Tefulong

Intelligent Electric Actuator
AVA，AVAM,AVAMD,
AVAT(AVAQ),AVATM Range

Instruction

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Actuator Operation Manual

Please read and understand this manual before installing, operating or maintaining actuator.

All Greatork actuator can be configured by infra-red setting tool according to site's requirement. Please make sure the compatibility between actuator and process control systems. Read this manual carefully.

The manual mainly include:
* Manual and auto(local and remote) operation
*Actuator preparation and installation
*Actuator basic setting to open/close valves
*Actuator advanced setting to operate according to site control or indicate requirement.
* Circuit diagram and default set.

Greatork actuator is non intrusive design, users have no need to open actuator cover for commissioning or checking data.

Greatork infra-red setting tool can be used to set actuator torque, position limit and other data configuration. The data setting can always be finished regardless of power supply is connected or not.

For more documents of Greatork actuators, please visit our website: www.greatork.com or contact us at greatork@greatork.com.

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1. General Instructions of Greatork Actuator

Greatork Actuator can be commissioned without opening the electrical cover. Setting of torque values, position limits and all other control&indication functions can be set quickly and conveniently even in explosion proof locations by infra-red setting tool. The actuator allows commissioning and adjustment to be carried out regardless the main power supply of actuator is connected or not.

The motor of Greatork on/off actuator is S2-15min short time duty, and the duty of modulating actuator is S4-25%.

The ambient standard operating temperature of Greatork Actuator is from -20°C to 60°C or -30°C to 70°C (optional).

Diagnose menus can check the status of the control system, valve and actuator. This function will greatly shorten troubleshooting time and make actuator operation much more convenient.

This instruction will enable users to install, operate, adjust and inspect Greatork Actuators easily.

If the actuator has a nameplate with the sign of explosion-proof, it is suitable for use in Zone 1 and Zone 2 explosive atmospheres only. It should not be installed in atmospheres where ignition temperature is more than 135°C.

Under no circumstances should any modification or alteration be carried out on the actuator as this will invalidate the conditions under which its certification has been granted.

The actuator should be moved to a non-hazardous area for repair or maintain. Only the trained persons can be allowed to install, maintain and repair the actuator. Work undertaken must be carried out in accordance with outlines in the manual.

WARNING:

Motor Temperature

With excessive use, the motor surface temperature could reach 132ºC (270ºF).

Motor Thermostat Bypass

If the actuator is configured to be motor thermostat bypass, when using the ESD function, the hazardous area certification will be invalidated.

Enclosure Materials

AVA01 to AVA06 series enclosures are manufactured in aluminum alloy with stainless steel fasteners and the thrust bases are manufactured in cast iron. AVA07 to AVA10G series enclosures are manufactured in aluminum alloy and cast iron with stainless steel fasteners and the thrust bases are manufactured in cast iron. AVAT series enclosures are manufactured in aluminum alloy with stainless steel fasteners.

Users must ensure that the working environment is good, and the actuator itself should not afford the protection function. Users must suitably protect the actuator against its working environment.

Actuator Storage

If your actuator cannot be installed immediately, store it in a dry place.

If the actuator has been installed, but cannot be cabled, it is recommended that the plastic transit cable entry plugs be replaced with metal plugs, which sealed with PTFE tape.

Recommend storage temperature range: -20℃ to 45℃(-4℉ to 113℉).

2. Drive Bush of Actuator

2.1 **Coupling mounting of Multi turn actuator**

2.1.1 AVA01 to AVA03 A and Z type Thrust Drive Bush (remove for Machining)

Fig 2.1.1 Type A Thrust Drive Bush and Spares

Turn actuator body onto it's side, loosen the two cap head screws holding base plate onto thrust base, pull out the whole drive bush with bearing.

Before machining the drive bush, remove the thrust bearing from it as following:

1.Locate and loosen the two grub screws in the steel bearing stop ring.

2.Unscrew the bearing stop ring from the drive bush, slide the bearing off the drive bush carefully. Keep the stop ring and bearing in a safe, clean place ready for re-assembly.

3.Machine the drive bush to suit the valve stem, generous clearance on screw thread allowed. Make sure the male thread on the bush is not damaged.

Re-assembly

1.Remove all scrap iron on the drive bush, make sure the O rings on the drive bush and bearing stop rings are in good condition, clean and greased.

2.Slide bearing onto drive bush and make sure it is fitted down to the shoulder.

3.Screw bearing stop ring with the grub screws uppermost onto the drive bush, tighten down and lock with the two grub screws.

4.Refit the drive bush assembly into the base casting on the actuator, make sure the slots in the drive bush are located into the drive dogs of the hollow output shaft.

5.Refit the base plate and secure with cap headed screws.

2.1.2 AVA01 to AVA06 Non-Thrust base B Type

Loosen the 4 set screws on base plate and remove the base plate, then users can see the drive bush and retaining clip.

Removal of B3 and B4 Type

Using external circlip pliers expand the circlip while pulling on the drive bush. The drive bush will detach from the actuator center column and the circlip retain in it's groove.

Re-assembly of B3 and B4 Type

Grease drive bush and circlip, fit the circlip in it's groove, push the drive bush into the actuator centre column ensuring the key and groove are aligned.

Expand the circlip while pushing the drive bush into the center column. The drive bush will move forward. Release circlip pliers ensuring the cirlip is correctly seated in both the drive bush and center column grooves. Re-install the base plate and fix with 4 set screws.

2. Drive Bush of Actuator

B1 Type

The removal and refitting procedure of B1 drive bush is the same as B3&B4, but shall use customized spring clip. Removal and Refitting spring clip as same as the B3/B4 but should use long nose pliers.

2.1.3 AVA07-AVA10G A and Z Type Thrust Base (Remove for machining)

Engage "**MANUAL**" operation and turn hand wheel until retainer set screw can be seen through hole in actuator base.

Loosen set bolt and use hammer and punch unscrew retainer. Remove drive bush and machine it to suit input shaft of valve stem or gearbox. Generous clearance on screw thread allowed.

Type A bush

Loosen set bolt

Unscrew retainer

Type A drive bush on actuator

If the actuator has A type drive bush, the bush can be fitted in position 1 or 2 to suit the position of the valve flange.

If the actuator has a Z3 type drive bush, the bush can only be fitted below the actuator base.

Re-Assembly

After confirming the position required, insert the machined drive bush, make sure the key of actuator output shaft suits the bush. Fit drive bush retainer, turning clockwise and fully tightened by hammer and punch. Turn hand wheel to align retainer set screw with hole in the side of base and tighten.

2.1.4 AVA07 to AVA10G Non-Thrust base B Type

B1 Type

Bore and key of output shaft should in accordance with ISO5210 standard. No need to machine drive bush.

B3 and B4 Type

This two type drive bushes can be distinguished by cap headed screws.

B3 has been pre-machined according ISO5210 standard when supplied.

B4 is supplied blank and should be machined to suit the input shaft of the gearbox or valve.

3. Mounting of Actuator

Make sure the valve is fixed before install the actuator, or the combination may be top heavy and therefore unstable.

When necessary, lift the actuator by mechanical lifting equipment for easy installation.

At all time, make sure the installation is under the guidance of trained and experienced personnel, especially when mounting actuators.

WARNING:

The actuator should be fully supported until actuator drive bush is fully suiting the valve shaft and the actuator is fully suiting valve flange.

Flange of actuator and valve should conform to ISO5210.

Material of yoke between actuator and valve must conform to ISO Class 8.8, yield strength 628 N/sq mm.

WARNING:

Do not lift the actuator after installed on valve and should always lift the valve only. Each assembly shall be put on individual basis for safe lifting.

3.1 Rising Stem valves Top Mounting

A) Fitting the Actuator and Base together- suitable for AVA series

Install the machined drive bush into the thrust base as previously described, lower the actuator, install it On the threaded valve stem,

Engage "**MANUAL**" operation and turn the hand wheel in opening direction to engage the drive bush onto the stem. Continue turning the hand wheel until the actuator is fitted on the valve flange. Turn two further cycles and fully tighten securing bolts.

B) Fitting Thrust Base to Valve Actuator, only suitable for AVA01 to AVA06

Install the machined drive bush into the thrust base as previously described, remove the thrust base from actuator, align the drive bush (surface with groove at the top) with threaded valve stem and place it on the threaded valve stem, turn it in opening direction to suit the thread. Continue turning until the base is fully installed on the valve flange. Fit the securing bolts but do not tighten it. Put the actuator onto the thrust base slowly and rotate the whole actuator until the drive key on the actuator output shaft fully suit with the drive bush. Actuator flange should align with base flange.

Keep turning actuator until fixing holes aligned. Tighten actuator and base by bolts and turn hand wheel in opening direction for two cycles, and firmly tighten actuator and valve flange.

3. Mounting of Actuator

Normally, Greatork Actuator is mounted on the valve with drive base. There are two kinds of bases: thrust base and non-thrust base. Both of their key parts are drive bush which are directly mounted on the valve stem. The drive bush for thrust base has the type of trapezoidal screw threads, and for non-thrust base has the key, three jaws or square shaft. In general, the drive bush is either machined depending on the data of valve factory or machined by users (It should be removed before machining).

The flange standard of drive bases are under national standard. For multi-turn actuators(AVA), flanges are F10, F14, F16, F25 and F30 according ISO5210; For quarter-turn actuators(AVAT), flanges are F05,F07, F10, F12 and F14 according ISO5211. However, the flange can be machined depending on drawing of client.

3.2 Mounting the Linear Actuator

Linear actuators have same actuator model and thrust base like multi-turn actuators, but linear actuators have additional transforming bracket and a screw, of which one end are trapezoidal screw threads, and the other end is hexagon column.

Assemble the actuator with a screw and a bracket, couple the bracket to the valve flange with fasteners, and couple the screw to valve stem with wafer nuts.

Note: The valve should be at its fully closed position when coupling.

3.3 Mounting the Actuator with Gearbox

Usually, a part-turn valve needs a 90° gearbox, and a large torque multi-turn valve needs a bevel gearbox or a spur gearbox. Gearbox has a removable drive bush which is machined depending on the diameter of the valve stem and connections.

Gearbox is always coupled to the damper with a rocker and spherical linkage.

3.4 Cable Connections and Grounding

WARNING:

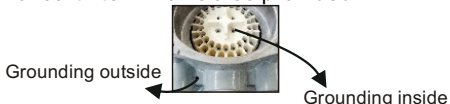
When remove terminal cover for wiring, make sure all power is cut off.

When actuator phase to phase voltage is higher than 600V AC, do not connect with power system which phase to phase voltage is higher than 600V AC by hanging wire or earth wire.

Check that power supply voltage whether agrees with that stamped on the actuator nameplate.

The breaker or fuse for the actuator should be selected depending on the rated current of the motor.

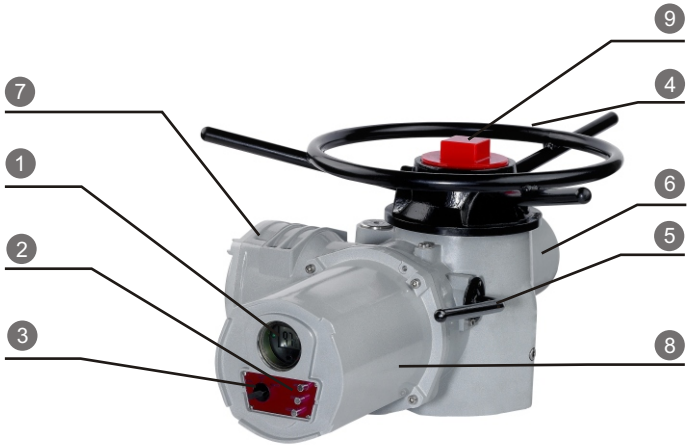
A lug with a 6mm diameter hole is cast adjacent to the conduit entries for attachment of an external protective earthing strap by a nut and bolt. An internal earth terminal is also provided.



