CONVALVE

SPECIALIST IN VALVE AUTOMATION

# MINI MOTORIZED BALL VALVES
# USER MANUAL



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REVISION NO: 01

## INTRODUCTION

Thank you for purchasing Convalve products. Each product has been thoroughly inspected after its production to offer you the highest quality and reliable performance. Please read the product manual carefully prior to installing and commissioning the product.

- Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly.
- The manual should be provided to the end-user.
- The manual can be altered or revised without any prior notice. Any changes in the product's specification, design, and/or any components may not be printed immediately but until the following manual revision.
- The manual should not be duplicated or reproduced for any purpose without prior approval from Convalve.
- In case of any other problems that are not stated in this manual, please make immediate contact with Convalve for assistance.

## TRANSPORTATION AND STORAGE

- Convalve recommends storing Mini Motorized Ball Valves in a clean and dry environment. For optimal storage conditions, it is recommended to store the Mini Motorized Ball Valves, safeguarding them against adverse weather conditions and other potentially harmful elements. At Convalve, we prioritize the longevity and performance of our products, and these storage guidelines are meant to preserve the Mini Motorized Ball Valves' functionality and reliability throughout their lifecycle.
- Handling the Mini Motorized Ball Valves with care is of utmost importance to prevent any scratches, damage, or harm to the environment during transportation. Adequate protection should be provided to ensure the mini motorized ball valve remains intact throughout the transportation process.

## PRODUCT DESCRIPTION

Mini motorized ball valves are used for general purposes in air conditioning systems, heating and cooling lines and other processes. These valves are driven by a bi-directional motor. The feedback signal is received when the valve is fully opened (models with auxiliary contacts). This feature makes it possible to operate a different device following the opening of the valve

## SPECIFICATION

**ACTUATOR :**

EA7……AM **AC** 230/110/24V, 50/60Hz, 3-point
EA7……A **AC** 230/110/24V, 50/60Hz, on/off
Output torque: >3.5N.m
Angle of rotation: 90°
Protection rating: IP54/IP55/IP65*
On/off time: 16 sn. (50Hz)
Ambient Temperature: -10° C ~80° C
Ambient humidity: 0~90%RH

EA7……DM **DC** 3/6-12/24V, 3-point
EA7……D **DC** 3/6-12/24V, on/off
Output torque:2 N.m
Angle of rotation: 90°
Protection rating: IP54/IP55/IP65*
On/off time: 5-12 sec
Ambient Temperature: -10° C ~80° C
Ambient humidity: 0~90%RH

**VALVE BODY :**

Medium: cold/hot water, air, gases
Temperature of medium: 2° C...90° C (Max. 120° C for SS304)
Rated pressure: PN20
Pipe connector: BSP internal thread
Ambient temp. range: −5…+60° C; 0…90%RH
Size: 1/2" , 3/4" , 1" and 1-1/4"
Valve type: 2-way and 3-way

Valve body: forged brass, 2.0381
Sealing: EPDM+PTFE, with double O-ring
Ball: nickel-plated brass
Stem: EPDM O-rings, with double O-ring

Valve body: Stainless Steel SS304, 1.4308
Sealing: EPDM+PTFE, with double O-ring
Ball: Stainless Steel SS304
Stem: EPDM O-rings, with double O-ring

| MODEL NO. | WORKING VOLTAGE | ACTUATOR TYPE | OUTPUT TORQUE | CONSUMPTION | ON/OFF TIME | VALVE BODY | |
|---|---|---|---|---|---|---|---|
| EA7220AM | 230VAC±15% 50/60Hz | 3-point or on/off | 3.5N.m | 7W | 50Hz:16 sec 60Hz:12 sec | CBBVM215<br>CBBVM220<br>CBBVM225<br>CBBVM232<br>CBBVM315<br>CBBVM320<br>CBBVM325 | CSBVM215<br>CSBVM220<br>CSBVM225<br>CSBVM315<br>CSBVM320<br>CSBVM325 |
| EA7220A | | On/off | | | | | |
| EA7110AM | 110VAC±15% 50/60Hz | 3-point or on/off | | | | | |
| EA7110A | | On/off | | | | | |
| EA7024AM | 24VAC±15% 50/60Hz | 3-point or on/off | | | | | |
| EA7024A | | On/off | | | | | |

| MODEL NO. | WORKING VOLTAGE | ACTUATOR TYPE | OUTPUT TORQUE | CONSUMPTION | ON/OFF TIME | VALVE BODY | |
|---|---|---|---|---|---|---|---|
| EA7003DM | DC3V | 3-point or on/off | 2 N.m | 2W | 5-12 sec | CBBVM215<br>CBBVM220<br>CBBVM225<br>CBBVM232<br>CBBVM315<br>CBBVM320<br>CBBVM325 | CSBVM215<br>CSBVM220<br>CSBVM225<br>CSBVM315<br>CSBVM320<br>CSBVM325 |
| EA7003D | | On/off | | | | | |
| EA7012DM | DC12V | 3-point or on/off | | | | | |
| EA7012D | | On/off | | | | | |
| EA7024DM | DC24V | 3-point or on/off | | | | | |
| EA7024D | | On/off | | | | | |

## TECHNICAL OVERVIEW

**PRINCIPLE OF OPERATION :**

- Mini motorized ball valves control the flow of fluid or gas through a rotating ball with a hole. By rotating the ball 90° around its axis, the valve can either open or close, regulating the flow of the medium. These valves are available in two-way or three-way configurations, with the latter having a T-shaped hole for different switching schemes.

