

Bray Commercial Division 13788 West Road, Suite 200A Houston, Texas 77041

BCDSales@Bray.com Phone: 1-888-412-2729 www.braycommercialdivision.com © 2022 Bray International, Inc. 08/08/23

# STM Ball Valves - 2-Way & 3-Way, 2-1/2" - 4"

# **IOM Manual**



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## STM Ball Valves - Installation, Operation and Maintenance Manual

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| Technical Specifications - Va                  | alve                                   |   |  |  |  |  |  |  |  |  |
|--|--|---|--|--|--|--|--|--|--|--|
| Service  | Hot Water, Chille                      | ed Water, 50/50 Glycol Solutions,<br>2 kPa) Saturated Steam for HVAC Systems                                      |  |  |  |  |  |  |  |  |
| Size Range                                     | 2-Way & 3-Way                          | 2-1/2" through 4" (DN 65 to 100)  |  |  |  |  |  |  |  |  |
| Valve Fluid<br>Temperature Limits              | 0 to 284°F (-18 t                      | o 140°C)  |  |  |  |  |  |  |  |  |
| Valve Body Pressure/<br>Temperature Rating     | Water                                  | ANSI Class 150<br>250 PSI at -20° to 100°F (29° to 38°C)<br>235 PSI at: 200°F (93°C)<br>218 PSI at: 284°F (140°C) |  |  |  |  |  |  |  |  |
|  | Steam                                  | 25 PSIG (172 kPa) Saturated Steam for HVAC Systems  |  |  |  |  |  |  |  |  |
| Maximum Close-Off                              | 2-Way                                  | 100 PSI (689 kPa)   |  |  |  |  |  |  |  |  |
| Pressure                                       | 3-Way                                  | 50 PSI (345 kPa)  |  |  |  |  |  |  |  |  |
| Maximum Recommended<br>Operating Pressure Drop | 30 PSI (207 kPa)                       | ) for quiet service   |  |  |  |  |  |  |  |  |
|  | 2-Way                                  | Equal Percentage  |  |  |  |  |  |  |  |  |
| Flow Characteristics                           | 3-Way                                  | Equal Percentage Flow Characteristics of In-line Port or<br>Linear Percentage Flow Characteristics of Angle Port  |  |  |  |  |  |  |  |  |
| Rangeability                                   | Greater than 500                       | D:1   |  |  |  |  |  |  |  |  |
|  | 2-Way & 3-Way                          | 0.01% of Maximum Flow, Control Port, ANSI/FCI 70-2, Class 4   |  |  |  |  |  |  |  |  |
| Leakage  | 3-Way                                  | 1% of Maximum Flow, Bypass Port   |  |  |  |  |  |  |  |  |
| End Connections                                | ANSI Class 150 F                       | lange   |  |  |  |  |  |  |  |  |
| Minimum Ambient                                | -4°F (-20°C)                           | D24-210/DC24-310 Series Non-Spring Return Actuators   |  |  |  |  |  |  |  |  |
| Operating Temperature                          | -40°F (-40°C)                          | DS-180 Series Spring Return Actuators   |  |  |  |  |  |  |  |  |
| Maximum Ambient                                | 122°F (50°C)                           | D24-210/DC24-310 Series Non-Spring Return Actuators   |  |  |  |  |  |  |  |  |
| Operating Temperature                          | 131°F (55°C)                           | DS-180 Series Spring Return Actuators   |  |  |  |  |  |  |  |  |
|  | Body                                   | Brass   |  |  |  |  |  |  |  |  |
|  | Flanges                                | Ductile Iron  |  |  |  |  |  |  |  |  |
|  | Ball & Stem                            | 300 Series Stainless Steel  |  |  |  |  |  |  |  |  |
| Materials                                      | Seats                                  | Graphite Reinforced PTFE with EPDM O-Ring Backing   |  |  |  |  |  |  |  |  |
|  | Stem Seals                             | EPDM O-Rings  |  |  |  |  |  |  |  |  |
|  | Flow Control<br>Disk                   | Amodel AS-1145HS Polyphthalamide Resin  |  |  |  |  |  |  |  |  |
| Warranty                                       | 5 Years limited from time of shipment. |   |  |  |  |  |  |  |  |  |

**Disclaimer** - The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Bray office. Bray, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



### Safety Instructions - Definition of Terms Read, Follow and Save these instructions



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

#### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

#### NOTICE

Used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

#### **Qualified Personnel**

A qualified person in terms of this document is one who is familiar with the installation, commissioning and operation of the device and who has appropriate qualifications, such as:

• Is trained in the operation and maintenance of electric equipment and systems in accordance with established safety practices.