3.5 Cable Entry

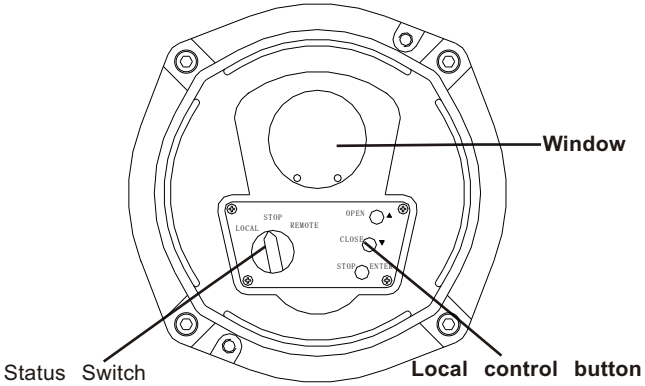
In explosion-proof zone, explosion-proof cable joint should be used at the cable entry. Make the cable joint appropriate to the outer diameter of the cable. Ensure that cable glands or conduit are tight and fully waterproof. Seal unused cable entries with a steel or brass threaded plug. The standard cable entry size is 2×NPT1" and 1×NPT1-1/2" for AVA series, 2×NPT1"For AVAT series, for other cable entry size please contact Greatork.

4.Operating Greatork Actuator



1.Display Screen
2.Local Control Button(Open/Stop/Close)
3.Status Knob(Local/Stop/Remote)
4.Handwheel or Rocking handle(install when using)
5.Hand/Auto lever
6. Motor
7.Wiring Terminal Compartment
8.Electric Control Cover
9.Protective Sleeve for Hollow Shaft

5.Actuator control panel



This picture is actuator control panel, it includes indication windows, status switch and local control button.
(1) Indication window: It shows the actuator working status, users can know actuator working status and set actuator parameter by Infrared setting tool through this window.
(2) Status switch: Users can choose LOCAL, STOP and REMOTE mode by this switch.
(3) Local control button: Users can open/close/stop valve by these buttons, or select menus instead of infra-red setting tool.

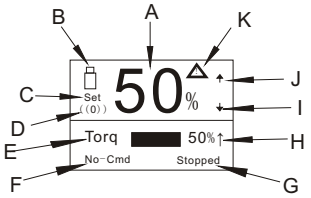
6.Actuator window

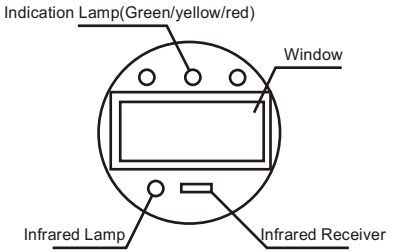
The window consists of indication lamp and LCD screen.

(1)Indication lamp
There are 3 position indication lamps (green, yellow and red) to indicate fully close, mid-operating and fully open separately, default as green to fully close, yellow to mid-operating, red to fully open. The color of lamp which indicates fully open and fully close can be changed by setting. (refer to 3.2.9.1 of P36). The lamp also can be set to flash when actuator operating or alarming (refer to 3.2.9.2 of P36).

(2)LCD Screen

Left picture below is LCD screen





（A）Valve position indication. When actuator fully open, it shows —, when actuator fully close, it shows ⊥, when actuator is in the mid-position, it shows numbers in percentage.

（B）Battery alarm indication. When actuator battery power is lower than 15%, the alarm will appear.

6.Actuator window

When lower than 10%, battery alarm will flash to tell users to change battery. If external power supply cut when battery alarm flashing, the whole LCD screen will flash and alarm.

（C）Set status indication: Actuator is available to adjust only when “set” icon shows. Input right password in password menu, the “set” icon will show.

（D）Communication indication: This icon（(0)）will show when connected with Fieldbus system.

（E）Torque indication: Actuator will show torque with status bar and numbers in percentage.

（F）Command indication: Actuator will show present executing command.

（G）Status indication: Show actuator present status or alarm.

（H）Panel setting mode: Show actuator present mode, LOCAL, STOP or REMOTE. When set through knob on panel, “←”means LOCAL, “↑” means STOP, “→”means REMOTE. When set through menu by infrared setting tool(refer to 3.2.3.15 of P29) , “◀” means LOCAL, “▲” means REMOTE, “▶” means STOP.

（I）Close direction indication: This arrow“↓” means close direction.

（J）Open direction indication: This arrow “↑” means open direction.

（K）Alarm indication: This icon“⚠” will show when actuator alarm.

7.Infrared setting tool instruction

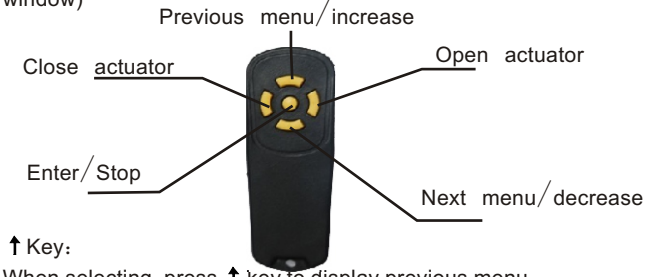
7.1 Specification

Enclosure: IP67

Certification: Eex ia ⅡC T4 (intrinsically safe)

INT SAFE, Class I &II, DIV 1 GROUPS A B C D E F G

Operating Distance: 0.75m (should be exactly in front of the display window)



↑Key：

When selecting, press ↑ key to display previous menu.

When setting, press ↑ key to change number or words.

↓Key：

When selecting, press ↓ key to display next menu.

When setting, press ↓ key to change number or words.

7.Infrared setting tool instruction

←┘ Key:

When selecting, press ←┘ key to confirm. When set actuator parameter, press ←┘ key to confirm. When actuator is local operating, press ←┘ key to stop actuator.

← Key:

Press ← Key to open actuator locally.

→ Key:

Press →Key to close actuator locally.

7.2 Setting Tool Battery Replacement

The convenient method for checking battery status is to see whether the setting tool can transmit infrared. When pressing any button, a flashing red indicator light can be seen from the infrared transmitter window. For replacing battery, remove cross screws in the back of setting tool , then remove the back cover then replace. It should be replaced in a safe area.

7.3 Menu instruction

Actuator menu is protected by password, users can change parameters when input right password (default password is 0000), or only available to observe actuator configuration. When configuration, make sure the knob is at LOCAL or STOP position. REMOTE status is only available to observe configuration.

When setting , actuator display main menu, press ↑ or ↓ key to enter menu mode. The menu adopt rolling cycle display, indicate present menu with "► ◄" arrow. Choose menu, press ←┘ key, actuator will enter submenu. When the menu is the at last stage, press ←┘ key to set. When setting, press ←┘ key, the menu parameter will flash and can be selected, then press ↑ key or ↓ key to select parameter. When finish parameter selection, press ←┘ key again, the menu will stop flashing and parameter will be saved. There is a **RETURN** menu in each menu to return to upper menu. If the menu is at the first stage, it will return to the main menu.

Note: When users are setting actuator at any menu, switch actuator knob on the local control panel, actuator will back to main menu. Users can use this function to back to main menu quickly.

8. Actuator control method

Actuator has many control methods, including local switch control, local setting tool control, remote on/off control, remote modulating control, Fieldbus control. This manual mainly introduces local switch control, local setting tool control, and remote on/off control. As remote modulating control and Fieldbus control are optional, they will be introduced in special document.

8.1 Local switch control

Switch to LOCAL, the screen will show "←" (refer to P7), it means actuator is at local control status. Users can press buttons at right side to open/close/stop actuator.

Local holding control: Default set as self-sustain control, namely when press open/close button, actuator will open/close valve, even when users release these buttons, actuator will still moving until fully open/close. When need stop, press STOP. (refer to 3.2.3.11 of P28)

Local inching control: Set "local holding" to "disabled", actuator will change from self-sustain control to inching control. Then users press open/close button, actuator will move, when release, actuator will stop.(refer to 3.2.3.13 of P28)

8.2 Local setting tool control

When actuator at LOCAL status, and "Ir-Tool Control" menu is "Enabled", press ← key, actuator will open, press → key actuator will close.

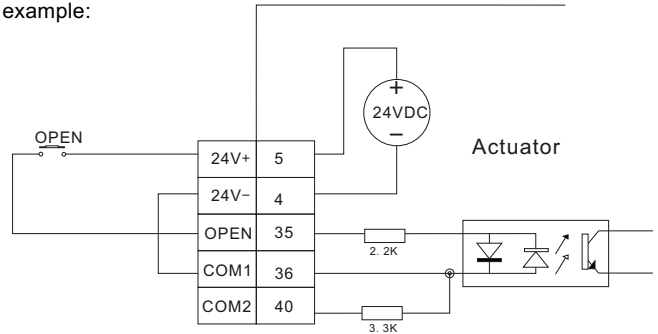
When actuator "Local holding" menu is set "Enabled, press ← or → key, actuator will fully open or close to the limit position. When press ←┘ key, actuator will stop. When actuator is under "Local inching control" status, press ← or → key, actuator will operate for 1 second and stop.

8.3 Remote on/off control

Switch to REMOTE, the screen will show "→" (refer to P7), namely actuator at remote status, then actuator can be controlled by the on/off signal of terminal compartment. Please refer to appendix actuator circuit diagram, it marks signal input terminals corresponding to remote open, close, stop, ESD, interlock open and interlock close. Please find detailed instruction of remote control signal terminal circuit and remote control wiring method.

8.3.1 Signal input terminal circuit

Below is signal input terminal circuit structure, take the terminal No.35 for example:

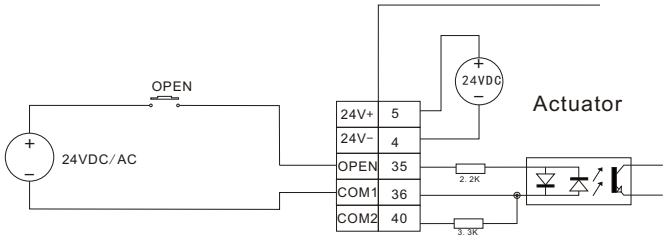


This picture is the input terminal circuit of the remote signal. Terminal No.5 and No.4 are actuator internal 24v control voltage. Terminal No.35 is valve open signal input terminal, terminal No.36 is control signal

8. Actuator control method

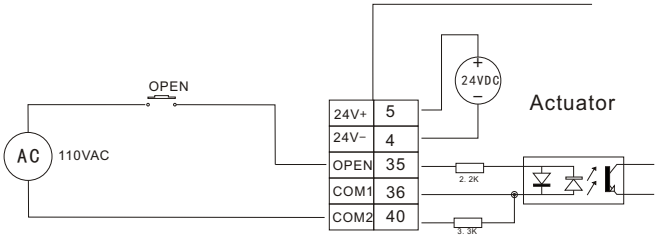
common terminal, generally connect with negative pole of 24v control voltage. OPEN is control button to open the valve. When users push OPEN button, current will go through 24v voltage positive pole and OPEN button, flow to terminal No.35, which let photo coupler work, and generate open valve signal. As actuator adopts AC photo coupler, terminal No.35 can accept both 24vac and 24vdc control signal. Besides controlled by Internal control voltage, Actuator can also be controlled by external control voltage. The wiring method refers to picture below.

