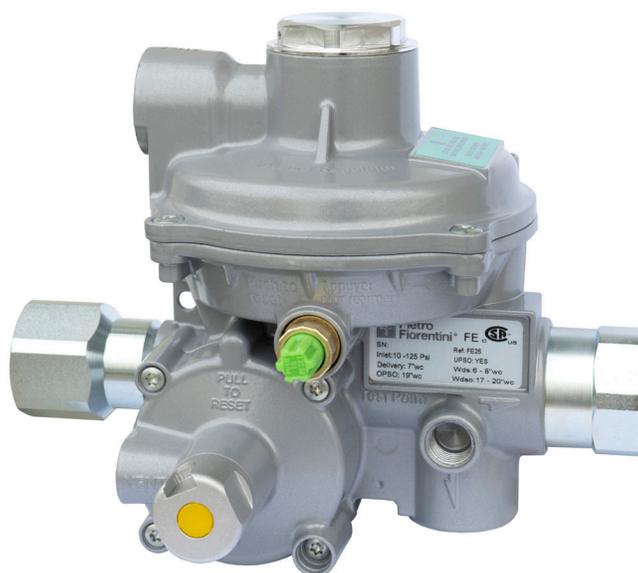


# FE

Low-pressure gas regulator



**TECHNICAL BROCHURE**

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fecsa\_technicalbrochure\_USA\_revA

