

Stream-Select, Switching, and Shutoff Valve Assemblies



TT2 and T2 Series

- Provide multiple valve operations in a single, compact unit
- Require fewer tubing connections than conventional systems
- Save cabinet space and installation time
- Include 316 stainless steel valve and actuator

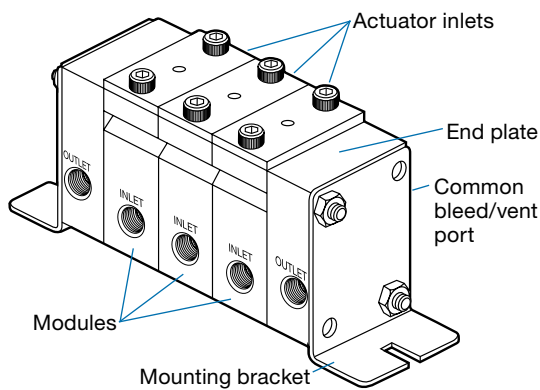
Features

All Models

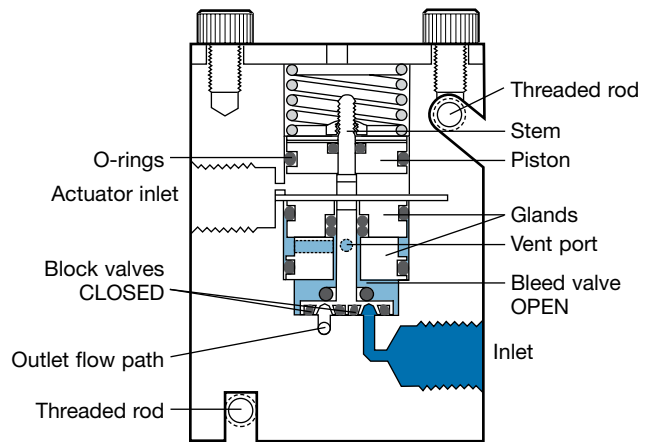
- Compact design reduces space requirements.
- Low internal volume enhances purging and cleaning and carries a smaller sample.
- Built-in pneumatic actuators provide positive, repetitive shutoff with fewer potential leak points than conventional systems.
- Stainless steel construction provides enhanced corrosion resistance.
- 1/16, 1/8, and 1/4 in. and 3 mm Swagelok tube fitting and 1/8 in. female NPT end connections facilitate system versatility.

TT2B Models

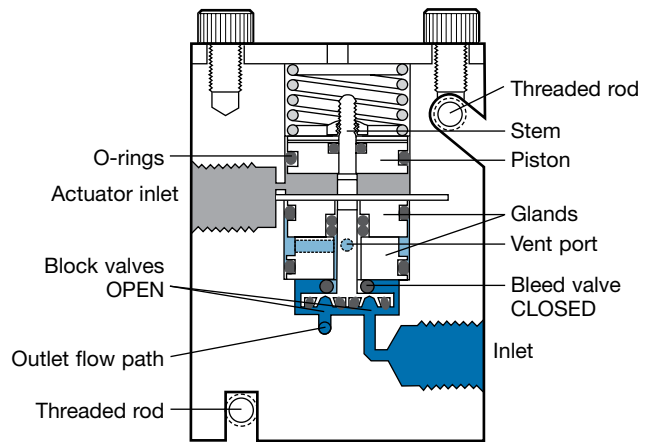
- Modules assemble to provide shutoff or stream selection in process analyzer sampling systems.
- Common vent ports enable detection and control of fugitive emissions and prevent mixing of system media with actuation media.



TT2B1 Normally Closed Module in CLOSED Position



TT2B1 Normally Closed Module in OPEN Position



Technical Data

| Orifice in. (mm) | Temperature Rating °F (°C) | Pressure Rating psig (bar) | Actuator Mode | Actuator Pressure, psig (bar) | |
|--|---|----------------------------------|------------------------------------|-------------------------------|------------|
| | | | | Minimum | Maximum |
| End plates: 0.052 (1.32) Modules: 0.070 (1.8) | 0 to 300 (-17 to 148): fluorocarbon FKM O-rings | 100 (6.8) | Normally closed | 50 (3.5) | 150 (10.3) |
| Body (T2A1 and T2C1 with 1/8 in. female NPT connections and all T2D1 models): 0.110 (2.8) | 0 to 200 (-17 to 93): ethylene propylene O-rings | 200 (13.7) | High-pressure normally closed | 80 (5.6) | |
| | 20 to 300 (-6 to 148): Kalrez® O-rings | 300 (20.6) | Normally open and double acting | | |

