

## Super-mini Terminal Block Signal Conditioners M5X-UNIT

- Voltage output: -10 - +10 V DC

### SUBTRACTOR

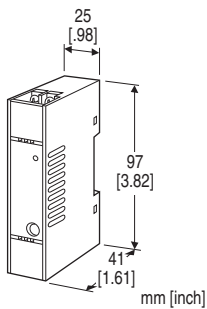
(PC programmable)

#### Functions & Features

- Receives two DC inputs and provides an output proportional to the subtraction of the inputs
- PC programmable
- High-density mounting
- Power LED

#### Typical Applications

- Calculating temperature or flow differences



## MODEL: M5XSBS-1-R[1]

### ORDERING INFORMATION

- Code number: M5XSBS-1-R[1]

Specify a code from below for [1].

- (e.g. M5XSBS-1-R/Q)
- Specify the specification for option code /Q (e.g. /C01/S01/SET)

### INPUT 1 - Field-selectable

#### ◆ DC Input

- Current input: 0 - 50 mA DC
- Voltage input: -1000 - +1000 mV DC
- Voltage input: -10 - +10 V DC

### INPUT 2 - Field-selectable

#### ◆ DC Input

- Current input: 0 - 50 mA DC
- Voltage input: -1000 - +1000 mV DC
- Voltage input: -10 - +10 V DC

### EXTERNAL INTERFACE

#### ◆ OUTPUT SIGNAL

- 1: DC output (field-selectable)
- Current output: 0 - 20 mA DC
  - Voltage output: -5 - +5 V DC

### POWER INPUT

#### DC Power

R: 24 V DC

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

### [1] OPTIONS

blank: none

/Q: With options (specify the specification)

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

#### COATING (For the detail, refer to our 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-2777)

### RELATED PRODUCTS

- PC Configurator cable (model: COP-US)
- PC configurator software (model: M5CFG)

Downloadable at our web site.

### GENERAL SPECIFICATIONS

**Construction:** Terminal block

**Connection:** M3.5 screw terminals (torque 0.8 N·m)

**Screw terminal:** Nickel-plated steel (standard) or stainless steel

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

**Isolation:** Input to output to power

**Equation:**  $X_0 = K_0 \{ K_1(X_1 + A_1) - K_2(X_2 + A_2) \} + A_0$

$X_1 - X_2$ : input signal (%) -2 - +102 %

$K_0 - K_2$ : gain (no units) ±29.999

$A_0 - A_2$ : bias (%) ±299.99 %

Factory default setting

$K_0 = 1, K_1 = 1, K_2 = 1, A_0 = 0 \%, A_1 = 0 \%, A_2 = 0 \%$

**Power indicator LED:** Green LED; Blinking patterns indicate different operating status of the transmitter.

**Parameters:** Stored in non-volatile memory; write/erase cycle endurance: less than 20 000

**Programming:** Downloaded from PC;

- input type
- input range
- output type
- output range
- zero and span

- parameter

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

Standard default setting: DC current input 4 - 20 mA

### Input type

- DC current input: 0 - 50 mA DC
- DC voltage input: -1000 - +1000 mV DC
- DC voltage input: -10 - +10 V DC

(3 types can be switched for each input 1 and input 2 by DIP switch and PC)

#### ■ DC Current

**Input resistance:** Incorporated (15.5 Ω)

**Input range:** 0 - 50 mA DC

**Measurable range:** 0 - 52.5 mA DC

**Minimum span:** 2 mA DC

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

#### ■ DC Voltage

### Input range

- S1: -1000 - +1000 mV DC
- S2: -10 - +10 V DC

### Measurable range

- S1: -1100 - +1100 mV DC
- S2: -11 - +11 V DC

### Minimum span:

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

**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.

### Input resistance

- S1: ≥ 100 kΩ
- S2: ≥ 1 MΩ

## OUTPUT SPECIFICATIONS

Standard default setting: DC current output 4 - 20 mA

### Output type

- DC current output: 0 - 20 mA DC
- DC voltage output: -10 - +10 V DC
- DC voltage output: -5 - +5 V DC

