

CKD Series Intelligent Electric Actuator Installation and Operation Manual



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Preface

Welcome to use the Hengchun CKD Intelligent Electric Actuator!

■ About this manual

- (1) This manual is intended for CKD series multi-turn actuators.
- (2) Make sure to read and understand this manual complete.

■ Notes for safe

- (1) To strictly observe this manual is a part of requirements of using this electric actuator.
- (2) Electrical installation, maintenance and use of this actuator shall be conducted according to national laws, rules and regulations related to safety in order to adapt to the site installation.
- (3) During electrical work, some parts are with voltage which endangers personal safety. The electrical system or equipment can only be operated by skilled electrical technician or trained personnel under control and monitor by such technicians, and anyone must observe corresponding rules and regulations of the electrical engineering.
- (4) During operation, the temperature of electric actuator will rise, and the temperature of surface may be higher than 60°C. Please check temperature of the surface before touching, in order to avoid burns.
- (5)  The purpose of this figure: warning! Qualified operator must be familiar with all safety warnings and notes in this manual. Violation of these safety warnings and notes may cause serious personal injury and property loss.
- (6) In dangerous area, it is forbidden to use conductive contact actuator, unless the work has been specially permitted, otherwise you should cut off the power supply, and disassemble the actuator and move it to a non-hazardous area for repair or maintenance.

■ Maintenance

- (1) If the actuator cannot be installed immediately, you should store it in a dry place until ready wiring.
- (2) If the actuator has been installed, but not the wiring, it is recommended that you plug into the cable entry plastic wrapped around a Teflon seal metal plug.

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Overview

Hengchun advanced digital valve control technology and after many years of proven reliability mechanical components design ideas fully integrated, launched a full intelligent non-invasive CKD multi-turn actuators. CKD drive electric actuator application by reliable records have over half a century bronze worm gear, heat treatment and after carefully hardened alloy steel worm constituted.

CKD electric actuator design is simple and compact structure, with a very broad torque output range, widely used in power plants, metallurgy, petroleum, chemical, water, machinery, light workers, fire and environmental protection industries.

Advantages CKD multi-turn actuators include:

- perfect self-diagnosis and protection
- simple to operate, easy to maintain
- rich selection process control
- for all valve types, use the same circuit wiring diagram
- long-term maintenance-free



Control Feature

Local Control

The local display module of CKD actuators configured with a unique user-friendly integrated graphics and text display type LCD liquid crystal screen, include the following features:

- Graphic display: Shows the position of the electric actuators.
- Control mode: Displays the control mode of the electric actuator.
- Information Center: Displays the operating status of electric actuator, the input signal, running torque and detailed alarm information.
- LED indication: Red / open, green / close, yellow / stop, orange / infrared receiver.
- IrDA infrared receiver: the use of Infrared setting device can set the parameters of the electric actuator.
- Selection knob: In the normal control mode, to achieve local / Stop select / remote control mode.
- Control knob: In local control mode, to achieve the opening / closing operation of the control function.

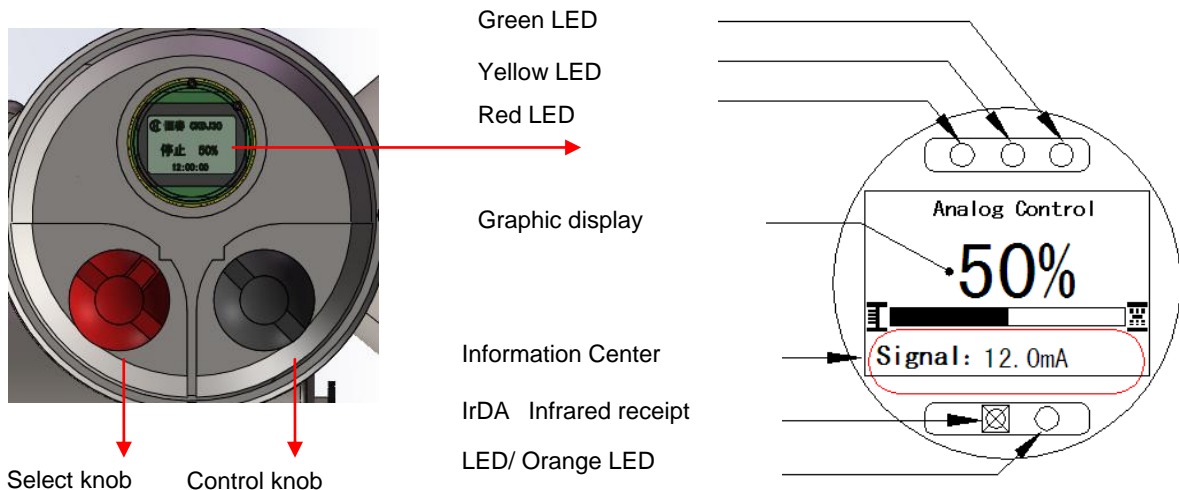
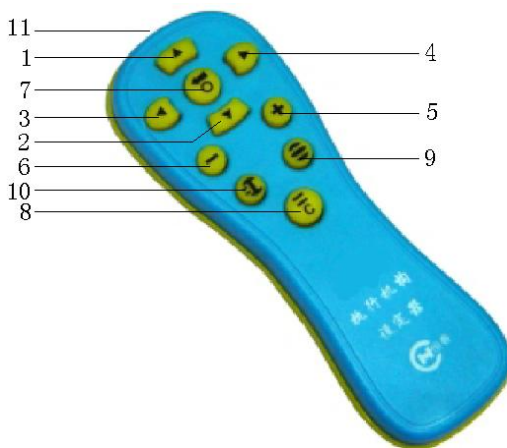


Figure 1: Local Display Module

Parameter Settings

Infrared setting device is applied for non-invasive working setting on the actuator. When using setting device, select knob is located in the "STOP" position, and infrared emission head of setting device shall point right to the actuator, and the distance from display window of actuator is less than 1 meter.

When the actuator is shown in the main interface (selector knob located at arbitrary position), through "+, -" button to adjust the LCD contrast to adapt to environmental changes in temperature field.



Name	Meaning
1.Up	Page Up
2. Down	Page Down
3. Left	Move Leftward
4. Right	Move Rightward
5. Add	Add Value or Modify Options
6. Reduce	Reduce Value or Modify Options
7. Confirm	Save Current Settings or Enter into Next Menu
8. Back	Back to Last Menu or Stop Directive
9. Open Valve	Open Valve in Stop Mode
10. Close Valve	Close Valve in Stop Mode
11.Infrared Emission	Infrared Emission Window

Figure 2: Infrared Setting Device

Remote Control

CKD electric actuator can accept many kinds of remote input command signal, to realize the remote control of the electric actuators:

- 2-wire control
- 3-wire control
- 4-wire control
- external interlock control
- ESD emergency control
- remote Analogue control
- modbus fieldbus
- profibus fieldbus

Remote switch control signals can be either a contact of the self-hold signal, can also be a point contact signal.

Switch signal may be an external 18-30VDC or 187-250VAC power supply, but also by CKD electric actuator internal 24VDC power supply, control signals can be non-polar connection, user-friendly field wiring and commissioning.

Current switching control signal input: 5mA @ 24VDC or 5mA @ 220VAC

ON-- contact closure required minimum control voltage: 12V

OFF-- contact separation required maximum control voltage: 6V

The minimum duration of the contact signals: 50mS (milliseconds)

Use among all remote Input signal - Standard surge peak 3.75KV.

2-wire Control

2-wire control mode is capable of self-sustaining single remote switch contacts to control the electric actuator to open or close the valve, the remote switch contacts are usually a relay contact. The motion relationship between remote switch contacts and electric actuators can be changed in the parameter setting mode, can be set to open priority and also be set close priority. Set to open priority: remote open contact closure, the electric actuator move to open direction; Remote open contact separation, the electric actuator move to close direction. Set to close priority: remote close contact closure, the electric actuator move to close direction; Remote close contact separation, the electric actuator move to open direction. In inching operation mode the 2-wire control mode is prohibited, because when the remote signal switch contact state changes, the electric actuator can change direction accordingly. 2-wire control is disabled by default.

3-wire Control

3-wire control mode uses two separate switching contacts to control the electric actuator to open or close the valve to complete the action. In parameter setting mode, users can choose to inching operation mode or self-retaining mode. When selecting the self-retaining mode, if the actuator is no ESD emergency command appears in the running, the electric actuator does not stop in the middle of the trip, but would have been moved to the end of travel (fully open or closed position).

4-wire Control

4-wire control mode using three separate switching contacts to control electric actuators complete opening, closing and stop the action, Factory default setting of 4-wire control is inching operation. The relationship between remote switch contacts and electric actuators motion can be changed in the parameter setting mode, can be set to inching operation mode and also be set to self-retaining mode.

External interlock control

When enabled external interlock setting, actuator receives the remote switch signal, must also have corresponding interlocking signal before the actuator operation. Where relevant interlock signal is lost, actuator will be stop. The factory default disable external interlock control.

ESD control

ESD emergency control function using ESD emergency signal to control electric actuators complete opening, closing and stop at the current location, ESD emergency order can transcend any other local and remote control signal (ESD override local setting is enable).

ESD emergency control function can be set to exceed the following states:

- motor overheating protection (factory default setting - off)
- external interlock control (factory default setting - off)
- select knob located in local position (factory default setting - off)
- selector knob located in stop position (factory default setting - off)

The factory default is prohibited ESD emergency control.

Proportional control (optional)

The actuators accept 4-20mA DC input signal to achieve position and process control, and use an absolute type, linear position sensing device provides 4-20mA DC valve position feedback. Analog input signal with electrical isolation, short circuit protection, open circuit detection, and can be non-polar connection, user-friendly field wiring and commissioning. The control module uses solid state starter for three-phase or single-phase power supply, meet at least 1200 starts / hour requirement.

- accuracy: $\pm 1\%$
- linear: $\pm 0.5\%$ (relative to the full trip)
- deadband: 0.1% to 9.9%, adjustable in 0.1% increments (factory default setting: 1.0%)
- delay time: 1 second
- input impedance: 300 Ω
- drift: $<\pm 200\text{ppm}$
- invert: 4-20mA (20mA=fully open) or 20-4mA (4mA=fully open)
(factory default setting: 20mA = fully open)
- lost signal action: When the input signal is lost, the actuators move to fully open position, fully closed position, the pre-specified location, or stop at the current position (factory default setting: Stop at the current position)

Loss of Signal: Input signal $\leq 2.3\text{mA}$

Modbus control (optional)

Hengchun uses Modbus RTU protocol as a standard network protocol used by the company, transfer rate up to 38.4Kbit / S. A single network can be configured up to 31 actuators, and does not affect network performance and reduce network response time. Without the use of repeaters, length of the entire network can reach 1200m. Hengchun offers standard dual redundant bus interface, and fully guarantee the reliability of the electric actuator is under network control.

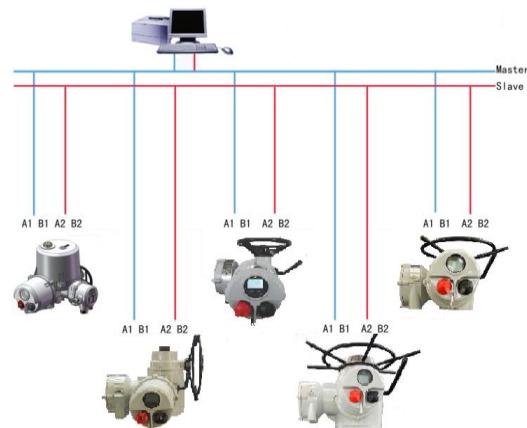


Figure 3: Bus Network Topology

Profibus control (optional)

Hengchun provides Profibus DP protocol communications module (including V0 and V1 services), the actuator can be incorporated into the standard Profibus communications networks, support GSD, EDD, DTM files for device configuration and management. Data transfer rate of 9.6Kbit / S ~ 12Mbit / S (adaptation), a single network can be configured to 126 actuators, and does not affect network performance and reduce network response time. Meanwhile Hengchun offers standard dual-channel redundant DP bus interface, and fully guarantee the reliability of the electric actuator is under network control.

HCBUS-1000 dual-channel bus controller (optional)

Modern equipment requires field-level modern communications, equipment managers need to have more and faster information than before, HCBUS-1000 two-line communication control system effectively connected electric valve actuators and control systems, it is a reliable, independent and easy to install intelligent network, is designed for CKD actuator product and design.



Figure 4: dual-channel bus controller

Information

Local information

LCD liquid crystal graphical display section can show the valve position and current control mode. Information Center contains 16 characters of text display, and can display operational status of CKD electric actuator, input signals, running torque and detailed alarm information.

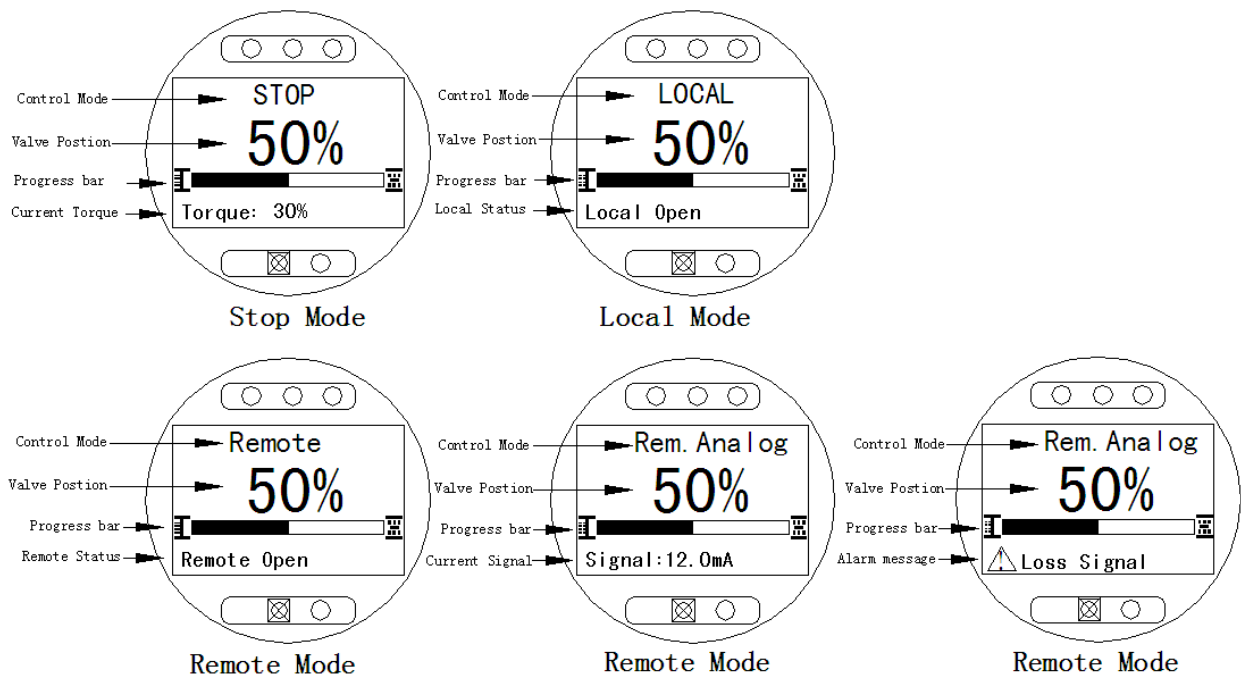


Figure 5: LCD liquid crystal display
(providing clear and understandable graphical and text information display)

CKD actuators in the work can display alarm information on the LCD screen information center, detailed alarm information listed in table 2. Running status information of actuators will be covered by the alarm information, alarm message displayed alternately when multiple alarms occur.

