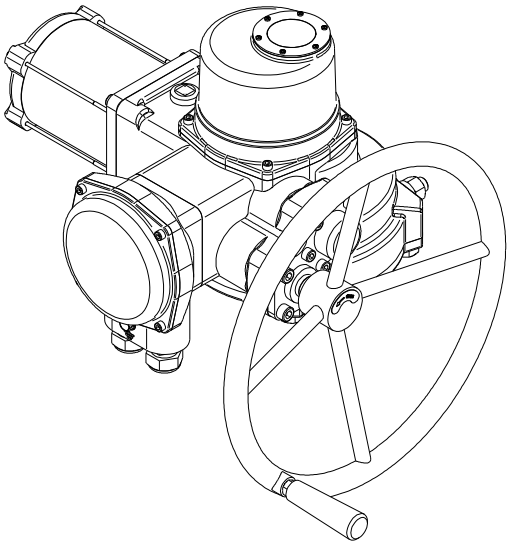
802 SERIES ELECTRIC ACTUATORS

INSTRUCTION MANUAL



TIANJIN BEIFANG VALVE ACTUATOR CO., Ltd.

Issue 201103

Thank you for purchasing and using our products. This manual is valid for 802 series electric quarter-turn actuators.

Please before you operate your product, be sure to read this booklet carefully. These operation instructions are only valid for "**clockwise closing**", i.e. driven shaft turns clockwise to close the valve.

WHERE TO FIND INFORMATION

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Please tell us some information about your product when contact with us:

Model, Factory Number

1.Summarize

1.1 Range of application

802 series electric actuators suit a wide range of quarter-turn applications. They provide a reliable position control of butterfly, ball valves, as well as similar ones.

1.2 Brief

•802 Series valve actuators powered by electric have limit switch and torque switch in open and close direction .

•802 Series valve actuators can output many kinds of signals to meet customers' requirements.

•802 Series valve actuators with control package integrate the startup of motor and other control units in a watertight box. .

1.3 Warnings and notes

Non-observance of the **warnings** and **notes** may lead to serious injuries or damages. Qualified personnel must be thoroughly familiar with all **warnings** and **notes** in these operation instructions.

This sign means：**Hint！**
Explain the topic in detail.

This sign means ： **Note！**
Non-observance of these notes may lead to the blight to products or the failure of operation.

This sign means ： **Warning！**
If not carried out the "warnings" correctly can affect the safety of persons or material.

2.Technical data

Power: Standard: 380V/50Hz/3ph AC, voltage vibration range:±10%, frequency vibration range: ±5%.

Work duty: Standard: S2 system. 15 minutes cyclic running time, the startup interval is 2～ 3 times running time. 60 starts/hr. for application, do not exceed 600 starts/hr. when adjusting.

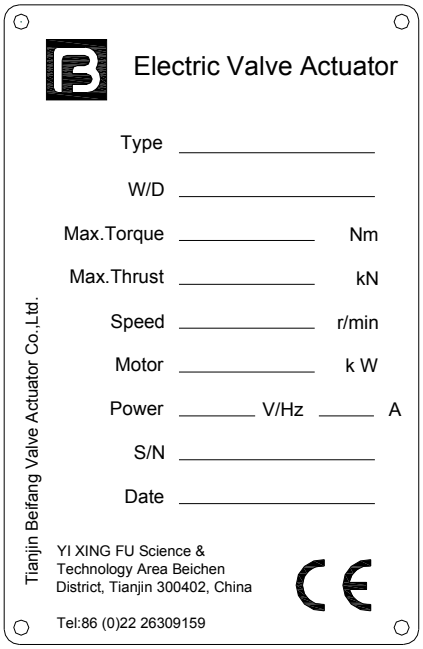
Options: MS4——S4 system, used for precise adjusting, 1200 starts/hr.

Protection: Standard: A temperature protection switch embedded in the windings of the motor will trip the actuator control circuit if the motor windings overheat. There mounted thermal overload relay in the control package..

