

CSB600 Series Commercial / Industrial Pressure Reducing Regulators

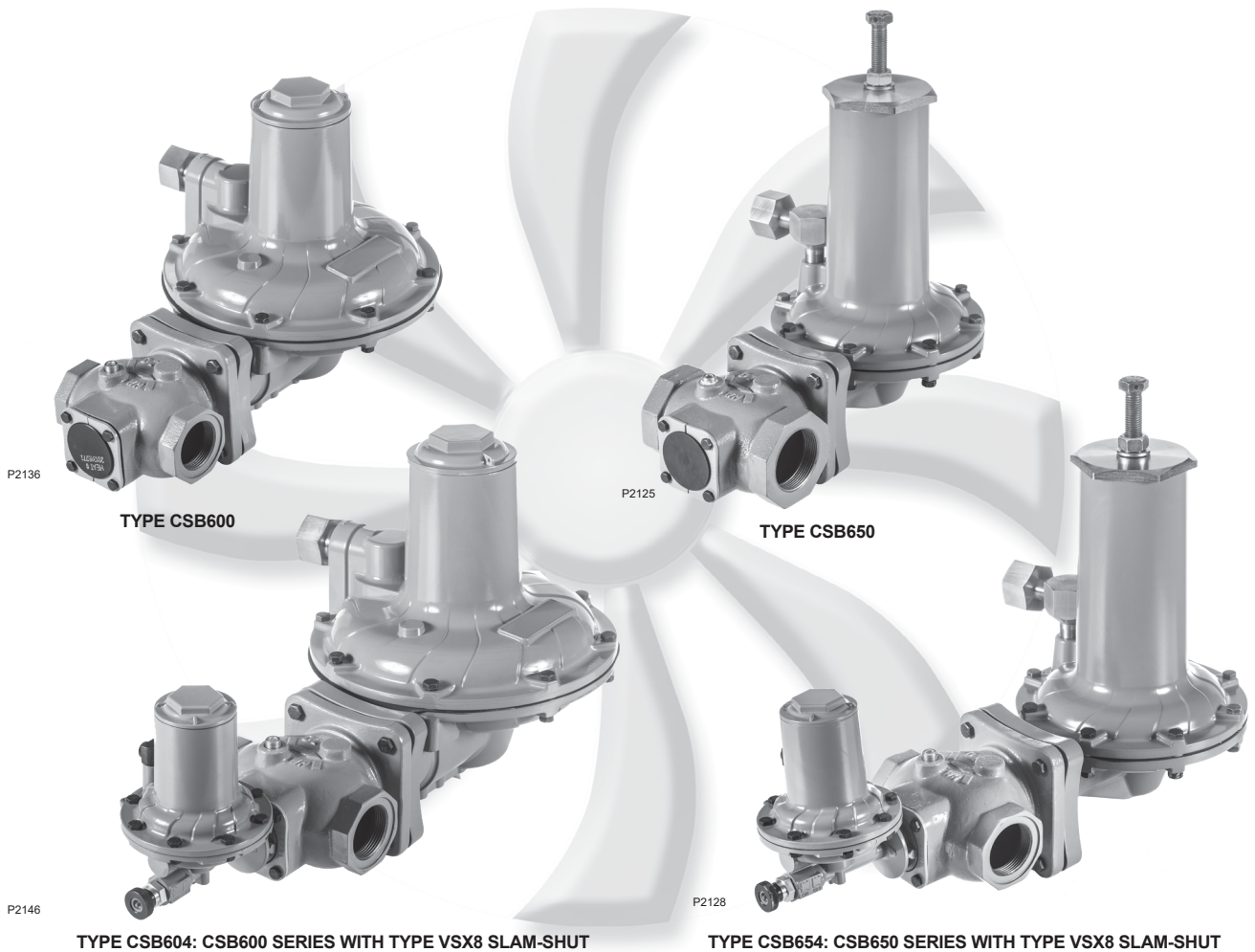


Figure 1. Typical Type CSB604 Pressure Reducing Regulator

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Introduction

Scope of the Manual

This Instruction Manual provides installation and maintenance instructions and parts list information for CSB600 Series regulators. Instructions and parts lists for other equipment mentioned in this Instruction Manual are found in separate manuals.

CSB600 Series

Specifications

The Specifications section lists the specifications for the CSB600 Series Regulators. The following information is stamped on the nameplate of CSB600 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)

Lockup Class

Up to SG10 (depending on Outlet Pressure)

Failure Mode per EN334

Fail Open (FO)

Integral Strength (IS) Pressure Rating⁽¹⁾

See Table 4

Differential Strength (DS) Pressure Ratings⁽¹⁾

See Table 5

Body Sizes, Materials, End Connections and Pressure Ratings⁽¹⁾

See Table 6

Operating Pressure Range⁽¹⁾

Regulator: See Table 7

Slam-Shut Module:

See Tables 8a, 8b, 8c and 8d

Maximum Outlet Pressure⁽¹⁾

Emergency Casing:

Type CSB600/CSB600F/CSB620/CSB620F:

4.0 bar / 58.0 psig

Type CSB650: 5.0 bar / 72.5 psig

To Avoid Internal Metallic Parts Damage:

Type CSB600/CSB600F/CSB620/CSB620F:

0.34 bar / 5.0 psig over set pressure

Type CSB650: 1.5 bar / 21.8 psig – not to exceed maximum emergency outlet

Operating Casing:

Types CSB600 and CSB620: 1.1 bar / 16 psig

Type CSB650: 5.0 bar / 72.5 psig

Outlet Pressure Ranges⁽¹⁾

9.0 mbar to 4.0 bar / 0.13 to 58.0 psig

See Table 7

Orifice Size

25 mm / 1.0 in.

Flow and IEC Sizing Coefficients

See Table 5

Pressure Registration

External

Temperature Capabilities⁽¹⁾⁽²⁾⁽³⁾

According to PED Standards:

-20 to 66°C / -4 to 151°F

Non-PED:

-30 to 66°C / -22 to 151°F

Spring Case Vent Connection

1 NPT: Types CSB600 and CSB620

1/2 NPT: Type CSB650

Type VSX8 Slam-Shut Device Maximum Inlet

Pressure (P_{umax})⁽¹⁾:

Differential Strength (DS): 16.0 bar / 232 psig

Integral Strength (IS): 6.0 bar / 87 psig

Approximate Weights

with Threaded body

Type CSB600/CSB620: 13 kg / 29 lbs

Type CSB650: 14 kg / 31 lbs

Type CSB604/CSB624: 14 kg / 31 lbs

Type CSB654: 15 kg / 33 lbs

with Flanged body

Add 5.2 kg / 11 lbs to weights listed

Designed, Tested and Evaluated Consistent With:

ANSI B16, ASME BPVC Sec. VIII Div. I, ASTM B117 (Corrosion Resistance), EN 334 and EN 14382

PED Conformity Statement and Information

The CSB600 Product Series is in conformity with the Pressure Equipment Directive PED 2014/68/EU. 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 MIPd \leq 1.1 PS.

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 Tables 8a, 8b, 8c and 8d are based on -20 to 60°C / -4 to 140°F.

3. Product has passed Emerson testing for lockup, relief start-to-discharge and reseal down to -40°.


Table 1. Available Configurations

TYPE NUMBER						OPTION	
C	S	B	6				
							PRESSURE CONSTRUCTION
0							Low Pressure Applications (Outlet Pressure: 9.0 to 110 mbar / 3.6 in. w.c. to 1.6 psig) ⁽²⁾
2							Medium Pressure Applications (Outlet Pressure: 61 to 780 mbar / 0.9 to 11.3 psig) ⁽²⁾
5							High Pressure Applications (Outlet Pressure: 0.70 to 4.0 bar / 10.2 to 58.0 psig) ⁽²⁾
							OVERPRESSURE PROTECTION
0							Without Overpressure Protection Module
0F							Without Overpressure Protection Module (Outlet Pressure: 9.0 to 110 mbar / 3.6 in. w.c. to 1.6 psig and 270 to 325 mbar / 3.9 to 4.7 psig only) ⁽²⁾
4							With Type VSX8 Slam-Shut Module ⁽¹⁾
4F							With Type VSX8 Slam-shut Module ⁽¹⁾ (Outlet Pressure: 9.0 to 110 mbar / 3.6 in. w.c. to 1.6 psig and 270 to 325 mbar / 3.9 to 4.7 psig only) ⁽²⁾
							PRESSURE REGISTRATION
					E		External
							RELIEF
					N		None
					T		Token Internal Relief ⁽³⁾
Example: Type number CSB624ET : CSB600 Series regulator constructed for medium pressure applications, with Type VSX8 slam-shut module, with External pressure registration and with Token relief. 1. Reference Instruction Manual D103127X012 for information regarding the Type VSX8 Slam-Shut Module. 2. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded. 3. Token relief is not available for outlet pressure above 500 mbar / 8 psig.							

Table 2. PED Information

TYPE	DESCRIPTION	PED CATEGORY	FLUID GROUP
CSB600, CSB600F, CSB620, CSB620F and CSB650	Base regulator	I	Groups 1 and 2 according to PED 2014/68/EU, 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.
CSB604, CSB604F, CSB624, CSB624F and CSB654	Regulator with slam shut	IV	
European EN Reference Standards		EN 334 and EN 14382	

Table 3. Directive ATEX Information

TYPE	CLASSIFICATION	ATEX ASSEMBLIES	ATEX LABELLING
CSB604, CSB604F, CSB624, CSB624F, CSB654 version with Type VSX8	Non-electrical equipment	Not falling under the ATEX Directive 2014/34/EU	No
CSB604, CSB604F, CSB624, CSB624F, CSB654 with limit switch	Non-electric equipment equipped with an electrical device falling under the scope of the ATEX Directive 2014/34/EU	Constitutes an assembly according to the ATEX Directive 2014/34/EU	

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. (Emerson) 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

CSB600 Series regulators are typically installed on industrial and commercial applications. Types under CSB600 Series are utilized for low capacity applications. See Table 1 for Available Configurations. Low, Medium and High outlet pressure constructions are available via Types CSB600, CSB620 and CSB650 respectively, that provide outlet setpoints ranging from 9.0 mbar to 4.0 bar / 0.13 to 58.0 psig.

The Types CSB604, CSB604F, CSB624, CSB624F and CSB654 are examples of CSB600 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.

External outlet pressure registration requires an external control line/sense line.

CSB600 Series

 PATENT PENDING 0062	REGULATOR	SLAMSHUT	SERIAL NO.	
	TS	TEMP CLASS	DOM	
	PS	FLUID GROUP	CAT	LOC
	DN	SEAT ϕ	BODY	
	PN		MATL	

Std: EN334 REGULATOR PED mfg: Chartres France	TYPE	PDS
	Pumax	Pmax
	Wds	Mat: Case
	Type	Failure Mode

REGULATOR NAMEPLATES

Std: EN14382 SLAM SHUT PED mfg: Chartres France	RELAYS	Pu max	IS 6.0 bar
	MATL CASE	Max IN	DS 16.0 bar
	TYPE	P max	LP 1.5 bar
	Wdsu OP range over LP	Max OUT	HP 5.5 bar
	PSD	CLASS	A Min, Min and Max installation
			B Max installation only

Pressure range following service condition

IS	PS 6.0 bar	P _{umax} 6.0 bar	PSD 6.0 bar
DS	PS 20.0 bar	P _{umax} 16.0 bar	PSD 6.0 bar

SLAM-SHUT NAMEPLATE

FRANCEL SAS Chartres FRANCE	II 2 G T
TYPE	
No de Série SERIAL No.	An YEAR
Utilisation INTENDED USE	

NAMEPLATE FOR EXPLOSIVE ATMOSPHERE IF ATEX ASSEMBLED

Figure 2. CSB600 Series Regulator and Slam-Shut Nameplates and Labels

Table 4. Integral Strength (IS) Pressure Ratings⁽¹⁾

TYPE	MAXIMUM ALLOWABLE PRESSURE ⁽²⁾ / MAXIMUM EMERGENCY INLET PRESSURE		MAXIMUM OPERATING INLET PRESSURE ⁽²⁾	
	P _s		P _{umax}	
	bar	psig	bar	psig
CSB600 and CSB604	4.0	58.0	4.0	58.0
CSB600F and CSB604F				
CSB620 and CSB624				
CSB620F and CSB624F				
CSB650 and CSB654	5.0	72.5	5.0	72.5

1. Applicable only to applications where the inlet rating cannot exceed the outlet rating.
 2. 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 5. Differential Strength (DS) Pressure Ratings and Flow and Sizing Coefficients

