MESURA®

A Cavagna Group Company

S23 Industrial & Distribution Regulator

Product Bulletin

1. PRODUCT OVERVIEW

The S23 regulator is a direct acting, balanced inlet pressure reducing regulator. The S23 is a spring-open design that is commonly used for industrial applications as well as distribution stations. The S23 is available with a Valve Safety Integrated (VSI-23), an integrally mounted slam shut valve (SSV) which can provide Over Pressure Shut Off (OPSO) and/or Under Pressure Shut Off (UPSO). The VSI-23 is a completely independent device, providing the system with over pressure protection without any external devices needed.

The S23 features a direct linkage system, which provides quick response times for industrial applications. The balanced inlet provides stable delivery pressure as inlet pressure changes, and allows the use of a single, 3.35 inch orifice for all inlet pressures. This simplifies product sizing & selection and reduces inventory.

2. MATERIALS OF CONSTRUCTION

Mesura S23 Regulator

BODY:	Ductile Iron or Steel	**FITTINGS:**	Steel
DIAPHRAGM CASINGS:	Aluminum or Steel	**ORIFICE:**	Stainless Steel
DIAPHRAGMS:	Nitrile (NBR)	**DIAPHRAGM PLATES:**	Steel
SPRINGS:	Stainless steel	**CLOSING CAP:**	Ductile Iron
STEM:	Stainless steel	**FASTENERS:**	Zinc Plated Steel
DISK HOLDER:	Steel	**ADJUSTING SCREW/BOLT:**	Brass / Steel
DISCS AND O-RINGS:	Nitrile (NBR)	**PRESSURE SENSING:**	External

Mesura VSI-23 Slam Shut Valve

MOUNTING FLANGE:	Brass Alloy	**FITTINGS:**	Steel
SSV SUPPORT:	Aluminum Bar Stock	**DISCS AND O-RINGS:**	Nitrile (NBR)
COVER:	Aluminum	**DIAPHRAGMS:**	Nintrile/Reinforced NBR
SPRINGS:	Stainless Steel	**DIAPHRAGM PLATES:**	Steel
STEM:	Stainless Steel	**CLOSING CAP:**	Brass
ADJUSTING SCREW:	Brass	**FASTENERS:**	Steel
BALL BEARING:	Stainless Steel	**PRESSURE SENSING:**	External

3. BASICS OF OPERATION

The Mesura S23 is a spring to open, direct operated regulator. Outlet pressure registers on the bottom of the diaphragm, which is opposed by the regulating spring. Set point is determined by the adjustment of the regulating spring. When outlet pressure drops below the set point, the regulating spring will force the diaphragm assembly down. This downward force is directly translated to the stem, which pushes the plug down, away from the orifice, increasing the flow of gas to the downstream system.

As oulet pressure increases, the diaphragm will overcome the spring force and begin to move up and compress the regulating spring. This will pull the stem up, pulling the plug up until the plug presses into the orifice, stopping the flow of gas to the downstream system.

The VSI-23 slam shut valve operates independently from the S23 and can feature an OPSO or an UPSO. To activate the OPSO, downstream pressure must overcome the OPSO spring set point and move the VSI-23 diaphragm up (right in Figure 3). This allows the yoke to release and the SSV shutoff spring forces the disk into the orifice. To activate the UPSO, downstream pressure must drop below the UPSO set point until the UPSO spring can force the VSI-23 diaphragm down (left in Figure 3) until the yoke releases and the SSV shutoff spring forces the disk into the orifice.

4. SPECIFICATIONS

Table 1: S23 Regulator Specifications						
Max Operating Inlet Pressure	**BP/MP/AP**	87 psig	6 bar	**Emergency Inlet Pressure**	290 psig	20 bar
	APA	290 psig	20 bar	**Emergency Outlet Pressure** (Casing)	87 psig	6 bar
Operating Outlet Pressure Range		See Table 4		**Operating Temperature**	-20 to 60 °C -4 to 140 °F	
Maximum Outlet Pressure to avoid damage to internal parts	**BP:**	5 psig	0.345 bar	**Body Sizes**	NPS 3	
	MP:	15 psig	1.03 bar	**Flange Ratings**	CL150 & CL300 RF	
	AP/APA	87 psig	6 bar	**Vent Connection**	1/2" NPT	
Maximum Differential Pressure	**BP/MP/AP**	87 psid	6 bar	**Sense Line Connection**	1/2" NPT	
	APA	285 psid	19.7 bar	**Dimensions & Weight**	See Section 11	
Orifice Size		3.35 inches		**Wide Open Cg**	3380	

