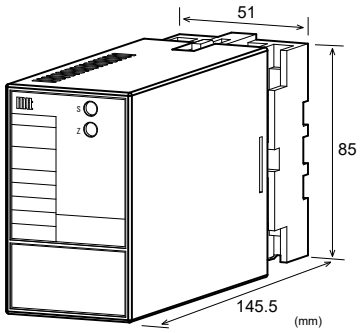
Product Specification Sheet Model: MS5301

Plug-In Thermocouple Temperature Transmitter with Isolated Dual Output

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

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
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

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 cold junction compensation sensor 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.
	100mV	100kΩ min.
Current Output (DC)	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.)
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	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

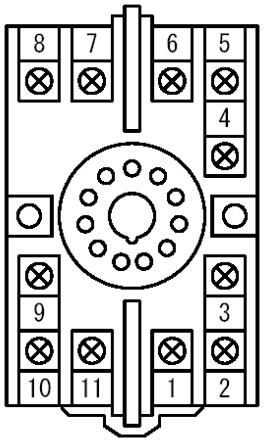
●PHYSICAL

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

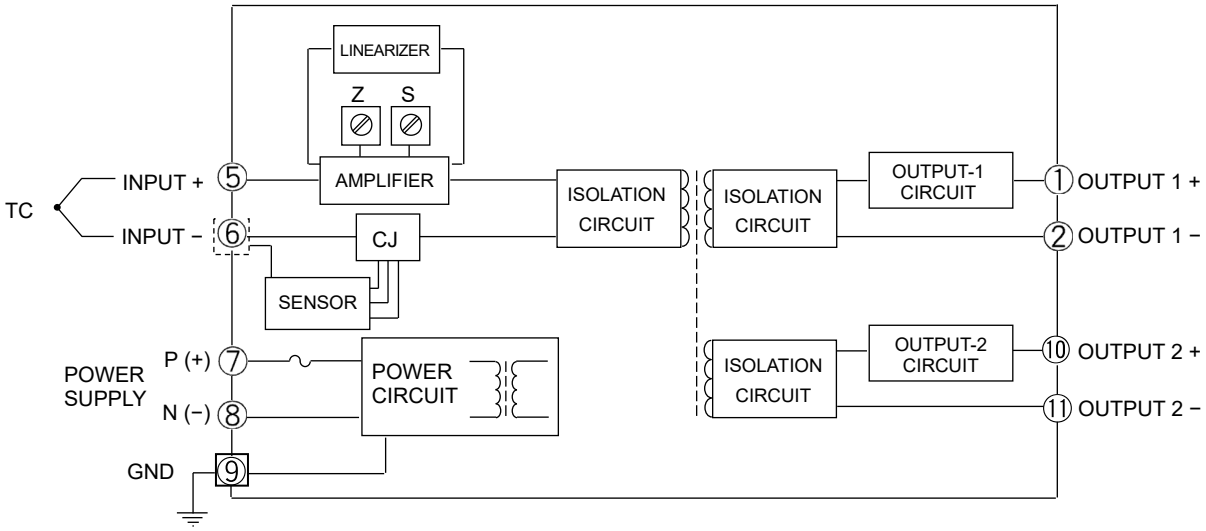
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

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 (−)	
⑨	GND	
⑩	+ OUTPUT 2	
⑪	− OUTPUT 2	

BLOCK DIAGRAM

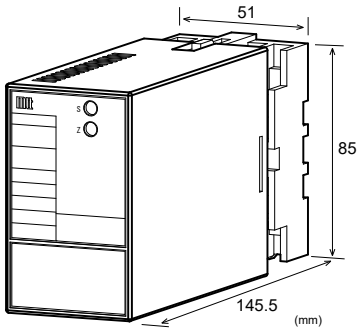


Product Specification Sheet Model: MS5302

Plug-In RTD Temperature Transmitter with Isolated Dual Output

DESCRIPTION

The MS5302 is a plug-in RTD temperature transmitter that converts input signals from an RTD into commonly used DC signals and provides an isolated dual output.



ORDERING CODE

MS5302 - □ - □ □ □

Model

Power Supply

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

Input

P1: Pt 100Ω
P5: Pt 50Ω
J: JPt 100Ω
N: Ni 508.4Ω
Y: Other than those above.

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
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
/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.) MS5302-A-P1A6 (0 to 150°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 "Y": MS5302-A-YAA (Input: Cu 10Ω at 0°C, 0 to 100°C)
For an output code of "0": MS5302-A-P106 (0 to 150°C / Output: 2 to 5V)
For an option code of "X": MS5302-A-P1AA/X (0 to 150°C / Response frequency 50Hz)
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

Excitation Current	Approx. 1mA with Pt for 0 to 100°C
Lead Wire Resistance	200Ω max. per wire

Ranges Available
The latest edition of the relevant JIS standard is used, unless otherwise specified.
<Standard specifications> (Temp at 0% input = 0°C)

Pt 100Ω	Specify between 0-50°C and 0-500°C in steps of 50°C (e.g. Pt 100Ω, 0 to 150°C).
JPt 100Ω	Specify between 0-50°C and 0-500°C in steps of 50°C (e.g. JPt 100Ω, 0 to 250°C).
Pt 50Ω	0 to 100°C

<Quasi-standard specifications>

RTD	Temperature Range (°C)	Input Span	Input Bias
Pt 100Ω	-200 to +850	50°C min.	Up to 4x the input span.
JPt 100Ω	-200 to +500	50°C min.	
Pt 50Ω	-200 to +600	100°C min.	
Ni 508.4Ω	-50 to +250	30°C min.	

Input Spec Ex.: For Pt 100Ω (150 to 200°C), the input span is 50°C and the bias 150°C (3x the span).
Note: 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.
	100mV	100kΩ min.
Current Output (DC)	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.)	
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)	
Burnout Protection	Upscale (even if any of the three wires, A, B, and B' is opened)	

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 ±0.15% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	170ms 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

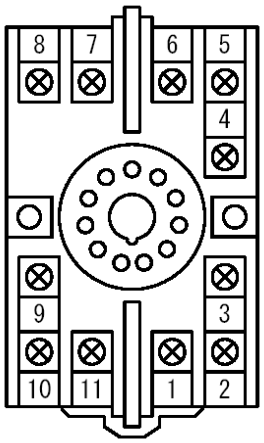
●PHYSICAL

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

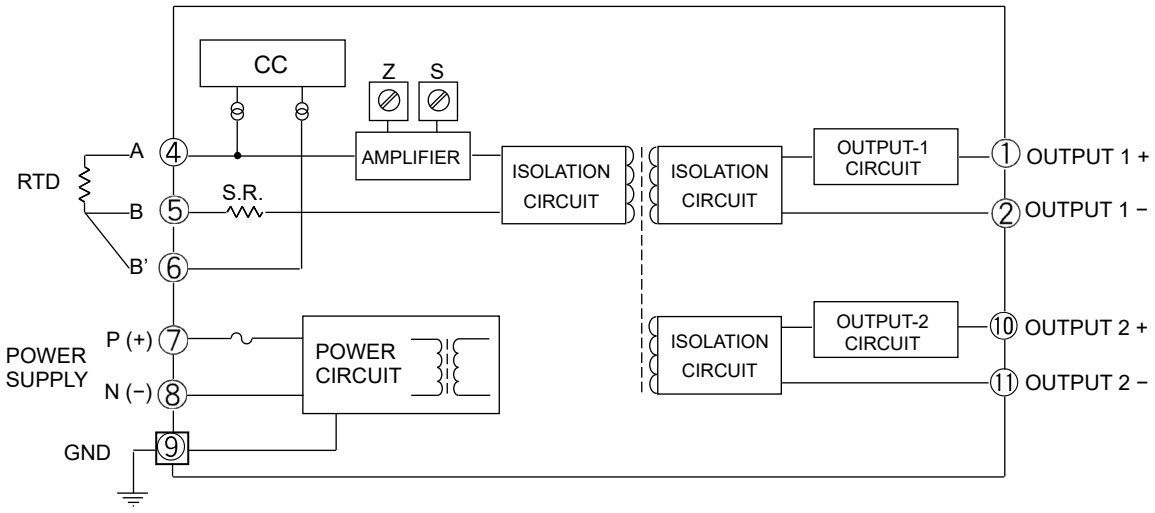
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



①	+ OUTPUT 1	
②	− OUTPUT 1	
③	N.C.	
④	RTD A	
⑤	RTD B	
⑥	RTD B'	
⑦	P (+)	POWER
⑧	N (−)	
⑨	GND	
⑩	+ OUTPUT 2	
⑪	− OUTPUT 2	

BLOCK DIAGRAM

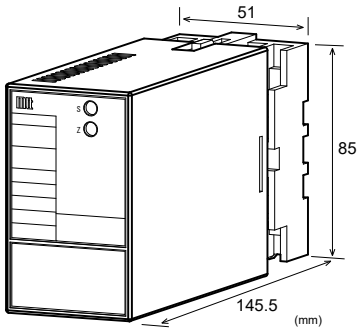


Product Specification Sheet Model: MS5303

Plug-In Millivolt Isolator with Isolated Dual Output

DESCRIPTION

The MS5303 is a plug-in millivolt (mV) isolator that converts mV input signals from sensors or other devices into commonly used DC signals and provides an isolated dual output.



ORDERING CODE

MS5303 - □ - □ □ □

Model

Power Supply

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

Input

1: 0 to 10mV DC
2: 0 to 100mV DC
1W: ±10mV DC
2W: ±100mV DC
0: Other DC voltage signals

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
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.

Options

No code: None
/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.
(e.g.) MS5303-A-266

Other Ordering Examples:
For an input code of "0": MS5303-A-066 (Input: 0 to 75mV)
For an output code of "Z": MS5303-A-2Z6 (Output: 8 to 20mA)
For an option code of "X": MS5303-A-266/X (Response frequency: 50Hz)
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. 5.0VA	Approx. 1.6W	Approx. 6.0W

●INPUT SECTION

Input Resistance	1MΩ min. with or without power.
Allowable Input Voltage	30V DC max., continuous.

Range Available

Input Range (DC)	-200mV to 200mV
Input Span (DC)	5mV* to 400mV
Input Bias	-100 to 100%

Note: For any input range including negative input signals, the input span ranges from *10mV to 400mV.
Input Spec Ex. 1: For 50 to 150mV input, the input span is 100mV and the bias +50%.
Input Spec Ex. 2: For -10 to 30mV input, the input span is 40mV and the bias -25%.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)	
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)	

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 (at 25°C±5°C).
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

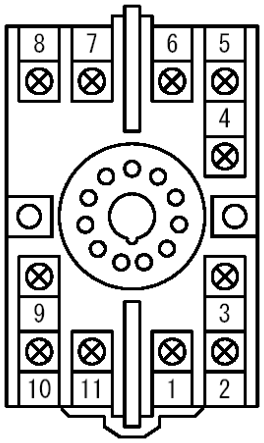
●PHYSICAL

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

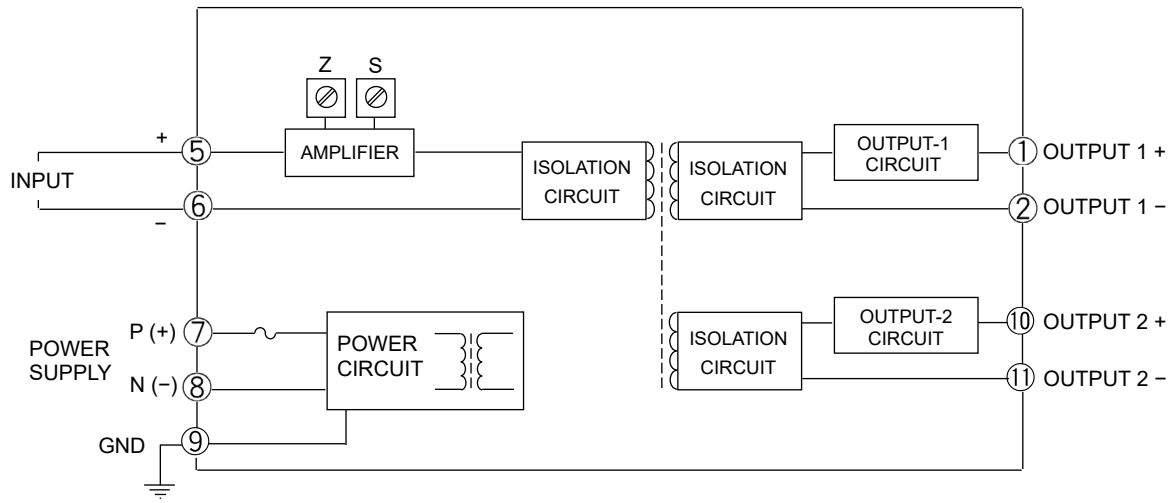
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

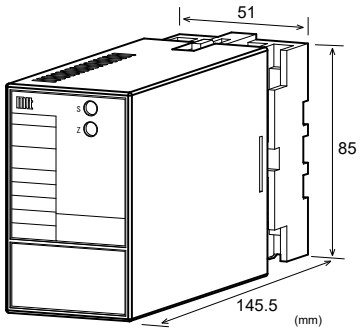


Product Specification Sheet Model: MS5304

Plug-In High-Level Signal Conditioner (Isolator) with Isolated Dual Output

DESCRIPTION

The MS5304 is a plug-in high-level signal conditioner (isolator) that converts DC current or voltage signals into commonly used DC signals and provides an isolated dual output.



ORDERING CODE

MS5304 - □ - □ □ □

Model

Power Supply

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

Input

A: 4 to 20mA DC
B: 2 to 10mA DC
C: 1 to 5mA DC
D: 0 to 20mA DC
E: 4 to 20mA DC *1
H: 10 to 50mA 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
4W: ±10V DC
5W: ±5V DC
0: Other DC voltage signals

*1: Shunt resistor 50Ω

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
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.

Options

No code: None
/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.
(e.g.) MS5304-A-AA6

Other Ordering Examples:
For an input code of "Z": MS5304-A-ZAA (Input: 8 to 20mA)
For an output code of "0": MS5304-A-A60 (Output: 2 to 5V)
For an option code of "X": MS5304-A-666/X (0-90% response time: 5ms 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 Approx. 5.0VA	24V DC Approx. 1.6W	100-240V DC Approx. 6.0W

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	1MΩ min. with or without power.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5 mA	100Ω
	0 to 20mA	250Ω
	10 to 50mA	10Ω
Allowable Input Voltage		
Voltage Input Model	30V DC max., continuous. (Standard for a span up to 10V)	
Current Input Model	40mA DC max., continuous. (Standard for 4 to 20mA)	

Ranges Available	Current Signal	Voltage Signal
Input Range (DC)	-100 to 100mA	-300 to 300V
Input Span (DC)	100μA[*1] to 200mA	200mV[*2] to 600V
Input Bias	-100 to 100%	-100 to 100%

Note: For any input range including negative input signals, the input spans for current and voltage signals range from [*1]200μA to 200mA and [*2]400mV to 600V, respectively.

Input Spec. Ex. 1: For 3 to 8V input, the input span is 5V and the bias +60%.

Input Spec. Ex. 2: For -5 to 0V input, the input span is 5V and the bias -100%.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)

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 (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	85ms 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

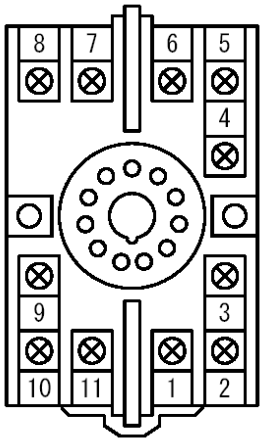
●PHYSICAL

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

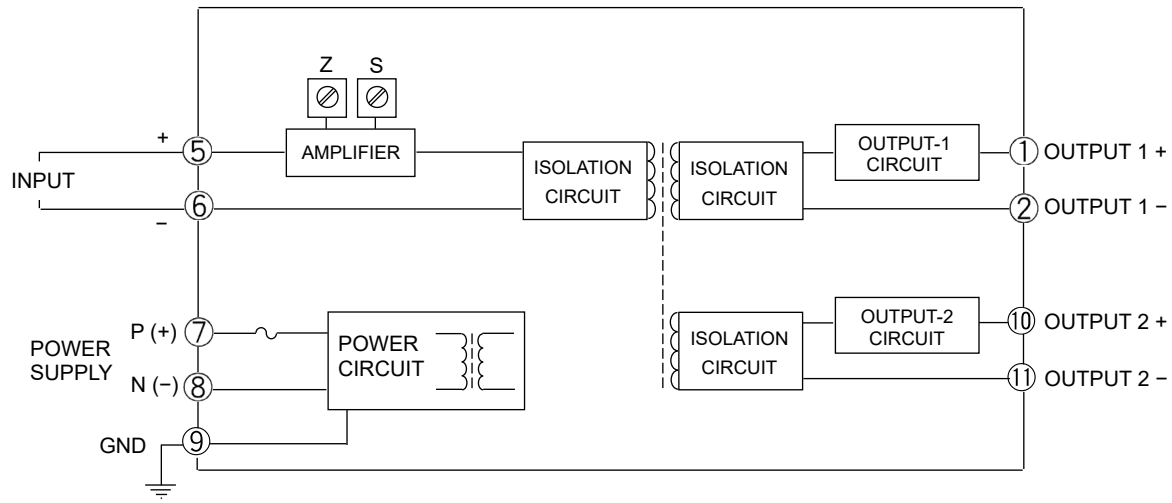
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS5305HA

Plug-In Digital Alarm Setter (High Accuracy Model)

DESCRIPTION

The MS5305HA is a plug-in, high-accuracy digital alarm setter that compares the levels of DC current or voltage signals with two or four set-points and outputs two or four independent isolated relay contact closure signals.

ORDERING CODE

MS5305HA- □ - □ □

Model

Power Supply

A: 100 to 240V AC (50 to 60Hz)
D: 24V DC **P**: 110V DC

Input

A: 4 to 20mA DC
B: 2 to 10mA DC
C: 1 to 5mA DC
D: 0 to 20mA DC
E: 4 to 20mA DC *1
H: 10 to 50mA 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
4W: ±10V DC
5W: ±5V DC
0: Other DC voltage signals

*1: Shunt resistor 50Ω

Output

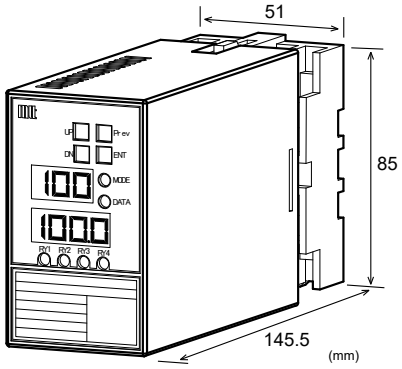
A: 4 x form A contacts
B: 4 x form B contacts
C: 2 x form C contacts

Options

No code: None
/S: Screw terminal with spring washer
/D: Relay contact with max. allowable voltage 125V DC
/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 above.
(e.g.) MS5305HA-A-AA



SPECIFICATIONS

●POWER SECTION

Power Requirements	100 to 240V AC: 85 to 264V AC (47 to 63Hz) 24V DC: 24V DC±10% 110V DC: 90 to 121V 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	110V DC
	Approx. 7.5VA	Approx. 2.5W	Approx. 5.5W

●INPUT SECTION

Input Resistance

Voltage Input Model	1MΩ min. with or without power.	
Current Input Model	4 to 20mA	250Ω (std.)
	2 to 10mA	250Ω
	1 to 5 mA	100Ω
	0 to 20mA	250Ω
	10 to 20mA	10Ω

Allowable Input Voltage

Voltage Input Model	30V DC max., continuous. (Standard for a span up to 10V)
Current Input Model	40mA DC max., continuous. (Standard for 4 to 20mA)

Ranges Available

	Current Signal	Voltage Signal
Input Range (DC)	-100 to 100mA	-300 to 300V
Input Span (DC)	100μA to 200mA	200mV to 600V
Input Bias	-100 to 100%	-100 to 100%

Input Spec. Ex. 1: For 3 to 8V input, the input span is 5V and the bias +60%.
Input Spec. Ex. 2: For -5 to 0V input, the input span is 5V and the bias -100%.

