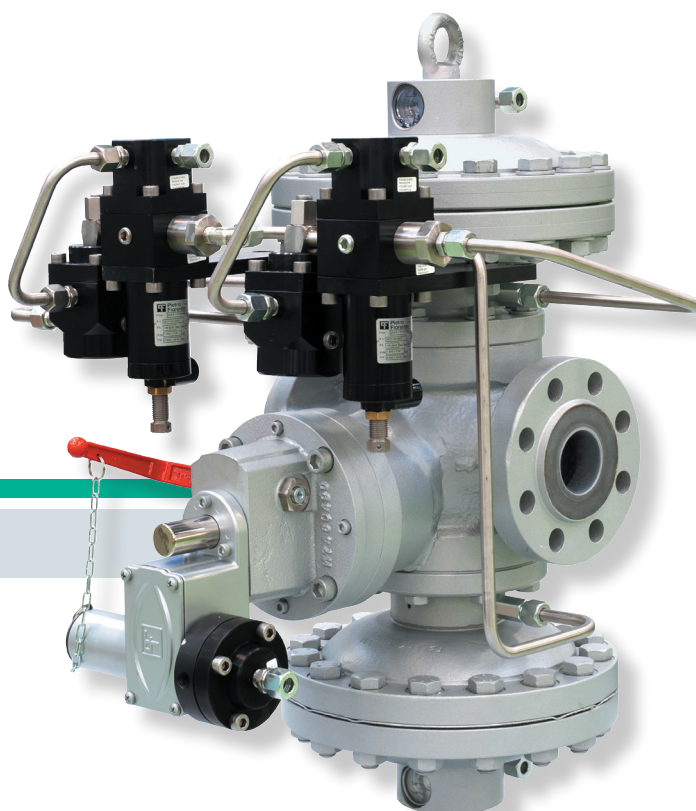




 Terval AP
Pressure regulator

Classification and Area of Application

Terval AP is a trivalent system, which combines **three devices in one**: the Regulator, the Monitor, and the Slamshut.

The pressure regulator and the monitor are pilot controlled, for medium and high pressure applications.

It is particularly suitable for use within the framework of installations for the distribution of natural gas, as well as for supply networks for civil and industrial use.

The accuracy of the regulated pressure, the high rangeability ratio, together with the fast adaptation to changes in the operating conditions, even in the presence of abrupt changes in the flow rate, make the regulator Terval AP particularly suitable for use in gas supply installations of electric power generation stations (Turbogas).

The **Terval AP** can be supplied in two versions, according to European standard **EN 334**:

- Terval AP/FC Regulator Fail to Close
- Terval AP/FO Regulator Fail to Open

It is truly a TOP ENTRY design, which confers to the regulator management advantages, for example the ability to performs full maintenance without uninstalling it from the connection pipe.

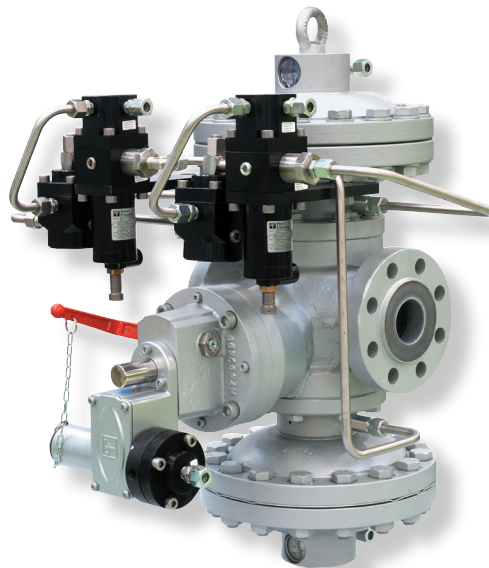


Fig.1

TERVAL AP

TERVAL AP/FC

TERVAL AP/FC is a system which combines three devices in one: a Fail to Close Pressure Regulator, a **Fail to Close** Monitor, and a Slam Shut.

The Regulator is classified, according to EN334, as a **Fail to Close** device: it means that the control member automatically tends to close or close when failures occur.

Upstream the regulator, two safety devices are installed, the Monitor and the Slam Shut.

