

# Fisher™ FIELDVUE™ DPC2K Digital Process Controller

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X1901

This quick start guide provides installation and initial setup information for the DPC2K digital process controller

## Related Documents

The following documents include product specifications, configuration, reference materials and custom setup information, maintenance procedures, and replacement part details. If a copy of any of these documents is needed scan or click the QR code at the right, contact your [Emerson sales office](#), or visit our website at Fisher.com.

- Bulletin 34.7:DPC2K - Fisher FIELDVUE DPC2K Digital Process Controller ([D104561X012](#))
- Fisher LoopConnect™ Software Quick Start Guide (D104558X012)
- Fisher FIELDVUE DPC2K Digital Process Controller Instruction Manual (D104786X012)



Scan or click for Installation Documents & Field Support

[emrson.co/FieldSupportDPC2K](https://emrson.co/FieldSupportDPC2K)

## Using This Guide

This guide describes how to install the DPC2K digital process controller and set operational information using the Local User Interface (LUI). The LUI consists of a display, four navigation pushbuttons and two action pushbuttons.

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### Note

The Local User Interface allows for operational changes only. LoopConnect software is required to communicate with and configure the DPC2K digital process controller.

Contact your Emerson sales office if software installation files are required.

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Do not install, operate, or maintain a DPC2K digital process controller without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all contents of this guide, including all safety cautions and warnings. If you have any questions about these instructions, contact your [Emerson sales office](#) before proceeding.

**⚠ WARNING**

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before proceeding with any Installation procedures:

- Always wear protective clothing, gloves, and eyewear to prevent personal injury or property damage.
  - Do not remove the actuator from the valve while the valve is still pressurized.
  - Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
  - Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve.
  - Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
  - Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
  - Vent the pneumatic actuator loading pressure and relieve any actuator spring precompression so the actuator is not applying force to the valve stem; this will allow for the safe removal of the stem connector.
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**⚠ WARNING**

To avoid static discharge when flammable gases or dust are present, do not rub or clean the instrument with solvents. To do so could result in a spark that may cause the flammable gases or dust to explode, resulting in personal injury or property damage. Clean with a mild detergent and water only.

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**NOTICE**

Do not use sealing tape on pneumatic connections. This instrument contains small passages that may become obstructed by detached sealing tape. Thread sealant paste should be used to seal and lubricate pneumatic threaded connections.

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## Security

### NOTICE

Physical security is an important part of any security program and is fundamental to protecting your system.

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and must be protected against by restricting access of unauthorized personnel in your facility.

- The DPC2K Single Loop Controller has several security capabilities:
  - System stores configuration and log data.
  - DPC2K Signed Firmware prevents the downloading of corrupted or unauthorized firmware.
  - The DPC2K has the capability to enable or disable the provided communication channels as well as enabling or disabling various types of communication on those channels.
  - The Write Protect switch, located under the terminal cover, when enabled, helps prohibit unintentional configuration and calibration changes over all interfaces.
- If unsecured, any device in the field is vulnerable to a physical attack; safety and security procedures must include mitigation by physical security controls.
- By default the instrument is shipped from the factory with all the communication channels disabled. The following are unsecured, unencrypted inputs and outputs used by the DPC2K single loop controller:
  - AI1: Analog input capable of reading a 4-20 mA signal and communicating HART FSK as a secondary device.
  - AI2: Analog input capable of reading a 4-20 mA signal.
  - AO: Analog output capable of driving a 4-20 mA signal.
  - Communication Channels:
    - RS-485 – In normal operation, this channel is used to communicate Modbus.
    - HART-FSK – The DPC2K will be a secondary HART communicating device on AI1.
    - LUI – Local user interface provides ethernet configuration options and monitoring.
    - LAN/TCP – Supports user defined HART-IP port and a Modbus defined TCP port.
    - LAN/UDP – Supports up to four UDP sessions over HART-IP.
- The DPC2K uses LoopConnect software for device configuration, including enabling communication protocols used and data monitoring. It is expected that LoopConnect software is installed and run on a computer that is configured and operated according to local security policies.
- Product Operation Best Practices:
  - Ensure that operation personnel are trained both on local security policies and the secure operation of the DPC2K and LoopConnect software.

- It is recommended that you set the Write Lock switch in the enabled position after configuration is complete.
- Operate the device within a controlled and secured physical environment.
- When connected to a network, operate the DPC2K and LoopConnect software within a controlled and secured network environment.
- Configure security settings of the DPC2K, providing access to only what is absolutely required to perform configuration and operational functions.
- Apply security patches and updates as they are released.

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### Note

Work with your [Emerson sales office](#) to stay informed and obtain access to security patches and updates.

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- Report security incidents and potential product vulnerabilities at:  
[https://go.emersonautomation.com/reportvulnerability\\_en](https://go.emersonautomation.com/reportvulnerability_en)
- Product Disposal Guidelines

When the device needs to be disposed of consider the following aspects of device removal:

- Identify whether the device can be reused in another part of the process or for testing or training purposes.
- Identify what data is stored on the device and sanitize this data with the latest industry recommended methods.  
To restore the device back to factory defaults:
  1. Using LoopConnect navigate to the Device Data Tab.
  2. Select “Restore Factory Defaults” and follow on screen instructions.

If the device will not be reused, follow local disposal policy.

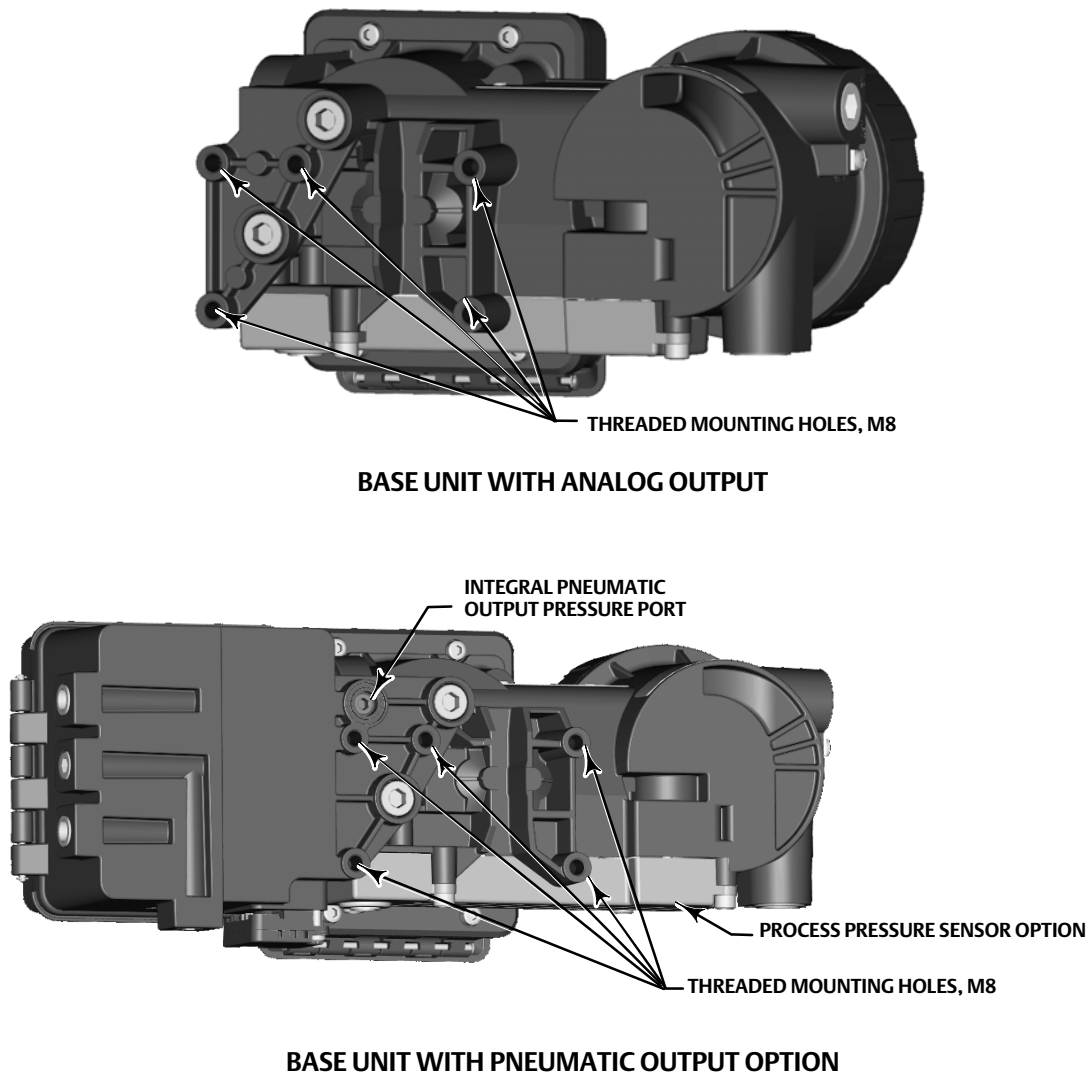
To uninstall LoopConnect software from your computer go to Start > Settings > Apps > Apps & features and select LoopConnect.

## Step 1—Install the DPC2K on the Actuator

### Housing Variations

The DPC2K housing is available in two different configurations, the base unit with analog output, and the base unit with pneumatic output. Figure 1 shows the mounting holes for each option.

Figure 1. Housing Variations



## General Mounting Guidelines

If ordered as part of a control valve assembly, the factory will mount the digital process controller on the actuator and calibrate the instrument. If you purchased the digital process controller separately, you will need a mounting kit. The following procedures are general guidelines. See the instructions that come with the mounting kit for detailed information on mounting the digital process controller to a specific actuator model and the magnetic array matched to the actuator.

### NOTICE

The magnet assembly material has been specifically chosen to provide a long-term stable magnetic field. However, as with any magnet, care must be taken when handling the magnet assembly. Another high powered magnet placed in close proximity (less than 25 mm) can cause permanent damage. Potential sources of damaging equipment include, but are not limited to: transformers, DC motors, stacking magnet assemblies.

#### General Guidelines for use of High Power Magnets with Travel Sensors

Use of high power magnets in close proximity to **any travel sensor** which is operating a process should be avoided. High power magnets can affect the sensor’s ability to measure the valve travel.

#### Use of Magnetic Tools with the DPC2K

- **Magnetic Tip Screw Drivers** – Magnetic tip screw drivers can be used to work on the DPC2K. However, they should not be brought in close proximity to the magnet assembly (located at the back of the instrument) during process operations.
- **Calibrator Strap Magnets** – These are high power magnets used to hold 4-20 mA calibrators and other equipment. Normally, these calibrators would not be used while an instrument is controlling the process. High power magnets should be kept at least 15 cm (6 in.) from the DPC2K.



#### Notes

- As a general rule, do not use less than 60% of the magnet assembly travel range for full travel measurement. Performance will decrease as the assembly is increasingly subranged.
- The linear magnet assemblies have a valid travel range indicated by arrows molded into the piece. This means that the hall sensor (the center point of the channel on the back of the DPC2K housing) has to remain within this range throughout the entire valve travel. The linear magnet assemblies are symmetrical. Either end may be up.
- Mounting the instrument vertically, with the vent at the bottom of the assembly, or horizontally, with the vent pointing down, is recommended to allow drainage of moisture that may be introduced via the instrument air supply.

