



ZB5B~ZB40B

隔爆型阀门电动装置 使用说明书

**OPERATION INSTRUCTION MANUAL
FOR
FLAMEPROOF TYPE ELECTRIC VALVE
ACTUATORS**

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THE PEOPLE'S REPUBLIC OF CHINA

一、概述 General Description

本系列隔爆型阀门电动装置（简称隔爆电装）是 ZB 系列阀门电动装置的隔爆型。隔爆标志有 d I、d II BT4。本系列隔爆电装具有 ZB 系列电装的特点：功能全，性能可靠，控制系统先进，体积小，重量轻，品种规格齐等特点。本产品性能指标达到 JB/T8528-1997《普通型阀门电动装置技术条件》的规定。

隔爆性能符合 GB3836.1-2000《爆炸性环境用防爆电气设备 通用要求》、GB3836.2-2000《爆炸性环境用防爆电气设备 隔爆型电气设备“d”》及 JB/T8529-1997《隔爆型阀门电动装置技术条件》的规定。

该系列隔爆型阀门电动装置用于阀瓣做直线运动的阀门，如截止阀、闸阀、节流阀、隔膜阀、水闸等。可以用于明杆阀，也可以用于暗杆阀，是对阀门实现远控、集控和自动控制的必不可少的驱动装置。

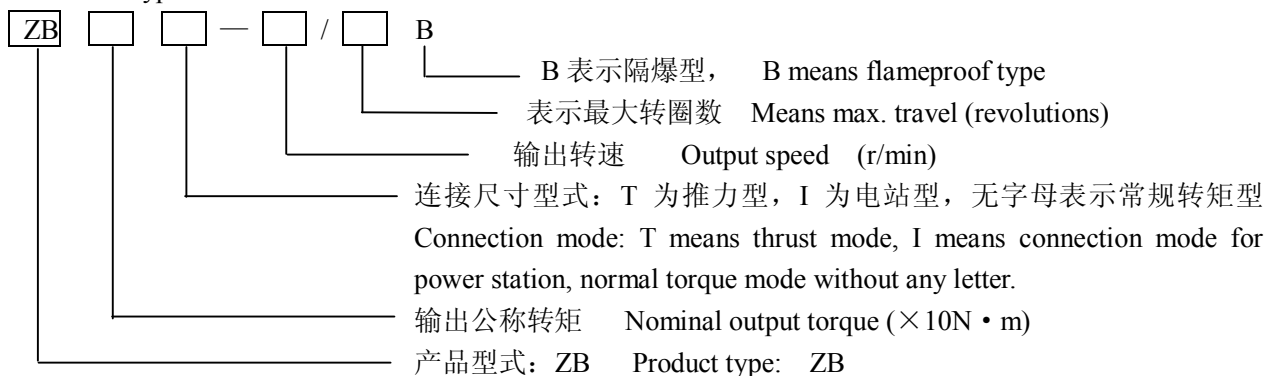
This series flameproof electric valve actuators (flameproof actuator as abbreviation) are explosion-proof type of series ZB electric valve actuators. Flameproof marks divided into d I ,d II BT4 . This series flameproof actuators are provided with features of series ZB actuators: of full functions, advanced in control system, small in size, complete in specifications. The performance of flameproof actuators conforms to Std JB/T8528 SPECIFICATIONS OF ELECTRIC VALVE ACTUATORS OF COMMON TYPE.

Flameproof performance of these products conforms to Std GB3836.1—2000 ELECTRICAL APPARATUS FOR EXPLOSIVE ATMOSPHERES-- GENERAL REQUIREMENTS and Std GB3836.2-2000 ELECTRICAL APPARATUS FOR EXPLOSIVE ATMOSPHERES—FLAMEPROOF ELECTRICAL APPARATUS “d” and Std JB/T 8529—1997 TECHNICAL SPECIFICATIONS OF FLAMEPROOF ELECTIRIC VALVE ACTUATORS.

This series flameproof electric valve actuators are suitable to valves of which the clacks move linearly, such as globe valves, gate valves, throttle valve, diaphragm valve etc. They can be used for rising stem valves and non-rising stem valves as well. They are necessary devices to carry out remote control, centralized control and automatic control of valve.

二、型号表示方法 Representation of Type

1. 型号 type



例：ZB15T—24/40B 表示输出公称转矩 $150\text{N} \cdot \text{m}$ （约 $15\text{kg} \cdot \text{m}$ ）推力型，输出转速 $24\text{r}/\text{min}$ ，最大转圈数 40，防爆型。For example: ZB15T—24/40B represents actuator of rated output torque $150\text{N} \cdot \text{m}$ ($15\text{kg} \cdot \text{m}$) thrust mode, output speed $24\text{r}/\text{min}$, max travel 40 turns, flameproof type.

2. 防爆标志说明

d I

└── d 表示隔爆型， I 表示煤矿用。 d means Flame-proof, I means For colliery

d II B T4

└── 电气设备的允许最高表面温度，T4 为 135°C 。Allowed max temperature on electric apparatus, Limit of T4 is 135°C

└── 爆炸性混合物最大试验安全间隙 B 级。Class B of tested max safety clearance for explosive mixture

└── d 表示隔爆型， II 表示工厂用。 d means Flame-proof, II means For plants and works

三. 结构 Structure

1. 电动机 Motor

采用 YBDF 防爆型电动机, 该电机启动转矩大, 转动惯量小, 其输出转矩特性适合于阀门驱动, 各项性能符合标准 JB/T2195 《YDF₂ 系列阀门电动装置用三相异步电动机技术条件》

Type YBDF explosion-proof electric valve motors are adopted. These motors are provided with large start torque, small moment of inertia, Their performance of output torque is suitable for valve drive. Other performance conform to Std JB/T 2195 SPECIFICATIONS OF YDF₂SERIES THREE-PHASE ASYNCHRONOUS VALVE MOTORS.

2. 减速机构 Reducing mechanism

电动时采用一级齿轮和一级蜗杆蜗轮传动, 手动时手轮直接驱动输出轴。

When electric operating, one stage of gears and one stage of worm gear and worm is adopted. When hand operating, handwheel drives output shaft directly.

3. 手电动切换 Hand / electric clutch

手动操作前将手电动切换手柄按箭头方向抬起, 此时即可手动 (当手柄抬不到位置时必须将手轮旋转一角度, 即可抬起)

电动时, 切换机构会自动恢复到电动位置, 切不可强行将切换手柄扳回到电动位置。电动时手轮不转。

Before hand operating, push the clutch lever up. (If the lever could not be pushed to end, turn the handwheel while pushing the lever.) Only the clutch is changed over, hand operating can be carried out.

When electric drive is carried out, the clutch lever will turn back automatically and must not be pulled back by hand operation.

4. 行程控制器 Travel limit

行程控制器采用十进制计数器, 设有开、关、中 1、中 2 四个位置, 每个位置提供两对常开两对常闭触点。中 1 和中 2 分别提供两个任意可调的中间阀位信号, 也可以将其调到全开或全关位置, 以增加启闭位置触点数。

Travel limit adopts decimal counter and is provided with 4 control positions of OPEN, CLOSE, MED1 and MED2 and each position consists of two pairs of normal open contacts and two pairs of normal close contacts. Signals from MED1 and MED2 control two random medium positions respectively, and can be adjusted to complete opening or seating to increase number of contact for the two positions.

5. 开度机构 Position indicator

开度机构用于指示开、关方向和位置。设有现场开度指示盘, 闪光开关和远方发信电位器。开度机构与阀门的工作行程严格保持同步, 对中同口径的阀门, 为了使其开度指针都能满刻度指示, 设有多种速比的齿轮组, 用户可根据实际需要提出电动阀门的最大转圈数。

Position indicator is used to indicate the operating direction of valve and position of valve. Position indicator is provided with local indicating dial, switch of flashing lamp and potentiometer transmitting remote signal. Position indicator keeps strictly synchronous with valve travel. For valves of different diameters, position indicator is provided with gear sets of varied ratio to show full scale of max output rotations chosen by user.

6. 力矩控制器 Torque limit

力矩控制器可在阀门开向或关向动作。当阀门在全开、全关或中间位置产生过载, 达到预先调定的转矩值时, 力矩开关会自动切断电源, 从而达到控制输出力矩保护电动阀门的目的。

Torque limit can function in both opening direction and closing direction of valve. When overload reaches preset torque value as a result of valve being completely opened or seated or in medium position, the switch will cut off motor power automatically to control output torque and safeguard the motor-driven valve.