(3 types can be switched by DIP switch and PC)

■ **DC Current:** 0 - 20 mA DC

**Output range:** 0 - 23 mA DC

**Minimum span:** 1 mA

**Load resistance:** 550 Ω

#### ■ DC Voltage

- **Output range** -10 - +10 V DC

**Voltage range:** -11.5 - +11.5 V DC

**Minimum span:** 1 V

**Load resistance:** Output drive 1 mA max.  
(ex. 0 - 10 V DC: 10 V ÷ 1 mA = 10 kΩ)

- **Output range -5 - +5 V DC**

**Voltage range:** -5.75 - +5.75 V DC

**Minimum span:** 500 mV

**Load resistance:** Output drive 1 mA max.  
(ex. 1 - 5 V DC: 5 V ÷ 1 mA = 5000 Ω)

## INSTALLATION

**Power consumption:** ≤ 1W

**Operating temperature:** -20 to +65°C (-4 to +149°F)

**Operating humidity:** 30 to 90 %RH (non-condensing)

**Atmosphere:** No corrosive gas or heavy dust

**Mounting:** DIN rail

**Weight:** 80 g (2.8 oz)

## PERFORMANCE in percentage of span

**Input accuracy (% of max. input range):** ±0.01 %

(±0.02 % for current input)

**Output accuracy (% of max. output range):** ±0.02 %

(±0.04 % for current output)

**Temp. coefficient:** ±0.015 %/°C (±0.008 %/°F) of max. span

**Response time:** ≤ 500 msec. (0 - 90 %)

**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 AND CALCULATION EXAMPLES

### ■ Overall Accuracy

The accuracy includes input accuracy, which converts the sensor input into a digital value, and output accuracy, which converts the digital value into an analog signal.

The accuracy of the device is the total of the input accuracy and the output accuracy.

### Input accuracy

Input accuracy for the setting value span is shown as following formula.

Input accuracy = (input range ÷ input setting value span) × 0.01 %

For current input,

Input accuracy = (input range ÷ input setting value span) × 0.02 %

(Use the larger one when input 1 accuracy and input 2 accuracy are different.)

### Output accuracy

Output accuracy for the setting value span is shown as following formula.

Output accuracy = (output range ÷ output setting value

span) × 0.02 %

For current output,

Output accuracy = (output range ÷ output setting value span) × 0.04 %

### Calculation examples

The overall accuracy is ±0.1 % when following setting.

$K_0 = K_1 = K_2 = 1$ ,  $A_0 = A_1 = A_2 = 0$  %

Input 1: input range -10 - +10 V, input setting value span 0 - 5 V

Input 2: input range 0 - 50 mA, input setting value span 0 - 20 mA

Output: output range 0 - 20 mA, output setting value span 4 - 20 mA

Input 1 accuracy =  $(20 \text{ V} \div 5 \text{ V}) \times 0.01 \text{ \%} = 0.04 \text{ \%}$

Input 2 accuracy =  $(50 \text{ mA} \div 20 \text{ mA}) \times 0.02 \text{ \%} = 0.05 \text{ \%}$

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

Input 2 accuracy (0.05 %) is larger than input 1 accuracy (0.04 %), the overall accuracy is input accuracy 0.05 % + output accuracy 0.05 % = 0.1 %.

