

## Super-mini Signal Conditioners with Display Mini-M M2E Series

### THERMOCOUPLE TRANSMITTER

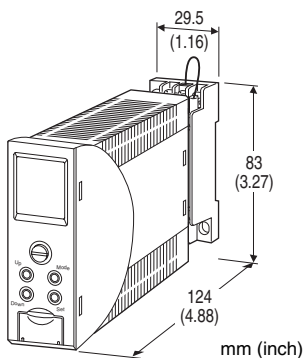
(PC programmable)

#### Functions & Features

- Accepts direct input from a thermocouple and provides a linearized process signal
- Adjustments with the front button
- Wide selection of thermocouples
- OEL display with good visibility

#### Typical Applications

- Small burnout sensing current enables long distance transmission with minimum offset drifts
- Electric furnace (isolation)
- No burnout type can connect to a single T/C in parallel with a recorder



## MODEL: M2EXT-[1][2]

### ORDERING INFORMATION

- Code number: M2EXT-[1][2]

Specify a code from below for each [1] and [2].

- (e.g. M2EXT-M2/Q)
- Specify the specification for option code /Q (e.g. /C01/S01/SET)

### 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

#### ◆ DC Output

- Current output: 0 - 20 mA DC
- Voltage output: -5 - +5 V DC

- Voltage output: -10 - +10 V DC

### [1] POWER INPUT

#### AC Power

M2: 100 - 240 V AC (Operational voltage range 85 - 264 V, 47 - 66 Hz)

#### DC Power

R: 24 V DC

(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)

P: 110 V DC

(Operational voltage range 85 - 150 V, ripple 10 %p-p max.)

### [2] OPTIONS

blank: none

/Q: With options (specify the specification)

### SPECIFICATIONS OF OPTION: Q (multiple selections)

#### COATING (For the detail, refer to M-System's web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

#### TERMINAL SCREW MATERIAL

/S01: Stainless steel

#### EX-FACTORY SETTING

/SET: Preset according to the Ordering Information Sheet (No. ESU-5145)

### RELATED PRODUCTS

- M2E configurator software (model: M2ECFG)

Downloadable at M-System's web site.

A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual (EM-5147) for the M2E configurator for applicable cable types.

### GENERAL SPECIFICATIONS

**Construction:** Plug-in

**Connection:** M3 screw terminals (torque 0.8 N·m)

**Screw terminal:** Chromated steel (standard) or stainless steel

**Housing material:** Flame-resistant resin (gray)

**Isolation:** Input to output to power

**Overrange output:** Approx. -10 to +110 % (Not available for current output not greater than 0 mA)

**Input zero fine adj. range:** -10 to +10°C (front button)

**Input span fine adj. range:** -10 to +10°C (front button)

**Output zero fine adj. range:** -5 to +5% (front button)

**Output span fine adj. range:** 95 to 105% (front button)

**Output setting:** DIP Switch on side panel (refer to the instruction manual)

**Configuration:** Program with front buttons or Via PC.

**Programmable features include:**

- T/C type
- Input setting
- Output range
- Output scaling
- Zero and span fine adjustments
- Loop test

**Burnout protection:** Upscale standard; downscale or no burnout optional by programming

(Set to "None" at item [51] Burnout, when the unit is connected with another instrument in parallel.)

**Linearization:** Standard

**Cold junction compensation:** CJC sensor attached to the input terminals

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

## DISPLAY

**Display functions:** Displays and sets measured range, engineering unit

**Effective visual area:** Approx. 15.6 × 20.8 mm (0.61" × 0.82")

**Number of pixels:** 68 × 95 (horizontal × vertical)

**Character color:** Yellow

**Display life:** Approx. 60000 hours

(Expected time for the Display brightness to be reduced to 50 % when the Display is used continuously with brightness setting 2 in 25 °C)

**Display type:** OEL display

**Display digit:** Negative 5 digits, positive 6 digits (-99999 to 999999)

**Decimal point position:**

- Input display: None, number of decimal places 1 or 2
- Output display: Settable arbitrarily

## INPUT SPECIFICATIONS

**Input resistance:** 1 MΩ min.

**Burnout sensing:** ≤ 0.2 μA

**Measurement rang:** -5 to +105% of input setting value  
Refer to the operating manual (EM-5145-B) for changing input range, setting value.

