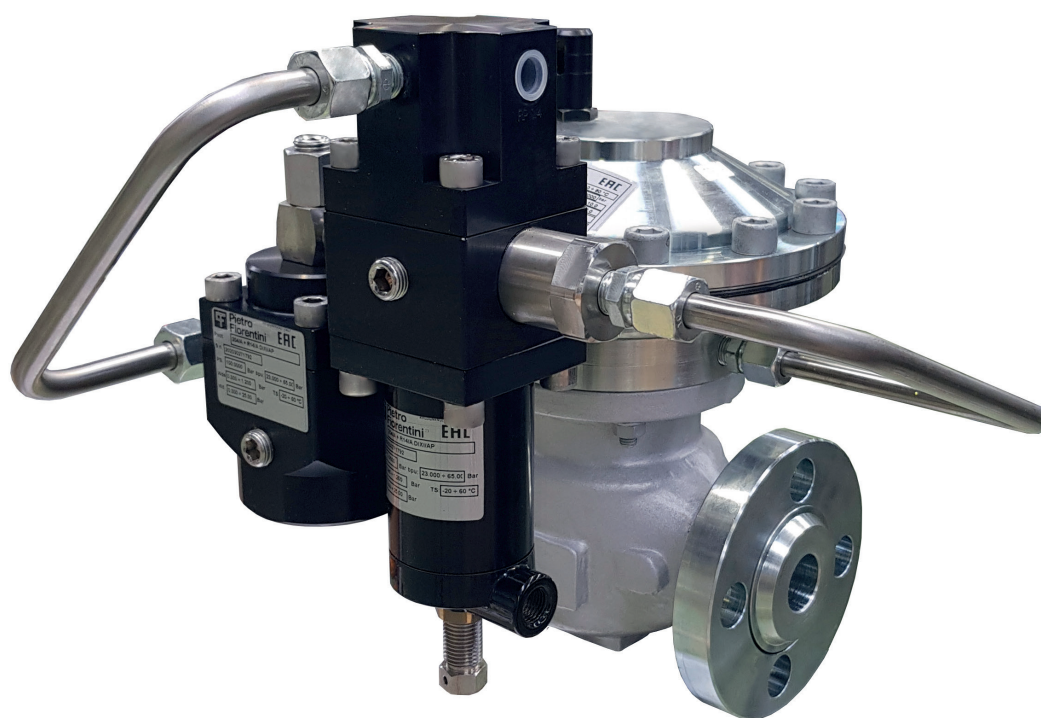


# Dixi AP

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

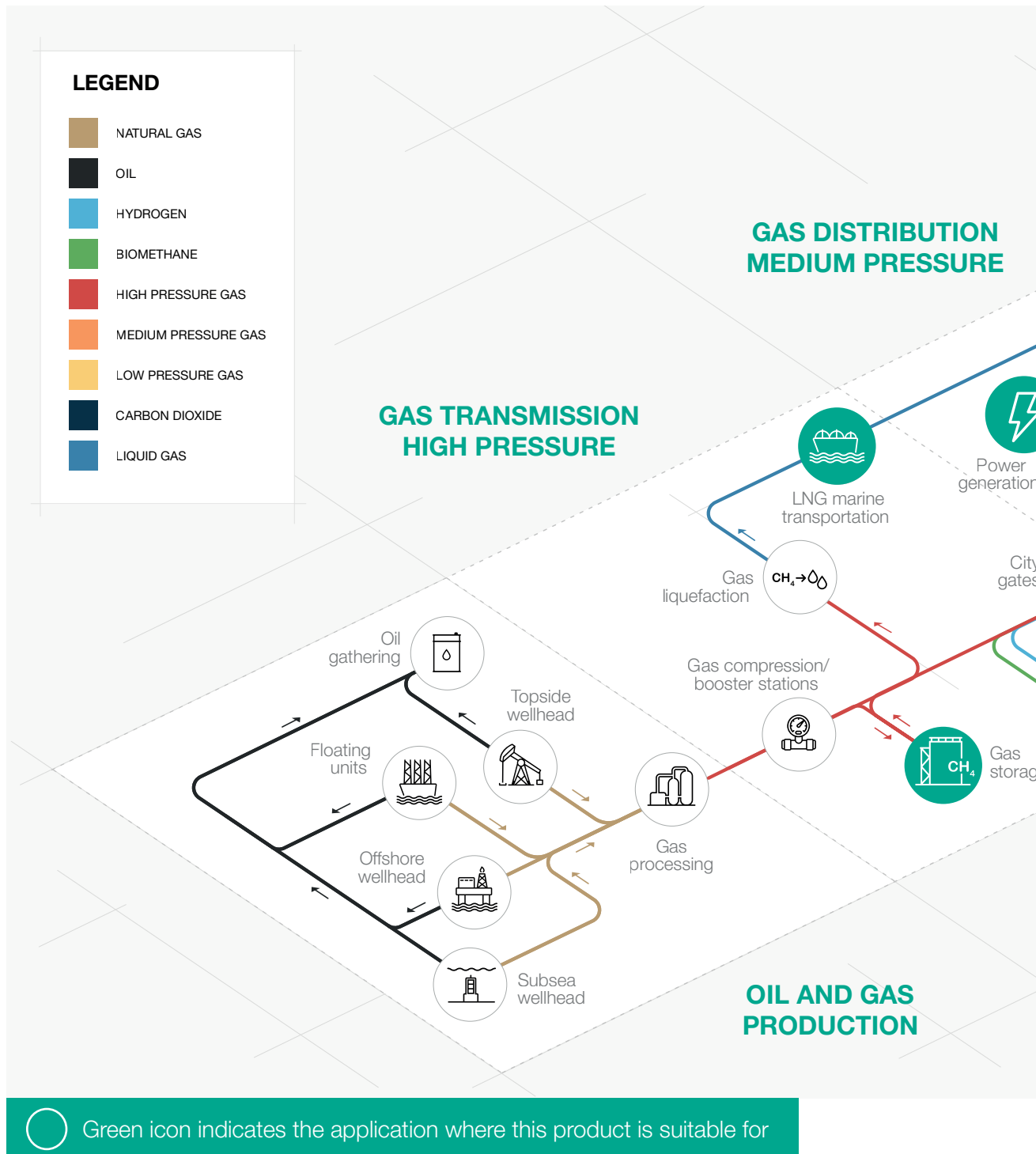


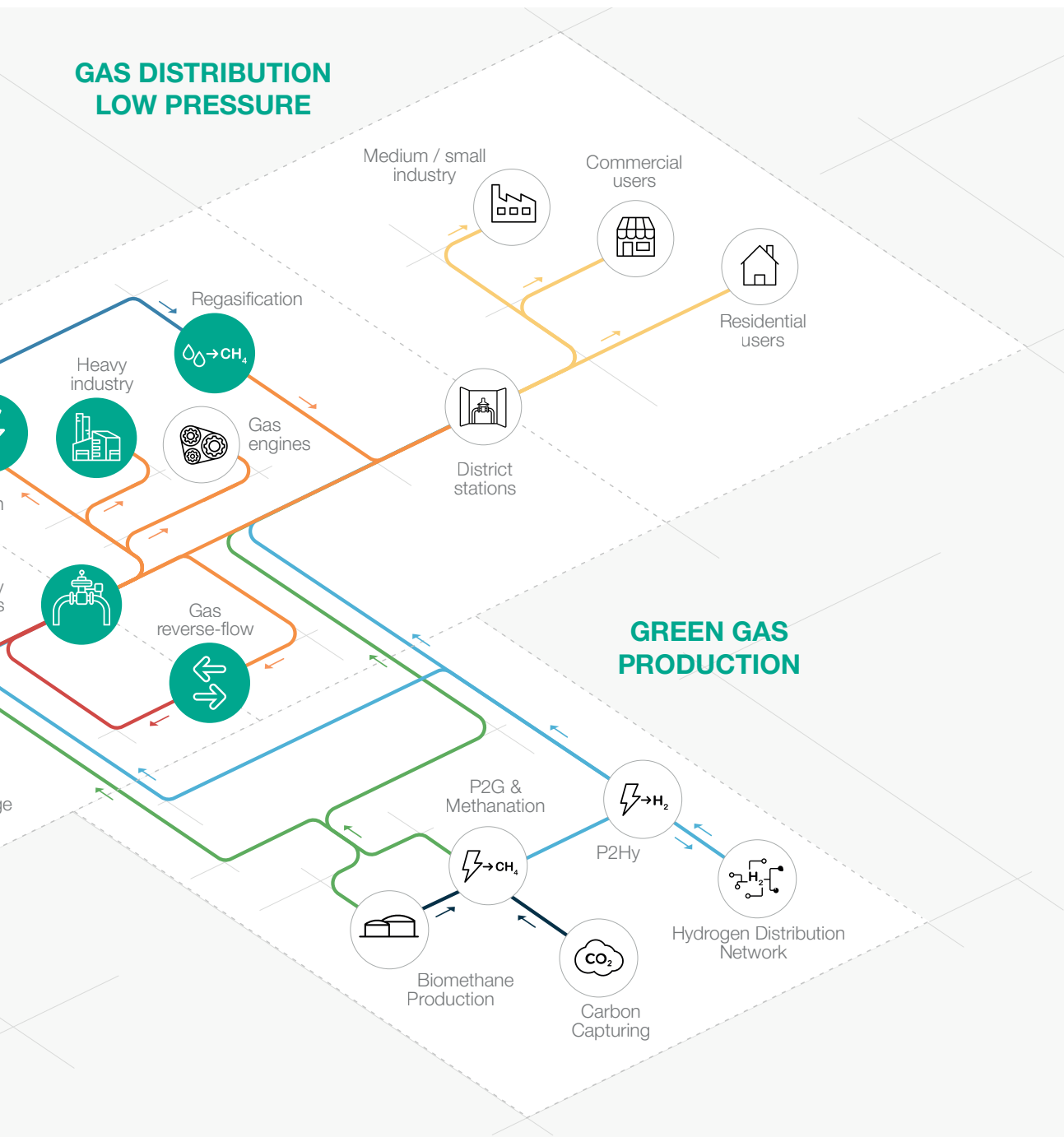
Experience since 1940



We operate in over 100 countries

# Area of Application





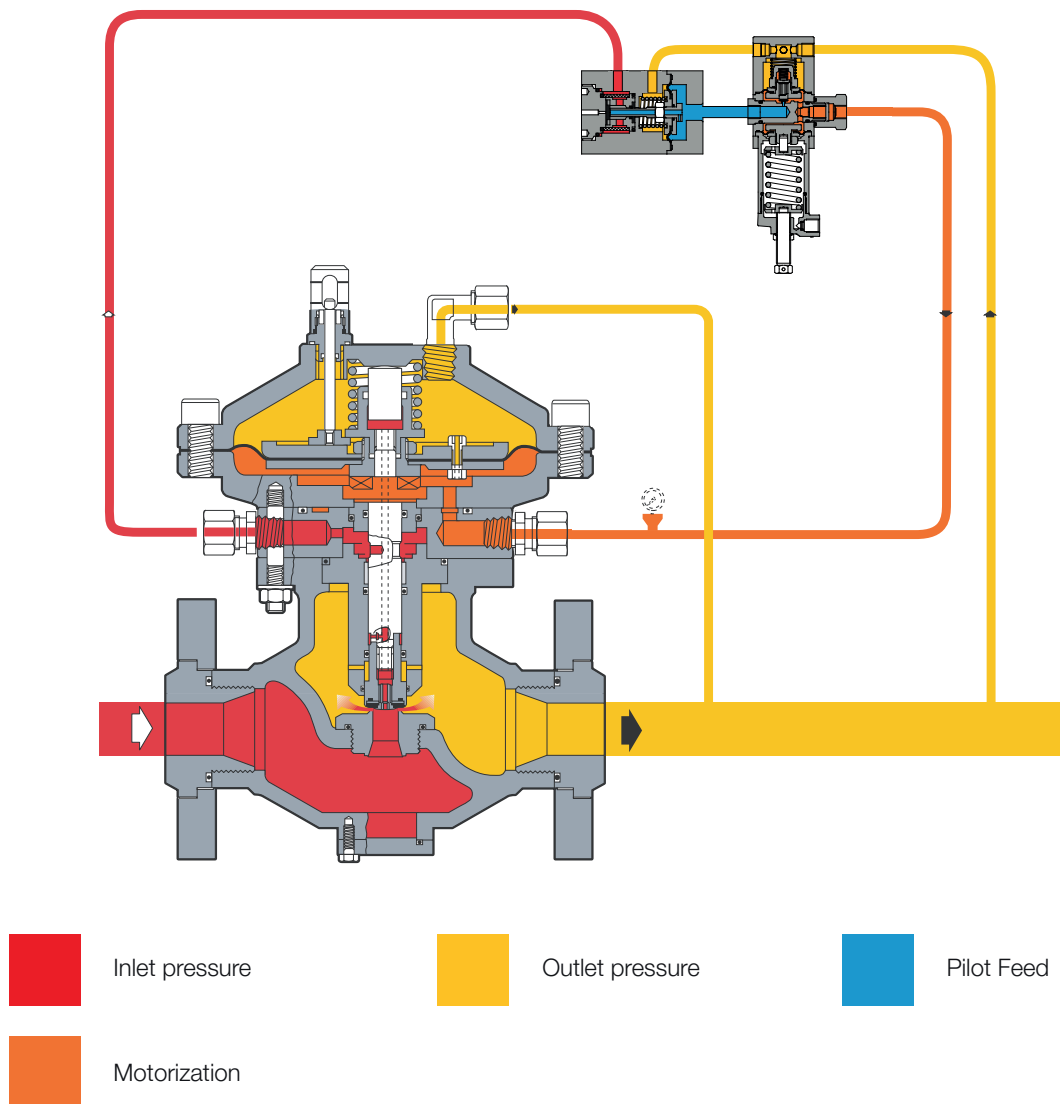
**Figure 1** Area of Application Map

# Introduction

**Dixi AP** 