



APRAGAZ certifies that the Quality System developed by:

**CAVAGNA GROUP S.p.a. Divisione RECA**

for the following activities:

**Design, manufacturing and sales of**

- Pressure regulators (and accessories) for LPG, natural gas and high-pressure gases used for welding and cutting.
- Gas flow meter

carried out at the following location(s):

**Via Matteotti, 5  
25012 VIADANA DI CALVISANO (Brescia)  
ITALY**

has been assessed and found in accordance with the requirements of the standard:

**ISO 9001:2015**

Under the condition the quality system of the company is working satisfactorily,  
the certificate is valid until:

**17/12/2026**

Approval date: 14/12/2023

The General Manager

on behalf of the company

  
**B. NEVE, ir**

17445P000



084 - QMS  
17021



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***08/01/2027***

Approval date : 08/01/2024

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A Cavagna Group Company

# PRESSURE REGULATORS **S7**

*DOUBLE STAGE*



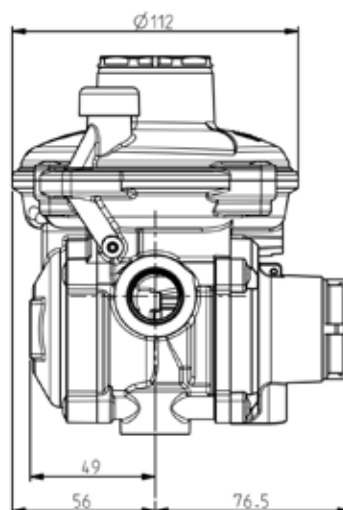
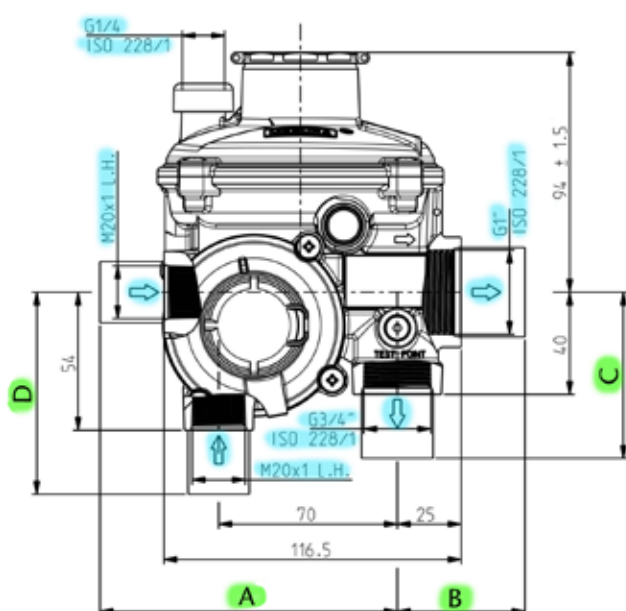
## 1 DESCRIPTION

The **S7** series regulators are a line of direct action type pressure regulators, double stage, normally used for domestic applications, if directly assembled to the meter or in decompression installations in gas grids and industrial uses for natural and manufactured gas, lpg, or other non-corrosive preliminarily treated stable gas.

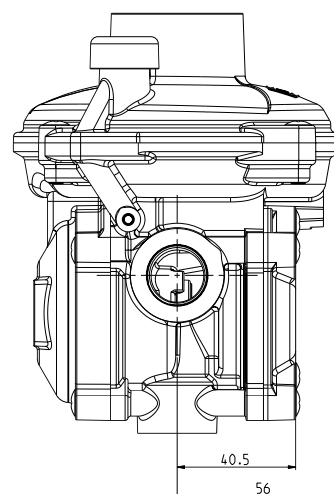
## 2 MATERIALS

**BODY:** Die-cast aluminium EN AC 46500 EN1706  
**DIAPHRAGM:** Nitrile synthetic rubber NBR EN549  
**SPRINGS:** Stainless steel

**COVER:** Die-cast aluminium EN AC 46500 EN1706  
**SEATS:** Brass or aluminium



With shut-off



Without shut-off

			S7-6	S7-10	S7-25	S7-50	S7-70
Diameters			Refer to connection pages				
Connections			Set Configuration pages				
Nominal Capacity (*)	Q	m3/h	6	10	25	50	70
Inlet pressure (**)	Bpe	bar	0,5 ÷ 5 or 6 (***)				1 ÷ 6 (***)
Outlet pressure range	Wh	mbar	14 ÷ 150 (BP) & 100 ÷ 450 (MP)				
Regulating class	RG/AC	%	up to 5				up to 10
Closing pressure class	SG	%	up to 10				up to 20
Working temperature	T	°C	-30 ÷ 60				
Weight		Kg	1,5				

(\*) referred to natural gas with relative density  $d=0,61$

(\*\*) Version Bpe available: 0,022÷1.5 bar ( for Pd 20÷ mbar)

(\*\*\*) Up to max inlet pressure 8.6 bar

### 3 AVAILABLE VERSIONS



Standard version,  
manual reset only



Reset of excess flow  
with button



Reset excess flow  
with lever



Pressure Fitting  
Connection



Variable Regulator

### 4 SAFETY DEVICES

#### OVERPRESSURE SHUT-OFF (OPSO)

It interrupts immediately the gas distribution when the outlet pressure value exceeds the shut-off set point value. The shut-off is adjustable and rearmable exclusively by manual rearming.

#### BLOCKING DEVICE DUE TO EXCESS FLOW

The blocking device intervenes, closing the flow of gas towards the system, when the nominal flow of the regulator exceeds a certain value (between 110% and 200% of the nominal flow).

#### UNDERPRESSURE SHUT-OFF (UPSO)

It interrupts immediately the gas distribution when the outlet pressure value is less than the shut-off set point value. The shut-off is adjustable, exclusively external, by manual rearming.

#### RELIEF VALVE

The relief valve is a device that releases a calibrated amount of gas into the air, through the vent, when the calibration pressure exceeds a certain value. When the pressure returns to the nominal calibration value, the valve closes again. This device protects the regulator from temporary and short pressure exchanges.

**THE RESET OF THE LOCKING DEVICES IS EXCLUSIVELY MANUAL.**



## 4.1 ADDITIONAL SAFETY FUNCTIONS

### ANTI-RESET DEVICE

It's a intrinsic function of the slam shut device which not allow, in any case, the equipment's automatic rearming. Therefore, the rearming, exclusively manual, can be happen only after resolving the inconvenient causes made by the shut-off.

### RESET FOR BLOCKING DEVICE DUE TO EXCESS FLOW WITH PUSH-BUTTON OR LEVER

For the overflow blocking device, push button or lever reset can be requested (see pictures in paragraph 3).

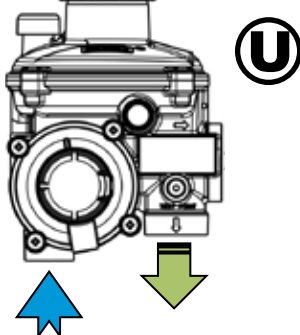
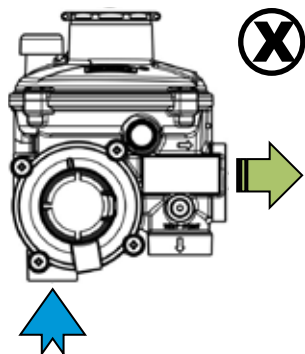
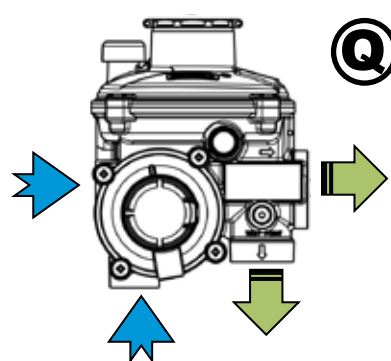
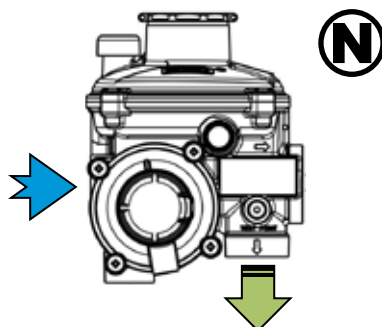
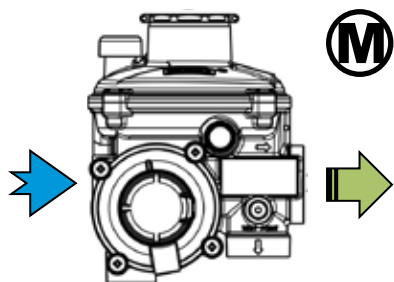
### BLOCK IN CASE OF SECOND STAGE MEMBRANE BREAKAGE

The device is designed in such a way that, following a high gas leak caused by the breaking of the second stage membrane, the shut-off device for minimum downstream pressure intervenes, thus closing the flow of gas towards the plant.

