

Cirval

Medium - Low 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

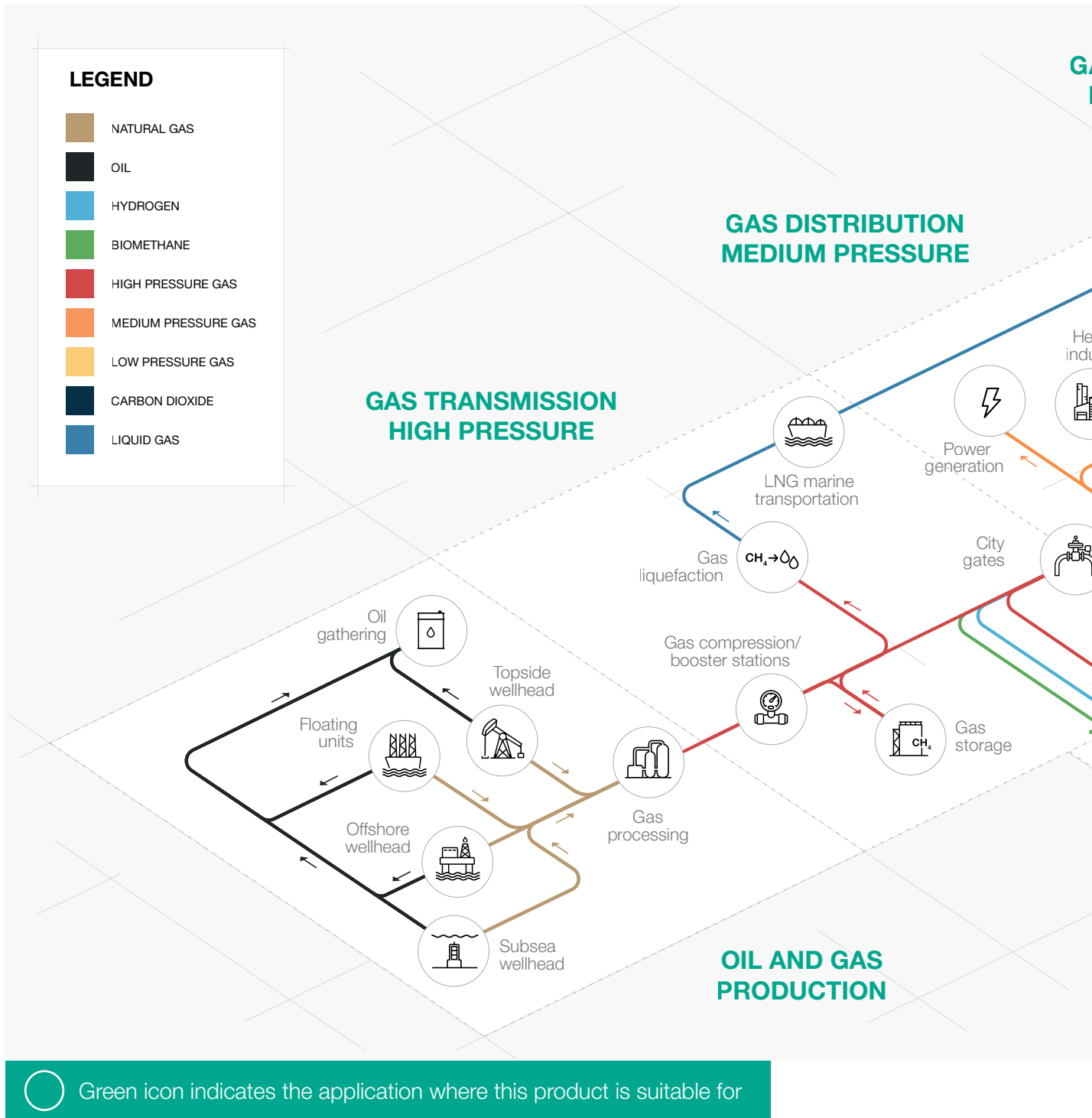


Experience since 1940



Operating in over 100 countries

Area of Application



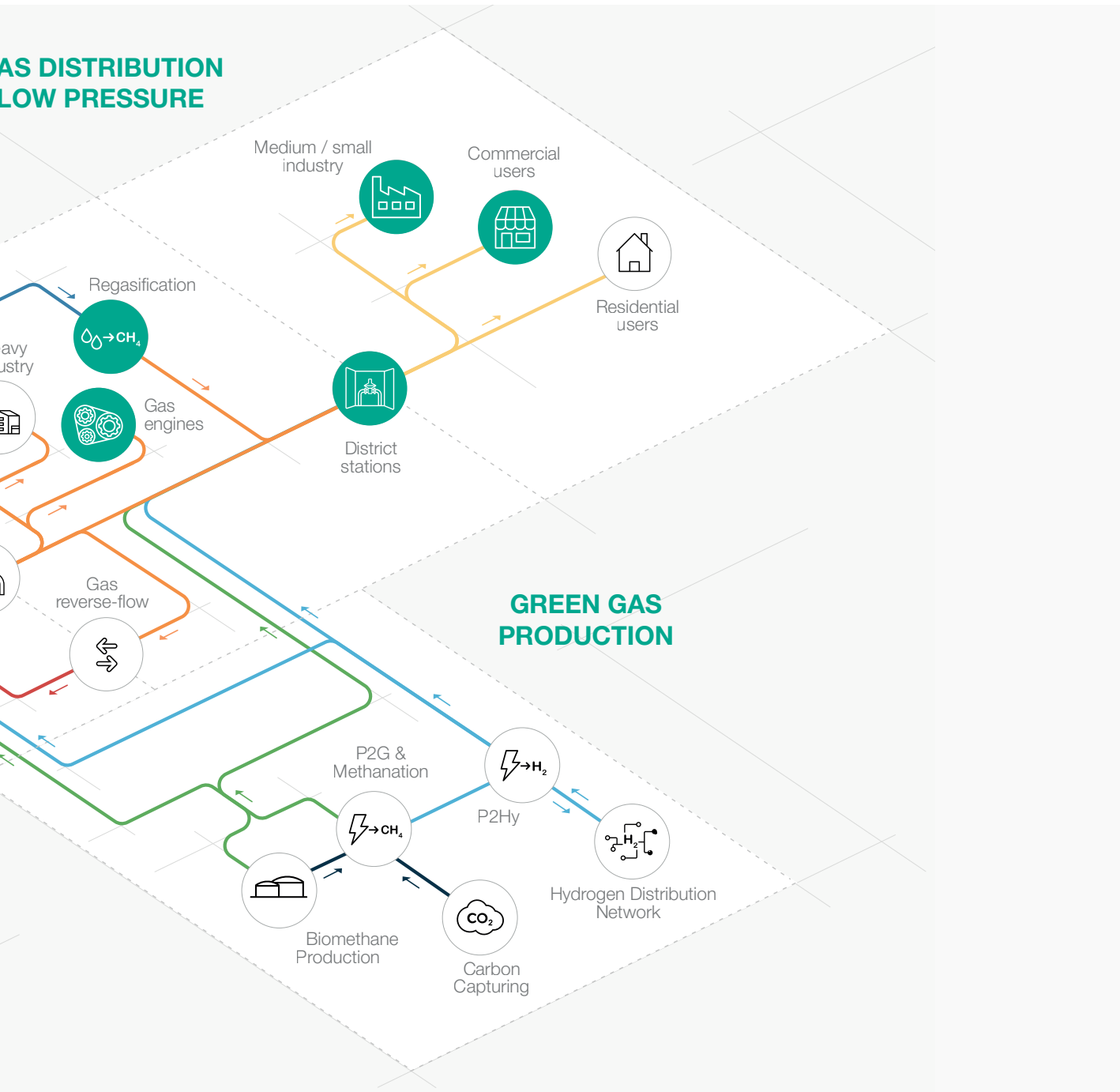


Figure 1 Area of Application Map



Introduction

The **Cirval** is a **lever-operated gas pressure regulator** controlled by a diaphragm and setting spring which controls the valve.

Mainly used for medium and low pressure natural gas distribution networks, as well as commercial and industrial applications.

It should to be used with previously filtered non-corrosive gases.