## OUTPUT SPECIFICATIONS

■ DC Current

**Output range:** 0 - 20 mA DC

**Conformance range:** 0 - 22mA DC

**Minimum span:** 1 mA

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

**Load resistance:** Output drive 15 V max.

(Not available to output less than 0 mA, output range may not be extended to -10 %)

■ DC Voltage

**Output range:** -5 - +5 V DC, -10 - +10 V DC

**Conformance range:** -6.0 - +6.0 V DC, -12 - +12 V DC

**Minimum span:** 250 mV, 1 V

**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 max.

## INSTALLATION

**Power Consumption**

•AC:

Max. 4.5 VA at 100 V

Max. 6.5 VA at 200 V

Max. 8.5 VA at 264 V

•DC: Max. 2.3 W

**Operating temperature:** -5 to +55°C (23 to 131°F)

**Operating humidity:** 10 to 85 %RH (non-condensing)

**Mounting:** Surface or DIN rail

**Weight:** Approx. 200 g (0.44 lb)

## PERFORMANCE

**Accuracy:** Input accuracy + output accuracy

See CALCULATION EXAMPLES OF OVERALL ACCURACY.

Inversely proportional to the setting span.

Except the accuracy of input resistor.

**Input accuracy:** [Table 1 Accuracy value + Cold Junction Compensation Error 0.5°C (0.9°F)] or ±0.1 % of span, whichever is greater.

**Display accuracy:**

Input display: Input accuracy ±1 digit

Output display: Input accuracy + output accuracy ±1 digit

**Output accuracy:** ±0.04 % of max. output range

**Cold junction compensation error:**

±0.5°C at 25 ±10°C

±0.9°F at 77 ±18°F

(The described accuracy may be partially not satisfied when the input temperature is below 0°C. Consult factory.)

**Temp. coefficient (% of max. I/O range):** ±0.015 %/°C

(±0.008 %/°F)

**Input resolution:** Max. 20 bits

**Output resolution:** Max. 16 bits

**Response time (filter time constant: 0 sec.):** ≤ 0.5 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: 2000 V AC @1 minute (input to output to power to ground)

## CALCULATION EXAMPLES OF OVERALL ACCURACY

### [Example]

#### • Input Accuracy

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

1) Absolute value accuracy (Table 1): 1.00°C

2) CJC error (0.5°C) added: 1.50°C

3)  $1.50^{\circ}\text{C} \div 1000^{\circ}\text{C} \times 100 = 0.15 \%$

4)  $0.15 \% > 0.1 \%$  of span.  $\Rightarrow 0.15 \%$  is selected.

• Output Accuracy = Output Range Span (20 mA)  $\div$  Output Span Setting (16 mA)  $\times 0.04 \%$  = 0.05 %

Overall accuracy = 0.15 + 0.05 =  $\pm 0.20 \%$

[Table 1]