### Mounting on sliding-stem linear actuators

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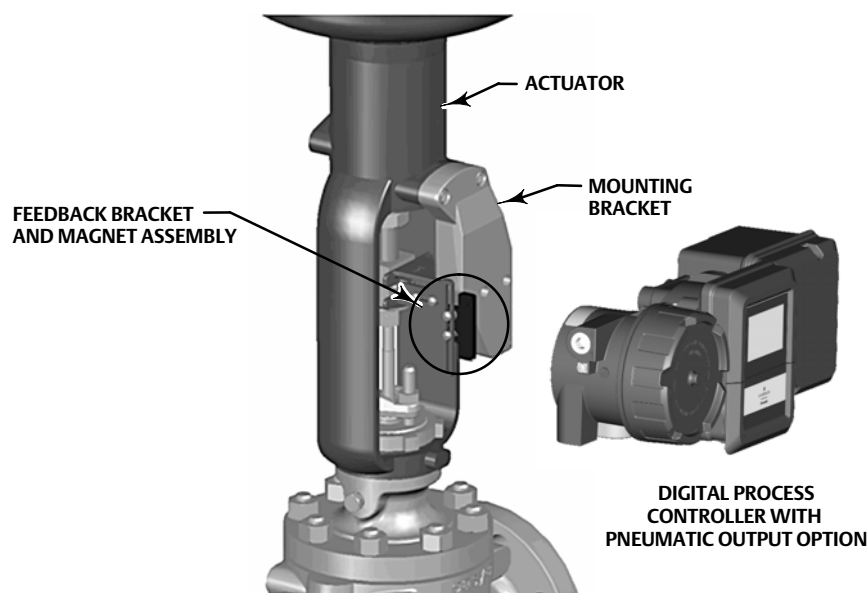
## Sliding-Stem Linear Actuators

### Bracket Mounted

Fisher 667, 657, and GX

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.

Figure 2. Mounting Parts for Sliding-Stem Actuator with up to 210 mm (8.25 in.) Travel



2. Attach the mounting bracket to the actuator.
3. Loosely attach the feedback pieces and magnet assembly to the valve stem connector. Do not tighten the fasteners until the magnet assembly is positioned and aligned in steps 4 and 5.

### **⚠ WARNING**

**Do not install a magnet assembly that is shorter than the physical travel of the actuator. Loss of control will result from the magnet assembly moving outside the range of the index mark in the feedback slot of the DPC2K housing and may result in personal injury or property damage.**

4. Using the alignment template (supplied with the mounting kit), position the magnet assembly inside the retaining slot.
5. Align the magnet assembly as follows:
  - For air-to-open actuators (e.g. Fisher 667) vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DPC2K housing is within the valid range on the magnet assembly throughout the range of travel. See Figure 3.



- For air-to-close actuators (e.g. Fisher 657) vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DPC2K housing is within the valid range on the magnet assembly throughout the range of travel. See Figure 4.

Figure 3. Air-to-Open Magnet Assembly Alignment

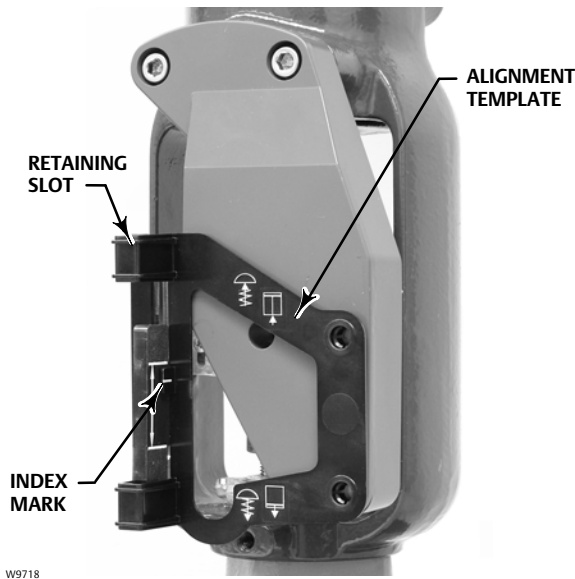
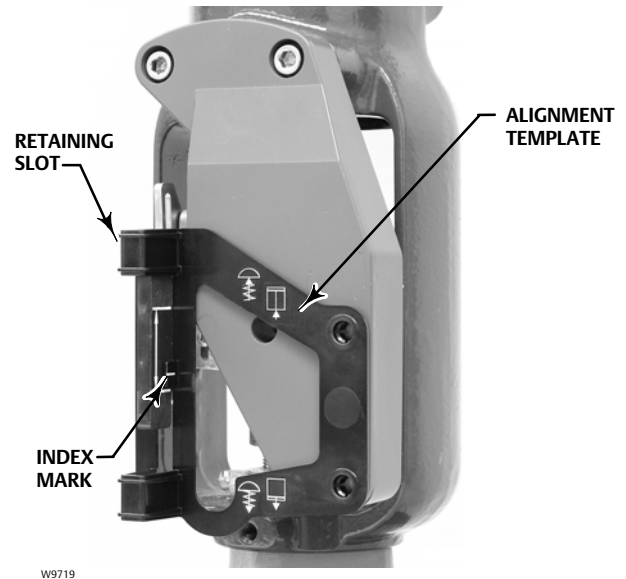


Figure 4. Air-to-Close Magnet Assembly Alignment



6. Tighten the fasteners and remove the alignment template.

**Note**

Use a flat end hex key to tighten the magnet assembly fasteners to a torque of 2.37 N•m (21 lbf•in) for 4 mm screws, and 5.08 N•m (45 lbf•in) for 5 mm screws. For added security, especially in vibrating services, blue (medium) threadlocker may be used on the fasteners.

7. Mount the DPC2K to the mounting bracket, using the mounting bolts.
8. Check for clearance between the magnet assembly and the DPC2K feedback slot.

**Note**

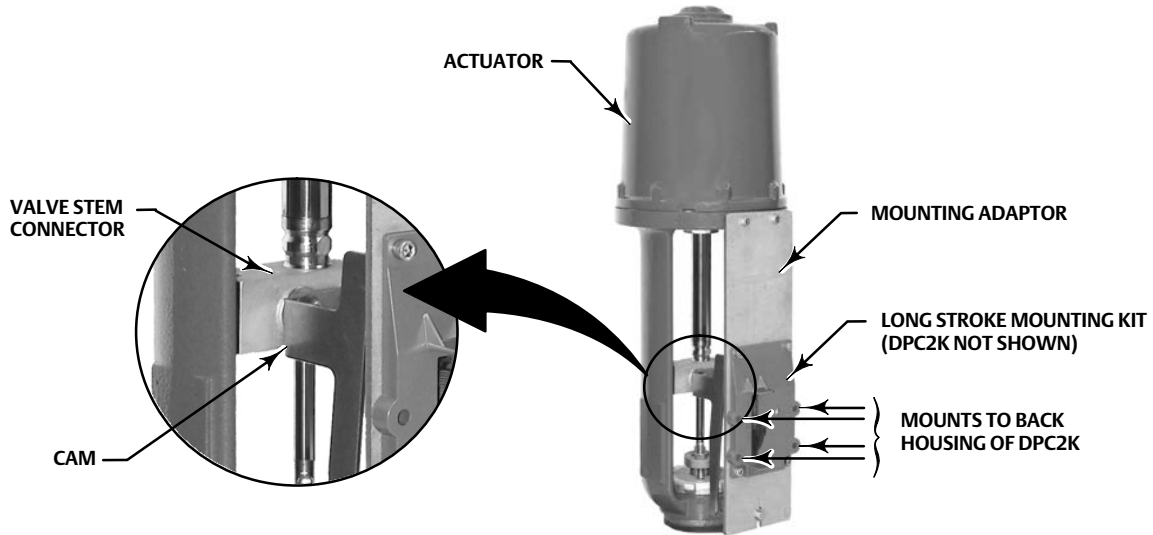
Ensure that there is clearance between the magnet assembly and the DPC2K housing slot throughout the full range of travel.

9. Proceed to Step 2—Connect the Pneumatic Tubing on page 18.

Actuators over 210 mm (8.25 in.) Travel

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the pneumatic actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while working on the equipment.

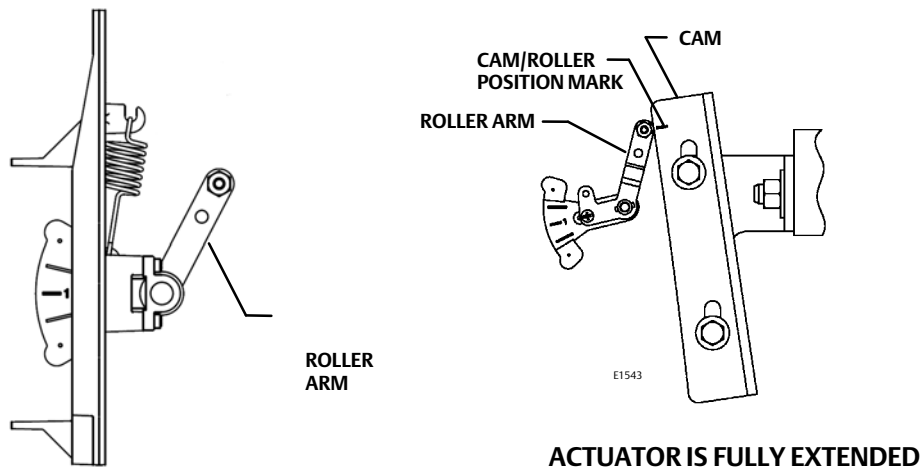
Figure 5. Mounting on Sliding-Stem (Linear) Actuators over 210 mm (8.25 in.) Travel



W9709

2. Install the cam to the valve stem connector as described in the instructions included with the mounting kit.
3. Install the mounting adaptor to the actuator.
4. Attach the digital process controller and mounting kit assembly to the mounting adaptor. The roller on the digital process controller feedback arm will contact the actuator cam as it is being attached.

Figure 6. Roller Arm Variation used for Sliding-Stem (Linear) Actuators over 210 mm (8.25 in.) Travel



E1229

E1543

5. Proceed to Step 2—Connect the Pneumatic Tubing on page 18.

## Integral Mounted Fisher Actuators

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
2. Loosely attach the feedback pieces and magnet assembly to the valve stem connector.

Do not tighten the fasteners until the magnet assembly is positioned and aligned in steps 3 and 4. Do not tighten the fasteners because fine adjustment is required.