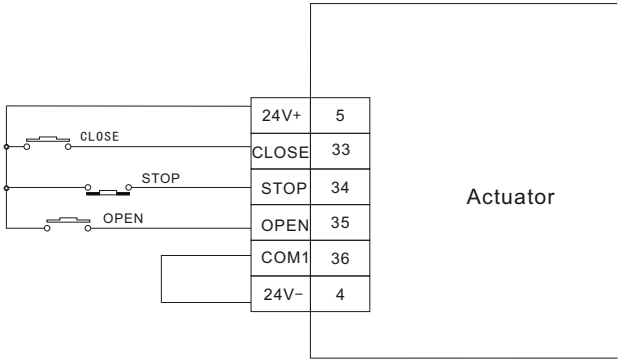
Terminal No.40 is 110v common terminal of the control signal, when use external 110v control voltage, the voltage should connect with terminal No.40 instead of terminal No.36(refer to picture below).



8.3.2 Common wiring method of remote control

（A） Open valve, close valve, stop self holding control





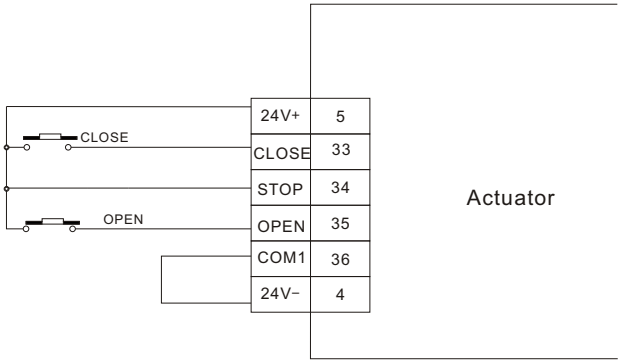
8. Actuator control method

Note：1. Press OPEN button, actuator will execute open command, when release, actuator will continue moving to open direction.

2. Press CLOSE button, actuator will execute close command, when release, actuator will continue moving to close direction.

3. Press STOP, actuator will stop.

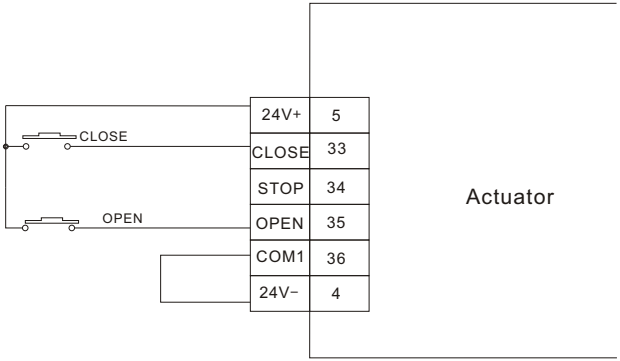
（B） Self holding control of open and close valve



Note: 1.Press OPEN button, actuator will execute open command, when release, actuator will continue moving to open direction.

2. Press CLOSE button, actuator will execute close command. when release, actuator will continue moving to close direction.

（C）Inching control of open and close valve

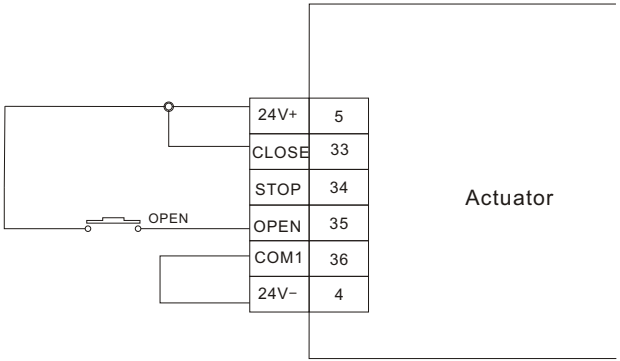


Note: 1. Press OPEN button, actuator will execute open command, when release, actuator will stop.

2. Press CLOSE button, actuator will execute close command, when release, actuator will stop.

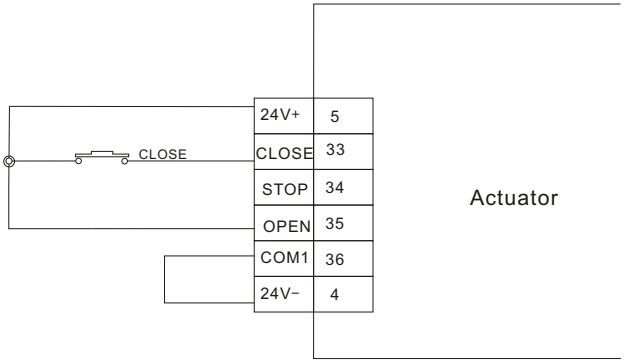
8. Actuator control method

（D） Two wire control (Open valve priority)



Note: 1. Set “Two wire control” to “Open”.(refer to 3.2.3.14 of P29)
2. Press OPEN button, actuator will execute open command. when release, actuator will execute close valve command.

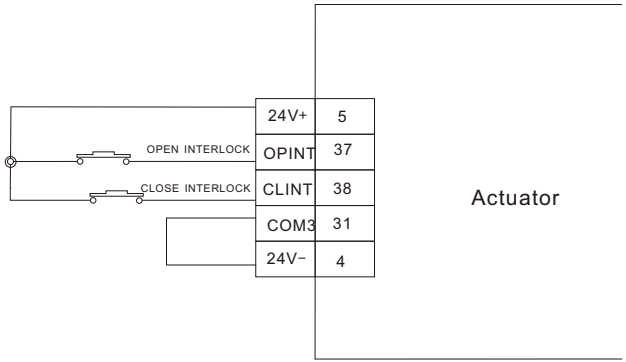
（E） Two wire control (Close valve priority)



Note: 1. Set “Two wire control” to “Close”.(refer to 3.2.3.14 of P29)
2. Press CLOSE button, actuator will execute close command, when release, actuator will execute open valve command.

8. Actuator control method

（F）Interlock control



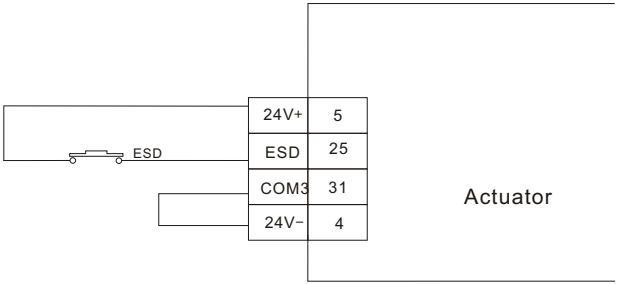
Note: 1. When “terminal function 1” is set “Open interlock”, and “terminal function 2” is set “Close interlock”, actuator remote open and close interlock is valid (refer to 3.2.3.8 of P27 & 3.2.3.9 of P27).

2. Only when open interlock button connected, actuator will execute open command, or will alarm (refer to 4.1.6 of P38).

3. Only when close interlock button connected, actuator will execute close command, or will alarm (refer to 4.1.7 of P38).

4. For detailed instruction of interlock control, please refer to 3.2.3.10 of P28.

（G）ESD control



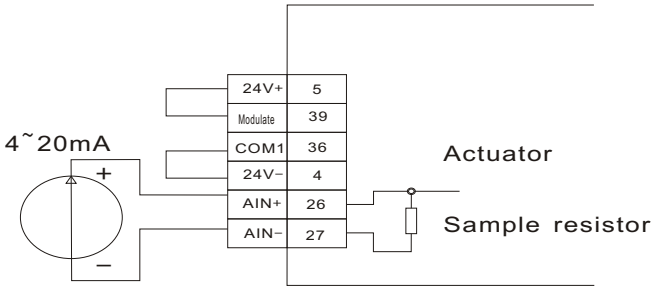
Note：1. When “terminal function 0” is set “ESD”, actuator ESD function is valid (refer to 3.2.3.1 of P25).

2. For detailed ESD function, please refer to P25 to P27.

Note: Users can lock actuator to LOCAL, STOP and REMOTE status by “panel set” function, please refer to 3.2.3.15 of P29. When users locked actuator by this way, the status select knob will invalid, and the knob can only be valid by set “Panel set” to“Default”.

8. Actuator control method

8.4 Modulating control (optional)



Note：1. When actuator installed modulating model, and set “modulating” menu to “Enabled”, the function will be valid.

2. Modulating control shall be at REMOTE status. Terminal No.39 is used to switch between remote on/off control and modulating control, when connect terminal No.39 with terminal No.5, actuator is under modulating control. When disconnect, actuator is under remote on/off control.

3. Terminal No.26 and terminal No.27 connect with positive and negative pole of control signal respectively.

4. The input impedance of analog signal input terminal is 200Ω.

5. Detailed instruction of modulating control, please refer to 3.2.5 of P30.

8.5 Fieldbus control (optional)

Detailed information will be provided in other documents.

8.6 Manual Operation

Depress the Hand/Auto lever into “Manual” status. Turn the hand wheel to check whether it has engaged the clutch. When the valve value on the LCD changes while turning, the lever can now be released and it will automatically return to its original position. The “Manual” status will remain engaged until the actuator is operated electrically.

If the lever can't be depressed into “Manual” status for the first time, turn the hand wheel by 30° and depress the lever again.

When the actuator is operated electrically, its “Manual” status will automatically switch to “electrical” status.

Note: Please do not depress the lever when the actuator is operating electrically.

If required, the Hand/Auto lever can be locked by a padlock with a 6.5mm hasp.

8. Actuator control method

When the actuator wiring is finished, users should ensure that power supply voltage agrees with rated voltage stamped on the actuator nameplate before input electricity. It is not necessary to check phase rotation sequence for Greatork Actuator.

If the actuator is mounted on the valve for the first time, the position limit should be carried out before electrical operation (refer to 3.1.3 of P22), so that its valve stroke can be limited correctly.

It is strongly recommended that set position limit by manual. Fully open the valve by hand wheel and set open limit position, then fully close the valve by hand wheel and set closed limit position, at last set torque protection value and open-closed action (refer to 3.1.1 of P19 & 3.1.3 of P22).

Simple Commissioning instruction

1. Manually/electric operated the actuator to valve fully close position

2. Get into actuator menu with setting tool, input the password(0000), when there is a “set” icon show on the top left corner, means the password is right. Press the ↓ button on setting tool when reach RETURN menu, press ENTER(middle round button) on the setting tool to back to main menu.

3. Go to Commission menu, press ENTER(middle round button) on the setting tool to get into BASIC menu. Press ENTER.

4. Then press ↓ button on setting tool until reach PositionLimit menu. Press ENTER to go to menu SetCloseLimit, Press ENTER, the close position limit is finished. Then manually/electric operated the actuator to valve fully open position, do the same way like close limit.

5. After that, get into Commission menu-----Basic menu-----Valve menu, make sure the value of Close Action and Open Action menu is PositionLimit.

9. Signal feedback

9.1 On/off signal feedback

(A) Actuator has 4 relay feedback contacts (8 contacts is optional) to indicate actuator working status. Parameters of these 4 contacts are as following:

Rated voltage	Rated current
250VAC	5A
30VDC	5A

4 feedback contacts can be set to different function and normal open/close method according to user's requirement through menu (Detailed instruction, please refer to 3.2.2 of P22).

(B) Actuator has 1 SPST monitor relay contact to feedback actuator alarm. Monitor relay contact parameters are as following:

Rated voltage	Rated current
250VAC	8A
30VDC	8A

Monitor relay contacts can be set to different functions and normal open/close method according to user's requirement through menu (Detailed instruction, please refer to 3.2.2.2 of P25).

