Operation Manual

Electric Actuators
Series 05/10/20/40/60/100/200/300

Notes

1.  No manual operation is allowed when it is energized .

2. The actuator is equipped with overheat protection device . When the motor exceeds the temperature of 125℃ ,the overheat protection device will switch off the motor power automatically.

3. It is necessary to install additionally the leakage protection device before it is put in to operation.

4. Please confirm the input voltage and all connections.

5. It is not allowed to in series or in parallel the power lines of two or more actuators. Otherwise, it will cause movement out of control and motor over temperature rising due to the interference of condensers from each other.

6. It is necessary to have sealing treatment of water-proof cable end at the inlet side according to the instruction manual, otherwise, the actuator will be damaged by water or dirt coming from outside.

7.  The servo controller must be wired and adjusted according to the Instruction Manual for the sake of it not being damaged.

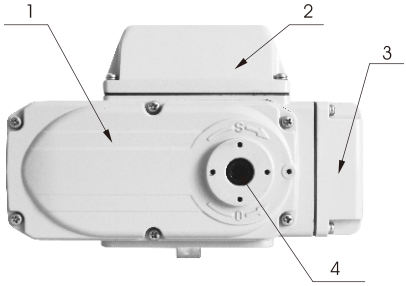
8. The service personnel for installation and adjustment must be qualified for the operation.

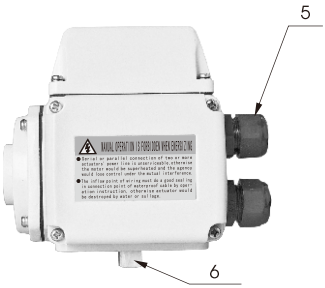
9. It is prohibited to operate the actuator under overload condition.

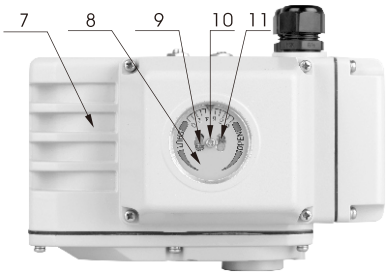
10. The manufacturer will not be responsible for the improper changes and maintenance on the actuator.

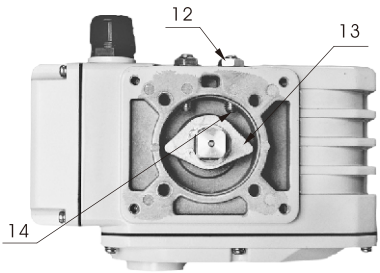
CONTENTS

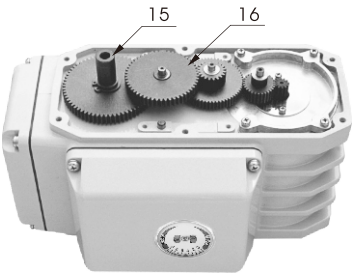
NAMES OF COMPONENTS

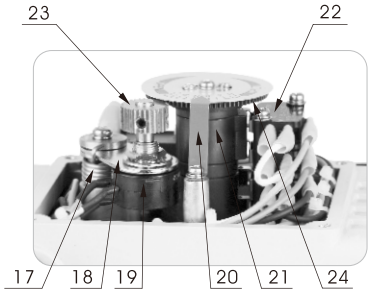












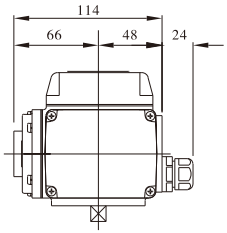
	Driving Cover	2	Electric Elements Cover	3	Junction Box Cover	4	Manual Operation Port
5	Water-proof Cable Connector	6	Output Shaft	7	Casing	8	Scale Plate
9	Shut Position Regulating Shaft	10	Scale Plate Lock Screw	11	Open Position Regulating Shaft	12	Lock Nut
13	Mechanical Limit Stopper	14	Adjusting Screw	15	Worm shaft	16	Reducing Gear Group
17	Torsion Spring	18	Potentiometer Mounting Plate	19	Potentiometer	20	Pointer
21	Stroke Dog	22	Micro-Switch	23	Potentiometer Gear	24	Opening Gear

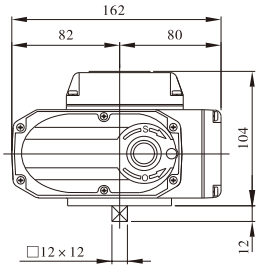
S (SHUT) Direction of arrow (clockwise) represents close.

O (OPEN) Direction of arrow (counter-clockwise) represents open.

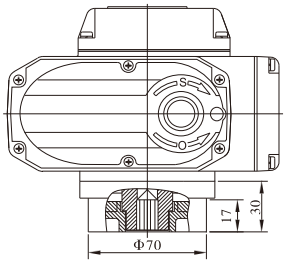
OVERALL DIMENSIONS AND PERFORMANCE PARAMETERS 05 SERIES

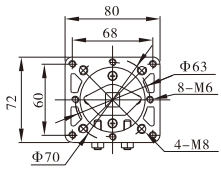
Standard type



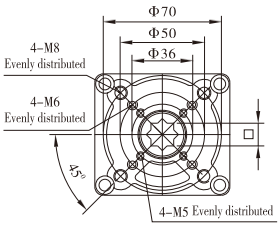


Direct installation type





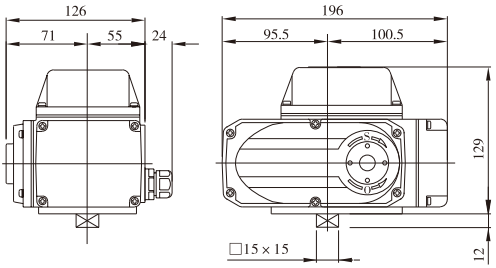
Parameters for direct installation type	
Square	□9x9 □11x11 □14x14
Flange	F03 F05 F07
Valve stem	Height≤17mm



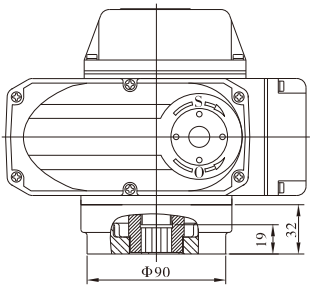
Parameters / Type / Power / Performance	05 SERIES				
	DC24V	AC24V	AC110V	AC380V	AC220V
Motor Power	13W	10W	10W	6W	10W
Rated Current	1.28A	1.50A	0.24A	0.07A	0.16A
Standard Time/Torque	25S/50Nm				
Maximum Torque	65Nm				
Optional Time/Torque	4S/20Nm 12S/30Nm				4S/20Nm 12S/30Nm 60S/50Nm
Turning Angle	0~360° Adjustable				
Available Control Circuit	Types of A、B、C、D、E、F、G、H、GEY				
Total Weight	2.5kg				
Insulating Resistance	DC24V/AC24V：100MΩ/250VDC AC110V/AC220V/AC380V：100 MΩ/500VDC				
Withstand Voltage Class	DC24V/AC24V：500VAC 1minutes、AC110V/AC220V：1500VAC 1minutes、AC380V：1800VAC 1minutes				
Protection Class	IP67				
Installation Angle	360°, at any angle				
Electric Interface	Two G1/2 Water-proof Cable Connectors, one for power line and one for signal line.				
Ambient Temperature	-25℃ ~ +55℃				
Optional Function	◆Dehumidify Heater ◆Dome indicator ◆Modbus communication				

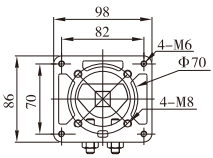
OVERALL DIMENSIONS AND PERFORMANCE PARAMETERS 10 SERIES

Standard type

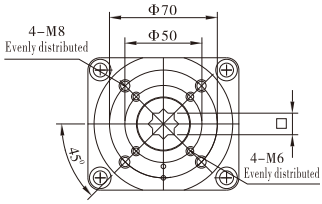


Direct installation type





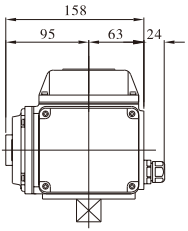
Parameters for direct installation type	
Square	□ 9x9 □ 11x11 □14x14
Flange	F05 F07
Valve stem	Height ⩽19mm

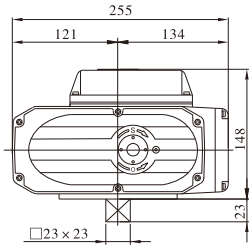


Type / Parameters / Power / Performance	10 SERIES				
	DC24V	AC24V	AC110V	AC380V	AC220V
Motor Power	25W	25W	25W	15W	25W
Rated Current	2.03A	2.12A	0.57A	0.10A	0.35A
Standard Time/Torque	30S/100Nm				
Maximum Torque	130Nm				
Optional Time/Torque	15S/50Nm				15S/50Nm 60S/100Nm
Turning Angle	0～90° Adjustable				
Available Control Circuit	Types of A、B、C、D、E、F、G、H、GEY				
Total Weight	4.5kg				
Insulating Resistance	DC24V/AC24V：100MΩ/250VDC AC110V/AC220V/AC380V：100 MΩ/500VDC				
Withstand Voltage Class	DC24V/AC24V：500VAC 1minutes、AC110V/AC220V：1500VAC 1minutes、AC380V：1800VAC 1minutes				
Protection Class	IP67				
Installation Angle	360° at any angle				
Electric Interface	Two G1/2 Water-proof Cable Connectors, one for power line and one for signal line.				
Ambient Temperature	-25℃～+55℃				
Optional Function	◆Over-torque Protector ◆Dehumidify Heater ◆Dome indicator ◆Handle ◆Modbus communication				