### PRESSURE FITTING CONNECTION

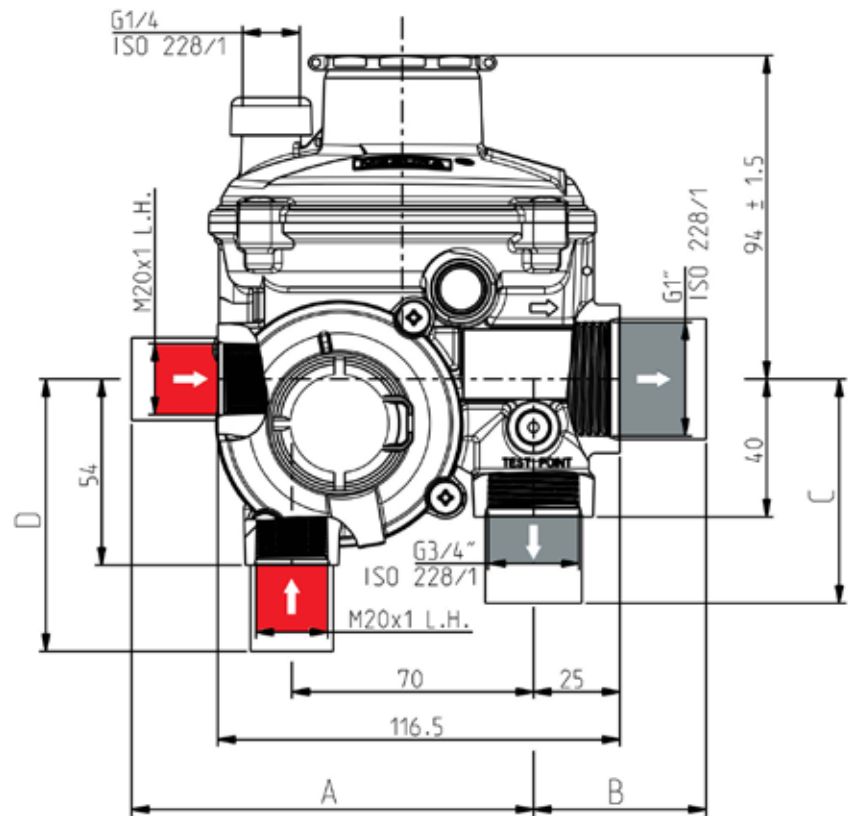
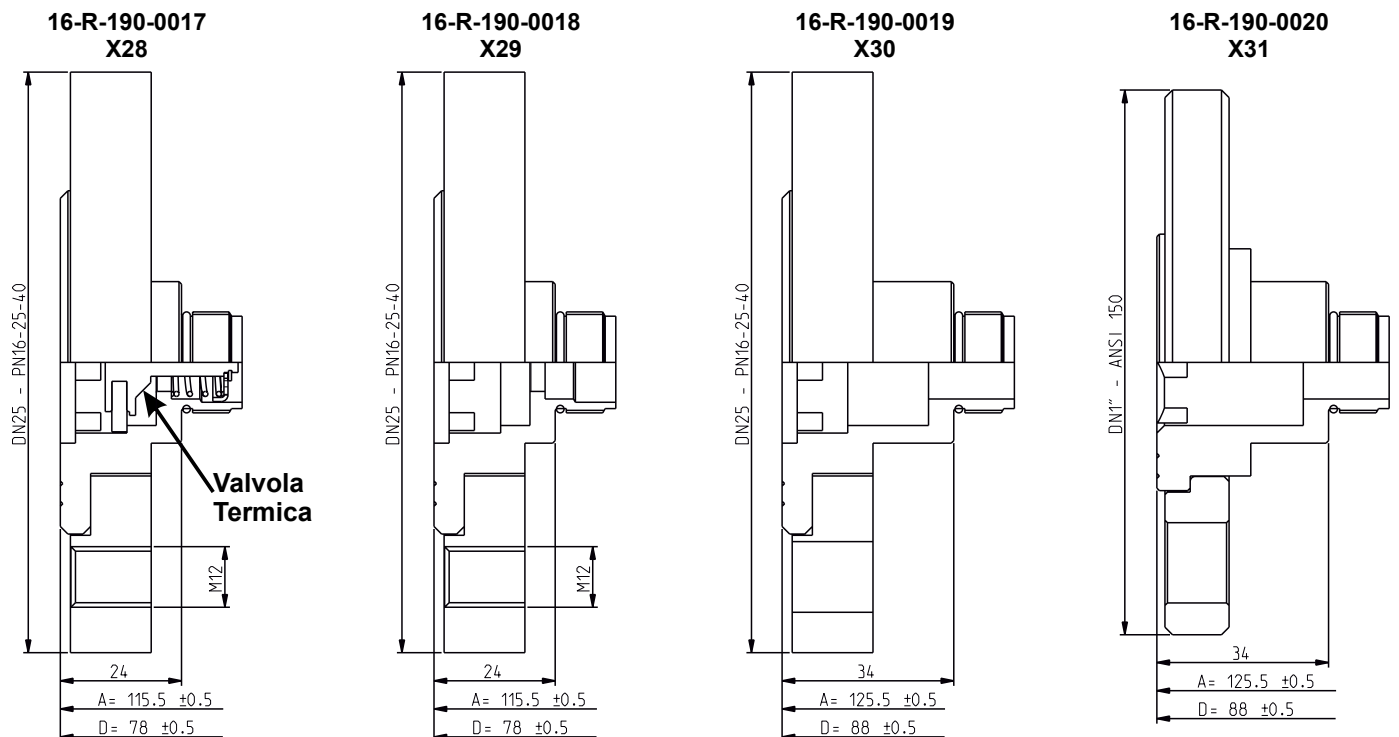
On request, a pressure fitting connection is provided on the output of the regulator.

## 5.1 CONFIGURATIONS



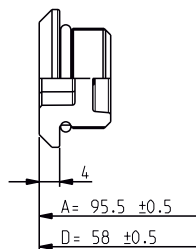
**\*Q:** "Modular" Configuration without inlet and outlet connections available for models S7-6 m3/h - S7-10 m3/h. For higher flow rate (ex. S7-25 / S7-50..) the outlet connesctions are mounted during production.

## INLET CONNECTIONS FLANGED

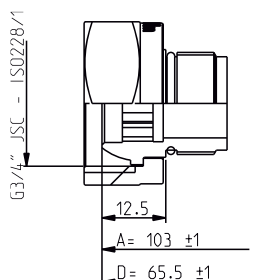
INLET CONNECTIONS  
FLANGED

## INLET CONNECTIONS

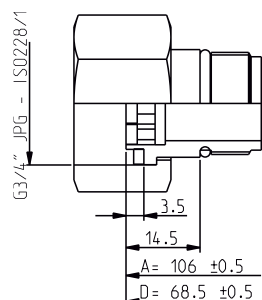
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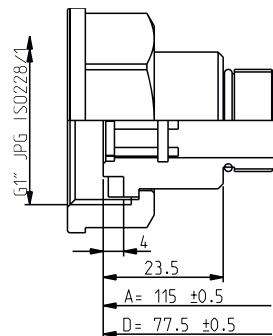
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X12**



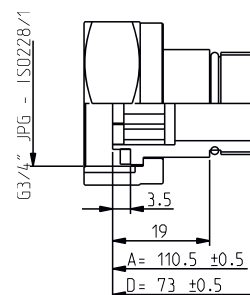
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X13**



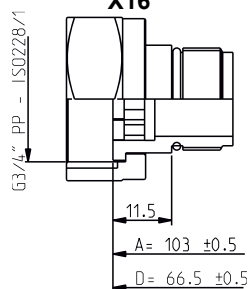
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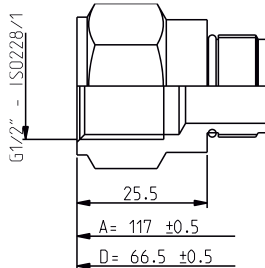
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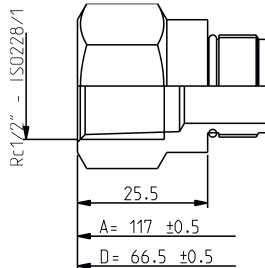
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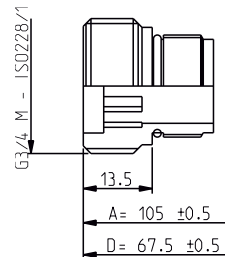
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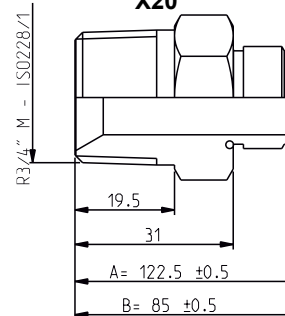
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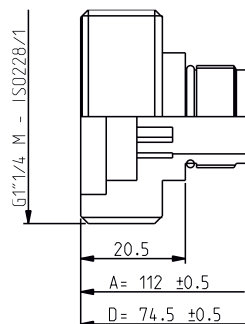
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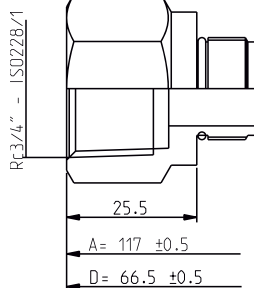
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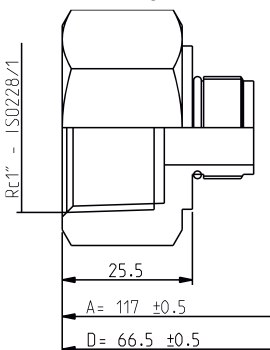
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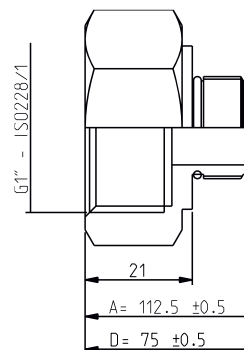
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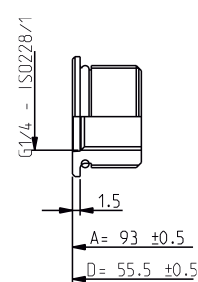
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X23**