Table1: alarm information

Phase Loss	Motor Over Tmp	Torque Trip OP	Torque Trip CL
Motor stall	Start timeout	Data Error	24VDC Fail
Encoder fault	Limit Error	Over Limit	Signal Loss
ESD Active	Battery Low	Torque Board Fault (Torque Board Fault Enable)	

Table2: Torque Board Fault

View torque calibration failed	Failed to save torque calibration	Failed to read the value of the torque	Torque sampling overrun
EEPROM Fault	Invalid torque calibration	Hardware Fault	CRC Check fault

On the LED display module, highlighting leds (red/green/yellow) display device status as shown in table 3, orange for receiving infrared light.

Table3: LED light-emitting diode display

Status of the valve	LED light emitting diode display		
	Red LED	Green LED	Yellow LED
Fully closed position	Extinguish	Light up	Extinguish
Fully open position	Light up	Extinguish	Extinguish
Moving in the close direction	Extinguish	Flashing	Extinguish
Moving in the open direction	Flashing	Extinguish	Extinguish
Stop at the middle position	Extinguish	Extinguish	Light up

Remote indication

Standard relay output

CKD actuator is configured with four self-latching relay output contact as a remote status information indication. The status of each contact can be individually configured for N.O or N.C.

Relay Output rating: 5A @ 30VDC, 5A @ 250VAC, or 2A @ 250VAC inductive loads.

Relay output can be set to display other status information (see Table 5), the default settings are:

Table4: contact default settings

Relay Contact	Default Contact Options	Default Contact Status
S1	fully CL	N.O.
S2	Fully OP	N.O.
S3	Rem. mode	N.O.
S4	Comp. Alarm	N.O.

Table5: contact function options

Fully CL	Fully OP	Middle Travel -XX%	Torque Trip CL
Torque Trip OP	Torque Trip	Motor stall	Closing
Opening	Moving	Hand-wheel	Blinker
ESD Action	CL Exlock	OP Exlock	Interlock

Stop mode	Local mode	Rem. mode	Over Tmp
Lost phase	Battery Low	Actuator Fault	Valve Fault
Comp. Alarm			

Monitoring relay output

Monitoring relay (S0) is used to indicate state of electric actuators. When the actuator is in a normal state, the monitoring relay will be energized; When any of the following situations occurs, Monitoring relay will be released:

- Selector knob is not in a remote location
- Single or multiple phase loss
- Motor overheating
- Power Failure

Monitoring relay provides a N.O contact and a N.C contact. Once the fault disappear or be solved, it will be released. Monitoring relay can also be set as general contact, as a general contact like S1 to S4 configuration Settings.

Analog feedback output - Valve position (optional)

CKD electric actuator provides a continuous 4-20mA feedback signal as remote indication of valve position. The feedback signal with electrical isolation, short circuit protection, open circuit detection, and powered by an internal 24VDC power supply.

- Accuracy: $\pm 0.5\%$
- Linear: $\pm 1\%$ (relative to the fully trip)
- load capacity: maximum 750 Ω
- Drift: $<\pm 200\text{ppm}$
- invert: 4-20mA (20mA=fully open) or 20-4mA (4mA=fully open)
(factory default setting: 20mA = fully open)

Self-diagnostic information and historical record

CKD actuators display the diagnostic information and historical record by information menu, these data can be browsing at any time, and can help users to diagnose and troubleshoot. These data include the following information:

Diagnostic information

Diagnostic information can provide the following state of the module:

- Local module
- Remote switch control
- Relay contact feedback

Fault records

Content of the fault record, please see table 2 on page 9. The fault record can record the most recent 20 faults information, and the order for the latest alarm information is placed in the first alarm log and so on.

Knob action records

The knob operation record can record the most recent 100 knob action information, and the order for the latest knob action information is placed in the first Knob action log and so on.

Valve motion record

The valve motion record can record the most recent 100 Valve motion information, and the order for the latest valve motion information is placed in the first valve motion log and so on. The content of valve motion including:

- Valve operation mode
- The start time and position
- The end time and position

Record data can be cleared in the clear record menu.

Protection Features

Motor protection

The thermal switch embedded in the motor windings can effectively protect the motor, and prevent the motor overheating and burning. If the motor winding temperature reaches 130 °C (T4), thermal switch will become open, then exciting electromagnetic starter or solid state starter disconnect and cut off the power supply of the motor. When the motor overheat, the actuator can provide the motor overheat alarm for local and remote.

Power phase monitoring and correction

Actuator continuous monitoring the power, not only can prevent the motor work when the power phase lacks, and can automatically correct the power phase, this ensures that the motor rotation direction is always correct. It can effectively prevent accidental damage caused by the wrong motor rotation direction during the debugging phase. When the power phase lacks, the actuator can provide the power phase loss alarm for local and remote.

Torque protection

CKD electric actuator using dual torque protection, can be through the motor over current protection, can also be through the new torque board protection. Protection torque can be adjusted at the rated torque of 40%-120%, with an increment of 1%. When the fault occurs, the actuator can provide the over torque alarm for local and remote.

Double Seal Protection

CKD actuator adopts double seal protection design, the shell is completely waterproof, dustproof and airtight, up to the highest degree of protection IP68. Dual seal design allows electrical chamber and terminal chamber is completely isolated. When opening the terminal cover wiring in initial installation period, it can continue to protect the electrical components of the chamber.

Encoder fault protection

When the control unit detects an absolute encoder error such as valve position overrun, valve position mutation, etc., the control unit will exciting electromagnetic starter or solid state starter disconnect and cut off the power supply of the motor, and the actuator can provide the encoder alarm for local and remote. Before the troubleshooting, electrical operation will be inhibited. Usually you should check the absolute encoder and reset travel limit to deal with the failure, after the troubleshooting software reset can remove the alarm.

Valve Stall protection

When the valve is tight or other reasons cannot be driven, if the motor cannot continue to move in 7 seconds, then the control unit will exciting electromagnetic starter or solid state starter disconnect and cut off the power supply of the motor, and the actuator can provide the motor stall alarm for local and remote. Before the troubleshooting, electrical operation will be inhibited. Usually you should check the valve and use manual operation to deal with the failure, after the troubleshooting software reset can remove the alarm.

Motor Commutation Protection

Whether the actuator in local mode or remote mode, when it is in motion, once it received the command in the opposite direction of movement, it will immediately stop moving for 0.5 seconds (even without receiving the stop command), and then to the opposite direction. This can prevent the motor from a tremendous surge current during commutation (surge current impact or damage to the motor windings, motor starter and related circuit).

Parameter protection

When the control unit detects an internal parameter error, the control unit will exciting electromagnetic starter or solid state starter disconnect and cut off the power supply of the motor, and the actuator can provide the data error alarm for local and remote. Before the troubleshooting, electrical operation will be inhibited. Usually you should restore the default settings, reset travel limit and parameters to deal with the failure, after the troubleshooting software reset can remove the alarm.

Control Fault Protection

When the external control part malfunction such as loss of signal, signal overrun, etc. the control unit will exciting electromagnetic starter or solid state starter disconnect and cut off the power supply of the motor, and the actuator can provide the control fault alarm for local and remote.

Electrical Features

Power Supply

CKD actuators can be applied to 3ph and 1ph Power:

3ph: 3phase 380VAC 50Hz

1ph: 1phase 220VAC 50Hz

Note: You must specify the type of power supply when user ordering. When the power supply voltage range in the plus or minus 10% and frequency range in plus or minus 5hz, does not cause the change of the electric actuator output. If you have a special power supply requirement, please contact Hengchun company or offices and agencies in various places.

MOTOR

The actuator is a kind of special equipment, mainly used for driving valves, baffles and other throttling device, so the motor has a special load characteristic curve. The induction motor with high torque, low inertia and tightly sealed protection is specifically designed to meet these requirements. When the actuator is used for driving heavy load, we recommend using a three-phase AC motor. The motor of the switch type actuator used standard operating system for 15min (for motor starting times of 60 times per hour).

When the actuator is used for modulating control applications, the motor starting times meet 1200 times per hour. When the power supply voltage variation is within $\pm 10\%$ range, the motor can be guaranteed to work at maximum load. The motor insulation class is F-class, and with the thermal switch built-in motor windings (thermal switch of operating temperature of 130°C). For certain special applications, Hengchun can provide a space heater to improve the temperature of the electrical chamber. If you need the detailed information, please contact Hengchun company or offices and agencies in various places.

Internal Power Supply

CKD actuator provides the internal 24VDC power supply, which can be used to drive the digital inputs and the 4-20mA analog feedback. The internal 24VDC power supply and the analog input circuit are equipped with solid state auto-recovery type fuses, after the troubleshooting the fuses can automatically recover.

Absolute Encoder(optional)

Position detection module adopts the non-contact type absolute encoder, good abrasion resistance, stable performance, long life, high linearity, high resolution, greatly improves the stability of the system.

The absolute encoder can real-time detect the valve position, the module directly connected with the position feedback shaft by the gear, ensure synchronous with the valve position at all times.

Even in the case of loss of power supply, the module can be guaranteed not to lose the position information of the valve, and also without the use of extra battery power to keep the valve position information.

Space Heater (optional)

CKD actuator electrical chamber equipped with anti-condensation space heaters, by using space heater, it can effectively prevent internal condensation. When the internal temperature reached 10 degrees, the space heater stops working.

Backup Battery

CKD actuator has a 9VDC / 1200mAh lithium battery as a backup power supply. Case of power failure, press the switch handle, and turn the hand wheel, then the back-up battery power on. It can be convenient for parameter setting and manual operation, the battery automatically power off without any operation for 30 seconds.

Separate Terminal Chamber

The terminal chamber is completely independent of the other control section and is tightly sealed, it provides 44 terminals. When making electrical wiring, without opening the electrical chamber the electronic control module can be avoid exposure to the field environment, and can effectively prevent the electronic control module accidental damage.

- Terminal cover sampling "O" ring seal
- Terminal cavities provide two standard cable outlet (also available three or four).
- Signal cables must be shielded.
- All the cable outlets have already been sealed using plugs. When wiring, please select the appropriate fittings and glands to seal the outlet, and unused cable outlet must be sealed using metal plug. We must be strictly in accordance with the relevant national standards, in order to reach the nominal level of IP protection.
- When the actuator is applied to an explosive situation, cable outlet must be used explosion-proof necking tubes and sealing rings. Power supply terminal and ground terminal must be used AMP 160292 ring type joints, and signal terminals must be used AMP 34138 ring type joints.

Electrical Protection

CKD actuator circuit boards are treated with anti-protection, the interconnection between the printed circuit boards adopt anti-lock off and gold-plated connectors. The external signals are treated with optocoupler isolation and three level lightning protection, these ensure the reliability of the product.

Safety Ground

Electric actuator safety grounding screw located in the terminal side cover for a M5x16 brass screw, must be strictly in accordance with the relevant national standards to ensure safe and reliable grounding device.

Protection Certification and Technical Parameters

Shell Protection

The standard level of protection is IP68.

Explosion-proof and Explosion Protection

Explosion-proof grade: Standard Exd II BT4, up Exd II CT4.

EMC Level

EMC test level III, results meet IEC61000-4-3.

Corrosion Protection

CKD actuator shell is made of aluminum alloy, and the surface has a strong anti-corrosion ability after phosphating and spray treatment, so Hengchun actuators can be applied to the vast majority of applications.

All fasteners screws and gasket materials are made of stainless steel, interconnection between printed circuit boards are made of gold-plated connectors, all feature ensures superior corrosion resistance.

Working System

- Switch Type: S2-15min working system, start times of up to 630 cycles / hour
- Modulating Type: S4-25% working system, start times of up to 1200 cycles / hour

Operating Temperature

- Operating temperature: - 30 ° C — + 70 ° C (Special - up to 40°C —+ 85°C)

Note: explosion-proof temperature (- 30 ° C — + 60 ° C)

Partial view and structure features

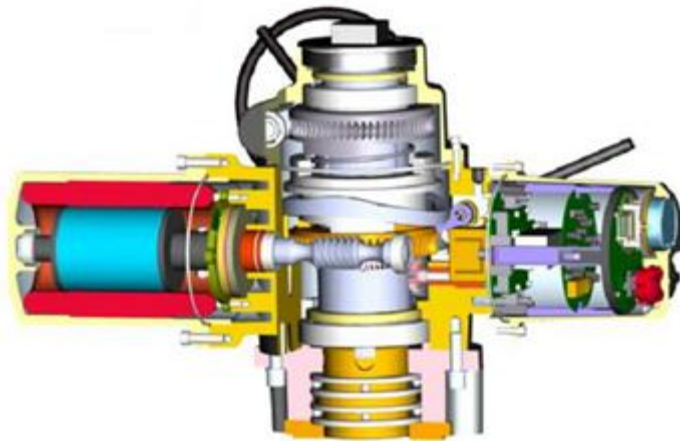


Figure7: CKD multi-turn actuators partial view and structure features

Mechanical structure and features

Parts material and features

- Main housing: made of aluminum alloy, the surface has a strong anti-corrosion ability after phosphating and spray treatment.
- Worm wheel: using high strength alloy bronze, providing higher wear resistance and better strength.
- Worm shaft: high-strength alloy steel, surface hardened by heat treatment.
- External fasteners: stainless steel.

Main drive chain

The main drive chain uses worm and gear drive, which has the characteristics of compact structure, small space, self-locking, low noise.

Handwheel Operation

The manual / automatic switching lever switch to manual mode, hand wheel operation can be achieved. Turn the handwheel and press the switch handle until the valve position changes, then release the handle to carry out handwheel operation.

Non-intrusive Design

The electrical housing is equipped with a select knob and a control knob, and the knob shaft is not through the control box lid. The knobs used Hall sensor to control the actuator, so without opening the cover you can achieve non-intrusive parameter setting and local control. The select knob can be locked in the desired control position to prevent manipulation.

The use and maintenance of reduction gear box

In order to enlarge the output torque of the actuator, and use the smaller actuator to achieve larger output torque, it is necessary to use the electric actuator and the reduction box. Hengchun electric actuator gear box has JW part of the rotary deceleration box and JB multi rotary gear box, and multi turn electric actuator supporting the form 90 DEG rotary and multi turn.

JW series part of rotary speed reduction box

JW series of rotary reduction gear box is a 90 degree rotation of the curve deceleration box, mainly used in ball valves, butterfly valves, plug valves, is the power, chemical and metallurgical process regulation and control on the best choice. Product surface spray comply with the requirements of industrial grade product, and meet the requirements of environmental protection. Built in rotating parts coated with high efficiency and environmental protection, and effectively improve the mechanical efficiency of the product. Mechanical limit rod can be customized according to customer requirements, and the output shaft can be flexible disassembly and convenient with industry and trade, the matching connection size. Input indicator can clear the said supporting the valve position switch, convenient for customers to observe the operation status of the products; control of the valve from the open position to the closed position and do not need to do special processing, input and output flange connection line with ISO5211 standards. JW series reducer box rated output torque from 300nm to 600000Nm, divided into 11 frame specifications, each frame can provide multiple transmission than for the user to choose, and offer a variety of connection mode and dimensions can be very good matching of different sizes and specifications of the control unit.

Product features

Complete closed transmission.

Built-in grease to improve service life and seal.

A wide range of gear ratios can be used for any input ratio selection, widely used.

Worm bearing angle orientation, complete self locking;

Removable drive sets can be flexible to remove; convenient processing and its supporting the size of the connection.

Mechanical limit of 0 degree to 90 degree.

Work environment

JW series of rotary reduction gear box in a variety of climatic regions, in a variety of special temperature areas of the industrial field widely used. Have reliable operation stability and long-term maintenance free. Therefore, we strive to make our gear boxes can be adapted to a variety of harsh environment.

