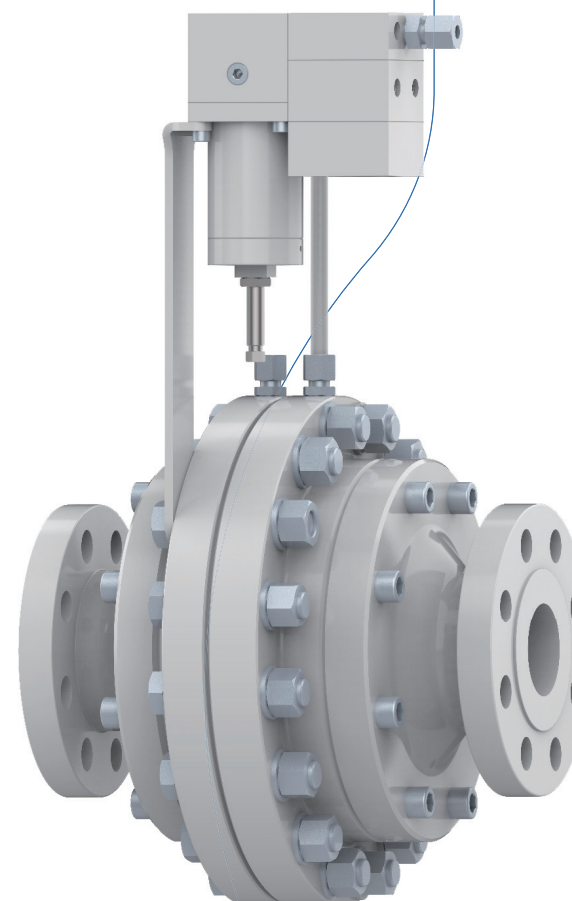




# Regulator **AR Series**



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# AR Series

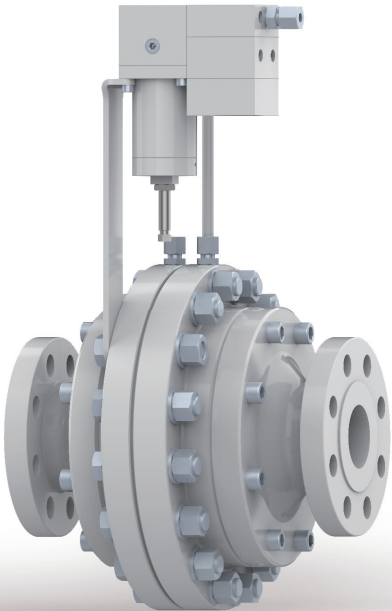
## DESCRIPTION

The AR series pressure regulator is an indirect-acting regulator equipped with the DGP300 series high-performance pilot, is suitable for medium and high pressure.

The regulators are widely used in both commercial and industrial installations using Natural Gas, LPG and other non-corrosive gases.

## FEATURES

- High flow coefficient
- Low startup differential pressure
- Fail to close/ fail to open
- Equipped with valve position indicator device
- Optional silencer (internal or external)
- Optional valve position remote transmission



## PARAMETERS

### Operating Parameters

- Maximum inlet pressure: 100 bar
- Outlet pressure regulation range: 0.5–80bar
- Accuracy class AC: up to 1
- Lock-up pressure class SG: up to 2.5
- Working temperature: -20℃ –+60℃

### Flow Coefficient (Cg)

| AR100 | AR200 | AR300 | AR400 | AR600 | AR800 |
|-------|-------|-------|-------|-------|-------|
| 620   | 2300  | 5200  | 8400  | 19500 | 32000 |

Connecting Parameters

| Model             | AR100                         | AR200 | AR300 | AR400 | AR600 | AR800 |
|-------------------|-------------------------------|-------|-------|-------|-------|-------|
| Connecting size   | DN25                          | DN50  | DN80  | DN100 | DN150 | DN200 |
| Pressure rating   | Class300/Class600             |       |       |       |       |       |
| Flange standards* | Class according to ASME B16.5 |       |       |       |       |       |

