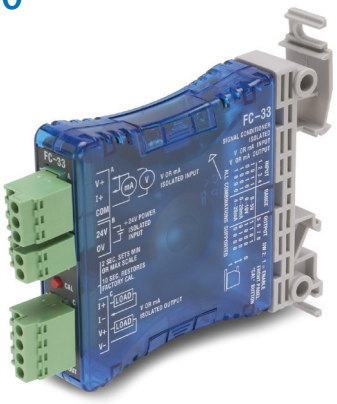
FC-33 DC Selectable Signal Conditioner

$192.00



c UL us UL file E200031

Overview

The FC-33 is a DIN-rail or side-mount, selectable input/output signal conditioner with 1500VDC isolation between input and output, and 1500VDC isolation between 24-volt power and input/output. The field configurable input/output types allow a wide ranging capability for 0-5V, 0-10V, 0-20 mA and 4-20 mA signals.

The FC-33 has built-in self-calibration, but also has OFFSET (zero) and SPAN (full scale) adjustments of the output signal. The OFFSET has an adjustment range of 0 to 25% of full scale input and the SPAN has an adjustment of 80% to 102%.

Level LED: The LED is a powerful tool when setting up the signal conditioner. During normal operation the LED will blink at a proportional rate to the selected input signal level. When performing field calibration the LED is used for indication of the internal calibration process.

CAL-Pushbutton: This pushbutton, along with various switch settings, allows you to calibrate the OFFSET and/or SPAN for your application or to restore factory default calibration.

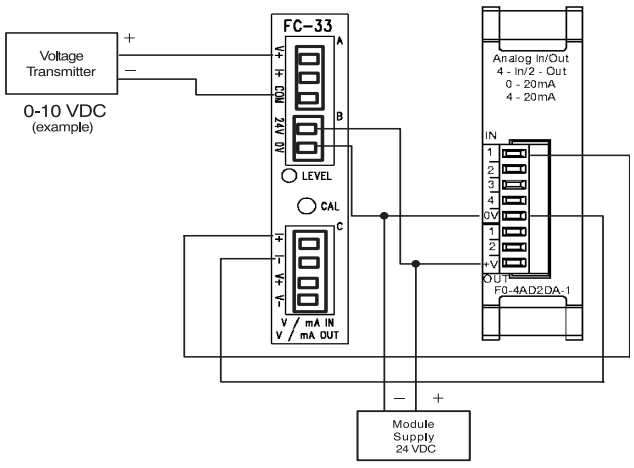
Specifications	
Input Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA
Input Impedance	250Ω, ±0.1% current input 200Kq / 400Kh Voltage input
Output Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA
Load Impedance	2KΩ minimum, voltage output 0Ω minimum, current output
Maximum Load / Current	550Ω @ 24VDC (sink/source)
Sample Duration Time	10mS
Filter Characteristic	-3 dB @ 3 Hz, -6 dB/octave
Linearity Error	0.05% FSO maximum
Stability	0.05% FSO maximum
Accuracy vs. Temperature	0.005%/ °C, (50ppm/°C)
Input Power	24VDC, ±10% @ 50mA
Recommended Fuse	0.032 mA, Series 217, current inputs
Isolation	1500VDC input - output* 1500VDC power - input* 1500VDC power - output* *applied for 1 second
Maximum Inaccuracy of Output	0.05% @ 25°C, FSO maximum 0.25% @ 0-60°C, FSO maximum
Output Current	21mA maximum (for mA output)
Approx. Field Cal. Range	0 - 25% (0 - 1.5 V / 5 V mode) 80% - 102% (4 - 5.1 V / 5 V mode)
Operating Temperature	0-60°C (32 to 140°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	5 to 90% (non-condensing)
Vibration	ML STD 810C 514.2
Shock	ML STD 810C 516.2
Noise Immunity	NEMA ICS3-304

Application

The FC-33, field configurable isolated input/output signal conditioner, is useful in eliminating ground loops and interfacing sensors to PLC analog input modules. The FC-33 has 3-way isolation; this feature solves many types of configuration problems. For example, the signal conditioner can be configured for a sinking input and a sourcing output. It also allows signal translation from current input to voltage output or voltage input to current output.

