VS100 Series Slam-Shut Device

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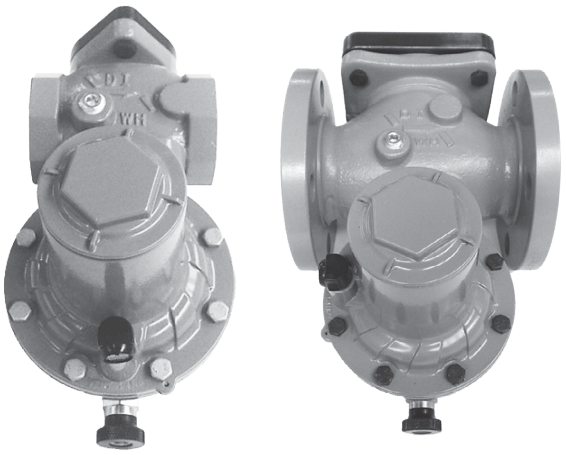


Figure 1. *VS100 Series Slam-Shut Device*

⚠ 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™ slam-shut device 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.

Only a qualified person must install or service the VS100 Series slam-shut device. If a leak develops or if the slam-shut device continually vents gas, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Installation, operation and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operations which may result in equipment damage or personal injury.

Introduction

Scope of the Manual

This Instruction Manual provides installation, maintenance and parts ordering information for the VS100 Series slam-shut device. Refer to VSX4 and VSX8 Series Controller Instruction Manual, Form 5867 included with the VS100 Series for additional VSX4 and VSX8 Series information. Instructions for other equipment used with the VS100 Series can be found in separate Instruction Manuals.

Product Description

The VS100 Series slam-shut device is designed to shut off the flow of gas to the downstream system in the event of outlet pressure rising above or falling below the predefined levels.

The VS100 Series consists of the following:

- A body with a removable orifice, enclosed by a bonnet.
- A VSX4 or VSX8 Series controller.

Specifications

The Specifications section lists the specifications for the VS100 Series slam-shut device. The following information is stamped on the label of VS100 Series: Type and Class, Maximum Outlet Pressure and Spring Range. Additional operating information is located on the slam-shut device label.

Available Configurations[5]
See Table 4

Connections
Slam-Shut Vent: 1/4 NPT
External Sensing Line: 1/4 NPT

Body Material
Ductile Iron (GS)
Steel (WCC)

Body Sizes and End Connection Styles
See Table 8

Maximum Emergency Inlet Pressure (PS)[1][2][3][4]
20.0 bar / 290 psig

Maximum Operating Inlet Pressure (Pu_{max})[1][2][3][4]
16.0 bar / 232 psig

Operating Temperature (TS)[1]
PED: -20 to 66°C / -4 to 150°F
Non-PED: -30 to 66°C / -20 to 150°F

Response Time (ta)
< 1 second

Functional Class
A: OPSO and UPSO
B: OPSO only

CE Marking
0062

European EN Reference Standard
EN 14382

Orifice Diameter
Medium Capacity Body (MC): 19 mm / 0.75 in.
High Capacity Body (HC): 30 mm / 1.18 in.

Valve Plug Size
Medium Capacity Body (MC) Ø: 24 mm / 0.94 in.
High Capacity Body (HC) Ø: 39 mm / 1.53 in.

Position Indicator
Extended stem visible in center of reset button refer to VSX4 and VSX8 Series controller Instruction Manual

Resetting Trip Mechanism
Manually after fault rectification

Casing Material
Aluminum

Pressure Detection
External

Approximate Shipping Weights
See Table 8

Flow Coefficient and Power Loss

Symbols

Q = Natural gas flow rate in Nm^3/h
P_u = Absolute inlet pressure in bar
C_g = Flow rate coefficient
C_1 = Body shape factor

Flow Coefficients

TYPE	ORIFICE		BODY	C_g
	mm	In.		
VS110 (VSX4)	19	0.75	1 NPT	306
			1-1/4 NPT	307
			1-1/2 NPT	321
VS120 (VSX8)	30	1.18	1-1/4 NPT	789
			1-1/2 NPT	840
			2 NPT	856
			NPS 2 Flanged	881

Pressure Drop

$$\Delta P = \frac{P_u - \sqrt{P_u^2 - 4\left(\frac{Q}{1.05 \times C_g}\right)^2}}{2}$$

Option

Wire Seal: The VS100 Series can be ordered with an optional tamper-proof lock wire to preclude unauthorized access to the adjustment springs.

Reed Switch: An optional remote notification switch can be installed offering the capability to remotely notify the operator should VS100 Series shut off occur. Refer to VSX4/8 Instruction Manual, D103127X012 for more information.

1. The pressure/temperature limits in this Instruction Manual or any applicable standard limitation should not be exceeded.
2. EN334 Integral Strength (IS) 6 bar / 87 psig. Used where inlet rating must equal outlet rating per code.
3. EN334 Differential Strength (DS) 16 bar / 232 psig. Used where DS ratings required per code.
4. EN334 Specific Maximum Allowable Pressure (PS_d) 6 bar / 87 psig. Used where PS_d ratings are required per code.
5. Product has passed Emerson testing for shutoff and trip function at -40°F/°C.

Table 1. *PED Information*

TYPE	DESCRIPTION	PED DIRECTORY	FLUID GROUP
VS100	Regulator body with VSX4 or VSX8 Series controller	IV	Groups 1 and 2 according to 2014/68/EU, 1st and 2nd family gas according to EN 437 or other gases (compressed air and nitrogen). The gas must be non-corrosive,clean (filtration on inlet side necessary) and dry.

Table 2. *Directive ATEX Information*

TYPE	CLASSIFICATION	ATEX ASSEMBLIES	ATEX LABELLING
VSX4 or VSX8	Non-electrical equipment	Not falling under the 2014/34/EU Directive	No
VSX8 with reed contact	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 2014/34/EU Directive	CE Ex II 2 G T

Table 3. *Accuracy According to EN 14382 - VS100 Series*

ACCURACY GROUP (AG)	P_d < 35 mbar / 0.507 psig	35 mbar ≤ P_d < 60 mbar / 0.507 psig ≤ P_d < 0.87 psig	60 mbar ≤ P_d < 100 mbar / 0.87 psig ≤ P_d < 1.5 psig	P_d ≥ 100 mbar / 1.5 psig
AG_{min}	30	15	10	5
AG_{max}	10	10		
Note: Stable inlet pressure AG_{min} = AG 10 (P_d < 60 mbar / 0.87 psig) and AG 5 (P_d > 60 mbar / 0.87 psig), AG_{max} = AG 5				

Table 4. *VS100 Series Configurations*

TYPE	BODY SIZE	ORIFICE DIAMETER		CONTROLLER	OVERPRESSURE MONITORING RANGE (W_{do})		UNDERPRESSURE MONITORING RANGE (W_{du})	
		mm	In.		mbar	psig	mbar	psig
VS111	Medium Capacity	19	0.75	VSX4L	30 to 1600	0.44 to 23.2	5 to 750	0.07 to 10.9
VS112				VSX4H	1100 to 5500	16.0 to 79.8	500 to 2800	7.25 to 40.6
VS121	High Capacity	30	1.18	VSX8L	30 to 1600	0.44 to 23.2	5 to 750	0.07 to 10.9
VS122				VSX8H	1100 to 5500	16.0 to 79.8	500 to 2800	7.25 to 40.6

