Series that include the Integral True-Monitor™ or slam-shut overpressure protection modules to ensure that they protect the downstream system in the event the primary regulator losses pressure control. This inspection must test that the Integral True-Monitor or slam-shut functions as intended.

Note

For adjusting setpoints above 100 mbar / 1.5 psig, use a 13 mm / 1/2-inch hex driver, a 13 mm / 1/2-inch socket or a 27 mm / 1-1/16-inch socket to turn the adjusting screw (key 65).

Disassembly to Replace the Regulator Main Diaphragm

1. Remove the closing cap (key 60, Figure 11) or loosen hex locknut (key 58, Figure 16). Turn the adjusting screw (key 65) or nut (key 58) counterclockwise to ease spring (key 38) compression.
2. Remove the adjusting screw (key 65) and spring (key 38).
3. Remove hex nuts (key 16, Figure 11) and cap screws (key 15, Figure 11). Separate the upper spring case (key 1) from the lower casing assembly (key 9).

Note

When disassembling a CSB400 Series regulator, lift the upper spring case (key 1) straight up in order to avoid hitting the stem (key 44).

4. Slide the diaphragm assembly (key 55) away from the body (key 70) to unhook the pusher post (key 51) from the lever (key 10). Lift off the diaphragm assembly (key 55).
5. a. For none relieving units such as the Types CSB400IN and CSB400EN, unscrew the cap (key 45), see Figure 12, high-pressure Non-Relief and low-pressure Non-Relief assemblies. The cap fastens the R.V. spring seat (key 43) to the pusher post (key 51). Unscrew the cap to separate the R.V. spring seat (key 43), diaphragm assembly (key 55) and pusher post (key 51).

   b. For units with internal token relief such as Type CSB400IT, refer to Figure 12, unscrew the adjusting upper seat (key 47). This will allow for removal of the relief spring (key 41), R.V. spring seat (key 43), diaphragm assembly (key 55) and pusher post (key 51).

6. Reassemble the spring case (key 1) unit in the reverse order of the above steps. Before tightening the cap screws (key 15) or stem (key 44) into the pusher post (key 51), place the loosely-assembled diaphragm assembly (key 55) into position in the lower casing (key 9), being sure that the pusher post (key 51) is hooked on the lever (key 10). Rotate the diaphragm (key 55A) so that the diaphragm and lower casing (key 9) holes are aligned. Tighten the stem (key 44) or diaphragm retainer (key 45) for HP and LP non-relief assemblies.

Disassembly to Replace Valve Disk, Balanced Port Assembly Diaphragm and Regulator Orifice

1. Remove the bolts (key 71, Figure 11) which hold the lower spring casing (key 9) to the body (key 70). Separate the lower spring casing (key 9) from the body (key 70).
2. Check the body O-ring (key 21) for wear.
3. Remove the balanced port assembly (key 35, Figures 11 and 13) from the body, make sure to rotate the assembly toward the outlet of the body as it is being removed to clear the sense tube from the body.
4. Examine the valve disk (key 35K) for nicks, cuts and other damage. If damage is present, it is recommended to replace both the disk and also the balanced port diaphragm (key 35F) and associated diaphragm O-ring (key 35M), that comes into direct contact with the inner flange of the balanced port diaphragm. Start the process of replacing the disk by disassembling the balanced port assembly. Remove the four cap screws (key 35R) and then the cap (key 35G).
5. Grasp the spring retainer (key 35C) and slide the brazed housing (key 35A) away to expose the diaphragm (key 35F) and disk (key 35K). Still grasping the spring retainer (key 35C) insert a 5 mm Allen wrench into the disk screw (key 35E) and unscrew.
6. Remove the disk (key 35K) and discard if damaged Slide the diaphragm O-ring (key 35M) off the stem (key 35B) along with the diaphragm (key 35F). Slide the new diaphragm over the stem in the same manner that it was removed, make sure that it completely contacts the surface of the inner retainer (key 35J).
7. Reassemble the Balanced Port assembly in reverse order of the above. Ensure Dow Corning® 33 or comparable extreme low temperature lubricant completely coats the O-ring (key 35M), stem (key 35B) and the center bore of the outer retainer (key 35H).
8. Examine the seating edge of the orifice (key 25). If it is nicked or rough, replace the orifice and O-ring (key 27). If a slam shut or monitor is installed on the backside of the body, refer to the applicable Instruction Manual for inspection and removal of the overpressure protection orifice (key 26) and O-ring (key 27).
9. Reassemble the regulator in reverse order of the above steps.

Regulator Reassembly

As indicated by the square callouts in Figures 11 to 17, it is recommended that a good quality pipe thread sealant be applied to pressure connections and fittings and a good quality extreme low temperature lubricant, such as Dow Corning® 33, be applied to O-rings. Also apply an anti-seize compound to the adjusting screw threads, orifice threads and other noted areas as needed.

