

Preface

The electric actuators we manufactured are the products by using the imported advanced technique from BERNARD company of France at the end of 80s. The automatic instruments No.7 factory is the only manufacturer having the imported manufacturing technique of the electric actuators from BERNARD company of France. For most years, we always occupy the forefront in designing and developing of the electric actuator. During digesting, absorbing and transforming the imported technique, at the same time, we also absorb the up-to-date international the newest technique of electric actuators to improve the functions and performances of the imported BERNARD electric actuators.

Now, SD series products all add the functions of local operating, dynamic braking, signal isolating, cut-signal protecting and hand-wheel tripping etc. The protecting class exceeds IP 67. Therefore, the quality and reliability have been improved more.

SR series has the characteristic of the hand-wheel electric operating priority function.

SM series is designed for the especially frequent industrial conditions or systems. The working duty is 100%.

The intelligent model electric actuator we designed has excellent specifications and advanced technique in internal and external markets to provide more select for the users.

The registered trade mark of our imported technical products is '天伯牌'.

We have provided large number of electric actuators for the industrial processing automatic control systems for most of years.

1. Classification and uses of the products

The electric actuator is an executing unit in the industrial automatic instruments and the main indispensable device of the automatic controlling system, it accepts the signals from the regulator, PLC and DCS etc. controlling computer to automatically perform the regulating action. It is extensively used for the fields of power station, metallurgy, chemistry, mine, pharmacy, thermal power, architecture material, transportation, urban subway, water and sewage treatment etc.

SD, SR and SM series electric actuators adopt combined structure. They have the full types, small volume, ethereal weight and convenience mounting mode, reliable performances and easy for adjustment and maintenance.

(1) Classified according to the mode of output

- ① Quarter-turn electric actuator: Scope of turning: 0-90 degrees. The output torque is indicated by Nm. It is used for the butterfly valve, the ball valve, the louver valve, the air gate, the baffle and the stopcock.
- ② Linear-turn electric actuator: The output thrust is indicated by N. The output is linear displaces. It is used for the single or dual-base regulation valve, the sleeves valve and the gate valve.
- ③ Multi-turn electric actuator: The output torque is indicated by Nm. Turning is beyond 360 degrees. It is used for the gate valve, the stop valve, the slide valve and high temperature and high voltage regulation valve etc.

(2) Classified according to the mode of control

- ① Proportional modulating model: The electric actuator can accept 4-20mA, 0-10mA, 1-5V analogue controlling signals. The output angle is in proportion to the analogue signal. The electric actuator forms a closed loop to realize the automatic regulation.
- ② Remote model: The electric actuator accepts the on-off signal. The remote model and ON-OFF model products of BERNARD company have the same design and the same controlling circuit, the outside wire just has a little different according to the operating mode, so they are called by a joint name as remote model.
 - A Remote model (integral model): The actuator accepts the contact signal (a long pulse). The signal holding, the actuator turns continuously, the signal disappearing, the actuator stops turning.
 - B. ON-OFF model: The actuator accepts the contact signal (a pulse). Just input an instantaneous contact signal, which needn't to be held, the actuator also turns till to

the end position.

It is emphasized that the mechanism driving, controlling circuit and the motor of our remote model products are all designed according to 50% working duty of the modulating model. The motor allows the frequent operating (1200 times/hour). So the users could use the DCS to directly output an on-off signal for controlling the actuator used as a modulating model to realize the system's open loop modulating.

The proportional modulating model electric actuator we manufactured by using the imported technique is classified in two forms on the structure, the integral mode and the separate mode. The integral mode is the positioner (Multi-function servo-amplifier) is combined with the actuator as an integral structure. The separate mode is: the positioner and the actuator are mounted separately.

2. The characteristics of the products

SD, SR and SM series electric actuators all adopt combined structure. The currentcizing, the standardizing and the seriesizing of the spare parts are considered attentively. The mechanisms, the motors and the controlling circuits are combined to form varieties of series and specifications. The quantity of the necessary spare parts to the users for operating and maintaining are reduced much. SD, SR and SM series electric actuators have the characteristics of full types, small volume, ethereal weight, mounting convenience, reliable performances and sample adjusting and maintenance.

The configuring characteristics of the electric actuators

1. The single phase and three-phase integral proportional modulating model electric actuators all adopt non-contact optical and electric coupling over-zero triggering solid-state relays to control the motor. The remote model adopts the high reliability imported alternating current contact for controlling.

2. Local operating function

The product equips with the no-penetrating shaft magnetic switches, to realize the local/remote over-change and the electric actuator turning by operating the switches. The switches are used for controlling the infirm electric circuit of the actuator. The switches can be locked to avoid local operating unauthorized. If the local operating doesn't need, please select the product without the local operating structure.

3. Manual operating

The actuator all equips with a hand-wheel for operating the actuator to the open and close directions when the power supply occurs fault. When the hand-wheel operating is needed, push the handwheel towards the direction of the hand-wheel shaft, then it can be used. After finishing operating, the hand-wheel is automatically clutched. The hand-wheel couldn't turn when the actuator at the electric operating state.

4. Over-torque protecting function

The actuator has an over-torque surveying device that can accurately survey the torque of the valve. When the torque exceeds the setting scope, the torque switch inside the actuator outputs a signal to the controlling circuit for stopping the motor to protect the valve, the driving parts and the motor. After the mechanical over-torque fault is relieved, shutting down the power supply or input an instantaneously reversed signal, the actuator will come back to turn normally.

5. Special type servo-motor

The single phase and three-phase motors adopted for the actuator are the high servo characteristic special type motors having the high start-up torque, the low turning inertia and small start-up current. The motor allows frequent start-up, normally 1200times/hour. SM series motor allows start-up at 1800 times/hour. SM series electric actuator is designed for the especially frequent industrial conditions.

6. Thermal protection of the motor

The motor of the actuator all equips with a thermal switch connected with the controlling circuit, when the motor occurs abnormal over-thermal phenomenon, which inside temperature exceeds 130 degrees, the thermal switch is shutdown, at the time, the circuit for controlling the motor is shut-down for protecting the motor and the actuator. After the motor is cooling, the switch turn-on again, the circuit comes back to work.

7. Travel controlling mechanism

The travel control recurs to the cam mechanism inside the actuator. This cam is connected with the reducer shaft of the actuator by a set of reducing gears. The cam mechanism has four individual adjustable cams to control 4 position microswitches for controlling the upper limit and downer limit positions of the actuator. Two of the micro-switches can be used as the contact output of the upper and downer limit positions (The capacity of the contact: 5A 250V AC).

8. Position indicating

The output current is used for the position indication. All types actuator equip with the current transmitter circuit to output the position feedback current as the position indicating or used for comparing with the input signal. The output current is 4-20mA DC. The output impedance $\leq 500\Omega$. constant current output. The feedback current circuits of the standard modulating model and intelligent model are integrated with the full logical controlling circuits of the actuator into a whole structure. The remote model actuator has a 2-wire individual current module to output 4-20mA current.

9. Cut-off signal position-locked function

The modulating model actuators all have 4-20mA analog controlling signals open circuit automatically checking function. If cut-off signal occurs, the actuator will hold the original position or turning to the set emergency position.

10. Dynamic braking

Dynamic braking is the standard configuration to protect from over impacting to the valve because of the motor inertia over large. The dynamic braking adopts the electric braking form with the valve position surveyed by the precise valve position sensor to control the motor turning and precisely positioning.

Options

1. Three-phase electric actuator power supply's phase order automatically rectified (Phase position automatically rectified). This function module can be mounted inside the positioner needn't consider the phase order of the power supply. The actuator can turn to the correct direction automatically.

2. Fault alarming:

The actuator can output the alarm signal in the cases of the power supply shut down, over-torque, motor over-heat and phase cut. The capacity of the contact is 5A, 250V AC.

3. Condensation-resistance heater

To protect the electronic components from condensing and dewing in the cold and humidity places.

4. Attached position feedback current

The actuator could attach a set of position sensor and a current transmitter in addition. The position feedback current could be output synchronously (or proportionally) with the original one. The output is 4~20mA DC, impedance $\leq 500\Omega$.

If the above options are necessary, please note it in the contract.

3. The main technical parameters of the electric actuator

1. Input signal: 4~20mA Impedance 250Ω , 0~10mA Impedance 200Ω .

2. Deadline: 0.3~3% Continuously adjustable.

3. Input passage: One for the analogue current input and one for the on-off input.

4. Output signal: 4~20mA DC Impedance $\leq 500\Omega$
The input passage and the output passage are isolated.

5. Output torque and travel:
Quarter turn: 100Nm~12000Nm Travel 90 degrees
Linear turn: 2000Nm~25000Nm Travel 10, 16, 25, 40, 60, 100mm
Multi-turn: 40Nm~900Nm Travel 1~50 circles

6. Basic error: $\pm 1\%$; $\pm 0.5\%$

7. Deviation: $\leq \pm 1\%$

8. Damping characteristic: No-oscillating

9. Protecting class: IP 67

10. Operating environment: Temperature: -25°C ~ $+70^{\circ}\text{C}$

11. Power supply: Single phase: 220V $\pm 10\%$ 50Hz

Three-phase: 380V 50Hz

The technical parameters of the remote model (ON-OFF model) do not conclude the first item and the second item. The other items are the same as the proportional modulating model.

4. The structure of the electric actuator

The electric actuator is composed of the reducer, the motor, the position transmitter, the travel position limit, torque limit mechanism and the positioner.

The brand '天伯牌' electric actuators we manufactured are composed of the remote model and the proportional modulating model which are all basic on the integral mode structure. As for the proportional modulating model, the users could select the separated model electric actuator according to the technical specifications and the environment conditions. The separated structure means that the positioner is separately mounted with the actuator. If the separated model electric actuator is ordered, we may provide DFD-2000 and DFD-3000 intelligent model electric operators combined with the servo-amplifier and the positioner as a whole body. Its structure is plate-mounted mode. The dimensions of the plate are $80 \times 160\text{mm}$. The dimensions of the hole are $70 \times 156\text{mm}$. The intelligent electric operators DFD-2000 and DFD-3000 see the operating instructions.

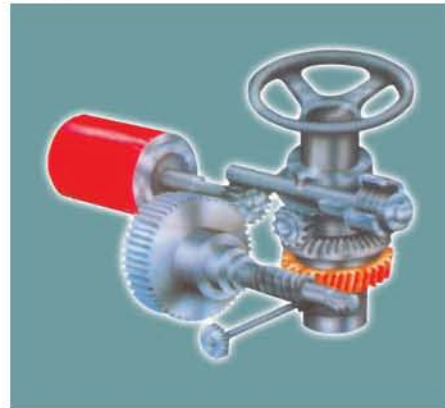
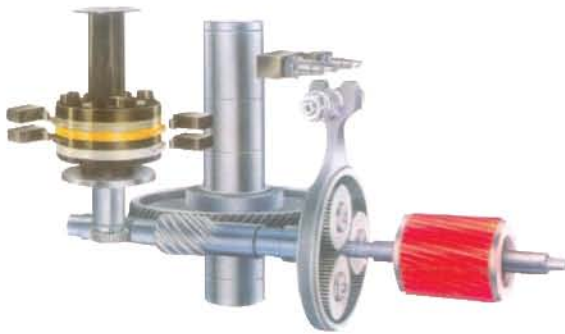
The structure of each part:

1. Reducer

The reducer of the electric actuator is used for turning the high speed rotating of the motor to the low speed driving of the output shaft by the reducing device to output the large torque. The reducer adopts multi-class reducing. The first class adopts the small volume, large driving ratio and high efficiency epicyclic driving. The middle class usually adopts bevel gear driving. The final class usually adopts the worm gear and worm driving with the mechanical self locked function or the guide screw and the nut driving. Therefore, the whole reducer has not only the higher mechanical driving efficiency, but also the mechanical self-locked characteristic. See Fig.1

The driving lubrication adopts the long-efficiency lithium group grease to pledge the maintaining not have to open the case during a period of overhaul.

Fig.1 Reducer driving sketch diagram



2. Motor

The motor is the power source for the electric actuator. The motor special adopts the single phase or three-phase low inertia and high torque special type servomotor. The motor is up to the standard S4 of IEC34. It not only allows frequently start-up, but also has the excellent performance. There is equipped an over-heat protecting switch inside the stator winding of the motor. The switch is connected with the controlling circuit. As soon as the motor is over-heated (The temperature of the motor always arise when the motor is in normal working, but it can't exceed the allowance operating temperature.), the controlling circuit will be shut down to protect the motor. While the motor is cooling, the switch will come back to work automatically. The circuit and the motor will come back to work.

3. Travel limit

There are the electric position limit and the mechanical position limit (The multi-turn model has the electric position limit only.) in an electric actuator.

The electric position limit is composed of the cams with four individual adjustable cam and the micro-switches by specialized designing. The cams rotate along with the output shaft of the electric actuator. The scope of travel of the electric actuator is determined by adjusting the related position of the camplates and the switches.

The cams adjustment is very easy. There need a screwdriver only when adjusting. Press the adjustment wheel of the related cam and turn it to make the cam to the required position. While the screwdriver is left, the cam has just locked at this position. (The scope of the actuator's electric position limit has been adjusted before the actuator ex-works, so please do not adjust it anyway.) The cam mechanism sees Fig. 2.

The mechanical position limit is used for protecting the actuator from turning beyond the scope of working when the actuator is manually operated. When the actuator is automatically operated, if the electric position limit is out of work, the mechanical limit will be in action.

(Usually the electric position limit is in action first.) The mechanical position limit of the quarterturn electric actuator adopts the adjustable limit bolts mounted inside the case to limit the turning scope of the fan-shaped worm gear. The mechanical position limit of the linearturn electric actuator adopts the limit washer mounted inside the guide screw and nut reducer.

These two kinds of mechanism are all mounted inside the reducer, volume small and reliable.

4. Torque limit mechanism

BENARD electric actuator has an over-torque protecting device. Its structure is small and special. See Fig. 1. The principle is: The epicyclic driving inner gear generates a deflection following with the torque during transmitted the torque to stir the sliding block equipped with two spiral cylinder springs for balancing the torque of the clockwise and counter clockwise directions. When over-torque, the sliding block drives the rod to contact the torque switch of this torque direction. The switch acts to shut down the motor controlling circuit to stop the motor. This circuit has the memorized function, only after the fault has been removed, the circuit can come back to work. The way of removing the fault, we have mentioned in the fourth item of the characteristics of the products.