Table 5a. *North American Overpressure Shut-off OPSO Ranges Only*

REGULATOR		SLAM SHUT DEVICE				
Type	Typical Setpoint	Type (Maximum Operating Inlet)	Over Pressure Shut-off (OPSO) Set Range	Factory Set OPSO	Spring Part Number	Spring Color
	psig		psig	psig		
VS111 VS121	7 in. w.c.	VSX4L VSX8L (125 psi)	12 to 24 in. w.c.	22 in. w.c.	GF02168X012	Brown
	11 in. w.c.		16 in. w.c. to 1.6 psig	25 in. w.c.	GF02169X012	Red
	14 in. w.c.		24 in. w.c. to 2.8 psig	1.1	GF02170X012	Orange
	1		1.4 to 4.1	2	GF02171X012	Pink
	2		2.0 to 7.3	3.5	GF02172X012	Green
	3		2.0 to 7.3	5	GF02172X012	Green
	5		3.2 to 11.0	7	GF02173X012	Silver
	10		5.8 to 21	12	GF04353X012	Yellow
VS111 VS121	7 in. w.c.	VSX4L VSX8L (232 psi)	12 to 24 in. w.c.	22 in. w.c.	GF02168X012	Brown
	11 in. w.c.		16 in. w.c. to 1.6 psig	25 in. w.c.	GF02169X012	Red
	14 in. w.c.		24 in. w.c. to 2.8 psig	1.1	GF02170X012	Orange
	1		1.4 to 4.1	2	GF02171X012	Pink
	2		2.0 to 7.3	3.5	GF02172X012	Green
	3		2.0 to 7.3	5	GF02172X012	Green
	5		3.2 to 11.0	7	GF02173X012	Silver
	10		5.8 to 21	12	GF04353X012	Yellow
VS112 VS122	15	VSX4H VSX8H (232 psi)	13.1 to 43.5	19	GF02173X012	Silver
	20		13.1 to 43.5	25	GF02173X012	Silver
	30		13.1 to 43.5	35	GF02173X012	Silver
	40		23.2 to 79.8	45	GF04353X012	Yellow

Table 5b. *European Overpressure Shut-off OPSO Ranges Only*

REGULATOR		SLAM SHUT DEVICE				
Type	Typical Setpoint	Type (Maximum Operating Inlet)	Over Pressure Shut-off (OPSO) Set Range	Factory Set OPSO	Spring Part Number	Spring Color
	mbar		mbar	mbar		
VS111 VS121	20	VSX4L VSX8L (8.6 bar)	30 to 60	43	GF02168X012	Brown
	21			43	GF02168X012	Brown
	27			45	GF02168X012	Brown
	30			60	GF02168X012	Brown
	35		40 to 110	70	GF02169X012	Red
	50		60 to 193	120	GF02170X012	Orange
	60			120	GF02170X012	Orange
	75			140	GF02170X012	Orange
VS111 VS121	20	VSX4L VSX8L (16 bar)	30 to 60	55	GF02168X012	Brown
	21			55	GF02168X012	Brown
	27			55	GF02168X012	Brown
	30			60	GF02168X012	Brown
	35		40 to 110	70	GF02169X012	Red
	50		60 to 193	120	GF02170X012	Orange
	60			120	GF02170X012	Orange
	75			140	GF02170X012	Orange
	100		95 to 280	160	GF02171X012	Pink
	150		140 to 500	250	GF02172X012	Green
	160			250	GF02172X012	Green
	200			330	GF02172X012	Green
	300		220 to 760	440	GF02173X012	Silver
	500		400 to 1450	900	GF04353X012	Yellow
	750			1050	GF04353X012	Yellow
	1000			1400	GF04353X012	Yellow
VS112 VS122	1200	VSX4H VSX8H (16 bar)	900 to 3000	1600	GF02173X012	Silver
	1500		1600 to 5500	1900	GF04353X012	Yellow
	2000			2400	GF04353X012	Yellow
	3000			4000	GF04353X012	Yellow
	4000			5000	GF04353X012	Yellow

Table 5c. *North American Overpressure and Underpressure Shut-off OPSO/UPSO Ranges*

REGULATOR		SLAM SHUT DEVICE									
Type	Typical Setpoint	Type (Maximum Operating Inlet)	Under Pressure Shut-off (UPSO) Set Range	Spring Part Number	Spring Color	Over Pressure Shut-off (OPSO) Set Range Over UPSO Setpoint	Spring Part Number	Spring Color	Factory Set UPSO	Factory Set Adjusted OPSO Range	Factory Set OPSO
	psig		psig			psig			psig	psig	psig
VS111 VS121	7 in. w.c.	VSX4L VSX8L (125 psi)	3 to 12 in. w.c.	ERAA05835A0	White	16 to 29 in. w.c.	GF02168X012	Brown	3 in. w.c.	19 in. w.c. to 1.2 psig	22 in. w.c.
	11 in. w.c.		3 to 12 in. w.c.	ERAA05835A0	White	16 to 29 in. w.c.	GF02168X012	Brown	6 in. w.c.	22 in. w.c. to 1.3 psig	25 in. w.c.
	14 in. w.c.		4 in. w.c. to 1.1 psig	T14169T0012	Blue	20 in. w.c. to 1.8 psig	GF02169X012	Red	9 in. w.c.	1.0 to 2.1	1.1
	1		10 in. w.c. to 2.3 psig	T14169T0012	Blue	1.2 to 3.2	GF02169X012	Red	14 in. w.c.	1.7 to 3.7	2
	2		10 in. w.c. to 2.3 psig	T14169T0012	Blue	1.2 to 3.2	GF02170X012	Orange	1	2.2 to 4.2	3.5
	3		1.5 to 7.3	T14170T0012	Silver	2.6 to 5.6	GF02171X012	Pink	2	4.6 to 7.6	5
	5		1.5 to 7.3	FA142869X12	Orange Stripe	2.6 to 5.6	GF02171X012	Pink	3	5.6 to 8.6	7
	10		1.5 to 7.3			3.5 to 8.2	GF02172X012	Green	5	8.5 to 13.2	12
VS111 VS121	7 in. w.c.	VSX4L VSX8L (232 psi)	3 to 12 in. w.c.	ERAA05835A0	White	18 to 30	GF02168X012	Brown	3 in. w.c.	21 in. w.c. to 1.2 psig	22 in. w.c.
	11 in. w.c.		3 to 12 in. w.c.	ERAA05835A0	White	18 to 30	GF02168X012	Brown	6 in. w.c.	24 in. w.c. to 1.3 psig	25 in. w.c.
	14 in. w.c.		4 in. w.c. to 1.1 psig	T14169T0012	Blue	25 to 1.9	GF02169X012	Red	9 in. w.c.	1.2 to 2.2	1.1
	1		10 in. w.c. to 2.3 psig	T14169T0012	Blue	1.2 to 3.2	GF02170X012	Orange	14 in. w.c.	1.7 to 3.7	2
	2		10 in. w.c. to 2.3 psig	T14170T0012	Silver	1.2 to 3.2	GF02170X012	Orange	1	2.2 to 4.2	3.5
	3		1.5 to 7.3	FA142869X12	Orange Stripe	2.6 to 5.6	GF02171X012	Pink	2	4.6 to 7.6	5
	5		1.5 to 7.3	FA142869X12	Orange Stripe	2.6 to 5.6	GF02171X012	Pink	3	5.6 to 8.6	7
	10		1.5 to 7.3	FA142869X12	Orange Stripe	3.5 to 8.2	GF02172X012	Green	5	8.5 to 13.2	12
	15		1.5 to 10.9	T14171T0012	Olive	6.7 to 13.5	GF02173X012	Silver	7	13.7 to 20.5	19
VS112 VS122	20	VSX4H VSX8H (232 psi)	7.3 to 29.0	FA142869X12	Orange Stripe	15.2 to 22.8	GF02171X012	Pink	10	25.2 to 32.8	25
	30		7.3 to 29.0	FA142869X12	Orange Stripe	18.1 to 33.4	GF02172X012	Green	15	33.1 to 48.4	35

