

W-Series 2-Piece Control Top

AND SWITCH-ONLY OPTIONS

FORM NO.: 95-03083 REVISION: 04/2008

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



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www.hollandapt.com
Phone: 800-800-8464

➤ **Waukesha Cherry-Burrell**

SPX FLOW, Inc.
611 Sugar Creek Road
Delavan, WI 53115 USA

Tel: (800) 252-5200 or (262) 728-1900
Fax: (800) 252-5012 or (262) 728-4904

E-mail: wcb@spx.com
Web site: www.spxflow.com

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Waukesha Cherry-Burrell Warranty

Seller warrants its products to be free from defect in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorney's fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

Shipping Damage or Loss

If equipment is damaged or lost in transit, file a claim at once with the delivering carrier. The carrier has signed the Bill of Lading acknowledging that the shipment has been received from WCB in good condition. WCB is not responsible for the collection of claims or replacement of materials due to transit shortages or damages.

Warranty Claim

Warranty claims must have a **Returned Goods Authorization (RGA)** from the Seller before returns will be accepted.

Claims for shortages or other errors, exclusive of transit shortages or damages, must be made in writing to Seller within ten (10) days after delivery. Failure to give such notice shall constitute acceptance and waiver of all such claims by Buyer.

Safety

READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT

Waukesha Cherry-Burrell recommends users of our equipment and designs follow the latest Industrial Safety Standards. At a minimum, these should include the industrial safety requirements established by:

1. Occupational Safety and Health Administration (OSHA), Title 29 of the CFR
Section 1910.212- General Requirements for all Machines
2. National Fire Protection Association, ANSI/NFPA 79
ANSI/NFPA 79- Electrical Standards for Industrial Machinery
3. National Electrical Code, ANSI/NFPA 70
ANSI/NFPA 70- National Electrical Code
ANSI/NFPA 70E- Electrical Safety Requirement for Employee Workplaces
4. American National Standards Institute, Section B11

Attention: Servicing energized industrial equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lockout industrial equipment from power sources, and release stored energy, if present. Refer to the National Fire Protection Association Standard No. NFPA70E, Part II and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout-Tagout) and OSHA Electrical Safety Related Work Practices, including procedural requirements for:

- Lockout-tagout
- Personnel qualifications and training requirements
- When it is not feasible to de-energize and lockout-tagout electrical circuits and equipment before working on or near exposed circuit parts

Locking and Interlocking Devices: These devices should be checked for proper working condition and capability of performing their intended functions. Make replacements only with the original manufacturer's renewal parts or kits. Adjust or repair in accordance with the manufacturer's instructions.

Periodic Inspection: Industrial equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions and adjusted as indicated by experience. At a minimum, an initial inspection within 3 to 4 months after installation is recommended. Inspection of the electrical control systems should meet the recommendations as specified in the National Electrical Manufacturers Association (NEMA) Standard No. ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment, for the general guidelines for setting-up a periodic maintenance program.

Replacement Equipment: Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the equipment series, model, serial number, and revision level of the equipment.

Warnings and cautions are provided in this manual to help avoid serious injury and/or possible damage to equipment:



DANGER: marked with a stop sign.
Immediate hazards which **WILL** result in severe personal injury or death.



WARNING: marked with a warning triangle.
Hazards or unsafe practices which **COULD** result in severe personal injury or death.



CAUTION: marked with a warning triangle.
Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

Care of Stainless Steel

Stainless Steel Corrosion

Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel. If film is disturbed or destroyed, stainless steel becomes much less resistant to corrosion and may rust, pit or crack.

Corrosion pitting, rusting and stress cracks may occur due to chemical attack. Use only cleaning chemicals specified by a reputable chemical manufacturer for use with 300 series stainless steel. Do not use excessive concentrations, temperatures or exposure times. Avoid contact with highly corrosive acids such as hydrofluoric, hydrochloric or sulfuric. Also avoid prolonged contact with chloride-containing chemicals, especially in presence of acid. If chlorine-based sanitizers are used, such as sodium hypochlorite (bleach), do not exceed concentrations of 150 ppm available chlorine, do not exceed contact time of 20 minutes, and do not exceed temperatures of 104°F (40°C).

Corrosion discoloration, deposits or pitting may occur under product deposits or under gaskets. Keep surfaces clean, including those under gaskets or in grooves or tight corners. Clean immediately after use. Do not allow equipment to set idle, exposed to air with accumulated foreign material on the surface.

Corrosion pitting may occur when stray electrical currents come in contact with moist stainless steel. Ensure all electrical devices connected to the equipment are correctly grounded.

Elastomer Seal Replacement Following Passivation

Passivation chemicals can damage product contact areas of WCB equipment. Elastomers (rubber components) are most likely to be affected. Always inspect all elastomer seals after passivation is completed. Replace any seals showing signs of chemical attack. Indications may include swelling, cracks, loss of elasticity or any other noticeable changes when compared with new components.

Care of Acrylic Control Top Covers

Acrylic covers may be cleaned using a mild detergent and warm water. Be sure to clean the water regularly, as any entrapped dirt in the cleaning water can cause scratching. Use a soft or sponge cloth, and avoid applying pressure. Rinse thoroughly with clean water, and dry by blotting the residual water with a clean cloth or chamois. Do not rub the surface.



CAUTION: DO NOT use abrasive cleaners, window cleaning sprays, solvents (such as acetone, gasoline, benzene, lacquer thinner), or chlorinated solvents for cleaning control top covers. These agents will damage and/or attack the control top covers.

Introduction

For valve information, please refer to the specific publication assigned to the type of valve you have. For additional product information, please see our web site at <http://www.spxprocessequipment.com/sites/wcb/literature.asp>.

General Information

Information in this manual should be read by all personnel involved in installation, setup, operation and maintenance of W-Series control tops and switch-only options.

NOTE: In this manual, "stem-raised" is understood to be when the valve stem is fully retracted into the actuator. "Stem-lowered" is understood to be when the valve stem is fully extended out from the actuator.

NOTE: The terms "control top" and "control module" are used interchangeably.

Models and Specifications

Control Modules are used with pneumatically actuated valves to protect and deploy stem feedback switches and/or air solenoid valves. These NEMA 4X enclosures mount on top of the valve actuator. An indicator stem extends into the control top, providing a position measurement surface for the feedback switches.

This manual covers the W-Series 2-piece control top. The W-Series 3-piece control top (O&M manual 95-03077) is obsolete but service parts are available. W-Series 2-piece control modules are retrofit-able on all W-Series valves shipped since 1995.

Materials

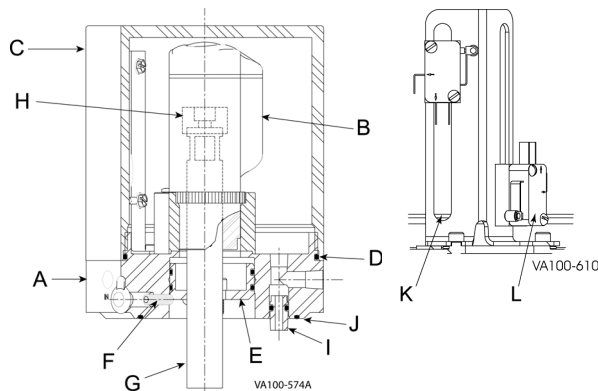


Figure 1: 2-Piece Control Top

A	Stainless steel base
B	Set & Forget switch
C	1-piece, see-through acrylic top
D	O-ring seal
E	Mounting cup
F	Attachment set screws
G	Indicator stem
H	Target (inside switch)
I	Vent Plug (control module)
J	O-Ring
K	Switch Bracket
L	Proximity or Micro Switch

Operating Parameter

Temperature

W-Series control modules are designed to work in a temperature environment of 32°F to 140°F (0° - 60°C). W-Series control modules are intended for normal exterior cleaning procedures. See "Care of Acrylic Control Top Covers" on page 6 for more details.

Installation and Operation

Routing for Compressed Air, Vent and Wiring

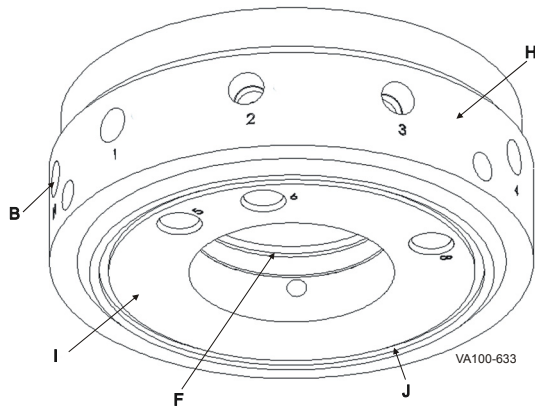


Figure 2: Base Underside View

- A. V-Groove Plenum with air supply channels
- B. Air-In
- C. Setscrew
- D. Vent
- E. Wire

Compressed air is routed through the base from Air-In (item B) to a V-groove air-plenum (item A) in the inside diameter (item F). Supply channels from the plenum feed each of three (3) threaded solenoid mounts (item S) on top. An energized solenoid passes air to the adjacent, non-threaded outlet hole, feeding the corresponding side (item H) and underside (item I) air ports.

For air routing to the top of an actuator, for example, W60 Air-to-Lower, the side port is plugged, and the underside port uses a vent plug and o-ring to connect to the air connection on top of the actuator.

For air routed to the side of the actuator, for example W60 Air-to-Raise or the actuator sidewall for W70, the underside port is plugged and the side port is open.

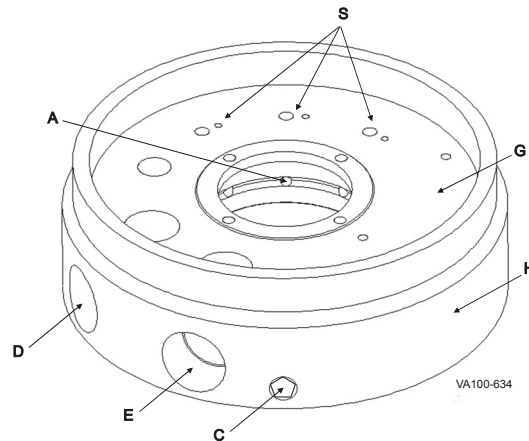


Figure 3: Base Top View

- F. Inside Diameter
- G. Top
- H. Side
- I. Underside
- J. O-Ring
- S. Solenoid Mount

For unused solenoid ports, both the side and underside ports are plugged, and the top threaded mount is plugged.

Vent air from the top of the actuator is routed through the control module base via underside port no. 8. A venting plug and o-ring are used to connect the actuator port to port no. 8. Vent air passes through the module to the side vent plug (item D) in the base.

Wiring is routed inside the control module from the side port (item H) to the joined top port. A cable strain relief or optional pin-connector is used on the side port.

Installation of the top is secured using three (3) setscrews (item C) in the side of the base.

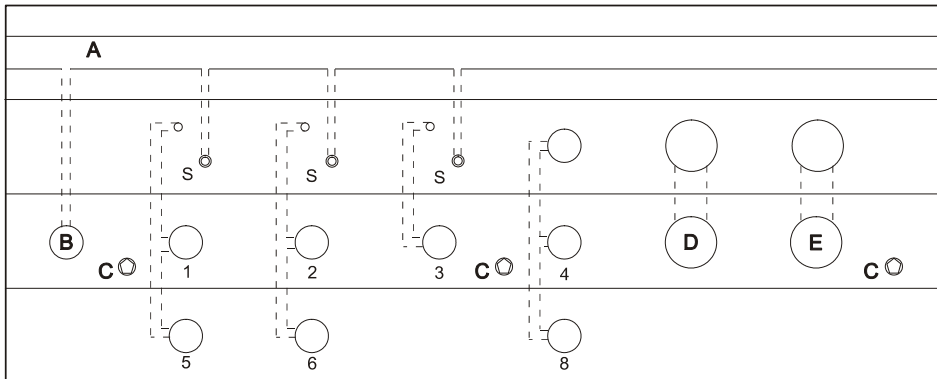


Figure 4: Routing for Compressed Air, Vent and Wiring

Solenoids Operation

Barrel-Type Solenoid

- 24VDC (5-25VDC) typically used on all valves
- Up to three (3) solenoids
- Ports in the base are numbered
- On single-seat valves, the air boost requires two (2) solenoids
- 120VAC (50-60Hz) solenoid is available

Solenoid Operation

Solenoids direct compressed air through the ports in the base of the control top to drive the motion of the valve. For the solenoid to work correctly and achieve the required valve condition, specific ports must be open or plugged. Many configurations are possible. Figure 5 and Figure 6 list the appropriate configurations for W60/W80/W90 and W70 valves. Prior to startup, perform a functional test on each valve by applying compressed air.

W60 / W80 / W90 Single Seat Solenoid and Port Arrangements

Valve Configuration	Solenoid Location 1	Solenoid Location 2	Solenoid Location 3	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 8	Top Port	In Port
Single Seat - No Solenoid - AR	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Vent	Open	Plug
Single Seat - No Solenoid - AL & AA	Plug	Plug	Plug	Plug	Plug	Plug	Open	Plug	Plug	Vent	Plug	Plug
Single Seat - 1 Solenoid - AR	Solenoid	Plug	Plug	Open	Plug	Plug	Plug	Plug	Plug	Vent	Open	Open
Single Seat - 1 Solenoid - AL	Solenoid	Plug	Plug	Plug	Plug	Plug	Plug	Vent	Plug	Open	Plug	Open
Single Seat - 2 Solenoids - Air Boost & AA	Solenoid	Solenoid	Plug	Open	Plug	Plug	Plug	Plug	Vent	Open	Plug	Open
Single Seat 3 Pos. AR - 2 Solenoid	Solenoid	Solenoid	Plug	Open	Open	Plug	Plug	Plug	Plug	Vent	Open	Open

Note:

For W60 / W80 / W90 single seat valves:

AR = Air to raise actuator, AL = Air to lower actuator, AA = Air to air actuator

AR (2) Solenoids: Solenoid 1 = AR; Solenoid 2 = Air boost

AL (2) Solenoids: Solenoid 1 = Air boost; Solenoid 2 = AL

3-Position AR Actuator (2) Solenoids: Solenoid 1 = Valve open; Solenoid 2 = Mid-position

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Figure 5: Single Seat Solenoid Arrangements W60/W80/W90

W70 Series Mix Proof and W75RS PMO Solenoid and Port Arrangements

Valve Configuration	Solenoid Location 1	Solenoid Location 2	Solenoid Location 3	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 8	Top Port	In Port
Mix Proof - No Solenoid	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Vent	Open	Plug
Mix Proof - 1 Solenoid	Solenoid	Plug	Plug	Open	Plug	Plug	Plug	Plug	Plug	Vent	Open	Open
Mix Proof - 2 Solenoids	Solenoid	Solenoid	Plug	Open	Open	Plug	Plug	Plug	Plug	Vent	Open	Open
Mix Proof - 3 Solenoids	Solenoid	Solenoid	Solenoid	Open	Open	Open	Plug	Plug	Plug	Vent	Open	Open
Mix Proof Radial Seal (RS) - No Solenoid	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Open	Plug	Plug
Mix Proof Radial Seal (RS) - 1 Solenoid	Solenoid	Plug	Plug	Open	Plug	Plug	Plug	Plug	Plug	Open	Plug	Open
Mix Proof Radial Seal (RS) - 2 Solenoids	Solenoid	Solenoid	Plug	Open	Open	Plug	Plug	Plug	Plug	Open	Plug	Open
Mix Proof Radial Seal (RS) - 3 Solenoids	Solenoid	Solenoid	Solenoid	Open	Open	Open	Plug	Plug	Plug	Open	Plug	Open
PMO - No Solenoid	Plug	Plug	Plug	Plug	Plug	Plug	Open	Plug	Plug	Open	Open	Plug
PMO - 1 Solenoid	Solenoid	Plug	Plug	Open	Plug	Plug	Open	Plug	Plug	Open	Open	Open
PMO - 2 Solenoids	Solenoid	Solenoid	Plug	Open	Open	Plug	Open	Plug	Plug	Open	Open	Open
PMO - 3 Solenoids	Solenoid	Solenoid	Solenoid	Open	Open	Open	Open	Plug	Plug	Open	Open	Open

Note:

For all W-Series Mix Proof:

Solenoid 1 = Valve Open; Solenoid 2 = Upper seat lift; Solenoid 3 = Lower seat lift

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Figure 6: Solenoid Arrangements, W70 Series Mix Proof and W75RS PMO Mix Proof

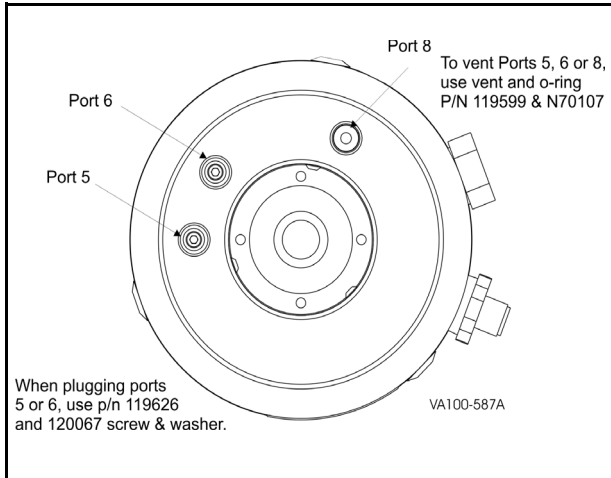


Figure 7: Control Top Bottom View, Ports 5,6,8

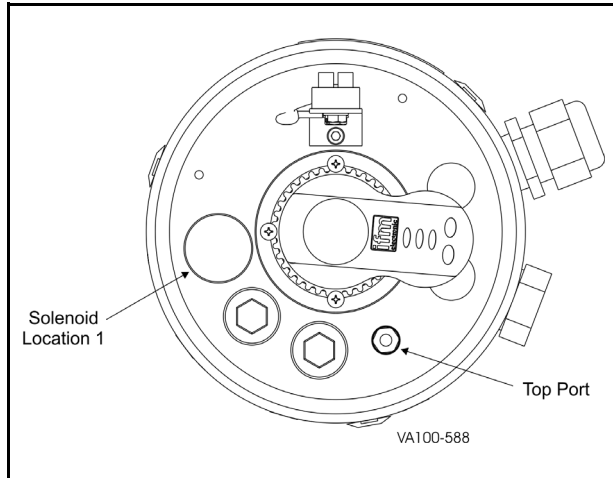


Figure 9: Top View, (1) Solenoid

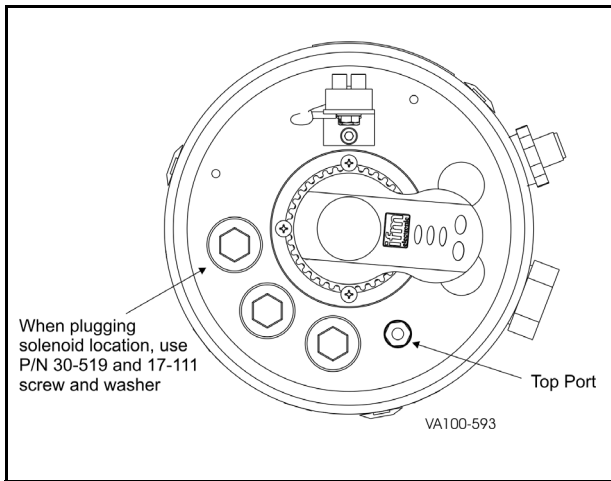


Figure 8: Top View, No Solenoids

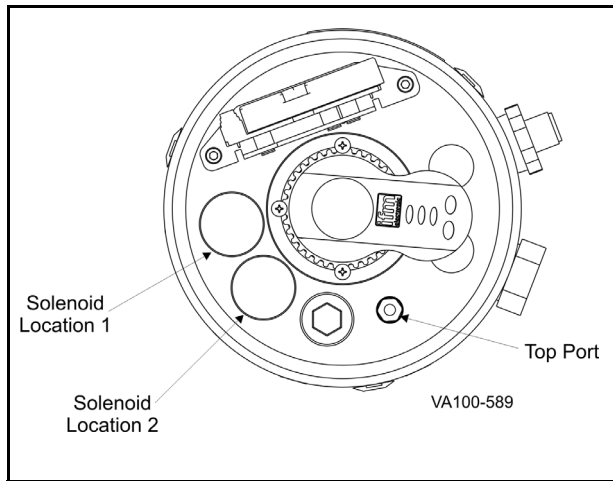


Figure 10: Top View, (2) Solenoids

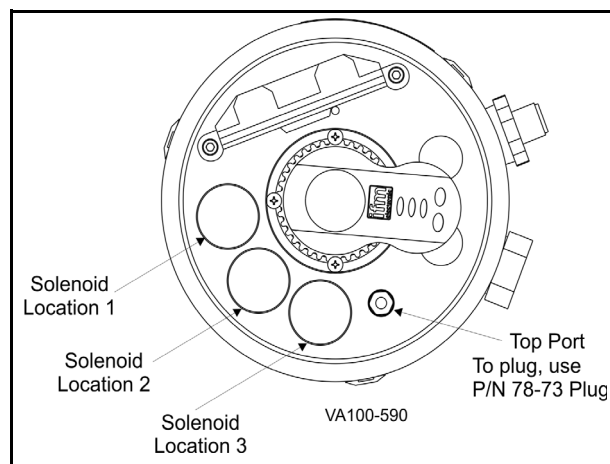


Figure 11: Top View, (3) Solenoids

NOTE: Arrangements are the same for proximity and micro switch configurations.

