PTJ/PTJM Intelligent Electric Actuator
Installation and Operation Instructions

Shenzhen Power-Tomorrow Actuator Valve CO., LTD.
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Installation Guide

Important Matter

- Check if the data on product nameplate are consistent with the requirements in the field.
- Check if the actuator is properly installed.
- The actuator installation should be easy for field wiring, commissioning, use and maintenance.
- The actuator should be treated with heat insulation if it is exposed to the heat source.
- Before removing the cover of terminal cavity, you must switch the power supply of the actuator.
- The actuator should be grounded reliably.
- Cable inlet of the actuator should be treated with protection seal.

Connection of Actuator and Valve

Flanges of the PTJ series of electric actuators are produced according to ISO5211 standard (see Table 5 in Appendix 1). If the actuator is directly connected with the valve, the specification of the flange on the upper end of the valve should be consistent with the one of the selected actuator, otherwise coupling devices such as transition flanges, brackets should be installed. When the valve coupling flange is inconsistent with ISO standard, our company can customize the base flange according to the actual requirements if knowing the specification in advance. Of course, whether to install coupling device and the height of the device will depend on the valve shaft length, packing gland, etc.

Connection of Driving Sleeve and Valve Shaft

Torque out of the actuator is realized by the driving sleeve connected with the output shaft. The driving sleeve can be removed and processed into the shape and the size suitable for the valve shaft coupling.

1. Disassembling of driving sleeve (see Figure 12)
PTJ060-PTJ100 driving sleeve is installed in the base round hole. Remove the 4 connecting screws, and then you can install PTJ150-PTJ250 driving sleeve in the gear box. You must first remove the 4 connecting screws on the upper cover of the gear box, then remove the upper cover, and put the driving sleeve out from one side of the gear box base. After removal, you'd better install screws and related parts in place to avoid loss.
2. Processing of driving sleeve

When the actuator is in the closed position, the position of the driving sleeve mounting hole and the flange screw hole on the flange plate is usually at 45° angle as shown in Figure 13, but except for one special case: The direction of 4 M12 screw holes of center distance Φ125 on the PTJ60-PTJ100 base coincides with the one of the driving sleeve mounting hole. Therefore, when processing the inner hole of the driving sleeve, you should use its 4 mounting holes as the reference position, and pay attention to ensure the coaxiality of the inner hole and the top circle of the driving sleeve. In addition, please note that the diameter of inner hole of the driving sleeve (i.e. the valve shaft diameter) shall not exceed Value D (MAX) in table 10.

It is recommended that the driving sleeve is connected with the valve shaft by key coupling, and that the opening of the key on the driving sleeve points to any of the mounting holes (see Figure 14). In addition, the sleeve and the valve shaft can be connected with some other forms, as shown in figure 15.
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Figure 15 Coupling forms of driving sleeve and valve shaft

When delivering goods, our company can provide the driving sleeve suitable for the valve shaft coupling according to user requirements. If needed, please put forward in advance and indicate the requirements for the processing size in drawings.

3. Installation of driving sleeve

Install the processed driving sleeve on the valve shaft for inspection of the connection size, shape and position accuracy. At the same time, according to Values F and G and the height of the coupling device in Table 4, check if the length of the valve shaft and its coupling end (A, A1) is appropriate.

If it is correct after inspection, install the driving sleeve to the home position of the actuator, and tighten the connection screws. In the installation, you must pay attention to the direction of the driving sleeve to ensure the proper relative position of the actuator and the valve. When you install the PTJ150-PTJ250 driving sleeve, the arrow on the upper cover of the gear box should point to the same direction as the one before disassembling to avoid the indication error.
User Manual

Electrical Connection

Electrical Interface

Electrical Interface View

Common PTJ terminal assignment

External wiring of the common PTJ/PTJM actuator is led out by two rectangular plugs. The terminal on the plug is described in the table below:

Table 1: Description of terminals in common PTJ rectangular terminal box

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Terminal Name</th>
<th>Terminal Description</th>
<th>Terminal No.</th>
<th>Terminal Name</th>
<th>Terminal Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Common *</td>
<td>Input common terminal of motor power</td>
<td>B5</td>
<td>O2-NC</td>
<td>Normally close contact of Open position switch 2</td>
</tr>
<tr>
<td>A2</td>
<td>Positive *</td>
<td>Positive input terminal of motor power</td>
<td>B6</td>
<td>O2-COM</td>
<td>Common contact of Open position switch 2</td>
</tr>
<tr>
<td>A9</td>
<td>Reverse *</td>
<td>Reverse input terminal of motor power</td>
<td>B7</td>
<td>C3- NO</td>
<td>Normally open contact of Close position switch 3</td>
</tr>
<tr>
<td>A4</td>
<td>C1-NO</td>
<td>Normally open contact of Close position switch 1</td>
<td>B8</td>
<td>C3-COM</td>
<td>Common contact of Close position switch 3</td>
</tr>
<tr>
<td>A5</td>
<td>C1-COM</td>
<td>Common contact of Close position switch 1</td>
<td>B9</td>
<td>O3- NO</td>
<td>Normally open contact of Open position switch 3</td>
</tr>
<tr>
<td>A6</td>
<td>O1-NO</td>
<td>Normally open contact of Open position switch 1</td>
<td>B10</td>
<td>O3-COM</td>
<td>Common contact of Open position switch 3</td>
</tr>
<tr>
<td>A7</td>
<td>O1-COM</td>
<td>Common contact of Open position switch 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>A8</strong></td>
<td><strong>QO1- NC</strong></td>
<td>Normally close contact of Open overtorque switch 1</td>
<td>B11</td>
<td><strong>TEMP1</strong></td>
<td>Motor temperature switch contact 1</td>
</tr>
<tr>
<td><strong>A12</strong></td>
<td><strong>QO1- COM</strong></td>
<td>Common contact of Open overtorque switch 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A13</strong></td>
<td><strong>QC1- NC</strong></td>
<td>Normally close contact of Close overtorque switch 1</td>
<td>B12</td>
<td><strong>C4-NC/TEMP2</strong></td>
<td>Normally close contact of Close position switch 4 Motor temperature switch contact 2</td>
</tr>
<tr>
<td><strong>A14</strong></td>
<td><strong>QC1- COM</strong></td>
<td>Common contact of Close overtorque switch 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A15</strong></td>
<td><strong>QO2- NO</strong></td>
<td>Normally open contact of Open overtorque switch 2</td>
<td>B13</td>
<td><strong>C4-COM/POTEN1</strong></td>
<td>Common contact of Close position switch 4 Position potentiometer endpoint 1</td>
</tr>
<tr>
<td><strong>A16</strong></td>
<td><strong>QO2- COM</strong></td>
<td>Common contact of Open overtorque switch 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B1</strong></td>
<td><strong>QC2- NO</strong></td>
<td>Normally open contact of Close overtorque switch 2</td>
<td>B14</td>
<td><strong>O4-NC/POTEN2</strong></td>
<td>Normally close contact of Open position switch 4 Position potentiometer endpoint 2</td>
</tr>
<tr>
<td><strong>B2</strong></td>
<td><strong>QC2- COM</strong></td>
<td>Common contact of Close overtorque switch 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B3</strong></td>
<td><strong>C2-NC</strong></td>
<td>Normally close contact of Close position switch 2</td>
<td>B15</td>
<td><strong>O4-COM/POTEN</strong></td>
<td>Common contact of Open position switch 4 Position potentiometer middle sliding endpoint</td>
</tr>
<tr>
<td><strong>B4</strong></td>
<td><strong>C2-COM</strong></td>
<td>Common contact of Close position switch 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
1. In the table, NO=Normal Open, NC=Normal Close.
2. Terminals with * are for three-phase motor, and terminals A1, A2 and A9 are connected with 380VAC.
3. C3～C4 Close position switch, O3～O4 Open position switch, QO2 Open overtorque switch and QC2 Close overtorque switch, motor temperature switch and position potentiometer are optional. You must state the increased options and quantities when ordering goods.
4. PTJ006 and PTJ009 models have no overtorque protection switch.
5. The above switch contact capacity is 5A/250VAC or 5A/30VDC.
6. Terminals B12, B13, B14 and B15 have a common end. If the user selects to increase four limit switches, there will be no motor temperature switch and position potentiometer.

**Intelligent PTJ terminal assignment**

External wiring of the intelligent PTJ/PTJM actuator is led out by two rectangular plugs. The terminal on the plug is described in the table below:

*Description of terminals in intelligent PTJ rectangular terminal box*
<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Terminal Name</th>
<th>Terminal Description</th>
<th>Terminal No.</th>
<th>Terminal Name</th>
<th>Terminal Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Power1 *</td>
<td>Input terminal 1 of AC power supply</td>
<td>B1</td>
<td>MONI-1</td>
<td>Monitoring relay contact 1It does not alarm in the remote, making the actuator not in remote control, closed with contact MONI-COM.</td>
</tr>
<tr>
<td>A2</td>
<td>Power2 *</td>
<td>Input terminal 2 of AC power supply</td>
<td>B2</td>
<td>MONI-2</td>
<td>Monitoring relay contact 2It does not alarm in the remote, making the actuator not in remote control, open with contact MONI-COM.</td>
</tr>
<tr>
<td>A9</td>
<td>Power3 *</td>
<td>Input terminal 3 of AC power supply</td>
<td>B3</td>
<td>MONI-COM</td>
<td>Monitoring relay common contact</td>
</tr>
<tr>
<td>A4</td>
<td>R-COM-220VAC</td>
<td>Common terminal of remote digital signal (220VAC)</td>
<td>B4</td>
<td>RELAY5</td>
<td>Relay 5, normally closed</td>
</tr>
<tr>
<td>A5</td>
<td>ESD</td>
<td>Emergency action</td>
<td>B5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>R-OPEN</td>
<td>Input terminal of remote open signal</td>
<td>B6</td>
<td>RELAY4</td>
<td>Relay 4, normally open</td>
</tr>
<tr>
<td>A7</td>
<td>R-COM</td>
<td>Common terminal of remote digital signal</td>
<td>B7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A8</td>
<td>R-STOP</td>
<td>Input terminal of remote stop signal</td>
<td>B8</td>
<td>RELAY3</td>
<td>Relay 3, normally open</td>
</tr>
<tr>
<td>A12</td>
<td>R-CLOSE</td>
<td>Input terminal of remote close signal</td>
<td>B9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A13</td>
<td>24Vdc(-)</td>
<td>Non-stabilized voltage 24Vdc (-) output terminal</td>
<td>B10</td>
<td>RELAY2</td>
<td>Relay 2, normally open</td>
</tr>
<tr>
<td>A14</td>
<td>CPT(-)</td>
<td>Valve position current feedback (-) terminal</td>
<td>B11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A15</td>
<td>CPT(+)</td>
<td>Valve position current feedback (+) terminal</td>
<td>B12</td>
<td>RELAY1</td>
<td>Relay 1, normally open</td>
</tr>
<tr>
<td>A16</td>
<td>24Vdc(+)</td>
<td>Non-stabilized voltage 24Vdc (+) output terminal</td>
<td>B13</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B15</td>
<td>APC(+)</td>
<td>Proportion controller current input (+) terminal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B16</td>
<td>APC(-)</td>
<td>Proportion controller current input (-) terminal</td>
</tr>
</tbody>
</table>

Note:
1. For three terminals with *, the single-phase power supply is connected to A1 and A9 when the single-phase actuator is used.
2. CPT=Current Position Transmitter, APC=Automatic Proportion Controller.
Warning: Before removing the independent terminal cavity, you must first cut off the power supply of the electric actuator.
Common PTJ Settings

1. Adjustment of position limit switch
CLS cam is corresponding to the position limit switch for the valve full close end, and OLS cam is corresponding to the one for the valve full open end. Electrically or manually make the valve full close, cut off the power supply, loosen the M4 socket hexagon screw fastening the CLS cam so that the valve position indicator is at “CLOSE” position; rotate the CLS cam to make the limit switch act (click), and then fasten the M4 socket hexagon screw. Manually make the valve full open, and use the same way to adjust the OLS cam of the full open position limit switch. Note: the limit switch must be adjusted after the power supply is cut off. Improper adjustment of the limit switch can easily damage the internal parts of the actuator.

2. Adjustment of stop screw for mechanical limit
Loosen the locknut on the stop screw for mechanical limit (or remove the cap nut), unscrew the stop screw for a certain length to make the actuator to act to the full close valve position, screw the stop screw on this side until it reaches the worm gear; unscrew the stop screw for two circles in the opposite direction, manually act to make the worm gear reach the stop screw, and then tighten the lock nut (or screw the cap nut). Use the same way to adjust the stop screw on the other side.

3. Adjustment of auxiliary limit switch
According to the same sequence to adjust the position limit switch, you can adjust the auxiliary limit switch to get any rotation angle of contact required. That is, electrically or manually make the valve full close, cut off the power supply, loosen the M4 socket hexagon screw fastening the cam so that the valve position indicator is at “CLOSE” position; rotate the cam to make the limit switch act (click), and then fasten the M4 socket hexagon screw. Manually make the valve full open, and use the same way to adjust the cam of the full open auxiliary limit switch.

4. Manual operation
When there is no operating power supply, you can use the handwheel operation mechanism to manually operate. The handwheel is on the side (it can not be manually operated when the power is on). If it is needed for manual operation, switch the manual/electric switchover handle to the manual position in the direction of the handwheel, and then rotate the handwheel to operate manually. In the manual operation, if the switchover handle can not put into gear, you can rotate the handwheel for around 1/4 of circle (clockwise or anticlockwise), switch the switchover handle to manual position and then can manually operate with the handwheel. When the power is turned on, the switchover handle will be automatically switched to electric position, and the handwheel can not be operated, namely the electric operation is preferred for the switchover handle.

