

# Reflux 819/FO

High Medium Pressure Gas Regulator



**TECHNICAL BROCHURE**

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**[www.f Fiorentini.com](http://www.f Fiorentini.com)**

# Who we are

We are a global organization specialized in designing and manufacturing technologically advanced solutions for natural gas treatment, transmission and distribution systems.

We are the ideal partner for operators in the Oil & Gas sector, with a business offer that goes across the whole natural gas chain.

We are in constant evolution to meet our customers' highest expectations in terms of quality and reliability.

Our aim is to be a step ahead of the competition, with customized technologies and an after-sale service program undertaken with the highest grade of professionalism.



## Pietro Fiorentini advantages



Localised technical support

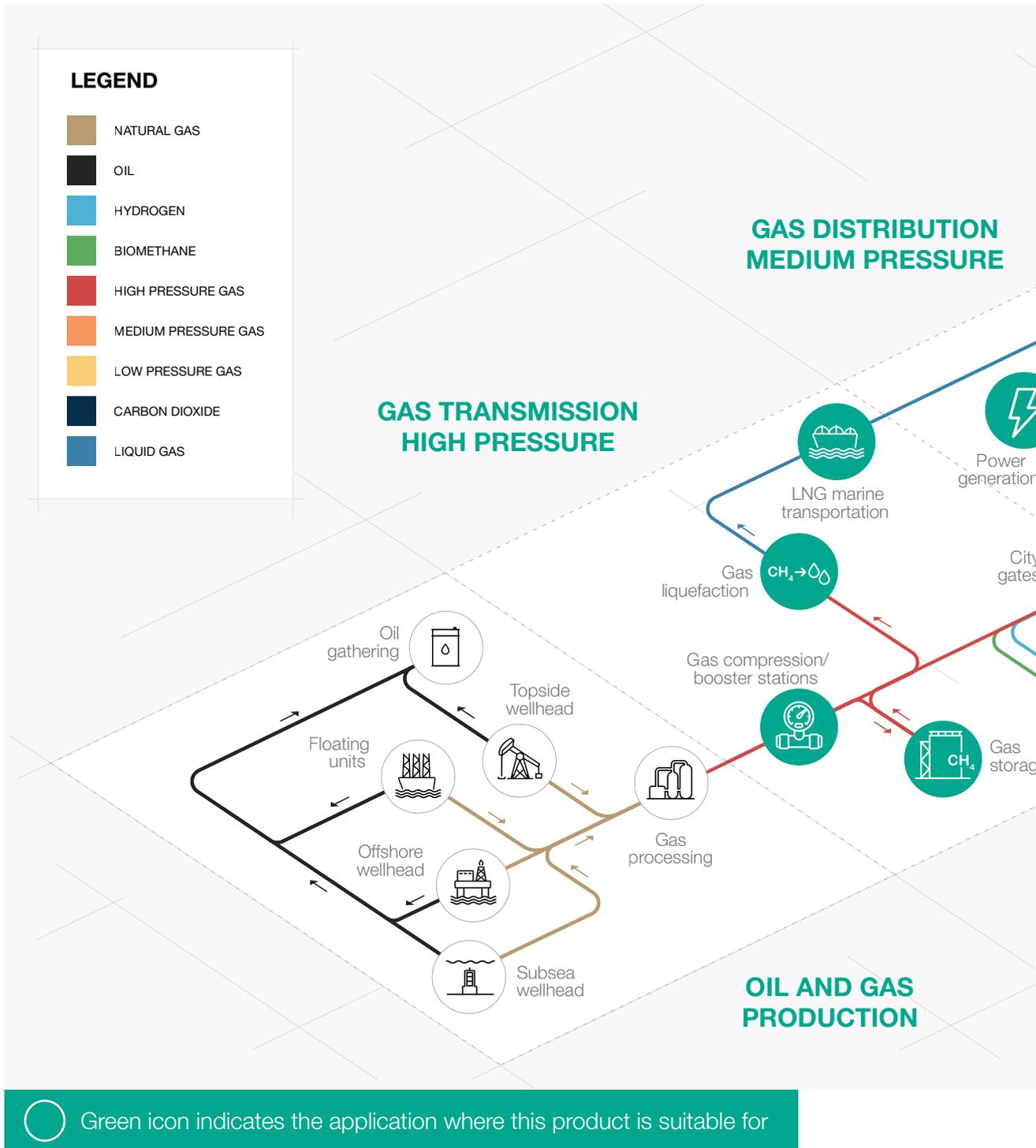


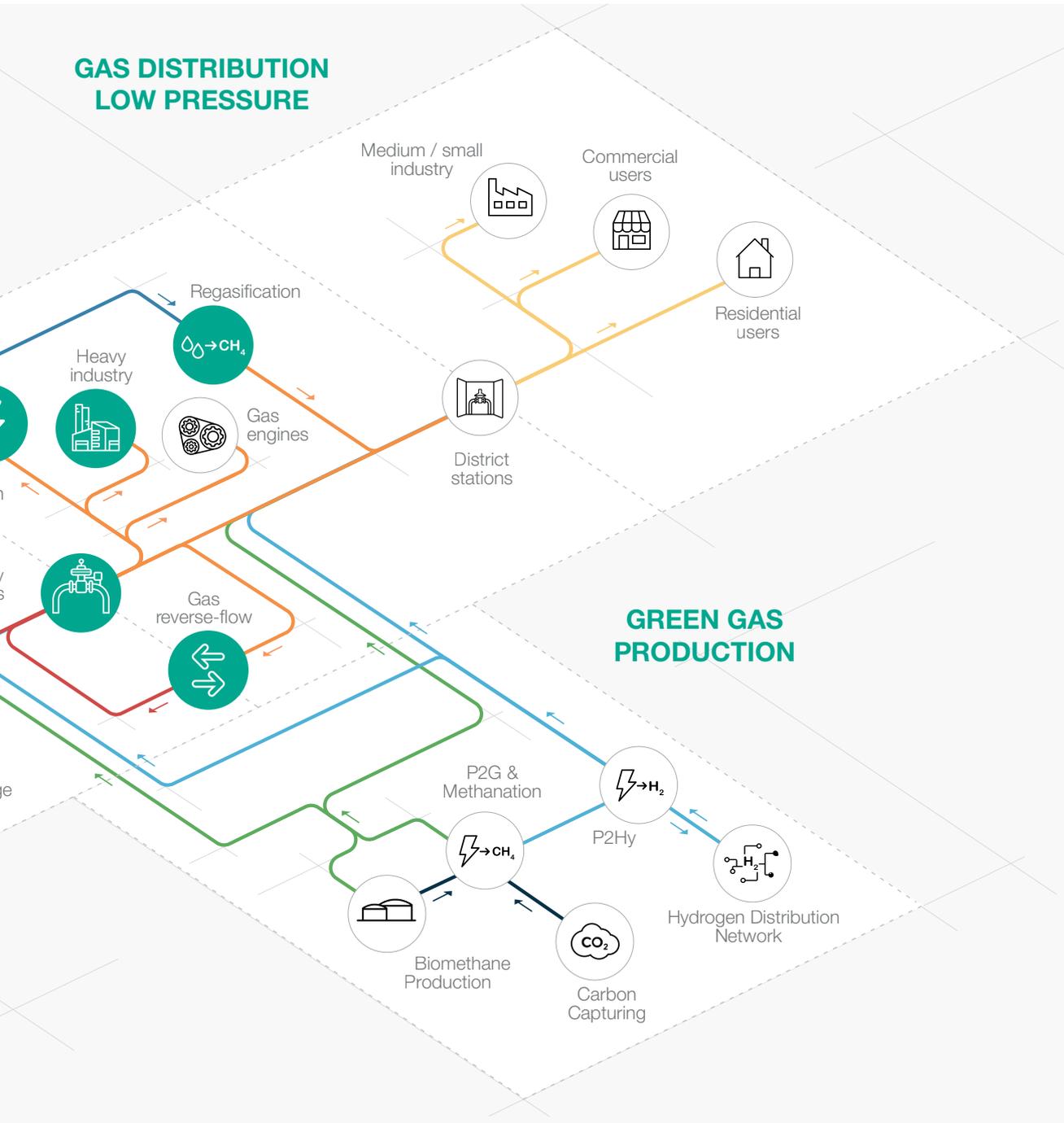
Experience since 1940



We operate in over 100 countries

# Area of Application





**Figure 1** Area of Application Map

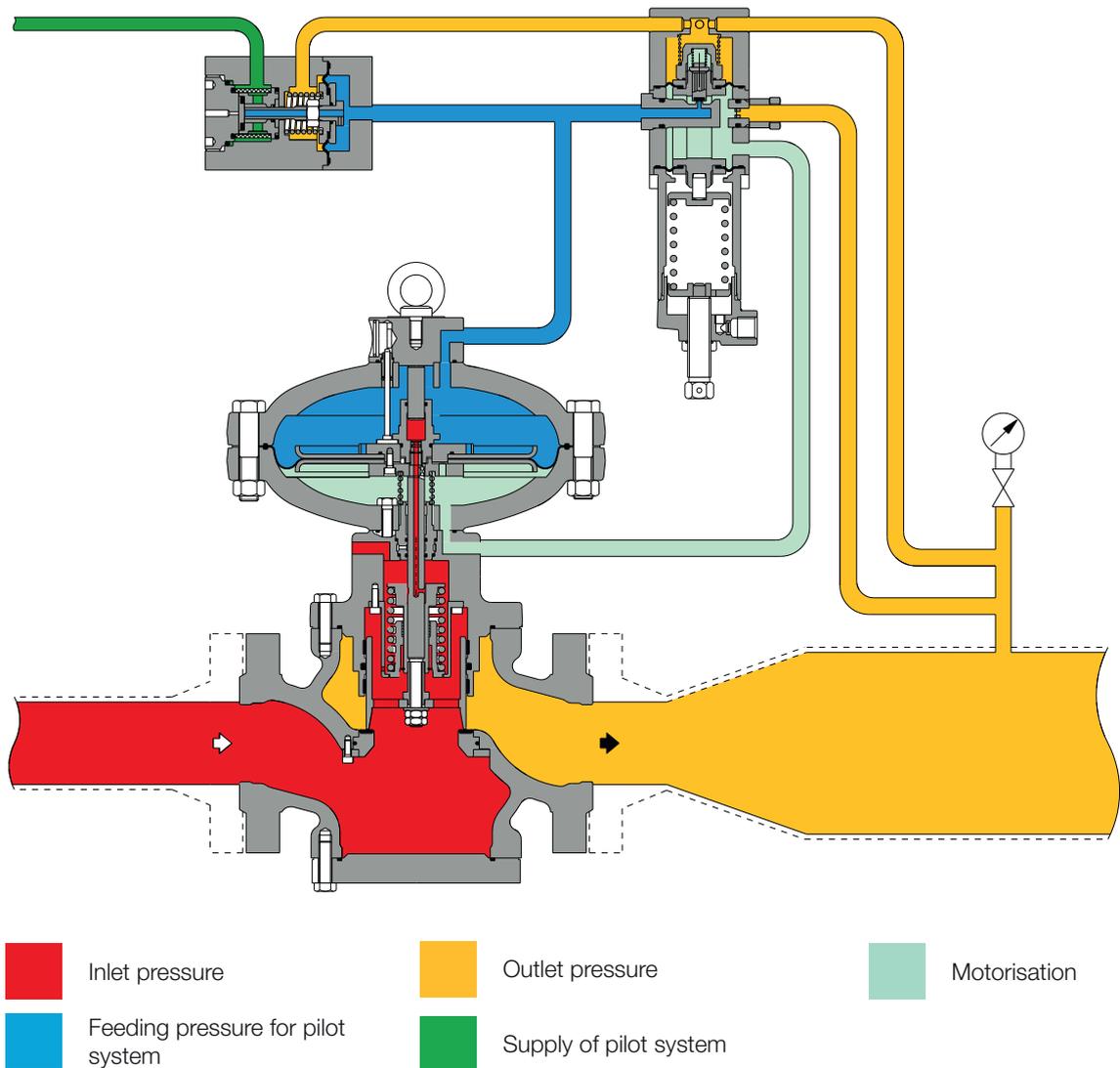


# Introduction

**Reflux 819/FO** is one of the **pilot-operated gas pressure regulators** designed and manufactured by Pietro Fiorentini.

This device is suitable for use with previously filtered non-corrosive gases, and it is mainly used for high-pressure transmission systems, power plants and for medium pressure natural gas distribution networks.

According to the European Standard EN 334, it is classified as **Fail Open**.



**Figure 2** Reflux 819/FO

# Features and Calibration ranges

**Reflux 819/FO** is a **pilot-operated** device for high pressure and medium pressure with a unique **dynamic balancing system** which ensures an **outstanding turn down ratio** combined with an extremely **accurate outlet pressure control**.

**Reflux 819/FO** is a balanced pressure regulator. This means that the controlled outlet pressure is not affected by variations in the inlet pressure and flow during its operation. Therefore a balanced regulator can have a single-size orifice for all pressure and flow conditions.

This regulator is suitable for use with previously filtered, non corrosive gases, in natural gas transmission and distribution networks as well as high load industrial application.

It is a **truly top entry design** which allows **easy maintenance** of parts directly in the field **without removing the body from the pipework**.

Set point adjustment of the regulator is operated via a pilot unit used to load and unload the motorization pressure to the bottom chamber.

The modular design of Reflux 819/FO pressure regulators allows for the factory (or retro-site fitting) of an emergency monitor regulator PM/819 or a slamshut valve SB/82 or HB/97 (depending on size). Additionally an integral silencer DB/819 can be installed. All without removing the body from the pipeline.



**Figure 3** Reflux 819/FO with silencer DB/819



**Figure 4** Reflux 819/FO with SB/82



## Reflux 819/FO competitive advantages

- 

Compact and simple design
- 

Top Entry
- 

High accuracy
- 

Easy maintenance
- 

High turn-down ratio
- 

Built-in accessories
- 

True Fail Open plug and seat regulator
- 

Biomethane compatible and available with specific versions for full Hydrogen or blending
- 