●OUTPUT SECTION

Trip Points	Separately adjustable for each output channel by front accessible switches. Range: 0.0 to 105.0% of span (in 0.1% steps) * In the engineering unit mode, trip points can be set within the range displayed in engineering units. * Available alarm range is from -10 to 110%. Accuracy: Better than ±(0.1% of span + resolution)
Hysteresis	Separately adjustable for each output channel by front accessible switches. Range: 0.5 to 10.0% of span (in 0.1% steps) Accuracy: Better than ±(0.1% of span + resolution)
Relay Status Indicator LED	A red LED turns on when the relay is activated.
Output without Power	4 x form A contacts: All four contacts are open. 4 x form B contacts: All four contacts are closed. 2 x form C contacts: COM and NC are closed; COM and NO are open.
Start-up Delay	Separately adjustable for each output channel by front accessible switches. Range: 1 to 99s (in 1s steps)
Activation Delay	Separately adjustable for each output channel by front accessible switches. Range: 0 to 99s (in 1s steps) Accuracy: ±0.2s max. (excluding response time)
Deactivation Delay	Separately adjustable for each output channel by front accessible switches. Range: 0 to 99s (in 1s steps) Accuracy: ±0.2s max. (excluding response time)

●PERFORMANCE

Temperature Effect	Better than ±0.15% of span per 10°C change in ambient.
Response Time	500ms max. (0 to 90%) with a step input at 100%.
Resolution	1/3000
Indications	Mode indication: 7-segment red LED display, 8mm character height, 3 digits. 1 red/green LED indicator. Data indication: 7-segment red LED display, 8mm character height, 4 digits. 1 red/green LED indicator. Relay status indication: 4 red LED indicators. (2 red LED indicators for the form C contact version) Data display range: Approx. -20 to 110% of input If input in engineering units is out of the following range, the figures -999 or 9999 blinks at 1 second intervals (0.5s on/0.5s off). Decimal point position 0: -999 to 9999 Decimal point position 1: -99.9 to 999.9 Decimal point position 2: -9.99 to 99.99 Decimal point position 3: -999 to 9.999 If non-data-display mode is enabled, "----" appears on the display when there is a signal input below a set value. Data display accuracy: Better than ±(0.1% of span + resolution) Display cycle: Approx. 0.5s
Isolation	Isolation between input, output, and power.
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
Insulation Resistance	100MΩ min. (@ 500V DC) 4 x form A contacts: Input / [OUT1, OUT2] / [OUT3, OUT4] / Power / Ground 4 x form B contacts: Input / [OUT1, OUT2] / [OUT3, OUT4] / Power / Ground 2 x form C contacts: Input / OUT1 / OUT2 / Power / Ground
Dielectric Strength	2000V AC for 1 minute (Cutoff current: 0.5mA) 4 x form A contacts: Input / [OUT1, OUT2] / [OUT3, OUT4] / Power / Ground 4 x form B contacts: Input / [OUT1, OUT2] / [OUT3, OUT4] / [Power, Ground] 2 x form C contacts: Input / OUT1 / OUT2 / [Power, Ground] 2000V AC for 1 minute between Power and Ground (Cutoff current: 5.0mA)
Relay Contacts (Standard)	
Rated Load	3A, 250V AC (Resistive load) 3A, 30V DC (Resistive load)
Max. Allowable Voltage	250V AC, 30V DC
Max. Allowable Current	3A (Resistive load)
Electrical Life	NO: 50,000 cycles NC: 30,000 cycles (Rated load by resistive load; frequency 360 cycles/h)
Mechanical Life	5 million cycles (Frequency 10, 000 cycles/h)
Relay Contacts (Optional)	
Rated Load	3A, 250V AC (Resistive load) 3A, 30V DC (Resistive load)
Max. Allowable Voltage	250V AC, 125V DC* * Load current 0.4mA max. (resistive load) for 125V DC
Max. Allowable Current	3A (Resistive load)
Electrical Life	AC: 100,000 cycles DC: 50,000 cycles (Rated load by resistive load; frequency 1800 cycles/h)
Mechanical Life	10 million cycles (Frequency 18, 000 cycles/h)

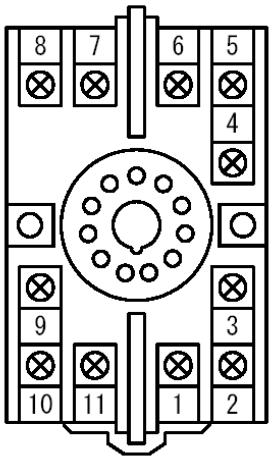
●PHYSICAL

Installation	Wall/DIN rail mounting
Mounting Direction	Vertical
Screwing Torque (Recommended)	Standard: 0.78 to 1.18 [Nm] With spring washer: 0.78 to 0.98 [Nm]
Wiring	M3.5 screw terminal connection
External Dimensions	W51 × H85 × D145.5 mm (including the socket)
Weight	Main unit: 250g max. Socket: Approx. 75g

●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)

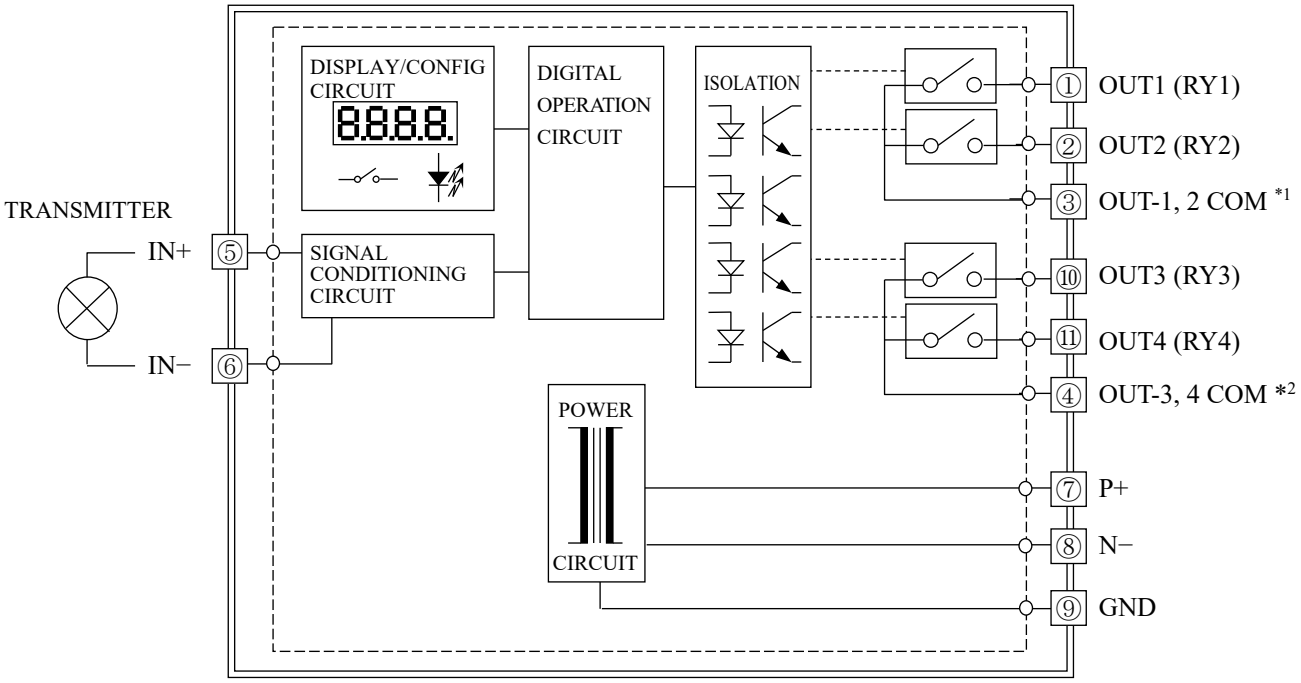
TERMINAL ASSIGNMENTS



Terminal	4 x form A contacts	4 x form B contacts	2 x form C contacts
1	OUT1 (NO)	OUT1 (NC)	OUT1 (NC)
2	OUT2 (NO)	OUT2 (NC)	OUT1 (NO)
3	OUT1,OUT2 COM	OUT1,OUT2 COM	OUT1 COM
4	OUT3,OUT4 COM	OUT3,OUT4 COM	OUT2 COM
5	IN+	IN+	IN+
6	IN−	IN−	IN−
7	P+ (POWER)	P+ (POWER)	P+ (POWER)
8	N− (POWER)	N− (POWER)	N− (POWER)
9	GND	GND	GND
10	OUT3 (NO)	OUT3 (NC)	OUT2 (NC)
11	OUT4 (NO)	OUT4 (NC)	OUT2 (NO)

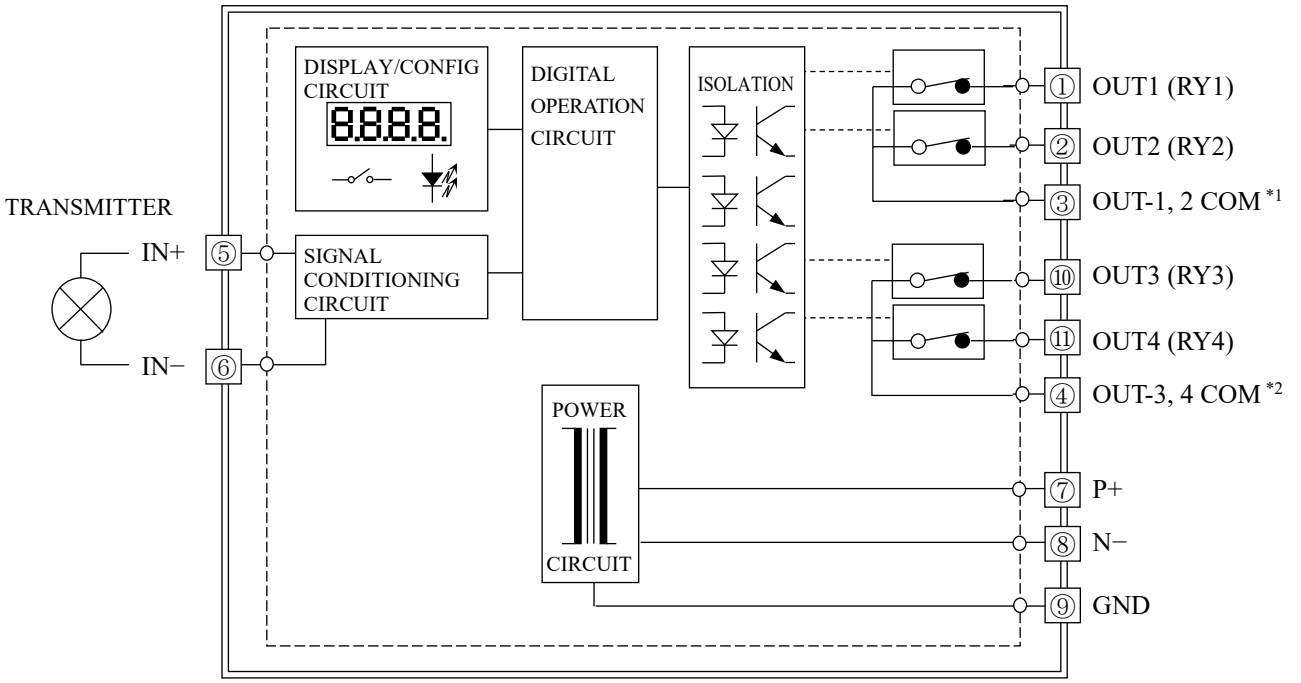
BLOCK DIAGRAM

4 x Form A Contacts:



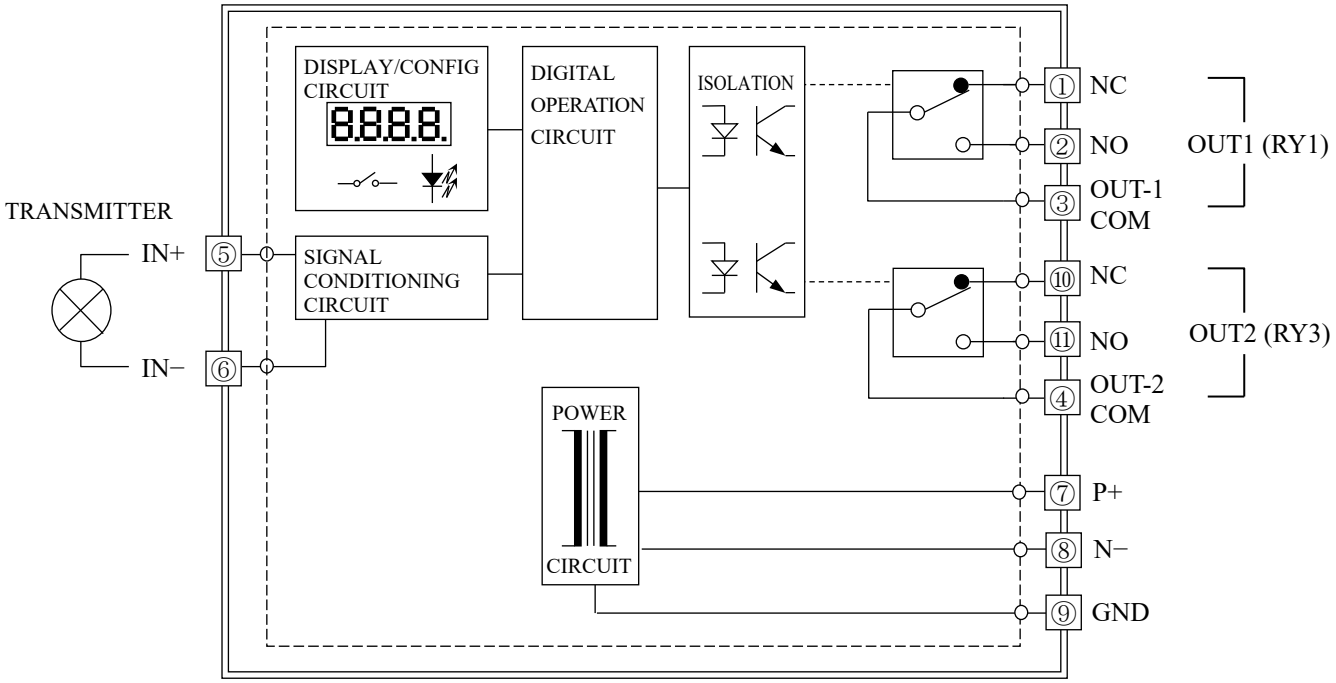
*1: The sum of the load currents on RY1 and RY2 must not exceed 3A.
*2: The sum of the load currents on RY3 and RY4 must not exceed 3A.

4 x Form B Contacts:

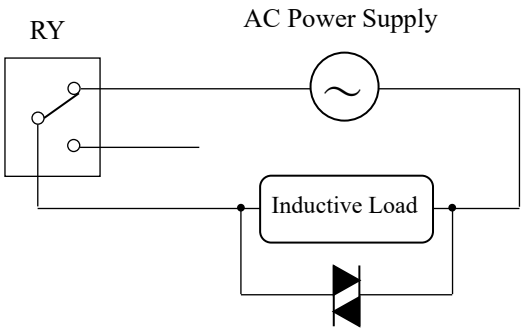


*1: The sum of the load currents on RY1 and RY2 must not exceed 3A.
*2: The sum of the load currents on RY3 and RY4 must not exceed 3A.

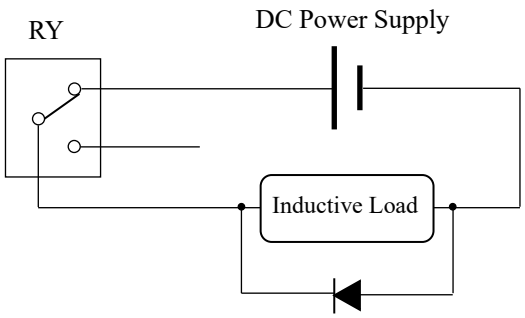
2 x Form C Contacts:



When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load as shown below.

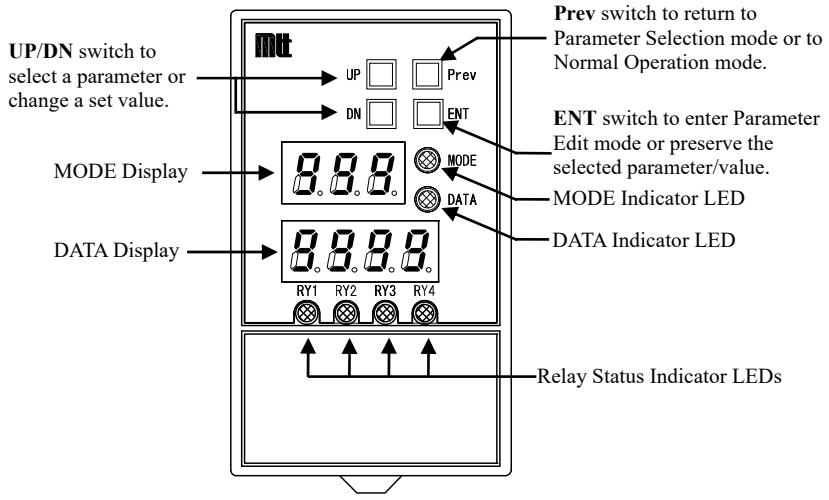


Protection Circuit
(Varistor, CR circuit, etc.)

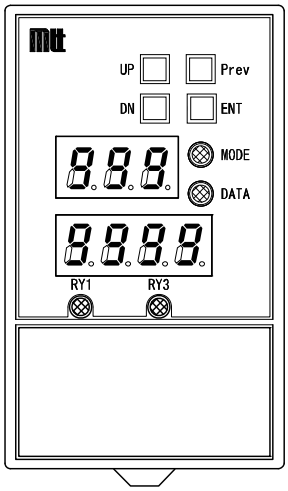


Protection Circuit
(Diode, varistor, CR circuit, etc.)

