

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 signal **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 signal

Output 2 _____

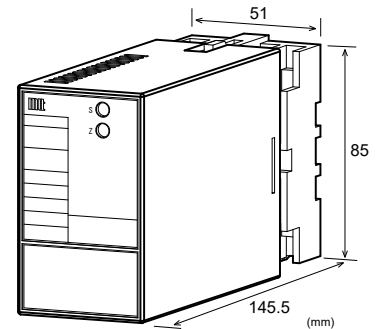
The codes are the same as for Output 1.

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.)
/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 (WRε5-26 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

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

INPUT SECTION

Input Resistance	1MΩ min. with or without power.
Allowable Signal Source Resistance	1kΩ max.
Allowable Input Voltage	30V DC max., continuous.
Cold Junction Compensation	A built-in temperature-sensitive resistor is used.
Cold Junction Compensation Error	±0.5°C max. (25°C±15°C)
Linearizer	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 1: 350Ω max.

Zero Adjustment Approx. ±5% of span.
(Adjustable by the front-accessible trimmer.)

Span Adjustment Approx. ±5% of span.
(Adjustable by the front-accessible trimmer.)

Burnout Protection Standard: Upscale
(Downscale is optional.)

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 5-way isolation between input, output 1, output 2, power, and ground.

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 Vertical

Orientation

Screwing Torque 0.78 to 1.18 [Nm] * Recommended

Wiring M3.5 screw terminal connection

External Dimensions W51 × H85 × D145.5mm (including the socket)

Weight Main unit: 200g max.

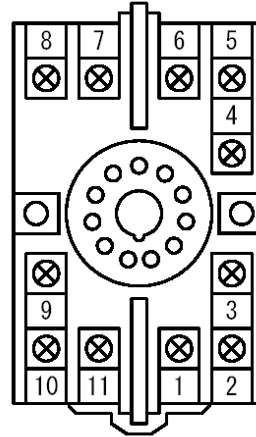
Socket: 80g max.

MATERIALS

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)
Conformal Coating	HumiSeal® 1A27NSLU (Polyurethane)

* HumiSeal® is a registered trademark of Chase Corporation.

TERMINAL ASSIGNMENT



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

BLOCK DIAGRAM