BP: Base Pressure, MP: Medium Pressure, AP: Apex Pressure, APA: Apex Piston Assembly

Table 2: VSI-23 SSV Specifications				
Emergency Inlet Pressure (Body)	290 psig	20 bar	**Over Pressure Shut Off Accuracy**	BP: AG 10 MP & AP: AG 5
Emergency Outlet Pressure (Casing)	87 psig	6 bar	**Under Pressure Shut Off Accuracy**	BP: AG 20 MP: AG 10 AP: AG 5
Dimensions & Weight	See Section 11			
Vent Connection	1/8" NPT		**Sense Line Connection**	1/8" NPT

5. AVAILABLE SAFETY FEATURES

OVERPRESSURE SHUT-OFF (OPSO)

If outlet pressure reaches the OPSO set point, the flow of gas is shut off at the inlet of the regulator. This requires a manual reset. OPSO is available standalone or with UPSO.

UNDERPRESSURE SHUT-OFF (UPSO)

If outlet pressure decreases to the UPSO set point, the flow of gas is shut off at the inlet of the regulator. This requires a manual reset.

INTERNAL DAMPER

For constructions without Token IRV, the IRV spring is used to function as a damper to absorb surges in outlet pressure. This improves regulator stability, especially in the presence of small, quick changes in outlet pressure.

TOKEN INTERNAL RELIEF VALVE (IRV)

The internal relief valve will release a small amount of gas through the vent during an overpressure event. When the pressure decreases, the IRV re-seats, stopping the release of gas. This protects the regulator from brief pressure surges, such as thermal expansion.

6. CAPACITY INFORMATION

The Mesura S23 is a high capacity regulator available for applications requiring 5%, 10%, or 20% droop requirements (AC5, AC10, or AC20). For current capacity information, please send application details to Cavagna North America.

