No. : IP80-OM00008-D

Operation Manual

ELECTRO-PNEUMATIC POSITIONER

PRODUCT NAME

IP8000-0∗0-∗-X14
IP8100-0∗0-∗-X14

MODEL/ Series

SMC Corporation

INDEX

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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.

*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 10218-1992: Manipulating industrial robots -Safety.
etc.

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.

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.

Safety Instructions

⚠ 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 govemed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules goveming that export are known and followed.**

1. Outline

IP8*00 Series electro-pneumatic positioner controls the motion of actuator by the operation of pilot valve. This pilot valve is activated by signal current from adjustment unit mounted to air cylinder.
Specials of "-X14" received the certification of "Intrinsically safe explosion proof conforming with ATEX directive (Ex ibⅡCT5/T6 Gb) " from DEKRA. D

2. Specifications

Table 1 Specifications

Item \ Type	IP8000		IP8100	
	Lever type lever		Rotary type cam	
	Single action	Double action	Single action	Double action
Input current	4～20mADC (Standard)*1			
Input resistance	235±15Ω (4～20mADC)			
Supply air pressure	0.14～0.7MPa			
Standard stroke	10 ～ 85mm (External lever allow-able runout angle 10°～30°)		60°～100°*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			
Thermal coefficient	Within 0.1%F.S/℃			
Output flow rate	80l/min (ANR) or more (SUP=0.14MPa)*3			
Air consumption	Within 5l/min (ANR) (SUP=0.14MPa)			
Ambient and using fluid temperature	-X14	-20℃～80℃ (T5)		
		-20℃～60℃ (T6)		
	-X14-L	-40℃～60℃ (T6)		
Explosion-protected construction	Intrinsic safety type of explosion-protection (CE 0344 Ex Ⅱ2G Ex ibⅡC T5/T6 Gb) D			
	Approval No.DEKRA 03 ATEX1119X D			
Air connection port	1/4NPT female screw			
Electric wiring connection port	M20×1.5			
Material	Aluminum diecast for the body			
Weight	Applox. 2.4kg			
Classification of degree of protection	JISF8007 IP65 (conform to IEC Pub.529)			
Parameters (Current circuit)	Ui≦28V, Ii≦125mA, Pi≦1.2W, Ci≦0nF, Li≦0mH			

＊1：1/2 split range is possible with the standard type (by adjusting the span).
＊2：The stroke is adjustable in 0～60°and 0 ～100°.
＊3：Standard air (JIS B0120):temp.20℃, absolute press.760mmHg,ratio humidity 65%.

3. Operation Principle

3-1 Type IP8000

When the input current increases, armature (13) receives counter-clockwise rotating torque with leaf-spring (11) of torque motor (12) functioning as the support, counter-weight (4) is pushed towards left, the space between nozzle (6) and flapper (5) opens and the nozzle back pressure decreases. As the result, exhaust valve (7) of pilot valve (1) moves to right, the output pressure of OUT1 increases and diaphragm valve (15) moves downward. The movement of diaphragm valve (15) acts on feedback spring (10) through feedback lever (8), transmission lever (14) and span adjusting lever (9) and the actuator is balanced at the position where it is balanced with the force generated by the input current. Gain suppression spring (2) is used to immediately feedback the movement of exhaust valve (7) to counter-weight (4) and it increases the loop stability. For zero-point adjustment, change the tension of zero-adjust spring (3).

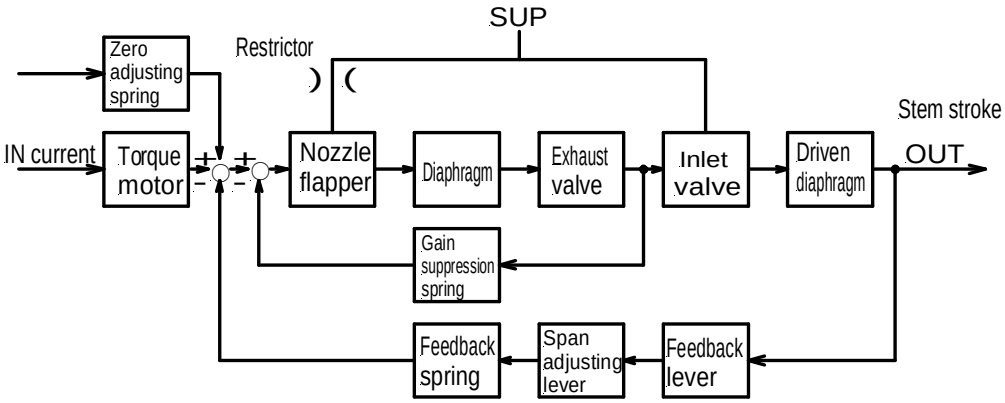


Fig. 1 Block diagram of Type IP8000

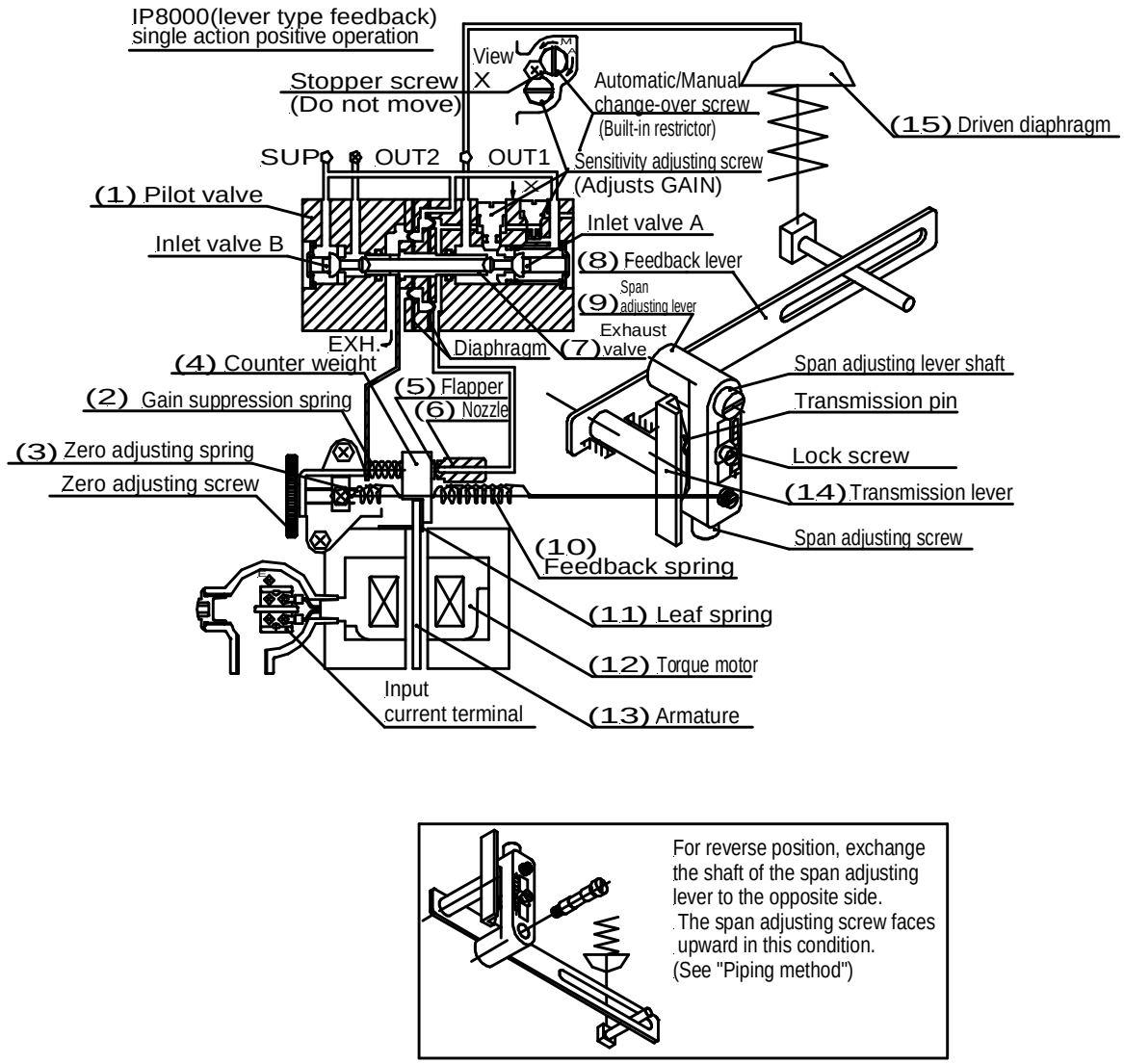


Fig.2. Drawing for IP8000 operation principle

3-2 Type IP8100

When the input current increases, armature (14) receives counter-clockwise rotation torque with leaf-spring (12) of torque motor (13) functioning as the support, counter-weight (4) is pushed towards left, the space between nozzle (6) and flapper (5) opens and the nozzle back pressure decreases. As the result, exhaust valve (7) of pilot valve (1) moves to right, the output pressure of OUT1 increases and the output pressure of OUT2 decreases, starting the rotation of rocking actuator (16). The movement of rocking actuator (16) acts on feedback spring (10) through feedback shaft, cam (8), span adjusting lever (9) and transmission lever (15) and the actuator is balanced at the position where it balances with the force generated by the input current. Fig.6 shows the case of cam DA structure normal actuation (the main shaft of rocking actuator (16) turns clockwise at the time the input current increases).

Gain suppression spring (2) is used to immediately feedback the movement of exhaust valve to counter-weight (4) and it increases the loop stability. For zero-point adjustment, change the tension of zero-point adjust spring (3).

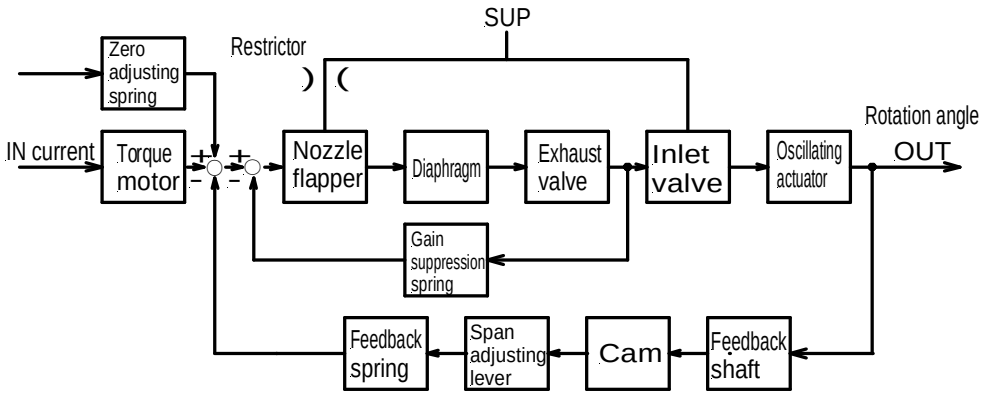


Fig.3 Block diagram of Type IP8100

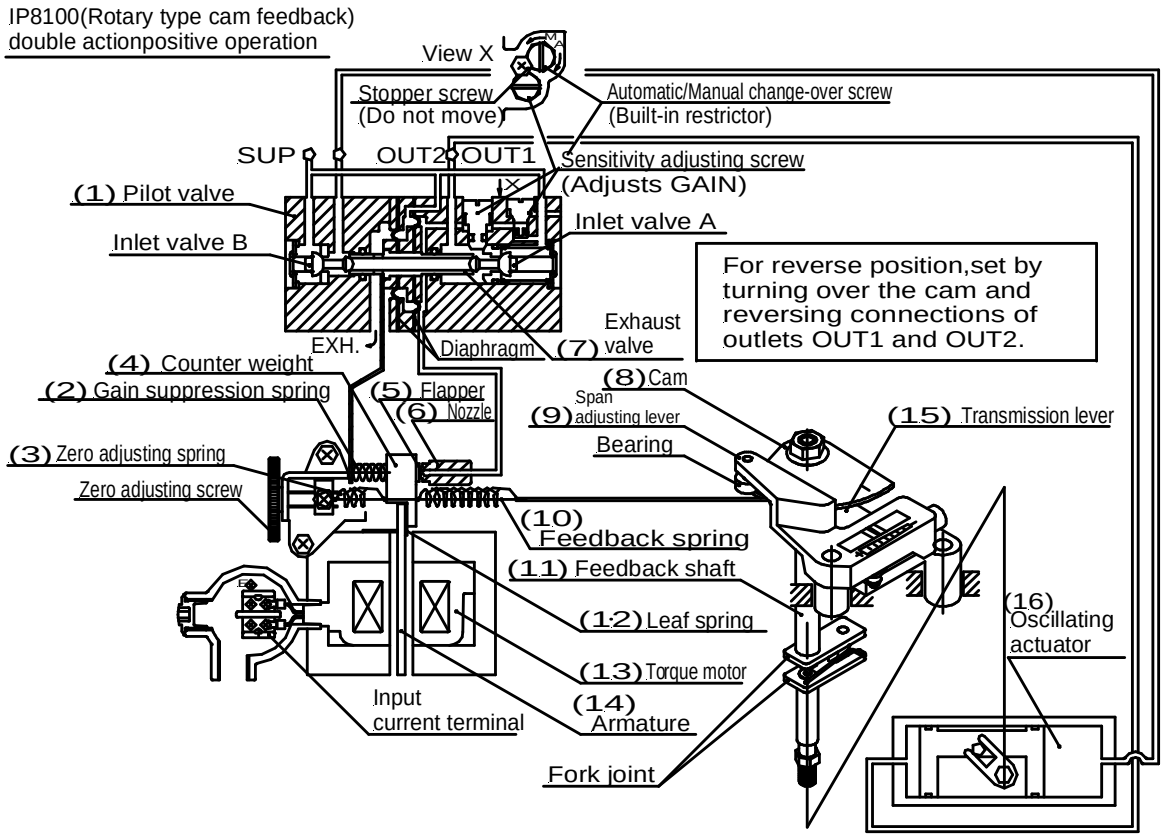


Fig.4 Drawing for IP8100 operation principle

4. Attaching

Warning

(1) Make a space needed for maintenance on the setting area.

(2) Care so that finger wouldn't be pinched during mounting and positioning cam. Cut supply pressure and release compressed air in positioner and actuator in advance.

Caution

(1) Confirm actuator and positioner are connected properly and tightly.

4-1. Type IP8000

4-1-1 Example of attaching to actuator

The type IP8000 positioner is compatible with Type IP600 and IP6000 in the attaching pitch. If you are using IP600 and IP6000 already, the bracket for those positioner can be used to attach IP8000 to the actuator.

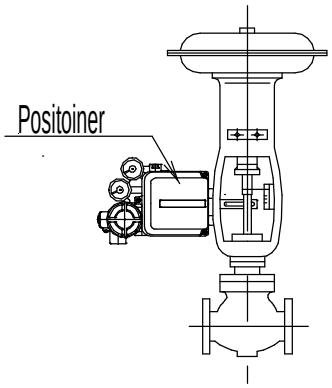


Fig.5 Directly attaching to diaphragm valve

Directly attach using the screw hole at a side of the positioner and the screw hole at the yoke side of diaphragm.

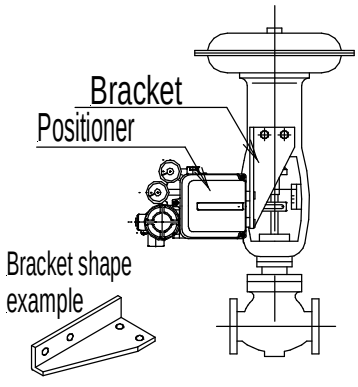


Fig.6 L-shape bracket

Attach using the screw hole at a side of the positioner and the screw hole at the front mount of diaphragm valve.

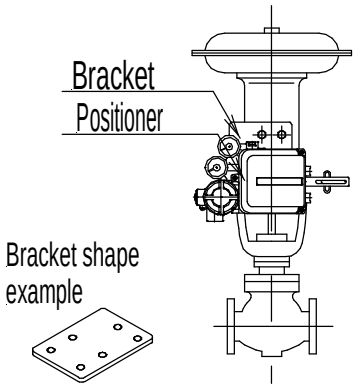
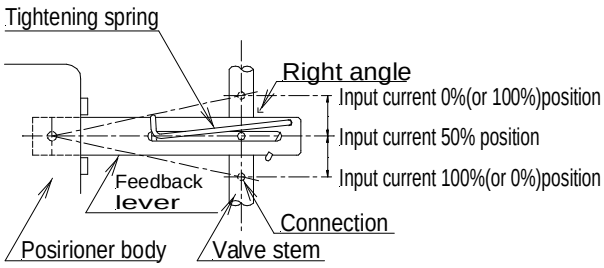


Fig.7 Front bracket

Attach using the screw hole at the positioner back and the screw hole at the front mount of diaphragm valve.

4-1-2 Connection with external feedback lever



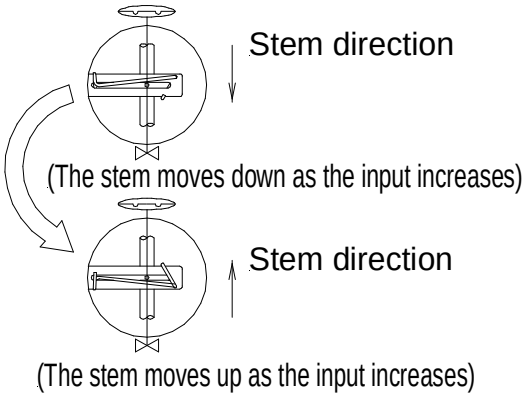


Fig.9 Use position of feedback lever

(1)Attach to the position that the valve stem and lever form the right angle when the input signal is 50%(distribute evenly with 50% input signal set as the reference).

(2)Attach to the position that the runout angle is within the range of 10°to 30°.

(3)To move the valve stem downward at the time of input current increase(normal actuation), attach to the position at which the tightening spring comes to the upper side of the connection, as shown in Fig.9.

To move the valve stem upward(reverse actuation), turn-over the feedback lever and attach to the position at which the tightening spring comes to the lower side of connection.

4-2 Type IP8100

4-2-1 Example of attaching to actuator

The type PI8100 positioner is compatible with type IP610 and IP6100 in the attaching pitch. If you are using IP610 or IP6100 already, the bracket can be used to attach IP8100 to the actuator. If you change from IP6100 to IP8100 and select accessory H (with external scale plate), fork lever type fitting needs to be adjusted at lower position.

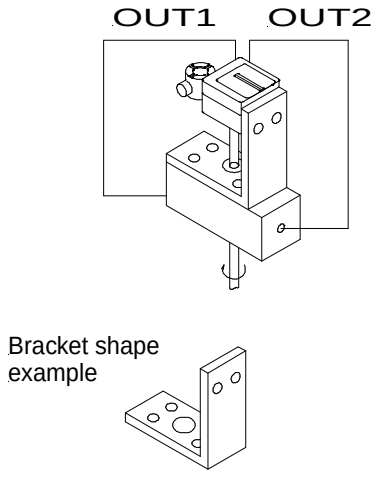


Fig.10 Mounting by positioner side screw

Attach using the screw hole at a side of the positioner and the screw hole at the actuator top.

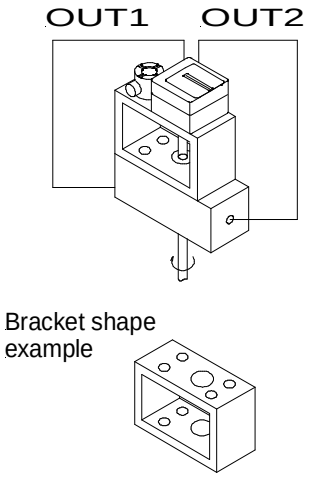
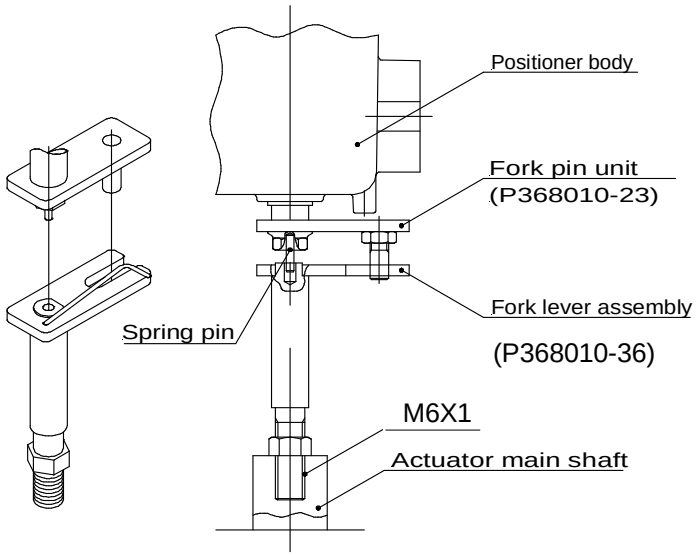


Fig.11 Mounting by positioner back screw

Attach using the screw hole at the positioner back and the screw hole at the actuator top.

4-2-2 Connection with feedback shaft



(1) Attach to the position at which the positioner feedback shaft and the rotary actuator main shaft are alsmost concentric (range in which the spring pin of feedback shaft edge enters the hole of fork lever assembly shaft edge).

(2) If the separation joint type for IP610 is made in a special specification, it can be used for this connection.

Fig.12 Example of attaching using fork lever type joint

4-2-3 Cam attaching procedure

(1) Use the DA face of cam to turn the actuator main shaft clockwise (viewed from the positioner front cover side) at the time of input signal increase. Use the RA face to turn it counter-clockwise (reverse actuation). Correctly attach the cam to the flange part of feedback shaft.

(2) Attach the cam in the procedure of loosening the hexagonal nut with flange first, setting the using actuator to the starting position and then setting the cam reference line and the bearing contact point of span adjusting arm unit to the matching position.

(3) Do not apply the supply pressure when attaching the cam as otherwise it is very dangerous.

(4) When the positioner is shipped from our plant, the cam is tentatively tightened to the shaft. Be sure to firmly lock the cam to the lock nut (Tightening torque 2.0～2.5 Nm)

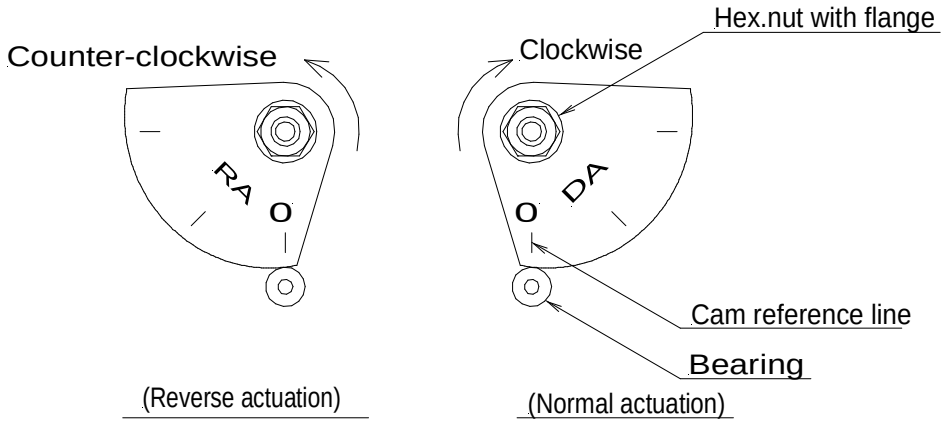
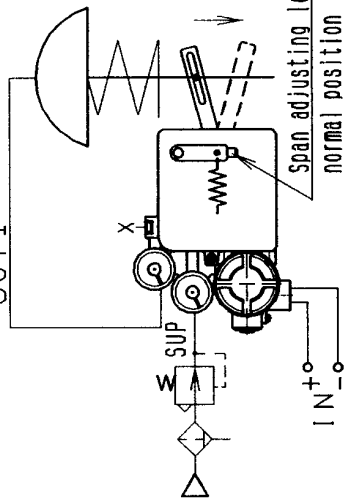
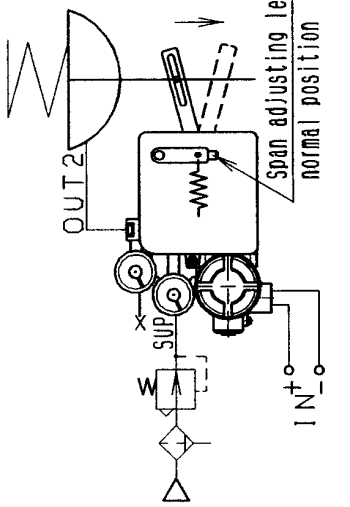
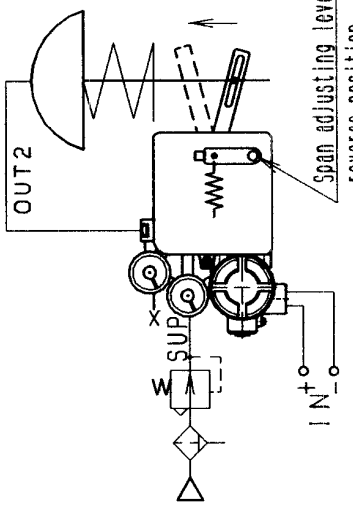
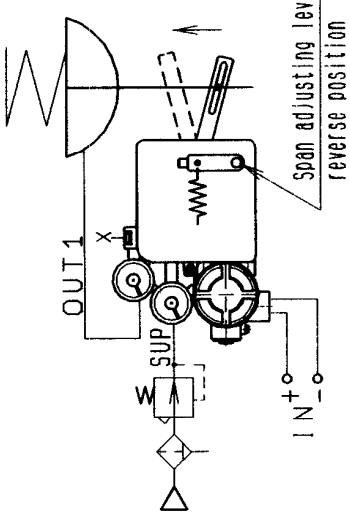


Fig.13 Example of cam attaching

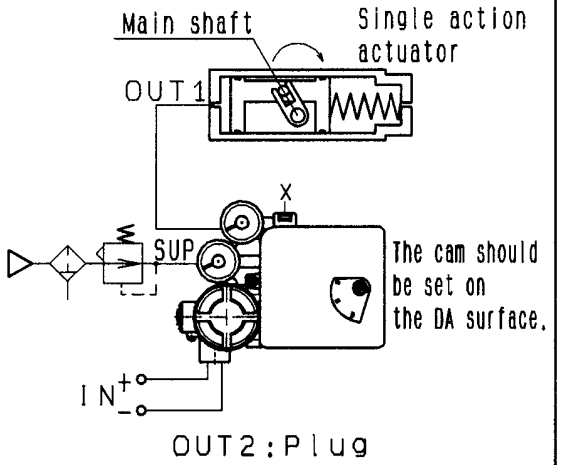
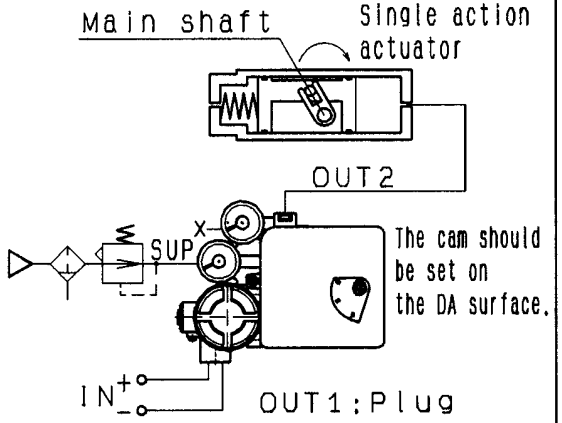
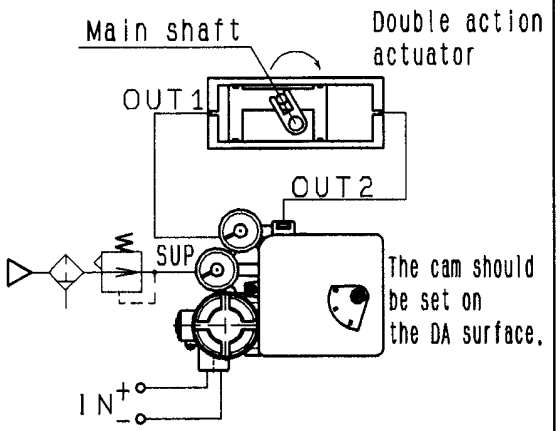
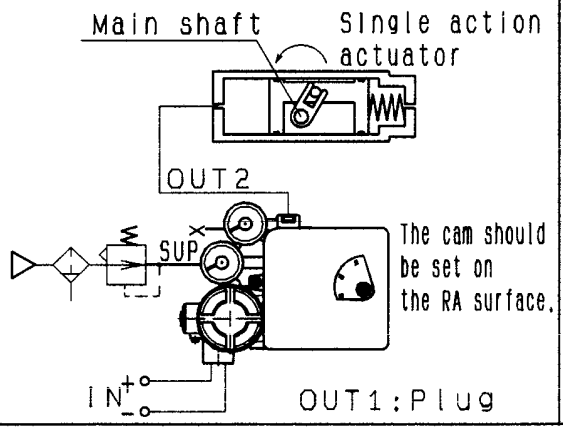
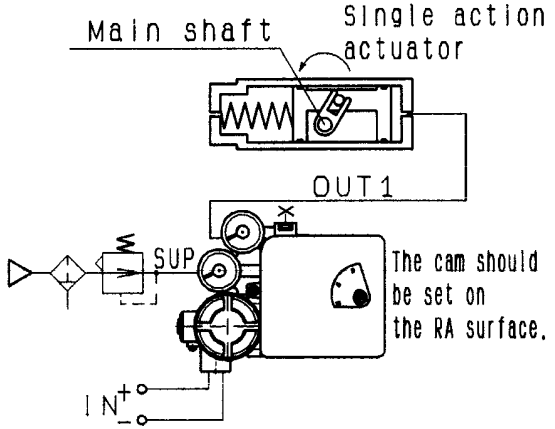
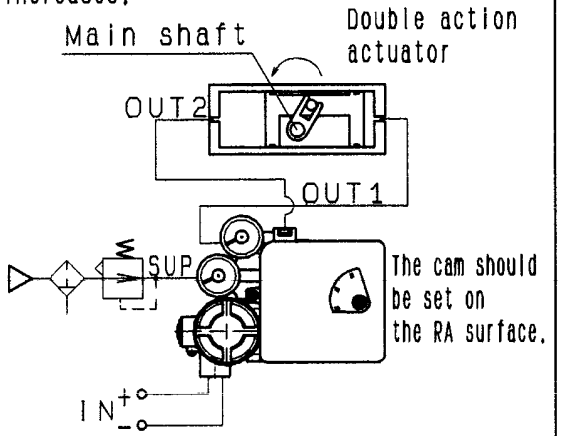
5. Piping and Attaching of Internal Feedback Unit

Table 2 Piping for IP8000 (Lever type)

	Single action	Double action
Normal action *Note	Actuation:The stem moves in the arrow direction when the input current increases. 	Actuation:The stem moves in the arrow direction when the input current increases.(Normal actuation using the reverse actuation drive unit). 
Reverse action *Note	Actuation:The stem moves in the arrow direction when the input current increases.(Reverse actuation using the normal actuation drive unit. 	Actuation:The cylinder rod moves in the arrow direction when the input current increases. 

Note;Refer to item(3) of 3-1-2 Connection with external feedback lever.

Table 3 Piping for IP8100(Rotary type)

	Single action		Double action
Normal action *Note	Actuation:The actuator main shaft turns clockwise when the input signal increases. 	Actuation:The actuator main shaft turns clockwise when the input signal increases. (Normal action using the reverse actuation drive unit). 	Actuation:The actuator main shaft turns clockwise when the input signal increases. 
Reverse action *Note	Actuation:The actuator main shaft turns counter-clockwise when the input signal increases.(Reverse actuation using the normal actuation drive unit). 	Actuation:The actuator main shaft turns counter-clockwise when the input signal increases. 	Actuation:The actuator main shaft turns counter-clockwise when the input signal increases. 

Note:Refer to 3-2-3 Cam attaching procedure

Caution

Prior to piping, flush enough and remove chip, cutting oil and dust in tube so that obstruction wouldn't intrude into positioner.

Confirm specification and working direction of actuator, and mount pipes and internal feedback unit in accordance with table 2 and 3.

6. Electrical Wiring

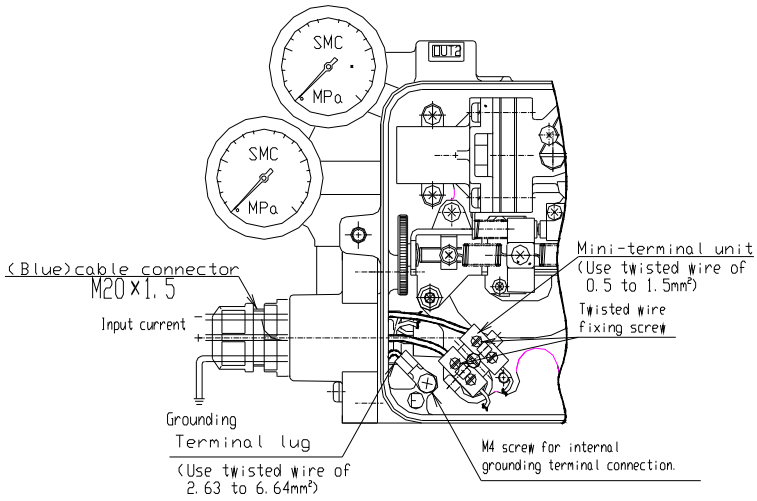


Fig.14 Positioner without terminal box

(1)Connect the (+) and (-) output terminals from the regulator with the (+) and (-) input terminals, respectively, of the positioner terminal box. The port diameter at the conduction wire drawing port is the size of M20×1.5 parallel screw for piping and the depth is for a 20 mm female screw.

Warning

D

1. A positioner must be energized only after wiring via a barrier.
2. Use a linear resistance type barrier based on intrinsically safe parameter for the input circuit.
3. If a positioner is used as intrinsic safety type of explosion protected construction for ATEX, connect it only to the intrinsically safety electric circuit with the following maximum value.

   Parameter (current circuit): Ui≦28V, Ii≦125mA, Pi≦1.2W, Ci≦0nF, Li≦0mH

4. Positioner has an aluminium alloy enclosure. When used in a potentially explosive atmosphere requiring the use of category 2G equipment, the apparatus must be installed so that, in the event of rare incidents, an ignition source due to impact or friction is excluded.
5. Do not use it in a non-hazardous area where air leakage would cause a risk.
6. If a positioner is used in a hazardous area, speed of the actuating part should be 1m/s or less. The actuator should not have hunting.
7. Make sure to use a grounding terminal, and grounding should be performed based on an electric work policy in each region.
8. The temperature at a positioner surface should not be increased more than the temperature rate by direct sunshine.
9. To maintain explosion protected construction, the electric circuit should not be changed.

ATEX Intrinsic Safety type of Explosion Protected Construction D

IP8*00-0*0-*-X14 type electro-pneumatic positioner has an explosion protected construction which was approved by DEKRA, a notified body for explosion protected certification, as ATEX compliant intrinsic safety type of explosion protected construction. Please pay full attention when it is used as an explosion protected construction specification.

Explosion Protected Construction Rate

The IP8*00-0*0-*-X14 model is compliant with the ATEX Directive 2014/34/EU, Intrinsically Safe type of Construction, to Ⅱ 2G Ex ib Ⅱ C T5/T6 Gb classification, according to EN 60079-0:2012+A11:2013, and EN 60079-11:2012,and EN 13463-1:2009.

7. Adjustment

Caution

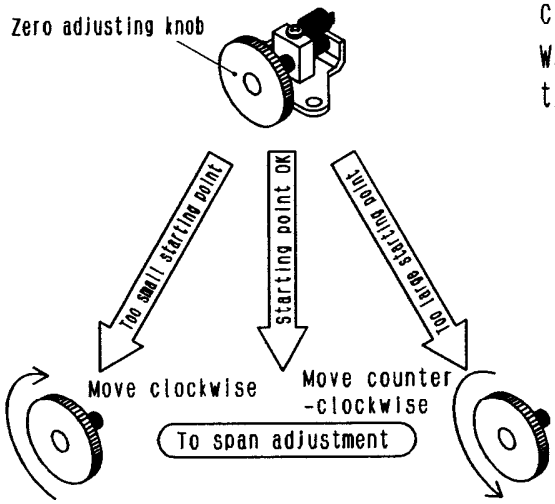
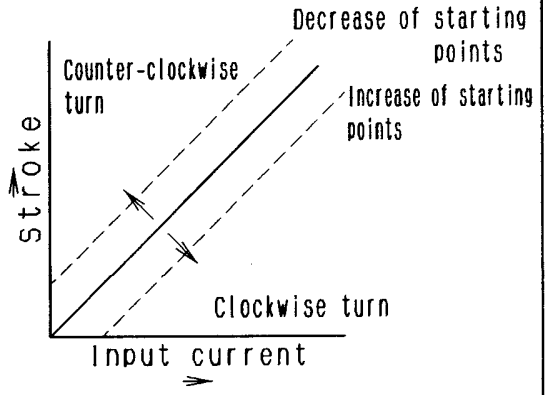
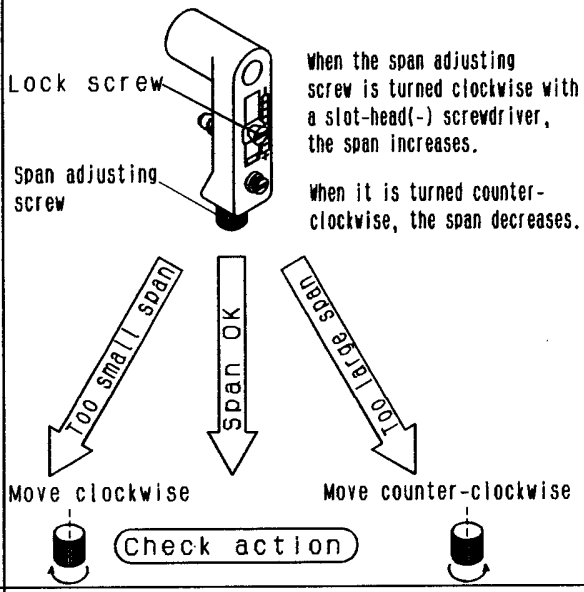
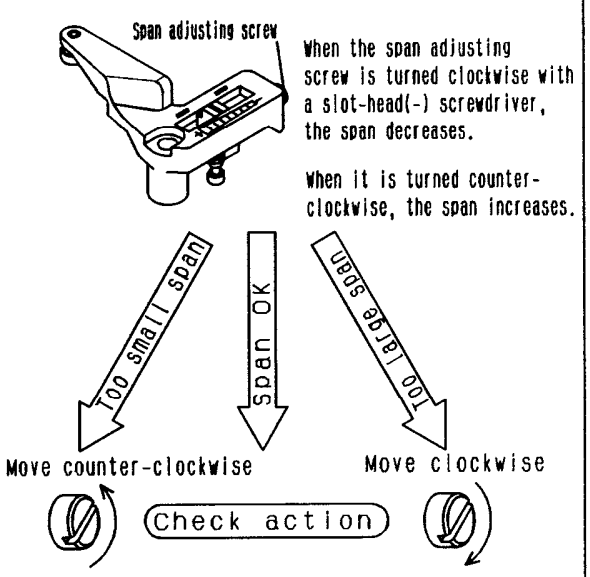
(1) For this positioner, span and zero point adjustment of each actuator is necessary. Adjustment shall be done based on each actuator size.
(2) Keep in mind that span and zero point adjustment interfere in each other.
(3) Characteristics changes due to change of mounting position, ambient temperature and supply pressure.
(4) If it takes long time until operation after initial adjustment, check and adjust this product.
(5) Sensitive adjustment is effective for only double acting actuator.
(6) Manual change function is effective for single acting actuator which is controlled by using OUT1.

Check the following prior to start the adjustment.

(1) Check that the pipeline is correctly connected with the pressure supply port and OUT1 and OUT2 ports.
(2) Check that the wires are correctly connected with the (+), (−) and grounding terminals.
(3) Check that the actuator and positioner are sturdily connected.
(4) Check for locking of the auto/manual changeover screw of pilot valve (fully tightened in the clockwise direction).
(5) Check that the span adjusting lever of internal feedback lever (Type IP8000) is attached to the correct (normal or reverse) position. (Refer to Tables 2.)
(6) Check for correct use of the cam surface (normal or reverse) in Type IP8100 and that the flange nut is firmly locked. (Refer to Table 3.)

7-1 Zero-point adjustment and span adjustment

Table 4 Adjustment procedure

	TYPE IP8000	TYPE IP8100
Zero-point adjustment		When the zero adjusting knob is turned clockwise, the starting point increases. When it is turned counter-clockwise, the starting point decreases. 
Span adjustment		
Adjusting procedure	(1) Set the input current to 0% (4mADC in the standard specification) and turn the zero adjusting knob by hand to set it to the actuator starting point. (2) Then, set the input current to 100% (20mADC in the standard specification) and check the actuator stroke. At this point, depending on whether the span is too large or too small, loosen the lock screw and then adjust the span as shown in the illustration above. (3) Set the input current to 0% and conduct the zero-point adjustment, as done in Step (1) again. (4) Repeat the above operations until the predetermined stroke of the actuator is obtained to the input current.	(1) Set the input current to 0% (4mADC in the standard specification) and turn the zero adjusting knob by hand to set it to the actuator starting point. (2) Then, set the input current to 100% (20mADC in the standard specification) and check the actuator stroke. At this point, depending on whether the span is too large or too small, adjust the span as shown in the illustration above. (3) Set the input current to 0% and conduct the zero-point adjustment, as done in Step (1) again. (4) Repeat the above operations until the predetermined stroke of the actuator is obtained to the input current.

7-2 Sensitivity adjustment

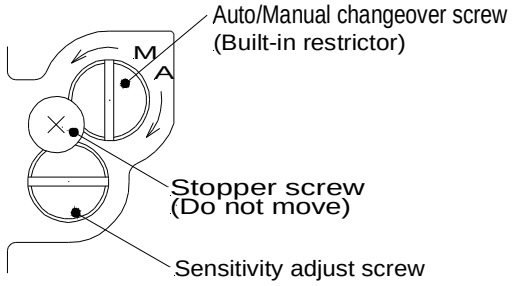


Fig.15 Pilot valve

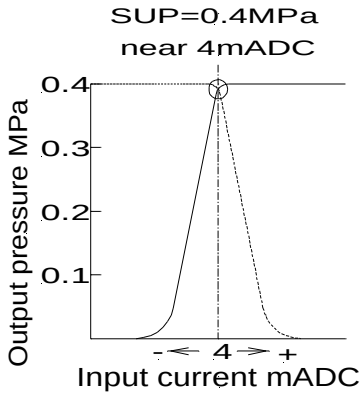


Fig16 Input/output-pressure characteristic

Fig.16 shows the input current –output pressure characteristics of OUT1 and OUT2 of the pilot valve. When the positioner is shipped from our plant, the output pressure is set to the optimum state as shown in Fig.16 and this needs no adjustment ordinarily.

Caution

The sensitivity adjustment of pilot valve is effective to the double action actuator only. If the sensitivity is poor because of the actuator type of load condition, turn the sensitivity adjust screw clockwise. If hunching occurs, turn the sensitivity adjust screw counter-clockwise.

(The amount of turning depends on actuators. Turn it by 1/16 to one turn. Do not loosen the stopper screw at this time since it is set to avoid the screw coming off.)

∗ If hunching occurs with an actuator of small capacity, refer to the description in 11-1 (for both single action and double action.)

7-3 Manual switching

(1) To operate the diaphragm valve manually, turn the Auto/Manual changeover screw of pilot valve towards M. The supply pressure and OUT1 output are conducted and the stroke can be adjusted by using the supply pressure setting reducing valve.(Refer to fig.15 Pilot valve)

(2) To operate based on the input current, tighten the Auto/Manual changeover screw towards A. The screw is tightened up in the A direction when the positioner is shipped from our plant. (Refer to fig.15 Pilot valve)

Caution

On this manual switching, SUP and OUT1 are conducted through the pilot valve and when the pilot valve becomes out of order, the manual switching is not functioning. Note that the stopper small screw set to the top is for prevention from coming off. Do not loosen it.

8. Maintenance and Check

Warning

(1) After installation, repair and disassembling, connect compressed air and perform a proper function test and a leak test. If bleed noise is louder than the initial state or operation is abnormal, stop operation and check if installation is proper or not.
And modification of electrical construction is prohibited due to maintaining Explosion-Protected construction function.

Caution

(1) Check if supply air is clean or not. Inspect compressed air cleaning system periodically and keep condition to be able to always get clean air so that dust, oil and humidity which cause malfunction and failure wouldn't include into the equipment.

(2) If handled improperly, compressed air can be dangerous. Maintenance and replacement of unit parts should be performed only by trained and experienced personnel for instrumentation equipment as well as following the product specifications.

(3) Check the positioner once a year. When you find excessively worn diaphragm. O-ring and other packing or any unit that has been damaged with new ones. Treatment at an early stage is especially important if the positioner is used in a place of severe environment like coastal area.

(4) Before removing the positioner for maintenance or replacing unit parts after installation, make sure the supply pressure is shut off and all residual air pressure is released from piping.

(5) When the fixed orifice is clogged with carbon particles or others, remove the pilot valve Auto/Manual changeover screw (built-in restrictor) and clean it by inserting a φ0.2 wire into the aperture. If it must be replaced with new one, stop the supply pressure and remove the stopper screw of the pilot valve.

(6) When you disassemble the pilot valve, coat grease to the O-ring of the sliding section.
(Use the TORAY SILICONE SH45 grease.)

(7) Check air leak from piping which compressed air flows. Air leak from air piping could deteriorate characteristics.
Air is normally discharged from a bleed port, but this is a necessary air consumption based on the construction of the positioner, and is not an abnormality if the air consumption is within the specified range.

9. Caution on Handling

Warning Operation

(1) Do not use this positioner out of the range of its specifications as this can cause failure. (Refer to 1. Specifications.)
(2) If the system is supposed to be in danger because of failure of the positioner, prepare the system with a safety circuit to avoid danger.
(3) Be sure that the terminal cover and body cover are put on during the operation.

Caution Handling

(1) Avoid giving impact to the body and torque motor of positioner, and giving excessive force to armature because it leads to failure. Handle with care during transport and operation.
(2) If you leave the positioner at the operation site for a long time without using it, put the cover on it so that the rain water does not enter the positioner. If the atmosphere is of high temperature or high humidity, take measures to avoid condensation inside. The condensation control measures must be taken thoroughly for export shipment.
(3) Avoid to set positioner near magnetic field because characteristics are effected.

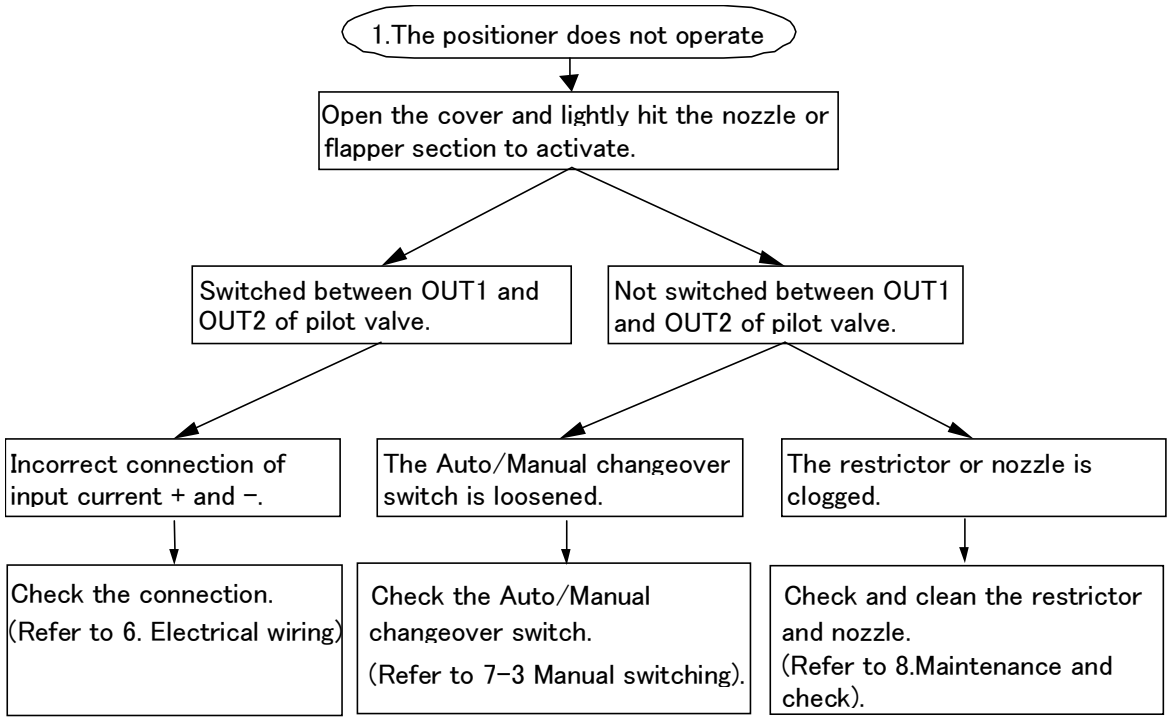
Caution Air supply

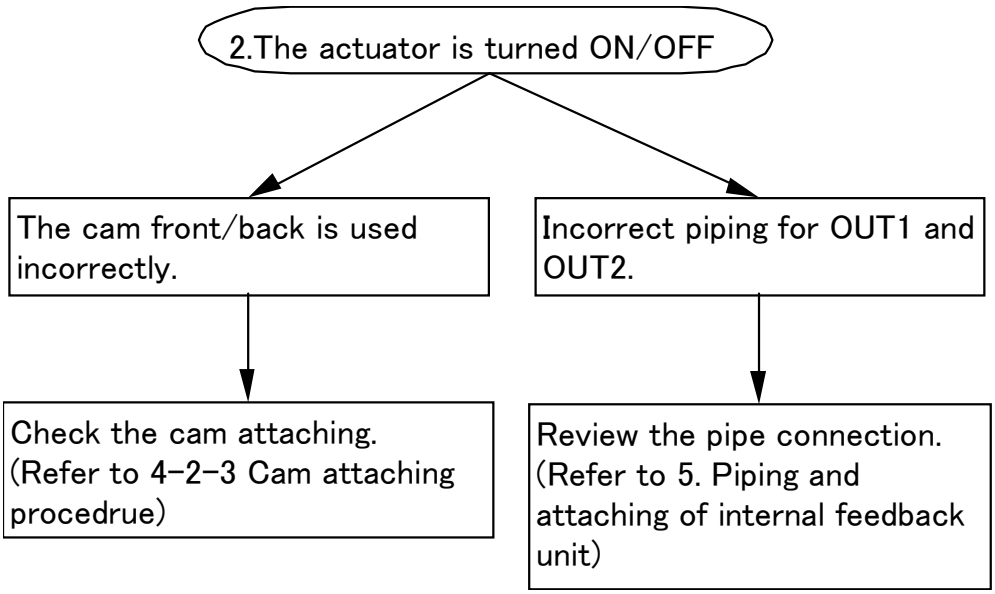
(1) Positioner has Restrictor and Nozzle which has fine paths in it. Therefore please use clean air which is dehydrated and filtered, and also avoid employing Lubricator which causes malfunction.
(2) Avoid using compressed air compressed air containing chemicals, synthetic fluid including organic solvent, salinity, and corrosive gas as it may cause malfunction.
(3) Use dehumidified and dust-removed clean air as the supplying air source.
(4) If atmosphere is below freezing point, take measure to avoid condensation.

