
ZB 型多回转阀门电动装置

使用说明书

OPERATION MANUAL FOR
TYPE ZC ELECTRIC VALVE ACTUATORS

一 概 述

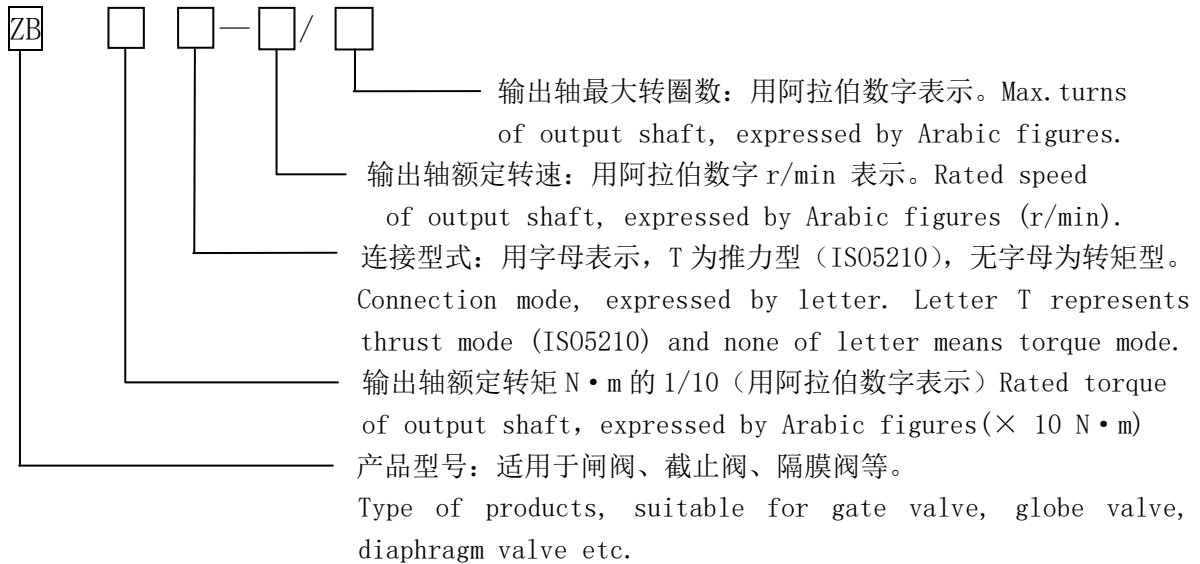
General Description

ZB 系列阀门电动装置为双位阀电驱动装置，适用于阀瓣做直线运动的阀门，如截止阀、闸阀、节流阀、隔膜阀等。与二级减速装置组合后，也可用于阀瓣做旋转运动的阀门，如球阀、蝶阀等。

Series ZB Electric Valve Actuators are designed for two position valves and suitable for valves which stems move linearly, such as globe valve, gate valve, throttle valve and diaphragm valve. Combined with a two stage reducer, they can also be used in operating valves which stems move rotating, such as ball valve and butterfly valve.

二 型号表示方法

Type Representation



三 工作环境和主要技术数据

Service Environment and Main Technical Data

1. 电机电压：380V，50Hz（特殊订货可 380V~660V，50Hz，60Hz）
控制电压：220V，50Hz（特殊订货可 220V~240V，50Hz，60Hz）
Power voltage: 380V, 50Hz (380V~660V, 50Hz, 60Hz for special order)
Control voltage: 220V, 50Hz (220V~240V, 50Hz, 60Hz for special order)
2. 工作环境：Service environment:
 - 2.1.1 环境温度：-20~60℃
Environmental temperature: -20~60℃
 - 2.1.2 环境相对湿度：≤90%（25℃时）
Permitted relative humidity: no more than 90% (25℃)
 - 2.1.3 工作环境不含有腐蚀性、易燃、易爆的介质；
No corrosive, flammable and explosive media.
 - 2.1.4 防护等级 IP55

Protection IP55

3. 短时工作制，时间定额为 10 分钟；
Short-time duty, rated time 10 minutes.

4. 规格和主要技术数据见表 1。
For specifications and main parameters see Table 1.

1 主要性能参数 Main performance parameters Table 1

型号 Type	电 机 Motor			输出转速 Speed r/min								公 称 推 力 Thrust kN	最大 阀杆 直径 Max. dia of stem	最大 转圈 数 Max. rev	手动 速比 Hand ratio	重 量 kg
	型 号 Type	功率 power kW	电 流 Cur- rent A	12	18	24	30	36	42	48	60					
				额 定 转 矩 Rated Torque N·m												
ZB ₄ ^{2.5}	YDF56M2	0.05	0.45	40	25							20	20	6 10 20 30 40 60 80 100 120 160	1:1	30
ZB ₁₅ ⁵	YDF63M2	0.09	0.63	100	50							40	28			35 ~ 45
	YDF63L1	0.12	0.74			50										
	YDF63L2	0.18	1.0	150	100	80	60	50								
	YDF80M1	0.25	1.4		150	100	80	70	60	50						
	YDF80M2	0.37	1.8			150	130	100	90	80	50					
	YDF80L	0.55	2.4					150	130	100	90					
ZB ₄₀ ²⁰	YDF80M1	0.25	1.4	250								100	36			65 ~ 85
	YDF80M2	0.37	1.8	400	300	200										
	YDF80L	0.55	2.4		350	250	200									
	YDF100M1	0.75	3.0			400	300	250	200							
	YDF100M2	1.10	4.0				400	350	300	250	200					
	YDF100L1	1.5	5.0						400	350	300					
	YDF100L2	2.20	7.0								400					

ZB₄^{2.5} (ZB0), ZB₁₅⁵ (ZB1), ZB₄₀²⁰ (ZB2)

说明：电机的起动电流和最大电流约为表格所示的额定值的 7 倍，运行过程中电流偏大是正常现象。

Note: The motor starting current and maximum current is about 7 times the rated value, the operation of the current is too large is a normal phenomenon.

四 结 构

Constructions

1. ZB0 的结构见图 1
For constructions of ZB0 refer to Fig.1
2. ZB1~ZB2 的结构见图 2
For constructions of ZB1~ZB2 refer to Fig.2

五 外形和连接尺寸

Contour and Connection Dimensions

1. 外形及外形尺寸 Contour and overall size

(1) ZB0 外形尺寸及重心位置见图 3

For overall size and center gravity of ZB0 refer to Fig.3

(2) ZB1~ZB2 外形尺寸及重心位置见图 4 和表 2

For overall size and center of gravity of ZB1~ZB2 refer to Fig. 4 and table 2.

