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Explosion-Proof Electric Actuator User Manual

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Explosion-Proof Electric Device Installation and Use Instructions

Before installing or using the -Ex series explosion-proof products, please read this manual carefully.

Model Representation

EX①②③

- Ex indicates flameproof electric actuator.
- In the model specifications, ① denotes torque (digital × 10 N·m), including 05, 10, 20, 40, 60, 80, 100, and 200.
- ② denotes control circuit type, including A, S, R, P, D.
- For safety usage precautions, refer to the product manual.

Explosion-Proof Structure and Performance

The flameproof structure of BRPS explosion-proof products complies with GB3836.1-2000 "Explosive Gas Atmospheres – Part 1: General Requirements for Electrical Equipment". The explosion-proof enclosure formed by the product's explosion-proof components can withstand the explosion pressure generated by explosive gas mixtures inside the shell and prevent the internal explosion from propagating to the external explosive gas environment. This means that if an explosion occurs inside the product, it will not ignite explosive gas mixtures outside the shell.

Explosion-Proof Rating

The product's explosion-proof rating is: Ex d IIC T4

Ex: Explosion-proof identifier.

d: Explosion-proof type, represented as "flameproof".

II: Equipment category, indicating electrical equipment for explosive gas environments other than coal mines.

C: Explosion level, which determines the dimensions (width and gap) of the flameproof joints.

T4: Temperature class, indicating the maximum allowable surface temperature of the actuator is 135°C.

Appendix B of GB3836.1-2000 details the levels and temperature classes of flammable gases and vapors. Users may refer to it if necessary.

Special Note: The types and groups of explosive media in the usage environment must match those permitted by this product; otherwise, explosion-proof effectiveness will not be achieved.

Usage Precautions

1. Pay attention to warnings on labels: In environments with flammable or explosive gases, do not open any covers (i.e., open the explosion-proof cavity) while energized.
2. The explosion-proof lens is part of the explosion-proof structure; do not disassemble or impact it with hard objects. Replace damaged explosion-proof parts immediately. Do not perform electric operations before qualified parts are installed.
3. Do not tear or lose the product nameplate and warning labels; keep the text clear.
4. During debugging or maintenance, avoid damaging flameproof joints (e.g., bumps or scratches). Do not omit fastening screws for the electric cover, control cover, motor cover, or housing.
5. The motor cavity is an independent explosion-proof chamber; users are prohibited from disassembling motor fastening screws or adhesive interfaces for motor leads.
6. The product must be grounded internally and externally. All fasteners must be tight and inspected regularly.
7. Use explosion-proof cable connectors and appropriate cables as specified in this manual for wiring entries.
8. Installation and debugging personnel must have relevant operational qualifications.

Explosion-Proof Electric Device Overview, Features, and Model Coding

Product Overview

The **GR-EX** series explosion-proof electric actuator is a new-generation product developed with advanced foreign technology. It features unique design, modern style, high intelligence, high protection, compact size, high integration, long service life, and stable performance. It can be operated on-site or remotely, suitable for controlling valves rotating 0°–300°, such as butterfly valves, ball valves, air valves, and other similar equipment. It meets various requirements for industrial automation control and management. Driven by 380V/220V/110V AC power and controlled by 4–20mA current signals or 0–10VDC voltage signals, it positions valves accurately for automatic control, with a maximum output torque of 1000 N·m. Widely used in industries like petroleum, chemical, metallurgy, water treatment, shipping, papermaking, power plants, printing, food processing, pharmaceuticals, and building automation systems.

Product Features

1. Powerful functions: Intelligent regulating type, switching type, and various signal output types available.
2. Compact and lightweight: Volume and weight are only about 35% of traditional products.
3. Elegant appearance: Aluminum alloy die-cast housing, aesthetically smooth, and reduces electromagnetic interference.
4. Reliable performance: Key components such as bearings and electrical elements use imported brand products.
5. High protection rating: IP61 high-standard protection level.
6. Precision and wear resistance: Integrated worm gear output shaft made of special copper alloy forging, with high strength and wear resistance.
7. Minimal backlash: Integrated structure avoids key connection gaps, ensuring high transmission accuracy.
8. Safety assurance: Passes 1500V withstand voltage test, with F-grade insulated motor for safety.
9. Simple integration: Uses single-phase power, simple external wiring; also supports 380V or DC power.
10. Easy to use: No lubrication or inspection required, waterproof, rust-proof, and installable at any angle.
11. Intelligent numerical control: Intelligent control module integrated into the actuator body, eliminating the need for an external positioner. Features digital setting, digital calibration, high precision, self-diagnosis, and multifunctionality.
12. Intelligent electric actuator adopts integrated, modular technology for reliable and comprehensive functions. Integrates position feedback and servo amplification, with easy adjustment and simplified wiring; supports extended communication interfaces.
13. On-site digital display and manual operation: Actuator control module includes a digital display showing actuator opening degree, with buttons for on-site operation.
14. Menu setting function: Intelligent control module has menu keys for setting control methods, control precision, and protection measures.
15. Self-adjustment function: After determining the electrical travel (electrical zero and full positions), the actuator automatically calibrates the electrical zero and full outputs without manual adjustment.
16. Programmable upper and lower limits: Set actuator travel limits via buttons.
17. Signal-loss action setting: Actuator can be set to fully open, stop, or fully close in case of signal loss.
18. Error code function: When a fault occurs, the control module displays error codes indicating the cause.