\* Other connection standards can be provided upon request

Materials

| Connector                | Diaphragm cover          | Plate                    | Diaphragm                  | Sleeve      | O-ring                                      |
|--------------------------|--------------------------|--------------------------|----------------------------|-------------|---------------------------------------------|
| Forging<br>ASTM A350 LF2 | Forging<br>ASTM A350 LF2 | Forging<br>ASTM A350 LF2 | Reinforced<br>fiber rubber | Alloy steel | Nitrile rubber (NBR)<br>Fluoro rubber (FKM) |

MODEL INTRODUCTION

| Model | Description                                                                                          |
|-------|------------------------------------------------------------------------------------------------------|
| AR    | AR series pressure regulator                                                                         |
| FTO   | Indicates "fail to open"; if omitted, it defaults to "fail to close"                                 |
| 1     | Indicates different nominal diameters, such as "1" representing the nominal diameter of NPS1" (DN25) |
| 2     |                                                                                                      |
| 3     |                                                                                                      |
| 4     |                                                                                                      |
| 6     |                                                                                                      |
| 8     |                                                                                                      |
| 0 3   | P1 ≤ 100bar, 0.5bar ≤ P2 ≤ 13bar*                                                                    |
| 4     | P1 ≤ 100bar, 13bar ≤ P2 ≤ 40bar                                                                      |
| 5     | P1 ≤ 100bar, 40bar ≤ P2 ≤ 80bar                                                                      |
| 300   | Nominal pressure rating (Class)                                                                      |
| 600   |                                                                                                      |
| SLI   | Equipped with internal silencer, omitted if not equipped                                             |
| SLE   | Equipped with internal and external silencers, omitted if not quipped                                |

\*P1: Inlet pressure, P2: Outlet pressure

| Model | Description                      |
|-------|----------------------------------|
| DGP   | DGP series pilot                 |
| 3     | Type 300 pilot                   |
| 0 3   | P1 ≤ 100bar, 0.5bar ≤ P2 ≤ 13bar |
| 4     | P1 ≤ 100bar, 13bar ≤ P2 ≤ 40bar  |
| 5     | P1 ≤ 100bar, 40bar ≤ P2 ≤ 80bar  |

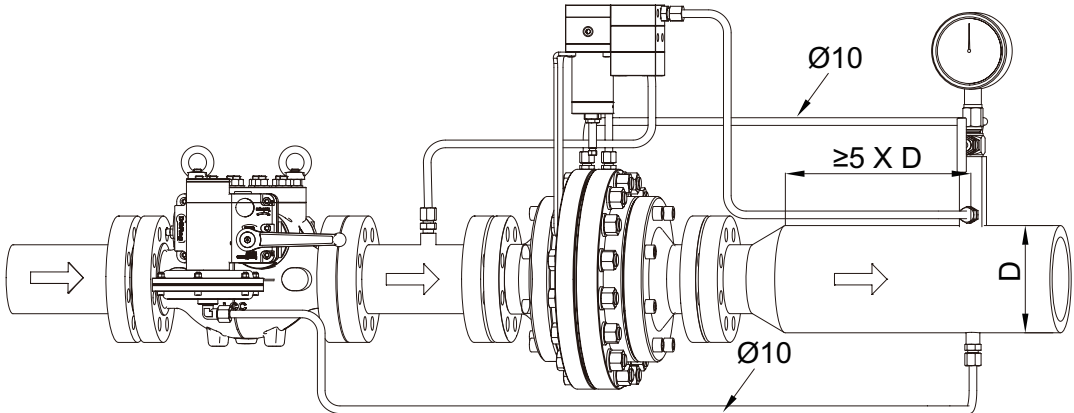
\*P1: Inlet pressure, P2: Outlet pressure

