



# Pneumatic-Pneumatic Positioner (Lever type/Rotary type)

## Series *IP5000/5100*

- JIS F8007 IP55
- Fulfilling options: Opening indicator (IP5100), Built-in bypass (SIG-OUT1) (IP5000), Built-in equalizing valve (OUT1-OUT2) (IP5100)

### How to Order



**IP5 000 - 0 1 0**

**Type**

|     |             |
|-----|-------------|
| 000 | Lever type  |
| 100 | Rotary type |

**Input pressure**

|   |                                     |
|---|-------------------------------------|
| 0 | 0.02 to 1 MPa (Standard)            |
| 1 | 0.02 to 0.06 MPa<br>0.06 to 0.1 MPa |

**Pressure gauge (SUP, OUT1)**

|   |         |
|---|---------|
| 0 | None    |
| 1 | 0.2 MPa |
| 2 | 0.3 MPa |
| 3 | 1 MPa   |

**Indication of opening** Note

|   |              |
|---|--------------|
| 0 | Not provided |
| 1 | Indicated    |

Note) IP5000 is available only with option "0" (no indication).

**Ambient temperature**

|     |                                |
|-----|--------------------------------|
| Nll | -20 to 80°C (Standard)         |
| T   | -5 to 100°C (High temperature) |
| L   | -30 to 60°C (Low temperature)  |

**Pressure gauge/Air port**

|     |               |
|-----|---------------|
| Nll | Rc (Standard) |
| N   | NPT           |
| F   | G             |

**Accessories** Note 1

|     |  |  |
|-----|--|--|
| Nll | None (Standard)                          | With standard lever (10 to 85 mm stroke) for IP5000  |
| A   | ø0.7 Output restriction with pilot valve | Common to IP5000 and IP5100 small capacity actuators |
| B   | ø1.0 Output restriction with pilot valve |  |
| C   | Fork lever-type fitting M                | Only for IP5100                                      |
| D   | Fork lever-type fitting S                |  |
| E   | For stroke 35 to 100 mm with lever unit  | Only for IP5000 <small>Note 2</small>                |
| F   | For stroke 50 to 140 mm with lever unit  |  |

**Precautions**

- Avoid impact to positioner while transporting and handling.
- Operate within specified temperature range to prevent deterioration of seals.
- Attach a body cover to the positioner when it is in use or left in the field in order to avoid rain water.
- Take measures to avoid dew condensation if the positioner is exposed to high temperature and humidity during transportation or storage or when it is left on the site.
- The zero point is subject to the mounting position. Adjust zero point after installation on the site.
- As the positioner contains extra-fine orifices such as restrictor and nozzle, if drain or dust is present in the supply pressure line, malfunction (\*1) may result. In addition to an air filter (SMC Series AF), it is recommended to use a mist separator (SMC Series AM, AFM) and a micro mist separator (SMC Series AMD, AFD). Also, refer to "SMC Air Preparation System" for air quality.
- Never use a lubricator, as this can cause a malfunction (\*1).

\*1 If the restrictor is clogged, output from the OUT1 port of the positioner may occur continuously or hunching and overshoot may occur.

### Specifications

| Item                                 | Type | IP5000  |               | IP5100  |               |
|--------------------------------------|------|---|---------------|---|---------------|
|                                      |      | Lever type lever feedback                                 |               | Rotary type cam feedback                                |               |
|                                      |      | Single action   | Double action | Single action   | Double action |
| <b>Supply pressure</b>               |      | 0.14 to 0.7 MPa   |               |   |               |
| <b>Input pressure</b>                |      | 0.02 to 0.1 MPa   |               |   |               |
| <b>Standard stroke</b>               |      | 10 to 85 mm   |               | 60° to 100°   |               |
| <b>Sensitivity</b>                   |      | Within 0.1% F.S.  |               | Within 0.5% F.S.  |               |
| <b>Linearity</b>                     |      | Within ±1% F.S.   |               | Within ±2% F.S.   |               |
| <b>Hysteresis</b>                    |      | Within 0.75% F.S.   |               | Within 1% F.S.  |               |
| <b>Repeatability</b>                 |      | Within ±0.5% F.S.   |               |   |               |
| <b>Air consumption</b>               |      | 5 L/min (ANR) or less (SUP = 0.14 MPa) <sup>Note</sup>    |               | 11 L/min (ANR) or less (SUP = 0.4 MPa) <sup>Note</sup>  |               |
| <b>Output flow rate</b>              |      | 80 L/min (ANR) or more (SUP = 0.14 MPa) <sup>Note</sup>   |               | 200 L/min (ANR) or more (SUP = 0.4 MPa) <sup>Note</sup> |               |
| <b>Ambient and fluid temperature</b> |      | -20°C to 80°C (Standard)                                  |               |   |               |
| <b>Coefficient of temperature</b>    |      | Within 0.1% F.S./°C                                       |               |   |               |
| <b>Air connection port</b>           |      | Rc1/4 (Standard)  |               |   |               |
| <b>Main component parts</b>          |      | Aluminum die-cast, Stainless steel, Brass, Nitrile rubber |               |   |               |
| <b>Weight</b>                        |      | Approx. 1.4 kg  |               | Approx. 1.2 kg  |               |
| <b>Dimensions</b>                    |      | 118 x 102 x 86 (Body)                                     |               | 118 x 92 x 77.5 (Body)                                  |               |