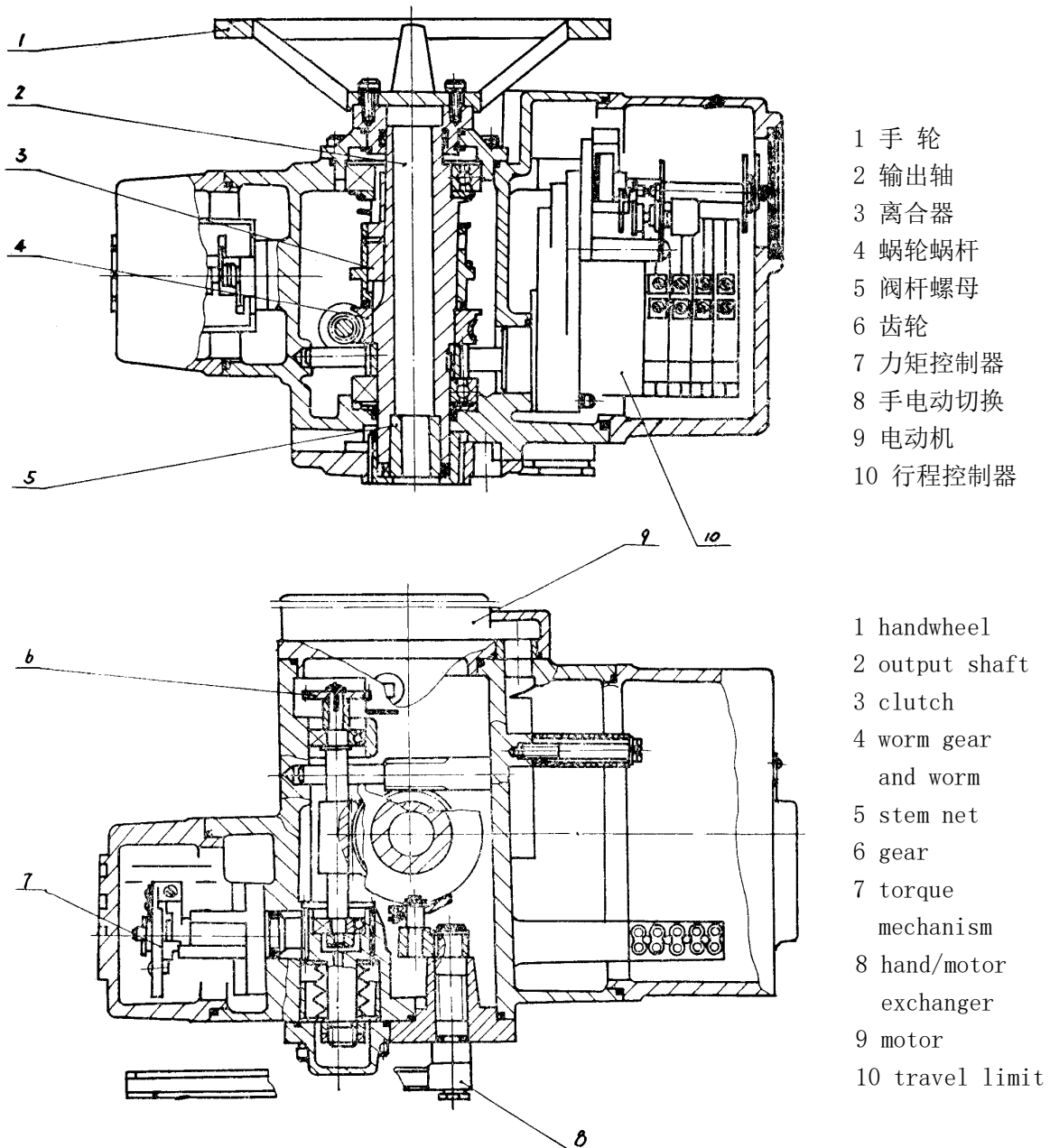
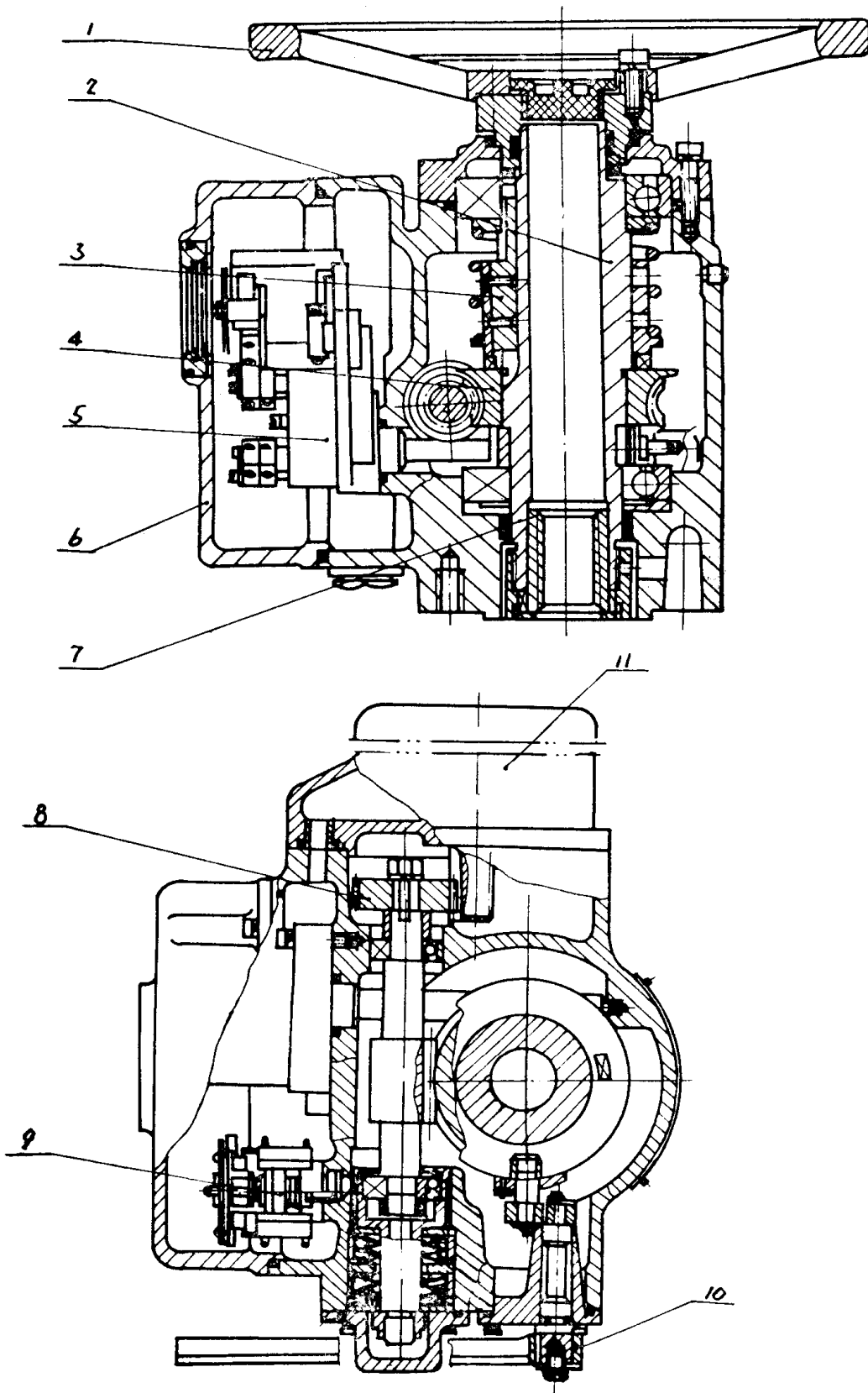


图1 ZB0 的结构 Fig.1 Constructions of ZB0



- 1 手轮
- 2 输出轴
- 3 离合器
- 4 蜗杆蜗轮
- 5 行程机构
- 6 电器箱盖
- 7 阀杆螺母
- 8 齿 轮
- 9 力矩机构
- 10 手电动切换
- 11 电动机

- 1 handwheel
- 2 output shaft
- 3 clutch
- 4 worm gear
and worm
- 5 travel limit
- 6 cover
- 7 stem nut
- 8 gear
- 9 torque
mechanism
- 10 hand/motor
exchanger
- 11 motor