# 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



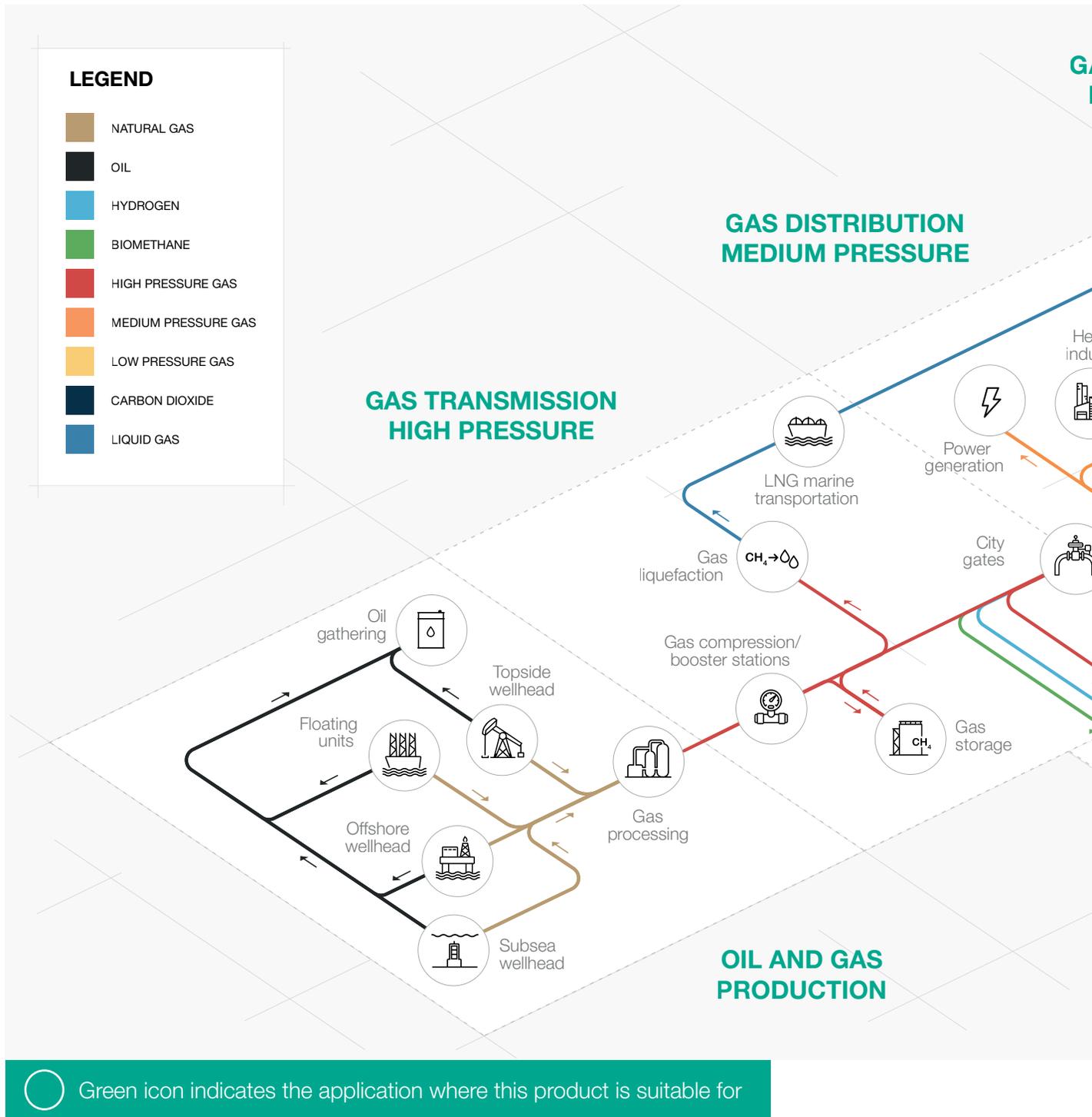
Experience since 1940

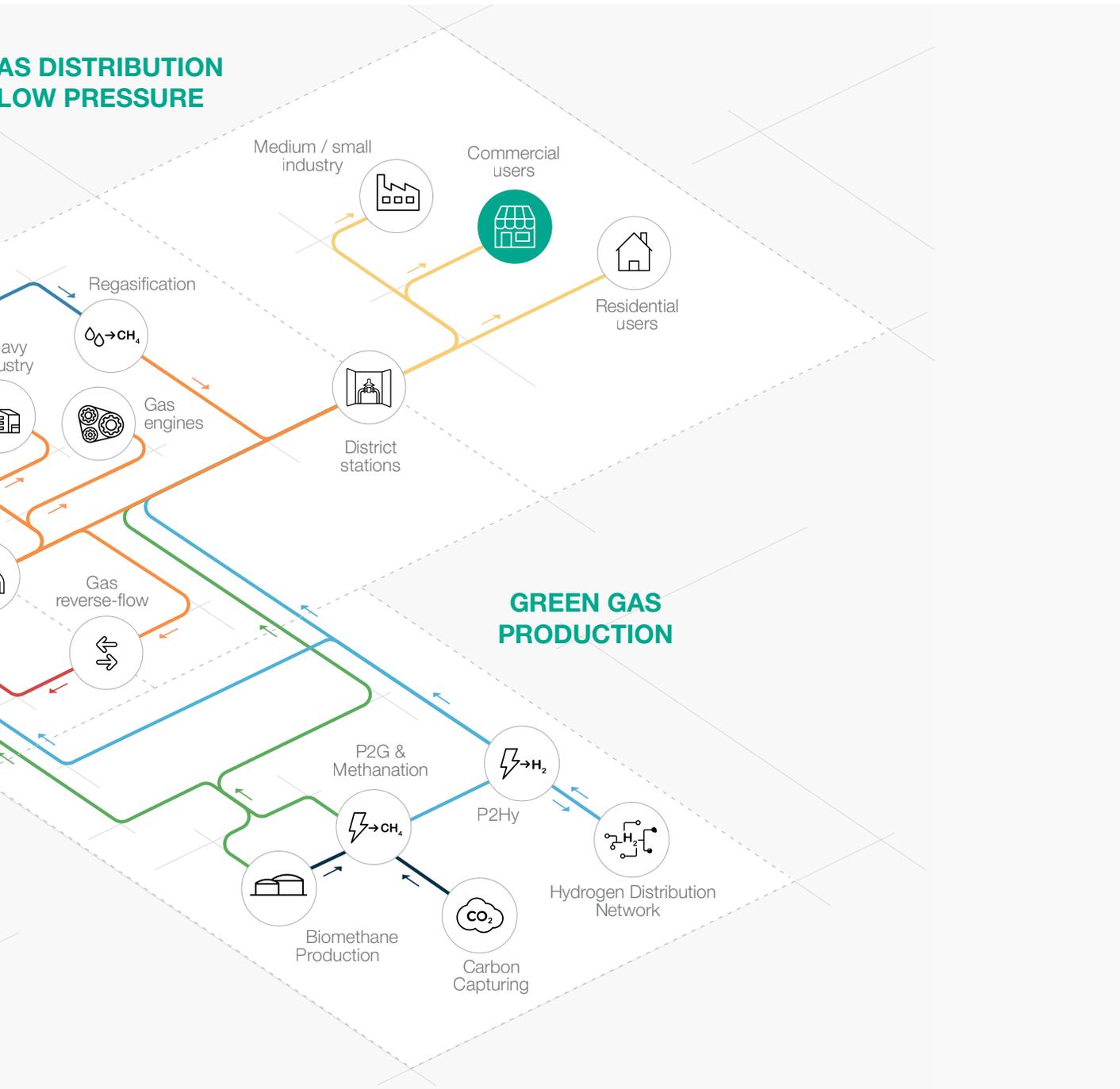


Operating in over 100 countries



# Area of Application





**Figure 1** Area of Application Map

# Introduction

The **FE** is a two-stage gas pressure regulator by Pietro Fiorentini. There are two types of the regulator:

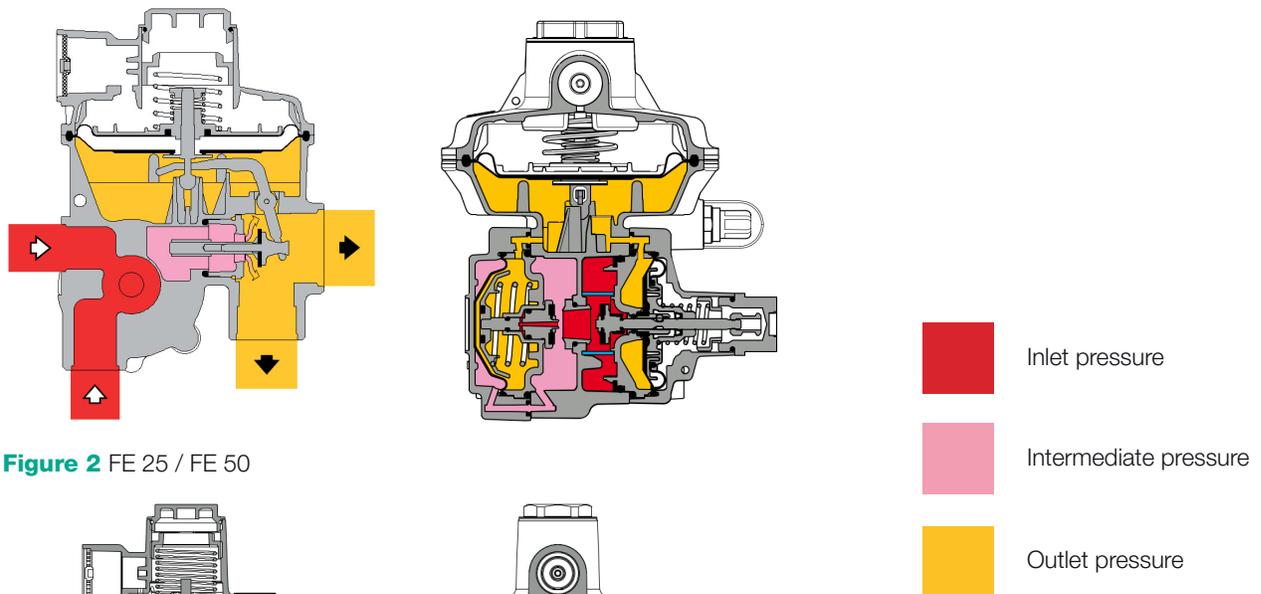
- FE 25 / FE 50 lever-operated
- FE 75 / FE 100 spring loaded

