

Norflux

High - Medium Pressure Gas Regulator



TECHNICAL BROCHURE

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Who we are

We are a global organization that specializes 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 solutions that span the whole natural gas chain.

We are constantly evolving 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 level of professionalism.



Pietro Fiorentini advantages



Localized technical support



Experience since 1940



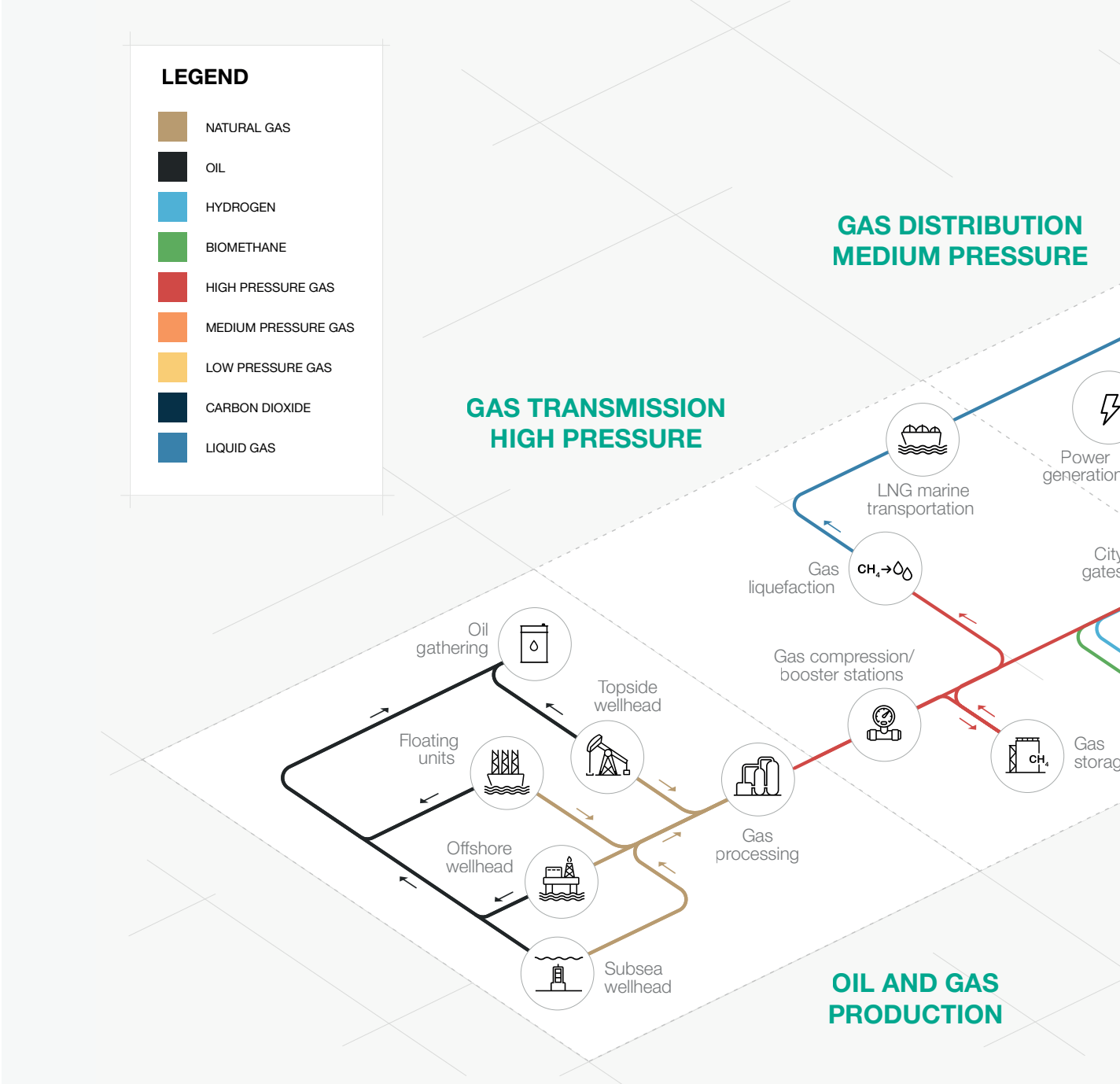
Operating in over 100 countries



Area of Application

LEGEND

- NATURAL GAS
- OIL
- HYDROGEN
- BIOMETHANE
- HIGH PRESSURE GAS
- MEDIUM PRESSURE GAS
- LOW PRESSURE GAS
- CARBON DIOXIDE
- LIQUID GAS