TYPE	SPECIFIC MAXIMUM ALLOWABLE PRESSURE / MAXIMUM EMERGENCY OUTLET PRESSURE ⁽¹⁾		MAXIMUM EMERGENCY INLET PRESSURE ⁽¹⁾		MAXIMUM OPERATING INLET PRESSURE ⁽¹⁾		ORIFICE SIZE		FLOW COEFFICIENTS WIDE OPEN			IEC SIZING COEFFICIENT		
	P _{SD}		P _s		P _{umax}		mm	In.	C _g	C _v	C ₁	X _r	F _D	F _L
	bar	psig	bar	psig	bar	psig								
CSB600 and CSB604	4.0	58.0	12.0	174	10.0	145	25	1.0	675	17.9	37.8	0.91	0.89	0.73
CSB600F and CSB604F					6.0	87								
CSB620F and CSB624F					16.0	232								
CSB620 and CSB624														
CSB650 and CSB654	5.0	72.5	20.0	290	16.0	232								

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

Table 6. Body Sizes, Material, End Connections and Cold Working Pressure Ratings

BODY MATERIAL	BODY SIZE		END CONNECTION	FACE-TO-FACE DIMENSION		BODY PRESSURE RATING							
	DN	NPS		mm	In.	bar	psig						
Ductile Iron	32	1-1/4	NPT	155	6.10	17.2	250						
	40	1-1/2											
	50	2											
	32	1-1/4	Rp										
	40	1-1/2											
	50	2											
	50	2	CL125 FF / CL150 FF					191	7.52				
	50	2						254	10.0				
	50	2						267	10.5				
	50	2	CL150 RF					254	10.0				
	50	2	PN 10/16					254	10.0	16.0	232		
	50	2						191	7.52				
	50	2						200	7.87				
	32	1-1/4	PN 16 Slip-On					200	7.87				
40	1-1/2	222		8.74									
WCC Steel	32	1-1/4	NPT	155	6.10	20.0	290						
	40	1-1/2											
	50	2											
	32	1-1/4	Rp										
	40	1-1/2											
	50	2											
	50	2	CL150 RF					254	10.0			20.0	290
	50	2	PN 10/16					254	10.0			16.0	232

Table 7. CSB600 Series Primary Regulator Outlet Pressure Ranges

TYPE	OPERATING PRESSURE RANGE, W _d		PART NUMBER	SPRING COLOR	SPRING WIRE DIAMETER		SPRING FREE LENGTH	
	mbar	psig			mm	In.	mm	In.
CSB600, CSB604, CSB600F and CSB604F	9 to 14	3.6 to 5.6 in. w.c.	GE30336X012	Silver	3.00	0.118	224	8.82
	13 to 24	5.2 to 9.6 in. w.c.	ERSA01138A0	Red	3.50	0.138	235	9.25
	22 to 39	8.8 to 15.7 in. w.c.	GE30338X012	Black Stripe	4.00	0.156	172	6.78
	32 to 50	12.8 to 20.1 in. w.c.	GE30339X012	Purple	4.30	0.171	187	7.35
	42 to 70	16.9 to 28.1 in. w.c.	GE30340X012	White Stripe	4.62	0.182	188	7.40
	61 to 110	0.9 to 1.6	ERSA03656A0	Dark Green	4.88	0.192	224	8.82
CSB620 and CSB624	61 to 110	0.9 to 1.6	ERSA03656A0	Dark Green	4.88	0.192	224	8.82
	105 to 220	1.5 to 3.2	ERSA03657A0	Blue	5.94	0.234	217	8.54
	210 to 380	3.1 to 5.5	GG06247X012	Black	8.00	0.315	206	8.11
	320 to 570	4.6 to 8.3	ERSA01582A0	Red with White Stripe	8.71	0.343	177	6.97
	510 to 780	7.4 to 11.3	ERSA05055A0	Blue with White Stripe	10.0	0.394	181	7.13
CSB620F and CSB624F	270 to 325	3.9 to 4.7	ERAA11747A0	Black with White Stripe	6.35	0.250	227	8.94
CSB650 and CSB654	0.7 to 1.19 bar	10.2 to 17.3	GE30345X012	Purple Stripe	9.00	0.354	225	8.86
	1.05 to 2.7 bar	15.2 to 39.2	GE30346X012	Brown	11.0	0.433	226	8.88
	2.3 to 3.25 bar	33.4 to 47.1	ERSA01125A0	Grey with Red Stripe	12.6	0.496	225	8.86
	3.1 to 4.0 bar	45 to 58.0	ERSA01126A0	Grey with Orange Stripe	13.7	0.539	226	8.88

CSB600 Series

Table 8a. North American Overpressure Shut-off OPSO Only Ranges

REGULATOR			SLAM SHUT DEVICE							
Type	Typical Setpoint	Spring Range	Type (Maximum Operating Inlet)	Token Relief Set	Relief Range Shown as a % of Regulator Setpoint		Required Difference Between Token Relief and OPSO	Over Pressure Shut-off (OPSO) Set Range	Factory Set OPSO	
	psig	psig		psig	min	max	psig	psig	psig	
CSB604F	7 in. w.c.	5.2 to 9.6 in. w.c.	VSX8L (125 psi)	12 in. w.c.	170	215	3.2 in. w.c.	12 to 24 in. w.c.	22 in. w.c.	
	11 in. w.c.	8.8 to 15.7 in. w.c.		17 in. w.c.	150	160	4 in. w.c.	16 in. w.c. to 1.6 psig	25 in. w.c.	
	14 in. w.c.	12.8 to 20.0 in. w.c.		21 in. w.c.	150	160	4 in. w.c.	24 in. w.c. to 2.8 psig	1.1	
	1	24 in. w.c. to 1.6 psig		1.4	140	150	6.4 in. w.c.	1.4 to 4.1	2	
CSB624F	2	1.5 to 3.2		2.6	130	140	0.6	2.0 to 7.3	3.5	
	3			3.8	125	140	0.6		5	
	5	3.1 to 5.5		6.2	125	140	0.7	3.2 to 11.0	7	
	10	7.4 to 11.3					5.8 to 13.3 ⁽¹⁾	12		
CSB604	7 in. w.c.	5.2 to 9.6 in. w.c.		VSX8L (232 psi)	12 in. w.c.	170	215	3.2 in. w.c.	12 to 24 in. w.c.	22 in. w.c.
	11 in. w.c.	8.8 to 15.7 in. w.c.			17 in. w.c.	150	160	4 in. w.c.	16 in. w.c. to 1.6 psig	25 in. w.c.
	14 in. w.c.	12.8 to 20.0 in. w.c.	21 in. w.c.		150	160	4 in. w.c.	24 in. w.c. to 2.8 psig	1.1	
	1	24 in. w.c. to 1.6 psig	1.4		140	150	6.4 in. w.c.	1.4 to 4.1	2	
CSB624	2	1.5 to 3.2	2.6		130	140	0.6	2.0 to 7.3	3.5	
	3		3.8		125	140	0.6		5	
	5	3.1 to 5.5	6.2		125	140	0.7	3.2 to 11.0	7	
	10	7.4 to 11.3				5.8 to 13.3 ⁽¹⁾	12			
CSB654	15	10.2 to 17.3	VSX8H (232 psi)					13.1 to 39.1 ⁽¹⁾	19	
	20	15.2 to 39.2						13.1 to 43.5	25	
	30						23.2 to 72.5 ⁽¹⁾	35		
	40	33.4 to 47.1					23.2 to 72.5 ⁽¹⁾	45		

Grey areas indicate that token relief is not available above 8 psig setpoint.
 1. Max OPSO setpoint truncated to reflect maximum outlet pressure for spring range.

Table 8b. European Overpressure Shut-off OPSO Only Ranges

REGULATOR			SLAM SHUT DEVICE						
Type	Typical Setpoint	Spring Range	Type (Maximum Operating Inlet)	Token Relief Set	Relief Range Shown as a % of Regulator Setpoint		Required Difference Between Token Relief and OPSO	Over Pressure Shut-off (OPSO) Set Range	Factory Set OPSO
	mbar	mbar		mbar	min	max	mbar	mbar	mbar
CSB604F	10	9 to 14	VSX8L (8.6 bar)	17	170	215	8	30 to 60	32
	15	13 to 24		26	170	215	6		
	20	13 to 24		34	170	215	6		
	21			36	170	215	4		
	27	22 to 39		41	150	160	5	30 to 60	46
	30			45	150	160	10		
	35	22 to 39		53	150	160	10	40 to 110	70
	50	42 to 70		70	140	158	16	60 to 193	90
	60			84	140	158	16		
75	98		130	140	20	60 to 193	130		
CSB604	10	9 to 14	VSX8L (16 bar)	17	170	215	8	30 to 60	40
	15	13 to 24		26	170	215	10		
	20	13 to 24		34	170	215	10		
	21			36	170	215	10		
	27	22 to 39		41	150	160	10	30 to 60	55
	30			45	150	160	10		
	35	22 to 39		53	150	160	10	40 to 110	70
	50	42 to 70		70	140	158	16	60 to 193	90
	60			84	140	158	16		
75	98		130	140	20	60 to 193	130		
CSB624	100	61 to 110	VSX8L (16 bar)	130	130	140	20	60 to 193	170
	120	105 to 220		156	130	140	40	95 to 280	205
	150			195	130	140	40		
	160	105 to 220		208	130	140	40	95 to 280	265
	200	105 to 220		250	125	140	50	138 to 500	330
	300	210 to 380		375	125	140	50	138 to 500	450
	500	320 to 570		625	125	140	60	221 to 760	700
	600	510 to 780					400 to 915 ⁽¹⁾	840	
750				400 to 1100 ⁽¹⁾	1050				
CSB624F	300	270 to 325	VSX8L (8.6 bar)				138 to 500	450	
CSB654	1000	700 to 1190	VSX8H (16 bar)				400 to 1450	1320	
	1200	1050 to 2700					900 to 3000	1600	
	1500						1600 to 4000 ⁽¹⁾	1900	
	2000	1050 to 2700					1600 to 4000 ⁽¹⁾	2400	
	3000	2300 to 3250					1600 to 5000 ⁽¹⁾	3400	
4000	3100 to 4000				1600 to 5000 ⁽¹⁾	4400			

Grey areas indicate that token relief is not available above 500 mbar setpoint.
 1. Max OPSO setpoint truncated to reflect maximum outlet pressure for spring range.

Table 8c. North American Overpressure and Underpressure Shut-off UPSO/OPSO Ranges

REGULATOR			SLAM SHUT DEVICE									
Type	Typical Setpoint	Spring Range	Type (Maximum Operating Inlet)	Token Relief Set	Relief Range Shown as a % of Regulator Setpoint		Required Difference Between Token Relief and OPSO	UPSO	OPSO	Factory Set		
					Set Range	Shut-off (OPSO) Set Range Over UPSO Setpoint		UPSO	Adjusted OPSO Range	OPSO		
psig		psig		psig	min	max	psig	psig	psig	psig	psig	
CSB604F	7 in. w.c.	5.2 to 9.6 in. w.c.	VSX8L (125 psi)	12 in. w.c.	170	215	3.2 in. w.c.	3 to 12 in. w.c.	16 to 29 in. w.c.	3 in. w.c.	19 in. w.c. to 1.2 psig	22 in. w.c.
	11 in. w.c.	8.8 to 15.7 in. w.c.		17 in. w.c.	150	160	4 in. w.c.			6 in. w.c.	22 in. w.c. to 1.3 psig	25 in. w.c.
	14 in. w.c.	12.8 to 20.0 in. w.c.		21 in. w.c.	150	160	4 in. w.c.	4 in. w.c. to 1.1 psig	20 in. w.c. to 1.8 psig	9 in. w.c.	1 to 2.1 psig	1.1
	1	24.0 in. w.c. to 1.6 psig		1.4	140	150	6.4 in. w.c.	10 in. w.c. to 2.3 psig	1.2 to 3.2	14 in. w.c.	1.7 to 3.7	2
CSB624F	2	1.5 to 3.2	VSX8L (232 psi)	2.6	130	140	0.6	1.5 to 7.3	2.6 to 5.6	1	2.2 to 4.2	3.5
	3			3.8	125	140	0.6			2	4.6 to 7.6	5
	5	3.1 to 5.5		6.2	125	140	0.7	1.5 to 7.3	3.5 to 8.2	3	5.6 to 8.6	7
	10	7.4 to 11.3						1.5 to 7.3	3.5 to 8.2	5	8.5 to 13.2	12
	15	10.2 to 17.3						1.5 to 10.9	6.7 to 13.5	7	13.7 to 20.5	19
CSB604	7 in. w.c.	5.2 to 9.6 in. w.c.	VSX8L (232 psi)	12 in. w.c.	170	215	3.2 in. w.c.	3 to 12 in. w.c.	18 to 30 in. w.c.	3 in. w.c.	21 in. w.c. to 1.2 psig	22 in. w.c.
	11 in. w.c.	8.8 to 15.7 in. w.c.		17 in. w.c.	150	160	4 in. w.c.			6 in. w.c.	24 in. w.c. to 1.3 psig	25 in. w.c.
	14 in. w.c.	12.8 to 20.0 in. w.c.		21 in. w.c.	150	160	4 in. w.c.	4 in. w.c. to 1.1 psig	25 in. w.c. to 1.9 psig	9 in. w.c.	1.2 to 2.2	1.1
	1	24.0 in. w.c. to 1.6 psig		1.4	140	150	6.4 in. w.c.	10 in. w.c. to 2.3 psig	1.2 to 3.2	14 in. w.c.	1.7 to 3.7	2
CSB624	2	1.5 to 3.2	VSX8L (232 psi)	2.6	130	140	0.6	1.5 to 7.3	2.6 to 5.6	1	2.2 to 4.2	3.5
	3			3.8	125	140	0.6			2	4.6 to 7.6	5
	5	3.1 to 5.5		6.2	125	140	0.7	1.5 to 7.3	3.5 to 8.2	3	5.6 to 8.6	7
	10	7.4 to 11.3						1.5 to 7.3	3.5 to 8.2	5	8.5 to 13.2	12
	15	10.2 to 17.3						1.5 to 10.9	6.7 to 13.5	7	13.7 to 20.5	19
CSB654	20	15.2 to 39.2	VSX8H (232 psi)					7.3 to 29.0	15.2 to 22.8	10	25.2 to 32.8	25
	30									18.1 to 33.4	15	33.1 to 48.4
	40							20	38.1 to 53.4			45

