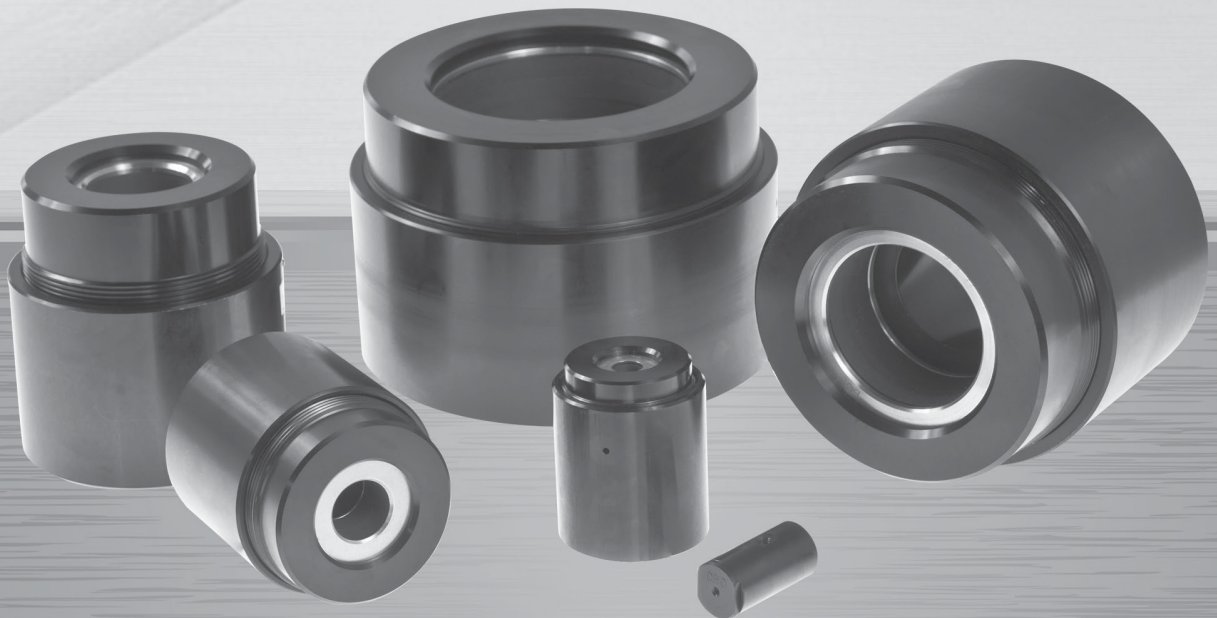


**FastTest**<sup>®</sup>  
Your Productivity Connection

# ***FE Series User Manual***

**Includes FE+ Connection Verification**



## INTRODUCTION

### Copyright

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### Scope

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This manual supports FasTest Inc. products only. If special components, including but not limited to serial hubs, power supplies, PLC's are included based on a customer's specification or special request, it is the customer's responsibility to consult support materials and technical support specific to these special components provided by the third party manufacturers. FasTest Inc. assumes no liability for misuse, misapplication, or support for products that are not the FasTest Inc. brand.

Using the products in a manner not specified in this manual can impair the safety of operators and equipment.

We reserve the right to make alterations for the purpose of technical improvement.

Technical Support is available from: [insidesales@fastestinc.com](mailto:insidesales@fastestinc.com)

Edition: WP007 Rev D; 02/20/2017 En

**OVERVIEW**

The FE Series delivers fast, leak free connections for vacuum and pressure testing, fluid filling or flushing applications. The connector seals internally to smooth tubes or threaded ports of many materials. Compressed air activates the seals for a leak tight, non-marring connection for air and liquid applications - even with rough and oily surfaces.

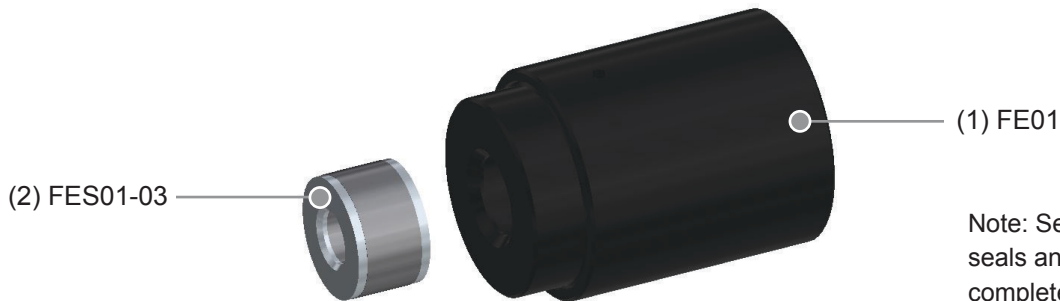
**Optional Features:**

**CONNECTION VERIFICATION**

The **Connection Verification™** feature provides the user an indication the connector has properly actuated to a calibrated position. As pilot pressure is applied to a FE+ connector, the “piston” moves in a linear manner which compresses the Main Seal on the test piece. **Connection Verification™** uses a sensor that measures internal piston travel which is calibrated to the user’s specific sealing range. After calibration, the connector will send a feedback signal each time the piston travels within the range set by the user.

**Contents:**

A new FE comes with the connector (1) and a seal set (2) as shown in Figure 1A. **Users must install the seal set into the connector before use.**



Note: Seal sets contain elastomer seals and backup washers. For complete listing of seal set size ranges see catalog.

Figure 1A. FE connector and seal set

**CONNECTION VERIFICATION**

A new FE+ (Connection Verification) comes with only the base connector (1), **seal sets are sold seperately. Users must install the seal set into the connector before use.** If the connector includes Connection Verification, a CV01 cable (3) will included, a CV02 cable will not be included. As shown in Figure 1B.