FRONT VIEW



Output: Form A or B contacts



Output: Form C contacts

MODE Section: Consists of a MODE display and a red/green MODE indicator LED.

Normal operation mode	The display is off and the indicator LED lights green.
Error status	The display shows an error code (comprising a letter E and a two-digit number), and the indicator LED lights red.
Parameter Selection mode	The display shows a parameter code (comprising a letter P and a two-digit number), and the indicator LED blinks green.

DATA Section: Consists of a DATA display and a red/green DATA indicator LED.

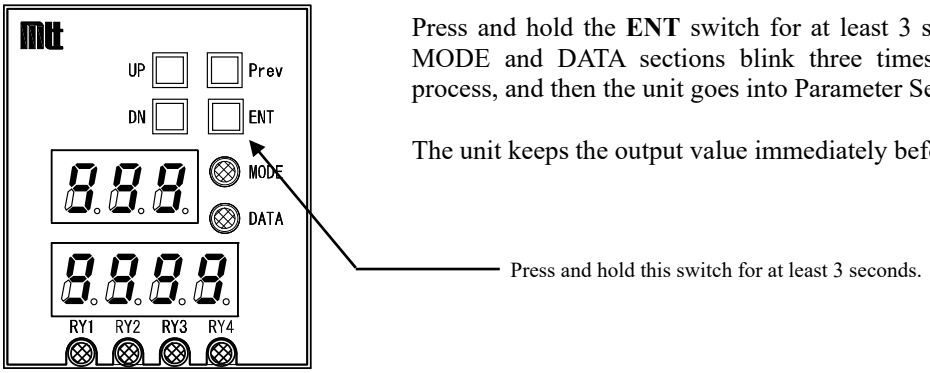
Normal operation mode	The display shows an input value in engineering units or in percentage (0 to 100%). Red LED indicates that the value is positive; green LED indicates that it is negative.
Errors status	The display and indicator LED are both off.
Parameter Selection mode	The display shows a set value corresponding to the parameter code selected. The indicator LED lights red when the value is positive and green when negative.

RY1 - RY4: Relay status indicator LED (red LED turns on when the corresponding relay is activated)
For the form C contact output, RY2 and RY4 have no function.
RY1: OUT1
RY2: OUT2 (not applicable for the form C contact output)
RY3: OUT3
RY4: OUT4 (not applicable for the form C contact output)

PARAMETER SETTING

Configuring Parameters

1. Switching from Normal Operation Mode to Parameter Selection Mode



Press and hold the **ENT** switch for at least 3 seconds. All the LEDs in the MODE and DATA sections blink three times, indicating self-diagnostics process, and then the unit goes into Parameter Selection mode.

The unit keeps the output value immediately before the switching.

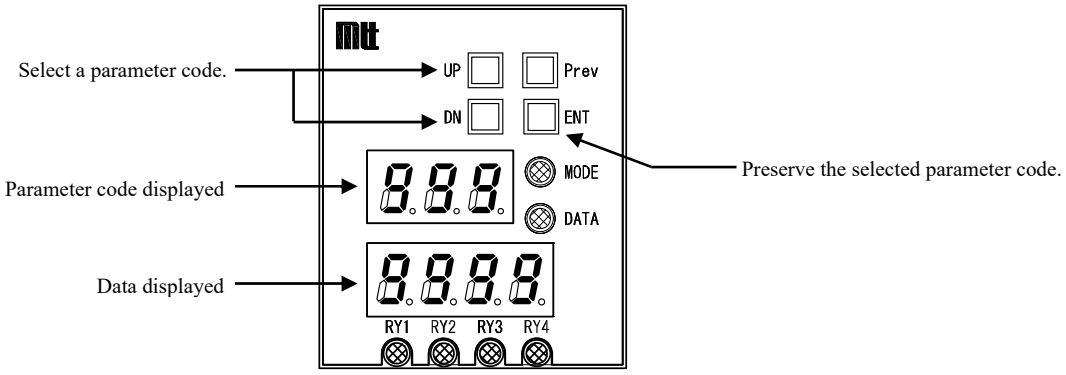
2. Selecting a Parameter

Once the module enters Parameter Selection mode, the MODE display shows a letter P, followed by a two-digit number, and the MODE indicator LED blinks green.

Press the **UP** or **DN** switch until the parameter code you want appears on the MODE display. (For a complete list of parameter codes, refer to the "Parameter Code List" on page 10.) The DATA display shows the current value corresponding to the parameter code being displayed.
The DATA indicator LED lights red when the value is positive and green when negative.

3. Switching from Parameter Selection Mode to Parameter Edit Mode

In Parameter Selection mode, press the **ENT** switch to go into Parameter Edit mode, where the value indicated in the DATA display can be modified.



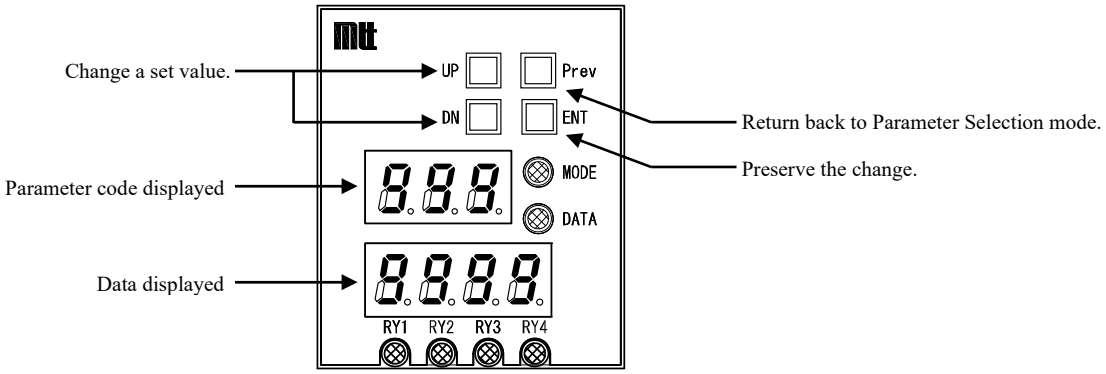
4. Changing Parameter Values

Once the module enters Parameter Edit mode, the MODE indicator LED lights green and the DATA indicator LED blinks red or green. A blinking red LED indicates that the value displayed is positive; a blinking green LED indicates that it is negative.

Press the **UP** or **DN** switch until the value you want appears on the DATA display. Pressing and holding the switch increases the speed at which the value changes.

Press and hold the **ENT** switch for at least 3 seconds to save the value indicated on the DATA display into the module. At this point, the DATA display turns off for about 0.5 second.

Press the **Prev** switch to return to Parameter Selection mode.



5. Changing Multiple Parameter Values

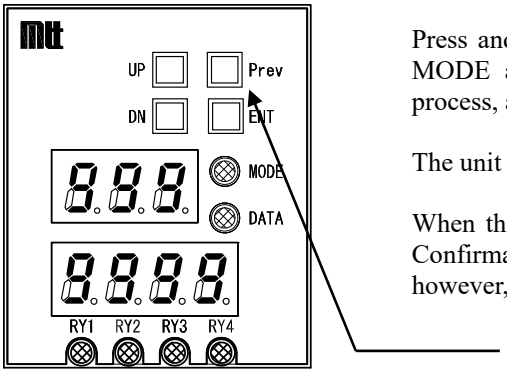
If you want to change more than one parameter, just repeat steps 2 to 4.

6. Exiting Parameter Selection Mode and Returning to Normal Operation Mode

While in Parameter Selection mode as mentioned in step 2, press and hold the **Prev** switch for at least 3 seconds. All the LEDs in the MODE and DATA sections blink three times, and the unit returns to Normal Operation mode. If no switch is operated for one minute, the module automatically returns to Normal Operation mode.

Confirming Set Values

1. Switching from Normal Operation Mode to Confirmation Mode
   Note: The Confirmation mode does not allow users to make any changes to the settings.



Press and hold the **Prev** switch for at least 3 seconds. All the LEDs in the MODE and DATA sections blink three times, indicating self-diagnostics process, and then the unit goes into Confirmation mode.

The unit keeps the output status for normal operation.

When the module moves from any error status (error code E10 or E90) to Confirmation mode, all the relays remain deactivated. In the case of E90, however, relay behavior and status indication may be undefined.

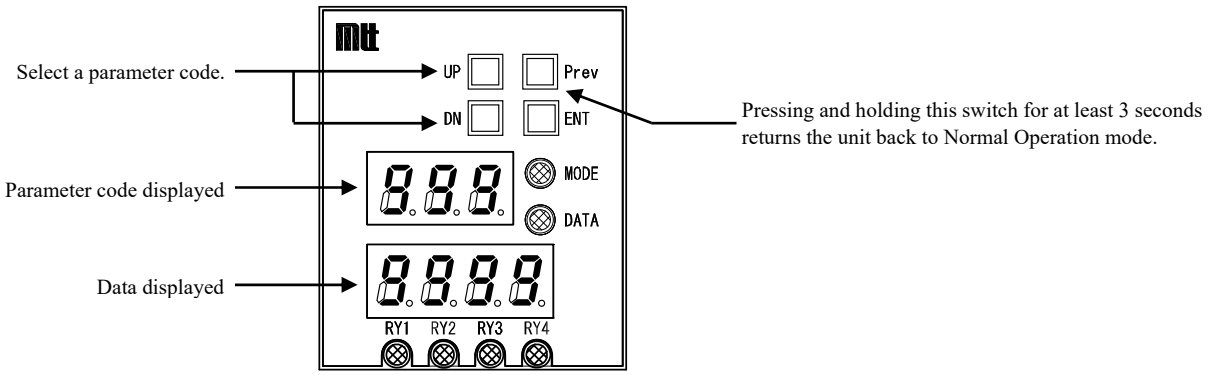
2. Selecting a Parameter

Once the module enters Confirmation mode, the MODE display shows a parameter code (a letter P, followed by a two-digit number), and the MODE indicator LED blinks green.

Press the **UP** or **DN** switch until the parameter code you want appears on the MODE display. The DATA display shows the value corresponding to the parameter code being displayed. (For a complete list of parameter codes, refer to the "Parameter Code List" on page 10.)
The DATA indicator LED lights red when the value is positive and green when negative.

3. Exiting Confirmation mode and Returning to Normal Operation mode

While in the Confirmation mode, press and hold the **Prev** switch for at least 3 seconds. All the LEDs in the MODE and DATA sections blink three times, and the unit returns to Normal Operation mode.
If no switch is operated for one minute, the module automatically returns to Normal Operation mode.



Parameters

Parameter Code List

Parameter Code			Range	Description	Factory Default
Hi	Mid	Lo			
P	1	1	0.0 to 105.0	Trip point (%)	0.0
		2			0.0 *
		3			100.0
		4			100.0 *
	2	1	0.5 to 10.0	Hysteresis (%)	1.0
		2			1.0 *
		3			1.0
		4			1.0 *
	3	1	H, L, 0	Relay activation mode H: Activated when input is above set point L: Activated when input is below set point 0: Constantly deactivated	H
		2			H *
		3			L
		4			L *
	4	1	1 to 99	Start-up delay (sec)	1
		2			1 *
		3			1
		4			1 *
	5	1	0 to 99	Activation delay (sec)	0
		2			0 *
		3			0
		4			0 *
	6	1	0 to 99	Deactivation delay (sec)	0
		2			0 *
		3			0
		4			0 *
	9	0	0 to 30	Display turn-on time (min) 0: Constantly on 1 to 30: Turn-on time	0
		1	0, 1	Input display mode 0: Percentage (0-100%) 1: Engineering units	0
		2	-999 to 9999	0% input in engineering units	0
		3	-999 to 9999	100% input in engineering units	1000
		4	0 to 3	Decimal point position for input in engineering units 0: XXXX 1: XXX.X 2: XX.XX 3: X.XXX	1
	9	5	0, 1	Non-data-display mode 0: Disabled 1: Enabled	1
	9	6	-15.0 to 0.0	Set value for non-data-display mode (%)	-5.0

Note: For parameter codes P1x - P6x, the least significant digit corresponds to the output number (relay number).
For 2 form C contact outputs, the parameters marked with an asterisk can be configured but do not work.

Trip Point

Input Display mode "0" (where input is displayed in 0-100%):
A trip point is adjustable from 0.0 to 105.0% in steps of 0.1%. It can be configured separately for each relay output. Each trip point is displayed in percentage values.

Input Display mode "1" (where input is displayed in engineering units):
A trip point is adjustable from 0.0 to 100.0% in steps of 0.1%. It can be configured separately for each relay output. Each trip point is displayed in engineering units.

The correspondence of Parameter Codes to the name of outputs is as listed below.

Parameter Code	Outputs		
	4 x form A contacts	4 x form B contacts	2 x form C contacts
P11	RY1	RY1	RY1
P12	RY2	RY2	N/A *
P13	RY3	RY3	RY3
P14	RY4	RY4	N/A *

* It can be configured, but does not function.

Notes:
1) When the trip point set to 105% in percentage mode is displayed in engineering units, its value will be equivalent to 105%. Pressing the **UP** or **DN** switch once here will make the value equal to 100%. Engineering unit mode does not allow setting of any value over 100%. If the 100%-equivalent value is not saved, the set value will remain at 105%.
2) With the engineering unit setting that does not allow 0.1% readings, the display may not change even if the **UP** or **DN** switch is pressed once. In this case, a simple solution is to change the decimal point position to an appropriate (0.1% viewable) setting to recognize any display changes. Another alternative is to just press and hold down the switch for faster value changes. It is therefore recommended that in engineering unit mode, the display should be configured for 1/1000 of span.

Hysteresis

This parameter is used to define hysteresis. It is adjustable from 0.5% to 10.0% in steps of 0.1%, and can be configured separately for each relay output.

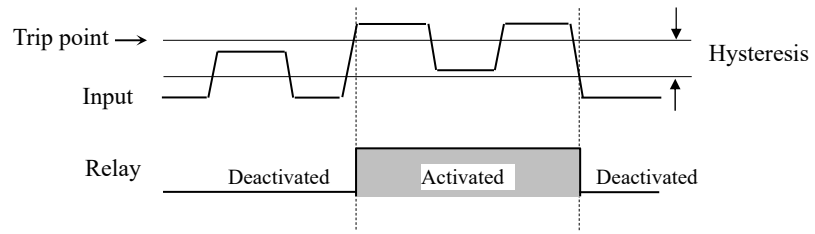
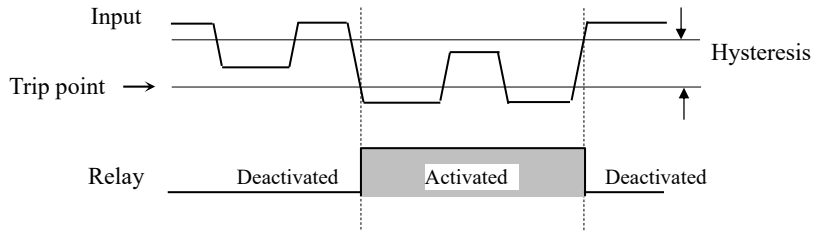
The correspondence of Parameter Codes to the name of outputs is as listed below.

Parameter Code	Outputs		
	4 x form A contacts	4 x form B contacts	2 x form C contacts
P21	RY1	RY1	RY1
P22	RY2	RY2	N/A *
P23	RY3	RY3	RY3
P24	RY4	RY4	N/A *

* It can be configured, but does not function.

Relay Activation Mode

This parameter is used to set relay operation in response to input. It can be configured separately for each relay output.

<table>
<tr><th>Mode of Operation</th><th>Relay Operation</th></tr>
<tr><td rowspan="3">H</td><td>Input > Trip point: Activated</td></tr>
<tr><td>Input < (Trip point − Hysteresis): Deactivated</td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="3">L</td><td>Input > (Trip point + Hysteresis): Deactivated</td></tr>
<tr><td>Input < Trip point: Activated</td></tr>
<tr><td> 
</td></tr>
<tr><td>0</td><td>Deactivated regardless of input level.</td></tr>
</table>

The correspondence of Parameter Codes to the name of outputs is as listed below.

Parameter Code	Outputs		
	4 x form A contacts	4 x form B contacts	2 x form C contacts
P31	RY1	RY1	RY1
P32	RY2	RY2	N/A *
P33	RY3	RY3	RY3
P34	RY4	RY4	N/A *

* It can be configured, but does not function.

Start-up Delay

This parameter is used to set a period of time taken for the relay to get ready after module power on. It is adjustable from 1 to 99 seconds in steps of one second, and can be configured separately for each relay output.

The correspondence of Parameter Codes to the name of outputs is as listed below.

Parameter Code	Outputs		
	4 x form A contacts	4 x form B contacts	2 x form C contacts
P41	RY1	RY1	RY1
P42	RY2	RY2	N/A *
P43	RY3	RY3	RY3
P44	RY4	RY4	N/A *

* It can be configured, but does not function.

Relay Activation Delay

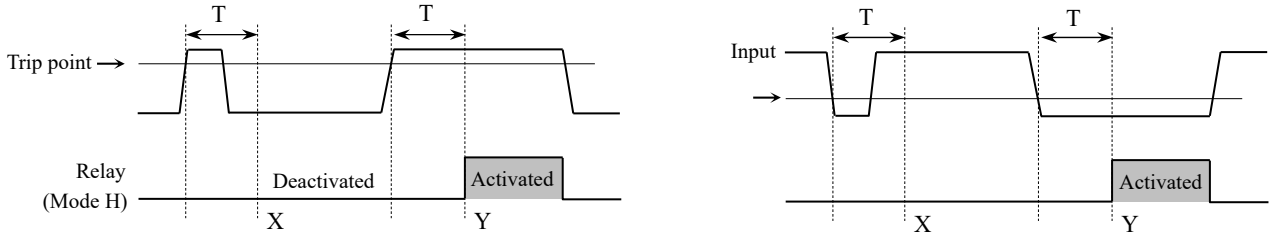
This parameter is used to set the duration of input that allows the relay to be activated. It is adjustable from 0 to 99 seconds in steps of 1 second, and can be configured separately for each relay output.

The correspondence of Parameter Codes to the name of outputs is as listed below.

Parameter Code	Outputs		
	4 x form A contacts	4 x form B contacts	2 x form C contacts
P51	RY1	RY1	RY1
P52	RY2	RY2	N/A *
P53	RY3	RY3	RY3
P54	RY4	RY4	N/A *

* It can be configured, but does not function.

Example: When the delay time is defined as T,
X shows that the relay is kept deactivated because the input is within the delay time (T), and
Y shows that the relay is activated because the input is past the delay time (T).