Wiring and Pin Instructions: Set & Forget Switch

PAGE, FIGURE	CONNECTION	VOLTAGE
Page 11, Fig. 12	Strain Relief	DC
Page 12, Fig. 13	6 Pin Eurofast	DC
Page 12, Fig. 14	8 Pin Eurofast	DC
Page 13, Fig. 15	10 Pin Eurofast	DC
Page 13, Fig. 16	12 Pin Eurofast	DC
Page 14, Fig. 17	AS-I Wiring	DC
Page 14, Fig. 18	DeviceNet Wiring, Single Seat	DC
Page 15, Fig. 19	DeviceNet Wiring, Mix Proof	DC

Note: The Set & Forget Switch is available with 24VDC Power only

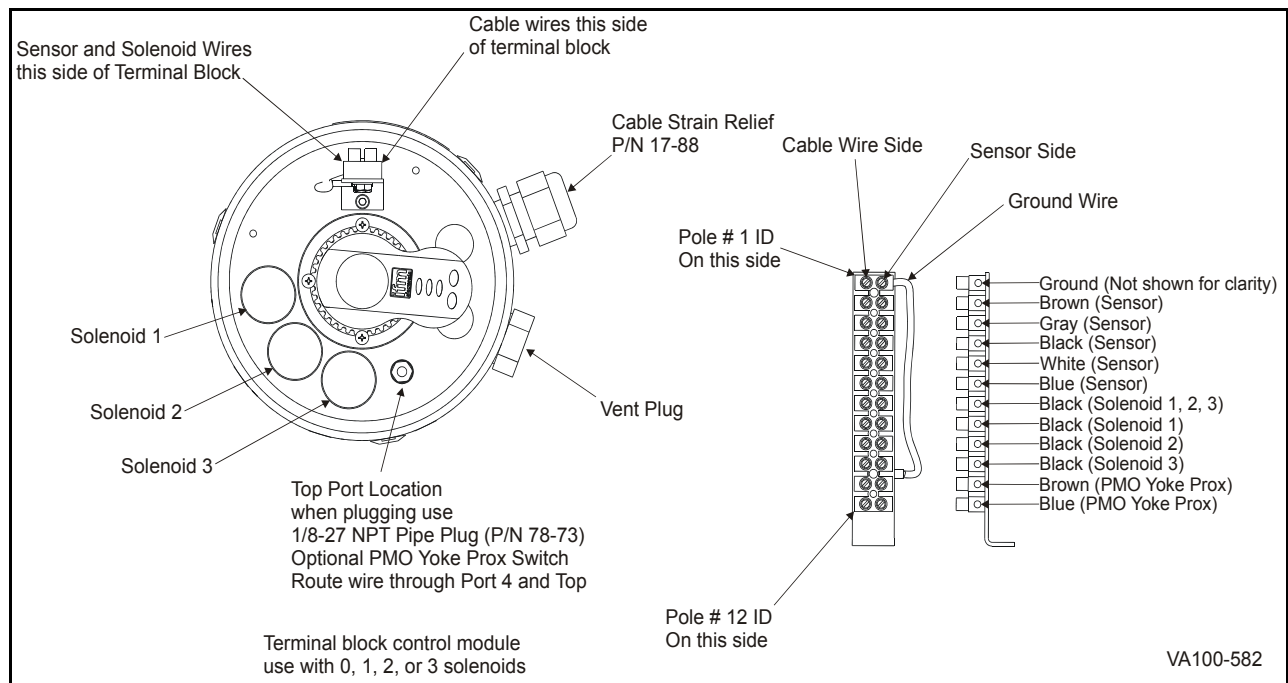


Figure 12: Strain Relief

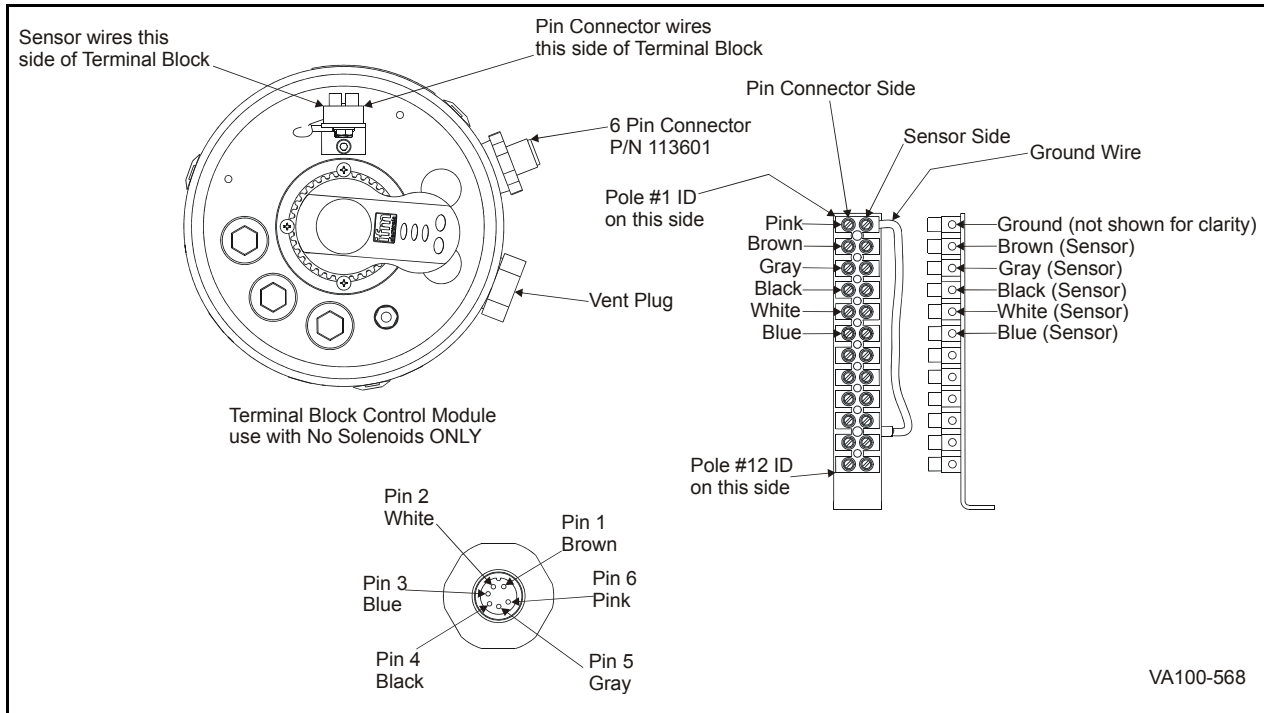


Figure 13: 6-pin Eurofast wiring

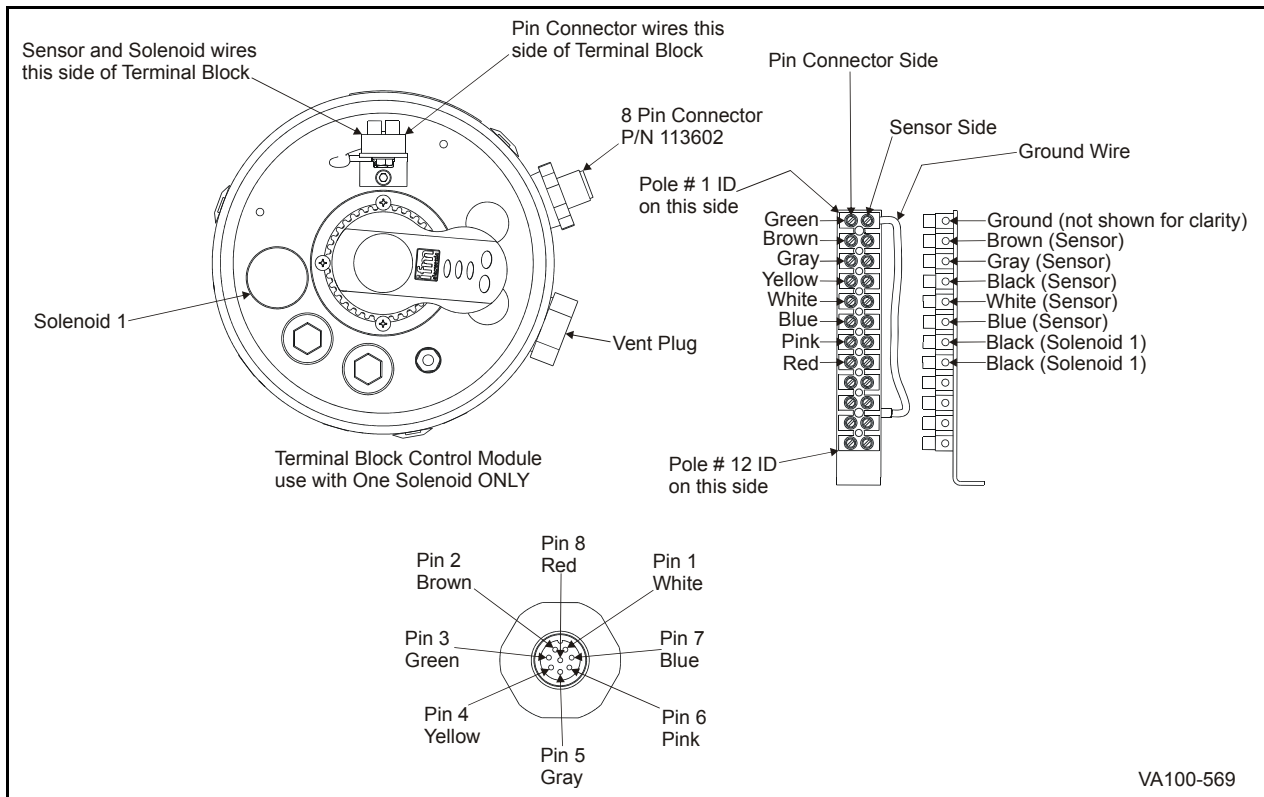


Figure 14: 8-pin Eurofast wiring

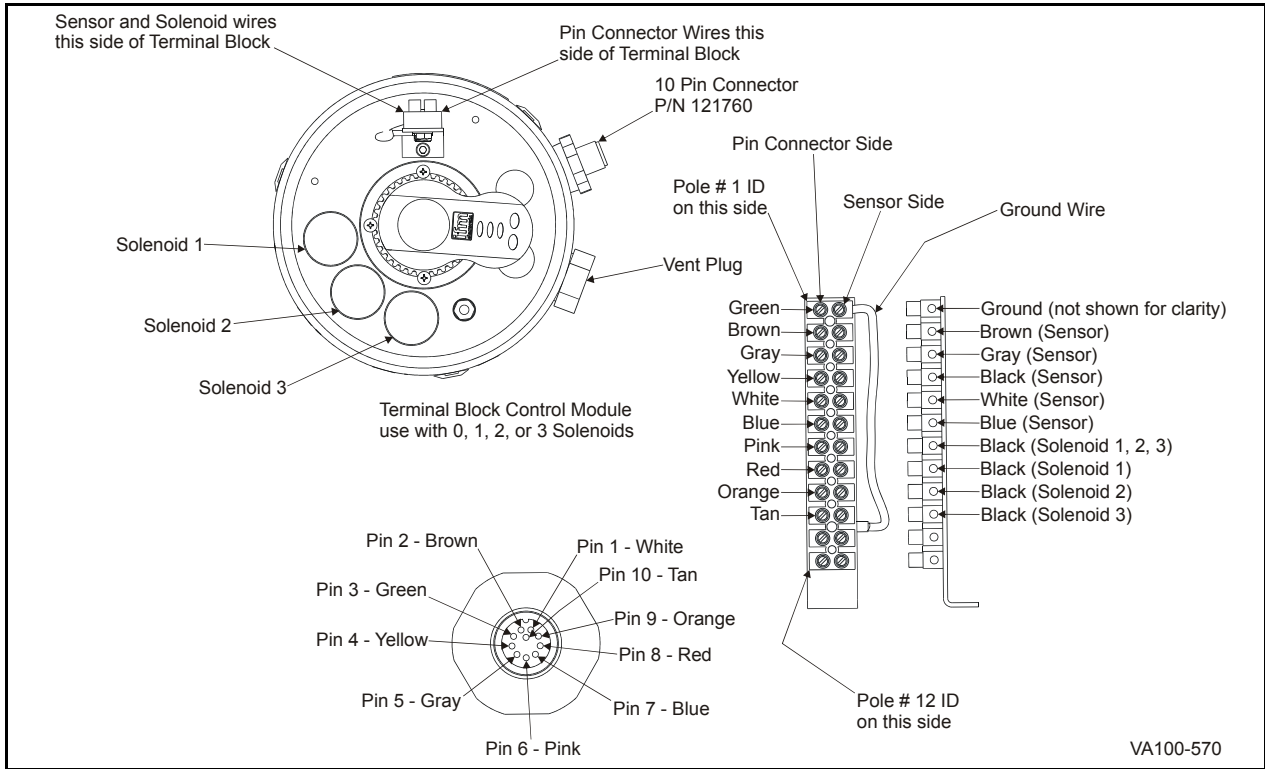


Figure 15: 10-pin Eurofast wiring

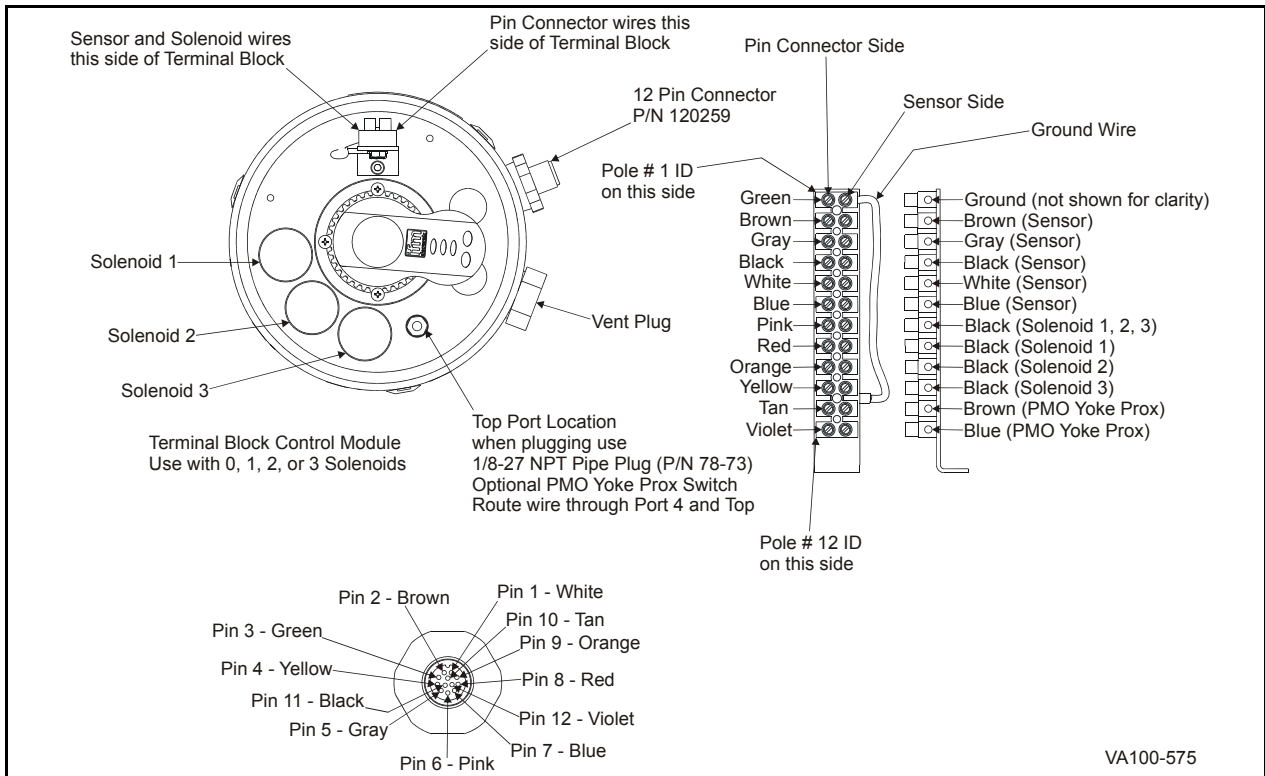


Figure 16: 12-pin Eurofast wiring

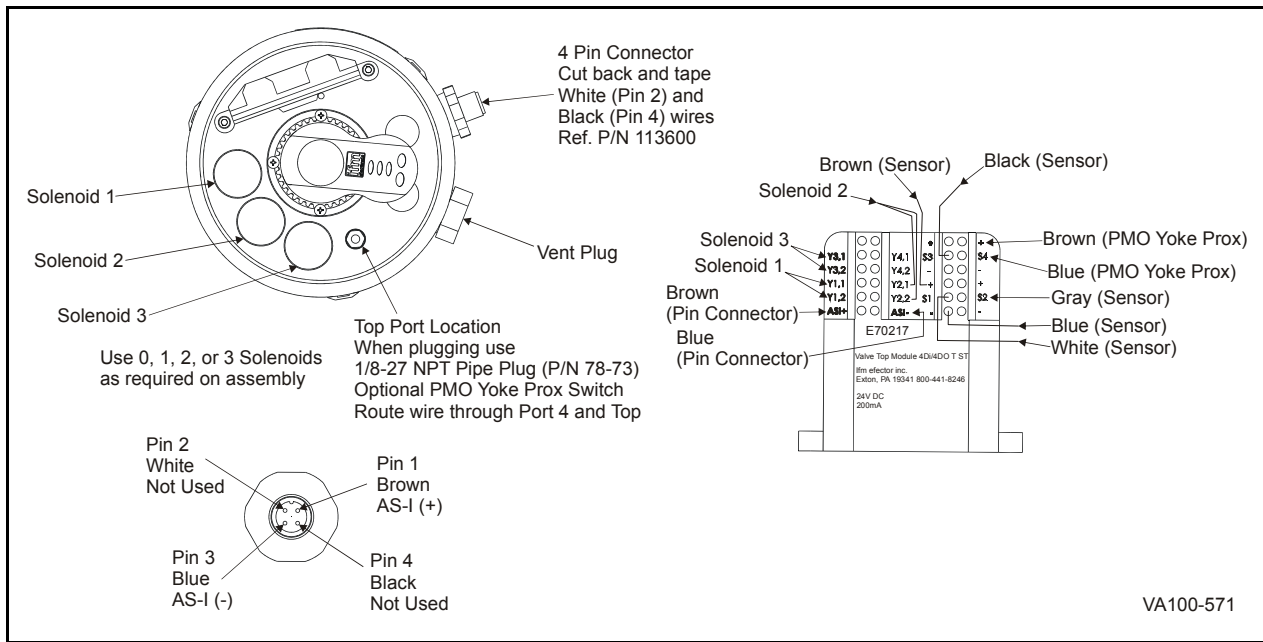


Figure 17: AS-I Eurofast Wiring

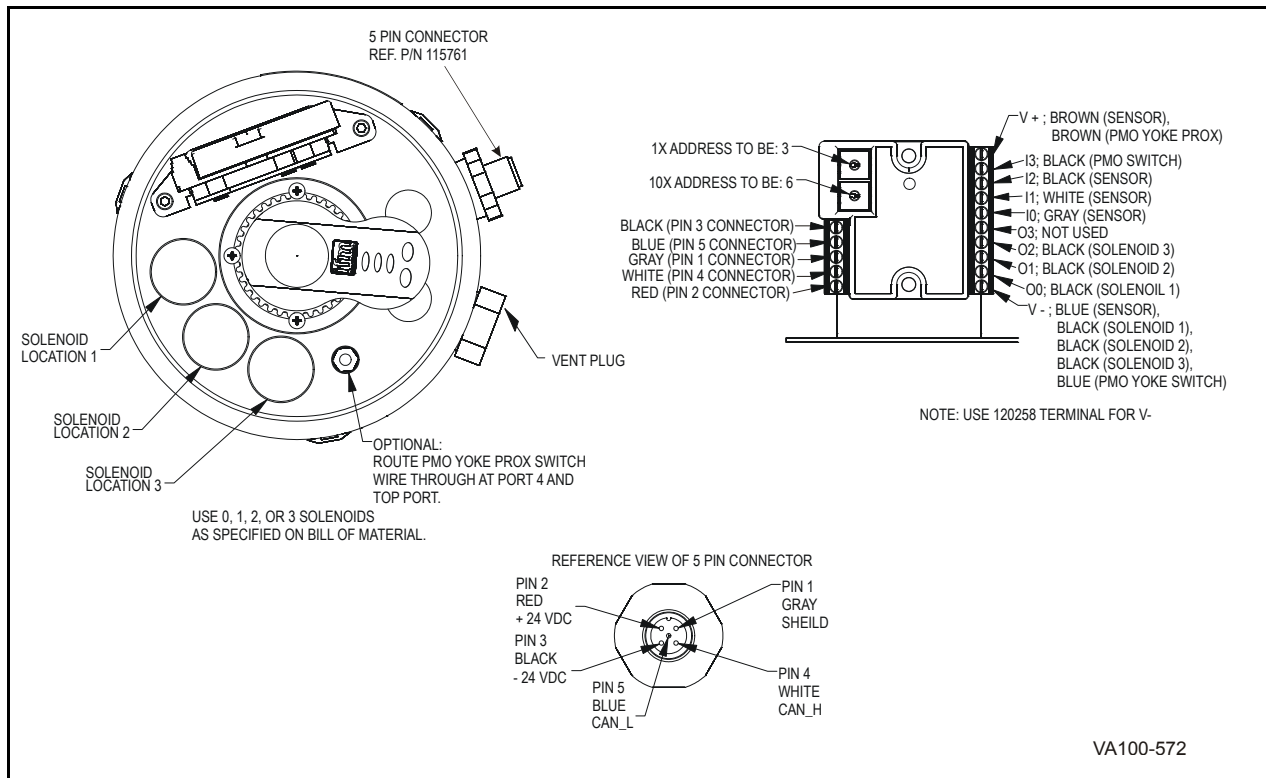


Figure 18: DeviceNet Eurofast Wiring, Single-Seat

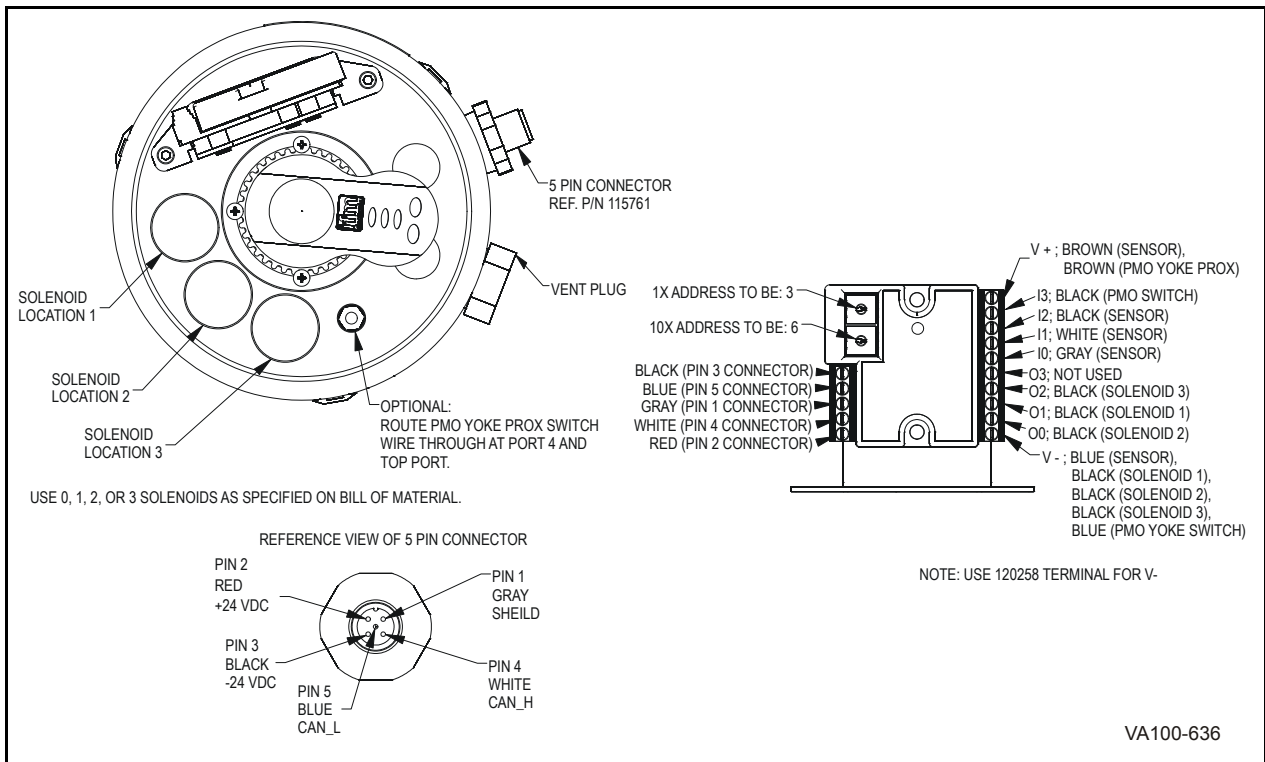


Figure 19: DeviceNet Eurofast Wiring, Mix Proof

Wiring and Pin Instructions: Proximity and Micro Switches

PAGE, FIGURE	SPECIFICATION TYPE	PIN CONNECTOR	NUMBER OF SOLENOIDS	PMO YOKE SWITCH	3 WIRE PROXIMITY
Page 17, Fig. 20	Strain Relief Micro Switch	17-88	3	No	No
Page 17, Fig. 21	Strain Relief Proximity Switch	17-88	3	Yes	Yes
Page 18, Fig. 22	4-Pin Eurofast	113600	0	No	No
Page 18, Fig. 23	4-Pin Eurofast with AS-I Card	113600	3	Yes	No
Page 19, Fig. 24	5-Pin Eurofast	115761	0	Yes	No
Page 19, Fig. 25	5-Pin Eurofast with DeviceNet Card, Single Seat	115761	3	Yes	Yes
Page 20, Fig. 26	5-Pin Eurofast with DeviceNet Card, Mix Proof	115761	3	Yes	Yes
Page 20, Fig. 27	6-Pin Eurofast	113601	1	No	No
Page 21, Fig. 28	8-Pin Eurofast	113602	3	No	No
Page 21, Fig. 29	8-Pin Eurofast with 3-Wire Proximity	113602	1	No	Yes
Page 22, Fig. 30	10-Pin Eurofast	121760	3	No	Yes
Page 22, Fig. 31	10-Pin Eurofast	121760	3	Yes	No
Page 23, Fig. 32	12-Pin Eurofast	120259	3	Yes	Yes
Page 23, Fig. 33	5-Pin Minifast	5512434	0	Yes	No
Page 24, Fig. 34	6-Pin Minifast	113252	1	No	No
Page 24, Fig. 35	7-Pin Minifast	108848	2	No	No
Page 25, Fig. 36	8-Pin Minifast	122078	3	No	No
Page 25, Fig. 37	9-Pin Minifast	122079	3	Yes	No
Page 26, Fig. 38	10-Pin Minifast	122080	3	No	Yes
Page 26, Fig. 39	10-Pin Minifast	122080	3	Yes	No