SPRING

Pressure range of the pilot spring

| Model  | Version | Outlet pressure range(mbar) | Part number | Color         |
|--------|---------|-----------------------------|-------------|---------------|
| DGP300 | DGP303  | 500–1200                    | 19010500321 | Purple-Red    |
|        |         | 1100–2600                   | 19010500322 | Medium Yellow |
|        |         | 2200–4000                   | 19010500323 | Light Blue    |
|        |         | 3500–6000                   | 19011001121 | White         |
|        |         | 5500–9000                   | 19011001122 | Yellow        |
|        |         | 8000–17000                  | 19011001123 | Green         |
|        | DGP304  | 8000–17000                  | 19011001123 | Blue          |
|        |         | 16000–22000                 | 19011001124 | Red           |
|        |         | 21000–27000                 | 19011001125 | Black         |
|        |         | 26000–31000                 | 19011001126 | White         |
|        |         | 29000–40000                 | 19011001127 | Yellow        |
|        | DGP305  | 39000–80000                 | 19011001128 | Green         |

INSTALLATION

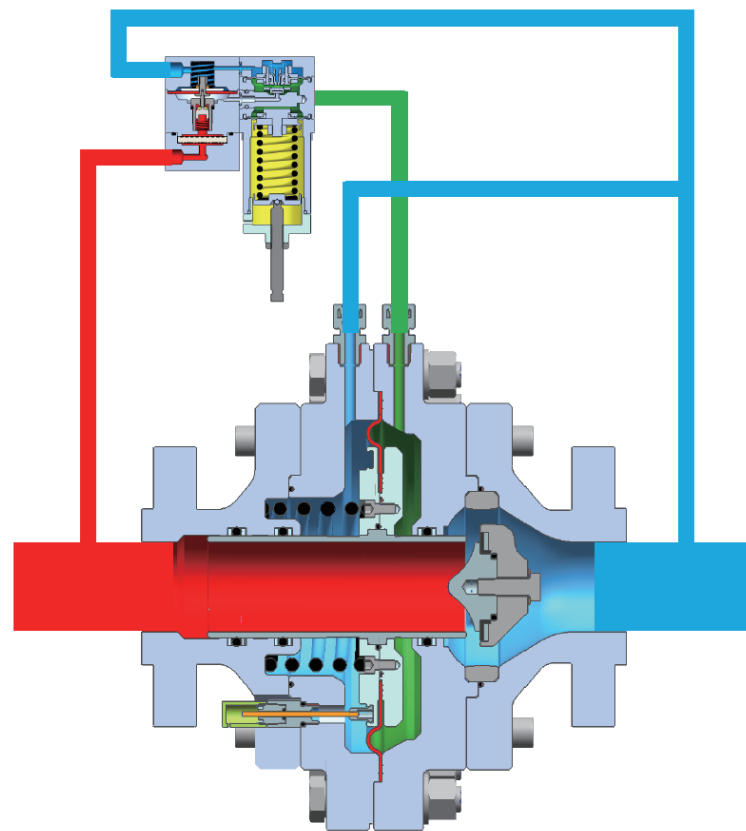


## OPERATING PRINCIPLE

The AR series pressure regulator is an indirect-acting regulator equipped with the DGP300 series pilot.

When the downstream flow demand decreases, the outlet pressure above the diaphragm and the pilot increases. Under the joint action of the load pressure set by the pilot and the outlet pressure above the diaphragm, the diaphragm moves downward, and the movement of the diaphragm drives the valve orifice to move downward. The valve seat installed on the valve body is vulcanized with rubber to ensure a tight fit between the seat and the orifice for sealing purposes.

When the downstream flow demand increases, the outlet pressure above the diaphragm and the pilot decreases. Under the joint action of the load pressure set by the pilot and the outlet pressure above the diaphragm, the diaphragm moves upward, and the movement of the diaphragm drives the valve orifice to move upward, moving away from the valve seat, until the flow demand decreases.