Temperature: Standard: －20℃～＋70℃
－20℃～＋40℃（for ex-proof actuators）

Noise : 60～70 dB

Marking:



Degree of protection: Standard: IP65（IEC 529:1989）

Options: WT7——IP67（ IEC 529:1989 ）
WT8——IP68（ IEC 529:1989 ）
EXP——An ex-proof enclosure to ExdIIBT4（IEC 60079-0:1998,IEC 60079-1:1998）

•Outputting data:

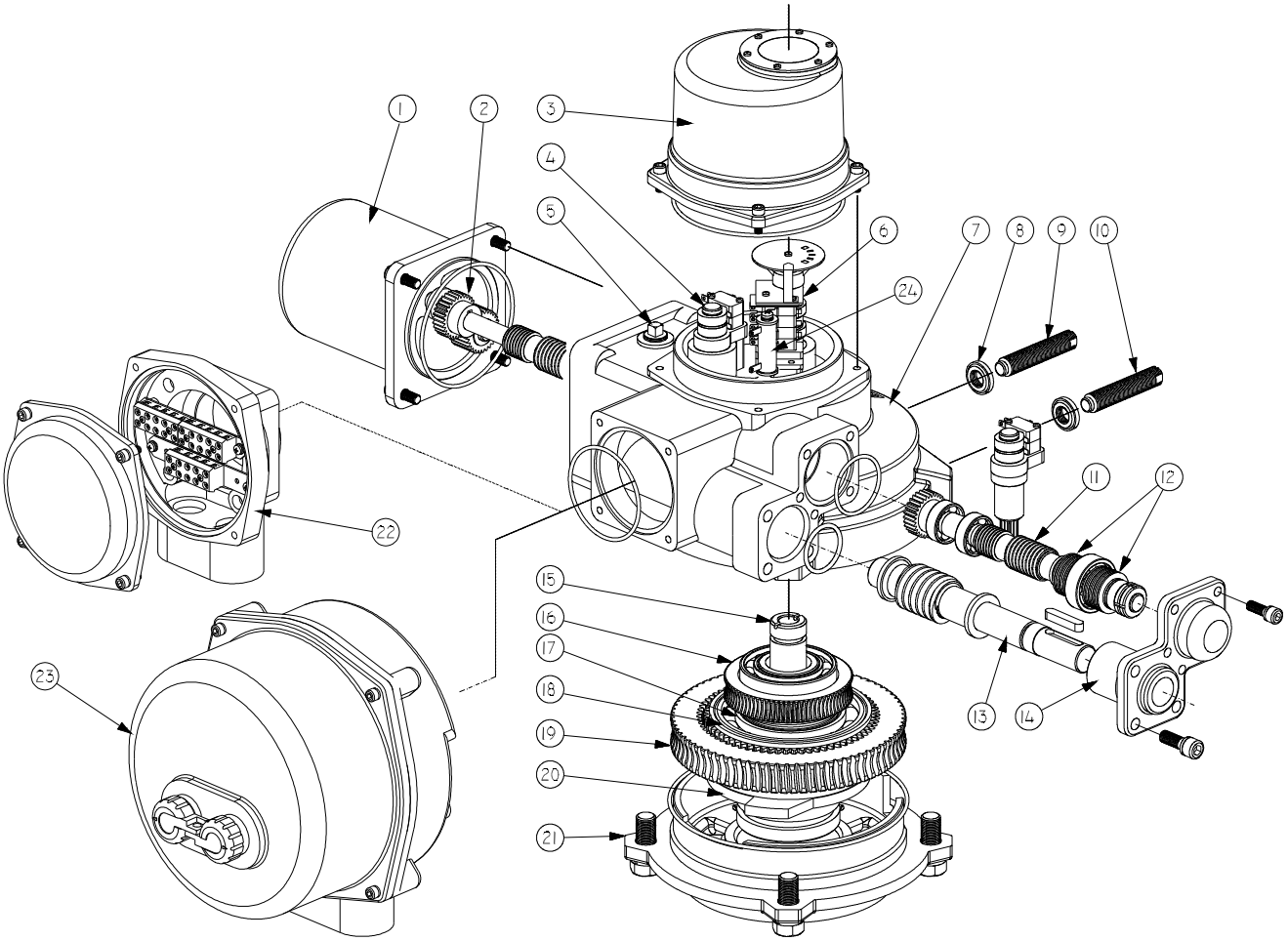
Base No.	Unit type	Output torque	Output Speed	Motor power (380V/50Hz/3ph AC)	Rated Current	Start Current
		Nm	r/min	kW	A	A
8021	802.10-1	100	1	0.03	0.32	1.1
	802.20-0.5	200	0.5	0.03	0.32	1.1
	802.20-1	200	1	0.06	0.6	2
	802.30-0.5	300	0.5	0.06	0.6	2
	802.30-1	300	1	0.09	0.7	2.1
8022	802.60-1	600	1	0.18	1.2	5
	802.120-0.5	1200	0.5	0.18	1.2	5
	802.120-1	1200	1	0.37	2.3	11
	802.150-0.5	1500	0.5	0.18	1.2	5
	802.150-1	1500	1	0.37	2.3	11
8023	802.250-0.5	2500	0.5	0.55	2.3	12
	802.250-1	2500	1	0.75	2.8	16
	802.500-0.5	5000	0.5	0.75	2.8	16
8023 +3011	802.1000-0.2	10000	0.2	1.1	4.3	21
	802.1200-0.2	12000	0.2	1.1	4.3	21

•Mechanical data:

	8021	**8022**	**8023**	**8023+3011**
Manual gear ratio	88:1	74:1	67:1	194:1
Weight kg	36	56	100	203

It is natural that the temperature of the motor surface reach or exceed 80 ^{0}C when working, do not touch the motor for fear scald.

3.Construction



1	Motor	13	(Manual operated) Worm shaft
2	Spur gear set	14	Worm shaft end cap
3	Compartment cover	15	Drive sleeve
4	Torque switch	16	Worm gear
5	Grease fitting	17	Eccentric shaft
6	Limit switch and position indicator	18	Planetary gear
7	Main house	19	(Manual operated) Worm gear
8	Mechanical stops gasket	20	Clutch sleeve
9	Stop bolt closing	21	Joint flange
10	Stop bolt opening	22	Terminal box
11	Worm shaft	23	Control package
12	Disk spring	24	Space heater

4.Principles of operation

4.1 Motor operation

Your actuator is always available for motor operation whenever the motor is energized.

The spur gear set #2 drives the worm shaft #11 and worm gear #16，which in turn rotates the eccentric shaft #17by means of key.Rotation of the eccentric shaft causes the planetary gear #18 and the worm gear #19 to drive the clutch sleeve#20. The drive sleeve#15 is keyed to the clutch sleeve and, hence, rotates producing the required output rotary motion.

The BF series controllers made in our company can be used together with 802 series electric actuators to meet different requirement.

4.2 Manual operation

The shift from manual to motor operation is fully automatic and no hand/auto lever is provided. When the product is need to be adjusted or repaired, the consumer can directly operate the handwheel which is keyed to the worm shaft #13, then the rotation of the manual operated worm gear causes the planetary gear to drive the clutch sleeve, which rotates the drive sleeve by means of key.

It is best not to operate the handwheel in motor mode for fear that the varying of the output speed and torque.

In motor mode，driving the handwheel oppositely leads to a higher output speed, and driving at the same direction leads to an output speed-down or a reverse rotation of the drive sleeve.

4.3 Travel and torque limiting

A cam shaft pinned with the drive sleeve #15 in limit switches and position indicator #6 is used for travel limit. Once the limit switch which remains in step with the valve position is driven by cams set on the cam shaft in the right position, the power to the motor is interrupted.

The disk spring #12 is mounted on the worm shaft#11. As torque is generated by the actuator, axial move of the worm shaft is proportionable to the torque. A finite compression of the disk spring represents a finite torque output. The torque switch #4 senses the movement of the worm shaft and interrupts the power to the motor.

4.4 Mechanical stops

Two adjustable mechanical stop bolts #9 ,#10 are provided in open and close direction.

5. Lubrication

- There are O-rings between the main house #4 and its contacting portion. The main house is fully filled with 00# gear lubricating grease to lubricate the worm shaft, worm gear, gears and bearings. (for sizes 9031~9036, the surface of the gears in the counter is coated with solidified molybdenum bisulfide).
- No seal can remain absolutely tight at all times, therefore, it is not unusual to find a very small amount of weeping around shaft seals-especially during long periods of idleness such as storage. Once the equipment has begun operating, this phenomenon should disappear.
- It is not need to refresh the lubricating grease periodically. If the lubricant is deficient in quantity or its quality has changed, please infuse the lubricating grease with the same trademark or the same performance from the grease fitting.

00# gear lubricating grease:

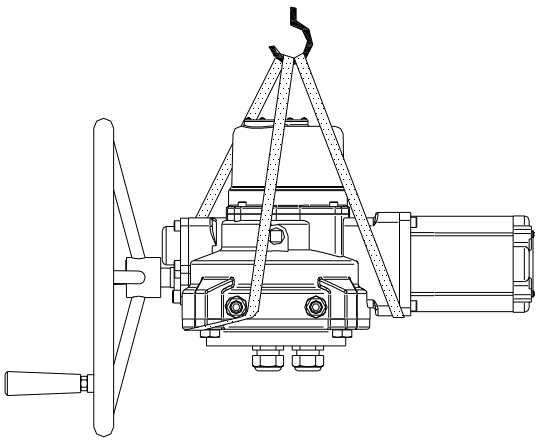
Base	Lithium
Temperature range	-20 ~ +120 ^{0}C

6. Transport and storage

6.1 Transport

Lift the actuator with slings suitable for its weight.

