

REFLUX 819/FO

Pressure Regulators

REFLUX 819/FO

Classification and range of use

REFLUX 819/FO is a downstream pressure regulator, 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 range ability ratio, together with the ability to quickly adjust to changes in operating conditions, even in the presence of abrupt changes in the flow rate, make the **REFLUX 819/FO** regulator particularly suited for use in gas supply installations of electric power generation stations (Turbogas).

The **REFLUX 819/FO** regulator is classified, according to European Standard **EN 334**, as a Fail to Open regulator.

It is truly a **TOP ENTRY** design, which confers to the regulator management advantages, for example the ability to perform full maintenance without removing from the connecting pipes.

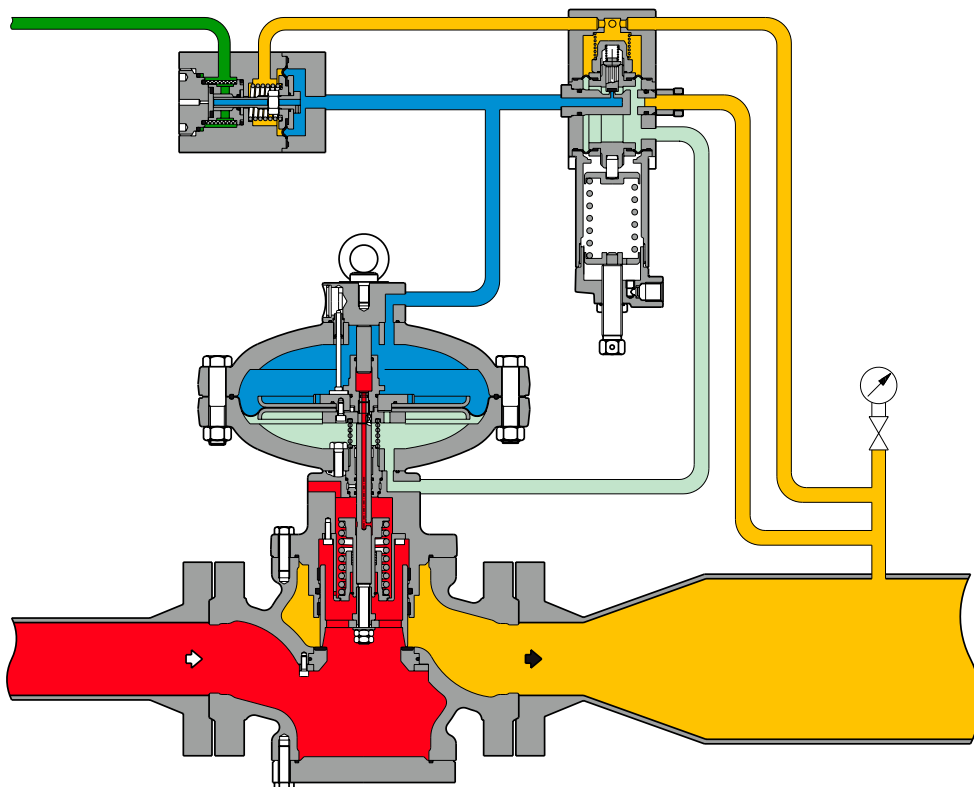


Fig.1

REFLUX 819/FO - Basic version

Features

Operating Features:*

■ Maximum inlet pressure:	Up to 102 bar
■ Downstream pressure regulation range:	from 1 bar to 74 bar depending on the pilot installed (see the Pilots section).
■ Minimum differential pressure:	1.9 bar
■ Minimum ambient temperature:	Execution up to -40°C,
■ Maximum ambient temperature:	+60°C
■ Inlet Gas Temperature:	Up to -20°C +60°C
■ AC accuracy class:	Up to 2.5
■ SG lock up over pressure:	Up to 10

Construction Features:

■ DN Nominal dimensions:	25 (1"); 50 (2"); 80 (3"); 100 (4"); 150 (6"); 200 (8"); 250 (10"); 300 (12").
■ Flanged Connections	Class 150-300-600 RF or RTJ, according to ANSI B16.5 and PN 16/40 according to EN 1092, ISO 7005.

Materials:**

■ Body:	ASTM A 352 LCC cast steel for classes ANSI 600 and 300; ASTM A 216 WCB cast steel for classes ANSI 150 and PN 16/40.
■ Heads:	ASTM A 350 LF2 steel
■ Stem:	AISI 416 stainless steel
■ Plug:	ASTM A 350 LF2 nickel-plated steel
■ Seat:	Vulcanized Nitrile Rubber on metal support
■ Membrane:	Rubberised Canvas (pre-formed by hot-pressing process).
■ O-rings:	Nitrile Rubber
■ Connection fittings:	Made of zinc-plated steel according to DIN 2353; on request, stainless steel.

NOTE: * Different operating features available on request.

** The above materials refer to standard versions.

Different materials can be provided in relation to specific needs.

Coefficients Cg, KG and K1

Nominal diameter								
Millimetres	25	50	80	100	150	200	250	300
Inches	1"	2"	3"	4"	6"	8"	10"	12"
Coefficient Cg	575	2220	4937	8000	16607	25933	36525	55000
Coefficient KG	605	2335	5194	8416	17471	27282	38425	57860
Coefficient K1	106.78	106.78	106.78	106.78	106.78	106.78	106.78	106.78

Table 1

For the sizing formula, please refer to www.fiorentini.com/sizing

Piloting system

Operation of the **REFLUX 819/FO** regulator is ensured by a piloting system made up, in the basic version, of two separate devices: the **Pre-regulator** and the **Pilot**.

Pre-regulator

The following models are available:

- **R14/A/FO**: Self-adjusting pre-regulator that automatically regulates the feeding pressure to the pilot depending on the desired regulation pressure. It is equipped with integral filter and supplied from the gas high pressure side.
- **Three-way valve + R14/A + R14/A/FO**: optional system for self-operation.
- **R14/A**: additional pre-regulator used to increase the regulator response.

