Product Specification Sheet Model: MS3700DV

Slim Plug-In Voltage Divider

DESCRIPTION

The MS3700DV is a slim plug-in voltage divider that divides high voltage direct current signals and provides a single output.

ORDERING CODE

MS3700DV - ☐

Model

Division Ratio

1: 1/600 (Standard)
2: Other division ratios

Options

No code: None
/Z: Allowable input voltage: ±1200V max.
/H: Polyurethane conformal coating
/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.
(e.g.) MS3700DV-1

SPECIFICATIONS

●INPUT SECTION

Input Resistance	Approx. 1.2MΩ (Standard)
Allowable Input Voltage	±600V DC max., continuous.
Ratios Available	1/300 to 1/1000 (Standard: 1/600)

●OUTPUT SECTION

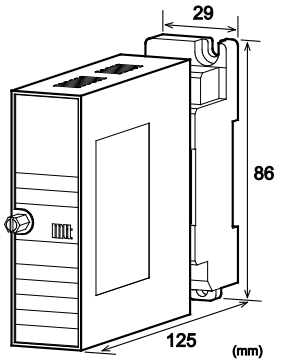
Output Resistance	Approx. 2kΩ (Standard)
Output Voltage	Input voltage × Division ratio

●PERFORMANCE

Accuracy Rating	Better than ±0.2% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.05% of span per 10°C change in ambient.
Insulation Resistance	100MΩ min. (@ 500V DC) between [input, output] and ground.
Dielectric Strength	2100V AC for 1 minute between [input, output] and ground. (Cutoff current: 0.5mA)
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended



External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 70g max. Socket: 60g max.

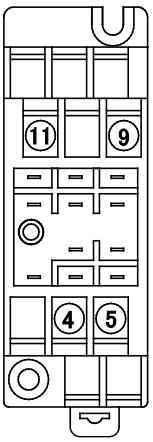
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

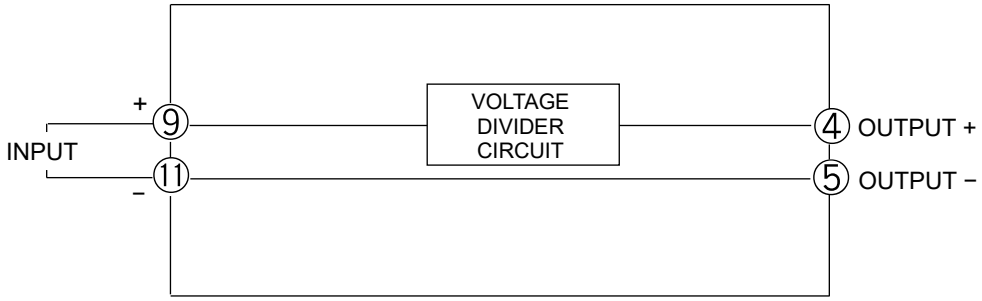
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013

TERMINAL ASSIGNMENTS



④	+ OUTPUT
⑤	− OUTPUT
⑨	+ INPUT
⑪	− INPUT

BLOCK DIAGRAM



Product Specification Sheet Model: MS3701

Slim Plug-In Thermocouple Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3701 is a slim, plug-in thermocouple temperature transmitter that converts input signals from a thermocouple into commonly used DC signals and provides isolated single or dual output.

ORDERING CODE

MS3701 - □ - □ □ □

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

No code: None
The codes are the same as for Output 1.

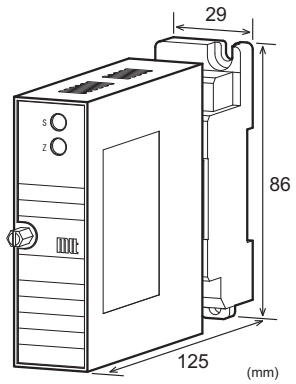
Note 1: When a voltage output is selected for Output 1, a current output cannot be selected for Output 2.
Note 2: When the code A (4 to 20mA) is selected for both of the two outputs, the output load will be 550Ω maximum for Output 1 and 350Ω maximum for Output 2.
Note 3: Upscale burnout protection is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

Options

No code: None
/D: Downscale burnout protection
/K: Fast response (0 to 90% response time: 10ms max.)
/L: Dual current output with high output load
*Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)

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

CE



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.) MS3701-A-KAA (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": MS3701-A-0AA (WRe5-26 0 to 2000°C)
For an output code of "0": MS3701-A-K60 (0 to 500°C / Output: 2 to 5V)
For an option code of "X": MS3701-A-K66/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.5W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

Input Resistance	With or without power: 1MΩ min.
Allowable Signal Source Resistance	1kΩ max.
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

<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%

Note: 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
Wiring	M3.5 screw terminal connection (with drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

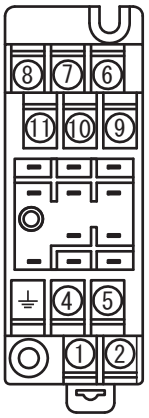
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

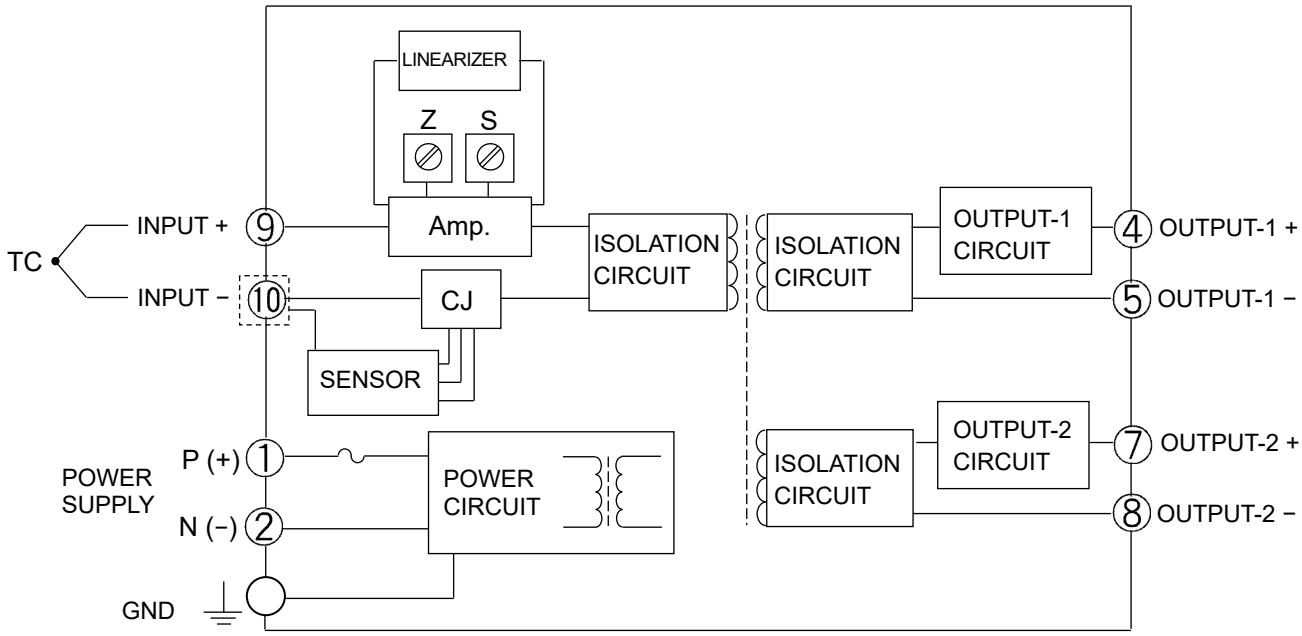
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

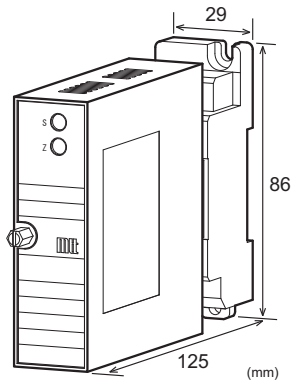


Product Specification Sheet Model: MS3701F

Slim Plug-In Thermocouple Temperature Transmitter with Isolated Single/Dual Output (Fast Response Model)

DESCRIPTION

The MS3701F is a slim, plug-in thermocouple temperature transmitter that converts input signals from a thermocouple into commonly used DC signals and provides isolated single or dual output. This model features a fast response time of 500µs (0-90% response).



ORDERING CODE

MS3701F - □ - □ □ □

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

No code: None
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
/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.) MS3701F-A-KAA (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": MS3701F-A-0AA (WRe5-26 0 to 2000°C)
For an output code of "0": MS3701F-A-K60 (0 to 500°C / Output: 2 to 10V)
For an option code of "X": MS3701F-A-K66/X (0 to 500°C / 0 to 90% response time: 1ms 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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.5W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

Input Resistance	With or without power: 1MΩ min.
Allowable Signal Source Resistance	1kΩ max.
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

<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: 4mV 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, min.	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%

Note: 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	500μs 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

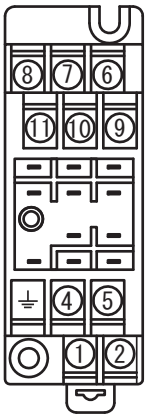
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

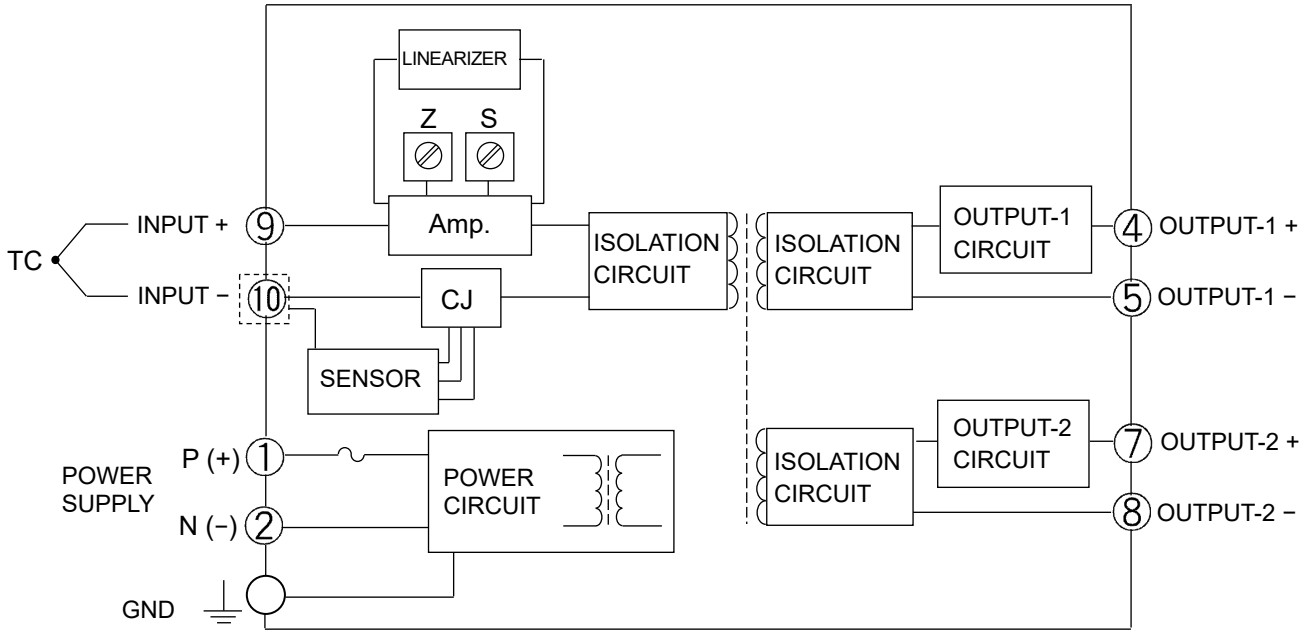
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3702

Slim Plug-In RTD Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3702 is a slim, plug-in RTD temperature transmitter that converts input signals from an RTD into commonly used DC signals and provides isolated single or dual output.

ORDERING CODE

MS3702 - □ - □ □ □

Model

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

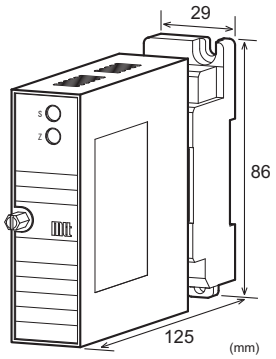
Input
P1: Pt 100Ω **J**: JPt 100Ω
P5: Pt 50Ω **N**: Ni 508.4Ω
Y: Other than those above.

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

Output 2
No code: None
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.)
/L: Dual current output with high output load
* Note subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

CE



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.) MS3702-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": MS3702-A-YAA (Input: Cu 10Ω at 0°C / 0 to 100°C)
For an output code of "0": MS3702-A-P106 (0 to 150°C / Output: 2 to 5V)
For an option code of "X": MS3702-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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.6W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

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

Ranges Available
<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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

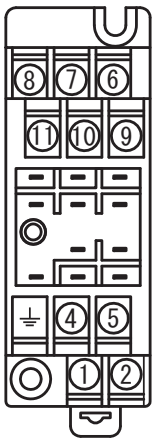
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

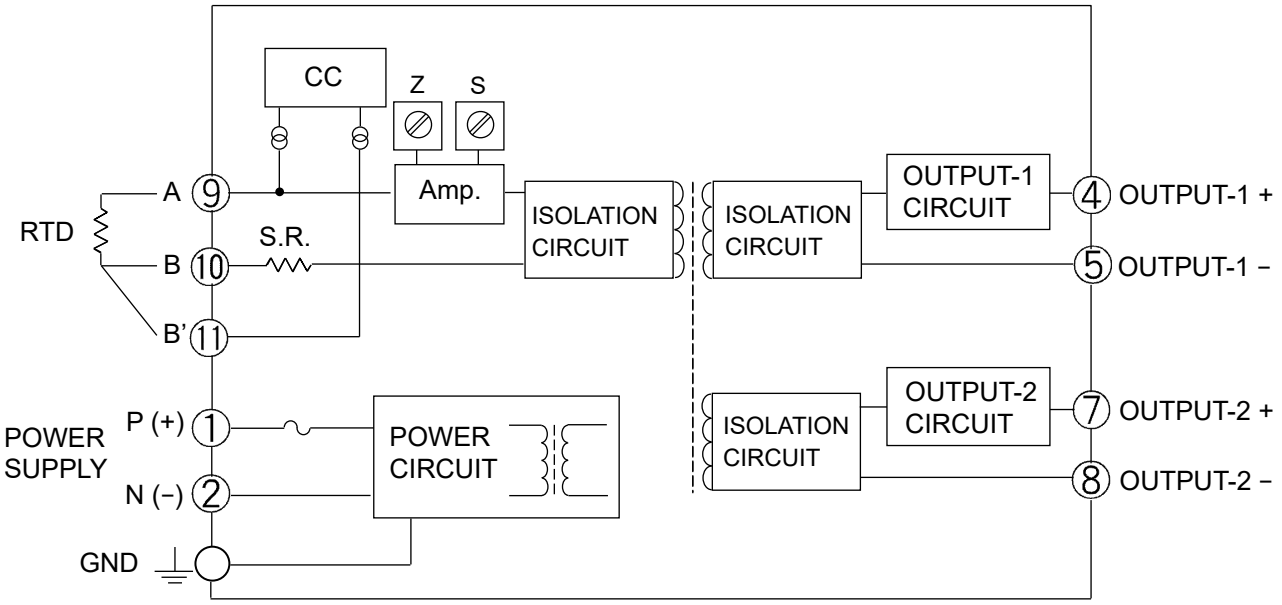
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

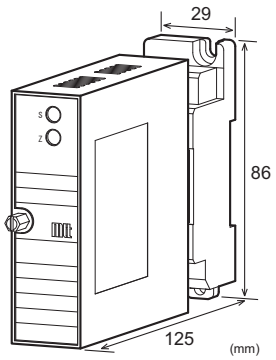


Product Specification Sheet Model: MS3702-01

Slim Plug-In 4-Wire RTD Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3702-01 is a slim, plug-in 4-wire RTD temperature transmitter that converts input signals from a 4-wire RTD into commonly used DC signals and provides isolated single or dual output.



ORDERING CODE

MS3702 -01 - □ - □ □ □

Model

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

Input
P1: Pt 100Ω **J**: JPt 100Ω
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
No code: None
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.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3702-01-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": MS3702-A-YAA (Input: Cu 10Ω at 0°C / 0 to 100°C)
For an output code of "0": MS3702-A-P106 (0 to 150°C / Output: 2 to 5V)
For an option code of "X": MS3702-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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.6W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

Excitation Current	Approx. 1mA with Pt for 0 to 100°C
Lead Wire Resistance	50Ω max. per wire

Ranges Available
<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).

<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	

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%

Note: 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

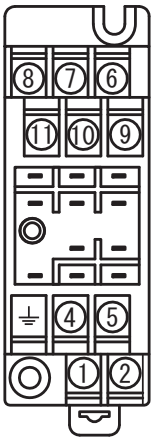
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

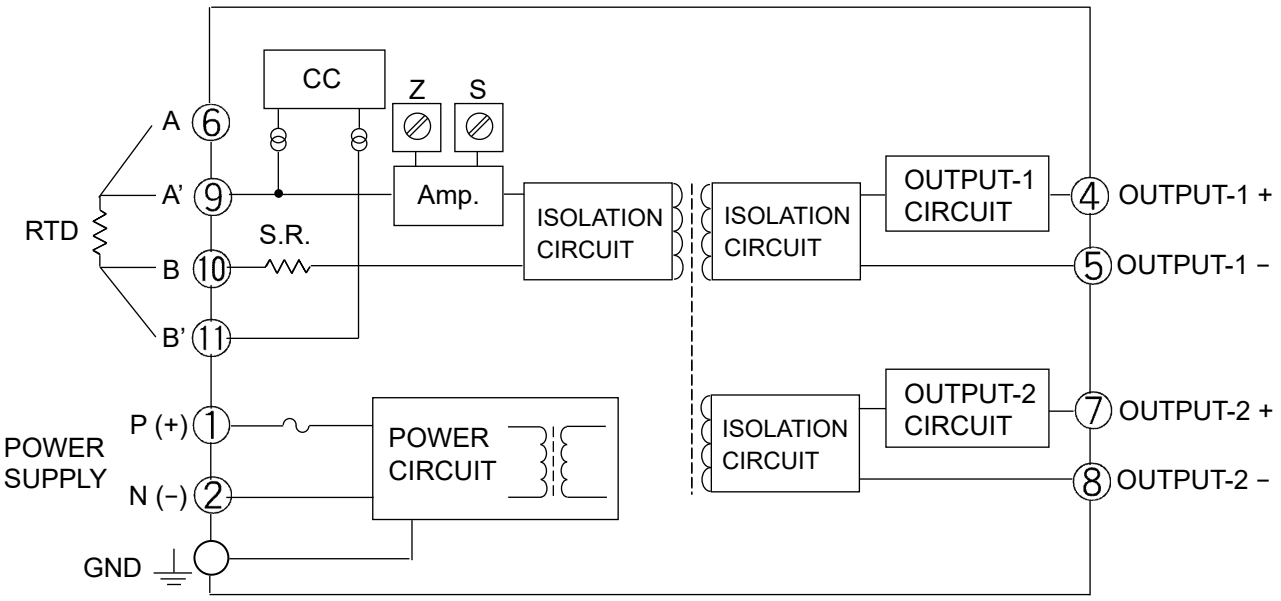
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

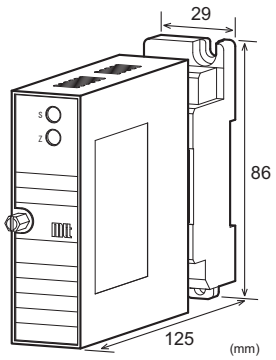


Product Specification Sheet Model: MS3702B

Slim Plug-In RTD Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3702B is a slim, plug-in RTD temperature transmitter that converts input signals from an RTD into commonly used DC signals and provides isolated single or dual output. This model is intended for measurement of narrow temperature spans, e.g. 30 to 50°C (Pt 100Ω input). It is therefore recommended to choose this for applications where a measuring temperature span is small.



ORDERING CODE

MS3702B - □ - □ □ □

Model

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

Input
- **P1**: Pt 100Ω
- **J**: JPt 100Ω
- **P5**: Pt 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
- **No code**: None
- **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
- **/L**: Dual current output with high output load
  * Not subject to CE approval.
  (OUT-1: 750Ω / OUT-2: 550Ω)
- **/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.) MS3702B-A-P1A6 (0 to 30°C)

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

Another Ordering Example:
For an output code of "0": MS3702B-A-P106 (0 to 30°C / Output: 2 to 5V)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.6W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

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

Ranges Available

RTD	Temperature Range (°C)	Input Span	Input Bias
Pt 100Ω	-200 to +850	30 to 50°C	Up to 4x the input span.
JPt 100Ω	-200 to +500	30 to 50°C	
Pt 50Ω	-200 to +600	60 to 100°C	

Input Spec Ex.: For Pt 100Ω (60 to 90°C), the input span is 30°C and the bias 60°C (2x the span).

●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%

Note: 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 ±1.0% of span per 10°C change in ambient.
Response Time	240ms 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

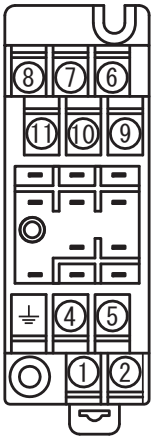
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

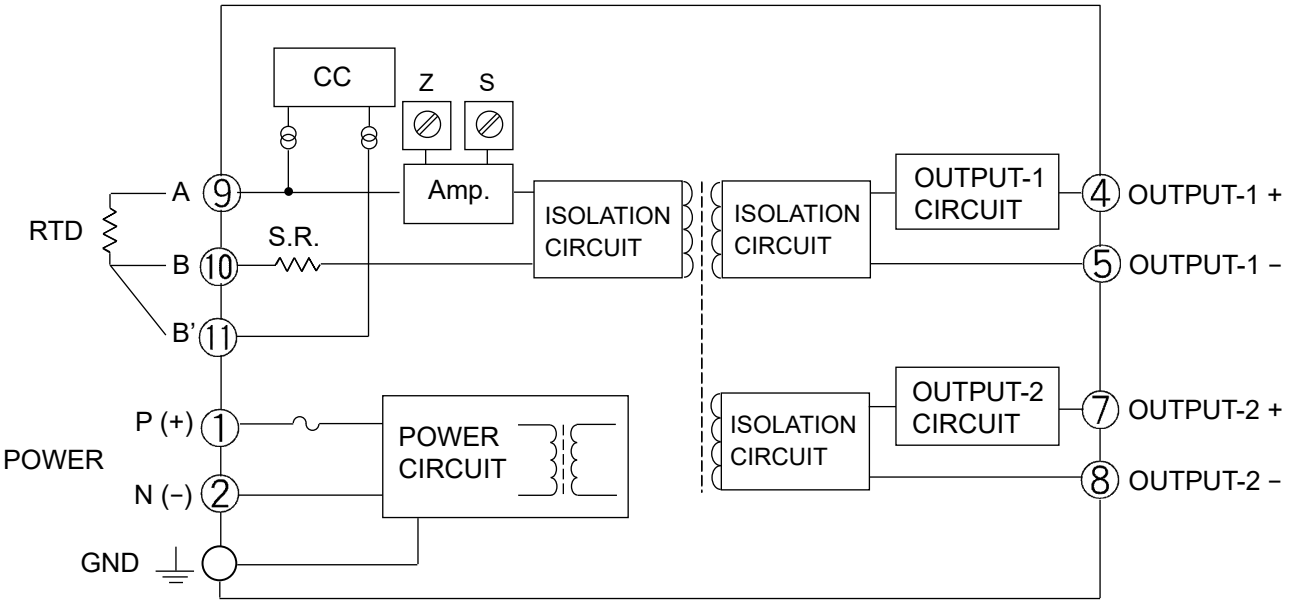
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3703

Slim Plug-In Millivolt Isolator with Isolated Single/Dual Output

DESCRIPTION

The MS3703 is a slim, plug-in millivolt (mV) isolator that converts mV input signals from sensors or other devices into commonly used DC signals and provides isolated single or dual output.

ORDERING CODE

MS3703 - □ - □ □ □

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

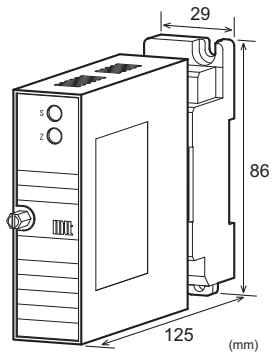
Output 2
- **No code**: None
- **The codes are the same as for Output 1.**

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.)
- **/L**: Dual current output with high output load
  * Not subject to CE approval.
  (OUT-1: 750Ω / OUT-2: 550Ω)
- **/H**: Polyurethane conformal coating
- **/X**: Others (Special order)

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

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3703-A-266

Other Ordering Examples:
For an input code of "0": MS3703-A-066 (Input: 0 to 75mV)
For an output code of "Z": MS3703-A-2Z6 (Output: 8 to 20mA)
For an option code of "X": MS3703-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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.0VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.6W max	6.0W max

●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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

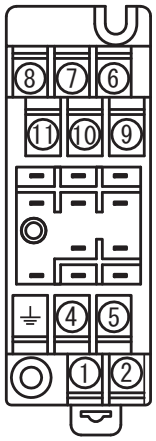
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

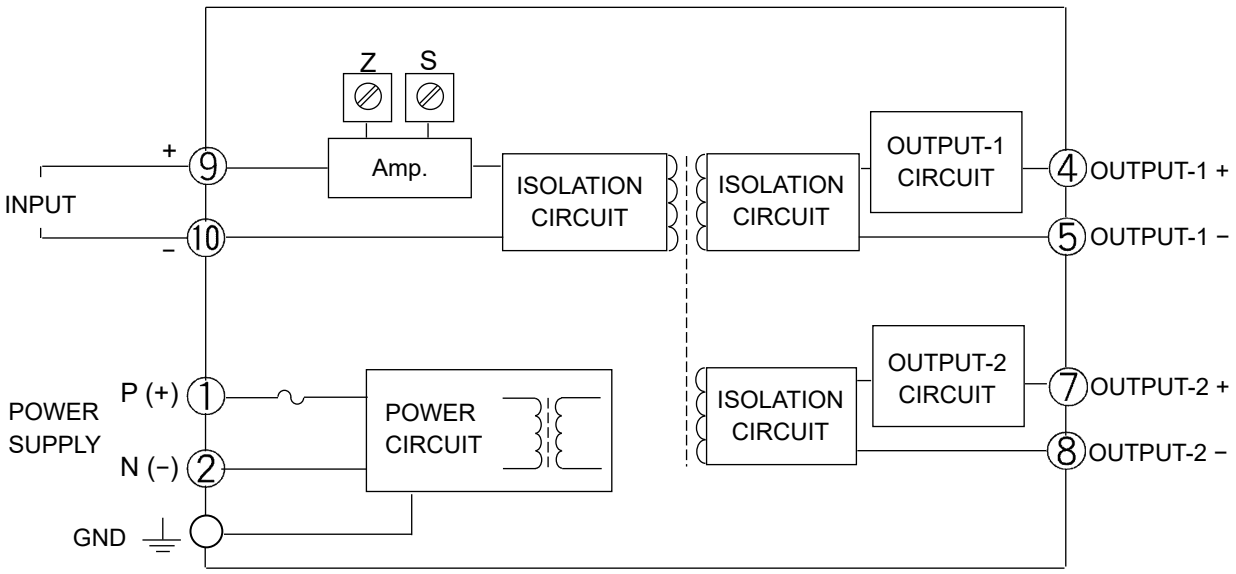
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3704

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

DESCRIPTION

The MS3704 is a slim, plug-in high-level signal conditioner (isolator) that converts DC current or voltage signals into commonly used DC signals and provides isolated single or dual output.

ORDERING CODE

MS3704 - □ - □ □ □

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

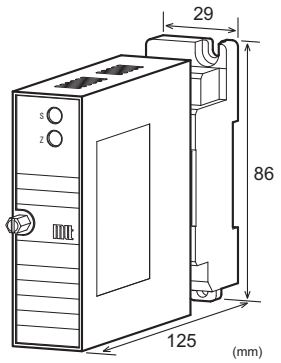
No code: None
The codes are the same as for Output 1.

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.)
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3704-A-AA6

Other Ordering Examples:
For an input code of "Z": MS3704-A-ZAA (Input: 8 to 20mA)
For an output code of "0": MS3704-A-A60 (Output: 2 to 5V)
For an option code of "X": MS3704-A-66/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.0VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.6W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

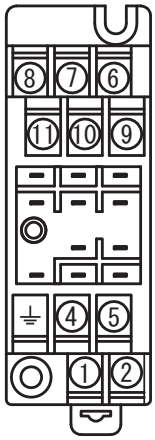
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

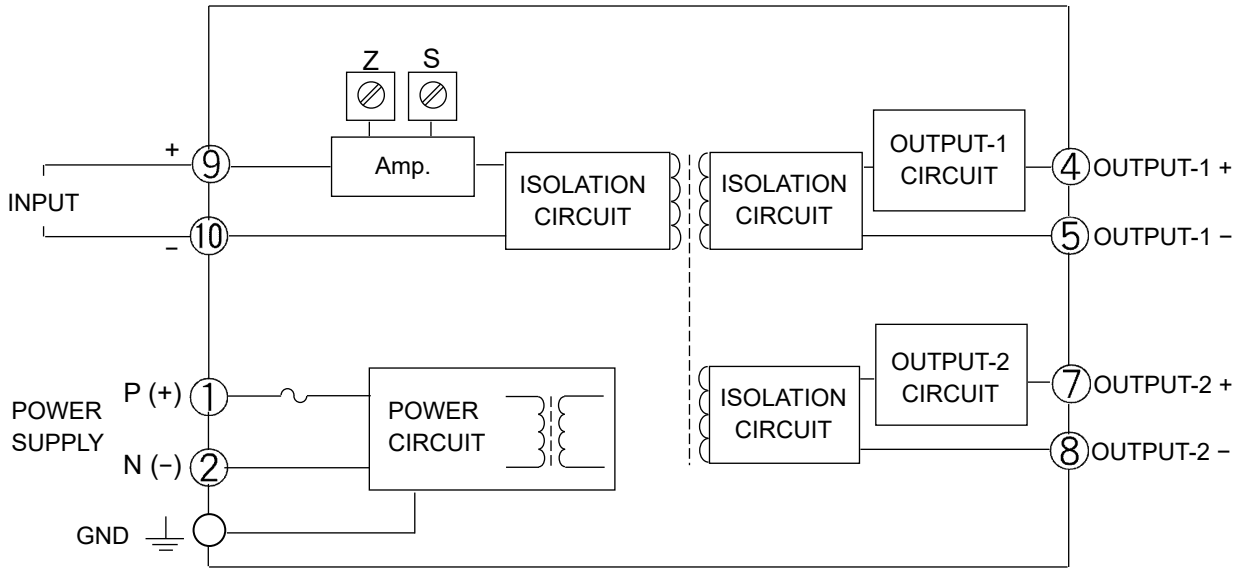
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

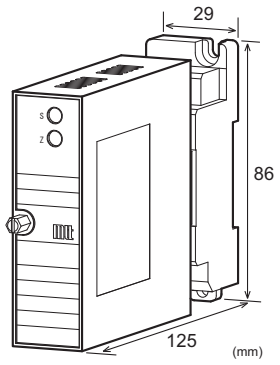
BLOCK DIAGRAM



Slim Plug-In High-Level Signal Conditioner (Isolator) with Isolated Single/Dual Output (11-27V DC Powered)

DESCRIPTION

The MS3704-D1 is a slim, plug-in high-level signal conditioner (isolator) that converts DC current or voltage signals into commonly used DC signals and provides isolated single or dual output. This model operates with an 11-27V DC power supply.



ORDERING CODE

MS3704 - D1 - □ □ □

Model

Power Supply
11 to 27V 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

3: 0 to 1V DC
4: 0 to 10V DC
5: 0 to 5V DC
6: 1 to 5V DC

*1: Shunt resistor 50Ω

Output 1

A: 4 to 20mA DC
D: 0 to 20mA DC

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

Output 2

No code: None
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 Ouput 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.) MS3704-D1-AA6

Another Ordering Example:
For an option code of "X": MS3704-D1-66/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 Requirement	11 to 27V DC
Power Sensitivity	Better than ±0.1% of span.
Power Line Fuse	160mA fuse is installed (standard).
Power Consumption	
Power	11 to 27V DC
Single Output	0.8W max.
Dual Output	1.2W max.

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
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)	

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)	4-20mAsingle 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.)	

●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

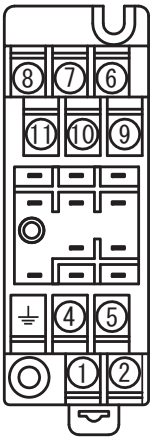
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

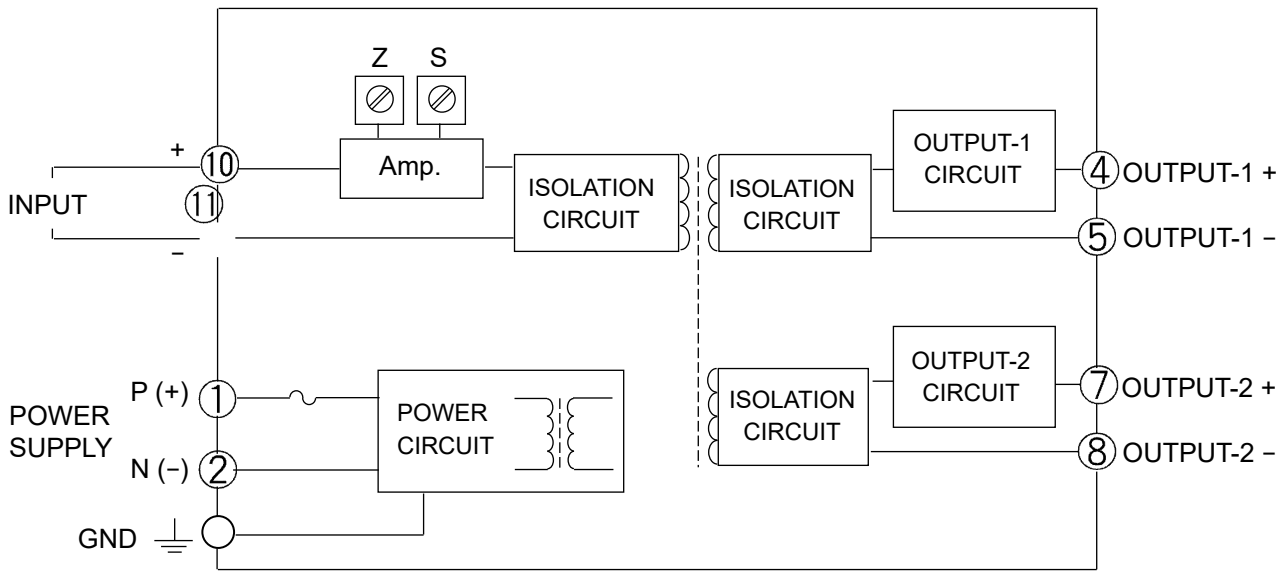
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

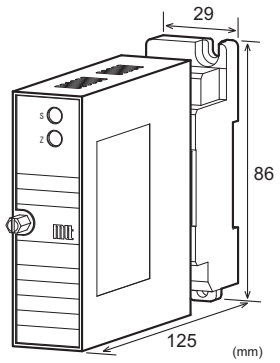


Product Specification Sheet Model: MS3704HI MS3700

Slim Plug-In High-Level Signal Conditioner (Isolator) with Isolated Single Output (High Output Load Model)

DESCRIPTION

The MS3704HI is a slim, plug-in high-level signal conditioner (isolator) that converts DC current or voltage signals into commonly used DC current signals and provides an isolated single output. This model features connection of output load resistance up to 1kΩ.



ORDERING CODE

MS3704HI - □ - □ □

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

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

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.) MS3704HI-A-AA

Other Ordering Examples:
For an input code of "Z": MS3704HI-A-ZA (Input: 8 to 20mA)
For an output code of "Z": MS3704HI-A-AZ (Output: 2 to 10mA)

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 is installed (standard).		
Power Consumption			
Power	100-240V AC 6.0VA max	24V DC 1.5W max	100-240V DC 2.5W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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 200mAand (*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		
Current Output (DC)	4 to 20mA	1kΩ 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
Output Range (DC)	0 to 20mA
Output Span (DC)	4 to 20mA
Output Bias	0 to 100%

Note: For current output signals, the accuracy of any current output smaller than 0.1mA is not guaranteed.
Output Spec. Ex.: For 4 to 20mA output, the output span is 16mA and the bias +25%.

●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	3-way isolation between input, output 1, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output, power, and ground.
Dielectric Strength	Input / Output / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 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

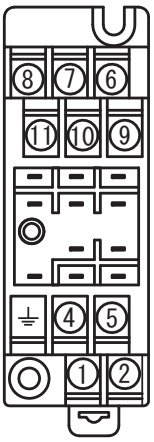
●PHYSICAL

Installation	Wall/DIN rail mounting Note: Avoid direct contact between units. (It is recommended that a space of at least 10mm should be maintained.)
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

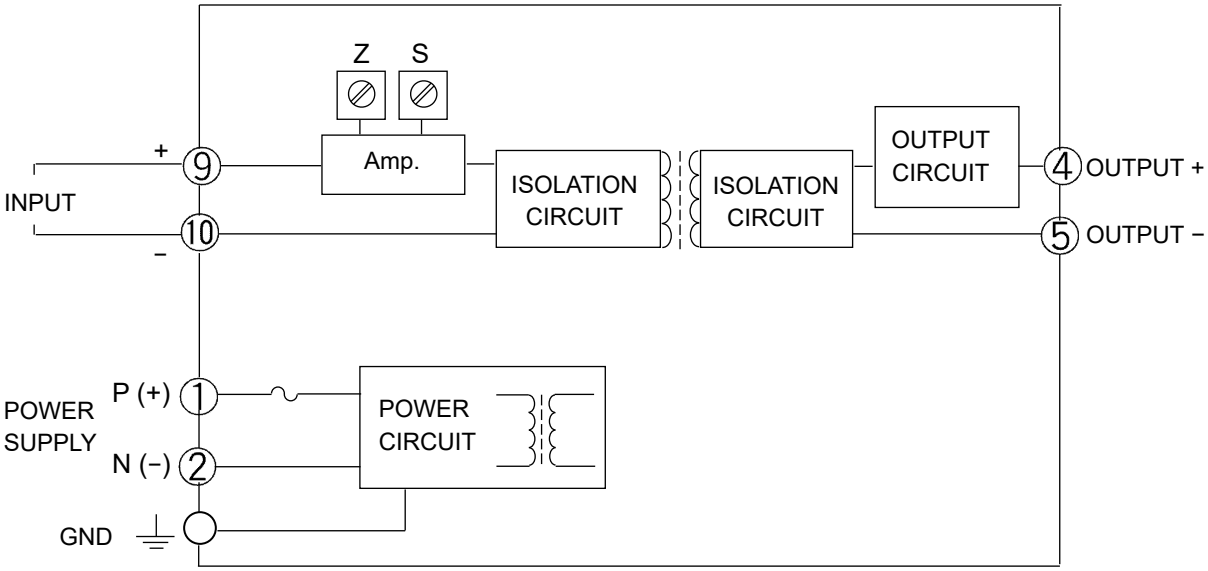
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3704IS

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

DESCRIPTION

The MS3704IS is a slim, plug-in high-level signal conditioner (isolator) that converts typical standard process signals, i.e. 1 to 5V DC voltage signals or 4 to 20mA DC current signals, into 1 to 5V voltage signals or 4 to 20mA current signals and provides an isolated single output.

