

# Needle Valve Actuators

## Model FRC - Electric, 24 VDC Flow Regulating Control/Shutoff

10V2, SW, SM, VM Series  
Needle Valves to 60,000 psi (4140 bar)



### Principle of Operation:

The need to remotely control process flow electrically using high pressure multi-turn needle valves has long been sought. Pneumatic control of this type is an engineering challenge and cost prohibitive. Parker Autoclave Engineers solves these issues with our FRC line of electric actuators. When mated to our Regulating Stem Needle Valves and sent a 4-20mA signal, this actuated valve system provides precise control when needed and even provides enough torque to close the valve when not needed. This valve/actuator combination is capable of controlling Liquid or Gas flows.

The FRC Electric Actuator uses a 4-20mA input signal to turn the valve a programmed amount of turns from fully closed to fully open (typically 5 turns) while also providing a position feedback using an independent 4-20mA signal. It is also capable of closing the valve completely when a 4mA signal is received. Should power be lost, the valve will freeze and “remember” its last position and will not need to be re-zeroed. The FRC actuator is designed to work with a number of Parker Autoclave Engineers Needle Valves from 1/8" to 3/4" tube sizes and up to 60,000 psi (4140 bar) using the Regulating Stem option - see individual valve brochures for Cv and Flow Curves.

### Features:

- Designed for Multi-turn Needle Valves, tubing/pipe sizes 1/8" to 3/4"
- Precise, accurate control using Regulating Stem option.
- Operational Temperature Range: -40° to 160°F (-40° to 70°C) - Valve temperature not to exceed 600°F
- Closing Torque capable of up to 60,000 psi (4140 bar) operation
- Weatherproof or Explosionproof (CSA approved Cls 1, Div 1 Grps B, C & D)
- Maximum Rotation Speed: FRC1 = 4 sec/turn, FRC2 = 15 sec/turn (5 turn open/close)
- Weatherproof Enclosure is supplied with TURCK 5 position cable connector and 20' of cable



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# Specifications and Ordering Guide:

## Electric Actuator

### Electrical Specifications:

- Electrical Input: 24VDC only, 72 Watt maximum
- Control Input: 4-20mA
- Position Feedback: Independent 4-20mA
- Position Detection: Hall Sensors
- Motor: BLDC brushless DC motor

### Position on Powerloss:

- Remembers Last Position
- Reseats Valve if Current is Between 3.0 and 4.16mA

### Mechanical Specifications:

- Standard Enclosure - EPD Coated NEMA 4/IP65 Equivalent
- Optional Anodized Aluminum Explosion-Proof Enclosure, Nema 8/IP67, CSA Approved for Class 1, Division 1, Groups B, C, D / T6 Areas
- 500+ Positions per turn (+/- 0.25° Position Accuracy), 3243 Actuator Positions over Full Span
- Maximum Rotation Speed: #1 Actuator = 4 sec/turn (5 turn open/close), #2 Actuator (high torque) = 15 sec/turn (5 turn open/close)
- Actuator Operating Temperature -40°(-40°C) to 160°F(70°C), Valve Temperature not to exceed 600°F
- Actuator life Expectancy: 250,000 cycles
- Gears and Bearings are Lifetime Lubricated
- 20 ft. cable included with 6 pin/5 wire connector (FRC1 and FRC2 Weatherproof version only)
- Wiring Terminal, Maximum Wire Size: 18 Gauge  
(To Terminate larger gauge wire, see Option Code XPFL below)

### Ordering Guide: [reference individual Valve Series brochure for exact valve detail]

|                              |              |                     |          |           |              |   |                                   |                |
|------------------------------|--------------|---------------------|----------|-----------|--------------|---|-----------------------------------|----------------|
| Example Part Number:         | <b>20SM</b>  | <b>9</b>            | <b>8</b> | <b>8</b>  | <b>2</b>     | - | <b>FRC2X</b>                      | <b>TG</b>      |
| Ordering Parameters/Options: | Valve Series | Tube/Pipe Size (OD) | Seat     | Stem Type | Body Pattern |   | Electric Flow Regulating Actuator | Valve Optionsr |
| Table Reference: (see below) | A            | B                   | C        | D         | E            |   | F                                 | G              |

