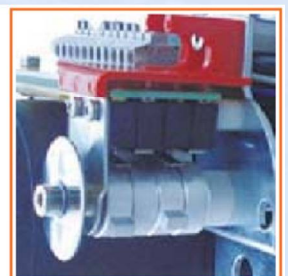
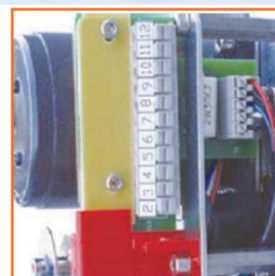




CASA[®]

EQS Series (Electrical Quarter-turn Actuator)



** The Best Actuator System **



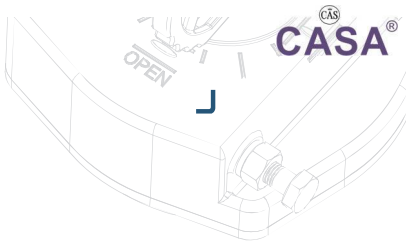
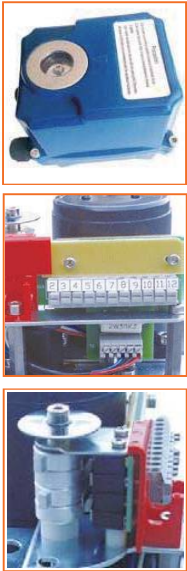
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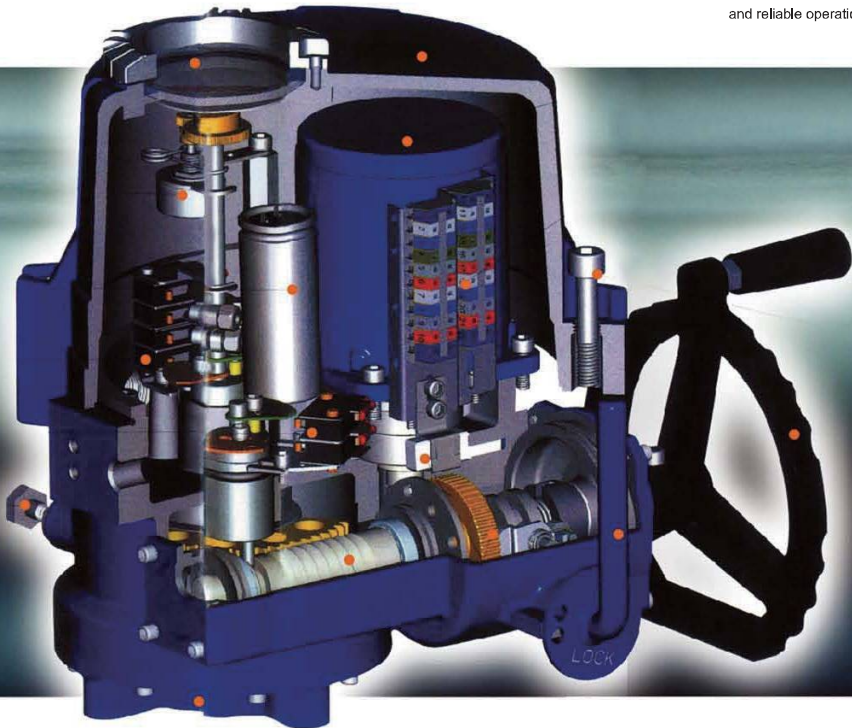
Short Description of ZPApecky EQS Series Product

ZPApecky EQS series electrical actuator is a new generation of products researched and developed by introducing up to date foreign technologies. The performance stability is fully guaranteed with 90% components imported with original packaging. ZPApecky EQS series electrical actuator features high intelligence, high protection, small size, high integration, long service life and stable performance. It can be controlled either locally or remotely and is applicable for all kinds of 90-degree turn equipments such as ball valves, butterfly valves and air door baffles, satisfying all requirements of industrial automatic control pipelines. It is widely used in industries including power station, petrochemical, metallurgy, desulfurization, petroleum, chemical, water treatment, paper making, ship building and building automation etc.. The torque scope of ZPApecky EQS series electrical actuator is from 60Nm to 3,000Nm within which a variety of models are available.

II. Description of Characterisatics

- 1. Housing: Aluminum alloy Housing processed by hard anodizing and polyester powder finishing at a protection degree of IP67 (Namur &6) or IP68 has light weight, strong anticorrosive ability and applies to all kinds of harsh working conditions.
- 2. Motor: The specially designed squirrel-cage inductive motor has high startup torque and can reach top the maximum value soon after the start. It has overheat and overload protection unit set inside and boosts the high output efficiency, high accuracy and low noise.
- 3. PCU: High-performance integrated microprocessor saves complicated setting on site of installation. Its one-push automatic correction and self-debugging functions bring customers much convenience.
- 4. Sealing: Double O rings are used to realize two-way seal.
- 5. Manual Operation Mechanism: The manual operation is carried out by wrenching lever of clutch which will automatically restore to electrical control position upon power on. In addition, the handwheel is designed to drive the actuator easily, fast and conveniently, with its size determined according to the torque required to open the actuator.
- 6. Gear and Self-locking Device: The double-worm wheel and worm system and secondary reduction gearbox can avoid inaccurate valve position caused by instant counter rotation of actuator and guarantee correct and sound valve position when power off. In addition, the device features high output efficiency and low noise.

- 7. Limit Switch: The limit switch with high accuracy can be easily used to adjust the open and close limit of the valve. Overload protection is provided against overlarge torque of valve to protect both the valve and actuator.
- 8. Anti-condensation Heater: Switch on at the temperature of 20°C ±3°C to avoid internal water condensation and switch off at the temperature of 30°C ±3°C . The power is off automatically when the temperature is too high.
- 9. Limit Bolts: The limit bolts control the stroke of actuator through the open and close positions of the actuator to avoid the worm and worm wheel off the way.
- 10. Indicator: The operator can watch the accurate open position of the valve in distance by the relatively big indicating window.
- 11. Terminal Board: The plug and play terminal board can be installed easily and conveniently. Each terminal compressed by spring guarantees firm wiring and can be used in shaky environment.
- 12. Wiring: The internal wiring is simple and clear and is easy for connection.
- 13. Connecting Shaft Sleeve: The connecting shaft sleeve can be dismounted for individual processing based on reality. The mounting base meets ISO5211 Standard and can be connected with valve easily.
- 14. Lubrication: All gears and transmission shafts apply CIATM221 grease and are lubrication and maintenance free for 5 years.
- 15. Anti-interruption Magnetic Ring: Effectively prevent the circuit being interrupted by the external magnetic field to guarantee stable and reliable operation of the electrical actuator.



ZPApecky EQS series electrical actuators have all gone through strict quality inspection before delivery which guarantees the stability and reliability of the products. In addition, there are senior intelligent products of various control forms and modes for option:

- (1) The digital integrated chip with ultra large specification has powerful function and high accuracy rate. Once the actuator is electrified, the chip will test the control circuit automatically to ensure correct operation.
- (2) The actuator adopts Hall sensor as its displacement sensor which conducts digital quantization treatment to pulse signals; the Hall Effect magnetic pulse system can accurately measure and control the stroke of actuator.
- (3) Since the IA infrared ray system was successfully used, IA now has been supported the communication compatible with IrDA. The functional parameter setting, debugging and local electrical operation of actuator can all be settled by handheld infrared ray remote control without opening the housing to expose the internal control circuit (non-intrusive des!)
- (4) The actuator adopts LCD screen with high-resolution LCD digital, English & Chinese languages and identifiers to show the percentage of valve openness in real time. The backlight of LCD screen provides great convenience to the user for night operation. The hi-lite LED red and green lights respectively indicate full close and full open of the actuator. In case of power off, the backup battery will support screen display.
- (5) The actuator is equipped with remote/ local (on/off) control function with relevant pilot lamps: full close- red light on, be closing- red light flickers, torque switch on- yellow light on, torque switch failure- yellow light flickers, full open- green light on, being opening- green light flickers. The electronic contactor and transmitter have automatic phase adjustment and correction function. 24-48 terminals on the terminal board for option. The position relay and the local LCD display are used to monitor remote position indicator and are compatible with PRFIBUS communication system.



III. Standard Configuration

Protection Degree	Water-proof IP 67, NAMUR 4 and 6, (IP 68 Optional)
Voltage of Power Supply	110/220-230V AC/ 1Ph/50/60Hz±10% 380/400/440V AC/3Ph/50/60Hz±10%
Control Power Supply	110/220-230V AC/ 1Ph/50/60Hz±10%
Working Duty (On-off Type)	S2: 10Min~30Min/S4:20~50%
Working Duty (Modulating Type)	S4: 30~50%, 300~1,200 Starts/Hour
Motor	Whole Sealing Squirrel-cage Inductive Motor of F Degree
Limit Switch	2 for Each Open/Close Switch (SPDT 250VAC/10A Rating) (More Available)
Torque Switch	1 for Each Open/Close Switch (SPDT 250VAC/10A Rating) (More Available)
Thermal Protection and Temperature Setting	Thermal Protection Switch Set Inside (Max. 150 ±5 , Min97 ±15)
Stroke	90°±5°(0°~100°)
Position Indicator	Continuous Mechanical Position Indication
Manual Operation Mechanism	Attached
Self-locking Function	Attached
Mechanical Limit	Attached (External Adjustment Available)
Anti-condensation Heater	5W (110/220-230VA C)
Cable Interface	2 PF 3/4"
Ambient Temperature	Basic Type: -20 ~+70 Optional Type: -40 ~+100
Ambient Humidity	Min. Relative Humidity 10%, Max. Relative Humidity 100%, No Condensation
Anti-shock	XYZ 10g. 02~34Hz, 30 minutes
Housing	Aluminum Alloy Housing Processed of Hard Anodizing and Polyester Painting

IV. Options

Code	Remark	Note
EX	Explosive-proof Type	Exd II BT4, BT6, CT4, CT6
WT	Watertight Type (IP68)	Continuous work underwater for 100 hours
ALS	Auxiliary Limit Switch	4 ones at most
ATS	Auxiliary Limit Switch	4 ones at most
SV	Variable torque and switch speed	Please contact this company before making an order.
PK	Potentiometer (0~1Kohm)	High precision and integrated design guarantee correct output of valve position
CT	Current Transformer (Output Signal 4~20mA)	0 Point and Stroke Adjustable (4-line and 2-line systems for option)
PCU	Intelligent Central Processing Unit (4~20mA Signal Input and Output)	Intellectualized one-push automatic correction and adjustment function
LCU	Local Control Unit	Remote control/ open/ stop/ close switch
LCD	Liquid Crystal Display	Watch the valve position clearly
LPA	Horizontal Installation	Control air door baffle; Output connecting lever, support and spherical linkage attached

