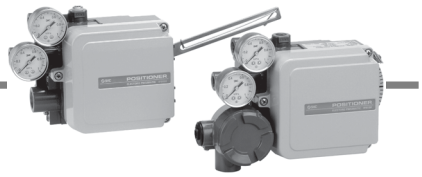
Electro-Pneumatic Positioner

Series IP8000/8100



How to Order

IP8 [000] – 0 [0] [0] – [ ]

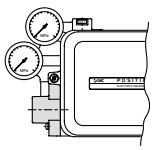
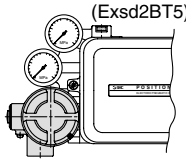
Type

000	Lever type feedback
100	Rotary type

Pressure gauge

0	None
1	0.2MPa
2	0.3MPa
3	1.0MPa

Construction

0	1 Note 1)
No terminal box	With terminal box (Exsd2BT5)
	

Accessories Note 2)

Nil	None (Standard)	IP8000 has standard lever for stroke (10 to 85mm)
A Note 3)	ø0.7 Output restriction with pilot valve	Accessory for IP8000, 8100 small capacity actuator
B Note 3)	ø1.0 Output restriction with pilot valve	
C	Fork lever joint M	Accessory for IP8100
D	Fork lever joint S	
E Note 4)	For stroke 35 to 100mm with lever unit	Accessory for IP8000
F Note 4)	For stroke 50 to 140mm with lever unit	
G Note 5)	Compensation spring (A)	For IP8000, 8100
H	With external scale plate	Accessory for IP8100
J Note 6)	With opening current transmission (4 to 20mA DC)	Accessory for IP8100

Note 1) For construction No.1(with terminal box), the ambient and fluid temperatures are as follows:
- Exd2BT5 —— –20 to 60°C
- Non-explosion proof (non hazardous locations only) ———— –20 to 80°C
The positioner body is EXd2BT5 labeled.

Note 2) If two or more accessories are required, the part numbers should be made according to alphabetical order. (ex. IP8000-011-AG)
Note 3) "A" is applied to approx 90cm^3-capacity actuator.
"B" is applied to approx 180cm^3-capacity actuator.
Note 4) Standard lever is not attached.
Note 5) 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 6) With terminal box, Non-explosion proof. Select "1" for the construction.

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 Note 1)			
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° Note 2)	
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	80ℓ/min (ANR) or more (SUP = 0.14MPa)			
	200ℓ/min (ANR) or more (SUP = 0.4MPa)			
Air consumption	5ℓ/min (ANR) or less (SUP = 0.14MPa)			
	11ℓ/min (ANR) or less (SUP = 0.4MPa)			
Ambient and fluid temperature	–20 to 80°C (Non-explosion proof) –20 to 60°C (Flame proof and explosion proof)			
Explosion proof construction	Flame proof and explosion proof construction: Exd2BT5 (Certificate number: C15916 of Technology Institution of Industrial Safety)			
Air port	Rc 1/4 female			
Electrial connection	G 1/2 female			
Wiring method	Flame proof packing system, Sealant fitting system (explosion-proof)			
	Resin G 1/2 connector (Non-Explosion proof, 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 Sprit range (Standard)
Note 2) Stroke adjustment: 0 to 60°C, 0 to 100°C

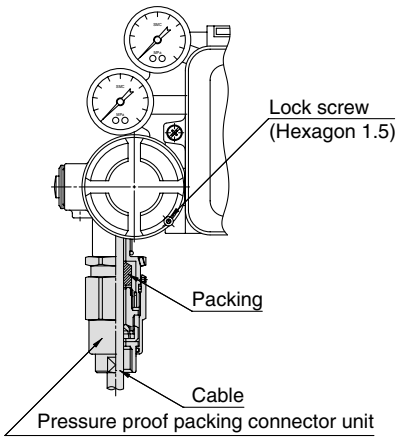
Explosion Proof

This product has the following approvals.
Exd2BT5: Newly established standard based on international (IEC 79)

Use as Exd2BT5

(A) Pressure-proof packing.
As shown below in the chart, use "Cable gland" (option).

(B) Metal Piping.
Attach the sealant fitting 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 flame proof packing (Option)

Part name	Part number	Suited cable outer diameter
Flame proof packing connector unit	P368010-32	ø7.0 to ø10.0
	P368010-33	ø10.1 to ø12.0

SMC

Accessory / Option

Pilot valve with output restriction (IP8000, 8100 type)

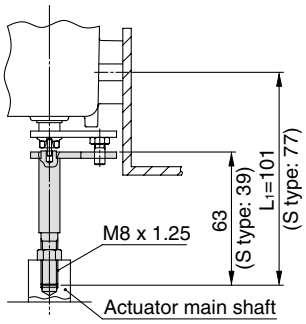
In general, mounting on a small-size actuator may cause hunting. For prevention, a pilot valve with a built-in output restriction is available. The restriction is removable.

