



# Instruction Manual

## Electric Actuated Ball Valve

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U.S. SOLID is a specialized manufacturer dedicated to the research, development, and production of electric and pneumatic valve actuators for industrial automation. Our heavy-duty electric actuators are specifically engineered for demanding ball valve applications, featuring an integrated drive and transmission design that delivers exceptional torque in a compact, rugged housing. This series of products is ideal for industries such as electric power, food processing, industrial automation, and water treatment, our actuators provide reliable, precise performance in the most challenging environments.

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## WARNINGS

### 1. General Safety

- Read these instructions carefully before installing, operating, or servicing the actuator.
- Installation, commissioning, operation, and maintenance must be performed by qualified personnel only.
- Comply with all applicable local codes, standards, and safety regulations.
- Do not operate the actuator until all safety conditions described in this manual are satisfied.
- Failure to observe these instructions may result in personal injury, product damage, or operational failure, and will void any applicable warranties.
- Store these instructions near the product for future reference.

### 2. Electrical Safety

- **Disconnect Power:** Always disconnect electrical power before operating the manual override, removing covers, or performing any maintenance or service on the actuator.
- **Verify Voltage:** Before connecting power, confirm that the supplied voltage matches the actuator's rated voltage. Applying incorrect voltage may damage the actuator and void the warranty.
- **Dedicated Power Supply:** Each actuator must be connected to its own dedicated, fuse-protected, and isolated power circuit. Do not connect multiple actuators in parallel on the same circuit or use the same controller contact point to control more than one actuator. Parallel connection may cause loss of control, motor overheating, product damage, and reduced service life.
- **Control Device:** A suitable control device (e.g., three-way switch, control relay, PLC output) must be used to manage actuator operation. Ensure compatibility with actuator specifications.

### 3. Installation and Environmental Safety

- **Storage:** Store actuators in a clean, dry environment before installation.
- **Outdoor Installation:** If the actuator is installed outdoors, it is recommended to provide additional protective covering to prevent water ingress, ensure mechanical stability, and extend service life.
- **Temperature Limits:** Ensure the operating temperature does not exceed the specified limits of the actuator. Exceeding these limits may compromise performance.
- **Conduit Installation:** Use the correct diameter when installing cable or conduit to prevent damage to the actuator enclosure or internal components.

## 4. Maintenance and Operation

- **No Internal Serviceable Parts:** The actuator contains no internal parts requiring routine maintenance. Do not attempt to open or repair internal components.
- **Annual Cycling:** To ensure proper operation, the actuator should be cycled at least once per year.
- **Coordination:** Coordinate any repair work with operating personnel and observe all relevant health and safety regulations.

## WIRING INSTRUCTIONS

### 1. Verify Voltage

Before installation, verify that the voltage rating of the actuator matches the available power supply. Incorrect voltage may cause permanent damage and will void the warranty.

### 2. Access Terminal Block

- Remove the terminal box cover to access the terminal strip.
- Connect wiring according to the applicable wiring diagram provided inside the terminal box cover.
- Ensure all connections are secure and properly insulated.

### 3. Control Device

The installer must provide a suitable control device, such as a three-way switch, control relay, or PLC output, to manage actuator operation. Verify compatibility with actuator specifications before connection.

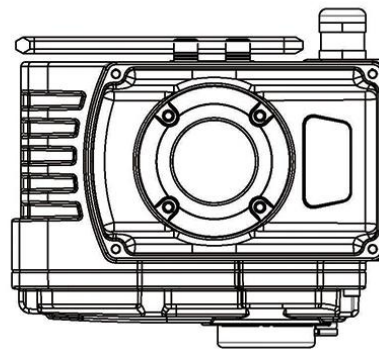
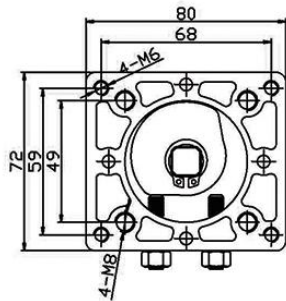
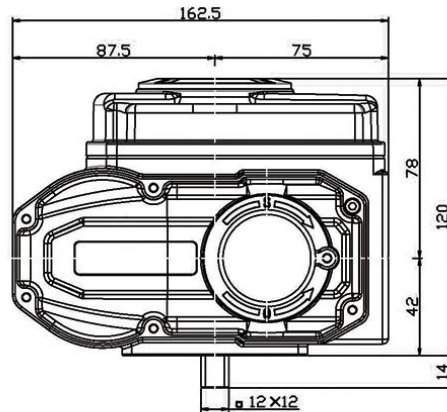
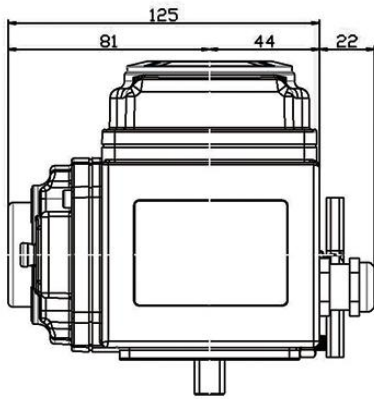
### 4. Dedicated Power Circuit

- Each actuator must be powered by its own dedicated, fuse-protected, and isolated power supply.
- Do not wire multiple actuators in parallel on the same circuit. Parallel connections may result in loss of control, motor overheating, and product damage.

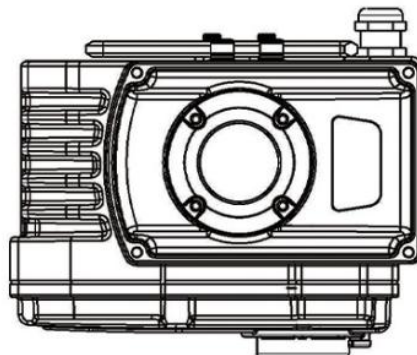
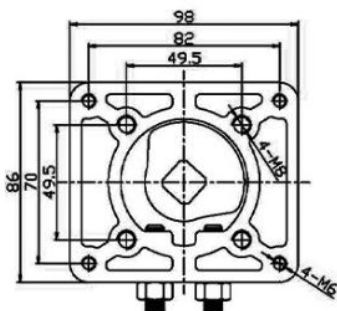
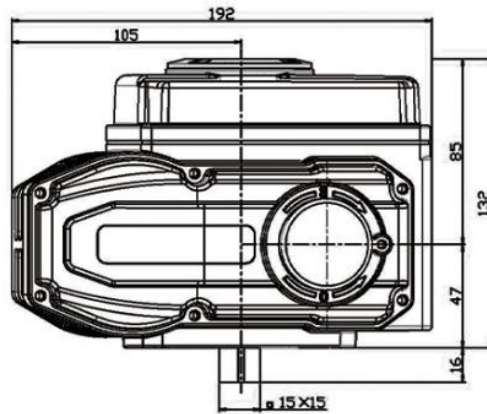
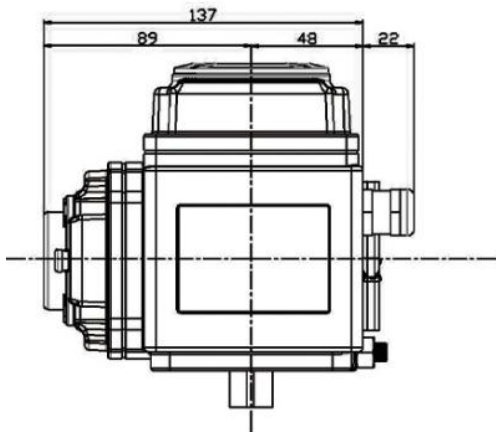
### 5. Final Voltage Check

Before energizing the actuator, re-check that the applied voltage matches the actuator rating. Energizing with incorrect voltage will damage the actuator and void the warranty.

## USS-Model 05

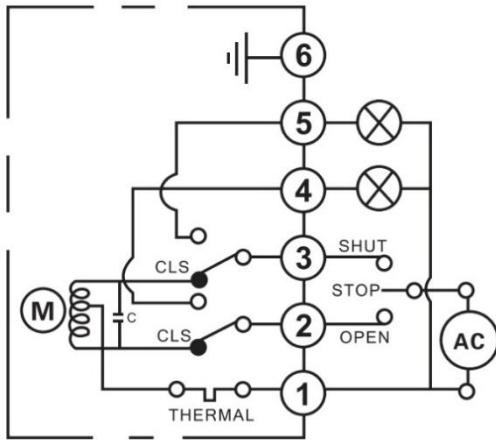


## USS-Model 10



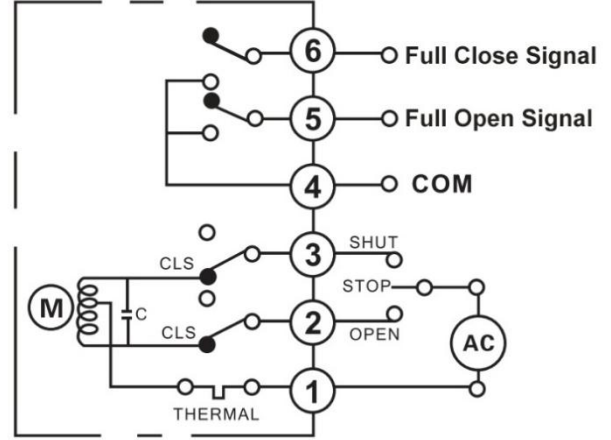


Models: USS-HDBV000...	11、 12、 13、 14	15、 16...		
Electric Actuator	Model 05	Model 10	Model 16	Model 30
<b>Max Torque</b>	50Nm	100Nm	160Nm	300Nm
<b>Open/Close Time</b>	20 seconds	30 seconds	30 seconds	30 seconds
<b>Working Temperature</b>	0 - 90°C	0 - 90°C	0 - 90°C	0 - 90°C
<b>Current</b>	0.1A	0.15A	0.2A	0.3A
<b>Amb. Temp</b>	-30°C to 60°C	-30°C to 60°C	-30°C to 60°C	-30°C to 60°C
<b>IP Rating</b>	IP65			
<b>Medium Pressure</b>	< 1.6MPa			
<b>Max Power</b>	20W	30W	35W	60W



**Type A: ON/OFF Type with Wet Contact Feedback**

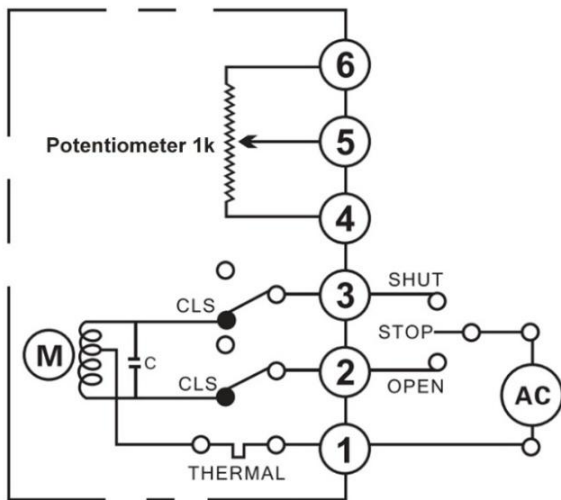
**Function:** The control circuit executes open/close operations, and it provides wet contact signals to indicate fully open/closed positions.



