



# PEY/PEX SERIES

*Instruction Manual*



**Max-Air** Technology Inc.

751 Hoff Road - O'Fallon, Missouri 63366 U.S.A.  
[www.max-airtechnology.com](http://www.max-airtechnology.com) [info@max-airtechnology.com](mailto:info@max-airtechnology.com)

## Electro-Pneumatic Positioner PEY & PEX Series Instruction Manual

This instruction manual is for parts **PEY01/PEX01** Electro-Pneumatic Positioner, 4-20mA, with Universal Mounting and Gages, **PEY02/PEX02** Electro-Pneumatic Positioner with Internal LS, Universal Mounting and Gages, **PEY03/PEX03** Electro-Pneumatic Positioner with Internal PTM, Universal Mounting and Gages, and **PEY04/PEX04** Electro-Pneumatic Positioner with Internal LS & PTM, Universal Mounting and Gages.

### CONTENTS

1. General Information.....	2
2. Features.....	2
3. Specifications.....	2
4. Structure.....	3
5. Principle of Operation .....	3
6. Block Diagram.....	4
7. Installation	
7.1 Example of Attaching to Actuator.....	4
7.2 Connection with Feedback Shaft .....	4
7.3 Cam Attaching Procedure .....	5
7.4 Attaching Procedure of Opening Degree Indication Plate.....	5
8. Air Piping Connection .....	6
9. Electrical Wiring .....	6
10. Adjustment	
10.1 Zero Adjustment.....	7
10.2 Span Adjustment.....	7
10.3 Auto/Manual Switch .....	7
10.4 Seat Adjusters .....	8
11. Maintenance and Check .....	8
12. Caution and Handling .....	9
13. Troubleshooting .....	9
14. Options	
14.1 Pilot Valve with Output Orifice.....	10
14.2 Feedback Lever Type .....	10
15. Dimensions .....	11
16. Wiring	
16.1 PEY01/PEX01 Wiring Diagram.....	11
16.2 PEY02/PEX02 Wiring Diagram.....	12
16.3 PEY03/PEX03 Wiring Diagram.....	12
16.4 PEY04/PEX04 Wiring Diagram.....	13

## 1. GENERAL INFORMATION

The PEY/PEX electro-pneumatic positioner is used for rotary operation of pneumatic rotary valve actuators by means of an electrical controller or control system with an analog output signal of 4 to 20 mA or split ranges.

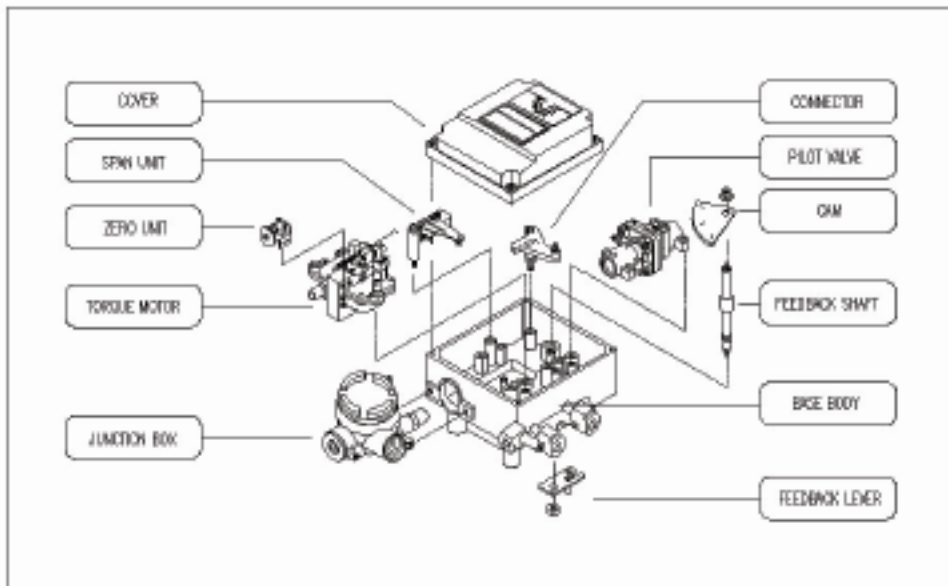
## 2. FEATURES

- No resonance in the range of 5~200Hz.
- Performs ½ Split Control without any other substitutes.
- Easy to adjust zero and span.
- Easy to convert from Reverse Action to Direct Action or vice versa.
- Easy Feedback Connection.
- Fast and accurate response.
- Low air consumption.
- Easy to protect from hunting effect by using output orifice in actuators of small size.
- Designed as a block build structure for maintenance and repair.

