

**DESCRIPTION**

The MS5301 is a plug-in thermocouple temperature transmitter that converts input signals from a thermocouple into commonly used DC signals and provides an isolated dual output.

**ORDERING CODE**

**MS5301** -  -

**Model** \_\_\_\_\_

**Power Supply** \_\_\_\_\_

**A:** 100 to 240V AC (50 to 60Hz)  
**D:** 24V DC                      **P:** 100 to 240V DC

**Input** \_\_\_\_\_

**K:** Type K thermocouple            **B:** Type B thermocouple  
**E:** Type E thermocouple            **R:** Type R thermocouple  
**J:** Type J thermocouple            **S:** Type S thermocouple  
**T:** Type T thermocouple            **N:** Type N thermocouple  
**0:** Other than those above.

**Output 1** \_\_\_\_\_

**A:** 4 to 20mA DC                      **1:** 0 to 10mV DC  
**D:** 0 to 20mA DC                      **2:** 0 to 100mV DC  
**Z:** Other DC current signals        **3:** 0 to 1V DC  
    **4:** 0 to 10V DC  
    **5:** 0 to 5V DC  
    **6:** 1 to 5V DC  
    **3W:** ±1V DC  
    **4W:** ±10V DC  
    **5W:** ±5V DC  
    **0:** Other DC voltage signals

**Output 2** \_\_\_\_\_

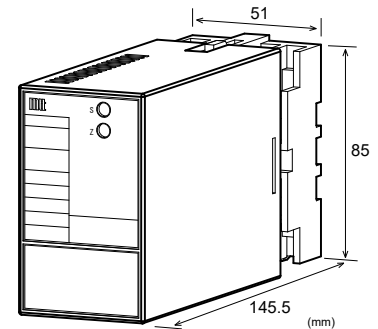
**The codes are the same as for Output 1.**

Note 1: When a voltage output is selected for Output 1, a current output cannot be selected for Output 2.  
Note 2: When the code A (4 to 20mA) is selected for both of the two outputs, the output load will be 550Ω maximum for Output 1 and 350Ω maximum for Output 2.  
Note 3: Upscale burnout protection is standard.

**Options** \_\_\_\_\_

**No code:** None  
**/D:** Downscale burnout protection  
**/K:** Fast response (0 to 90% response time: 10ms max.)  
**/H:** Polyurethane conformal coating  
**/X:** Others (Special order)

\* For non-standard options, ask MTT for availability.


**ORDERING INFORMATION**

To place an order, please use the ordering code format as shown on the left. Also specify a measuring temperature range\*.

(e.g.) MS5301-A-KAA/DK (0 to 500°C)

\* Note that the temperature range should be specified in steps of at least 10 degrees Celsius.

**Other Ordering Examples:**

For an input code of "0": MS5301-A-0AA (WRe5-26, 0 to 2000°C)

For an output code of "0": MS5301-A-K60 (0 to 500°C / Output: 2 to 5V)

For an option code of "X": MS5301-A-KAA/X (0 to 500°C / Burnout drive time: 500ms max.)

Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /KX).

**SPECIFICATIONS**
**POWER SECTION**

<b>Power Requirements</b>	100 to 240V AC: 85 to 264V AC (47 to 63Hz)		
	24V DC: 24V DC±10%		
	100 to 240V DC: 85 to 264V DC		
<b>Power Sensitivity</b>	Better than ±0.1% of span for each power supply range.		
<b>Power Line Fuse</b>	160mA fuse		
<b>Maximum Power Consumption</b>			
<b>Power</b>	100-240V AC	24V DC	100-240V DC
	Approx. 6.5VA	Approx. 1.8W	Approx. 6.0W

**INPUT SECTION**

<b>Input Resistance</b>	1MΩ min. with or without power.
<b>Allowable Signal Source Resistance</b>	1kΩ max.
<b>Allowable Input Voltage</b>	30V DC max., continuous.
<b>Cold Junction Compensation</b>	A built-in cold junction compensation sensor is used.
<b>Cold Junction Compensation Error</b>	±0.5°C max. (25°C±15°C)
<b>Linearizer</b>	Built-in analog linearizer (6 segments maximum)

**Ranges Available**

The latest edition of the relevant JIS standard is used, unless otherwise specified.

<Standard specifications> (Temp at 0% input = 0°C)

K	Specify between 0-100°C and 0-1350°C in steps of 50°C (e.g. K 0 to 350°C).
E	Specify between 0-100°C and 0-1000°C in steps of 50°C (e.g. E 0 to 150°C).
J	Specify between 0-100°C and 0-800°C in steps of 50°C (e.g. J 0 to 550°C).
T	Specify between 0-100°C and 0-400°C in steps of 50°C (e.g. T 0 to 250°C).
B	Specify between 0-1200°C and 0-1800°C in steps of 100°C (e.g. B 0 to 1700°C).
R	Specify between 0-400°C and 0-1700°C in steps of 100°C (e.g. R 0 to 1400°C).