- Waterproof grade: JW series angle stroke reduction gear box complies with the EN 60529 standard provides for the seal protection class of IP67.
- Working temperature: JW series angle stroke reduction box standard operating temperature: -40 Centigrade to +120 Centigrade.
- Paint color: standard surface JW series rotary gear box for the silver paint color

Local indication

Many applications require that the valve position can be displayed locally.

In the basic series, the gear box provides an indication of the cover used to provide the following information:

Valve terminal location: the terminal position indicates that a terminal position has been reached.

Valve position: by indicating the position, you can estimate the position of the valve.

Valve is running.



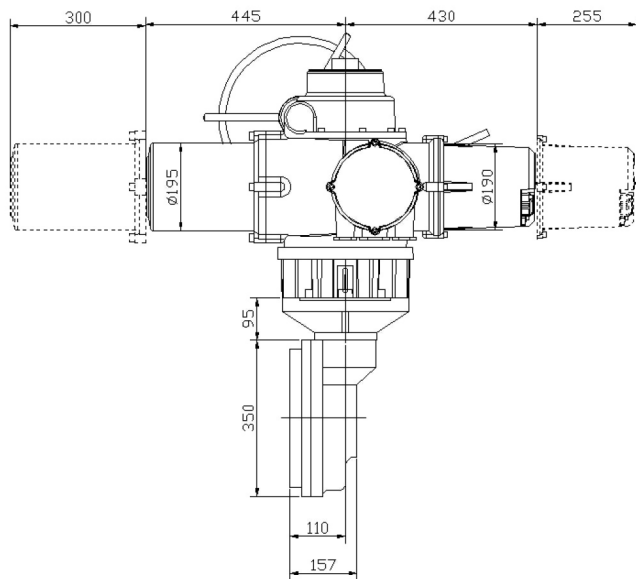
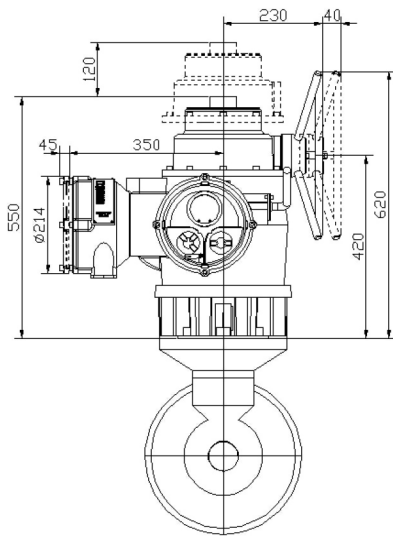
The direct cover is directly connected with the worm wheel and is connected with the valve stem. Any valve operation can be reliably directed.

JB series rotary reduction gear box

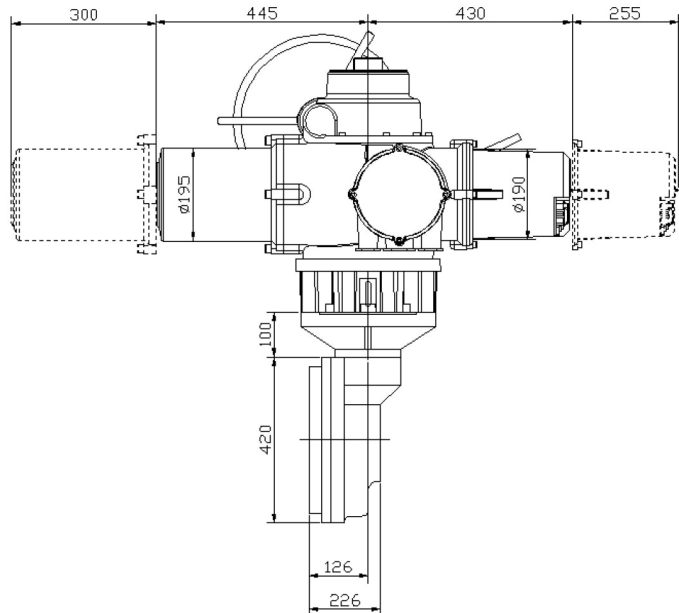
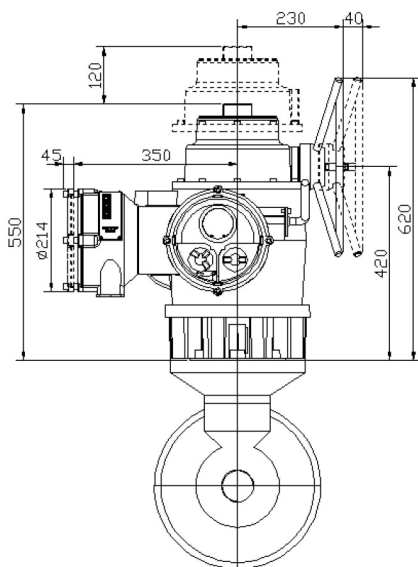
CKD multi-turn electric actuator through the configuration of JB series of rotary reducer, the output torque of the actuator is enlarged exponentially, so that the smaller actuator is used.

Achieve larger output torque. Torque range from 1800NM-24000NM.





CKD180-250 outline dimension chart



CKD300 outline dimension chart

Reduction gearbox maintenance and repair

Inspection of corrosion condition and leakage

Check the corrosion status of all parts. If it is found that the outer surface is corroded, the component must be treated immediately in accordance with the specification. Check all parts, especially gear box, hydraulic system, brake and oil leakage. Must be ruled out leakage and find out the reasons for leakage. It is necessary to replace the damaged parts and clean up the polluted area.

Run abnormal noise check

Must check the operating components of the abnormal noise, to pay special attention to the worm gear in the transmission or under the full load condition whether there is abnormal sound.

Maintenance of gear box

- In the maintenance of gear box, must make the actuator power off, and to ensure that not because of the wrong operation and start.
- Check whether there is abnormal noise during the operation of the gear box.
- Check if there is any leakage in the gear box, check all the grooves, oil seals, bolt holes, fit clearance and leakage of oil.

Check oil condition

Gear box must be carried out after 5000 hours of operation of the oil sampling inspection, no matter how the operating conditions of the sampling time not later than one year. It is very important to assess the characteristics of various kinds of oil, such as viscosity, aging, water and so on. The results of the oil inspection should tell you the oil supplier. Replacement of oil: if the use of mineral oil must be replaced once every 2 years, if the use of synthetic oil must be replaced every 3 years; if the oil from the appearance of the change, it should be replaced immediately. Oil replacement, must be used and the same grade of oil. Do not allow the use of mixed oil or do not need to produce a manufacturer of oil. In particular, it is not a simple mixture of different mineral oils or other different oils. If you change from mineral oil to synthetic oil, or from synthetic oil to mineral oil, gear box must be thoroughly cleaned before the new oil is injected. In the replacement of oil, in order to clear the bottom of the iron impurities, and residual oil, gear box must use new oil flushing. High viscosity oil must be pre heating. The new oil should be injected after the gear box is thoroughly cleaned.

Check gear

Check possible damage of the gear mesh surface, check the possible damage to the gear mesh surface

Main failure forms and causes

- Local broken teeth: fatigue, overload, impact
- Wear: overload, lubricant
- Pitting: eating surface hardness is low, overload, uneven load
- Glue: poor oil supply, low gear precision, high temperature, low tooth surface hardness
- Tooth root fatigue crack: fatigue, overload, fillet heat treatment or processing defect

Content

Installation Guide

Important

- Check if the product nameplate data consist with requirements of site.
- Check if the actuator is installed correctly.
- The installation of actuator is convenient for field wiring, debugging, use and maintenance.
- The actuator is exposed to heat source and needs heat insulation treatment.
- Before removing the cover of wiring terminal cavity, you must cut off power supply of the actuator.
- The actuator must be securely grounded.
- The wiring inlet of actuator must be conducted with seal protective treatment

Connection between the actuator and the valve

Flange plate of CKD series multi-turn electric valve actuator shall be manufactured according to GB12222 standard (See appendix one table five). If the actuator and the valve adopt direct connection mode, then the specifications connecting flange for the upper end of the valve must consist with the type of selected flange plate for actuator, otherwise connecting devices such as transition flange and bracket must be added. When the valve connecting flange is not consistent with the ISO standard, if the specifications have been told in advance, our company can customize to manufacture the base flange according to actual requirements. Certainly, whether the connecting device and the height of connecting device or not depends on the length of valve shaft and forms of packing gland.

Connection between driving sleeve and valve shaft

Torque output of actuator is carried out by the driving sleeve which is connected to output shaft, and driving sleeve can be disassembled and processed into shapes and sizes suitable for valve shaft coupling.

■Removal of driving sleeve (See Figure 7)

The drive sleeve of the CKD10-CKD100 is installed in the flange seat seat, and the 2 connecting screws are removed, and the flange plate can be removed to remove the drive sleeve.

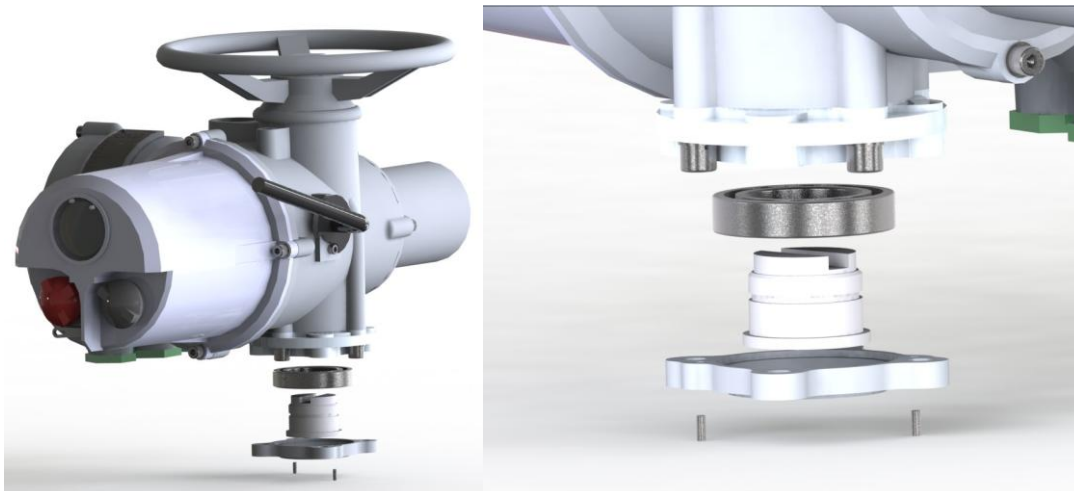


Fig. 7 removing method of driving sleeve

■ Processing of driving sleeve

Drive sleeve and the valve shaft a variety of connectivity options (Figure 8) generally recommend that the key link and trapezoidal threaded connection, in addition, the sleeve and the valve shaft can also be using some other form of connection, as shown in Figure 8.

The company may be required by the user, in conjunction with the delivery to provide suitable for the valve shaft coupling drive sets, if required, please put forward in advance and in the drawings indicate the size of the processing requirements.

■ Installation of driving sleeve

Processing good drive sleeve and valve shaft test, to test connection size, shape and position accuracy. At the same time, according to table 11, D5 height of the size and connection device, the size of the check valve shaft and a coupling end is appropriate.

Test and proved correct, will drive the sleeve is mounted to the actuators in situ and tighten the connecting screws to ensure execution self-contained valve mechanism and the relative position.

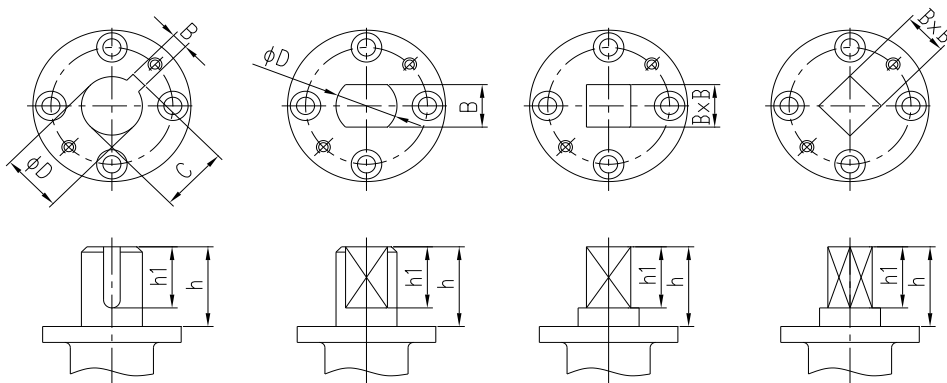


Fig. 8 coupling form of drive sleeve and valve shaft

■ Reduction box connection

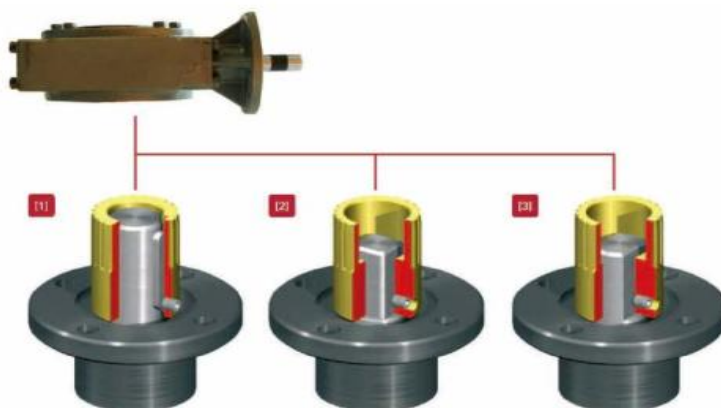
JW series of rotary reduction gear box installed in the valve, the installation flange standard based on ISO EN 5211 or DIN3210. Torque is transmitted to the valve shaft through a separate spline shaft. In the basic series, the spline shaft is not a turning type, it can provide the following shape of the hole. If special fly Marne design with a shorter stem or need a transition flange between the gear box and the valve and spline shaft may be too short. In this case, the spline shaft can be extended.

Spline shaft can punch. The provided fastening screw can be used for connecting the spline shaft and the valve shaft.

(1) In accordance with EN ISO5211 standard key slot hole drilling can provide one, two or four keys. These keys are in compliance with the DIN 6885 P1 standard. Please contact us if you need any other keys.