图2 ZB1 和 ZB2 的结构
Fig.2 Constructions of ZB1 and ZB2

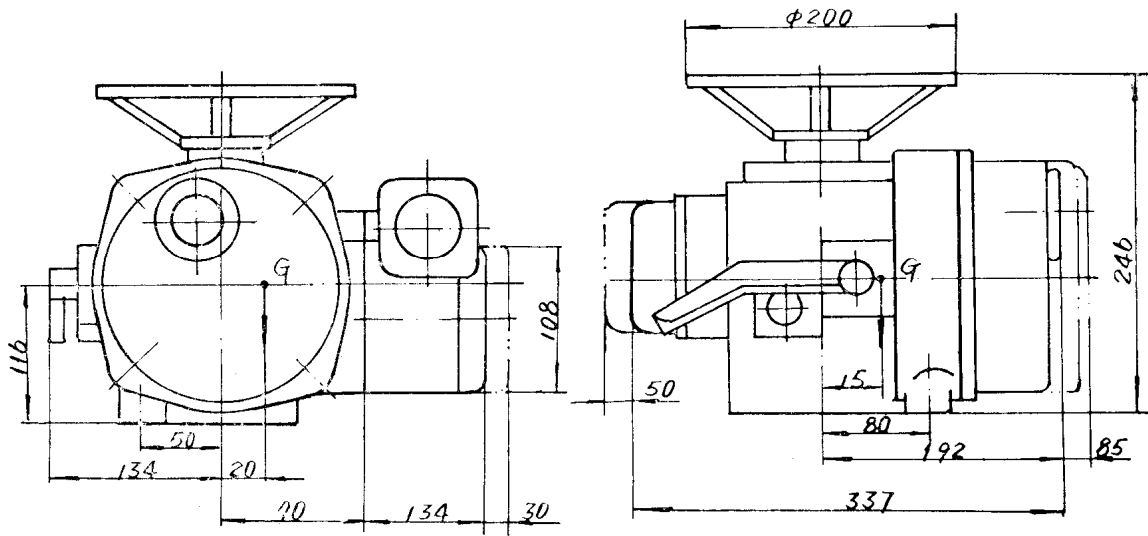


图3 ZB0 外形尺寸和重心位置图
 Fig.3 Overall size and center of gravity of ZB0

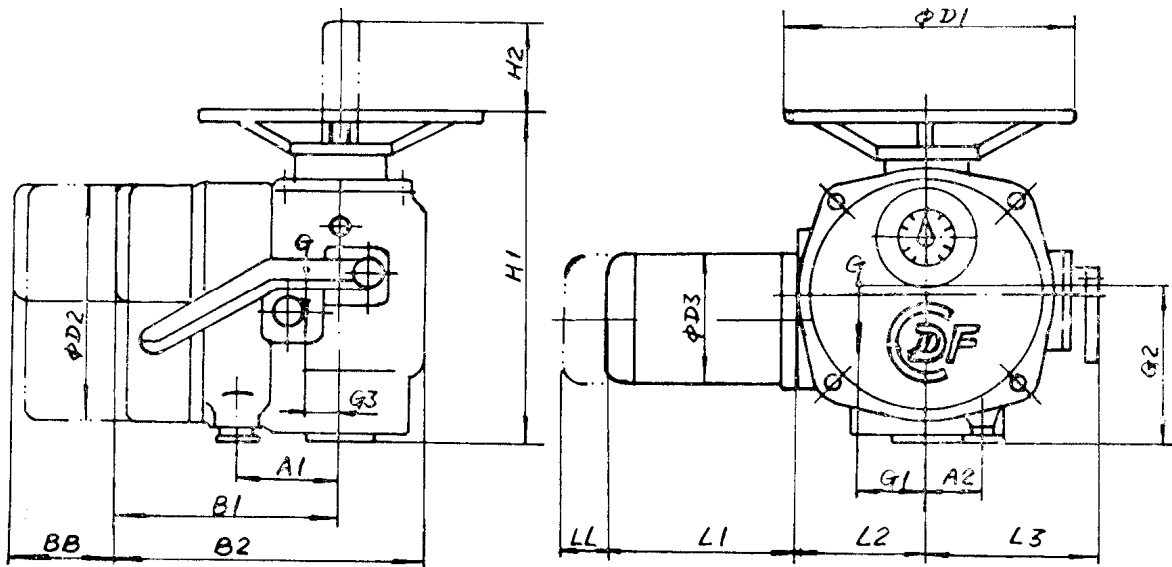


图4 ZB1 和 ZB2 外形尺寸和重心位置
 Fig.4 Overall size and center of gravity of ZB1 and ZB2

表2 ZB1 和 ZB2 外形尺寸和重心位置表

Overall size and center of gravity of ZB1 and ZB2

Table 2

尺寸 size	A1	A2	B1	B2	$\phi D1$	$\phi D2$	$\phi D3$	H1	L1	L2	L3	G1	G2	G3	BB	LL
ZB1	88	50	207	277	250	210	115~ 136	307	140 160	115	153	53	132	40	90	55
ZB2	115	55	237	327	360	236	136~ 172	359	205	142	185	62	136	45	90	55

2. 连接尺寸 Connection Dimensions

连接尺寸见图 5 和表 3 For connection dimensions refer to Fig. 5 and table 3

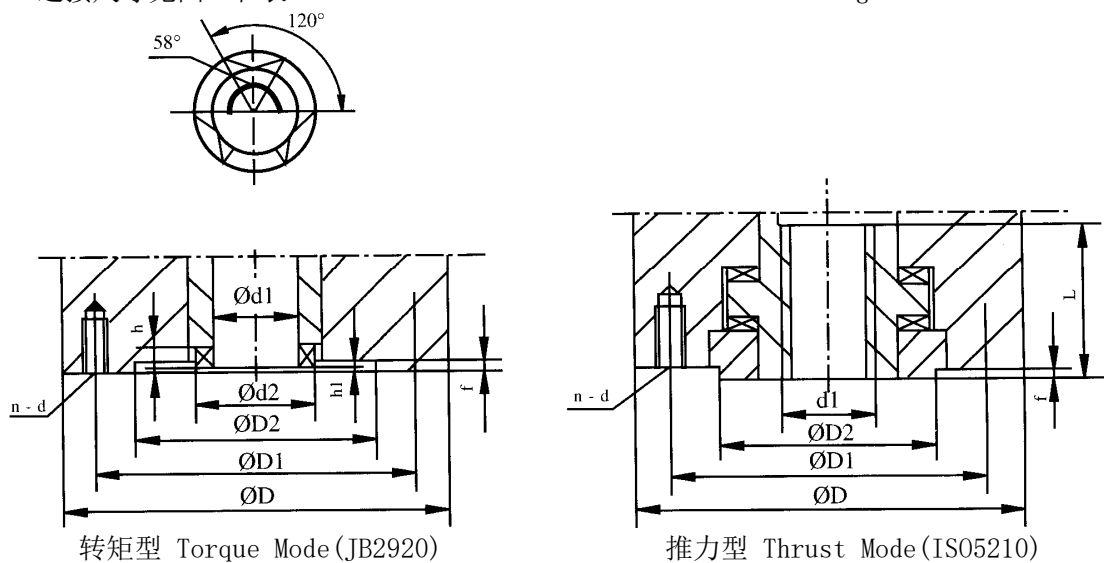


图 5 连接尺寸图

Fig.5 Connection Dimensions

表 3 连接尺寸表

Connection Dimensions

Table 3

Mode 尺寸 Size 型号 Type	转矩型 Torque Mode (JB2920-81)									推力型 Thrust Mode (IS05210)						
	$\Phi d1$	$\Phi d2$	$\Phi D2$ (H9)	n-d	$\Phi D1$	ΦD	h1	h	f	ΦD	$\Phi D1$	$\Phi D2$ (f8)	d1	n-d	L	f
ZB0	20	28	75	4-M8	95	115	2	6	5	90	70	55	T20	4-M8	36	3
ZB1	30	45	90	4-M10	120	140	2	8	4	125	102	70	T28	4-M10	40	3
ZB2	42	58	125	4-M12	160	180	2	10	4	175	140	100	T36	4-M16	50	4

