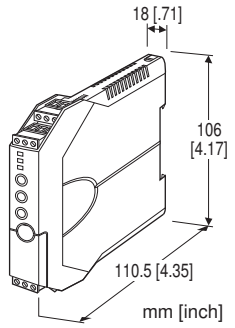
Space-saving Signal Conditioners M3-UNIT Series

THERMOCOUPLE TRANSMITTER

(field- and PC-configurable)

Functions & Features

• Accepts a thermocouple input and provides an isolated, linearized DC signal
• Easy 'One-Step Cal' calibration using the front three control buttons without needing a PC; PC software is also usable
• Both input and output type and range are configurable
• Front control button function can be locked
• Cold junction compensation
• Linearization and burnout



MODEL: M3LT–R4/[1][2]

ORDERING INFORMATION

• Code number: M3LT-R4/[1][2]
Specify a code from below for each of [1] and [2].
(e.g. M3LT-R4/A/UL/Q)
• Specify the specification for option code /Q
(e.g. /C01)
• Orders will be shipped at default factory settings (K, 0 – 1000°C input / 4 – 20 mA output)

INPUT – Field-selectable

Thermocouple

(PR), K (CA), E (CRC), J (IC), T (CC), B (RH), R, S, C (WRe 5-26), N, U, L, P (Platinel II)

OUTPUT – Field-selectable

Current

0 – 20 mA DC

Voltage

-2.5 – +2.5 V DC
-10 – +10 V DC

POWER INPUT

DC Power

R4: 10 – 32 V DC
(Operational voltage range 9 - 36 V, ripple 10 %p-p max.)

[1] CONFIGURATION OPTIONS

A: PC and field configurable
B: Field configurable

[2] OPTIONS (multiple selections)

Standards & Approvals

blank: CE marking
/UL: UL approval, CE marking

Other Options

blank: none
/Q: Option other than the above (specify the specification)

SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to our web site.)

/C01: Silicone coating
/C02: Polyurethane coating
/C03: Rubber coating (UL not available)

RELATED PRODUCTS

• PC Configurator cable (model: MCN-CON or COP-US)
• PC configurator software (model: M3CFG)
Downloadable at our web site.

GENERAL SPECIFICATIONS

Construction: Small-sized front terminal structure
Connection: Euro type connector terminal
(applicable wire size: 0.2 to 2.5 mm^2, stripped length 8 mm)
Housing material: Flame-resistant resin (gray)
Isolation: Input to output to power
Overrange output: -15 to +115 %
Zero adjustment: -15 to +15 % (front)
Span adjustment: 85 to 115 % (front)
Burnout: Upscale (default), downscale or no burnout selectable
Linearization: Standard
Cold junction compensation: CJC sensor attached to the input terminals
Status indicator LED: Tri-color (green/amber/red) LED; Blinking patterns indicate operation status of the transmitter.
Configuration:
PC Configurator: (Model: M3LTCFG) via Windows PC connected to th front jack.
Programmable features include:
• I/O type and range

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- Zero and span adjustments
- Burnout action
- User's T/C table setting
  (max. 300 points, input emf specified within -100 – +1000 mV)
- Others

(Refer to the instruction manual)

'One-Step Cal' calibration: With I/O type and the full-scale range configured via the internal DIP switches, precise 0 % and 100 % ranges are calibrated via the front control buttons with a help of LED. Also I/O calibration and fine adjustment are available with a PC.

Configurator connection: 2.5 dia. miniature jack; RS-232-C level

INPUT SPECIFICATIONS

■ **Thermocouple**: See table 1

Input resistance: ≥ 1 MΩ

Burnout sensing: 130 nA ±10 %

Temperature range: See Table 1.

OUTPUT SPECIFICATIONS

■ **DC Current**

Maximum range: 0 – 20 mA DC

Minimum span: 1 mA

Conformance range: 0 – 24 mA DC

(Negative overrange current below 0 mA is not available.)

Offset: Lower range can be any specific value within the output range provided that the minimum span is maintained.

Load resistance: Output drive 12 V maximum

■ **DC Voltage**

Narrow Spans

Maximum range: -2.5 – +2.5 V DC

Minimum span: 250 mV

Conformance range: -3 – +3 V DC

Wide Spans

Maximum range: -10 – +10 V DC

Minimum span: 1 V

Conformance range: -11.5 – +11.5 V DC

Offset: Lower range can be any specific value within the output range provided that the minimum span is maintained.