(2) Fang Kong based on the ISO EN 5211 standard or with a special size

(3) Double face



According to ISO EN 5211 standard or with special size

Operation manual

Electrical connection

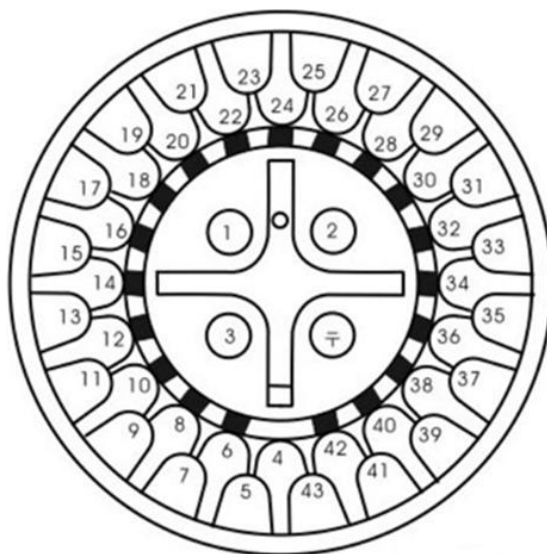


Figure 1: Electrical wiring terminal cavity

Specification table of CKD terminal

NO.	Name	Description of Terminal	NO.	Name	Description of Terminal
1	Power1 *	AC power supply input end 1	22	ESD	Emergency signal input end
2	Power2 *	AC power supply input end 2	23	R-L-CLOSE	Remotely close interlocking signal input end
3	Power3 *	AC power supply input end 3	24	R- L-OPEN	Remotely close interlocking signal input end
	rounding		25	R-L-COM	Common end (24Vdc/ac) of remote interlocking signal input end
4	24Vdc(+)	Non-regulated 24Vdc (+) output end	26	R-L-COM-220VAC	Common end (220Vdc/ac) of remote interlocking signal input end
5	24Vdc(-)	Non-regulated 24Vdc (-) output end	27	Manual/Auto com(24V)	Common end (24Vdc/ac) of manual/auto switch signal input end
6	Relay S1	Relay 1, N.O. end	28	Manual/Auto com(220V)	Common end (220Vdc/ac) of manual/auto switch signal input end
7			29	Manual/Auto signal	manual/auto switch signal input end
8	Relay S2	Relay 2, N.O. end	30	Relay S5	Relay 5, N.O. end
9			31		
10	Relay S3	Relay 3, N.O. end	32	Relay S6	Relay 5, N.O. end 1
11			33	CPT(-)	Analog Output 4-20mA(-)
12	Relay S4	Relay 4, N.O. end	34	Relay S6	Relay 5, N.O. end 2
13			35	CPT(+)	Analog Output 4-20mA(+)
14	Monitor relay N.C.	Monitor relay normal close end	36	Ve-24Vdc(-)	Analog Output Power Ve (24Vdc(-))
15	Monitor relay com	Monitor relay command end	37	Ve-24Vdc(+)	Analog Output Power Ve (24Vdc(+))
16	Monitor relay N.O.	Monitor relay normal open end			

Installation and Operation Manual for CKD Multi-Turn Electric Valve Actuator

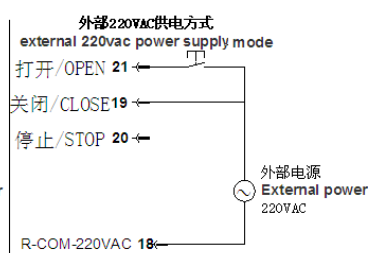
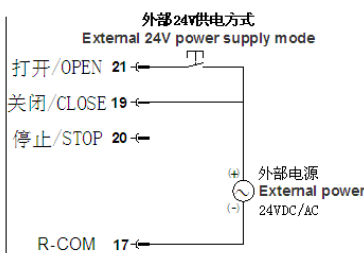
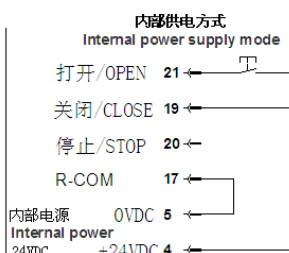
17	R-COM	Common end (24Vdc/ac) of remote switch signal	39	Bus master/	Relay S7-1/Bus Master B Port
18	R-COM-220 VAC	Common end (220Vac) of remote switch signal	40	Relay S7	Relay S7-2/Bus Master A Port
19	R- CLOSE	Remotely close signal input end	41	APC/Bus Slave/	4-20mA(-) Input/Relay S8-1/Bus Slave B Port
20	R-STOP	Remotely stop signal input end	42	Relay S8	4-20mA(+) Input/Relay S8-2/Bus Slave A Port
21	R- OPEN	Remotely open signal input end	43		Cable shield end

1. For three terminals with *, if it is single-phase actuator, then the single-phase power supply is connected to the 1, 2.

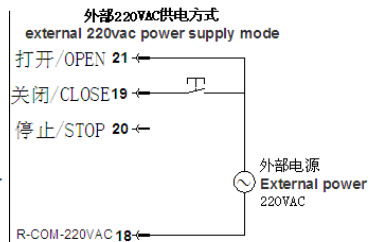
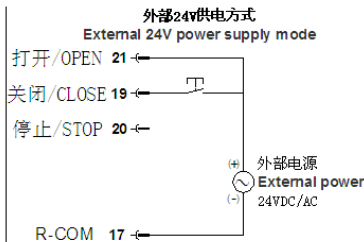
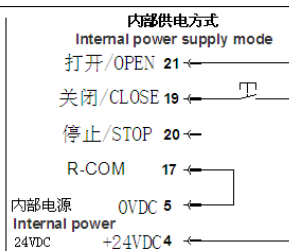
2.CPT=Current Position Transmitter, APC=Automatic Proportion Controller.

Remote control circuit

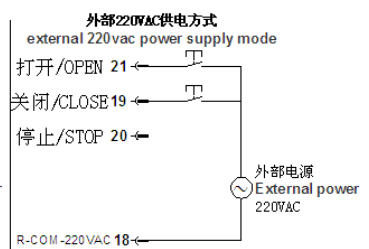
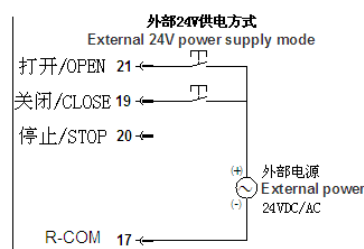
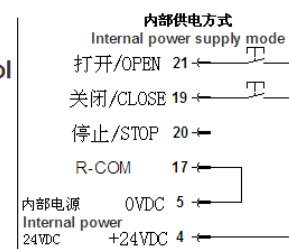
2线制控制 (开优先) Two-wire control (open first)



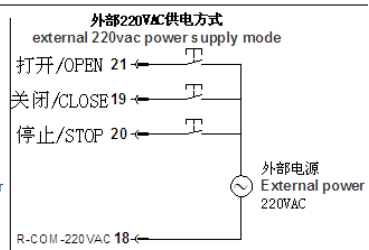
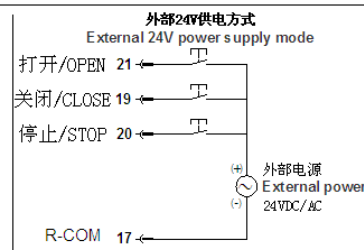
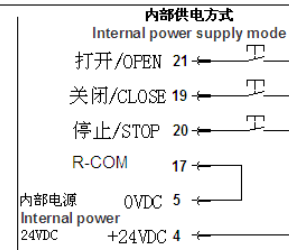
2线制控制 (关优先) Two-wire control (close first)



3线制控制 Three-wire control

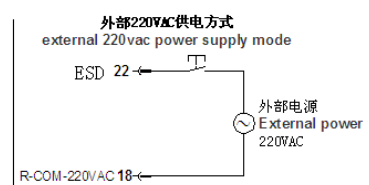
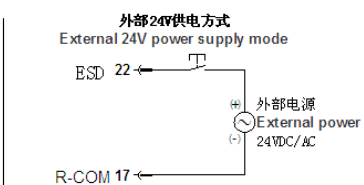
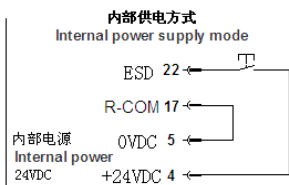


4线制控制 Four-wire control

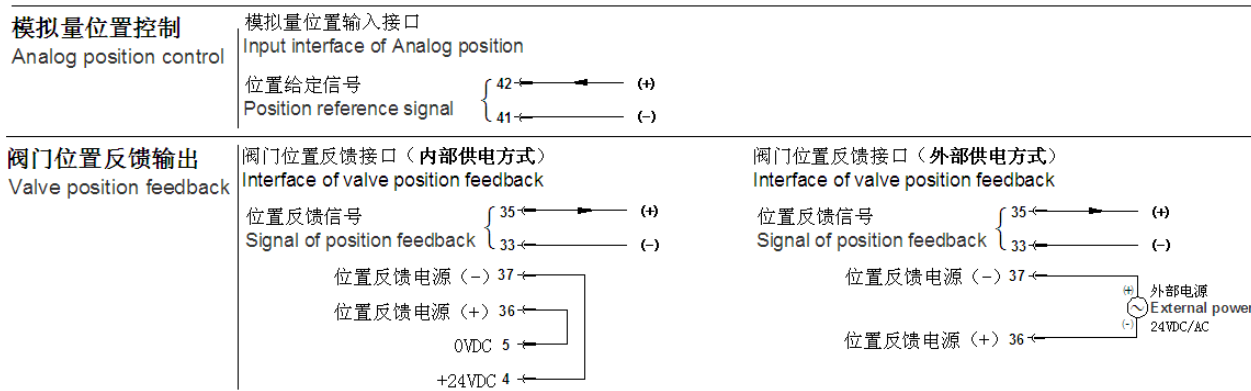


ESD Emergency Control / External Interlock Control

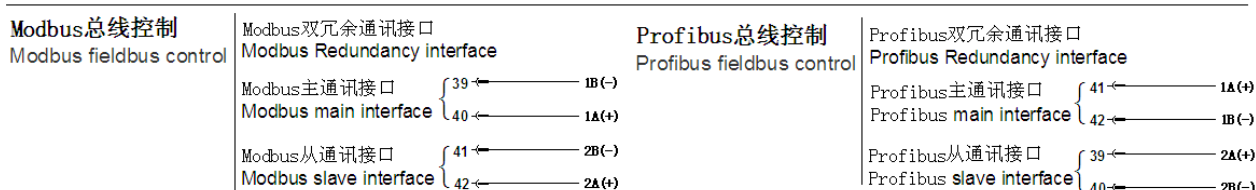
ESD紧急控制 ESD emergency control



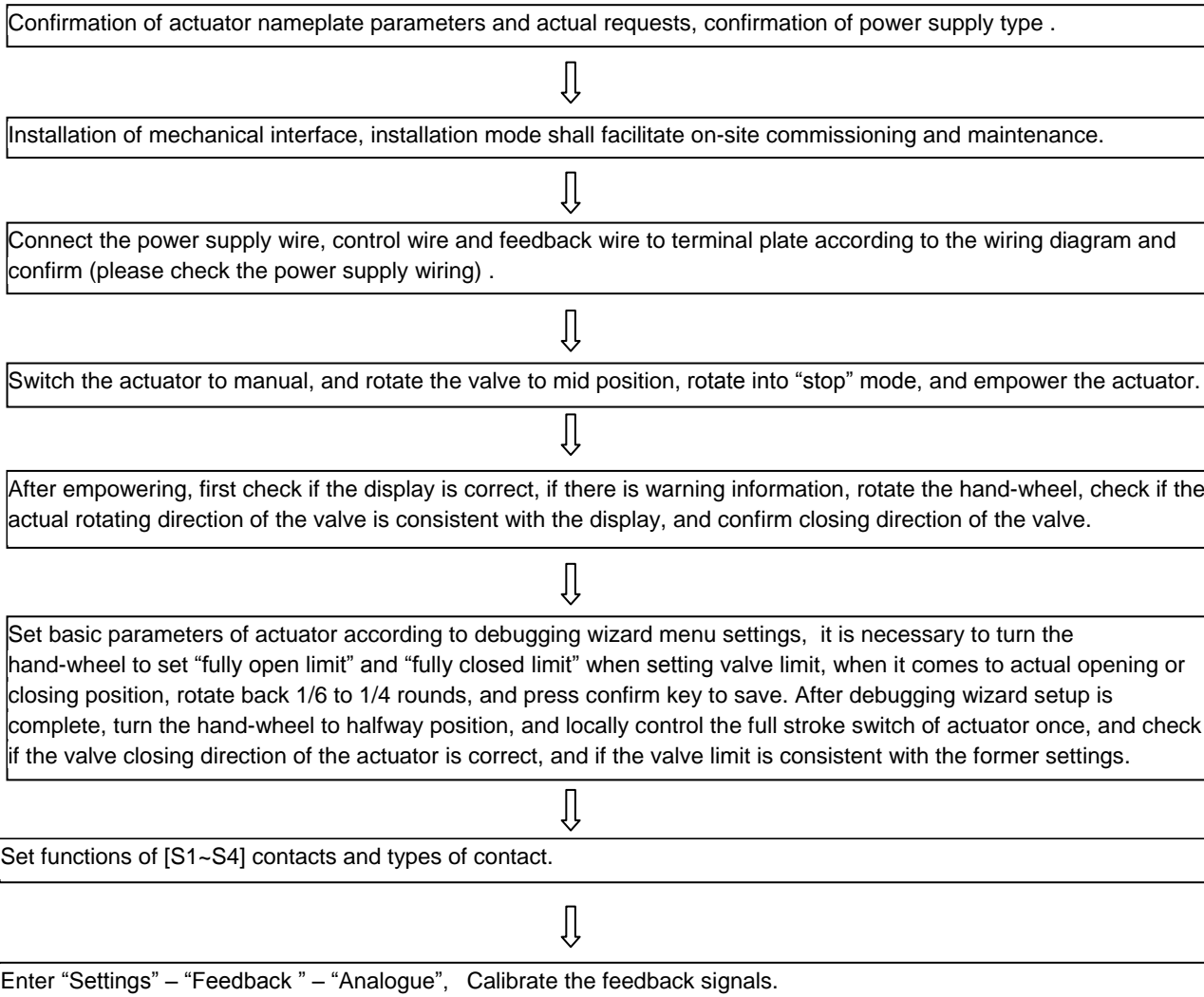
Analog position control / Valve position feedback



Fieldbus control



Typical installation and debugging process





After completion of all the settings, you shall conduct several times of operations and view the feedback data in the control room, and seal the normal terminal box and the inlet installation after your confirmation; then installation and debugging of the actuator is complete.

You can use the debugging wizard menu to complete the setting of basic functions of actuator, and then set contact feedback and current feedback according to demands.

Operation Guide

Local Module

Local module contains following contents:

- Graphic display
- Information center
- LED display
- Control Knob and selection Knob

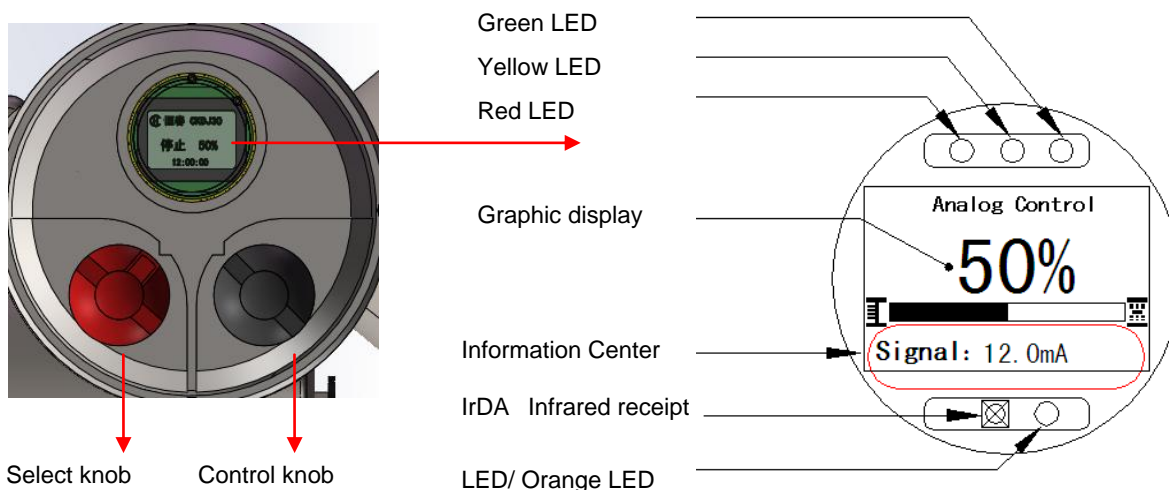


Figure 1: Local Display Module

Graphical Display and Information Center

Local display module of CKD Multi-turn Electric Valve Actuator is equipped with clear graphics and text integrated display type LCD screen, and local display module is integrated with the following characteristics:

- Graphic display: display valve position percent of the electric actuator.
- Information center: display of operation status, input signals and detailed alarm information of electric actuator.
- LED display: Red/open, Green/ close, Red/stop, Orange/infrared receiving indication lamp.
- IrDA infrared receipt: use infrared setting device provided by Hengchun to set the parameters of CKD electric actuator.

