川仪股份
CYAC

Operation Manual

M Series Intelligent Electric Actuator

M85/86d



Chongqing Chuanyi Automation Co., LTD. Actuator Filiale

V002510

Preface

Thank you for using M85/M86d Series Electric Actuator, please read this Manual carefully before installation and commissioning.

(1) About this Operation Manual

(1) This Operation Manual will be delivered to and used by end user. Please keep it carefully;
(2) Please read this Operation Manual carefully to understand fully the method of product operation before operation;
(3) Extracting or copying part of or the whole Operation Manual is forbidden without permission;
(4) The content of this Operation Manual may be changed without prior notice;
(5) We have endeavored to ensure its correctness during the preparation of this Operation Manual. Any mistake or omission, please contact with Marketing Department.

(2) Safety Cautions

(1) In order to protect and ensure safety of this product and the system controlled thereby, follow the safety instruction and cautions in this Operation Manual when using the product. We are not responsible for any bad consequence due to noncompliance with the Manual.
(2) If any independent protective unit or safety circuit is going to be installed on the product or the system controlled thereby, make sure such equipments are installed on the outside of the product. Please do not attempt to change this product or install such circuit in this product.
(3) When replacing spare parts or consumables of the product, please use the parts recommended by our factory.

■ Disclaimer for the Product

（1）We don’t provide any guarantee except for those mentioned in the Warranty otherwise provided;
（2）We are not responsible for compensation of any losses to the concerned party caused by unpredictable product flaw during direct or indirect using process.

■ Environmental Protection Item

In order for better protection environment and human health, when users install, repair and maintain the product or the lifetime of product is over, please observe national/regional laws and regulations, properly handle the material generated by recycling the actuators. Deliver them to the local manufacturers with the state-recognized recycling qualification. The type of waste materials include:
(1) Substituted damaged and scrap materials, such as coated metal parts, screws, nuts and batteries, cables and other rubber and plastic parts.
(2) Waste lubricants and lubricants spilled during use.
(3) Waste circuit boards and electronic components.
(4) Other waste materials.
If you have any question, please contact with us after-sale staff.

■ Special Cautions

------ To insure the operation pressure inside to release and no lubricant leaking occurs:
（1）After installation is completed, the oil plug screw at the highest point of the M86d series (adjustable type) actuator must be replaced with the vent screw provided in the spare parts! The M85d series (switching type) is not required.
------ To insure product reaching **the stated protection and protect inside structure from the damage because of sealing:**
（2）Put the cable through the lead collar accompanied in spare parts and tighten it!
（3）Tighten the hood screw after installation and adjustment!
（4）Forbidden to open explosion-proof cavity in electricity, open the explosion-proof cavity after power off for 5 minutes.
（5）Do not damage cover and explosion-proof combination surface during installation and maintenance. Tighten concerned screws after maintenance.
（6）It’s forbidden to change spare parts randomly. If it’s necessary to change, please use our appointed spare parts.
（7）When installing Angle Electric Actuator, please match the valve's off position strictly with the electric actuator's off position.
Any losses due to noncompliance of installation requirement are not within warranty scope.

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Instruction to Out-of-box Inspection, Transportation and Storage

1 Out-of-box Inspection

Each actuator was inspected strictly to ensure product quality before leaving factory. Please make the following inspections when opening the actuator package:

- Check whether the actuator is damaged in transportation.
- Check whether the actuator model conforms to that printed on the outside package and whether the actual items in the package conform to the packing list.

2 Transportation and Storage

- Transportation temperature: -30°C~+75°C; storage temperature: -10°C~55°C.
- Place the actuator in indoor and dry environment to avoid condensation in case of no special package.
- Appropriate package and desiccant must be provided for transportation or storage under environment of humidity or corrosive gases; check the desiccant regularly for effectiveness.

3 Safety Instructions

According to the design purpose, the actuator is a dedicated device for driving the terminal control unit (valves, baffles, etc.). Improper operation can pose a danger to the operator. When in use, attention should be paid to:

The installation, disassembly, commissioning, operation and maintenance of the actuator must be carried out by qualified professional technicians. At the same time, necessary protective equipment such as safety helmets, safety ropes, goggles, work clothes, insulating gloves and labor protection shoes should be worn. In case of special circumstances, it must be carried out under the guidance of our company's professionals.

After the actuator is installed, it is strictly prohibited to hang any items on the handwheel.

Manual operation must strictly follow the handwheel operation instructions in this guide. It is prohibited to operate the handwheel while the power is on.

When operating the actuator in a high-temperature environment, the operator must wear special protective gloves to prevent work-related injuries caused by the heating of metal parts.

In hazardous areas, it is strictly prohibited to use conductive or heat-conducting materials to come into contact with the actuator. The power supply should be cut off, the actuator removed and moved to a safe area for maintenance or repair.

The lubricating oil that spills during the oil change process should be cleaned up in time to avoid accidents.

When opening the cover, the operator must strictly follow the safety operation procedures: cut off the power supply first, and wait for 5 minutes before conducting operations such as electronic component inspection and replacement.

1 Overview

M8500/M8600 series conversion-frequency actuator is professional equipment for driving unit of terminal control (value, baffle and so on).

This product takes the high-performance digital signal controller (abbreviated as DSC) as its core and adopts the contemporary advanced frequency conversion control technology, achieving ideal flexible starting and flexible positioning control, and reducing mechanical shock. I t has a series of self-diagnose and self-protect function for over torque and over heat. It has excellent protect effect to terminal adjusted unit of value. It adopts conversion-frequency control, which can flexible adjustment for output thrust (torque) during orientation process to realize high-precision orientation and without over rush. Its start-current approach motor's rating current, which is start-current of routine switch control for one-eight to one-fourth and reduce strike for this produce's driving part and motor. It has high-reliability.

According to the user's requirements, this product can also have infrared communication functions or bus communication functions that comply with MODBUS, HART, PROFIBUS-DPV1, and FF protocols, enabling digital communication control, rapid setting, remote control operation, fault diagnosis, and information collection of the product.

This produce widely applies to electricity, metallurgy, oil, chemicals, building materials, urban water supply, sewage treatment, and other industries with high control requirements of the occasion.

2 Grade of protect

Adopt double seal structure, it can ensure to reach IP68 grade of protect.

3 Structure and principle

3.1 General Structure and Working Principles



Fig. 1 Main Parts

The actuator is by the composition of the conversion-frequency motor, position sensor, worm wheel, worm, driving shaft, control unit, local operation panel, hand-wheel.

The control unit accepts 4～20mA or discrete control signal and driving motor's turning. The motor drives worm which driving worm wheel again to drive output shaft turning. The position sensor checks position of motor's turning and transmit position of value to control board. When the control board checks that the position signal and given control signal is the same as position appointed, cutting motor's power, the self-lock character of the worm and worm wheel make the actuator stop running.

3.2 Structure of electric parts and principle

The electrical parts mainly involve connection terminal board, power filtering board, CPU board, conversion-frequency board, hall sensor board and so on.

The terminal block provides external wiring, including input and output terminals for control signals, power terminals, etc., which are located inside the terminal box.

The power filtering board locates in operation faceplate-cover. It makes up of power filtering, fuser and resistance/capacitance filtering network which fulfill power filtering to realize EMI protect. Main power enter into connection terminal by power filtering board outputting to conversion-frequency which supply power for the device.

The CPU board and signal board locate inside operation faceplate-cover and signal board locate in the back of CPU. The switch-box's knobs on the button of operation faceplate operate by magnetism part effecting into magnetic switch. They realize operation and control without contact.

The CPU board mainly makes up of micro-controller, digital analog input/output channels, operation switch, display and so on, which is control core in the device. The analog adjustment signal inputs to the CPU by the signal board. The feedback signal fulfills D/A switch by the CPU board and outputs direction volts d.c. into the signal board. The signal board fulfills photo-electricity separation and V/A switch, which output to up-system. After the displacement of output shaft has been checked by the hall sensor, it outputs pulse signal into the CPU board and fulfills count and switch. The discrete signal outputs the relay of 1-4 on the CPU board. The discrete signal outputs the relay of 5-7 on the signal board.

The conversion-frequency board locates inside operation faceplate-cover. It directly installs bottom of the device's cover. It main makes up of power transformer, main relay,theIGBT module and control circuit. The transformer supplies for the device. The IGBT module accepts CPU board control, which fulfill AC-DC-AC switch. It realizes conversion-frequency control to the motor.

3.3Additional gearbox

Some actuator equipped with additional gear-box to meet customer's special requirement of torque.The digital brand on the additional gearbox record concerned input torque and force and so on.

4 Technique parameter

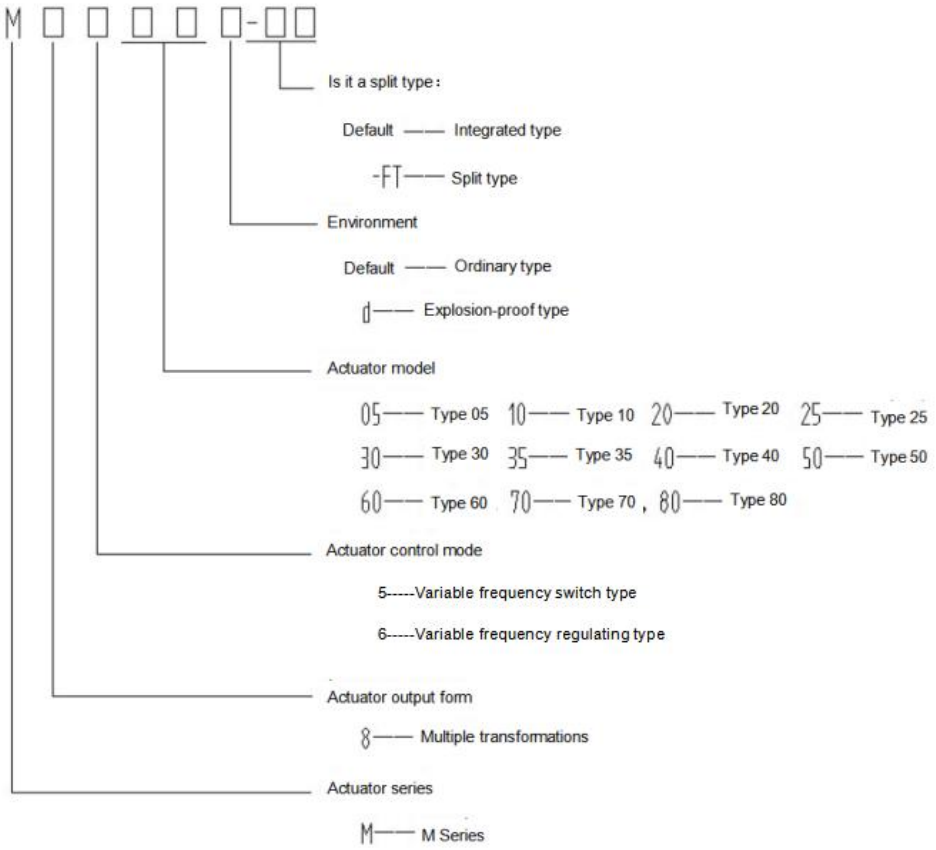


Figure 4.1 Basic Model Format of M85/86d series actuators

4.1 Currency data

Power voltage: AC 380V 3PH；-15%/+10%；50Hz/6OHz±5%

Optional choose:**AC** 460V 3PH；-15%/+10%；50Hz/60Hz±5%

AC 220V 1PH；-10%/+10%；50Hz±5%

(According to user's request)

Voltage output: 24V DC Max.15 mA, It has output short protect.