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

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

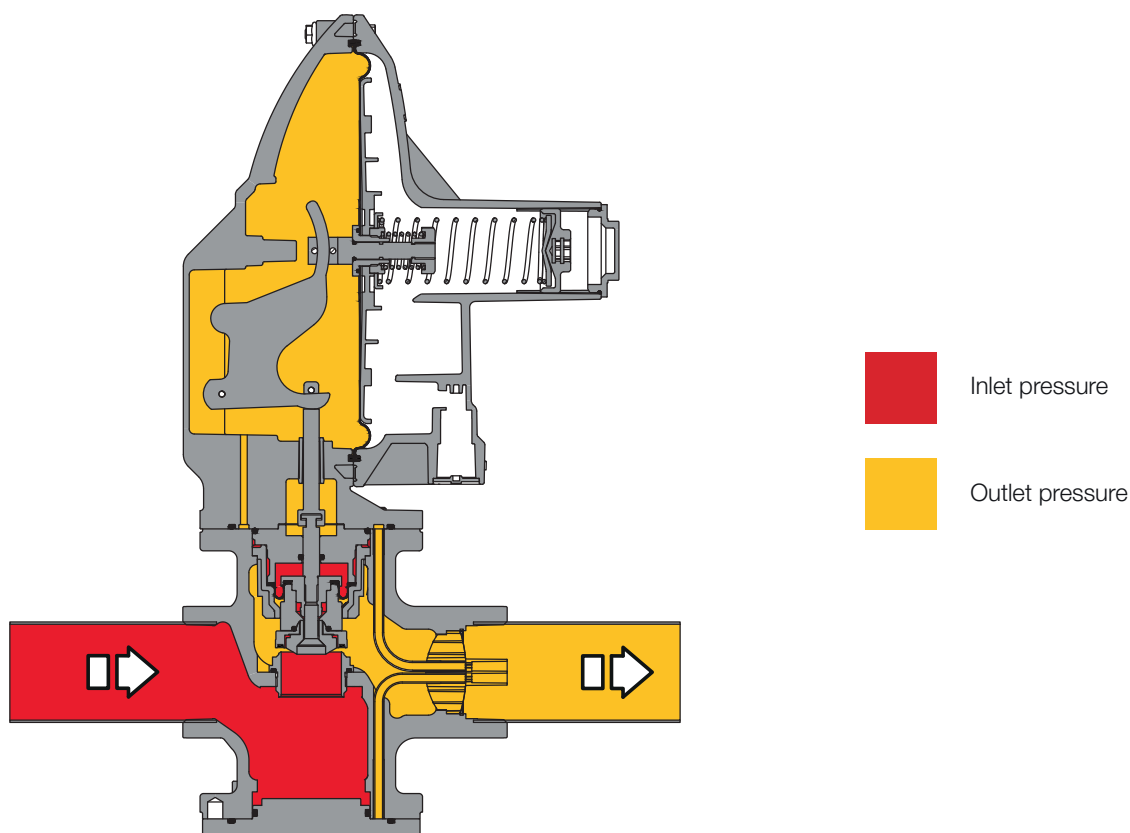


Figure 2 Cirval

Features and Calibration ranges

The Cirval is a lever-operated device for medium and low pressure with a unique dynamic balancing cartridge system which ensures an **outstanding turndown ratio** combined with an extremely **accurate outlet pressure control**.

A balanced pressure regulator is a pressure regulator where the delivery pressure accuracy 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.

The Cirval is available in two sizes: the Cirval 200 and the Cirval 300

This regulator should be used with previously filtered, non-corrosive gases in distribution networks as well as commercial and 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 Cirval pressure regulators allows for retrofitting either a slam shut valve, Integral Full Monitor (IFM) or Independent Monitoring Device (IMD).

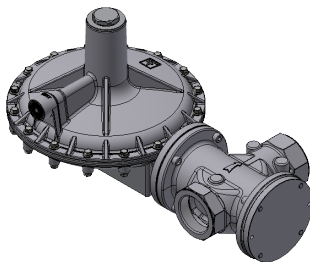


Figure 3 Cirval 300

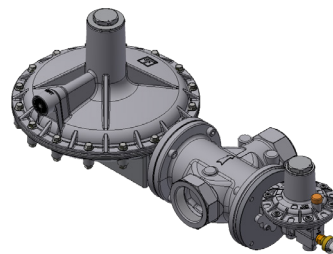


Figure 4 Cirval 300 with LA slam shut valve



Cirval competitive advantages



Compact and simple design



High accuracy



Fail Open plug and seat regulator



Balanced type



Token IRV



Top entry



Easy maintenance



Built-in accessories



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

Features

| Features | Values |
|---|---|
| Design pressure* (PS ¹ / DP ²) | up to 860 kPa up to 125 psig |
| Ambient temperature* (TS ¹) | from -29 °C to +65 °C from -20 °F to +150 °F |
| Inlet gas temperature* | from -20 °C to +60 °C from -4 °F to +140 °F |
| Inlet pressure (MAOP / p _{umax} ¹) | from 13.8 kPa to 517 kPa from 2 psig to 75 psig |
| Range of downstream pressure (Wd ¹) | from 1.7 kPa to 82 kPa from 7" w.c. to 12 psig |
| Available accessories | LA Slam shut, IMD (Independent Monitoring Device), IFM (Integral Full Monitor), built-in strainer |
| Minimum operating differential pressure (Δp _{min} ¹) | 12 kPa 1.75 psig |
| Accuracy class (AC ¹) | up to 10 |
| Lock-up pressure class (SG ¹) | up to 20 |
| Nominal size (DN ^{1,2}) | DN 32 1-1/4"; DN 40 1-1/2"; DN 50 2" |
| Orifice | Cirval 200: 3/4" Cirval 300: 1-1/2" |
| Connections | Cirval 200: 1-1/4", 1-1/2" and 2" NPT according to ANSI B1.20.1, Cirval 300: 2" NPT according to ANSI B1.20.1, 2" S.125FF according to ANSI B16.5 and Sliding 2" S.150RF for AU version |

(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.

Table 1 Features

Materials and Approvals

| Part | Material |
|--------------|---------------------------------|
| Body | Ductile iron GS 400-18 ISO 1083 |
| Cover | Die cast aluminum |
| Seat | Brass |
| Diaphragm | Nitrile rubber |
| Sealing ring | Nitrile |

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 **Cirval** regulator is designed according to ANSI B109.4 and CSA 6.18 standards. 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.



ANSI B109.4



CSA 6.18



Design pressure by version

| Design pressure (PS according to EN334) | | | | |
|---|------|------|-----------|------|
| Version | Body | | Slam shut | |
| | MPa | psig | MPa | psig |
| all versions | 0.86 | 125 | 2.00 | 290 |

Table 3 Design pressure for body and slam shut

| Design pressure (PS according to EN334) | | | | | | | | | | | | |
|---|--------------|------|-------|------|-------|------|-------|------|-------|------|-------|------|
| Parts | Control head | | | | | | | | | | | |
| | 200BP | | 300BP | | 200MP | | 300MP | | 200TR | | 300TR | |
| | MPa | psig | MPa | psig | MPa | psig | MPa | psig | MPa | psig | MPa | psig |
| Covers | 0.86 | 125 | 0.86 | 125 | 0.86 | 125 | 0.86 | 125 | 0.86 | 125 | 0.86 | 125 |
| Diaphragm | 0.03 | 4.3 | 0.03 | 4.3 | 0.07 | 10.8 | 0.10 | 14 | 0.17 | 24 | 0.17 | 24 |
| Max Diaphragm Δp | 0.02 | 2.9 | 0.02 | 2.9 | 0.05 | 7.2 | 0.07 | 10.1 | 0.11 | 15 | 0.11 | 15 |

Table 4 Design pressure for regulator's parts

Maximum allowable operating pressure

| MAOP Maximum Allowable Operating Pressure (p_{umax} according to EN334) | | | | | |
|--|--------------|-----------------------|------|-----------------------|------|
| | Version | Control head | | | |
| | | 200BP 200MP 200TR | | 300BP 300MP 300TR | |
| | | MPa | psig | MPa | psig |
| WITHOUT CE MARKING | all versions | 0.52 | 75 | 0.52 | 75 |

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 | Control head TR | Spring Table web link |
| Model | kPa psig | kPa psig | kPa psig | |
| Cirval 200 | 1.6 - 10.3 0.2 - 1.5 | 9.6 - 36.5 1.4 - 5.3 | 35.8 - 82.7 5.2 - 12 | TT 1817 |
| Cirval 300 | 1.6 - 8.3 0.2 - 1.2 | 8 - 50.3 1.2 - 7.3 | 50 - 82.7 7.2 - 12 | TT 1818 |

Table 6 Settings table

| CIRVAL 200BP VERSION | | | | | | | |
|---|------------------|--------------|-----|-----|----|-----------------------|------|
| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (" w.c.) | |
| | | | | | | Min. | Max. |
| 1 | US64470068GI | Yellow | 2 | 110 | 34 | 6.4 | 10.0 |
| | US64470024BI* | White | 1.3 | 45 | 15 | | |
| 2 | US64470139NE | Black | 2.2 | 115 | 34 | 9.2 | 16 |
| | US64470024BI* | White | 1.3 | 45 | 15 | | |
| 3 | US64470140MA | Brown | 2.7 | 106 | 34 | 13.6 | 26 |
| | US64470024BI* | White | 1.3 | 45 | 15 | | |
| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (psig) | |
| | | | | | | Min. | Max. |
| 4 | US64470071GR | Grey | 2.8 | 115 | 34 | 0.89 | 1.50 |
| | US64470031RO* | Red | 1.7 | 40 | 15 | | |
| d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm) (*) NOTE: Internal relief valve spring for regulator set-point as stated in the Spring range column | | | | | | | |