Load resistance: Output drive 1 mA maximum

INSTALLATION

Power consumption

•**DC**: Approx. 3 W

Operating temperature: -25 to +65°C (-13 to +149°F)

Max. 55°C (131°F) for UL approval

Operating humidity: 0 to 95 %RH (non-condensing)

Mounting: DIN rail

Weight: 100 g (0.22 lb)

PERFORMANCE

Accuracy: See Table 1 and refer to calculation examples of overall accuracy.

Cold junction compensation error:

±0.5°C at 25 ±10°C

±0.9°F at 77 ±18°F

Temp. coefficient: ±0.015 %/°C (±0.008 %/°F) of max. span at -5 to +55°C [23 to 131°F]

Response time: ≤ 0.9 sec. (0 – 90 %)

Burnout response: ≤ 10 sec.

Line voltage effect: ±0.1 % over voltage range

Insulation resistance: ≥ 100 MΩ with 500 V DC

Dielectric strength: 1500 V AC @ 1 minute

(input to output or power to ground)

500 V AC @ 1 minute (output to power)

CALCULATION EXAMPLES OF OVERALL ACCURACY

[Example 1]

Input: K thermocouple, 0 – 1000°C, Output: 4 – 20 mA DC

1) Absolute value accuracy (Table 1): 0.25°C

2) CJC error (0.5°C) added: 0.75°C

3) 0.75°C ÷ 1000°C × 100 = 0.075 %

4) 0.075 % < 0.1 % of span. ➠ 0.1 % is selected.

5) Output span 16 mA (= 20 mA – 4 mA)

Max. span 20 mA

Output span ≥ 1/10 of max. span ➠ No need of adding 0.2 %.

6) Overall accuracy equals ±0.1 % of span

[Example 2]

Input: K thermocouple, 50 – 150°C, Output: 2.0 – 2.5 V DC

1) Absolute value accuracy (Table 1): 0.25°C

2) CJC error (0.5°C) added: 0.75°C

3) 0.75°C ÷ (150 – 50)°C × 100 = 0.75 %

4) 0.75 % > 0.1 % of span. ➠ 0.75 % is selected.

5) Output span 0.5 V (= 2.5 V – 2.0 V)

Max. span 5 V

Output span ≤ 1/10 of max. span ➠ Add 0.2 %.

6) Overall accuracy equals ±0.95 % of span (0.75 + 0.2)

STANDARDS & APPROVALS

EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

RoHS Directive

Approval:

UL/C-UL general safety requirements

(UL 61010-1, CAN/CSA-C22.2 No.1010-1)

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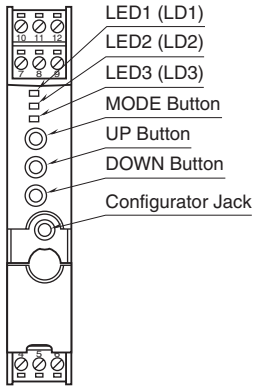
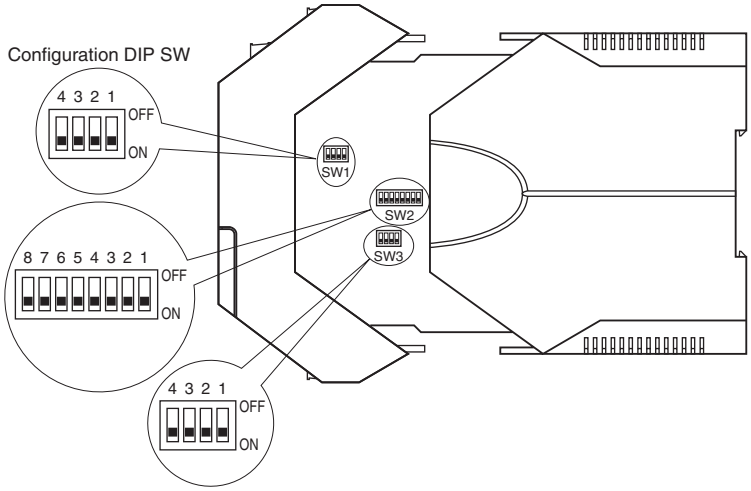
EXTERNAL VIEW

■ **FRONT VIEW**



■ **SIDE VIEW**



The DIP switch setting is required to select output types before setting a precise output range using the PC configurator software.
For detailed information on the configuration and calibration, refer to the instruction manual.