Testing

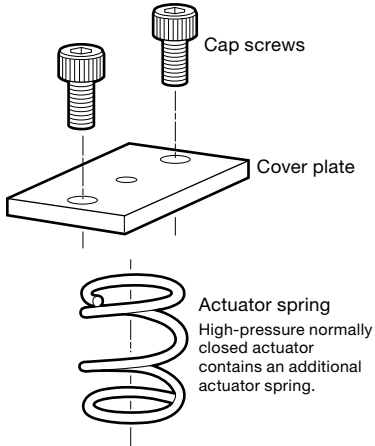
Every TT2 and T2 series valve is factory tested at room temperature with nitrogen at its maximum rated pressure. Block and bleed valve seals have a maximum allowable leak rate of 0.1 std cm³/min. Shell testing is performed on piston, cap, and module seals to a requirement of no detectable leakage with a liquid leak detector.

Cleaning and Packaging

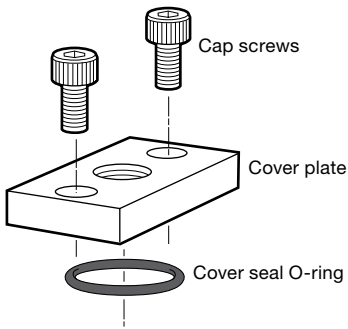
All TT2 and T2 series valves are cleaned and packaged in accordance with Swagelok *Standard Cleaning and Packaging* (SC-10), [MS-06-62](#).

Materials of Construction

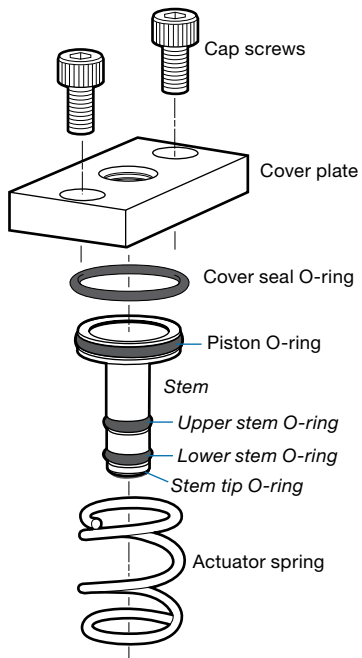
Normally Closed and High-Pressure Normally Closed Actuator



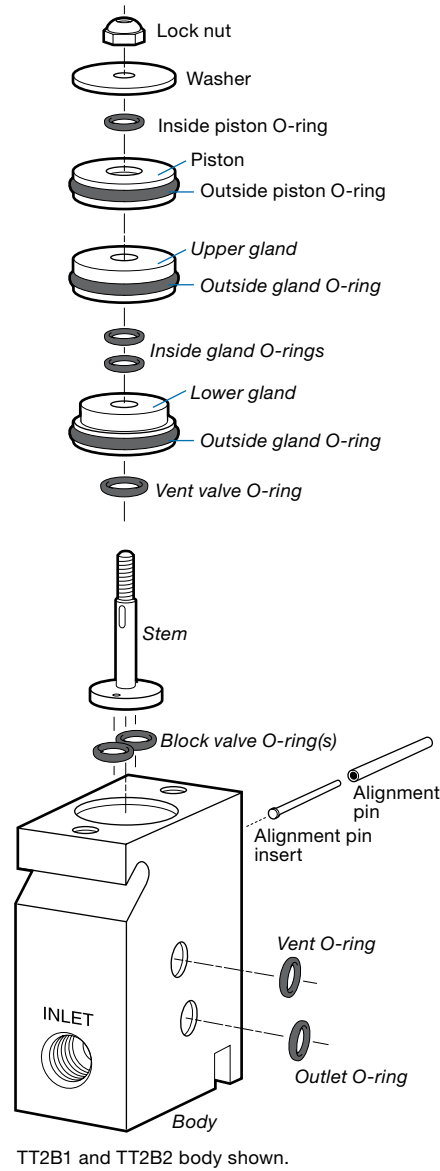
Double-Acting Actuator



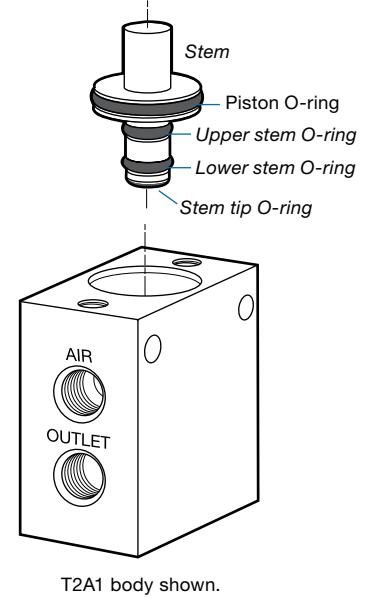
Normally Open Actuator and Stem (T2A1, T2C1, and T2D1 Only)