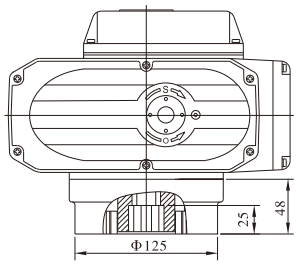
OVERALL DIMENSIONS AND PERFORMANCE PARAMETERS 20/40/60 SERIES

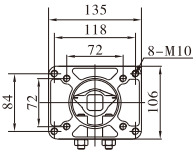
Standard type



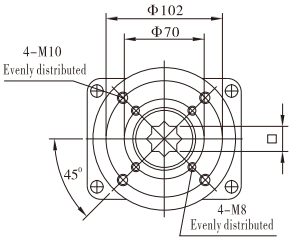


Direct installation type





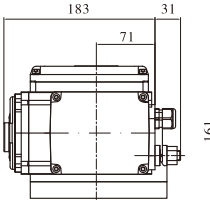
Parameters for direct installation		
	DCL-20	DCL-40\60
Square	□14×14 □17×17	□17×17or□22×22
Flange	F07	F10
Valve stem	Height≤25mm	

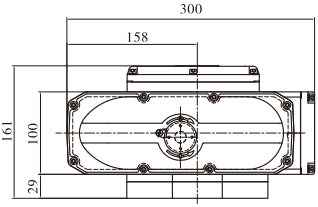


Type / Parameters / Power / Performance	20 SERIES					40 SERIES					60 SERIES				
	DC24V	AC24V	AC110V	AC380V	AC220V	DC24V	AC24V	AC110V	AC380V	AC220V	DC24V	AC24V	AC110V	AC380V	AC220V
Motor Power	35W	40W	40W	30W	40W	70W	90W	90W	40W	90W	70W	90W	90W	40W	90W
Rated Current	3.57A	3.65A	0.65A	0.15A	0.37A	5.13A	6.80A	1.12A	0.29A	0.57A	6.04A	6.80A	1.18A	0.29A	0.60A
Standard Time/Torque	30S/200Nm					30S/400Nm					45S/600Nm				
Maximum Torque	260Nm					520Nm					800Nm				
Optional Time/Torque	15S/100Nm			15S/100Nm 60S/200Nm		15S/200Nm			15S/200Nm 60S/400Nm						
Turning Angle	0～90° Adjustable														
Available Control Circuit	Types of A、B、C、D、E、F、G、H、GEY														
Total Weight	8.0kg					8.5kg					9.0kg				
Insulating Resistance	DC24V/AC24V：100MΩ/250VDC AC110V/AC220V/AC380V：100 MΩ/500VDC														
Withstand Voltage Class	DC24V/AC24V：500VAC 1minutes、AC110V/AC220V：1500VAC 1minutes、AC380V：1800VAC 1minutes														
Protection Class	Ip67														
Installation Angle	360° at any angle														
Electric Interface	Two G1/2 Water-proof Cable Connectors, one for power line and one for signal line.														
Ambient Temperature	-25℃～+55℃														
Optional Function	◆Over-torque Protector ◆Dehumidify Heater ◆Dome indicator ◆Handle ◆Modbus communication														

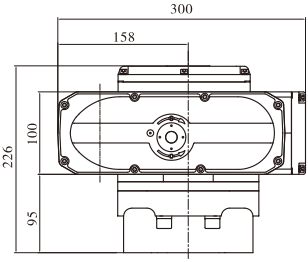
OVERALL DIMENSIONS AND PERFORMANCE PARAMETERS 100/200/300 SERIES

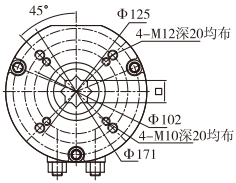
100 SERIES



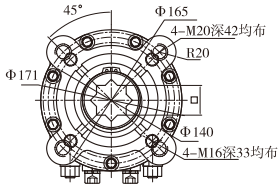


200/300 SERIES





	DCL—100	DCL—200 / DCL—300
Square	□ 22×22 □ 27×27	□ 27×27 □ 36×36
Flange	F10 F12	F14 or F16
Valve stem	Height≤40mm	Height≤66mm

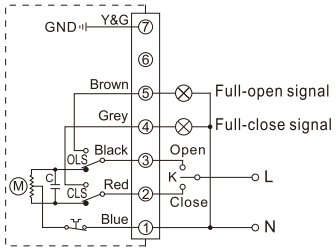


Type / Parameters / Power / Performance	100 SERIES				200/300 SERIES			
	DC24V	AC110V	AC220V	AC380V	DC24V	AC110V	AC220V	AC380V
Motor Power	113W	120W	120W	90W	113W	120W	120W	90W
Rated Current	6.5A	2.0A	1.0A	0.5A	7.1A	2.2A	1.1A	0.6A
Standard Time/Torque	50S/1000Nm	30S/1000Nm			110S/2000Nm 170S/3000Nm	90S/2000Nm		110S/3000Nm
Maximum Torque	1300Nm				2600Nm		3900Nm	
Turning Angle	0～90° Adjustable							
Available Control Circuit	Types of A、B、C、D、E、F、G、H、GEY							
Total Weight	14Kg				21Kg			
Insulating Resistance	DC24V：100MΩ/250VDC AC110V/AC220V/AC380V：100 MΩ/500VDC							
Withstand Voltage Class	DC24V：500VAC 1minutes、AC110V/AC220V：1500VAC 1minutes、AC380V：1800VAC 1minutes							
Protection Class	Ip67							
Installation Angle	360° at any angle							
Electric Interface	Two G1/2 Water-proof Cable Connectors, one for power line and one for signal line.							
Ambient Temperature	-25℃～+55℃							
Optional Function	◆Over-torque Protector ◆Dehumidify Heater ◆Dome indicator ◆Handle ◆Modbus communication							

Performance Indexes of Adjusting Type (Type E)

Type / Power / Parameters / Performance	05E Series	10E Series	20E Series	40E Series	60E Series	100E Series	200E Series	300E Series
	AC24/110/220 DC24	AC24/110/220 DC24	AC24/110/220 DC24	AC24/110/220 DC24	AC24/110/220 DC24	AC110/220 / DC24		
Output Torque	50Nm	100Nm	200Nm	400Nm	600Nm	1000Nm	2000Nm	3000Nm
Maximum Torque	65Nm	130Nm	260Nm	520Nm	800Nm	1300Nm	2600Nm	3900Nm
Acting Time	25S	30S	30S	30S	45S	30S/50S	90S/110S	110S/170S
Turning Angle	0 ~ 90°	0 ~ 90°	0 ~ 90°	0 ~ 90°	0 ~ 90°	0 ~ 90°	0 ~ 90°	0 ~ 90°
Motor Power	10W	25W	40W	90W	90W	120W	120W	120W
Rated Current	1.50/0.24/0.16A 1.28A	2.12/0.57/0.35A 2.03A	3.65/0.65/0.37A 3.57A	6.80/1.12/0.57A 5.13A	6.80/1.18/0.60A 6.04A	2.0/1.0A/ 6.50A	2.2/1.1A/ 7.10A	2.2/1.1A/ 7.10A
Total Weight	2.5kg	4.5kg	9kg	9.5kg	10kg	14kg	21kg	21kg
Input Signal	4~20mADC，1~5VDC，2~10VDC							
Output Signal	4~20mADC							
Basic Error	not more than ±0.5%							
Reciprocating Error	≤ 0.5%							
Dead Space	0.5% - 5.0% adjustable							
Damping Characteristic	0 times							
Repeating Error in Actuator	≤ 0.5%							
Insulating Resistance	AC24V:100MΩ/250VDC AC110/220V:100MΩ/500VDC							
Withstand Voltage Class	AC24V:500VAC 1 minute AC110/220V:1500VAC 1 minute							
Protection Class	IP67							
Installation Angle	360° at any angle							
Electric Interface	Two G1/2 Water-proof Cable Connectors, one for power line and one for signal line.							
Ambient Temperature	-25℃ ~ +55℃							
Optional Function	♦Over-torque Protector ♦Dehumidify Heater ♦Passive contact switch ♦Dome indicator ♦Handle ♦Modbus communication							
Remark	Any other input or output signal needed, please specified in purchase order							

CONTROL CIRCUIT

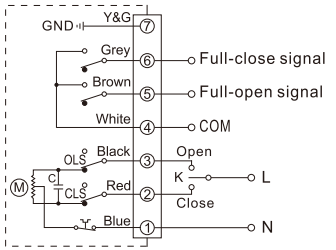


Type A: Limit Position Switch (Active contact)

The opening or closing operation is realized by switching open or close the circuit, outputting a group of full-open or full-close active signals.

