

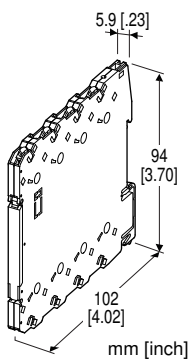
## Tension-Clamp Ultra-Slim Signal Conditioners M6S Series

### UNIVERSAL TRANSMITTER

(PC programmable)

#### Functions & Features

- Maintenance-free tension clamp connection
- Universal input (mV, V, mA, T/C, RTD and potentiometer)
- 5.9-mm ultra-slim transmitter
- Low profile allows the M6S module mounted in a 120-mm deep panel.
- PC programmable
- High-density mounting
- Power indicator LED



### MODEL: M6SXU-[1][2]-[3][4]

#### ORDERING INFORMATION

- Code number: M6SXU-[1][2]-[3][4]

Specify a code from below for each of [1] through [4].

(e.g. M6SXU-Z1Z1-M2/Q)

Non-specified orders will be shipped as default factory settings (M6SXU-00: 4 – 20 mA input/4 – 20 mA output).

- Input range (e.g. 4 – 20 mA DC)
- Output range (e.g. 4 – 20 mA DC)
- Specify the specification for option code /Q (e.g. /C01)

#### [1] INPUT

**0:** User-calibrated (Factory default: 4 – 20 mA DC)

If the unit is to be factory-calibrated to a specific input type, please select from the following:

Current

**Z1:** Range 0 – 50 mA DC (Input resistance 17 Ω)

Voltage

**S1:** Range -1000 – +1000 mV DC (Input resistance 1 MΩ min.)

**S2:** Range -10 – +10 V DC (Input resistance 1 MΩ min.)

Thermocouple

**T1:** (PR) (Usable Range 0 to 1760°C, 32 to 3200°F)

**T2:** K (CA) (Usable range -270 to +1370°C, -454 to +2498°F)

**T3:** E (CRC) (Usable range -270 to +1000°C, -454 to +1832°F)

**T4:** J (IC) (Usable range -210 to +1200°C, -346 to +2192°F)

**T5:** T (CC) (Usable range -270 to +400°C, -454 to +752°F)

**T6:** B (RH) (Usable range 100 to 1820°C, 212 to 3308°F)

**T7:** R (Usable range -50 to +1760°C, -58 to +3200°F)

**T8:** S (Usable range -50 to +1760°C, -58 to +3200°F)

**TN:** N (Usable range -270 to +1300°C, -454 to +2372°F)

**T0:** Specify (Please provide an emf table.)

RTD

**(2-, 3- or 4-wire)**

**R1:** JPt 100 (JIS'89)

(Usable range: -200 to +500°C, -328 to +932°F)

**R3:** Pt 100 (JIS'89)

(Usable range: -200 to +650°C, -328 to +1202°F)

**R4:** Pt 100 (JIS'97, IEC)

(Usable range: -200 to +850°C, -328 to +1562°F)

**R5:** Pt 50 Ω (JIS'81)

(Usable range: -200 to +649 °C, -328 to +1200°F)

**R7:** Pt 1000

(Usable range: -200 to +850°C, -328 to +1562°F)

**R9:** Cu 10 @25°C

(Usable range: -50 to +250°C, -58 to +482°F)

**R0:** Specify (Please provide a resistance table.)

Potentiometer

**M1:** Total resistance 100 – 5000 Ω

(Configurator software is used to change input over the described range of the selected suffix code.

For changing between suffix codes, set the Input Range Selector on the side of unit before software adjustment.)

#### [2] OUTPUT

**0:** User-calibrated (Factory default: 4 – 20 mA DC)

If the unit is to be factory-calibrated to a specific output type, please select from the following:

Current

**Z1:** Range 0 – 20 mA DC

Voltage

**V2:** Range -10 – +10 V DC

**V3:** Range -5 – +5 V DC

(Configurator software is used to change output over the described range of the selected suffix code.

For changing between suffix codes, set the Output Range Selector on the side of unit before software adjustment.)

#### [3] POWER INPUT

AC Power

**M2:** 100 – 240 V AC (Operational voltage range 90 – 264 V, 47 – 66 Hz)

DC Power  
**R:** 24 V DC  
 (Operational voltage range 24 V  $\pm$ 10 %, ripple 10 %p-p max.)