**Type B: ON/OFF Type with Dry Contact Feedback**

**Function:** Operates the valve to fully open or closed positions. It provides dry contact feedback to indicate fully open/closed positions.

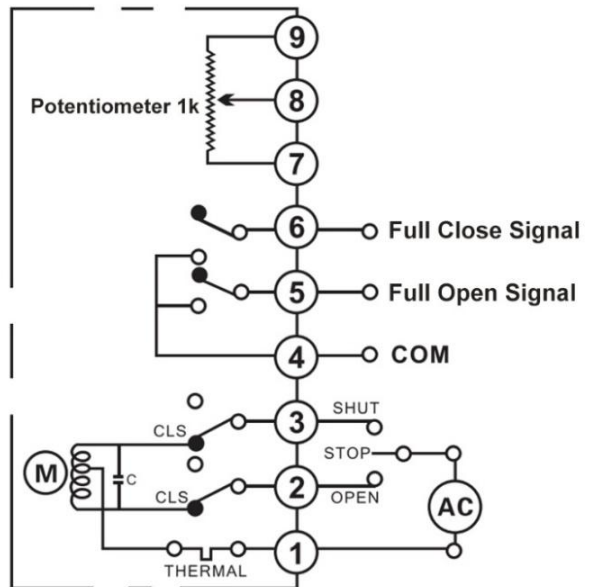
**Structure:** Equipped with two auxiliary limit switches for position signaling.



**Type C: ON/OFF Type with Potentiometer Feedback**

**Function:** Controls the valve position via the electrical circuit. Provides a proportional 0–1kΩ output corresponding to the actual valve stroke.

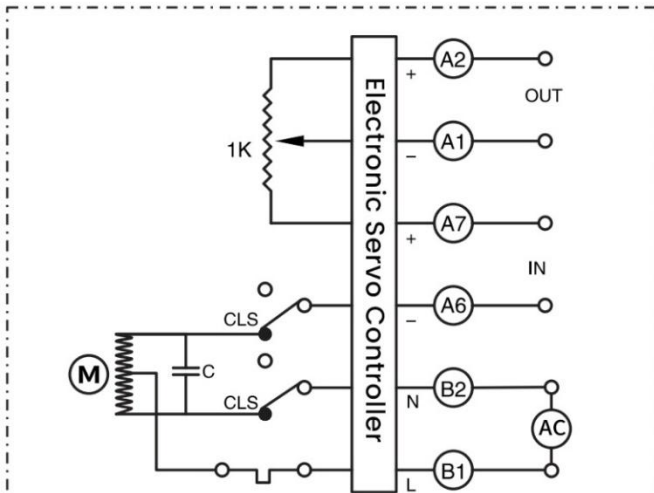
**Structure:** Equipped with a high-precision 1kΩ potentiometer for real-time position feedback.



**Type D: ON/OFF Type with Potentiometer & Dry Contact Feedback**

**Function:** Controls the valve position via the electrical circuit. Outputs a continuous 0–1kΩ signal corresponding to the valve stroke, plus dry contacts for the fully open/closed status.

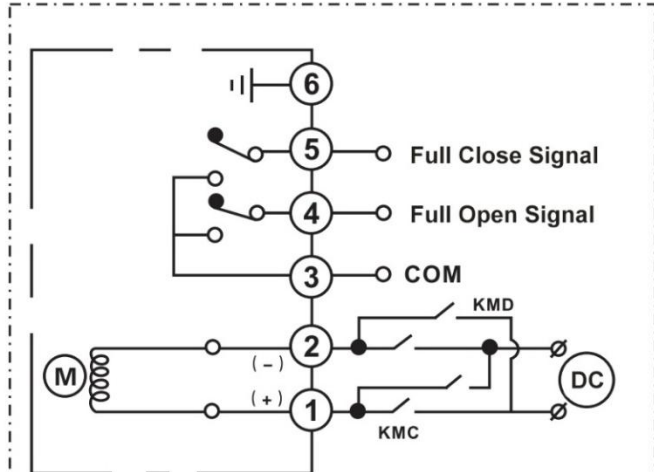
**Structure:** Dual-feedback system featuring a 1kΩ potentiometer and auxiliary limit switches.



**Type E: Modulating Type with Integrated Servo Controller**

**Function:** Modulates valve position based on input signals (4-20mA, 1-5V, or 0-10VDC) and provides a 4-20mA position feedback signal.

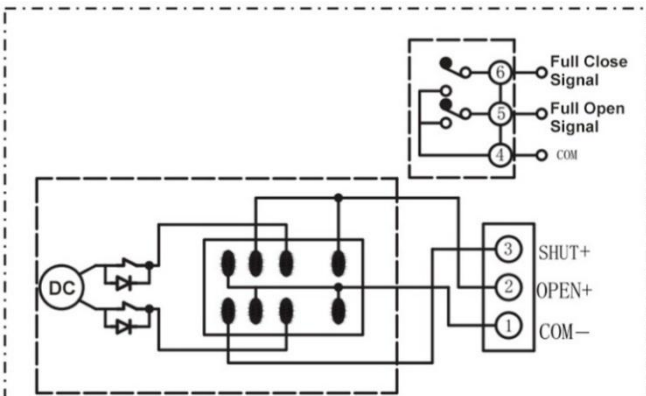
**Structure:** Includes an integrated servo control module and a 1kΩ potentiometer.



**Type F: ON/OFF Type, Standard DC Polarity Reversal Control**

**Function:** Operates via DC polarity reversal (switching +/-). The actuator provides dry contact feedback for "Full Open" and "Full Close" positions.

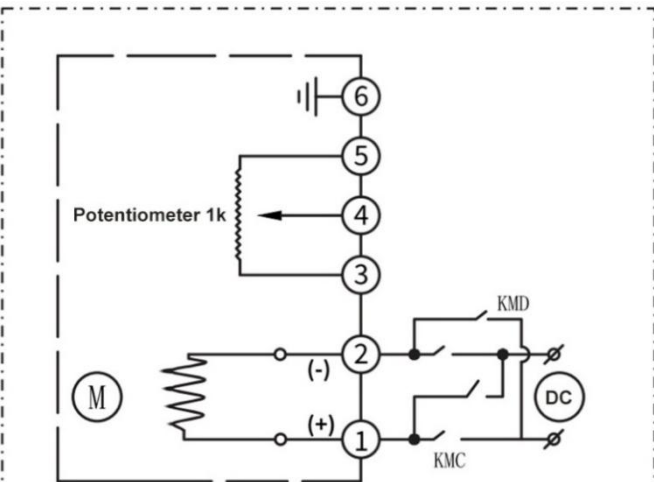
**Structure:** Equipped with two auxiliary limit switches for position signaling.



**Type I: ON/OFF Type, 3-Wire DC Control (Relay Integrated)**

**Function:** Uses an integrated relay to switch the DC polarity, enabling full open/close operations via a 3-wire control interface. The actuator provides dry contact signals for "Full Open" and "Full Close" position feedback.

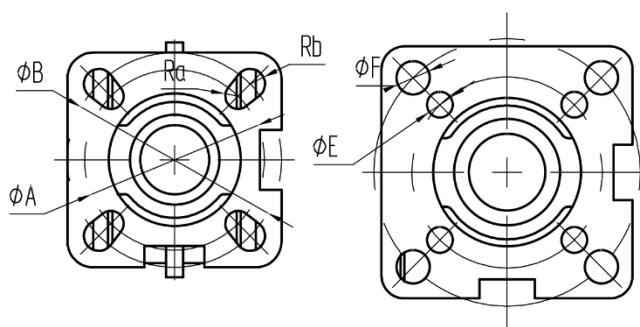
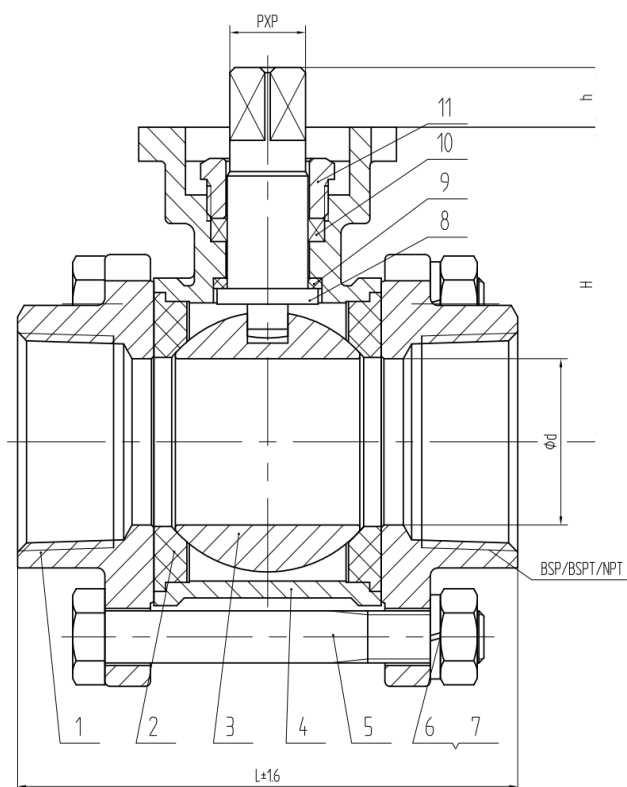
**Structure:** Equipped with an integrated relay for simplified external wiring.



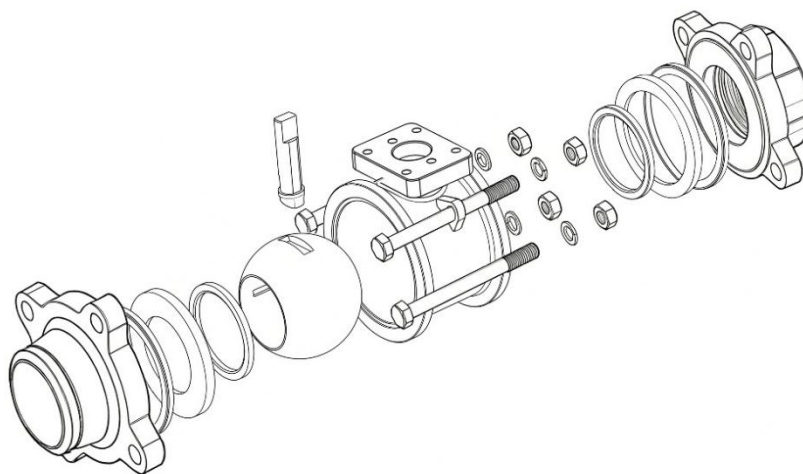
**Type J: ON/OFF Type, DC Control with Potentiometer Feedback**

**Function:** Operates the valve's open/close functions via DC polarity reversal. Provides a proportional 0-1kΩ output corresponding to the actual valve stroke.

