

# Needle Valve Actuators

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

10V2, SW, SM, VM, QS  
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 6 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 9/16" 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 sizes 1/8" to 9/16"
- 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 (CIs 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 only)
- Explosionproof 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:	20SM	9	8	8	2	—	FRC2X	TG
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, 15P, 15SM, 20SM, 30VM, 60VM	

B - Tube/Pipe Size (limited to sizes shown below)	
2	1/8" (10V2 only)
4	1/4"
6	3/8"
8	1/2" (SW and P Only)
9	9/16" (SM and VM 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	Indoor/Weather-Proof w/20ft cable
FRC2	Indoor/Weather-Proof w/20ft cable (High Torque: SW8, 15P8, 15SM9, 20SM9 Valves)
FRC1X	Explosion-Proof - Div. 1, Class 1, Groups B, C, and D
FRC2X	Explosion-Proof - Div. 1, Class 1, Groups B, C, and D (High Torque: SW8, 15P8, 15SM9, 20SM9 Valves)

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, 1/2" NPT Explosion Proof Potted 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.	

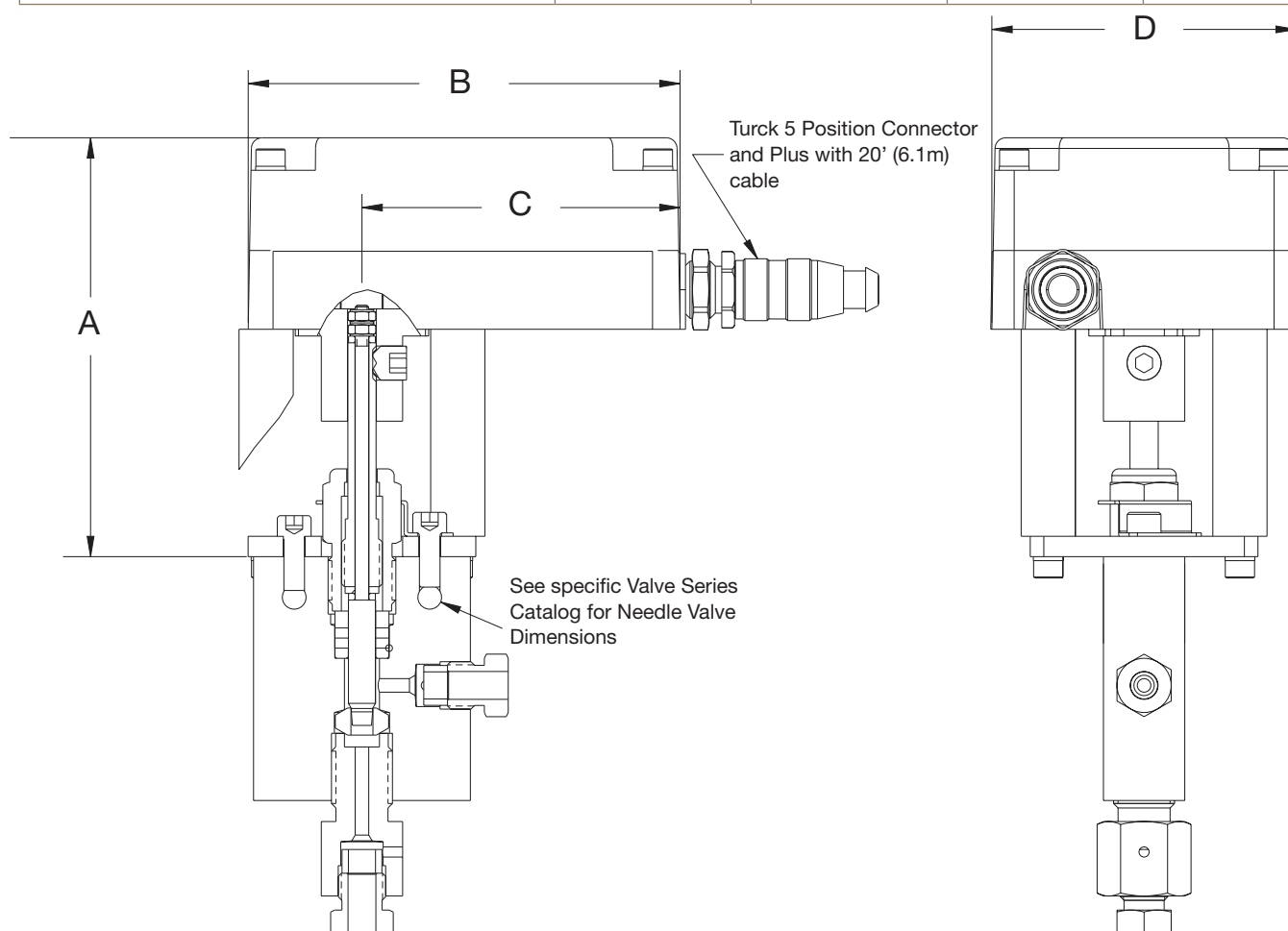
Note: Actuators can be rotated to any one of four compass locations. (requires zeroing function (re-seating).