9. Signal feedback

9.2 Analog feedback (optional)

Actuator can optionally choose one active/passive 4-20mA current valve position transmitter to feedback valve signal. The parameters are as following:

Acceptable max. output resistance	650Ω
Current feefback accuracy	±2‰
Current linearity	±1‰

Analog feedback can be changed to voltage valve position transmitter optionally as required. For details of voltage valve position transmitter, please contact with AVA.

If valve position transmitter is installed, users need set “valve position transmitter” to be valid in the menu (refer to 3.2.4 of P30). Users can set 4mA to be fully close or open by menu (refer to 3.2.4 of P30).

10. Alarm (At lower right corner)

10.1 Battery alarm

Actuator has 3 pcs 1.5volt alkaline cell inside to record valve position when manual operated under power cut. When battery power low than 15%, actuator will alarm, when decrease to 10%, battery alarm icon will flash to remind replacing battery. Battery alarm will not influence actuator operation.

Battery alarm icon 

10.2 Phase lost alarm (only for 3 phase power supply)

When one of 3 phases power supply lost, actuator will show “**PhaseLst**”, and stop.

10.3 Motor over temperature

There is temperature sensor in motor, when motor temperature is higher than 135℃, actuator will show “**TempErr**” alarm and stop.

10.4. Torque alarm

Actuator has torque sensor, when open/close torque is higher than set torque value (the value can be set by users, please refer to 3.1.2 of P20), actuator main screen will show “**TorqTrip**” and stop. Users can learn torque value when torque alarm displays through screen(refer to 4.7.6 of P41). Operate actuator at opposite direction, the torque alarm will disappear.

10.5 Stall alarm

When actuator actual rotated speed is lower than 70% of rated speed, actuator will show **“Stall”** and stop. Operate actuator at opposite direction, the alarm will disappear.

10.6 Locked rotor alarm

When locked rotor for 5 seconds, actuator will show “LockRotor” alarm and stop. Operate actuator at opposite direction, the alarm will disappear.

10. Alarm (At lower right corner)

10.7 24V alarm

When actuator internal 24v voltage error (eg. Terminal No.4 and No.5 short circuit), actuator main screen will show "**24vErr**" and stop.

10.8 No open interlock/ No close interlock

When interlock function is valid(refer to 3.2.3.8& 3.2.3.9 of P27), and actuator receives open valve signal but no open interlock signal, actuator main screen will show "**NoOpenIL**" alarm, it means actuator doesn't receive open interlock signal and can not operate. No close interlock"**NoCloseIL**" is the same way.

10.9 CPU over temperature

When actuator internal temperature exceed 80℃, actuator main screen will show "**CPUTemp**" and stop. Alarm will disappear, only when CPU temperature lower than 80℃.

10.10 EPROM error

When actuator data memorizer error, actuator main screen will show flashing"**EPROMErr**". It's hardware error, and can be solved by changing hardware.

10.11 Pressure sensor error

When actuator torque sensor error, actuator main screen will show "**SensorErr**". It's hardware error, and can be solved by changing hardware.

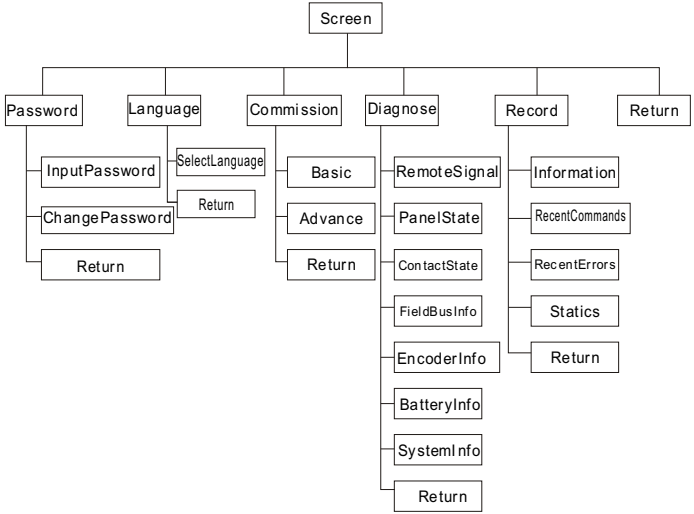
10.12 Valve position error

When actuator valve position lost, actuator will show flashing "**PosErr**", alarm will disappear when actuator reset the limit and restart power.

Note: When there is two or more alarms, the alarm indication letter at the lower right corner will show alternately.

11. Menu Structure

Actuator menu structure as following:



Menu includes upper menu and submenu, every stage has RETURN to back to upper menu. User can turn status switch to back to main screen quickly. Menu operation method please refer to P8.

12. Menu function

12.1 Passowrd

（1.1） Input password

Main Screen ─ Password
└ InputPassword

Note： Actuator parameters are protected by password, users can only change parameters when input right 4 numbers password. If password is right, screen will display “set” icon(refer to P7). If the password is wrong, users can only observe parameters but can't set.

（1.2）Change Password

Main Screen ─ Password
└InputPassword ─ ChangePassword

Note： Users can change password only when input right password, or this menu will be shielded.

12.2 Language

（2.1）Select language

Main screen─Password─language
└SelectLanguage

Note: Users can choose “Chinese” or “English”, has set accordingly when at factory.

12.3 Commission

（3.1）“Basic” menu

（3.1.1）“Valve” menu

（3.1.1.1）Close Direction

Main Screen─Password─Language─Commission
└ Basic
└Valve
└CloseDirection

Parameter： Clockwise, Anti-Clockwise

Note： Close direction is used to set actuator close at clockwise or anti-clockwise direction.
Default：Clockwise

（3.1.1.2）Close Action (actuator close method)

Main Screen─Password─Language─Commission
└ Basic
└ Valve
└ CloseAction

Parameter： PositionLimit, TorqueTrip

Note: ”CloseAction” means how actuator reaches fully close position. “PositionLimit “means actuator will limit stop at fully close position(refer to 3.1.3.1 of P22), namely actuator will stop at set limit position. “TorqueTrip” means torque stop at fully close position, namely actuator will judge the position which exceed set torque value as the fully close position and stop.

（3.1.1.3）Open Action (actuator open method)

Main Screen—Password—Language—Commission
└ Basic
└ Valve
└ OpenAction

Note: “OpenAction” means how actuator reaches fully open position. “PositionLimit” means actuator will limit stop at fully open position(refer to 3.1.3.2 of P22), namely actuator will stop at set limit position.

“TorqueTrip” means torque stop at fully open position, namely actuator will judge the position which exceed set torque value as the fully open position and stop.

（3.1.2）“Torque” set

（3.1.2.1）TorqueTripMode

Main Screen—Password—Language—Commission
└ Basic
┆
└ Torque
└ TorqueTripMode

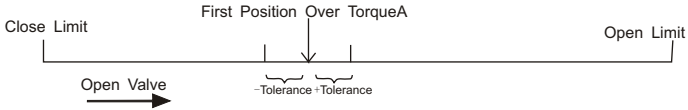
Parameter：Normal, Intelligent

Note：”TorqueTripMode” is used to set open/close valve torque protection. “Normal” means when operating , and output torque exceed the set torque protection value, actuator will stop and alarm.

“Intelligent” means when operating, and output torque exceed the set

Commission/Basic

torque protection value, actuator will not stop immediately ,but backward for certain distance(available to set by user, refer to 3.1.2.4 of P21), then keep moving forward, and try certain times (available to set by user, refer to 3.1.2.5 of P21). If still over torque, actuator will alarm and stop. Please refer to example below:



As picture shows, given actuator is under intelligent protection mode, “backward” menu(refer to 3.1.2.4 of P21)) is set 5%, “backwardTimes” menu is set 2(refer to 3.1.2.5 of P21), “position tolerance” is set 1%(refer to 3.1.2.6 of P21), when actuator over torque at A position in open direction, actuator will record this position, backward 5% then keep opening, when over torque within ±1% of A position again, actuator will backward 5% and opening again. When still over torque within ±1% of A position, but the backward times is up, actuator will stop and alarm. Position tolerance is used to judge whether over torque position changed, if it's out of position tolerance scope, actuator will re-calculate the backward times.

（3.1.2.2）CloseTorque

Main Screen—Password—Language—Commission
└ Basic
┆
└ Torque
└ CloseTorque

Parameter：40%~100%

Note: Close torque is used to set torque protection value when close valve. If actuator close torque exceeds that value, actuator will alarm (refer to normal, intelligent mode, 3.1.2.1 of P20).

（3.1.2.3） OpenTorque

Main Screen—Password—Language—Commission
└Basic
┆
└Torque
└OpenTorque

Parameter: 40%~100%

Note: Open torque is used to set torque protection value when open valve. If actuator opening output torque exceeds that value, actuator will alarm (refer to normal, intelligent mode, 3.1.2.1 of P20).

（3.1.2.4）Backward Distance (Only for Intelligent Mode)

Main Screen—Password—Language—Commission
└ Basic
┆
└ Torque
└BackwardDistance

Parameter:1%~10%

Note: Backward distance Menu is used to set actuator distance of backward when actuator is over torque. When actuator is back to the set position, it will stop backing, but move forward again.

Commission/Basic

（3.1.2.5）Backward Times (Only for Intelligent Mode)

Main Screen—Password—Language—Commission
└Basic
┆
└Torque
└ BackwardTimes

Parameter:：1~10

Note: Backward times Menu is used to set the actuator times of backward when actuator is over torque. When reach set backward times, actuator will stop and display alarm.

（3.1.2.6）Position tolerance (Only for Intelligent Mode)

Main Screen—Password—Language—Commission
└ Basic
┆
└Torque
└ PosTolerance

Parameter:1%~5%

Note: PosTolerance menu is used to set the deviation value of present over torque position. After actuator recognized the position over torque, as long as the actuator is over torque within ± PosTolerance range of that over torque position, actuator regarded as over torque at that position.

（3.1.3）Position Limit

（3.1.3.1）Close Limit

Main Screen—Password—Language—Commission
└Basic
└ PositionLimit
└SetCloseLimit

Parameter: Set, Cancel

Note: Menu “SetCloseLimit” is used to set actuator current position as fully close position. Parameter “set” is used to confirm fully close position. Parameter “Cancel” is used to cancel the current operation.

（3.1.3.2）Open Limit

Main Screen—Password—Language—Commission
└ Basic
└ PositionLimit
└ SetOpenLimit

Parameter:Set, Cancel

Note: Menu “ SetOpenLimit” is used to set actuator current position as fully open position. Parameter “set” is to confirm fully open position. Parameter “Cancel” is used to cancel the current operation.

（3.2）Advanced

（3.2.1）Options

Main Screen—Password—Language—Commission
└Advanced
└ Options

Note: Menu Options is used to set actuator optional functions. Many of its submenus are used to set actuator special functions. When these functions are set as enabled, the corresponding function menu will display. If they are set as “disabled”, these functions will be shielded automatically.

（3.2.2）Contacts

（3.2.2.1）Contact1

（3.2.2.1.1）Contact Function

Main Screen—Password—Language—Commission
└ Advanced
└ Contacts
└ Contact1
└ ContactFunction

Parameter: Close Limit, Open Limit, Middle Position, Torque Trip Close, TorqueTripOpen, TorqueTrip, TorqueTripMid, Opening, Closing, Running, Stall, Low Battery, Hand Wheel, Running Blink, Stop State, Open Interlock, Close Interlock, Interlock, ESD Signal,

Phase Lost, Local State, Remote State, 24VError, Inspecting, MotorRunning, MotorTempError, SensorError, CPUTempError, IntegratedError.
Menu “contactfunction” is used to set the contacts action condition of on/off signal value feedback. Take Contact 1 as the example. Set method of other contacts are as same as contact 1.