- **Do not attach ropes or hooks to the motor, handwheel for the purpose of lifting by hoist.**
- **If the actuator is mounted on valve, attach ropes or hooks for the purpose of lifting by hoist to valve and not to the actuator.**



6.2 Storage

- Units should be stored in the clean, dry environment.
- Connect the internal space heater regularly, or place desiccant in the compartment to protect the switches.

7.Installation

7.1 Mechanical and electrical connection

1. Manual operates the unit in the fully open position before installation. Then secure the joint flange and the valve flange with machine screws and nuts.
2. Mount motors on a horizontal plane, if possible.
3. **Shut off incoming power.**
4. Open the compartment cover#3，keep the compartment clean and dry.
5. **Operate the unit by handwheel only** when initially setting the limit switches.
6. Open the terminal box #22，connect wires and check it to ensure that it coincides with the applicable wiring diagram. (Note:Please connect to earth with 2.5 mm2 conductor.)
7. Manual operates the unit to keep the valve in the intermediate position, then turn power on and check the rotating direction of the motor. If the direction is wrong, interchange any two leads on three phase motors.

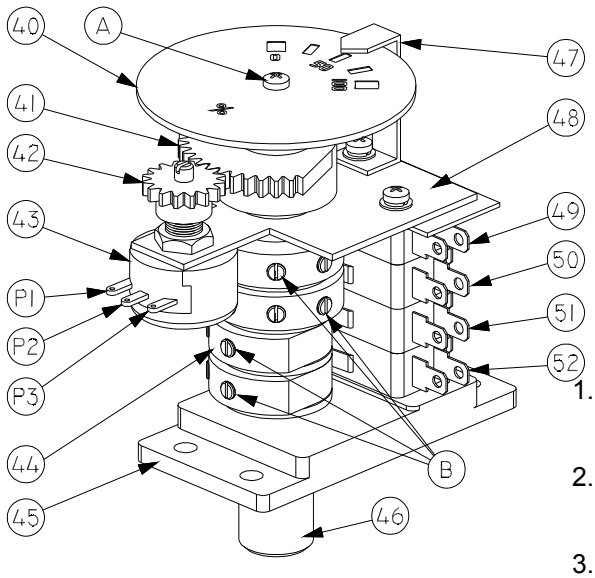
Work on the electrical system or equipment must only be carried out by an electrician who possess operating certificate or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

7.2 CAUTION

1. Limit switch is not factory set. It must be set when the unit is installed on the valve.
2. The torque switch was set at the factory; the setting torque is equal to the “Max. Output Torque” showed in the nameplate.
3. Disconnect all incoming power before opening the compartment or terminal box.
4. Do not motor operate the valve without first setting the Limit switches.
5. Reset the travel Limit switch prior to motor operation if the unit has been dismantled or removed from the valve.
6. Check to ensure that the valve is in the fully open position when the unit is dismantled from the valve.

8. limit switch and position indicator

8.1 Limit switch



40	Dial
41	Sector gear
42	Pinion
43	Potentiometer
44	Cam
45	Limit pedestal
46	Limit shaft
47	Pointer
48	Up plate
49	1KXK microswitch
50	2KXK microswitch
51	1GXK microswitch
52	2GXK microswitch

The unit is supplied with 4 switches, each of which has 3 contacts. Two switches are used for end of travel indication, the remaining two ones may be adjusted for any intermediate point of travel. Please consult the relevant wiring diagram for the function of the microswitches.