**20SM9882-FRC2XTG** = 20SM Series Needle Valve, 20,000 psi MAWP, 9/16" MP Cone and Thread, 2-way Angle/Replaceable Seat Valve, Flow Regulating On/Off Explosion Proof Actuator/High Torque, PTFE Glass packing to 600°F max.

| A - Valve Series                       |  |
|--|--|
| 10V2 , SW, 10/15P, 15/20SM, 30VM, 60VM |  |

| B - Tube/Pipe Size (limited to sizes shown below) |                                      |
|---|--------------------------------------|
| 2   | 1/8" (10V2 Series only)              |
| 4   | 1/4"                                 |
| 6   | 3/8"                                 |
| 8   | 1/2" (SW and P Series Valves Only)   |
| 9   | 9/16" (SM and VM Series Valves Only) |
| 12  | 3/4" (P and SM Series Valves Only)   |

| C - Seat: STD/Replaceable Type |                                   |
|--------------------------------|-----------------------------------|
| 0                              | STD                               |
| 8                              | Replaceable (Body Pattern 2 Only) |

| D - Stem Type |            |
|---------------|------------|
| 8             | Regulating |

| E - Body Pattern (see individual valve brochure for details) |                      |
|--|----------------------|
| 1  | Straight             |
| 2  | Angle                |
| 3  | 3-Way, 2 On-Pressure |
| 4  | 3-Way, 1 On-Pressure |

| F - Electric Flow Regulating Actuator |  |
|---------------------------------------|--|
| FRC1                                  | Low Torque Valves - Indoor/Weather-Proof w/20ft cable  |
| FRC2                                  | High Torque Valves - Indoor/Weather-Proof w/20ft cable (SW8 15P8 10P12 15SM9&12 20SM9&12 Valve Sizes)                    |
| FRC1X                                 | Low Torque Valves - Explosion-Proof: Div. 1, Class 1, Groups B, C, and D   |
| FRC2X                                 | High Torque Valves - Explosion-Proof: Div. 1, Class 1, Groups B, C, and D (SW8 15P8 10P12 15SM9&12 20SM9&12 Valve Sizes) |

| G - Valve Options: (600°F Maximum Valve Temperature)                                   |   |
|--|---|
| TG   | PTFE Glass Packing to 600°F   |
| B  | Cryogenic 0 to -100°F   |
| CSS  | Coated Stem and Seat  |
| K  | Anti-Vibration Glands   |
| SOG  | NACE Approved Materials   |
| XPFL   | Pre-wired Flying Leads inside 1/2" NPT Class 1, Div 1 Groups B, C&D enclosure mounted outside actuator to splice wire gauges over size 18 for Class 1, Div 1 Groups B, C& D areas to terminate larger gauge wire "outside" enclosure. |
| Many other options available - see individual Valve Series Catalog or contact Factory. |   |