Built-in pilot's filter
- 

Balanced type

## Features

Features	Values
Design pressure* (PS <sup>1</sup> / DP <sup>2</sup> )	up to 10.2 MPa up to 102 barg
Ambient temperature* (TS <sup>1</sup> )	from -20 °C to +60 °C from 4 °F to +140 °F
Inlet gas temperature*	from -20 °C to +60 °C from 4 °F to +140 °F
Inlet pressure (MAOP / p <sub>umax</sub> <sup>1</sup> )	from 0.3 to 10.2 MPa from 3 to 102 barg
Range of downstream pressure (Wd <sup>1</sup> )	from 0.1 to 7.4 MPa from 1 to 74 barg
Available accessories	DB/819 Silencer, LDB/171 Silencer, PM/819 Monitor, SB/82 Slam shut, HB/97 Slam shut
Minimum operating differential pressure (Δp <sub>min</sub> <sup>1</sup> )	0.2 MPa   2 barg
Accuracy class (AC <sup>1</sup> )	up to 2.5
Lock-up pressure class (SG <sup>1</sup> )	up to 5
Nominal size (DN <sup>1,2</sup> )	DN 25 / 1"; DN 50 / 2"; DN 80 / 3"; DN 100 / 4"; DN 150 / 6"; DN 200 / 8"; DN 250 / 10"; DN 300 / 12"
Connections	Class 150, 300, 600 RF or RTJ according to ASME B16.5 and PN16

<sup>(1)</sup> according to EN334 standard

<sup>(2)</sup> according to ISO 23555-1 standard

<sup>(\*)</sup> NOTE: Different functional features and/or extended temperature ranges may be available on request. Stated inlet gas temperature range is the maximum for which the equipment's full performance, including accuracy is guaranteed. Product may have a different pressure or temperature ranges according to the version and/or installed accessories.

**Table 1** Features

# Materials and Approvals

Part	Material
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
Diaphragm	Rubberised Canvas (pre-formed by hot-pressing process)
O-rings	Nitrile Rubber
Compression fittings	Made of zinc-plated steel according to DIN 2353; on request, stainless steel

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

**Table 2** Materials

## Construction Standards and Approvals

**Reflux 819/FO** regulator is designed according to the European standard EN 334. The regulator reacts in opening (Fail Open) according to EN 334.

The product is certified according to European Directive 2014/68/EU (PED). DVGW certified as a truly Fail Open regulator.

Leakage class: bubble tight, better than VIII according to ANSI/FCI 70-3.



EN 334



PED-CE



DVGW



# Pilot ranges and types

Type	Model	Operation	Range Wh		Spring Table web link
			MPa	barg	
Main pilot	204/A/FO	Manual	0.1 - 3.3	1 - 33	<a href="#">TT 1183</a>
Main pilot	205/A/FO	Manual	2 - 6	20 - 60	<a href="#">TT 1183</a>
Main pilot	207/A/FO	Manual	4.1 - 7.4	41 - 74	<a href="#">TT 1183</a>

**Table 3** Settings table

Pilot adjustment	
Pilot type .../A	Manual setting
Pilot type .../D	Electric remote control setting
Pilot type .../CS	Pneumatic remote control setting
Pilot type .../MP	Magnetic pilot for remote control setting / flow limitation

**Table 4** Pilot adjustment table

General link to the calibration tables: [PRESS HERE](#) or use the QR code:



# Accessories

## For the pressure regulators:

- Cg limiter
- Limit switches
- Position transmitter
- Silencer
- Slam shut valve
- Monitor

## For the pilot circuit:

- R14/A/S preregulator for the high pressure circuit (differential pressure > 3.5 MPa | 35 barg)
- Heating cable for preheating pilot circuit
- Electrical heater PPH200
- Supplementary filter CF14 or CF14/D
- ESD filter CF/5/S
- ATF 15 antifreeze