• Is trained or authorized to energize, de-energize, ground, tag and lock electrical circuits and equipment in accordance with established safety practices.

• Is trained in the proper use and care of personal protective equipment (PPE) in accordance with established safety practices.

• Is trained in first aid.

• In cases where the device is installed in a potentially explosive (hazardous) location – is trained in the operation, commissioning, operation and maintenance of equipment in hazardous locations.

#### **Product Description**

The STM Series Flanged Ball Valves are designed to regulate hot and chilled water, 50/50 glycol solutions, and 25 psig steam in Heating, Ventilating, and Air Conditioning (HVAC) systems.

**IMPORTANT:** The STM Series Flanged Ball Valves are intended to control saturated steam, hot water, and chilled water flow under normal equipment operating conditions. Where failure or malfunction of the valve could lead to personal injury or pro perty damage to the controlled equipment or other property, additional precautions must be designed into the system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the valve.

#### Installation

Install the STM Series Flanged Ball Valves with the actuator at or above the centerline of the horizontal piping, as shown in Figure 1.



Figure 1: Recommended Mounting Positions for Non-Steam Applications



**IMPORTANT:** In steam applications, install the valve with the stem horizontal to the piping. Failure to follow these guidelines may shorten the life of the actuator.

#### **Installation Continued**

To minimize heat transfer in steam applications, wrap the valve and piping with insulation. Allow at least 4 in. (102 mm) of clearance from the top of the shaft to remove the actuator (as noted in dimensions).

When mounting the actuator in the field and before installing the actuator, use an adjustable wrench to man- ually rotate the valve stem several times. This rotation breaks the torque that may have built up during long- term storage.

**IMPORTANT:** Do not attempt to manually rotate the drive shaft while the actuator is installed without first releasing the actuator gears. Manually rotating the drive shaft without releasing the actuator gears may result in permanent damage to the actuator.

**IMPORTANT:** Take care to prevent foreign material such as weld slag, thread burrs, metal chips, and scale from entering the piping system. This debris can damage or severely impede the operation of the valve by embedding itself in the seats, scoring the valve, and ultimately resulting in seat leakage. If the debris becomes embedded in the seats, subsequent flushing and filtering of the piping system with the valve installed does not remedy the problem.

#### Mounting

#### **Location Considerations**

**IMPORTANT**: Protect the actuator from dripping water, condensation, and other moisture. Water or moisture could result in an electrical short, which may damage or affect the operation of the actuator.

**IMPORTANT:** Do not cover the actuator with thermal insulating material. High ambient temperatures may damage the actuator, and a hot water pipe, a steam pipe, or other heat source may overheat it during long- term storage.

#### Piping

Be sure to wire the input lines to the electric actuator correctly for the valve to move in the proper direction. See piping diagrams below for typical two and three-way piping configurations.

Note: Mount the valve downstream from the coil to minimize heat transfer to the actuator.

**IMPORTANT:** Use copper conductors only. Make all wiring connections in accordance with local, national, and regional regulations. Do not exceed the actuator's electrical ratings.

#### **Piping Diagrams**





#### **Setup and Adjustments**

Port A has the flow characterizing disk. Connect Port A to the outlet from the coil. On three-way models, use Port B as the bypass port.

Two-way STM Series Ball Valves are fully open when the electric actuator is fully Counterclockwise (CCW) and fully closed when the electric actuator is fully Clockwise (CW).

For three-way valves, the Coil Port A and Common Port AB are fully open when the electric actuator is fully CCW, as shown in Figure 1. The Bypass Port B and Common Port AB are fully open when the actuator is fully CW, as shown in Figure 2. For non-spring return and spring-to-open proportional control models in the Direct Acting (DA) mode, a minimum control signal drives the electric actuator to the fully CCW position while a maximum control signal drives the electric actuator in the fully CW position.