5. Torque switch TS (not in PTJ06 and PTJ09)
Torque switch can be installed in the internal of the rotary actuator, which is to ensure that a rated torque is exerted on the valve sealing surface after the valve is closed and to ensure the allowable leakage when the valve is closed. (Note: Before the actuator leaves the factory, the
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torque switch has been adjusted properly in the dedicated test bench. Users can not adjust it at random in the process of using; otherwise the internal parts of the actuator will be damaged.

**Operation Guide**

**Local Module**

The local module includes:
- Graphics display
- Information center
- Control and selector knobs
- LED display

![Local module](image)

*Figure 1: Local module*

**Graphics Display and Information Center**

Local display module in the PTJ part-turn electric actuator is equipped with clear graphics and LCD screen for comprehensive text display. The following characteristics are integrated in the local display module:
- **Graphics display**: display of remote operation mode, valve position opening, valve position feedback identification, infrared remote control identification, cavity temperature of the electric actuator.
- **Information center**: display of control mode, running state, input signal current value of the electric actuator as well as specific alarm information.
- **LED display**: red/on, green/off.
- **IrDA infrared receiver**: parameters of PTJ electric actuator can be set by using infrared setter provided by Hnswell.

**Control Knob and Selector Knob**

Selector knob: used to select “LOCAL” control mode/“STOP”/“REMOTE” control mode.
Selector knob: used to select “LOCAL” control mode, realizing “OPEN”/“CLOSE” functions.
Selector knob can be locked in any position by using a padlock.

**LED indicator light (light-emitting diode)**

There are two LED indicator lights in the local module: red/green, with their functions shown as follows:

<table>
<thead>
<tr>
<th>Valve state</th>
<th>Red LED</th>
<th>Valve state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full close position</td>
<td>Off</td>
<td>Full close position</td>
</tr>
<tr>
<td>Full open position</td>
<td>On</td>
<td>Full open position</td>
</tr>
<tr>
<td>Running in closing direction</td>
<td>Off</td>
<td>Running in closing direction</td>
</tr>
<tr>
<td>Running in opening direction</td>
<td>Flash</td>
<td>Running in opening</td>
</tr>
</tbody>
</table>
IrDA infrared receiver

The local module is configured with the IrDA infrared receiver which can use the infrared setter provided by Hnswell to control the actuator.

Parameter Settings Options

PTJ part-turn electric actuator supports the following two parameter setting modes for the user to select:

- Infrared setter provided by Hnswell: all parameters of the electric actuator can be set by using the compact tool.
- Local module knob: parameters of the electric actuator can be set by using control knob and selector knob in the local module integrated with the electric actuator.

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>R key</td>
<td>Reset</td>
</tr>
<tr>
<td>OK key</td>
<td>Confirmation</td>
</tr>
<tr>
<td>↓ key</td>
<td>Move down of move left</td>
</tr>
<tr>
<td>→ key</td>
<td>Plus</td>
</tr>
<tr>
<td>← key</td>
<td>Minus</td>
</tr>
<tr>
<td>↻ key</td>
<td>Exit or stop</td>
</tr>
<tr>
<td>↪ key</td>
<td>Reset</td>
</tr>
<tr>
<td>↦ key</td>
<td>Confirmation</td>
</tr>
</tbody>
</table>

Name

Table 1: Key functions of infrared setter

Infrared setter settings:
The selector knob is in the Stop or Local mode, and the infrared setter can be used for parameter setting or inquiry of the electric actuator. Press “OK” key to enter the menu.

Knob settings:
The selector knob is in Stop mode, and the control knob is in Close state for 5 seconds.
Enter the knob setting parameter mode:
- Selector knob Stop → Local, corresponding to OK key of the infrared setter (hereinafter referred to as OK key).
- Selector knob Stop → Remote, corresponding to ↻ key of the infrared setter (hereinafter referred to as ↻ key).
- Control knob Stop → Open, corresponding to → key of the infrared setter (hereinafter referred to as → key).
Enter the valve opening and closing limit setting menu, corresponding to ↪ key of the infrared setter (hereinafter referred to as ↪ key).
Control knob Stop → Close, corresponding to ↓ key of the infrared setter. Enter the valve opening and closing limit setting menu, corresponding to ↤ key of the infrared setter (hereinafter referred to as ↤ key).
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Note: In the menu of parameter modification, press the +, - keys to modify the parameters; press ←, → keys for left/right shift of the numerical parameters according to ▲; press OK key to display the “saved” and flash, indicating successful modification.

Warning: Do not enter the menu of parameter modification in the operation of the actuator.

Actuator Operation

Stroke Settings

The stroke setting must be completed in the normal operation, or the electric actuator can not work properly.

Important: Hnswell strongly recommends the use of handwheel for the stroking setting of the electric actuator to avoid accidents. If it is difficult to use the handwheel due to long stroke, make sure to start the electric mode when the valve is always in the safe state. When the valve gets close to the full open or full close position, you must switch to the manual mode to use the handwheel to turn the valve to the full open or full close position.