Parts Ordering

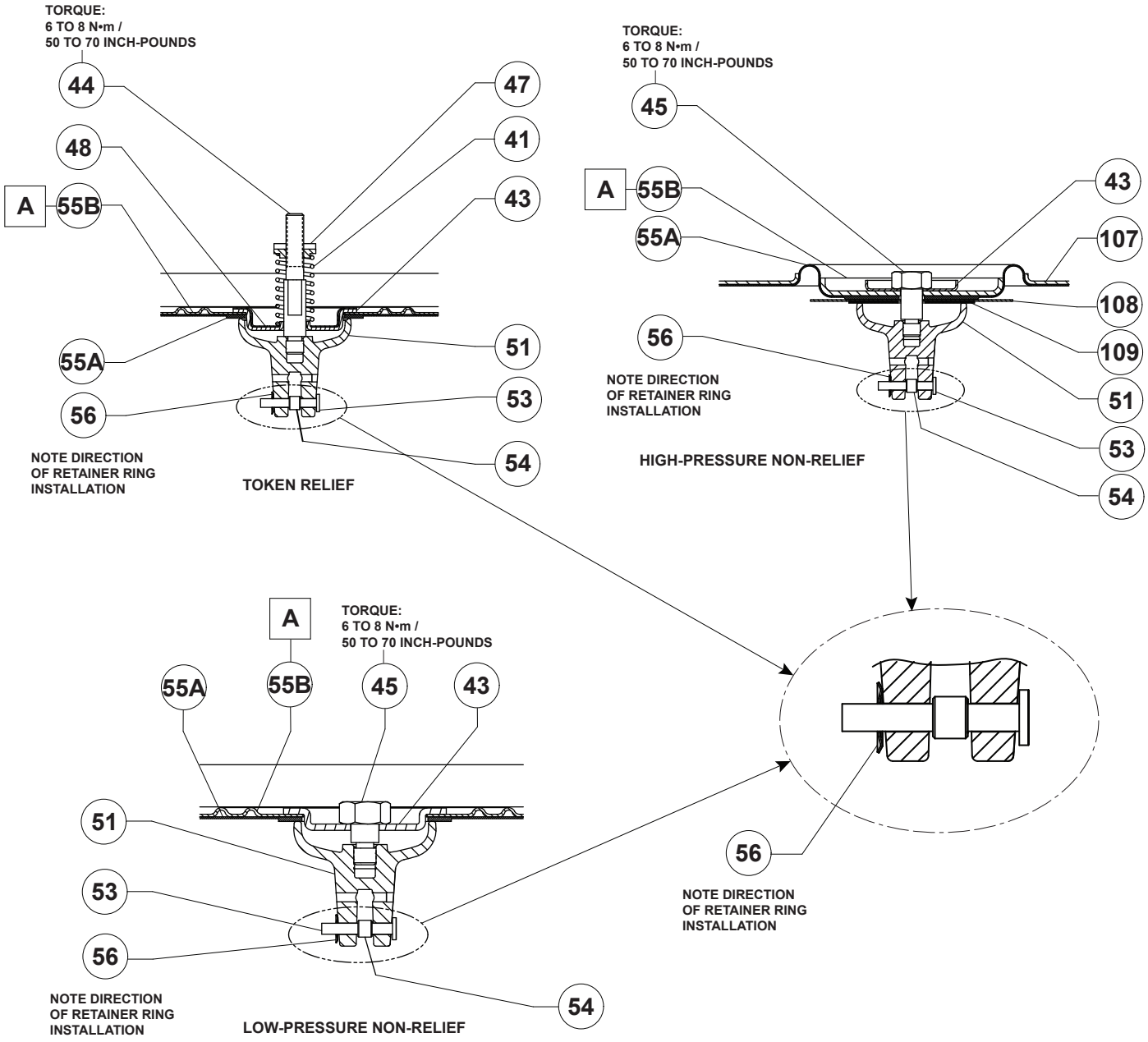
The type number, orifice size, spring range and date of manufacture are stamped on the nameplate. Always provide this information in any correspondence with your local Sales Office regarding replacement parts or technical assistance.