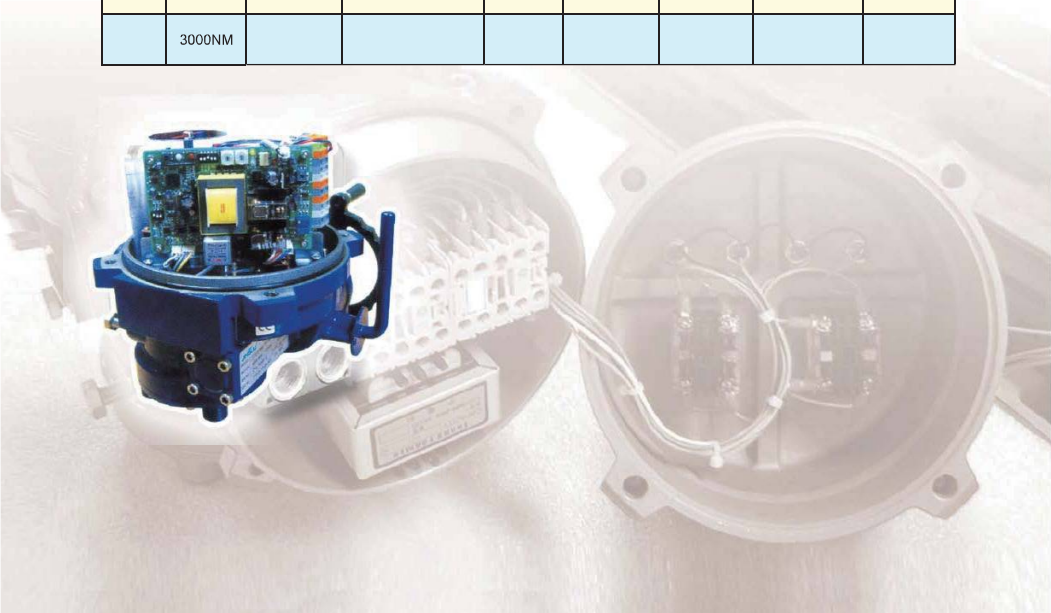


V. Model Selection Form

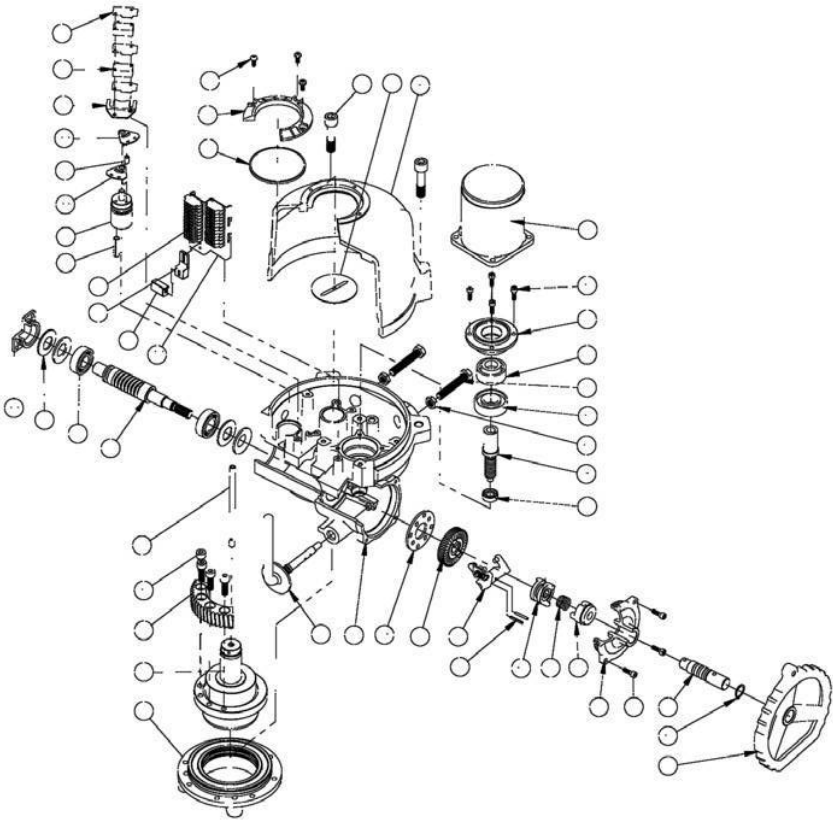
Model	EQS60	EQS100	EQS160	EQS240	EQS350	EQS500	EQS800	EQS1100	EQS1500	EQS2000	EQS3000
Output Torque (Nm)	60	100	160	240	350	500	800	1100	1500	2000	3000
Working Duty (%)	40	40	30	30	30	30	30	30	30	30	30
Operating Time	50Hz	13	21	26	26	31	31	39	39	93	117
	60Hz	11	18	22	22	26	26	32	32	78	97
Max. Axle Diameter (mm)	Round (Φ)		22	25	25	40	40	48	48	75	75
	Square (Φ)	14	20	23	23	34	34	40	40	64	64
Rated Current (A)											
1Phase/ 110V	50Hz	0.98	0.98	1.60	1.62	1.72	3.60	3.90	3.90	3.60	3.80
	60Hz	1.10	1.10	1.70	1.72	1080	3.90	4.20	4.30	3.90	4.20
1 Phase/ 220V	50Hz	0.52	0.52	0.85	0.87	0.92	1.50	2.05	2.15	1.50	2.05
	60Hz	0.58	0.58	0.90	0.90	0.95	1.60	2.20	2.30	1.60	2.20
3 Phase/ 380V	50Hz	0.43	0.43	0.30	0.32	0.32	0.52	0.82	0.84	0.52	0.82
	60Hz	0.33	0.33	0.30	0.32	0.32	0.56	0.88	0.90	0.56	0.88
3 Phase/ 440V	50Hz	0.59	0.59	0.30	0.32	0.32	0.55	0.82	0.84	0.55	0.82
	60Hz	0.42	0.42	0.32	0.35	0.35	0.58	0.88	0.88	0.58	0.88
Motor Degree	F	F	F	F	F	F	F	F	F	F	F
Motor Power	15W	15W	40W	40W	40W	90W	180W	180W	90W	180W	180W
Flange of Connection Standard ISO5211	F03/ F05	F07	F07/F10	F10/F12	F10/F12	F12/F14	F12/F14	F12/F14	F16	F16	F16
Weight (Kg)	3.5	7	15	15	20	20	25	25	65	75	75
Rounds of Rotation of Handwheel	10	10	12	12	14	14	17	17	65	70	70

Electrical Part-run Actuator: EQS-

Model	Torque	Voltage of Power Supply	Control Type	Protection Grade	Explosive-proof Grade	Switching Time	Others	Client No.
EQS	60NM	(1) 24V DC	(1)On/Off Type	(1)IP67	(0)Nil	(0)With No Requirement	(0)Nil	
	100NM	(2) 220V AC	(2)Modulating Type	(2) IP68	(1) Grade EX B	(1) With Requirement	(1)Connecting Lever and Spherical Linkage	
	160NM	(3) 380V AC	(3)Others		(2) Grade EE C		(2)Local Control Unit	
	240NM	(4) Others					(3) Safe Return: FS	
	350NM						(4)LCD	
	500NM						(5)Infrared Ray	
	800NM						(6)Fieldbus	
	1100NM							
	1500NM							
	2000NM							
	3000NM							



VI. Working Principle and Dimensional Drawing



Structure Chart

No.	Name of Component	Quantity	Specification	No.	Name of Component	Quantity	Specification
1	Housing	1		17	Clutch	1	Φ5*24
2	End Cover	1		18	Indicating Shaft	1	
3	Handwheel Cap	1		19	Change-over Plate	1	
4	Base	1		20	Torque Axis	1	
5	Bolt	4	M12*50	21	Spring Pin	1	
6	View Window	1		22	Gear	1	
7	Cap of View Window	1		23	Converter	1	
8	Spring Washer	4		24	Positive and Negative Runner A	1	
9	Drive Shaft	1		25	Positive and Negative Runner B	1	
10	Drive Shaft	1		26	Spring	1	
11	Bearing	2	6003	27	Wheel	1	
12	Output Shaft	1		28	Gasket	1	
13	Gear	1		29	Base Cap	1	
14	Bearing	1		30	Bearing	1	608
15	Bearing Cap	1	6003	31	Bearing	1	6004
16	Axis of Handwheel	1		32	Spring Pin	2	Φ3*22

No.	Name of Component	Quantity	Specification	No.	Name of Component	Quantity	Specification
33	Bolt	4	M8*25	41	Sensor B/K	1	
34	Nut	2	M10	42	Switch	2	
35	Bolt	2	M10*60	43	Fitting Seat	1	
36	Bolt	8	M5*16	44	Installing Support of Terminal Block	1	
37	Motor	1		45	Indicator	1	
38	Anti-condensation Heater	1		46	Duct	1	
39	Cam	2		47	Terminal Block	2	
40	Gasket	3		48	Screw	4	M5*12





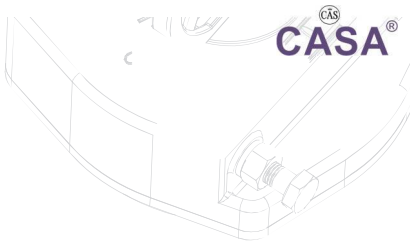
CASA[®]

EMS Series (Electrical Multi-turn Actuator)



TOP COVER BOLTS





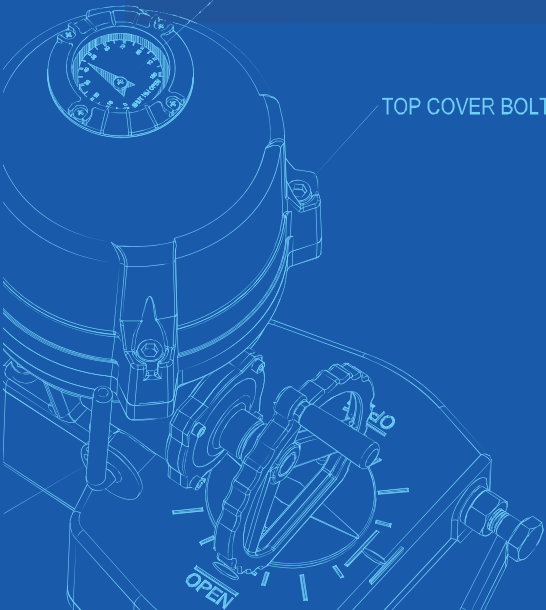
Short Description of ZPApecky EMS Series Products

ZPApecky EMS series electric actuator applies graphic lattice LCD which indicates the working status and alarm of the actuator in terms of torque, valve opening and limit setting etc.. The device contains automatic protection and diagnosis function and allows for adjustment, parameter examination and fault diagnosis without opening the housing of the working actuator even in hazardous area thanks to its explosion-proof function. The fieldbus communications card is adopted to form full-distribution computer coordinative work system to realize remote data collection, remote communications and remote diagnosis and maintenance. Featuring advanced technology, reliable performance and convenient operation, the actuator can be widely used in oilfield, power station, metallurgical industry, water treatment, paper making and chemical industry etc. and is thereby warmly welcomed by a large number of customers.