## 3. SPECIFICATIONS

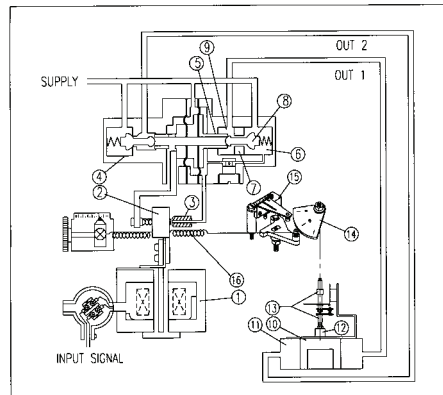
Item • Type	Single Acting	Double Acting
Input Signal	4 ~ 20mA DC	
Impedance	250 ± 15 Ω	
Supply Pressure	0.14 ~ 0.7 Mpa	
Stroke	0 ~ 90 °	
Air connection	PT (NPT) ¼	
Gauge Connection	PT (NPT) 1/8	
Conduit	PF ½	
Explosion Proof	ExialIBT6, ExdmIIBT6, ExdmICT6	
Degree of Protection	IP66	
Ambient Temperature	-20℃ ~ 70℃ (-4℉ ~ 158℉)	
Linearity	±2% F.S.	
Hysteresis	1% F.S.	
Sensitivity	±0.5% F.S.	
Repeatability	±0.5% F.S.	
Air Consumption	5 LPM (Sup. = 0.14 Mpa)	
Flow Capacity	80 LPM (Sup. = 0.14 Mpa)	
Material	Aluminum Diecasting	
Weight	Approx 2.8kg with junction box	

## 4. STRUCTURE

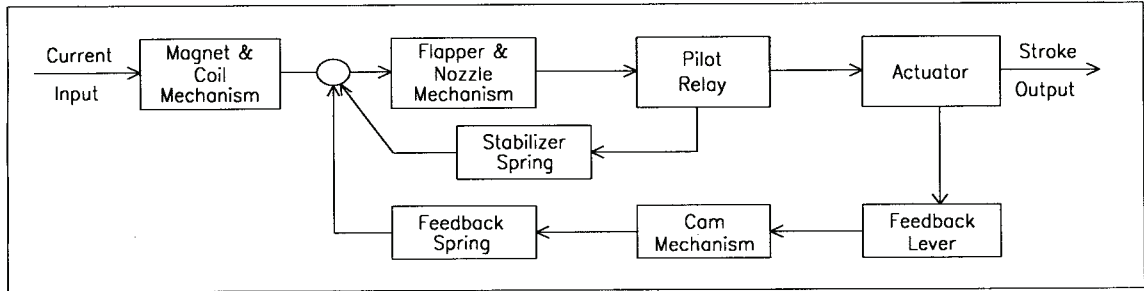


## 5. PRINCIPLE OF OPERATION

Increase the input current signal to change the lift position of the valve. The force exerted by the (1) Torque Motor reduces Nozzle Back Pressure with an increase in the gap between the (2) Flapper and (3) Nozzle. Then, the (5) Spool moves upward and the (7) Seat opens simultaneously. Air pressure of the OUT1 pipe is discharged to the (10) Actuator. As pressure in the actuator chamber goes up, the (12) Actuator stem starts to rotate. The movement of the (12) Actuator stem exerts force to the (a) Feedback Spring through Feedback Shaft connections. Then the (10) Actuator stops when the force exerted by the input current signal equals that of the feedback spring.