Table 7 TT 1817 - Cirval 200BP version setting springs

| CIRVAL 200MP VERSION | | | | | | | |
|----------------------|------------------|--------------|-----|-----|----|---------------------|------|
| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (psig) | |
| | | | | | | Min. | Max. |
| 1 | US64470141VE | Green | 3.2 | 120 | 34 | 1.46 | 2.39 |
| | US64470031RO* | Red | 1.7 | 40 | 15 | | |
| 2 | US64470338BL | Blue | 3.8 | 110 | 34 | 2.40 | 5.29 |
| | US64470031RO* | Red | 1.7 | 40 | 15 | | |

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)
 (*) **NOTE:** Internal relief valve spring for regulator set-point as stated in the Spring range column

Table 8 TT 1817 - Cirval 200MP version setting springs

Medium - Low Pressure Gas Regulator



CIRVAL 200TR VERSION

| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (psig) | |
|------|------------------|--------------|-----|-----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 1 | US64470144VI | Violet | 5 | 100 | 34 | 5.22 | 12 |
| | US64470031RO* | Red | 1.7 | 40 | 15 | | |

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)
 (*) **NOTE:** Internal relief valve spring for regulator set-point as stated in the Spring range column

Table 9 TT 1817 - Cirval 200TR version setting springs

CIRVAL 300BP VERSION

| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (" w.c.) | |
|------|------------------|--------------|-----|-----|----|-----------------------|------|
| | | | | | | Min. | Max. |
| 1 | US64470382NE | Black | 2.5 | 160 | 39 | 6.4 | 11.6 |
| | US2700525* | Orange | 2 | 40 | 22 | | |
| 2 | US64470301GI | Yellow | 2.8 | 145 | 39 | 10.8 | 16.8 |
| | US2700645* | Red | 2.3 | 40 | 22 | | |
| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (psig) | |
| | | | | | | Min. | Max. |
| 3 | US64470302VI | Violet | 3.8 | 140 | 39 | 0.59 | 1.20 |
| | US2700999* | Grey | 3 | 37 | 22 | | |

d = Wire Diameter (mm)

Lo = Spring Length (mm)

De = External Diameter (mm)

(*) **NOTE:** Internal relief valve spring for regulator set-point as stated in the Spring range column

Table 10 TT 1818 - Cirval 300BP version setting springs

CIRVAL 300MP VERSION

| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (psig) | |
|------|------------------|--------------|-----|-----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 1 | US64470262AR | Orange | 4.5 | 140 | 39 | 1.16 | 2.39 |
| | US2700999* | Grey | 3 | 37 | 22 | | |
| 2 | US64470398AZ | Light Blue | 5 | 140 | 39 | 2.40 | 4.20 |
| | US2700999* | Grey | 3 | 37 | 22 | | |
| 3 | US64470408RO | Red | 5.5 | 140 | 40 | 4.22 | 7.29 |
| | US2700999* | Grey | 3 | 37 | 22 | | |

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)
 (*) **NOTE:** Internal relief valve spring for regulator set-point as stated in the Spring range column

Table 11 TT 1818 - Cirval 300MP version setting springs

CIRVAL 300TR VERSION

| Pos. | Spring item code | Spring color | d | Lo | De | Spring range (psig) | |
|------|------------------|--------------|-----|-----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 1 | US64470408RO | Red | 5.5 | 140 | 40 | 7.25 | 12 |
| | US2700999* | Grey | 3 | 37 | 22 | | |

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

(*) **NOTE:** Internal relief valve spring for regulator set-point as stated in the Spring range column

Table 12 TT 1818 - Cirval 300TR version setting springs

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



Accessories

For the pressure regulators:

- Integral Full Monitor (IFM)
- Slam shut valve
- Independent Monitoring Device (IMD)

Integral Full Monitor (IFM)

IFM is an overpressure protection device, which will take over a failing worker regulator. In this configuration the gas flows through the monitor first and then through the worker (or active) regulator.

The monitor regulator outlet pressure set-point shall be set higher than the worker to allow the monitor regulator to be in a wide open position during normal operation.

With the Integral Full Monitor, the Cg valve coefficient is 5% lower than the corresponding version without.

When the outlet pipe increases more than 1 diameter, installing an external sensing line is recommended to guarantee optimal performances.

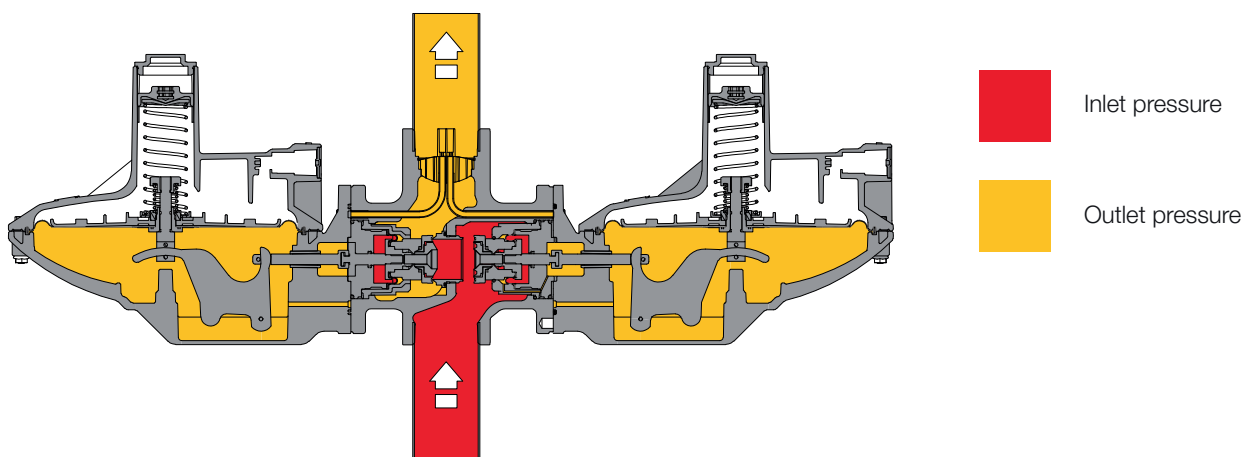










Figure 5 Cirval IFM

Slam Shut LA

The Cirval pressure regulator offers the possibility of installing an **incorporated LA slam shut valve** and this can be done either during the manufacturing process or be retrofited in the field. **Retrofitting the LA can be done without modifying** the pressure regulator body assembly.

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

The main characteristics of this device are:

- | | | | |
|--|--|--|------------------------|
|  OPSO | Overpressure shut-off |  | Compact dimensions |
|  UPSO | Underpressure shut-off |  | Easy maintenance |
|  | Internal by-pass |  | Remote tripping option |
|  | Optional push button for tripping test |  | Limit switch option |