**16-R-190-0015  
X24**



**16-R-190-0016  
X25**





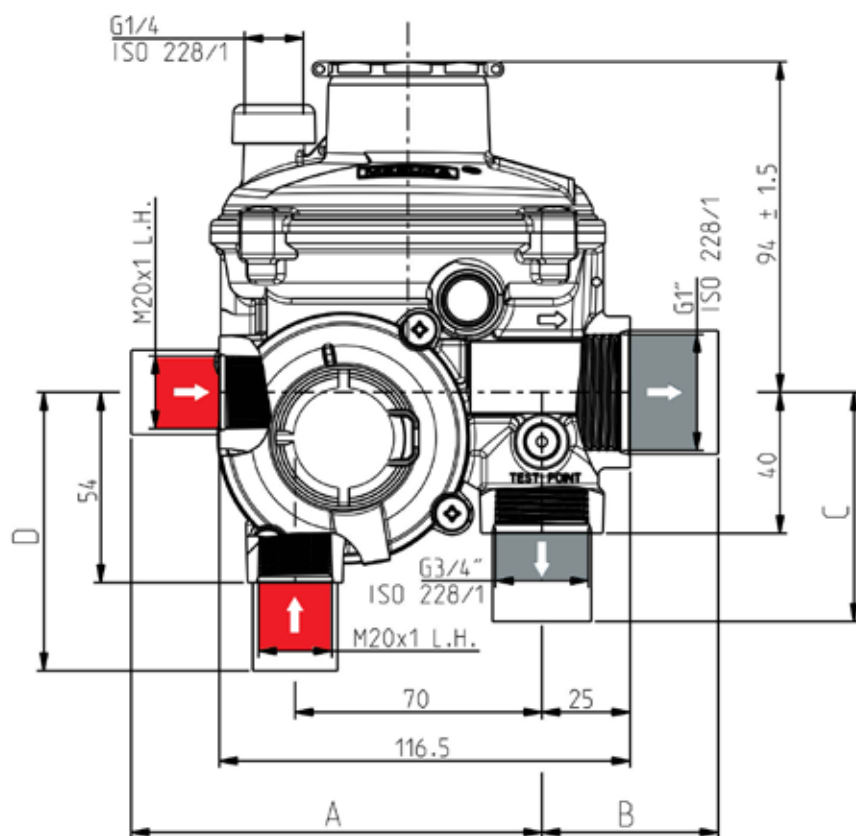
3/4" NPT

25.5

A = 117  $\pm 0.5$

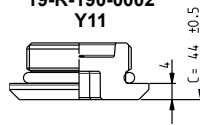
D = 66.5  $\pm 0.5$

## OUTLET CONNECTIONS IN ANGLE POSITION

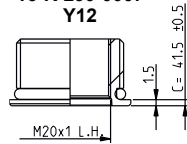


# OUTLET CONNECTIONS IN ANGLE POSITION

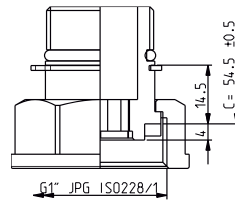
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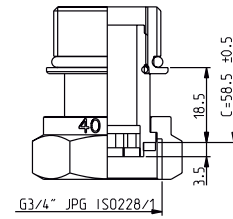
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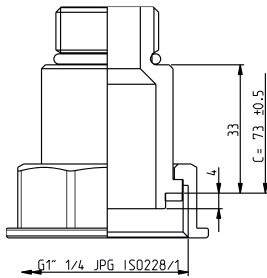
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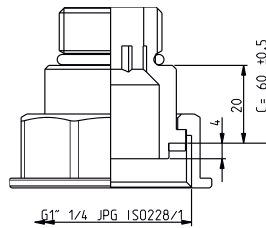
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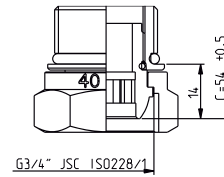
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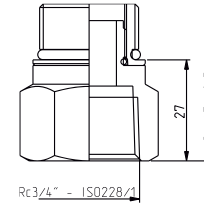
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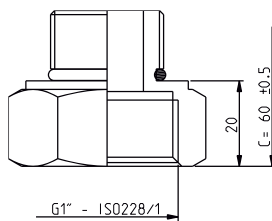
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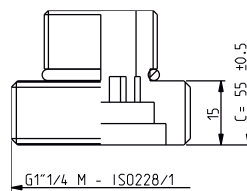
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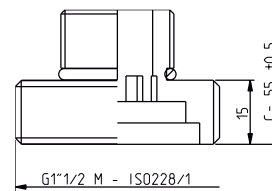
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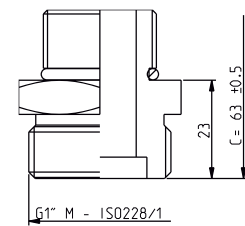
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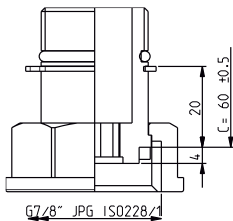
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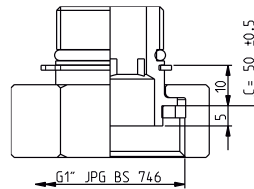
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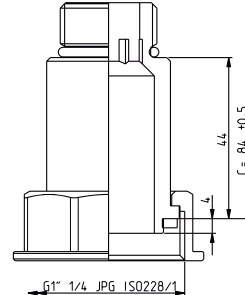
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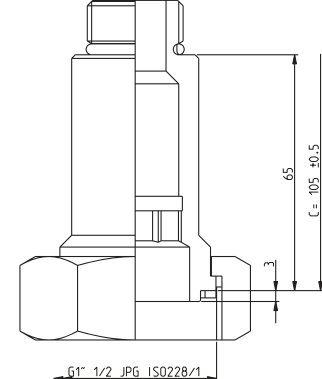
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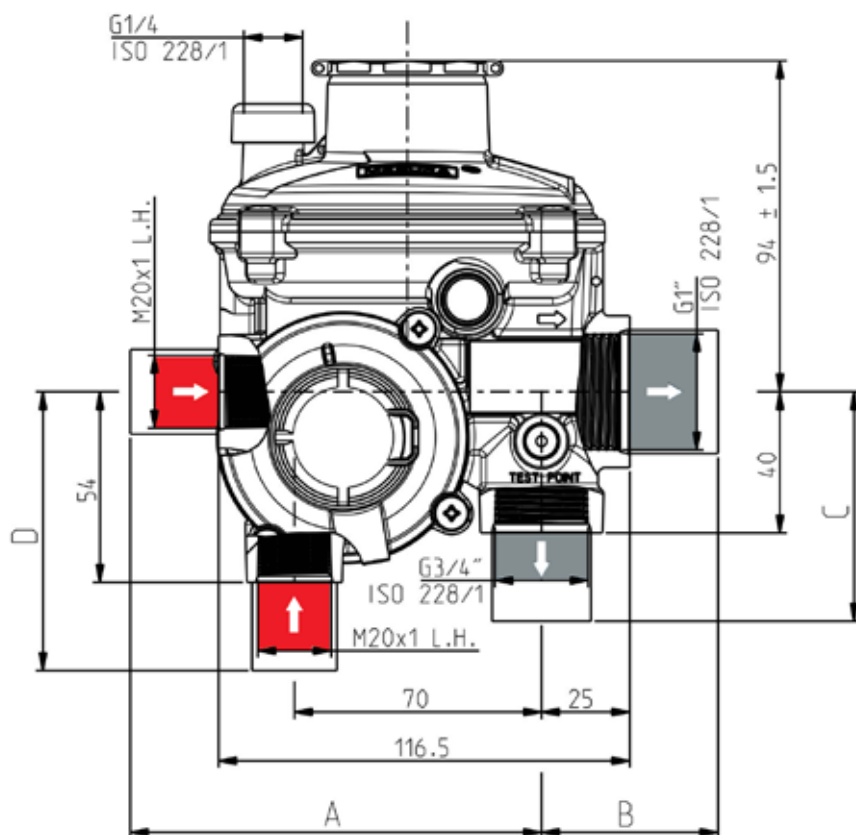
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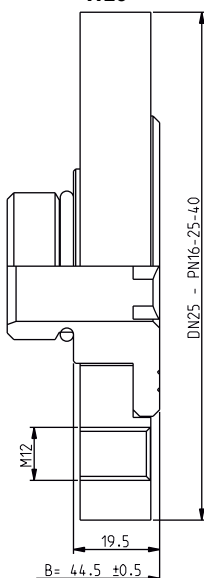


## OUTLET CONNECTIONS IN LINE

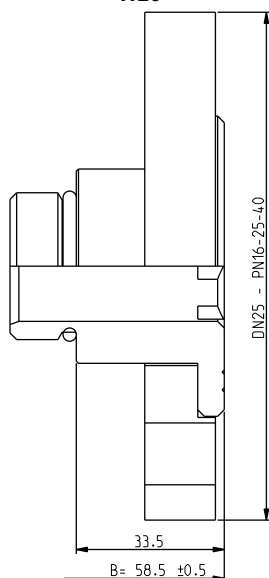


## OUTLET CONNECTIONS IN LINE

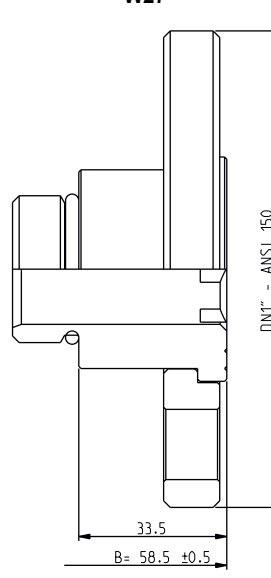
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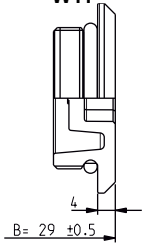
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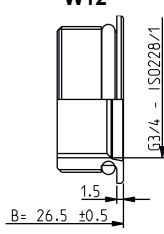
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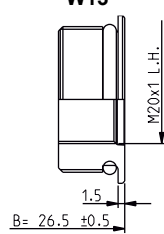
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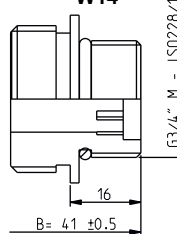
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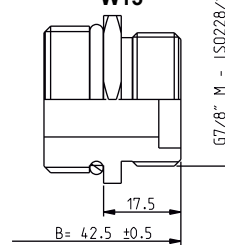
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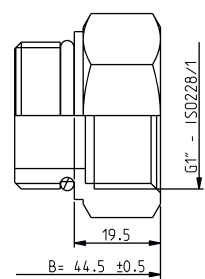
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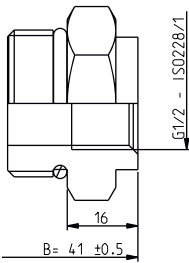
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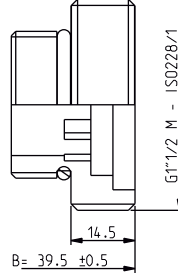
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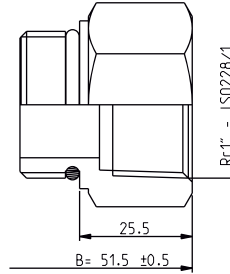
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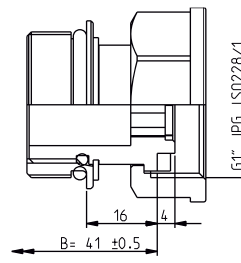
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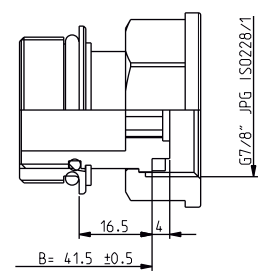
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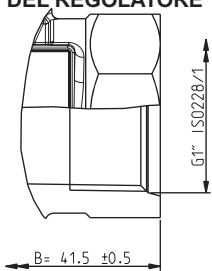
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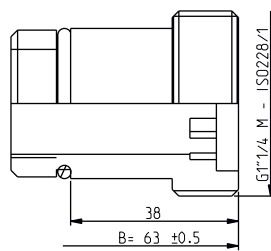
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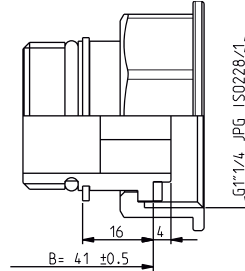
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LAVORATO NEL CORPO  
DEL REGOLATORE