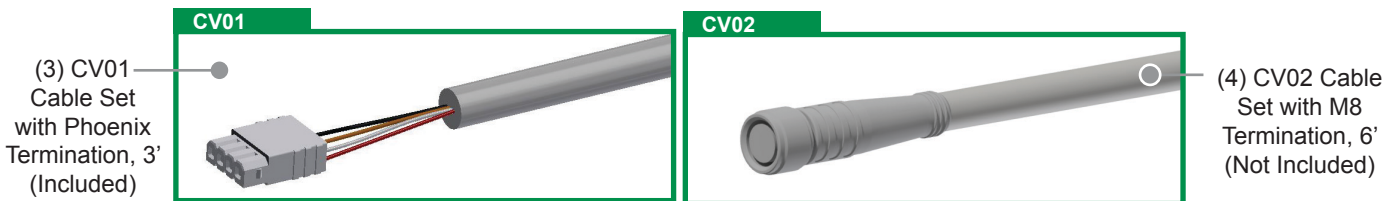


Figure 1B. Connection Verification cables

## SPECIFICATIONS

|                               |   |
|-------------------------------|---|
| <b>Operating Pressure</b>     | 500 psi (34 bar)  |
| <b>Connection Profile</b>     | External Tubes and Threads  |
| <b>Termination Profile</b>    | Female 10-32" UNF, M5X8, NPT/BSPP: 1/8" to 2 1/2"                             |
| <b>Mounting Port</b>          | Female 10-32" to 3/8-24" UNF, M5X8 to M11X1.5, 4-40" to 3/8-24" UNC           |
| <b>Pilot Port</b>             | Female 10-32" UNF, M5X8, 1/8" NPT/BSPP  |
| <b>Pilot Pressure</b>         | 60-600 psi  |
| <b>Housing Material</b>       | Aluminum and Stainless steel  |
| <b>Seal Material</b>          | Standard: Neoprene, Urethane<br>Optional: FKM (Viton), Buna-N or EPDM         |
| <b>Operating Temperatures</b> | 0°F to 200°F (-17°C to 93°C) Neoprene<br>32°F to 175°F (0°C to 79°C) Urethane |

### CV

NPN (max 100 mA load)

Supply voltage range:  
8V to 24V

Over-voltage protection

Sealed electronics

Internal memory stores  
calibration points

## CHART 1: Dimensions

| FE Body Sizes | A       | B       | C          | D         | E       | F       | G            | H       | I       | J       | L      |
|---------------|---------|---------|------------|-----------|---------|---------|--------------|---------|---------|---------|--------|
| <b>FE001</b>  | 1.72    | .085    | 1/8 NPTF   | 10-32 UNF | 0.63    | NA      | 4-40 UNC     | NA      | NA      | NA      | .22    |
| <b>FEM001</b> | (42.68) | (21.59) | 1/8 BSPP   | M5x.8     | (16.0)  | NA      | M2.5x.45     | NA      | NA      | NA      | (5.58) |
| <b>FE01</b>   | 2.05    | 1.49    | 1/8 NPTF   | 10-32 UNF | 1.10    | .55     | 10-32 UNF    | .54     |         |         | .58    |
| <b>FEM01</b>  | (52.1)  | (37.9)  | 1/8 BSPP   | M5x.8     | (28.0)  | (14.0)  | M5x.8        | (13.72) |         |         | (14.8) |
| <b>FE1</b>    | 2.72    | 2.22    | 1/4 NPTF   | 1/8 NPTF  | 1.62    | .81     | 1/4 - 28 UNF | .770    |         |         | .61    |
| <b>FEM1</b>   | (69.1)  | (56.4)  | 1/4 BSPP   | 1/8 BSPP  | (41.2)  | (20.6)  | M6x1         | (19.56) |         |         | (15.5) |
| <b>FE2</b>    | 3.50    | 3.11    | 1/2 NPTF   | 1/8 NPTF  | 2.50    | 1.25    | 1/4 - 28 UNF | 1.185   |         |         | 1.06   |
| <b>FEM2</b>   | (88.9)  | (79.0)  | 1/2 BSPP   | 1/8 BSPP  | (63.5)  | (31.75) | M6x1         | (30.01) |         |         | (27.0) |
| <b>FE3</b>    | 4.48    | 4.23    | 1 NPTF     | 1/8 NPTF  | 3.25    | 1.63    | 1/4 - 28 UNF | 1.5     | .52     | .41     | 1.64   |
| <b>FEM3</b>   | (113.8) | (107.5) | 1 BSPP     | 1/8 BSPP  | (82.6)  | (41.5)  | M6x1         | (38.1)  | (13.20) | (10.41) | (41.7) |
| <b>FE4</b>    | 4.60    | 5.48    | 1 1/2 NPTF | 1/8 NPTF  | 4.25    | 2.13    | 1/4 - 28 UNF | 2.10    |         |         | 1.64   |
| <b>FEM4</b>   | (116.9) | (139.2) | 1 1/2 BSPP | 1/8 BSPP  | (108.0) | (54.2)  | M6x1         | (53.34) |         |         | (41.7) |
| <b>FE5</b>    | 4.60    | 6.98    | 2 NPTF     | 1/8 NPTF  | 5.50    | 2.75    | 3/8 - 24 UNF | 2.70    |         |         | 1.64   |
| <b>FEM5</b>   | (116.9) | (178.0) | 2 BSPP     | 1/8 BSPP  | (139.7) | (57.2)  | M11x1.5      | (68.58) |         |         | (41.7) |
| <b>FE6</b>    | 4.97    | 7.48    | 2 1/2 NPTF | 1/8 NPTF  | 6.12    | 3.06    | 3/8 - 24 UNF | 3.05    |         |         | 1.64   |
| <b>FEM6</b>   | (136.3) | (190.0) | 2 1/2 BSPP | 1/8 BSPP  | (155.5) | (77.8)  | M11x1.5      | (77.47) |         |         | (41.7) |

### Standard FE

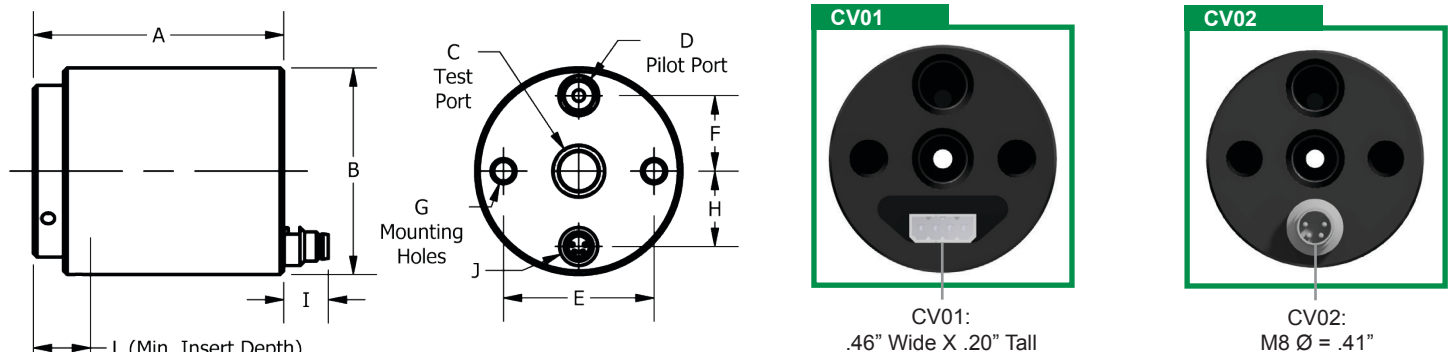


Figure 2. Connector Dimensional Features

**INSTALLATION AND OPERATING INSTRUCTIONS**

Standard and Connection Verification versions: read and understand each of the following procedures before operating the connector:

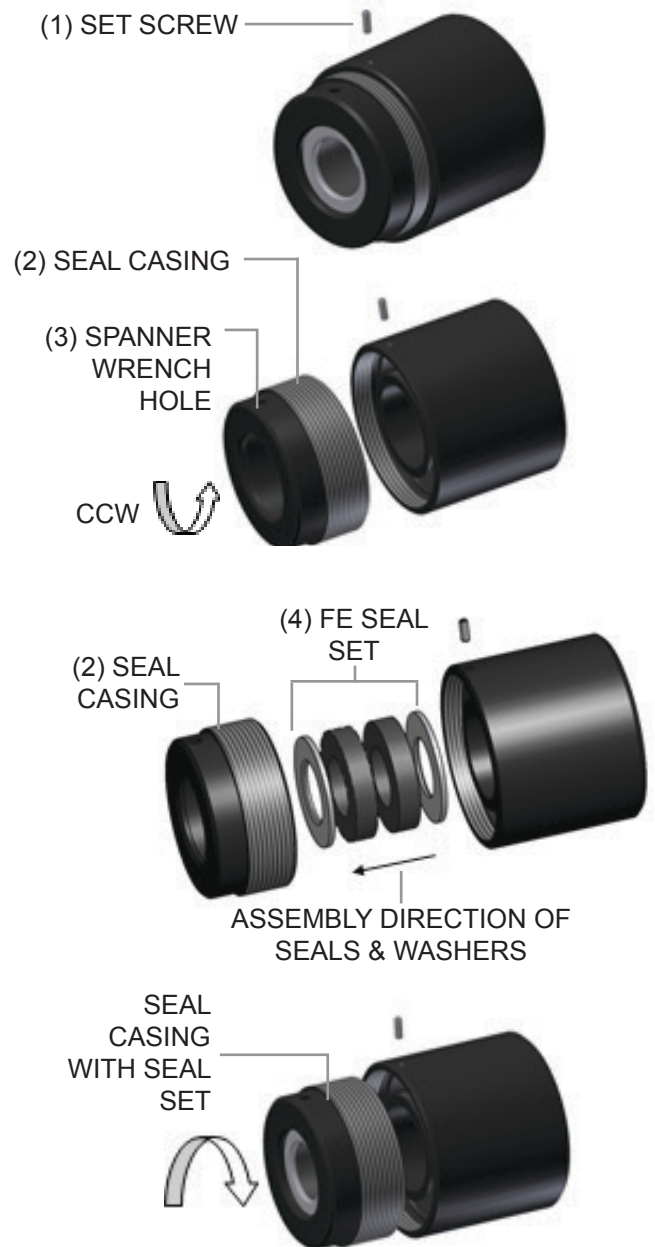
- A. Installation of Seals
- B. Mounting the Connector
- C. Attachment of Pilot Pressure and Test Media Supply Lines
- D. Connector Operation

**A. Installation of Seals**

1. For seal install or replacement loosen set screw (1) on side of housing.
2. Unscrew (counterclockwise) and remove seal casing (2). NOTE: A spanner wrench hole (3) is provided for breaking the seal casing loose if required.

Note: Seal sets contain elastomer seals and washers. For complete listing of seal set size ranges see catalog.

3. Seal set contains elastomer seals and washers. Verify that seals and washers are the same size. Assemble seal set (4) into seal casing (2) per Figure 3.
4. Reassemble and tighten seal casing (2) with seal set (4) to housing.
5. Retighten set screw (1).



**Figure 3. Installation of Seals**

## B. Mounting the Connector

The connector must be secured to the test piece with a mechanical or other device to assure the connector is not uncoupled from the test piece by the uncoupling force of the test itself. The securing or holding device may be a fixture, clamp, cylinder or other appropriate means that prevents ejection of the test piece from the connector.

### Uncoupling force example:

Test piece has a ½" O.D. and is tested at 100 psi maximum. Uncoupling force = area ( $\pi r^2$ ) x pressure =  $\pi(.25)^2 \times 100 \approx 20$  lbs. Secured device should be designed to withstand this force and include an adequate margin for safety. Do not activate the connector without an adequate and safe securing mechanism.

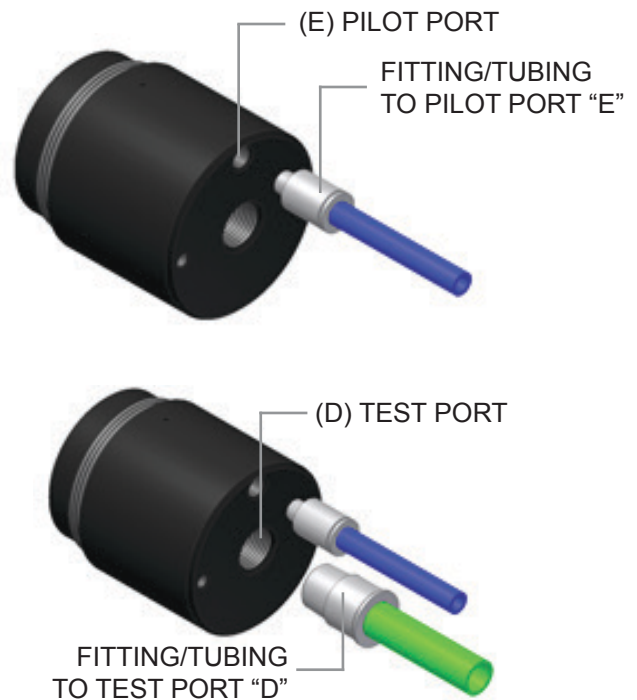
Mount the FE connector to the fixture or appropriate device using either threaded mounting holes on the rear of the connector body, or appropriate adapter.

## C. Attachment of Pilot Pressure and Test Media Supply Lines

1. Attach pilot pressure line to pilot port (E) from Figure 4

Note: A regulated pneumatic source is required to maximize seal life and assure optimum seal ability for the application. The pilot pressure should be minimized to maintain sealing on the test piece without excessive compression of the seal.

2. Attach test media line to test port (D) from Figure 4.
3. Provide a means whereby test pressure will not be introduced until the pilot pressure required to seal is reached. The means should also provide quick exhaust of test pressure in the event pilot pressure falls below the minimum required to seal.