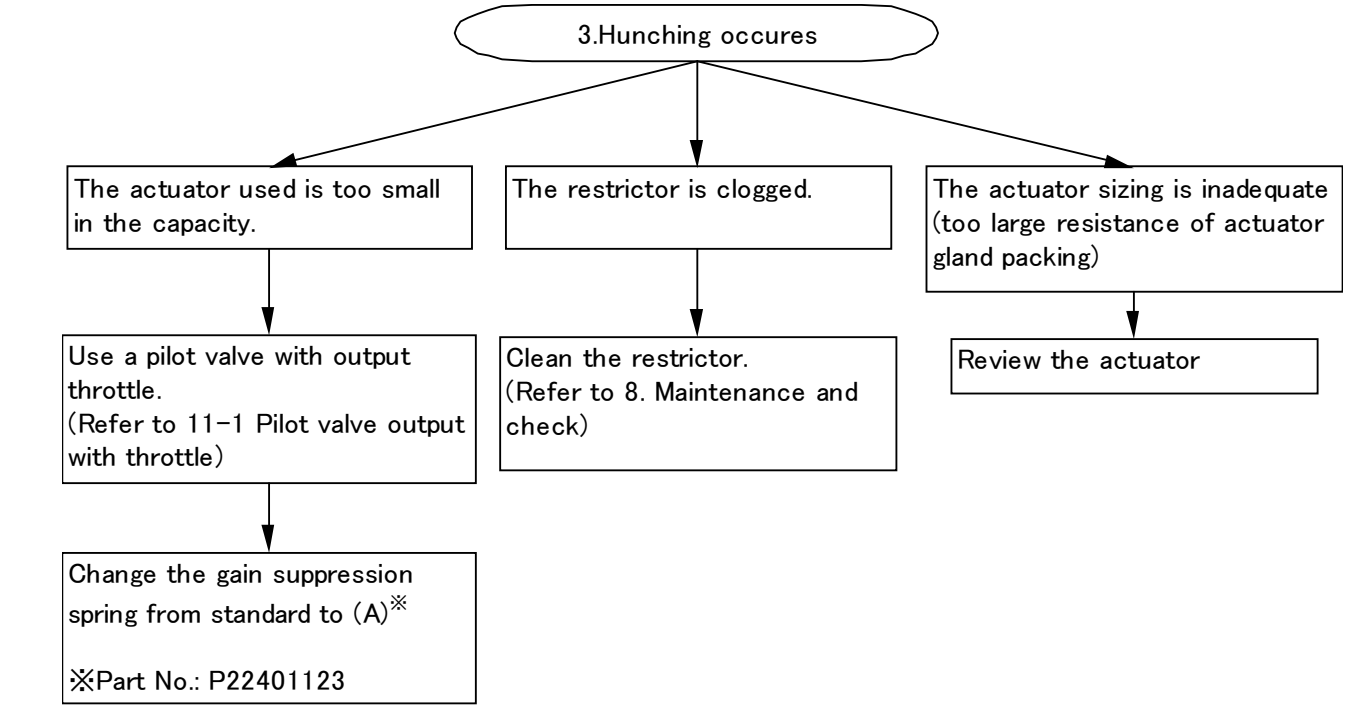
Caution Environment

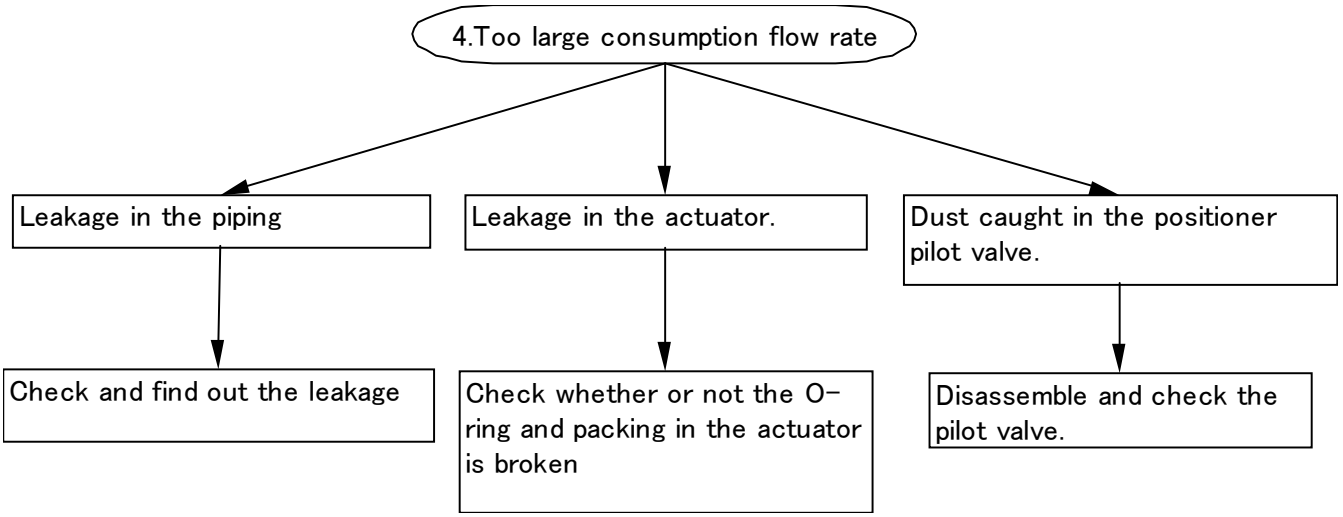
(1) Do not use in an environment where the product is exposed to corrosive gas, chemicals, salt water, water or steam.
(2) Do not operate the product in a location where it is subject to strong vibration and/or shock.
(3) If the positioner is used under temperature outside of the specification, the sealing materials deteriorate quicker and also the positioner may not operate normally.

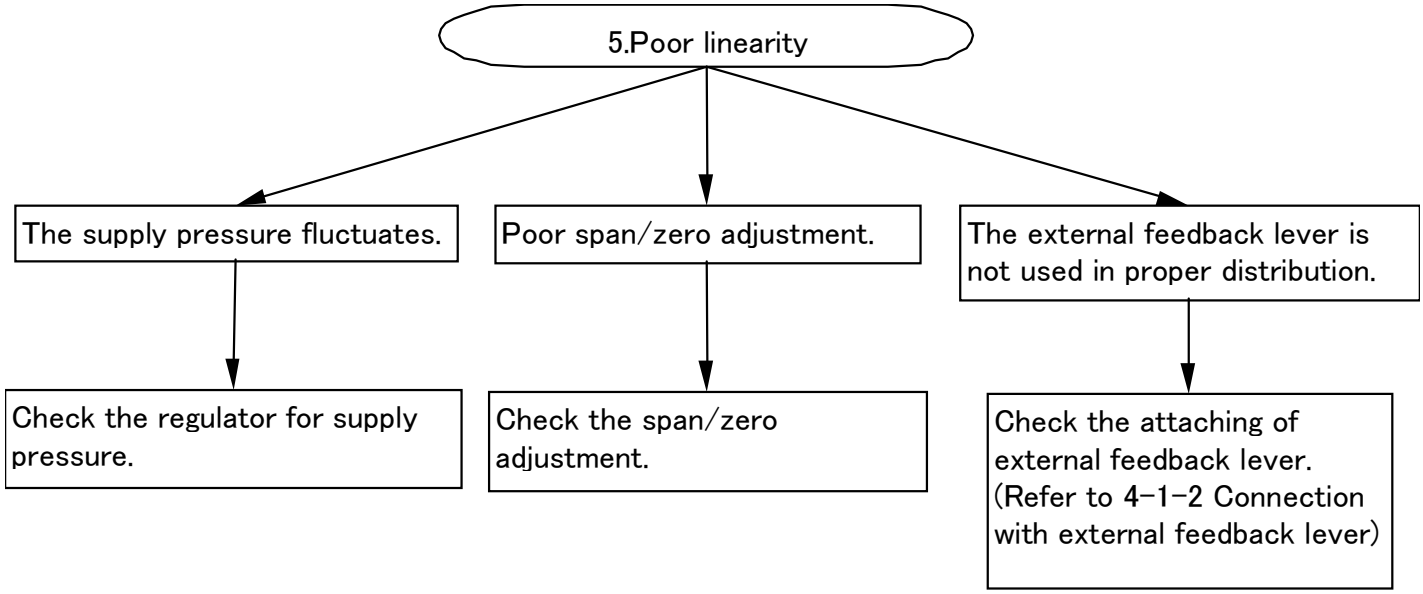
10. Troubleshooting

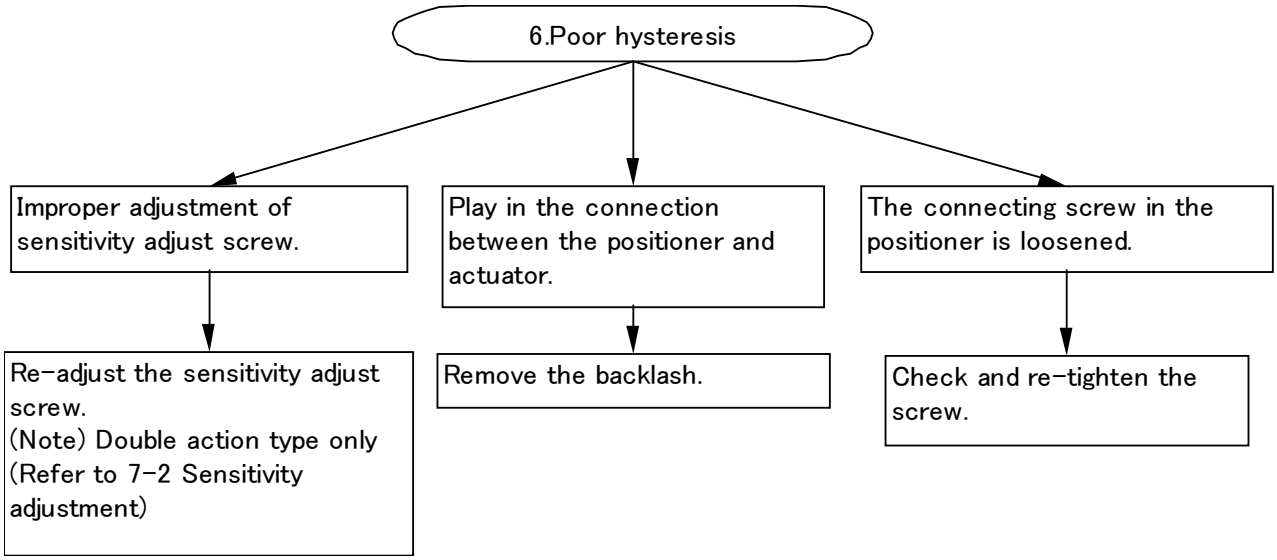





3.Hunching occures
The actuator used is too small in the capacity.
The restrictor is clogged.
The actuator sizing is inadequate (too large resistance of actuator gland packing)
Use a pilot valve with output throttle.
(Refer to 11-1 Pilot valve output with throttle)
Clean the restrictor.
(Refer to 8. Maintenance and check)
Review the actuator
Change the gain suppression spring from standard to (A)※
※Part No.: P22401123


4.Too large consumption flow rate
Leakage in the piping
Leakage in the actuator.
Dust caught in the positioner pilot valve.
Check and find out the leakage
Check whether or not the O-ring and packing in the actuator is broken
Disassemble and check the pilot valve.


5.Poor linearity
The supply pressure fluctuates.
Poor span/zero adjustment.
The external feedback lever is not used in proper distribution.
Check the regulator for supply pressure.
Check the span/zero adjustment.
Check the attaching of external feedback lever. (Refer to 4-1-2 Connection with external feedback lever)


6.Poor hysteresis
Improper adjustment of sensitivity adjust screw.
Play in the connection between the positioner and actuator.
The connecting screw in the positioner is loosened.
Re-adjust the sensitivity adjust screw. (Note) Double action type only (Refer to 7-2 Sensitivity adjustment)
Remove the backlash.
Check and re-tighten the screw.

11. Option

11-1 Pilot valve with output throttle

Hunching may occur when the positioner is attached to a small capacity actuator. In such a case, use a pilot valve having a throttle for OUT1 and OUT2. The throttle is removable. (Refer to Figs.17 and 18 for mounting and dismounting the throttle.)

Table 5 Throttle types

Quite for actuator	Throttling diameter	Part No.	Pilot unit No. having the Throttle shown at left
90cm^3	φ0.7	P36801080	P565010-18
180cm^3	φ1	P36801081	P565010-19

A
A

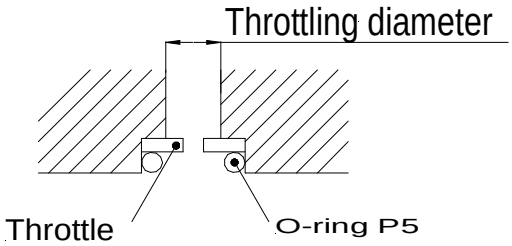


Fig. 17 Throttle mounting

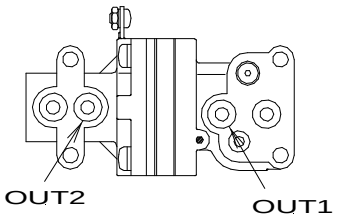


Fig. 18 Pilot valve bottom drawing

(Note 1) When mounting the throttle, pay attention not to let dust and others enter the port hole.
Be sure to mount an O-ring after mounting the throttle.
(Note 2) If the hunching does not stop even after mounting the throttle, use gain suppression spring(A), separately provided.【Part No. P22401123】

11-2 Fork lever type joint (Type IP8100)

Two types of joint, having different attaching sizes for different bracket attaching methods, are available as the fork lever type joint of rotary type IP8100.

Table 6 Type of fork lever type joint

Description	Part No.
Fork lever assembly MX	P368010-36
Fork lever assembly SX	P368010-37

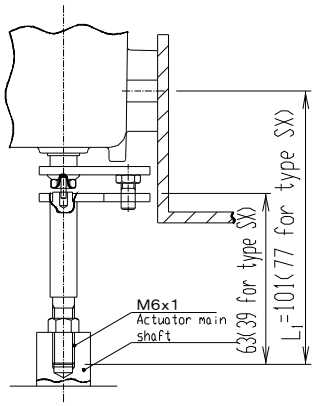


Fig. 19 Example of sude attaching using fork lever assembly MX

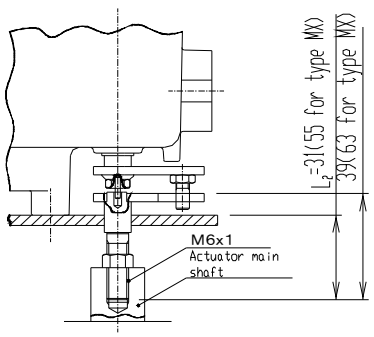


Fig.20 Example of backside attaching using fork lever assembly SX

In the case of side attaching, if you use fork lever assembly MX, it is compatible with our IP610 positioner in the attaching size. Also, in the case of backside attaching, if you use fork lever assembly SX, it is compatible with our IP610 positioner in the attaching size.

11-3 External feedback lever (Type IP8000)

Levers having different stroke sizes are available for the feedback lever of lever type IP8000. Order them to match your valve stroke.