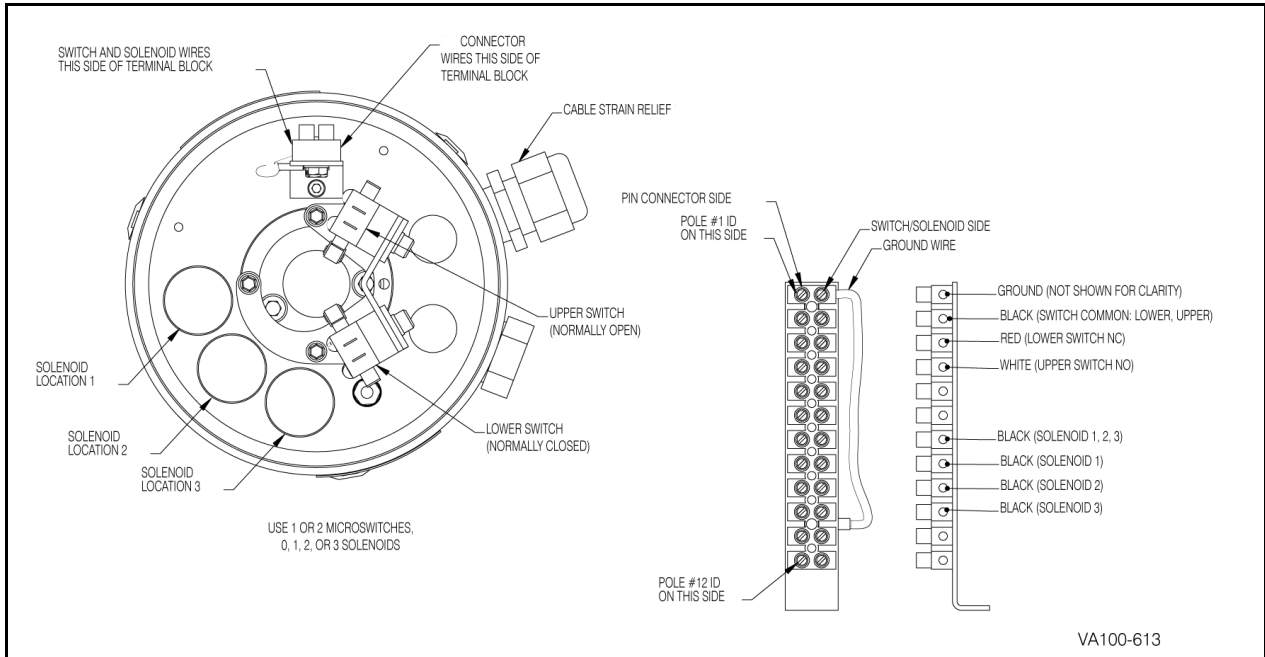


Figure 20: Strain Relief Micro Switch

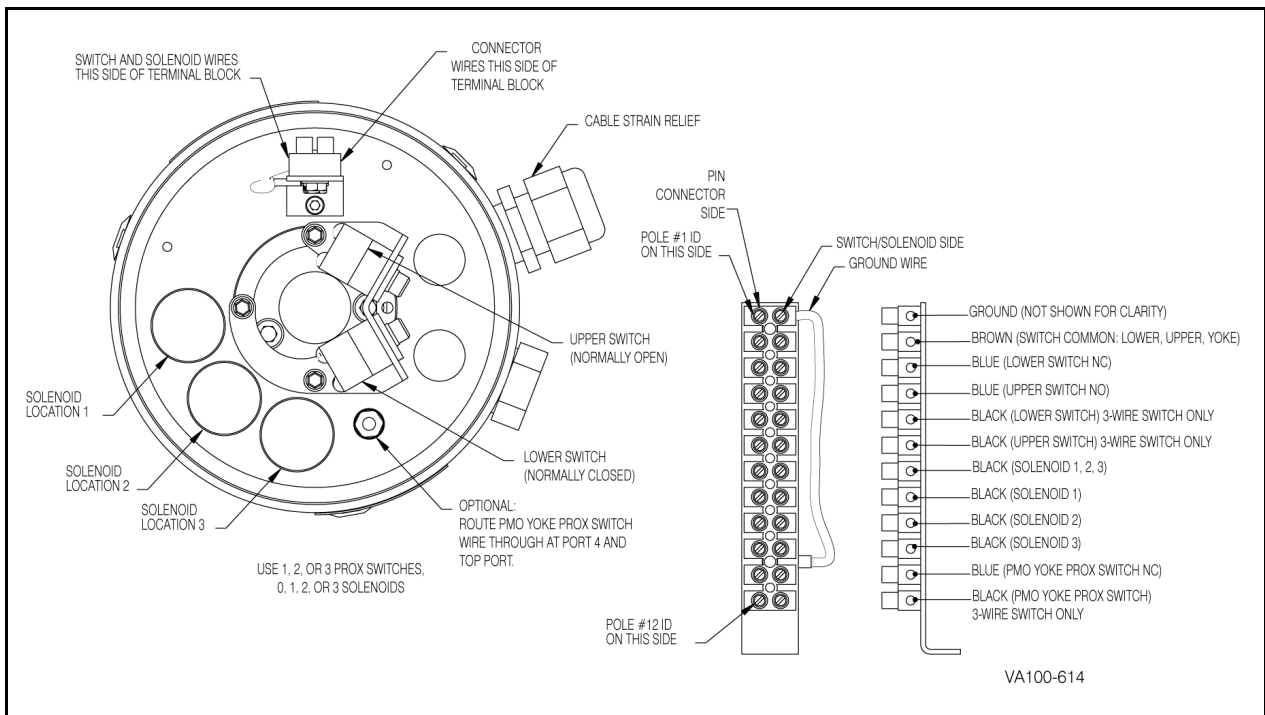


Figure 21: Strain Relief Proximity Switch

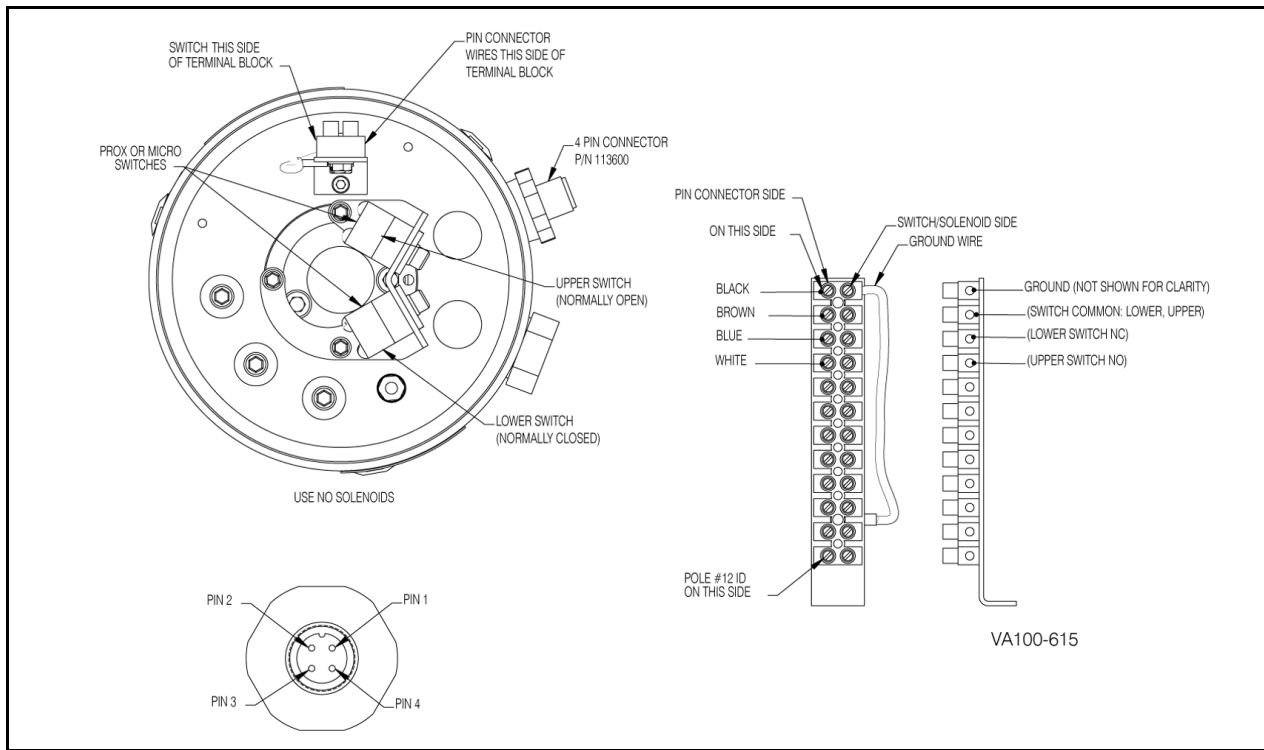


Figure 22: 4-Pin Eurofast

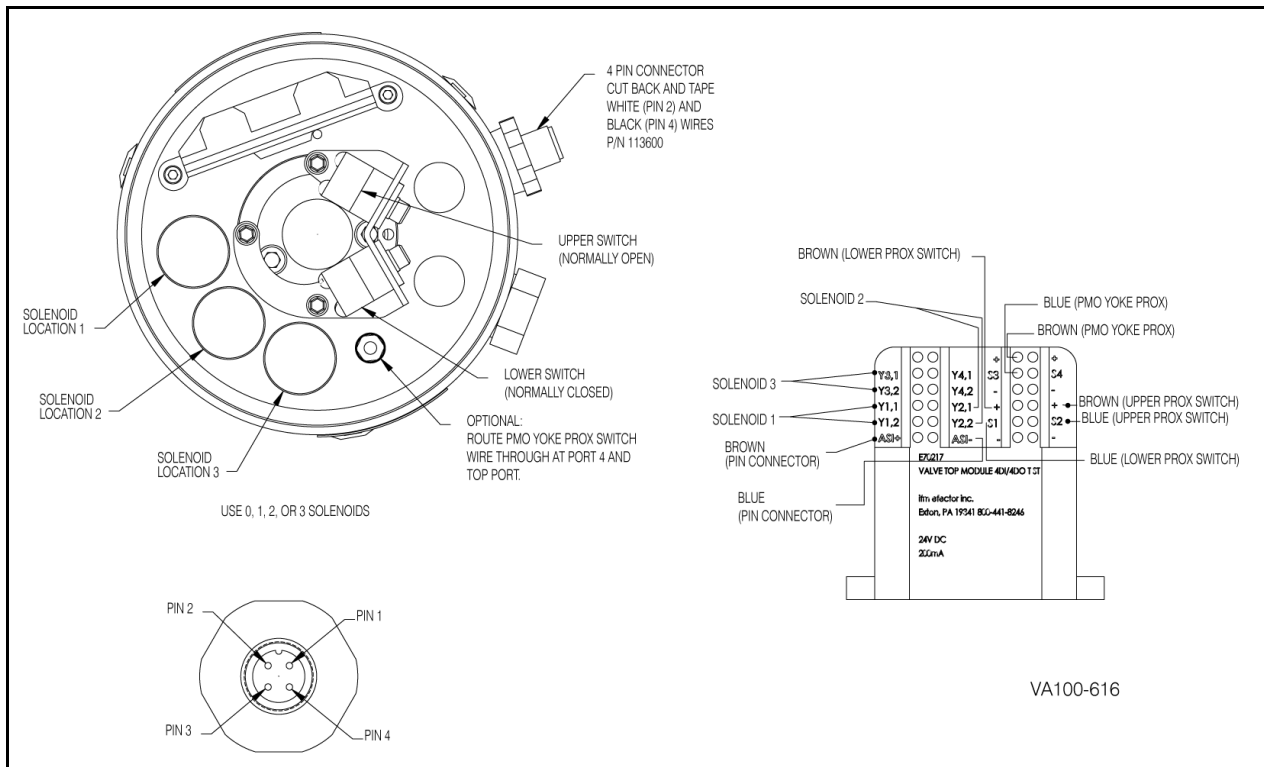


Figure 23: 4-Pin Eurofast with AS-I Card

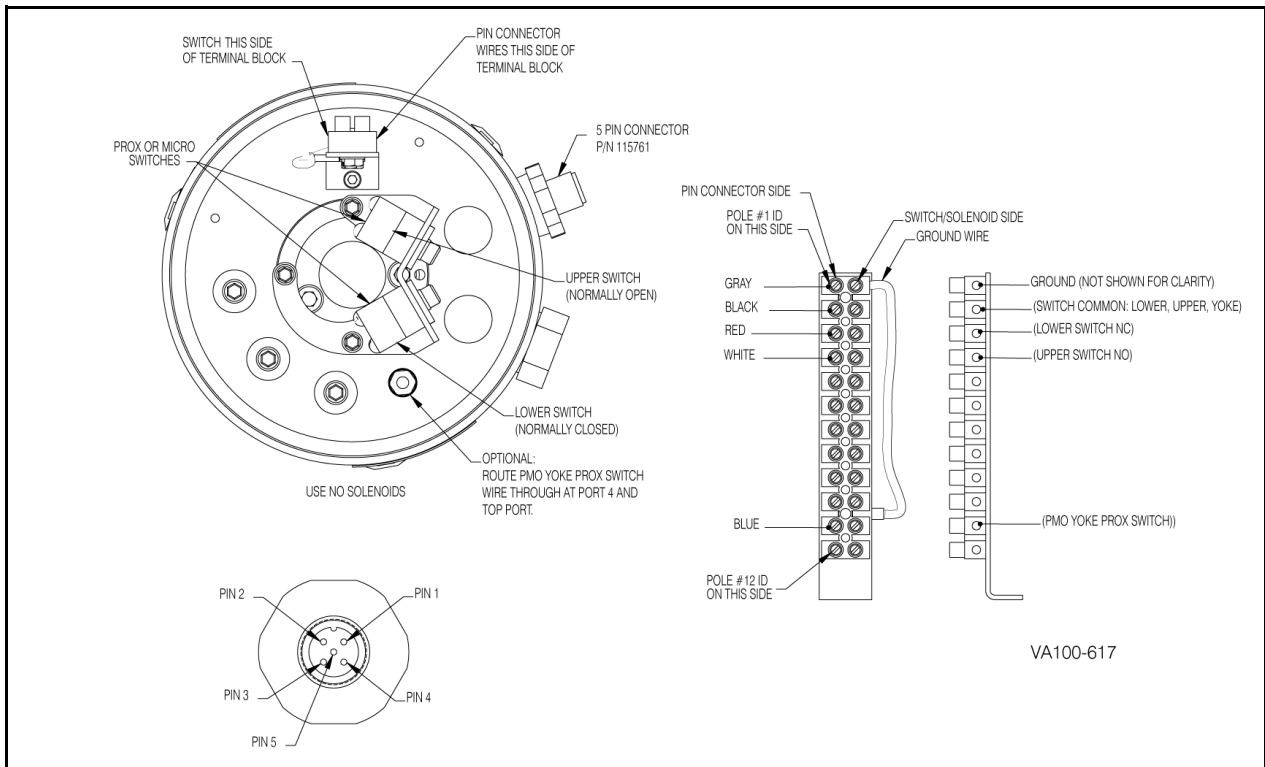


Figure 24: 5-Pin Eurofast

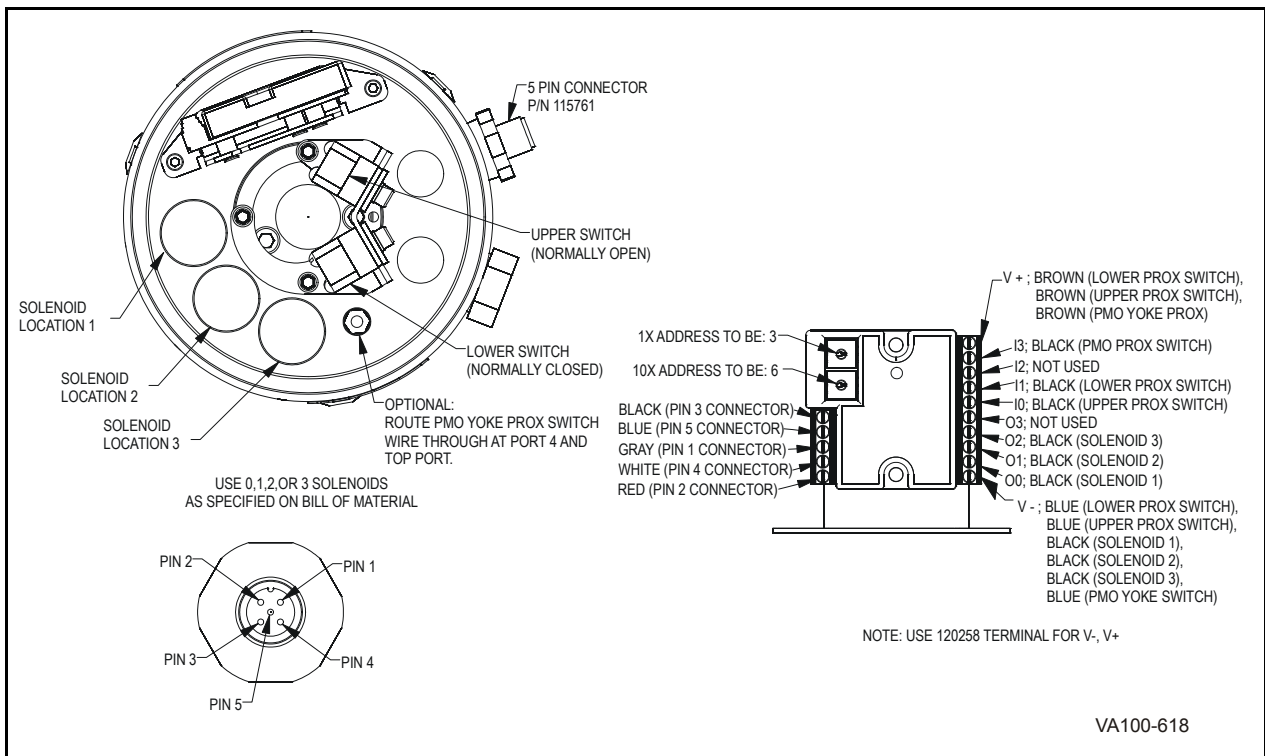


Figure 25: 5-Pin Eurofast with DeviceNet Card, Single Seat

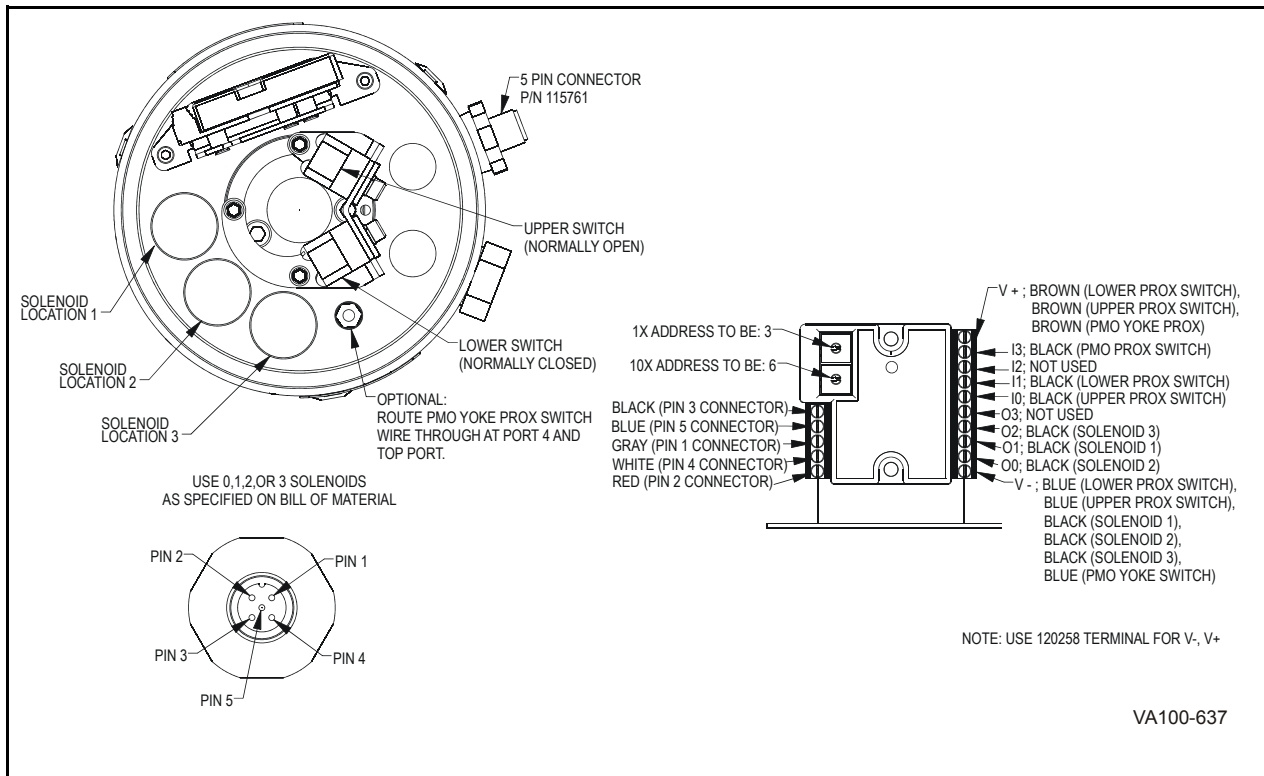


Figure 26: 5-Pin Eurofast with DeviceNet Card, Mix Proof

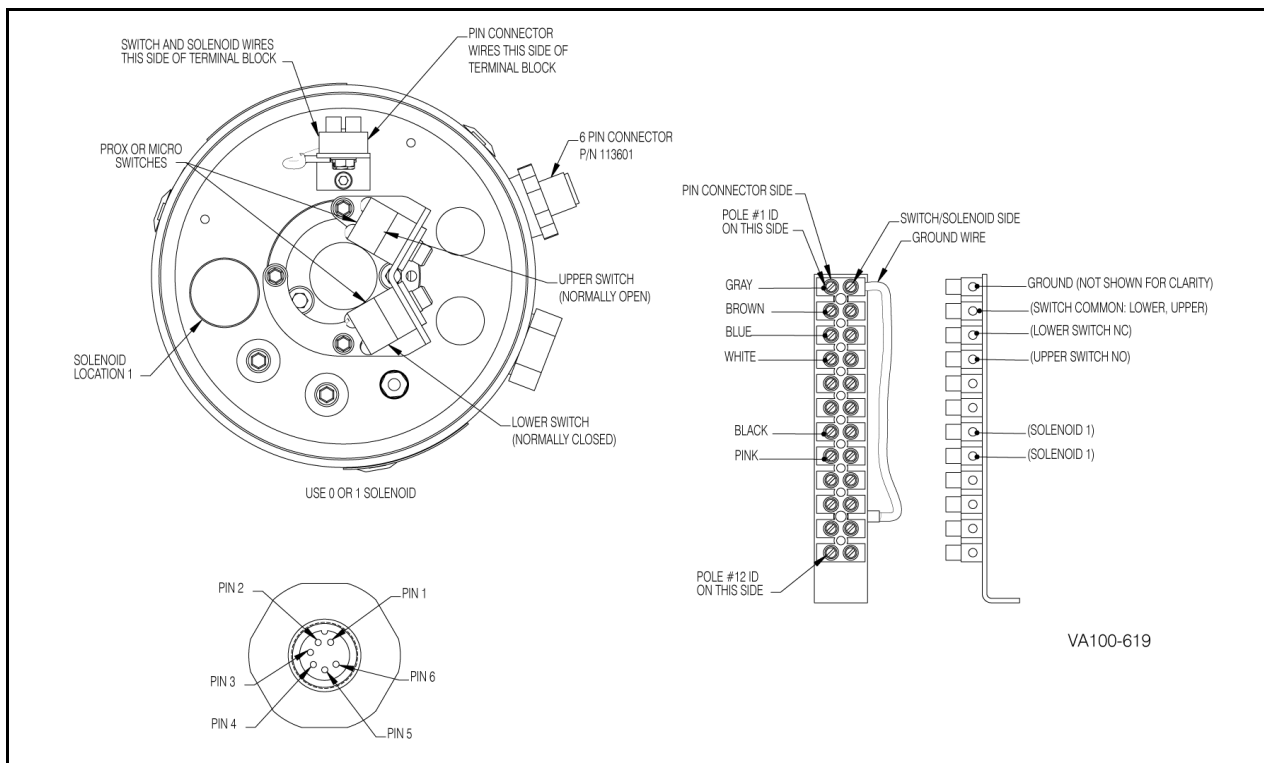


Figure 27: 6-Pin Eurofast

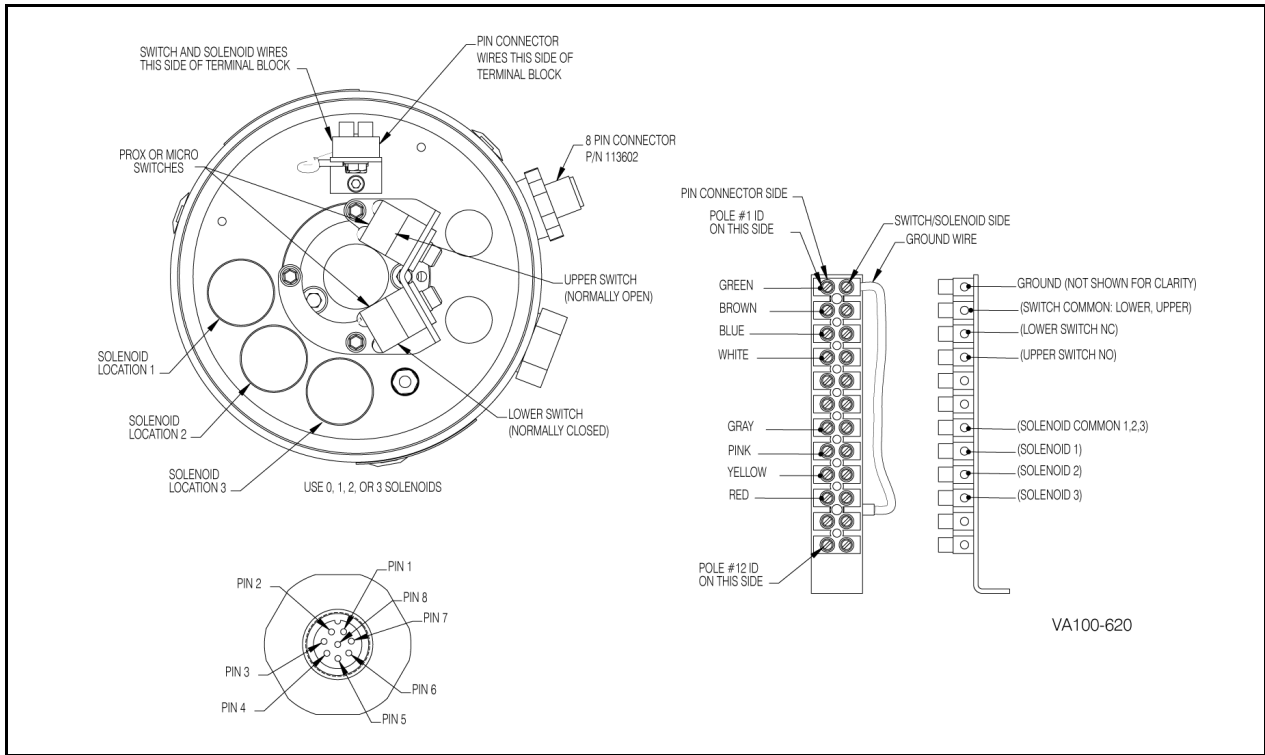


Figure 28: 8-Pin Eurofast

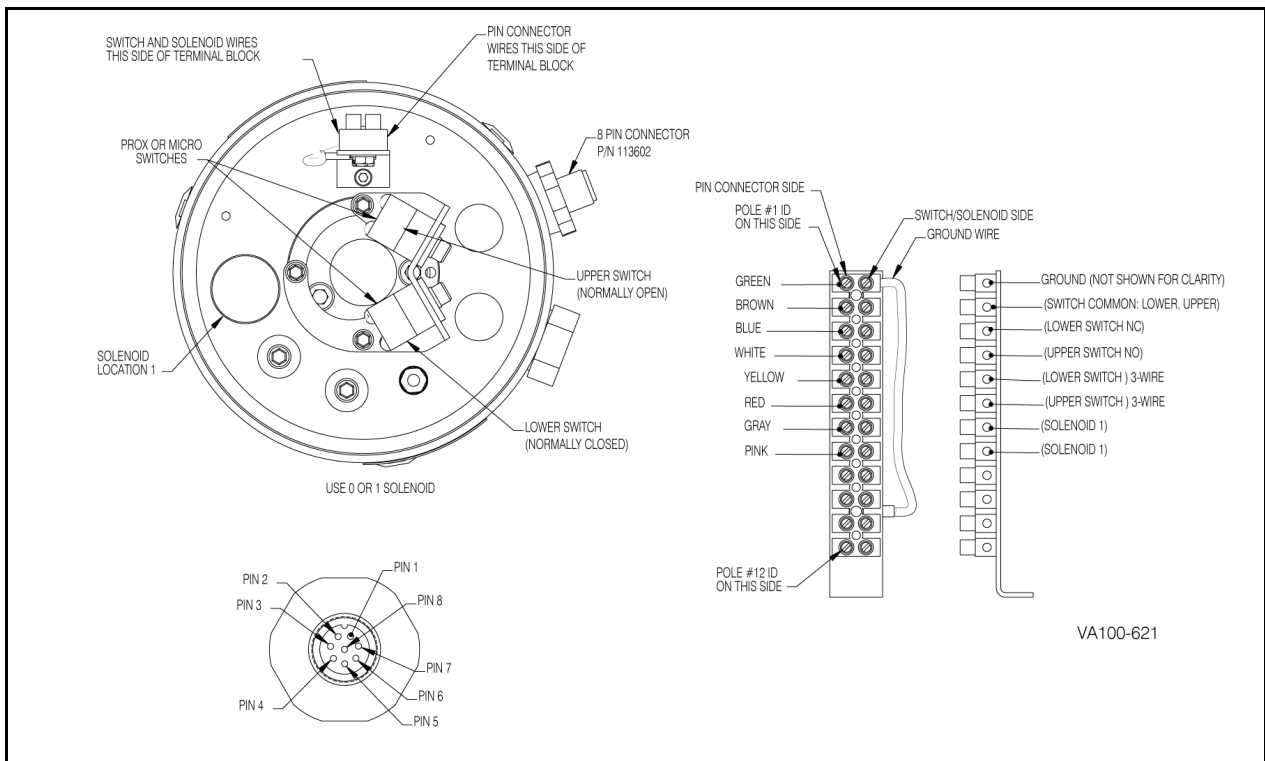


Figure 29: 8-Pin Eurofast with 3-Wire Proximity

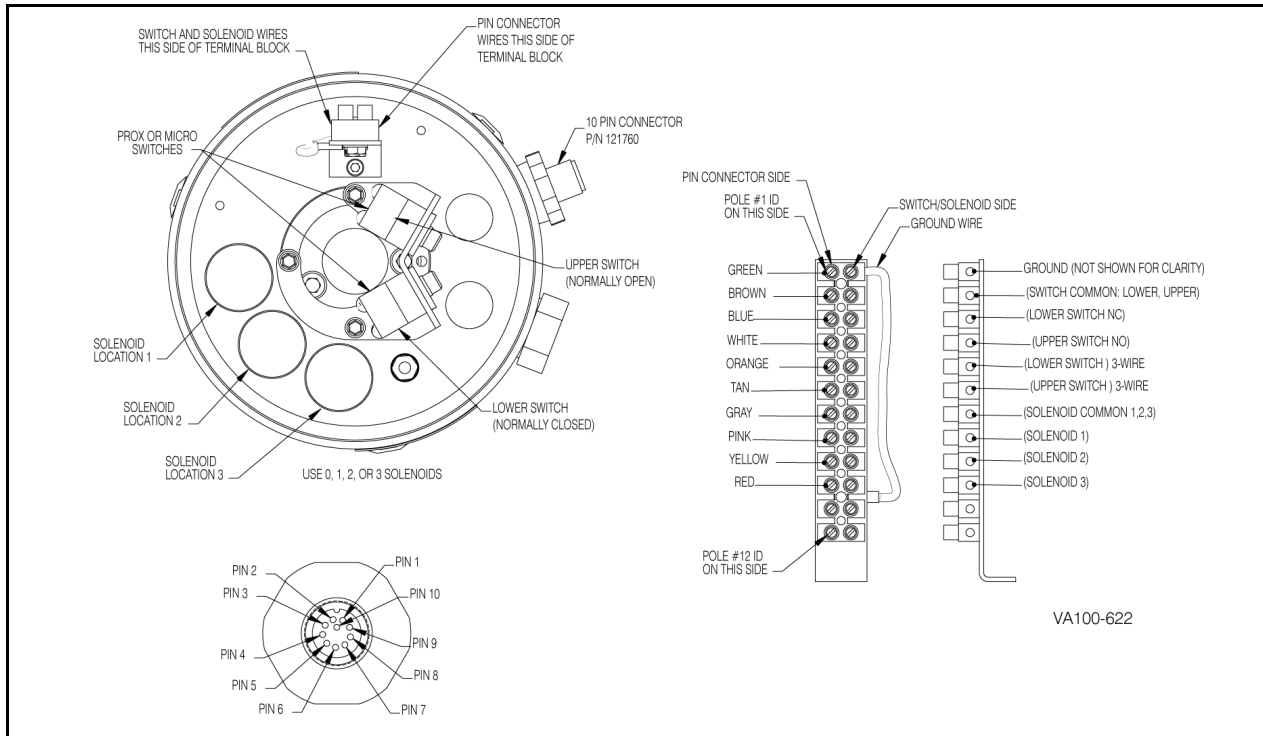


Figure 30: 10-Pin Eurofast

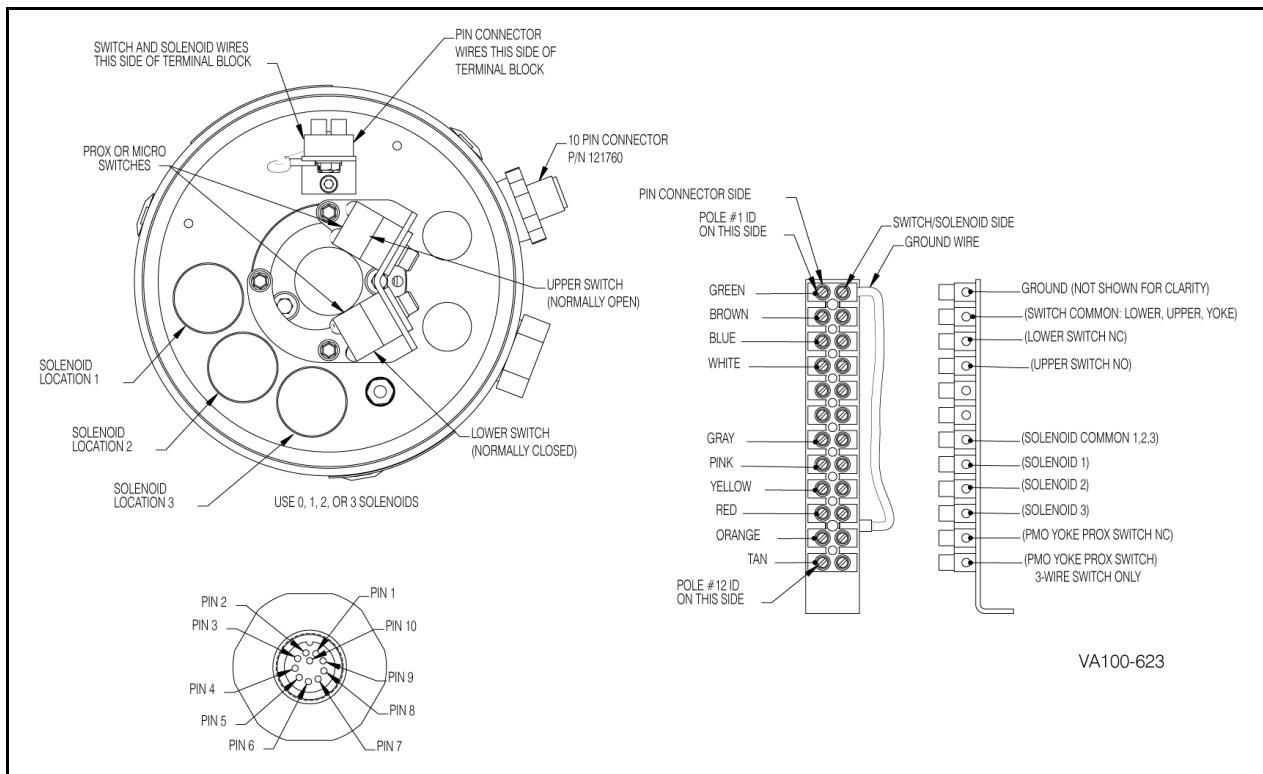


Figure 31: 10-Pin Eurofast

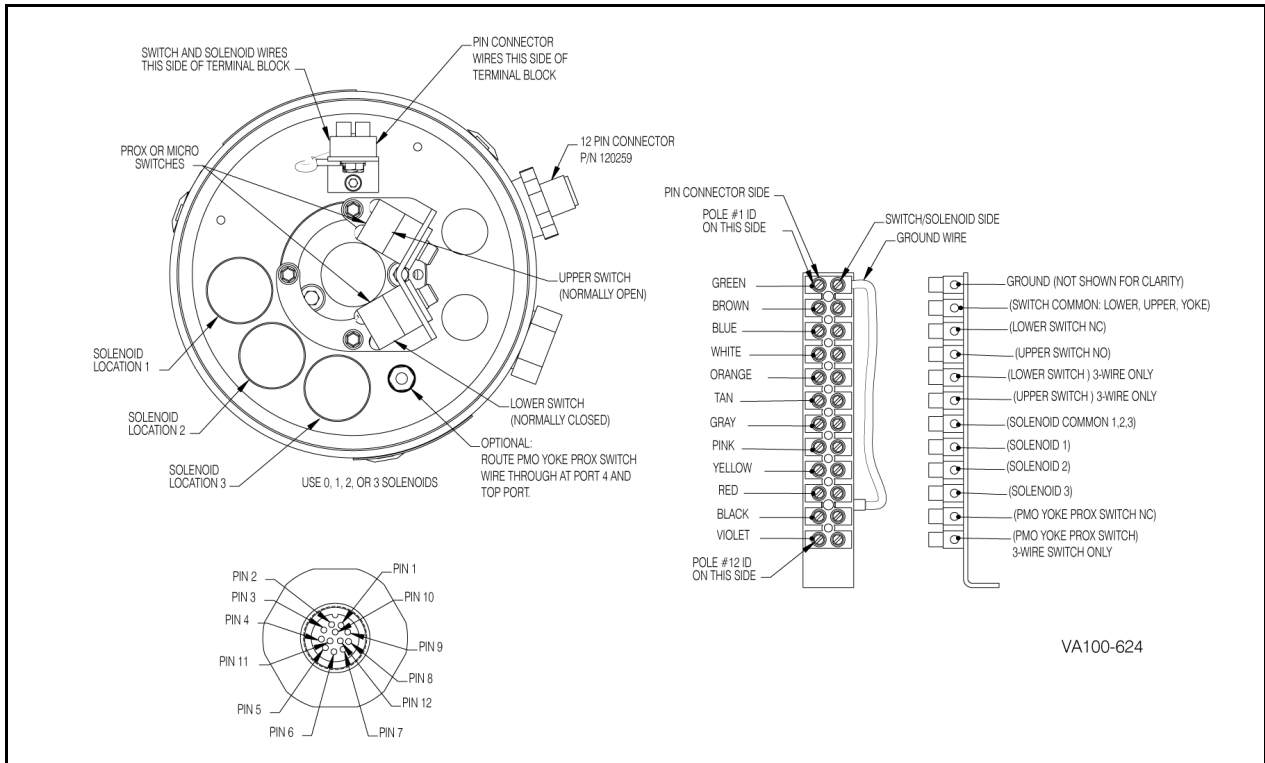


Figure 32: 12-Pin Eurofast

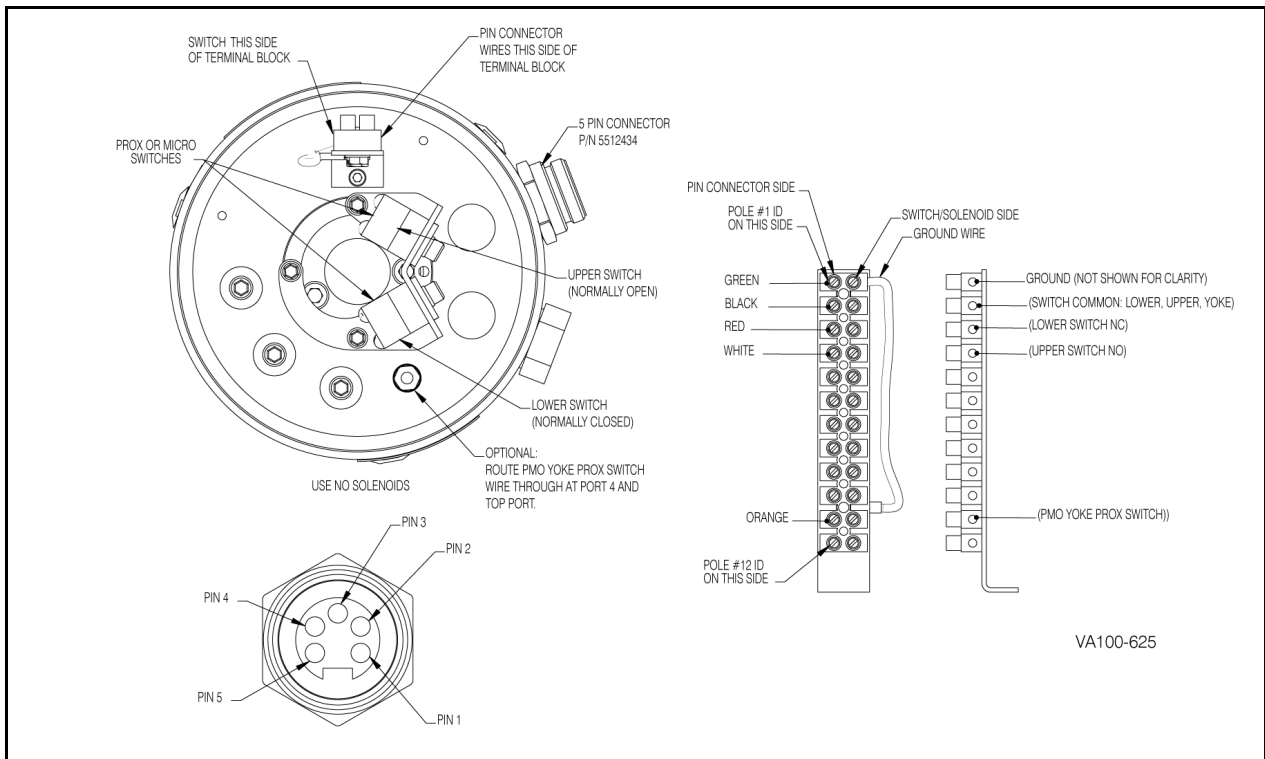


Figure 33: 5-Pin Minifast

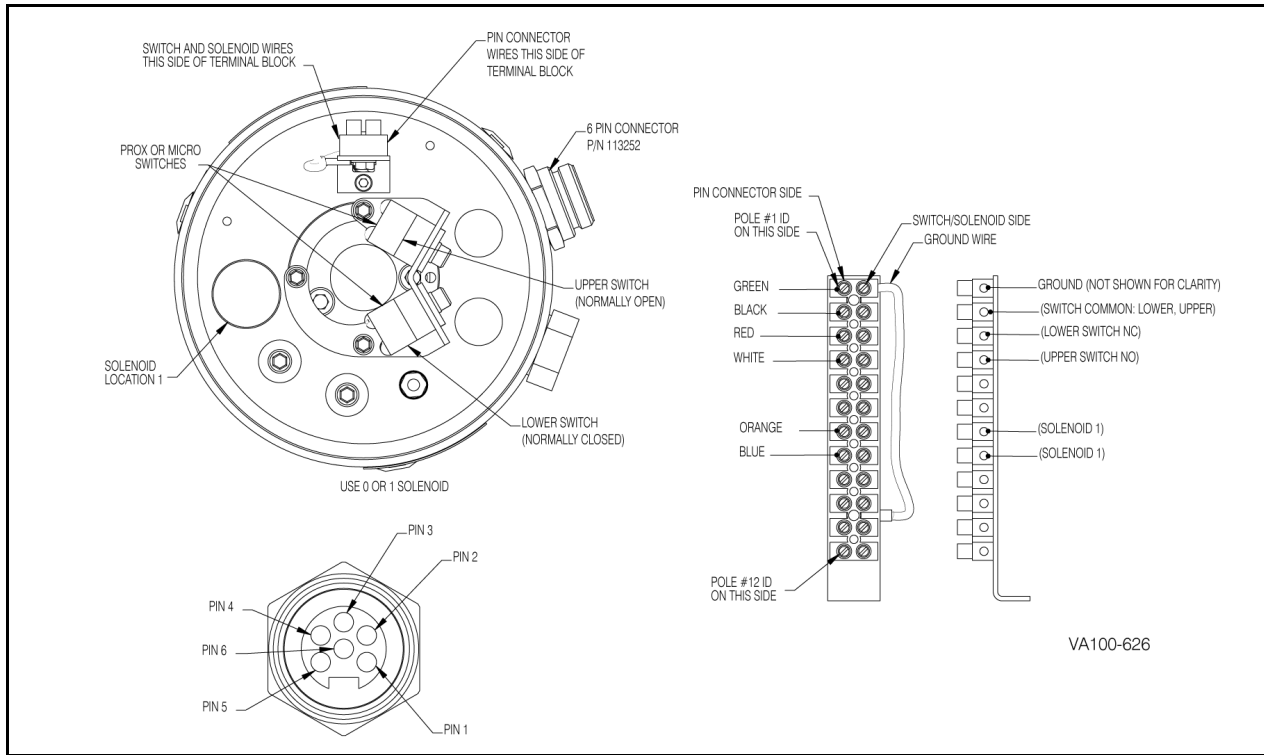


Figure 34: 6-Pin Minifast

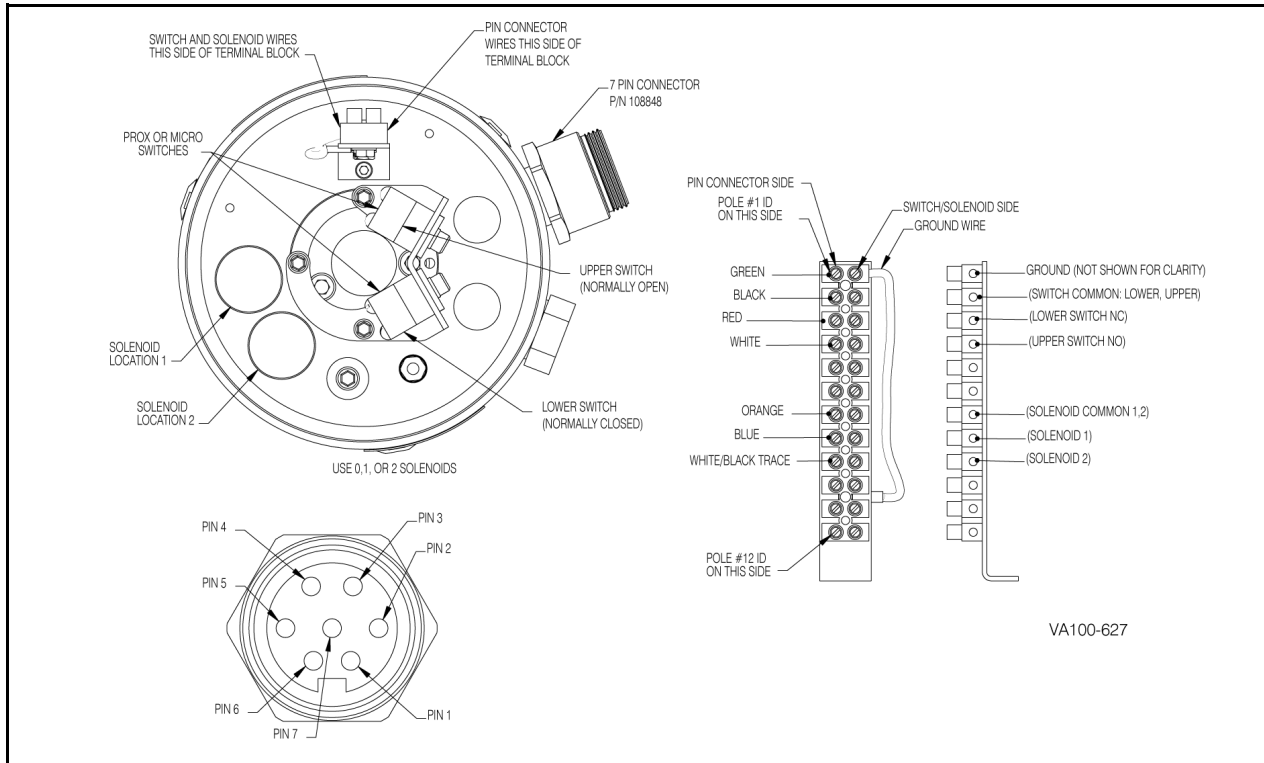


Figure 35: 7-Pin Minifast

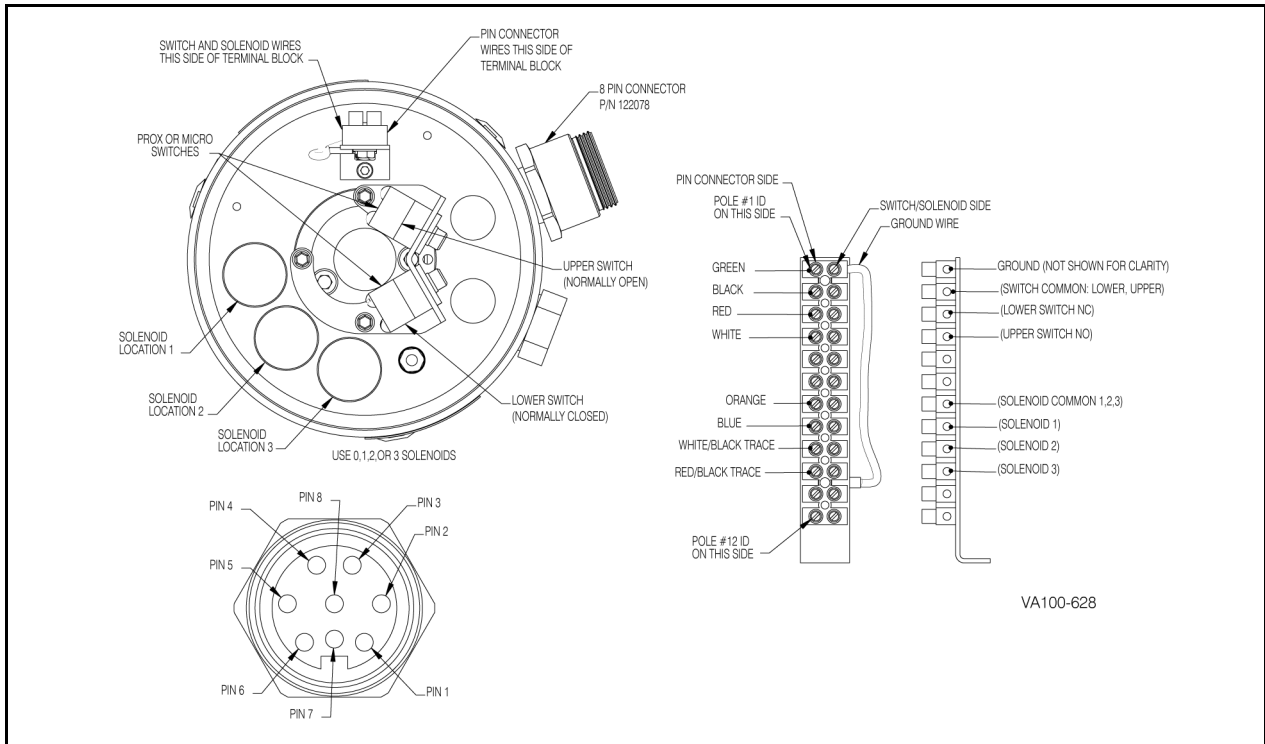


Figure 36: 8-Pin Minifast

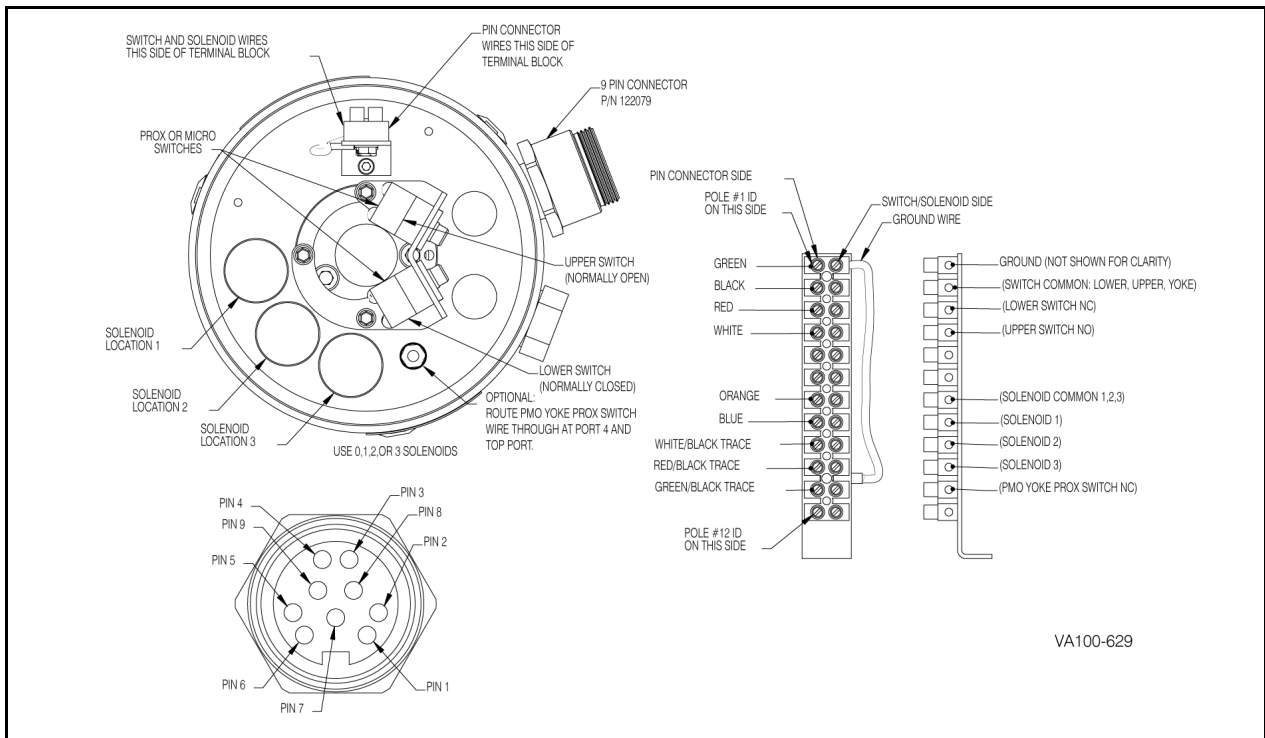


Figure 37: 9-Pin Minifast

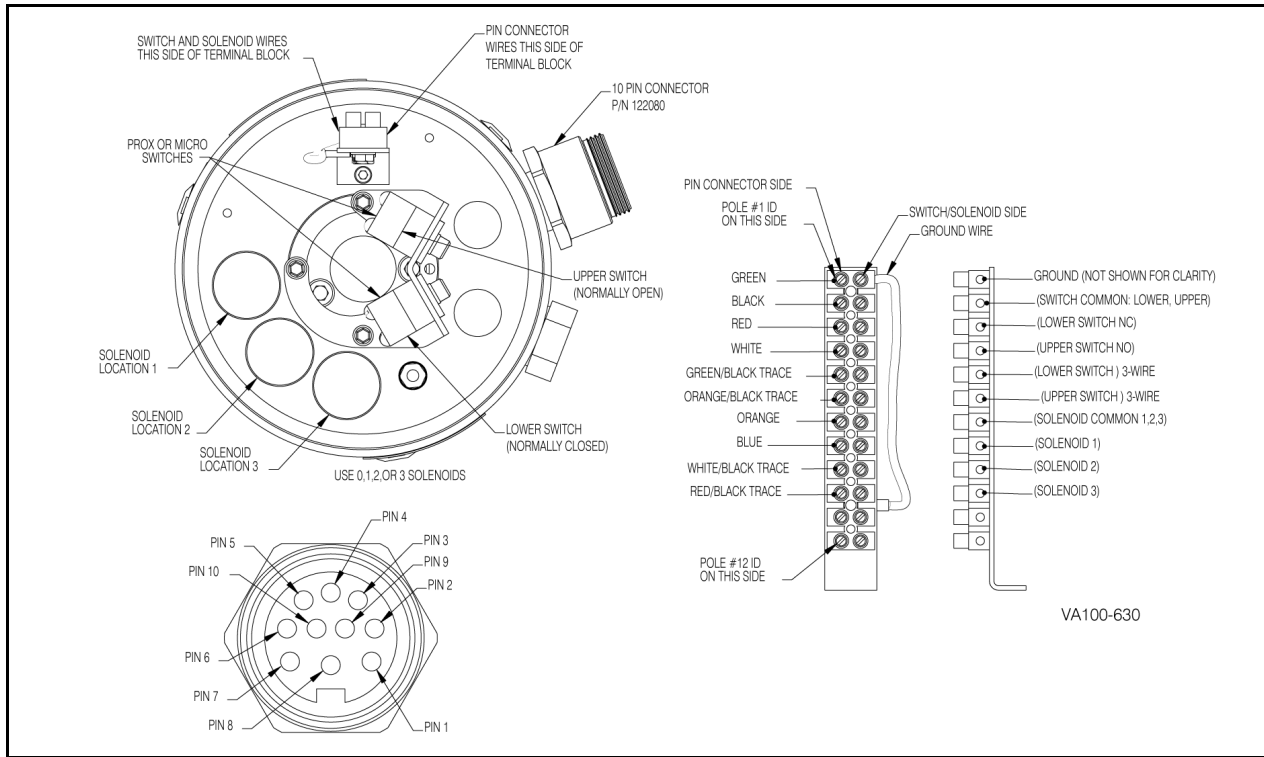


Figure 38: 10-Pin Minifast

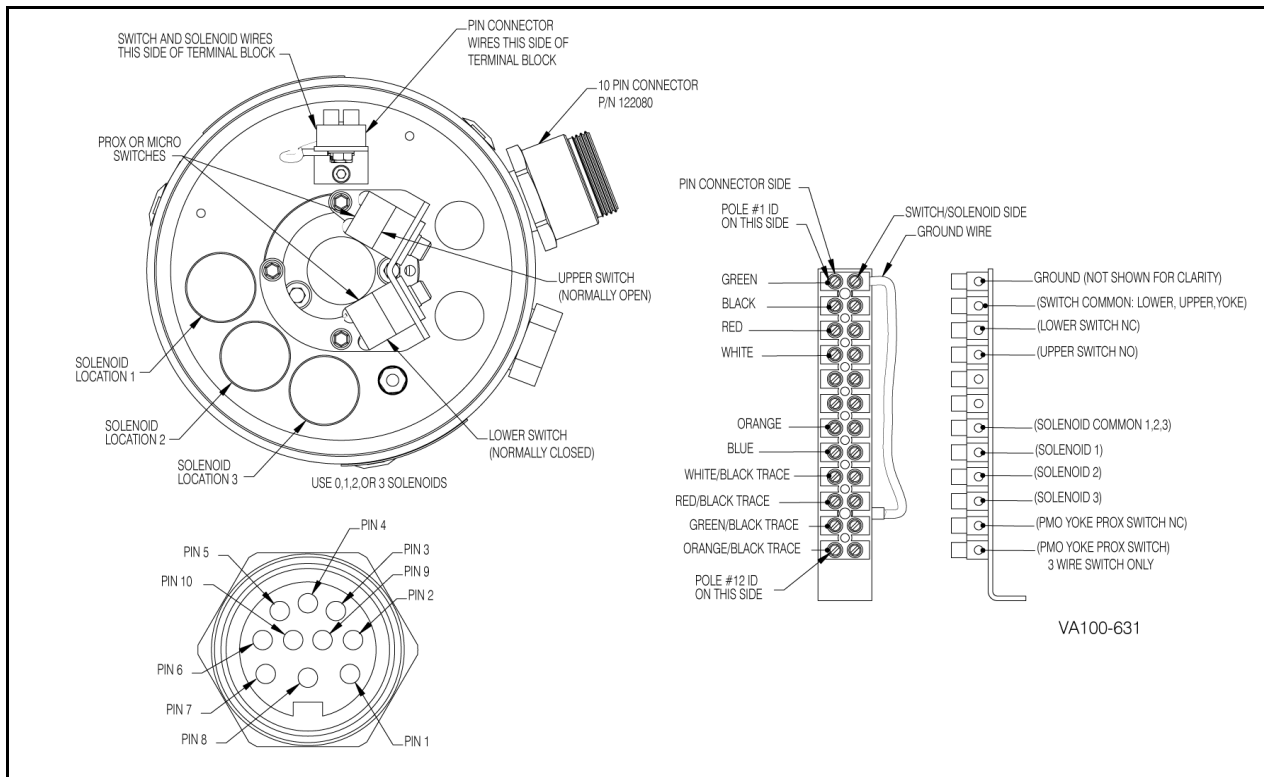


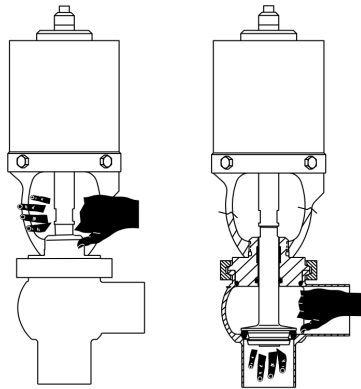
Figure 39: 10-Pin Minifast

Maintenance

Important Safety Tips.



DANGER: Do not put a hand into the yoke or body of a pneumatically actuated valve.



VA100-359a

Detaching Valve and Control Module from Service

1. Drain all pipe system elements attached to the valve and, if necessary, clean or rinse.
2. Remove or block all fluid and gas lines to prevent any material from entering all pipe system elements attached to the valve.
3. Shut off the delivery of air, unless it is required for the removal of the valve stem/actuator assembly from the body.



CAUTION: Only an authorized electrician should disconnect power.