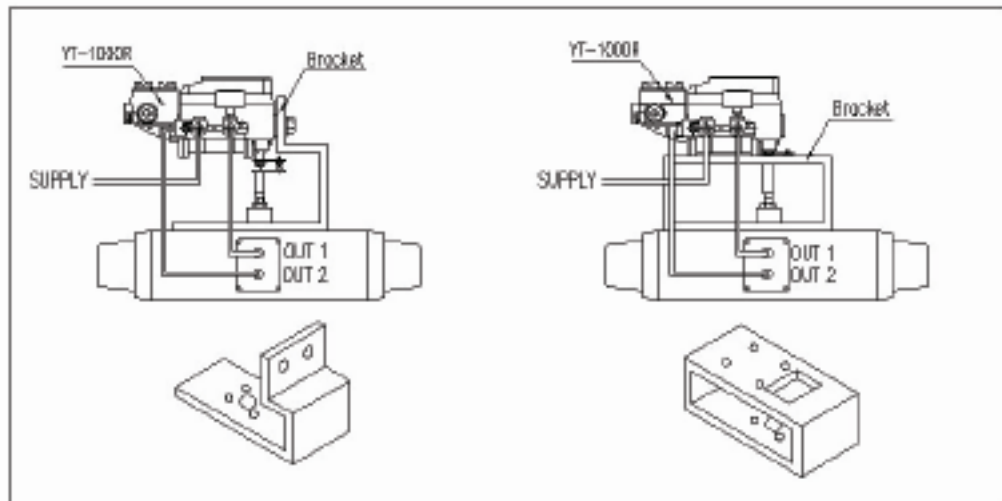


## 6. BLOCK DIAGRAM OF PEY/PEX SERIES



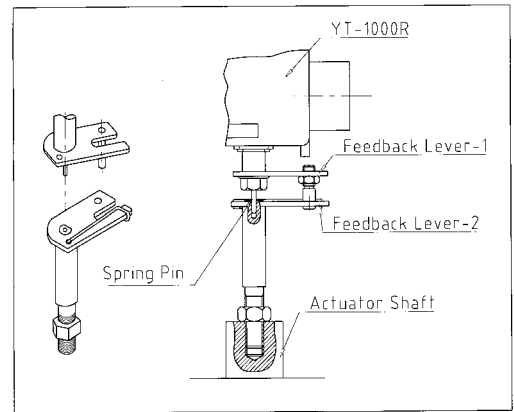
## 7. INSTALLATION

### 7.1 Example of Attaching to Actuator

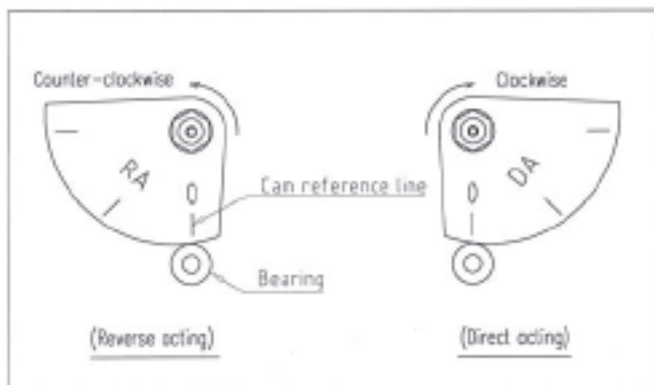


### 7.2 Connection With Feedback Shaft

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



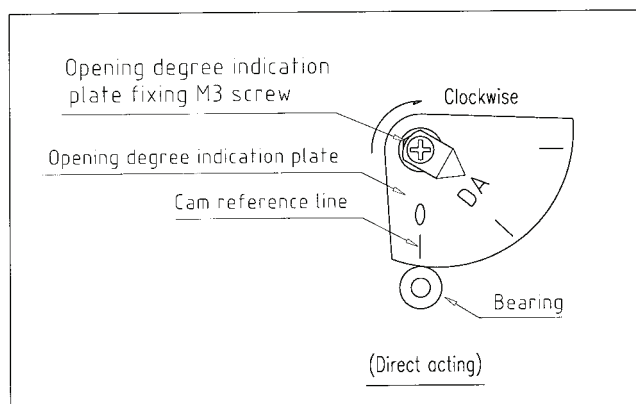
### 7.3 Cam Attaching Procedure



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

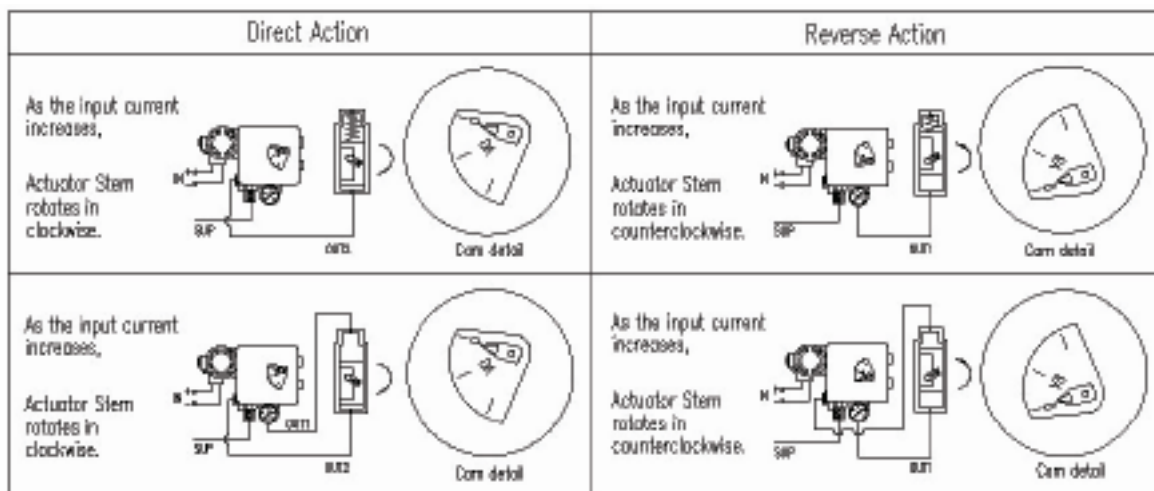
- 2 Attach the cam by first loosening the hexagonal nut with the flange, setting the using actuator to the starting position and then setting the cam reference line and the bearing contact point of the span adjusting arm unit to the matching position.
- 3 Do not apply the supply pressure when attaching the cam, as otherwise it is very dangerous.
- 4 When the positioner is shipped out of 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 (20~25 kgfcm).

### 7.4 Attaching Procedure of Opening Degree Indication Plate



Lock the cam and then adjust the zero point and span. Then fix the opening degree indication plate to the shaft using the M3 screw provided. At the time, set the opening degree indication plate to the state of attaching reference line.

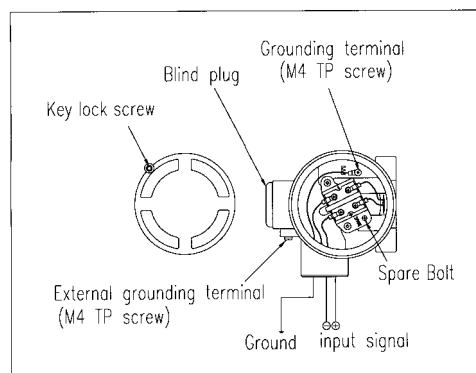
## 8. AIR PIPING CONNECTION



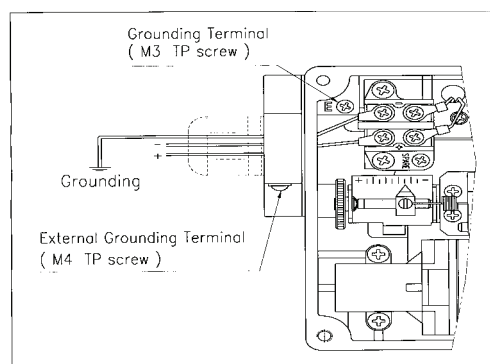
- 1 Fully purge the pipe to remove foreign matter.
- 2 Use clean supply air, fully removed of humidity and dust.
- 3 Use MAFRLIN14 filter regulator to keep the supply air pressure constant.
- 4 When using the double acting type as the single acting type, blind either OUT1 or OUT2 and remove the pressure gauge to close its connection.