Motor control: Three phases conversion-frequency control

Working mode: S4—25% 1200 times/hour, according to **IEC**34

The protection degree: IP66/IP67/IP68.

Humidity: ＜95% average (to avoid atomization, please use heater).

Ambient temperature: -40℃- +70℃

Installing position: at will. But you should avoid two oil discharge plugs to be in or approach the same level.

Electric connection: see the seventh part

The shortest setting pulse: 50ms full pulse

Dead band of the controller : 0.5%；(0.2%-10%can be adjusted.)

Analog signal input (optional choose): 4mA-20mAd.c.（M86□□） Isolation with electricity, rising characteristic, input voltage is less than 10 V.

Digital input(E1-E4): four routes light coupling isolation input, potential independent, free configuration

Digital 0: -3V～+5V or open circuit.

Digital 1: +12V～+35V

Analog output(optional choose): 4mA～20mAd.c.position signal, load capacity, Max.500Ω,isolation with electricity.

Digital output: 4 standard output (A1-A4) and 3 options (A5-A7); electrical isolation, free configuration: maximum voltage 250Va.c., Maximum current <5A, minimum current >1mA.

5 Lubricate

5.1 Actuator

The actuator need to use lubricate. There is unlimited on the location of the installation(see 6.2 part of the instruction manual). You needn't to change lube during the whole life of the actuator.

When supplying goods, both oil drain holes are sealed with oil drain plugs. Once the actuator is installed in place, to prevent the actuator from heating up during operation and causing the internal air of the casing to expand and increase the pressure, the top oil drain bolt of the M86d series (regulating type) actuator needs to be replaced with the exhaust plug provided randomly. This is not necessary for the M85d series (switching type).

5.2 Lube

table.3 Lube

Actuator	Oil	The type of oil	The range of temperature
M8610/M8510	0.3L	Heavy-load gear oil	-40℃～+70℃
M8620/M8520	0.3L		
M8630/M8530	0.4L		
M8640/M8540	0.8L		
M8650/M8550	0.8L		

5.3 Additional gear-box

Some actuators need to connect a additional gear-box for upgrade output torque and limit running range. So they need to lubricate for upgrading life.

5.3.1 Worm wheel

We advise to change a lube after running six years.

5.3.2 Linear switch unit

We advise to change a lube after running 4-5years.

5.4 Assistant output module (A mode)

For lever/linear switch, the actuator can install assistant output module A. It lubricates interior axletree by lube of module connection sleeve. It need to replenish lube every other two months.

Use the same lube to valve's stem.

6 Installing

6.1 The inspection of actuator

- Whether the actuator was proper connect with the value.
- Whether using the most top of discharged oil bolt to change discharged gas with random.
- Checking setting valve of cutting torque (P1.3, P1.4), torque setting shouldn't be over stated range of the 11thpart.
- Checking speed setting (P1.5,P1.6)

6.2 Installing notes

- Installing position is unlimited. But you should avoid two oil diacharge plugs to be in or approach the same level.

- All directions of the actuator can operate with hand, electric connection or local.

Special note：When electric actuator (M8510d～M8530d/M8610d～M8630d) combine with the corner-type gearbox(with lever A8005L～A8090L) ,there is interference when output lever run to upper position , see Fig.2, (fig 2a-b) is standard combination position when leaving factory. For fig 2c and 2d of table 4 "×" shows interference happened in assembly, it's not recommended to adopt. Except standard installation position, user should estimate if there is interference of lever turning position when other combination position is used.

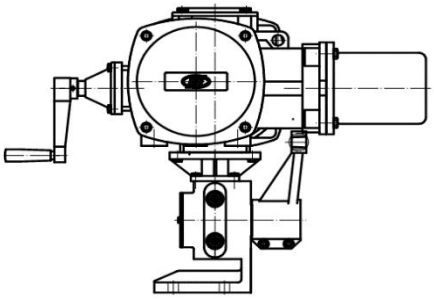


Fig. 2a

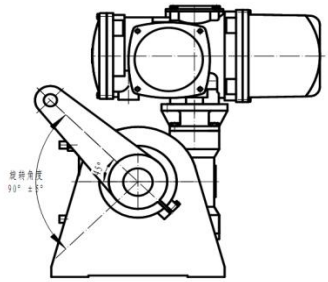


Fig. 2b

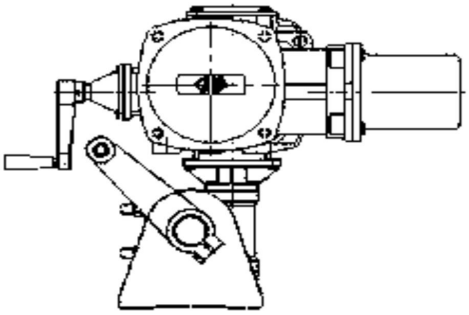


Fig. 2c

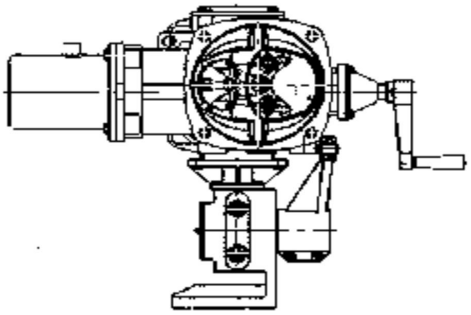


Fig. 2d

Fig 2 Position diagram of electric actuator and corner-type reducer with lever

Item	Model	Installation way		
		Fig 2c	Fig 2d	
			Lever on the left	Lever on the right
1	M8$^{5}_{6}$10+A8005L			
2	M8$^{5}_{6}$10+A8010L	×		
3	M8$^{5}_{6}$20+A8020L	×		
4	M8$^{5}_{6}$20+A8040L			×
5	M8$^{5}_{6}$30+A8040L			×
6	M8$^{5}_{6}$30+A8090L			×

Note: 1. Lever on the left or the right is depends on the situation of facing the lever and above the actuator.

2. Marking with "**×**"means not suitable to use combination collocation because of interference.

- If the actuator exposures in heat-source, it need to use separate layer or heat-shield.
- When the outer power is interrupted, the actuator use the back-up lithium battery to record manual valve's running. The lithium battery is installed the top of connection terminal box. When the top switch of battery should be cut during transport and stock, the battery circuit is disconnect. After installing and adjusting, the switch need to dial connected position.

- When exceed the factory, the actuator isn't be pre-adjustmented (the range of operation isn't defined). After connection of machine and electric, adjust running range again.(see P1.1 and P1.2 of 8.1.1)
- The handwheel and ventilation plug for replacement supplied by manufacturer are not installed before leaving factory. After installation the whole set, the supplied parts should be installed and displaced.
- When user purchase the electric actuator (M8300/ 8400) without additional unit or second stage reducer, manufacturer should supply accessories: one piece of positioning ring (see graphic representation in page 13), it's not installed when leaving factory. User must install it during connection.
- The actuator's eyebolt is only used for hoisting actuator.After the actuator and converter or valve are assembled, the whole weight increase. You need to adopt suitable binding rope in right position when rise.

7 Electric connection

The external wiring terminal of the actuator is shown in Figure 3a, and the electrical connection schematic diagram is shown in Figure 3b. Table 5 shows the terminal functions. The electrical wiring is directly connected to the terminal row of the terminal box through cables. The connection points are arranged in the connection chamber and the shell of the actuator. Grounding is an important measure to ensure the personal safety of the operator and anti-electromagnetic interference. Please be sure to ground reliably when using.

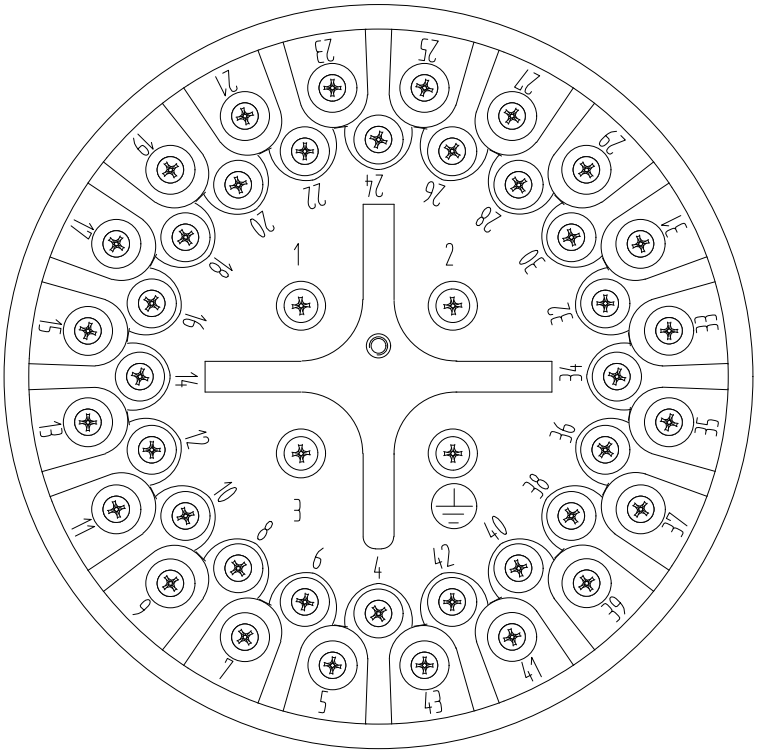


Figure 3a. The external wiring terminal of the actuator

Table5 Terminal function

Function Name	Terminal number	Function description	Remarks
Power Supply	1、2、3	Three-phase power supply (no phase sequence).	standard
Grounding	⏚	Ground protection.	standard
Digital input 1（E1）	14（+）	actuator opening instruction.	standard
Digital input 2（E2）	15（+）	actuator closing instruction.	standard
Digital input 3（E3）	16（+）、20（-）	Remote analog control (24V)/remote	standard