Relay Deactivation Delay

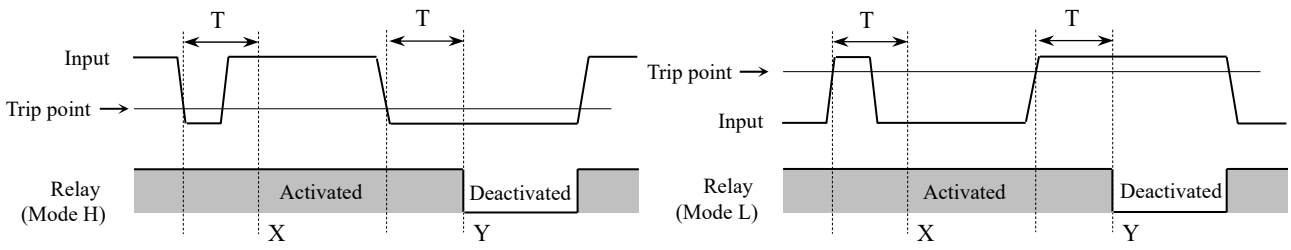
This parameter is used to set the duration of input that allows the relay to be deactivated. It is adjustable from 0 to 99 seconds in steps of 1 second, and can be configured separately for each relay output.

The correspondence of Parameter Codes to the name of outputs is as listed below.

Parameter Code	Outputs		
	4 x form A contacts	4 x form B contacts	2 x form C contacts
P61	RY1	RY1	RY1
P62	RY2	RY2	N/A *
P63	RY3	RY3	RY3
P64	RY4	RY4	N/A *

* It can be configured, but does not function.

Example: When the delay time is defined as T,
X shows that the relay is kept activated because the input is within the delay time (T), and
Y shows that the relay is deactivated because the input is past the delay time (T).



Input Display Mode

This parameter is used to specify the method for displaying an input value on the DATA display during normal operation or trip point setting.

Parameter Code	Set Value	Description
P91	0	Displayed in percentage (%) Displays an input value or set trip point with an input span defined as 100%.
	1	Displayed in engineering units Displays an input value or trip point set for parameter code P92 or P93.

Display Turn-on Time

This parameter is used to set the turn-on time for the DATA display in the Normal Operation mode. It can be set to "constant on" or is adjustable from 1 to 30 minutes in steps of 1 minute. When it is set to 0, the DATA display does not turn off. When it is set to any of the values from 1 to 30, the DATA display turns off automatically if no operations are made for the set period of time. Pressing any of the **UP**, **DN**, **Prev**, and **ENT** switches turns on the DATA display, following three blinks of all LEDs representing self-diagnostics.

Parameter Code	Set Value	Description
P90	0	Constant ON
	1 to 30	Turn-on time

0% Input in Engineering Units

This parameter is used to define a value for 0% input when display in engineering units is selected for the Input Display Mode (parameter code P91). It is adjustable from -999 to 9999 in steps of 1 without a decimal point.

Parameter Code	Set Value	Description
P92	-999 to 9999	0% input value in engineering units

100% Input in Engineering Units

This parameter is used to define a value for 100% input when display in engineering units is selected for the Input Display Mode (parameter code P91). It is adjustable from -999 to 9999 in steps of 1 without a decimal point.

Parameter Code	Set Value	Description
P93	-999 to 9999	100% input value in engineering units

Decimal Point Position for Input in Engineering Units

This parameter is used to define a decimal point position for input in engineering units (parameter codes P92 & P93).

Parameter Code	Set Value	Decimal Point Position
P94	0	XXXX
	1	XXX.X
	2	XX.XX
	3	X.XXX

Examples:

0% input in engineering units (P92)	100% input in engineering units (P93)	Decimal point position for input in engineering units (P94)	Display range for 0 to 100% input
0	100	0	0 to 100
0	1000	1	0.0 to 100.0
-100	1000	2	-1.00 to 10.00
-100	1000	3	-0.100 to 1.000
-999	9999	3	-.999 to 9.999 *

Note: If input is out of the range from -999 to 9999, it can no longer be shown on the display screen, and the DATA display and the DATA indicator LED will blink.

Non-Data-Display Mode

This parameter is used to define whether an input value is displayed or not when it falls below the set value defined for non-data-display mode (parameter P96) in Normal Operation mode.

Parameter Code	Set Value	Description
P95	0	Displays an input value.
	1	Displays “----”.

Set Value for Non-Data-Display Mode

This parameter is used to define a value to set the non-data-display mode (P95) to 1 and show “----” on the DATA display when an input falls below the set value. It can be set from -15% to 0.0% in steps of 0.1%.

Parameter Code	Set Value	Description
P96	-15.0 to 0.0	Set value for non-data-display mode

Error Indication

If an error is detected in the module, the MODE display shows a corresponding error code (a letter E, followed by a two-digit number), and the MODE indicator LED lights red.

Error Code List

Error Code	Event	Relay Behavior	Recovery Operation	Remarks
E10	Parameter data error	All relays deactivated	Reconfiguration	
E90	System error	All relays deactivated	None	Relay behavior and status indication may be undefined.
Other than above	Undefined error	All relays deactivated	None	Relay behavior and status indication may be undefined.

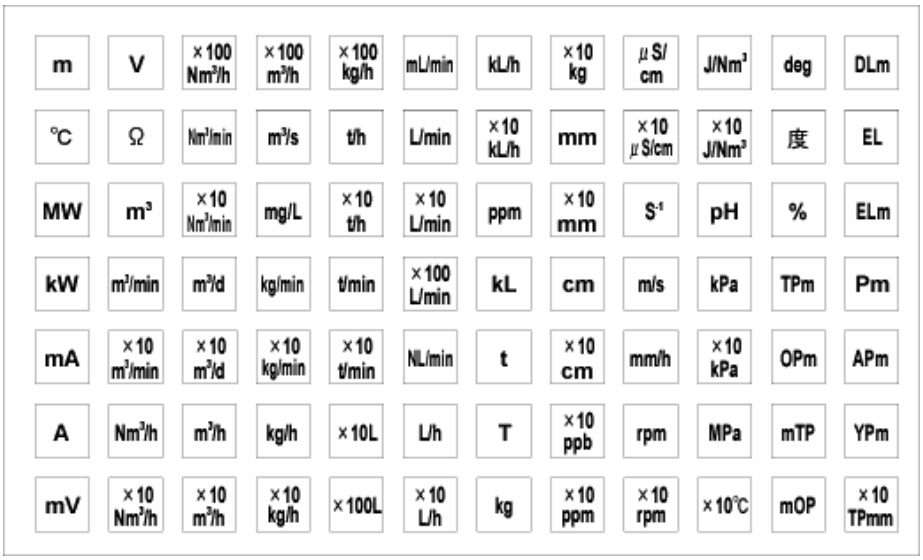
Panel Indication

No.	Event	MODE Section		DATA Section	
		MODE Indicator LED	MODE Display	DATA Indicator LED	DATA Display
1	Power-on, mode switching, or switch operation during display "off" time	Green LED turns ON for 1s, then red LED turns ON for 0.5s. This cycle is repeated 3 times.	All LEDs turn ON for 1s, then turn OFF for 0.5s. This cycle is repeated three times.	Green LED turns ON for 1s, then red LED turns on for 0.5s. This cycle is repeated 3 times.	All LEDs turn ON for 1s, then turn OFF for 0.5s. This cycle is repeated three times.
2	Input (Normal)	Green LED is ON.	OFF	Red LED is ON if the value is positive. Green LED is ON if the value is negative.	Input value
3	Input (Non-data-display mode: enabled when below set value)	Green LED is ON.	OFF	Red LED blinks at 1s intervals if the value is positive. Green LED blinks at 1s intervals if the value is negative.	"----" is displayed.
4	Input (Overflow) *	Green LED is ON.	OFF	Red LED blinks at 1s intervals if the value is positive. Green LED blinks at 1s intervals if the value is negative.	-999 or 9999 blinks at 1 second intervals.
5	Display turn-off	Green LED is ON.	OFF	OFF	OFF
6	Selection of the parameter to be configured or confirmed	Green LED blinks at 1 second intervals.	Parameter code	Red LED is ON if the value is positive. Green LED is ON if the value is negative.	Set value
7	Parameter constant setting	Green LED is ON.	Parameter code	Red LED blinks at 1s intervals if the value is positive. Green LED blinks at 1s intervals if the value is negative.	Set value
8	Parameter data error	Red LED is ON.	Error code	OFF	OFF
9	System error	Red LED is ON.	OFF	OFF	OFF

* No. 4: The DATA indicator LED and DATA display blink only if an input reading in engineering unit mode is out of the range from -999 to 9999.
* No. 8 & 9: Indication may be undefined.

ACCESSORIES

Engineering unit sticker label: 1 sheet



FACTORY SETTINGS

If you specify a set value for each of the parameters when ordering, your product will be preconfigured to your specification and shipped. To specify, use the table below. Otherwise, the product will be configured to our factory default settings.

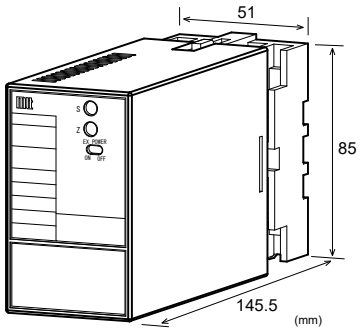
Parameter	Range	Customer specified	Example	Factory Default
RY1 trip point (%)	0.0 to 105.0		75.0	0.0
RY2 trip point (%)			50.0	0.0
RY3 trip point (%)			25.0	100.0
RY4 trip point (%)			0.0	100.0
RY1 hysteresis (%)	0.5 to 10.0		2.0	1.0
RY2 hysteresis (%)			2.0	1.0
RY3 hysteresis (%)			2.0	1.0
RY4 hysteresis (%)			2.0	1.0
RY1 mode of operation	H, L, 0		L	H
RY2 mode of operation			L	H
RY3 mode of operation			0	L
RY4 mode of operation			H	L
RY1 start-up delay (s)	1 to 99		5	1
RY2 start-up delay (s)			10	1
RY3 start-up delay (s)			15	1
RY4 start-up delay (s)			20	1
RY1 activation delay (s)	0 to 99		10	0
RY2 activation delay (s)			20	0
RY3 activation delay (s)			30	0
RY4 activation delay (s)			40	0
RY1 deactivation delay (s)	0 to 99		20	0
RY2 deactivation delay (s)			20	0
RY3 deactivation delay (s)			30	0
RY4 deactivation delay (s)			30	0
Display turn-on time (m)	0 to 30		2	0
Input display mode 0: Percentage 1: Engineering units	0, 1		0	0
0% input in engineering units	-999 to 9999		0	0
100% input in engineering units	-999 to 9999		2000	1000
Decimal point position for input in engineering units 0: XXXX 1: XXX.X 2: XX.XX 3: X.XXX	0 to 3		0	1
Non-data-display mode 0: Disabled 1: Enabled	0, 1		0	1
Set value for non-data-display mode	-15.0 to 0.0		-10.0	-5.0

Product Specification Sheet Model: MS5307

Plug-In Distributor with Isolated Dual Output

DESCRIPTION

The MS5307 is a plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides an isolated dual output. This model can also be used as an isolator.



ORDERING CODE

MS5307 - □ - □ □

Model

Power Supply

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

Input

4 to 20mA DC from 2-wire transmitters

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals

1: 0 to 10mV DC
2: 0 to 100mV DC
3: 0 to 1V DC
4: 0 to 10V DC
5: 0 to 5V DC
6: 1 to 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.

Options

No code: None
/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 above.
(e.g.) MS5307-A-A6

Other Ordering Examples:
For an output code of "0": MS5307-A-60 (Output: 2 to 5V)
For an option code of "X": MS5307-A-AA/X (Response frequency: 50Hz)
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 Approx. 7.0VA	24V DC Approx. 2.4W	100-240V DC Approx. 8.4W

●INPUT SECTION

Input Signal	4 to 20mA DC from 2-wire transmitters
Input Resistance	250Ω
Transmitter Power Supply	Output voltage: 26.4V, typical. (0% input) 21.6V, typical. (100% input) Maximum current: 22mA, typical.
Limit Current for Short-Circuit Protection	40mA max.
Permissible Short-Circuit Duration	Continuous.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)	
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)	

Ranges Available		
	Current Signal	Voltage Signal
Output Range (DC)	0 to 20mA	0 to 10V
Output Span (DC)	4 to 20mA	10mV to 10V
Output Bias	0 to 100%	0 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 4 to 8V output, the output span is 4V and the bias +100%.

●PERFORMANCE

Accuracy Rating	Better than ±0.1% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	85ms 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

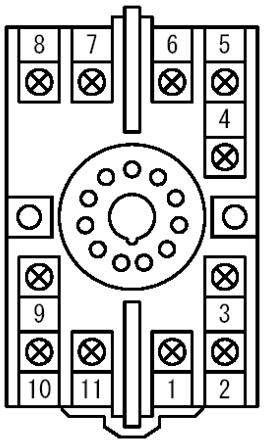
●PHYSICAL

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

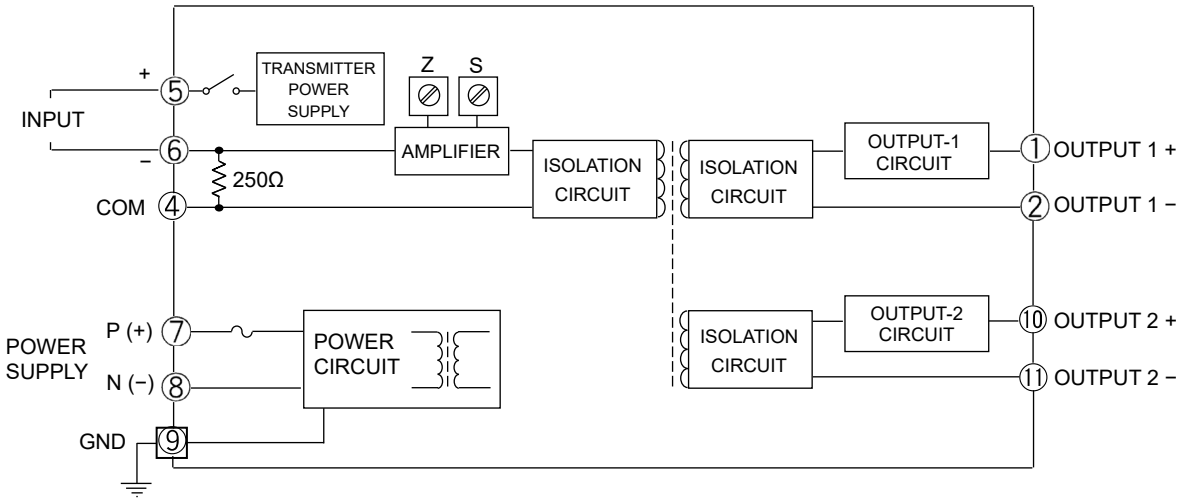
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

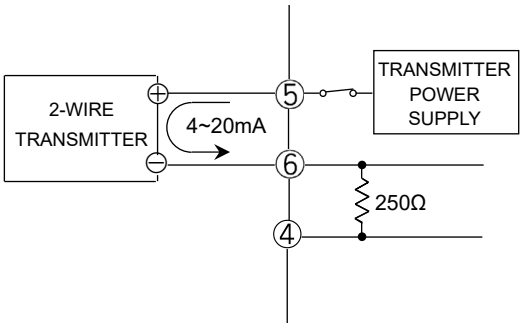


①	+ OUTPUT 1	
②	− OUTPUT 1	
③	N.C.	
④	COM	
⑤	+ INPUT	
⑥	− INPUT	
⑦	P (+)	POWER
⑧	N (−)	
⑨	GND	
⑩	+ OUTPUT 2	
⑪	− OUTPUT 2	

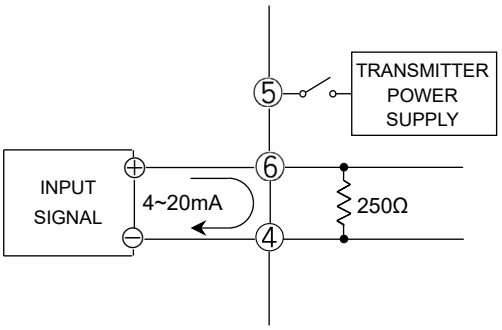
BLOCK DIAGRAM



When used as a distributor:



When used as an isolator:



DESCRIPTION

The MS5307B is a plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides an isolated dual output. This model can also be used as an isolator.

ORDERING CODE

MS5307B - ☐ - ☐ ☐

Model

Power Supply

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

Input

4 to 20mA DC from 2-wire transmitters

Output 1

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

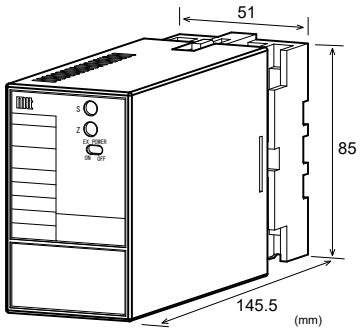
Options

No code: None
/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 above.
(e.g.) MS5307B-A-A6

Other Ordering Examples:
For an output code of "0": MS5307B-A-60 (Output: 2 to 5V)
For an option code of "X": MS5307B-A-AA/X (Response frequency: 50Hz)
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 Approx. 7.0VA	24V DC Approx. 2.4W	100-240V DC Approx. 8.4W

●INPUT SECTION

Input Signal	4 to 20mA DC from 2-wire transmitters
Input Resistance	250Ω
Transmitter Power Supply	Output voltage: 26.4V, typical. (0% input) 21.6V, typical. (100% input) Maximum current: 22mA, typical.
Limit Current for Short-Circuit Protection	40mA max.
Permissible Short-Circuit Duration	Continuous.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)	
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)	

Ranges Available		
	Current Signal	Voltage Signal
Output Range (DC)	0 to 20mA	0 to 10V
Output Span (DC)	4 to 20mA	10mV to 10V
Output Bias	0 to 100%	0 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 4 to 8V output, the output span is 4V and the bias +100%.