**Figure 4.** Attachment of Pilot and Media Lines

CONNECTION VERIFICATION WIRING

CV01

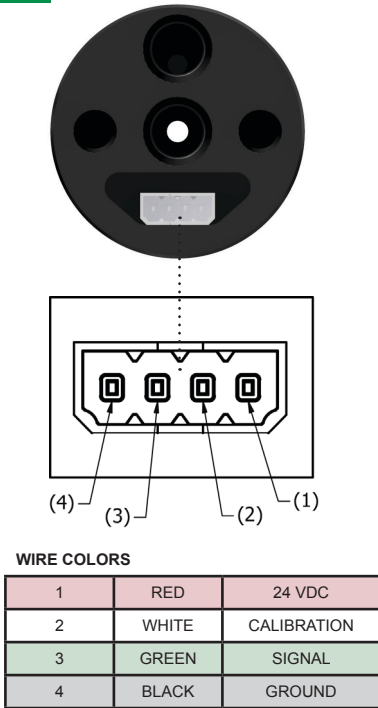


Figure 5. CV01 Pin Layout and Orientation

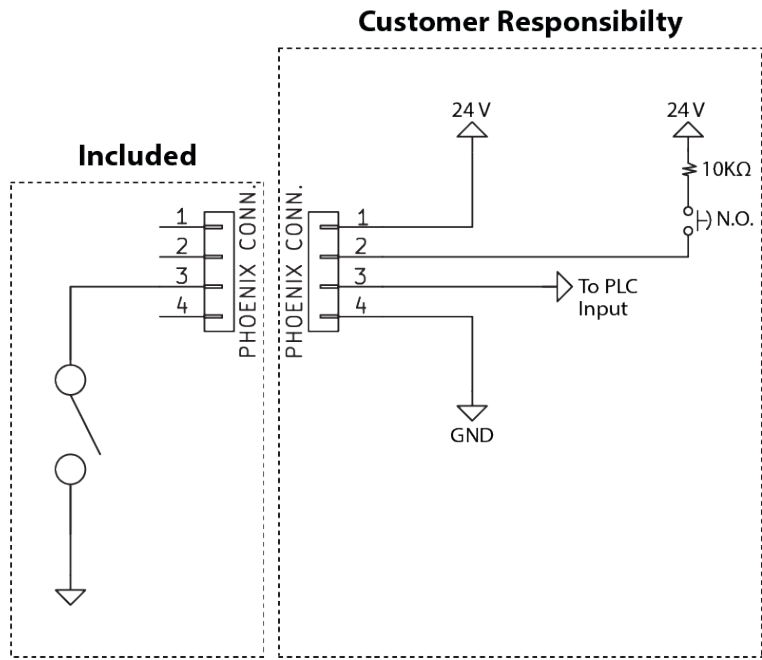


Figure 6. Typical PLC Application Electrical Diagram

CV02

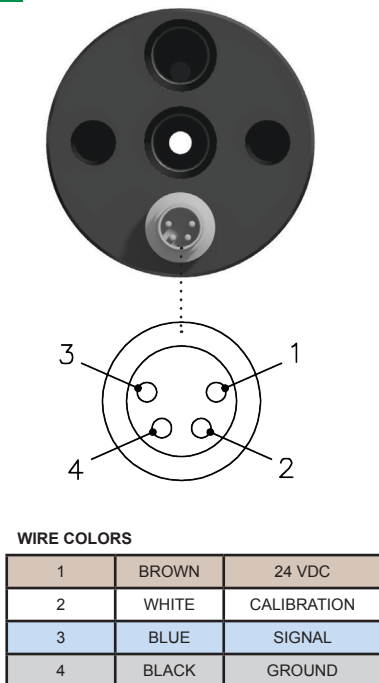


Figure 7. CV02 Pin Layout and Orientation

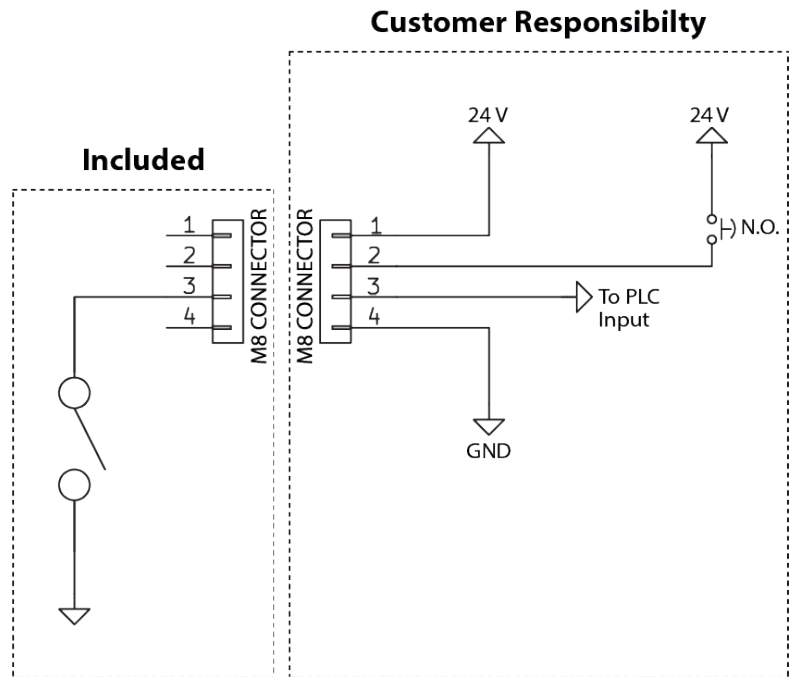
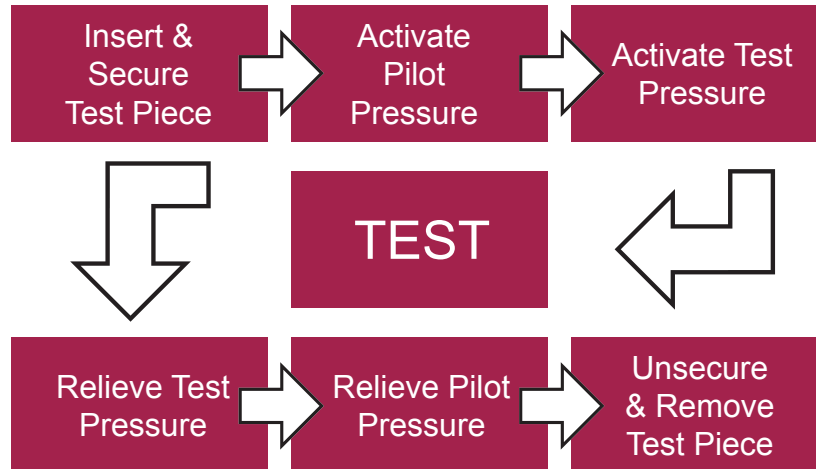