		switch control (0V) switching; When the ESD function is available, it is the ESD control input	
Digital input 4（E4）	17（+）	The actuator is stopped	standard
Common point（COM）	18（-）	The common negative terminal of the open instruction, close instruction, and stop instruction	standard
Digital output 1（A1）	4、5、6	For fault signal, terminal 4 is the common terminal. In normal time, terminals 4 and 5 are on, while in case of failure (or power loss), terminals 4 and 6 are on.	standard
Digital output 2（A2）	7、8、9	Local/Remote state feedback signal; terminal 7 is the common end; when the actuator is in Local, terminals 7 and 8 are on; when the actuator is in Remote, terminals 7 and 9 are on.	standard
Digital output 3（A3）	10、11	Open in place signal, when the actuator is in full open position, terminals 10 and 11 are on.	standard
Digital output 4（A4）	12、13	Close in place signal, When the actuator is in the fully closed position, terminals 12 and 13 are on.	standard
Digital output 5（A5）	25、26、27	Open over-torque alarm signal, terminal 25 is the common end, and terminals 25 and 26 are connected when alarming.	**optional**
Digital output 6（A6）	28、29、30	Turn off the over-torque alarm signal, terminal 28 is the common end, and terminals 28 and 29 are connected when alarming.	**optional**
Digital output 7（A7）	31、32	Operation signal of actuator, terminals 31 and 32 are switched on during normal operation.	**optional**
Adjust the analog input	33（-）、34（+）	4 mA ~ 20 mad. c. input, M86d series configuration, M85d series not.	**optional**
Feedback analog output	35（-）、36（+）	4 mA~ 20mad.c. The output, M86d, M85dC series configuration	**optional**
24Vd.c. output	21/23（+）、22/24（-）	External output of actuator 24Vd.c. Power interface, output current ≤ 15mA.	standard

Note: Digital output A1-A4 output is standard configuration, A5-A7 is optional when ordering, all functions in the table are factory.
The default configuration allows the user to configure A1-A7 as needed.

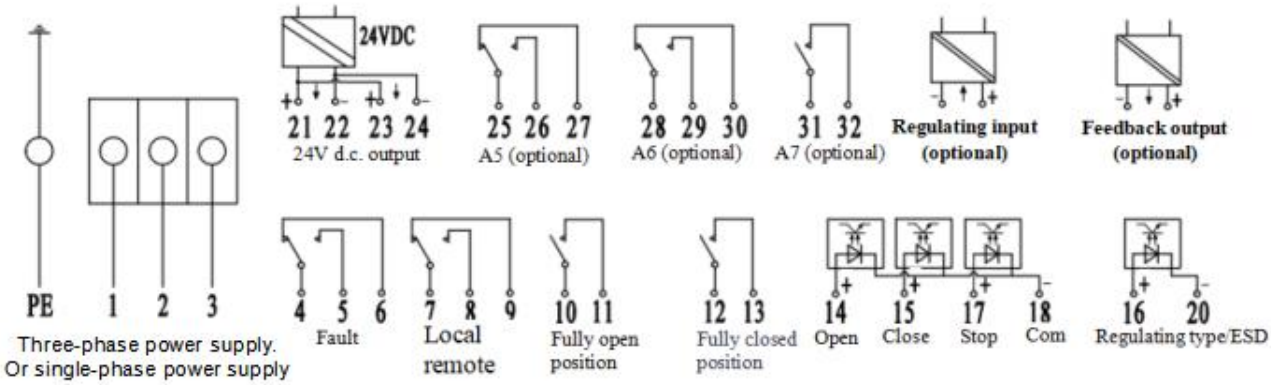


Figure 3b. The electrical wiring schematic diagram

7.1 Connection

The permissible contact load is shown in Section 4 of the specification.

Shield all signal cables, shielding the ground wire with only one contact to the actuator.

The recommended basic wiring and system wiring are shown in Figure 4a, Figure 4b and Figure 5, Figure 6.

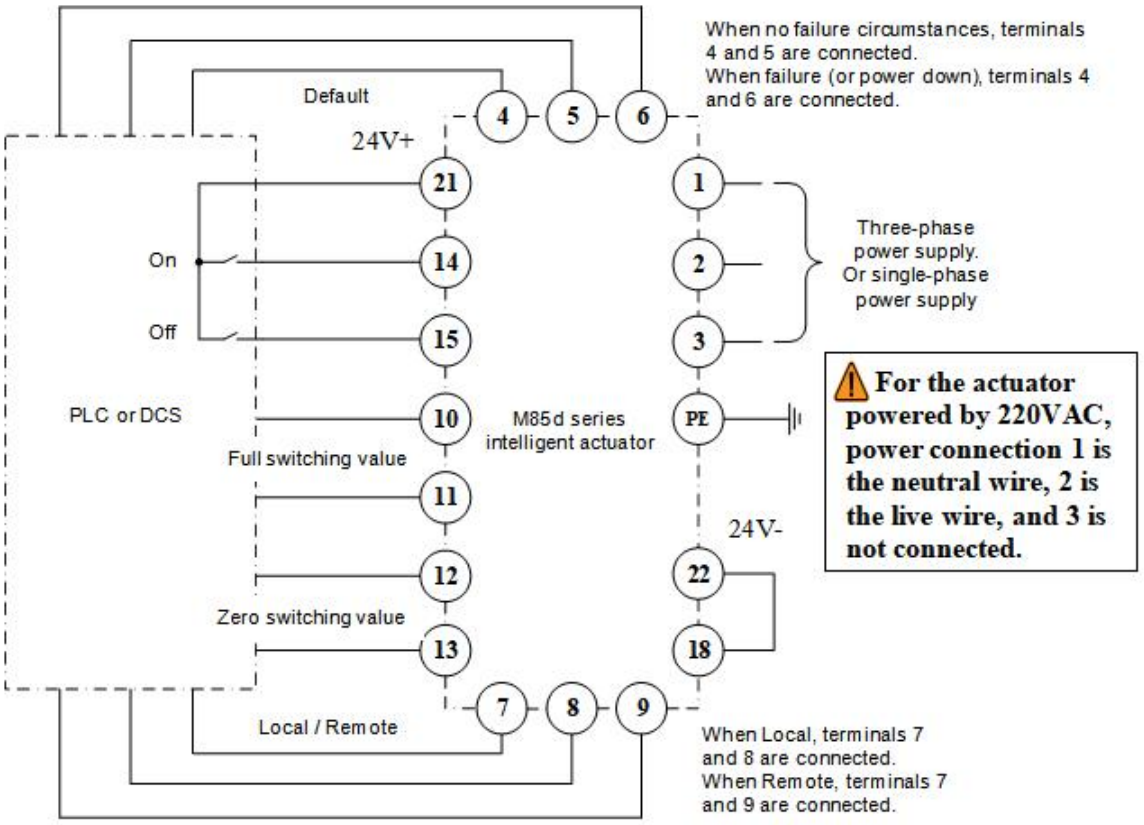


Figure 4a. Switching Signal control wiring diagram (passive wiring mode)

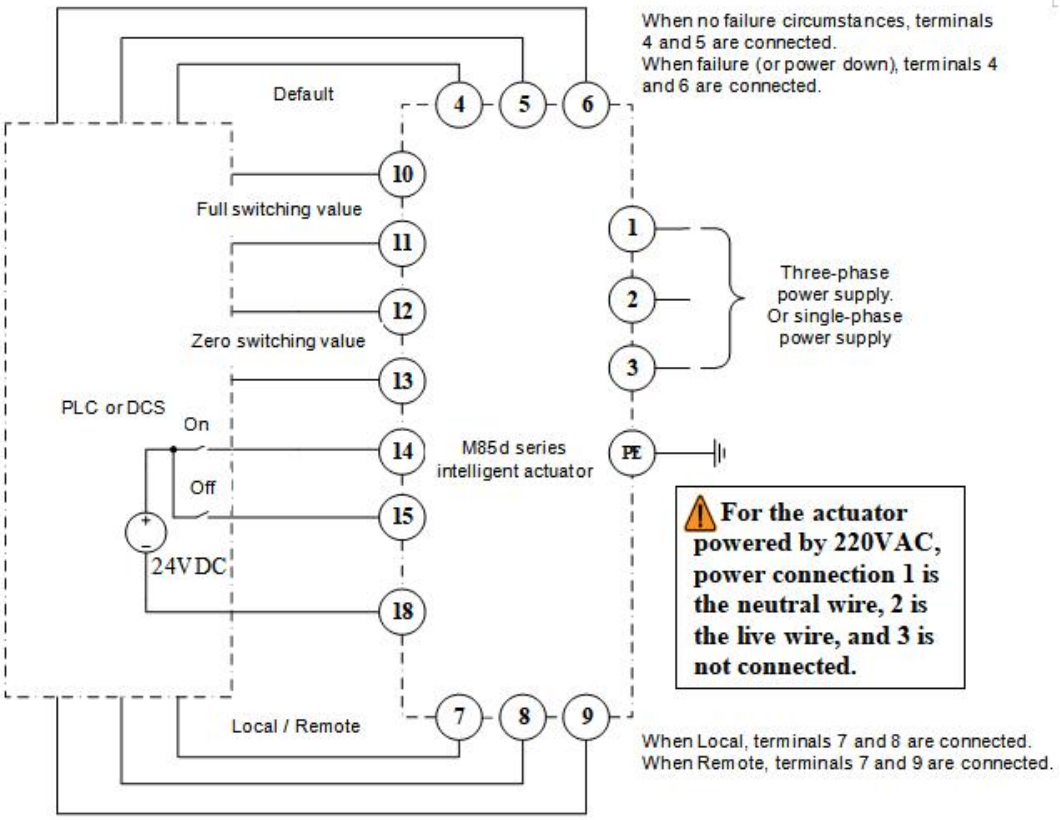


Figure 4b. Switching Signal control wiring diagram (active wiring mode)