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

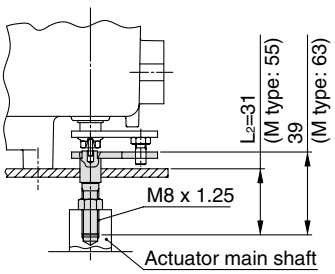
Fork lever joints (IP8100 type)

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

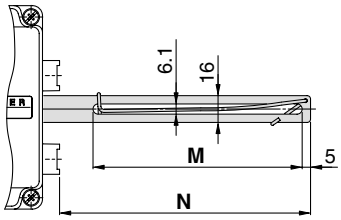


Side mounting with the fork lever assembly S

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

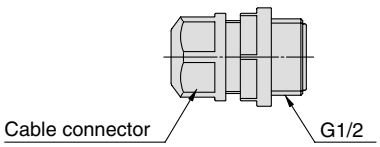


Resin connector (Non-explosion proof specification)

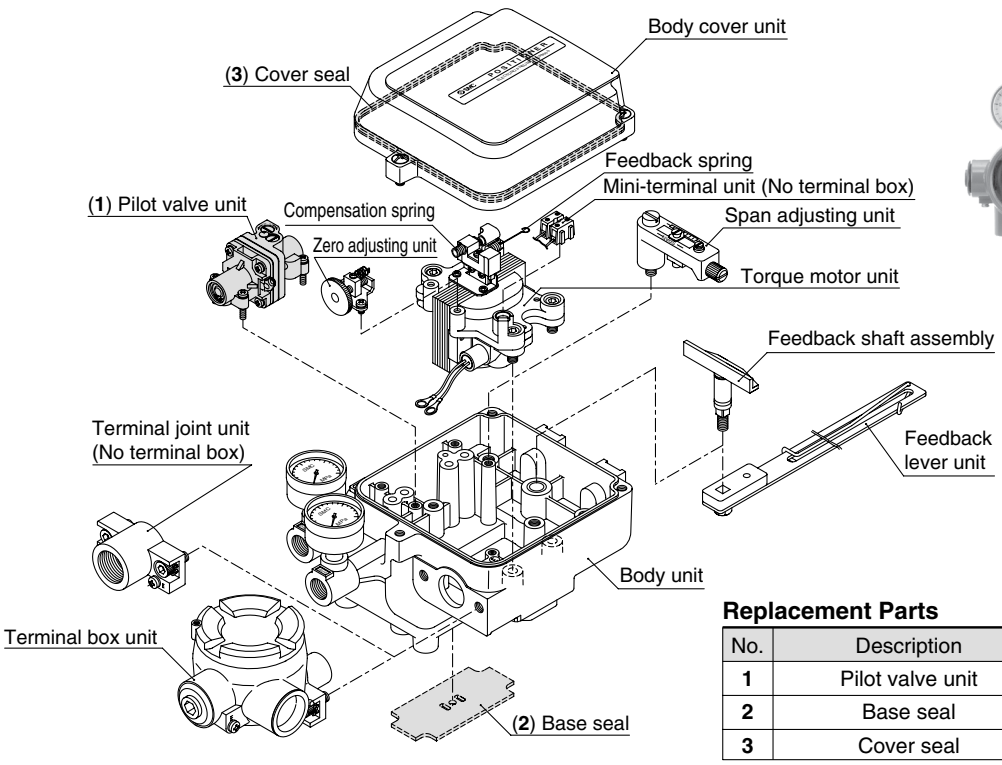
Optional cable connectors are available for different cable sizes.
These are not for explosion proof applications.

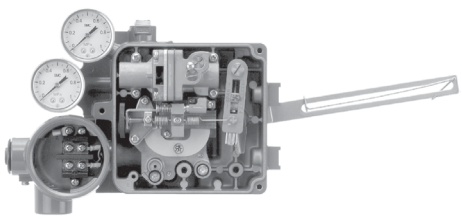
Cable connector (option)

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



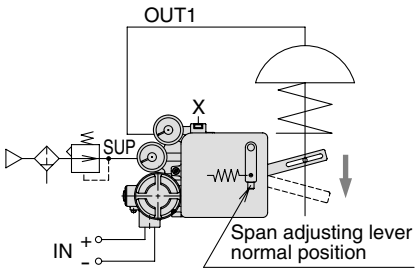
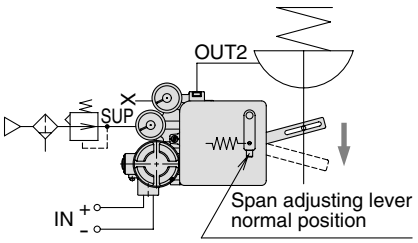
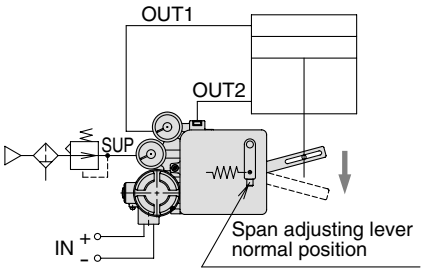
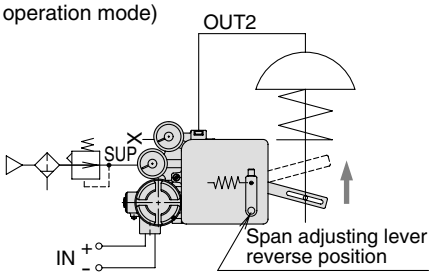
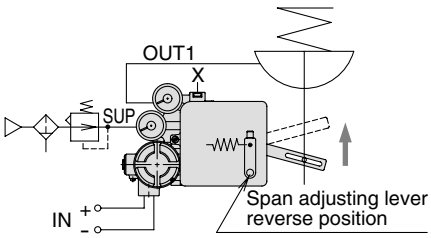
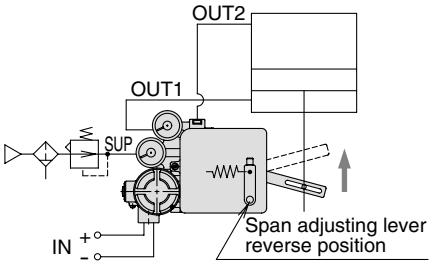