Figure 8. Typical PLC Application Electrical Diagram

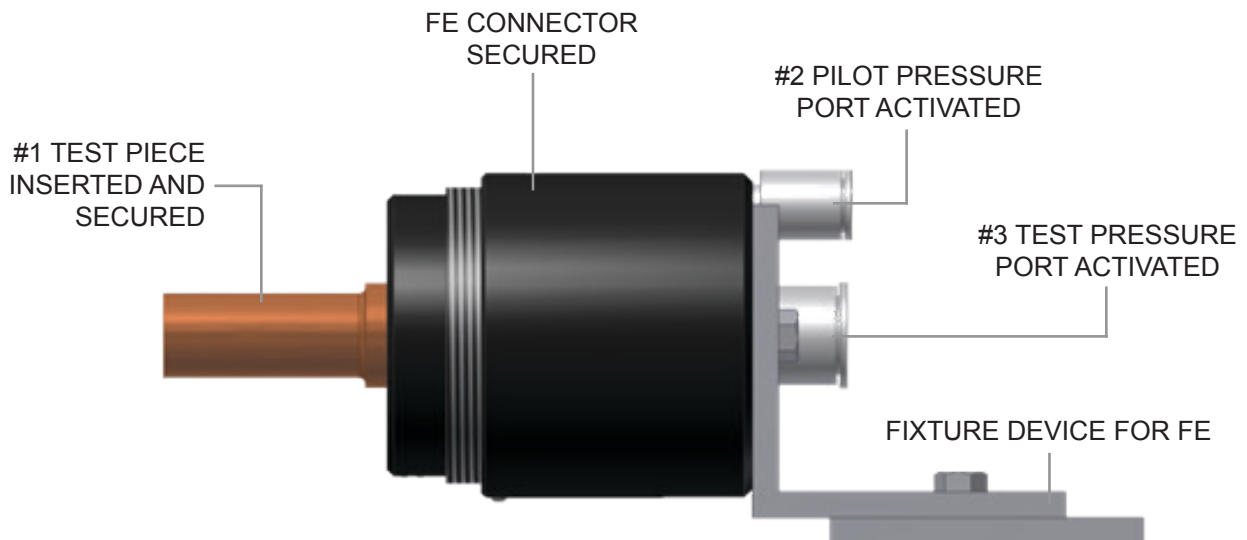
## Connector Operation

FasTest recommends that both the FE connector and the test piece are secured by mechanical devices before proceeding with the following sequence:

Activate connector testing sequence as shown below.



1. Insert test piece into the end of the connector and secure. Make sure the test piece is inserted to the required minimum insertion length. This will assure proper location relative to the seals. Make sure the connector and test piece are secure.
2. Apply pilot pressure to seal against the part. Generally, a 60 to 90 psi pneumatic pilot pressure source is required. Additional pilot pressure may be required for contoured surfaces (i.e., threads etc...). See FasTest catalog for Pilot Pressure Booster. CAUTION: Do not activate PILOT or TEST PRESSURE without test piece in place.
3. With pilot activated, introduce gas or liquid through the FasTest FE connector.
4. Perform testing operation.
5. Relieve test pressure.
6. Relieve pilot pressure.
7. Remove test piece.



**Figure 9.** Fixture and Operation



**MAINTENANCE AND CARE**

A daily, weekly and periodic inspection of the connector by competent person is recommended. Lubricate connector on regular intervals. Petroleum jelly is recommended but care should be taken to verify the lubricant is compatible with the application. User must establish a regular interval for maintenance as determined by the user media and operational environment. Inspection should include; damage to the body, missing or loose components, leak tightness, ease of operation, sufficient lubrication, wear, dirt accumulation and damage. Use only original FasTest spare parts that are designed for the application and are subject to strict quality control. See CHART 2 on pg. 9 for seal sizes and part numbers.

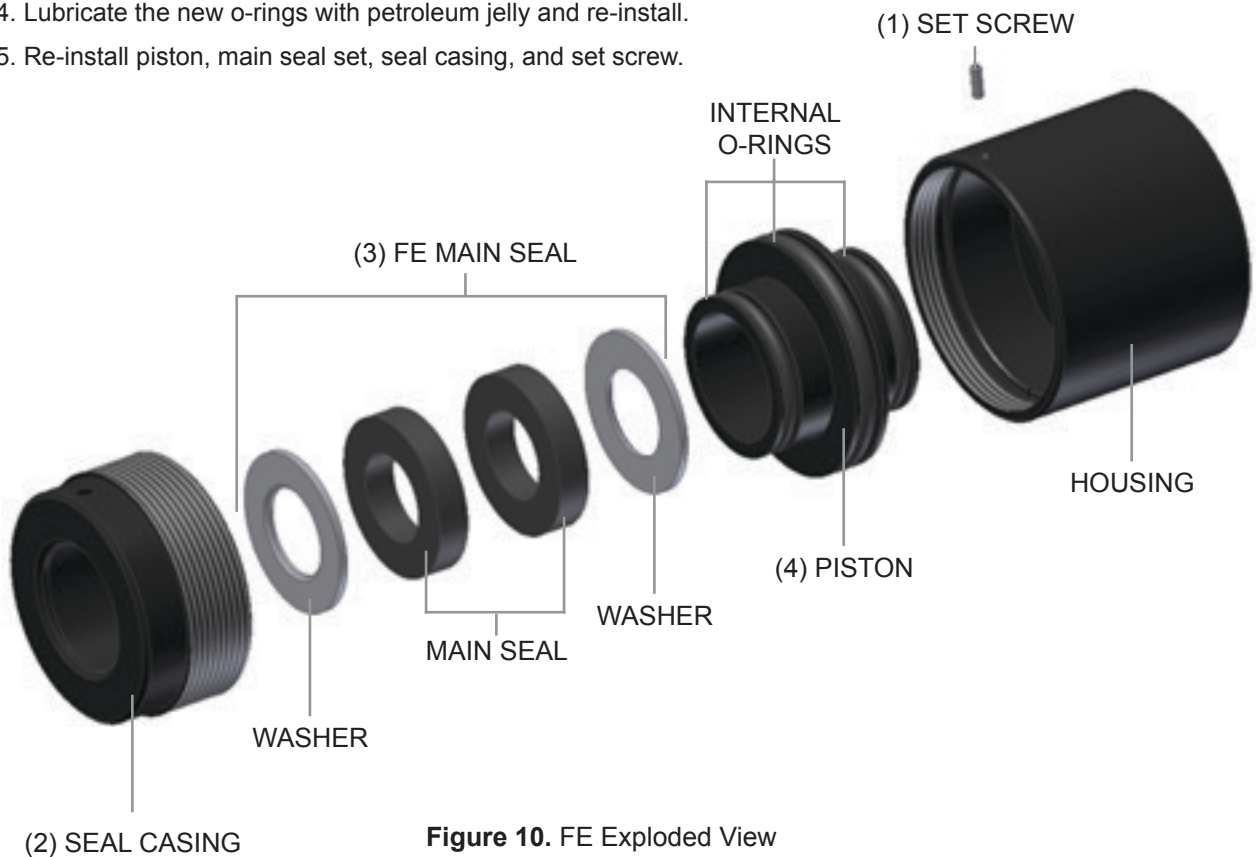
- A. Replacing Main Seal
- B. Replacing Internal Seals