7. OPERATIONAL SCHEMATICS

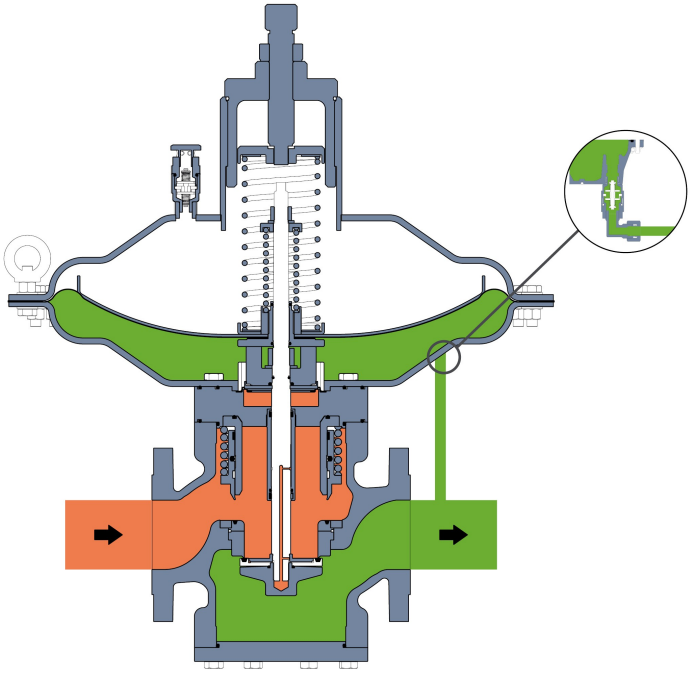

Figure 1: Mesura S23 BP & MP Schematic

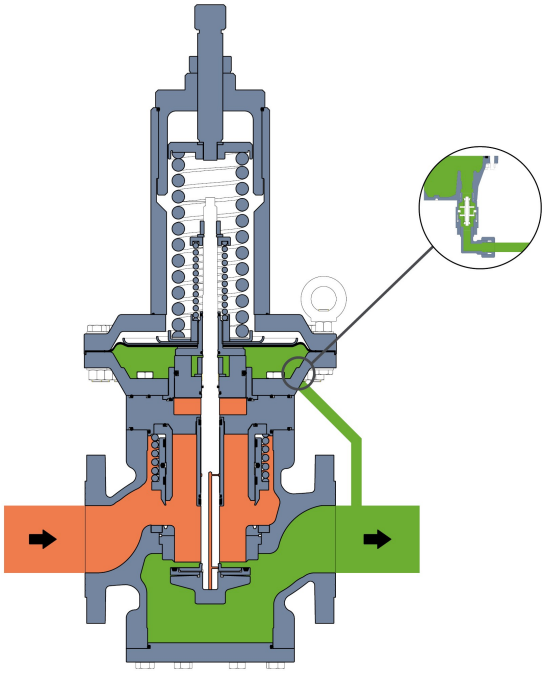

Figure 2: Mesura S23 APA Schematic

The S23 regulator has 2 different actuators and 2 different balancing systems available that create the Base Pressure (BP), Medium Pressure (MP), Apex Pressure (AP), and Apex Piston Assembly (APA) constructions.

ACTUATOR: The BP and MP constructions represented in Figure 1 use the standard actuator and balancing system but have several different components designed for the respective outlet pressure ranges. The AP and APA constructions use a higher pressure actuator to allow for higher outlet pressures. The AP/APA actuator can be seen in Figure 2.

BALANCING SYSTEM: The balancing system utilized in the body determines the operating inlet pressure. The BP, MP and AP constructions utilize a balancing system that features a balancing diaphragm for improved performance at lower inlet pressures. The APA version features the Apex Piston Assembly, which allows for inlet pressures up to 290 psig. The Apex Piston Assembly can be seen in Figure 2.

The VSI-23 is available as an OPSO only device or an OPSO/UPSO device. The VSI-23 operates completely independently from the S23, only sharing the S23 body. During normal operation, the VSI-23 has no impact on the regulator. Once the OPSO or UPSO set point is reached and the VSI-23 activates and gas is stopped at the regulator inlet. The VSI-23 requires a manual reset.