WINDOW & INDICATOR

TOP COVER BOLTS



II. Major Technical Parameters

2.1	Input Signal:	4mA-20mA; 1VDC-5VDC; 2mA-10mA; 0.5V
2.2	Power Supply:	380VAC/50Hz; 220VAC/50Hz
2.3	Intrinsic Error Limit:	≤1%
2.4	Repeatability Error of Stroke Control Unit	≤1%
2.5	Dead Band	Adjustable from 0.1% to 9.9%
2.6	Protection Grade	IP68
2.7	Explosion-proof: Explosion-proof Mark:	Exd II CT4
2.8	Ambient Temperature:	-40 ~+70
2.9	Input and output passages both adopt photoelectric isolation.	
2.10	Ambient Humidity:	≤95%



III. Description of Functions, Performance and Features

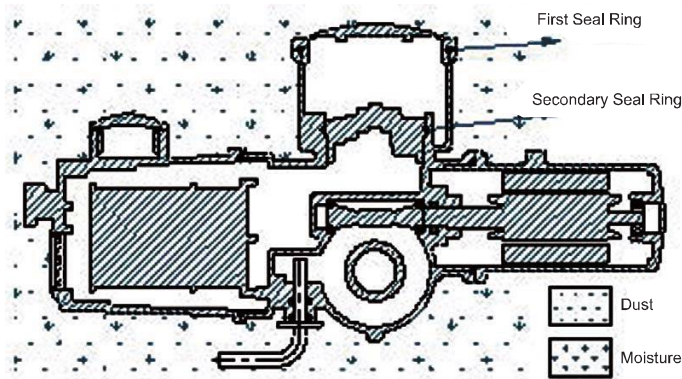
3.1 Working Principle of Actuator

The motor directly drives the worm through the shaft coupling system and then the worm drives the worm gear which further rotates the output shaft through the clutch. When the changing-over lever is switched to manual position, the clutch will move upward to disengage worm gear and connect with handwheel; as a result, the output is driven by turning the handwheel. Electric operation is always preferential unless the changing-over lever is fixed at the manual position. The output shaft runs to rotate a pair of bevel gears and traces the valve position through the valve position sensor.

3.2 Functions and Features of Actuator

3.2.1 Double-seal Structure

As shown in picture 3-2 below, during the installation and debugging of the project, even though the terminal cover of the actuator is opened for long, dust and moisture can't enter the motor and the housing of the actuator because of the secondary seal between the terminal board and the housing; therefore, the motor and the control circuit will not be corroded and the reliability of the actuator is enhanced.



Picture 3-2 Double-seal Structural Diagram

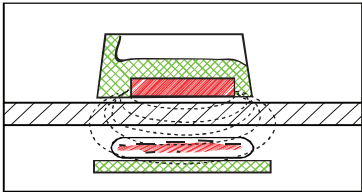
EMS series actuator can work normally under 3-meter deep water for 48 hours. However, please take aware that this function is only for short-time protection against the accident where the actuator is flooded, not for long-time and continuous operation underwater. In addition, the user shall be responsible for solid seal of cable entries; otherwise water may flow into the actuator and cause trouble.

3.2.2 Non-intrusive Design

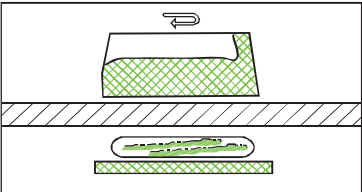
Non-intrusive design concept reflects in two aspects: firstly, the mode selection knob and the local operation knob adopt magnetic steel bar to control the tongue pipe in the housing of the actuator regardless of the traditional knob tandem shaft (Refer to Pictures 3-4, 3-5); secondly, infrared control is used to set, change and adjust the parameters of the actuator without opening the housing of the actuator.

The non-intrusive structure has the following advantages:

- (1) The housing need not to be opened, which avoids corrosion by ash, harmful gas and moisture outside.
- (2) Adjustment is easy even in rain or in the environment with combustible gas.
- (3) It is convenient to check the status of the actuator.



Picture 3-4 The magnetic steel bar in knob closes the neighboring tongue relay.



Picture 3-5 The tongue relay separates after the magnetic steel bar in the knob leaves the relay.

3.2.3 Protection Function

3.2.3.1 Torque Protection

This function protects both the valve and the actuator in case of excessive torque in actuator operation. Torque protection value is set by the infrared control.

3.2.3.2 Value Position Limit Protection

The actuator stops automatically upon reaching its close or open limit (relevant to the working mode).

3.2.3.3 Automatic Phase Sequence Adjustment

EMS actuator can automatically test the sequence of three-phase power supply inserted into the power supply terminal and make sure to connect correct phase sequence to the motor through proper logic calculation. Without this function, it is possible to damage the valve due to wrong phase sequence; with this function, the power supply wiring of the actuator can ignore the problem of phase sequence.

3.2.3.4 Instant Reversal Protection

When the actuator receives the order of moving to opposite direction, a time delay is added automatically to avoid unnecessary wear of the valve shaft and gear box.

3.2.3.5 Phase Short Protection of Power Supply

EMS actuator has perfect function of power supply phase short protection. By monitoring the voltage and current at the same time, it can spot the power supply phase short no matter the motor is working or not and stops the motor operation to avoid motor overheat. Be attention that most power supply phase short occurs when the motor is working.

3.2.3.6 Protection against Valve Jamming

No matter the actuator is moving to open or close direction, torque protection function shall be temporarily stopped for 5-10 seconds after signal of motor excitation is send out (If the actuator does not move during the foresaid 5-10 seconds, the control circuit will cut the power supply to the motor.). This function is used to solve valve jamming.

3.2.3.7 Overheat Protection

Two thermal relays are installed at the edge of motor winding to measure the temperature of motor winding directly. When the thermal relay tests the winding is too hot, the control circuit will stop the operation of the actuator.

3.2.3.8 Electricity Protection

The input and output paths are of photoelectric isolation.

3.2.4 Test of Valve Position and Torque

A pair of bevel gears driven by the output shaft drives a round magnetic sheet with multiple N poles and S poles on one circle which further makes the two magnetic sensors around the magnetic sheet produce pulse signal; the valve position is figured out by direction judging and counting the pulse signal. The resolution ratio of valve position test is 11.5° rotating angle of output shaft and the accumulative number of output shaft can top 2,040 rounds, which means that the stroke range of EMS series actuators is greatly larger and breaks the former limit to the stroke of actuators.

Torque is acquired by testing the current and flux of the motor. This is convenient very much with continuous measure of output torque and adjustment of torque protection value. This avoids machine wearing and guarantees long-term stability.

3.2.5 Interval Timing Operation

Interval timing operation refers to that the actuator runs intermittently in the opening and closing process, that is, it moves for a certain time, stops for a while and starts to move again, so on so forth. Both the moving and static time can be set.

This function is quiet suitable for the occasion in need of avoiding hydraulic shock (water hammer effect) and fluid surge and extends the stroke time effectively.

3.2.6

Fieldbus technology is a new development of meters instruments, computer technology and network technology in the fields of control system and automation area. Fieldbus forms network interconnection system between field instruments and between the field instrument and the controller and realizes digitalized, two-way and multipoint digital communications. The open bus has universal and public international standard ISO/OSI model and can organize instruments from different manufacturers into an open internetwork, featuring operability and interoperability and laying foundation for decentralized control system. Through various network transmission mediums, the actuator installed with fieldbus communications card can be integrated into fieldbus system which supports Modbus, CAN, Profibus and FF etc. to realize remote communications, remote data collection and remote diagnosis and maintenance.

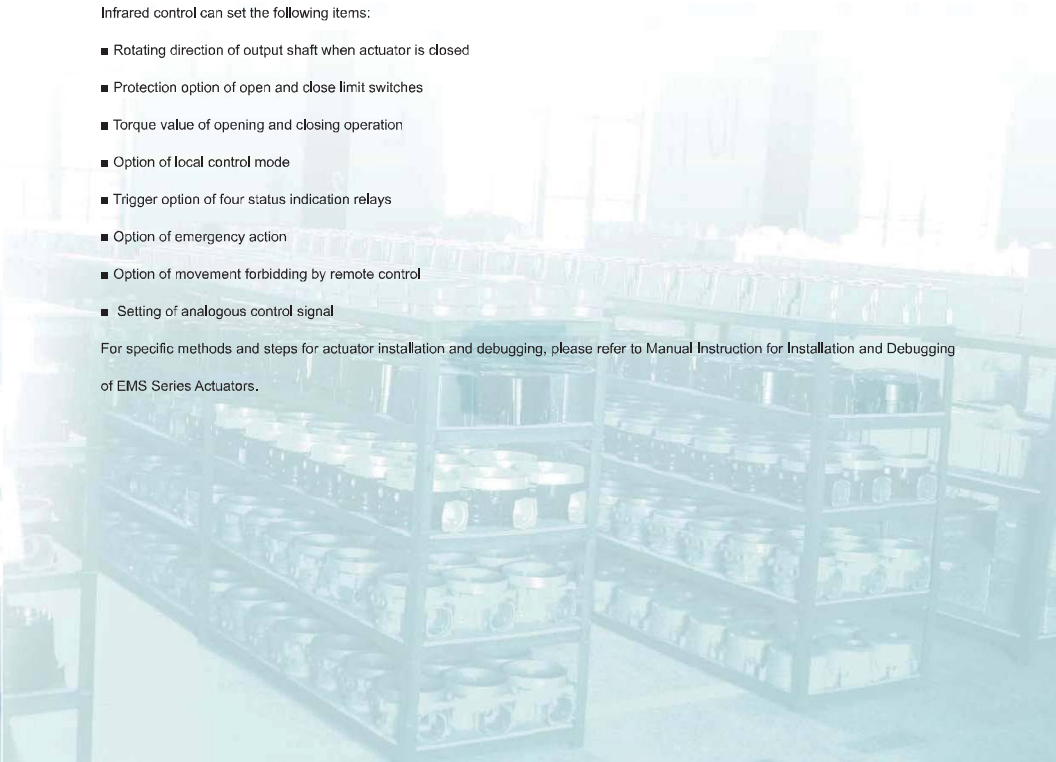
3.2.7 Debugging and Fault Shoot of Actuator

Infrared control of EMS series actuator is used to make setting and diagnose fault for actuator. It can debug actuator fast and conveniently without opening the housing of actuator. In addition, it is much more fast and convenient to find out faults as the diagnosis function can indicate many internal status of actuator.

Infrared control can set the following items:

- Rotating direction of output shaft when actuator is closed
- Protection option of open and close limit switches
- Torque value of opening and closing operation
- Option of local control mode
- Trigger option of four status indication relays
- Option of emergency action
- Option of movement forbidding by remote control
- Setting of analogous control signal

For specific methods and steps for actuator installation and debugging, please refer to Manual Instruction for Installation and Debugging of EMS Series Actuators.



3.2.8 Indication of Actuator

The actuator is equipped with LCD which is made up of four indicating zones including menu, alarm, reference and electric quantity of battery. The menu displays setting, inspection and diagnosis of actuator. The valve location is indicated on actuator in the form of digit and mimic diagram, with a resolution ratio of 1%. The LCD has backlight which is lighted by the main power.