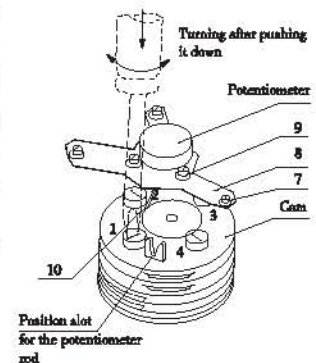


Fig.2 Cam

5. Position transmitter

The position transmitter of the actuator is composed of the position sensor and the current transmitter circuit. Its principle is: Change the angle (displacement) to 4~20mA current signals as the position feedback indicating signal transmitted to the computer. The position sensor adopts the high-precision, long-life (5×10^7) electric conducting plastic potentiometer, it turns coaxially with the travel limit cams.

As for the integral model actuator, the resistance value of the potentiometer is transmitted to the positioner GAMX compared with the input signal, then output a proportional signal 4~20mA DC with the angle changing of the positioner. This signal is isolated with the input passage of the positioner GAMX. (If needed, the user could change it to the form of the cathode co-ground.)

As for the remote model actuator, its angle sensor, the electric conducting plastic potentiometer, is connected with the current transmitter TAM (See Fig.3). TAM is internal power supplied (24VDC) of the actuator, the external power supply (12V~36VDC) is also allowed, to form the two-wire duty 4~20mA current changing, that namely is the actuator's position signal output current.

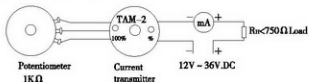


Fig.3

6. Positioner and position controller

The positioner of the proportional modulating model compares the analogue signals sent from the upper device (For example, the computer), then the signal is logically changed and amplified to drive the motor rotating proportionally according to this signal.

The position controller of the remote model actuator controls the actuator turning and stopping according to the on-off signal from the upper device.

GAMX of the integral proportional modulating model positioner and the logic controlling circuit of the remote model position controller are all installed in the controlling box on the structure. (See the configuration diagrams of the products or Fig. 13A.)



5. The electric principle and wiring of the electric actuator

(1). The integral proportional modulating model electric actuator

The integral proportional modulating model electric actuator is driven by the motor. The controlling and feedback signals are DC. The upper instrument or the computer sends a controlling signal incepted by GAMX-D positioner then compare and logic operate the signals with the position state of the actuator and amplify it to a strength electric signal to control the actuator turning proportionally according to this signal to the related open degrees of the valve or air gate. Meanwhile GAMX-D sends the open degrees signal and the state of the actuator back to the upper device or computer for completing the modulating function.

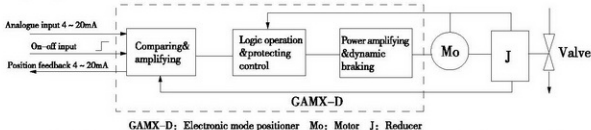


Fig.4 Principle block diagram of the integral proportional modulating model electric actuator

The electric mode positioner GAMX-D functions and adjustment ways are introduced emphatically as follows. The structure of the circuit board sees Fig. 5.

◆ The circuit inputs signal 4~20mA or the passive on-off signals (That means it needn't provide the contact signal with power supply.). The output is 4~20mA; the input passage and the output passage are isolated completely.

◆ When the input signal is the passive contact signal (See terminals 34, 35, 36 and 39 in Fig.6), the remote model control can be realized.

- ◆ The manual/auto switch TS is on the circuit board. When at the manual position, turning the potentiometer P1 to operate the actuator.
- ◆ Cut-off signal state setting: Use RT short-circuit component for setting
 - (1) RT position is $\begin{smallmatrix} \bigcirc & \bigcirc & \bigcirc \\ \bigcirc & \bigcirc & \bigcirc \end{smallmatrix}$. When the signal is cut-off, the actuator will keep the original position.
 - (2) RT position is $\begin{smallmatrix} \bigcirc & \bigcirc & \bigcirc \\ \bigcirc & \bigcirc & \bigcirc \end{smallmatrix}$. When the signal is cut-off, the actuator will be full closed.
 - (3) RT position is $\begin{smallmatrix} \bigcirc & \bigcirc & \bigcirc \\ \bigcirc & \bigcirc & \bigcirc \end{smallmatrix}$. When the signal is cut-off, the actuator will be full opened.
- ◆ Change the turning directions:

Use IT1 and IT2 for setting the turning directions:

 - (1) The actuators are all set as the clockwise direction turning before they ex-work. That namely is IT1 and IT2 keep the original position (The switches are at the released state.) 4mA is the valve-closed position. 20mA is the valve-opened position.
 - (2) Push down IT1 and IT2 at the same time (The switches are all at the position locked state.), the actuator will turning at the counter clockwise direction. 4mA is the valveopened position; 20mA is the closed position of the valve.
- ◆ Full range adjustment: Use P2 for adjusting.
- ◆ Deadline adjustment: Use P3 for adjusting, the scope of adjusting is 0.3~3%.
- ◆ Datum voltage (Point A and point D on the circuit board) adjustment: Point A and D are normally adjusted before they ex-work. When the input signal is 4mA, the voltage of point A is 5V DC. It needn't to be adjusted by the users.
- ◆ The LED indicating lights on the board: L1 (Green) indicates the direction for opening; L2 (Red) indicates the direction for closing; L3 (Yellow) indicates the dynamic braking (twinkling).

Fig.5: The structure sketch diagram of GAMX-D electronic model circuit board.

Fig.6: The wiring diagram of 1-phase and 3-phase integral proportional modulating model electric actuator.

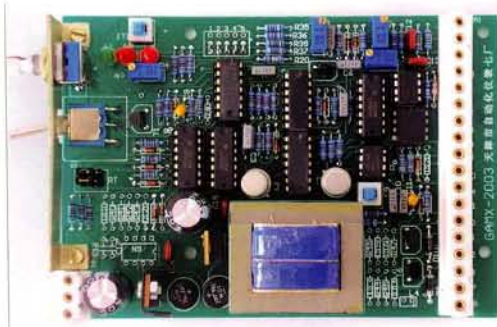
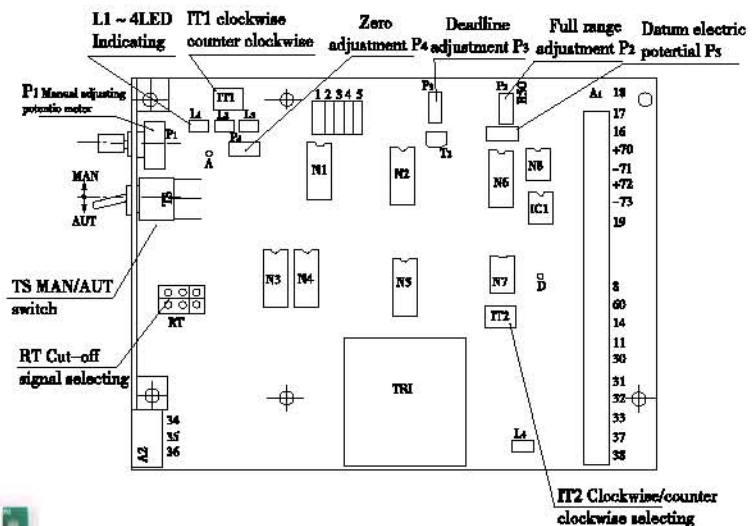


Fig.5 GAMX-D circuit board of the electronic mode positioner

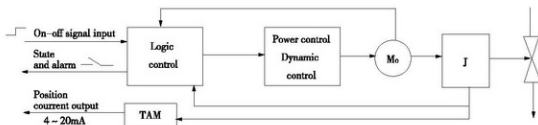


Special explanations:

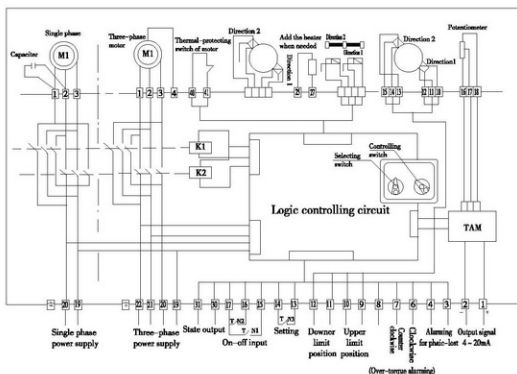
③ The optional accessories are the addable optional accessory functions. If needed, please note it when ordering.

(2). Remote model electric actuator

The input signal of the remote model electric actuator is the intermittent on-off signals, but not the continuous current or voltage signals. The remote model electric actuator accepts the passive on-off contact signals (The capacity of the contact $\geq 1A/250VAC$). The principle block diagram as follows:



Mo: Motor J:Reducer TAM: Position current transmitter



◆ Output signal: 4~20mA DC impedance $\leq 500\Omega$.

◆ The remote model actuator also can be used as on-off model.

(1) The remote model: The terminals 13 and 14 are empty wired. N1 clockwise direction and N2 counter clockwise are the continuous on-off signals input for controlling the motor. When the signal is holding, the actuator turning. When the signal disappears (The contact is shut down.), the actuator is stopped. So the remote model electric actuator could accept the continuous or intermittent on-off signals from DCS to perform the open loop modulating.

(2) The on-off model: The terminals 13 and 14 are short wired (short circuit). The circuit has the selfholding function. N1 and N2 are input an instantaneous pulse signal (a passive pulse contact signal need not to be held.). The actuator turns from one limit to the other. If we add a normal closed switch between 13 and 14, the switch is used for emergency stopping.

◆ The logic controlling circuit of the above single phase and three-phase remote model electric actuators are same. But when you select the products, please must note whether the single phase or three-phase. The phases order is not important for the three-phase remote model actuator with the phase automatic inspecting function. However the three-phase wired, the actuator will turn towards the clockwise direction all along. While the phase is lost (or phase cut), the actuator can't start-up or stopped at once, and output an alarming signal from terminals 3 and 4.

◆ The remote model electric actuator has the local operating function to realize the local/remote overchanging by the switch on the case. Terminals 30 and 31 are the local and remote output terminals. When it is in site, it can realize open-stop-close operating.

◆ The outside wired controlling input, N1, N2 and N3, the rated contact capacity $\geq 1A/220V$ AC.

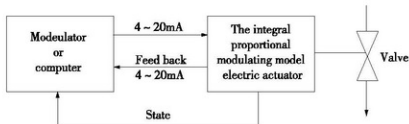
◆ Terminals 1 and 2 are used for outputting the position current signals, 19~22 are wired for the power supply.

◆ The remote model electric actuator has the electric braking function.

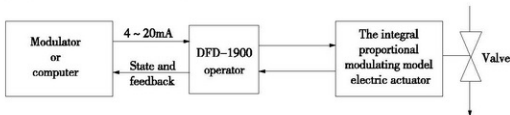
(3). The typical applications of the electric actuator

1. The integral proportional modulating model

a. The principle block diagram without the operator



b. The principle diagram with DFD-1900T operator



The circuit principle diagram of DFD—1900T operator sees Fig.8.

The operator is the plate mode structure. The dimensions are $80 \times 80 \times 250$, the detailed information sees the product instruction. Hole 76×76 mm, the configuration sees Fig.9.

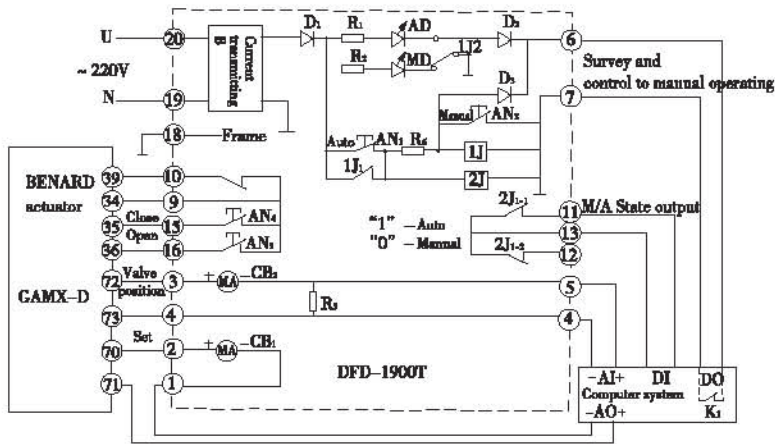


Fig.8 The electric principle diagram of DFD-1900T electric operator



Fig.9 The configuration diagram of DFD-1900T electric operator

2. DCS+remote model electric actuator

Directly use DCS contact output and the remote model actuator to compose the proportional modulating model. The principle block is as below. The concrete wiring diagram sees Fig.10

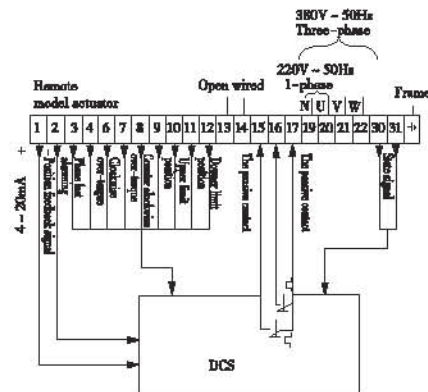
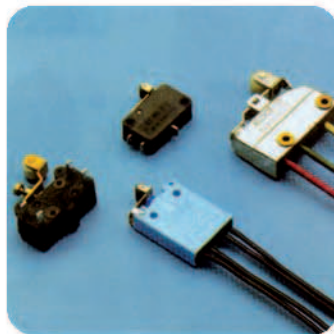
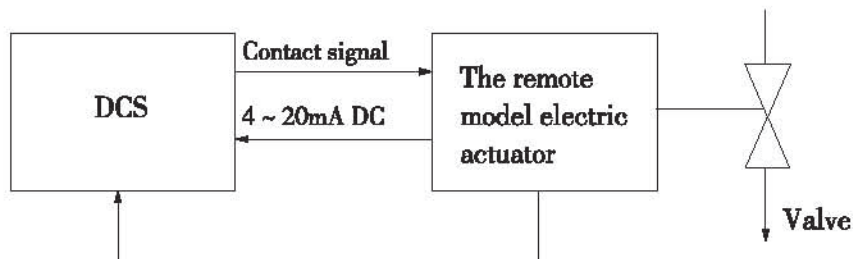


Fig.10 DCS+Remote model compose the proportional modulating model control

3. Separated mode proportional model

The remote model electric actuator and the DFD-2000 (3000) intelligent model operator are combined to the separated mode modulating model electric actuator. DFD-2000 intelligent operator directly output to control the motor by the silicon controlled rectifier. DFD-3000 intelligent operator is the passive contact output. It integrates the operating and comparing and amplifying functions, adopts the big scale integral circuit, no adjustable parts. Parameters setting, functions mode selecting and the analogue input and output signals precisely demarcating are all realized by using of the digital displaying and the buttons on the instrument plate.

