Space-saving Two-wire Signal Conditioners *B3-UNIT*

RTD TRANSMITTER
(field-configurable)

MODEL **B3FR**

MODEL & SUFFIX CODE SELECTION

B3FR❑

MODEL

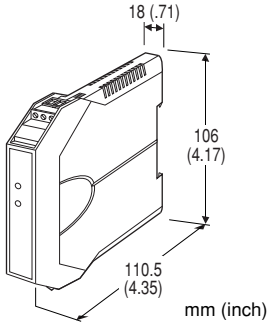
INPUT RTD
Pt 100 (JIS '97, DIN, IEC751), Ni 120, Cu 10 (@25°C)

OUTPUT
4 – 20mA DC

SUPPLY VOLTAGE
12 – 45V DC

OPTIONS

/UL : UL approval



Functions & Features

- Converting an RTD input into an isolated, linearized 4 – 20mA DC signal
- DIP switch configurable input range
- Linearization and burnout
- Monitor terminals
- High-density mounting
- CE marking
- UL approval

ORDERING INFORMATION

Specify code number. If you need the transmitter to be calibrated to a specific range, please specify when ordering. Non-specified orders will be shipped at default factory setting (Pt 100, 0 – 100°C).

- **Code number** (e.g. B3FR)
- **Input range** (e.g. Pt 100, 0 – 200°C)

GENERAL SPECIFICATIONS

Connection: Removable terminal block
Housing material: Flame-resistant resin (grey)
Isolation: Input to output
DIP switches: For input range calibration
Burnout protection: Upscale, downscale or no burnout selectable with DIP SW (default: upscale)
Linearization: Standard

INPUT & OUTPUT

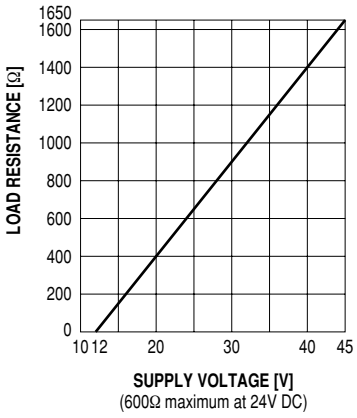
■**INPUT**: 2- or 3-wire RTDs
Maximum leadwire resistance: 20Ω per wire (3-wire)
Sensing current: 1mA
Temperature range

RTD	MAXIMUM RANGE		MIN. SPAN	
	°C	°F	°C	°F
Pt 100	-50 to +750	-58 to +1382	300	540
(JIS '97/DIN/IEC)	-50 to +350	-58 to +662	100	180
	-50 to +150	-58 to +302	50	90
Ni 120	-50 to +200	-58 to +392	100	180
	-50 to +100	-58 to +212	50	90
Cu 10 (@25°C)	-50 to +250	-58 to +482	100	180

■**OUTPUT**: 4 – 20mA DC
Load resistance vs. supply voltage:

$$\text{Load Resistance } (\Omega) = \frac{\text{Supply Voltage (V)} - 12\text{ (V)}}{0.02\text{ (A)}}$$

(including leadwire resistance)



INSTALLATION

Supply voltage: 12 – 45V DC
Operating temperature: -40 to +85°C (-40 to +185°F)
Max. 55°C (131°F) for UL approval
Operating humidity: 0 to 95% RH (non-condensing)
Mounting: DIN rail
Dimensions: W18×H106×D110.5 mm (0.71"×4.17"×4.35")
See General Spec. Sheet Figure A-1.
Weight: 80 g (2.8 oz.)
Terminal assignment: See General Spec. Sheet Figure B-1.

PERFORMANCE in percentage of span

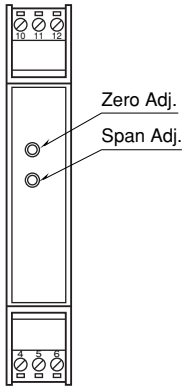
Accuracy
Pt 100, Cu 10: ±0.2%
Ni 120: ±0.3%
Temp. coefficient: ±0.02%/°C (±0.01%/°F) typical;
±0.03%/°C (±0.02%/°F) for Cu 10
Response time: ≤0.5 seconds (0 – 90%)
Burnout response: ≤10 seconds
Insulation resistance: ≥100MΩ with 500V DC
Dielectric strength: 2000V AC @1 minute
(input to output to ground)