Table 7 Feedback lever types

Stroke	Unit No.
10～85mm(Standard accessory)	P368010-20
35～100mm	P368010-21
50～140mm	P368010-22

11-4 Scale plate unit

Caution

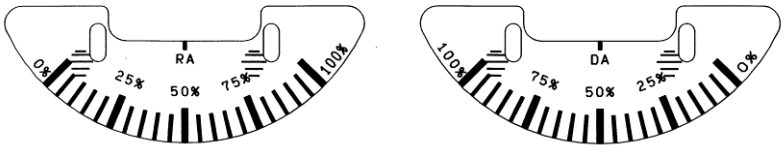
Locate scale plate with care not to make finger pinched between needle and plate.

Adjustment of scale plate

（1）Perform adjustment of zero span in positioner before installing the positioner to either face of DA or RA with consideration of operating direction.（Refer to Fig. 21.）

（2） Stop positioner at intermediate opening of actuator (where input signal of 50% finishes to enter to the positioner) and adjust the position of needle to meet with 50＋% of scale plate. (Refer to Fig.22) If the needle can't be met with 50+% even with adjustment, stop pressure supply once, reposition fork lever type fitting and cam, and readjust zero span.

（3） At the end of start and stop of actuator, confirm needle points 0% and 100% of scale plate respectively. If the needle points others, position the needle by loosening cross recessed hexagon bolt holding scale plate with spanner and sliding the scale plate. (Refer to Figure 23, 24.)



Reverse Normal

Fig.21 Scale plate

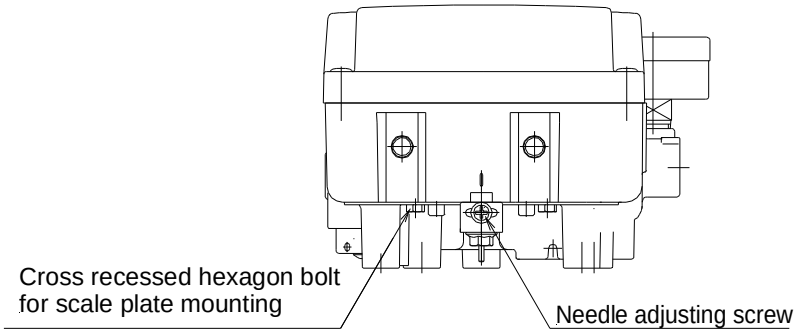


Fig.22 Positioning of needle

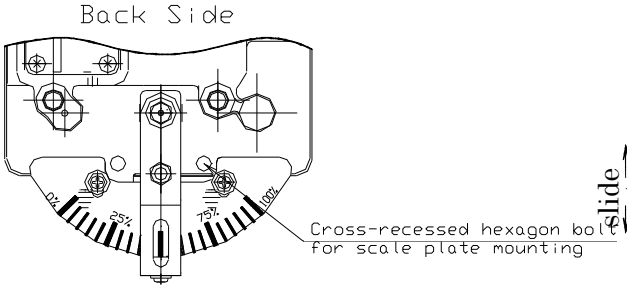


Fig23. Scale plate (Back side)

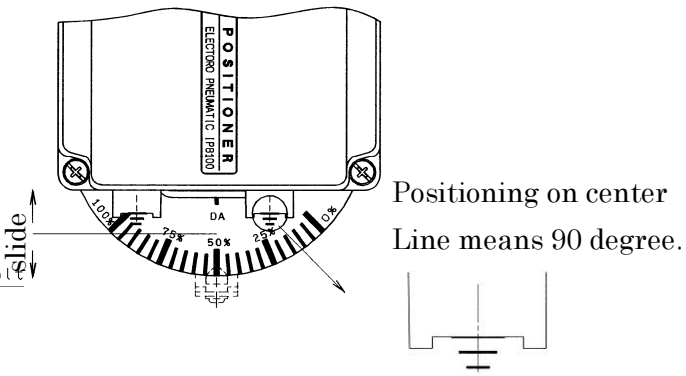
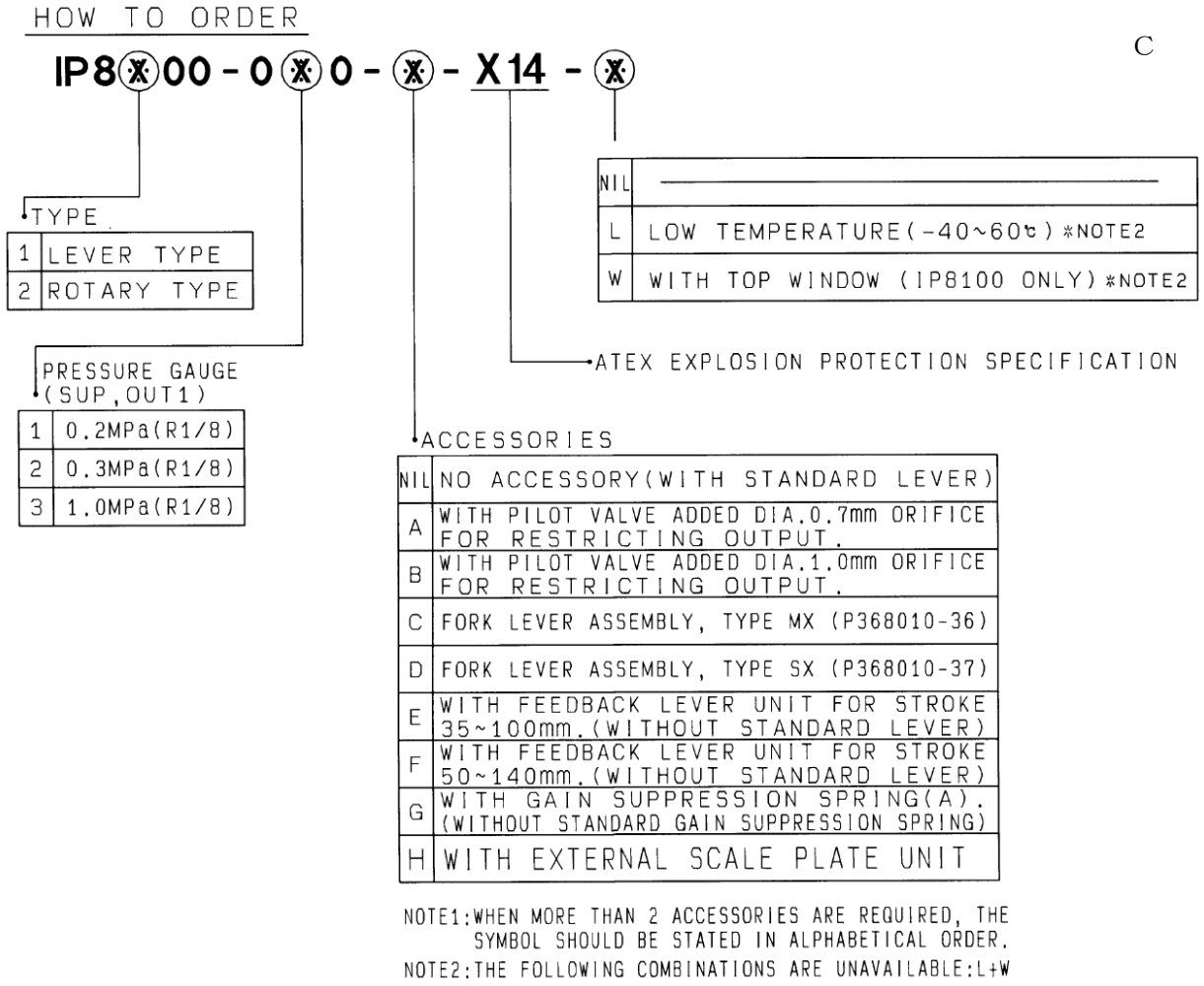


Fig.24 Positioning for Scale plate

12. How to order



CERTIFICATE

(1) EU-Type Examination

(2) **Equipment or protective systems intended for use in potentially explosive atmospheres - Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number: **KEMA 03ATEX1119 X** Issue Number: **7**

(4) Product: **Electro pneumatic positioner model series IP6000-0.0-.-X14**
Electro pneumatic positioner model series IP6100-0.0-.-X14
Electro pneumatic positioner model series IP8000-0.0-.-X14-.
Electro pneumatic positioner model series IP8100-0.0-.-X14-.

(5) Manufacturer: **SMC Corporation**

(6) Address: **4-14-1, Sotokanda, Chiyoda, Tokyo, 101-0021, Japan**

(7) This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) DEKRA Certification B.V., Notified Body number 0344 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential test report number 212804900 Issue 4.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2012 + A11 : 2013 **EN 60079-11 : 2012** **EN 13463-1 : 2009**

except in respect of those requirements listed at item 18 of the Schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

II 2 G Ex ib IIC T5 / T6 Gb

Date of certification: 21 October 2016

DEKRA Certification B.V.

R. Schuller
Certification Manager

PRODUCTS
RvA C 001

DEKRA Certification B.V. Meander 1051, 6825 MJ Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 88 96 83000 F +31 88 96 83100 www.dekra-certification.com Registered Arnhem 09085396

(13) **SCHEDULE**

(14) **to EU-Type Examination Certificate 03ATEX1119 X** Issue No. 7

(15) **Description**

The electro pneumatic positioners model series IP6.00-0.0-.-X14 and model series IP8.00-0.0-.-X14-. serve to operate valves by means of a pneumatic driven actuator, which is controlled by a 4-20 mA signal.

The relation between ambient temperature and temperature class for the different model series is listed in the following table:

Model series	Temp. class T5	Temp. class T6
	Ambient temperature range	Ambient temperature range
IP6000-0.0-.-X14	-20 °C ≤ T_a ≤ +80 °C	-20 °C ≤ T_a ≤ +60 °C
IP6100-0.0-.-X14	-20 °C ≤ T_a ≤ +80 °C	-20 °C ≤ T_a ≤ +60 °C
IP8000-0.0-.-X14	-20 °C ≤ T_a ≤ +80 °C	-20 °C ≤ T_a ≤ +60 °C
IP8100-0.0-.-X14	-20 °C ≤ T_a ≤ +80 °C	-20 °C ≤ T_a ≤ +60 °C
IP8000-0.0-.-X14-L	-40 °C ≤ T_a ≤ +80 °C	-40 °C ≤ T_a ≤ +60 °C
IP8100-0.0-.-X14-L	-40 °C ≤ T_a ≤ +80 °C	-40 °C ≤ T_a ≤ +60 °C
IP8100-0.0-.-X14-W	-20 °C ≤ T_a ≤ +80 °C	-20 °C ≤ T_a ≤ +60 °C

Electrical data

Signal circuit:
In type of explosion protection intrinsic safety Ex ib IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values:
U_i = 28 V; I_i = 125 mA; P_i = 1,2 W; C_i = 0 nF; L_i = 0 mH.

The signal circuit of the positioners of model series IP6.00-0.0-.-X14 shall, from a safety point of view, be considered to be connected to earth.

Installation instructions

The instructions provided with the equipment shall be followed in detail to assure safe operation.

(16) **Report Number**

No. 212804900 Issue 4.

(17) **Specific conditions of use**

Electrostatic charges on the non-metallic or coated parts of possitioners shall be avoided.

(18) **Essential Health and Safety Requirements**

Covered by the standards listed at item (9).

(19) **Test documentation**

As listed in Report No. 212804900 Issue 4.

(13) **SCHEDULE**

(14) **to EU-Type Examination Certificate 03ATEX1119 X** Issue No. **7**

(20) **Certificate history**

Issue 1 -	project no. 202462200	initial certificate
Issue 2 -	project no. 208619700	Evaluation for lower ambient temperature added Added new models
Issue 3 -	project no. 210692300	Evaluation according to updated standards Alternative enclosure with window added
Issue 4 -	project no. 212804900	Evaluation according to updated standards
Issue 5 -	project no. 214731900	Evaluation according to updated standards Alternative safety components added
Issue 6 -	project no. 214731900	Alternative cable gland, connection terminal and encapsulation added Alternative safety components added
Issue 7 -	project no. 219478200	Evaluation according to updated standards Alternative encapsulation added Specific condition of use added

SMC CE Ex

Doc. No. IP80-TF1V258EN

EU DECLARATION OF CONFORMITY

SMC Corporation, 4-14-1 Soto-Kanda, Chiyoda-ku, Tokyo 101-0021 Japan

declares under its sole responsibility, that the following equipment:

Electro Pneumatic Positioner
IP8#00-0#0-#-X14-# series
Batch codes: **2003 onwards and bearing the G mark on the product or packaging**

is in conformity with the relevant Union harmonisation legislation and has been demonstrated to fulfil the requirements with reference to the harmonised or applied standard(s) as listed below:

Directive	Requirements	Harmonised standards
ATEX Directive 2014/34/EU	Essential health and safety requirements set out in Annex II	EN 60079-0: 2012+A11:2013 EN 60079-11: 2012 EN 13463-1: 2009
EMC Directive 2014/30/EU	Essential requirements set out in Annex I	EN 61000-6-3: 2007 EN 55011: 2009 +A1:2010 EN 61000-6-2:2005
RoHS Directive 2011/65/EU	Restriction of substances as set out in Annex II	EN50581:2012

based on the conformity assessment/technical file held by the following notified body:

DEKRA Certification B.V. (0344) **P.O.Box 5185,6802 ED Arnhem,** **The Netherlands**	**EC type Examination Certificate No.:** **DEKRA 03 ATEX 1119X**

Classification: Ex II 2G Ex ib IIC T5 / T6 Gb

SMC CE Ex

Importer/Distributor in EU and EFTA:

Country	Company	Telephone	Address
Austria	SMC Pneumatik GmbH (Austria)	(43) 2262-62280	Girakstrasse 8, AT-2100 Korneuburg
Belgium	SMC Pneumatics N.V./S.A.	(32) 3-355-1464	Nijverheidsstraat 20, B-2160 Wommelgem
Bulgaria	SMC Industrial Automation Bulgaria EOOD	(359) 2 9744492	Business Park Sofia, Building 8-6th Floor, BG-1715 Sofia
Croatia	SMC Industrijska Automatika d.o.o.	(385) 1 370 72 88	Zagrebačka Avenija 104,10 000 Zagreb
Czech Republic	SMC Industrial Automation CZ s.r.o.	(420) 541-424-611	Hudcova 78a CZ-61200 Brno
Denmark	SMC Pneumatik A/S	(45) 70 25 29 00	Egeskovvej 1, DK-8700 Horsens
Estonia	SMC Pneumatics Estonia OÜ	(372) 651-0370	Laki 12, EE-10621 Tallinn
Finland	SMC Pneumatiikka Finland Oy	(358) 207 513 513	PL72, Tiistinniityntie 4, SF-02031 Espoo
France	SMC France	(33) 1-6476-1000	1 Boulevard de Strasbourg, Parc Gustave Eiffel, Bussy Saint Georges, F-77607, Marne La Vallee, Cedex 3
Germany	SMC Deutschland GmbH	(49) 6103-402-0	Boschring 13-15, D-63329 Egelsbach
Greece	SMC Italia Hellas Branch	(30) 210-2717265	Anagenniseos 7-9 - P.C. 14342, Nea Philadelphia, Athens
Hungary	SMC Hungary Ipari Automatizálási Kft.	(36) 23-511-390	Torbágy u. 19, HU-2045 Törökbálint
Ireland	SMC Pneumatics (Ireland) Ltd.	(353) 1-403-9000	2002 Citywest Business Campus, Naas Road, Saggart, Co. Dublin
Italy	SMC Italia S.p.A.	(39) 02-9271-1	Via Garibaldi, 62, I-20061 Carugate, Milano
Latvia	SMC Pneumatics Latvia SIA	(371)781-77-00	Dzelzavas str. 120g, Riga, LV-1021
Lithuania	SMC Pneumatics Lietuva,UAB	(370)5-264-81-26	Oslo g.1, LT-04123 Vilnius
Netherlands	SMC Pneumatics B.V.	(31) 20-531-8888	De Ruyterkade 120, NL-1011 AB Amsterdam
Norway	SMC Pneumatics Norway AS	(47) 67-12-90-20	Vollsveien 13c, Granfoss Næringspark, N-1366 Lysaker
Poland	SMC Industrial Automation Polska Sp. zo.o	(48) 22 211 96 00	ul. Poloneza 89, PL-02-826 Warszawa
Portugal	SMC Sucursal Portugal, S.A.	(351) 945-184 100	Rua De Eng Ferrerira Dias 452 4100-246,Porto
Romania	SMC Romania S.r.l.	(40)21-3205111	Str. Frunzei, Nr.29, Sector 2 Bucharest
Slovakia	SMC Priemyselna Automatizacia, Spol s.r.o.	(421) 41-321321-1	Fantranská 1223, Teplicka nad vahom, 01301
Slovenia	SMC Industrijska Avtomatika d.o.o.	(386) 7388 5412	Mirnska cesta 7, SLO-8210 Trebnje
Spain	SMC España, S.A.	(34) 945-184-100	Zuazobidea 14, 01015 Vitoria
Sweden	SMC Pneumatics Sweden AB	(46) 8-603-12-00	Ekhagsvägen 29-31, SE-14171 Segeltorp
Switzerland	SMC Pneumatik AG	(41) 052-396-3131	Dorfstrasse 7, Postfach 117, CH-8484, Weisslingen
United Kingdom	SMC Pneumatics (U.K.) Ltd.	(44) 1908-563888	Vincent Avenue, Crownhill, Milton Keynes, Bucks MK8 0AN