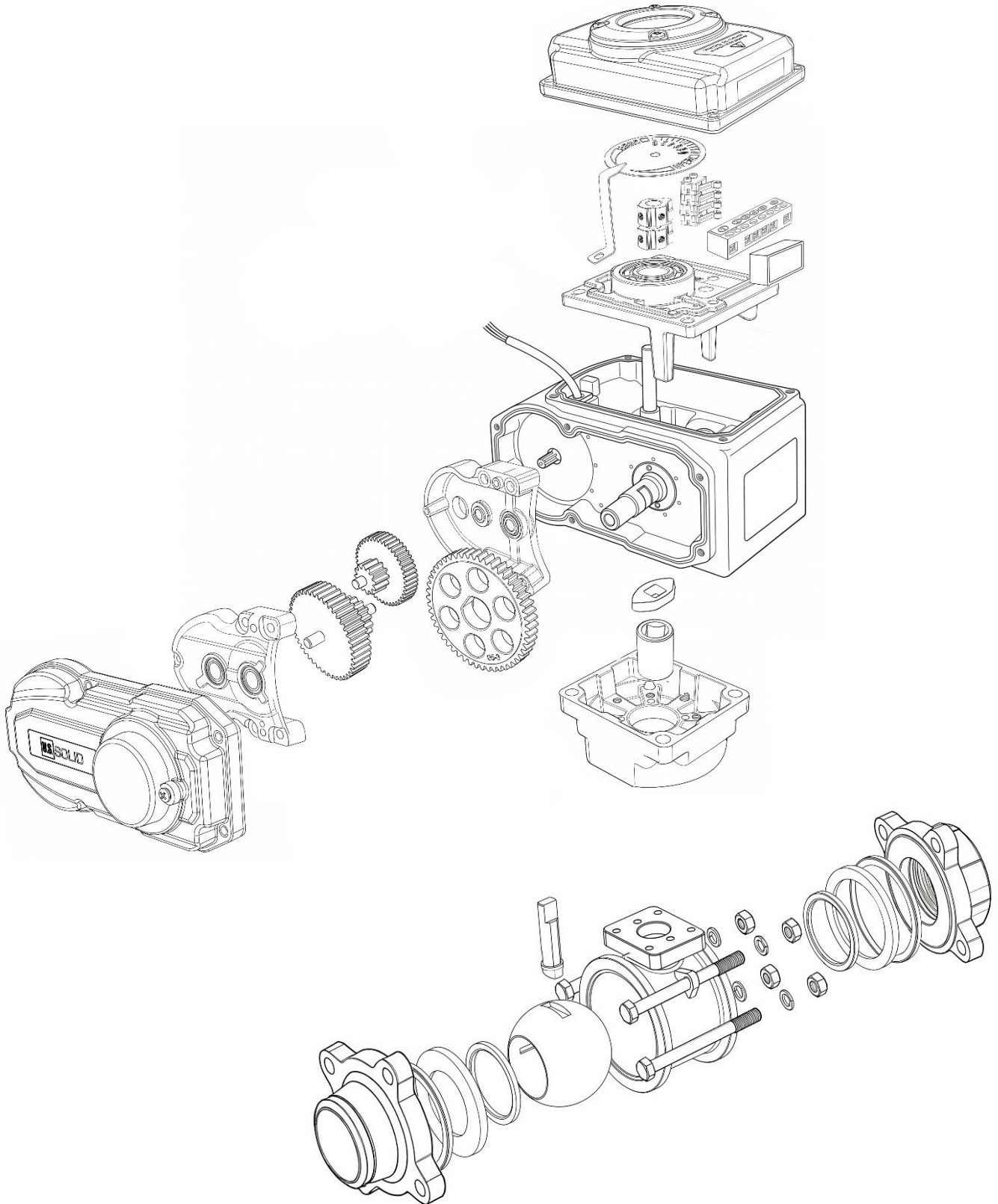
**Structure:** Equipped with a 1kΩ Potentiometer.



**3-Piece High Platform Threaded Ball Valve**



DN	in	Ød	L	BSP/BSPT /NPT	H≈	h	PXP	ØA	ØB	Ra	Rb	ØE	ØF
10	3/8"	12	69	3/8	38.5	6	9X9	36	42	3	3	-	-
15	1/2"	15	69	1/2	38.5	6	9X9	36	42	3	3	-	-
20	3/4"	20	79	3/4	46	8	9X9	36	42	3	3	-	-
25	1"	25	85	1	55.5	12	11X11	42	50	3	3.5	-	-
32	1 1/4"	32	100	1 1/4	60.5	14	11X11	42	50	3	3.5	-	-
40	1 1/2"	38	109	1 1/2	71	20	14X14	50	70	-	-	7	9
50	2"	49	129	2	78	17	14X14	50	70	-	-	7	9
65	2 1/2"	65	163	2 1/2	97.5	28	17X17	70	102	-	-	9	11
80	3"	79	190	3	108	28	17X17	70	102	-	-	9	11
100	4"	99	236	4	158	28	17X17	70	102	-	-	9	11