- Mini motorized ball valves are actuated by an electric motor, providing precise control over the valve's position. The EA7 actuator, in particular, is designed with a transmission system to ensure smooth and gradual opening and closing actions, while still delivering high torque for efficient operation.

- The EA7 actuator is equipped with two limit switches, which serve as endpoints for the valve's movement. When the actuator reaches one of these end positions (90° rotation), the power supply to the electric motor automatically shuts down. As a result, no further electrical power is required to maintain the valve in the end positions.

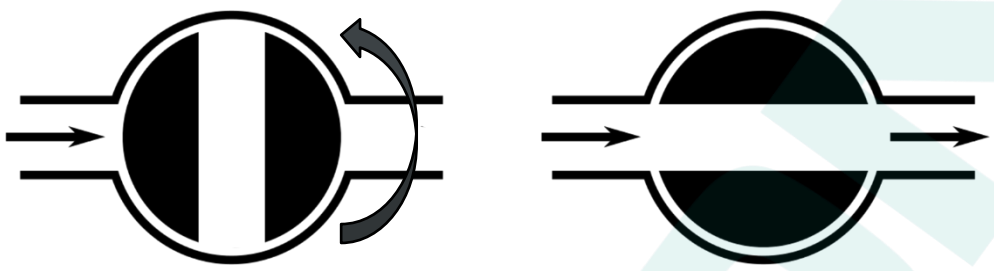
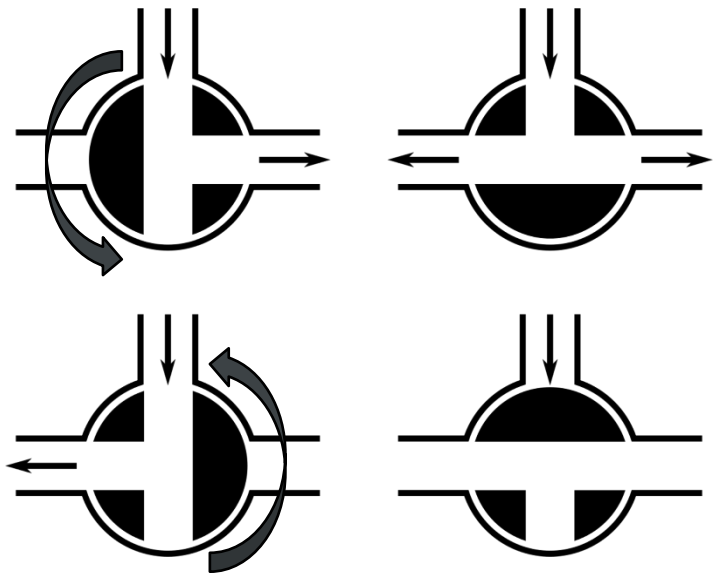
- The EA7 actuator is offered in two control options: 3-point control or On/Off control with an internal relay. The choice of control method allows for versatile usage based on specific application requirements.

- In summary, mini motorized ball valves provide precise and reliable flow control, enabling seamless integration into various systems and processes, such as air conditioning, heating, and industrial applications. The EA7 actuator enhances the valve's performance with its smooth operation, high torque, and efficient power management.

**CIRCUIT DIAGRAM :**

Below is the table that illustrates the circuit functions of the ball valves. While the 2-way ball valves have only two possible states, open or closed, the 3-way ball valves offer additional options by rotating the ball 180°.

The 2-way ball valves are straightforward, providing either full flow when open or no flow when closed. However, the 3-way ball valves offer more flexibility with six possible flow configurations, enabling different routing options for the fluid or gas depending on the application's needs.