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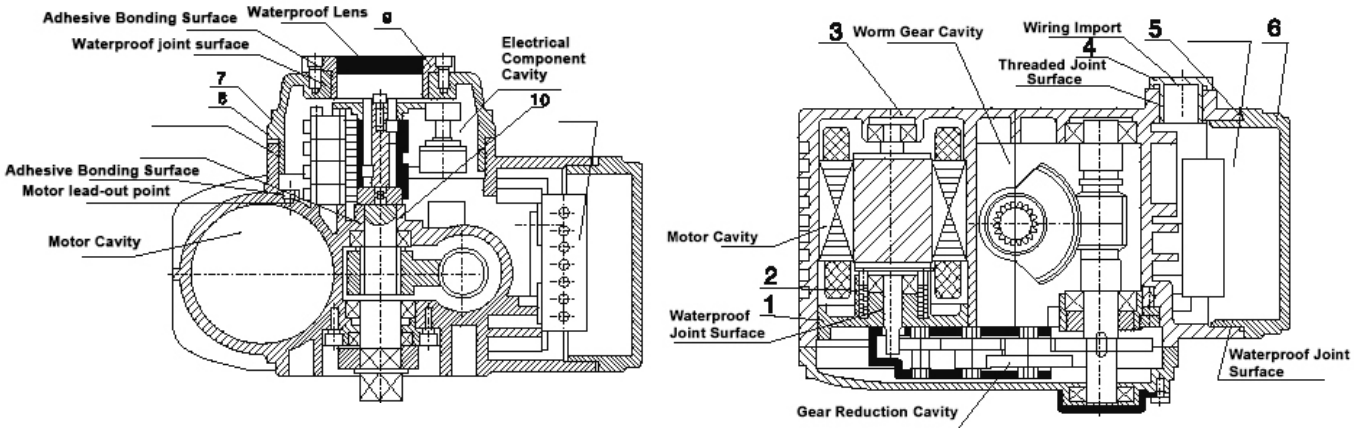
Motor Actuator Application Selection



Parts List

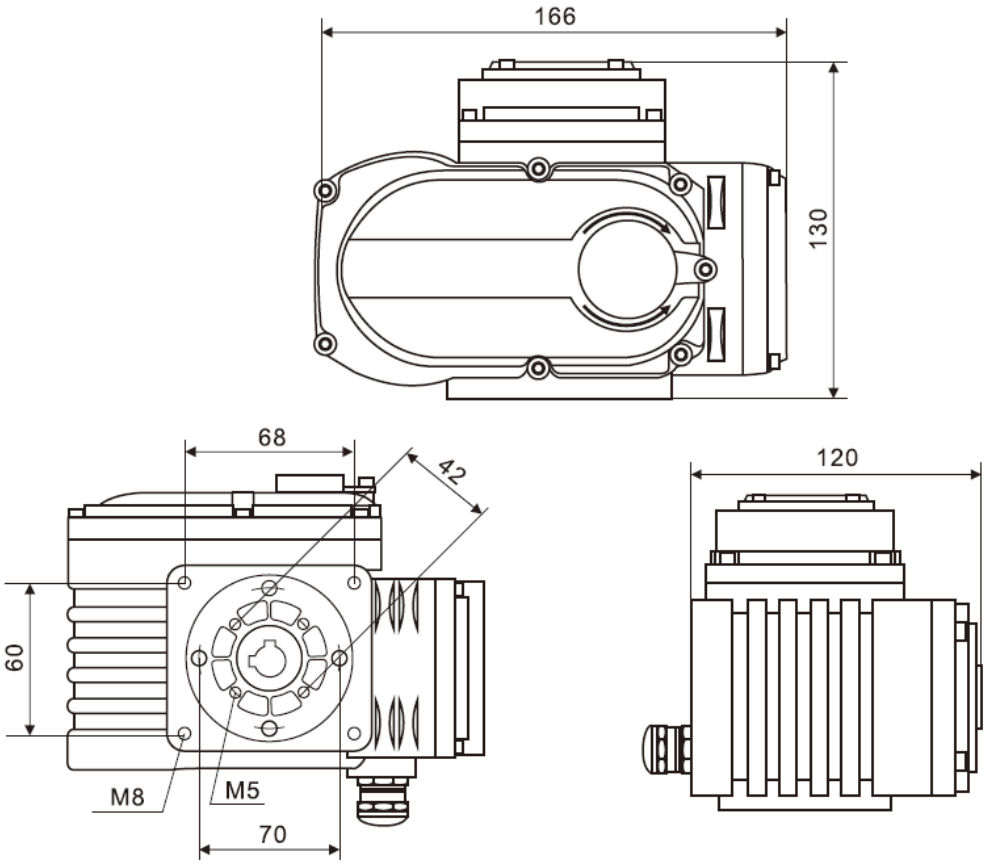
No.	Name	Quantity	Material
1	Motor Cover	1	ADC12
2	Motor Rotor Shaft	1	40Cr
3	Housing	1	ADC12
4	Waterproof Connector	2	Brass
5	O-ring Seal	1	Nitrile Rubber

No.	Name	Quantity	Material
6	Control Cover	1	ADC12
7	Electric Cover	2	ADC12
8	O-ring Seal	1	Nitrile Rubber
9	Waterproof Lens	1	Explosion-Proof Glass
10	Output Shaft	1	40Cr Nickel Plated