●PERFORMANCE

Accuracy Rating	Better than ±0.1% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	85ms 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

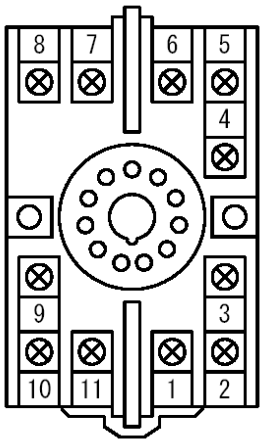
●PHYSICAL

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

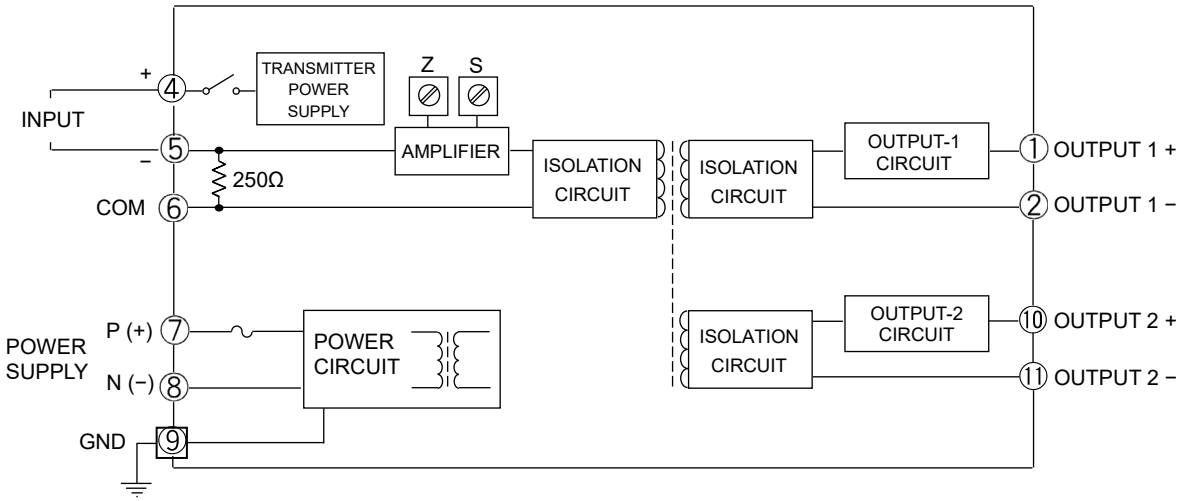
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

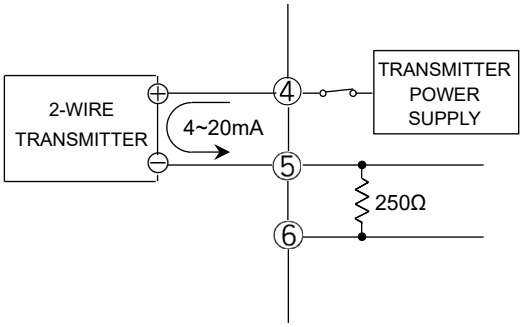


①	+ OUTPUT 1	
②	− OUTPUT 1	
③	N.C.	
④	+ INPUT	
⑤	− INPUT	
⑥	COM	
⑦	P (+)	POWER
⑧	N (−)	
⑨	GND	
⑩	+ OUTPUT 2	
⑪	− OUTPUT 2	

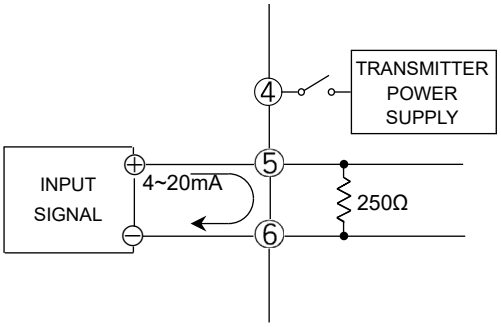
BLOCK DIAGRAM



When used as a distributor:



When used as an isolator:

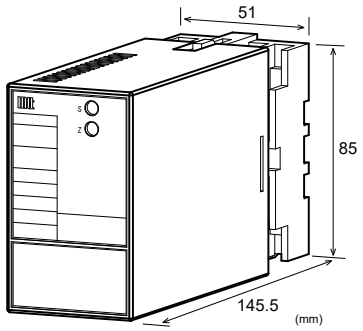


Product Specification Sheet Model: MS5308

Plug-In Frequency/Analog Converter with Isolated Dual Output

DESCRIPTION

The MS5308 is a plug-in frequency-to-analog converter that converts pulse train signals from flow sensors and the like into commonly used DC signals and provides an isolated dual output.



ORDERING CODE

MS5308 - □ - □ □ □

Model

Power Supply

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

Input

O: Dry contact or open collector
(Pull-up: Approx. 13V, 3.3kΩ)
A: AC voltage pulse
(Threshold voltage: Approx. 0.06Vp-p)
D: DC voltage pulse
(Threshold voltage: Approx. 2V)
I: 4 to 20mA DC pulse
(Threshold current: Approx. 8mA)
Y: Other input signals and/or threshold voltages

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signal

1: 0 to 10mV DC
2: 0 to 100mV DC
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.

Options

No code: None
/A: Sensor power supply: 24V DC (±10%), 2-wire type
/B: Sensor power supply: 12V DC (±10%), 2-wire type
/C: Sensor power supply: 24V DC (±10%), 3-wire type
/D: Sensor power supply: 12V DC (±10%), 3-wire type
/E: Sensor power supply: 5V DC (±10%), 2-wire type
/F: Sensor power supply: 5V DC (±10%), 3-wire type
/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 frequency range.
(e.g.) MS5308-A-DA6 (0 to 850Hz)

Other Ordering Examples:
For an input code of "Y": MS5308-A-YAA (0 to 500Hz / Input DC voltage pulse: 0 to 12V / SH = 8.5V, SL = 2.5V)
For an input code of "Y": MS5308-A-YAA (0 to 500Hz / Input AC voltage pulse: 200Vp-p / S = 2Vp-p)
* SH = Threshold level HI, SL = Threshold level LO, S = Threshold level
Note: For DC current pulse input, the range should be specified between 0-100μA and 0-100mA.

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. 9.0VA	Approx. 3.0W	Approx. 9.0W

●INPUT SECTION

Input Resistance

Voltage Input Model (DC)	With power:	1MΩ min. (Standard, 5V input)
	Without power:	30kΩ min.
Current Input Model (DC)	250Ω (Standard for 4 to 20mA) Note: When a 2-wire type sensor power supply is specified, a shunt resistor of 100Ω is used.	

Allowable Input Voltage

DC Voltage Input Model	30V DC max., continuous.
DC Current Input Model	40mA DC max., continuous.
AC Voltage Input Model	200Vp-p AC max., continuous (up to ±100V with reference to 0V).

Input Pulse Width	20μs min.
Duty Ratio	40 to 60%
Maximum Sensor Supply Current	30mA

Ranges Available

	AC Voltage Pulse	DC Voltage Pulse
Input Range	-300 to 300V	0 to 300V
Input Voltage Span	0.1 to 600Vp-p	1 to 300V
Input Bias	N/A	0 to +300%
Threshold Voltage	50mVp-p min.	Hi-Lo voltage: 0.2V min.
Input Frequency	Within the range between 0-20Hz and 0-20kHz.	

Input Spec. Ex.: For 10 to 15V DC voltage pulse input, the input voltage span is 5V and the bias +200%.

●OUTPUT SECTION

Allowable Output Load

Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)

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 ±0.3% of span. Ripple: 0.2%p-p or less of span (for at least 10% input) (at 25°C±5°C)
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.

Response Time

Input Frequency	0 to 90% with a step input at 100%
20Hz	8s max.
200Hz	1s max.
2kHz	500ms max.
20kHz	500ms max.

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

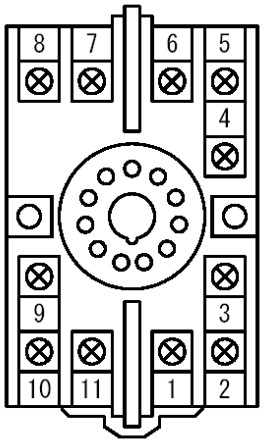
●PHYSICAL

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

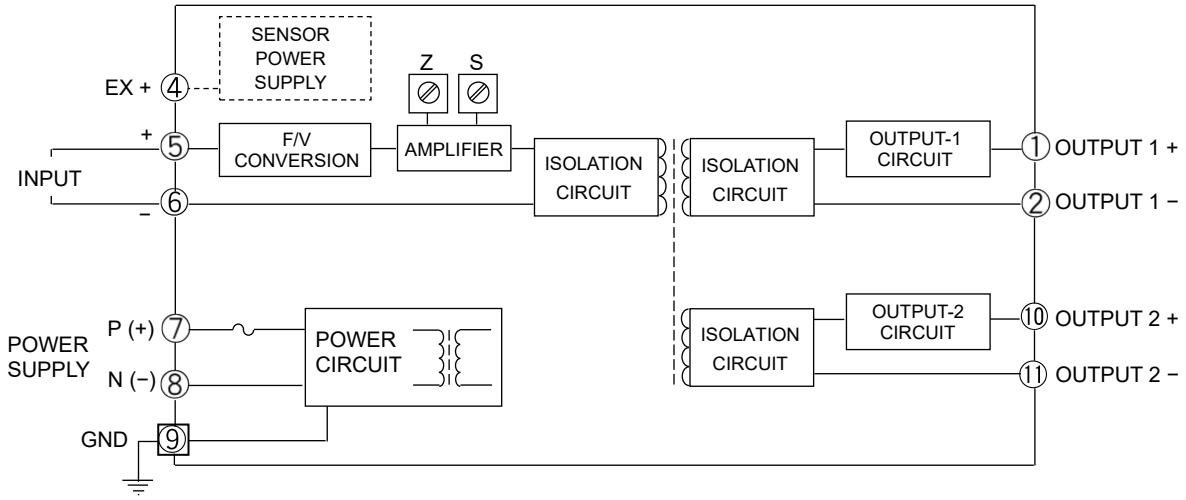
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

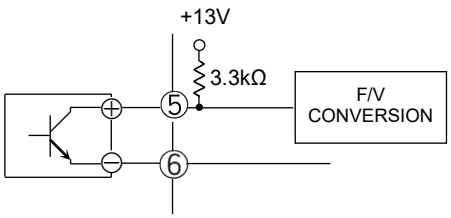


①	+ OUTPUT 1	
②	− OUTPUT 1	
③	N.C.	
④	EX +	
⑤	+ INPUT	
⑥	− INPUT	
⑦	P (+)	POWER
⑧	N (−)	
⑨	GND	
⑩	+ OUTPUT 2	
⑪	− OUTPUT 2	

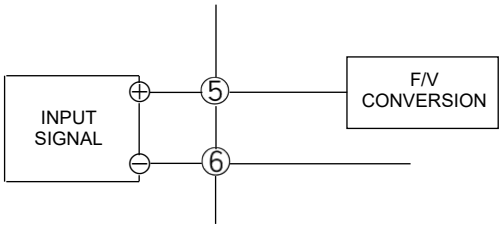
BLOCK DIAGRAM



For dry contact or open collector input:

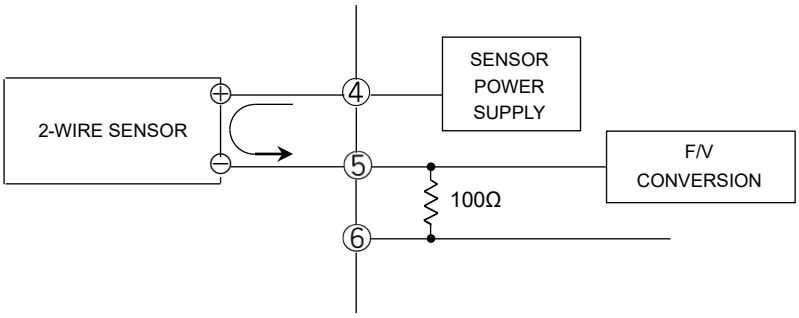


For voltage pulse input:



When a 2-wire sensor is used:

Note: The connections may vary depending on the type of the sensor used.

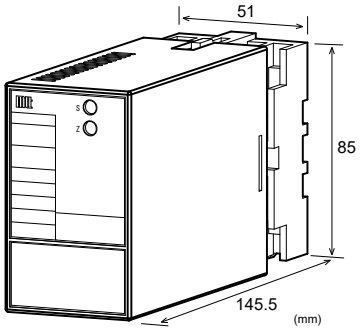


Product Specification Sheet Model: MS5310

Plug-In Potentiometer Transmitter with Isolated Dual Output

DESCRIPTION

The MS5310 is a plug-in type potentiometer transmitter that detects changes in the resistance of potentiometric sensors, converts them into commonly used DC signals and provides an isolated dual output.



ORDERING CODE

MS5310 - □ - □ □

Model

Power Supply

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

Input

Range between 0-100Ω and 0-10kΩ

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
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.

Options

No code: None
/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.
(e.g.) MS5310-A-A6
* Resistance range: Specify a resistance range (e.g. 0 to 1kΩ); otherwise, products will be supplied with a factory default of 0 to 10kΩ.

Other Ordering Examples:
For an output code of "0": MS5310-A-A0 (Output: 2 to 5V)
For a specific resistance range: MS5310-A-AA (0 to 500Ω) (When you specify a resistance range, our factory performs the test accordingly, the fact of which will be indicated in the label attached.)
For an option code of "X": MS5310-A-AA/X (Response frequency: 50Hz)
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. 5.0VA	Approx. 1.5W	Approx. 6.0W

●INPUT SECTION

Input Signal	Range between 0-100Ω and 0-10kΩ.
Measuring Voltage	Approx. 0.5V
Allowable Lead Wire Resistance	10% or less of total resistance per wire. (The resistance of all three wires must be equal.)

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	4-20mA single output	750Ω max.
	4-20mA dual output	Output 1: 550Ω max. Output 2: 350Ω max.
Zero Adjustment	Approx. 0 to 50% of total resistance. (Adjustable by the front-accessible trimmer.)	
Span Adjustment	Approx. 50 to 100% of total resistance. (Adjustable by the front-accessible trimmer.)	

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 ±0.2% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	170ms 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

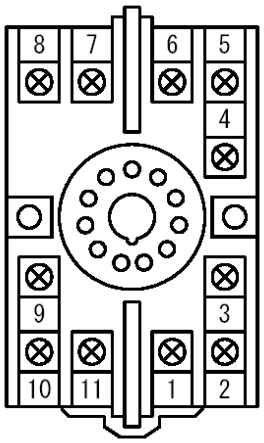
●PHYSICAL

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

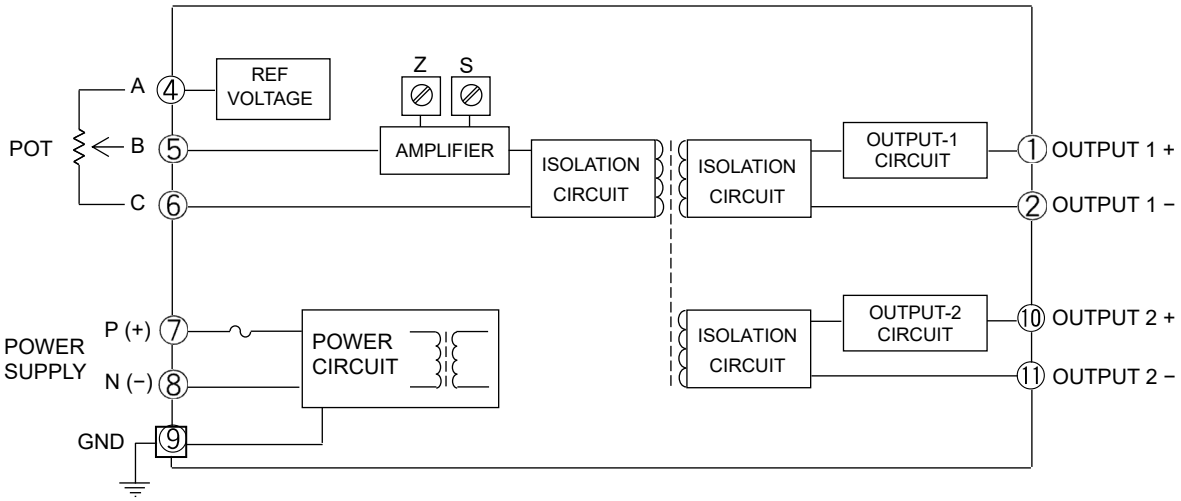
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



①	+ OUTPUT 1	
②	− OUTPUT 1	
③	N.C.	
④	POT A	
⑤	POT B	
⑥	POT C	
⑦	P (+)	POWER
⑧	N (−)	
⑨	GND	
⑩	+ OUTPUT 2	
⑪	− OUTPUT 2	

BLOCK DIAGRAM

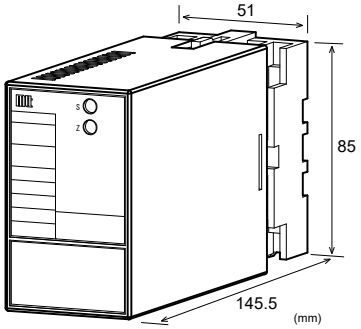


Product Specification Sheet Model: MS5320

Plug-In CT Transmitter with Isolated Dual Output

DESCRIPTION

The MS5320 is a plug-in CT transmitter that calculates the rms values of AC current signals from a CT, converts them into commonly used DC signals, and provides an isolated dual output.



ORDERING CODE

MS5320 - □ - □ □ □

Model

Power Supply

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

Input (AC Current Signal)

1: 0 to 1A AC, 50/60Hz
5: 0 to 5A AC, 50/60Hz

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals

1: 0 to 10mV DC
2: 0 to 100mV DC
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.

Options

No code: None
/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 above.
(e.g.) MS5320-A-5A6

Other Ordering Examples:
For an output code of "0": MS5320-A-160 (Output: 2 to 5V)
For an option code of "X": MS5320-A-1AA/X (0-90% response time: 100ms max.)

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 Approx. 5.0VA	24V DC Approx. 1.6W	100-240V DC Approx. 6.0W

●INPUT SECTION

Input Resistance	5A AC input: 2mΩ (Shunt resistor) 1A AC input: 10mΩ (Shunt resistor)
Allowable Input Current	Continuous: 120% of the rated input value Instantaneous: 10 times the rated input value (within 3 seconds)
Crest Factor	3 max.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)	
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)	

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 ±0.25% of span with at least 10% input (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	400ms 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

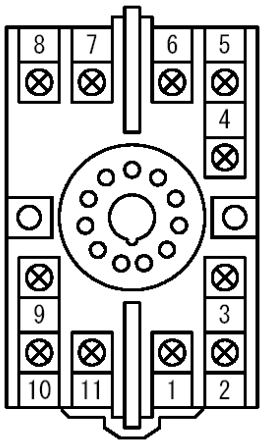
●PHYSICAL

Installation	Wall/DIN rail mounting
Mounting Direction	Vertical
Screwing Torque	0.78 to 1.18 [Nm] * Recommended
Wiring	M3.5 screw terminal connection The supplied protector should be connected to the terminal block.
External Dimensions	W51 × H85 × D145.5 mm (including the socket, but not including the protector)
Weight	Main unit: 200g max. Socket: 80g max. Protector: 22g max.