TT2B Module Subassembly



T2A1, T2C1, and T2D1 Normally Closed and Double-Acting Module Subassembly



| Component | Model | Material |
|---|-------|--|
| Cap screws | All | 18-8 SS |
| Cover plate | All | 304 SS |
| Actuator spring(s) | All | 302 SS/ ASTM A313 |
| Lock nut | TT2B | Nylon |
| Washer | | 316 SS |
| Piston | All | 416 SS |
| Actuation media O-rings (nonwetted) | All | Fluorocarbon FKM |
| Body, glands, stem | All | 316 SS |
| System media O-rings (wetted) | All | <i>Fluorocarbon FKM, Kalrez, or ethylene propylene</i> |
| Alignment pin | TT2B | 18-8 SS |
| Alignment pin insert | | 416 SS |
| End plate (not shown) | | 316 SS |
| Mounting bracket (not shown), threaded rods (2) (not shown) | | 304 SS |
| Nuts (4) (not shown) | | 316 SS |
| Lubricant | All | <i>Silicone-based</i> |

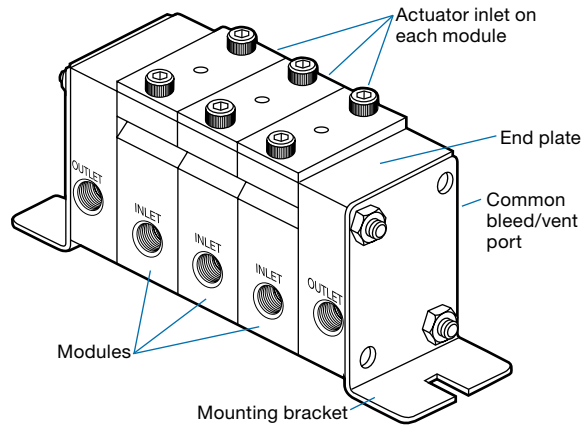
Wetted components listed in *italics*.

TT2B Models

The TT2B models are compact assemblies of stream-select modules with built-in pneumatic actuators that can introduce any one of a number of samples to a process analyzer.

An assembly consists of two end plates, two mounting brackets, and one or more modules. The number of modules is determined by the number of incoming streams. Modules can be added or removed easily as the number of incoming streams changes.

System media connections are available in 1/8-in. and 3-mm female Swagelok tube fittings and 1/8-in. female NPT fittings.

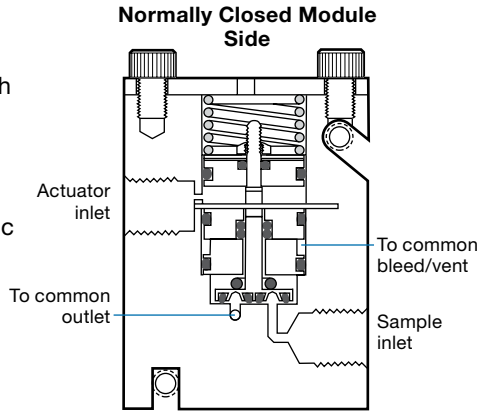


TT2B1

■ Double block and bleed stream-select assembly with common bleed/vent port

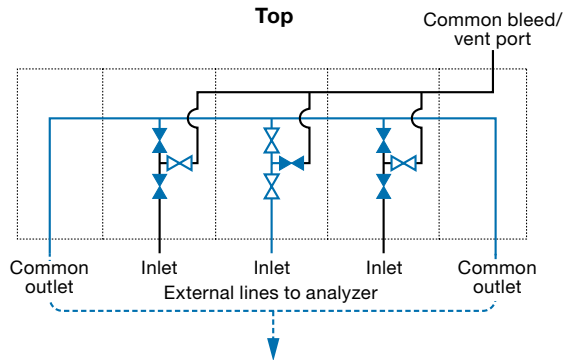
Each module contains:

- Two block valves
- One bleed valve Pneumatic actuator.