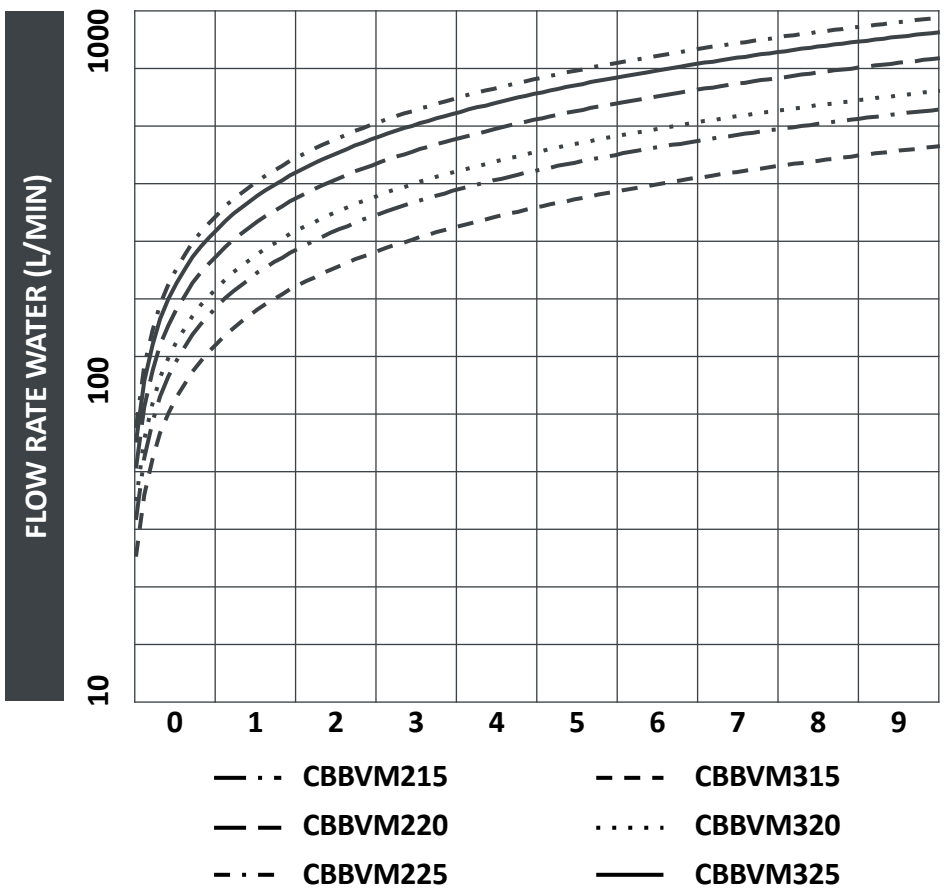
| 2-WAY | 3-WAY |
|---|---|
|  |  |

**FLOW CHART :**

The flow chart represents the relationship between the flow rate (measured in liters per minute, l/min) of the ball valves and the differential pressure across the inlet and outlet of the valve. The vertical axis of the chart is shown on a logarithmic scale, indicating that the flow rate may not increase linearly with the increase in differential pressure.

As the differential pressure across the valve increases, the flow rate tends to increase, allowing more fluid or gas to pass through the valve. However, the exact relationship between flow rate and differential pressure can vary depending on the specific design and characteristics of the ball valve.

It is important to consult the specific flow chart provided by the manufacturer for the accurate representation of the flow rate and differential pressure relationship for the particular type of ball valve being used. The graph serves as a valuable tool for understanding the valve's performance under different pressure conditions and assists in making informed decisions regarding its application in various systems.



## SAFETY

1. Before installing, using, or maintaining the device, carefully read and follow the safety instructions provided.
2. This device contains gas and/or liquid under pressure. To ensure proper protection, the actuator complies with protection class IP54 (according to IEC 60529) when properly connected. Improper use may lead to hazards.
3. This product is not designed to be used as a safety device. Do not use it for such purposes.
4. Never put your hands, body parts, or other objects into the ports of the valve. The rotating ball can cause serious injuries or damages.
5. Proper transport, storage, installation, use, and maintenance are crucial for reliable and error-free operation. The product may not function correctly due to dirt, wear, damage (e.g., from dropping), or improper use. Therefore, avoid using the product in applications where a malfunction can pose danger or cause damage.
6. Check the compatibility of the medium used, temperature, and other operating conditions with the materials and specifications of the product. It is the user's responsibility to select the right product for the intended application.
7. This product is not intended or approved for medical applications, use in food-related processes, or applications in gas appliances.
8. Do not exceed the limits for pressure, temperature, or voltage as indicated on the product and/or in the technical documentation.
9. Modifying the construction of this device is not allowed.
10. Be cautious of electric shock when working with electrical equipment.

## INSTALLATION AND MAINTENANCE

**SAFETY INSTRUCTIONS :**

1. Install the electric ball valve in a dry environment. In moist environments, take precautions to prevent moisture from penetrating the actuator.
2. Safely install the ball valve to avoid electric shock, burns, or other injuries. Keep the electric ball valve away from flammable materials.
3. Protect the product from frost, as it may cause damage or block moving parts, leading to malfunction.
4. Perform maintenance only when the system is depressurized, electrically disconnected, and cooled down.
5. Always turn off the power supply before working on the electric ball valve to prevent the risk of electrical shock and accidental activation of the actuator.
6. The technical documentation carefully before installation, use, or maintenance. product is safe when correctly installed and operated by qualified individuals. Read the safety instructions
7. Ensure controlled and safe operation of the electric ball valve to prevent accidents or damage to the system.

**INSTALLATION :**

**Fluids and Gases:**

1. It is advisable to use electric ball valves with clean liquids or gases, as dirt can cause excessive wear. Before installation, ensure that the pipes are free from dirt or debris. Consider installing a filter (500 µm) upstream of the electric ball valve for additional protection.