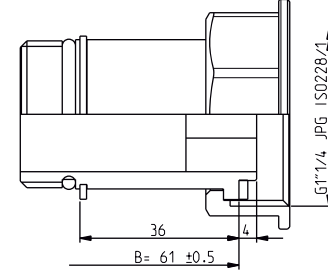
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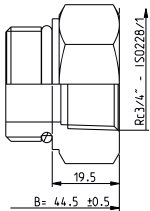
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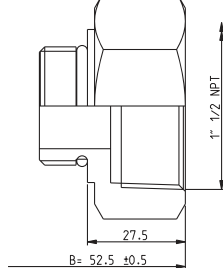
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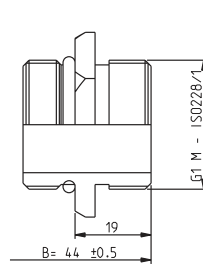
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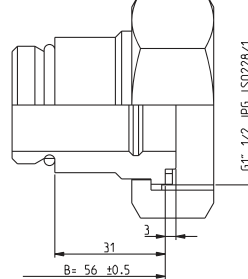
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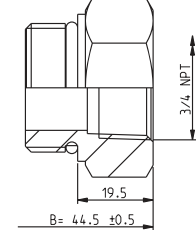
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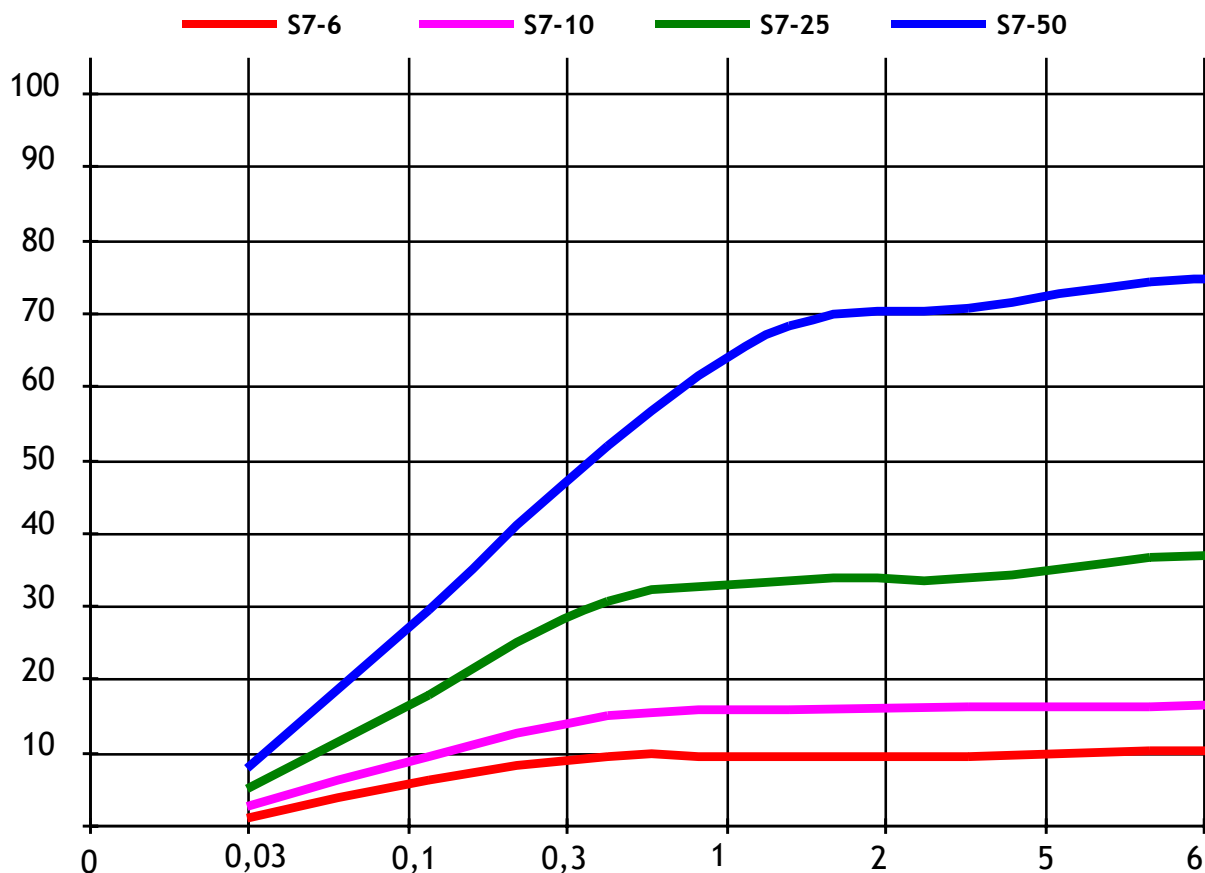
16-R-290-0037  
W31



16-R-290-0038  
W32



## 5.2 CAPACITY TABLE



Typical Capacity curves for regulators with  
 Outlet pressure=25 mbar and RG class up to 5%  
 Values refer to Natural Gas, with relative density (d)=0,61



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**Mesura S.A.S.**  
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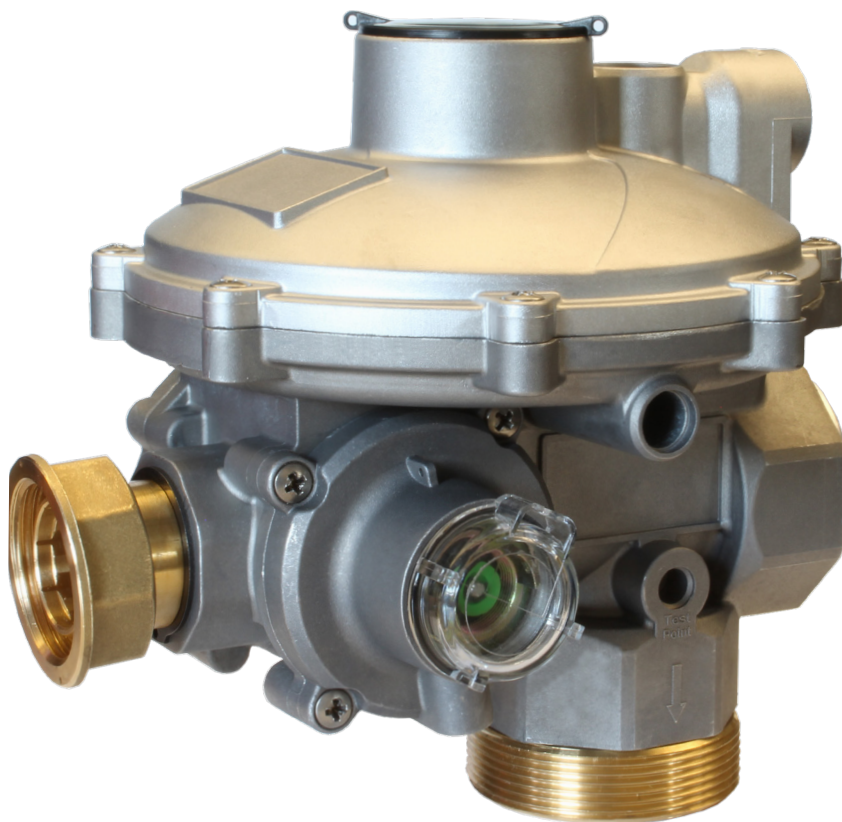




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# PRESSURE REGULATOR **S9**

*DOUBLE STAGE*



## 1 DESCRIPTION

The **S9** series regulators are a line of direct-acting, two-stage pressure regulators, normally for domestic use if directly assembled to the meter or in decompression systems for civil and industrial use, for natural gas, LPG or other types of non-corrosive gases and preliminary treated stable gases.

## 2 MATERIALS

**BODY:** EN AC 46500 EN1706 aluminium

**SEAT:** Brass or aluminium

**DIAPHRAGM:** NBR rubber EN549 (rubber with reinforcement fabric for MP and MPTR versions)

**COVERS:** EN AC 46500 EN1706 aluminium

**SPRINGS:** Stainless steel

S9			
Connections	Ref. to FIG.1 and FIG.2. Various connections available on request		
Nominal Capacity (*)	Q	m <sup>3</sup> /h	Up to 150 Stmc/h**
Inlet Pressure (**)	Bpe	bar	From 0.04 to 8.6
Outlet pressure	Pd	mbar	15 ÷ 100 (BP) & 100 ÷ 300 (MP) 300 ÷ 500 (MPTR***)
Adjustment accuracy class	AC/RG	%	Up to 5
Accuracy class on closure	SG	%	Up to 10
Working temperature	T	°C	-30 ÷ 60
Weight		Kg	2,2 (without additional fittings)

(\*) Referred to natural gas with relative density  $d=0,61$

(\*\*) Capacity as a function of inlet pressure, outlet pressure and accuracy class (AC/RG). Performance curves available on request.

(\*\*\*) TR: reduced head

FIG.1

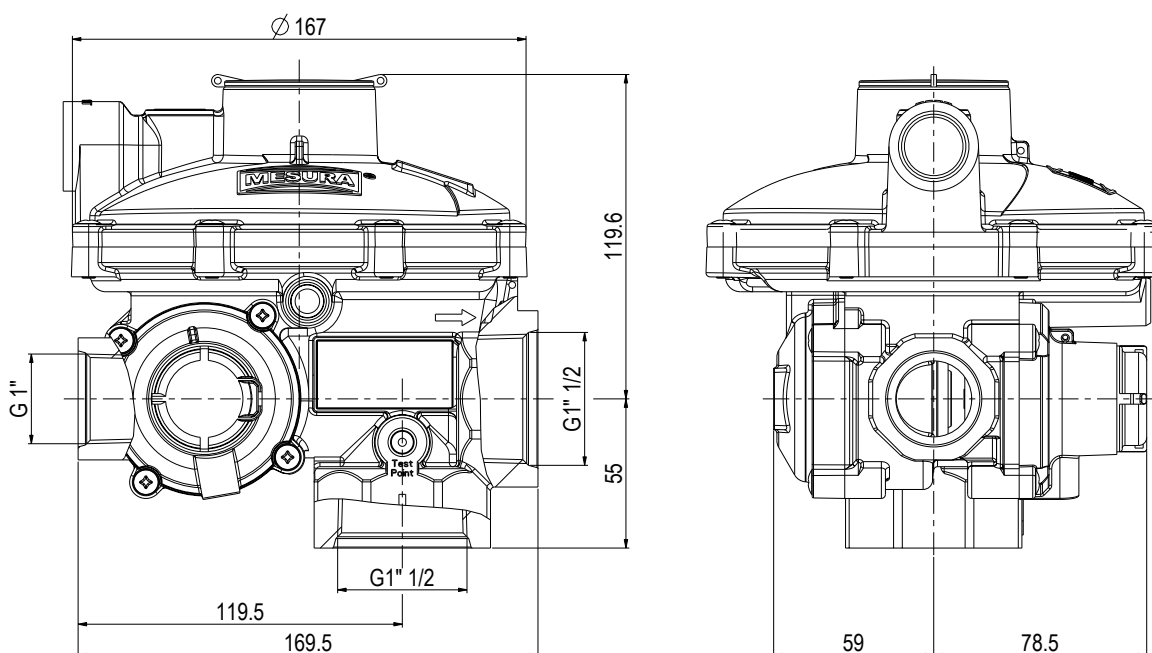
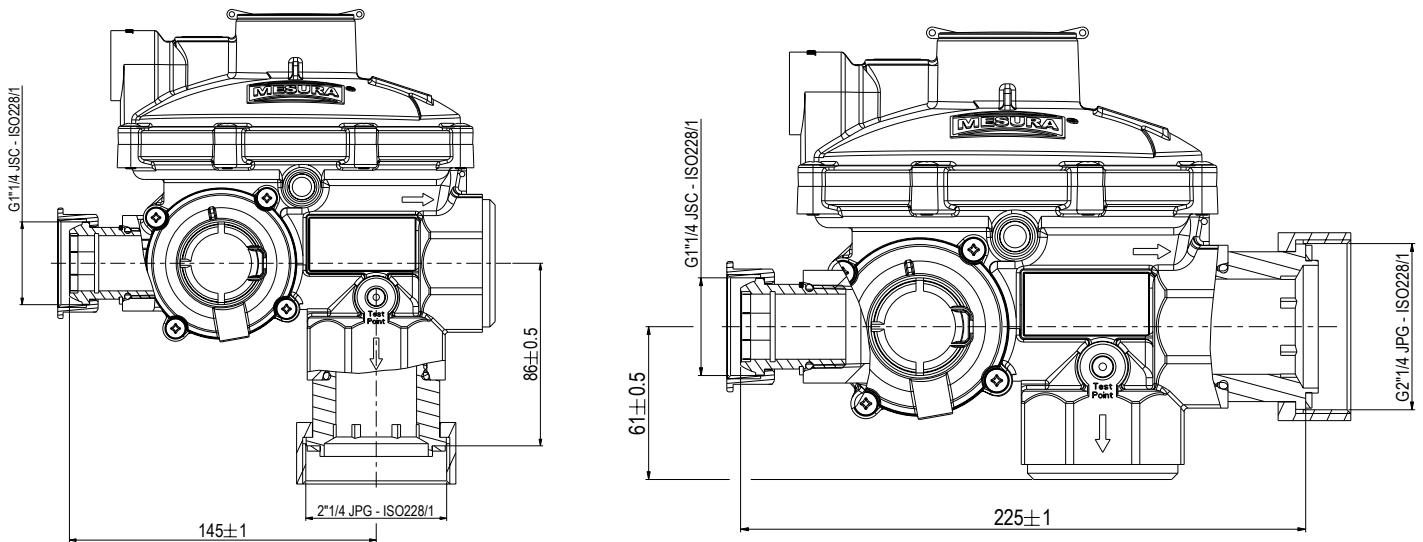