Tokyo, Date: 22nd July 2017

M. Yahagi

Masaaki Yahagi
Assistant Manager
Product Development Division - IV

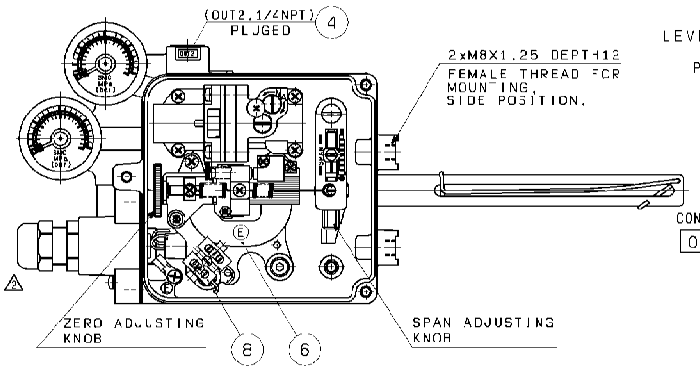
DKP50047-F-058A June 2015

E	IP8000-0*0-*-X14	ON BAD

SPECIFICATIONS

INPUT CURRENT	0~20mADC, 4~20mADC
INPUT RESISTANCE	235±15Ω(4~20mADC)(AT AMBIENT TEMPERATURE20°C)
SUPPLY AIR PRESSURE	0.14~0.7MPa
STANDARD STROKE	10~85mm(ALLOWABLE SWING ANGLE 10°~30°)
SENSITIVITY	WITHIN 0.1% OF FULL SPAN (WITHIN 0.5% OF FULL SPAN)
LINEARITY	WITHIN ±1% OF FULL SPAN (WITHIN ±2% OF FULL SPAN)
HYSTERESIS	WITHIN 0.75% OF FULL SPAN (WITHIN 1% OF FULL SPAN)
REPEATABILITY	WITHIN ±0.5% OF FULL SPAN
TEMPERATURE COEFFICIENT	WITHIN 0.1% F.S./°C
OUTPUT FLOW	80l/min(ANR) OR MORE(AT SUP=0.14MPa)
AIR CONSUMPTION	WITHIN 5l/min(ANR) (AT SUP=0.14MPa)
AMBIENT AND FLUID TEMPERATURE	-20°C~80°C(-5),-20°C~60°C(TS)
EXPLOSION-PROTECTED CONSTRUCTION	CE c344 II2G Ex dIIC T5/T6 Gb ⚠ APPROVED NO. DEKRA 13ATEX 1119X ⚠
CLASSIFICATION OF DEGREE OF PROTECTION	IEC Pub.529 IP65
AIR CONNECTIONS	1/4NPT (FEMALE)
ELECTRICAL CONNECTION	M20x1.5 (FEMALE)
MASS	APPROX. 2.4kg

NOTE1. [ ] SHOWS FIGURES RESULTING FROM THE OPERATION OF DOUBLE ACTING VALVE AND CYLINDER VALVE.
2. (ANR) SHOWS STANDARD AIR. (JIS B 0120)
3. IF 1/2 SPRIT RANGE IS USED, ADD 2% TO THE ABOVE CHARACTERISTICS.



HOW TO ORDER

IP8000- 0 3 0 - X14

- LEVER TYPE
- PRESSURE GAUGE (SUP,OUT1)

0	None
1	0.2MPa
2	0.3MPa
3	1.0MPa

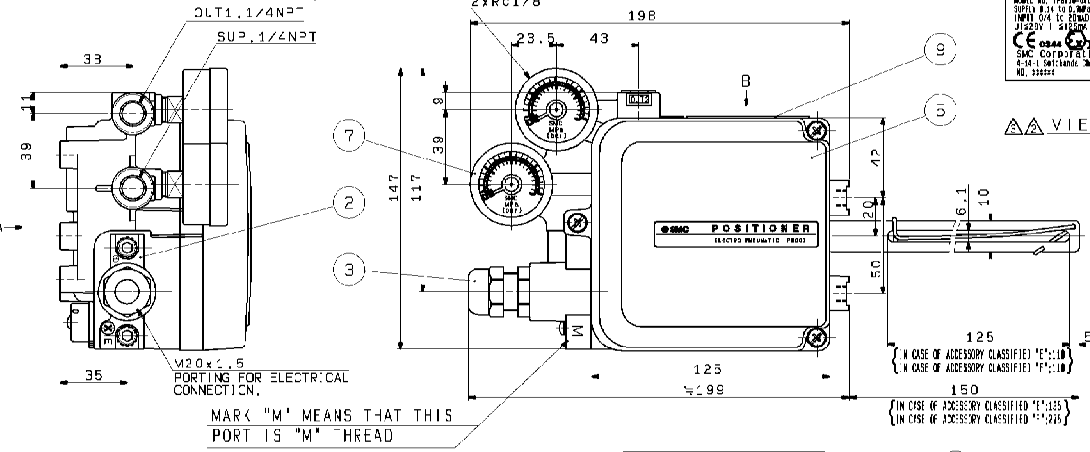
- CONSTRUCTION

0	WITHOUT TERMINAL BOX

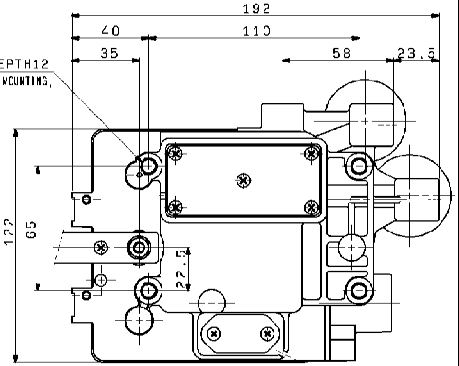
- ACCESSORIES

NIL	NO ACCESSORY(WITH STANDARD LEVER)
A	WITH PILOT VALVE ADDED DIA.0.7mm ORIFICE FOR RESTRICTING OUTPUT.
B	WITH PILOT VALVE ADDED DIA.1.0mm ORIFICE FOR RESTRICTING OUTPUT.
E	WITH FEEDBACK LEVER UNIT FOR STROKE 35~100mm.(WITHOUT STANDARD LEVER)
F	WITH FEEDBACK LEVER UNIT FOR STROKE 50~140mm.(WITHOUT STANDARD LEVER)
G	WITH GAIN SUPPRESSION SPRING(A). (WITHOUT STANDARD GAIN SUPPRESSION SPRING)

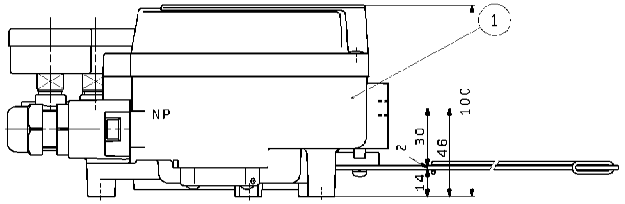
NOTE:WHEN MORE THAN 2 ACCESSORIES ARE REQUIRED, THE SYMBOL SHOULD BE STATED IN ALPHABETICAL ORDER.



⚠⚠ VIEW OF B



VIEW OF A



NOTE

1. TORQUE MOTOR HAS AN INDICATION OF Ⓔ ON IT'S MAGNET.
⚠2. USE EITHER OF THE CABLE GLANDS.

ALL PARTS EXCEPT SPECIFIED ONES ARE SAME AS THOSE OF OUR STANDARD IP8000-0*0-*

ITEM	PART NO	PART NAME	MATERIAL	QTY	REMARKS
9	INI-565-0-24	SPECIFIED ABE(ATEX-STANDARD)	RESIN	1	
Ex 8	P368010-67	TERMINAL UNIT	——	1	
7	G43-*-01-X101	PRESSURE GAUGE	——	2	R1/8(MPa,bar)
Ex 6	P365010-26	TORQUE MOTOR UNIT	——	1	WITH 3 DIODE
5	INI-368-0-96	OPERATION MANUAL SHEET	RESIN	1	INSIDE OF BODY COVER
⚠ 4		PLUG	STEEL	1	1/4NPT
⚠ Ex 3	VG M2C EXI BL DY-9534-1M20	CABLE GLAND	POLYAMIDE NYLON	1	Wainui e' COLOR HARTEC BLUE
2	INI-565-0-15	JOINT	ALUMINIUM ALLOY	1	M20x1.5
1	P365001001-9	BODY	ALUMINIUM ALLOY	1	3x1/4NPT,2xRc1/8

REV NO	CHANGE OF APPROVAL NO.,PLUG	2016-10-13 ,Yamamoto IP80-3NC0317
4	ADDITION OF CABLE GLAND	2014-09-26 ,Yamamoto IP80-3NC0241
3	EEx→Ex	2007-02-02 ,Yamaguchi IP80-3NC0078
2	DESCRIPTION	DATE PREPARED REV NO

DRAWN	A. Ioka	SCALE	FREE
DESIGNED	I. Hamamoto	CWS NAME	ELECTRO-PNEUMATIC POSITIONER
CHECKED	M.Yahagi	CWS NO	C :PB0C0-0*0-*-X14
APPROVED	M.Yahagi	REVISION	3
DATE	2016-10-14		

TOLERANCES JIS B 0405

RANGE(mm)	f	m	c
0.5~6	0.05	0.1	0.2
3~6	0.05	0.1	0.2
6~30	0.1	0.2	0.5
30~120	0.15	0.3	0.8
120~400	0.2	0.5	1.2
400~1000	0.3	0.8	2
1000~2000	0.5	1.2	3

FINISH:表面処理 / PAINT:塗装 / MASS:質量
PACKING:包装区分 / MATERIAL:材質
MATERIAL SIZE:材料寸法

UNLESS OTHERWISE NOTED ALONG WITH A SEPARATE CONTRACT OR AGREEMENT WITHIN THE PRODUCT SPECIFICATIONS,THE SAFETY INSTRUCTIONS SPECIFIED IN THE PRODUCT CATALOG ARE APPLIED. PLEASE CONTACT YOUR LOCAL SMC SALES OFFICE FOR FURTHER DETAILS.

CWS NAME | CWS NO | DWG NO AD10424603 | SMC Corporation

IP8100-0*0-*-X14 C ON 5AC

SPECIFICATIONS

INPUT CURRENT	0~20mADC, 4~20mADC
INPUT RESISTANCE	235±15Ω(4~20mADC(AT AMBIENT TEMPERATURE23°C)
SUPPLY AIR PRESSURE	0.14~0.7MPa
STANDARD STROKE	60°~100° (THE STROKE IS ADJUSTABLE) (IN 0°~60° AND 0°~100°)
SENSITIVITY	WITHIN 0.5% OF FULL SPAN
LINEARITY	WITHIN ±2% OF FULL SPAN
HYSTERESIS	WITHIN 1% OF FULL SPAN
REPEATABILITY	WITNIN ±0.5% OF FULL SPAN
TEMPERATURE COEFFICIENT	WITHIN 0.1% F.S./°C
OUTPUT FLOW	200ℓ/min(ANR) OR MORE(AT SUP=0.4MPa)
AIR CONSUMPTION	WITHIN 11ℓ/min(ANR) (AT SUP=0.4MPa)
AMBIENT AND FLUID TEMPERATURE	-20°C~80°C(T5),-20°C~60°C(T6)
EXPLOSION-PROTECTED	CE 0344 II2G Ex dIICT5/T6 Gb ⚠1
⚠3 CONSTRUCTION	APPROVED No. DEKRA 03ATEX 1119X ⚠2
CLASSIFICATION OF DEGREE OF PROTECTION IEC Pub.529 IP65	
AIR CONNECTIONS	1/4NPT (FEMALE)
ELECTRICAL CONNECTIONS	M20x1.5 (FEMALE)
MASS	APPROX. 2.4kg

NOTE1.(ANR) SHOWS STANDARD AIR. (JIS B 0120)
2.IF 1/2 SPRIT RANGE IS USED, ADD 1% TO THE ABOVE CHARACTERISITCS.

NOTE

1.TORQUE MOTOR HAS AN INDICATION OF Ⓔ ON IT'S MAGNET.
⚠2.USE EITHER OF THE CABLE GLANDS.

HOW TO ORDER

IP8100-030-○-X14

ROTARY TYPE

PRESSURE GAUGE (SUP,OUT1)

0	NONE
1	0.2MPa
2	0.3MPa
3	1.0MPa

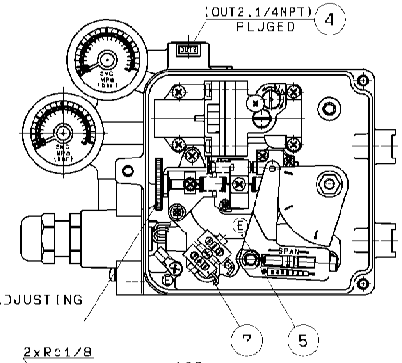
CONSTRUCTION

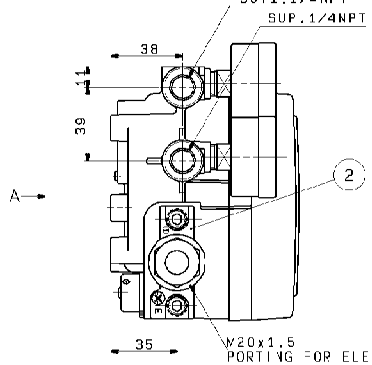
J	WITHOUT TERMINAL BOX

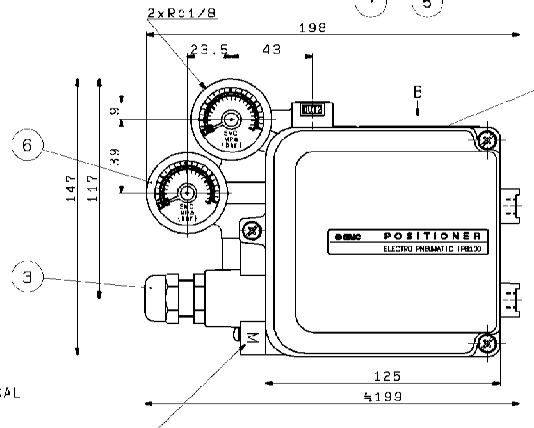
ACCESSORIES

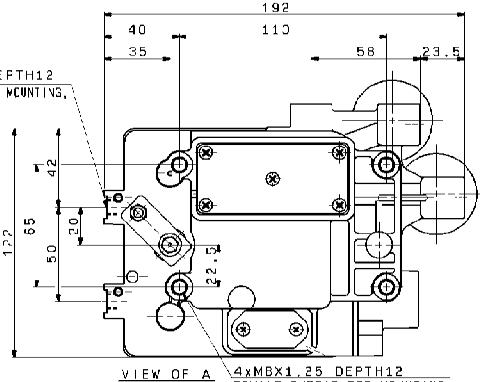
N:NO	ACCESSORY
A	WITH PILOT VALVE ADDED DIA.0.7mm ORIFICE FOR RESTRICTING OUTPUT.
B	WITH PILOT VALVE ADDED DIA.1.0mm ORIFICE FOR RESTRICTING OUTPUT.
C	FORK LEVER ASSEMBLY, TYPE MX(P368010-36)
D	FORK LEVER ASSEMBLY, TYPE SX(P368010-37)
G	WITH GAIN SUPPRESSION SPRING(A) (WITHOUT STANDARD GAIN SUPPRESSION SPRING)
H	WITH external scale plate unit

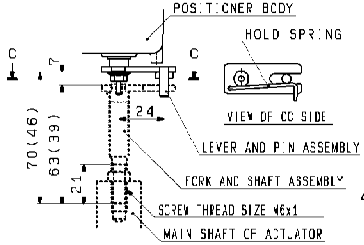
NOTE:WHEN MORE THAN 2 ACCESSORIES ARE REQUIRED, THE SYMBOL SHOULD BE STATED IN ALPHABETICAL ORDER.

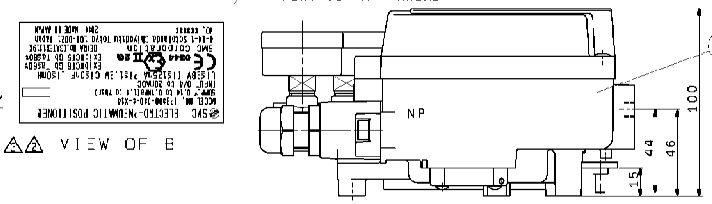












⚠2 VIEW OF B

DIMENSION OF OPTIONAL "FORK LEVER ASSEMBLY"
( ) SHOWS DIMENSION OF FORK LEVER ASSEMBLY TYPE "SX".