The **Monitor** is a safety accessory that performs the functions of the service regulator when the main regulator fails. This is a Fail to Close regulator that is usually in the fully open position during normal operation of the service regulator.

The Slam Shut is installed upstream the Monitor and its function is to interrupt the gas flow in case of irregular pressure conditions compared to those set in the pressure Regulators or Monitor.

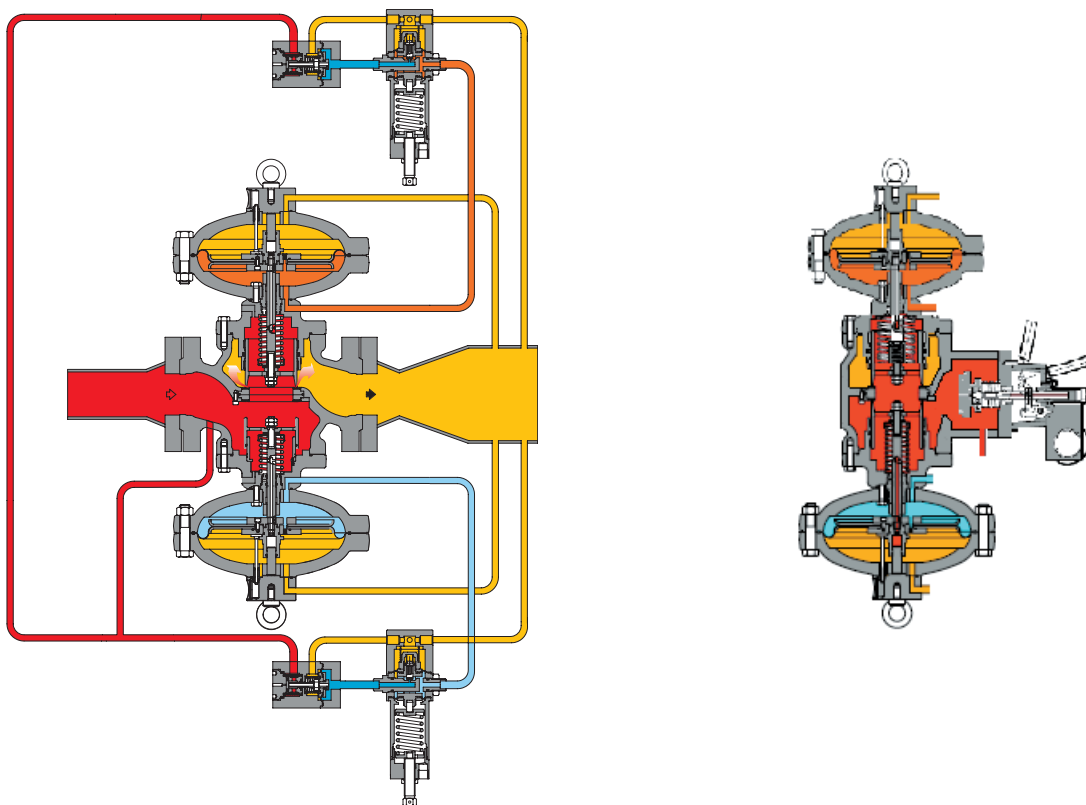


Fig.2

TERVAL AP/FC

TERVAL AP/FO

TERVAL AP/FO is a system which combines three devices in one: a Fail to Open Regulator, a Fail to Close Monitor, and a Slam Shut.

The **Regulator** is classified, according to EN334, as a **Fail to Open** device: it means that the control member automatically tends to open or open when failures occur.

Upstream the regulator, two safety devices are installed, the Monitor and the SlamShut.

The Monitor is a safety accessory that performs the functions of the service regulator when the main regulator fails. This is a **Fail to Close** regulator that is usually in the fully open position during normal operation of the service regulator.

The Slam Shut is installed upstream the Monitor and its function is to interrupt the gas flow in case of irregular pressure conditions compared to those set in the pressure Regulators or Monitor.