Compatible Valves

Actuator Type	Rated Output Torque (Nm)	Soft Seal Butterfly Valve (Ref. Diameter)	Soft Seal Ball Valve (Ref. Diameter)	Hard Seal Butterfly Valve (Ref. Diameter)	Hard Seal Ball Valve (Ref. Diameter)	Ventilation Butterfly Valve (Ref. Diameter)
5	50	DN15-65	DN15-32	DN40-50	DN15-25	DN50-150
10	100	DN80-100	DN32-50	DN65-100	DN32-40	DN200-300
15	150	DN125	DN50	DN125	DN40	DN350
20	200	DN150	DN65	DN125	DN50	DN400-500
40	400	DN200	DN80-100	DN150	DN65	DN600
60	600	DN200-250	DN100-125	DN200	DN80-100	DN700
100	1000	DN300	DN150	DN250	DN125	DN800-900
200	2000	DN400	DN200	DN350	DN150	DN1000

05 Series Dimensions and Performance Parameters



Model Parameter Power Performance	GR-05			
Power Performance	DC24V	AC110V	AC380V	AC220V
Motor Power	13W	10W	8W	15W
Rated Current	1.28A	0.24A	0.07A	0.25A
Standard Time/Torque	20S/50Nm			
Rotation Angle Range	0-90° adjustable			
Optional Control Circuit	A-type standard, S-type passive, R-type opening signal			
Overall Weight	3.0kg			
Insulation Resistance	AC24V: 100M Ω /250VDC; AC110V/AC220V/AC380V: 100M Ω /500VDC			
Withstand Voltage Level	AC24V: 500VAC for 1 min; AC110V/AC220V: 1500VAC for 1 min; AC380V: 1800VAC for 1 min			
Explosion-Proof Rating	Exd11CT4			
Installation Method	360° any angle installation			
Electrical Interface	M18x1.5 waterproof connector; user must install corresponding waterproof cable connectors based on selected cables			
Ambient Temperature	-20° C ~ +60° C			
Optional Function	Dehumidifying heater			
Protection Level	IP65 (custom IP67)			

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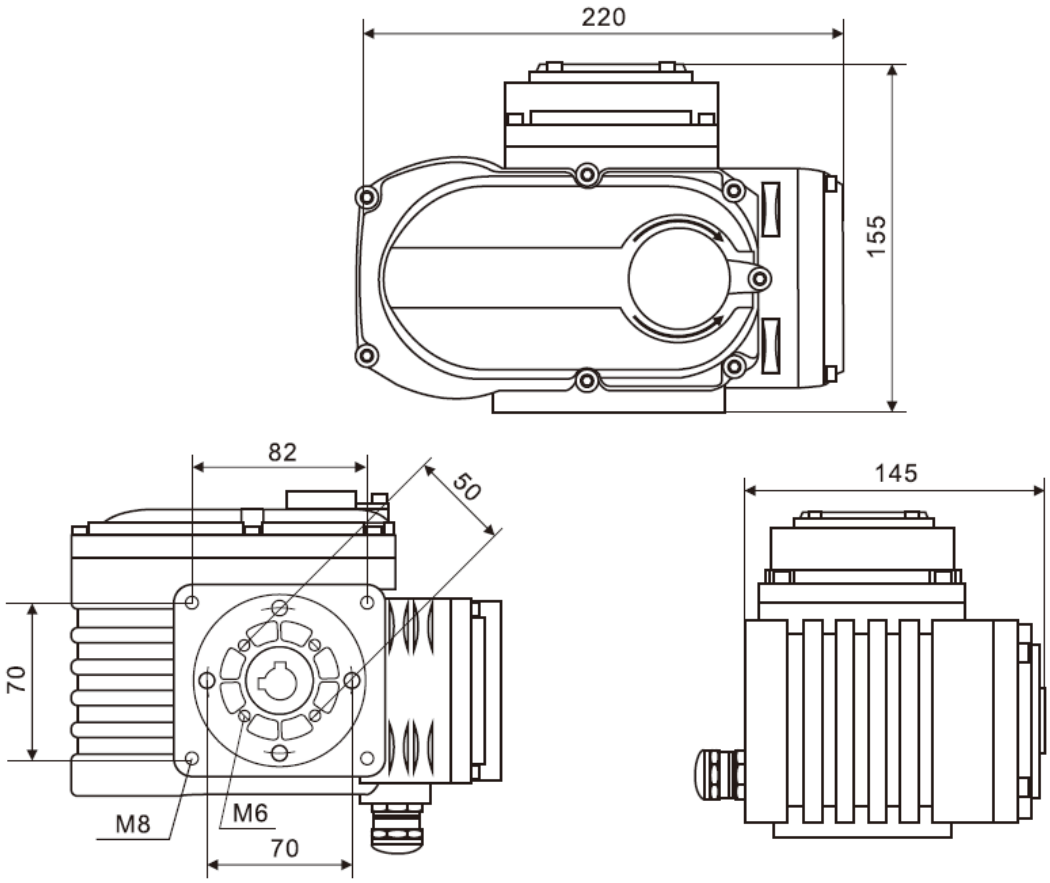
10, 15, 20 Series Dimensions and Performance Parameters



Model Parameter Power Performance	GR-10				GR-15			GR-20	
Power Performance	DC24V	AC110V	AC380V	AC220V	DC24V	AC380V	AC220V	AC380V	AC220V
Motor Power	25W	25W	15W	25W	2.03W	15W	30W	30W	40W
Rated Current	2.03A	0.57A	0.10A	0.3A	2.03A	0.10A	0.35A	0.15A	0.40A
Standard Time/Torque	30S/100Nm				30S/160Nm			30S/200Nm	
Rotation Angle Range	0-90° adjustable								
Optional Control Circuit	A-type standard, S-type passive, R-type opening signal, P-type regulating								
Overall Weight	5.0kg				5.2kg			5.5kg	
Insulation Resistance	AC24V: 100M Ω /250VDC; AC110V/AC220V/AC380V: 100M Ω /500VDC								
Withstand Voltage Level	AC24V: 500VAC for 1 min; AC110V/AC220V: 1500VAC for 1 min; AC380V: 1800VAC for 1 min								
Explosion-Proof Rating	Exd11CT4								
Installation Method	360° any angle installation								
Electrical Interface	M18x1.5 waterproof connector; user must install corresponding waterproof cable connectors based on selected cables								
Ambient Temperature	-20° C ~ +60° C								
Optional Function	Dehumidifying heater								
Protection Level	IP65 (custom IP67)								

