# Pneumatic Instrumentation Equipment

*For Pneumatic Control in*

PA Process Automation FA Factory Automation




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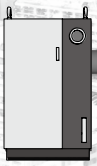
# For Pneumatic Control in

# PA Process Automation



Compressor

## Air Preparation Equipment Page 1131

### Air Dryers

- Flow capacity: 65000 L/min (ANR)
- Outlet air pressure dew point: 10°C

- Flow capacity: 780 L/min (ANR)
- Outlet air atmospheric pressure dew point: −30°C

### Air Preparation Filters

Micro Mist Separator with Prefilter

- Nominal filtration rating: 0.01 µm

Odor Removal Filter

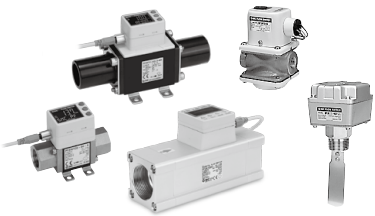
- Outlet oil mist concentration: Max. 0.0032 ppm

## Detection Conversion Unit Page 1108

### Pressure Sensors

- Air: −0.1 to 1 MPa
- General fluids: −0.1 to 15 MPa

### Flow Sensors



- Air: 0.2 to 12000 L/min (ANR)
- General fluids: 0.5 to 250 L/min (ANR)

## Industrial Filters Page 1135

- Flow capacity: Max. 3800 L/min (ANR)
- Nominal filtration rating: 0.5 to 120 µm

# FA Factory Automation

## Pressure Control Equipment Page 1071

- Set pressure range: 0.02 to 0.5 MPa
- Set pressure range: 0.005 to 0.8 MPa

## Piping Material Page 1138

### Fittings/S Couplers

- Stainless steel series

### Tubing

- Coil tube

- Double-layered tube
- Longer length tube

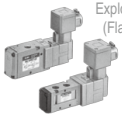
## Operation Unit

### Solenoid Valves Page 1113

Explosion-proof Specifications

Intrinsically safe explosion proof

Explosion proof (Flameproof)



NAMUR Standards IP67

### Accessories Page 1086

Relay

Booster relay

Valves

Lock-up valve

Electro-Pneumatic Transducer

Electro-pneumatic transducer

### Positioners Page 1040

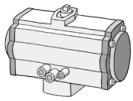
Smart positioner

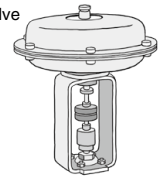
Electro-pneumatic positioner

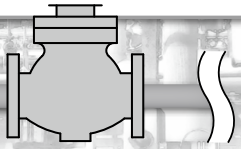
## Actuators Page 1096

- Applicable cylinder size: ø50 to ø300

Industrial process valve Actuator







In principle, SMC products cannot be used outdoors.



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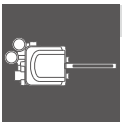


## Positioners Page 1040



## Regulators Page 1071

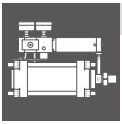


## Relays/Valves Page 1086



## Electro-Pneumatic Transducers Page 1093



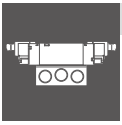


## Actuators Page 1096



## Detection Conversion Unit Page 1108





## Solenoid Valves Page 1113

## Air Preparation Equipment — Page 1131



## Industrial Filters — Page 1135



## Piping Materials — Page 1138

# Pneumatic Instrumentation Equipment

# Positioners

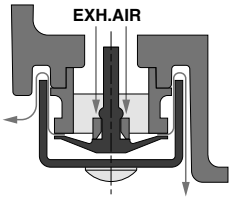
# Series IP8□

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

CE [Option]

## Dustproof / Waterproof

Passed by external organization on **JIS F8007** (conforms to IEC 60529) **IP65**




**A centralized exhaust system employs the combination of the check valve and the labyrinth effect enhancing both dustproof and waterproof performance.**

## Monitoring function

**Electro-Pneumatic Positioner**

· Opening current transmission analog (4 to 20 mA DC) continuous output

**Smart Positioner**

· Alarm point output function (2 points)
· Analog (4 to 20 mA DC) continuous output

## With external scale plate (Rotary type, Bottom mounting)

**External scale plate**
Improved visibility of opening indicator

## Explosion-proof construction

| | |
|---|---|
| **Electro-Pneumatic Positioner** | TIIS explosion-proof construction (Exd Ⅱ BT5) |
| | ATEX intrinsically safe explosion-proof construction ( Ⅱ 2G Ex ib Ⅱ CT5/T6) |
| **Smart Positioner** | ATEX intrinsically safe explosion-proof construction ( Ⅱ 1G Ex ia Ⅱ CT4/T5/T6) |

## With internal opening indicator plate

**Internal opening indicator plate**
Opening indicator plate inside body

## Body with LCD window

**(Smart Positioner)**

**LCD window**
Allows checking of control from outside body

## Electro-Pneumatic Positioner

Universal mechanically controlled type
***Series IP8000/8100***

**IP8000**
(Lever type)

**IP8100**
(Rotary type)

## Smart Positioner

Electronically controlled easy-adjustment transmitting type ***Series IP8001/8101***

**IP8001**
(Lever type)

**IP8101**
(Rotary type)

# Smart Positioner

**Series IP8001/8101**


**IP8001** (Lever type)

**IP8101** (Rotary type)

## Built-in microcomputer and sensor allows easy remote parameter change and monitoring.

- Internal push button for easy setting of various parameters (Refer to parameter list)
- Zero point/span adjustment easier than with previous mechanical positioners

Parameter List

| Notes | No | Parameter | Description |
|---|---|---|---|
| Standard equipped functions | 1 | Positive operation/ reverse operation setting | Change operation direction with regard to input signal<br>Change to internal components, piping not possible |
| | 2 | Split range setting | Change range of input signal |
| | 3 | Preferred zero point/span adjustment setting | Change actuator stroke range with regard to input signal |
| | 4 | Forced full close/full open setting | To ensure valve closure, force actuator opening to be 0% or 100% with a preferred input signal. |
| | 5 | Valve characteristic setting | Select from these 6 valve characteristics<br>Linear characteristic<br>Equality % characteristic (2 kinds)<br>Quick open characteristic (2 kinds)<br>User preferred point setting (11 points) |
| | 6 | PID constant setting | Change PID constant |
| | 7 | Calibration setting | Zero point/span adjustment, Auto PID constant setting, input signal display value calibration, etc. |
| Optional equipped functions | 8 | Alarm 1 output setting | Set upper/lower stroke limits for actuator from which alarm is output |
| | 9 | Alarm 2 output setting | |
| | 10 | Analog (4 to 20 mA DC) output setting | Set increase/decrease direction for 4 to 20 mA DC output with regard to actuator stroke |

## Full Output Functions

Selecting models with output functions by model selection selects with alarm point output function (2 points) and analog (4 to 20 mA DC) continuous output function. This will allow remote detection of operating abnormalities.

## Control State Display

Positioning, deviation, and input value are displayed (numerically) on the internal LCD, allowing visual verification of the control state.


**Display example**

| Positioning (%) | Input value (%) | Deviation (%) |
|---|---|---|
| P 50.0 | S 60.0 | E 10.0 |

## Handles 2-line Input for Existing Equipment

Control furnished with conventional 2-line input signal (4 to 20 mA DC) not requiring separate power source.

## HART Transmission Function

HART transmission function can be designated by model selection.
Allows remote monitoring and setting change of positioner.

## Intercompatible Installation

Dimensions of mounting parts same as previous mechanical series IP6000/IP8000 Electro-Pneumatic Positioner. External feedback lever and fork lever-type fitting for joining actuator and positioner are therefore also the same.

## Energy Saving Product

Lever-type features 60% reduced air flow consumption compared with IP8000.



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

CE [Option]

# Series IP8000/8100

- **Enclosure: JISF8007 IP65 (conforms to IEC 60529)**
- **Monitoring function (Opening current transmission 4 to 20 mA DC, Accessory J, JR)**
- **Explosion-proof construction/Electro-pneumatic positioner: TIIS explosion-proof construction (Exd Ⅱ BT5), ATEX intrinsically safe explosion-proof construction (Ⅱ 2G Ex ib Ⅱ CT5/T6)**

## How to Order

**ATEX directive compliance and connection**

| | |
|---|---|
| **X14** | ATEX directive category 2<br>Intrinsically safe explosion-proof item<br>Air connection port: 1/4 NPT<br>Conduit connection port: M20 x 1.5<br>With blue cable gland |

**Option** Note 10)

| Symbol | Option | Applicable model | |
|---|---|---|---|
| | | IP8000-X14 | IP8100-X14 |
| **Nil** | — | ● | ● |
| **L** | Low temperature (–40 to 60°C) | ● | ● |
| **W** | With internal opening indicator plate | — | ● |

**ATEX Directive Intrinsically Safe Explosion proof**

**IP8 000 – 0 1 0 – □ – X14 – □**

**Standard**

**IP8 000 – 0 1 0 – □ – □ – □**

**Type**

| | |
|---|---|
| **000** | Electro-pneumatic lever type |
| **100** | Electro-pneumatic rotary type |

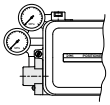
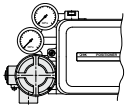
**Pressure gauge**

| Symbol | Pressure |
|---|---|
| **0** | None |
| **1** | 0.2 MPa |
| **2** | 0.3 MPa |
| **3** | 1.0 MPa |

**Lever type IP8000**

**Rotary type IP8100**

**Construction** Note 1)

| 0 | 1 |
|---|---|
| No terminal box | With terminal box (Exsd Ⅱ BT5) TIIS (Japan) explosion-proof item |
|  |  |

**CE marking**

| | |
|---|---|
| **Nil** | — |
| **Q** | CE marked product |

**Connection**

| Symbol | Air | Electric | Applicable model | |
|---|---|---|---|---|
| | | | IP8□00-0□0 | IP8□00-0□1 |
| **Nil** | Rc1/4 | G1/2 | ● | ● |
| **M** | Rc1/4 | M20 x 1.5 | ● | — |
| **N** | Rc1/4 | 1/2NPT | ● | — |
| **1** | 1/4NPT | G1/2 | ● | ● |
| **2** | 1/4NPT | M20 x 1.5 | ● | — |
| **3** | 1/4NPT | 1/2NPT | ● | — |
| **4** | G1/4 | G1/2 | ● | ● |
| **5** | G1/4 | M20 x 1.5 | ● | — |
| **6** | G1/4 | 1/2NPT | ● | — |

**Accessories** Note 2)

| Symbol | Accessories | Applicable model | |
|---|---|---|---|
| | | IP8000 | IP8100 |
| **Nil** | None (Standard) | ● | ● |
| **A** | ø0.7 Output restriction with pilot valve Note 3) | ● | ● |
| **B** | ø1.0 Output restriction with pilot valve Note 3) | ● | ● |
| **C** | Fork lever-type fitting M Note 4) | — | ● |
| **D** | Fork lever-type fitting S Note 5) | — | ● |
| **E** | For stroke 35 to 100 mm with lever unit Note 6) | ● | — |
| **F** | For stroke 50 to 140 mm with lever unit Note 6) | ● | — |
| **G** | Compensation spring (A) Note 7) | ● | ● |
| **H** | With external scale plate Note 8) | — | ● |
| **J** | With opening current transmission (4 to 20 mA DC)/Positive operation Note 9) | — | ● |
| **JR** | With opening current transmission (4 to 20 mA DC)/Reverse operation Note 9) | — | ● |

Note 1) For construction No.1 (with terminal box), the ambient and fluid temperatures are as follows:
- Exd Ⅱ BT5 — –20 to 60°C
- Non-explosion proof (non hazardous locations only) — –20 to 80°C

The positioner body is EXd Ⅱ BT5 labeled.

Note 2) If two or more accessories are required, the part numbers should be made according to alphabetical order. (ex. IP8100-010-AG)

Note 3) "A" is applied to approx 90cm$^3$-capacity actuator.
"B" is applied to approx 180cm$^3$-capacity actuator.

Note 4) Fork lever-type fitting MX (Connection thread: M6 x 1) for IP8100-0□0-□-X14.

Note 5) Fork lever-type fitting SX (Connection thread: M6 x 1) for IP8100-0□0-□-X14.

Note 6) Standard lever is not attached.

Note 7) It is to be used together with "A" or "B" when tending to overshoot by the use of "A" or "B".
It is mounted to the body as a replacement of the standard compensation spring.

Note 8) For side mounting, select a model with internal opening indicator plate (IP8100-0□□-□-□-X318 for standard type, X14-W for ATEX intrinsically safe explosion-proof type).

Note 9) Symbol J/JR is with terminal box, non-explosion proof specification. Select 1 for Construction. Positive operation signifies clockwise rotational direction by the main actuator shaft when positioner cover is viewed from the front.

Note 10) Combination of L and W is not available.



SMC

# Smart Positioner
# (Lever type/Rotary type)
# Series IP8001/8101

CE [Option]

- **Auto calibration**
- **Enclosure: JISF8007 IP65(conforms to IEC 60529)**
- **Explosion-proof construction/ATEX intrinsically safe explosion-proof construction (Ⅱ 1G Ex ia Ⅱ CT4/T5/T6)**
- **HART transmission function**
- **Monitoring function**

## How to Order

**ATEX Directive Intrinsically Safe Explosion proof**

**52 – IP8 001 – 0 3 4 – □ – □ – □**

**Standard**

**IP8 001 – 0 3 0 – □ – □ – □**

**Specifications**

| | |
|---|---|
| **4** | Intrinsically safe explosion proof (ATEX) + output function + HART transmission function |

**ATEX directive compliance**

| | |
|---|---|
| **52** | ATEX directive category 1 Intrinsically safe explosion-proof item |

**ATEX temperature**

| Symbol | ATEX temperature | Applicable model | |
|---|---|---|---|
| | | **IP8001** | **IP8101** |
| **Nil** | T4 | ● | ● |
| **T6** | T5/T6 | ● | ● |

**CE marking**

| | |
|---|---|
| **Nil** | — |
| **Q** | CE marked product |

**Lever type IP8001**

**Rotary type IP8101**

**Type**

| | |
|---|---|
| **001** | Smart lever type |
| **101** | Smart rotary type |

**Pressure gauge**

| Symbol | Pressure gauge | Applicable model | |
|---|---|---|---|
| | | **IP8001** | **IP8101** |
| **1** | 0.2 MPa | ● | — |
| **2** | 0.3 MPa | ● | — |
| **3** | 1.0 MPa | ● | ● |

**Specifications**

| | |
|---|---|
| **0** | Basic type |
| **2** | With output function {Analog (4 to 20 mA DC) output + Alarm output x 2} |
| **3** | With HART transmission function |

**Connection**

| Symbol | Air | Electric |
|---|---|---|
| **Nil** | Rc1/4 | G1/2 |
| **M** Note) | Rc1/4 | M20 x 1.5 |
| **N** | Rc1/4 | 1/2NPT |
| **1** | 1/4NPT | G1/2 |
| **2** Note) | 1/4NPT | M20 x 1.5 |
| **3** | 1/4NPT | 1/2NPT |
| **4** | G1/4 | G1/2 |
| **5** Note) | G1/4 | M20 x 1.5 |
| **6** | G1/4 | 1/2NPT |

Note) When the symbol is M, 2, or 5 for 52-ATEX directive items, a blue cable gland is included with the electrical connection.

**Accessories** Note 1)

| Symbol | Accessories | Applicable model | |
|---|---|---|---|
| | | **IP8001** | **IP8101** |
| **Nil** | None (Standard) | ● | ● |
| **C** | Fork lever-type fitting M | — | ● |
| **D** | Fork lever-type fitting S | — | ● |
| **E** | For stroke 35 to 100 mm with lever unit Note 2) | ● | — |
| **F** | For stroke 50 to 140 mm with lever unit Note 2) | ● | — |
| **H** | With external scale plate Note 3) | — | ● |
| **W** | Body with LCD window | ● | ● |

Note 1) If two or more accessories are required, the part numbers should be given in alphabetical order. (ex. IP8101-010-CH)
Note 2) Standard lever is not attached.
Note 3) For side mounting, select "-W" and check the control position by viewing the LCD display value.



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## Specifications [Note 1)]

| Type / Item | IP8000 | | IP8100 | | IP8001 | IP8101 |
|---|---|---|---|---|---|---|
| | Electro-Pneumatic Positioner | | | | Smart Positioner | |
| | Lever type lever feedback | | Rotary type cam feedback | | Lever type | Rotary type |
| | Single action | Double action | Single action | Double action | Single action / Double action | |
| **Input current** | 4 to 20 mA DC (Standard) [Note 2)] | | | | | |
| **Min. operating current** | — | | | | 3.85 mA DC or more | |
| **Intra-terminal voltage** | — | | | | 12 V DC (equivalent to 600 Ω input resistance, at 20 mA DC) | |
| **Max. supplied power** | — | | | | 1 W (Imax: 100 mA DC, Vmax: 28 V DC) | |
| **Input resistance** | 235 ±15 Ω (4 to 20 mA DC) | | | | — | |
| **Supply air pressure** | 0.14 to 0.7 MPa | | | | | 0.3 to 0.7 MPa |
| **Standard stroke** | 10 to 85 mm (Allowable deflection angle 10 to 30°) | | 60 to 100° [Note 3)] | | 10 to 85 mm (Allowable deflection angle 10 to 30°) | 60 to 100° [Note 3)] |
| **Sensitivity** [Note 4)] | Within 0.1% F.S. | Within 0.5% F.S. | | | Within 0.2% F.S. | |
| **Linearity** [Note 4)] | Within ±1% F.S. | Within ±2% F.S. | | | Within ±1% F.S. | |
| **Hysteresis** [Note 4)] | Within 0.75% F.S. | Within 1% F.S. | | | Within 0.5% F.S. | |
| **Repeatability** [Note 4)] | Within ±0.5% F.S. | | | | | |
| **Coefficient of temperature** | Within 0.1% F.S./°C | | | | Within 0.05% F.S./°C | |
| **Supply pressure fluctuation** | Within 0.3% F.S./0.01 MPa | | | | — [Note 5)] | |
| **Output flow** [Note 6)] | 80 L/min (ANR) or more (SUP = 0.14 MPa) | | | | 200 L/min (ANR) or more (SUP = 0.4 MPa) | |
| **Air consumption** [Note 6)] | 5 L/min (ANR) or less (SUP = 0.14 MPa)<br>11 L/min (ANR) or less (SUP = 0.4 MPa) | | | | 2 L/min (ANR) or less (SUP = 0.14 MPa)<br>4 L/min (ANR) or less (SUP = 0.4 MPa) | 11 L/min (ANR) or less (SUP = 0.4 MPa) |
| **Ambient and fluid temperature** | General structure: –20 to 80°C | | | | | |
| | TIIS explosion-proof: –20 to 60°C<br>ATEX intrinsically safe explosion-proof: –20 to 80°C (T5)<br>–20 to 60°C (T6)<br>–40 to 60°C (T6)/-L type low-temperature specification | | | | ATEX intrinsically safe explosion-proof –20 to 80°C (T4/T5)<br>–20 to 60°C (T6) | |
| **Explosion proof construction** [Note 7)] | TIIS explosion-proof construction (Exd Ⅱ BT5)<br>ATEX intrinsically safe explosion-proof construction (Ⅱ 2G Ex ib Ⅱ CT5/T6) | | | | ATEX intrinsically safe explosion-proof construction<br>(Ⅱ 1G Ex ia Ⅱ CT4/T5/T6) | |
| **ATEX intrinsically safe explosion-proof parameter (current circuit)** | Ui ≤ 28 V, Ii ≤ 125 mA, Pi ≤ 1.2 W<br>Ci ≤ 0 nF, Li ≤ 0 mH | | | | Ui ≤ 28 V, Ii ≤ 100 mA, Pi ≤ 0.7 W<br>Ci ≤ 12.5 nF, Li ≤ 1.5 mH | |
| **Exterior covering enclosure** [Note 8)] | JISF8007, IP65 (conforms to IEC Pub.60529) | | | | | |
| **Transmission method** [Note 7)] | — | | | | HART transmission | |
| **Air connection port** [Note 9)] | Rc 1/4 female thread, NPT 1/4 female thread, G 1/4 female thread | | | | | |
| **Electrical connection port** [Note 9)] | G 1/2 female thread, M20 x 1.5 female thread, NPT 1/2 female thread | | | | | |
| **Material/coating** | Aluminum diecast body/baking finish with denatured epoxy resin | | | | | |
| **Weight** | 2.4 kg (Without terminal box)/2.6 kg (With terminal box) | | | | 2.6 kg | |

Note 1) Specification values are given at normal temperature (20°C).
Note 2) 1/2 Split range (Standard)
Note 3) Stroke adjustment: 0 to 60°, 0 to 100°
Note 4) Characteristics relating to accuracy differ depending on combination with other constituent loop equipment, such as positioners and actuators.
Note 5) While there is no output changes due to pressure fluctuations, when the pressure supply setting is changed following calibration, once again adjust balance current and perform calibration.
Note 6) (ANR) indicates JIS B0120 standard air.
Note 7) Model selection required for explosion proof construction and HART transmission.
Note 8) For IP66 compliant products, refer to pages 1059 to 1062.
Note 9) Thread type can be specified by model selection.

## Optional Specifications

| Item / Type | | IP8100-0□1-J/JR (Non-explosion proof) | IP8□01-0□2 (Non-explosion proof) | 52-IP8□01-0□4 |
|---|---|---|---|---|
| | | Electro-Pneumatic Positioner | Smart Positioner | |
| **Analog output** | **Wiring** | 2-line | | |
| | **Output signal** | 4 to 20 mA DC | | |
| | **Power supply voltage** | 12 to 35 V DC | 10 to 28 V DC | |
| | **Load resistance** | (Power supply voltage –12 V) ÷ 20 mA DC or less | 0 to 750 Ω | |
| | **Accuracy** | ±2% F.S. or less [Note 1)] | ±0.5% F.S. or less [Note 2)] | |
| | **Hysteresis** | Within 1% F.S. | — | |
| **Alarm output 1, 2** | **Wiring** | — | 2-line | |
| | **Applicable standards** | — | — | DIN19234/NAMUR Standard |
| | **Power supply voltage** | — | 10 to 28 V DC | 5 to 28 V DC |
| | **Load resistance** | — | 10 to 40 mA DC | (Constant current output) |
| | **Alarm ON** | — | R = 350 Ω ±10% | ≥ 2.1 mA DC |
| | **Alarm OFF (Leakage current)** | — | 0.5 mA DC or less | ≤ 1.2 mA DC |
| | **Response time** | — | 50 msec or less | |

Note 1) Indicates analog output accuracy with respect to actuator angle.
Note 2) Indicates analog output accuracy with respect to LCD display position value (P value).

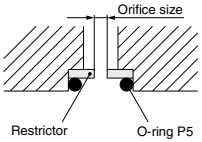
## Accessory/Option

### Pilot valve with output restriction (IP8000/8100)

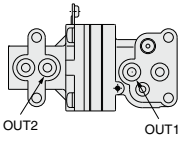
In general, mounting on a small-size actuator may cause hunting. For prevention, a pilot valve with a built-in output restriction is available. The restriction is removable.

| Actuator capacity | Orifice size | Part number | Pilot unit part number | Model selection accessory |
|---|---|---|---|---|
| 90 cm³ | ø0.7 | P36801080 | P565010-18 | A |
| 180 cm³ | ø1 | P36801081 | P565010-19 | B |

Note) Output orifice not required for Smart Positioner regardless of actuator capacity.




Restrictor mounting diagram



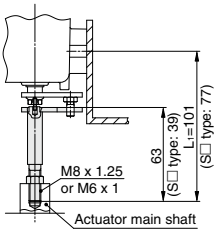

Pilot valve bottom view

### Fork lever-type fittings (IP8100/8101)

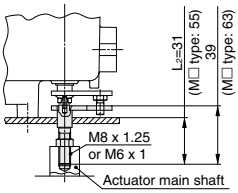
2 kinds of rotary type IP8100/8101 fork lever-type fittings, that differ by installation dimensions dependent on bracket installation method, and 2 kinds of installation portion thread sizes, are available.
When installing on the side surface, using fork lever assembly M provides interchangeability with the installation dimensions of SMC IP610 positioner. When installing on the rear surface, using fork lever assembly S also provides interchangeability with the installation dimensions of SMC IP610 positioner.

| Part name | Unit number | Installation portion thread size | Model selection accessory |
|---|---|---|---|
| Fork lever assembly M | P368010-24 | M8 x 1.25 | C |
| Fork lever assembly S | P368010-25 | | D |
| Fork lever assembly MX | P368010-36 | M6 x 1 | C Note) |
| Fork lever assembly SX | P368010-37 | | D Note) |

Note) Installation portion thread size is M6 x 1 for IP8100-0□0-X14 when accessory C or D are selected.




Side mounting with the fork lever assembly M□



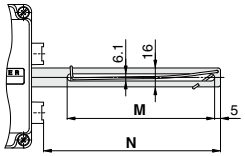

Rear mounting with the fork lever assembly S□

### External feedback lever (IP8000/8001)

Different feedback levers are available dependent upon valve strokes. Order according to the valve stroke.

**Feedback lever types**

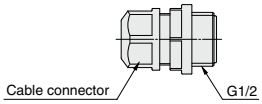
| Stroke | Unit number | | Size **M** | Size **N** | Model selection accessory |
|---|---|---|---|---|---|
| | **IP8000** | **IP8001** | | | |
| 10 to 85 mm | P368010-20 | P565010-323 | 125 | 150 | Standard accessory |
| 35 to 100 mm | P368010-21 | P565010-324 | 110 | 195 | E |
| 50 to 140 mm | P368010-22 | P565010-325 | 110 | 275 | F |
| 6 to 12 mm | P368010-260 | P565010-329 | 75 | 75 | Available as special order |




### Resin connector (Non-explosion proof specification)

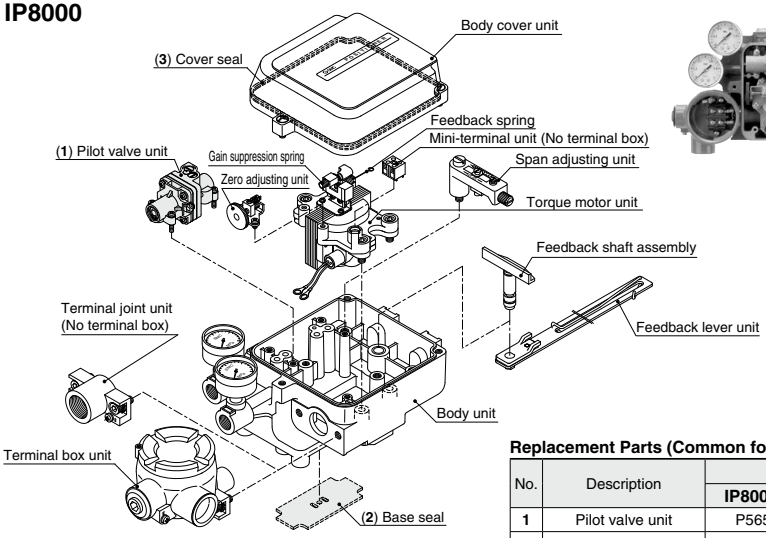
Optional cable connectors are available for different cable sizes. These are not for explosion proof applications. Recommended for use with indoor applications.

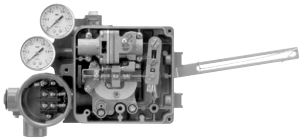
| Part name | Part number | Suited cable outer diameter |
|---|---|---|
| Resin-made cable clamp unit (A) | P368010-26 | ø7 to ø9 |
| Resin-made cable clamp unit (B) | P368010-27 | ø9 to ø11 |



## Exploded View

### IP8000

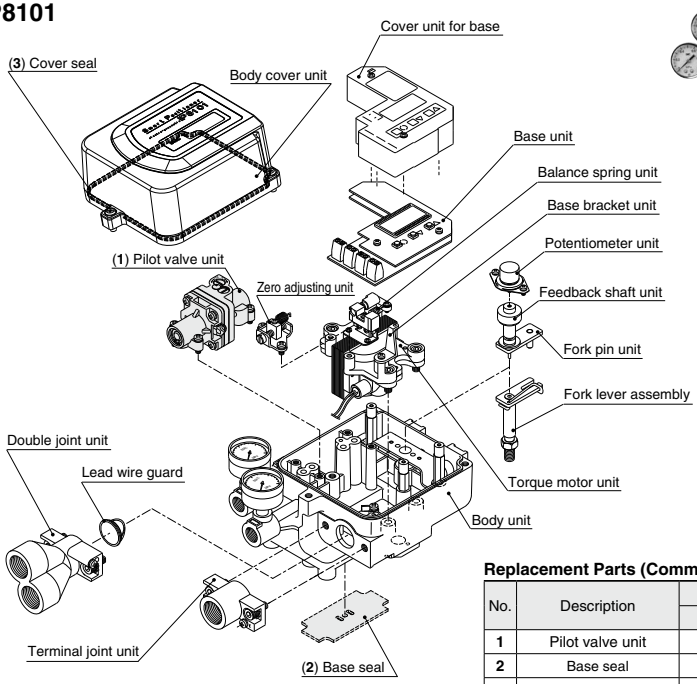


**Replacement Parts (Common for IP8000/8100)**

| No. | Description | Part no. | |
|---|---|---|---|
| | | IP8000/8100 | IP8000/8100-□-X14-L |
| 1 | Pilot valve unit | P565010-7 | P565010-48 |
| 2 | Base seal | P56501012-3 | |
| 3 | Cover seal | P56501013 | |

### IP8101



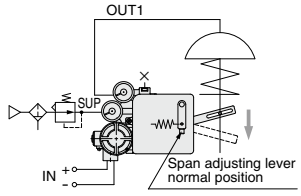
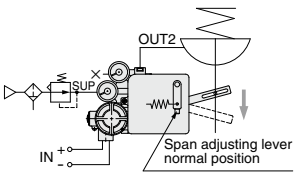
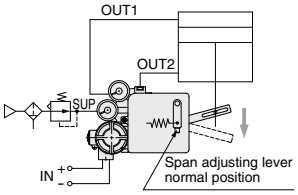
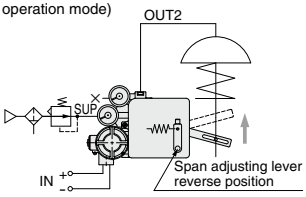
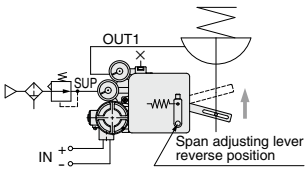
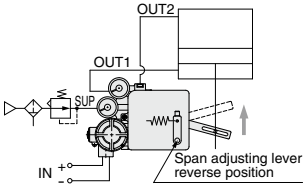

**Replacement Parts (Common for IP8001/8101)**

| No. | Description | Part no. | |
|---|---|---|---|
| | | IP8001 | IP8101 |
| 1 | Pilot valve unit | P565010-322 | P565010-303 |
| 2 | Base seal | P56501012-3 | |
| 3 | Cover seal | P56501013 | |

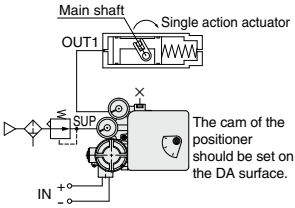
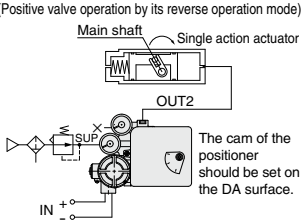
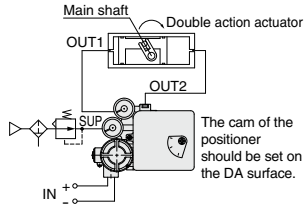
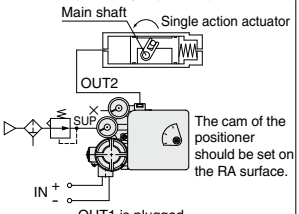
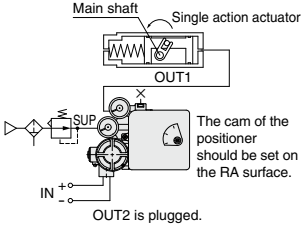
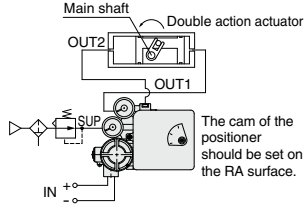
## Piping

Note) When the input signal is discontinued, the pressure of OUT1 decreases, and the pressure of OUT2 increases.

### IP8000/Lever type

| | Single action | | Double action |
|---|---|---|---|
| Positive operation | When the input signal is increased, the stem moves as allow mark.<br>  <br>OUT2 is plugged. | When the input signal is increased, the stem moves as allow mark.<br>(Positive valve operation by its reverse operation mode)<br>  <br>OUT1 is plugged. | When the input signal is increased, the cylinder rod moves as allow mark.<br>  |
| Reverse operation | When the input signal is increased, the stem moves as allow mark.<br>(Reverse valve operation by its positive operation mode)<br>  <br>OUT1 is plugged. | When the input signal is increased, the stem moves as allow mark.<br>  <br>OUT2 is plugged. | When the input signal is increased, the cylinder rod moves as allow mark.<br>  |

### IP8100/Rotary type

| | Single action | | Double action |
|---|---|---|---|
| Positive operation | When the input signal is increased, the actuator shaft rotates in a clockwise direction.<br>  <br>OUT2 is plugged. | When the input signal is increased, the actuator shaft rotates in a clockwise direction.<br>(Positive valve operation by its reverse operation mode)<br>  <br>OUT1 is plugged. | When the input signal is increased, the actuator shaft rotates in a clockwise direction.<br>  |
| Reverse operation | When the input signal is increased, the actuator shaft rotates in a counter clockwise direction.<br>(Reverse valve operation by its positive operation mode)<br>  <br>OUT1 is plugged. | When the input signal is increased, the actuator shaft rotates in a counter clockwise direction.<br>  <br>OUT2 is plugged. | When the input signal is increased, the actuator shaft rotates in a counter clockwise direction.<br>  |



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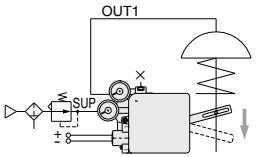
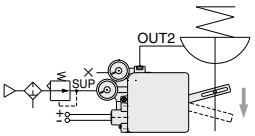
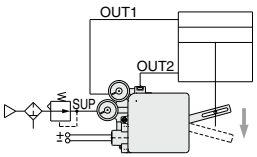
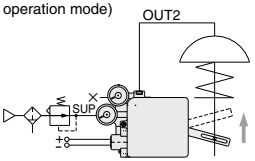
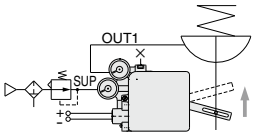
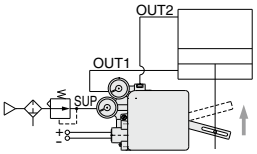
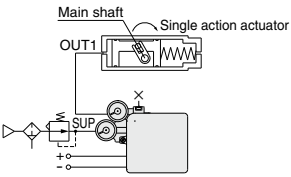
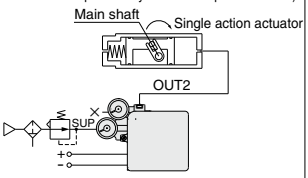
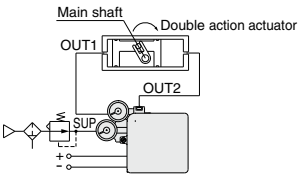
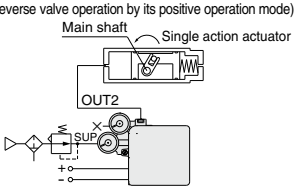
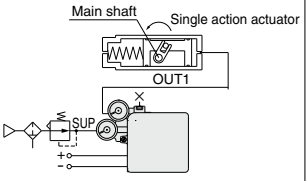
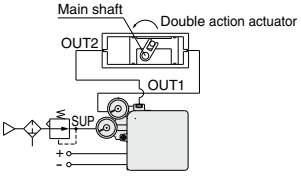
## Piping

Note) When the input signal is discontinued, the pressure of OUT1 decreases, and the pressure of OUT2 increases.
Caution is also similarly required when changing the control direction in parameter mode.

## IP8001/Lever type

| | Single action | | Double action |
|---|---|---|---|
| Positive operation | When the input signal is increased, the stem moves as allow mark.<br>  <br><br>OUT2 is plugged. | When the input signal is increased, the stem moves as allow mark.<br>(Positive valve operation by its reverse operation mode)<br>  <br><br>OUT1 is plugged. | When the input signal is increased, the cylinder rod moves as allow mark.<br>  <br> |
| Reverse operation | When the input signal is increased, the stem moves as allow mark.<br>(Reverse valve operation by its positive operation mode)<br>  <br><br>OUT1 is plugged. | When the input signal is increased, the stem moves as allow mark.<br>  <br><br>OUT2 is plugged. | When the input signal is increased, the cylinder rod moves as allow mark.<br>  <br> |

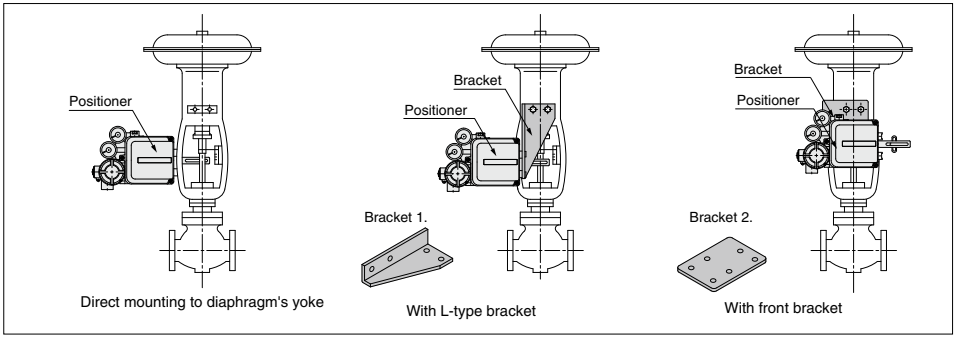
## IP8101/Rotary type

| | Single action | | Double action |
|---|---|---|---|
| Positive operation | When the input signal is increased, the actuator shaft rotates in a clockwise direction.<br>  <br><br>OUT2 is plugged. | When the input signal is increased, the actuator shaft rotates in a clockwise direction.<br>(Positive valve operation by its reverse operation mode)<br>  <br><br>OUT1 is plugged. | When the input signal is increased, the actuator shaft rotates in a clockwise direction.<br>  <br> |
| Reverse operation | When the input signal is increased, the actuator shaft rotates in a counter clockwise direction.<br>(Reverse valve operation by its positive operation mode)<br>  <br><br>OUT1 is plugged. | When the input signal is increased, the actuator shaft rotates in a counter clockwise direction.<br>  <br><br>OUT2 is plugged. | When the input signal is increased, the actuator shaft rotates in a counter clockwise direction.<br>  <br> |

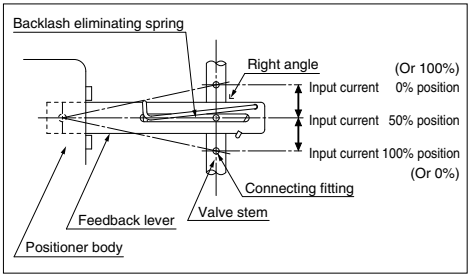
## Installation

### IP8000/8001 (Lever type)

**1.** Create brackets that are appropriate for the positioner and diaphragm valve mounting methods, and affix it firmly using the mounting hole on the side or rear surface.