It is particularly suitable for low pressure natural gas distribution networks for residential and commercial users.

It should be used with previously filtered non-corrosive gases including biomethane and natural gas blended with hydrogen.

According to the European Standard EN 334, it is classified as **Fail Close** because it is always supplied with an overpressure protection device (slam shut valve).

The FE is **Hydrogen Ready** for NG-H<sub>2</sub> blending.



**Figure 2** FE 25 / FE 50

**Figure 3** FE 75 / FE 100

# Features and Calibration ranges

The FE is a two-stage device for low pressure equipped with integrated slam shut (OPSO), and optional excess flow function (UPSO) and fire protection valve.

The balanced 1st stage regulation limits the pressure variation to the 2nd stage, so it is possible to reach high accuracy of the regulated outlet pressure. Therefore, a balanced double stage regulator has a single-size orifice for all pressure and flow conditions.

The FE can be installed in vertical or horizontal position. For FE 25/FE 50: one in-line or 90° inlet and two outlets. For FE 75/FE100: one in-line inlet and two outlets. This reduces greatly space requirements for all types of installations.

The FE regulator is highly customizable in terms of settings, fittings and accessories.



**Figure 4** FE 25 (max flow rate 875 scfh | 25 Sm<sup>3</sup>/h) and  
FE 50 (max flow rate 1,500 scfh | 43 Sm<sup>3</sup>/h)



**Figure 5** FE 75 (max flow rate 2,600 scfh | 75 Sm<sup>3</sup>/h) and  
FE 100 (max flow rate 3,500 scfh | 100 Sm<sup>3</sup>/h)

## FE competitive advantages



Operates with low differential pressure



Slam shut for over pressure  
Slam shut for under pressure



Two-stage double diaphragm and single orifice regulator



Highly customizable



Suitable for 1 ft clearance installation with 2.5 cf/h limited venting



Built-in thermal valve option



Built-in strainer for seat protection



Built-in flow limiter valve option



Suitable for outdoor installations



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

## Features FE 25 / FE 50

Features	Values
Design pressure* (PS <sup>1</sup> / DP <sup>2</sup> )	up to 860 kPa up to 125 psig
Ambient temperature* (TS <sup>1</sup> )	All versions -40°C to +65°C   -40°F to +150°F
Inlet gas temperature*	<ul style="list-style-type: none"> <li>Standard version -10°C to +65°C   14°F to +150°F</li> <li>Arctic version -20°C to +65°C   -22°F to +150°F</li> </ul>
Inlet pressure (MAOP / p <sub>umax</sub> <sup>1</sup> )	from 10 kPa to 0.86 MPa from 1.45 psig to 125 psig
Range of downstream pressure Wds	<ul style="list-style-type: none"> <li>from 1.3 kPa to 16 kPa for BP version from 5" w.c. to 2.6 psig for BP version</li> <li>from 16.1 kPa to 50 kPa for MP version from 2.61 psig to 7.25 psig for MP version</li> </ul>
Range of downstream pressure Wdso	<ul style="list-style-type: none"> <li>from 1.3 kPa to 18 kPa for BP version from 5.2" w.c. to 2.6 psig for BP version</li> <li>from 30 kPa to 80 kPa for MP version from 4.31 psig to 11.6 psig for MP version</li> </ul>
Minimum inlet pressure and nominal capacity	<ul style="list-style-type: none"> <li>up to 24.8 Sm<sup>3</sup>/h   875 sfch with 28 kPa   4 psig differential pressure</li> <li>up to 42.7 Sm<sup>3</sup>/h   1,500 sfch with 69 kPa   10 psig differential pressure</li> </ul>
Accuracy class (AC <sup>1</sup> )	10
Lock-up pressure class (SG <sup>1</sup> )	20, minimum 0.75 kPa   3" w.c.
Connections*	In-line 3/4" or 1" NPT according to ANSI B1.20.1, other configurations or connections on request

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

(<sup>2</sup>) 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.