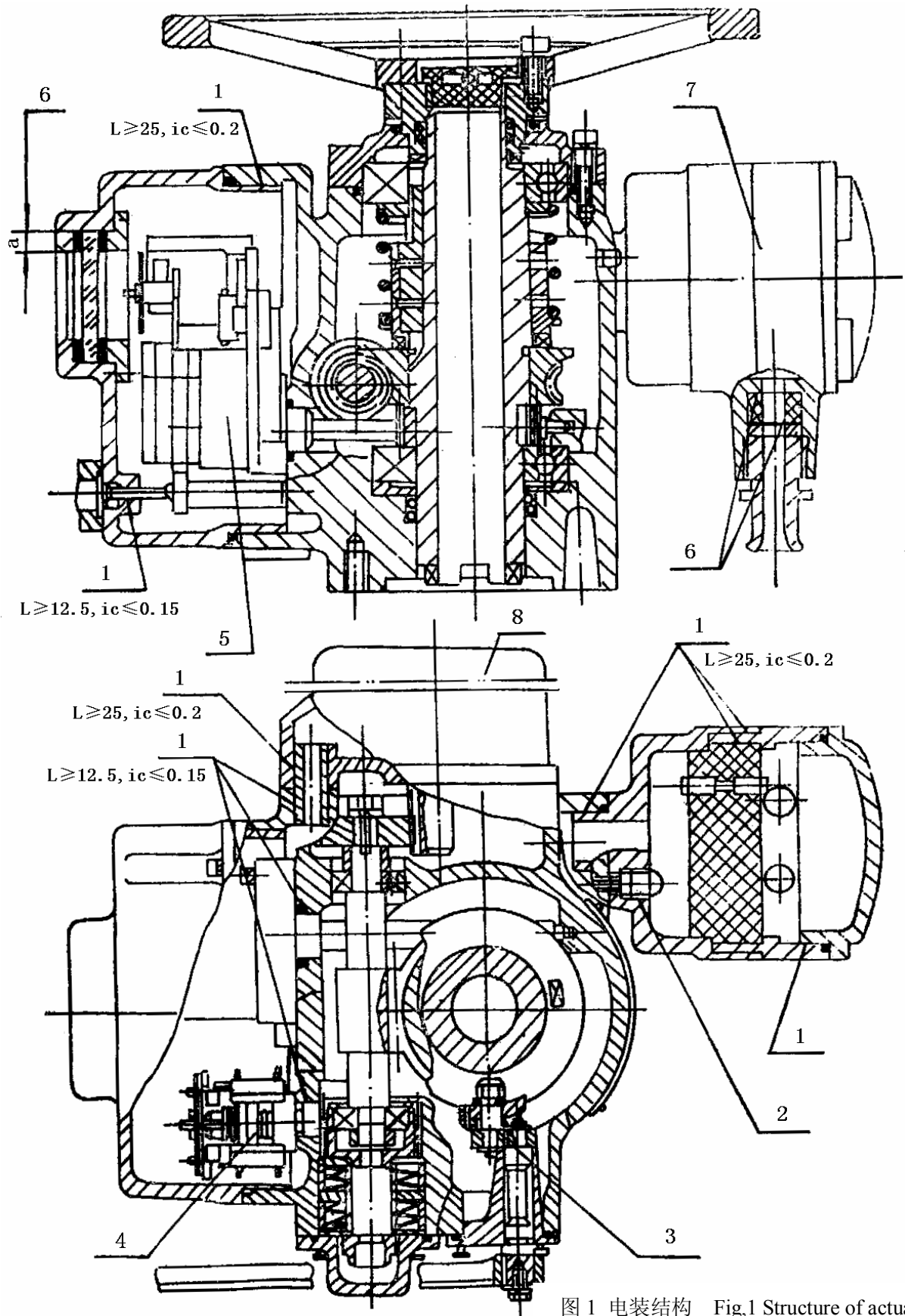


图 1 电装结构 Fig.1 Structure of actuator

1. 隔爆面 Flame-proof joint 2. 隔爆螺纹 Flame-proof screw 3. 手电动切换 Clutch
 4. 力矩控制器 Torque limit 5. 行程和开度机构 Travel limit and position indicator
 6. 密封隔爆 Sealing and flame-proof 7. 接线盒 Terminal box 8. 防爆电机 Flame-proof motor

四、工作环境及主要技术参数 Service Environment and Main Technical Parameters

1. 电源 Power Supply

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 含有爆炸性气体或粉尘, 本装置有 dI (煤矿井下用电气设备) 和 dIIBT4 (工厂用) 两种, dIIBT4 所适用环境为 II A、II B 级 T1~T4 组的爆炸性气体混合物。

Within explosive gases or dust, these actuators are provided with Class dI (as electric apparatus for colliery mine) and Class dIIBT4 (for plant and works). Class dIIBT4 is suitable to the atmosphere of explosive gases mixture specified by groups T1~T4 of Class IIA and Class IIB.

2.2 环境温度: -20 ~ +60°C Ambient temperature: -20~60°C

2.3 环境相对湿度: ≤90% (+25°C时) Relative humidity: ≤90% (at 25°C)

2.4 海拔高度: ≤1000m Seal level: ≤1000m

2.5 防护等级: IP55 (特殊订货可达 IP67) Protection: IP55 (IP67 for special order)

3. 本装置为短时工作制, 额定运行时间为 10 分钟。

These actuators are for short time duty. The rated operating time is 10 minutes.

4. 规格和主要技术参数 Specifications and Main Technical Parameters

表 1 table 1

型号 type	电机 功率 power kW	电流 current A	输出转速 output speed r/min								公称 推力 thrust k·N	最大阀 杆直径 max. dia of stem	最大 转圈 数 max. rev	手动 速比 hand ratio	参 考 重 量 kg
			12	18	24	30	36	42	48	60					
			输出转矩 output torque N·m												
ZB ₁₅ B	0.09	0.68	100	50							40	28	6 10 20 30 40 60	1	60
	0.12	0.74			50										
	0.18	1.22	150	100	80	60	50								
	0.25	1.4		150	100	80	70	60	50						
	0.37	1.8			150	130	100	90	80	60					
	0.55	2.4					150	130	100	90					
ZB ₄₀ B	0.25	1.4	250								100	36	100 120 160	1	75
	0.37	1.8	400	200											
	0.55	2.4		300	250	200	150								
	0.75	3.0			400	300	250	200	150						
	1.1	4.0				400	350	300	250	200					
	1.5	5.0						1400	350	300					
	2.2	7.0								400					

注: 粗线框内为正常供货, 其它供用户选用, 作特殊供货。Note: Specifications in thick line frame are provided as normal supply. Others are for users to choose to be special supply.

五、外形及连接尺寸 Overall Size and Connection Dimensions

1. 外形和外形尺寸见图 2 和表 2 Contour and overall size see Fig.2 and table 2.