## 9. ELECTRICAL WIRING

- 1 Connect the (+) and (-) output terminals from the regulator with the (+) and (-) input terminals of the positioner junction box, respectively
- 2 For Explosion Proof, both pressure tight conduit thread connection types and pressure tight packing types are available
- 3 Use Cable Gland in pressure tight packing type. (Cable O.D.= 9.0~11)
- 4 Use PF ½ standard for conduit thread connection types
- 5 Close junction box cover and lock the key lock



ExdmIIBT6



ExiaIIBT6

## 10. ADJUSTMENT

Check the following prior to starting the adjustment.

- 1 Check that the pipeline is correctly connected with the pressure supply port and OUT1 and OUT2 port.
- 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 the pilot valve (fully tightened in the clockwise direction).
- 5 Check that the span adjusting lever of the internal feedback lever is attached to the correct (Direct or Reverse) position.
- 6 Check for correct use of the cam face (Direct or Reverse) and that the flange nut is firmly locked.

### 10.1 Zero Adjustment

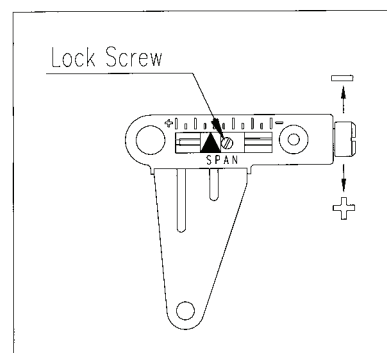
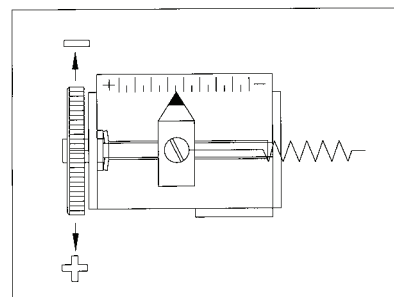
- 1 Set a signal to the Stroke starting signal (4mA) then turn the Zero Adjuster clockwise or counterclockwise.
- 2 In the case of a Spring Actuator, check if it is set to standard pressure in Zero Point. If not, repeat Zero adjustment.

### 10.2 Span Adjustment

- 1 Adjust Range Adjustment so that the Actuator stops at 0% position of the Stroke by the 0% applied input signal and 100% position for 100% input signal respectively.
- 2 Check Zero Point and repeat Zero Span Adjustment. 1/2 Split Range can be used by Zero and Span Adjustment.
- 3 After Setting, tighten up the lock screw of the span adjustment.

### 10.3 Auto/Manual Switch

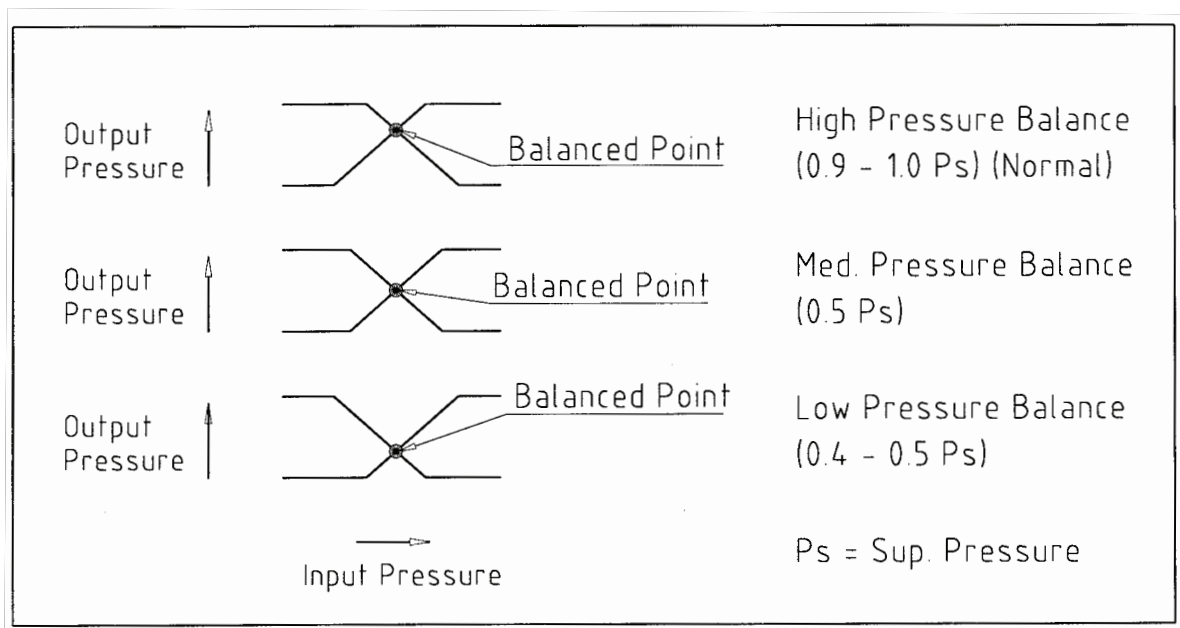
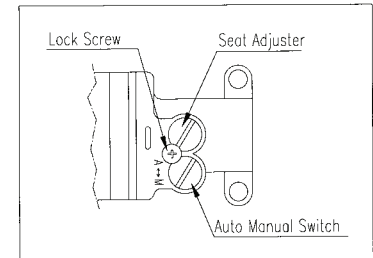
- 1 This is a switch for changing Auto and Manual.
- 2 Shipped products are set for Auto. To use Manual operation, turn A/M switch counterclockwise.
- 3 In manual operation, the pressure of the MAFR-LIN14 regulator connects to the Actuator. After using, return switch to "A".
- 4 Not available for Single Acting-OUT2 and Double Acting.





## 10.4 Seat Adjuster

- 1 No need to adjust at the field because the seat adjuster is adjusted before shipment for balanced pressure point of output pressure.
- 2 The seat adjuster is always used for Double-acting. If it is necessary to change balanced pressure point of output pressure, use the seat adjuster.
- 3 If the sensitivity is poor because of the actuator type or load condition, turn the seat adjuster screw clockwise. If hunting occurs, turn the seat adjuster screw counter-clockwise. (The amount of turning varies by actuators. Do not loosen the stopper screw at this time since it is set to avoid coming off the seat adjuster.)
- 4 If hunting occurs due to an actuator of small capacity, refer to description in chapter **14. OPTION.**



## 11. MAINTENANCE AND CHECK

- 1 If the supply air is dirty, the positioner may not operate normally. Periodically check the compressed air cleaning system and make sure that clean air is always supplied.
- 2 When you disassemble the pilot valve, coat grease on the O-ring of the sliding section.
- 3 When the fixed orifice is clogged with carbon particles or others, remove the pilot valve Auto/Manual changeover screw (built-in fixed aperture) and clean it by inserting a 0.2 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.
- 4 Check the positioner once a year. If you find an excessively worn diaphragm, O-ring and other packing or any unit, it should be changed with a new one. Treatment at an early stage is especially important if the positioner is used in a place of severe environment like coastal areas.

## 12. CAUTION AND HANDLING

- 1 Do not apply large vibration or impact to the positioner. It causes trouble. The positioner must be handled very carefully during transportation and operation.
- 2 If the positioner is used under temperature outside of the specification, the sealing materials deteriorate quickly and the positioner may not operate normally.
- 3 Do not remove the terminal cover at a dangerous position during power conduction.
- 4 Be sure that the terminal cover and body cover are put on during the operation.
- 5 If you leave the positioner at the operation site for a long time without using it, put the cover on it so that rain water does not enter the positioner. If the atmosphere is of high temperature or high humidity, take measures to avoid condensation inside. Condensation control measures must be taken thoroughly for export shipment.

## 13. TROUBLESHOOTING

Condition	Cause	What to do
Not operated with Input Signal applied	Too low or no supply air	Input supply air
	Loose connection	Tighten set screw of Terminal
	Wrong wiring for (+) and (-)	Connect wiring (+) and (-)
	Short or open circuit of terminal Motor	Replace Motor Unit
	Clogged Nozzle	Replace Motor Unit
	Loose or wrong setting of Feedback Lever	Correct setting and tighten
OUT1 pressure raised And stay, does not Come down	Leakage of A/M switch	Tighten or replace A/M switch
	Wrong contact or search of Flapper	Replace Motor Unit
	Clogged fixed orifice	Clean or replace fixed orifice
Output pressure is operated by A/M Switch only	Clogged nozzle	Clean nozzle or replace Motor Unit
Hunting is occurred	Off-positioned stabilizer spring	Insert stabilizer spring
	Too low of actuator volume	Insert orifice
	Clogged fixed orifice	Clean or replace fixed orifice
Actuator is operated by On/Off only	Wrong connection of OUT1 and OUT2 tube	Correct position of tube
Linearity is not good	Wrong setting of feedback lever	Readjust setting of feedback lever
	Wrong Zero, Span adjustment	Readjustment of Zero, Span Adjustment
	Supply pressure is unstable	Replace regulator
Hysteresis is not good	Wrong setting of Seat Adjuster	Readjust Seat adjuster
	Loose connection of actuator and positioner	Tighten connection
	Cam shaft is worn out	Replace Cam Shaft