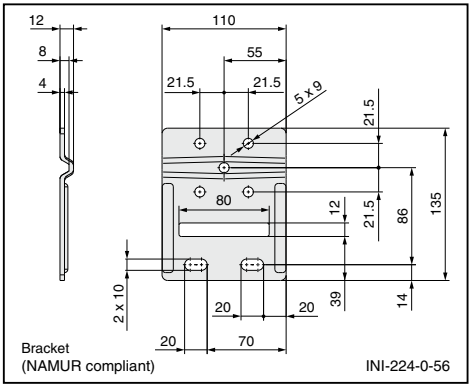



**2.** The feedback lever that detects the displacement of valve stems should be mounted at a position so that the lever is at right angles to the valve stem for an input current of 50%. The figure is the configuration viewed from the front.



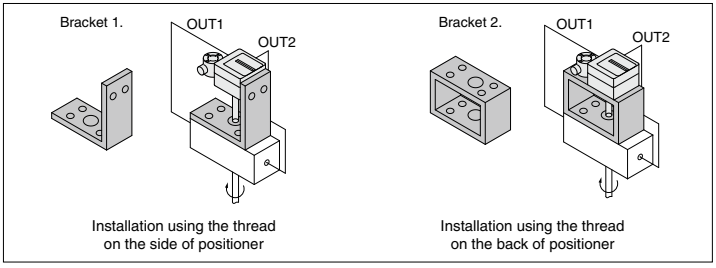

**3.** Brackets for lever type positioners, which are compliant with NAMUR and DIN/IEC 60534-6-1 are now available.

| Description | Part no. |
|---|---|
| Bracket (NAMUR compliant) single unit | INI-224-0-56 |




### IP8100/8101 (Rotary type)

**1.** The positioner should be mounted so that the feedback shaft is aligned with the shaft of the rotary actuator.

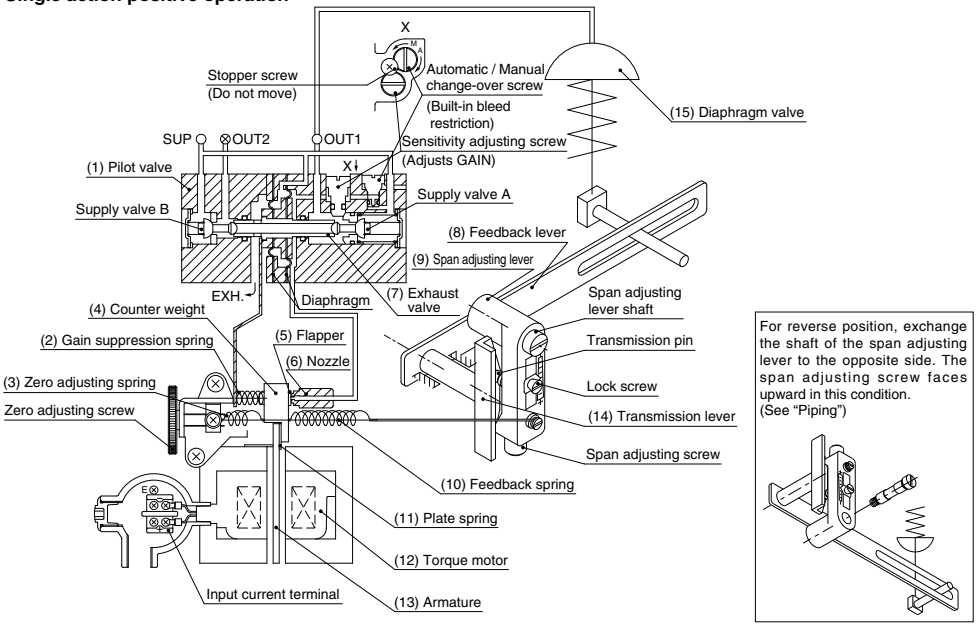


## Principle of Operation

### IP8000/Lever type

When the input current increases, (11) the plate spring of (12) the torque motor will work as a pivot, (13) armature will receive a counter clockwise torque, (4) the counter weight will be pushed to the left, the clearance between (6) the nozzle and (5) the flapper will increase, and the nozzle back pressure will decrease. Consequently, (7) the exhaust valve of (1) the pilot valve moves to the right, the output pressure of OUT1 increases and (15) the diaphragm moves downwards. The motion of (15) the diaphragm acts on (10) the feedback spring through (8) the feedback lever, (14) the transmission lever and (9) the span adjustment lever to rest at the balance position generated by the input current. (2) The gain suppression spring is for direct feedback of the motion of (7) the exhaust valve to (4) the counter weight to increase the stability of the loop. The zero point should be adjusted by change of (3) the zero adjustment spring tension.

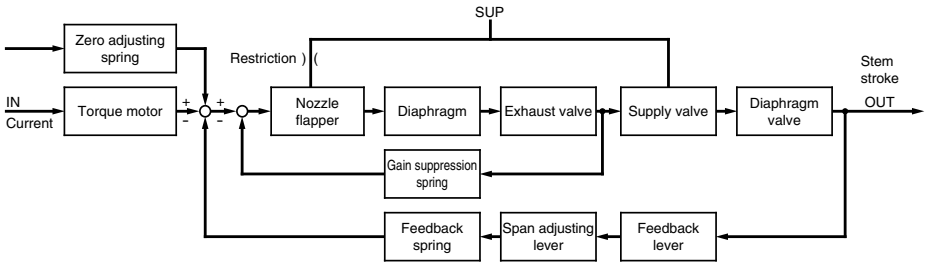
**Single action positive operation**




For reverse position, exchange the shaft of the span adjusting lever to the opposite side. The span adjusting screw faces upward in this condition. (See "Piping")



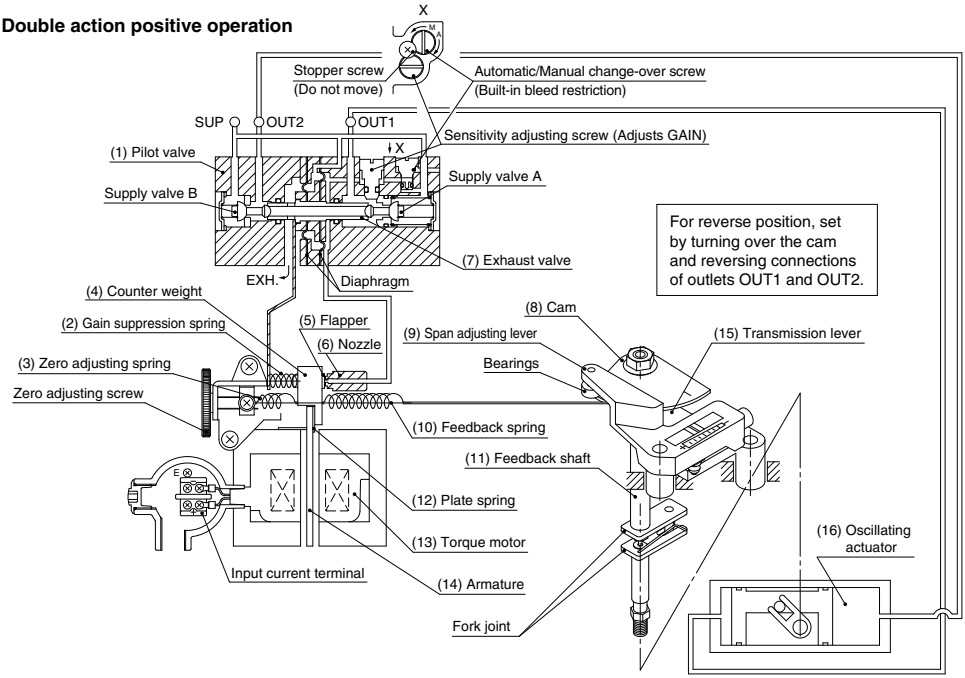
**Block diagram**



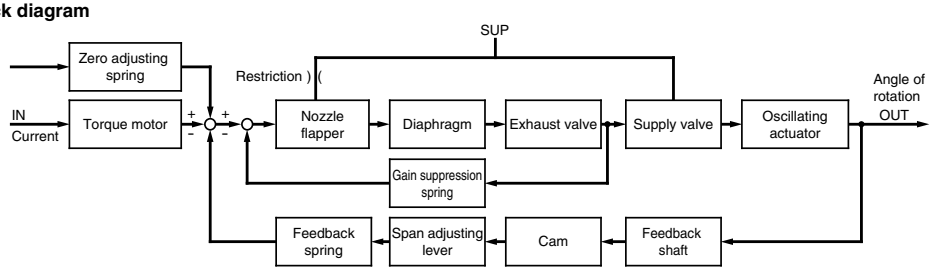
## IP8100/Rotary type

When the input current increases, (12) the plate spring of (13) the torque motor will work as a pivot, (14) armature will receive a counter-clockwise torque, (4) the counter weight will be pushed to the left and the clearance between (6) the nozzle and (5) the flapper will increase, and the nozzle back pressure will decrease. Consequently, (7) the exhaust valve of (1) the pilot valve moves to the right, the output pressure of OUT1 increases that of OUT2 decreases and (16) the rotary actuator moves. The motion of (16) the actuator acts on (10) the feedback spring through (11) the feedback shaft, (8) the cam, (9) the span adjustment lever and (15) transmission lever to rest at the balance position generated by the input current. (8) the cam is set on the DA surface and operates positively while (16) the oscillating actuator shaft rotates in a clockwise direction when the input signal is increased. (2) The gain suppression spring is for direct feedback of the motion of (7) the exhaust valve to (4) the counter weight to increase the stability of the loop. The zero point should be adjusted by change of (3) the zero adjustment spring tension.

### Double action positive operation




### Block diagram



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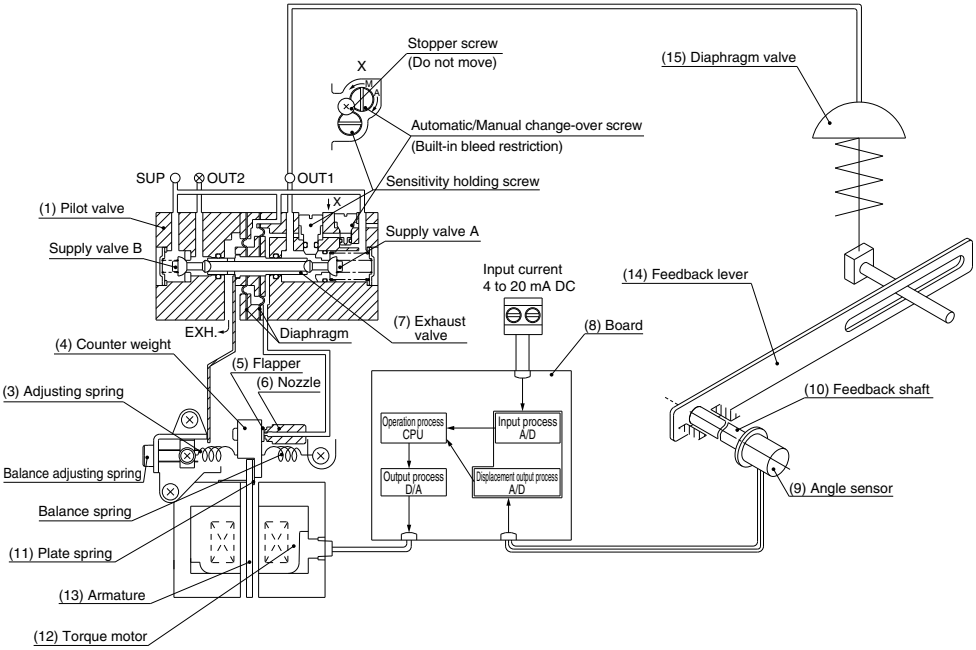
## Principle of Operation

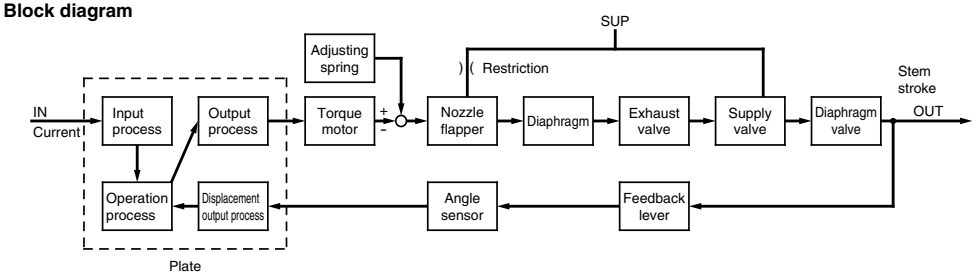
### IP8001/Lever type

When the input current increases, the electrical current inside (12) the torque motor coil will change through (8) the plate's input process, operation process and output process, and (13) the armature will oscillate, with (11) the plate spring as its base. As a result, the clearance between (6) the nozzle and (5) the flapper will increase, and the nozzle back pressure will decrease. Consequently, (7) the exhaust valve of (1) the pilot valve moves to the right, the output pressure of OUT1 increases and causes (15) the diaphragm valve to move. The motion of (15) the diaphragm valve is transmitted to the displacement output process of (8) the board through (14) the feedback lever, (10) the feedback shaft and (9) angle sensor, and the calculated output position will match the input current.

**Single action positive operation**



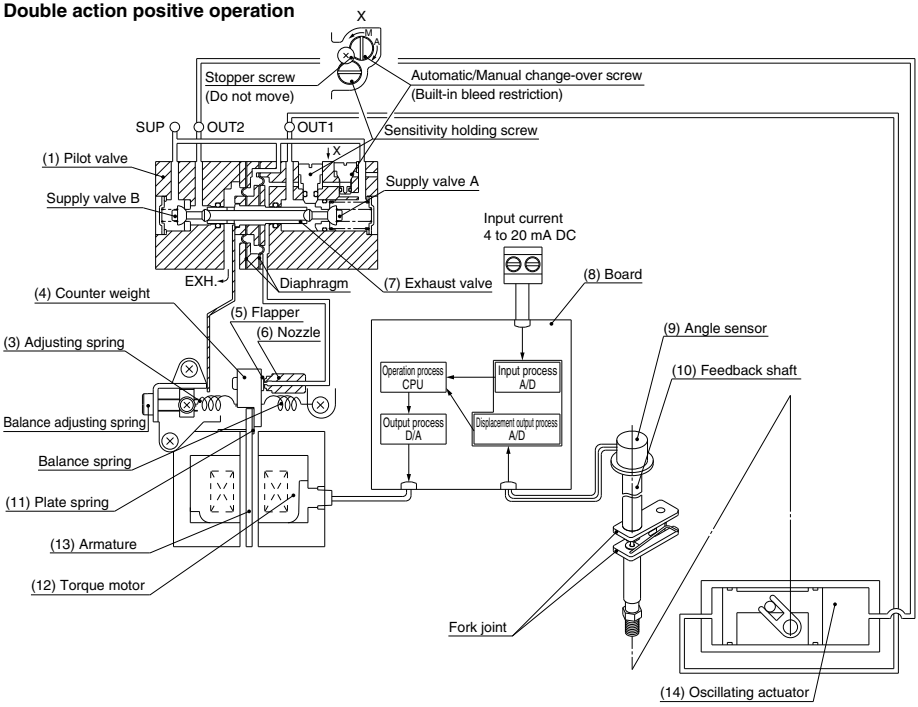

**Block diagram**



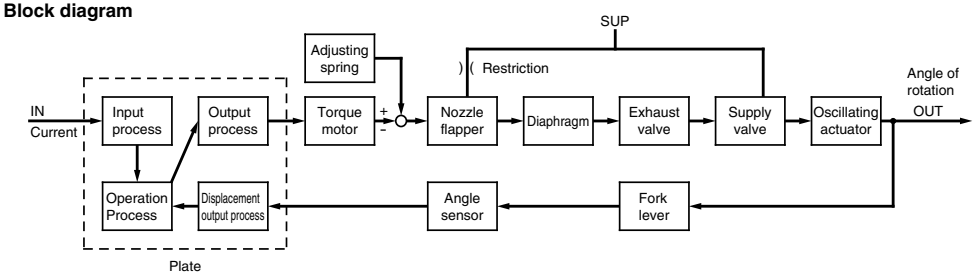
## IP8101/Rotary type

When the input current increases, the electrical current inside (12) the torque motor coil will change through (8) the plate's input process, operation process and output process, and (13) the armature will oscillate, with (11) the plate spring as its base. As a result, the clearance between (6) the nozzle and (5) the flapper will increase, and the nozzle back pressure will decrease. Consequently, (7) the exhaust valve of (1) the pilot valve moves to the right, the output pressure of OUT1 increases and causes the output pressure of OUT2 to decrease, causing (14) the oscillating actuator to move. The motion of (14) the oscillating actuator is transmitted to the fork lever-type fitting, (10) the feedback shaft (9) angle sensor, and the displacement output process of (8) the board, and output position will match the input current.

### Double action positive operation




### Block diagram



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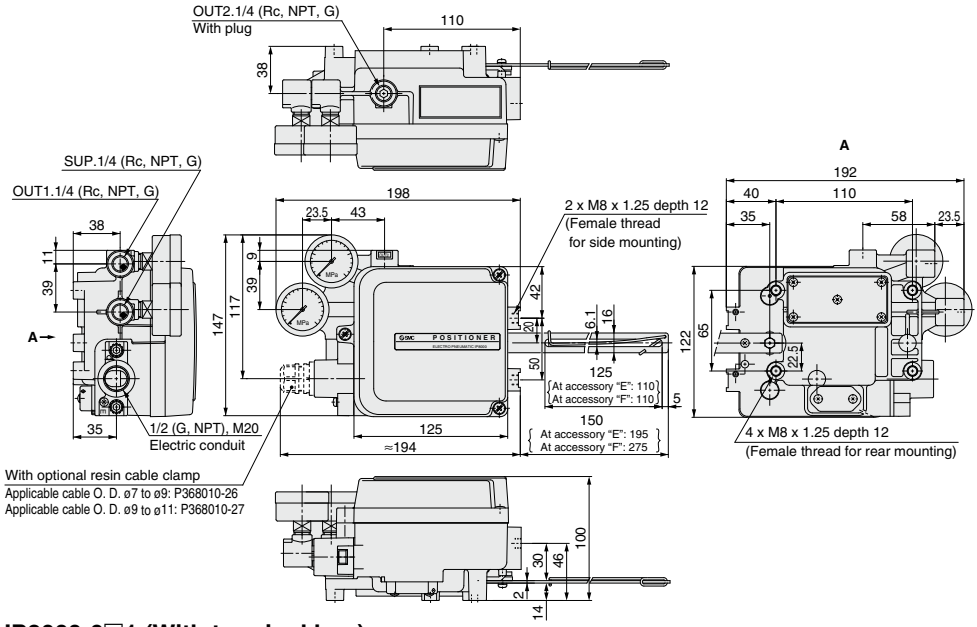
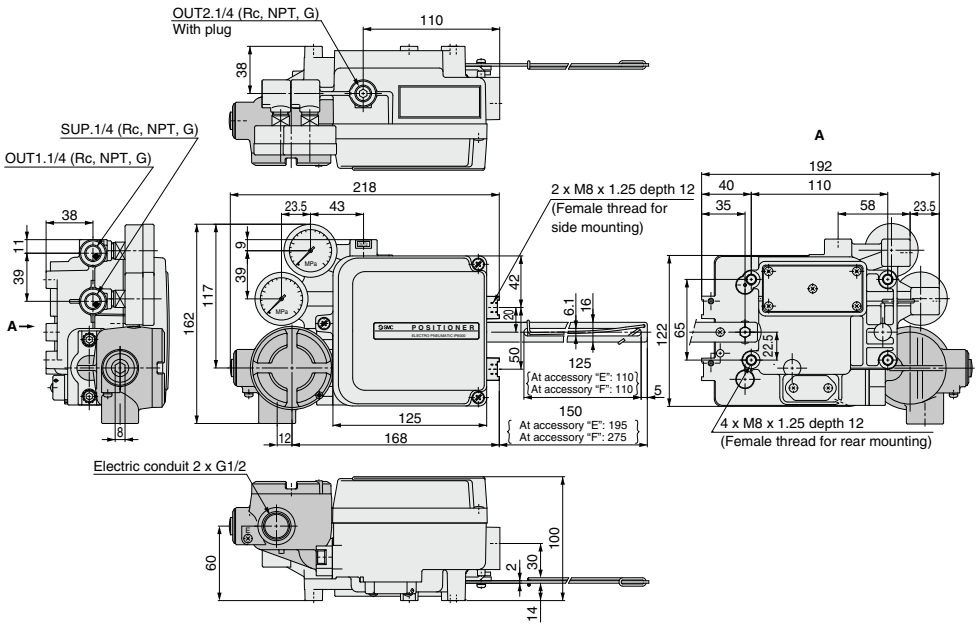
## Dimensions/IP8000 (Lever type)

### IP8000-0□0 (Without terminal box)

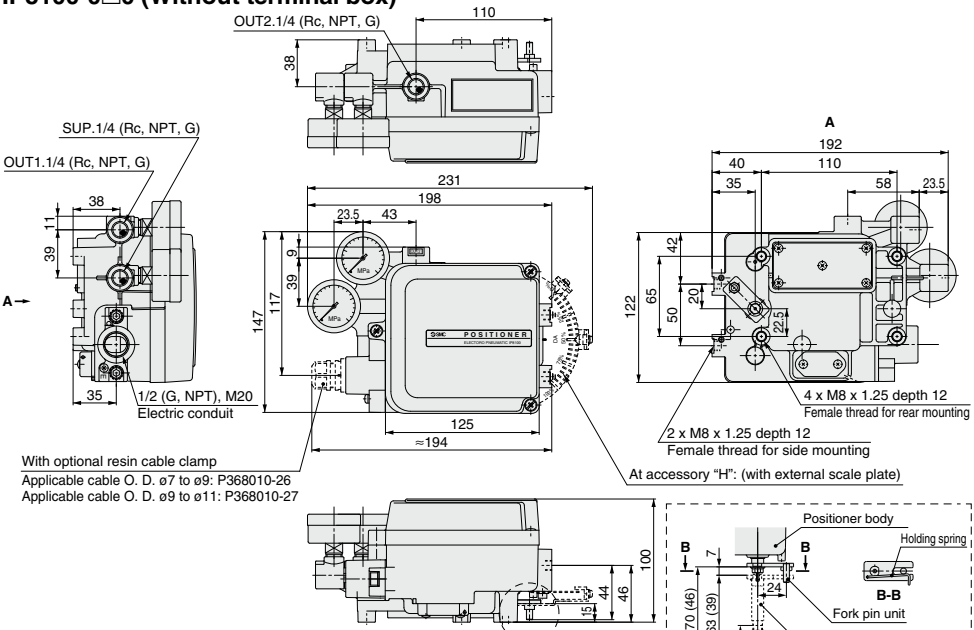



### IP8000-0□1 (With terminal box)

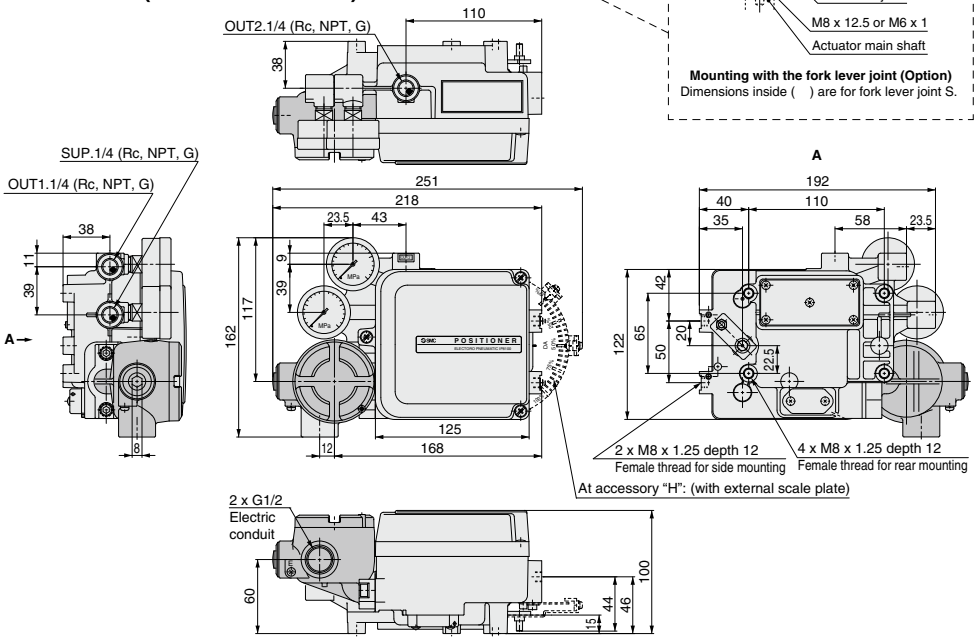


## Dimensions/IP8100 (Rotary type)

### IP8100-0□0 (Without terminal box)

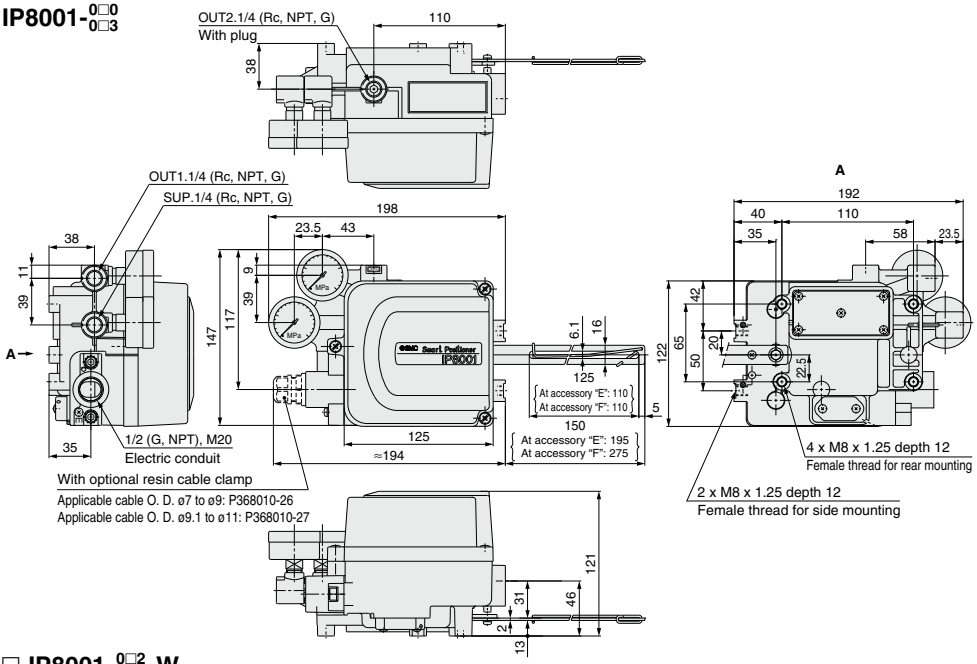



### IP8100-0□1 (With terminal box)

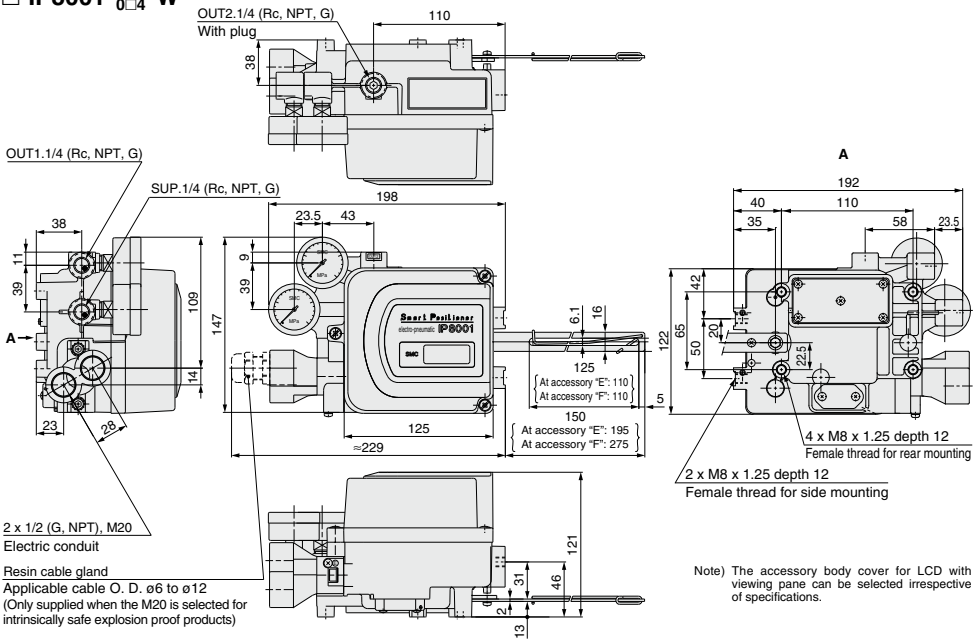


## Dimensions/IP8001 (Lever type)

### IP8001-$^{0\square0}_{0\square3}$



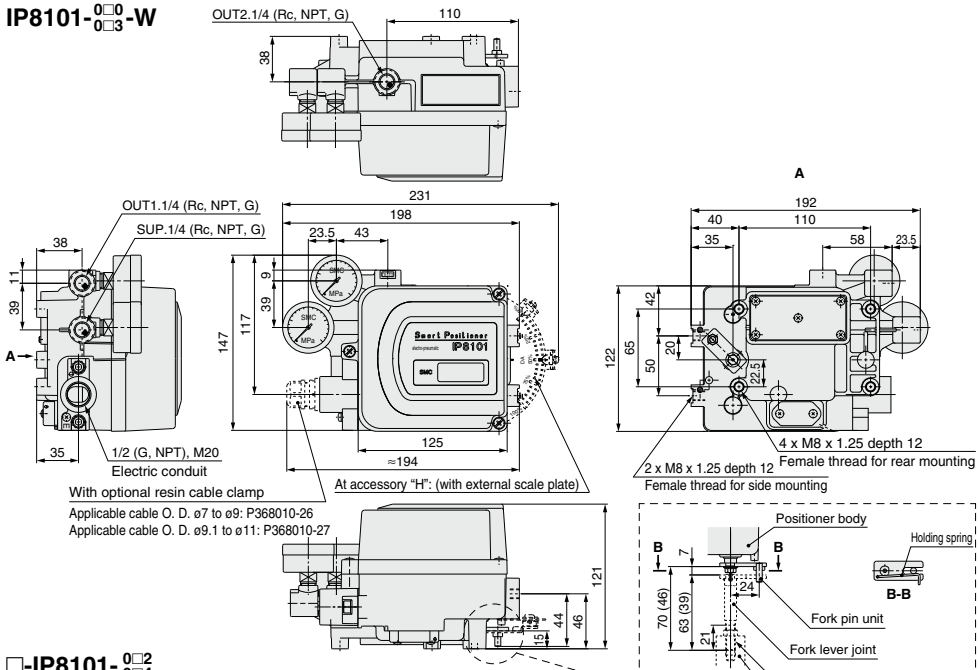

### □-IP8001-$^{0\square2}_{0\square4}$-W

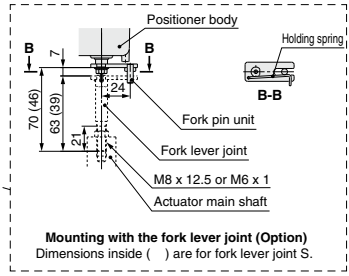



Note) The accessory body cover for LCD with viewing pane can be selected irrespective of specifications.

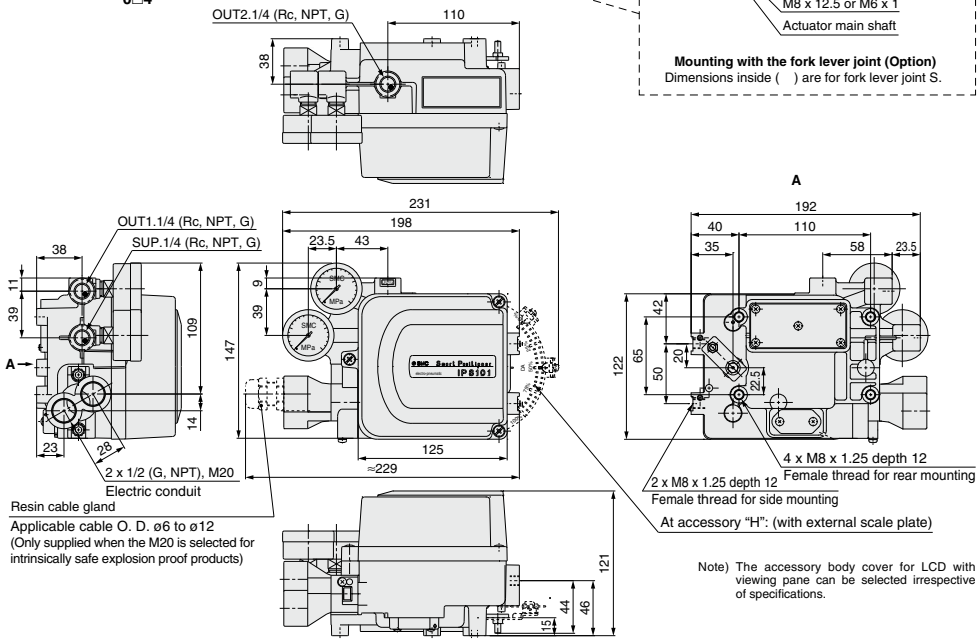
## Dimensions/IP8101 (Rotary type)

### IP8101-$^{0\square0}_{0\square3}$-W




### □-IP8101-$^{0\square2}_{0\square4}$




Note) The accessory body cover for LCD with viewing pane can be selected irrespective of specifications.



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

# Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

Made to Order

## 1 Exterior Covering Enclosure: JISF8007 IP66 (Conforms to IEC60529)

∗ Same as the standard, other than the IP66 compliant protective cover.

**How to Order**

**IP8000/Lever type**

**IP8000 - 0 □ □ - □ - □ - X310 - P - □**

**Lever type**

| Pressure gauge (SUP, OUT1) | | Construction | |
|---|---|---|---|
| 0 | None | 0 | No terminal box (With non-explosive proof connector) |
| 1 | 0.2 MPa | | |
| 2 | 0.3 MPa | | |
| 3 | 1.0 MPa | 1 | With terminal box (Exd Ⅱ BT5) |

| Accessories | | Connection Note 2) | | | CE marking | |
|---|---|---|---|---|---|---|
| | | | Air | Electric | | |
| Nil | None (With standard lever) | Nil | Rc1/4 | G1/2 | Nil | — |
| A | ø0.7 Output restriction with pilot valve | M | Rc1/4 | M20 x 1.5 | Q | CE marked product |
| B | ø1.0 Output restriction with pilot valve | N | Rc1/4 | 1/2NPT | | |
| E | For stroke 35 to 100 mm with lever unit (Standard lever is not attached.) | 1 | 1/4NPT | G1/2 | | |
| F | For stroke 50 to 140 mm with lever unit (Standard lever is not attached.) | 2 | 1/4NPT | M20 x 1.5 | | |
| | | 3 | 1/4NPT | 1/2NPT | | |
| G | Compensation spring (A) (It is mounted to the body as a replacement of the standard compensation spring.) | 4 | G1/4 | G1/2 | | |
| | | 5 | G1/4 | M20 x 1.5 | | |
| | | 6 | G1/4 | 1/2NPT | | |

Note 1) If two or more accessories are required, the part numbers should be given in alphabetical order.
Note 2) If 1 is selected for Construction, M, N, 2, 3, 5, 6 cannot be selected for Connection.