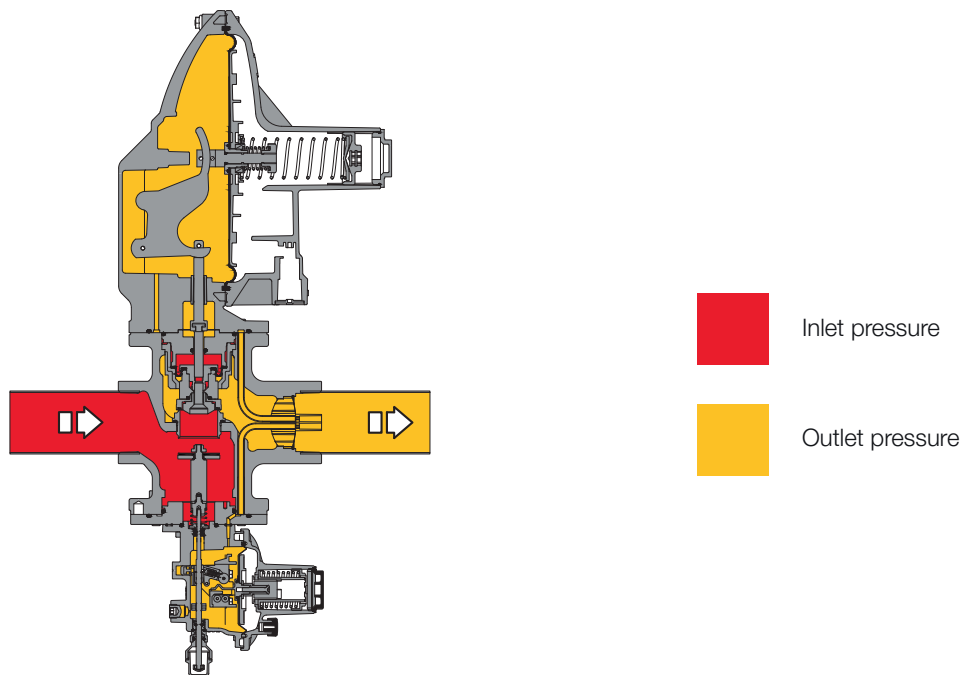


Figure 6 Cirval with LA



| Pressure switch types and ranges | | | | | |
|----------------------------------|-------|-----------|----------|-------------|--------------------------|
| SSV Type | Model | Operation | Range Wh | | Spring Table web link |
| | | | kPa | psig | |
| LA | BP | OPSO | 3 - 18 | 0.43 - 2.61 | TT 00214 |
| | | UPSO | 0.6 - 6 | 0.09 - 0.9 | |
| LA | MP | OPSO | 14 - 45 | 2 - 6.5 | TT 00214 |
| | | UPSO | 1 - 24 | 0.14 - 3.4 | |
| LA | TR | OPSO | 25 - 550 | 3.6 - 79 | TT 00214 |
| | | UPSO | 10 - 350 | 1.45 - 50 | |

Table 13 Settings table

| Shut-off device model LA performance | |
|---|-----------------------------|
| Worker set point | Minimum suggested set-point |
| 1.7 kPa 7"w.c. | 3.7 kPa 15"w.c. |
| 13.7 kPa 2 psig | 20.6 kPa 3 psig |
| 34.4 kPa 5 psig | 48.2 kPa 7 psig |
| 68.9 kPa 10 psig | 89.6 kPa 13 psig |
| Please see PF monitor and accessory setting sheet for precise settings. | |

Table 14 Recommended slam shut settings

LA/BP "OPSO"

| Pos. | Spring part number | Spring color | d | Lo | De | Spring range (psig) | |
|------|--------------------|--------------|-----|----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 1 | US64470112RO | Red | 2.2 | 44 | 34 | 0.43 | 0.71 |
| 2 | US64470115GR | Grey | 2.8 | 42 | 34 | 0.72 | 2.61 |

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

Table 15 TT 002014 - LA/BP "OPSO" setting springs

LA/BP "UPSO"

| Pos. | Spring part number | Spring color | d | Lo | De | Spring range (psig) | |
|------|--------------------|--------------|-----|----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 12 | US64470024BI | White | 1.3 | 45 | 15 | 0.08 | 0.87 |

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

Table 16 TT 002014 - LA/BP "UPSO" setting springs

LA/MP "OPSO"

| Pos. | Spring part number | Spring color | d | Lo | De | Spring range (psig) | |
|------|--------------------|--------------|-----|----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 3 | US64470115GR | Grey | 2.8 | 42 | 34 | 2.03 | 2.59 |
| 4 | US64470116GI | Yellow | 3.2 | 40 | 34 | 2.61 | 4.04 |
| 5 | US64470051BI | White | 3.2 | 50 | 34 | 4.06 | 6.52 |

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

Table 17 TT 002014 - LA/MP "OPSO" setting springs

LA/MP "UPSO"

| Pos. | Spring part number | Spring color | d | Lo | De | Spring range (psig) | |
|------|--------------------|--------------|-----|----|----|---------------------|------|
| | | | | | | Min. | Max. |
| 13 | US64470024BI | White | 1.3 | 45 | 15 | 0.14 | 0.85 |
| 14 | US64470038GI | Yellow | 2 | 40 | 15 | 0.87 | 3.48 |

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

Table 18 TT 002014 - LA/MP "UPSO" setting springs



| LA/TR "OPSO" | | | | | | | |
|--------------|--------------------|--------------|-----|----|----|---------------------|-------|
| Pos. | Spring part number | Spring color | d | Lo | De | Spring range (psig) | |
| | | | | | | Min. | Max. |
| 6 | 64470116GI | Yellow | 3.2 | 40 | 34 | 3.62 | 7.96 |
| 7 | 64470051BI | White | 3.2 | 50 | 34 | 7.97 | 12.31 |
| 8 | 64470057BL | Blue | 3.5 | 50 | 34 | 12.32 | 20.29 |

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

Table 19 TT 002014 - LA/TR "OPSO" setting springs

| LA/TR "UPSO" | | | | | | | |
|--------------|--------------------|--------------|-----|----|------|---------------------|-------|
| Pos. | Spring part number | Spring color | d | Lo | De | Spring range (psig) | |
| | | | | | | Min. | Max. |
| 15 | US64470038GI | Yellow | 2 | 40 | 15 | 1.45 | 7.23 |
| 16 | US64470045MA | Brown | 2.4 | 41 | 15.3 | 7.25 | 14.48 |

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

Table 20 TT 002014 - LA/TR "UPSO"

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



Independent Monitoring Device (IMD)

The IMD is a rough cut monitor control overpressure protection safety device (OPP), which is designed to limit downstream pressure build-up in case of regulator failure. Example are lock-up failure, cut diaphragm or lever disconnect which can cause a catastrophic failure.

When a failure occurs, the IMD operates on the inlet side of the orifice to limit the downstream pressure. Since the IMD is a separate an independent monitoring device from the main regulator, it will function in the event of worker regulator's failure.

With the Independent Monitoring Device, the Cg valve coefficients is 10% lower than the corresponding version without, except for IMD-1 which has a maximum flow limitation (see table 21).

When the IMD is in operation or in lock-up, a small amount of gas will bleed continuously to the atmosphere through a small port in the IMD (less than 1 scfh). This generates an alert of regulator's abnormal condition.

Token relief valve is always disabled when using the IMD.

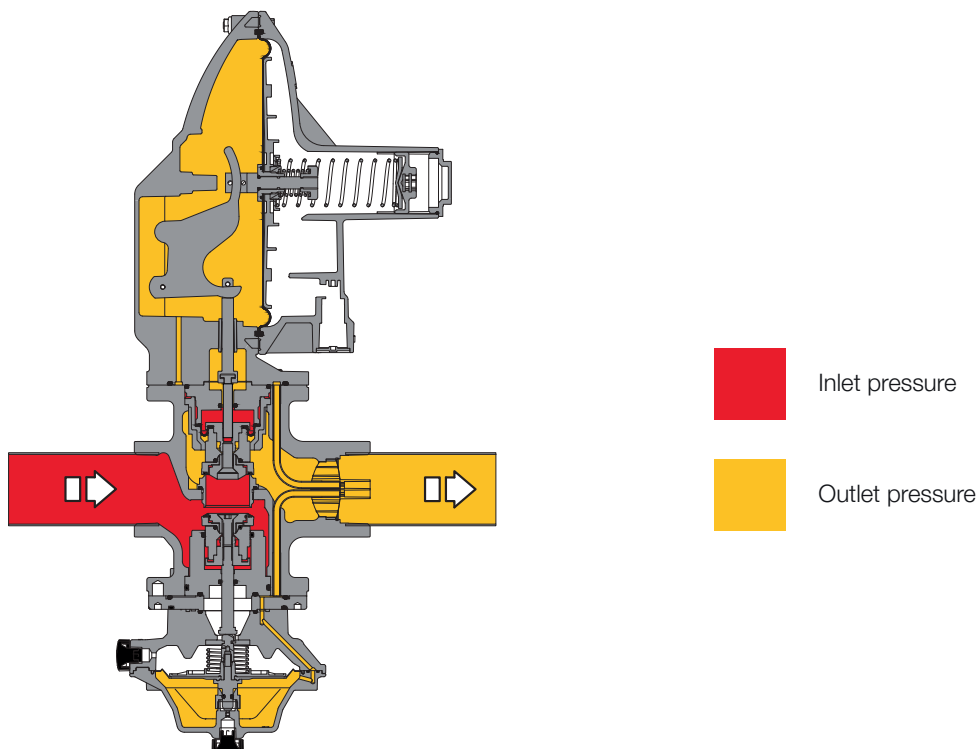


Figure 7 Cirval IMD

| IMD performance | | | | | | |
|------------------------------------|-------------|--------------------------------------|-----------------------------------|----------------------|--------------------------------------|---|
| Regulator set range | IMD version | Maximum IMD peak activation pressure | IMD pressure control range* | IMD lock-up pressure | IMD activated vent flow rate | Cg reduction/maximum flow |
| 1.7 kPa 7" w.c. | IMD-1 | 6.2 kPa 0.9 psig | 3.4 - 4.8 kPa 0.5 - 0.7 psig | 6.2 kPa 0.9 psig | < 0.028 m ³ /h < 1 cfh | 10%; max flow 457 m ³ /h 16000 scfh |
| 1.7 - 6.8 kPa 7" w.c. - 1 psig | IMD-2 | 12.4 kPa 1.8 psig | 8.2 - 11.7 kPa 1.2 - 1.7 psig | 12.4 kPa 1.8 psig | < 0.028 m ³ /h < 1 cfh | 10 % |
| 1.7 - 13.7 kPa 7" w.c. - 2 psig | IMD-5 | 26.8 kPa 3.9 psig | 16.5 - 25.5 kPa 2.4 - 3.7 psig | 26.8 kPa 3.9 psig | < 0.028 m ³ /h < 1 cfh | 10 % |
| 1.7 - 34.4 kPa 7" w.c. - 5 psig | IMD-7 | 47.5 kPa 6.9 psig | 37.9 - 44.8 kPa 5.5 - 6.5 psig | 47.5 kPa 6.9 psig | < 0.028 m ³ /h < 1 cfh | 10 % |

*depending on flow rate and inlet pressure

Table 21 IMD performance table. Standard version and vent limited option

In-line monitor

In-line monitor is an emergency pressure regulator that is usually upstream from the worker regulator, in an abnormal event, when the worker regulator is unable to maintain downstream pressure from exceeding the set point, the monitor will take over the worker regulator at a set point slightly higher.