Notes of wiring terminals:

1. Terminal 1 is for the connection of zero line of power cord.
2. The connection between power phase line and terminal 2 is for the operation of “close”.
3. The connection between power phase line and terminal 3 is for the operation of “open”.
4. When the power phase line is connected with the terminal 2 and “close” operation is at its position, the “full-close signal” indication lamp connected with terminal 4 lights up.
5. When the power phase line is connected with the terminal 3 and “open” operation is at its position, the “full-open signal” indication lamp connected with terminal 5 lights up.
6. Terminal 7 connects PE.

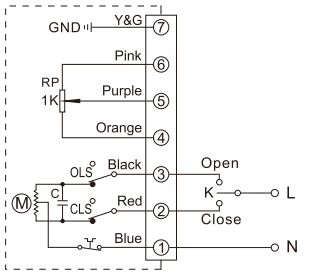


Type B:Switch with middle position(Passive Contact)

The opening or closing operation is realized by switching “open” or “close” the circuit, outputting a group of full open or close passive signals.

Notes of wiring terminals:

1. Terminal 1 is for the connection of zero line of power.
2. The connection between power phase line and terminal 2 is for “close” operation.
3. The connection between power phase line and terminal 3 is for “open” operation.
4. Terminal 4 is common terminal as passive contact.
5. When it is at “open” operation position, terminal 5 will output the “full-open signal”.
6. When it is at “close” operation position, terminal 6 will output the “full-close signal”.
7. Terminal 7 connects PE

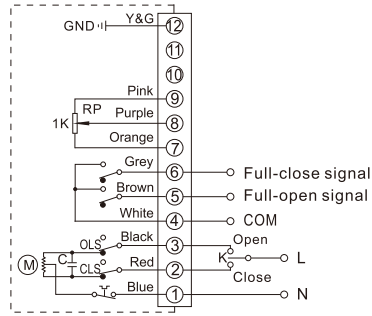


Type C: With 1 KΩ (or 500 Ω) Potentiometer

The opening or closing operation is realized by switching “open” or “close” circuit, outputting resistance signals corresponding to opening position.

Notes of wiring terminals:

1. Terminal 1 is for the connection of zero line of power.
2. The connection between power phase line and terminal 2 is for “close” operation.
3. The connection between power phase line and terminal 3 is for “open” operation.
4. Terminal 4 is low end of potentiometer. When it is at “open” operation, the resistance value between terminal 4 and terminal 5 is increasing along with the increasing of opening.
5. Terminal 5 is for the moving arm of potentiometer.
6. Terminal 6 is high end of potentiometer. When it is at “open” operation, the resistance value between terminal 6 and terminal 5 is reducing along with the increasing of opening.
7. Terminal 7 connects PE



Type D: Position Switch with Potentiometer and Passive Contact

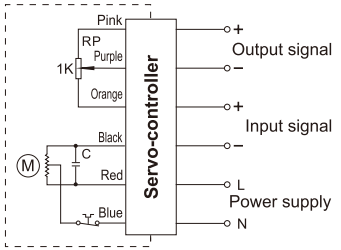
The opening or closing operation is realized by switching “open” or “close” the circuit, outputting resistant signals corresponding to the opening position, and at the same time outputting a group of “full-close” and “full-open” passive signals.

Notes of wiring terminals:

1. Terminal 1 is for the connection of zero line of power.
2. The connection between power phase line and terminal 2 is for the operation of “close”.
3. The connection between power phase line and terminal 3 is for the operation of “open”.
4. Terminal 4 is common terminal as passive contact.
5. When it is at “open” operation position, terminal 5 will output the “full-open signal”.
6. When it is at “close” operation position, terminal 6 will output the “full-close signal”.
7. Terminal 7 is low end of potentiometer. When it is at “open” operation, the resistance value between terminal 7 and terminal 8 is increasing along with the increasing of opening.
8. Terminal 8 is for the moving arm of potentiometer.
9. Terminal 9 is high end of potentiometer. When it is at “open” operation, the resistance value between terminal 9 and terminal 8 is reducing along with the increasing of opening.
10. Terminal 12 connects PE.

Note: The internal circuit of actuator is shown in the dotted frame.

CONTROL CIRCUIT

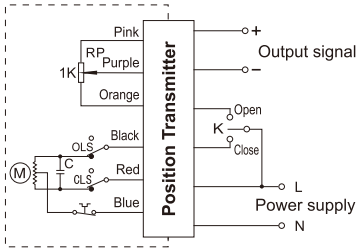


Type E: With Servo Controller

Input: 4~20mADC or 1~5VDC, 2~10VDC; Output: 4~20mADC

Notes of wiring terminals:

1. The "N" of input end of power supply is connected with zero line and "L" is connected with phase line.
2. The "-" at input signal end is connected with negative pole of input signal and "+" is connected with positive pole of input signal.
3. The "-" at output signal end is connected with negative pole of output signal and "+" is connected with positive pole of output signal.

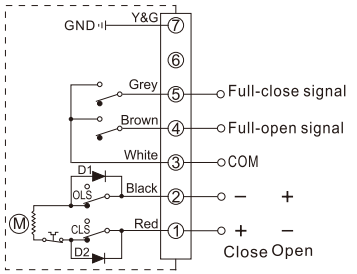


Type F: With Position Transmitter

To output signal of 4~20mADC for valve (full-range feedback for valve)

Notes of wiring terminals:

1. The "N" at input end of power supply is connected with zero line and "L" is connected with phase line.
2. When phase line "L" at input end of power supply is connected with "close", it runs towards to "close" direction, when it is connected with "open",it runs towards to "open" direction.
3. The "-" at output signal end is connected with negative pole of output signal and "+" is connected with positive pole of output signal.

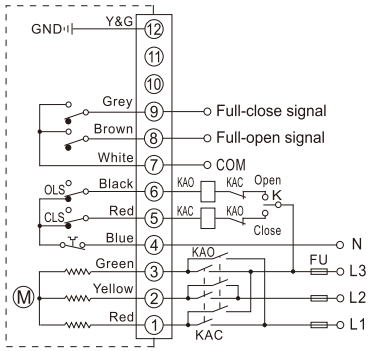


Type G : DC Control Circuit (With Passive Contact Switch)

According to the single conductivity of diode, the opening and the closing operation can be realized by means of the exchange of the positive pole and the negative pole of DC power supply and output a group of full open and close passive signals.

Notes of wiring terminals:

1. For the operation of "close", the terminal 1 is connected with positive pole and the terminal 2 is connected with negative pole. For operation of "open", the terminal 2 is connected with positive pole and the terminal 1 is connected with negative pole.
2. The terminal 3 is the common terminal with passive contact.
3. When it is at "open" operation position, terminal 4 will output the "full-open signal".
4. When it is at its "close" operation position, terminal 5 will output the "full-close signal".
5. Terminal 7 connects PE



Type H : 3-phase AC Control Circuit (With Passive Contact Switch)

By means of the external phase-reversing circuit, the "open" or "close" operation can be realized for running normally or reversibly of motor and output a group of full open or close passive signal.

Notes of wiring terminals:

1. Terminal 1, 2 and 3 are connected with 3-phase AC power supply, the running normally or reversibly of motor can be realized by means of the external phase-reversing circuit.
2. Terminal 4 is the common terminal of external control circuit.
3. Terminal 5 is for the control of "close" operation.
4. Terminal 6 is for the control of "open" operation.
5. Terminal 7 is the common terminal passive contact.
6. When it is at its "open" operation position, terminal 8 will output the "full-open signal".
7. When it is at its "close" operation position, terminal 9 will output the "full-close signal".
8. Terminal 12 connects PE

Note: The internal circuit of actuator is shown in the dotted frame.

APPLICATION REQUIREMENTS

1. Requirement of Installation Conditions

- The product can be installed not only indoors, but also outdoors.
- The product is not explosion-proof, care shall be taken to avoid inflammable and explosive environment.
- It is necessary to have protective cover installed if it operates in such conditions of long time raining, directly receiving sunshine or spatter.
- Please reserve space for manual operation and maintenance.
- The ambient temperature shall be within the rang of -25~55℃.

2. Requirement of Working Medium Temperature

- When it operates with valve, the heat of working medium will be conducted to the body of the unit, care shall be taken to the temperature rising.
- When the temperature of the working medium is high, the bracket connected to the valve will reduce the heat conductivity.
- Please select the standard type bracket if the temperature of working medium is below 80℃.
- Please select the bracket for high temperature if the temperature of working medium is higher than 80℃.

3. Installation Requirement for Cable and Cable Pipe

- Refer to Fig.1 when installing pipes.

①The outer diameter of the pipe shall be Φ9~Φ11.

②Waterproof shall be fully adopted.

③ The electric actuator shall be located higher than the pipe, so water in the pipe will not flow into the unit and the safety of the unit can be ensured.

- The outer diameter of the cable shall be Φ9~Φ11, refer to Fig. 2. No cable, which is not fit to the inner diameter of waterproof cable connector, is allowed to use. Otherwise, water may enter into the unit through the connector to damage the parts inside actuator.
- In principle, the shielded cable shall be adopted as the signal cable, which shall be wired separately from the power cable.