**IP8100/Rotary type**

**IP8100 - 0 □ □ - □ - □ - X310 - P - □**

**Rotary type**

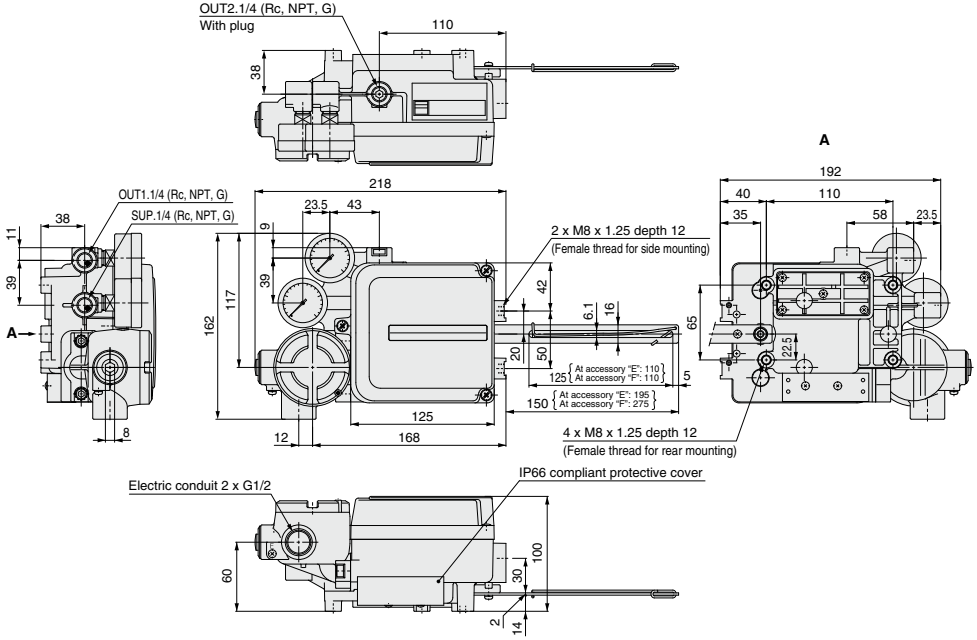
| Pressure gauge (SUP, OUT1) | | Construction | |
|---|---|---|---|
| 0 | None | 0 | No terminal box (With non-explosive proof connector) |
| 1 | 0.2 MPa | | |
| 2 | 0.3 MPa | | |
| 3 | 1.0 MPa | 1 | With terminal box (Exd Ⅱ BT5) |

| Accessories | | Connection Note 2) | | | CE marking | |
|---|---|---|---|---|---|---|
| | | | Air | Electric | | |
| Nil | None (With standard lever) | Nil | Rc1/4 | G1/2 | Nil | — |
| A | ø0.7 Output restriction with pilot valve | M | Rc1/4 | M20 x 1.5 | Q | CE marked product |
| B | ø1.0 Output restriction with pilot valve | N | Rc1/4 | 1/2NPT | | |
| C | Fork lever assembly M | 1 | 1/4NPT | G1/2 | | |
| D | Fork lever assembly S | 2 | 1/4NPT | M20 x 1.5 | | |
| G | Compensation spring (A) (It is mounted to the body as a replacement of the standard compensation spring.) | 3 | 1/4NPT | 1/2NPT | | |
| | | 4 | G1/4 | G1/2 | | |
| H | With external scale plate | 5 | G1/4 | M20 x 1.5 | | |
| J | With opening current transmission (4 to 20 mA DC, with terminal box, non-explosion proof)/Positive operation | 6 | G1/4 | 1/2NPT | | |
| JR | With opening current transmission (4 to 20 mA DC, with terminal box, non-explosion proof)/Reverse operation | | | | | |

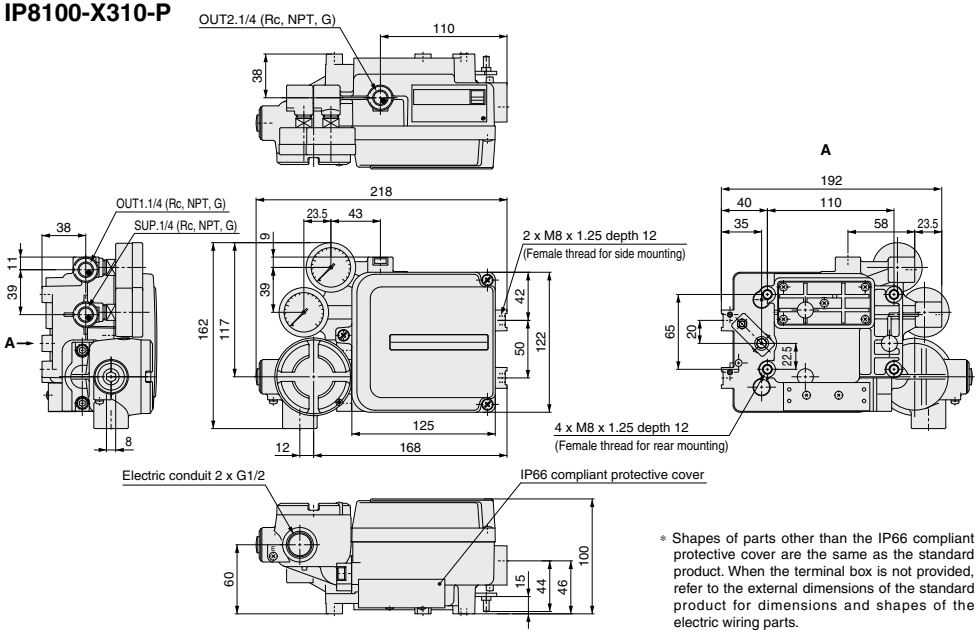
Note 1) If two or more accessories are required, the part numbers should be given in alphabetical order.
Note 2) Symbol J/JR is with terminal box, non-explosion proof specification. Select 1 for Construction.
Note 3) If 1 is selected for Construction, M, N, 2, 3, 5, 6 cannot be selected for Connection.

## Dimensions

### P8000-X310-P




### IP8100-X310-P




* Shapes of parts other than the IP66 compliant protective cover are the same as the standard product. When the terminal box is not provided, refer to the external dimensions of the standard product for dimensions and shapes of the electric wiring parts.



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## 2 Exterior Covering Enclosure: JISF8007 IP66 (Conforms to IEC60529)

∗ Same as the standard, other than the IP66 compliant protective cover.

### How to Order

**IP8001/Lever type**

**ATEX directive compliance**

| | |
|---|---|
| 52 | ATEX directive category 1 |

**Specifications**

| | |
|---|---|
| 4 | Intrinsically safe explosion proof (ATEX) + Output function + HART transmission |

**ATEX temperature**

| | |
|---|---|
| Nil | T4 |
| T6 | T5/T6 |

52 - IP8001 - 0 □ 4 - □ - □ - □ - X405 - P

IP8001 - 0 □ □ - □ - □ - X405 - P - □

**Smart lever type**

| Pressure gauge | | Specifications | | Accessories | |
|---|---|---|---|---|---|
| 1 | 0.2 MPa | 0 | Basic type | Nil | None (With standard lever) |
| 2 | 0.3 MPa | 2 | With output function {Analog (4 to 20 mA DC) output + Alarm output × 2} | E | For stroke 35 to 100 mm with lever unit (Standard lever is not attached.) |
| 3 | 1.0 MPa | | | F | For stroke 50 to 140 mm with lever unit (Standard lever is not attached.) |
| | | 3 | With HART transmission function | W | Body with LCD window |

| Connection | | | CE marking | |
|---|---|---|---|---|
| | Air | Electric | Nil | — |
| Nil | Rc1/4 | G1/2 | Q | CE marked product |
| M | Rc1/4 | M20 x 1.5 | | |
| N | Rc1/4 | 1/2NPT | | |
| 1 | 1/4NPT | G1/2 | | |
| 2 | 1/4NPT | M20 x 1.5 | | |
| 3 | 1/4NPT | 1/2NPT | | |
| 4 | G1/4 | G1/2 | | |
| 5 | G1/4 | M20 x 1.5 | | |
| 6 | G1/4 | 1/2NPT | | |

Note 1) If two or more accessories are required, the part numbers should be given in alphabetical order.
Note 2) If a connecting port is M20 × 1.5, a blue cable gland is included.

**IP8101/Rotary type**

**ATEX directive compliance**

| | |
|---|---|
| 52 | ATEX directive category 1 |

**Specifications**

| | |
|---|---|
| 4 | Intrinsically safe explosion proof (ATEX) + Output function + HART transmission |

**ATEX temperature**

| | |
|---|---|
| Nil | T4 |
| T6 | T5/T6 |

52 - IP8101 - 0 3 4 - □ - □ - □ - X405 - P

IP8101 - 0 3 □ - □ - □ - X405 - P - □

**Smart rotary type**

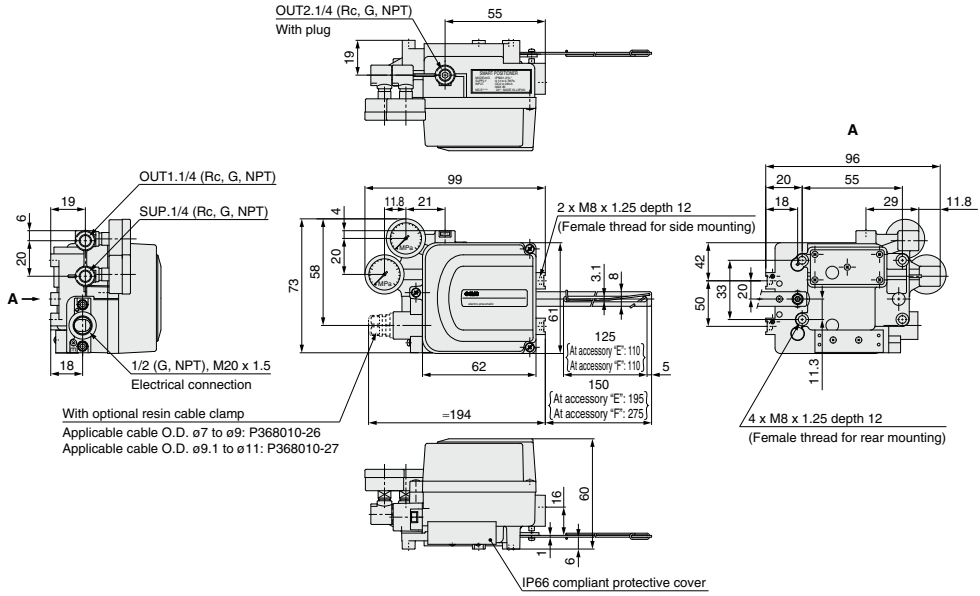
| Pressure gauge | | Specifications | | Accessories | |
|---|---|---|---|---|---|
| 3 | 1.0 MPa | 0 | Basic type | Nil | None (Standard) |
| | | 2 | With output function {Analog (4 to 20 mA DC) output + Alarm output × 2} | C | Fork lever-type fitting M |
| | | | | D | Fork lever-type fitting S |
| | | | | H | With external scale plate |
| | | 3 | With HART transmission function | W | Body with LCD window |

| Connection | | | CE marking | |
|---|---|---|---|---|
| | Air | Electric | Nil | — |
| Nil | Rc1/4 | G1/2 | Q | CE marked product |
| M | Rc1/4 | M20 x 1.5 | | |
| N | Rc1/4 | 1/2NPT | | |
| 1 | 1/4NPT | G1/2 | | |
| 2 | 1/4NPT | M20 x 1.5 | | |
| 3 | 1/4NPT | 1/2NPT | | |
| 4 | G1/4 | G1/2 | | |
| 5 | G1/4 | M20 x 1.5 | | |
| 6 | G1/4 | 1/2NPT | | |

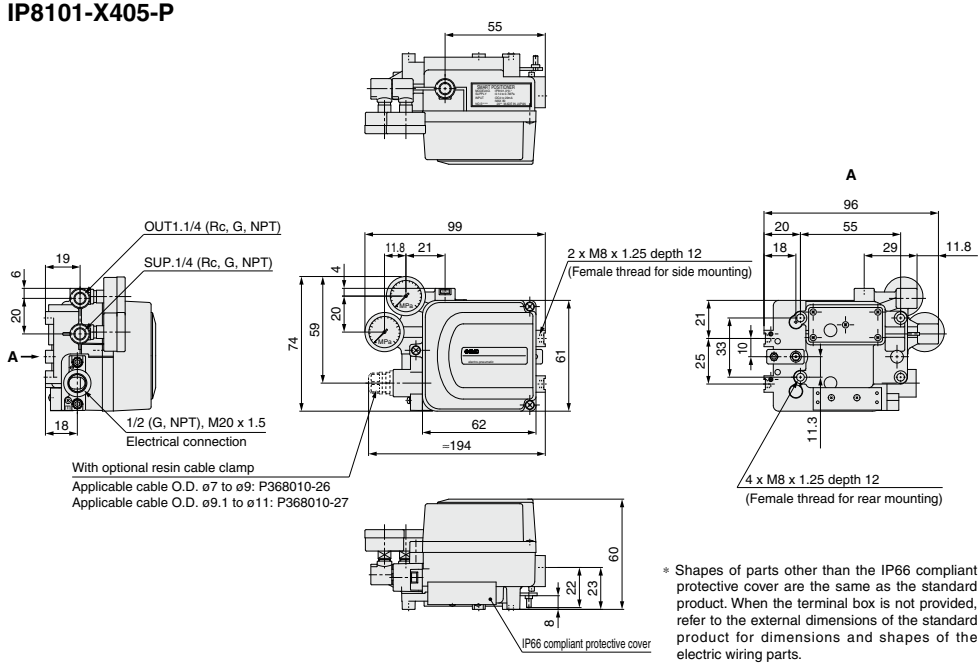
Note 1) If two or more accessories are required, the part numbers should be given in alphabetical order.
Note 2) If a connecting port is M20 × 1.5, a blue cable gland is included.

## Dimensions

### IP8001-X405-P




### IP8101-X405-P




* Shapes of parts other than the IP66 compliant protective cover are the same as the standard product. When the terminal box is not provided, refer to the external dimensions of the standard product for dimensions and shapes of the electric wiring parts.



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# Technical data

## Explosion proof

**1. TIIS explosion-proof construction**

The electro-pneumatic positioner IP8000/8100 becomes explosion proof, as certified by TIIS, according to the model selected. The explosion-proof grade has the following approval: Exd ⅡBT5.

Take extra care when handling the positioner as explosion-proof equipment

**To use as Exd ⅡBT5**

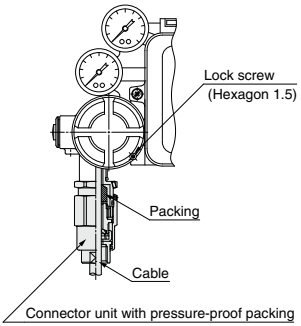
**A) Pressure-proof packing**

As shown below in the chart, use "Cable gland" **(Option)**.

**B) Metal piping**

Attach the sealant fitting bracket near the cable port.

(For details, refer to "The guideline on electric equipment explosion proof" published by the Technology Institution of Industrial Safety).




**Cable gland with pressure proof packing (Option)**

| Description | Unit product no. | Applicable outside diameter |
|---|---|---|
| Connector unit with pressure proof packing | P368010-32 | ø7.0 to ø10.0 |
| | P368010-33 | ø10.1 to ø12.0 |

**2. ATEX Intrinsically safe explosion-proof construction**

Pneumatic positioners IP8000/8100 and IP8001/8101 Smart Positioners are ATEX compliant, intrinsically safe and explosion proof, as certified by KEMA, the accreditation body for explosion-proof products. Take extra care when handling these explosion-proof products.

In regards to explosion-proof grades,

The Pneumatic Positioner IP8□00 meets Ⅱ2G Ex ib ⅡCT5/T6, and

The Smart Positioner IP8□01 meets the Ⅱ1G Ex ia ⅡCT4/T5/T6.

Check the positioner's specifications and explosion-proof grades and use in the most optimal environment.

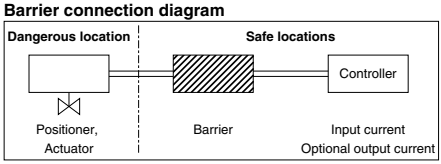
**• Wiring**

When using the positioner as an intrinsically safe explosion-proof product, always set up a barrier in a **safe environment**, and perform each positioner's wiring through the barrier. Simultaneously, use the provided cable gland (M20 x 1.5) as the extension for the lead wire. If a connecting port other than M20 x 1.5 is selected, the cable gland will not be provided, so use a cable gland with the same or greater explosion-proof grades than this positioner.

**• Barrier**

Connect the barrier as shown in the diagram below. Moreover, the user must select a barrier that is suitable for each function, based on the ATEX intrinsically safe explosion-proof parameters (current circuit). For IP8001/8101 type smart positioners, use a linear resistant type barrier that is based on the explosion-proof parameters.

**Barrier connection diagram**



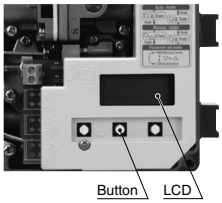

Moreover, at SMC, the barriers listed in the chart below are used to check operations. To purchase, please contact PEPPER + FUCHS Inc. (Germany).

**Recommended barriers**

| | Manufacturer | Model | Note | Applicable model | |
|---|---|---|---|---|---|
| | | | | IP8□00-X14 | 52-IP8□01 |
| For input signal (non HART transmission) | PEPPERL + FUCHS (Germany) | KFD2-CD-Ex1.32 | — | ○ | ○ |
| For input signal (for HART transmission) | | KFD2-SCD-Ex1.LK<br>KCD2-SCD-Ex1 | — | — | ○ |
| For analog output | | KFD2-STC4-Ex1 | — | — | ○ |
| For alarm output | | KFD2-SOT2-Ex2 | Transistor Output passive type | — | ○ |
| | | KFD2-ST2-Ex2 | Transistor Output passive type | — | ○ |
| | | KFD2-SR2-Ex2.W | Relay output | — | ○ |

## HART transmission

With smart positioners IP8001/8101, the user can operate the positioner using buttons and change parameter settings by viewing the LCD display (shown the right). Furthermore, depending on the model selected, the same button operation and parameter settings, and monitoring is possible from a remote location via HART transmission.




The table below lists an example of applications that are compatible with smart positioner IP8001/8101. Application selection must be made by the user. Please contact Emerson Process Management for further details.

**HART transmission compatible application**

| Product name Note) | Manufacturer |
|---|---|
| AMS™ Suite : Intelligent Device Manager ® | Emerson Process Management (US) |
| 375 Field Communicator | |

Note) AMS™ Suite: Intelligent Device Manager® is a registered trademark of Emerson Electric Co.

# Series IP8□
# Electro-Pneumatic Positioner/Smart Positioner
# Specific Product Precautions 1

**Be sure to read this before handling.**

## Operation

### ⚠Warning

1. **Do not operate the positioner outside the specified range as this may cause problems. (Refer to the specifications.)**
2. **Design the system to include a safety circuit to avoid the risk of danger should the positioner suffer failure.**
3. **Be sure that exterior lead-in wiring to the terminal box is based on the guidelines for explosion-protection of manufactory electric equipment when being used as a flame proof, explosion proof construction.**
4. **Do not remove terminal cover in a hazardous location while the power is on.**
5. **Covers for the terminal and body should be in place while operating.**
6. **When using as an intrinsically safe explosion-proof product, do not wire in a hazardous location while the power is on.**

### ⚠Caution

1. **Do not touch the actuator or valve's oscillating section when supply pressure has been added, as this is dangerous.**
2. **Make sure fingers do not get caught when mounting and aligning the cam.**
   Cut off the pressure supply and always release the compressed air inside the positioner and actuator before performing this work.
3. **Always use with the body cover unit mounted.**
   Moreover, the positioner may not meet degrees of protection IP65 depending on the body cover mounting conditions. In order to meet degrees of protection IP65, tighten threads using the proper tightening torques (2.8 to 3.0 N·m).
4. **Always flush the pipe's insides before piping to ensure foreign objects such as machining chips do not enter the positioner.**
5. **The actuator opening may become unstable when using the booster relay.**
6. **Always use a ground connection to prevent noise from the input current and to prevent damage because of static electricity.**
7. **Use the pressure reading on the supplied pressure gauge as an indication.**
8. **The supplied pressure gauge's needle will malfunction if the pressure supply to the internal mechanism or positioner freezes.**
   Ensure that the pressure gauge's internal parts do not freeze if using the pressure gauge in an operating environment with an ambient temperature of less than 0°C.
9. **This positioner performs the fixed position control.**
   Avoid turning ON or OFF the input signal highly frequently.

## For Users

### ⚠Caution

1. **Assemble, operate and maintain the positioners after reading the operation manual thoroughly and understanding the content.**

## Handling

### ⚠Caution

1. **Avoid excessive vibration or impact to the positioner body and any excessive force to the armature, as these actions may cause damage to the product. Handle carefully while transporting and operating.**
2. **If being used in a place where vibration occurs, using a binding band is recommended to prevent broken wires because of the vibration.**
3. **When exposed to possible moisture invasion, please take the necessary measures. For example, if the positioner is left on-site for long periods, a plug should be put in the piping port and a body cover unit fitted to avoid water penetration.**
   Take measures to avoid dew condensation inside the positioner if exposed to high temperature and humidity. Take enough measures against condensation especially when packing for export.
4. **Keep magnetic field off the positioner, as this affects its characteristics.**

## Air Supply

### ⚠Caution

1. **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.**
2. **Never use a lubricator, as this can cause a malfunction (∗1).**
3. **Do not use compressed air containing chemicals, organic solvents, salinity or corrosive gases, as this may cause malfunction.**
4. **When operating below the freezing point, protect the positioner from freezing.**

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



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# *Series IP8□*
# Electro-Pneumatic Positioner/Smart Positioner
# Specific Product Precautions 2

**Be sure to read this before handling.**

## Operating Environment

### ⚠Caution

1. **Do not operate in locations with an atmosphere of corrosive gases, chemicals, sea water, or where these substances will adhere to the regulator.**
2. **Do not operate out of the indicated operation temperature range as this may cause damage to electronic parts and seal materials to deteriorate.**
3. **Do not operate in locations where excessive vibration or impact occurs.**
4. **If the body cover is being installed in a place where the body cover is exposed to direct sunlight, the use of a standard body cover without the LCD window is recommended.**

## Maintenance

### ⚠Warning

1. **After installation, repair or disassembly, connect compressed air and conduct tests to confirm appropriate function and leakage.**

   Do not use the positioner when noise from the bleeder sounds louder compared with the initial state, or when it does not operate normally. If these occur, check immediately if assembled and mounted correctly.

   Never modify electrical construction to maintain explosion-proof construction.

### ⚠Caution

1. **Confirm whether the compressed air is clean.**

   Dust, oil, or moisture mixed within the equipment may result in malfunction and positioner problems. Perform periodic inspection of the air preparation equipment to ensure clean air is always supplied.

2. **Improper handling of compressed air is dangerous. Not only observing the product specifications, but also replacement of elements and other maintenance activities should be conducted by personnel having sufficient knowledge and experience pertaining to instrumentation equipment.**
3. **Perform annual inspections of the positioner.**

   Replace badly damaged seals and units such as diaphragm and O-ring during the inspection.

   When used in tough environmental and/or service conditions such as seaside locations, replacements should be undertaken more frequently.

## Maintenance

### ⚠Caution

4. **When performing inspections, demounting the positioner, or replacing the elements with the positioner still in its mounted position, first, stop the compressed air, then exhaust the residual pressure before undertaking operation.**
5. **Should the restrictor become clogged with carbon particles, etc., demount automatic/manual change-over screw (with built-in restrictor) and clean it using a ø0.2 wire.**

   Stop the compressed air and remove the screw to switch the pilot valve off before replacing the restrictor.

6. **Apply just a small amount of grease set by SMC to the sliding parts (O-ring and exhaust valve) when disassembling a pilot valve unit.**

   Replacing the valve unit every three years is recommended.

7. **Check for air leakage from pipes that pass compressed air and connecting parts.**

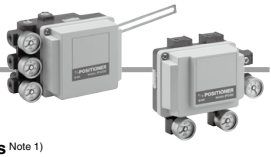
   Air leakage from air piping results in reduced operational performance and a decline of characteristics, etc.

   It is structurally necessary for air to be released from the bleeder, it is not abnormal as long as the air consumption is within the specified range.

# 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**

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

**Pressure gauge/Air port**

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

**Accessories** Note 1)

| | | |
|---|---|---|
| Nil | 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 Note 2) |
| F | For stroke 50 to 140 mm with lever unit | |

Note 1) If two or more accessories are required, the part numbers should be given in alphabetical order.
Ex.) IP5000-010-AD
Note 2) For "E" and "F", standard lever is not provided.

## Precautions

1. Avoid impact to positioner while transporting and handling.
2. Operate within specified temperature range to prevent deterioration of seals.
3. Attach a body cover to the positioner when it is in use or left in the field in order to avoid rain water.
4. 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.
5. The zero point is subject to the mounting position. Adjust zero point after installation on the site.
6. 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.
7. 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 |
| **Supply pressure** | 0.14 to 0.7 MPa | | | |
| **Input pressure** | 0.02 to 0.1 MPa | | | |
| **Standard stroke** | 10 to 85 mm | | 60° to 100° | |
| **Sensitivity** | Within 0.1% F.S. | Within 0.5% F.S. | | |
| **Linearity** | Within ±1% F.S. | Within ±2% F.S. | | |
| **Hysteresis** | Within 0.75% F.S. | Within 1% F.S. | | |
| **Repeatability** | Within ±0.5% F.S. | | | |
| **Air consumption** | 5 L/min (ANR) or less (SUP = 0.14 MPa)Note) | | 11 L/min (ANR) or less (SUP = 0.4 MPa)Note) | |
| **Output flow rate** | 80 L/min (ANR) or more (SUP = 0.14 MPa)Note) | | 200 L/min (ANR) or more (SUP = 0.4 MPa)Note) | |
| **Ambient and fluid temperature** | –20°C to 80°C (Standard) | | | |
| **Coefficient of temperature** | Within 0.1% F.S./°C | | | |
| **Air connection port** | Rc1/4 (Standard) | | | |
| **Main component parts** | Aluminum die-cast, Stainless steel, Brass, Nitrile rubber | | | |
| **Weight** | Approx. 1.4 kg | | Approx. 1.2 kg | |
| **Dimensions** | 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: Nil) |
| P378010-12 | Feedback lever | For IP5000/35 to 100 mm (Accessory: E) |
| P378010-13 | Feedback lever | For IP5000/50 to 140 mm (Accessory: F) |



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## Principle of Operation

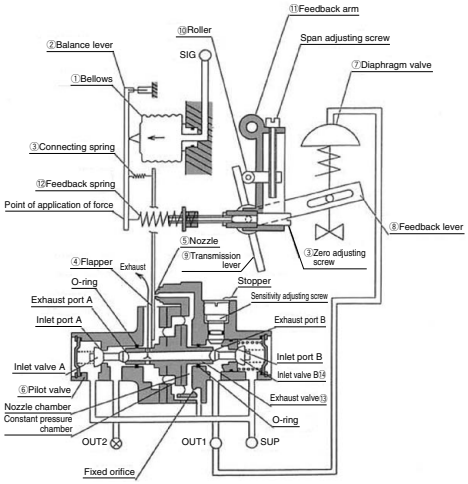
### IP5000 type

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**



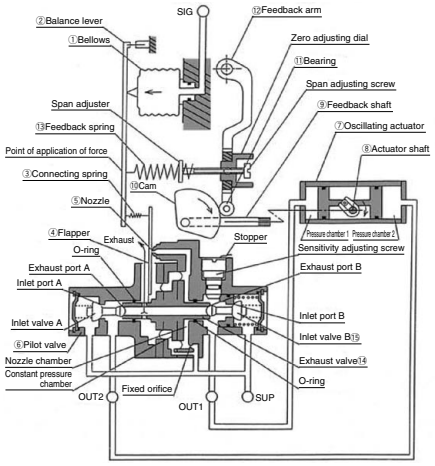

### IP5100 type

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.

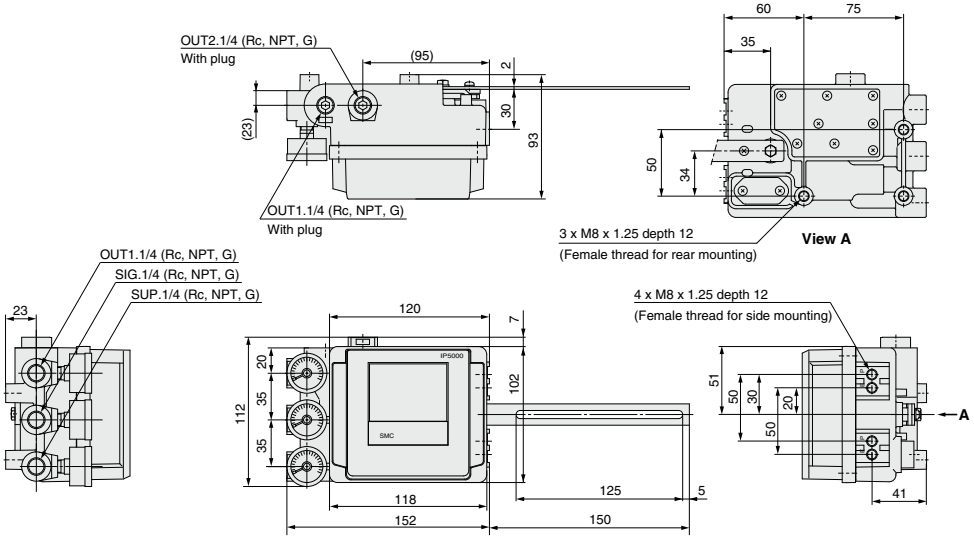
Since oscillating actuator ⑦ moves until the tensile force of feedback spring ⑬ and the force generated by bellows ① balance, it is always set in the position proportional to the input pressure. When the signal air pressure decreases, the operation is reversed.

**IP5100 principle of operation**

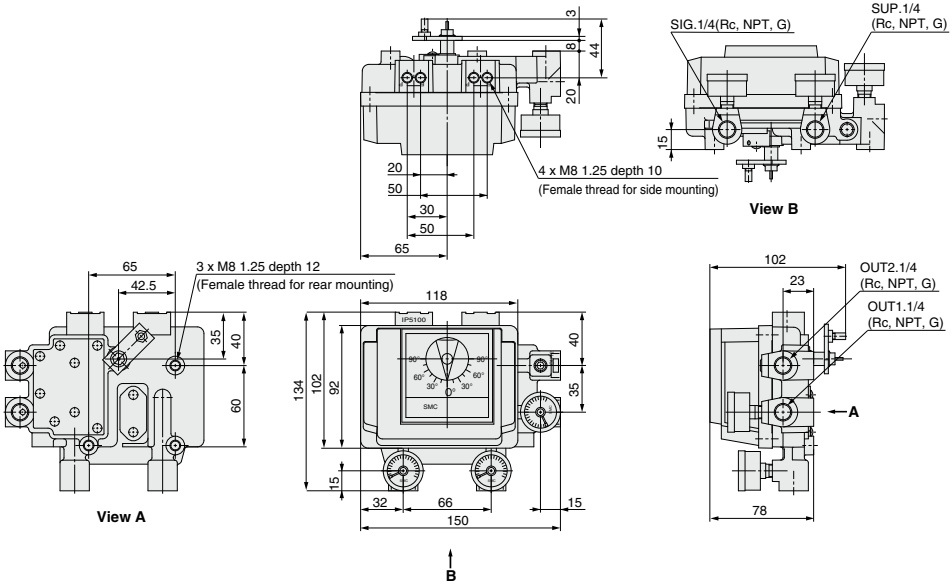


## Dimensions

### IP5000 type (Lever type lever feedback)




### IP5100 type (Rotary type cam feedback)



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# Cylinder Positioner
# *Series IP200*

- **Servo-mechanism allows precise and stable position control of cylinders.**
- **Can be used as a cylinder position control unit for general industrial machines.**

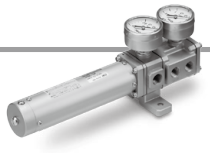
## How to Order

**IP200 – 100**

**Applicable stroke**

| 25 to 300 mm |
|---|

∗ Manufacture of strokes at 1 mm intervals is possible.



## Specifications (No load)

| | |
|---|---|
| **Supply pressure** | 0.3 to 0.7 MPa |
| **Input pressure** | 0.02 to 0.1 MPa |
| **Applicable bore size** | ø50 or more |
| **Applicable stroke** | 25 to 300 mm or less |
| **Sensitivity** | Within 0.5% F.S. |
| **Linearity** | Within ±2% F.S. |
| **Hysteresis** | Within 1% F.S. |
| **Repeatability** | Within ±1% F.S. |
| **Air consumption**∗ | 18 L/min (ANR) or less (SUP = 0.5 MPa) |
| **Influence by change in supply pressure** | Within 1% F.S./0.05 MPa |
| **Ambient and fluid temperature** | –5°C to 60°C |
| **Port size** | Rc1/4 (Gauge port Rc1/8) |
| **Weight** | Approx. 700 g |

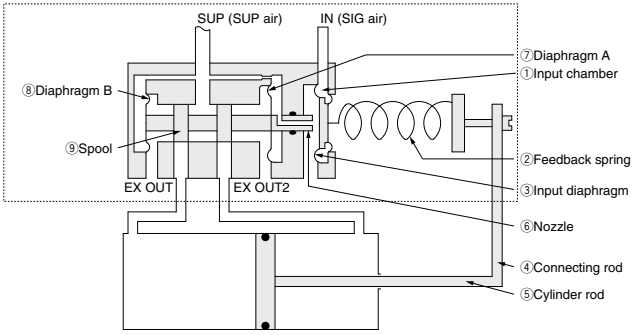
∗ Air consumption is due to exhaust from nozzle.

**Replacement Parts**

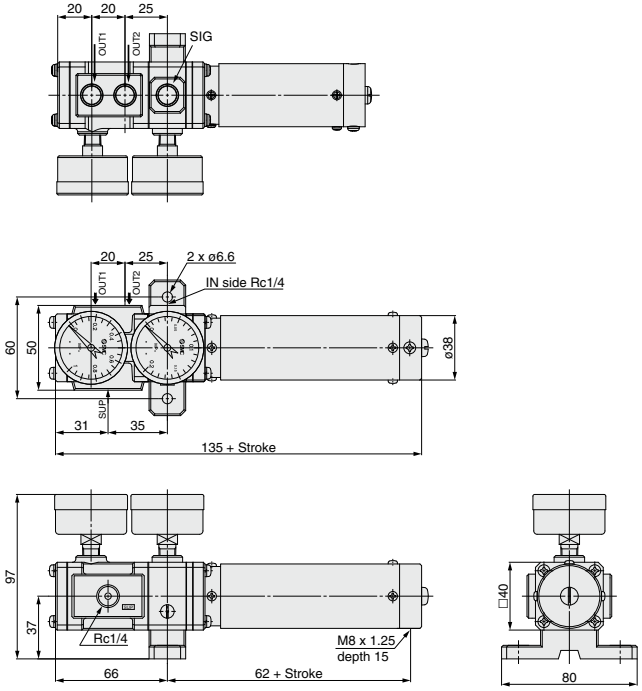
| Part no. | Description | Note |
|---|---|---|
| IP200-02 | Pilot valve unit | |
| 39020-23 | Seal kit | Ambient temperature: Standard (–5° to 60°) |

## Construction/Principle of Operation

When signal pressure enters input chamber ①, the input diaphragm ③ is deflected left. Clearance of the nozzle ⑥ is reduced causing higher back pressure at diaphragm A ⑦. This diaphragm A ⑦ has larger area than diaphragm B ⑧ resulting in movement of the spool to the left. Supply pressure then flows to OUT1 ① and partial exhaust from OUT2 takes place resulting in cylinder rod ⑤ movement to the right. The movement is linked via connecting rod ④ and feedback spring ② to the input diaphragm ③ balancing the higher pressure. When this occurs nozzle ⑥ clearance increases allowing centralizing of the spool ⑨ to take place. This holds the piston rod in the new position. Input signal increase results in proportional movement of the piston rod.



## Dimensions




# ⚠ Precautions

**Caution**

## ⚠ Caution

**1. 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.**

**2. Never use a lubricator, as this can cause a malfunction (∗1).**

**3. Be sure to flush the piping to prevent foreign matter from entering the positioner before connecting them.**

∗1 If the restrictor is clogged, the cylinder rod may not perform a stroke or hunching and overshoot may occur.

# Pneumatic Instrumentation Equipment

# Regulators

# Filter Regulator
# *Series IW*

- **Two types are available: adjustable set pressure type and fixed set pressure type.**
- **Low/High temperature and external parts copper-free types can be selected.**
- **Pressure gauge connecting direction: 2 directions (Front/Back)**
- **Weight: 0.66 kg (Adjustable type), 0.58 kg (Fixed type)**

## How to Order

**IW 2 [1] [2] – [ ] 02 – [ ] – [ ]**

**Filter regulator**

**Type of setting**

| | |
|---|---|
| 1 | Adjustable type (Handle) |
| 2 | Fixed type (0.14 MPa) |

**Set pressure**

| | |
|---|---|
| 2 | 0.02 to 0.2 MPa |
| 3 | 0.02 to 0.3 MPa |
| 5 | 0.02 to 0.5 MPa |

∗ Fixed type is IW222 only.

**Thread type**

| | |
|---|---|
| Nil | Rc |
| N | NPT∗ |

∗ Semi-standard

**Port size**

| | |
|---|---|
| 02 | 1/4 |

**Accessories**

| | |
|---|---|
| Nil | None |
| B | With bracket |
| G | With pressure gauge |

**Suffix**

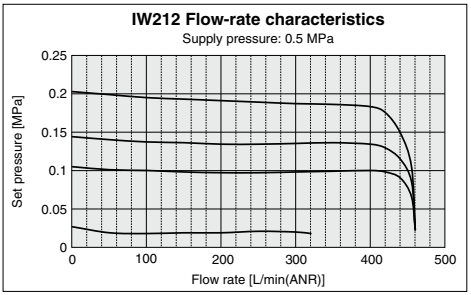
| | Low temperature (–30 to 60°C) | High temperature∗ (–10 to 100°C) | External parts copper-free |
|---|---|---|---|
| Nil | — | — | — |
| T | — | ● | — |
| L | ● | — | — |
| S | — | — | ● |
| ST | — | ● | ● |
| SL | ● | — | ● |

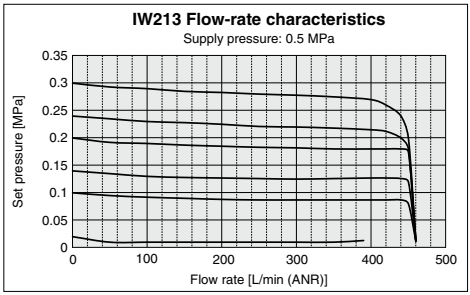
∗ With pressure gauge type: Max. 80°C.