Table 1 Features

## Features FE 75 / FE 100

Features	Values
Design pressure* (PS <sup>1</sup> / DP <sup>2</sup> )	up to 860 kPa up to 125 psig
Ambient temperature* (TS <sup>1</sup> )	All versions -40°C to +65°C   -40°F to +150°F
Inlet gas temperature*	<ul style="list-style-type: none"> <li>Standard version -10°C to +65°C   14°F to +150°F</li> <li>Arctic version -20°C to +65°C   -22°F to +150°F</li> </ul>
Inlet pressure (MAOP / p <sub>umax</sub> <sup>1</sup> )	from 50 kPa to 0.86 MPa from 7.25 psig to 125 psig
Range of downstream pressure Wds	<ul style="list-style-type: none"> <li>from 1.3 kPa to 14.5 kPa for BP version from 5" w.c. to 2.1 psig for BP version</li> <li>from 14.51 kPa to 35 kPa for MP version from 2.1 psig to 5.1 psig for MP version</li> </ul>
Range of downstream pressure Wdso	<ul style="list-style-type: none"> <li>from 1.3 kPa to 15.9 kPa for BP version from 5" w.c. to 2.3 psig for BP version</li> <li>from 16 kPa to 50 KPa for MP version from 2.31 psig to 7.25 psig for MP version</li> </ul>
Minimum inlet pressure and nominal capacity	<ul style="list-style-type: none"> <li>up to 75 Sm<sup>3</sup>/h   2,600 scfh with 50 kPa   7.25 psig differential pressure</li> <li>up to 100 Sm<sup>3</sup>/h   3,500 scfh with 69 kPa   10 psig differential pressure</li> </ul>
Accuracy class (AC <sup>1</sup> )	10
Lock-up pressure class (SG <sup>1</sup> )	20, minimum 0.75 kPa   3" w.c.
Connections*	In-line 1", 1 1/2 NPT according to ANSI B1.20.1, other configurations or connections on request
<p>(<sup>1</sup>) according to EN334 standard  (<sup>2</sup>) 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.</p>	

**Table 2** Features



# Materials and Approvals

Part	Material
Body	Aluminum
Cover	Aluminum
Diaphragms and seats	Nitrile rubber for BP version Rubberized fabric for TR version
Sealing rings	Nitrile

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

**Table 3** Materials

## Construction Standards and Approvals

The FE regulator is designed according to the European standard EN 16129, Italian Standard UNI 11655, ANSI B109.4 and CSA 6.18.

The FE BP version is CSA certified.

ANSI Z21.80 certification is limited to 70 kPa | 10 psig maximum inlet pressure.

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



EN16129



UNI 11655



ANSI B109.4



CSA 6.18



ANSI Z21.80

# Design pressure

Design pressure (PS according to EN334)				
	Body		Slam shut	
	MPa	psig	MPa	psig
all versions	0.86	125	0.86	125

**Table 4** Design pressure for body and slam shut

# Maximum allowable operating pressure

MAOP Maximum Allowable Operating Pressure ( $p_{umax}$ according to EN334)					
Version		Control head			
		FE BP		FE MP	
		MPa	psig	MPa	psig
WITHOUT CE MARKING	all versions	0.86	125	0.86	125

**Table 5** MAOP Maximum Allowable Operating Pressure without CE marking



# Springs ranges and control heads

Control heads pressure ranges			
	Control head BP	Control head MP	Spring Table web link
Model	kPa psig	kPa psig	
FE 25 / FE 50	1.3 - 18 0.18 - 2.6	18.1 - 50 2.61 - 7.25	-
FE 75 / FE 100	1.3 - 16 0.19 - 2.3	14 - 35 2 - 5.1	<a href="#">IT 1729</a>

**Table 6** Settings table

Range of the springs for FE 25 / FE 50		
Color	Model	Range
BLUE US64470358BL	BP	"5.2" – 6.8" w.c.
ORANGE US64470359AR		6.8" - 8.8" w.c.
GREEN US64470360VE		8.8" - 11.2" w.c.
RED US64470361RO		11.2" - 15.3" w.c.
LIGHT BLUE US64470362AZ		15.3" - 20.9" w.c.
FUCHSIA US64470363RS		20.9" - 30.1" w.c.
BROWN US64470368MA		30.1" - 40.1" w.c.
GREY US64470364GR		40.1" - 56.2" w.c.
BLACK US64470365NE		56.2" - 72.2" w.c.
BROWN 64470368MA	MP	2.6 - 3.2 psig
GREY 64470364GR		3.2 - 4.35 psig
BLACK 64470365NE		4.35 - 5.8 psig
VIOLET 64470366V		5.8 - 7.25 psig

**Table 7** Settings table for FE 25 / FE 50

Range of the springs for FE 75 / FE 100		
Color	Model	Range
WHITE US64470171BI	BP	5.2" - 7.6" w.c.
ORANGE US64470130AR		8.0" - 10.4" w.c.
GREEN US64470131VE		10.8" - 15.7" w.c.
RED US64470132RO		16.1" - 23.7" w.c.
BLUE US64470133BL		24.1" - 31.7" w.c.
LIGHT BLUE US64470134AZ		32.1" - 39.7" w.c.
YELLOW US64470135GI		40.1" - 64.2" w.c.
YELLOW US64470135GI	MP	2.0 - 3.0 psig
GREY US64470136GR		3.0 - 5.1 psig

**Table 8** Settings table for FE 75 / FE 100

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



# Accessories

## For the pressure regulators:

- Slam shut
- IRV
- Nylon filter
- Double diaphragm
- Vent limited version
- Thermal safety valve
- Univent

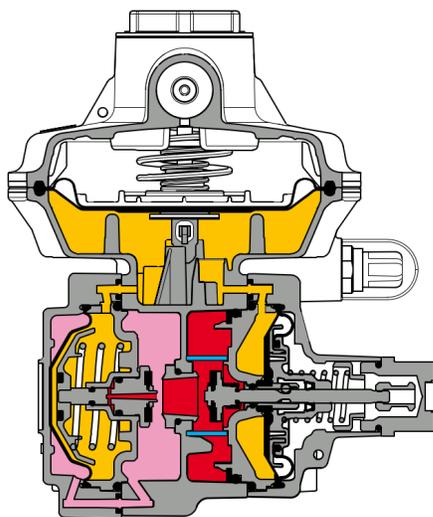
## Slam Shut

The FE is always supplied with an incorporated slam shut valve.