Important: You must check it after stroke setting is completed. Be sure to use the handwheel to turn the valve to the safe position in the middle of stroke. Use the local knob to control the actuator to open and close. Check if the valve opening and closing direction is correct and the valve full open and closed position is correct. Remote control can be done only after the proper inspection.

System Reset

The PTJ part-turn electric actuator supports two ways of manual system reset.
1. Place the selector knob in STOP control mode, exit the parameter setting mode, and press “reset” key in the infrared setter (hereinafter referred to as R key) to realize the system reset.
2. Place the selector knob in STOP mode, exit the parameter setting mode and have the control knob located in the Open state for 5 seconds to realize the system reset, corresponding to the R key of the infrared setter.

IrDA Infrared Control Mode

Place the selector knob in STOP control mode, exit the parameter setting mode, and press “OPEN”/ “CLOSE”/ “STOP” key in the infrared setter to control Open/Close/Stop of the electric actuator.

LOCAL – local control mode

Place the selector knob in LOCAL control mode, exit the parameter setting mode, and use the knob to control Open/Close of the electric actuator
Note: The factory default operation of the PTJ electric actuator is set to the inching operation mode.

LOCAL control mode – inching operation mode
1. Place the control knob in the OPEN or CLOSE position and keep doing it for more than 0.5 seconds, and the electric actuator will move in the opening or closing direction.
2. When the control knob is released, the electric actuator will stop movement.
LOCAL control operation —— self-sustain operation mode
1. Place the control knob in the OPEN or CLOSE position and keep doing it for more than 0.5 seconds, and the electric actuator will move in the opening or closing direction and finally to the open or closed position.
2. Making the electric actuator stop movement: Place the selector knob in the STOP position

**REMOTE – Remote digital control mode**

Remote control of the electric actuator can be allowed through the input switch signal. In the parameter setting mode, change the remote control source to the switch control and use the 4-wire connection mode. The factory default remote control of the PTJ electric actuator is set to the inching operation mode. Exit the parameter setting mode, and place the selector knob in the REMOTE control mode.

**LOCAL control operation —— inching operation mode**

1. Input the remote digital control signal, and the electric actuator will move in the opening or closing direction.
2. Cancel the remote digital control signal, and the electric actuator will stop movement.

**REMOTE control operation —— self-sustain operation mode**

1. Input remote digital control signal and keep doing it for more than 0.5 seconds, and the electric actuator will move in the opening or closing direction and finally to the open or closed position.
2. If it is needed to have the electric actuator stop in the middle position, input the stop signal to make it stop movement.

**REMOTE – remote analog control mode**

For modulating actuator, remote control of the electric actuator can be allowed through the input analog signal. In the parameter setting mode, change the remote control source to the analog control, and then exit the parameter setting mode. Analog position control module accepts 4-20mADC input signal for position and process control. 4-20mA input signal is corresponding to 0%-100% of the valve position and uses an absolute linear position sensing device to provide 4-20mADC valve position feedback.

**Handwheel Operation**

The actuator provides the handwheel and the electric/manual switchover handle so that the manual operation can be carried out in some special cases such as the main power failure or the control circuit fault. Before operation of the handwheel, first place the selector knob in the Stop or Local position, press the electric/manual switchover handle to the manual position, meanwhile turn the handwheel slowly to make the clutch put into gear. After putting into manual gear, you can release the handle, it will go back to the free position relying on the spring action, but the internal clutch has been locked in the manual position. Then turn the handwheel to drive the output shaft to rotate, thus realizing the manual operation. The clutch is skillfully designed to the electric priority mechanism. When the motor rotates, the clutch will automatically switch to the electric operation position. The switchover handle can be locked in electric or manual operation position by using a padlock. Please note that the motor rotation cannot make the clutch automatically switch to the electric operation position when the handle is locked in the manual position with a padlock.
Electric Actuator Parameter Settings