Green icon indicates the application where this product is suitable for

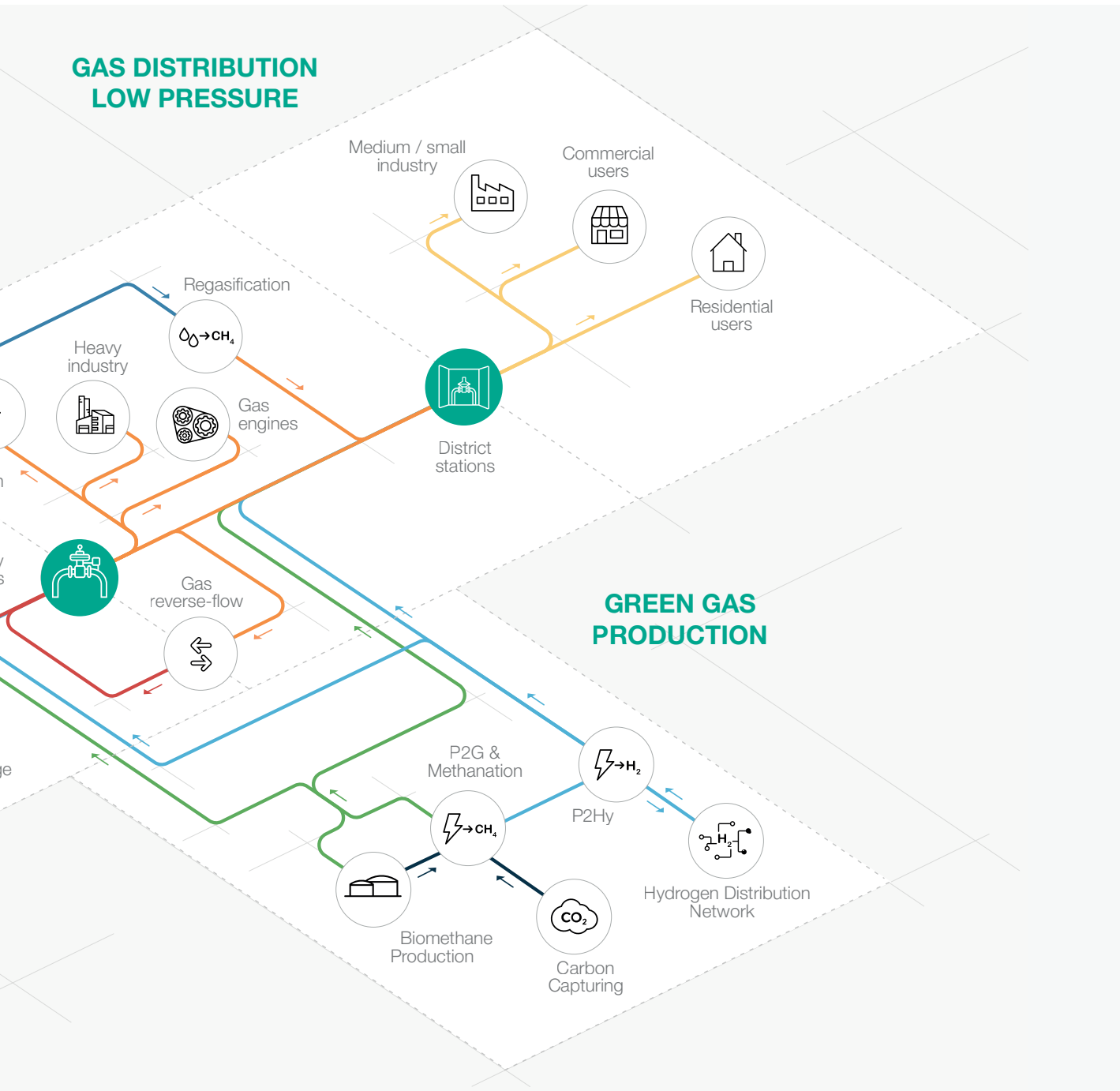


Figure 1 Area of application map

Introduction

The **Norflux** is a **direct-operated** regulator controlled by a diaphragm and setting spring which controls the valve. It is mainly used for high-pressure transmission systems and for medium pressure natural gas distribution networks with previously filtered non-corrosive gases.

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

The Norflux is **Hydrogen Ready** for NG-H2 blending.