Grey areas indicate that token relief is not available above 8 psig setpoint.

Table 8d. European Overpressure and Underpressure Shut-off UPSO/OPSO Ranges

REGULATOR			SLAM SHUT DEVICE									
Type	Typical Setpoint	Spring Range	Type (Maximum Operating Inlet)	Token Relief Set	Relief Range Shown as a % of Regulator Setpoint		Required Difference Between Token Relief and OPSO	UPSO	OPSO	Factory Set		
					Set Range	Shut-off (OPSO) Set Range Over UPSO Setpoint		UPSO	Adjusted OPSO Range	OPSO		
mbar		mbar		mbar	min	max	mbar	mbar	mbar	mbar	mbar	
CSB604F	15	13 to 24	VSX8L (8.6 bar)	26	170	215	6	7 to 11	30 to 44	8	38 to 52	40
	20	13 to 24		34	170	215	6	7 to 11	30 to 44	10	40 to 54	40
	21	13 to 24		36	170	215	4	7 to 11	30 to 44	10	40 to 54	40
	27	22 to 39		41	150	160	5	7 to 15	32 to 44	14	46 to 58	46
	30	22 to 39		45	150	160	10	7 to 30	40 to 72	15	55 to 87	60
	35	22 to 39		53	150	160	10	7 to 30	40 to 72	18	58 to 90	70
	50	42 to 70		70	140	158	16	10 to 75	48 to 74	25	73 to 99	90
	60	42 to 70		84	140	158	16	10 to 75	48 to 74	30	78 to 104	100
	75	61 to 110		98	130	140	20	25 to 160	83 to 221	38	121 to 259	130
	15	13 to 24		VSX8L (16 bar)	26	170	215	6	7 to 30	40 to 55	8	48 to 63
20	13 to 24	34	170		215	6	7 to 30	40 to 55	10	50 to 65	55	
21	13 to 24	36	170		215	4	7 to 30	40 to 55	10	50 to 65	55	
27	22 to 39	41	150		160	5	7 to 30	40 to 55	14	54 to 69	55	
30		45	150		160	10	7 to 30	45 to 76	15	60 to 91	60	
35	42 to 70	53	150		160	10	7 to 30	45 to 76	18	63 to 94	70	
50		70	140		158	16	10 to 75	50 to 80	25	75 to 105	90	
60		84	140		158	16		30	80 to 110	100		
75		98	130		140	20	38	121 to 259	130			
CSB624	100	61 to 110	VSX8L (16 bar)		130	130	140	20	25 to 160	83 to 221	50	133 to 271
	120	105 to 220		156	130	140	40	60			143 to 281	205
	150			195	130	140	40	75	158 to 296	250		
	160			208	130	140	40	80	163 to 301	265		
	200			250	125	140	50	100	214 to 361	330		
	300	210 to 380		375	125	140	50	100 to 500	179 to 386	150	329 to 536	450
	500	320 to 570		625	125	140	60	100 to 500	241 to 565	300	491 to 815	700
	600	510 to 780						100 to 500	241 to 565	300	541 to 865	840
	750							100 to 750	460 to 932	375	835 to 1120 ⁽¹⁾	1050
	CSB624F	300		270 to 325	VSX8L (8.6 bar)					100 to 500	179 to 386	200
CSB654 GrDF	1 bar	0.7 to 1.19 bar	VSX8L (16 bar)					100 to 500	460 to 932	750	1210 to 1682	1210
CSB654	1 bar	0.7 to 1.19 bar	VSX8L (16 bar)					100 to 500	460 to 932	500	960 to 1432	1320
	1.2 bar	1.05 to 2.7 bar									500 to 2000	1050 to 1570
	1.5 bar		750	1800 to 2320	1900							
	2 bar		1000	2250 to 3300	2400							
	3 bar	2.3 to 3.25 bar	VSX8H (16 bar)					500 to 2800	2100 to 3750	1500	2750 to 3800	3400
4 bar	3.1 to 4 bar											

Grey areas indicate that token relief is not available above 500 mbar setpoint.

1. Max OPSO setpoint truncated to reflect maximum outlet pressure for spring range.

Example: If a non-standard setpoint is needed, see the following example for the proper use of Tables 8a, 8b, 8c and 8d. In this example, the non-standard regulator setpoint is 140 mbar / 2.0 psig. The minimum factory token relief set pressure is 130% of the non-standard setpoint. The resulting token relief set pressure is 183 mbar / 2.6 psig. The minimum factory OPSO and UPSO set pressures are 165% and 50% of the non-standard setpoint, respectively. The resulting minimum settings are: OPSO = 231 mbar / 3.4 psig and UPSO = 70 mbar / 1.0 psig.

CSB600 Series

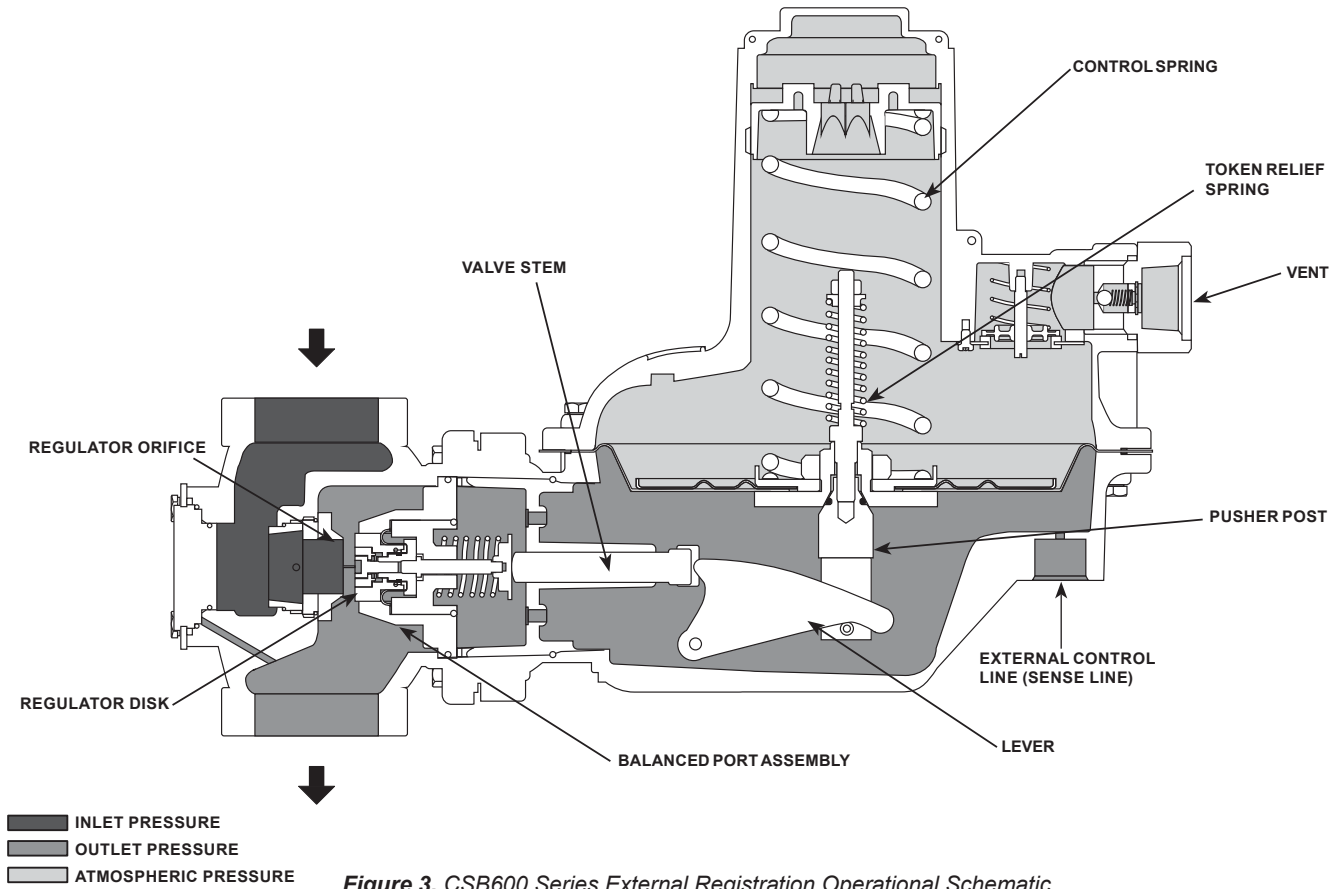


Figure 3. CSB600 Series External Registration Operational Schematic

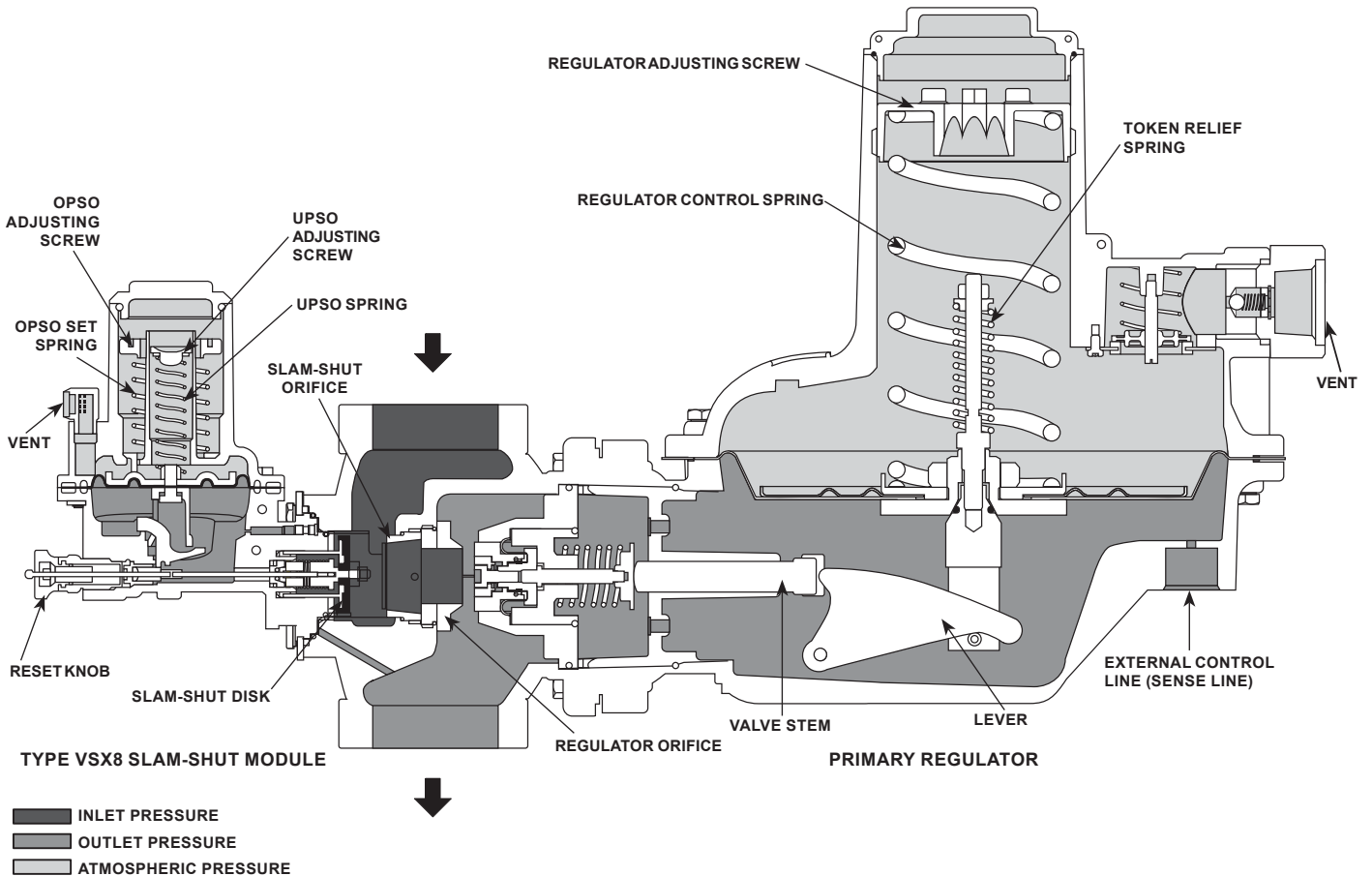


Figure 4. Type CSB604ET, Externally Registered Regulator and Slam-Shut Operational Schematic