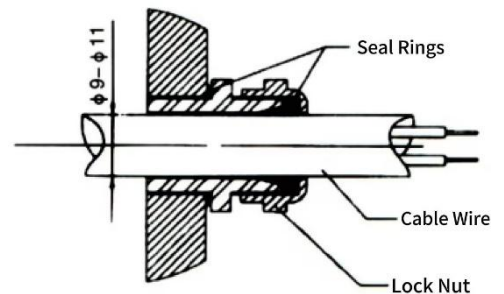


## 1. Installation & Environmental Guidelines

- **Indoor & Outdoor Use:** The product is suitable for both indoor and outdoor installation. The ambient operating temperature must remain within -30°C to +60°C (-22°F to 140°F).
- **Non-Explosion Proof:** This is a non-explosion-proof unit. Do NOT install in flammable, combustible, or explosive atmospheres.
- **Environmental Protection:** For installations exposed to prolonged rainfall, debris/material splashing, or direct sunlight, the actuator must be housed in a protective enclosure.
- **Maintenance Clearance:** Ensure adequate clearance space around the unit for wiring, controller access, and manual override operation.

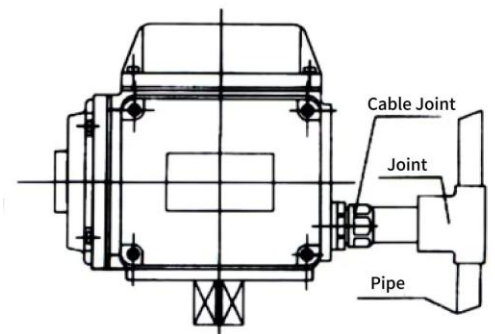
## 2. Valve & Actuator Assembly

- **Manual Pre-Check:** Manually operate the actuator to drive the valve through its full stroke. Confirm smooth operation and ensure there are no obstructions or abnormalities. Turn the valve to the fully closed position.
- **Coupling Installation:** Fit one end of the coupling (adapter) onto the valve stem.
- **Actuator Alignment:** Ensure the electric actuator is in the **fully closed** position, then insert the actuator's output shaft into the square drive of the coupling.
- **Securing the Unit:** Install and tighten the mounting bolts between the electric actuator and the valve body.
- **Final Inspection:** Operate the actuator using a hex wrench. Ensure the movement is concentric and properly aligned without binding. Do not force beyond mechanical limits to avoid over-travel and gear damage.
- **NOTE:** Improper alignment between the actuator and valve stem may cause premature wear or failure of the drive nut.



## 3. Cable & Conduit Installation

- **Conduit Requirements:** Use conduit or cable glands with an outer diameter (OD) of φ9-11mm. Ensure all connections are properly sealed to maintain watertight integrity.
- **Water Ingress Prevention:** To prevent water from entering the actuator through the conduit, install the actuator higher than the conduit (using a drip loop).
- **Wiring Specifications:** Use cables with an OD of φ9-11mm. Ensure the cable gland is fully tightened to create a secure seal. Do not use undersized or damaged cables.
- **Signal Integrity:** Use shielded cable for signal lines. To avoid interference, do not run signal wires parallel to high-voltage power lines.



## 1. System Calibration & Testing

This product has undergone comprehensive factory testing. However, due to potential inconsistencies in valves, couplings, and assembly tolerances, minor field adjustments may be required. If recalibration is necessary, please follow the commissioning procedures outlined above.

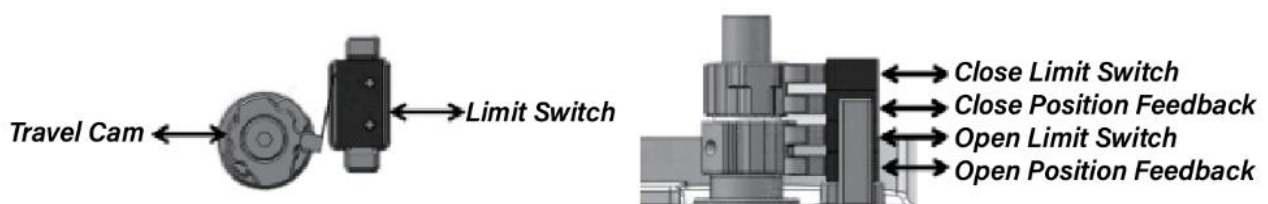
- **Pre-Operation Check (Manual Override):** After mounting the actuator to the valve, perform a manual cycle test. Ensure the manual override operates smoothly without any binding or mechanical interference. If resistance or "sticking" is detected, identify and resolve the root cause to ensure fluid operation before proceeding to electrical power-up.
- **Direction of Rotation:** When applying power for the first time, verify that the actuator's direction of rotation matches the valve's open/close orientation. Operating the unit in the wrong direction may lead to internal component damage or terminal failure.