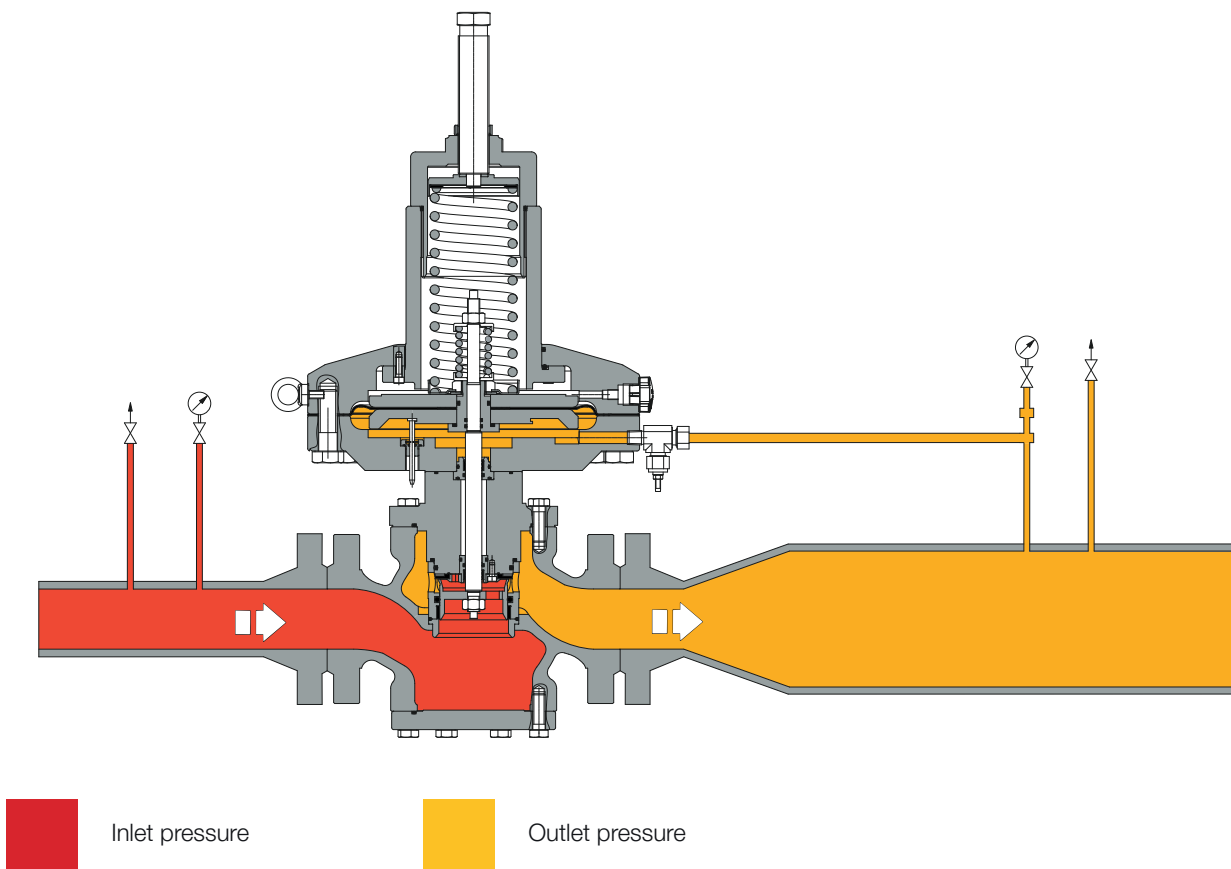


Figure 2 Norflux

Features and Calibration ranges

The **Norflux** is a **direct-operated** device for high and medium pressure with a unique **dynamic balancing system** which ensures an **outstanding turn down ratio** combined with an extremely **accurate outlet pressure control**.

A balanced pressure regulator it is a pressure regulator where delivery pressure accuracy it is not affected by the fluctuation of the inlet pressure and flow during its operation.

Therefore, a balance pressure regulator can have a single orifice for all pressure and flow operating conditions.

This regulator is suitable for use with previously filtered, non corrosive gases in distribution networks as well as high load industrial applications.

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

The modular design of the Norflux pressure regulators allows to retrofit the slam shut valve SB.