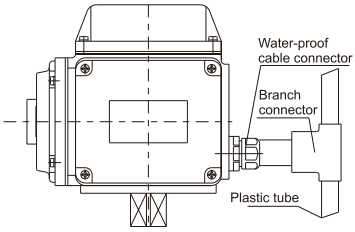


Fig.1

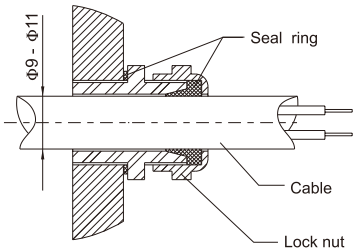


Fig.2

4.Requirement of Power Supply

- The power supply corresponding to that specified for the type of actuator ordered must be provided at the installation site.
- The Power supply and voltage shall be as following specified at the installation site:

AC380V±10% 50Hz/60Hz AC 220V±10% 50Hz/60Hz
AC110V±10% 50Hz/60Hz AC 24V±10% 50Hz/60Hz
DC 24 V± 5%

5. Selection of Fuses for Circuit Breaker

Type \ Ampere \ Voltage	DC24	AC24V	AC110V	AC220V	AC380V
05 Series	5A	5A	3A	2A	2A
10 Series	7A	7A	5A	3A	2A
20/40/60 Series	15A	15A	7A	5A	3A
100/200/300 Series	15A		7A	5A	5A

INSTALLATION OF ELECTRIC ACTUATOR ONTO VALVE

Installation of electric actuator onto valve (Fig. 3)

① Turn the valve to full close position manually and check if there is any abnormal condition.

② Fix the bracket on the valve.

③ Put one end of the coupling into the spindle of valve.

④ Drive the electric actuator to the full close position by crank (pointer is pointing at SHUT, which is at the starting position of scale), insert the output shaft into the square hole of coupling.

⑤ Fasten connecting bolts to connect bracket with electric actuator and the body of valve.

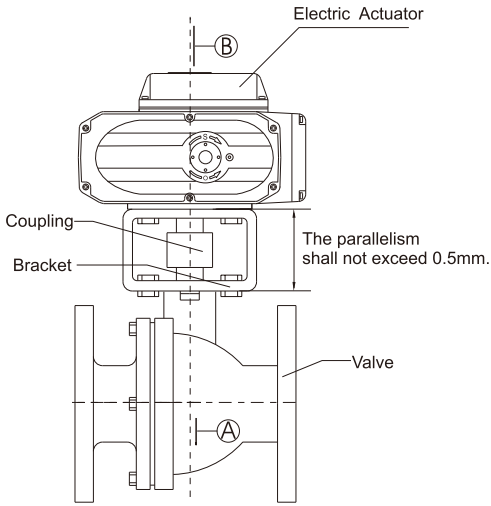
⑥ Drive the electric actuator by crank and confirm the operation is stable without eccentricity and distortion, check the valve, if full close and full open in the range of opening indication of the actuator.

Note: Too much force will lead to the electric actuator over-travel and being damaged.

Special Hints:

Please be noted to those customers who provide the bracket and coupling by their own:

- The bracket and coupling shall be designed and processed by the professional mechanical technicians and meet the requirements noted in Fig. 4
- The precision of square holes at two ends of coupling shall be guaranteed, try as much as possible to eliminate driving clearance, so as to avoid backlash (Reciprocating Error) during operation of valve.
- It is necessary to guarantee the positional precision of square holes at the two ends of coupling. Otherwise, it may exceed the working range designed for actuator; leading to that valve could not work normally due to the travel of actuator not able to be adjusted.



The coaxiality between axes Ⓐ and Ⓑ shall not exceed ϕ0.2mm.

Fig. 4

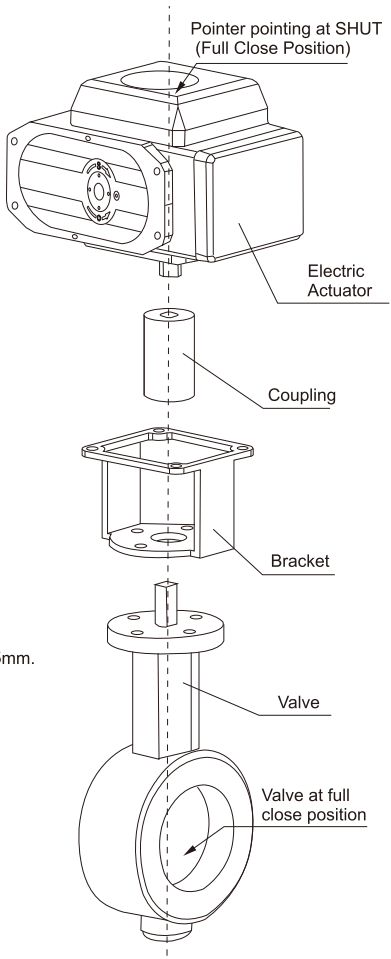


Fig. 3

OVERALL ADJUSTMENT OF ELECTRIC VALVE

1.Adjustment of Electric limit for Micro Regulation type(Fig.5)

①Full-close position adjustment: Drive the valve to Full-close position by a handle at first, loosen the lock screw on scale plate, and adjust the scale plate, making the pointer just to the "0" position on the scale plate (SHUT direction), tighten lock screw on scale plate. Then adjust Shut-position regulation shaft "S" in a clockwise direction with 2mm inner hexagon spanner, make stroke dog D1 turning in a clockwise direction, in turn actuate K2、K1，then stop adjusting Shut-position regulation shaft "S" when K1 moves and make a noise.

② Full-open position adjustment: Drive the valve to Full-open position by a handle at first, making the pointer to the "0" position on the scale plate (OPEN direction), Then adjust Open-position regulation shaft "O" in a counter-clockwise direction with 2mm inner hexagon spanner, make stroke dog D2 turning in a counter-clockwise direction, in turn actuate K4、K3，then stop adjusting Open -position regulation shaft "O" when K3 moves and make a noise.

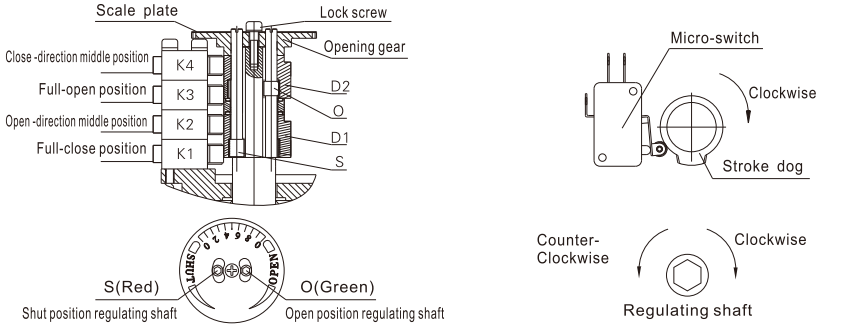


Fig.(5)

2. Adjustment of Electric limit for Middle position type (Fig.6)

①Adjustment D1: Drive the valve to Full-close position by a handle, loosen the lock screw on scale plate, and adjust the scale plate, making the pointer to the "0" position on the scale plate (SHUT direction), tighten lock screw on scale plate. Loosen fixed screw on the stroke dog D1, turn D1 in a clockwise direction, making the corresponding micro-switch K1 move, then stop turning D1 when you hear a sound of K1, fasten the screw on D1 and fix D1.

②Adjustment D2: Drive the valve to Full-open position by a handle, making the pointer to the "0" position on the scale plate (OPEN direction), Loosen fixed screw on the stroke dog D2, turn D2 in a counter-clockwise direction, making the corresponding micro-switch K2 move, then stop turning D2 when you hear a sound of K2, fasten the screw on D2 and fix D2.

③Adjustment D3: After driving the valve to Full-open position by a handle, drive the valve in a clockwise direction operating 2° toward close-direction by a handle, then loosen fixed screw on the stroke dog D3, turn D3 in a counter-clockwise direction, making K3 move and create a sound, fix D3.

④Adjustment D4: After driving the valve to Full-close position by a handle, drive the valve in a counter-clockwise direction operating 2° toward open-direction by a handle, then loosen fixed screw on the stroke dog D4, turn D4 in a clockwise direction, making K4 move and create a sound, fix D4.

Special Hints: ①After the valve is equipped by user, it is necessary to readjust the position if the Full-close position and Full-open position of valve are not same as the Full-close position and Full-open position of the electric actuator. You can adjust it according to the methods mentioned above in the 1 or 2.

②At the ex-factory debugging, the micro-switch of "Close-direction middle position" is adjusted advance 2° than the micro-switch of "Full-close position", the micro-switch of "Open-direction middle position" is adjusted advance 2° than the micro-switch of "Full-open position". In reality, you can adjust it according to the needs of control. The output of middle position micro-switch represents the signal of passive contact. The output of micro-switches of "Full-close position" and "Full-open position" controls the "Full-close position" and "Full-open position" of the valve. No middle position micro-switch and stroke dog for type A, C, E, F.