ORDERING CODE

MS3704IS - □ - □ □

Model

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

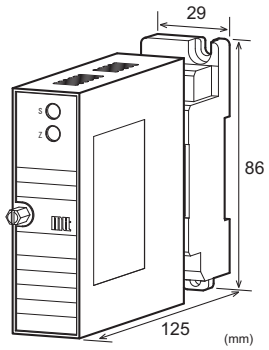
Input
A: 4 to 20mA DC **6**: 1 to 5V DC

Output
A: 4 to 20mA DC **6**: 1 to 5V DC

Options
No code: None
/H: Polyurethane conformal coating

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.
(e.g.) MS3704IS-A-AA



CE

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 is installed (standard).		
Power Consumption			
Power	100-240V AC 4.0VA max.	24V DC 1.2W max.	100-240V DC 4.8W max.

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA	250Ω
Allowable Input Voltage		
Voltage Input	30V DC max., continuous.	
Current Input	40mA DC max., continuous.	

●OUTPUT SECTION

Maximum Output Load	
Voltage Output (DC)	2mA max.
Current Output (DC)	750Ω 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.)

●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	3-way isolation between input, output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output, power, and ground.

Dielectric Strength	Input / Output / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

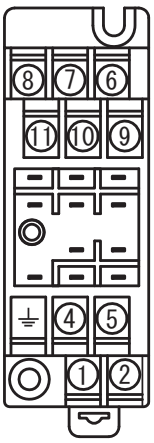
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

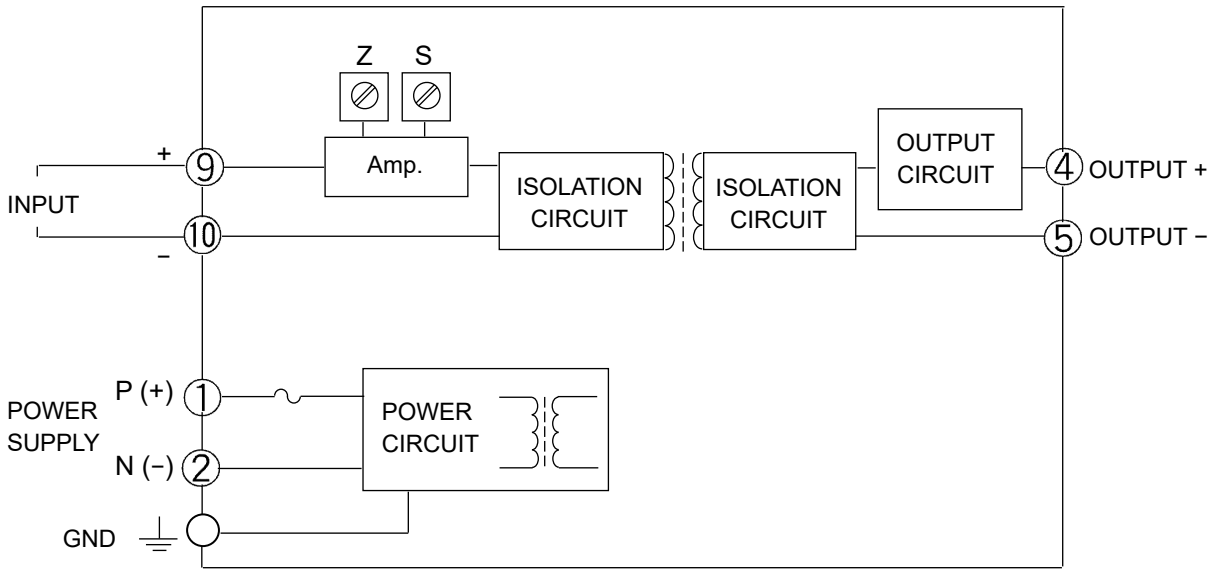
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1/EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

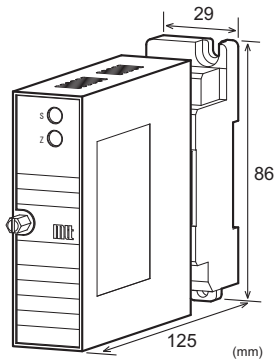


Product Specification Sheet Model: MS3704-S

Slim Plug-In High-Level Signal Conditioner (Isolator) with Isolated Single/Dual Output (24V AC-Powered)

DESCRIPTION

The MS3704-S is a slim, plug-in high-level signal conditioner (isolator) that converts DC current or voltage signals into commonly used DC signals and provides isolated single or dual output. This model operates with a 24V AC power supply.



ORDERING CODE

MS3704-S-□□□

Model

Power Supply

S: 24V AC (50 to 60Hz)

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

No code: None
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.) MS3704-S-AA6

Other Ordering Examples:
For an input code of "Z": MS3704-S-ZAA (Input: 8 to 20mA)
For an output code of "0": MS3704-S-A60 (Output: 2 to 5V)
For an option code of "X": MS3704-S-66/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 Requirement	24V AC: 24V AC±15% (47 to 63Hz)
Power Sensitivity	Better than ±0.1% of span.
Power Line Fuse	160mA fuse is installed (standard).
Power Consumption	
Single Output	2.0VA max.
Dual Output	2.5VA max.

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
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 200mAand (*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

Maximum 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

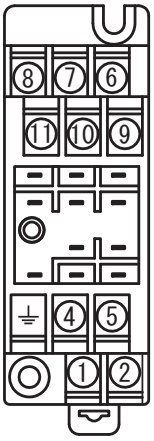
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

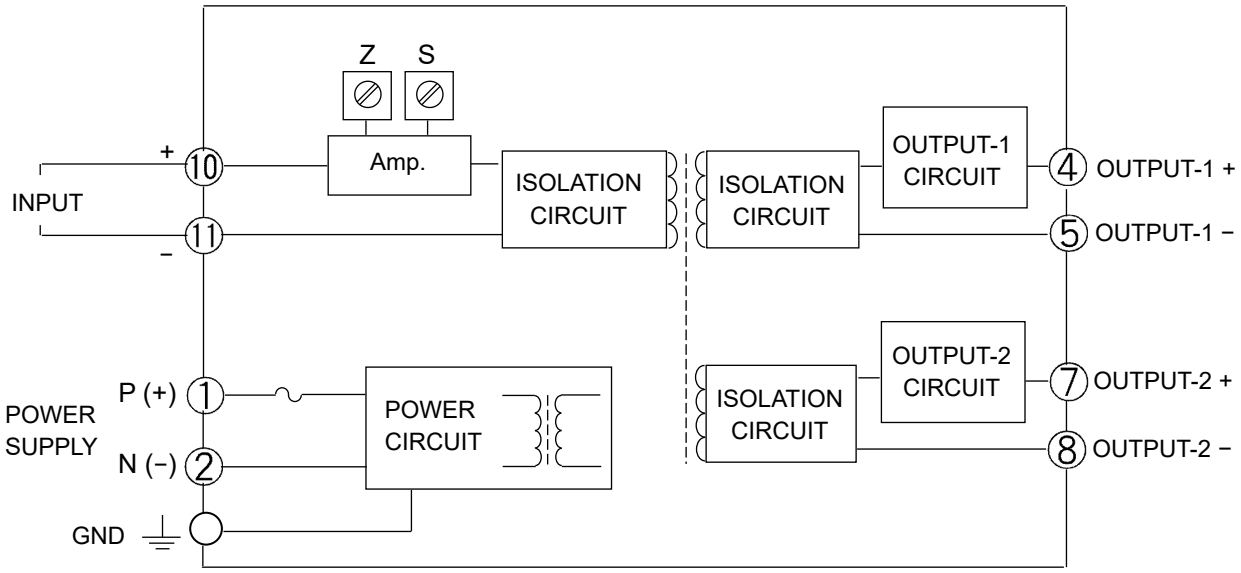
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3704SW

Slim Plug-In High-Level Signal Conditioner (Isolator) with Isolated Dual Output (I/O Switch-Selectable)

DESCRIPTION

The MS3704SW is a slim, 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. This model features built-in input and output selector switches, which allow users to preset either 1-5V or 4-20mA input and output signals.

ORDERING CODE

MS3704SW- ☐

Model

Power Supply

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

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.) MS3704SW-A

Another Ordering Example:
For an option code of "X": MS3704SW-A/X (0-90% response time: 200ms 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 is installed (standard).

Power Consumption

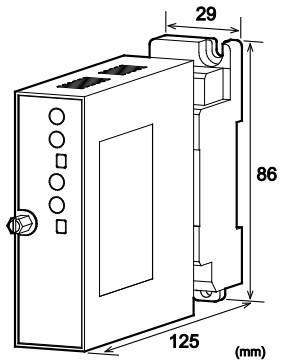
Power	100-240V AC	24V DC	100-240V DC
	6.5VA max.	2.0W max.	2.5W max.

●INPUT SECTION

Input Signal	1 to 5V or 4 to 20mA Selectable by the rear-accessible switch.
Input Resistance	
Voltage Input (DC)	1MΩ min. with or without power.
Current Input (DC)	250Ω
Allowable Input Voltage	
Voltage Input	30V DC max., continuous.
Current Input	40mA DC max., continuous.

●OUTPUT SECTION

Output Signal	1 to 5V or 4 to 20mA Selectable by the front-accessible switch.



CE

Allowable Output Load		
Voltage Output (DC)	Output 1:	2mA max.
	Output: 2	2mA max.
Current Output (DC)	Output 1:	750Ω max.
	Output: 2	350Ω max.
Zero Adjustment	Output 1:	Approx. ±5% of span.
	Output: 2	Approx. ±5% of span.
	(Adjustable by the front-accessible trimmer.)	
Span Adjustment	Output 1:	Approx. ±5% of span.
	Output: 2	Approx. ±5% of span.
	(Adjustable by the front-accessible trimmer.)	
Burnout Protection	Selectable between upscale and downscale only for voltage input. (Downscale for current input)	

●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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

INPUT SETTING

Input: 1 to 5V
Burnout: Upscale

1	2	3
ON	OFF	OFF

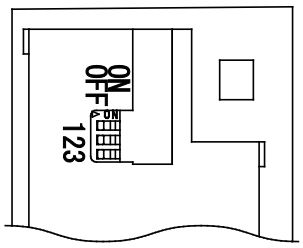
Input: 1 to 5V
Burnout: Downscale

1	2	3
OFF	ON	OFF

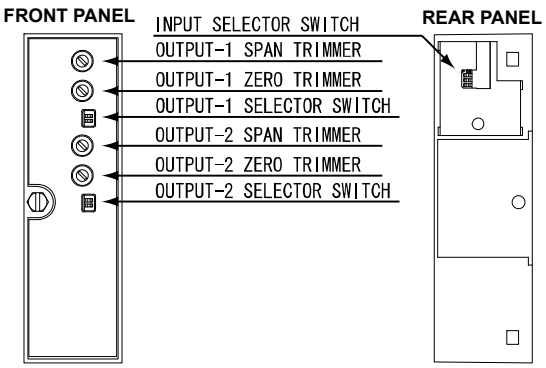
Input: 4 to 20mA

1	2	3
OFF	OFF	ON

REAR PANEL



FRONT & REAR PANEL COMPONENTS



OUTPUT SETTING

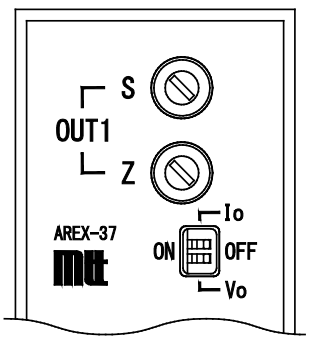
Output: 4 to 20mA

Io	Vo
ON	OFF

Output: 1 to 5V

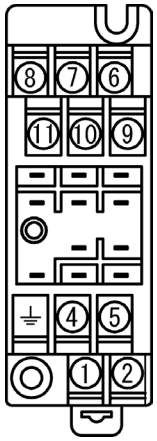
Io	Vo
OFF	ON

FRONT PANEL



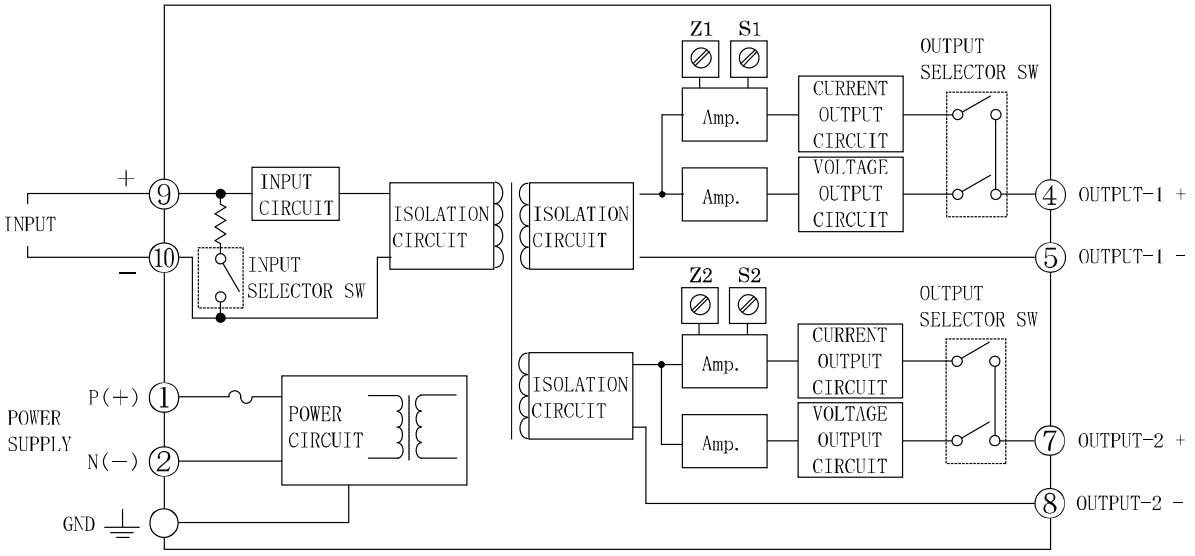
Note: Unless otherwise requested, both input and output will be set to 4 to 20mA.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

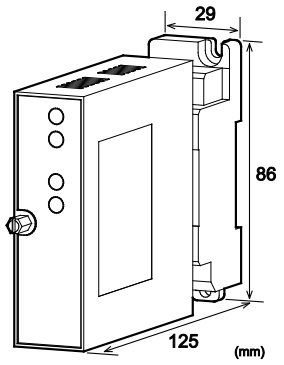


Product Specification Sheet Model: MS3704W

Slim Plug-In High-Level Signal Conditioner (Isolator) with Isolated Dual Output (Outputs 1&2 Separately Adjustable)

DESCRIPTION

The MS3704W is a slim, 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. This model features separate adjustment of the two outputs (Output 1 & Output 2).



ORDERING CODE

MS3704W - □ - □ □ □

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
- **D**: 0 to 20mA DC
- **3**: 0 to 1V DC
- **4**: 0 to 10V DC
- **5**: 0 to 5V DC
- **6**: 1 to 5V DC

Output 1
- **A**: 4 to 20mA DC
- **D**: 0 to 20mA DC
- **5**: 0 to 5V DC
- **6**: 1 to 5V DC

Output 2
The codes are the same as for Output 1.

Note: When 4 to 20mA or 1 to 5V is selected for input, 0 to 20mA or 0 to 5V cannot be selected for both outputs.

Options
- **No code**: None
- **/H**: Polyurethane conformal coating
- **/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.
(e.g.) MS3704W-A-AA6

Another Ordering Example:
For an option code of "X": MS3704W-A-666/X (0-90% response time: 200ms 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 is installed (standard).		
Power Consumption			
Power	100-240V AC 6.5VA max	24V DC 2.0W max	100-240V DC 2.5W max

●INPUT SECTION

Input Resistance	
Voltage Input (DC)	1MΩ min. with or without power.
Current Input (DC)	250Ω
Allowable Input Voltage	
Voltage Input	30V DC max., continuous.
Current Input	40mA DC max., continuous.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	Output 1:	2mA max.
	Output 2:	2mA max.
Current Output (DC)	Output 1:	750Ω max.
	Output 2:	350Ω max.
Zero Adjustment	Output 1:	Approx. ±5% of span.
	Output 2:	Approx. ±5% of span.
	(Adjustable by the front-accessible trimmers.)	
Span Adjustment	Output 1:	Approx. ±5% of span.
	Output 2:	Approx. ±5% of span.
	(Adjustable by the front-accessible trimmers.)	

●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

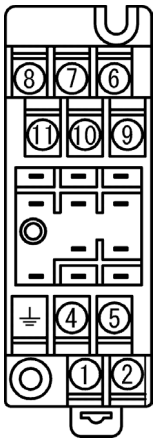
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

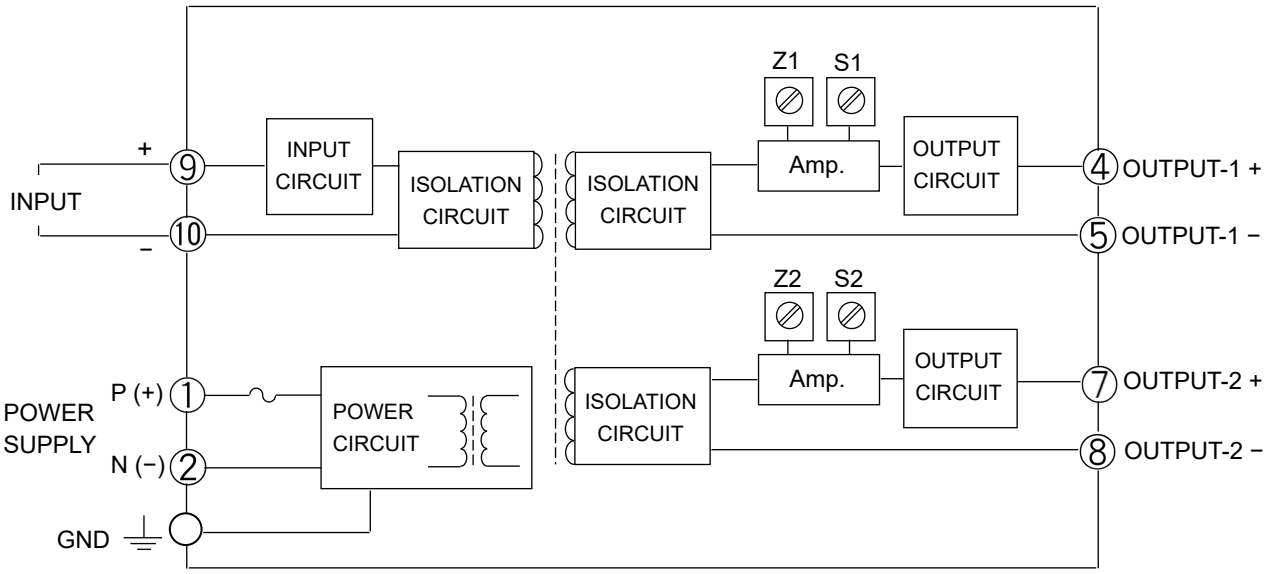
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

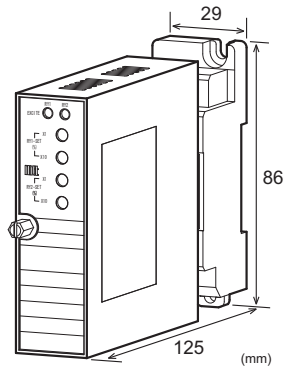


Product Specification Sheet Model: MS3705

Slim Plug-In Alarm Setter with Isolated Dual Output

DESCRIPTION

The MS3705 is a slim, plug-in alarm setter that compares the levels of DC current or voltage signals with two set-points (upper and lower limits) and outputs two independent isolated relay contact closure signals.



ORDERING CODE

MS3705 - □ - □ □ □

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 **3**: 0 to 1V DC
D: 0 to 20mA DC **4**: 0 to 10V DC
5: 0 to 5V DC
6: 1 to 5V DC

Relay Activation Modes for Output 1&2

Mode of operation for each channel can be selected from the following:

	Input < Set Value	Input > Set Value
H:	Relay deactivated	Relay activated
L:	Relay activated	Relay deactivated

Note: The mode of operation cannot be changed by any user.

Options

No code: None
/K: Fast response (0 to 90% response time: 100ms 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.) MS3705-A-6HL

* The factory default trip point for both channels is 50% of input span.

Other Ordering Examples:
For an option code of "X": MS3705-A-6HL/X (Response time constant: T = 50ms with 90% setting)
For specific trip points*: MS3705-A-6HL
Trip point for Output 1: 40%
Trip point for Output 2: 70%
* Specify trip points in % within the range of 0 to 99% of input span.
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 is installed (standard).		
Power Consumption			
Power	100-240V AC 6.5VA max	24V DC 2.0W max	100-240V DC 8.4W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With power:	1MΩ min.
	Without power:	10kΩ min.
Current Input (DC)	4 to 20mA (std.)	250Ω
Allowable Input Voltage		
Voltage Input Model	30V DC max., continuous.	
Current Input Model	40mA DC max., continuous.	

●OUTPUT SECTION

Output Signal	Two independent form C relay contact closure signals
Trip Points	
Setting	Through the front-accessible rotary switches.
Range	0 to 99% of span (adjustable in steps of 1%).
Accuracy	±0.5% of span.
Hysteresis	1.0%±0.3% of span
Relay Indicator	The red LED lights up when the relay is activated.
Relay Activation without Power	COM and NC are closed for each output.
Relay Start-up Limitation	The relay gets ready for action about 2 seconds after power-up.

●PERFORMANCE

Temperature Effect	Better than ±0.15% of span per 10°C change in ambient.
Response Time	150ms max. (0 to 90%) with a step input at 100%.
Isolation	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: 5.0mA)
Relay Contacts	
Rated Load	5A 125V AC, 5A 30V DC
Maximum Allowable Voltage	250V AC, 30V DC
Maximum Allowable Current	5A (NO) / 3A (NC)
Electrical Life	5A, 250V AC (NO): 50×10^3 cycles (Frequency: 1,800 cycles/h) 5A, 30V DC (NO): 100×10^3 cycles (Frequency: 1,800 cycles/h)
Mechanical Life	5×10^6 cycles (Frequency: 18,000 cycles/h)
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

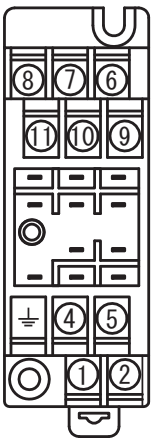
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

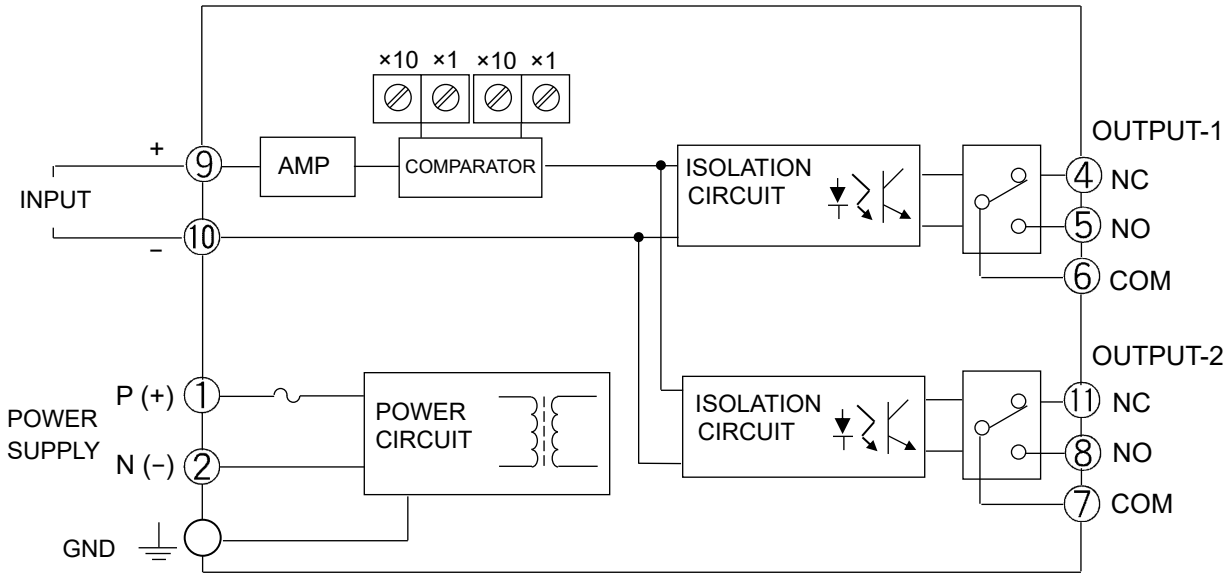
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



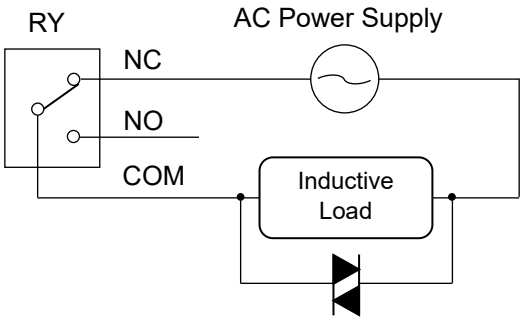
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	NC OUT 1	
⑤	NO OUT 1	
⑥	COM OUT 1	
⑦	COM OUT 2	
⑧	NO OUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	NC OUT 2	

BLOCK DIAGRAM



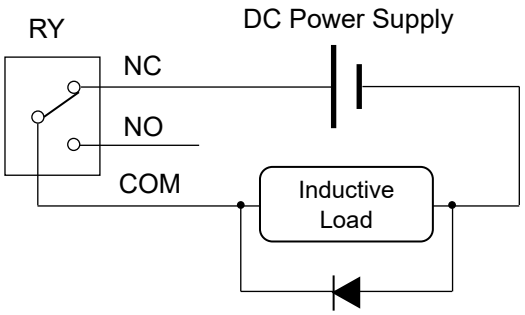
When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load.

Example of AC Power Connection:



Protection Circuit
(Varistor, CR circuit, etc.)

Example of DC Power Connection:



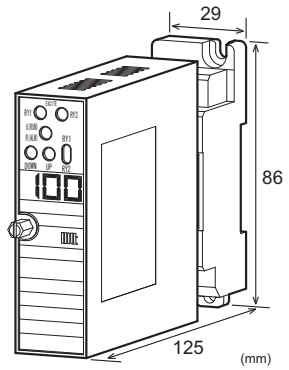
Protection Circuit
(Diode, varistor, CR circuit, etc.)

Product Specification Sheet Model: MS3705HA

Slim Plug-In Digital Alarm Setter with Isolated Dual Output
(High Accuracy Model)

DESCRIPTION

The MS3705HA is a slim, plug-in digital alarm setter (with high accuracy) that compares the levels of DC current or voltage signals with two set-points (upper and lower limits) and outputs two independent isolated relay contact closure signals.



ORDERING CODE

MS3705HA - □ - □ □ □

Model

Power Supply

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

Input

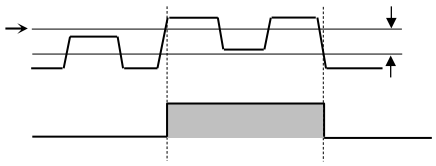
A: 4 to 20mA DC
B: 2 to 10mA DC
C: 1 to 5mA DC
D: 0 to 20mA DC
E: 4 to 20mA DC*1
H: 10 to 50mA DC
Z: Other DC current signals
3: 0 to 1V DC
4: 0 to 10V DC
5: 0 to 5V DC
6: 1 to 5V DC
4W: ±10V DC
5W: ±5V DC
0: Other DC voltage signals

*1: Shunt resistor 50Ω

Relay Activation Modes for Output 1&2

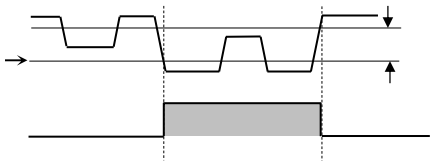
Mode of operation for each channel can be selected from the following:

H: Output operation



Input > Set value	Relay activated
Input < (Set value – Hysteresis)	Relay deactivated

L: Output operation



Input > (Set value + Hysteresis)	Relay deactivated
Input < Set value	Relay activated

Note: The mode of operation can be changed by the switch on the front panel.

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 on the left.
(e.g.) MS3705HA-A-6HL

* The factory default settings are as follows:
Output 1:
Relay activation mode: H
Trip point: 50%
Hysteresis: 1.0%
Output 2:
Relay activation mode: L
Trip point: 50%
Hysteresis: 1.0%
See also the default settings on page 5.

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 is installed (standard).

Power Consumption

	100-240V AC	24V DC	100-240V DC
Power	7.0VA max	2.2W max	8.4W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	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 20mV)

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

Output Signal	Two independent form C relay contact closure signals
Trip Point	
Setting	Through the front-accessible setting switches.
Range	0 to 105% of span (adjustable in steps of 0.1%; in steps of 1% for the range over 100%).
Accuracy	Better than ±0.1% of span.
Hysteresis	0.5 to 50.0% ±0.1% of span. (Adjustable by the front-accessible switches.)

Note: The upper and lower hysteresis limits are respectively 110% and -10% of span.

Relay Status Indicator LED	The red LED lights up when the relay is activated.
Relay Activation without Power	COM and NC are closed for each output.
Relay Start-up Limitation	Standard: The relay gets ready for action about 2 seconds after power-up.

Note: Non-standard limitation is also available upon request when ordering. It should be between 1 and 60 seconds.

●PERFORMANCE

Temperature Effect	Better than ±0.15% of span per 10°C change in ambient (at 25°C±5°C).
Response Time	150ms max. (0 to 90%) with a step input at 100%.
Relay Trip Point Indicator	Red LED, digit height 8.0mm, 3 digits.
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: 5.0mA)
Relay Contacts	
Rated Load	5A 125V AC, 5A 30V DC
Maximum Allowable Voltage	250V AC, 30V DC
Maximum Allowable Current	5A (NO) / 3A (NC)
Electrical Life	5A, 250V AC (NO): 50 × 10^3 cycles (Frequency: 1,800 cycles/h) 5A, 30V DC (NO): 100 × 10^3 cycles (Frequency: 1,800 cycles/h)
Mechanical Life	5 × 10^6 cycles (Frequency: 18,000 cycles/h)
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

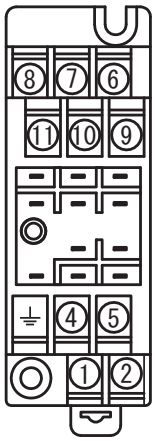
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

●MATERIAL

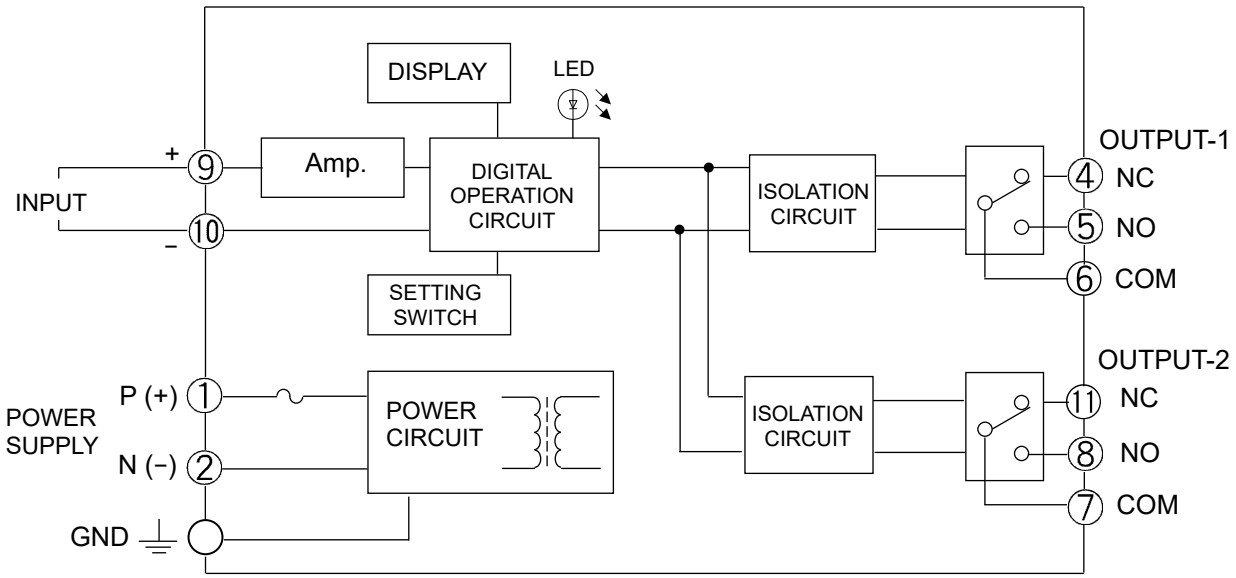
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



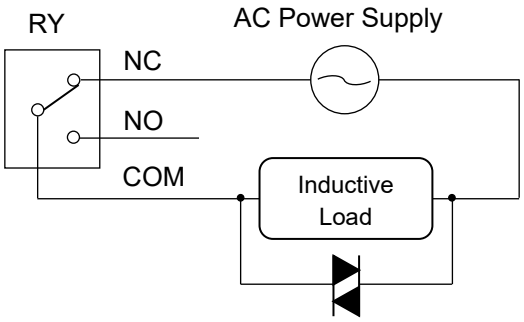
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	NC OUT 1	
⑤	NO OUT 1	
⑥	COM OUT 1	
⑦	COM OUT 2	
⑧	NO OUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	NC OUT 2	

BLOCK DIAGRAM



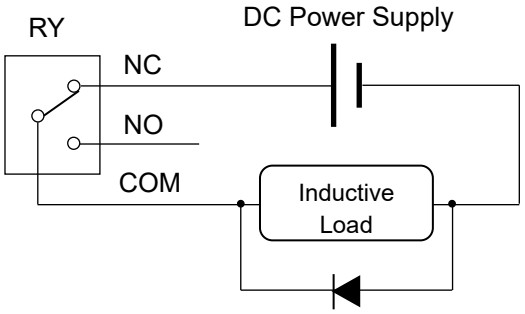
When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load.

Example of AC Power Connection:



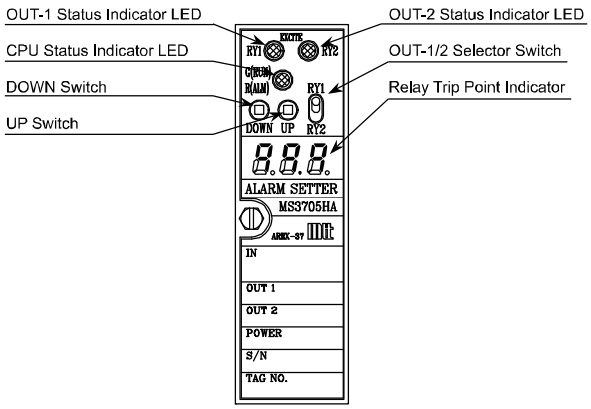
Protection Circuit
(Varistor, CR circuit, etc.)

Example of DC Power Connection:



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

FRONT VIEW



SETTING

●TRIP POINT SETTING

Setting for OUT-1

When the OUT-1/2 Selector Switch is set to the RY1 position with the power on, the Relay Trip Point Indicator shows the current trip point value for OUT-1. This value can be changed to a desired value by pressing the UP/DOWN Switch.

Setting for OUT-2

When the OUT-1/2 Selector Switch is set to the RY2 position with the power on, the Relay Trip Point Indicator shows the current trip point value for OUT-2. This value can be changed to a desired value by pressing the UP/DOWN Switch.

●HYSTERESIS / MODE SETTING

The hysteresis and relay activation mode can be changed based on the conditions indicated below.

For the relay activation mode “H”:

Input	Output
≥ Set value	Relay activated
≤ (Set value – Hysteresis)	Relay deactivated
(Set value – Hysteresis) to Set value	Unchanged

For the relay activation mode “L”:

Input	Output
≥ (Set value + Hysteresis)	Relay deactivated
≤ Set value	Relay activated
Set value to (Set value + Hysteresis)	Unchanged

Checking and Setting the Hysteresis

When the power is turned on with the UP Switch held down, the CPU Status Indicator LED blinks green and the Relay Trip Point Indicator shows a 3-digit hysteresis value for the output selected with the OUT-1/2 Selector Switch. This hysteresis value can be changed to a desired value by pressing the UP/DOWN Switch.

Checking and Setting the Relay Activation Mode

When the power is turned on with the DOWN Switch held down, the CPU Status Indicator LED blinks green and the Relay Trip Point Indicator shows a single-digit relay activation mode for the output selected with the OUT-1/2 Selector Switch. The mode can be toggled between 1 and 0 using either the UP or DOWN Switch (1 for the mode “H”, 0 for the mode “L”).

