



# T-Series Models TVF, TVH & TVL Quick Start Guide

**STOP** This document contains only basic setup and calibration information. For more detailed information, please refer to our website at: [www.topworx.com](http://www.topworx.com)

## Installation Notes

Valvetop™ products can be used on both linear and rotary valve automation applications. Always use sound mechanical practices when mounting. When fastening the Valvetop switch box to the bracket on the actuator, torque the fasteners to 224 in·oz (1.58 N·m) after cycling the valve a couple of times. This allows the shaft to self-center in the pinion slot, or coupler. Be cautious not to allow undue axial (thrust) load on the shaft.

**!** This product comes shipped with plastic plugs in the conduit entries and valve ports (if so equipped) in an effort to protect the internal components from debris during shipment and handling. It is the responsibility of the receiving and/or installing personnel to provide appropriate permanent sealing devices to prevent the intrusion of debris, or moisture, when stored outdoors or when installed.

**!** It is the responsibility of the installer, or end user, to install this product in accordance with the National Electrical Code (NFPA 70 or any other national or regional code defining proper practices.

## Factory Preset

All Valvetop products are factory set for 90° rotation on normal acting actuators. The switch at full clockwise is for process valve closed and uses the red striker. When changing orientation the target disk will have to be relocated for your application. The Target is designed to be adjusted on 90° increments allowing the Valvetop unit to be rotated 90°, 180°, or 270° from standard. On reverse acting units the switch function will be transposed. Clockwise for open will become clockwise for closed. On units with indicator domes, the dome cover with mask will have to be rotated to give proper indication.

## Wiring Diagram



## Switch Calibration Procedure

**!** Never perform the switch calibration procedure while in an area that could be hazardous. Intrinsically Safe models, unit must be wired in accordance the control drawing included with the product.

For Options M, K, T, P & R calibration may be performed using a Volt-Ohm meter by using the Ohm setting across COM and NO. When switch is active, the meter will read <0.5 Ohms, or the Diode setting may be used simply to indicate continuity. If a direct power source is being used, an appropriately sized resistor must be used in series with the contacts, or permanent damage will occur.

For all INDUCTIVE sensor options, a power source and resistors will be required for calibration. (Refer to the product nameplate for current limitations.)

## Setting Switches

### Mechanical Switches, Reed Switches & ALL threaded cylindrical inductive sensor options

Each T-Series unit is equipped with 2 or 4 adjustable targets with a usable range between 45° and 90°. For normal acting applications the targets are color coded red for closed and green for open. The color code would be reversed for reverse acting units. After installing the unit on the actuator or valve assembly, the targets must be set.

**!** Warning: Strikers are spring loaded and may eject forcefully upon disassembly. Use caution when disassembling.

### Normal Acting Actuator:

- Step 1: Rotate the valve full clockwise to the closed position.
- Step 2: Twist the red target button(s) as required to engage the switch.
- Step 3: Rotate the valve full counterclockwise to the open position.
- Step 4: Twist the green target button(s) as required to engage the switch

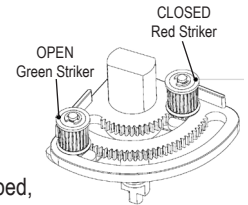
### Reverse Acting Actuator:

- Step 1: Rotate the valve full clockwise to the open position.
- Step 2: Twist the red target button(s) as required to engage the switch.
- Step 3: Rotate the valve full counterclockwise to the closed position.
- Step 4: Twist the green target button(s) as required to engage the switch.

### For switching angle under 45°:

When the switch box is mounted to a linear actuator or when the actuator strokes less than 45°, we recommend the following:

- Step 1: Remove shaft from switch box by removing the circlip underneath the switch box.
- Step 2: Remove the circlip underneath the cam if equipped, then push the cam down the shaft by 3-4mm and turn it 90°.
- Step 3: Push the cam back up, you will see the flats fit snugly between the locating lugs inside the hub.
- Step 4: Replace the circlip
- Step 5: Remove the closed switch from the bracket and install it on the inside of the bracket next to the open switch

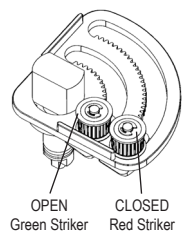


### To re-assemble:

- Step 1: Replace the screws with M3 X 25mm long screws (insert through both switches and bracket and fasten with the nut on the inside closest to the switch box bearing).
- Step 2: Remove the Closed striker assembly (red) by removing the circlip or screw on top, and install it on the inner rack.
- Step 3: Twist the green striker to the other end of the cam's rack (The red striker assembly should be twisted to the other end of the inner rack).
- Step 4: Re-install the shaft in the switch box and fit the s/s washer and circlip to the underside of the switchbox.
- Step 5: The switches can now be set anywhere between 0° & 45°.