An external sensing line is required in upstream monitor configurations, and the internal sensing line will be plugged.

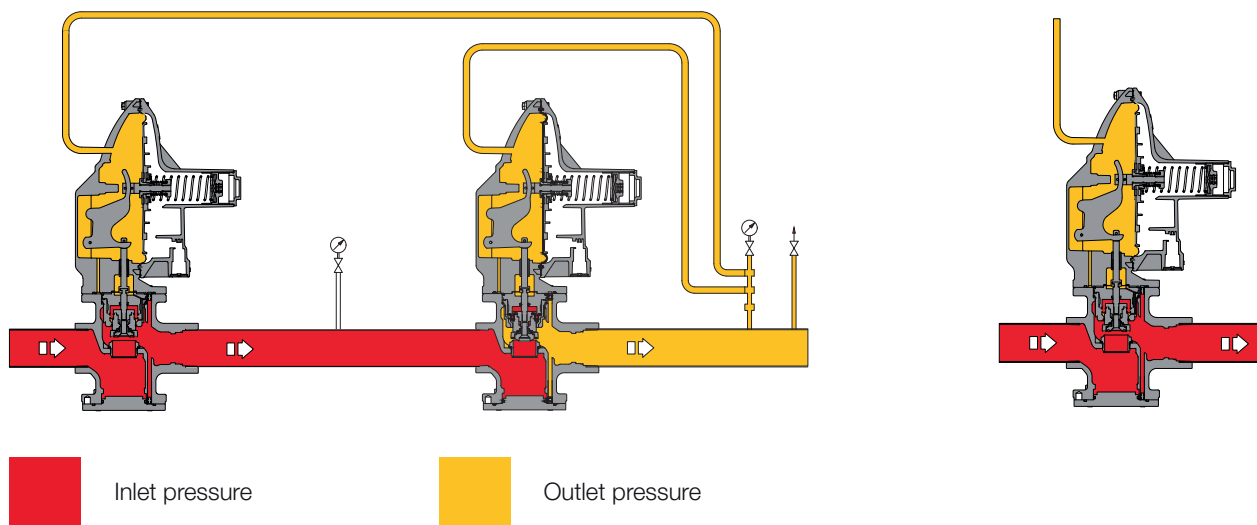


Figure 8 Cirval inline monitor

Balanced valve design (Fig. 8 - Item 1)

The Cirval is a spring loaded, lever-operated regulator that incorporates a balanced cartridge design. The balancing piston allows an opposite force equal to the inlet pressure to be applied on the back side of the orifice's seat disk. This feature improves the accuracy of the outlet pressure setting as inlet pressure fluctuates and provides high turndown ratio across a wide flow range.

Integral strainer (Fig. 8 - Item 2)

The Cirval is equipped with a removable internal 300 micron (50 U.S. mesh) strainer to prevent foreign particles, such as weld slag or PE shavings, to get stuck between the orifice and seat/disk thus preventing lockup. The purpose of the strainer is to provide protection to the Cirval and its optional accessories thus protecting the customers downstream piping system. The strainer can be easily accessed to be cleaned or replaced without removing the regulator body from the piping.

Token relief valve (Fig. 8 - Item 3)

The Cirval has an optional token relief valve that discharges a small amount of gas into the atmosphere when the regulator exceeds the relief valve set point. Token relief valve cannot be used as overpressure protection device. However it can be activated or deactivated in the field, if necessary.

During no-flow conditions, thermal expansion of the gas can cause downstream static pressure to build up. The token relief valve will prevent downstream pressure from rising, and if equipped, can prevent nuisance tripping of the slam shut valve.

Outlet pressure sensing (Fig. 8 - Item 4)

The Cirval can sense downstream pressure internally (4a) or externally (4b). Internal sensing lines are fully independent between accessories to provide Independent control.

External sensing can be connected without plugging the internal sensing and use a secondary external sense line connected to the lower diaphragm case. For external sensing line only, it is recommended to use the inline monitor version.

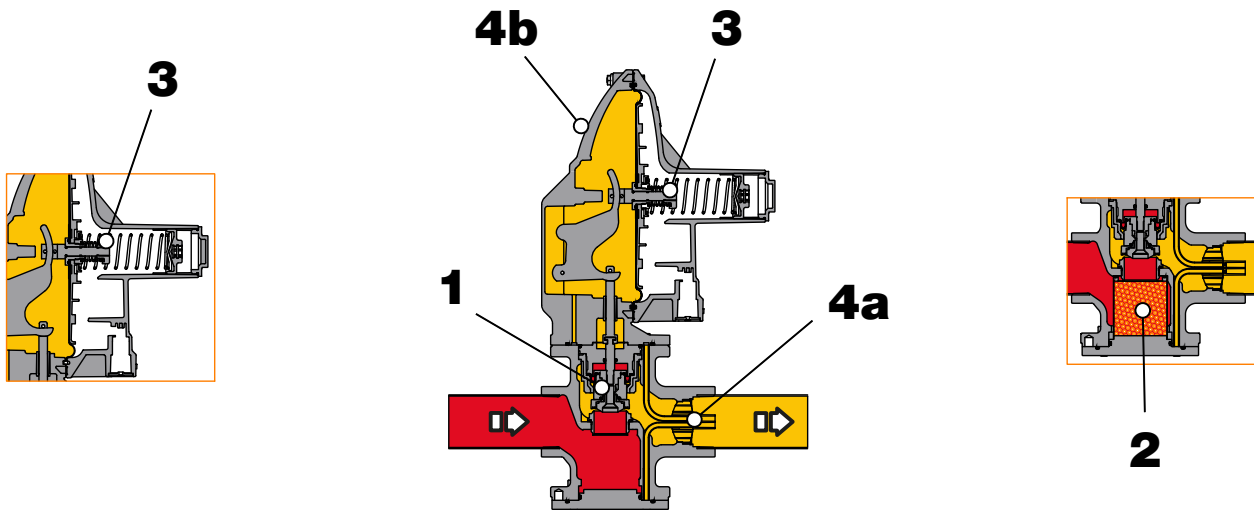


Figure 9 Cirval components location

Safety limitation

In case of a single regulator supplied without built-in overpressure protection device (SSV, IMD or IFM), the regulator shall be protected with a secondary means of overpressure protection per the DOT §192.740 and NFPA 54 5.9.3.1 standard.

The overpressure protection must be provided per code capable of limiting the downstream pressure to the system.