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

Parts List

Key	Description	Part Number
	Spare Parts (Repair Parts Kit include keys 12, 19, 21, 27, 35K, 55, 62, 75 and 77)	
	Type CSB400	RCSB400X012
	Type CSB403	RCSB403X012
	Type CSB404	RCSB404X012
1	Spring Case, Aluminum	GE24555X012
2	Vent Screen, 18-8 Stainless steel	T1121338982
3	Retaining Ring, Steel	T1120925072
4	Stabilizer Guide, 304 Stainless steel	GE27061X012
5	Stabilizer, Acrylonitrile Butadiene Styrene (ABS)	GE27063X012
6	Stabilizer Spring, Stainless steel	GE35010X012
7	Retainer Ring, Zinc-plated steel	GE27024X012
8	Stabilizer Screw, Zinc-plated steel (3 required)	GE29724X012
9	Lower Casing, Aluminum	GE24289X012
10	Lever, Steel	
	Types CSB400, CSB403, CSB404, CSB410 and CSB414	GE28773X012
	Types CSB420, CSB423, CSB424, CSB430, CSB434, CSB450 and CSB454	GE28772X012
11	Valve Stem, Aluminum	GE27812X012
12*	O-ring, Nitrile (NBR)	
	External Registration Only	1E472706992
13	Lever Pin, 18-8 Stainless steel	
	Types CSB400, CSB403, CSB404, CSB410 and CSB414	T14397T0012
	Types CSB420, CSB423, CSB424, CSB430, CSB434, CSB450 and CSB454 (2 required)	T14397T0012
14	Lever Screw, Steel	
	Types CSB400, CSB403, CSB404, CSB410 and CSB414 (2 required)	GE34243X012
	Types CSB420, CSB423, CSB424, CSB430, CSB434, CSB450 and CSB454 (4 required)	GE34243X012
15	Cap Screw, Steel (8 required)	GE32059X012
16	Nut, Steel (8 required)	GE32060X012
17	Union Ring, Aluminum	GE26590X012
18	Snap Ring, 302 Stainless steel	T1120637022
19*	O-ring, Nitrile (NBR) (2 required)	1K594906562
20	Stem Guide, Aluminum	GE26027X012
21*	O-ring, Nitrile (NBR)	GE45216X012
22	Pipe plug, 3/4 NPT, Steel	
	Internal Registration Only	GE34199X012
23	Screw (For external registration only), Steel (2 required)	1E175828982
24*	O-ring (For external registration only), Nitrile (NBR) (2 required)	17A0960X012
25	Orifice	
	Types CSB400F and CSB404F, Aluminum	GG08494X012
	All other Types, Brass	GE31321X012
26	OPP Orifice 18 mm / 0.69 inch	
	With Integral True-Monitor™ Orifice, Aluminum	GE30003X012
	With Slam-shut Orifice, Brass	GE28684X012
27*	O-ring, Nitrile (NBR)	
	Type CSB400 (1 required)	10A3802X022
	Type CSB403 (2 required)	10A3802X022
	Type CSB404 (2 required)	10A3802X022
35	Balanced Port Assembly for all bodies except GAZ	
	Standard	GE31196X012
	Low temperature “F” version	GE31196X022
35A	Brazed Housing	GE31261X012
35B	Stem, Stainless steel	GE31191X012
35C	Spring Retainer, Zinc-plated steel	GE31189X012
35D	Spring, Stainless steel	GE30193X012
35E	Disk Screw, Zinc-plated steel	GE31190X012
35F*	Diaphragm, Nitrile (NBR) / Fabric	GE30439X012
35G	Cap, Brass	GE31195X012
35H	Outer Retainer, Brass	GE31187X012
35J	Inner Retainer, Brass	GE31186X012
35K*	Disk Assembly, Brass / Nitrile (NBR)	
	Standard version	ERSA00457A0
	Low Temperature “F” version	GE31185X012
35M	O-ring, Nitrile (NBR) (2 required)	1E472706992
35N*	O-ring, Nitrile (NBR)	1U879006562
35R	Screw, Steel (4 required)	GE25968X012
35S	Pin, Zinc-plated steel	GE31232X012
35	Balanced port assembly for Rp 1 x 2-1/4, GAZ Body	
	Standard	GE33822X012
	Low temperature “F” version	GE33822X022
35A	Brazed Housing	GE32505X012
35B	Stem, Stainless steel	GE31191X012
35C	Spring Retainer, Zinc-plated steel	GE31189X012
35D	Spring, Stainless steel	GE30193X012
35E	Disk Screw, Zinc-plated steel	GE31190X012
35F*	Diaphragm, Nitrile (NBR) / Fabric	GE30439X012
35G	Cap, Brass	GE31195X012
35H	Outer Retainer, Brass	GE31187X012
35J	Inner Retainer, Brass	GE31186X012
35K*	Disk Assembly, Brass / Nitrile (NBR)	
	Standard version	ERSA00457A0
	Low-temperature “F” version	GE31185X012
35M	O-ring, Nitrile (NBR) (2 required)	1E472706992
35N*	O-ring, Nitrile (NBR)	1U879006562
35R	Screw, Cap, Hex Socket, Steel (4 required)	GE25968X012
38	Spring	
	17 to 24 mbar / 6.8 to 9.6 inches w.c., Pink	GE30191X012
	24 to 35 mbar / 9.6 to 14 inches w.c., Orange Stripe	GE43955X012
	35 to 60 mbar / 14 to 24 inches w.c., Dark Green	GE30201X012
	54 to 100 mbar / 0.78 to 1.5 psig, Tan	GE30202X012
	100 to 160 mbar / 1.45 to 2.3 psig, Purple Stripe	GE35081X012
	138 to 300 mbar / 2.0 to 4.4 psig, Dark Blue	GE30192X012
	276 to 517 mbar / 4 to 7.5 psig, Red	GE33121X012
	500 mbar to 1 bar / 7.3 to 14.5 psig, Light Blue	GE30203X012
	1 to 3 bar / 14.5 to 43.5 psig, Light Green	GE30204X012
40	Upper Spring Seat, Steel	
	High Pressure, Zinc-plated steel	GE32501X012
41	Relief Valve Spring, 302 Stainless steel	
	Types CSB400, CSB403 and CSB404, Token	GE30194X012
	Types CSB420, CSB423 and CSB424, Token	GE42225X012
43	Relief Valve Spring Seat, Zinc-plated steel	
	Types CSB400 and CSB420, Non-Relief	GE27327X012
	Type CSB450, Non-Relief	GE31677X012
	Types CSB400 and CSB420, Token	GE28947X012
44	Stem, Aluminum	
	Types CSB400 and CSB420, Token	GE30895X012
45	Diaphragm Retainer, Zinc-plated steel	
	Types CSB400 and CSB420, Non-Relief	GE30887X012
	Type CSB450, Non-Relief	GE33850X012
47	Upper Spring Seat, Aluminum	
	Types CSB400 and CSB420, Token	GE33332X012
48	Restrictor Plate, Zinc-plated steel	
	Token	GE28948X012
51	Pusher Post, Aluminum	
	Token	ERAA00876A0
	Non-Relief	ERAA00875A0
53	Solid Rivet, 18-8 Stainless steel	GE29761X012
54	Roller Pin, Brass	GE27060X012
55*	Diaphragm Assembly, Steel / Nitrile (NBR)	
	Without Diaphragm Head Limiter	GE31248X012
	With Diaphragm Head Limiter	GE32140X012
55A	Diaphragm	- - - - - - - - - - -
55B	Diaphragm Head	- - - - - - - - - - -

*Recommended spare part.