This feature would be useful in a system design with a limited type and number of channels – for example: eight channels of 0-10 VDC, seven of which are used, and one 4-20 mA input transmitter.

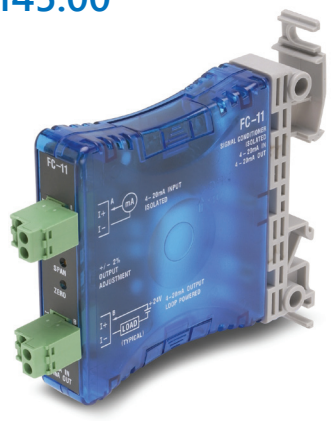
Typical User Wiring



Voltage Input and Current Output (example)

FC-11 4-20mA Isolated Signal Conditioner

$145.00



c UL us *UL file E200031*

Overview

The FC-11 is a DIN-rail or side-mount, 4-20 mA Input/Output loop powered signal conditioner with 1500VDC isolation between input and output.

The FC-11 has a user-selectable factory calibration. The output can also be calibrated with OFFSET (zero) and SPAN (full scale) adjustments. The OFFSET has an adjustment range of 0 to 25% of full scale input and the SPAN has an adjustment of 80% to 102%.

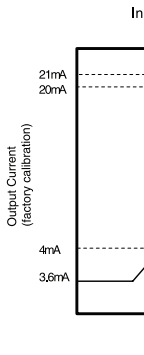
Application

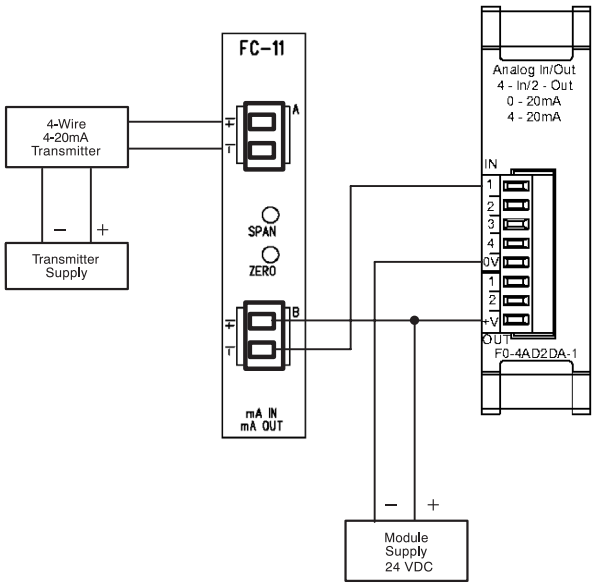
The FC-11 isolated input/output signal conditioner is useful in eliminating ground loops and sinking/sourcing issues when interfacing to PLC analog input modules. The FC-11 design feature solves many types of configuration problems. For example, the signal conditioner can solve the problem of connecting a sinking input transmitter to a sinking analog input module.

Specifications	
Input Ranges ***Extended Input range[1]***	4-20 ma 3.5 mA to 20.6 mA, ± 1%
Input Burden Voltage[2]	6.8 VDC
Maximum Input Current	34mA @ 9.7 VDC
Output Burden Voltage[3]	8.5 VDC minimum
Output Range ***Extended Output Range[1]***	4-20 mA 3.5 mA to 20.6 mA, ± 1%
Maximum Load Impedance	650Ω @ 24VDC, 1000Ω @ 29VDC
Maximum Output Current	23mA @ 29VDC
Sample Duration Time	18mS maximum
Linearity Error	0.1% FSO maximum
Max Inaccuracy of Output	0.05% @ 25°C, FSO maximum, 0.3% @ 0-60°C, FSO maximum
Filter Characteristics	-3 dB @ 200 Hz, -6 dB / octave
Stability	0.1% FSO maximum
Accuracy vs. Temperature	± 0.0065% / °C (65ppm / °C)
Isolation	1500VDC Input - Output
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Relative Humidity	5 to 90% (non-condensing)
Vibration	ML STD 810C 514.2
Shock	ML STD 810C 516.2
Noise Immunity	NEMA ICS3-304