**A. Replacing Main Seal**

1. If replacing seals only, inspect washers for warping, corrosion, or excessive wear.
2. Replace complete FasTest main seal set if washers are warped, corroded, or worn.
3. See "Installation of Seals" section for detailed instructions.

**B. Replacing Internal Seals**

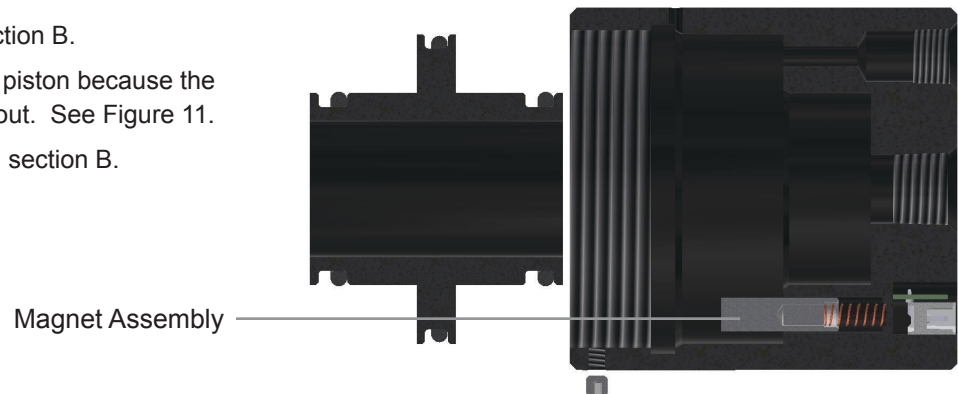
1. Loosen set screw (1) and remove seal casing (2) and main seal set (3).
2. Remove piston (4). This may require a short blast of air pressure.
3. Use a small pick to remove the internal o-rings. See Figure 10.
4. Lubricate the new o-rings with petroleum jelly and re-install.
5. Re-install piston, main seal set, seal casing, and set screw.



**Figure 10. FE Exploded View**

### C. Replacing Internal Seals on a Connector with Connection Verification

1. Follow steps (1) and (2) in section B.
2. Take care when removing the piston because the actuator assembly can come out. See Figure 11.
3. Follow steps (3) through (5) in section B.