4. Disconnect the electrical supply and lock out all power. If the valve has a control module with a solenoid, the air and electric supply must remain ON until the valve is opened and the clamp removed. This will separate the stem/actuator assembly from the body.

Inspection

W-Series 2-piece control modules require no special maintenance. However, visual inspections should be made between maintenance periods to check switches and confirm valve cycle operation.

Perform routine inspections frequently. See "Troubleshooting" on page 43.

Maintain an adequate stock of replacement parts. Set up specific inspection and servicing schedules to maintain efficiency and avoid unexpected shutdowns.

Inspect the switch settings and operation on a regular basis.

Maintenance Intervals

Maintenance intervals can only be determined by the user and the specific application, since they depend on the following conditions:

- Daily period of operation
- Switching frequency

Removal from Valve and Disassembly

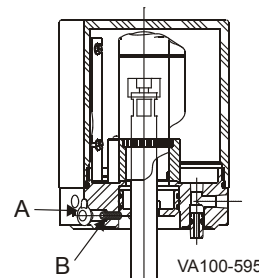
The W-Series, 2-piece control module can be removed from the valve while the valve either remains connected to the piping system or is separately removed. Due to air requirements and system interlock integrity, do not keep the valve in service while removing the control module.

Removal from Valve

1. Disconnect the air.
2. Remove the (3) set screws behind the (3) plastic plugs with tabs at the base of the module (Figure 40).
3. Lift off the control module, taking care not to strain or stretch the wiring connector.
4. If required, disconnect the electrical supply and lock out the power.



CAUTION: Only an authorized electrician should disconnect power.



A. Plug with tab
(3 places)

B. Set Screw
(3 places)

Figure 40: Control Top Removal

Disassembly

1. Remove the valve from service.
2. Shut off the delivery of air.
3. Disconnect the electrical supply and lock out all power

CAUTION: Only an authorized electrician should disconnect power.

4. Unscrew the single-piece clear top (Figure 41) and remove it.
5. To remove the solenoids, unscrew them from the base, being careful with the wires.