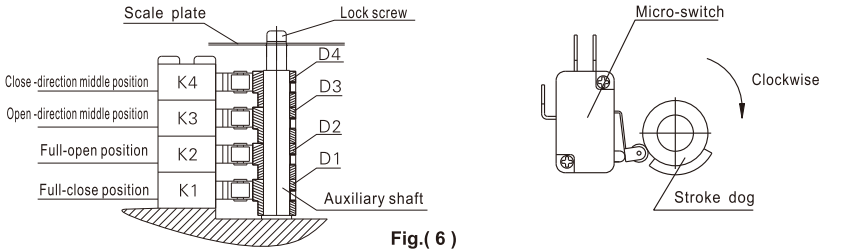


Fig.(6)

OVERALL ADJUSTMENT OF ELECTRIC VALVE

3.Adjustment of potentiometer (Fig. 7) Suitable for type C、D

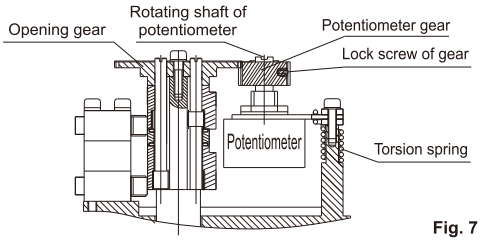
① Drive the actuator to the middle position by handle, making the pointer to 50% position on scale plate.

② Engage the potentiometer gear and opening gear (it is easy to lock when lock screw of gear is toward outside)

③ Refer to Fig.7,measure the resistance between the initial end and terminal end of the potentiometer with multimeter (Resistance value between Pin 1 and Pin 3 of the potentiometer),write down the R value .(If no special requirement, the factory had set it to 1kΩ ±3%).

④ Connect separately the boom of potentiometer (Pin 2)and the another any end of potentiometer with two terminals of multimeter, turn the rotating shaft of potentiometer slowly by means of screwdriver and observe the reading of multimeter .When the resistance value is R/2 ± 2Ω , stop adjusting the rotating shaft of potentiometer and fasten the lock screw of gear.

Special Hint: The potentiometer and gear for type E is not allowed to be adjusted.



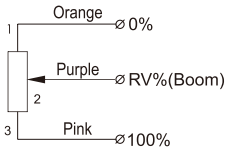


Fig. 7

4.Adjustment of Mechanical Limiting Stopper (Fig. 8, 9)

①Drive the valve to the Full- Close Position by handle and make the Full-close Position Limit-switch move (When the Limit Switch moves, you can hear a sound of “click”).

②Loosen the lock nut on the right side and turn clockwise the adjusting screw for closing limit-switch by means of inner hexagon spanner and make the adjusting screw to contact with the mechanical stopper, and then turn back the adjusting screw anti-clockwise for half of ring, make the mechanical limit-switch at the Full-close position be delayed with 2.5° angle distance to the Electric Limit-switch and then fasten the lock nut.

③Use the same method to make the adjustment of Full-open position mechanical limit-switch (on left side).

Special Hints: After adjustment, you have to make the electric limit position and mechanical limit position of the actuator meet the requirements of Fig. 9. During the operation, if the mechanical limit-switch is leading or coincident with the electric limit-switch, the turning of motor would be blocked and the motor would have the danger of being burnt out or over-heated!

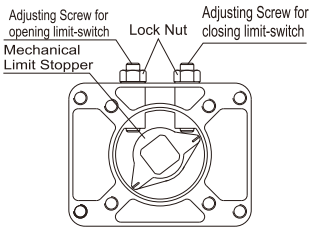


Fig.8

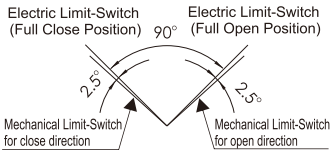


Fig. 9

5.Electric Test-run

①Connect the circuit correctly according to the control circuit diagram adhered inside the cover for Junction Box. After confirming, switch on the power supply.

②The switch is turned to CLOSE; the actuator drives the valve to close direction (clockwise direction) until full-close micro-switch (K1) is actuated, the electric actuator will stop turning.

③The switch is turned to OPEN; the actuator drives the valve to the Full -open direction (counter-clockwise) until full-open micro-switch(K3) (Fig.5:K3; Fig.6:K2) is actuated, the electric actuator will stop turning.

④ After the adjustment mentioned above, if the indication status of opening indicator is not in conformity with the real position of the valve, loosen fixing screw at the center of scale plate, re-adjust the position of the scale plate till the indication of valve being correct.

ADJUSTMENT METHOD OF ADJUSTING TYPE (TYPE E) ACTUATOR

1. Install correctly the electric actuator on the body of valve according to the instruction of《INSTALLATION OF ELECTRIC ACTUATOR ONTO VALVE》, make sure the operation is in normal condition by means of manual operation.
2. Drive the valve to Full-close position by a handle at first, and ensure that mechanical limiting stopper not hit adjustment screws or box, otherwise, please adjust mechanical limiting stopper according to the second point in the fourth step of 《OVERALL ADJUSTMENT OF ELECTRIC VALVE》.Then loosen the lock screw on scale plate and adjust the scale plate, making the pointer just to the "0" position on the scale plate (SHUT position), tighten the lock screw on scale plate.
3. Drive the valve to Full-open position by a handle again, ensure that mechanical limiting stopper not hit adjustment screws or box, otherwise, please adjust mechanical limiting stopper according to the third point in the fourth step of 《OVERALL ADJUSTMENT OF ELECTRIC VALVE》. When the stroke angle of the valve is 90°,the pointer must point to "0" position on the Scale plate (OPEN position).

Special Hints:
①If no special requirement, the stroke of actuator is set to 90° between Full-close position and Full-open position at the ex-factory debugging. After the valve is equipped by user, it is necessary to readjust the angle if the Full-close position and Full-open position of the valve are not same as the Full-close position and Full-open position of the Electric actuator. The mechanical limit must match up to the requirement of Fig.10 as you adjust it.
②User is not allowed to adjust the potentiometer and gear as the opening potentiometer of all adjusting type (Type E) has been considered that the possible changes of Full-open and Full-close positions will lead to the deviation of working area of potentiometer when the valve is adjusted.
③Connect the wiring terminal correctly according to Fg.11 so as not to damage the servo-controller. Be sure to keep it in mind: It is not allow absolutely connecting the power lead with the terminals of input signal or output signal.
④Input signal:TO BE CONNECTED TO A CLASS 2 CIRCUIT ONLY
RACCORDER UNIQUEMENT à UN CIRCUIT DE CLASSE 2.

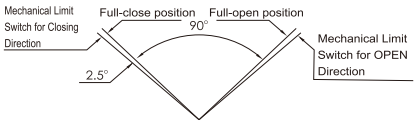
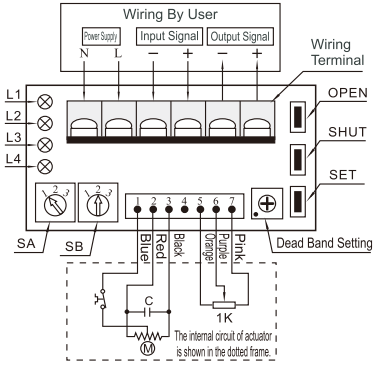
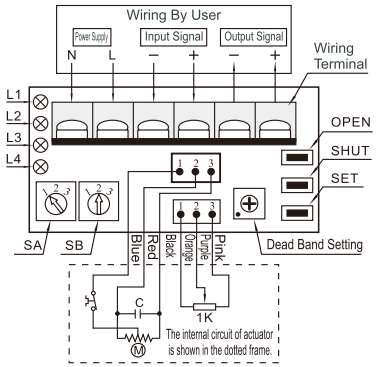


Fig. 10



SF-ZC Servo-Controller



SF-LC/PC Servo-Controller

Fig. 11

4. Illustrate for serve-controller Board
①Button:
● OPEN: In set condition (the arrow of selective switch SA points to 2), actuator will operate in opening direction when the button is pressed and the motor will stop when the button is released. The actuator is in a demarcating Full-open position when buttons SET and OPEN are pressed at the same time.
● SHUT: In set condition, actuator will operate in closing direction when the button is pressed and the motor will stop when the button is released. The actuator is in a demarcating Full-close position when buttons SET and SHUT are pressed at the same time.
● SET: In set condition, actuator will perform specific function when the SET cooperates with OPEN and SHUT.
②Selective switch:
● SA: Select the modes for positive interaction and counteractive of input signal and setstate, the corresponding function with the direction of arrow is (SA points to 1 at ex-factory):
1—positive interaction 2—setstate 3—counteractive
● SB: Select the process mode when input signal lose efficacy, the corresponding function with the direction of arrow is (SA points to 2 at ex-factory):
1—valve is in Full-open position 2—valve is in normal position 3— valve is in Full-close position
③ Dead Band Value Setting Potentiometer: Potentiometer is used to set dead band value. The opening value of the potentiometer from 1-10, the corresponding dead band value is 0.5%-5.0%.
④ Indicator lamp:
● L1: Green indicator lamp shows power, the power indicator lamp lights up when connecting terminals N and L of serve-controller with power;
● L2: Red indicator lamp shows malfunction of input signal failure, this lamp lights up when input signal lose efficacy.
● L3: Red indicator lamp shows malfunction of position inspection circuit, this lamp lights up when the lead of opening potentiometer is open or short or damaged.
● L4: Red indicator lamp shows malfunction of stickiness, this lamp lights up when actuator is sticked.

ADJUSTMENT METHOD OF ADJUSTING TYPE (TYPE E) ACTUATOR

5.Setting Make the arrow of selective switch SA to “2”, that is the set condition. You can perform a demarcating stroke, mode selection in deal with input signal failure, dead band setting, manual operation and output current correcting, etc. in set condition.

①Stroke Standardization

● Full-close position standardization: Adjust the stroke of the actuator to Full-close position by means of pressing the buttons OPEN and (or) SHUT. Pressing SET at first and hold on it, then pressing SHUT and keeping 4s at the same time. Release SHUT and SET at the same time when indicator lamp L2 lights up. As L2 goes out, Full-close position standardization is completed.

● Full-open position standardization: The signal 20mADC must be input accurately on the terminal of input signal when Full-open position standardization is performed.

Adjust the stroke of the actuator to Full-open position by means of pressing the buttons OPEN and (or) SHUT. Pressing SET at first and hold on it, then pressing OPEN and keeping 4s at the same time. Release OPEN and SET at the same time when indicator lamp L2 lights up. As L2 goes out, Full-open position standardization is completed.

②Mode Selection In Deal With Input Signal Failure

Selective switch SB is used to select the process mode on input signal failure:

1—valve is in Full-open position 2—valve is in normal position 3—valve is in Full-close position

Note: The varying of selective switch SB is still effective in automatic operation condition.

③Dead Band Value Setting

Turn the potentiometer of dead band value setting in a clockwise direction, dead band value will increase. Turn the Potentiometer of dead band value setting in a counter-clockwise direction, dead band value will reduce. There is scale on the right side of the potentiometer, the dead band value will vary 0.5% with turning one scale. The servo-controller will manage in accordance with 0.5% when the dead band value setting less than 0.5%.

④In set condition, actuator will operate manually in opening direction and closing direction by means of pressing the button OPEN or SHUT.

6. Running Make the selective switch SA to “1” or “3” position, that is the automatic operation condition. The opening of actuator and output signal will change with input signal.

Input signal / Item to be checked	4mA	8mA	12mA	16mA	20mA
Pointer position	CLOSE position “0”	2.5	5.0	7.5	OPEN position “0”
Valve position	0% opening	25% opening	50% opening	75% opening	100% opening
Output current	4mA	8mA	12mA	16mA	20mA

Note: ■ When selective switch SA points to “3” position (counteractive), input current 4mA is corresponding to the Valve position 100% opening, the output current is 4mA; input current 20mA is corresponding to the Valve position 0% opening, the output current is 20mA.

■ The accuracy grade of the servo-controller is grade 1, the basic allowance is not more than±1%, reciprocating allowance is less than1%.

7. Output current correcting The output current of the servo-controller has been corrected at the ex-worSET, users no need to adjust. If output current is not 4mA with the valve Full-close or output current is not 20mA with the valve Full-open, and allowance is more than 1%, you can correct it in accordance with following process:

Connect a 20mADC ammeter to terminal of the input current, make the selective switch SA to “2” position, turn into setstate. Pressing the button SET at first and hold on it, then pressing buttons OPEN and SHUT at the same time. Release this three buttons at the same time when indicator lamp L2 lights up that is turning into 4mA correction. Observe the indication of the ammeter. The current will increase when button OPEN is pressed and it will reduce when button SHUT is pressed. Adjust output current to 4.00mA(±0.02). Press the button SET and indicator lamp L2 goes out, and then release SET until L2 lights up again, the correction for 4mA is completed, turn into automatically the correction for 20mA. Observe the indication of the ammeter, adjust current to 20.00mA(±0.02) by buttons OPEN and SHUT, Press the button SET and indicator lamp L2 goes out, and then release SET until L2 lights up again, the correction for output current is completed, L2 goes out.

8. Malfunction judgement and management The malfunction indicator lamps will light up when malfunction occurs, different indicator lamp lights up stand for different malfunction.

①L2 lights up: The input signal is considered disabled by servo-controller if input signal is less than 2.5mA or more than 22mA. Measure voltage between terminals of input signal wiring, the voltage should be 0.88-4.4V when input signal is 4-20mA (Resistance: 220Ω). When input signal is less than 0.55V (Current: 2.5mA) or more than 4.84V (Current: 22mA), it will signify the lead of input signal is open, short, leakage of electricity or an incorrect signal of control system. If the voltage of terminals is normal and L2 is still come on, the trouble area may be servo-controller.

②L3 lights up: The trouble occurs in the circuit of position inspection. Check whether the lead of opening potentiometer is open and short or whether potentiometer itself is damaged. The voltage of potentiometer should be about 4V under normal circumstances, the centre line of potentiometer and the voltage of any terminal will vary with the opening of the potentiometer. If the inspections are normal and L3 is still come on, the trouble area may be servo-controller.

③L4 lights up: The mechanical trouble occurs in the operation. Check whether the lead of electric motor is loose or open; whether electric motor itself is work normally; rotate the actuator separately in two directions by handle, check whether the actuator is stuck. If the inspections are normal and L4 is still come on, the trouble area may be servo-controller.

④The opening of the actuator is not corresponding with the specified opening of the input signal or can not complete the Full stroke

● The signal is not added at calibration Full-open or 20mADC signal added is not accurate.

● The 20mADC signal added at calibration Full-open has difference with 20mADC signal at operation area when debugging is performed.

● Circuit malfunction occurs in the potentiometer of dead zone value setting on the servo-controller.

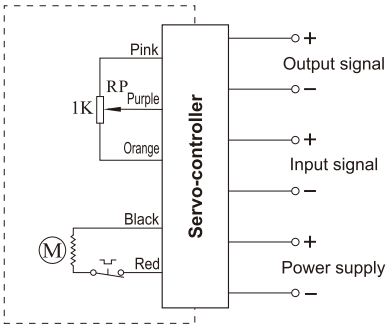
For first and second causes, you can recalibrate Full-open according to actual 20mADC signal of operation area. If the malfunction can not be solved, the trouble area may be servo-controller.

⑤Output current is not corresponding with the valve opening

If the opening potentiometer is damaged or the lead of potentiometer is open and short, the malfunction that output current is not corresponding with the valve opening will occurs and L3 lights up. If the circuit trouble of potentiometer is troubleshooting and output current is still not corresponding with the valve opening after correcting output current, the trouble area should be servo-controller.

TYPE GEY WIRING AND ADJUSTMENT

Type GEY: With Servo Controller



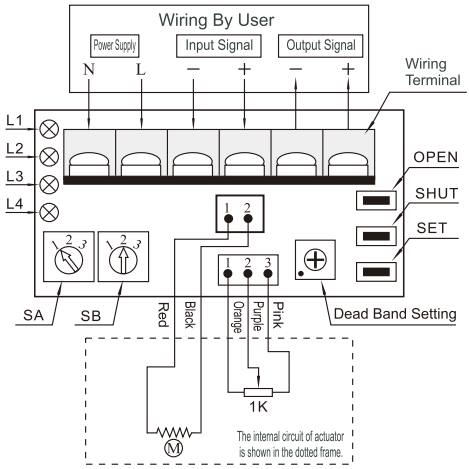
Input: 4~20mADC or 1~5VDC, 2~10VDC
Output: 4~20mADC

Notes of wiring terminals:

1. The "-" of input end of power supply is connected with negative pole of DC24V power supply and "+" is connected with positive pole of DC24V power supply .
2. The "-" at input signal end is connected with negative pole of input signal and "+" is connected with positive pole of input signal.
3. The "-" at output signal end is connected with negative pole of output signal and "+" is connected with positive pole of output signal.

Note: The internal circuit of actuator is shown in the dotted frame.

Type GEY For Serve-controller Board



SF–ZCY/DC24V, SF–LCY/DC24V Servo-Controller

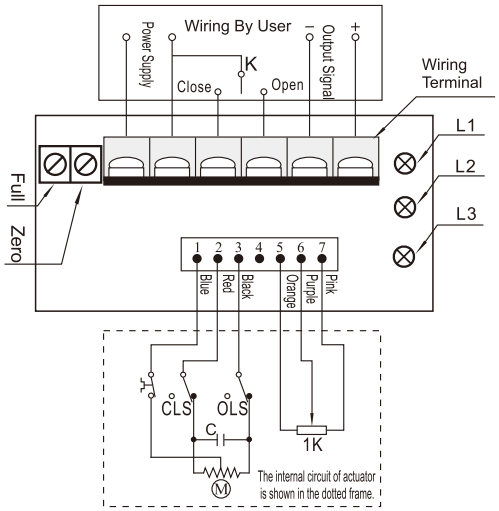
Fig.13

The board illustration and debugging method of GEY servo-controller are exactly the same as those on page 13/14

ADJUSTMENT METHOD FOR POSITION TRANSMITTER (TYPE F) ACTUATOR

1.Install correctly the electric actuator on the body of valve according to the instruction of 《 INSTALLATION OF ELECTRIC ACTUATOR ONTO VALVE》, make sure the operation is in normal condition by means of manual operation.
2.Refer to the adjustment requirements of 《 OVERALL ADJUSTMENT OF ELECTRIC VALVE》 , adjust correctly the Electric Limit Switch (CLS for close limit, OLS for open limit) and Mechanical Limit Switch of the electric actuator.