Principle of Operation

Type CSB600 Base Regulator Operation

Refer to Figure 3. 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. The action of the pusher post assembly, lever and valve stem moves the balanced port assembly closer to the orifice and reduces gas flow. If downstream demand increases, pressure under the regulator diaphragm decreases. Spring force pushes the pusher post assembly downward, the balanced port assembly 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 CSB600ET, 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, indicating that an overpressure situation is occurring.

Type CSB604/CSB604F/CSB624/CSB624F/CSB654 Slam-Shut Operation

The Type VSX8 slam-shut module on the Type CSB604/CSB604F/CSB624/CSB624F/CSB654 regulator is a fast-acting shutoff 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 Tables 8a, 8b, 8c and 8d for guidance regarding the typical setpoints of the regulator and associated slam-shut module OPSO and also the combined OPSO and UPSO setpoints. The Type VSX8's actions are independent of the Type CSB604/CSB604F/CSB624/CSB624F/CSB654 regulator and of variations to the inlet pressure. The Type VSX8 comes standard with external downstream pressure registration. External registration requires a downstream sensing line. See Figure 6 for guidance regarding installation of the downstream control line.

The Type VSX8 shutoff disk is normally in the open (reset) position, see Figure 4. 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 flow has been shut off, refer to the Type VSX8 Instruction Manual (D103127X012) for additional details.



WARNING

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 (i.e. valves, elbows and bends), downstream of the regulator and/or slam-shut device. Due to these factors additional protections should be installed to stop the 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, see Figures 5 through 6. This minimizes the possibility of freezing and of water or other foreign materials entering the vent and interfering with proper operation.

For Type CSB604/CSB604F/CSB624/CSB624F/CSB654 with slam-shut, point the vent of both the primary regulator and slam shut downward to resist collection of precipitation and moisture. From the factory, the slam shut vent will be always point in the same direction as that of the primary regulator.

CSB600 Series

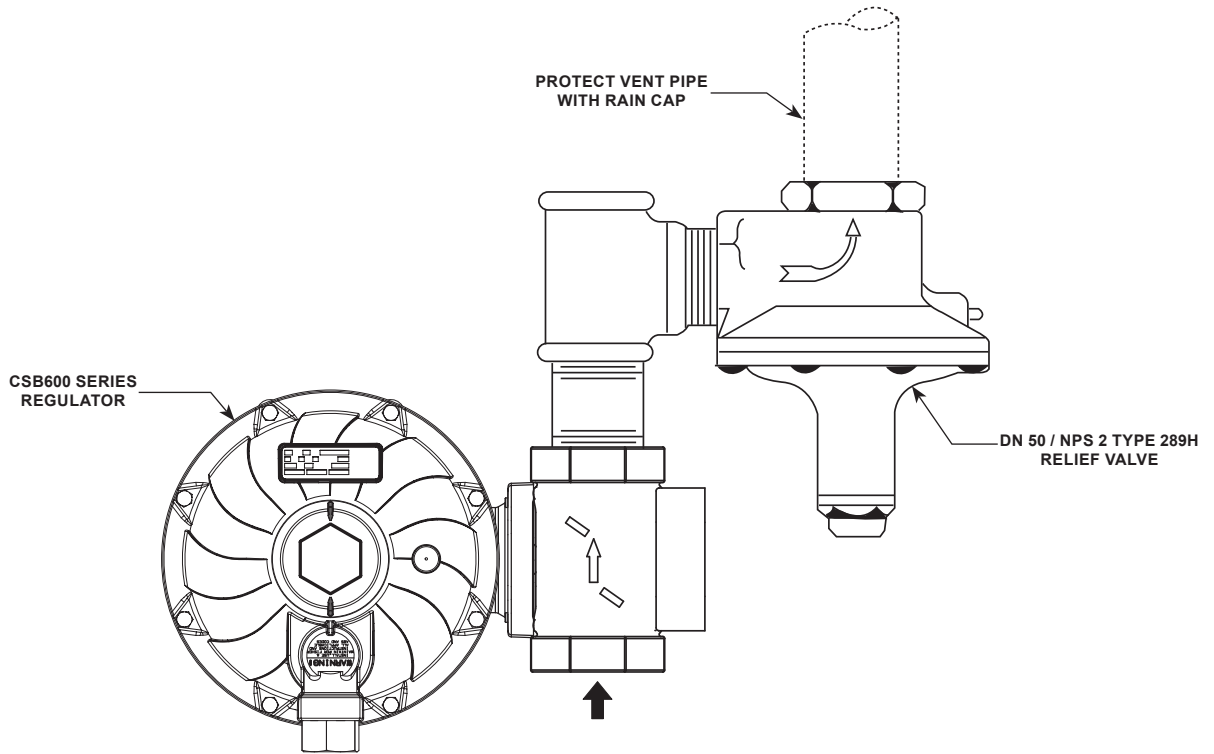


Figure 5. CSB600 Series Regulator Installed with the Vent Pointed Downward and with a Type 289H Relief Valve for High Capacity Relief

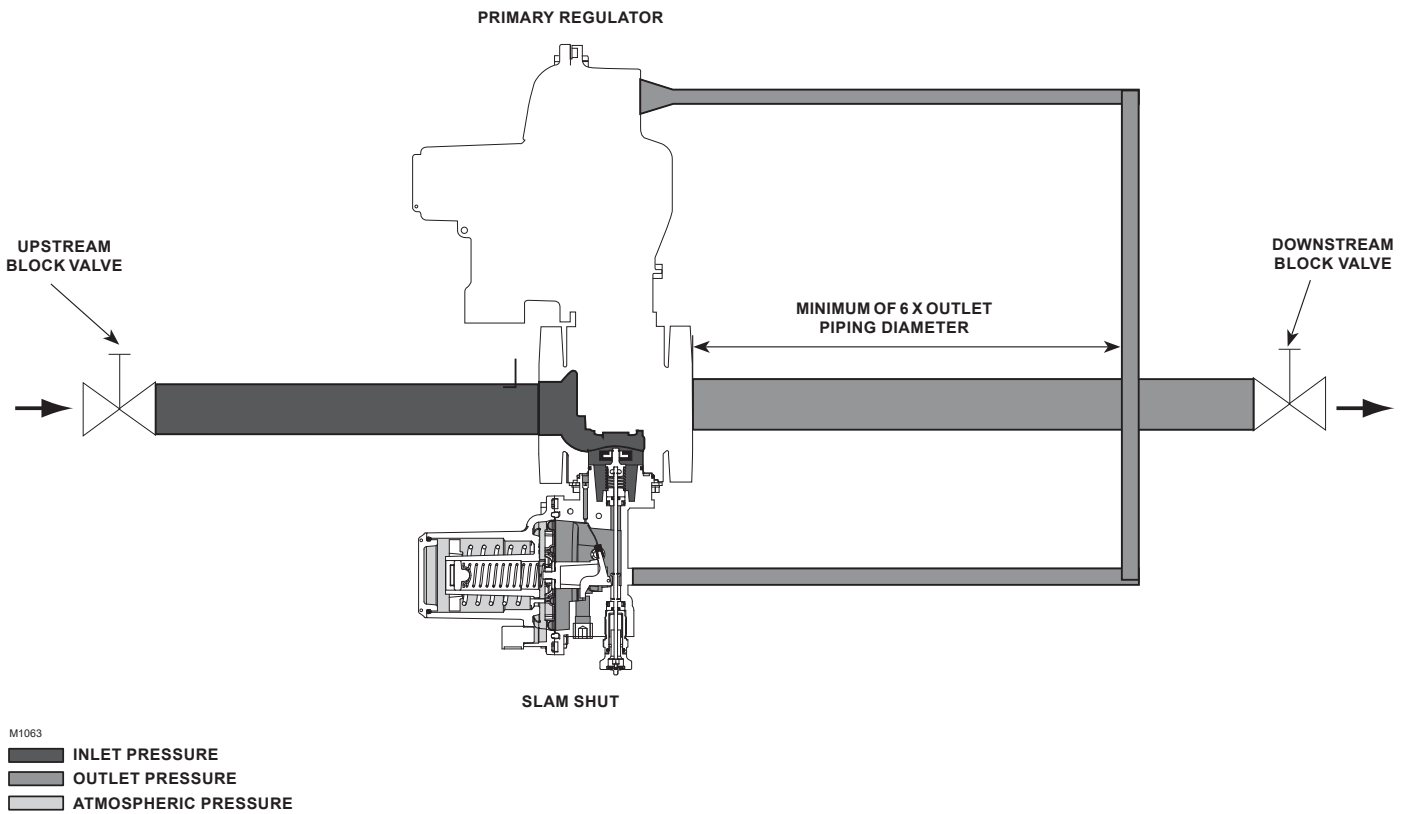


Figure 6. Type CSB604 Downstream Control Line Installation

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.

See Vent Line Installation section for the recommended venting practice.

CAUTION

CSB600 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 CSB600 Series if inlet pressure will be high enough to damage downstream equipment. Common methods of external overpressure protection include relief valves, monitoring regulators, shutoff 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.

WARNING

The usage of an assembly incorporating an electrical accessory in an explosive atmosphere the Type CSB604 regulators equipped with an electrical accessory (proxy, microswitch) are:

- are classified “assembly” in conformity with the ATEX Directive 2014/34/EU (ref CEN/SFG-I Guidance sheet-February 2015)
- can be installed in any type of classified zones according to the Directive 1999/92/EC dated 16 December 1999, according to the following conditions:

- a.) the equipment is connected to a suitable and certified intrinsically safe apparatus/electric circuit (zener barrier)
- b.) the equipment is used according to the appropriate instruction manual issued by the manufacturer and/or available on our website
- c.) when the equipment is used in a natural gas pressure reducing and/or metering station in compliance with the following European standards: EN 12186, EN 12279 and EN 1776.

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.
- Verify that:
 - Equipment limits of utilization (PS, TS) correspond 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 make an analysis if it is necessary to take into account the effect 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.

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 5 through 6. 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.

CSB600 Series

- 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 ft. 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.

CSB600 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 6 times the outlet pipe diameter.

For all types with external control lines, use tubing with an inner diameter of 16 mm / 0.63 in. or larger.

Downstream Control Line Installation with Slam-Shut Device

Refer to Figure 6. When installing the Types CSB604ET, CSB604EN, CSB604FET, CSB604FEN CSB624ET, CSB624EN, CSB624FET, CSB624FEN, CSB654ET and CSB654EN 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 6 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 6 times the outlet pipe diameter.

For all types with external control lines, use tubing with an inner diameter of 16 mm / 0.63 in. or larger for the primary regulator and 6.4 mm / 0.25 in. 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 5. The outside end of the vent line should be protected with a rainproof assembly. The Type 289H is typically set 25 mbar / 10 in. w.c. higher than the outlet pressure setting of the regulator, up to 75 mbar / 30 in. 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. Refer to the 289 Series Instruction Manual (D100280X012) for complete information.