The intelligent operator can be assembled between DCS (modulator) and the actuator, not have to equip the amplifier for realizing auto/manual over-changing, clockwise and counter clockwise turning. The instrument adopts plate mode mounting, the dimensions: 80×160×95mm; the hole dimensions: 76×152mm. The instruments are divided into upright mode and horizontal mode. The external wiring sees Fig.12. The detailed information sees the product's instruction.



Fig.11

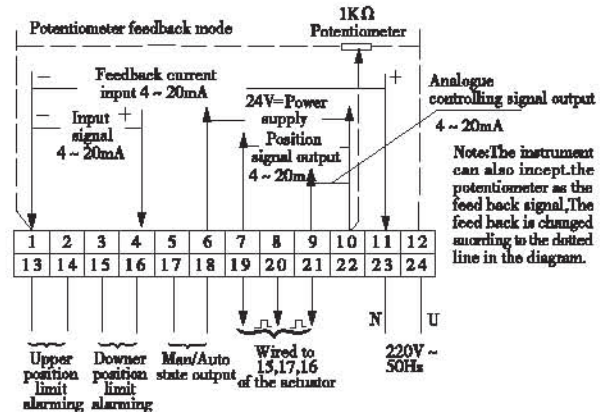


Fig.12 The external wiring terminals diagram of DFD-3000 electric operator

4. Remote model and on-off model

If you choose our remote model electric actuator, wire according to Fig.7, terminals 15, 16, and 17 are wired to the on-off signals input.

- The remote model: The terminals 13 and 14 are empty wired. N1 and N2 are the continuous on-off signals input.
- The on-off model: The terminals 13 and 14 are short wired. N1 and N2 are the instantaneous on-off signals (a passive pulse contact signal) input.

6. Installation, adjustment and maintenance of the electric actuator

(1). Installation

The electric actuator can be mounted for any directions. The configuration and mounting dimensions see the diagrams in the late of this introduction. It is specially paid attention that whether the external nuts of the actuator are twist tightened to avoid the water entering into the case when the electric actuator begins to be mounted, adjusted and maintenance. Usually, the inner reducer should be cleaned every two or three years and change the grease to guarantee it in the normal use.

Pay attention to the valve medium temperature conduction of the flange-mounted actuator to avoid the conducting heat exceeding the allowance temperature to make the actuator over-heat.

The base mounted electric actuator should be pay attention to the joint arm of the valve and the output arm of the actuator that need to keep balance or move in one plane. Connecting by two ball hinges, the thrust point of the two ball hinges must in one plane. This plane should be parallel with the plane of the two arms to avoid generating attached torque. For rustresistance and convenience maintaining, removing and assembling, when the actuator and the valve are mounted, print a little lubricate grease on the mounted surface and the joint place.

(2). Wiring

For the internal circuit and the external circuit of each type and specification of the electric actuator are not same, so the users should check the product's type and the related wiring diagram correct or not before wiring. After conforming it is exactly correct, the adjustment and the operation could be done.

(3). Local operating

The actuator with local operating switch has the site local operating function (See Fig.13), which can select the remote control, local control and emergency functions. When the left red knob (Selecting switch) is turned to the auto/remote position, the actuator only accepts the outside input analogue signal and on-off signal (At this time, whatever the right knob is turned to any position, the actuator doesn't act). When the red knob is switched to the local position, the actuator only accepts the local controlling. When the right blue knob is turned to $\overline{\text{I}}$, the actuator will turn to the closed direction. When the knob is turned to $\overline{\text{II}}$, the actuator will turn to the opened direction. When the left knob is turned to the stop position, the actuator will stop at once. When the left knob is turned to the OFF (close) position, the actuator will stop at both auto and manual states. The left knob (selecting switch) has the lock pin mechanism and can add a locker to avoid the non-authority operating.

(4). Adjustment of the actuator

The adjustment of the actuator has been done before it is put into use. The users need not to readjust when it is in use. Please check it by putting in the power supply before it is connected with the valve. Notice that the wiring must be correct, especially the input signal wire and the position output signal wire need to be separated with other transmitting cables.

Put in the power supply after the wiring has been checked. The turning directions and the zero position of the actuator with local operating function can be checked according to the above (3) mentioned local operating methods. Then the actuator should be mounted. During mounting, pay attention that whether the zero point position is correctly coinciding with the zero point position of the valve and air gate. If the scope of the full travel is up to the requirements the actuator can be put in commissioning.

The actuator can be readjusted if it is required. The detailed adjusting stages are as follows:

(1) Adjustment of the integral electric mode proportional modulating model actuator

If the actuator is the three-phase integral electric mode modulating model electric actuator, the way of adjustment is the same as the single ones, but only need to notice the phase order of the power supply. Before putting in the power supply, turn the hand wheel of the actuator to the middle position and the left knob of the local operator to the local position. After the power supply is turned on, when the right knob is operated for the opened direction, the actuator will turn to the open direction. At the same time, press the opened position limit switch beside the cams by a screwdriver, if the actuator stops, it means that the phases of the power supply are correct. The adjustment working can be continued. It also can be confirmed by the auto/manual switch of the circuit board and the manual potentiometer P1. If the actuator can't stop, please exchange two cables of the power supply. The phase order of the three-phase actuator with the automatic phase checking function doesn't need to be mentioned. As to the single phase integral electric mode modulating model electric actuator has not the phase order problem.

The way of adjustment of the three-phase and single-phase integral electric mode modulating model electric actuator is as follows:

Conform the turning directions:

If the actuator is equipped with the local operator, turn the left knob to the auto/remote position (See Fig.13.). If the actuator is equipped without the local operator, the way is as follows:

Pull out the positioner from the control box, the electric mode positioner GAMX-D circuit sees Fig.14, turn the switch TS to the manual position (MAN), turn the hand wheel of the actuator to make the output shaft of the actuator turn to the middle position, and turn the potentiometer P1 to 50% position. After the power supply is turned on, the actuator should turn to the reset position of P1. At this time, press the position limit switch of this direction by a screwdriver, the actuator should stop, which means that the direction is correct. When the switch is released, the actuator turns till to the middle position and then stop. Then the actuator is controlled in the scope of 0~100% by turning the potentiometer P1. The MAN/AUTO over-change switch and the manual potentiometer P1 on the circuit board can control the actuator directly. To accept 4~20mA analogue signals, switch TS is turned to AUT position.

Adjustment of deadline

Adjusting P3 (P3 is a multi-circle potentiometer.) to change the deadline. If the deadline is too small, the actuator will vibrate and the motor will be in over-heat. If the deadline is extremely small, the actuator will turn to only one direction. If the deadline is too large, the basic error will increase, even the actuator has no output of two directions.

Adjustment of the travel controlling (terminal position):

Shut down the power supply and open the travel control box, the cam mechanism can be seen. See Fig.2.

For example, the B base products, the cam plate is under the supporter 8 of the potentiometer, the cam plate composed of 4 cams with different colors and codes. The 4 and 3 (blue and black) cams control the beginning and the ending positions. To adjust the closed position of the valve, align the adjusting screw slot of No.4 cam by the screwdriver, push it down and turn the cam for the closed direction, till the protruding part has just pressed the closed position travel limit switch. Use the same way to adjust No.3 cam, make it just presses the opened position travel switch. After finishing the adjustment, twist the three screws 9 tighten of the potentiometer supporter. (Note: No.3 and 4 cams of A base actuator are just contrary of the B base. That namely No.3 is corresponding to the ending, No.4 is corresponding to the beginning. In addition to notice that the cams 1 and 2 should be adjusted synchronously with 3 and 4, the cams 1 and 2 control the corresponding position micro-switches, used as the contact output signals of the ending and beginning positions.)

Adjustment of zero (0%)

Set the AUT/MAN switch to MAN position. See Fig.14. Turn on the power supply. Turn the potentiometer P1 to the ending of 0% position to make the actuator turn to the closed direction. If it stops before it reaches the travel limit switch, loose the three screws code No.9, turn the potentiometer (See Fig.2) slightly, the actuator turns followed till it stops at the closed direction limit switch, the red LED L2 has just gone out. Retighten the three screws of code No.9.

If the actuator turns to the closed direction till the closed travel limit switch is in action, the actuator stops but the red LED still light. In this case, loose the three screws code No.9, and then turn the potentiometer to another direction till the LED has just gone out, retighten the three screws.



Fig.13A Postioner

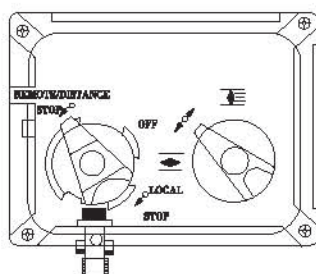


Fig.13B Local operator

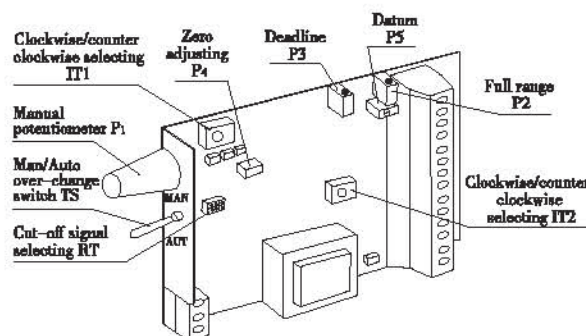


Fig.14 GAMX-D Circuit board

Adjustment of full range (100%):

Turn the potentiometer P1 to the ending of 100% position to make the actuator turn to the opened direction. If it stops before it reaches the travel limit switch (The green LED has just gone out.), clockwise turning the full range adjusting potentiometer P2, the actuator turns followed till it stops at the closed direction limit switch.

If the actuator turns to the opened direction till the opened travel limit switch, the actuator stops but the green LED still light. In this case, counter clockwise turn the potentiometer P2 till the LED has just gone out.

After finishing the above adjustment, set the AUT/MAN switch to AUT position. When the input signal is 4mA, the actuator turns to 0% position. When the input signal is 20mA, the actuator turns to 100% position. When the signals are changed in the scope of 4~20mA, the actuator should turn proportionally. Only at the automatic state, the full opened and full closed positions can be conformed.

Adjustment of the turning directions:

Clockwise direction: 4mA is valve full closed, 20mA is valve full opened, the button switches IT1 and IT2 keep the original position. (The switches are at the opened state.)

Counter clockwise direction: 4mA is valve full opened, 20mA is valve full closed, push down the switches IT1 and IT2 at the same time (The switches are at the closed state.)

If there has no special requirement in the order, when the signal increases, the actuator will turn to the clockwise

direction. If the counter clockwise is required, push down the switches IT1 and IT2 at the same time, the signal increases, the actuator will turn to the counterclockwise direction. In this case, the zero position of the output shaft of the actuator is not absolutely coincide with the required zero position, release the three screws (See Fig.2 screws code No.9.) and turn the potentiometer slightly, the actuator will turn till to the required zero position. If the full range has a little different, micro-adjust the potentiometer P2 on the GAMX-D circuit board.

Cut-off signal state setting:

- (1) RT position is  . When the signal is cut-off, the actuator will keep the original position.
- (2) RT position is  . When the signal is cut-off, the actuator will be full closed.
- (3) RT position is  . When the signal is cut-off, the actuator will be full opened.

Check the function of over-torque protection

When the actuator turns to the opened or closed directions, manually push the torque limit switches to the corresponding direction, the red LED L3 will light, the over-torque protecting circuit should be in action, the actuator stops turning. Only the actuator turns to the reverse direction or the power supply is shut down, the lock of the protecting circuit can be automatically removed.

Cautions

(1) GAMX-D electric mode positioner can be controlled not only by the analogue signals, but also by the on-off signals. The positioner itself can output a positional indicating signal. The transmitting cables of these signals must be shielded from other transmitting cables (The min. is 1 inch.). Otherwise, it can be disturbed to affect the working. The shield pole of the shielded cable should be wired to the ground.

(2) The output signals and the input signals of GAMX-D positioner are designed to be isolated. If the co-ground of the input and the output signals is required, the users could wire the negative poles together to form the co-ground.

(3) The special explanation: Datum potentiometer P5 and the zero adjusting potentiometer P4 have been adjusted before the actuator ex-works. Please do not adjust them except for the contingent situation.

(2) Adjustment of the remote model actuator

The actuator has been adjusted before it ex-works. Please conform the controlling models, scope of travel and the phase order before operating it. The remote model actuator is wired according to Fig.7. If it is the three-phase product (except for the products with the automatic identifying function), please conform the phase order firstly by utilizing the way of the local manual operator in the item of the proportional modulating model actuator. If the power supply of the single phase remote model actuator is wired correctly, the actuator could be in normal working.

Adjustment of the travel control (Terminal position)

The actuator turns to the required beginning position and the ending position by using the local operator. If the scope of the travel is too large or too small, please accurately adjust the two travel limit switches (Realize by adjusting the positions of cams 3 and 4), and then observe the position output current signal. For example: The beginning position current output should be 4mA. 90 degrees position current output should be 20mA. If they are not corresponding, adjust 0% and 100% the two multi-circle potentiometers of TAM the current transmitter. And repeat it twice for accurate positioning. At the same time, please notice to adjust cams 1 and 2 to make the position micro-switches controlled by the cams 1 and 2 acting synchronously with 3 and 4 as the position contact output signals.

Check the wiring of the remote model actuator according to Fig.15. Terminals 13 and 14 open wired is the remote model. If it is the on-off model, please check it according to the remote model actuator, then short wire 13 and 14. The circuit has the self-holding function that means it is changed to the on-off model.

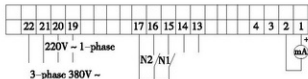


Fig.15 N1 and N2 are the passive switches or the passive contact signals

Check the function of over-torque protection

When the actuator turns to the opened or closed directions, manually push the corresponding torque limit switches, the over-torque protecting circuit should be in action, the actuator stops turning. Only the actuator turns to the reverse direction or the power supply is shut down, the lock of the protecting circuit can be automatically removed. If it is not in action, please check the wiring.

Change the turning directions of the actuator

The turning directions of the remote model actuator has been adjusted that N1 is wired, for turning to the clockwise direction, N2 is wired for turning to the counter clockwise direction.

The contrary action of the actuator is adjusted very conveniently, N2 is wired for the clockwise turning, N1 is wired for the counter clockwise turning, at the same time, ex-change 1 and 3 of the potentiometer of the current transmitter TAM-2, and readjust 0% and 100% positions. The marks of the travel limit switches and the open  and close  marks of the hand wheel are in inverse. The open and close marks of the operator are in inverse with the operating directions.