**Figure 11.** FE Section View

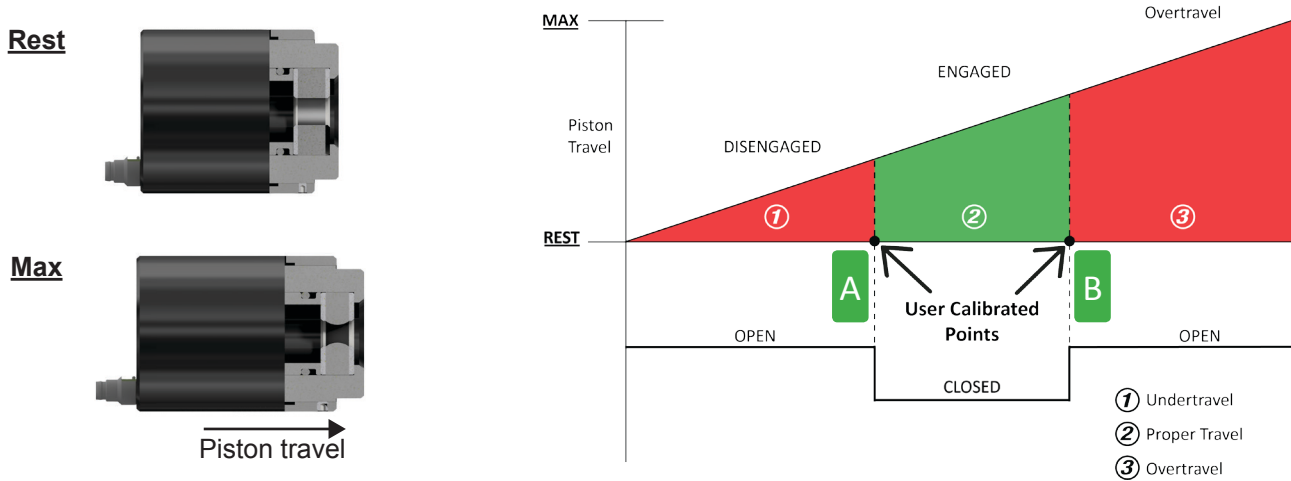
**CHART 2: Connector Sealing Range**

| Model | FES Seal Set   | Sealing Range | No. of Seals | Model    | FES Seal Set  | Sealing Range | No. of Seals |
|-------|--|---------------|--------------|----------|---------------|---------------|--------------|
| FE001 | FES001-0050  | .030 - .050   | 1            | FE3      | FE3-31        | 1.496 - 1.614 | 3            |
|       | FES001-001   | .050 - .080   | 1            |          | FE3-32        | 1.614 - 1.732 | 3            |
|       | FES001-002   | .080 - .130   | 1            |          | FE3-33        | 1.732 - 1.850 | 3            |
| FE01  | FES01-01<br>FES01-02<br>FES01-03<br>FES01-04<br>FES01-05<br>FES01-1/8NPT   | .100 - .180   | 1            |          | FE3-34        | 1.850 - 1.969 | 3            |
|       |  | 180 - .260    | 1            |          | FE3-1 1/2NPT  | 1-1/4 NPT     | 1            |
|       |  | .260 - .340   | 1            |          | FE3-1 1/2NPT  | 1-1/2 NPT     | 1            |
|       |  | .340 - .420   | 1            | FE4      | FE4-41        | 1.960 - 2.087 | 3            |
|       |  | .420 - .510   | 1            |          | FE4-42        | 2.087 - 2.205 | 3            |
|       |  | 1/8 NPT       | 1            |          | FE4-43        | 2.205 - 2.323 | 3            |
| FE1   | FE1-15<br>FE1-16<br>FE1-17<br>FE1-18<br>FE1-19<br>FE1-1/4NPT<br>FE1-3/8NPT   | .433 - .512   | 1            |          | FE4-44        | 2.323 - 2.441 | 3            |
|       |  | .512 - .591   | 1            |          | FE4-45        | 2.441 - 2.559 | 3            |
|       |  | .591 - .669   | 1            |          | FE4-46        | 2.559 - 2.677 | 3            |
|       |  | .669 - .750   | 1            | FE4-47   | 2.677 - 2.795 | 3             |              |
|       |  | .750 - .827   | 1            | FE4-48   | 2.795 - 2.913 | 3             |              |
|       |  | 1/4 NPT       | 1            | FE4-49   | 2.913 - 3.032 | 3             |              |
|       |  | 3/8 NPT       | 1            | FE4-2NPT | 2 NPT         | 1             |              |
| FE2   | FE2-21<br>FE2-22<br>FE2-23<br>FE2-24<br>FE2-25<br>FE2-26<br>FE2-27<br>FE2-28<br>FE2-29<br>FE2-1/2NPT<br>FE2-3/4NPT<br>FE2-1NPT | .787 - .866   | 2            | FE5      | FE5-51        | 2.970 - 3.100 | 3            |
|       |  | .866 - .945   | 2            |          | FE5-52        | 3.100 - 3.230 | 3            |
|       |  | .945 - 1.204  | 2            |          | FE5-53        | 3.230 - 3.360 | 3            |
|       |  | 1.024 - 1.102 | 2            |          | FE5-54        | 3.360 - 3.490 | 3            |
|       |  | 1.102 - 1.181 | 2            |          | FE5-55        | 3.490 - 3.620 | 3            |
|       |  | 1.181 - 1.260 | 2            |          | FE5-56        | 3.620 - 3.750 | 3            |
|       |  | 1.260 - 1.339 | 2            |          | FE5-57        | 3.750 - 3.880 | 3            |
|       |  | 1.339 - 1.417 | 2            |          | FE5-58        | 3.880 - 4.010 | 3            |
|       |  | 1.417 - 1.510 | 2            |          | FE5-59        | 4.010 - 4.130 | 3            |
|       |  | 1/2 NPT       | 1            | FE6      | FE6-61        | 4.130 - 4.260 | 3            |
|       |  | 3/4 NPT       | 1            |          | FE6-62        | 4.260 - 4.390 | 3            |
|       |  | 1 NPT         | 1            |          | FE6-63        | 4.390 - 4.520 | 3            |
|       |  |               |              |          | FE6-64        | 4.520 - 4.650 | 3            |
|       |  |               |              | FE6-65   | 4.650 - 4.780 | 3             |              |
|       |  |               |              | FE6-66   | 4.780 - 4.810 | 3             |              |
|       |  |               |              | FE6-67   | 4.910 - 5.040 | 3             |              |

• Note: Standard main seal material is Neoprene. NPT seals are Urethane. NPT seal sets require pilot pressure booster. Use of less than the listed number of seals (for less insertion depth) requires a spacer. See FasTest catalog. Seal Installation Instructions included with seal sets.

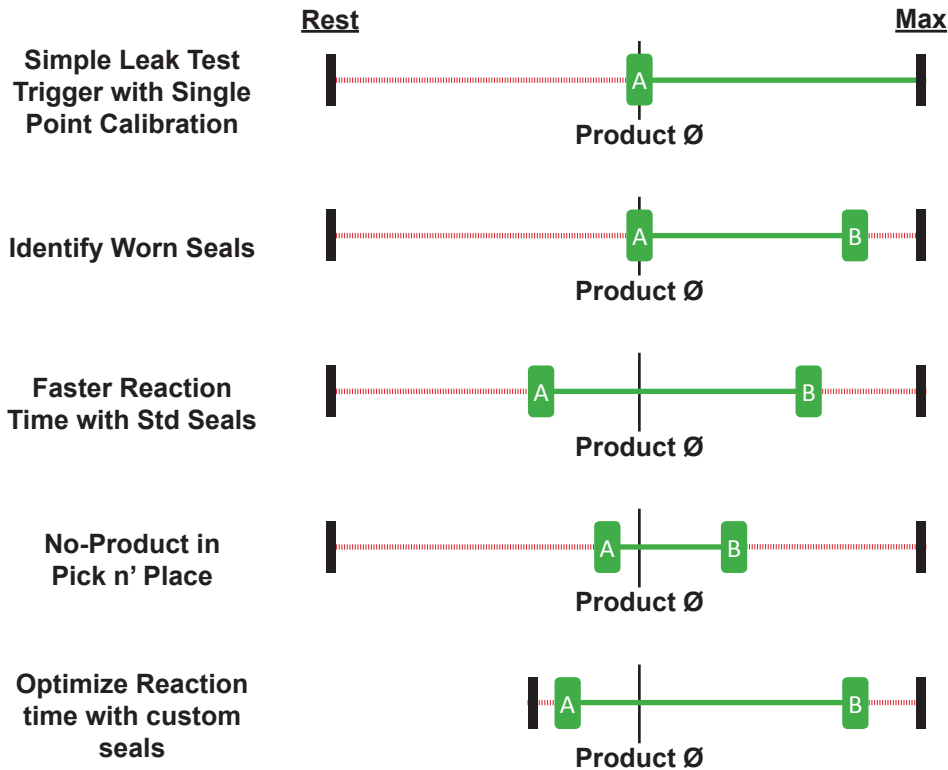
## CONNECTION VERIFICATION CALIBRATION

**Connection Verification™** enabled connectors need to be calibrated to each application. **The FE+ connector retains calibration point(s) even when power is removed.** Due to the fine sensor resolution and variations in seal height, calibration is recommended each time seals are replaced or the connector is re-built.



Each time the connector is actuated; a piston slides forward and settles at a final position. To get consistent piston travel; pilot pressure, product under test, connector placement, and main seal must be consistent. If one of those attributes changes, piston travel will change and our system can be setup to alert operators.

The connector stores a “good point” or a “good range” depending on the application. Below are suggested calibration options:



Calibration points may need to be re-calibrated as the main seal wears.

## CONNECTION VERIFICATION CALIBRATION

The connector has two calibration procedures that provide flexibility for different applications.