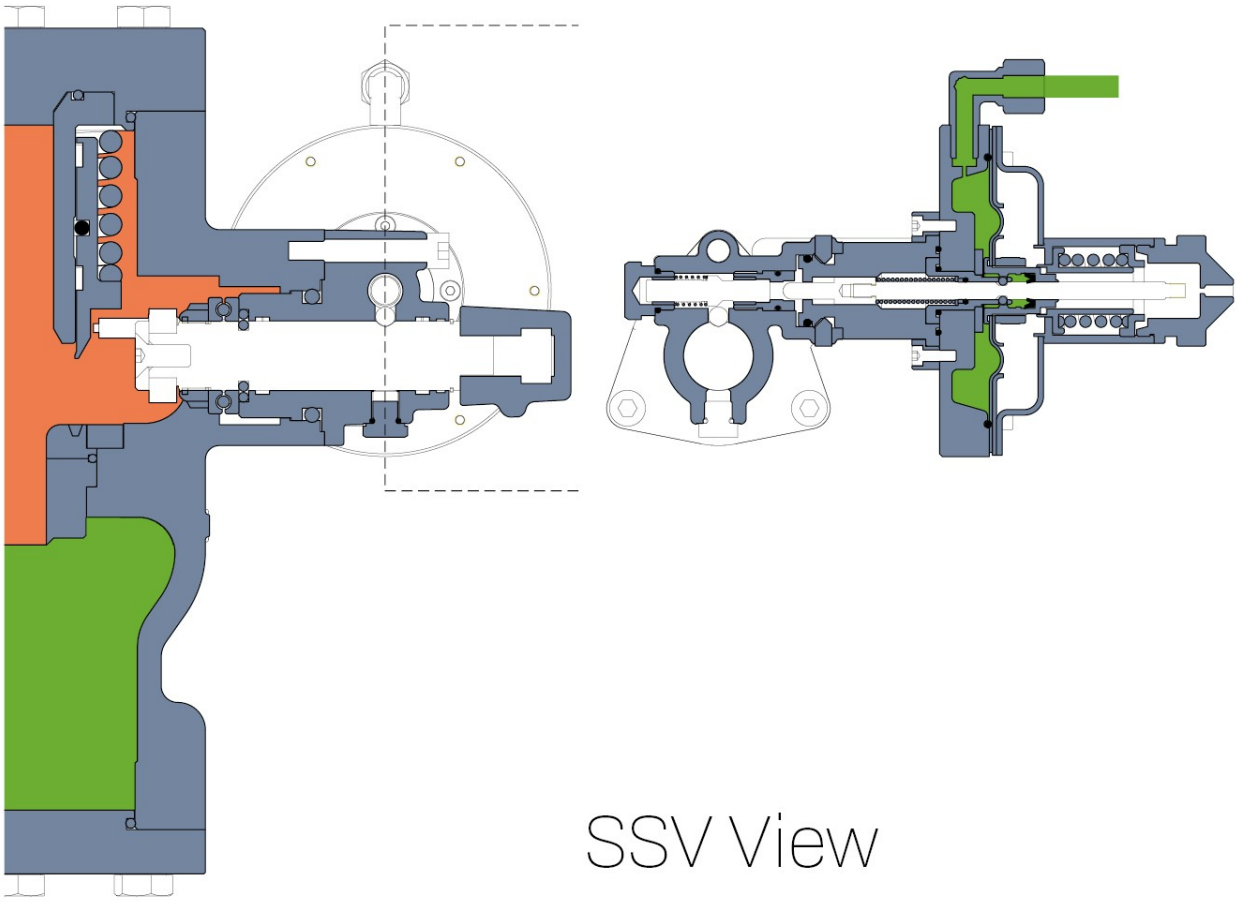

Figure 3: VSI-23 OPSO Only

8. PRODUCT CONFIGURATION

This table shows common set points for popular configurations in North America. Custom set points are available for the delivery pressure, OPSO and UPSO. Please specify all set points in Section 12.

Table 3: Common Configurations						
Regulator			OPSO		UPSO	
Model	Set Point	Spring Color	Set Point	Spring Color	Set Point	Spring Color
BP	7" w.c.	White	28" w.c.	Red	4" w.c.	SST
	14" w.c.	Blue	1.5 psig	Green	6" w.c.	SST
	1 psig	Green	2.5 psig	Blue	10" w.c.	Red
MP	2 psig	Green	4.5 psig	White	20" w.c.	Red
	5 psig	Dark Grey	7.25 psig	Brown	3 psig	Blue
AP/APA	10 psig	Brown	12.5 psig	White	5 psig	Blue
	15 psig	Dark Grey	18 psig	Brown	7 psig	Blue

9. SPRING SPECIFICATIONS

For recommended/standard settings, refer to Table 3. Additional spring ranges are available.

Table 4: S23 Regulating Spring Ranges				
Model	Part Number	Color	Pressure Range	
			PSIG	mbar
BP	32-R-190-0146	White	6 - 8.4" WC	15 – 21
	32-R-190-0147	Yellow	8.5 – 11.6" WC	21 – 29
	32-R-190-0148	Blue	10 – 14.8" WC	25 – 37
	32-R-190-0149	Red	14.9 – 24.5" WC	37 – 61
	32-R-190-0150	Green	23 – 36" WC	57 – 90
MP	32-R-190-0149	Red	1.26 – 1.5	80 – 105
	32-R-190-0150	Green	1.4 – 2.45	95 – 170
	32-R-190-0190	Orange	2.2 – 3.3	150 – 230
		Violet	2.8 – 4.0	190 – 280
	32-R-190-0191	Dark grey	3.95 – 5.9	270 – 410
	32-R-190-0192	Brown	6.85 – 10.1	470 - 710
AP/APA	32-R-190-0150	Green	4.7 – 7.25	320 – 500
	32-R-190-0190	Orange	6.1 – 10.1	420 – 700
		Violet	8.0 – 13.0	550 – 900
	32-R-190-0191	Dark grey	10.3 – 18.5	710 – 1280
	32-R-190-0192	Brown	20.3 – 33.3	1400 – 2300
	32-R-190-0193	Pink	27.6 - 52	1900 - 3600