Besides LCD, the actuator is equipped with 2 LEDs. The red LED indicates that the actuator is fully closed and green LED indicates that the actuator is fully opened.

The actuator is installed with lithium battery which supports LCD and valve location test when main power is off. In this situation, the actuator does not accept orders from control and does not light up the backlight and the two LEDs.

The actuator is installed with 4 status indicating relays as well. For details, please refer to section 6.3.

3.2.9 Operation of Actuator

The actuator is operated in electrical and manual modes. The handwheel on actuator is used for manual operation. The changing-over lever is used to shift the operating mode of actuator from electrical to manual. Because the electrical operation first system is set, the actuator shall automatically resume electrical operation once motor starts up.

EMS series actuator adopts top mounting handwheel as its standard handwheel which saves labor for manual operation.

The handwheel provides emergency manual operation when electrical operation falls in trouble. It is allowable to lock level at position of electrical operation.

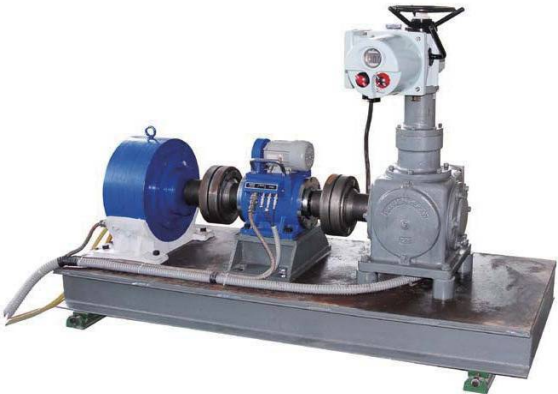
3.2.10 Advanced and Reliable Structure of Actuator

- a. Even though the terminal cover is opened on site, the exclusively-sealed terminal case still can guarantee the completeness of electric device.
- b. The field operation of control relay and working mode adopts isolated magnetic pumping, saving a driving shaft with seal.
- c. The local display window can be changed with direction so as to fit into mounting position of actuator. In addition, sealed display window and special infrared control setting and diagnosing the actuator avoids opening electric housing to expose internal control circuits and prevents erosion of ash and moisture.
- d. Low inertia and high torque electric motor: The motor can reach max torque rapidly after startup and can seldom overrun without excitation; motor winding is installed with accurate temperature relay that can effectively guard against motor overheat.
- e. Solid circuit is specially designed to test the torque of actuator, saving spring relay and lever.
- f. Worms driving worm gears in oil slots can maximally extend service life of actuator in various environments.

- g. Valve location counter can accurately measure and control the actuator's position and guarantee exact counting of valve location even after power is cut off and resupplied.
 - h. When power can not be supplied in accident, drive handwheel directly to provide reliable emergency manual operation.
 - i. Manual and power-driven clutch can be operated safely even when the motor is working.
- Note: When motor starts up, the clutch will switch to power-driven status automatically unless the change-over lever is deliberately locked at the position of manual operation.
- j. Lubricating available thrust bearing is designed for life extension and easy dismounting of actuator and helps demount actuator without changing valve position.
 - k. For well fitting into valve, the dismountable drive shaft sleeve can be machined according to valve rod.
 - l. The motor shaft and worm shaft are independent with each other so as to change the output speed of actuator.
 - m. Support open fieldbus such as HART, Modbus, CAN, Profibus and FF etc..

3.2.11 Design of Explosive-proof Structure of Actuator

The explosive-proof structure of actuator is a kind of ExdIBT4 flameproof product designed according to the regulations of GB3836.1-2000 General Requirements on Electrical Apparatuses in Explosive Gas Environment Part 1 and GB3836.2-2000 Type "d" Flameproof Electrical Apparatuses in Explosive Gas Environment Part 2. This design is applicable for 1,2 work areas with grade A, B and T1-T4 explosive mixtures at an atmosphere pressure of 86 KPa-106KPa and ambient temperature of -30 ~+70 .



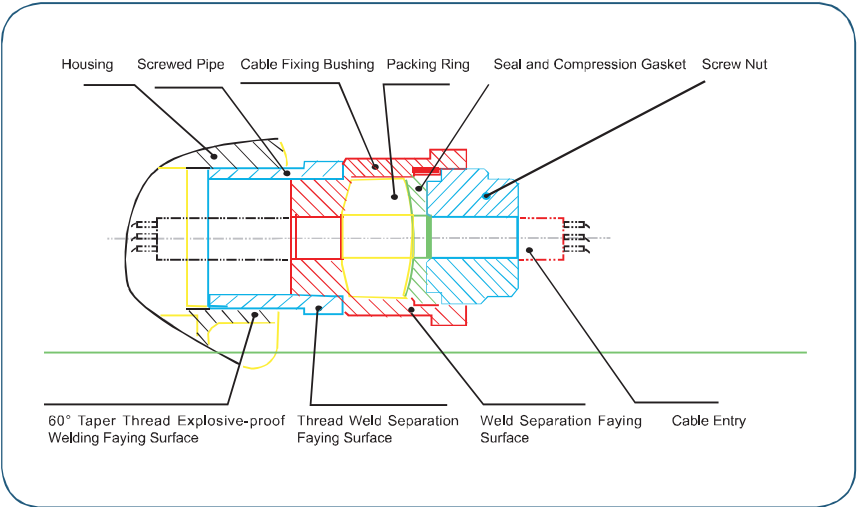
3.2.11.1 Fine Seal

Faying face between housing and accessories is relatively long with smaller separation, which takes the effect of explosion proof. Meanwhile, the requirement on seal is satisfied by imported framework rotary oil seal and excellent O-shape seal ring.

3.2.11.2 Cable Entry Device

Cable entry device design the explosive-proof structure according to GB3836.2 and Appendix D of Supplementary Requirements on Explosive-proof Cable Entry and Gasket. Both the length connection of the thread and the width connection of the seal ring with the cable all meet the requirement of explosive-proof standard.

3.2.11.3 Refer to Picture 3-8 for Wire Introduction and Connection of Explosive-proof Actuator



Two-level sealing is applied between battery compartment and electrical compartment as well as between motor compartment and electrical compartment to ensure the explosive-proof performance of the device.

Note: 1. Cable Diameter: 10 (2 Lines), 14 (1 Line)

2. Unused cable entry shall be sealed by steel or brass screwed plug.

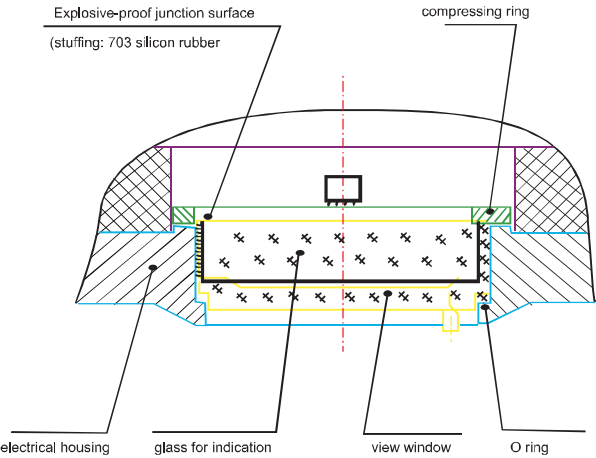
3.2.11.4 View Window Structure of Explosive-proof Actuator

The transparent view window connect the body with O ring and sealant filled (this connection is forbidden to be separated, or the explosive-proof surface will be damaged.). The double-layer transparent compressing ring compressed structure meets standard 5.4, 5.5 and 8.1 of GB3836.2. For details, refer to Picture 3-10.

To guarantee normal LCD direction of the actuator in different install direction, that is, all LCD characters and figures are shown in right direction; four modes of actuator's LCD screen are supported:

- (1) The actuator is placed in horizontal direction (handwheel upwards), the LCD screen installed as normal;
- (2) The actuator is placed down upside (handwheel downwards), the LCD screen installed as normal with form of indication set as reverse indication by control;
- (3) The actuator is placed left side (handwheel on the left), the LCD screen installed on the side of flange;
- (4) The actuator is placed right (handwheel on the right), the LCD installed on the side of flange with form of indication set as reserve indication by control.

The customer supply the above actuator's installation direction, we will supply according to the LCD screen's correct settings. If the customer can not supply the installation direction of actuator, our company can dispatch professional working staff to the on-site to ste the LCD screen.



Picture 3-10

3.2.12 Electronic Latch Effect

It is very easy to cause over torque when actuator starts up high-inertia load. In order to start high-inertia load successfully, the EMS actuator should temporarily stops torque protection function with the several seconds after sending to motor stimulus signals. This phenomenon is called electronic latch effect. If the actuator does not move within seconds after the stimulus signal is sent to motor, the control circuit will automatically cancel the power to the motor. The electronic latch effect is very effective in opening long-time closed valve.

3.2.13 Data Saving Function in Electrical Mains Off

When main power is off, battery supplies power to valve position inspection circuit and save the valve position in ERPR0M. The battery also supplies power to LCD indicator (do not support backlit) and four status indicating relays. Whatever the main power off or battery change, the valve position is stored. It is suggested that the battery should be changed when the mains can supply power.



3.2.14 Scope of Application

EMS series actuator is of continuous adjustment actuator, in rated adjust torque, it works at an action frequency of 1,200 starts/ hour and operation duration rate of 50%. Compared with EQS series actuator, this kind of actuator has higher positioning accuracy. EMS series actuator can well satisfy most industrial areas on the demand of loop-locked and automatic return circuit execution. When choose EMS actuator, the torque required by valve to reach midway shall not exceed the corresponding adjustable torque of the actuator. The basic type of EMS actuator refers to multi-turn actuator which is suitable for linear valves such as regulating valve. When the EMS series actuator asked to output part-turn, can choose our W series gearbox. Assembly the EMS series actuator with the W gearbox, it can output the 0-90° part-turn. The output rated torque range is 470N.m~51500N.m, it can fully satisfy the actual demand of the industrial field.

When the basic EMS series actuator outputs inadequate torque to move the linear valve, you can choose our D series multi-turn worm-gear box; On occasion ti driving quarter-turn valve such as ball valve and butterfly valve, you can choose our W series quarter-turn worm-gear box . For the aforesaid two series worm-gear boxes, there are level-one and level-two speed supplied. The transmission proportion for level-one speed reduction is 1:40, 1:60 and 1:70 and that for level-two speed reduction is above 1:80. It is to set a pair of cylindrical gears or circular gears to reduce the speed. For the combination performance of EMS series actuators with part reduction gearboxes, please refer to the form below. For more detailed information about reduction worm-gear boxes, please feel free to contact us.