6. To remove the Set & Forget switch, (Figure 41), disconnect wires then remove locking screws (Figure 41)
7. Grasp the switch housing firmly and pull the switch up out of the sensor mount.

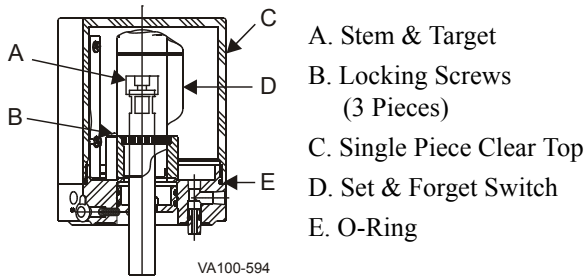


Figure 41: Control Top Switch Removal

8. To disassemble the Proximity or Micro Switch mounts, disconnect the wires, then unscrew the round-head screws holding the switch to the switch blocks. See “W-Series 2-Piece Control Module with Proximity or Micro Switches” on page 38, item 37.

Assembly

Install in reverse order as described above.

1. Referring to Figure 42, insert the Set & Forget switch over the indicator stem and target, into the sensor mount, aligning the switch to the desired location, typically with the LED's facing outward. Ensure a tight fit.
2. Install the locking screws (Figure 41) at three locations and hand-tighten. Be careful not to over-tighten the locking screws.
3. To assemble the Proximity or Micro Switch mounts, install the switch blocks with cap screws (See Figure 52, page 34, item A) onto the mounting bracket.

4. Connect the wiring.

WARNING: Only authorized electricians should terminate electrical wires.

5. To install solenoids, first check that the o-ring at the solenoid base is in place. Thread the solenoid into the module base until metal-to metal contact is made. Do not over-tighten or strip the threads.

6. Connect the wiring.

WARNING: Only authorized electricians should terminate electrical wires.

7. Ensure that the cover top o-ring (Figure 41) is in place. Replace if damaged.

8. Screw the single-piece, clear top (Figure 41) onto the module base until the top bottoms out, being careful not to crimp the wiring.

Switches

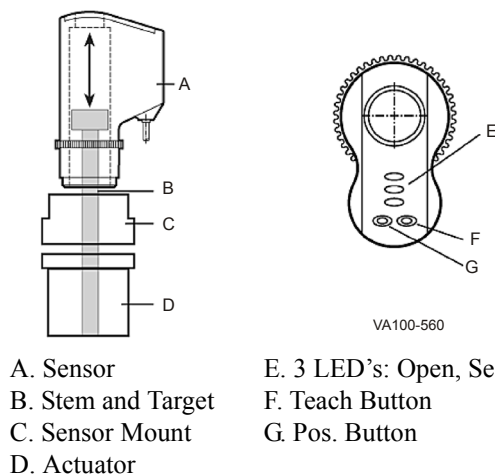
Set & Forget Switch

All material in this section has been re-printed courtesy of IFM Efector.

NOTE: In this manual, “stem-raised” is understood to be when the valve stem is fully retracted into the actuator. “Stem-lowered” is understood to be when the valve stem is fully extended out from the actuator.

Function and Features