Vent Line Installation

The CSB600 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.

CSB600 Series outlet pressure ranges are shown in Table 7. Outlet pressure higher than 0.34 bar / 5.0 psig above the setpoint may damage internal metallic parts. **The maximum emergency (casing) outlet pressure for all types is 4.0 bar / 58.0 psig except for Type CSB650 which is 5.0 bar / 72.5 psig.**

Startup



CAUTION

Pressure gauges must 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

For types that include the slam-shut module, refer to the Instruction Manual for Type VSX8 slam shut (D103127X012) for adjustment and maintenance of the slam shut.

The range of allowable pressure settings for the primary regulator is printed or stamped on the nameplate. If the required setting is not within this range, substitute the correct spring (as shown in Table 7). If the spring is changed, change 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 CSB600, CSB600F, CSB620F and CSB620

WARNING

During setpoint adjustment, do not mistake the Token Relief Spring Nut (key 46) for the main spring adjusting screw. Turning the Token Relief Spring Nut will change the token relief setting and if rotated counterclockwise could result in gas discharge and possible personal injury.

1. Remove the closing cap (key 60, Figure 12).
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 (key 60).

For Type CSB650

1. Loosen the hex nut (key 67, Figure 12).
2. To increase the outlet setting, turn the adjusting bolt (key 64) clockwise. To decrease the outlet setting, turn the adjusting screw counterclockwise.
3. Tighten the hex nut (key 67).

CSB600 Series with Slam Shut

When adjusting the primary regulator and slam shut for operation, reference Tables 8a, 8b, 8c and 8d for the OPSO setpoints and also the combined OPSO and UPSO setpoints of the slam shut for the given regulator spring ranges.

Resetting Type VSX8 Slam Shut after Overpressure/Underpressure

CAUTION

Internal regulator parts and installed downstream equipment can be damaged if the following procedure in resetting the Type VSX8 controller is not followed.

If the regulator is exposed to an overpressure condition, it should be tested for lockup or shut-off after resetting the slam shut to verify the regulator is not damaged. 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.

1. Slowly pull the reset button (refer to Type VSX8 Instruction Manual, D103127X012) away from the controller. This slow movement allows for a slow bleed of the pressure across the controller's disk and seat area. The operator should be able to hear the pressure bleeding through the system.
2. When the pressure has equalized and the air bleeding sound has dissipated, the reset button (refer to Type VSX8 Instruction Manual D103127X012) should be pulled completely away from the controller by hand until the internal shut-off mechanism has been re-latched.
3. Once the operator feels the click of the re-latch occurring, the reset button (refer to Type VSX8 Instruction Manual D103127X012) should be pushed completely back into its original position.
4. It is recommended to test the regulator for lock up or shut-off after resetting the slam-shut

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.

CSB600 Series

1. Slowly close the upstream shut-off valve.
2. Open vent valves downstream of the regulator.
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.

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” section.

Regulators that have been disassembled for repair must be tested for proper operation before being returned to service. Only parts manufactured by Emerson 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 or the requirement of local, state and federal rules and regulations.

In accordance with applicable National or Industry codes, standards and regulations/recommendations, all hazards covered by specific tests after final assembling before applying the CE marking, shall be covered also 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 CSB600 Series that include the slam-shut overpressure protection module to ensure protection of the downstream system in the event the primary regulator loses pressure control. This inspection must test that the slam-shut functions as intended.

Main Diaphragm Maintenance



CAUTION

For version with token relief, measure the distance before disassembly and note for reassembly (see Figure 10). Failure to follow the instructions regarding measurement could impact the token relief's setpoint.

Perform the following steps to disassemble, inspect and replace the main diaphragm.

1. Remove the closing cap (key 60, Figure 12) or loosen hex locknut (key 67). Turn the adjusting screw (key 65) or adjusting bolt (key 64) counterclockwise to ease spring (key 38) compression.

Note

When disassembling a CSB600 Series regulator, support the adjusting screw (key 65) to prevent damage or contamination due to falling.

2. Remove the adjusting screw (key 65) or the adjusting bolt (key 64), the bonnet (key 61), upper spring seat (key 63) and sealing washer (key 113). Check the sealing washer and replace if damaged. Remove the spring (key 38).
3. Remove hex nuts (key 16, Figure 7 or 8) and bolts (key 15). Separate the upper spring case (key 1) from the lower casing assembly (key 9).

Note

When disassembling a CSB600 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, Figure 10) and attached parts away from the body (key 70) to unhook the pusher post (key 50) from the lever (key 10). Lift out the diaphragm assembly and the attached parts such as pusher post and relief valve seat (key 51).
- 5a. For non-relieving units such as Types CSB600IN and CSB600EN, see Figure 10 – Non-relief Assembly. Remove the screw (key 45) and nut (key 40) to separate relief valve spring seat (key 43), diaphragm assembly (key 55) and pusher post (key 50). Check the diaphragm (key 55A) for damage and replace if necessary.

- 5b. For units with token relief such as Types CSB600IT and CSB600ET, see Figure 10 – Token Relief Assembly. Remove token relief nut (key 46), spring retainer (key 42), relief spring (key 41), nut (key 40) and relief valve spring seat (key 43). Remove the stem (key 44) to separate diaphragm assembly (key 55) and pusher post (key 50). Check the diaphragm (key 55A) for damage and replace if necessary.

Note

The diaphragm assembly (key 55) and the upper spring case and lower casing must be reassembled in a level, horizontal orientation to ensure the relief stem is centered in the upper spring case during use.

6. Reassemble the diaphragm assembly (key 55) unit in the reverse order of the above steps. Assembly torques for the diaphragm assembly are provided in Figure 10. Before tightening the screw (key 45, for non-relief) or the stem (key 44, for token relief) into the pusher post (key 50), place the loosely-assembled diaphragm assembly (key 55) into position in the lower casing (key 9, Figure 7 or 8), making sure that the pusher post is hooked on the lever (key 10, Figure 7 or 8). Rotate the diaphragm so that the diaphragm and lower casing holes are aligned. Tighten the stem or screw using the proper torque values (see Figure 10).
 7. Reassemble the remaining parts by following steps 1 to 3 in reverse order. Tighten the hex nuts (key 16) and bolts (key 15) in a criss-cross pattern and tighten to the proper torque value (see Figure 7 or 8).
- replacing the disk by disassembling the balanced port assembly. Remove the four cap screws (key 36R) and then the retainer plate (key 36S).
 5. Grasp the spring retainer (key 36B) and slide the housing (key 36F) away to expose the diaphragm (key 36E) and disk (key 36J). Still grasping the spring retainer insert a 5 mm / 0.20 in. Allen wrench into the disk screw (key 36D) and unscrew.
 6. Remove the disk (key 36J), discard and replace if damaged. Slide the diaphragm O-ring (key 36N) off the stem (key 36A) along with the diaphragm (key 36E). 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 diaphragm retainer (key 36H).
 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-rings (keys 36N and 36P), stem (key 36A) and the center bore of the brass cap (key 36G). Assemble with proper torques provided in Figure 9.
 8. Examine the seating edge of the orifice (key 25, Figure 7 or 8). If it is nicked or rough, replace the orifice and O-ring (key 82). The orifice installation torque range is provided in Figure 7 or 8. If a slam shut is installed on the backside of the body, refer to Type VSX8 Instruction Manual for inspection and removal of the overpressure protection orifice (key 26, see Figure 13) and O-ring (key 27).
 9. Reassemble the regulator in reverse order of the above steps. Tighten the bolts (key 71) using the proper torque values (see Figure 7 or 8).

Valve Disk, Balanced Port Assembly Diaphragm and Regulator Orifice Maintenance

Perform the following steps to disassemble, inspect and replace valve disk, balanced port assembly diaphragm and regulator orifice.

1. Remove the bolts (key 71, Figure 7 or 8) which hold the lower spring casing (key 9) to the body (key 70). Separate the lower spring casing from the body.
2. Check the body O-ring (key 19 or 21) for wear and replace if damaged.
3. Remove the balanced port assembly (key 36, Figure 7 or 8) from the body (key 70).
4. Examine the disk (key 36J, Figure 9) for nicks, cuts and other damage. If damage is present, replace disk and the balanced port diaphragm (key 36E) and associated diaphragm O-ring (key 36N) that comes into direct contact with the inner flange of the balanced port diaphragm. Start the process of

Regulator Reassembly

As indicated by the square callouts in Figures 7 to 13, it is recommended that a good quality pipe thread sealant be applied to pressure connections and fittings and a good quality low temperature lubricant be applied to O-rings. Also apply an anti-seize compound to the adjusting screw threads and other noted areas as needed. Tighten bolts, screws and stem using proper torque (see Figures 7 to 12).

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.

CSB600 Series

Parts List

Key	Description	Part Number	Key	Description	Part Number
1	Spring Case, Aluminum For Types CSB600 and CSB620 For Type CSB650	GE26100X012 ERSA01009A0	36J	Disk, Nitrile (NBR)	GE27088X012
4	Stabilizer Guide, Stainless steel For Types CSB600 and CSB620 only	GE27061X012	36K	Disk Retainer, Brass	GE27089X012
5	Stabilizer, Lustran® 648 For Types CSB600 and CSB620 only	GE27063X012	36L*	O-ring, Nitrile (NBR)	GE32673X012
6	Spring, Stainless steel For Types CSB600 and CSB620 only	GE35010X012	36M*	O-ring, Nitrile (NBR)	GE32674X012
7	Retaining Ring, Zinc-plated carbon steel For Types CSB600 and CSB620 only	GE27024X012	36N*	O-ring, Nitrile (NBR)	GE29751X012
8	Stabilizer Screw, Zinc-plated steel (3 required) For Types CSB600 and CSB620 only	GE29724X012	36P*	O-ring, Nitrile (NBR)	GE32676X012
9	Lower Casing, Aluminum For Types CSB600 and CSB620 For Type CSB650	GE26103X012 ERSA01010A0	36R	Screw, Zinc-plated steel (4 required)	GE34243X012
10	Lever, BP, Steel For all types except Types CSB650 and CSB654 (Lever Ratio 2:1) For Type CSB650/CSB654 (Lever Ratio 1:1)	GE27409X012 ERSA01012A0	36S	Retainer Plate	GE27253X012
11	Stem, BP, Aluminum For all types except Types CSB650 and CSB654 For Type CSB650/CSB654	GE27485X012 ERSA01025A0	38	Spring, Music wire 9 to 14 mbar / 3.6 to 5.6 in. w.c., Silver 13 to 24 mbar / 5.2 to 9.6 in. w.c., Red 22 to 39 mbar / 8.8 to 15.7 in. w.c., Black Stripe 32 to 50 mbar / 12.8 to 20.1 in. w.c., Purple 42 to 70 mbar / 16.9 to 28.1 in. w.c., White Stripe 61 to 110 mbar / 0.9 to 1.6 psig, Dark Green 105 to 220 mbar / 1.5 to 3.2 psig, Blue 210 to 380 mbar / 3.1 to 5.5 psig, Black 320 to 570 mbar / 4.6 to 8.3 psig, Red with White Stripe 510 to 780 mbar / 7.4 to 11.3 psig, Blue with White Stripe 270 to 325 mbar / 3.9 to 4.7 psig, Black with White Stripe 0.7 to 1.19 bar / 10.2 to 17.3 psig, Purple Stripe 1.05 to 2.7 bar / 15.2 to 39.2 psig, Brown 2.3 to 3.25 bar / 33.4 to 47.1 psig, Grey with Red Stripe 3.1 to 4.0 bar / 45 to 58 psig, Grey with Orange Stripe	GE30336X012 ERSA01138A0 GE30338X012 GE30339X012 GE30340X012 ERSA03656A0 ERSA03657A0 GG06247X012 ERSA01582A0 ERSA05055A0 ERAA11747A0 GE30345X012 GE30346X012 ERSA01125A0 ERSA01126A0
13	Lever Pin, Carbon steel	GE29701X012	40	Relief Valve Seat Nut Zinc-plated steel	GE46959X012
14	Lever Screw, Plated Carbon steel (2 required)	GE30039X012	41	Token Relief Spring, stainless steel Type CSB600/CSB600F/CSB604/CSB604F Type CSB620/CSB624/CSB620F/CSB624F Type CSB650/CSB654	GG06009X012 ERAA17935A0 ERSA01128A0
15	Bolt, Steel (8 required)	GE29974X012	42	Spring Retainer, (for token relief) Zinc-plated steel For Types CSB600 and CSB620 For Type CSB650	GE46956X012 GG06010X012 GG06011X012
16	Nut, Steel (6 required for For Type CSB600 and CSB620, 8 required for Type CSB650)	ERAA21202A0	43	Spring Seat, Zinc-plated steel	GG06011X012
17	Union Ring, Aluminum	GE26416X012	44	Stem, Zinc-plated steel (with token relief)	ERAA00767A0
18	Snap Ring, Zinc-plated steel	GE27018X012	45	Screw, Zinc-plated steel (without token relief)	ERSA01141A0
19*	O-ring, Nitrile (NBR)	GE29755X012	46	Token Relief Nut (1 required), Steel	ERAA21202A0
20	Stem Guide, Aluminum For low and medium pressure only	GE26107X012	50	Pusher Post, Aluminum For Types CSB600 and CSB620 For Type CSB650	GE27405X012 ERSA01139A0
21*	O-ring, Nitrile (NBR) For low and medium pressure only	GE29754X012	51	Relief Valve Seat For all types except Type CSB620/624 (510 to 780 mbar / 7.4 to 11.3 psig), Aluminum For Type CSB620/624 (510 to 780 mbar / 7.4 to 11.3 psig)	GE46957X012 ERAA33372A0
25*	Orifice, Aluminum, 25 mm / 1.0 in.	GE32084X012	52*	Pusher Post O-ring, Nitrile (NBR)	GE47389X012
26*	Orifice, Aluminum (with slam-shut module) 25 mm / 1.0 in.	GE32066X012	53	Pin, Stainless steel	GE29761X012
27*	O-ring, Nitrile (NBR) (with slam-shut module)	GE32723X012	54	Roller Pin, Brass	GE27060X012
36*	Balanced Port Assembly Type CSB600/CSB604/CSB600F/CSB604F With External Registration Type CSB620/CSB624/CSB620F/ CSB624F/CSB650/CSB654 With External Registration	GG04072X012 ERSA01428A0	55*	Diaphragm Assembly For Types CSB600 and CSB620 (9 to 570 mbar / 3.6 in. w.c. to 8.3 psig) For Types CSB620 (510 to 780 mbar / 7.4 to 11.3 psig) For Type CSB650	GE30529X012 ERAA33533A0 ERSA01024A0
36A	Stem, Stainless steel	GE27012X012			
36B	Retainer, Spring, Zinc-plated steel	GG01431X012			
36C	Spring, Stainless steel Type CSB600/CSB604/CSB600F/CSB604F Type CSB620/CSB624/CSB620F/ CSB624F/CSB650/CSB654	GE27014X012 ERSA00987A0			
36D	Screw, Alloy steel	GE27015X012			
36E	Diaphragm, Nitrile Rubber (NBR) with Polyester Fabric	GG06241X012			
36F	Housing, Zinc-plated steel With External Registration	GG05165X012			
36G	Cap, Brass	GE27086X012			
36H	Retainer Diaphragm, Zinc-plated steel	GG05836X012			