VI. Datum for Model Selection

Performance Data Sheet of EMS Series Adjustable Multi-turn Actuator (220VAC/50Hz)

Output speed rpm		18	24	36	48	72	96	144	192
EMS30	Adjust Torque N.m	12	12	10	10				
	Max. Torque N.m	24	24	21	20				
	Motor Power KW	0.06	0.08	0.08	0.1				
	Stall Current A	6.5	7.3	7.3	7.9				
	Rated Current A	1.6	1.8	1.8	1.9				
	Adjust Torque N.m	20	18	15	13				
EMS50	Max. Torque N.m	42	38	33	27				
	Motor Power KW	0.12	0.12	0.12	0.12				
	Stall Current A	8.5	8.5	8.5	8.5				
	Rated Current A	2.0	2.0	2.0	2.0				
	Adjust Torque N.m	40	32	26	25	18			
	Max. Torque N.m	85	77	58	55	38			
EMS100	Motor Power KW	0.19	0.21	0.23	0.25	0.28			
	Stall Current A	9.5	10.2	11.6	13	14.1			
	Rated Current A	2.3	2.45	2.8	3.2	3.4			
	Adjust Torque N.m	70	70	55	42	42			
	Max. Torque N.m	133	133	107	89	89			
	Motor Power KW	0.28	0.35	0.32	0.35	0.37			
EMS200	Stall Current A	14.1	17.2	16.5	17.2	18.1			
	Rated Current A	3.4	3.75	3.6	3.75	3.9			
	Adjust Torque N.m	180	150	130	102	72			
	Max. Torque N.m	343	328	265	204	142			
	Motor Power KW	0.8	0.8	0.75	0.8	0.8			
	Stall Current A	36	36	32	36	36			
EMS550	Rated Current A	7.8	7.8	7	7.8	7.8			

Performance Data Sheet of EMS Series Adjustable Multi-turn Actuator (380VAC/50Hz)

Output speed rpm		18	24	36	48	72	96	144	192
EMS30	Adjust Torque N.m	17	17	15.6	13.6				
	Max. Torque N.m	34	34	30	27				
	Motor Power KW	0.07	0.07	0.13	0.14				
	Stall Current A	2.3	2.3	3.6	3.7				
	Rated Current A	0.75	0.75	1	1.1				
	Adjust Torque N.m	34	34	30	27				
EMS50	Max. Torque N.m	61	54	54	48				
	Motor Power KW	0.12	0.13	0.19	0.23				
	Stall Current A	2.7	3.6	4.7	6.4				
	Rated Current A	0.85	1.0	1.0	2.1				
	Adjust Torque N.m	81	81	68	54	47			
	Max. Torque N.m	122	109	81	68	54			
EMS100	Motor Power KW	0.3	0.3	0.35	0.35	0.47			
	Stall Current A	6.8	6.8	9.25	9.25	10.25			
	Rated Current A	2.3	2.3	2.8	2.8	3.6			
	Adjust Torque N.m	152	152	129	102	102			
	Max. Torque N.m	204	204	163	136	136			
	Motor Power KW	0.47	0.47	0.58	0.68	0.70			
EMS200	Stall Current A	10.25	10.25	13.4	16	16			
	Rated Current A	3.6	3.6	4.6	5.5	5.5			
	Adjust Torque N.m	271	271	253	203	203			
	Max. Torque N.m	544	544	408	313	218			
	Motor Power KW	0.9	1.05	1.27	1.2	1.35			
	Stall Current A	18	25	28	27.6	29			
EMS550	Rated Current A	6	7	9	7.8	8.2			

Performance Data Sheet of Combination of EMS Adjustable Actuator and W Series Worm-gear Box

	Rated Torque	Stroke Time	Output Speed of Actuator	Transmission Proportion of Worm-gear Box	Max. Valve Shaft Diameter		Rated Torque	Stroke Time	Output Speed of Actuator	Transmission Proportion of Worm-gear Box	Max. Valve Shaft Diameter
EMS30B4/W4	410	29	36	70:1	64	EMS100 B4/W6	1770	29	36	70:1	102
EMS30B4/W4	280	25	24	40:1	64	EMS100 B4/W6	2052	44	24	70:1	102
EMS30B4/W4	267	33	18	40:1	64	EMS200 B4/W6	2734	22	48	70:1	102
EMS30B4/W4	418	44	24	70:1	64	EMS100B4/W6R*	2537	29	72	140:1	102
EMS50B4/W4	558	25	24	40:1	64	EMS100 B4/W6R*	2750	44	48	140:1	102
EMS50B4/W4	723	22	48	70:1	64	EMS100 B4/W7	2016	38	24	60:1	127
EMS50B4/W4	535	33	18	40:1	64	EMS200 B4/W7	3328	25	36	60:1	127
EMS50B4/W4	789	29	36	70:1	64	EMS200 B4/W7	3784	38	24	60:1	127
EMS30B4/W4R*	447	25	48	80:1	64	EMS100B4/W7R*	2690	38	48	120:1	127
EMS30B4/W4R*	503	33	36	80:1	64	EMS100B4/W7R*	3640	38	72	180:1	127
EMS50B4/W5	438	25	24	40:1	76	EMS200 B4/W8	3800	38	24	60:1	153
EMS50B4/W5	842	22	48	70:1	76	EMS550 B4/W8	6370	25	36	60:1	153
EMS50B4/W5	417	33	18	40:1	76	EMS550 B4/W8	6830	38	24	60:1	153
EMS50B4/W5	915	29	36	70:1	76	EMS200B4/W8R*	4880	38	48	120:1	153
EMS50B4/W5	1,014	44	24	70:1	76	EMS200B4/W8R*	7325	38	72	180:1	153
EMS30B4/W5R*	525	38	48	120:1	76	EMS200B4/W8R*	6072	38	36	60:1	153
EMS50B4/W5R*	695	25	48	80	76	EMS550 B4/W9	6211	25	24	60:1	178
EMS50B4/W5R*	760	33	36	80	76	EMS550 B4/W9	15412	38	72	180:1	178
EMS50B4/W5R*	1,618	44	48	140	76	EMS550B4/W9R*	17004	38	24	60:1	203.2
EMS50B4/W6R*	1,618	44	48	140	102	EMS550B4/W10	17148	38	72	180:1	203.2

Note: With *specification added R transmission proportion represent the multistage reducer above 80.

Performance Data Sheet of EMS Open-close Actuator (220VAC/50HZ)

Output speed rpm		18	24	36	48	72	96	144	192
EMS30	Rated Torque N.m	20	20	17	15				
	Motor Power KW	0.08	0.08	0.08	0.08				
	Stall Current A	7.3	7.3	7.3	7.3				
	Rated Current A	1.8	1.8	1.8	1.8				
EMS80	Rated Torque N.m	24	24	20	17				
	Motor Power KW	0.1	0.1	0.1	0.1				
	Stall Current A	8.2	8.2	8.2	8.2				
	Rated Current A	2.1	2.1	2.1	2.1				
EMS140	Rated Torque N.m	32	28	22					
	Motor Power KW	0.12	0.12	0.12					
	Stall Current A	8.8	8.8	8.8					
	Rated Current A	2.4	2.4	2.4					
EMS200	Rated Torque N.m	81	81	81	63	63			
	Motor Power KW	0.23	0.23	0.28	0.28	0.32			
	Stall Current A	11.6	13	14.1	14.1	16.5			
	Rated Current A	2.8	3.2	3.4	3.4	3.6			
EMS400	Rated Torque N.m	142	142	127	108				
	Motor Power KW	0.35	0.37	0.37	0.37				
	Stall Current A	17.2	18.1	18.1	18.1				
	Rated Current A	3.75	3.9	3.9	3.9				
EMS800	Rated Torque N.m	252	232	184	147	109			
	Motor Power KW	0.8	0.8	0.75	0.8	0.8			
	Stall Current A	36	36	32	36	36			
	Rated Current A	7.8	7.8	7	7.8	7.8			

Performance Data Sheet of EMS Open-close Actuator (380VAC/50HZ)

Output speed rpm		18	24	36	48	72	96	144	192
EMS30	Rated Torque N.m	34	34	34	34	34	34		
	Motor Power KW	0,05	0,05	0,07	0,10	0,13	0,17		
	Stall Current A	1.4	1.8	2.3	3	3.6	3.6		
	Rated Current A	0.45	0.6	0.75	1	1	1.3		
EMS80	Rated Torque N.m	81	81	81	81	61	47		
	Motor Power KW	0.12	0.14	0.19	0.23	0.24	0.24		
	Stall Current A	2.7	3.7	4.7	6.4	6.4	6.4		
	Rated Current A	0.85	1.1	1.5	2.1	2.1	2.1		
EMS140	Rated Torque N.m	108	136	102					
	Motor Power KW	0.15	0.23	0.23					
	Stall Current A	3.7	6.4	6.4					
	Rated Current A	1.1	2.1	2.1					
EMS200	Rated Torque N.m	203	203	203	203	176	142	120	
	Motor Power KW	0.30	0.35	0.47	0.58	0.70	0.70	0.72	
	Stall Current A	6.8	9.25	10.25	13.4	16	16	16.5	
	Rated Current A	2.3	2.8	3.6	4.6	5.5	5.5	5.6	
EMS300	Rated Torque N.m	350	300	250					
	Motor Power KW	0.55	0.55	0.58					
	Stall Current A	12.5	12.5	13.4					
	Rated Current A	4.3	4.3	4.6					
EMS400	Rated Torque N.m	400	400	298	244				
	Motor Power KW	0.58	0.68	0.68	0.68				
	Stall Current A	13.4	16	16	16				
	Rated Current A	406	5.5	5.5	5.5				

Performance Data Sheet of EMS Open-close Actuator (380VAC/50HZ)

Output speed rpm		18	24	36	48	72	96	144	192
EMS600	Rated Torque N.m	610	610	542	474	474	366	275	
	Motor Power KW	0.90	1.05	1.27	1.35	1.90	1.80	2.00	
	Stall Current A	18	25	28	29	41	37	43	
	Rated Current A	6	7	9	8.2	12.5	12	13	
EMS1000	Rated Torque N.m	1020	1020	845	680	680	542	406	
	Motor Power KW	2.10	2.10	2.10	3.7	3.7	3.7	3.7	
	Stall Current A	45	45	45	61	61	61	61	
	Rated Current A	11	11	11	16.5	16.5	16.5	16.5	
EMS1500	Rated Torque N.m	1490	1490	1290	1020	1020	745	645	542
	Motor Power KW	2.75	2.75	4.80	4.80	4.80	4.80	4.80	4.80
	Stall Current A	61	61	95	95	95	95	95	95
	Rated Current A	15	15	25	25	25	25	25	25
1EMS2000	Rated Torque N.m	2030	2030	1700	1355	1355	1020	865	730
	Motor Power KW	4.5	4.5	4.5	7.5	7.5	7.5	3.5	7.5
	Stall Current A	78	78	78	138	138	138	138	138
	Rated Current A	21	21	21	35	35	35	35	35
EMS3000	Rated Torque N.m		3000						
	Motor Power KW		4.8						
	Stall Current A		78						
	Rated Current A		22						

*Because over fast sliding deceleration can speed up the damage of drive shaft sleeve, be cautious to choose rotate speed when mounting gate valve directly.