Table 5d. *European Overpressure and Underpressure Shut-off OPSO/UPSO Ranges*

REGULATOR		SLAM SHUT DEVICE									
Type	Typical Setpoint	Type (Maximum Operating Inlet)	Under Pressure Shut-off (UPSO) Set Range	Spring Part Number	Spring Color	Over Pressure Shut-off (OPSO) Set Range / Over UPSO Setpoint	Spring Part Number	Spring Color	Factory Set UPSO	Factory Set Adjusted OPSO Range	Factory Set OPSO
	mbar		mbar			mbar			mbar	mbar	mbar
VS111 VS121	20	VSX4L VSX8L (8.6 bar)	7 to 11	ERAA05835A0	White	30 to 44	GF02167X012	Black	10	40 to 54	43
	21		7 to 11	ERAA05835A0	White	30 to 44	GF02167X012	Black	10	40 to 54	43
	27		7 to 11	ERAA05835A0	White	30 to 44	GF02167X012	Black	10	40 to 54	45
	30		7 to 30	ERAA05835A0	White	40 to 72	GF02168X012	Brown	15	55 to 87	60
	35		7 to 30	ERAA05835A0	White	40 to 72	GF02168X012	Brown	22	62 to 98	70
	50		10 to 75	T14169T0012	Blue	48 to 74	GF02168X012	Brown	25	78 to 99	90
	60			T14169T0012	Blue	48 to 74	GF02168X012	Brown	30	78 to 104	100
	75		25 to 160	T14170T0012	Silver	83 to 221	GF02170X012	Orange	40	121 to 259	140
VS111 VS121	20	VSX4L VSX8L (16 bar)	7 to 30	ERAA05835A0	White	40 to 55	GF02167X012	Black	10	50 to 65	55
	21			ERAA05835A0	White		GF02167X012	Black	10	50 to 65	55
	27			ERAA05835A0	White		GF02167X012	Black	14	54 to 69	55
	30			ERAA05835A0	White	45 to 76	GF02168X012	Brown	15	60 to 91	60
	35			ERAA05835A0	White		GF02168X012	Brown	18	63 to 94	70
	50		10 to 75	T14169T0012	Blue	50 to 80	GF02168X012	Brown	25	75 to 105	90
	60			T14169T0012	Blue		GF02168X012	Brown	30	80 to 110	100
	75		25 to 160	T14170T0012	Silver	83 to 221	GF02170X012	Orange	38	121 to 259	140
	100			T14170T0012	Silver		GF02170X012	Orange	50	133 to 271	160
	120			T14170T0012	Silver		GF02170X012	Orange	60	143 to 281	205
	150			T14170T0012	Silver		GF02170X012	Orange	75	158 to 296	250
	160			T14170T0012	Silver		GF02170X012	Orange	80	163 to 301	250
	200		100 to 500	FA142869X12	Orange Stripe	114 to 261	GF02170X012	Orange	100	214 to 361	330
	300			FA142869X12	Orange Stripe	179 to 386	GF02171X012	Pink	150	329 to 536	440
	500			FA142869X12	Orange Stripe	241 to 565	GF02172X012	Green	250	491 to 815	700
	750		100 to 750	T14171T0012	Olive	460 to 932	GF02173X012	Silver	375	835 to 1300	1050
	1000			T14171T0012	Olive		GF02173X012	Silver	500	960 to 1432	1400
VS112 VS122	1200	VSX4L VSX8H (16 bar)	500 to 2000	FA142869X12	Orange Stripe	1050 to 1570	GF02171X012	Pink	600	1650 to 2170	1600
	1500			FA142869X12	Orange Stripe		GF02171X012	Pink	750	1800 to 2320	1900
	2000			FA142869X12	Orange Stripe	1250 to 2300	GF02172X012	Green	1000	2250 to 3300	2400
	3000			FA142869X12	Orange Stripe		GF02172X012	Green	2000	2250 to 4300	4000
	4000		500 to 2800	T14171T0012	Olive	2100 to 3750	GF02173X012	Silver	2000	4100 to 5750	5000

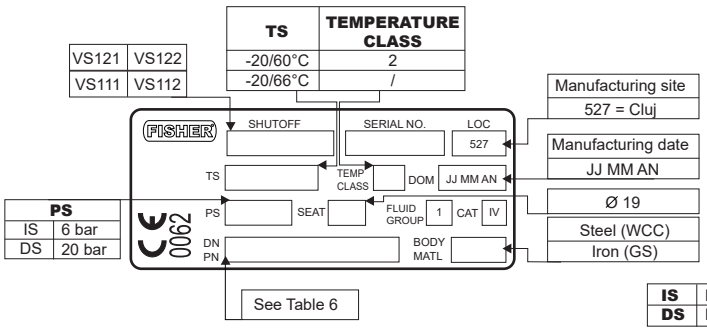


Figure 2. *PED VS100 Series Label*

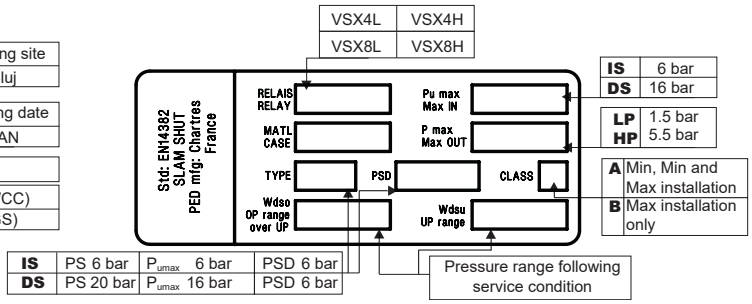


Figure 3. *EN 14382 VSX4 and VSX8 Series Label*

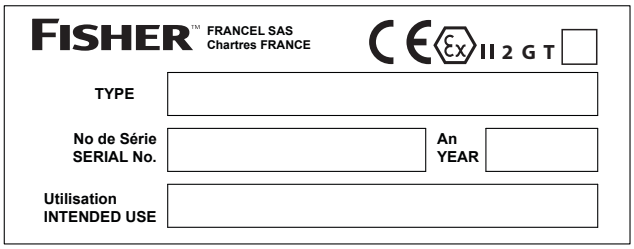


Figure 4*. Nameplate for explosive atmosphere if ATEX assembled*

Principle of Operation

The pressure in the zone to be protected (generally the pipeline on the outlet side of the pressure regulator and situated after the slam-shut device (see Figures 5 and 7) activates the VSX4 and VSX8 Series controller.

The pressure measuring element of the VSX4 and VSX8 Series controller consists of a diaphragm that senses downstream pressure. The downstream pressure is controlled by the regulator (Figure 7). The top side of the VSX4 and VSX8 Series diaphragm encounters the force imposed by the overpressure shut-off spring and underpressure shut-off spring.

When the downstream pressure increases above the overpressure shut-off (OPSO) setting, the diaphragm moves up.

When the downstream pressure decreases below the underpressure shut-off (UPSO) setting, the diaphragm moves down.

Both of these actions result in the rotation of the cam and the release of the reset pin.

The valve plug spring moves the valve plug against the regulator port, stopping the flow of gas.

Before opening the valve plug, an equal pressure balance on inlet and outlet sides is required.

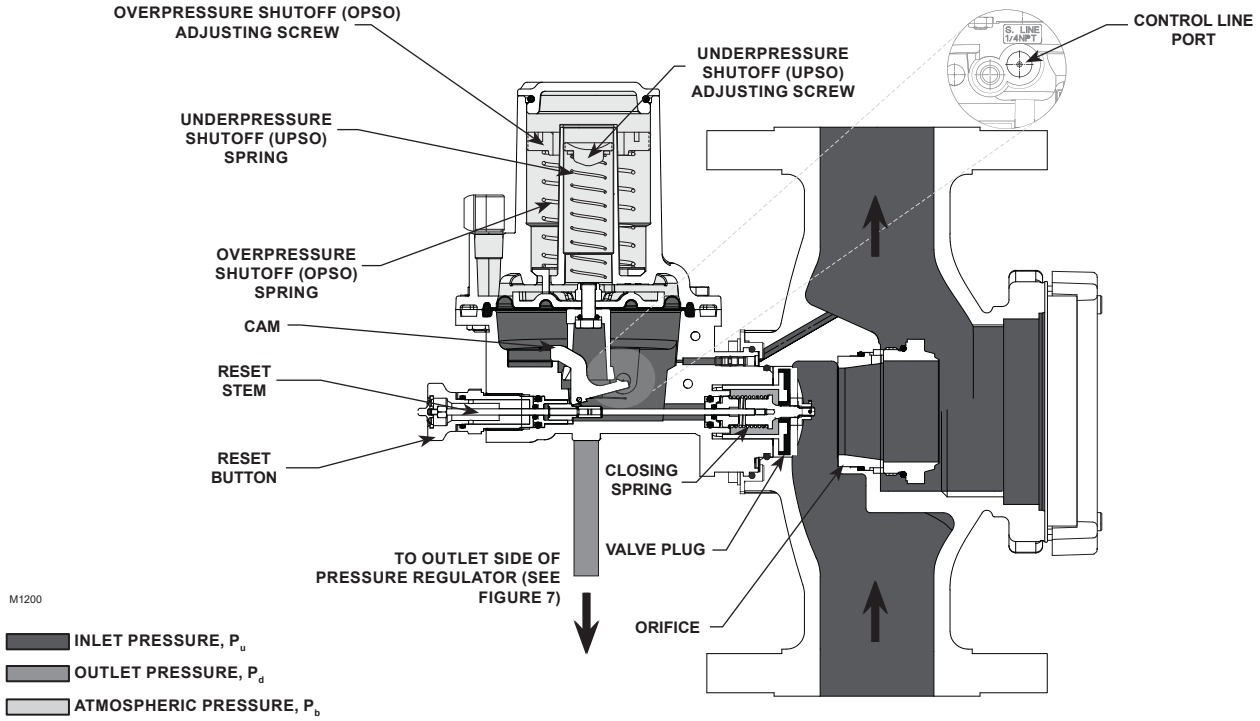
Refer to the VSX4 and VSX8 Series Instruction Manual, Form 5867. Using the reset button, activate the internal bypass, then rearm the valve plug in accordance with the Manual Reset Procedure. Rearming and pressure balancing are achieved at the same time.