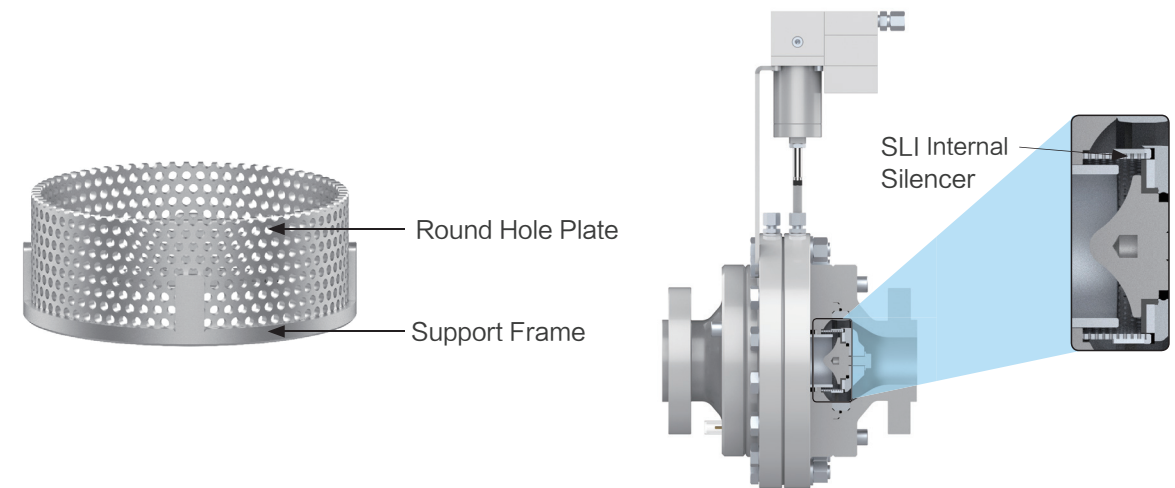


■ atmospheric pressure 
 ■ inlet pressure 
 ■ outlet pressure 
 ■ actuating pressure

## SILENCER

### SLI Internal Silencer

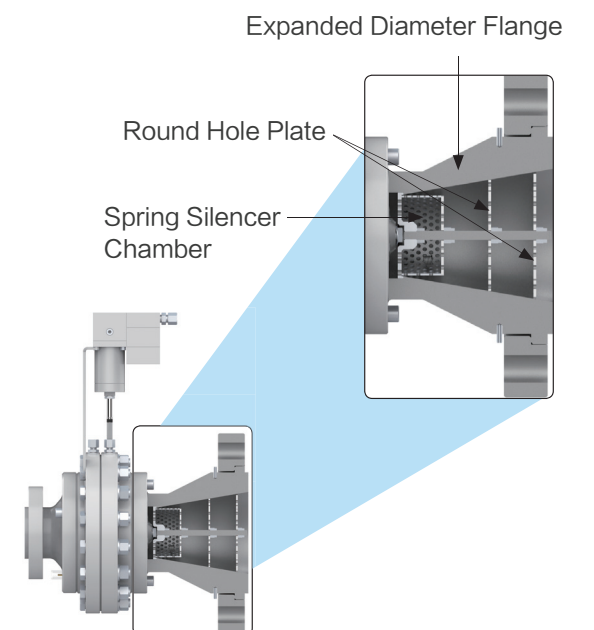
The AR series pressure regulator can be equipped with an embedded internal silencer. This silencer consists of an external support frame and a round hole plate. The SLI silencer features a simple and compact structure, low pressure loss, high clogging resistance, and a broad noise suppression bandwidth. Even under extreme operating conditions with low inlet pressure and flow velocity, it guarantees maximum flow of gas passes through the regulator with the smallest nominal diameter while achieving noise reduction.



