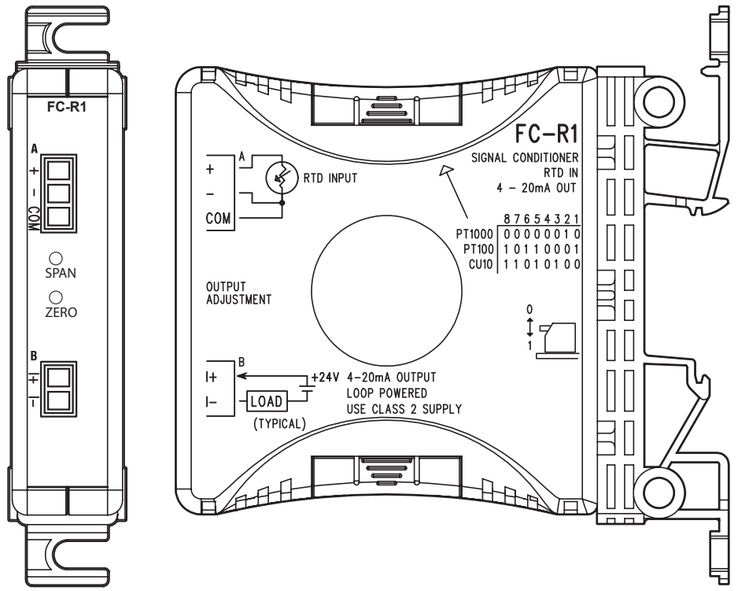
FC-R1 RTD INPUT
LOOP POWERED SIGNAL CONDITIONER

Product Guide

3505 HUTCHINSON ROAD
CUMMING, GA 30040-5860



Description:

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

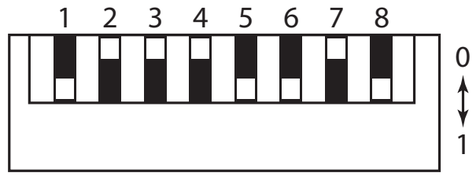
The FC-R1 has user selectable, CU10 (10 Ohm Copper), PT100 (100 Ohm Platinum), PT1000 (1000 Ohm Platinum) RTD Input, but also has OFFSET (zero) and SPAN (full scale) adjustments of the output signal. The OFFSET (zero) has an adjustment range of 0 to 25% of full scale output, the SPAN (full scale) has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

Application

The FC-R1 field configurable input signal conditioner is useful for interfacing RTD sensors to our PLC analog current input modules. Use shielded RTD's whenever possible to minimize noise on the input signal. Ground the shield wire at one end only. The suggested 3-lead configuration shown provides one lead to (+) terminal, one lead to the (-) termnial and one lead to the (COM) terminal. Compensation circuitry nulls out the lead length for accurate temperature measurements. Some sensors have 4-leads, when making connections, do not connect the second lead to the (+) terminal, leave that lead unconnected.

Input Selection

The signal conditioner can be configured for either CU10, PT100, PT1000 Input and Output signal type of 4 - 20mA.



EXAMPLE:
PT100 INPUT
4 - 20 mA OUTPUT

Input Ranges	Switch Position							
	1	2	3	4	5	6	7	8
CU10	0	0	1	0	1	0	1	1
PT100	1	0	0	0	1	1	0	1
PT1000	0	1	0	0	0	0	0	0

Specifications

Input Ranges	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	500µA ± 50µA	
	PT1000	80µA ± 20µA	
Common Mode Range	0-3.5 VDC		
Maximum Inaccuracy (Includes Offset, Span, Linearity)	CU10	0.35% FSO	
	PT100 & PT1000	0.2% FSO @ 25°C	
	PT100 & PT1000	0.26% FSO	
Maximum Loop Supply	30VDC		
Load Impedance	0Ω Minimum		
Maximum Load	12V Power Supply	203Ω	
	24V Power Supply	745Ω	
Linearity Error	CU10	0.35% FSO	
	PT100 & PT1000	0.2%FSO Maximum	
Output Slew Rate	1% @ 20mS		
Filter Characteristics	105dB @ DC, 60dB @ 10Hz, 40dB @ 60Hz		
Stability	0.05% FSO Maximum		

NOTE: All data 0-60°C except where specified.

Input Setting Explanation

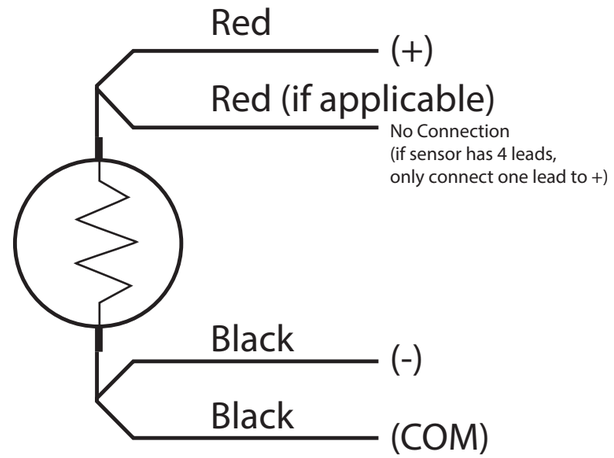
The default setting from the factory is PT100. This selects the DIN (Deutsche Institute for Normung) requirements for accuracy of the RTD element. The temperature vs. resistance curve, RTD's are calibrated to DIN 43760, BS1995, or IEC751 specifications which is 0.00385Ω/Ω/°C (100°C=138.50Ω).