Weights and Dimensions

The Cirval

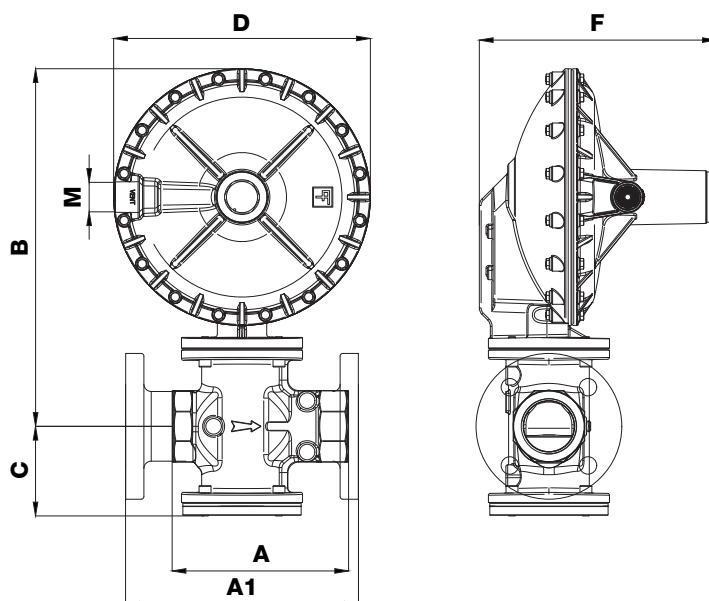


Figure 10 Cirval dimensions

| Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative) | | | | | | |
|---|-----------------------------|--------|-------------------|--------|---------------|--------|
| Model | Cirval 200 | | Cirval 300 | | Cirval 300 AU | |
| | [mm] | inches | [mm] | inches | [mm] | inches |
| A | 167.7 | 6.6" | 193 | 7.6" | 193 | 7.6" |
| A1 | - | - | 254 | 10.0" | 267* | 10,5** |
| B | 259 | 10.2" | 391.2 | 15.4" | 391.2 | 15.4" |
| C | 66 | 2.6" | 99.1 | 3.9" | 99.1 | 3.9" |
| D | 185.4 | 7.3" | 279.4 | 11.0" | 279.4 | 11.0" |
| F | 177.8 | 7.0" | 256.5 | 10.1" | 256.5 | 10.1" |
| M | 3/4" NPT | | 3/4" NPT | | 3/4" NPT | |
| Inlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Outlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Tubing Connections | 1/4" NPT x 3/8" O.D. Tubing | | | | | |
| | | | | | | |
| Weight | Kg | lbs | Kg | lbs | Kg | lbs |
| NPT | 5.4 | 11.9 | 11.8 | 26 | - | - |
| FF/RF | - | - | 16 | 35.3 | 18 | 39.6 |

*sliding flanges with body connectors dual sealing guaranteed with o-ring and high integrity sealing compound.

Table 22 Weights and dimensions

Cirval with IFM

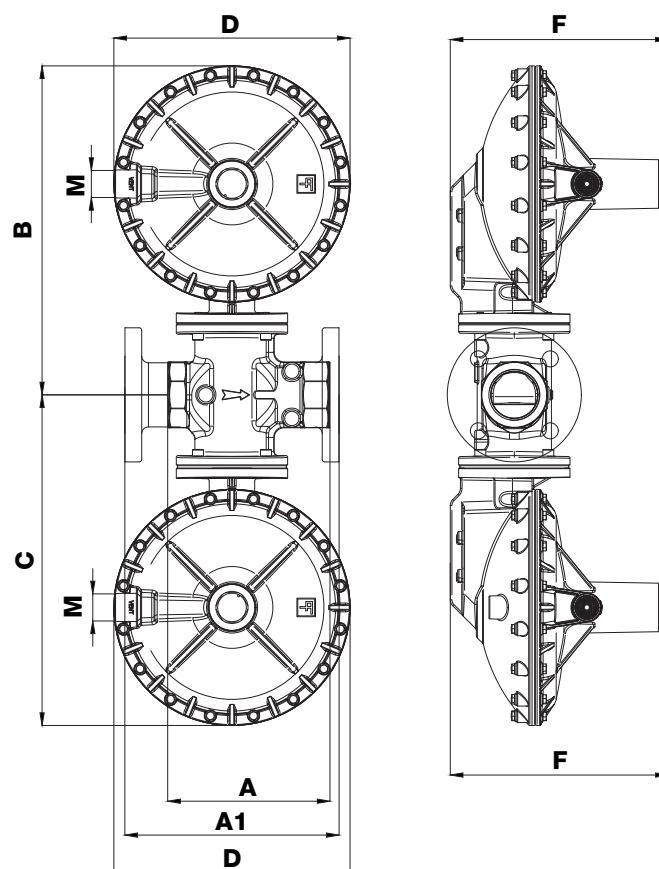


Figure 11 Cirval with IFM dimensions

| Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative) | | | | | | |
|---|-----------------------------|--------|-------------------|--------|---------------|--------|
| Model | Cirval 200 | | Cirval 300 | | Cirval 300 AU | |
| | [mm] | inches | [mm] | inches | [mm] | inches |
| A | 167.7 | 6.6" | 193 | 7.6" | 193 | 7.6" |
| A1 | - | - | 254 | 10.0" | 267* | 10,5"* |
| B | 259 | 10.2" | 391.2 | 15.4" | 391.2 | 15.4" |
| C | 259 | 10.2" | 391.2 | 15.4" | 391.2 | 15.4" |
| D | 185.4 | 7.3" | 279.4 | 11.0" | 279.4 | 11.0" |
| F | 177.8 | 7.0" | 256.5 | 10.1" | 256.5 | 10.1" |
| M | 3/4" NPT | | 3/4" NPT | | 3/4" NPT | |
| Inlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Outlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Tubing Connections | 1/4" NPT x 3/8" O.D. Tubing | | | | | |
| | | | | | | |
| Weight | Kg | lbs | Kg | lbs | Kg | lbs |
| NPT | 7.1 | 13.6 | 16.8 | 37.3 | - | - |
| FF/RF | - | - | 21 | 46.3 | 23 | 50.7 |

*sliding flanges with body connectors dual sealing guaranteed with o-ring and high integrity sealing compound.