# Dimensional information:

Electric Actuator: FRC1

## Dimensional Information:

Valve Series	Dimensions: inches (mm)			
	A	B	C	D
1/4" & 3/8" NPT - 15P 1/8", 1/4" & 3/8" Low Pressure - 10V/SW 1/4" & 3/8" 15QS 1/4" & 3/8" Medium Pressure - 20SM 1/4", 3/8" & 9/16" High Pressure - 30VM/60VM	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.	

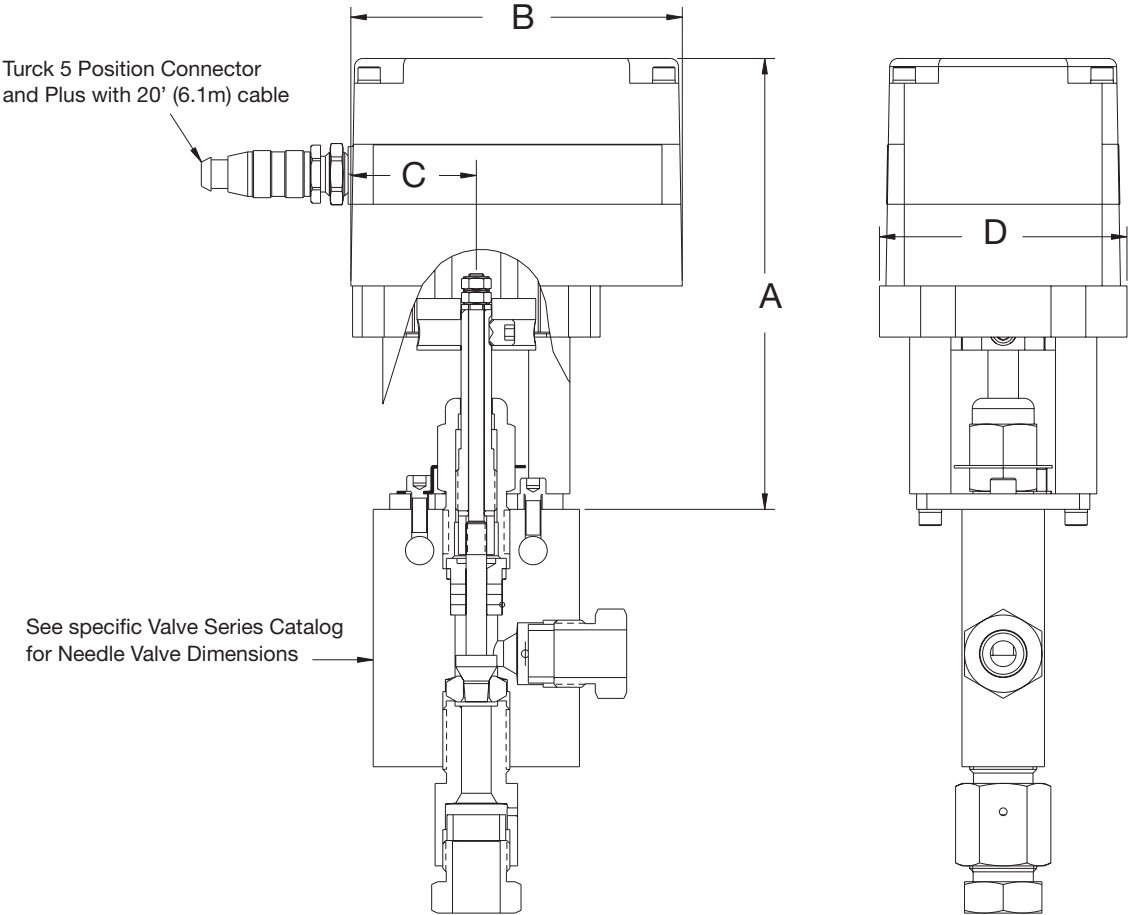
Basic Repair Kits
For <b>Valves</b> - See specific Manual Valve brochure for valve repair parts and Manual Needle Valve IOM manual for instructions.  For <b>FRC1 Actuator</b> - Replace entire Actuator using Part Number AE002865  For <b>FRC1 Mounting Kit</b> : Part Number AE002867