Three-Module Assemblies, Center Module Actuated

▶ Closed
◀ Open

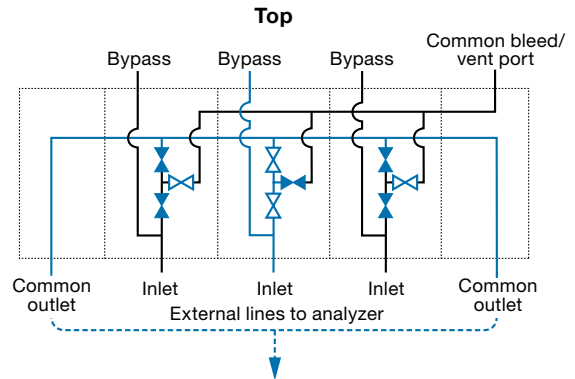
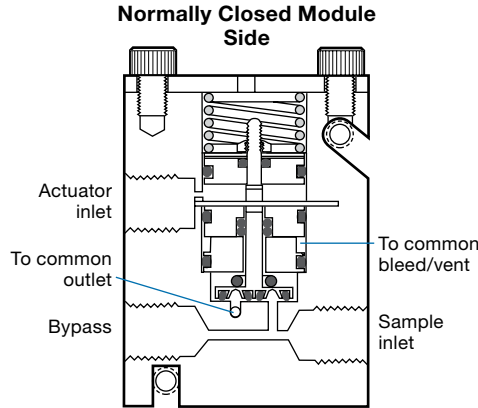


TT2B2

■ Double block and bleed stream-select assembly with integral bypass and common bleed/vent port

Each module contains:

- Two block valves
- One bleed valve
- Bypass port
- Pneumatic actuator.

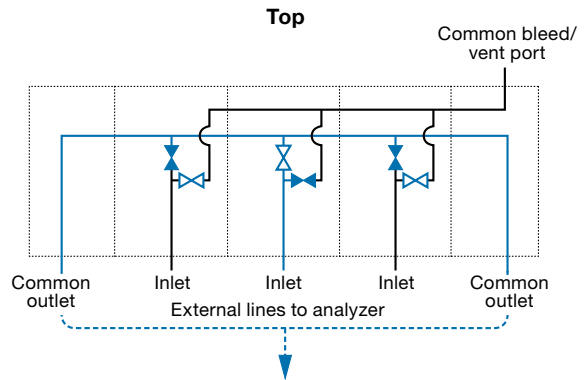
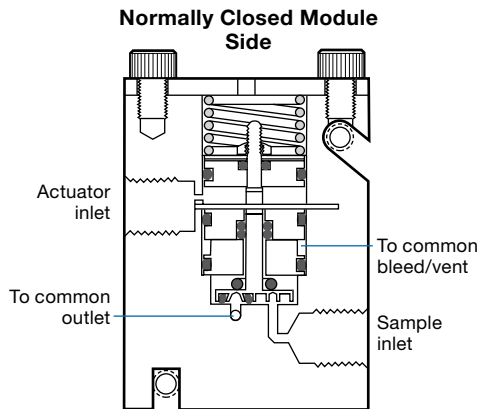


TT2B3

■ Modular three-way switching stream-select assembly with common bleed/vent port.

Each module contains:

- One block valve
- One bleed valve
- Pneumatic actuator.

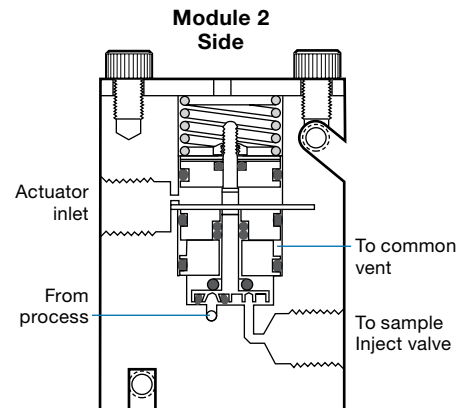
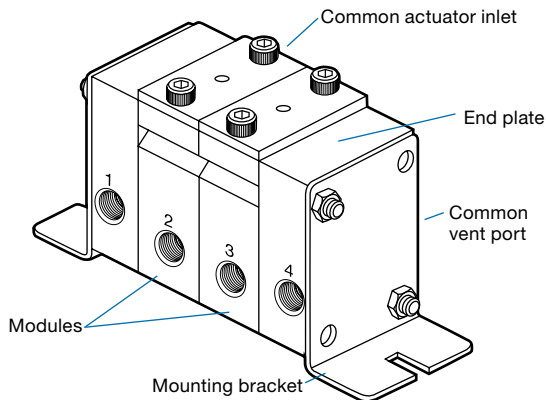