Norflux competitive advantages



Compact and simple design



Built-in accessories



Operates with high differential pressure



Easy maintenance



Spring loaded regulator for high pressure



Biomethane compatible and 20% Hydrogen blending compatible. Higher blending available on request

Features

Features	Values	
Design pressure* (PS ¹ / DP ²)	up to 10.0 MPa up to 1450 psig	
	Standard version	Arctic version
Ambient temperature* (TS ¹)**	from -20 °C to +65 °C from -4 °F to +150 °F	from -40 °C to + 65°C from -40 °F to +150 °F
Inlet gas temperature* ^{***}	from -10°C to + 60°C from +14 °F to +140 °F	from -20 °C to +60 °C from -4 °F to +140 °F
Inlet pressure (MAOP / p _{umax} ¹)	from 0.1 to 9.5 MPa from 14.5 to 1378 psig	
Range of downstream pressure (Wd ¹)	from 0.07 to 0.4 MPa from 10 to 58 psig	
Available accessories	incorporated slam-shut	
Minimum operating differential pressure (Δp _{min} ¹)	48 kPa 7 psig	
Accuracy class (AC ¹)	up to 10 (depending on working conditions)	
Lock-up pressure class (SG ¹)	up to 10 (depending on working conditions)	
Nominal size (DN ^{1,2})	DN 50 2"	
Orifice Sizes	2"	
Connections	Class 300/600 RF / RTJ according to ASME B 16.5	

(¹) according to EN334 standard

(²) according to ISO 23555-1 standard

(*) 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.

(**) NOTE: Stated temperature range is the operating range for which the equipment's mechanical resistance and leakage rate are guaranteed. Some body materials, if multiple choices are available, may not be suitable for all the available versions shown.

(***) NOTE: Stated temperature range is the range for which the equipment's full performance, including accuracy and lock-up are guaranteed. Some body materials, if multiple choices are available, may not be suitable for all the available versions shown.

Table 1 Features

Materials and Approvals

Part	Material
Body	Cast steel ASTM A352 LCC
Cover	ASTM A 350 LF2 steel
Seat	Stainless steel
Diaphragm	Vulcanized rubber
Sealing ring	Nitrile rubber
Compression fittings	Zinc-plated carbon 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

The **Norflux** regulator is designed according to European standard EN 334.

The regulator reacts in opening (Fail Open) according to EN 334.

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



EN 334



Maximum permissible operating pressures

Design pressures (p_s according to EN334)				
Version	Body		Slam-shut valve	
	MPa	psig	MPa	psig
#300 - #600 Steel body	10	1450	10	1450

Table 3 Design pressures bodies and block valves

Design pressure (p_s according to EN334)		
Parts	MPa	psig
Cover	10	1450
Diaphragm	0.8	116
Max Diaphragm Δp	0.45	65

Table 4 Design pressure of control heads

MAOP Maximum Allowable Operating Pressure (p_{urmax} according to EN334)			
	Version	MPa	psig
WITHOUT CE MARKING	All version (all body materials)	9.5	1378
	All version (all body materials) + SSV	9.5	1378

Table 5 MAOP Maximum Allowable Operating Pressure without CE marking

Springs ranges and control heads

Control head pressure range			
		Range	Web link spring table
Model	DN		
Norflux	2"	0.07 - 0.4 MPa 10.0 - 58.0 psig	TT 893

Table 6 Control heads range

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



NORFLUX						
Spring part number	Spring color	d	Lo	De	Spring range (psig)	
					Min.	Max.
US2703735	White	9	260	85	10.1	12.3
US2704390	Green	11	260	85	12.3	21.7
US2704820	Purple	13	260	85	21.7	36.2
US2705010	Light blue	15	260	85	36.2	58.0

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 7 TT 893 - NORFLUX setting springs

Accessories

For the pressure regulators:

- Cg limiter
- Visual opening indicator
- Slam shut valve

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 the monitor is set at a higher pressure than the 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.