Replacement Parts

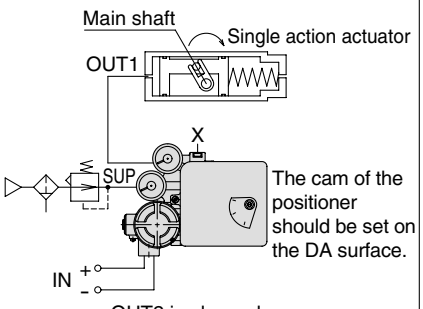
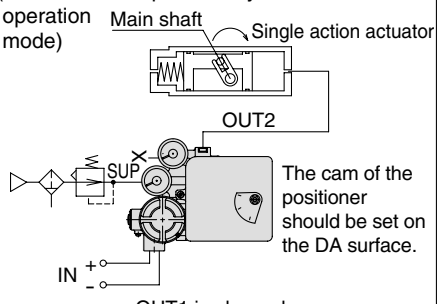
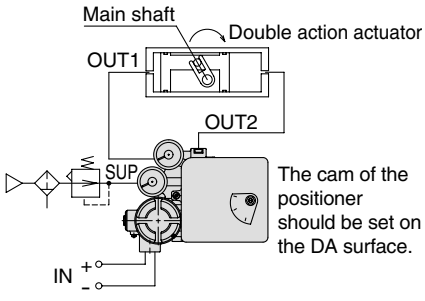
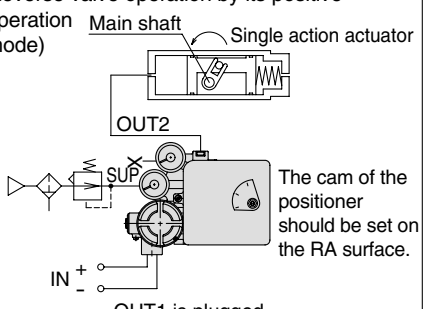
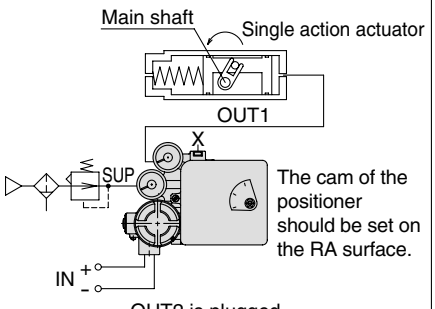
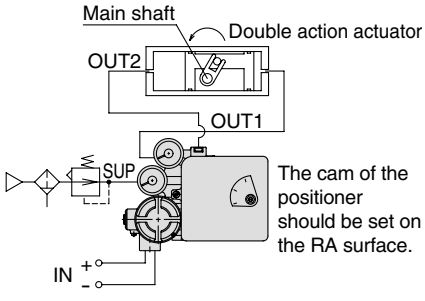
No.	Description	Part no.	Note
1	Pilot valve unit	P565010-7	IP8000/8100
2	Base seal	P56501012-3	
3	Cover seal	P56501013	

Piping

IP8000 / Lever type

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

IP8100 / Rotary type

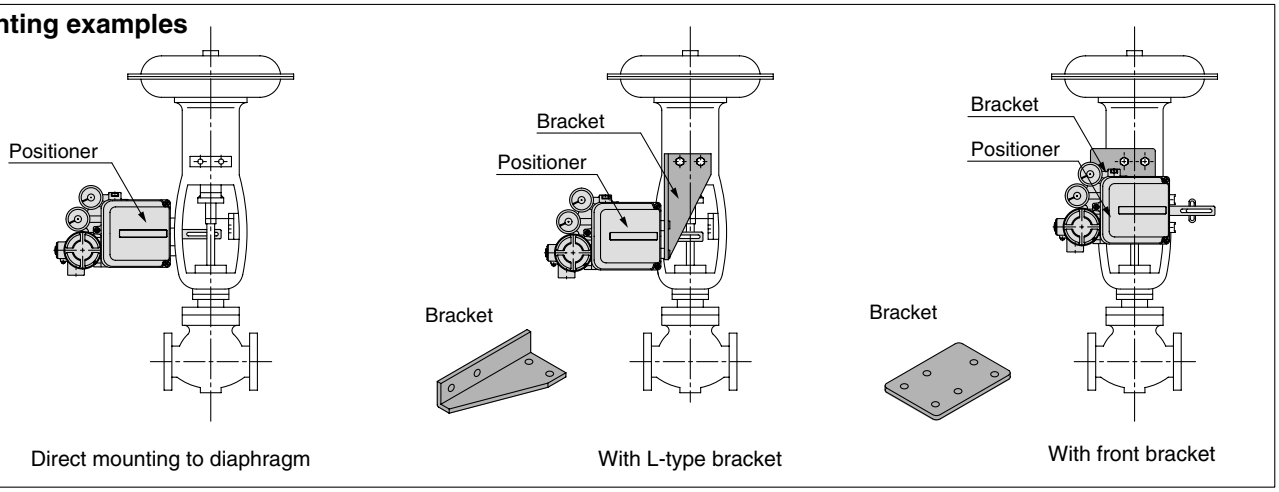
	Single action		Double action
Positive operation	When the input signal is increased, the actuator shaft rotates in a clockwise direction.  OUT2 is plugged.	When the input signal is increased, the actuator shaft rotates in a clockwise direction. (Positive valve operation by its reverse operation mode)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