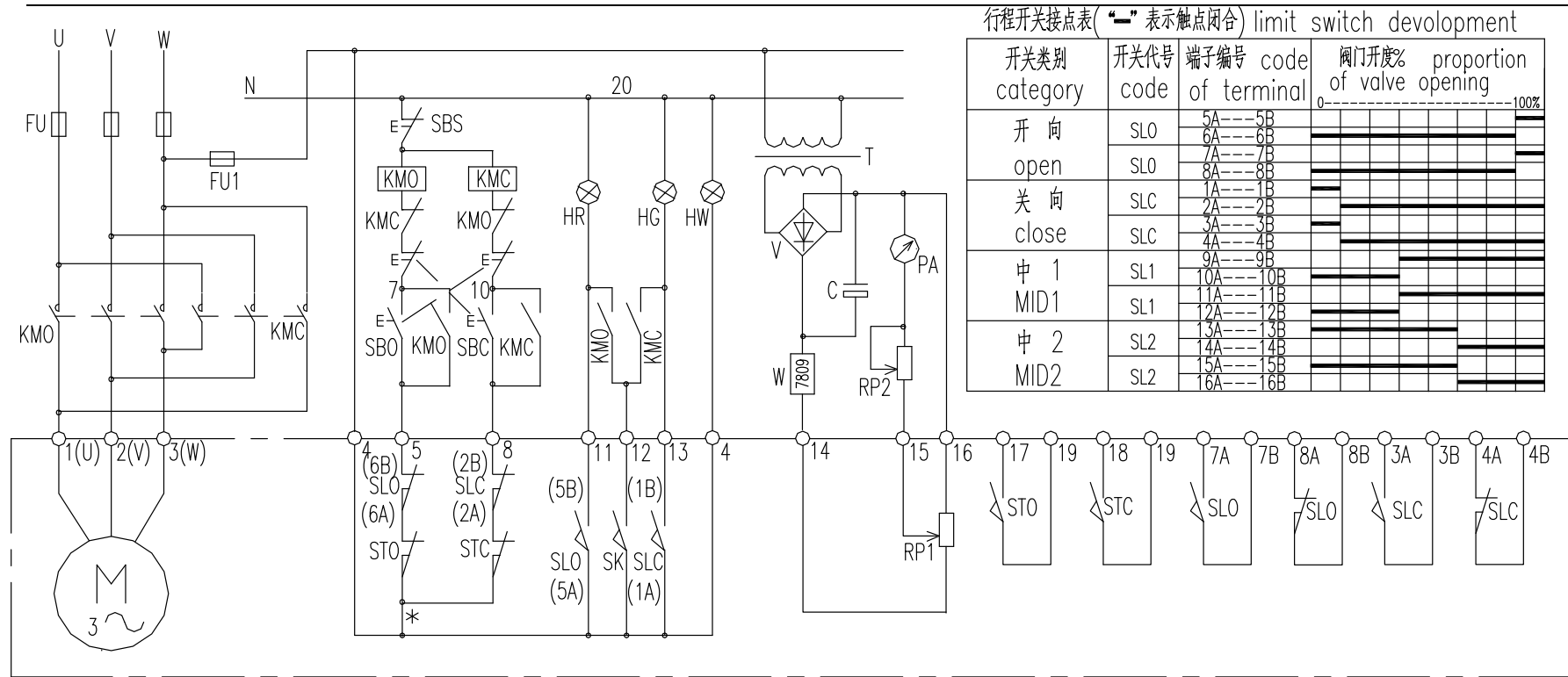
螺纹安装孔的位置与电装电机轴线成错开对称分布。

Screw hollow and motor spindle are distributed staggered and equally.

六 电气原理及接线

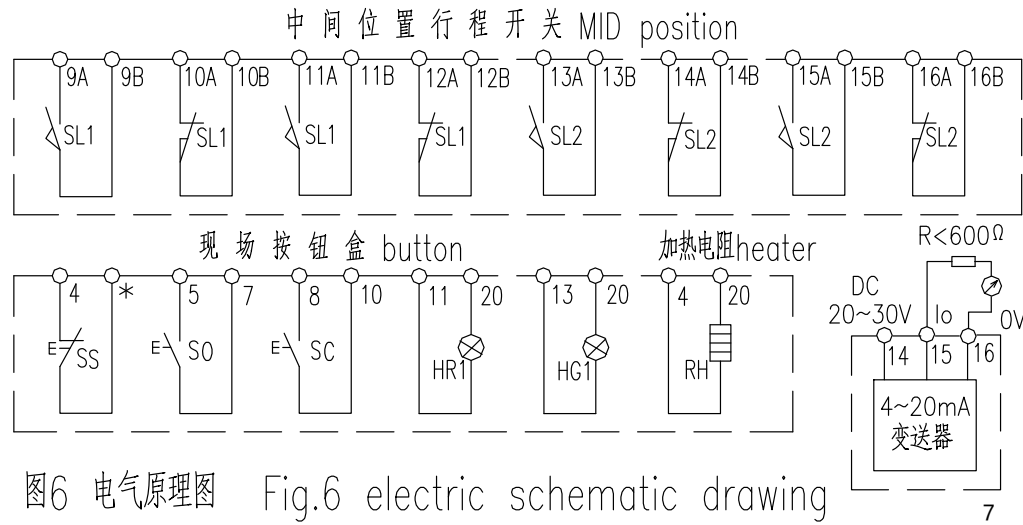
Schematic Diagram and Wiring Diagram

1. 电气原理图见图 6 For Schematic Diagram, see Fig.6
2. 接线图见图 7 For Wiring Diagram, see Fig.7



行程开关接点表 (“—”表示触点闭合) limit switch development

开关类别 category	开关代号 code	端子编号 of terminal	code	阀门开度% proportion of valve opening
开向 open	SLO	5A---5B		
		6A---6B		
		7A---7B		
关向 close	SLC	1A---1B		
		2A---2B		
		3A---3B		
中 1 MID1	SL1	9A---9B		
		10A---10B		
		11A---11B		
中 2 MID2	SL2	12A---12B		
		13A---13B		
		14A---14B		



电气元件表 electric elements

序号 No.	代号 code	名称 规格 name spec.	序号 No.	代号 code	名称 规格 name spec.
1	M	电动机 motor YDF	11	RP2	电位器 potentiometer 6.8K
2	KMO、KMC	交流接触器 A.C.contacts	12	RP1	电位器 potentiometer 100Ω
3	FU	熔断器 fuse RT14	13	STO、STC	转矩开关 torque DK1-2
4	SBS、SBO、SBC	按钮 buttons LA19-11A	14	SLO、SLC	开、关向行程开关 limit switch
5	HR、HG、HW	指示灯 indicating lamp	15	SL1、SL2	中间位置行程开关 limit switch(MID)
6	T	变压器 transformer 220/12V,8W	16	SK	闪光开关 flashing switch
7	V	整流桥 rectifier diode W04M	17	SS、SO、SC	现场按钮 local button
8	C	电容 capacitor 100μF/25V	18	HR1、HG1	现场指示灯 local indicate lamp
9	PA	电压表 voltmeter 85C1,5V	19	RH	加热电阻 heater RX20-20W 5.1K
10	FU1	熔断器 fuse BLX 3A	20	W	三端稳压器 manostat 7809