NOTES:
1. When adjusting SPAN and OFFSET potentiometer
2. Voltage required to power internal circuitry
3. Formula, [(output load) x 20 mA] + 8.5 V,.i.e.: 13.5 VDC @ 250Ω
4. Internal analog converter resolution is 12-bit

Typical User Wiring





4-20 mA Input Isolated to 4-20 mA Output (example)

FC-T1 Thermocouple/mV Input Isolated Signal Conditioner

$192.00

c UL us *UL file E200031*

Overview

The FC-T1 is a DIN-rail or side-mount thermocouple/mV input signal conditioner with 1500VAC isolation between input and output.

The field configurable input allows a wide ranging capability for a type J, K, E, R, S, T, B, N and C thermocouple, or 0-156.25 mV and ±156.25 mV signals.

The FC-T1 has built-in self-calibration, but also offers OFFSET (zero) and SPAN (full scale) potentiometer for adjustment of the output signal.

The FC-T1 is also equipped with cold junction compensation (CJC) circuitry to provide an internal ice-point reference.

The temperature calculation and linearization are based on data provided by the National Institute of Standards and Technology (NIST).

ALARM and RUN LED: This LED is bicolor (red and green). A red LED indicates either power up, a fault with internal calibration, or a thermocouple burnout condition, while a green LED indicates normal operation.

Burnout Function: The output current can be selected to provide either upscale (20mA) or downscale (4mA) detection whenever thermocouple burnout occurs.

Click on the thumbnail or go to https://www.automationdirect.com/VID-TE-0006 for a short video on Remote Temperature Sensing

Specifications				
Input Ranges	***T/C***	***°C***	***°F***	***Resolution[1]***
	J	-190 to 760	-310 to 1400	0.23°C
	K	-150 to 1372	-238 to 2502	0.37°C
	E	-210 to 1000	-345 to 1832	0.295°C
	R	65 to 1768	149 to 3214	0.42°C
	S	65 to 1768	149 to 3214	0.42°C
	T	-230 to 400	-382 to 752	0.15°C
	B	529 to 1820	984 to 3308	0.315°C
	N	-70 to 1300	-94 to 2372	0.33°C
	C	65 to 2320	149 to 4208	0.55°C
	0 to 156.25 mV			0.038 mV
	-156.25 mV to +156.25 mV			0.076 mV
Output Range	4 to 20 mA			
External Power Supply	15 mA, 22 to 26 VDC			
Input Impedance	>5 MΩ			
Absolute Maximum Rating	Fault protected input ±50 V			
Maximum Inaccuracy	±3°C, Temperature Input ±0.1%, Voltage Input			
Linearity Error	0.1%			
Over Temperature Error	0.1 X 10^{-5}% (10 ppm)/°C			
Insulation Resistance	≥100 Mr with 500 VDC (Input to output power)			
Isolation	1500 VAC @ 1 Sec. (Input to output commons)			
Sample Duration Time	120 mS Voltage Input 250 mS Thermocouple Input			
Common Mode Rejection	-100 dB @ DC, -90 dB @ 50/60 Hz			
Input Filter (FIR)	-3 dB @ 15 Hz, -100 dB @ 50 Hz, -100 dB @ 60 Hz			
Broken Thermocouple	Up/Down Scale Red/Green LED			
Over Range	Up Scale			
Under Range	Down Scale			
Burnout Time	≤ 3 Seconds			
Cold Junction Compensation	Automatic			
Warm-up Time	30 min. typical ±1°C repeatability			
Operating Temperature	0 to 60°C (32 to 140°F)			
Storage Temperature	-20 to 70°C (-4 to 158°F)			
Relative Humidity	5 to 90% (non-condensing)			
Environmental Air	No corrosive gases permitted			
Vibration	ML STD 810C 514.2			
Shock	ML STD 810C 516.2			
Noise Immunity	NEMA ICS3-304			