Factory Default Settings

<table>
<thead>
<tr>
<th>Valve setting</th>
<th>Actuator setting</th>
<th>Switch control</th>
<th>Relay feedback</th>
<th>Analog control</th>
<th>Valve position feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve closing direction = clockwise</td>
<td>Local control = inching</td>
<td>Switch control mode = inching</td>
<td>1# function = full open valve position 1# action = closing</td>
<td>Dead zone = 0.8%</td>
<td>Valve position feedback = 191</td>
</tr>
<tr>
<td>Torque switch bypass prohibited</td>
<td>Remote control source = Analog</td>
<td>Selection of 2-wire system = prohibited</td>
<td>2# function = full close valve position 2# action = closing</td>
<td>Signal loss action = keeping position</td>
<td>Valve position feedback = 1013</td>
</tr>
<tr>
<td>Power supply = AC-380V</td>
<td>ESD direction = keeping position</td>
<td>3# function = Open overtorque 3# action = closing</td>
<td>Signal zero position setting = 162</td>
<td>Valve opening inertial range = 0%</td>
<td></td>
</tr>
<tr>
<td>Password = 0000</td>
<td>ESD type = Effective closing</td>
<td>4# function = Close overtorque 4# action = closing</td>
<td>Signal full scale setting = 814</td>
<td>Valve closing inertial range = 0%</td>
<td></td>
</tr>
<tr>
<td>Language selection = Simplified Chinese</td>
<td>ESD exceeded Local = prohibited</td>
<td>5# function = middle position -50% 5# action = breaking</td>
<td>Input polarity = normal</td>
<td>Feedback polarity = normal</td>
<td></td>
</tr>
<tr>
<td>Display = normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enter Parameter Setting Mode

Enter the parameter setting mode in the infrared setter
Place the selector knob in the Stop or Local mode; use the infrared setter to aim at IrDA infrared receiving tube within 0.5 meters. Press OK key to enter the password input interface, input the correct password and enter the parameter setting mode in the infrared setter.

Enter Parameter Setting Mode in Knob
Place the selector knob in the Stop mode and the control knob in the Close state and keep doing it for 5 seconds. Press OK key to enter the password input interface, input the correct password and enter the parameter setting mode in the knob.

Input Password

Enter the password input interface, as shown in the above figure. The default password is 0000, and the 4-digit password is from 0-9 numbers. The user can modify it as needed, with + or - key used to modify values and ← or → key for left/right shift (according to ▲). Input the set password and enter the main menu.
Main Menu

Press OK key to enter the main menu interface, as shown in the above figure. The main menu contains 8 sub menus, and you can press + or - key for forward and backward shift and ↑or↓ key for up and down shift. The text description in the sub menu is displayed in the information center.

Modify Parameter Settings

Commissioning Wizard

The basic setting of the electric actuator can be easily completed according to the commissioning guide. According to the selected remote control mode in the remote control source, the analog/switch control will go to the corresponding setting process.

Setup wizard process for modulating type
1. Enter commissioning wizard, press the OK key to enter the next step;
2. Set the valve closing direction. Press the + or - key to change the valve closing direction to clockwise /counterclockwise, and then press the OK key to save and enter the next step;

3. Set the valve closing limit. In the parameter setting mode in the infrared setter, press \[\mathcal{O}\] key (in the parameter setting mode in the knob, control knob Stop \[\to\] Close, corresponding to the \[\mathcal{O}\] key of the infrared setter). You must manually turn the valve to the full close position with the handwheel when the valve gets close to the full close position, and then press the OK key to save and enter the next step.

4. Set the valve opening limit. In the parameter setting mode in the infrared setter, press \[\mathcal{Z}\] key (in the parameter setting mode in the knob, control knob Stop \[\to\] Open, corresponding to the \[\mathcal{Z}\] key of the infrared setter), you must manually turn the valve to the full open position with the handwheel when the valve gets close to the full open position, and then press the OK key to save and enter the next step.

5. Set remote control source. Press + or – key to change the remote control source to analog/switch control, here, analog control is selected for the modulating actuator, and then press the OK key to save and enter the next step;

6. Signal zero position setting - calibration value of the input signal 4mA, in this setting option, DCS control system output 4mA is needed, and then press the OK key to save and enter the next step;

7. Signal full scale position setting - calibration value of the input signal 20mA, in this setting option, DCS control system output 20mA is needed, and then press the OK key to save and enter the next step;

8. Dead zone, press the + or – key to modify the values and \[\leftarrow\to\rightarrow\] key for left/right shift (according to \[\uparrow\]) to get the desired values for dead zone, and then press the OK key to save and enter the next step;

9. Signal loss action - the actuator action for loss of 4-20mA input signal, press the + or – key to change the signal loss action to keeping position/opening valve/closing valve/keeping the current action/running to specified position -XX%, and then press the OK key to save and enter the next step;

10. Complete the commissioning wizard settings.

**Setup wizard process for switching type**

1. Enter commissioning wizard, press OK key to enter the next step:

2. Set the valve closing direction. Press the + or - key to change the valve closing direction to clockwise /counterclockwise, and then press the OK key to enter the next step;

3. Set the valve closing limit. In the parameter setting mode in the infrared setter, press \[\mathcal{O}\] key (in the parameter setting mode in the knob, control knob Stop \[\to\] Close, corresponding to the \[\mathcal{O}\] key of the infrared setter). You must manually turn the valve to the full close position with the handwheel when the valve gets close to the full close position, and then press the OK key to save and enter the next step.