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 and for medium pressure natural gas distribution networks.

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



**Figure 2** Dixi AP

# Features and Calibration ranges

**Dixi AP** is a **pilot-operated** device for high pressure and medium pressure with a unique **dynamic balancing system** which ensures a **great turn down ratio** combined with an **accurate outlet pressure control**.

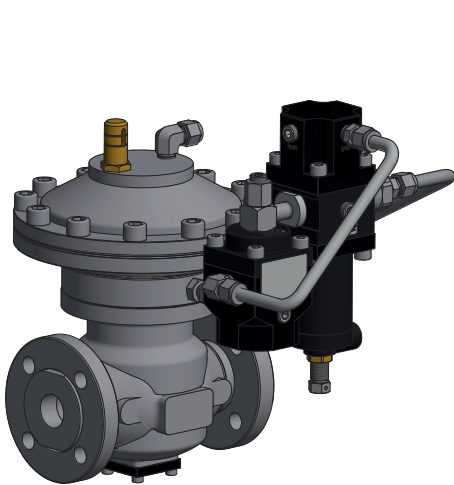
**Dixi AP** is a balanced pressure regulator. This means that the controlled outlet pressure is not affected by variations in the inlet pressure and flow during its operation. Therefore a balanced regulator can have a single-size orifice for all pressure and flow conditions.

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

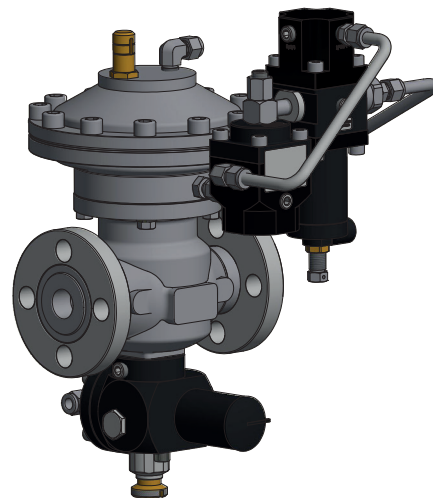
It is a **truly top entry design** which allows **easy maintenance** of parts directly in the field **without removing the body from the pipework**.

Set point adjustment of the regulator is achieved via a pilot, loading and unloading the pressure in the top chamber.

The modular design of Dixi AP pressure regulators allows retrofitting of slam shut valve SB/87 model on the same body.



