

## ***SM Series***

### **Motorized Ball Valves**

On/Off & Modulating Electric Actuators



# **USER'S MANUAL**

**Installation, Operation, & Maintenance**

**Assured Automation**

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## 1. GENERAL INFORMATION

The SM Series is an excellent motorized valve for use in the HVAC, industrial automation, and potable water systems (using the lead free version).



## 2. WARNING

**Read and understand all of these instructions before installing or operating!**

## 3. NOTICE

Assured Automation reserves the right to modify the data and features contained in this document without prior notice. Assured Automation is also not responsible for damages to persons, property or third parties caused by inappropriate use of the product.

## 4. GENERAL SAFETY INFORMATION

Temperature range of  $-4^{\circ}\text{F}$  to  $266^{\circ}\text{F}$  for valves,  $-4^{\circ}\text{F}$  to  $+158^{\circ}\text{F}$  for actuators. Do not use outside these ranges.

Do not use voltage other than that which is specified on the label of the unit

Do not open the actuator enclosure! Doing so will compromise the Ingression Protection Rating (IP56) void any warranty. In the event that the actuator stops working, call Assured Automation for assistance.

Do not use the actuator on any valve other than the valve that it came with. The valve/actuator combination has been properly sized to work together based on the actuator having a torque output of: Max. break torque of the valve under pressure + 25%.

If the actuator is assembled on the valve, and the valve has not been used in a long period of time, the actuator should be removed and the valve should be manually rotated using a screwdriver before operating with the actuator to ensure that the ball rotates freely and avoid damaging the actuator.

Handle with care to avoid damage to the actuator enclosure, electronics and valve seats.

Keep away from heat, humidity, condensation, rain, and never submerge in water.

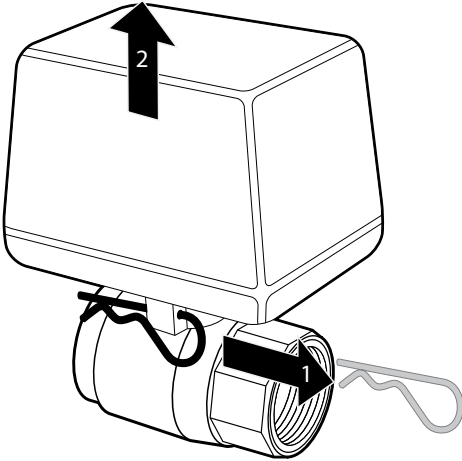
The circuits connected to the equipment must be protected against both overload and electrical shortage.

The ends of all wires that are not used should be properly insulated.

## 5. INSTALLATION

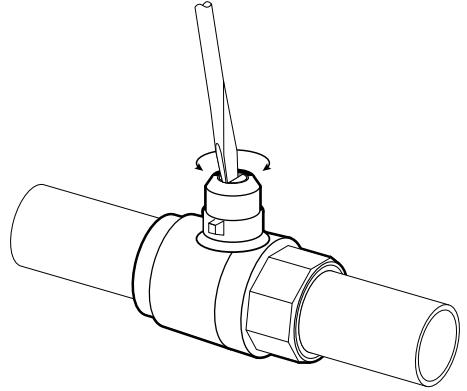
To install the valve and actuator follow these steps:

1. Remove the actuator from the valve by removing the locking pin where the actuator attaches to the valve stem (1) then pull the actuator straight off of the stem (2). Set the actuator and locking pin safely aside.



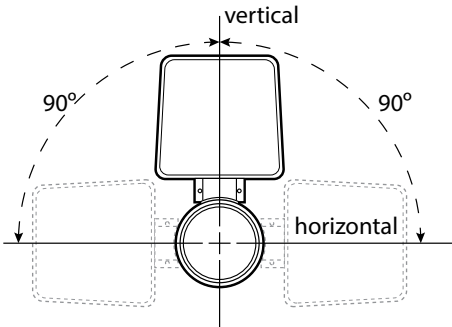
2. Install the valve in the line making sure that the optimizing trim disc is in the down-stream port and the final orientation of the valve leaves the stem at a horizontal or upwards position to avoid media leakage into the actuator in case of stem seal failure. Use ONLY the wrench flats to tighten valve onto pipes. NEVER apply torque to the actuator or valve stem.

3. Once the valve is installed, check that the ball still turns freely before replacing the actuator. Do so using a screwdriver as shown below. Be sure to return the stem to its original position from when the actuator was removed.



4. Replace the actuator by firmly pressing it straight onto the stem until it is fully seated. If the actuator does not easily mount, check the alignment of the stem slot and the actuator drive, and adjust by rotating the stem if needed. Replace the locking pin.

5. Connect power supply to the wires following the wiring diagram on the label of the unit. This should only be done by a qualified electrician with the proper permits, license and following all applicable laws, codes, and regulations. Wiring diagrams are also contained in this manual on page



## 6. OPERATION

### On/Off Actuators



The on/off models operate by rotating 90° when power of the appropriate voltage is applied to the green control signal wire (see wiring diagram on label). When power is removed from the control signal, the actuator rotates back 90° to the original position. This is the “normal” or “signal de-energized” position, and can be changed in the field by rotating the square stem insert in the actuator’s star shaped drive.