Note:

After making any setting change, the OUT-1/2 Selector Switch must be set to the opposite position to where it is located. This switching procedure enables the instrument to save the updated setting information.

To resume normal operation, the unit must be powered off and on.

Indicators

The Relay Trip Point Indicator goes OFF if no switch is operated for one minute, while the CPU Status Indicator LED keeps illuminating green. This LED turns red and blinks if any CPU error is detected.

UP/DOWN Switch

The switch is of a push button type. Pressing and holding the switch increases the speed at which the value changes.

Factory Default Settings

If not specified, the relay operation will be set to the factory defaults as shown in the table below.

Output	Mode	Trip Point	Hysteresis
OUT-1	H	50%	1.0%
OUT-2	L	50%	1.0%

LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Relay Trip Point Indicator (7-segment LED)	CPU Status Indicator	Relay	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal operation	–
2	Normal operation	OFF	Green LED is ON.	Normal operation	–
3	Trip Point setting	Set value	Green LED is ON.	Normal operation	–
4	Hysteresis / Mode setting	Set value	Green LED blinks at 1 second intervals.	Deactivated	–
5	Data error in Relay Trip Point setting	02 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
6	Data error in Relay Start-up Limitation	04 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
7	Data error of a compensated value	08 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	None
8	Data error in Hysteresis Setting	16 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
9	Data error in Relay Activation Mode Setting	32 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
10	System error	Not defined.	Red LED is ON; Green LED is not defined.	Deactivated	None

Notes:
No. 1: When the Relay Trip Point Indicator is turned ON, a 3-digit number “888” with dots is displayed.
No. 5 - 9: Only the last 2 digits are displayed in the event of an error.
No. 10: The red LED may fail to light up. The relay operation may sometimes be unstable.

DEFAULT SETTINGS

If you specify trip points and hysteresis at the time you place an order, the product will be set to your specified values before shipment.
The following is an example of how to specify these parameters.

(Example)
Trip Point for Output 1: 20%
Hysteresis for Output 1: 2%
Trip Point for Output 2: 30%
Hysteresis for Output 2: 4%

If nothing is specified, the product will be set to the following default values:
Trip Point for Output 1: 50.0%
Hysteresis for Output 1: 1.0%
Trip Point for Output 2: 50.0%
Hysteresis for Output 2: 1.0%

The relay start-up limitation (standard: 2 s) is available from1 to 60 s as a special order.
The following is an example of how to specify this parameter.

(Example)
Relay start-up limitation: 10s

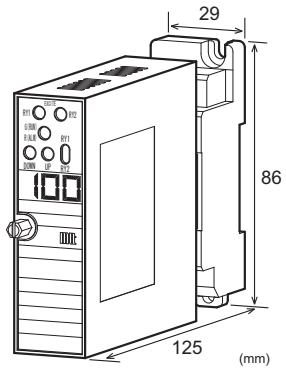
Note that you cannot set the relay start-up limitation.

Product Specification Sheet Model: MS3705HB

Slim Plug-In Digital Alarm Setter with Isolated Dual Output
(High Accuracy Model)

DESCRIPTION

The MS3705HB is a slim, plug-in digital alarm setter (with high accuracy) that compares the levels of DC current or voltage signals with two set-points (upper and lower limits) and outputs two independent isolated relay contact closure signals.



ORDERING CODE

MS3705HB - □ - □ □ □

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

Relay Activation Modes for Output 1&2

Mode of operation for each channel can be selected from the following:

0:

Input > Set value	Relay activated
Input < (Set value – Hysteresis)	Relay deactivated

1:

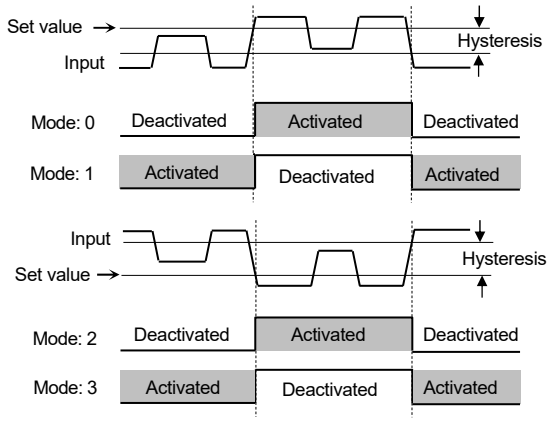
Input > Set value	Relay deactivated
Input < (Set value – Hysteresis)	Relay activated

2:

Input > (Set value + Hysteresis)	Relay deactivated
Input < Set value	Relay activated

3:

Input > (Set value + Hysteresis)	Relay activated
Input < Set value	Relay deactivated



Note: The mode of operation can be changed by the switch on the front panel.

Options

No code: None
/H: Polyurethane conformal coating

Options (continued)

/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.) MS3705HB-A-602

* The factory default settings are as follows:
Output 1:
Relay activation mode: 0
Trip point: 50%
Hysteresis: 1.0%
Output 2:
Relay activation mode: 2
Trip point: 50%
Hysteresis: 1.0%
See also the default settings on page 5.

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 is installed (standard).		
Power Consumption			
Power	100-240V AC 7.0VA max	24V DC 2.2W max	100-240V DC 8.4W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	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 20mV)	

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

Output Signal	Two independent form C relay contact closure signals
Trip Point	
Setting	Through the front-accessible setting switches.
Range	0 to 105% of span (adjustable in steps of 0.1%; in steps of 1% for the range over 100%).
Accuracy	Better than ±0.1% of span.
Hysteresis	0.5 to 50.0% ±0.1% of span. (Adjustable by the front-accessible switches.)

Note: The upper and lower hysteresis limits are respectively 110% and -10% of span.

Relay Status Indicator LED	The red LED light up when the relay is activated.
Relay Activation without Power	COM and NC are closed for each output.
Relay Start-up Limitation	Standard: The relay gets ready for action about 2 seconds after power-up.

Note: Non-standard limitation is also available upon request when ordering. It should be between 1 and 60 seconds.

●PERFORMANCE

Temperature Effect	Better than ±0.15% of span per 10°C change in ambient (at 25°C±5°C).
Response Time	150ms max. (0 to 90%) with a step input at 100%.
Relay Trip Point Indicator	Red LED, digit height 8.0mm, 3 digits.
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: 5.0mA)
Relay Contacts	
Rated Load	5A 125V AC, 5A 30V DC
Maximum Allowable Voltage	250V AC, 30V DC
Maximum Allowable Current	5A (NO) / 3A (NC)
Electrical Life	5A, 250V AC (NO): 50×10^3 cycles (Frequency: 1,800 cycles/h) 5A, 30V DC (NO): 100×10^3 cycles (Frequency: 1,800 cycles/h)
Mechanical Life	5×10^6 cycles (Frequency: 18,000 cycles/h)
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

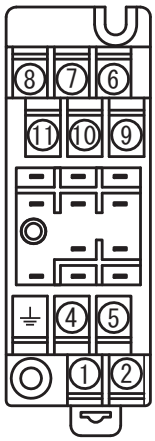
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

●MATERIAL

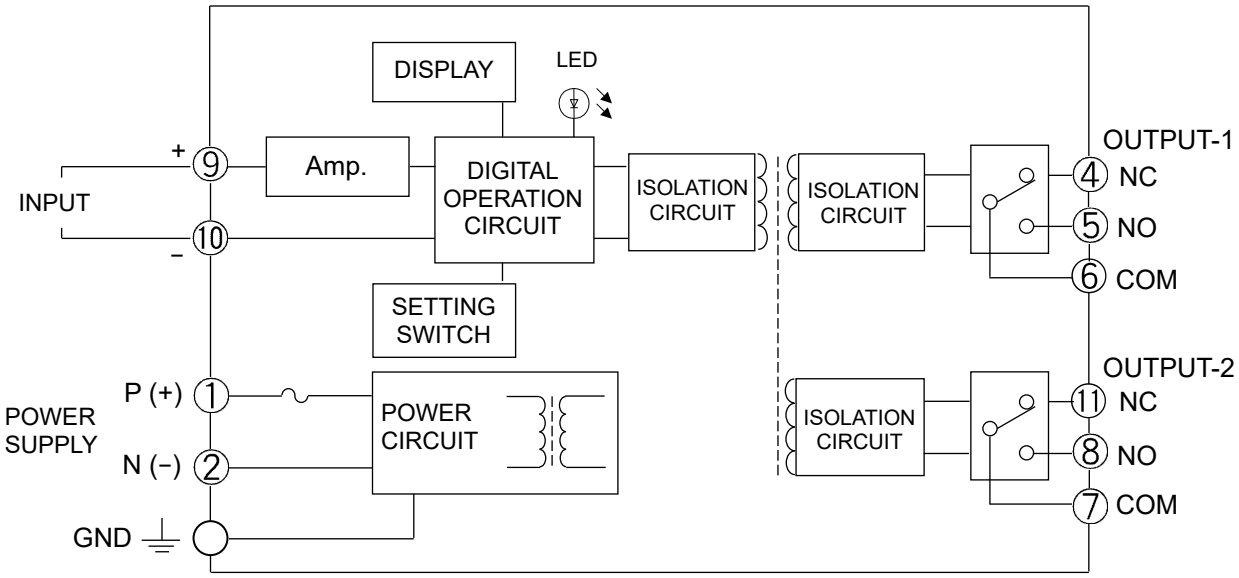
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



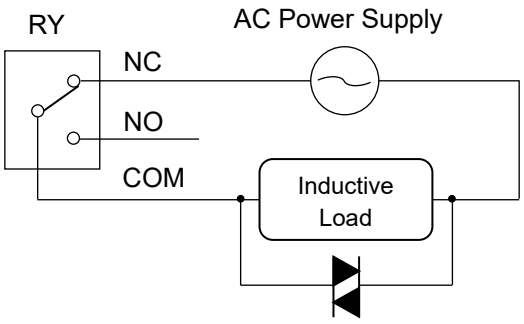
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	NC OUT 1	
⑤	NO OUT 1	
⑥	COM OUT 1	
⑦	COM OUT 2	
⑧	NO OUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	NC OUT 2	

BLOCK DIAGRAM



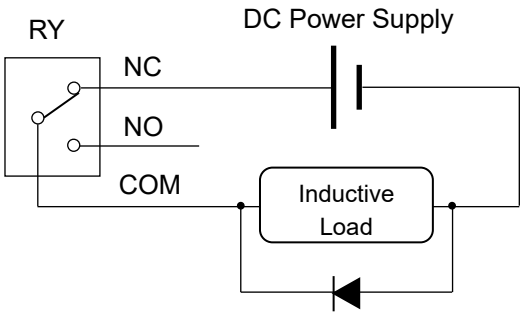
When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load.

Example of AC Power Connection:



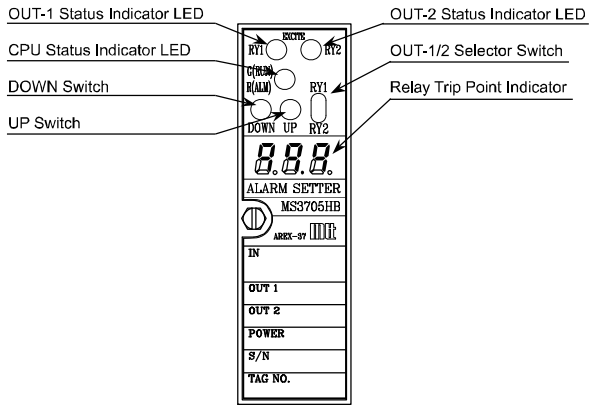
Protection Circuit
(Varistor, CR circuit, etc.)

Example of DC Power Connection:



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

FRONT VIEW



SETTING

●TRIP POINT SETTING

Setting for OUT-1

When the OUT-1/2 Selector Switch is set to the RY1 position with the power on, the Relay Trip Point Indicator shows the current trip point value for OUT-1. This value can be changed to a desired value by pressing the UP/DOWN Switch.

Setting for OUT-2

When the OUT-1/2 Selector Switch is set to the RY2 position with the power on, the Relay Trip Point Indicator shows the current trip point value for OUT-2. This value can be changed to a desired value by pressing the UP/DOWN Switch.

●HYSTERESIS / MODE SETTING

The hysteresis and relay activation mode can be changed based on the conditions indicated below.

Input	Output	
	Mode 0	Mode 1
≥ Set value	Relay activated	Relay deactivated
≤ (Set value – Hysteresis)	Relay deactivated	Relay activated
(Set value – Hysteresis) to Set value	Unchanged	Unchanged

Input	Output	
	Mode 2	Mode 3
≥ (Set value + Hysteresis)	Relay deactivated	Relay activated
≤ Set value	Relay activated	Relay deactivated
Set value to (Set value + Hysteresis)	Unchanged	Unchanged

Checking and Setting the Hysteresis

When the power is turned on with the UP Switch held down, the CPU Status Indicator LED blinks green and the Relay Trip Point Indicator shows a 3-digit hysteresis value for the output selected with the OUT-1/2 Selector Switch. This hysteresis value can be changed to a desired value by pressing the UP/DOWN Switch.

Checking and Setting the Relay Activation Mode

When the power is turned on with the DOWN Switch held down, the CPU Status Indicator LED blinks green and the Relay Trip Point Indicator shows a single-digit relay activation mode for the output selected with the OUT-1/2 Selector Switch. The mode can be toggled between 1and 0 using either the UP or DOWN Switch (1 for the mode “H”, 0 for the mode “L”).

Note:

After making any setting change, the OUT-1/2 Selector Switch must be set to the opposite position to where it is located. This switching procedure enables the instrument to save the updated setting information.

To resume normal operation, the unit must be powered off and on.

Indicators

The Relay Trip Point Indicator goes OFF if no switch is operated for one minute, while the CPU Status Indicator LED keeps illuminating green. This LED turns red and blinks if any CPU error is detected.

UP/DOWN Setting Switch

The switch is of a push button type. Pressing and holding the switch increases the speed at which the value changes.

Factory Default Settings

If not specified, the relay operation will be set to the factory defaults as shown in the table below.

Output	Mode	Trip Point	Hysteresis
OUT-1	0	50%	1.0%
OUT-2	2	50%	1.0%

LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Relay Trip Point Indicator (7-segment LED)	CPU Status Indicator	Relay	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal operation	–
2	Normal operation	OFF	Green LED is ON.	Normal operation	–
3	Trip Point setting	Set value	Green LED is ON.	Normal operation	–
4	Hysteresis / Mode setting	Set value	Green LED blinks at 1 second intervals.	Deactivated	–
5	Data error in Relay Trip Point setting	02 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
6	Data error in Relay Start-up Limitation	04 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
7	Data error of a compensated value	08 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	None
8	Data error in Hysteresis Setting	16 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
9	Data error in Relay Activation Mode Setting	32 (Error code)	Red LED blinks at 1 second intervals.	Deactivated	Reconfig-uration
10	System error	Not defined.	Red LED is ON; Green LED is not defined.	Deactivated	None

Notes:
No. 1: When the Relay Trip Point Indicator is turned ON, a 3-digit number “888” with dots is displayed.
No. 5 - 9: Only the last 2 digits are displayed in the event of an error.
No. 10: The red LED may fail to light up. The relay operation may sometimes be unstable.

DEFAULT SETTINGS

If you specify trip points and hysteresis at the time you place an order, the product will be set to your specified values before shipment.
The following is an example of how to specify these parameters.

(Example)
Trip Point for Output 1: 20%
Hysteresis for Output 1: 2%
Trip Point for Output 2: 30%
Hysteresis for Output 2: 4%

If nothing is specified, the product will be set to the following default values:
Trip Point for Output 1: 50.0%
Hysteresis for Output 1: 1.0%
Trip Point for Output 2: 50.0%
Hysteresis for Output 2: 1.0%

The relay start-up limitation (standard: 2 s) is available from1 to 60 s as a special order.
The following is an example of how to specify this parameter.

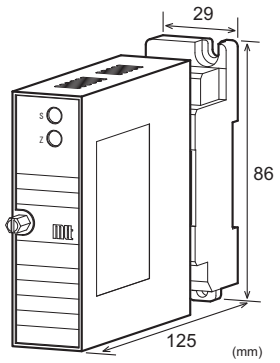
(Example)
Relay start-up limitation: 10 s

Note that you cannot set the relay start-up limitation.

Slim Plug-In Strain Gauge Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3706 is a slim, plug-in strain gauge transmitter that supplies excitation voltage to strain-gauge type pressure sensors, load cells, and the like and converts their output signals into standard process signals. It provides isolated single or dual output.



ORDERING CODE

MS3706 - □ - □ □ □ □

Model

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

Excitation Voltage
E2: 5V DC **0**: Other DC voltage
E3: 10V DC

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

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

Output 2
No code: None
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.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 bridge resistance.
(e.g.) MS3706-A-E3144 (700Ω)

Other Ordering Examples:
For an excitation voltage code of "0": MS3706-A-011A (700Ω / Excitation voltage: 4V)
For an input code of "0": MS3706-A-E20AA (700Ω / Input: 0 to 20mV)
For an output code of "Z": MS3706-A-E21Z6 (700Ω / Output: 8 to 20mA)
For an option code of "X": MS3706-A-E22A6/X (700Ω / 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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	7.0VA max	2.1W max	7.2W max
Dual Output	7.0VA max	2.4W max	8.4W max

●INPUT SECTION

Input Resistance	With power: 1MΩ min. (Without power: 10kΩ min.)
Allowable Input Voltage	30V DC max., continuous.
Excitation Voltage	5V DC at 120Ω bridge resistance 10V DC at 350Ω bridge resistance Other voltages

Ranges Available	
Input Range (DC)	-200mV to 200mV
Input Span (DC)	5mV* to 400mV
Input Bias	-100 to 100%
Excitation Voltage	3 to 10V

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%

Note: 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

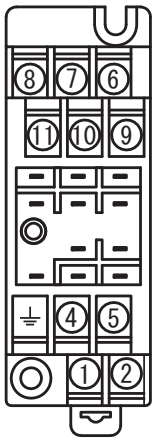
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

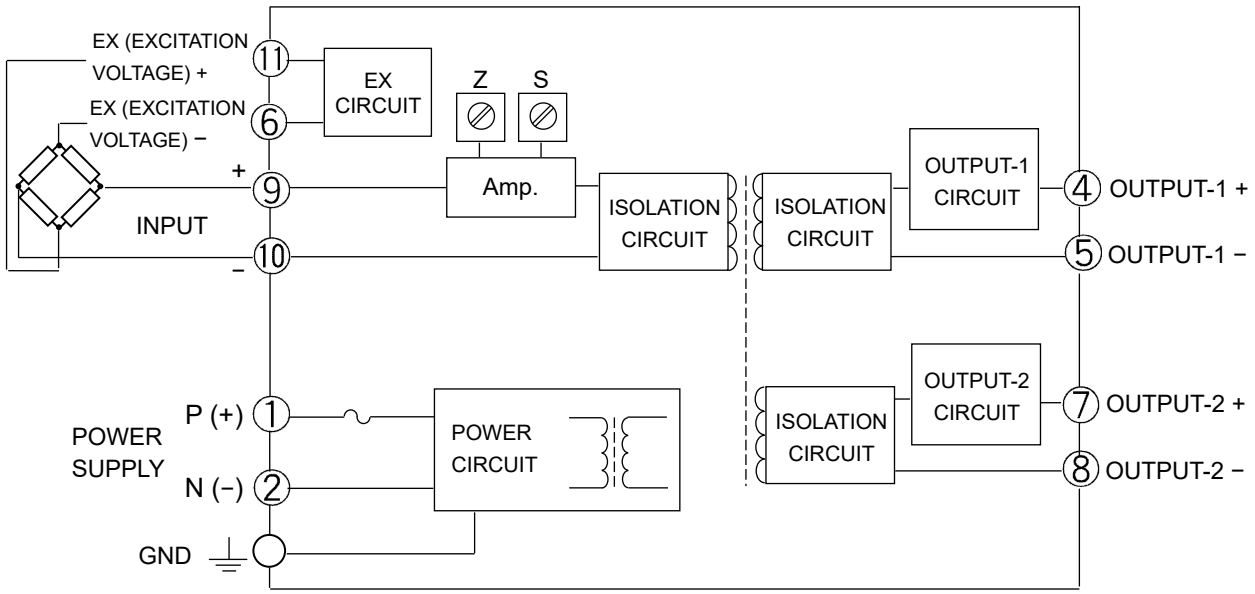
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



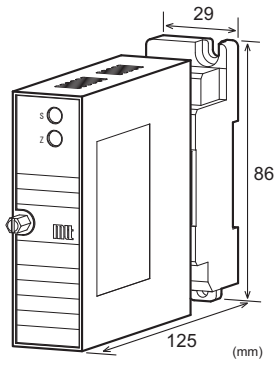
①	P (+) POWER
②	N (−)
⏚	GND
④	+ OUTPUT 1
⑤	− OUTPUT 1
⑥	− EX (Excitation voltage)
⑦	+ OUTPUT 2
⑧	− OUTPUT 2
⑨	+ INPUT
⑩	− INPUT
⑪	+ EX (Excitation voltage)

BLOCK DIAGRAM



DESCRIPTION

The MS3706B is a slim, plug-in strain gauge transmitter that supplies excitation voltage to strain-gauge type pressure sensors, load cells, and the like and converts their output signals into standard process signals. It provides isolated single or dual output.



ORDERING CODE

MS3706B - □ - □ □ □ □

Model

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

Excitation Voltage
E2: 5V DC **0**: Other DC voltages
E3: 10V DC

Input
A: 0 to 1mV DC **AW**: ±1mV DC
B: 0 to 2mV DC **BW**: ±2mV DC
0: Other DC voltage signals

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

Output 2
No code: None
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 1and 350Ω maximum for Output 2.

Options
No code: None
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 bridge resistance.
(e.g.) MS3706B-A-E2BW4W4W (700Ω)

Other Ordering Examples:
For an excitation voltage code of "0": MS3706B-A-0A11 (700Ω / Excitation voltage: 4V)
For an input code of "0": MS3706B-A-E20AA (700Ω / Input: 0 to 20mV)
For an output code of "Z": MS3706B-A-E2AZ6 (700Ω / Output: 8 to 20mA)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	7.0VA max	2.1W max	7.2W max
Dual Output	7.0VA max	2.4W max	8.4W max

●INPUT SECTION

Input Resistance	With power: 1MΩ min. (Without power: 10kΩ min.)
Allowable Input Voltage	30V DC max., continuous.
Excitation Voltage	5V DC at 120Ω bridge resistance 10V DC at 350Ω bridge resistance Other voltages

Ranges Available

Input Range (DC)	-5mV to 5mV
Input Span (DC)	0.8mV* to 10mV
Input Bias	-100 to 100%
Excitation Voltage	3 to 10V

Note: For any input range including negative input signals, the input span ranges from *1.6mV to 10mV.
Input Spec. Ex.: For -2 to 2mV input, the input span is 4mV and the bias -50%.

●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%

Note: 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 ±0.5% of span (at 25°C±5°C).
Temperature Effect	Better than ±1.0% 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

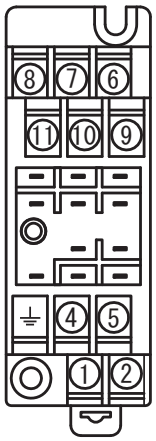
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

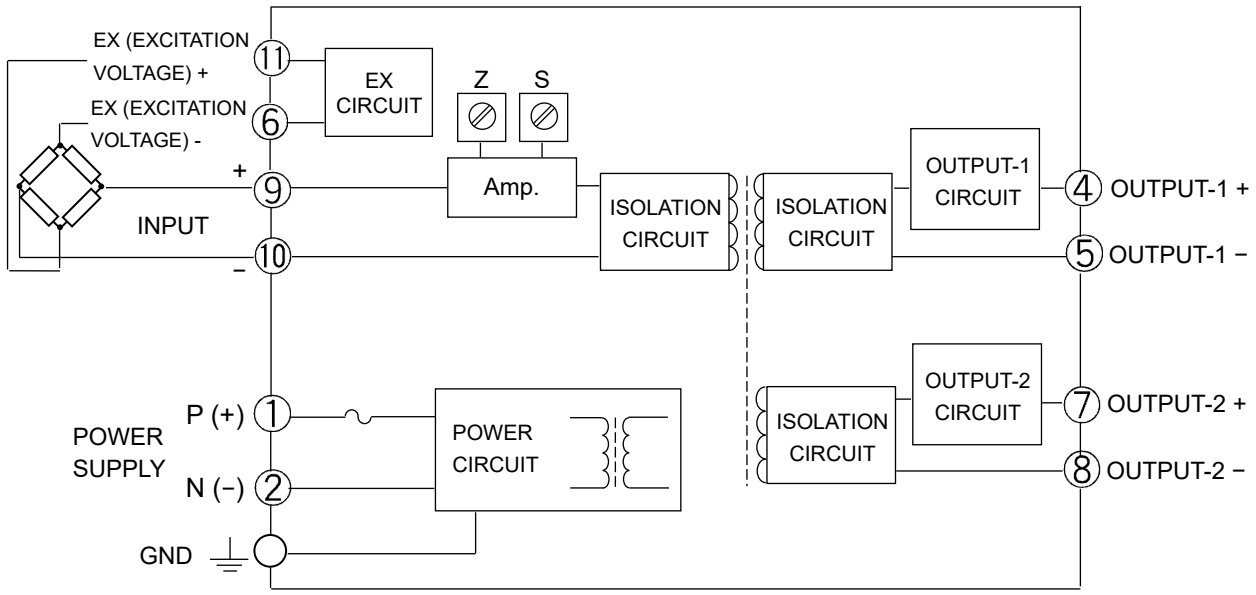
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	− EX (Excitation voltage)	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	+ EX (Excitation voltage)	

BLOCK DIAGRAM

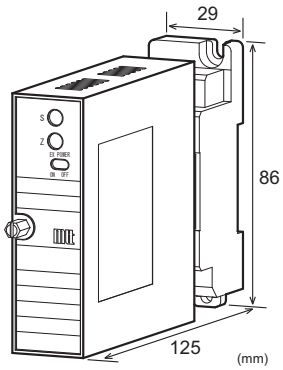


Product Specification Sheet Model: MS3707

Slim Plug-In Distributor with Isolated Single/Dual Output
(for Smart Communicators)

DESCRIPTION

The MS3707 is a slim, plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides isolated single or dual output.
This model supports smart communicators.



CE

ORDERING CODE

MS3707 - □ - □ □ / _X

Model

Power Supply
A: 100 to 240V AC (50 to 60Hz)
D: 24V DC

Input
4 to 20mA DC from 2-wire transmitters

Output 1
A: 4 to 20mA DC **6**: 1 to 5V DC

Output 2
No code: None
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

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.
(e.g.) MS3707-A-A6/X (for smart communicators)

SPECIFICATIONS

●POWER SECTION

Power Requirements	100 to 240V AC: 85 to 264V AC (47 to 63Hz) 24V DC: 24V DC±10%
Power Sensitivity	Better than ±0.1% of span for each power supply range.
Power Line Fuse	160mA fuse is installed (standard).

Power Consumption

Power	100-240V AC	24V DC
Single Output	6.5VA max	2.1W max
Dual Output	7.5VA max	2.4W max

●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.
Maximum Current	24mA, typical. (when 2-wire transmitter current is only used) 40mA, typical. (when 2-wire transmitter current and current for communication are used)
Limiting Current for Short-Circuit Protection	45mA, typical.
Permissible Short-Circuit Duration	Continuous.

●OUTPUT SECTION

Allowable Output Load

Voltage Output (DC)		2mA max.
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.)

●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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

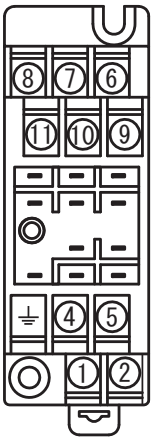
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2µm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

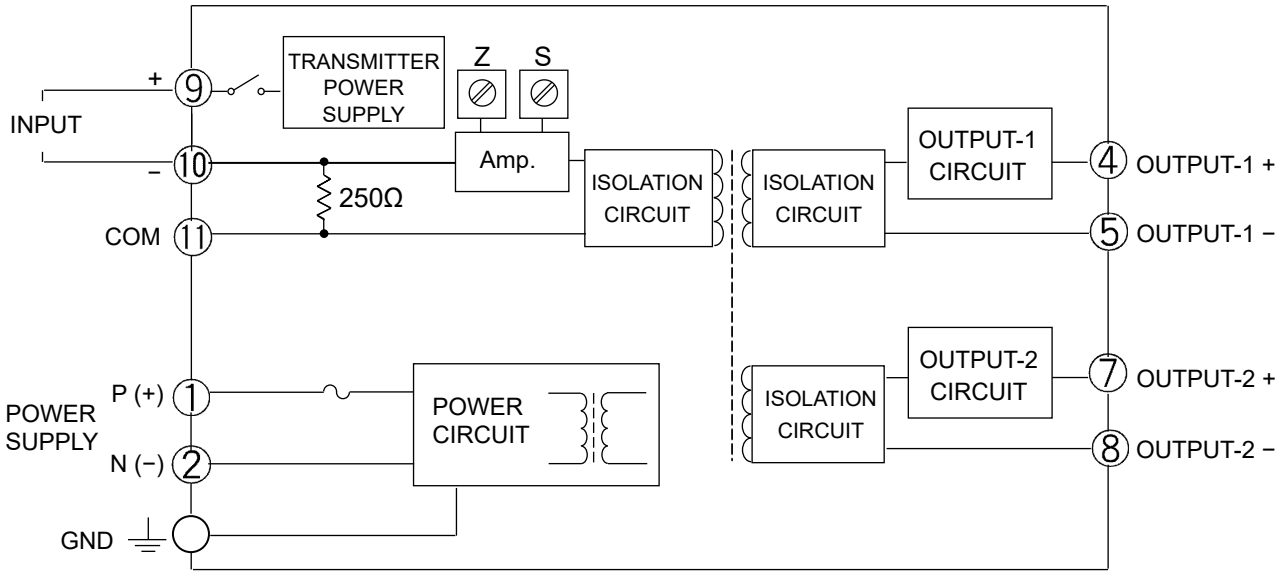
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3707

Slim Plug-In Distributor with Isolated Single/Dual Output

DESCRIPTION

The MS3707 is a slim, plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides isolated single or dual output. This model can also be used as an isolator.

ORDERING CODE

MS3707 - □ - □ □

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

No code: None
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.

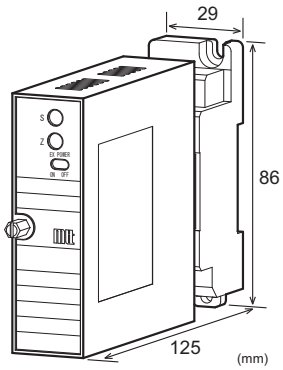
Options

No code: None
/K: Fast response (0 to 90% response time: 10ms max.)
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3707-A-A6

Other Ordering Examples:
For an output code of "0": MS3707-A-60 (Output: 2 to 5V)
For an option code of "X": MS3707-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).



CE

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	6.5VA max	2.1W max	7.2W max
Dual Output	7.5VA max	2.4W max	8.4W max

●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.
Limiting 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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

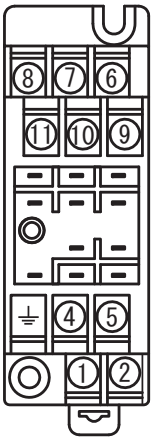
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

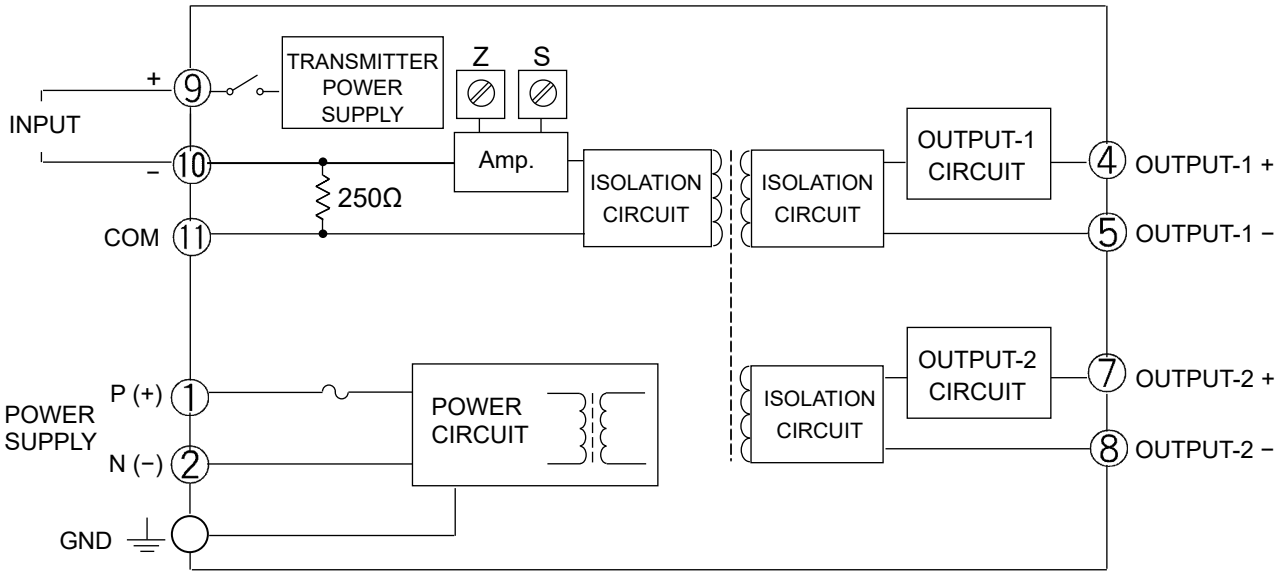
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS

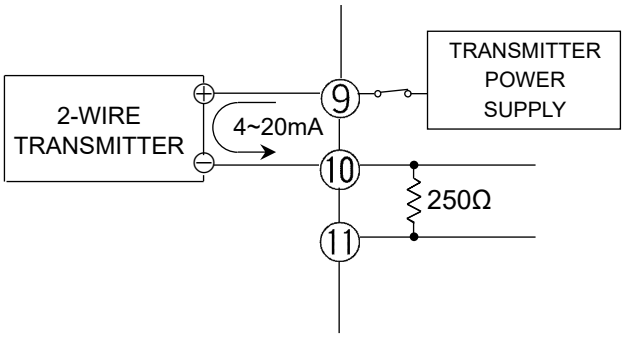


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	COM	

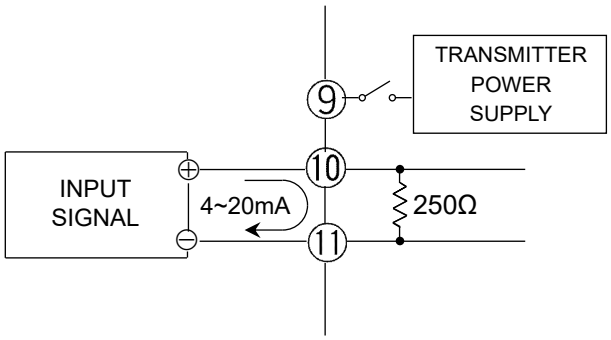
BLOCK DIAGRAM



When used as a distributor:



When used as an isolator:

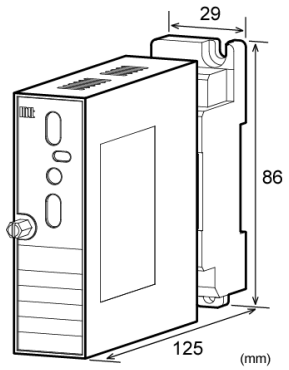


Product Specification Sheet Model: MS3707G

Slim Plug-In Distributor with Isolated Single/Dual Output for Level Gauges

DESCRIPTION

The MS3707G is a slim, plug-in distributor that powers a two-wire level gauge, converts its 4 to 20mA signals into commonly used DC signals, and provides isolated single or dual output. A wide span adjustment range allows the unit to be used for level gauges with different ranges.



ORDERING CODE

MS3707G - □ - □ □

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

No code: None
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.) MS3707G-A-A6
Factory adjustments are made with 0-100% input / 0-100% output. For any other input ranges, specify the range as indicated below.
(e.g.) For 0-50% input / 0-100% output:
MS3707G-A-A6 (Input: 0 to 50%)
Zero and span adjustments are made to your specified input range, but shipping inspection is performed with 0-100% input / 0-100% output.

Another Ordering Example:
For an output code of "0": MS3707G-A-60 (Output: 2 to 5V)

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	7.0VA max	2.5W max	3.0W max
Dual Output	7.5VA max	2.7W max	3.0W max

●INPUT SECTION

Input Signal	4 to 20mA DC from 2-wire transmitters
Input Resistance	250Ω
Transmitter Power Supply	Output voltage: 24 to 28V (0% input) 18V min. (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. ±10% of span. (Adjustable by the front-accessible trimmer.)
Span Adjustment	Approx. 10 to 100% of span. (Adjustable by the front-accessible trimmer and rotary switch.)