(3) Adjustment of the separated mode proportional modulating model actuator

The separated mode proportional modulating model actuator is wired according to DFD-2000 (3000) intelligent electric operator (Fig.12) and the remote model actuator (Fig.7). The way of adjustment refers to the mentioned remote model electric actuator.

Cautions of adjusting, mounting and operating

◆ The actuator with the output arm, the output arm is connected with the output shaft by the gear shape spline, the beginning point position of the output arm can be self fitted conveniently.

◆ Before the actuator is mounted, please ensure its appearance damaged or not and check whether the type, full travel time, output torque, rated voltage and ground wiring indicated on the trademark carefully accordance with the requirements.

◆ Wiring after checking. Before commissioning, firstly, check whether the turning direction of the motor is compared with the opened or closed direction of the valve. After adjustment of the whole actuator, pay attention to fit the case and twist the screws tighten to keep the sealing performance, especially for the cable outlet. Otherwise, the dust and water can enter the case that lead to the circuit faults. The actuator can't work normally.

◆ Every overhaul, the users should remove all the grease and re-pour the new one or change it every 2 or 3 years.

◆ Every overhaul, the users should exchange the old and damaged sealing rings. The sealing face should avoid being damaged when it is mounted or disassembled. If it is damaged, it should be repaired or changed. When it is assembled, print a layer of rustproof grease on the contacting face for contributing to seal, rustproof and maintain.

◆ As to the places with heavy vibrating and high frequency, check the fasteners and the wiring terminals regularly and twist them in time.

◆ If the actuator has not been used, it should be stored in the clean and dry places. If it is stored for a long time, especially pay attention to the dump-proof to avoid rusting and damaging of the components.

◆ BENARD electric actuator has the self-locked function on the structure of the mechanical transmission. So the motor has not mechanical bracking. Further more, the motor has the excellent sealing feature. So when the motor needs to be removed for maintaining, pay attention to print the sealing glue on the connecting interface to ensure the sealing, rainproof and dust-proof performances,

◆ The input and the output signal wires must adopt the shield two-wire twist cable to protect the actuator circuit and the upper devices from the site electric magnetism disturbing affect.

We can provide the various specification actuators according to the requirements of the users such as the functions, the unconventional working voltage, the mode of mechanical mounting, the interface and the flange etc. please note the detailed requirements in your order.

The types of the optional ball hinge see Fig.33A The dimensions of the output arm part of the base mode actuator see Fig.33B.

Tab.1

Type	Torque	Voltage	Speed	Mounting mode	Control mode	Special function	Description of codes
OA	□□	K F	□□	H Z	G Y N C S	P Ex -T	Working torque is expressed by the numbers, the unit 10Nm
AS							Single phase 220V.AC 50Hz
BS							Three phase 380V.AC 50Hz
A+RS							The rated travel time(90°) is expressed by the numbers, the unit (s)
B+RS	Output torque	Power supply	Travel time	Mounting mode	Control mode	Ex -T	Base mode mounting
							Flange directly mounting
SAQ							The standard integral proportional modulating model 4~20mA input, on-off signals
SMAQ							The remote model, on-off signal input
SMBQ	SMA+RS	SMB+RS					The intelligent model 4~20mA input
							The bus model
							The updated mode proportional modulating model(The remote model: DFD intelligent servo operator)
							With local operating
	SMB+RS						Explode-proof
							Special requirements: over-high, over-low temperature, working voltage, dimensions and travel, etc, Note 1

Note 1: The concrete requirements of the special required electric actuator need to be written down in the order.

For example: ①A+RS100K30HCP

The type A+RS, the working torque 1000Nm, single phase power supply, the full travel time 30s, base mode mounting, the integral proportional modulating model, with local operating. (The local operating function also can not be integrated.).

②SAQ200F30HGP

The type SAQ, the handwheel electric priority, the working torque 200Nm, three-phase power supply, the full travel time 40s, direct mounting, the remote model, with local operating.

③SMAQ25K30HGP

The type SMA, the working duty 100%, the working torque 250Nm, single phase power supply, the full travel time 30s, base mode mounting, the integral proportional modulating model, with local operating.

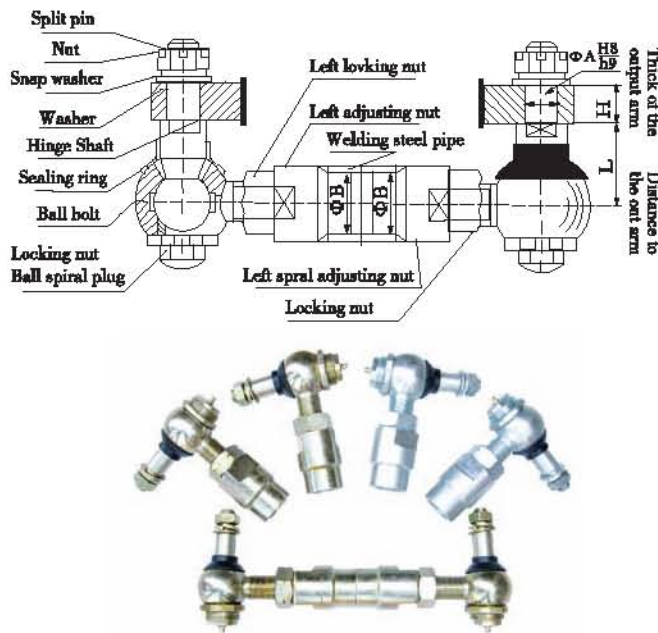
2 The type and the configuration dimensions diagram of the quarter turn electric actuator.

2.1 Table 2 is the type and parameters table of SD series quarter turn electric actuator.

Tab.2

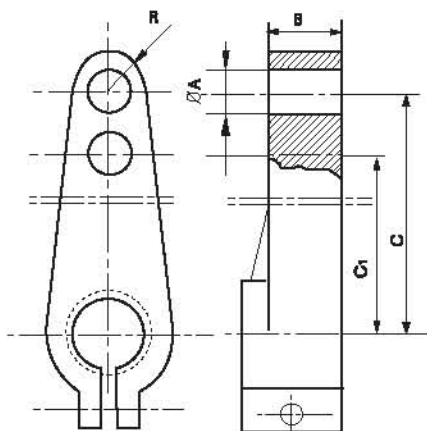
Type	Output torque Nm		Full travel time S	Flange connecting Configuration diagram	Net weight	Base connecting Configuration diagram	Ball hinge	Motor		(Load ratio 50%)	
	Working	Max.						Power Kw	Rotating speed rpm	Rated current	Start-up current
OA10K Remarks	100	190	25/60	Fig. 16	11	Fig. 21	SQJ-10	0.025	1500	1.00	2.00
OA10F ※								0.25	750	0.35	1.2
AS25K	250	500	30/60	Fig. 17	22	Fig. 20	SQJ-25	0.065	1500	1.20	2.6
AS25F								0.065	750	0.9	1.8
B S60K	600	1000	30/60	Fig. 17	32	Fig. 20	SQJ-60	0.10	1500	2.2	4.5
B S60F								0.10	750	0.5	2.0
A+RS100K	1000	1400	30/60	Fig. 18	48	Fig. 19	SQJ-100	0.26	1500	2.6	5.6
A+RS100F								0.16	750	2.0	6.0
B+RS160K	1600	2000	40	Fig. 18	76	Fig. 19	SQJ-160	0.25	1400	2.6	5.6
B+RS160F								0.25	1400	1.8	5.9
B+RS250K	2500	3000	40, 55	Fig. 18	78	Fig. 19	SQJ-250	0.40	1400	3.4	7.5
B+RS250F								0.40	1400	1.8	5.9
B+RS400K	4000	4000	65, 105	Fig. 18	78	Fig. 19	SQJ-400	0.40	1400	0.34	7.5
B+RS400F								0.65	1400	2.5	9.6
B+RS600K	4000	6000	105	Refer to Fig. 28②	84	Fig. 22	SQJ-600	0.40	1400	3.4	7.5
B+RS600F								0.65	1400	2.5	9.6
B+RS650F	6000	9000	105	Refer to Fig. 28②	137	Fig. 22		0.65	1400	2.5	9.6
B+RS800F	8000	10800	125					0.65	1400	2.5	9.6
B+RS900F	9000	12000	125	Fig. 28②	137	Fig. 22	SQJ-800	1.00	1400	2.8	11
B+RS1000F	10000	11000	105					1.00	1400	2.8	11

Remarks※: OA Type actuator has not the torque protection.



Type	Torque	ΦB	Adjustment scope of length	ΦA	Thick H	Distance L	Remarks
SQJ-10	100	34	0~50	10	15	36	Note:① The space angles of the output arms are all 25°
SQJ-25	250	34	0~60	18	22	41	
SQJ-60	600	38.5	0~60	20	25	41	
SQJ-100	1000	38.5	0~60	20	28	44	
SQJ-160	1600	50.5	0~60	20	30	51	Note:② The diameters of the output arm with taper are all 1:10
SQJ-250/400	4000	50/65	0~60/100	30	34	61	
SQJ-600	6000	72.5	0~180	36	34	61	
SQJ-800	8000	72.5	0~200	40	40	70	
SQJ-1000	12000	72.5	0~200	40	40	71	

Fig.33A Dimensions diagram of the ball hinge



No.	Type	Arm length C/C1	Hole Φ A (mm)	Thick B (mm)	R
1	OA	100	Φ10 H10	17	R20
2	AS	100	Φ18 H10	22	R20
3	A+RS100	250/200	Φ20 H10	28	R20
4	RS-60	160	Φ20 H10	25	R22
5	B+RS160	250/200	Φ20 H10	30	R25
6	B+RS400 B+RS230	250/200	Φ30 H11	34	R30
7	B+RS600	350	Φ36 H11	34	R30
8	B+RS650-800	400	Φ40 H11	40	R35
9	B+RS1000	400	Φ40 H11	50	R40

Fig.33B The connecting dimension diagram of the quarter-turn actuator the output arm part of

7. Types and configuration dimensions of the electric actuator

The working duty (the load ratio of the motor) of the brand 天伯牌 SD series and SR series electric actuators is 50%. The allowance start-up times are 1200times/hour. Therein:

SD series products include multiturn model: Model A and model B; quarter-turn: AS, BS, A+RS, B+RS and OA; the linear turn: OAZ, A+Z, B+Z etc. electric actuators.

SM series electric actuator working duty is 100%. The allowance start-up times are 1800times/hour. The products include: multi-turn: SMA and SMB; quarter-turn: SMQA, SMQB, SMA+RS, SMB+RS; linear-turn: SMAL and SMBL electric actuators. SM series is designed for the especially frequent industrial conditions or systems. For example: the water supply for the power plant etc.

The detailed specifications, types and mounting dimensions are as the followed diagrams and tables.

(1). Quarter-turn electric actuator

1.The quarterturn electric actuator specifications and types instruction see Tab. 1.

Tab.1

Type	Torque	Voltage	Speed	Mounting mode	Control mode	Special function	Description of codes
OA	□□	K F	□□	H Z	G Y N C S	P Ex -T	Working torque is expressed by the numbers, the unit 10Nm
AS							Single phase 220V.AC 50Hz
BS							Three phase 380V.AC 50Hz
A+RS							The rated travel time(90°) is expressed by the numbers, the unit (s)
B+RS	Output torque	Power supply	Travel time	Mounting mode	Control mode	Ex	Base mode mounting
							Flange directly mounting
SAQ							The standard integral proportional modulating model 4~20mA input, on-off signals
SMAQ							The remote model, on-off signal input
SMBQ	SMA+RS	SMB+RS					The intelligent model 4~20mA input
							The bus model
							The updated mode proportional modulating mode(The remote model: DFD intelligent servo operator)
							With local operating
	SMB+RS						Explode-proof
							Special requirements: over-high, over-low temperature, working voltage, dimensions and travel, etc, Note 1

Note 1: The concrete requirements of the special required electric actuator need to be written down in the order.

For example: ①A+RS100K30HCP

The type A+RS, the working torque 1000Nm, single phase power supply, the full travel time 30s, base mode mounting, the integral proportional modulating model, with local operating. (The local operating function also can not be integrated.).

②SAQ200F30HGP

The type SAQ, the handwheel electric priority, the working torque 200Nm, three-phase power supply, the full travel time 40s, direct mounting, the remote model, with local operating.

③SMAQ25K30HGP

The type SMA, the working duty 100%, the working torque 250Nm, single phase power supply, the full travel time 30s, base mode mounting, the integral proportional modulating model, with local operating.

2 The type and the configuration dimensions diagram of the quarter turn electric actuator.

2.1 Table 2 is the type and parameters table of SD series quarter turn electric actuator.

Tab.2

Type	Output torque Nm		Full travel time S	Flange connecting Configuration diagram	Net weight	Base connecting Configuration diagram	Ball hinge	Motor		(Load ratio 50%)	
	Working	Max.						Power Kw	Rotating speed rpm	Rated current	Start-up current
OA10K	100	190	25/60	Fig. 16	11	Fig. 21	SQJ-10	0.025	1500	1.00	2.00
OA10F								0.25	750	0.35	1.2
AS25K	250	500	30/60	Fig. 17	22	Fig. 20	SQJ-25	0.065	1500	1.20	2.6
AS25F								0.065	750	0.9	1.8
B S60K	600	1000	30/60	Fig. 17	32	Fig. 20	SQJ-60	0.10	1500	2.2	4.5
B S60F								0.10	750	0.5	2.0
A+RS100K	1000	1400	30/60	Fig. 18	48	Fig. 19	SQJ-100	0.26	1500	2.6	5.6
A+RS100F								0.16	750	2.0	6.0
B+RS160K	1600	2000	40/30	Fig. 18	76	Fig. 19	SQJ-160	0.25	1400	2.6	5.6
B+RS160F								0.25	1400	1.8	5.9
B+RS250K	2500	3000	40/55	Fig. 18	78	Fig. 19	SQJ-250	0.40	1400	3.4	7.5
B+RS250F								0.40	1400	1.8	5.9
B+RS400K	4000	4000	65/105	Fig. 18	78	Fig. 19	SQJ-400	0.40	1400	0.34	7.5
B+RS400F								0.65	1400	2.5	9.6
B+RS600K	4000	6000	105/65	Refer to Fig. 28②	84	Fig. 22	SQJ-600	0.40	1400	3.4	7.5
B+RS600F								0.65	1400	2.5	9.6
B+RS650F	6000	9000	105	Refer to Fig. 28②	137	Fig. 22		0.65	1400	2.5	9.6
B+RS800F	8000	10800	125					0.65	1400	2.5	9.6
B+RS900F	9000	12000	125	Refer to Fig. 28②	137	Fig. 22	SQJ-800	1.00	1400	2.8	11
B+RS1000F	10000	11000	105					1.00	1400	2.8	11

Remarks※: OA Type actuator has not the torque protection.