The limit switch must be adjusted after the actuator has been mounted on its associated equipment to make the responding cam can touch the microswitch once the valve reach the fully open or close position. Proceed as follows：

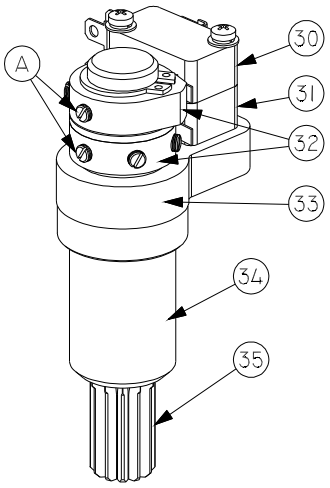
1. Disconnect all incoming power to the unit prior to opening the compartment.
2. If a potentiometer#43 is supplied, check to ensure that the pinion #42 and sector gear #41 are disengaged.
3. Manual operates the valve in the close position.
4. Adjust the cam beside the 1GXK#51：Loosen screw（B），clockwise rotates the cam，once it touch the 1GXK, tighten screw（B）.
5. Adjust the cam beside the 2GXK#52：Loosen screw（B），clockwise rotates the cam and make it touch the 2GXK earlier than the above cam, tighten screw（B）.
6. Manual operates the valve in the open position.
7. Adjust the cam beside the 1KXK#49：Loosen screw（B），counterclockwise rotates the cam，once it touch the 1KXK, tighten screw（B）.
8. Adjust the cam beside the 2KXK#50：Loosen screw（B），counterclockwise rotates the cam and make it touch the 2KXK earlier than the above cam, tighten screw（B）.
9. When the above adjustment finished, energize the actuator to test its operation 1~2 times.

8.2 Position indication

802 series actuator provides mechanical valve position indicator, the potentiometer #43 is supplied for remote indication. Proceed of mechanical valve position indicator as follows：

1. Operate the valve in the close position.
2. Loosen screw（A）on dial ,move the dial to make the pointer point the position，and retighten screw（A）

9. Setting the torque switch



30	Limit switch opening
31	Limit switch closing
32	Cam
33	Torque seat
34	Torque sleeve
35	Torque shaft

The torque switch is designed to protect the actuator in open and close directions. The switch was set at the factory. It is not need to be reset generally.

Should the present switch setting require changing, proceed as follows：

1. Loosen screw（A），move the cam corresponding to the switches. For open direction, clockwise moving indicates a lower torque and counterclockwise moving indicates a higher torque. The contrary moving is for close direction.
2. Tighten screw（ A），motor operates the valve to check that if the output torque is meet the requirement when the power to motor is interrupted. If not, repeat the above process to reset.

⚠

Disconnect all incoming power before opening or closing the switch cover.

10. MECHANICAL STOPS

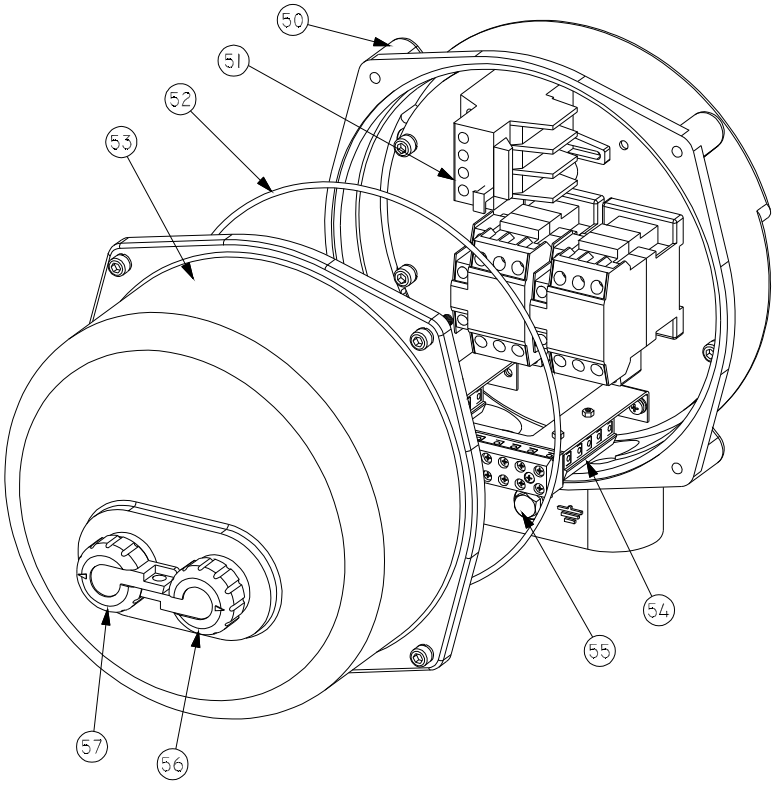
Mechanical stops are designed for limiting the open-close parts （disk, valve ball, etc.） in the working range，they can limit the travel of valve accurately.