*Recommended spare part.
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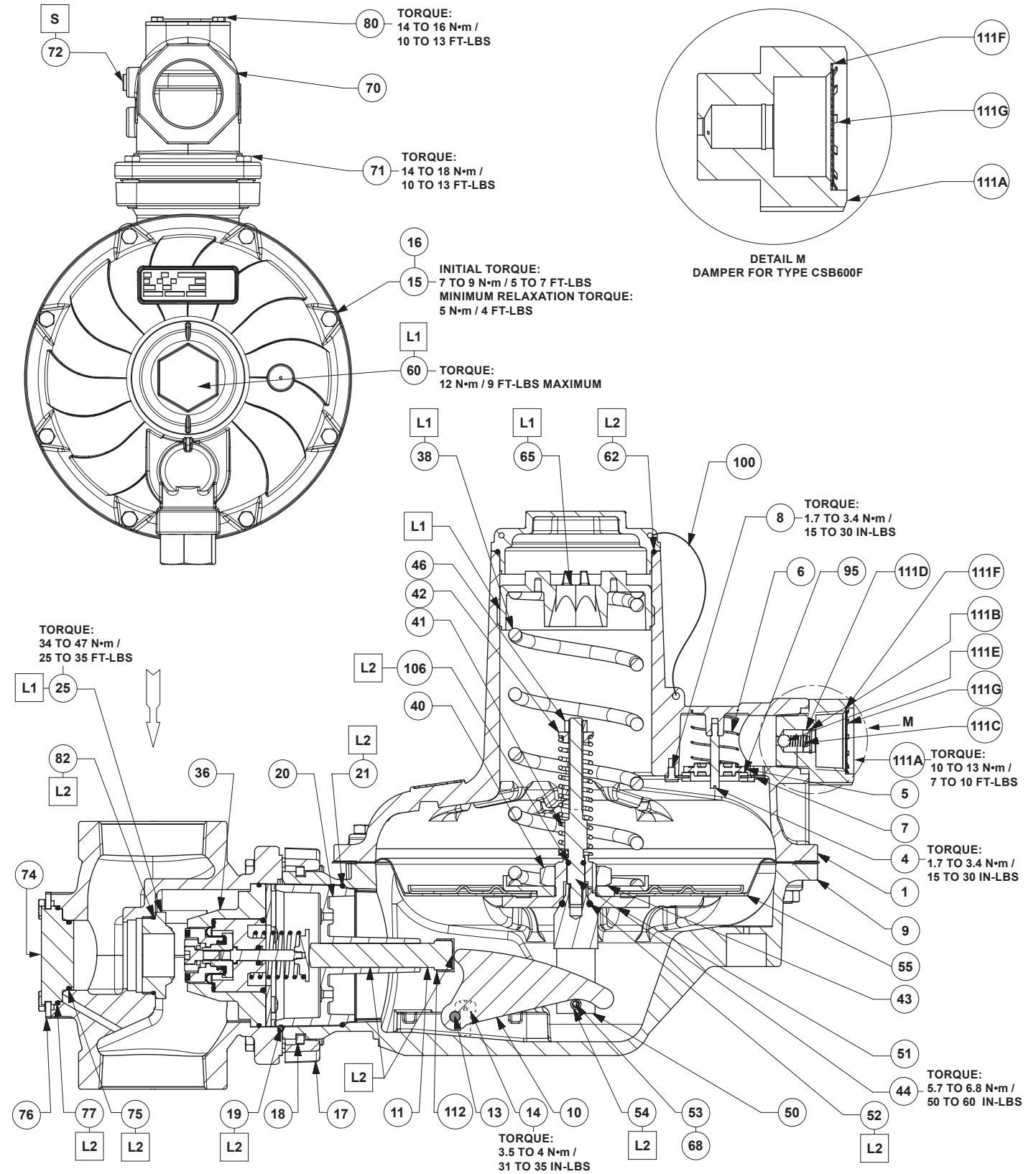
CSB600 Series

Key	Description	Part Number	Key	Description	Part Number
60	Closing Cap, Aluminum All types except Types CSB650 and CSB654	GE26109X012	75*	O-ring, Nitrile (NBR)	GF03442X012
61	Bonnet, Zinc-plated steel For Types CSB650 and CSB654 only	GE26812X012	76	Snap Ring Flange, Steel (2 required)	GF01942X012
62*	O-ring, Nitrile (NBR)	GE29750X012	77*	O-ring, Nitrile (NBR)	GF03443X012
63	Upper Spring Seat, Zinc-plated Carbon steel For Types CSB650 and CSB654 only	GE26809X012	80	Screw, Steel (4 required)	GE38176X012
64	Adjusting Bolt, Steel For Types CSB650 and CSB654 only 0.7 to 2.7 bar / 10.2 to 39.2 psig 2.3 to 4.0 bar / 33.4 to 58.0 psig	ERSA01362A0 GE27026X012	82*	O-ring, Nitrile (NBR)	GE30397X012
65*	Adjusting Screw, Aluminum All types except Types CSB650 and CSB654	GE26108X012	90	Nameplate	-----
66	Ball, 440C Stainless steel For Types CSB650 and CSB654 only	GE33131X012	91	Warning Label	-----
67	Hex Nut, Steel For Types CSB650 and CSB654 only	GE49038X012	93	Label	-----
68	Retaining Ring, Steel	GE33772X012	94	Overlay Label	-----
70	Body Ductile Iron NPT 1-1/4 x 1-1/4 1-1/2 x 1-1/2 2 x 2 ISO Rp 1-1/4 x 1-1/4 Rp 1-1/2 x 1-1/2 Rp 2 x 2 Flange DN 50 / NPS 2, CL125 FF / CL150 FF ⁽¹⁾ DN 50 / NPS 2, CL125 FF / CL150 FF ⁽²⁾ DN 50 / NPS 2, CL125 FF / CL150 FF ⁽³⁾ DN 50 / NPS 2, CL150 RF DN 50 / NPS 2, PN 16/10 ⁽¹⁾ DN 50 / NPS 2, PN 16/10 ⁽²⁾ DN 32 / NPS 1-1/4, PN 16 Slip-on ⁽⁴⁾ DN 40 / NPS 1-1/2, PN 16 Slip-on ⁽⁵⁾ Steel NPT 1-1/4 x 1-1/4 1-1/2 x 1-1/2 2 x 2 ISO Rp 1-1/4 x 1-1/4 Rp 1-1/2 x 1-1/2 Rp 2 x 2 Flange DN 50 / NPS 2, CL150 RF ⁽²⁾ DN 50 / NPS 2, PN 10/16 ⁽²⁾	GE26306X012 ERAA02453A1 ERAA02437A1 GE26310X012 ERAA03878A1 ERAA02715A1 GE48292X012 ERAA02711A1 ERAA02718A1 ERAA02720A1 GE48296X012 ERAA02719A1 GE26310X012 ERAA03878A1 GE26306X022 ERAA02453A2 ERAA02437A2 GE26310X022 ERAA03878A2 ERAA02715A2 ERAA02720A2 ERAA02719A2	95	Grommet, Nitrile (NBR) For Types CSB600 and CSB620 only	GE35358X012
71	Bolt, Steel (4 required)	GE29974X012	96	Rubber Washer, Nitrile (NBR) For Type CSB650 only	ERSA01501A0
72	Pipe Plug (not shown), 1/4 NPT Plated Alloy steel Stainless steel	1C333528992 1C3335X0012	100	Lockwire	-----
74	Blanking Plug, Aluminum (without slam-shut module)	GE31255X012	101	Hub (not shown), Zinc-plated steel (2 required) DN 32 / NPS 1-1/4, PN 16-slip-on ⁽⁴⁾ DN 40 / NPS 1-1/2, PN 16-slip-on ⁽⁵⁾	GG05939X012 GG05925X012
			102	Slip-on Flange (not shown), Steel (2 required) DN 32 / NPS 1-1/4, PN 16-slip-on ⁽⁴⁾ DN 40 / NPS 1-1/2, PN 16-slip-on ⁽⁵⁾	M0240950X12 M0244690X12
			103*	O-ring (not shown), Nitrile (NBR) (2 required) DN 32 / NPS 1-1/4, PN 16-slip-on ⁽⁴⁾ DN 40 / NPS 1-1/2, PN 16-slip-on ⁽⁵⁾	GG05940X012 GE41121X012
			104	Spacer, DN 50 / NPS 2, PN 10/16 with Spacer, Carbon Steel-plated ⁽⁴⁾	ERSA00992A0
			105	Restriction Plate, Stainless steel For Type CSB650 only	GG06008X012
			106*	Diaphragm Stem O-ring, Nitrile (NBR) For types with token relief only	GE49041X012
			111	Damper Assembly (no damper on Type CSB600F/604F) For Type CSB600/604/620/624/620F/624F For Type CSB650/654	GG06048X012 GG06058X012
			111A	Connector, Zinc-plated steel For Type CSB600/604/620/624 For Type CSB650/654	ERAA21077A0 ERAA21078A0
			111B	Retainer Ring (not on Type CSB600F/604F external registration)	GG06054X012
			111C	Spring, Stainless steel (not on CSB600F/604F)	GG06055X012
			111D	Spring Retainer, Zinc-plated steel (not on Type CSB600F/604F external registration)	GG06056X012
			111E	Plastics Ball (not on Type CSB600F/604F external registration)	GG06057X012
			111F	Vent screen	T1121338982
			111G	Retaining Ring	T1120925072
			112	Stem Cap	ERAA18503A0
			113*	Sealing Washer, For Type 650/654 only	11A9681X012
			114	Elbow (For Type CSB650/654 only)	ERAA21079A0
			115	Thrust Washer, For Type CSB620/624/620F/624F only	GE47292X012
			116	Drive Screw	ERAA01884A0
			117	Diaphragm Plate (for Type CSB620/624, 510 to 780 mbar / 7.4 to 11.3 psig only)	ERAA33373A0

* Recommended spare part.