Installation

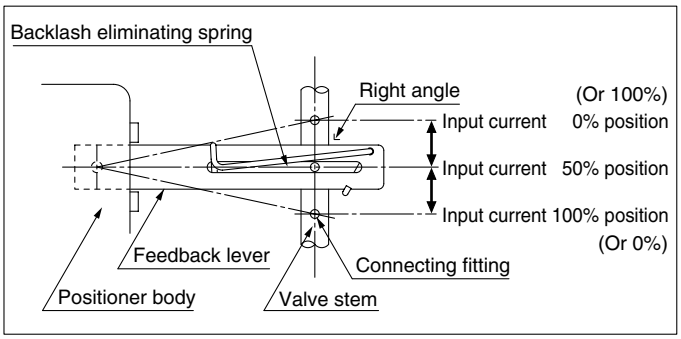
IP8000 type (Lever type lever feedback)

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

Mounting examples

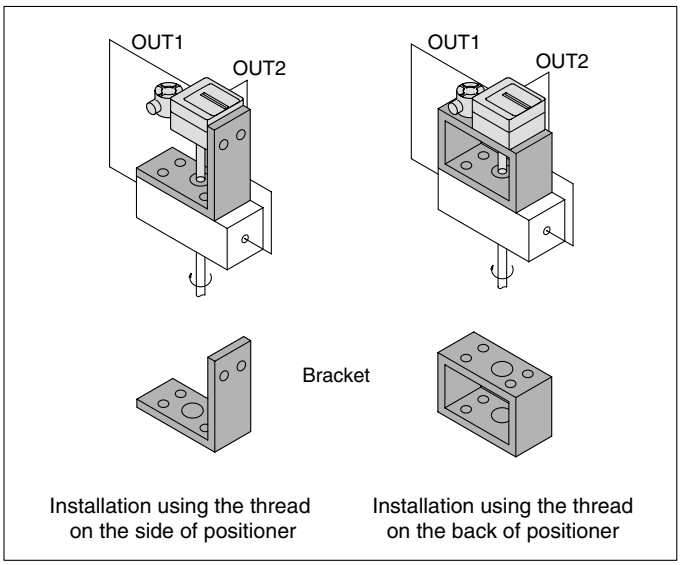


2 A connecting fitting or pin to transfer the displacement of valve stem should be mounted at a position so that the feedback lever is at right angles to the valve stem for an input current of 50%. The right figure is the configuration viewed from the front.



IP8100 type (Rotary type cam feedback)