## In-line Monitor

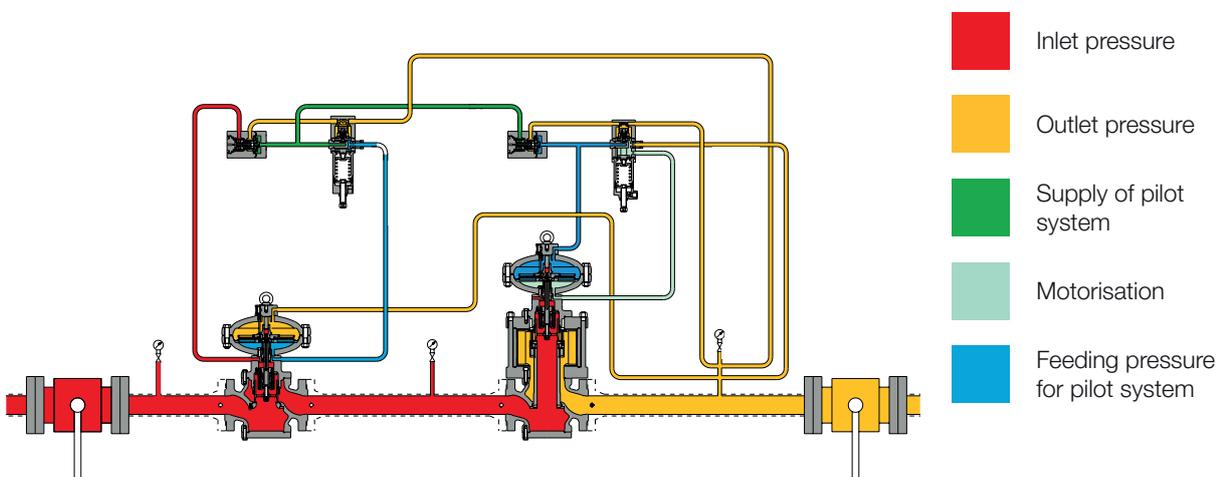
The in-line monitor is generally installed **upstream** of the active regulator.

Although the function of the monitor regulator is different, the two regulators are virtually identical from the point of view of their mechanical components.

The only difference is that monitor is set at a higher pressure than active regulator.

The Cg coefficient of the active regulator is the same, however during the sizing process, the differential pressure drop generated by the fully open in-line monitor shall be considered.

As a general practise to incorporate this effect, a 20% reduction of the Active regulator's Cg value can be applied.



**Figure 5** Reflux 819/FO active with in-line monitor Reflux 819



## PM/819 monitor

**This emergency regulator (monitor) is directly integrated** onto the body of the main regulator. Both pressure regulators, therefore, use the same valve body, although they have independent actuators, pilots and valve seats.

The monitor is normally in the fully open position during normal operation of the active regulator and takes over in the event of its failure.

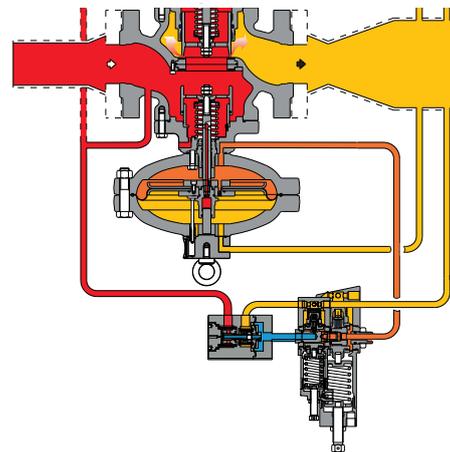
The operational characteristics of the PM/819 monitor are the same as for the Reflux 819 regulator (refer to that specific technical brochure).

The Cg coefficients of regulators having an incorporated monitor is 5% lower than those for standard version.

This solution allows the construction of pressure reduction lines with compact dimensions.

Another great advantage offered by the incorporated monitor regulator is that **it can be installed at any time**, even on an existing regulator, **without major changes to the pipework**.

-  Compact dimensions
-  Completely independent
-  "Fail to close" action
-  Built-in pilot filter
-  Visual opening indicator
-  Easy maintenance
-  Limit switch option
-  Accelerating valve option



-  Inlet pressure
-  Outlet pressure
-  Feeding pressure for pilot system

**Figure 6** Reflux 819/FO with PM/819

Type	Model	Operation	Range Wh		Spring Table web link
			MPa	barg	
Main pilot	204/A	Manual	0.03 - 4.3	0.3 - 43	<a href="#">TT 433</a>
Main pilot	205/A	Manual	2 - 6	20 - 60	<a href="#">TT 799</a>
Main pilot	207/A	Manual	4.1 - 7.4	41 - 74	<a href="#">TT 1146</a>

**Table 5** Settings table

Types of pilot adjustment	
Pilot type .../A	Manual setting
Pilot type .../D	Electric remote control setting
Pilot type .../CS	Pneumatic remote control setting
Pilot type .../FIO	Smart unit for remote setting, monitoring, flow limitation

**Table 6** Pilot adjustment table

The monitor regulator can be equipped with an additional pilot called “accelerating valve” to enable a quick response time during the monitor take over. According to PED the accelerating valve is required on the monitor when acting as a safety accessory.

Type	Model	Operation	Range Wh		Spring Table web link
			MPa	barg	
Accelerating valve	M/A	Manual	0.03 - 2	0.3 - 20	<a href="#">TT 354</a>
Accelerating valve	M/A1	Manual	2 - 6.3	20 - 63	<a href="#">TT 892</a>
Accelerating valve	M/A2	Manual	4 - 7.5	40 - 75	<a href="#">TT 892</a>

**Table 7** Accelerating valve adjustment table

General link to the calibration tables: [PRESS HERE](#) or use the QR code:





## DB/819 silencer

Whenever certain noise limit is desired, an additional silencer allows to considerably reduce the noise level (dBA).

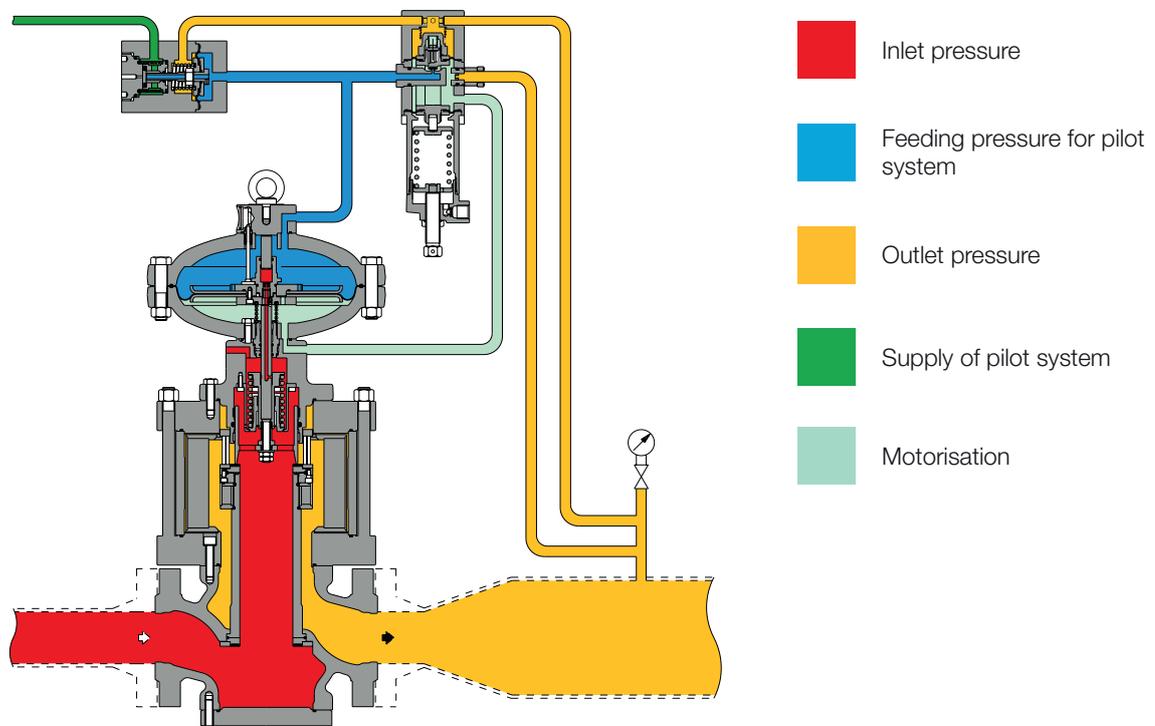
Reflux 819/FO pressure regulator can be supplied with an **incorporated silencer** in either the standard version or version with incorporated slam shut or monitor regulator.

The high efficiency noise absorption takes place at the point where the noise is generated, thus preventing its propagation.

With the built-in silencer, the  $C_g$  valve coefficient is 5% lower than the corresponding version without.