Control knob and Select knob

Select knob: select control mode "LOCAL" / "STOP" / "REMOTE".

Control knob: select knob is located in "LOCAL", control knob can finish "OPEN" / "CLOSE".

Select knob can be locked in any position of the padlock.

LED indicator light (light emitting diode)

On local module, there are 3 LED indicator lights: Red/Green/Yellow, and the functions of LED indicator lights are as follows:

LED light emitting diode display

Status of the valve	LED light emitting diode display		
	Red LED	Green LED	Yellow LED
Fully closed position	Extinguish	Light up	Extinguish
Fully open position	Light up	Extinguish	Extinguish
Moving in the close direction	Extinguish	Flashing	Extinguish
Moving in the open direction	Flashing	Extinguish	Extinguish
Stop at the middle position	Extinguish	Extinguish	Light up

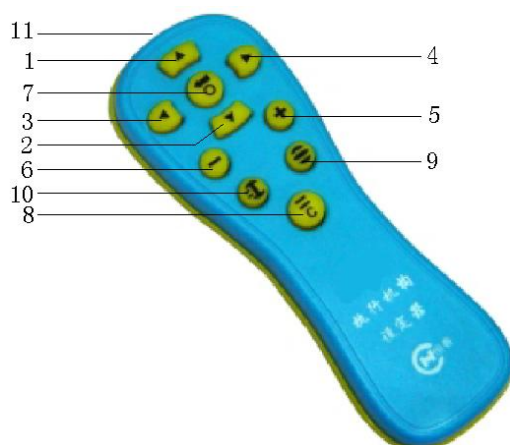
IrDA infrared receiving operation

Local module is configured with IrDA infrared receiving function, and you can use infrared setting device provided by Hengchun to control the actuator.

Operation of parameter setting

Infrared setting device is applied for non-invasive working setting on the actuator. When using setting device, select knob is located in the "STOP" position, and infrared emission head of setting device shall point right to the actuator, and the distance from display window of actuator is less than 1 meter.

When the actuator is shown in the main interface (selector knob located at arbitrary position), through "+, -" button to adjust the LCD contrast to adapt to environmental changes in temperature field.



Name	Meaning
1.Up	Page Up
2. Down	Page Down
3. Left	Move Leftward
4. Right	Move Rightward
5. Add	Add Value or Modify Options
6. Reduce	Reduce Value or Modify Options
7. Confirm	Save Current Settings or Enter into Next Menu
8. Back	Back to Last Menu or Stop Directive
9. Open Valve	Open Valve in Stop Mode
10. Close Valve	Close Valve in Stop Mode
11.Infrared Emission	Infrared Emission Window


Note: In the parameter modification menu, press +, - keys to modify the value or options, press ←, → keys for numeric parameters to move leftward or rightward according to ▲, press confirm key to display "Saved", which means it is modified successfully.

 **Warning: do not modify parameters during running of the actuator.**

Operation of Actuator

Valve Limit Setting

The valve limit setting must be completed before normal operations, otherwise the electric actuator cannot work normally.

 **Warning:** Hengchun company strongly recommends the use of the hand-wheel operation to conduct the valve limit setting for electric actuator, in order to avoid accidental damage of the valve. When the travel is too long, the hand wheel operation will be laborious, and therefore it must be ensured that the valve is always in safe status before working electrically. When close to fully open or fully closed position of the valve, you must manually rotate to fully open or fully closed position using hand-wheel.

 **Warning:** you must check after completion of the valve limit setting.

Make sure to manually rotate the valve to middle safety position using hand-wheel operation, and adopt control knob control actuator to open and close. Check if opening and closing direction of valve is correct, and if fully open position and closed position of the valve is correct. Remote control can be carried out after check.

IrDA infrared control mode

Select knob is located at "STOP" position, and press "Open valve" / "Close valve" / "Stop" buttons on infrared setting device on the main interface, and then electric actuator opens / closes / stops.

LOCAL - Local control mode

Select knob is located on "LOCAL", rotary control knob on the main interface can operate electric actuator to open and close.

Note: factory default settings of the CKD electric actuator is inching operation mode.

LOCAL control operation -- Inching operation mode

- Put the control knob in the open (close) position, and keep more than 1 second, and then the electric actuator will open (close) directional movement.
- After release of the operation knob, electric actuator will stop.

LOCAL control operation – Self-holding operation mode

- Put the control knob in the open (close) position, and keep more than 1 second, and then the electric actuator will open (close) directional movement, release the control knob and it will still operate until the fully open or fully closed position.
- Stop the electric actuator: put the select knob in "STOP" position.

REMOTE - Remote switch volume control mode

Through signals of external switch volume, you can carry out remote control for the electric actuator, modify remote control type to "switch" in the parameter setting mode, and adopt four-wire wiring mode. Factory default remote control mode of CKD electric actuator is set to: inching operation mode. Return to the main interface, and put the select knob in "REMOTE".

REMOTE control operation - Inching operation mode

- Close remote switch volume contact, and electric actuator will move to open or close direction.
- Undo remote switch volume signals, and electric actuator will stop motion.

REMOTE control operation-Self-holding operation mode

- Close remote switch volume contacts and keep more than 0.5 seconds, and the electric actuator will move in open or close direction and will operate to the fully open or fully closed position.

● If you need the electric actuator to stop in the middle position, close remote stop contacts will stop the electric actuator.

REMOTE – Control Mode of Remote Analog

Regulating type of actuator permits remote control operation for electric actuator through input signals of the Analog. In the parameter setting mode, modify the remote type to "Analog", and return to the main interface. Put the select knob in "REMOTE" position, Analog position control module receives 4-20mADC input signals to control position and process. The 4-20mA input signals correspond to the 0% - 100% valve position, and use an absolute linear position sensing device to provide 4-20mADC valve position feedback.

Hand-wheel Operation

Actuator provides the operation hand wheel and electric / manual switch handle, which enable manual operations under special circumstances, such as failure of main power supply or control circuit. Before hand-wheel operation, first put the select knob at the "stop" or "local" position, press the electric/manual switch handle to manual position, slowly rotate the hand-wheel while pressing the handle, so as to put the clutch into gear. After putting into manual gear, you can release the handle, and it will return to free position with the effect of spring, but internal clutch has been locked in the manual position, then rotate the hand-wheel to drive the output shaft to rotate, and thus you have realized manual operation. The clutch has been cleverly designed to electric priority structure, when the motor rotates, the clutch will automatically switch to electric operation position.

 **Warning: it is forbidden to operate manually in the remote control mode.**

Parameter setting of electric actuator

Factory default settings

Actuator setting	Emergency Control	Switch		Analog	
		Switch Control	Relay Feedback	Analog Control	Valve Position Feedback
CL Direction = Clock	ESD Control = OFF	Maintained= NO	S1 Fun = Fully CL S1 Type = N/O	L-Signal = 145	L- Signal= 147
Close Torque = 100%	ESD Direction = Stop	Interlock = OFF	S2 Fun = Fully OP S2 Type = N/O	H-Signal = 745	H-Signal = 750
Open Torque = 100%	ESD Contact = N/O	2-wire Priority = OFF	S3 Fun = Rem. Mode S3 Type = N/O	Deadband = 1.0%	OP Inertia = 2%
Torque bypass = NO	Override Tmp = OFF		S4 Fun = Comp. Fail S4 Type = N/O	LOS Action = Stop	CL Inertia = 2%
Maintained= YES	Override Exlock = NO		S0 Monitor Relay	OP Inertia = 2%	Invert = 4-20mA
Control Type = Switch	Override local = NO			CL Inertia = 2%	
Power supply = 3phase					
Change Password = 0008					

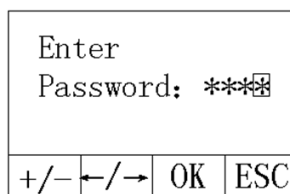
Enter into parameter setting mode

Select knob is located in "STOP" position, use infrared setting device to align IrDA infrared receiving tube within 1 meter, and press the confirm button to enter into the password input interface.

Tip: Actuator can receive infrared directives (except for mandatory mode) if only select knob is located in "STOP" mode, and all parameter settings can be saved if only confirm key is pressed, and "saved" is displayed.

Enter the password

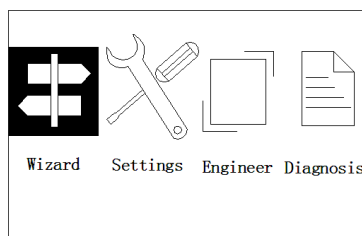
The password of CKD electric actuator is 4 bit 0-9 digitals, and default password is 0000. You can press +, - keys to modify the values, and press ←, → keys to move. Enter the correct password, and press the confirm key to enter the main menu.



Enter the main menu

Press the confirm key to enter the main menu interface, as shown above, the main menu contains 4 menus, and press ←, → keys to move leftwards and rightwards.

Main Menu



Debugging Wizard

The diagram illustrates the sequence of screen displays for the parameter setting of the inverter. The sequence is as follows:

- Setup Wizard**
Enter wizard?
+/- / +/- / OK / ESC
- Control Type**
☒ Switch ☐ Analog
☐ Modbus ☐ Profi.
+/- / +/- / OK / ESC
- Maintained**
☒ NO ☐ YES
+/- / +/- / OK / ESC
- Deadband**
0.0%
+/- / +/- / OK / ESC
- Set L-Signal**
Signal: 0155
Input L-Signal
+/- / +/- / OK / ESC
- Set H-Signal**
Signal: 0155
Input H-Signal
+/- / +/- / OK / ESC
- LDS Action**
☒ Stop ☐ Close
☐ Open ☐ XX%
+/- / +/- / OK / ESC
- Setup Wizard**
Setup Completed
+/- / +/- / OK / ESC
- Auxiliary**
☐ OFF ☒ ON
+/- / +/- / OK / ESC
- Address**
01
+/- / +/- / OK / ESC
- Stop Bit**
☒ 1Bit ☐ 2Bit
+/- / +/- / OK / ESC
- Parity Bit**
☒ None ☐ Odd
☐ Even
+/- / +/- / OK / ESC
- Baud Rate**
9600
+/- / +/- / OK / ESC
- Protocol**
☐ DPV0 ☒ DPV1
+/- / +/- / OK / ESC
- LOS Time**
01
+/- / +/- / OK / ESC
- Redundancy**
☒ NO ☐ YES
+/- / +/- / OK / ESC
- Setup Wizard**
Setup Completed
+/- / +/- / OK / ESC
- Setup Wizard**
Setup Completed
+/- / +/- / OK / ESC

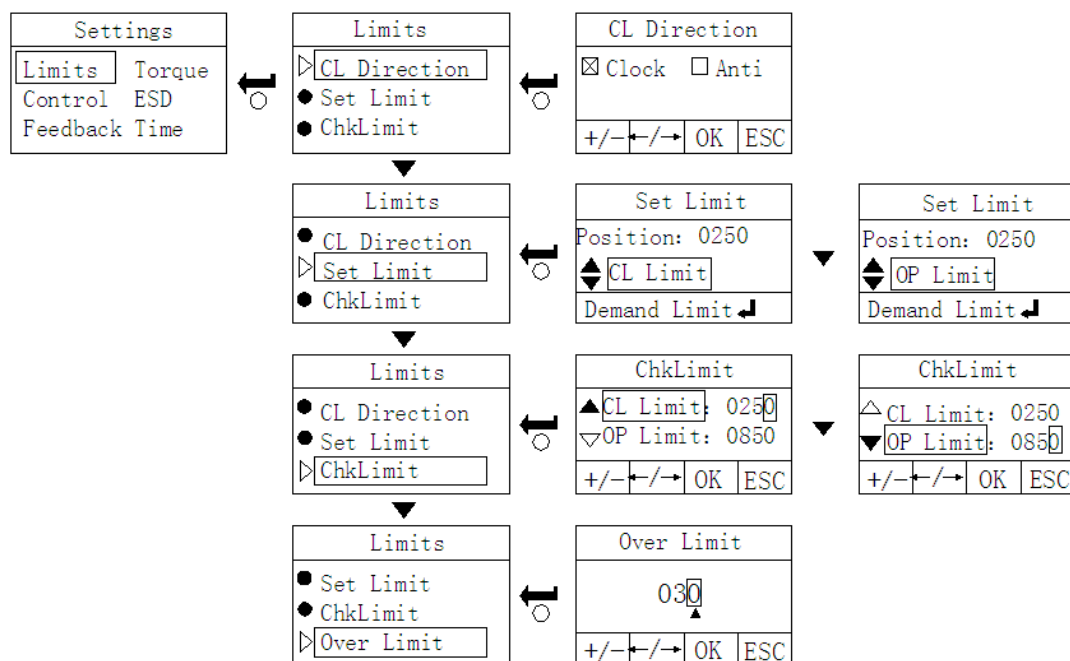
Tip: after completion of "open torque" menu settings, press "down" key to enter the "control type" menu, choose different menu options and press "confirm" key to save, it will automatically enter the corresponding wizard setup process.

Setting Menu

Settings	
Limits	Torque
Control	ESD
Feedback	Time

The setting menu contains six sub-menus, switch in the sub-menus by pressing the "up, down, left and right" keys, press "confirm" key to enter the next level of menu.

Limits Setting



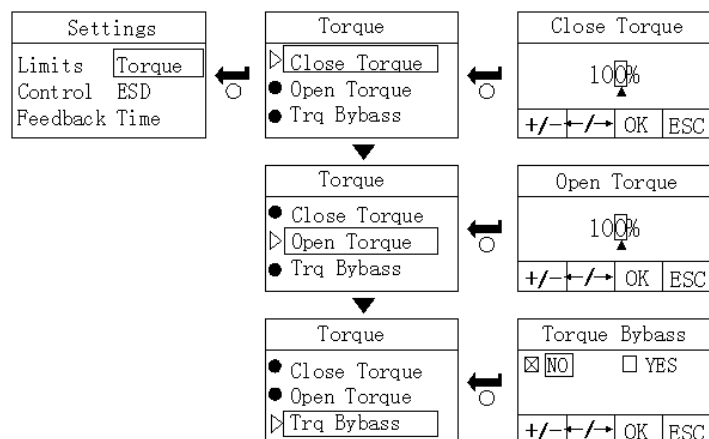
"CL Direction" menu, press "+, -" key to change, and it can be set as "Clock / Anti".

"Set Limit" menu, press "up, down" keys to switch between "CL Limit" and "OP Limit", when setting "CL Limit", adjust valve to actual fully closed position, press "confirm" key to save fully closed limit. Set "OP Limit" in the same steps.

"ChkLimit" menu, you can view "CL Limit" and "OP Limit" which have been set, click "up, down" keys to switch between "CL Limit" and "OP Limit". At the same time, you can fine adjust "CL Limit" and "OP Limit". When fine-tuning closed limit, press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"Over limit" menu, press "+, -" key to modify, press "left and right" key shift, press "confirm" key to keep after the change. The modified range is 20-250, the default value is 30. The menu parameter indicates that the valve is open or closed due to the inertia, the position of the valve exceeds the maximum allowable value of the set position.