Performance Data Sheet of the Combination of EMS Open-close Actuator and D/W Gearbox (220VAC/50HZ)

Model of Combination		Scope of Rated Torque Output	Output Speed	Speed Ratio of Gearbox	Max. Diameter of Valve Shaft
EMS30	D4	190~422	18~48	40/70	Φ64
	W4				
EMS80	D4	270~564	18~48	40/70	Φ64
	W4				
EMS140	D5	318~630	18~36	40/70	Φ76
	W5				
EMS200	D5	1009~1556	18~72	40/70	Φ76
	W5				
EMS200	D6	1324~1704	18~72	70	Φ102
	W6				
EMS400	D6	2271~2979	18~48	70	Φ102
	W6				
EMS400	D7	2986~4281	18~48	60	Φ127
	W7				
EMS600	D7	2504~6248	18~72	60	Φ127
	W7				



Performance Data Sheet of the Combination of EMS Open-close Actuator and D/W Gearbox (380VAC/50HZ)

Model of Combination		Scope of Rated Torque Output	Output Speed	Speed Ratio of Gearbox	Max. Diameter of Valve Shaft
EMS30	D4	430~717	18~96	40/70	Φ64
	W4				
EMS80	D4	750~1691	18~96	40/70	Φ64
	W4				
EMS140	D5	1300~2858	18~36	40/70	Φ76
	W5				
EMS200	D5	1621~3900	18~144	40/70	Φ76
	W5				
EMS200	D6	2140~4270	18~144	70	Φ102
	W6				
EMS300	D6	5260~7344	18~36	70	Φ102
	W6				
EMS400	D6	5132~8393	18~48	70	Φ102
	W6				
EMS400	D7	5746~12060	18~48	60	Φ127
	W7				
EMS600	D7	5920~14013	18~144	60	Φ127
	W7				
EMS1000	D8	9350~19480	18~144	60	Φ153
	W8				

Note: 1. The form only lists part of the assembly of primary gearbox and that of secondary gearbox with a speed ratio of above 80:1. Please contact our company for getting detailed materials;
2. As long as the customer provides relevant valve data (diameter, pressure, pressure difference, type of valve, medium flow and temperature), we are responsible for model recommendation.

**Performance Data Sheet of EMSL Linear Adjustable Actuator
(220VAC/50Hz)**

Model	Output speed rpm	18	24	36	48	72
EMSL 30	Diameter/Lead of Drive Shaft mm	26/3				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F10				
	Thrust Adjustment KN	6.50	6.50	5.42	5.42	
	Linear Speed mm/sec	0.9	1.2	1.8	2.4	
	Rated Close Thrust KN	13.00	13.00	11.38	10.84	
EMSL 50	Diameter/Lead of Drive Shaft mm	26/3				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F10				
	Thrust Adjustment KN	10.84	9.76	8.13	7.05	
	Linear Speed mm/sec	0.9	1.2	1.8	2.4	
	Rated Close Thrust KN	22.76	20.60	17.89	14.63	
EMSL 100	Diameter/Lead of Drive Shaft mm	32/6				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	15.37	12.29	9.99	9.60	6.91
	Linear Speed mm/sec	1.8	2.4	3.6	4.8	7.2
	Rated Close Thrust KN	32.65	29.58	22.28	21.19	14.60

Model	Output speed rpm	18	24	36	48	72
EMSL 100	Diameter/Lead of Drive Screw mm	38/14				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	9.34	7.47	6.07	5.84	4.20
	Linear Speed mm/sec	4.2	5.6	8.4	11.2	16.8
	Rated Close Thrust KN	19.85	17.98	13.54	12.84	8.87
EMSL 200	Diameter/Lead of Drive Screw mm	32/6				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	26.89	26.89	21.13	16.13	16.13
	Linear Speed mm/sec	1.8	2.4	3.6	4.8	7.2
	Rated Close Thrust KN	51.09	51.09	41.10	34.19	34.19
EMSL 200	Diameter/Lead of Drive Screw mm	38/14				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	16.35	16.35	12.84	9.81	9.81
	Linear Speed mm/sec	4.2	5.6	8.4	11.2	16.8
	Rated Close Thrust KN	31.06	31.06	24.99	20.78	20.78

**Performance Data Sheet of EMSL Linear Adjustable Actuator
(380VAC/50Hz)**

Model	Output speed rpm	18	24	36	48	72
EMSL 30	Diameter/Lead of Drive Shaft mm	26/3				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F10				
	Thrust Adjustment KN	9.20	9.20	8.45	7.37	
	Linear Speed mm/sec	0.9	1.2	1.8	2.4	
	Rated Close Thrust KN	18.43	18.43	16.26	14.63	
EMSL 50	Diameter/Lead of Drive Shaft mm	26/3				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F10				
	Thrust Adjustment KN	18.43	18.43	16.26	14.63	
	Linear Speed mm/sec	0.9	1.2	1.8	2.4	
	Rated Close Thrust KN	33.06	29.27	29.27	26.02	
EMSL 100	Diameter/Lead of Drive Shaft mm	32/6				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	31.15	31.15	26.12	20.74	18.06
	Linear Speed mm/sec	1.8	2.4	3.6	4.8	7.2
	Rated Close Thrust KN	46.87	41.87	31.15	26.12	20.74

Model	Output speed rpm	18	24	36	48	72
EMSL 100	Diameter/Lead of Drive Shaft mm	38/14				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	18.91	18.91	15.88	12.61	10.97
	Linear Speed mm/sec	4.2	5.6	8.4	11.2	16.8
	Rated Close Thrust KN	28.49	25.45	18.91	15.88	12.61
EMSL200	Diameter/Lead of Drive Shaft mm	32/6				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	58.39	58.39	49.56	39.18	39.18
	Linear Speed mm/sec	1.8	2.4	3.6	4.8	7.2
	Rated Close Thrust KN	78.37	78.37	62.62	52.25	52.25
EMSL 200	Diameter/Lead of Drive Shaft mm	38/14				
	Max. Linear Stroke mm	115				
	Flange Model (ISO5210)	F14				
	Thrust Adjustment KN	35.49	35.49	30.12	23.82	23.82
	Linear Speed mm/sec	4.2	5.6	8.4	11.2	16.8
	Rated Close Thrust KN	47.64	47.64	38.06	31.76	31.76

V. Integral Performance and Specification of Actuator

5.1 Scope of Torque and Rotation

Set the Scope of Output Shaft: 3.5 turns~2,040 turns, Resolution Rate: 11.5°

Set the Scope of Torque: Rated Torque 40%~120%

Working Time of Electronic Lock: The electronic lock forbids the torque protection function for a few seconds after actuator sends out stimulus signal to motor; if actuator does not move within seconds, the control circuit will automatically cancel power supply to motor.

5.2 Cable Entry and Connection Terminal

The size of middle cable entry is M40*1.5 and that of cable entries on both sides is M25*1.5.

Three-phase power (380VAC/50Hz) has 4 terminals and single-phase power (220VAC/50Hz) has 3 terminals; specification is M5.

There are 47 signal terminals in total, with specification M4.

5.3 Device Mounting Connector

EMS series actuator's base form: split base, the interface size connect the base with valve which meeting ISO5210 Standard. The connection of actuator and valve is divided into thrust and non-thrust types. Thrust connection comprises A, Z and Z3, non-thrust connection comprises B1, B3 and B4. Please refer to Pictures 5-1 and 5-2 for drive sleeves used in all kinds of connection and the Pictures 5-3 and 5-4 for actuator installation. For actuator models ranging from EMS30 to EMS550, type A and type Z are not distinguished and are uniformly called type A as a result of improvement to thrust drive parts.

5.3.1 Type A Connection

The amounting base of actuator for type A connection contains a thrust bearing and a dismountable drive sleeve. The thrust bearing is used to stand the counteractive axial thrust from valve operation and the drive sleeve can be disassembled and processed by the customer to match valve shaft.

5.3.2 Type Z3 Connection (Applicable for Models from EMS 30 to EMS550)

Type Z3 connection allows valve shaft with wider external diameter than that of type A connection. In addition, it has longer drive sleeve, increase the length of thread engagement between valve shaft and drive sleeve to lessen the thread's pressure. Type Z3 connection is a special form of type A connection.

Type A and type Z3 connection both belong to thrust connection. EMS30~EMS550 split-type bases use sealed thrust bearing and lifelong maintenance-free grease. EMS30~EMS550 integrated bases, the thrust bearing together with the inner mechanism use the oil for lubrication. Either the split-type or integrated thrust base can defend the entire counteractive thrust from valve, rather than transmit the strength to internal transmission mechanism.

5.3.3 Type B Connection

Type B connection supports mounting base without thrust bearing fits actuators which only provide torque without bear thrust. Type B connection can be applied to such situations as screw drive valve with nut attached and combination of secondary worm-gear box and actuator. The drive sleeve for type B connection is designed according to ISO5210 Standard in size. Type B connection is divided into three forms- B1, B3, B4.

5.3.4 Type B1 Connection

The drive sleeve for type B1 connection is equipped with a big axle bore and keyway to connect with the thrust nut assembly of rising-stem valve.

5.3.5 Type B3 Connection

The drive sleeve of type B3 connection has relatively small axle bore and keyway.

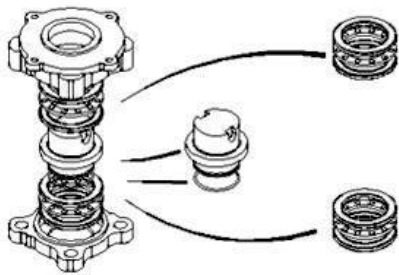
5.3.6 Type B4 Connection

The mounting base and drive sleeve dimension for type B4 and B3 connection are almost same only one different, that is the type B4 drive sleeve do not have axle bore and keyway which shall be processed by valve manufacturer or user according to the actual situation. Choose type A connection to drive rising and rotary valve stem.(The shaft to point the valve not only do the rotation but also do the axial movement)

For EMS30-550 actuators which seem ok to choose type B3 and B4 connection to valve in appearance, must apply type A connection if rising valve stem is involved. For any doubts on specific situation, please feel free to contact us.

Sketch Map of Device Mounting Connector:

Thrust Type



Picture 5-1 Sketch Map of Connection Form of Split-type Mounting Base with Thrust Drive Sleeve of EMS30-EMS550 Actuators

Non-thrust Type



Picture 5-2 Sketch Map of Connection Form of Split-type Mounting Base with Non-thrust Drive Sleeve of EMS30-EMS550 Actuators

Type B1: Applicable for EMS30-EMS550 Actuators with Relatively Big Fastening Bore; Bore and Keyway in Accordance with ISO5210 Standard

Type B2: Applicable for EMS30-EMS550 Actuators with Relatively Small Fastening Bore; Bore and Keyway in Accordance with ISO5210 Standard

Type B3: Applicable for EMS30-EMS550 Actuators with No Fastening Bore; Bore and Keyway shall be Individually Processed by Customer in Accordance with ISO5210 Standard.

5.4 Vibration

The permissible vibration frequency and strength of EMS series actuators for normal operation is 0.5 times gravitational acceleration within 10Hz~200Hz.