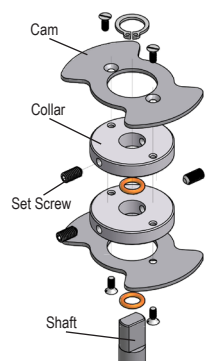
### For switching angle up to 180°:

- Step 1: Remove shaft from switch box by removing the circlip underneath the switch box.
- Step 2: Remove the open switch from the bracket and install it on the inside of the bracket.
- Step 3: Remove the Open striker assembly (green) by removing the circlip or screw on top, and install it on the inner rack next to the red striker assembly.
- Step 4: Re-install the shaft in the switch box and fit the s/s washer and circlip to the underside of the switchbox.
- Step 5: The open switch can now be set anywhere between 90° & 180°.



## Setting Slotted Inductive Sensors

- Step 1: Loosen set screw
- Step 2: Rotate cam(s) and collar(s) until desired switch function is achieved
- Step 3: Tighten set screw

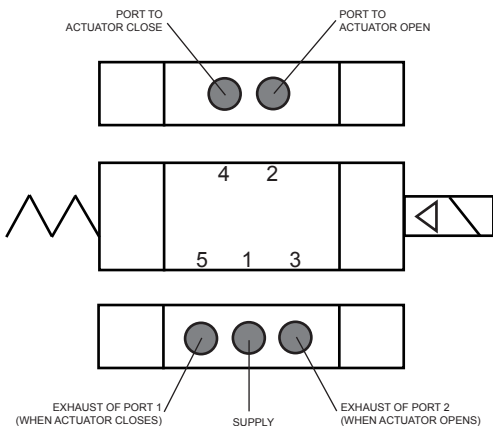


### Pneumatic Hookup Procedures

Prior to connecting the supply air to the spool valve, flush the system to remove any debris or contaminants. Galvanized pipe can easily flake and contaminate the system and therefore is not recommended. A 40 micron point of use filter at every device is recommended.

### 4-Way Spool Valves

The TopWorx™ spool valve is a 5 port, 4-way valve driven by an internally mounted pilot valve. The spool valve supply port and work ports are marked as follows:



**STOP** Never Plug, Block, or Restrict Port 5

### Highly Recommended

TopWorx highly recommends Loctite 567 brand thread sealant. Do not use a hard setting pipe compound. If Teflon thread seal tape is used, start the wrap on the second thread from the leading thread of the fitting. This will prevent tape shreds from contaminating the spool valve seals.

Breathers (AL-M30 1/8"NPT) should be installed in the exhaust ports to keep debris from falling into the spool valve and damaging the seals. This must be addressed prior to installation, or storage.



A flow control may be used in Port 3, but should NEVER BE USED in Port 5. Any blockage or restriction may cause an internal pressure build-up inside the enclosure and pose a safety issue.

Spool Valve Specifications	
Medium	Dried, filtered air (40 micron)
Operating Pressure	30psi (2.76Bar) - 100psi (6.89Bar)
Flow Coefficient	1.0Cv
Environment Rating	Type 4, 4X, IP67 (metal enclosures only)
Port Size	1/4" NPT or BSP for 1.0Cv valve
Ambient Temperature Range	Refer to product nameplate marking
Valve Body	Available in Hardcoat Anodized Aluminum or 316 Stainless Steel
Valve Seals	Buna-N/EPDM

### Special Conditions of Safe Use (All installations)

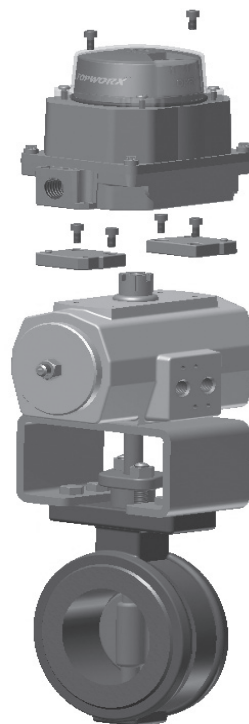
Clean only with a damp cloth to prevent possibility of electrostatic discharge. For Explosion Proof installations, the internal ground connection shall be used and the external ground connection, if supplied in addition, is supplemental bonding allowed where local authorities permit, or is required.

When installing with a third party listed nipple-mount solenoid, it is the responsibility of the installer to provide fittings, and apparatus, suitable for the area classification in accordance with the National Electrical Code. All cable entry devices or conduit stopping boxes shall be certified in type of explosion protection Ex e and Ex tb, suitable for the conditions of use and correctly installed. The IIC enclosures are excluded from use in Carbon disulphide atmospheres. The air pressure to the valve block, when fitted, shall not exceed 7 bar.