Installation and Overpressure Protection

WARNING

Personal injury or system damage may result if this slam-shut device is installed, without appropriate overpressure protection, where service conditions could exceed the limits given on the Specifications section and slam-shut device nameplate.

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. When installing outdoors, point the spring case vent of the regulator and of the slam-shut device downward to allow condensate to drain. This minimizes the



VSX4 AND VSX8 SERIES CONTROLLER WITH FLANGED BODY

Figure 5. *Typical VS100 Series Operational Schematic*

possibility of freezing and accumulation of water or other foreign materials entering the vent and interfering with proper operation.

Slam-shut device installations should be adequately protected from physical damage.

The equipment should not receive any type of shock causing damage to the casing and therefore causing leaks.

No modification should be made to the structure of the equipment (drilling, grinding and soldering).

Under enclosed conditions or indoors, escaping gas may accumulate and be an explosion hazard. In these cases, the vent(s) should be piped away from the regulator/slam-shut device to the outdoors.

Failure to install a downstream control line could result in a hazardous condition. A downstream control line is required for the VS100 Series installation. The slam-shut device will not control pressure or shutoff if a downstream control line is not installed.

If the slam-shut device is exposed to an overpressure condition, it should be inspected for any damage that may have occurred. Slam-shut device operation below the limits specified in the Specifications section and slam-shut device nameplate does not preclude the possibility of damage from external sources or from debris in the pipeline.

The usage of an assembly incorporating an electrical accessory in an explosive atmosphere the VS100 Series 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: EN12186, EN12279 and EN 1776.

General Installation Instructions

Note

The VSX4 and VSX8 Series can be rotated 360° for easy installation and maintenance.

- Install according to EN 12186 and EN 12279.

Before proceeding to installation:

- The slam-shut device must be compatible with the gas being regulated.
- 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 or slam-shut device body.
- Blow out any debris or dirt in the tubing and the pipeline.
- Ensure that the external sense orifice is clean.
- Apply pipe compound to the external threads of the pipe before installing the slam-shut device.
- Verify these points:
  - 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).
  - The slam-shut device and its springs correspond to the desired operating conditions of the associated regulator.
- When assembling piping and flanges, do not apply excessive pressure force on the body and the bolts, O-rings, flanges or fittings. All connections should be compatible with the geometry and working conditions of the pipeline.
- If needed, a support may be used under the piping and regulator / slam-shut device body to avoid excessive pressure force on the regulator / slam-shut device.

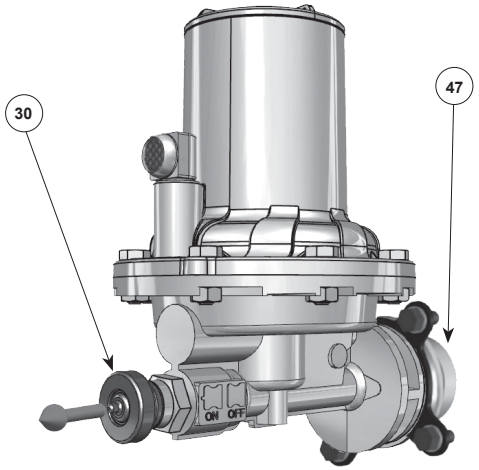


Figure 6. *Controller Manual Bypass*

- Connect downstream control line tubing to the 1/4 NPT connection in the lower casing, and run the tubing downstream of the regulator outlet a minimum distance of 4 times the outlet pipe diameter (see Figure 7).
- Periodically check all vent openings to be sure that they are not plugged.

Startup and Shutdown

WARNING

This Instruction Manual must be used with the VSX4 and VSX8 Series Instruction Manual and Instruction Manual of the associated equipment.

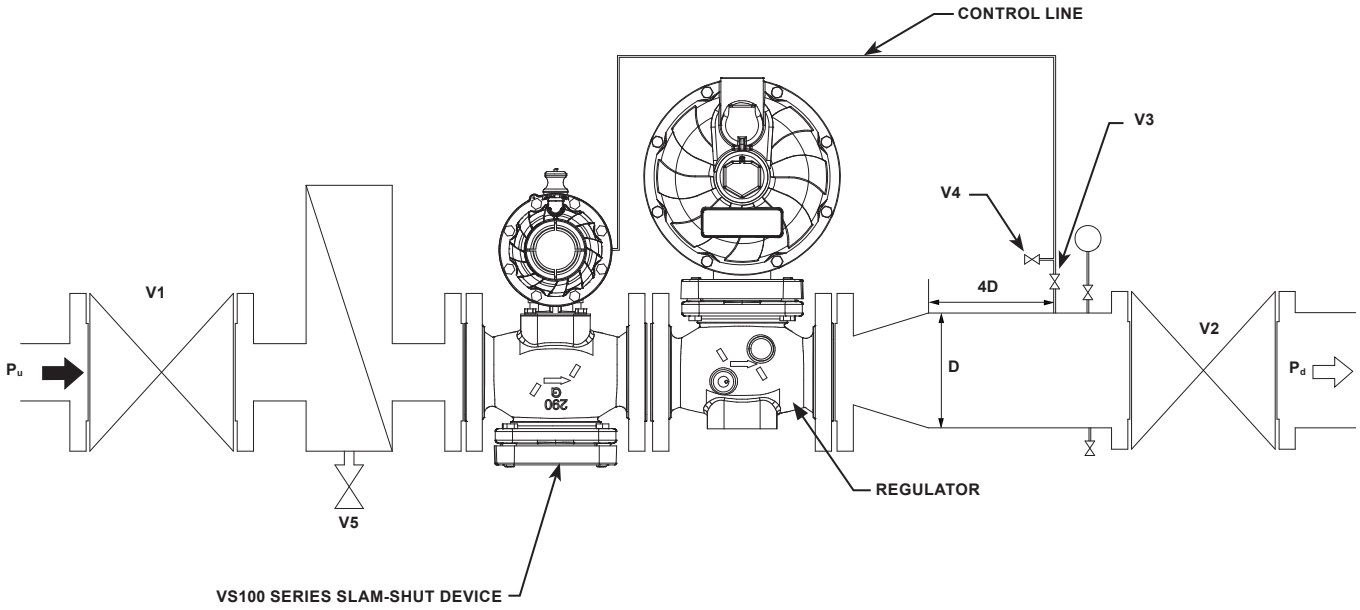
Commissioning

WARNING

All interventions on the equipment should only be performed by qualified and trained personnel.

CAUTION

Equipment installed downstream the controller can be damaged if the following procedure for resetting the controller is not followed. This equipment includes the integral controller / regulator configurations.



P_u - INLET PRESSURE
P_d - OUTLET PRESSURE

Figure 7. *VS100 Series Installation*

Step 1:

- Slowly pull the reset button (key 30) 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.

Step 2:

- When the pressure has equalized and the air bleeding sound has dissipated, the reset button (key 30) can be pulled completely away from the controller by hand until the internal shut-off mechanism has been re-latched.