## 2. Calibration & Limit Adjustment

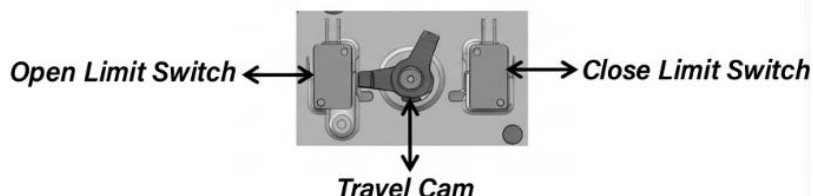
### Electrical Limit Switch Adjustment

- **Closing Position:** Manually rotate the valve to the Fully Closed position. Check if the travel cam is precisely engaging the microswitch. The cam must not bypass or fail to reach the switch. If adjustment is needed, loosen the cam's set screw and reposition the cam until you hear a distinct "click" indicating switch activation. Secure the set screw and perform a powered test to verify the closing position; fine-tune if necessary.
- **Opening Position:** Manually rotate the valve to the Fully Open position and inspect the corresponding cam and microswitch. Follow the same adjustment procedure as the closing position.

Type 05/10/16 Switch Configuration



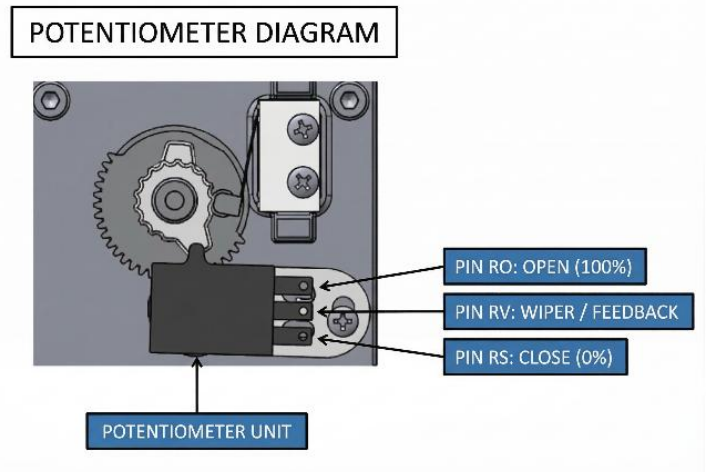
Type 30 Switch Configuration



**CAUTION:** Ensure the travel cams are accurately set to the valve's actual mechanical limits. Improper adjustment may cause over-travel, leading to permanent damage to the valve or actuator.

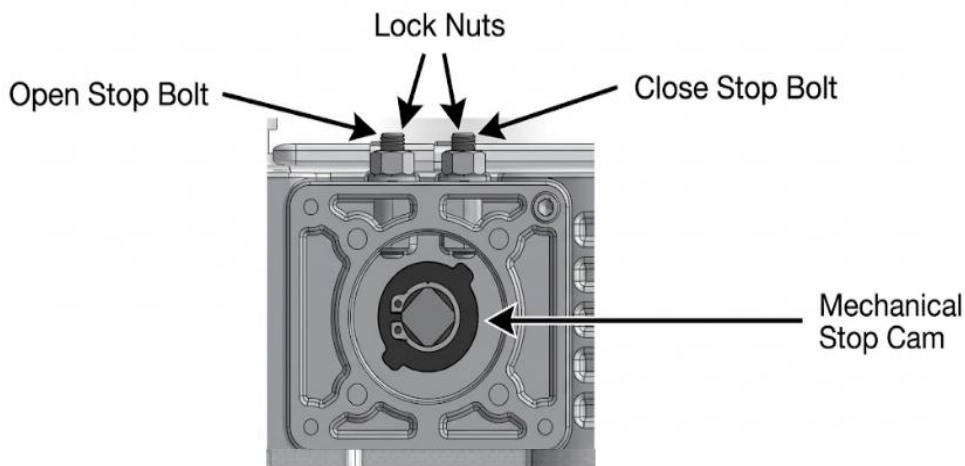
### 3. Potentiometer Calibration

- Closed Position Resistance:** Drive the actuator electrically to the Fully Closed position until the motor stops via the limit switch. Using a multimeter (Ohm setting), measure the resistance between terminals RS and RV. The target value is approximately 80Ω. If the reading is outside this range, loosen the potentiometer mounting screws and rotate the drive gear until the resistance reaches 80Ω. Tighten the screws, ensuring the potentiometer gear meshes tightly with the drive gear without backlash.
- Open Position Resistance:** Drive the actuator to the Fully Open position. Measure the resistance between terminals RO and RV. The value should be less than 1kΩ. If it exceeds 1kΩ, the valve opening angle must be re-adjusted.



### 4. Mechanical Travel Stop Adjustment

- Close Direction:** Power the actuator to the Fully Closed position. Once the motor stops, loosen the lock nut on the Close Adjustment Bolt. Turn the bolt clockwise until it contacts the internal mechanical stop. Then, back off (rotate counter-clockwise) the bolt 2.5 turns and tighten the lock nut securely.
- Open Direction:** Follow the same procedure to adjust the Open Adjustment Bolt at the fully open position.



**⚠ CAUTION:** Mechanical stops must be accurately calibrated to align with the electrical limit switches. Failure to do so may result in actuator motor overload, internal gear stripping, or permanent equipment damage.