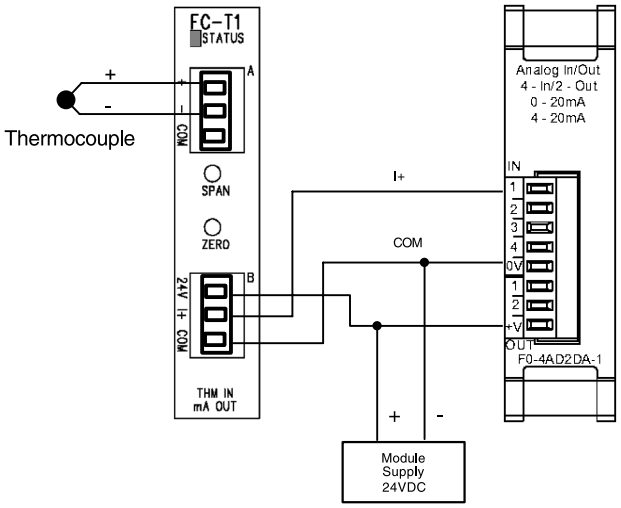
Note:
[1] Internal analog converter resolution is 12-bit.

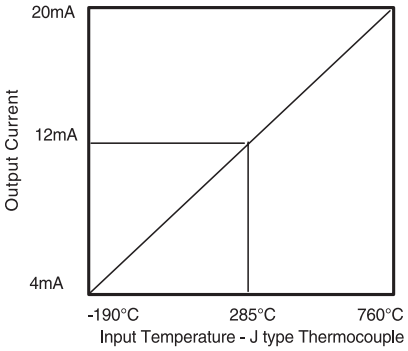
FC-T1 Thermocouple/mV Input Isolated Signal Conditioner

Application

The FC-T1, field configurable thermocouple/mV signal conditioner, is useful in eliminating ground loops and for interfacing to PLC analog input modules. If your requirements are only for one channel of temperature, you can add the signal conditioner to your 4-20 mA input module. Or, if your requirements are for a single millivolt signal source, you have the option of adding this input to your analog module.