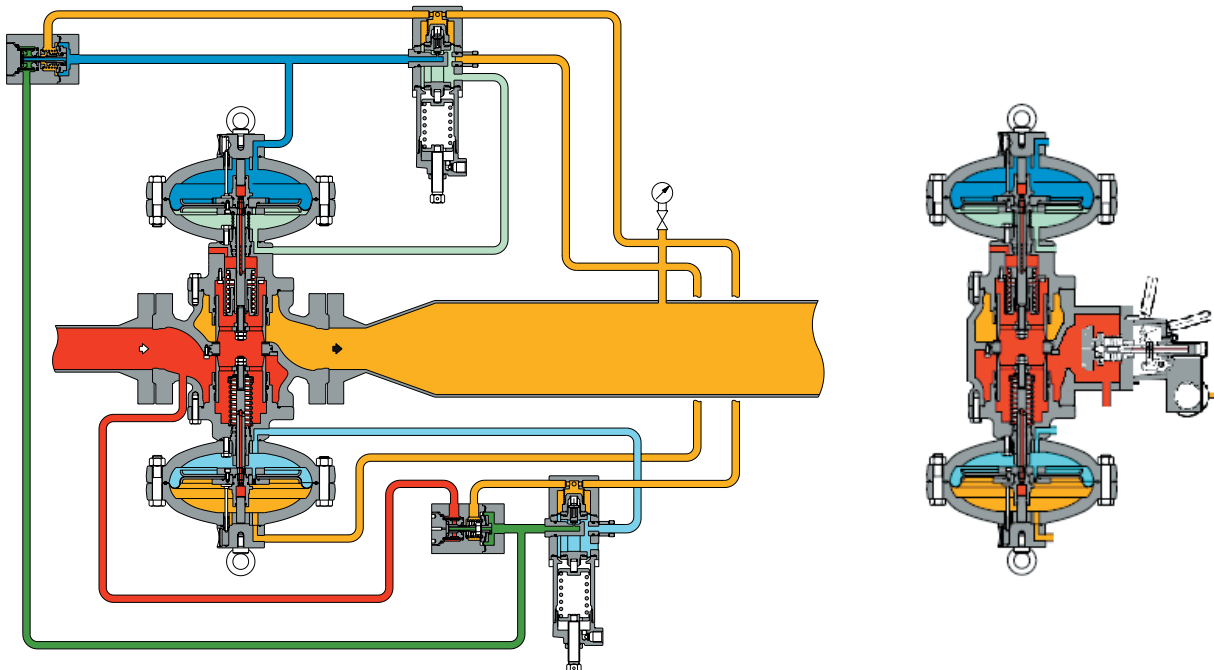


Fig.3

TERVAL AP/FO

FEATURES

Functional features:*

■ Maximum inlet pressure:	Up to 102 bar
■ Range of downstream pressure:	- from 0,3 bar to 74 bar (FC version) - from 1 bar to 74 bar (FO version)
■ Minimum working differential pressure:	0,5 bar (FC version) - 1,9 bar (FO version)
■ Minimum ambient temperature:	Execution up to -40°C,
■ Maximum ambient temperature:	+60°C
■ Inlet gas temperature:	Up to -20°C + 60°C,
■ Accuracy class AC:	Up to 1
■ Lock-up pressure class SG:	Up to 2,5

Design features:

■ Nominal dimensions DN:	25 (1"); 50 (2"); 80 (3"); 100 (4").
■ Flanged connections:	Class 300-600 RF or RTJ, according to ANSI B16.5/40.

Materials:**

■ Body:	Cast steel ASTM A 352 LCC for classes ANSI 600 and 300.
■ Head covers:	ASTM A 350 LF2 forged steel
■ Stem:	AISI 416 stainless steel
■ Plug:	ASTM A 350 LF2 Nikel coated on sealing surface
■ Seat:	Nitril Rubber Vulcanized on a metal support
■ Diaphragm:	Rubberized canvas (performed by hot-pressing process.).
■ Sealing ring:	Nitril rubber
■ Connection fittings:	In zinc-plated carbon steel according to DIN 2353; Stainless steel on request.

REMARK: * Different functional features available on request.

** The materials indicated above refer to the standard models.
Different materials can be provided according to specific needs.