Table 5: VSI-23 OPSO Spring Ranges				
Model	PART NUMBER	COLOR	Pressure Range	
			PSIG	mbar
BP	32-R-190-0015	Stainless steel	8 - 16" WC	20 - 40
	32-R-190-0195	Red	16 - 28" WC	40 - 70
	32-R-190-0196	Green	28.1 - 56" WC	70 - 140
	32-R-190-0101	Blue	44.2 - 84" WC	110 - 210
MP	32-R-190-0023	White	3.7 - 6.1	250 - 420
	32-R-190-0020	Orange	4.8 - 6.5	330 - 450
	32-R-190-0024	Brown	6.25 - 8.0	430 - 550
	32-R-190-0016	Light Blue	8.0 - 13.0	550 - 895
AP	32-R-190-0101	Blue	4.35 - 6.6	300 - 455
	32-R-190-0023	White	10.2 - 13.0	700 - 900
	32-R-190-0020	Orange	13.1 - 16.6	900 - 1150
	32-R-190-0024	Brown	16.25 - 24.4	1120 - 1550
	32-R-190-0016	Light Blue	21 - 32.6	1450 - 2250
	32-R-190-0017	Dark grey	29.75 - 40.6	2050 - 2800
	32-R-190-0112	Pink	36.3 - 48.5	2500 - 3350
	32-R-190-0102	Violet	43.6 - 65.2	3000 - 4500
	32-R-190-0197	Black	65.3 - 75.4	4500 - 5200

Table 6: VSI-23 UPSO Spring Ranges				
Model	PART NUMBER	COLOR	Pressure Range	
			PSIG	mbar
BP	32-R-190-0198	Stainless steel	3,2 - 6" WC	8 - 15
	32-R-190-0025	Red	6 - 20" WC	15 - 50
	32-R-190-0026	Green	18 - 40" WC	45 - 100
MP	32-R-190-0021	Blue	1.45 - 3.6	100 - 250
	32-R-190-0199	White	3.33 - 6.8	230 - 470
AP	32-R-190-0200	Brown	1.45 - 3.6	100 - 250
	32-R-190-0021	Blue	2.9 - 7.25	200 - 500
	32-R-190-0199	White	5.8 - 13	400 - 900
	32-R-190-0018	Orange	8.7 - 36.25	600 - 2500
	32-R-190-0201	Light Blue	29 - 43.5	2000 - 3000

10. PRODUCT MARKING & IDENTIFICATION

The sample nameplate below in Figure 4 shows the information available on each regulator. These are fixed to the S23 actuator on the spring barrel. The most critical components of an S23 regulator construction can be easily identified by a four or 5 digit code following "Type S23-" in the upper left hand corner of the nameplate. The series of numbers and letters after the dash correlate to Table 7. Table 7 indicates the spring range, body style, and safety options of the S23.

MESURA®	cavagna group MANUFACTURER	Via Matteotti, 5 25012 CALVISANO (BS) MADE IN ITALY	CE
Type S23-##L-$	**Serial No:** XXXXXX	**DOM:** MM/YY	**EN 334**
Set Point:	XXXX PSIG	**Spring Range:**	XXX – XXX XXX
Max Inlet Pressure:	XXXX PSIG	**Orifice Size:**	3.35 Inch
Max Diff Pressure:	XXXX PSIG	**Max Outlet Pressure:**	XXX PSIG
IRV TYPE:	None	**Emergency Outlet:**	XXX PSIG

Figure 4: S23 Regulator Nameplate

The S23 may feature a Valve Safety Integrated (VSI-23) into the same body. The VSI-23 is a slam shut valve (SSV) mounted in the same body of the S23, but operates completely independently from the regulator. This SSV will have its own name plate fixed to the diaphragm casing since it is an independent device. An example of this nameplate is below in Figure 5:

MESURA®	cavagna group MANUFACTURER	Via Matteotti, 5 25012 CALVISANO (BS) MADE IN ITALY	
VSI-23 MP	**Serial No:** XXXXXX	**DOM:** MM/YY	**EN 14382**
OPSO Spring Range:	XXX – XXX PSIG	**UPSO Spring Range:**	XXX – XXX PSIG
Max Inlet Pressure:	XXX PSIG	**Max Outlet Pressure:**	XXX PSIG
Max Diff Pressure:	XXX PSIG	**Emergency Outlet:**	XXX PSIG