FIG.2



### 3 SAFETY DEVICES AVAILABLE AND ACCESSORIES

#### BUILT-IN FILTER LOCATED AT THE INLET OF THE REGULATOR OVERPRESSURE SHUT-OFF (OPSO)

The downstream overpressure shut-off device immediately interrupts the gas flow to the system, at the inlet of the regulator, when the regulated pressure exceeds the shut-off set point value.

#### RELIEF VALVE

The relief valve is a device that releases a calibrated quantity of gas into the air, through the vent of the cover, when the calibration pressure exceeds a certain value. When the pressure returns to the nominal calibration value, the valve closes again. This device protects the regulator from temporary and short pressure fluctuations.

#### ANTI-RESET DEVICE

The anti-reset device is a function of the slam shut device that does not allow, in any case, the automatic rearming of the equipment.

#### BLOCK IN CASE OF RUPTURE OF SECOND STAGE MEMBRANE

The device is designed so that, following a high gas leakage caused by the rupture of the second stage diaphragm, the shut-off device for minimum downstream pressure intervenes, thus closing the gas flow to the system.

#### EXCESS FLOW RATE BLOCKING DEVICE

The excess flow blocking device intervenes, closing the gas flow to the system, when the nominal flow rate of the regulator exceeds a set value (between 110% and 150% of the nominal flow rate).

#### DOWNSTREAM UNDERPRESSURE SHUT-OFF (UPSO)

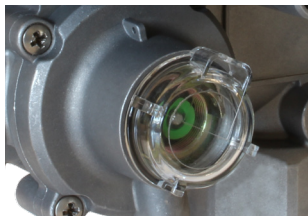
The device intervenes and immediately interrupts the gas distribution if there is a drop in the regulated pressure, below a certain value, or if there is a drop in the supply pressure.

#### OUTLET PRESSURE CONNECTION

On request, a pressure fitting connection is provided on the outlet of the regulator.

#### THE RESET OF THE LOCKING DEVICES IS EXCLUSIVELY MANUAL

## 4 AVAILABLE VERSIONS



Standard version,  
manual reset only

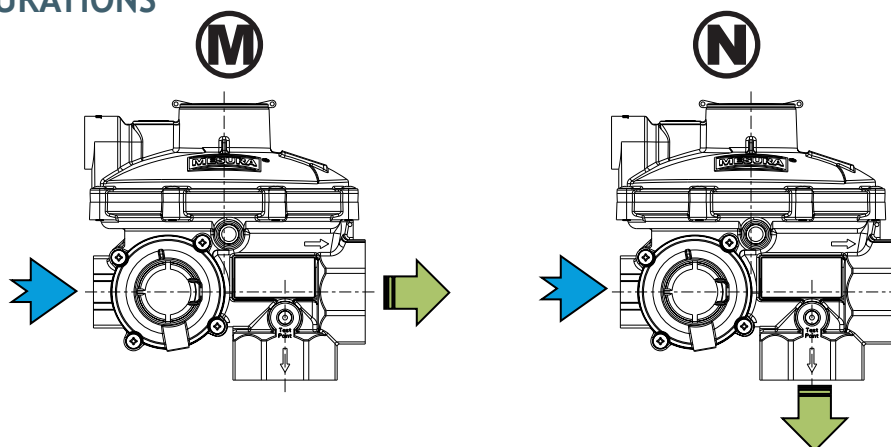


Variable regulator



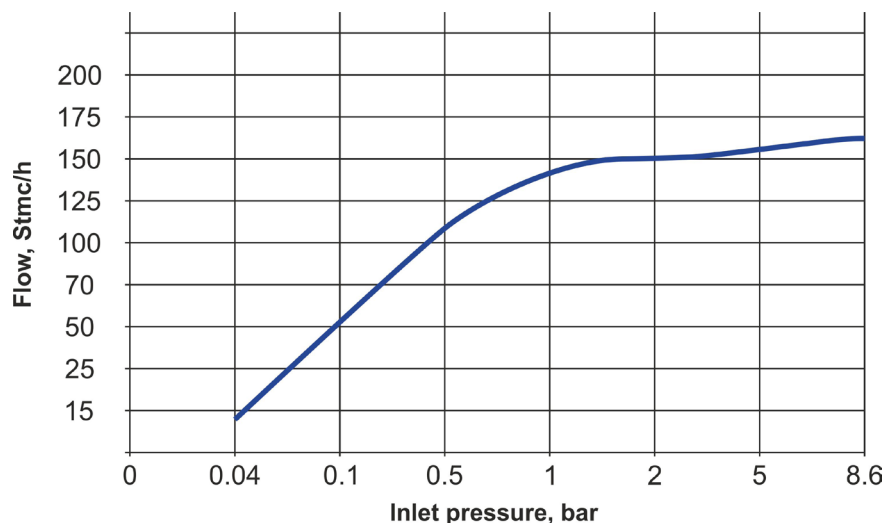
Downstream pressure  
test point

## 5 CONFIGURATIONS



## 6 EXAMPLE FLOW RATE TABLE FOR S9-125

Outlet pressure=25 mbar and RG class up to 5%. The values refer to Natural Gas, with relative density (d)=0.61



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# PRESSURE REGULATORS **S21**

*SPRING LOADED*



## 1 DESCRIPTION

The regulator **S21** is a downstream direct-acting pressure regulator with balanced plug, for low, medium and high pressures. Suitable for civil and industrial uses in canalized networks for natural gas, manufactured gas, LPG and non-corrosive liquids.

Thanks to the concept of a balanced system, the following features are achieved:

- high and accurate flow rate coefficient (even at maximum flow rates);
- high accuracy for lock up zone and pressure.
- Full lock up – no internal leakage.
- Reduced response times.

The **S21** pressure regulator is classified “Fail to Open” type, according to European Standard EN 334.

The **S21** pressure regulators are “top entry” type, which allows for maintenance operations without having to remove the body from the pipes.

## 2 AVAILABLE VERSIONS

### .BP

for an inlet pressure range of 0,5 ÷ 5 bar  
for an outlet pressure range of 10 ÷ 150 mbar

### .MP

for an inlet pressure range of 0,5 ÷ 5 bar  
for an outlet pressure range of 150 ÷ 500 mbar

### .AP

for an inlet pressure range of 0,5 ÷ 5 bar  
for an outlet pressure range of 500 ÷ 4000 mbar

### .APA

for an inlet pressure range of 2 ÷ 20 bar  
for an outlet pressure range of 500 ÷ 4000 mbar

### .APS (NOT BALANCED)

for an inlet pressure range of 2 ÷ 20 bar  
for an outlet pressure range of 500 ÷ 4000 mbar

## 3 MATERIALS

- Body in cast iron GJS-400-18 UNI EN 1563
- Covers in aluminium die-cast EN AC46100 EN1706
- Diaphragms in rubber with cloth enforcement
- Seats in stainless steel or brass
- Springs in stainless steel

## 4 FEATURES

- Diaphragm shock absorber or relief valve
- Available with internal pressure pulse only
- In accordance to 2014/68/UE - EN334
- Working Temperature: -20° C (-30° C) ÷ 60° C
- Regulating Class: up to A.C. 5
- Closing Pressure Class: up to S.G.10

## 5 TECHNICAL DATA

AVAILABLE VERSIONS:  
• B: WITH OPSO/UPSO SHUT-OFF VALVE  
• M: WORKING AS MONITOR

	INLET PRESSURE			OUTLET PRESSURE				CG (VALVE COEFFICIENT)	CONNECTIONS
	BP, MP, AP	APS	APA	BP	MP	AP, APS	AP, APA		
	BAR			MBAR					
S21- IPR 75	5 or 6	20		10 ÷ 150	150 ÷ 500	500 ÷ 4000		160	1" x 1"
S21- IPR 150	5 or 6		20				500 ÷ 4000	281	1"x1"1/2



## 5.1 DIMENSIONING

The choice of the regulator is made using the **CG** valve coefficient.

**CG** coefficient is numerically equivalent to the value of air flow in Scfh in critical conditions with full open regulator operating with an upstream pressure of 1 psia and a temperature of 15° C.

Flow rates with maximum operating at different operating conditions can be calculated as follows:

a. in non critical conditions (when  $P_U < 2 P_D$ )

$$Q = \frac{13,57}{\sqrt{d \times (t_u + 273)}} \times C_g \times \frac{P_u + P_D}{2} \times \sin \left[ K_1 \times \sqrt{\frac{P_u - P_D}{P_u + P_D}} \right]_{\text{deg}}$$

b. in critical conditions (when  $P_U \geq 2 P_D$ )

$$Q = \frac{13,57}{\sqrt{d \times (t_u + 273)}} \times C_g \times \frac{P_u + P_D}{2}$$

where:

Q = capacity [Stm3/h]

$P_U$  = Absolute upstream pressure [bar]

$P_D$  = Absolute downstream pressure [bar]

$P_b$  = Ambient atmospheric pressure [bar]

d = relative density (air= 1, non dimensional value)

$K_1$  = body shape factor

$t_u$  = gas temperature at the inlet of the regulator under test in °C

## 6 OPERATING PRINCIPLE

The operating principle for the **S21** regulators is the same as for all models, with the exception of certain marginal differences, exemplified below.

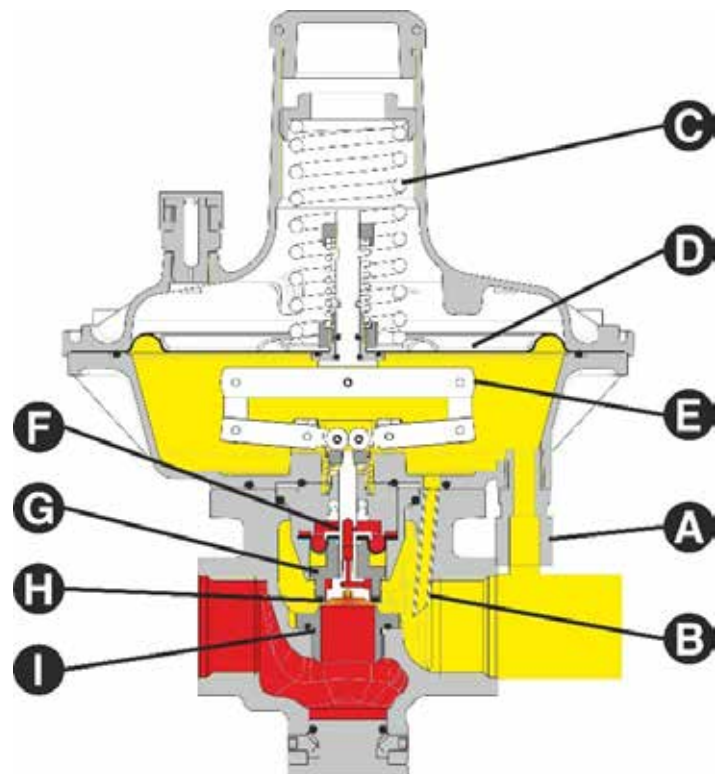
The **S21** pressure regulator is a direct action type device with downstream control pressure through external (A) plus internal (B) impulse (internal only impulse version available).

The downstream pressure is controlled by comparing the spring load (C) and the thrust deriving from the downstream pressure on the diaphragm (D).

The movement of the diaphragm is transmitted by the lever system (E) to the rod (F) and stopper (G).

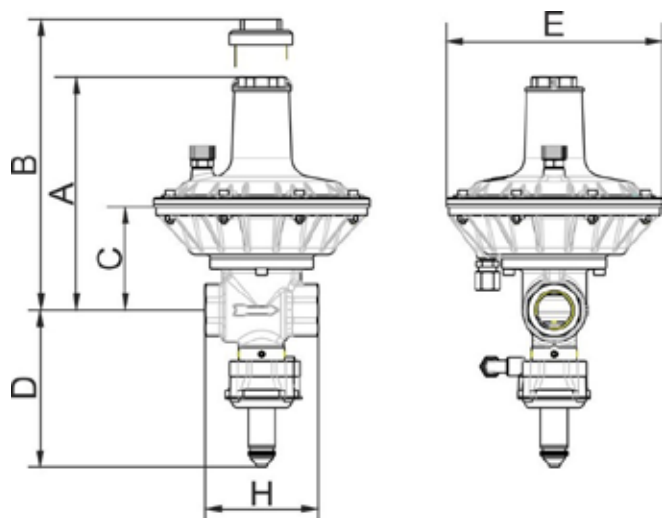
The rubber pad (H) is vulcanized on the stopper and assures hermetic closing when there is no capacity request on the installation

If during operation the thrust deriving from the downstream pressure is less than the spring load (C), the diaphragm (D) lower itself, and draws the stopper (G) away from the valve housing (I) until the downstream pressure once again attains the pre-set calibration value.



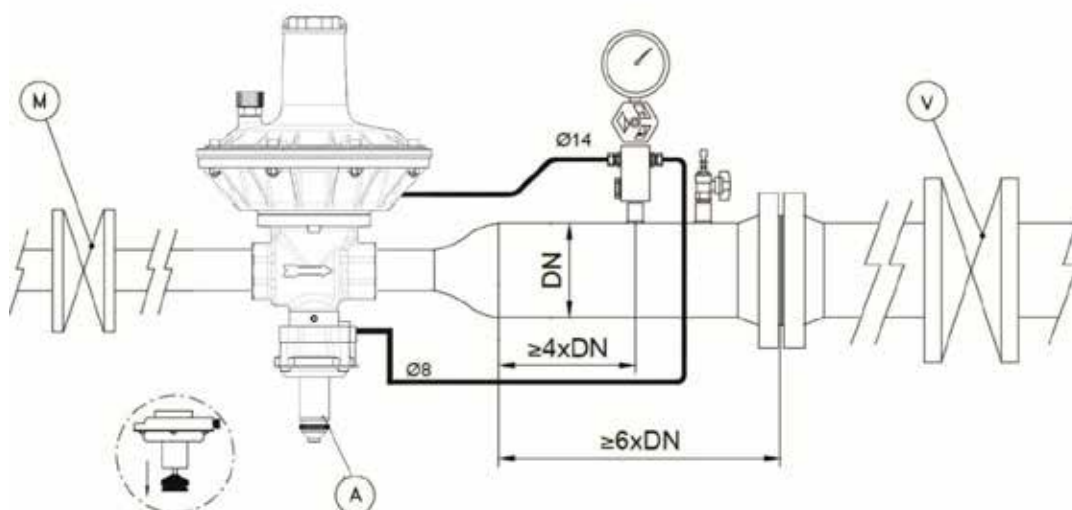
## 7.1 OVERALL DIMENSIONS

S21-IPR 75 / S21- IPR 150 B



	H		A	B	C	D	G	E		
	1" x 1"	1" x 1" 1/2						VERSION		
			MM							
S21-IPR 75 B	100		220	385	90	135	-	189	189	189 TR
								BP	MP	AP - APS
S21-IPR 150 B		130	220	385	90	135	-	189	189	189 TR
								BP	MP	AP - APA

## 7.2 INSTALLATION S21



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# PRESSURE REGULATORS **S22**

*SPRING LOADED*



## 1 DESCRIPTION

The regulator **S22** is a downstream direct-acting pressure regulator with balanced plug, for low, medium and high pressures.

Suitable for civil and industrial uses in canalized networks for natural gas, manufactured gas, LPG and non-corrosive liquids.

Thanks to the concept of a balanced system, the following features are achieved:

- high and accurate flow rate coefficient (even at maximum flow rates);
- high accuracy for lock up zone and pressure.
- Full lock up – no internal leakage.
- Reduced response times.

The **S22** pressure regulator is classified “Fail to Open” type, according to European Standard EN 334.

The **S22** pressure regulators are “top entry” type, which allows for maintenance operations without having to remove the body from the pipes.

## 2 AVAILABLE VERSIONS

### .BP

for an inlet pressure range of 0,5 ÷ 5 bar  
for an outlet pressure range of 10 ÷ 150 mbar

### .MP

for an inlet pressure range of 0,5 ÷ 5 bar  
for an outlet pressure range of 150 ÷ 500 mbar

### .AP

for an inlet pressure range of 0,5 ÷ 5 bar  
for an outlet pressure range of 500 ÷ 4000 mbar

### .APA

for an inlet pressure range of 2 ÷ 20 bar  
for an outlet pressure range of 500 ÷ 4000 mbar

## 3 MATERIALS

- Body in cast iron (GJS-400-18 UNI EN 1563)
- Covers in aluminium die-cast EN AC46100 EN1706
- Diaphragms in rubber with cloth enforcement
- Seats in stainless steel or brass
- Springs in stainless steel

## 4 FEATURES

- Anti-pumping device
- Diaphragm shock absorber or relief valve
- In accordance to 2014/68/UE - EN334
- Working Temperature: -20° C (-30°C) ÷ 60°C
- Regulating Class: up to A.C. 5
- Closing Pressure Class: up to S.G. 10

## 5 TECHNICAL DATA

**AVAILABLE VERSIONS:**  
• **B:** WITH OPSO/UPSO SHUT-OFF VALVE  
• **M:** WORKING AS MONITOR

	INLET PRESSURE		OUTLET PRESSURE			CG (VALVE COEFFICIENT)	CONNECTIONS
	BP, MP, AP	APA	BP	MP	AP, APA		
	BAR		MBAR				
S22- IPR 300	5 or 6	20	14 ÷ 150	150 ÷ 500	500 ÷ 4000	574	DN40
S22- IPR 600	5 or 6	20			500 ÷ 4000	1160	DN50

## 5.1 DIMENSIONING

The choice of the regulator is made using the **CG** valve coefficient.

**CG** coefficient is numerically equivalent to the value of air flow in Scfh in critical conditions with full open regulator operating with an upstream pressure of 1 psia and a temperature of 15° C.