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

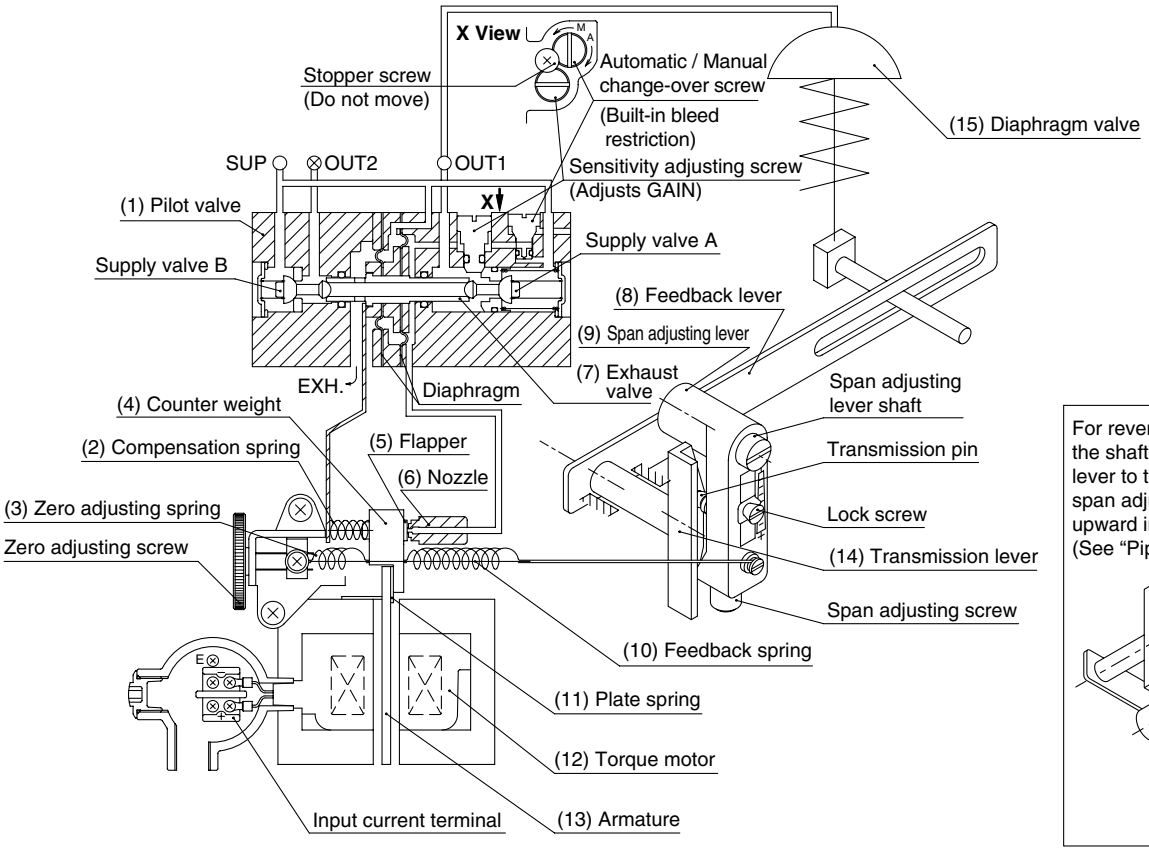


Principle of Operation

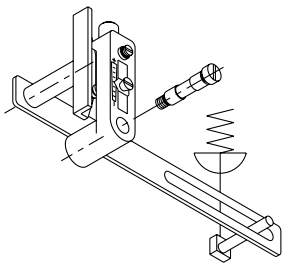
IP8000 / Lever type

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 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 tention.

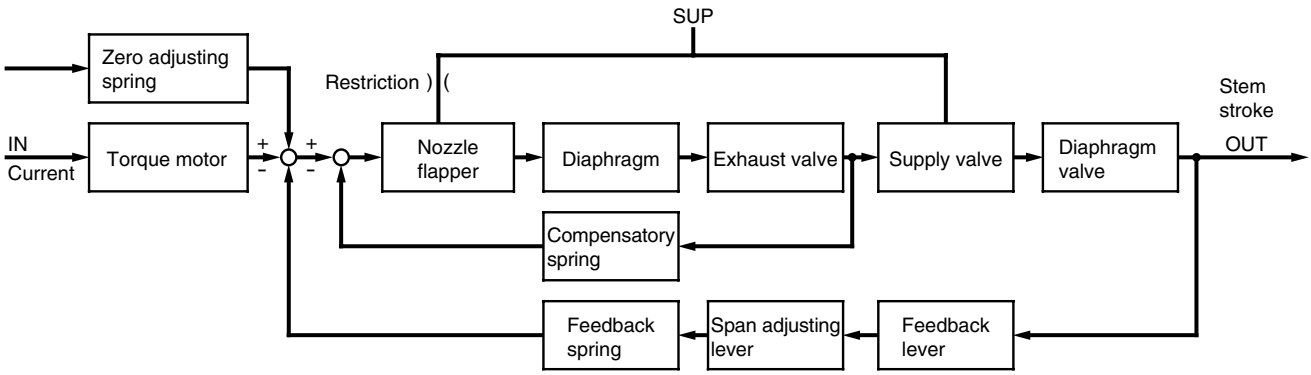
Single action positive operation



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”)