Zero Adjustment for Output 2	Approx. ±2% of span. (Adjustable by the front-accessible trimmer.)
Span Adjustment for Output 2	Approx. ±2% 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%

Note: 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). * Gain = 1
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient. * Gain = 1
Response Time	200ms 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

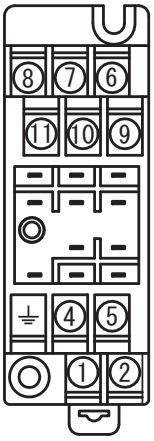
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

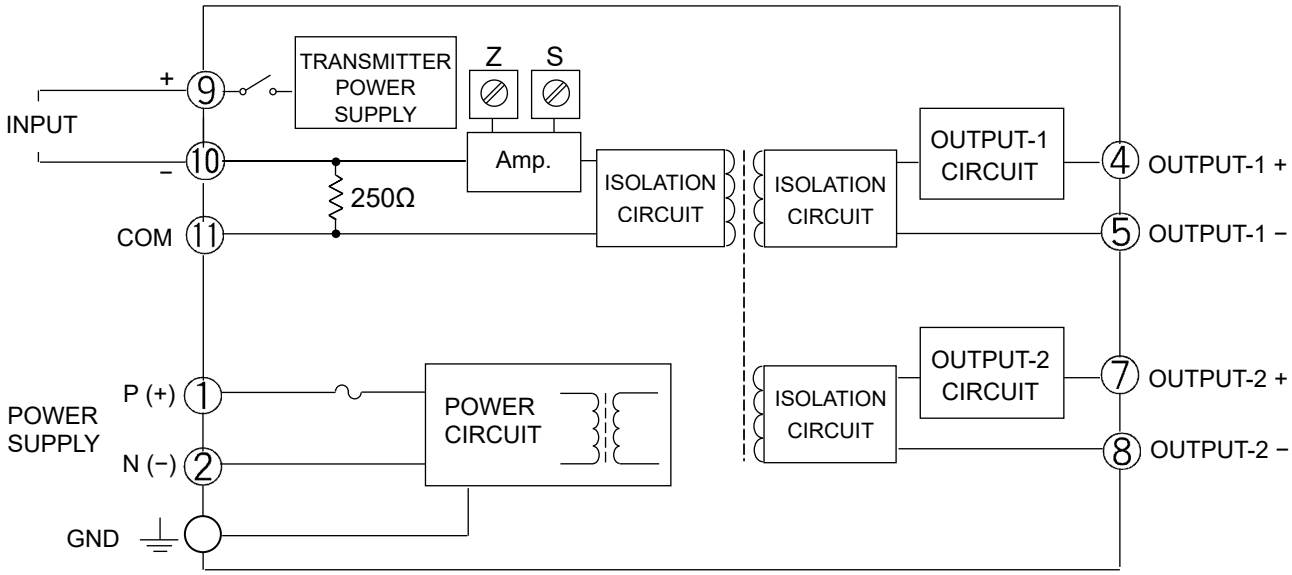
Housing	ABS resin (UL-94V-0)
Terminal Block	PBT resin (UL-94V-0)
Terminal Block Cover	PC resin (UL-94V-2)
DIN Rail Stopper	PP resin (UL-94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL-94V-0)

TERMINAL ASSIGNMENTS

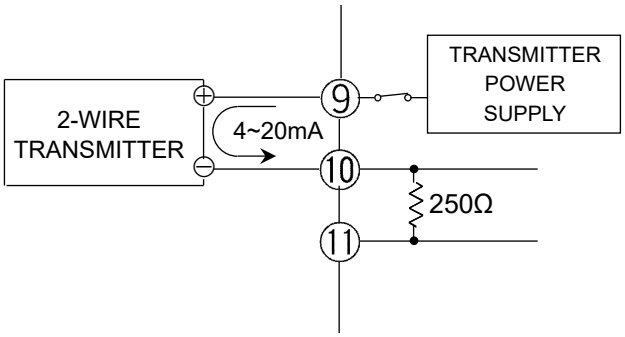


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	COM	

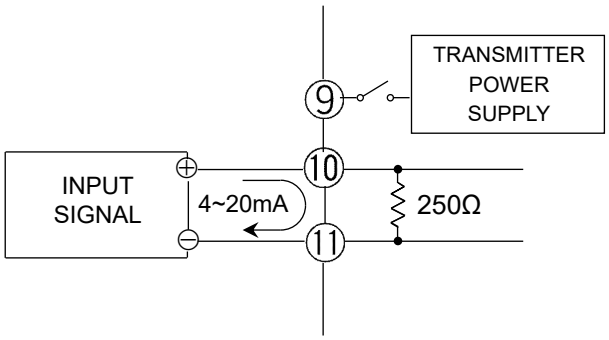
BLOCK DIAGRAM



When used as a distributor:



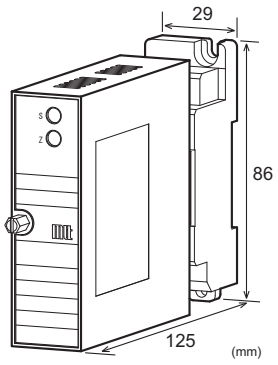
When used as an isolator:



Slim Plug-In Distributor with Isolated Single Output with HART Communication

DESCRIPTION

The MS3707H is a slim, plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides an isolated single output. It isolates bidirectional HART communication signals. This model can also be used as an isolator.



ORDERING CODE

MS3707H - □ -A

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
A: 4 to 20mA DC

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.) MS3707H-A-A

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 is installed (standard).		
Power Consumption			
Power	100-240V AC 7.7VA max	24V DC 2.2W max	100-240V DC 2.9W max

●INPUT SECTION

Input Signal	4 to 20mA DC from 2-wire transmitters
Input Resistance	250Ω
Transmitter Power Supply	Output voltage: 25V, typical. (0% input) 18V, typical. (100% input) Maximum current: 25mA, typical.
Limit Current for Short-Circuit Protection	26mA (typ.)
Permissible Short-Circuit Duration	Continuous.

●OUTPUT SECTION

Allowable Output Load	600Ω max. (250Ω ±10% for HART communication)
Zero Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)

●HART COMMUNICATION

Frequency Bandwidth	500Hz to 10kHz (with maximum attenuation of -10dB)
Transmission Gain	Approx. -3dB (over a range of 1kHz to 3kHz) Note that the gain is measured with 250Ω load.
Communication Mode	Bidirectional

●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	500ms max. (0 to 90%) with a step input at 100%.
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	3-way isolation between input, output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output, power, and ground.
Dielectric Strength	Input / Output / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5mA)
Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

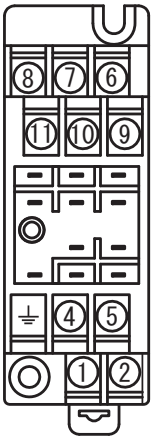
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

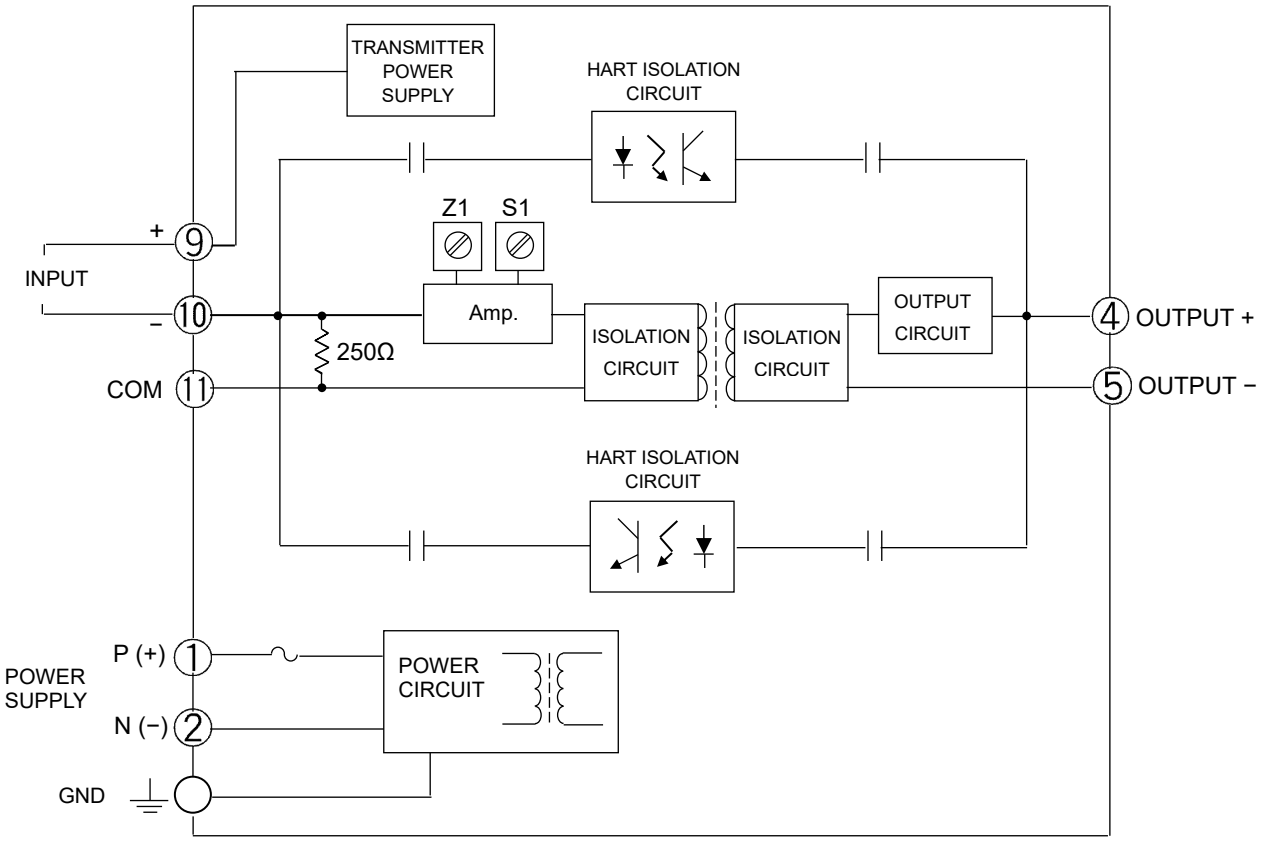
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

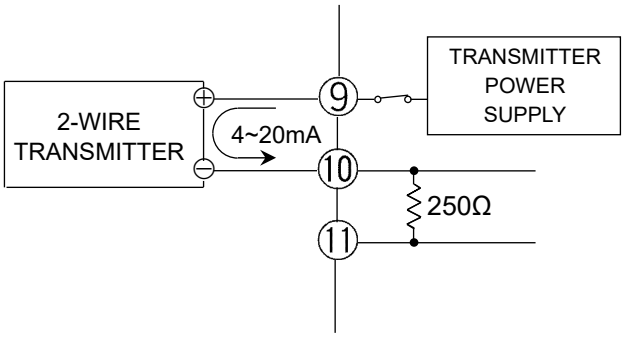


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	− OUTPUT	
⑥	N.C.	
⑦	N.C.	
⑧	N.C.	
⑨	+ INPUT	
⑩	− INPUT	
⑪	COM	

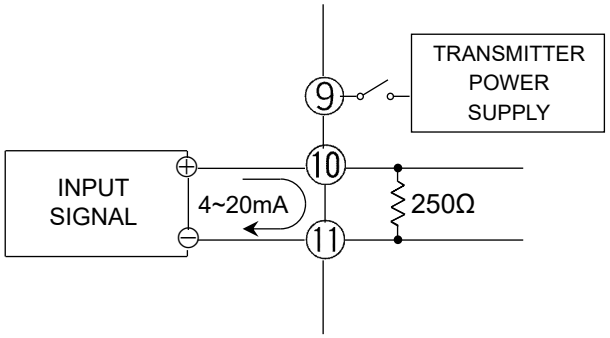
BLOCK DIAGRAM



When used as a distributor:



When used as an isolator:

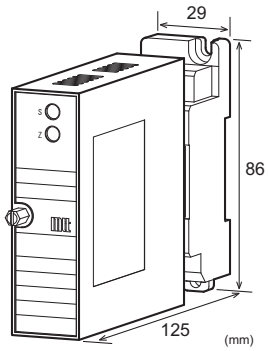


Product Specification Sheet Model: MS3708

Slim Plug-In Frequency/Analog Converter with Isolated Single/Dual Output

DESCRIPTION

The MS3708 is a slim, plug-in frequency to analog converter that converts pulse train signals from flow sensors and the like into commonly used DC signals and provides isolated single or dual output.



ORDERING CODE

MS3708 - □ - □ □ □

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 for input full scale up to 20kHz: Approx. 0.06Vp-p)
(Threshold voltage for input full scale exceeding 20kHz: Approx. 1.50Vp-p)
D: DC voltage pulse (Threshold voltage: Approx. 2V)
I : 4 to 20mA DC pulse (Threshold current: Approx. 8mA)
Y: Other input signal and/or threshold voltage

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

No code: None
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

Options (continued)

/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3708-A-DA6 (0 to 850Hz)

Other Ordering Examples:
For an input code of "Y": MS3708-A-YAA (0 to 500Hz / Input DC voltage pulse: 0 to 12V / SH=8.5V, SL=2.5V)
For an input code of "Y": MS3708-A-YAA (0 to 500Hz / Input AC pulse: 200Vp-p / S=2Vp-p)
* SH= Threshold level HI, SL=Threshold level LO, S=Threshold level
Note 1: When a DC current pulse is selected for input, the range should be specified between 0-100μA and 0-100mA.
Note 2: If you wish to include multiple options in your order, specify the option codes in series (e.g. /CX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	8.3VA max	2.6W max	8.3W max
Dual Output	9.0VA max	3.0W max	9.0W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With power:	1MΩ min. (Standard, 5V input)
	Without power:	30kΩ min.
Current Input (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	4μs min.	
Duty Ratio	40 to 60%	
Sensor Supply Current	30mA max.	

Ranges Available

	AC Voltage Pulse	DC Voltage Pulse
Input Range	-300 to 300V	0 to 300V
Input Span	0.1 to 600Vp-p	1 to 300V
Input Bias	N/A	0 to +300%
Threshold Voltage		
Input Frequencies up to 20kHz	50mVp-p min.	Hi-Lo voltage: 0.2V min.
Input Frequencies exceeding 20kHz	1.50Vp-p min.	Hi-Lo voltage: 0.2V min.
* For non-standard threshold voltage for the input frequency range exceeding 20kHz, ask MTT for availability.		
Input Frequency	Within the range between 0-15Hz and 0-100kHz.	

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%

Note: 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%
15Hz	16s max.
20Hz	8s max.
200Hz	1s max.
2kHz	500ms max.
20kHz	500ms max.
100kHz	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

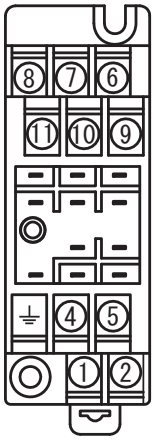
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

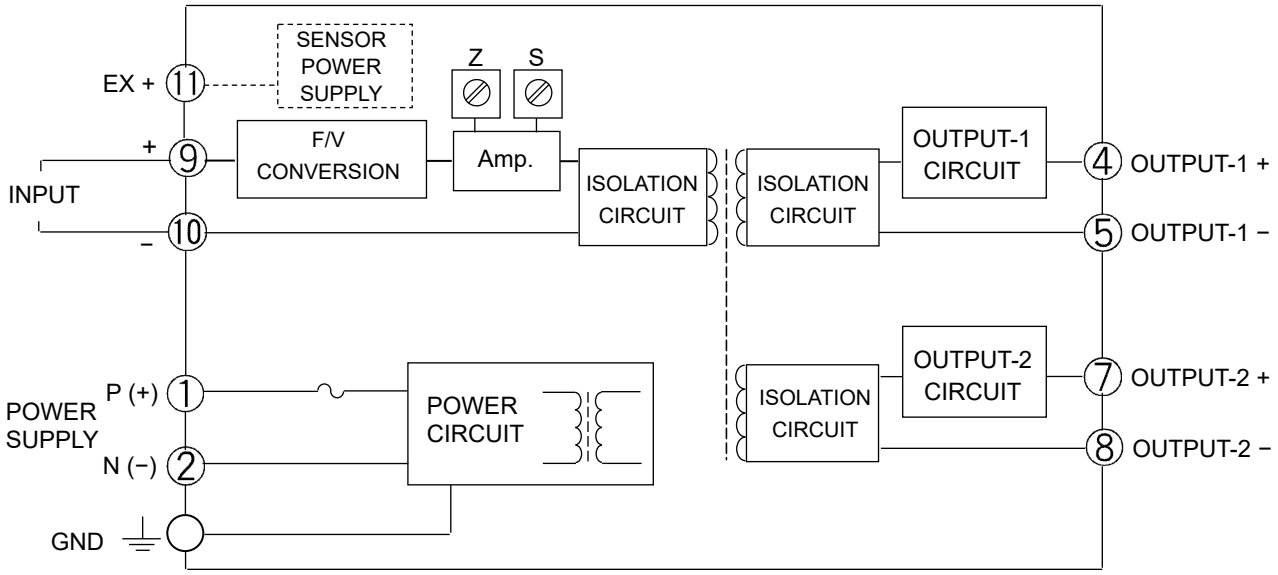
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

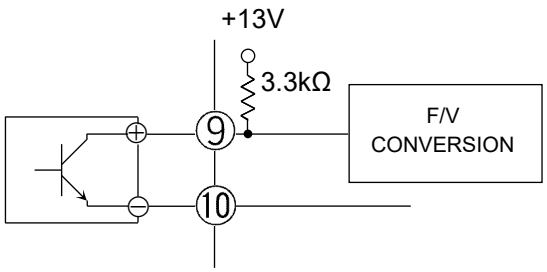


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	EX	

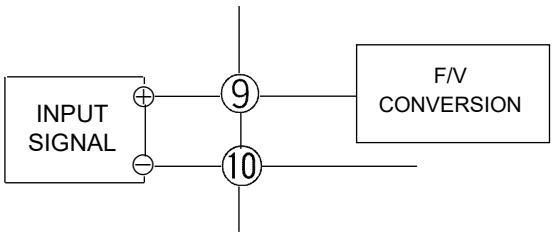
BLOCK DIAGRAM



For dry contact or open collector input:

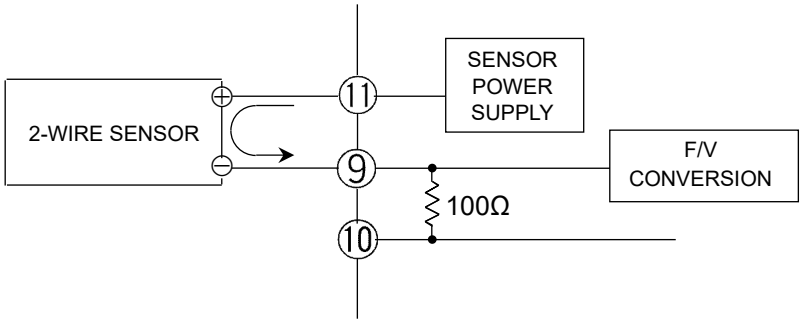


For voltage pulse input:



When a 2-wire sensor is used:

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



Product Specification Sheet Model: MS3709

Slim Plug-In Pulse Shaper (Pulse Isolator) with Isolated Single/Dual Output

DESCRIPTION

The MS3709 is a slim, plug-in pulse shaper (pulse isolator) that accepts pulse train signals from sensors or other devices, shapes these pulses or converts signal levels, and provides isolated single or dual output.

ORDERING CODE

MS3709 - □ - □ □ □

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; Threshold voltage: Approx. 2V)
M: Dry contact or open collector
(Pull-up: Approx. 13V, 3.3kΩ; Threshold voltage: Approx. 5V)
* For Azbil's electromagnetic flowmeter MGG10C, etc.
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)
Note: Threshold current when a 2-wire sensor power supply is specified: Approx. 14mA
Y: Other input signal and/or threshold voltage

Output 1

1: TTL level
2: Open collector
3: Voltage pulse 10V±10%
4: Voltage pulse 12V±10%

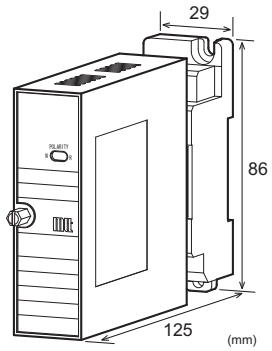
Output 2

No code: None
The codes are the same as for Output 1.

Note: When a combination of TTL levels or voltage pulses is selected for Outputs 1 and 2, the voltage levels for both outputs should be the same.

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
/T: Pulse Hold Function provided.
/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.) MS3709-A-D11

Other Ordering Examples:
For an input code of "Y": MS3709-A-Y11 (Input DC voltage pulse: 0 to 12V / SH = 8.5V, SL = 2.5V)
For an input code of "Y": MS3709-A-Y11 (Input AC pulse: 200Vp-p / S= 2Vp-p)
For an option code of "T": MS3709-A-D11/CT (Pulse hold time: 200ms)
* SH = Threshold level HI, SL = Threshold level LO, S = Threshold level
Note 1: Specify a pulse width between 200µs and 500ms.
Note 2: When a DC current pulse is selected for input, the range should be specified between 0-100µA and 0-100mA.
Note 3: If you wish to include multiple options in your order, specify the option codes in series (e.g. /AX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	2.1W max	7.2W max
Dual Output	5.5VA max	2.2W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With power:	1MΩ min. (Standard, 5V input)
	Without power:	10kΩ min.
Current Input (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	10μs min. (for both ON and OFF)
Sensor Power Supply	30mA max. (2-wire or 3-wire type)

Ranges Available

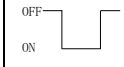
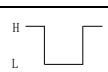
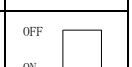
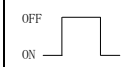
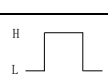
	AC Voltage Pulse	DC Voltage Pulse
Input Range	-300 to 300V	0 to 300V
Input Voltage Span	0.1 to 600Vp-p	1 to 300V
Input Bias	N/A	0 to +300%
Threshold Voltage	50mVp-p min.	Hi-Lo voltage: 0.2V min.

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

●OUTPUT SECTION

Allowable Output Load	
TTL Level	(Maximum output 10mA @ 3.5V)
Voltage Pulse 10V	(Maximum output 7mA @ ±10%)
Voltage Pulse 12V	(Maximum output 7mA @ ±10%)
Maximum Rating	Open collector (Maximum rating: 30V, 100mA)
Maximum Output Frequency without Pulse Hold Function	Voltage Pulse Output: 50kHz Open Collector Output: 20kHz (For both of the above, the conditions are as follows: input pulse duty ratio 50% and standard threshold voltage.)
Maximum Output Frequency with Pulse Hold Function	When a pulse hold time is specified, the maximum possible output frequency is determined by: Hz = 1 / (T × 1.2 + 10μs*) * 10μs: Output pulse Lo level for TTL and voltage pulse outputs or output pulse ON for open collector output. (Example) When a pulse hold time of 200ms is set, the maximum output frequency is: 1 / (0.2×1.2+0.00001) = 4.166Hz
Duty Ratio	50% typical (Input pulse duty ratio 50%, standard threshold voltage) DC voltage pulse: 0-5V/1kHz input AC voltage pulse: 5Vp-p/1kHz input Open collector: 1kHz input
Polarity Reversing Function	See the Output Logic Table below.

●OUTPUT LOGIC

Input Signal	Input Waveform	Polarity Reversing Switch	Voltage Pulse Output	Open Collector Output
Voltage Pulse		NORMAL		
		REVERSE		
Open Collector		NORMAL		
		REVERSE		

●PERFORMANCE

Output Pulse Hold Time Accuracy	Better than ±20% of a user-specified value.
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

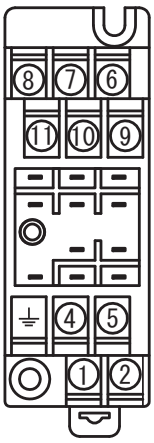
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

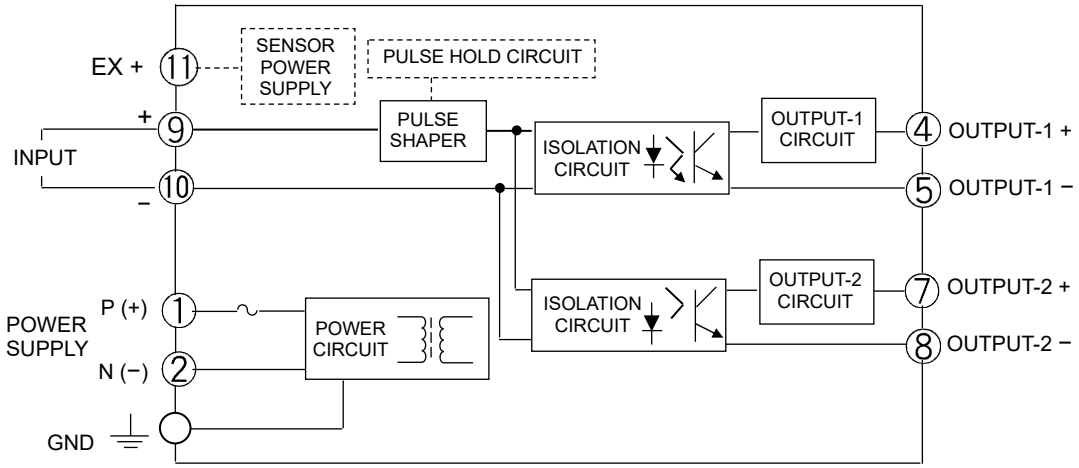
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS

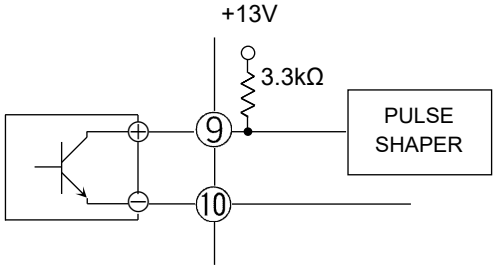


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	EX	

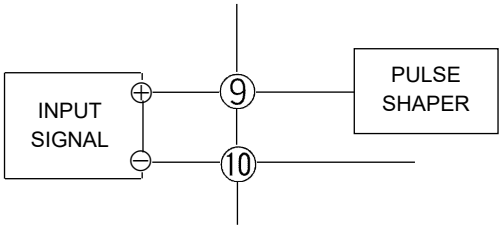
BLOCK DIAGRAM



For dry contact or open collector input:

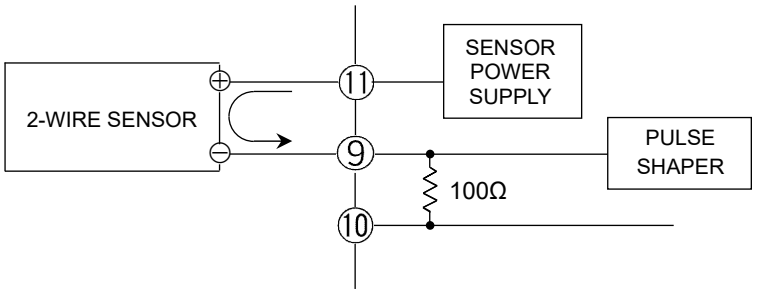


For voltage pulse input:



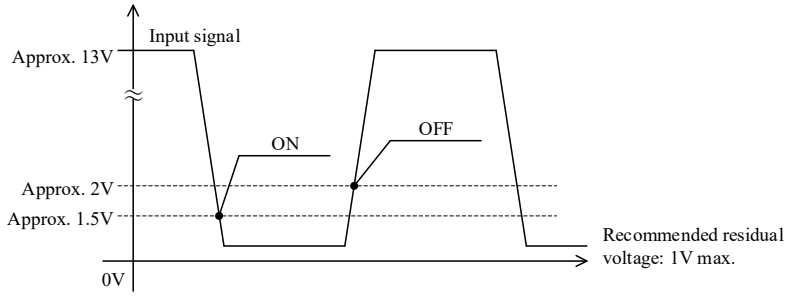
When a 2-wire sensor is used:

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

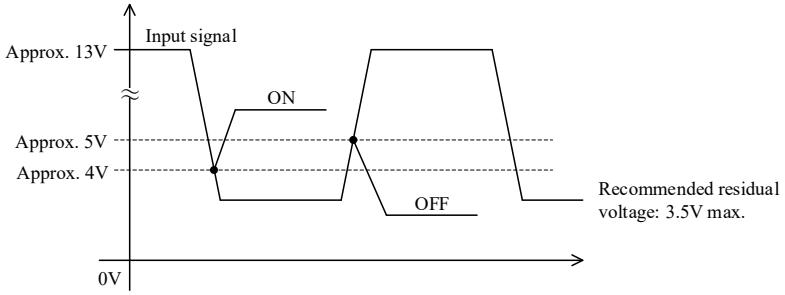


THEORY OF OPERATIONS

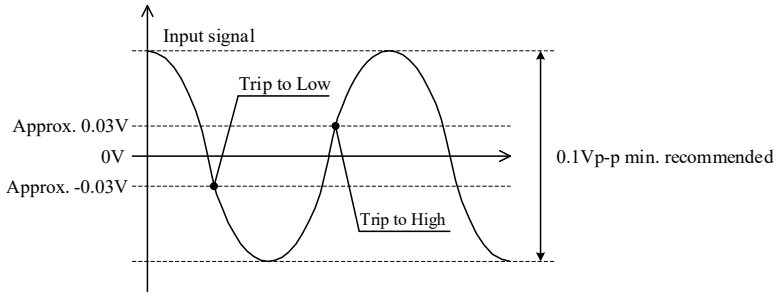
Input code O: Open collector input; threshold voltage: approx. 2V



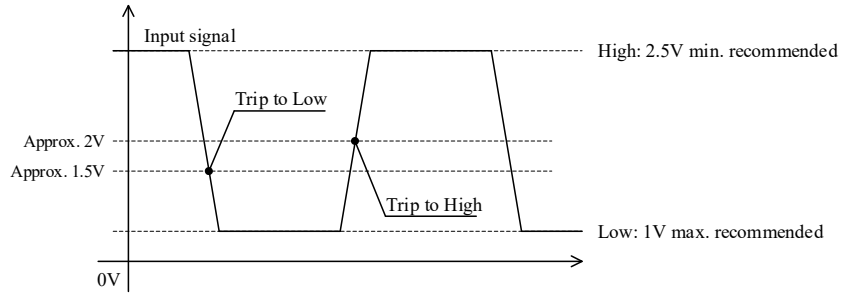
Input code M: Open collector input; threshold voltage: approx. 5V
This spec. is for input signals with a residual voltage of 1.5V or greater (Azbil's electromagnetic flowmeter MGG10C, etc.).



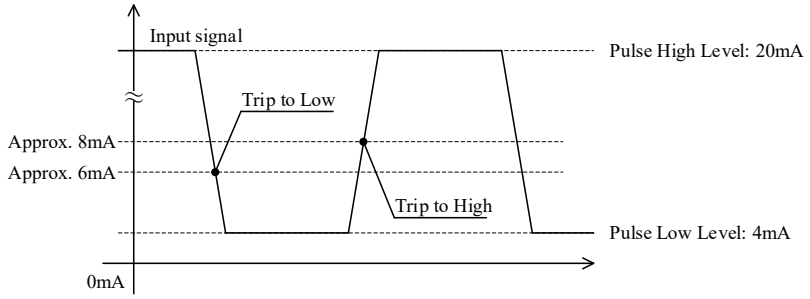
Input code A: AC voltage pulse input; threshold voltage: approx. 0.06Vp-p



Input code D: DC voltage pulse input; threshold voltage: approx. 2V



Input code I: 4-20mA DC input; threshold current: approx. 8mA



Product Specification Sheet Model: MS3710

Slim Plug-In Potentiometer Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3710 is a slim, plug-in potentiometer transmitter that detects changes in the resistance of potentiometric sensors, converts them into commonly used DC signals and provides isolated single or dual output.

ORDERING CODE

MS3710 - □ - □ □

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

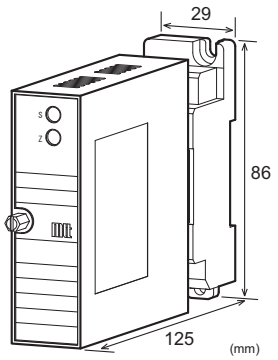
No code: None
The codes are the same as for Output 1.

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.)
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3710-A-A6

* Factory default: Factory testing is carried out with an input range of 0 to 5kΩ.

Other Ordering Examples:
For an output code of "0": MS3710-A-A0 (Output: 2 to 5V)
For a specific resistance range: MS3710-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": MS3710-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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.1W max	4.8W max
Dual Output	5.5VA max	1.5W max	6.0W max

●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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

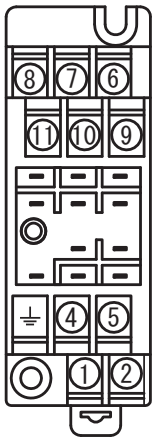
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

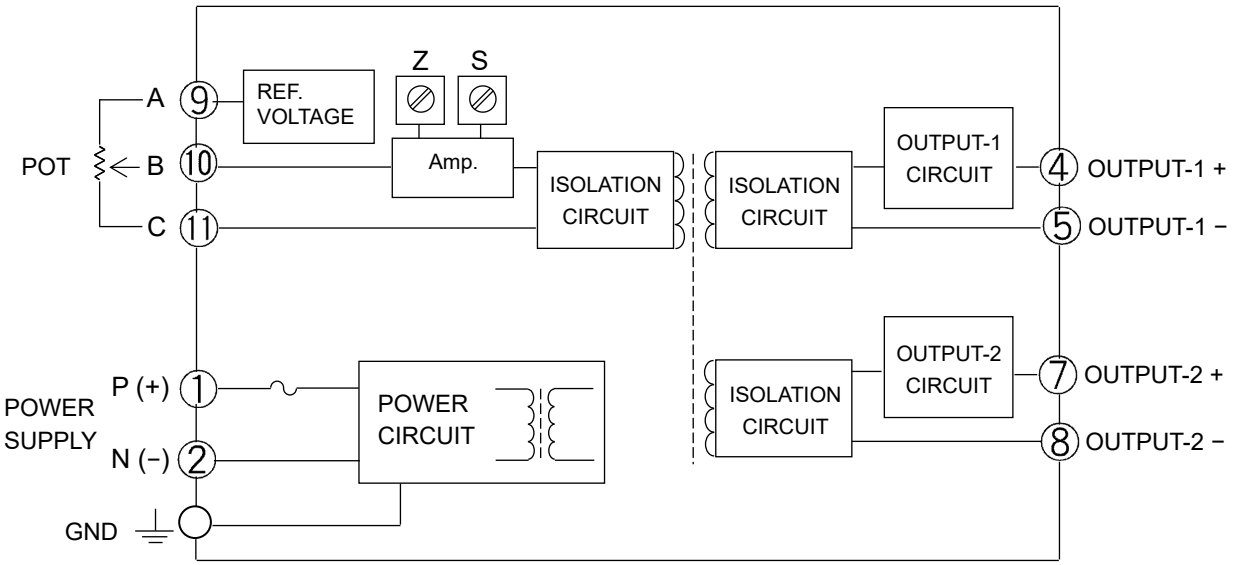
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

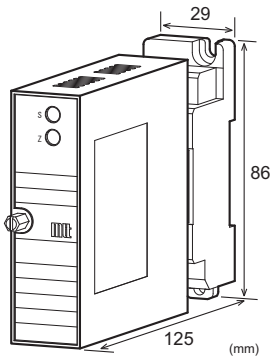


Product Specification Sheet Model: MS3710-01

Slim Plug-In 4-Wire Potentiometer Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3710-01 is a slim, plug-in 4-wire potentiometer transmitter that detects changes in the resistance of potentiometric sensors, converts them into commonly used DC signals and provides isolated single or dual output.



ORDERING CODE

MS3710-01 - □ - □ □ □

Model

Power Supply

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

Input

R: 4-wire potentiometer
Specify an input range.

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

No code: None
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 1and 350Ω maximum for Output 2.
Note 3: Burnout protection is upscale.

Options

No code: None
/K: Fast response (0 to 90% response time: 10ms max.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 an input range.
(e.g.) MS3710-01-A-RA6 (20 to 70Ω)

* Note that the total resistance and input range should be specified in steps of at least 50 ohms.

Other Ordering Examples:
For an output code of "0": MS3710-01-A-R06 (50 to 100Ω / Output: 2 to 5V)
For an option code of "X": MS3710-01-A-RA/X (0 to 50Ω / 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 Supply	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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.6W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

Excitation Current	Approx. 1mA
Allowable Lead Wire Resistance	50Ω max. per wire

Ranges Available
<Standard specifications>

Total Resistance	300Ω max.
Input Range	Specify between 50Ω and 200Ω in steps of 50Ω.

Input Spec Ex.: For 125 to 175Ω input, the input span is 50Ω.
Note: Any specification out of the total resistance or input range 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.)	

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%

Note: 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 (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

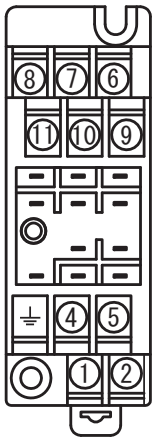
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

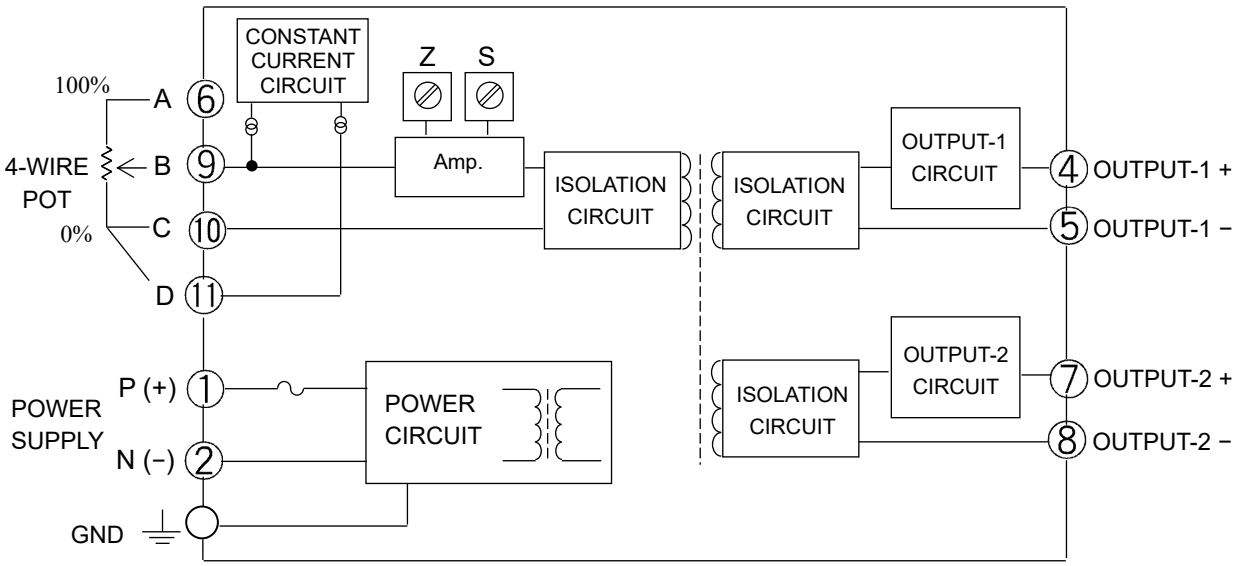
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

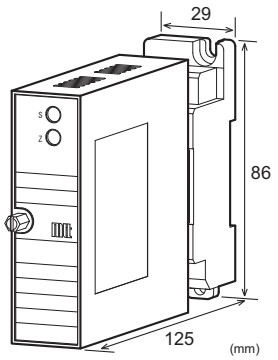


Product Specification Sheet Model: MS3710-02

Slim Plug-In Potentiometer Transmitter with Isolated Single/Dual Output (Constant Current Model)

DESCRIPTION

The MS3710-02 is a slim, plug-in constant-current potentiometer transmitter that detects changes in the resistance of potentiometric sensors, converts them into commonly used DC signals and provides isolated single or dual output.