ALL PARTS EXCEPT SPECIFIED ONES ARE SAME AS THOSE OF OUR STANDARD IP8100-0*0-*

ITEM	PART NO	PART NAME	MATERIAL	QTY	REMARKS
10	P368010-37	FORK LEVER ASSEMBLY TYPE SX	——	1	FOR ACCESSORIE D
9	P368010-36	FORK LEVER ASSEMBLY TYPE MX	——	1	FOR ACCESSORIE C
8	INI-565-0-24	SPECIFIED LABEL(ATEX-STANDARD)	RESIN	1	
Ex 7	P368010-6*	TERMINAL UNIT	——	1	
6	G43-*-01-X101	PRESSURE GAUGE	——	2	R1/8(NPE,Def)
Ex 5	P565010-26	TORQUE MOTOR UNIT	——	1	WITH 3 DIODE
⚠1 4		PLUG	STEEL	1	1/4NPT
⚠2 Ex 3	VG M20 EXI EL 07-9554-1M2b	CABLE GLAND	POLYAMIDE NYLON	1	Weidmuller BARTEC COLOR BLUE
2	INI-565-0-15	JOINT	ALUMINIUM ALLOY	1	M20x1.5
1	P56501001-10	BODY	ALUMINIUM ALLOY	1	3x1/4NPT,2xRc1/8

REV NO	DESCRIPTION	DATE (PREPARED)	REV NO
3	CHANGE OF APPROVAL NO.,PUG	2015-10-30 I.Yamamoto	IP80-DMC0317
2	ADDITION OF CABLE GLAND	2014-09-26 I.Yamamoto	IP80-DMC0241
1	EEx-Ex	2007-07-02 I.Yamaguchi	IP80-DMC0076

TOLERANCES JIS - B0405			
RANGE(mm)	GRADE f	m	c
0.5≤D≤3	±0.05	±0.1	±0.2
3<D≤6	±0.05	±0.1	±0.2
6<D≤30	±0.1	±0.2	±0.5
30<D≤120	±0.15	±0.3	±0.8
120<D≤400	±0.2	±0.5	±1.2
400<D≤1000	±0.3	±0.8	±2
1000<D≤2000	±0.5	±1.2	±3

DRAWN	A. Oka	FINISH / PAINT / MASS / PACKING / MATERIAL / MATERIAL SIZE
DATE	2016-10-13	
DESIGNED	I.Hamanoto	SCALE FREE
DATE	2016-10-13	THIRD ANGLE
CHECKED		DWG NAME ELECTRO-PNEUVATIC POSITIONER
DATE		
APPROVED	M.Yahagi	DWG NO C IP8100-0*0-*-X14 REVISION 3
DATE	2016-10-14	

MODEL / QTY

UNLESS OTHERWISE NOTED ALONG WITH A SEPARATE CONTRACT OR AGREEMENT WITHIN THE PRODUCT SPECIFICATIONS, THE SAFETY INSTRUCTIONS SPECIFIED IN THE PRODUCT CATALOG ARE APPLIED. PLEASE CONTACT YOUR LOCAL SMC SALES OFFICE FOR FURTHER DETAILS.

FINISH:表面処理 / PAINT:塗装 / MASS:質量
PACKING:包装区分 / MATERIAL:材質
MATERIAL SIZE:材料寸法

VG NO.:

DWG NO.

DWG ID AD10425303 SMC Corporation

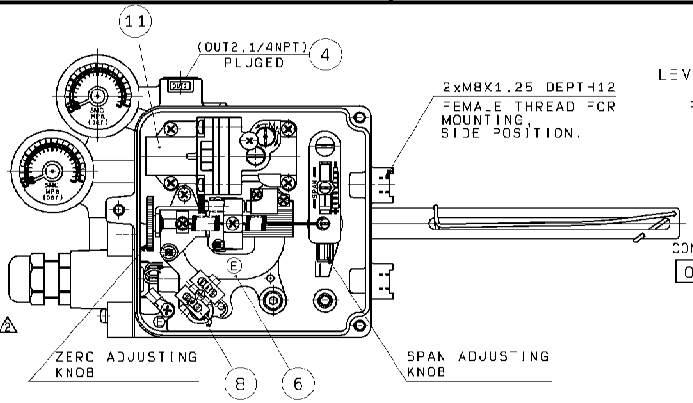
A2-VC6

IP8000-C*0-x-X14-L ① ON SMC

SPECIFICATIONS

INPUT CURRENT	0~20mADC, 4~20mADC
INPUT RESISTANCE	235±15Ω(4~20mADC)(AT AMBIENT TEMPERATURE20°C)
SUPPLY AIR PRESSURE	0.14~0.7MPa
STANDARD STROKE	10~85mm(ALLOWABLE SWING ANGLE 10°~30°)
SENSITIVITY	WITHIN 0.1% OF FULL SPAN (WITHIN 0.5% OF FULL SPAN)
LINEARITY	WITHIN ±1% OF FULL SPAN (WITHIN ±2% OF FULL SPAN)
HYSTERESIS	WITHIN 0.75% OF FULL SPAN (WITHIN 1% OF FULL SPAN)
REPEATABILITY	WITHIN ±0.5% OF FULL SPAN
TEMPERATURE COEFFICIENT	WITHIN 0.2% F.S./°C
OUTPUT FLOW	80l/min(ANR) OR MORE(AT SUP=0.14MPa)
AIR CONSUMPTION	WITHIN 5l/min(ANR) (AT SUP=0.14MPa)
AMBIENT AND FLUID TEMPERATURE	-4°C~60°C
⚠ EXPLOSION-PROTECTED CONSTRUCTION	CE 0344 II2G Ex ib IIC T6 Gb ⚠ APPROVED NO. DEKRA 03ATEX 1119X ⚠
CLASSIFICATION OF DEGREE OF PROTECTION	IEC PUB.529 IP65
AIR CONNECTIONS	1/4NPT (FEMALE)
ELECTRICAL CONNECTION	M20x1.5 (FEMALE)
MASS	APPROX. 2.4kg

NOTE1. 1) SHOWS FIGURES RESULTING FROM THE OPERATION OF DOUBLE ACTING VALVE AND CYLINDER VALVE.
2.(ANR) SHOWS STANDARD AIR. (JIS B 0120)
3.IF 1/2 SPRIT RANGE IS USED, ADD 1% TO THE ABOVE CHARACTERISTICS.



HOW TO ORDER

IP8000- 0 ③ 0 -○- X14 - L

LEVER TYPE

PRESSURE GAUGE (SUP,OUT1)

0	NONE
1	0.2MPa
2	0.3MPa
3	1.0MPa

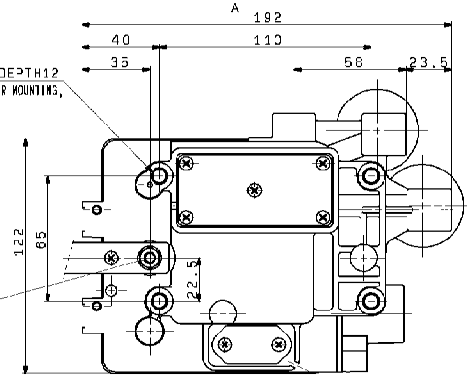
CONSTRUCTION

0	WITHOUT TERMINAL BOX

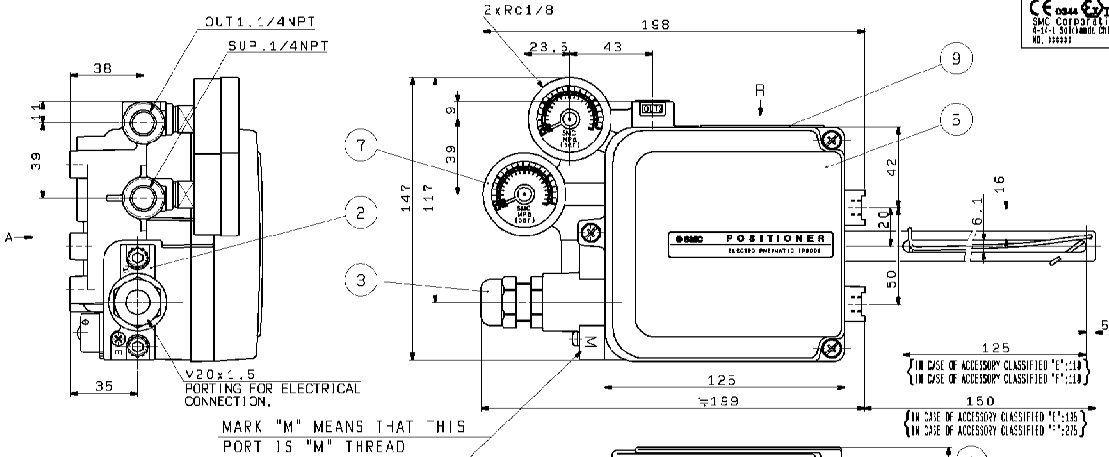
ACCESSORIES

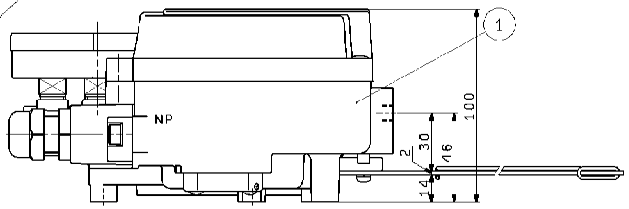
NIL	NO ACCESSORY(WITH STANDARD LEVER)
A	WITH PILOT VALVE ADDED DIA.0.7mm ORIFICE FOR RESTRICTING OUTPUT.
B	WITH PILOT VALVE ADDED DIA.1.0mm ORIFICE FOR RESTRICTING OUTPUT.
E	WITH FEEDBACK LEVER UNIT FOR STROKE 35~100mm.(WITHOUT STANDARD LEVER)
F	WITH FEEDBACK LEVER UNIT FOR STROKE 50~240mm.(WITHOUT STANDARD LEVER)
G	WITH GAIN SUPPRESSION SPRING(A). (WITHOUT STANDARD GAIN SUPPRESSION SPRING)

NOTE:WHEN MORE THAN 2 ACCESSORIES ARE REQUIRED, THE SYMBOL SHOULD BE STATED IN ALPHABETICAL ORDER.



⚠⚠B





NOTE.1.TORQUE MOTOR HAS AN INDICATION OF Ⓔ ON IT'S MAGNET.
2.CUT2 PORT (1/4NPT) ARE PLUGED.
⚠ 3.USE EITHER OF THE CABLE GLANDS.

ALL PARTS EXCEPT SPECIFIED ONES ARE SAME AS THOSE OF OUR STANDARD IP800C-0*0-*

ITEM	PART NO	PART NAME	MATERIAL	QTY	REMARKS
11	P565010-48	PILOT VALVE UNIT	——	1	
10	P565010-46	FEED BACK SHAFT ASSEMBLY	——	1	
9	INI-565-0-41	SPECIFIED LABEL(ATEX-STANDARD)	RESIN	1	
Ⓔx 8	P368010-67	TERMINAL UNIT	——	1	
7	C43-*-01-X101	PRESSURE GAUGE	——	2	R1/8(MPa,bar)
Ⓔx 6	P565010-49	TORQUE MOTOR UNIT	——	1	WITH 3 DIODE
5	INI-363-0-96	OPERATION MANUAL SHEET	RESIN	1	INSIDE OF BODY COVER
⚠ 4		PLUG	STEEL	1	1/4NPT
⚠ Ⓔx 3	YG M20 EXI BL	CABLE GLAND	POLYAMIDE	1	Weidmuller COLOR
	03-6085-0067				BARTEC BLUE
2	P565010-52	TERMINAL JOINT UNIT	ALUMINIUM ALLOY	1	M20x1.5
1	P565010-50	BODY UNIT	——	1	3x1/4NPT,2xRC1/8

REV.NO	DESCRIPTION	DATE	PREPARED	REV NO
3	CHANGE OF APPROVAL NO. PLUG	2016-10-13	H.Yamamoto	IP8D-DM00317
2	ADDITION OF CABLE GLAND	2014-08-26	H.Yamamoto	IP8D-DM00241
1	EEx→Ex	2012-07-02	H.Yamamoto	IP8D-DM00076

FINISH / PAINT / MASS / PACKING / MATERIAL

MODEL IP8

TOLERANCES JIS B 0405				
RANGE(mm)	GRADE f	m	c	
0.5≤D≤3	±0.05	±0.1	±0.3	
3<D≤6	±0.05	±0.1	±0.3	
6<D≤30	±0.1	±0.2	±0.5	
30<D≤120	±0.15	±0.3	±0.8	
120<D≤400	±0.2	±0.5	±1.2	
400<D≤1000	±0.3	±0.8	±2	
1000<D≤2000	±0.5	±1.2	±3	

DRAWN	DATE	A.Iioka 2016-10-13
DESIGNED	DATE	H.Yamamoto 2016-10-13
CHECKED	DATE	
APPROVED	DATE	M.Yahagi 2016-10-14

SCALE FREE

THIRD ANGLE

DWG NAME ELECTRO-PNEUMATIC POSITIONER

DWG NO C IP8000-0*0-*-X14-L REV.S104 3

UNLESS OTHERWISE NOTED ALONG WITH A SEPARATE CONTRACT OR AGREEMENT WITHIN THE PRODUCT SPECIFICATIONS,THE SAFETY INSTRUCTIONS SPECIFIED IN THE PRODUCT CATALOG ARE APPLIED. PLEASE CONTACT YOUR LOCAL SMC SALES OFFICE FOR FURTHER DETAILS.

FINISH:表面処理 / PAINT:塗装 / MASS:質量
PACKING:包装区分 / MATERIAL:材質
MATERIAL SIZE:材料寸法

DWG NAME | DWG REC | DWG ID AD50096503 | SMC Corporation

A2-V06

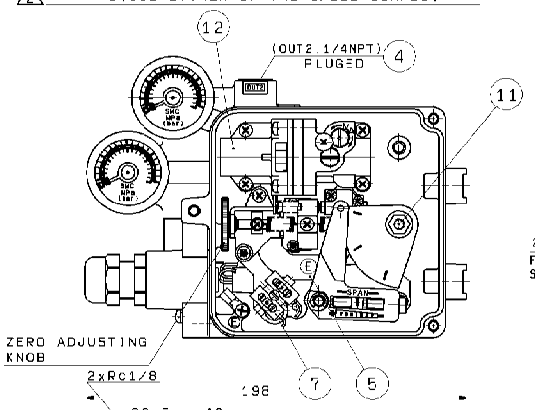
IP8100-0*3-*-X14-L ① ON SMC

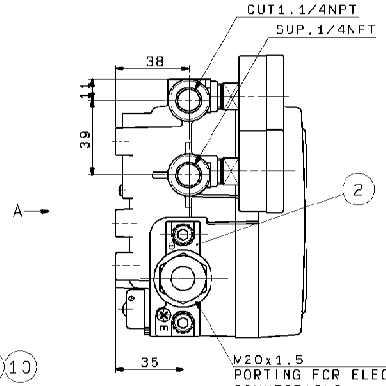
SPECIFICATIONS

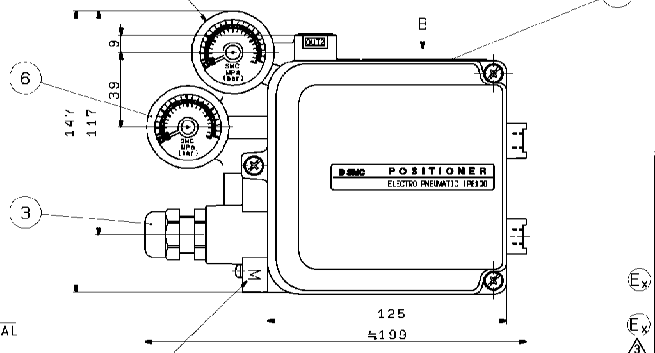
INPUT CURRENT	0~20mADC, 4~20mADC
INPUT RESISTANCE	235±15Ω(4~20mADC)(AT AMBIENT TEMPERATURE20°C)
SUPPLY AIR PRESSURE	0.14~0.7MPa
STANDARD STROKE	60°~100° (THE STROKE IS ADJUSTABLE) (IN 0°~60° AND 5°~100°)
SENSITIVITY	WITHIN 0.5% OF FULL SPAN
LINEARITY	WITHIN ±2% OF FULL SPAN
HYSTERESIS	WITHIN 1% OF FULL SPAN
REPEATABILITY	WITHIN ±0.5% OF FULL SPAN
TEMPERATURE COEFFICIENT	WITHIN 0.1% F.S./°C
OUTPUT FLOW	20l/min(ANR) OR MORE(AT SUP=0.4MPa)
AIR CONSUMPTION	WITHIN 1.2l/min(ANR) (AT SUP=0.4MPa)
AMBIENT AND FLUID TEMPERATURE	-40°C~60°C
EXPLOSION-PROTECTED	CE 0344 II2G Ex bIICT6 (X) ⚠
⚠ CONSTRUCTION	APPROVED NO. DEKRA 03ATEX 1119X ⚠
CLASSIFICATION OF DEGREE OF PROTECTION	IEC Pub.529 IP65
AIR CONNECTIONS	1/4NPT (FEMALE)
ELECTRICAL CONNECTIONS	M20x1.5 (FEMALE)
MASS	APPROX. 2.4kg

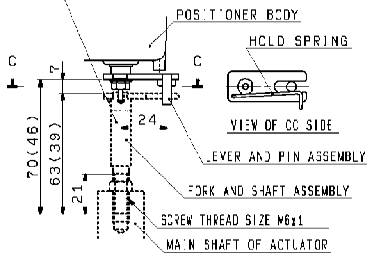
NOTE1.(ANR) SHOWS STANDARD AIR. (JIS B 0120)
2.IF 1/2 SPRIT RANGE IS USED, ADD 1% TO THE ABOVE CHARACTERISITCS.

NOTE.1.TORQUE MOTOR HAS AN INDICATION OF Ⓔ ON IT'S MAGNET.
2.OUT2 PORT (1/4NPT) ARE PLUGED.
⚠2 3.USE EITHER OF THE CABLE GLANDS.



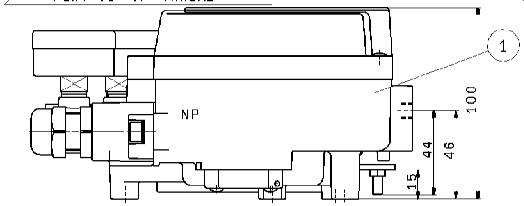






DIMENSION OF OPTIONAL "FORK LEVER ASSEMBLY"
( ) SHOWS DIMENSION OF FORK LEVER ASSEMBLY TYPE "SX".

⚠⚠B



UNLESS OTHERWISE NOTED ALONG WITH A SEPARATE CONTRACT OR AGREEMENT WITHIN THE PRODUCT SPECIFICATIONS, THE SAFETY INSTRUCTIONS SPECIFIED IN THE PRODUCT CATALOG ARE APPLIED. PLEASE CONTACT YOUR LOCAL SMC SALES OFFICE FOR FURTHER DETAILS.

HOW TO ORDER

IP8100- 0③⓪-○- X14 - L

ROTARY TYPE
PRESSURE GAUGE (SUP,OUT1)

C	None
1	0.2MPa
2	0.3MPa
3	1.0MPa

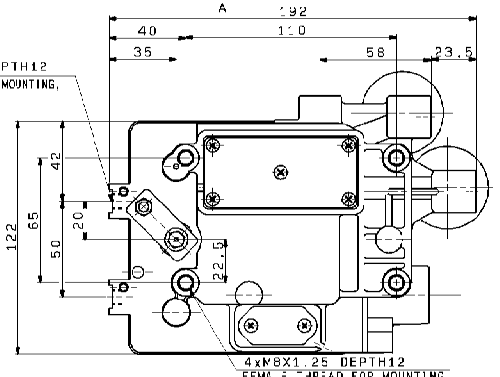
CONSTRUCTION

C	WITHOUT TERMINAL BOX

ACCESSORIES

NIL	NO ACCESSORY
A	WITH PILOT VALVE ADDED O.A.0.7mm ORIFICE FOR RESTRICTING OUTPUT.
B	WITH PILOT VALVE ADDED O.A.1.0mm ORIFICE FOR RESTRICTING OUTPUT.
C	FORK LEVER ASSEMBLY, TYPE MX(P368010-36)
D	FORK LEVER ASSEMBLY, TYPE SX(P368010-37)
G	WITH GAIN SUPPRESSION SPRING(A). (WITHOUT STANDARD GAIN SUPPRESSION SPRING)
H	WITH external scale plate unit

NOTE:WHEN MORE THAN 2 ACCESSORIES ARE REQUIRED, THE SYMBOL SHOULD BE STATED IN ALPHABETICAL ORDER.



ALL PARTS EXCEPT SPECIFIED ONES ARE SAME AS THOSE OF OUR STANDARD IP8100-0*0-*

ITEM	PART NO	PART NAME	MATERIAL	QTY	REMARKS
12	P565010-48	PILOT VALVE UNIT	——	1	
11	P565010-47	FEED BACK SHAFT ASSEMBLY	——	1	
10	P368010-37	FORK LEVER ASSEMBLY TYPE SX	——	1	FOR ACCESSORIE D
9	P368010-36	FORK LEVER ASSEMBLY TYPE MX	——	1	FOR ACCESSORIE C
8	IN1-565-0-41	SPECIFIED LABEL(ATEX STANDARD)	RESIN	1	
Ex 7	P368010-67	TERMINAL UNIT	——	1	
6	G43-*-01-X101	PRESSURE GAUGE	——	2	R1/8(MPa,bar)
Ex 5	P565010-49	TORQUE MOTOR UNIT	——	1	WITH 3 DIODE
⚠1 4		PLUG	STEEL	1	1/4NPT
⚠2 3	VC M20 EXI BL 03-6065-0367	CABLE GLAND	POLYAMIDE	1	Weidmuller COLOR BARTEC BLUE
Ex 2	P565010-52	TERMINAL JOINT UNIT	ALUMINIUM ALLOY	1	M20x1.5
1	P565010-51	BODY UNIT	——	1	3x1/4NPT,2xRc1/8

REV	DESCRIPTION	DATE PREPARED	REV NO
⚠3	CHANGE OF APPROVAL NO.,PLUG	2016-10-13 .Hamamoto	IPB0-DW0033*
⚠2 4	ADDITION OF CABLE GLAND	2014-01-28 .Hamamoto	IPB0-DWCC24L
⚠1 1	EEx→Ex	2007-03-02 1.Yamamoto	IPB0-DWDDCTE

TOLERANCES JIS B 0405

RANGE(mm)	GRADE m	GRADE f	GRADE c
0.5≤D≤3	0.05	0.1	0.2
3<D≤6	0.05	0.1	0.3
6<D≤30	0.1	0.2	0.5
30<D≤120	0.15	0.3	0.8
120<D≤400	0.2	0.5	1.2
400<D≤1000	0.3	0.8	2
1000<D≤2000	0.5	1.2	3

DRAWN A.Iioka DATE 2016-10-13
DESIGNED I.Hamamoto DATE 2016-10-13
CHECKED DATE
APPROVED M.Yahagi DATE 2016-10-14

FINISH / PAINT / MASS / PACKING / MATERIAL / MATERIAL SIZE

SCALE FREE

THIRD ANGLE

MODEL QTY

DWG NAME ELECTRO-PNEUMATIC POSITIONER

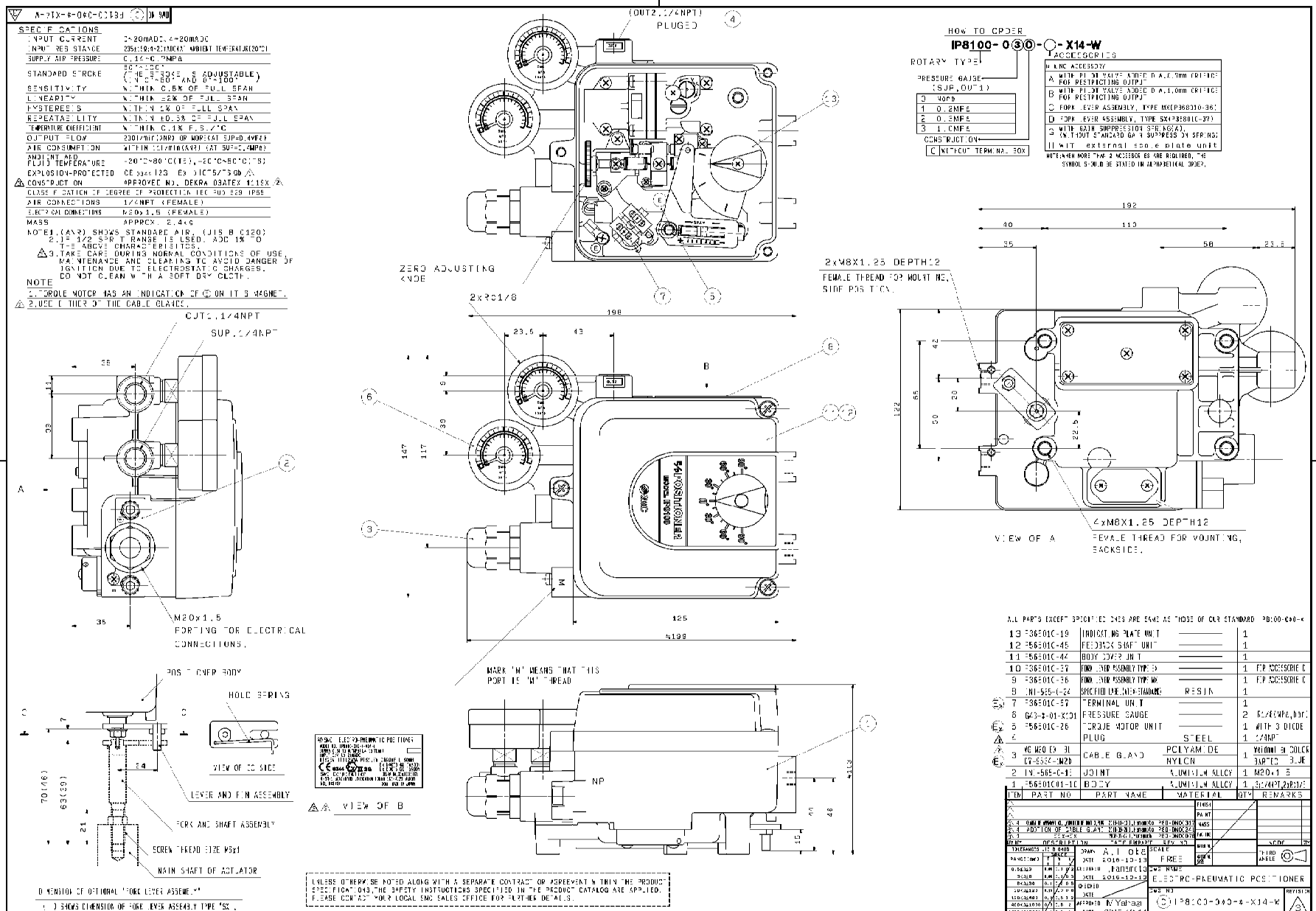
DWG NO ③IP8100-0*0-* X14 L

REVISION ③

DWG NAME | DWG REC | DWG ID AD5C096703 | SMC Corporation

FINISH:表面処理 / PAINT:塗装 / MASS:質量
PACKING:包装区分 / MATERIAL:材質
MATERIAL SIZE:材料寸法

A2-VDE


SPECIFICATIONS
INPUT CURRENT 4-20mADC, 4-20mADC
INPUT RESISTANCE 250±10Ω(4-20mADC) AMBIENT TEMPERATURE20°C
SUPPLY AIR PRESSURE 0.14~0.7MPa
STANDARD STROKE 90°±10°
SENSITIVITY WITHIN 0.5% OF FULL SPAN
LINEARITY WITHIN ±2% OF FULL SPAN
HYSTERESIS WITHIN 1% OF FULL SPAN
REPEATABILITY WITHIN ±0.5% OF FULL SPAN
TEMPERATURE COEFFICIENT WITHIN 0.1% F.S./°C
OUTPUT FLOW 200l/min(ANR) OR MORE(AT SUP=0.4MPa)
AIR CONSUMPTION WITHIN 12l/min(ANR) (AT SUP=0.4MPa)
AMBIENT AND FLUID TEMPERATURE -20°C~80°C(-4°F~176°F)
EXPLOSION-PROTECTED CONSTRUCTION
CLASSIFICATION OF DEGREE OF PROTECTION IEC 60529 IP68
AIR CONNECTIONS 1/4NPT (FEMALE)
ELECTRICAL CONNECTIONS M20x1.5 (FEMALE)
MASS APPROX. 2.4kg
NOTE
1. (ANR) SHOWS STANDARD AIR. (JIS B 8120)
2. 1/2 SPRING RANGE IS USED. ADJUSTED TO THE ABOVE CHARACTERISTICS.
3. TAKE CARE DURING NORMAL CONDITIONS OF USE, MAINTENANCE AND CLEANING TO AVOID DANGER OF IGNITION DUE TO ELECTROSTATIC CHARGES. DO NOT CLEAN WITH A SOFT DRY CLOTH.
NOTE
1. SOLENOID MOTOR HAS AN INDICATOR OF ON IT'S MAGNET.
2. USE EITHER OF THE CABLE GLANDS.
HOW TO ORDER
IP8100-0③0-○-X14-W
ROTARY TYPE
PRESSURE GAUGE (SUP, OUT)
0 NONE
1 0.2MPa
2 0.5MPa
3 1.0MPa
CONSTRUCTION
C WITHOUT TERMINAL BOX
ACCESSORIES
W WITH ACCESSORY
A WITH PILOT VALVE (NOZZLE Ø A.7mm ORIFICE FOR RESTRICTING OUTPUT)
B WITH PILOT VALVE (NOZZLE Ø A.1.0mm ORIFICE FOR RESTRICTING OUTPUT)
C FORK LEVER ASSEMBLY, TYPE MX(P368310-36)
D FORK LEVER ASSEMBLY, TYPE SX(P368010C-37)
S WITH GAIN SUPPRESSION SPRING(GA), (WITHOUT STANDARD GAIN SUPPRESSION SPRING)
N WITHOUT external scale plate unit
NOTE: WHEN MORE THAN 2 ACCESSORIES ARE REQUIRED, THE SYMBOL SHOULD BE STATED IN ALPHABETICAL ORDER.
(OUT2, 1/4NPT) PLUGED
ZERO ADJUSTING KNOB
2xR21/8
CUT2, 1/4NPT
SUP, 1/4NPT
M20x1.5 FORMING FOR ELECTRICAL CONNECTIONS.
POS'T CVER BODY
HOLD SPRING
VIEW OF D SIDE
LEVER AND PIN ASSEMBLY
FORK AND SHAFT ASSEMBLY
SCREW THREAD SIZE M3x1
MAIN SHAFT OF ACTUATOR
DIMENSION OF OPTIONAL "FORK LEVER ASSEMBLY"
( ) SHOWS DIMENSION OF FORK LEVER ASSEMBLY TYPE "SX".
MARK "M" MEANS THAT THIS PORT IS "M" THREAD
VIEW OF B
2xM8X1.25 DEPTH12
FEMALE THREAD FOR MOUNTING, SIDE POSITION.
VIEW OF A
4xM8X1.25 DEPTH12
FEMALE THREAD FOR MOUNTING, BACKSIDE.
ALL PARTS EXCEPT SPECIFIED ONES ARE SAME AS THOSE OF OUR STANDARD IP8100-C00-X
13 P368010C-19 INDICATING PLATE UNIT 1
12 P368010C-45 FEEDBACK SHAFT UNIT 1
11 P368010C-44 BODY COVER UNIT 1
10 P368010C-32 FORK LEVER ASSEMBLY TYPE M 1 FOR ACCESSORIE C
9 P368010C-36 FORK LEVER ASSEMBLY TYPE MA 1 FOR ACCESSORIE C
8 IN-565-C-24 SPECIFIED USE, NON-STANDARD RESIN 1
7 P368010C-87 TERMINAL UNIT 1
6 GW3-8-01-X201 PRESSURE GAUGE 2 R1/8(1MPa,bar)
5 P368010C-26 TORQUE MOTOR UNIT 1 WITH 3 DIODE
4 PLUG STEEL 1 1/4NPT
3 VC M20 EX 3L CV-0552-M20 CABLE GLAND POLYAMIDE NYLON 1 Yellowish SOLDERED BLUE
2 IN-565-C-18 JOINT ALUMINUM ALLOY 1 M20x1.5
1 P368010C01-10 BODY ALUMINUM ALLOY 1 R(1/4NPT,2xR3/8)
ITM PART NO. PART NAME MATERIAL QTY REMARKS
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DRAWN A.I OKE 2016-12-13
CHECKED T.ANSHICHO 2016-12-13
APPROVED M.Yahagi 2016-12-14
SCALE FREE
DWG NAME ELECTRIC-PNEUMATIC POSITIONER
DWG NO IP8100-0X0-X-X14-W
DWG NO BA05642103
SMC Corporation
A1-V06

Revision history		
A	'04.06.24	P368010-28,29→ P565010-18,19
B	'04.11.09	Add the ATEX certificate
C	'08.07.31	EEx→Ex, Addition. Add the "-L,-W"
D	'18.3.7	Change of "Approval No."

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