## [4] OPTIONS

**blank:** none  
**/Q:** With options (specify the specification)

### SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to our web site.)  
**/C01:** Silicone coating  
**/C02:** Polyurethane coating

### RELATED PRODUCTS

- PC configurator software (model: M6CFG)  
 Downloadable at our 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 for the PC configurator for applicable cable types.

### GENERAL SPECIFICATIONS

**Connection**  
**Input and output:** Tension clamp  
**Power input:** Via the Installation Base (model: M6SBS)  
 (not available for AC power input)  
 or Tension clamp  
**Applicable wire size:** 0.2 to 2.5 mm<sup>2</sup>, stripped length 8 mm  
**Housing material:** Flame-resistant resin (black)  
**Isolation:** Input to output to power  
**Overrange output:** -2 - +102 %  
 (Negative current output is not available.)  
**Zero adjustment:** -2 to +2 % (PC programming)  
**Span adjustment:** 98 to 102 % (PC programming)  
**Burnout (thermocouple, RTD & potentiometer input):**  
 Upscale standard; downscale or no burnout  
 optional by programming  
**Linearization (thermocouple & RTD input):** Standard  
**Cold Junction Compensation (thermocouple input):** CJC  
 sensor incorporated  
**Power indicator LED:** Green LED turns on when the power is  
 supplied.  
**Status indicator LED:** Orange LED; Blinking patterns indicate  
 different operating status of the transmitter.  
**Programming:** Downloaded from PC; input type and range,  
 output type and range, zero and span, burnout type,  
 linearization table, (max. 101 points, specified within -2 -  
 +102% for both input and output), user's TC/RTD table  
 (max. 300 points, specified within -1000 to +1000 mV for  
 TC or 0 to 20 k $\Omega$  for RTD), etc.

For detailed information, refer to the users manual for the  
 PC configurator.

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

### INPUT SPECIFICATIONS

■ **DC Current:** Input resistor incorporated  
 (If not specified, the input range is 4 - 20 mA DC.)  
**Input range:** 0 - 50 mA DC  
**Minimum span:** 2 mA  
**Offset:** Lower range can be any specific value within the  
 input range provided that the minimum span is maintained.

■ **DC Voltage**

- **Code S1 (narrow spans)**  
**Input range:** -1000 - +1000 mV DC  
**Minimum span:** 100 mV
- **Code S2 (wide spans)**  
**Input range:** -10 - +10 V DC  
**Minimum span:** 1 V

**Offset:** Lower range can be any specific value within the  
 input range provided that the minimum span is maintained.  
 If not specified, the input range is shown below.

S1: 0 - 100 mV DC  
 S2: 1 - 5 V DC

■ **Thermocouple**  
**Input resistance:**  $\geq$  1 M $\Omega$   
**Burnout sensing:**  $\leq$  3  $\mu$ A  
**Minimum span:** 20°C or 36°F  
 If not specified, the input range is shown below.

T1 PR: 0-1600°C  
 T2 K: 0-1000°C  
 T3 E: 0-500°C  
 T4 J: 0-500°C  
 T5 T: 0-300°C  
 T6 B: 500-1600°C  
 T7 R: 500-1600°C  
 T8 S: 0-1600°C  
 TN N: 0-1000°C

■ **RTD:** 2-, 3- or 4-wire RTD  
**Maximum leadwire resistance:** 10  $\Omega$  per wire  
**Sensing current:**  $\leq$  1.0 mA  
**Minimum span:** 20°C or 36°F  
**Resistance range:**  
 0 - 500  $\Omega$  (Input code: 1, 3, 4, 5, 9)  
 0 - 5 k $\Omega$  (Input code: 7)  
 If not specified, the input range is 100°C.

■ **Potentiometer**  
**Sensing current:**  $\leq$  1.0 mA  
**Minimum span**  
 0 - 100  $\Omega$  : 10  $\Omega$   
 0 - 300  $\Omega$  : 30  $\Omega$   
 0 - 600  $\Omega$  : 60  $\Omega$

0 - 1200 Ω : 120 Ω  
 0 - 2500 Ω : 250 Ω  
 0 - 5000 Ω : 500 Ω  
 If not specified, the input range is 0 - 1200 Ω.