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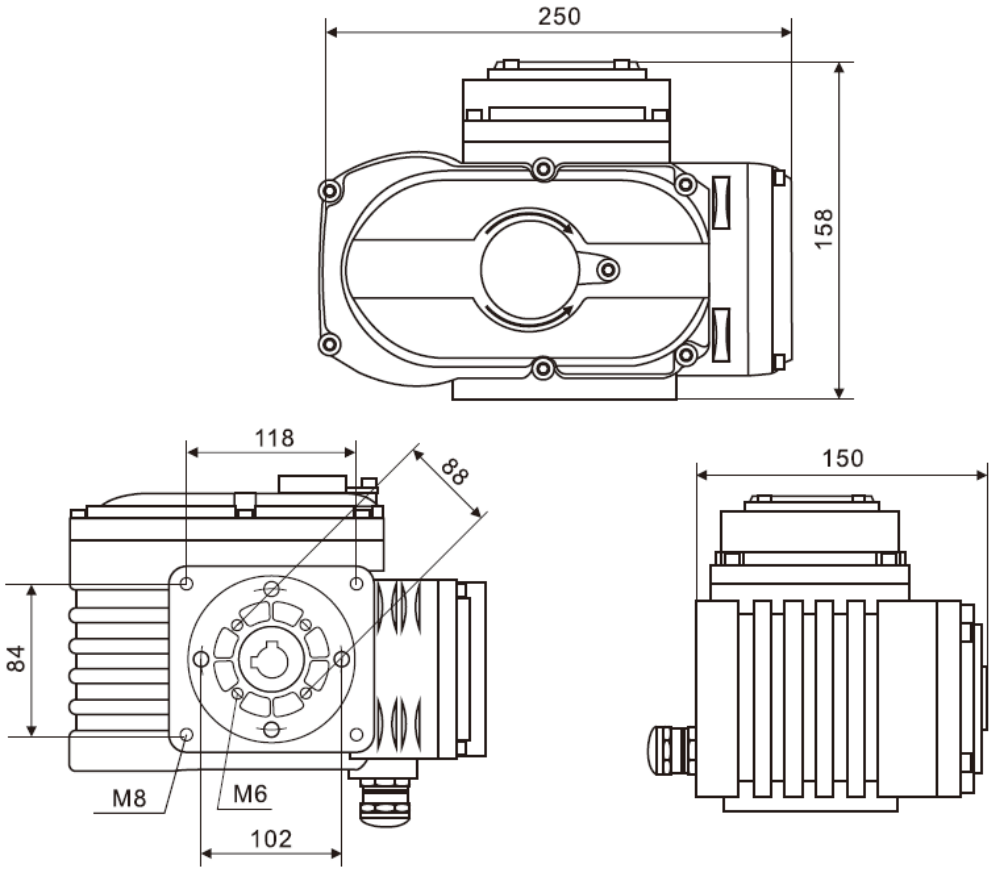
40, 50, 60 Series Dimensions and Performance Parameters



Model Parameter Power Performance	GR-40			GR-50		GR-60	
Power Performance	DC24V	AC220V	AC380V	AC220V	AC380V	AC220V	AC380V
Motor Power	70W	50W	30W	90W	40W	90W	40W
Rated Current	6A	0.5A	0.19A	0.70A	0.29A	0.75A	0.29A
Standard Time/Torque	30S/400Nm			30-60S/500Nm		30S/600Nm	
Rotation Angle Range	0-90° adjustable						
Optional Control Circuit	A-type standard, S-type, R-type, P-type						
Overall Weight	7.6kg			7.8kg		7.9kg	
Insulation Resistance	100MΩ/500VDC (AC110V/AC220V/AC380V)						
Withstand Voltage Level	1500VAC for 1 min (AC110V/AC220V/AC380V)						
Explosion-Proof Rating	E-CT4						
Installation Method	360° any angle installation						
Electrical Interface	M18x1.5 waterproof connector; user must install corresponding waterproof cable connectors based on selected cables						
Ambient Temperature	-20° C ~ +60° C (other temperatures custom)						
Housing Material	Aluminum alloy die-cast						
Optional Function	Dehumidifying heater						
Protection Level	IP65 (custom IP67)						