When adjust the mechanical stops：

1. Secure with nuts when finished adjusting.
2. Mechanical stops must correspond to limit switch. Ensure that the action of limit switch is prior to mechanical stops. Proceed as follows：When the valve reach the require position, screw the corresponding mechanical stops to withstand the clutch sleeve, **then turn back 1~2 circles**.

12. CONTROL PACKAGE

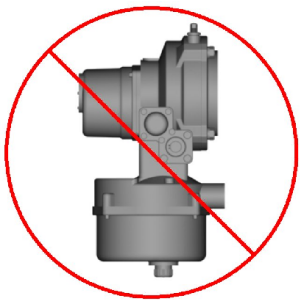
12.1 Structure



50	Case
51	Component group
52	Seal ring
53	Package cover
54	Terminal strip
55	Ground-bolt
56	Control button
57	Selector

11.2 Operation

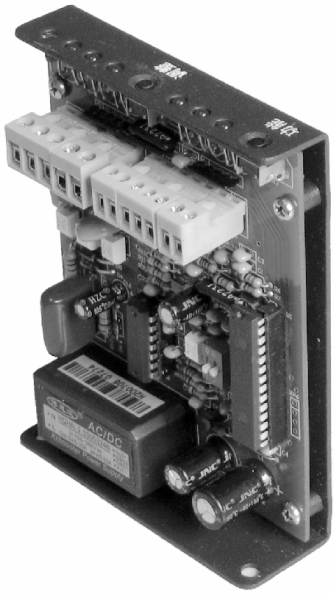
- When the selector is in “remote”, the actuator may be remotely controlled.
- When the selector is in “local”，turning the control button may control the actuator in site.
- When the control button is in “stop” and the selector is in “remote”, they can be locked to prevent from mistaken operation.

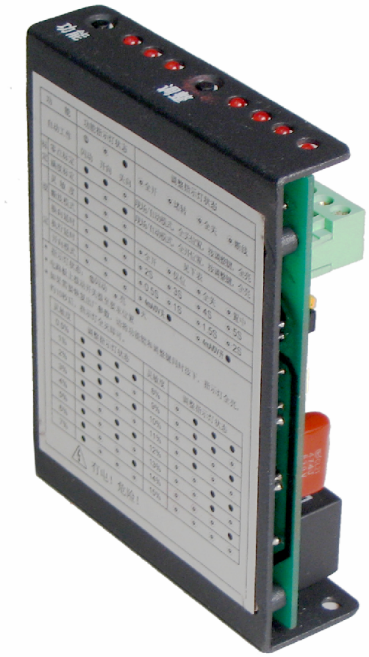


- **Installation with control package’s underside should be avoided or the reliability and life time of the contacts will be reduced.**
- **Open the package cover carefully to avoid damaging switches or terminals for the control button is wiring the terminal strip.**

- **Disconnect all incoming power to the unit prior to opening or closing the package cover.**
- **Do not touch other parts to avoid getting an electric shock when pushing the “SET” button.**

11.3 EPC module





The EPC module with flexible function and excellent control algorithms is installed in the regulating actuator and can proportional control the valve in according to the inputted analog control signal.

The EPC module is installed in the regulating actuator with control package produced by our company. If the users need to replace the EPC module, please connect wires correctly according to the wiring diagram supplied with the actuators.

☞ The EPC module must be set after the setting of the limit switch and the position indicator of the actuator (please refer to the instruction manual provided with the valve actuator).

Set the EPC module together with the operation of the actuator. When the selector of actuator is in "Local", the EPC module can only output 4~20mA valve position signal; When the selector is in "Remote", the EPC module can trace the input signal and analog regulate the valve position. (Note: According to the different wiring diagram, when the actuator is in "Remote" state, the inputting mode could be manual or auto, the EPC module can only work properly in "auto" mode.)

You are advised to refer to the 《EPC Regulating Module Instruction Manual》 for further details.

Appendix 1：Primary electrical components

1.Microswitch

- Load factor：250VAC，15A
- Temperature：– 55 ~ + 60℃
- Mechanic life：10^6 times
- Electric life：10^5 times

2.Potentiometer

- Rated load：3 W（70℃）
- Rotation angle：300° ± 10°

3.Space heater

- Prevent the actuators from humidity and condensation.
- Voltage：220VAC
- Resistance: 6.8kΩ。

4.Transmitter

- Two optional module can be supplied：

  VPT2：Two-wire system. Input 24VDC signal and feedback 4～20mA DC with two wire.