Cg and KG coefficient

Nominal diameter				
Millimeters	25	50	80	100
Inches	1"	2"	3"	4"
Cg flow coefficient	515	2050	4450	7200
KG flow coefficient	542	2228	4836	7825
				Tab.1

For sizing formulas refer to www.fiorentini.com/sizing

Pilots System

The operation of the regulator **Terval AP** is assured by a piloting system consisting, as basic option, of two separate devices: the **Preregulator** and the **Pilot**.

Fail to Close Piloting system

The Terval AP/FC is equipped with following pilot system:

R14/A/FO pre-regulator. Self adjusting pre-regulator that automatically regulates the feeding pressure to the pilot depending on the desired regulation pressure. It is equipped with a built-in filter and it is fed by the upstream gas.

Series 200 Pilots. The available models, according to the pressure to be regulated, are:

- **204/...** Outlet pressure control range from 0,3 to 43 bar (with different setting springs),
- **205/...** Control range from 20 to 60 bar (with different setting springs),
- **207/...** Control range from 41 to 74 bar (with different setting springs).

Fail to Open Piloting system

The Terval AP/FO is equipped with following pilot system:

R14/A/FO pre-regulator. Self adjusting pre-regulator that automatically regulates the feeding pressure to the pilot depending on the desired regulation pressure. It is equipped with a built-in filter and it is fed by the upstream gas.

Series 200 Pilots. The available models, according to the pressure to be regulated, are:

- **204/A/FO** Outlet pressure control range from 1 to 33 bar (with different setting springs),
- **205/A/FO** Control range from 20 to 60 bar (with different setting springs),
- **207/A7FO** Control range from 41 to 74 bar (with different setting springs).

Piloting system Options

The pilots are normally adjusted on the field or from remote. In the different cases, in order to be identified, they are assigned the following suffixes:

- **.../A** Manual calibration on field
- **.../D** Control with electrical/electronic of remote setting range
- **.../CS** Control with pneumatic of remote setting range
- **.../F.I.O.** SMART unit for remote adjustment that allows the indirect measurement, and flow limitation.

Shut-off device model SB/82

This incorporated **Safety Device** interrupts the gas flow in case of irregular pressure conditions compared to those set in the pressure switch device. It can be independently set to stop the flow both for Over Pressure (**OPSO**) and Under Pressure (**UPSO**). The set point can be varied according to the operating requirements, with following ranges:

MOD. SB	MIN.	MAX
102M	0,2 ÷ 2,8	0,2 ÷ 5.5
102MH	2,8 ÷ 5.5	0,2 ÷ 5.5
103M	0,2 ÷ 8	2 ÷ 22
103MH	8 ÷ 19	2 ÷ 22
104M	1,6 ÷ 18	15 ÷ 45
104MH	18 ÷ 41	15 ÷ 45
105M	3 ÷ 44	30 ÷ 90
105MH	44 ÷ 90	30 ÷ 90

Tab.2

Values in Bar(g)

The shut-off device is equipped with a button for the local manual activation command of the slam shut. For safety reasons, the shut-off device can only be reset manually; inside the slam-shut valve, there is a by-pass device that facilitates the resetting operation.

The shut-off device can be equipped with pneumatic or electromagnetic accessories for the command, as well as with sensors (micro switches) for the remote signaling of its activation

MODULARITY AND ACCESSORIES

The **TERVAL AP** regulator has been designed with a high degree of modularity in order to make it possible to incorporate additional devices and accessories in the basic version.

These optionals can also be added to a basic regulator at a later time, with no need to modify the pre-existing connection pipes.

Silencer DB/819 and LDB/171

The Terval AP can be equipped with silencer, as optional. Two versions are available:

- **DB/819 external silencer** – noise reduction up to 30 dBA
- **LDB/171 internal silencer** – noise reduction up to 15 dBA

Both silencers allow to absorb the noise that is generated in the pressure regulator during the lamination process. Their exceptional efficiency is due to the fact that the noise absorption it occurs at the same point where it is generated, thus preventing its propagation.

The application of silencers reduces the value of coefficients Cg and KG by 5%.