ORDERING CODE

MS3710-02 - □ - □ □

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

No code: None
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: Burnout protection is upscale.

Options

No code: None
/K: Fast response (0 to 90% response time: 10ms max.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3710-02-A-A6 (0 to 100Ω)

Other Ordering Examples:
For an output code of "0": MS3710-02-A-06 (0 to 100Ω / Output: 2 to 5V)
For an option code of "X": MS3710-02-A-A/X (0 to 10kΩ / 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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.6W max	6.0W max
Dual Output	7.0VA max	1.8W max	6.0W max

●INPUT SECTION

Excitation Current	Approx. 1mA: Input range between 0-100Ω and 0-2kΩ. Approx. 0.2mA: Input range between 0-2kΩ and 0-10kΩ.
Allowable Lead Wire Resistance	200Ω max. per wire

Ranges Available
<Standard specifications>

Specify between 0-100Ω and 0-1kΩ in steps of 10Ω.
Specify between 0-1kΩ and 0-10kΩ in steps of 100Ω.

Note: Any specification out of the above listed requirement 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.)

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%

Note: 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

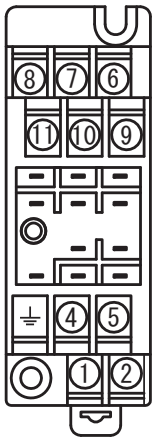
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

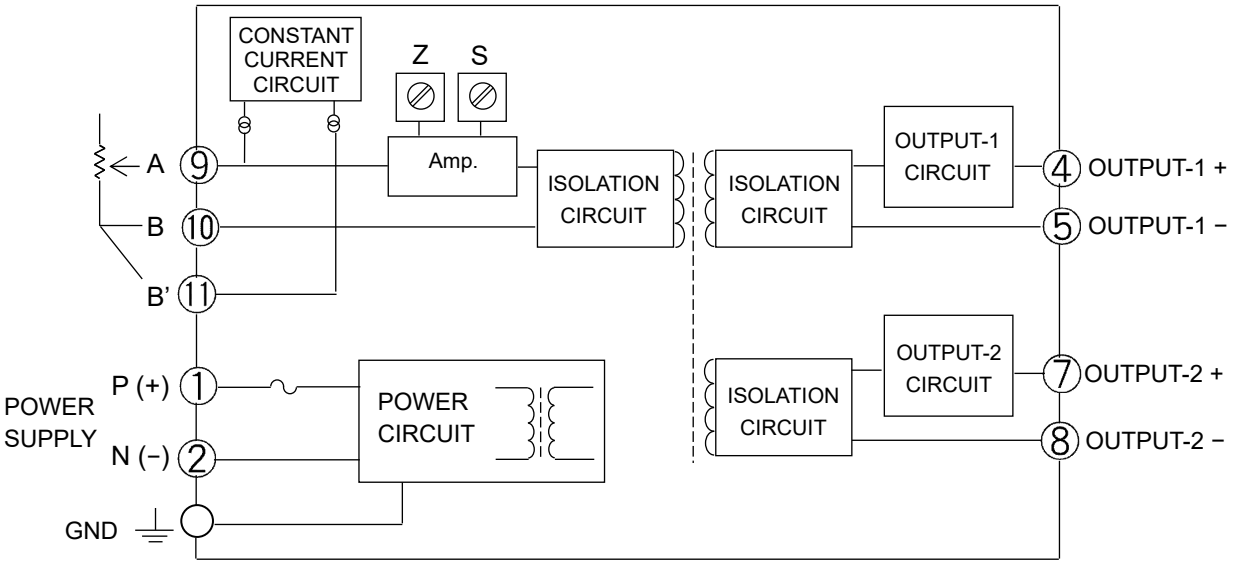
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3711

Slim Plug-In Pulse Divider with Isolated Single/Dual Output

DESCRIPTION

The MS3711 is a slim, plug-in pulse divider that accepts pulse train signals from sensors or other devices, shapes and divides these pulses, converts signal levels as necessary, and provides isolated single or dual output.

ORDERING CODE

MS3711 - □ - □ □ □

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 signal and/or threshold voltage

Output 1

1: TTL level
2: Open collector
3: Voltage pulse 10V±10%
4: Voltage pulse 12V±10%

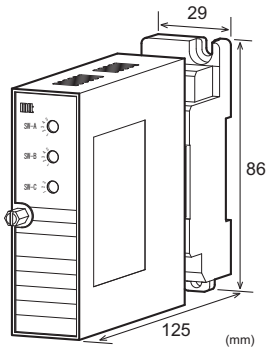
Output 2

No code: None
The codes are the same as for Output 1.

Note: When a combination of TTL levels or voltage pulses is selected for Outputs 1 and 2, the voltage levels for both outputs should be the same.

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
/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.) MS3711-A-O22

* With the default setting, the division ratio is 1/1.

Other Ordering Examples:
For an input code of "Y": MS3711-A-Y22 (Input DC voltage pulse: 0 to 12V / SH=8.5V, SL=2.5V)
For an input code of "Y": MS3711-A-Y22 (Input AC pulse: 200Vp-p / S= 2Vp-p)
For a specific division ratio: MS3711-A-O22 (Division ratio: 1/100)
* SH = Threshold level HI, SL = Threshold level LO, S = Threshold level
Note 1: For DC current pulse input, the range should be specified between 0-100μA and 0-100mA.
Note 2: If you wish to include multiple options in your order, specify the option codes in series (e.g. /AX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	2.1W max	7.2W max
Dual Output	5.5VA max	2.2W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With power:	1MΩ min. (Standard, 5V input)
	Without power:	10kΩ min.
Current Input (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).

Maximum Input Frequency 50kHz

Input Pulse Width 20μs min.

Duty Ratio 40 to 60% (at standard threshold voltage)

Sensor Power Supply 30mA max. (2-wire or 3-wire type)

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 range: 0.2V min.

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

TTL Level	(Maximum output 5mA @ 3.5V)
Voltage Pulse 10V	(Maximum output 7mA @ ±10%)
Voltage Pulse 12V	(Maximum output 7mA @ ±10%)

Maximum Rating Open collector: 30V, 50mA

Division Ratio

Division ratios can be set within the range of 1 to 1/3200 by combination of the settings for three switches.

[Setting method]

1. Set either the switch A or B to 1 (N.C.).
2. To make input and output frequencies equal, set the switch A to 2 (TH) and the switch B to 1 (N.C.).
3. The division ratio is determined by multiplying a value defined for the switch A or B by a value selected for the switch C.

[Example]

If the switch A = 1 (N.C.), the switch B = 4 (1/64), and the switch C = 2 (1/5), the division ratio will be 1/64×1/5=1/320.

Switch No.	Switch A	Switch B	Switch C
1	N.C.	N.C.	1/1
2	TH	1/16	1/5
3	1/2	1/32	1/25
4	1/4	1/64	
5	1/8	1/128	

Note: A correct division cannot be achieved if the switches A and B are both set to 1 (N.C.) or both set to other than 1.

* See page 3 for a list of division ratios.

Duty Ratio

50% typical (Input pulse duty ratio 50%, standard threshold voltage)

DC voltage pulse: 0-5V/1kHz input
AC voltage pulse: 5Vp-p/1kHz input
Open collector: 1kHz input

Maximum Output Frequency

Voltage Pulse Output	50kHz
Open Collector Output	20kHz

(For both of the above, the conditions are as follows: input pulse duty ratio 50% and standard threshold voltage)

●PERFORMANCE

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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

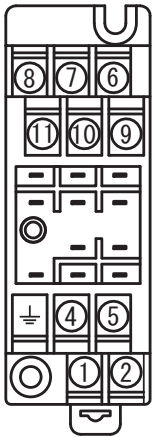
●MATERIAL

Housing	ABS resin (UL-94V-0)
Terminal Block	PBT resin (UL-94V-0)
Terminal Block Cover	PC resin (UL-94V-2)
DIN Rail Stopper	PP resin (UL-94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL-94V-0)

LIST OF DIVISION RATIOS

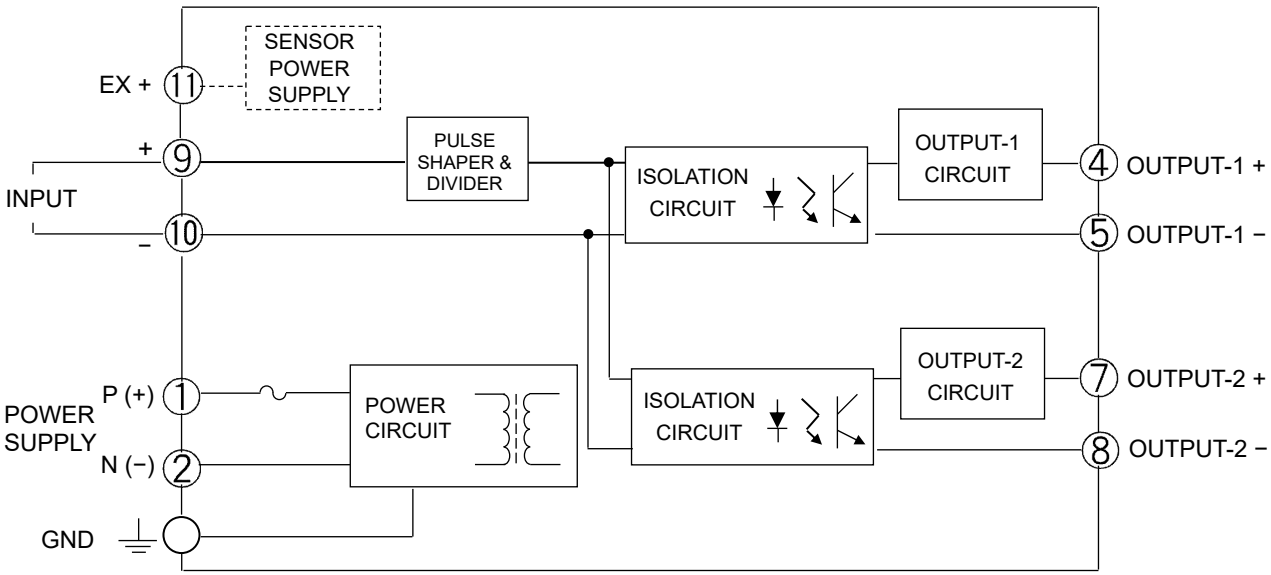
Division Ratio	Switch A		Switch B		Switch C	
	Switch No.	Type	Switch No.	Type	Switch No.	Type
1/1	2	TH	1	N.C.	1	1/1
1/1	2	TH	1	N.C.	2	1/5
1/1	2	TH	1	N.C.	3	1/25
1/2	3	1/2	1	N.C.	1	1/1
1/4	4	1/4	1	N.C.	1	1/1
1/8	5	1/8	1	N.C.	1	1/1
1/10	3	1/2	1	N.C.	2	1/5
1/16	1	N.C.	2	1/16	1	1/1
1/20	4	1/4	1	N.C.	2	1/5
1/32	1	N.C.	3	1/32	1	1/1
1/40	5	1/8	1	N.C.	2	1/5
1/50	3	1/2	1	N.C.	3	1/25
1/64	1	N.C.	4	1/64	1	1/1
1/80	1	N.C.	2	1/16	2	1/5
1/100	4	1/4	1	N.C.	3	1/25
1/128	1	N.C.	5	1/128	1	1/1
1/160	1	N.C.	3	1/32	2	1/5
1/200	5	1/8	1	N.C.	3	1/25
1/320	1	N.C.	4	1/64	2	1/5
1/400	1	N.C.	2	1/16	3	1/25
1/640	1	N.C.	5	1/128	2	1/5
1/800	1	N.C.	3	1/32	3	1/25
1/1600	1	N.C.	4	1/64	3	1/25
1/3200	1	N.C.	5	1/128	3	1/25

TERMINAL ASSIGNMENTS

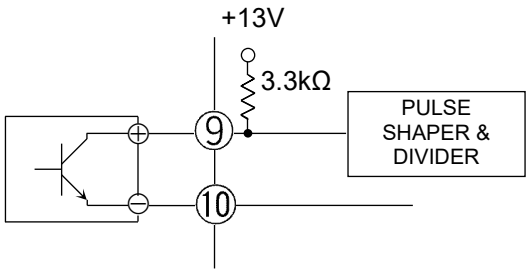


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	EX	

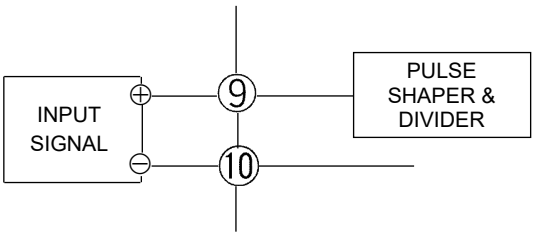
BLOCK DIAGRAM



For dry contact or open collector input:

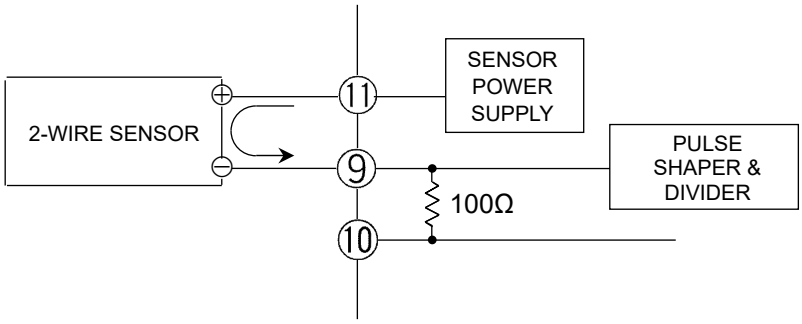


For voltage pulse input:



When a 2-wire sensor is used:

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

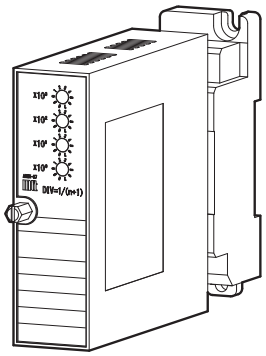


Product Specification Sheet Model: MS3711A

Slim Plug-In Pulse Divider with Isolated Single/Dual Output

DESCRIPTION

The MS3711A is a slim, plug-in pulse divider that accepts pulse train signals from sensors or other devices, shapes and divides these pulses, converts signal levels as necessary, and provides isolated single or dual output.



ORDERING CODE

MS3711A - □ - □ □ □

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 signal and/or threshold voltage

Output 1

1: TTL level
2: Open collector
3: Voltage pulse 10V±10%
4: Voltage pulse 12V±10%

Output 2

No code: None
The codes are the same as for Output 1.

Note: When a combination of TTL levels or voltage pulses is selected for Outputs 1 and 2, the voltage levels for for both outputs should be the same.

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
/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.) MS3711A-A-O22

* With the default setting, the division ratio is 1/1.

Other Ordering Examples:
For an input code of "Y": MS3711A-A-Y22 (Input DC voltage pulse: 0 to 12V / SH=8.5V, SL=2.5V)
For an input code of "Y": MS3711A-A-Y22 (Input AC pulse: 200Vp-p / S= 2Vp-p)
For a specific division ratio: MS3711A-A-O22 (Division ratio: 1/100)
* SH = Threshold level Hi, SL = Threshold level Lo, S = Threshold level
Note 1: When a DC current pulse is selected for input, the range should be specified between 0-100μA and 0-100mA.
Note 2: If you wish to include multiple options in your order, specify the option codes in series (e.g. /AX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	2.1W max	7.2W max
Dual Output	5.5VA max	2.2W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input Model	With power:	1MΩ min. (Standard, 5V input)
	Without power:	10kΩ min.
Current Input Model	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).

Maximum Input Frequency	100kHz
Input Pulse Width	10μs min.
Duty Ratio	40 to 60% (at standard threshold voltage)
Sensor Power Supply	30mA max. (2-wire or 3-wire type)

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 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

TTL Level	5mA @ 3.5V
Voltage Pulse 10V	7mA @ ±10%
Voltage Pulse 12V	7mA @ ±10%

Maximum Rating	Open collector: 30V, 50mA
Division Ratio	1/1 to 1/10000 Division ratios can be set using the four 10-position rotary switches on the front panel. Assuming that these four switches are set to a, b, c and d as shown below, a 4-digit number "n" is expressed as follows: $n = a\times10^3+b\times10^2+c\times10^1+d\times10^0$ where a, b, c and d are variables, each of which takes any of the numbers 0 to 9. Dividing 1 by (n+1) gives a division ratio.

Division Ratio	Switch Setting			
	$\times10^3$	$\times10^2$	$\times10^1$	$\times10^0$
1/n+1	a	b	c	d
1/1	0	0	0	0
1/100	0	0	9	9
1/10000	9	9	9	9

Duty Ratio	40 to 60% (Input pulse duty ratio 50%, standard threshold voltage) Note that the duty ratio will be 30 to 70% only when the division ratio is 1/3. DC voltage pulse: 0-5V/1kHz input AC voltage pulse: 5Vp-p/1kHz input Open collector: 1kHz input

Maximum Output Frequency

Voltage Pulse Output	100kHz
Open Collector Output	50kHz (Load resistance 1kΩ max.)

(For both of the above, the conditions are as follows: input pulse duty ratio 50% and standard threshold voltage)

●PERFORMANCE

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)
Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

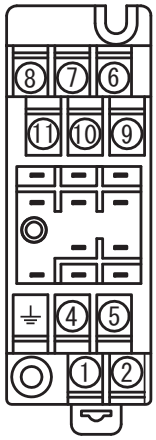
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

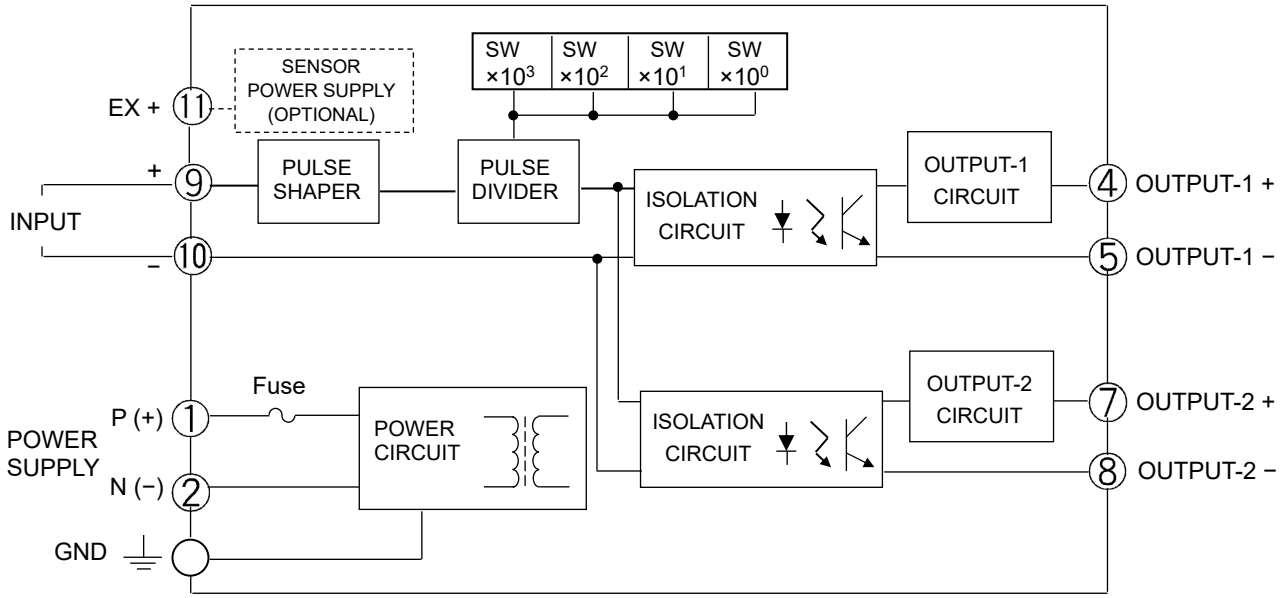
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

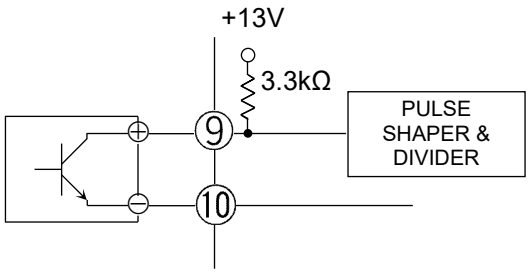


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	EX	

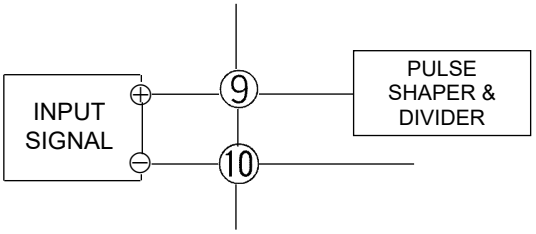
BLOCK DIAGRAM



For dry contact or open collector input:

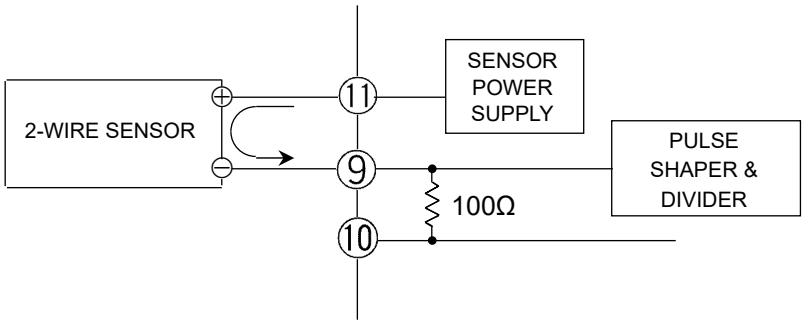


For voltage pulse input:



When a 2-wire sensor is used:

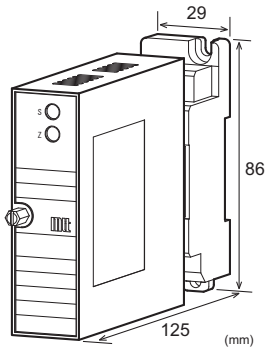
Note: The connections may vary with the type of the sensor used.



Slim Plug-In Square-Root Extractor with Isolated Single/Dual Output

DESCRIPTION

The MS3713 is a slim, plug-in square-root extractor that extracts the square roots of DC current or voltage signals, converts them into commonly used DC signals and provides isolated single or dual output.



ORDERING CODE

MS3713 - □ - □ □ □

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
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 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

No code: None
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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3713-A-A66

Other Ordering Examples:
For an input code of "Z": MS3713-A-ZAA (Input: 8 to 20mA)
For an output code of "0": MS3713-A-A60 (Output: 2 to 5V)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.6W max	6.0W max
Dual Output	6.0VA max	2.0W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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)	0 to 100mA	0 to 300V
Input Span (DC)	100μA to 100mA	200mV to 300V
Input Bias	0 to 100%	0 to 100%

Input Spec. Ex.1: For 4 to 20mA input, the input span is 16mA and the bias +25%.
Input Spec. Ex. 2: For 2 to 6V input, the input span is 4V and the bias +50%.

●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.)	
Square-Root Extraction	$X = 10 \times \sqrt{Y}$ where X = Output signal (0 to 100%) Y = Input signal (0 to 100%) Note: The cutoff function works when the output reaches 8%±1%.	

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%

Note: 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 (with input of 1 to 100%, at 25°C±5°C).
Temperature Characteristics	Better than ±0.2% of span per 10°C change in ambient.
Response Time	120ms 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

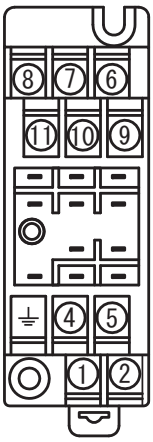
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

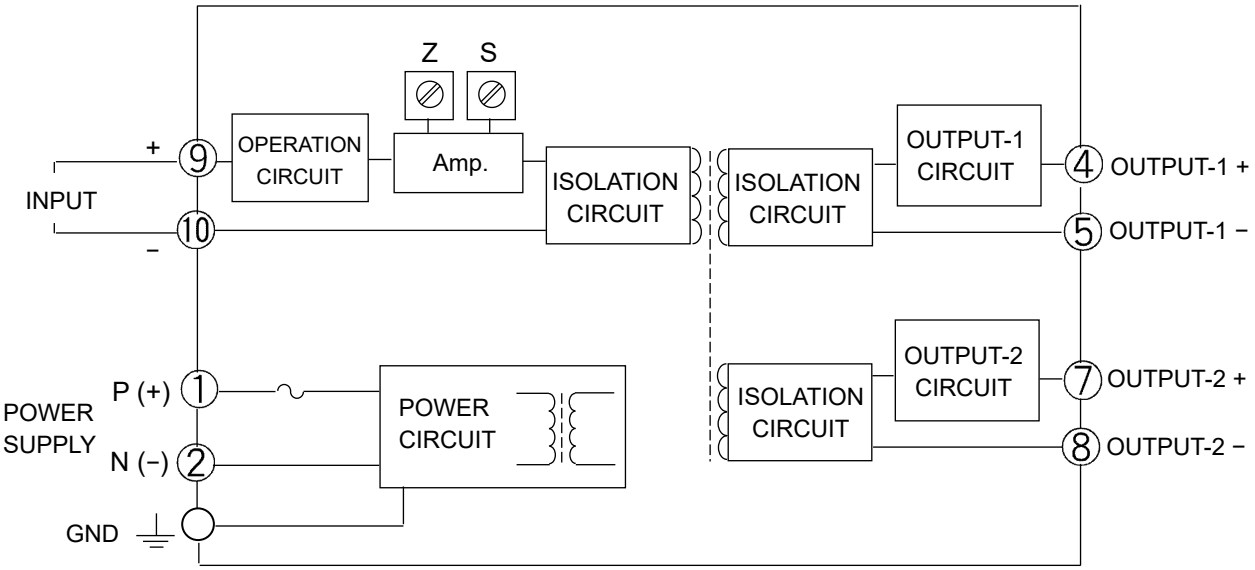
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

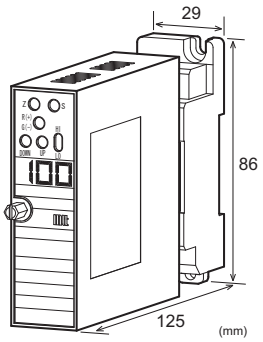


Product Specification Sheet Model: MS3714

Slim Plug-In Limiter with Isolated Single/Dual Output

DESCRIPTION

The MS3714 is a slim, plug-in limiter that converts DC current or voltage signals into commonly used DC signals, limits the outputs to force them to fall within the range between user-defined upper and lower limits, and provides isolated single or dual output.



ORDERING CODE

MS3714 - □ - □ □ □

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 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

No code: None
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
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3714-A-666

* The factory default settings are:
Upper limit = 100%
Lower limit = 0%.

Other Ordering Examples:
For an input code of "0": MS3714-A-066 (Input: 0.2 to 1V)
For an output code of "0": MS3714-A-660 (Output: 2 to 5V)
For specific upper and lower limits: MS3714-A-666 (Upper limit: 95%, Lower limit: 5%)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	6.0VA max	1.7W max	6.0W max
Dual Output	6.5VA max	2.1W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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.)
Limit Setting Range	-10 to +105% for both upper and lower limits (in steps of 0.1%; but 1% for the range over 100%).

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%

Note: 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).
Limit Setting Accuracy	Better than ±0.2% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.15% of span per 10°C change in ambient.
Response Time	85ms max. (0 to 90%) with a step input at 100%.
Limit Value Indicator	Red LED, digit height 8.0mm, 3 digits.
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

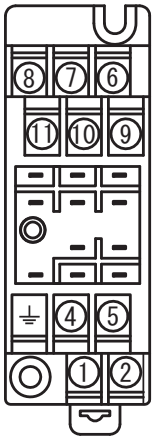
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

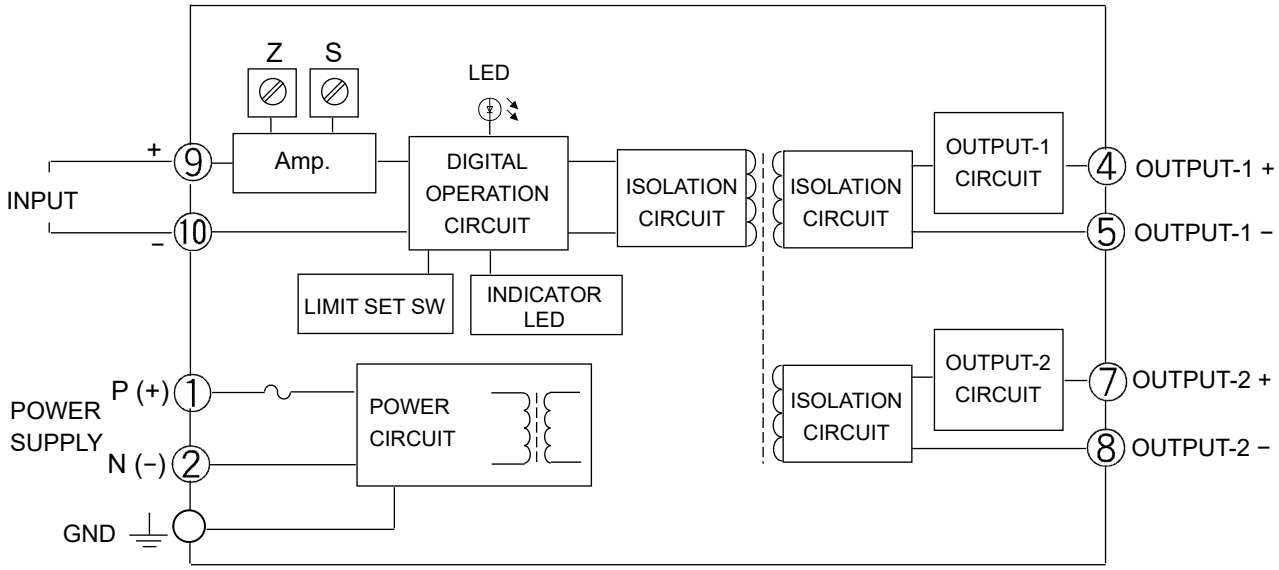
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS

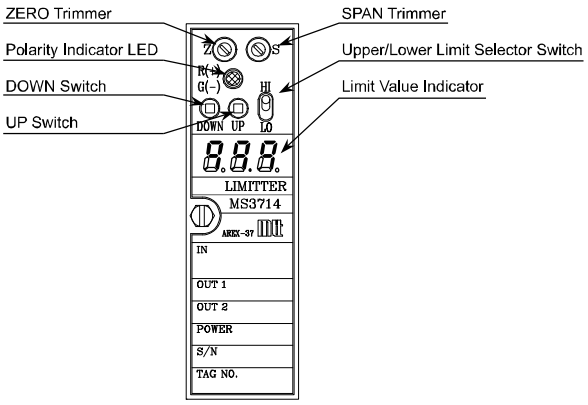


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



FRONT VIEW



SETTING

●LIMIT VALUE SETTING

Upper Limit Setting

When the Upper/Lower Limit Selector Switch is set to the HI position, the Limit Value Indicator shows the current upper limit. This limit value can be changed to a desired value by pressing the UP/DOWN Switch.

Lower Limit Setting

When the Upper/Lower Limit Selector Switch is set to the LO position, the Limit Value Indicator shows the current lower limit. This limit value can be changed to a desired value by pressing the UP/DOWN Switch.

Indicator

The Polarity Indicator LED is red when the set value is positive and green when it is negative.
The Limit Value Indicator goes OFF if no switch is operated for one minute, while the Polarity Indicator LED keeps illuminating green regardless of the polarity.

UP/DOWN Switch

The switch is of a push button type. Pressing and holding the switch increases the speed at which the value changes.

Factory Default Settings

If not specified, the upper and lower limits will be set to the factory defaults as indicated below:
Lower limit: 0%
Upper limit: 100%

LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Limit Value Indicator (7-segment LED)	Polarity Indicator LED	Output	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	OFF	Green LED is ON.	Normal	–
3	Value setting	Set value	Red LED is ON when the set value is positive; Green LED is ON when it is negative.	Normal	–
4	DAC error	Error code: 1	Red LED blinks at 0.25 second intervals.	Typically 0%, but may vary.	None
5	CRC error of a set value	Error code: 2	Red LED blinks at 1 second intervals.	0%	Reconfig-uration
6	CRC error of a compensated value	Error code: 4	Red LED blinks at 1 second intervals.	0%	None
7	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0%, but may vary.	None

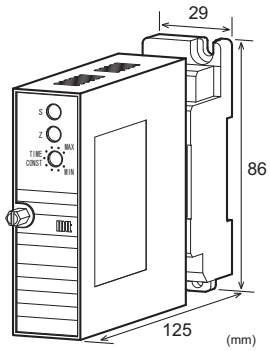
Notes:
No. 1: When the Limit Value Indicator is turned ON, a 3-digit number “888” with dots is displayed.
No. 7: The red LED may fail to light up.
No. 4 - 7: Only the last digit is displayed in the event of an error.

Product Specification Sheet Model: MS3716

Slim Plug-In First-Order Delay Signal Conditioner with Isolated Single/Dual Output

DESCRIPTION

The MS3716 is a slim, plug-in first-order delay signal conditioner that adds a first-order delay to DC current or voltage input signals, converts them into commonly used DC signals, and provides isolated single or dual output.



ORDERING CODE

MS3716 - □ - □ □ □

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

No code: None
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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 time constant setting range between 0.2 and 20 seconds.
(e.g.) MS3716-A-AA6 (0.5 to 10s)

Other Ordering Examples:
For an input code of "Z": MS3716-A-ZAA (0.2 to 20s / Input: 8 to 20mA)
For an output code of "0": MS3716-A-A60 (0.2 to 20s / Output: 2 to 5V)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	1.4W max	6.0W max
Dual Output	6.0VA max	1.8W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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)

Time Constant Setting Range	A time constant setting range should be specified between 0.2 and 20 seconds.
Time Constant Setting Trimmer	Rotation of up to 260°

Time Constant Setting Accuracy	Minimum value: -30 to 0% of a user-specified value Maximum value: 0 to +30% of a user-specified value

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%

Note: 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 5V 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.
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

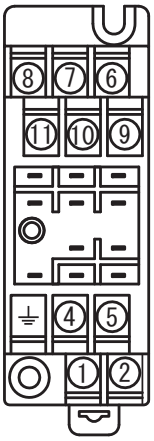
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

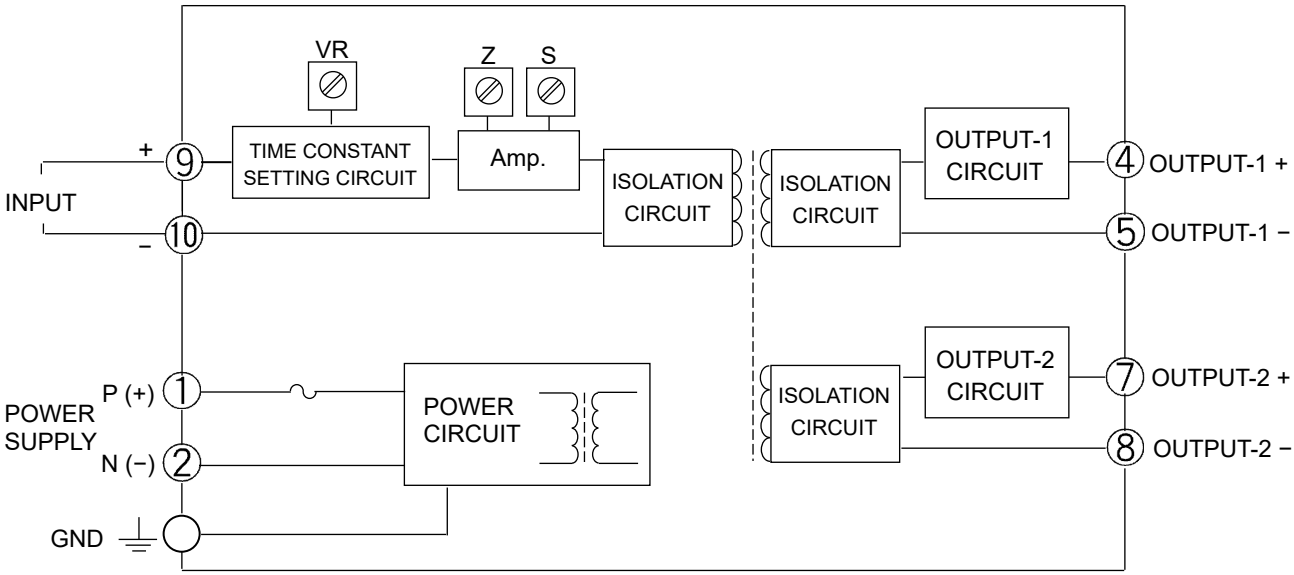
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



FACTORY DEFAULT SETTINGS

If you specify a time constant at the time you place your order, the product will be adjusted to your specified value prior to shipment as far as it is within the given constant setting range. The following example shows how you specify your desired time constant.

(Example) If you specify a time constant of 10 seconds:

Time constant: 10s (63%)

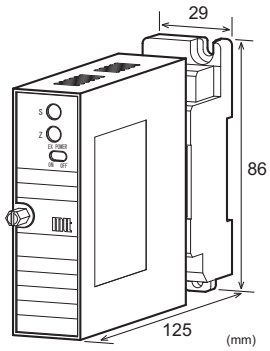
If not specified, the time constant will be set to the minimum value of your specified range.