For spring-to-close proportional control models in the DA mode, a minimum control signal drives the electric actuator to the fully CW position, while a maximum control signal drives the electric actuator to the fully CCW position.



## **Port Configurations**



Figure 1: STM Series Three-Way Ball Valve (Coil Port A Open to Common Port AB)

#### Troubleshooting

**Servicing the Actuator or Piping System** When servicing the electric actuator or the piping system:

- Disconnect the power supply to the actuator.

- Relieve the pressure in the piping system

**Warning**: Risk of Electric Shock. Disconnect each of multiple power supplies before making electrical connections. More than one disconnect may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

**Caution**: Risk of Property Damage. Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

Figure 2: STM Series Three-Way Ball Valve (Bypass Port B Open to Common Port AB)





| STM - 2-Way Dimensions — 2-1/2" - 4" |      |     |                     |       |                                   |       |                   |      |      |      |        |       |       |       |       |      |      |        |    |    |  |
|--------------------------------------|------|-----|---------------------|-------|-----------------------------------|-------|-------------------|------|------|------|--------|-------|-------|-------|-------|------|------|--------|----|----|--|
| Valve<br>Model<br>Number             | Size |     | Flow<br>Coefficient |       | Please Reference the Illustration |       |                   |      |      |      |        |       |       |       |       |      |      |        |    |    |  |
|                                      |      |     |                     |       | Bolt Hole                         |       | Number<br>of Bolt | А    |      | В    |        | с     |       | D     |       | E    |      | Weight |    |    |  |
|                                      | in.  | mm  | Cv                  | Kv    | Diam                              | neter | Holes             | in.  | mm   | in.  | mm     | in.   | mm    | in.   | mm    | in.  | mm   | lbs    | kg |    |  |
| STM 250-2-47                         |      |     |                     | 47    | 47                                | 40.7  |                   |      |      |      |        |       |       |       |       |      |      |        |    |    |  |
| STM 250-2-74                         | 2.5  | 65  | 74                  | 64.0  | 5.50                              | 139   | 4                 | 3.50 | 89   | 5.71 | 145    | 11.42 | 290   | 10.25 | 260   | 2.05 | 52   | 34     | 15 |    |  |
| STM 250-2-117                        |      |     | 117                 | 101.2 |                                   |       |                   |      |      |      |        |       |       |       |       |      |      |        |    |    |  |
| STM 3-2-74                           |      |     | 74                  | 64.0  |                                   |       |                   |      |      |      |        |       |       |       |       |      |      |        |    |    |  |
| STM 3-2-117                          | 7.0  | 00  | 117 10              | 101.2 | 6.00                              | 152   | 4                 | 3.75 | 95   | 6.10 | .0 155 | 12.20 | 310   | 10.25 | 260   | 2.40 | 63   | 36     | 16 |    |  |
| STM 3-2-176                          | 5.0  | 00  | 176                 | 152.2 | 6.00                              |       |                   |      |      |      |        |       |       |       |       | 2.49 |      |        |    |    |  |
| STM 3-2-211*                         |      |     | 211                 | 182.5 |                                   |       |                   |      |      |      |        |       |       |       |       |      |      |        |    |    |  |
| STM 4-2-117                          | 10   | 100 | 117                 | 101.2 | 7 50                              | 101   |                   | 4 50 | 111  | 6 90 | 175    | 17 77 | 750   | 10.05 | 200   | 7 00 | 70   |        | 20 |    |  |
| STM 4-2-176*                         | 4.0  | 4.0 | 100                 | 176   | 76 152.2                          | 7.50  | 191               | 0    | 4.50 | 114  | 0.69   | 1/5   | 13.// | 350   | 10.25 | 260  | 3.09 | 76     | 44 | 20 |  |

- Allow a minimum of 4 inches for actuator removal.

- Weights are for valve bodies only.