1. 191 mm / 7.5 in. face-to-face dimension.
2. 254 mm / 10 in. face-to-face dimension.
3. 267 mm / 10.5 in. face-to-face dimension.
4. 200 mm / 7.87 in. face-to-face dimension.
5. 222 mm / 8.74 in. face-to-face dimension.

CSB600 Series



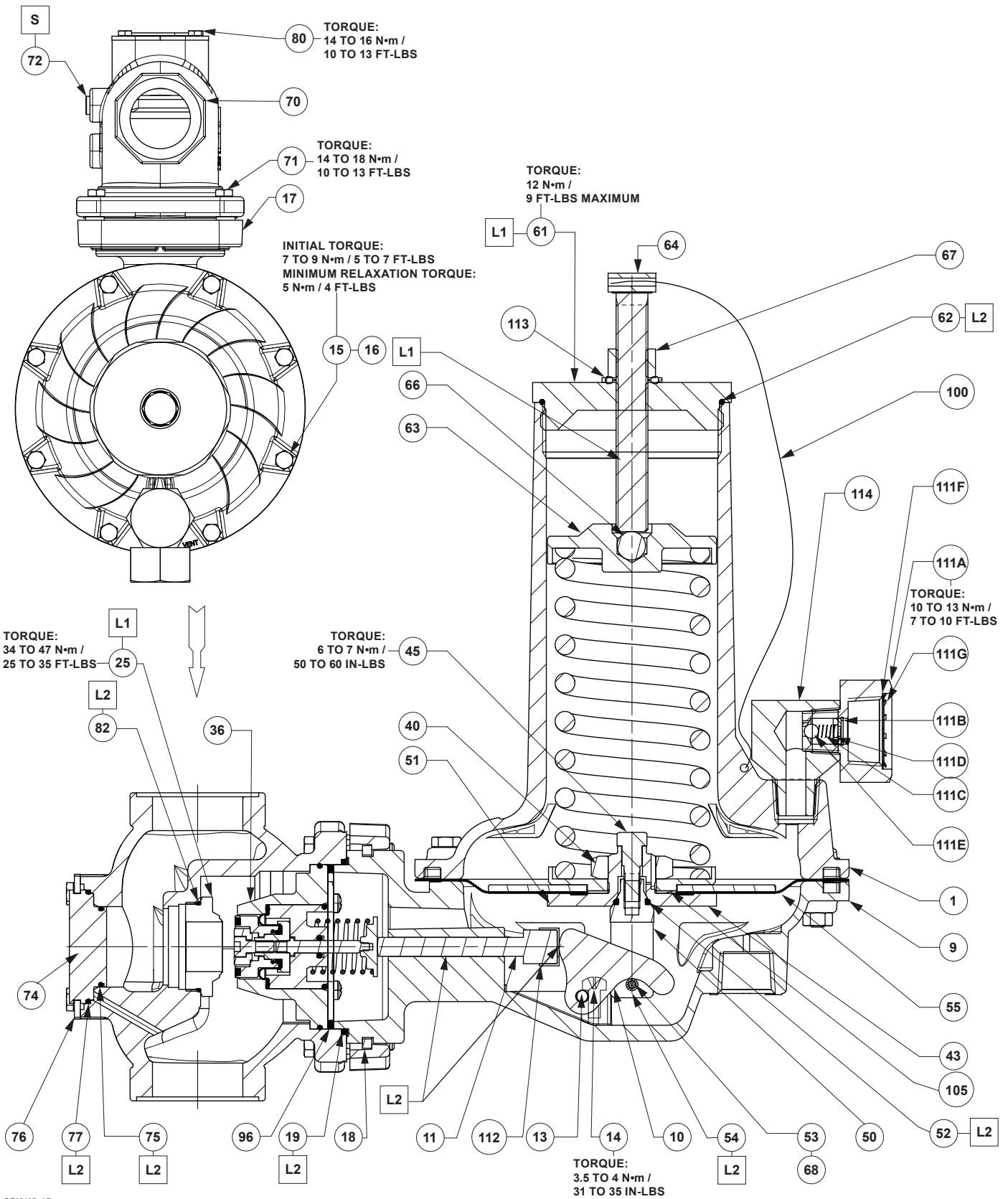
GE32407_AR

APPLY LUBRICANT (L) AND SEALANT (S):⁽¹⁾
S = MULTI-PURPOSE PTFE THREAD SEALANT
L1 = ANTI-SEIZE LUBRICANT

L2 = EXTREME LOW-TEMPERATURE BEARING GREASE⁽²⁾

1. Lubricants and sealant must be selected such that they meet the temperature requirements.
2. No lubricant between main stem and stem guide for LP under 30 mbar / 0.44 psig.

Figure 7. CSB600 and CSB620 Series Regulator Assembly



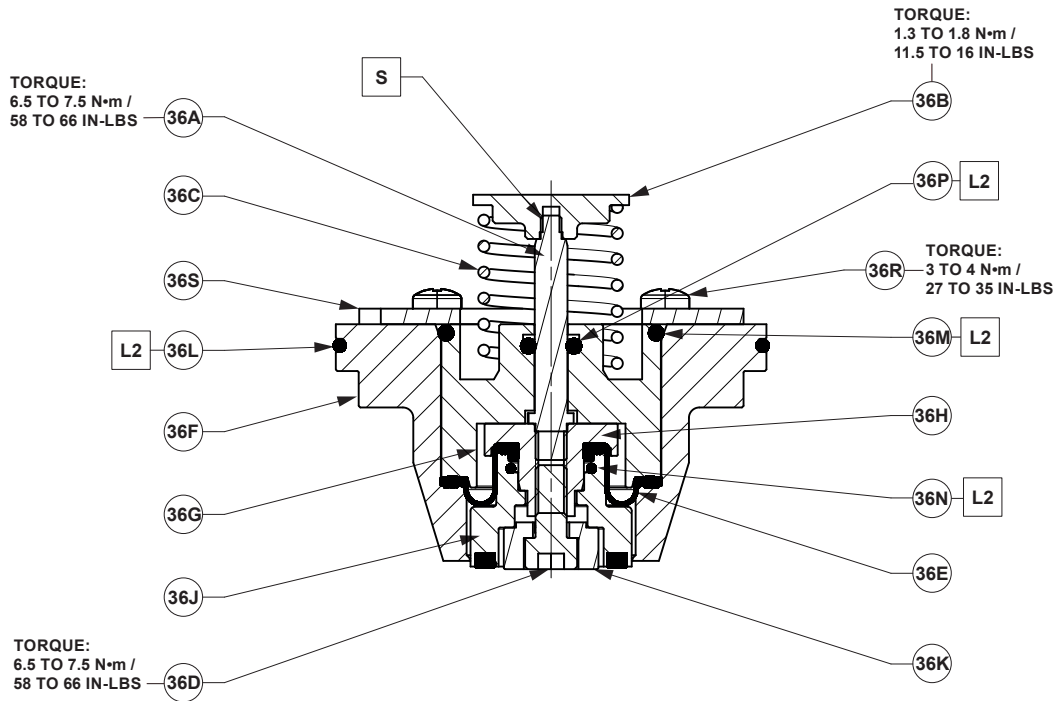
GE32407_AR

- APPLY LUBRICANT (L) AND SEALANT (S)⁽¹⁾:
- S = MULTI-PURPOSE PTFE THREAD SEALANT
- L1 = ANTI-SEIZE LUBRICANT
- L2 = EXTREME LOW-TEMPERATURE BEARING GREASE

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

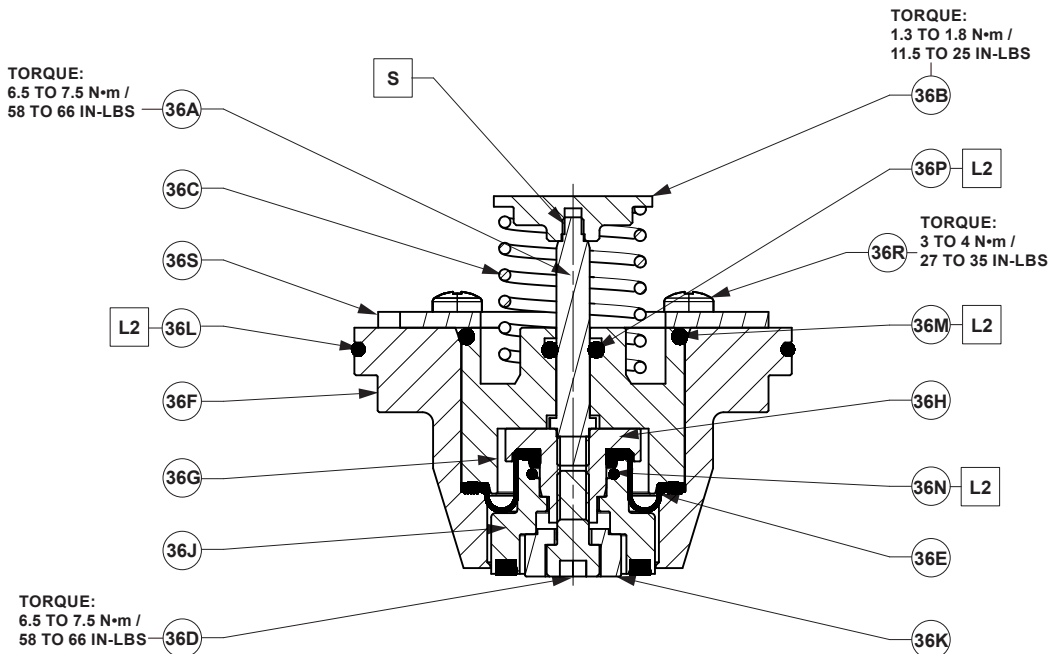
Figure 8. CSB650 Series Regulator Assembly

CSB600 Series



GG04072_ED

BALANCED PORT ASSEMBLY FOR TYPE CSB600/CSB604/CSB600F/CSB604F



ERSA01428_DD

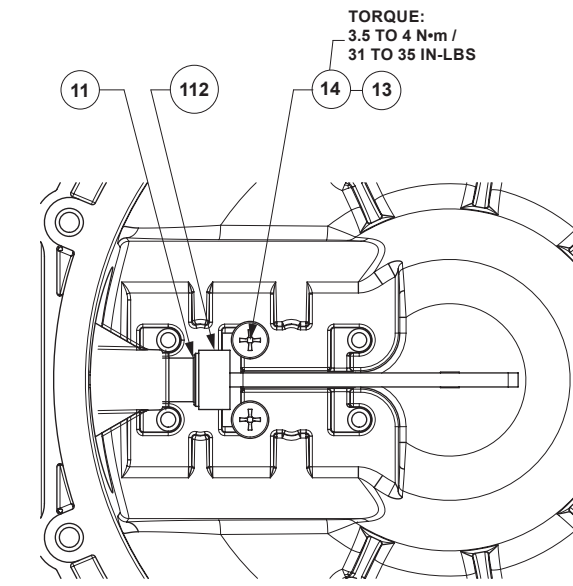
BALANCED PORT ASSEMBLY FOR TYPE CSB620/CSB624/CSB620F/CSB624F/CSB650/CSB654

- APPLY LUBRICANT (L) OR SEALANT (S)⁽¹⁾:
- L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
- S = PERMANENT HIGH-STRENGTH THREADLOCKER

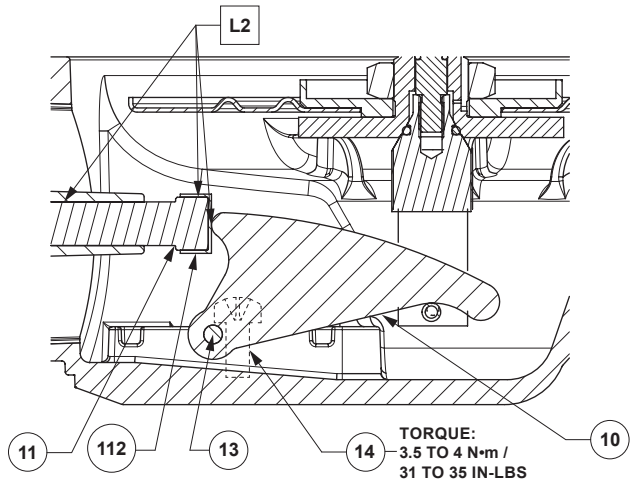
1. Lubricants and sealants must be selected such that they meet the temperature requirements.