Voltage ：24VDC

- Resistance ：560Ω~1kΩ
- Temperature ：-30℃~+70℃
- Instructions：

1.Connect wires according to the relevant wiring diagram；

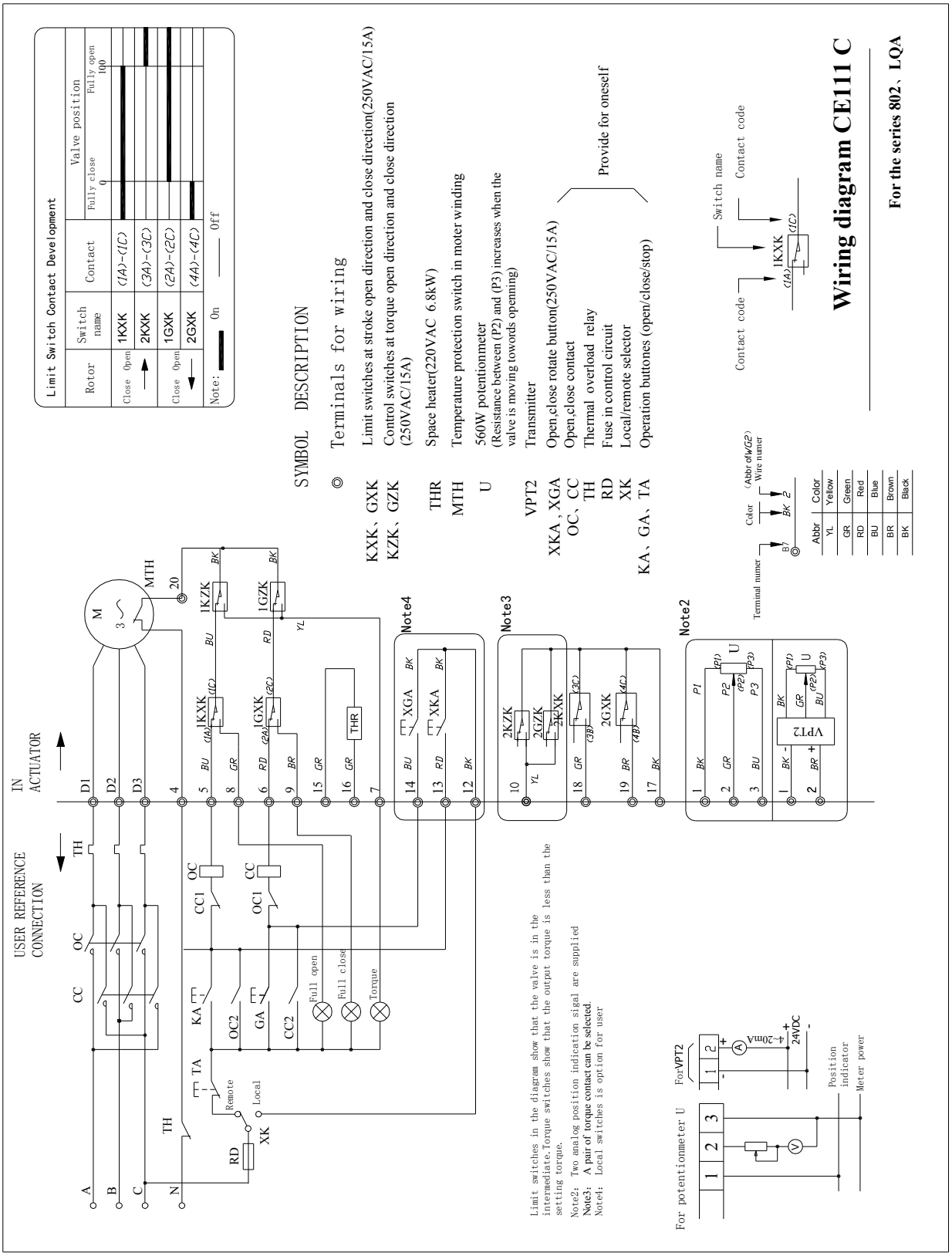
2.Place valve in the fully open position, adjust the potentiometer to make the output current is 20mA；

3.Place valve in the fully close position, adjust the potentiometer to make the output current is 4mA；