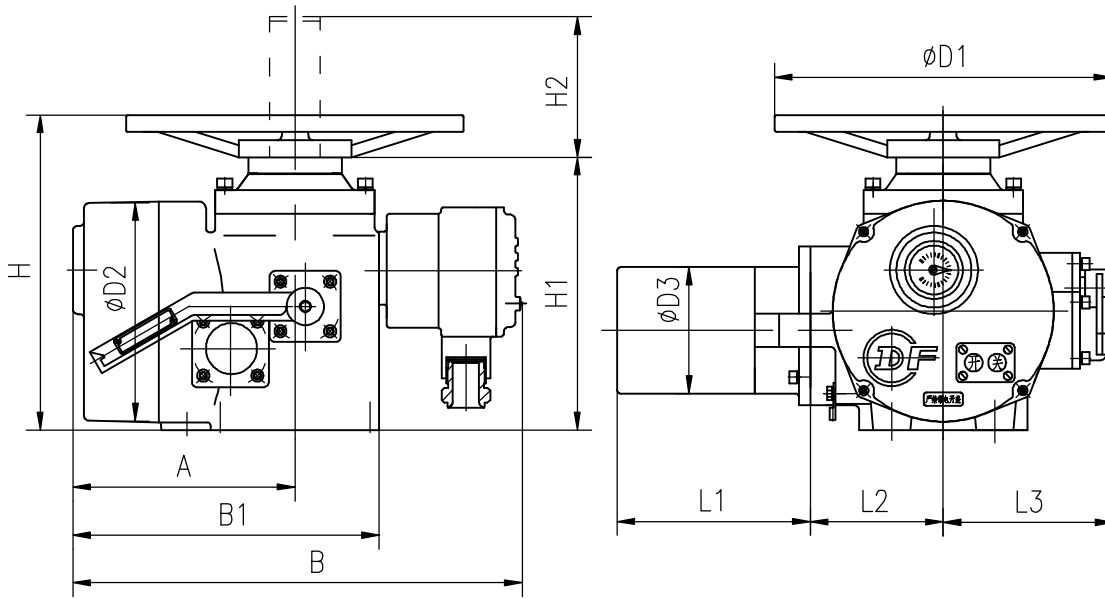


图 2 外形尺寸图

Fig.2 Over Size

表 2 table 2

尺寸 size 型号 type	A	B1	B	L1	L2	L3	H	H1	H2	D1	D2	D3
ZB ₁₅ ⁵ B	241	311	485	202~291	115	158	304	259	用户定	250	210	115~136
ZB ₄₀ ²⁰ B	265	355	519	291~346	142	185	337	291		360	236	136~172

2. 连接尺寸见图 3 和表 3 connection dimensions see Fig.3 and table 3.

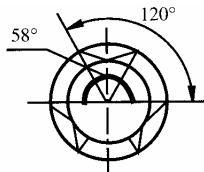
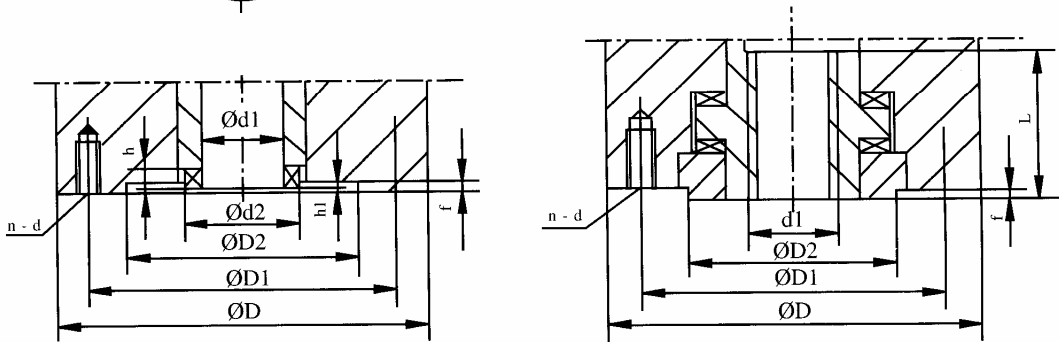


图 3 连接尺寸图

Fig.3 connection dimensions



转矩型 Torque Mode(JB2920)

推力型 Thrust Mode (ISO5210) 表 3 table3

Mode 尺寸 Size 型号 Type	转矩型 Torque Mode (JB2920-81)									推力型 Thrust Mode (ISO5210)						
	Φd1	Φd2	ΦD2 (H9)	n-d	ΦD1	ΦD	h1	h	f	ΦD	ΦD1	ΦD2 (f8)	d1	n-d	L	f
ZB ₁₅ ⁵ B	30	45	90	4-M10	120	140	2	8	4	125	102	70	T28	4-M10	40	3
ZB ₄₀ ²⁰ B	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. 现场使用和维护 Site Operation and Service

1. 禁止在爆炸性环境下拆去电气箱盖带电调试电动装置。

In explosive atmospheres any trial and adjustment of electric operation with cover removed from electric box is forbidden.

2. 不得在阴雨天于户外打开电气箱罩、电机等密封部位。

Do not open electric compartment, motor and other sealed locations on rainy days.

3. 检查维修后, 须将电气箱罩、电机及其它密封部位盖严紧固, 以防雨水、潮气侵入, 造成电气元件失效及零件锈蚀。

After maintenance, cover of electric compartment, motor and other sealed locations must be tightened and fastened avoid moisture and rain.

4. 打开电气箱罩时, 必须先切断电源。

Before remove the cover of electric compartment, power supply must be cut off.

5. 装置自阀门取下维修重装后, 要重调行程控制器, 方可启动电动机。

After reassembly, the actuator must be reset before it goes into operation.

七. 安装和拆卸 Installation and Disassemble

1. 安装形式: 安装形式无原则要求, 但电机处于水平状态, 电气箱罩处于水平或垂直向上状态为推荐安装形式, 这样利于润滑、维修及观察。

Type of installation: There is not requirement in principal for installation. But motor of actuator should be horizontal and cover of electric compartment is recommended to be level and upward so as to be convenient for lubrication, maintenance and observation.

2. 安装空间应保证维修检查时拆卸各部件所需的空間。

Installation space should be enough for check and disassembling.

3. 如果是明杆阀门, 应检查阀杆伸出量与阀杆护套的长度是否相符。

For rising stem valve, check if the length of stem extension conforms to the length of stem cap.