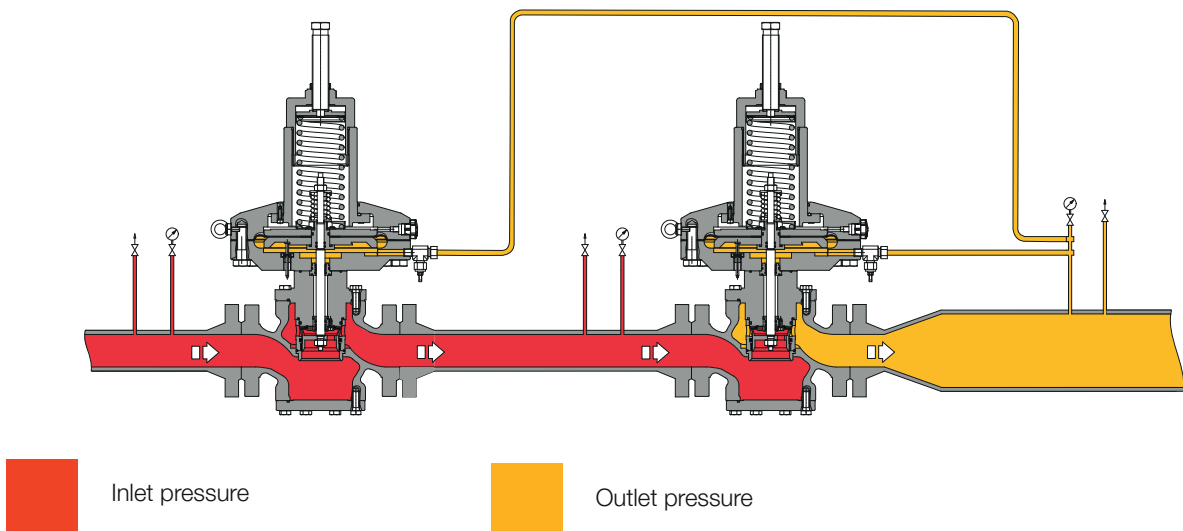


Figure 3 Norflux with In-line monitor setup









SB/185 slam shut valve

Norflux pressure regulator offers the possibility of installing an **SB/185 incorporated slam shut valve**, and this can be done either during the manufacturing process or be retrofitted in the field.

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

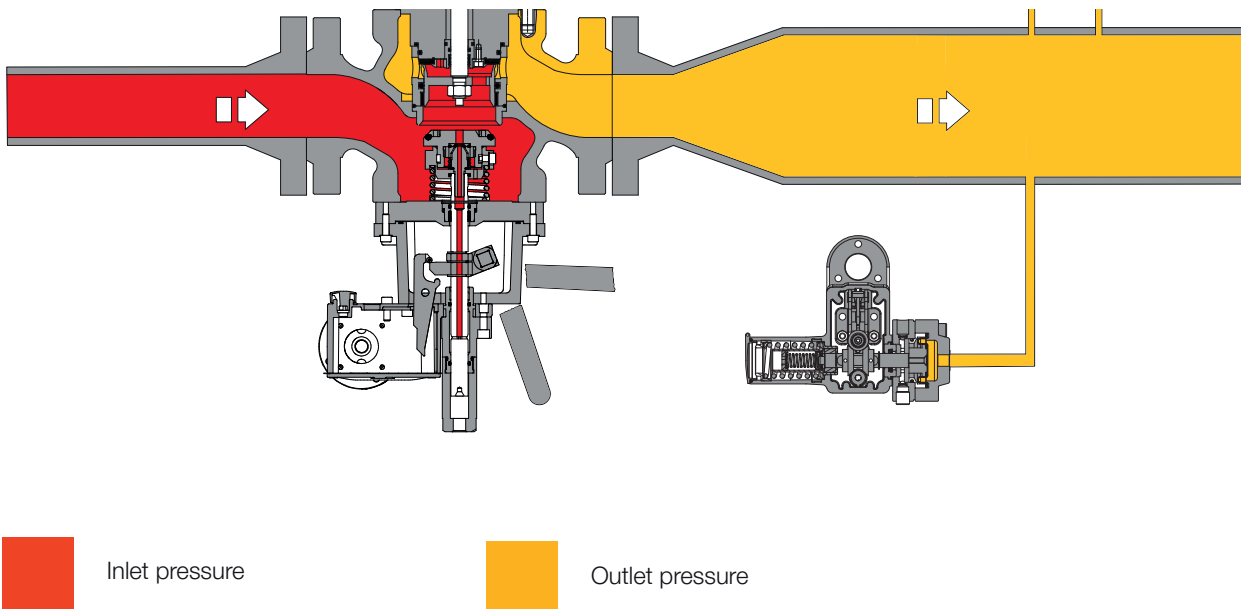


Figure 4 Norflux with SB/185



Pressure switch types and ranges					
SSV Type	Model	Operation	Range Wh		Spring Table web link
			MPa	psig	
SB/185	103M	OPSO	0.2 - 2.2	29.0 - 319.0	TT 1331
		UPSO	0.02 - 0.8	2.9 - 116.0	
SB/185	104M	OPSO	1.5 - 4.5	217.5 - 652.6	TT 1331
		UPSO	0.16 - 1.8	23.2 - 261.0	
SB/185	105M	OPSO	3 - 9	435.0 - 1305.3	TT 1331
		UPSO	0.3 - 4.4	43.5 - 638.1	