图6 电气原理图 Fig.6 electric schematic drawing

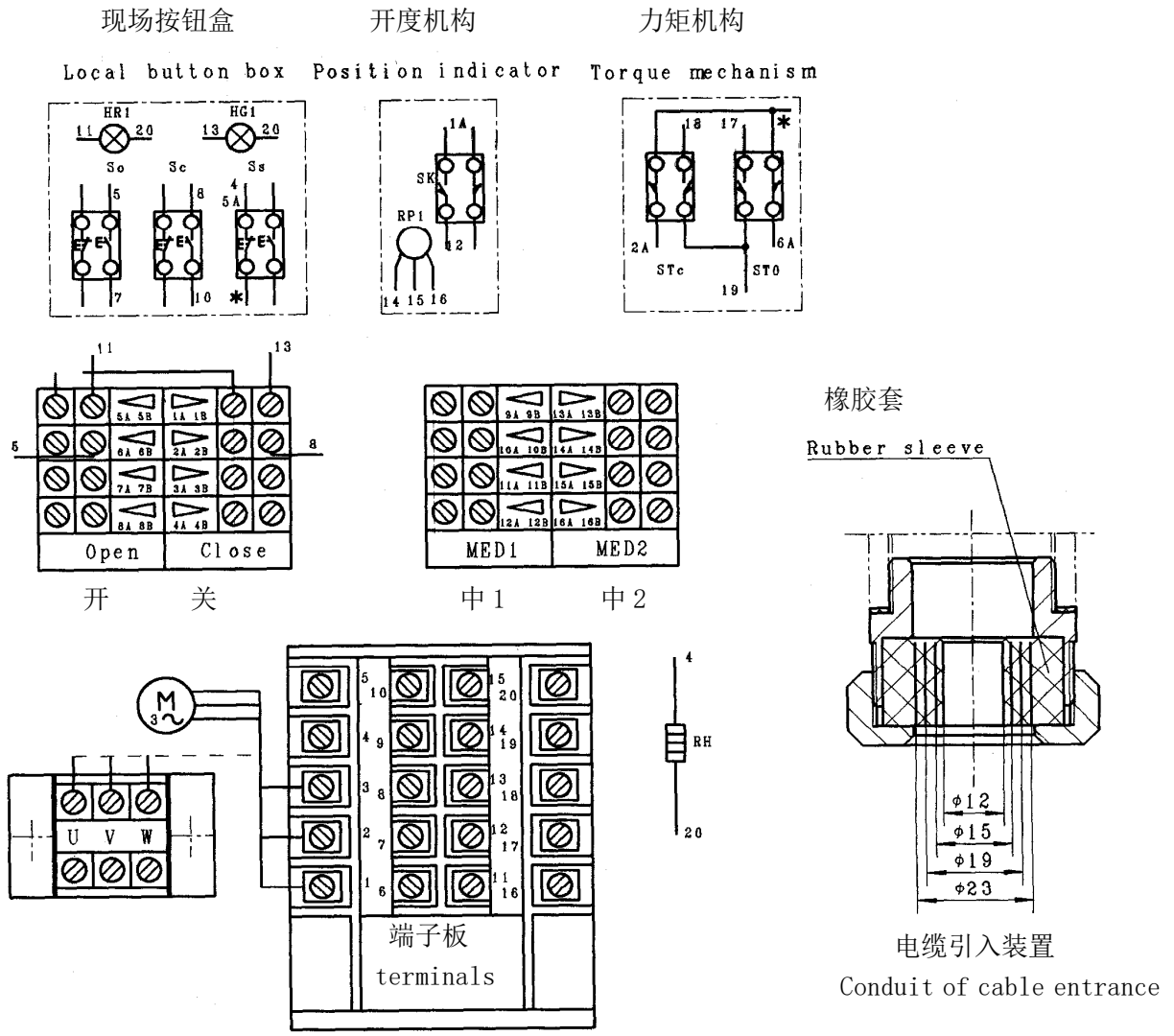


图 7 电气接线图 Fig.7 wiring diagram

说明:

1. 电气原理图仅供参考，点划线框内的元器件在电装内；
2. 虚线框内元件作特殊规格提供，若使用变送器，则电位器 RP1 不接，端子板号 14、15、16 为变送器引出线号。变送器分有源和无源两种，需订货说明。若有源，则 14 号端子改接零线 N。
3. 如果要接入 SS，需将端子 4 与图示 * 断开后接入。

Explanation:

1. This drawing is for reference only. Elements in dot dash line frame are built in.
2. Elements in dash line frame are provided as special specifications, if transmitter is adopted, the original terminal code 14, 15, 16 should be changed over to leading-in wire of transmitter. Meanwhile, the potentiometer RP1 must be disconnected. The transmitter is divided into two kinds: active and passive. The kind of transmitter must be declared when ordering. If active transmitter is adopted, the terminal 14 must be changed over to Neutral Line.
3. If SS is necessary to be connected in, it should be done after the terminal 4 is disconnected with * indicated in the figure.

七 调 整

Adjustment

电动装置与阀门组装后，应对力矩控制器、行程控制器、开度机构进行调整，方可使用，调整前务必使阀门处于中间位置。

Assembled with valve, torque mechanism, travel limit and position indicator of actuator must be adjusted respectively before going into operation. Valve should be placed at medium position before adjusting.

1. 力矩机构的调整 Adjustment of torque mechanism

力矩控制器的结构见图8 For structure of torque mechanism refer to Fig. 8

力矩控制器在出厂前已根据订货要求整定好并填在产品证明书上，(如用户未指定，通常开向整定在公称值上，关向为公称值的0.7)一般不需再调整，若需改变力矩整定值，可参考产品证明书上的力矩曲线，查找对应刻度值，进行调整。方法如下：松开螺钉，将调整臂调到对应的刻度值，再紧固螺钉即可。决不能盲目调大，否则关严后可能打不开，如果超出力矩机构的控制范围将烧毁电机。

Torque mechanism has been preset according to customer's order and the numerical value of torque is filled in the conformity certificate so it need not be reset usually. (If the customer has not specified, the set torque value for opening is generally the nominal value, and that for closing is 0.7 time of the nominal) If rated torque value needs resetting, refer to torque curve in the certificate and check corresponding scale. Adjust as following: Loosen screw, set the handle to corresponding scale and then fix screw. The setting is by no mean able to increase the value random, or the valve will not be able to open after seating, and the motor may be destroyed if the set value oversteps the control range.