4. 安装、拆卸、调试时不可损伤隔爆面和密封件, 重新装配时, 隔爆面须涂 204-1 防锈油。接线盒内各电气间隙为: 220V 的 ≥ 6 , 380V 的 ≥ 8 。

When installing, disassembling and adjusting, flame-proof joint and sealing parts must not be damaged. When reassembling, flame-proof joint must be coated with 204-1 antirust agent. Inside electric compartment, electric gap should be more then 6 (220V) or 8 (380V).

5. 安装或重装后, 首次电动操作, 必须使阀门处于中间位置检查开关方向。

For the first electric operation after assembling or reassembling, valve must be in medium position for checking directions of opening and closing.

6. 当需拆卸装置时, 应先将手动手轮旋转数圈, 在阀门稍开状态下进行。

When disassembling of actuator is needed, turn handwheel several rotations to make valve be in a little opened position.

八. 润 滑 Lubrication

1. 装置出厂前已注入专用齿轮脂 (无锡炼油厂生产的 0 号半流体齿轮脂), 但为慎重起见, 使用时应通过注油孔检查润滑情况。

These actuators are filled with special gear grease before leaving factory (No. 0 semifluid gear grease witch produced by Wuxi Oil Refinery). For the purpose of caution, check the lubrication before them go into operation.

2. 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。

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.

3. 电机轴承的润滑脂一般情况下不必更换或添加。

Lubricant of motor bearing does not need replacing or addition generally.

4. 当选用其它润滑脂时，应注意选用抗氧化，耐热性、防锈性、化学稳定性均好，并添加了抗挤压剂的油脂。

When lubricant of other trade-mark is chosen, it shall be antioxidant, heat-resisting, antirust, of stable chemistry, with extrusion-resisting agent added in.

5. 添加润滑脂或注油，注意不可带进异物，加完后必须拧紧油堵。

When adding in lubricant, foreign material must not be filled in. When filling is finished. Oil plug must be tightened.

6. 若对电动装置有特殊要求，需用润滑油润滑时，此时装置出厂前不加润滑油，故使用前必须注意。

If the actuator is specified to fill in with lubricating oil, it will be not filled oil before leaving factory. So it must be lubricated before going into operation.

九、电气原理及接线 Schematic Diagram and Wiring Diagram

1. 电气原理及接线见图 5。具体控制线路由用户自行选择，这里提供的电气原理图仅供参考。

For schematic diagram and wiring diagram, see Fig.5. Electric skeleton diagram here is for reference only. Concrete control circuit is decided by user.

2. 确认使用电压与电装铭牌上的电压相符。

Be sure that applied voltage is conformed to the voltage indicating in name plate.

3. 接线盒有两个电缆引入装置，通常一个引入电机电力电缆，另一个引入控制电缆。电缆直径可选（见图 5）。使用的电力电缆必须有地线。

There are two conduits on electric compartment, one for power cable and the other for control cable. The dia. of cable may be chosen (see Fig. 5). Power cable must be provided with earth wire.

4. 端子接线方法：接线要牢固可靠，应采用如图 4 的方法，用弯接头夹住电线

Wiring of terminals: Wiring should be firm and reliable. Connection of wire clamped with elbow joint showed in Fig. 4 should be adopted.

5. 旋向检查：先将手电动切换手柄板到手动位置，转动手轮，将阀门转到半开状态，然后按动开向按钮，证实阀门开向转动，若相反，切断电源，对称三相电源的任意二相。

Rotation check : Push the hand / auto clutch lever to hand operation position, turn the valve to middle position, then press the opening button to identify valve opening. If the rotation is reverse, cut off power supply and exchange any two power lines.

6. 电装外接地端子必须接地。

Ground terminal on housing must be earthed.