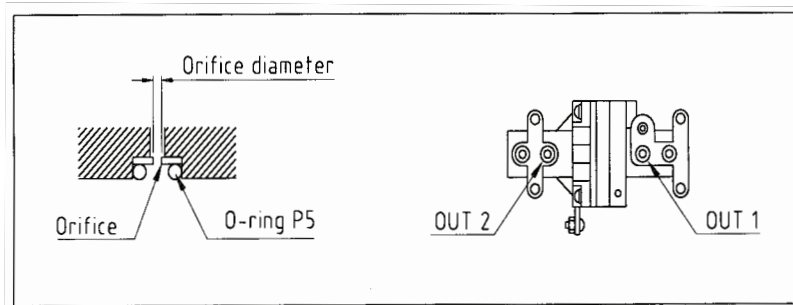
## 14. OPTION

### 14.1 Pilot Valve With Output Orifice

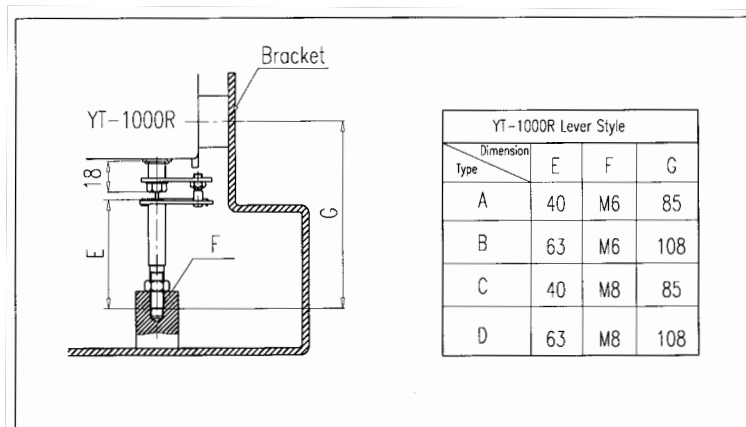
- 1 Hunting may occur when the positioner is attached to a small capacity actuator. In this case, use a pilot valve having a output orifice for OUT1 and OUT2. The output orifice is removable.
- 2 Output orifice types

Volume of actuator	Output orifice diameter	Ordering No.
Below 90cm <sup>3</sup>	∅0.7	①
90 ~ 180 cm <sup>3</sup>	∅1.0	②
Over 180 cm <sup>3</sup>	None	③

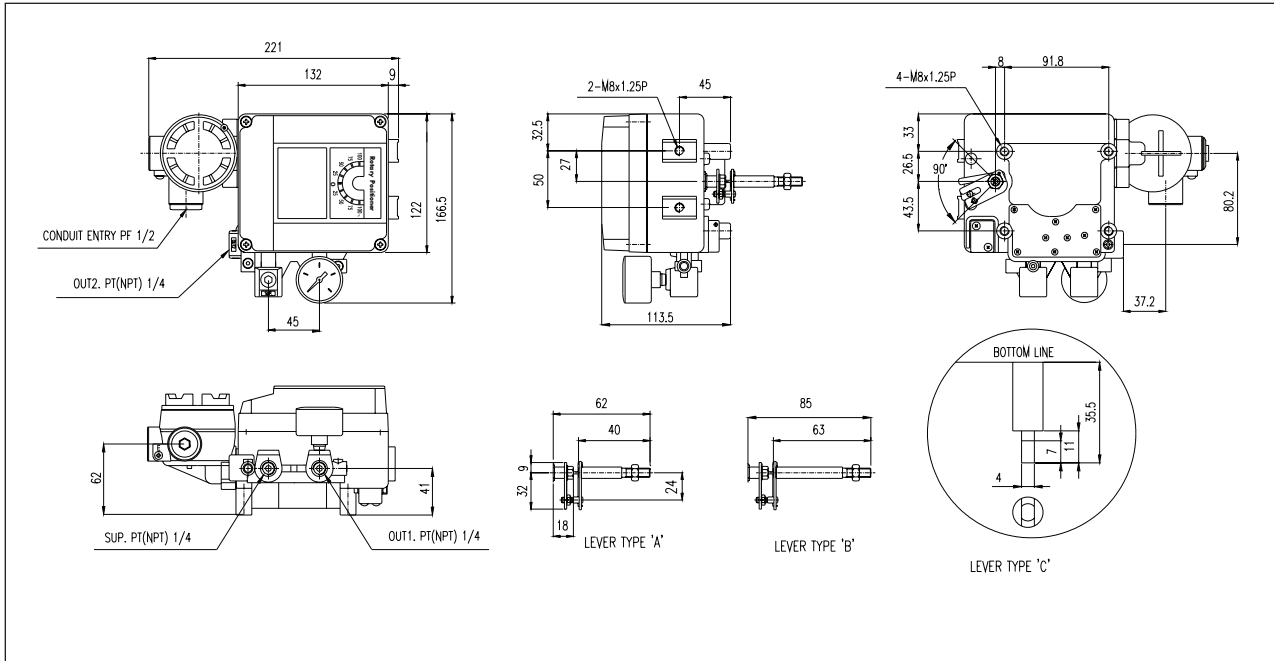
- 3 After pulling out the O-ring from the OUT1 and OUT2 ports, push the proper orifice and then mount the O-ring to OUT1 and OUT2 again. When mounting the output orifice, pay attention not to let dust or other particles enter the port.
- 4 If the hunting does not stop even after mounting the output orifice, please contact us