CloseLimit: When actuator reach fully close position, contact action.

OpenLimit: When actuator reach fully open position, contact action.

MiddlePosition: When actuator is in the scope of set middle position, contact action. When select this parameter, the shield menu ”low position” and”high position” will display after “ContactFunction”. Those two menu are used to limit the scope of middle position (refer to 3.2.2.1.3&3.2.2.1.4 of P24).

TorqueTripClose(Torque trip when closing): Actuator displays “TorqTrip” when valve closing, contact action (refer to 3.1.2.2 of P20).

TorqueTripOpen(Torque trip when opening): Actuator displays “TorqTrip” alram when valve opening, contact action (refer to 3.1.2.3 of P21).

TorqueTrip(Torque trip at any position): Actuator displays “TorqTrip” alarm at any position, contact action.

TorqueTripMid(Torque trip at middle travel): Actuator displays “TorqTrip” alarm at middle travel, contact action.

Opening: When actuator is running in the direction of open, contact action.

Closing: When actuator is running in the direction of close, contact action.

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Stall: When actuator displays “Stall” alarm, contact action.

LowBattery: When actuator displays battery alarm icon(left side of main screen), contact action.

HandWheel(Manual operation): When actuator is manual operating, contact action.

RunningBlink: When actuator is running, contact will alternately connect and disconnect with an interval of 0.5 second.

StopState: When actuator knob is switched to STOP, or Menu “PanelIr-Set” is set Stop, contact action (refer to 3.2.3.15 of P29).

OpenInterlock: When actuator receive open interlock signal, contact action (refer to 3.2.3.8 of P27).
CloseInterlock: When actuator receive close interlock signal, contact action.

Interlock: When actuator receive open interlock or close interlock signal, contact action.

ESDSignal: When actuator receive ESD signal, contact action (refer to 3.2.3 of P25).

PhaseLost: When actuator displays “PhaseLst” alarm, contact action.

LocalState: When actuator knob is switched to LOCAL or Menu “PanelIr-Set” is set Local, contact action.

RemoteState: When actuator knob is switched to REMOTE or Menu “PanelIr-Set” is set Remote, contact action.

Inspecting: When “AutoInspection” menu (under Menu “options”) is set enabled, and actuator is under auto inspection state, contact action.(refer to 3.2.7 of P35)

24VError: When actuator displays”24VErr ” alarm, contact action.

MotorRunning: When actuator motor is connecting with power (Regardless motor is running or not), contact action.

MotorTempError(Motor over temperature) : When actuator displays “TempErr” alarm, contact action.

SensorError (Pressure sensor error) : When actuator displays “SensorErr” alarm, contact action.

CPUTempError(CPU over temperature): When actuator displays “CPUTemp” alarm, contact action.

IntegratedError: When actuator displays any alarm which can result in actuator stop running, contact action.

（3.2.2.1.2）ContactForm

Main Screen—Password—Language—Commission
- Advanced
  - Contacts
    - Contact 1
      - ContactForm

Parameter: NormallyOpen, NormallyClose

Note: When parameter is set NormallyOpen, contact action means contact connect; When parameter is NormallyClose, contact action means contact disconnect.

Commission/Advance

（3.2.2.1.3）Low position (Display when menu “ContactFunction” is set “Middle Position”)

Main Screen—Password—Language—Commission
- Advanced
  - Contacts
    - Contact 1
      - …LowPosition

Parameter: Fully close, 0%~99%, fully open

Note: When Actuator indication contact act in the scope of middle position, low position value of middle position scope should lower than high position value.

（3.2.2.1.4）High position (Display when menu “ContactFunction” is set “Middle Position”)

Main Screen—Password — Language—Commission
- Advanced
  - Contacts
    - Contact 1
      - …HighPosition

Parameter: Fully close, 0%~99%, fully open

Note: When Actuator indication contact act in the scope of middle position, high position value of middle position scope should higher than low position value.

（3.2.2.2）MonitorSwitch

Main Screen—Password—Language—Commission
└Advanced
└ Contacts
└Contact 1 —MonitorSwitch
└Local/stop MotorTempError—LostPhaseError—
Stall — LockedRotor — CPUTempError — TorqueTrip —24VError—
TorqSensorError—PositionError—SwitchForm

Note: Menu “MonitorSwitch” has 11 submenus, previous 10 contacts is used to set action condition of Monitor contacts. Parameters can be set Enable or Disable. When set “Enable”, condition monitor valid and contact action. Menu “SwitchForm” is used to set “NormallyOpen” or “ NormallyClose”.

Local/Stop：When actuator knob is switched to LOCAL or STOP, or Menu ”PanelIr-Set” is set “Remote”, contact action.

MotorTempError：When motor is over temperature and “TempErr” alarm, contact action.

LostPhaseError： When actuator lost phase and “PhaseLst” alarm,

Commission/Advance

Stall：When motor stall, contact action.

LockedRotor：When motor locked rotor, contact action.

CPUTempError：When CPU is over temperature and “CPUTemp” alarm, contact action.

TorqueTrip： When actuator “TorqTrip” alarm, contact action.

24VError：When actuator “24VErr” alarm, contact action.

TorqSensorError(Torque Sensor error)：When actuator “SensorErr” alarm, contact action.

PositionError： When actuator “PosErr” alarm, contact action.

SwitchForm：When set ”NormallyClose”, contact action, terminal no. 42 and 43 connect, 44 and 43 disconnect.

When set ”NormallyOpen”, contact action, terminal no. 42 and 43 disconnect, 44 and 43 connect.

（3.2.3）ControlMode

（3.2.3.1）Terminal0

Main Screen—Password—Language—Commission
└ Advanced
└ControlMode
└ Terminal0

Parameter: ESDControl, Disable

Note: For function of terminal no. 25, when set ”ESDControl”, it is ESD control terminal; When set “Disabled”, it has no any function.

（3.2.3.2）ESDAction（Terminal0= ESD control ）

Main Screen—Password—Language—Commission
└ Advanced
└ControlMode
└ …ESDAction

Parameter： StayPut, Close, Open

When it is set as “StayPut”, and connects with ESD signal, actuator stop at the last position. Other signals such as open, close valve can not control actuator. When it is set as “Close”, and connects with ESD signal, actuator run in close valve direction. Other signals such as open, stop can not control actuator. When it is set as “Open”, and connects with ESD signal, actuator run in open valve direction, Other signals such as close, stop can not control actuator.

（3.2.3.3） ESDContactForm

Main Screen—Password—Language—Commission
└ Advanced
└ControlMode
└…ESDContactForm

Parameter： NormallyOpen, NormallyClose

Note: “NormallyOpen” means when ESD control terminal (terminal no. 25) connects with voltage signal, executes ESD function; When disconnect, don't executes ESD function.

Commission/Advance

“NormallyClose” means when ESD control terminal (terminal no. 25) connect with voltage signal, don't executes ESD function; when disconnect, executes ESD function.

（3.2.3.4）ESDExTempError

Main Screen—Password—Language—Commission
└ Advanced
└ControlMode
└…ESDExTempError

Parameter： Enabled, Disabled

Note: When set”Enabled”, ESD function exceed motor over temperature(TempErr). If ESD action is set “Valve open” or “Valve close”, press ESD button, even though motor over temperature, actuator still running in valve open or close direction.

When set”Disbled”, ESD function can't exceed motor over temperature(TempErr). If ESD action is set “Valve open” or “Valve close”, and motor is over temperature, press ESD button, actuator still keep stop state.

（3.2.3.5）ESDExInterlock

Main Screen—Password—Language—Commission
└ Advanced
└
ControlMode
└… ESDExInterLock

Parameter： Enabled, Disabled

Note: When set “enabled”, if interlock function is valid(refer to 3.2.3.8 &3.2.3.9 of P27), ESD function exceed interlock signal regardless whatever there is interlock signal or not.

When set “disabled”, ESD function is available only when interlock signal is valid.

3.2.3.6 ESDExLocalStop

Main Screen—Password—Language—Commission
└Advance
└ControlMode
└…ESDExLocalStop

Parameter: Enabled, Disabled

Note: When set”Enabled”, actuator knob is switched to STOP, ESD function still can exceed Stop state and control actuator.

(3.2.3.7) ESDExTorqueTrip, ESDExStall, ESDExLockedRotor, ESDExPhaseLost, ESDExPosErr

Main Screen—Password—Language—Commission
└Advanced
└ControlMode
└Terminal0—…ESDExTorqueTrip—
ESDExStall—ESDExLockedRotor—
ESDExPhaseLost—ESDExPosErr

Parameter: Enabled, disabled

Note: When set “Enabled”, ESD still can control actuator, even if these protection alarms display.

(3.2.3.8) Terminal1

Main Screen—Password—Language—Commission
└ Advanced
└ ControlMode
└…Terminal 1

Parameter: OpenInterlock, Disabled

Note: When set “OpenInterlock”, Openinterlock function of actuator terminal no.37 is enabled(refer to 8.3 of P10).

(3.2.3.9) Terminal2

Main Screen—Password—Language—Commission
└Advanced
└ControlMode
└ …Terminal 2

Parameter: CloseInterlock, FieldBusSelect, Disabled

Note: When set “CloseInterlock”, actuator terminal no. 38 has Close interlock function; When set ” FieldBusSelect”, actuator terminal no. 38 has fiedlbus select function(refer to 8.3 of P10).

（3.2.3.10）InterlocksScope

Main Screen—Password—Language—Commission
└Advanced
└ControlMode
└…InterlockScope

Parameter: Local/Remote, Remote

Note: When set “Local/Remote”, interlock signal can control actuator regardless actuator is at Local or Remote. Namely, with interlock signal, actuator can correspondingly open or close valve.

When set”Remote”, interlock signal is only valid for remote signal, but at LOCAL, actuator can open or close valve locally regardless whatever there is interlock signal or not.

（3.2.3.11）LocalHolding

Main Screen—Password—Language—Commission
└ Advanced
└ ControlMode
└…LocalHolding

Parameter: Enabled, Disabled

Note: When set”Enabled”, local control is Local holding(Keep running when release button). When set”Disabled”, local control is inching control(Stop when release button).

Commission/Advance

（3.2.3.12）RemoteHolding

Main Screen—Password—Language—Commission
└ Advanced
└ControlMode
└ …RemoteHolding

Parameter: Enabled, Disabled

Note: When set”Enabled”, and stop signal is high level, stop signal is high level, stop command (compatible with Sipos or Auma) is invalid; When stop signal is low level (or hang), stop command(compatible with ROTORK) is valid.

When terminal no.34 is not connected, set RemoteHolding to Enabled, remote open/close signal control will be self holding.

When set Disabled, actuator will be remote inch control.

When terminal no.34 is connected with high level, set RemoteHolding to Enabled, actuator will be remote inch control.

When set Disabled, remote open/close signal control will be self holding.

（3.2.3.13）IR-ToolControl

Main Screen—Password—Language—Commission
└ Advanced
└ ControlMode
└ …IR-ToolControl

Parameter: Enabled, Disabled

Note: When set"Enabled", Infrared setting tool can not only set parameter, but also open and close valve locally. When set" Disabled", infrared setting tool can only set parameter.

（3.2.3.14）2-WirePriority

Main Screen—Password—Language—Commission
└ Advanced
└ ControlMode
└ …2-WirePriority

Parameter: Open, Close

Note: **Open**: Actuator executes valve open command when 2-wirePriority control.

Close:Actuator executes valve close command when 2-wirePriority control.