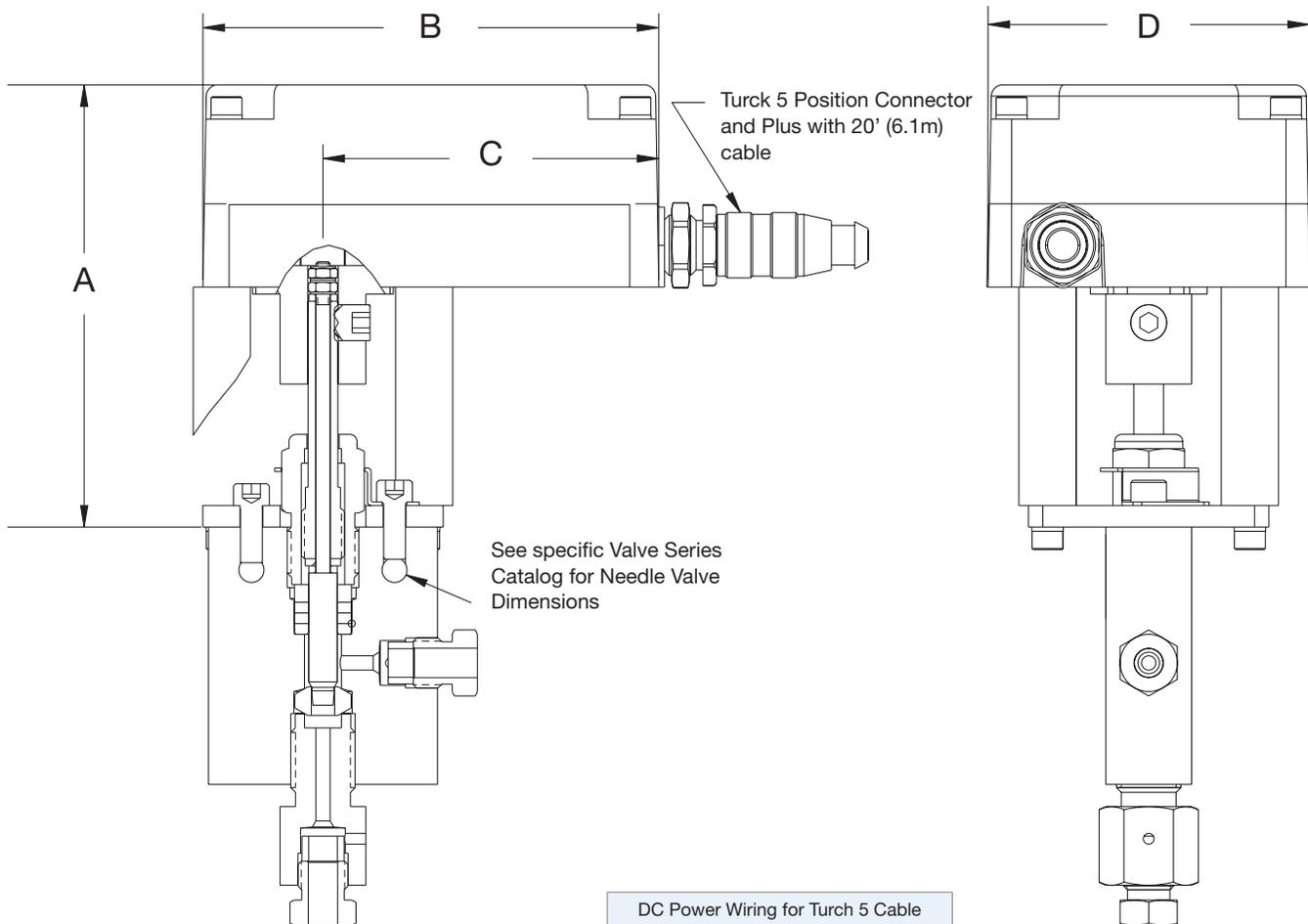
Note: Actuators can be rotated to any one of four compass locations. (requires zeroing function (re-seating)).

# Dimensional information:

Electric Actuator: FRC1

## Dimensional Information:

| Valve Series   | Dimensions: inches (mm) |              |              |           |
|--|-------------------------|--------------|--------------|-----------|
|  | A                       | B            | C            | D         |
| 1/4" & 3/8" NPT - P Series<br>1/8", 1/4" & 3/8" Low Pressure - 10V/SW Series<br>1/4" & 3/8" Medium Pressure - 20SM Series<br>1/4", 3/8" & 9/16" High Pressure - 30VM/60VM Series | 3.87 (98)               | 3.98 (101.2) | 3.00 (76.12) | 2.80 (71) |



| DC Power Wiring for Turch 5 Cable |                         |
|-----------------------------------|-------------------------|
| White                             | +24 VDC (72 Watt Max)   |
| Black                             | Power Ground            |
| Grey                              | Output Signal (4-20 mA) |
| Brown                             | Input Signal Ground     |
| Blue                              | +Input Signal (4-20 mA) |

Warning: Do not connect terminal 3 (Grey wire) directly or through a Multimeter, to ground. A sensing resistor of 50 ohms or more needs to be present or damage will occur.

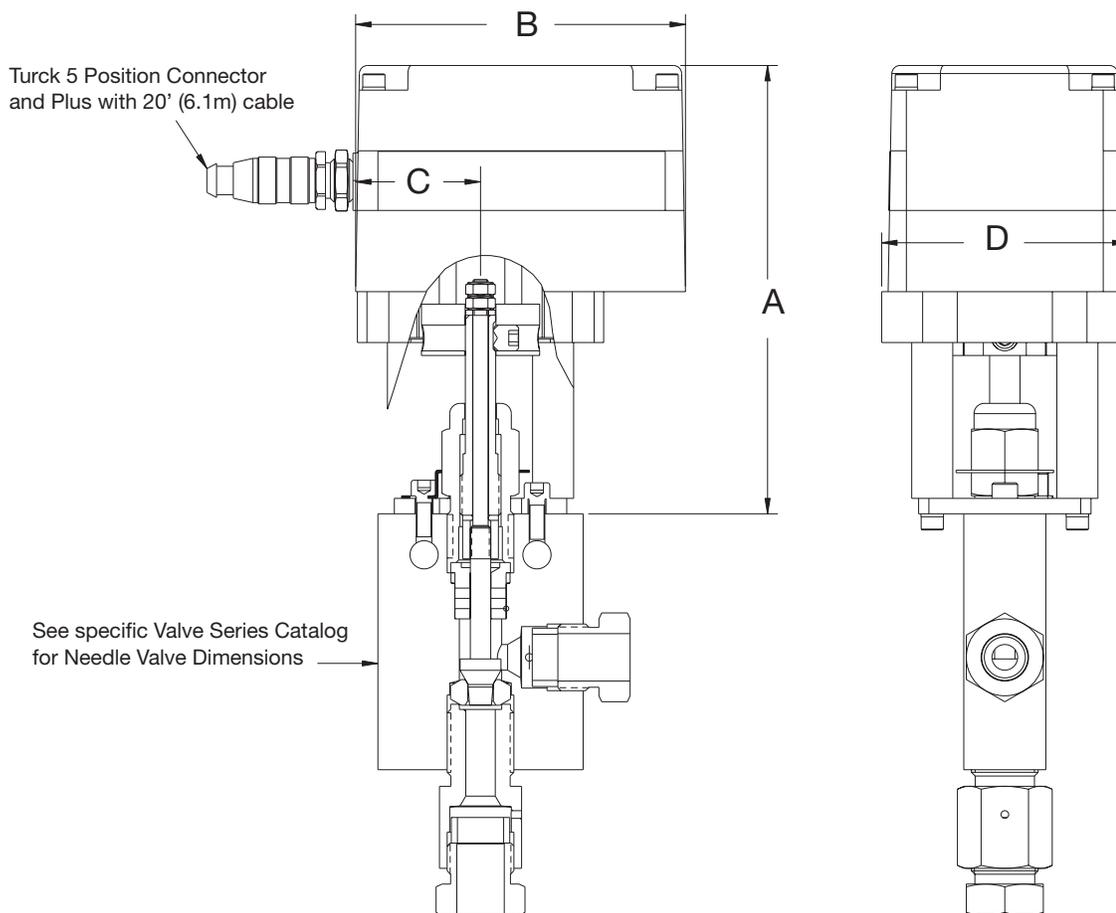
| Basic Repair Kits  |
|--|
| For <b>Valves</b> - See specific Manual Valve brochure for valve repair parts and Manual Needle Valve IOM manual for instructions. |
| For <b>FRC1 Actuator</b> - Replace entire Actuator using Part Number AE002865  |
| For <b>FRC1 Mounting Kit</b> : Part Number AE002867  |