Figure 5: VSI-23 Nameplate

Table 7: S23 Product Coding					
Model -	**Spring**	**Body**	**-**	**Options**	**Description**
S23 -					
	11				6 - 8.4" WC
	12				8.5 – 11.6" WC
	13				10 – 14.8" WC
	14				14.9 – 24.5" WC
	15				23 – 36" WC
	21				1.26 – 1.5
	22				1.4 – 2.45
	23				2.2 – 3.3
	24				2.8 – 4.0
	25				3.95 – 5.9
	26				6.85 – 10.1
	31				4.7 – 7.25
	32				6.1 – 10.1
	33				8.0 – 13.0
	34				10.3 – 18.5
	35				20.3 – 33.3
	36				27.6 - 52
	42				4.7 – 7.25
	43				6.1 – 10.1
	44				8.0 – 13.0
	45				10.3 – 18.5
	46				20.3 – 33.3
	47				27.6 - 52
		I			3" CL150 RF
		J			3" CL300 RF
				N	Regulator only
				B	Integral SSV (VSI-23)
				M	Monitor Construction
				MB	Monitor + SSV (VSI-23)
				R	Regulator only
				S	Integral SSV (VSI-23)
				MR	Monitor Construction
				MS	Monitor + SSV (VSI-23)

Description
BP: Base Pressure
MP: Medium Pressure
AP: Apex Pressure
APA: Apex Piston Assembly
No IRV
With IRV

11. CONFIGURATIONS & DIMENSIONS

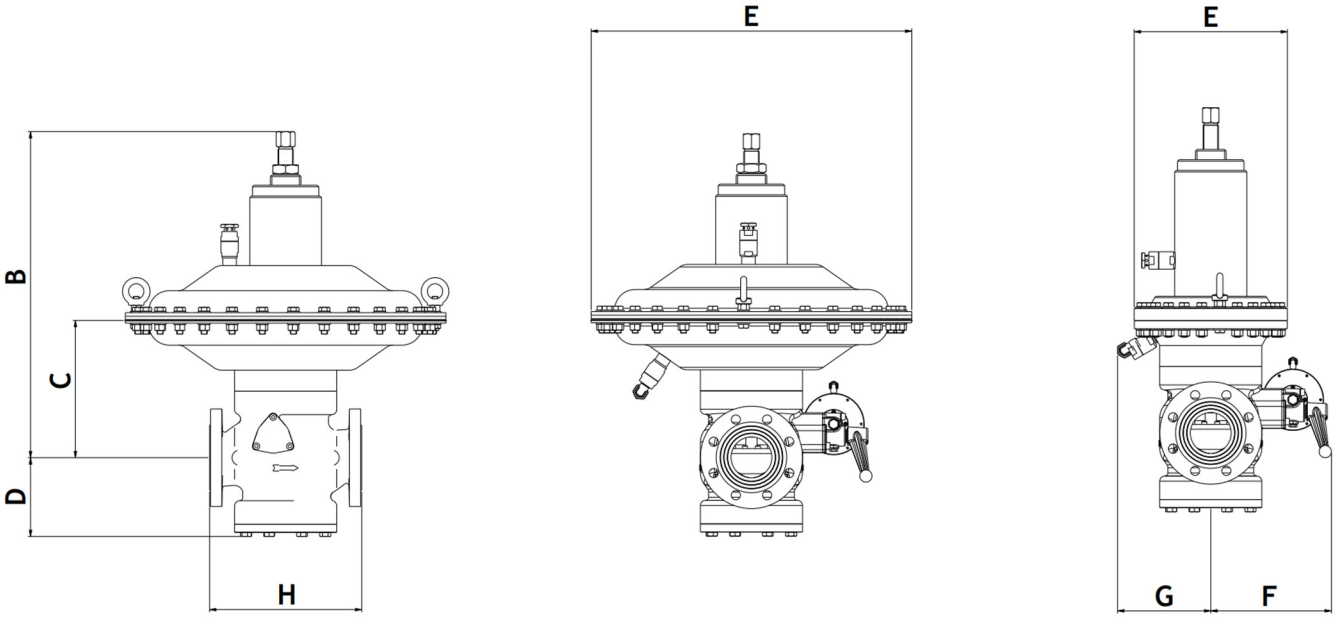

Figure 6: Regulator Dimensions in Inches (mm)

Table 8: Dimensions in Inches (mm)							
Type	**B (max)**	**C**	**D**	**E**	**F**	**G**	**H**
BP or MP	27.5 (700)	10.6 (269)	6.1 (155)	24.8 (630)	9.3 (236)	7.2 (183)	11.73 (298)
AP or APA				11.8 (300)			

Figure 7 below indicates the position of the sense line for the regulator. Please specify desired sense line positions or the standard position (F) will be assumed.