Commission/Advance

（3.2.3.15）PanelMenuSelect

Main Screen—Password—Language—Commission
└Advanced
└ControlMode
└ …PanelMenuSelect

Parameter: Default, Local, Stop, Remote

Note: When set "Default", actuator switch state can select actuator status(LOCAL/STOP/REMOTE).

When set "Local", "stop ", or "Remote", actuator will belocked at "Local", "stop ", or "Remote" status, status switch will be disabled.

（3.2.3.16）TorqueTripBypass

Main Screen—Password—Language—Commission
└ Advanced
└ ControlMode
└ …TorqueTripBypass

Parameter: 0%~5%

Note: When set "1%" and actuator is opening from fully close position, actuator will open valve with max. torque from fully close to 1%. When actuator is closing from fully open position, actuator close valve with max. torque from fully open to 99%. This option is used to open or close stick valve.

3.2.3.17 TorqueTripDelay

Main Screen—Password—Language—Commission
└ Advanced
└ ControlMode
└ …TorqueTripDelay

Parameter: 0~100 (Unit: 0.1 second)

Note: When set 5, torque protection is valid 0.5 second after actuator start. This option is used to ensure actuator open non-moving valve with high start torque.

3.2.4 PosFeedBack (Option)

3.2.4.1 FullyCloseSignal

Main Screen—Password—Language—Commission
└ Advanced
└…PosFeedBack
└ …FullyCloseSignal

Parameter:4mA, 20mA

Note: When set “4mA”, 4-20 mA Position Feedback is 4mA to fully close, 20mA to fully open.

When set”20mA”, 4-20 mA Position Feedback is 20mA to fully close, 4mA to fully open.

Commission/Advance

3.2.5 Modulate (Option)

3.2.5.1 ModulatingMode

Main Screen—Password—Language—Commission
└ Advanced
└ …Modulate
└ ModulatingMode

Parameter: PositionControl, ThresholdControl

Note: When set “PositionControl”, adopt 4~20mA current signal to adjust actuator valve position. When set “Thresholdcontrol”, adopt 4~20mA current signal to control actuator ”Open, Close, Stop”.

3.2.5.2 HighSignalEqual

Main Screen —Password—Language—Commission
└ Advanced
└ …Modulate
└…HighSignalEqual

Parameter： OpenLimit, CloseLimit

Note: When set”OpenLImit”, 4~20mA control is 20mA to fully open, 4mA to fully close. When set”CloseLImit”, 4~20mA control is 4mA to fully open, 20mA to fully close.

3.2.5.3 SignalScope

Main Screen—Password—Language—Commission
└ Advanced
└ …Modulate
└ …SignalScope

Parameter: FactorySettings, UserDefine

Note: When set"FactorySettings", actuator control signal is set as 4-20mA at factory. When set "UserDefine", actuator control signal is can be set by users (High or low signal value set please refer to 3.2.5.4 and 3.2.5.5 of P31.

3.2.5.4 HighSignalValue (Scope=user define)

Main Screen—Password — Language—Commission
└ Advanced
└ …Modulate
└…HighSignalValue

Parameter: 0~4095

Note: When "Signal scope" is set "UserDefine", this menu is used to set the high value of user defined current signal. For example: User wants to set current 18mA as high value of current signal instead of standard signal of 20mA.

Commission/Advance

Input current 18mA at current signal input terminal (Terminal no.26, 27), press confirm key of setting tool, wait until parameter is stable, press confirm key again to save parameter.

3.2.5.5 LowSignalValue(Scope=user define)

Main Screen—Password—Language—Commission
└ Advanced
└ …Modulate
└ …LowSignalValue

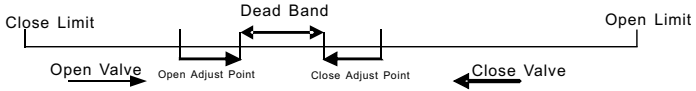
Parameter: 0~4095

Note: When menu "SignalScope" is set "Userdefine", this menu is used to set the low value of user defined current signal. Set method is the same as "HighSignalValue".

3.2.5.6 OpenAdjustPoint

Main Screen—Password—Language—Commission
└Advanced
└ …Modulate
└…OpenAdjustPoint

Parameter: 0~20



When reach open adjust band, adjust pulse(unit: pulse). For example: When set OpenAdjustPoint as 5, actuator will inching control when reach dead band 5 Adjust Point away, running in open direction into the scope of dead band, inching pulse width can be adjusted from 0-1S.

3.2.5.7 CloseAdjustPoint

Main Screen—Password—Language—Commission
└ Advanced
└…Modulate
└… CloseAdjustPoint

Parameter: 0~20

Note: When reach close adjust band, adjust pulse(unit: pulse). For example: When set OpenAdjustPoint as 5, actuator will inching control when reach dead band 5 Adjust Point away, running in close direction into the scope of dead band, inching pulse width can be adjusted from 0-1S.

Commission/Advance

3.2.5.8 AdjustPulseWidth

Main Screen—Password—Language—Commission
└ Advanced
└…Modulate
└…AdjustPulseWidth

Parameter：0~10

Note: When reach Adjust Band, adjust impulse, set Adjust Pulse Width(unit: 0.1S).

3.2.5.9 DeadBand

Main Screen—Password—Language—Commission
└ Advanced
└ Modulate
└…DeadBand

Parameter: 1‰~50‰

Note: Only modulating actuator has dead band. Dead band can be adjusted from 1‰~50‰.

If actuator vibrates or responses to unnecessary signal changes, then increase control signal dead band.

If it needs more accurate control, then decreases dead band.

Adjust precision of dead band will increase when full travel time increase.

3.2.5.10 InhibitTime

Main Screen—Password—Language—Commission
└ Advanced
└ …Modulate
└ …InhibitTime

Parameter：0-50

Note：In order to prevent from working frequently within rapidly fluctuating point signal, actuator will delay to prevent unnecessary movement. When the system becomes stable, actuator will response steadily according to required point signal. Actuator will response the signal changes after inhibit time. (Unit: 0.1 second), default value is 1 second.

3.2.5.11 SignalLostAction

Main Screen—Password—Language—Commission
└ Advanced
└…Modulate
└…SignalLostAction

Parameter：StayPut， High-Position， Low-Position

Note：StayPut：When signal lost, the actuator stops.

High signal position: When signal lost, actuator runs to the corresponding position of the high signal.

Low signal position: When signal lost, actuator runs to the corresponding position of the low signal.

Commission/Advance

3.2.5.12 SignalLostScope

Main Screen—Password—Language—Commission
└ Advanced
└ …Modulate
└…SignalLostScope

Parameter：0‰~200‰

Note: When the signal is lower than value which equal to low signal (High signal-Low signal)*Signal lost scope, actuator judges loss of signal. Default value is 100‰.

3.2.5.13 SignalEndsScope

Main Screen—Password—Language—Commission
└ Advanced
└ …Modulate
└ …SignalEndsScope

Parameter：0‰~100‰

Note: When the signal is in the range (Low signal, low signal+ (high signal-low signal)* SignalEndsScope), actuator is with low signal;

When the signal is in the range (High signal-(high signal-low signal)* SignalEndsScope, high signal), the actuator is with high signal.

The default value 20‰.

3.2.5.14 SignalErrorScope

Main Screen—Password—Language—Commission
└ Advanced
└…Modulate
└ …SignalErrorScope

Parameter：0%~100%

Note: When the signal changes exceed value equal to (high signal - low signal) * signal recording threshold, an analog threshold alarm will be recorded in actuator alarm.

3.2.6 InterruptTimer (Option)

Interrupt timer allows the actuator to response the local and remote control commands by the pulse way of "stop / start".

This function can be extended by setting the effective travel time to prevent the severe impact of the pipeline fluid (water hammer effect).

3.2.6.1 TimerDirection

Main Screen —Password —Language —Commission
└ Advanced
└ …InterruptTimer
└ TimerDirection

Commission/Advance

Parameter： Open，Close

Note: The default timer direction is open, namely, start time counting when open valve and stop when close valve -Pulse operation is around valve open position.

Open: Start InterruptTimer in valve open direction.

Close: Start InterruptTimer in valve close direction.

3.2.6.2 TimerStart

Main Screen—Password—Language—Commission
└ Advanced
└ …InterruptTimer
└ TimerStart

Parameter：0%~100%

Note: Start interrupt timer at start position（0%~100%, default value 2%).

3.2.6.3 TimerStop

Main Screen—Password—Language—Commission
└ Advanced
└ …InterruptTimer
└…TimerStop

Parameter：0%~100%

Note: Stop interrupt timer in stop position（0%~100%, default value 5%)

3.2.6.4 ContactorOnTime

Main Screen—Password—Language—Commission
└ Advanced
└…InterruptTimer
└…ContactorOnTime

Parameter：1~99

Note: Motor run interval (Unit: seconds).

3.2.6.5 ContactorOffTime

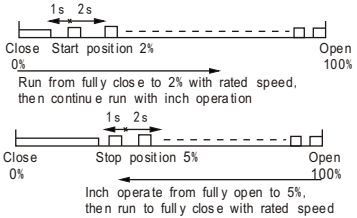
Main Screen—Password—Language—Commission
└ Advanced
└ …InterruptTimer
└ …ContactorOffTime

Parameter：1~99
Note: Motor stop interval (in seconds).

3.2.6.6 ESDOverrideTimer

Main Screen—Password—Language—Commission
└ Advanced
└ …InterruptTimer
└…ESDOverrideTimer

Commission/Advance



Parameter： Enabled， Disabled

Note: When this function is set Enabled under ESD condition, the interrupt timer will be bypassed; When set Disabled, the interrupt timer is available.

Example: If actuator installs interrupt timer, and set default value as above, then actuator will run from fully close to 5% with rated speed, then run to fully open by inching operation (open 1 second, stop 2 seconds), then run from fully open to 2%(inching operation), then run to fully close from 2% with rated speed.

3.2.7 AutoInspection

3.2.7.1 InspectInterval

Main Screen—Password—Language—Commission
- Advanced
  - …AutoInspection
    - InspectInterval

Parameter：1~99

Note: Auto inspection interval time(Unit: days).

Priority rate of auto inspection is the lowest, so it can only be available when finished remote self holding operation wiring,(please refer to section 8.3.2 picture A of page 11), namely under remote self holding control status. Auto inspection only happen at fully close or fully open position, the interval time start calculate from latest time which reach fully open or fully close position. When finished set of Inspect interval and inspect distance, actuator will auto operate from fully close/open position for set distance, then go back to fully close/open position, then waiting for next time operation(according set inspect interval time in days) .

3.2.7.2 InspectDistance

Main Screen—Password—Language—Commission
- Advanced
  - …AutoInspection
    - …InspectDistance

Parameter：1~20

Note: Auto inspection distance(Unit: impulse numbers of incremental sensor).

3.2.8 Clock

3.2.8.1 Date

Main Screen—Password—Language—Commission
- Advanced
  - …Clock
    - Date

Parameter：2000/01/01

Note: Set record date format is Year/Month/Day, eg.2010/01/01.

3.2.8.2 Time

Main Screen—Password—Language—Commission
- Advanced
  - …Clock
    - …Time

Parameter：18:00

Note: Set record time, the format is 18:00.

3.2.9 IndicatorLamp

3.2.9.1 CloseLampColor

Main Screen—Password—Language—Commission
└ Advanced
└…IndicatorLamp
└CloseLampColor

Parameter： Green， Red

Note: if set Green: it means fully close with green lamp on. If set Red, it means fully close with red lamp on.