<Quasi-standard specifications>

Type	Temperature Range (°C)	(+) Bias	(-) Bias
K	-200 to +1370	Up to 5x input span.	Up to 1x input span.
E	-200 to +1000	Up to 3x input span.	Up to 0.5x input span.
J	-200 to +1200	Up to 5x input span.	Up to 0.5x input span.
T	-200 to +400	Up to 2x input span.	Up to 0.5x input span.
B	0 to +1820	Up to 5x input span.	N/A
R	-50 to +1760	Up to 10x input span.	No limitation.
S	-50 to +1760	Up to 10x input span.	No limitation.
N	-200 to +1300	Up to 5x input span.	Up to 0.5x input span.

Input Spec Ex. 1: For K -100 to 400°C, the input span is 500°C and the bias -0.2x the input span.

Input Spec Ex. 2: For J 300 to 400°C, the input span is 100°C and the bias 3x the input span.

Note 1: Input span: 3mV min.

Note 2: For input temperature ranges starting from any specified temperature below 0°C, the accuracy may be partly out of specification.

Note 3: For the type B thermocouple, the accuracy in the temperature range below 600°C is not guaranteed.

Note 4: Any specification out of the temperature range or bias requirement listed above is handled as a special order.

**● OUTPUT SECTION**

**Allowable Output Load**

Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
Current Output (DC)	100mV	100kΩ min.
	4-20mA single output	750Ω max.
	4-20mA dual output	Output 1: 550Ω max. Output 2: 350Ω max.

Zero Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)
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Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)
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Burnout Protection	Standard: Upscale (Downscale is optional.)
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**Ranges Available**

	Current Signal	Voltage Signal
Output Range (DC)	0 to 20mA	-10 to 10V
Output Span (DC)	4 to 20mA	10mV to 20V
Output Bias	0 to 100%	-100 to 100%

\* For current output signals, the accuracy of any current output smaller than 0.1mA is not guaranteed.

Output Spec Ex. 1: For 4 to 20mA output, the output span is 16mA and the bias +25%.

Output Spec Ex. 2: For -1 to 4V output, the output span is 5V and the bias -20%.

**● PERFORMANCE**

**Accuracy Rating**

Better than ± [0.1% of span + 0.5°C {Cold junction compensation error} + Linearity error] (at 25°C±5°C)

Note: Linearity errors vary with input spans.

Input Span	Linearity Error (%)	Input Span	Linearity Error (%)
JIS K 0-300°C	0.1	JIS K 0-600°C	0.15
JIS J 0-200°C	0.15	JIS E 0-200°C	0.15
JIS E 0-600°C	0.25	JIS R 0-1600°C	0.5
JIS S 0-1000°C	0.25	JIS T 0-300°C	0.25

Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	160ms max. (0 to 90%) with a step input at 100%.
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	4-way isolation between input, output 1, output 2, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output 1, output 2, power, and ground.
Dielectric Strength	Input / [Output 1, Output 2] / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5mA) Output 1 / Output 2: 500V AC for 1 minute (Cutoff current: 0.5mA)
Surge Withstand Capability	Tested as per ANSI/IEEE C37.90.1-1989.
Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

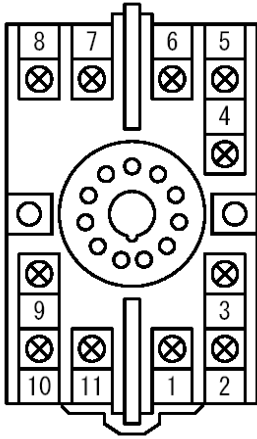
**● PHYSICAL**

Installation	Wall/DIN rail mounting
Mounting Direction	Vertical
Screwing Torque	0.78 to 1.18 [Nm] * Recommended
Wiring	M3.5 screw terminal connection
External Dimensions	W51 × H85 × D145.5 mm (including the socket)
Weight	Main unit: 200g max. Socket: 80g max.

**● MATERIAL**

Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

**TERMINAL ASSIGNMENTS**



①	+ OUTPUT 1
②	- OUTPUT 1
③	N.C.
④	N.C.
⑤	T.C. +
⑥	T.C. -
⑦	P (+) POWER
⑧	N (-) POWER
⑨	GND
⑩	+ OUTPUT 2
⑪	- OUTPUT 2

**BLOCK DIAGRAM**