Step 3:

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

Preliminary Verifications (Refer to Figure 7)

- Start-up positions:
  - Inlet and Outlet valves (V1 and V2)
    → Closed
- Verify absence of pressure between inlet and outlet valves:
  - Slam-shut device valve plug
    → Closed
  - Impulse isolation valve (V3)
    → Closed
  - Impulse atmospheric valves (V4 and V5)
    → Open

Table 6. *VS100 Series Troubleshooting*

INDICATION	CAUSE	ACTION
If the valve will not close	Operating fault	Check the following: • The shutoff pressure settings for high and low pressure values are correct. • The O-rings are tight shut. • The sensing line is plugged. Remove the VS100 Series and check the following: • The reset latch is not stuck. • The state of the diaphragm assembly for wear and tear **Or contact your local Sales Office.**
If the downstream pressure in the slam-shut device decreases	External leak	Locate and seal the leak **or contact your local Sales Office.**
If the outlet pressure in the slam-shut device is constant	- - - -	• Bleed off the outlet side of the regulator. • Observe the evolution of the outlet pressure (check tightness).
If the downstream pressure in the slam-shut device increases	Internal leak	Check the following: • The valve plug (disk) **Or contact your local Sales Office.**

Table 7. *VS100 Series Recommended Tools*

WRENCH		PART		TORQUE	
mm	In.	Key	Identification	N•m	Ft-Lbs
27	1.063	60	Orifice	47 to 61	35 to 45
51	2	63		107 to 160	79 to 118
13	0.512	34	Screw	6	4.4
		71		15	11

Setpoint Verification

- Using the atmospheric valve V4, inject pressure equal to the outlet pressure of the regulator:
  - Step 1
    → Reset the slam-shut device
    (see VSX4 and VSX8 Series Instruction Manual)
  - Step 2
    → Progressively increase the pressure at V4 to reach tripping point of VS100 Series
  - Step 3
    → Adjust setting if necessary
    (see VSX4 and VSX8 Series Instruction Manual)

Note the setpoint value on the equipment or mark it in a commissioning document.

Position before Commissioning

- Impulse isolation valve (V3)
  → Open
- Impulse atmospheric valves (V4 and V5)
  → Closed
- Slam-shut device valve plug
  → Closed

The equipment is ready for commissioning

Commissioning (Maximum only or Maximum and Mininimum)

- Inlet valve (V1)
  → Open slowly
- Internal bypass
  → Open slowly
  (see VSX4 and VSX8 Series Instruction Manual)
- Reset the VS100 Series
  → Reset slowly
  (see VSX4 and VSX8 Series Instruction Manual)
- Outlet valve (V2)
  → Open slowly

The equipment is commissioned

After checking and commissioning the slam-shut device, it is recommended to seal it.

Maintenance

WARNING

Only a qualified person shall perform maintenance procedures. If necessary, contact your local Sales Office.

Failure to test the slam-shut device for proper shutoff can result in a hazardous condition. Test the slam-shut device for operation per applicable federal, state and local codes, rules and regulations and Emerson instructions.

Due to normal wear or damage that may occur from external sources, the slam-shut device 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 assembling 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 VS100 Series. The slam-shut device should be tested for both under and overpressure shutoff activation and pressure tight shutoff annually with test intervals not to exceed 15 months but at least once each calendar year. If the slam-shut device does not close at the desired pressures or leaks gas after closure, repair and/or replace the slam-shut device.

Servicing Check

- Recommended frequency:
  - Annually but not to exceed 15 months
- Verification:
  - Tripping and tripping value
  - Slam-shut device valve plug tightness
- Beginning valve positions refer to Figure 7:
  - Inlet valve (V1)
    → Open
  - Outlet valve (V2)
    → Open
  - Slam-shut device valve plug
    → Open
  - Regulator
    → In operation

Inlet and outlet sides of the regulator under pressure.

- Tripping verification:
  - Inlet valve (V1)
    → Closed
  - Outlet valve (V2)
    → Closed
  - Regulator
    → Increase setpoint to reach tripping without exceeding outlet limits

Disassembly

WARNING

Only parts manufactured by Emerson should be used for repairing the VS100 Series Slam-shut Device.

- Recommended frequency:
  - Every 3 years minimum
- Verification:
  - Condition of O-rings, diaphragm, disk, orifice and lubrication
- Replace parts
  - Refer to Figure 15 in the VSX4 and VSX8 Series Instruction Manual. O-rings (keys 33 and 46), diaphragm (key 6) and safety valve plug (key 47). Refer to disassembly section of the VSX4 and VSX8 Series Instruction Manual
  - Refer to Figure 9 in VS100 Series Instruction Manual. Orifices (keys 60 and 63) and O-rings (keys 61 and 73). Refer to disassembly section of the VS100 Series Instruction Manual
  - Or replace the VSX4 and VSX8 Series controller

Disassembly of the VSX4 and VSX8 Series Controller

Refer to VSX4 and VSX8 Series Instruction Manual.

Disassembly of the VS100 Series Slam-Shut Device

WARNING

To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator/slam-shut device from system pressure and relieving all internal pressure.

CAUTION

Removing the two orifices must be performed with care so as not to damage the orifice seating surfaces.

Medium Capacity Body Disassembly

- Before removing the orifice (key 60), the slam-shut device must be removed from the body.
- Using a 27 mm / 1.063 in. wrench, unthread and remove the orifice and O-ring (key 61). Removing the orifice must be performed with caution.
- Using a 13 mm / 0.512 in. wrench, unthread and remove the two screws (key 71), the union ring (key 75) and body plug (key 74) with its O-ring (key 73).

High Capacity Body Disassembly

- Using a 13 mm / 0.512 in. wrench, unthread and remove the four screws (key 71), the union ring (key 75) and body plug (key 74) with its O-ring (key 73).
- Once the body plug is removed, the orifice (keys 60 and 63) may then be removed.
- Using a 51 mm / 2 in. wrench, unthread and remove the orifice (key 63) and its O-ring (key 64).
- Then manually remove the orifice (key 60) with its O-ring (key 61) without any hand tool. This last action can be facilitated by removing the slam-shut device (key 84).

Reassembly

Reassembly of the VSX4 and VSX8 Series Controller

- Refer to VSX4 and VSX8 Series Instruction Manual.

Reassembly of the VS100 Series Slam-Shut Device

- Perform the above operations in reverse order (respect tightening torques).
- Reinstall the orifices (old or new) with caution.

Test After Repair

- Slam-shut devices that have been disassembled for repair must be tested for proper operation before being returned to service.

Parts Ordering

The type number, pressure ranges, functional class and date of manufacture are stamped on the nameplate. Always provide this information when corresponding with your local Sales Office regarding replacement parts or technical assistance.

When ordering replacement parts, refer to the key number of each needed part as found in the parts list.

Parts List

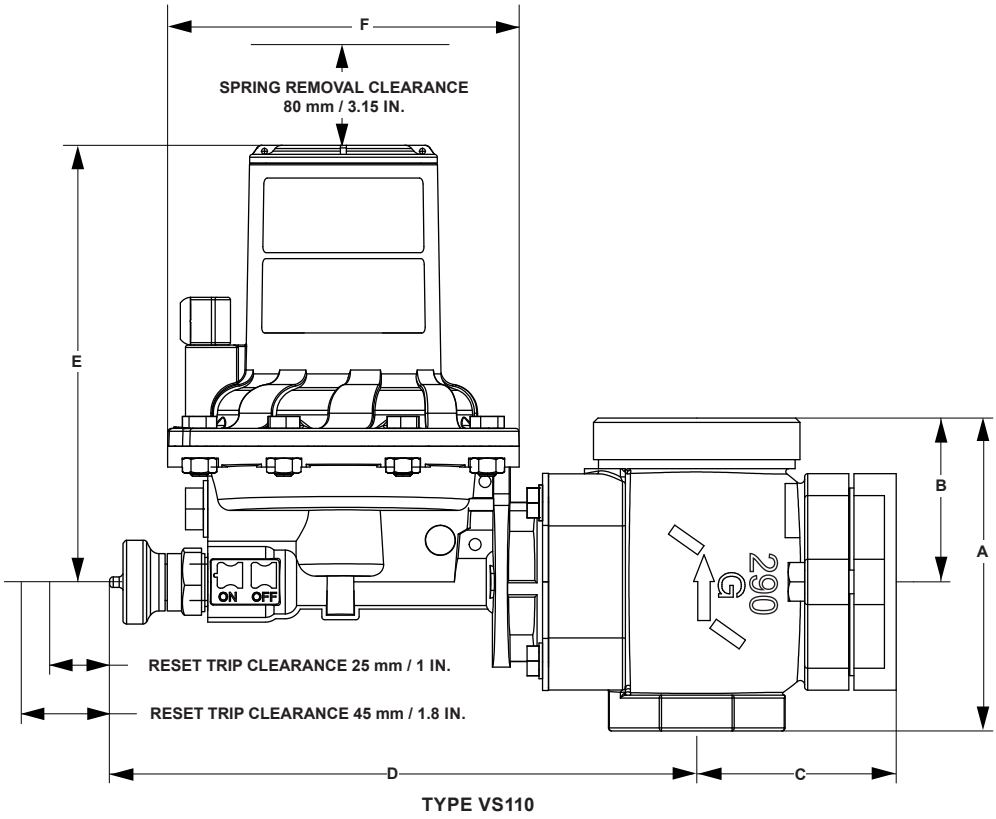
Key	Description	Part Number
33	O-ring	GF03442X012
34	Screw, Steel (4 required)	GE38176X012
36	Half Flange (2 required)	GF01942X012
38	UPSO Spring	See Tables 5c and 5d
40	UPSO Adjusting Screw	ERAA05947A0
41	OPSO Spring	See Tables 5a, 5b, 5c and 5d
43	OPSO Adjusting Screw	GF01923X012
46	O-ring	GF03443X012
48	Type Y602-12 Vent	27A5516X012
50*	O-ring	GF03449X012
51	Plug	GF02261X012
70	Body	See Table 8
71	Bolt	
	Types VS111 and VS112 (2 required)	GE32061X012
	Types VS121 and VS122 (4 required)	GE29974X012
73	O-ring, NBR	
	Types VS111 and VS112	GE45216X012
	Types VS121 and VS122	ERAA01118A0
74*	Plug, Aluminum	
	Types VS111 and VS112	GF04373X012
	Types VS121 and VS122	GE34190X012
75	Union ring	GF04335X012
	Types VS111 and VS112	GF04335X012
	Types VS121 and VS122	GF04994X012
80	Label, Base	----------
84	Label, Slamshut	----------
100	Caution Label	
103	UPSO Washer	ERAA05957A0