Note) Standard air temperature: 20°C (293 K), Absolute pressure: 760 mmHg (101.3 kPa), Relative humidity: 65%

### Replacement Parts

| Part no.   | Description           | Note                                    |
|------------|-----------------------|---|
| P378010-10 | Pilot valve unit      | For IP5000                              |
| P378020-11 | Pilot valve unit      | For IP5100                              |
| P368010-24 | Fork lever assembly M | For IP5100 (Accessory: C)               |
| P368010-25 | Fork lever assembly S | For IP5100 (Accessory: D)               |
| P378010-11 | Feedback lever        | For IP5000/10 to 85 mm (Accessory: Nll) |
| P378010-12 | Feedback lever        | For IP5000/35 to 100 mm (Accessory: E)  |
| P378010-13 | Feedback lever        | For IP5000/50 to 140 mm (Accessory: F)  |



## Principle of Operation

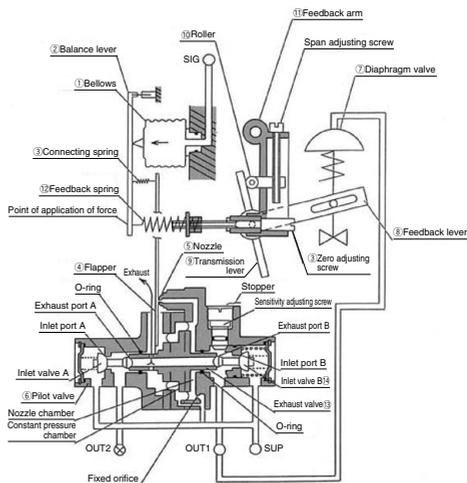
### IP5000 type

When the input pressure applied to the SIG port of the positioner increases, bellows ① press balance lever ② to the left. As this movement moves flapper ④ to the left through connecting spring ③, the gap between nozzle ⑤ and flapper ④ widens, and the nozzle back pressure of pilot valve ⑥ drops. As a result, the pressure balance in the constant pressure chamber is broken, and exhaust valve ⑬ presses inlet valve B ⑭ to the right, thus opening inlet port B. Then, output pressure OUT1 rises, and driven diaphragm ⑦ moves downward.

The movement of diaphragm valve ⑦ deflects feedback arm ⑪ to the right through feedback lever ⑧, transmission lever ⑨, and roller ⑩. Such deflection increases the tension of feedback spring ⑫ and acts on balance lever ②.

Since driven diaphragm ⑦ moves until the tensile force of feedback spring ⑫ and the force generated by bellows ① balance, it is always set in the position proportional to the input pressure. When the signal air pressure decreases, the operation is reversed.

### IP5000 principle of operation



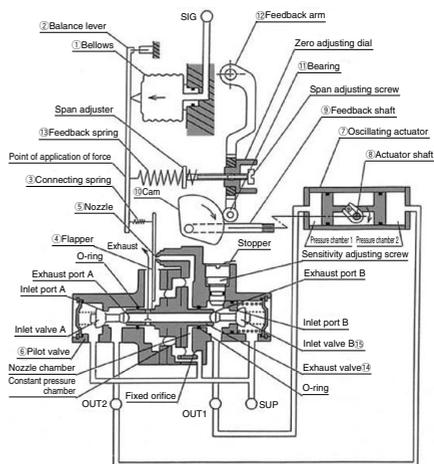
### IP5100 type

When the input pressure applied to the SIG port of the positioner increases, bellows ① press balance lever ② to the left. As this movement moves flapper ④ to the left through connecting spring ③, the gap between nozzle ⑤ and flapper ④ widens, and the nozzle back pressure of pilot valve ⑥ drops. As a result, the pressure balance in the constant pressure chamber is broken, and exhaust valve ⑭ presses inlet valve B ⑮ to the right. Then, inlet port B opens, and output pressure OUT1 increases.