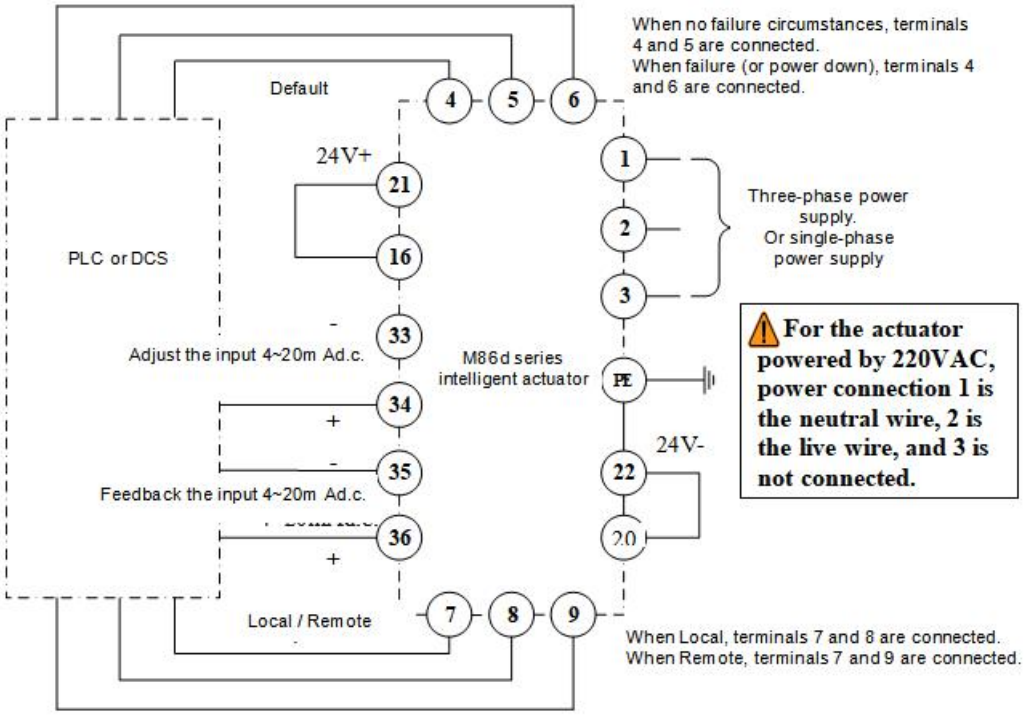


Figure 5. Analog signal control wiring diagram

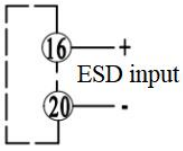


Figure 6. ESD Signal control wiring diagram

7.2 Wire diameter choice (contact connection)

Power cable: 2.5～4mm^2 hand wire or 4mm^2 soft wire

Signal cable: 0.5～1.5mm^{2}hand wire or 4mm^2 soft wire

7.2.1 The screw thread dimension of cable sealing entry.

Protection grade by the site after the installation of cable sealing to ensure that the mouth, be sure to use match the explosion-proof device into the line of outer diameter of cable.Users to buy the cable interface matching with explosion-proof device into line, explosion-proof device must have a cable seal structure into line, and have approved by the state authority explosion-proof certificate and production license issued by the testing machine, cable diameter should match the device into the line, otherwise the safety accidents caused by device into line, our company is not responsible for.Actuator cable outlet hole thread sizes and line diameter requirements are as follows:

Actuator model	Outlet hole screw size(Metric)	Explosion-proof into line device matching cable diameter range of our company
M8□10~60d	2×M32×1.5(Standard)	10mm～19mm
	1×M40×1.5(Optional)	

7.3 Safety

Main power's insurance locate in filter board. It's specification is

3×15A（M8610d-M8630d），or 3×25A（M8640d/8650d），Φ6.3×32；（the same as M85dseries）

8 Parameter setting and faceplate operation

The actuator goes along configuration adjustment (setting position, Setting parameter, collocate, diagnose and so on) by control board.All setting can process in this device's control board by "**LOCAL**" (local operation).

The device's control board is installed in electric unit. It contains the parts as follows:

Mode selection switch

REM: REMOTE mode, used for REMOTE 4-20mA control (LCD display "Remote-a")/remote switch quantity control (LCD display "remote-B")

O/S: Prohibited mode, electric operation prohibited.

LOC: Local mode, operated and set through the operation panel.

↑ Button: Increase the parameter setting value when opening the valve or setting the menu.

↓ Button: To close the valve or reduce the parameter setting value during menu Settings.

STOP/MODE button: Long press to enter the menu, short press to confirm or exit the menu.

LED: A green LED indicates "Main power available", while a red LED shows "Fault".

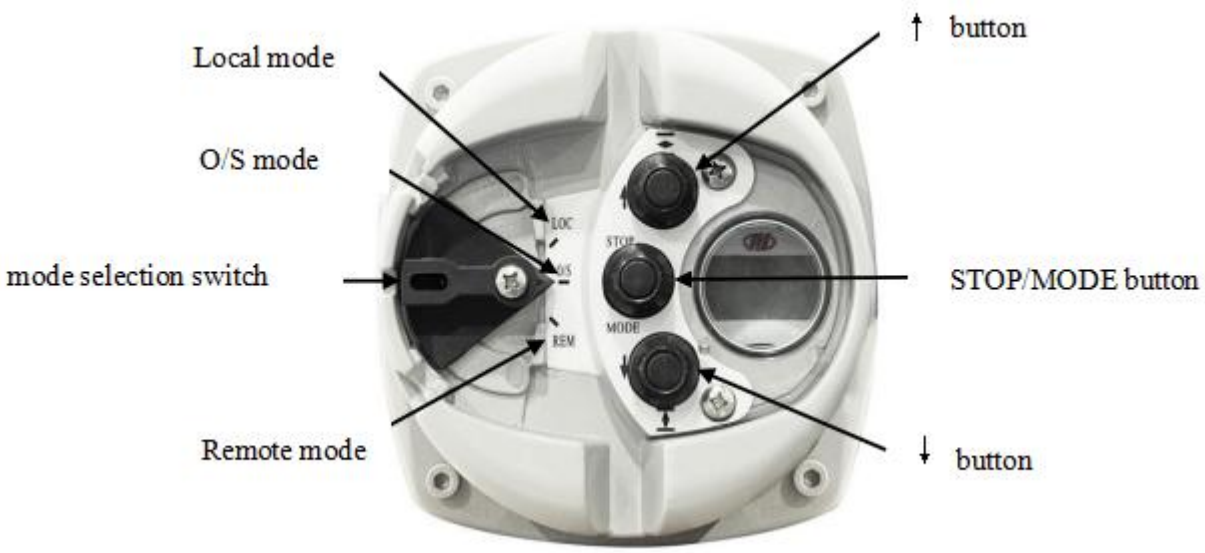


Fig.7 Operation faceplate

8.1 By the operation and adjustment of control board.

Operation/adjustment menu is divided into 7 main menu:

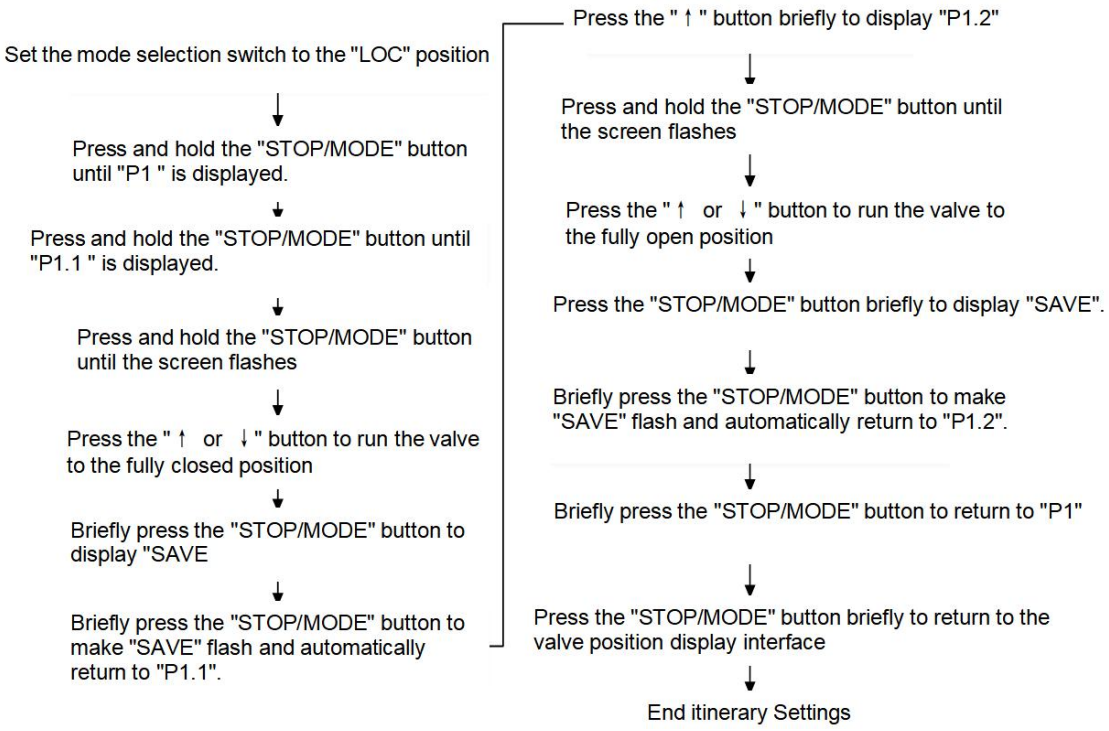
- P1 SETUP
- P2 PARAMETR SETUP
- P3 DIAGNOSE
- P4 MACHINE DATA
- P5 CALIBRAT CALIBRATION
- P6 DIGITAL OUTPUT CONFIGURATION
- P7 INSTANCY OPERATION

Every main menu can be divided into one or several sub menu.

Before operation or adjustment of control board, put mode selection switch to "**LOC"** position, see figure 5."STOP/MODE"key have long press and dot press operation ways, long press is used to enter menu, dot press is used to confirm or quit menu. "↑""↓"key are used to up and down search menu or setup increasing or reducing of parameter, when local operation or setup valve position to zero and full point, it can drive output shaft turn.

Before drive actuator, setup operation range of output shaft. In "**LOC"** mode long press "STOP/MODE" key→P1，long press "STOP/MODE" key →P1.1,long press"STOP/MODE" key to enter zero setup, press "↑" or "↓"key，output shaft turn to required mechanical zero position, dot press "STOP/MODE" key, select to save current setup zero position. Dot press"↑" key to enter into P1.2 and set full bit, use same way, operate output shaft of actuator to mechanical full bit, save and then exit, finish operation range setup of output shaft.