### **⚠ WARNING**

**Do not install a magnet assembly that is shorter than the physical travel of the actuator. Loss of control will result from the magnet assembly moving outside the range of the index mark in the feedback slot of the DPC2K housing and may result in personal injury or property damage.**

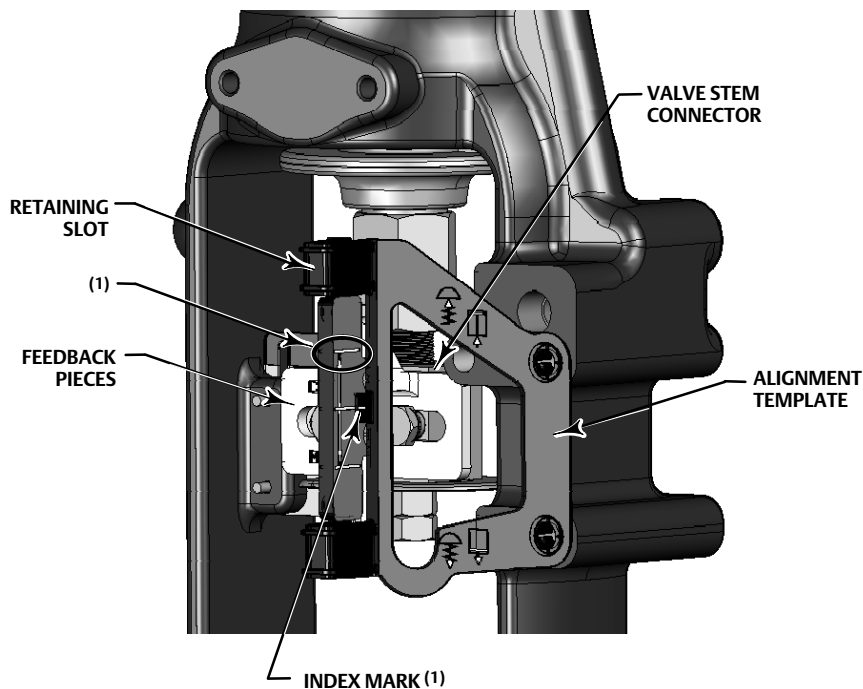
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3. Using the alignment template (supplied with the mounting kit), position the feedback assembly inside the retaining slot.
4. Continue on with the appropriate procedure below to align the magnet assembly.

## Air-to-Open (667 size 30i - 76i)

Vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the upper extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark in the feedback slot of the DPC2K housing is within the valid range on the magnet assembly throughout the range of travel. See Figure 7.

Figure 7. Air-to-Open Magnet Assembly Alignment



**NOTE:**

1. IMAGE DENOTES ACTUATOR AT HALF TRAVEL. ALIGN UPPER EXTREME OF MAGNET ASSEMBLY WITH ALIGNMENT TEMPLATE INDEX MARK.

1. Tighten the fasteners and remove the alignment template.

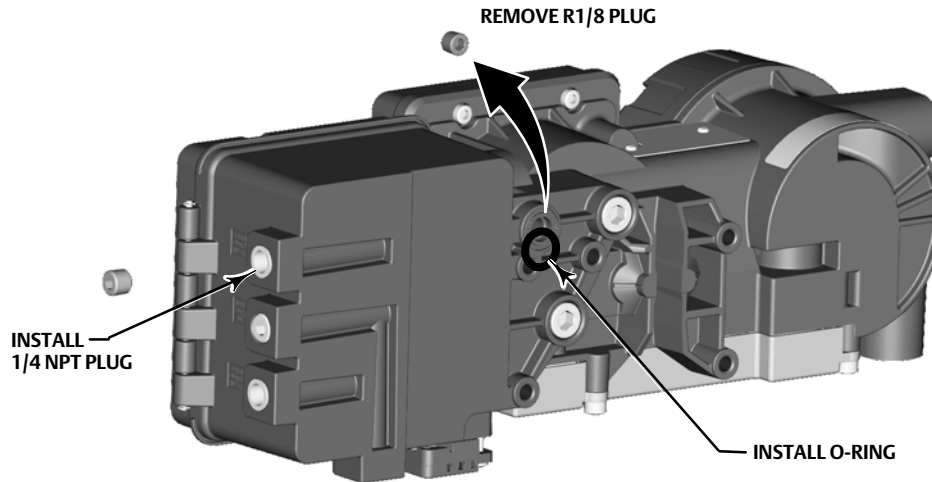
**Note**

Use a flat end hex key to tighten the magnet assembly fasteners to a torque of 2.37 N•m (21 lbf•in) for 4 mm screws, and 5.08 N•m (45 lbf•in) for 5 mm screws. For added security, especially in vibrating services, blue (medium) threadlocker may be used on the fasteners.

2. Remove the plug (R1/8) from the back of the DPC2K housing.

The pneumatic output port on the DPC2K lines up with the integral actuator pneumatic port. See Figure 8.

Figure 8. Modifications for Integral Mounted Actuator; Air-to-Open Construction Only



3. Install the plug (1/4 NPT, included in the mounting kit) in pneumatic Output A.
4. Attach the DPC2K to the actuator mounting pad on the side that has the open pneumatic port.

Be sure to place the O-ring between the digital process controller's pneumatic output and the actuator mounting pad. Pneumatic tubing is not required because the air passages are internal to the actuator.

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**Note**

Use a 13 mm socket or box end wrench to attach the digital process controller to the 667 size 30i -76i actuator mounting pad.

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5. Check for clearance between the magnet assembly and the DPC2K feedback slot.
  6. If not already installed, install a vent in the port on the upper diaphragm casing.
  7. Proceed to Step 2—Connect the Pneumatic Tubing on page 18.
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**Note**

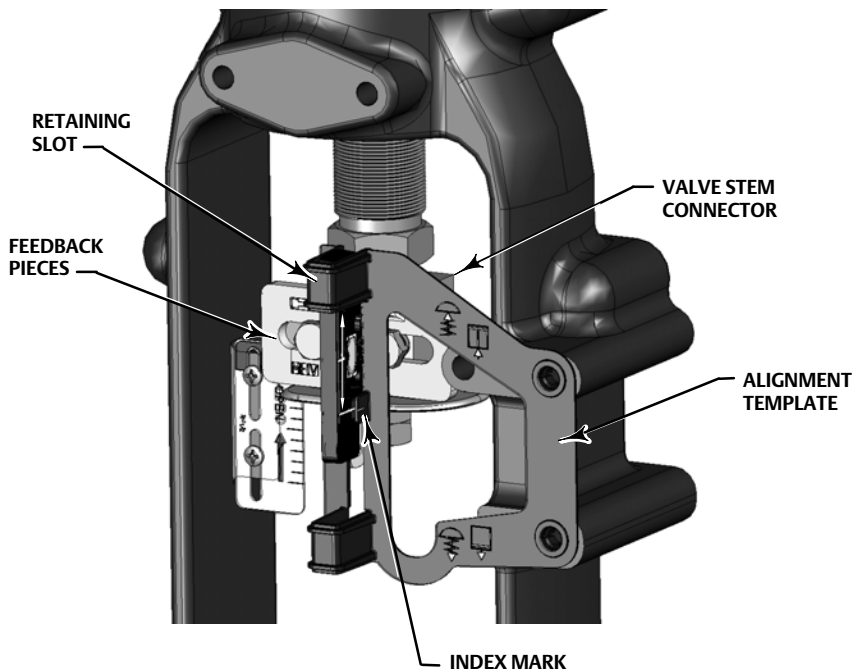
Refer to the 667 Diaphragm Actuator Sizes 30/30i - 76/76i and 87 instruction manual ([D100310X012](#)) for 667 product information.

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## Air-to-Close (657 size 30i - 70i)

Vertically align the magnet assembly so that the center line of the alignment template is lined up as close as possible with the lower extreme of the valid travel range on the magnet assembly. The magnet assembly should be positioned so that the index mark on the pole pieces (back of the DPC2K housing) is within the valid range on the magnet assembly throughout the range of travel. See Figure 9.

Figure 9. Air-to-Close Magnet Assembly Alignment



1. Tighten the fasteners and remove the alignment template.

### Note

Use a flat end hex key to tighten the magnet assembly fasteners to a torque of 2.37 N•m (21 lbf•in) for 4 mm screws, and 5.08 N•m (45 lbf•in) for 5 mm screws. For added security, especially in vibrating services, blue (medium) threadlocker may be used on the fasteners.

2. Attach the DPC2K to the actuator mounting pad.

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**Note**

Use a 13 mm socket or box end wrench to attach the digital process controller to the 657 size 30i -70i actuator mounting pad.

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3. Check for clearance between the magnet assembly and the DPC2K feedback slot.
4. Install tubing between the actuator casing and the appropriate DPC2K pneumatic output port.
5. If not already installed, install a vent in the port on the lower diaphragm casing or yoke.
6. Proceed to Step 2—Connect the Pneumatic Tubing on page 18.

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**Note**

Refer to the 657 Diaphragm Actuator Sizes 30/30i through 70/70i and 87 instruction manual ([D100306X012](#)) for 657 product information.

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## Quarter-Turn Rotary Actuators

Figure 10. Mounted on 2052 Rotary Actuator



X2027

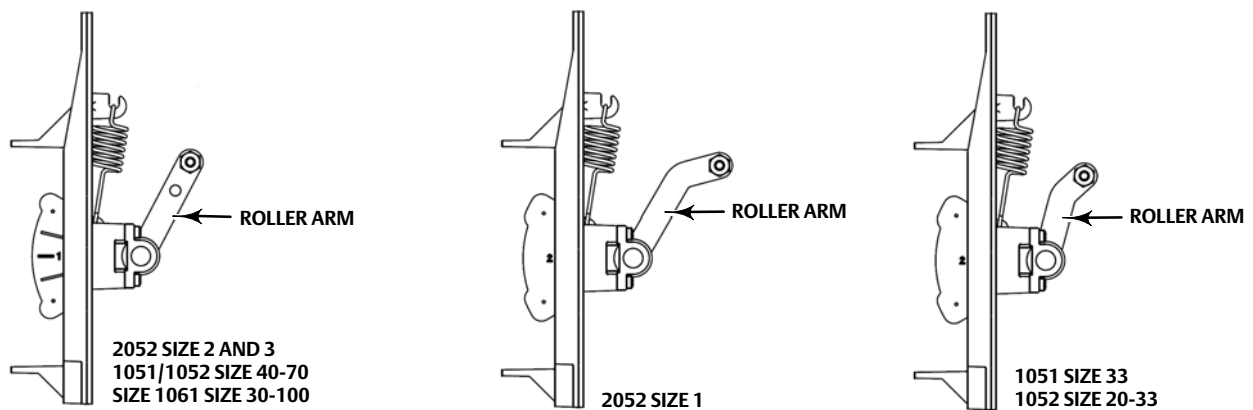
## Integral Mounted Fisher Actuators

1. Isolate the control valve from the process line pressure and release pressure from both sides of the valve body. Shut off all pressure lines to the pneumatic actuator, releasing all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while working on the equipment.
2. Verify that the appropriate cam is installed on the actuator as described in the instructions included with the mounting kit.
3. Attach the digital process controller and mounting kit assembly to the actuator.

The roller on the digital process controller feedback arm will contact the actuator cam as it is being attached, as shown in Figure 12.

4. Proceed to Step 2—Connect the Pneumatic Tubing on page 18.

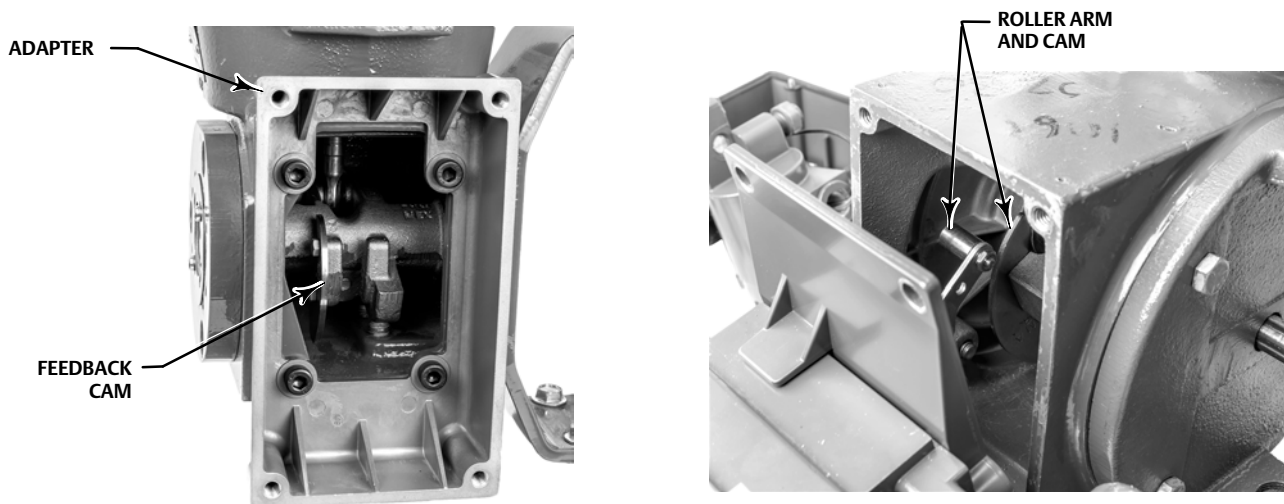
Figure 11. Rotary Actuator Mounting Variations



NOTE THE DIFFERENCE IN THE SHAPE AND LENGTH OF THE ROLLER ARM

E1229

Figure 12. Integral Mounted Fisher Actuators





## Remote Mount

### Pipestand Mounting

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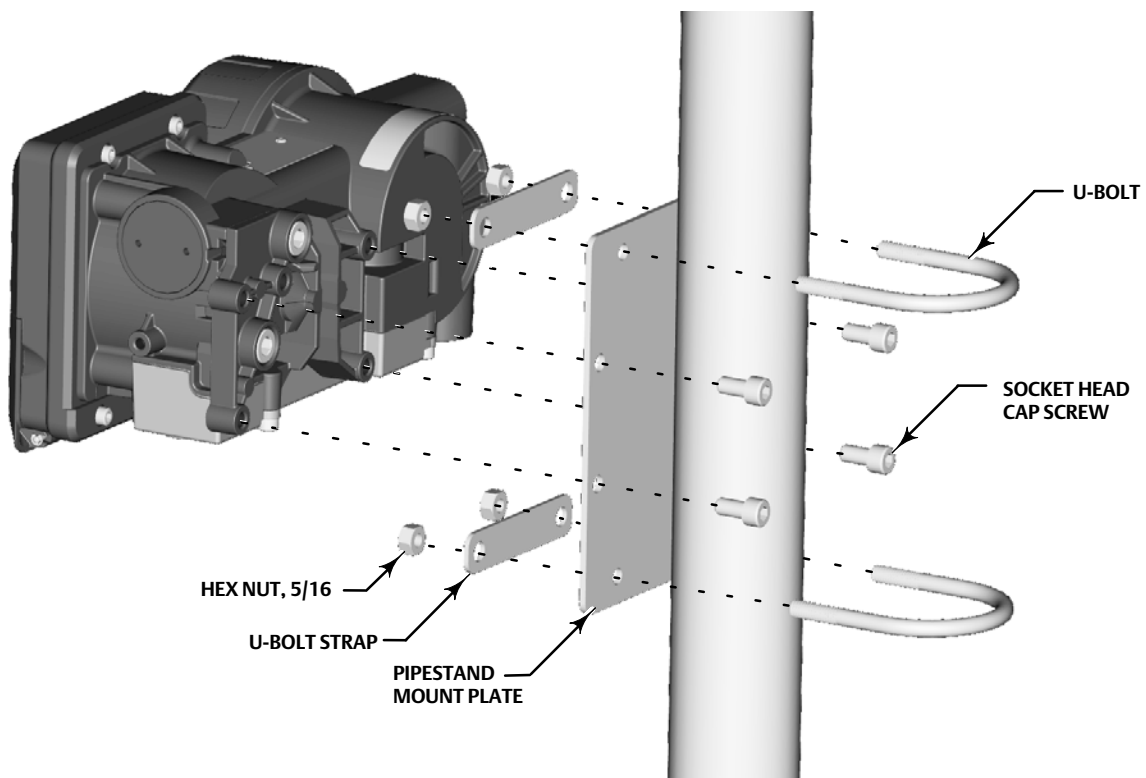
**Note**

Pipestand mounting applies to both Analog Output and Pneumatic Output options.

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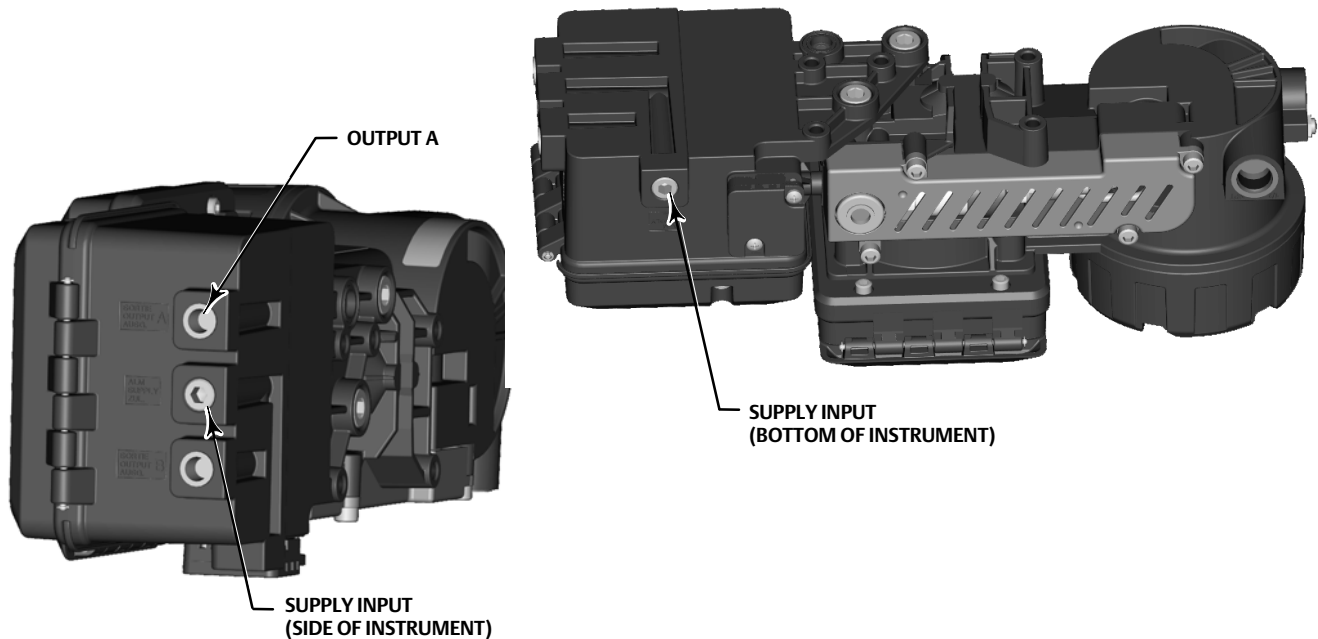
1. Attach the mounting plate to the pipestand using the U-bolts, the U-bolt straps, and the 5/16 hex nuts.
  2. Use the four socket head cap screws to securely fasten the instrument to the mounting plate and the pipestand as shown in Figure 13.
  3. Proceed to Step 2—Connect the Pneumatic Tubing on page 18.
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Figure 13. Pipestand Mounting Kit



## Step 2—Connect the Pneumatic Tubing

Figure 14. Supply Inputs and Outputs



### NOTICE

**Do not use sealing tape on pneumatic connections. This instrument contains small passages that may become obstructed by detached sealing tape. Thread sealant paste should be used to seal and lubricate pneumatic threaded connections.**

1. Connect DPC2K pneumatic OUTPUT A to the actuator pneumatic input using at least 10 mm (3/8-inch) diameter tubing.

### Note

To have the actuator stem extend from the cylinder with increasing input signal, connect OUTPUT A to the actuator cylinder connection farthest from the actuator stem. To have the actuator stem retract into the cylinder with increasing input signal, connect OUTPUT A to the actuator cylinder connection closest to the actuator stem.

**⚠ WARNING**

Supply medium must be clean, dry, oil-free, and noncorrosive and meet the requirements of ISA Standard 7.0.01 or ISO 8573-1.

Severe personal injury or property damage may occur from an uncontrolled process if the instrument supply medium is not clean, dry, oil-free, and noncorrosive. While use and regular maintenance of a filter that removes particles larger than 40 micrometers in diameter will suffice in most applications, further filtration down to 5 micrometer particle size is recommended. Lubricant content is not to exceed 1 ppm weight (w/w) or volume (v/v) basis. Condensation in the air supply should be minimized.

Check with an Emerson field office and industry instrument air quality standards for use with corrosive air or if you are unsure about the amount of air filtration or filter maintenance.

When using natural gas as the supply medium, or for hazardous location applications, the following warnings also apply:

- Remove electrical power before removing the housing cap. Personal injury or property damage from fire or explosion may result if power is not disconnected before removing the cap.
- Remove electrical power before disconnecting any of the pneumatic connections.
- When disconnecting any of the pneumatic connections or any pressure retaining part, natural gas will seep from the unit and any connected equipment into the surrounding atmosphere. Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken. Preventive measures may include, but are not limited to, one or more of the following: ensuring adequate ventilation and the removal of any ignition sources.
- Ensure that all caps and covers are correctly installed before putting this unit back into service. Failure to do so could result in personal injury or property damage from fire or explosion.

2. Connect a filter or filter regulator to the DPC2K side or bottom supply input using at least 10 mm (3/8-inch) diameter tubing.

- When using a yoke mounted 67CFR filter regulator, mount the filter regulator with two cap screws to the pre-drilled and tapped holes in the actuator yoke. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. No O-ring is required.
- When using a casing mounted filter regulator, use a separate casing mounting bracket (typically provided with the filter regulator). Attach the mounting bracket to the filter regulator and then attach this assembly to the actuator casing. Thread a 1/4-inch socket-head pipe plug into the unused outlet on the filter regulator. No O-ring is required.
- If the supply pressure is less than the maximum actuator and instrument pressure rating, a regulator is not required. However, a filter is always required. Attach the filter securely to the actuator or instrument.

**⚠ WARNING**

Personal injury or property damage can occur from cover failure due to overpressure. Ensure that the housing vent opening is open and free of debris to prevent pressure buildup under the cover.

This unit vents the supply medium into the surrounding atmosphere. When installing this unit in a non-hazardous (non-classified) location in a confined area, with natural gas as the supply medium, you must remotely vent this unit to a safe location. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

When installing this unit in a hazardous (classified) location remote venting of the unit may be required, depending upon the area classification, and as specified by the requirements of local, regional, and national codes, rules and regulations. Failure to do so when necessary could result in personal injury or property damage from fire or explosion, and area re-classification.