**Mounting the Valve :**

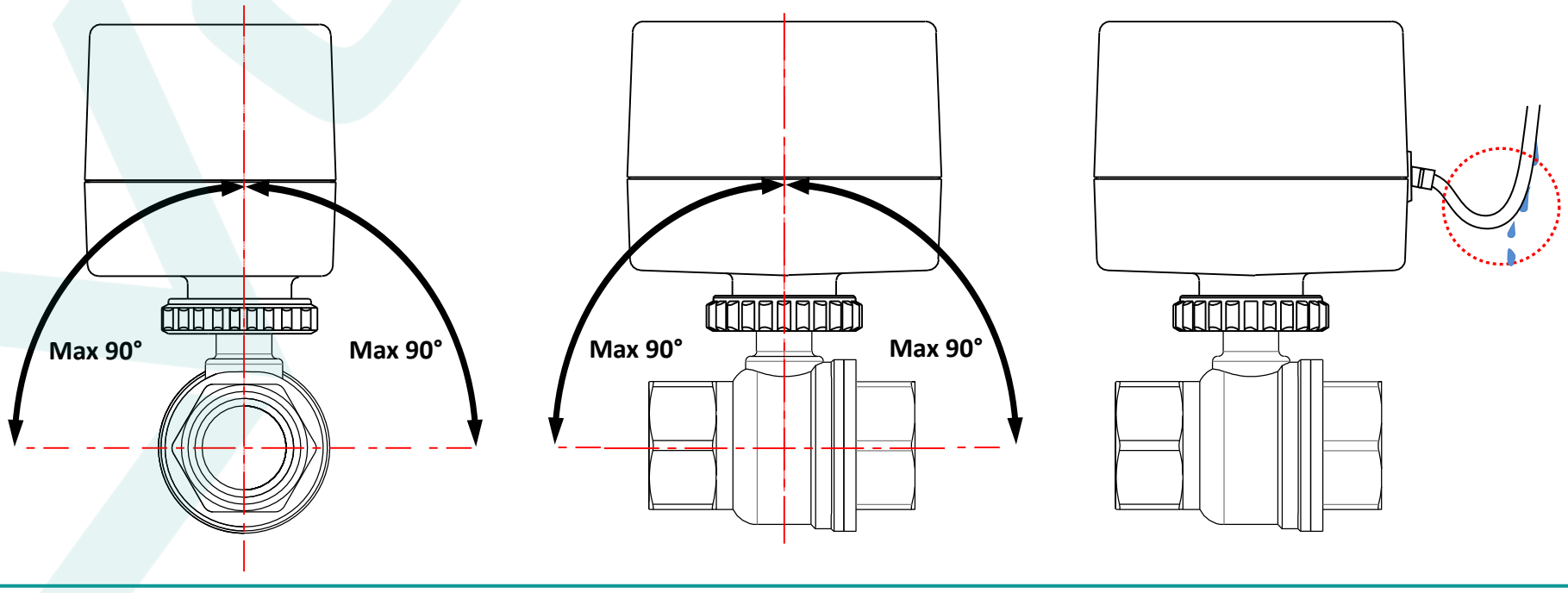
1. Securely fasten the pipes on both sides of the valve during installation. Apply force only to designated areas, such as the hexagon, and avoid putting pressure on the actuator.
2. Prevent vibration in the pipes to ensure stable operation.
3. Use an appropriate sealant for threaded connections of the ball valve. Avoid introducing thread-sealing material into the valve, as it may cause malfunction.

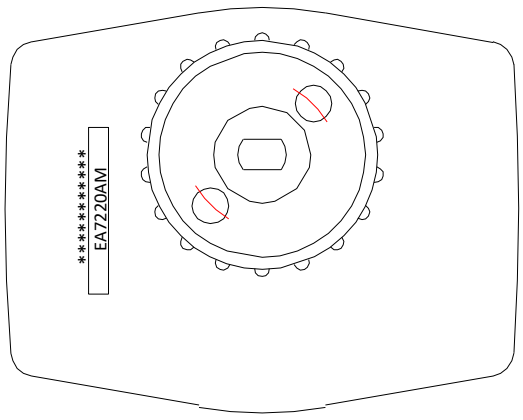
**Position :**

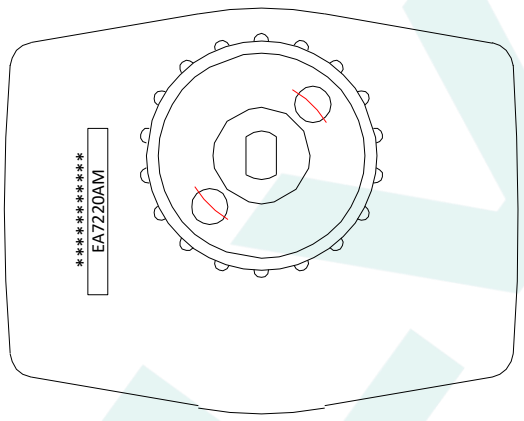
1. It is recommended to install the electric ball valve in a vertical position with the actuator facing upwards. This minimizes the risk of moisture accumulation in the actuator.
2. If the valve needs to be mounted at an angle, ensure it deviates a maximum of 90° from the vertical position.
3. Prevent drops of water from entering the actuator along the cable by ensuring proper cable management and sealing.

**Installation of the actuator on the coil :**

1. For 3-way valves, there are two possible installation orientations achieved by rotating the ball 180°. The correct orientation should be chosen based on the specific application and desired flow direction.
2. Proper installation is crucial to ensure the reliable and safe functioning of the actuator and the valve. Therefore, it is recommended to follow the manufacturer's guidelines and refer to the technical documentation for the specific model being used.

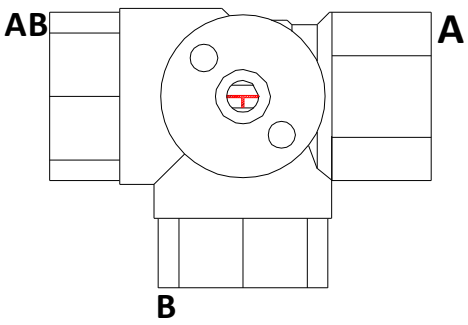




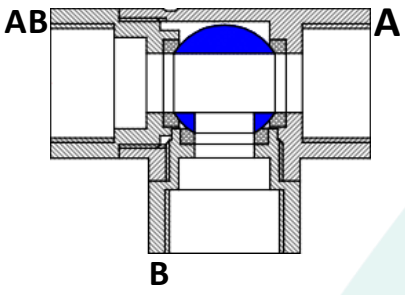

## ACTUATOR STATE AS DELIVERED

INSTALLATION METHOD 1



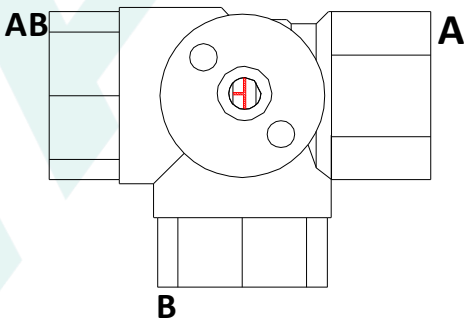

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Black wire and the Brown wire, valves will be opened.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Brown wire, valves will be opened.



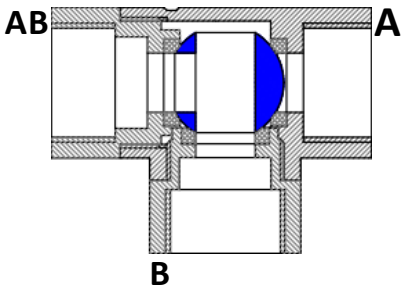

**90 degrees counter clockwise turn**

**90 degrees clockwise turn**



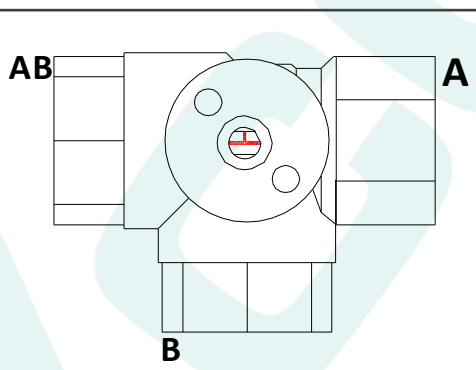

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Brown wire valves will be closed.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Blue wire valves will be closed.



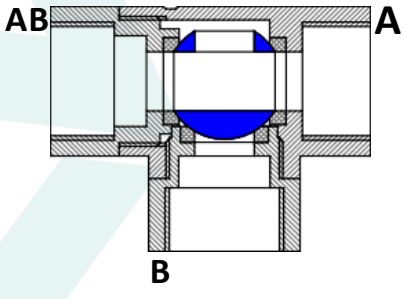

**EA7220AM(A)+CBBVM315/20/25. at 90 degrees clockwise and counterclockwise turn. Core Ball is "T" mode.**

INSTALLATION METHOD 2



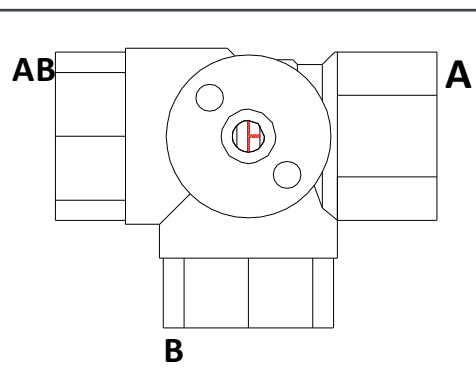

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Black wire and the Brown wire, valves will be opened.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Brown wire, valves will be opened.