●MATERIAL

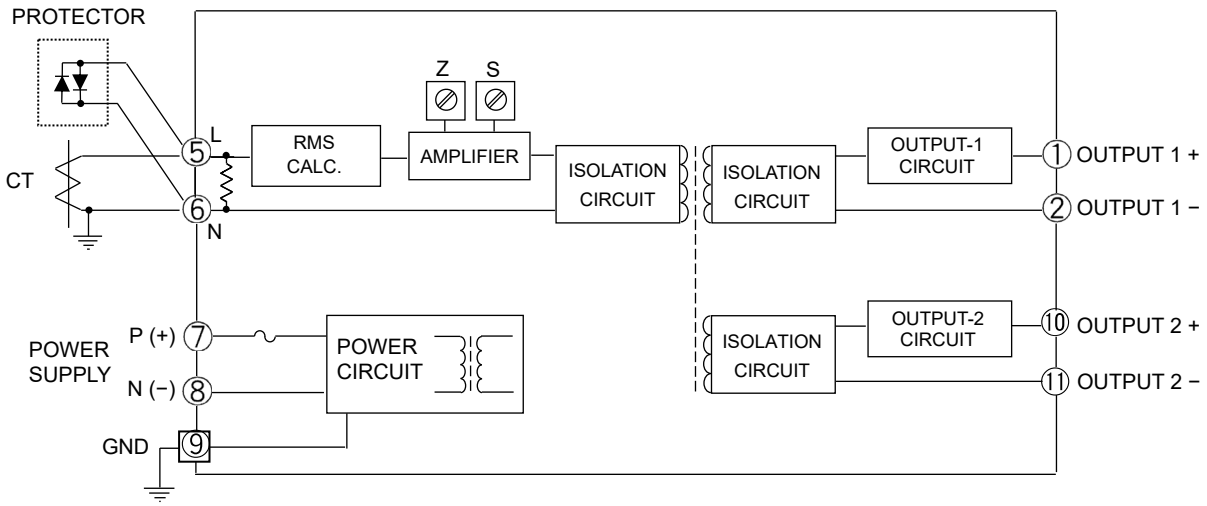
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

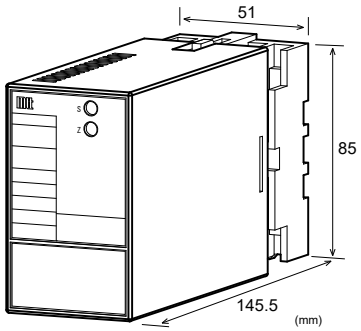


Product Specification Sheet Model: MS5321

Plug-In PT Transmitter with Isolated Dual Output

DESCRIPTION

The MS5321 is a plug-in PT transmitter that calculates the rms values of AC voltage signals from a PT, converts them into commonly used DC signals, and provides an isolated dual output.



ORDERING CODE

MS5321 - □ - □ □ □

Model

Power Supply

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

Input (AC Voltage Signal)

1: 0 to 110V AC, 50/60Hz
2: 0 to 150V AC, 50/60Hz
3: 0 to 300V AC, 50/60Hz
0: Other AC voltage signals, 50/60Hz

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals

1: 0 to 10mV DC
2: 0 to 100mV DC
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.

Options

No code: None
/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 above.
(e.g.) MS5321-A-2A6

Other Ordering Examples:
For an input code of "0": MS5321-A-0A6 (Input: 0 to 200V)
For an output code of "0": MS5321-A-2A0 (Output: 2 to 5V)
For an option code of "X": MS5321-A-2A6/X (0-90% response time: 100ms max.)

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 Approx. 5.0VA	24V DC Approx. 1.6W	100-240V DC Approx. 6.0W

●INPUT SECTION

Input Resistance	1MΩ min. with or without power.
Allowable Input Current	Continuous: 120% of the rated input value Instantaneous: 1.5 times the rated input value (within 5 seconds)
Crest Factor	3 max.
Ranges Available	Between 0-10mV AC and 0-300V AC.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	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.)	
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)	

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 ±0.25% of span with at least 10% input (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	400ms 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

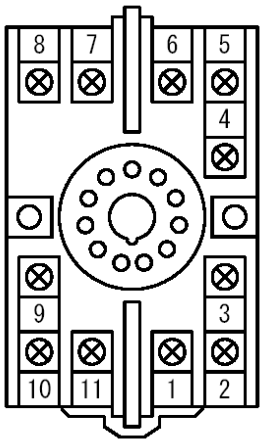
●PHYSICAL

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

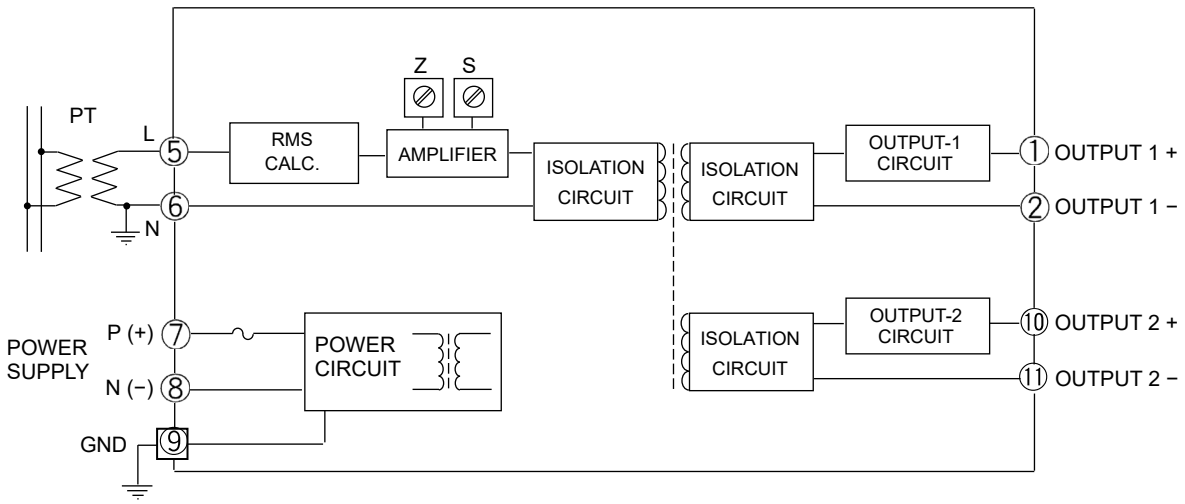
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS5385

Plug-In Insulation Resistance Monitor

DESCRIPTION

The MS5385 continuously monitors the insulation resistance of an inactive motor and indicates the insulation status at three levels: GOOD, ALARM, and FAILURE.

ORDERING CODE

MS5385 - □ - □

Model

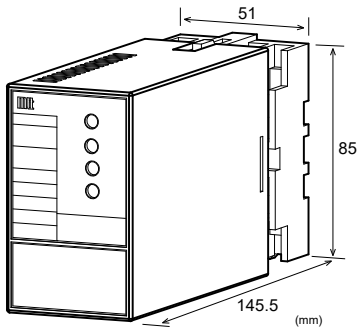
Power Supply
A: 100 to 240V AC (50 to 60Hz)

Operation Detection Signal
1: 100/110V AC (50/60Hz)
2: 200/220V AC (50/60Hz)

Options
No code: None
/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 above.
(e.g.) MS5385-A-2



SPECIFICATIONS

●POWER SECTION

Power Requirement	100 to 240V AC: 85 to 264V AC (47 to 63Hz)
Power Line Fuse	160mA fuse
Power LED	Red Power LED is lit when the power is ON.
Maximum Power Consumption Power	100-240V AC 5.5VA

●OPERATION DETECTION SIGNAL

Rated Input Voltage	100V/110V AC, 200V/220V AC
Tolerance	Rated input voltage ±10% (Frequency: 50/60Hz)

●MAINS VOLTAGE

Rated Input Voltage	200V/220V AC, 50/60Hz

●OPERATIONS

Insulation Resistance Detection Terminals	Insulation resistance is detected between combined terminals of #1, #2 and #3 and terminal #4. Input of an operation detection signal disconnects the insulation resistance detection circuit.		
Insulation Resistance Detection Points	ALARM	Set point	1MΩ±20%
		Reset point	1.2MΩ±20%
	FAILURE	Set point	0.4MΩ±15%
		Reset point	0.5MΩ±15%
Output Timer Duration	60 to 90 seconds (fixed) When insulation resistance falls below each set point and stays there for the timer duration, the relevant relay is activated with the corresponding indication.		

Indications & Contact Output	Insulation Resistance	Indication	Relay Contacts
	1.2MΩ min.	GOOD level; green indicator light	Terminals 5&6 are open. Terminals 6&7 are open.
	1M-0.5MΩ	ALARM level; yellow indicator light	Terminals 5&6 are closed. Terminals 6&7 are open.
	0.4MΩ max.	ALARM level; yellow indicator light FAILURE level; red indicator light	Terminals 5&6 are closed. Terminals 6&7 are closed.
Output Relay Contact Capacity	250V AC 1A, 24V DC 1A (resistive load)		

●PERFORMANCE

Dielectric Strength	Input / Power / Output Relay Contact Terminals / Operation Detection Terminals: 1500V AC for 1 minute (Cutoff current: 1mA)
Insulation Resistance	100MΩ min. (@ 500V DC) between input, power, output relay contact terminals, and operation detection terminals.
Storage Temperature	-10 to 60°C

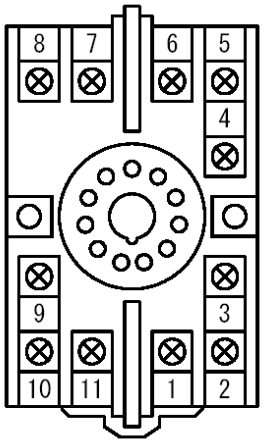
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection
Screwing Torque	0.78 to 1.18 [Nm] * Recommended
External Dimensions	W51 × H85 × D145.5 mm
Weight	Main unit: 250g max. Socket: 80g max.

●MATERIAL

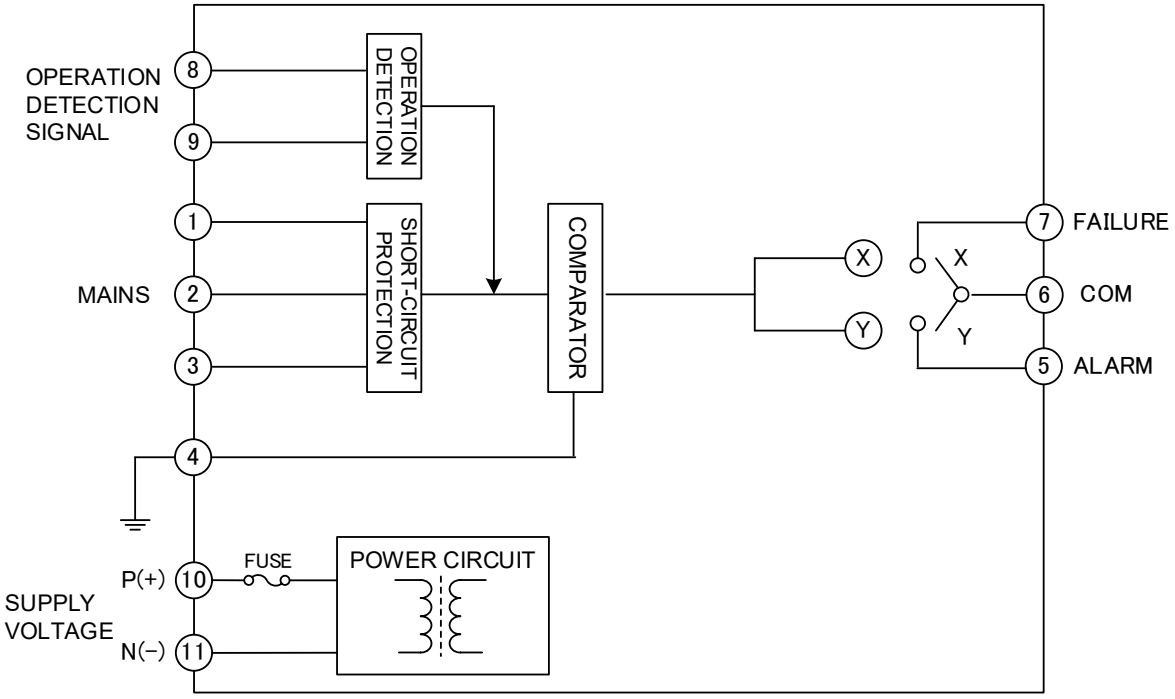
Housing	ABS resin (UL 94V-0)
Socket	ABS resin (UL 94V-0)
Screw Terminal	Galvanized steel with trivalent chromate finish
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



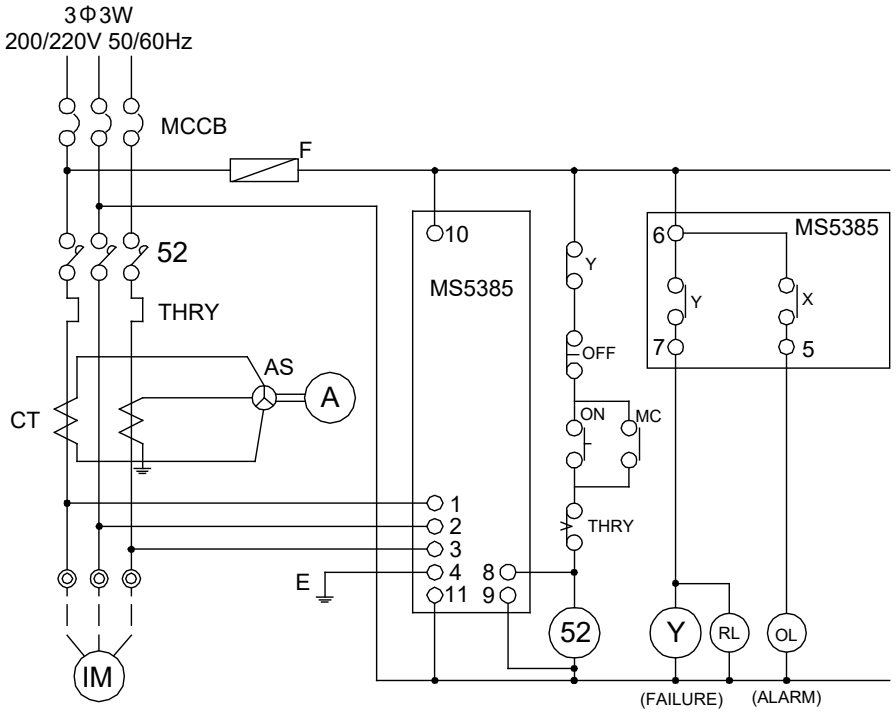
①	U-INPUT	
②	V-INPUT	
③	W-INPUT	
④	E-INPUT	
⑤	ALARM	
⑥	COM	
⑦	FAILURE	
⑧	CONTROL-L	
⑨	CONTROL-N	
⑩	P (+)	POWER
⑪	N (−)	

BLOCK DIAGRAM



1. When the insulation resistance between combined terminals of #1, #2 and #3 and terminal #4 falls below approx. 1.0MΩ, the ALARM relay will be activated and terminals #5 and #6 will be closed about one minute later.
2. When the resistance further falls below approx. 0.4MΩ, the FAILURE relay will be activated and terminals #7 and #6 will be closed about one minute later.
3. The FAILURE relay will change from ON to OFF when the resistance exceeds approx. 0.5MΩ.
4. The ALARM relay will change from ON to OFF when the resistance exceeds approx. 1.2MΩ.
5. Applying a signal between terminals #8 and #9 will switch off the relays whatever the insulation resistance is.

EXAMPLE OF APPLICATION



Product Specification Sheet Model: MS5405DC

Alarm Setter with Dual/Quad Output (DC Signal)

DESCRIPTION

The MS5405DC is a plug-in alarm setter that compares the levels of DC current or voltage signals with two or four set-points and outputs two or four independent isolated relay contact closure signals. The unit's front panel is provided with a display to indicate input values and alarm status.

ORDERING CODE

MS5405DC-[1]-U[2]/[3]

[1] Power Supply

A: 100 to 240V AC (50 to 60Hz)
D: 24V DC
P: 110V DC

[2] Output

A: 4 form A contact outputs
B: 4 form B contact outputs
C: 2 form C contact outputs

[3] Option

No code: None
S: Screw terminal with spring washer
D: Relay contact with max. allowable voltage 125V DC
X: Special order

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

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.

Examples: MS5405DC-A-UA
MS5405DC-A-UA/SD

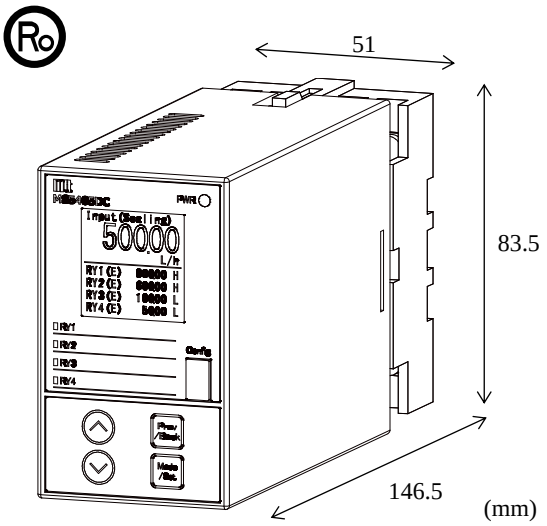
SPECIFICATIONS

●POWER SECTION

Power Requirements	100 to 240V AC: 85 to 264V AC (47 to 63Hz) 24V DC: 24V DC±10% 110V DC: 90 to 121V DC
Power Sensitivity	±0.02%/FS max. for each power supply range
Power Consumption	100V AC: 5.1VA / 240V AC: 7.2VA 24V DC: 2.2W 110V DC: 2.8W

●INPUT SECTION

Input	Current input: ±40mA DC Voltage input: ±10V DC / ±2V DC / ±200mV DC *Switching between current and voltage inputs is done with the rear panel switch.
Input Resistance	Current input: 50Ω typ. Voltage input: 1MΩ min. with/without power.
Allowable Input Range	Current input: ±50mA DC max., continuous. Voltage input: ±30V DC max., continuous.



Minimum Span	±40mA DC: 4mA ±10V DC: 1V ±2V DC: 200mV ±200mV DC: 20mV
Input Bias	Input bias can be set within the input range.
Measurement Range Available	-5 to 105% of span

●OUTPUT SECTION

Relay Contacts (Standard)

Rated Load	3A/250V AC (Resistive load) 3A/30V DC (Resistive load)
Maximum Allowable Voltage	250V AC, 30V DC
Maximum Allowable Current	3A (Resistive load)
Electrical Life	NO: 50,000 cycles / NC: 30,000 cycles (Resistive load; frequency 360 cycles/h)
Mechanical Life	5 million cycles (Frequency: 10,000 cycles /h)

Relay Contacts (Optional)

Rated Load	3A/250V AC (Resistive load) 3A/30V DC (Resistive load)
Maximum Allowable Voltage	250V AC, 125V DC* * 125V DC: Load current 0.4mA max. (Resistive load)
Maximum Allowable Current	3A (Resistive load)
Electrical Life	AC: 100,000 cycles / DC: 50,000 cycles (Resistive load, frequency 18,000 cycles/h)
Mechanical Life	10 million cycles (Frequency: 18,000 cycles /h)

●DISPLAY

Functions	Indicates input values, settings, alarm and error status, and other conditions.
Display Type	OEL display
Display Size	W 26.09 × H 26.09 mm, typ.
Pixel Count	128 × 128
Luminescent Color	White
Service Life	10,000 h, typ. (Standard period of time until the brightness is reduced by half)
Number of Digits	Negative: 4 digits / Positive: 5 digits (-9999 to 99999)
Decimal Point Position	Decimal point position can be set as desired.
Display Cycle	0.5s, typ.