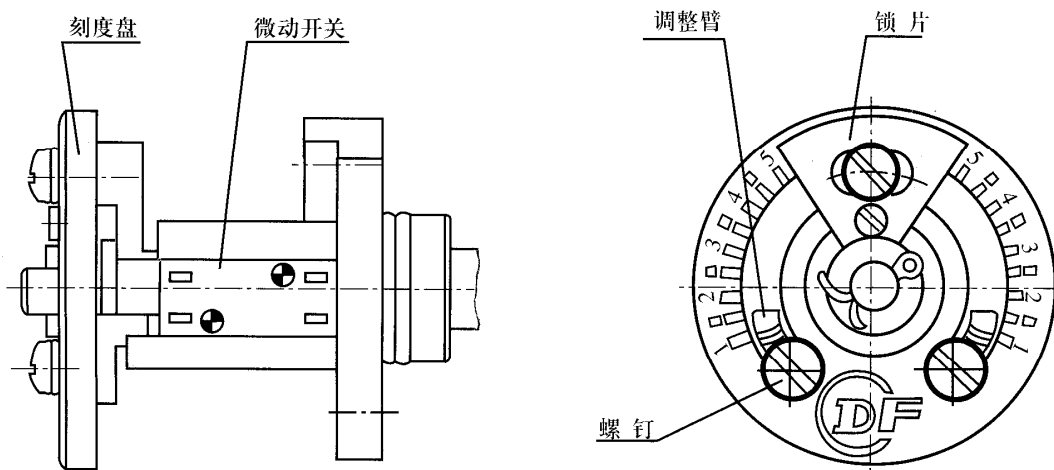


图8 力矩机构 Fig.8 torque mechanism

刻度盘 dial

微动开关 microswitch

调整臂 adjusting lever

锁片 lock plate

螺钉 screw

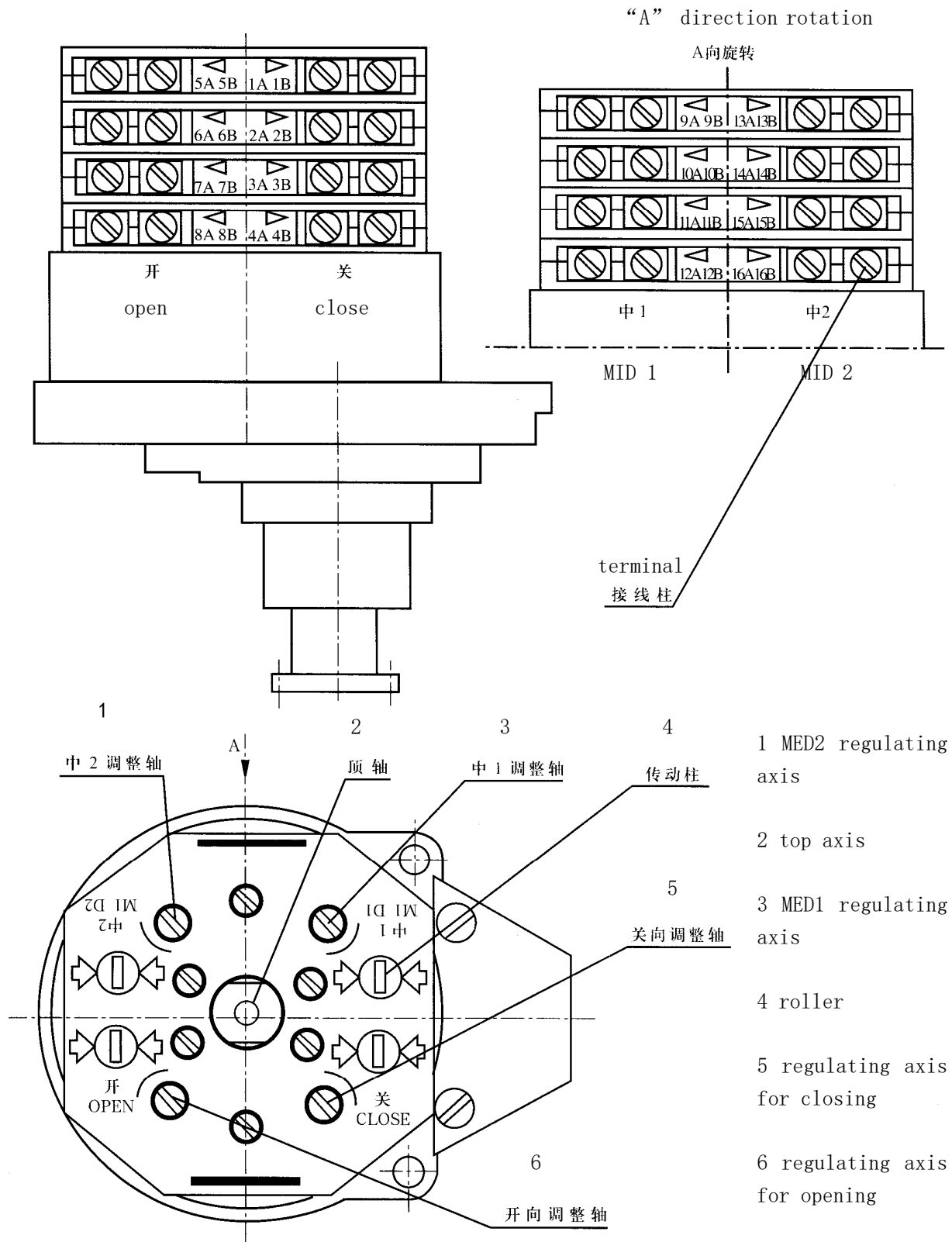


图9 行程机构 Fig.9 travel limit

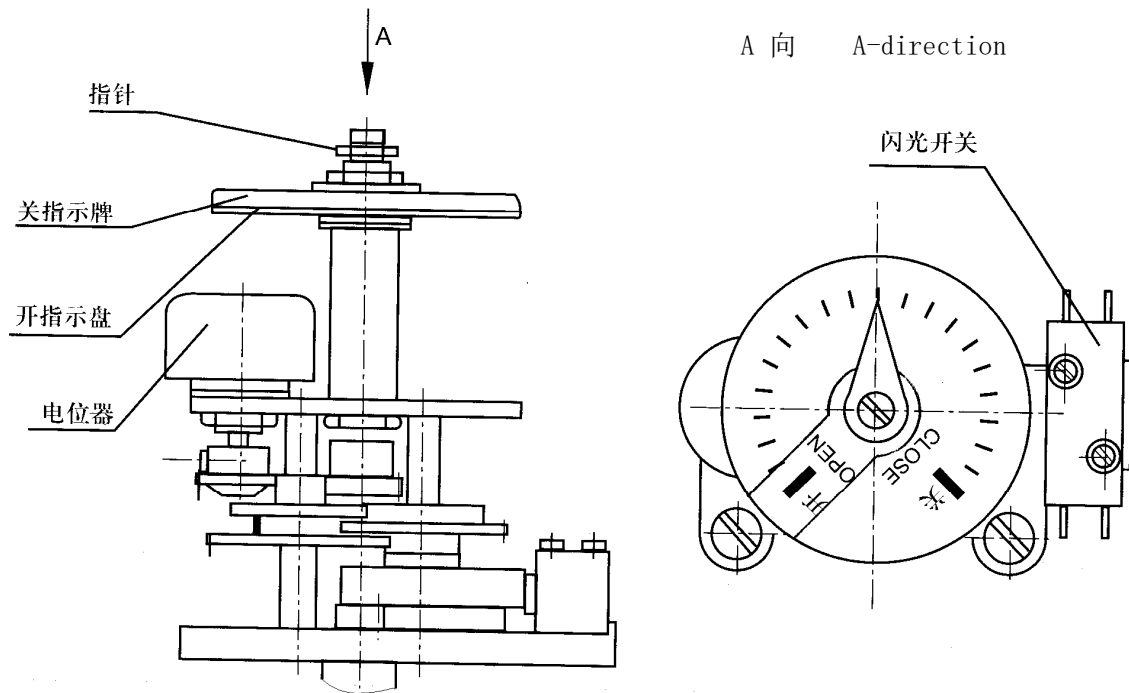


图 10 开度指示器 Fig.10 position indicator

指针 pointer 关指示牌 closing dial 开指示牌 opening dial
 电位器 potentiometer 闪光开关 flashing switch