The main characteristics of this device are:

-  Overpressure shut-off
-  Double diaphragm

-  Compact dimensions



-  Inlet pressure
-  Intermediate pressure
-  Outlet pressure

**Figure 6** FE with slam shut

Pressure switch types and ranges					
SSV Type	Model	Operation	Range Wh		Spring Table web link
			kPa	psig	
FE 25 / FE 50	BP	OPSO	2.5 - 30	0.36 - 4.3	-
FE 25 / FE 50	MP	OPSO	30 - 80	4.31 - 11.6	-
FE 75 / FE 100	BP	OPSO	3.2 - 23.1	0.46 - 3.35	<a href="#">TT 1729</a>
FE 75 / FE 100	BP	UPSO	0.6 - 25	0.087 - 3.6	<a href="#">TT 1729</a>
FE 75 / FE 100	MP	OPSO	21 - 55.2	3 - 8	<a href="#">TT 1729</a>

**Table 9** Settings table

Range of the springs for FE 25 / FE 50 OPSO		
Color	Model	Range
GREY US6447038700	FE BP	10" - 14" w.c.
BLUE US64470120BLU		14" - 20" w.c.
YELLOW US64470402GI		16" - 20" w.c.
YELLOW US64470121GI		20" - 35" w.c.
GREEN US64470122VE		32" - 44" w.c.
VIOLET US6447040700		39" - 58" w.c.
RED US64470123ROS		44" - 65" w.c.
ROSE US64470793RS		77.6" - 97" w.c.
LIGHT BLUE US64470124AZ		65" - 88" w.c.
BROWN US64470020MAR		88" - 120" w.c.
GREY 64470169GR	FE MP	4.35 - 7.2 psig
WHITE 64470168BI		7.2 - 11.6 psig

**Table 10** Settings table for FE 25 / FE 50



Range of the springs for FE 75 / FE 100 OPSO		
Color	Model	Range
GREEN 64470111VE	FE BP	12.6" - 21.8" w.c.
LIGHT BLUE 64470113AZ		21.9" - 40" w.c.
BROWN 64470114MA		40.1" - 64.2" w.c.
GREY 64470115GR		64.4" - 84.3" w.c.
YELLOW 64470116GI		84.5" - 92.7" w.c.
YELLOW 64470116GI	FE MP	3.1 - 4.8 psig
WHITE 64470416BI		4.8 - 8.0 psig

**Table 11** Settings table for FE 75 / FE 100

Range of the springs for FE 75 / FE 100 UPSO		
Color	Model	Range
ORANGE 64470308AR	FE BP	0.087 - 0.21 psig
GREEN 64470128VE		0.21 - 0.57 psig
WHITE 64470024BI		0.58 - 1.15 psig
RED 64470031RO		1.16 - 2.02 psig
YELLOW 64470038GI		2.03 - 3.62 psig

**Table 12** Settings table for FE 75 / FE 100

## IRV

The FE has an integrated token relief valve that discharges a small volume of gas into the atmosphere when the regulator exceeds the relief valve set point. It prevents slam shut valve (with manual reset) to trigger in case of abnormal non-hazardous overpressure conditions. The token IRV can be activated or deactivated in the field, if necessary. The most common conditions are:

- thermal expansion due to the day/night temperature variation
- quick on/off appliance
- small internal leakage

Relief valve adjustment springs			
Spring item code	Spring color	Spring range (w.c.)	
		Min.	Max.
US64470027VER	Green	8.02 + Pd	20.07 + Pd
US64470029GIA	Yellow	4.41 + Pd	8.02 + Pd
US64470213BL	Blue	3.21 + Pd	4.41 + Pd
US64470027VER	Green	60.21 + Pd	100.36 + Pd
US64470029GIA	Yellow	Max 59.81 + Pd	

**Table 13** Relief valve adjustment springs table

## Nylon filter

The FE is equipped with a nylon mesh 100 micron | 140 mesh to prevent foreign particles, such as weld slag or PE shavings, to get stuck between the orifice and seat/disk thus preventing lockup for new installations.

The purpose of the nylon mesh is to provide protection to the FE and its accessories thus protecting the customers downstream piping system.



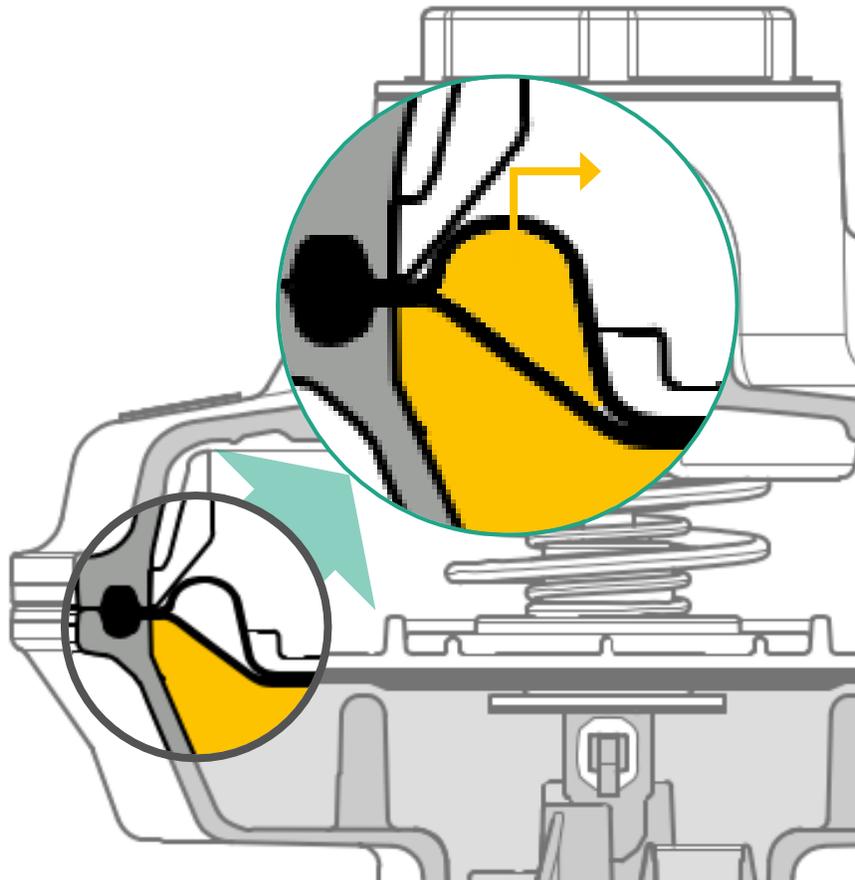
**Figure 7** FE with nylon filter

## Double diaphragm

The FE second stage and the FE slam shut have two diaphragms each: an operating and a safety ones. In case of rupture of the operating diaphragm, the safety diaphragm ensures the operation of the regulator.

In addition, there is a bleed hole (internal vent limiter) in the diaphragm allowing the leak of a minimal amount of gas (< 1 scfh for FE 25/FE 50, and < 2.5 scfh FE 75/FE 100) into the atmosphere and making the failure detectable.

Double diaphragm option is available only for maximum regulator's downstream pressure up to 2 psig.



**Figure 8** FE 2nd stage double diaphragms

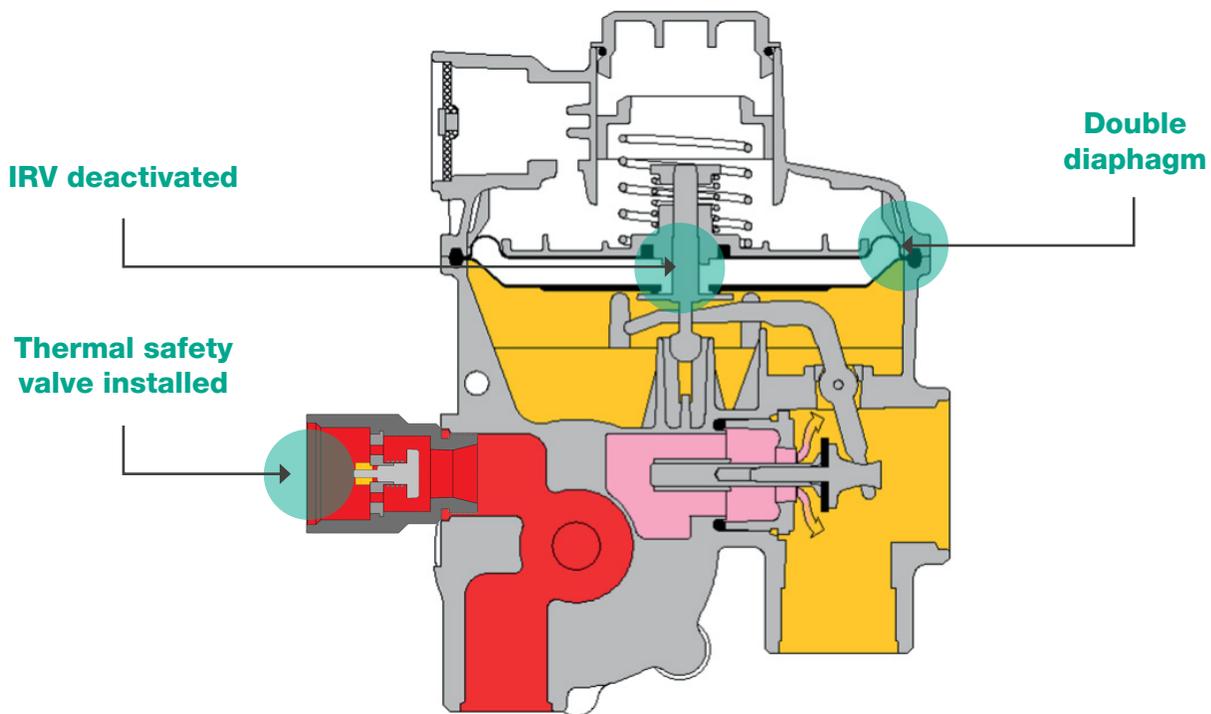
## Vent limited version

The vent limited version can be used for indoor applications, when a vent tubing is not operationally or regulatory required. In this case IRV is deactivated.

The vent limited version is designed to limit the amount of gas released due to diaphragm failure.

In this configuration, the FE's 2nd stage and slam shut are equipped with a double diaphragm and a thermal safety valve is installed on the FE's inlet.

Should the operating diaphragm fail, the safety diaphragm takes over activating a limited vent (< 1 scfh for FE 25/FE 50, and < 2.5 scfh FE 75/FE 100)



**Figure 9** FE with vent limited version



## Thermal safety valve

The thermal valve is a safety device that shuts the inlet gas flow in case of excessive ambient temperature, e.g., due to fire. The valve is rated to stop the gas flow for up to 90 minutes at 1472 °F | 800 °C.

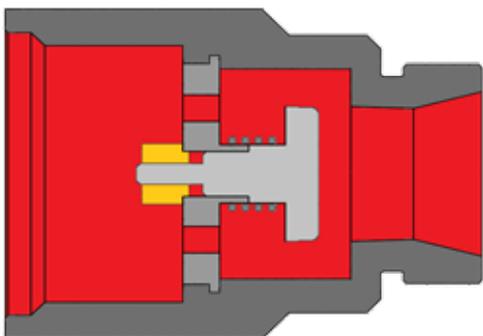
The valve mechanism is composed of a seat, plug, spring, and a block of thermoplastic material. The block holds the valve open under normal conditions, and when the temperature exceeds a certain limit, it softens releasing the plug and stopping the flow. There are two sizes depending on the flow rate and pressure drop: TVD1 (typically for FE 25/ FE 50) and TVD2 (typically for FE 75/FE 100).

Temperature limits:

212 °F +/- 18 °F | 100 °C +/- 10 °C

266 °F +/- 18 °F | 130 °C +/- 10 °C

320 °F +/- 18 °F | 160°C +/- 10 °C



**Figure 10** FE with thermal safety valve

### Fire protection valve TVD1 (FE 25/FE 50) pressure drop

Inlet pressure		Flow rate											
		1 m³/h 35 scfh		5 m³/h 175 scfh		9.9 m³/h 350 scfh		14.9 m³/h 525 scfh		24.8 m³/h 875 scfh		42.8 m³/h 1500 scfh	
kPa	psig	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.
6.9	1	0	0	0.3	1.2	1	4	3.73	15	5.5	22	-	-
13.8	2	0	0	0.25	1	0.87	3.5	3.48	14	5	20	-	-
34.5	5	0	0	0.2	0.8	0.75	3	3.23	13	4.5	18	12	50
69	10	0	0	0.15	0.6	0.62	2.5	2.49	10	3.5	14	8	32
≥ 276	≥ 40	0	0	0.1	0.4	0.5	2	1.49	6	2	8	4	16

**Table 14** Fire protection valve TVD1 (FE 25/FE 50) pressure drop table

### Fire protection valve TVD2 (FE 75/FE 100) pressure drop

Inlet pressure		Flow rate											
		5 m3/h   175 scfh		9.9 m3/h   350 scfh		20 m3/h   700 scfh		50 m3/h   1750 scfh		75 m3/h   2600 scfh		100 m3/h   3500 scfh	
kPa	psig	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.	kPa	" w.c.
6.9	1	0.2	0.8	0.3	1.2	0.5	2	1.74	7	3.5	14	-	-
13.8	2	0.1	0.4	0.15	0.6	0.45	1.8	1.49	6	3	12	-	26
34.5	5	0.05	0.2	0.25	1	0.37	1.5	1.24	5	2.5	10	5	20
69	10	0	0	0.15	0.6	0.2	0.8	1	4	1.2	4.8	4	17
≥ 276	≥ 40	0	0	0.1	0.4	0.15	0.6	0.5	2	0.9	3.6	1	6

**Table 15** Fire protection valve TVD2 (FE 75/FE 100) pressure drop

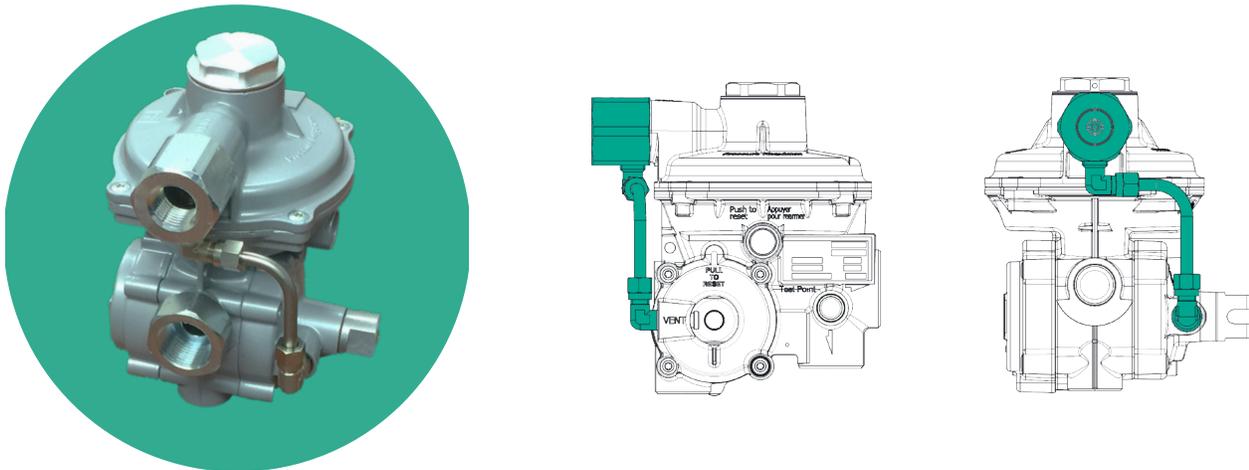
## Univent

FE univent version offers a single vent connection point for 2nd stage and slam-shut.

FE can be converted easily to the univent version using a retrofitting kit.

Since the FE is already a vent limited regulator, the size of the vent pipe can be as small as OD ¼”.

Additionally, there is no impact on performance with 3/8” vent pipes up to 40 ft long and with 1/2” vent pipes up to 100 ft long.