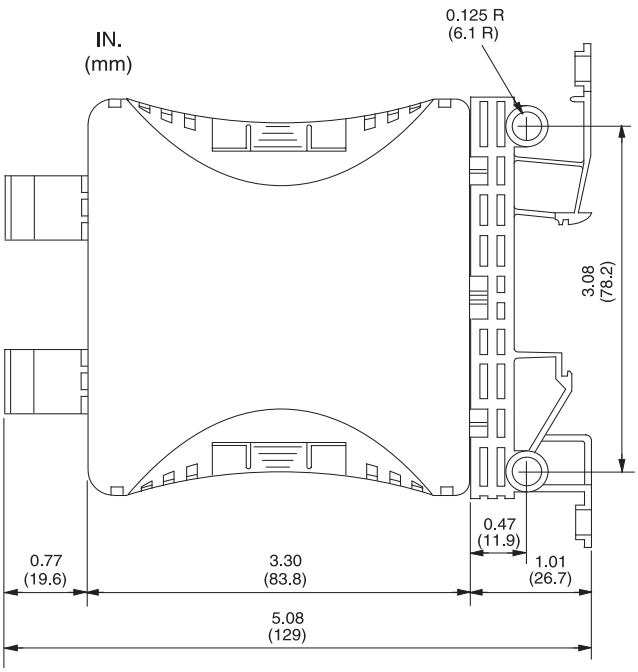
Typical User Wiring

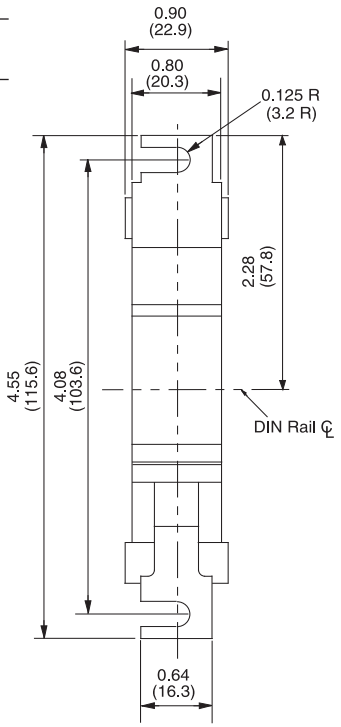




Signal Conditioner Dimensions

These dimensions are typical for all of the signal conditioners.
All dimensions are in inches (millimeters).





FC-R1 RTD Input Loop Powered Signal Conditioner

$192.00

c UL us UL file E200031

Overview

The FC-R1 is a DIN-rail or side-mount Resistive Temperature Detector signal conditioner. It is a non-isolated signal conditioner which converts a 3-wire RTD to a linearized 4-20 mA current loop signal.

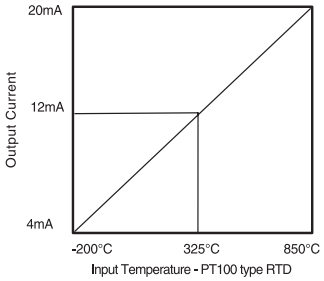
The FC-R1 has a user selectable CU10 (10 Ohm copper), PT100 (100 Ohm platinum) or PT1000 (1000 Ohm platinum) RTD input, and also offers OFFSET (zero) and SPAN (full scale) adjustments of the output signal. The OFFSET has an adjustment range of 0 to 25% of full scale output and the SPAN has an adjustment of 80% to 102%.

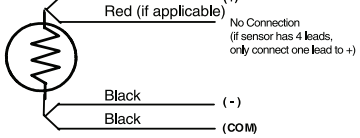
Specifications			
Input Ranges	CU10	-200°C to 260°C	-328°F to 500°F
	PT100	-200°C to 850°C	-328°F to 1562°F
	PT1000	-200°C to 595°C	-328°F to 1103°F
RTD Excitation Current	CU10, PT100 500 µA ±50 µA PT1000 80 µA ±20 µA		
Common Mode Range	0 - 3.5 VDC		
Output Range	4-20 mA (linearized)		
Maximum Inaccuracy	0.35% FSO / CU10 0.2% FSO @ 25°C / PT100 & PT1000 0.26% FS0 @ 60°C / PT100 & PT1000		
Maximum Loop Supply	30VDC		
Load Impedance	0Ω minimum		
Maximum Load/Power Supply	203Ω / 12V, 745Ω / 24V		
Linearity Error	0.35% FSO / CU10 0.2% FSO / PT10 & PT1000		
Output Slew Rate	1% @ 20 mS		
Filter Characteristics	105 dB @ DC, 60 dB @ 10 Hz, 40 dB @ 60Hz		
Stability	0.05% FSO maximum		
Operating Temperature	0 to 60°C (32 to 140°F)		
Storage Temperature	-20 to 70°C (-4 to 158°F)		
Relative Humidity	5 to 90% (non-condensing)		
Environmental Air	No corrosive gases permitted		
Vibration	ML STD 810C 514.2		
Shock	ML STD 810C 516.2		
Noise Immunity	NEMA ICS3-304		

Click on the thumbnail or go to https://www.automationdirect.com/VID-TE-0006 for a short video on Remote Temperature Sensing