### Calibration Process 1 – “Single Point Calibration”

Single Point calibration is optimized for quick calibration and users that only need to know the connector actuated to a certain point, e.g. bench top leak testing.

1. Place product or Device Under Test (DUT) into the FE+
2. Apply pilot pressure
3. Apply 8-24V to pin #2 and hold for 2 seconds to define point A (Refer to Figure 12) - Output signal begins “flashing” (alternating between open and closed states) to signify the user has entered calibration mode
4. Wait 30 seconds for calibration mode to timeout – Output signal will remain in closed state
5. Remove pilot pressure and DUT - Output signal will switch to open state
6. Insert DUT and cycle pilot pressure to confirm proper output

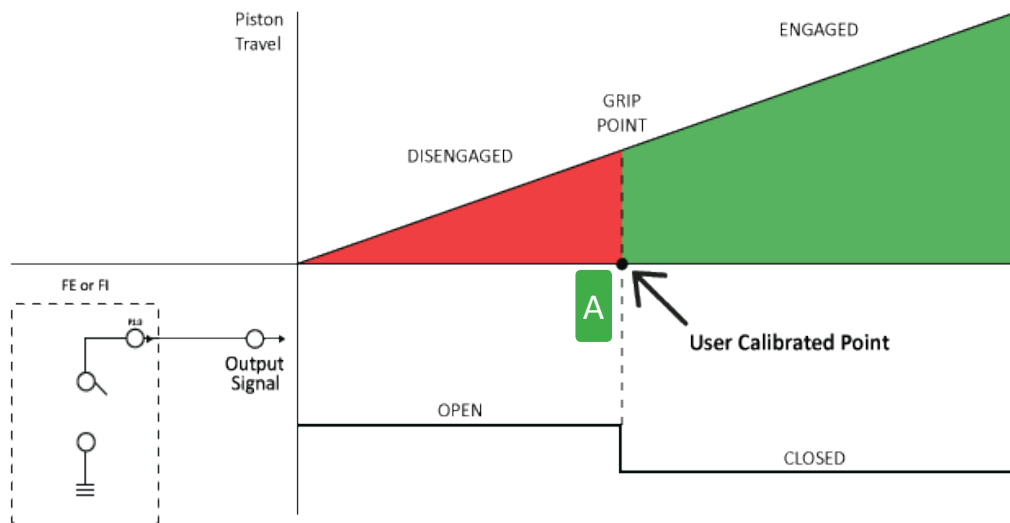


Figure 12. Single Point Calibration Graph

## CONNECTION VERIFICATION CALIBRATION

### Calibration Process 2 – “Dual Point Calibration”

Process 2 is for applications that require greater control and recognition of overtravel conditions.

e.g. automated leak testing and pick-n-place applications.

#### NOTE: steps 4-7 must be completed within 30 seconds

1. Place DUT into FE+
2. Apply pilot pressure
3. Apply 8-24V to pin #2 for 2 seconds to define point A (Figure 13). After Pin #2 is re-opened (no voltage applied), a 30 second calibration timeout clock initiates. *The output signal begins “flashing” or alternating between open and closed states to signify the user has entered calibration mode.*
4. Remove pilot pressure and DUT
5. \* Place a sample piece inside the main seal that represents point B (user determines size)
6. Apply pilot pressure
7. Apply 8-24V to pin #2 for 2 seconds to set point B and wait for calibration timeout (Refer to Figure 6) - Output signal will remain in closed state
8. Remove pilot pressure and DUT - Output signal will switch to open state
9. Insert DUT and cycle pilot pressure to confirm proper output

\* Point B sample piece represents a location of the piston at the maximum allowable limit. In an FE+ connector this would be a smaller diameter cylinder than the DUT. **The size of the sample piece (calibration range) must be determined by the customer in their specific application.**

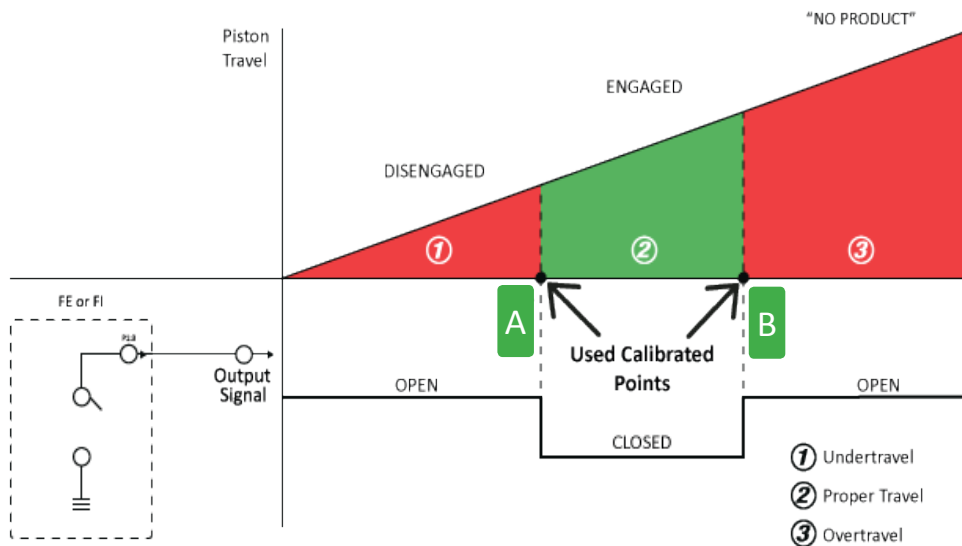


Figure 13. Dual Point Calibration Graph

**TROUBLESHOOTING**

|   |   |
|---|---|
| <p><b>How does measuring piston travel correlate to verified connections?</b></p> | <p>By calibrating the movement of the piston, you are able to ensure a consistent connection. If the piston stops outside of the calibrated zone, you know that something in the setup has changed.</p> |
| <p><b>How do I know what calibration range to set?</b></p>                        | <p>It is application dependent and will require investigation by each specific user.</p>  |
| <p><b>What impacts will the calibration range have on my test setup?</b></p>      | <p>Larger range creates more consistent results, smaller ranges make the test more accurate but are more sensitive to variables such as pilot pressure, test piece, temperature, mounting, etc.</p>     |
| <p><b>Do I need to re-calibrate after changing seals?</b></p>                     | <p>It depends on the sensitivity of the range. The seals can vary up to 0.040 making this possible w/ a larger range.</p>   |
| <p><b>Does the connector retain calibration points if it loses power?</b></p>     | <p>Yes, the calibration points are stored on internal memory.</p>   |

For any other questions, contact: [insidesales@fastestinc.com](mailto:insidesales@fastestinc.com)

**WARRANTY**

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