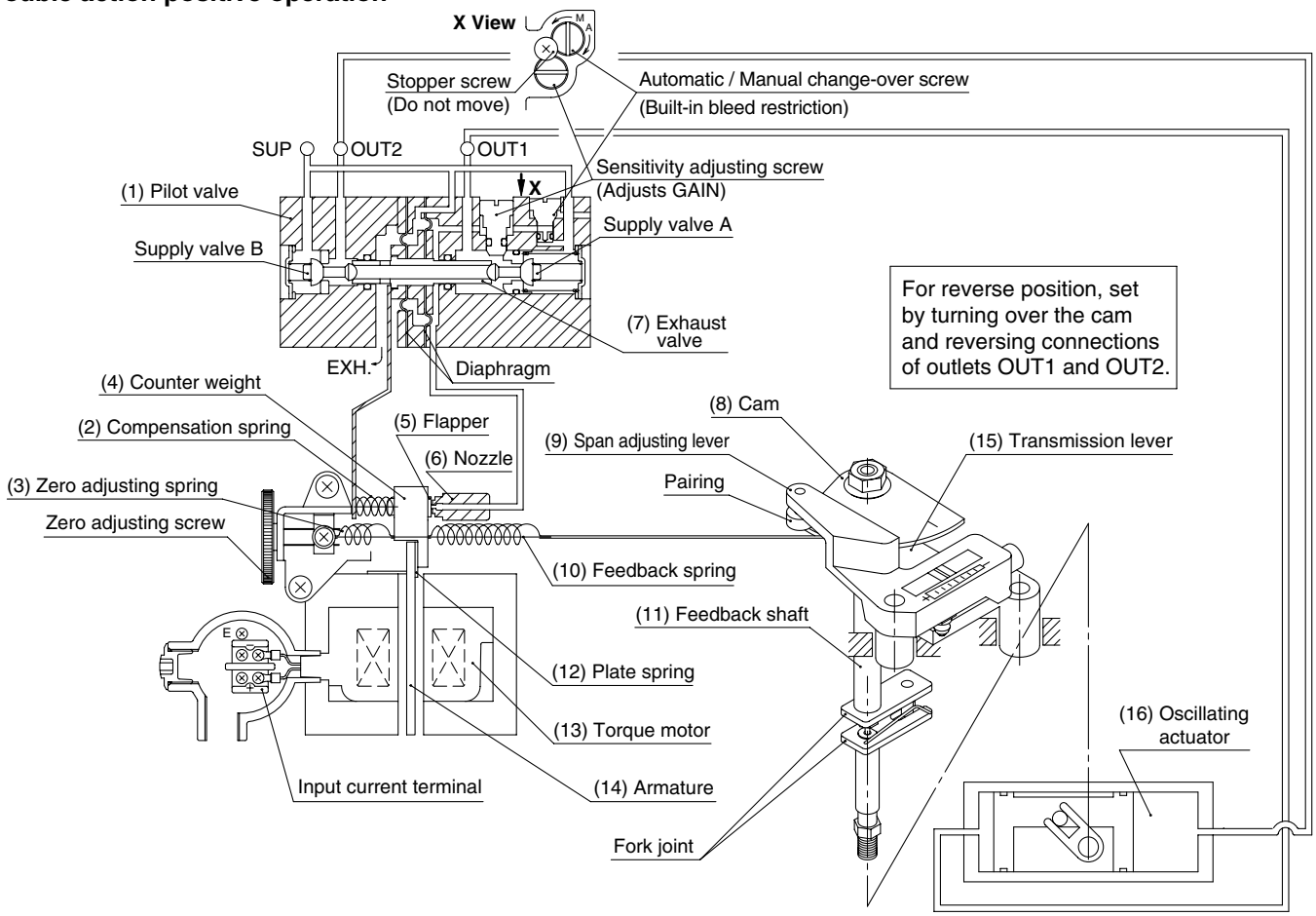
Block diagram



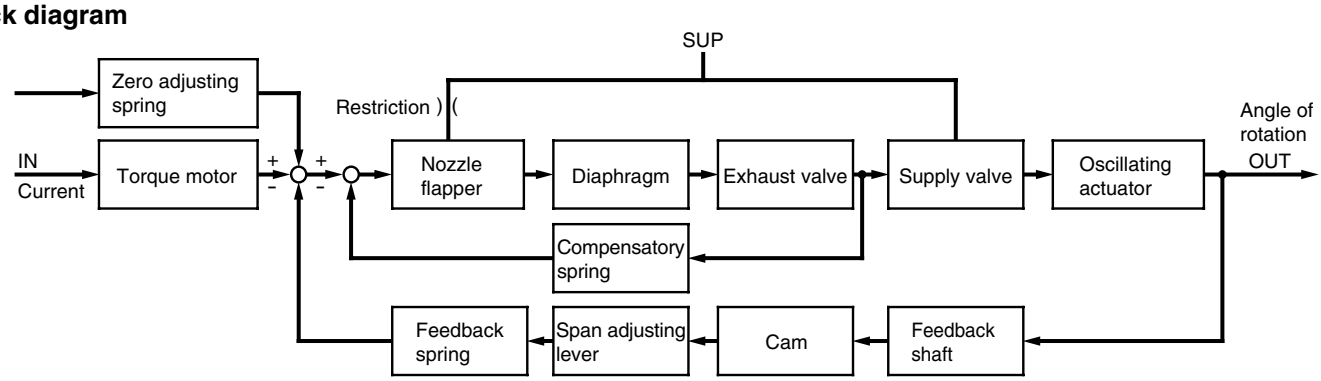
IP8100 / Rotary type

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 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