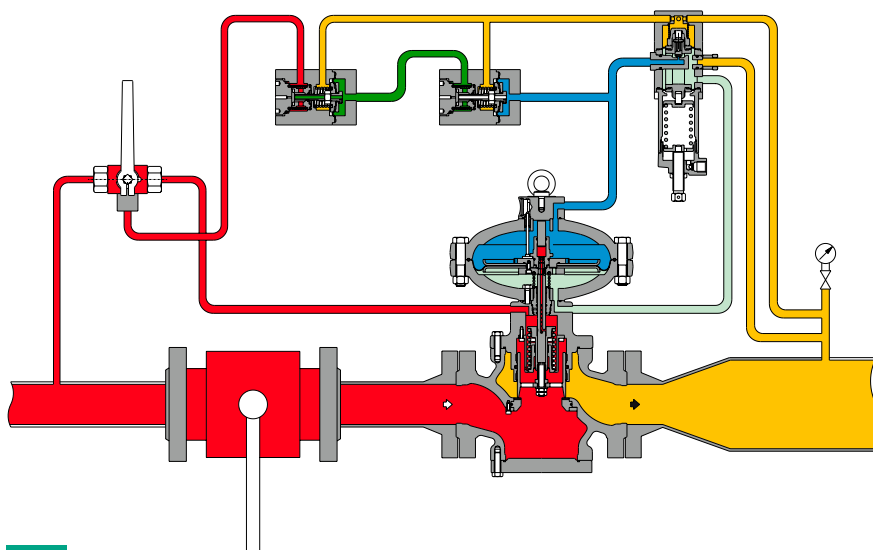


Fig. 2

REFLUX 819/FO - Regulator with 3-way valve +R14/A + R14/A/FO

Modularity and accessories

The **REFLUX 819/FO** 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 can also be added to a basic regulator at a later time, with no need to modify the pre-existing connection pipes.

Pilot

The pilots used for the **REFLUX 819/FO** regulators are from **series 200**.

The available models, in relation to the pressure to be regulated, are:

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

The pilots can be manually 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 allow the indirect measurement, and the flow limitation.

Incorporated silencer DB/819 or LDB171

The silencer **DB/819** allows absorbing the noise that is generated in the pressure regulator during the lamination process.

Its great efficiency is due to the fact that noise absorption takes place at the same point where it is generated, thus preventing its propagation.

LDB171 is available as an alternative to the **DB/819** silencer, it has the advantage of not increasing the size compared to the standard regulator. **LDB171** is recommended for applications where is required a lower noise reduction.

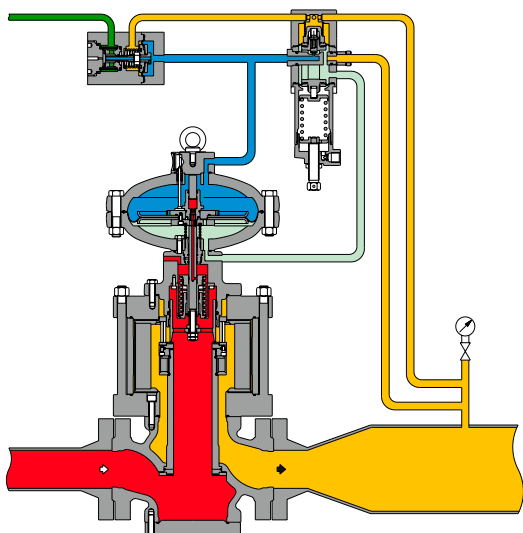


Fig.3

REFLUX 819/FO

With silencer DB/819

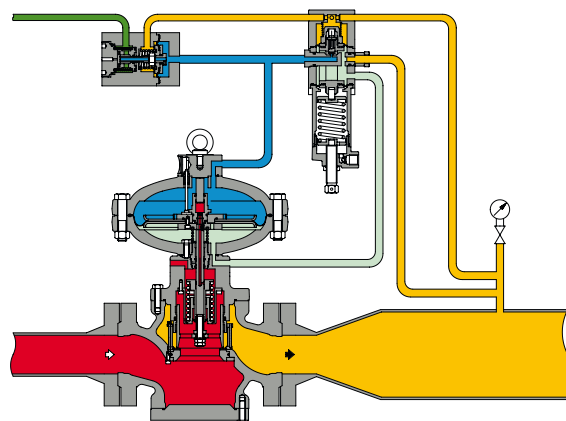


Fig.4

REFLUX 819/FO

With silencer LDB171

This mechanical solution allows to still have the possibility of incorporating in the basic regulator, besides the silencer, also the slam-shut valve or the monitor.

With the application of the silencer **DB/819** the C_g and K_g valve coefficients are 5% lower than the corresponding basic regulator.

Shut-off device model SB/82 or HB/97

These are **Safety Devices** that interrupt the gas flow in case of irregular pressure conditions compared to those set in the pressure switch device.