Accessories on request

For the pressure regulators:

- Stroke limiters
- Flow limiting devices
- Micro switches for signaling the plug position
-  Position transmitters
- Stainless steel fittings, with single or dual sealing ring

For the pilot circuit

- M/A accelerators
- R14/A/S Pre-reducer for high pressure pilot circuits ($P > 12$ bar)
- Heating cable for pilot circuit pre-heating
- Electric heater
- Additional filter CF 14
- Dehydrating filter CF 14/D
- .../F.I.O. SMART unit for remote regulation

Sizing of pressure Regulator

In general, the choice of a regulator is based on the calculation of the flow rate determined by the use of formulas and on the flow rate coefficients (Cg or KG) as indicated by the EN 334 standard. For the sizing of the involved regulators, kindly refer to our website: www.fiorentini.com/sizing.

For different gases and for natural gas with a different density than 0.61 shall be applied the correction coefficients resulting from the following formula:

$$F_c = \sqrt{\frac{175.8}{S \times (273.16 + t)}}$$

S = relative density to air
t = gas temperature [°C]

Correction factors FC		
Type of gas	Relative density (S)	Fc factor
Air	1.00	0.78
Propane	1.53	0.63
Butane	2.00	0.55
Nitrogen	0.97	0.79
Oxygen	1.14	0.73
Carbon dioxide	1.52	0.63

Tab.3

The chart shows the correction factors FC valid for above mentioned gas at 15 °C and to the declared relative density.

Flow rate conversion			
Stm ³ /h	x	0,94795	= Nm ³ /h

Tab.4

CAUTION:

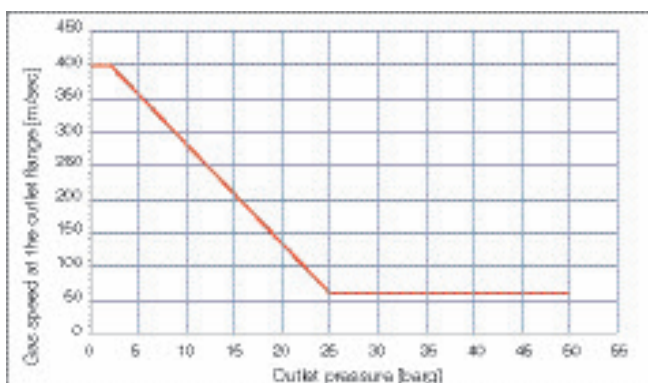
In order to get optimal performance, to avoid premature erosion phenomena and to limit noise emissions, it is recommended to check that gas speed at the outlet flange does not exceed the values of the graph below.

The gas speed at the outlet flange may be calculated by means of the following formula:

$$V = 345.92 \times \frac{Q}{DN^2} \times \frac{1 - 0.002 \times Pd}{1 + Pd}$$

where:

- V** = gas speed in m/sec
Q = gas flow rate in Stm³/h
DN = nominal size of regulator in mm
Pd = outlet pressure in barg.



TERVAL AP

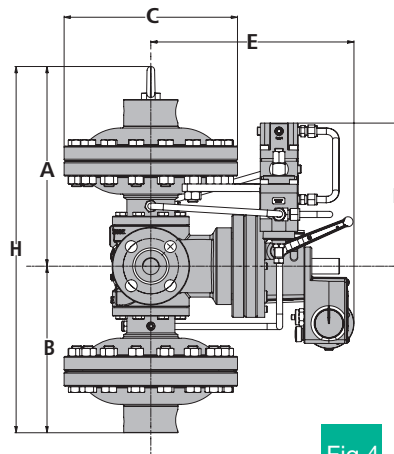
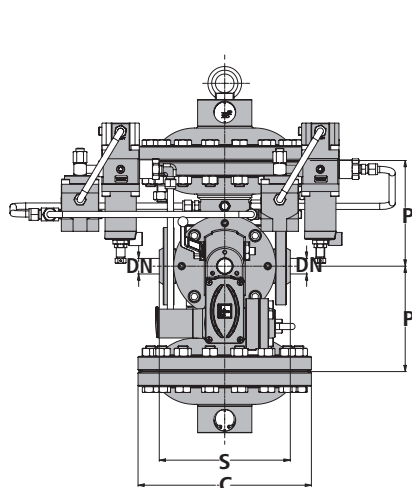