Given the modular arrangement of the regulator, the silencer may be retrofitted to both standard Reflux 819/FO version as well as those with incorporated slam shut or monitor, **without any need to modify the main piping.**

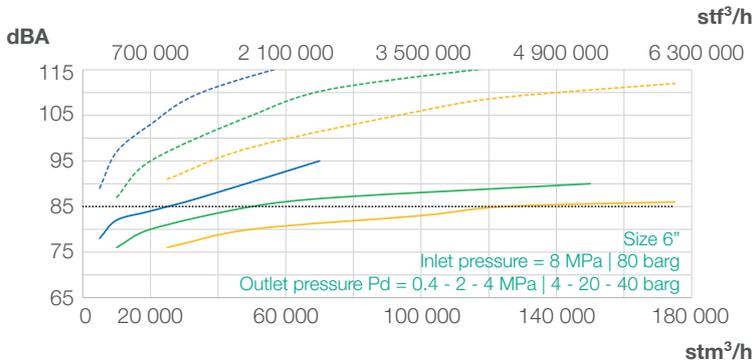
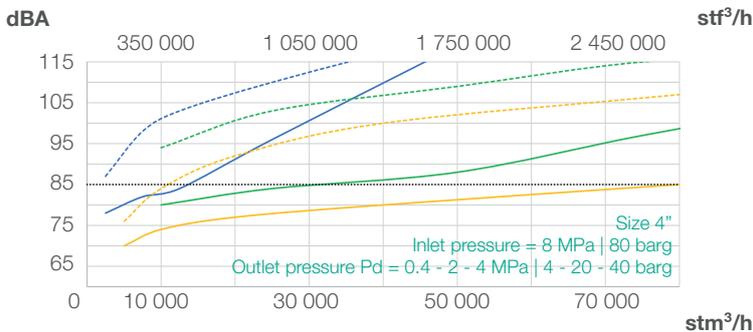
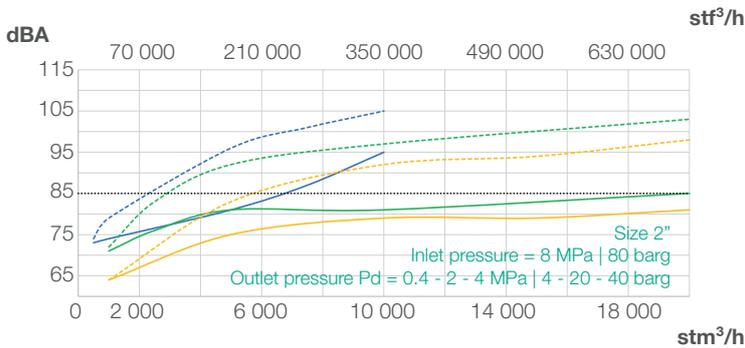
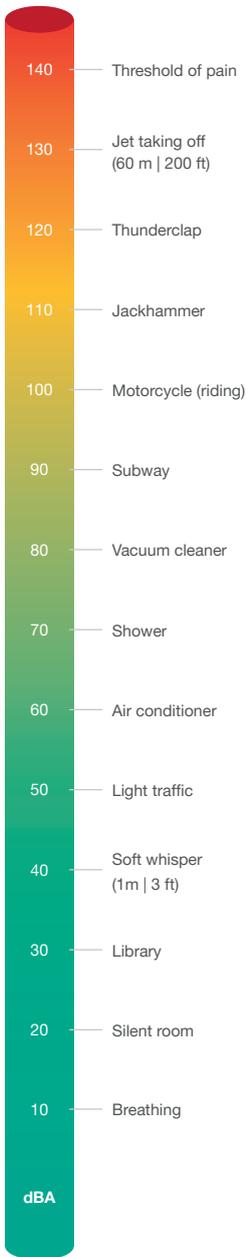
Pressure reduction and control operate in the same manner as in the standard version.



**Figure 7** Reflux 819/FO with DB/819 silencer

The charts below represent the silencer effectiveness based on some common reference conditions for 2", 4" and 6". For actual calculations at specific desired conditions please refer to the online sizing tool or contact your closest Pietro Fiorentini representative.

- Pd 0.4 MPa | 4 barg NO Silencer
- Pd 2 MPa | 20 barg NO SILENCER
- Pd 4 MPa | 40 barg NO Silencer
- ..... Recommended noise limit (85 dBA at 1 mt | 3 feet)
- Pd 0.4 MPa | 4 barg DB/819
- Pd 2 MPa | 20 barg DB/819
- Pd 4 MPa | 40 barg DB/819



**Chart 1** Reflux 819/FO's silencer efficiency charts



## SB/82 or HB/97 slam shut valves

Reflux 819/FO pressure regulator offers the possibility of installing an **SB/82 or HB/97 incorporated slam shut valve**, depending on the regulator size, and this can be done either during the manufacturing process or be retrofitted in the field.

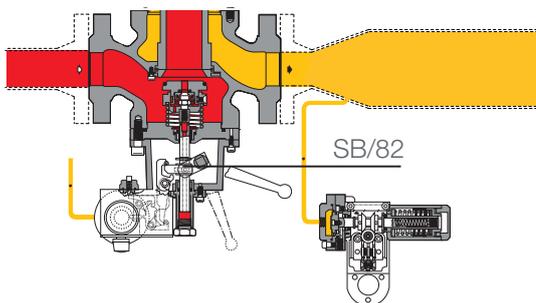
SB/82 is available for all sizes, while HB/97 is available from 4" to 12" only.

**Retrofitting can be done without modifying** the pressure regulator assembly.

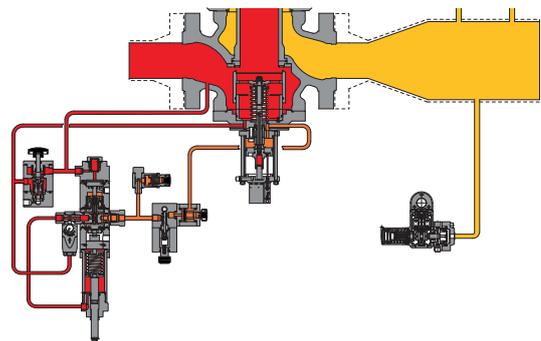
With the built-in slam shut, the Cg valve coefficients is 5% lower than the corresponding version without.

The main characteristics of this device are:

-  Over Pressure Shut-Off
-  Under Pressure Shut-Off
-  Internal by-pass
-  Push button for tripping test
-  Compact dimensions
-  Easy maintenance
-  Remote tripping option
-  Limit switch option



**Figure 8** Reflux 819/FO with SB/82



**Figure 9** Reflux 819/FO with HB/97



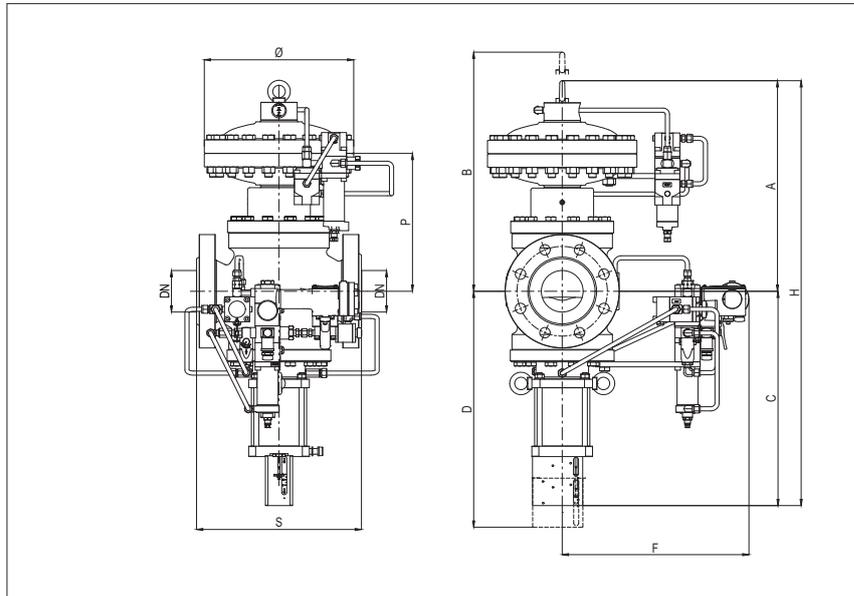
Pressure switch types and ranges					
SSV Type	Model	Operation	Range Wh		Spring Table web link
			MPa	barg	
SB/82	102M	OPSO	0.02 - 0.55	0.2 - 5.5	<a href="#">TT 1331</a>
		UPSO	0.02 - 0.28	0.2 - 2.8	
SB/82	102MH	OPSO	0.02 - 0.55	0.2 - 5.5	<a href="#">TT 1331</a>
		UPSO	0.28 - 0.55	2.8 - 5.5	
SB/82	103M	OPSO	0.2 - 2.2	2 - 22	<a href="#">TT 1331</a>
		UPSO	0.02 - 0.8	0.2 - 8	
SB/82	103MH	OPSO	0.2 - 2.2	2 - 22	<a href="#">TT 1331</a>
		UPSO	0.8 - 1.9	8 - 19	
SB/82	104M	OPSO	1.5 - 4.5	15 - 45	<a href="#">TT 1331</a>
		UPSO	0.16 - 1.8	1.6 - 18	
SB/82	104MH	OPSO	1.5 - 4.5	15 - 45	<a href="#">TT 1331</a>
		UPSO	1.8 - 4.1	18 - 41	
SB/82	105M	OPSO	3 - 9	30 - 90	<a href="#">TT 1331</a>
		UPSO	0.3 - 4.4	3 - 44	
SB/82	105MH	OPSO	3 - 9	30 - 90	<a href="#">TT 1331</a>
		UPSO	4.4 - 9	44 - 90	
HB/97	103	OPSO	0.13 - 1.1	1.3 - 11	<a href="#">TT 984</a>
		UPSO	0.04 - 0.68	0.4 - 6.8	
HB/97	104	OPSO	1 - 3.15	10 - 31.5	<a href="#">TT 984</a>
		UPSO	0.1 - 2.06	1 - 20.6	
HB/97	105	OPSO	2.5 - 7.6	25 - 76	<a href="#">TT 985</a>
		UPSO	0.25 - 5	2.5 - 50	
HB/97	105/92	OPSO	5.8 - 8.5	58 - 85	<a href="#">TT 985</a>
		UPSO	4.5 - 7.5	45 - 75	

**Table 8** Accelerating valve adjustment table



# Weights and Dimensions

## Reflux 819/FO



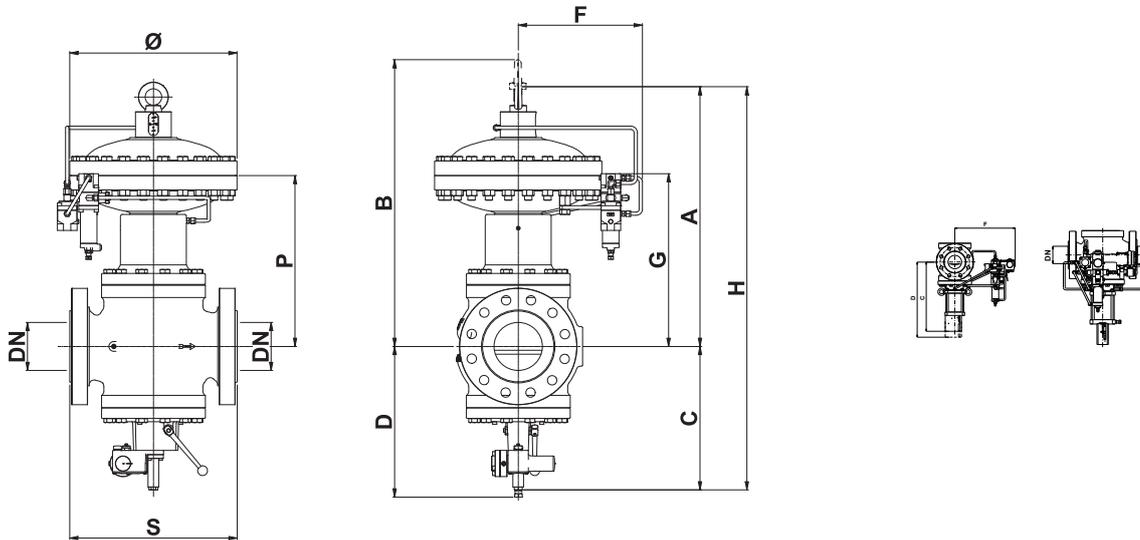
**Figure 10** Reflux 819/FO dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)								
	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches
Size (DN)	25   1"	50   2"	80   3"	100   4"	150   6"	200   8"	250   10"	300   12"
S - ANSI 150/PN16	184   7.24"	254   10"	298   11.73"	352   13.86"	451   17.76"	543   21.38"	673   26.50"	737   29.02"
S - ANSI 300	197   7.76"	267   10.51"	317   12.48"	368   14.49"	473   18.62"	568   22.36"	708   27.87"	775   30.52"
S - ANSI 600	210   8.27"	286   11.26"	336   13.23"	394   13.23"	508   20"	609   23.98"	752   29.61"	819   32.24"
Ø	278   10.94"	278   10.95"	360   14.17"	360   14.17"	510   20.08"	510   20.08"	610   24.02"	718   28.27"
A	371   14.61"	435   17.13"	490   19.29"	532   20.94"	789   31.06"	750   29.53"	1075   42.33"	1060   41.73"
B	461   18.15"	515   20.28"	590   23.23"	642   25.28"	874   34.41"	460   18.11"	1175   46.26"	1330   52.36"
C	100   3.94"	130   5.12"	150   5.91"	190   7.48"	225   8.86"	265   10.43"	340   13.39"	375   14.76"
D	130   5.12"	160   6.30"	200   7.87"	250   9.84"	275   10.83"	420   16.54"	440   17.33"	475   18.70"
F	310   12.20"	310   12.20"	320   12.60"	320   12.60"	420   16.54"	460   18.11"	470   18.50"	500   19.68"
G	311   12.24"	375   14.76"	410   16.14"	422   16.61"	549   21.61"	1015   39.96"	847   33.35"	780   30.71"
H	471   18.54"	560   22.05"	640   25.20"	722   28.43"	1014   39.92"	370   14.57"	1515   59.65"	1435   56.50"
P	220   8.66"	285   11.22"	320   12.60"	332   13.07"	459   18.07"	460   18.11"	775   30.52"	762   30"
Tube Connections	Øe 10 x Øi 8 (on request imperial sizing)							

Weight	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs
ANSI 150/PN 16	44   97	61   134	105   231	146   322	308   679	408   899	900   1984	1433   3159
ANSI 300	45   99	62   137	109   240	156   344	345   761	470   1036	950   2094	1450   3197
ANSI 600	46   101	64   141	112   247	165   364	360   794	495   1091	1000   2204	1530   3373

**Table 9** Weights and dimensions

## Reflux 819/FO + SB/82 or HB/97



**Figure 11** Reflux 819/FO + SB/82 or HB/97 dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)								
	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches
Size (DN)	25   1"	50   2"	80   3"	100   4"	150   6"	200   8"	250   10"	300   12"
S - ANSI 150/PN16	184   7.24"	254   10"	298   11.73"	352   13.86"	451   17.76"	543   21.38"	673   26.50"	737   29.02"
S - ANSI 300	197   7.76"	267   10.51"	317   12.48"	368   14.49"	473   18.62"	568   22.36"	708   27.87"	775   30.51"
S - ANSI 600	210   8.27"	286   11.26"	336   13.23"	394   13.23"	508   20"	609   23.98"	752   29.61"	819   32.24"
Ø with SB/82	278   10.94"	278   10.94"	360   14.17"	360   14.17"	510   20.08"	510   20.08"	610   24.02"	-
Ø with HB/97	-	-	-	-	-	900   35.43"	-	718   28.27"
A	371   14.60"	435   17.13"	490   19.29"	532   20.94"	789   31.06"	887   34.92"	1075   42.32"	1060   41.73"
B	461   18.15"	515   20.28"	590   23.23"	642   25.28"	874   34.41"	987   38.86"	1147   45.16"	1330   52.36"
C with SB/82	215   8.46"	240   9.45"	270   10.63"	300   11.81"	375   14.76"	450   17.72"	530   20.87"	-
C with HB/97	-	-	-	518   20.39"	645   25.39"	687   27.05"	796   31.34"	940   37"
D with SB/82	290   11.42"	330   12.99"	380   14.96"	440   17.32"	560   22.05"	625   24.61"	730   28.74"	-
D with HB/97	-	-	-	650   25.59"	835   32.87"	445   17.52"	1060   41.73"	1250   49.21"
F	310   12.20"	310   12.20"	320   12.60"	320   12.60"	420   16.54"	420   16.54"	470   18.50"	-
F with HB/97	-	-	-	358   14.09"	410   16.14"	-	510   20.08"	530   20.87"
G	311   12.24"	375   14.76"	410   16.14"	422   16.62"	549   21.61"	597   23.50"	847   33.35"	780   30.71"
H	471   18.54"	675   26.57"	760   29.92"	832   32.76"	1164   45.83"	1337   52.64"	1515   59.65"	2000   78.74"
P	221   7.70"	285   11.22"	320   12.60"	332   13.07"	459   18.07"	507   19.96"	775   30.51"	762   30"
Tubing Connections	Øe 10 x Ø 8 (on request imperial sizing)							

Weight	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs
ANSI 150/PN 16 with SB/82	53   117	71   157	115   254	160   353	320   705	460   1014	950   2094	-
ANSI 150/PN 16 with HB/97	-	-	-	150   331	310   683	414   913	894   1971	1655   3649
ANSI 300 with SB/82	55   121	73   161	122   269	171   377	365   805	525   1157	1000   2205	-
ANSI 300 with HB/97	-	-	-	230   507	424   935	599   1321	1090   2403	1730   3814
ANSI 600 with SB/82	56   123	75   165	125   276	180   397	380   838	550   1213	1050   2315	-
ANSI 600 with HB/97	-	-	-	276   608	476   1049	684   1508	1200   2646	1810   3990