# Dimensional information:

Electric Actuator: FRC2

## Dimensional Information:

Valve Series	Dimensions: inches (mm)			
	A	B	C	D
1/2" NPT - 15P 1/2" Low Pressure - SW 9/16" Medium Pressure - 15/20SM, 15QS	5.47 (139)	4.02 (102.0)	1.52 (39)	2.88 (73)



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

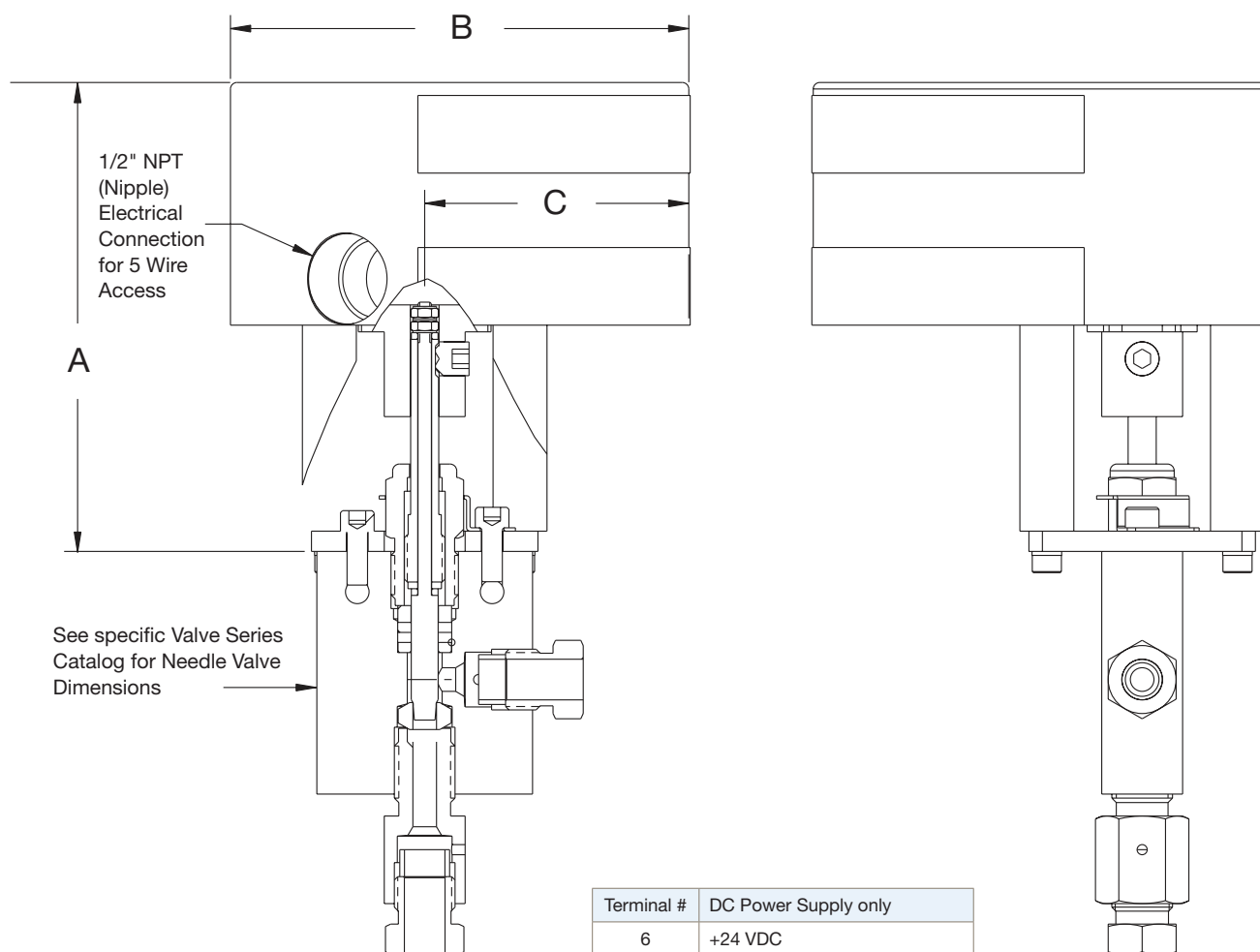
DC Power Wiring for Turch 5 Cable	
White	+24 VDC (72 Watt Max)
Black	Power Ground
Grey	Output Signal (4-20 mA)
Brown	Input Signal Ground
Blue	+Input Signal (4-20 mA)
Warning: Do not connect terminal 3 (Grey wire) directly or through a Multimeter, to ground. A sensing resistor of 50 ohms or more needs to be present or damage will occur.	

# Dimensional information:

Electric Actuator: FRC1X

## Dimensional Information:

Valve Series	Dimensions: inches (mm)		
	A	B	C
1/4" & 3/8" NPT - 15P 1/8", 1/4" & 3/8" Low Pressure - 10V/SW 1/4" & 3/8" 15QS 1/4" & 3/8" Medium Pressure - 20SM 1/4", 3/8" & 9/16" High Pressure - 30VM/60VM	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)