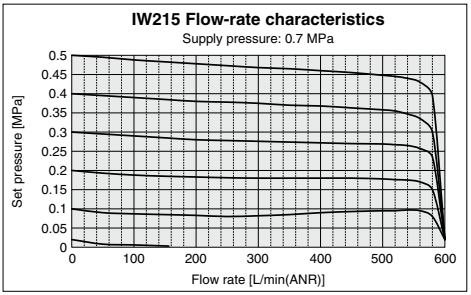
## Standard Specifications

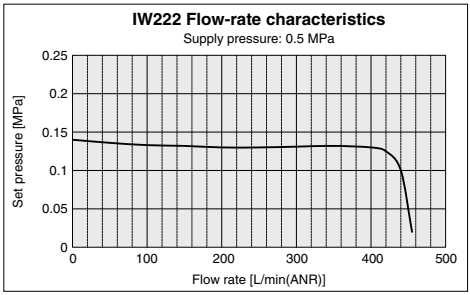
| Model | IW212 | IW213 | IW215 | IW222 |
|---|---|---|---|---|
| | Adjustable type (Basic) | | | Fixed type |
| **Maximum supply pressure** | Max. 1.0 MPa | | | 0.3 to 1.0 MPa |
| **Set pressure** | 0.02 to 0.2 MPa | 0.02 to 0.3 MPa | 0.02 to 0.5 MPa | 0.14 MPa |
| **Air consumption (At maximum set pressure)** | 1 L/min (ANR) or less | | | 0.5 L/min (ANR) or less |
| **Ambient and fluid temperature** | –10 to 60°C (No freezing) | | | |
| **Filtration accuracy** | 5 μm | | | |
| **Port size** | Rc1/4 | | | |
| **Pressure gauge port** | Rc1/4 (2 locations) | | | |
| **Weight** | 0.66 kg | | | 0.58 kg |

## Flow-rate Characteristics (Representative values)

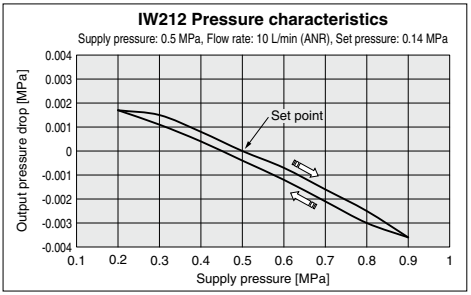


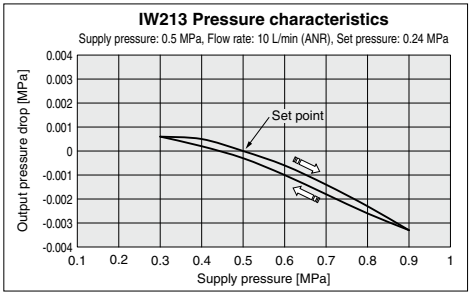



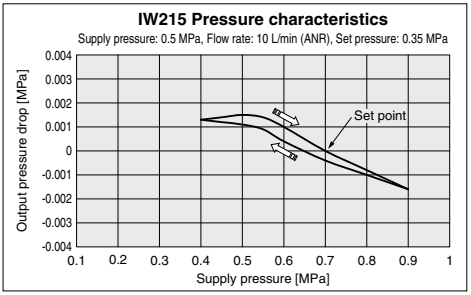



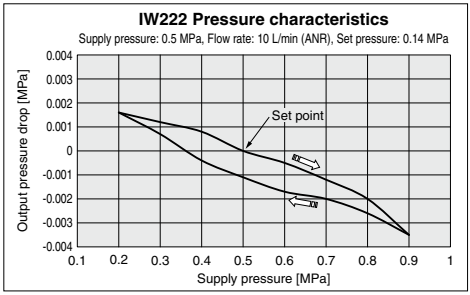




## Pressure Characteristics (Representative values)

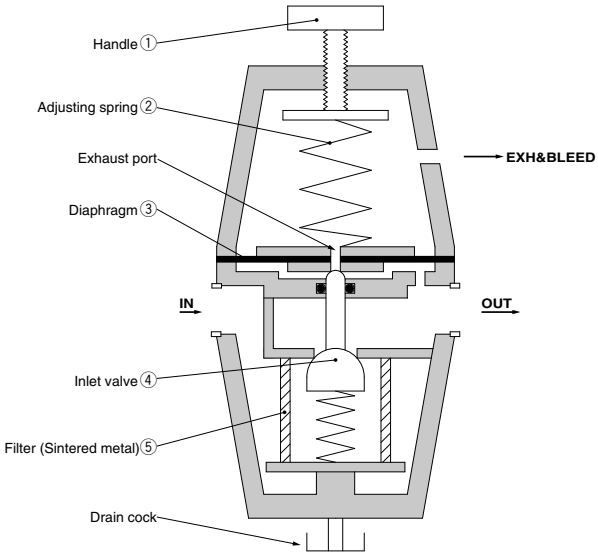


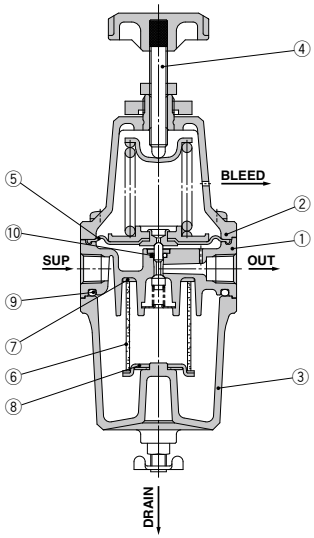



## Principle of Operation




Air flow from the inlet passes through filter (sintered metal) ⑤ where solids are removed. When handle ① is adjusted downwards, adjusting spring ② is compressed. The inlet valve ④ is opened allowing air flow to the outlet. Air outlet pressure balances against diaphragm ③ and adjusting spring ②. When the outlet pressure is higher than the set pressure, the inlet valve ④ is closed and exhaust of the excess outlet pressure takes place through the adjusting spring cover bleed. This ensures constant outlet pressure is maintained.

## Construction




### Component Parts

| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Body assembly** | Aluminum die-casted/Aluminum | Silver color |
| 2 | **Bonnet** | Aluminum die-casted/Brass | Silver color |
| 3 | **Bowl assembly** | Aluminum die-casted/Brass | Silver color |
| 4 | **Handle** | ABS/Stainless steel | — |

### Replacement Parts

| No. | Description | Material | Part no. |
|---|---|---|---|
| 5 | **Diaphragm assembly** | Aluminum die-casted/Brass/NBR | P218010-1 |
| 6 | **Element** | Bronze | 1301111-5B |
| 7 | **Seal** | NBR | 1301510 |
| 8 | **Filter disk assembly** | Brass/NBR | P218010-16 |
| 9 | **O-ring** | NBR | AS568-228 |
| 10 | **O-ring** | NBR | JISB2401 P4 |



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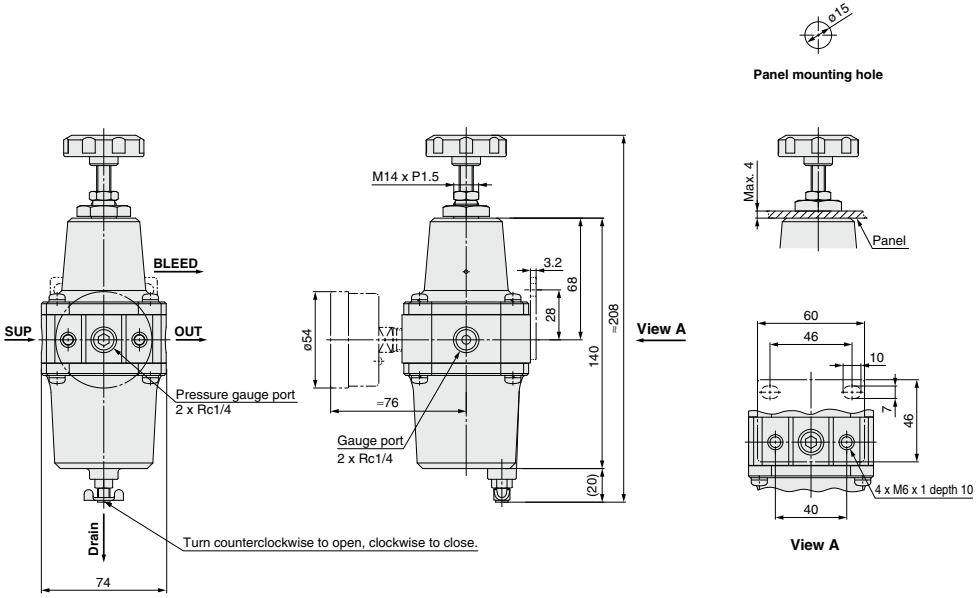
## Dimensions


ø15
Panel mounting hole
BLEED
SUP
OUT
Pressure gauge port
2 x Rc1/4
Drain
Turn counterclockwise to open, clockwise to close.
74
M14 x P1.5
3.2
68
28
ø54
=76
Gauge port
2 x Rc1/4
140
=208
(20)
View A
Max. 4
Panel
60
46
10
7
46
4 x M6 x 1 depth 10
40
View A

# Filter Regulator
# *Series 1301*

- **External main parts: Stainless steel type is available.**
- **Low temperature/High temperature type is available. (Made-to-Order products of Series AW on page 1079)**

## How to Order

**1301 – 002 □**

**Filter regulator**

**Set pressure**

| | |
|---|---|
| **002** | 0.02 to 0.2 MPa |
| **1202** | 0.02 to 0.29 MPa |
| **2502** | 0.02 to 0.49 MPa |
| **902*** | 0.02 to 0.2 MPa |

* External main parts are made of stainless steel. For details, refer to page 1077.

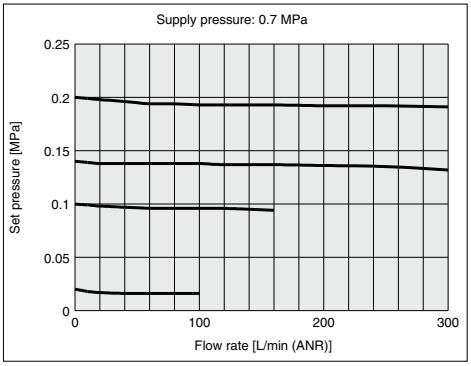
**Accessories**

| | |
|---|---|
| **Nil** | None |
| **B** | With bracket |
| **G** | With pressure gauge |

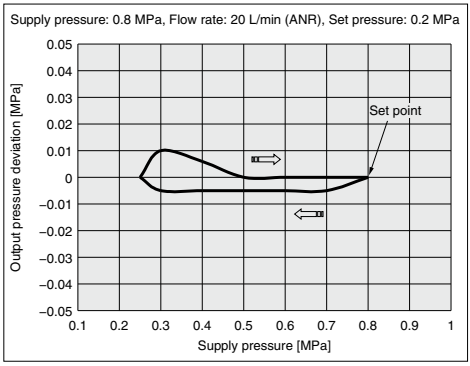
## Standard Specifications

| Model | Basic type | | | External main parts: Stainless steel |
|---|---|---|---|---|
| | **1301-002** | **1301-1202** | **1301-2502** | **1301-902** |
| **Maximum supply pressure** | Max. 1.0 MPa | | | |
| **Set pressure** | 0.02 to 0.2 MPa | 0.02 to 0.29 MPa | 0.02 to 0.49 MPa | 0.02 to 0.2 MPa |
| **Ambient and fluid temperature** | –5 to 60°C (No freezing) | | | |
| **Filtration accuracy** | 5 μm | | | |
| **Port size** | Rc1/4 | | | |
| **Pressure gauge port** | Rc1/8 (1 location) | | | |
| **Weight** | 1.07 kg | | | |

## Flow-rate Characteristics (Representative values)




## Pressure Characteristics (Representative values)



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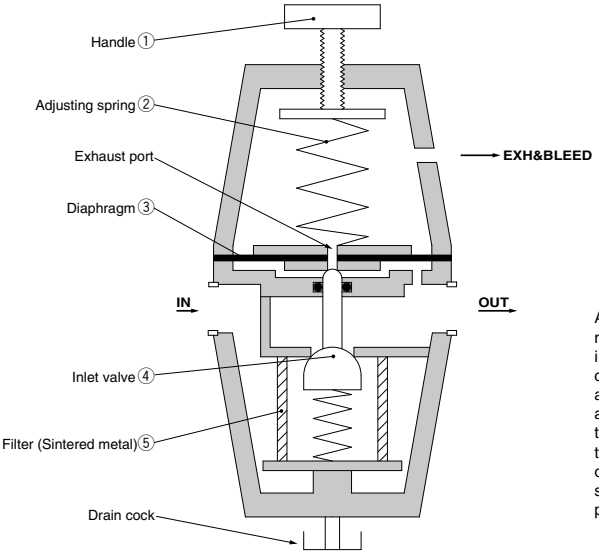
## Principle of Operation

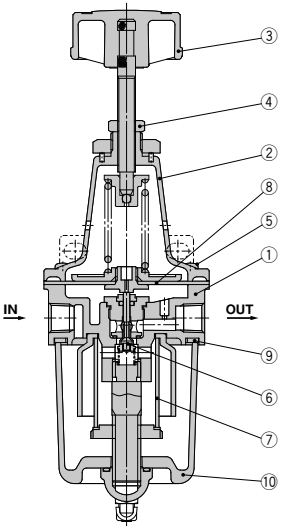
### 1301




Air flow from the inlet passes through filter (sintered metal) ⑤ where solids are removed. When handle ① is adjusted downwards, adjusting spring ② is compressed. The inlet valve ④ is opened allowing air flow to the outlet. Air outlet pressure balances against diaphragm ③ and adjusting spring ②. When the outlet pressure is higher than the set pressure, the inlet valve ④ is closed and exhaust of the excess outlet pressure takes place through the adjusting spring cover bleed. This ensures constant outlet pressure is maintained.

## Construction

### 1301



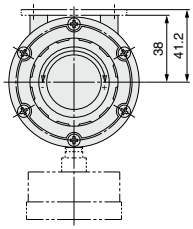

#### Component Parts

| No. | Description | Material | | | | Note |
|---|---|---|---|---|---|---|
| | | Basic type | | | External main parts: Stainless steel | |
| | | 1301-002 | 1301-1202 | 1301-2502 | 1301-902 | |
| 1 | Decompression chamber | Zinc die-casted | | | | Silver color |
| 2 | Bonnet | Zinc die-casted | | | | Silver color |
| 3 | Handle | ABS/Brass | | | ABS/Stainless steel | — |
| 4 | Lock nut | Brass | | | Stainless steel | — |
| 5 | Round head Phillips screw | Brass | | | Stainless steel | — |

#### Replacement Parts

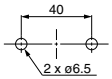
| No. | Description | Material | Part no. | | | |
|---|---|---|---|---|---|---|
| | | | Basic type | | | External main parts: Stainless steel |
| | | | 1301-002 | 1301-1202 | 1301-2502 | 1301-902 |
| 6 | Pilot valve | Stainless steel/NBR | 1301207#1 | | | 1301207#1 |
| 7 | Element | Bronze | 1301111-5B | | | 1301111-5B |
| 8 | Diaphragm assembly | Weather resistant NBR/ Brass/ADC | 13014A | | | 13014A |
| 9 | Bowl seal | NBR | 130124 | | | 130124 |
| 10 | Bowl assembly | ZDC/Brass | 130191A | | | — |
| | | ZDC/Stainless steel | — | | | 130191A-S |

## Dimensions

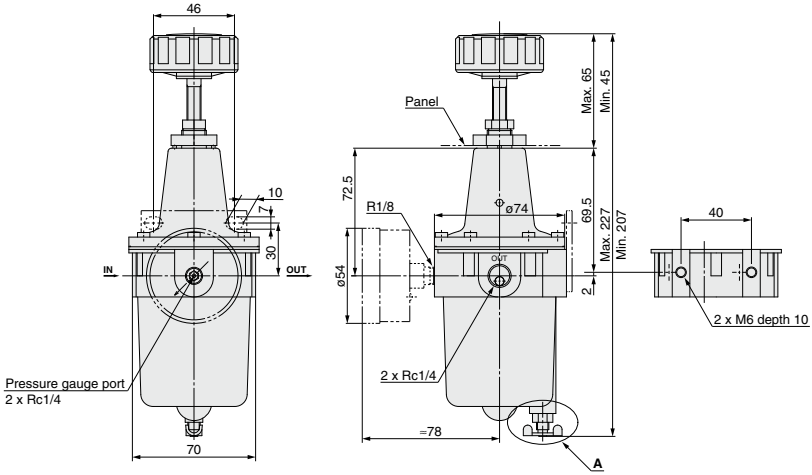



**View A**

| Model | 1301-002(BG) 1202(BG), 2502(BG) | 1301-902(BG) |
|---|---|---|
| Dimensions |  |  |

| Panel mounting hole | Horizontal mounting | Vertical mounting |
|---|---|---|
| |  |  |





# Filter Regulator
# *AW30 to AW60*
# Made to Order

Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

## Special Temperature Environment

Special materials are used in the manufacturing of seals and resin parts to allow them to withstand various temperature conditions in cold or tropical (hot) climates.

### Specifications

| Made-to-Order part no. | | -X430 | -X440 |
|---|---|---|---|
| **Environment** | | Low temperature | High temperature |
| **Ambient temperature (°C)** | | –30 to 60 | –5 to 80 |
| **Fluid temperature (°C)** | | –5 to 60 (with no freezing) | |
| **Material** | **Rubber parts** | Special NBR | FKM |
| | **Main parts** | Metal (Aluminum die-cast, etc.) | |
| **Nominal filtration rating** | | 5 µm | |

**AW30-03G-2-X440**

### Applicable Model

| Model | AW30 | AW40 | AW40-06 | AW60 |
|---|---|---|---|---|
| **Port size** | 1/4, 3/8 | 1/4, 3/8, 1/2 | 3/4 | 3/4, 1 |

- Option/Semi-standard: Select one each for **a** to **g**.
- Option/Semi-standard symbol: When more than one specification is required, indicate in alphanumeric order.

Example) AW30-03BG-2N-X430

**AW 30 – ❶ 03 BG – 2 ❷ ❸ ❹ ❺ ❻ – X430**

**For high/low temperature**

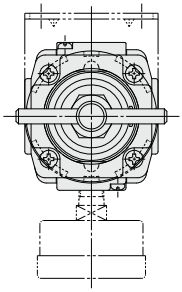
| | |
|---|---|
| **X430** | Low temperature |
| **X440** | High temperature |

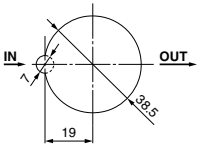
| | | Symbol | Description | ❶ Body size 30 | 40 | 60 |
|---|---|---|---|---|---|---|
| ❷ | Thread type | **Nil** | Rc | ● | ● | ● |
| | | **N** | NPT | ● | ● | ● |
| | | **F** | G | ● | ● | ● |
| ❸ | Port size | **02** | 1/4 | ● | ● | — |
| | | **03** | 3/8 | ● | ● | — |
| | | **04** | 1/2 | — | ● | — |
| | | **06** | 3/4 | — | ● | ● |
| | | **10** | 1 | — | — | ● |
| ❹ | Option Note 1) a Mounting | **Nil** | Without mounting option | ● | ● | ● |
| | | **B** Note 2) | With bracket | ● | ● | ● |
| | | **H** | With set nut (for panel fitting) | ● | ● | — |
| | b Pressure gauge | **Nil** | Without pressure gauge | ● | ● | ● |
| | | **G** Note 3) | Round type pressure gauge (without limit indicator) | ● | ● | ● |
| ❺ | Bowl Note 4) | **2** | Metal bowl | ● | ● | ● |
| ❻ | Semi-standard c Set pressure | **Nil** | 0.05 to 0.85 MPa setting | ● | ● | ● |
| | | **1** Note 5) | 0.02 to 0.2 MPa setting | ● | ● | ● |
| | d Drain port | **Nil** | With drain cock | ● | ● | ● |
| | | **J** Note 6) | Drain guide 1/4 | ● | ● | ● |
| | e Exhaust mechanism | **Nil** | Relieving type | ● | ● | ● |
| | | **N** | Non-relieving type | ● | ● | ● |
| | f Flow direction | **Nil** | Flow direction: Left to right | ● | ● | ● |
| | | **R** | Flow direction: Right to left | ● | ● | ● |
| | g Pressure unit | **Nil** | Name plate, caution plate for bowl, and pressure gauge in imperial units: MPa | ● | ● | ● |
| | | **Z** Note 7) | Name plate, caution plate for bowl, and pressure gauge in imperial units: psi, °F | ○ Note 8) | ○ Note 8) | ○ Note 8) |

Note 1) Option B, G, H are not assembled and supplied loose at the time of shipment.
Note 2) Assembly of a bracket and set nuts (AW30 to AW40)
Including 2 mounting screws for the AW60
Note 3) Mounting thread for pressure gauge: 1/8 for the AW30, 1/4 for the AW40 and AW60. Pressure gauge type: G43
Note 4) Only metal bowl 2 is available.
Note 5) The only difference from the standard specifications is the adjusting spring for the regulator. It does not restrict the setting of 0.2 MPa or more. When the pressure gauge is attached, a 0.2 MPa pressure gauge will be fitted.
Note 6) Without a valve function
Note 7) For thread type: NPT. This product is for overseas use only according to the new Measurement Law. (The SI unit type is provided for use in Japan.)
Note 8) ○: For thread type: NPT only

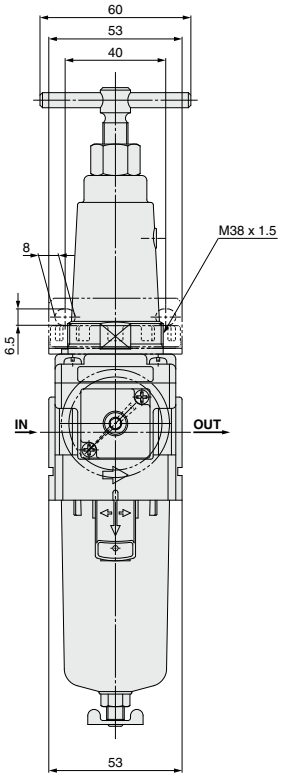
## Dimensions

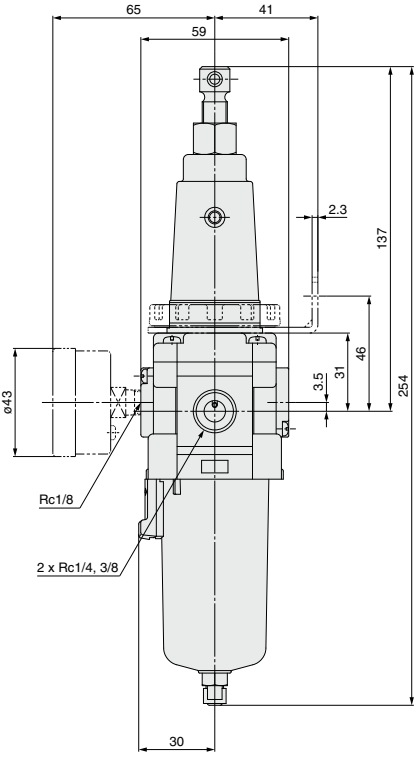
### AW30-X430, -X440






**Panel fitting dimensions**






INDEX

# Filter Regulator

## Stainless Steel 316 and Special Temperature Environment (–40°C) Specifications

# AW30/40-X2622

- **External parts material: Stainless steel 316**
- **Ambient and fluid temperature: –40 to 80°C**
- **NACE International Standards compliant**
  The JIS component standards of the external parts and the component measurement results of the certificate for materials are within the ANSI/NACE standards.

## How to Order

**AW 30 – ❷ 03 ❹ – ❺ – X2622 ❻**

❶ ❷ ❸ ❹ ❺ ❻

**Stainless steel 316 specification**

· Option/Semi-standard: Select one each for **a** to **d**.
· Option/Semi-standard symbol: When more than one specification is required, indicate in alphanumeric order.
Example) AW30-03C-2R-X2622A

| | | | | Symbol | Description | ❶ Body size 30 | ❶ Body size 40 |
|---|---|---|---|---|---|---|---|
| ❷ | Thread type | | | **Nil** | Rc | ● | ● |
| | | | | **N** | NPT | ● | ● |
| | | | | **F** | G | ● | ● |
| | | | | + | | | |
| ❸ | Port size | | | **02** | 1/4 | ● | ● |
| | | | | **03** | 3/8 | ● | ● |
| | | | | **04** | 1/2 | — | ● |
| | | | | **06** | 3/4 | — | ● |
| | | | | + | | | |
| ❹ | Option i | **a** | Float type auto drain | **Nil** | Without option | ● | ● |
| | | | | **C** Note 1) | Float type auto drain (N.C.) | ● | ● |
| | | | | + | | | |
| ❺ | Semi-standard | **b** | Bowl | **2** Note 2) | Metal bowl | ● | ● |
| | | | | + | | | |
| | | **c** | Flow direction | **Nil** | Flow direction: Left to right | ● | ● |
| | | | | **R** | Flow direction: Right to left | ● | ● |
| | | | | + | | | |
| ❻ | Option ii | **d** | Pressure gauge Note 3) Bracket | **Nil** | Without option | ● | ● |
| | | | | **A** | Round type pressure gauge (without limit indicator) | ● | ● |
| | | | | **B** | With bracket | ● | ● |
| | | | | **C** | Round type pressure gauge (without limit indicator), With bracket | ● | ● |

Note 1) When the float type auto drain is selected, the fluid temperature range is –5 to 60°C (with no freezing), and the maximum operating pressure is 1.0 MPa. Take measures if the fluid temperature is likely to be out of the specified range due to the ambient temperature.
Note 2) Only metal bowl is available.
Note 3) The pressure gauge is shipped together, but not assembled. AW30: G43-10-□01-X3 or AW40: G43-10-□02-X3 is included.

## Specifications

| | |
|---|---|
| **Fluid** | Air |
| **Ambient and fluid temperature** | –40 to 80°C (with no freezing) |
| **Proof pressure** | 3.0 MPa |
| **Maximum operating pressure** | 2.0 MPa |
| **Set pressure range** | 0.05 to 0.85 MPa |
| **Nominal filtration rating** | 5 μm |
| **Drain capacity (cm³)** | AW30: 20, AW40: 80 |
| **Construction** | Relieving type |
| **Weight (kg)** | AW30: 1.19, AW40: 3.40 |

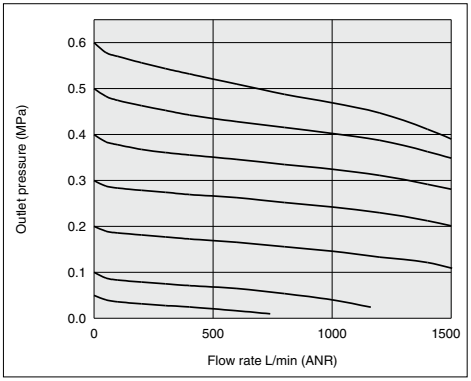
## Applicable Model

| Model | AW30 | AW40 |
|---|---|---|
| Port size | 1/4, 3/8 | 1/4, 3/8, 1/2, 3/4 |

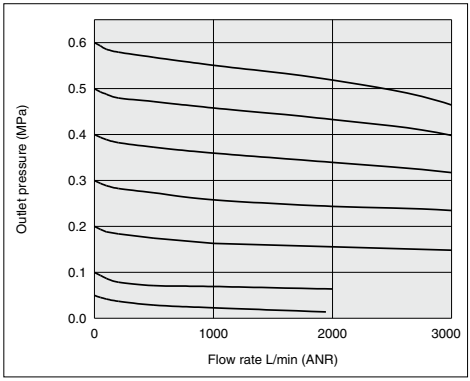
## Flow-rate Characteristics (Representative values)

Condition: Inlet pressure 0.7 MPa

### AW30-02-2-X2622



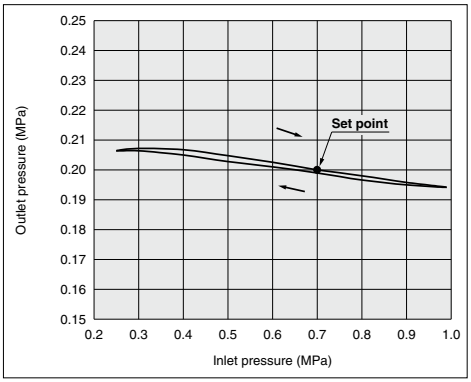

### AW40-04-2-X2622



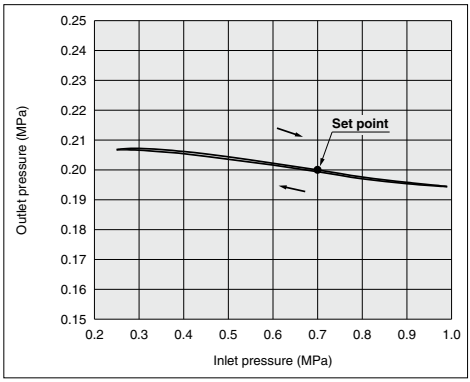

## Pressure Characteristics (Representative values)

Conditions: Inlet pressure 0.7 MPa, Outlet pressure 0.2 MPa, Flow rate 20 L/min (ANR)

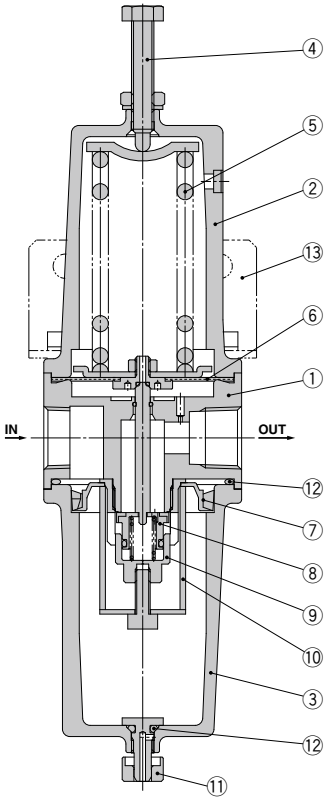
### AW30-02-2-X2622

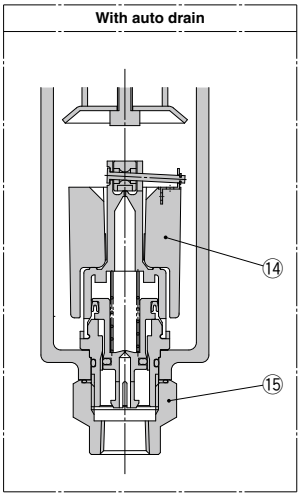



### AW40-04-2-X2622



## Construction

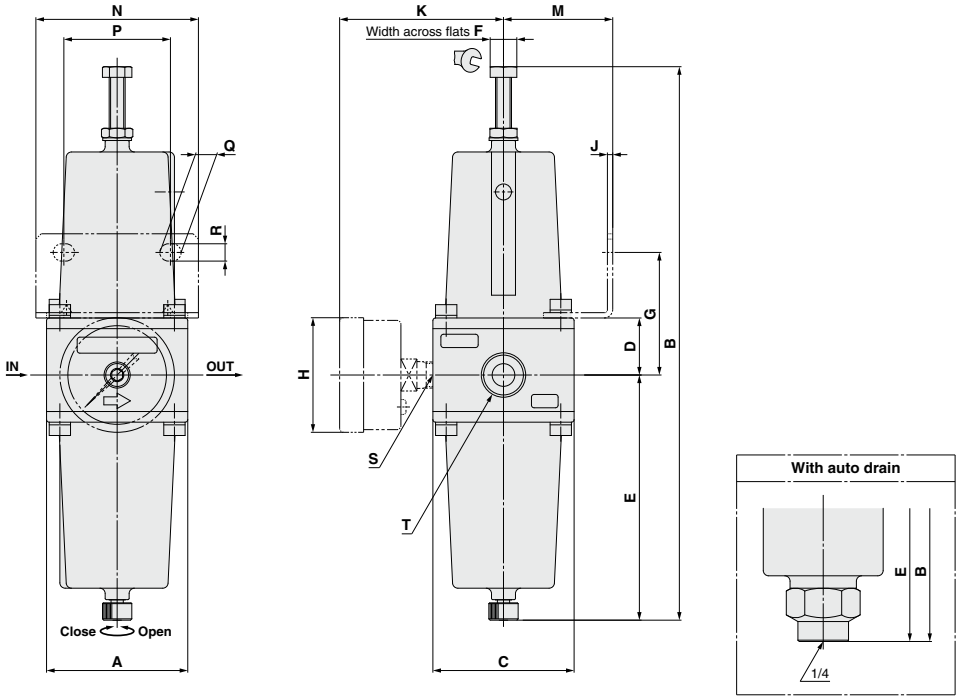



### Component Parts

| No. | Description | Material |
|---|---|---|
| 1 | **Body** | SCS14A (Equivalent to Stainless steel 316) |
| 2 | **Bonnet** | SCS14A (Equivalent to Stainless steel 316) |
| 3 | **Bowl** | SCS14A (Equivalent to Stainless steel 316) |
| 4 | **Pressure adjustment screw** | Stainless steel 316L |
| 5 | **Adjusting spring** | Stainless steel 304 |
| 6 | **Diaphragm** | CR |
| 7 | **Deflector** | PBT |
| 8 | **Valve** | Stainless steel 316/Low-temperature NBR |
| 9 | **Valve guide** | Stainless steel 316 |
| 10 | **Element** | Stainless steel 316L |
| 11 | **Drain cock** | Stainless steel 316 |
| 12 | **O-ring** | Low-temperature NBR |
| 13 | **Bracket** | Stainless steel 316 |
| 14 | **Auto drain** | POM/PBT/Foamed phenol/NBR etc. |
| 15 | **Drain guide** | Stainless steel 316 |

## Dimensions




| Model | T | A | B | C | D | E | F | G | H | J | K | M | N | P | Q | R | S | With auto drain | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | B | E |
| **AW30-X2622** | 1/4, 3/8 | 53 | 208 | 53 | 21.4 | 92 | 10 | 46 | ø43 | 2 | 61.5 | 41 | 61 | 40 | 8 | 6.5 | 1/8 | 255 | 139.5 |
| **AW40-X2622** | 1/4, 3/8, 1/2, 3/4 | 75 | 334 | 72 | 29.8 | 146 | 13 | 56 | ø43 | 2.5 | 73 | 50 | 80 | 54 | 10.5 | 8.5 | 1/4 | 366 | 178 |

## Regulator — Best Pneumatics


### Precision Regulator *IR*

Pressure Control Equipment

- Setting sensitivity: Within 0.2% F.S.
- Repeatability: Within ±0.5% F.S.

| Series | Port size | Set pressure (MPa) |
|---|---|---|
| **IR1000** | 1/8 | 0.005 to 0.2<br>0.01 to 0.4<br>0.01 to 0.8 |
| **IR2000** | 1/4 | |
| **IR3000** | 1/4, 3/8, 1/2 | 0.01 to 0.2<br>0.01 to 0.4<br>0.01 to 0.8 |

# Pneumatic Instrumentation Equipment

# Relays/Valves

# Booster Relay
# *Series IL100*

- **Used when the piping distance between instrumentation and operational area is long, or when operational area has large capacity.**
- **Can help accelerate actuation speed considerably.**

## How to Order

**IL 100 – [ ] 02 [ ] – [ ]**

**Booster relay**

**Thread type**

| | |
|---|---|
| **Nil** | Rc |
| **N** | NPT* |
| **F** | G* |

* Semi-standard

**Port size**

| | |
|---|---|
| **02** | 1/4 |
| **03** | 3/8 |

**Suffix**

| | |
|---|---|
| **Nil** | Standard |
| **T** | High temperature (–5 to 100°C) |
| **L** | Low temperature (–30 to 60°C) |
| **S** | Copper-free |
| **ST** | Copper-free/ High temperature (–5 to 100°C) |
| **SL** | Copper-free/ Low temperature (–30 to 60°C) |

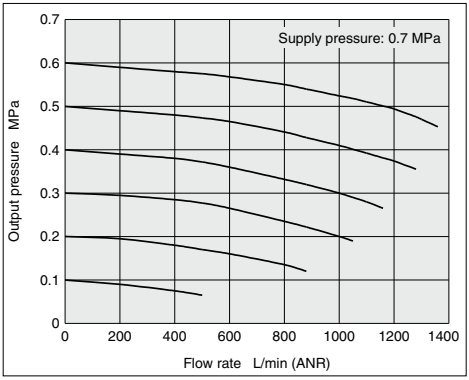
**Accessories**

| | |
|---|---|
| **Nil** | None |
| **B** | With bracket |

## Standard Specifications

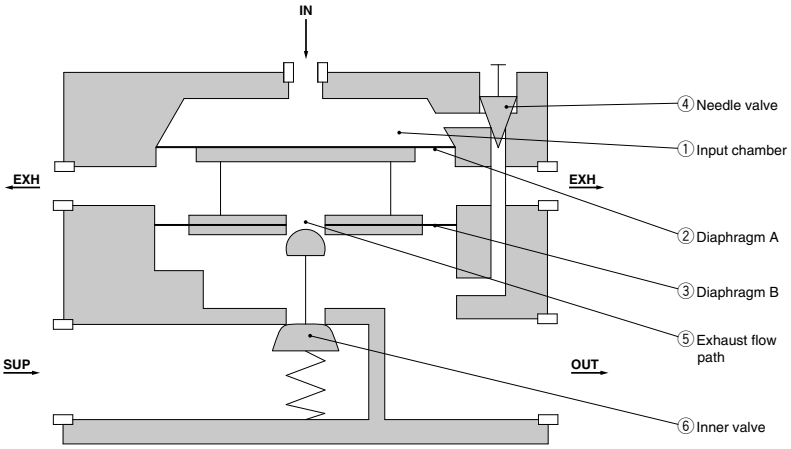
| | |
|---|---|
| **Supply pressure** | Max. 1.0 MPa |
| **Input pressure** | Max. 0.7 MPa |
| **Output pressure** | Max. 0.7 MPa |
| **Pressure ratio** | 1 : 1 |
| **Air consumption** | 3 L/min (ANR) or less (OUT = 0.5 MPa) |
| **Linearity** | Within ±1% |
| **Hysteresis** | Within 1% |
| **Ambient and fluid temperature** | –5 to 60°C |
| **Port size** | 1/4, 3/8 |
| **Weight** | 0.56 kg |

## Flow-rate Characteristics



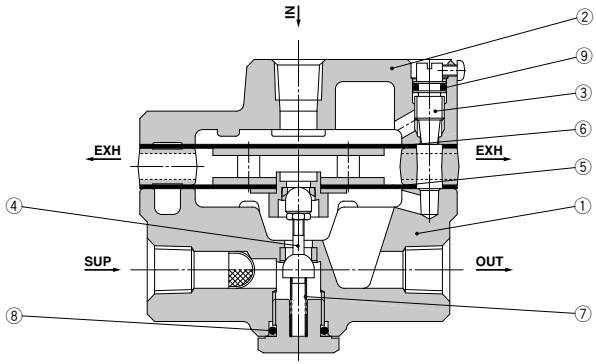
## Principle of Operation

### IL100




Signal pressure enters the input chamber ① and diaphragm A ② and exerts a downward force on diaphragm B ③. When the force of the input chamber ① exceeds the force of diaphragm B ③, inner valve ⑥ is inseated allowing air flow out the secondary supply port. On signal pressure exhaust the supply valve closes and exhaust flow path ⑤ is opened to allow vent of the secondary air supply to atmosphere. Input and output ports are connected by a needle valve ④. Adjustment ensures that exact equalization occurs between the signal and output supply. The above function allows a low volume signal to provide high volume output with pressure ratio remaining (1:1) for signal to output.