Product Specification Sheet Model: MS3717

Slim Plug-In Distributor with Isolated Single/Dual Output
(with Square-Root Extraction Function)

DESCRIPTION

The MS3717 is a slim plug-in distributor that powers a two-wire transmitter, extracts the square roots of its 4 to 20mA signals, converts them into commonly used DC signals, and provides isolated single or dual output. This model features a square-root extraction function.



ORDERING CODE

MS3717 - □ - □ □

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
3W: ±1V DC
4W: ±10V DC
5W: ±5V DC
0: Other DC voltage signals

Output 2
No code: None
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.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3717-A-66

Other Ordering Examples:
For an output code of "0": MS3717-A-60 (Output: 2 to 5V)
For an option code of "X": MS3717-A-66/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	7.5VA max	2.4W max	8.5W max
Dual Output	7.5VA max	2.9W max	9.0W max

●INPUT SECTION

Input Signal	4 to 20mA DC from 2-wire transmitters
Input Resistance	250Ω
Transmitter Power Supply	Output voltage: 25V, typical. (0% input) 18V, typical. (100% input) Maximum current: 25mA, typical.
Limit Current for Short-Circuit Protection	26mA (typ.) * The unit has a built-in short-circuit detection circuit.
Permissible Short-Circuit Duration	Continuous.

●OUTPUT SECTION

Maximum 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.)	
Square-Root Extraction Function	$X = 10 \times \sqrt{Y}$ where X = Output signal (0 to 100%) Y = Input signal (0 to 100%) Note: X will be 0% when the input is less than or equal to 1%.	

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 4 to 8V output, the output span is 4V and the bias +100%.

●PERFORMANCE

Accuracy Rating	Better than ±0.2% of span (with input of 1 to 100%, 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

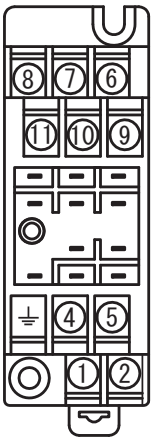
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

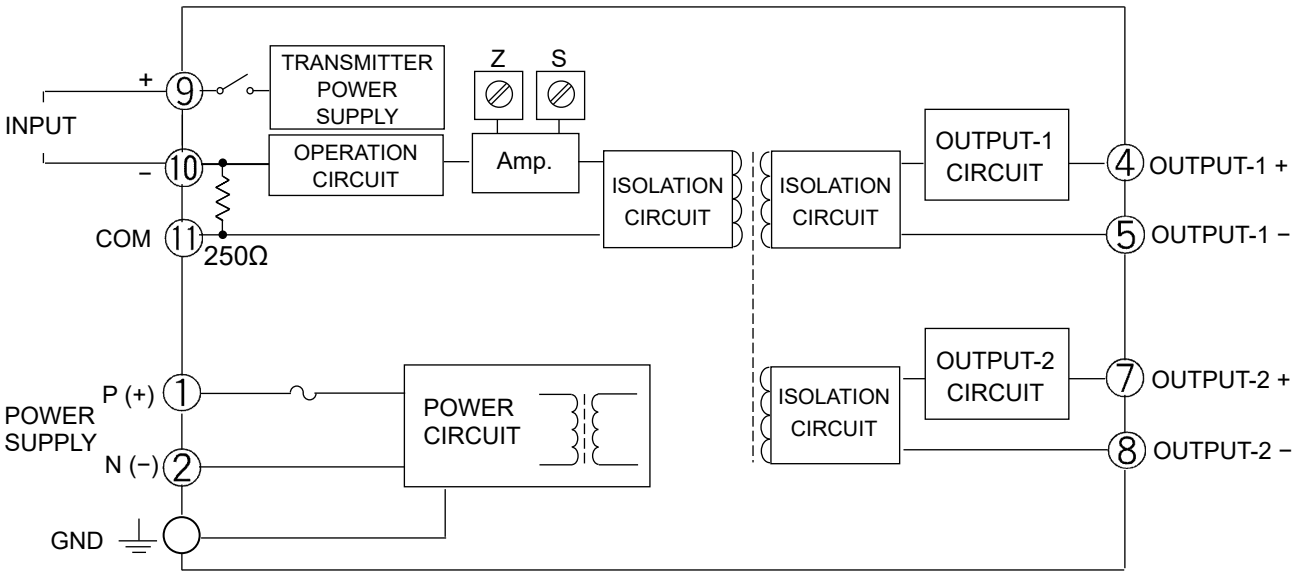
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

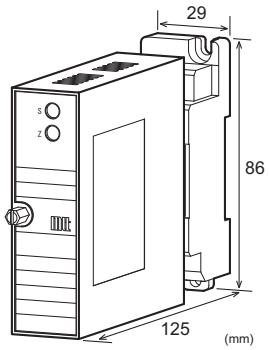


Product Specification Sheet Model: MS3718 MS3700

Slim Plug-In Frequency/Analog Converter with Isolated Single/Dual Output (for Ultra Low Frequency)

DESCRIPTION

The MS3718 is a slim, plug-in frequency to analog converter that converts pulse train signals from flow sensors and the like into commonly used DC signals and provides isolated single or dual output.



ORDERING CODE

MS3718 - □ - □ □ □

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 for input full scale up to 20Hz: Approx. 0.05Vp-p)
D: DC voltage pulse (Threshold voltage: Approx. 2V)
I : 4 to 20mA DC pulse (Threshold current: Approx. 8mA)
Y: Other input signal and/or threshold voltage

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
No code: None
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 1and 350Ω maximum for Output 2.

Options
No code: None
/B: Sensor power supply: 12V DC (±10%), 2-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.) MS3718-A-DA6 (0 to 10Hz)

Other Ordering Examples:
For an input code of "Y": MS3718-A-YAA (0 to 10Hz / Input DC voltage pulse: 0 to 12V / SH = 8.5V, SL = 2.5V)
For an input code of "Y": MS3718-A-YAA (0 to 10Hz / Input AC pulse: 200Vp-p / S = 2Vp-p)
* SH = Threshold level HI, SL = Threshold level LO, S = Threshold level
Note 1: For DC current pulse input, the range should be specified between 0-100μA and 0-100mA.
Note 2: If you wish to include multiple options in your order, specify the option codes in series (e.g. /BX).

SPECIFICATIONS

●POWER SECTION

Power Supply	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 is installed (standard).		
Power Consumption			
Power	100-240V AC	24V DC	100-240V DC
Single Output	8.3VA max	2.6W max	8.3W max
Dual Output	9.0VA max	3.0W max	9.0W max

●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	10μs min.
Sensor Supply Current	20mA max.

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		
Input Frequency up to 20Hz	50mVp-p min.	Hi-Lo voltage: 0.2V min.
Input Frequency	Within the range between 0-0.01Hz and 0-20Hz.	

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%

Note: 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).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	2 pulses + 0.2S for the start, and subsequently 1 pulse + 0.2S (0 to 90%).
Cutoff Function*	Available upon request (when ordering)
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

* Cutoff function: It forces output to be fixed to 0% when input becomes equal to or less than a set value.

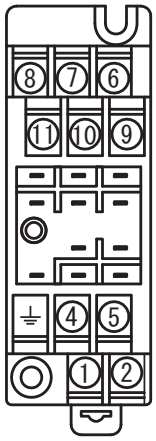
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

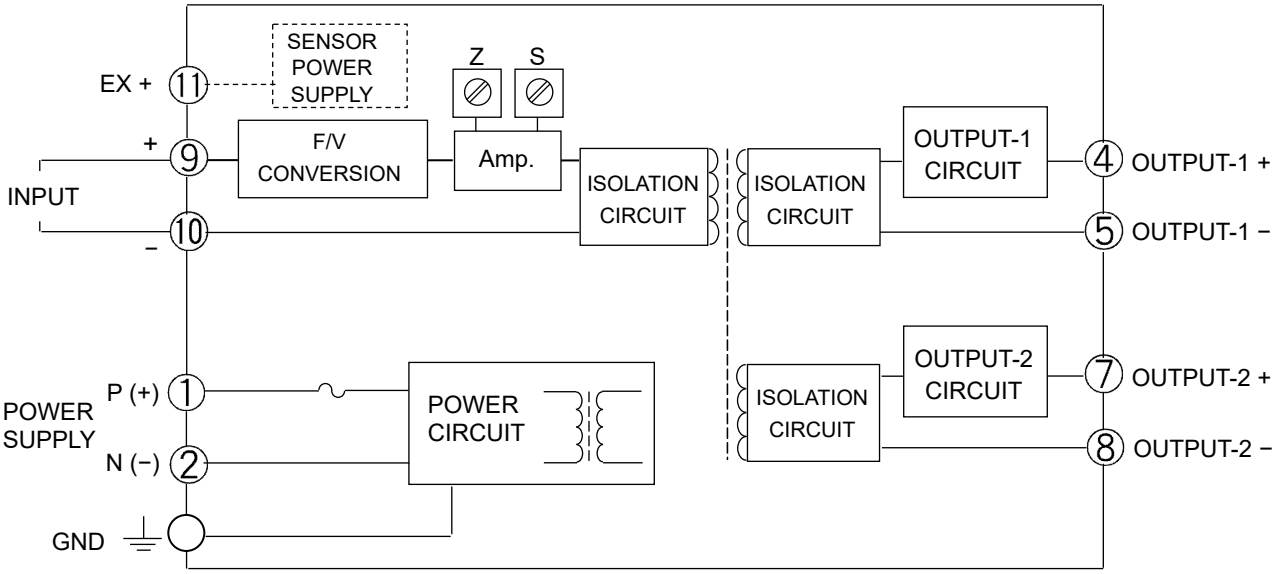
Housing	ABS resin (UL-94V-0)
Terminal Block	PBT resin (UL-94V-0)
Terminal Block Cover	PC resin (UL-94V-2)
DIN Rail Stopper	PP resin (UL-94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL-94V-0)

TERMINAL ASSIGNMENTS

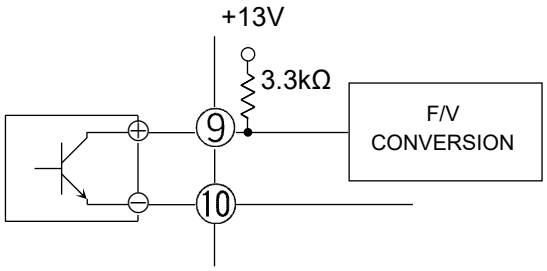


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	EX	

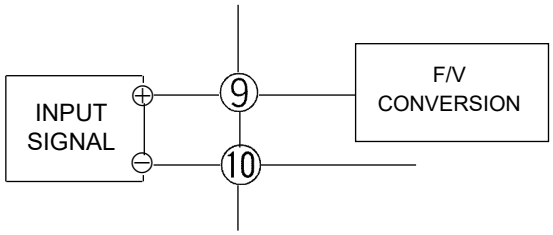
BLOCK DIAGRAM



For dry contact or open collector input:

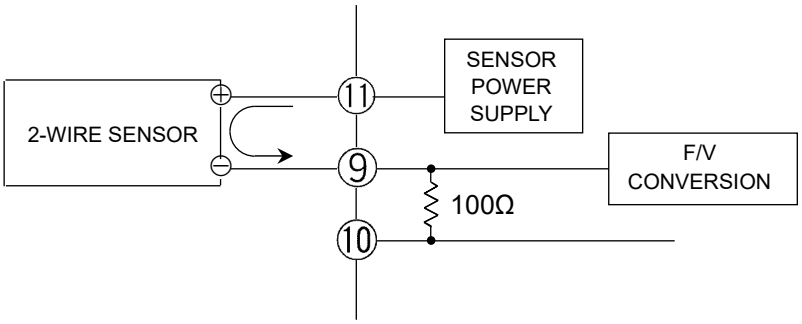


For voltage pulse input:



When a 2-wire sensor is used:

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

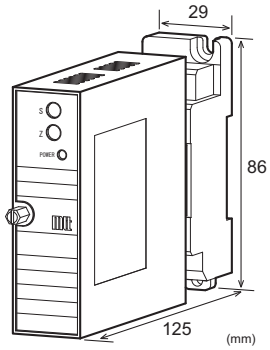


Product Specification Sheet Model: MS3719

Slim Plug-In Filter Unit with Single Output
(Non-Isolation between Input and Output)

DESCRIPTION

The MS3719 is a slim, plug-in filter unit that filters voltage input signals with preset filter characteristics and provides a single output. The unit has no isolation between input and output.



ORDERING CODE

MS3719 □□-□-□□□

Model

Output
- **No code**: -10 to 10V
- **I**: -20 to 20mA

Input Connection
- **No code**: Differential
- **SE**: Single-Ended

Power Supply
- **A**: 100 to 240V AC (47 to 63Hz)
- **P**: 100 to 240V DC
- **D**: 24V DC

High Pass Filter
- **1**: 1st order filter
- **2**: 2nd order filter
- **4**: 4th order filter
- **N**: No high pass filter.

Low Pass Filter
- **2**: 2nd order filter
- **4**: 4th order filter
- **8**: 8th order filter
- **N**: No low pass filter.

Options
- **No code**: None
- **/A**: External power supply ±15V DC (50mA)
- **/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. Also specify a cutoff frequency and gain.

(e.g.) MS3719-A-12
(High pass filter: 200Hz / Low pass filter: 10kHz / Gain 10x)

Notes:
1. If you select a 2nd or 4th order high pass filter, an 8th order low pass filter is not available.
2. If you select an 8th order low pass filter, neither a 2nd nor 4th order high pass filter is not available.
3. If no gain is specified, the unit will be manufactured so as to have a gain of 1x.
4. If you wish to include multiple options in your order, specify the option codes in series (e.g. /AX).

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	Voltage output: 160mA fuse Current output: 200mA fuse

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	9.0VA max	3.2W max	9.6W max
Dual Output	9.0VA max	3.5W max	9.6W max

●INPUT SECTION

Input Signal	-10 to 10V
Input Resistance	1MΩ min. with or without power.
Allowable Input Voltage	±30V DC max., continuous.
External Power Supply	Output voltage: ±15V (±5%) Output current: 50mA max.

Cutoff Frequencies Available

<Standard specifications>

Item	Order	Standard Specifications
Cutoff Frequency for High Pass Filters	1st	0.05Hz, 0.1Hz, 1Hz, 10Hz, 100Hz, 200Hz
	2nd, 4th	10Hz, 100Hz, 200Hz
Cutoff Frequency for Low Pass Filters	2nd	1Hz, 10Hz, 100Hz, 1kHz, 10kHz
	4th, 8th	100Hz, 1kHz, 10kHz
Gains		1x, 2x, 10x, 50x, 100x, 300x

<Quasi-standard specifications>

Item	Order	Ranges Available
Cutoff Frequency for High Pass Filters	1st	0.05 to 200Hz
	2nd, 4th	1 to 200Hz
Cutoff Frequency for Low Pass Filters		1 to 10kHz
Gains		1x to 300x

Notes:
1. Any specification out of the cutoff frequency or gain range listed above is treated as a special order.
2: The cutoff frequency of a high pass filter should be lower than that of a low pass filter.
3: For current output models, the cutoff frequency of a low pass filter should be lower than or equal to 1kHz.

(Example) Setting an input of ±100mV with a gain of 100x produces an output of ±10V.

●OUTPUT SECTION

Output Signal	-10 to 10V -20 to 20mA
Allowable Output Load	Voltage output: 2kΩ min. Current output: 550Ω max.
Zero Adjustment	Approx. ±1.2% of span. (Adjustable by the front-accessible trimmer.)
Span Adjustment	Approx. ±1.0% of span. (Adjustable by the front-accessible trimmer.)

●PERFORMANCE

Accuracy Rating	Better than ±0.1% of span with ±10V DC output (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient with ±10V DC output.
Passband Ripple	±0.5dB
Cutoff Frequency Tolerance	< 10Hz: ±10% (10Hz ≤: ±5%)
Filter Configurations	
High Pass Filter	1st order filter 2nd and 4th order filters (Butterworth)
Low Pass Filter	2nd, 4th and 8th order filters (Butterworth)
Power-ON Indicator	Green LED
Isolation	Isolation between [input, output] and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between [input, output], power, and ground.
Dielectric Strength	[Input, Output] / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5.0mA)
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

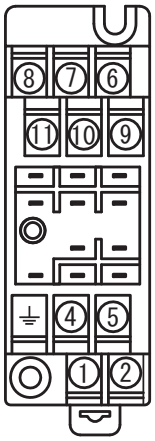
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



Differential Input:

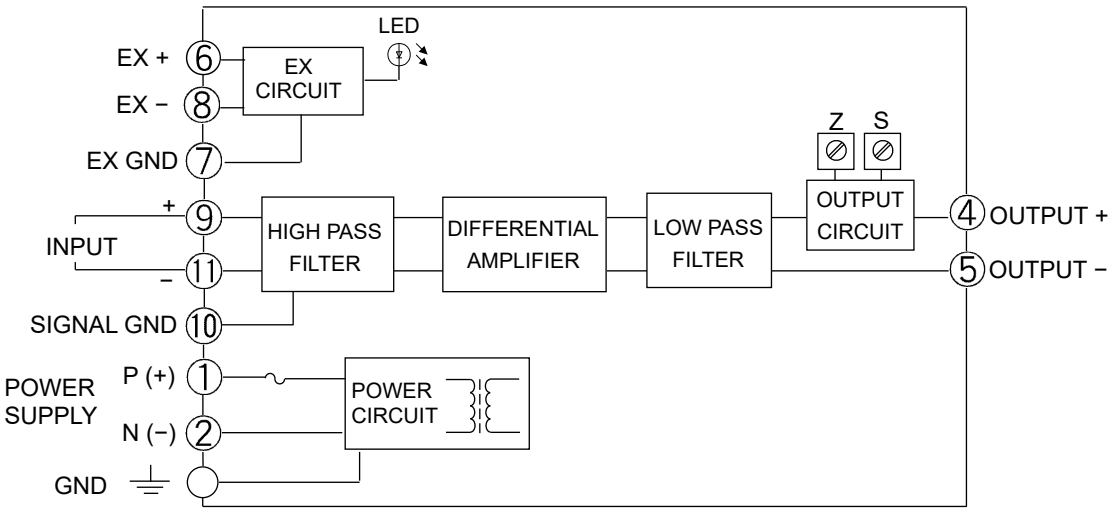
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	− OUTPUT	
⑥	EX +	
⑦	EX GND	
⑧	EX −	
⑨	+ INPUT	
⑩	SIG GND	
⑪	− INPUT	

Single-ended Input:

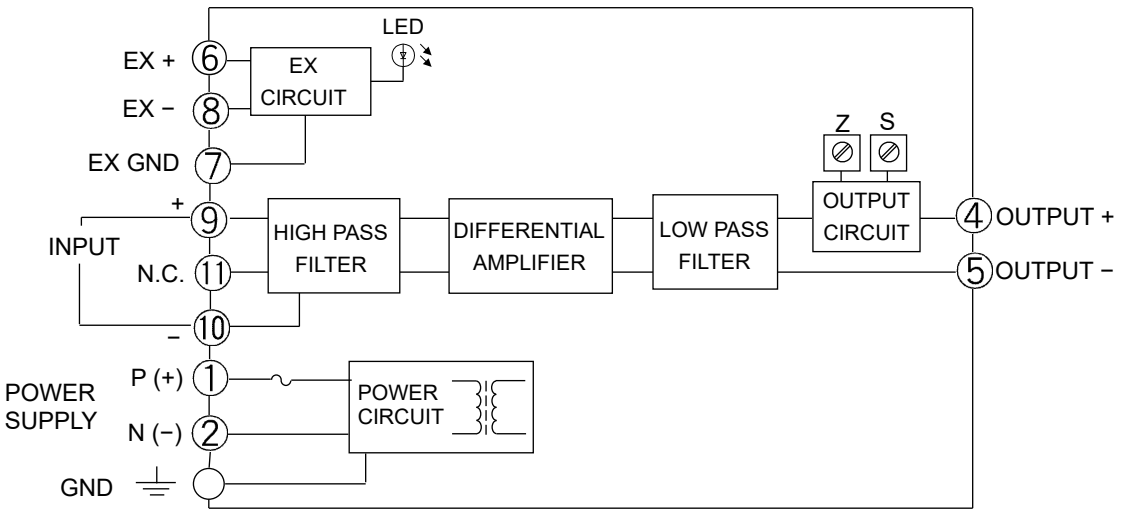
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	− OUTPUT	
⑥	EX +	
⑦	EX GND	
⑧	EX	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM

Differential Input:



Single-ended Input:



Product Specification Sheet Model: MS3720

Slim Plug-In CT Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3720 is a slim, 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 isolated single or dual output.

ORDERING CODE

MS3720 - □ - □ □ □

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

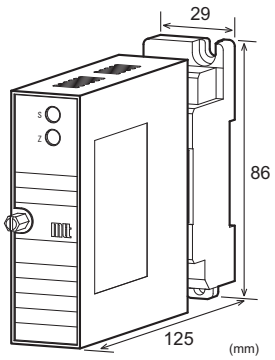
Output 1
A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
3: 0 to 1V DC
4: 0 to 10V DC
5: 0 to 5V DC
6: 1 to 5V DC
3W: ±1V DC
4W: ±10V DC
5W: ±5V DC
0: Other DC voltage signals

Output 2
No code: None
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
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3720-A-5A6

Other Ordering Examples:
For an output code of "0": MS3720-A-160 (Output: 2 to 5V)
For an option code of "X": MS3720-A-1AA/X (0-90% response time: 100ms max.)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.2W max	4.8W max
Dual Output	5.5VA max	1.6W max	6.0W max

●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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws) The supplied shunt resistor should be connected to the terminal block. (The two brackets of the resistor should be fixed to the terminals ⑨ and ⑩).
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket, but not including the shunt resistor)
Weight	Main unit: 120g max. Socket: 80g max. Shunt resistor: 5g max.

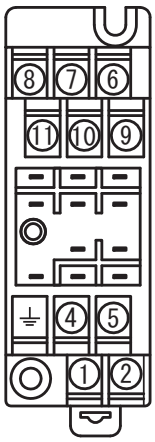
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

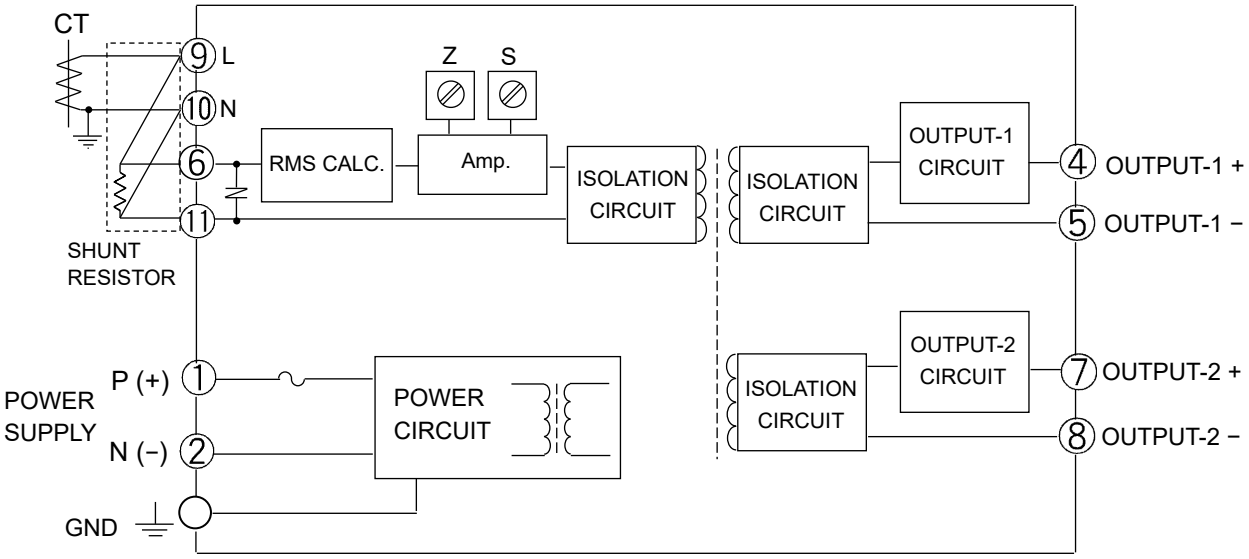
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Slim Plug-In Fast Response CT Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3720-01 is a slim, plug-in fast response CT transmitter that calculates the average values of AC current signals from a CT, converts them into commonly used DC signals, and provides isolated single or dual output.

ORDERING CODE

MS3720 - 01 - □ - □ □ □

Model

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

Input
1: 0 to 1A AC, 50/60Hz (sine wave)
5: 0 to 5A AC, 50/60Hz (sine wave)

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
No code: None
The codes are the same as for Output 1.

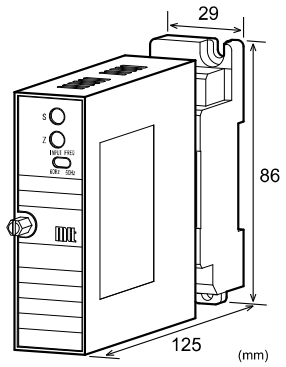
Note 1: When a voltage output is selected for Output 1, a current output cannot be selected for Output 2.
Note 2: When the code A (4 to 20mA) is selected for both of the two outputs, the output load will be 550Ω maximum for Output 1 and 350Ω maximum for Output 2.

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.) MS3720-01-A-1A6

Other Ordering Examples:
For an output code of "0": MS3720-01-A-160 (Output: 2 to 5V)
For an option code of "X": MS3720-01-A-56/X (0-90% response time: 85ms 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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.5W max	2.0W max
Dual Output	6.0VA max	2.5W max	3.0W max

●INPUT SECTION

Input Resistance	1A AC input: 10mΩ (Shunt resistor) 5A AC input: 2mΩ (Shunt resistor)
Allowable Input Current	Continuous: 120% of the rated input value Instantaneous: 10 times the rated input value (within 3 seconds)
Input Frequency	50/60Hz

Notes:
1. The input frequency is selectable between 50Hz and 60Hz by toggling the frequency selector switch on the front panel.
2. If not specified, the input frequency is set to the factory default, 60Hz.
3. Only a sine wave input is applicable.

●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%

Note: 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 (at 25°C±5°C).
Output Ripple	Less than 0.5%p-p of span.
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	20ms 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

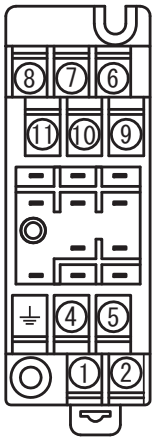
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

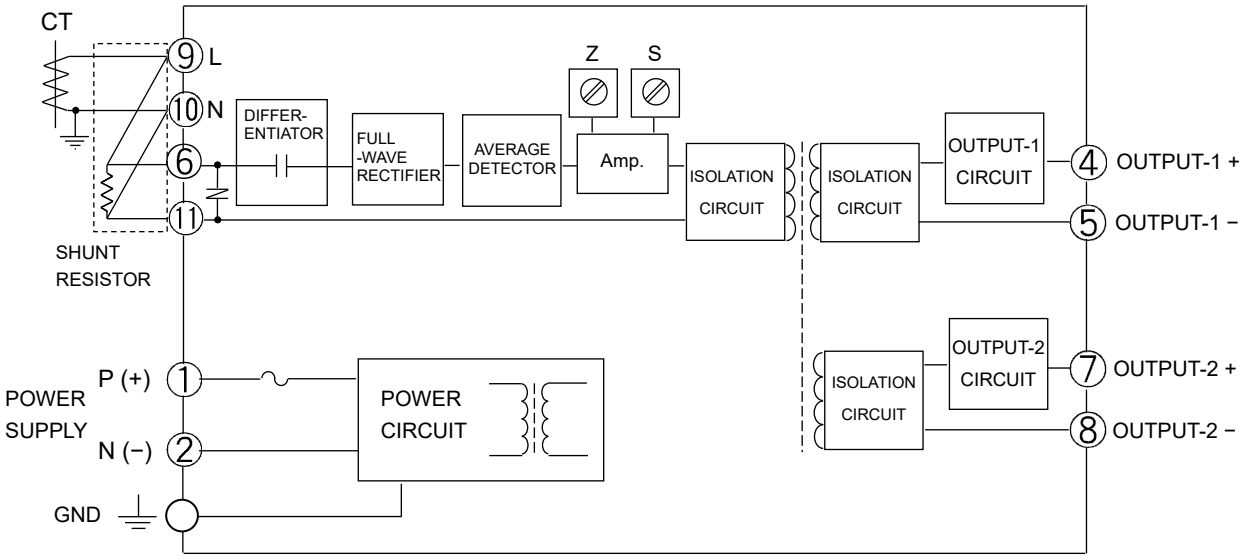
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

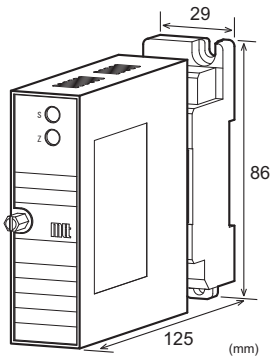


Product Specification Sheet Model: MS3720C

Slim Plug-In CT Transmitter with Isolated Single/Dual Output (Clamp Type CT Input)

DESCRIPTION

The MS3720C is a slim, plug-in CT transmitter that calculates the rms values of AC current signals from a clamp type CT, converts them into commonly used DC signals, and provides isolated single or dual output.



ORDERING CODE

MS3720C - □ - □ □ □

Model

Power Supply

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

Input (AC Current Signal)

R5: 0 to 5A AC
01: 0 to 10A AC
02: 0 to 20A AC
03: 0 to 30A AC
04: 0 to 40A AC
00: Other AC current signals
05: 0 to 50A AC
10: 0 to 100A AC
20: 0 to 200A AC
40: 0 to 400A AC
60: 0 to 600A AC

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

No code: None
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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3720C-A-R5A6

Other Ordering Examples:
For an output code of "0": MS3720C-A-0560 (Output: 2 to 5V)
For an option code of "X": MS3720C-A-10A/X (0-90% response time: 500ms max.)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.6W max	6.0W max

●INPUT SECTION

Input Signal	Output from the clamp type CT
Crest Factor	3 max.

Notes:
1. The output terminals of the supplied clamp type CT should be connected to the input terminals on the transmitter's terminal block.
2. A connecting cable is not included.

●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%

Note: 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 ±0.4% 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	450ms 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

CLAMP TYPE CT SPECIFICATIONS

●CTF-5A
Input 0-5A

Rated Primary Current	5A AC (rms)
Maximum Allowable Current	100A (rms), continuous.
Applicable Wire Size	φ7.9 mm max.
External Dimensions	W25.3 × H41.3 × D33 mm (not including the protrusion)
Weight	Approx. 60g

●CTF-50A
Input (0-10A) to (0-50A)

Rated Primary Current	50A AC (rms)
Maximum Allowable Current	100A (rms), continuous.
Applicable Wire Size	φ9.5 mm max.
External Dimensions	W25.5 × H48 × D23 mm (not including the protrusion)
Weight	Approx. 45g

●CTF-100A
Input (0-60A) to (0-100A)

Rated Primary Current	100A AC (rms)
Maximum Allowable Current	200A (rms), continuous.
Applicable Wire Size	φ14.5 mm max.
External Dimensions	W30.5 × H55 × D29.5 mm (not including the protrusion)
Weight	Approx. 80g

●CTF-200A
Input (0-125A) to (0-200A)

Rated Primary Current	200A AC (rms)
Maximum Allowable Current	300A (rms), continuous.
Applicable Wire Size	φ24 mm max.
External Dimensions	W35.5 × H76 × D45 mm (not including the protrusion)
Weight	Approx. 190g

●CTF-400A
Input (0-225A) to (0-400A)

Rated Primary Current	400A AC (rms)
Maximum Allowable Current	600A (rms), continuous.
Applicable Wire Size	φ35.5 mm max.

External Dimensions	W35.5 × H94 × D62.5 mm (not including the protrusion)
Weight	Approx. 310g

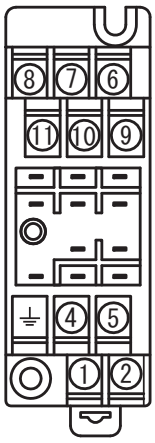
●CTF-600A
Input (0-500A) to (0-600A)

Rated Primary Current	600A AC (rms)
Maximum Allowable Current	800A (rms), continuous.
Applicable Wire Size	φ35.5 mm max.
External Dimensions	W35.5 × H94 × D62.5 mm (not including the protrusion)
Weight	Approx. 360g

●GENERAL SPECIFICATIONS

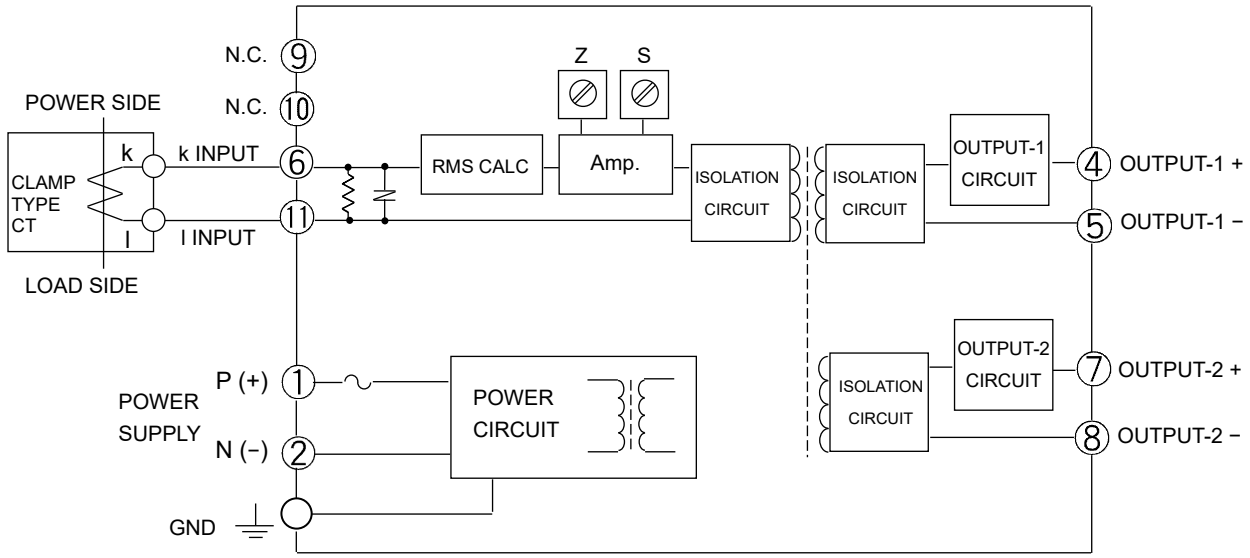
Applicable Frequency	50Hz/60Hz/400Hz
Accuracy	±1%
Open-Circuit Protection	Built-in overvoltage clamping device; clamping voltage 7.5V
Insulation Resistance	100MΩ min. (@ 500V DC) between the housing and output terminals.
Dielectric Strength	2200V AC for 1 minute between the housing and output terminals. (Cutoff current: 0.5mA)
Operating Environment	Ambient temperature: -10 to 60°C Humidity: 5 to 80% RH (non-condensing)
Storage Temperature	-20 to 60°C
Wiring	M3 screw terminal connection
Screwing Torque	0.5 [Nm] * Recommended
CT Output Cable	Shielded cable with a nominal conductor cross-section of 0.5 to 2.0 mm^2
Housing Material	PP resin (UL 94V-0)

TERMINAL ASSIGNMENTS



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

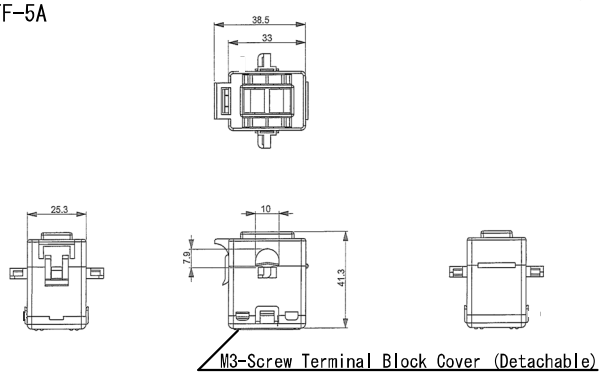
BLOCK DIAGRAM



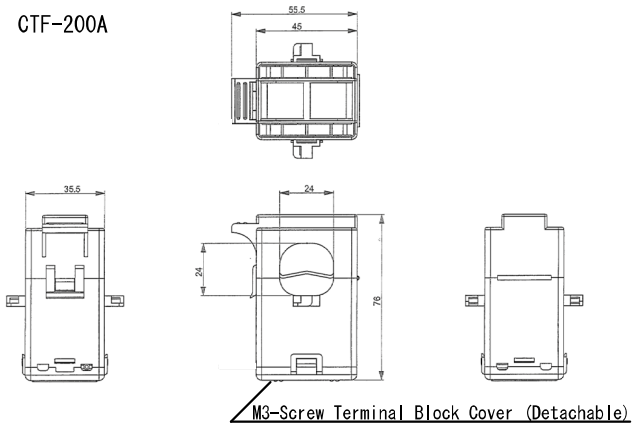
* The output terminals of the supplied clamp type CT should be connected to the input terminals on the transmitter's terminal block.
* A connecting cable is not included.
* A shielded cable not longer than 30 meters should be used to connect the clamp type CT to the transmitter's terminal block.