Table 23 Weights and dimensions

Cirval with LA

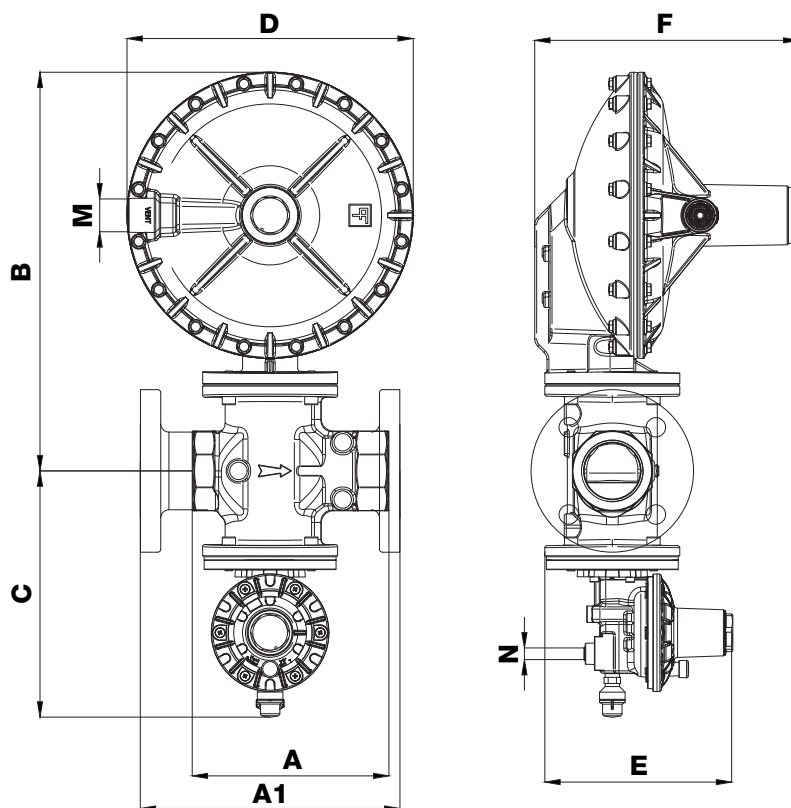


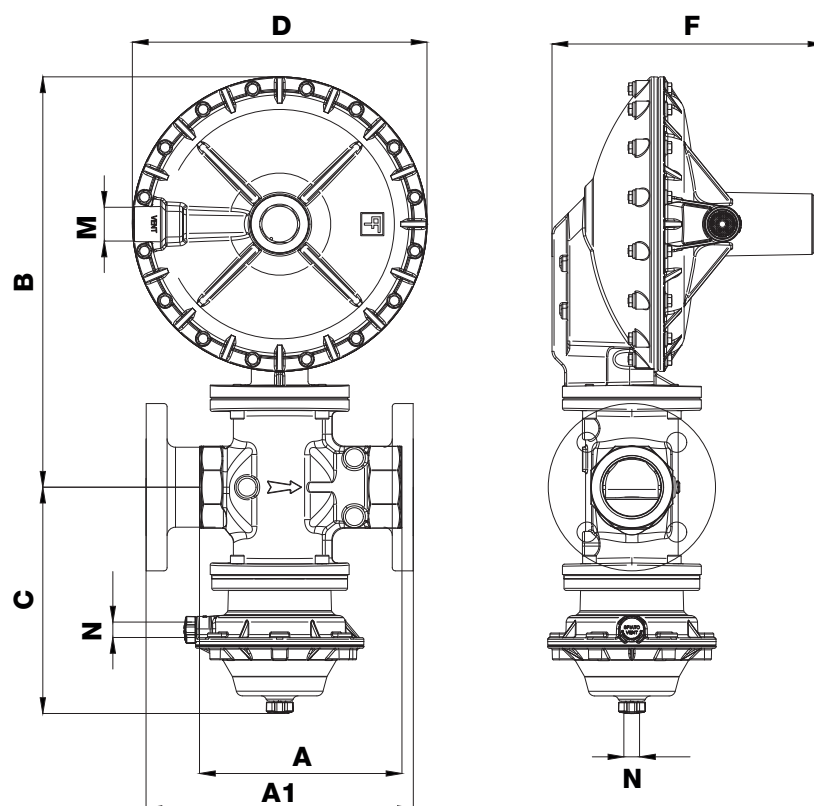
Figure 12 Cirval with LA dimensions

| Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative) | | | | | | |
|---|-----------------------------|--------|-------------------|--------|---------------|--------|
| Model | Cirval 200 | | Cirval 300 | | Cirval 300 AU | |
| | [mm] | inches | [mm] | inches | [mm] | inches |
| A | 167.7 | 6.6" | 193 | 7.6" | 193 | 7.6" |
| A1 | - | - | 254 | 10.0" | 267* | 10,5** |
| B | 259 | 10.2" | 391.2 | 15.4" | 391.2 | 15.4" |
| C | 208.3 | 8.2" | 241.3 | 9.5" | 241.3 | 9.5" |
| D | 185.4 | 7.3" | 279.4 | 11.0" | 279.4 | 11.0" |
| E | 165.1 | 6.5" | 185.4 | 7.3" | 185.4 | 7.3" |
| F | 177.8 | 7.0" | 256.5 | 10.1" | 256.5 | 10.1" |
| M | 3/4" NPT | | 3/4" NPT | | 3/4" NPT | |
| N | 1/4" NPT | | 1/4" NPT | | 1/4" NPT | |
| Inlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Outlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Tubing Connections | 1/4" NPT x 3/8" O.D. Tubing | | | | | |
| | | | | | | |
| Weight | Kg | lbs | Kg | lbs | Kg | lbs |
| NPT | 6.4 | 14.1 | 12.8 | 28.2 | - | - |
| FF/RF | - | - | 17 | 37.5 | 19 | 42 |

*sliding flanges with body connectors dual sealing guaranteed with o-ring and high integrity sealing compound.

Table 24 Weights and dimensions

Cirval with IMD

**Figure 13** Cirval with IMD dimensions

| Weights and Dimensions (for other connections please contact your closest Pietro Fiorentini representative) | | | | | | |
|---|-----------------------------|--------|-------------------|--------|---------------|---------|
| Model | Cirval 200 | | Cirval 300 | | Cirval 300 AU | |
| | [mm] | inches | [mm] | inches | [mm] | inches |
| A | 167.7 | 6.6" | 193 | 7.6" | 193 | 7.6" |
| A1 | - | - | 254 | 10.0" | 267* | 10,5"** |
| B | 259 | 10.2" | 391.2 | 15.4" | 391.2 | 15.4" |
| C | 165 | 6.5" | 213 | 8.4" | 213 | 8.4" |
| D | 185.4 | 7.3" | 279 | 11.0" | 279 | 11.0" |
| F | 177.8 | 7.0" | 256.5 | 10.1" | 256.5 | 10.1" |
| M | 3/4" NPT | | 3/4" NPT | | 3/4" NPT | |
| N | 1/4" NPT | | 1/4" NPT | | 1/4" NPT | |
| Inlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Outlet | 1-1/4"; 1-1/2"; 2" NPT | | 2" NPT; 2" S125FF | | 2" S150RF | |
| Tubing Connections | 1/4" NPT x 3/8" O.D. Tubing | | | | | |
| | | | | | | |
| Weight | Kg | lbs | Kg | lbs | Kg | lbs |
| NPT | 6.6 | 14.6 | 13 | 28.7 | - | - |
| FF/RF | - | - | 17.2 | 37.9 | 19 | 42 |

*sliding flanges with body connectors dual sealing guaranteed with o-ring and high integrity sealing compound.

Table 25 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 using the flow rate coefficients (Cg) and the form factor (K1) as indicated by the EN 334 standard. Sizing is available through the on-line Pietro Fiorentini sizing program.

| Flow rate coefficient | | |
|-----------------------|------------|------------|
| Model | Cirval 200 | Cirval 300 |
| Cg | 200 | 759 |
| K1 | 89 | 96 |

Table 26 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 on-line 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 27)
T = gas temperature (°C)

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

S = relative density (refer to Table 27)
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 | 59 °F and at the declared relative density.

Table 27 Correction Factor Fc

Flow rate conversion

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

Nm³/h reference conditions T= 0 °C; P= 1 barg | T= 32 °F; P= 14.5 psig
 Stm³/h reference conditions T= 15 °C; P= 1 barg | T= 59 °F; P= 14.5 psig

Table 28 Flow rate conversion

CAUTION:

In order to get optimal performance, to avoid premature wear on the regulators components, 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 of the regulator which may be calculated by 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 Stm³/h
 DN = nominal size of regular in mm
 Pd = outlet pressure in barg

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

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

Cirval 200 - DN 1-1/4"

from 1.74 kPa | 7" w.c. up to 68.9 kPa | 10 psig

flow capacity table

| Cirval flow rate (according to ANSI B 109.4) | | | | | | | | | |
|--|------|--------------------|------|--------------------|------|------------------|-------|-------------------|-------|
| Inlet pressure | | Outlet pressure | | | | | | | |
| | | droop +2/-1" w.c. | | droop ±2" w.c. | | droop ±1% ABS | | droop ±1% ABS | |
| | | 1.74 kPa 7" w.c. | | 3.5 kPa 14" w.c. | | 6.9 kPa 1 psig | | 34.5 kPa 5 psig | |
| kPa | psig | Stm³/h | Scfh | Stm³/h | Scfh | Stm³/h | Scfh | Stm³/h | Scfh |
| 13.8 | 2 | 59 | 2100 | 59 | 2100 | - | - | - | - |
| 34.5 | 5 | 71 | 2500 | 71 | 2500 | 71 | 2500 | - | - |
| 48.3 | 7 | 79 | 2800 | 79 | 2800 | 99 | 3500 | - | - |
| 68.9 | 10 | 99 | 3500 | 99 | 3500 | 122 | 4300 | 61 | 2150 |
| 103.4 | 15 | 156 | 5500 | 156 | 5500 | 170 | 6000 | 80 | 2825 |
| 172.4 | 25 | 198 | 7000 | 198 | 7000 | 234 | 8250 | 109 | 3850 |
| 275.8 | 40 | 241 | 8500 | 241 | 8500 | 297 | 10500 | 194 | 6850 |
| 413.7 | 60 | 198 | 7000 | 198 | 7000 | 297 | 10500 | 269 | 9500 |
| 499.9 | 72.5 | 198 | 7000 | 198 | 7000 | 297 | 10500 | 347 | 12250 |
| CG = 200 K1= 89 | | | | | | | | | |

Table 29 Cirval flow rate with outlet pressure from 1.74 kPa | 7" w.c. up to 34.5 kPa | 5 psig

| Cirval flow rate | | | | | |
|--------------------|------|-------------------|-------|--------------------|-------|
| Inlet pressure | | Outlet pressure | | | |
| | | droop ±10% Gauge | | droop ±10% Gauge | |
| | | 34.5 kPa 5 psig | | 68.9 kPa 10 psig | |
| kPa | psig | Stm³/h | Scfh | Stm³/h | Scfh |
| 13.8 | 2 | - | - | - | - |
| 34.5 | 5 | - | - | - | - |
| 48.3 | 7 | - | - | - | - |
| 68.9 | 10 | 140 | 4950 | - | - |
| 103.4 | 15 | 184 | 6500 | - | - |
| 172.4 | 25 | 283 | 10000 | 184 | 6500 |
| 275.8 | 40 | 382 | 13500 | 297 | 10500 |
| 413.7 | 60 | 382 | 13500 | 382 | 13500 |
| 499.9 | 72.5 | 382 | 13500 | 425 | 15000 |
| CG = 200 K1= 89 | | | | | |

Table 30 Cirval flow rate with outlet pressure from 34.5 kPa | 5 psig up to 68.9 kPa | 10 psig