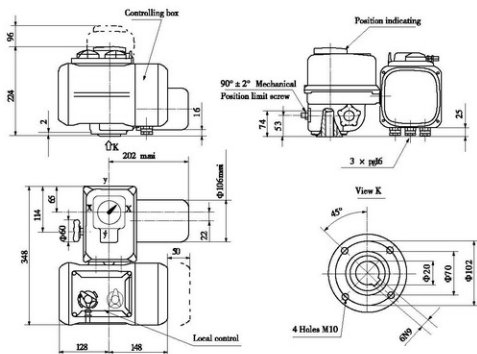
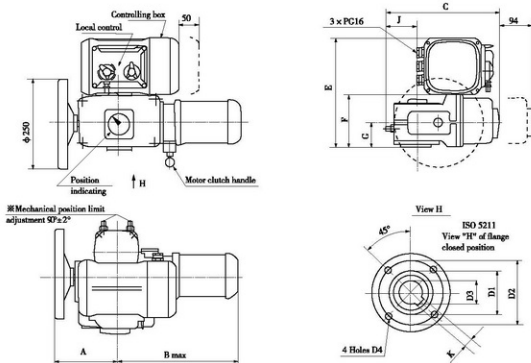


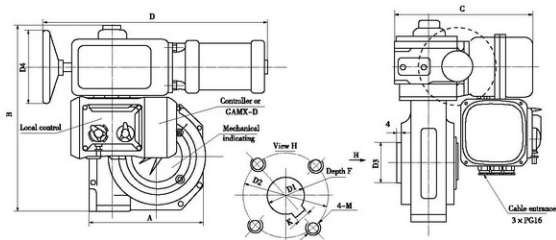
Fig.16 OA-10 Directly mounted mode electric actuator dimensions diagram



※ Note 1: A and B model multi-turn actuators have not the position limit screws, only the quarter-turn actuator have them.

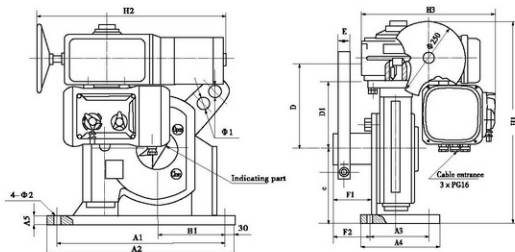
Type	A	B	C	D	E	F	G	D ₁	D ₂	D ₃	K	J	D ₄
AS/A	119	340	336	85	305	150	61	φ 70	φ 102	φ 28/φ 20	8N9	88	M10
BB/B	209	396	360	130	360	167	84	φ 100	φ 140	φ 35/φ 28	10N9	132	M16

Fig.17 A, B multi-turn actuators, and AS, BS quarter-turn directly-mounted mode actuator dimensions diagram



Type	Flange ISO	A	B	C	D	K Key slot	F	D1	D2	D3	M	D4
A+RS100	F12	265	408	275	520	14JS9	50	φ45H8	φ125	φ85	M12	φ160
B+RS160	F14	296	372	361	612	18JS9	80	φ60H8	φ140	φ100	M16	φ250
B+RS250	F16	395	491	361	612	20JS9	80	φ70H8	φ165	φ130E8	M20	φ250
B+RS400		440										

Fig.18 A+RS, B+RS Directly-mounted mode quarter-turn electric actuator configuration and dimensions diagram



Type	A ₁	A ₂	A ₃	A ₄	A ₅	B ₁	D ₁	C	D	E	F ₁	F ₂	H ₁	H ₂	H ₃	Φ1	Φ2
A + RS100	240	280	150	190	18	140	200	170	250	28	80	86	450	510	295	2 × Φ20	Φ17
B + RS160	375	435	175	235	18	225	200	170	250	30	93	91	517	580	361	2 × Φ20	Φ22
B + RS250	500	560	180	240	18	240	200	230	250	34	78	73	602	580	361	2 × Φ30	Φ22
B + RS400	500	560	180	240	18	240	200	230	250	34	92	86	602	612	361	2 × Φ30	Φ22
B + RS1000	630	700	250	320	20	365	370	400	40	105	70	804	612	361	Φ40	Φ32	

Fig.19 A+RS B+RS Base mode quarter-turn electric actuator configuration and dimensions diagram

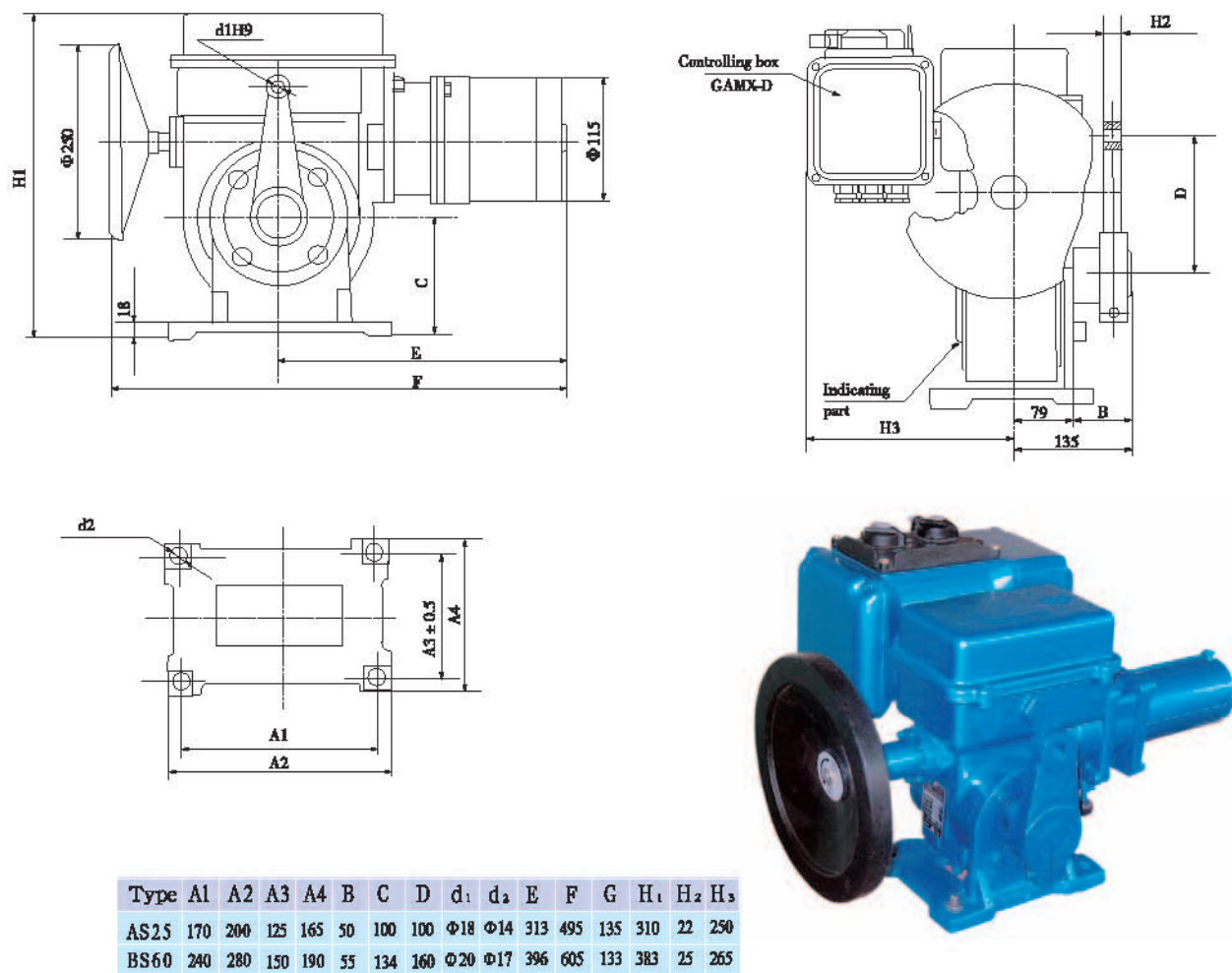


Fig.20 AS-50 BS-60 Base mode quarter-turn electric actuator configuration and dimensions diagram

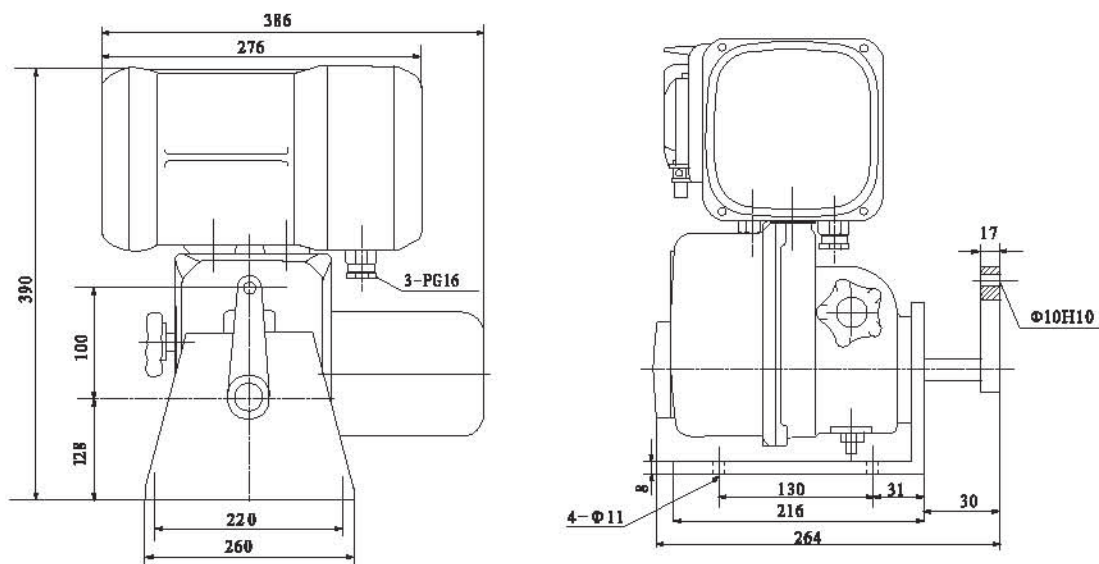
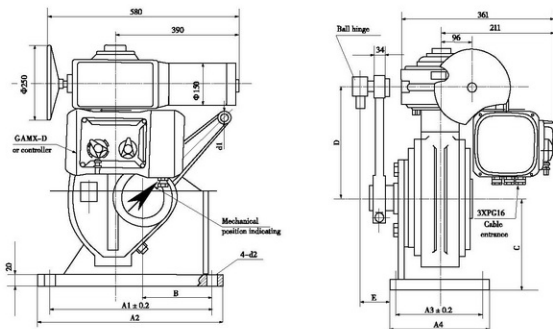


Fig.21. OA-10 Base mode quarter-turn electric actuator mounted dimensions diagram



Type	A1	A2	A3	A4	B	C	D	E	d1	d2
B+RS600	480	540	260	320	200	267	350	140	36	22
B+RS650	575	645	330	420	240	300	400	150	36	32
B+RS800	575	645	330	420	240	300	400	150	36	32
B+RS900	575	645	330	420	240	300	400	150	36	32

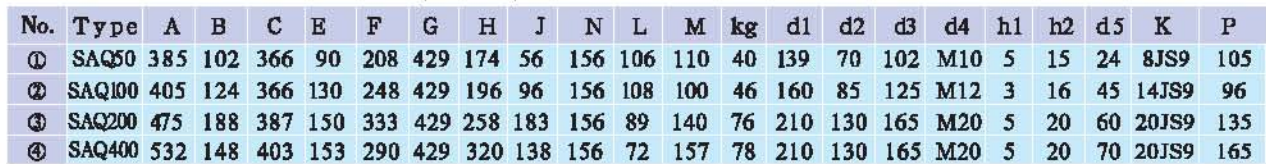
Fig.22 B+RS600, B+RS650, B+RS800, B+RS900 electric actuator mounted dimensions diagram

2.2 Tab.3 is the specifications, types and parameters of SAQ(SR series) quarter-turn electric actuator

Tab.3

Type	Output torque Nm		Full travel time S	Flange mounting		Base mounting		Motor		(Load ratio 50%)	
	Operating	Max.		Configuration diagram	Net weight	Configuration diagram	Ball hinge	Power Kw	Rotating speed rpm	Rated current A	Start-up current A
SAQ50K SAQ50F	250	500	30.60	Fig. 23	42	Fig. 24	SQJ-25	0.065	1400	1.2 0.9	2.6 1.8
SAQ100K SAQ100F	1000 1000	1200 1200	33.55	Fig. 23	49	Fig. 24	SQJ-100	0.16	1400	2.8 1.0	6.5 3.5
SAQ200K SAQ200F	2000	2000	40.60	Fig. 23	77	Fig. 24	SQJ-250	0.25	1400	2.6 2.0	5.6 6.0
SAQ400K SAQ400F	4000	4000	125 87.125	Fig. 23	78	Fig. 24	SQJ-400	0.25 0.35	1400	2.6 1.8	5.6 5.9

SR series products are composed of SA, SAQ and SAL products. The major characteristic of SR series electric actuator is the handwheel electric operating priority function.



Technical drawing of the SAQ series hand wheel over-change valve, showing front and side views with dimensions and labels.