## OUTPUT SPECIFICATIONS

### ■ DC Current

**Output range:** 0 - 20 mA DC  
**Conformance range:** 0 - 20.4 mA 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 11 V max.  
 (e.g. 4 - 20 mA: 550 Ω [11 V ÷ 20 mA])  
 If not specified, the output range is 4 - 20 mA DC.

### ■ DC Voltage

**Code V2 (wide spans)**  
**Output range:** -10 - +10 V DC  
**Conformance range:** -10.4 - +10.4 V DC  
**Minimum span:** 1 V  
**Code V3 (narrow spans)**  
**Output range:** -5 - +5 V DC  
**Conformance range:** -5.2 - +5.2 V DC  
**Minimum span:** 0.5 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.  
 (e.g. 1 - 5 V: 5000 Ω [5 V ÷ 1 mA])  
 If not specified, the output range is shown below.  
 V2: 0 - 10 V DC  
 V3: 1 - 5 V DC

## INSTALLATION

**Power Consumption**  
 •AC: Max. 2 VA  
 •DC: Approx. 0.5 W  
**Operating temperature:** -20 to +55°C (-4 to +131°F)  
**Operating humidity:** 30 to 90 %RH (non-condensing)  
**Mounting:** Installation Base (model: M6SBS) or DIN rail  
**Weight:** 65 g (2.3 oz)

## PERFORMANCE in percentage of span

**Cold junction compensation error (thermocouple input):**  
 ±3°C at 25 ±10°C  
 ±5.4°F at 77 ±18°F  
**Temp. coefficient:** ±0.01 %/°C (±0.006 %/°F) of max. span  
**Response time:** (0 - 90 %)  
 DC voltage or current: ≤ 0.5 s  
 Thermocouple, RTD, potentiometer: ≤ 1 s

**Burnout response time (thermocouple, RTD, potentiometer input):** ≤ 10 s  
**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)

## Accuracy

• **DC voltage or current**  
**Accuracy:** Input accuracy + output accuracy  
 Inversely proportional to the span.  
**Input accuracy:** (% of range)  
 -1000 - +1000 mV : ±0.01 %  
 -10 - +10 V : ±0.01 %  
 0 - 50 mA : ±0.02 % (Except the accuracy of input resistor.)  
**Output accuracy:** ±0.04% of max. output range  
**[Example]** Input Type -10 - +10 V, Input Range 1 - 5 V,  
 Output Type -5 - +5 V, Output Range 1 - 5 V  
 Input accuracy = Max. Input Range (20 V) ÷ Span (4 V) ×  
 0.01 % = 0.05 %  
 Output accuracy = Max. Output Range (10 V) ÷ Span (4 V)  
 × 0.04 % = 0.1 %  
 Accuracy = ±0.15 %

### • Thermocouple

**Overall accuracy:** Input accuracy + output accuracy  
**Input accuracy:** Accuracy + Cold Junction Compensation  
 Error 3°C (5.4°F)  
**Output accuracy:** Max. Output Range ÷ Span × ±0.04%

T/C	ACCURACY (°C)	CONFORMANCE RANGE (°C)
(PR)	±1.00	0 - 1760
K (CA)	±0.25	-150 - +1370
E (CRC)	±0.20	-170 - +1000
J (IC)	±0.25	-180 - +1200
T (CC)	±0.25	-170 - +400
B (RH)	±0.75	400 - 1760
R	±0.50	200 - 1760
S	±0.50	0 - 1760
N	±0.30	-130 - +1300

T/C	ACCURACY (°F)	CONFORMANCE RANGE (°F)
(PR)	±1.80	32 - 3200
K (CA)	±0.45	-238 - +2498
E (CRC)	±0.36	-274 - +1832
J (IC)	±0.45	-292 - +2192
T (CC)	±0.45	-274 - +752
B (RH)	±1.35	752 - 3200
R	±0.90	392 - 3200
S	±0.90	32 - 3200
N	±0.54	-202 - +2372

**[Example]** K thermocouple, 0 - 1000°C, 4 - 20 mA DC output

Abundance accuracy in °C: 0.25°C (see the above table)

CJC error (3°C) added: 3.25°C

➤ Input accuracy =  $3.25^{\circ}\text{C} \div 1000^{\circ}\text{C} \times 100 = 0.325\%$

Output span: 16 mA (20 - 4)

➤ Output accuracy =  $20\text{ mA} \div 16\text{ mA} \times 0.04 = 0.05\%$

➤ Overall accuracy including CJC error =  $0.325 + 0.05 = \pm 0.38\%$  of span

## • RTD

**Accuracy:** Input accuracy + output accuracy

Inversely proportional to the span.