5.5 Enclosure Protection and Explosive-proof Standard

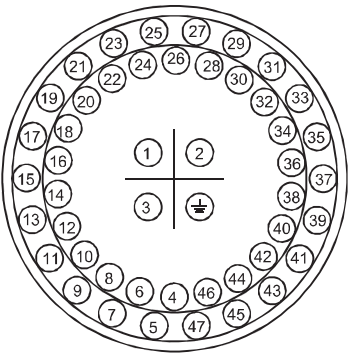
Water-proof Type: In Accordance with GB4208-93 IP68 Protection Standard

Flameproof Type: In Accordance with GB3836.2-2000 Exd II BT4 Flameproof Standard

VI. Control and Wiring of Actuator

Refer to Picture 6-1 for general internal wiring diagram of EMS series actuator;

Refer to Table 6-1 for terminal explanation of sunflower connecting box.



Note: *items in table 6-1 refer are options; after some options are chosen (refer to table 6-2), the relevant terminal number have selected functions.

Form 6-1 Terminal Explanation Table of Sunflower Connecting Board

Terminal No.	Name of Terminal	Meaning of Terminal	Terminal No.	Name of Terminal	Meaning of Terminal
	Earthing Mark	Earthing	15	Battery Relay 2 end*	Low Power Indicating Relay's Output Contactor 2
1	380VAC1**	380V Alternative Current Input Terminal	16	Temperature Relay 1end*	Motor's Overheat Indicating Relay's Contactor 1
2	380VAC2**	380V Alternative Current Input Terminal			
3	380VAC3**	380V Alternative Current Input Terminal	17	Temperature Relay 2 end*	Motor's Overheat Indicating Relay's Contactor 2
4	DC Power 0V	24V Unregulated Direct Current "-" Output Terminal			
5	DC Power 24V	24V Unregulated Direct Current "+" Output Terminal	18		
6	Relay S1 Terminal 1	Relay S1 Output Contactor 1	19	Remote Relay Common end*	Remote/ Local Indicating Relay Common Terminal
7	Relay S1 Terminal 2	Relay S1 Output Contactor 2	20	Remote Relay NC*	Remote/ Local Indicating Relay NC
8	Relay S2 Terminal 1	Relay S2 Output Contactor 1	21	Remote Relay NO*	Remote/ Local Indicating Relay NO
9	Relay S2 Terminal 2	Relay S2 Output Contactor 2	22	Valve Position Feedback Current (+)*	Valve Position Feedback Current (+) Terminal
10	Relay S3 Terminal 1	Relay S3 Output Contactor 1	23	Feedback Current (-)*	Valve Position/ Torque Feedback Current (-) Terminal
11	Relay S3 Terminal 2	Relay S3 Output Contactor 2	24	Torque Feedback Current (+)*	Torque Feedback Current (+) Terminal
12	Relay S4 Terminal 1	Relay S4 Output Contactor 1	25	Emergency Action	Emergency Action Signal Input Terminal (+)
13	Relay S4 Terminal 2	Relay S4 Output Contactor 2	26	Valve Control Current (+)*	Valve Position Control Current Input (+)
14	Battery Relay Terminal 1*	Low Power Indicating Relay Output Contact 1	27	Valve Control Current (-)*	Valve Position Control Current Input (-)

Terminal No.	Name of Terminal	Meaning of Terminal	Terminal No.	Name of Terminal	Meaning of Terminal
28	Earthing Mark	Earthing	40	Remote High-voltage Common Terminal	Emergency Action, Remote Open/Close, Stop/Retain signal input high-voltage common Terminal
29	Open Relay Terminal 1*	Indicating Relay Contact 1 when actuator is at the "open limit" position			
30	Open Relay Terminal 2*	Indicating Relay Contact 2 when actuator at the "open limit" position	41	Manual/ Automatic Low-voltage Common Terminal	Manual/ Automatic Signal Low-voltage Input Common Terminal
31	ACT-Forbidden Low-voltage Common Terminal	Open/Close act-forbidden signal input Low-voltage Common Terminal	42	Monitoring Relay Common Terminal	Monitoring Relay Contactor Common Terminal
32	Act-forbidden High-voltage Common Terminal	Open/close Act-forbidden Signal Input High-voltage Common Terminal	43	Monitoring Relay Terminal 1	Monitoring Relay Electrical Contactor NC Terminal of (Non-stimulation)
33	Remote Close	Input Terminal of Remote Close Signal	44	Monitoring Relay Terminal 2	NO Terminal of Monitoring Relay Contactor (Non-stimulation)
34	Stop/Retain	Input Terminal of Stop/Retain Signal	45	Manual/Automatic High-voltage Common Terminal	Manual/Automatic Signal High-voltage Input Common Terminal
35	Remote Open	Input Terminal of Remote Open Signal		Close Relay Terminal 1*	Output Contactor of Indicating Relay as Actuator at the "Close Limit" position
36	Remote Low-voltage Common Terminal	Emergency Action, Remote Open/ Close, Stop/ Retaining Signal Input Low-voltage Common Terminal		Close Relay Terminal 2*	Output Contact or of Indicating Relay as Actuator at the "Close Limit" position
37	Open-Valve without Act	Input Terminal of Open Valve Without Act Signal			
38	Close-Valve Without Act	Input Terminal of Close-Valve without Act Signal			
39	Manual/ Automatic Select Terminal	Input Terminal of Manual/Automatic Signal			

Note:

Note:

1.Item ***** is for single-phase motor,220VAC is connected with terminal 1 and 2, terminal 3 is free.

2.Item * refers to option; after some options are chosen (refer to the table below), the relevant terminals have chosen functions.

3.The wiring diagram of this kind of actuator is similar with that of HK, pay attention to the different terminal numbers on sunflower connecting board.

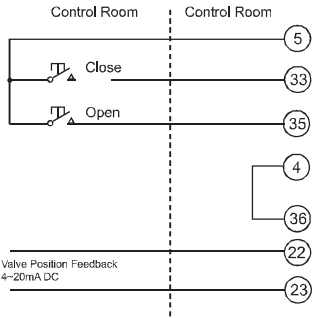
4.Please consult us if the above information can't meet your requirements.

6.1 Local Control

When the mode select knob is set to local control position, the actuator can be opened or closed through local operation button. The local operation can be set as inching or retaining operation mode.

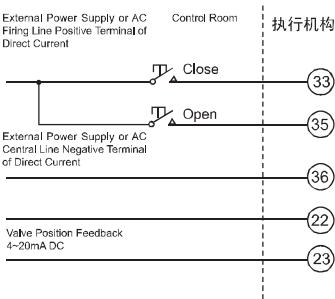
6.2 Remote Open-Close Control (Remote Manual Control)

Remote control circuit can be supplied by internal 24V DC power, external 24V~60V AC or DC power 120V~220V DC or AC power. Refer to pictures 6-1 to 6-9 for all forms of wiring diagram. (The sequence numbers in pictures refer to terminal numbers on sunflower connecting board.)

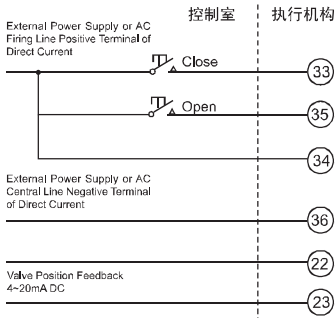


Picture 6-1 Form 1: the inching switch/ close control
actuator can stop at any position halfway

6.2.2 Pictures 6-4 to 6-6 are to external 24~60V DC or AC power supply

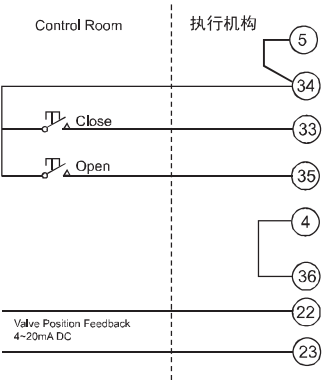


Picture 6-4 Inching Open/Close Control
The actuator can stop at any position halfway.

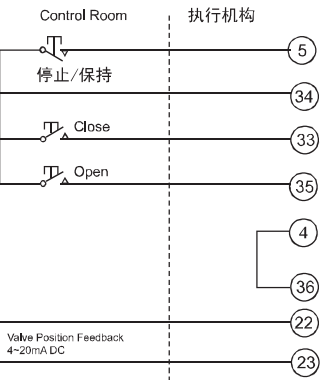


Picture 6-5 Form 2: Self-latch Open/Close Control
The stroke can be reversed but can't stop at any position halfway

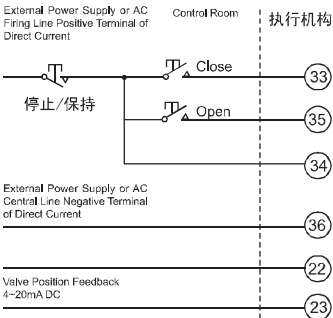
6.2.1 Pictures 6-1~6-3 are to internal 24V power supply



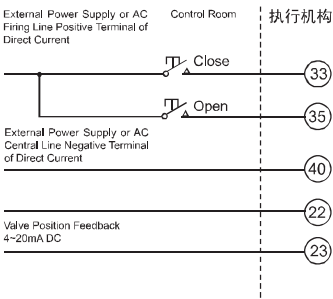
Picture 6-2 Form 2: Self-latch Open/Close Control
The stroke can be reversed but can't stop at any position halfway



Picture 6-3 Form 3: self-latch Open/ Close/ Stop Control



Picture 6-6 self-latch Open/ Close/ Stop Control



Picture 6-7 Inching Open/Close Control
The actuator can stop at any position halfway.

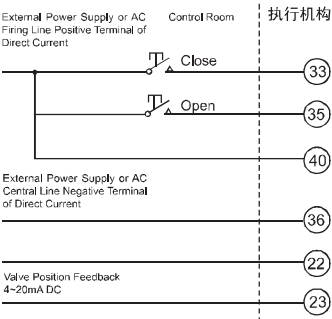
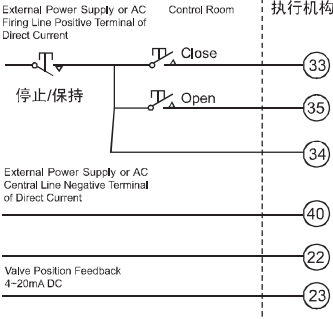


图6-8 保持式关闭控制，行程可逆，但不能停在中途位置

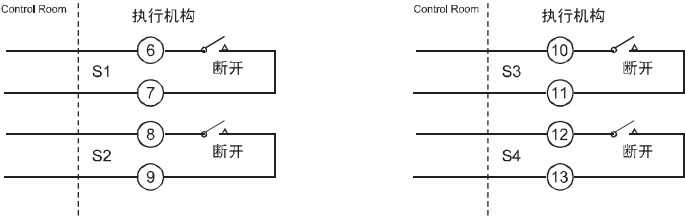


Picture 6-9 Form 3: self-latch Open/ Close/ Stop Control

6.3 Status Indicating Relay

There are 4 status indicating relays on each EMS actuator, with each having a passive contact capacity of 5A/250VAC or 5A/30VDC and each is available to be set open or close in certain situation. Refer to Manual Instruction of Installation and Debugging for details. The contact wiring of status relay contactor is as Picture 6-10 below.