4. Set the valve opening limit. In the parameter setting mode in the infrared setter, press \[\mathcal{Z}\] key (in the parameter setting mode in the knob, control knob Stop \[\to\] Open, corresponding to the \[\mathcal{Z}\] key of the infrared setter), you must manually turn the valve to the full open position with the handwheel when the valve gets close to the full open position, and then press the OK key to save and enter the next step.

5. Set remote control source. Press the + or – key to change the remote control source to analog/switch control, here, switch control is selected for the switching actuator, and then press the OK key to save and enter the next step;

6. Set remote control mode. Press the + or – key to change the remote control mode to inching/self-sustain, and then press the OK key to save and enter the next step;

7. Complete the commissioning wizard settings.
Valve Setting

The valve setting contains 4 sub menus: valve closing direction, valve closing limit, valve opening limit and torque switch bypass. These 4 sub menus can be switched by pressing ↑ or ↓ key.

Refer to the commissioning wizard for settings of valve closing direction, valve closing limit and valve opening limit.

Torque switch bypass settings, press the + or – key to change to prohibit/permit, and then press OK key to save.
Actuator Setting

The actuator setting contains 7 sub menus: local control, remote control source, power supply, restore default settings, password change, language selection and display. These 7 sub menus can be switched by pressing ↑ or ↓ key.

1. Local control sub menu contains inching/self-sustain options, press the + or – key to select and then press the OK key to save the settings.

2. Remote control source sub menu contains analog control/switch control options, press the + or – key to select and then press the OK key to save the settings.

3. Power supply sub menu contains AC-380/AC-220V options, press the + or – key to select and then press the OK key to save the settings. The power supply of the actuator has been set in the factory, and it is not needed to change it in the field.

4. Restore the default – restore the actuator parameters to the factory default settings, press the OK key to restore it.

5. Password change menu, the password is 4 digits from 0-9 numbers, press the + or – key to change the value and ← or → key for left/right shift (according to ▲) to get the desired password, and then press OK key to save.

6. Language selection sub menu contains simplified Chinese/English options, press the + or – key to select and then press the OK key to save.

7. Display sub menu contains positive display/reverse display options, press the + or – key to select and then press the OK key to save.

Note: "Positive display" is the normal display, and "reverse display" is the display of pictures rotated 180°.
Switch

Switch control
Relay output
Emergency control
Select?

Switch control mode
Select 2-wire system
OK
key

Switch control mode
Select 2-wire system
Prohibit 2-wire system
+ - Confirm?

Relay S1
Relay S2
Relay S3
Select?

S2-S5 is the same as S1, omitted here.

Action direction
Contact type
Exceed local
Select?

Exceeding local
Prohibit

Action direction
Keeping position
+ - Confirm?

Action direction
Effective closing
+ - Confirm?

Exceeding local
Prohibit

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The switch setting contains 3 sub menus: switch control, relay output and emergency control. These 3 sub menus can be switched by pressing ↑ or ↓ key

1. Switch control menu contains two sub menus: switch control mode and selecting 2-wire system.
   a) Switch control mode sub menu contains inching/self-sustain options, press the + or – key to select and then press the OK key to save the settings.
   b) Selecting 2-wire system sub menu contains prohibiting 2-wire system/opening priority/closing priority options, press the + or – key to select and then press the OK key to save the settings.

   Note:
   Select “prohibiting 2-wire system” and the 2-wire system is invalid.
   Select “opening priority”, the remote opening signal is switched on, and the actuator opens the valve; when the remote opening signal is switched off, the actuator closes the valve and it can not stop in the middle position.
   Select “closing priority”, the remote opening signal is switched on, and the actuator closes the valve; when the remote opening signal is switched off, the actuator opens the valve and it can not stop in the middle position.

2. Relay out menu contains 5 sub menus: Relay S1, Relay S2, Relay S3, Relay S4 and Relay S5.
   Relay S1 contains 2 sub menus: S1 function and S1 action. S2-S5 is the same as S1, and we take S1 as an example as follows:
   a) S1 function sub menu contains 29 options (see the table below), press the + or – key to select and then press the OK key to save the settings.
   b) S1 action sub menu contains closing/breaking options, press the + or – key to select and then press the OK key to save the settings.

3. Emergency control menu contains 3 sub menus: action direction, contact type and exceeding local.
   a) Action direction sub menu contains keeping position /opening valve/closing valve options, press the + or – key to select and then press the OK key to save the settings.
   b) Contact type sub menu contains effective closing/ effective breaking options, press the + or – key to select and then press the OK key to save the settings.
   c) Exceeding local sub menu contains prohibit/permit options, press the + or – key to select and then press the OK key to save the settings.