3.2.9.2 LampBlink

Main Screen—Password—Language—Commission
└ Advanced
└…IndicatorLamp
└…LampBlink

Parameter： Disabled， Error， Running

Note: If set Disabled, lamp will not blink. If set Error, it means lamp will blink when error alarmed. If set Running, it means when actuator operating, lamp will blink.

Commission/Advance

3.2.10 Default

3.2.10.1 DefaultParameter

Main Screen—Password—Language—Commission
└ Advanced
└ …Default
└ DefaultParameter

Parameter：Set，Cancel

Note: If choose Set, actuator will set as factory default value. If choose Cancel, parameter change cancelled.

3.2.10.2 DefaultPosition

Main Screen—Password—Language—Commission
└ Advanced
└…Default
└…DefaultPosition

Parameter：Set，Cancel

Note: If choose Set, actuator valve position limit setting will reset as factory default value. If choose Cancel, parameter change cancelled.

12.4 Diagnose

（4.1）RemoteSignal

（4.1.1）Open

Main Screen—Password—… — Diagnose
└ RemoteSignal
└ Open

Note: Enabled means remote open valve signal valid. Disabled means remote open valve signal invalid.

（4.1.2）Close

Main Screen—Password—… —Diagnose
└ RemoteSignal
└ …Close

Note: Enabled means remote close valve signal valid. Disabled means remote close valve signal invalid.

（4.1.3）Stop

Main Screen—Password—… —Diagnose
└ RemoteSignal
└ …Stop

Note: Enabled means remote stop valve signal valid. Disabled means remote stop valve signal invalid.

Diagnose

（4.1.4）Remote/Modulate

Main Screen—Password—… —Diagnose
└ RemoteSignal
└ …Remote/Modulate

Note: Enabled means Remote/modulating(terminal No.39) signal valid. Enabled means Remote/modulating(terminal No.39) signal invalid.

（4.1.5）ESD

Main Screen—Password—… —Diagnose
└RemoteSignal
└…ESD

Note: Enabled means actuator ignore local or remote control when ESD signal valid. Disabled means ESD signal invalid.

（4.1.6）OpenInterlock

Main Screen—Password—… —Diagnose
└RemoteSignal
└…OpenInterlock

Note: Interlock control (open valve) by actuator with external interlock function, can avoid unauthorized electric open operation.

Enabled means remote open interlock signal valid.

Disabled means remote open interlock signal invalid(refer to 3.2.3.8 of P27).

（4.1.7）CloseInterlock

Main Screen—Password—…—Diagnose
└RemoteSignal
└…CloseInterlock

Note: Interlock control (close valve) by actuator with external interlock function, can avoid unauthorized electric valve close operation. Enabled means remote close interlock signal valid. Disabled means remote close interlock signal invalid(refer to 3.2.3.9 of P27).

（4.2）PanelState

（4.2.1）PointToRemote

Main Screen—Password—…— Diagnose
└PanelState
└ PointToRemote

Note: Enabled means actuator knob is switched to REMOTE position. Disabled means actuator knob is not switched to REMOTE position.

（4.2.2）PointToStop

Main Screen—Password—…— Diagnose
└ PanelState
└ PointToStop

Note: Enabled means actuator knob is switched to STOP position. Disabled means actuator knob is not switched to STOP position.

Diagnose

（4.2.3）PointToLocal

Main Screen—Password—…— Diagnose
└ PanelState
└ …PointToLocal

Note: Enabled means actuator knob is switched to LOCAL position. Disabled means actuator knob is not switched to LOCAL position.

（4.2.4）PressOpen

Main Screen—Password—…— Diagnose
└PanelState
└ …PressOpen

Note: Enabled means actuator open valve button pressed. Disabled means actuator open valve button not pressed.

（4.2.4）PressClose

Main Screen—Password—…— Diagnose
└ PanelState
└…PressClose

Note: Enabled means actuator close valve button pressed. Disabled means actuator close valve button not pressed.

（4.2.5）PressStop

Main Screen—Password—…— Diagnose
┗PanelState
┗…PressStop

Note: Enabled means actuator stop valve button pressed. Disabled means actuator stop valve button not pressed.

（4.3）ContactState

（4.3.1）Contact1

Main Screen—Password—…— Diagnose
┗ContactState
┗ Contact1—Contact 2— Contact3
—Contact4—MonitorSwitch

Note: “Contact” (Indication contacts and monitor switch) menu is used to set on-off signal feedback contacts operating conditions.

Take contact 1 for example, other contacts set as same as contact 1. OFF means contact 1 break, ON means contact 1 make.

（4.4）FieldBusInfo (retain)

（4.4.1）FieldBusState

Main Screen—Password—…— Diagnose
┗ FieldBusInfo
┗ FieldBusState

Note: Enabled means actuator can connect with bus control system. Disabled mean actuator can't connect with bus control system.

（4.4.2）FieldBusCommand

Main Screen—Password—… — Diagnose
┗FieldBusInfo
┗FieldBusCommand

Note: Enabled means bus control system command valid. Disabled means bus control system.

（4.5）EncoderInfo

（4.5.1）EncoderDiagnose

Main Screen—Password—…— Diagnose
┗ EncoderInfo
┗EncoderDiagnose

Note: Ok means encoder all right. Error means encoder has problem.

（4.5.2）EncoderValue

Main Screen—Password—…— Diagnose

└EncoderInfo

└ …EncoderValue

Note: It will show current encoder value, when valve opening, encoder value generally increase; When valve closing, encoder value generally decrease.

（4.5.3）EncoderOrder (retain)

Main Screen—Password—…— Diagnose

└ EncoderInfo

└…EncoderOrder

Note: Number 0~3 is used to judge hall sensor is ok or error.

（4.6）BatteryInfo

（4.6.1）BatterPower

Main Screen—Password—…— Diagnose

└BatteryInfo

└ BatterPower

Note: 0~100% shows battery power level.

Diagnose

（4.7）SystemInfo

（4.7.1）PowerVoltage

Main Screen—Password—… —Diagnose

└SystemInfo

└PowerVoltage

Note: Current power supply value.

（4.7.2）PowerFrequency

Main Screen—Password—… —Diagnose

└ SystemInfo

└…PowerFrequency

Note: Current power frequency (only valid for 3 phase power supply).

（4.7.3）Speed

Main Screen—Password—…— Diagnose

└ SystemInfo

└ …Speed

Note: Actuator current speed (AVA series, unit: round per minute (rpm)).

（4.7.4）CPUTemperature

Main Screen—Password—… —Diagnose
└ SystemInfo
└ …CPUTemperature

Note: Current CPU temperature.

（4.7.5）ResetCode

Main Screen—Password—… — Diagnose
└ SystemInfo
└ …ResetCode

Note: The first: RST rest, second: Reset with power supply, third: Software rest, forth: watch dog reset, fifth: windows watch dog reset, sixth: low power consumption reset.

（4.7.6）TorqueAD

Main Screen—Password—… — Diagnose
└ SystemInfo
└…TorqueAD

Note: Actuator torque AD value (from 0 to 4096).

（4.7.7）PhaseTime

Main Screen—Password—…— Diagnose
└SystemInfo
└…PhaseTime

Note: Phase time of actuator sampling, when the power is 50Hz, the value is 133 or 66. When the power is 60Hz, the value is 111 or 56.

12.5 Record

（5.1）Information

（5.1.1）ProductionDate

Main Screen—Password—…— Record
└ Information
└ ProductionDate

Note: Actuator production date.

（5.1.2）SerialNumber

Main Screen—Password—…— Record
└ Information
└ …SerialNumber

Note: Actuator production code.

（5.1.3）SoftWare

Main Screen—Password—… — Record
└Information
└ …SoftWare

Note: Actuator software version.

（5.2）RecentCommands

Main Screen—Password—… —Record
└RecentCommands

Note: Last 10 command for actuator. Press ↓ key to observe all 10 commands, or return to upper menu by press ↑ key.

（5.3）RecentErrors

Main Screen—Password—…— Record
└ RecentErrors

Note: Last 10 alarms of actuator. Press ↓ key to observe all 10 commands, or When users can return to upper menu by press ↑ key.

（5.4）Statics

（5.4.1）Contactor1 Works

Main Screen—Password—…—Record
└ Statics
└ Contactor1 Works

Note: Control the contactor operating times at anticlockwise direction.

（5.4.2）Contactor2 Works

Main Screen—Password—…—Record
└ Statics
└ Contactor2 Works

Note: Control the contactor operating times at clockwise direction.

（5.4.3）MaxOpenTorque

Main Screen—Password—…—Record
└ Statics
└ …MaxOpenTorque

Note: Max output opening torque percentage when actuator operating.

（5.4.4）MaxCloseTorque

Main Screen—Password—…—Record
└ Statics
└ …MaxCloseTorque

Note: Max output closing torque percentage when actuator operating.

（5.4.5）ResetData

Main Screen—Password—…—Record
└ Statics
└ …ResetData

Note: Reset above data to zero.

13.Maintenance, inspection and trouble shooting

For long time no trouble operation, every actuator should be fully tested and installed, sealed, modulated according to instruction. AVA and AVAT adopt special double sealed and non-intrusive enclosure, which can realize exhaustive protection of actuators.

Users should not open terminal cover when do routine examination. There is no need to open the terminal cover and adjust the internal electrical control parts which are sealed by AVA Quality Control Department.

The power of actuator should be isolated before examination and maintenance, except battery replacement.

The power of actuator should be isolated before open the terminal cover, except battery seal plug.

Routine examination including:

1. Check and secure that the bolts between actuator and valve are tightened.

2. Ensure the cleanness and lubrication of valve stem and coupling.

3. An operating plan should be made when motorized valve seldom be operated.

4. Battery should be replaced every 5 years.

Battery of actuator

Battery is used to support the valve position detection and display when power is cut off. In case power cut off, battery can ensure the transfer of valve position and display on screen when manual operation.

It can also support data recording when data logger is installed.

13.Maintenance, inspection and trouble shooting

WARNING:

Battery seat which located on the actuator enclosure should not be damaged on explosion-proof zone. If users need to get battery seat out, the power of actuator should be isolated or cut first.

AVA/AVAT has added a special circuit in battery function. It can reduce battery consumption and increase its life.

The battery has a life about 7 years.

There is an icon on the screen to indicate the battery capacity.

To avoid data lose, recommend to replace battery when main power is on. If main power is not available and the battery is discharged, check the valve position after replacement of battery.

Battery disassembly

Choose Local Stop, disassemble the battery which located at the top of enclosure, beside handwheel. It is in the seal plug which has a tag on it.

Use a 6mm Allen key to remove the control box, ensure the O-ring is still on the control box, disconnect the wire of battery, and pull the battery out from the plastic seal hole.

14.Weights and Lubrication

Unless specially ordered for extreme climatic conditions, Greatork Actuators are dispatched with gearcases filled with GL-5 75W/90 lubricant suitable for ambient temperatures ranging from 22°F/30°C to 160°F/70°C.

Note: Excluding secondary gearboxes.