Labels and dimensions include:

- Local control GAMX controlling box
- Hand wheel over-change
- 3-PG16 Cable entrance
- 2-d2
- Mechanical position limit $90^\circ \pm 2^\circ$
- 4-d1
- Dimensions: A, A1, B, B1, C, C1, D, E, F, F1, G, H, K, M, N, φ304, 323, 50

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Tab.4: SM series quarter-turn electric actuator specifications and types

Tab.4

Type	Output torque Nm	Full travel time S	Flange mounting		Base mounting	Motor (Load ratio 50%)			
			Configuration diagram	Net weight		Power Kw	Rotating speed rpm	Rated current	Start-up current
SMAQ12K SMAQ12F	125	30	Fig.25	21	The mounted dimensions refer to Fig.20.AS	0.02 0.015	1400		
SMAQ25K SMAQ25F	250	30	Fig.25	22		0.04 0.035	1400	0.95 0.4	2.2 1
SMA+RS50K SMA+RS50F	500	25, 45	Fig.26	41	The mounted dimensions refer to Fig.24.SAQ50	0.1 0.08	1400		
SMA+RS100K SMA+RS100F	1000	33, 48 88	Fig.26	48	The mounted dimensions refer to Fig.24.SAQ100	0.1 0.12	1400	0.55	2.5
SMA+RS125K SMA+RS125F	1250	70, 103	Fig.26	75	The mounted dimensions refer to Fig.24.SAQ200	0.1 0.12	1400	0.55	2.5
SMA+RS200F	2000	38	Fig.27	78	Refer to Fig.19.B+RS250	0.35	1400	1.35	5.2
SMA+RS250K SMA+RS250F	2500	70, 103	Fig.26	75 78	The mounted dimensions refer to Fig.24.SAQ200	0.20 0.12	1400	0.55	2.5
SMB+RS300F	3000	38	Fig.27	78	The mounted dimensions refer to Fig.19B+RS250	0.35	1400	1.35	5.2
SMB+RS400F	4000	65	Fig.27	78	Refer to Fig.22B+RS600	0.35	1400	1.35	5.2
SMB+RS600F	6000	105	Fig.28	80	Refer to Fig.22B+RS800	0.5	1400		
SMB+RS800F	8000	165	Fig.28	139					

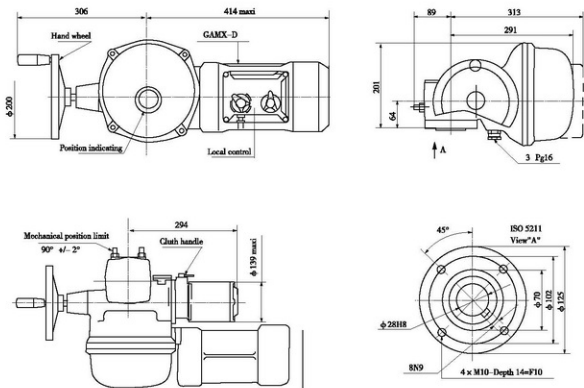


Fig.25 SMAQ12, 25 Directly mounted mode quarter-turn electric actuator dimensions diagram

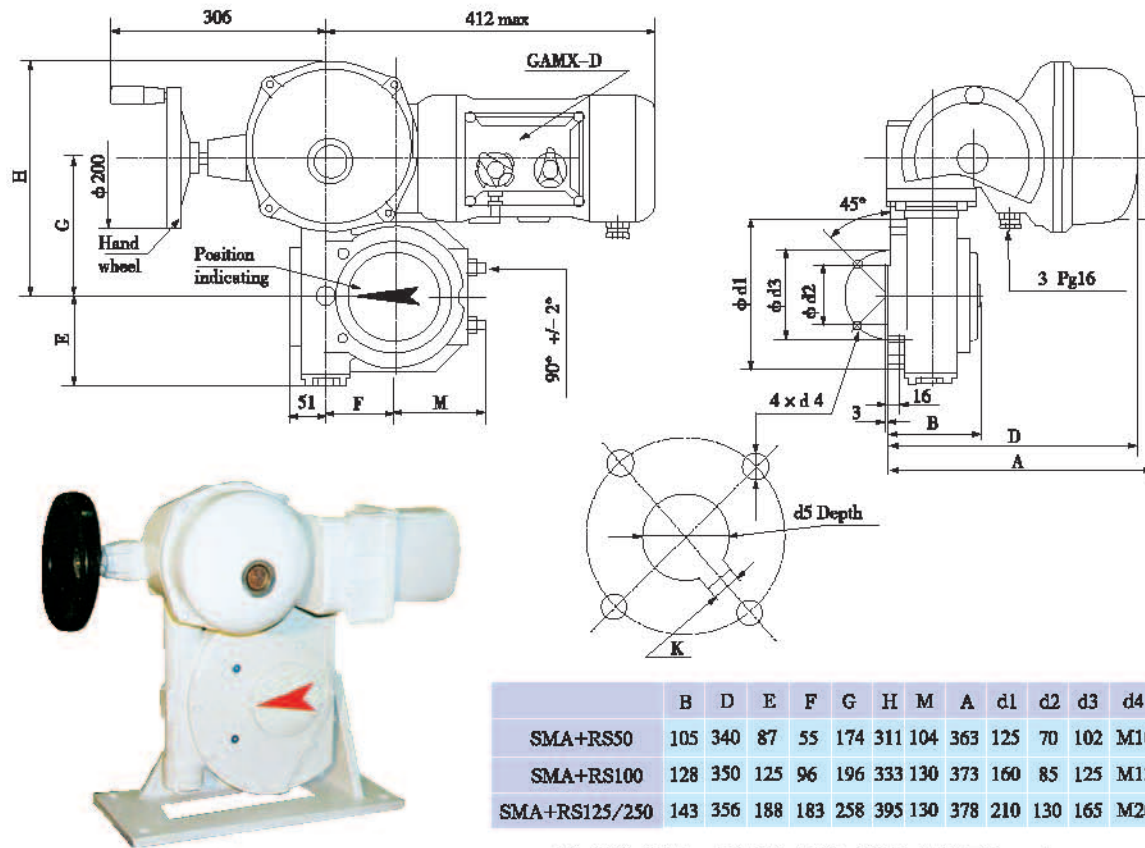


Fig.26 SMA+RS50, 100, 125, 250 Directly-mounted mode electric actuator dimensions diagram

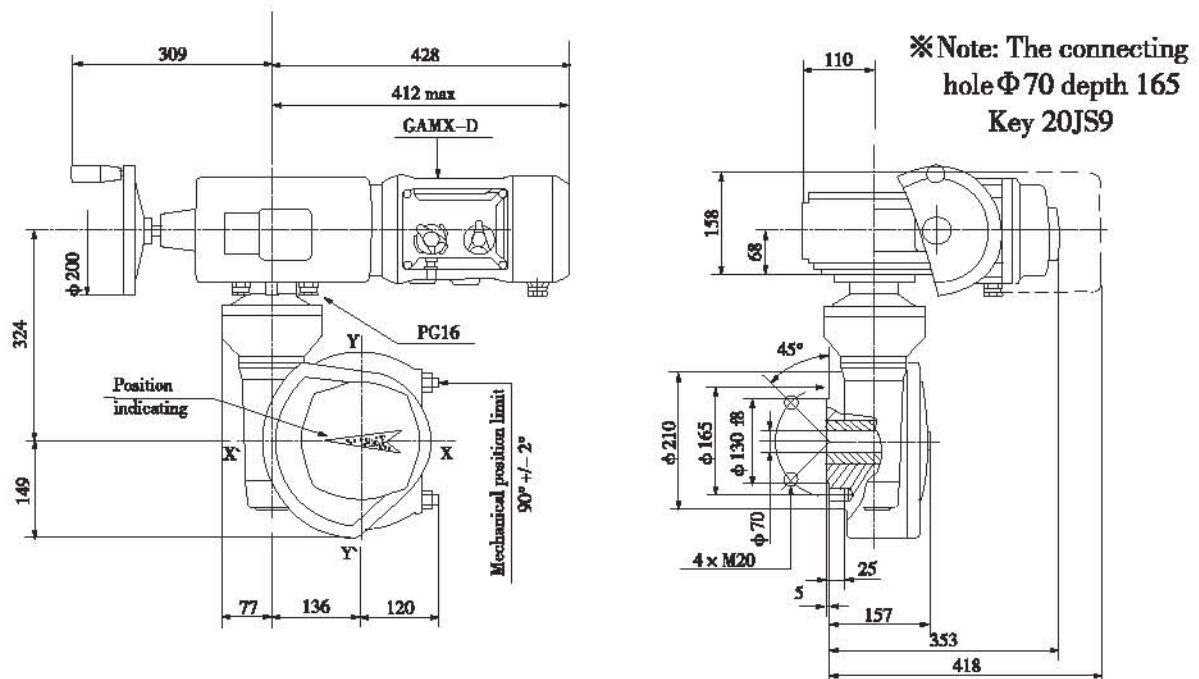
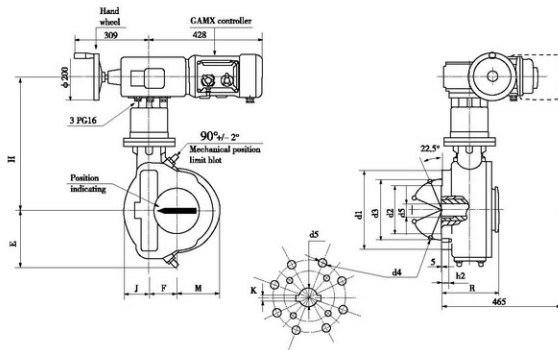


Fig.27 SMB+RS200, 300, 400 Directly-mounted mode quarter-turn electric actuator configuration and dimensions diagram



	ISO	d1	d2	d3	d4	h1	J	E	F	H	M	R	d5 × K
①SMB+RS800	F25	300	200	254	8×M16	24	105	237	115	559	175	242	Φ75×145 20
②SMB+RS600	F16	200	130	165	4×M20	20	122	212	100	345	118	192	Φ75×105 20

Fig.28 SMB+RS600, SMB+RS800 Directly mounted quarter-turn electric actuator dimensions table

(2). Linear-turn electric actuator

1. The linear-turn electric actuator types and specifications instruction.

Tab.5

Type	Thrust	Power supply	Speed	Control mode	Special function	Description of codes
OAZ	□□	K	□□	□□	G	The working thrust is expressed by the numbers, unit 100N
		F				Single-phase 220V.AC 50Hz
						3-phase 380V.AC 50Hz
A+Z						Rated speed is expressed by the numbers, unit mm/10s
B+Z						Rated travel is expressed by the numbers, unit mm
SAL					Y	The standard integral proportional modulating model, input 4~20mA.DC, on-off signal
SMAL					N	The remote model(Include on-off model)input on-off signal
SMBL	Output thrust	Power supply	Rated speed	Rated Travel	C	The intelligent model Input 4~20mA.DC
					S	The bus model
					P	The separated mode porportional modulating model(Remote model+DFD intelligent servo operator)
					Ex	With local operating
					T	Explosion-proof
						Specil requirements: Over-high, over-low temperature, working voltage, dimensions and triavel etc. Note:1

Notel:The special requirements need to be written down in the order.

For example:①B+Z250F1260G

The type B+Z, the working thrust 25000N, thre phase 380V 50Hz power supply,the speed 1.2mm/sec, the full travel 60mm,the intengral proportional modulating model.

②ASL160K1240GP

The type SAL,the working thrust 16000N,single phase220V 50Hz power supply 1.2mm/sec, the full travel 40mm,the integral proportional modulating model

③SMAL64L0616NP

The type SAK,the working duty100%, the working thrust 6400N, single plase 220V 50Hz power supply, the speed 0.6mm/sec, the full travel 16mm,the intelligent model,with local operating function.

2. Linear–turn electric actuator

2.1 OAZ series electric actuator Linear–turn specifications and types table



Tab.6

Type	Thrust	travel mm	Speed mm/s
OAZ–30K0410	3000	10	0.4
OAZ–30K0416		16	
OAZ–30K0425		25	
OAZ–20K0410	2000	10	1.2
OAZ–20K1216		16	
OAZ–20K1225		25	

Remarks:OAZ Series products have no over–torque protection.

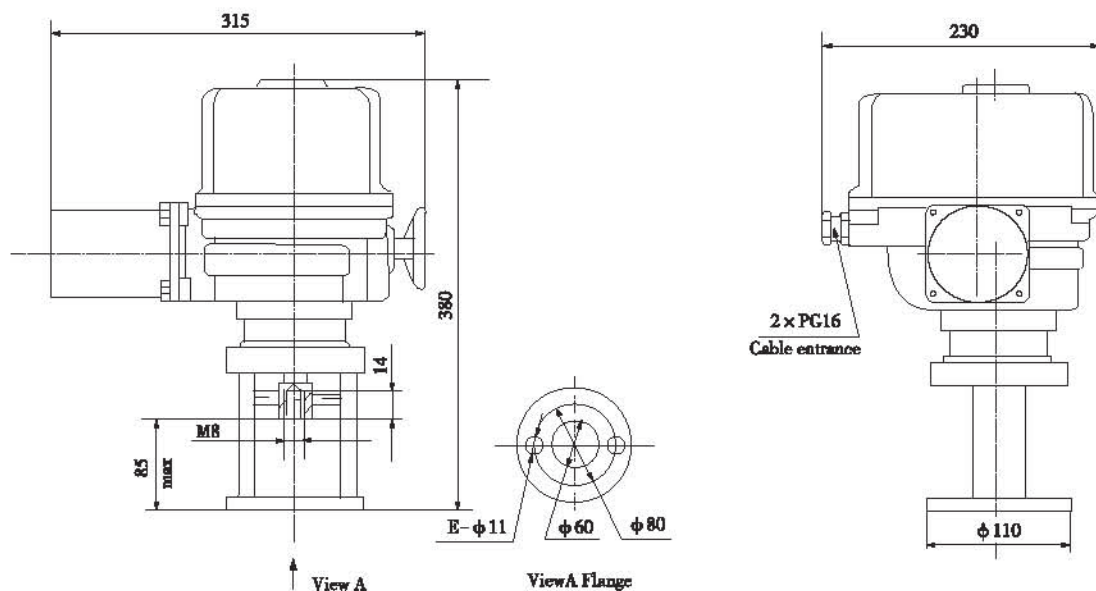


Fig.29 OAZ series small type Linear–turn electric actuator dimensions diagram

2.2 SD series Linear-turn electric actuator tyator types,specifications anal Parameters

Tab.7

Type	Rated load N	Rated travel mm	Rated speed mm/s	Connecting hole of the valve end F	Flange connecting D ₁	Inside diameter of the flange D ₂	Connecting hole D ₃	A	B	K	C	
Single-phase200V~ 3-phase380V~												
A+Z54/K0610	6400	10	0.6	M8×1.25	φ80	φ60D ₁	2holesφ11	480	407	20	280	
A+Z54/K1210			1.2									
A+Z54/K0616			0.6									
A+Z54/K1216		16	1.2	M12×1.25	φ105	φ80D ₁		480	460	25	280	
A+Z54/K0625			0.6									
A+Z54/K1225			1.2									
A+Z54/K1240		40	1.2					550	591	460	30	
A+Z54/K1840			1.8									
A+Z54/K1260			1.2									
A+Z54/K1860		60	1.8									
A+Z100/K0616			0.6	M16×1.5	φ118	φ95D ₁	4holesφ11	480	480		280	
A+Z100/K0625	10000	25	0.6									
A+Z100/K1225			1.2									
A+Z100/K1825			1.8									
A+Z100/K1240		40	1.2					550	591	480	280	
A+Z100/K1840			1.8									
A+Z100/K1260			1.2									
A+Z100/K1860		60	1.8									
A+Z160/K1225			1.2				6holesφ18	550	591	480	280	
A+Z160/K1240	16000	25	1.2									
A+Z160/K1840			1.8									
A+Z160/K1260			1.2									
A+Z160/K1860		40	1.8									
A+Z160/K1200			1.2									
A+Z160/K1800			1.8									
B+Z250/K1240	25000	40	1.2	M27×2	φ135	φ100D ₁	6holesφ18	550	600	38	380	
B+Z250/K1840			1.8									
B+Z250/K1260			1.2									
B+Z250/K1860		60	1.8					600	600			
B+Z250/K1200			1.2									
B+Z250/K1800			1.8									
B+Z250/K1200		100	1.2					600	600			
B+Z250/K1800			1.8									