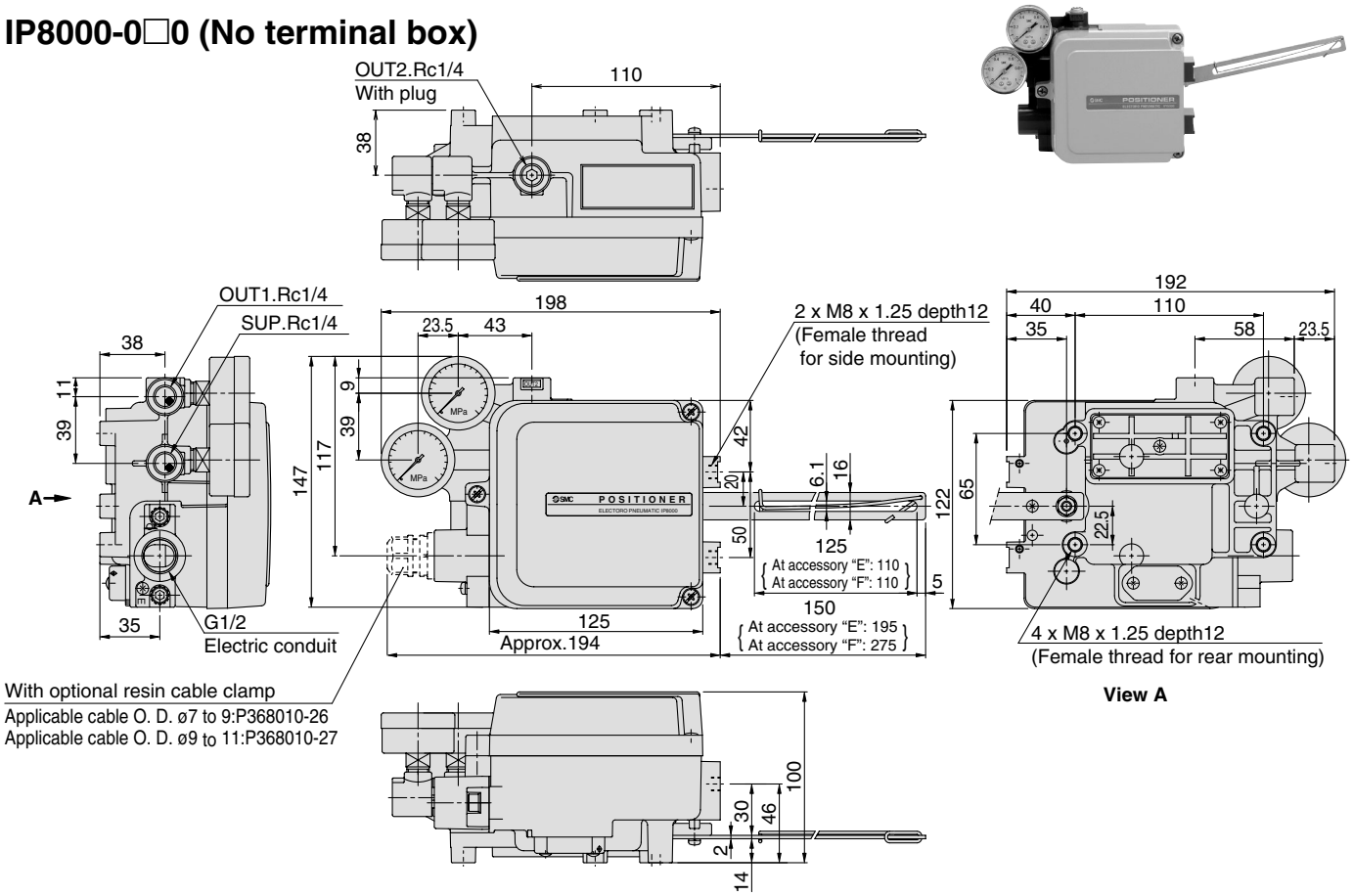


Block diagram



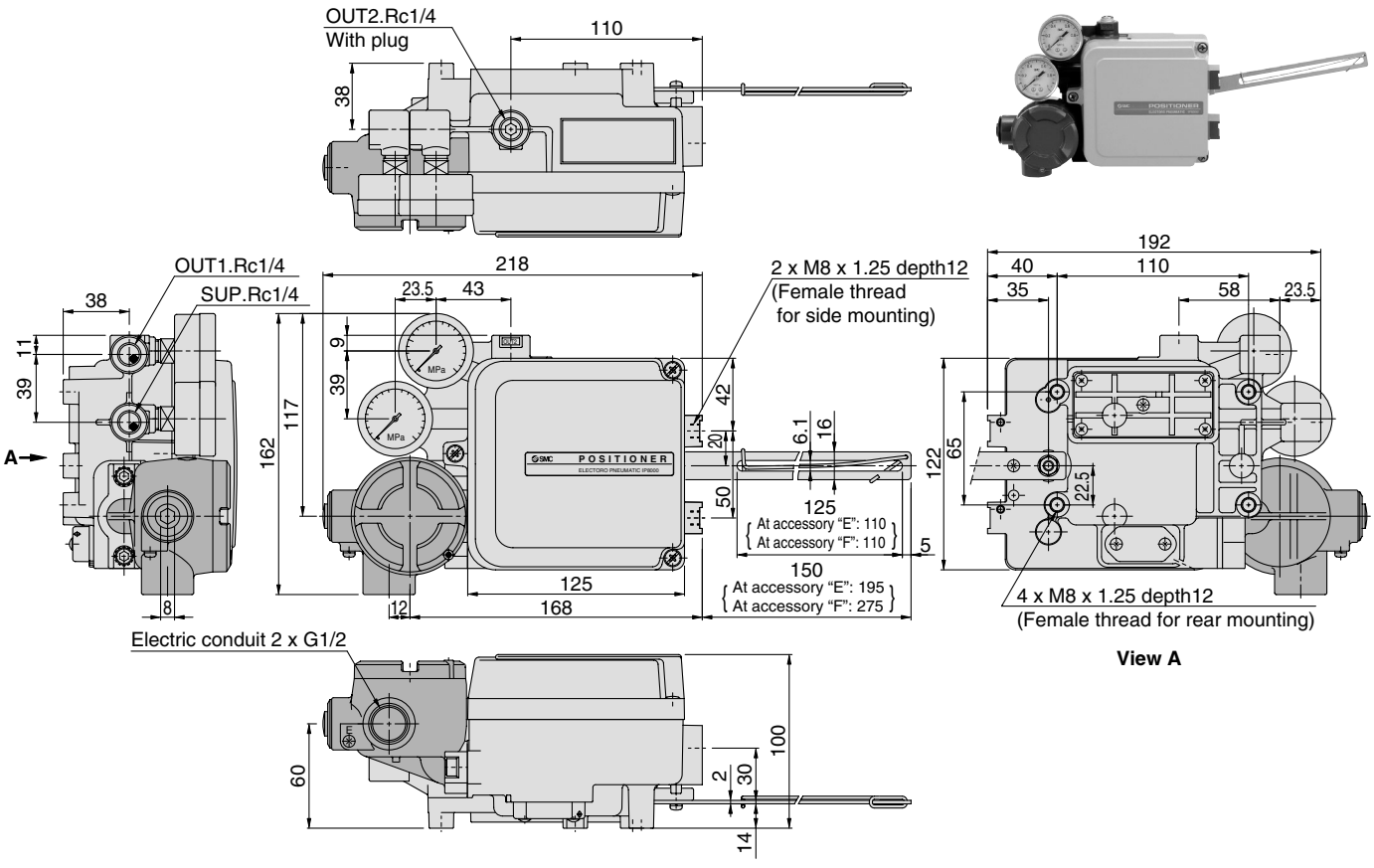
Dimensions / IP8000 (Lever type)