Attention: There must be min. interval between zero and full bit of actuator, when output shaft doesn't reach min. adjustable range, 4 lines will be shown in display"- - - -"，when actuator exceed min. adjustable range, line will change to "□□□□".



8.1.1 Menu function see table 6.

Table 6 Menu

Main menu	Sub menu	Menu function	Display or explaination
P1 COMMON SETUP	P1.1 ADJUST_C	Setup valve position to zero	stroke range meet min. requirement and display "□□□□"
	P1.2 ADJUST_O	Setup valve position to full dot	
	P1.3 TORQUE_C	Closing torque	40～100%（10% step）
	P1.4 TORQUE_O	Opening torque	40～100%（10% step）
	P1.5 SPEED_C	Closing speed	20～100%（5% step）
	P1.6 SPEED_O	Opening speed	20～100%（5% step）
P2 PARAMETR SETUP	P2.1 CUTOFF_C	Closing is chosen by stroke or torque switch off	T TRAVEL_D（stroke）/ TORQUE_D（torque）
	P2.2 LIMIT_C	Closing stroke switch off position	0～45%（1% step）
	P2.3 CUTOFF_O	Opening is chosen by stroke or torque switch off	TRAVEL_D（stroke）/ TORQUE_D（torque）
	P2.4 LIMIT_O	Opening stroke switch off position	55～100%（1% step）
	P2.5 SWITCH	Digital input inching/self- holding selection	INCH（inching）,HOLD（self-holding）
	P2.6 ALM_DEAL	Signal break off disposal way	HOLD（holding）,On （fullopening）,OFF（full closing）
	P2.7 PLACE_C	Low terminal midway alarm	0～45% less or equal setting value alarm
	P2.8 PLACE_O	High terminal midway alarm	55～100% more than or equal setting value alarm
	P2.9 DBAND	Dead zone	0.2～10%

Main menu	Sub menu	Menu function	Display or explaination
	Note 1：P2.2、P2.4 can operate only “position correlative switch” is chosen. Note2： If choose switch off according to torque, system should be in self-holding working mode, it’s wrong to choose inching working mode.		
P3 SELF DIAGNOSE	P3.1 ERR_ACTU	Trouble diagnosis information sheet	If more than one trouble information, use “↑”, “↓” key to check
	P3.2 ALM_ACTU	Alarm information sheet	If more than one alarm information, use“↑”, “↓” key to check
	P3.3 HALLCODE	Hall sensor diagnosis	Change 20 codes when handwheel turn one circle
	P3.4 INPUT	Modulating signal	Observe current sampling value of modulating signal
P3 SELF DIAGNOSE	P3.5 TEMP_MOT	Motor winding temperature	Observe current motor winding temperature
	P3.6 TEMP_ELC	Electronic unit temperature	Observe current electronic unit circumstance temperature
	P3.7 BATTERY	Battery voltage	Observe current battery voltage
P4 MACHINE PARAMETER	P4.1 TIME_C	Closing stroke time	
	P4.2 TIME_O	Opening stroke time	
	P4.3 SW_VER	Software revision no.	
	P4.4 HW_VER	Hardware revision no.	
	P4.5 ADDRESS	Communication address	Value range 0～255
P5 CALIBRAT	P5.1 PASSWORD	Enter calibration password	Password is 51
	P5.2 INPUT_Z	Adjust input zero	Set modulating signalto4mA,inching “↑”or “↓”key, save and exit after confirmation.
	P5.3 INPUT_F	Adjust input full	Set modulating signal to 20mA,inching “↑”or “↓”key, save and exit after confirmation.
	P5.4 OUTPUT_Z	Feedback output zero	Inching“↑”or “↓”key and adjust feedback output signal to 4mA and then save, exit.
	P5.5 OUTPUT_F	Feedback output full	Inching“↑”or “↓”key and adjust feedback output signal to 20mA and then save, exit.
P6 DIGITAL OUTPUT CONFIGURATION	P6.1 PASSWORD	Enter digital configuration password	Password is 61
	P6.2 OUTPUT_1	A1 digital output configuration	Configuration range see table 7 I/O output configuration
	P6.3 OUTPUT_2	A2 digital output configuration	
	P6.4 OUTPUT_3	A3 digital output configuration	
	P6.5 OUTPUT_4	A4 digital output configuration	
	P6.6 OUTPUT_5	A5 digital output configuration	
	P6.7 OUTPUT_6	A6 digital output configuration	
	P6.8 OUTPUT_7	A7 digital output configuration	
P7 EMERGENCY OPERATION	P7.1 INSTANCY	Emergency operation	In emergency pay no attention to alarm information and drive output shaft moving, but it’s possible to damage some function

Main menu	Sub menu	Menu function	Display or explaination
	P7.2 POS_INST	Emergency setup current valve when valve position is lost	You can estimate opening and set valve position value directly according to current output draft position.

Digital output can be changed by P6 digital output configuration, the optional range of digital configuration see table 7.

Table7 I/O output configuration range

I/O output		Information explanation	Information display	Default value
A1	Optional range	Move in normal situation Switch off in trouble situation	Display “FAILURE” if trouble happens	Fault
		Over torque	TORQUE_E	
A2		Over torque in opening	TORQUE_O	Local/remote
		Valve position is more than setup value of high terminal	PLACE1_O	
A3		Valve position over limit or lost	POS_LOSE	Open to terminal
		Open to terminal	ADJUST_O	
A4		Local/remote	REMOTE	Close to terminal
		Adjustment signal switch off	NO_SIGN	
A5		Integrative alarm	ALARM	Over torque in opening
		Battery low or empty	BATTERY	
A6		Temperature over limit	TEMP	Over torque in closing
		Over torque in closing	TORQUE_C	
A7		Valve position is less than setup value of low terminal	PLACE2_C	Integrative alarm
		Close to terminal	ADJUST_C	

8.2 Save setup

First use “↑”, “↓” button of display to set new parameter, then short press stop/mode button, if parameter is changed, display will show static “**SAVE**”.

If you want to cancel, press “↑”or “↓” button to operate, then press “STOP/MODE” button to return.

If you want to save new value, press “STOP/MODE” button, flashing “**SAVE**” shows saving process.

9 Alarm and trouble

Intelligent frequency conversion actuator have strong function, after analysis function start(P3 menu, see section 8 of manual), see information via **LCD**, table 8 and 9 describe alarm and trouble information.

9.1 Alarm

Definition: Alarm system start automatically when actuator reaches to critical situation, actuator continues working. If always keep such status, actuator will stop running.

9.2 Alarm information

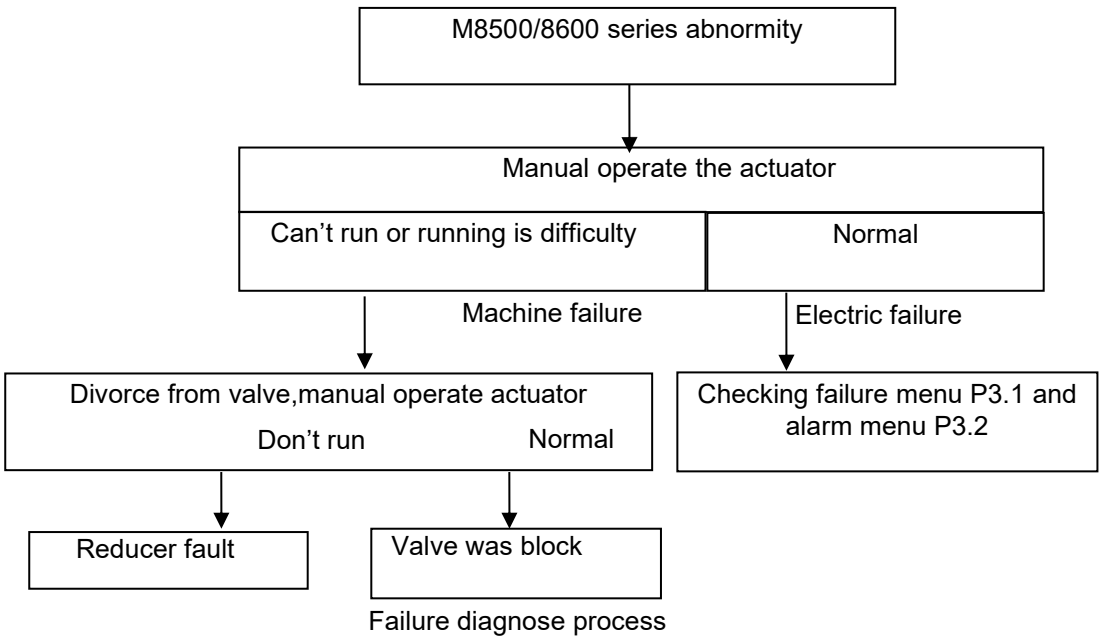
Because chosen operation mode is different, interval flashing display of alarm information just as LOCAL/ALARM，0/S/ALARM or REMOTE/ALARM, detailed information in main menu of alarm sheet P3.2，when several trouble happens at same time, only show trouble and no alarm display.

Table8　LCD display alarm information

Display character	Alarm description
IN_SIGN	Adjustment signal switch off. But in remote switch control condition, no analysis to adjustment signal break off.
BAT-CHANG	The power of battery is not enough, exchanging should be done immediately.
BAT-EMPT	If battery empty, data exists if power off, but hand-wheel drive can cause valve displacement, when power on, valve position should be set again.
TORQUE-0	Opening torque alarm, load torque more than optional opening alarm value.
TORQUE-C	Closing torque alarm, load torque more than optional closing alarm value.
TEMP-MOT	The temperature of motor over limit, alarm if above 110℃,release from alarm if reduce to 100℃.
TEMP-ELC	The temperature of electronic part over limit, alarm if above 80℃,release from alarm if reduce to 75℃.
IN_SIGN	Adjustment signal switch off
TORCNT_C	The time of over torque in closing is more than 10000
TORCNT_O	The time of over torque in opening is more than 10000
STARTCNT	Startup time is more than 5×10^7
ENDCNT_C	The time of closing terminal is more than 10^7
ENDCNT_O	The time of opening terminal is more than 10^7
RUNTIME	Total running time is more than 10 years

9.3 Trouble

Hardware/software have problem or incorrect handling of operator, actuator will show trouble information automatically. Trouble shooting should follow the process. If trouble endanger personnel or actuator, please switch off power.