When the main power is off, the contactors S1~S4 remain the status before cutting off power off and the actuator's status remains unchanged during the period of cutting off the power off.



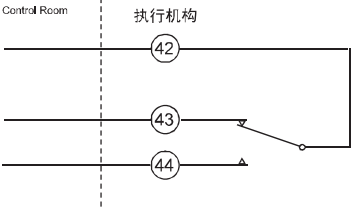
Picture 6-10 Wiring Diagram of Status Relay Contactors.

6.4 Monitoring Relay

This kind of relay has a group of passive change-over contactors with a capacity of 5A/250VAC or 5A/30VDC. The relay loses stimulation under the following conditions:

Power off or phase shortage; main control circuit fault; mode select knob is not at the remote position; temperature relay trips

In conclusion, the monitoring relay is used to inspect whether the actuator can be controlled. External wiring diagram is shown in Picture 6-11.



Picture 6-11 Wiring Diagram of Monitoring Relay (42 and 43 are NC terminals when the relay is not energized.)

6.5 Emergency Action Control Function

On sunflower connecting board, terminal number and signal common terminal respectively are 25 and 36. If the actuator is set access to emergency action, the actuator will move to the preset safe position (full open or full close) when emergency action signal triggers emergency action function.

6.6 Remote Action Forbidden Control Function

On sunflower connecting board, terminal number of open-valve forbidden signal is 37, terminal number of close-valve forbidden signal is 38 and the common terminal number is 31. The actuator can be set access to remote action forbidden by setter. In this situation, if the forbidden signal is low-voltage, then the actuator is forbidden to move to the corresponding direction. Action forbidden signal enjoys higher priority than emergency action signal. Below is examples to illustrate the application of action forbidden function.

Regarding to conduct open/close control over high-flow steam pipeline, in order to lower the requirement on the torque of actuator, respectively install a gate valve driven by actuator on mainline and subline. The two valves are operated in such principle: if the valve on sideline is not at full-open position, the valve on mainline does not execute opening action; if the valve on mainline is not on full-close position, the valve on subline does not execute close action. This function is hereby realized by remote action forbidden function of EMS actuators. Picture 6-12 shows its external wiring diagram.

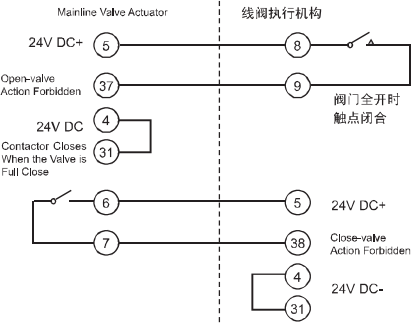


图6-12 禁动功能应用实例

6.7 Optional Functions of Actuator Refer to Form 6-2

6.7.1 Alarm Relay

Remote input/ relay board can be added the following 5 optional relays in addition, with the passive contactors of each relay connected to the board:

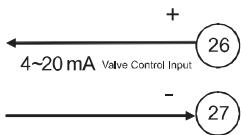
- Extreme position close indicating relay with normal open contactor
- Extreme position open indicating relay with normal open contactor
- Low-voltage battery alarm relay with normal open contactor
- Temperature relay alarm relay tripping with normal open contactor
- Remote/ local indicating relay with change-over contactor

6.7.2 Analogue Input/ Output Board

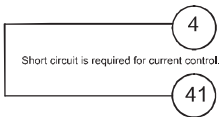
- The board is used to process the following signals:
- Analogue Input Signal- by which the actuator can automatically control valve position in proportion with analogue current signal, the user can choose signal scope between 4mA~20mA and 2mA~10mA by select.
- Valve Position Feedback Output convert valve position into 4mA~20mA analogue signal remote output.
- Torque Signal Output convert torque it into 4mA~20mA signal remote output in proportion.

6.8 Analogue Control of Actuator

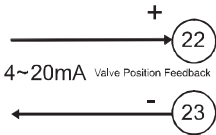
- The actuator can accept DC analogue current signal and control valve position automatically in proportion.
- Input 4~20mA current signal into terminals 26(+) and 27(-) to carry out remote proportional control over actuator and form closed loop control system with the 4~20mA valve position current feedback.



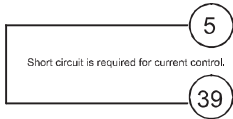
Wiring Diagram 1 for Current Control



Wiring Diagram 2 for Current Control



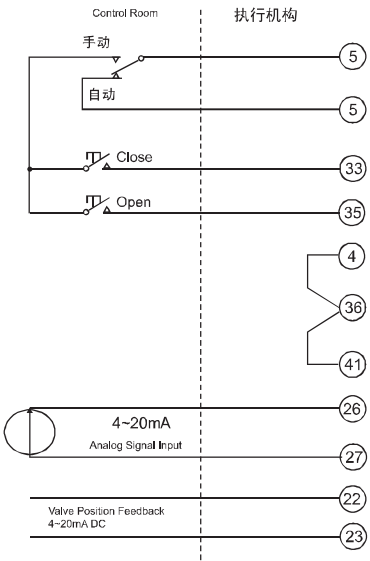
Wiring Diagram for Position Feedback



Wiring Diagram 3 for Current Control

Measures in case that Input Signal Failure

- It is regarded as signal failure when the input signal is 50% lower than low-end signal. Actions when signal failure can be set as keeping the original position or moving to valve position corresponding to high-end signal or low-end signal.
- Refer to wiring diagram Picture 6-13 in need of exchanging on-off control system with analogue control system for remote operation in control room.
- In case of applying external 120~220V or external power supply to changing control circuit, the user may refer to pictures 6-1 to 6-9 about remote open-close control and design by choosing different design thought of power.



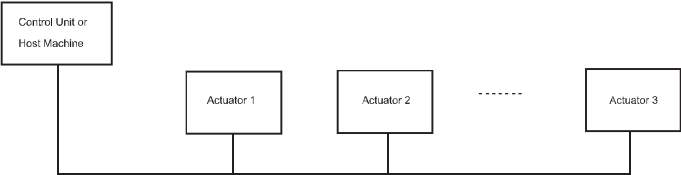
Picture 6-13 Wiring Diagram of Remote Manual and Automatic Control and Change-over Circuit (Change-over circuit shall be internal 24V power supply.)

Valve Position Feedback Signa

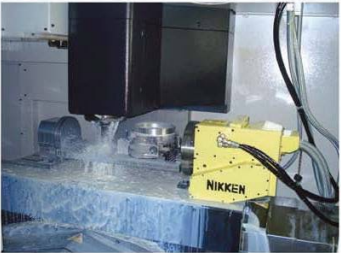
- EMS actuators offer 4~20mA valve position feedback signals and output from terminals 22(+) and 23(-), with maximum external load of 400Ω and precision of 0.5%.

6.9 Fieldbus Control

The fieldbus communication card of actuator includes HART bus communication card, Modbus communication card, CAN bus communication card, Profibus communication card and FF bus foundation communication card. The control system made up of fieldbus is shown in the following Picture 6-14.



Picture 6-14 Fieldbus Control System



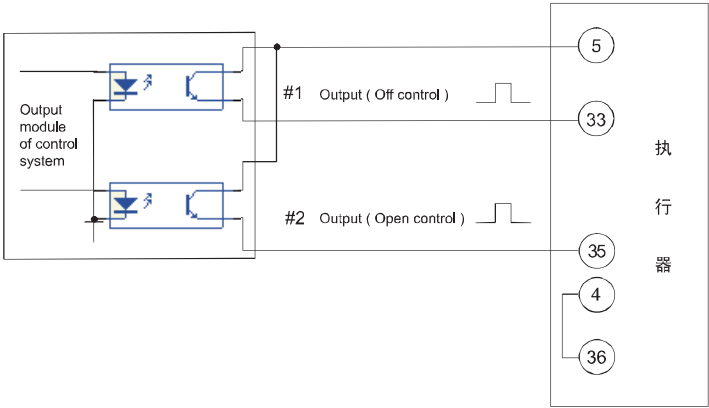
6.10 Wiring Diagram No. of EMS Series Actuator

Item No.	Optional Functions					Wiring Diagram No.
Basic Circuit	Low-power Battery Alarm Relay of , Remote Indicating Relay, Overheat Motor Alarm Relay	Closing Extremity Indicating Relay, Opening Extremity Indicating Relay	Analogue Signal Input	Valve Position Feedback Current Output	Torque Feedback Current Output	
√	-	-	-	-	-	100-00
√	√	-	X	X	X	101-**
√	-	√	X	X	X	102-**
√	√	√	X	X	X	103-**
√	X	X	√	-	-	1**-01
√	X	X	-	√	-	1**-02
√	X	X	√	√	-	1**-03
√	X	X	-	-	√	1**-04
√	X	X	√	-	√	1**-05
√	X	X	-	√	√	1**-06
√	X	X	√	√	√	1**-07

6.11 Pulse Control

If the user needs to apply pulse to incremental position control over the actuator, this mode of control is suitable for EMS series actuators.

Wiring Diagram is as below:



Requirement on pulse is additionally stated as below:

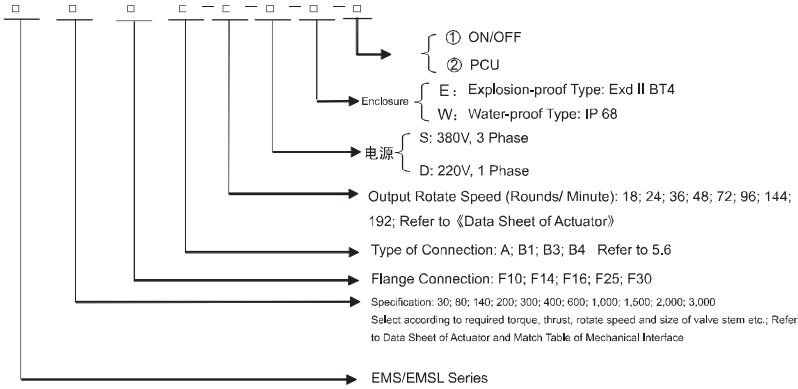
(1) Width of pulse is determined by the following formula:below:

$$\frac{18 \times 10^4}{32N} > \text{Pulse Width} > \frac{6 \times 10^4}{32N} \text{ ms}$$

(Time of Action Stoppage): Meet the requirement of 50% Connection Rate and 1,200 Times/ Hour Startup Frequency.

VII. Explanation on Model Selection Marks

Please indicate each item of product models seriously. The wiring diagram number after the model indicates the type option of actuator. For request of outboard secondary gearbox, please indicate the model of gearbox.



Refer to 6.10 for Details

Example: EMS200F14A-24-S-W-On/Off indicates that the actuator's max. torque is 204N.m, connecting flange is F14, drive connection is type A, rotate speed of output shaft is 24 rounds/Min., power is 3-phase and 380V, enclosure is IP68 water-proof and wiring is on-off type.

7.2 Model Mark of Reduction Gearbox (Model of Secondary Reduction Gearbox is included)

Transmission Ratio
Seat No. of Reduction Gearbox
Reduction Gearbox Series-D, W Refer to 《Actuator Combination Data Sheet》 for D,W