STANDARDS & APPROVALS

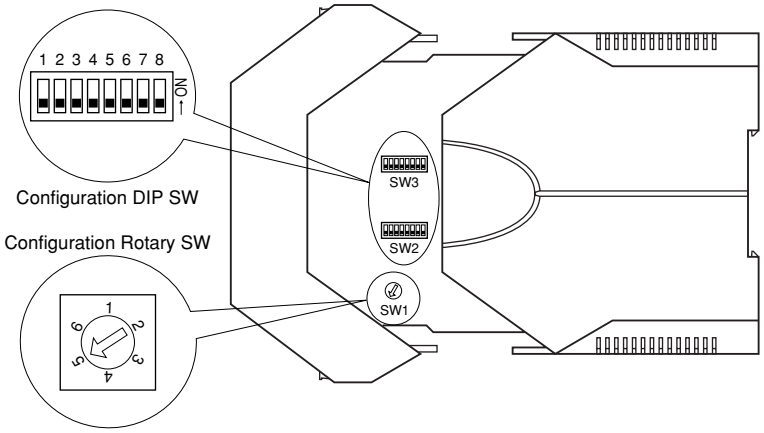
CE conformity: EMC Directive (89/336/EEC)
EMI EN61000-6-4
EMS EN61000-6-2
Approval: UL/C-UL general safety requirements
(UL 61010-1, CAN/CSA-C22.2 No.1010-1)

RANGE CONFIGURATION

■FRONT VIEW



■SIDE VIEW



■ GENERAL PROCEDURE

First select a coarse range using the internal DIP switches (SW1, SW2, SW3) according to Tables 1 through 3, and then fine tune the range using the front zero and span adjustments.

■ SELECTING DIP SW

MAXIMUM RANGE

Choose the required range matching the minimum and maximum values according to Table 1.

Table 1. ■ = ON

RTD	MAXIMUM RANGE	SW1	SW2							
			1	2	3	4	5	6	7	8
Pt 100	-50 to +750°C	1	■				■			
	-50 to +350°C	2	■					■		
	-50 to +150°C	3	■					■		
Ni 120	-50 to +200°C	4		■					■	
	-50 to +100°C	5		■					■	
Cu 10	-50 to +250°C	6			■			■		
Pt 100	-58 to +1382°F	1	■				■			
	-58 to +662°F	2	■					■		
	-58 to +302°F	3	■					■		
Ni 120	-58 to +392°F	4		■					■	
	-58 to +212°F	5		■					■	
Cu 10	-58 to +482°F	6			■			■		

GAIN

See Table 2.
The gain is defined by the following equation:

$$\text{Gain} = \frac{[\text{Max. Range} - (-50^{*1})]\ (°\text{C})}{[100\%\ \text{Input} - 0\%\ \text{Input}]\ (°\text{C})} \times 100\ (\%)$$

*1. -58 for °F

Table 2 ■ = ON

GAIN	SW3		
	1	2	3
100% ≤ Gain < 167%	■		
167% ≤ Gain < 267%		■	
267% ≤ Gain ≤ 400%			■

OFFSET

The offset is defined by the following equation:

$$\text{Offset} = \frac{[0\%\ \text{Input} - (-50^{*1})]\ (°\text{C})}{[\text{Max. Range} - (-50^{*1})]\ (°\text{C})} \times 100\ (\%)$$

*1. -58 for °F

Offset setting SW3-4 is set to OFF at default. When the desired offset is 26%*2 or greater and out of adjustable range with the front potentiometer, turn the SW3-4 ON.
*2. 28% for Ni 120.

BURNOUT

Table 3 ■ = ON

BURNOUT	SW3			
	5	6	7	8
Upscale	■		■	
Downscale		■		■
No Burnout				

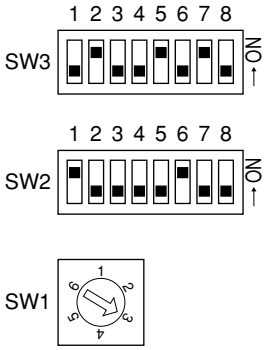
■ ZERO & SPAN ADJUSTMENTS

After setting SW1 through SW3 for the coarse offset and gain, adjust the Zero (offset) and Span (gain).

■ EXAMPLE

RTD Type: Pt 100
Calibration Range: 0 – 90°C
Maximum Range Selected: 150°C
Burnout: Upscale
Gain: [150 – (-50) / 90 – 0] × 100 = 222%
Offset: [0 – (-50) / (150 – (-50)] × 100 = 25%

The SW1, SW2 and SW3 are configured as follows:



SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM