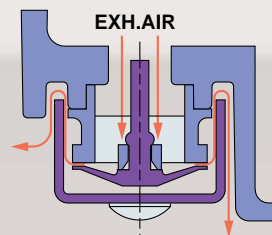


Electro-Pneumatic Positioner



Vibration resistance : No resonances
5 to 200Hz

Dust resistance : Conforms to
IEC 60529 IP65



A centralized exhaust system employs the combination of the check valve and the labyrinth effect enhancing both dust resistance and water resistance performance.

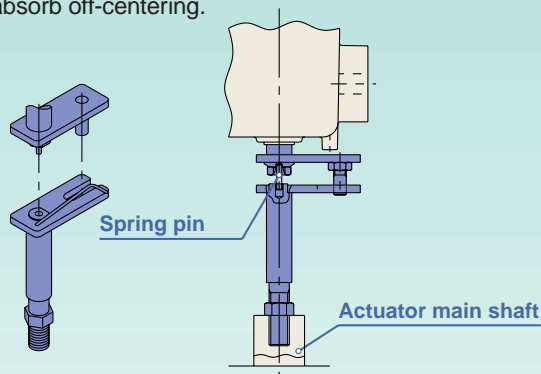
Series IP8000/8100

(Lever type)

(Rotary type)

● Fork lever joints (Rotary type)

Can absorb off-centering.



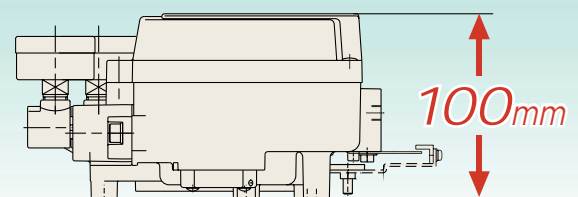
● A span adjuster achieves 1/2 split range

● Opening current transmission (4 to 20mA DC)

Can detect remote position, rotary type only.

● Mounting dimensions are same as conventional types, series IP6000/6100.

100mm in height (shortened by 13% compared with IP6100)



Pressure gauge (O. D. $\phi 43$)

Enlarged O.D. allows improved visibility.

External scale plate (Rotary type)

Improved visibility of opening indicator



With terminal box

No terminal box also option also available

Electro-Pneumatic Positioner

Series IP8000/8100

How to Order



IP8 000 - 0 0 0 - [] - Q

Type

000	Lever type feedback
100	Rotary type

Pressure gauge

0	None
1	0.2MPa
2	0.3MPa
3	1.0MPa

Construction

0	1
No terminal box	With terminal box

CE marked compliant product

Accessories Note 1)

-	None (Standard)	IP8000 has standard lever for stroke (10 to 85mm)
A <small>Note 2)</small>	∅0.7 Output restriction with pilot valve	Accessory for IP8000, 8100 small capacity actuator
B <small>Note 2)</small>	∅1.0 Output restriction with pilot valve	
C	Fork lever joint M	Accessory for IP8100
D	Fork lever joint S	
E <small>Note 3)</small>	For stroke 35 to 100mm with lever unit	Accessory for IP8000
F <small>Note 3)</small>	For stroke 50 to 140mm with lever unit	
G <small>Note 4)</small>	Compensation spring (A)	For IP8000, 8100
H	With external scale plate	Accessory for IP8100
J <small>Note 5)</small>	With opening current transmission (4 to 20mA DC) Clockwise operation	Option for IP8100 <small>Note 6)</small>
JR	With opening current transmission (4 to 20mA DC) Counterclockwise operation	

Note 1) If two or more accessories are required, the part numbers should be made according to alphabetical order. (ex. IP8000-011-AG)

Note 2) "A" is applied to approx 90cm³-capacity actuator. "B" is applied to approx 180cm³-capacity actuator.

Note 3) Standard lever is not attached.

Note 4) 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 5) Available only with terminal box. Select "1" for the construction.

Note 6) Clockwise operation: The feedback shaft viewed from the positioner cover side moves clockwise in condition that the input signal and opening current transmission are increased.

Counterclockwise operation: The feedback shaft moves counterclockwise in the above condition.

Specifications

Item	Type	IP8000		IP8100	
		Lever type lever feedback		Rotary type cam feedback	
		Single action	Double action	Single action	Double action
Input current		4 to 20mADC <small>Note 1)</small>			
Input resistance		235±15Ω (4 to 20mADC)			
Supply air pressure		0.14 to 0.7MPa			
Standard stroke		10 to 85mm (Deflection angle 10 to 30°)		60 to 100° <small>Note 2)</small>	
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.			
Coefficient of temperature		Within 0.1%F.S. / °C			
Supply pressure fluctuation		Within 0.3%F.S./0.01MPa			
Output flow		80 /min (ANR) or more (SUP = 0.14MPa)			
		200 /min (ANR) or more (SUP = 0.4MPa)			
Air consumption		5 /min (ANR) or less (SUP = 0.14MPa)			
		11 /min (ANR) or less (SUP = 0.4MPa)			
Ambient and fluid temperature		-20 to 80°C			
Air port		Rc 1/4 female			
Electrical connection		G 1/2 female			
Wiring method		Resin G 1/2 connector (option)			
Exterior covering enclosure		JISF8007, IP65 (conforms to IEC Pub.529)			
Material		Aluminum diecast body / epoxy resin			
Weight		With terminal box 2.6kg (None 2.4kg)			

Note 1) 1/2 Split range (Standard)

Note 2) Stroke adjustment: 0 to 60°, 0 to 100°

Accessory / Option

Pilot valve with output restriction (IP8000, 8100 type)

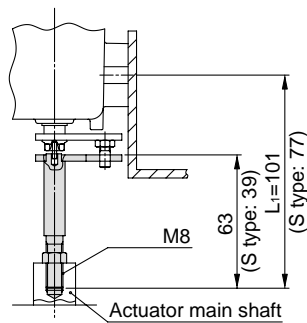
In general, mounting on a small-size actuator may cause hunting. For prevention, a pilot valve with a built-in output restriction is available. The restriction is removable.

Actuator Capacity	Orifice size	Part number	Pilot unit part number
90cm ³	ø0.7	P36801080	P565010-18
180cm ³	ø1	P36801081	P565010-19

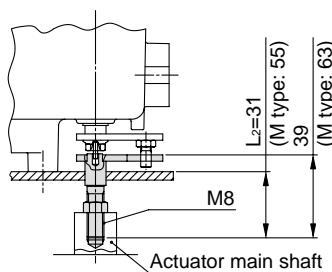
Fork lever joints (IP8100 type)

Two types of the fork lever joints are available dependent upon different mounting dimensions. This is recommended because it can absorb off-centering, compared with direct mounting type.

Part name	Part number
Fork lever assembly M	P368010-24
Fork lever assembly S	P368010-25



Side mounting with the fork lever assembly M

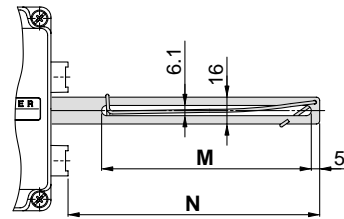


Bottom mounting with the fork lever assembly S

External feedback lever (IP8000 type)

Different feedback levers are available dependent upon valve strokes. Consult with SMC in case of 10mm or less stroke.

Stroke	Unit number	Size M	Size N
10 to 85mm (Accessory "Nil")	P368010-20	125	150
35 to 100mm (Accessory "E")	P368010-21	110	195
50 to 140mm (Accessory "F")	P368010-22	110	275

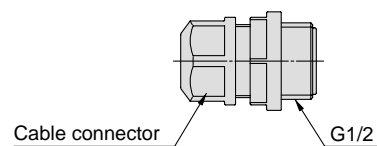


Resin connector

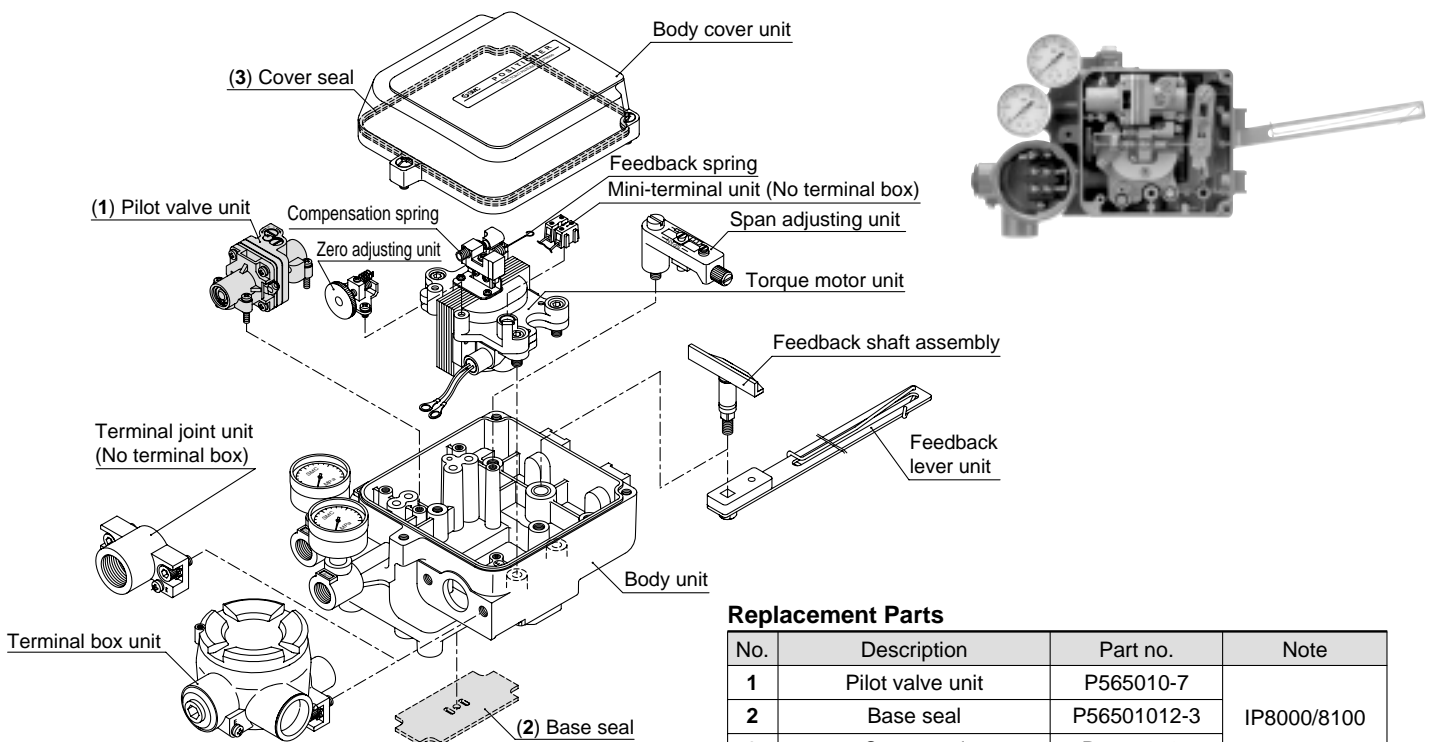
Optional cable connectors are available for different cable sizes.

Cable connector (option)

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



Replacement Parts

No.	Description	Part no.	Note
1	Pilot valve unit	P565010-7	IP8000/8100
2	Base seal	P56501012-3	
3	Cover seal	P56501013	

Series IP8000/8100

Piping

IP8000 / Lever type

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

IP8100 / Rotary type

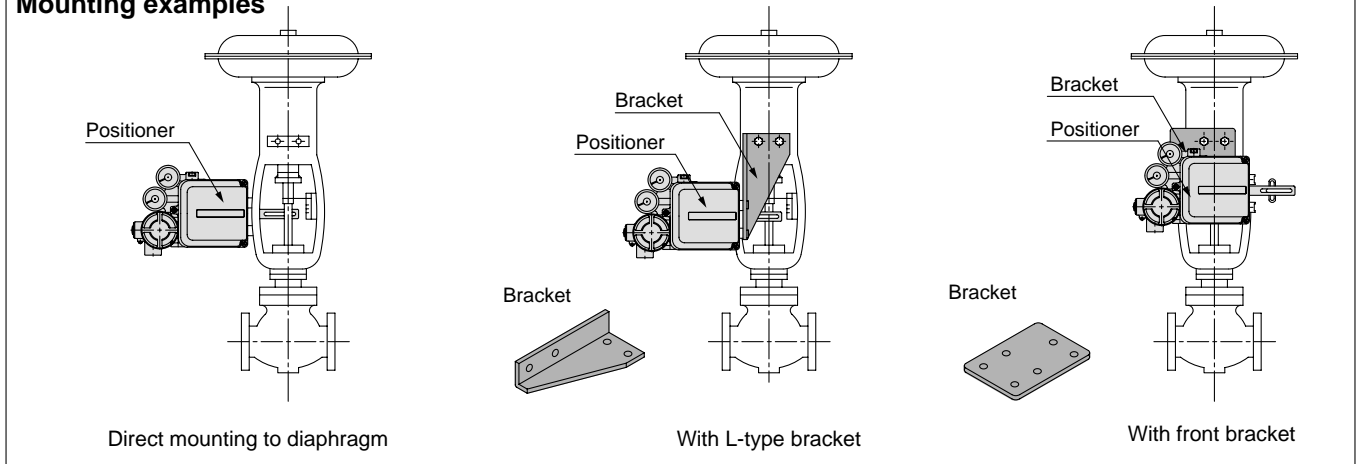
	Single action	Double action	
Positive operation	<p>When the input signal is increased, the actuator shaft rotates in a clockwise direction.</p> <p>OUT2 is plugged.</p>	<p>When the input signal is increased, the actuator shaft rotates in a clockwise direction. (Positive valve operation by its reverse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

Installation

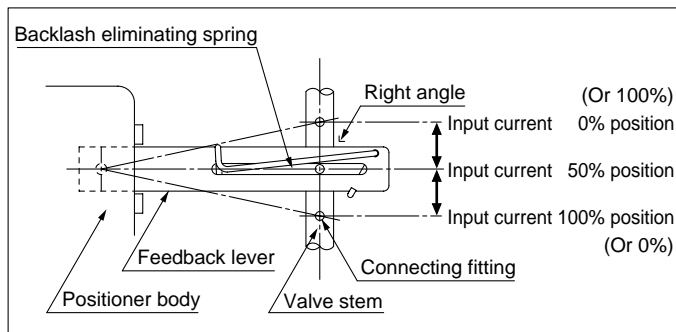
IP8000 type (Lever type lever feedback)

- The unit should be mounted using bolts firmly fixed through mounting holes on the side or back of the positioner.

Mounting examples

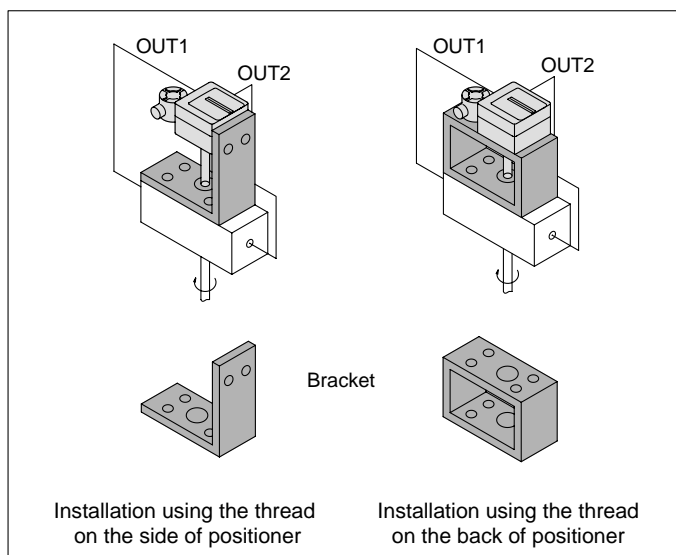


- A connecting fitting or pin to transfer the displacement of valve stem should be mounted at a position so that the feedback lever is at right angles to the valve stem for an input current of 50%. The right figure is the configuration viewed from the front.



IP8100 type (Rotary type cam feedback)

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

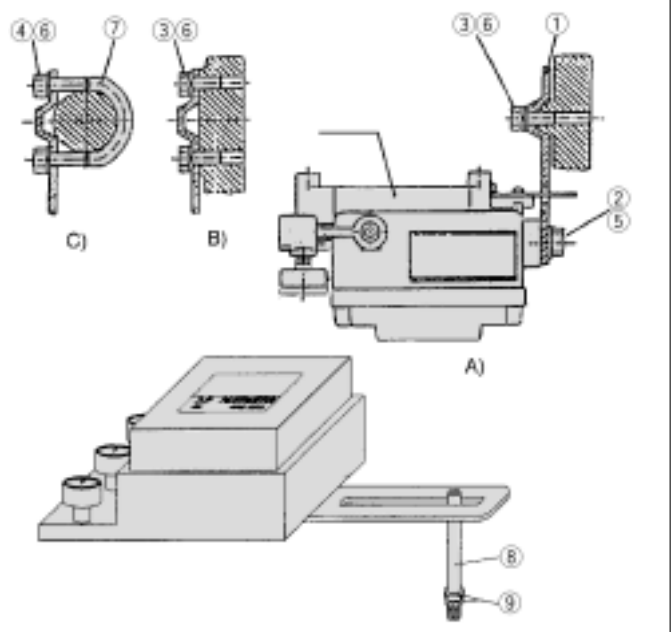


Mounting bracket conforming to DIN IEC 534

Positioner IP8000 mounted using a bracket conforming to DIN IEC 534

Part number: **INI-224-0-56-1**

No.	Qty.	Description	Note
1	1	Pilot valve unit	INI-224-0-56
2	2	Bolt	M8x16 DIN933-Zn5bkcB
3	4	Bolt	M8x20 DIN933-Zn5bkcB
4	4	Nut	M8 DIN934-Zn5bkcB
5	2	Washer	B8, 4 DIN125-Zn5bkcB
6	4	Spring washer	B8 DIN127-Zn5bkcB
7	2	Bracket	100 320-4480
8	1	Rod	M6x70
9	2	Nut	M6



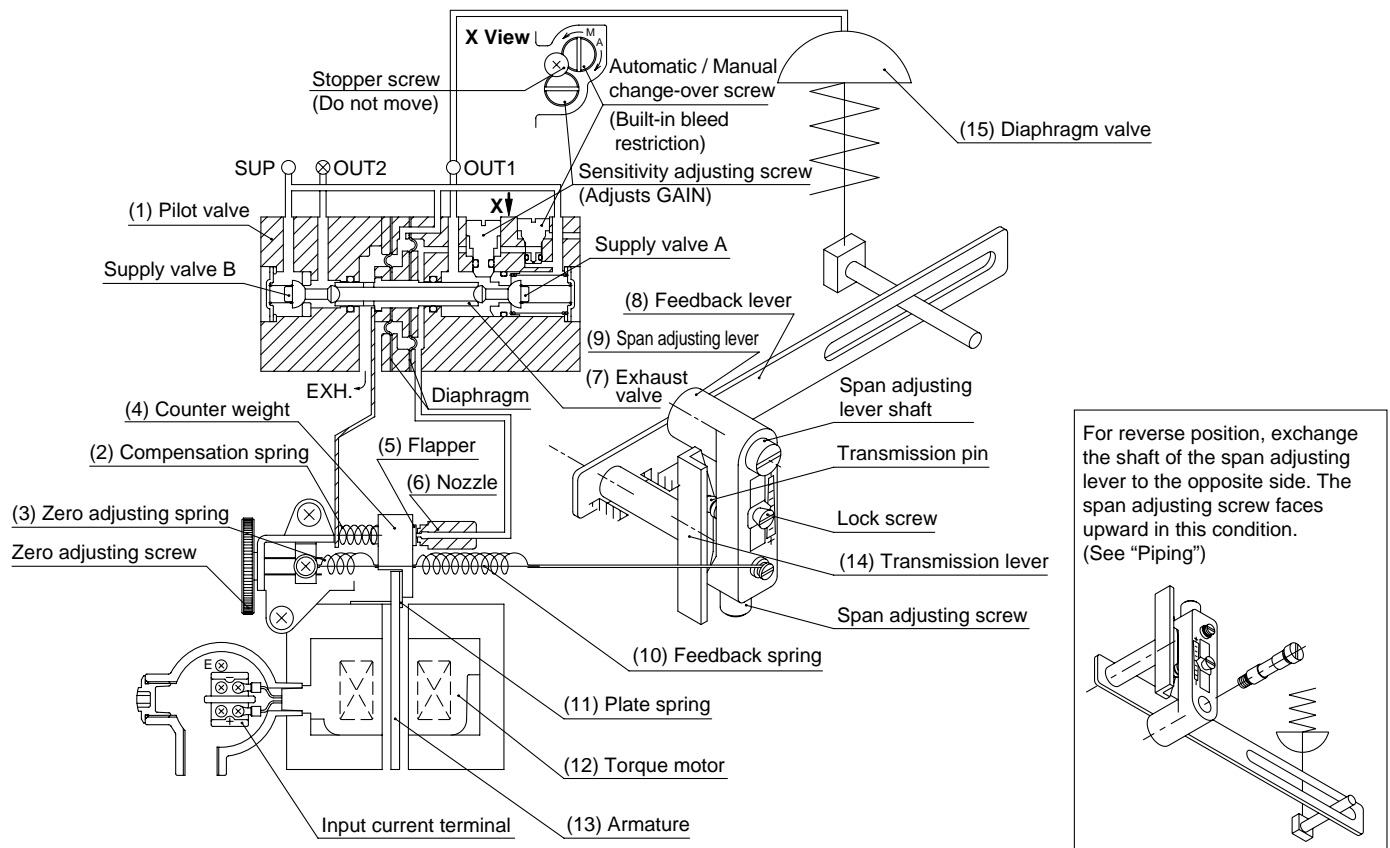
Series IP8000/8100

Principle of Operation

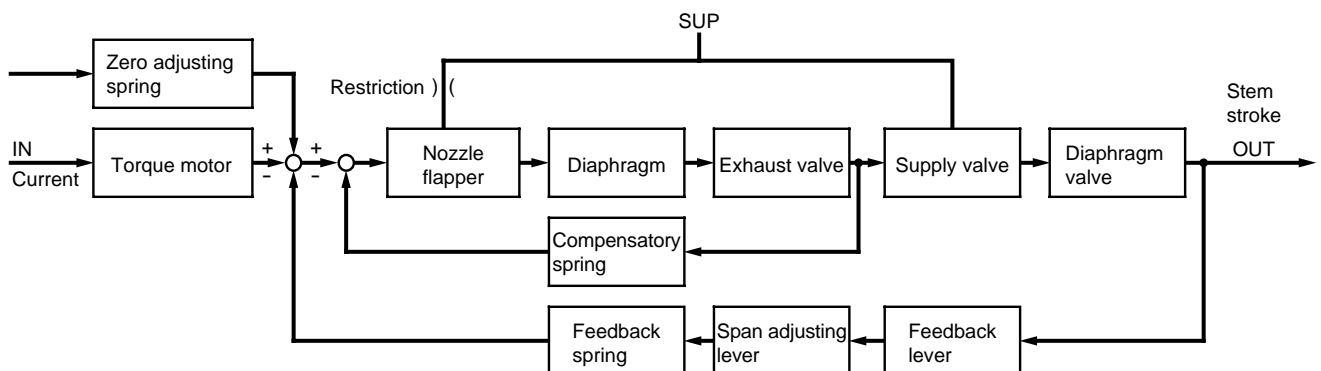
IP8000 / Lever type

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 compensation 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



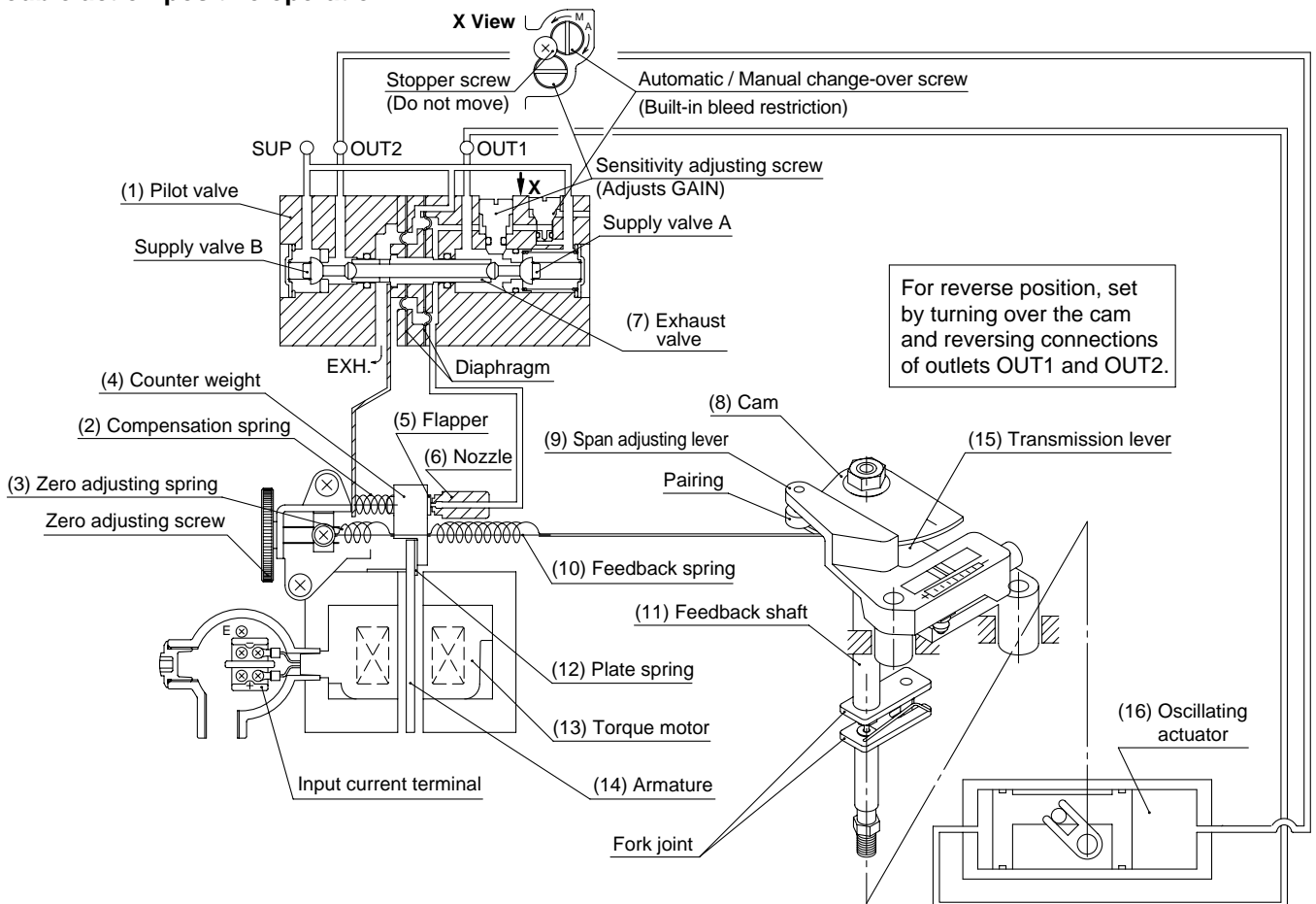
Block diagram



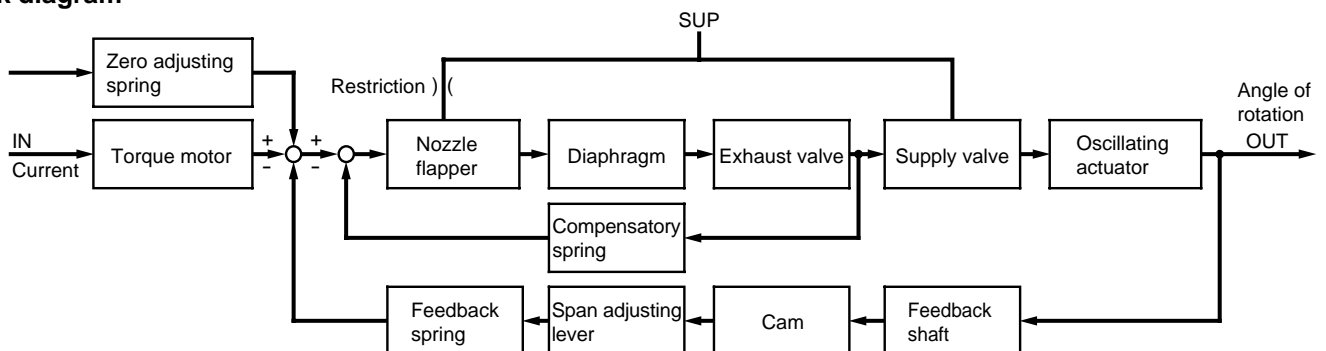
IP8100 / Rotary type

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 compensation 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



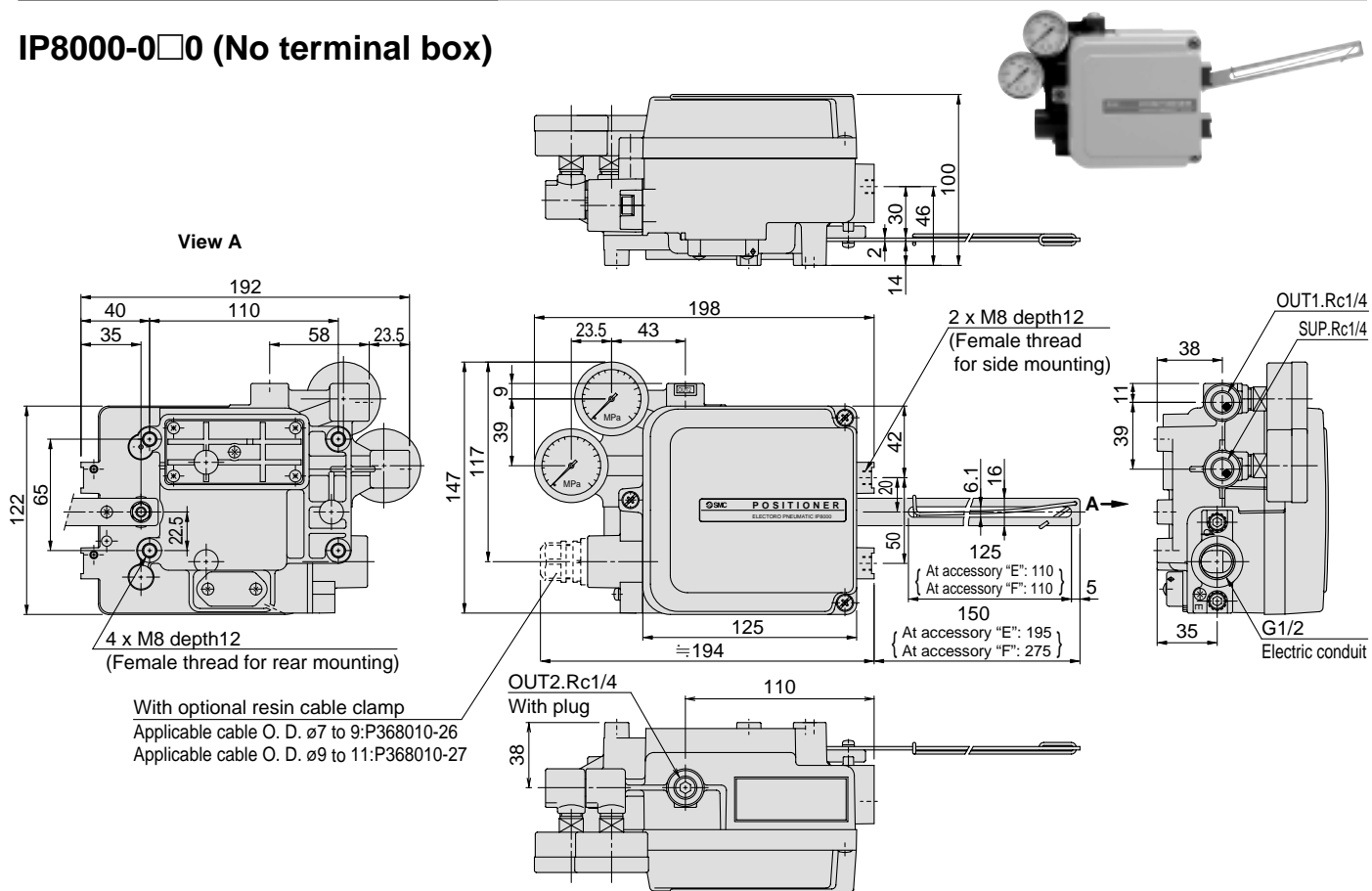
Block diagram



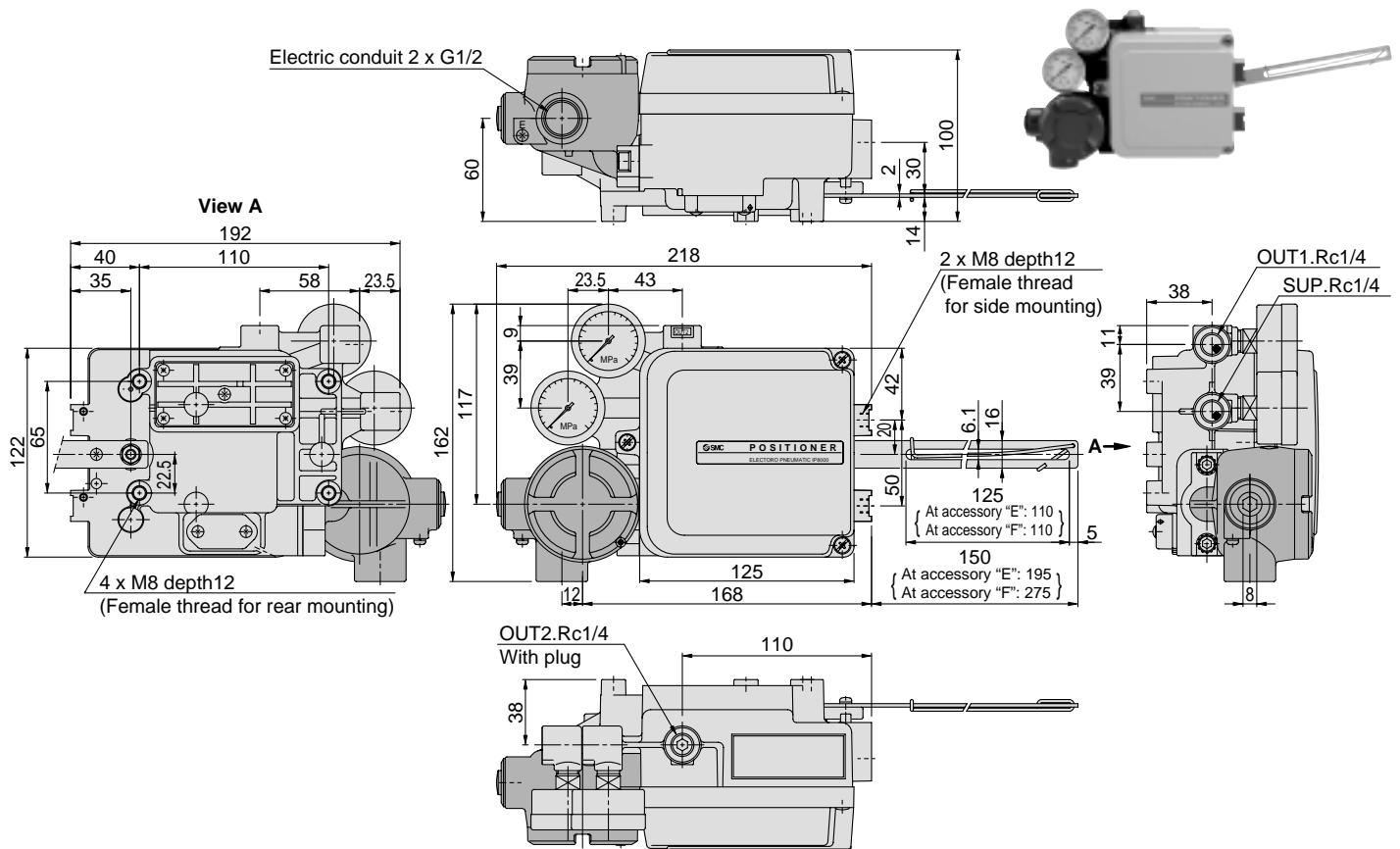
Series IP8000/8100

Dimensions / IP8000 (Lever type)

IP8000-0□0 (No terminal box)

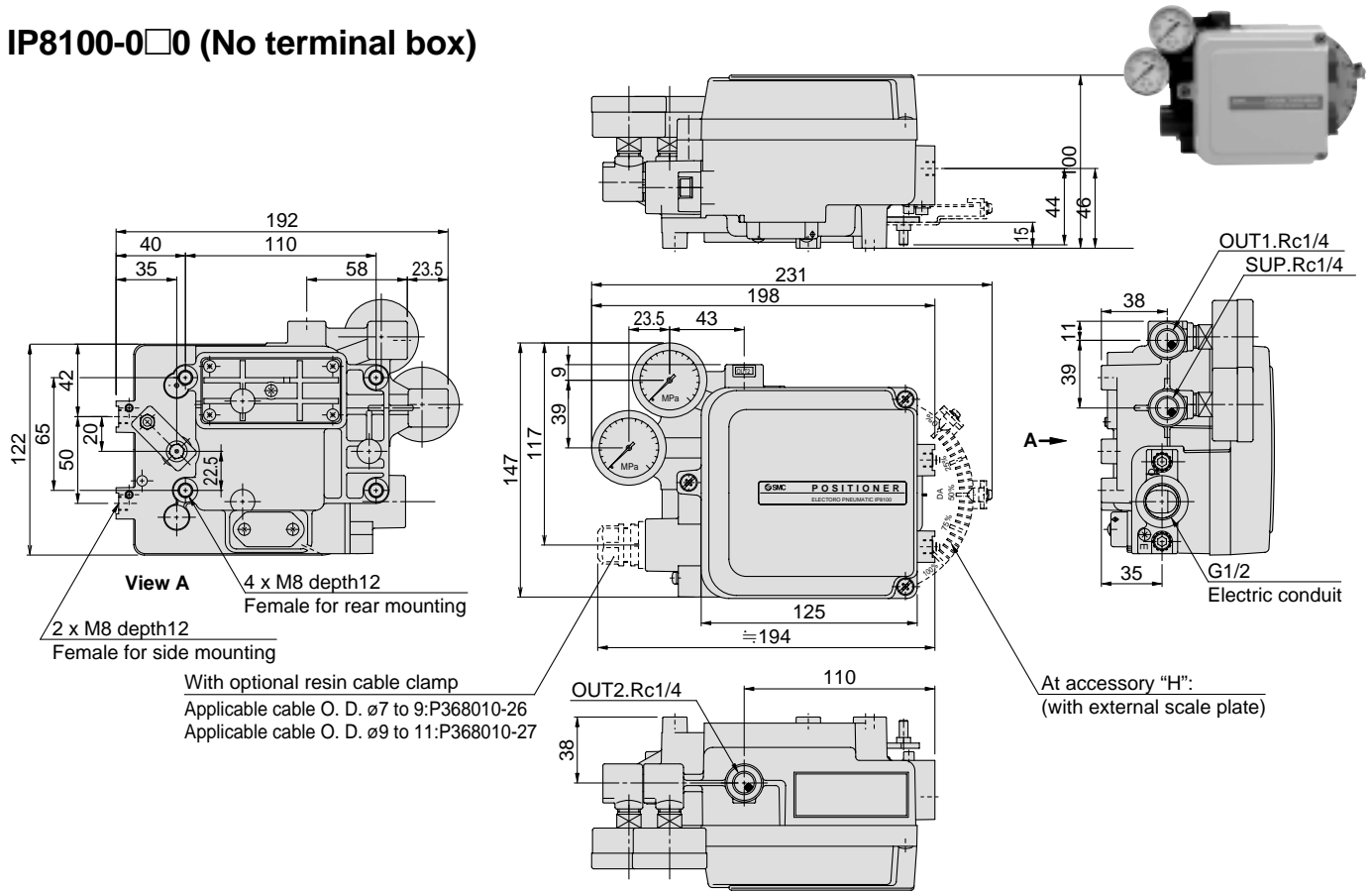


IP8000-0□1 (With terminal box)

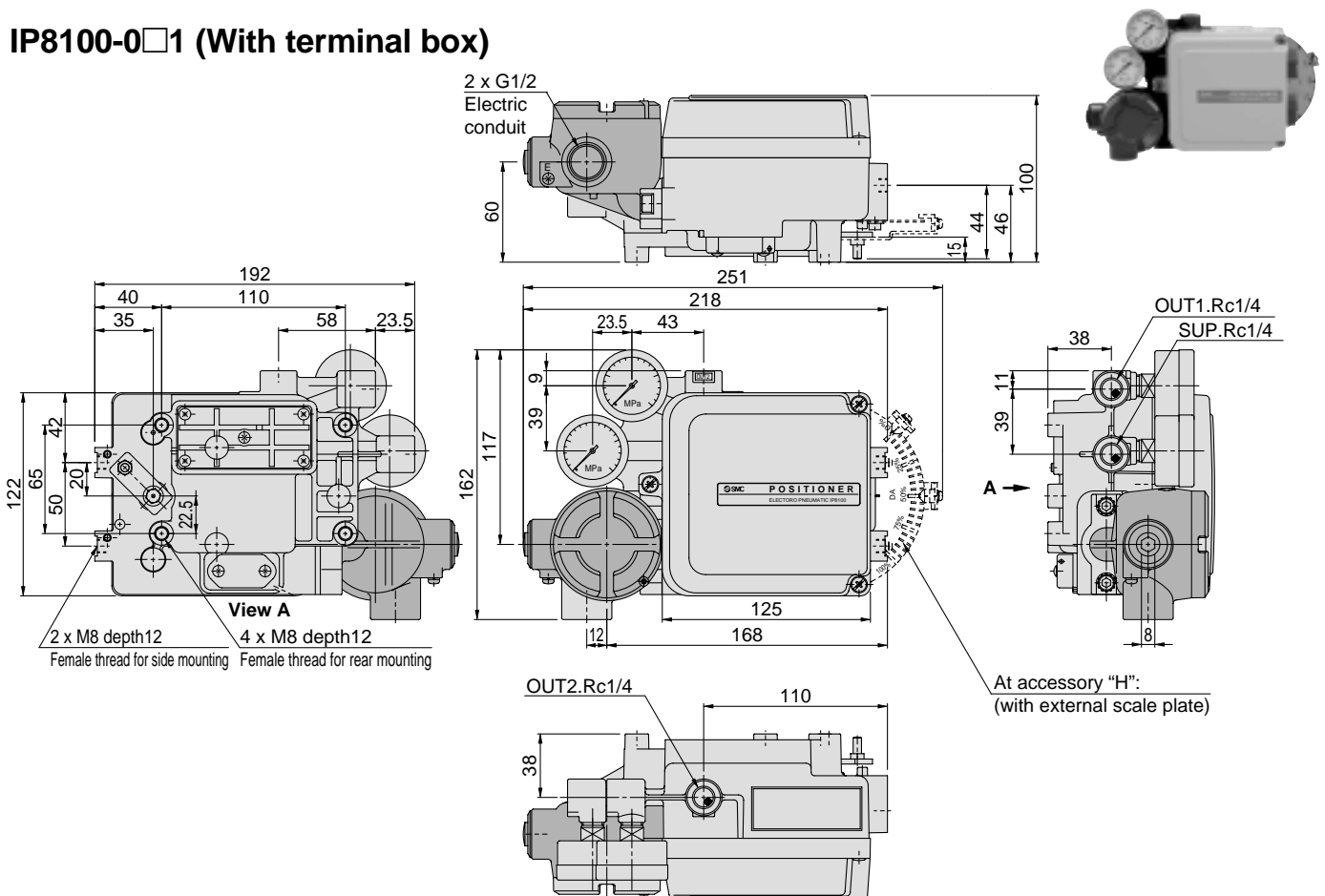


Dimensions / IP8100 (Rotary type)

IP8100-0□0 (No terminal box)



IP8100-0□1 (With terminal box)








Series IP8000/8100

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems

Note 2) JIS B 8370: Pneumatic system axiom

Warning

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

Since the products specified here are used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or maintenance of pneumatic systems should be performed by trained and experienced operators.

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

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven object have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc. (Bleed air into the system gradually to create back pressure.)

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuit in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.



Series IP8000/8100

Electro-Pneumatic Positioner Precautions

Be sure to read 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. Covers for the terminal and body should be in place while operating.

Handling

⚠ Caution

1. Avoid impact to the positioner body or torque motor and any excessive force to the armature, as these actions may cause damage to the product.
Handle carefully while transporting and operating.
2. 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 an external cover 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.
3. Keep magnetic field off the positioner, as this affects its characteristics.

Air Supply

⚠ Caution

1. Use only dehumidified and dust-extracted clean compressed clean air as the positioner contains extra-fine orifices such as restrictor and nozzle.
Do not use a lubricator.
2. Do not use compressed air containing chemicals, organic solvents, salinity or corrosive gases, as this may cause malfunction.
3. Use dehumidified and dust-extracted clean compressed air as an air supply.
4. When operating below the freezing point, protect the positioner from freezing.
5. Piping
Before piping make sure to clean away all chips, cutting oil, dust etc.
When installing piping or fitting into a port, ensure that sealant material does not enter the port inside.
When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
6. Lubrication
The positioner has a fixed orifice and nozzle, which contain fine paths in them. Use filtered, dehydrated air and avoid the use of lubricators as this may cause malfunction of the positioner. Ensure that the air supply system is filtered to 5 micron.

Operating Environment

⚠ Caution

1. Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, saltwater, water or steam.
2. Do not mount the product in a location where it will be subject to strong vibrations and/or shock.
3. Do not mount the product in a location where it is exposed to radiant heat.
4. Allow sufficient space for maintenance and adjustment around the product when mounted.

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.

⚠ 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 performed 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.
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 $\phi 0.2$ 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 to sliding parts (O-ring and exhaust valve) when disassemble a pilot valve.
Use silicone grease, for example, SH45 produced by Du Pont-Toray Co., Ltd.
7. Confirm air leakage from compressed air piping and junctions.
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.

Installation

⚠ Warning

1. Do not install unless the safety instructions have been read and understood.
2. Since zero-point varies depending on the mounting position, the zero point should be adjusted after installation.
3. Avoid hitting the product with metallic objects!
4. Avoid using this product in non-explosive environments which can become explosive due to air leakage!