The PT1000 utilizes the same type curve except it is (100°C=1385Ω).

The CU10 utilizes temperature coefficient of 0.0042Ω/Ω/°C (100°C=12.89683Ω).

Precision excitation currents are used to generate voltage drop across the RTD element. To maintain accuracy it is important that all 3 RTD wires are the same length.

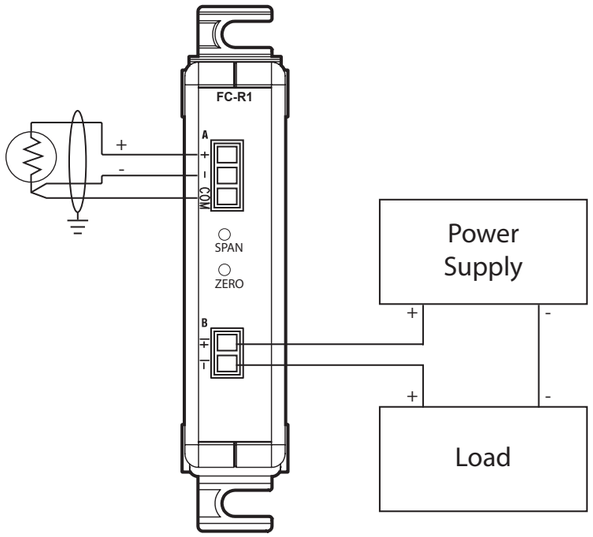
It is suggested if your application does not need modified OFFSET or SPAN - DO NOT ADJUST potentiometers since this loses the factory calibration.



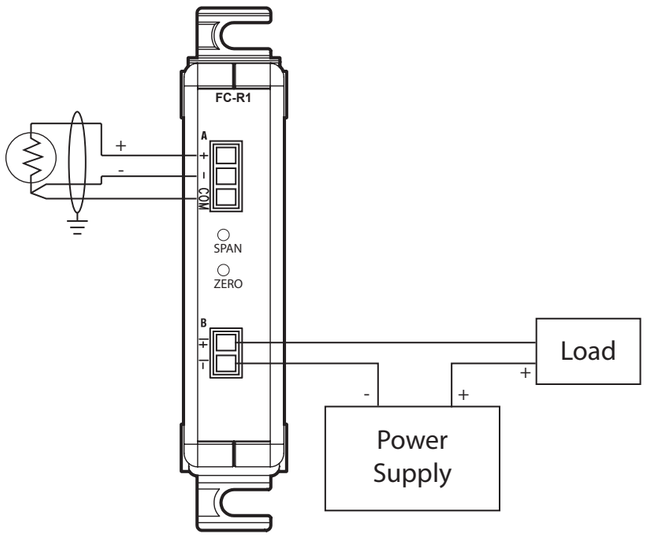
Operating Specifications

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	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304

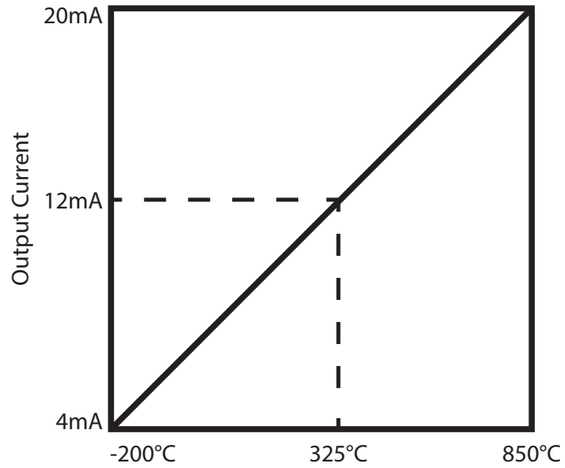
Typical Connections



RTD Signal Conditioner to 4-20mA Sourcing



RTD Signal Conditioner to 4-20mA Sinking



Input Temperature - PT100 Type RTD

Max_{temp} - Min_{temp} = $Total_{temp}$ / Counts = resolution
850° - (-200°) = 1050° / 4095 = 0.256°C / count - resolution

$Actual_{temp}$ - Min_{temp} = $Total_{temp}$ / Resolution = Counts
325° - (-200°) = 525° / 0.256° = 2050 Counts

Counts X Resolution = $Total_{temp}$ + Min_{temp} = $Actual_{temp}$
2048 X 0.256° = 524.3° + -200° = 324.3°C

UL Information

A. THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D OR NON-HAZARDOUS LOCATIONS ONLY.

Cet équipement est conçu pour être utilisé dans des environnements de Classe I, Division 2, Groupes A, B, C, D ou non dangereux.

B. WARNING - EXPLOSION HAZARD - SUBTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2/ZONE 2.

AVERTISSEMENT : Risque d'explosion: la substitution de composants peut compromettre la convenance pour la Classe I, Division 2/Zone 2.

C. WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

AVERTISSEMENT: Risque d'explosion: Ne pas déconnecter l'équipement à moins que l'alimentation soit coupée ou que la zone soit reconnue non dangereuse.