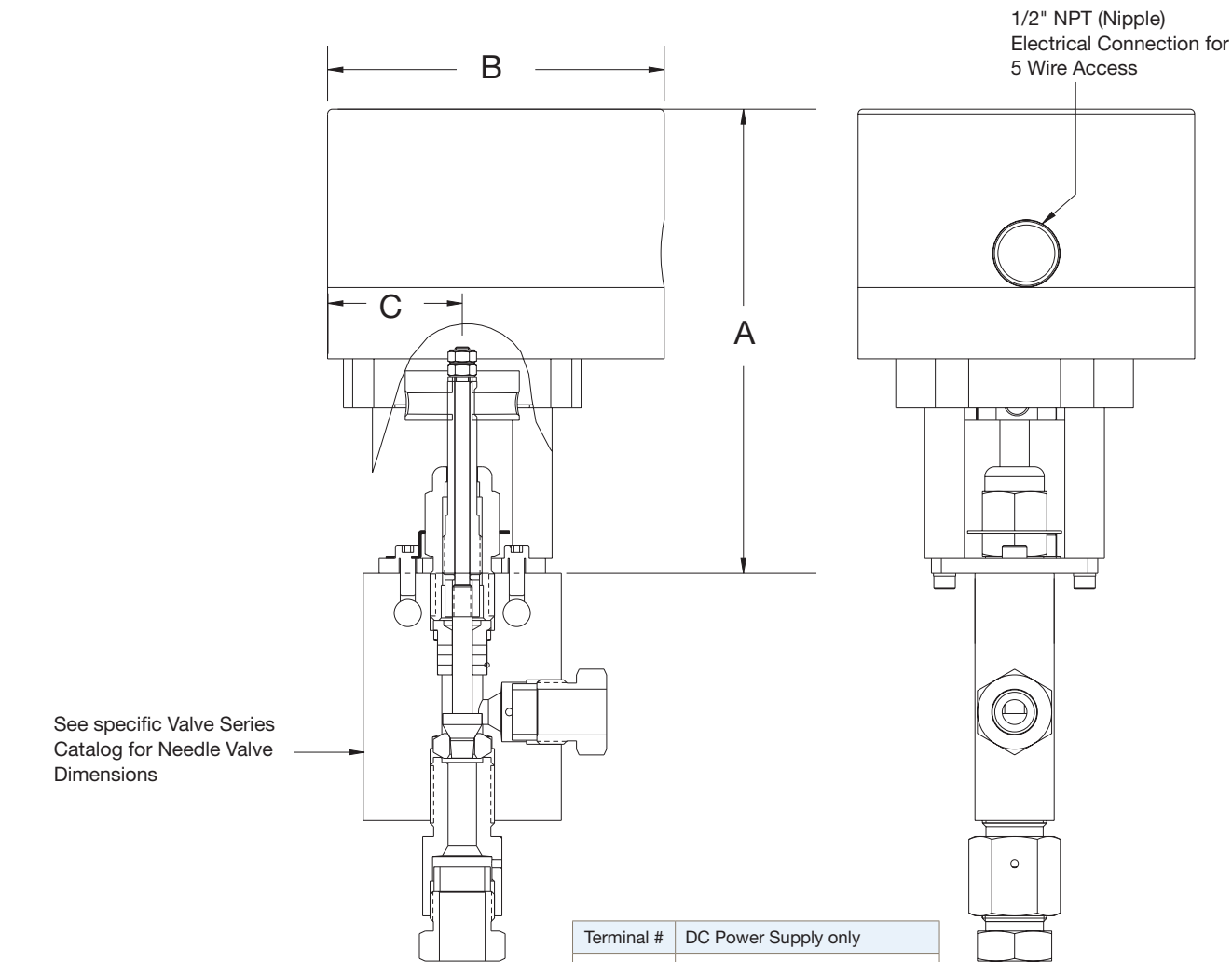
Warning: Do not connect terminal 4 directly or through a Multimeter, to ground. A sensing resistor of 50 ohms or more needs to be present or damage will occur.

# Dimensional information:

Electric Actuator: FRC2X

## Dimensional Information:

Valve Series	Dimensions: inches (mm)		
	A	B	C
1/2" NPT - 15P 1/2" Low Pressure - SW 9/16" Medium Pressure - 15/20SM, 15QS	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

# Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further information call 1-800-C-Parker.

MARKET		KEY MARKETS		KEY PRODUCTS	
	<b>AEROSPACE</b>	Aircraft Engines Commercial Commerical Transports Military Aircraft Regional Transports	Business and General Aviation Land-Based Weapons Systems Missiles and Launch Vehicles Unmanned Aerial Vehicles	Flight Control Systems & Components Fluid Conveyance Systems Fluid Metering Delivery & Atomization Devices Fuel Systems & Components	Hydraulic Systems & Components Inert Nitrogen Generating Systems Pneumatic Systems & Components Wheels & Brakes
	<b>CLIMATE CONTROL</b>	Agriculture Food, Beverage and Dairy Precision Cooling Transportation	Air Conditioning Life Sciences & Medical Processing	Co2 Controls Electronic Controllers Filter Driers Hand Shut-Off Valves Hose & Fittings	Pressure Regulating Valves Refrigerant Distributors Safety Relief Valves Solenoid Valves Thermostatic Expansion Valves
	<b>ELECTRO-MECHANICAL</b>	Aerospace Life Science & Medical Packaging Machinery Plastics Machinery & Converting Semiconductor & Electronics Factory Automation	Machine Tools Paper Machinery Primary Metals Textile Wire & Cable	AC/DC Drives & Systems Electric Actuators, Gantry Robots & Slides Electrohyrostatic Actuation Systems Electromechanical Actuation Systems Human Machine Interface	Linear Motors Stepper Motors, Servo Motors Drives & Controls Structural Extrusions
	<b>FILTRATION</b>	Food & Beverage Life Sciences Mobile Equipment Power Generation Transportation	Industrial Machinery Marine Oil & Gas Process	Analytical Gas Generators Compressed Air & Gas Filters Condition Monitoring Engine Air, Fuel & Oil Filtration & Systems	Hydraulic, Lubrication & Coolant Filters Process, Chemical, Water Microfiltration Filters Nitrogen, Hydrogen & Zero Air Generators
	<b>FLUID and GAS HANDLING</b>	Aerospace Agriculture Bulk Chemical Handling Construction Machinery Food & Beverage Fuel & Gas Delivery	Industrial Machinery Mobile Oil & Gas Transportation Welding	Brass Fittings & Valves Diagnostic Equipment Fluid Conveyance Systems Industrial Hose	PTFE & PFA Hose, Tubing & Plastic Fittings Rubber & Thermoplastic Hose & Couplings Tube Fittings & Adapters Quick Disconnects
	<b>HYDRAULICS</b>	Aerospace Aerial lift Agriculture Construction Machinery Forestry	Industrial Machinery Mining Oil & Gas Power Generation & Energy Truck Hydraulics	Diagnostic Equipment Hydraulic Cylinders & Accumulators Hydraulic Motors & Pumps Hydraulic Systems Hydraulic Valves & Controls	Power Take-Offs Rubber & Thermoplastic Hose & Couplings Tube Fittings & Adapters Quick Disconnects
	<b>PNEUMATICS</b>	Aerospace Conveyor & Material Handling Factory Automation Life Science & Medical	Machine Tools Packaging Machinery Transportation & Automotive	Air Preparation Brass Fittings & Valves Manifolds Pneumatic Accessories Pneumatic Actuators & Grippers Pneumatic Valves & Controls	Quick Disconnects Rotary Actuators Rubber & Thermoplastic Hose & Couplings Structural Extrusions Thermoplastic Tubing & Fittings Vacuum Generators, Cups & Sensors
	<b>PROCESS CONTROL</b>	Chemical & Refining Food, Beverage & Dairy Medical & Dental	Microelectronics Oil & Gas Power Generation	Analytical Sample Conditioning Products & Systems Fluoropolymer Chemical Delivery Fittings, Valves & Pumps High Purity Gas Delivery Fittings, & Valves & Regulators	Instrumentation Fittings, Valves Regulators Medium Pressure Fittings & Valves Process Control Manifolds
	<b>SEALING and SHIELDING</b>	Aerospace Chemical Processing Consumer Energy, Oil & Gas Fluid Power General Industrial	Information Technology Life Sciences Military Semiconductor Transportation	Dynamic Seals Elastomeric O-Rings Emi Shielding Extruded & Precision-Cut, Fabricated Elastomeric Seals	Homogeneous & Inserted Elastomeric Shapes High Temperature Metal Seals Metal & Plastic Retained Composite Seals Thermal Management

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## ! CAUTION !

Do not mix or interchange component parts or tubing with those of other manufacturers. Doing so is unsafe and will void warranty.

Parker Autoclave Engineers Valves, Fittings, and Tools are not designed to interface with common commercial instrument tubing and are designed to only connect with tubing manufactured to Parker Autoclave Engineers AES specifications. Failure to do so is unsafe and will void warranty.

## WARNING

**FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

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