## Construction




### Component Parts

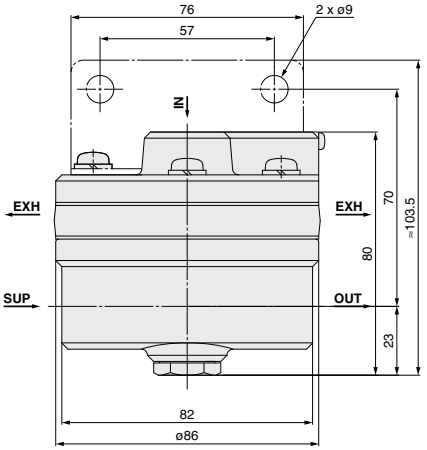
| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Valve** | Aluminum alloy | Silver baking finish |
| 2 | **Cover** | Aluminum alloy | Silver baking finish |
| 3 | **Throttle valve** | Stainless steel | |
| 4 | **Inner valve** | Stainless steel | |
| 5 | **Diaphragm assembly** | Aluminum alloy/NBR/Resin | Chromated |
| 6 | **Diaphragm** | NBR | |
| 7 | **Valve spring** | Stainless steel | |
| 8 | **O-ring** | NBR | |
| 9 | **O-ring** | NBR | |

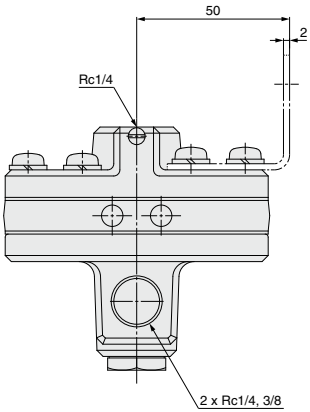
### Replacement Parts

| Model | Order no. | Contents |
|---|---|---|
| **IL100** | KT-IL100 | Set of left nos. ⑤, ⑥, ⑦, ⑧, ⑨ |

## Dimensions

### IL100



# Lock-Up Valve
# Series IL201/211/220

- **The lock-up valve is used if any air source or air supply piping line failure occurs in the air operated process control line.**

**Single acting, Double acting: Retains pressure at the operating area as emergency operation until the air source is recovered to its normal state.**
**3 Port: Changes the supply port if a trouble occurs.**

## How to Order

**IL 201 – □ 02 □ – □**

**Action**

| | |
|---|---|
| **201** | Single acting |
| **211** | Double acting |
| **220** | 3 Port |

**Thread type**

| | |
|---|---|
| **Nil** | Rc |
| **N** | NPT* |
| **F** | G* |

* Semi-standard

**Port size**

| | |
|---|---|
| **02** | 1/4 |

**Accessories**

| | |
|---|---|
| **Nil** | None |
| **B** | With bracket |

**Suffix**

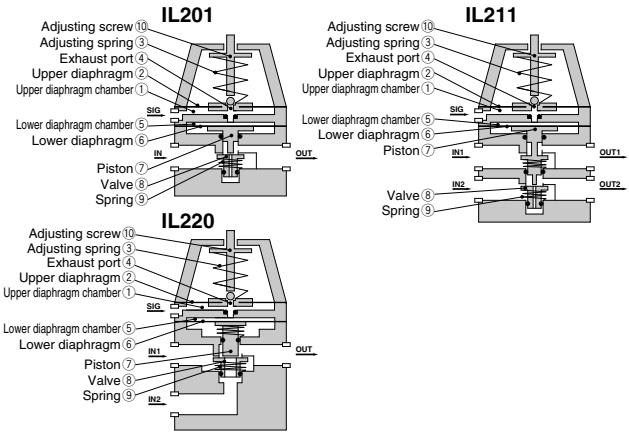
| | |
|---|---|
| **Nil** | Standard |
| **T** | High temperature (–5 to 100°C) |
| **L** | Low temperature (–30 to 60°C) |
| **S** | External parts copper-free |
| **ST** | External parts copper-free/ High temperature (–5 to 100°C) |
| **SL** | External parts copper-free/ Low temperature (–30 to 60°C) |

## Standard Specifications

| Model | IL201 | IL211 | IL220 |
|---|---|---|---|
| **Action** | Single acting | Double acting | 3 Port |
| **Signal pressure** | Max. 1.0 MPa Note 1) | | |
| **Set pressure range** | 0.14 to 0.7 MPa Note 1) | | |
| **Shut-off pneumatic circuit pressure** | Max. 0.7 MPa | | |
| **Ambient and fluid temperature** | –5 to 60°C | | |
| **Port size** | Rc1/4 | | |
| **Differential** Note 2) | 0.01 MPa | | |
| **Weight** | 0.45 kg | 0.64 kg | 0.7 kg |

Note 1) Provide a differential pressure of 0.1 MPa or more between the signal pressure and set pressure. If the differential pressure is small, the internal part is worn out due to the structure of this product and the bleed amount from the exhaust port increases, which may affect the characteristics.
Note 2) Pressure difference between lock activated and lock released

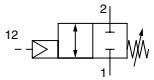
## Principle of Operation



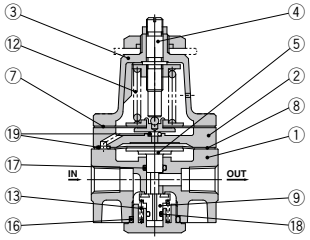

The signal air pressure enters the upper diaphragm chamber ① to generate a force. When this force is larger than the force generated by compressing the adjusting spring ③, the upper diaphragm ② is pushed up, the exhaust port ④ is closed, and the signal air pressure enters the lower diaphragm chamber ⑤ and acts the lower diaphragm ⑥. This pushes down the piston ⑦ to open the valve.
IL201 and IL211 enter the status, in which the flow path between IN and OUT is opened. IL220 enters the status, in which the flow path between IN1 and OUT is opened. If the signal air pressure drops to a level below the set pressure for some reason, the upper diaphragm ② is pushed down, the pressure inside the lower diaphragm ⑤ is exhausted from the exhaust port ④, and the valve ⑧ is closed by the force of the spring ⑨. At this time, IN and OUT are shut down in IL201 and IL211. In IL220, IN1 and OUT are shut down, and the flow path between IN2 and OUT is opened. The set pressure is adjusted with the adjusting screw ⑩.

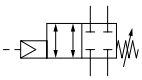

INDEX

## Construction

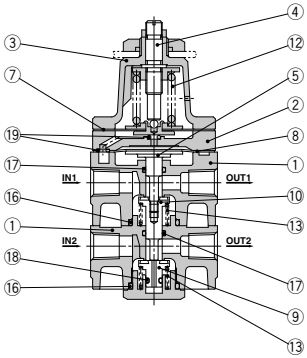


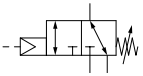

**IL201**



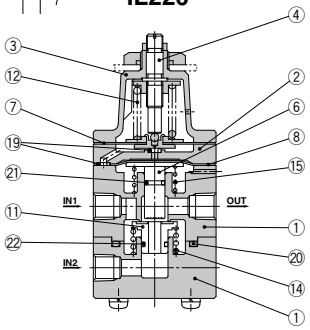



**IL211**



**IL220**




### Component Parts

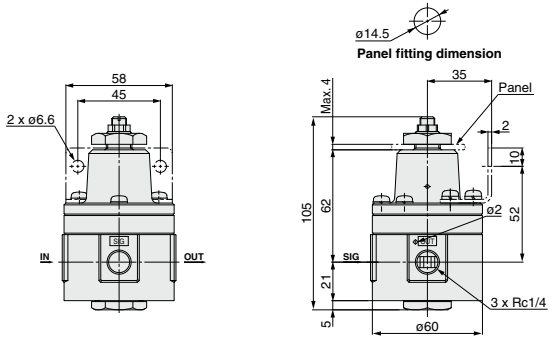
| No. | Description | Material | Note |
|---|---|---|---|
| 1 | **Body** | Aluminum alloy | Silver baking finish |
| 2 | **Pilot body** | Aluminum alloy | Silver baking finish |
| 3 | **Bonnet** | Aluminum alloy | Silver baking finish |
| 4 | **Adjusting screw** | Stainless steel | |
| 5 | **Piston** | Brass | |
| 6 | **Piston rod** | Brass | |
| 7 | **Diaphragm assembly** | Aluminum alloy/Brass/NBR | Chromated |
| 8 | **Diaphragm** | NBR | |
| 9 | **Piston valve** | Brass/NBR | |
| 10 | **Piston valve** | Brass/NBR | |
| 11 | **Valve** | Brass/NBR | |
| 12 | **Adjusting spring** | Steel wire | Zinc chromated |
| 13 | **Valve spring** | Stainless steel | |
| 14 | **Valve spring** | Stainless steel | |
| 15 | **Piston spring** | Stainless steel | |
| 16 | **O-ring** | NBR | |
| 17 | **O-ring** | NBR | |
| 18 | **O-ring** | NBR | |
| 19 | **O-ring** | NBR | |
| 20 | **O-ring** | NBR | |
| 21 | **O-ring** | NBR | |
| 22 | **O-ring** | NBR | |

### Replacement Parts

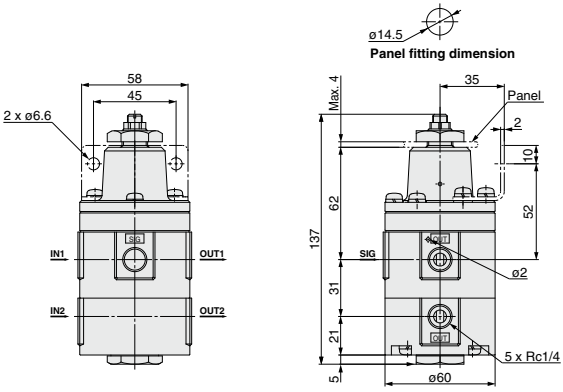
| Model | Order no. | Contents |
|---|---|---|
| **IL201** | KT-IL201 | Set of left nos. ⑦, ⑧, ⑨, ⑫, ⑬, ⑯, ⑰, ⑱, ⑲ |
| **IL211** | KT-IL211 | Set of left nos. ⑦, ⑧, ⑨, ⑩, ⑫, ⑬, ⑯, ⑰, ⑱, ⑲ |
| **IL220** | KT-IL220 | Set of left nos. ⑦, ⑧, ⑪, ⑫, ⑭, ⑮, ⑲, ⑳, ㉑, ㉒ |

## Dimensions

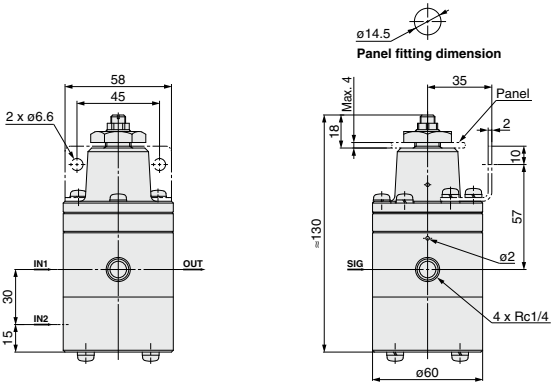
### IL201




### IL211

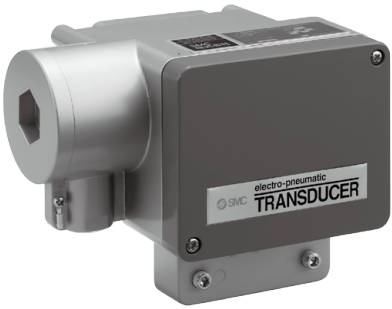



### IL220



## Pneumatic Instrumentation Equipment

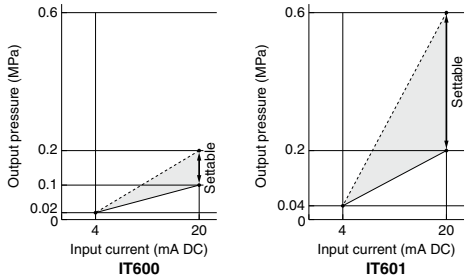
# Electro-Pneumatic Transducers



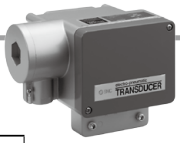
# Electro-Pneumatic Transducer
# Series IT600

- **The air pressure in proportion to the current signal can be output.**
  Can be used as input pressure signal in combination with the pneumatic-pneumatic positioner.
- **Wide output pressure range/0.02 to 0.6 MPa**
  The maximum pressure can be set freely through the span adjustment.
- **Fast response**
  The pilot valve capacity is large and the large flow can be obtained. Therefore, the response is excellent when operating the actuator directly or controlling the inner pressure of the tank with a large capacity.
- **Independent electric unit/Explosion-proof (flameproof) construction**
  The span adjustment, zero-point adjustment, and inspection maintenance can be performed with the body cover removed even in a hazardous place where the explosion or fire may occur.
- **Easy span adjustment**
  As the span adjustment mechanism uses a vector mechanism, the span adjustment can be performed smoothly.

**Output pressure setting range**




## How to Order



**IT60 0 – 0 0 0 – 0 □**

**Output pressure**

| | |
|---|---|
| 0 | 0.02 to 0.2 MPa |
| 1 | 0.04 to 0.6 MPa |

**Input current**

| | |
|---|---|
| 0 | 4 to 20 mA DC |

**Pressure gauge***

| | |
|---|---|
| 0 | None |
| 1 | 0.2 MPa |
| 2 | 0.3 MPa |
| 3 | 1 MPa |
| 4 | 0.4 MPa |
| 6 | 0.6 MPa |

*(SUP, OUT1)

**External wiring connection**

| | |
|---|---|
| 0 | Flameproof threaded-joint metal conduit and normal joint not requiring explosion-proof design |
| 1 | Flameproof packing type cable gland |

**Options**

| | |
|---|---|
| Nil | None |
| B | Bracket ($2^B$ pipe installation) |
| J | Hexagon wrench (for tightening terminal cover) |

**Seal type**

| | |
|---|---|
| 0 | None |
| 1 | Applicable cable O.D. 7 to 7.9 mm |
| 2 | Applicable cable O.D. 8 to 8.9 mm |
| 3 | Applicable cable O.D. 9 to 9.9 mm |
| 4 | Applicable cable O.D. 10 to 10.9 mm |
| 5 | Applicable cable O.D. 11 to 11.5 mm |
| 6 | A complete set of 5 types of flameproof packing |

## Specifications

| Item \ Model | IT600 | IT601 |
|---|---|---|
| | Low pressure | High pressure |
| **Input current** | 4 to 20 mA DC | |
| **Input impedance** | 235 Ω (4 to 20 mA, 20°C) | |
| **Supply air pressure** | 0.14 to 0.24 MPa | 0.24 to 0.7 MPa |
| **Output pressure** | 0.02 to 0.1 MPa (Max. 0.2 MPa) | 0.04 to 0.2 MPa (Max. 0.6 MPa) |
| **Linearity** | Within ±1.0% F.S. | |
| **Hysteresis** | Within 0.75% F.S. | |
| **Repeatability** | Within ±0.5% F.S. | |
| **Air consumption** | 7 L/min (ANR) (SUP = 0.14 MPa) | 22 L/min (ANR) (SUP = 0.7 MPa) |
| **Ambient and fluid temperature** | –10 to 60°C | |
| **Air connection port** | Rc1/4 female thread | |
| **Electrical connection** | Rc1/2 female thread | |
| **Explosion-proof construction** | Explosion-proof (flameproof) construction d2G4 (Certificate no. T28926) | |
| **Material** | Aluminum die-cast body | |
| **Weight** | 3 kg | |

**Replacement Parts**

| Part no. | Description | Note |
|---|---|---|
| P255010-1 | Pilot valve unit | IT600 |
| P255010-19 | Pilot valve unit | IT601 |

## Principle of Operation

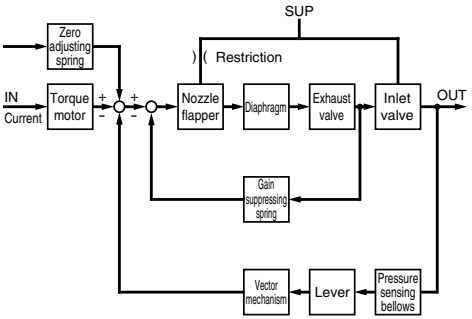
When the input current increases, armature ① in the torque motor will be subjected to a clockwise torque, pushing flapper lever ② to the left. As a result, the clearance of nozzle flapper ③ will increase and the nozzle back pressure will decrease. This moves exhaust valve ⑩ of pilot valve ⑤ to the left, causing the output air pressure of OUT1 to increase.

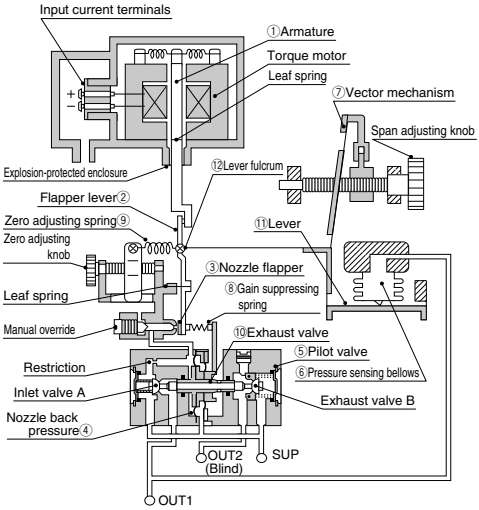
The output pressure thus increased is passed through the path inside the pilot valve to pressure sensing bellows ⑥, where it is converted to the force. This force acts on vector mechanism ⑦ via lever ⑪. Because the force will balance the force generated by means of the input current at lever fulcrum ⑫, the output air pressure proportional to the input current will be obtained.

Gain suppression spring ⑧ functions to immediately feedback the movement of the exhaust valve to the flapper lever, thereby contributing to loop stability.

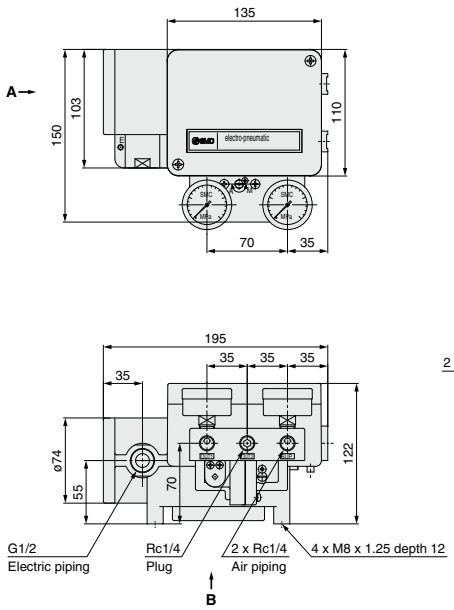
Zero point and span adjustments are performed by varying the tension force of zero adjusting spring ⑨ and the angle of the vector mechanism, respectively.

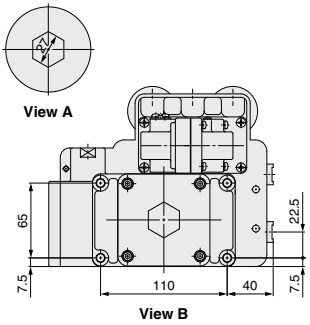
### Block diagram illustrating operating principle

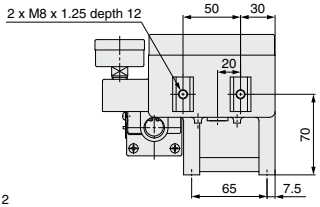



## Dimensions



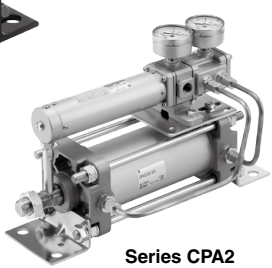



# Pneumatic Instrumentation Equipment

# Actuators

P Cylinder (Cylinder with Positioner)

**Series CPS1**



**Series CPA2**

# P Cylinder (Cylinder with Positioner)

# Series CPA2/CPS1

## CPA2 ø50, ø63, ø80, ø100
## CPS1 ø125, ø140, ø160, ø180, ø200, ø250, ø300

- **The cylinder positioning in proportion to the input signal (air pressure) is possible.**
- **Correction operation function: Returns to the initial setting position even when the position deviates due to load variations.**

### How to Order

**Bore size ø50 to 100**

**CP A2 B 100 – 100 □ □**

**Type**

| | |
|---|---|
| CP | P cylinder |

**Cylinder**

| | |
|---|---|
| A2 | CA2 cylinder (Non-lube type) |

**Mounting**

| | |
|---|---|
| B | Basic |
| L | Axial foot |
| F | Rod flange |
| G | Head flange |
| C | Single clevis |
| D | Double clevis |
| T | Center trunnion |

**Bore size**

| | |
|---|---|
| 50 | 50 mm |
| 63 | 63 mm |
| 80 | 80 mm |
| 100 | 100 mm |

**Stroke**

25 to 300 mm

**Rod boot**

| | |
|---|---|
| Nil | None |
| J | Nylon tarpaulin |
| K | Heat resistant tarpaulin |

**Accessories**

| | |
|---|---|
| Nil | None |
| I | With single knuckle |
| Y | With double knuckle |

* Assembled at the time of shipment.

**Bore size ø125 to 300**

**CP S1 B N 125 – 100 □ □**

**Type**

| | |
|---|---|
| CP | P cylinder |

**Cylinder**

| | |
|---|---|
| S1 | CS1 cylinder |

**Mounting**

| | |
|---|---|
| B | Basic |
| L | Axial foot |
| F | Rod flange |
| G | Head flange |
| C | Single clevis |
| D | Double clevis |
| T | Center trunnion |

**Lubrication**

| | |
|---|---|
| N | Non-lube type |

**Bore size**

| | |
|---|---|
| 125 | 125 mm |
| 140 | 140 mm |
| 160 | 160 mm |
| 180 | 180 mm |
| 200 | 200 mm |
| 250 | 250 mm |
| 300 | 300 mm |

**Stroke**

25 to 300 mm

**Rod boot**

| | |
|---|---|
| Nil | None |
| J | Nylon tarpaulin |
| K | Heat resistant tarpaulin |

**Accessories**

| | |
|---|---|
| Nil | None |
| I | With single knuckle |
| Y | With double knuckle |

* Assembled at the time of shipment.

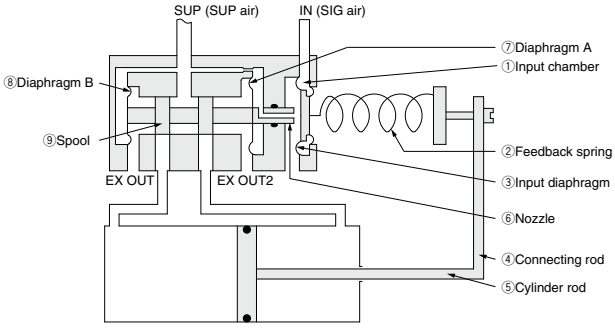
## Specifications

| Item | Model | |
|---|---|---|
| | **CPA2** | **CPS1** |
| **Input pressure** | 0.02 to 0.1 MPa | |
| **Supply pressure** | 0.3 to 0.7 MPa | |
| **Linearity** | Within ±2% F.S. | |
| **Hysteresis** | Within 1% F.S. | |
| **Repeatability** | Within ±1% F.S. | |
| **Sensitivity** | Within 0.5% F.S. | |
| **Air consumption** | 18 L/min (ANR) or less (SUP = 0.5 MPa) Note 1) | |
| **Ambient and fluid temperature** | –5°C to 60°C (No freezing) | 0°C to 60°C (No freezing) |
| **Coefficient of temperature** | 0.1% F.S./°C | |
| **Stroke adjustment margin** | Within 10% F.S. | |
| **Applicable cylinder stroke** | 25 mm (Min.) to 300 mm (Max.) | |
| **Air connection port** | Rc1/4 female thread Note 2) | |

Note 1) (ANR) indicates JIS B0120 standard air.
Note 2) Please contact SMC for connection ports other than the standard.

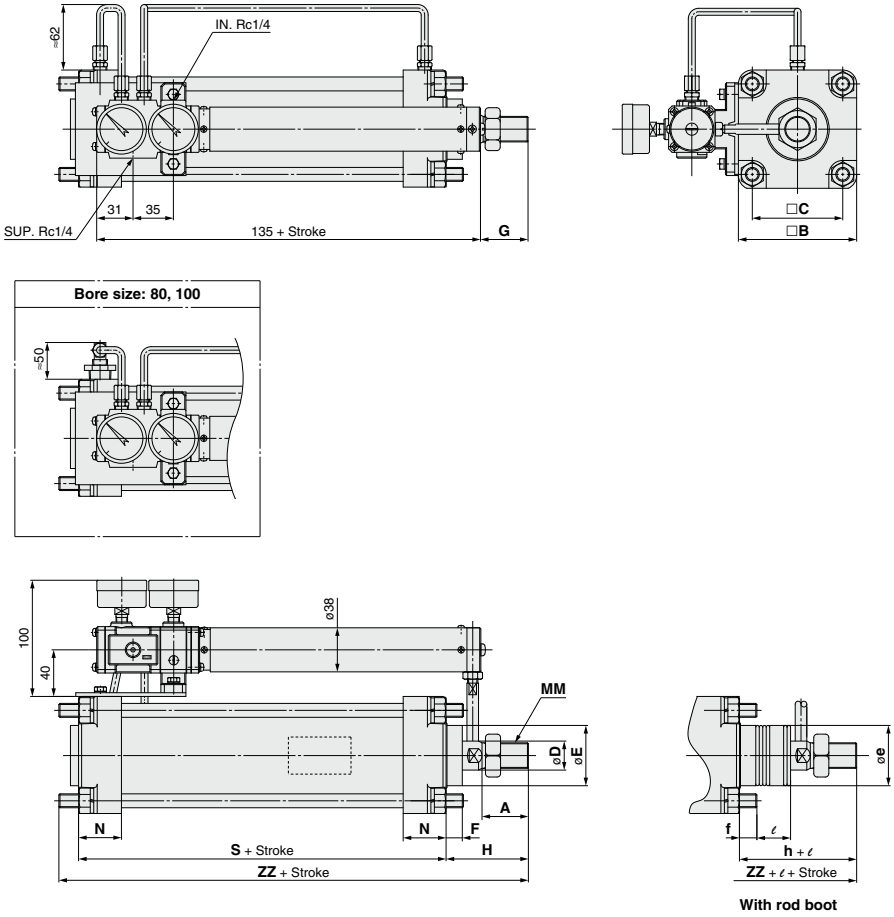
## Construction/Principle of Operation

When input pressure enters input chamber ①, the input diaphragm ③ is deflected left. Clearance of the nozzle ⑥ is reduced causing higher back pressure at diaphragm A ⑦.
This diaphragm A ⑦ has larger area than diaphragm B ⑧ resulting in movement of the spool to the left. Supply pressure then flows to OUT1 ① and the air inside the cylinder is exhausted from OUT2, resulting in cylinder rod ⑤ movement to the right. The movement is linked via connecting rod ④ and feedback spring ② to the input diaphragm ③ balancing the higher pressure. When this occurs nozzle ⑥ clearance increases allowing centralizing of the spool ⑨ to take place. This holds the piston rod in the new position. Input signal increase results in proportional movement of the piston rod.



## Dimensions

### Basic: CPA2B



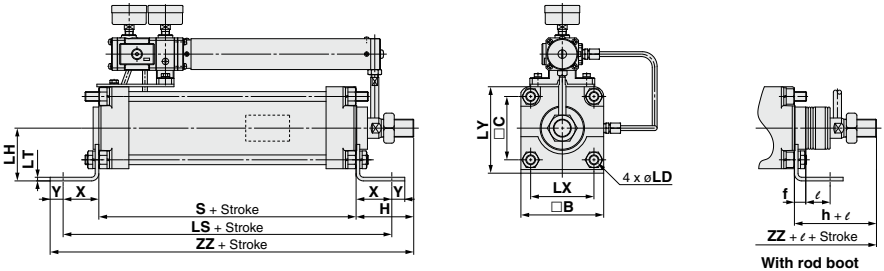

**Dimensions** (mm)

| Bore size | A | □B | □C | øD | øE | F | G | N | S | MM | Without rod boot | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | H | ZZ | øe | f | h | ℓ | ZZ |
| **50** | 35 | 70 | 52 | 20 | 40 | 10 | 31 | 30 | 90 | M18 x 1.5 | 58 | 159 | 52 | 11.2 | 66 | 1/4 stroke | 167 |
| **63** | 35 | 85 | 64 | 20 | 40 | 10 | 31 | 31 | 98 | M18 x 1.5 | 58 | 170 | 52 | 11.2 | 66 | | 178 |
| **80** | 40 | 102 | 78 | 25 | 52 | 14 | 41 | 37 | 116 | M22 x 1.5 | 71 | 204 | 65 | 12.5 | 80 | | 213 |
| **100** | 40 | 116 | 92 | 30 | 52 | 14 | 41 | 40 | 126 | M26 x 1.5 | 72 | 215 | 65 | 14 | 81 | | 224 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Dimensions

### Axial foot: CPA2L



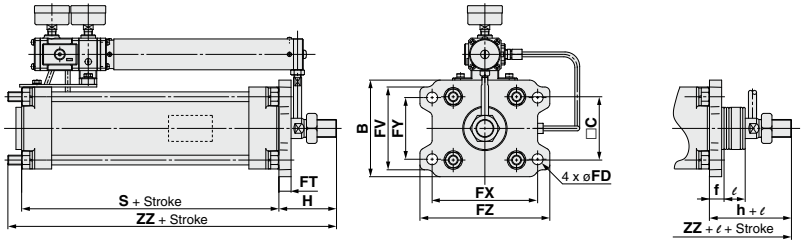

With rod boot

**Dimensions** (mm)

| Bore size | □B | □C | S | X | Y | øLD | LH | LS | LT | LX | LY | Without rod boot | | With rod boot | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | H | ZZ | f | h | ℓ | ZZ |
| **50** | 70 | 52 | 90 | 27 | 13 | 9 | 45 | 144 | 3.2 | 50 | 80 | 58 | 188 | 11.2 | 66 | 1/4 stroke | 196 |
| **63** | 85 | 64 | 98 | 34 | 16 | 11.5 | 50 | 166 | 3.2 | 59 | 93 | 58 | 206 | 11.2 | 66 | | 214 |
| **80** | 102 | 78 | 116 | 44 | 16 | 13.5 | 65 | 204 | 4.5 | 76 | 116 | 71 | 247 | 12.5 | 80 | | 256 |
| **100** | 116 | 92 | 126 | 43 | 17 | 13.5 | 75 | 212 | 6 | 92 | 133 | 72 | 258 | 14 | 81 | | 267 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

### Rod flange: CPA2F




With rod boot

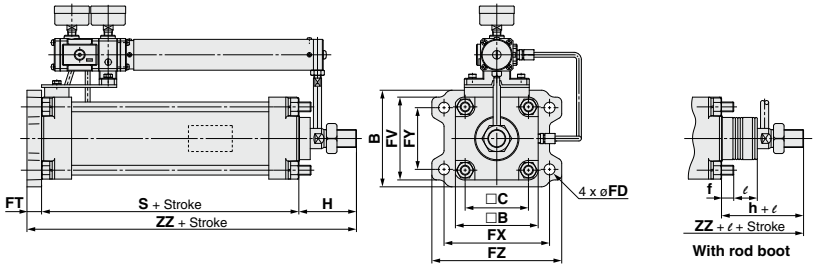
**Dimensions** (mm)

| Bore size | B | □C | S | FV | øFD | FT | FX | FY | FZ | Without rod boot | | With rod boot | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | H | ZZ | f | h | ℓ | ZZ |
| **50** | 81 | 52 | 90 | 70 | 9 | 12 | 90 | 50 | 110 | 58 | 159 | 15 | 66 | 1/4 stroke | 167 |
| **63** | 101 | 64 | 98 | 86 | 11.5 | 15 | 105 | 59 | 130 | 58 | 170 | 17.5 | 66 | | 178 |
| **80** | 119 | 78 | 116 | 102 | 13.5 | 18 | 130 | 76 | 160 | 71 | 204 | 21.5 | 80 | | 213 |
| **100** | 133 | 92 | 126 | 116 | 13.5 | 18 | 150 | 92 | 180 | 72 | 215 | 21.5 | 81 | | 224 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Dimensions

### Head flange: CPA2G

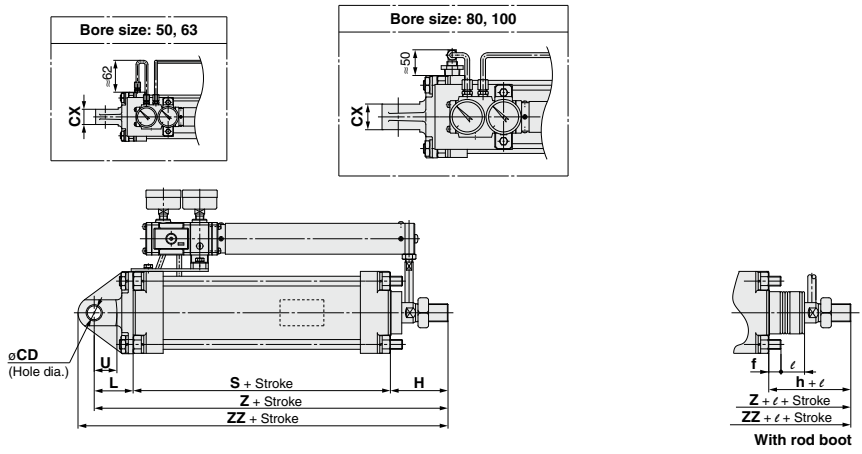



**Dimensions** (mm)

| Bore size | B | □B | □C | S | FV | øFD | FT | FX | FY | FZ | Without rod boot | | With rod boot | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | H | ZZ | f | h | ℓ | ZZ |
| **50** | 81 | 70 | 52 | 90 | 70 | 9 | 12 | 90 | 50 | 110 | 58 | 160 | 11.2 | 66 | 1/4 stroke | 168 |
| **63** | 101 | 85 | 64 | 98 | 86 | 11.5 | 15 | 105 | 59 | 130 | 58 | 171 | 11.2 | 66 | | 179 |
| **80** | 119 | 102 | 78 | 116 | 102 | 13.5 | 18 | 130 | 76 | 160 | 71 | 205 | 12.5 | 80 | | 214 |
| **100** | 133 | 116 | 92 | 126 | 116 | 13.5 | 18 | 150 | 92 | 180 | 72 | 216 | 14 | 81 | | 225 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

### Single clevis: CPA2C



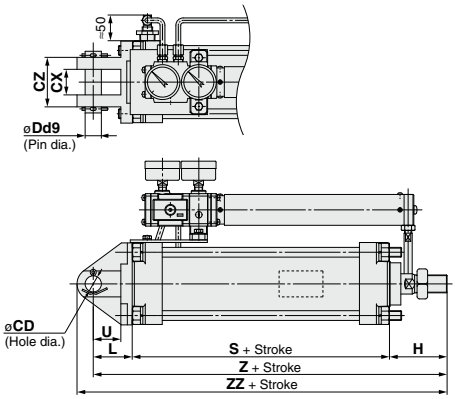

**Dimensions** (mm)

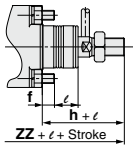
| Bore size | L | S | U | $øCD_{H10}$ | CX | Without rod boot | | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | H | Z | ZZ | f | h | ℓ | Z | ZZ |
| **50** | 35 | 90 | 19 | $12^{+0.070}_{0}$ | $18.0^{-0.1}_{-0.3}$ | 58 | 183 | 195 | 11.2 | 66 | 1/4 stroke | 191 | 203 |
| **63** | 40 | 98 | 23 | $16^{+0.070}_{0}$ | $25.0^{-0.1}_{-0.3}$ | 58 | 196 | 212 | 11.2 | 66 | | 204 | 220 |
| **80** | 48 | 116 | 28 | $20^{+0.084}_{0}$ | $31.5^{-0.1}_{-0.3}$ | 71 | 235 | 255 | 12.5 | 80 | | 244 | 264 |
| **100** | 58 | 126 | 36 | $25^{+0.084}_{0}$ | $35.5^{-0.1}_{-0.3}$ | 72 | 256 | 281 | 14 | 81 | | 265 | 290 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Dimensions

## Double clevis: CPA2D



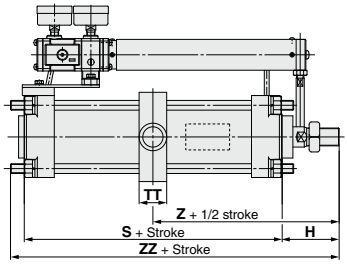

**With rod boot**

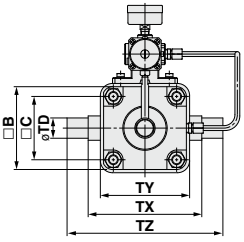
**Dimensions** (mm)

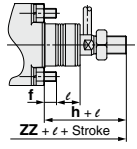
| Bore size | L | S | U | øCD$_{H10}$ | CX | CZ | øDd9 | Without rod boot | | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | H | Z | ZZ | f | h | ℓ | Z | ZZ |
| **50** | 35 | 90 | 19 | $12^{+0.070}_{0}$ | $18.0^{+0.3}_{+0.1}$ | 38 | $12^{-0.050}_{-0.093}$ | 58 | 183 | 195 | 11.2 | 66 | 1/4 stroke | 191 | 203 |
| **63** | 40 | 98 | 23 | $16^{+0.070}_{0}$ | $25.0^{+0.3}_{+0.1}$ | 49 | $16^{-0.050}_{-0.093}$ | 58 | 196 | 212 | 11.2 | 66 | | 204 | 220 |
| **80** | 48 | 116 | 28 | $20^{+0.084}_{0}$ | $31.5^{+0.3}_{+0.1}$ | 61 | $20^{-0.065}_{-0.117}$ | 71 | 235 | 255 | 12.5 | 80 | | 244 | 264 |
| **100** | 58 | 126 | 36 | $25^{+0.084}_{0}$ | $35.5^{+0.3}_{+0.1}$ | 64 | $25^{-0.065}_{-0.117}$ | 72 | 256 | 281 | 14 | 81 | | 265 | 290 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Center trunnion: CPA2T




**With rod boot**

**Dimensions** (mm)

| Bore size | □B | □C | S | øTD$_{e8}$ | TT | TX | TY | TZ | Without rod boot | | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | H | Z | ZZ | f | h | ℓ | Z | ZZ |
| **50** | 70 | 52 | 90 | $15^{-0.032}_{-0.059}$ | 22 | 95 | 74 | 127 | 58 | 103 | 154 | 11.2 | 66 | 1/4 stroke | 111 | 162 |
| **63** | 85 | 64 | 98 | $18^{-0.032}_{-0.059}$ | 28 | 110 | 90 | 148 | 58 | 107 | 162 | 11.2 | 66 | | 115 | 170 |
| **80** | 102 | 78 | 116 | $25^{-0.040}_{-0.073}$ | 34 | 140 | 110 | 192 | 71 | 129 | 194 | 12.5 | 80 | | 138 | 203 |
| **100** | 116 | 92 | 126 | $25^{-0.040}_{-0.073}$ | 40 | 162 | 130 | 214 | 72 | 135 | 206 | 14 | 81 | | 144 | 215 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CA2 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.