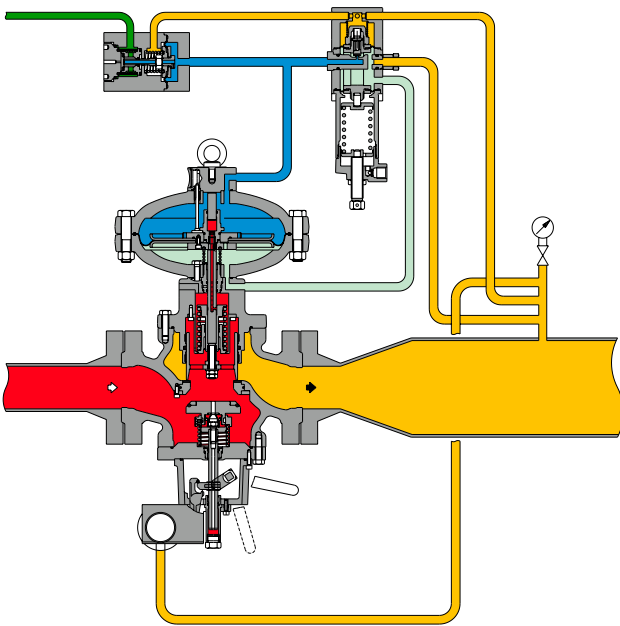


Fig.5 **REFLUX 819/FO** - With slam shut valve SB

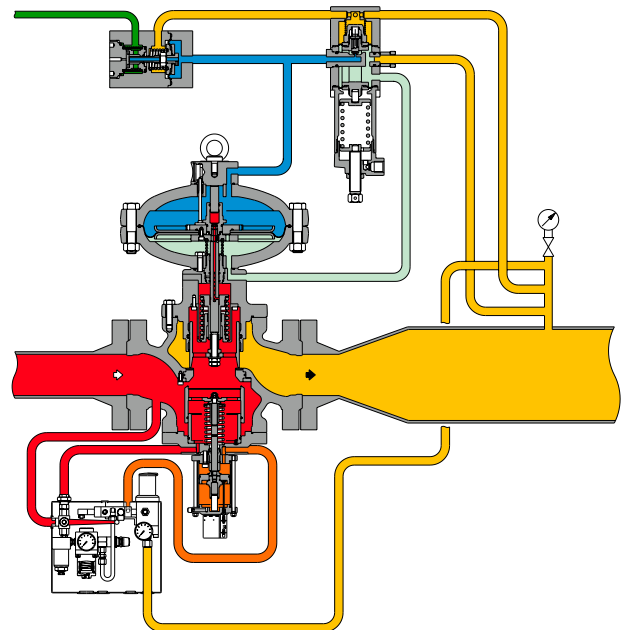


Fig. 6 **REFLUX 819/FO** - With slam shut valve HB

The set point can be varied according to the operating requirements, within the ranges indicated into the table no. 2, depending on the provided pressure switch.

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.

Pressure switches

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
MOD. HB		
103	0.4 ÷ 6.8	1.3 ÷ 11
104	1 ÷ 20.6	10 ÷ 31.5
105	2.5 ÷ 50	25 ÷ 76
105/92	45 ÷ 75	58 ÷ 85
		Table 2

Values in bar(g)

The shut-off device can be calibrated for pressure increase, **Over Pressure Shut-Off (OPSO)** and/or for pressure reduction, **Under Pressure Shut-Off (UPS0)**.

The two intervention modes can be regulated independently by dedicated calibration springs: one spring for the maximum pressure intervention and the second spring for the minimum pressure intervention.

The choice between the two models, SB/82 and HB/97, depends on the regulator gauge and on the max. instantaneous flow rate to be delivered.

Generally speaking, up to diameter DN 80 (3") included, the valve model SB/82 is assembled exclusively, while for larger gauges the possibility to assemble model HB/97 instead of model SB/82 must be evaluated.

For in-depth evaluations, please contact our commercial technical service.

The shut-off device reduces the value of coefficients Cg and KG by 7% than the basic regulator.

Incorporated monitor PM/819

The **MONITOR** is a safety accessory that performs the functions of the service regulator when the main regulator fails.

This is a regulator that is usually in the fully open position during normal operation of the service regulator.

It is usually installed upstream, in the direction of the gas flow, of another pressure regulator that performs the function of a WORKING regulator.

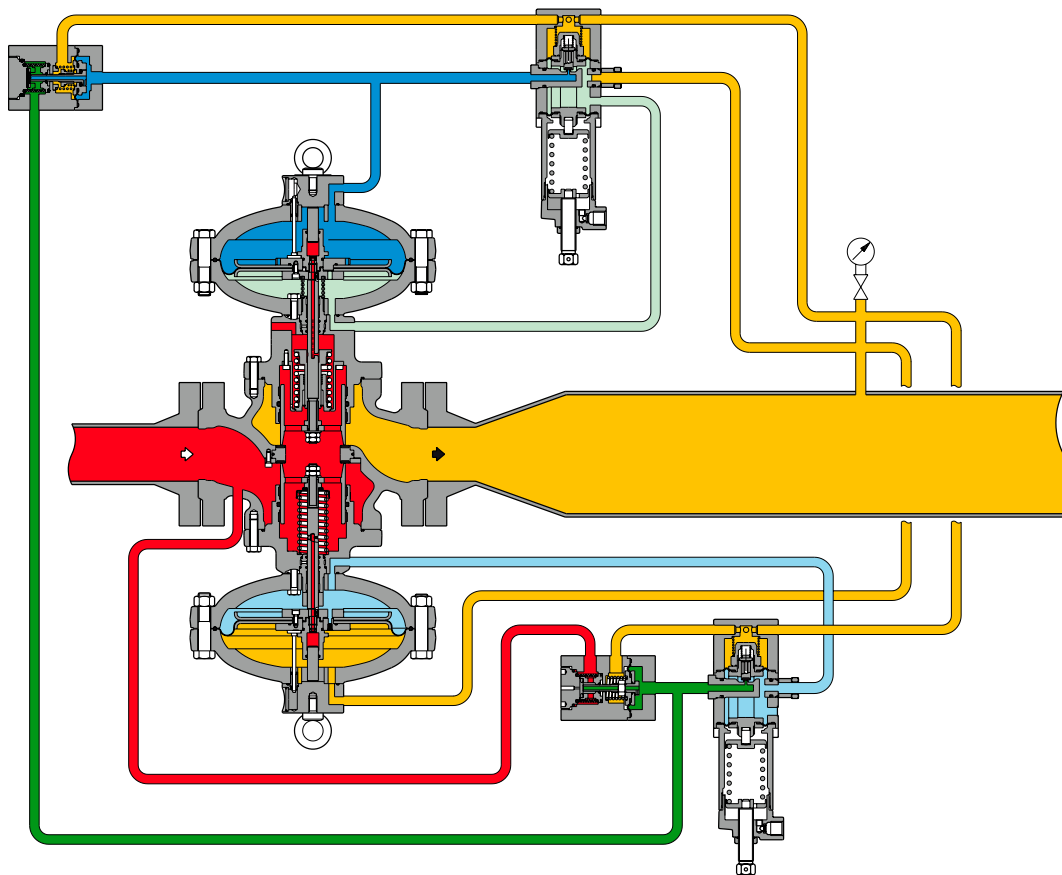


Fig. 7

REFLUX 819/FO - With incorporated monitor

In this specific case, **Monitor PM/819** is assembled on the same body of the service regulator but it is equipped with its own seal seat, pilot system and independent motorization.