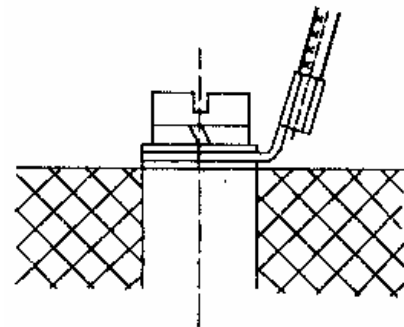


图 4 接线方法 Fig.4 wiring of terminal

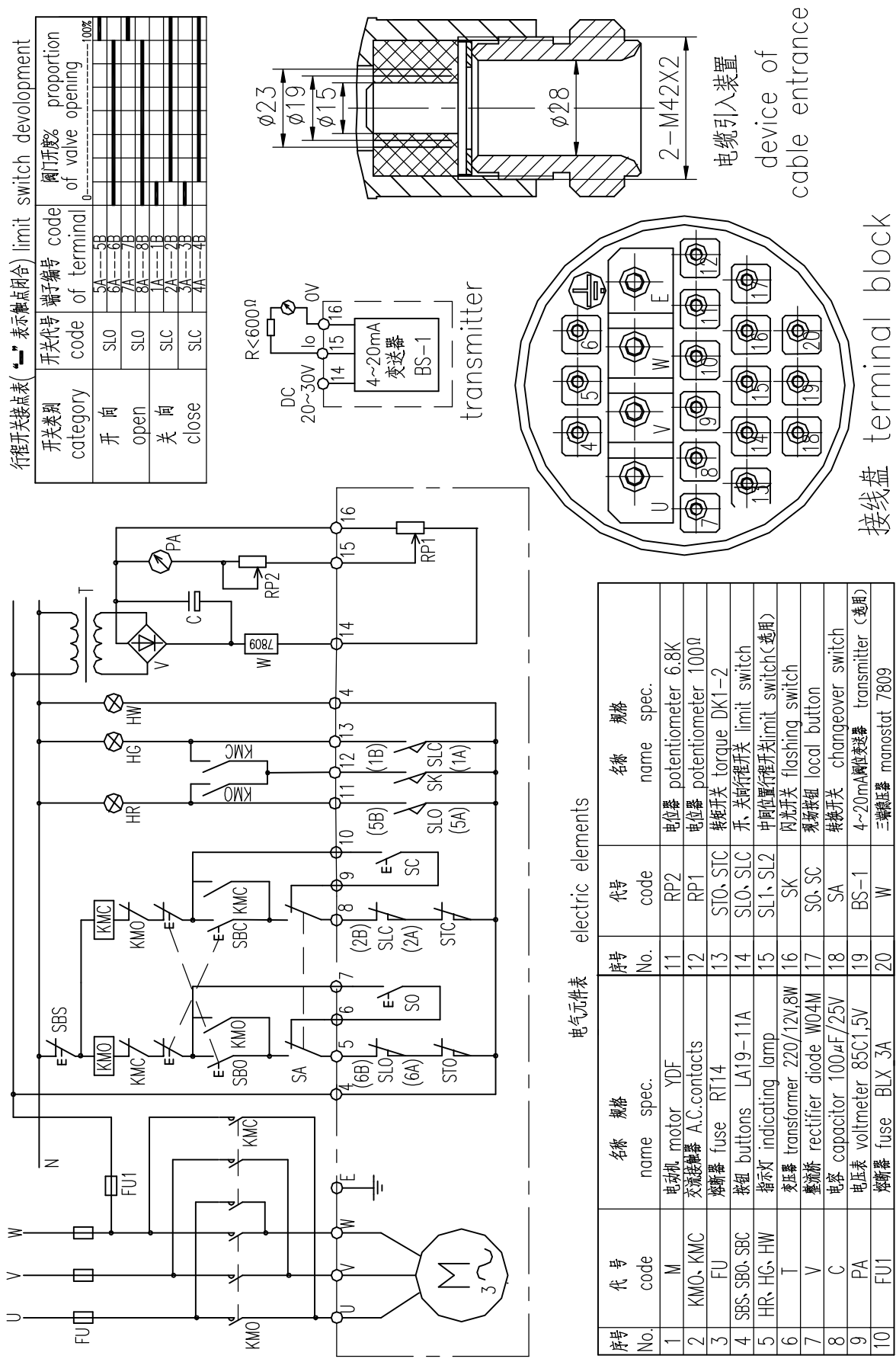


图 5 电气原理和接线 Fig. 5 schematic diagram and wiring diagram

说明:

1. 电气原理仅供参考, 点划线框内的元件在电动装置内部。
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 改为变送器引出线号。通常变送器的直流 24V 工作电源由电动装置内部提供。
3. 图中的电缆引入装置有两个, 引入装置中的橡胶套有三种孔径尺寸, 应根据电缆的外径决定, 一定要确保橡胶套和电缆之间的可靠密封。

Explain:

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. Generally, 24V D.C. of transmitter is provided by actuator.
3. There are two devices for cable entrance and three sizes of diameter of rubber sleeve inside the device. Be sure to select proper rubber sleeve according to outer diameter of cable to ensure reliable sealing between rubber sleeve and cable.

十、调整 Adjustment

(一). 力矩控制器的调整 力矩控制器的结构见图 6。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), 一般不允许再调整, 若一定要调的话, 必须十分谨慎, 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: 松开该方向的螺钉, 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。

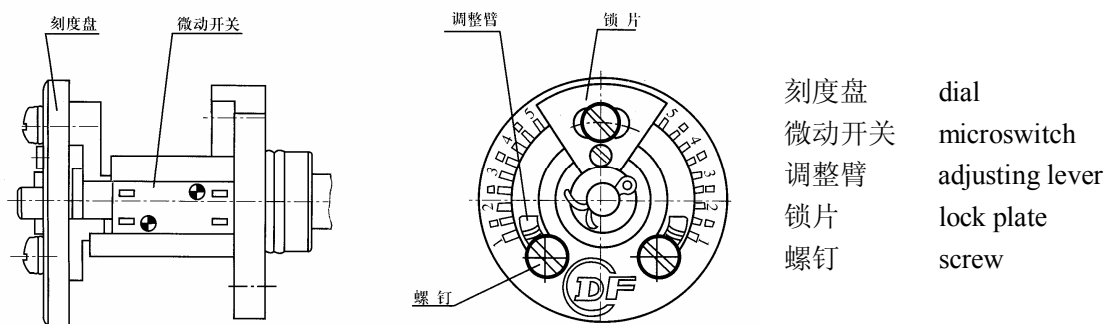


图 6 力矩机构 Fig.6 torque mechanism

1. Adjustment of torque mechanism

Structure of torque mechanism refer to Fig. 11. Torque mechanism has been preset according to customer's order and the numerical value of torque is filled in the 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.

(二). 行程控制器的调整 Adjustment of travel limit.

行程控制器的结构见图 7. The structure of travel limit refer to Fig.7

(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。

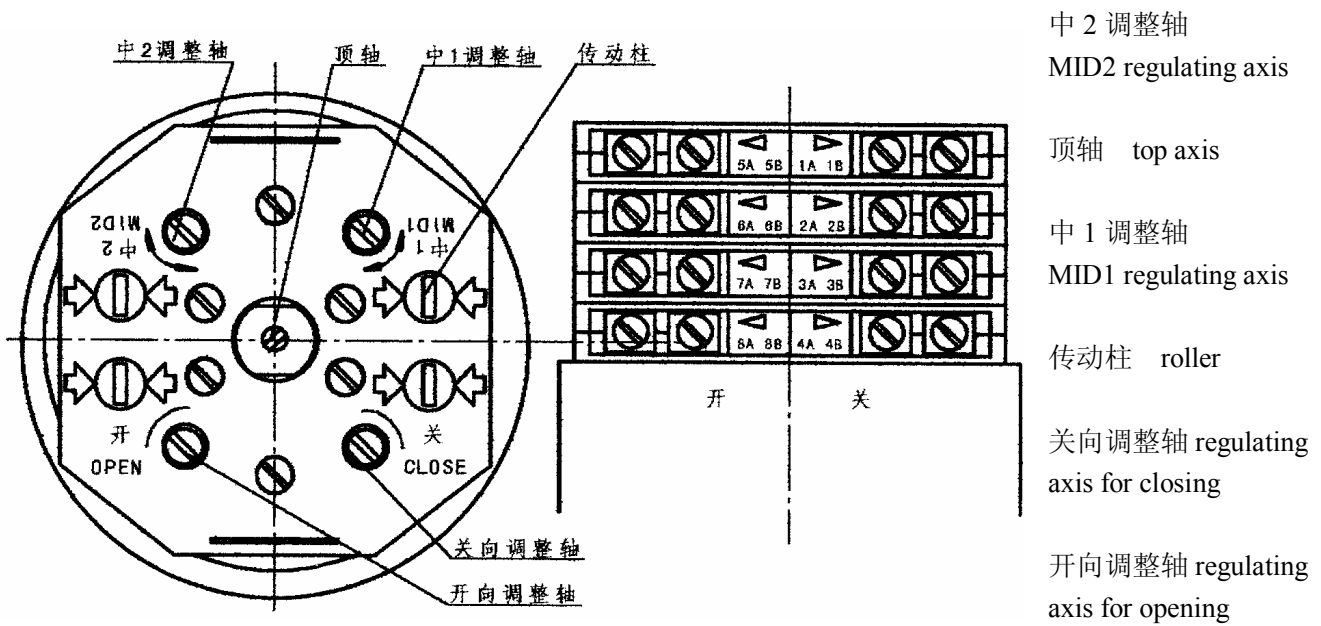


图 7 行程控制器 Fig.7 travel limit

- ③ 按关向箭头旋转“关向”调整轴，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/auto exchanger 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 and rotate the axis a quarter circle to be clamped.

Rotate closing regulating 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”调整轴，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 regulating 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 两个中间位置作为特殊规格供货，其标号图中未画出。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。这时调整轴的旋转方向视中 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调整轴的旋向一致。

Adjustment of medium positions

MID1 and MID2 are supplied as special order. Their codes have not been indicated in the Fig. Customers can apply MID1 and MID2 to medium positions in opening course or closing course, or to increase the number of contacts if need be, when adjusting, the rotation of regulating axis depends on whether MID1 or

MID2 is used for opening or closing. If used for opening, it will rotate in the same direction in which regulating axis for opening rotates, if used for closing, it will rotate in the same direction in which regulating axis for closing 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. During the setting of travel limit, 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.

(三). 开度机构的调整 Adjustment of position indicator

开度机构结构见图 8, 调整方法如下:

For structure of position indication refer FIG.8, 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 9, 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.9. 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.

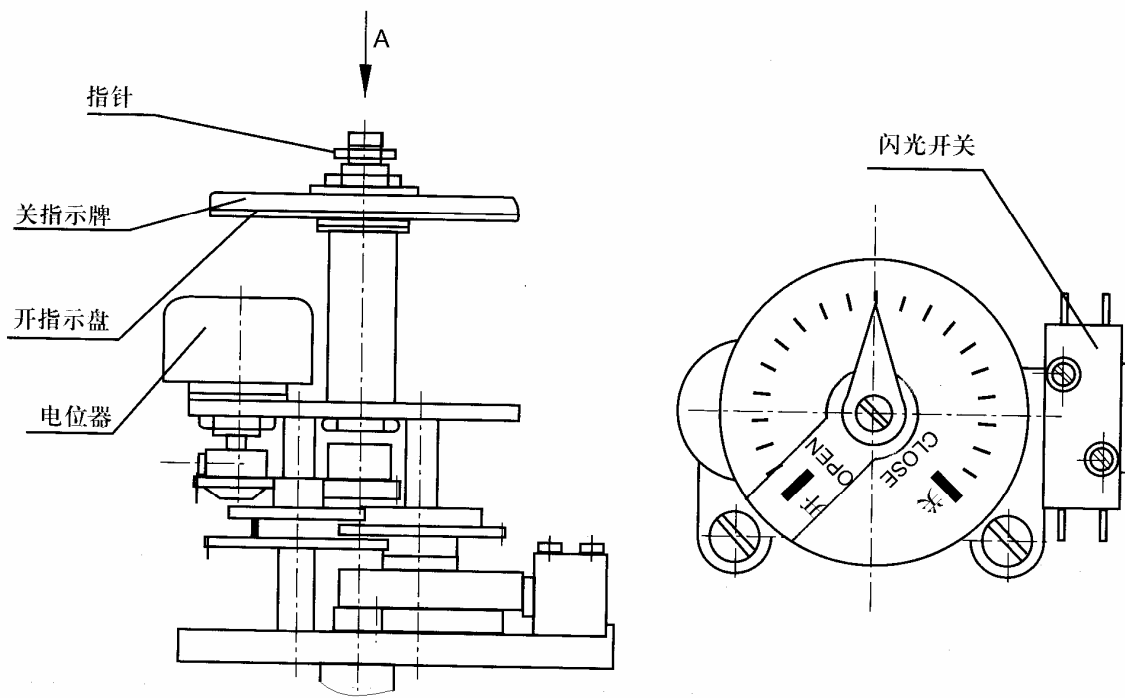


图 8 开度指示器 Fig.8 position indicator

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

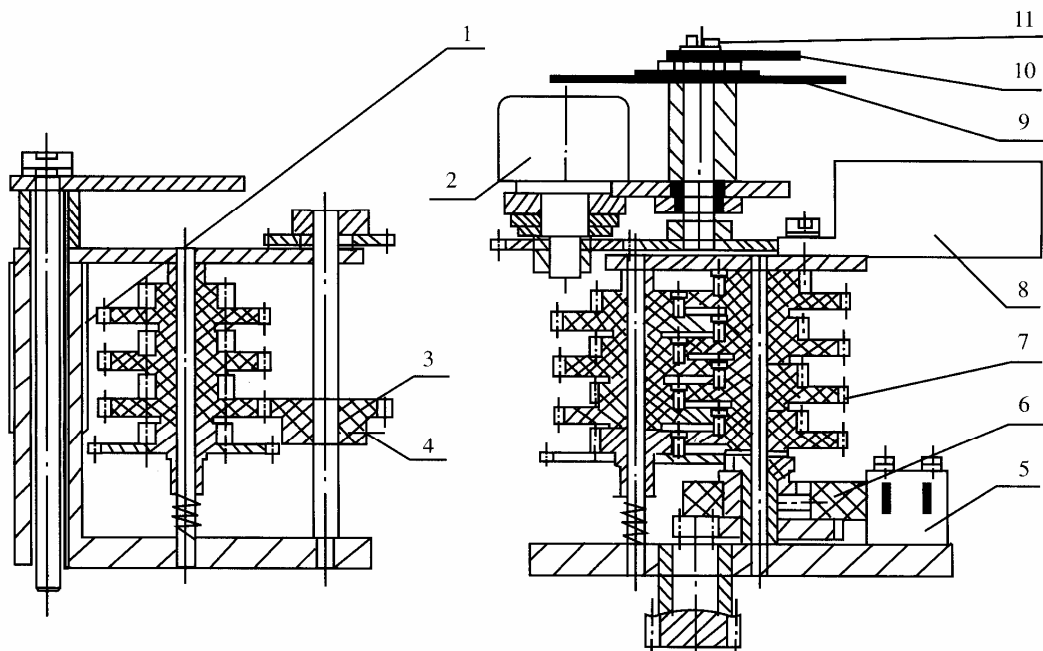


图 9 可调转圈数开度机构 Fig.9 adjustable valve position indicating mechanism

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

(四) 阀位变送器的调整 Adjustment of transmitter

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）。图 10 中 14、15、16 为接线板端子号（即电流输出端），H 为指示灯，其亮度随输出电流的增大而变亮。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 微型电位器，直至输出电流精确为 4mA；打开阀门至全开位置，调节 T2，直至输出电流精确为 20mA。如果输出轴逆时针转动为关阀，则红线和绿线需对调并电位器的调节旋向应相反。需要注意，阀门从全关到全开，取样电位器转角必须保证在 $150\sim 270^\circ$ 之间，否则需更换电动装置最大转圈数的规格。高精度导电塑料电位器的安装位置为替代图 8 或图 9 中的普通电位器。

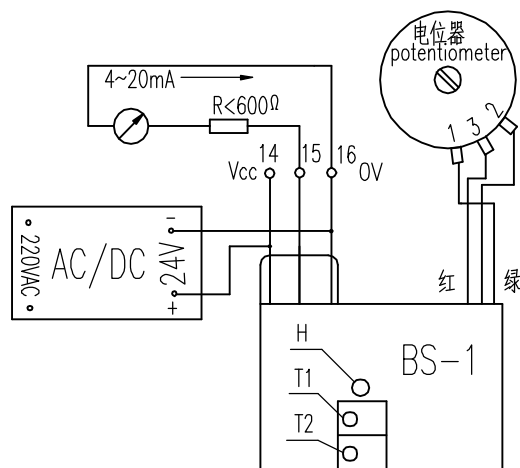


图 10 阀位变送器 Fig.10 transmitter

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 approach 4 mA. (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. If counterclockwise rotation of output shaft providing valve seating is required, exchange the red wire connector and green

wire connector to the potentiometer exchange each other. Give your attention to that the rotation angle must be within the

range between $150\sim 270^\circ$, or the electric actuator should be replaced by a larger size with much more maximum revolutions. The position of common potentiometer in Fig.8 or Fig.9 can also be the installation position for conductive plastic potentiometer as substitute.

十一、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、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。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. 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.

3、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.

4、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.

5、起吊时，不得吊装手轮。

When hoisting, never use hand wheel as ear.

6、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.

十二. 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，待电机冷却 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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