DIMENSIONAL OUTLINE DRAWINGS

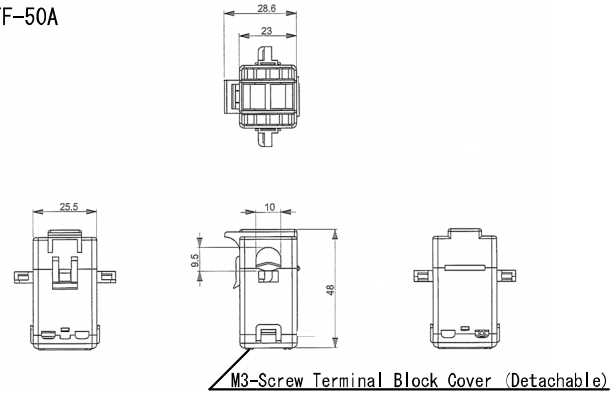
CTF-5A



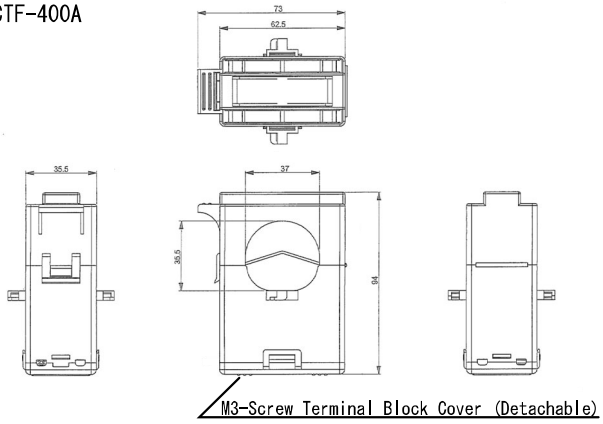
CTF-200A



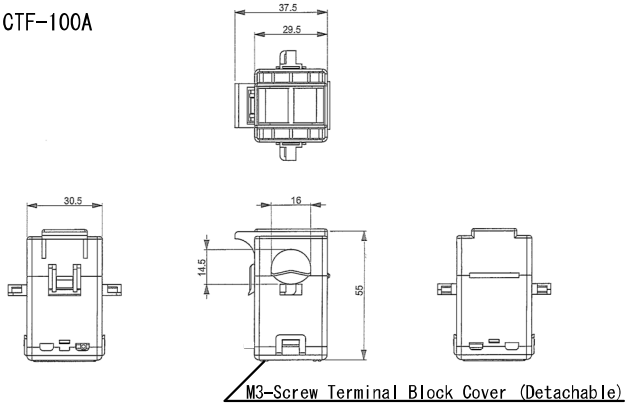
CTF-50A



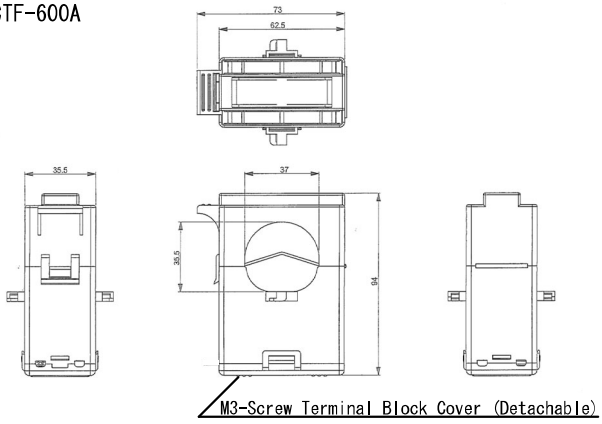
CTF-400A



CTF-100A



CTF-600A



Product Specification Sheet Model: MS3721

Slim Plug-In PT Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3721 is a slim, 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 isolated single or dual output.

ORDERING CODE

MS3721 - □ - □ □ □

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

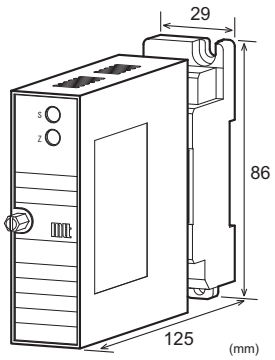
Output 2

No code: None
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
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3721-A-2A6

Other Ordering Examples:
For an input code of "0": MS3721-A-0A6 (Input: 0 to 200V)
For an output code of "0": MS3721-A-2A0 (Output: 2 to 5V)
For an option code of "X": MS3721-A-2A6/X (0-90% response time: 100ms max.)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.2W max	4.8W max
Dual Output	5.5VA max	1.6W max	6.0W max

●INPUT SECTION

Input Resistance	1MΩ min. with or without power.
Allowable Input Voltage	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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

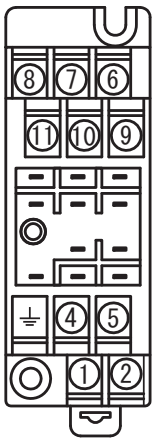
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

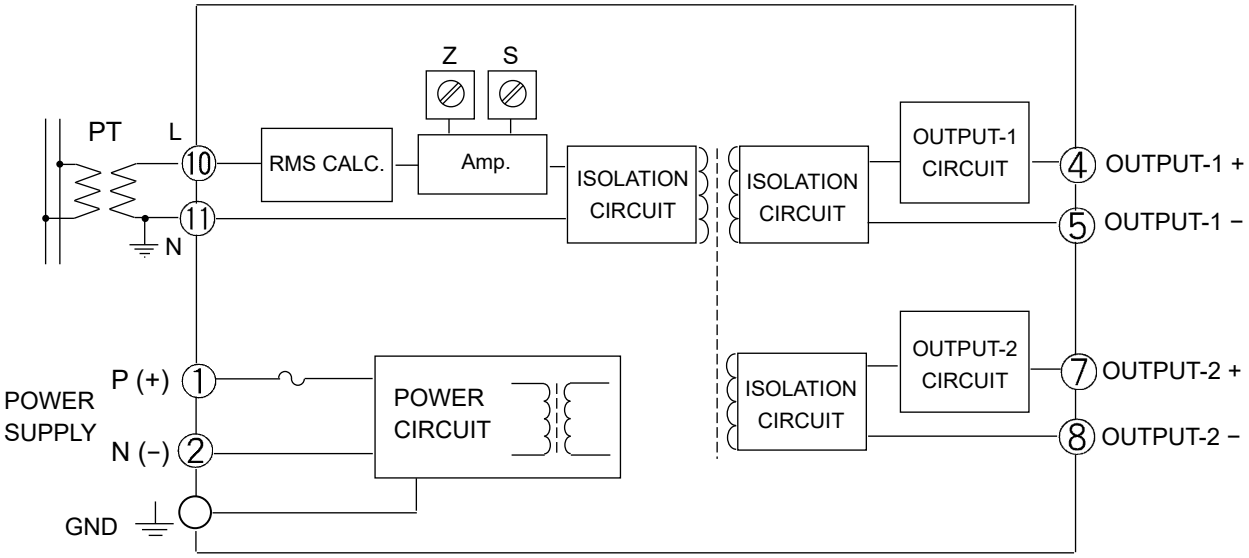
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

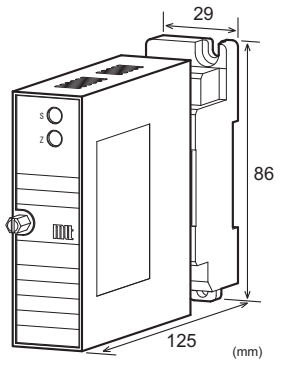


Product Specification Sheet Model: MS3724

Slim Plug-In High-Level Signal Conditioner with Isolated Single Output (High Output Load Model)

DESCRIPTION

The MS3724 is a slim, plug-in high-level signal conditioner that converts DC current or voltage signals into commonly used DC signals and provides an isolated single output. This model features an allowable load resistance of 200Ω at 10V.



ORDERING CODE

MS3724 - □ - □ □

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
- **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

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.) MS3724-A-4W4W

Other Ordering Examples:
For an input code of "Z": MS3724-A-Z4 (Input: 8 to 20mA)
For an output code of "0": MS3724-D-50 (Output: 2 to 5V)
For an option code of "X": MS3724-A-44/X (Fc: 30Hz-3dB)
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 is installed (standard).		
Power Consumption			
Power	100-240V AC 7.5VA max	24V DC 2.5W max	100-240V DC 3.5W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
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	1V	20Ω min.
	5V	100Ω min.
	10V	200Ω min.
Allowable Lead Wire Resistance		
2-wire	Up to 1.25% of output load resistance	
4-wire	Up to 5% of output load resistance	
Note: If the wire resistance exceeds 0.05% (2-wire) or 0.2% (4-wire) of the output load resistance, zero/span adjustments are required.		
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		
Output Range (DC)	-10 to 10V	
Output Span (DC)	1 to 20V*	
Output Bias	-100 to 100%	
Note: For any output range including negative output signals, the output span ranges from *2 to 20V.		
Output Spec. Ex.1: For 2 to 10V output, the output span is 8V 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	3-way isolation between input, output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output, power, and ground.
Dielectric Strength	Input / Output / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5.0mA)
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

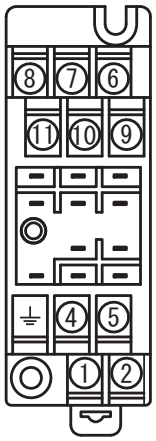
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max. Bracket: 2g max. each (2 pieces supplied per unit)

●MATERIAL

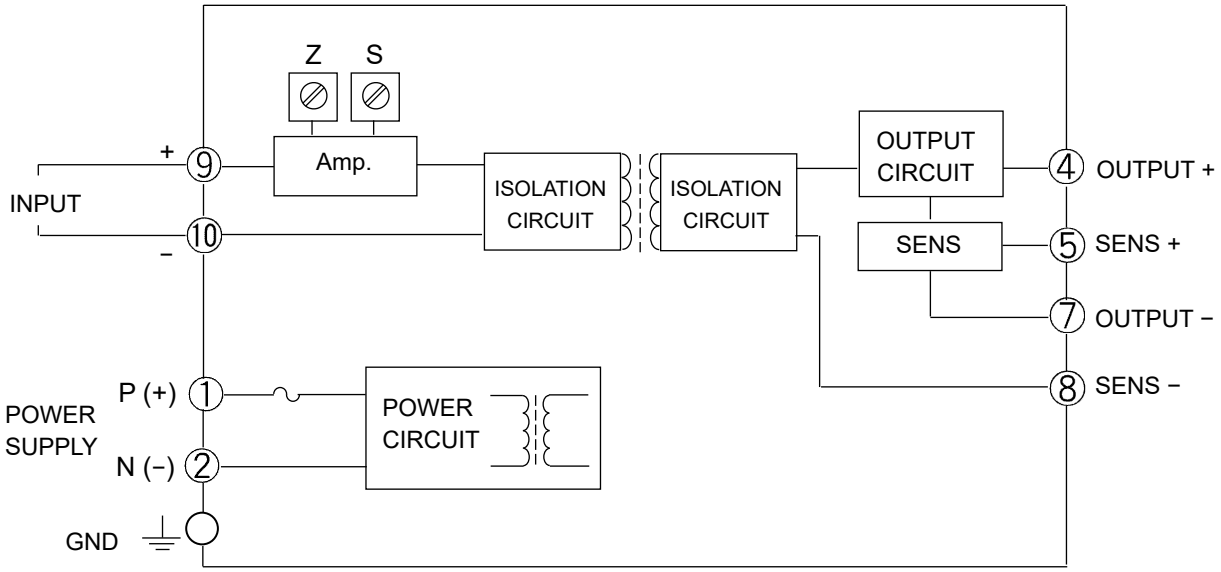
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2µm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

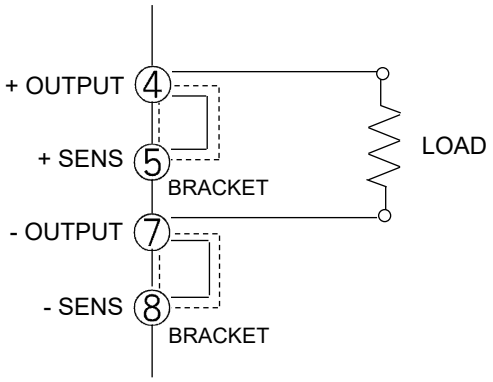


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	+ SENS	
⑥	N.C.	
⑦	− OUTPUT	
⑧	− SENS	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

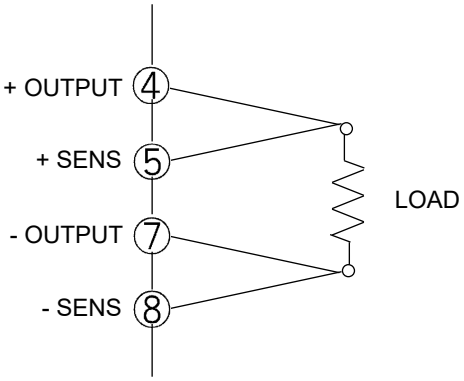
BLOCK DIAGRAM



Normally, the terminals + OUTPUT and + SENS (#4 and #5) should be short connected with the supplied bracket. Also, the terminals - OUTPUT and - SENS (#7 and #8) should be short connected with the supplied bracket.



If the wiring resistance for output is too high to be acceptable, the terminal connections should be made without the supplied brackets as illustrated below.



Slim Plug-In High/Low Signal Selector with Isolated Single/Dual Output

DESCRIPTION

The MS3725 is a slim, plug-in high/low signal selector that selects the higher or lower of two input signals, converts it into a standard process signal, and provides isolated single or dual output. (The input ranges of the two signals should be the same.)

ORDERING CODE

MS3725 □ - □ - □ □ □

Model

Mode of Operation
H: High selection **L**: Low selection

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
0: Other DC voltage signals

*1: Shunt resistor 50Ω

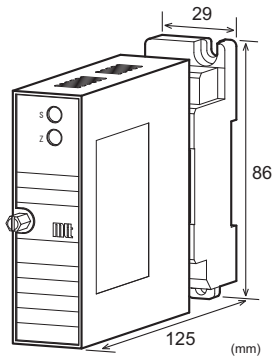
Output 1
A: 4 to 20mA DC
D: 0 to 20mA DC
Z: Other DC current signals
1: 0 to 10mV DC
2: 0 to 100mV DC
3: 0 to 1V DC
4: 0 to 10V DC
5: 0 to 5V DC
6: 1 to 5V DC
3W: ±1V DC
4W: ±10V DC
5W: ±5V DC
0: Other DC voltage signals

Output 2
No code: None
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.)
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3725H-A-6A6

Other Ordering Examples:
For an input code of "0": MS3725H-A-0A6 (Input: 2 to 10V)
For an output code of "0": MS3725H-A-6A0 (Output: 2 to 5V)
For an option code of "X": MS3725H-A-6A6/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.4W max	4.8W max
Dual Output	5.5VA max	1.7W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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)	0 to 100mA	0 to 10V
Input Span (DC)	100μA to 100mA	200mV to 10V
Input Bias	0 to 100%	0 to 100%

Input Spec. Ex.1: For 4 to 20V input, the input span is 16mA and the bias +25%.
Input Spec. Ex. 2: For 2 to 6V input, the input span is 4V and the bias +50%.

●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%

Note: 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.
Selection Sensitivity	Better than 0.5% of span.
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

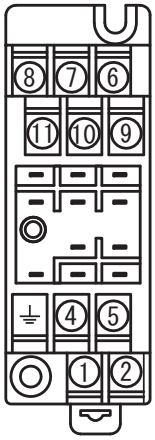
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

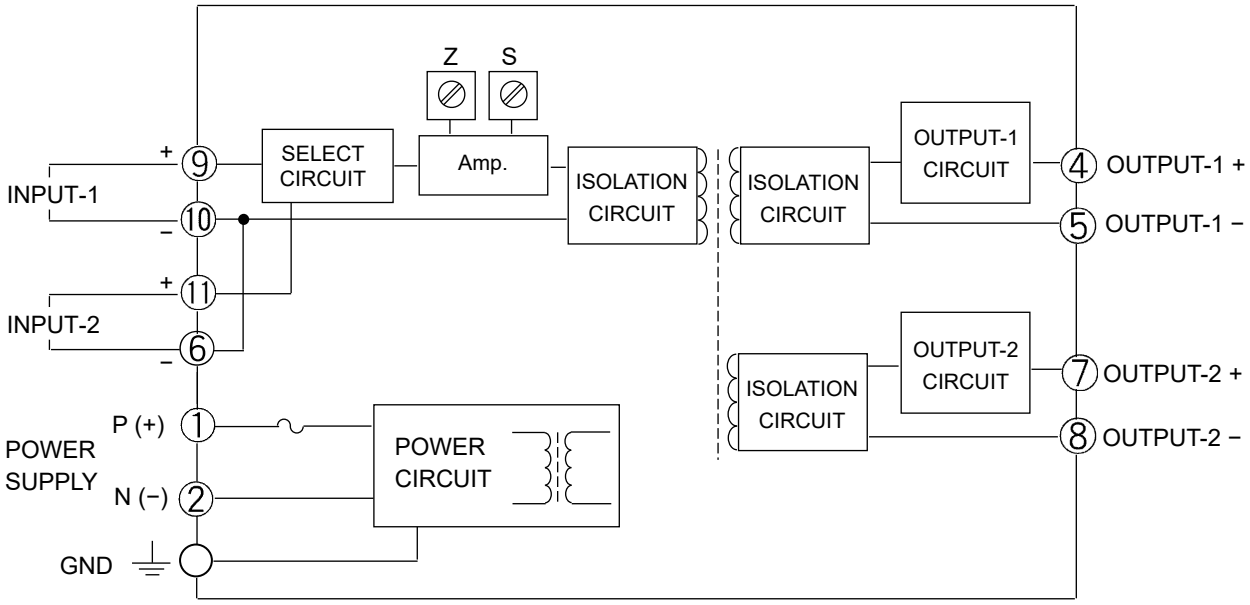
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



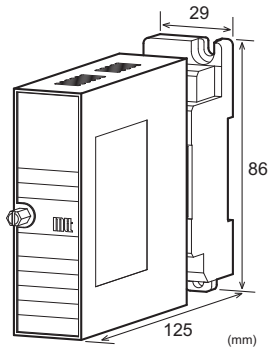
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	− INPUT 2	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT 1	
⑩	− INPUT 1	
⑪	+ INPUT 2	

BLOCK DIAGRAM



DESCRIPTION

The MS3727 is a slim, plug-in signal selector that switches between two input signals by switching input. The selector is available in three input types: DC current input, DC voltage input, and DC current input with a 50Ω shunt resistor. (For the DC current input, the input terminals on the non-selected side will not open.)



ORDERING CODE

MS3727 - □ - □ _

Model

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

Input
A: DC current signal **C**: DC voltage signal
B: DC current signal (Shunt resistor 50Ω)

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.) MS3727-A-A

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 Line Fuse	160mA fuse is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
	3.5VA max	0.6W max	6.0W max

●INPUT SECTION

Input Signal	2 channels (INPUT-1, INPUT-2)
Shunt Resistor	For the input code B, a built-in 50Ω shunt resistor is provided.
Allowable Input Range	DC current signal: ±50mA DC max. (Minimum span: 1mA DC) DC voltage signal: ±50V DC max. (Minimum span: 10mV DC)
Switching Input	Dry contact (Internal pull-up: 24V DC at 10mA)

●OUTPUT SECTION

Output Signal	Input code A or C: Equivalent to the input signal level Input code B: Input signal × Shunt resistor (50Ω) Note: Either INPUT-1 or INPUT-2 is output.
Operation	When the power is ON and the switching input is ON, INPUT-1 is output. When the power is ON and the switching input is OFF, INPUT -2 is output. When the power is OFF, both INPUT-1 and INPUT-2 give no output. For details, refer to the Switching Configurations.

●PERFORMANCE

Accuracy Rating	Input code B: ±0.1% (shunt resistor's accuracy)
Temperature Effect	Input code B: ±0.25ppm/°C
Response Time	5ms max.
Internal Resistance between Input and Output	50Ω max. per wire (ON resistance of photo MOS relay)
Condition of Non-selected Input Channel	Input code A: 50Ω max. (due to the ON resistance of photo MOS relay) Input code B: Shunt resistor 50Ω Input code C: Open (leakage current 1μA max.) Note: When the power is OFF, the above-described condition applies to both channels.
Isolation	Isolation between [input, output], switching input, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between [input, output], switching input, power, and ground.
Dielectric Strength	[Input, Output] / Switching Input / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5mA)

Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

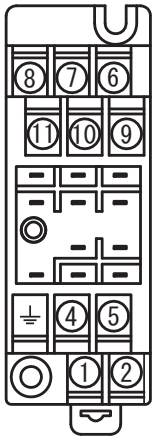
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

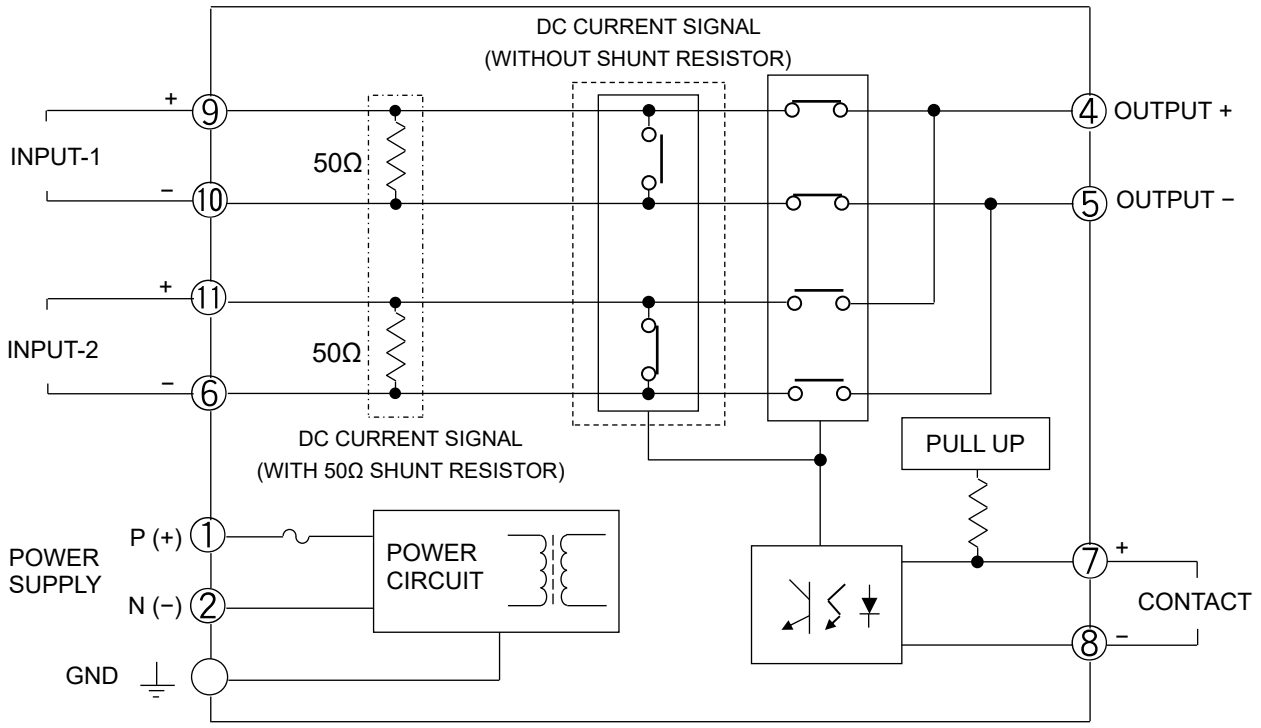
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	− OUTPUT	
⑥	− INPUT-2	
⑦	+ CONTACT	
⑧	− CONTACT	
⑨	+ INPUT-1	
⑩	− INPUT-1	
⑪	+ INPUT-2	

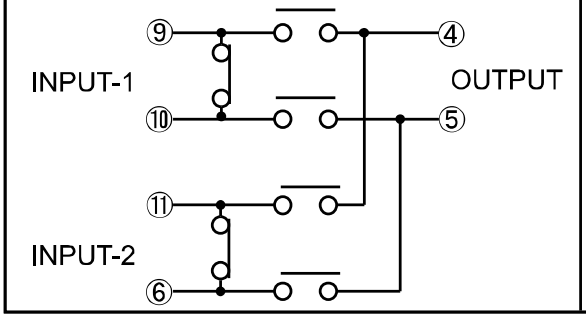
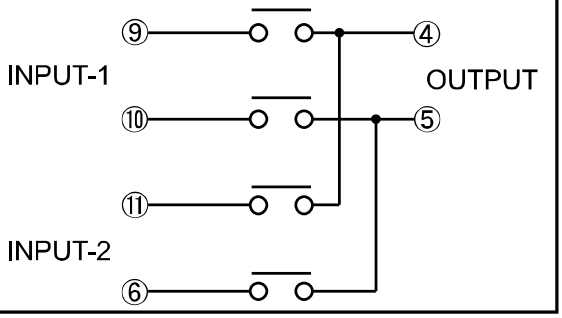
BLOCK DIAGRAM



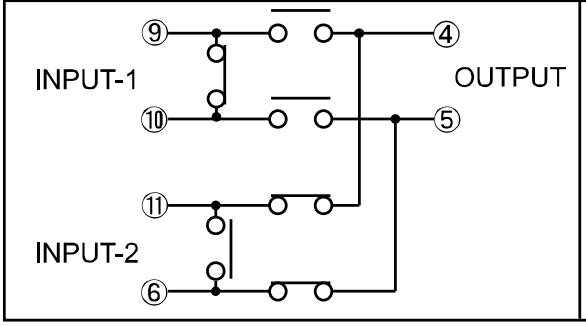
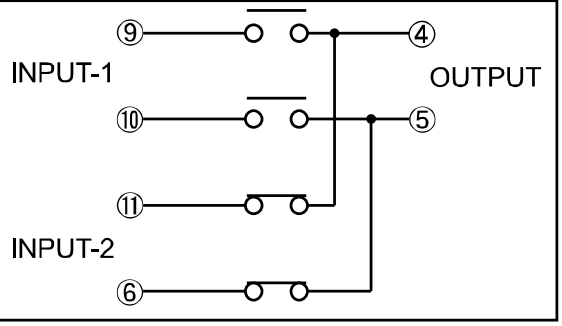
* For switching configurations, refer to page 3.

SWITCHING CONFIGURATIONS

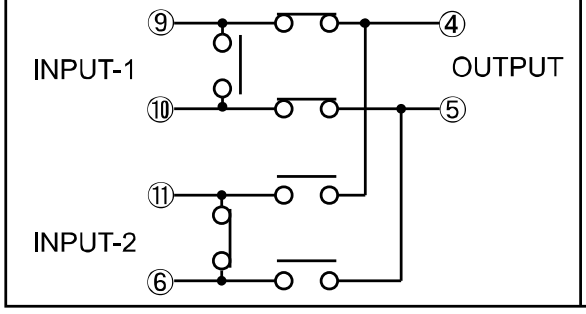
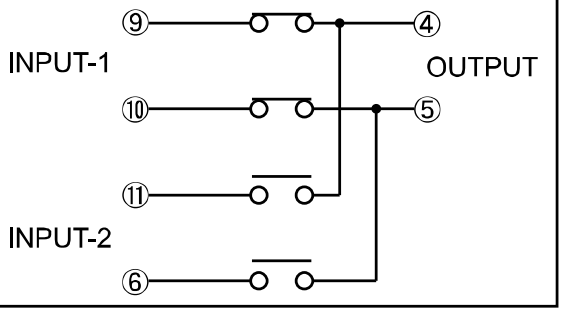
●Power Supply: OFF

DC Current Input	DC Voltage Input / DC Current Input (Shunt Resistor 50Ω)
	

●Power Supply: ON; Switching Input: OFF (Open)

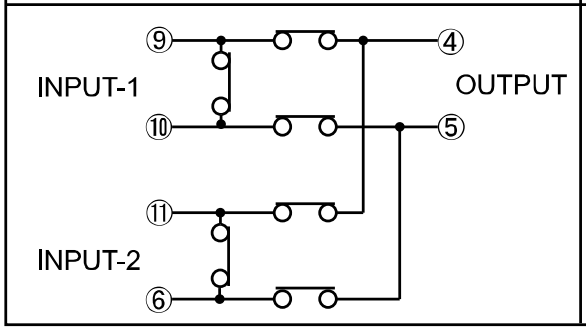
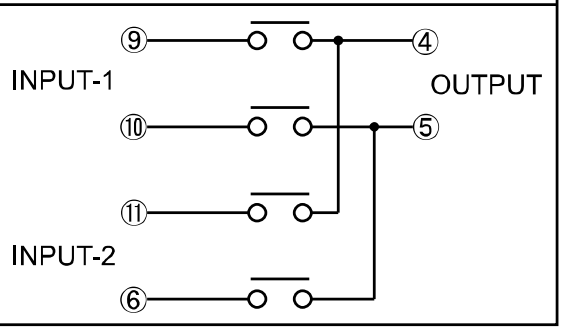
DC Current Input	DC Voltage Input / DC Current Input (Shunt Resistor 50Ω)
	

●Power Supply: ON; Switching Input: ON (Shorted)

DC Current Input	DC Voltage Input / DC Current Input (Shunt Resistor 50Ω)
	

●Power Supply: ON; Switching Input: Transition (ON to OFF or OFF to ON)

* Transition time is included in response time.

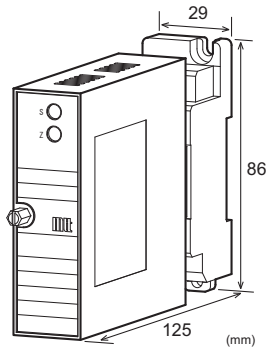
DC Current Input	DC Voltage Input / DC Current Input (Shunt Resistor 50Ω)
	

Product Specification Sheet Model: MS3728

Slim Plug-In Tacho-Generator Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3728 is a slim, plug-in tacho-generator transmitter that accepts voltage signals from a tacho-generator, converts them into standard process signals, and provides isolated single or dual output.



ORDERING CODE

MS3728 - □ - □ □ □

Model

Power Supply

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

Input

1: 0 to 50mV AC
2: 0 to 1V AC
3: 0 to 10V AC
4: 0 to 100V AC
5: 0 to 200V AC
0: Other AC 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

No code: None
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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3728-A-2A6

* Factory default: Factory testing is carried out with an input range of 0 to 500Hz.

Other Ordering Examples:
For an input code of "0": MS3728-A-0AA (Input: 0 to 250V AC)
For an output code of "0": MS3728-A-260 (Output: 2 to 5V)
For a specific frequency range: MS3728-A-2A6 (0 to 100Hz) (When you specify a frequency range, our factory makes the test accordingly, the fact of which will be indicated in the label attached.)
For an option code of "X": MS3728-A-26/X (Response frequency: 50Hz)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.6W max	6.0W max

●INPUT SECTION

Input Resistance	Input span ≤ 500mV: 100kΩ min. (100kΩ min. without power) Input span > 500mV: 1MΩ min. (1MΩ min. without power)
Allowable Input Voltage	Continuous: 120% of the rated input value
Input Frequency	15Hz to 1kHz (with 100% input)
Ranges Available	Between 0-50mV 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%

Note: 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 ±0.4% of span with at least 10% input (at 25°C±5°C).
Output Ripple	Less than ±0.2% of span at 2.5Hz or more.
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	450ms 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

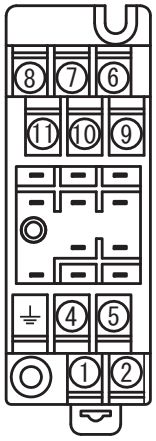
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

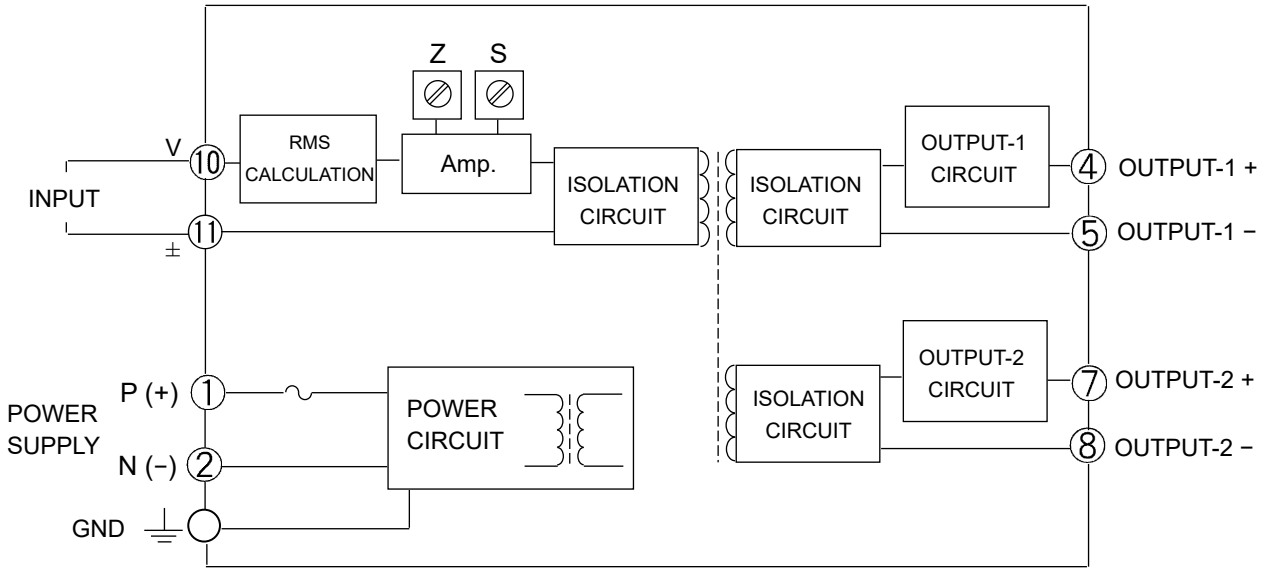
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3729

Slim Plug-In Analog/Frequency Converter with Isolated Single/Dual Output

DESCRIPTION

The MS3729 is a slim, plug-in analog to frequency converter that converts DC current or voltage signals into pulse train signals. The unit provides isolated single or dual output.

ORDERING CODE

MS3729 - □ - □ □ □

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
0: Other DC voltage signals

*1: Shunt resistor 50Ω

Output 1

1: TTL level
2: Open collector
5: Photo MOS relay

Output 2

No code: None
The codes are the same as for Output 1.

Options

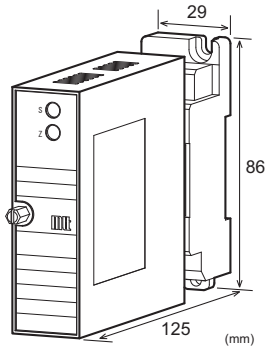
No code: None
/T: Pulse Hold Function provided.
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above. Also specify an output frequency range*.
(e.g.) MS3729-A-611 (0 to 4.3kHz)

* Note that the output frequency range should be specified between 0-0.001Hz and 0-5kHz (30Hz max. for the photo MOS relay).

Other Ordering Examples:
For an input code of "0": MS3729-A-011 (0 to 4.3kHz / Input: 0.2 to 1V)
For an option code of "T": MS3729-A-611/T (0 to 2Hz / 200ms)
Note 1: For the option code "T", specify a pulse hold time between 200µs and 500ms.
Note 2: If you wish to include multiple options in your order, specify the option codes in series (e.g. /TX).



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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	3.5VA max	1.0W max	3.6W max
Dual Output	4.0VA max	1.2W max	4.8W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	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 100V	-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

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	Output frequency range between 0-0.001Hz and 0-5kHz Note: When the photo MOS relay is selected, the range should be between 0-0.001Hz and 0-30Hz.
Maximum Output Load	TTL level: Maximum output 10mA at 3.5V
Maximum Rating	
Open Collector	Maximum rating: 30V, 100mA (Resistive load)
Photo MOS Relay	Maximum load voltage: 400V (Peak AC) Maximum continuous load current: 0.15A (Peak AC) Peak load current: 0.5A @ 100ms (1 shot) DC Maximum output power dissipation: 360mW ON resistance: 16Ω max. Off-state leakage current: 1μA max.

Maximum Output Frequency

<With Pulse Hold Function>

When a pulse hold time is specified, the maximum possible output frequency is determined by the following equation:

Hz = 1 / (T × 1.2 + 10μs*)

* 10μs: Output pulse Lo level for TTL or voltage pulse output, or output pulse ON for open collector output

(Example) When a pulse hold time of 200ms is set, the output frequency is:

1 / (0.2 × 1.2 + 0.00001) = 4.166 Hz

Duty Ratio without Pulse Hold Function	40 to 60%

●PERFORMANCE

Accuracy Rating	Better than ±0.1% of span (at 25°C±5°C).
Pulse Hold Time Accuracy	Better than ±20% of a user-specified value.
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	
Output Frequency	0 to 90% with a step input at 100%
0.5Hz	3.1s max.
5Hz	310ms max.
50Hz	65ms max.
500Hz ≤	35ms max.
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

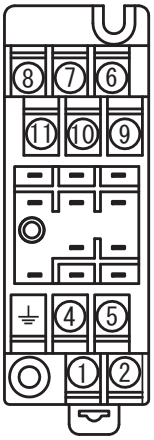
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

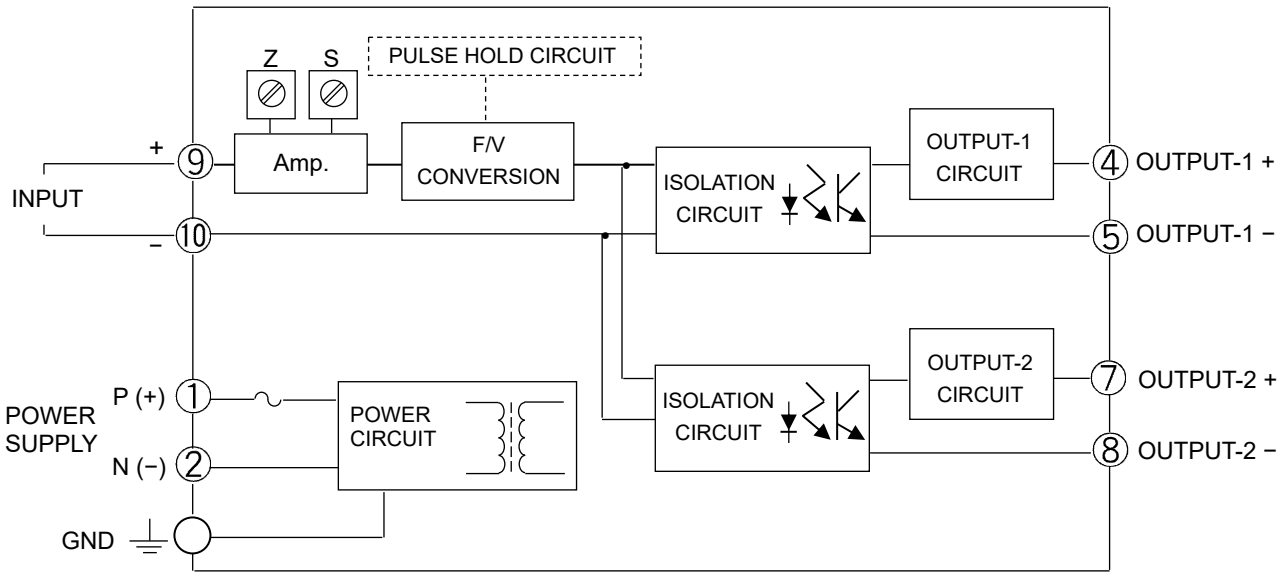
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



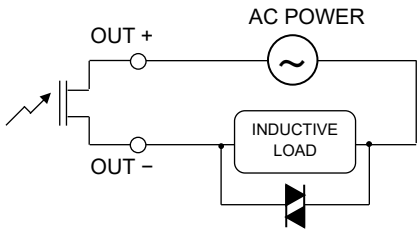
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



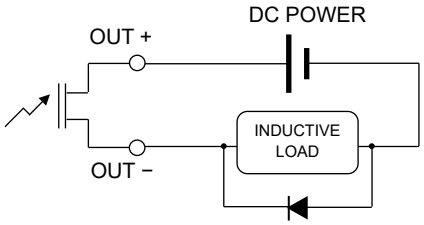
Note: When an inductive load, such as an electric motor, is connected to the photo MOS relay output, a relay contact protection circuit must be connected across the load.