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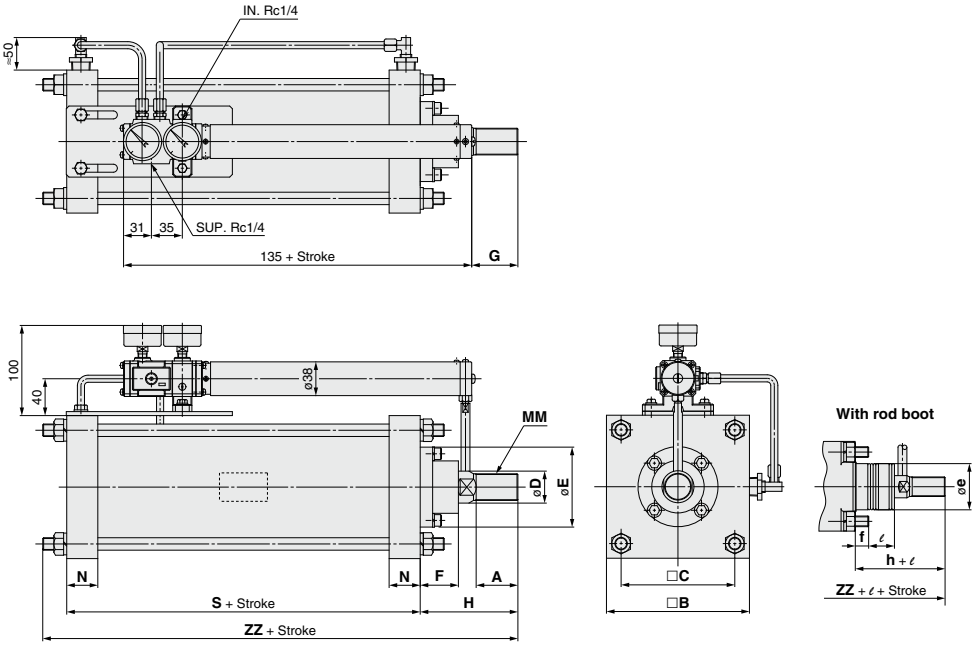
## Dimensions

## Basic: CPS1B



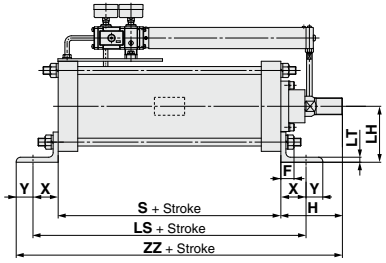

**Dimensions** (mm)

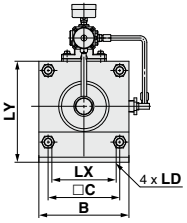
| Bore size | A | □B | □C | øD | øE | F | G | MM | N | S | Without rod boot | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | H | ZZ | øe | f | h | ℓ | ZZ |
| **125** | 50 | 145 | 115 | 36 | 90 | 43 | 52 | M30 x 1.5 | 35 | 98 | 110 | 235 | 75 | 40 | 133 | | 258 |
| **140** | 50 | 161 | 128 | 36 | 90 | 43 | 52 | M30 x 1.5 | 35 | 98 | 110 | 235 | 75 | 40 | 133 | | 258 |
| **160** | 56 | 182 | 144 | 40 | 90 | 43 | 59 | M36 x 1.5 | 39 | 106 | 120 | 256.5 | 75 | 40 | 141 | 0.2 stroke | 277.5 |
| **180** | 63 | 204 | 162 | 45 | 115 | 48 | 66 | M40 x 1.5 | 39 | 111 | 135 | 281 | 85 | 45 | 153 | | 299 |
| **200** | 63 | 226 | 182 | 50 | 115 | 48 | 66 | M45 x 1.5 | 39 | 111 | 135 | 281 | 90 | 45 | 153 | | 299 |
| **250** | 71 | 277 | 225 | 60 | 140 | 60 | 77 | M56 x 2.0 | 49 | 141 | 160 | 342.5 | 105 | 55 | 176 | 0.17 stroke | 358.5 |
| **300** | 80 | 330 | 270 | 70 | 140 | 60 | 88 | M64 x 2.0 | 49 | 146 | 175 | 372.5 | 115 | 55 | 190 | | 387.5 |

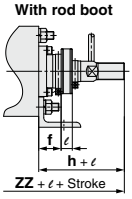
Note 1) If the air is not for pneumatic instrumentation, install a mist separator on the supply pressure side.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Dimensions

### Axial foot: CPS1L



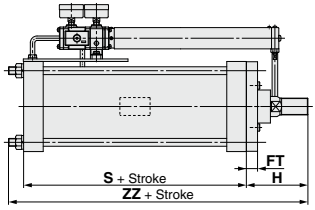



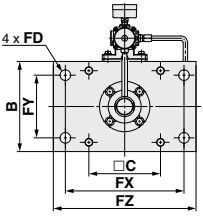

**Dimensions** (mm)

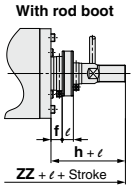
| Bore size | B | □C | F | S | X | Y | LD | LH | LS | LT | LX | LY | Without rod boot | | With rod boot | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | H | ZZ | f | h | ℓ | ZZ |
| **125** | 145 | 115 | 43 | 98 | 45 | 20 | 19 | 85 | 188 | 8 | 100 | 157.5 | 110 | 273 | 40 | 133 | 0.2 stroke | 296 |
| **140** | 161 | 128 | 43 | 98 | 45 | 30 | 19 | 100 | 188 | 9 | 112 | 180.5 | 110 | 283 | 40 | 133 | | 306 |
| **160** | 182 | 144 | 43 | 106 | 50 | 25 | 19 | 106 | 206 | 9 | 118 | 197.0 | 120 | 301 | 40 | 141 | | 322 |
| **180** | 204 | 162 | 48 | 111 | 60 | 30 | 24 | 125 | 231 | 10 | 132 | 227.0 | 135 | 336 | 45 | 153 | | 354 |
| **200** | 226 | 182 | 48 | 111 | 60 | 30 | 24 | 132 | 231 | 10 | 150 | 245.0 | 135 | 336 | 45 | 153 | | 354 |
| **250** | 277 | 225 | 60 | 141 | 80 | 40 | 29 | 160 | 301 | 12 | 180 | 298.5 | 160 | 421 | 55 | 176 | 0.17 stroke | 437 |
| **300** | 330 | 270 | 60 | 146 | 90 | 40 | 33 | 200 | 326 | 15 | 212 | 365.0 | 175 | 451 | 55 | 190 | | 466 |

Note 1) If the air is not for pneumatic instrumentation, install a mist separator on the supply pressure side.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.

### Rod flange: CPS1F




**Dimensions** (mm)

| Bore size | B | □C | S | FD | FT | FX | FY | FZ | Without rod boot | | With rod boot | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | H | ZZ | f | h | ℓ | ZZ |
| **125** | 145 | 115 | 98 | 19 | 14 | 190 | 100 | 230 | 110 | 238 | 40 | 133 | 0.2 stroke | 261 |
| **140** | 160 | 128 | 98 | 19 | 20 | 212 | 112 | 255 | 110 | 232 | 40 | 133 | | 255 |
| **160** | 180 | 144 | 106 | 19 | 20 | 236 | 118 | 275 | 120 | 252 | 40 | 141 | | 273 |
| **180** | 200 | 162 | 111 | 24 | 25 | 265 | 132 | 320 | 135 | 277 | 45 | 153 | | 295 |
| **200** | 225 | 182 | 111 | 24 | 25 | 280 | 150 | 335 | 135 | 277 | 45 | 153 | | 295 |
| **250** | 275 | 225 | 141 | 29 | 30 | 355 | 180 | 420 | 160 | 336 | 55 | 176 | 0.17 stroke | 352 |
| **300** | 330 | 270 | 146 | 33 | 30 | 400 | 212 | 475 | 175 | 369 | 55 | 190 | | 384 |

Note 1) If the air is not for pneumatic instrumentation, install a mist separator on the supply pressure side.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.



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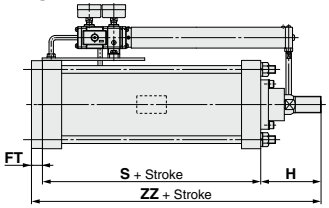
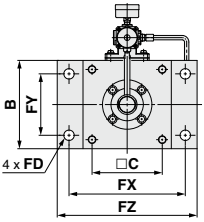
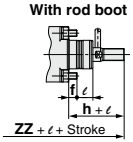
## Dimensions

## Head flange: CPS1G



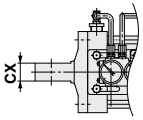



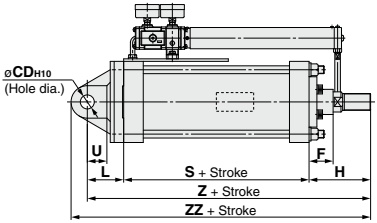

**Dimensions** (mm)

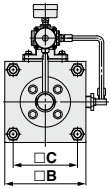
| Bore size | B | □C | FD | FT | FX | FY | FZ | S | Without rod boot | | With rod boot | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | H | ZZ | f | h | ℓ | ZZ |
| **125** | 145 | 115 | 19 | 14 | 190 | 100 | 230 | 98 | 110 | 235 | 40 | 133 | 0.2 stroke | 258 |
| **140** | 160 | 128 | 19 | 20 | 212 | 112 | 255 | 98 | 110 | 235 | 40 | 133 | | 258 |
| **160** | 180 | 144 | 19 | 20 | 236 | 118 | 275 | 106 | 120 | 256.5 | 40 | 141 | | 277.5 |
| **180** | 200 | 162 | 24 | 25 | 265 | 132 | 320 | 111 | 135 | 281 | 45 | 153 | | 299 |
| **200** | 225 | 182 | 24 | 25 | 280 | 150 | 335 | 111 | 135 | 281 | 45 | 153 | | 299 |
| **250** | 275 | 225 | 29 | 30 | 355 | 180 | 420 | 141 | 160 | 342.5 | 55 | 176 | 0.17 stroke | 358.5 |
| **300** | 330 | 270 | 33 | 30 | 400 | 212 | 475 | 146 | 175 | 372.5 | 55 | 190 | | 387.5 |

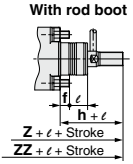
Note 1) If the air is not for pneumatic instrumentation, install a mist separator on the supply pressure side.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Single clevis: CPS1C



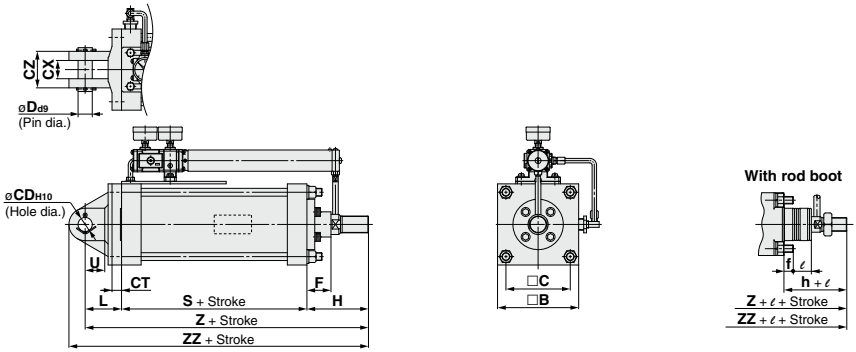

**Dimensions** (mm)

| Bore size | □B | □C | F | L | S | U | øCDH10 | CX | Without rod boot | | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | H | Z | ZZ | f | h | ℓ | Z | ZZ |
| **125** | 145 | 115 | 43 | 65 | 98 | 35 | $25^{+0.084}_{0}$ | $32^{-0.3}_{-0.1}$ | 110 | 273 | 302 | 40 | 133 | 0.2 stroke | 296 | 325 |
| **140** | 161 | 128 | 43 | 75 | 98 | 40 | $28^{+0.084}_{0}$ | $36^{-0.3}_{-0.1}$ | 110 | 283 | 315 | 40 | 133 | | 306 | 338 |
| **160** | 182 | 144 | 43 | 80 | 106 | 45 | $32^{+0.100}_{0}$ | $40^{-0.3}_{-0.1}$ | 120 | 306 | 342 | 40 | 141 | | 327 | 363 |
| **180** | 204 | 162 | 48 | 90 | 111 | 50 | $40^{+0.100}_{0}$ | $50^{-0.3}_{-0.1}$ | 135 | 336 | 380 | 45 | 153 | | 354 | 398 |
| **200** | 226 | 182 | 48 | 90 | 111 | 50 | $40^{+0.100}_{0}$ | $50^{-0.3}_{-0.1}$ | 135 | 336 | 380 | 45 | 153 | | 354 | 398 |
| **250** | 277 | 225 | 60 | 110 | 141 | 65 | $50^{+0.100}_{0}$ | $63^{-0.3}_{-0.1}$ | 160 | 411 | 466 | 55 | 176 | 0.17 stroke | 427 | 482 |
| **300** | 330 | 270 | 60 | 130 | 146 | 80 | $63^{+0.120}_{0}$ | $80^{-0.3}_{-0.1}$ | 175 | 451 | 519 | 55 | 190 | | 466 | 534 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Dimensions

## Double clevis: CPS1D

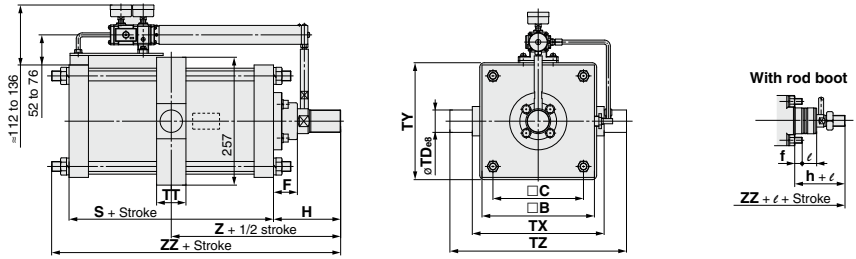



**Dimensions** (mm)

| Bore size | □B | □C | F | L | S | U | øCDH10 | CT | CX | CZ | øDd9 | Without rod boot | | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | H | Z | ZZ | f | h | ℓ | Z | ZZ |
| **125** | 145 | 115 | 43 | 65 | 98 | 35 | $25^{+0.084}_{0}$ | 17 | $32^{+0.3}_{+0.1}$ | $64^{-0}_{-0.2}$ | $25^{-0.065}_{-0.117}$ | 110 | 273 | 302 | 40 | 133 | 0.2 stroke | 296 | 325 |
| **140** | 161 | 128 | 43 | 75 | 98 | 40 | $28^{+0.084}_{0}$ | 17 | $36^{+0.3}_{+0.1}$ | $72^{-0}_{-0.2}$ | $28^{-0.065}_{-0.117}$ | 110 | 283 | 315 | 40 | 133 | | 306 | 338 |
| **160** | 182 | 144 | 43 | 80 | 106 | 45 | $32^{+0.100}_{0}$ | 20 | $40^{+0.3}_{+0.1}$ | $80^{-0}_{-0.2}$ | $32^{-0.080}_{-0.142}$ | 120 | 306 | 342 | 40 | 141 | | 327 | 363 |
| **180** | 204 | 162 | 48 | 90 | 111 | 50 | $40^{+0.100}_{0}$ | 23 | $50^{+0.3}_{+0.1}$ | $100^{-0.1}_{-0.3}$ | $40^{-0.080}_{-0.142}$ | 135 | 336 | 380 | 45 | 153 | | 354 | 398 |
| **200** | 226 | 182 | 48 | 90 | 111 | 50 | $40^{+0.100}_{0}$ | 25 | $50^{+0.3}_{+0.1}$ | $100^{-0.1}_{-0.3}$ | $40^{-0.080}_{-0.142}$ | 135 | 336 | 380 | 45 | 153 | | 354 | 398 |
| **250** | 277 | 225 | 60 | 110 | 141 | 65 | $50^{+0.100}_{0}$ | 30 | $63^{+0.3}_{+0.1}$ | $126^{-0.1}_{-0.3}$ | $50^{-0.080}_{-0.142}$ | 160 | 411 | 466 | 55 | 176 | 0.17 stroke | 427 | 482 |
| **300** | 330 | 270 | 60 | 130 | 146 | 80 | $63^{+0.120}_{0}$ | 37 | $80^{+0.3}_{+0.1}$ | $160^{-0.1}_{-0.3}$ | $63^{-0.100}_{-0.174}$ | 175 | 451 | 519 | 55 | 190 | | 466 | 534 |

Note 1) Use only dehumidified and dust extracted clean compressed air as the air supply.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

## Center trunnion: CPS1T



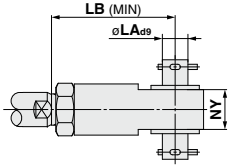

**Dimensions** (mm)

| Bore size | □B | □C | F | S | TT | TX | TY | TZ | øTDe8 | Without rod boot | | | With rod boot | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | H | Z | ZZ | f | h | ℓ | Z | ZZ |
| **125** | 145 | 115 | 43 | 98 | 50 | 170 | 164 | 234 | $32^{-0.050}_{-0.089}$ | 110 | 159 | 227 | 40 | 133 | 0.2 stroke | 182 | 250 |
| **140** | 161 | 128 | 43 | 98 | 55 | 190 | 184 | 262 | $36^{-0.050}_{-0.089}$ | 110 | 159 | 227 | 40 | 133 | | 182 | 250 |
| **160** | 182 | 144 | 43 | 106 | 60 | 212 | 204 | 292 | $40^{-0.050}_{-0.089}$ | 120 | 173 | 248 | 40 | 141 | | 194 | 269 |
| **180** | 204 | 162 | 48 | 111 | 59 | 236 | 228 | 326 | $45^{-0.050}_{-0.089}$ | 135 | 190.5 | 272 | 45 | 153 | | 208.5 | 290 |
| **200** | 226 | 182 | 48 | 111 | 59 | 265 | 257 | 355 | $45^{-0.050}_{-0.089}$ | 135 | 190.5 | 272 | 45 | 153 | | 208.5 | 290 |
| **250** | 277 | 225 | 60 | 141 | 69 | 335 | 325 | 447 | $56^{-0.060}_{-0.106}$ | 160 | 230.5 | 331 | 55 | 176 | 0.17 stroke | 246.5 | 347 |
| **300** | 330 | 270 | 60 | 146 | 79 | 400 | 390 | 534 | $67^{-0.060}_{-0.106}$ | 175 | 248 | 357 | 55 | 190 | | 263.0 | 372 |

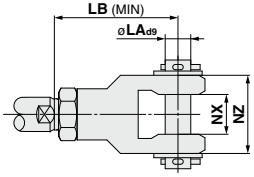
Note 1) If the air is not for pneumatic instrumentation, install a mist separator on the supply pressure side.
Note 2) Install a cylinder so that the cylinder rod might not be twisted.
Note 3) Do not apply force to the protective cover of the feedback spring.
Note 4) The zero point is subject to the mounting position. Adjust zero point after installation on the site.
Note 5) Do not use a lubricator.
Note 6) Cylinder dimensions are the same as those of the CS1 series. For details, refer to **the WEB catalog** or the Best Pneumatics No. 2.
Note 7) When using the cylinder outdoors, take measures to avoid wind and rain.

# Dimensions of Accessories

## Series CPA2




**Single knuckle joint assembly**

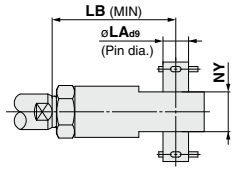



**Double knuckle joint assembly**

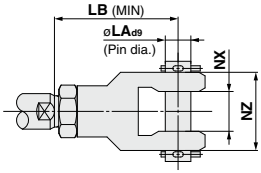
| Bore size | Dimensions of accessories | | | | |
|---|---|---|---|---|---|
| | **øLA$_{d9}$** | **LB** | **NX** | **NY** | **NZ** |
| **50** | $12^{-0.050}_{-0.093}$ | 74 | $16^{+0.3}_{+0.1}$ | $16^{-0.1}_{-0.3}$ | 38 |
| **63** | $12^{-0.050}_{-0.093}$ | 74 | $16^{+0.3}_{+0.1}$ | $16^{-0.1}_{-0.3}$ | 38 |
| **80** | $18^{-0.050}_{-0.093}$ | 87 | $28^{+0.3}_{+0.1}$ | $28^{-0.1}_{-0.3}$ | 55 |
| **100** | $20^{-0.065}_{-0.117}$ | 102 | $30^{+0.3}_{+0.1}$ | $30^{-0.1}_{-0.3}$ | 61 |

∗ A knuckle pin, split pins and flat washers are included with the double knuckle joint.

## Series CPS1




**Single knuckle joint**




**Double knuckle joint assembly**

| Bore size | Dimensions of accessories | | | | |
|---|---|---|---|---|---|
| | **øLA$_{d9}$** | **LB** | **NX** | **NY** | **NZ** |
| **125** | $25^{-0.065}_{-0.117}$ | 121 | $32^{+0.3}_{+0.1}$ | $32^{-0.1}_{-0.3}$ | $64^{-0.1}_{-0.3}$ |
| **140** | $28^{-0.065}_{-0.117}$ | 126 | $36^{+0.3}_{+0.1}$ | $36^{-0.1}_{-0.3}$ | $72^{-0.1}_{-0.3}$ |
| **160** | $32^{-0.080}_{-0.142}$ | 134 | $40^{+0.3}_{+0.1}$ | $40^{-0.1}_{-0.3}$ | $80^{-0.1}_{-0.3}$ |
| **180** | $40^{-0.080}_{-1.142}$ | 151 | $50^{+0.3}_{+0.1}$ | $50^{-0.1}_{-0.3}$ | $100^{-0.1}_{-0.3}$ |
| **200** | $40^{-0.080}_{-0.142}$ | 155 | $50^{+0.3}_{+0.1}$ | $50^{-0.1}_{-0.3}$ | $100^{-0.1}_{-0.3}$ |
| **250** | $50^{-0.080}_{-0.142}$ | 198 | $63^{+0.3}_{+0.1}$ | $63^{-0.1}_{-0.3}$ | $126^{-0.1}_{-0.3}$ |
| **300** | $63^{-0.100}_{-0.174}$ | 217 | $80^{+0.3}_{+0.1}$ | $80^{-0.1}_{-0.3}$ | $160^{-0.1}_{-0.3}$ |

∗ A pin and split pins are included with the double knuckle joint.

# Detection Conversion Unit



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# Pressure Switch/ Micro Switch Type
# *Series IS100*

- **The pressure switch IS100 series can be utilized for automatic air pressure control in a wide variety of fields, such as industrial machinery or chemical plant.**

**Pressure adjustment range: 0.02 to 0.1 MPa**
**Electric wiring: Various wiring and entry methods can be selected.**
**Mechanical service life: 100,000 cycles**

## How to Order

**IS 1 00 – 02**

- Pressure switch
- Port size Rc1/4
- Specifications

| | |
|---|---|
| 00 | 3-pin plug and socket |
| 01 | External terminals |
| 12 | Enclosed terminals |

**IS 1 13 – 02 – 04**

- Pressure switch
- Electrical entry

| | |
|---|---|
| 04 | 15a, G1/2 |
| 06 | 20a, G3/4 |

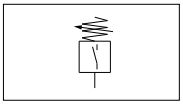
- Port size Rc1/4
- Specifications

| | | |
|---|---|---|
| 13 | Enclosed terminals | With cable gland |
| 14 | Enclosed terminals | Female threaded |

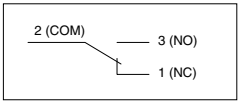
## Specifications

| Model | IS100-02 | IS101-02 | IS112-02 | IS113-02-□□ | IS114-02-□□ |
|---|---|---|---|---|---|
| **Proof pressure** | 0.2 MPa | | | | |
| **Pressure adjustment range** | 0.02 to 0.1 MPa | | | | |
| **Hysteresis** | 0.0015 MPa or less | | | | |
| **Repeatability** | ±5% F.S. | | | | |
| **Fluid** | Air | | | | |
| **Ambient and fluid temperature** | –5 to 60°C (No freezing) | | | | |
| **Port size** | Rc1/4 | | | | |
| **Rated voltage** | 125/250 VAC 5A, 30 VDC 5A | | | | |
| **Mechanical service life** | 100,000 cycles | | | | |

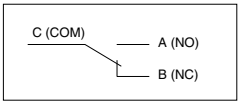
**Symbol**



**Electrical circuit**
IS100

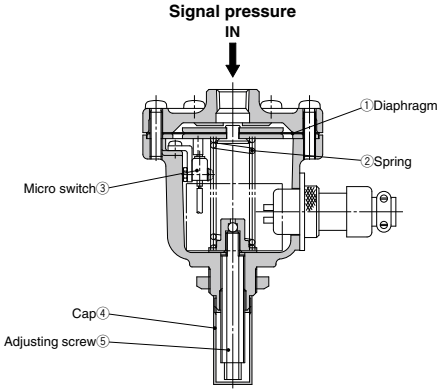



Other



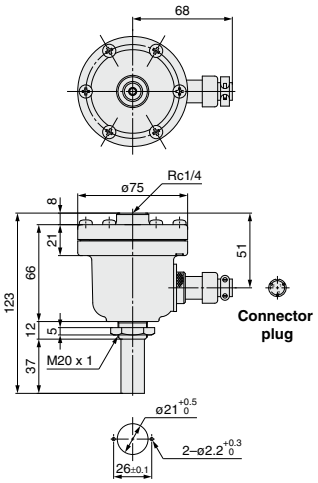

## Construction/Principle of Operation

Signal pressure enters the chamber above diaphragm ① and exerts downward force compressing spring ②. After sufficient deflection, contact with the plunger of the micro switch ③ is made operating the electrical circuit. As overtravel of diaphragm is prevented by an internal stop, the micro switch is not subject to extra load with increased pressure. On decrease of signal pressure the electrical circuit function is reversed. Contacts are available for N.C. or N.O. operation. Adjustment is carried out by removing cap ④ and rotating adjusting screw as required changing spring load.



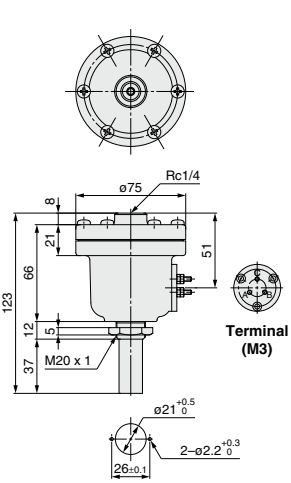
## Dimensions

### IS100-02



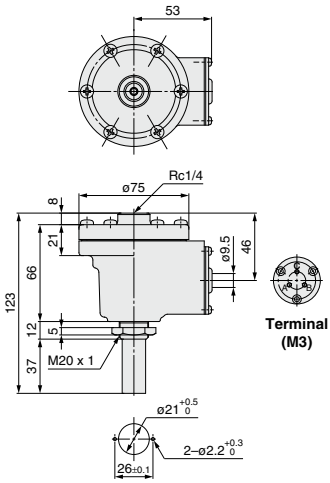

Panel mounting hole

### IS101-02



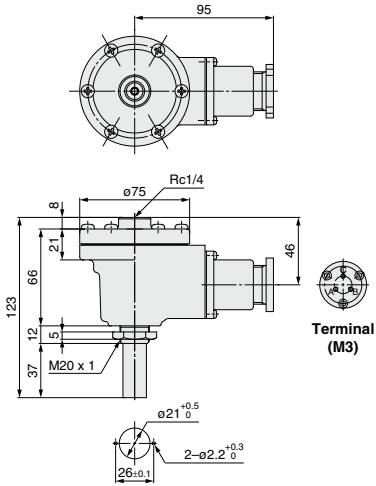

Panel mounting hole

### IS112-02



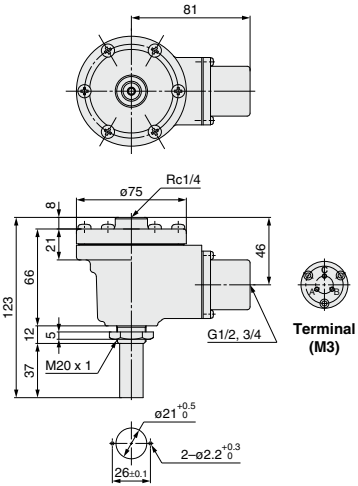

Panel mounting hole

### IS113-02-□




Panel mounting hole

### IS114-02-□




Panel mounting hole

## Pressure Switch/Reed Switch Type
## *IS10*

- Small (Overall height 52 mm, Width 15 mm)

| Series | Type | Set pressure range | Contact |
|---|---|---|---|
| IS10 | Positive pressure | 0.1 to 0.4 MPa<br>0.1 to 0.6 MPa | Reed switch<br>1a |

## Pressure Switch/Micro Switch Type
## *IS3000*

- Can be used for micro load around 10 mA.
- With neon light

| Series | Type | Set pressure range | Contact |
|---|---|---|---|
| IS3000 | Positive pressure | 0.1 to 0.7 MPa | Micro switch<br>1ab |

## General Purpose Pressure Switch/Snap Switch Type
## *ISG*

- For general fluids
- Equivalent to IP44 (ISG2∗□)
- With indicator light (IS2761)
- With hysteresis adjusting function

| Series | Type | Set pressure range | Contact |
|---|---|---|---|
| ISG11□, 21□ | Positive pressure | 0.02 to 0.3 MPa | Snap switch<br>1a1b<br>2ab |
| ISG12□, 22□ | Positive pressure | 0.05 to 0.7 MPa | |
| ISG13□, 23□ | Positive pressure | 0.1 to 1.0 MPa | |
| ISG19□, 29□ | Vacuum pressure | −10 to −100 kPa | |
| IS2761 | Positive pressure | 0.1 to 1.0 MPa | 1ab (Light 1b) |

## 2-Color Display High-Precision Digital Pressure Switch
## *ZSE/ISE30A*

- With One-touch fitting (Straight, Elbow)
- Space-saving, Mountable side by side without clearance
- With display calibration function
- Can copy to up to 10 switches simultaneously.

| Series | Type | Rated pressure range |
|---|---|---|
| ZSE30AF | Compound pressure | −100.0 to 100.0 kPa |
| ZSE30A | Vacuum pressure | 0.0 to −101.0 kPa |
| ISE30A | Positive pressure | −0.100 to 1.000 MPa |

## 2-Color Display Digital Pressure Switch
## *ISE70/75(H)*

- Metal body type (Aluminum die-casted)
- IP67
- With M12 connector

| Series | Type | Rated pressure range |
|---|---|---|
| ISE70 | Positive pressure (for air) | 0 to 1 MPa |
| ISE75 | Positive pressure (for general fluids) | 0 to 10 MPa |
| ISE75H | Positive pressure (for general fluids) | 0 to 15 MPa |

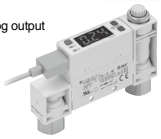
## 2-Color Display Digital Pressure Switch
## *ZSE/ISE80*

- Suitable for a wide variety of fluids with stainless diaphragm
- IP65
- Low leakage. VCR®, Swagelok® compatible fittings can be selected.
- Rear ported, bottom ported

| Series | Type | Rated pressure range |
|---|---|---|
| ZSE80F | Compound pressure | −100.0 to 100.0 kPa |
| ZSE80 | Vacuum pressure | 0.0 to −101.0 kPa |
| ISE80 | Positive pressure | −0.100 to 1.000 MPa |
| ISE80H | Positive pressure | −0.100 to 2.000 MPa |

## Flow Switches/Sensors Best Pneumatics

### 2-Color Display Digital Flow Switch *PFM*



- Switch output, accumulated pulse output, analog output
- Grease-free
- 3-step setting
- Integrated flow adjustment valve
- Compact, lightweight, space-saving
- Panel mount, DIN rail, bracket, direct mounting

| Series | Rated flow range (L/min) |
|---|---|
| PFM<br>( ): For $CO_2$ | 0.2 to 10 (0.2 to 5) |
| | 0.5 to 25 (0.5 to 12.5) |
| | 1 to 50 (1 to 25) |
| | 2 to 100 (2 to 50) |

## Flow Switches/Sensors

### 2-Color Display Digital Flow Switch *PFMB*

- Air, $N_2$
- Grease-free
- Integrated flow adjustment valve (200 L type only)
- Compact and space-saving

| Series | Rated flow range (L/min) |
|---|---|
| PFMB | 2 to 200 |
| | 5 to 500 |
| | 10 to 1000 |

## Flow Switches/Sensors Best Pneumatics

### Digital Flow Switch for Air *PF2A*

- Switch output, accumulated pulse output, analog output
- IP65

| Series | Rated flow range (L/min) |
|---|---|
| PF2A | 1 to 10 |
| | 5 to 50 |
| | 10 to 100 |
| | 20 to 200 |
| | 50 to 500 |
| | 150 to 3000 |
| | 300 to 6000 |
| | 600 to 12000 |

### 3-Color Display Digital Flow Switch for Water *PF3W*

- 3-color/2-screen display
- Integrated flow adjustment valve and temperature sensor (4 L, 16 L, 40 L type only)
- 3-step setting
- 40% smaller than existing product (compared to PF2W)
- IP65 compliant, non-grease type
- Fluid temperature: 0 to 90°C
- Switch output, accumulated pulse output, analog output
- PVC piping type (10 to 100, 30 to 250 L/min only)

| Series | Rated flow range (L/min) |
|---|---|
| PF3W | 0.5 to 4 |
| | 2 to 16 |
| | 5 to 40 |
| | 10 to 100 |
| | 50 to 250 (30 to 250) |

( ): For PVC piping type

## Flow Switches/Sensors

### 3-Color Display Electromagnetic Type Digital Flow Switch *LFE□*

- Compact, lightweight
  56 mm x 40 mm x 90 mm (H x W x D)
  Weight: 340 g (LFE1□3)
- Reverse flow can be detected.
- Fluid temperature: 0 to 85°C
- Current consumption: 45 mA
- Applicable fluids: Water, water-soluble coolant

| Series | Rated flow range (L/min) |
|---|---|
| LFE□ | 0.5 to 20 |
| | 2.5 to 100 |
| | 5 to 200 |

## Flow Switches/Sensors Best Pneumatics

### Diaphragm Style Flow Switch *IFW5*

- Used as a general relaying device when water stoppage or water volume reduction occurs during the use of a cooling water system, etc.
- With neon light

| Series | Set flow rate range (L/min) | Contact |
|---|---|---|
| IFW5 | 1 to 10 | Micro switch 1ab |
| | 10 to 20 | |
| | 20 to 50 | |

## Flow Switches/Sensors Best Pneumatics

### Paddle Style Flow Switch *IF3*

- Used as a general relaying device when water stoppage or water volume reduction occurs during the use of a cooling water system, etc.
- Port size 3/4,1
- Equivalent to IP42 and IP44

| Series | Set flow rate range (L/min) | Contact |
|---|---|---|
| IF3 | 14 to 60 | Micro switch 1ab |
| | 20 to 1500 | |
| | 36 to 2600 | |



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## Pneumatic Instrumentation Equipment

# Solenoid Valves


**Directional Control Valves**



**Fluid Control Equipment**

# NAMUR Interface 3 Port Solenoid Valve
# *Series VFN200N*

**The interface surface complies with NAMUR.**

- **Can be directly installed on the industrial valve actuator that complies with NAMUR.**

## How to Order

**VFN212N – 5 D Z ☐ – 02 F – ☐ – ☐**

**NAMUR Interface**

**Voltage**

| | |
|---|---|
| **1** | 100 VAC, 50/60 Hz |
| **2** | 200 VAC, 50/60 Hz |
| **3** | 110 to 120 VAC, 50/60 Hz |
| **4** | 220 VAC, 50/60 Hz |
| **5** | 24 VDC |
| **6** | 12 VDC |
| **7** | 240 VAC, 50/60 Hz |

For other rated voltages, please contact SMC.

**Electrical entry**

| | |
|---|---|
| **G** | Grommet |
| **E** | Grommet terminal |
| **T** | Conduit terminal |
| **D** | DIN terminal |
| **DO** | DIN terminal (Without connector) |
| **Y** Note) | DIN terminal |
| **YO** Note) | DIN terminal (Without connector) |

Note) Conforming to DIN 43650, Form B

**Thread type**

| | |
|---|---|
| **Nil** | Rc (PT) |
| **F** | G (PF) |
| **N** | NPT |

**Manual override**

| | |
|---|---|
| **Nil** | Non-locking push type (Flush) |
| **A** | Non-locking push type (Extended) |
| **B** | Locking type (Tool required) |

**Light/Surge voltage suppressor**

| | |
|---|---|
| **Nil** | None |
| **Z** | With light/surge voltage suppressor |
| **S** Note) | With surge voltage suppressor |

Note) Available for grommet type only.

**Solenoid**

| | |
|---|---|
| **Nil** | Single solenoid |
| **D** | Double solenoid |

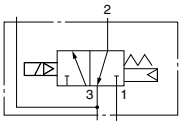
**CE marking**

| | |
|---|---|
| **Nil** | — |
| **Q** | CE marked product |

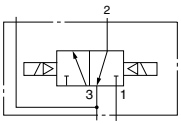
## Specifications

| | | | |
|---|---|---|---|
| **Valve specifications** | **Fluid** | | Air, Inert gas |
| | **Valve type** | | Normally closed |
| | **Max. operating pressure** | | 0.9 MPa (130 psi) |
| | **Min. operating pressure** | | 0.15 MPa (22 psi) |
| | **Ambient and fluid temperature** | | –10 to +60°C Note 1) |
| | **Lubrication** | | Not required Note 2) |
| | **Pilot valve manual override** | | Non-locking push type (Flush) |
| | **Enclosure** | | Dustproof |
| | **Port size** | | 1/4 |
| | **Cv factor (Effective area)** | | Refer to "Flow-rate Characteristics" table below. |
| | **Weight** | | Refer to "Weight" table below. |
| | **Other** | | Cylinder ports should be NAMUR hole pattern. |
| **Electrical specifications** | **Coil rated voltage** | | 12, 24 VDC, 100, 110 to 120, 200, 220, 240 VAC (50/60 Hz) |
| | **Allowable voltage fluctuation** | | –15 to +10% of rated voltage |
| | **Coil insulation type** | | Class B or equivalent |
| | **Apparent power AC (Power consumption)** | **Inrush** | 5.0 VA/60 Hz, 5.6 VA/50 Hz |
| | | **Holding** | 2.3 VA (1.5 W)/60 Hz, 3.4 VA (2.1 W) 9/50 Hz |
| | **Power consumption DC** | | 1.8 W |
| | **Electrical entry** | | Grommet, Grommet terminal, Conduit terminal, DIN terminal |

**Symbol**
Single solenoid




Double solenoid




Note 1) Use dry-air at low temperature.
Note 2) Use turbine oil No.1 (ISO VG32), if lubricated.