# Dimensional information:

Electric Actuator: FRC2

## Dimensional Information:

| Valve Series  | Dimensions: inches (mm) |              |           |           |
|---|-------------------------|--------------|-----------|-----------|
|   | A                       | B            | C         | D         |
| 1/2" & 3/4" NPT - P Series<br>1/2" Low Pressure - SW Series<br>9/16" & 3/4" SM Series Medium Pressure | 5.47 (139)              | 4.02 (102.0) | 1.52 (39) | 2.88 (73) |



| DC Power Wiring for Turch 5 Cable |                         |
|-----------------------------------|-------------------------|
| White                             | +24 VDC (72 Watt Max)   |
| Black                             | Power Ground            |
| Grey                              | Output Signal (4-20 mA) |
| Brown                             | Input Signal Ground     |
| Blue                              | +Input Signal (4-20 mA) |

Warning: Do not connect terminal 3 (Grey wire) directly or through a Multimeter, to ground. A sensing resistor of 50 ohms or more needs to be present or damage will occur.

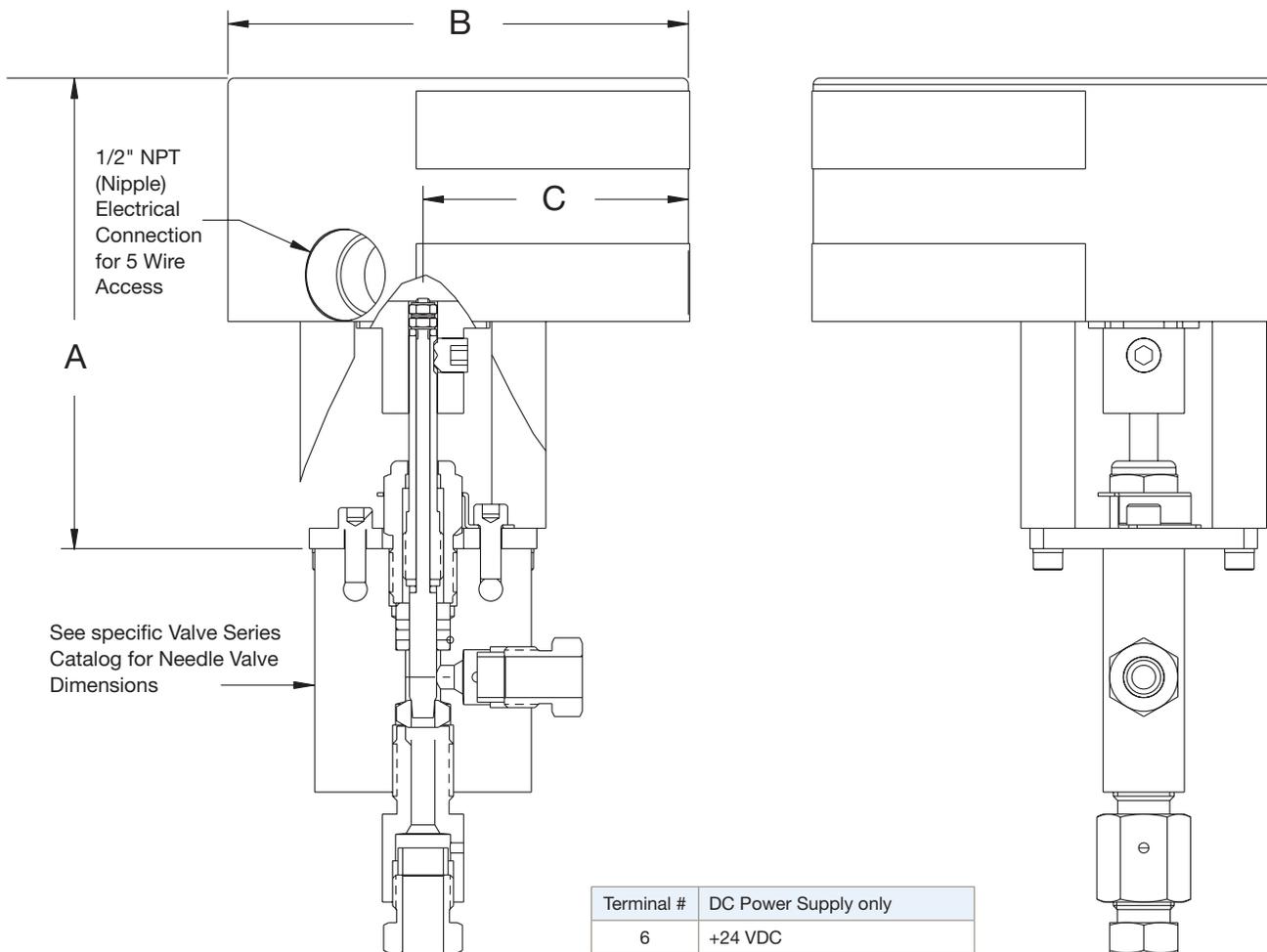
| Basic Repair Kits  |
|--|
| For <b>Valves</b> - See specific Manual Valve brochure for valve repair parts and Manual Needle Valve IOM manual for instructions. |
| For <b>FRC2 Actuator</b> - Replace entire Actuator using Part Number AE002865  |
| For <b>FRC2 Gear Reduction/Mounting Kit</b> : Part Number AE002868   |