**Table 10** Weights and dimensions

# Reflux 819/FO + PM/819

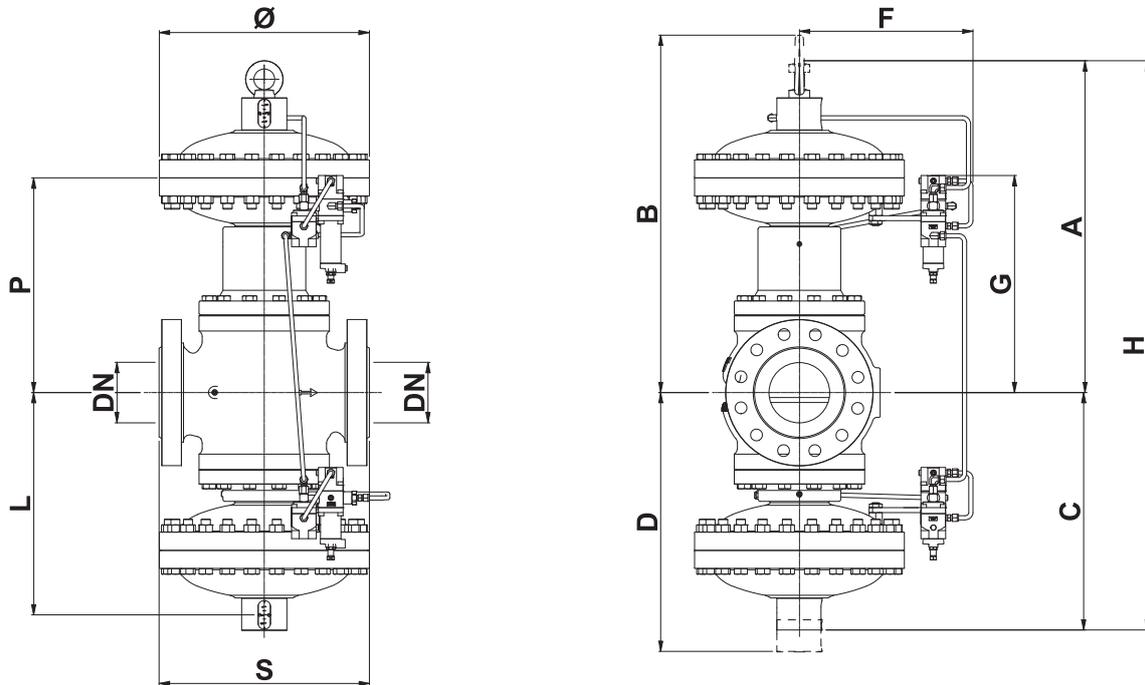
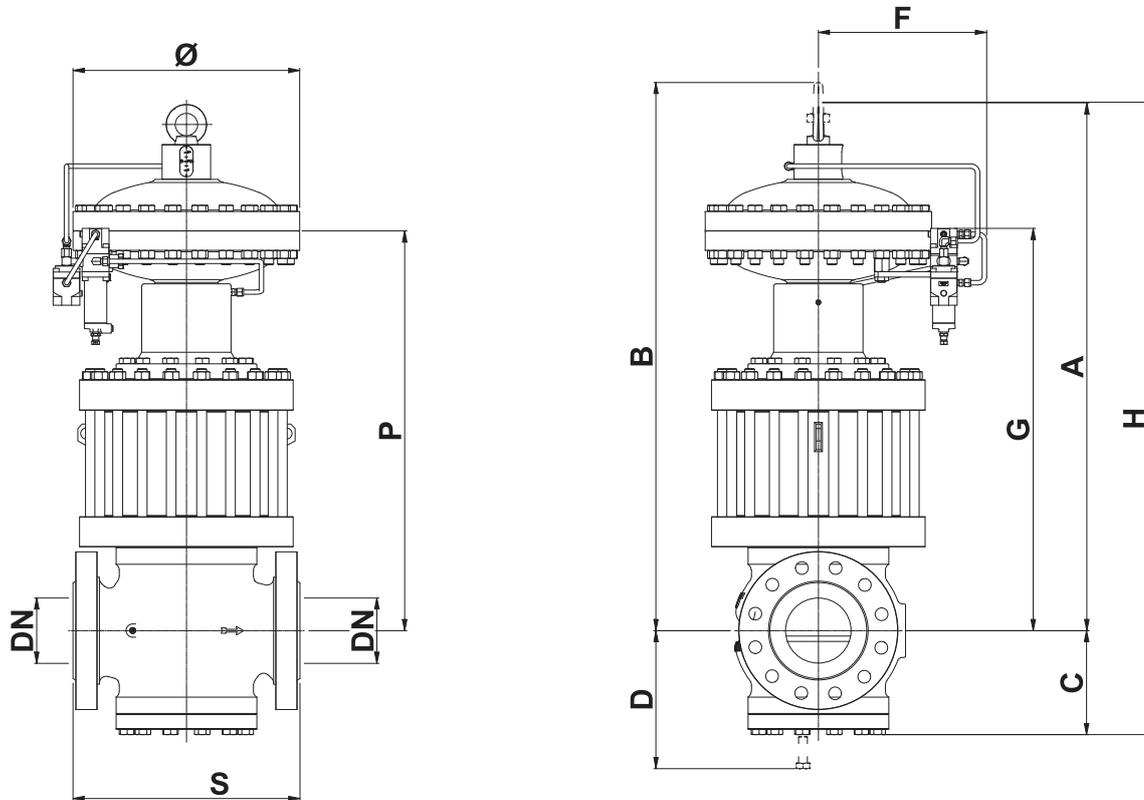


Figure 12 Reflux 819/FO + PM/819 dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)							
	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches
Size (DN)	25   1"	50   2"	80   3"	100   4"	150   6"	200   8"	250   10"
S - ANSI 150/PN16	184   7.24"	254   10"	298   11.73"	352   13.86"	451   17.76"	543   21.38"	673   26.50"
S - ANSI 300	197   7.76"	267   10.51"	317   12.48"	368   14.49"	473   18.62"	568   22.36"	708   27.87"
S - ANSI 600	210   8.27"	286   11.26"	336   13.23"	394   13.23"	508   20"	609   23.98"	752   29.61"
Ø	278   10.94"	278   10.94"	360   14.17"	360   14.17"	510   20.08"	510   20.08"	610   24.02"
A	371   14.61"	435   17.13"	490   29.29"	532   20.94"	789   31.06"	887   34.92"	1075   42.32"
B	461   18.15"	515   20.28"	590   23.23"	642   25.28"	874   34.41"	967   38.07"	500   19.69"
C	320   12.60"	350   13.78"	430   16.93"	490   19.29"	650   25.60"	750   29.53"	800   31.50"
D	410   16.14"	430   16.93"	530   20.87"	600   23.62"	735   28.94"	850   33.46"	900   35.43"
F	310   12.20"	310   12.20"	320   12.60"	320   12.60"	420   16.54"	420   16.54"	470   18.50"
G	311   12.24"	375   14.76"	410   16.14"	422   16.61"	459   18.07"	597   23.50"	847   33.35"
H	691   27.20"	785   30.90"	920   36.22"	1022   40.24"	1439   56.65"	1637   64.65"	1175   46.26"
L	170   6.69"	200   7.87"	260   10.24"	290   11.42"	320   12.60"	370   14.57"	500   19.69"
P	221   8.70"	285   11.22"	320   12.60"	332   13.07"	459   18.07"	507   19.96"	847   33.35"
Tube Connections	Øe 10 x Øi 8 (on request imperial sizing)						
Weight	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs
ANSI 150/PN 16	84   185	105   231	180   397	245   540	517   1140	670   1477	1400   3086
ANSI 300	85   187	106   234	184   406	255   562	554   1221	731   1612	1450   3197
ANSI 600	86   190	108   238	187   412	264   582	569   1254	756   1667	1500   3307

Table 11 Weights and dimensions

## Reflux 819/FO + DB/819



**Figure 13** Reflux 819/FO + DB/819 dimensions

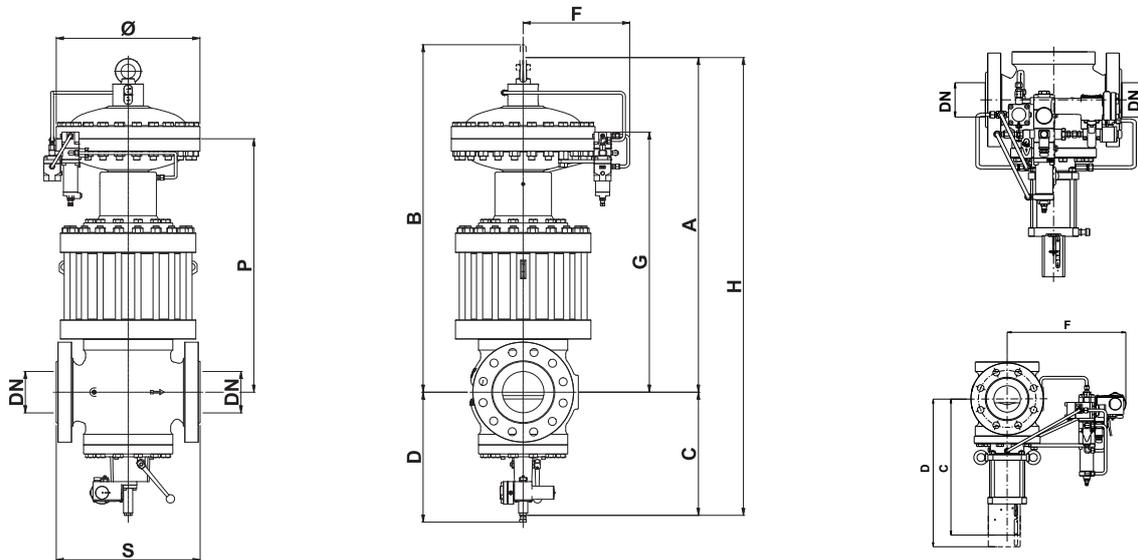
**Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)**

	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches
Size (DN)	25   1"	50   2"	80   3"	100   4"	150   6"	200   8"	250   10"	300   12"
S - ANSI 150/PN16	184   7.24"	254   10"	298   11.73"	352   13.86"	451   17.76"	543   21.38"	673   26.50"	737   29.02"
S - ANSI 300	197   7.76"	267   10.51"	317   12.48"	368   14.49"	473   18.62"	568   22.36"	708   27.87"	775   30.51"
S - ANSI 600	210   8.27"	286   11.26"	336   13.23"	394   13.23"	508   20"	609   23.98"	752   29.61"	819   32.24"
Ø	278   10.94"	278   10.94"	360   14.17"	360   14.17"	510   20.08"	510   20.08"	610   24.02"	718   28.27"
A	571   22.48"	660   25.98"	760   29.92"	842   33.15"	1074   42.28"	1222   48.11"	1575   62.01"	1640   64.57"
B	661   26.02"	725   28.54"	505   19.88"	937   36.89"	1259   49.57"	1387   54.61"	1775   69.88"	1905   75"
C	100   3.94"	130   5.12"	150   5.91"	190   7.48"	225   8.86"	265   10.43"	340   13.39"	375   14.76"
D	130   5.12"	160   6.30"	200   7.87"	250   9.84"	275   10.83"	320   12.60"	440   17.32"	475   18.70"
F	310   12.20"	310   12.20"	320   12.60"	320   12.60"	420   16.54"	420   16.54"	470   18.50"	500   19.69"
G	476   18.74"	580   22.83"	675   26.57"	812   31.97"	394   15.51"	1032   40.63"	1375   54.13"	1355   53.35"
H	671   26.42"	790   31.10"	845   33.27"	1032   40.63"	1299   51.14"	1487   58.54"	1915   75.39"	2015   79.33"
K	220   8.66"	300   11.81"	330   12.99"	390   15.35"	480   18.90"	595   23.43"	695   27.36"	745   29.33"
P	421   16.57"	485   19.09"	565   22.24"	627   24.68"	829   32.64"	907   35.71"	1275   50.20"	1337   52.64"
Tubing Connections	Øe 10 x Ø 8 (on request imperial sizing)							

Weight	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs
ANSI 150/PN 16	70   154	126   278	195   430	260   573	565   1246	835   1841	1280   2822	2091   4610
ANSI 300	72   159	128   282	204   450	289   637	608   1340	925   2039	1380   3042	2286   5040
ANSI 600	73   161	130   287	207   456	298   657	640   1411	950   2094	1430   3152	2366   5216

**Table 12** Weights and dimensions

# Reflux 819/FO + DB/819 + SB/82 or HB/97



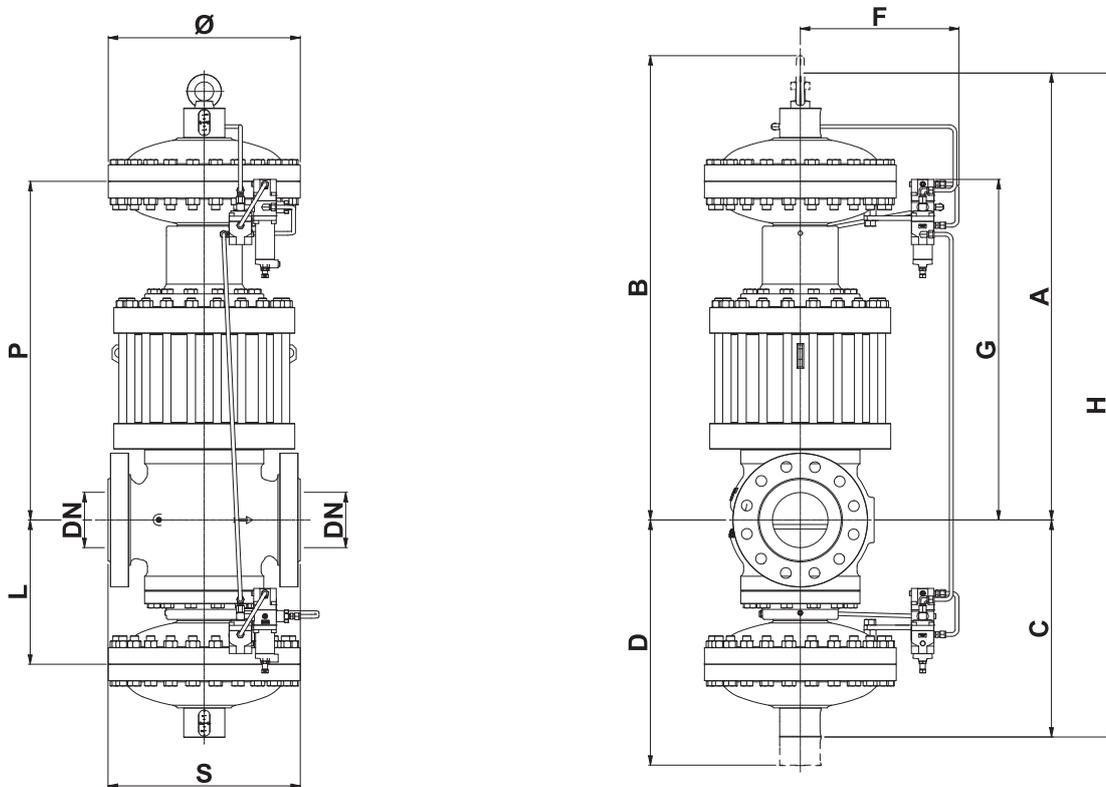
**Figure 14** Reflux 819/FO + DB/819 + SB/82 or HB/97 dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)								
	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches
Size (DN)	25   1"	50   2"	80   3"	100   4"	150   6"	200   8"	250   10"	300   12"
S - ANSI 150/PN16	184   7.24"	254   10"	298   11.73"	352   13.86"	451   17.76"	543   21.38"	673   26.50"	737   29.02"
S - ANSI 300	197   7.76"	267   10.51"	317   12.48"	368   14.49"	473   18.62"	568   22.36"	708   27.87"	775   30.51"
S - ANSI 600	210   8.27"	286   11.26"	336   13.23"	394   13.23"	508   20"	609   23.98"	752   29.61"	819   32.24"
Ø	278   10.94"	278   10.94"	360   14.17"	360   14.17"	510   20.08"	510   20.08"	610   24.02"	718   28.27"
A	571   22.48"	660   25.98"	760   29.92"	842   33.15"	1074   42.28"	1222   48.11"	1575   62.01"	1640   64.57"
B	661   26.02"	725   28.54"	845   33.27"	937   36.89"	1259   49.57"	1387   54.61"	1775   69.88"	1905   75"
C with SB/82	215   8.46"	240   9.45"	270   10.63"	300   11.81"	375   14.76"	450   17.71"	530   20.87"	-
C with HB/97	-	-	-	518   20.39"	645   25.39"	687   27.05"	796   31.34"	940   37.01"
D with SB/82	280   11.02"	330   12.99"	380   14.96"	440   17.32"	560   22.05"	625   24.61"	730   28.74"	-
D with HB/97	-	-	-	650   25.59"	835   32.87"	900   35.43"	1060   41.73"	1250   49.21"
F	310   12.20"	310   12.20"	320   12.60"	320   12.60"	420   16.54"	420   16.54"	470   18.50"	-
F with HB/97	-	-	-	358   14.09"	410   16.14"	445   17.52"	510   20.08"	530   20.87"
G	476   18.74"	580   22.83"	675   26.57"	812   31.97"	934   36.77"	1032   40.63"	1375   54.13"	1355   53.35"
H	796   31.34"	900   35.43"	1030   40.55"	1142   44.96"	1449   57.05"	1672   65.83"	2105   82.87"	2580   101.57"
K	220   8.66"	300   11.81"	330   12.99"	390   15.35"	480   18.90"	595   23.43"	695   27.36"	745   29.33"
P	421   16.57"	485   19.09"	565   22.24"	617   24.29"	827   32.56"	907   35.71"	1275   50.20"	1337   52.64"
Tube Connections	Øe 10 x Øi 8 (on request imperial sizing)							

Weight	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs
ANSI 150/PN 16 with SB/82	79   174	136   300	205   452	274   604	577   1272	887   1955	1330   2932	-
ANSI 150/PN 16 with HB/97	-	-	-	266   586	569   1254	569   1254	569   1254	2371   5227
ANSI 300 with SB/82	82   181	139   306	217   478	304   670	628   1384	980   2161	1430   3153	-
ANSI 300 with HB/97	-	-	-	318   701	661   1457	1006   2218	687   1515	2560   5643
ANSI 600 with SB/82	83   183	141   311	220   485	313   690	660   1455	1500   3307	1480   3263	-
ANSI 600 with HB/97	-	-	-	330   727	687   1515	1022   2253	756   1667	2646   5833

**Table 13** Weights and dimensions

## Reflux 819/FO + DB/819 + PM/819



**Figure 15** Reflux 819/FO + DB/819 + PM/819 dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)							
	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches	[mm]   inches
Size (DN)	25   1"	50   2"	80   3"	100   4"	150   6"	200   8"	250   10"
S - ANSI 150/PN16	184   7.24"	254   10"	298   11.73"	352   13.86"	451   17.76"	543   21.38"	673   26.50"
S - ANSI 300	197   7.76"	267   10.51"	317   12.48"	368   14.49"	473   18.62"	568   22.36"	708   27.87"
S - ANSI 600	210   8.27"	286   11.26"	336   13.23"	394   13.23"	508   20"	609   23.98"	752   29.61"
Ø	278   10.94"	278   10.94"	360   14.17"	360   14.17"	510   20.08"	510   20.08"	610   24.02"
A	571   22.48"	660   25.98"	760   29.92"	842   33.15"	1074   42.28"	1222   48.11"	1575   62.01"
B	661   26.02"	725   28.54"	845   33.27"	937   36.89"	1259   49.57"	1387   54.61"	1775   69.88"
C	320   12.60"	350   13.78"	430   16.93"	490   19.29"	650   25.59"	750   29.53"	800   31.50"
D	410   16.14"	430   16.93"	530   20.87"	600   23.62"	735   28.94"	850   33.64"	900   35.43"
F	310   12.20"	310   12.20"	320   12.60"	320   12.60"	420   16.54"	420   16.54"	470   18.50"
G	476   18.74"	580   22.83"	675   26.57"	812   31.97"	934   36.77"	1032   40.63"	1375   54.13"
H	891   35.08"	1010   39.76"	1195   47.05"	1332   52.44"	1724   67.87"	1972   77.64"	2375   93.50"
K	220   8.66"	300   11.81"	330   12.99"	390   15.35"	480   18.90"	595   23.43"	695   27.36"
L	221   8.70"	200   7.87"	260   10.24"	290   11.42"	320   12.60"	370   14.57"	500   19.69"
P	421   16.57"	485   19.09"	320   12.60"	617   24.29"	827   32.56"	907   35.71"	1275   50.20"
Tubing Connections	Øe 10 x Øi 8 (on request imperial sizing)						
Weight	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs	Kg   lbs
ANSI 150/PN 16	110   242	170   375	270   595	359   791	774   1706	1097   2418	1780   3924
ANSI 300	112   247	172   379	267   588	388   855	783   1726	1185   2612	1880   4145
ANSI 600	113   249	174   383	270   595	397   875	815   1797	1210   2668	1930   4254

**Table 14** Weights and dimensions



# Sizing and Cg

In general, the choice of a regulator is made based on the calculation of the flow rate determined by the use of formulae using the flow rate coefficients (Cg) and the form factor (K1) as indicated by the EN 334 standard.

Flow rate coefficient								
Nominal size	25	50	80	100	150	200	250	300
Inches	1"	2"	3"	4"	6"	8"	10"	12"
Cg	575	2220	4937	8000	16607	25933	36525	55000
K1	106.78	106.78	106.78	106.78	106.78	106.78	106.78	106.78

**Table 15** Flow rate coefficient

For sizing [PRESS HERE](#) or use the QR code:



**Note:** In case you do not have the proper credentials to access, feel free to contact your closest Pietro Fiorentini representative.

In general the online sizing considers multiple variables as the regulator is installed in a system, enabling a better and multiperspective approach to the sizing.

For different gases, and for natural gas with a different relative density other than 0.61 (compared to air), the correction coefficients from the following formula shall be applied:

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

S = relative density (refer to Table 17)  
T = gas temperature ( °C )

$$F_c = \sqrt{\frac{316.44}{S \times (459.67 + T)}}$$

S = relative density (refer to Table 17)  
T = gas temperature ( °F )

Correction Factor Fc		
Gas type	Relative Density S	Correction Factor 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

Note: the table shows the Fc correction factors valid for Gas, calculated at a temperature of 15°C and at the declared relative density.

**Table 16** Coefficient factor Fc

Flow rate conversion
Stm <sup>3</sup> /h x 0.94795 = Nm <sup>3</sup> /h

Nm<sup>3</sup>/h Reference conditions:

T= 0 °C; P= 1 bar(a) | T= 32 °F; P= 14.5 psi(a)

Stm<sup>3</sup>/h Reference conditions:

T= 15 °C; P= 1 bar(a) | T= 59 °F; P= 14.5 psi(a)

**Table 17** Flow rate conversion

### CAUTION:

In order to get optimal performance, to avoid premature erosion phenomena and to limit noise emissions, it is recommended to check the gas speed and its compliance with local practice and regulations. The gas speed at the outlet flange may be calculated by means of the following formula:

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

$$V = 0.0498 \times \frac{Q}{DN^2} \times \frac{14.504 - 0.002 \times Pd}{14.504 + Pd}$$

V = gas speed in m/s

Q = gas flow rate in Stm<sup>3</sup>/h

DN = nominal size of regular in mm

Pd = outlet pressure in barg

V = gas speed in ft/s

Q = gas flow rate in Scfh

DN = nominal size of regular in inches

Pd = outlet pressure in psig



Sizing of regulators is usually made based on valve Cg value (Table 15).

Flow rates in fully open position and various operating conditions are related by the following formulae where:

Q = flow rate in Stm<sup>3</sup>/h

Pu = inlet pressure in bar (abs)

Pd = outlet pressure in bar (abs).

- **A** > when the Cg value of the regulator is known, as well as Pu and Pd, the flow rate can be calculated as follows:

- **A-1** in sub critical conditions: (Pu < 2 x Pd)

$$Q = 0.526 \times C_g \times P_u \times \sin \left( K_1 \times \sqrt{\frac{P_u - P_d}{P_u}} \right)$$

- **A-2** in critical conditions: (Pu ≥ 2 x Pd)

$$Q = 0.526 \times C_g \times P_u$$

- **B** > vice versa, when the values of Pu, Pd and Q are known, the Cg value, and hence the regulator size, may be calculated using:

- **B-1** in sub-critical conditions: (Pu < 2xPd)

$$C_g = \frac{Q}{0.526 \times P_u \times \sin \left( K_1 \times \sqrt{\frac{P_u - P_d}{P_u}} \right)}$$

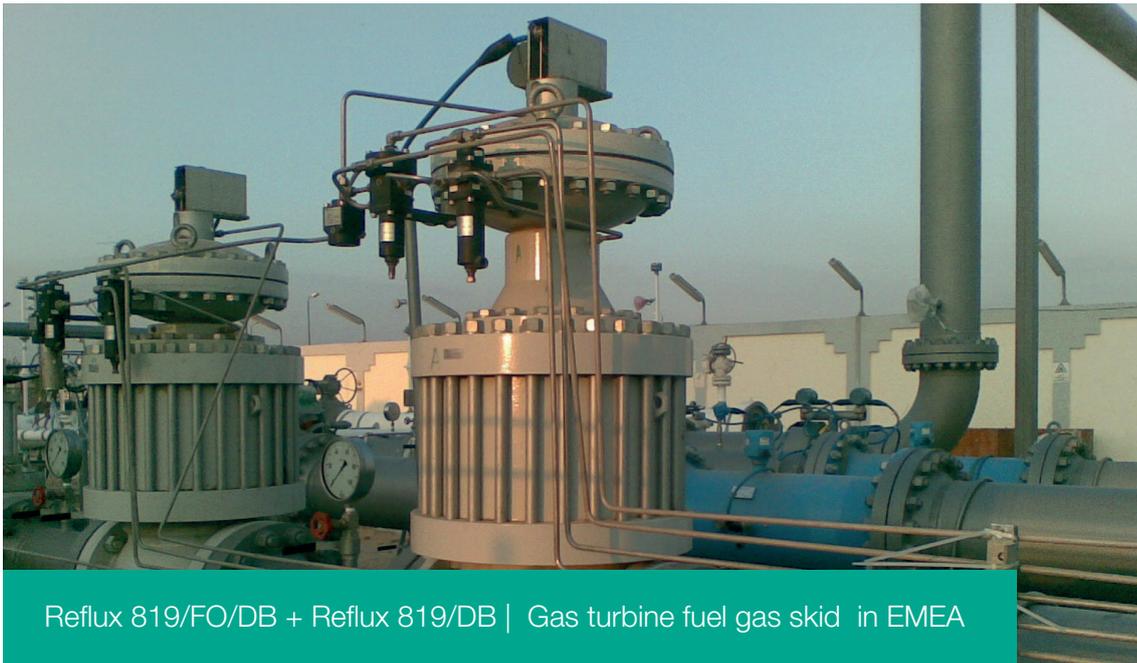
- **B-2** in critical conditions (Pu ≥ 2 x Pd)

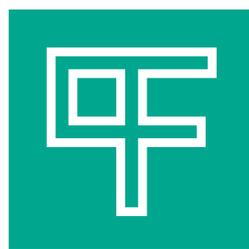
$$C_g = \frac{Q}{0.526 \times P_u}$$

**NOTE:** The sin value is understood to be DEG.

# Installations

Here below, at glance, are some typical installations by application and geographical location. On demand we are available to supply a more comprehensive experience list and/or references.





# Pietro Fiorentini

**TB0006ENG**



The data are not binding. We reserve the right  
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reflux819fo\_technicalbrochure\_ENG\_revD

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