## STANDARDS & APPROVALS

### EU conformity:

EMC Directive

EMI EN 61000-6-4

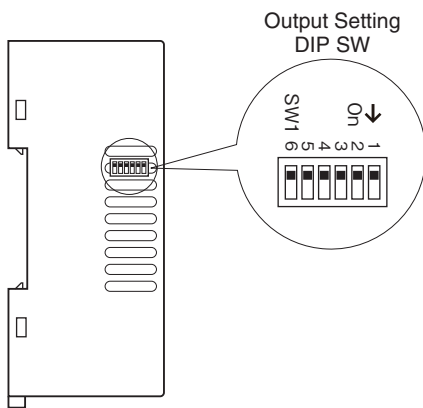
EMS EN 61000-6-2

RoHS Directive

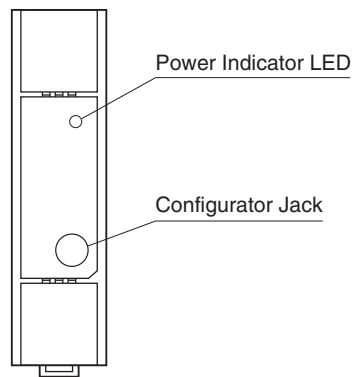
## EXTERNAL VIEW

Refer to the instruction manual for the setting procedure.

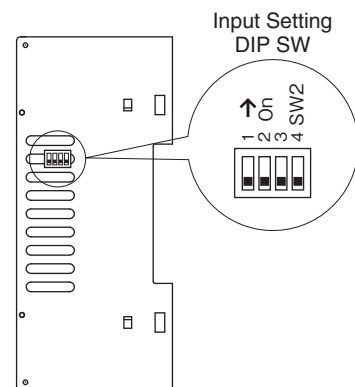
### ■ LEFT VIEW



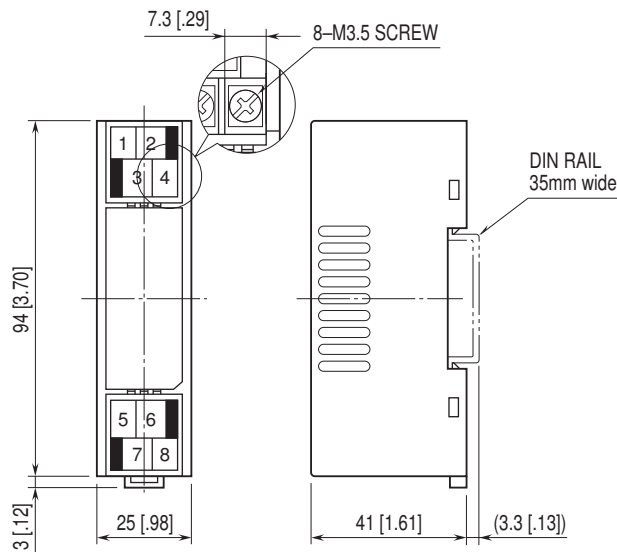
### ■ FRONT VIEW



### ■ RIGHT VIEW

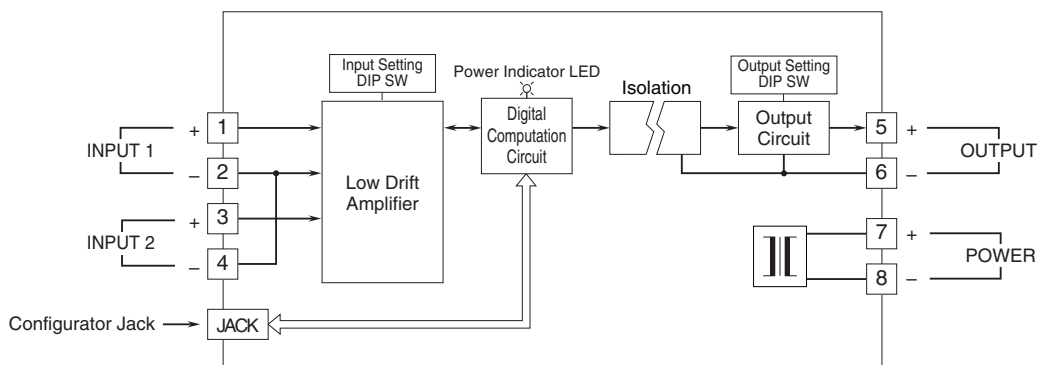


## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



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

## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



Specifications are subject to change without notice.