The Set & Forget rising stem valve sensor is a continuous absolute linear measurement system with a measuring stroke of 3.15" (80mm). The sensor is used for position feedback for rising stem valves. For position detection, three programmable switch points can be freely selected in the measuring range. The position is signaled visually by 3 LED's.



- | | |
|--------------------|-------------------------------|
| A. Sensor | E. 3 LED's: Open, Seat, Close |
| B. Stem and Target | F. Teach Button |
| C. Sensor Mount | G. Pos. Button |
| D. Actuator | |

Figure 42: Set & Forget Switch

Description of Switch Function

- The sensor measures the upper edge of the valve spindle.
- Non-contact and wear-free detection of the valve positions: **closed**, **open** and the **position for seat lift** (for Mix Proof applications) during the cleaning process.
- It is also possible to monitor the state of the valve seals for W60/W80 series valves instead of the seat lift. Due to the high resolution of 0.2 mm, even slight changes can be detected.
- Easy and time-saving adjustment by means of “teaching” (reading) the valve positions: The “taught” valve positions are automatically assigned certain switching characteristics of the three outputs; several operating modes are available (see “Programming Guide: Single Seat Valves W60/W80/W90” on page 31 or “Programming Guide: Double Seat Valves W70 and W60 3-Position Actuator” on page 32).
- Monitored stroke (detection range) is 3.15" (80 mm). The condition “valve spindle outside detection range” is indicated.
- After adjustment, the unit can be electronically locked to prevent unauthorized manipulation.

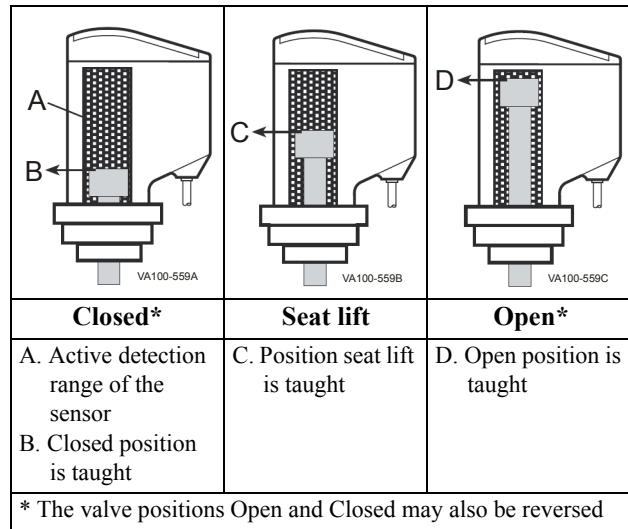


Figure 43: Application Example

Electrical connection

The unit must be connected by a qualified electrician. Observe all national and international regulations for the installation of electrical equipment. Disconnect power before connecting the unit as shown in Figure 44.

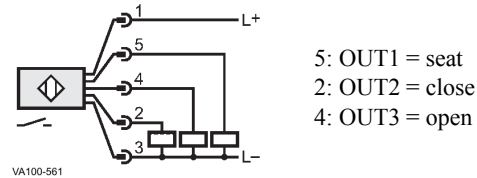


Figure 44: Electrical Input Mapping

The Set & Forget switch is available for installation in the 2-Piece Control Module or in a switch-only configuration.