## Flow-rate Characteristics

| | | Flow-rate characteristics | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1→4/2 (P→A/B) | | | 4/2→5/3 (A/B→EA/EB) | | |
| | | C | b | Cv | C | b | Cv |
| 2-position | Single solenoid | 2.68 | 0.40 | 0.72 | 5.41 | 0.31 | 1.38 |
| | Double solenoid | 2.68 | 0.40 | 0.72 | 5.41 | 0.31 | 1.38 |

## Weight

(g)

| Model | Weight |
|---|---|
| **VFN212N-5D-02F** | 240 |
| **VFN212N-5D-02F-D** | 380 |



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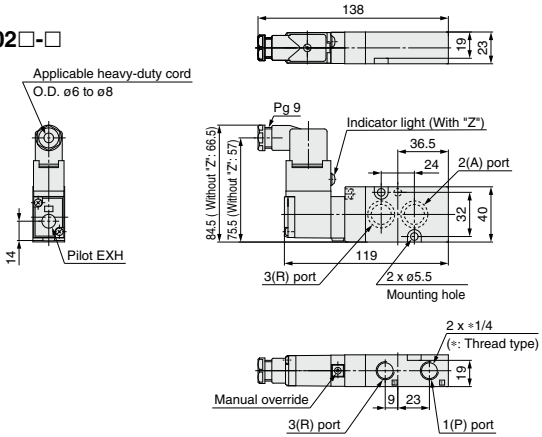
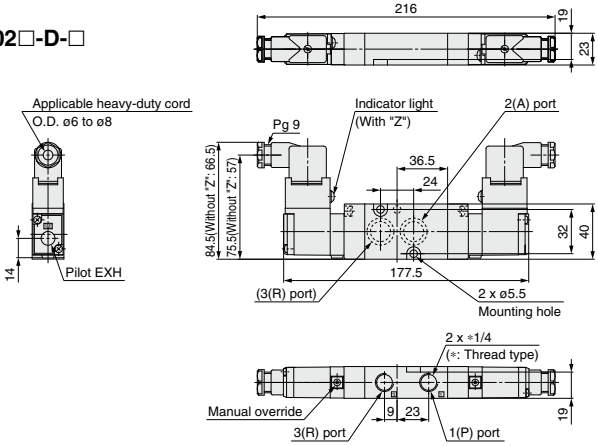
## Dimensions

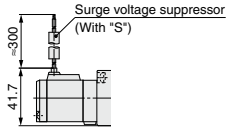
### DIN terminal
### VFN212N-□$^{D}_{(Y)}$□□-02□-□



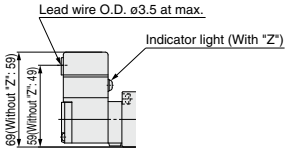

### DIN terminal
### VFN212N-□$^{D}_{(Y)}$□□-02□-D-□



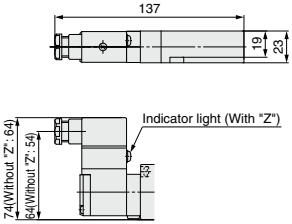

### Grommet
### VFN212N-□G□□-02□-□-□



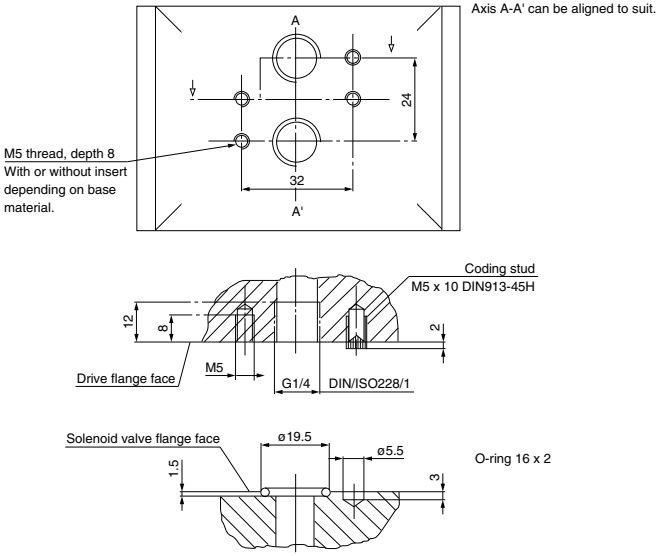

### Grommet terminal
### VFN212N-□E□□-02□-□-□




### Conduit terminal
### VFN212N-□T□□-02□-□-□



## NAMUR Mounting Pattern




The solenoid valve can be attached with 2 mounting bolts.
The positioning of the coding stud hole is left up to the manufacturer and thus also determines the location of the coding stud.

# NAMUR Interface 5 Port Solenoid Valve
# *Series VFN2000N*

**The interface surface complies with NAMUR.**

- **Can be directly installed on the industrial valve actuator that complies with NAMUR.**

## How to Order

**VFN2 [1] 20 – [N] – [5] [D] [Z] [ ] – 02 [F] – [ ]**

**Solenoid**

| | |
|---|---|
| 1 | Single solenoid |
| 2 | Double solenoid |

**NAMUR Interface**

**Voltage**

| | |
|---|---|
| 1 | 100 VAC, 50/60 Hz |
| 2 | 200 VAC, 50/60 Hz |
| 3 | 110 to 120 VAC, 50/60 Hz |
| 4 | 220 VAC, 50/60 Hz |
| 5 | 24 VDC |
| 6 | 12 VDC |
| 7 | 240 VAC, 50/60 Hz |

For other rated voltages, please contact SMC.

**Electrical entry**

| | |
|---|---|
| G | Grommet |
| E | Grommet terminal |
| T | Conduit terminal |
| D | DIN terminal |
| DO | DIN terminal (Without connector) |
| Y Note) | DIN terminal |
| YO Note) | DIN terminal (Without connector) |

Note) Conforming to DIN 43650, Form B

**Thread type**

| | |
|---|---|
| Nil | Rc (PT) |
| F | G (PF) |
| N | NPT |

**Manual override**

| | |
|---|---|
| Nil | Non-locking push type (Flush) |
| A | Non-locking push type (Extended) |
| B | Locking type (Tool required) |

**Light/Surge voltage suppressor**

| | |
|---|---|
| Nil | None |
| Z | With light/surge voltage suppressor |
| S Note) | With surge voltage suppressor |

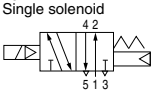
Note) Available for grommet type only.

**CE marking**

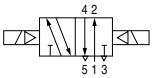
| | |
|---|---|
| Nil | — |
| Q | CE marked product |

**Symbol**

Single solenoid




Double solenoid




## Specifications

| | | | |
|---|---|---|---|
| Valve specifications | Fluid | | Air, Inert gas |
| | Max. operating pressure | | 0.9 MPa (130 psi) |
| | Min. operating pressure | | 0.15 MPa (22 psi) |
| | Ambient and fluid temperature | | –10 to +60°C Note 1) |
| | Lubrication | | Not required Note 2) |
| | Pilot valve manual override | | Non-locking push type (Flush) |
| | Enclosure | | Dustproof |
| | Port size | | 1/4 |
| | Cv factor (Effective area) | | Refer to "Flow-rate Characteristics" table below. |
| | Weight | | Refer to "Weight" table below. |
| | Other | | Cylinder ports should be NAMUR hole pattern. |
| Electrical specifications | Coil rated voltage | | 12, 24 VDC, 100, 110 to 120, 200, 220, 240 VAC (50/60 Hz) |
| | Allowable voltage fluctuation | | –15 to +10% of rated voltage |
| | Coil insulation type | | Class B or equivalent |
| | Apparent power AC (Power consumption) | Inrush | 5.0 VA/60 Hz, 5.6 VA/50 Hz |
| | | Holding | 2.3 VA (1.5 W)/60 Hz, 3.4 VA (2.1 W) 9/50 Hz |
| | Power consumption DC | | 1.8 W |
| | Electrical entry | | Grommet, Grommet terminal, Conduit terminal, DIN terminal |

Note 1) Use dry-air at low temperature.
Note 2) Use turbine oil No.1 (ISO VG32), if lubricated.

## Flow-rate Characteristics

| | | Flow-rate characteristics | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1→4/2 (P→A/B) | | | 4/2→5/3 (A/B→EA/EB) | | |
| | | C | b | Cv | C | b | Cv |
| 2-position | Single solenoid | 3.48 | 0.25 | 0.85 | 4.57 | 0.17 | 1.06 |
| | Double solenoid | 3.48 | 0.25 | 0.85 | 4.57 | 0.17 | 1.06 |

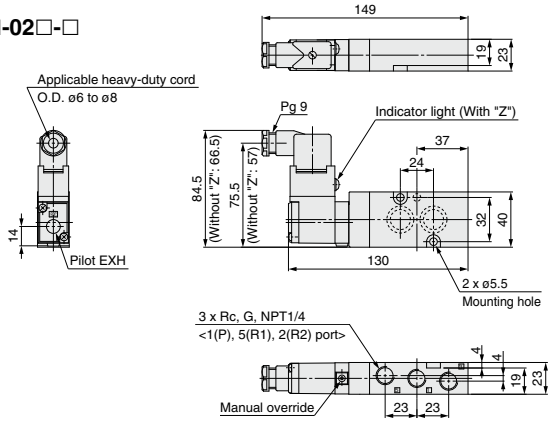
## Weight

(g)

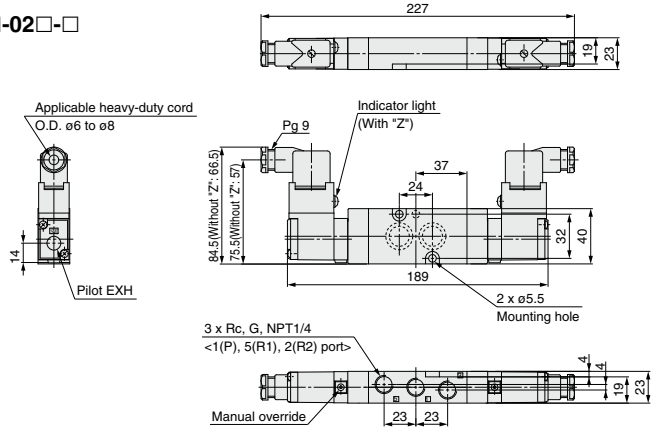
| Model | Weight |
|---|---|
| **VFN2120N-5D-02F** | 260 |
| **VFN2220N-5D-02F** | 400 |

## Dimensions

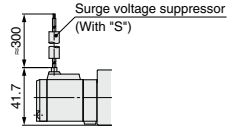
### DIN terminal
### VFN2120N-□$^{D}_{(Y)}$□□-02□-□



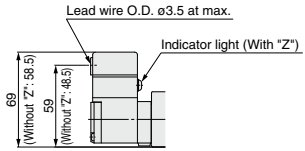

### DIN terminal
### VFN2220N-□$^{D}_{(Y)}$□□-02□-□



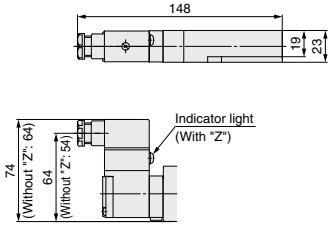

### Grommet
### VFN2120N-□G□□-02□-□



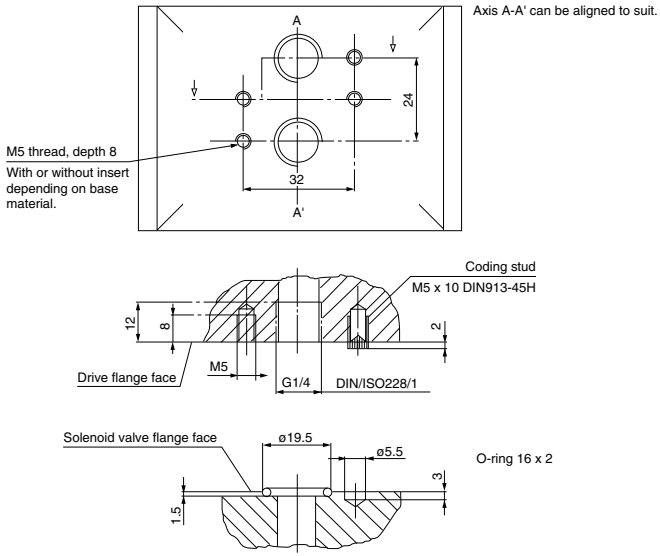

### Grommet terminal
### VFN2120N-□E□□-02□-□




### Conduit terminal
### VFN2120N-□T□□-02□-□



## NAMUR Mounting Pattern




The solenoid valve can be attached with 2 mounting bolts.
The positioning of the coding stud hole is left up to the manufacturer and thus also determines the location of the coding stud.

## How to Order Pilot Valve

**SF4 – 5 D Z □ – 12 – X99**

**Coil rated voltage**

| | |
|---|---|
| **1** | 100 VAC, 50/60 Hz |
| **2** | 200 VAC, 50/60 Hz |
| **3** | 110 to 120 VAC, 50/60 Hz |
| **4** | 220 VAC, 50/60 Hz |
| **5** | 24 VDC |
| **6** | 12 VDC |
| **7** | 240 VAC, 50/60 Hz |

For other rated voltages, please contact SMC.

**Electrical entry**

| | |
|---|---|
| **G** | Grommet |
| **E** | Grommet terminal |
| **T** | Conduit terminal |
| **D** | DIN terminal |
| **DO** | DIN terminal (Without connector) |
| **Y** Note) | DIN terminal |
| **Y0** Note) | DIN terminal (Without connector) |

Note) Conforming to DIN 43650, Form B

**Manual override**

| | |
|---|---|
| **Nil** | Non-locking push type (Flush) |
| **A** | Non-locking push type (Extended) |
| **B** | Locking type (Tool required) |

**Light/Surge voltage suppressor**

| | |
|---|---|
| **Nil** | None |
| **Z** | With light/surge voltage suppressor |
| **S** Note) | With surge voltage suppressor |

Note) Available for grommet type only. Grommet type is available only with surge voltage suppressor, not with indicator light.

**Pilot valve assembly for VFN200N/VFN2000N**

# NAMUR Interface Solenoid Valves Specific Product Precautions 1

**Be sure to read this before handling.**

## Design

## ⚠Warning

### 1. Actuator drive

When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.

### 2. Holding pressure (including vacuum)

Since the valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a pressure vessel.

### 3. Not suitable for use as an emergency shutoff valve, etc.

The valves are not designed for safety applications such as an emergency shutoff valve. If the valves are used for the mentioned applications, additional safety measures should be adopted.

### 4. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

### 5. Release of residual pressure

For maintenance purposes install a system for releasing residual pressure.

## Selection

## ⚠Warning

### 1. Confirm the specifications.

Products are designed only for use in compressed air systems (including vacuum). Do not operate at pressures or temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)
Please contact SMC when using a fluid other than compressed air (including vacuum).

### 2. Extended periods of continuous energization

Please contact SMC when a valve is continuously energized for an extended period of time or when the energized period is longer than the de-energized period.

## ⚠Caution

### 1. Momentary energization (Double solenoid valve)

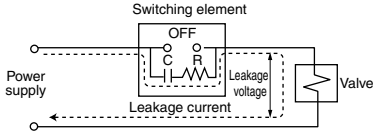
If a double solenoid valve is operated with momentary energization, it should be energized for at least 0.1 second.
However, depending on the condition of the secondary load, it should be energized until the cylinder reaches the stroke end position, since there is a possibility of malfunction.

## Selection

## ⚠Caution

### 2. Leakage voltage

Take note that the leakage voltage will increase when a C-R circuit (surge voltage suppressor) is used for protecting a switching device because of the passing leakage voltage through the C-R circuit.




The suppressor residual leakage voltage should be as follows.
DC coil: 3% or less of rated voltage
AC coil: 20% or less of rated voltage

### 3. Solenoid valve drive with SSR

If the minimum load current of the SSR is larger than that of the solenoid valve, this may cause a malfunction.

When selecting the SSR, refer to the element catalog specifications.

### 4. Surge voltage suppressor

If a surge protection circuit contains nonstandard diodes, such as Zener diodes or ZNR, a residual voltage that is in proportion to the protective circuit and the rated voltage will remain. Therefore, take into consideration the surge voltage protection of the controller.
In the case of diodes, the residual voltage is approximately 1 V.

### 5. Operation in a low temperature condition

It is possible to operate a valve in extreme temperature, as low as –10°C. Take appropriate measures to avoid freezing of drainage, moisture etc. in low temperature.

### 6. Mounting orientation

Mounting orientation of a single solenoid valve is universal. When installing a double solenoid valve, mount the valve so that spool valve is horizontal.

## Mounting

## ⚠Warning

### 1. If air leakage increases or equipment does not operate properly, stop operation.

Check mounting conditions when air and power supplies are connected. Initial function and leakage tests should be performed after installation.

### 2. Operation manual

Install the products and operate them only after reading the operation manual carefully and understanding its contents.
Also, keep the manual where it can be referred to as necessary.

### 3. Painting and coating

Warnings or specifications printed or affixed to the product should not be erased, removed or covered up. Also, applying paint to resinous parts may have an adverse effect due to the solvent in the paint.



INDEX

# NAMUR Interface Solenoid Valves Specific Product Precautions 2

**Be sure to read this before handling.**

## Piping

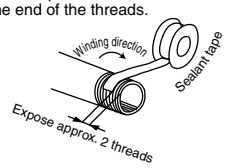
### ⚠Caution

**1. Preparation before piping**

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

**2. Wrapping of sealant tape**

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.




**3. Connection of fittings**

When attaching fittings to valves, tighten with the tightening torque shown below.

| Connection thread size | Proper tightening torque N·m(kgf·cm) |
|---|---|
| 1/4 | 12 to 14 (120 to 140) |

**4. Piping to products**

When piping to a product, refer to the operation manual to avoid mistakes regarding the supply port, etc.

## Wiring

### ⚠Caution

**1. Applied voltage**

When electric power is connected to a solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.

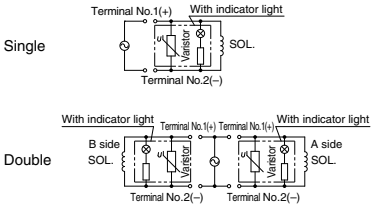
**2. Check the connections.**

Check if the connections are correct after completing all wiring.

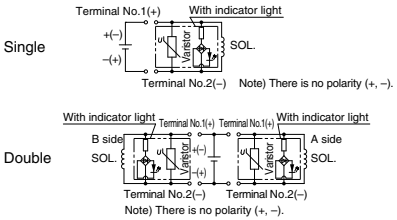
## Light/Surge Voltage Suppressor

### ⚠Caution

**AC and 100 VDC**




**24 VDC or less**




- Type G: Use lead wire from solenoid to connect with power side. Grommet with DC voltage surge voltage suppressor has polarity. Connect red lead wire to + (positive) side and black to – (negative) side.

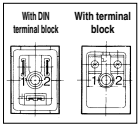
| Surge voltage suppressor | |
|---|---|
| DC | AC |
|  |  |



## Wiring

### ⚠Caution

In the case of DIN terminal and terminal block (with indicator light/ surge voltage suppressor), the interior wiring is shown below.




Applicable terminal: 1.25-3, 1.25-3S, 1.25Y-3N, 1.25Y-3S, but in the case of with DIN terminal block, is not a terminal structure.

Note) There is no polarity (+, –).



SMC

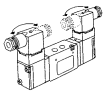
# NAMUR Interface Solenoid Valves Specific Product Precautions 3

**Be sure to read this before handling.**

## Changing Direction of DIN Terminal/Cable Entry

### ⚠Caution

To change direction of DIN terminal retaining screw, pull off outer cover, rotate connector board through 180°. Replace cover and tighten screw.



## Lubrication

### ⚠Caution

**1. Lubrication**

1) The valve has been lubricated for life at the factory, and does not require any further lubrication.
2) If a lubricant is used in the system, use class 1 turbine oil (no additive), ISO VG32. Once a lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away. Refer to each manufacturer's brand name of class 1 turbine oil (no additive), ISO VG32 as shown below.

**Class 1 Turbine Oil (No additive), ISO VG32**

| Classification of viscosity cst (40C) / Viscosity according to ISO Grade | 32 |
|---|---|
| Idemitsu Kosan Co., Ltd. | Turbine oil P-32 |
| Nippon Oil Corporation | Turbine oil 32 |
| COSMO OIL CO., LTD. | Cosmo turbine 32 |
| Japan Energy Corporation | Kyodo turbine 32 |
| Kygnus Sekiyu K.K. | Turbine oil 32 |
| Kyushu Oil Co., Ltd. | Stork turbine 32 |
| Mitsubishi Oil Co., Ltd. | Mitsubishi turbine 32 |
| SHOWA SHELL SEKIYU K.K. | Turbine 32 |
| Tonen General Sekiyu K.K. | General R turbine 32 |
| FUJI KOSAN CO., LTD. | Fukkol turbine 32 |

Please contact SMC for details about class 2 turbine oil (with additives), ISO VG32.

## Air Supply

### ⚠Warning

**1. Use clean air.**

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

### ⚠Caution

**1. Install an air filter.**

Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 µm or smaller.

## Air Supply

### ⚠Caution

**2. Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.**

Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

**3. If excessive carbon powder is seen, install a mist separator on the upstream side of the valve.**

**If excessive carbon dust is generated by the compressor, it may adhere to the inside of a valve and cause it to malfunction.**

For compressed air quality, refer to SMC Best Pneumatics catalog.

## Operating Environment

### ⚠Warning

**1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.**

**2. Do not use in explosive atmospheres.**

**3. Do not use in a place subject to heavy vibration and/or impact.**

Confirm the specifications in the main section of the catalog.

**4. The valve should not be exposed to prolonged sunlight. Use a protective cover.**

**5. Remove any sources of excessive heat.**

**6. In locations where there is contact with spatter from water, oil, solder, etc., take suitable protective measures.**

**7. When the solenoid valve is mounted in a control panel or its energized for a long time, make sure ambient temperature is within the specification of the valve.**

# NAMUR Interface Solenoid Valves Specific Product Precautions 4

**Be sure to read this before handling.**

**Maintenance**

## ⚠Warning

**1. Perform maintenance inspection according to the procedures indicated in the operation manual.**

If handled improperly, malfunction and damage of machinery or equipment may occur.

**2. Removal of equipment, and supply/exhaust of compressed air**

When components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function. For 3-position closed center type, exhaust the residual pressure between the valve and the cylinder.

When the equipment is operated after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc. Then, confirm that the equipment is operating normally.

**3. Low frequency operation**

Valves should be operated at least once every 30 days to prevent malfunction. (Use caution regarding the air supply.)

**4. Manual override**

When the manual override is operated, connected equipment will be actuated. Operate after safety is confirmed.

## ⚠Caution

**1. Drain flushing**

Remove drainage from the air filters regularly.

**2. Lubrication**

Once lubrication has been started, it must be continued.

Use class 1 turbine oil (with no additive), VG32. If other lubricant oil is used, it may cause malfunction. Please contact SMC for suggested class 2 turbine oil (with additive), VG32.

# NAMUR Interface 3/5 Port Solenoid Valve
# IP67 Compliant, Hygienic Design Type
# *VFN2120N-X23/-X36*

CE [Option]

- Hygienic design is adopted
  Resin body with less concaves. Direct cleaning of valve is possible (IP67)
- 3 port/5 port available
  Function plate realized 3/5 port selectable
- Low power consumption
  Power consumption: 0.5 W
- Port threads: NPT1/4, G1/4 available

## How to Order

**VFN2120N-5 □ -02 N- □ □ -X23 A- □**

**Voltage**

| | |
|---|---|
| 5 | 24 VDC |

**Manual**

| | | X23 | X36 |
|---|---|---|---|
| Nil | Push type | ○ | — |
| B | Locking type (Tool required) | ○ | — |
| C | Locking type (Manual type) | — | ○ |

○: Available

**1/3/5 port thread size**

| | |
|---|---|
| 02 | 1/4" |

**1/3/5 port thread type**

| | |
|---|---|
| N | NPT |
| F | G |

**Mounting thread type**

| | |
|---|---|
| Nil | UNF10-32 thread |
| M | M5 x 0.8 thread |
| N | No mounting thread |

**Check valve**

| | |
|---|---|
| Nil | Available |
| 0 | Not available |

**Electrical entry**

| | |
|---|---|
| X23 | Vertical entry to piping port |
| X36 | Horizontal entry to piping port |

**Valve specifications**

| | |
|---|---|
| A | 3 port (Coil side: A port) |
| B | 5 port (Coil side: B port) |
| C | 3 port (Coil side: B port) |
| D | 5 port (Coil side: A port) |

**CE-compliant**

| | |
|---|---|
| Nil | — |
| Q | CE-compliant |

# VFN2120N-X23/-X36

## Standard Specifications

| | |
|---|---|
| **Fluid** | Air |
| **Operating pressure range** | 0.15 to 0.9 MPa |
| **Ambient and fluid temperature** | −10 to +60°C |
| **Lubrication** | Not required |
| **Manual override** | Push type/Locking type (tool required)/ Locking type (manual type) |
| **Enclosure** | Equivalent to IP67 |
| **Thread port size** | 1/4" |
| **Flow-rate characteristics (Cv/Effective area)** | 0.8/11 mm² |
| **Rated voltage** | 24 VDC |
| **Allowable voltage fluctuation** | −15 to +10% of rated voltage |
| **Type of coil insulation** | Class B |
| **Power consumption** | 0.5 W |

## Replacement Parts

**①Mounting screw**

| Model | Type | Contents |
|---|---|---|
| **AXT842-30-19A-2** | UNF10-32 | With washer/A set of 10 screws |
| **AXT842-30-19A-3** | M5 x 0.8 | |

**Mounting screw**

**②Check valve**

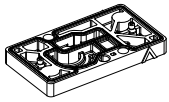
| Model | Contents |
|---|---|
| **AXT842-30-17A** | A set of 10 pcs. |

**Check valve**

**③Function plate assembly**∗

| Model | Valve specifications |
|---|---|
| **AXT842-30-10-A** | 3 port (Coil side: A port) |
| **AXT842-30-10-B** | 5 port (Coil side: B port) |
| **AXT842-30-10-C** | 3 port (Coil side: B port) |
| **AXT842-30-10-D** | 5 port (Coil side: A port) |

∗ Valve specifications can be freely changed by changing the function plate.



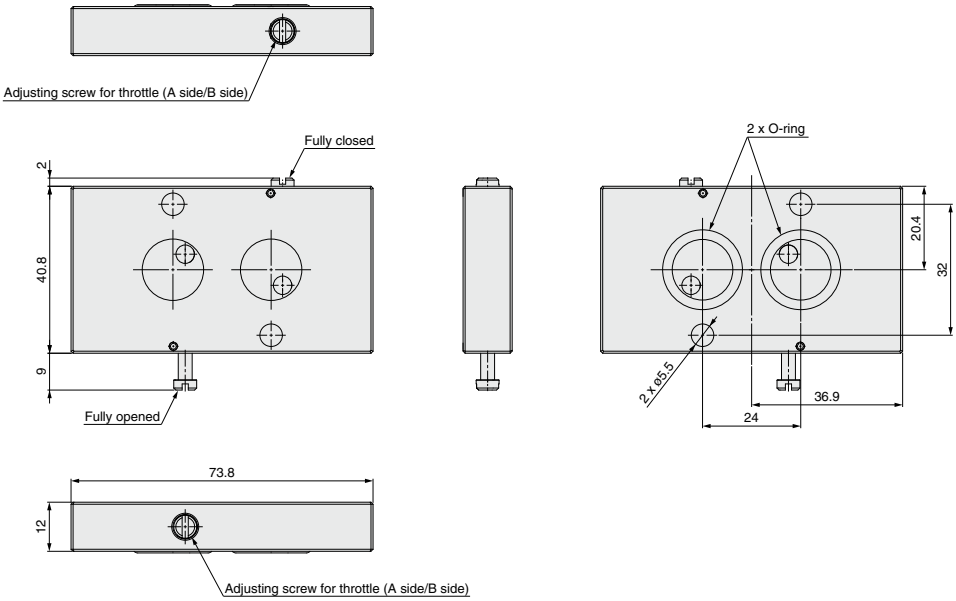
**Function plate assembly**

## Options

**Throttle valve spacer**

| Part no. | Mounting screw type | Body material | Accessories |
|---|---|---|---|
| **AXT842-30-22A-1** | UNF10-32 | Stainless steel | O-ring for interface (2 pcs.) Mounting screw for spacer (2 pcs.) |
| **AXT842-30-22A-2** | M5 x 0.8 | | |
| **AXT842-30-24A-1** | UNF10-32 | Aluminum (Black anodized) | |
| **AXT842-30-24A-2** | M5 x 0.8 | | |

## Dimensions

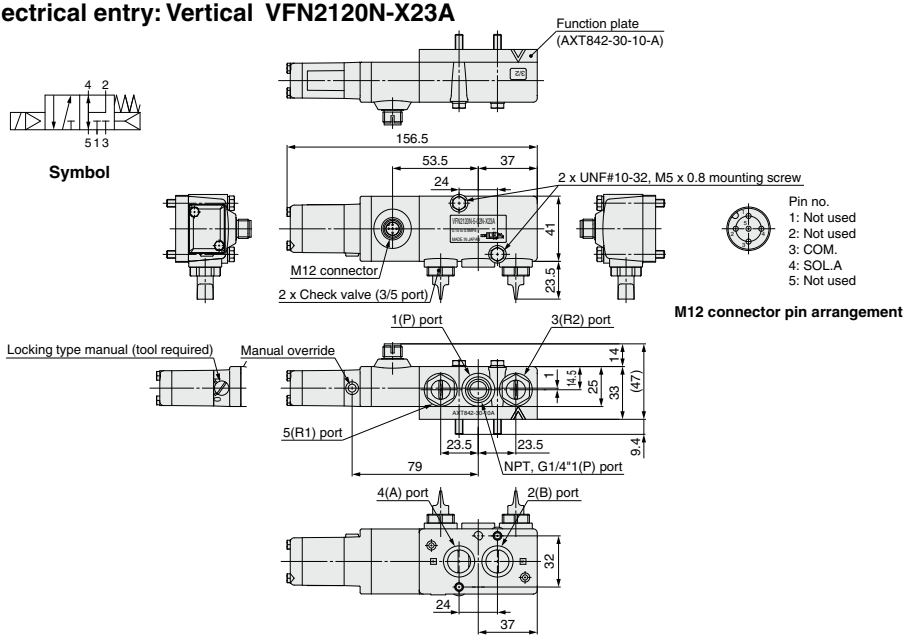




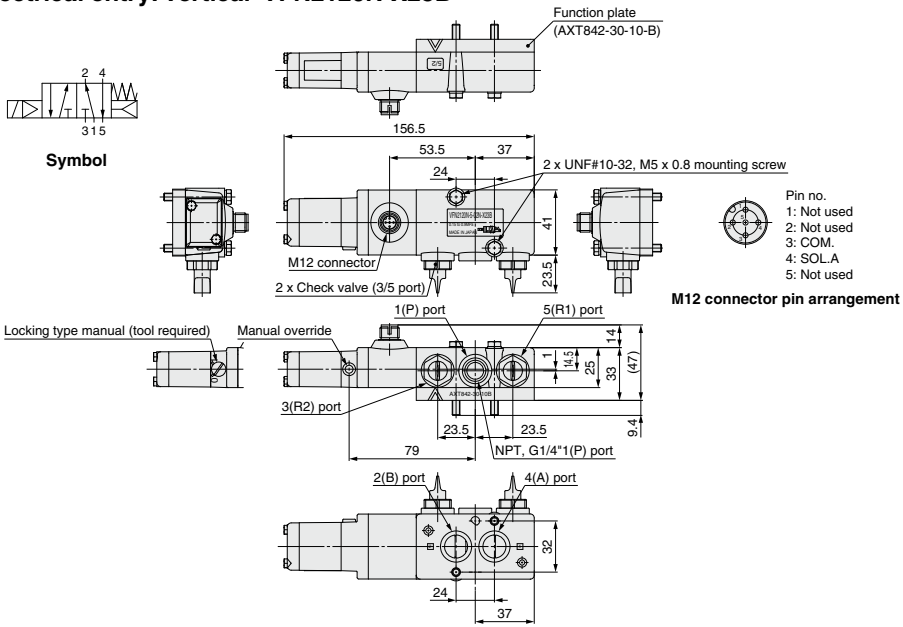

SMC

## Dimensions

### Electrical entry: Vertical VFN2120N-X23A




### Electrical entry: Vertical VFN2120N-X23B



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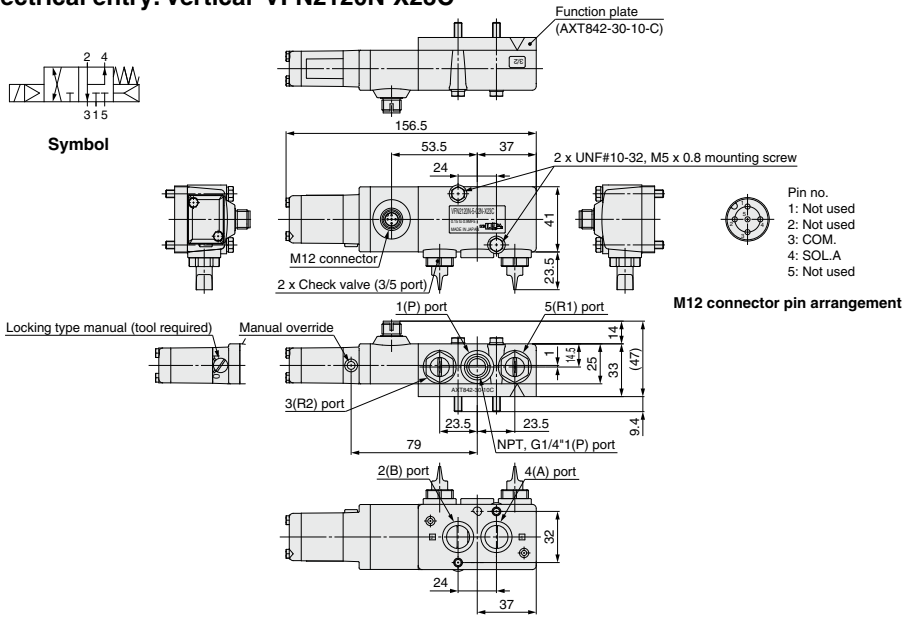
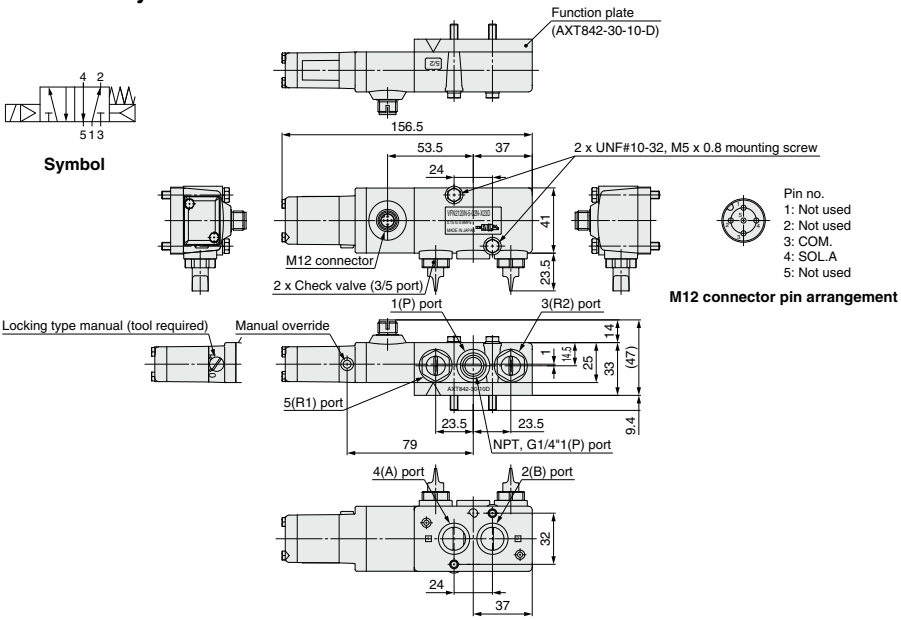
## Dimensions

### Electrical entry: Vertical VFN2120N-X23C

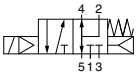



### Electrical entry: Vertical VFN2120N-X23D

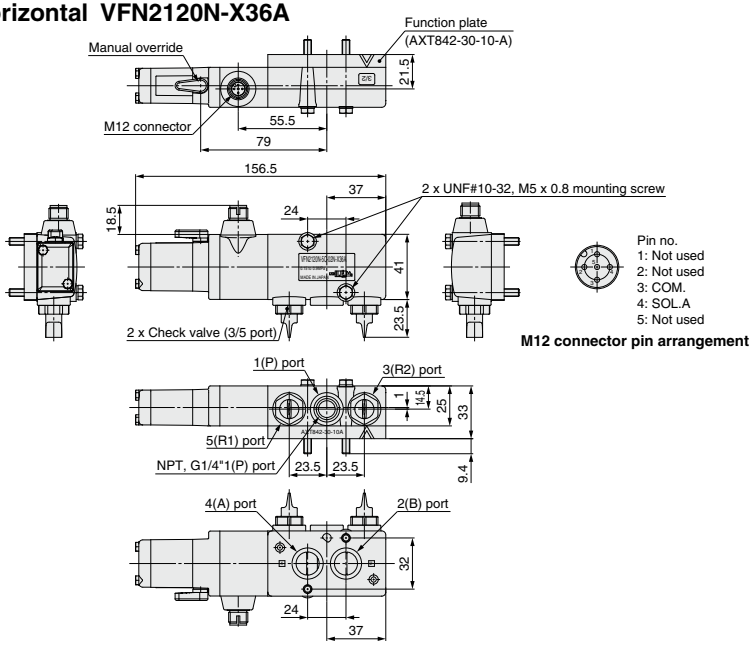


## Dimensions

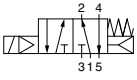
### Electrical entry: Horizontal VFN2120N-X36A



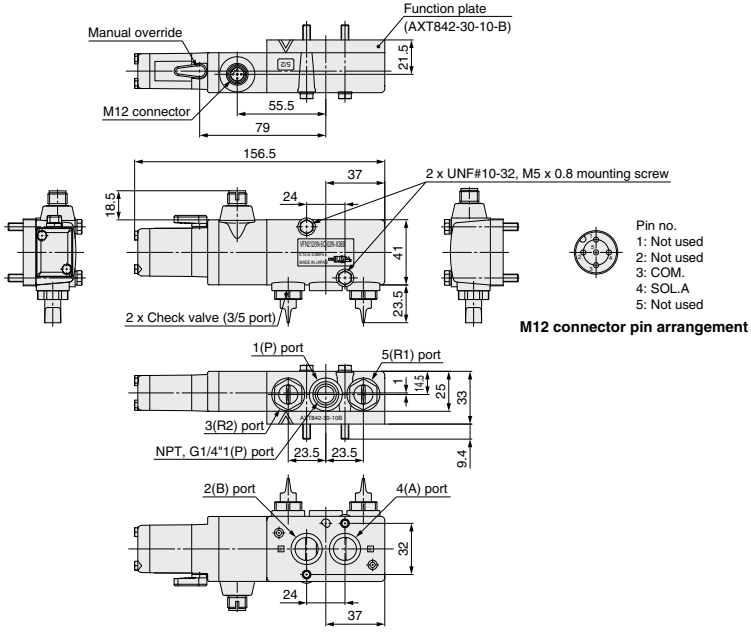

**Symbol**




### Electrical entry: Horizontal VFN2120N-X36B




**Symbol**



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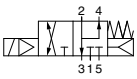
## Dimensions