### 14.2 Feedback Lever Type

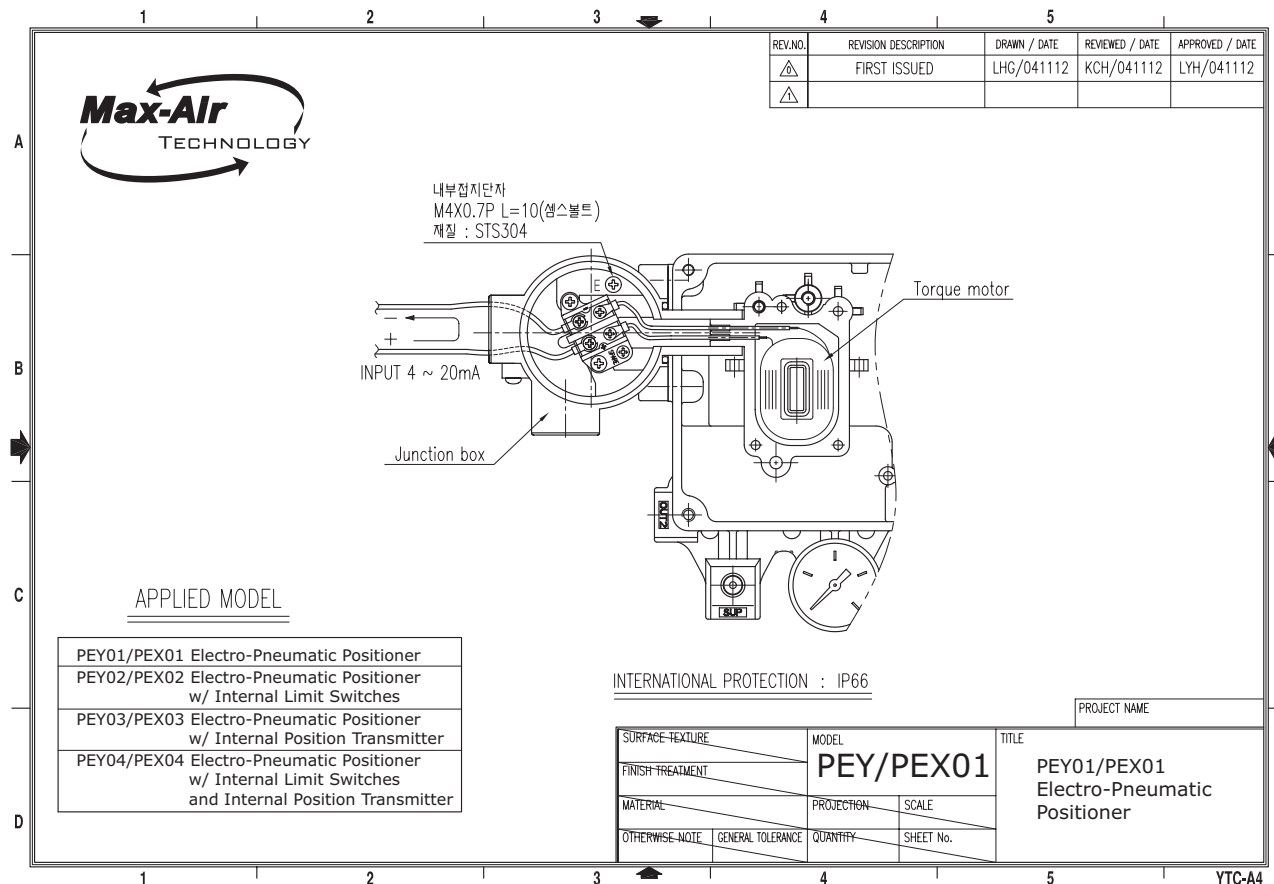


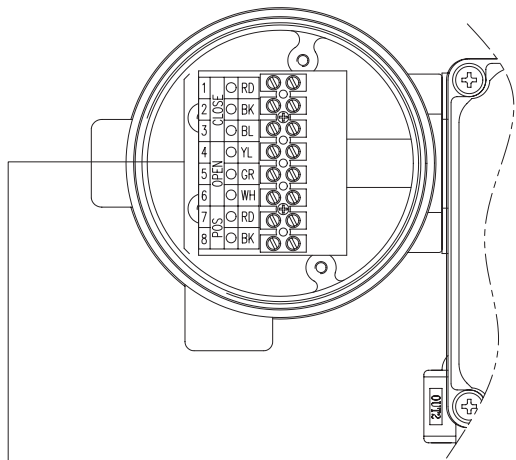
## 15. DIMENSIONS



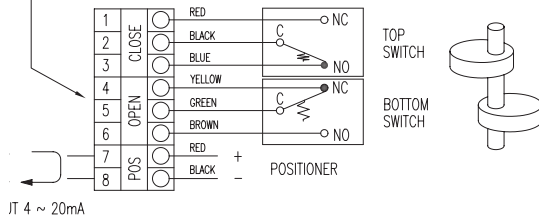
## 16. WIRING

### 16.1 PEY01/PEX01 Wiring Diagram



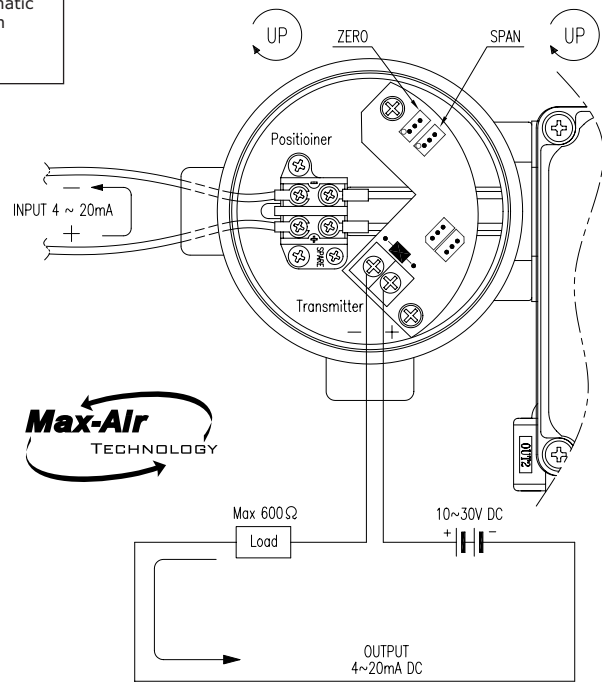


### 16.2 PEY02/PEX02 Wiring Diagram



PROJECT NAME		-	
SURFACE-TEXTURE	MODEL	TITLE	
FINISH-TREATMENT	PEY02/PEX02	Electro-Pneumatic Positioner with Internal Limit Switches	
MATERIAL	PROJECTION	SCALE	
OTHERWISE-NOTE	GENERAL TOLERANCE	QUANTITY	SHEET No.