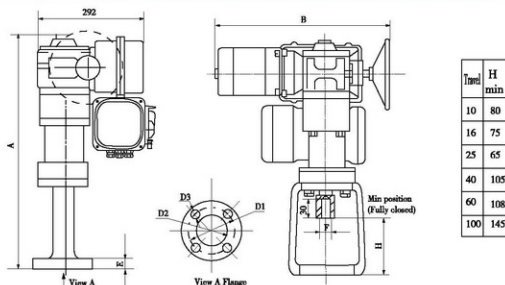


Fig.30 SD series Linear-turn electric actuator configuration diagram dimensions see Tab.7

2.3 SAZ(SR series)series linear-turn electric actuator types,specifications and parameters table

Tab.8

Type		Rated load	Rated travel	Rated speed	Connecting	Flange	Inlet diameter	Connecting	A	E
Single-phase200V50Hz	3-phase380V50Hz	N	mm	mm/Sel	hole of the valve and F	connecting D ₁	of the flange D ₂	hole D ₃		
SAL64K06	SAL64F06	6400	10, 16	0.6	M8×1.25	φ 80	φ 60D ₁₁	2-φ 11		
SAL64K10	SAL64F10			1.0						
SAL64K0625	SAL64F0625			0.6						
SAL64K1025	SAL64F1025			1.0						
SAL64K1225	SAL64F1225		25	1.2	M12×1.25	φ 105	φ 80D ₁₁		580	20
SAL64K1825	SAL64F1825			1.8						
SAL64K1040	SAL64F1040			1.0						
SAL64K1240	SAL64F1240		40	1.2						
SAL64K1840	SAL64F1840			1.8						
SAL64K1260	SAL64F1260			1.2	M16×1.5	φ 118	φ 95D ₁₁	4holes φ 11	650	25
SAL64K1860	SAL64F1860	10000	60	1.8						
SAL100K0616	SAL100F0616			0.6						
SAL100K1216	SAL100F1216		16	1.2						
SAL100K0625	SAL100F0625			0.6					580	20
SAL100K1025	SAL100F1025			1.0						
SAL100K1225	SAL100F1225		25	1.2						
SAL100K1825	SAL100F1825			1.8						
SAL100K1040	SAL100F1040			1.0					650	25
SAL100K1240	SAL100F1240		40	1.2						
SAL100K1840	SAL100F1840			1.8						
SAL100K1260	SAL100F1260	16000	60	1.2	M20×1.5	φ 135	φ 100D ₁₁	5holes φ 18	650	25
SAL100K1860	SAL100F1860			1.8						
SAL160K1225	SAL160F1225			1.2						
SAL160K1825	SAL160F1825		25	1.8						
SAL160K1240	SAL160F1240			1.2					650	25
SAL160K1840	SAL160F1840		40	1.8						
SAL160K1260	SAL160F1260			1.2						
SAL160K1860	SAL160F1860		60	1.8						
SAL160K1200	SAL160F1200			1.2					690	30
SAL160K1800	SAL160F1800		100	1.8						

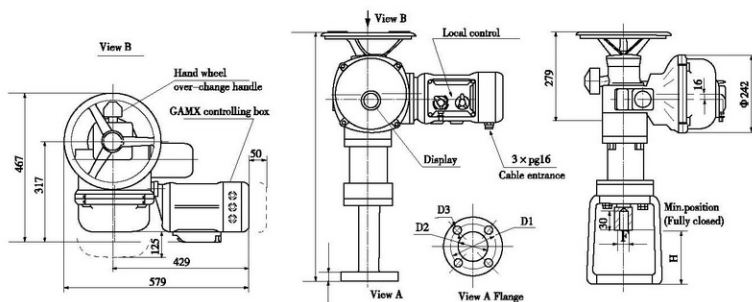


Fig.31 SAI Linear-turn electric actuator configuration diagram

Travel	10	16	25	40	60	100
H mm	80	75	65	105	108	145

(3). Multi-turn electric actuator

Multi-turn electric actuator types and specifications instruction

Tab.9

Type	Torque	Power supply	Speed	Control mode	Special function	Description of cooles
A B	□□	K				The working torque is expressed by the numbers, unit 10Nm Single phase 220V, AC, 50Hz
		F				3 phase 380V, AC, 50Hz
SA			□□			The rated travel is expressed by the numbers, unit: rpm
						The rated speed is expressed by the numbers, unit: r
					G	The standard integral proportional modulating model, input 4~20mA, on-off signal.
					Y	The remote model (including on-off model), input on-off signal.
					N	The intelligent model, input 4~20mA, DC.
SMA SMB					C	The bus model
					S	The separated mode proportional modulating model (the remote + DFD intelligent servo operator)
					P	With local operating
	Output torque	Power supply	Rated speed	Rated travel	Control mode	Ex T
						Explode-proof The special requirements cover: high/low temperature, working voltage, dimensions and travel etc. Note: The special requirements need to be written down in the order.

2 Multi-turn electric actuator types, specifications and dimensions table

2.1 Tab. 10 is the types and specifications table of SD series multi-turn actuator.

Tab.10

Type	The out put working torque Nm	Speed rpm	Turning revolutions (travel)	Configuration dimensions coigram
Single-phase 220V~ 3-phase 380V~				
A-4K A-4F	40	5, 10, 18	5~26	Refer to Fig17, typeA
A-6K A-6F	60	3, 5, 10, 18	5~26	
A-10K A-10F	100	3, 5, 10	3~14	
A-16K A-16F	160	3	3~7	
		3, 5	3~4	Refer to Fig17, typeB
B-4K B-4F	40	19	15, 23, 35, 50	
B-6K B-6F	60	13	15, 23, 35, 50	
B-6K B-6F	60	19	15, 23, 35, 50	
B-10K B-10F	100	7	9, 15, 23, 35, 50	
B-10K B-10F	100	13	15, 23, 35, 50	
B-10K B-10F	100	19	15, 23, 35, 50	
B-16K B-16F	160	4.5	5, 7.5, 12, 18	
B-16K B-16F	160	7	9, 15, 23, 35, 50	
B-16K B-16F	160	13, 19	15, 23, 35, 50	
B-25K B-25F	250	4.4	5, 8, 12, 18	
B-25K B-25F	250	7	5, 15, 20, 34, 50	

For example:

① A-10K1820YP, the working torque 100Nm, single phase power supply, the speed 18r/min, the full travel 20 revolutions, with local operating.

② B-16K1315GP, the working torque 160Nm, single phase power supply, the speed 13r/min, the full travel 25 revolutions, the proportional modulating model with local operating.

2.2 Tab.11 is the types and specifications table of the SA (SR series) multi-turn electric actuator.

SA Multi-turn electric actuator belongs to SR series.

Tab.11

Type		The output working torque Nm	Speed rpm	Travel (revolutions) r	Power of motor KW	The configuration and dimensions diagram
Single-phase 220V~	3-phase 380V~					
SA50K	SA50F	50	26, 29	8~50	0.25	Fig.32
			17, 20		0.16	
			10		0.1	

Example of the type and specification:

SA50K2630N: The working torque 50Nm(Max. 60Nm), the single phase power supply, the speed is 26 revolutions per minute, the full travel is 30 revolutions, the intelligent model electric actuator.

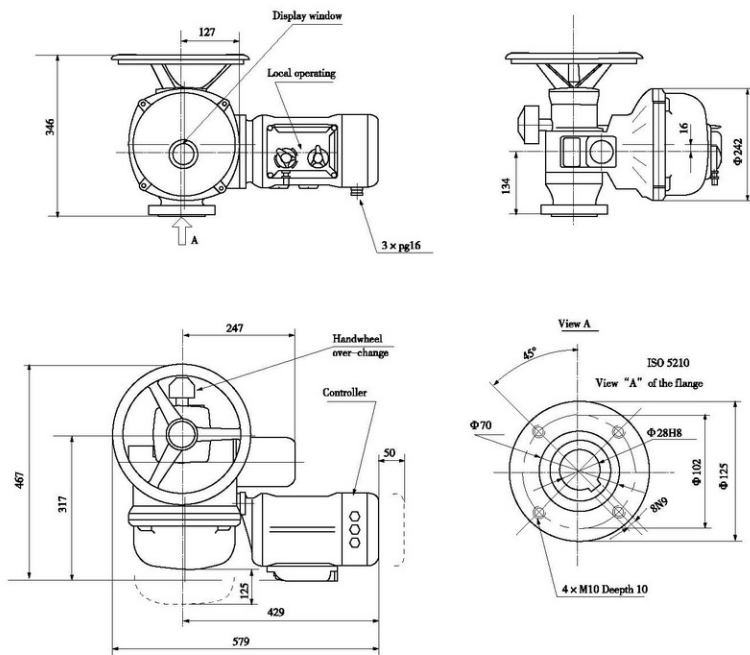


Fig.32 SA Multi-turn electric actuator configuration and dimensions diagram

2.3.SM series multi-turn actuator the main types and specifications table.

Tab.12

type		Rated load Nm	Rated speed rpm	Full travel r	Parameters of the motor			Configuration dimensions diagram
1-phase220V	3-phase380V				Phase	Power KW	Speed rpm	
SMA 3K04	SMA 3 F04	30	4.8	3~8	K/F	0.1/0.08	1400	Refer to Fig.25
SMA 3K09	SMA 3 F09	30	9	7~15	K/F	0.04/0.035	1400	
SMA 3K18	SMA 3 F18	30	18	7~30	K/F	0.1/0.08	1400	
SMA 3K27	SMA 3 F27	30	27	11~40	K/F	0.1/0.12	1400	Directly mounted mode quarter turn actuator
SMA 6K04	SMA 6 F04	60	4.8	3~8	K/F	0.1/0.12	1400	
SMA 6K09	SMA 6 F09	60	9	7~15	K/F	0.1/0.08	1400	
SMA 6K18	SMA 6 F18	60	18	7~30	K/F	0.2/0.12	1400	Refer to fig.17
SMA 10K04	SMA 10 F04	100	4.8	3~8	K/F	0.2/0.12	1400	
SMA 10K09	SMA 10 F09	100	9	7~15	K/F	0.2/0.12	1400	
SMB 4K13	SMB 4 F3	40	13	4~48	K/F	0.1/0.08	1400	B multi- turn actuator
SMB 4K23	SMB 4 F23	40	23	7~99	K/F	0.1/0.12	1400	
SMB 4K43	SMB 4 F43	40	43	7~99	K/F	0.2/0.35	1400	
SMB 6K07	SMB 6 F07	60	7	4~48	K/F	0.1/0.08	1400	
SMB 6K13	SMB 6 F13	60	13	4~48	K/F	0.2/0.12	1400	
SMB 6K23	SMB 6 F23	60	23	7~99	K/F	0.2/0.35	1400	
	SMB 6 F43	60	43	7~99	F	0.35	1400	
SMB-16/K07	SMB 16 F07	160	7	4~48	K/F	0.2/0.12	1400	
	SMB 16 F13	160	13	4~48	F	0.35	1400	
	SMB 25 F07	250	7	4~48	F	0.35	1400	

Type and specification marking example:

SMB16K0735GP. The working duty is 100%, the working torque is 160Nm, single phase power supply, the speed is 7rpm, the full travel is 35 revolutions the standard modulating model with local operating.

8. Intelligent model electric actuator

The intelligent model electric actuator absorbs our almost 40 years' manufacturing experience of the electric actuator, bases on the imported technology manufactured BENARD actuator and adopts the large scale integral circuit (CPU) specially used for the instruments to compose the intelligent positioner for forming the new type intelligent model electric actuator. The intelligent positioner is mainly composed of the comparing and amplifying control circuit, the power output module, the person and computer dialog displaying unit and the infrared incepting unit. The actuator adopts the noninvasive mode structure design. The parameters adjusting, setting, checking and operating of the electric actuator have been performed by the infrared ray remoter and the digital display screen and not have to open the case of the actuator.

The intelligent model electric actuator collects the various electric actuators' practical functions and the technical characteristics. The users can permissively set parameters and select functions according to the requirements of the system. During the process of setting, there has the perfect person and computer dialog function, the technical parameters and states are displayed in site. The strength configuration function can configure to the various controlling modes and operating modes, for example: the modulating model controlling mode, on-off model controlling mode, in the case of not adding or reducing any software and hardware. The parameters' amending, transmitting and reading are operated very simple. The intelligent model electric actuator is the most advanced high-level product in national and overseas. It meets the needs of the requirements depending on its most economical price and reliability.

The type of the intelligent model electric actuator: Add the letter 'N' at the end of the general products' type, the power supply, the torque, the speed and the mounting dimensions all refer to the general series of the electric actuators. The detailed operating instruction sees 'The intelligent model electric actuator instructions'.

The basic working principle

The intelligent model electric actuator has the high-speed and the low power consumption single-chip as the core of the in-telligent signals collecting and controlling unit precisely positioning the various valves or devices.

The analogue signals from the modulator or transmitter entrance the positioner via A/D transferred. The microcomputer

of the positioner checks this input signal and the position feedback signal periodically. When these two signals are not balance, while the deviation exceeds the deadline, it sends out an amplified controlling signal to the solid state relays or the silicon controlled rectifiers to drive the motor turning to the direction for reducing the deviation at once, consequently drive the reducer to change the open degrees of the valve. At the same time, the microcomputer also changes the position signal of the valve's open degrees to the digital pulse signals transmitted to the display window, so the open degrees can be observed from it. Meanwhile, it outputs an analogue 4~20mA current signal corresponding to the valve's open degrees. This signal is absolutely isolated with the input signal to fit with various control systems computers or DCS.

The special applied situations for the electric actuator composed of the intelligent positioner

- Realize the optimum control, improve the controlling performance, it is required to survey and control in site and treat with the fault or stop the device in time, when the faults occur.
- The requirements of control are very strict. It needs the precise controlling system, in which the valve and the processing variable need to be continuously surveied and accurately diagnosed, and then to be set and adjusted.