Cirval 200 - DN 1-1/2"

from 1.74 kPa | 7" w.c. up to 68.9 kPa | 10 psig

flow capacity table

Cirval flow rate (according to ANSI B 109.4)

| Inlet pressure | | Outlet pressure | | | | | | | |
|----------------|------|---------------------|------|---------------------|------|---------------------|-------|---------------------|-------|
| | | droop +2/-1" w.c. | | droop ±2" w.c. | | droop ±1% ABS | | droop ±1% ABS | |
| | | 1.74 kPa 7" w.c. | | 3.5 kPa 14" w.c. | | 6.9 kPa 1 psig | | 34.5 kPa 5 psig | |
| kPa | psig | Stm ³ /h | Scfh | Stm ³ /h | Scfh | Stm ³ /h | Scfh | Stm ³ /h | Scfh |
| 13.8 | 2 | 68 | 2400 | 68 | 2400 | - | - | - | - |
| 34.5 | 5 | 79 | 2800 | 79 | 2800 | 79 | 2800 | - | - |
| 48.3 | 7 | 99 | 3500 | 99 | 3500 | 105 | 3700 | - | - |
| 68.9 | 10 | 119 | 4200 | 119 | 4200 | 127 | 4500 | 69 | 2450 |
| 103.4 | 15 | 184 | 6500 | 184 | 6500 | 184 | 6500 | 95 | 3350 |
| 172.4 | 25 | 241 | 8500 | 241 | 8500 | 269 | 9500 | 130 | 4600 |
| 275.8 | 40 | 241 | 8500 | 241 | 8500 | 340 | 12000 | 251 | 8850 |
| 413.7 | 60 | 198 | 7000 | 198 | 7000 | 340 | 12000 | 326 | 11500 |
| 499.9 | 72.5 | 198 | 7000 | 198 | 7000 | 340 | 12000 | 396 | 14000 |

CG = 200 K1= 89

Table 31 Cirval flow rate with outlet pressure from 1.74 kPa | 7" w.c. up to kPa | 5 psig

Cirval flow rate

| Inlet pressure | | Outlet pressure | | | |
|----------------|------|---------------------|-------|---------------------|-------|
| | | droop ±10% Gauge | | droop ±10% Gauge | |
| | | 34.5 kPa 5 psig | | 68.9 kPa 10 psig | |
| kPa | psig | Stm ³ /h | Scfh | Stm ³ /h | Scfh |
| 13.8 | 2 | - | - | - | - |
| 34.5 | 5 | - | - | - | - |
| 48.3 | 7 | - | - | - | - |
| 68.9 | 10 | 144 | 5100 | - | - |
| 103.4 | 15 | 198 | 7000 | - | - |
| 172.4 | 25 | 311 | 11000 | 198 | 7000 |
| 275.8 | 40 | 425 | 15000 | 311 | 11000 |
| 413.7 | 60 | 425 | 15000 | 425 | 15000 |
| 499.9 | 72.5 | 425 | 15000 | 481 | 17000 |

CG = 200 K1= 89

Table 32 Cirval flow rate with outlet pressure from 34.5 kPa | 5 psig up to 68.9 kPa | 10 psig

Cirval 200 - DN 2"

from 1.74 kPa | 7" w.c. up to 68.9 kPa | 10 psig

flow capacity table

| Cirval flow rate (according to ANSI B 109.4) | | | | | | | | | |
|--|------|--------------------|------|--------------------|-------|------------------|-------|-------------------|-------|
| Inlet pressure | | Outlet pressure | | | | | | | |
| | | droop +2/-1" w.c. | | droop ±2" w.c. | | droop ±1% ABS | | droop ±1% ABS | |
| | | 1.74 kPa 7" w.c. | | 3.5 kPa 14" w.c. | | 6.9 kPa 1 psig | | 34.5 kPa 5 psig | |
| kPa | psig | Stm³/h | Scfh | Stm³/h | Scfh | Stm³/h | Scfh | Stm³/h | Scfh |
| 13.8 | 2 | 71 | 2500 | 71 | 2500 | - | - | - | - |
| 34.5 | 5 | 85 | 3000 | 85 | 3000 | 85 | 3000 | - | - |
| 48.3 | 7 | 105 | 3700 | 109 | 3850 | 109 | 3850 | - | - |
| 68.9 | 10 | 130 | 4600 | 142 | 5000 | 142 | 5000 | 69 | 2450 |
| 103.4 | 15 | 184 | 6500 | 184 | 6500 | 184 | 6500 | 105 | 3700 |
| 172.4 | 25 | 255 | 9000 | 283 | 10000 | 297 | 10500 | 163 | 5750 |
| 275.8 | 40 | 255 | 9000 | 283 | 10000 | 368 | 13000 | 269 | 9500 |
| 413.7 | 60 | 227 | 8000 | 249 | 8800 | 368 | 13000 | 340 | 12000 |
| 499.9 | 72.5 | 227 | 8000 | 249 | 8800 | 368 | 13000 | 453 | 16000 |
| CG = 200 K1= 89 | | | | | | | | | |

Table 33 Cirval flow rate with outlet pressure from 1.74 kPa | 7" w.c. up to kPa | 5 psig

| Cirval flow rate | | | | | |
|--------------------|------|-------------------|-------|--------------------|-------|
| Inlet pressure | | Outlet pressure | | | |
| | | droop ±10% Gauge | | droop ±10% Gauge | |
| | | 34.5 kPa 5 psig | | 68.9 kPa 10 psig | |
| kPa | psig | Stm³/h | Scfh | Stm³/h | Scfh |
| 13.8 | 2 | - | - | - | - |
| 34.5 | 5 | - | - | - | - |
| 48.3 | 7 | - | - | - | - |
| 68.9 | 10 | 150 | 5300 | - | - |
| 103.4 | 15 | 205 | 7250 | - | - |
| 172.4 | 25 | 326 | 11500 | 204 | 7200 |
| 275.8 | 40 | 467 | 16500 | 326 | 11500 |
| 413.7 | 60 | 467 | 16500 | 439 | 15500 |
| 499.9 | 72.5 | 467 | 16500 | 496 | 17500 |
| CG = 200 K1= 89 | | | | | |

Table 34 Cirval flow rate with outlet pressure from 34.5 kPa | 5 psig up to 68.9 kPa | 10 psig



Cirval 300 - DN 2"

from 1.74 kPa | 7" w.c. up to 68.9 kPa | 10 psig

flow capacity table

Cirval flow rate (according to ANSI B 109.4)

| Inlet pressure | | Outlet pressure | | | | | | | |
|----------------|------|--------------------|-------|--------------------|-------|------------------|-------|-------------------|-------|
| | | droop +2/-1" w.c. | | droop ±2" w.c. | | droop ±1% ABS | | droop ±1% ABS | |
| | | 1.74 kPa 7" w.c. | | 3.5 kPa 14" w.c. | | 6.9 kPa 1 psig | | 34.5 kPa 5 psig | |
| kPa | psig | Stm³/h | Scfh | Stm³/h | Scfh | Stm³/h | Scfh | Stm³/h | Scfh |
| 13.8 | 2 | 198 | 7000 | 198 | 7000 | - | - | - | - |
| 34.5 | 5 | 241 | 8500 | 255 | 9000 | 255 | 9000 | - | - |
| 48.3 | 7 | 269 | 9500 | 283 | 10000 | 297 | 10500 | - | - |
| 68.9 | 10 | 354 | 12500 | 368 | 13000 | 368 | 13000 | 300 | 10600 |
| 103.4 | 15 | 425 | 15000 | 439 | 15500 | 481 | 17000 | 421 | 14850 |
| 172.4 | 25 | 481 | 17000 | 552 | 19500 | 609 | 21500 | 630 | 22250 |
| 275.8 | 40 | 538 | 19000 | 651 | 23000 | 772 | 27250 | 665 | 23500 |
| 413.7 | 60 | 708 | 25000 | 651 | 23000 | 772 | 27250 | 772 | 27250 |
| 499.9 | 72.5 | 708 | 25000 | 651 | 23000 | 772 | 27250 | 772 | 27250 |

CG = 759 K1= 96

Table 35 Cirval flow rate with outlet pressure from 1.74 kPa | 7" w.c. up to kPa | 5 psig

Cirval flow rate

| Inlet pressure | | Outlet pressure | | | |
|----------------|------|-------------------|-------|--------------------|-------|
| | | droop ±10% Gauge | | droop ±10% Gauge | |
| | | 34.5 kPa 5 psig | | 68.9 kPa 10 psig | |
| kPa | psig | Stm³/h | Scfh | Stm³/h | Scfh |
| 13.8 | 2 | - | - | - | - |
| 34.5 | 5 | - | - | - | - |
| 48.3 | 7 | - | - | - | - |
| 68.9 | 10 | 496 | 17500 | - | - |
| 103.4 | 15 | 708 | 25000 | - | - |
| 172.4 | 25 | 850 | 30000 | 204 | 7200 |
| 275.8 | 40 | 850 | 30000 | 326 | 11500 |
| 413.7 | 60 | 850 | 30000 | 439 | 15500 |
| 499.9 | 72.5 | 850 | 30000 | 496 | 17500 |

CG = 759 K1= 96

Table 36 Cirval flow rate with outlet pressure from 34.5 kPa | 5 psig up to 68.9 kPa | 10 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 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.





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