Switch-Only Option

The Set & Forget switch is mounted directly to the valve actuator using a mounting adapter. The body has an o-ring flange for sealing against water entry. The sensor and target stem is required on the actuator (Figure 45). All operations are the same as the module-mounted switch.

A vent at the base of the adapter allows air to escape in the event of an actuator seal failure and drainage of any condensed liquids. For a horizontal valve mount, the vent should be rotated downward. For an inverted installation, the switch cap can be removed or drilled as required.

Secure the adapter to the actuator with cap screws. Secure the switch to the adapter with screws, ensuring the proper placement of the o-ring. Do not over-tighten.

A 5-pin male connector is standard (Figure 46). Refer to Figure 44 for input mapping.

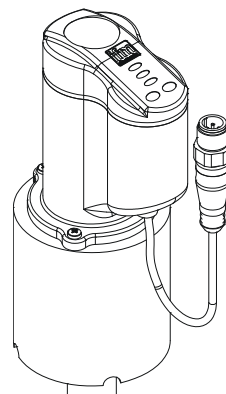


Figure 45: Actuator

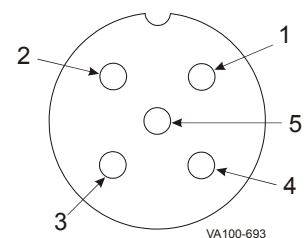


Figure 46: 5-pin connector

Operation

The sensor is operated via the push buttons **Pos.** and **Teach**. To do so, press the buttons with a blunt object. See Figure 47.



CAUTION: Sharp objects may damage the buttons.

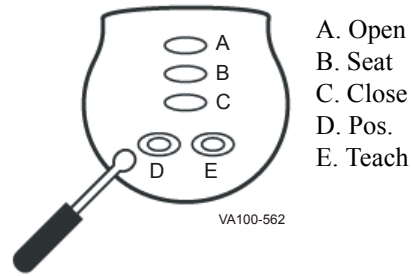


Figure 47: Push Buttons

Programming

After mounting, adjust the unit to the valve positions to be detected (see programming guides). First, clarify your type of valve. The sensor differentiates between two types:

1. Valves with 2 operating positions (closed and open)
2. Valves with 3 operating positions (closed, open, and an intermediate position for either seat lifting or 3-position actuators).

For valves with 2 operating positions, the wear of the valve seals is monitored automatically. This function is not possible for detecting three operating positions.

The programming options are shown in the programming overview (Figure 48). After passing into the programming mode (Teach mode) the unit first expects the adjustment of the closed position; however, you can also start with any other position.

If, for example, the valve is already in the open position, start adjusting this position. To do so, press the Pos. button twice, thus skipping the adjustment of the closed position and the seat position. You can carry out the skipped adjustment steps afterwards.

Skipping a current programming step is also required if you use valves with only 2 operating positions for which the position seat lift is not available. If the position seat lift is not adjusted ("taught"), the unit automatically passes into an operating mode which monitors the wear of the valve seals (see Set-up/operation section).

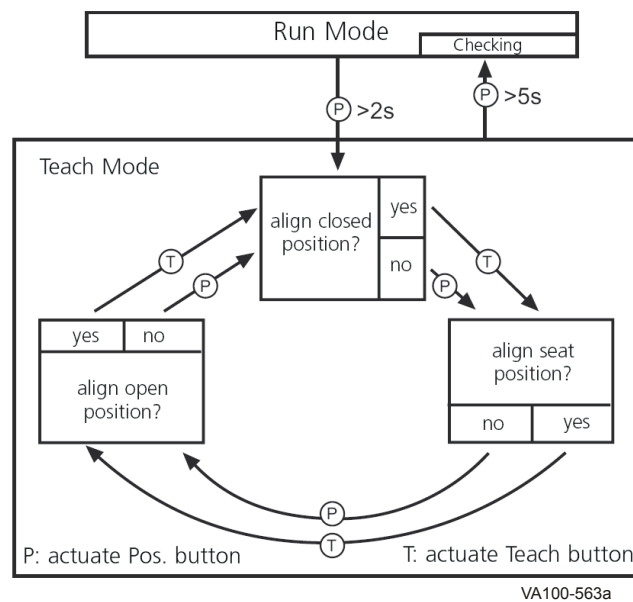


Figure 48: Programming Overview

Programming Guide: Single Seat Valves W60/W80/W90

Run Mode Display: After power up, the sensor goes automatically into run mode.

NOTE: A green blinking LED means that the sensor was powered up without a target present. Power down and power up with the target present. A red blinking LED means that the target is out of range. Re-position target within sensing area. No LED means no output has been triggered.

NOTE: The P button (Position) can be used to toggle between Red, Green, and Yellow. Use this button in case you want to first teach Valve Open. Seatlift is not used for Single Seat Valves. The default is set for the Closed position (RED LED) as starting point.

NOTE: The valve sensor can only be programmed when assembled to a functioning valve.

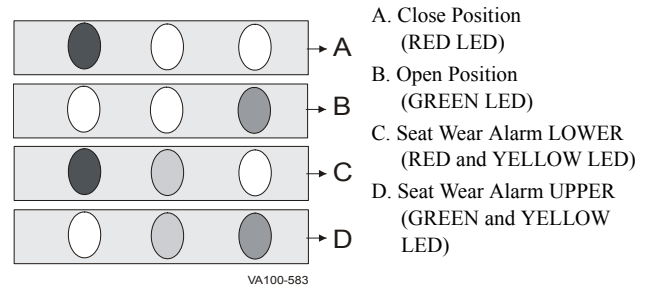


Figure 49: W60/W80/W90 Output Conditions

Programming Steps:

1	Press the Pos. push button for a minimum of 2 seconds.	➔	All LED's flash 2x simultaneously. The unit is in the programming mode. Then only the LED " closed " is lit. The unit is now ready for the adjustment of the closed position.
2	Put the valve into the closed Pos. and press the Teach button.	➔	The LED " closed " goes out and the LED " seat " lights. The unit has stored the closed position and is now ready for the adjustment of the position seat lift (seat) .
3	Put the valve into the position seat lift and press the Teach button.	➔	The LED " open " lights. The unit is now ready for the adjustment of the open position.
4	Put the valve into the open position and press the Teach button.	➔	The LED " open " goes out and the LED " closed " lights again. The unit has now stored all positions.
5	Press the Pos. push button for a minimum of 5 seconds. After 5 seconds, the LED "open" flashes at about 2Hz.	➔	After releasing, all stored measured values are checked. If no errors are detected, all LED's flash 2x simultaneously. The unit automatically quits the programming mode and immediately passes into the operating mode. If an error is found during the check, the LED " closed " flashes at about 8Hz. Acknowledge the error message by pressing the Pos. button and repeat the adjustment.

Programming Guide: Double Seat Valves W70 and W60 3-Position Actuator

Run Mode Display: After power up, the sensor goes automatically into run mode.

NOTE: A green blinking LED means that the sensor was powered up without a target present. Power down and power up with the target present. A red blinking LED means that the target is out of range. Re-position the target within the sensing area. No LED means no output has been triggered.

NOTE: The P button (Position) can be used to toggle between Red, Green, and Yellow. Use this button to first teach Valve Open or Valve Seatlift or 3rd position. The default is set for Close position (Red LED) as the starting point.

NOTE: The valve sensor can only be programmed when assembled to a functioning valve.

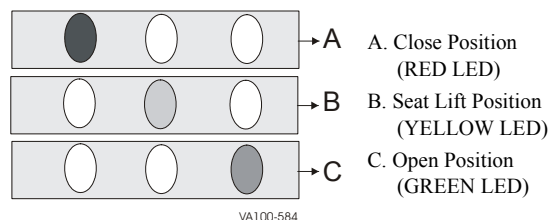


Figure 50: W70 and W60 3-Position Actuator Output Conditions

Programming Steps:

1	Press the Pos. push button for a minimum of 2 seconds.	➔	All LED's flash 2x simultaneously. The unit is in the programming mode. Then only the LED "closed" is lit. The unit is now ready for the adjustment of the closed position.
2	Put the valve into the closed Pos. and press the Teach button.	➔	The LED "closed" goes out and the LED " seat " lights. The unit has stored the closed position and is now ready for the adjustment of the position seat lift (seat) .
3	Put the valve into the position seat lift and press the Teach button.	➔	The LED "seat" goes out and the LED " open " lights. The unit has stored the position seat lift and is now ready for the adjustment of the open position.
4	Put the valve into the open position and press the Teach button.	➔	The LED "open" goes out and the LED " closed " lights again. The unit has now stored all positions.
5	Press the Pos. push button for a minimum of 5 seconds. After 5 seconds, the LED "open" flashes at about 2 Hz.	➔	After releasing, all stored measured values are checked. If no errors are detected, all LED's flash 2x simultaneously. The unit automatically quits the programming mode and immediately passes into the operating mode. If an error is found during the check, the LED " closed " flashes at about 8Hz. Acknowledge the error message by pressing the Pos. button and repeat the adjustment.

Locking/Unlocking

The unit can be locked electronically to prevent unintentional operations.

Press both adjustment push buttons simultaneously for at least 10s in the operating mode. After 10 seconds, each LED lights briefly one after the other. Then the unit is locked or unlocked.

In the locked state, operations are ignored. The factory default setting is Unlocked.

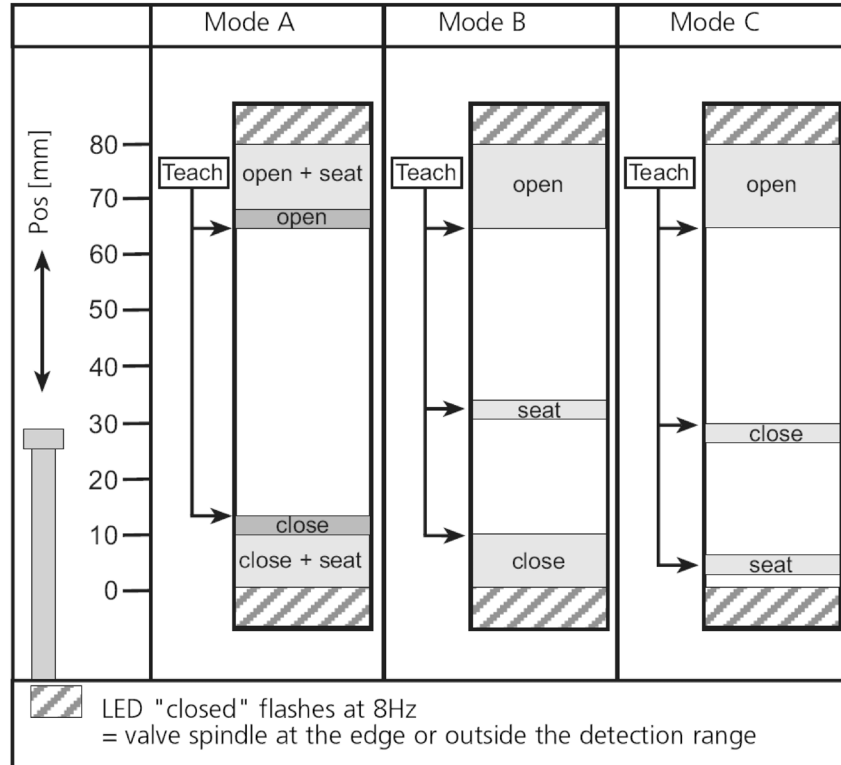
Set-up/Operation

After mounting, wiring and adjustment, check whether the unit operates correctly. If possible, put the valve into all available positions and check if the unit switches correctly and if the operations are correctly indicated by the LED's.

Indication by LED for the different operating modes

The sensor has 3 operating modes which the sensor automatically generates depending on the programming:

- Mode A: For valves with 2 operating positions. The wear of the valve seals is monitored.
- Mode B: For valves with 3 operating positions. The position Seat lift (seat) is between the positions Closed and Open.
- Mode C: For valves with 3 operating positions. The position seat lift (seat) is outside the positions Closed and Open.



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Figure 51: Modes A-C

- When the LED at the zones marked in grey lights up, the output corresponding to this state is closed (switched). At the zones marked in white and outside the detection range (zones hatched diagonally), all outputs are open (not switched).
- All modes are also available when the open and closed positions are inverted. The sensor detects this automatically, and the assignment of the switching characteristics is carried out automatically.
- The open and closed zones are placed near the edge (the teach positions are at the edge of the zones). The seat zones are placed in the middle, symmetrically around the teach position.
- To monitor the **seal**, the open and closed zones in mode A are only 1.5 mm in width. The zones open+seat and closed+seat are immediately adjacent. In these zones both the outputs "open" and "seat" and the outputs "closed" and "seat" are switched simultaneously. **This signals wear of the valve seal!**
- In mode A, only the closed and open positions can be adjusted. Do not adjust the seat lift; please skip this program step by pressing the Pos. button. The sensor then automatically generates mode A.

Error Messages

	LED	Error Description	Measure
during adjustment	close	Flashes at 8 Hz directly after leaving the programming mode = adjustment error! Taught position values are not within the detection range or positions are not permissible or plausible	Error message can be acknowledged by pressing the position button
during operation	close	Flashes at 8Hz = spindle head is at the edge or outside the detection range or spindle head is in non defined zones (white zones, see Figure 51 on page 33) for longer than 20 seconds	Check the position of the valve
	close	Flashes at 8Hz = fault in the electronics. Unlike the other error messages, this error message cannot be acknowledged or terminated.	Replace the sensor

Micro Switch

- A mechanical switch using a lever arm and roller that is compressed or released by stem movement.
- AC/DC 24VDC or 110VAC
- The position of the actuator stem is felt by a roller

Switch Adjustment

W-Series control tops with proximity switches or micro-switches utilize a positive switching configuration to provide discrete inputs for each valve position.

Lower Switch 1 is normally closed (NC) and passing power when the stem is down. When the stem raises, switch 1 opens and power is stopped.

Upper Switch 2 is normally open (NO) and does not pass power when the stem is down. When the stem is fully raised, Upper Switch 2 closes and passes power.

Proximity switches are supplied with incorporated LED's which light when power is passed and are inactive when power is stopped.

1. Raise the stem to open, loosen the cap screws holding the switch blocks (Figure 52, item A) with a 9/64" allen wrench and slide the switches to set the distance between the switches and the stem shaft at .040" (1 mm) (Figure 53).
If using a micro switch, place a .020" feeler gauge between the roller and the small diameter of the stem. Adjust the switch toward the stem until a "click" is heard.
2. Hand-tighten the cap screws (Figure 52, item A) to hold the switch position.

Proximity Switch

- IP67 sealed, inductive coil switch
- AC/DC
- The position of the actuator stem is detected by a sensor at the target printed on the switch

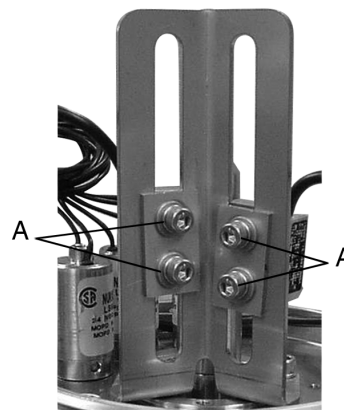


Figure 52: Switch Adjustment

3. With the stem raised, adjust the vertical height of the upper switch target to slightly below the stem shoulder (Figure 53). Tighten the cap screws securely.
4. Lower the stem to close the valve and adjust the target of the lower switch to slightly above the stem shoulder (Figure 54). Tighten the cap screws securely.

NOTE: Switches should detect stem movement within 1/16 inch (0.062 in/1.58 mm)



CAUTION: Do not over-tighten.

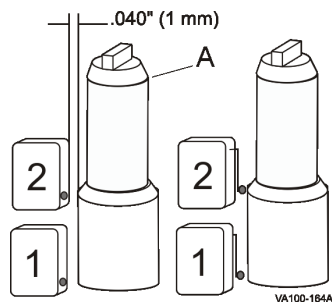


Figure 53: Valve Open Adjustment

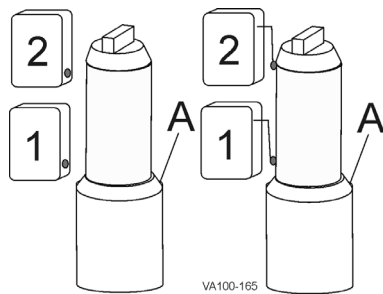
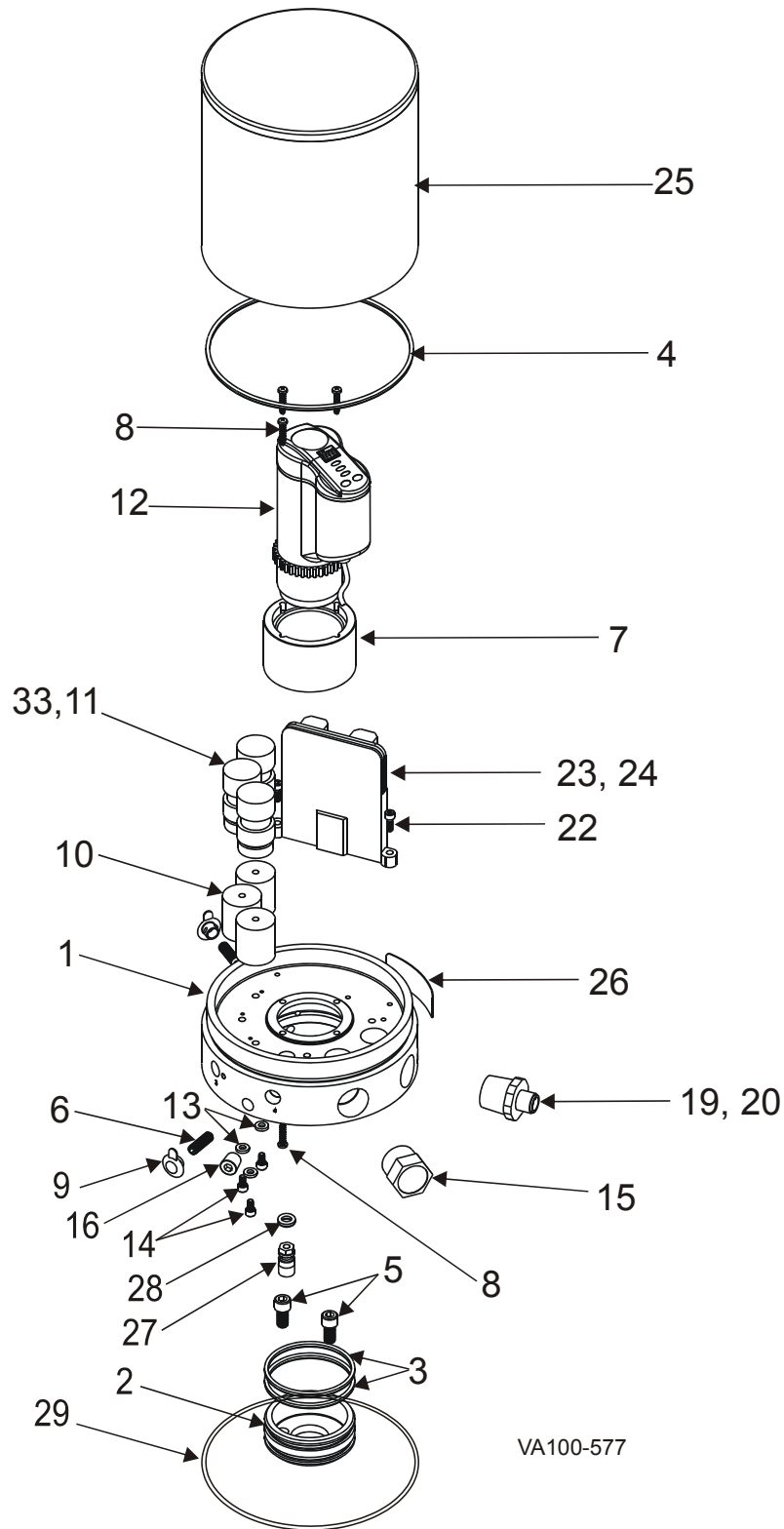


Figure 54: Valve Closed Adjustment

NOTE: In this manual, “stem-raised” is understood to be when the valve stem is fully retracted into the actuator. “Stem-lowered” is understood to be when the valve stem is fully extended out from the actuator.