**Figure 3** Dixi AP



**Figure 4** Dixi AP with SB/87 slam shut

## Dixi AP competitive advantages



Compact and simple design



High accuracy



High turn-down ratio



Fail Close plug and seat regulator



Built-in pilot filter



Top Entry



Easy maintenance



Built-in accessories



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



Balanced type

## Features

| Features                                                                                                                                                                                                                                                                       | Values                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Design pressure*                                                                                                                                                                                                                                                               | up to 8.5 MPa<br>up to 85 barg                                                           |
| Ambient temperature*                                                                                                                                                                                                                                                           | from -20 °C to +60 °C<br>from -4 °F to +140 °F                                           |
| Inlet gas temperature range*                                                                                                                                                                                                                                                   | from -20 °C to +60 °C<br>from -4 °F to +140 °F                                           |
| Inlet pressure range bpu (MAOP)                                                                                                                                                                                                                                                | from 0.15 to 8.5 MPa<br>from 1.5 to 85 barg                                              |
| Range of downstream pressure Wd                                                                                                                                                                                                                                                | from 0.05 to 2.5 MPa<br>from 0.5 to 25 barg                                              |
| Available Accessories                                                                                                                                                                                                                                                          | SB/87 Slam shut                                                                          |
| Minimum differential pressure                                                                                                                                                                                                                                                  | 0.1 MPa<br>1 barg                                                                        |
| Accuracy class AC                                                                                                                                                                                                                                                              | up to 2.5 (depending on working conditions)                                              |
| Lock-up pressure class SG                                                                                                                                                                                                                                                      | up to 10 (depending on working conditions)                                               |
| Nominal dimensions DN                                                                                                                                                                                                                                                          | DN 25 / 1"                                                                               |
| Connections*                                                                                                                                                                                                                                                                   | Class 150, 300, 600 RF or RTJ according to ASME B16.5<br>and PN 16 according to ISO 7005 |
| <b>(*) REMARK: Different functional features and/or extended temperature ranges available on request. Stated temperature ranges are the maximum for which the equipment's full performance, including accuracy, are fulfilled. Standard product may have a narrower range.</b> |                                                                                          |

**Table 1** Features



# Materials and Approvals

| Part                 | Material                                                                         |
|----------------------|----------------------------------------------------------------------------------|
| Body                 | Cast steel ASTM A352 LCB                                                         |
| Cover                | ASTM A350 LF2 Forged steel                                                       |
| Stem                 | AISI 416 stainless steel                                                         |
| Plug                 | AISI 416 + Vulcanized rubber                                                     |
| Seat                 | Stainless steel                                                                  |
| Diaphragm            | Vulcanized rubber                                                                |
| Sealing ring         | Nitrile rubber                                                                   |
| Compression fittings | According to DIN 2353 in zinc-plated carbon steel.<br>Stainless steel on request |

**REMARK:** 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

**Dixi AP** regulator is designed according to European standard EN 334.  
The regulator reacts in opening (Fail Close) according to EN 334.

The product is certified according to European Directive 2014/68/EU (PED).  
Leakage class: bubble tight, better than VIII according to ANSI/FCI 70-3.



EN 334



PED-CE

# Pilot ranges and types

| Type       | Model | Operation | Range Wh   |          | Spring Table<br>web link |
|------------|-------|-----------|------------|----------|--------------------------|
|            |       |           | MPa        | barg     |                          |
| Main pilot | 204/A | Manual    | 0.03 - 2.5 | 0.3 - 25 | <a href="#">TT 433</a>   |

**Table 3** 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 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
- Slam shut valve