The functional characteristics of **Monitor PM/819** are the same as those of the basic regulator **REFLUX 819/FO**. The **REFLUX 819/FO unit with Monitor PM/819** is characterized by equivalent C_g and K_G coefficients that are **7%** lower compared to the basic regulator.

This solution makes it possible to develop reduction lines with significantly reduced overall dimensions and lower pressure losses compared to the traditional solution of two in-line regulators.

In-line monitor

In this solution, the Monitor regulator and the Service regulator are installed in series.

Fig. 8 illustrates the traditional solution, whereby the monitor is usually installed upstream and the working regulator is installed downstream (in the direction of the gas flow).

The Monitor regulator is calibrated at a slightly higher value than the calibration set-point of the working regulator. The Cg and KG coefficients are reduced by 20% than the basic regulator (in the case of equal regulators with the same gauge).

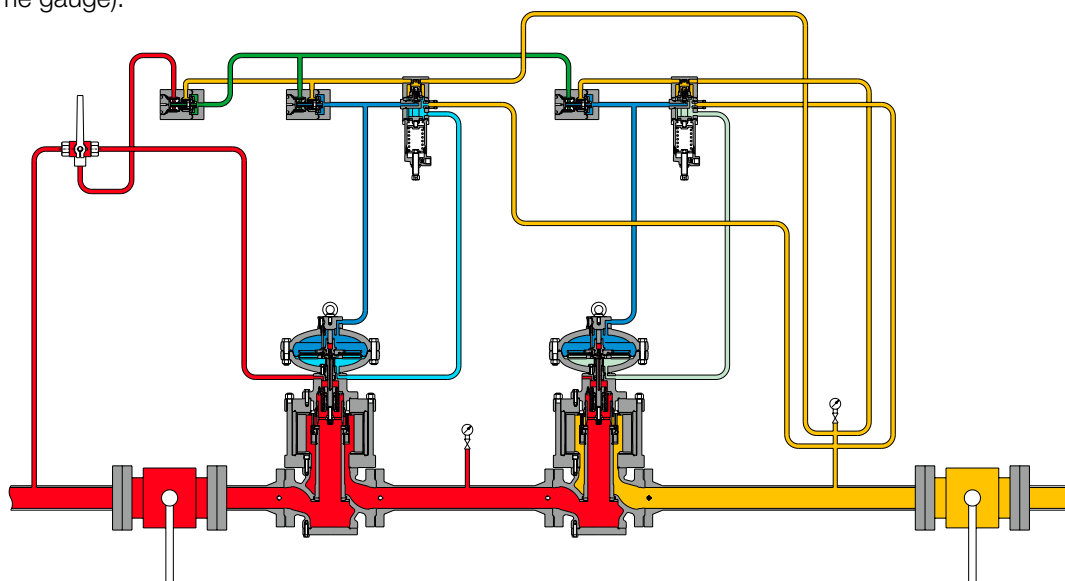


Fig. 8

REFLUX 819/FO - Solution with in-line monitor

Accessories on request

For the regulating valve:

- 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 (only on PM / 819 or FC type monitor)
- 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
- Fluid Control 896, Pilots used to modulate the regulation pressure
- .../F.I.O. SMART unit for remote regulation

Sizing the pressure regulator

The regulator is usually chosen on the basis of the flow rate calculation determined through use of formulas and flow rate coefficients (Cg or KG), as indicated by Standard EN 334.

For the sizing of the regulators in question, please visit our website www.fiorentini.com/sizing.

For other gases other than natural gas; for natural gases with density other than 0.61, please apply the correction coefficients resulting from the following formula:

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

S = Relative density at the air
t = gas temperature [°C]

Corrective factors Fc		
Gas type	Relative density (S)	Corrective factors Fc
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

Table 3

The table indicates the Fc corrective factors valid for gas, calculated at a temperature of 15 °C and at the Declared relative density.

Conversion of flow rates			
Stm ³ /h	x	0.94795	= Nm ³ /h

Table 4

Warnings:

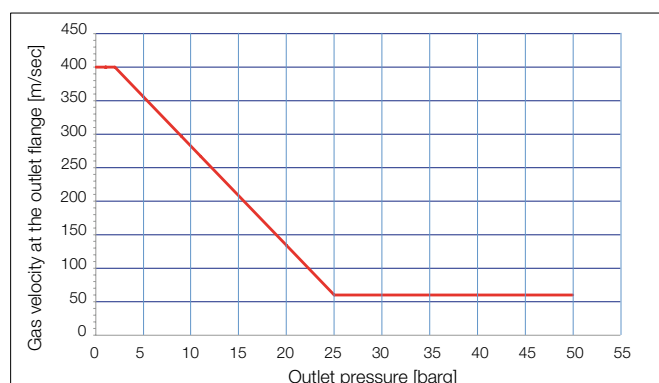
For the purpose of obtaining optimal performance, preventing erosion phenomena and limiting the level of emitted noise, it is recommended that the velocity at the regulator outlet flange does not exceed the velocity indicated in the diagram provided below.

Gas velocity at the outlet flange can be determined with the following relation:

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

Where:

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



Typical connection diagram

The following examples are provided as a recommendation to get the best performance from the **REFLUX 819/FO** regulator.