# Dimensional information:

Electric Actuator: FRC1X

## Dimensional Information:

| Valve Series   | Dimensions: inches (mm) |            |           |
|--|-------------------------|------------|-----------|
|  | A                       | B          | C         |
| 1/4" & 3/8" NPT - P Series<br>1/8", 1/4" & 3/8" Low Pressure - 10V/SW Series<br>1/4" & 3/8" Medium Pressure - 20SM Series<br>1/4", 3/8" & 9/16" High Pressure - 30VM/60VM Series | 3.67 (93.2)             | 4.25 (108) | 3.00 (76) |



| Basic Repair Kits  |
|--|
| For <b>Valves</b> - See specific Manual Valve brochure for valve repair parts and Manual Needle Valve IOM manual for instructions. |
| For <b>FRC1X Explosion Proof Actuator</b> - Replace entire Actuator using Part Number AE003534                                     |
| For <b>FRC1X Mounting Kit</b> : Part Number AE002899   |

| Terminal # | DC Power Supply only            |
|------------|---------------------------------|
| 6          | +24 VDC                         |
| 5          | Power Ground                    |
| 4          | Output Signal (4-20 mA)         |
| 3          | Not Connected                   |
| 2          | Isolated Input Signal GND       |
| 1          | Isolated Input +Signal (4.30mA) |