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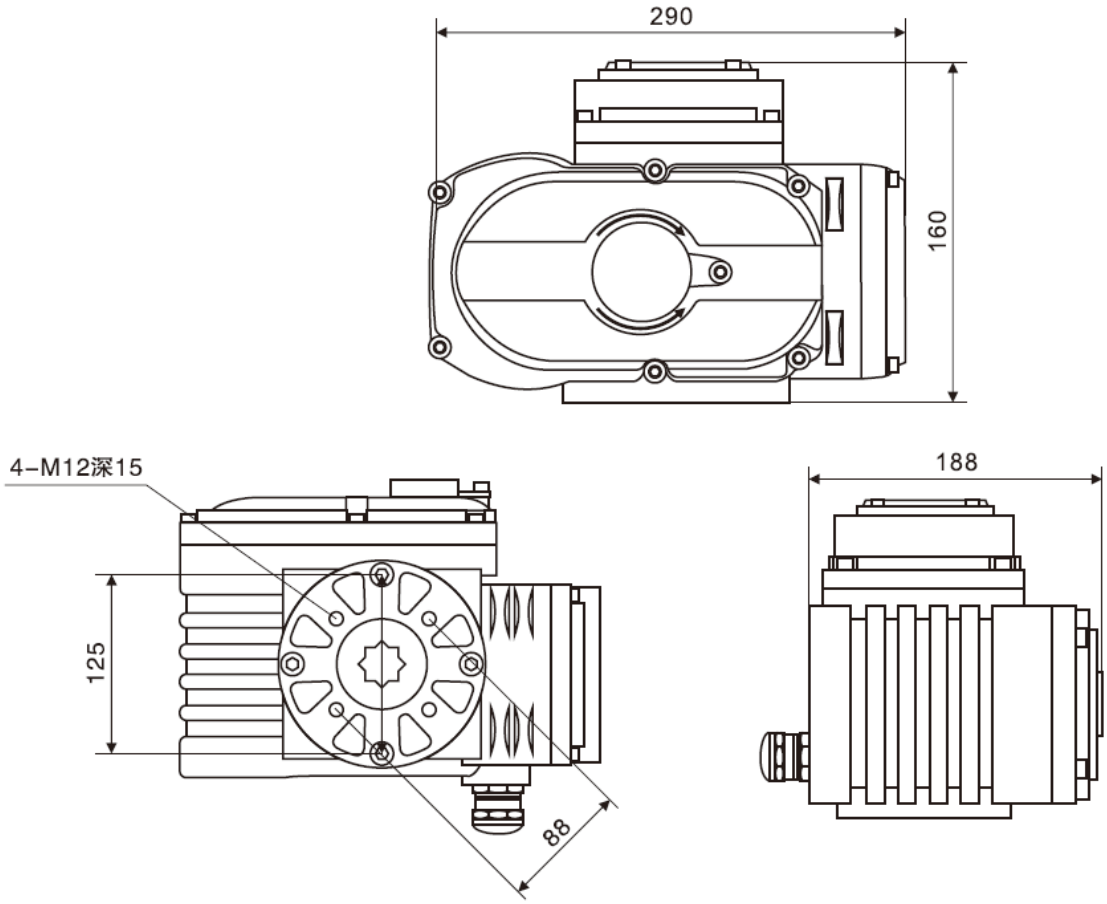
100, 200 Series Dimensions and Performance Parameters

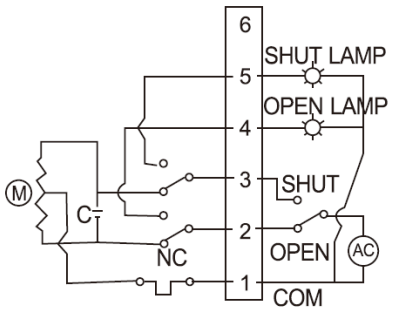


Model Parameter Power Performance	GR-100				GR-200	
Power Performance	DC24V	110VAC	AC220V	AC380V	AC220V	AC380V
Motor Power	120W			90W	160W	100W
Rated Current	9A	2.2A	1.12A	0.85A	1.2A	0.98A
Standard Time/Torque	50S/1000Nm				50S/2000Nm	
Rotation Angle Range	0-90° adjustable					
Optional Control Circuit	A-type standard, S-type, R-type, P-type					
Overall Weight	12.2kg				12.8kg	
Insulation Resistance	100MΩ/500VDC (AC110V/AC220V/AC380V)					
Withstand Voltage Level	1500VAC for 1 min (AC110V/AC220V/AC380V)					
Explosion-Proof Rating	E-CT4					
Installation Method	360° any angle installation					
Electrical Interface	M18x1.5 waterproof connector; user must install corresponding waterproof cable connectors based on selected cables					
Ambient Temperature	-20° C ~ +60° C (other temperatures custom)					
Housing Material	Aluminum alloy die-cast					
Optional Function	Dehumidifying heater					
Protection Level	IP65 (custom IP67)					

Wiring diagram

(1) AC220V Switch Type (Standard Type) Circuit Diagram

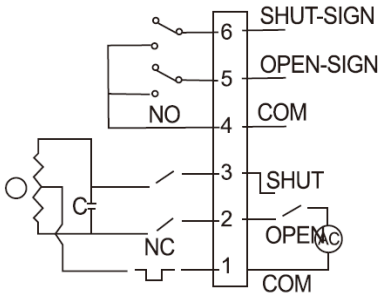
switch type(standard type)route map



A type:Terminal position switch(standard type)
Function:using the switch circuit to realize opening、closing operating and export a group.

(2) AC220V Passive Contact Type (S) Circuit Diagram

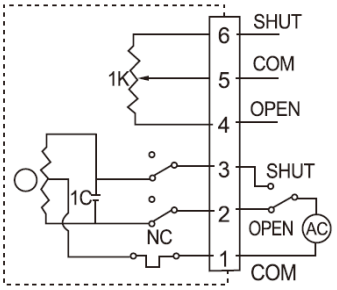
Passive contact type wiring map



B type:Bring the middle position switch
Function:using the switch circuit to realize opening、closing operating and export one group of intruct valve turn on or close the location all.
Structure:Take two middle position switches