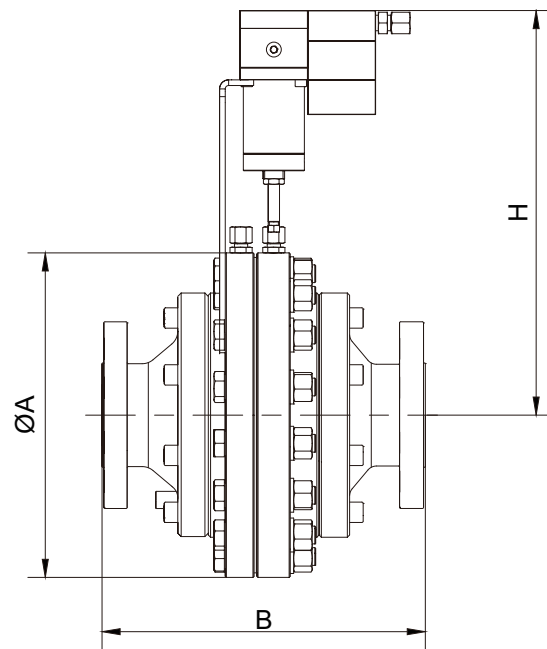
### SLE Expanded Diameter External Silencer

The AR series pressure regulator can be equipped with an expanded diameter external silencer. This silencer consists of an expanded diameter flange, two sections of round hole plates, and a cylindrical chamber densely packed with small springs. By replacing the outlet flange of the regulator, the expanded diameter flange allows direct installation of the silencer onto the regulator, eliminating noise caused by reducer couplings in the pipeline. The enlarged diameter chamber also provides ample space for mounting the spring silencer chamber and round hole plates.

Under various operating conditions, as gas flows through the spring silencer chamber and round hole plates, it is dispersed and buffered. The sudden expansion of the internal channel rapidly reduces airflow velocity, scattering the concentrated acoustic energy through gas diffusion. During continuous reflection and collision with the silencer's inner walls, the acoustic energy is gradually converted into thermal energy and other forms, thereby achieving noise reduction. The SLE expanded diameter external silencer adopts a modular design, offering technical advantages such as a reliable structure, broad adaptability, clog-resistant operation, low airflow resistance, and excellent noise suppression performance.

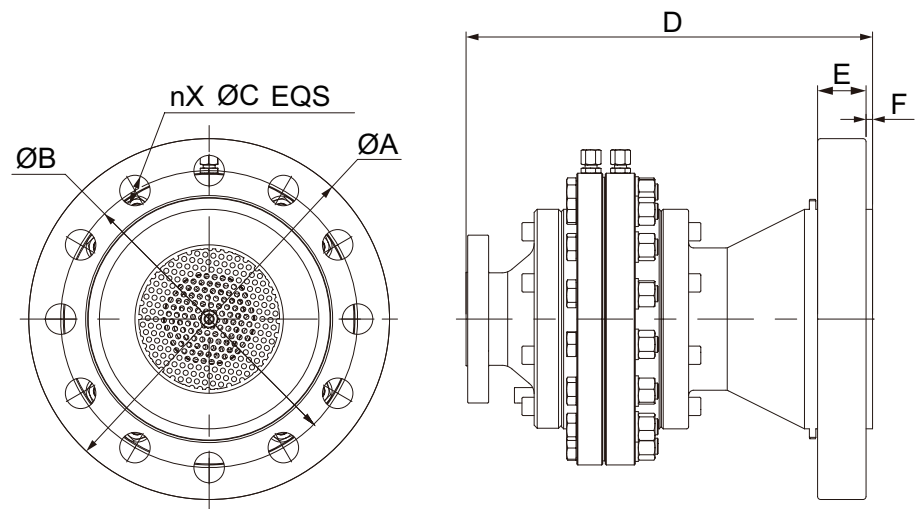


DIMENSIONS



unit : mm

| Model  | Pressure rate       | A   | B   | H     | weight (Kg) |
|--------|---------------------|-----|-----|-------|-------------|
| AR 100 | Class300 / Class600 | 225 | 210 | 355   | 30          |
| AR 200 | Class300 / Class600 | 287 | 286 | 392   | 60          |
| AR 300 | Class300 / Class600 | 400 | 337 | 418.5 | 146         |
| AR 400 | Class300 / Class600 | 480 | 394 | 447   | 205         |
| AR 600 | Class300 / Class600 | 610 | 508 | 480   | 465         |
| AR 800 | Class300 / Class600 | 653 | 610 | 210   | 648         |