Failure diagnose process

9.4 Trouble information

Interval flashing display of alarm information in LCD just as LOCAL/ALARM，0/S/ALARM or REMOTE/ALARM, detailed trouble information sheet see menu P3.1.The meaning of trouble information see table 9.

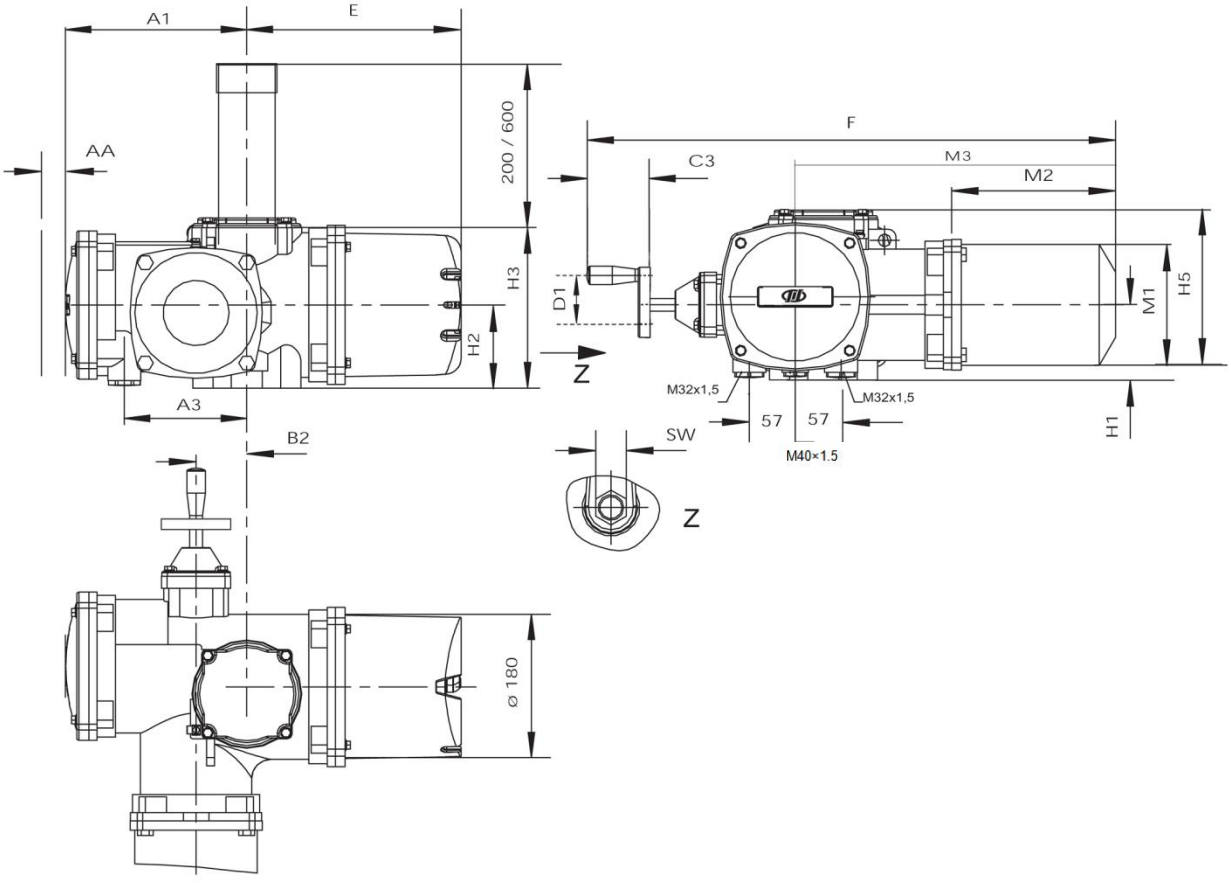
Table 9 LCDdisplay trouble information

Display character	Trouble description
ELECTR	Trouble of electronic unit
TEMP-MOT	When the motor temperature exceeds the limit and reaches the thermal protection value, stop the operation and wait for the motor to cool down before releasing the alarm.
TEMP-ELC	The temperature of electronic unit exceed limitation. Alarm above 85℃, release from alarm if down to 80℃.
RELAY	Main relay doesn't connect
END_POS	Actuator operation exceed terminal position
POS_LOSE	Valve position lost

10 Actuator outline and installation dimension

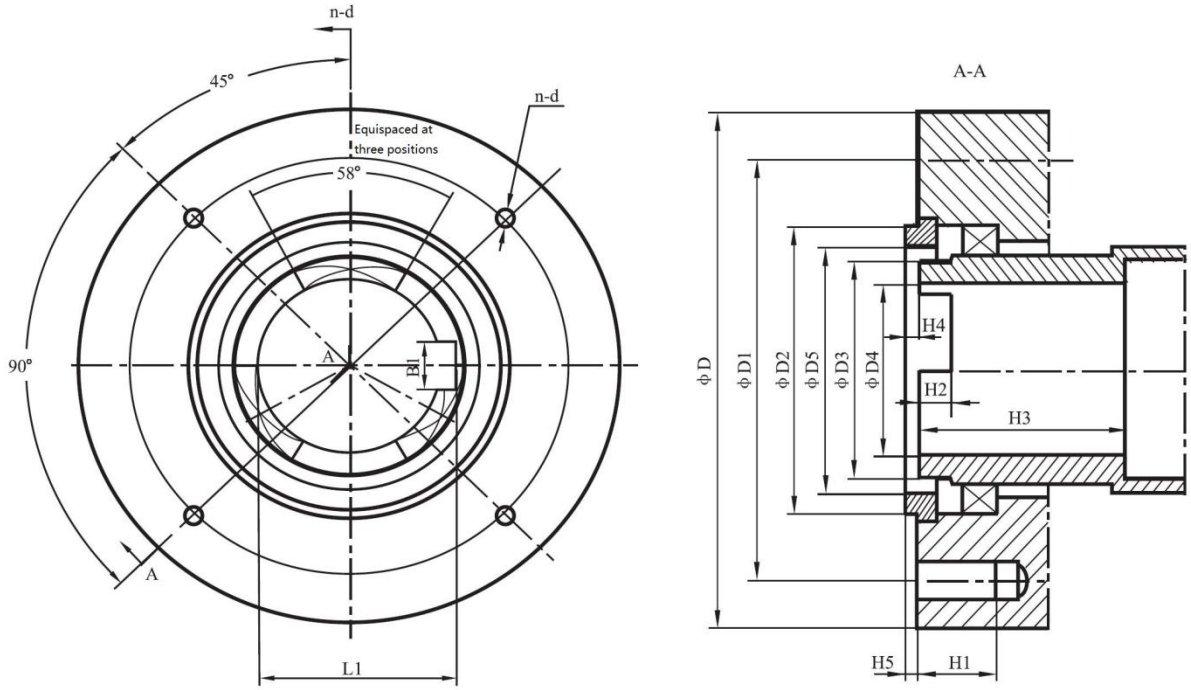
10.1Actuator Outline and Installation Dimension

See the following drawing and table about actuator outline and installation dimension.

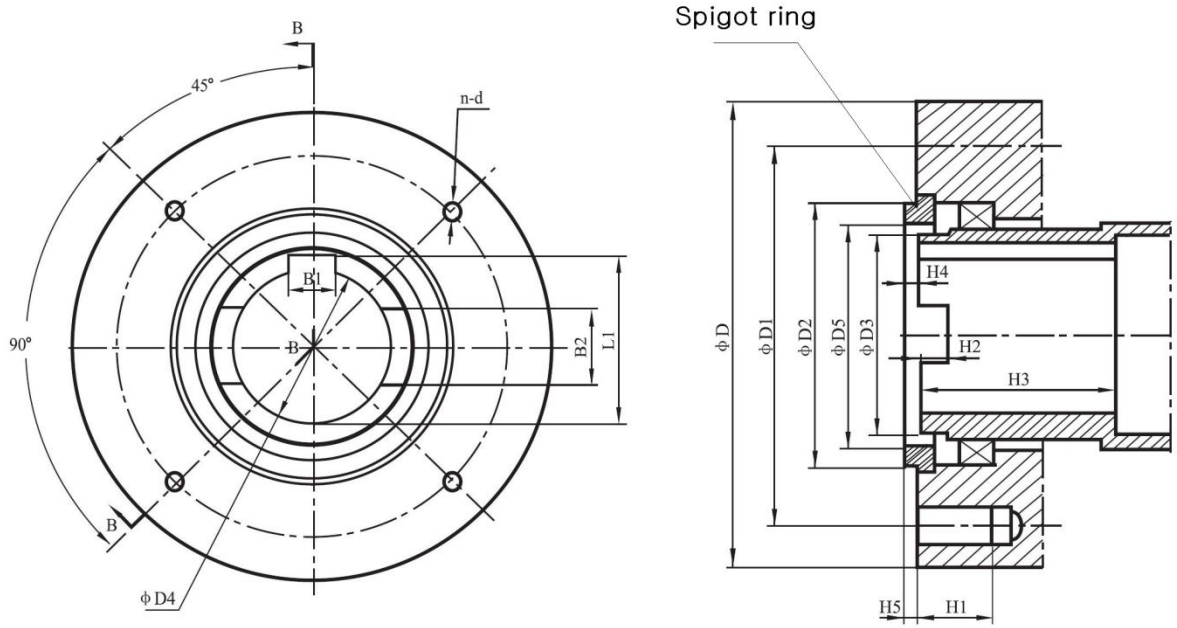


Model / Parameter	M8□10	M8□20	M8□30	M8□40	M8□50
ISO5210	F10	F10	F14	F16	F16
A1	207	207	226	250	250
A3	133	133	152	169	169
B2	50	50	63	80	80
C3	99	99	99	82.5	82.5
D1	R99	R99	R99	R95	R95
E	253	253	266	294	294
F	574	598	665	768.5	768.5
H1	94.5	94.5	94.5	140	140
H2	104.5	104.5	104.5	148	148
H3	202	202	202	250	250
H5	214	214	214	270	270
M1	Φ105	Φ120	Φ140	Φ225	Φ225
M2	136	160	200	300	300
M3	285	313	373	375	470