INPUT RANGE	°C			
	MINIMUM SPAN	SETTING RANGE	ACCURACY	CONFORMANCE RANGE
(PR)	20	0 to 1760	$\pm 2.00$	0 to 1760
K (CA)	20	-270 to +1370	$\pm 1.00$	-150 to +1370
E (CRC)	20	-270 to +1000	$\pm 1.00$	-170 to +1000
J (IC)	20	-210 to +1200	$\pm 1.00$	-180 to +1200
T (CC)	20	-270 to +400	$\pm 1.00$	-170 to +400
B (RH)	20	0 to 1820	$\pm 2.00$	400 to 1760
R	20	-50 to +1760	$\pm 2.00$	200 to 1760
S	20	-50 to +1760	$\pm 2.00$	0 to 1760
C (WRe 5-26)	20	0 to 2315	$\pm 2.00$	0 to 2315
N	20	-270 to +1300	$\pm 1.00$	-130 to +1300
U	20	-200 to +600	$\pm 1.00$	-200 to +600
L	20	-200 to +900	$\pm 1.00$	-200 to +900
P (Platinel II)	20	0 to 1395	$\pm 1.00$	0 to 1395
INPUT RANGE	°F			
	MINIMUM SPAN	SETTING RANGE	ACCURACY	CONFORMANCE RANGE
(PR)	36	32 to 3200	$\pm 3.60$	32 to 3200
K (CA)	36	-454 to +2498	$\pm 1.80$	-238 to +2498
E (CRC)	36	-454 to +1832	$\pm 1.80$	-274 to +1832
J (IC)	36	-346 to +2192	$\pm 1.80$	-292 to +2192
T (CC)	36	-454 to +752	$\pm 1.80$	-274 to +752
B (RH)	36	32 to 3308	$\pm 3.60$	752 to 3200
R	36	-58 to +3200	$\pm 3.60$	392 to 3200
S	36	-58 to +3200	$\pm 3.60$	32 to 3200
C (WRe 5-26)	36	32 to 4199	$\pm 3.60$	32 to 4199
N	36	-454 to +2372	$\pm 1.80$	-202 to +2372
U	36	-328 to +1112	$\pm 1.80$	-328 to +1112
L	36	-328 to +1652	$\pm 1.80$	-328 to +1652
P (Platinel II)	36	32 to 2543	$\pm 1.80$	32 to 2543
INPUT RANGE	K			
	MINIMUM SPAN	SETTING RANGE	ACCURACY	CONFORMANCE RANGE
(PR)	20	273.15 to 2033.15	$\pm 2.00$	273.15 to 2033.15
K (CA)	20	3.15 to 1643.15	$\pm 1.00$	123.15 to 1643.15
E (CRC)	20	3.15 to 1273.15	$\pm 1.00$	103.15 to 1273.15
J (IC)	20	63.15 to 1473.15	$\pm 1.00$	93.15 to 1473.15
T (CC)	20	3.15 to 673.15	$\pm 1.00$	103.15 to 673.15
B (RH)	20	273.15 to 2093.15	$\pm 2.00$	673.15 to 2033.15
R	20	223.15 to 2033.15	$\pm 2.00$	473.15 to 2033.15
S	20	223.15 to 2033.15	$\pm 2.00$	273.15 to 2033.15
C (WRe 5-26)	20	273.15 to 2588.15	$\pm 2.00$	273.15 to 2588.15
N	20	3.15 to 1573.15	$\pm 1.00$	143.15 to 1573.15
U	20	73.15 to 873.15	$\pm 1.00$	73.15 to 873.15
L	20	73.15 to 1173.15	$\pm 1.00$	73.15 to 1173.15
P (Platinel II)	20	273.15 to 1668.15	$\pm 1.00$	273.15 to 1668.15

**STANDARDS & APPROVALS**

**EU conformity:**

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1

Installation Category II

Pollution Degree 2

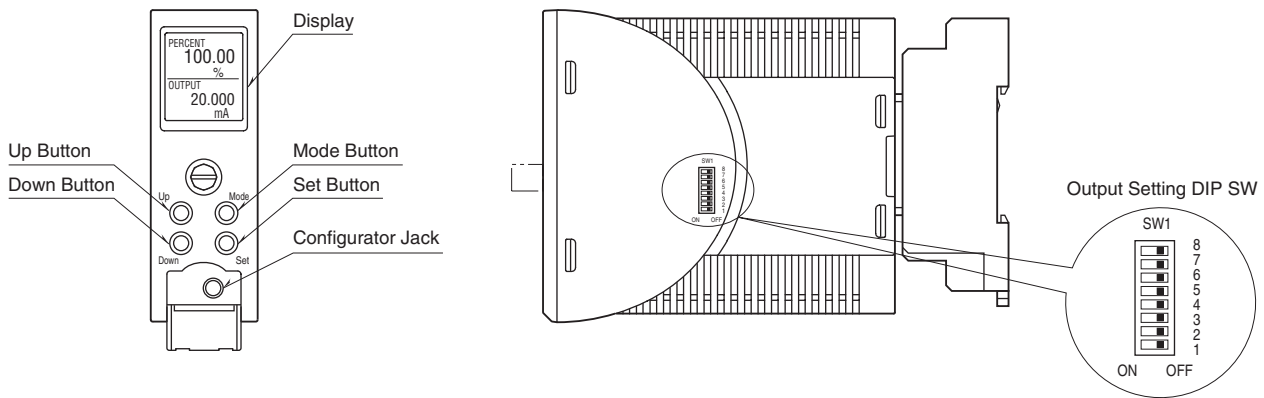
Input or output to power: Reinforced insulation (300 V)

Input to output: Basic insulation (300 V)