IN-LINE INSTALLATION

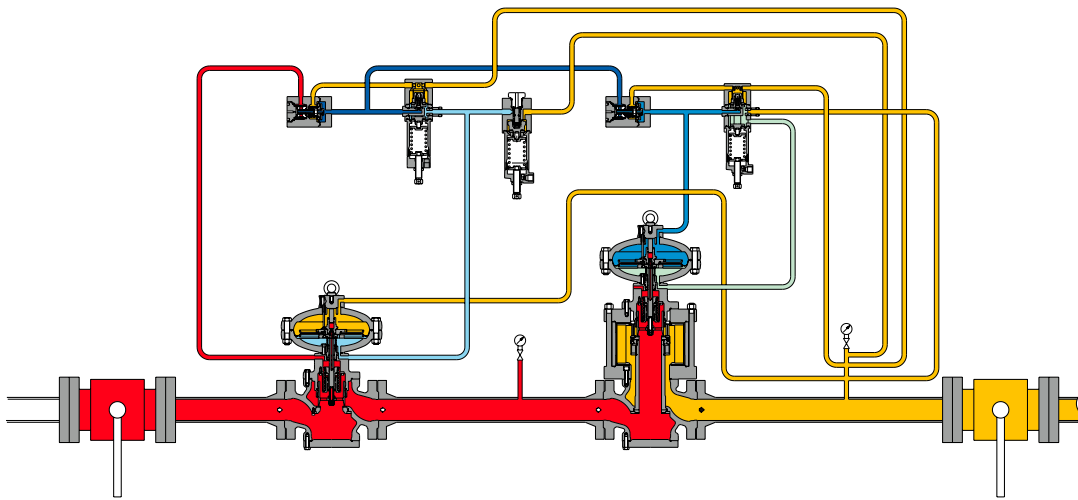


Fig. 9

Recommended installations

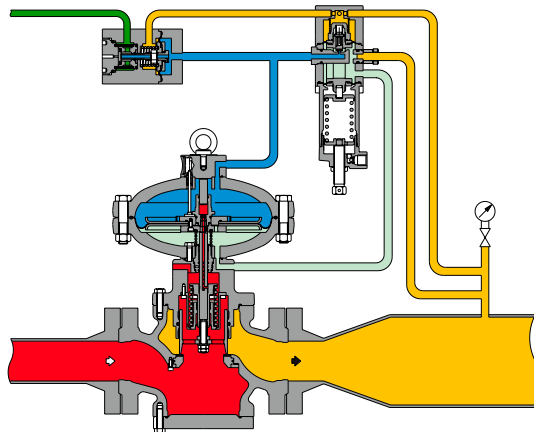
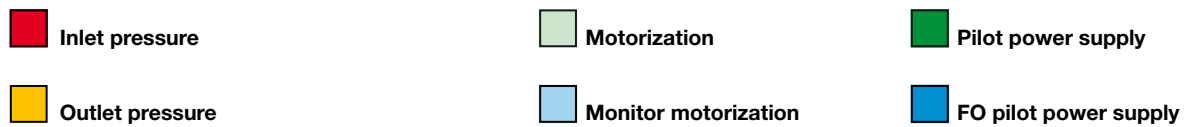


Fig.10

REFLUX 819 - Basic position



Installation examples

Shut-off valve SBC 782 and REFLUX 819/FO regulator with incorporated shut-off device SB82

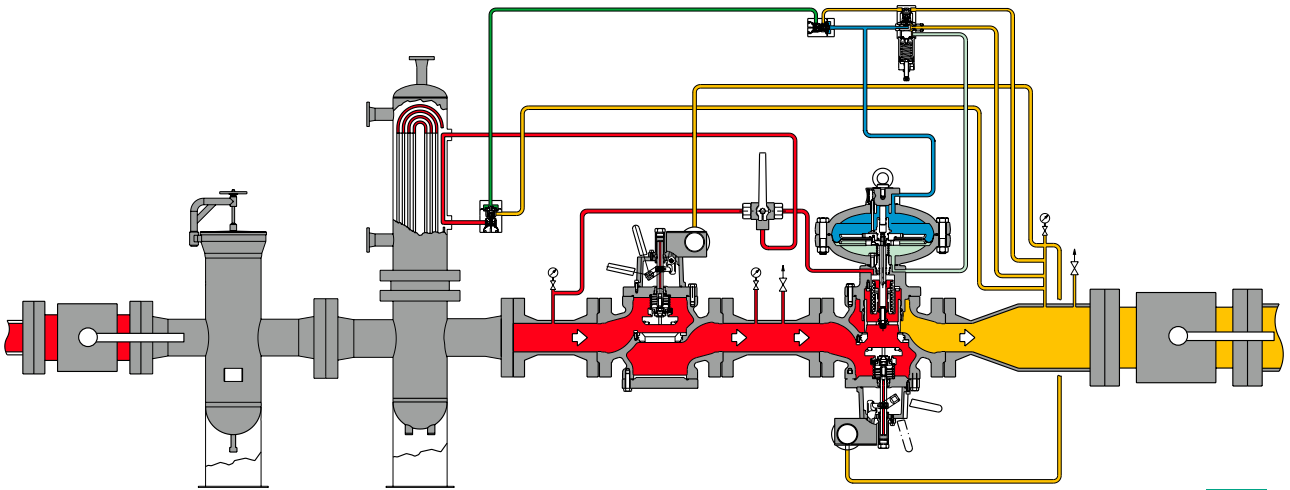


Fig.11

REFLUX 819 monitor regulator with incorporated shut-off device HB/97 and REFLUX 819/FO adjusting regulator