TT2B4

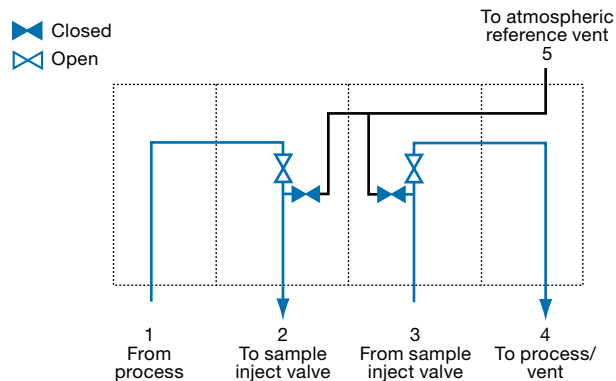
■ Two-module assembly with common actuator port and common vent port

Each module contains:

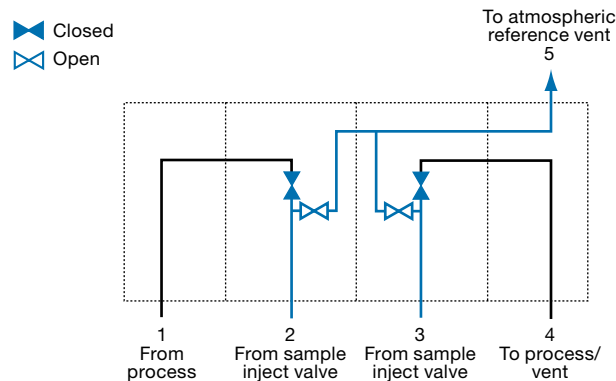
- One block valve
- One bleed valve.



Sample Loop Purge Mode—Actuated Position



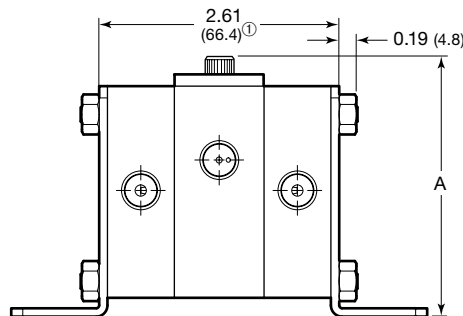
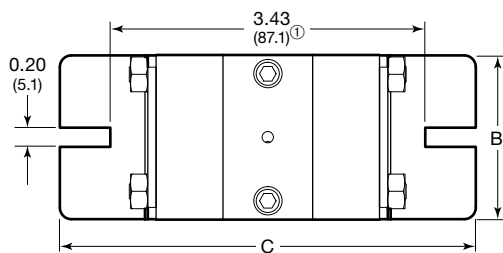
Atmospheric Reference Vent Mode—Normal Position



TT2B Dimensions

Dimensions, in inches (millimeters), are for reference only and are subject to change.

Actuator inlet port: all models, 1/8 in. female NPT.



| Model | Description | Basic Ordering Number | Dimensions, in. (mm) | | |
|-------|--|-----------------------|----------------------|-------------|-------------------------|
| | | | A | B | C |
| TT2B1 | Modular double block and bleed stream-select assembly | SS-TT2B1 | 2.76 (70.1) | 1.75 (44.4) | 4.53 (115) ^① |
| TT2B2 | Modular double block and bleed stream-select assembly with bypass port | SS-TT2B2 | | | |
| TT2B3 | Modular 3-way switching stream-select assembly | SS-TT2B3 | | | |
| TT2B4 | Two-module sample loop purge and atmospheric reference vent assembly | SS-TT2B4 | | | 5.51 (140) |

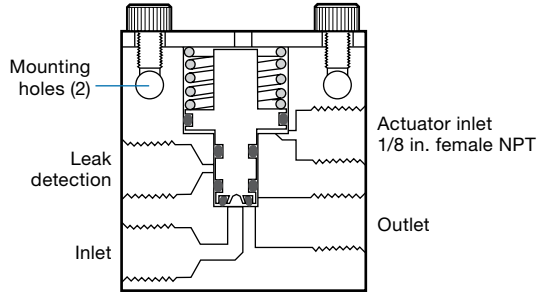
^① Dimensions for 1-module assembly; for each additional module, add 0.98 in. (24.9 mm).