INPUT TYPE, RANGE & ACCURACY

■ **INPUT TYPE, RANGE & ACCURACY** **TABLE 1**

Thermocouple	°C				°F			
	MIN. SPAN	MAXIMUM RANGE	CONFORMANCE RANGE	ACCURACY*1	MIN. SPAN	MAXIMUM RANGE	CONFORMANCE RANGE	ACCURACY*1
(PR)	20	0 to 1760	0 to 1760	±1.00	36	32 to 3200	32 to 3200	±1.80
K (CA)	20	-270 to +1370	-150 to +1370	±0.25	36	-454 to +2498	-238 to +2498	±0.45
E (CRC)	20	-270 to +1000	-170 to +1000	±0.20	36	-454 to +1832	-274 to +1832	±0.36
J (IC)	20	-210 to +1200	-180 to +1200	±0.25	36	-346 to +2192	-292 to +2192	±0.45
T (CC)	20	-270 to +400	-170 to +400	±0.25	36	-454 to +752	-274 to +752	±0.45
B (RH)	20	100 to 1820	400 to 1760	±0.75	36	212 to 3308	752 to 3200	±1.35
R	20	-50 to +1760	200 to 1760	±0.50	36	-58 to +3200	392 to 3200	±0.90
S	20	-50 to +1760	0 to 1760	±0.50	36	-58 to +3200	32 to 3200	±0.90
C (WRe 5-26)	20	0 to 2315	0 to 2315	±0.80	36	32 to 4199	32 to 4199	±1.44
N	20	-270 to +1300	-130 to +1300	±0.30	36	-454 to +2372	-202 to +2372	±0.54
U	20	-200 to +600	-200 to +600	±0.20	36	-328 to +1112	-328 to +1112	±0.36
L	20	-200 to +900	-200 to +900	±0.25	36	-328 to +1652	-328 to +1652	±0.45
P (Platinel II)	20	0 to 1395	0 to 1395	±0.25	36	32 to 2543	32 to 2543	±0.45

*1. [Accuracy + Cold Junction Compensation Error 0.5°C (0.9°F)] or ±0.1% of span, whichever is greater.
If the selected output span equals to or narrower than the one-tenth of the maximum span, add 0.2%.

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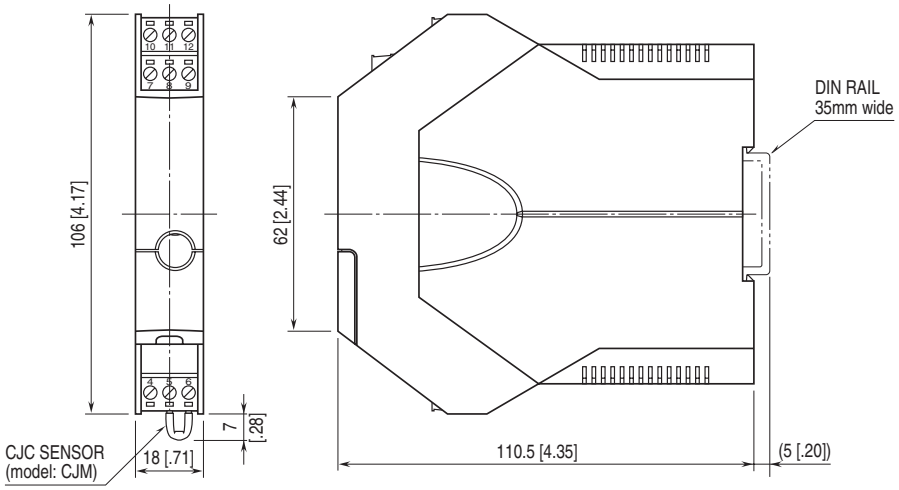
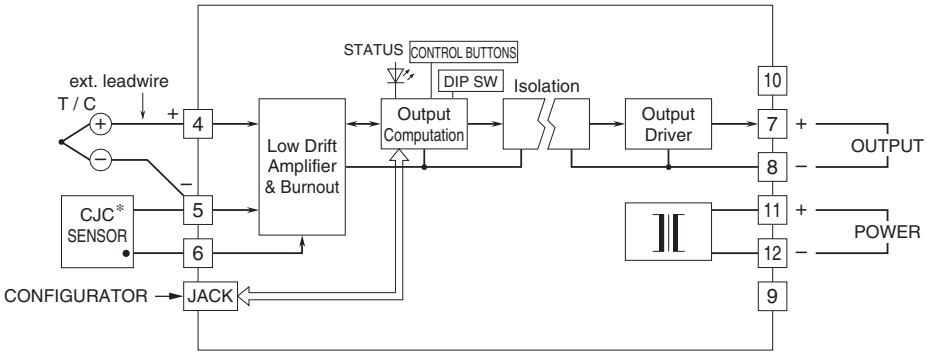
EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



• When mounting, no extra space is needed between units.

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



* The CJC Sensor is secured to the terminal 6.
Loosen only the terminal 4 – 5 and connect the T/C extension wires.

⚠ Specifications are subject to change without notice.

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