MESURA

Pressure Regulators S21

SPRING LOADED PRESSURE REGULATORS

A Cavagna Group Company

1 DESCRIPTION

The regulators **S21** are a new line of direct action type pressure regulators, normally used in decompression installation for civil and industrial uses in canalized networks for natural gas, manufactured gas, LPG or other non corrosive, preliminary treated stable gases.

The **S21** pressure regulators are “fail to open” type, which means that in case of malfunction due to the breaking of the main diaphragm or as a result of a lack of impulse downstream, the regulator will open up completely.

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

Modularity design allows for variation in its configuration even when already installed in stream. In addition, the modules can be easily disassembled for eventual controls and in case of malfunctions can be easily replaced with spare modules and subsequently repaired in the workshop, without having to shut down the installation.

The S21 pressure regulators have a counterbalanced regulation device

The S21 pressure regulators have a stroke indicator for quick identification of the instrument in operation

2 VERSIONS AVAILABLE

.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 10 ÷ 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 counterbalanced)

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)
- Covers in aluminium die-cast EN AC46100 EN1706
- Diaphragms in rubber with cloth enforcement
- Seats in stainless steel or brass
- Springs in stainless steel

FEATURES

- Anti-pumping device (only for S21-3)
- Diaphragm shock adsorber 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 5
- Closing Pressure Class: up to 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- 1	5 or 6	20		14 ÷ 150	150 ÷ 500	500 ÷ 4000		160	1" x 1"
S21- 2	5 or 6		20				500 ÷ 4000	281	1"x1"1/2
S21- 3	5 or 6		20				500 ÷ 4000	410	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 Pu < 2 Pd)

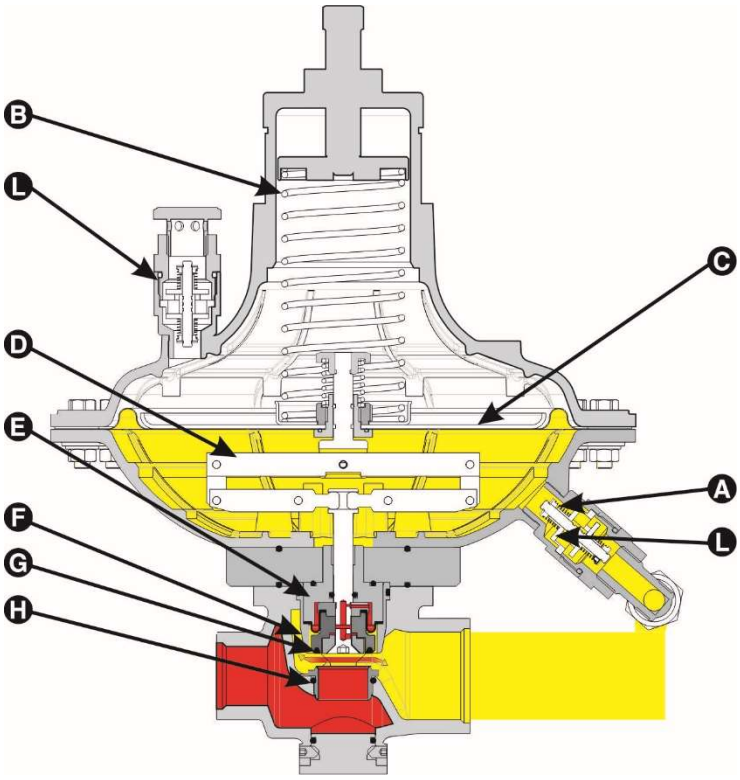
$$Q = \frac{13{,}57}{\sqrt{d \times (t_u + 273)}} \times C_g \times \frac{p_u + p_b}{2} \times \sin\left[K_1 \times \sqrt{\frac{p_u - p_d}{p_u + p_b}} \right]_{deg}$$

b. in critical conditions (when Pu ≥ 2 Pd)
where:

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

Q=capacity [Stm3/h]
Pu= Absolute pressure upstream [bar]
Pd= Absolute pressure downstream [bar]
Pb= Ambient atmospheric pressure [bar]
d= relative density (air= 1, non dimensional value)
K1= body shape factor
tu= gas temperature at the inlet of the regulator under test in °C

6 OPERATING PRINCIPLE

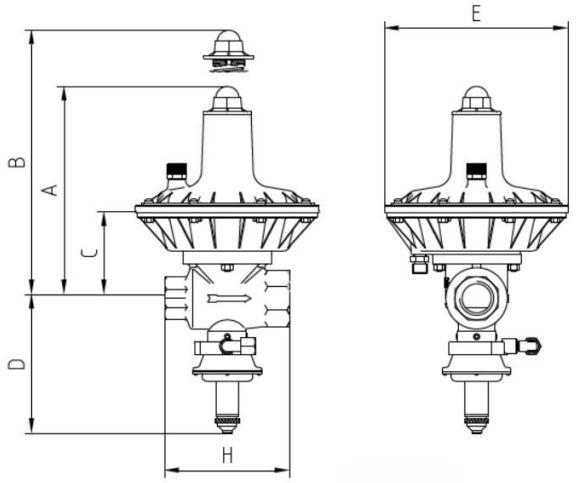


The operating principle for the **S21** regulators is the same as for all models, with the exception of certain marginal differences, exemplified below.
The **S21** pressure regulator is a direct action type instrument with pressure control downstream through external impulse **(A)**.
The downstream pressure is controlled by comparing the spring load **(B)** and the thrust deriving from the downstream pressure on the diaphragm **(C)**. The dia- phragm'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

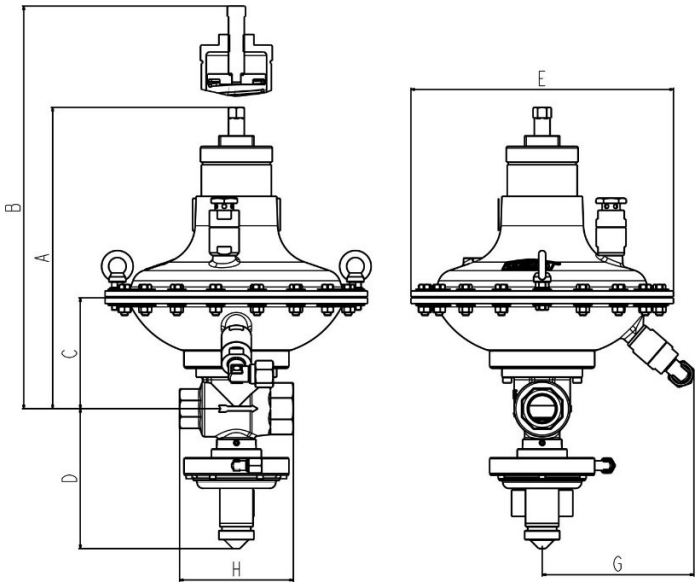
down- stream pressure is less than the spring load **(B)**, the diaphragm **(C)** lower itself, and draws the stopper **(F)** away from the valve housing **(H)** until the downstream pressure once again attains the pre-set calibration value. The regulator type S21-3 has two incorporated antipumping devices **(L)** which operate to reduce the inflow/outflow of gas to the head during transitory phases, in order to exclude pumping phenomenon.

7.1 OVERALL DIMENSIONS

S21-1 B / S21-2 B



S21-3 B



	H		A	B	C	D	G	E		
	1" x 1"	1"x1" 1/2						versio n		
	mm									
S21-1 B	100		220	3856	90	135	-	**189** BP	**189** MP	**189 TR** AP – APS
S21-2 B		130	220	3856	90	135	-	**189** BP	**189** MP	**189 TR** AP – APA
S21-3 B		130	220	450	120	160	175	**300** BP	**300** MP	**300** AP – APA

7.2 INSTALLATION S21

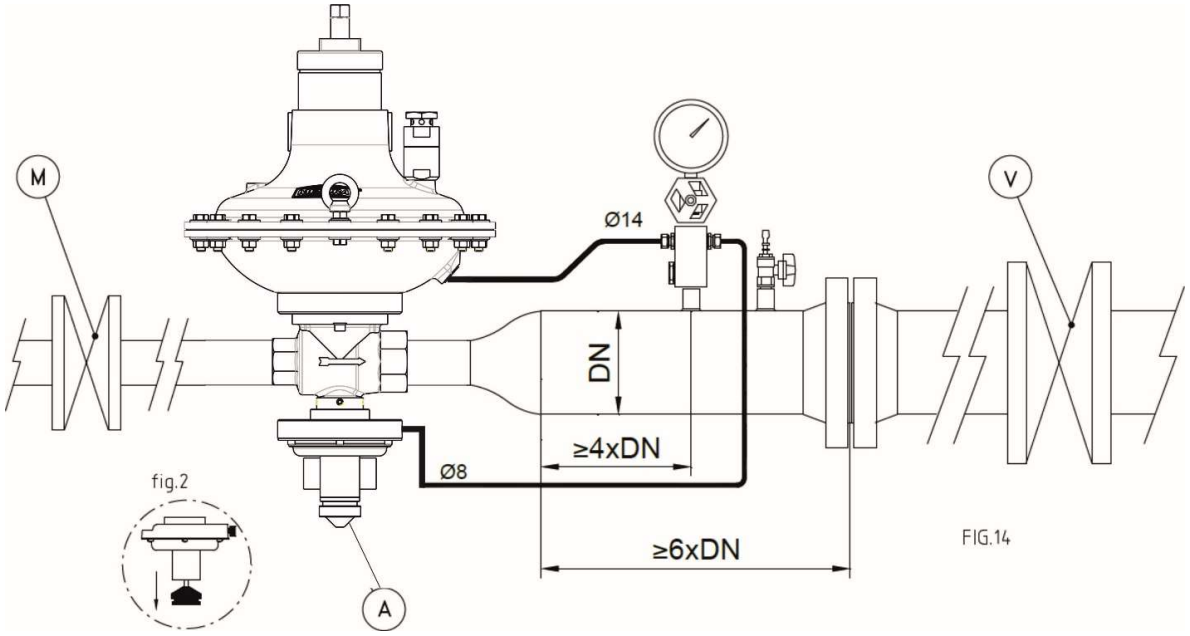


FIG.14