## 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
- ATF 15 antifreeze

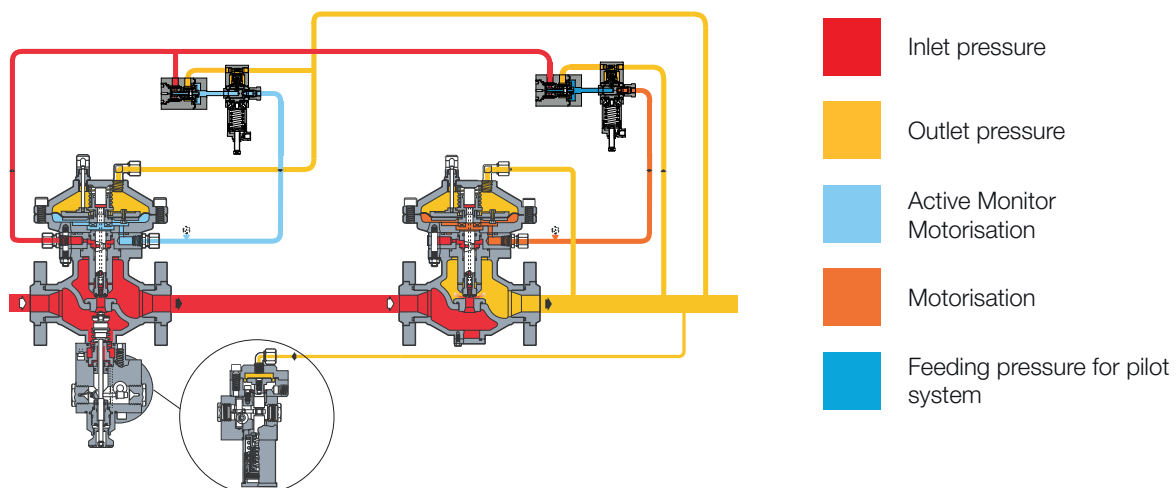
## In-line Monitor

**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** Dixi AP with In-line monitor setup

## SB/87 slam shut

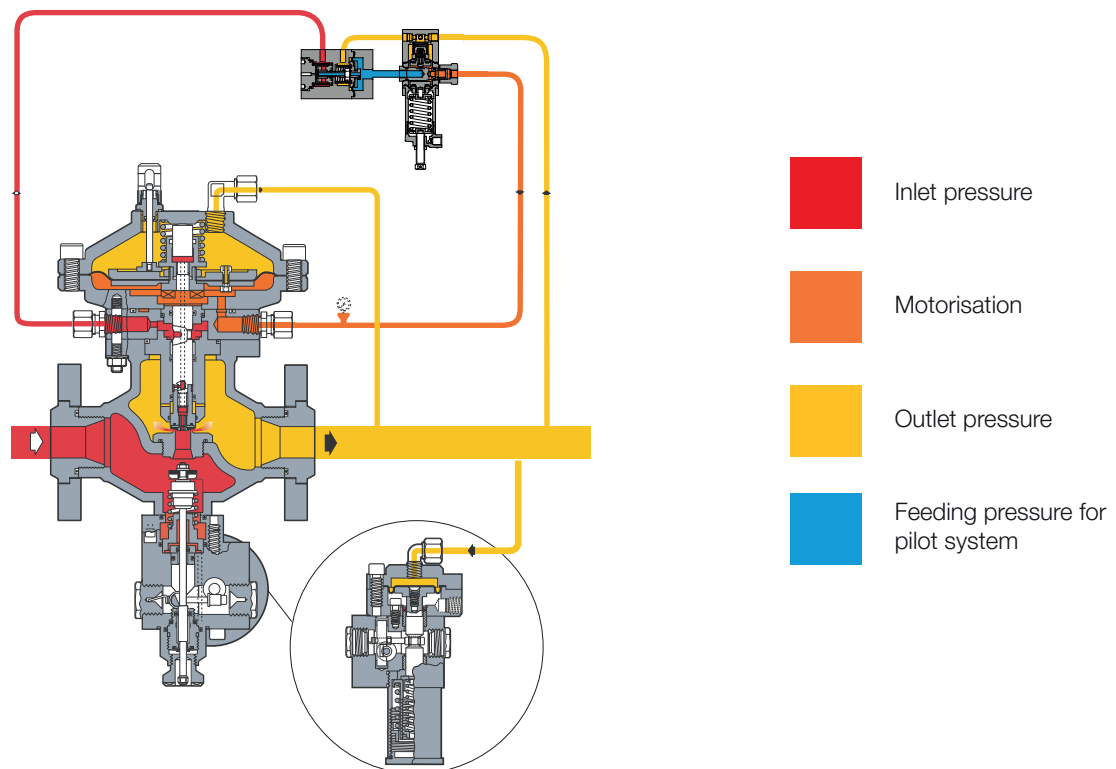
The Dixi AP pressure regulator offers the possibility of installing an **SB/87 incorporated slam shut valve**, and this can be done either during the manufacturing process or be retrofitted in the field.

**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:

-  OPSO Over Pressure Shut-Off
-  UPSO Under Pressure Shut-Off
-  Internal by-pass
-  Compact dimensions
-  Easy maintenance
-  Remote tripping option
-  Limit switch option