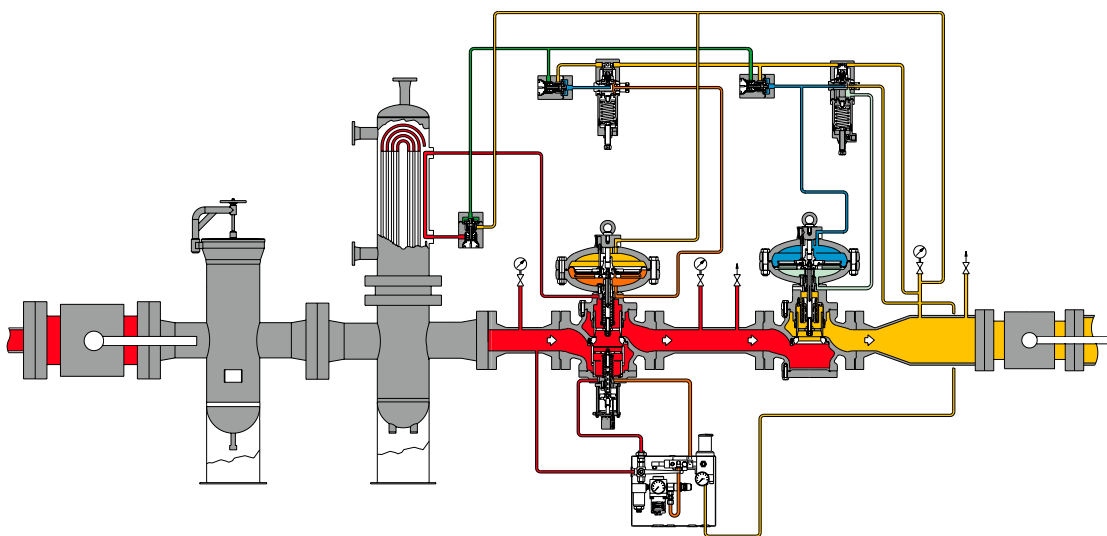


Fig.12

REFLUX 819/FO

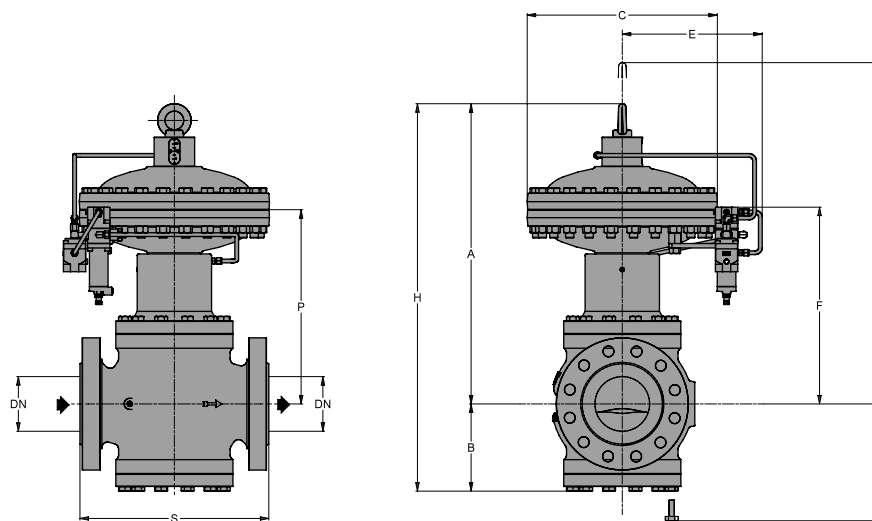


Fig.13

Dimensions								
Millimetres	25	50	80	100	150	200	250	300
Inches	1"	2"	3"	4"	6"	8"	10"	12"
S - Ansi 150/PN 16	184	254	298	352	451	543	673	737
S - Ansi 300	197	267	317	368	473	568	708	775
S - Ansi 600	210	286	336	394	508	609	752	819
A	371	435	490	532	789	750	1075	1060
B	100	130	150	190	225	265	340	375
C	278	278	360	360	510	510	610	718
D	130	160	200	250	275	420	440	475
E	310	310	320	320	420	460	470	500
F	311	375	410	422	549	1015	847	780
G	461	515	590	642	874	460	1175	1330
H	471	560	640	722	1014	370	1515	1435
P	220	285	320	332	459	460	775	762

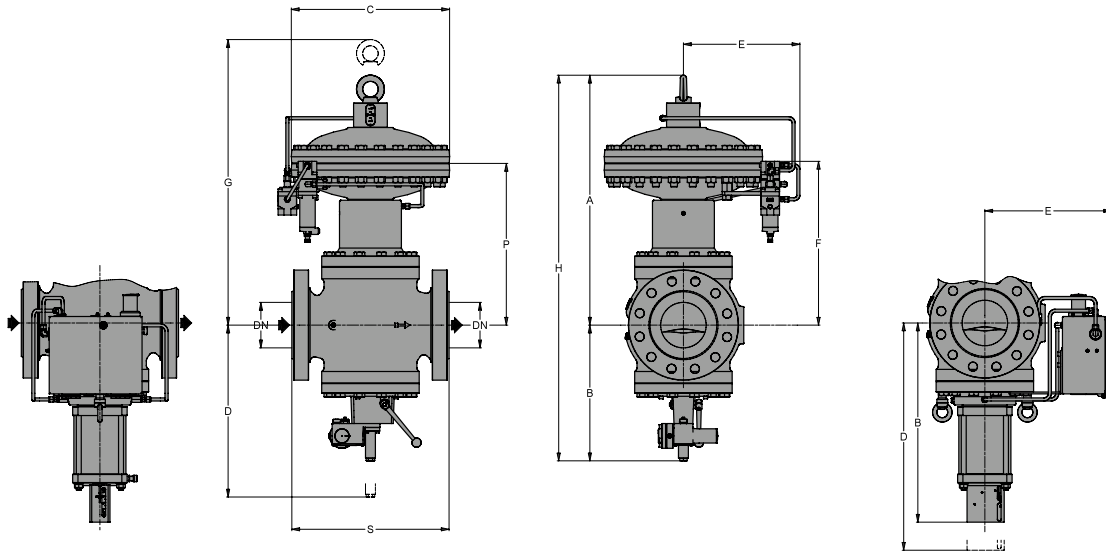
Table 5

Pneumatic fittings: 10x8mm

Dimension S according to EN 334 and IEC 534-3

Weight in Kg								
Ansi 150/PN 16	44	61	105	146	308	408	900	1433
Ansi 300	45	62	109	156	345	470	950	1450
Ansi 600	46	64	112	165	360	495	1000	1530

Table 6

REFLUX 819/FO + SB/82 or HB/97

Fig.14
Dimensions

Millimetres	25	50	80	100		150		200		250		300
Inches	1"	2"	3"	4"		6"		8"		10"		12"
S - Ansi 150/PN 16	184	254	298	352		451		543		673		737
S - Ansi 300	197	267	317	368		473		568		708		775
S - Ansi 600	210	286	336	394		508		609		752		819
A	371	435	490	532		789		887		1075		1060
B	215	240	270	300	518*	375	645	450	687*	530	796*	940
C	278	278	360	360		510		510	900*	610		718
D	290	330	380	440	650*	560	835*	625	445*	730	1060*	1250
E	310	310	320	320	358*	420	410*	420		470	510	530
F	311	375	410	422		549		597		847		780
G	461	515	590	642		874		987		1147		1330
H	471	675	760	832		1164		1337		1515		2000
P	221	285	320	332		459		507		775		762