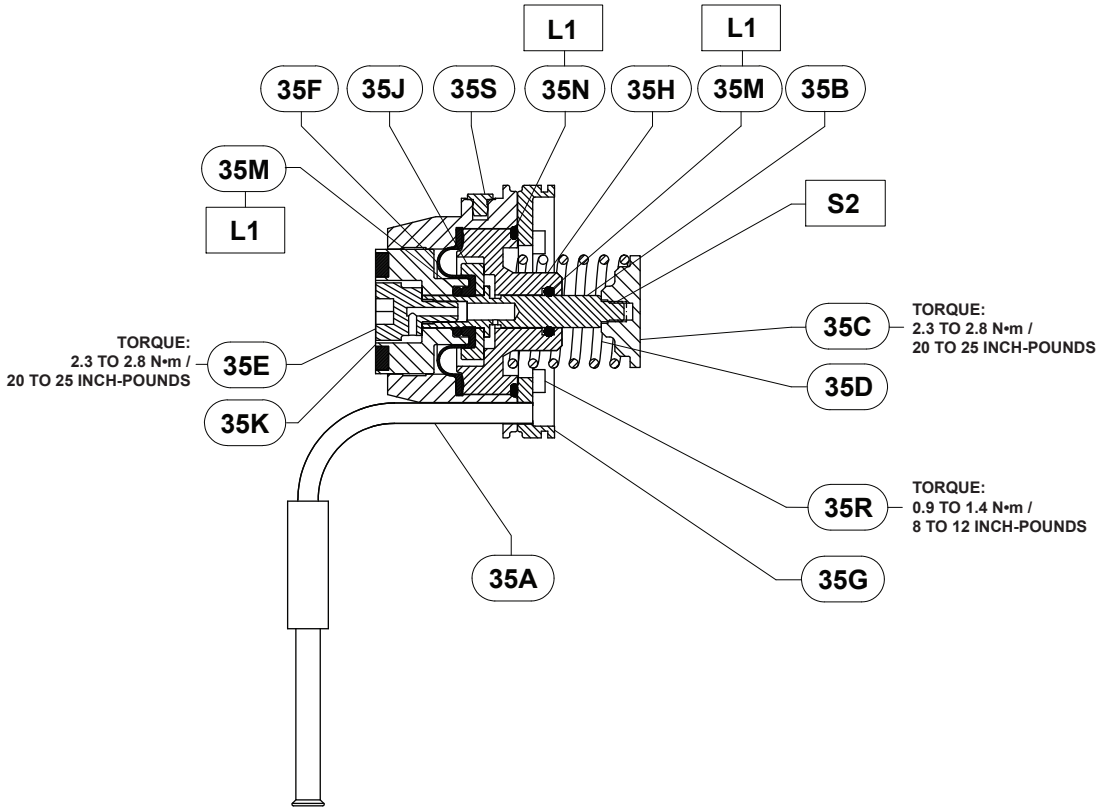
ERAA04154

☐ **APPLY ADHESIVE (A)[1]:**
A = ADHESIVE

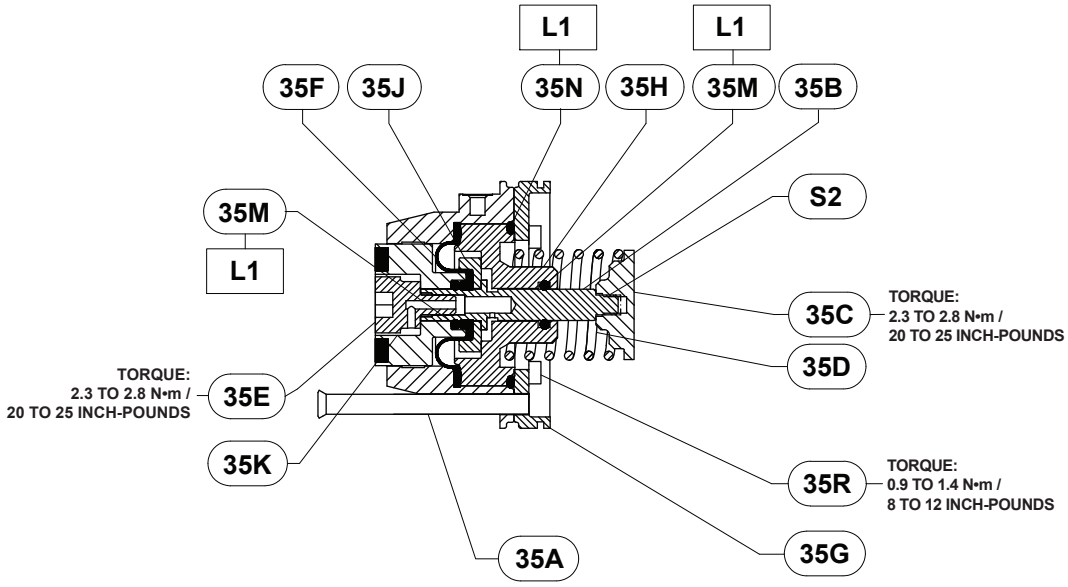
NOTE: APPLY ADHESIVE ON THE FLAT SURFACE OF THE DIAPHRAGM PLATE THAT CONTACTS THE DIAPHRAGM, TOWARD THE OUTER PERIMETER, AND AWAY FROM THE CENTER HOLE.