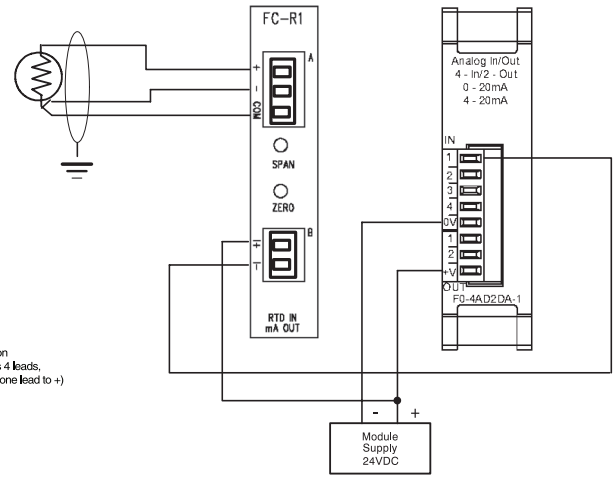
Application

The FC-R1 field configurable input signal conditioner is useful for interfacing RTD sensors to PLC analog current input modules. It is recommended that shielded RTDs be used whenever possible to minimize noise on the input signal.





Typical User Wiring



RTD Signal Conditioner to 4-20 mA DL05/06 analog module
Only use three wire and four wire RTDs.

FC-P3 Potentiometer Input, Analog Output Signal Conditioner

$191.00

UL file E157382

Overview

The FC-P3 is a resistive input to isolated analog output signal conditioner. The input resistive range (high end resistivity, low end resistivity) is set through the use of a pushbutton programming routine.

The FC-P3 is field configurable for 3-wire potentiometer/slide-wire inputs with end-to-end resistance ranges from 0-100 ohms to 0-100 kilohms. The input adjustment range can be scaled down to a minimum of 10% of the potentiometer being used. Switch selectable, analog output options include 0-20 mA, 4-20 mA, 0-5V, and 0-10 V. The PGM LED provides an indication of operating status and is used during the field programming process.

The MAX and MIN LED's indicate OVER and UNDER range status. The module can be 35mm DIN rail or side mounted and is UL listed. Power for the unit is provided by a customer supplied 24VAC or 24VDC Class 2 power supply.

Specifications	
Input Specifications	
Input Ranges	0 - 100Ω up to 0-100kΩ, 3-wire potentiometer/slide-wire
Programmable Range Minimum	Pushbutton Adjustable to 10% of full range of applied potentiometer
Excitation	>100 uA @ 2.5VDC
External Power Required	24VDC ±10% @ 120 mA or 24VAC ±10% @ 120mA, Class 2
Output Specifications	
Output Ranges	0-5 V, 0-10 V, 0-20 mA, 4-20 mA (DIP Switch Selectable/Invertable)
Maximum Output Current	21mA (for mA OUT ONLY)
Response Time	35ms for mA Out, 100ms for V Out
Load Impedance	2kΩ minimum, voltage output 550Ω maximum current output
Output Drive	Voltage: 10mA maximum Current: 21mA maximum
Maximum Inaccuracy	±0.75% @ 0-60°C, FSO maximum
Output Stability and Repeatability	0.05% FSO maximum