In the meantime, the movement of exhaust valve ⑭ to the right opens exhaust port A, and output pressure OUT2 decreases. Therefore, pressure difference is generated between pressure chamber 1 and pressure chamber 2 of oscillating actuator ⑦, and actuator shaft ⑧ turns in the direction of the arrow. The movement of actuator shaft ⑧ deflects feedback arm ⑫ to the right through feedback shaft ⑨, cam ⑩, and bearing ⑪. Such deflection increases the tension of feedback spring ⑬ and acts on balance lever ②.

Since oscillating actuator ⑦ moves until the tensile force of feedback spring ⑬ and the force generated by bellows ① balance, it is always set in the position proportional to the input pressure. When the signal air pressure decreases, the operation is reversed.

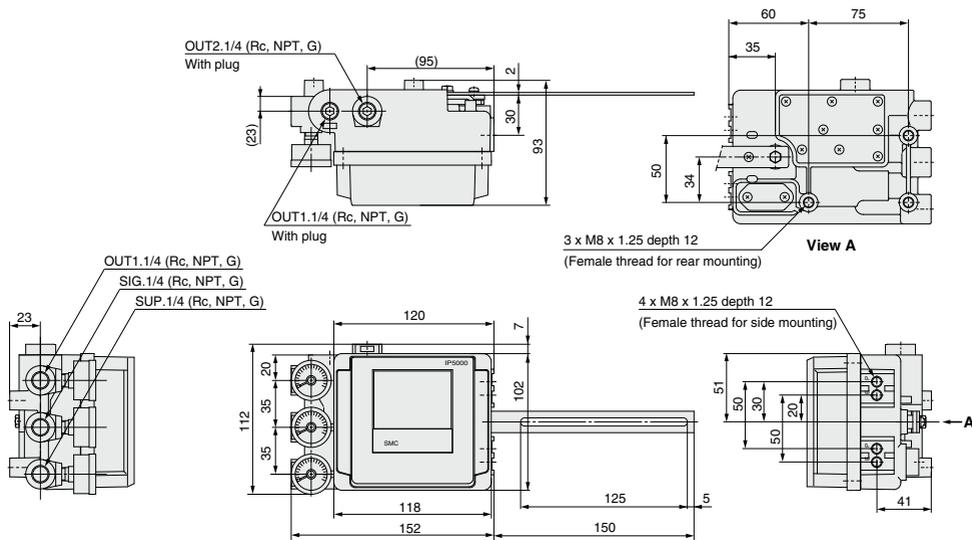
### IP5100 principle of operation



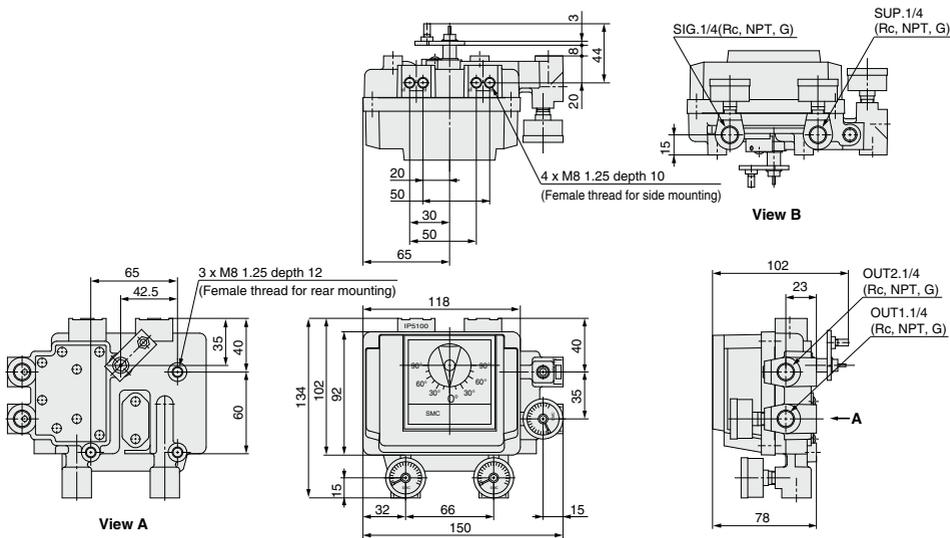


**Dimensions**

**IP5000 type (Lever type lever feedback)**



**IP5100 type (Rotary type cam feedback)**



Pneumatic Instrumentation Equipment

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