●PERFORMANCE

Accuracy Rating*	±40mA / ±10V / ±2V DC range: ±0.02%/FS + 1 digit @ 25°C±5°C ±200mV DC range: ±0.1%/FS + 1 digit @ 25°C±5°C
Temperature Effect	±0.0025%/FS max. per °C (with reference to 25°C)
Response Time	500ms max. (Time required for the output to reach the 90% level in response to a step input)
Isolation	4-way isolation between input, output, power, and ground.
Insulation Resistance	100MΩ min. (at 500V DC) between [Input/internal circuit], [RY1/2], Power, and Ground.
Dielectric Strength	2000V AC for 1 minute between [Input/internal circuit], [RY1/2], Power, and Ground.
Operating Environment	Ambient temperature: -5°C to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

●PHYSICAL

Installation	Wall/DIN rail mounting
Mounting Orientation	Vertical
Screwing Torque (Recommended)	Standard: 0.78 to 1.18 Nm With spring washer: 0.78 to 0.98 Nm
Wiring	M3.5 screw terminal connection
External Dimensions	W51 × H83.5 × D146.5 mm (including the socket)
Weight	Main unit: 260g, typ. Socket: 75g, typ.

●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)
Conformal Coating	HumiSeal® 1A27NSLU (Polyurethane)

* HumiSeal® is a registered trademark of Chase Corporation.

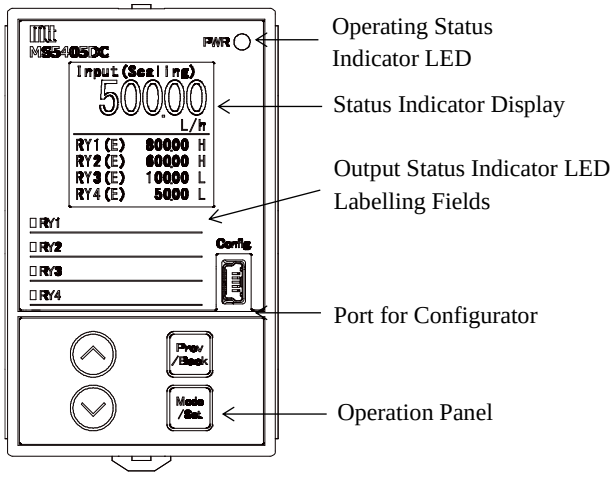
* Accuracy Rating

Since accuracy rating assumes that the input range is defined as a full span, accuracy of measurement with reference to an input set value (set span) is calculated as follows:

(Ex.) If the input range is ±40mA and input is 4-20mA:

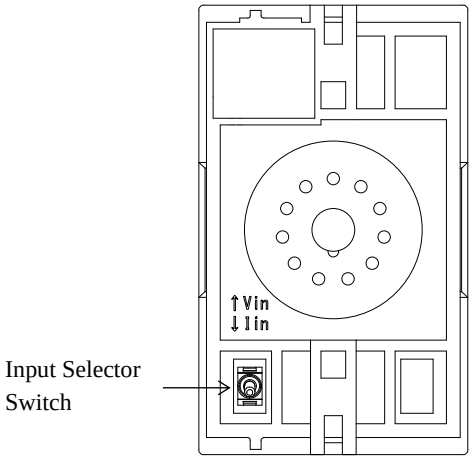
Input Accuracy = Accuracy rating × (Full span / Set span) + 1 digit
= 0.02%/FS × (80mA/16mA) + 1 digit
= 0.1% + 1 digit

FRONT VIEW



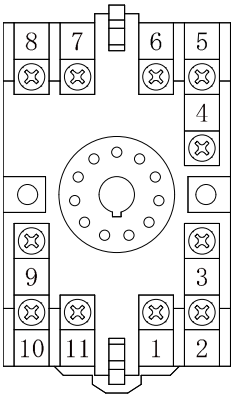
Name	Function
Operating Status Indicator LED	Indicates the operating status of the unit. A green LED lights in different patterns, depending on the status.
Status Indicator Display	Indicates input status, alarm status, and settings. Single and dual window modes are supported.
Output Status Indicator LED	Indicates the output status of the relays, RY1 - RY4. A red LED lights when the relay is activated.
Labelling Fields	These are fields to which labels (RY1 - RY4) are attached.
Port for Configurator	USB Type Mini-B, female connector. This port is connected to a PC when the unit is configured using the Configurator. USB bus power allows users to change parameters with the power off. (Screen display and output cannot be changed.)
Operation Panel	Four push buttons allow users to change display settings and parameters.

REAR VIEW



Name	Function
Input Selector Switch	Switches between current input and voltage input.

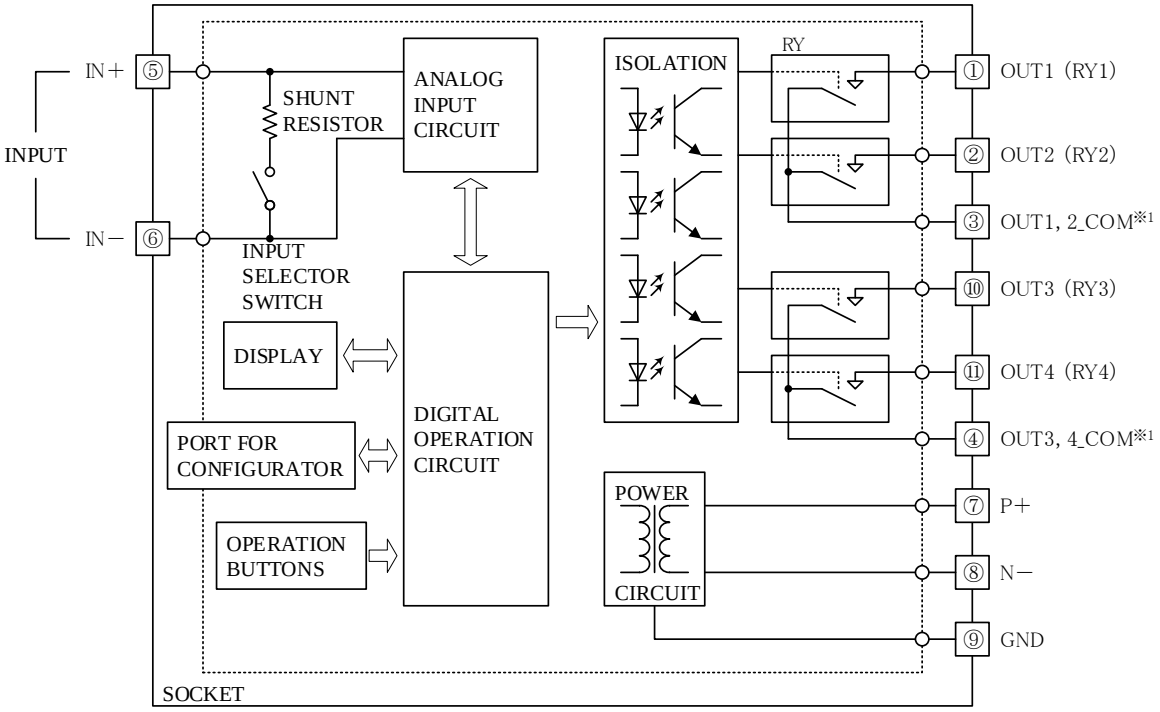
TERMINAL ASSIGNMENT



No.	Form A contact 4 outputs	Form B contact 4 outputs	Form C contact 2 outputs
1	OUT1 (NO)	OUT1 (NC)	OUT1 (NC)
2	OUT2 (NO)	OUT2 (NC)	OUT1 (NO)
3	OUT1, 2_COM		OUT1_COM
4	OUT3, 4_COM		OUT2_COM
5	IN+		
6	IN-		
7	P+ (POWER)		
8	N- (POWER)		
9	GND		
10	OUT3 (NO)	OUT3 (NC)	OUT2 (NC)
11	OUT4 (NO)	OUT4 (NC)	OUT2 (NO)

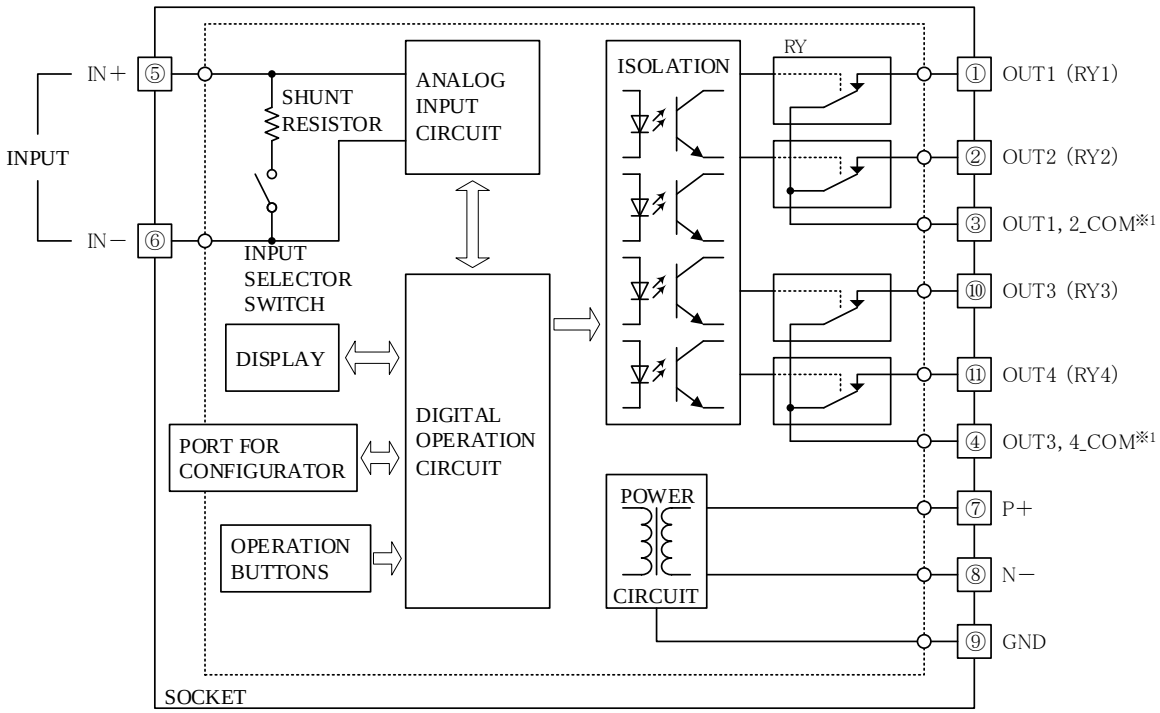
BLOCK DIAGRAM

● 4 form A contact outputs



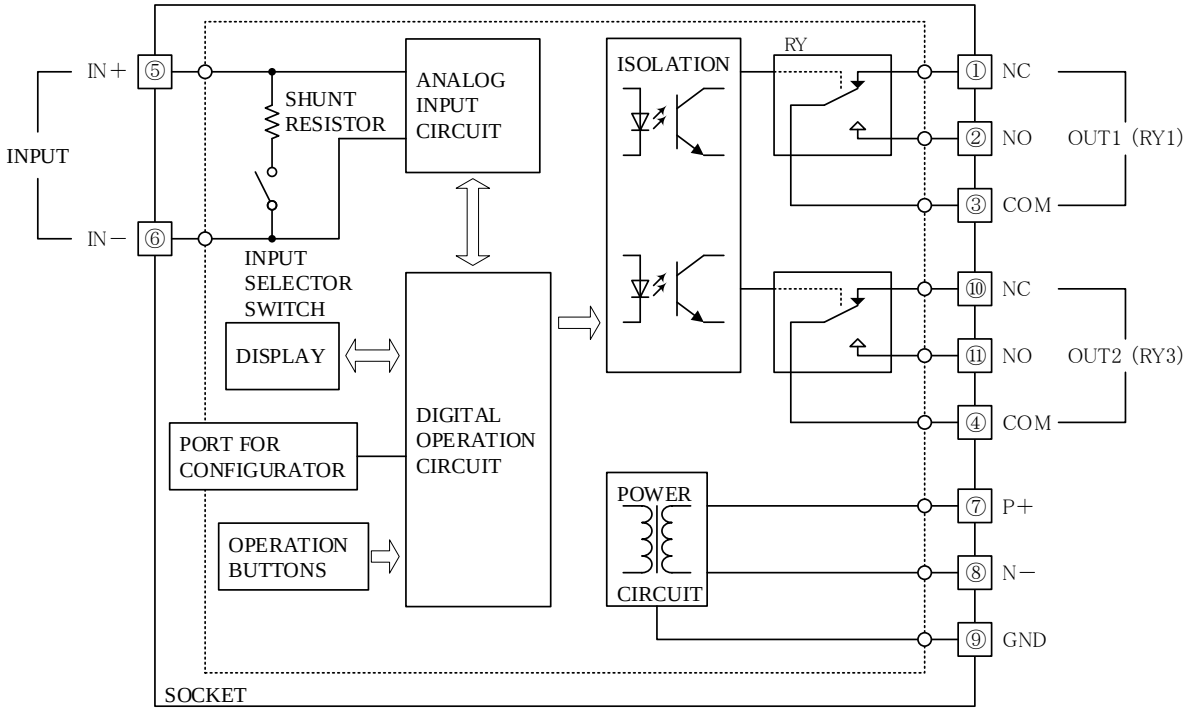
* The sum of the load currents on RY1 and RY2, and the sum of the load currents on RY3 and RY4 must not exceed 3A.

● 4 form B contact outputs

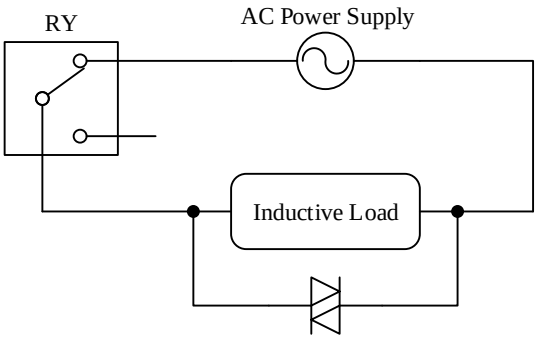


* The sum of the load currents on RY1 and RY2, and the sum of the load currents on RY3 and RY4 must not exceed 3A.

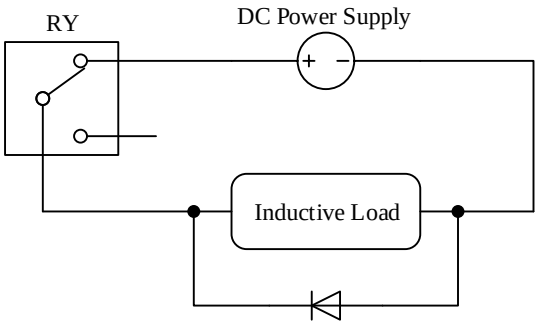
● 2 form C contact outputs



When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load as shown below.



Protection Circuit
(Varistor, CR circuit, etc.)



Protection Circuit
(Diode, varistor, CR circuit, etc.)

FUNCTIONS

● Alarm Settings

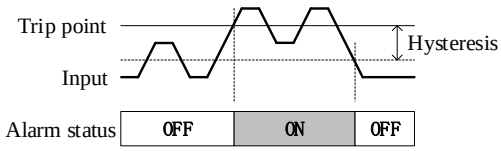
The following alarm settings are available for each output.

1. Alarm Mode: High / Low / Disable
2. Relay Activation with Alarm Status: Activated / Deactivated
3. Trip Point: Any value within the scaling setting range.
4. Hysteresis: Any positive value with reference to a trip point
5. Delay for Turning on the Alarm (seconds): Any value between 0 and 99.
6. Delay for Turning off the Alarm (seconds): Any value between 0 and 99.

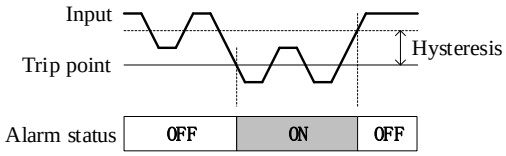
1. Alarm Mode:

The alarm mode can be set to “High Alarm” or “Low Alarm”. It can also be set to “Disable” if alarm is not used.

“High Alarm” mode:
Input > Trip point: Alarm turns on.
Input ≤ Trip point - Hysteresis: Alarm turns off.



“Low Alarm” mode:
Input < Trip point: Alarm turns on.
Input ≥ Trip point + Hysteresis: Alarm turns off.



“Disable Alarm” mode: Relay constantly deactivated

2. Relay Activation with Alarm Status:

Relay activation with alarm status can be set to either “Activated” or “Deactivated”.
The output (state between OUTx and COM terminals) depends on product specifications and relay behavior.

Specification	Relay Behavior	State between OUTx and COM
Form A Contact	Activated	Closed
	Deactivated	Open
Form B Contact	Activated	Open
	Deactivated	Closed

Note: Without power, all four form A contacts are open and all four form B contacts are closed.

Specification	Relay Behavior	State between OUTx and COM	
		NC	NO
Form C Contact	Activated	Open	Closed
	Deactivated	Closed	Open

Note: Without power, NC and COM are closed and NO and COM are open.

3. Trip Point

A threshold to trigger an alarm is adjustable within a scaling range of -9999 to 99999 in steps of 1.

4. Hysteresis

Hysteresis to turn off the alarm is adjustable within a positive scaling range of 0 to 99999 in steps of 1.

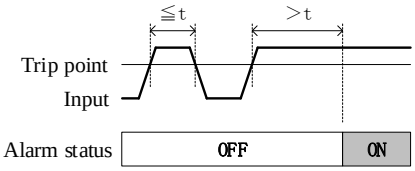
5. Delay for Turning on the Alarm:

A delay for turning on the alarm is adjustable from 0 to 99 seconds in steps of 1 second.

"High Alarm" mode with a delay for turning on the alarm set to "t" (s):

Duration of input above trip point > t: Alarm turns on.

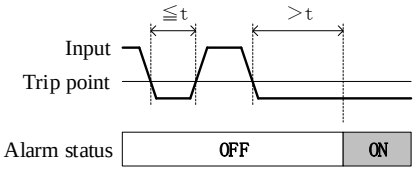
Duration of input above trip point ≤ t: Alarm does not turn on.



"Low Alarm" mode with a delay for turning on the alarm set to "t" (s):

Duration of input below trip point > t: Alarm turns on.

Duration of input below trip point ≤ t: Alarm does not turn on.



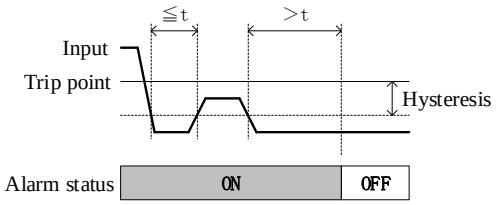
6. Delay for Turning off the Alarm:

A delay for turning off the alarm is adjustable from 0 to 99 seconds in steps of 1 second.

"High Alarm" mode with a delay for turning off the alarm set to "t" (s):

Duration of input below (trip point – hysteresis) > t:
Alarm turns off.