RoHS Directive

EN 50581

## EXTERNAL VIEW



COMPONENT	FUNCTION
Display	Indicates present values, setting values and abnormal information. Two types of present values at upper and lower are displayed by setting.
Mode Button	Used to shift from measuring mode to each setting mode. Destination to shift is changed by the time pressing and holding the button. Used to return from each setting mode to measuring mode. (press and hold for 2 sec. or more)
Set Button	Used to change setting value of setting parameter. When at setting changeable state, used to enter (save) the setting value. Used to move on through digits of setting value for input/output scaling at setting changeable state,
Up Button	Used to shift through setting parameter, and to increase or select setting value.
Down Button	Used to shift through setting parameter, and to decrease or select setting value.
Configurator Jack	Used to configure with M2E configurator software (model: M2ECFG). At the same time, set the lockout setting of the unit to 'lock'.

Refer to the operating manual (EM-5145-B) for detailed procedures.

## PARAMETER LIST

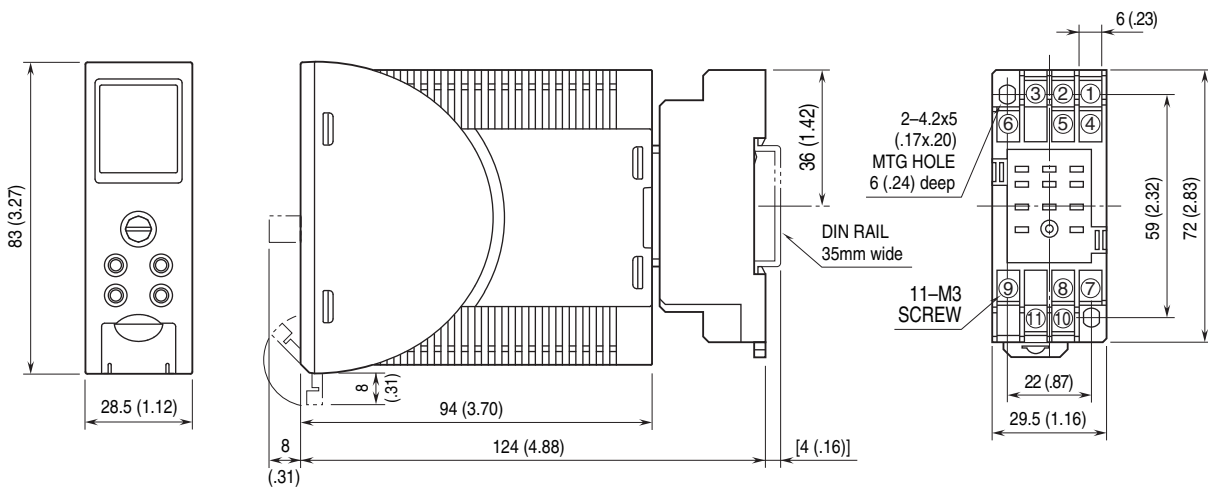
It is available to configure or confirm settings shown below by using front button. Configuring or confirming with PC is available when using M2E configurator software (model: M2ECFG).

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Basic setting	01	Lockout setting	Lock / Unlock	—	Lock
	11	Input range	(PR) K (CA) E (CRC) J (IC) T (CC) B (RH) R S C (WRe 5-26) N U L P (Platinel II)	—	K (CA)
	12	0 % input setting	(PR): 0.0 – 1740.0	°C	0.0
			K (CA): -270.0 – 1350.0		
			E (CRC): -270.0 – 980.0		
			J (IC): -210.0 – 1180.0		
			T (CC): -270.0 – 380.0		
			B (RH): 0.0 – 1800.0		
			R: -50.0 – 1740.0		
			S: -50.0 – 1740.0		
			C (WRe 5-26): 0.0 – 2295.0		
			N: -270.0 – 1280.0		
			U: -200.0 – 580.0		
			L: -200.0 – 880.0		
			P (Platinel II): 0.0 – 1375.0		
	13	100 % input setting	(PR): 20.0 – 1760.0	°C	1000.0
			K (CA): -250.0 – 1370.0		
			E (CRC): -250.0 – 1000.0		
			J (IC): -190.0 – 1200.0		
			T (CC): -250.0 – 400.0		
B (RH): 20.0 – 1820.0					
R: -30.0 – 1760.0					
S: -30.0 – 1760.0					
C (WRe 5-26): 20.0 – 2315.0					
N: -250.0 – 1300.0					
U: -180.0 – 600.0					
L: -180.0 – 900.0					
P (Platinel II): 20.0 – 1395.0					
16	Input decimal point	No decimal point The number of decimal places : 1 or 2	—	1 place of decimals	
17	Output range	0 – 20mA -5 – +5V -10 – +10V	—	0 – 20mA	
18	0 % output setting	0.000 – 19.000 -5.000 – 4.750 -10.000 – 9.000	mA V V	4.000	
19	100 % output setting	1.000 – 20.000 -4.750 – 5.000 -9.000 – 10.000	mA V V	20.000	
20	0 % output scaling	-99999 – 999999	—	0.00	
21	100 % output scaling	-99999 – 999999	—	100.00	
22	Output decimal point	No decimal point The number of decimal places : 1 – 5	—	2 places of decimals	
26	Loop test	-10.00 – 110.00	%	Cancel	