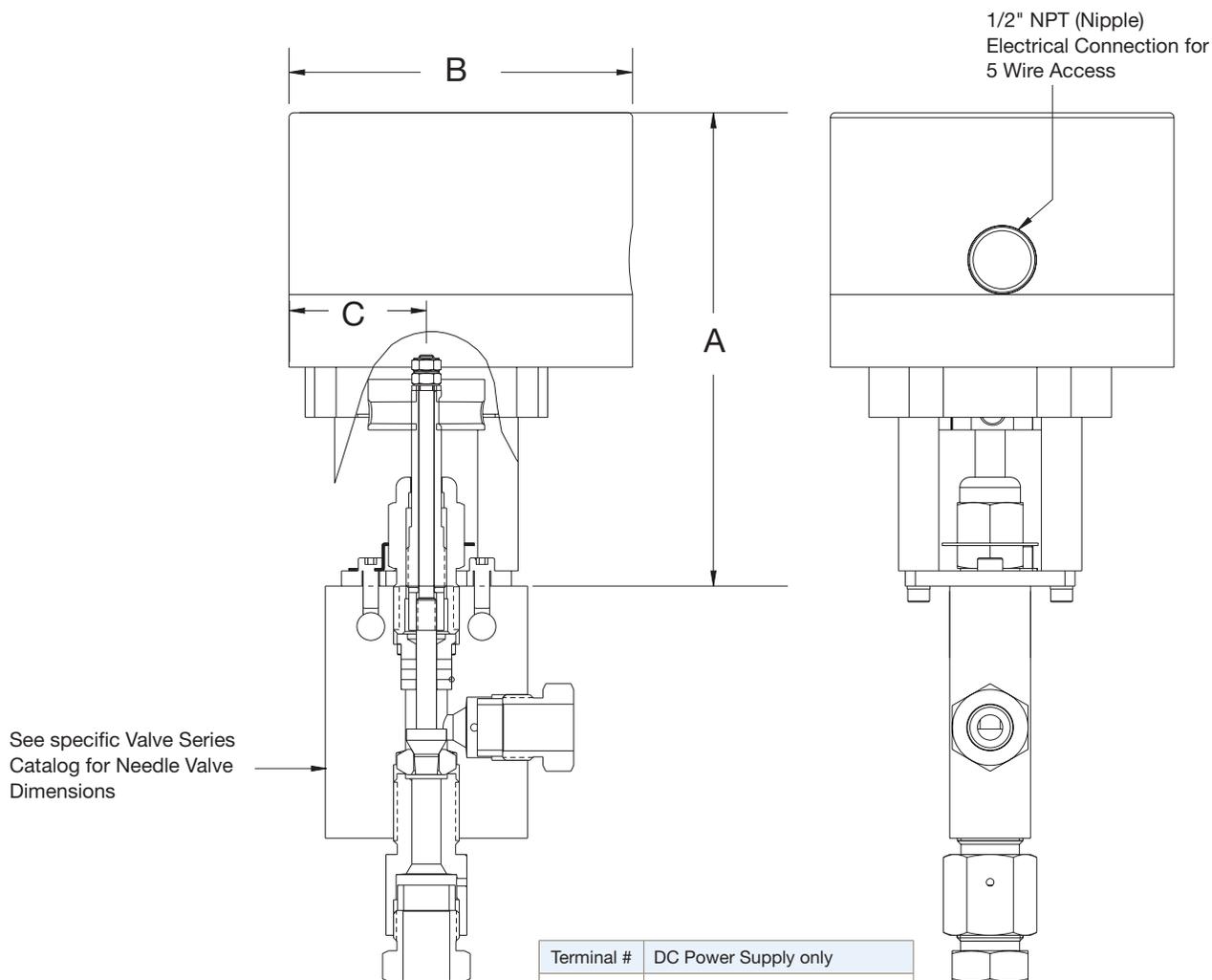
Warning: Do not connect terminal 4 directly or through a Multimeter, to ground. A sensing resistor of 50 ohms or more needs to be present or damage will occur.

# Dimensional information:

Electric Actuator: FRC2X

## Dimensional Information:

| Valve Series  | Dimensions: inches (mm) |            |           |
|---|-------------------------|------------|-----------|
|   | A                       | B          | C         |
| 1/2" & 3/4" NPT - P Series<br>1/2" Low Pressure - SW Series<br>9/16" & 3/4" SM Series Medium Pressure | 5.57 (141.4)            | 4.25 (108) | 3.00 (76) |



| Terminal # | DC Power Supply only            |
|------------|---------------------------------|
| 6          | +24 VDC                         |
| 5          | Power Ground                    |
| 4          | Output Signal (4-20 mA)         |
| 3          | Not Connected                   |
| 2          | Isolated Input Signal GND       |
| 1          | Isolated Input +Signal (4.30mA) |

Warning: Do not connect terminal 4 directly or through a Multimeter, to ground. A sensing resistor of 50 ohms or more needs to be present or damage will occur.

| Basic Repair Kits  |
|--|
| For <b>Valves</b> - See specific Manual Valve brochure for valve repair parts and Manual Needle Valve IOM manual for instructions. |
| For <b>FRC2X Explosion Proof Actuator</b> - Replace entire Actuator using Part Number AE003534                                     |
| For <b>FRC2X Gear Reduction/Mounting Kit</b> : Part Number AE003535  |