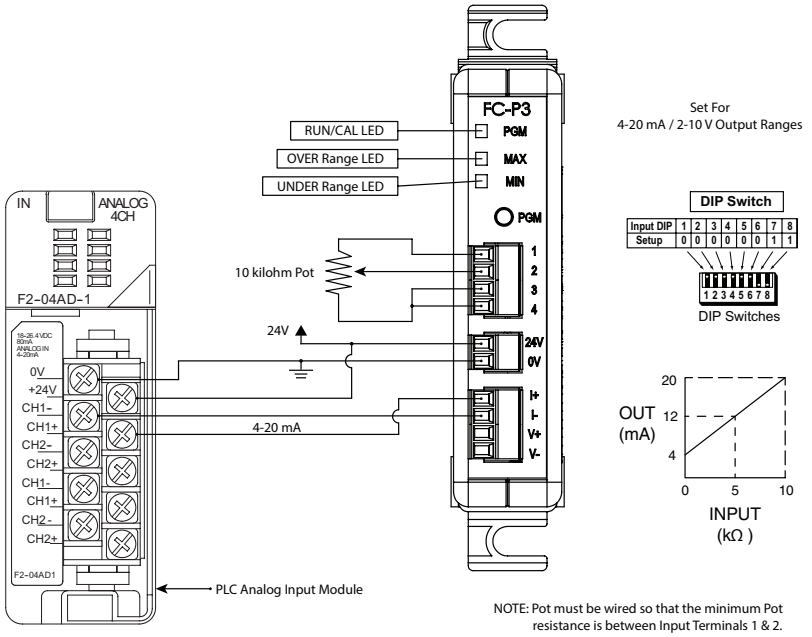
Specifications (continued)	
Output Specifications (continued)	
Output Ripple	0.05% of full scale
Output Protection	Outputs short circuit protected
Inverted Outputs	Invert Outputs using DIP Switch 6
Terminal Block Specifications	
Field Wiring	Removable Screw Terminal Blocks (included)
Number of Positions	2 (Dinkle EC350V-02P), 4 (Dinkle EC350V-04P), 4 (Dinkle EC350V-04P)
Wire Range	28-14 AWG solid or stranded conductor; wire strip length 1/4" (6-7mm)
Screw Torque	1.7 inch-pounds (0.19 NM)
General Specifications	
Accuracy vs. Temperature	±50 PPM of full scale/°C Maximum
Response Time	35ms, 100ms for 0-10V range
Power Dissipation within Module	3W Maximum
Thermal Dissipation	9.42 BTU/hr
Surrounding Air Temperature	0 to 60°C (32 to 140°F) IEC 60068-2-14 (Test Nb, Thermal Shock)
Storage Temperature	-20 to 70°C (-4 to 158°F) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)
Enclosure Rating	IP20
Humidity	5 to 95% (non-condensing) IEC 60068-2-30 (Test Db, Damp Heat)
Environmental Air	No corrosive gases permitted (EN61131-2 pollution degree 1)
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Isolation	1500VDC Input to Output 1000VDC Power to Input 1000VDC Power to Output applied for 1 second (100% tested)
Insulation Resistance	>10 MΩ @ 500 VDC
Noise Immunity	NEMA ICS3-304 IEC 61000-4-2 (ESD) Impulse 1000 V @ 1µS pulse IEC 6100-4-4 (FTB) RFI, (145 MHz, 440 MHz 5W @ 15 cm) IEC 61000-4-3 (RFI)
Weight	0.25 lbs
Agency Approvals	UL508*, File Number: E157382, CE
*** In order to comply with UL508, the supplied power must be less than 26 VDC and fused at a maximum of 3 amps.**	

Click on the above thumbnail or go to https://www.automationdirect.com/VID-PS-0003 for a short introductory video for the FC Series Signal Conditioners.

FC-P3 Application and Dimensions

Application

Use the FC-P3 to eliminate the challenge of getting a variable set by a machine operator into the PLC. Using the FC-P3 to convert the resistive signal from a 10 kilohm potentiometer to a 4-20 mA signal that can be used by a PLC is simple.



NOTE: Pot must be wired so that the minimum Pot resistance is between Input Terminals 1 & 2.

Wiring Connections

Input Terminal Block

Faceplate Label	Description
1	Pot End Terminal
2	Pot Wiper
3	Pot End Terminal
4	Shield Connection

NOTE: Pot must be wired so that the minimum Pot resistance is between Input Terminals 1 & 2.