Torque Setting

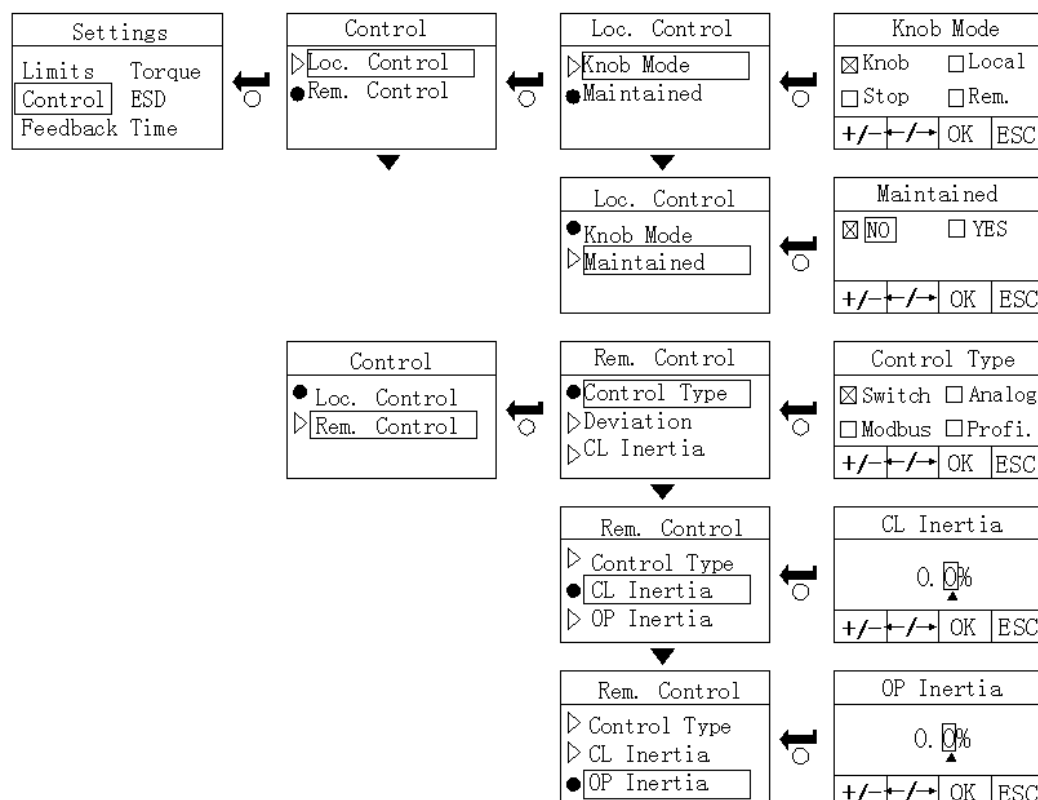


"Closed Torque" menu is applied for protection value by closing valve torque, and it can be set as 40%-100% of rated torque, press "+, -" keys to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"Open Torque" menu is applied for protection value by open valve torque, and it can be set as 40%-100% of rated torque, press "+, -" keys to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"Torque bypass" menu, press "+, -" keys to change, you can set disable / enable.

Control Settings



"Control " menu contains two sub-menus: "Loc. Control" / "Rem. Control" in the sub-menu, switch in the sub-menus by pressing the "up, down" keys, press "confirm" key to enter the next level of menu.

Local control

"Knob mode" menu is applied for choosing control mode of knob, and it can be set as four options, which are

"Knob"/"Local"/"Stop"/"Rem.", press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification. Menu options are explained as follows:

"Knob" -- Control mode of select knob;

"Local" -- Compulsory local mode, select knob is invalid in compulsory local mode, you can modify the parameters by infrared setting device;

"Stop", Compulsory stop mode, select knob is invalid in compulsory stop mode, you can modify the parameters by infrared setting device;

"Rem." -- Compulsory remote mode, select knob is invalid in compulsory remote mode, you can modify the parameters by infrared setting device.

"Maintained" menu, press "+, -" key to change, you can set the disable / enable, press "confirm" key to save after

modification.

Remote control

"Control Type" menu is the source of remote control, it can be set to four options, which are "switch" / "Analog" / "Modbus" / "Profi.", press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification. Menu options are explained as follows:

"Switch" -- remote switch control, remote control source is switch signal;

"Analog" -- remote simulation control, remote control source is 4-20mA signal;

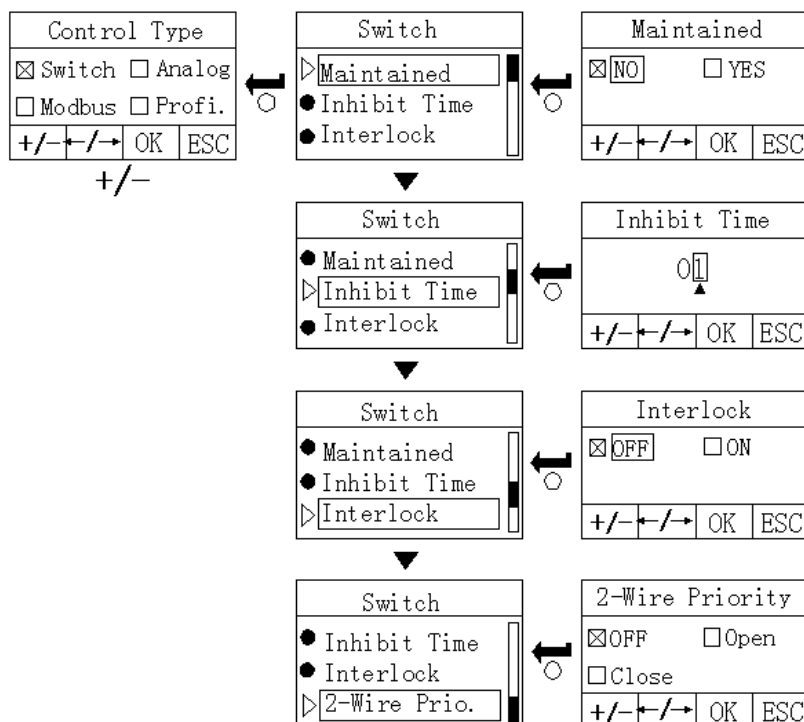
"Modbus" - remote Modbus bus control, remote control source is Modbus bus signal;

"Profibus" - remote Profibus bus control, remote control source is Profibus bus signal.

"CL Inertia" menu is closed inertia area, adopt fretting mode within the target valve position difference during closing process, press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"OP Inertia" menu is closed inertia area, adopt fretting mode within the target valve position difference during closing process, press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

◆ Switch control



" Maintained" menu is set to "NO" ,remote switch control is inching operation mode.

" Maintained" menu is set to "YES" ,remote switch control is Self-holding operation mode.

" Interlock" menu, press "+, -" key to change, you can set the disable / enable, press "confirm" key to save after modification.

"2-wire Prio." menu, press "+, -" key to change, you can set to disable / open first / close first, press "confirm" key to save after modification.

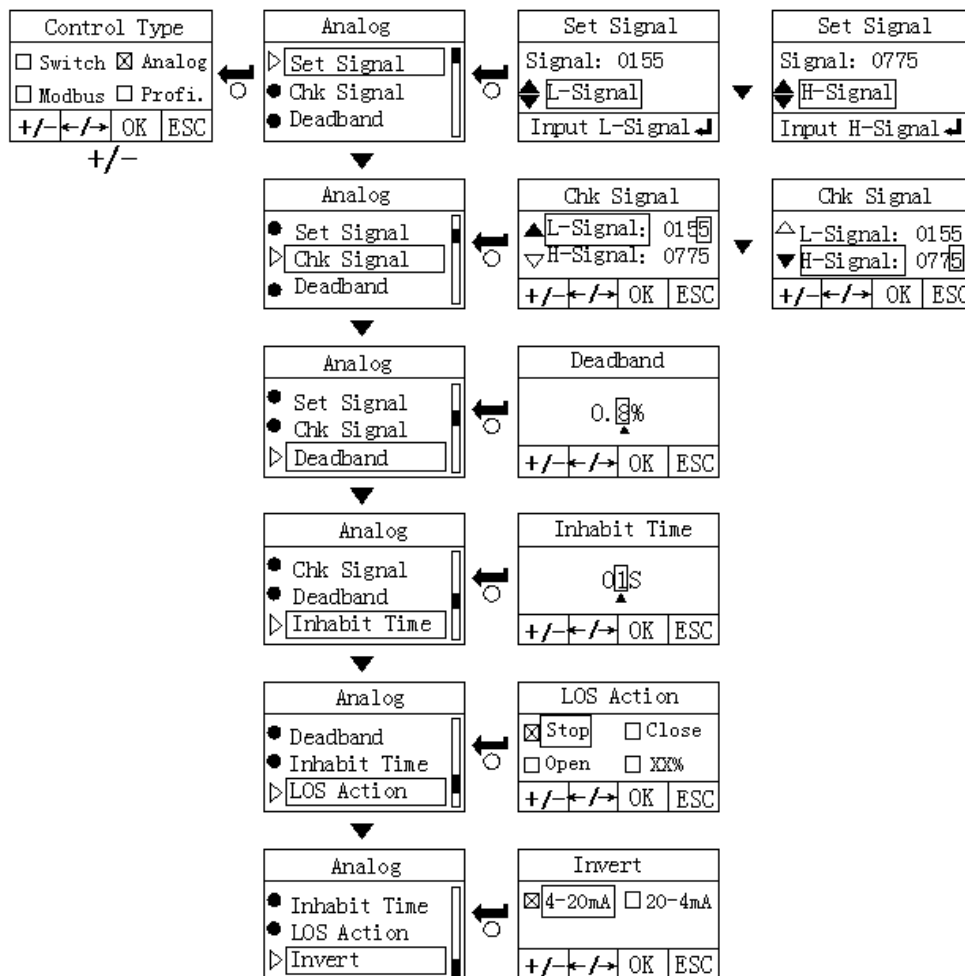
2-wire control adopts self-maintained single remote opening contacts to control the motion of electric actuator to open or close.

Open first: closed remote open contact, the electric actuator moves in the direction of opening; when remote open contact separates, electric actuator move in the direction of closing.

Close first, closed remote closing contact, the electric actuator moves in the direction of closing; when remote closing contact separates, electric actuator move in the direction of opening.

Inching operation mode is disabled in 2-wire control mode.

◆ Analog control



" Set Signal " menu, switch between L-signal and H-signal by pressing the "up, down" keys, when setting L-signal, input 4mA signal for DCS, press "confirm" key to save low signal. When setting H-signal, input 20mA signal for DCS, press "confirm" key to save the high signal.

" Chk Signal " menu, you can view the low signal and high signal that have been set, switch between low signal and high signal by pressing the "up, down" keys. You can fine tune the settings for L-signal or H-signal, press "+, -" to change, press "left, right" keys to move, and press "confirm" key to save after modification.

" Deadband " menu is dead zone setting values, setting range within 0.3%-5%, press "+, -" to change, press "left, right" keys to move, and press "confirm" key to save after modification.

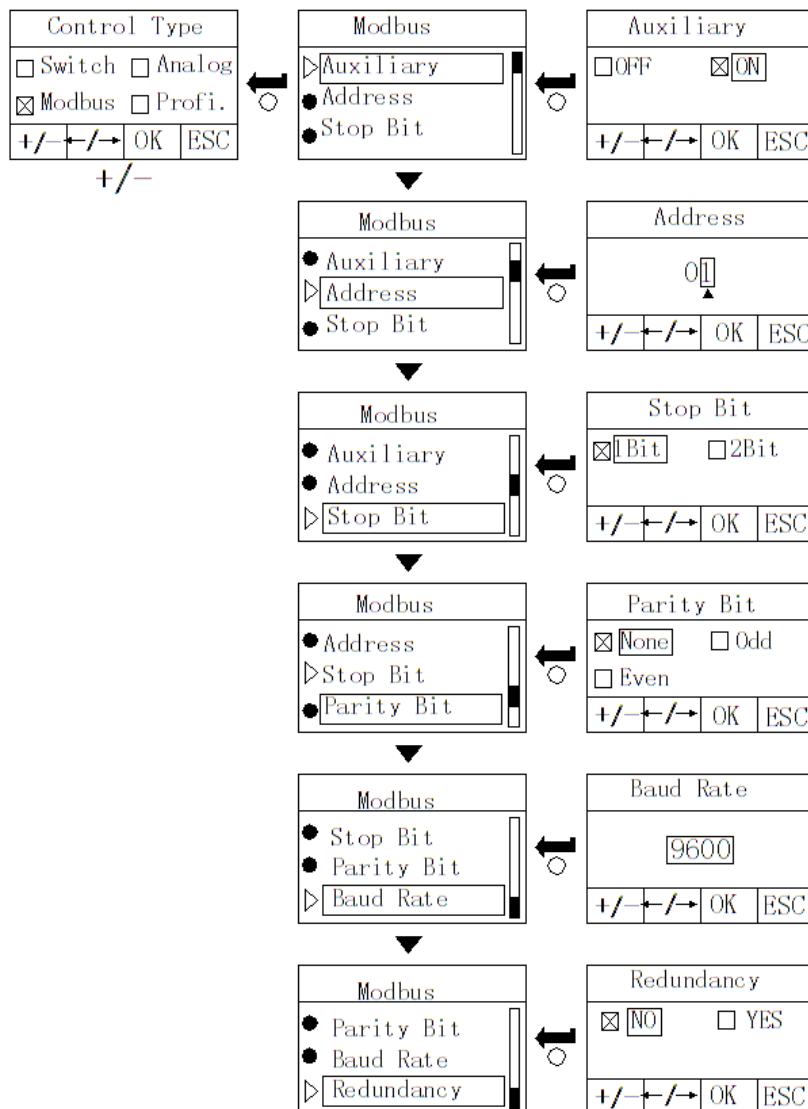
" Inhibit time " setting range within 1S-20S, press "+, -" to change, press "left, right" keys to move, and press "confirm" key to save after modification. Inhibit time can generate a delay when the actuator responds to transient changes of signals, in order to prevent unnecessary operation. When the signal is stable, the actuator will respond to stable change of signals.

" LOS Action " menu is the response to signal missing, press "+, -" to change, you can set to Stop/Close/Open /XX% (appointed valve opening), and press "confirm" key to save after modification.

"Invert" menu is valve opening corresponding to the high point signals, press "+,-" key to change, you can set to "4-20mA / 20-4mA", and press "confirm" key to save after modification. Options are described as follows:

4-20mA: 4mA=0%, 20mA=100%; 20-4mA: 20mA=0%, 4mA=100%.

◆ Modbus control



"Auxiliary" menu is compatible with the volume control switch, it can be set to two options, which are "OFF" / "ON", press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"Address" menu is used to set the modbus address of actuator, can be set 1-123, and press "confirm" key to save after modification.

"Stop bit" menu can be set "1Bit/2Bit", and press "confirm" key to save after modification.

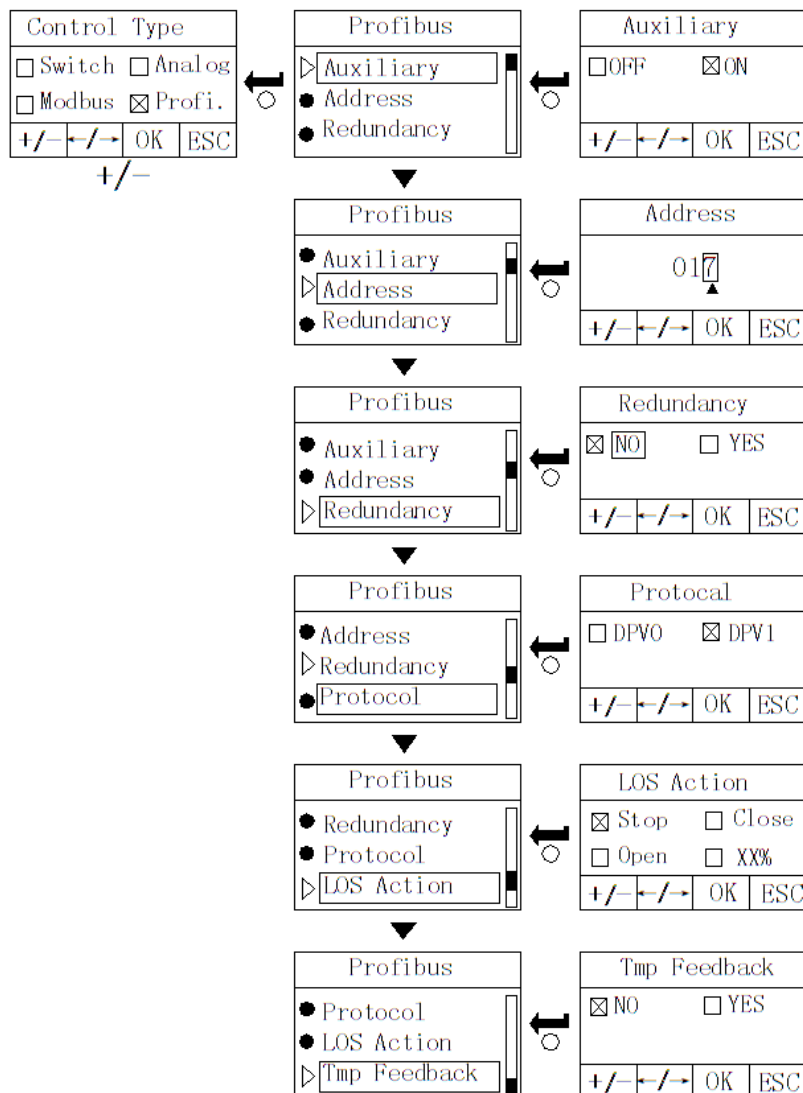
"Parity bit" menu can be set "None/Odd/Even", and press "confirm" key to save after modification.