### Preventative Maintenance

TopWorx Valvetop switch boxes are designed to operate for one million cycles without servicing. Call TopWorx when you are approaching this milestone for a preventative maintenance kit and instructions.

### Typical Mounting Assembly



### About TopWorx:

TopWorx, a division of Emerson Process Management, is the global leader in valve control and position sensing for the process industries. Our solutions enable plants, platforms, and pipelines to manage and control operations more intelligently and efficiently under the most demanding and extreme conditions.

Valvetop discrete valve controllers enable automated on/off valves to communicate via FOUNDATION Fieldbus, Profibus, DeviceNet, AS-Interface, and HART protocols. They attach to all rotary and linear valves and actuators and carry a variety of global certifications.

GO Switch leverless limit switches provide the ultimate position sensing reliability and durability in extremely hot, wet, cold, dirty, abusive, corrosive, and explosive environments.

For more information please visit [www.topworx.com](http://www.topworx.com).

### TopWorx Global Locations:

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### T-Series TVF, TVH & TVL Recommended Operating Temperatures

		Intrinsically Safe			
		w/o Solenoid		w/Solenoid	
Option	Switch	TVF	TVL/TVH	TVF	TVL
M	Mechanical switch - SPDT	-40C to +60C	-50C to +60C	-10C to +40C	-10C to +40C
K	Mech. switch w/Au contact	-40C to +60C	-50C to +60C	-10C to +40C	-10C to +40C
R	200mA Reed Switch	-40C to +60C	-50C to +60C	-10C to +40C	-10C to +40C
P	3A Reed Switch	-40C to +60C	-50C to +60C	-10C to +40C	-10C to +40C
T	Mech.Switch DPDT	-40C to +60C	-50C to +60C	-10C to +40C	-10C to +40C
1	NPN inductive	Not Available	Not Available	Not Available	Not Available
2	PNP inductive	Not Available	Not Available	Not Available	Not Available
<b>PEPPERL+FUCHS SWITCH OPTIONS - STANDARD</b>					
4	NBB2-V3-E2	Not Available	Not Available	Not Available	Not Available
5	NBB3-V3-Z4	Not Available	Not Available	Not Available	Not Available
E	NJ2-V3-N	-25C to +60C		-10C to +40C	
<b>PEPPERL+FUCHS SWITCH OPTIONS - CUSTOM</b>					
<N003>	SJ3.5-N	-25C to +60C	-25C to +60C	Not Available	Not Available
<N004>	SJ3.5-SN	-40C to +40C	-50C to +40C	Not Available	Not Available
<N011>	NJ2-11-N-G	-25C to +40C	-25C to +40C	Not Available	Not Available

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13. **GENERAL PROVISIONS:** (a) Buyer shall not assign its rights or obligations under the Agreement without Seller's prior written consent; (b) there are no understandings, agreements or representations, express or implied, not specified in the Agreement; (c) no action, regardless of form, arising out of transactions under the Agreement, may be brought by either party more than two years after the cause of action has accrued; (d) any modification of these terms and conditions must be set forth in a written instrument signed by a duly authorized representative of Seller; (e) the Agreement is formed and shall be construed, performed and enforced under the laws of the State of Missouri (however, Buyer and Seller agree that the proper venue for all actions arising under the Agreement shall be only in the State where the Goods involved in such actions were manufactured; (f) The 1980 United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement; (g) If any provision of the Agreement is invalid under any statute or rule of law, such provision, to that extent only, shall be deemed to be omitted without affecting the validity of the remainder of the Agreement; (h) Seller specifically objects to the application of any Federal Acquisition Regulation ("FAR") or other governmental procurement provision or clause to the Agreement; (i) UNLESS OTHERWISE SPECIFICALLY PROVIDED IN SELLER'S QUOTATION, GOODS AND SERVICES HEREUNDER ARE NOT INTENDED FOR USE IN ANY NUCLEAR OR NUCLEAR RELATED APPLICATIONS. Buyer (i) accepts Goods and Services in accordance with the restriction set forth in the immediately preceding sentence, (ii) agrees to communicate such restriction in writing to any and all subsequent purchasers or users and (iii) agrees to defend, indemnify and hold harmless Seller from any and all claims, losses, liabilities, suits, judgments and damages, including incidental and consequential damages, arising from use of Goods and Services in any nuclear or nuclear related applications, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability; (j) The rights, remedies and protections afforded to Seller under this Agreement, including but not limited to indemnification of Seller, limitation of remedy and liability and limited warranty shall extend to Seller and to its affiliates, subsidiaries, or related companies performing or supplying work, services, or products under this Agreement or any agreement into which it is incorporated by reference; and (k) Seller does not agree to: (i) indemnify Buyer; or (ii) name Buyer as an additional insured.