IP8000-0□0 (No terminal box)



View A

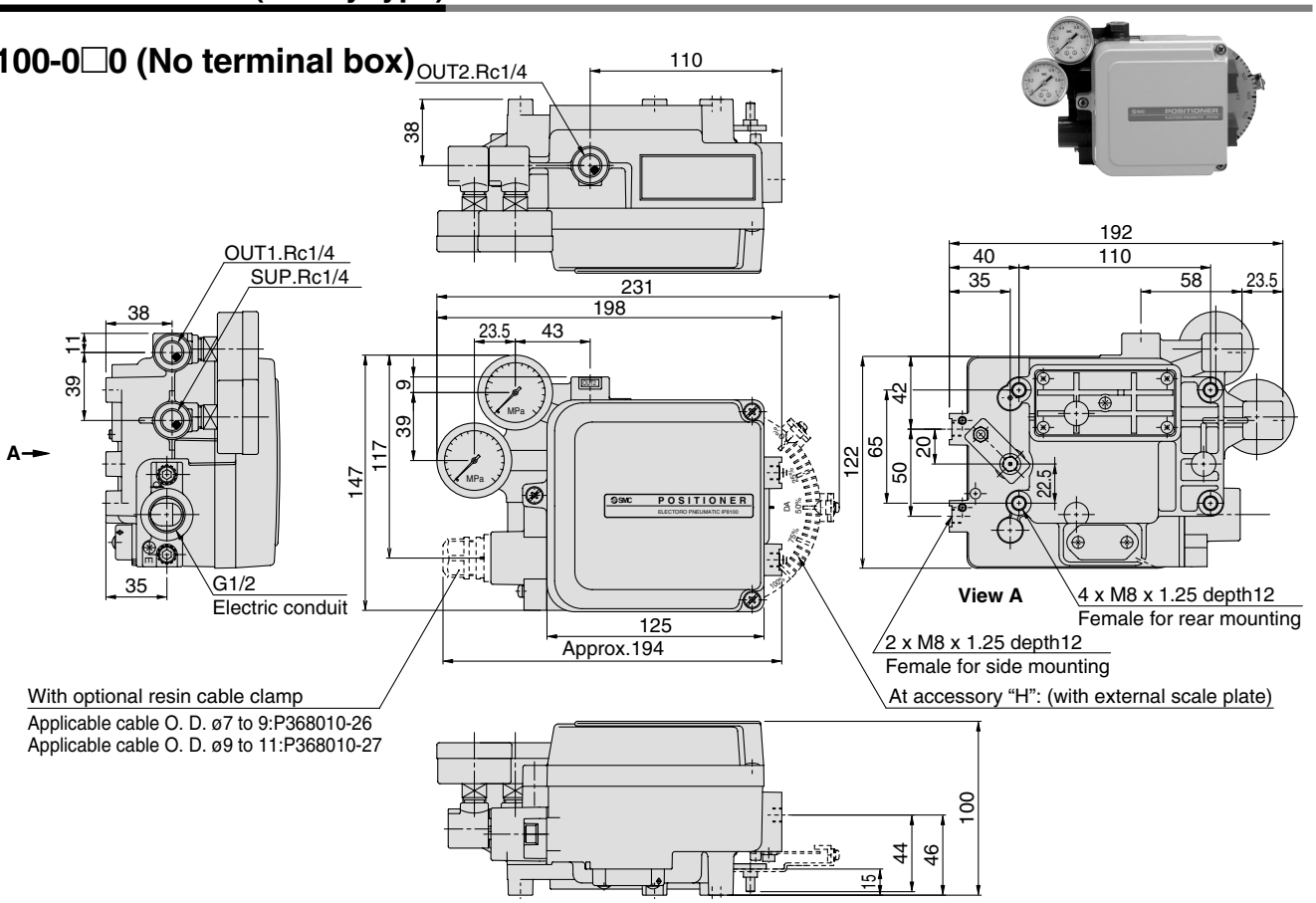
IP8000-0□1 (With terminal box)



View A

Dimensions / IP8100 (Rotary type)

IP8100-0□0 (No terminal box)



IP8100-0□1 (With terminal box)