- Dimensions may vary depending on the actuator

- Dimensions Shown are based on largest actuator available for this series. \* Reduced Port Valve - No characterizing disc.





| STM - 3-Way Dimensions — 2-1/2" - 4" |      |     |                     |             |                                   |      |                   |      |      |      |       |       |       |         |         |      |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |     |    |  |
|--------------------------------------|------|-----|---------------------|-------------|-----------------------------------|------|-------------------|------|------|------|-------|-------|-------|---------|---------|------|------|------|------|------|------|-------|-------|-------|-------|------|------|------|------|------|------|-----|----|--|
| Valve<br>Model<br>Number             | Size |     | Flow<br>Coefficient |             | Please Reference the Illustration |      |                   |      |      |      |       |       |       |         |         |      |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |     |    |  |
|                                      |      |     |                     |             | Bolt Hole                         |      | Number<br>of Bolt | А    |      | В    |       | с     |       | D       |         | Е    |      | F    |      | G    |      | Wei   | ight  |       |       |      |      |      |      |      |      |     |    |  |
|                                      | in.  | mm  | Cv                  | Kv          | Diameter                          |      | Holes             | in.  | mm   | in.  | mm    | in.   | mm    | in.     | mm      | in.  | mm   | in.  | mm   | in.  | mm   | lbs   | kg    |       |       |      |      |      |      |      |      |     |    |  |
| STM 250-3-47                         |      |     |                     |             | 47                                | 40.7 |                   |      |      |      |       |       |       |         |         |      |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |     |    |  |
| STM 250-3-74                         | 2.5  | 65  | 74                  | 64.0        | 5.50 13                           | 139  | 4                 | 3.50 | 89   | 5.71 | 145   | 11.42 | 290   | 0 10.25 | 260     | 2.05 | 52   | 0.75 | 19.1 | 5.87 | 149  | 43    | 20    |       |       |      |      |      |      |      |      |     |    |  |
| STM 250-3-117                        |      |     | 117                 | 101.2       |                                   |      |                   |      |      |      |       |       |       |         |         |      |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |     |    |  |
| STM 3-3-74                           |      |     | 74                  | 64.0        |                                   |      |                   |      |      |      |       |       |       |         |         |      |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |     |    |  |
| STM 3-3-117                          | 3.0  | 3.0 | 3.0                 | 3.0         | 3.0                               | 3.0  | 3.0               | 3.0  | 3.0  | 3.0  | 3.0   | 7.0   |       | 117     | 7 101.2 | c 00 | 150  | 4    | 7 75 | 0.5  | C 10 | 155   | 10.00 | 710   | 10.05 | 200  | 0.40 | 67   | 0.75 | 10.1 | 6.00 | 150 | 10 |  |
| STM 3-3-176                          |      |     |                     |             |                                   |      |                   |      |      |      |       | 80    | 176   | 152.2   | 6.00    | 152  | 4    | 3.75 | 95   | 6.10 | 122  | 12.20 | 310   | 10.25 | 260   | 2.49 | 63   | 0.75 | 19.1 | 0.20 | 123  | 49  | 22 |  |
| STM 3-3-211*                         |      |     | 211                 | 182.5       |                                   |      |                   |      |      |      |       |       |       |         |         |      |      |      |      |      |      |       |       |       |       |      |      |      |      |      |      |     |    |  |
| STM 4-3-117                          | 10   | 100 | 117 101.2           | 7 50        | 101                               | 0    | 4 50              | 114  | 6 90 | 175  | 17 77 | 750   | 10.05 |         | 7 00    | 70   | 0 75 | 10.1 | 7.05 | 170  | 60   | 20    |       |       |       |      |      |      |      |      |      |     |    |  |
| STM 4-3-176*                         | 4.0  |     | 176                 | 76 152.2 7. | 7.50                              | 191  | 8                 | 4.50 | 114  | 0.89 | 1/5   | 13.// | 350   | 10.25   | 260     | 3.09 | 70   | 0.75 | 19.1 | 7.05 | 1/9  | 62    | 28    |       |       |      |      |      |      |      |      |     |    |  |

- Allow a minimum of 4 inches for actuator removal.

- Weights are for valve bodies only.

Dimensions may vary depending on the actuator
Dimensions Shown are based on largest actuator available for this series.
Reduced Port Valve - No characterizing disc.