*Recommended Spare Part

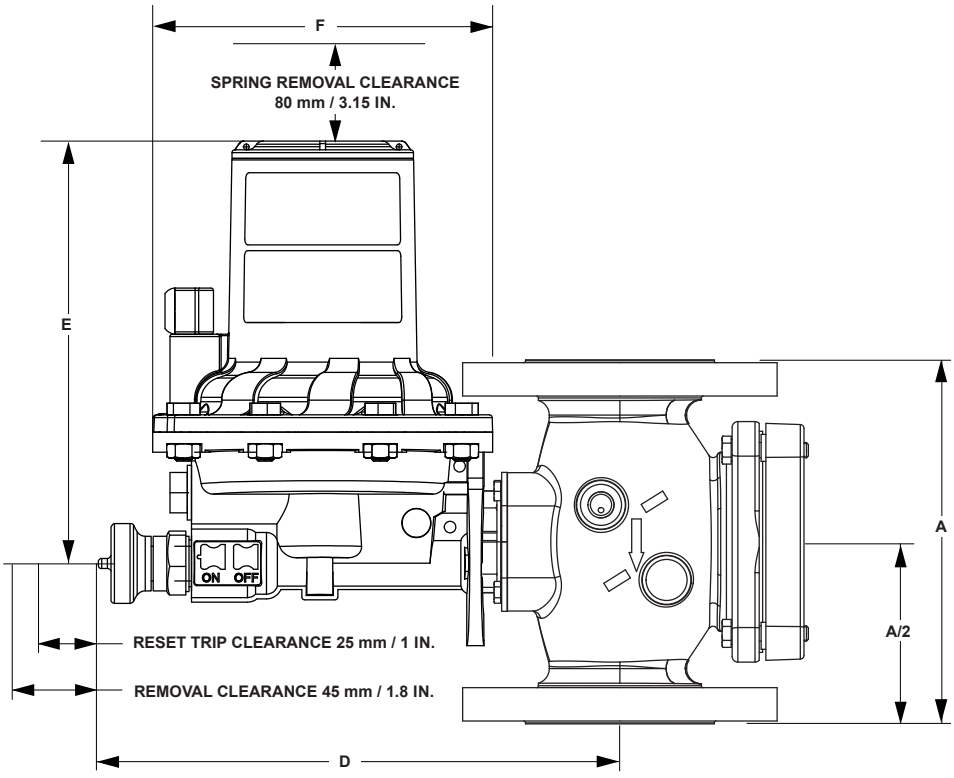
Table 8. *VS100 Series Bodies, Dimensions and Weights*

TYPE	BODY MATERIAL	PART NUMBER	INLET SIZE		OUTLET SIZE		END CONNECTION	DIMENSION, mm / In.						WEIGHT	
			DN	NPS	DN	NPS		A	B	C	D	E	F	kg	lbs
VS111 and VS112 (Medium Capacity)	Ductile Iron	GE26482X012	25	1	57	2-1/4	Rp x GAZ	105 / 4.1	55 / 2.2	67 / 2.6	205 / 8.1	147 / 5.8	118 / 4.7	3.3	7.3
		GE26469X012	32	1-1/4	32	1-1/4	Rp	114 / 4.5	57 / 2.3	46.3 / 1.8	210 / 8.3			3.6	7.9
		GE26470X012	40	1-1/2	40	1-1/2	Rp							3.6	7.9
		GE26463X012	25	1	25	1	NPT	100 / 3.9	50 / 2.0					3.1	6.8
		GE26468X012	25	1	25	1	Rp							3.1	6.8
		GE26465X012	32	1-1/4	32	1-1/4	NPT	114 / 4.5	57 / 2.3					3.6	7.9
		GE26466X012	40	1-1/2	40	1-1/2	NPT							3.6	7.9
		GE44902X012	40	1-1/2	40	1-1/2	PN16 Slip-on	184 / 7.2						6.7	14.8
	Steel	GE26463X022	25	1	25	1	NPT	100 / 3.9	50 / 2.0					3.1	6.8
		GE26465X022	32	1-1/4	32	1-1/4	NPT	114 / 4.5	57 / 2.3					3.6	7.9
		GE26466X022	40	1-1/2	40	1-1/2	NPT							3.6	7.9
		GE26468X022	25	1	25	1	Rp	100 / 3.9	50 / 2.0					3.1	6.8
		GE26469X022	32	1-1/4	32	1-1/4	Rp	114 / 4.5	57 / 2.3					3.6	7.9
		GE26470X022	40	1-1/2	40	1-1/2	Rp							3.6	7.9
VS121 and VS122 (High Capacity)	Ductile Iron	GE26306X012	32	1-1/4	32	1-1/4	NPT	155 / 6.1	77.5 / 3.1	91.4 / 3.6	212.7 / 8.4	147 / 5.8	118 / 4.6	6.9	15.2
		ERAA02453A1	40	1-1/2	40	1-1/2	NPT							6.9	15.2
		ERAA02437A1	50	2	50	2	NPT							7.1	15.7
		GE26310X012	32	1-1/4	32	1-1/4	Rp							6.9	15.2
		ERAA03878A1	40	1-1/2	40	1-1/2	Rp							6.9	15.2
		ERAA02715A1	50	2	50	2	Rp							7.1	15.7
		GE48292X012	50	2	50	2	CL125FF x CL150FF	191 / 7.5	95.5 / 3.8					13.2	29.1
		ERAA02711A1	50	2	50	2	CL125FF x CL150FF	254 / 10	127 / 5.0					15.8	34.8
		ERAA02718A1	50	2	50	2	CL125FF x CL150FF	267 / 11	133.5 / 5.3					15.8	34.8
		GE48296X012	50	2	50	2	PN10/16	191 / 7.5	95.5 / 3.8					13.2	29.1
		ERAA02719A1	50	2	50	2	PN10/16	254 / 10	127 / 5.0					15.8	34.8
	Steel	GE26306X022	32	1-1/4	32	1-1/4	NPT	155 / 6.1	77.5 / 3.1					6.9	15.2
		ERAA02453A2	40	1-1/2	40	1-1/2	NPT							6.9	15.2
		ERAA02437A2	50	2	50	2	NPT							7.1	15.7
		GE26310X022	32	1-1/4	32	1-1/4	Rp							6.9	15.2
		ERAA03878A2	40	1-1/2	40	1-1/2	Rp							6.9	15.2
		ERAA02715A2	50	2	50	2	Rp							7.1	15.7
		ERAA02720A2	50	2	50	2	CL150RF	254 / 10	127 / 5.0					15.5	34.2
		ERAA02719A2	50	2	50	2	PN10/16							15.5	34.2