**Note:** The actuator WILL NOT return to this position in the case of total power failure. It will only do so in the case that the system controller fails to send power to the control signal wire. It is also a consideration that should be taken into account for power consumption, where the more frequent state of the valve should be the one that requires no control signal.

#### Changing the “Control Signal De-energized” or “Normal” Position:

To change the normal position of the valve, simply remove the actuator (see installation step 1) and rotate the drive insert 90°. Then rotate the ball 90° also, using a screwdriver (see installation step 3). Then re-attach the actuator and replace the locking pin.

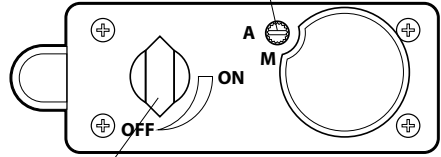
**Note:** The ball drilling orientation is parallel to the slot in the stem.

### Manual Operation of Valve:

There are two ways to operate the valve manually. One with the actuator attached, and one with it removed.

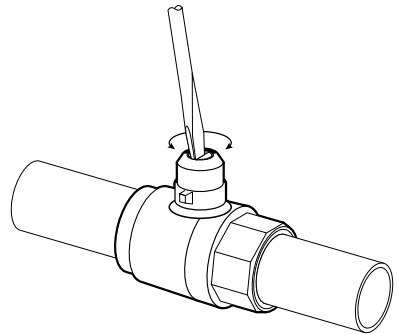
**When the actuator is still attached,** the valve can be manually operated by simply:

- 1) Depress with screwdriver and rotate from A (automatic) to M (manual)



- 2) Using a wrench, turn the position indicator to the desired position. The “ON” and “OFF” indicate the valve position is what it would be when the control signal is on or off.

**When the actuator has been removed,** the valve can be manually operated using a screwdriver as shown here.



**Note:** The ball drilling orientation is parallel to the slot in the stem.

## Modulating Actuators



The modulating models operate by rotating from 0 to 90° in direct relation to the voltage applied to the green control signal wire.

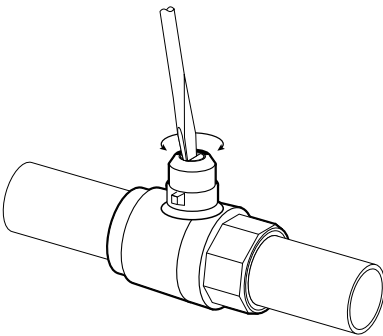
The control signal is either 0 to 10vDC or 4 to 20mA (see wiring diagram on label). The lower voltage is ALWAYS CLOSED, (0°) and the upper voltage is ALWAYS FULLY OPEN (90°).

### Flow Optimizing Trim Inserts:

Most modulating assemblies include a flow optimizer on the downstream side of the ball. This disc reduces total flow, but makes the flow rate evenly and directly proportional to the degree of rotation. These discs are installed at the factory and cannot be replaced. (See page 5 for Cv values and flow rates)

### Manual Operation of Valve:

**When the actuator has been removed,** the valve can be manually operated using a screwdriver as shown here.



**Note:** The ball drilling orientation is parallel to the slot in the stem.

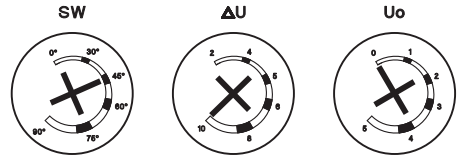
## Modulating Actuator Adjustment:

The modulating actuators include 3 trimmer dials that can be accessed by removing the cover plate on the top of the actuator.

These dials adjust the voltages required by the control signal and the point of rotation at which the auxiliary switch is closed. This allows users to customize the actuator for operation in specific applications where there are certain output voltages sent by other system components such as plc's and thermostats.

There are 3 dials:

0-10vDC models



**SW** = degree of rotation when the auxiliary switch makes contact (range: 0 - 90°)

**ΔU** = voltage span of the control signal  
Add **ΔU** to **Uo** to completely open the valve 90°.  
(range: 2 to 10v)

**Uo** = voltage of the control signal required to completely close the valve (0°).  
(range: 0 to 5v)

### Diagnostic LED's:

There are 2 LED's inside the actuator that can be observed through the viewing port that is also located under the cover plate on the top of the unit right beside the trimmer dials.