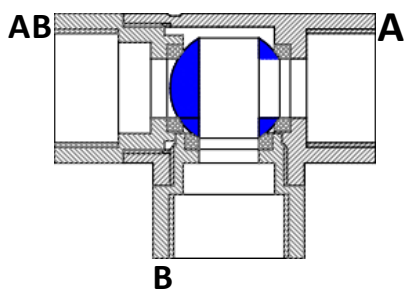

**90 degrees counter clockwise turn**

**90 degrees clockwise turn**



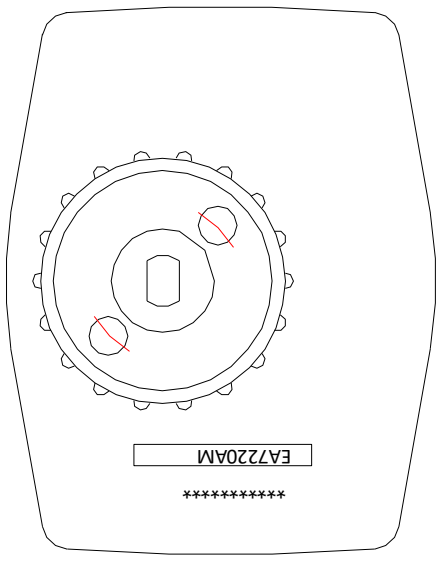

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Brown wire valves will be closed.

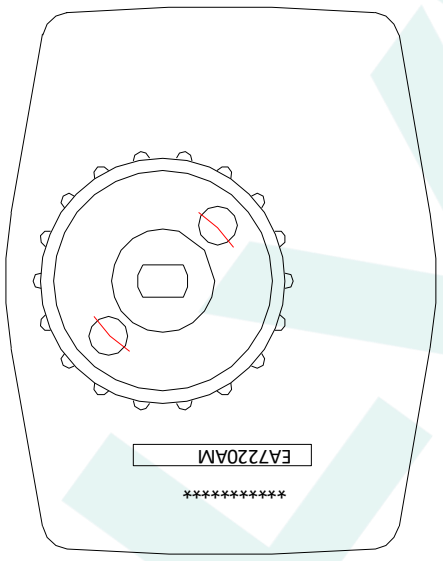
**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Blue wire valves will be closed.




**EA7220AM(A)+CBBVM315/20/25. at 90 degrees clockwise and counterclockwise turn. Core Ball is "T" mode**

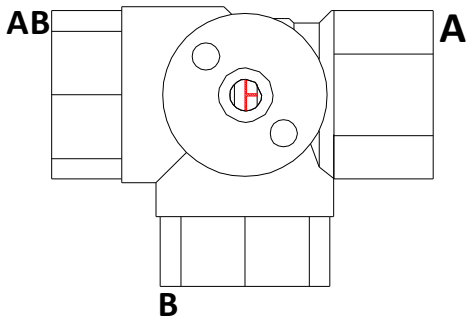
# INSTALLATION AND MAINTENANCE 3 WAY



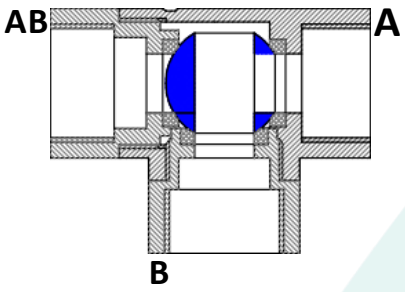

## ACTUATOR STATE AS DELIVERED

INSTALLATION METHOD 1



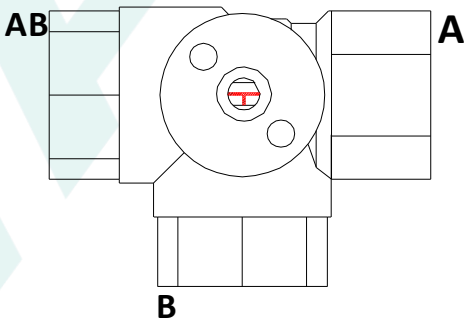

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Black wire and the Brown wire, valves will be opened.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Brown wire, valves will be opened.



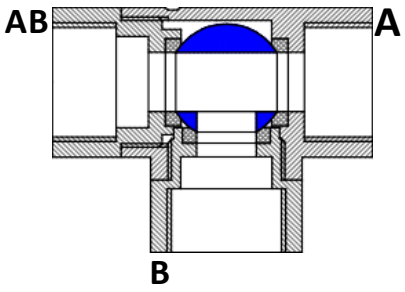

**90 degrees counter clockwise turn**

**90 degrees clockwise turn**



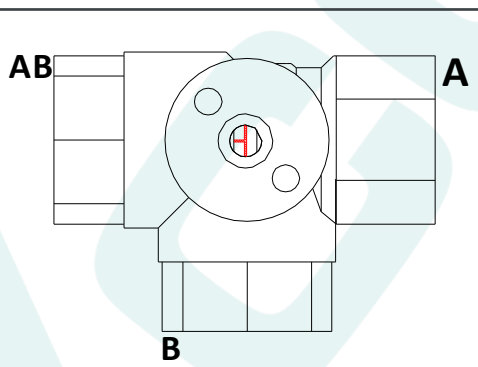

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Brown wire valves will be closed.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Blue wire valves will be closed.