The main characteristics

1. Intelligent protection:

◆ The actuator has the self-diagnose function for various parameters such as over-heat, over-cold, overtorque, over-limit and over-speed etc. For example: When the velocity occurs abnormal condition during the control, the displayer alarms and stopped the motor.

◆ When the controlling signal of the actuator is lost, the turning state of the actuator can be preset. (Hold the original position, fully opened, fully closed or 0~100% any position)

◆ It also has the functions of automatically checking and alarming. For example: When the motor of the actuator is blocked, the actuator will entrance the protected state and then output a alarming contact signal with the local twinkling alarm.

2. Excellent stability: The sensor adopts the precise electric conducting plastic potentiometer, the input and the output chips adopt 12 bits A/D and D/A transmitter.

3. Automatically adjustment: As for the zero and the full range adjustment setting of the valve, the sampling potentiometer only needs to work at the valid zone, not have to precisely adjust the potentiometer. Input the demarcating codes, the actuator will record the full opened and the full closed positions of the valve automatically.

4. There is a digital displaying window in the actuator, the upper row (Green) displays the control codes or the input controlling signal, the downer row (Red) displays the position value of the valve or the fault state hinting.

5. The positions of the zero point and the full range are settable arbitrarily. The settable scope: 0~75% for the zero point, 25~100% for the full range.

6. The user's setting and adjusting data is stored by adopting E^2 PROM, everlasting held after the power supply is shut down.

7. Dynamic braking function can restrain the system vibrating to make the system working stably and reliably.

8. The driving motor of the actuator adopts the high-reliability, turning stability, soft start-up characteristic, large torque, breaking-resistance single phase and three-phase AC servomotor.

9. The three-phase actuator has the functions of phase identifying and rectifying.

10. The disturb-resistance modes are settable according to the disturbing situation in site.

11. PID adjusting function can be attached in the circuit.

12. The intelligent model electric actuator has the local control function. When there is no infrared remoter in site, the local controlling switch button can be over-changed directly to operate the actuator turning.

The main technical parameters

1. The form of control: It can be set as the proportional modulating mode or on-off mode. The proportional modulating mode: Input the controlling signal 4~20mA or 0~10mA DC. The voltage signal 0~5V or 1~5V, output the position feed back signal 4~20mA or 0~5V DC, the input impedance: (1) The current model 250 Ω . (2) The voltage model 100 k Ω . The on-off model: The input is the passive on-off signal. It can be used as the remote model and the on-off model.

2. The turning mode of the output shaft: It can be set at the positive action or the reversed action. Meanwhile, the input and the output signals are changed automatically with the turning direction.

3. Deadline: 0.3~3% Set arbitrarily

4. The upper and downer position limit modes:

(1) The soft position limit setting: The downer limit can be set at 0~99%, the upper limit can be set at 1~100%.

(2) The up and down travel position limit.

(3) The terminal mechanical position limit (protection)

5. Basic error: $\pm 1\%$; $\pm 0.5\%$

6. Power supply: Single phase: $220V \pm 10\%$ 50Hz ; Three-phase: 380V 50Hz

7. Operating environment: Temperature: $-25^{\circ}C - +55^{\circ}C$; Related humidity $\leq 95\%$

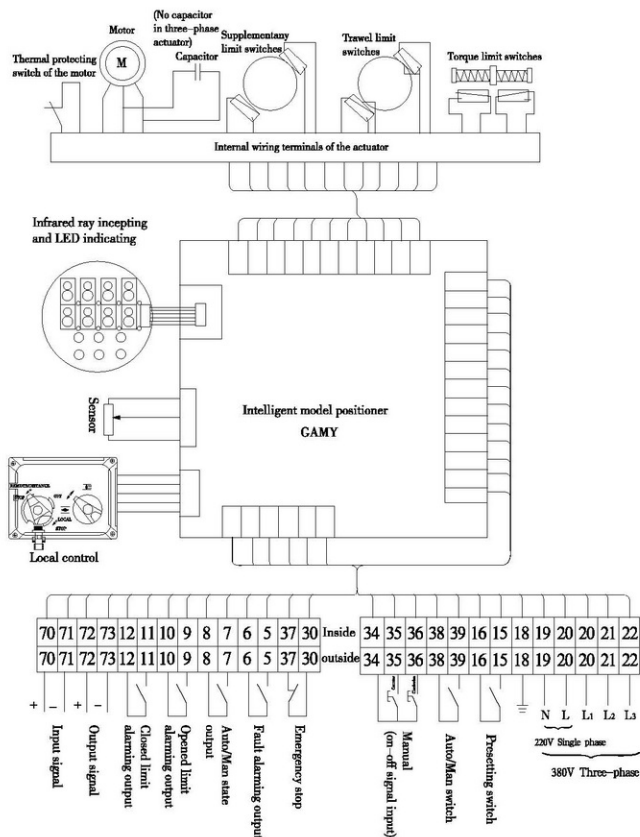


Fig.34 The wiring sketch diagram of the intelligent model electric actuator

9. The intelligent model bus electric actuator

The electric actuator is the most important driving device of the processing control system. It performs the corresponding operation for driving the valve and air gate etc. according to the upper device's signals in order to regulate and control the flux, the wind, the temperature and the pressure etc. processing parameters to realize the system processing control. Along with the modern industry develops, more and more higher applicability, functions, performances and reliabilities to the instruments and devices of the processing control system have been required by the users. To adapt the developing direction for dispersizing, networking and intelligentizing of the 21st century industrial control system, we have designed and manufactured the electric actuator with PROFIBUS-DP interface according to the international standard agreement. It is combined a PROFIBUS-DP adapter and an I/O module inside the intelligent model electric actuator to form an intelligent model bus electric actuator.

The intelligent model bus electric actuator has not only the general compatible analogue control interface with the traditional controlling system, but also the compatible bus interface with Profibus-DP as an accessory station of the bus controlling system. The bus electric actuator is more advanced, more convenience and more safe and reliable.

The structure and the mechanical driving principle of the intelligent model bus electric actuator is the same as the imported advanced technical manufactured series of the electric actuators. The type of the intelligent model bus electric actuator: Add the letter 'C' at the end of the general products' type, the power supply, the torque, the speed and the mounting dimensions could all refer to the general series of the electric actuators.

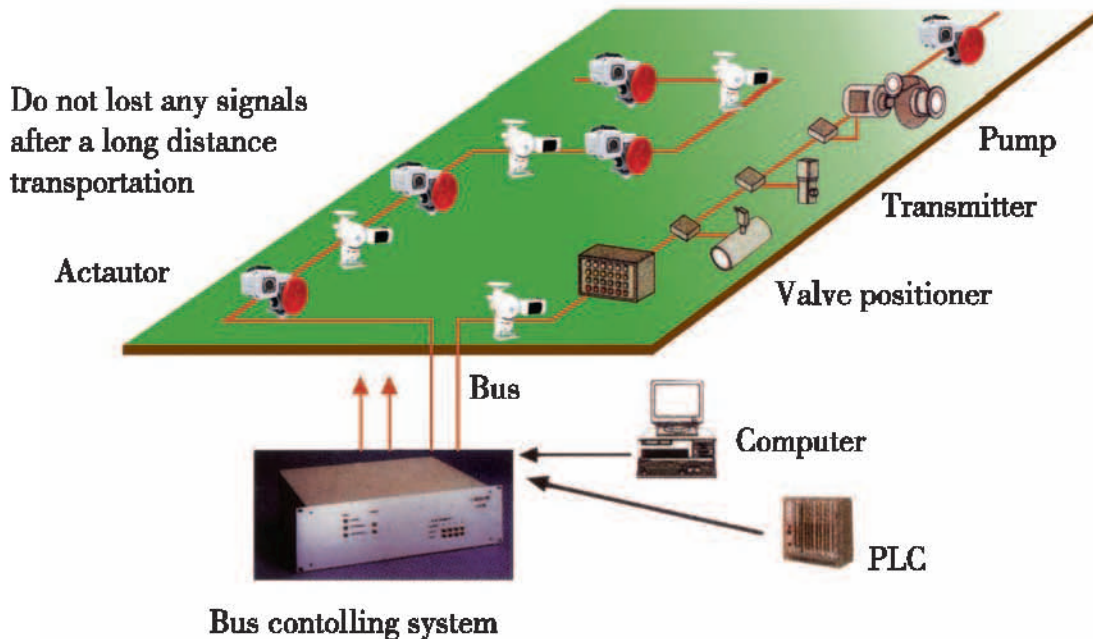
The basic working principle

The bus electric actuator is the same as the general one on the structure, equipped with the overtorque protection, the travel limit switch, the motor over-heat protection, the local operating hand wheel, the mechanical position limit switch and the local operating switch. The high intelligent position controlling circuit adopts the large scale instrument specialized integral chip (CPU) to compose the comparing, storage, amplifying logic controlling circuit, with the high precise position sensor, infrared receiving and displaying unit and the power output module etc. To form the circuit hardware, and equipped with the specialized software to compose the intelligent actuator which can accept 4~20mA input signal and output a 4~20mA signal and 4 sets of on-off signals (Those are: the clockwise and the counter clockwise directions travel, the over-torque or the motor blocked and the signals cut off). And that Profibus-DP bus communication circuit is composed of the imported 750-333 Profibus-DP adapter and 750 series digital input and output I/O module. The above circuit is combined with the precise mechanical driving reducer and servomotor by adopting non-invasive mode structure design (The parameters adjusting, setting, checking and operating of the electric actuator have performed by the infrared ray remote and digital display screen not have to open the case of the actuator.) to form an integral bus electric actuator.

The traditional electric actuator is connected with the upper device (That are the input signals, the feedback signals and the state signals of the actuator.) by adopting the form of contact to contact. And that the bus electric actuator communicates with the upper device (The controlling station) only by the shield two-wire twist copper cable (Transmitting medium) to perform the full digital, serial, bi-direction and multi-point relation, and has the compatible and the mutual operating performance. The principle is: The upper device sends out a digital command via the shield two-wire twist cable transmitted to the related agreement bus adapter and I/O changing to the analogue signal or on-off signal to take the actuator control the valve and the air gate according to the command signal. Meanwhile, the working state parameters and the diagnosing information of the actuator are transmitted via the adapter and I/O module changing to the digital signal to the upper device via the same transmitting medium. This process moves in circles to realize the system' modulating control.

The intelligent model bus electric actuator is also divided into single phase and three-phase products. The products have been adjusted according to the required specifications. The users just need connect the power supply cable and the signals transmitting bus cable with the power supply wiring terminals and the bus connector separately according to the wiring diagram.

Every Profibus-DP interface intelligent model electric actuator is as an accessory station. We provide the file GSD for equipping the software on the network. It need only to copy the file GSD to the corresponding root, the actuator has just been connected to the controlling system. Every actuator may set an unrepeat address code by the setting plate of the adopter.



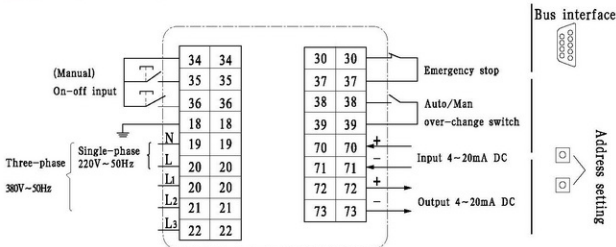
Characteristics of the products

1. Mechanism driving, the motor and the controlling circuit form an integral body, and adopt non-invasive model structure design. The parameters adjusting, setting, checking and operating of the electric actuator have performed by the infrared ray remoter and digital display screen and not have to open the case of the actuator.
2. It has the valve position presetting function. When the system occurs fault, the actuator will stop at the presetting position.
3. CPU memorizer, the set parameters by the users can be hold for 20 years after shut down.
4. The infrared ray remoter adopts specialized IC piece and certain codes, disturb-resistance and reliable, and it can be used for the parameters setting or the local operating.
5. It has not only the continuously modulating function and but also the on-off signals controlling function.
6. The electric actuator controlling system has the crossbar locking function, that means when the actuator is locked, it couldn't turn after it has received the operating signal for 8 to 10s. The controlling system will automatically cut off the power supply, and go into the protecting state. Add the over-torque switch to form the bi-protection.
7. As the intelligent model bus electric actuator adopts digital transmitting form, not only reduce the signals lost during the transmitting, but also improve the disturb-resistance, and the signal has high quality, can treat with high precision information. For using the intelligent model bus electric actuator could reduce the cable and the middle devices and wiring work, so the error and the system fault have been decreased.

8. As the bus has two directions communication function, the electric actuator is at the online inspecting and controlling states, so the remote programming, operating and diagnosing, also the online fault diagnosing and forecasting could be realized to perform the state maintaining. Operate and maintain much conveniently.
9. Profibus-DP bus actuator adopts two-wire twist shield cable redundancy design. Two wires of each one cable are redundant for each other to realize the two-passage operating. If one of them occurs a fault, open circuit, short circuit and grounding etc., the system could start-up the protecting system in time to guarantee the system to work normally.
10. Profibus-DP is a high-speed (Physics layer adopts RS485 transmitter form, communicational speed ratio is up to 12Mbps.) and a low cost communication system. Only need two two-wire twist shield cables to reduce the signals cable, the related cable slot, the bridge-frame and the switchboard etc. hardware. The project cost has been decreased. Wiring in site is very conveniently. If the electric actuators and the in-site controlling device need to be added, just connected to the original cables not have to attach the new cables. Not only the investment has been saved, but also the designing and mounting workload have been decreased.

Technical parameters and wiring

- ◆ a) The main parameters of the electric actuator see the related contents of '8. Intelligent model electric actuator'.
- ◆ b) The parameters setting, adjusting and operating see 'the intelligent model bus electric actuator' operating and adjusting manual.
- ◆ c) Wiring of the intelligent model bus electric actuator as follows:



The wiring diagram of the intelligent model bus electric actuator

Wiring directions

1. When the electric actuator is connected with the Profibus-DP controlling system, wire the bus and the power supply only, the other wiring terminals are all not wired.
2. The intelligent model bus electric actuator have been adjusted and set according to the parameters sheet, the user needn't to readjust and set parameters. If it needs to be checked before connected to the bus controlling system, check it according to the above wiring diagram.
3. The other functions and diagnosing alarms etc. of the bus model electric actuator are transmitted to the upper computer by the adapter and I/O module via the bus.

Whatever you have any questions, please don't hesitate contact us. If the instruction is altered, pardon for not informing.