Dimensions and Weights

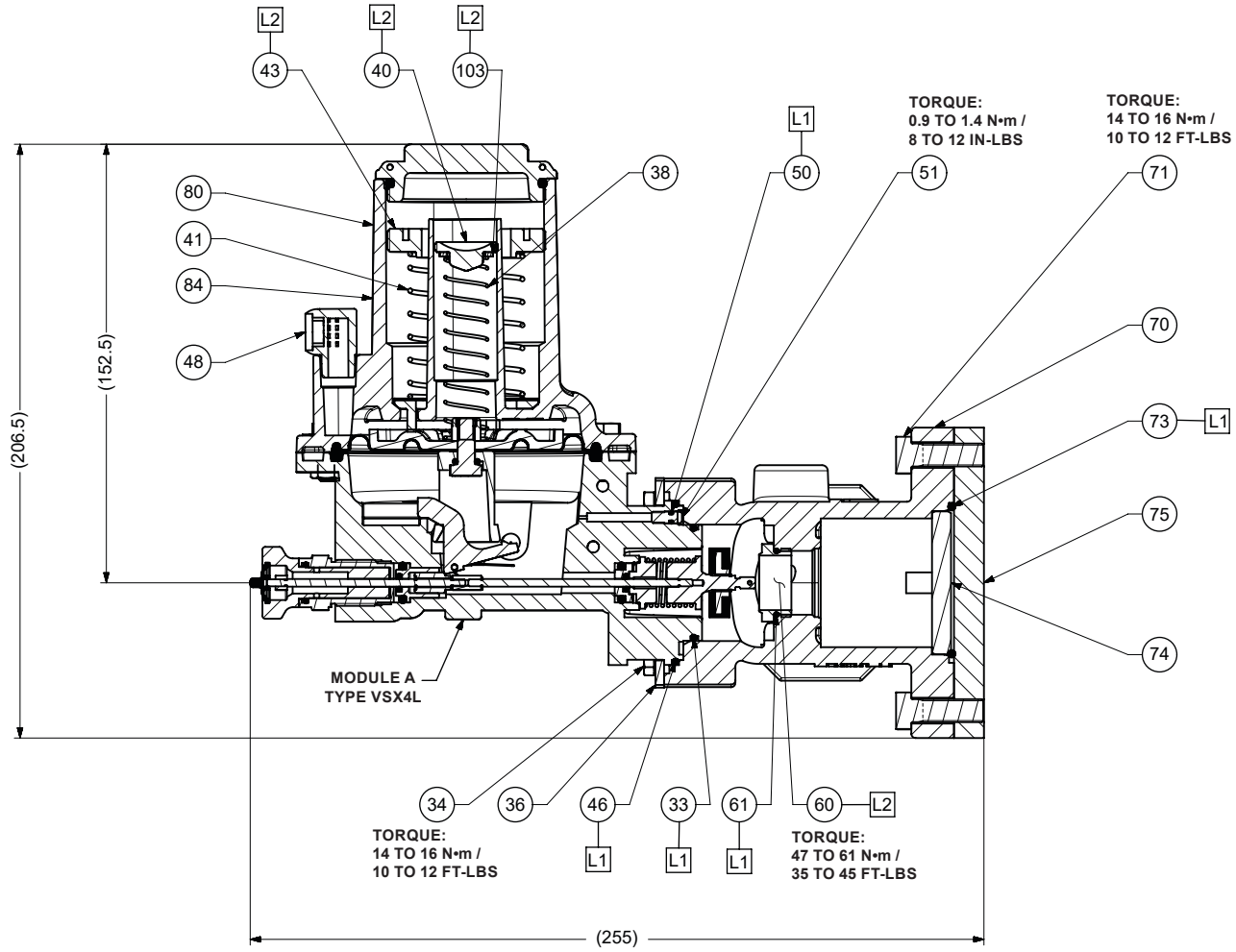


TYPE VS110



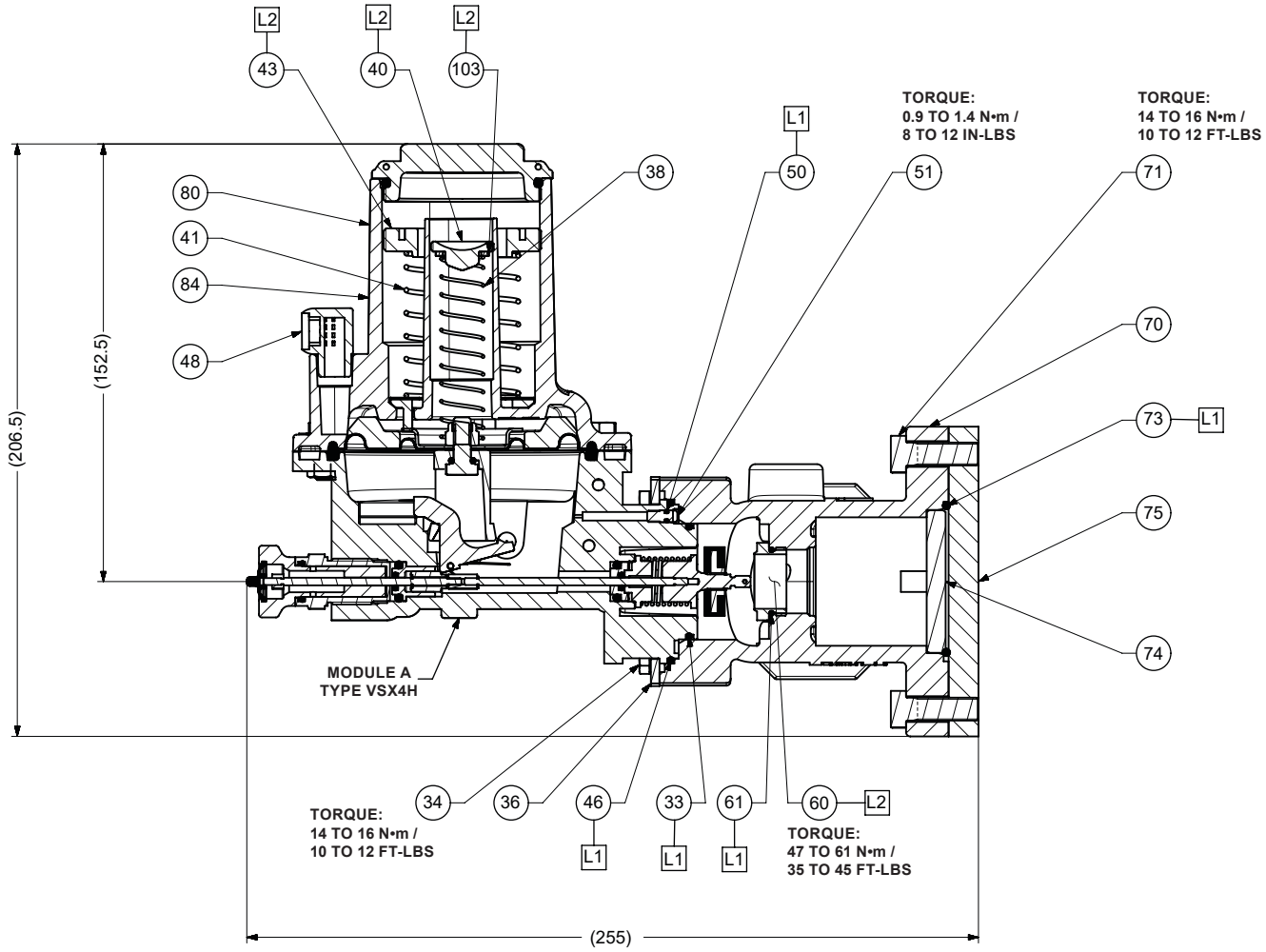
TYPE VS120 WITH FLANGE BODY

Figure 8. *VS100 Series Dimensions*



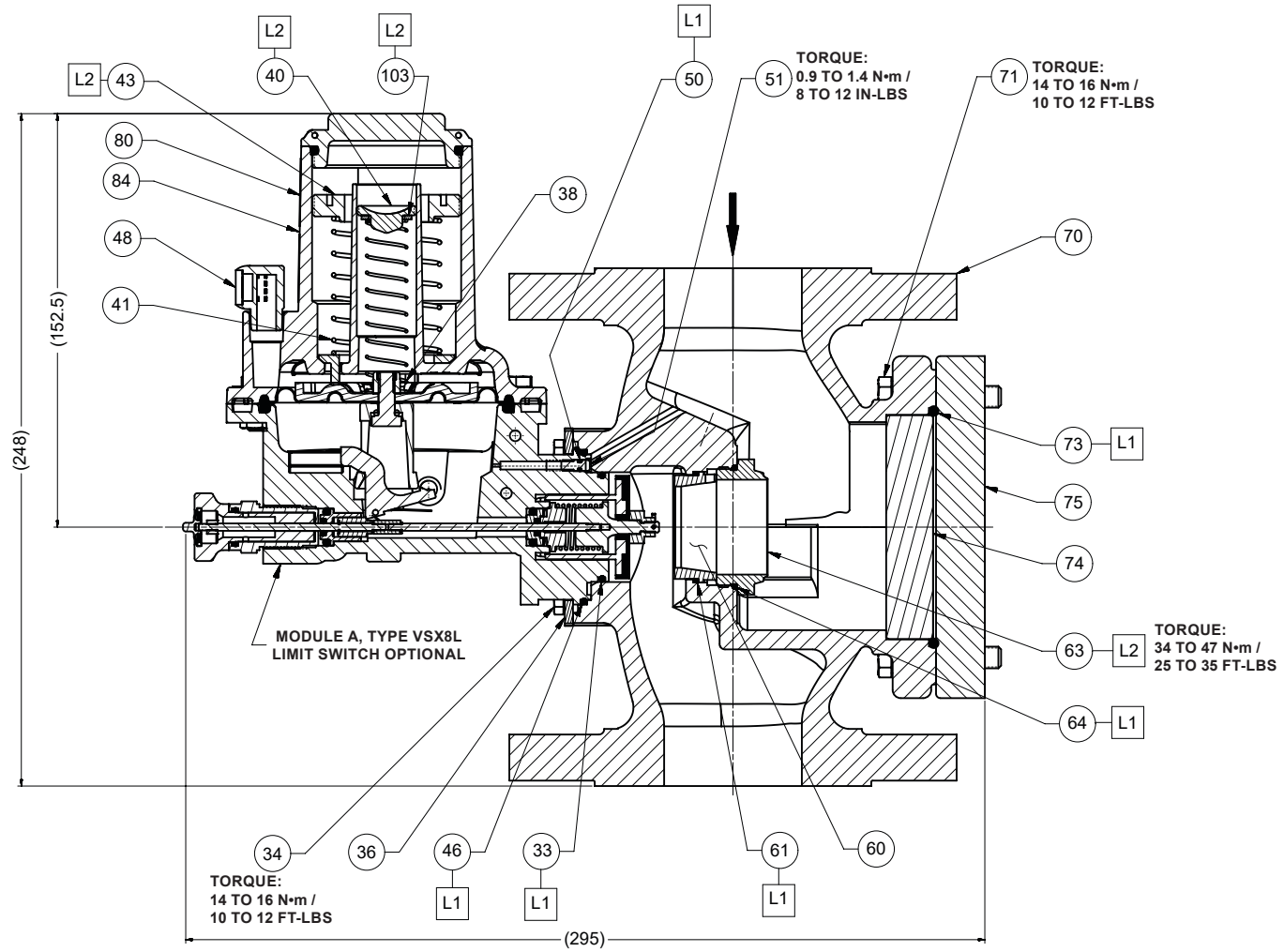
TYPE VS111 ASSEMBLY LOW PRESSURE

Figure 9. *VS100 Series Slam-Shut Device Assembly*



TYPE VS112 ASSEMBLY HIGH PRESSURE

Figure 9. *VS100 Series Slam-Shut Device Assembly (continued)*



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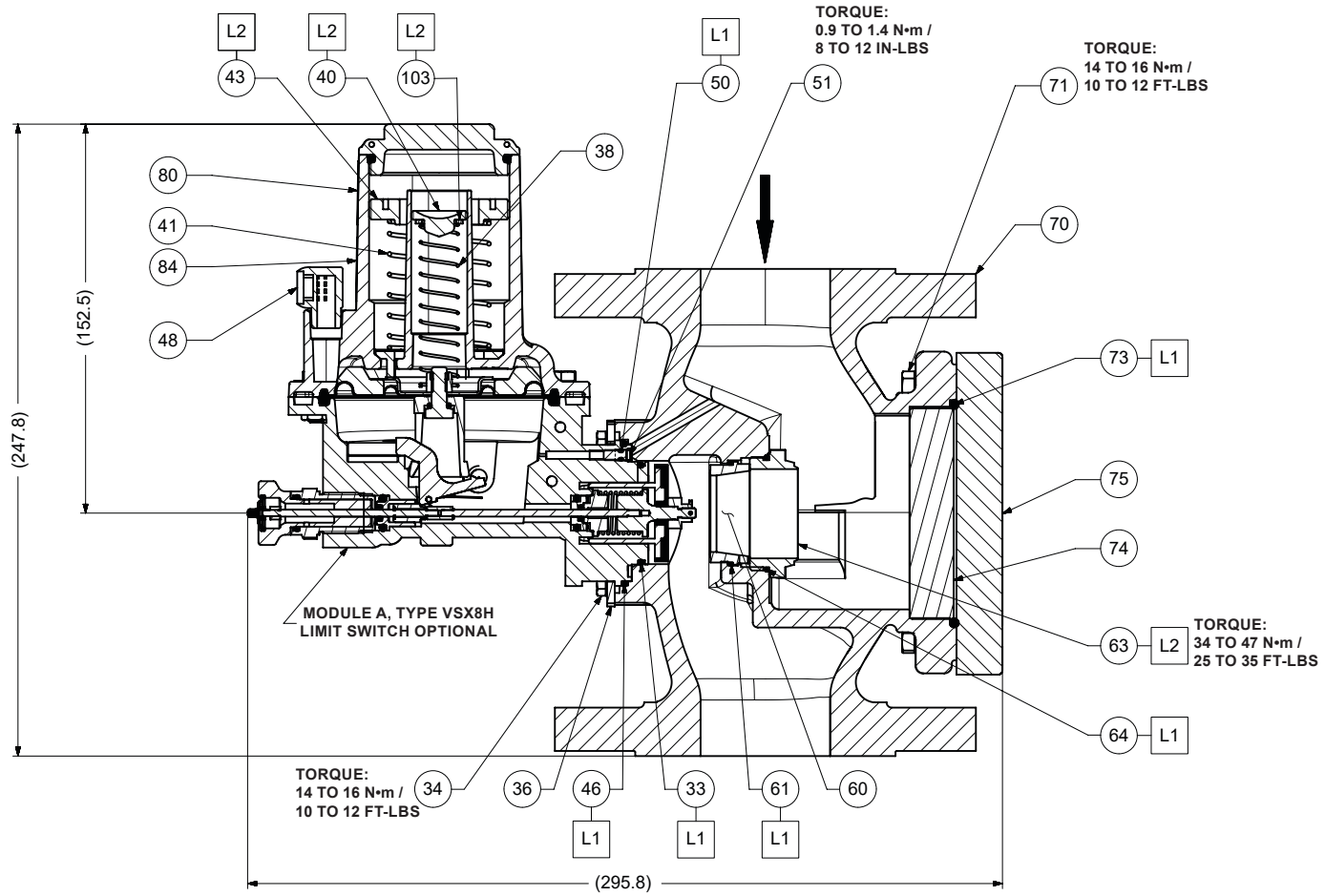
☐ **APPLY LUBRICANT (L)**
L1 = HIGH TEMPERATURE PTFE GREASE
L2 = ANTI-SEIZE LUBRICANT

TYPE VS121 ASSEMBLY LOW PRESSURE

Figure 9. *VS100 Series Slam-Shut Device Assembly (continued)*



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☐ **APPLY LUBRICANT (L)**
L1 = HIGH TEMPERATURE PTFE GREASE
L2 = ANTI-SEIZE LUBRICANT

TYPE VS122 ASSEMBLY HIGH PRESSURE

Figure 9. *VS100 Series Slam-Shut Device Assembly (continued)*

VS100 Series

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