(3) AC220V Opening Signal (R) Circuit Diagram

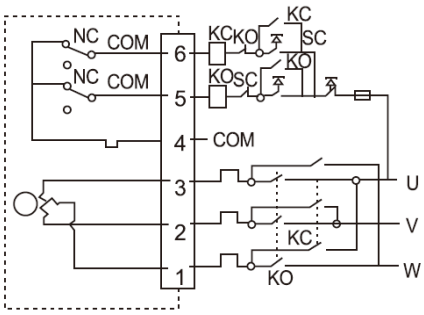
Make one degree of signals(R)wiring map



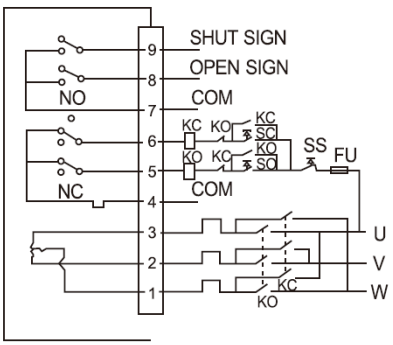
C type:Take the potentiometer
Function:Using the switch circuit to control the valve open with opening on degrre positions.
Structure:Take the 500Ω or 1000Ω potentiometer.

(4) AC380V Standard Type Circuit Diagram

AC380V standard type wiring map

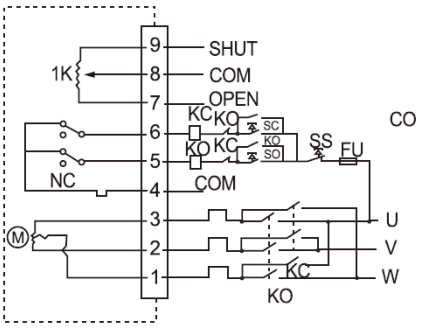


(5) AC380V passive contact type (S)wiring map



B type:Bring the middle position switch
Function:Using the switch supply to realize the operatations of opening and closing. and export one group instruct valve turn on,close the location all all
Structure:Take two middle position switches

(6) AC380V tums on one degree of signal types(R)wiring map

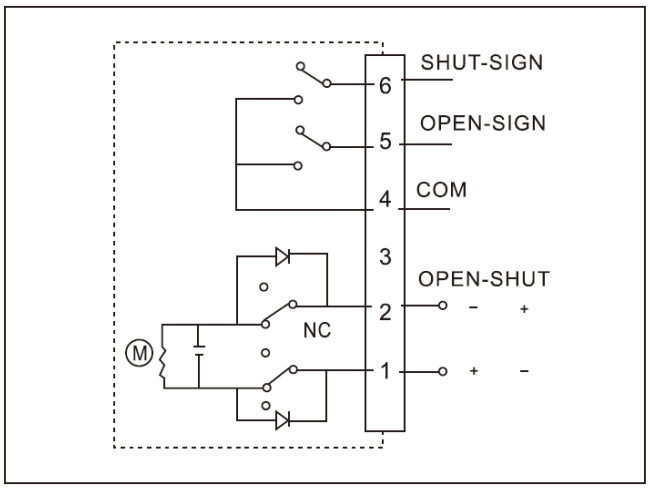


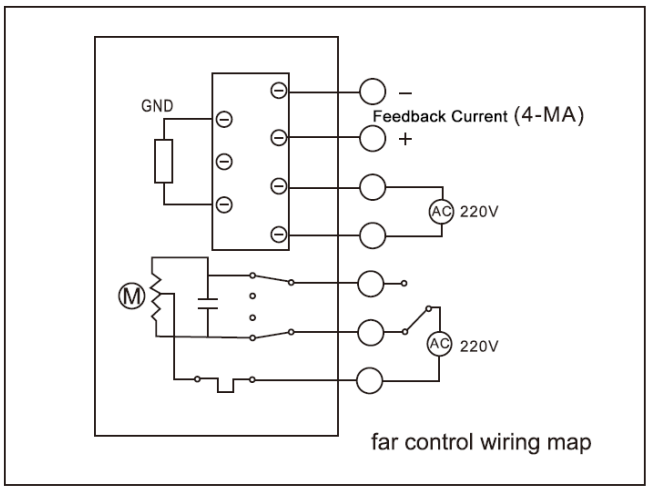
D type:Take the potentiometer and middle position switch
Function:Using the switch circuit to control the valve open the angleand export the resistance signals which comespon ding with opening on degrre positions,output a group of passive position signals at the same time.
Structure:Take the potentiometer and middle position switch