Fig.4

Terval AP/FC

Dimensions				
Millimeters	25	50	80	100
Inches	1"	2"	3"	4"
S - Ansi 300	197	267	317	368
S - Ansi 600	210	286	336	394
A	320	350	430	490
B	270	300	380	440
C	278	278	360	360
E	325	345	400*	470*
F	260	290	350	380
H	590	650	810	930
P	170	200	260	290

Pneumatic fittings; 10x8mm

Dimensions S according to EN 334 and IEC 534-3

Weight in Kg

Ansi 300	99	125	212*	301*
Ansi 600	100	126	215*	310*

Tab.5

* Indicative values

Terval AP/FO

Dimensions				
Millimeters	25	50	80	100
Inches	1"	2"	3"	4"
S - Ansi 300	197	267	317	368
S - Ansi 600	210	286	336	394
A	371	435	490	532
B	270	300	380	440
C	278	278	360	360
E	325	345	400*	470*
F	311	375	410	422
H	641	735	870	972
P	221	285	320	332
L	170	200	260	290

Pneumatic fittings; 10x8mm

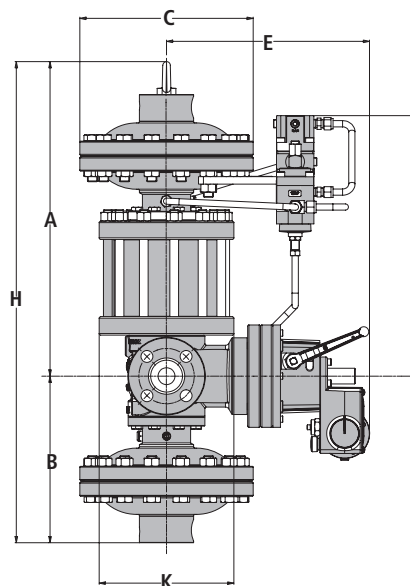
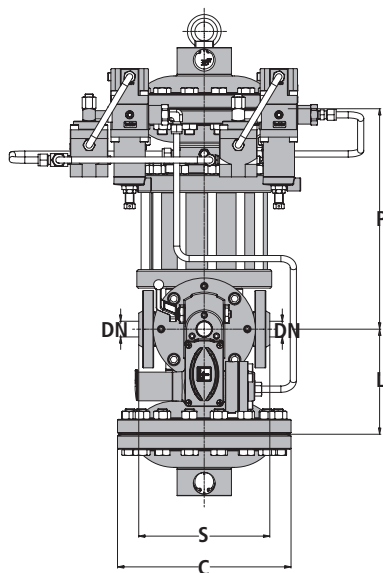
Dimensions S according to EN 334 and IEC 534-3

Weight in Kg

Ansi 300	99	125	212*	301*
Ansi 600	100	126	215*	310*

Tab.6

* Indicative values

TERVAL AP + DB819

Fig.5
Terval AP/FC + DB/819
Dimensions

Millimeters	25	50	80	100
Inches	1"	2"	3"	4"
S - Ansi 300	197	267	317	368
S - Ansi 600	210	286	336	394
A	520	575	700	800
B	270	300	380	440
C	278	278	360	360
E	325	345	400*	470*
F	425	495	615	670
H	790	875	1080	1240
P	370	400	505	575
L	170	200	260	290
K	220	300	330	390

Pneumatic fittings; 10x8mm

Dimensions S according to EN 334 and IEC 534-3

Weight in Kg

Ansi 300	126	190	307*	434*
Ansi 600	127	192	310*	443*

Tab.7

* Indicative values

Terval AP/FO + DB/819
Dimensions

Millimeters	25	50	80	100
Inches	1"	2"	3"	4"
S - Ansi 300	197	267	317	368
S - Ansi 600	210	286	336	394
A	571	660	760	842
B	270	300	380	440
C	278	278	360	360
E	325	345	400*	470*
F	476	580	675	812
H	841	960	1140	1282
P	421	485	620	716
L	170	200	260	290
k	220	300	330	390

Pneumatic fittings; 10x8mm

Dimensions S according to EN 334 and IEC 534-3

Weight in Kg

Ansi 300	126	190	307*	434*
Ansi 600	127	192	310*	443*

Tab.8

* Indicative values

www.fiorentini.com

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reserve the right to make changes
without prior notice.