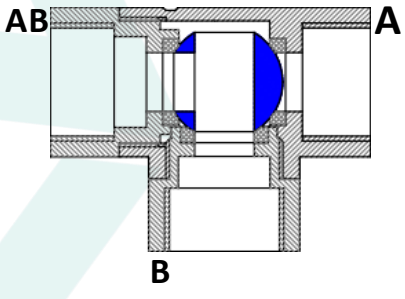

**EA7220AM(A)+CBBVM315/20/25. at 90 degrees clockwise and counterclockwise turn. Core Ball is "T" mode.**

INSTALLATION METHOD 2



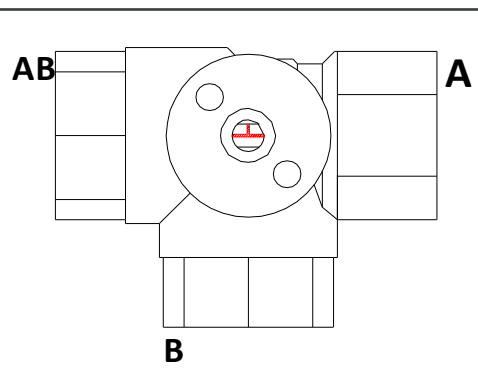

**EA7024A/EA7110A/EA7220A:**
The power supplied to the Black wire and the Brown wire, valves will be opened.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Brown wire, valves will be opened.