EUROPEAN SUBSIDIARIES:

Austria

SMC Pneumatik GmbH (Austria).
Girakstrasse 8, A-2100 Korneuburg
Phone: +43 2262-62280, Fax: +43 2262-62285
E-mail: office@smc.at
http://www.smc.at


France

SMC Pneumatique, S.A.
1, Boulevard de Strasbourg, Parc Gustave Eiffel
Bussy Saint Georges F-77607 Marne La Vallée Cedex 3
Phone: +33 (0)1-6476 1000, Fax: +33 (0)1-6476 1010
E-mail: contact@smc-france.fr
http://www.smc-france.fr


Netherlands

SMC Pneumatics BV
De Ruyterkade 120, NL-1011 AB Amsterdam
Phone: +31 (0)20-5318888, Fax: +31 (0)20-5318880
E-mail: info@smcpneumatics.nl
http://www.smcpneumatics.nl


Spain

SMC España, S.A.
Zuazobidea 14, 01015 Vitoria
Phone: +34 945-184 100, Fax: +34 945-184 124
E-mail: post@smc.smces.es
http://www.smces.es


Belgium

SMC Pneumatics N.V./S.A.
Nijverheidsstraat 20, B-2160 Wommelgem
Phone: +32 (0)3-355-1464, Fax: +32 (0)3-355-1466
E-mail: post@smcpneumatics.be
http://www.smcpneumatics.be


Germany

SMC Pneumatik GmbH
Boschring 13-15, D-63329 Egelsbach
Phone: +49 (0)6103-4020, Fax: +49 (0)6103-402139
E-mail: info@smc-pneumatik.de
http://www.smc-pneumatik.de


Norway

SMC Pneumatics Norway A/S
Vollsveien 13 C, Granfos Næringspark N-1366 Lysaker
Tel: +47 67 12 90 20, Fax: +47 67 12 90 21
E-mail: post@smc-norge.no
http://www.smc-norge.no


Sweden

SMC Pneumatics Sweden AB
Ekhagsvägen 29-31, S-141 71 Huddinge
Phone: +46 (0)8-603 12 00, Fax: +46 (0)8-603 12 90
E-mail: post@smcpneumatics.se
http://www.smc.nu


Bulgaria

SMC Industrial Automation Bulgaria EOOD
16 Kliment Ohridski Blvd., fl.13 BG-1756 Sofia
Phone: +359 2 9744492, Fax: +359 2 9744519
E-mail: office@smc.bg
http://www.smc.bg


Greece

S. Parianopoulos S.A.
7, Konstantinoupoleos Street, GR-11855 Athens
Phone: +30 (0)1-3426076, Fax: +30 (0)1-3455578
E-mail: parianos@hol.gr
http://www.smceu.com


Poland

SMC Industrial Automation Polska Sp.z.o.o.
ul. Konstruktorska 11A, PL-02-673 Warszawa.
Phone: +48 22 548 5085, Fax: +48 22 548 5087
E-mail: office@smc.pl
http://www.smc.pl


Switzerland

SMC Pneumatik AG
Dorfstrasse 7, CH-8484 Weisslingen
Phone: +41 (0)52-396-3131, Fax: +41 (0)52-396-3191
E-mail: info@smc.ch
http://www.smc.ch


Croatia

SMC Industrijska automatika d.o.o.
Crnomerec 12, 10000 ZAGREB
Phone: +385 1 377 66 74, Fax: +385 1 377 66 74
E-mail: office@smc.hr
http://www.smceu.com


Hungary

SMC Hungary Ipari Automatizálási Kft.
Budafoki út 107-113, H-1117 Budapest
Phone: +36 1 371 1343, Fax: +36 1 371 1344
E-mail: office@smc-automation.hu
http://www.smc-automation.hu


Portugal

SMC Sucursal Portugal, S.A.
Rua de Engº Ferreira Dias 452, 4100-246 Porto
Phone: +351 22-610-89-22, Fax: +351 22-610-89-36
E-mail: postpt@smc.smces.es
http://www.smces.es


Turkey

Entek Pnömatik San. ve Tic Ltd. Sti.
Perpa Tic. Merkezi Kat: 11 No: 1625, TR-80270 Okmeydanı Istanbul
Phone: +90 (0)212-221-1512, Fax: +90 (0)212-221-1519
E-mail: smc-entek@entek.com.tr
http://www.entek.com.tr


Czech Republic

SMC Industrial Automation CZ s.r.o.
Hudcova 78a, CZ-61200 Brno
Phone: +420 5 414 24611, Fax: +420 5 412 18034
E-mail: office@smc.cz
http://www.smc.cz


Ireland

SMC Pneumatics (Ireland) Ltd.
2002 Citywest Business Campus, Naas Road, Saggart, Co. Dublin
Phone: +353 (0)1-403 9000, Fax: +353 (0)1-464-0500
E-mail: sales@smcpneumatics.ie
http://www.smcpneumatics.ie


Romania

SMC Romania srl
Str Frunzei 29, Sector 2, Bucharest
Phone: +40 2132051111, Fax: +40 213261489
E-mail: smcromania@smcromania.ro
http://www.smcromania.ro


UK

SMC Pneumatics (UK) Ltd
Vincent Avenue, Crownhill, Milton Keynes, MK8 0AN
Phone: +44 (0)800 1382930 Fax: +44 (0)1908-555064
E-mail: sales@smcpneumatics.co.uk
http://www.smcpneumatics.co.uk


Denmark

SMC Pneumatik A/S
Knudsminde 4B, DK-8300 Odder
Phone: +45 70252900, Fax: +45 70252901
E-mail: smc@smc-pneumatik.dk
http://www.smc.dk.com


Italy

SMC Italia S.p.A
Via Garibaldi 62, I-20061 Carugate, (Milano)
Phone: +39 (0)2-927111, Fax: +39 (0)2-9271365
E-mail: mailbox@smcitalia.it
http://www.smcitalia.it


Russia

SMC Pneumatik LLC.
36/40 Sredny pr. St. Petersburg 199004
Phone: +812 118 5445, Fax: +812 118 5449
E-mail: smcfa@peterlink.ru
http://www.smc-pneumatik.ru


Estonia

SMC Pneumatics Estonia OÜ
Laki 12-101, 106 21 Tallinn
Phone: +372 (0)6 593540, Fax: +372 (0)6 593541
E-mail: smc@smcpneumatics.ee
http://www.smcpneumatics.ee


Latvia

SMC Pneumatics Latvia SIA
Smerla 1-705, Riga LV-1006, Latvia
Phone: +371 (0)777-94-74, Fax: +371 (0)777-94-75
E-mail: info@smclv.lv
http://www.smclv.lv


Slovakia

SMC Priemyselna Automatizacia, s.r.o.
Námestie Martina Benku 10, SK-81107 Bratislava
Phone: +421 2 444 56725, Fax: +421 2 444 56028
E-mail: office@smc.sk
http://www.smc.sk


Finland

SMC Pneumatics Finland OY
PL72, Tiistinniityntie 4, SF-02031 ESPOO
Phone: +358 207 513513, Fax: +358 207 513595
E-mail: smcfi@smc.fi
http://www.smc.fi


Lithuania

UAB Ottensten Lietuva
Savanoriu pr. 180, LT-2600 Vilnius, Lithuania
Phone/Fax: +370-2651602


Slovenia

SMC industrijska Avtomatika d.o.o.
Grajski trg 15, SLO-8360 Zuzemberk
Phone: +386 738 85240 Fax: +386 738 85249
E-mail: office@smc-ind-avtom.si
http://www.smc-ind-avtom.si


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