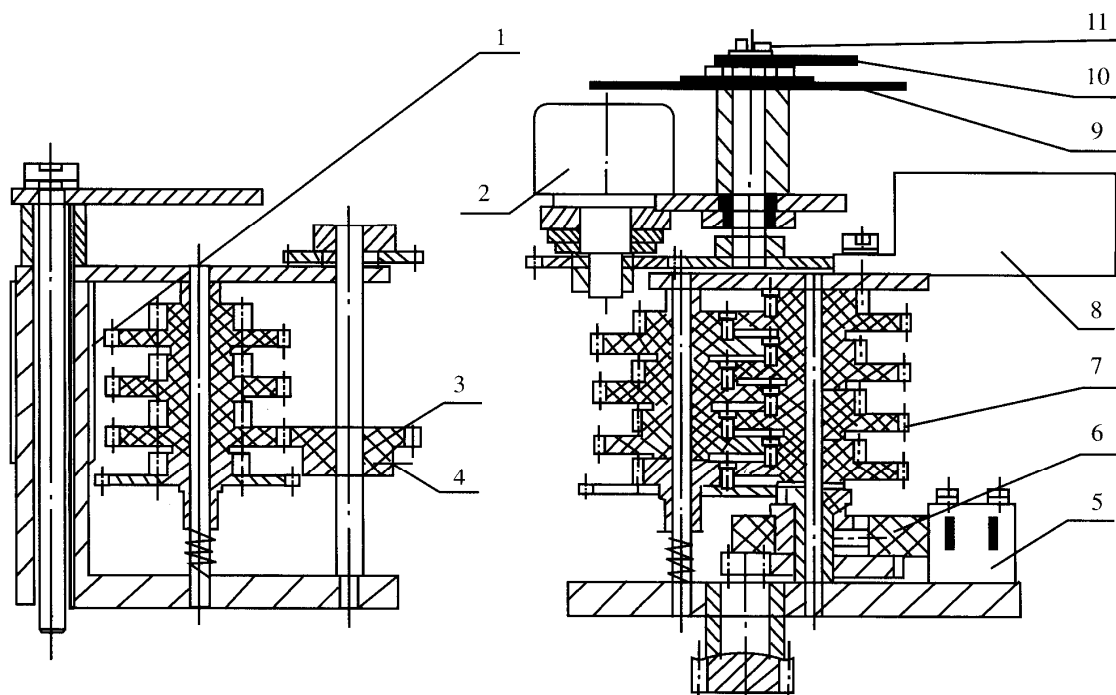


图 11 可调转圈数开度机构

Fig.11 adjustable valve position indicating mechanism

1 圈数表 revolution table	2 电位器 potentiometer	3 齿轮 gear
4 紧定螺钉 fixing screw	5 微动开关 microswitch	6 闪光凸轮 flashing cam
7 齿轮 gear	8 阀位变送器 transmitter	
9 开度指示盘 position indicating dial	10 指针 pointer	11 螺钉 screw

2. 行程控制器的调整 Adjustment of travel limit.

行程控制器的结构见图 9. For the structure of travel limit refer to Fig.9

(1) 阀门“全关”位置的调整

- ① 将手电动切换手柄按箭头方向推，用手动将阀门“全关”，再从这个位置稍退回一点。
- ② 用螺丝刀压下顶轴，并转 90° 可卡住为止。
- ③ 按关向箭头旋转“关向”计数轴，直到转动柱上的小凸台方向与两旁箭头方向基本一致为止。
- ④ 旋回顶轴，使之复位。

Adjustment of “Seating”

Pull the lever of hand/motor exchanger in the arrow direction, operate the valve to seating by hand wheel and then retreat a little from seating position.

Press top axis down by screwdriver and rotate the axis a quarter circle to be clamped.

Rotate closing counting axis following closing arrow until the project bar on roller and arrows on both side are basically in same direction.

Return top axis to original position.

(2) 阀门“全开”位置的调整

- ① 在阀门“全关”位置调好的基础上，手动或电动将阀门开到“全开”位置之前停下（建议开到全行程的 95%左右）。
- ② 用螺丝刀压下顶轴，并转 90° 可卡住为止。
- ③ 按开向箭头旋转“开向”计数轴，直到转动柱上的小凸台方向与两旁箭头方向基本一致为止。
- ④ 旋回顶轴，使之复位。

Adjustment of “complete open”

Operate the valve from seated position to open by hand wheel or electric operating and stop before the valve is complete open (operation of 95% stroke).

Press top axis down by screwdriver and rotate the axis a quarter circle to be clamped.

Rotate opening counting axis following opening arrow until the project bar on roller and arrows on both side are basically in the same direction.

Return top axis to original position.

(3) 中间位置的调整

中 1 和中 2 两个中间位置，用户可以根据需要用于开向或关向的中间位置，或用于增加开、关向的触点数。调整时计数轴的旋转方向视中 1、中 2 是用于开向还是关向而定，若用于开向则与开向调整轴的旋向一致，若用于关向则与关向计数轴的旋向一致。

Adjustment of medium positions

Customers can apply MID1 and MID2 to medium positions in opening course or closing course, or to increase the number of contacts if necessary. When adjusting, the rotation of counting axis depends whether MID1 or MID2 is used for opening or closing. If used for opening, it will rotate in the same direction in which counting axis rotates, if used for closing; it will rotate in the same direction in which counting axis rotates.

行程控制器全部调好后，需电动试运转，控制器控制的整个行程应符合要求，否则需要重新进一步调整。在行程控制器的调整过程中，如果出现调过头或者还没有开始调转动柱已经处于动作状态（即转动柱上小凸台方向与两旁箭头基本一致），这时需反方向旋转调整轴，直到恢复动作前状态，再按箭头方向重新调。

When the setting of travel limit is finished, the actuator need to be put into trial electric operation to check if the whole travel of the limit mechanism meets with the requirements, or it should be set once more. If it is overstepped or the roller acts before setting (i. e. raised part on roller is consistent with the arrows on both sides basically)

it is necessary to rotate the regulating axis reversely till it recovers the status before acting. Then reset it according to the arrow direction.

3. 开度机构的调整 Adjustment of position indicator

开度机构结构见图 10，调整方法如下：

For structure of position indication refer FIG.12, It should be adjusted as following:

(1) 电动或手动操作，将阀门关至“全关”位置后，切断电源。

Operate the valve electrically or by hand wheel to “seated” position, then cut off power supply.

(2) 松开开度指示盘上的指针螺钉，使指针与刻度盘上的“关”对齐，再将螺钉拧紧。

Loosen screw of pointer on indicating dial, set pointer pointing to “CLOSE”, then fix screw.

(3) 用钳子夹住电位器转轴，面对指示盘，按指针关方向转动电位器转轴至接近终端位置。

Clip the turning shaft of potentiometer by pliers, facing the dial, turn the shaft of potentiometer in the direction the closing dial points to approach end position.

(4) 电动或手动将阀门“全开”，保持“关”指示盘不动，转动“开”指示盘至指针所在的位置。

Operate the valve electrically or by handwheel to “complete opening” position, keeping the “closing dial” at original position, turn the “opening dial” to align with the pointer.

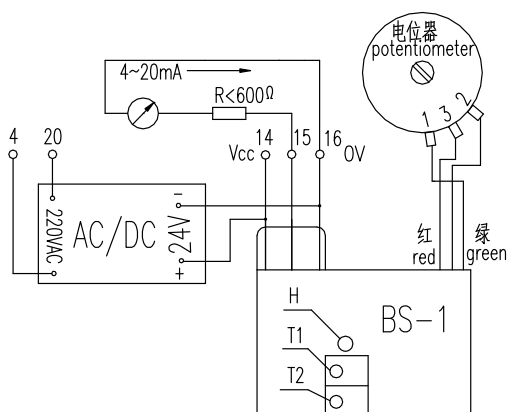
(5) 电动检查闪光。红灯在阀门开启过程中发出闪光，阀门全开时红灯亮。绿灯在阀门关闭过程中闪光，阀门全关时绿灯亮。

Operate the valve by motor to check flashing lights. The red lantern will flash during valve is opening and will light constantly when valve is complete open. The green lantern will flash during valve is closing and will light constantly when valve is seated.