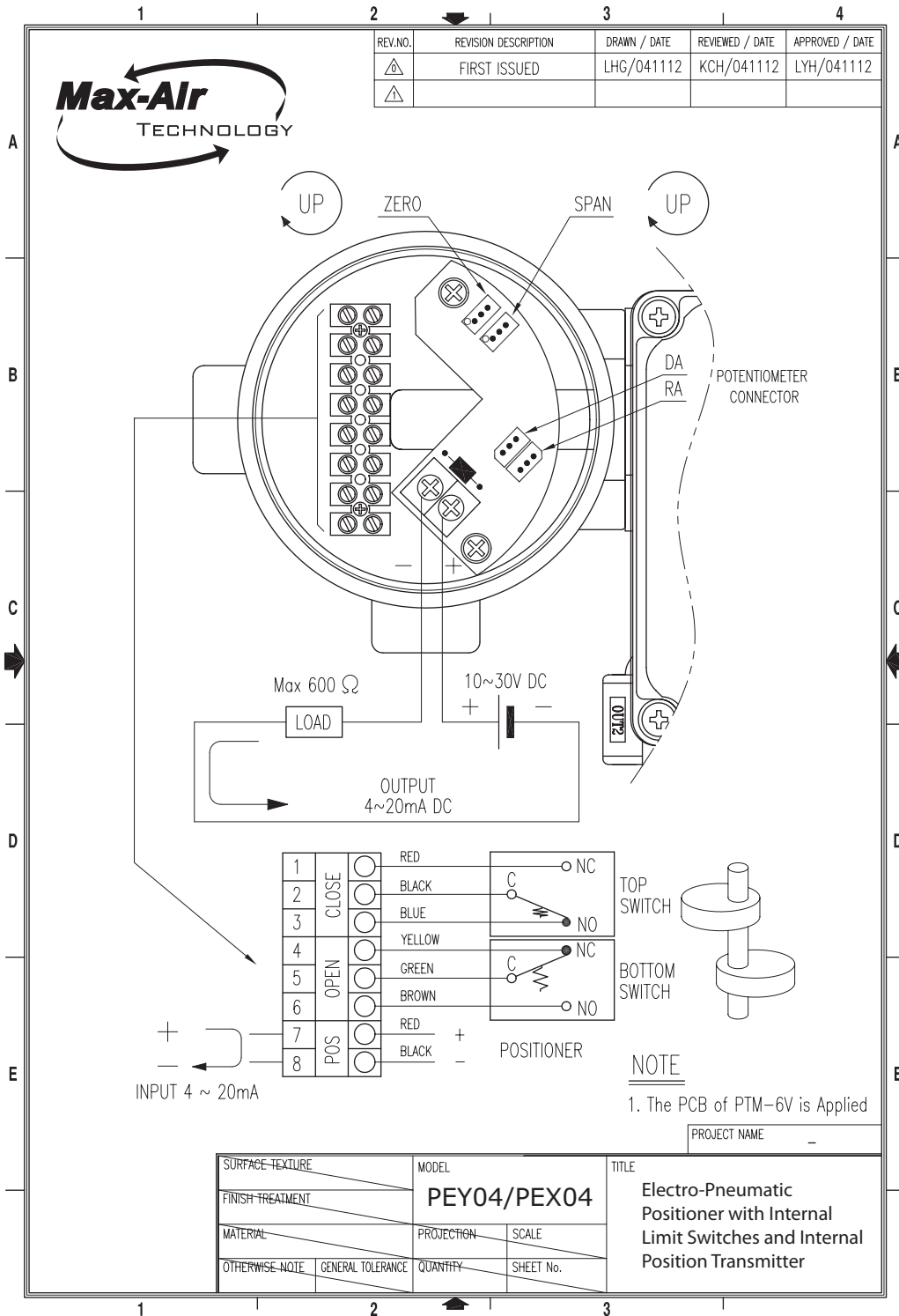
### 16.3 PEY03/PEX03 Wiring Diagram



**NOTE**  
1. The PCB of PTM-6V is Applied

PROJECT NAME		-	
SURFACE-TEXTURE	MODEL	TITLE	
FINISH-TREATMENT	PEY03	PEY03 Electro-Pneumatic Positioner with Internal Position Transmitter	
MATERIAL	PROJECTION	SCALE	
OTHERWISE-NOTE	GENERAL TOLERANCE	QUANTITY	SHEET No.

# 16.4 PEY04/PEX04 Wiring Diagram



751 Hoff Road • O'Fallon, MO 63366  
 1-888-842-9998 • Fax 636-272-4937  
 WWW.MAX-AIRTECHNOLOGY.COM