**Input accuracy:** (whichever is greater)

$\pm 0.1\%$  of input range or  $\pm 0.15^{\circ}\text{C}$  (Pt and JPt)

$\pm 1^{\circ}\text{C}$  (Cu 10)

**Output accuracy:**  $\pm 0.04\%$  of max. output range

**[Example]** Pt 100, 0 - 100°C, Output Type -5 - +5V, Output Range 1 - 5V

Input Accuracy\* ( $0.15^{\circ}\text{C}^{**}$ )  $\div$  Span ( $100^{\circ}\text{C}$ )  $\times$  100 %

+ Max. Output Range (10V)  $\div$  Span (4V)  $\times$  0.04 %

=  $\pm 0.25\%$

\* Calculate the accuracy in °C.

\*\*  $100^{\circ}\text{C} \times 0.1\% = 0.1^{\circ}\text{C} \leq 0.15^{\circ}\text{C}$ .  $0.15^{\circ}\text{C}$  is used as input accuracy value.

## • Potentiometer

**Accuracy:** Input accuracy + output accuracy

Inversely proportional to the span.

**Input accuracy:** (% of range)

0 - 100  $\Omega$  :  $\pm 0.05\%$

0 - 300  $\Omega$  :  $\pm 0.05\%$

0 - 600  $\Omega$  :  $\pm 0.03\%$

0 - 1200  $\Omega$  :  $\pm 0.03\%$

0 - 2500  $\Omega$  :  $\pm 0.01\%$

0 - 5000  $\Omega$  :  $\pm 0.01\%$

**Output accuracy:**  $\pm 0.04\%$  of max. output range

**[Example]** Total Resistance 0 - 1200  $\Omega$ , Input Range 250-

750  $\Omega$ , Output Type -5 - +5 V, Output Range 1 - 5 V

Max. Input Range (1200  $\Omega$ )  $\div$  Span (500  $\Omega$ )  $\times$  0.03 %

+ Max. Output Range (10 V)  $\div$  Span (4 V)  $\times$  0.04 %

=  $\pm 0.18\%$

## 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

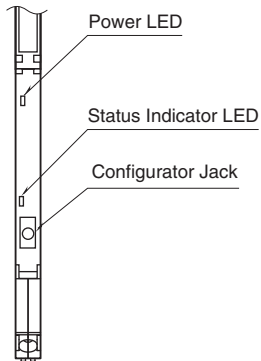
Input or output to power: Reinforced insulation (300 V)

Input to output: Basic insulation (300 V)

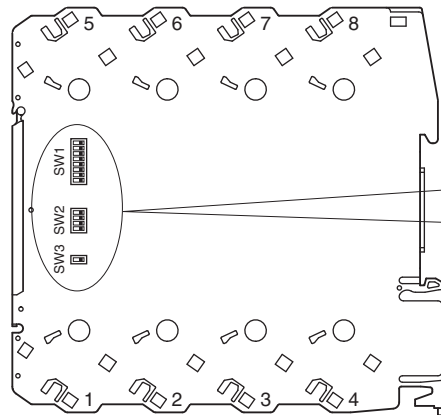
RoHS Directive

## EXTERNAL VIEW

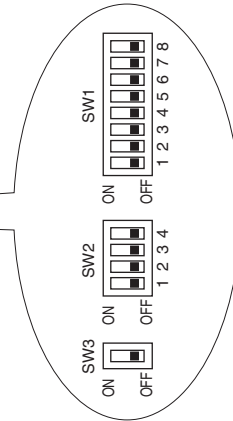
■ FRONT VIEW (with the cover open)