另有一种可调转圈数开度机构见图 11，其调整范围分七档，即 5、10、20、40、80、160、320 圈。当需要某种圈数时，只要将紧定螺钉 4 松开，移动齿轮 3 至圈数数表 1 的对应位置，旋紧紧定螺钉 4 即可。需要注意的是：每调一次，电位器轴与指针 10 的运行旋向均与调整前相反。

For another adjustable valve position indicating mechanism see Fig.11. Revolution setting of this mechanism is provided with seven steps, i.e. 5, 10, 20, 40, 80, 160 and 320 revolutions. As the certain revolutions are required, please loosen screw 4 and move gear 3 to the position paralleling to the certain revolutions of the table 1, and then tighten screw 4. The rest setting procedure is approximately as the same of 7.3 of this manual. It must be paid attention that rotation of potentiometer shaft and pointer 10 after each setting is always opposite to the last setting.

4. 阀位变送器 BS-1 的调整 Adjustment of transmitter BS-1



BS-1 阀位变送器其取样电位器选用高精度导电塑料电位器（独立线性度<1%，寿命 10×10^6 次）。调整方法如下：（以输出轴顺时针转动为关阀为例）使阀门处于全关位置，关方向旋转取样电位器转轴，使输出电流从大到小接近 4mA（导电塑料电位器无限位）调节 T1，直至输出电流精确为 4mA，打开阀门至全开位置，调节 T2，直至输出电流为 20mA。

The potentiometer is made up of conductive plastics of high precision (independent linearity <1%, life time: 10×10^6 cycles). The adjusting is as following: (Take seating of valve by clockwise rotation of output shaft as example) Make valve seated, turn the axle of

sampling potentiometer to make current decreasing gradually approaches 4mA. (Conductive plastic potentiometer has no rotation limit) Regulate T1 until output current is accurately 4mA. Unseat the valve to complete opening to regulate T2 until output current is 20mA.

八 注意事项 Cautions

1、安装前应将电动装置存放在清洁干燥的室内，若放在室外，应离地面一定高度，并有防水措施。

Before mounting, actuators shall be stored in clean and dry room, if actuators are placed outdoors, they shall be off ground and provided with drainage.

2、安装时应把电气箱盖和导线进出口密封好，以防潮气和雨水进入电气箱内，造成电气元件及零件锈蚀。

In the process of mounting, electric compartment and conduit shall be well sealed to prevent moisture and rain from penetrating to avoid electric component failure and parts rusting.

3、不得在阴雨天于户外打开电气箱盖、电机等密封部位，打开电气箱盖时，必须先切断电源。拆开重装时，密封部位需盖严紧固。

Do not open outdoor electric compartment, motor and other sealed location when it is rainy or overcast. Power supply must be cut off before opening electric compartment. During reassembling, sealing location shall be tightened and fastened.

4、手动操作前应将手电动切换手柄按箭头方向推（或拉），若推不下去时需边推边转手轮。切换后即可手动操作（ZB1~ZB2 可适当用加力杆）。手轮旋向通常与输出轴一致，顺时针为关，逆时针为开。电动时手柄自动复位，切不可手动扳回。

Before hand operation, lever of hand/motor exchanger shall be pushed or pulled in the arrow direction. If it could not be pushed down, turn hand wheel while push the lever. After declutching, hand wheel can be operated, (Proper additional lever may be suitable to ZB1~ZB2). Generally hand wheel and output shaft rotate in the same direction. They turn clockwise during closing and counter clockwise during opening. The lever of hand/motor exchanger will return to original position automatically when the device is operated electrically. Be sure not to pull back the lever by hand.

5、首次电动操作时，先手动操作使阀门处于中间位置，然后电动检查输出轴的旋向与阀门开关是否一致，若相反应即停机切断电源，将电动机的三相电源任意两相对调。

For the first electric operation, turn the valve to medium position by hand, then operate the valve electrically to check whether the output shaft and the valve rotate in the same direction, If the valve rotate in the opposite direction, Stop operating at once, Then cut off power supply and exchange any two phase of 3-phase power supply.

6、由于专用电机为短时工作制，调试时，连续试车时间不可太长。

Because of the short-time duty of motor, continuous trial run shall not be too long.

7、箱体内采用专用半流体齿轮脂 1 号或 2 号（无锡炼油厂生产）润滑。每年应检查一次润滑情况，如有异常，应及时更换或补充，如无异常可继续使用。

Lubricant filled in housing is NO. 2 semi fluid gear grease (produced by Wuxi Oil Refinery). Checking the lubrication once a year is recommended. If anything abnormal, the lubricant should be replaced or filled up in time. If nothing abnormal, it can go on with operation.

8、拆卸重装时，应注意检查密封件，发现损伤应及时更换，密封部位必须盖严紧固。

When the actuator is disassembled and reassembled, pay attention to sealing parts. Failed parts should be replaced in time. Sealing parts must be muffled and tightened.

9、对于不经常使用的阀门，应定期检查保养运行操作，建议每月运行一次，时间不超过 10 分钟。

Check and maintain the valve at regular intervals when the valve does not operate frequently. Total operation for not more than 10 minutes once a month is recommended.

10、起吊时，不得吊装手轮。

When hoisting, never use hand wheel as ear.

11、与阀门连接时用 8.8 级螺钉。

The actuator is connected with the valve by screws of 8.8 strength level.

12、安装或维修过程中的废弃物应妥善处理。固体废弃物的处理应符合 GB18599 《一般工业固体废物贮存、处理场污染控制标准》，废润滑油的处理应符合 GB/T17145 《废润滑油回收与再生利用技术导则》。

九 故障及其排除方法 Troubleshooting

序号 No	故障 Troubles	原因 Reasons	排除方法 Troubleshooting
1	电动机不能启动 Motor does not start.	1. 电源不通 Disconnected to power supply 2. 操作回路不通 Control circuit is dead 3. 行程或力矩控制器开关动作 Switches of limit or torque act.	1. 接通电源 Check power supply 2. 排除回路故障 Circuit troubleshooting 3. 解除动作开关 Eliminate the action of Switches.
2	输出轴旋向与规定要求相反 Motor is overheated	电机电源相序不对 Phase of motor power is not in order	三相线中任意对调二相 Exchange any two of three Phase.
3	电机过热 Motor is overheated	1. 连续试车时间过长 Too long a time to continue operating 2. 电装与阀门选配不当 Motor does not mate the actuator 3. 电机二相运转 One phase is off	1. 停止试车，待电机冷缺 Stop trial operating to make motor cool 2. 复核配套情况 Check the mating state 3. 检查供电回路 Check power circuit
4	运行中电机停转 Motor stops running during operation	1. 负载过大，力矩控制器失灵 Actuators are over loaded and torque control works 2. 阀门故障 Valve is in trouble	1. 提高力矩控制器的设定值 Raise the preset value of torque 2. 检查阀门 Check valve
5	阀门到位电机不停转，阀位指示灯不亮 Motor does not stop or lamp does not light when valve reaches preset position	1. 行程或力矩控制器失灵 Limit or torque mechanism fails. 2. 行程控制器调整不当 Travel limit is not proper set	1. 检查行程及力矩控制器 Check limit or torque mechanism 2. 重新调整行程控制器 Reset travel limit
6	远方开度发信失控 Remote position signal is out of control	远方开度电位器故障 Remote position potentiometer fails	清洗或更新电位器 Clean or replace the potentiometer.

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