Wiring diagram

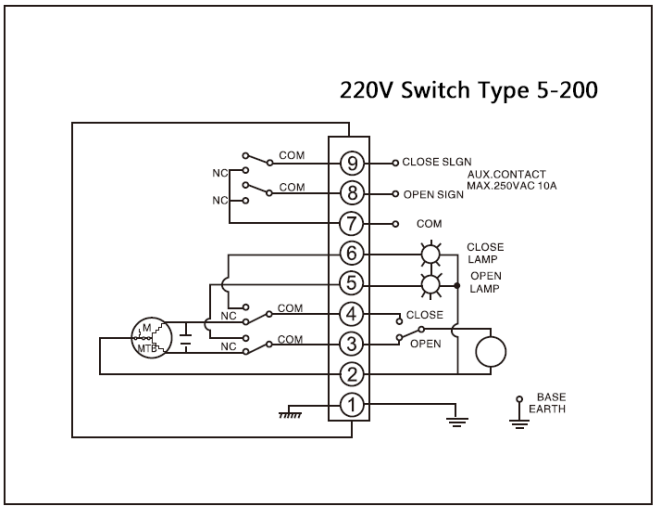
(7) DC Circuit Diagram

direct circuit diagram

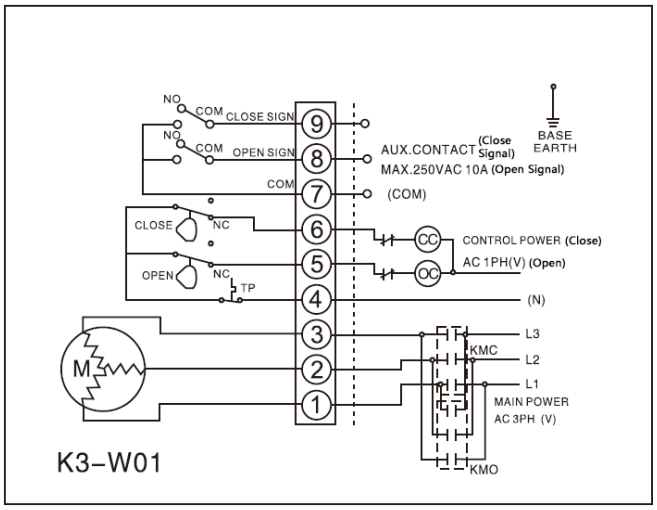




(11) 100-200 Series Standard AC220V Switch Type Circuit Diagram



(12) 100-200 Series AC380V Three-Phase AC Passive Contact Circuit Diagram



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Usage Requirements

1. Installation Environment

- This product can be installed both indoors and outdoors.
- In environments with long-term exposure to rain, splashing materials, or direct sunlight, install protective covers.
- Reserve maintenance space for wiring and manual operation.
- Ambient temperature: -30° C to +60° C.

2. Working Medium Temperature

- When used with valves, working medium temperature transfers to the body, causing temperature rise.
- Use high-temperature brackets when working medium temperature exceeds 60° C.
- For medium temperatures below 60° C, use standard brackets.

3. Power Supply Requirements

- Provide appropriate on-site power according to the ordered model.
- Power supply voltage must meet:

AC380V ±5% 50/60Hz

AC220V ±5% 50/60Hz

AC110V ±5% 50/60Hz

AC24V ±5% 50/60Hz

4. Fuse Selection for Short-Circuit Protection

Voltage Model Ampere	AC24V	AC110V	AC220V	AC380V
105	5A	3A	2A	2A
110/116	7A	5A	3A	2A
120/140/160	-	7A	5A	3A