T2A1 Model

- Positive, repetitive shutoff for gas or liquid service
- Inlet, outlet, and vent/leak detection available in 1/16 and 1/8 in. and 3 mm female Swagelok tube fittings and 1/8 in. female NPT end connections

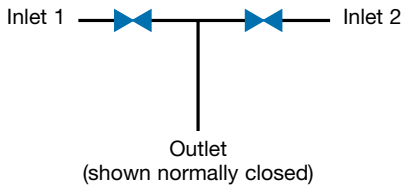


Normally Closed

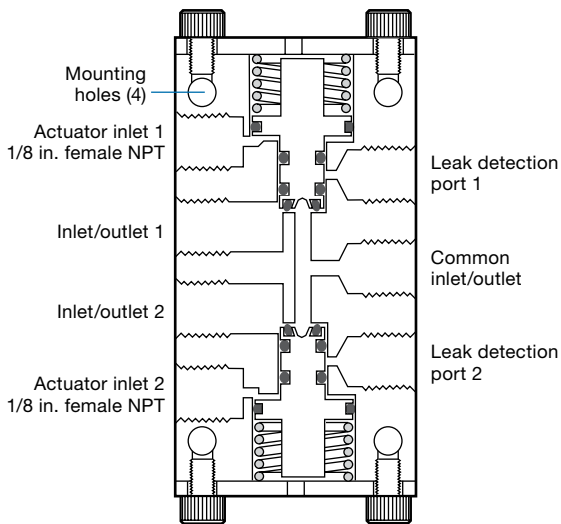


T2C1 Model

- Two independently actuated shutoff valves are in one body with functions of a 3-way (switching) valve.
- Bidirectional flow is possible.
- All three ports can be open or closed at the same time.
- System media connections are available in 1/16 and 1/8 in. and 3 mm female Swagelok tube fittings and 1/8 in. female NPT end connections.



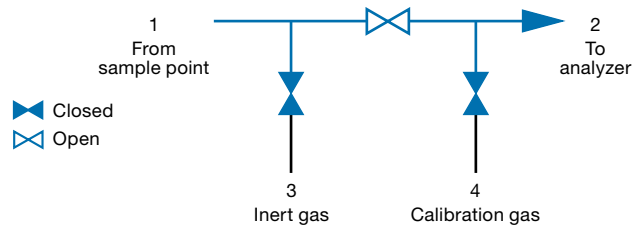
Normally Closed



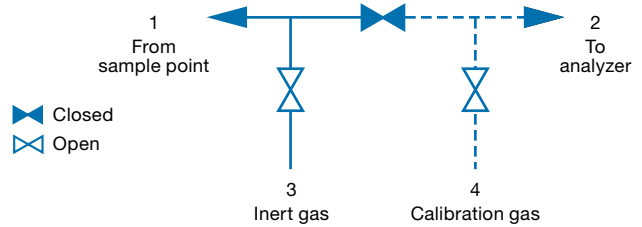
T2D1 Model

- Three-shutoff-valve assembly is designed for use in continuous emissions monitoring systems (CEMS).
- Design allows reversing flow to clear a sample probe while simultaneously allowing calibration of an analyzer.
- Two end valves are normally closed; center valve is normally open. In this position, system media begins at port-1, flows through the normally open center valve, and flows out the other side through port 2.
- When valves are actuated, center valve closes and two end valves open. This position allows an analyzer to receive a calibration gas from port 4, while an inert gas from port-3 clears the sample probe.
- System media connections are available in 1/4-in. female Swagelok tube fittings.