unit : mm

| Model     | Pressure rate | A   | B     | n  | C  | D   | E    | F   | weight (Kg) |
|-----------|---------------|-----|-------|----|----|-----|------|-----|-------------|
| AR100-SRS | Class300      | 255 | 200   | 8  | 22 | 300 | 30.2 | 1.6 | 51          |
|           | Class600      | 275 | 215.9 | 8  | 26 | 300 | 38.1 | 6.4 |             |
| AR200-SRS | Class300      | 320 | 269.9 | 12 | 22 | 400 | 35   | 1.6 | 95          |
|           | Class600      | 355 | 292.1 | 12 | 30 | 400 | 47.7 | 6.4 |             |
| AR300-SRS | Class300      | 455 | 387.4 | 16 | 30 | 500 | 46.1 | 1.6 | 218         |
|           | Class600      | 510 | 431.8 | 16 | 36 | 500 | 63.5 | 6.4 |             |
| AR400-SRS | Class300      | 455 | 387.4 | 16 | 30 | 525 | 46.1 | 1.6 | 260         |
|           | Class600      | 510 | 431.8 | 16 | 36 | 525 | 63.5 | 6.4 |             |
| AR600-SRS | Class300      | 520 | 450.8 | 16 | 33 | 660 | 49.3 | 1.6 | 562         |
|           | Class600      | 560 | 489.0 | 20 | 36 | 660 | 66.7 | 6.4 |             |
| AR800-SRS | Class300      | 650 | 571.5 | 20 | 36 | 722 | 55.6 | 1.6 | 861         |
|           | Class600      | 685 | 603.5 | 20 | 42 | 750 | 76.2 | 6.4 |             |

FLOW CAPACITY

The size of the regulator is usually selected based on the flow coefficient C<sub>g</sub>. Under the reference condition (15°C ), the maximum flow rate of a natural gas regulator when fully open is calculated using the following formula:

1) Sub-critical state [When ( P<sub>1</sub>- P<sub>2</sub> ) ≤ 0.5 ( P<sub>1</sub>+P<sub>a</sub> ) ]

$$Q=0.526 \cdot C_g \cdot (P_1+P_a) \cdot \sin \left[ K_1 \cdot \sqrt{\frac{P_1-P_2}{P_1+P_a}} \right] \text{ deg}$$

2) Critical state [When ( P<sub>1</sub>- P<sub>2</sub> ) > 0.5 ( P<sub>1</sub>+P<sub>a</sub> ) ]

$$Q=0.526 \cdot C_g \cdot ( P_1+P_a )$$

Q — Flow rate ( m<sup>3</sup>/h ) ;  
P<sub>1</sub> — Inlet pressure ( bar ) ;  
P<sub>a</sub> — Atmospheric pressure ( bar ) ;

C<sub>g</sub> — Flow coefficient;  
P<sub>2</sub> — Outlet pressure ( bar ) ;  
K<sub>1</sub> — valve shape coefficient,136 in this formula;

When the relative density d of the gas used differs from 0.61 (natural gas) or the gas temperature is not 15 °C , the flow rate should be multiplied by the correction factor F obtained using the following formula:

$$F=\sqrt{\frac{0.61*288}{d*(t+273)}}$$

F — Correction factor;  
d — Relative density d of the gas;  
t — Gas temperature ( °C ) ;  
The following is the gas relative density d and correction factor F of commonly used gases at the gas temperature of 15 °C :

| Gas type       | Relative density d | Factor F |
|----------------|--------------------|----------|
| Air            | 1                  | 0.78     |
| Coal gas       | 0.44               | 1.18     |
| Methane        | 0.55               | 1.05     |
| Ethane         | 1.05               | 0.76     |
| Propane        | 1.53               | 0.63     |
| Butane         | 2.01               | 0.55     |
| Nitrogen       | 0.97               | 0.79     |
| Carbon dioxide | 1.52               | 0.63     |