Special Hints: ① If no special requirement, the stroke of actuator is set to 90° between Full-close position and Full-open position at the ex-factory debugging. The output current is 4mA for Full-close position and the current is 20mA for Full-open position.
② User is not allowed to adjust the potentiometer and gear as the opening potentiometer has been considered that the possible changes of Full-open and Full-close positions will lead to the deviation of working area of potentiometer when the valve is adjusted.
③ Connect the wiring terminal correctly according to Fig.13.



WF-Z/L,WF-ZC/LC Position Transmitter

Fig.14

3.Illustrate for Position Transmitter board
① Adjustable potentiometer : “ Full” and “ Zero” are used to adjustment separately corresponding output current 20mA or 4mA when valve is in Full-open position or Full-close position.
②Indicator lamp:
- L1:Red indicator lamp shows power，the lamp lights up when position transmitter is connected to power.
- L2: Green lights on when valve runs to open direction.
- L3: Green lights on when valve runs to close direction

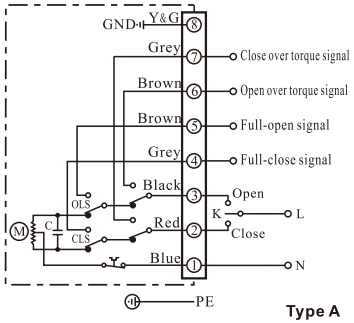
4.Adjustment & Setting
Connect a 20mADC ammeter to terminal of output signal when debugging is performed.
①The middle position of potentiometer confirming
The potentiometer has been adjusted at the ex-works，users no need to adjust.
②Output current correcting
The output current of the position transmitter has been corrected at the ex-works，users no need to adjust. If output current is not 4mA with the valve Full-close or output current is not 20mA with the valve Full-open ,and allowance is more than 1%, you can correct it in accordance with following process:
Connecting a 20mADC ammeter to terminal of the output signal,drive valve to full closed. Using a slotted screwdriver adjust "Zero"potentiometer, observing the current table results, when the output current is greater than 4mA ,then do clockwise rotating, otherwise counterclockwise rotating, until the current table shows 4mA (±0.02);drive valve fully open, with a slotted screwdriver adjust "Full" potentiometer, observing the current table shows, when the output current is greater than 20mA counterclockwise rotation,whereas the clockwise rotation, until the current table shows 20mA (±0.02), output current correction is completed.

Note: output current cabliration first adjust the "Zero", then "Full", otherwise it will cause trouble to position transmitter.

OVER TORQUE CONTROL CIRCUIT

Type A:Limit Switch with Active contact and over torque protect function

The opening or closing operation is realized by switching open or close the circuit,outputting a group of full open or full close active signals and open or close active signals of over torque.



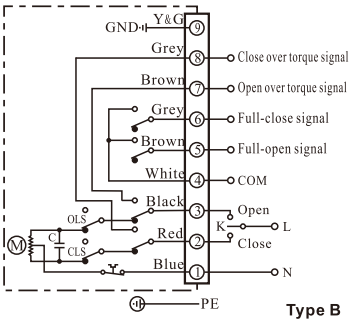
Type A

Notes of wiring terminals:

1.Terminal 1 is for the connection of zero line of power cord.
2.The connection between power phase line and terminal 2 is for the operation of "close".
3. The connection between power phase line and terminal 3 is for the operation of "open".
4.When the power phase line is connected with the terminal 2 and "close" operation is at its position,the "full close" signal indication lamp connected with terminal 4 lights.
5.When the power phase line is connected with the terminal 3 and "open" operation is its position, the "full open" signal indication lamp connected with terminal 5 lights.
6.When torque protection appeared during the course of the 'open' operation of actuator,the'open over torque alarm'signal indication lamp connected with terminal 6 lights.
7.When torque protection appeared during the course of the 'close' operation of actuator,the'close over torque alarm'signal indication lamp connected with terminal 7 lights.

Type B:Intermediate Position Switch and over torque protect function

With Passive contact The opening or closing operation is realized by switching "open" or "close" the circuit, outputting a group of full open or close passive signals and open or close active signals of over torque.



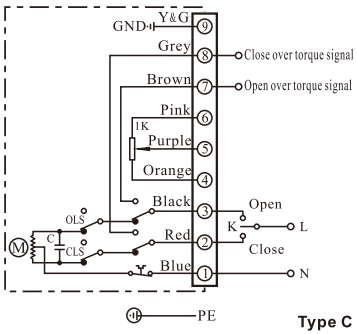
Type B

Notes of wiring terminals:

1.Terminal 1 is for the connection of zero line of power.
2.The connection between power phase line and terminal 2 is for "close" operation.
3. The connection between power phase line and terminal 3 is for the "open" operation.
4.Terminal 4 is common terminal as passive contact.
5.When it is at "open" operation position, terminal 5 will output the "full open" signal.
6.When it is at "close" operation position, terminal 6 will output the "full close" signal.
7.When torque protection appeared during the course of the 'open' operation of actuator,the'open over torque alarm'signal indication lamp connected with terminal 7 lights.
8.When torque protection appeared during the course of the 'close' operation of actuator,the'close over torque alarm'signal indication lamp connected with terminal 8 lights.

Type C:With 1 KΩ(or 500Ω) Potentiometer and over torque protect function

The opening or closing operation is realized by switching "open" or "close" circuit, outputting resistant signals corresponding to opening position and open or close active signals of over torque.



Type C

Notes of wiring terminals:

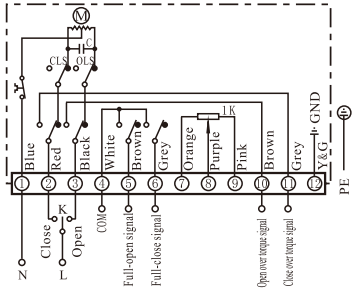
1.Terminal 1 is for the connection of zero line of power.
2.The connection between power phase line and terminal 2 is for "close" operation.
3. The connection between power phase line and terminal 3 is for the "open" operation.
4.Terminal 4 is for the lower end of potentiometer. When it is at "open" operation, the resistance value between terminal 4 and terminal 5 is increasing along with the increasing of opening.
5.Terminal 5 is for the moving arm of potentiometer.
6.Terminal 6 is for higher end of potentiometer.When it is at "open" operation, the resistance value between terminal 6 and terminal 5 is reducing along with the increasing of opening.
7.When torque protection appeared during the course of the 'open' operation of actuator,the'open over torque alarm'signal indication lamp connected with terminal 7 lights.
8.When torque protection appeared during the course of the 'close' operation of actuator,the'close over torque alarm'signal indication lamp connected with terminal 8 lights.

Note: The internal circuit of actuator is shown in the dotted frame.

OVER TORQUE CONTROL CIRCUIT

Type D:Position Switch with Potentiometer and Passive Contact Aand over torque protect function

The opening or closing operation is realized by switching “open” or “close” the circuit, outputting resistant signals corresponding to the opening position, and at the same time outputting a group of “Full-close” and “Full-open” passive signals and open or close active signals of over torque.



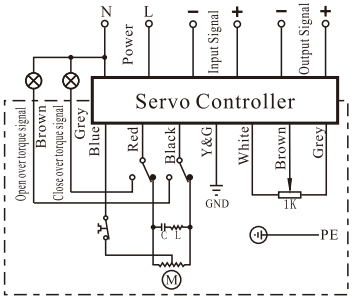
Type D

Notes of wiring terminals:

1.Terminal 1 is for the connection of zero line of power.
2.The connection between power phase line and terminal 2 is for the operation of “close” .
3. The connection between power phase line and terminal 3 is for the operation of “open” .
4.Terminal 4 is common terminal as passive contact.
5.When it is at “open” operation position, terminal 5 will output the “full open” signal.
6.When it is at “close” operation position, terminal 6 will output the “full close” signal.
7.Terminal 7 is for the lower end of potentiometer.When it is at “open” operation, the resistance value between terminal 7 and terminal 8 is increasing along with the increasing of opening.
8.Terminal 8 is for the moving arm of potentiometer.
9.Terminal 9 is for higher end of potentiometer.When it is at “open” operation, the resistance value between terminal 9 and terminal 8 is reducing along with the increasing of opening.
10.When torque protection appeared during the course of the ‘open’ operation of actuator,the‘open over torque alarm’signal indication lamp connected with terminal 10 lights.
11.When torque protection appeared during the course of the ‘close’ operation of actuator,the‘close over torque alarm’signal indication lamp connected with terminal 11 lights.