Weights and lubricant capacity

Part No.	N/W（Kg）	Lubricant capacity（L）
AVA01	32	0. 3
AVA02	32	0. 3
AVA03	32	0. 3
AVA04	52	0. 8
AVA05	52	0. 8
AVA06	75	1. 1
AVA07	200	6. 5
AVA08	230	7. 0
AVA09 & AVA09. 1	230	7. 0
AVA10 & AVA10G	230	7. 0
AVAT01	24	1. 5
AVAT02	24	1. 5
AVAT03	24	1. 5
AVAT04	35	1. 5
AVAT05	35	1. 5
AVAT06	35	1. 5

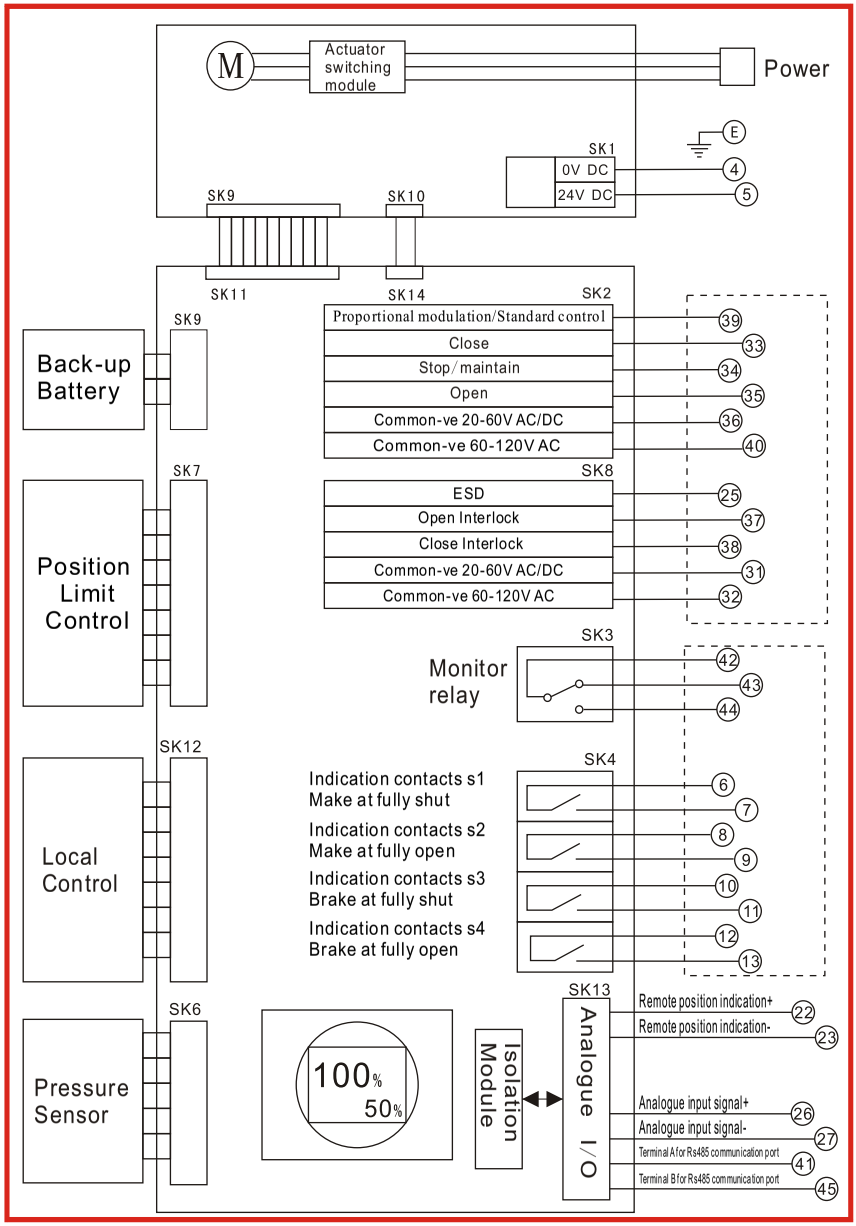
15.Program Default Set

Default Set		
Main Menu	Submenu	Default
Basic		
Valve	CloseDirection	Clockwise
	ClsoeAction	PositionLimit
	OpenAction	PositionLimit
TorqueTripMode	CloseTorque	100%
(Normal)	OpenTorque	100%
TorqueTripMode	CloseTorque	100%
(Intelligent)	OpenTorque	100%
	BackwardDistance	3%
	BackwardTimes	2
	PosTolerance	1%
Advanced		
Contact 1	ContactFunction	CloseLimit
	ContactForm	NormallyOpen
Contact 2	ContactFunction	OpenLimit
	ContactForm	NormallyOpen
Contact 3	ContactFunction	CloseLimit
	ContactForm	NormallyOpen
Contact 4	ContactFunction	OpenLimit
	ContactForm	NormallyOpen

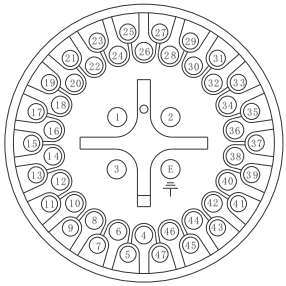
MonitorSwitch	Local/Stop	Enabled
	MotorTempError	Enabled
	LostPhaseError	Enabled
	Stall	Enabled
	LockedRotor	Enabled
	CPUTempError	Enabled
	TorqueTrip	Enabled
	24VError	Enabled
	TorqSensorError	Enabled
	PositionError	Enabled
	SwitchForm	NormallyClose
ControlMode	Terminal 0	ESDControl
	ESDAction	StayPut
	ESDContactForm	NormallyOpen
	ESDExTempError	Enabled
	ESDExInterlocks	Enabled
	ESDExLocalStop	Enabled
	ESDExTorqTrip	Enabled
	ESDExStall	Enabled
	ESDExLockedRotor	Enabled
	ESDExPhaseLost	Enabled
	ESDExPosErr	Disabled
	Terminal 1	Disabled
	Terminal 2	Disabled
	InterlocksScope	Local/Remote
	LocalHolding	Enabled
	RemoteHolding	Disabled
	IR-ToolControl	Enabled
	2-WirePriority	Open
	PanelMenuSelect	Default
	TorqueTripBypass	3%
	TorqueTripDelay	30

IndicatorLamp	CloseLampColor	Green
	LampBlink	Disabled
Optional Functions(Only display when functions are set Enabled in Options menu under Advance menu)		
Posfeedback	FullyCloseSignal	4mA
Modulate	ModulatingMode	PositionControl
	HighSignalEqual	OpenLimit
	SignalScope	FactorySetting
	OpenAdjustPoint	5
	CloseAdjustPoint	5
	AdjustPulseWidth	3
	DeadBand	10‰
	InhibitTime	10
	SignalLostAction	StayPut
	SignalLostScope	15‰
	SignalEndsScope	20‰
	SignalErrorScope	100%
FieldBus	FieldBusType	Profibus
	FieldBusAddress	11
	FieldBusRate	9600
	OpenAdjustPoint	5
	ClsoeAdjustPoint	5
	AdjustPulseWidth	3
	DeadBand	10‰
InterruptTimer	TimerDirection	Open
	TimerStart	2%
	TimerStop	5%
	ContactorOnTime	1
	ContactorOffTime	2
	ESDOverrideTimer	Enabled
AutoInspection	InspectInterval	15
	InspectDistance	1

Actuator Basic Circuit Diagram



Note: Position feedback is default 4-wire mode, so port No. 22 and No. 23 have been power supplied Internally by PCB, no need of power supply externally.

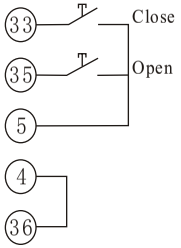


Warning: Please refer to the rated voltage stampted on the actuator nameplate before connecting power. Connect terminals 1, 2, and 3 when the power is three phases 380VAC. Connect terminals 1 and 2 when the power is single phase 220VAC.

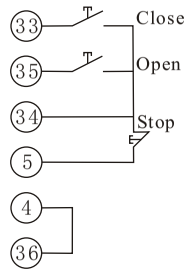
1	Power Line 1#
2	Power Line 2#
3	Power Line 3#
4	24vdc -Ve
5	24vdc +Ve
6	Monitor Relay S1-1
7	Monitor Relay S1-2
8	Monitor Relay S2-1
9	Monitor Relay S2-2
10	Monitor Relay S3-1
11	Monitor Relay S3-2
12	Monitor Relay S4-1
13	Monitor Relay S4-2
14	
15	
16	
17	
18	
19	
20	
21	
22	Remote Position Feedback +
23	Remote Position Feedback-
24	
25	ESD
26	Analogue Input Signal +Ve
27	Analogue Input Signal -Ve
28	
29	
30	
31	Common-Ve 20～60v Ac/Dc
32	Common-Ve 20～120v Ac
33	Remote Closing Signal Input End
34	Remote Stopping/ Maintaining Signal Input End
35	Remote Opening Signal Input End
36	Common- Ve 20～60v Ac/Dc
37	Open Interlock
38	Close Interlock
39	Manual/ Automatic
40	Common+Ve 20～120v Ac
41	
42	Common Monitor Relay
43	Common Monitor Relay Normally Closed
44	Common Monitor Relay Normally Open
45	
46	
47	
E	Grounding

AVA/AVAT Range Wiring Diagram

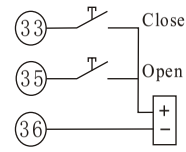
step control of internal power supply



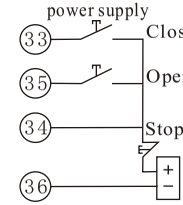
Self-maintained control of internal power supply



step control of external power supply



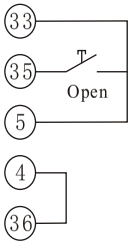
self-maintained control of external power supply



Note: Internal power supply voltage is 24VDC.
When the external control voltage is 20-60V DC/AC, the common terminal is 36.
When the external control voltage is 60-120V DC/AC, the common terminal is 40.

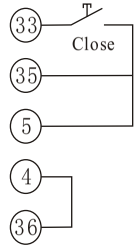
2-wires control

Valve open when contact closed
Valve closed when contact open
The function require that opening valve is set to be preferential



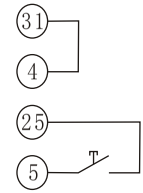
2-wires control

Valve close when contact closed
Valve open when contact open
The function require that closing valve is set to be preferential

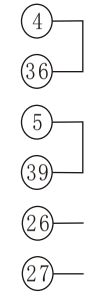


ESD

ESD can be set to close valve, open valve and stay up

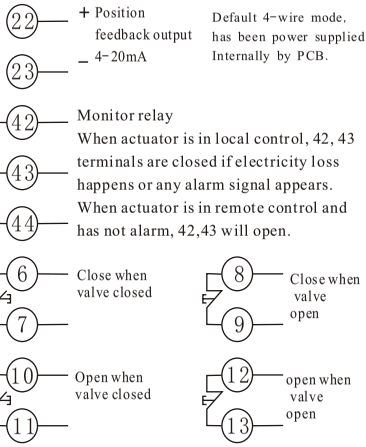


AVAM/AVATM Range Control Diagram

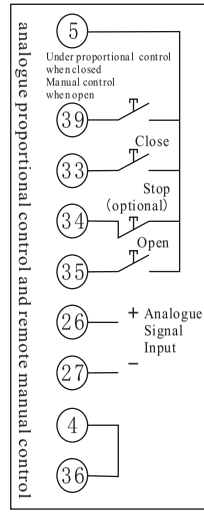


Note: Analogue input signal can be 4～20mA, 0～20mA, 0～5V, 0～10V. The default is 4～20mA. Please refer to instruction if changes are required.

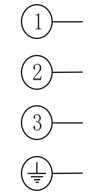
Feedback



Note : the indication content of four feedback relay is set freely. Refer to instruction.



Power



Note: Connect terminals 1 and 2 when the power for the actuator is single.

Note: Detailed wiring please refer to P10.

For more information,please contact Greatork.

As we are continually developing our products, please forgive us that the design of Greatork Actuators is subject to change without notice. The latest products and information are available at our website: www.greatork.com, for more information, please email us at Greatork@greatork.com.