Set & Forget Control Top



Set & Forget Control Top

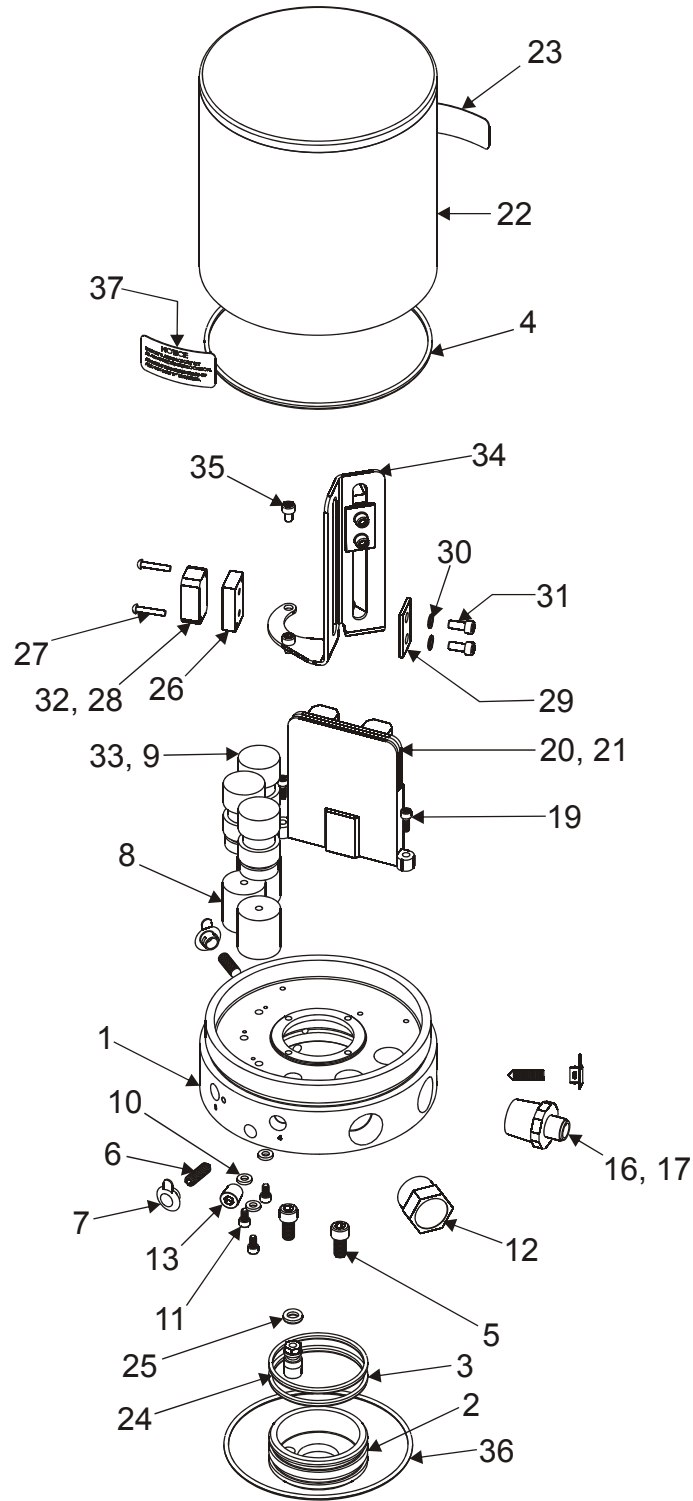
Item #	Part Description	Part No.
1	Base - w/ effector Clipp. Solenoid Control Module	119579
2	Mounting Cup - Control Module	119557
3	O-ring	N70134
4	O-ring	N70157
5	SCHS - 1/4-28 x .50", 18-8 SS	119625
6	Set Screw - 1/4-20 x .75", 18-8 SS, Cone Point	119624
7	Sensor Mount - Control Module	120218
8	Screw - #4-40 x .625" Plastite Phillips Pan Head	121658
9	Push in Plug w/ Tab, 3/8"	121659
10	Booster - Solenoid Valve, Clippard *	112467
11	Solenoid Valve - Clippard 24VDC	112468
12	Sensor - Efector PNP	119747
13	Washer - #6 Nylon x .062"	120067
14	SHCS - 6-32 x .25", 18-8 SS	119626
15	Breather Plug	112470
16	Pipe Plug - 1/8-27 NPT	78-73
17	Nylon Washer #10 ☒	17-111
18	SHCS - 10-32 x .25", 18-8 SS ☒	30-519
19	Pin Connector (optional) See Wiring Schematics	Varies
20	Cable Strain Relief (optional and not shown)	17-88
21	Terminal Block Assembly ☒	119645
22	SHCS - 6-32 x .375", 18-8 SS ☒☒	119627
23	Effector AS-I Slave Card (optional)	112469
24	Device Net Card - Interlink 4 in/4 out (optional)	123648
25	Cover Assembly - Standard Control Module	119561
26	Warning Label	5902473
27	Vent Plug - Control Module	119599
28	O-ring	N70107
29	O-ring	N70044
33	Solenoid Valve - Numatics 120VAC	122237
	Solenoid Valve - Numatics 24VAC	122238
	Solenoid Valve - Numatics 24VDC	122239
	Set & Forget Sensor Stem & Target; 4"/5" actuators	119677
	Set & Forget Sensor Stem & Target; 4"/6" long stroke	119679
	Set & Forget Sensor Stem & Target; 6" single seat & Mix Proof actuators	119681

PL5027-CH80

- ☒ Not shown - used to plug hole when solenoid not used.
- ☒ Not shown - used in place of AS-I or Device Net Card.
- ☒ Used for both Terminal Block Assembly and Control Cards.
- * Used only with Clippard Solenoid

Parts list shown is for valve with Set & Forget Control Module. Necessary parts will vary depending on whether there is a terminal strip, AS-I, Device Net, one solenoid, two solenoids, etc. Please contact factory for additional information.

W-Series 2-Piece Control Module with Proximity or Micro Switches



VA100-611

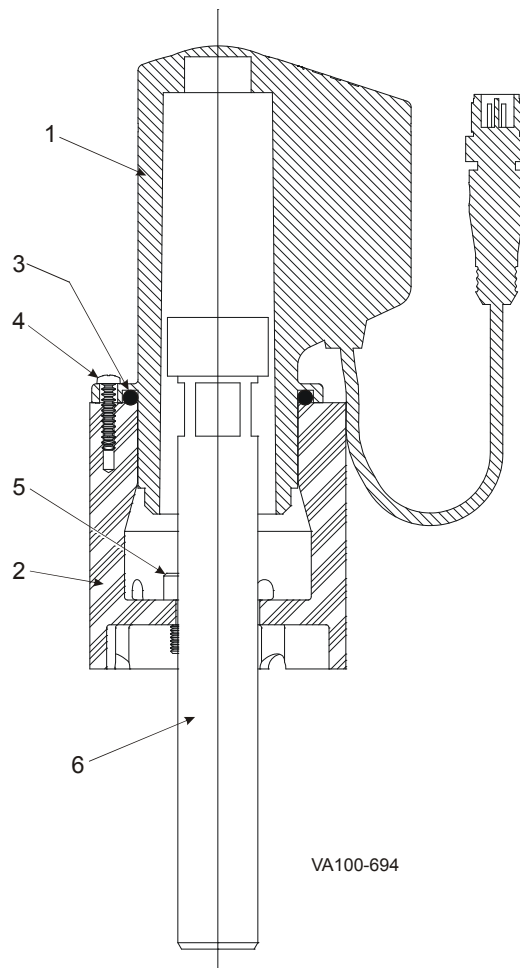
W-Series 2 Piece Control Module with Proximity or Micro Switches

Item #	Part Description	Part No.
1	Base - w/ effector Clipp. Solenoid Control Module	119579
2	Mounting Cup - Control Module	119557
3	O-ring	N70134
4	O-ring	N70157
5	SCHS - 1/4-28 x .50", 18-8 SS	119625
6	Set Screw - 1/4-20 x .75", 18-8 SS, Cone Point	119624
7	Push in Plug w/ Tab, 3/8"	121659
8	Booster - Solenoid Valve, Clippard *	112467
9	Solenoid Valve - Clippard 24VDC	112468
10	Washer - #6 Nylon x .062"	120067
11	SHCS - 6-32 x .25", 18-8 SS	119626
12	Breather Plug	112470
13	Pipe Plug - 1/8-27 NPT	78-73
14	Nylon Washer #10 ☒	17-111
15	SHCS - 10-32 x .25", 18-8 SS ☒	30-519
16	Pin Connector (Optional) Refer to Wiring Schematics	Varies
17	Cable Strain Relief	17-88
18	Terminal Block Assembly ☒	119645
19	SHCS - 6-32 x .375", 18-8 SS ☒	119627
20	Effector AS-I Slave Card (optional)	112469
21	Device Net Card - Interlink 4 in/4 out (optional)	123648
22	Cover Assembly - Standard Control Module	119561
	Cover - Long Stroke	119562
23	Warning Label	5902473
24	Vent Plug - Control Module	119599
25	O-ring	N70107
26	Switch Block	116297
27	Screw - #4-40 RHMS x .62	30-69
28	Upper Proximity Switch, two wire, normally open 24VDC/110VAC	115645
	Lower Proximity Switch, two wire, normally closed 24VDC/100VAC	115646
29	Switch Plate	116296
30	Washer Lock, # 8, 18-8 Regular	43-20
31	SHCS 8-32 x .375 18-8 SS	125719
32	Micro Switch	17-9
33	Solenoid Valve - Numatics 120VAC	122237
	Solenoid Valve - Numatics 24VAC	122238
	Solenoid Valve - Numatics 24VDC	122239
34	Bracket-Micro Switch Mounting	121371
	Bracket - Proximity Switch	121370
35	SHCS 8-32 x .25 18-8 SS	30-176
36	O-ring	N70044
37	Label-Switch Adjustment-Rad	112094

PL5027-CH81

- ☒ Not shown - used to plug hole when solenoid not used.
- ☒ Not shown - used in place of AS-I or Device Net Card.
- ☒ Used for both Terminal Block Assembly and Control Cards.
- * Used only with Clippard Solenoid

Set & Forget, Switch-Only



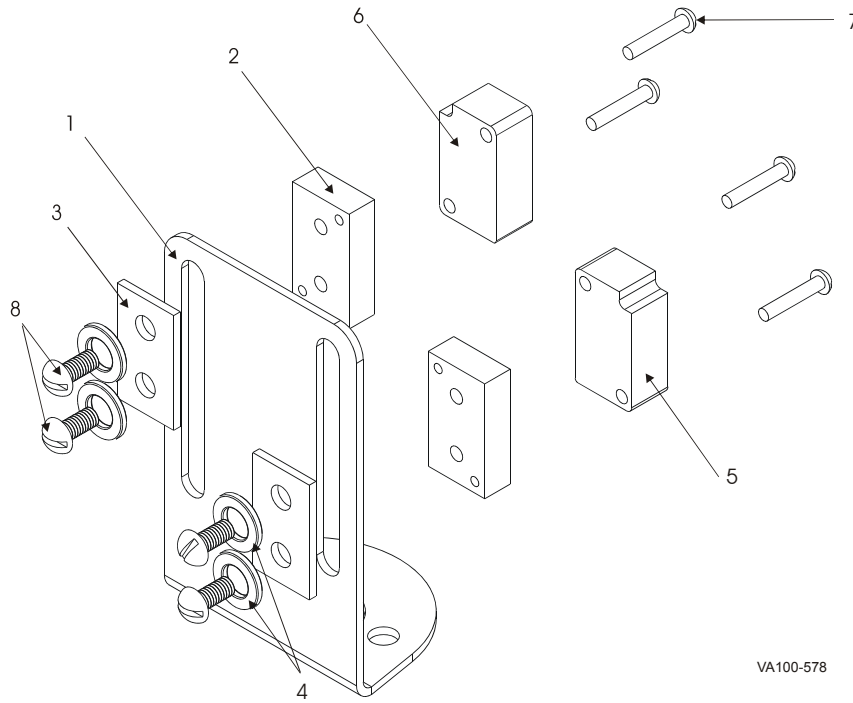
Item #	Description	Part No.
1	Set & Forget Switch-Only (PNP)	126078
2	Adapter Mount	125463
3	O-Ring	see note 1
4	Screws	121658
5	Cap Screws	119625
6	Stem for 126155 kit	119677
	for 126156 kit	119681
	for 126157 kit	119679

Kits (include switch, mount, hardware and stem)	
for 4" & 5" Single seat valve actuators	126155
for 6" single seat & Mix Proof valve actuators	126156
for use on long stroke actuators	126157

PL5027-CH129

1. Supplied with the switch; not available separately

Exterior Mount Proximity Switch



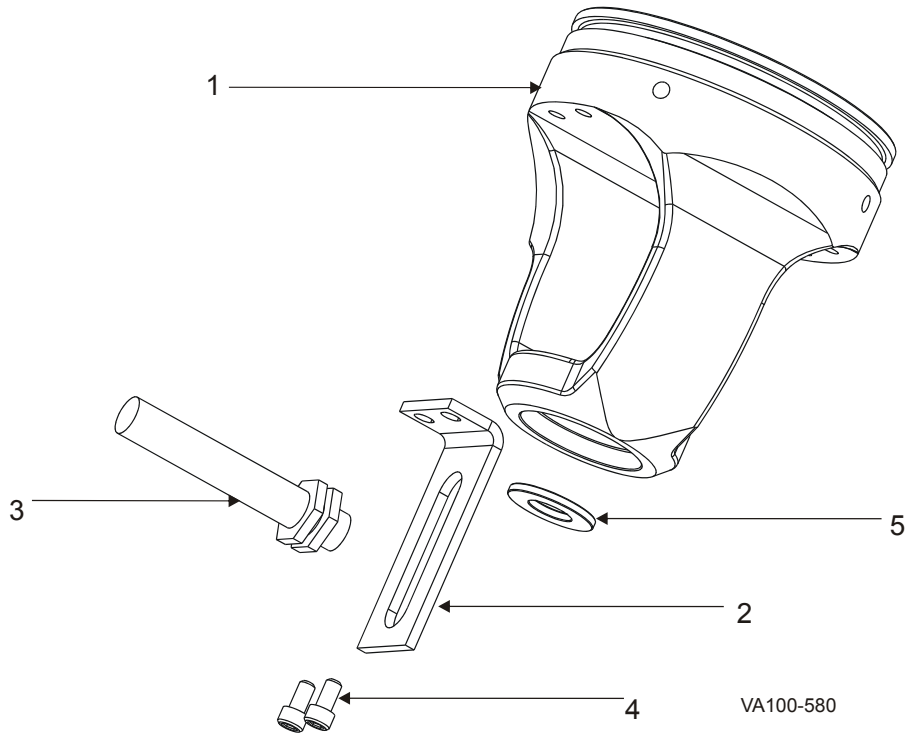
VA100-578

Item #	Description	Part No.
1	Bracket-Prox switch W60	116295
	W70	116294
	Long Stroke	116293
	Extra Long Stroke	120319
2	Switch Block	116297
3	Switch Plate	116296
4	Washer Plain #8 18/8 Narrow	43-26
5	Proximity switch 24VDC / 110VAC (NC)	17-79
6	Proximity switch 24VDC / 110VAC (NO)	17-72
7	Screw - #4-40 RHMS x .62	30-69
8	8-32 X .375 SRHMS 18-8	116298
* 9	1/4-28 X .375 SHCS 18-8	116299
* 10	Washer plain 1/4 18-8 Narrow	43-144

PL5027-CH82

* Mounting bolts not shown, items 9 and 10

Valve Mount Proximity Switch



Item #	Description	Part No.
1	Modified Yoke 4AR and 4AL	110132
	5AR and 5AL	112795
	6AR and 6AL	114430
2	Mount Bracket	112794
3	Switch *, Proximity 24VDC / 110AC	17-73
4	Screws	30-575
5	Washer, 4" and 5"	43-31
	Washer, 6"	43-169

PL5027-CH83

* Programmable NO/NC by choice of wire termination

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
<i>Leaking Air</i>		
Air leaking from between actuator and Control Module	Missing or damaged O-rings	Disassemble and remove Control Top, inspect air vent plug O-ring and mounting cup O-rings, replace if required.
	Wrong porting arrangement	Check porting and revise as required.
Air leaking from port in Control Module base.	Wrong porting arrangement	Check porting and revise as required.
Air leaking inside Control Module.	Solenoid valve gasket failure	Check solenoid O-ring. Replace or adjust as necessary.
<i>Operation</i>		
Valve fails to open	Air pressure too low	Set air pressure to 60psi (4 bar) for 4", 5", and 6" light spring actuator. 6" standard spring the pressure is 80 psi (bar)
	Control failure	Check control sequence. Check air supply.
	Vent blocked	Check control wiring and power source. Check actuator vent is not blocked.
Valve fails to close	Mechanical failure	Check for debris in valve.
		Check for loose stems.
Moisture in Control Module	Missing and/or damaged O-ring	Replace module O-ring.
	Top not screwed on	Ensure top is fully screwed down onto module base.
	Vent entry	Rotate vent down (horizontal mount) for draining.
		Plumb vent with down spool to deflect direct spray.
Wire port entry	Tighten strain gauge grommet.	
	Seal the wire-entry point.	
<i>Electrical</i>		
Set & Forget		
No Valve "Closed" or "Open" indication LED	No Power	Check power connections.
	No output triggered	Check proper assembly of indicator stem and target. Reset the sensor.
Green blinking LED upon power up	No target present	Power down and power up with target present.
Red blinking LED upon power up	Target out of range	Re-position target within sensor area (by checking proper assembly).
No Valve "Closed" or "Open" indication	Lower switch not adjusted properly	Adjust switch.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Electrical		
Set & Forget, continued		
No Valve “Open” signal	Upper switch not adjusted properly	Adjust switch.
Erratic switch alarms	Control failure	Check control wiring and power source.
	Loose hardware	Check Set & Forget Sensor mounting and proper assembly of indicator stem and target.
Proximity or Micro Switches		
No Valve “Closed” or “Open” indication LED or signal	No Power	Check power connections.
	No Output Triggered	Check proper assembly of indicator stem and switch’s position.
Opposite “Closed” or “Open” Indication LED or signal	NO and NC switches in wrong position	Check and confirm NO switch is Upper and NC switch is Lower.
Erratic Switch Alarms	Switch not properly adjusted	Adjust switch. Condition often result of tight gap setting or adjustment too close to trigger point of stem.
	Loose wiring	Confirm wiring terminations.
	Hydraulic shock in valve	Check that hydraulic shock or other factor is not actually moving stem. Switch could be correct.
Loss of Switch Adjustment	Switch not properly adjusted	Adjust switch.
	Switch hardware not snugged sufficiently against vibration level	Snug switch hardware.
	Loose switch bracket	Tighten bracket mount.
	Loose Control Top	Tighten Control Top setscrews.
As-i and/or DeviceNet Cards		
No Indicator LED on card	No Power	Check power connections.
	Wrong wiring	Confirm proper wiring.
	Bad card	Replace card.
Flickering Indicator LED on card	Communication error	Check and confirm proper wiring.
		Confirm no wiring strands are shorted between terminals.
	Bad Card	Consult Controls Engineer. Replace card.

W-Series 2-Piece Control Top

AND SWITCH-ONLY OPTIONS



Provided by:



SPX FLOW TECHNOLOGY

611 Sugar Creek Road

Delavan, WI 53115

P: (262) 728-1900 or (800) 252-5200

F: (262) 728-4904 or (800) 252-5012

E: wcb@spx.com

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