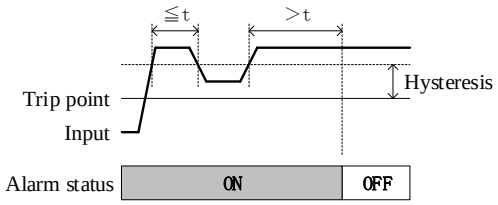
Duration of input below (trip point – hysteresis) ≤ t:
Alarm does not turn off.



"Low Alarm" mode with a delay for turning off the alarm set to "t" (s):

Duration of input above (trip point + hysteresis) > t:
Alarm turns off.

Duration of input above (trip point + hysteresis) ≤ t:
Alarm does not turn off.

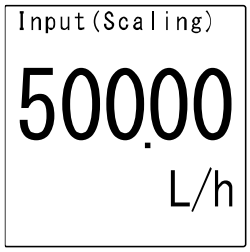


Display Screen

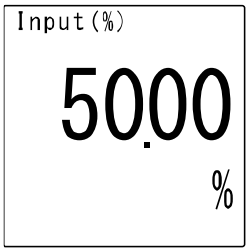
The Status Indicator Display on the front panel shows various settings and status of the unit.
(Note that the actual screen displays white text on a black background.)

[Standard Screen / Single Window]

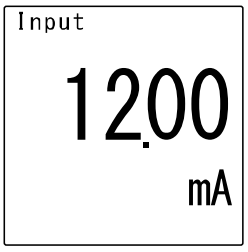
Scaled input value



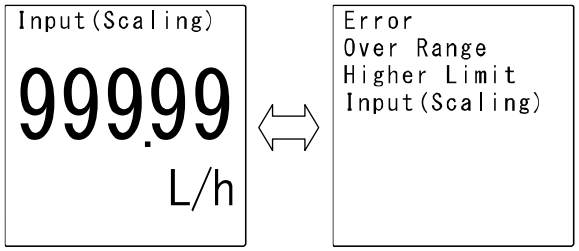
Input in percentage



Input in engineering unit



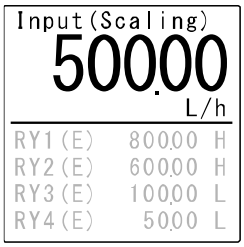
When an input error occurs
(display alternates between two screens)



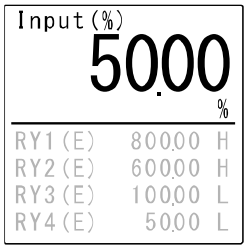
[Standard Screen / Dual Window]

Upper Window

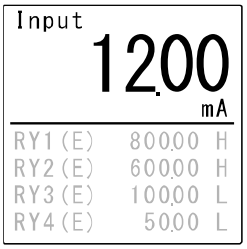
Scaled input value



Input in percentage

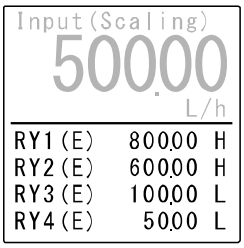


Input in engineering unit

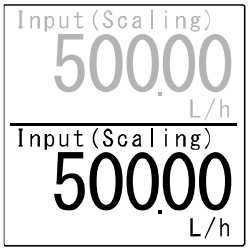


Lower Window

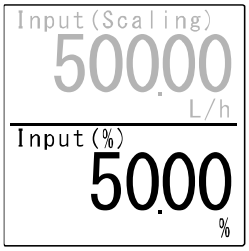
Alarm display



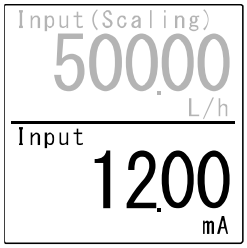
Scaled input value



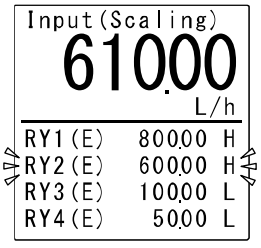
Input in percentage



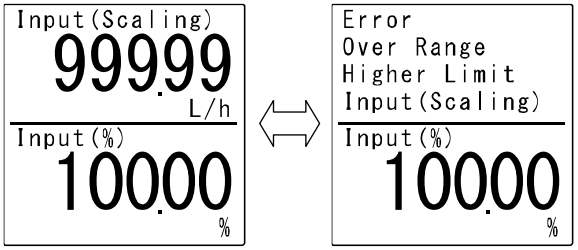
Input in engineering unit



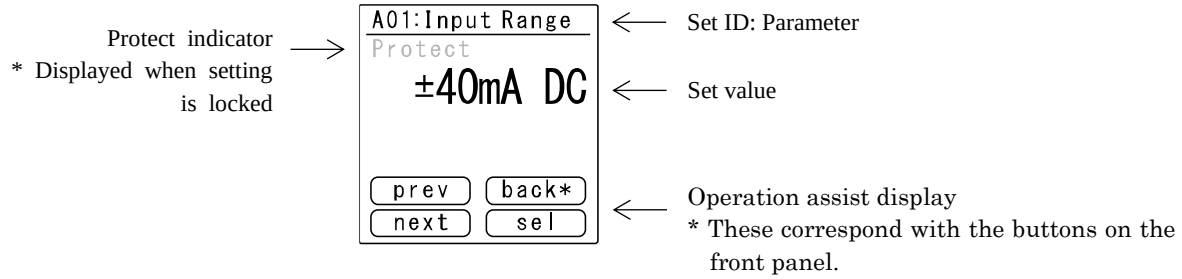
When there is an alarm
(Set point blinks)



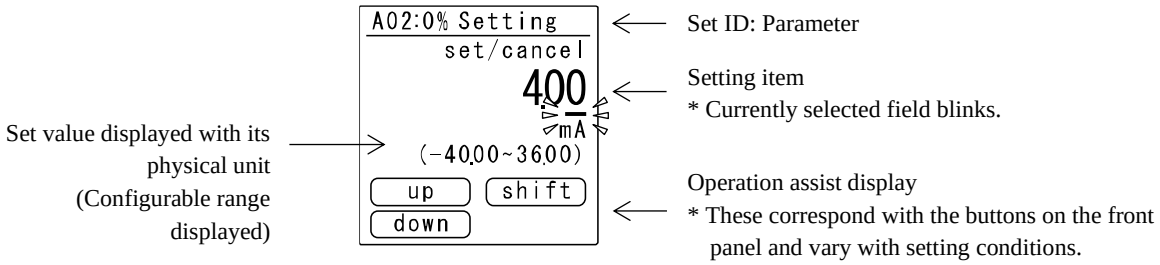
When an input error occurs
(only upper window display alternates between two screens)



[Parameter Selection Screen]

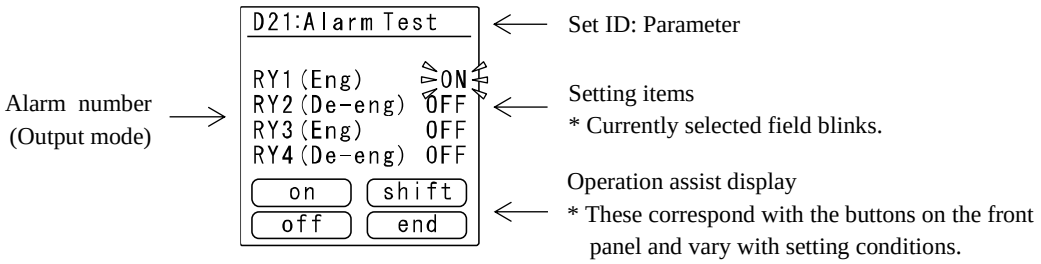


[Setting Screen]



[Other Screens]

(Ex.) Alarm test screen



● Status Indications

The status of the unit is indicated by the Status Indicator Display and Operating Status Indicator LED on the front panel.
If there are two or more errors, the Status Indicator Display indicates the errors in order, from top to bottom of the list below.
The Output Status Indicator LED of each relay comes on when the relevant relay is activated.

	Operating Status Indicator LED	Status Indicator Display		Remarks Troubleshooting
		Upper Screen	Lower Screen	
Initializing	OFF ○○○○ ○○○○	No display		–
CPU error				Push-button operation is disabled. Depending on error modes, the information displayed may vary. The unit requires repair if it does not recover from the error even after power cycling.
Initializing error	Blink *1 ●●●● ○○○○	No display		Push-button operation is disabled. The unit requires repair if it does not recover from the error even after power cycling.
Alarm testing	Blink *1 ●○●○ ●○●○	Screen for alarm testing		–
Memory error	Blink *1 ●●●● ○○○○	Settings		Execute “P_ID: D98 Initializing”, then reconfigure each item. The unit requires repair if it does not recover from the error even after the initialization.
Real input value over-range error		Error Over Range Higher Limit Input (%) *2	Settings	Set input to 105% or smaller.
Real input value under-range error		Error Over Range Lower Limit Input (%) *2	Settings	Set input to -5% or greater.
Scaled input value over-range error		Error Over Range Higher Limit Input (Scaling) *2	Settings	Set input to 99999 or smaller.
Scaled input value under-range error		Error Over Range Lower Limit Input (Scaling) *2	Settings	Set input to -9999 or greater.
Status Indicator Display error	Blink *1 ●●○○ ●●○○	No display		All processing except display continues. The unit requires repair if it does not recover from the error even after power cycling.
Limit Alarming	ON ●●●● ●●●●	Settings		–
Normal operation		Settings		–

*1: The circle symbols, ○ and ● show OFF and ON, respectively. Each symbol indicates a duration of 0.25s.
*2: Error information and settings (in normal operation) appear alternately on the display.

SETTING PARAMETERS

● A List of Setting Parameters

For details on each parameter, refer to the User's Manual, KRA0002483-H12-2.

Set ID (P_ID)	Parameter (Name Displayed)	Set Value/Range	Unit	Factory Default	Remarks
A01	Input range (Input Range)	±40mA DC ±10V DC ±2V DC ±200mV DC	-	±40mA DC	
A02	0% setting (0% Setting)	-40.00 to 36.00 -10.00 to 9.00 -2.000 to 1.800 -200.0 to 180.0	mA V V mV	4.00 1.00 0.000 0.0	
A03	100% setting (100% Setting)	-36.00 to 40.00 -9.00 to 10.00 -1.800 to 2.000 -180.0 to 200.0	mA V V mV	20.00 5.00 1.000 200.0	
A04	0% scaling (0% Scaling)	-9999 to 99999	-	0.00	A set value for A06 is reflected.
A05	100% scaling (100% Scaling)	-9999 to 99999	-	100.00	
A06	Scaling decimal point position (Dec Point)	0 to 4 decimal places	-	2 decimal places	
A07	Scaling unit (Scaling Unit)	Select from 120 kinds of unit. *User configurable	-	%	
B01 *1	Set memory number (Memory No.)	1 to 4	-	1	
B11 *1	RY1 mode of operation (RY1 Mode)	High/Low/ Disable	-	High	
B12 *1, 3	RY2 mode of operation (RY2 Mode)	High/Low/ Disable	-	High	
B13 *1	RY3 mode of operation (RY3 Mode)	High/Low/ Disable	-	Low	
B14 *1, 3	RY4 mode of operation (RY4 Mode)	High/Low/ Disable	-	Low	
B21 *1, 2	RY1 output mode (RY1 Out Mode)	Energized/ De-energized	-	Energized	
B22 *1, 2, 3	RY2 output mode (RY2 Out Mode)	Energized/ De-energized	-	Energized	
B23 *1, 2	RY3 output mode (RY3 Out Mode)	Energized/ De-energized	-	Energized	
B24 *1, 2, 3	RY4 output mode (RY4 Out Mode)	Energized/ De-energized	-	Energized	
B31 *1, 2	RY1 set-point (RY1 Setpoint)	-9999 to 99999	-	90.00	Set within the scaling setting range. A set value for A06 is reflected.
B32 *1, 2, 3	RY2 set-point (RY2 Setpoint)	-9999 to 99999	-	80.00	
B33 *1, 2	RY3 set-point (RY3 Setpoint)	-9999 to 99999	-	20.00	
B34 *1, 2, 3	RY4 set-point (RY4 Setpoint)	-9999 to 99999	-	10.00	

(Continued)

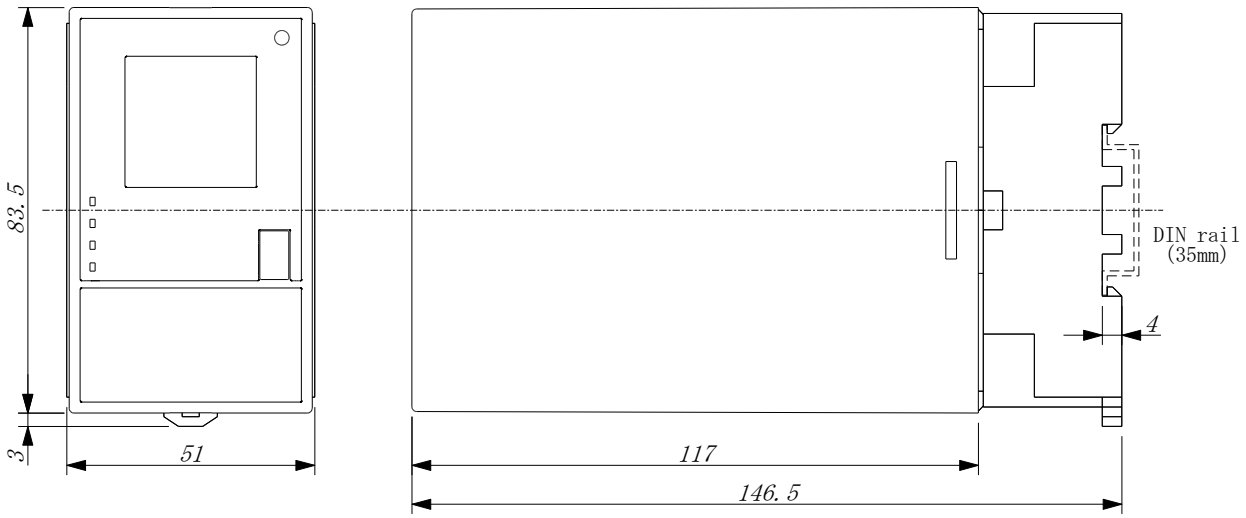
Set ID (P_ID)	Parameter (Name Displayed)	Set Value/Range	Unit	Factory Default	Remarks
C01 *2	RY1 hysteresis (RY1 Hys)	0 to 99999	-	1.00	A set value for A06 is reflected.
C02 *2, 3	RY2 hysteresis (RY2 Hys)	0 to 99999	-	1.00	
C03 *2	RY3 hysteresis (RY3 Hys)	0 to 99999	-	1.00	
C04 *2, 3	RY4 hysteresis (RY4 Hys)	0 to 99999	-	1.00	
C11 *2	RY1 ON delay time (RY1 ON Dly T)	0 to 99	Sec.	0	
C12 *2, 3	RY2 ON delay time (RY2 ON Dly T)	0 to 99	Sec.	0	
C13 *2	RY3 ON delay time (RY3 ON Dly T)	0 to 99	Sec.	0	
C14 *2, 3	RY4 ON delay time (RY4 ON Dly T)	0 to 99	Sec.	0	
C21 *2	RY1 OFF delay time (RY1 OFF Dly T)	0 to 99	Sec.	0	
C22 *2, 3	RY2 OFF delay time (RY2 OFF Dly T)	0 to 99	Sec.	0	
C23 *2	RY3 OFF delay time (RY3 OFF Dly T)	0 to 99	Sec.	0	
C24 *2, 3	RY4 OFF delay time (RY4 OFF Dly T)	0 to 99	Sec.	0	
C30	Power-on delay time (PWR ON Dly T)	0 to 99	Sec.	5	
D01	Display settings (Upper window) (Disp Set(T))	- Input (Scaling) - Input (%) - Input	-	Input (Scaling)	
D02	Display settings (Lower window) (Disp Set(B))	- Alarm - Input (Scaling) - Input (%) - Input - None	-	Alarm	Single window mode applies when “None” is selected.
D10	Display brightness (Disp Bright)	1 (dark) to 4 (bright)	-	2	
D11	Display turn-off time (Disp OFF T)	0 (stays ON) / 1 to 60	Min.	10	
D20	Alarm holding (Alarm Hold)	Enable/Disable	-	Disable	
D21	Alarm test (Alarm Test)	Nop/Test Run	-	Nop	
D98	Initializing (Reset Param)	Nop/Reset	-	Nop	
D99	Setting Protection (Protect)	Lock/Unlock	-	Lock	

*1: Each of the “Set memory numbers (set ID: B01)” 1 to 4 has set values, “B1x” to “B3x”. (Up to four combinations of set values “B1x” to “B3x” can be saved in the configuration memory.)

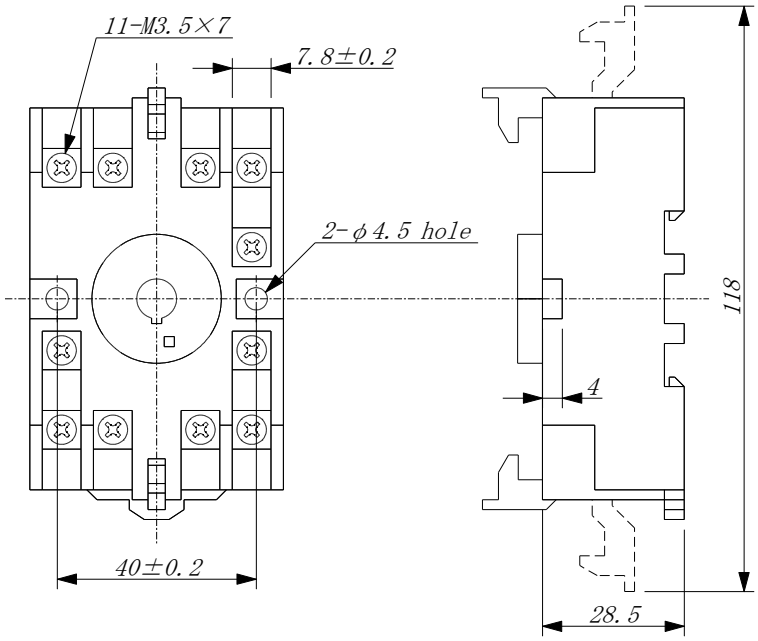
*2: If RYx mode of operation (set ID: B1x) is set to “Disable”, the items defined by the corresponding alarm number, “B2x” to “C2x” will not be displayed.

*3: For the form C contact output, both RY2 and RY4 setting parameters are not displayed.

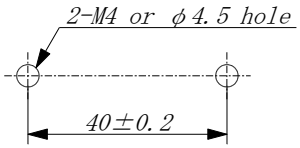
DIMENSIONAL OUTLINE DRAWINGS



* Mountable side by side without clearance



[Drilling Dimension for Wall Mounting]



(Unit: mm)

DEFAULT SETTINGS

If you specify a set value for each of the setting parameters when ordering, your product will be preconfigured to your specification and shipped. To specify, use Specification Order Form (KRA0002483-H20).
Otherwise, the product will be configured to our factory default settings.