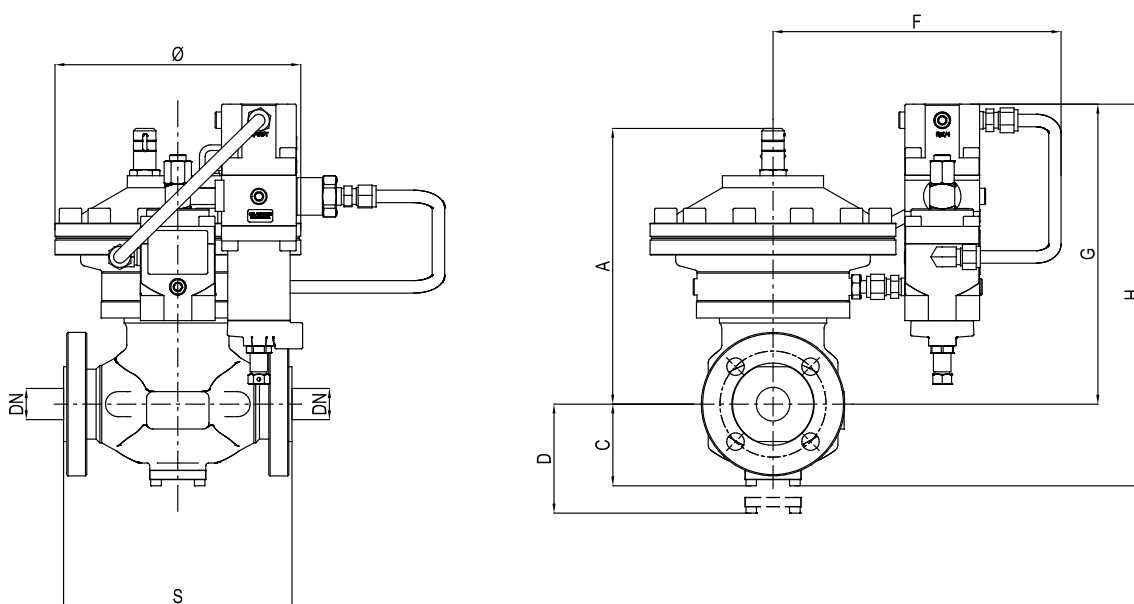
**Figure 6** Dixi AP with SB/87

| Pressure switch types and ranges |       |           |             |           |                          |
|----------------------------------|-------|-----------|-------------|-----------|--------------------------|
| SSV Type                         | Model | Operation | Range Wh    |           | Spring Table<br>web link |
|                                  |       |           | MPa         | barg      |                          |
| SB/87                            | 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/87                            | 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/87                            | 103M  | OPSO      | 0.2 - 2.2   | 2 - 22    | <a href="#">TT 1331</a>  |
|                                  |       | UPSO      | 0.02 - 0.8  | 0.2 - 8   |                          |
| SB/87                            | 103MH | OPSO      | 0.2 - 2.2   | 2 - 22    | <a href="#">TT 1331</a>  |
|                                  |       | UPSO      | 0.8 - 1.9   | 8 - 19    |                          |
| SB/87                            | 104M  | OPSO      | 1.5 - 4.5   | 15 - 45   | <a href="#">TT 1331</a>  |
|                                  |       | UPSO      | 0.16 - 1.8  | 1.6 - 18  |                          |

**Table 5** Setting table

# Weights and Dimensions

## Dixi AP



**Figure 7** Dixi AP dimensions

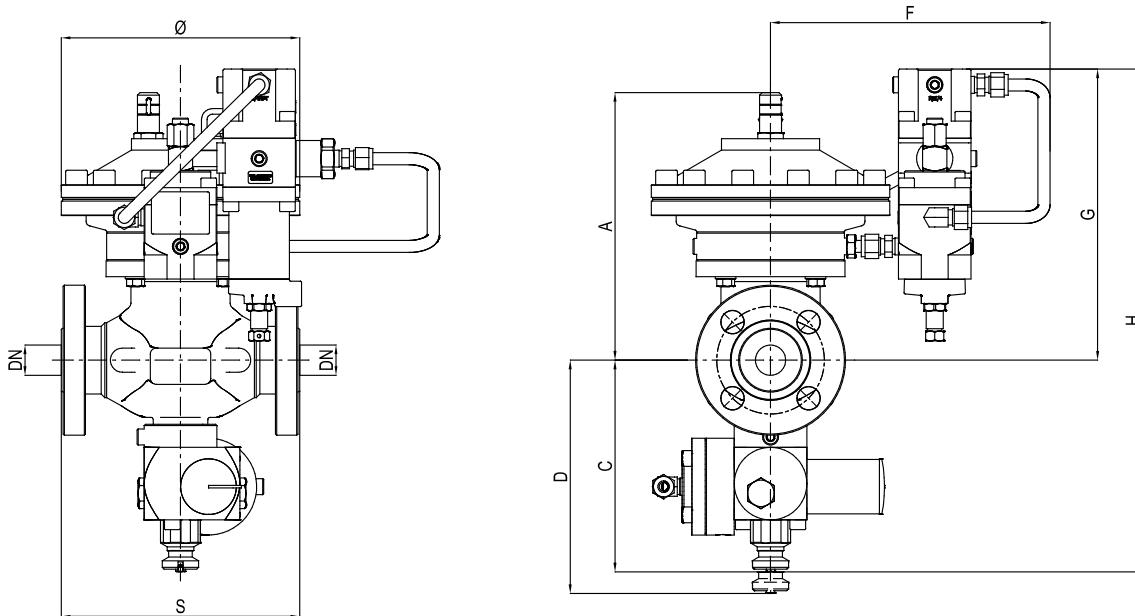
| Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative) |                                           |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------|
|                                                                                                             | [mm]   inches                             |
| Size (DN)                                                                                                   | 25   1"                                   |
| S - ANSI 150                                                                                                | 183   7.20"                               |
| S - ANSI 300                                                                                                | 197   7.76"                               |
| S - ANSI 600                                                                                                | 210   8.27"                               |
| Ø                                                                                                           | 197   7.76"                               |
| A                                                                                                           | 221   8.70"                               |
| C                                                                                                           | 65   2.56"                                |
| D                                                                                                           | 85   3.35"                                |
| F                                                                                                           | 230   9.06"                               |
| G                                                                                                           | 240   9.45"                               |
| H                                                                                                           | 305   12.01"                              |
| Tubing connections                                                                                          | Øe 10 x Øi 8 (on request imperial sizing) |