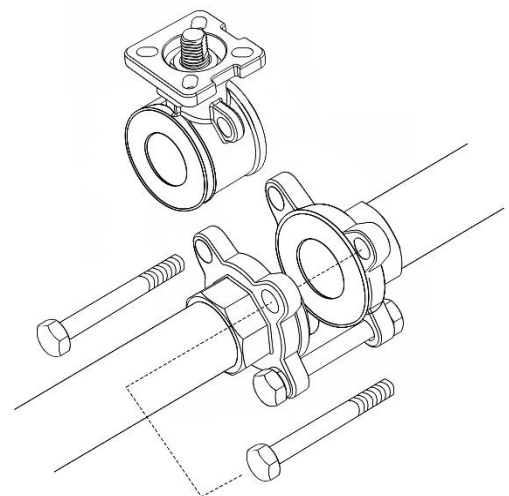
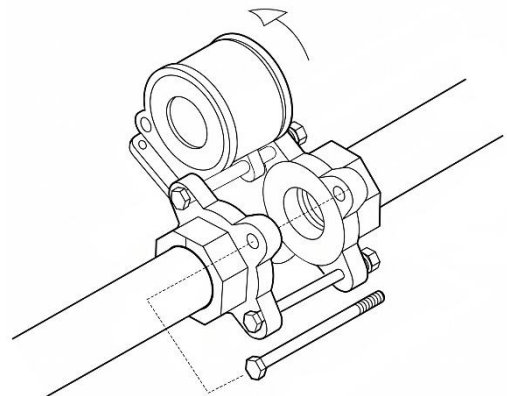
## 1. Preventive Maintenance & Preservation

To ensure the long-term reliability of the actuator, please adhere to the following maintenance protocols:

- **Environmental Sealing:** Upon completion of installation and commissioning, ensure the waterproof plug at the manual override port is securely seated. This is critical to prevent moisture ingress and maintain a dry internal environment.
- **Routine Inspection:** Periodically inspect the actuator during operation for signs of:
  - Mechanical loosening or vibration
  - Excessive thermal buildup (overheating)
  - Moisture or condensation buildup
  - *If any abnormalities are detected, perform immediate corrective maintenance to prevent equipment failure.*
- **Outdoor Protection:** If the actuator is installed in an outdoor or exposed environment, a dedicated weather shield or waterproof enclosure must be installed to protect the unit from direct environmental impact.

## 2. Maintenance & Service

- **In-Line Maintenance (Swing-Out Design):** To perform on-site service without disturbing the threaded pipe connections, simply remove one of the two upper bolts passing through the body hinges. This allows the remaining bolt to function as a pivot, enabling the center body section to swing out to either side. In this position, the ball and seats are fully accessible for inspection or replacement while the end caps remain securely threaded to the pipeline.
- **Off-Line Maintenance (Center Body Removal):** For complete shop service or component replacement, extract both bolts from the body hinges and loosen the remaining two lower bolts (leaving them in place). This configuration allows the center body to be lifted out of the line while the end caps and remaining bolts maintain the original pipe alignment and spacing. Once serviced, the valve body can be reinstated quickly without the need for cumbersome piping realignment.



SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
<b>Motor Fails to Start</b>	Power supply disconnected	Verify wiring and restore power supply
	Broken wire or loose terminal	Inspect wiring; tighten all connections
	Voltage mismatch	Ensure supply voltage matches nameplate
	Thermal overload tripped	Allow motor to cool; reduce duty cycle
	Limit switch failure	Replace limit switch assembly
	Faulty start capacitor	Replace capacitor; check operating temp
<b>Status Indicator Fails to Illuminate</b>	Indicator bulb/LED failure	Replace indicator component
	Signal switch malfunction	Replace signal switch
	Improper travel stop adjustment	Readjust limit switches and travel stops
<b>Actuator Hunting (Oscillating)</b>	Low supply voltage	Verify power supply meets requirements
	Signal interference (EMI)	Install shielded cables; check grounding
	Potentiometer disengaged	Realign and secure potentiometer gear

**FAQ:**

**Q1: Can I manually operate the valve?**

**A:** Yes. The actuator features a **manual override**. We recommend manually cycling the valve before electrical installation to ensure smooth operation.

**Q2: The valve does not fully close or open. What should I do?**

**A:** This usually indicates a Mechanical Stop misalignment. First, check for debris obstructing the ball. If clear, recalibrate the limit switches and mechanical stops according to the "Calibration" section of this manual.

**Q3: Is this valve suitable for high-viscosity fluids?**

**A:** Our heavy-duty series handles high-torque needs. However, extremely viscous media or large particulates may exceed the actuator's rated capacity, leading to "Stall" errors. Ensure the media's torque requirement stays within the actuator's specifications.

**Q4: Why does the actuator feel hot during operation?**

**A:** It is normal for the housing to feel warm during continuous cycling. However, if it is too hot to touch, check your duty cycle. Exceeding the recommended cycle or operating outside the -30°C to +60°C range may trigger thermal overload protection.

**Q5: Can this valve be installed outdoors?**

**A:** Yes, provided the model is IP67 rated. For permanent outdoor use, we strongly recommend a protective weather shield to prevent UV degradation and ice buildup, ensuring a longer service life.

**Q6: What should I do if the actuator does not respond to electrical signals?**

**A:** Follow these quick checks:

- **Power:** Verify the supply voltage matches the rating using a multimeter.
- **Wiring:** Ensure all connections are secure, clean, and corrosion-free.
- **Signal:** Confirm your controller (PLC/Switch) is actively sending the signal.
- **Circuit:** Ensure the actuator is on a dedicated circuit. Never wire actuators in parallel.

## **Contact**

Feel free to visit our website: [www.ussolid.com](http://www.ussolid.com)

You can email us at [service@ussolid.com](mailto:service@ussolid.com)

You can call one of our friendly customer service representatives at

+1(216) 223-8827