### Electrical entry: Horizontal VFN2120N-X36C

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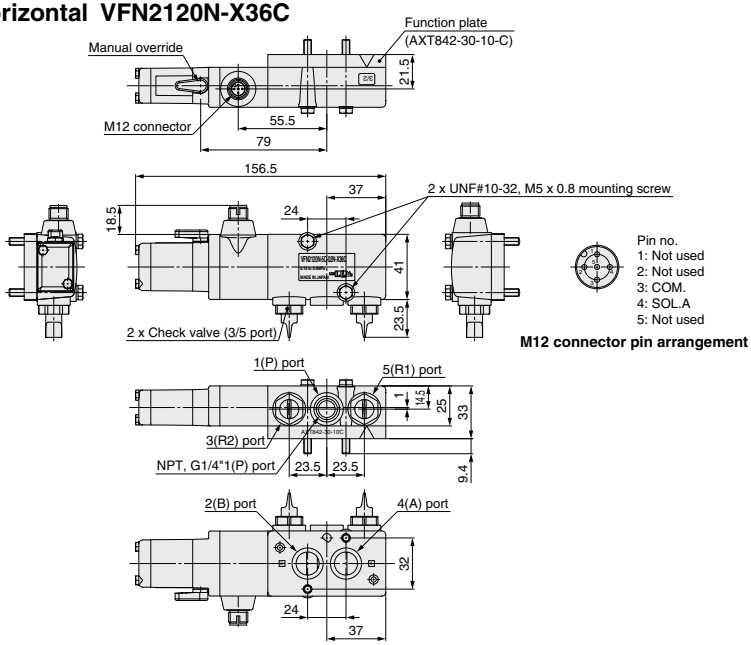
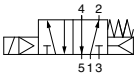
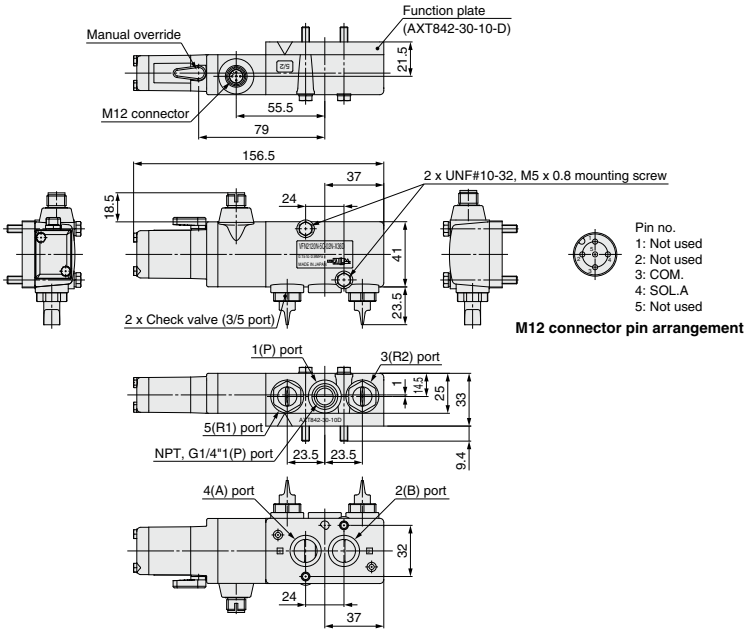



### Electrical entry: Horizontal VFN2120N-X36D




**Symbol**



## Directional Control Valves

For details, refer to the SMC website. http://www.smcworld.com

### Intrinsically Safe Explosion-proof System 5 Port Solenoid Valve *51-SY*

Operation unit

- Exia Ⅱ BT4 (TIIS approved product)
- Three types of electrical entry
  L-type plug connector, L-type plug connector with cover, Terminal type
- Three types of barriers can be selected.

| Series | Flow-rate characteristics 4/2→5/3 (A/B→EA/EB) | | | Power consumption (W) |
|---|---|---|---|---|
| | C [dm³/(s·bar)] | b | Cv | |
| **51-SY5000** | 2.8 | 0.29 | 0.66 | 0.52 |
| **51-SY7000** | 4.1 | 0.29 | 1.0 | |
| **51-SY9000** | 9.6 | 0.43 | 2.6 | |

### Explosion-proof Type 3/5 Port Solenoid Valve *50-VFE/50-VPE*

Operation unit

- d2G4 and Exd Ⅱ BT4 (TIIS approved product)
- Waterproof: Passed the IPX6 test.
- Exhausting equipment for pilot valve not required.
  (Common exhaust type for main and pilot valve [50-VFE3000])
- Possible to be into manifold (50-VFE)
- As a selector valve, divider valve, or able to use for vacuum applications. (50-VPE)

| Series | | Effective area mm² (Cv) | Power consumption (W) |
|---|---|---|---|
| **50-VFE3000** | 5 port | 18 (1.0) | 3.5 |
| **50-VFE5000** | | 45 (2.5) | |
| **50-VPE500** | 3 port | 41.4 (2.3) | |
| **50-VPE700** | | 72 (4) | |

## Fluid Control Equipment

Best Pneumatics


### Direct Operated 2 Port Solenoid Valve *VX2*

Fluid control equipment

- For air, medium vacuum, water, oil, steam
- Flow rate: 20% more flow*
- Height: 10% smaller*
- Lightweight: 30% lighter*
- Body material: Aluminum, resin (air), C37, stainless steel (water, oil, medium vacuum)
- Available with One-touch fittings (resin body)

| Series | Valve type | Port size | Orifice diameter (mmø) |
|---|---|---|---|
| **VX21/22/23** | N.C./N.O. | 1/8 to 1/2<br>ø6 to ø12 | 2 to 10 |

* Comparison with SMC conventional model

### Pilot Operated 2 Port Solenoid Valve *VXD*

Fluid control equipment

- For air, water, oil, heated water, high temperature oil
- Height: 7% smaller*

| Series | Valve type | Port size | Orifice diameter (mmø) |
|---|---|---|---|
| **VXD2** | N.C./N.O. | 1/4 to 1<br>32 A to 50 A<br>ø10, ø3/8", ø12 | 10 to 50 |

* Comparison with SMC conventional model

# Pneumatic Instrumentation Equipment

# Air Preparation Equipment

## Aftercoolers

Best Pneumatics 5

### Air Cooled Aftercooler *HAA*

- Can cool high temperature compressed air from compressors down to 40° C or less and efficiently remove moisture from the air.
- Cooling equipment is not required for this air cooled type.
- Maintenance is easy and the running cost is reasonable since this is free from concerns such as water supply cut-off or freezing.

| Series | Applicable compressor | Air flow capacity L/min (ANR) |
|---|---|---|
| **HAA** | 7.5 to 37 kW | 1000 to 5700 |

### Water Cooled Aftercooler *HAW*

- Can cool high temperature compressed air from compressors down to 40° C or less and efficiently remove moisture from the air.
- Stable operation is possible even in an environment with a high temperature, high moisture and heavy foreign particles for this water cooled type.

| Series | Applicable compressor | Air flow capacity L/min (ANR) |
|---|---|---|
| **HAW** | 2.2 to 110 kW | 300 to 18000 |

## Air Tanks

Best Pneumatics 5

### Air Tank *VBAT*

- Compact air tank
- Compact connections are possible with booster regulators.
- Can be used as an independent tank.
- Also partially compatible with overseas standards
- Material: Carbon steel, Stainless steel

| Series | Port size | Tank capacity (L) |
|---|---|---|
| **VBAT** | 3/8, 1/2, 3/4 | 5, 10, 20, 38 |

### Air Tank *AT*

- Accumulates the compressed air from compressors, also prevents it from being pulsated, and cools it.
- Use outside Japan is not allowed.
  The AT series air tank is in compliance with the regulations in Japan (Class 2 Pressure Vessel), but is not in compliance with related regulations outside Japan. (This is also applicable when the series is used as a unit.) Please consult with SMC for use of air tanks outside Japan.
- Material: Carbon steel

| Series | Port size | Tank capacity (L) |
|---|---|---|
| **AT** | 1/2 to 4[B] flange | 100 to 3000 |

## Air Dryers

Best Pneumatics 5

### Refrigerated Air Dryer *IDF/IDU□E, D*

- Air flow capacity: Increased by up to 40%* (SMC comparison)
- Power consumption: Reduced by up to 40%* (SMC comparison)
- Refrigerant: R134a (HFC) [IDF1E to 15E1/IDU3E to 15E1]
  R407C (HFC) [IDF22E to 370D/IDU22E to 75E]
- Improved corrosion resistance with the stainless steel heat exchanger (IDF4E to 75E/IDU3E to 75E)

* Series IDF□E/IDU□E

| Series | Applicable compressor | Air flow capacity m³/min (ANR) | |
|---|---|---|---|
| | | 50 Hz | 60 Hz |
| **IDF1E to 75E** | 0.75 to 75 kW | 0.10 to 11.0 | 0.12 to 12.4 |
| **IDF190D to 370D** | 190 to 370 kW | 32.0 to 54.0 | 38.0 to 65.0 |
| **IDU3E to 75E** | 2.2 to 75 kW | 0.32 to 11.0 | 0.37 to 12.5 |

### Refrigerated Air Dryer/Large Size Series *IDF□F*

- Tolerant of high temperature environment (Ambient temperature 45°C, Inlet air temperature 60°C)
- Exhaust heat amount is reduced by 25%.
- Air-cooled and water-cooled types are available.
- Stainless steel heat exchanger
- Refrigerant: R407C (HFC)

Air-cooled type Water-cooled type

| Series | Applicable compressor | Air flow capacity m³/min (ANR) | |
|---|---|---|---|
| | | 50 Hz | 60 Hz |
| **IDF100F** | 100 kW | 16 | 18.8 |
| **IDF125F** | 125 kW | 20.1 | 23.7 |
| **IDF150F** | 150 kW | 25 | 30 |

### Refrigerated Air Dryer: For Use in Europe, Asia, and Oceania *IDFA□E*

- EC Directive compliant product (with CE mark)
- Power supply voltage: Single-phase 230 VAC (50 Hz)
- Refrigerant: R134a (HFC), R407C (HFC). Coefficient of destruction for ozone is zero.
- Improved corrosion resistance with the use of stainless steel, plate type heat exchanger (IDFA4E to 75E)

| Series | Air flow capacity m³/h (ANR) | | | Compliant standard |
|---|---|---|---|---|
| | Outlet air pressure dew point | | | |
| | 3°C | 7°C | 10°C | |
| **IDFA3E to 75E** | 12 to 660 | 15 to 720 | 17 to 822 | CE |

### Refrigerated Air Dryer/Large Size Series: For Use in Europe, Asia, and Oceania *IDFA□F*

- Tolerant of high temperature environment (Ambient temperature 45°C, Inlet air temperature 60°C)
- Exhaust heat amount is reduced by 25%.
- Power supply voltage: Three-phase 380 VAC (for Asia and Oceania), 400 VAC (for Europe)
- Stainless steel heat exchanger
- Refrigerant: R407C (HFC)

| Series | | Outlet air pressure dew point | Air flow capacity m³/h (ANR) | Compliant standard |
|---|---|---|---|---|
| For use in Asia and Oceania | IDFA100F-38 | 10°C | 960 | CE |
| | IDFA125F-38 | | 1210 | |
| | IDFA150F-38 | | 1500 | |
| For use in Europe | IDFA100F-40 | 3°C | 860 | |
| | IDFA125F-40 | | 1100 | |
| | IDFA150F-40 | | 1340 | |



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## Air Dryers

Best Pneumatics 5

### Refrigerated Air Dryer: For Use in North, Central and South America *IDFB□E*

- UL certified product
- Power supply voltage: Single-phase 115 VAC, 230 VAC (60 Hz), Three-phase 460 VAC (60 Hz)
- Refrigerant : R134a (HFC), R407C (HFC) Coefficient of destruction for ozone is zero.
- Improved corrosion resistance with the use of stainless steel, plate type heat exchanger (IDFB4E to 75E)

| Series | Air flow capacity m³/h (ANR) | | | Compliant standards |
|---|---|---|---|---|
| | Outlet air pressure dew point | | | |
| | 37°F (2.8°C) | 45°F (7.2°C) | 50°F (10°C) | |
| IDFB3E to 75E | 10 (17) to 300 (510) | 11 (19) to 353 (600) | 12 (20) to 406 (690) | UL, CSA |

### Heatless Air Dryer *ID*

- Supply dry air with a low dew point below –30°C.
- Compact and lightweight without heater and electric control board.
- Possible to check the outlet dew point with the indicator. (Self-regenerative style allows for easy maintenance.)

| Series | Outlet air flow rate L/min (ANR) |
|---|---|
| ID | 80 to 780 |

### Membrane Air Dryer *IDG*

- Non-fluorocarbon
- Power supply not required
- Compatible with low dew point
- No vibration or heat discharge
- With a dew point indicator

| Series | Outlet air flow rate L/min (ANR) | Standard dew point (°C) |
|---|---|---|
| IDG1 to 100 | 10 to 1000 | –20 |
| IDG3H to 100H | 25 to 1000 | –15 |
| IDG30LA to 100LA | 75 to 300 | –40 |
| IDG60SA to 100SA | 50 to 150 | –60 |

## Filters

Best Pneumatics 5

### Water Separator *AMG*

- Eliminates water droplets in the compressed air.
- Water droplet removal rate: 99%

| Series | Air flow capacity L/min (ANR) | Port size |
|---|---|---|
| AMG | 300 to 12000 | 1/8 to 2 |

### Main Line Filter *AFF*

- Can remove impurities such as oil, water and foreign matter in compressed air and can improve the function of a dryer in the downstream, extend the life of precision filter, and prevent trouble with the equipment.

| Series | Filtration rating (μm) | Rated flow L/min (ANR) | Port size |
|---|---|---|---|
| AFF | 3 (Filtration efficiency: 99%) | 300 to 45000 | 1/8 to 2, JIS 10KFF flange 2 to 4[B] |

### Mist Separator *AM*

- Can remove oil mist in compressed air and separate and remove particles such as rust or carbon of 0.3 μm or more.

| Series | Filtration rating (μm) | Rated flow L/min (ANR) | Port size |
|---|---|---|---|
| AM | 0.3 (Filtration efficiency: 99.9%) | 300 to 12000 | 1/8 to 2 |

### Micro Mist Separator *AMD*

- Can separate and remove aerosol state oil mist in compressed air and remove particles such as carbon or dust of 0.01 μm or more.
- Use this product as a pre-filter for compressed air for precision instruments or clean room requiring higher clean air.

| Series | Filtration rating (μm) | Rated flow L/min (ANR) | Port size |
|---|---|---|---|
| AMD | 0.01 (Filtration efficiency: 99.9%) | 200 to 40000 | 1/8 to 2, JIS 10KFF flange 2 to 6[B] |

## Filters



### Micro Mist Separator with Pre-filter *AMH*

- The AM series + AMD series have been integrated to achieve a reduction in installation space and in piping labor.
- Can separate and remove aerosol state oil mist in compressed air and remove particles such as carbon or dust of 0.01 μm or more.
- Use this product as a pre-filter for compressed air for precision instruments or clean room requiring higher clean air.

| Series | Filtration rating (μm) | Rated flow L/min (ANR) | Port size |
|---|---|---|---|
| **AMH** | 0.01 (Filtration efficiency: 99.9%) | 200 to 12000 | 1/8 to 2 |

### Super Mist Separator *AME*

- Can separate and adsorb aerosol state fine oil particles in compressed air and change the oil lubricating compressed air to oilless air or equivalent.
- Use this product for filtration of compressed air requiring higher clean air for painting lines, compressed air for clean rooms and/or equipment where oils must be avoided.

| Series | Filtration rating (μm) | Rated flow L/min (ANR) | Port size |
|---|---|---|---|
| **AME** | 0.01 (Filtration efficiency: 99.9%) | 200 to 12000 | 1/8 to 2 |

### Odor Removal Filter *AMF*

- Efficiently can remove odor in compressed air with an activated carbon element. Use this product in the area such as a clean room where odors must be avoided.
- Activated carbon element with large filtration area

| Series | Filtration rating (μm) | Rated flow L/min (ANR) | Port size |
|---|---|---|---|
| **AMF** | 0.01 (Filtration efficiency: 99.9%) | 200 to 40000 | 1/8 to 2, JIS 10KFF flange 2 to 6[B] |

Pneumatic Instrumentation Equipment

# Industrial Filters


**Industrial Filters**



**Elements**

## Industrial Filter *FGD*

- Low flow rate filtration (Max. 60 L/min)
- Possible to select the antistatic specification (FGDE, FGDF).
- Can be used with a wide range of fluids as iron or stainless steel 316 bowl is used.

| Series | Port size | Max. operating pressure | Operating temperature (°C) |
|---|---|---|---|
| FGD | Rc3/8, 1/2, 3/4 | 0.7, 1 MPa | Max. 80 |

## Industrial Filter *FGE*

- Medium flow rate filtration (Max. 230 L/min)
- Element replacement is easy with the V-band type. (With cover anti-scattering mechanism)
- The bolt tightening type can be used with a wide range of fluids as fluoropolymer gasket and stainless steel 304 bowl are used.

| Series | Port size | Max. operating pressure | Operating temperature (°C) |
|---|---|---|---|
| FGE | R1, 2 | 0.7 MPa | Max. 80 |

## Industrial Filter *FGG*

- High flow rate filtration (Max. 350 L/min)
- Element replacement is easy with the V-band type. (With cover anti-scattering mechanism)

| Series | Port size | Max. operating pressure | Operating temperature (°C) |
|---|---|---|---|
| FGG | Rc2 | 0.7 MPa | Max. 80 |

## Bag Filter *FGF*

- Highly effective for filtration of high turbidity and high viscosity fluids
- High flow rate filtration (Max. 2000 L/min)
- The bag type element catches solid foreign matter, ensuring easy treatment.
- Suitable for filtering cleaning fluids

| Series | Port size | Max. operating pressure | Operating temperature (°C) |
|---|---|---|---|
| FGF | Rc2, 4B flange, 6B flange | 0.5 MPa | Max. 80 |

## High Precision Filter for Liquids *FGH*

- Filtration efficiency: 99% or more
- Filtration rating: 0.2, 0.4, 2, 4, 6, 13 μm are selectable.

| Series | Port size | Max. operating pressure | Operating temperature (°C) |
|---|---|---|---|
| FGH | Rc3/8 to 1 | 1 MPa | Max. 80 |

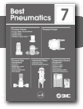
## Quick Change Filter *FQ1*

- Low flow rate filtration (Max. 30 L/min)
- No tools required.
- Easy element replacement

| Series | Port size | Max. operating pressure | Operating temperature (°C) |
|---|---|---|---|
| FQ1 | Rc1/2, 3/4, 1 | 1 MPa | Max. 80 |

## Elements





### Sintered Metal Filter Elements *EB/ES*

- Outstanding mechanical strength, heat resistance and chemical resistance.
- Formed by sintering finely powdered metal, so a high filtration accuracy can be obtained.
- Even if clogging progresses, the element can be reused by cleaning.
- Main applications
  Ideal as a check filter for keeping fluid clean.
  All types of gases, fluids, general solvents and high-temperature fluids

| Series | Material | Nominal filtration accuracy (μm) |
|---|---|---|
| **EB** | Bronze | 1, 2, 5, 10, 20<br>40, 70, 100, 120 |
| **ES** | Stainless steel 316 | |

### Fiber Elements *EH/EHM/EHK*

- Four types of materials with different characteristics are available so the filters are applicable to any application.
- Elements are economical because particle capturing capacity is excellent, and element life is long.
- Elements are disposable so maintenance and replacement are easy.
- Main applications

| | |
|---|---|
| Cotton | Cleaning water, General neutral fluids, General solvents, Dry air |
| Polypropylene | Plating fluids, General acids, Alkali fluids, Industrial water, Cooling water |
| Glass fiber | Acid fluids, High-temperature fluids |

| Series | Element material | Core material | Nominal filtration accuracy (μm) |
|---|---|---|---|
| **EH** | Cotton | Stainless steel 304 | 0.5, 1.5, 10, 20<br>50, 75, 100 |
| **EHM** | Polypropylene | Polypropylene | |
| **EHK** | Glass fiber | Stainless steel 316 | 1, 5, 10, 20 |

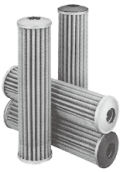
### Paper Elements *EP*

- Cartridges are pleated for a large filtration area, and elements are economical due to their long service life.
- Main applications
  Ideal for filtration of hydraulic oil, lubricating oil, fuel oil, oils for the liquid gas industry, dry inert gases, and dry air.

| Series | Material | Nominal filtration accuracy (μm) |
|---|---|---|
| **EP** | Filter paper<br>(Cotton, Phenol resin impregnated paper) | 5, 10, 20 |

### Micromesh Elements *EM*

- Stainless steel metal mesh has high filtration accuracy.
- Outstanding heat and chemical resistance. Applicable to a wide range of applications.
- Pleated type has 3 times the filtration area of a cylinder.
- Filters are economical because they can be cleaned and repeatedly used.
- Main applications
  Please use 40 microns or less as a high precision filter, and 74 microns or higher as a high-grade strainer.
  All types of gases and fluids, high-temperature fluids



| Series | Material | Jointing material | Nominal filtration accuracy (μm) |
|---|---|---|---|
| **EM100** | Stainless steel 304 | Epoxy resin | 5, 10, 20<br>40, 74, 105 |
| **EM500** | Stainless steel 316 | — | |

# Piping Materials





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# Double-layered Tubing for Instrumentation Device (Single-tubed/Double-tubed)

## *Series IN-241*

## *Series T0604 to T1075-X120/121/166*

- **Double-layered tubing with an external layer of vinyl chloride or polyolefin to protect the inner tubing**
- **Inner tubing color: "Black" or "Black + White"**

### Standard Specifications

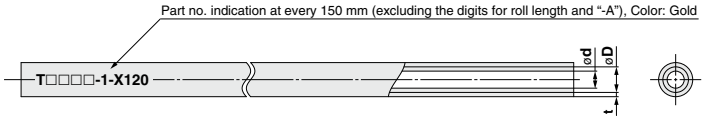
| | |
|---|---|
| **Fluid** | Air |
| **Max. operating pressure (at 20°C)** | Inner tubing O.D. ø6 : 3.0 MPa<br>ø8 : 2.0 MPa<br>ø10: 2.0 MPa |
| **Ambient and fluid temperature** | –40 to +100°C |
| **Inner tubing material** | Nylon |
| **Outer layer color** | Black |
| **Weight (Reference)** | 37 kg (T1075-2-300-X166) |

| Model | Diameter (mm) | Number of cores | | Inner tubing color | | Material | | Outer layer thickness (mm) | | Length per roll | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | Black | Black + White | Vinyl chloride | Polyolefin | 0.5 | 1 | 100 m | | 200 m | 300 m | |
| | | | | | | | | | | Reel | Roll | Reel | Reel | Roll |
| **IN-241-2522-100** | O.D. ø6<br>I.D. ø4 | ● | | ● | | | ● | ● | | ● | | | | |
| **IN-241-2522-300** | | ● | | ● | | | ● | ● | | | | | ● | |
| **T0604-1-100-X120-A** | | ● | | ● | | ● | | | ● | ● | | | | |
| **T0604-1-300-X120-A** | | ● | | ● | | ● | | | ● | | | | ● | |
| **T0604-2-100-X120-A** | | | ● | | ● | ● | | | ● | ● | | | | |
| **T0604-2-100-X121-A** | | | ● | | ● | ● | | | ● | ● | | | | |
| **IN-241-1047** | | | ● | | ● | ● | | | ● | | | ● | | |
| **IN-241-2523-100** | O.D. ø8<br>I.D. ø6 | ● | | ● | | | ● | ● | | ● | | | | |
| **IN-241-2523-300** | | ● | | ● | | | ● | ● | | | | | ● | |
| **T0806-1-100-X120-A** | | ● | | ● | | ● | | | ● | ● | | | | |
| **T0806-1-300-X120** | | ● | | ● | | ● | | | ● | | | | | ● |
| **IN-241-2502-100** | | | ● | ● | | | ● | ● | | | ● | | | |
| **IN-241-2593-100** | | | ● | | ● | | ● | ● | | | ● | | | |
| **T1075-1-100-X120-A** | O.D. ø10<br>I.D. ø7.5 | ● | | ● | | ● | | | ● | ● | | | | |
| **T1075-1-300-X120** | | ● | | ● | | ● | | | ● | | | | | ● |
| **IN-241-2503-100** | | | ● | ● | | | ● | ● | | | ● | | | |
| **IN-241-2594-100** | | | ● | | ● | | ● | ● | | | ● | | | |
| **T1075-2-300-X166** | | | ● | | ● | | ● | ● | | | | | ● | |

∗ If you need a different number of cores, different colors or lengths over 300 m, please contact our sales representatives.

## Dimensions

### Number of cores: 1 core




**Tube size**

| O.D. (øD) x I.D. (ød) |
|---|
| ø6 x ø4 |
| ø8 x ø6 |
| ø10 x ø7.5 |

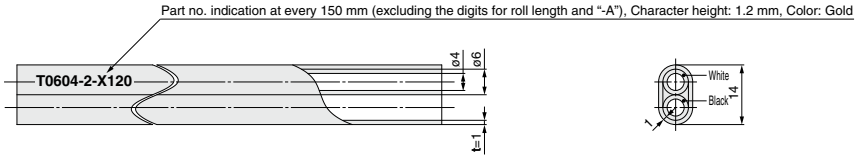
**Outer layer**

| Thickness (t) |
|---|
| 1 |

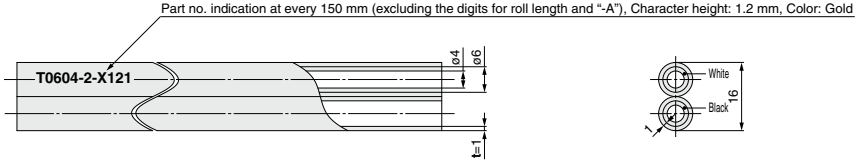
∗ The outer layer thickness for X120 is 1 mm only.

### Number of cores: 2 cores

**•IN-241-1047 •T0604-2-100-X120-A**

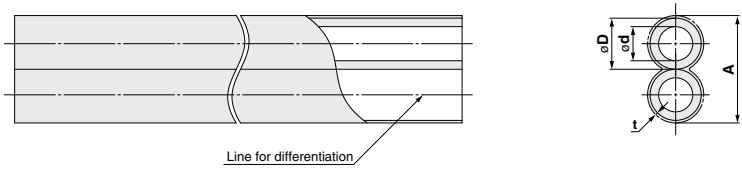



**•T0604-2-100-X121-A**




∗ The part no. is indicated on the product only for T□□□□-X120 and X121.

**•Except above mentioned tubing**




∗ Inner tubing color: If both of the inner tubing are black, one of them will have a line.

**Tube size**

| O.D. (øD) x I.D. (ød) |
|---|
| ø8 x ø6 |
| ø10 x ø7.5 |

**Outer layer**

| Thickness (t) |
|---|
| 0.5 |
| 1 |

**Width**

| O.D. (øD) x I.D. (ød) | Thickness (t) | Width (A) |
|---|---|---|
| ø8 x ø6 | 0.5 | 17 |
| | 1 | 18 |
| ø10 x ø7.5 | 0.5 | 21 |
| | 1 | 22 |



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## Reinforced Corrugated Cardboard Specification/Longer Length Reel

# Nylon Tubing

# *T0604-X64*

RoHS

- **Length per roll: 500/250 m**
- **For general pneumatic tubing**
- **Nylon Tubing**

Reinforced corrugated cardboard

### Series

| Model | T0604 |
|---|---|
| Tubing O.D. (mm) | 6 |
| Tubing I.D. (mm) | 4 |

| | |
|---|---|
| Black (B) | ● |
| White (W) | ● |
| 250 m reel | ● |
| 500 m reel | ● |

### Specifications

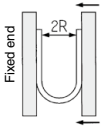
| | | |
|---|---|---|
| Fluid | | Air, Water |
| Max. operating pressure (MPa) Note 1) | 20°C or less | 3.0 |
| | 40°C | 2.1 |
| | 60°C | 1.5 |
| | 80°C | 1.25 |
| | 100°C | 1.1 |
| Applicable fittings Note 1) Note 2) | | One-touch fittings, Insert fittings, Self-align fittings, Miniature fittings |
| Min. bending radius (mm) Note 3) | Min. bending radius | 24 |
| | Bending value (Reference) | 18 |
| Operating temperature Note 1) | | −40 to +100°C, Water: 0 to +70°C (No freezing) |
| Material | | Nylon 12 |

Note 1) Be sure to operate under the maximum operating pressure and operating temperature conditions using the lower specifications of either the tubing or fittings.

Note 2) Mount an inner sleeve when using metal One-touch fittings in high-temperature environments of 60°C or more. Use self-align fittings at a temperature of 60°C or less.

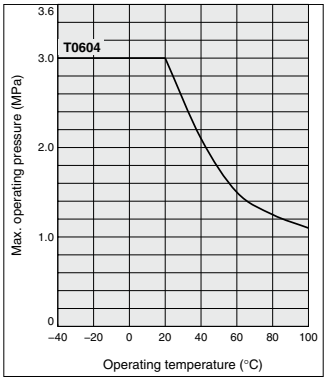
Note 3) The minimum bending radius is the representative value measured as shown in the left figure.
- Use a tube above the minimum bending radius.
- The tubing may be bent if used under the minimum bending radius. Therefore, refer to the bending value and make sure that the tubing is not bent or flattened.
- Please note that the bending value is not warranted because of the representative value when 2R is measured by the method in the left figure if the tubing is bent or flattened, etc.

**How to measure the minimum bending radius**




At a temperature of 20°C, bend the tubing into a U shape. Fix one end and gradually move the other end closer. Measure 2R at the point where the outside diameter's rate of change is 10%.

### Max. Operating Pressure




### How to Order

**T0604 B – 500 – X64**

- T0604: Indication of tubing model
- B: Color indication

| Symbol | Color |
|---|---|
| B | Black (Translucent) |
| W | White (Material color) |

- 500: Length per roll

| Symbol | T0604 |
|---|---|
| 250 | ● |
| 500 | ● |

## ⚠ Precautions

**Be sure to read this before handling. Refer to page 1154 for Safety Instructions. For Fittings and Tubing Precautions, refer to "Handling Precautions for SMC Products" on SMC website, http://www.smcworld.com**

### ⚠Caution

1. Applicable for general industrial water. Please consult with SMC if using other kinds of fluid. Surge pressure must be under the max. operating pressure. If the surge pressure exceeds the maximum operating pressure, it will result in damage to fittings and tubes.
2. Please exercise caution when using this item in a clean room. There is a possibility of plasticizer and other materials precipitating on the tube surface and detracting from the cleanliness level of the room.



SMC

## Reinforced Corrugated Cardboard Specification/Longer Length Reel

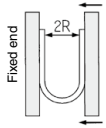
# FEP Tubing (Fluoropolymer)

# *TH0604-X64*

RoHS

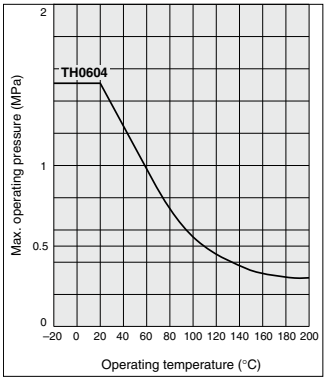
- **Length per roll: 500/250 m**
- **Operating temperature: Max. 200°C**
  It varies depending on the operating pressure. Refer to the graph for the maximum operating pressure.
- **Compatible with the Food Sanitation Law**
  - Compatible with the test conforming to the Food Sanitation Law based on the 370th notice given by the Ministry of Health and Welfare in 1959.
  - Complies with FDA (Food and Drug Administration) §177-1550 dissolution test.

**How to measure the minimum bending radius**




At a temperature of 20°C, bend the tubing into a U shape. Fix one end and gradually move the other end closer. Measure 2R at the point where the outside diameter's rate of change is 5%.

## Max. Operating Pressure




Note) The maximum operating pressure varies dependent on the I.D. bore size even if the O.D. is the same.

## Series

| Model | TH0604 |
|---|---|
| Tubing O.D. (mm) | 6 |
| Tubing I.D. (mm) | 4 |
| Translucent (N) | ● |
| 250 m reel | ● |
| 500 m reel | ● |

## Specifications

| | | |
|---|---|---|
| Fluid | | Air, Water Note 1), Inert gas |
| Applicable fittings Note 2) | | One-touch fittings, Insert fittings<br>Fluoropolymer fittings: Series LQ Note 3)<br>Miniature fittings: Series M, MS (Hose nipple type) |
| Max. operating pressure (MPa) | 20°C | 1.5 |
| | 100°C | 0.55 |
| | 200°C | 0.3 |
| | | Refer to below "Max. Operating Pressure." |
| Min. bending radius (mm) Note 4) | Min. bending radius | 35 |
| | Bending value (Reference) | 20 |
| Operating temperature | | Air, Inert gas: –20 to 200°C, Water: 0 to 100°C (No freezing) |
| Material | | FEP (Fluorinated Ethylene Propylene Resin) |

Note 1) When using a fluid in liquid form, the surge pressure must not exceed the maximum operating pressure. A surge pressure higher than the maximum operating pressure can cause breakage of the fittings, or rupture of the tubing.
Furthermore, an abnormal temperature increase due to adiabatic compression can also result in ruptured tubing.

Note 2) Do not use in locations where the FEP tubing will move.
Be sure to operate under the maximum operating pressure and operating temperature conditions using the lower specifications of either the tubing or fittings.
After long term use or under high temperatures, some fittings leakage may occur due to material deterioration with age. Perform periodic inspections, and if any leakage is detected, replace with a new product immediately.
When the insert and miniature fittings are used over extended periods of time, it may cause leakage due to the material deterioration of age. In such a case, give an additional tightening to the tube connection part. If leakage still occurs after giving an additional tightening, replace the fitting with a new product.
For other precautions, refer to "Fittings & Tubing Precautions." When using the fluoropolymer fittings, refer to the precautions for fluoropolymer fittings in Best Pneumatics No. 6. Select the size after confirming O.D. and I.D.

Note 3) Not applicable to the TH1075 since the I.D. is different.

Note 4) The minimum bending radius is the representative value measured as shown in the left figure.
- Use a tube above the recommended minimum bending radius.
- The tubing may be bent if used under the recommended minimum bending radius. Therefore, refer to the bending value and make sure that the tubing is not bent or flattened.
- Please note that the bending value is not warranted because of the value when 2R is measured by the method in the left figure if the tubing is bent or flattened, etc.

## How to Order

**TH0604 N – 500 – X64**

**Indication of tubing model**

**Color indication**

| Symbol | Color |
|---|---|
| N | Translucent |

**Length per roll**

| Symbol | TH0604 |
|---|---|
| 250 | ● |
| 500 | ● |



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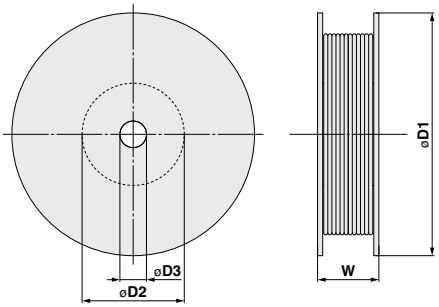
# T0604-X64/TH0604-X64

## Dimensions




**Dimensions**

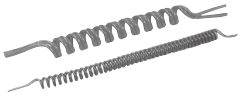
| Model | øD1 | øD2 | øD3 | W | Weight (kg) |
|---|---|---|---|---|---|
| **T0604□-250-X64** | 475 | 200 | 52 | 120 | 5.1 |
| **T0604□-500-X64** | 475 | 200 | 52 | 200 | 9.4 |
| **TH0604N-250-X64** | 475 | 200 | 52 | 120 | 9.4 |
| **TH0604N-500-X64** | 475 | 200 | 52 | 220 | 18.5 |

## Tubing

Best Pneumatics 6

### Polyurethane Coil Tubing *TCU*

- Flexible
- Max. operating pressure: 0.8 MPa or less (at 20°C)
- For moving applications



| Series | Tubing O.D. | Color | Number of cores | Fluid |
|---|---|---|---|---|
| TCU | ø4, ø6, ø8 | Black | 1, 2, 3 | Air |

Note) Colors other than black are available as Made-to-Order specifications.

### Longer Length Reel/-X3 Made to Order

(Please contact SMC for specifications in detail, dimensions, delivery and specifications other than those mentioned above.)

### Nylon tubing

**100 m reel**

Metric size and Inch size except ø16: Suffix "-X3" to the end of part number.
Ex.) T0425R-100-X3

**100/150/200/500 m reel**

Metric size: Suffix "-X3" to the end of part number.
Ex.) T0425G-500-X3

**Made to Order Availability**

| Part no. | Length \ Model | T0425* | T0604* | T0806* | T1075* | T1209* | TIA01* | TIA05* | TIA07* | TIA11* | TIA13* | Color |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X3 | 100 m reel | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | Black, White, Red, Blue, Yellow, Green |
| | 150 m reel | | | | ○ | | | | | | | |
| | 200 m reel | | | ○ | | | | | | | | |
| | 500 m reel | ○ | ○ | | | | | | | | | |

## Fittings/S Couplers

Best Pneumatics 6

### Stainless Steel 316 One-touch Fittings *KQG2*

- Material
  Metal parts: Stainless steel 316
  Seal parts: Special FKM
- Fluid temperature: –5 to 150°C
- Grease-free
- Can be used with steam.

| Series | Applicable tubing O.D. | Operating pressure range | Connection thread |
|---|---|---|---|
| KQG2 | ø3.2, ø4, ø6, ø8<br>ø10, ø12, ø16 | –100 kPa to 1 MPa | M, R, Rc |
| | ø1/8", ø5/32", ø1/4"<br>ø5/16", 3/8", ø1/2" | | UNF, NPT |

### Stainless Steel 316 Insert Fittings *KFG2*

- Material: Stainless steel 316
  (Swivel elbow: Stainless steel 316, Special FKM)
- Fluid temperature: –65 to 260°C
  (Swivel elbow: –5 to 150°C)
- Grease-free
- Can be used with steam.

| Series | Applicable tubing O.D. | Operating pressure range | Connection thread |
|---|---|---|---|
| KFG2 | ø4 x ø2.5, ø4 x ø3, ø6 x ø4<br>ø8 x ø6, ø10 x ø7.5, ø10 x ø8<br>ø12 x ø9, ø12 x ø10, ø16 x ø13 | –100 kPa to 1 MPa | R, Rc |
| | ø1/8" x ø0.086", ø5/32" x ø0.098"<br>ø1/4" x ø5/32", ø5/16" x ø0.236"<br>ø3/8" x ø1/4", ø1/2" x ø3/8" | | NPT |

### S Couplers: Stainless Steel Type *KKA*

- Body material: Stainless steel 304
- Seal material: Fluororubber (Special FKM)
- Fluid temperature: –5 to 150°C
- Grease-free

| Series | Port size | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | R, Rc1/8 | R, Rc1/4 | R, Rc3/8 | R, Rc1/2 | R, Rc3/4 | R, Rc1 | R, Rc1 1/4 | R, Rc1 1/2 |
| KKA3 | ● | ● | ● | | | | | |
| KKA4 | | ● | ● | ● | | | | |
| KKA6 | | | ● | ● | ● | | | |
| KKA7 | | | | ● | ● | ● | | |
| KKA8 | | | | | ● | ● | ● | |
| KKA9 | | | | | | ● | ● | ● |



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# Model Index (Alphanumerical Order)

## A

Products listed in the New Products Guide 1 and 2 are displayed in alphabetical order.
Part numbers can be searched for over the two volumes.

# Alphabet Index



## C

# Model Index (Alphanumerical Order)

Products listed in the New Products Guide 1 and 2 are displayed in alphabetical order.
Part numbers can be searched for over the two volumes.

# Alphabet Index



## D



## E



## H



## I

# Model Index (Alphanumerical Order)



## J



## K



## L



## M

Products listed in the New Products Guide 1 and 2 are displayed in alphabetical order.
Part numbers can be searched for over the two volumes.

# Alphabet Index

# Model Index (Alphanumerical Order)



## W



## X



## Z



## Numbers



## Other Products

## ⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

**⚠ Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**⚠ Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**⚠ Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

## ⚠Warning

**1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

**2. Only personnel with appropriate training should operate machinery and equipment.**

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

**3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.**

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

**4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

## ⚠Caution

**1. The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) **Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## ⚠Caution

**SMC products are not intended for use as instruments for legal metrology.**

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.