MODE	ITEM	SETTING PARAMETER	RANGE	UNIT	INITIAL VALUE
Option setting	51	Burnout	None / Down / Up	—	Up
	61	Unit (OUT Scaling)	Choose from 68 types*	—	%
	64	Temperature unit	°C / °F / K	—	°C
	65	Cold junction compensation	CJM/FXD TEMP	—	CJM
	66	Preset fixed terminal temperature	-50.00 – 100.00	°C	0.00
	67	Filter time constant	0 – 30	sec.	0
	69	Input Zero fine adjust	-10.00 – 10.00	°C	0.00
	70	Input Span fine adjust	-10.00 – 10.00	°C	0.00
	71	Output Zero fine adjust	-5.000 – 5.000	%	0.000
	72	Output Span fine adjust	95.000 – 105.000	%	100.000
	01	Lockout setting	Lock / Unlock	—	Lock
Advanced setting	90	Display setting	Upper: choose from 5 types* Lower: choose from 6 types*	—	Upper: INPUT Lower: PERCENT
	91	Brightness	1 (darkest) – 4 (brightest)	—	4
	92	Display timeout	0 (always on), 1 – 60	min.	10
	93	Reset all settings	OFF / RESET	—	OFF
	94	Version indication	—	—	—
	01	Lockout setting	Lock / Unlock	—	Lock

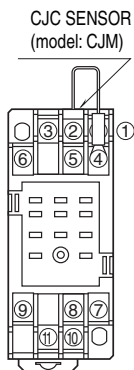
\* For detailed types, refer to the operating manual (EM-5145-B).

## DIMENSIONS unit: mm (inch)

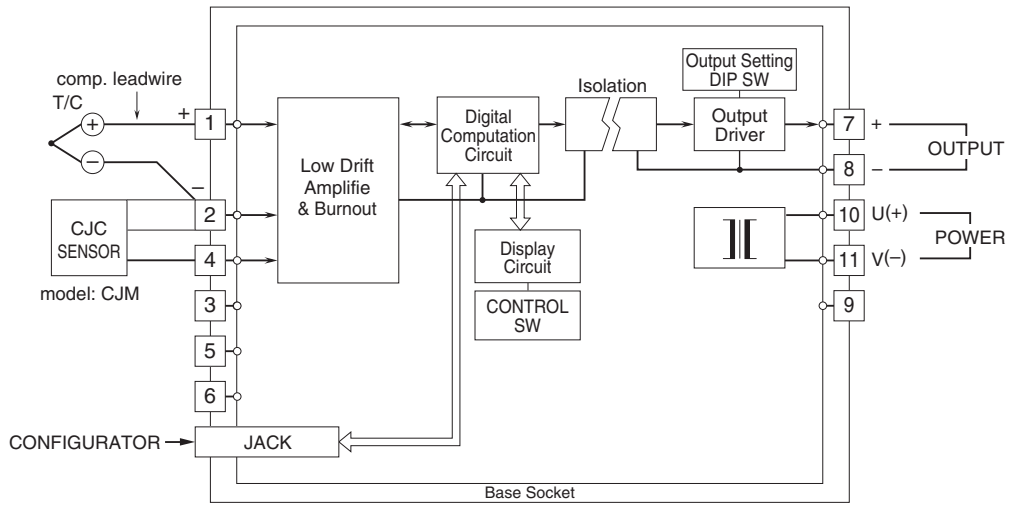


• When mounting, no extra space is needed between units.

## TERMINAL ASSIGNMENTS



## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



Specifications are subject to change without notice.