1. Adhesive must be selected such that it meets the temperature requirements.

Figure 12. *CSB400 Series Diaphragm and Relief Assemblies*



STANDARD BALANCED PORT ASSEMBLY



BALANCED PORT ASSEMBLY FOR Rp 1 X 2-1/4 GAZ BODY

ERAA04154

☐ **APPLY LUBRICANT (L) / SEALANT (S)[1]:**

L1 = DOW CORNING® 33 OR COMPARABLE EXTREME LOW TEMPERATURE LUBRICANT
S2 = PERMANENT THREAD SEALANT

1. Lubricant and sealant must be selected such that they meet the temperature requirements.

Figure 13. *Balance Trim Assemblies*

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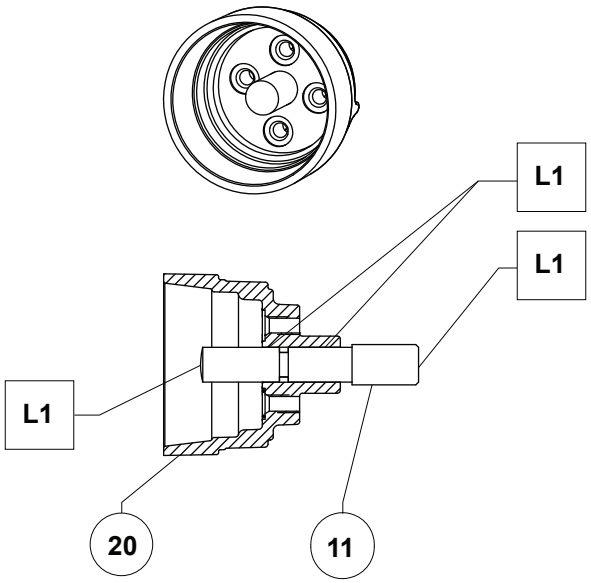
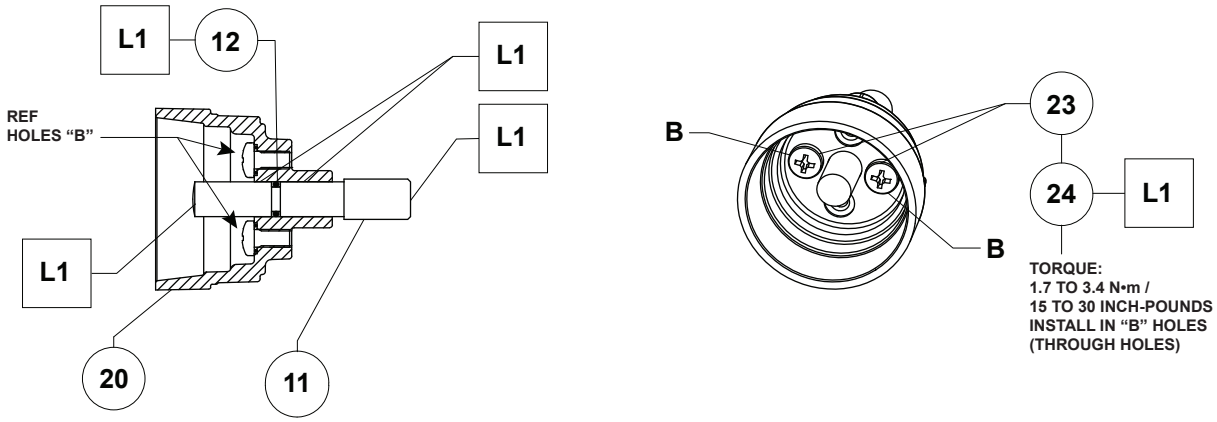


INTERNAL OR DUAL REGISTRATION
(NO SCREWS)



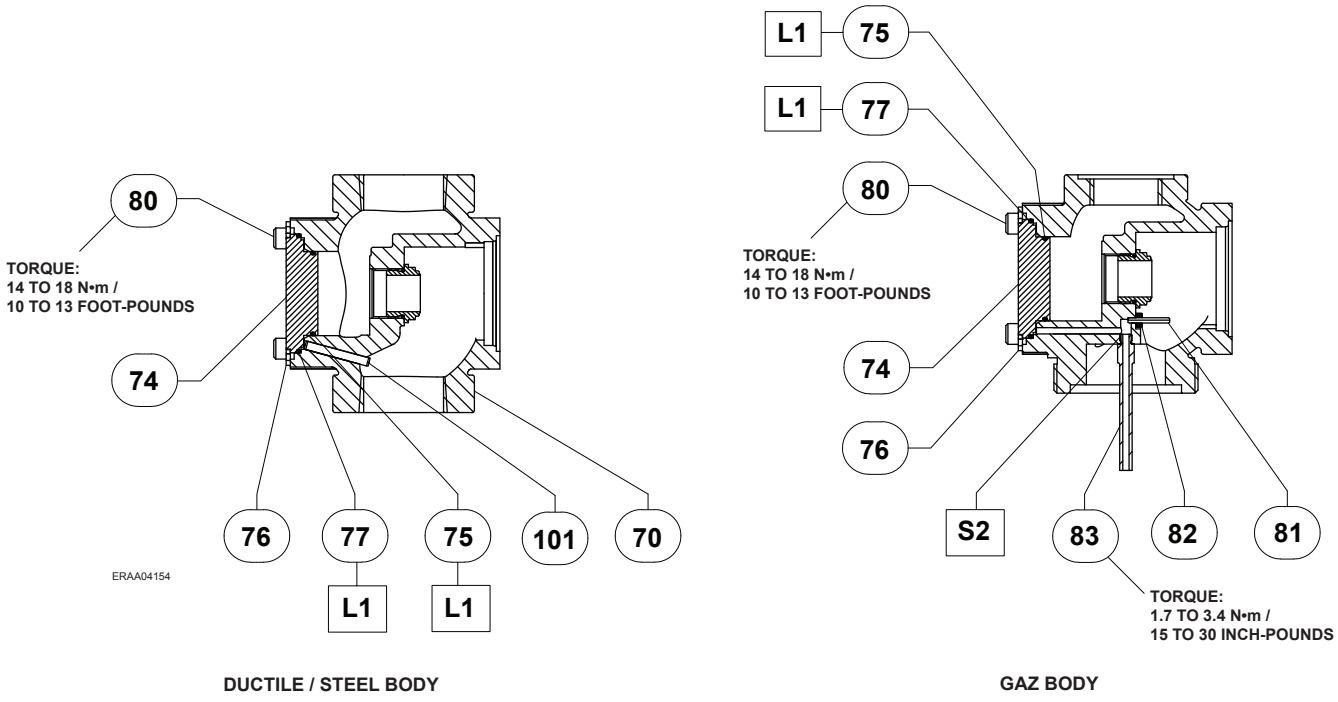
EXTERNAL REGISTRATION

GE27692

☐ **APPLY LUBRICANT (L)[1]:**
L1 = DOW CORNING® 33 OR COMPARABLE EXTREME LOW TEMPERATURE LUBRICANT

1. Lubricant must be selected such that it meets the temperature requirements.

Figure 14. *CSB400 Series Stem Guides*



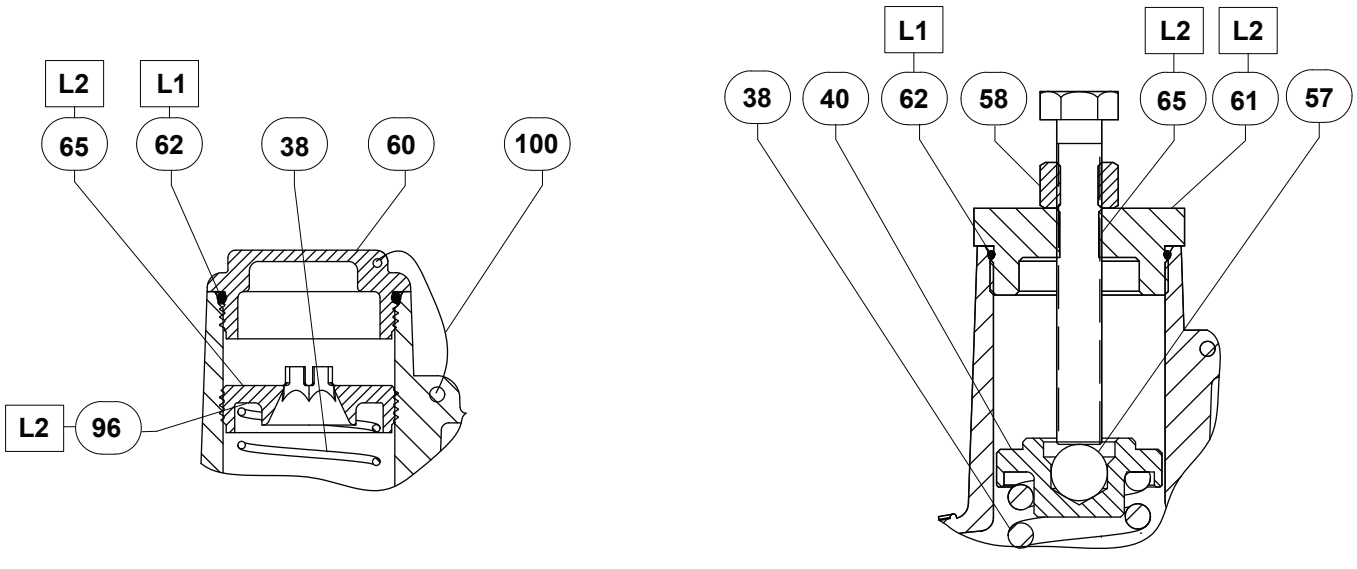
DUCTILE / STEEL BODY

GAZ BODY

☐ **APPLY LUBRICANT (L) / SEALANT (S)[1]:**
L1 = DOW CORNING® 33 OR COMPARABLE EXTREME LOW TEMPERATURE LUBRICANT
S2 = PERMANENT THREAD SEALANT

1. Lubricant and sealant must be selected such that they meet the temperature requirements.

Figure 15. *Standard Body Assembly and Rp 1 x 2-1/4 GAZ Body Assembly*



CSB400 / CSB420 SERIES STANDARD

CSB450 SERIES HIGH PRESSURE

ERAA04154

☐ **APPLY LUBRICANT (L)[1]:**
L1 = DOW CORNING® 33 OR COMPARABLE EXTREME LOW TEMPERATURE LUBRICANT
L2 = ANTI-SEIZE LUBRICANT

1. Lubricant and sealant must be selected such that they meet the temperature requirements.

Figure 16. *CSB400 Series Control Spring Adjustment Assemblies*

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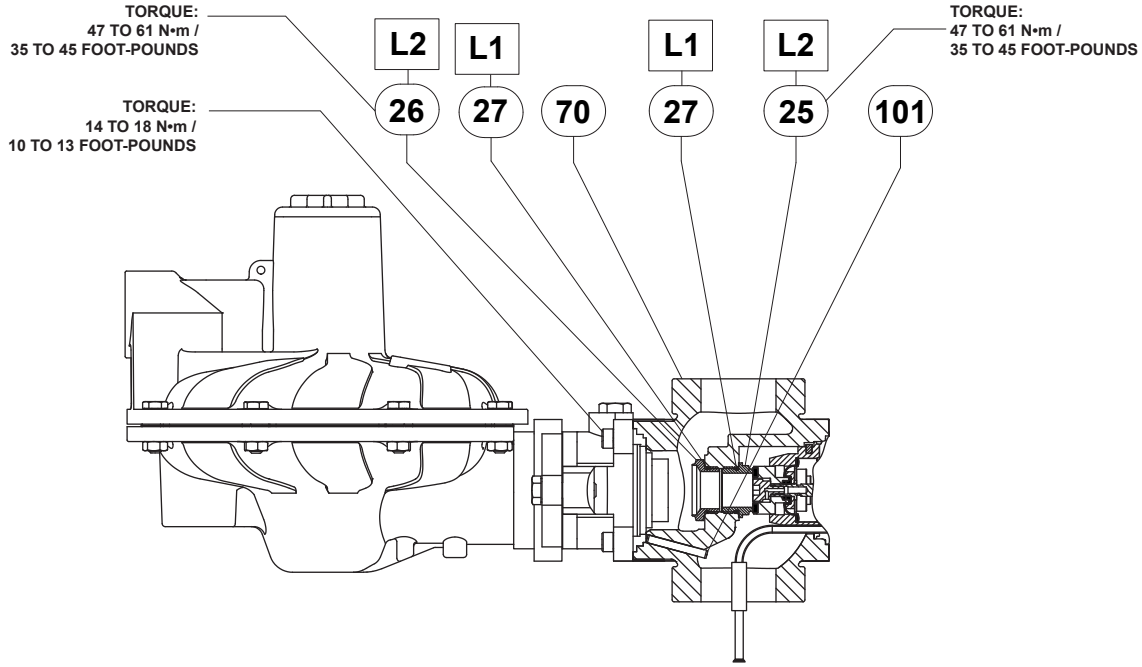
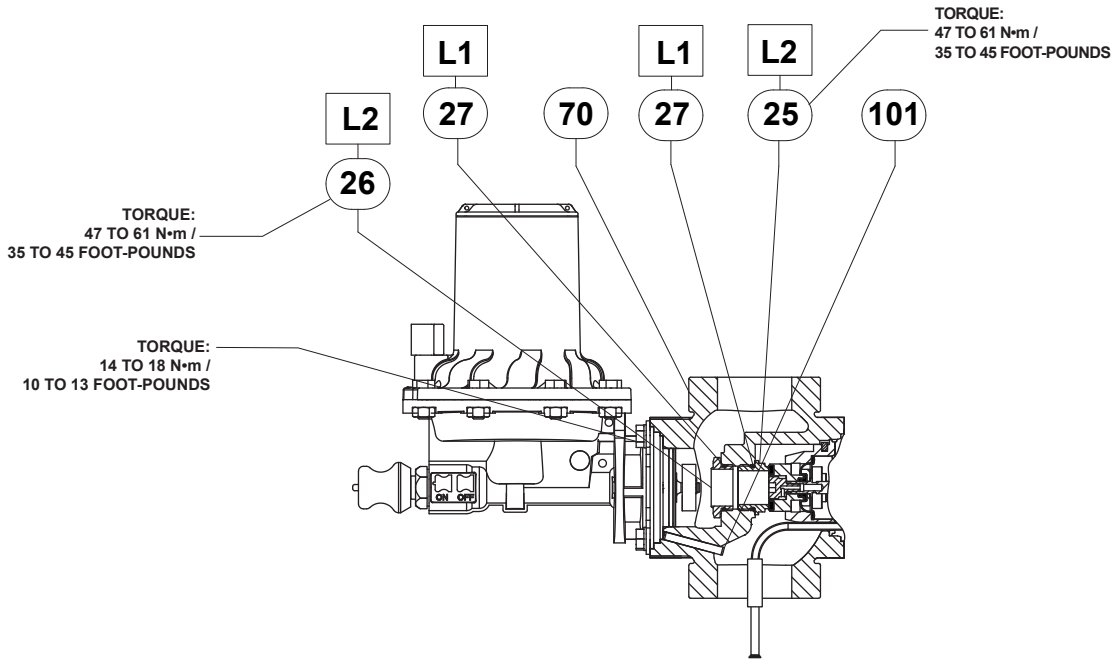