### Relay contact output options

<table>
<thead>
<tr>
<th>Full close</th>
<th>Full open</th>
<th>Middle valve position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closing valve</td>
<td>Opening valve</td>
<td>Closing and opening valve</td>
</tr>
<tr>
<td>Select Stop</td>
<td>Select Local</td>
<td>Select Remote</td>
</tr>
<tr>
<td>Power phase loss</td>
<td>Overtorque in closing direction</td>
<td>Overtorque in opening direction</td>
</tr>
<tr>
<td>Overtorque</td>
<td>Motor overheating</td>
<td>Motor stall</td>
</tr>
<tr>
<td>Valve position overflow</td>
<td>Parameter access failure</td>
<td>Actuator failure</td>
</tr>
<tr>
<td>Abnormal system voltages</td>
<td>Valve position detection disconnection</td>
<td>Hardware I2C bus fault</td>
</tr>
<tr>
<td>Hardware fault</td>
<td>Lack of input signal</td>
<td>Input signal disconnection</td>
</tr>
<tr>
<td>Input signal overflow</td>
<td>Valve position feedback disconnection</td>
<td>Control command conflict</td>
</tr>
<tr>
<td>Control fault</td>
<td>Effective ESD</td>
<td></td>
</tr>
</tbody>
</table>
The analog setting contains 2 sub menus: analog control and valve position feedback. These 2 sub menus can be switched by pressing ↑ or ↓ key.

1. Analog control menu contains 7 sub menus: dead zone, signal loss action, signal zero position setting, signal full scale setting, input polarity, valve opening inertial range and valve closing inertial range.
   a) Dead zone sub menu, press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) to get the desired values for dead zone, and then press the OK key to save.
   b) Signal loss action—the actuator action for loss of 4-20mA input signal, press the + or – key to change the signal loss action to keeping position/opening valve/closing valve/keeping the current action/running to specified position -XX%, and then press the OK key to save.
   c) Signal zero position setting ——calibration value of the input signal 4mA, in this setting option, DCS control system output 4mA is needed. Press the OK key to save and the factory default has been specified.
   d) Signal full scale setting ——calibration value of the input signal 20mA, in this setting option, DCS control system output 20mA is needed. Press the OK key to save and the factory default has been specified.
   e) Input polarity sub menu, press the + or – key to change the input polarity to the normal/reverse, and then press the OK key to save.
   f) Valve opening inertial range sub menu, press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) to get the desired valve opening inertial range, and then press the OK key to save.
   g) Valve closing inertial range sub menu, press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) to get the desired valve closing inertial range, and then press the OK key to save.

   Note: dead zone, adjustable from 0.3%-9.9%, factory default 0.8%.

   Input polarity, normal: 4mA=0%, 20mA=100%; reverse: 20mA=0%, 4mA=100%.

2. Valve position feedback menu contains 5 sub menus: zero valve position feedback, full-scale valve position feedback, valve opening feedback inertia and output polarity.
   a) Zero valve position feedback——calibration value of 0% of current feedback for valve position (4mA), press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) until the current feedback is changed to 4mA, and then press OK key to save. And the factory default setting has been specified.
   b) Full-scale valve position feedback——calibration value of 100% of current feedback for valve position (20mA), press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) until the current feedback is changed to 20mA, and then press OK key to save. And the factory default setting has been specified.
   c) Valve opening feedback inertia sub menu, press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) to get the desired valve opening inertia, and then press the OK key to save.
   d) Valve closing feedback inertia sub menu, press the + or – key to modify the values and ← or → key for left/right shift (according to ▲) to get the desired valve closing inertia, and then press the OK key to save.
   e) Output polarity sub menu, press the + or – key to change the output polarity to the normal/reverse, and then press the OK key to save.

   Note: output polarity, normal: 0%=4mA, 100%=20mA; reverse: 100%=4mA, 0%=20mA.
Information and Fault Diagnosis

Information

Information contains 2 sub menus: version information and operation information. These 2 sub menus can be switched by pressing ↑ or ↓ key.

1. Version information
   Description of the actuator model, software version and release time
2. Operation information
   Description of the power-on frequency, starting times and failure frequency of the actuator

Fault

Fault displays the recent 4 alarm records of the actuator, with No. 1 for the latest fault.
Diagnosis

Diagnosis contains 5 sub menus: local, remote digital, remote analog, valve position feedback and system power supply. These 5 sub menus can be switched by pressing ↑ or ↓ key.

1. Local
   Real-time monitoring of the local module state: remote, local, local open, local close.

2. Remote digital
   Real-time monitoring of the remote digital module state: remote open, remote close, remote stop, ESD.

3. Remote analog
   Real-time monitoring of the remote analog module state: current signal current value, current valve position value.

4. Valve position feedback
   Real-time monitoring of the valve position feedback state: valve position feedback, current valve position value.

5. System power supply
   Real-time monitoring of the system power state: Pow_12V, Pow_24Vout, Ch_5V.