10.2 Dimension of Actuator Output Flange



Connection Form(Three-jaw) and Dimension of M85(6)40d、M85(6)50d



Form(Two-slot)and Dimension of M85(6)10d、M85(6)20d、M85(6)30d

10.3 Dimension of Actuator Output Flange

Dimension of Actuator Output Flangemm

Actuator Model	Code of Connecting Flange	D	D1	D2	D3	D4	D5	H1	H2	H3	H4	H5	L1	B1	B2	n-d
M8□10d	F10	125	102	70	53	42	60	18	7	47.6	3.5	3	45.3	12	14	4-M10
M8□20d																
M8□30d	F14	175	140	100	74	60	88	22	8	53	4.1	3.6	64.4	18	20	4-M16

M8□40d M8□50d	F16	205	165	130	98	80	120	35	12	80	5	4	85.4	22	—	4-M20

11 Lever mode additional reducer

11.1 Technical data

Recommended adjusting torque Nm	Max. switch off torque Nm	Output switch off torque range of reducer （Nm）	Adjustment range of actuator switch off torque （%）	Speed adjusting rage （s/90°）	Reducer	Actuator
250	300	200-450	40%-80%	30-150	A8005	M8610d /M8510d
500	800	450-900	40%-80%	30-150	A8010	
800	1000	600-1200	40%-100%	32-161	A8020	
1200	1600	1150-1800	40%-70%	32-161		M8620d /M8520d
1600	2000	1200-2500	40%-100%	32-161	A8040	
2500	3600	1600-3600	40%-70%	32-160		M8630d /M8530d
4000	4500	2400-6000	40%-100%	32-160	A8090	
6000	8000	4000-8000	40%-100%	32-160		M8640d /M8540d
10000	12000	6000-10000	40%-100%	43-214	A8160	
12000	15000	10000-15000	40%-100%	43-214		M8650d /M8550d
8000	12000	8000-12000	40%-100%	43-214	A8200	M8640d /M8540d
12000	18000	12000-18000	40%-100%	43-214		M8650d /M8550d
16000	24000	16000-24000	70%-100%	85-418	A8400+G6804	M8640d /M8540d
24000	35000	24000-36000	70%-100%	85-418	A8400+G6804	M8650d /M8550d

Note：1）If switch off torque of actuator is within 40%-100%,the setup step size is 10%.

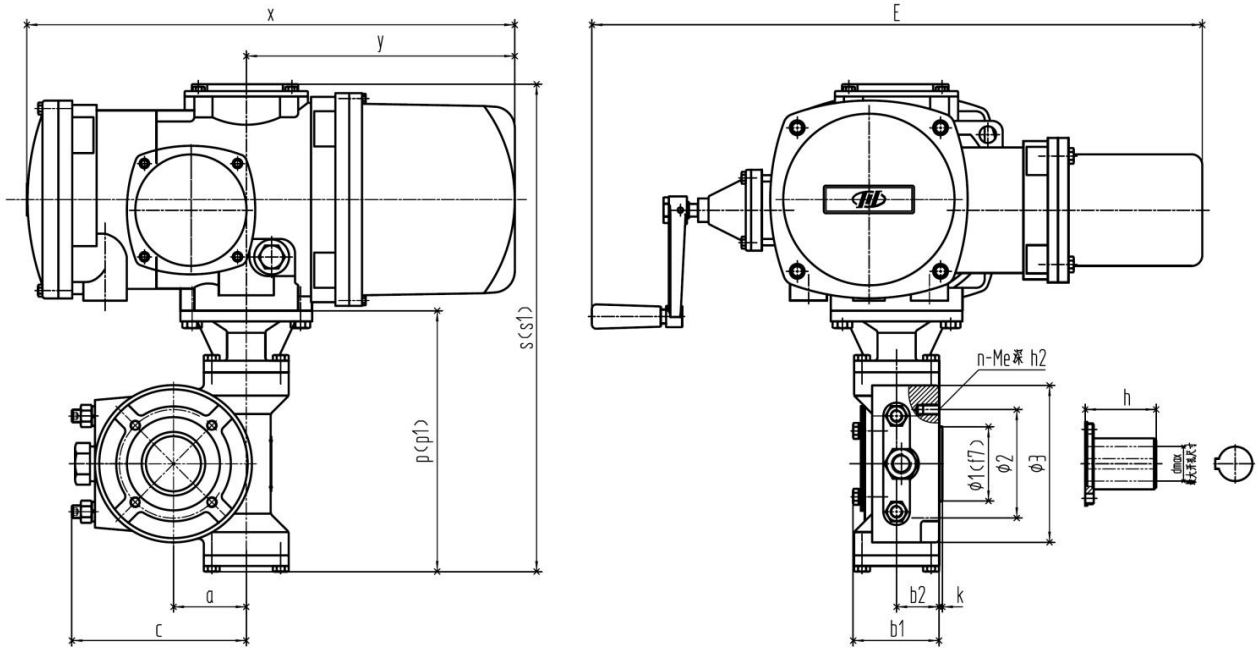
2）If stroke time is within 20%-100%, the setup step size is 5%.

11.2 Universal parameter

	A8005	A8010	A8020	A8040	A8090	A8160	A8200	A8400	A8400＋G6804
Actuator flange ISO5210	F10	F10	F10	F10/F14	F14/F16	F25/F30/F35	F16	F16	F16
Valve flange ISO5211	F10	F10	F14	F16	F25	F25/F30/F35	F40	F40	F40
Max. valve stem size mm	43	40	75	80	105	105	115	150	150
Weight kg	20	12（24）	27（45）	38(68)	72(138)	209	290	418	418

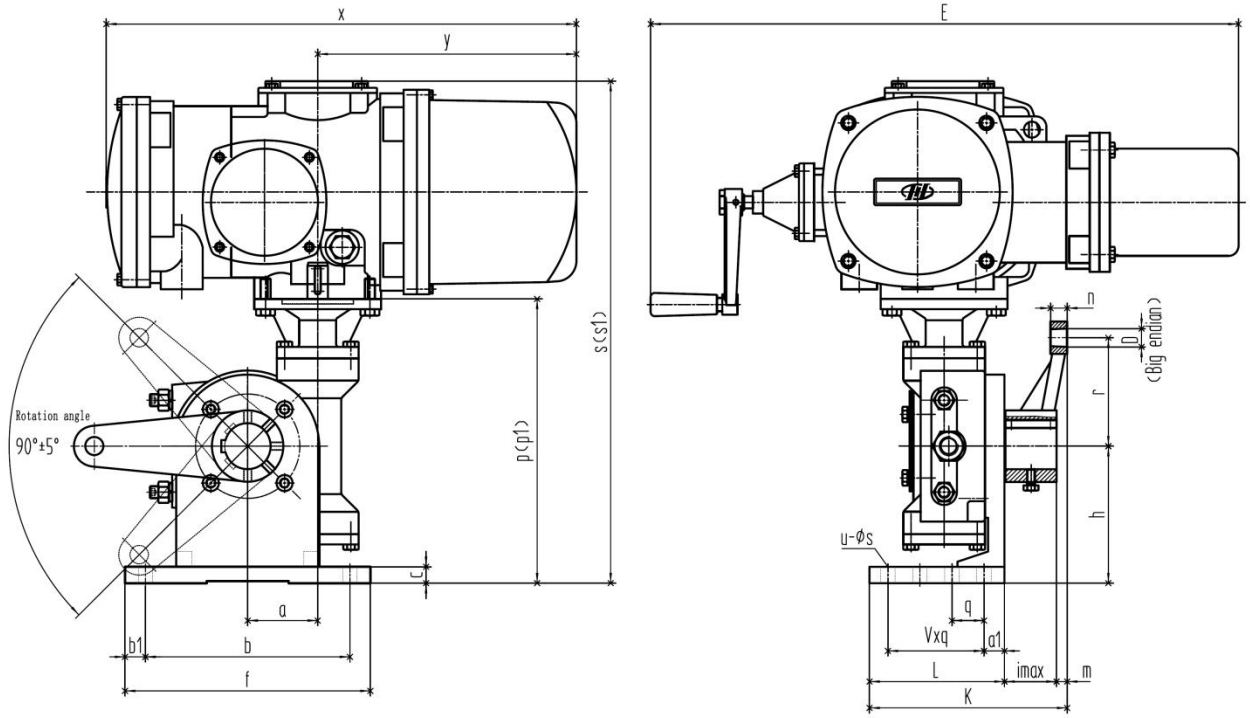
11.3 Outline and structure dimension of reducer

Outline and structure dimension of lever electrical actuator (directly mounted) (right turn hand-wheel, position index turn right)



Model	A8005	A8010	A8020	A8040	A8090 (+G6502)	A8160 A8161 A8162	A8250	A8400
a	52	68.5	85	101	150	160	200	250
c	140	165	199	245	330	400	480	570
b1	100	81	88	107	139.5	198	250	309.5
b2	52	40	46	57	62	113	144	166.5
n-Me deep h2	4-M10 deep 15	4-M10 deep 15	4-M16 deep 22	4-M20 deep 25	8-M16 deep 20	8-M20 deep 32	8-M30 deep 45	8-M36 deep 55
k	3	3	3	3	4	4	4	5
Ø1 (f7)	70	70	100	130	200	230	260	300
Ø2	102	102	140	165	254	298	356	406
Ø3	115	148	176	212	310	350	436	535
dmax	30	35	55	65	95	105	115	150
h	81	67	73	88	122	158	215	260
p (p1)	172	246	252	292	F14: 395 (531) F16: 399	589	640	830
s (s1)	386	460	466	506	F14: 609 (745) F16: 699	859	910	1100
E		M8□10=574	M8□20=598	M8□30=665	M8□40=769	M8□50=769		
x		M8□10=450	M8□20=120	M8□30=491	M8□40=544	M8□50=544		
y		M8□10=253	M8□20=253	M8□30=266	M8□40=294	M8□50=294		

Outline and structure dimension of lever electrical actuator（with lever）(right turn hand-wheel, position index turn right), see following drawing.



Note: ① Show in drawing, it's possible that connecting rod or lever collide with motor, pay attention to avoid.