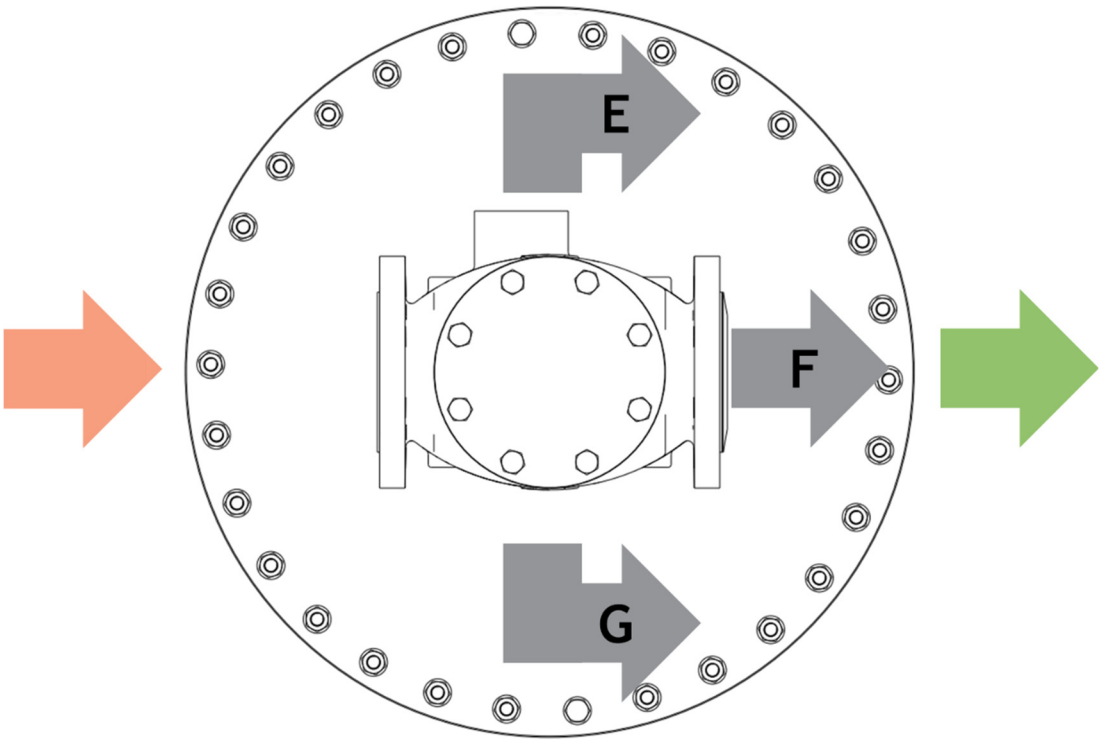

Figure 7: Regulator Sense Line Location Options.

View is from bottom, flow is left to Right.

12. PRODUCT SELECTION

Choose one option or enter the specific request for each section below. Section 8 above offers common set points, but any set points can be provided upon request.

PRODUCT CONSTRCTION CODE (Refer to Table 7) S23-__ __ __ __ __

DELIVERY PRESSURE

Set Point_____

OVER PRESSURE SHUT OFF

Set Point_____

UNDER PRESSURE SHUT OFF

Set Point_____

REGULATOR VENT PROTECTOR

*Standard Umbrella _____

Inverted Umbrella _____

90 Degree Fitting_____

REGULATOR SENSE LINE POSITION:

E _____

*F _____

G _____

SSV VENT PROTECTOR

Inverted Umbrella _____

*90 Degree Fitting_____

Standard Umbrella _____

* Indicates the standard offering that will be provided unless otherwise specified.

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