**Figure 11** FE with univent



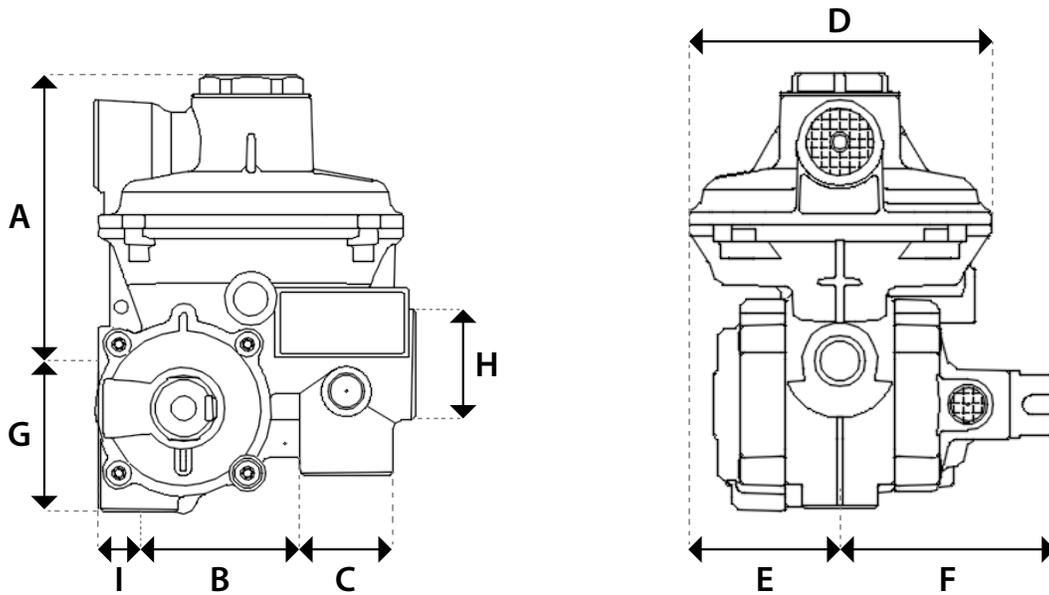
Univent installation video:

[Click here](#)



# Weights and Dimensions

FE 25 / FE 50

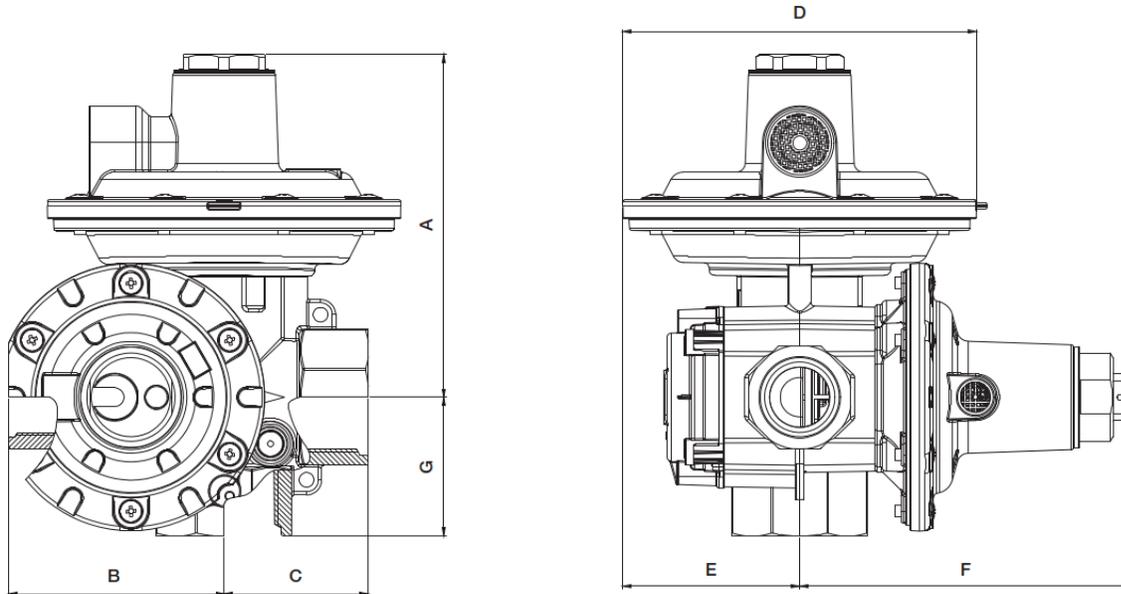


**Figure 12** FE 25 / FE 50 Dimensions

Weights and Dimensions (for other connections, please contact your closest Pietro Fiorentini representative)		
	[mm]	inches
A	106.5	4.18"
B	68	2.69"
C	25.5	1.0"
D	Ø112	Ø4.4"
E	56	2.2"
F	79	3.1"
G	54.3	2.13"
H	41	1.61"
I	14.7	0.58"
<b>Weight</b>		
	Kg	pounds
Aluminum regulator (without fittings)	1.0	2.20
Weight increase with fittings	from 0.13 to 0.68	from 0.3 to 1.5

**Table 16** Weights and dimensions

## FE 75 / FE 100



**Figure 13** FE 75 / FE 100 Dimensions

Weights and Dimensions (for other connections, please contact your closest Pietro Fiorentini representative)		
	[mm]	inches
A	147	5.8"
B	92	3.6"
C	62	2.4"
D	Ø152	Ø6"
E	76	3"
F	143	5.6"
G	60	2.4"
Weight	Kg	pounds
Aluminum regulator (without fittings)	2.2	4.9

**Table 17** Weights and dimensions



# 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 technology 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

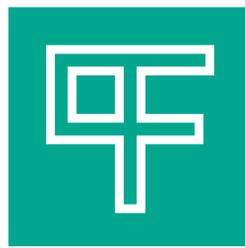
While in the past we limited ourselves to providing products, systems and services for the oil & gas sector, today we want to broaden our horizons and create technologies and solutions for a digital and sustainable world. We have a particular focus on renewable energy projects to help make the most of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

The time has come to understand how and why we operate now.









# Pietro Fiorentini

**TB0137USA**



The data is not binding. We reserve the right  
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