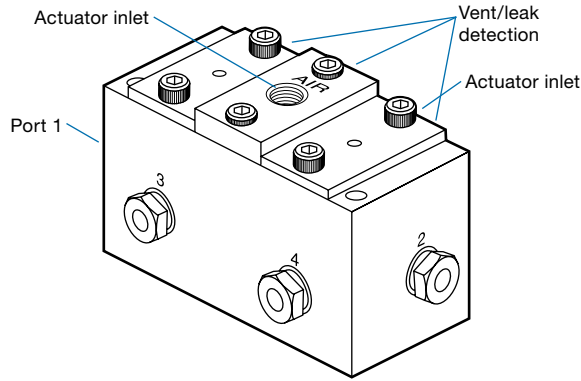
Normal Position



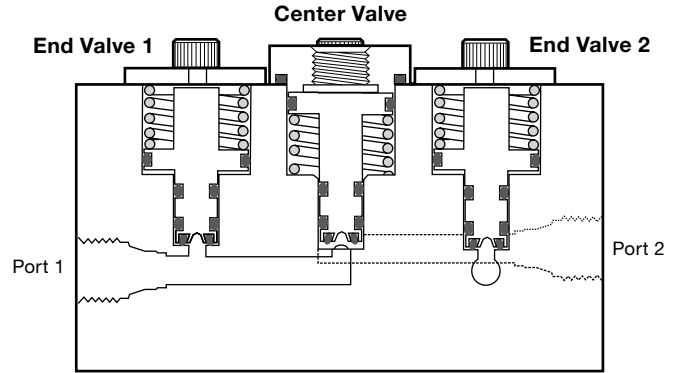
Actuated Position



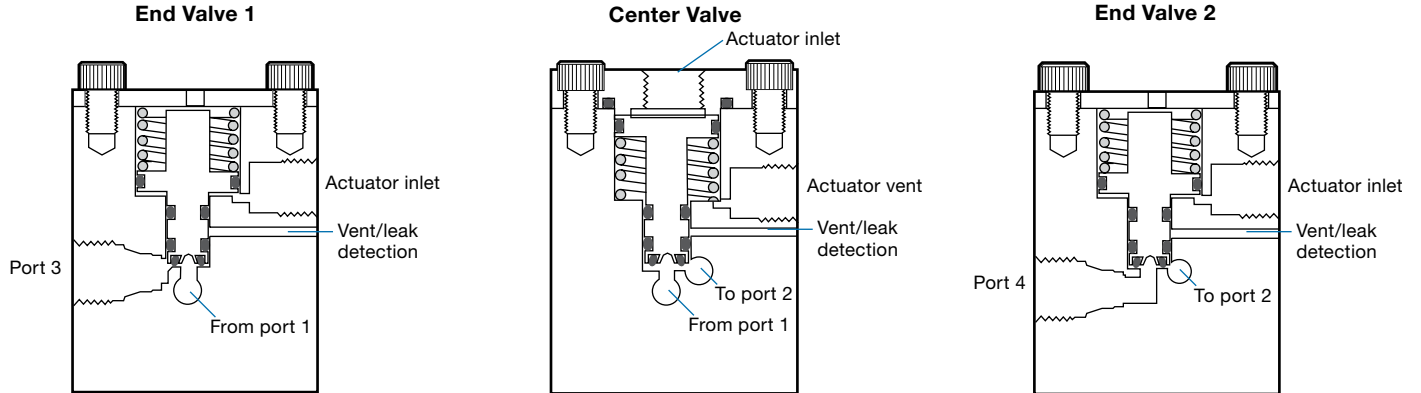
T2D1



Side



Front

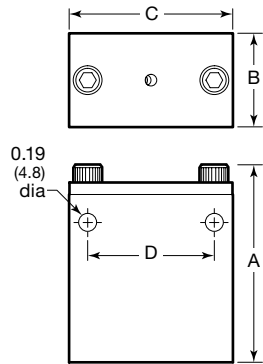


T2A1, T2C1, and T2D1 Dimensions

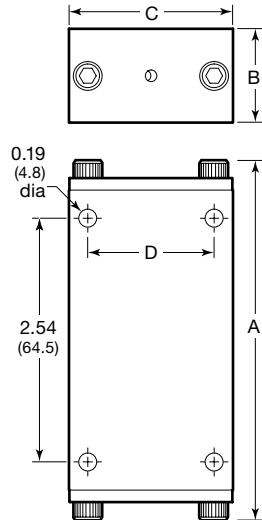
Dimensions, in inches (millimeters), are for reference only and are subject to change.

Actuator inlet port: all models, 1/8 in. female NPT.

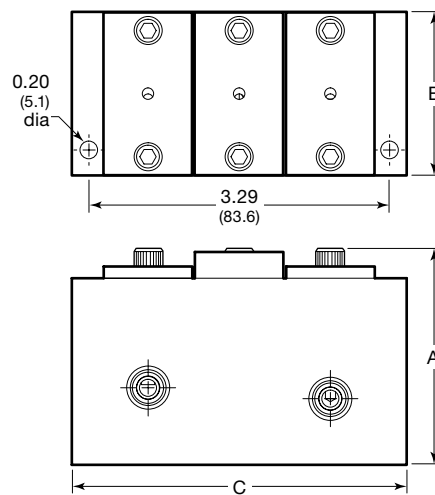
T2A1



T2C1



T2D1



| Model | Description | Basic Ordering Number | Dimensions, in. (mm) | | | |
|-------|---|-----------------------|----------------------|-------------|-------------|-------------|
| | | | A | B | C | D |
| T2A1 | 2-way shutoff valve, one-piece body | SS-T2A1 | 2.06 (52.3) | 0.98 (24.9) | 1.75 (44.4) | 1.35 (34.3) |
| T2C1 | Two shutoff valves with common outlet, 3-way switching valve, one-piece body | SS-T2C1 | 3.75 (95.2) | | | |
| T2D1 | Three shutoff valves in one-piece body for continuous emissions monitoring (CEMS) | SS-T2D1 | 2.31 (58.7) | 1.75 (44.4) | 3.67 (93.2) | — |