In addition to remote venting of the unit, ensure that all caps and covers are correctly installed. Failure to do so could result in personal injury or property damage from fire or explosion, and area re-classification.

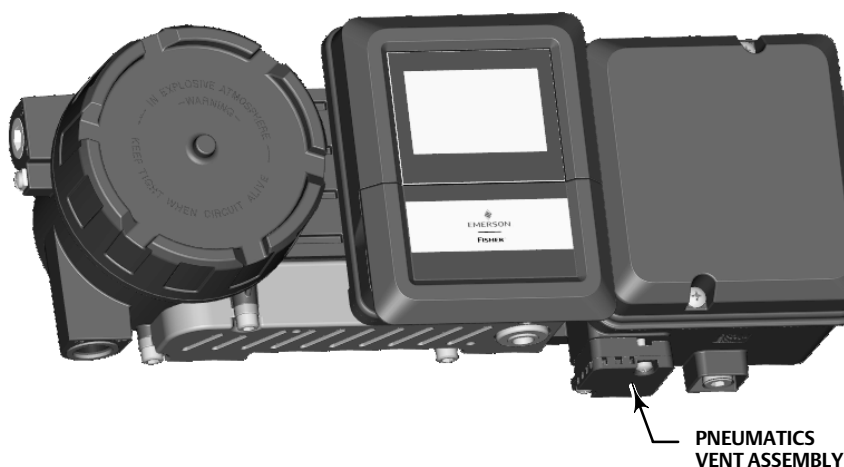
3. If necessary, remove the plastic vent assembly (Figure 15) on the DPC2K and install a pipe-away vent line using at least 12.7 mm (1/2-inch) diameter tubing. The vent line must be as short as possible with a minimum number of bends and elbows to prevent back pressure build-up.

**Note**

Ensure that a bug screen is installed at the open end of the pipe away vent.

Ensure that vent opening in the pipe away vent is protected against the entrance of any foreign material that could plug it. Check the vent periodically to be certain it is not plugged.

Figure 15. Vent Connection



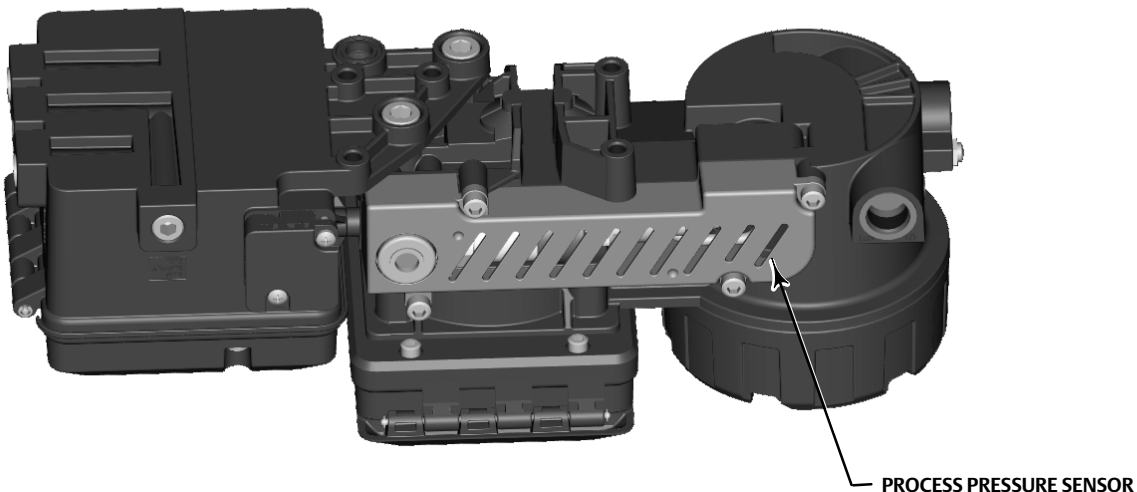
**⚠ WARNING**

To avoid personal injury or property damage resulting from bursting or parts, do not exceed maximum supply pressure. Personal injury or property damage may result from fire or explosion if natural gas is used as the supply medium and appropriate preventive measures are not taken. Preventive measures may include, but are not limited to, one or more of the following: Remote venting of the unit, re-evaluating the hazardous area classification, ensuring adequate ventilation, and the removal of any ignition sources.

4. Connect the pneumatic supply line to the 1/4 NPT IN connection on the filter regulator.
5. Proceed to Step 3—Connect the Electrical Wires on page 22.

## Process Pressure Sensor Option

Figure 16. Process Pressure Sensor Option

**⚠ WARNING**

To avoid personal injury or property damage resulting from the sudden release of pressure when using corrosive media, make sure the tubing and instrument components that contact the corrosive medium are of suitable noncorrosive material.

Also refer to the Installation Warning at the beginning of this section.

When installing process piping, follow accepted practices to ensure accurate transmission of the process pressure to the controller or transmitter. Install shutoff valves, vents, drains, or seal systems as needed in the process pressure lines. If the instrument is located such that the adjacent process pressure lines will be approximately horizontal, the lines should slope downward to the instrument for liquid-filled lines and upward to instruments for gas-filled lines.

## Step 3—Connect the Electrical Wires

### **⚠ WARNING**

Select wiring and/or cable glands that are rated for the environment of use (such as hazardous area, ingress protection and temperature). Failure to use properly rated wiring and/or cable glands can result in personal injury or property damage from fire or explosion.

Wiring connections must be in accordance with local, regional, and national codes for any given hazardous area approval. Failure to follow the local, regional, and national codes could result in personal injury or property damage from fire or explosion.

To avoid personal injury resulting from electrical shock, do not exceed maximum input voltage specified on the product nameplate. If the input voltage specified differs, do not exceed the lowest specified maximum input voltage.

Personal injury or property damage caused by fire or explosion may occur if electrical connections are attempted in a potentially explosive atmosphere or in an area that has been classified as hazardous. Confirm that area classification and atmosphere conditions permit the safe removal of the terminal box cap before proceeding.

The valve may move in an unexpected direction when power is applied to the digital process controller. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly when applying power to the instrument.

The DPC2K power requirements are 9 - 28 VDC. The Power connector, shown in Figure 17, is the only removable connector in the termination area.

### **Note**

If 12/24 VDC power is not readily available the illustration in Figure 18 shows how a simple solar power system may be used.

Wire the DPC2K as follows.

1. Remove the wiring terminal box cap.
2. Route the wires through the channels from the conduit entries according to your application requirements. Refer to the appropriate wiring procedure below. See Table 1 for a description of the terminals and switches shown in Figure 17.

### **Note**

Install conduit using any local and national electrical codes that apply to the connection.

If an Ethernet cable is being used, it may be required to bring this through first if it has a molded termination followed by smaller or individual wires.

**Note**

Proper grounding is a critical safety measure in all electrical systems and installations. The DPC2K has a safety ground terminal within the termination area, as well as an external ground lug on the exterior of the DPC2K housing.

**⚠ WARNING**

Personal injury or property damage, caused by fire or explosion, can result from the discharge of static electricity. Connect a 14 AWG (2.08 mm<sup>2</sup>) ground between the digital process controller and earth ground when flammable or hazardous gases are present. Refer to national and local codes and standards for grounding requirements.

Figure 17. Terminals, Connections, and Grounds

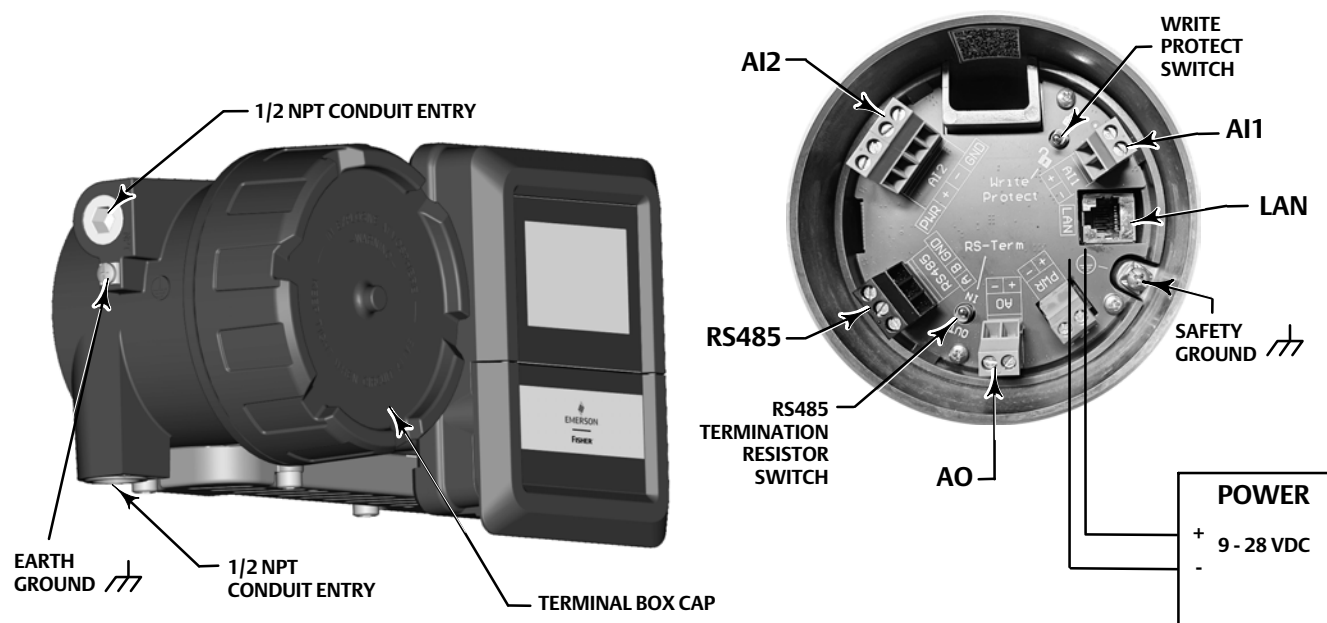
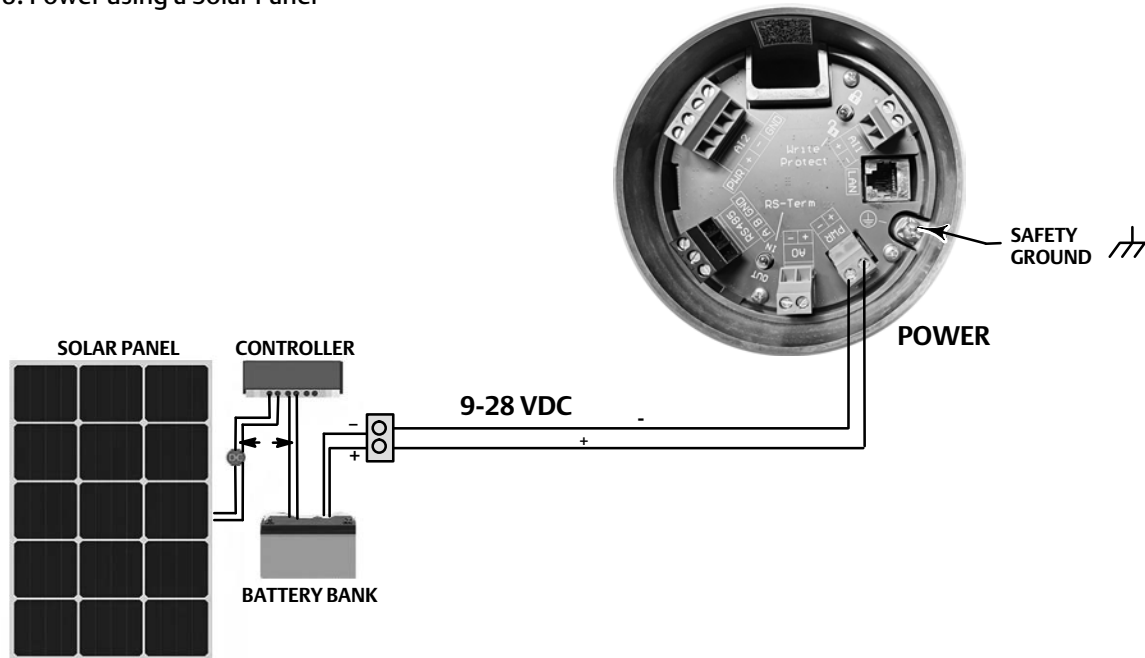