"Baud Rate" menu is used to set the bus communication baud rate, can be set

"300/600/1200/2400/4800/9600/19200/38400", and press "confirm" key to save after modification.

"Redunancy" menu is set to "NO" , Master / slave channel address is same. "Redunancy" menu is set to "YES" , slave channel address is value of master channel address added 123(≤ 124) or master channel address subtract 123(≥ 124).

◆ Profibus control



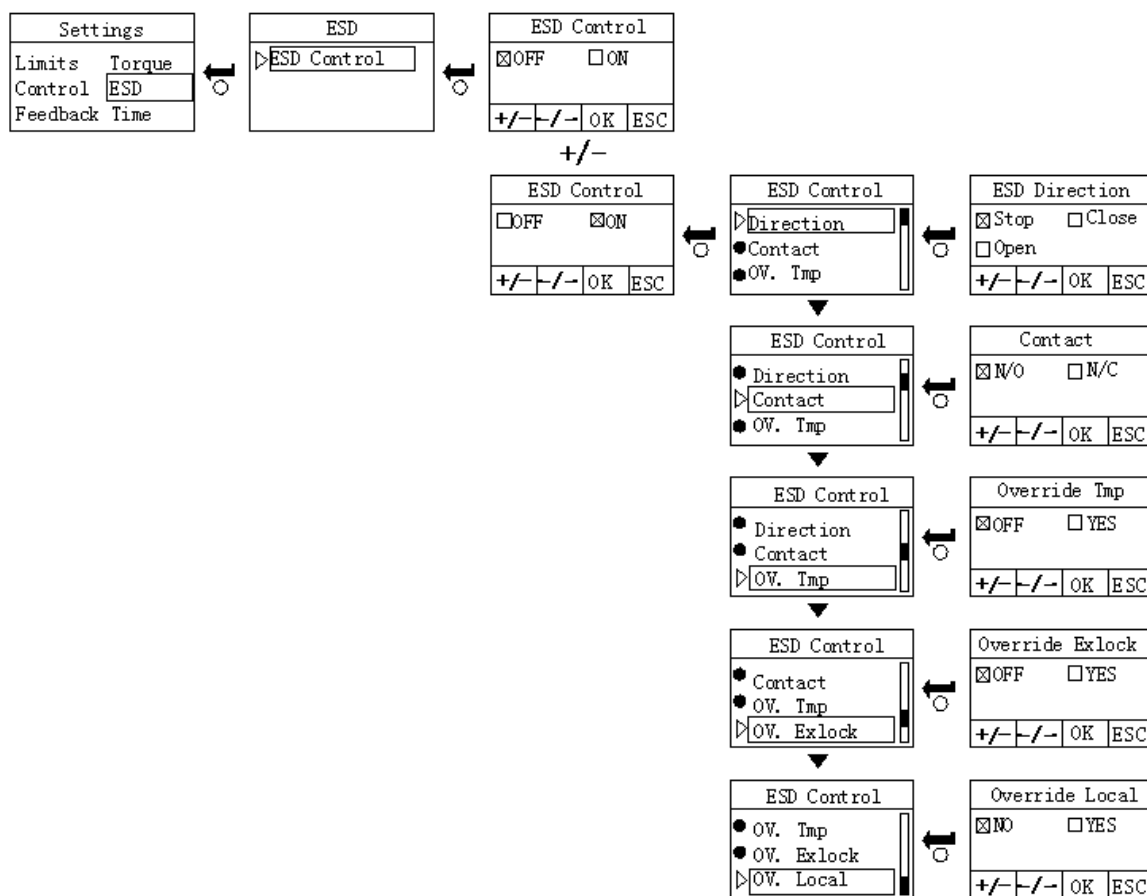
"Auxiliary" menu is compatible with the volume control switch, it can be set to two options, which are "OFF" / "ON", press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"Address" menu is used to set the profibus address of actuator, can be set 1-63, and press "confirm" key to save after modification.

"Redunancy" menu is set to "NO" , Master / slave channel address is same. "Redunancy" menu is set to "YES" , slave channel address is value of master channel address added 63(≤ 64) or master channel address subtract 63(≥ 64).

"Protocal" menu is used to set the profibus protocol version, it can be set to two options, which are "DPV0" / "DPV1", press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

Emergency control



"ESD Direction" is used to set ESD motion direction, can be set to "stop/ close/open", press "+, -" key to change, press "confirm" key to save.

"Contact " can be set to "N/O" / "N/C", press "+, -" key to change, press "confirm" key to save. Options are described as follows:

N/O: contact of emergency control is closed: emergency control is valid;

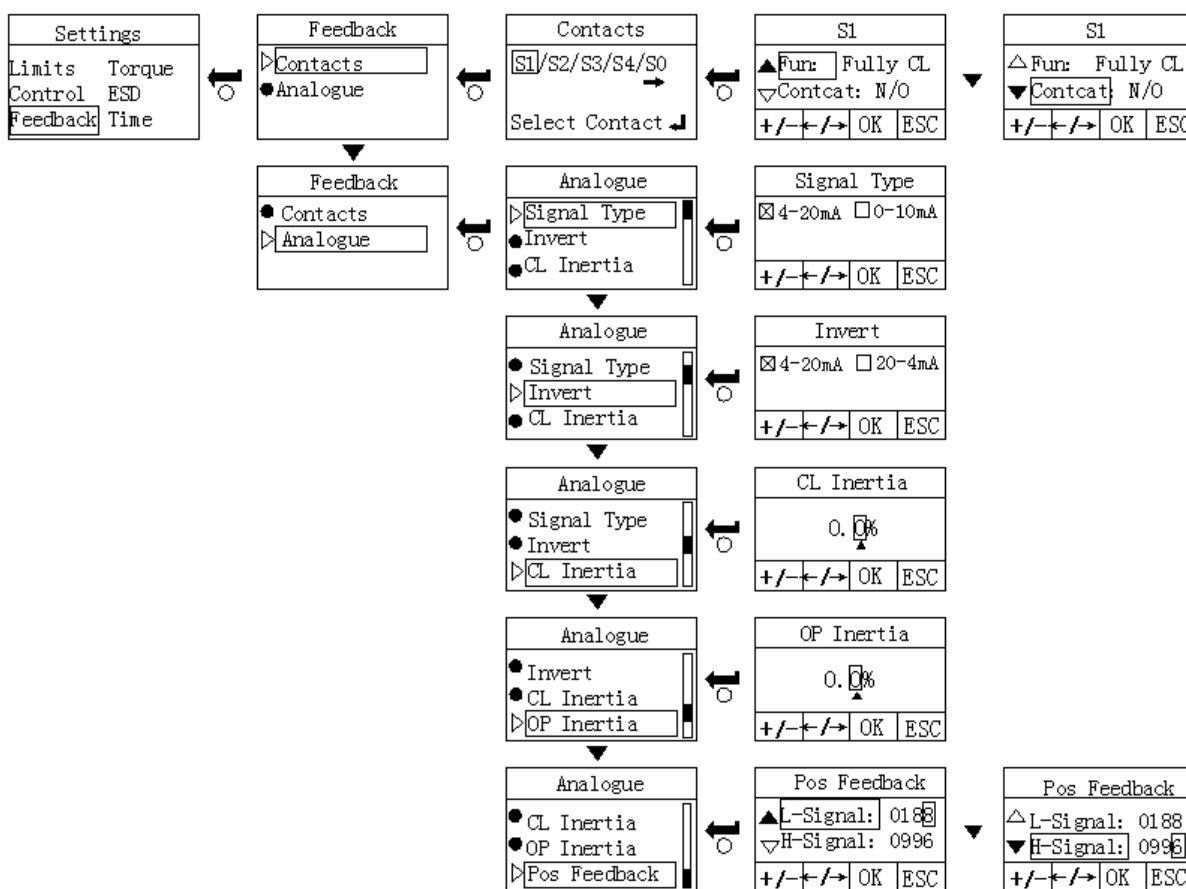
N/C: contact of emergency control is open: emergency control is valid.

"Override Tmp" can be set to "disable" / "enable", press "+, -" key to change, press "confirm" key to save. Enable Override Tmp, when emergency control is valid, even if the motor is alarming because of overheating, the actuator responds to emergency control.

" Override Exlock" can be set to "disable" / "enable", press "+, -" key to change, press "confirm" key to save. Enable override exlock, when emergency control is valid, even if it is in interlocking action, the actuator responds to emergency control.

" Override local" can be set to "disable" / "enable", press "+, -" key to change, press "confirm" key to save. Enable beyond local, when emergency control is valid, even if the select knob is in local position or stop position, the actuator responds to emergency control.

Feedback setting



"Contacts" contains S0-S4, switch in the S0-S4 by pressing "left, right" keys, press "confirm" key to enter the next level of menu

S0 can be configured with S1-S4 as function options as in below table, and can also be configured as monitoring function.

"S1-S4" menu, you can switch between "Fun" and "Contact" by pressing "up, down" keys, when setting "Fun", press "+, -" button to change, press "confirm" key to save. When setting "Contact", press "+, -" key to set to "NO/NC" press "confirm" key to save.

See table below for contact function options :

Fully CL	Fully OP	Middle Travel -XX%	TrqTrip CL
TrqTrip OP	TrqTrip	stall	Closing
Opening	Moving	Hand-wheel	Blinker
ESD Action	CL Exlock	OP Exlock	Interlock
Stop mode	Local mode	Rem. mode	Over Tmp
Lost phase	Valve Fault	Actuator Fault	Comp. Alarm

Current feedback

"Signal type" can be set to "4-20mA" / "0-10mA", press "+, -" keys to change, press "confirm" key to save.

"Invert" menu is the valve opening corresponding to high point of feedback signals, press "+, -" key to change, you can set to "4-20mA/20-4mA", and press "confirm" key to save after modification. Options are described as follows:

4-20mA: 4mA=0%, 20mA=100%;

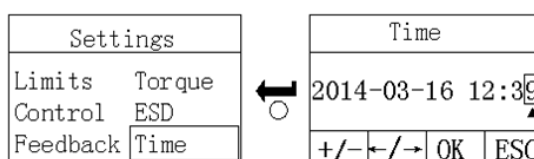
20-4mA: 20mA=0%, 4mA=100%.

"CL Inertia" menu is the modified value of CPT feedback when valve closed, the feedback values of CPT is the actual range values when valve closed – value of closed valve inertia. Press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

"OP Inertia" menu is the modified value of CPT feedback when valve opens, the feedback values of CPT is the actual range values when valve opens + value of open valve inertia. Press "+, -" key to change, press "left, right" keys to move, and press "confirm" key to save after modification.

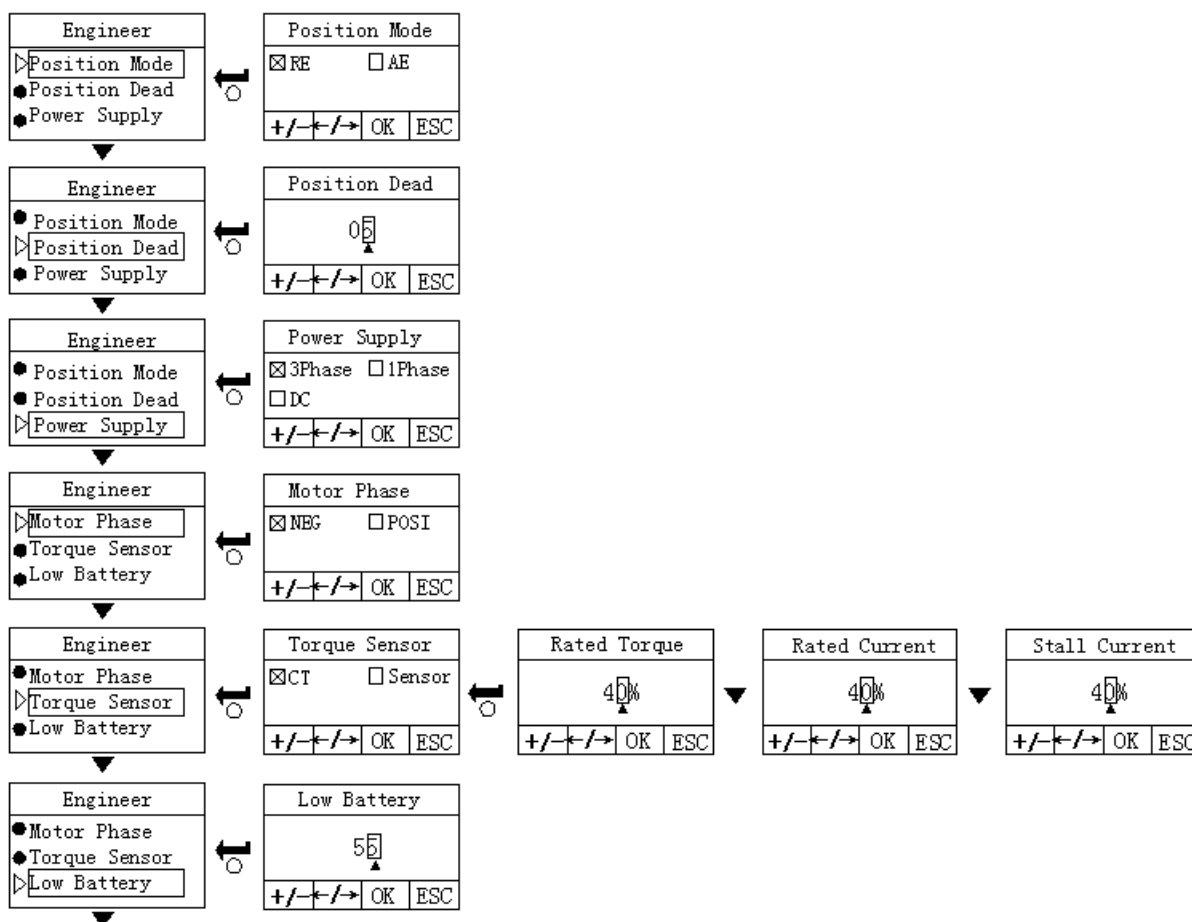
"Pos Feedback" menu, you can switch between "L-Signal / H-Signal" by pressing "up, down" keys. When setting "L-Signal", press "+, -" key to change, press "left, right" keys to move, change values of "L-Signal" to 4mA, press the "confirm" key to save. When setting "H-Signal", press "+, -" key to change, press "left, right" keys to move, change values of "H-Signal" to 20mA, press the "confirm" key to save.