Table 8 Settings table

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



Mod. 103M/103MH - Max pressure							
Spring part number	Spring color	d	Lo	De	Spring range (psig)		
					Min.	Max.	
US2701530	Yellow	4	60	35	29.0	58.0	
US2701790	Yellow/Black	4.5	60	35	58.0	108.7	
US2702280	White/Red	5.5	60	35	108.7	217.5	
US2702450	Red	6	60	35	217.5	319.0	

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 9 TT 1331 - Mod. 103M/103MH - Max pressure setting springs

Mod. 103M - Min pressure							
Spring part number	Spring color	d	Lo	De	Spring range (psig)		
					Min.	Max.	
US2700464	Orange	1.7	40	15	2.9	7.2	
US2700513	Red	2	40	15	7.2	11.6	
US2700713	Green	2.3	40	15	11.6	24.6	
US2700750	Black	2.5	40	15	24.6	58.0	
US2700985	Brown	3	40	15	58.0	116.0	

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 10 TT 1331 - Mod. 103M - Min pressure setting springs

Mod. 104M/104MH - Max pressure

Spring part number	Spring color	d	Lo	De	Spring range (psig)	
					Min.	Max.
2702280	White/Red	5.5	60	35	217.5	435.0
2702450	Red	6	60	35	435.1	652.6

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 12 TT 1331 - Mod. 104M/104MH - Max pressure setting springs

Mod. 104M - Min pressure

Spring part number	Spring color	d	Lo	De	Spring range (psig)	
					Min.	Max.
US2700713	Green	2.3	40	15	23.2	43.5
US2700750	Black	2.5	40	15	43.5	116.0
US2700985	Brown	3	40	15	116.0	261.0

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 11 TT 1331 - Mod. 104M - Min pressure setting springs

Mod. 105M/105MH - Max pressure

Spring part number	Spring color	d	Lo	De	Spring range (psig)	
					Min.	Max.
US2702280	White/Red	5.5	60	35	435.0	942.7
US2702450	Red	6	60	35	942.7	1305.3

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 14 TT 1331 - Mod. 105M/105MH - Max pressure setting springs

Mod. 105M - Min pressure

Spring part number	Spring color	d	Lo	De	Spring range (psig)	
					Min.	Max.
US2700713	Green	2.3	40	15	43.5	101.5
US2700750	Black	2.5	40	15	101.5	232.0
US2700985	Brown	3	40	15	232.0	638.1

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Table 13 TT 1331 - Mod. 105M - Min pressure setting springs



Weights and Dimensions

Norflux

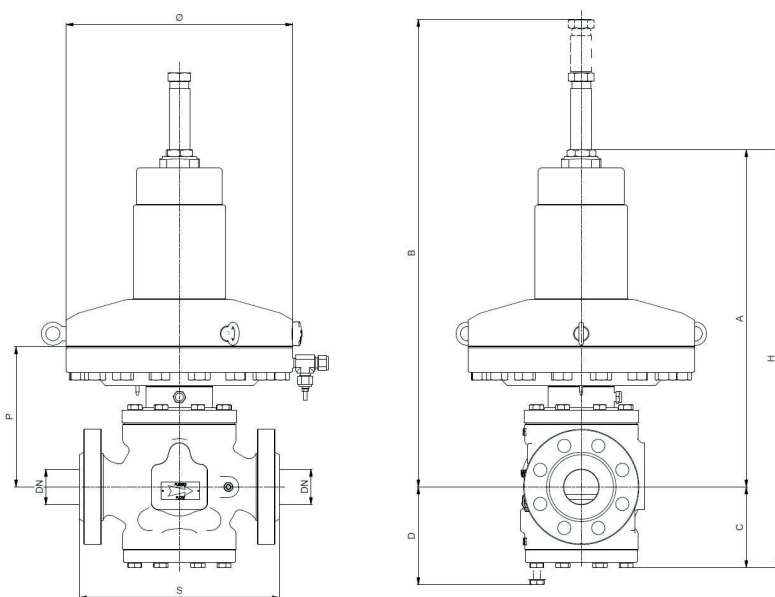


Figure 5 Norflux dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)			
Size (DN) - [mm]	50		
Size (DN) - inches	2"		
	[mm]		inches
S - ANSI 300	267		10.5"
S - ANSI 600	286		11.25"
Ø	324		12.8"
A	482		19.0"
B	602		23.7"
C	116		4.6"
D	151		5.9"
H	598		23.5"
P	200		7.9"
Tubing Connections	Øe 10 x Øi 8 (on request imperial sizing)		
Weight	Kg		lbs
ANSI 300	76		168
ANSI 600	78.4		173