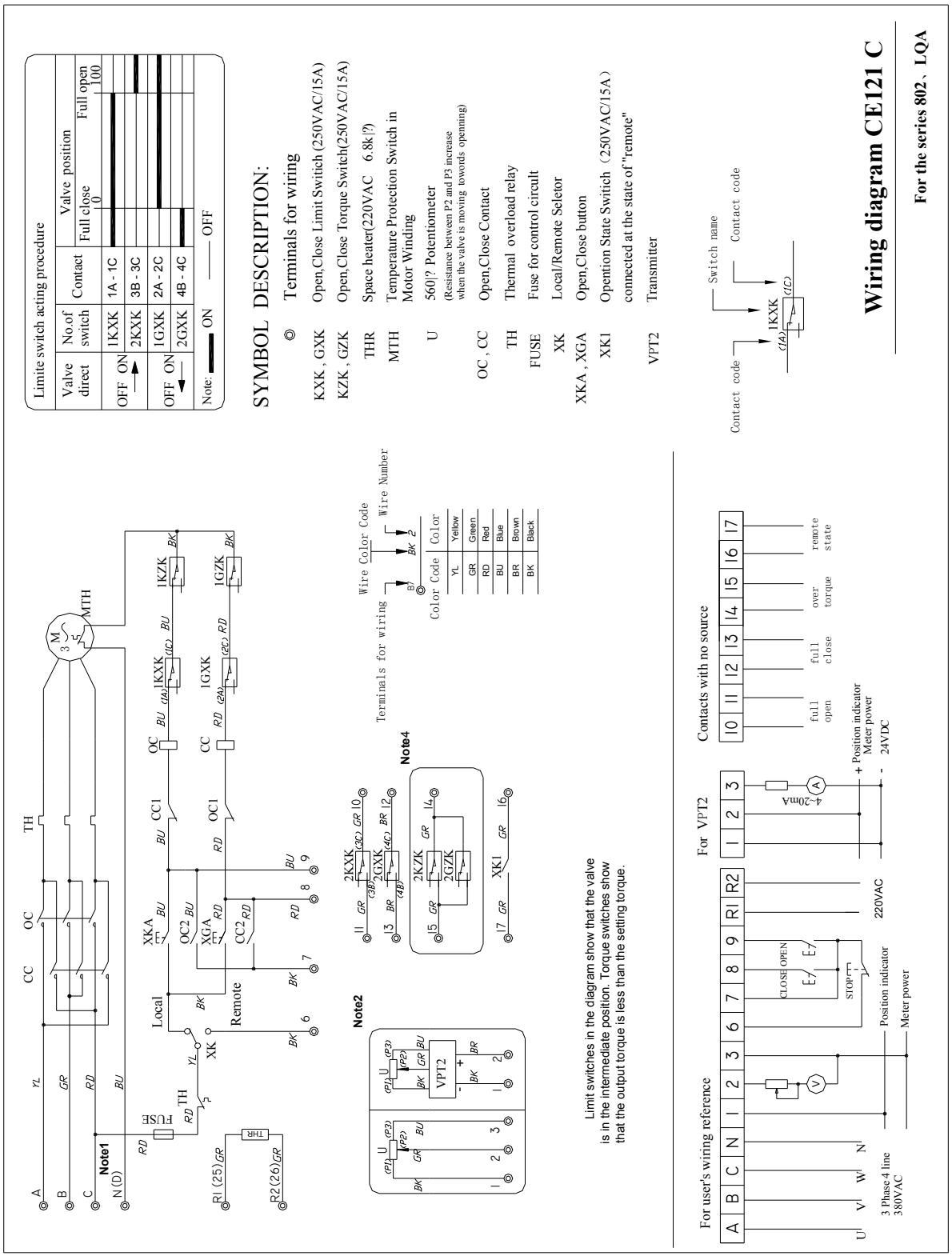
4.Repeat the above process, till the 4mA current and the 20mA current respectively indicate the full close and full open position of valve properly.

Appendix 2：Typical wiring diagram

1. Wiring diagram CE111C (Normal)



2. Wiring diagram CE121C (With Control Package)



Familiar problem and trouble-shooting

Problem	Reason	Trouble-shooting
Unable to operate by motor or emergency stop	Power problem	Check power supply.
	Damage of motor	Repair or replace the motor.
	Torque switch works	Check and ensure the valve is not damaged, and then set to increase the torque value.
Limit switch fails to stop valve travel	Damage of microswitch	Replace the microswitch.
	Looseness of cam screw	Readjust and tighten the screw.
	The wire is not connected	Connect the wire.
Failure of opening indicator	Damage of potentiometer	Replace the potentiometer.
	Looseness of the pinion of potentiometer or the gear of pointer	Readjust and tighten the gear screw.
	The wire is not connected	Connect the wire.

Please do not maintain the actuators by yourselves if you do not know the interior structure exactly and consult us in good time.

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