■ SIDE VIEW

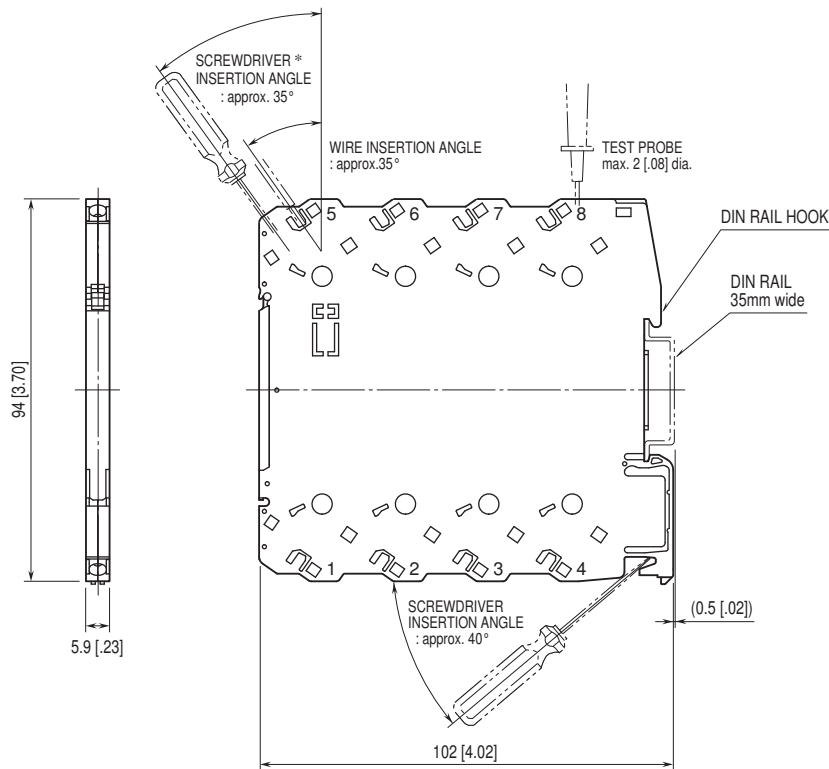


DIP switches for configuration



The DIP switch setting is required to select input and output types before setting a precise range using PC Configurator Software (model: M6CFG). Refer to the instruction manual for detailed procedures.

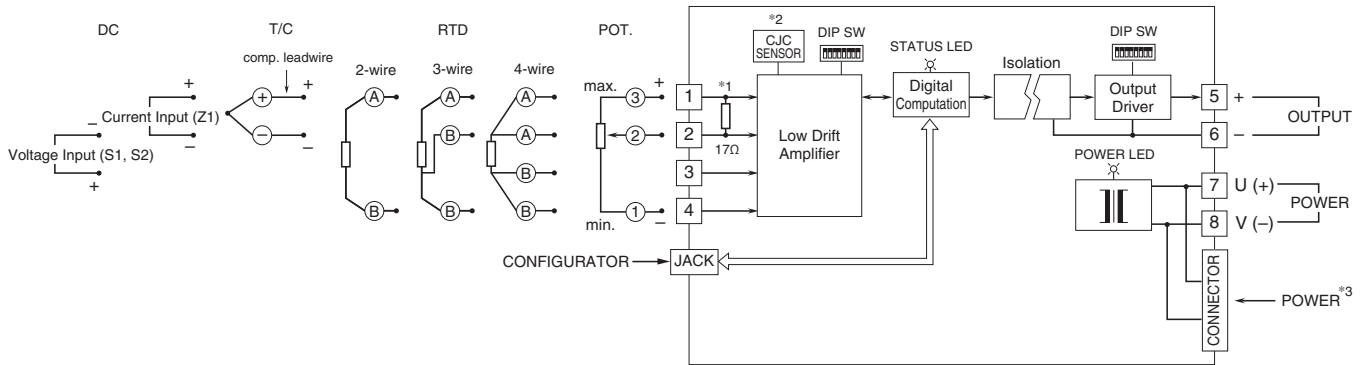
## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



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

\*Use a minus screwdriver: tip width 3.8 mm max., tip thickness 0.5 to 0.6 mm

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



\*1. Input shunt resistor incorporated for current input.

\*2. CJC sensor incorporated for thermocouple input.

\*3. Available only for DC power input type



Specifications are subject to change without notice.