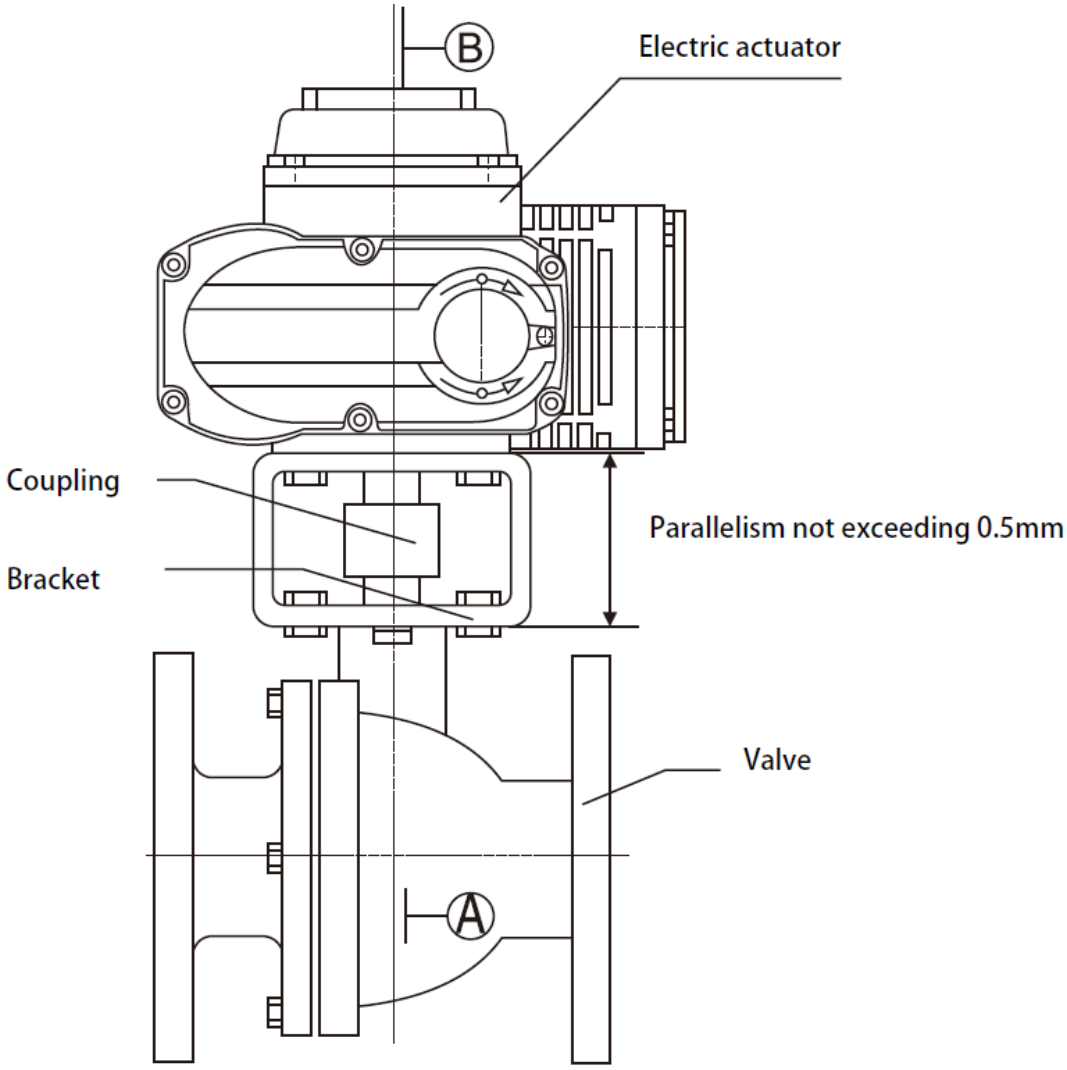
Actuator and Valve Installation

1. Manually rotate the valve to check for abnormalities and close it completely.
2. Fix the bracket to the valve.
3. Fit one end of the coupling onto the valve core shaft.
4. Drive the actuator to fully closed position (pointer at SHUT/0 scale), insert output shaft into coupling square hole.
5. Tighten connecting bolts between bracket, actuator and valve body.
6. Manually drive actuator through full stroke to confirm smooth operation without eccentricity or tilt. Verify valve can fully open/close within actuator range.

! **Caution**: Excessive force may cause actuator overtravel damage.

Special Notes

- For users providing custom brackets/couplings:
- Must be designed by professionals meeting Figure 4 requirements.
- Coupling shaft holes must maintain precision to eliminate transmission gaps.
- Strictly ensure position accuracy between shaft holes.
- Coaxiality between A-B axes ≤ Φ0.2mm



Coaxiality of A and B axes not exceeding φ0.2mm

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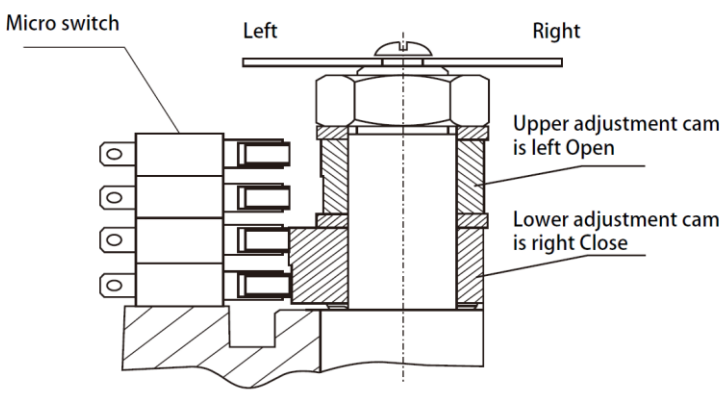
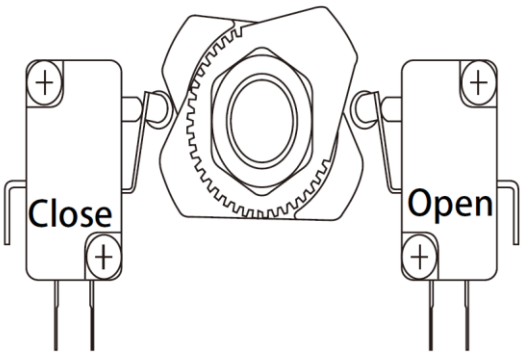
Electric Valve Commissioning

1. Electrical Limit Adjustment

Loosen travel stop screw, gently adjust stop angle with screwdriver to modify opening/closing limits. Tighten screw securely.



05 10 20 type



40、60、100、200

2. Potentiometer Adjustment (Opening/Intelligent Type)

a. Potentiometer resistance: 1KΩ or 5KΩ

b. Manually close valve completely

c. Loosen potentiometer, rotate gear while measuring resistance between terminals 4-5:

Adjust to ≤5Ω

For intelligent 7-pin connectors: Measure RV-RS resistance

! Do not over-rotate beyond open/close limits to avoid damage.

3. Mechanical Limit Adjustment

Loosen locknut on mechanical limit screw

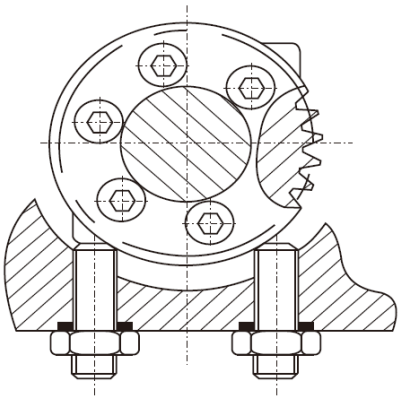
Manually move actuator to full close position

Rotate limit nut until contacting sector gear

Back off 2 full turns

Tighten locknut

Repeat process for full open position (Ref. Figure 5)



Usage and Maintenance

1. Maintenance

- Advanced molybdenum-based grease ensures no routine lubrication needed.
- Periodically operate actuator if valve usage is infrequent.

2. Troubleshooting Guide

Fault Phenomenon	Possible Cause	Solution
Motor not starting	Power not connected	Connect power properly
Motor not starting	Broken wire/loose terminal	Repair wiring, secure terminals
Motor not starting	Incorrect/low voltage	Verify voltage compliance
Motor not starting	Overheat protection activated	Check ambient temp/valve jamming
Motor not starting	Faulty microswitch	Replace microswitch
Motor not starting	Failed start capacitor	Contact manufacturer
Open/close indicator off	Improper stop adjustment	Re-adjust stops
Motor doesn't stop at limits	Faulty limit microswitch	Replace microswitch
Motor doesn't stop at limits	Reversed 3-phase sequence	Correct phase sequence
Motor doesn't stop at limits	Incorrect microswitch wiring	Check control circuit wiring
Motor doesn't stop at limits	Mechanical limit triggers early	Re-adjust per manual
Motor doesn't stop at limits	Servo controller misconfigured	Reconfigure per manual