Ordering Information

To create a TT2 or T2 series valve assembly ordering number:

1. Select a basic ordering number from **Dimensions**.

Example: SS-TT2B1

2. Add a system media (wetted) O-ring material designator.

Example: SS-TT2B1**V**

| Material | Designator |
|--------------------|------------|
| Fluorocarbon FKM | V |
| Kalrez | K |
| Ethylene propylene | E |

- 3a. For T2A1, T2C1, or T2D1 models, skip to step 4.

- 3b. For TT2B1, TT2B2, or TT2B3 models, add the desired number of valve modules.

Example: SS-TT2B1**V3**

- 3c. For TT2B4 models, add **2** to the ordering number.

Example: SS-TT2B4**V2**

4. Add an end connection designator.

| End Connection | Designator | Availability |
|---------------------------------------|------------|--|
| 1/8 in. female NPT | F2 | TT2B1, TT2B2, TT2B3, TT2B4, T2A1, T2C1 |
| 1/16 in. female Swagelok tube fitting | FS1 | T2A1, T2C1 |
| 1/8 in. female Swagelok tube fitting | FS2 | TT2B1, TT2B2, TT2B3, TT2B4, T2A1, T2C1 |
| 3 mm female Swagelok tube fitting | FS3MM | |
| 1/4 in. female Swagelok tube fitting | FS4 | T2D1 |

Example: SS-TT2B1**V3F2**

5. Add an actuator designator(s).

| Actuator | Designator | Availability |
|--|------------|------------------|
| Normally closed | -C | All models |
| Normally open | -O | T2A1, T2C1, T2D1 |
| Double acting | -D | All models |
| High-pressure normally closed | -H | |
| Normally closed, normally open, normally closed ^① | -COC | T2D1 |

^① Standard for T2D1 models.

Valves with the **same actuator** require one designator.

Example: SS-TT2B1V3F2-**C** for all three actuators in the assembly to be normally closed.

Valves with **different actuators** require individual designators.

Example: SS-TT2B1V3F2-**CDH** for the first actuator to be normally closed, the second to be double acting, and the third to be high-pressure normally closed.

Valves with **repetitive-pattern actuators** can be designated by listing the designators for that pattern only once.

Example: SS-TT2B1V8F2-**CD** for the first actuator to be normally closed, the second to be double acting, the third to be normally closed, the fourth to be double acting, and so forth through the eight-valve assembly.

Accessories

Maintenance Kits

TT2 and T2 Module Rebuild Kits

Kits include all internal components, plus bleed and outlet O-rings (TT2B1, TT2B2, TT2B3 models) or vent and actuator O-rings (TT2B4 model).

1. Start with the basic kit ordering number SS-91K-T.

2. Add a model designator.

Example: SS-91K-**TT2B1**

3. Add an O-ring^① designator.

Example: SS-91K-**TT2B1V**

4. Add an actuator designator.

Example: SS-91K-**TT2B1V-C**

| Model | Designator |
|---------------------|------------------|
| TT2B1, TT2B2 | T2B1 |
| TT2B3 | T2B3 |
| TT2B4 | T2B4 |
| T2A1, T2C1, T2D1 | 2A1 ^② |

^① When ordering a kit with Kalrez O-rings to rebuild a T2B module, add -006 after the actuator designator.

Example: SS-91K-**TT2B1K-C-006**

^② Kit rebuilds one valve.

TT2 Module Kits

Kits include complete, tested modules ready for insertion into an existing T2B or TT2B assembly.

1. Start with basic kit ordering number SS-1K-T.

2. Add a model designator.

Example: SS-1K-**TT2B1**

3. Add an O-ring designator.

Example: SS-1K-**TT2B1V**

4. Add an end connection designator:

Example: SS-1K-**TT2B1VF2**

5. Add an actuator designator.

Example: SS-1K-**TT2B1VF2-C**

Safe Product Selection

When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

WARNING

Do not mix/interchange Swagelok products or components not governed by industrial design standards, including Swagelok tube fitting end connections, with those of other manufacturers.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.