Table 7

Pneumatic fittings: 10x8mm

* Dimensions and weights with HB/97. Dimension S according to standards EN 334 and IEC 534-3

Weight in Kg

Ansi 150/PN 16	53	71	115	160	150*	320	310*	460	414*	950	894*	1655
Ansi 300	55	73	122	171	230*	365	424*	525	599*	1000	1090*	1730
Ansi 600	56	75	125	180	276*	380	476*	550	684*	1050	1200*	1810

Table 8

REFLUX 819/FO + PM/819

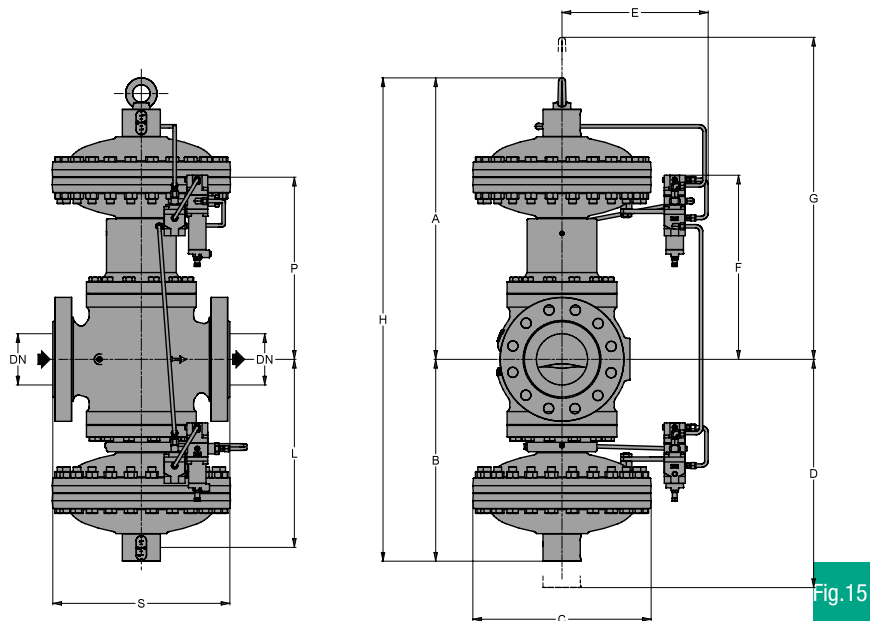


Fig.15

Dimensions														
Millimetres	25	50	80	100	150	200	250							
Inches	1"	2"	3"	4"	6"	8"	10"							
S - Ansi 150/PN 16	184	254	298	352	451	543	673							
S - Ansi 300	197	267	317	368	473	568	708							
S - Ansi 600	210	286	336	394	508	609	752							
A	371	435	490	532	789	887	1075							
B	320	371*	350	435*	430	490*	490	532*	650	789*	750	887*	800	1075*
C	278	278	360	360	510	510	610							
D	410	461*	430	515*	530	590*	600	462*	735	874*	850	987*	900	1175*
E	310	310	320	320	420	420	470							
F	311	375	410	422	459	597	847							
G	461	515	590	642	874	967	500							
H	691	742*	785	870*	920	960*	1022	1064*	14390	1578*	1637	1774*	1175	2150*
P	221	285	320	332	459	507	847	775*						
L	170	200	260	290	320	370	500							

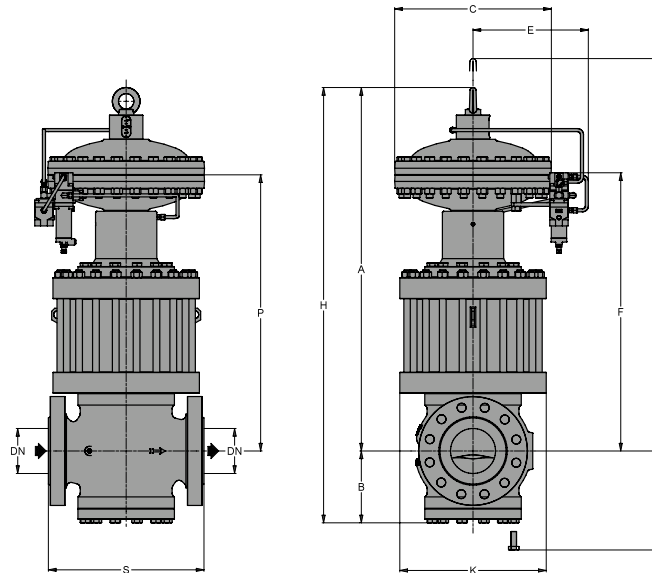
Table 9

Pneumatic fittings: 10x8mm

Dimension S according to standards EN 334 and IEC 534-3.

Weight in Kg									
Ansi 150/PN 16	84	105	180	245	517	670	1400		
Ansi 300	85	106	184	255	554	731	1450		
Ansi 600	86	108	187	264	569	756	1500		

Table 10

REFLUX 819/FO + DB/819

Fig.16

Dimensions								
Millimetres	25	50	80	100	150	200	250	300
Inches	1"	2"	3"	4"	6"	8"	10"	12"
S - Ansi 150/PN 16	184	254	298	352	451	543	673	737
S - Ansi 300	197	267	317	368	473	568	708	775
S - Ansi 600	210	286	336	394	508	609	752	819
A	571	660	760	842	1074	1222	1575	1640
B	100	130	150	190	225	265	340	375
C	278	278	360	360	510	510	610	718
D	130	160	200	250	275	320	440	475
E	310	310	320	320	420	420	470	500
F	476	580	675	812	394	1032	1375	1355
G	661	725	505	937	1259	1387	1775	1905
H	671	790	845	1032	1299	1487	1915	2015
P	421	485	565	627	829	907	1275	1337
K	220	300	330	390	480	595	695	745

Table 11

Pneumatic fittings: 10x8mm

Dimension S according to standards EN 334 and IEC 534-3.