Table 15 Weights and dimensions

Norflux + SB/185

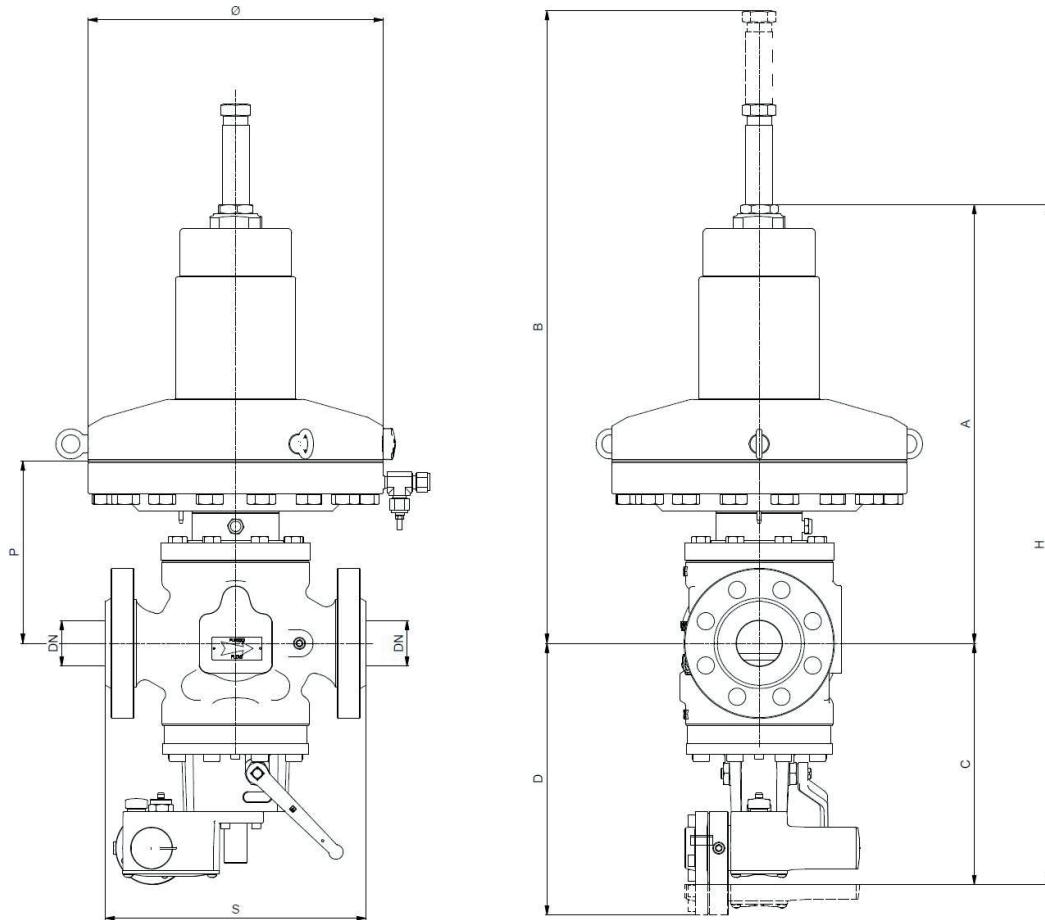


Figure 6 Norflux + SB/185 dimensions

Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative)			
Size (DN) - [mm]	50		
Size (DN) - inches	2"		
	[mm]		inches
S - ANSI 300	267		10.5"
S - ANSI 600	286		11.25"
Ø	324		12.8"
A	482		19.0"
B	602		23.7"
C	265		10.4"
D	355		14.0"
H	747		29.4"
P	200		7.9"
Tubing Connections	Øe 10 x Øi 8 (on request imperial sizing)		
Weight	Kg		lbs
ANSI 300	84		185
ANSI 600	86		190

Table 16 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. Sizing available through Pietro Fiorentini's online sizing programme.