Model	A8005	A8010	A8020	A8040	A8090 (+G6502)	A8160 A8161 A8162	A8250	A8400
U-ØS	4-Ø14	4-Ø14	4-Ø18	4-Ø22	6-Ø22	6-Ø22	8-Ø22	8-Ø22
V×q	1×70	1×94	1×94	1×102	2×80	2×80	3×70	3×70
a1	36	20	30	50	56	62	70	70
imax	66	51	80	100	100	143	150	150
k	198	183	240	285	356	415	470	470
L	132	132	160	185	256	272	320	320
m	8	0	0	0	0	0	0	0
n	20.5	20	30	30	30	40	42	42
D 1:10	Ø18	Ø22	Ø26	Ø30	Ø38	Ø38	Ø38	Ø38
r	160	150	200	250	250	250	500	500
h	107	134	163	200	235	250	310	350
f	180	240	290	330	400	520	630	630
b	140	200	223	270	338	448	580	580
b1	20	20	33.5	30	31	36	25	25
a	52	68.5	85	101	150	160	250	250
c	15	16	18	20	24	30	30	30
p (p1 Have transition gear)	207	278	310	365	F14:462(618) F16:466	668	666	915
s (s1)	420.5	492	524	579	F14:678(832) F16:738	882	880	1129
E		M8□10=574	M8□20=598	M8□30=665	M8□40=769	M8□50=769	M8□60=769	
x		M8□10=450	M8□20=120	M8□30=491	M8□40=544	M8□50=544	M8□60=544	
y		M8□10=253	M8□20=253	M8□30=266	M8□40=294	M8□50=294	M8□60=294	

12 Linear mode additional reducer

12.1 Technical data

Max. working thrust (Kn)	Max. speed (mm/s)	Stroke (mm)	Valve flange	Transformer	Actuator

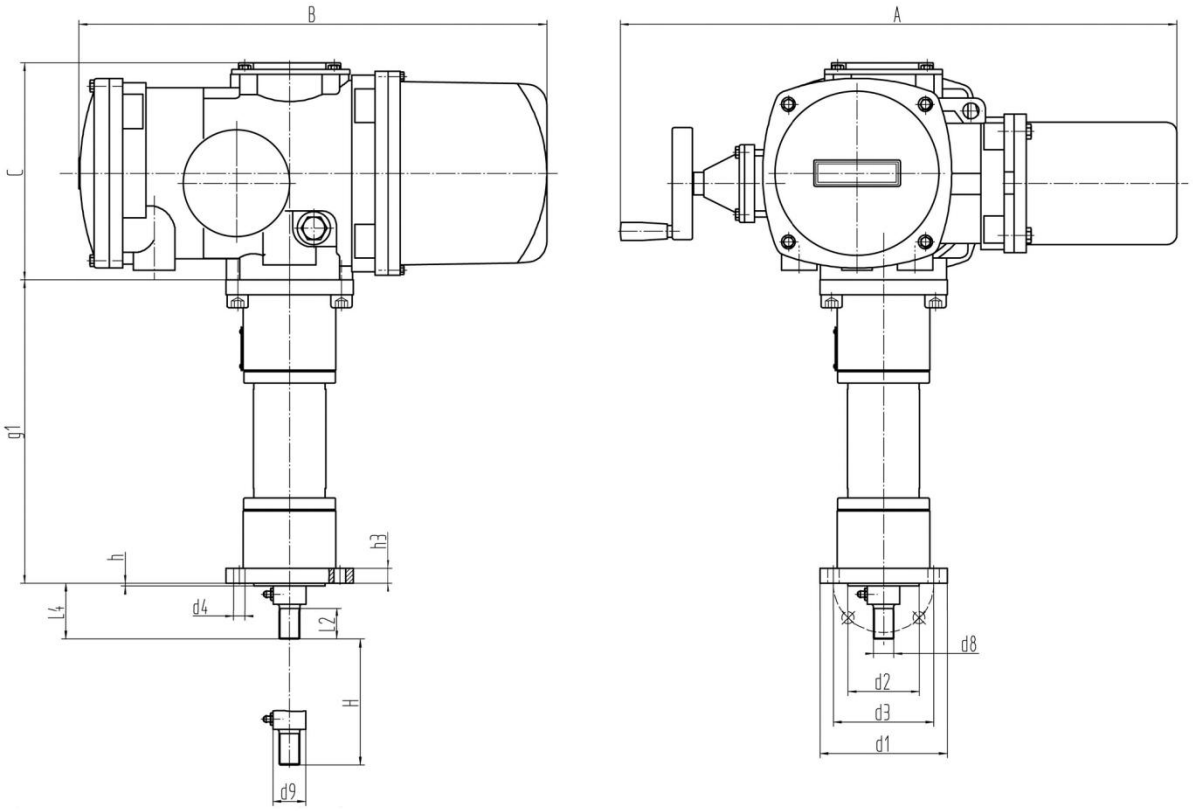
8	2.9	50，100	F10	L8210	M8610d/M8510d
16	2.9	50，100	F10	L8220	M8610d/M8510d
25	3.5	63，125	F10	L8230	M8620d/M8520d
40	4.1	60,100，160	F14	L8240	M8630d/M8530d

Note：1) Working thrust is 50% of max. switch off thrust

2) Setup stepping is 5%

12.2 Outline and installation dimension of linear mode additional reducer

12.2.1 Dimension with flange



	L8210		L8220		L8230		L8240		
Valve flange	F10		F10		F10		F14		
Actuator	M8610/M8510		M8620/M8520		M8620/M8520		M8630/M8530		
Actuator flange ISO5210	F10		F10		F10		F14		
Stroke H	50	100	50	100	63	125	60	100	160
d1	125		125		125		175		
d2	70f8		70f8		70h7		100f8		
d3	102		102		102		104		
d4	11		11		11		18		
d8	M12×1.25		M16×1.5		M20×1.5		M36×3		
g1	191	241	191	241	234	296	293	273	
h	3		3		3		4		
h3	15		15		15		18		

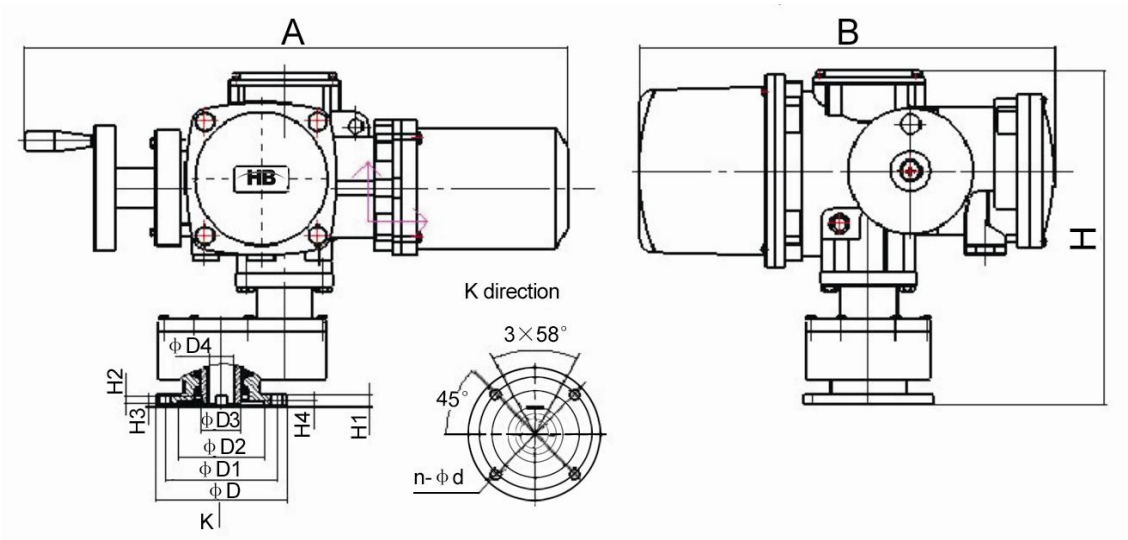
L2	20		25		30		55		
L4	44		49		54		74		
D9	20		20		32		50		
A	574		598		598		665		
B	460		460		460		492		
C	202		202		202		202		
Weight（kg	8	8.5	8	8.5	12	13	23.6	26	29

13 Multi-turn additional reducer

13.1 Technical data

Actuator	Reducer	Output			Flange	Power（kW）	Current（A）	Weight (Kg)
		Recommended adjusting torque（Nm）	Switch off torque （Nm）	Speed（r/min）				
M8650d M8550d	G7010	900	600-1500	2.6-13	5	5.0	10.5	110
M8650d M8550d	G7020	1800	1080-2500	1.5-7.5	7	5.0	10.5	135
M8650d M8550d	G7030	2400	1500-3500	1-6	8	5.0	10.5	160

13.2 Outline and installation dimension of multi- turn mode additional reducer



Actuator model	M8□50d +G7010	M8□50d +G7020	M8□50d +G7030
D	275	330	380
D1	235	285	340
D2	180	220	280
D3	82	98	118
D4	62	65	80
H	560	630	645
H1	25	30	35
H2	14	16	20
H3	2	3	3
H4	7	8	8
A	620	620	620
B	550	550	550
n-d	4-Φ22	4-Φ26	8-Φ22

14 Maintenance and Repair

Actuator should undergo the following check items every year to ensure the operation without errors and necessary safety measures should be taken before the check, maintenance of the actuator to ensure the smooth and safe maintenance process.

If you need to disassemble the actuator during the check and maintenance, power supply to the main circuit and sub circuits should be cut off and some charged parts around should be isolated.

14.1 Daily maintenance

	Maintenance period	**Maintenance contents**	**Maintenance criterion**
1	Every week	Inspect the oil leakage of the actuator's gearbox	No oil leaking
2		Inspect the valve position indication	Correct indication
3		Inspect thecleaning and lubrication of the stem and axle sleeve	Clean and lubricate
4		Inspect the housing of the actuator	No looseness, no damage
5		Inspect the stem thread of the uncovering flange joint	Using the requiring machine oil and protection sleeve to guarantee
6	Every month	Inspect the fastening bolt of the actuators	No looseness
7		Inspect the seal of the in and out wire	No looseness, no damage
8		Inspect the junction box	No moisture, no corrosion, no loose
9		Inspect the sound of the Open and close action,Maintenance if necessary	No abnormal sound
10	Half year	Inspect the manual devices of the valve ,Open and close the valve one time	Flexible, normally open
11		Inspect the open in place and the close in place signal	Normal control
12		Inspect the display	Normal display
13		Not too much dirty and dust on the actuator	Keep the actuator clean and visible
20	Every year	Regular performance check	Qualified

14.2 Battery pack

Do not replace battery in hazardous environment; the battery pack consists of a lithium thionyl chloride (Li-SOCL2) battery (nominal voltage 3.6V, nominal capacity 2.6Ah, produced by SAFT). The replacement period of the battery components is generally not more than 5 years. Ambient temperature and field operating conditions may affect battery life.

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