| Weight           | Kg   lbs   |
|------------------|------------|
| ANSI 150-300-600 | 24   52.91 |

**Table 6** Weights and dimensions

## Dixi AP + SB/87



**Figure 8** Dixi AP + SB/87 dimensions

| Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative) |                                           |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------|
|                                                                                                             | [mm]   inches                             |
| Size (DN)                                                                                                   | 25   1"                                   |
| S - ANSI 150                                                                                                | 183   7.20"                               |
| S - ANSI 300                                                                                                | 197   7.76"                               |
| S - ANSI 600                                                                                                | 210   8.27"                               |
| Ø                                                                                                           | 197   7.76"                               |
| A                                                                                                           | 221   8.70"                               |
| C                                                                                                           | 175   6.89"                               |
| D                                                                                                           | 195   7.68"                               |
| F                                                                                                           | 230   9.06"                               |
| G                                                                                                           | 240   9.45"                               |
| H                                                                                                           | 415   16.34"                              |
| I                                                                                                           | 88   3.46"                                |
| L                                                                                                           | 94   3.70"                                |
| Tubing connections                                                                                          | Øe 10 x Øi 8 (on request imperial sizing) |

| Weight           | Kg   lbs   |
|------------------|------------|
| ANSI 150-300-600 | 30   66.14 |

**Table 7** 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   |
| Inches                | 1"   |
| Cg                    | 159  |
| K1                    | 99.5 |

**Table 8** 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 9)  
T = gas temperature ( °C )



### 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 9** Correction factor Fc

### Flow rate conversion

$$\text{Stm}^3/\text{h} \times 0.94795 = \text{Nm}^3/\text{h}$$

Nm<sup>3</sup>/h reference conditions T= 0 °C; P= 1 barg

Stm<sup>3</sup>/h reference conditions T= 15 °C; P= 1 barg

**Table 10** 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 that the gas speed at the outlet flange does not exceed the values of the graph below. The gas speed at the outlet flange may be calculated by means of the following formula:

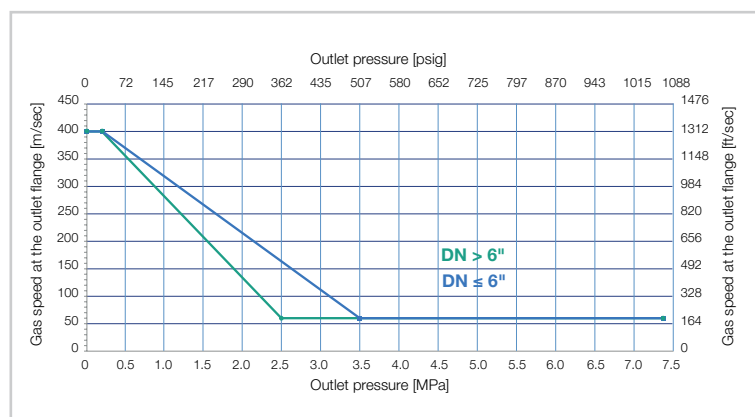
$$V = 345.92 \times \frac{Q}{\text{DN}^2} \times \frac{1 - 0.002 \times \text{Pd}}{1 + \text{Pd}}$$

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





Sizing of regulators is usually made based on valve Cg value (table 8).

Flow rates at 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)

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

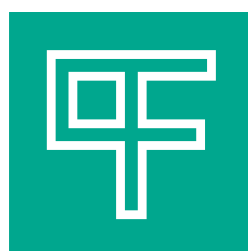
NOTE: The sin value is understood to be DEG.

# Installations

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



Dixi AP + SB/87 | Transmission application in Latin America



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