INTEGRAL TRUE-MONITOR™ ASSEMBLY



SLAM-SHUT ASSEMBLY

ERAA04154

☐ **APPLY LUBRICANTS (L)[1]:**
L1 = DOW CORNING® 33 OR COMPARABLE EXTREME LOW TEMPERATURE LUBRICANT
L2 = ANTI-SEIZE LUBRICANT

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 17. *CSB400 Series Slam-shut and Integral True-Monitor Modules*

Dow Corning® is a mark owned by Dow Corning Corporation.

Parts List (continued)

Key	Description	Part Number
56	Retaining Ring, Pusher Post Pin	GE33772X012
57	Bearing ball	GE33131X012
58	Hex Nut, High-Pressure,	
	(CSB450 Series only) Steel	GE33132X012
60	Closing Cap, Low-Pressure, Aluminum	GE29244X012
61	Bonnet, High-Pressure,	
	(CSB450 Series only) Zinc-plated steel	GE32499X012
62*	O-ring, Nitrile (NBR)	T10275X0012
65	Adjust Screw	
	Low-Pressure, Aluminum	GE27828X012
	High-Pressure, Steel	GE32500X012
70	Body	
	Ductile Cast Iron	
	NPT:	
	1	GE26463X012
	1-1/4	GE26465X012
	1-1/2	GE26466X012
	2	GE26467X012
	Rp:	
	Rp 1	GE26468X012
	Rp 1-1/4	GE26469X012
	Rp 1-1/2	GE26470X012
	Rp 1 x 1-1/4	GE42505X012
	Rp 1 x 2-1/4, GAZ	GE26482X012
	Rp 2	GE26471X012
	Flange:	
	DN 50 / NPS 2, CL150 FF	GE26480X012
	DN 40 / NPS 1-1/2, PN 10/16 Slip-Flange	GE44902X012
	DN 50 / NPS 2, PN 10/16	GE26481X012
	WCC Steel	
	NPT:	
	1	GE26463X022
	1-1/4	GE26465X022
	1-1/2	GE26466X022
	Rp	
	Rp 1	GE26468X022
	Rp 1-1/4	GE26469X022
	Rp 1-1/2	GE26470X022

Key	Description	Part Number
71	Bolt, Steel (2 required)	GE32061X012
72	Pipe Plug, 1/4 NPT	
	Steel	1C333528992
	316 Stainless steel	1C3335X0012
74	Blanking Plug, Aluminum	GE31255X012
75*	O-ring, Metric, Nitrile (NBR)	GF03442X012
76	Half Flange, Steel (2 required)	GF01942X012
77*	Metric O-ring, Nitrile (NBR)	GF03443X012
80	Cap Screw, Steel (4 required)	GE38176X012
81	Slotted Spring Pin	GE32503X012
82	Tube Gasket, Nitrile (NBR)	GE32502X012
83	Pitot Tube, Aluminum	GE31988X012
90	Nameplate	- - - - - - - - - - -
91	Warning Label	- - - - - - - - - - -
93	Information Label	- - - - - - - - - - -
94	Overlay Label	- - - - - - - - - - -
95	Grommet, Nitrile (NBR)	GE35358X012
96	Slip Disk, Stainless steel	GG05787X012
100	Wire and Seal	T14088T0012
101	Spring Pin, Steel	GE32724X012
104	Hub, Zinc-plated steel (2 required) not shown	GG02505X012
105	Flange Slip, Zinc-plated steel (2 required) not shown	GG02508X012
106	O-ring, Nitrile (NBR) (2 required) not shown	GE41121X012
107	Diaphragm Head Limiter, Zinc-plated steel	GE28761X012
108	Diaphragm Protector, Zinc-plated steel	GE42747X012
109	Pad, (CSB450 Series only)	T13830T0012

CSB400 Series

Industrial Regulators

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside U.S. +1 972 548 3574

Asia-Pacific
Shanghai 201206, China
Tel: +86 21 2892 9000

Europe
Bologna 40013, Italy
Tel: +39 051 419 0611

Middle East and Africa
Dubai, United Arab Emirates
Tel: +011 971 4811 8100

Natural Gas Technologies

Emerson Process Management
Regulator Technologies, Inc.

USA - Headquarters
McKinney, Texas 75070 USA
Tel: +1 800 558 5853
Outside U.S. +1 972 548 3574

Asia-Pacific
Singapore 128461, Singapore
Tel: +65 6770 8337

Europe
Bologna 40013, Italy
Tel: +39 051 419 0611
Chartres 28008, France
Tel: +33 2 37 33 47 00

Middle East and Africa
Dubai, United Arab Emirates
Tel: +011 971 4811 8100

TESCOM

Emerson Process Management
Tescom Corporation

USA - Headquarters
Elk River, Minnesota 55330-2445, USA
Tels: +1 763 241 3238
+1 800 447 1250

Europe
Selmsdorf 23923, Germany
Tel: +49 38823 31 287

Asia-Pacific
Shanghai 201206, China
Tel: +86 21 2892 9499

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