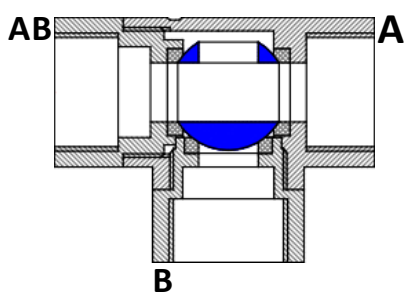

**90 degrees counter clockwise turn**

**90 degrees clockwise turn**




**EA7024A/EA7110A/EA7220A:**
The power supplied to the Brown wire valves will be closed.

**EA7003DM/EA7012DM/EA7024DM:**
The power supplied to the Blue wire valves will be closed.




**EA7220AM(A)+CBBVM315/20/25. at 90 degrees clockwise and counterclockwise turn. Core Ball is "T" mode**

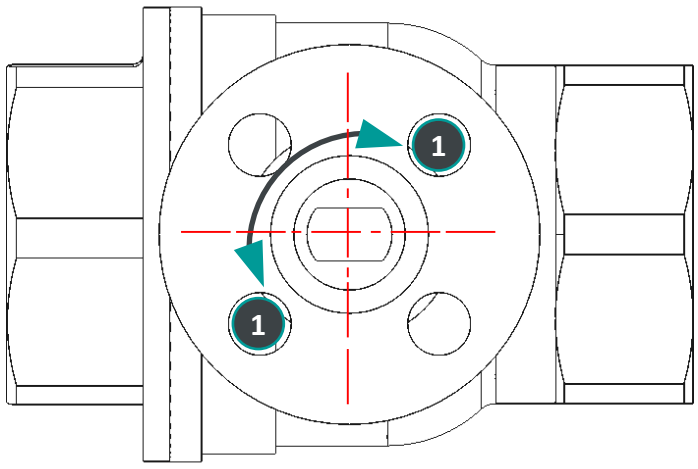
## INSTALLATION AND MAINTENANCE 2 WAY

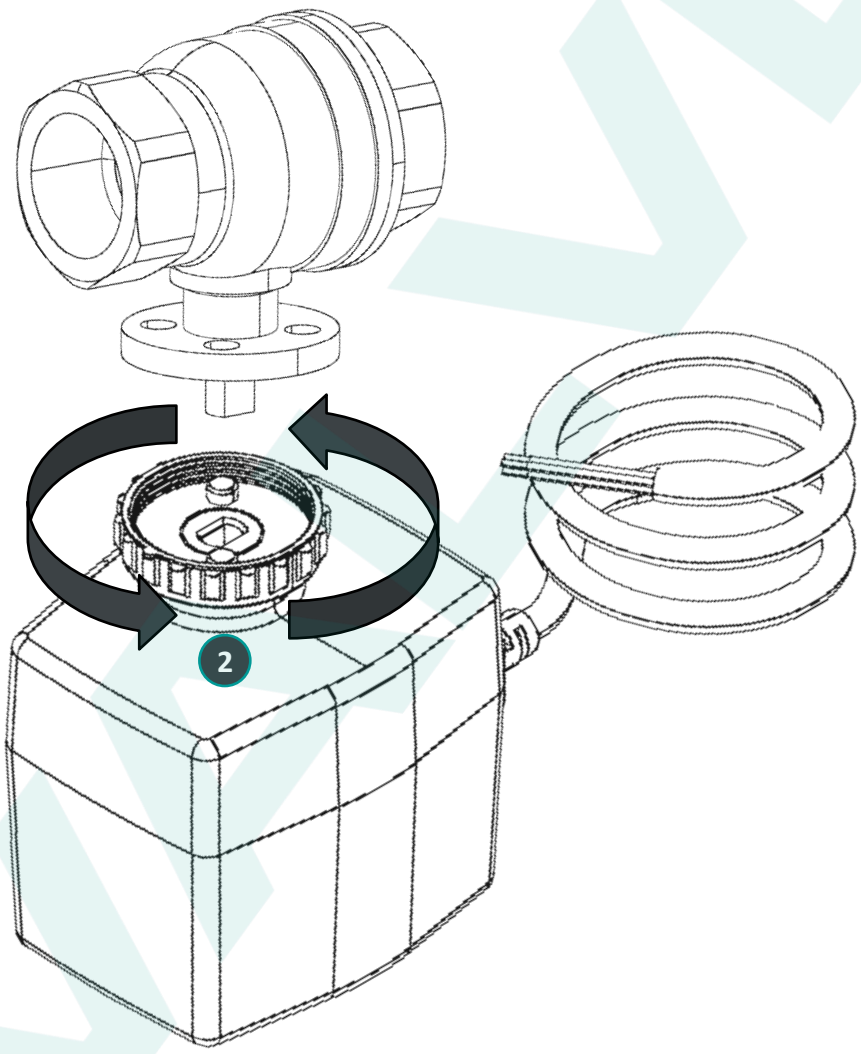
1. Use the provided nut to secure the actuator in place. Ensure the nut is tightened appropriately to prevent any looseness.

2. Check the position of the ball inside the valve. If it is not in the correct position, use a wrench to adjust it to the desired orientation.

3. Insert the actuator into the valve body (for two-way valves) using the provided ① 2-pin connection.

4. Tighten the nut securely ② to eliminate any clearance between the actuator and the valve, ensuring a tight and stable fit.



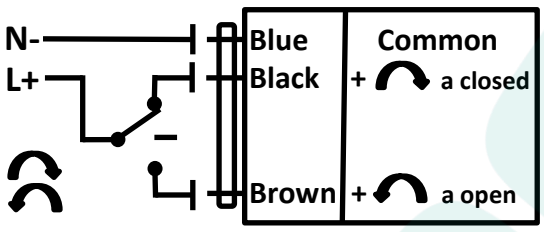

## ELECTRICAL WIRING DIAGRAM

Before proceeding with the installation, it is crucial to verify that the actuator code matches the connection diagram provided by the manufacturer. Incorrect installation can cause permanent damage to the actuator or result in hazardous situations.

The actuators are equipped with internal position switches, which means that they consume energy only during the opening or closing process. This design helps to optimize energy usage and ensures efficient operation of the actuator.

To ensure a safe and proper installation, always follow the provided connection diagram and consult the manufacturer's guidelines and specifications. This will help to avoid any potential risks and ensure the actuator functions as intended.

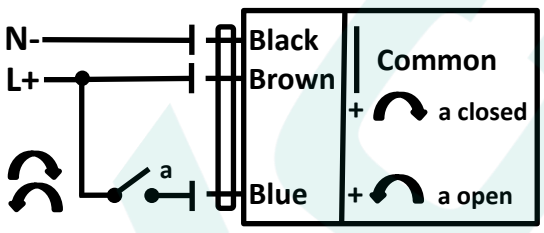
### AC




Valve (ON) : Brown wire
Valve (OFF) : Black wire
Com(N) : Blue wire

**Black wire and brown wire are prohibited to get electricity at the same time!**

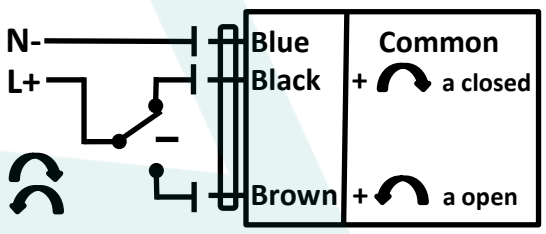
**EA7024AM , EA7110AM , EA7220AM**




Control wire : Black wire
Power wire : Brown wire
Com(N) : Blue wire

**EA7024A , EA7110A , EA7220A**

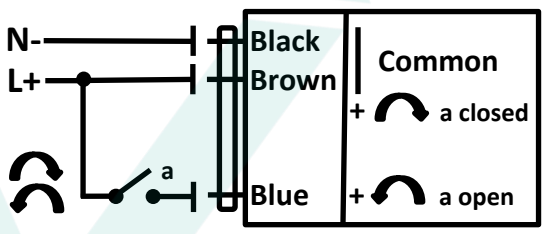
### DC




Valve (ON) : Brown wire
Valve (OFF) : Black wire
Com(N) : Blue wire

**Black wire and brown wire are prohibited to get electricity at the same time!**

**EA7003DM , EA7012DM , EA7024DM**




On-Off wire : Blue Wire
Power wire : Brown Wire
Com(N) : Black Wire

**EA7003D , EA7012D , EA7024D**