Figure 9. CSB600 Series Balanced Port Assembly

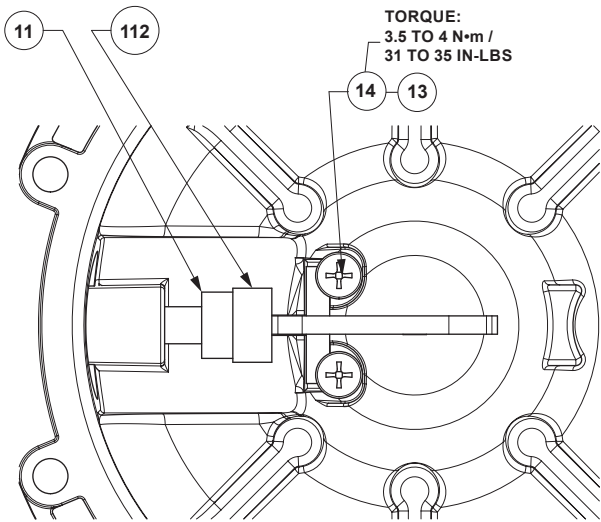
CSB600 Series



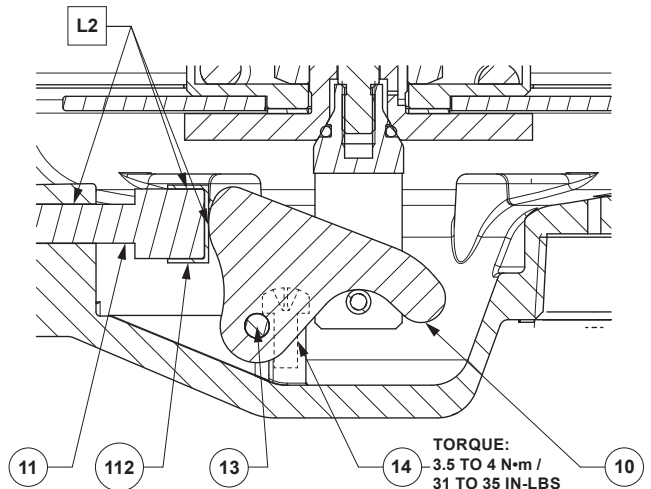
TYPE CSB600/CSB600F/CSB620/CSB620F
LEVER 2:1 'B' POSITION



TYPE CSB600/CSB600F/CSB620/CSB620F
LEVER 2:1 'B' POSITION



TYPE CSB650
LEVER 1:1



TYPE CSB650
LEVER 1:1

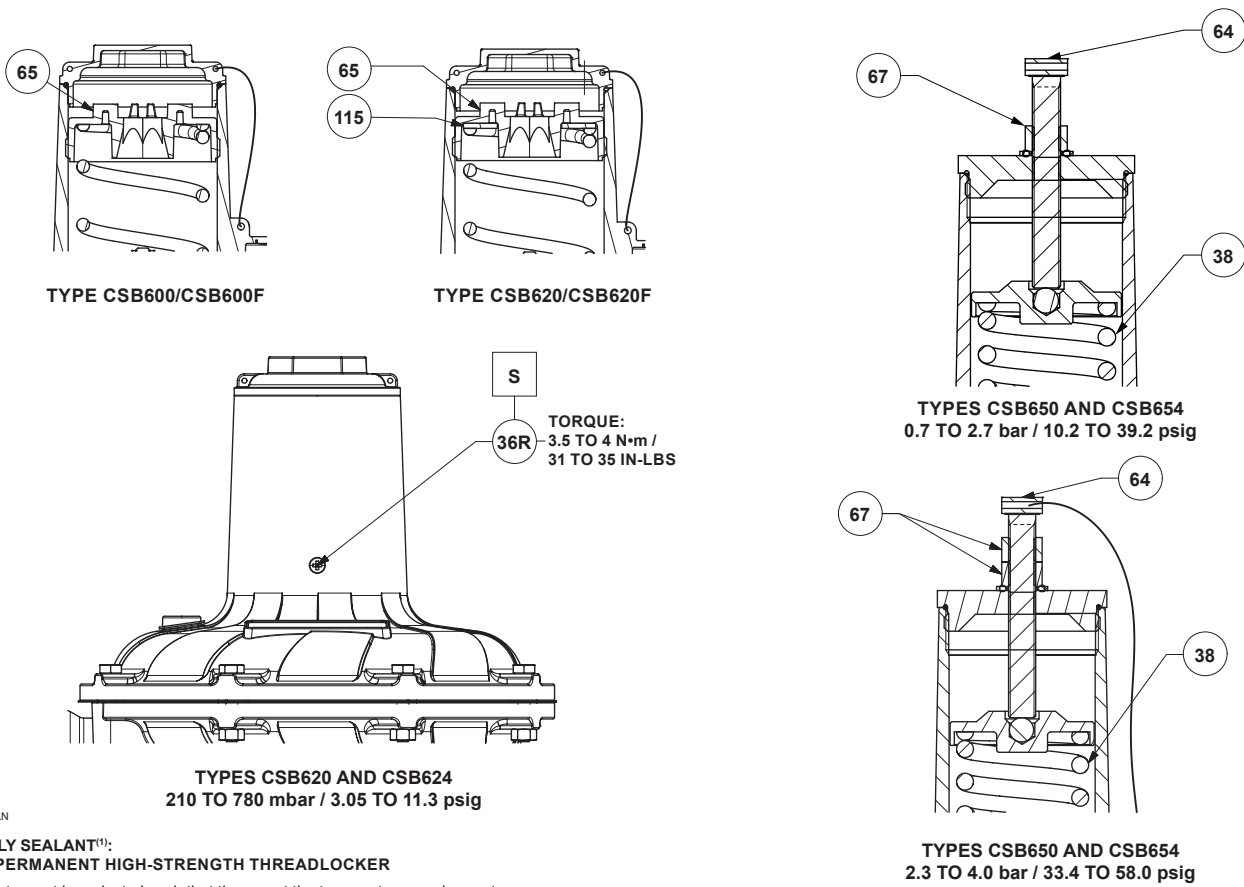
GE32407_AN

APPLY LUBRICANT⁽¹⁾:

L2 = EXTREME LOW-TEMPERATURE BEARING GREASE

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

Figure 11. Lever Positions and Stem Configurations



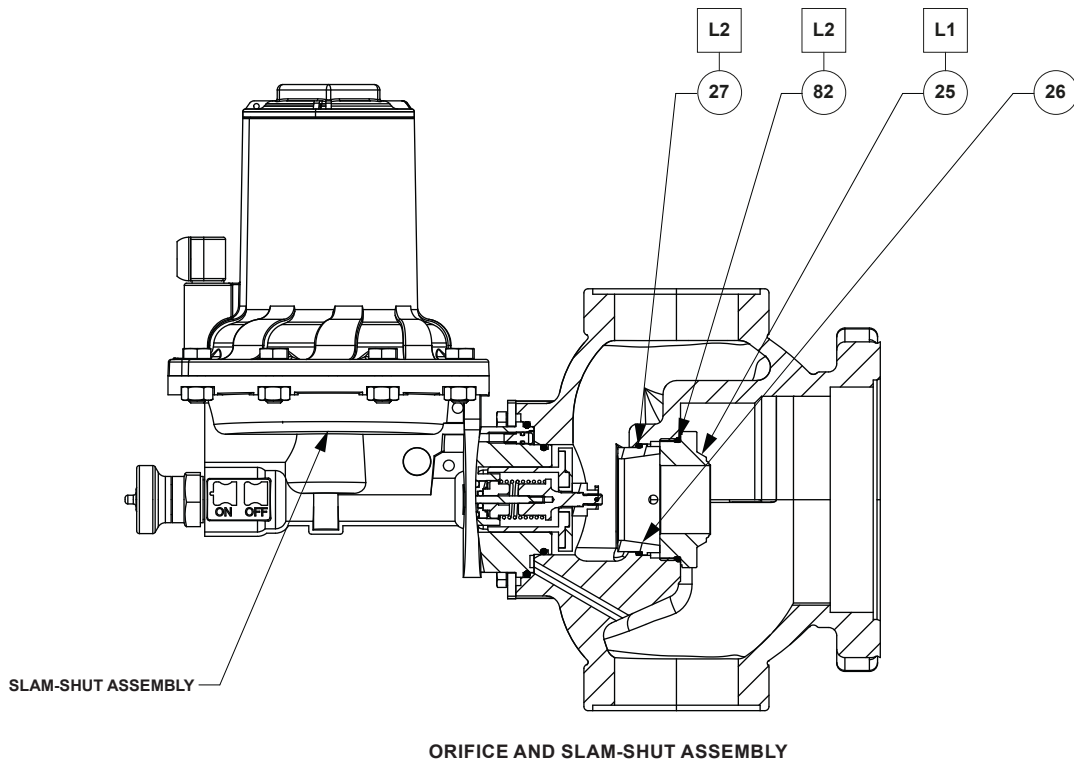
GE32407_AN

APPLY SEALANT⁽¹⁾:

S = PERMANENT HIGH-STRENGTH THREADLOCKER

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

Figure 12. CSB600 Series Control Spring Adjustment Assemblies



GE32407_AE

APPLY LUBRICANT⁽¹⁾:

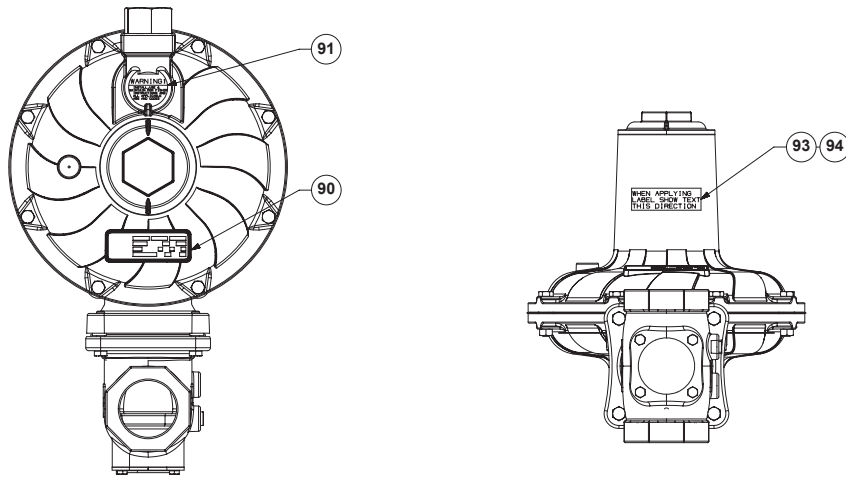
L1 = ANTI-SEIZE LUBRICANT

L2 = EXTREME LOW-TEMPERATURE BEARING GREASE

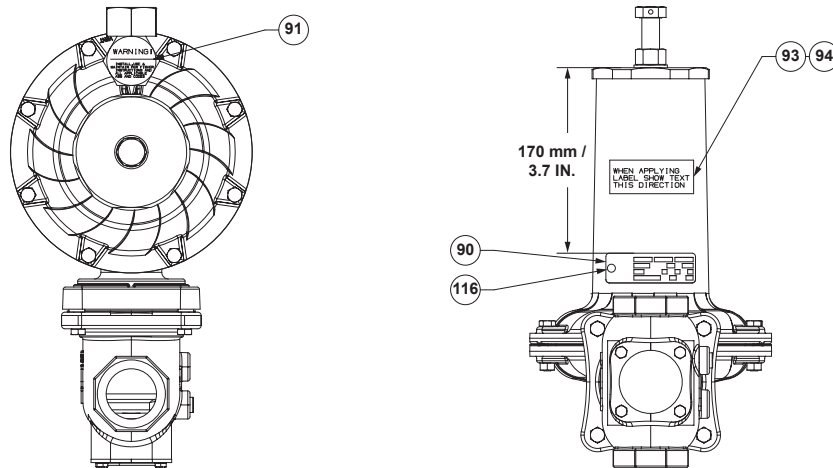
1. Lubricants must be selected such that they meet the temperature requirements.

Figure 13. CSB600 Series Slam-Shut Modules

CSB600 Series



TYPES CSB600 AND CSB620 - LOW AND MEDIUM PRESSURE ASSEMBLY



TYPE CSB650 - HIGH PRESSURE ASSEMBLY

Figure 14. CSB600 Series Nameplate and Label

GE32407_AN

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