Weight in Kg								
Ansi 150/PN 16	70	126	195	260	565	835	1280	2091
Ansi 300	72	128	204	289	608	925	1380	2286
Ansi 600	73	130	207	298	640	950	1430	2366

Table 12

REFLUX 819/FO + DB/819+SB/82 or HB/97

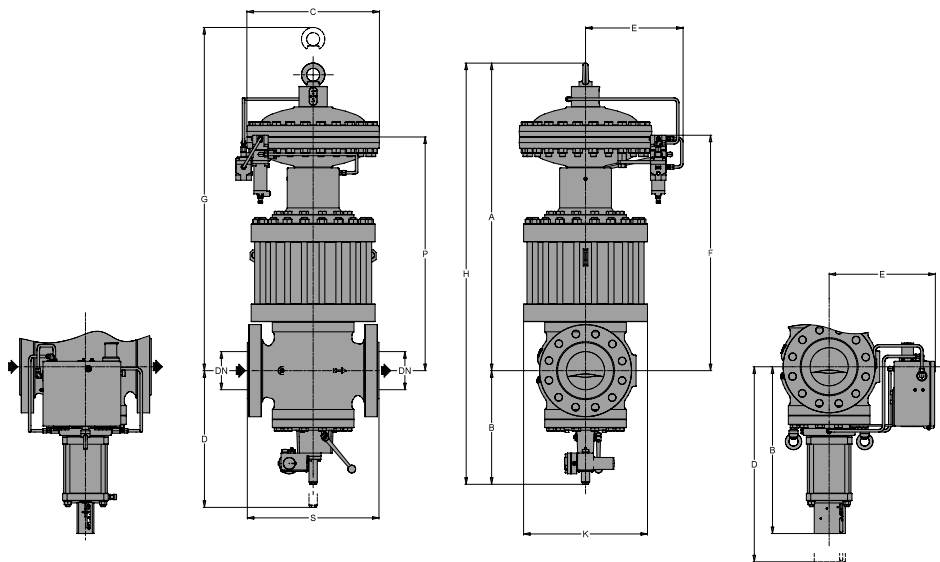


Fig.17

Dimensions

Millimetres	25	50	80	100	150	200	250	300				
Inches	1"	2"	3"	4"	6"	8"	10"	12"				
S - Ansi 150/PN 16	184	254	298	352	451	543	673	737				
S - Ansi 300	197	267	317	368	473	568	708	775				
S - Ansi 600	210	286	336	394	508	609	752	819				
A	571	660	760	842	1074	1222	1575	1640				
B	215	240	270	300	518*	375	645	450	687*	530	796*	940
C	278	278	360	360	510	510	510	610	610	718		
D	280	330	380	440	650*	560	835*	625	900*	730	1060*	1250
E	310	310	320	320	358*	420	410*	420	445*	470	510*	530
F	476	580	675	812	934	934	1032	1032	1375	1375	1355	
G	661	725	845	937	1259	1259	1387	1387	1775	1775	1905	
H	796	900	1030	1142	1449	1449	1672	1672	2105	2105	2580	
P	421	485	565	617	827	827	907	907	1275	1275	1337	
K	220	300	330	390	480	480	595	595	695	695	745	

Table 13

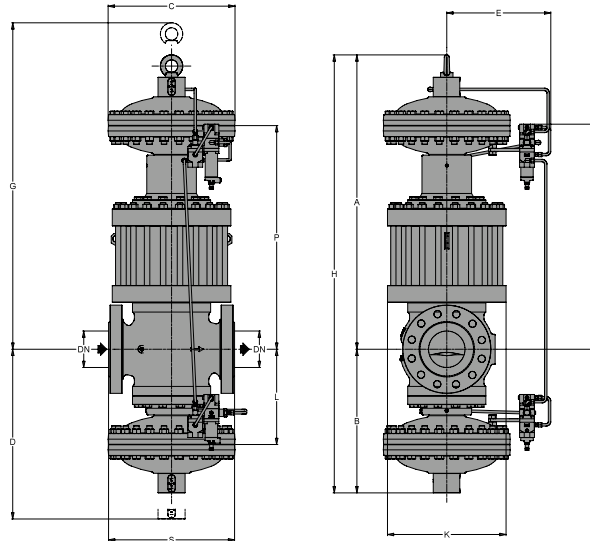
Pneumatic fittings: 10x8mm

* Dimensions and weights with HB/97. Dimension S according to standards EN 334 and IEC 534-3.

Weight in Kg

Ansi 150/PN 16	79	136	205	274	266*	577	569*	887	569*	1330	569*	2371
Ansi 300	82	139	217	304	318*	628	661*	980	1006*	1430	687*	2560
Ansi 600	83	141	220	313	330*	660	687*	1500	1022*	1480	756*	2646

Table 14

REFLUX 819/FO + DB/819 + PM/819

Fig.18

Dimensions														
Millimetres	25	50	80	100	150	200	250							
Inches	1"	2"	3"	4"	6"	8"	10"							
S - Ansi 150/PN 16	184	254	298	352	451	543	673							
S - Ansi 300	197	267	317	368	473	568	708							
S - Ansi 600	210	286	336	394	508	609	752							
A	571	660	760	842	1074	1222	1575							
B	320	371*	350	435*	430	490*	490	532*	650	789*	750	800	925*	
C	278	278	360	360	510	510	610							
D	410	461*	430	515*	530	590*	600	642*	735	874*	850	887*	900	1025*
E	310	310	320	320	420	420	470							
F	476	580	675	812	934	1032	1375							
G	661	725	845	937	1259	1387	1775							
H	891	942*	1010	1095*	1195	1250*	1332	1374*	1724	1863*	1972	2109*	2375	2650*
P	421	485	320	617	827	907	1275							
L	221	221*	200	285*	260	320*	290	332*	320	459*	370	507*	500	625*
K	220	300	330	390	480	595	695							
												Table 15		

Pneumatic fittings: 10x8mm

Dimension S according to standards EN 334 and IEC 534-3.

Weight in Kg								
Ansi 150/PN 16	110	170	270	359	774	1097	1780	
Ansi 300	112	172	267	388	783	1185	1880	
Ansi 600	113	174	270	397	815	1210	1930	
								Table 16

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The data are approximate and not binding. We reserve the right to make changes without prior notice.