**GREEN** = Power supply ON

**RED** = Aux. Switch CLOSED

**RED BLINKING** = Failure/Malfunction

## 7. Cv VALUES

Size	Model Code	Ball rotation in degrees - Cv (gpm with 1 psi ΔP)								
		10°	20°	30°	40°	50°	60°	70°	80°	90°
1/2"	-0.6	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6
	-0.8	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8
	-1.2	0.1	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.2
	-2.3	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.3
	-3.5	0.4	0.8	1.2	1.5	1.9	2.3	2.7	3.1	3.5
	-5.8	0.6	1.3	1.9	2.6	3.2	3.9	4.5	5.1	5.8
	(none)	Full Port - Valve without an optimizing trim disc... No Data Available.								
3/4"	-5.4	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4
	-8.1	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1
	(none)	Full Port - Valve without an optimizing trim disc... No Data Available.								
1"	-8.1	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1
	-12.7	1.4	2.8	4.2	5.6	7.1	8.5	9.9	11.3	12.7
	-18.5	2.1	4.1	6.2	8.2	10.3	12.3	14.4	16.4	18.5
	(none)	Full Port - Valve without an optimizing trim disc... No Data Available.								
1 1/4"	-18.5	2.1	4.1	6.2	8.2	10.3	12.3	14.4	16.4	18.5
	(none)	Full Port - Valve without an optimizing trim disc... No Data Available.								
1 1/2"	-13.9	1.5	3.1	4.6	6.2	7.7	9.2	10.8	12.3	13.9
	-23.6	2.6	5.2	7.9	10.5	13.1	15.7	18.3	21.0	23.6
	-54.3	6.0	12.1	18.1	24.1	30.2	36.2	42.2	48.3	54.3
	(none)	Standard Port - Valve without an optimizing trim disc... No Data Available.								
2"	-40.5	4.5	9.0	13.5	18.0	22.5	27.0	31.5	36.0	40.5
	-54.3	6.0	12.1	18.1	24.1	30.2	36.2	42.2	48.3	54.3
	(none)	Standard Port - Valve without an optimizing trim disc... No Data Available.								

## HOW TO CALCULATE A Cv

$C_v$  = Flow Coefficient     $Q$  = Flow Rate     $\Delta P$  = Pressure Drop     $G$  = Specific Gravity of Media

$$C_v = Q \sqrt{\frac{G}{\Delta P}}$$

$$Q = C_v \sqrt{\frac{\Delta P}{G}}$$

$$\Delta P = G \left( \frac{Q}{C_v} \right)^2$$

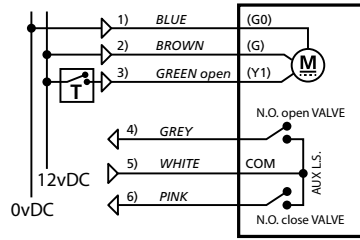
**TRY OUR ONLINE Cv CALCULATOR**  
[assuredautomation.com/smcv](http://assuredautomation.com/smcv)



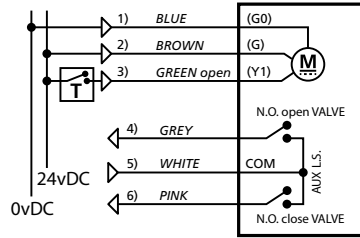
## 8. WIRING DIAGRAMS

### On/Off Actuators

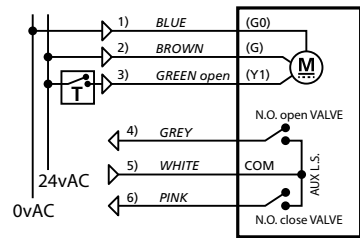
12vDC



24vDC



24vAC

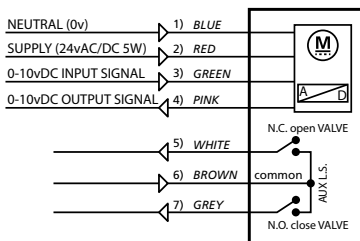


### Modulating Actuators

4-20mA



0-10vDC



## 9. TROUBLESHOOTING

In the event that the actuator does not work, check the following:

- Check the power line for correct voltage.
- Check that the wiring complies with the actuator wiring diagram.
- Check the torque required to operate the valve by operating it manually.
- For on/off units, check that the manual release knob is turned to "A" for automatic. (see manual override instructions)
- Verify that the control signal is supplying the proper voltage.

If all of these tests are passed, contact Assured Automation for further assistance.

## 10. MAINTENANCE

The electric actuator is maintenance free, the internal lubrication of the gearbox will last the life of the actuator. There are no user servicable parts inside.

To clean, use only cleansers with moderate degree of aggressiveness and that are non-flammable, avoid spraying with water or other liquid under pressure.

In the event of damage or malfunctions, please contact Assured Automation to return the actuator for testing, repair, or replacement.

OPENING THE ACTUATOR HOUSING WILL VOID ANY AND ALL WARRANTIES, AND ASSURED AUTOMATION ASSUMES NO LIABILITY FOR DAMAGES CAUSED BY DOING SO!

## 11. DISPOSAL

The actuator contains electrical and electronic components and is not allowed to be disposed of. It must be recycled.

All local and federal regulations and requirements must be observed.

## 12. DECLARATION OF CONFORMITY

IEC 60730-2-14

The product is then described with the essential requirements of the Directives:

### CE MACHINERY DIRECTIVE

89/336/EEC: 1998

### CE LOW VOLTAGE DIRECTIVE

2006/95/EC of 12 December 2006

### CE DIRECTIVE ON ELECTROMAGNETIC COMPATIBILITY

04/108CEE: 2004

92/31/EEC: 1992

93/68/EEC: 1993

93/97/EEC: 1993

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