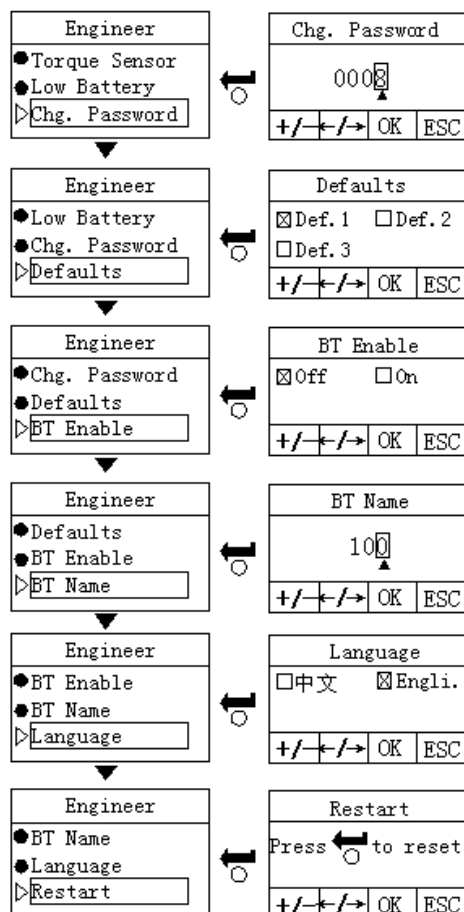
Time setting



"Time" menu, press "+, -" key to change, press "left, right" keys to move, set the current time and press the "confirm" key to save.

Advanced settings





"Engineer" contains twelve sub-menus, switch in the sub-menus by pressing the "up, down" keys, press "confirm" key to enter the next level of menu.

"Position Mode" menu, press "+, -" key to set the valve position mode for relative / absolute. Press confirm key to save. Valve position mode according to the selected valve plate settings: if the execution mechanism is installed in the hall of the relatively encoder, valve mode set to relative; if the execution mechanism is arranged is the absolute encoder, valve position mode set to an absolute.

"Position Dead" menu, press "+, -" key settings, press "confirm" key to save. When the valve position exceeds the set value, the valve position is changed.

"Power Supply" menu can be set to "three" / "single phase" / "DC", according to "+, -" key modification, according to "confirm" key preservation.

"Motor phase" menu to save the connection order of the motor can be adjusted automatically.

The rated current of the actuator is set at the factory.

"Low Battery" menu, press "+, -" key settings, press "confirm" key to save. When the battery power is lower than the set value, the battery in the warning sign position is less than the sign (no other warning).

"Chg. Password" menu, Password can be set for the 4 digit 0-9 number, you can press "+, -" key to modify, press "around" key shift, modify the password after the confirmation button to save.

"Defaults" to restore the factory settings, a total of three options:

Def. 1, in addition to the contact set, analog signal input / output, bus control, advanced setting parameters of all the basic set and state will return the default settings, while the limit is also restored to the factory default.

Def. 2, in addition to the contact settings, analog signal input / output, bus control, advanced settings, all of the basic settings and the state will return to the default settings, without changing the limit parameters.

Def. 3, the contact settings, analog signal input / output, bus control, advanced settings to restore the default settings.

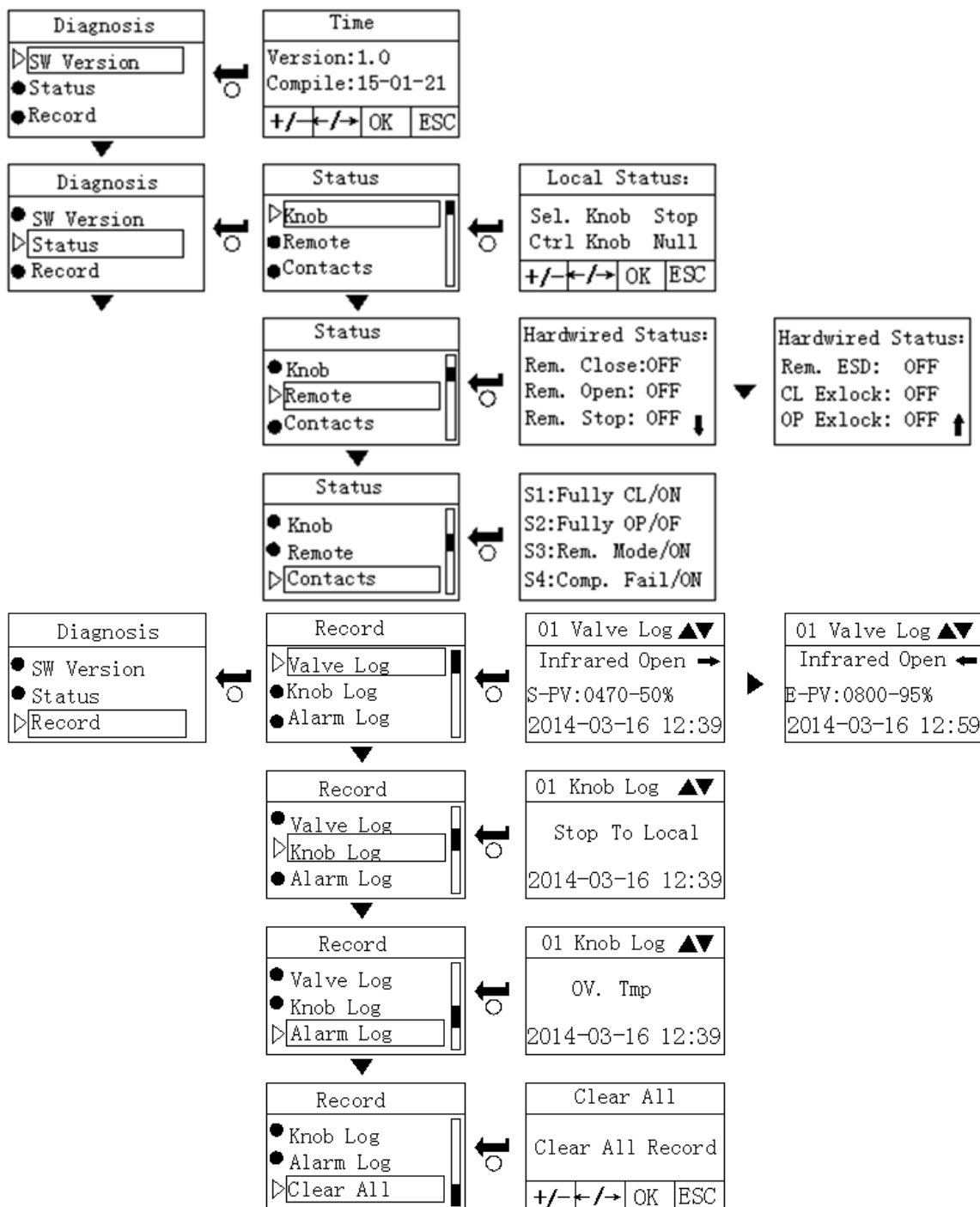
Bluetooth enable menu, press "+, -" key to modify, press "confirm" key to save. When the Bluetooth enable is set to prohibit, will not be able to upload and download parameters via bluetooth. When Bluetooth enabled, the Bluetooth host can upload and download parameters with the Bluetooth device.

"Bluetooth" menu, used to set the name of the native Bluetooth device. You can find the set name of the device in the Bluetooth host.

"System reset" press "confirm" key software reset.

Diagnosis

"Diagnosis" contains three sub-menus, switch in the sub-menus by pressing the "up, down" keys, press "confirm" key to enter the next level of menu.



"Diagnosis", you can check the software version information and compiling time.

"Status", you can check the knob status, remote switch status, contact feedback status, Analog input signals, Position feedback signals and Internal temperature.

"Record information" you can check the latest 20 valve action records, knob action records and history alarm records, empty records to empty record information.

Maintenance

1. Alarm information

When the actuator structure fails, the information center of LCD screen will display alarm information as in following table.

Data Error	Motor Over Tmp	Torque Trip OP	Torque Trip CL
Signal Loss	Motor stall	Phase Loss	Power Loss
Encoder fault	Torque Board Fault	Limit Error	Over Limit
Battery Low			

Meaning of alarm information:

Meaning of alarm information:

Data error: Actuator internal parameter error, need to restore the default settings.

Motor Over Tmp: The motor temperature over 130 °C, until motor cooling it will automatically be recovered.

Torque Trip CL: In closing process, the valve withstand the torque value exceeds the set value.

Torque Trip OP: In opening process, the valve withstand the torque value exceeds the set value.

Motor stall: When actuator starting or moving, if not detected valve position changes in seven seconds, then stop the motor operation, and displays motor stall.

Power loss: Power supply missing.

Phase loss: The three-phase power supply lacks one or two phase.

ESD active: The emergency protection signal sent by DCS is valid.

Limit Error: Actuator stroke setting is too short or not reasonable

Over Limit: Actuator valve position is beyond the scope of full open or close the limit allowed.

Torque module failure: Torque module fault occurs.

2. Trouble shooting for common faults of actuator

2.1 Phase Failure Analysis and Troubleshooting

Reason 1: Three-phase power supply lost one or two phase

Method: Check whether the external power supply is normal, eliminate power distribution system and line fault.

Reason 2: The power plate phase detection related electronic components failure

Method: Replace the same model power supply board

2.2 Motor Stall Failure Analysis and Troubleshooting

Reason 1: Manual / electric switching device is locked, motor idling

Method: Control actuator reverse operation, if it can run, then the fault is excluded. After repeated previous operation steps, if you fail to switch to electric mode, then you shall contact the manufacturer.

Reason 2: External factors that hinder the normal operation of actuator (such as, the valve is stuck)

Method: User excludes the impact the trouble that hinders normal operation of the actuator.

Reason 3: Motor control unit is bad or damaged

Method: Check cable connection of motor control unit, check if the motor control unit is damaged.

Reason 4: Position detection unit and signal feedback shaft disengage

Method: check if the position detection unit and feedback signal shaft disengage or the contact is not reliable.

Reason 5: Fault of location detection unit

: Method: Replace the position detection unit.

2.3 Does not display on empowering Failure Analysis and Troubleshooting

Reason 1: Power supply lost

Method: Check whether the external power supply is normal, eliminate power distribution system and line fault.

Reason 2: Transformer primary side fuse breaks

Method: Replace the same model of fuse.

Reason 3: Output voltage of power supply board is abnormal.

Method: Replace the same model of power supply board.

Reason 4: Display board failure

Method: Replace the same model of Display board.

2.4 Motor Overheat Failure Analysis and Troubleshooting

Reason 1: The motor continuous operates for a long time, the temperature exceeds 130 °C, temperature switch automatically disconnects.

Method: Actuator stops running, when the motor temperature drops may continue to work.

Reason 2: The temperature switch inside the motor is damaged

Method: Temporarily connect temperature detector plug-in shortly, work short time. Replace the motor during repair.

Reason 3: Circuit components related to main control board is damage

Method: Replace the same model of main control board.

2.5 Torque Trip Failure Analysis and Troubleshooting

Reason 1: Torque protection setting value is too small.

Method: Increase protection setting value.

Reason 2: External factors that hinder the normal operation of actuator (such as, the valve is stuck)

Method: User excludes the impact the trouble that hinders normal operation of the actuator.

Reason 3: Improper selection of actuator

Method: Replacing the matching actuator.

Reason 4: Circuit components related to main control board is damage

Method: Replace the same model of main control board.

2.6 Valve Position overrun Failure Analysis and Troubleshooting

Reason 1: Location detection unit is faulty

Method: Replace the location detection unit.

Reason 2: Hand-wheel operation causes valve position overrun

Method: Using the hand-wheel operation adjust valve position to the normal range.

Reason 3: Motor control unit is damaged

Method: Replace motor control unit.

Reason 4: Actuator inertia is big, but does not affect the safety valve

Method: The "over limit allowed" value is increased appropriately.

2.7 Switch can't control Failure Analysis and Troubleshooting

Reason 1: Connection error or unreliable

Method: Check the wiring and connection again.

Reason 2: Remote control type menu is not set to "switch"

Method: Re-set parameters

Reason 3: Select knob is not in remote location

Method: Rotate the select knob to remote location.

Reason 4: 24V power supply fault

Method: Replace the same model of power supply board.

Reason 5: Circuit components related to main control board is damage

Method: Replace the same model of main control board.

Reason 6: Select knob is damage

Method: Replace the select knob.

2.8 Can remote control, but can't local control

Reason 1: Circuit components related to knob board is damage

Method: Replace the knob board.

2.9 Action Trip Failure Analysis and Troubleshooting

Reason 1: The air switch of power distribution system is small or damage

Method: Replace the matching air switch.

Reason 2: Power wiring error

Method: Check the wiring and connection again.

Reason 3: Contactor or solid state relay module damage

Method: Replace the contactor or solid state relay module.

Reason 4: Motor damage

Method: Replace the motor.

Reason 5: Water flooding

Method: Actuator water resulting in abnormal insulation, replace the actuator.

2.10 Power-on Trip Failure Analysis and Troubleshooting

Reason 1: Power wiring error

Method: Check the wiring and connection again.

Reason 2: Contactor or solid state relay module short-circuited

Method: Replace the contactor or solid state relay module.

Reason 3: Transformer fault

Method: Replace the transformer.

2.11 Valve Position Lost Failure Analysis and Troubleshooting

Reason 1: The connection of actuator and valve connection is not good

Method: Check wear degree of driving shaft sleeve, if there is obvious wear, then replace driving shaft sleeve.

Reason 2: The location detection unit is damage

Method: Replace the location detection unit.

Reason 3: Circuit components related to main control board is damage

Method: Replace the same model of main control board.

2.12 The actuator output shaft did not turn Failure Analysis and Troubleshooting

Reason 1: Manual / electric switching device is fault

Method: Turn the hand wheel rotation. Reinstall the electric/manual handle.

Reason 2: Contactor or solid state relay module is fault

Method: Replace the contactor or solid state relay module.

Reason 3: The power board is damage

Method: Replace the same model of power board.

2.13 Actuator Rotate and the valve is not turning Failure Analysis and Troubleshooting

Reason 1: Actuator output shaft claws fracture

Method: Replace the output shaft.

Reason 2: Spindle on the top of the card is bad, causing the spindle to climb off

Method: Replace the main shaft under the card spring, bearing, lifting block components.

Reason 3: The driving shaft sleeve (copper connecting sleeve) trapezoidal thread has been polished

Method: Replace connecting flange assembly.

2.14 Actuator oil plug leaking oil Failure Analysis and Troubleshooting

Reason 1: Oil plug screw loose

Method: Fastening screw oil plug.

3. Maintenance

Each actuator is rigorously tested before delivery. Carry out installation, seal and test according to this manual, which can ensure of trouble free operation for many years.

Routine maintenance includes following contents:

- (1) Fasten the bolt between actuator and valve every about 6 months.
- (2) Make sure that the stem and the driving shaft sleeve are clean and lubricated.
- (3) If the valve is rarely running, you shall make an operation plan (operate once every 3~4 months).

Address: No. 5, MUYANG Road, Hanjiang Industrial Park, Yangzhou

Postal Code: 225127

24 Hour customer service hotline: 0514-80826580

Fax: service hotline 0514-87777000

Sales center service hotline: 0514-87777043

Website: <http://www.hengchun.cc>

Important: the manufacturer has taken many use and application into consideration on compiling and revision of the manual, and however, the manufacturer does not guarantee that the content of this manual is without any error, and it is not responsible for the product damage and collateral damage due to wrong operation or misuse of the manual. The manufacturer has the right to revise this manual, and there is no further notice.