Figure 18. Power using a Solar Panel



NOTE:  
POWER THE DPC2K WITH 9-28 VDC. IF 12/24C VD POWER IS NOT READILY AVAILABLE, SOLAR POWER CAN BE USED FOR REMOTE FIELD APPLICATIONS

## Wiring Connections

Table 1. Terminal/Switch Descriptions

Terminals/Switches	Description	Refer to
AI1	Use for remote setpoint	Figure 23: Remote Setpoints (Connecting with DCS, PLC, RTU's)
	Used with external powered 4-20 mA transmitter	Figure 22: Externally Powered 2-Wire Transmitters
Write Protect Switch	Prevents configuration and calibration changes to the instrument	Figure 17: Write Protect Switch; must be disabled in order to setup and configure the DPC2K
AI2	DPC2K powered 4-20 mA transmitter	Figure 19: Loop Powered 2-Wire Transmitters Figure 20: External DPC2K Powered 3-Wire Transmitters Figure 21: External DPC2K Powered 4-Wire Transmitters
	Remote setpoint if using pressure input of externally powered transmitter	Figure 22: Externally Powered 2-Wire Transmitters
RS485	Used for MODBUS RTU RS485 Resistor Switch used for multidrop	Figure 27: Serial RS-485
AO	Provides a 4-20 mA powered output	Figure 24: Analog Output, with FIELDVUE DVC6200 Figure 25: Analog Output, with Fisher easyDrive™ electric actuator
Power	9 - 28 VDC	Figure 17
LAN	Ethernet connectivity for: Modbus TCP HART IP	Figure 26: Ethernet LAN (Local Area Network)



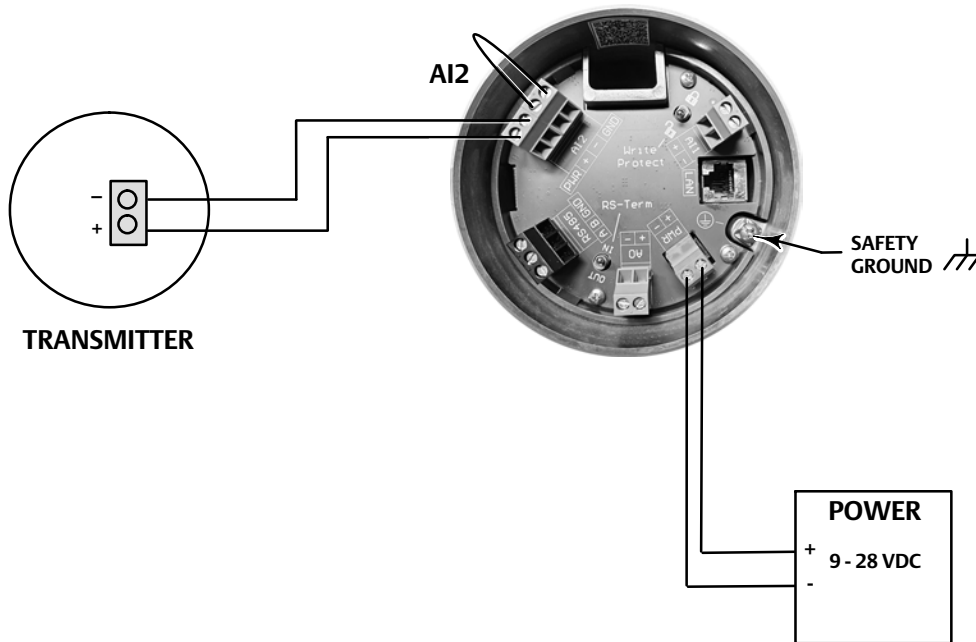
## Inputs: External Transmitters

### Loop Powered from DPC2K to 2-Wire External Transmitters (Figure 19)

AI2 is a 4-20 mA analog input. Power (28 VDC) may be sourced for the loop from the PWR and + terminals. The current loop measurement takes place between the + and – terminals on AI2. The – terminal is then connected to the ground terminal to complete the circuit

1. Connect the transmitters + (positive) terminal to the AI2 power terminal.
2. Connect the transmitters – (negative) terminal to AI2 + (positive) terminal.
3. Connect the AI2 – (negative) terminal to the AI2 ground terminal.
4. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
5. Replace and hand tighten the cap on the terminal box.
6. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 19. Loop Powered Transmitters

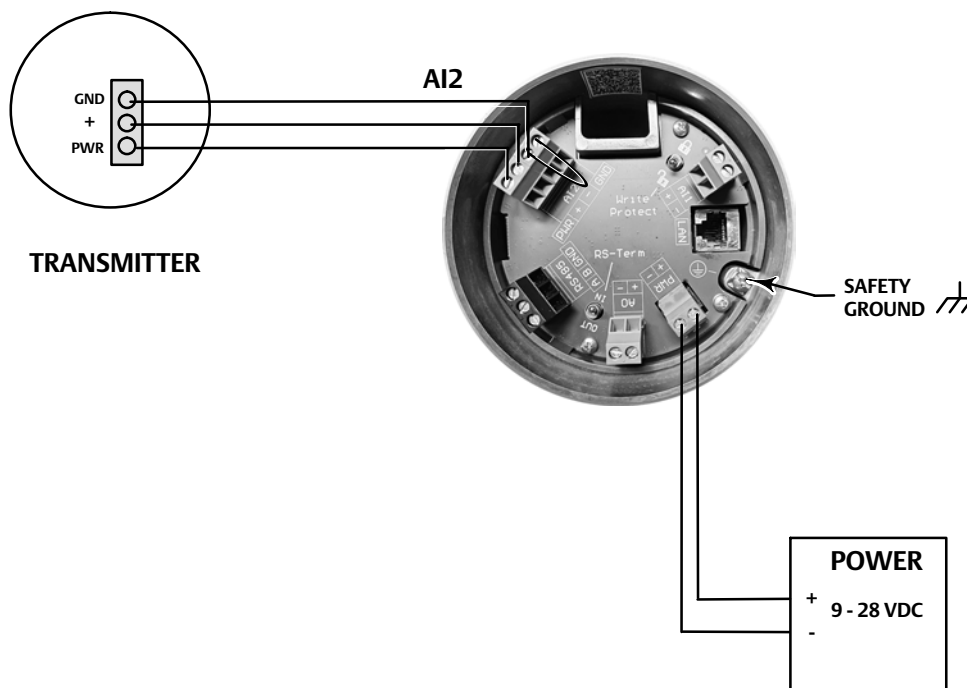


## External DPC2K Powered 3-Wire Transmitters (Figure 20)

For non-loop powered 4-20 mA transmitters, the DPC2K can provide the power for the transmitter, and measure the current between the return + and – terminals.

1. Connect the transmitters power terminal to the AI2 power terminal.
2. Connect the transmitters + (positive) terminal to the AI2 + (positive) terminal.
3. Connect the transmitters ground terminal to AI2 ground terminal.
4. Connect the AI2 – (negative) terminal to the AI2 ground terminal.
5. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
6. Replace and hand tighten the cap on the terminal box.
7. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 20. External DPC2K Powered 3-Wire Transmitters

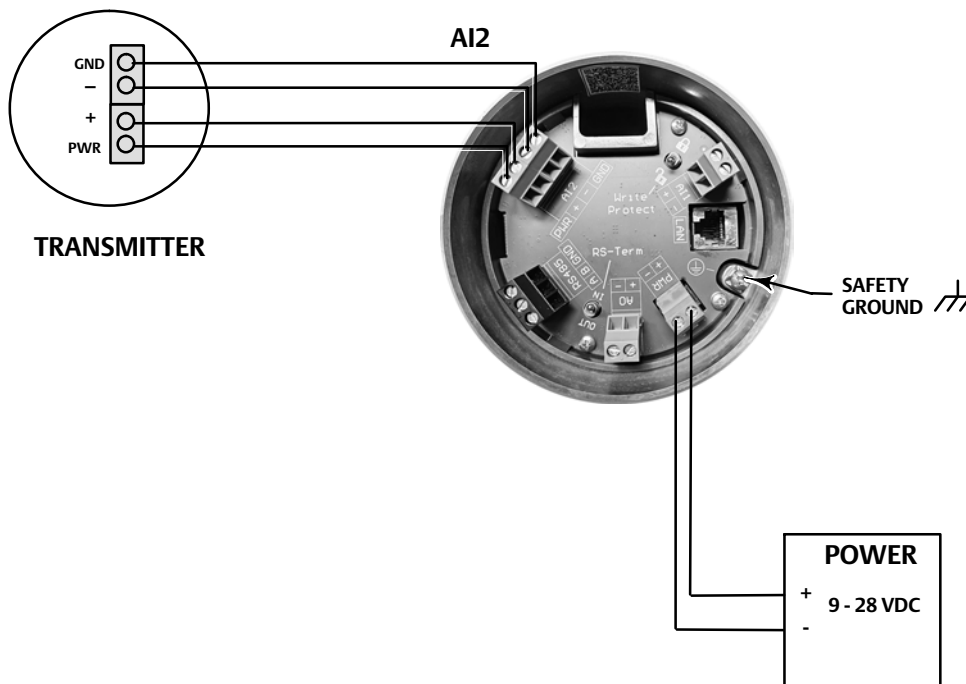


## External DPC2K Powered 4-Wire Transmitters (Figure 21)

For non-loop powered 4-20 mA transmitters, the DPC2K can provide the power for the transmitter, and measure the current between the return + and – terminals.