Type E: With Servo Controller and over torque protect function

Input: 4~20mADC or 1~5VDC; Output:4~20mADC



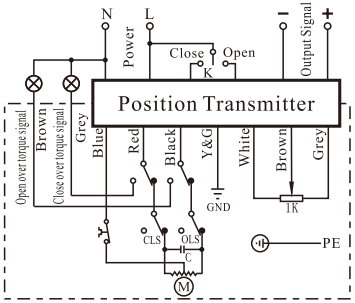
Type E

Notes of wiring terminals:

1.The “N” of input end of power supply is connected with zero line and “L” is connected with phase line.
2.The “-” at input signal end is connected with negative pole of input signal and “+” is connected with positive pole of input signal.
3.The “-” at output signal end is connected with negative pole of output signal and “+” is connected with positive pole of output signal.
4.When torque protection appeared during the course of the ‘open’ operation of actuator,the‘open over torque alarm’signal indication lamp lights.
5.When torque protection appeared during the course of the ‘close’ operation of actuator,the‘close over torque alarm’signal indication lamp lights.

Type F: With Position Transmitter and over torque protect function

To output signal of 4~20mADC for valve
(Full-range feedback for valve)



Type F

Notes of wiring terminals:

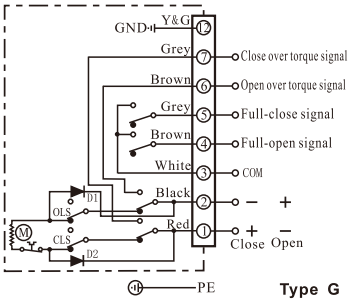
1.The “N” at input end of power supply is connected with zero line and “L” is connected with phase line.
2.When phase line “L” at input end of power supply is connected with “close”, it runs towards to “close” direction, when it is connected with “open” it runs towards to “open” direction.
3.The “-” at output signal end is connected with negative pole of output signal and “+” is connected with positive pole of output signal.
4.When torque protection appeared during the course of the ‘open’ operation of actuator,the‘open over torque alarm’signal indication lamp lights.
5.When torque protection appeared during the course of the ‘close’ operation of actuator,the‘close over torque alarm’signal indication lamp lights.

Note: The internal circuit of actuator is shown in the dotted frame.

OVER TORQUE CONTROL CIRCUIT

Type G : DC Control Circuit, with Passive Contact Switch and over torque protect function

According to the single conductivity of diode, the opening and the closing operation can be realized by means of the exchange of the positive polarity and the negative polarity of DC power supply and output a group of full open and close passive signals and open or close active signals of over torque.



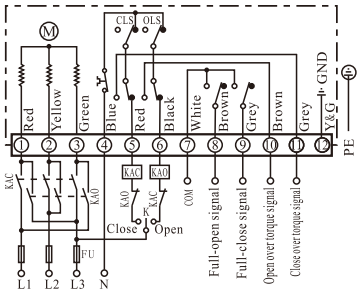
Type G

Notes of wiring terminals:

1. For the operation of “close”, the terminal 1 is connected with positive pole and the terminal 2 is connected with negative pole. For operation of “open”, the terminal 2 is connected with positive pole and the terminal 1 is connected with negative pole.
2. The terminal 3 is the common terminal with passive contact.
3. When it is at “open” operation position, terminal 4 will output the “full-open signal”.
4. When it is at its “close” operation position, terminal 5 will output the “full-close signal”.
5. When torque protection appeared during the course of the ‘open’ operation of actuator,the‘open over torque alarm’signal indication lamp connected with terminal 6 lights.
6. When torque protection appeared during the course of the ‘close’ operation of actuator,the‘close over torque alarm’signal indication lamp connected with terminal 7 lights.

Type H : 3-phase AC Control Circuit, with Passive Contact Switch and over torque protect function

By means of the external phase-reversing circuit, the “open” or “close” operation can be realized for running normally or reversibly of motor and output a group of full open or close passive signal and open or close active signals of over torque.



Type H

Notes of wiring terminals:

1. Terminal 1, 2 and 3 are connected with 3-phase AC power supply, the running normally or reversibly of motor can be realized by means of the external phase-reversing circuit.
2. Terminal 4 is the common terminal of external control circuit.
3. Terminal 5 is for the control of “close” operation.
4. Terminal 6 is for the control of “open” operation.
5. Terminal 7 is the common terminal passive contact.
6. When it is at its “open” operation position, terminal 8 will output the “full-open signal”.
7. When it is at its “close” operation position, terminal 9 will output the “full-close signal”.
8. When torque protection appeared during the course of the ‘open’ operation of actuator,the‘open over torque alarm’signal indication lamp connected with terminal 10 lights.
9. When torque protection appeared during the course of the ‘close’ operation of actuator,the‘close over torque alarm’signal indication lamp connected with terminal 11 lights.

Note: The internal circuit of actuator is shown in the dotted frame.

OVER TORQUE TROUBLE SHOOTING

Problem	Cause	Remedy
Open over torque alarm signal indication lamp lights	Valve opening direction is too large load and overload protection	1.Run the actuator to closing direction. 2.Exclude the overload of opening direction.
Close over torque alarm signal indication lamp lights	Valve closing direction is too large load and overload protection	1.Run the actuator to opening direction. 2.Exclude the overload of closing direction.

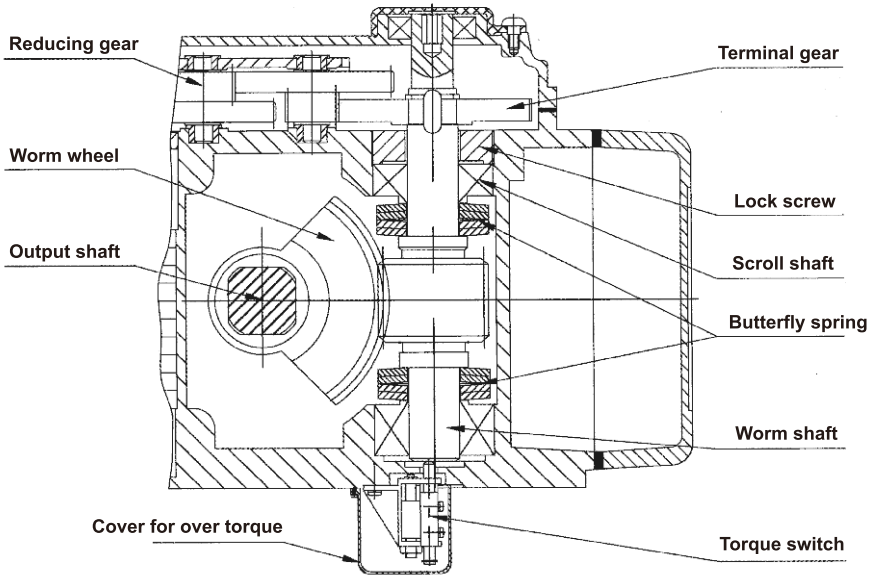
Note: Strictly forbidden to have removed the cover for over torque!

OVER TORQUE OPERATIONAL PRINCIPLE

When the load of output shaft reached the rated load of actuator. The motor go on working through the reducing gear drive worm shaft. The same time, worm shaft compress the butterfly spring and bring an axial displacement (the size of spring tension has been adjusted according to output torque,users do not adjust please),so that the torque switch moves and cut off motor power, making actuator stop working, and to avoid mechanical damage of actuator and valve.

Special tips:

Torque switch for the two-way play, that is the actuator by running clockwise or counterclockwise. When the load torque reached rated torque, torque switches will work.



OVER TORQUE MECHANICAL SCHEMATICS

OPERATION AND MAINTENANCE

1. Maintenance and service

① Since the high-grade molybdenum-base lubricant with long service life and good pressure resistance is employed, no lubrication and periodical maintenance are needed.

② If the operation of valve is rare, please drive the actuator regularly and check if there is any abnormal condition.

2. Trouble shooting

Problem	Cause	Remedy
Motor does not start	The power cord is not plugged in.	Plug in the power cord.
	Broken connection ,connector and cable is disengaged.	Connect the power line. Connect and fasten the terminal correctly.
	Voltage is not right or too low.	Check the voltage if it is normal.
	The overheat protection device is initiated. (The ambient temperature too high, or valve clogged)	Cool down the ambient temperature. Check the valve manually, see if it can be opened and closed normally.
	The micro-switch is not properly moving.	Replace the micro-switch.
	The capacitor is defective.	Contact the manufacturer and replace the capacitor.
	The diode for DC electric actuator is open.	Contact the manufacturer and replace the diode.
Indication lamp for close/open does not work.	Indicator lamp damaged	Replace the lamp.
	The action of micro-switch is not proper.	Replace the micro-switch.
Motor could not stop running when reaching to the limit position	The action of micro-switch is not proper.	Replace the micro-switch.
	Phase order of 3-phase DC power is wrong connected.	Adjust the order of three-phase.
	Misconnect the limit-switch with the control circuit.	Adjust the connection.
	Mechanical limit makes lead action.	Re-adjust the mechanical limit according to adjustment instruction of mechanical limit stopper.
	The diode of DC electric actuator is short .	Contact the manufacturer and replace the diode.
Actuator got water	Irregular cable or cable end at inlet side is not properly having waterproof treatment according to the Manual Instruction.	Contact the manufacturer for repair.
	The glass len for electric elements is broken.	
	The fixing screws for the covers of electric elements, junction box and driving unit are not locked.	