Flow rates with maximum operating at different operating conditions can be calculated as follows:

a. in non critical conditions (when  $P_u < 2 P_d$ )

$$Q = \frac{13,57}{\sqrt{d \times (t_u + 273)}} \times C_g \times \frac{p_u + p_b}{2} \times \sin \left[ K_1 \times \sqrt{\frac{p_u - p_d}{p_u + p_b}} \right]_{deg}$$

b. in critical conditions (when  $P_u \geq 2 P_d$ )

$$Q = \frac{13,57}{\sqrt{d \times (t_u + 273)}} \times C_g \times \frac{p_u + p_d}{2}$$

where:

Q = capacity [Stm3/h]

$P_u$  = Absolute upstream pressure [bar]

$P_d$  = Absolute downstream pressure

$P_b$  = Ambient atmospheric pressure [bar]

d = relative density (air= 1, non dimensional value)

$K_1$  = body shape factor

$t_u$  = gas temperature at the inlet of the regulator under test in °C

## 6 OPERATING PRINCIPLE

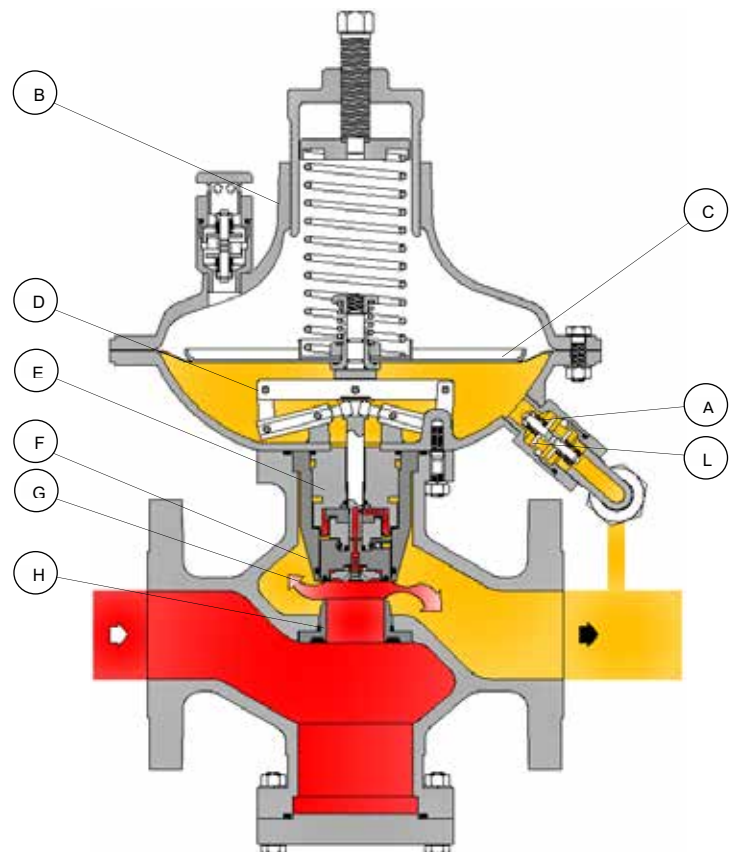
The operating principle for the **S22** regulators is the same as for all models, with the exception of certain marginal differences, exemplified below.

The **S22** pressure regulator is a direct action type instrument with pressure control downstream through external impulse (**A**).

The downstream pressure is controlled by comparing the spring load (**B**) and the thrust deriving from the downstream pressure on the diaphragm (**C**).

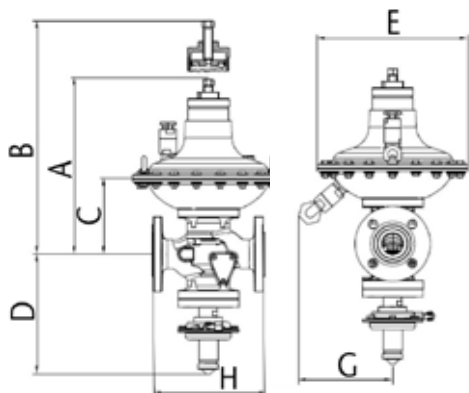
The diaphragm's movement is transmitted by the lever system (**D**) to the rod (**E**) and stopper (**F**). The rubber pad (**G**) is vulcanized on the stopper and assures hermetic closing when the required capacity is nil.

If during operation the thrust deriving from the downstream pressure is less than the spring load (**B**), the diaphragm (**C**) lower itself, and draws the stopper (**F**) away from the valve housing (**H**) until the downstream pressure once again attains the pre-set calibration value.



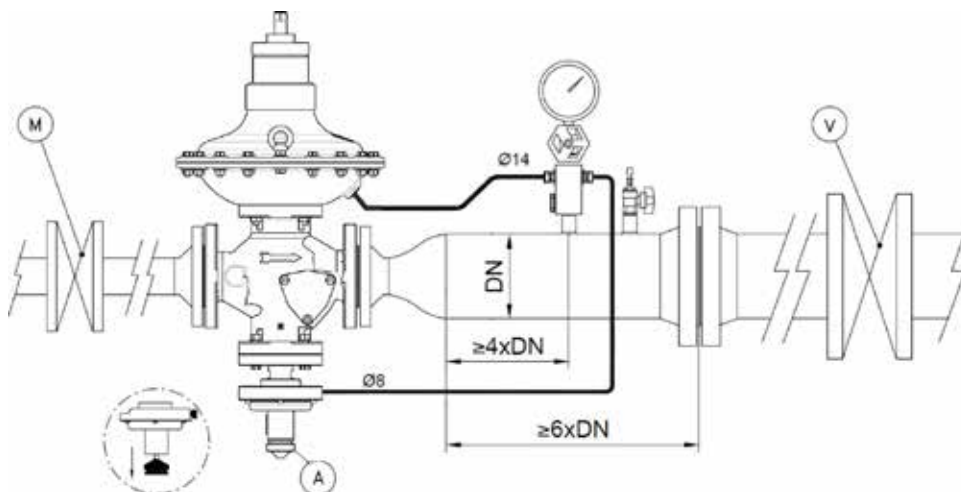
## 7.1 OVERALL DIMENSIONS

S22-IPR 300 B / S22-IPR 600 B



	H		A	B	C	D	F	G	E		
	DN 40	DN 50							VERSION		
	mm										
S22-IPR 300 B	223		400	460	151	240		175	300	300	300 TR
									BP	MP	AP - APA
S22-IPR 600 B	223	254	400	460	165	250		175	300	300	300 TR
									BP	MP	AP - APA

## 7.2 INSTALLATION S22



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# REGULATORS SERIES **S23**

*SPRING LOADED PRESSURE REGULATORS*



## 1 DESCRIPTION

The **S23** regulators are a new line of pressure regulators – direct operating type – designed to guarantee a high regulation accuracy and an utmost easiness in use. These devices are usually used in distribution and industrial systems and are designed to be installed in regulation units in gas grids of natural, manufactured and lpg gas or other non corrosive gases, filtered at first. The **S23** pressure regulators are “fail to open” type, which means that in case of malfunction due to breaking of the main diaphragm or as a result of a lack of impulse downstream, the regulator will open up completely. The **S23** pressure regulators are “top entry” type, which allows for maintenance operations without having to remove the body from the pipes. Modularity allows for variation in its configuration even when already installed in stream. In addition, the modules can be easily disassembled for eventual controls.

## 2 VERSIONS AVAILABLE

- |   |   |
|---|---|
| <p><b>.BP</b><br/>for an inlet pressure range of 0,5 ÷ 5 bar<br/>for an outlet pressure range of 10 ÷ 80 mbar</p> <p><b>.MP</b><br/>for an inlet pressure range of 0,5 ÷ 5 bar<br/>for an outlet pressure range of 75 ÷ 500 mbar</p> <p><b>.AP</b><br/>for an inlet pressure range of 0,5 ÷ 5 bar<br/>for an outlet pressure range of 500 ÷ 4000 mbar</p> | <p><b>.APA</b><br/>for an inlet pressure range of 0,5 ÷ 5 bar<br/>for an outlet pressure range of 500 ÷ 4000 mbar</p> |
|---|---|

## 3 MATERIALS

- Body in cast iron (GJS-400-18LT UNI EN 1563)
- Covers in pressed steel
- Diaphragms in rubber with cloth enforcement
- Seats in stainless steel
- Springs in stainless steel
- Available with internal pressure pulse only

## 4 FEATURES

- Counterbalanced regulating device
- Anti-pumping device
- Diaphragm shock absorber or relief valve
- Top entry construction
- In accordance to PED 2014/68/UE - EN334
- Working Temperature: -20 (-30) ÷ 60
- Regulating Class: up to A.C. 5
- Closing Pressure Class: up to S.G. 10

## 5 TECHNICAL DATA

	INLET PRESSURE			OUTLET PRESSURE				CG (VALVE COEFFICIENT)	CONNECTIONS
	BP, MP, AP	APS	APA	BP	MP	AP	AP, APA		
	BAR			MBAR					
S23- 1	5 or 6		19	10 ÷ 80	75 ÷ 500	500 ÷ 4000	500÷ 4000		DN50
S23- 2	5 or 6							3380	DN80

### AVAILABLE VERSIONS:

- B: WITH OPSO/UPSO SHUT-OFF VALVE
- M: WORKING AS MONITOR

## 5.1 DIMENSIONING

The choice of the regulator is made using the **C<sub>g</sub>** valve coefficient.

**C<sub>g</sub>** coefficient is numerically equivalent to the value of air flow in Scfh in critical conditions with full open regulator operating with an upstream pressure of 1 psia and a temperature of 15° C.

Flow rates with maximum operating at different operating conditions can be calculated as follows:

a. in non critical conditions (when  $P_e < 2 \text{ Pa}$ )

$$Q = 0,526 * C_g * P_e * \sin \left( 93,5 * \sqrt{\frac{(P_e - P_a)}{P_e}} \right)^{D_{eg}}$$

b. in critical conditions (when  $P_e \geq 2 \text{ Pa}$ )

where:

$$Q = 0,526 * C_g * P_e$$

Q=capacity [Stm3/h]

Pe= absolute upstream pressure [bar]

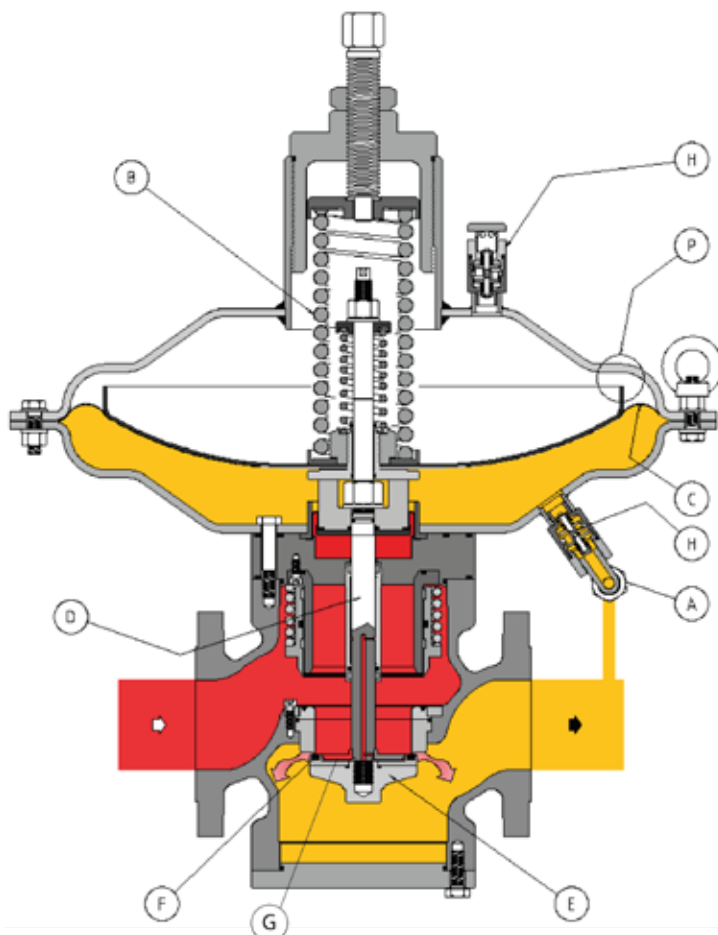
Pa= absolute downstream pressure [bar]

## 6 OPERATING PRINCIPLE

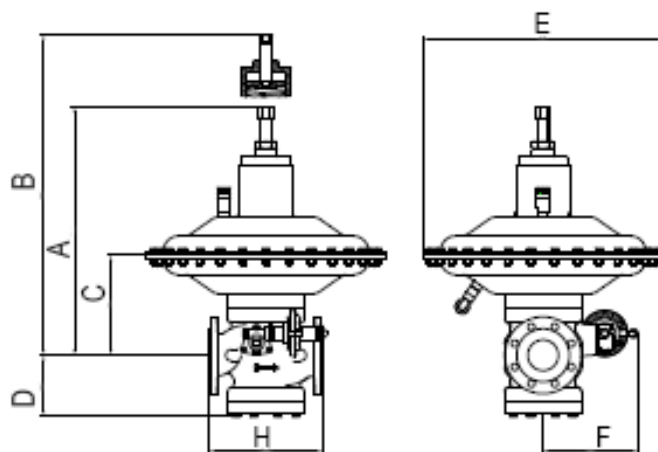
The operating principle for the **S23** regulators is the same as for all models, with the exception of certain marginal differences, exemplified below. The **S23** pressure regulator is a direct action type instrument with pressure control downstream through external impulse (**A**).