1. Connect the transmitters power terminal to the AI2 power terminal.
2. Connect the transmitters + (positive) terminal to the AI2 + (positive) terminal.
3. Connect the transmitters – (negative) terminal to the AI2 – (negative) terminal.
4. Connect the transmitters ground terminal to AI2 ground terminal.
5. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
6. Replace and hand tighten the cap on the terminal box.
7. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 21. External DPC2K Powered 4-Wire Transmitters

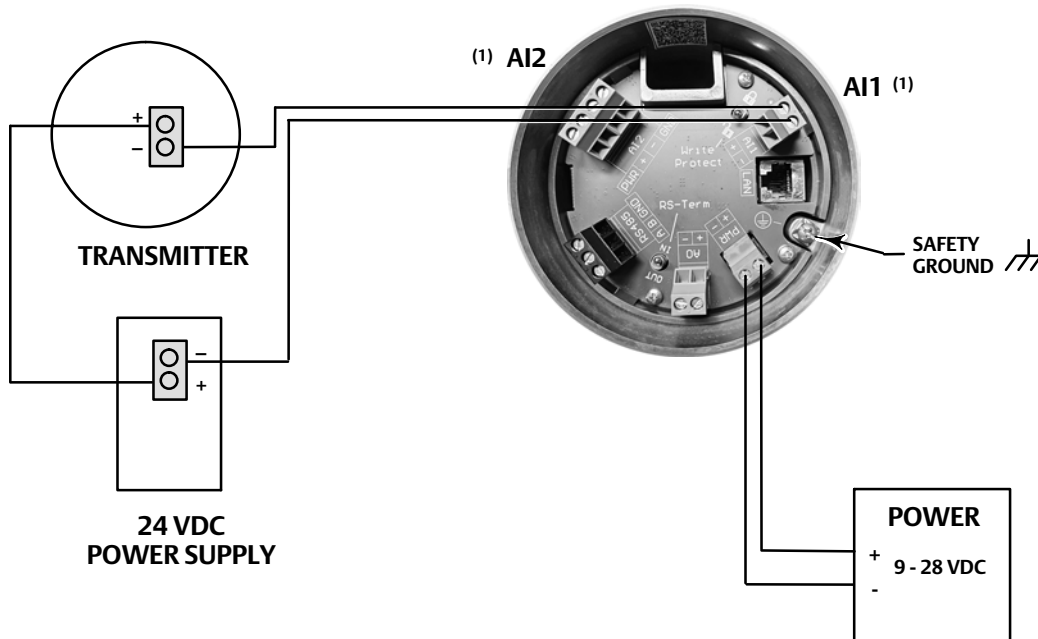


### External Powered 2-Wire Transmitters (Figure 22)

AI1 is a 4-20 mA input for use with current loops that have a separate power source. The loop current measurement is measured between the + and - terminals. AI2 may also be used in a similar way using the + and - terminals.

1. Connect the transmitters + (positive) terminal to the 24 VDC power supply + (positive) terminal.
2. Connect the transmitters - (negative) terminal to the AI1 or AI2 + (positive) terminal.
3. Connect 24 VDC power supply - (negative) terminal to the AI1 or AI2 - (negative) terminal.
4. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
5. Replace and hand tighten the cap on the terminal box.
6. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 22. External Powered 2 Wire Transmitters



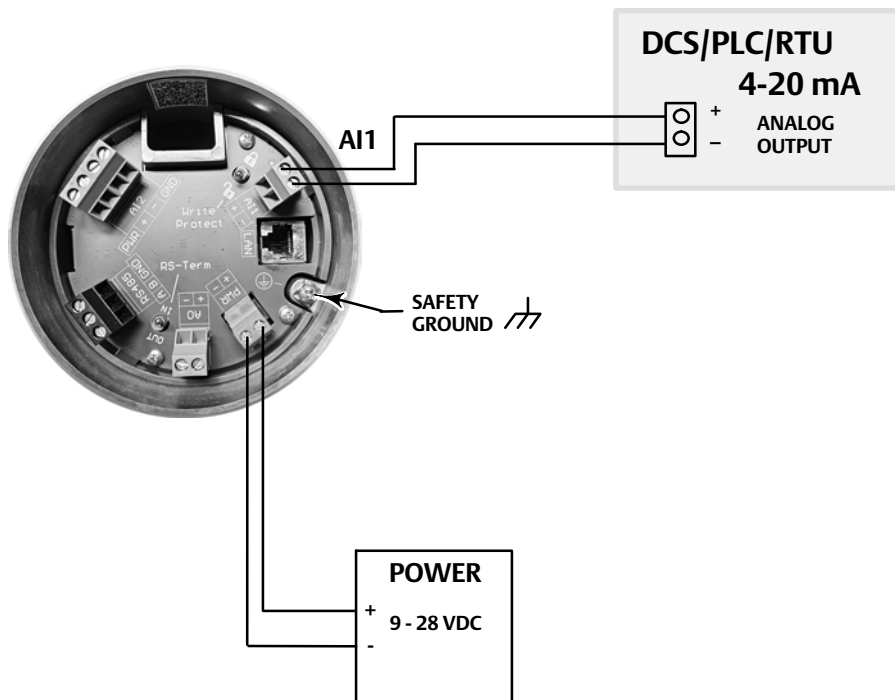
NOTE:  
1. CAN BE WIRED TO EITHER AI1 OR AI2 (OBSERVE POLARITY).

## Remote Setpoints (Connecting with DCS, PLC, RTU's) (Figure 23)

When an external device provides a 4-20 mA loop powered output as a remote setpoint, AI1 is the simplest connection. The current is measured between the + and – terminals. AI2 may also be used in a similar way using the + and – terminals.

1. Connect the DCS, PLC, RTU's + (positive) terminal to the AI1 + (positive) terminal.
2. Connect the DCS, PLC, RTU's – (negative) terminal to the AI1 – (negative) terminal.
3. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
4. Replace and hand tighten the cap on the terminal box.
5. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 23. Remote Setpoints (Connecting with DCS, PLC, RTU's)



## Output

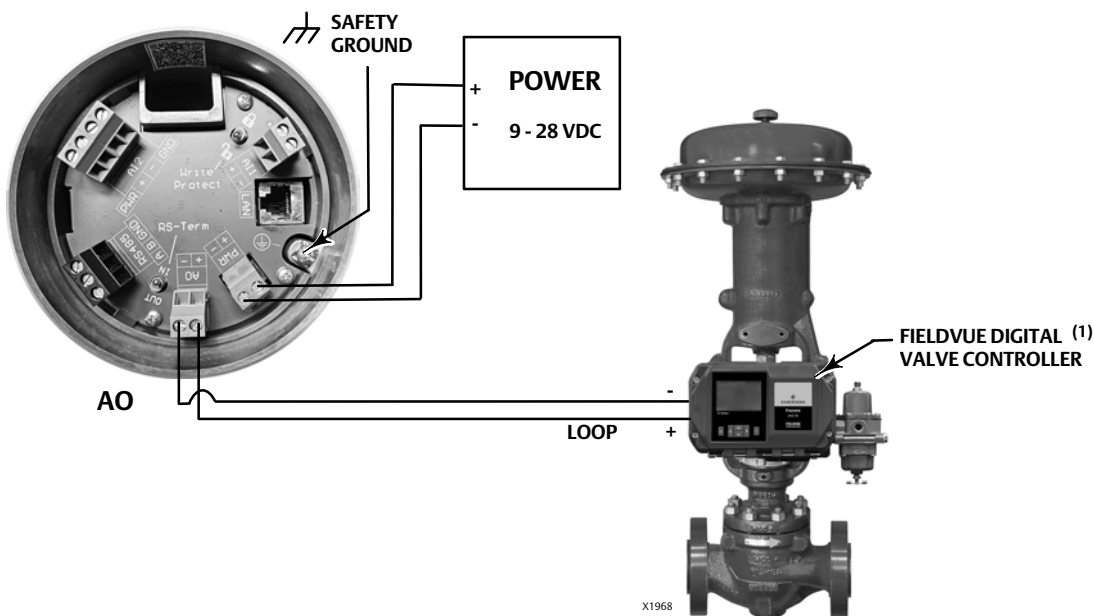
### Analog Output

The AO on the DPC2K will supply the loop voltage required to power the loop and set the current through the loop for control. The wiring diagram in Figure 24 shows connection to a FIELDVUE digital valve controller. Figure 25 shows the connections to a Fisher easyDrive electric actuator.

#### Analog Output, with FIELDVUE Digital Valve Controller (Figure 24)

1. Connect the AO – (negative) terminal to the digital valve controller – (negative) terminal.
2. Connect the AO + (positive) terminal to the digital valve controller + (positive) terminal.
3. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
4. Replace and hand tighten the cap on the terminal box.
5. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 24. Analog Output Wiring Schematic, with FIELDVUE Digital Valve Controller

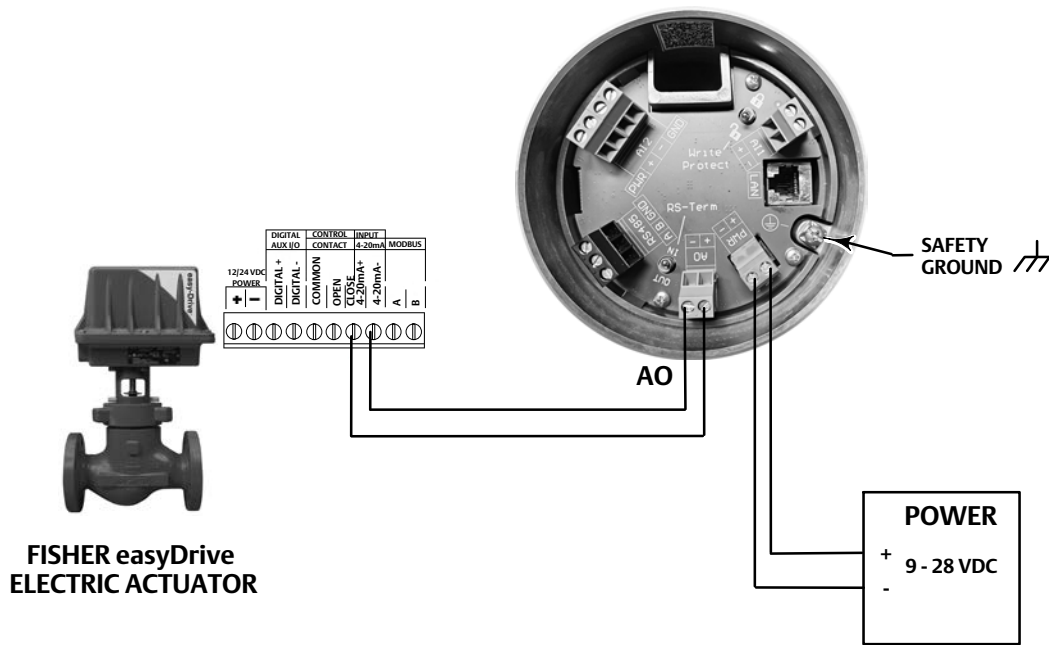


1. DVC7K SHOWN; CAN ALSO BE USED WITH A DVC6200 DIGITAL VALVE CONTROLLER.

Analog Output, with Fisher easyDrive (Figure 25)

1. Connect the AO – (negative) terminal to the easyDrive Input – (negative) terminal.
2. Connect the AO + (positive) terminal to the easyDrive Input + (positive) terminal.
3. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
4. Replace and hand tighten the cap on the terminal box.
5. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

Figure 25. Analog Output Wiring Schematic, with Fisher easyDrive Electric Actuator



## Communications

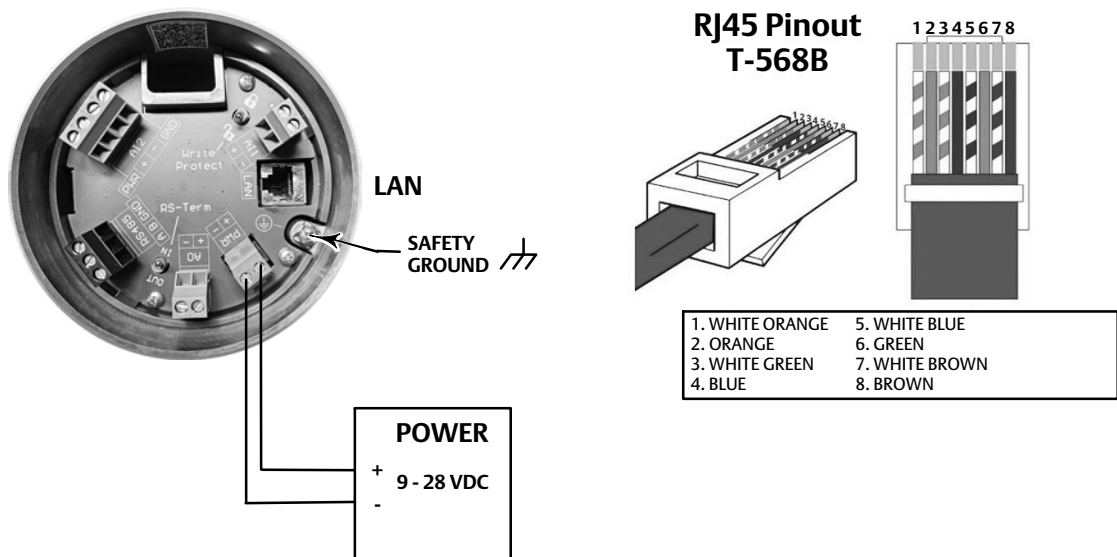
### Ethernet LAN (Local Area Network) (Figure 26)

1. Connect the Ethernet cable to the LAN connection.

**Note**

When an Ethernet cable is being used, it may be required to bring it through the channels first if it has a molded termination followed by smaller or individual wires.

Figure 26. Ethernet LAN (Local Area Network)



### Serial RS-485 (Figure 27)

**Note**

The example shown in Figure 27 shows a serial RS-485 with three devices connected. More or less devices may be used; connect as described in steps 3 - 6 below. The last device in the sequence will be connected to the DPC2K as described in steps 7 and 8.

1. Connect the bus signal A to the DPC2K RS485 A Terminal.
2. Connect the bus signal B to the DPC2K RS485 B Terminal.
3. Connect Device 1 A terminal terminal to Device 2 A terminal.

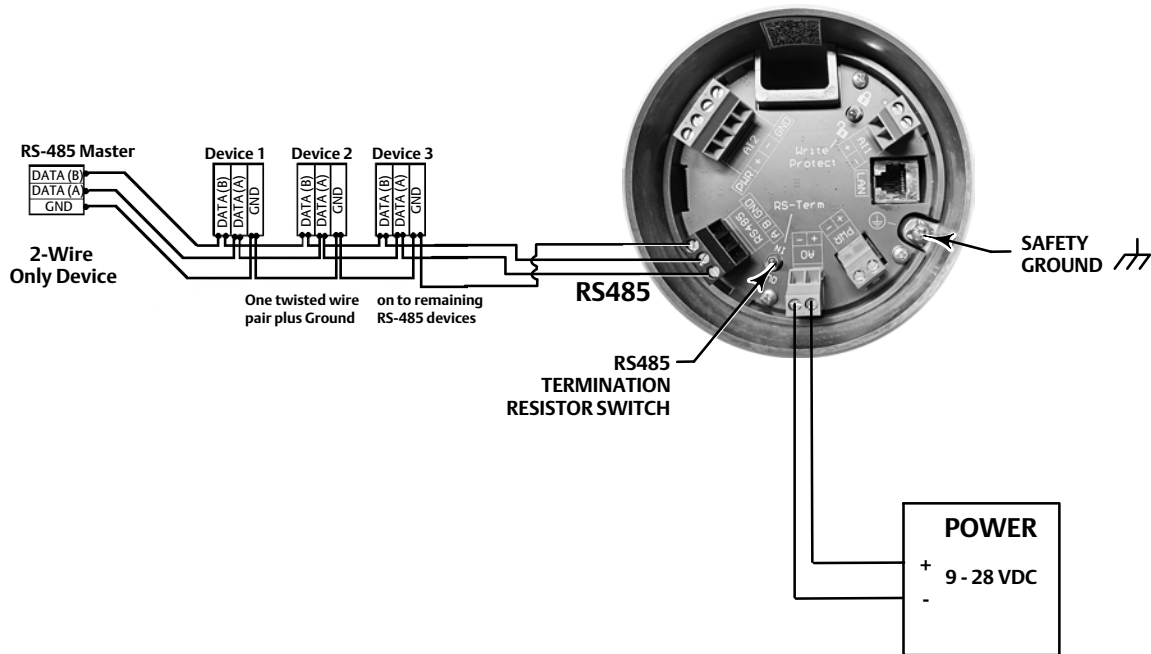


4. Connect Device 1 B terminal terminal to Device 2 B terminal.
5. Connect Device 2 A terminal terminal to Device 3 A terminal.
6. Connect Device 2 B terminal terminal to Device 3 B terminal.
7. Connect Device 3 A terminal to the DPC2K RS485 A terminal.
8. Connect Device 3 B terminal to the DPC2K RS485 B terminal.
9. Make connections to the earth and safety ground terminals, shown in Figure 17, following national and local codes and plant standards.
10. Replace and hand tighten the cap on the terminal box.
11. Once the electrical connections are complete, proceed to Step 4—Configure the Digital Process Controller on page 34.

**Termination resistor**

The Termination board has a switch to insert or remove a RS485 termination resistor. It should only be ON or in circuit if the DPC2K is installed at the end of the RS485 line. When RS-485 devices are multi-dropped, the last device in line needs to have a termination resistor which matches the impedance of the RS-485 network of 120 ohms.

Figure 27. Serial RS-485



## Step 4—Configure the Digital Process Controller

### **⚠ WARNING**

- Select wiring and/or cable glands that are rated for the environment of use (such as hazardous area, ingress protection and temperature). Failure to use properly rated wiring and/or cable glands can result in personal injury or property damage from fire or explosion.
- Wiring connections must be in accordance with local, regional, and national codes for any given hazardous area approval. Failure to follow the local, regional, and national codes could result in personal injury or property damage from fire or explosion.
- To avoid personal injury resulting from electrical shock, do not exceed maximum input voltage specified on the product nameplate. If the input voltage specified differs, do not exceed the lowest specified maximum input voltage.
- Personal injury or property damage caused by fire or explosion may occur if electrical connections are attempted in a potentially explosive atmosphere or in an area that has been classified as hazardous. Confirm that area classification and atmosphere conditions permit the safe removal of the terminal box cap before proceeding.
- The valve may move in an unexpected direction when power is applied to the digital process controller. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly when applying power to the instrument.
- While configuring the digital process controller the valve may move, causing process fluid or pressure to be released. To avoid personal injury and property damage caused by the release of process fluid or pressure, isolate the valve from the process and equalize pressure on both sides of the valve or bleed off the process fluid.
- Changes to the instrument setup may cause changes in the output pressure or valve travel. Depending on the application, these changes may upset process control, which may result in personal injury or property damage.

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#### **Note**

Before proceeding, check that all pressure connections, fasteners, and plugs are installed and tightened.

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#### **Note**

The Write Protect Switch, shown in Figure 17, must be disabled in order to setup and configure the DPC2K.

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#### **Note**

LoopConnect software is required to communicate with and configure the DPC2K digital process controller. The Local User Interface allows for operational changes only. LoopConnect software is provided with the instrument, however, if a copy of this software is needed contact your [Emerson sales office](#).

---

1. Apply electrical power to the digital process controller.
2. Use the navigation and action buttons (see Figure 28) to view the the supply pressure value on the Local User Interface (LUI). From the MAIN MENU navigate to Input/Output > Device > Pneumatic Supply > Value.

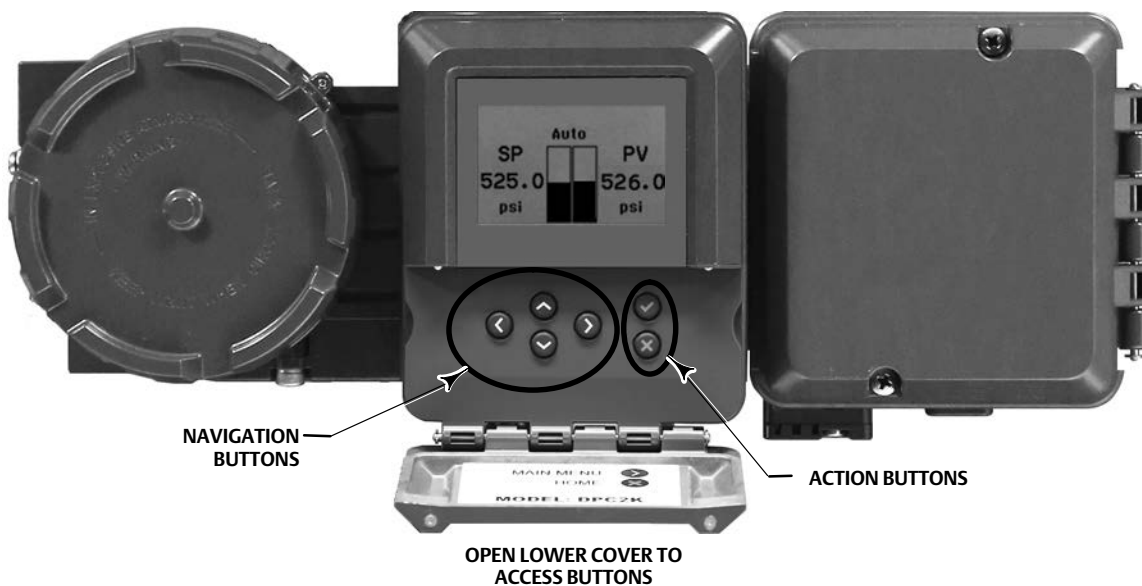
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**Note**

Press any of the four navigation button to display the MAIN MENU. Select X to return to the Home screen.

---

Figure 28. Local User Interface



from X2008

3. Apply pneumatic supply pressure to the digital process controller and adjust the supply pressure regulator according to the actuator requirements and limitations.
4. Review the LAN communication settings by navigating down from the MAIN MENU to Setup > Communication > LAN. Ensure settings are as expected (default IP Address is: 192.168.1.9).

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**Note**

Serial Communications are setup using the LoopConnect configuration software.

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5. Connect an Ethernet cable between the DPC2K LAN port and the computer.

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**Note**

Some newer laptops may not have an existing Ethernet port and a USB to Ethernet adapter may be required.

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6. Using LoopConnect configuration software, establish communication with the digital process controller; refer to the LoopConnect Quick Start Guide (D104558X012).

**⚠ WARNING**

**When Hardware Shutdown is enabled, the instrument will respond to a signal change regardless of instrument mode. The valve may move in an unexpected direction when power is applied to the digital process controller. To avoid personal injury and property damage caused by moving parts, keep hands, tools, and other objects away from the valve/actuator assembly when applying power to the instrument.**

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