External Power Terminal Block

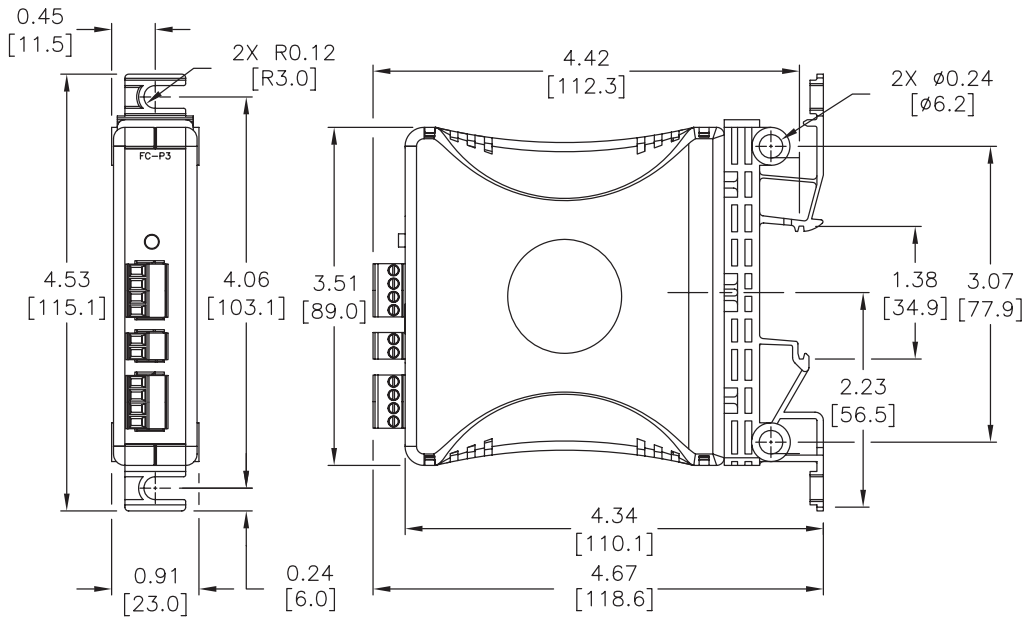
Faceplate Label	Description
24 V	24 VDC or 24 VAC ±10%, Class 2
0V	0V

Output Terminal Block

Faceplate Label	Description
I+	Current
I-	Current
V+	Voltage
V-	Voltage

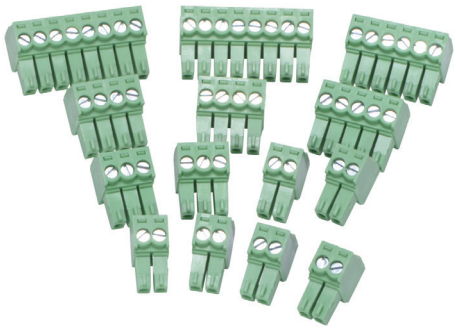
Dimensions

inches [mm]



FC Series Accessories

FC-5MM



FC-35MM

Description

Universal terminal block replacements for the FC Series signal conditioners. Each packcage includes enough terminal blocks to replace all the terminal blocks on any FC Series signal conditioner according to the following table:

FC Series Terminal Blocks		
FC Series Model	***Terminal Block Replacement Part Number***	***Package Includes***
FC-11	FC-5MM	(2) 2-pole blocks (2) 3-pole blocks (1) 4-pole blocks
FC-33		
FC-R1		
FC-T1		
FC-ISO-C	FC-35MM	(6) 2-pole blocks (2) 3-pole blocks (2) 4-pole blocks (1) 5-pole blocks (1) 6-pole blocks (2) 8-pole blocks
FC-ISO-D		
FC-B34		
FC-35B		
FC-P3		
FC-3RLY2		
FC-3RLY4		

Note: Depending on the model, some terminal blocks in the package may be unused.

Universal Signal Conditioners				
Part No.	***Description***	***Rated Torque (N·m)***	***Weight (Lbs)***	***Price***
FC-5MM	Terminal block, replacement, 5mm. Package of 5. For use with FC Series signal conditioners.	0.5	0.1	$18.00
FC-35MM	Terminal block, replacement, 3.5mm. Package of 14. For use with FC Series signal conditioners.	0.2	0.1	$33.00