The downstream pressure is controlled by comparing the spring load (**B**) and the thrust deriving from the downstream pressure on the diaphragm (**C**). The diaphragm's movement is transmitted by the lever system (**D**) to the rod (**E**). The rubber pad (**F**) is vulcanized on the stopper (**G**) and assures hermetic closing when the required capacity is nil. If during operation the thrust deriving from the downstream pressure is less than the spring load (**B**), the diaphragm (**C**) lower itself, and draws the stopper (**G**) away from the valve housing until the downstream pressure once again attains the pre-set calibration value.

The regulator has incorporated two anti-pumping devices (**H**) that have the function of slowing the inflow / outflow of the gas to the head in the transitory phases in order to eliminate possible phenomena of commutation.

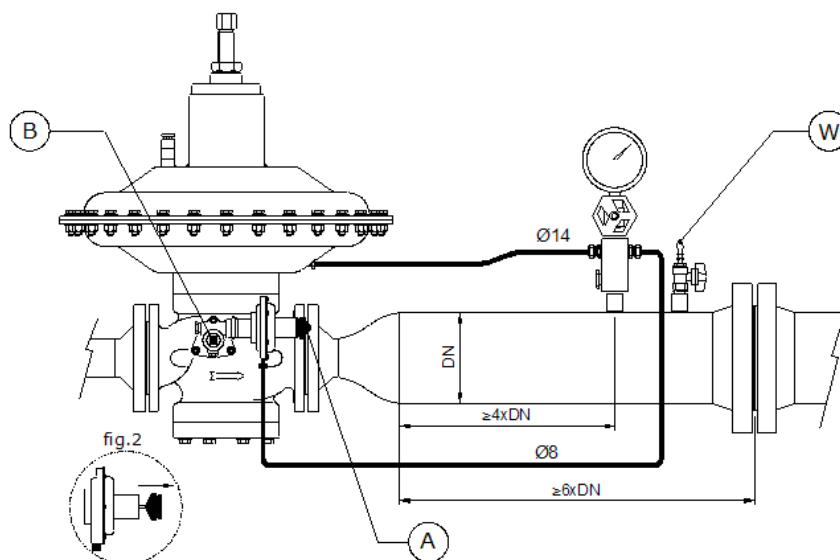


## 7.1 OVERALL DIMENSIONS S23



	H			A	B	C	D	F	E			
	DN 65	DN 80	DN 100						OUTLET PRESSURE RANGE (MBAR)			
	MM			MM					MM			
S23-1 B		298		750	960	500	210	160	630	630 TR	380	380 TR
									10 ÷ 80	75 ÷ 500	470 ÷ 2000	1900 ÷ 4000

## 7.2 INSTALLATION S23



## Annex 2

### Warranty conditions

LPG-NATURAL GAS-COMPRESSED GASES REGULATOR PRODUCTS WARRANTY | Not valid for USA and Canada

#### 1 – Compliance of the brand new products

The original seller of the brand new product (hereinafter referred to as Product) hereby warrants that the Product corresponds in quantity, quality, and type as specified in the sales contract (or, if missing, in the order's confirmation) for the Product and that the Product is without defects that could render it unfit for the use to which it is intended. The original seller of the Product is identified on the invoice for the Product and is referred to herein as the "Warrantor."

#### 2 – Extent of the guarantee

The warranty is limited only to defects in a) the design of the Product, b) the materials in the Product or c) the construction of the Product, which can be attributed to the Warrantor. The warranty does not apply in the case where the buyer is unable to prove correct storage and maintenance of the brand new products, or in the case the buyer has modified the Product without the prior written agreement of the Warrantor. Furthermore, the Warrantor is not liable for defects in the brand new product due to the normal wear and deterioration of those parts of the Product, which by their nature, are subject to rapid and continuous wear and tear (e.g.: lining, etc.).

In general, in no case shall the Warrantor be liable for defects in compliance that arise after the transfer of risk or possession of the Product to the buyer has taken place.

The warranty is valid only when the brand new products are installed, used and maintained in conformity with the warnings and instructions provided by the Warrantor in the instruction manual or other Product literature and in conformity with the applicable laws, standards or regulations existing in the location where the brand new products are used or, in the absence of any applicable laws, standards or regulations, in conformity with the best practices in the applicable industry or trade.

#### 3 – Claims

The buyer is required to check the compliance of the brand new Products and confirm the absence of flaws. The buyer should report any flaws or defects in brand new Products, in the following ways and time. Failure to properly and timely report a defect will void the warranty:

Claims for shortage or damages that could have been apparent from an examination of the exterior of the Product's packaging contents must be reported as soon as the brand new Products arrive at their place of destination or, in any event, , no more than 5 days after that time.

Claims relevant to quantity, colour, quality flaws or defects or non-compliance that the buyer should have been able to identify as soon as it took possession of the Product, must be made shortly after the time when the brand new Product arrives at its place of destination or, in any event, no more than 15 days after that time;

Hidden flaws, defects or non-compliance (that is, those not identifiable according to the inspection imposed by law and by the preceding subparagraphs) must be reported within 30 days after the discovery or in any event, no more than 5 years from the delivery date.

Claims must be sent by registered letter, addressed to the head office of the Warrantor and must describe in detail the alleged defect, flaw or non-compliance.

In order to preserve this warranty, the buyer must not attempt any disassembly repairs or modifications on the brand new product without the Warrantor's prior written agreement.

The buyer forfeits and waives its rights under this warranty if the buyer does not consent to every reasonable request of the Warrantor, or if after the Warrantor has requested the return of the defective brand new products at buyer's own expenses, the buyer fails to return the Product within 5 working days from the request.

In the event that the warranty claim is ultimately determined, in the sole discretion of Warrantor, to be unfounded, the buyer will reimburse the Warrantor all expenses incurred by Warrantor in evaluating the warranty claim (travel, expert valuations, transport expenses etc.).

#### 4 – Remedies

Following a report by the buyer duly made in accordance with the previous point 3, the Warrantor, within a reasonable period depending on the type of claim, may, at Warrantor's sole reasonable discretion:

- a) Supply to the buyer products of the same kind and quantity as those that have been proven to be defective or not in compliance with the contract: in such a case the Warrantor can require the return of the defective product, which becomes property of the Warrantor. Such products will be supplied FCA Warrantor's facility (Incoterms ® 2020);
- b) Communicate in writing the cancellation of the contract and offering a refund of the amount paid for the replaced product;
- c) Repair the products proven to be defective at its premises and supply the repaired products to the buyer FCA Warrantor's facility (Incoterms ® 2020).

No other cost (such as disassembling and/or reassembling of the products, transportation from/to the premises of buyer's customers, etc.) shall be charged to or paid by the Warrantor, unless previously expressly agreed in writing by the Warrantor.

#### 5 – Limit of seller's liability

The Warranty provided herein supersedes all legal warranty for defects and compliance, and excludes any other possible liability of the Warrantor, however originating, from the brand new products supplied by Warrantor. In particular, the buyer cannot put forward another claim for compensation in respect of any further damages, request any reduction of the contract price or cancellation of the contract. Once the period of the Warranty has expired no claim can be made against the Warrantor.

In no event shall Warrantor be liable to buyer for any direct, incidental, indirect, consequential or exemplary damages, including without limitation any claim for damages based on lost revenues or profits, however caused.

No exceptions to or modification of this Warranty will be permitted unless expressly and specifically defined and accepted by the parties in writing.

#### 6 – Technical regulations

As far as the brand new product characteristics and specifications are concerned, the Warrantor complies with the legislation and the technical regulations prevailing in Italy and the European Directives, unless otherwise specified in the contractual documentation (i.e. contract, order's confirmation, invoice, installation/fitting or use and maintenance manual); The buyer assumes the risk of any difference between the European Directives plus the Italian regulations and those of the country of destination,



regarding the use or installation of the Products, and indemnifies the Warrantor for any such differences it. The Warrantor guarantees the performance of brand new products manufactured by Warrantor only and exclusively in relation to uses, destinations, applications, tolerances, capacities, etc. that have been expressly indicated by Warrantor and that are incorporated in the contractual documentation (i.e. contract, order's confirmation, invoice, installation/fitting or use and maintenance manual).

The buyer is not authorised to dispose of the brand new Products supplied to him by the Warrantor in a way which does not conform to the indications described in the previous sub-paragraph and in the instructions given by Warrantor.

Where the buyer intends the said products to be resold, it shall be buyer's responsibility:

to inform the purchasers of the Product from buyer of the correct specifications and uses of the Product;  
to grant any further periods or extended terms of any warranty provided by buyer only to buyer's purchasers that exceed the warranty granted to buyer by Warrantor according to paragraph 3.

the buyer shall not grant or extend any warranty on behalf of Warrantor to any third party.

#### 7 – Personal injuries and property damages

Warrantor shall indemnify buyer from and against any and all claims, demands, losses, liabilities alleged by third parties relating to personal injuries and property damages suffered as a result of a defective product. In such event, Warrantor will exclusively be responsible within the limits, terms and conditions of the product liability insurance policy held by it (a copy of the related insurance declaration is available upon request).

In case of potential damages to third parties that may arise from a defective brand new product, the buyer and Warrantor shall work together in good faith to determine the nature and extent of the appropriate measures to be taken, including recall operations. It is understood that the costs and expenses associated with the recall or other measures shall be paid by Warrantor within the limits, the terms and the conditions set forth in Warrantor's liability insurance policy, with the exclusion of the costs connected to the locating and retrieving the Products in the market, which will be paid by the Buyer.