Flow rate coefficient	
Nominal size	50
Inches	2"
Cg	1861
K1	106.78

Table 17 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 18)
T = gas temperature (°C)

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

S = relative density (refer to Table 18)
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 18 Correction Factor Fc

Flow rate conversion
Stm ³ /h x 0.94795 = Nm ³ /h

Nm³/h Reference conditions:
 T= 0 °C; P= 1 bar(a) | T= 32 °F; P= 14.5 psi(a)
 Stm³/h Reference conditions:
 T= 15 °C; P= 1 bar(a) | T= 59 °F; P= 14.5 psi(a)

Table 19 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 = gas speed in m/s
 Q = gas flow rate in Stm³/h
 DN = nominal size of regular in mm
 Pd = outlet pressure in barg

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

V = gas speed in ft/s
 Q = gas flow rate in Scfh
 DN = nominal size of regular in inches
 Pd = outlet pressure in psi



Norflux - DN 2"

from 69 kPa | 10 psig up to 400 kPa | 58 psig
flow capacity table

Norflux flow rate (Accuracy 10% ; AC10 according to EN334)

Inlet pressure		Outlet pressure									
		69 kPa 10 psig		138 kPa 20 psig		207 kPa 30 psig		400 kPa 58 psig			
MPa	psig	Stm ³ /h	Scfh	Stm ³ /h	Scfh	Stm ³ /h	Scfh	Stm ³ /h	Scfh		
0.13	20	1530	54037	-	-	-	-	-	-		
0.20	30	2237	78996	2157	76199	-	-	-	-		
0.27	40	2837	100213	2721	96085	2407	85022	-	-		
0.34	50	3352	118395	3442	121578	3239	114403	-	-		
0.41	60	3770	133154	4057	143278	4059	143368	3200	113020		
0.68	100	3987	140829	5507	194494	5784	204288	5204	183810		
1.4	200	3132	110605	6545	231143	8070	285020	10275	362911		
2.1	300	2700	95369	6563	231792	8683	306676	11874	419374		
2.8	400	2645	93424	6560	231673	8808	311079	11990	423483		
4.1	600	2546	89931	6553	231452	9031	318955	12199	430840		
5.5	800	2519	88981	6506	229790	8982	317238	12124	428208		
6.9	1000	2494	88097	6464	228287	8940	315735	12058	425878		
8.3	1200	2471	87266	6425	226910	8902	314401	11999	423786		

CG = 1360 K1= 106.78

Table 20 Norflux flow rate with outlet pressure from 69 kPa | 10 psig up to 400 kPa | 58 psig and inlet pressure from 0.13 MPa | 20 psig to 8.3 MPa | 1200 psig

Customer Centricity

Customer centricity is a way of running your business — implementing a perfect customer experience at each stage of the pipeline. Pietro Fiorentini is one of the main Italian international company with high focus on product and service quality.

The main strategy is to create a stable, long-term relationship, putting the customer's needs first. Lean management and customer centricity are used to improve and maintain the highest level of customer experience.



Support

Pietro Fiorentini's top priority is to provide support to the client in all phases of project development, during installation, start up and operation. Pietro Fiorentini has developed a highly standardized Intervention-Management-System (IMS), which helps to facilitate the entire process and putting the customer at the forefront of every decision in our process while manufacturing or developing a product to help improve the product and service. With our IMS business model many services are available remotely, avoiding long waiting times, improving service, and avoiding unnecessary expenses.



Training

Pietro Fiorentini offers training services available for both experienced operators and new customers. The training is offered for all levels of our customers which can include one or all of the following: sizing of equipment, application, installation, operation, maintenance and is prepared according to the level of use and the customer's need.



Customer Relation Management (CRM)

The service and care of our customers are one of the main missions and vision of Pietro Fiorentini. For this reason, Pietro Fiorentini has enhanced the customer relation management system. This enables us to track every opportunity and request from our customers into one single information point and allows us to coordinate information allowing us to give the customer improved service.



Sustainability

Here at Pietro Fiorentini, we believe in a world capable of improvement through technologies and solutions that can shape a more sustainable future. That is why respect for people, society and the environment form the cornerstones of our strategy.



Our commitment to the world of tomorrow

While in the past we limited ourselves to providing products, systems and services for the oil & gas sector, today we want to broaden our horizons and create technologies and solutions for a digital and sustainable world, with a particular focus on renewable energy projects to help make the most of our planet's resources and create a future in which the younger generations can grow and prosper.

The time has come to put the why we operate before the what and how we do it.





Pietro Fiorentini

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