Example of AC power connection:



Protection circuit such as a varistor and CR circuit

Example of DC power connection:



Protection circuit such as a diode, varistor and CR circuit

Product Specification Sheet Model: MS3737

Slim Plug-In Distributor with Dual Output
(Non-Isolation between Input and Output)

DESCRIPTION

The MS3737 is a slim plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides a dual output. This model has no isolation between the input and output, providing a low-cost design. (The unit includes a transmitter power ON/OFF switch.)

ORDERING CODE

MS3737 - □

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

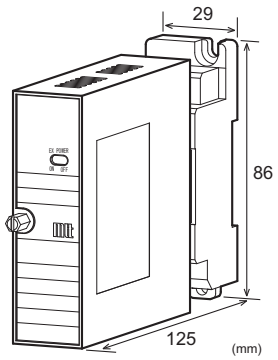
Output 1
1 to 5V DC

Output 2
4 to 20mA DC

Options
No code: None
/H: Polyurethane conformal coating

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.
(e.g.) MS3737-A



CE

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
	5.0VA max	1.5W max	5.8W max

●INPUT SECTION

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

Note: If the transmitter power supply is used for sensor excitation, the sensor should be connected between the terminals INPUT (+) and OUTPUT-2 (-), while the OUTPUT-2 terminals (+) and (-) should be kept open.

●OUTPUT SECTION

Output Signal	Output 1: 1 to 5V DC Output 2: 4 to 20mA DC
Allowable Load Resistance	Output 1: 250kΩ min. Output 2: 10Ω max. (Up to 260Ω is allowable if the plus and minus terminals of OUTPUT-1 are short connected.)

●PERFORMANCE

Accuracy Rating	Better than ±0.1%. (Accuracy of the shunt resistor)
Temperature Effect	Better than ±0.03% of span per 10°C change in ambient. (Temperature coefficient of the shunt resistor)
Isolation	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)
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 110g max. Socket: 80g max.

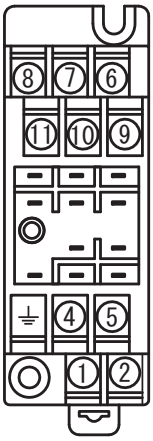
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

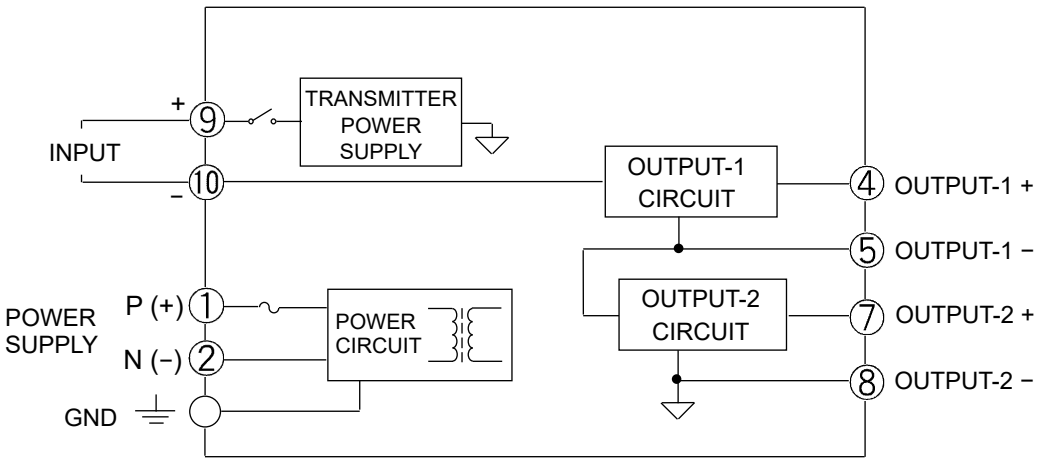
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Note: If the OUTPUT-1 is only used for distributor applications, the OUTPUT-2 terminals #7 and #8 should be short connected. If these terminals are open, the OUTPUT-1 gives no output.

Product Specification Sheet Model: MS3737LC

Slim Plug-In Distributor with Dual Output
(Non-Isolation between Input and Output)

DESCRIPTION

The MS3737LC is a slim plug-in distributor that powers a two-wire transmitter, converts its 4 to 20mA signals into commonly used DC signals, and provides a dual output. This model has no isolation between the input and output, providing a low-cost design. (The unit does not include a transmitter power ON/OFF switch.)

ORDERING CODE

MS3737LC - □

Model

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

Input
4 to 20mA DC from 2-wire transmitters

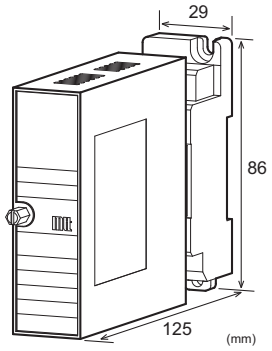
Output 1
1 to 5V DC

Output 2
4 to 20mA DC

Options
No code: None
/H: Polyurethane conformal coating

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.
(e.g.) MS3737LC-A



SPECIFICATIONS

●POWER SECTION

Power Requirements	100 to 240V AC: 85 to 264V AC (47 to 63Hz) 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 is installed (standard).	
Power Consumption		
Power	100-240V AC 3.5VA max	100-240V DC 4.8W max

●INPUT SECTION

Input Signal	4 to 20mA DC from 2-wire transmitters
Input Resistance	250Ω
Transmitter Power Supply	Output voltage: 25V, typical. with 0% input 18V, typical. with 100% input (Output 2: short) Maximum current: 25mA, typical.
Limit Current for Short-Circuit Protection	26mA (typical)
Permissible Short-Circuit Duration	Continuous.

Note: If the transmitter power supply is used for sensor excitation, the sensor should be connected between the terminals INPUT (+) and OUTPUT-2 (-), while the OUTPUT-2 terminals (+) and (-) should be kept open.

●OUTPUT SECTION

Output Signal	Output 1: 1 to 5V DC Output 2: 4 to 20mA DC
Allowable Load Resistance	Output 1: 250kΩ min. Output 2: 10Ω max. (Up to 260Ω is allowable if the plus and minus terminals of OUTPUT-1 are short connected.)

●PERFORMANCE

Accuracy Rating	Better than ±0.1% (Accuracy of the shunt resistor)
Temperature Effect	Better than ±0.03% of span per 10°C change in ambient. (Temperature coefficient of the shunt resistor)
Isolation	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: 5.0mA)
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

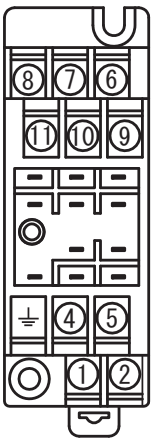
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 110g max. Socket: 80g max.

●MATERIAL

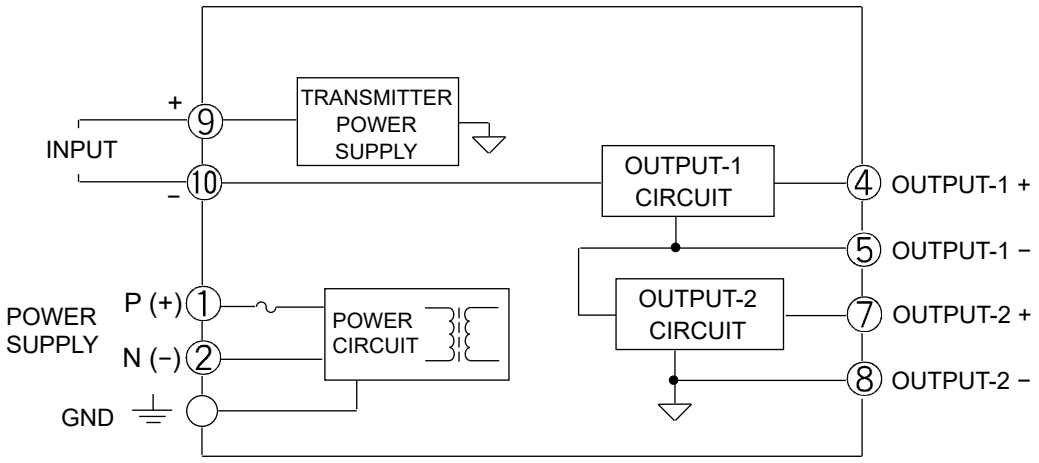
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



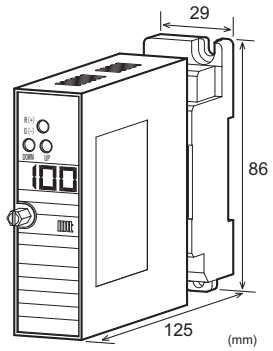
Note: If the OUTPUT-1 is only used for distributor applications, the OUTPUT-2 terminals #7 and #8 should be short connected. If these terminals are open, the OUTPUT-1 gives no output.

Product Specification Sheet Model: MS3738

Slim Plug-In Manual Setter with Isolated Single/Dual Output

DESCRIPTION

The MS3738 is a slim, plug-in manual setter that allows users to set a desired output value with the front-accessible switches and provides isolated single or dual output.



ORDERING CODE

MS3738 - □ - □ □

Model

Power Supply

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

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

No code: None
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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3738-A-AA
* The factory default output setting is 0%.

Other Ordering Examples:
For an output code of "Z": MS3738-A-AZ (Output: 8 to 20mA)
For a specific output setting: MS3738-A-A (Output setting: 50%)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	6.0VA max	1.7W max	6.0W max
Dual Output	6.5VA max	2.1W max	7.2W 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.

Output Setting Range	-10 to +105% (adjustable in steps of 0.1%; in steps of 1% for the range over 100% by the front-accessible switches.)

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%

Note: 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 ±0.15% of span per 10°C change in ambient.
Isolation	Isolation between output 1, output 2, and power.
Set Value Indicator	Red LED, digit height 8.0mm, 3 digits.
Insulation Resistance	100MΩ min. (@ 500V DC) between output 1, output 2, power, and ground.
Dielectric Strength	[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

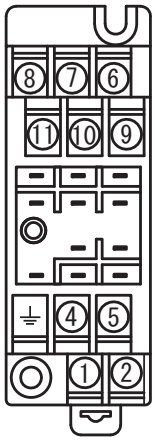
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

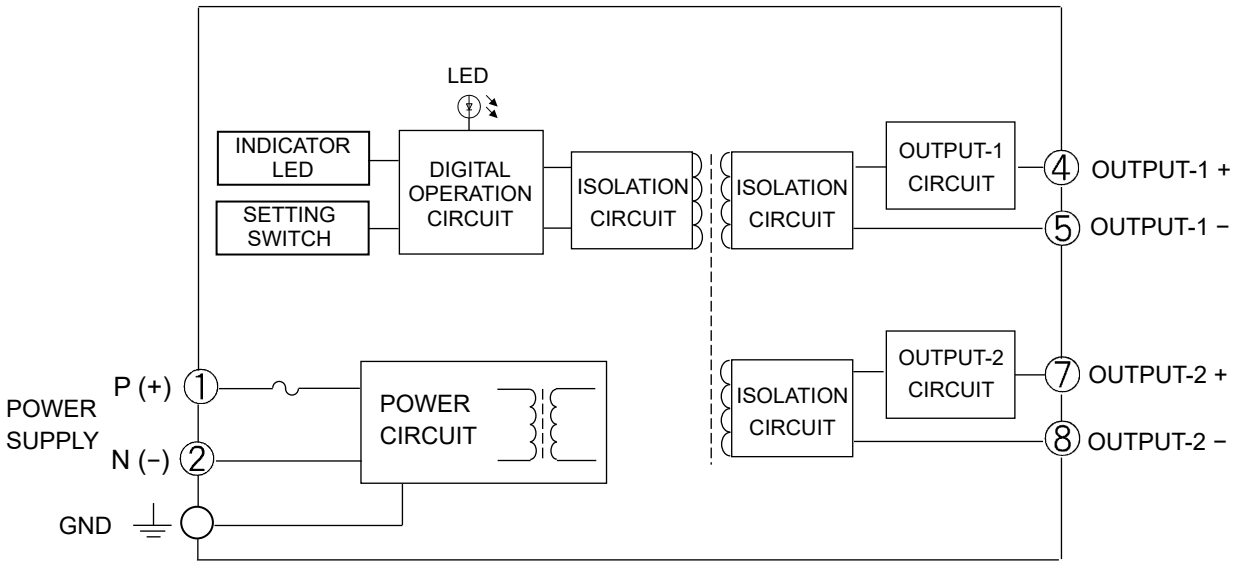
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

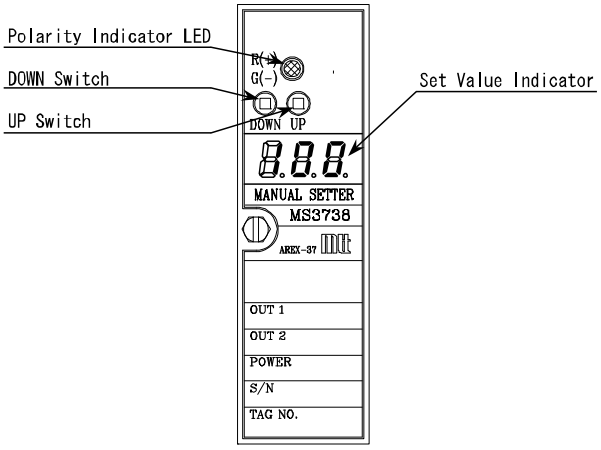


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	N.C.	
⑩	N.C.	
⑪	N.C.	

BLOCK DIAGRAM



FRONT VIEW



SETTING

●OUTPUT SETTING

When the power is turned on, the Set Value Indicator shows the current set value. This value can be changed to a desired value by pressing the UP/DOWN switch.

Indicators

The Polarity Indicator LED is red when the set value is positive and green when it is negative.
The Set Value Indicator is dimmed if no switch is operated for one minute, while the Polarity Indicator LED keeps illuminating depending on the polarity.

UP/DOWN Switch

The switch is of a push button type. Pressing and holding the switch changes the value faster.

Factory Default Setting

Unless otherwise requested, the output will be set to the factory default of 0%.

LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Set Value Indicator (7-segment LED)	Polarity Indicator LED	Output	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	Dimmed	Red LED is ON when the set value is positive; Green LED is ON when it is negative.	Normal	–
3	Value setting	Set value	Red LED is ON when the set value is positive; Green LED is ON when it is negative.	Normal	–
4	DAC error	Error code: 1	Red LED blinks at 0.25 second intervals.	Typically 0%, but may vary.	None
5	CRC error of a set value	Error code: 2	Red LED blinks at 1 second intervals.	0%	Reconfig-uration
6	CRC error of a compensated value	Error code: 4	Red LED blinks at 1 second intervals.	0%	None
7	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0%, but may vary.	None

Notes:
No. 1: When the Set Value Indicator is turned ON, a 3-digit number “888” with dots is displayed.
No. 4 - 7: Only the last digit is displayed in the event of an error.
No. 7: The red LED may fail to light up.

Product Specification Sheet Model: MS3739

Slim Plug-In Ratio/Bias Converter with Isolated Single/Dual Output (Output Bias Model)

DESCRIPTION

The MS3739 is a slim, plug-in ratio/bias converter (output bias model) that converts the ratio and bias of DC current or voltage signals and provides isolated single or dual output.

ORDERING CODE

MS3739 - □ - □ □ □

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 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

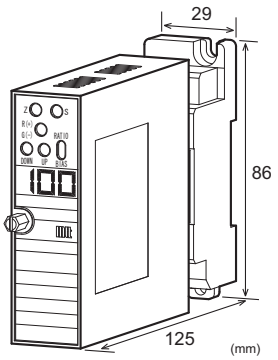
No code: None
The codes are the same as for Output 1.

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
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/H: Polyurethane conformal coating
/X: Others (Special order)
* For non-standard options, ask MTT for availability.

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3739-A-666
* The factory default settings are:
Positive gain; Ratio = 1; and Bias = 0%.

Other Ordering Examples:
For an input code of "Z": MS3739-A-ZAA (Input: 0.2 to 1V)
For an output code of "0": MS3739-A-A60 (Output: 2 to 5V)
For specific settings (gain/ratio/bias): MS3739-A-666 (Negative gain / Ratio = 2 / Bias = 0%)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).		
Power Consumption			
Power	100-240V AC	24V DC	100-240V DC
Single Output	6.0VA max	1.7W max	6.0W max
Dual Output	6.5VA max	2.1W max	7.2W max

INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
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.)	
Ratio Setting Range	Positive gain: 0.1 to 4.00 (in steps of 0.01) Negative gain: -0.1 to -4.00 (in steps of 0.01)	
Bias Setting Range	-100 to 100% (in steps of 1%)	
Output Range	Approx. -10 to +120% (1 to 5V DC)	

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%

Note: 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). Ratio = 1; Bias = 0% (Positive gain) Ratio = -1; Bias = 0% (Negative gain)
Equation	Y = KX + B (Positive gain) Y = KX + B + F (Negative gain) where Y: Output (%) K: Ratio X: Input (%) B: Bias F: 100%
Temperature Effect	Better than ±0.15% of span per 10°C change in ambient.
Response Time	85ms max. (0 to 90%) with a step input at 100%.
Ratio/Bias Indicator	Red LED, digit height 8.0mm, 3 digits.
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

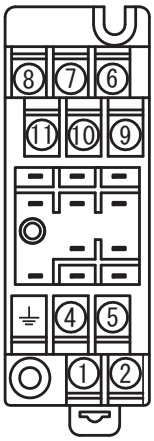
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

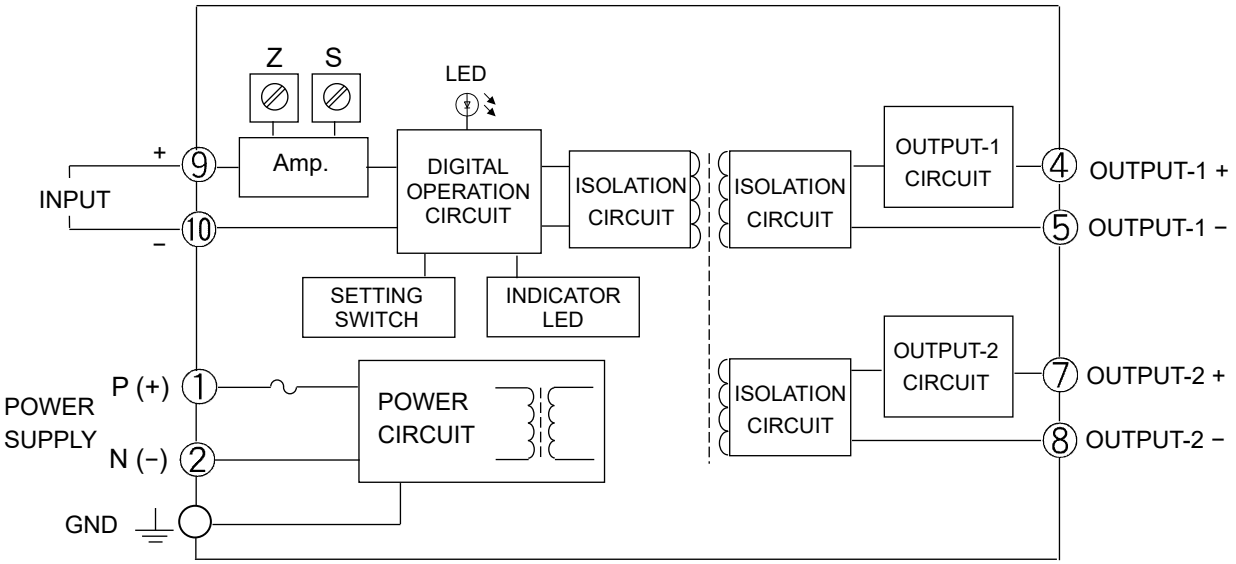
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS

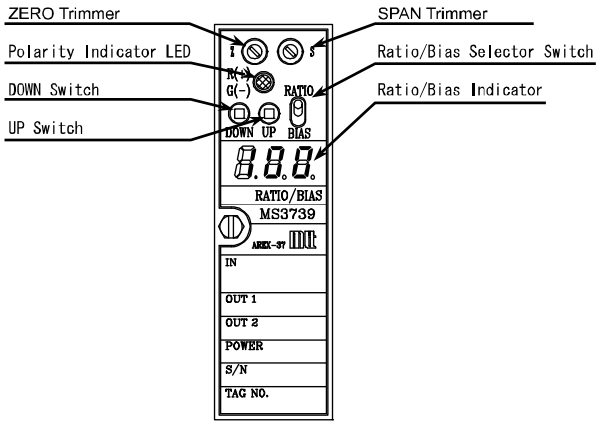


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



FRONT VIEW



SETTING

●RATIO/BIAS SETTING

Ratio Setting

When the Ratio/Bias Selector switch is set to the RATIO position, the Ratio/Bias Indicator shows the current ratio value. This value can be changed to a desired value by pressing the UP/DOWN switch.

Bias Setting

When the Ratio/Bias Selector switch is set to the BIAS position, the Ratio/Bias Indicator shows the current bias value. This value can be changed to a desired value by pressing the UP/DOWN switch.

Indicators

The Polarity Indicator LED is red when the set value is positive and green when it is negative.
The Ratio/Bias Indicator goes OFF if no switch is operated for one minute, while the Polarity Indicator LED keeps illuminating green regardless of the polarity.

UP/DOWN Switch

The switch is of a push button type. Pressing and holding the switch changes the value faster.

Factory Default Settings

Unless otherwise requested, the ratio and bias will be set to the factory defaults as indicated below:

Positive gain; Ratio = 1; and Bias = 0%.

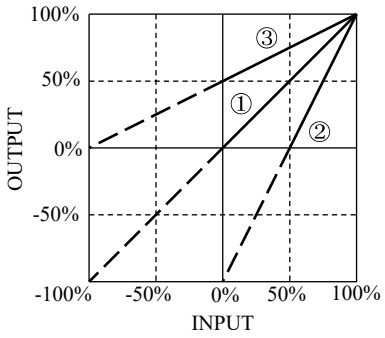
Examples of Positive Gain Setting

The following are typical examples of positive gain setting on a converter configured for 4-20mA DC input and 4-20mA DC output.

① To obtain 4-20mA DC output against 4-20mA DC input: Ratio = 1.00; Bias = 0%

② To obtain 4-20mA DC output against 12-20mA DC input: Ratio = 2.00; Bias = -100%

③ To obtain 12-20mA DC output against 4-20mA DC input: Ratio = 0.50; Bias = 50%



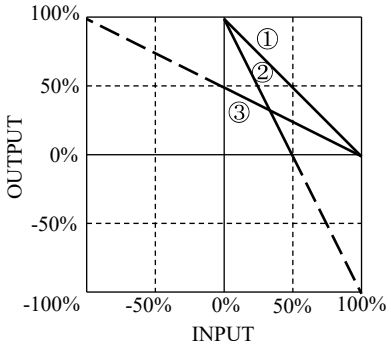
Examples of Negative Gain Setting

The following are typical examples of negative gain setting on a converter configured for 4-20mA DC input and 4-20mA DC output.

① To obtain 20-4mA DC output against 4-20mA DC input: Ratio = -1.00; Bias = 0%

② To obtain 20-4mA DC output against 4-12mA DC input: Ratio = -2.00, Bias = 0%

③ To obtain 12-4mA DC output against 4-20mA DC input: Ratio = -0.50, Bias = 50%



LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Ratio/Bias Indicator (7-segment LED)	Polarity Indicator LED	Output	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	OFF	Green LED is ON.	Normal	–
3	Value setting	Set value	Red LED is ON when the set value is positive; Green LED is ON when it is negative.	Normal	–
4	DAC error	Error code: 1	Red LED blinks at 0.25 second intervals.	Typically 0%, but may vary.	None
5	CRC error of a set value	Error code: 2	Red LED blinks at 1 second intervals.	0%	Reconfig-uration
6	CRC error of a compensated value	Error code: 4	Red LED blinks at 1 second intervals.	0%	None
7	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0%, but may vary.	None

Notes:

No. 1: When the Ratio/Bias Indicator is turned ON, a 3-digit number “888” with dots is displayed.

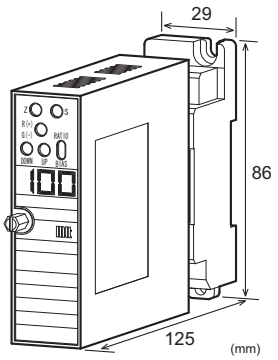
No. 4 - 7: Only the last digit is displayed in the event of an error.

No. 7: The red LED may fail to light up.

Slim Plug-In Ratio/Bias Converter with Isolated Single/Dual Output (Input Bias Model)

DESCRIPTION

The MS3739IB is a slim, plug-in ratio/bias converter (input bias model) that converts the ratio and bias of DC current or voltage signals and provides isolated single or dual output.



ORDERING CODE

MS3739IB - □ - □ □ □

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

No code: None
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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3739IB-A-AA6
* The factory default settings are:
Positive gain; Ratio = 1; and Bias = 0%.

Other Ordering Examples:
For an input code of "0": MS3739IB-A-0A6 (Input: 2 to 10V)
For an output code of "Z": MS3739IB-A-AAZ (Output: 8 to 20mA)
For specific settings (gain/ratio/bias): MS3739IB-A-AA6 (Negative gain / Ratio = 2 / Bias = 0%)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	6.0VA max	1.7W max	6.0W max
Dual Output	6.5VA max	2.1W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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.)
Ratio Setting Range	Positive gain: 0.1 to 4.00 (in steps of 0.01) Negative gain: -0.1 to -4.00 (in steps of 0.01)
Bias Setting Range	-100 to 100% (in steps of 1%)
Output Range	Approx. -10 to +120% (1 to 5V DC)

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%

Note: 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). Ratio = 1; Bias = 0% (Positive gain) Ratio = -1; Bias = 0% (Negative gain)
Equation	Y = K (X + B) (Positive gain) Y = K (X + B) + F (Negative gain) where Y: Output (%) K: Ratio X: Input (%) B: Bias F: 100%
Temperature Effect	Better than ±0.15% of span per 10°C change in ambient.
Response Time	85ms max. (0 to 90%) with a step input at 100%.
Ratio/Bias Indicator	Red LED, digit height 8.0mm, 3 digits.
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

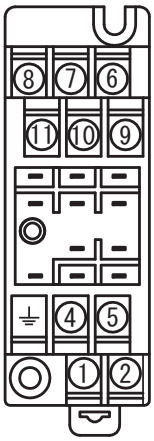
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

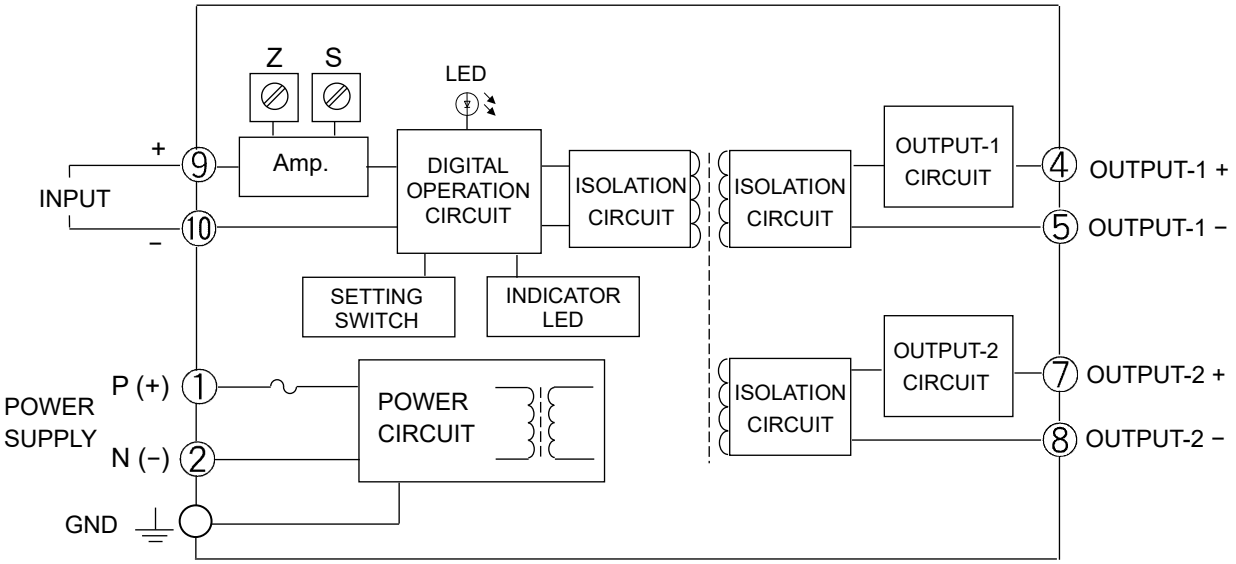
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

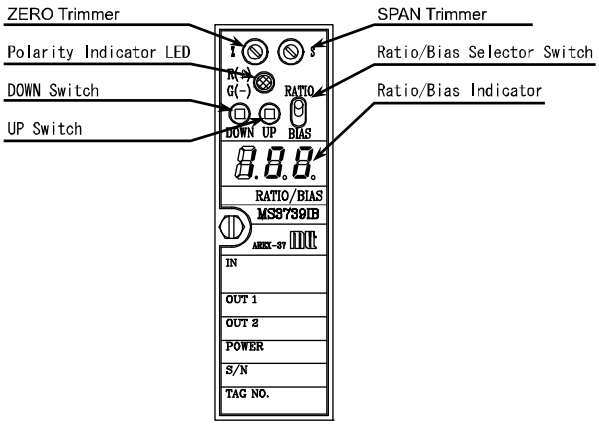


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



FRONT VIEW



SETTINGS

●RATIO/BIAS SETTING

Ratio Setting

When the Ratio/Bias Selector Switch is set to the RATIO position, the Ratio/Bias Indicator shows the current ratio value. This value can be changed to a desired value by pressing the UP/DOWN Switch.

Bias Setting

When the Ratio/Bias Selector Switch is set to the BIAS position, the Ratio/Bias Indicator shows the current bias value. This value can be changed to a desired value by pressing the UP/DOWN Switch.

Indicators

The Polarity Indicator LED is red when the set value is positive and green when it is negative.
The Ratio/Bias Indicator goes OFF if no switch is operated for one minute, while the Polarity Indicator LED keeps illuminating green regardless of the polarity.

UP/DOWN Switch

The switch is of a push button type. Pressing and holding the switch changes the value faster.

Factory Default Settings

Unless otherwise requested, the ratio and bias will be set to the factory defaults as indicated below:

Positive gain; Ratio = 1; and Bias = 0%.

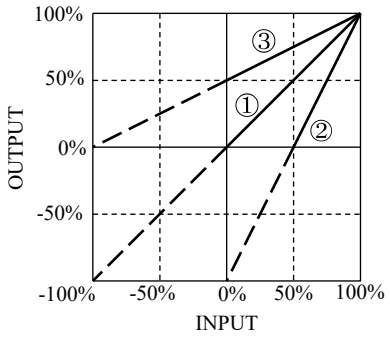
Examples of Positive Gain Setting

The following are typical examples of positive gain setting on a converter configured for 4-20mA DC input and 4-20mA DC output.

① To obtain 4-20mA DC output against 4-20mA DC input: Ratio = 1.00; Bias = 0%

② To obtain 4-20mA DC output against 12-20mA DC input: Ratio = 2.00; Bias = -50%

③ To obtain 12-20mA DC output against 4-20mA DC input: Ratio = 0.50; Bias = 100%



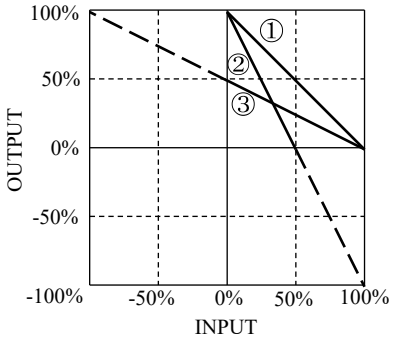
Examples of Negative Gain Setting

The following are typical examples of negative gain setting on a converter configured for 4-20mA DC input and 4-20mA DC output.

① To obtain 20-4mA DC output against 4-20mA DC input: Ratio = -1.00; Bias = 0%

② To obtain 20-4mA DC output against 4-12mA DC input: Ratio = -2.00; Bias = 0%

③ To obtain 12-4mA DC output against 4-20mA DC input: Ratio = -0.50; Bias = 100%



LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Ratio/Bias Indicator (7-segment LED)	Polarity Indicator LED	Output	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	OFF	Green LED is ON.	Normal	–
3	Value setting	Set value	Red LED is ON when the set value is positive; Green LED is ON when it is negative.	Normal	–
4	DAC error	Error code: 1	Red LED blinks at 0.25 second intervals.	Typically 0%, but may vary.	None
5	CRC error of a set value	Error code: 2	Red LED blinks at 1 second intervals.	0%	Reconfig-uration
6	CRC error of a compensated value	Error code: 4	Red LED blinks at 1 second intervals.	0%	None
7	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0%, but may vary.	None

Notes:

No. 1: When the Ratio/Bias Indicator is turned ON, a 3-digit number “888” with dots is displayed.

No. 4 - 7: Only the last digit is displayed in the event of an error.

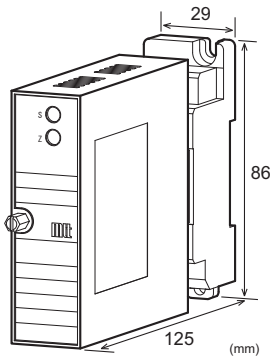
No. 7: The red LED may fail to light up.

Product Specification Sheet Model: MS3740

Slim Plug-In Signal Reverser with Isolated Single/Dual Output

DESCRIPTION

The MS3740 is a slim, plug-in signal reverser that converts DC current or voltage input signals into DC signals inversely proportional to those input signals and provides isolated single or dual output.



ORDERING CODE

MS3740 - □ - □ □ □

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

Output 2

No code: None
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.)
/L: Dual current output with high output load
* Not subject to CE approval.
(OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3740-A-AA6

Other Ordering Examples:
For an input code of "Z": MS3740-A-ZAA (Input: 8 to 20mA)
For an output code of "0": MS3740-A-A60 (Output: 5 to 2V)
For an option code of "X": MS3740-A-66/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.0VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.5W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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% 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%

Note: 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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

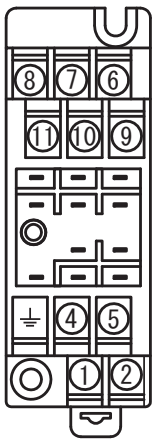
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

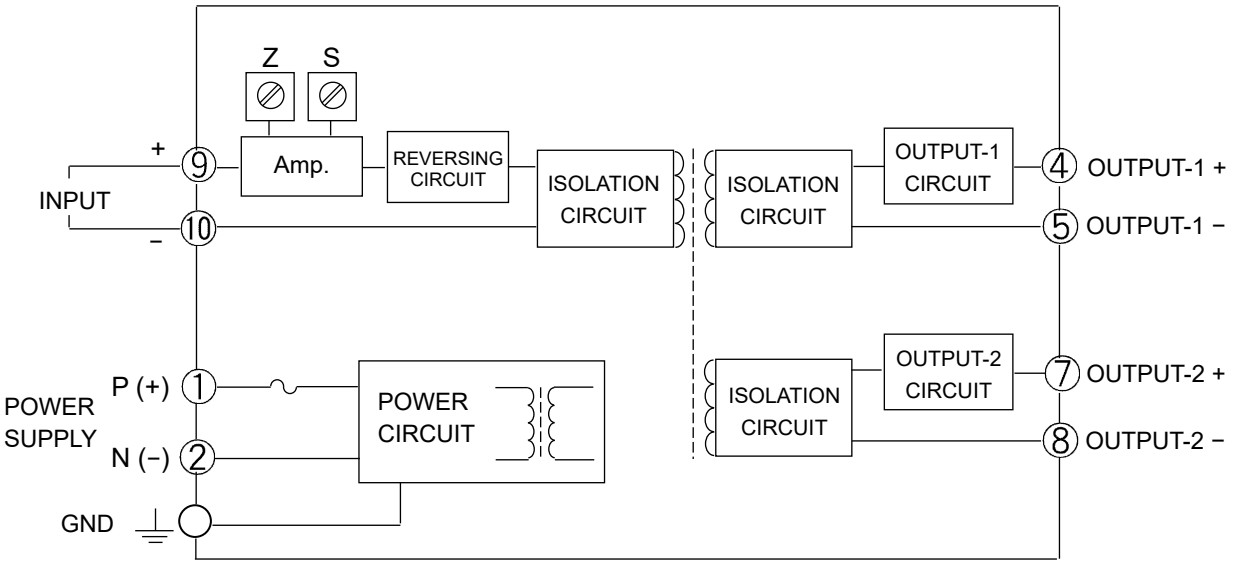
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Product Specification Sheet Model: MS3743 MS3700

Slim Plug-In Millivolt Isolator with Isolated Single/Dual Output (Fast Response Model)

DESCRIPTION

The MS3743 is a slim, plug-in millivolt (mV) isolator that converts mV input signals from sensors or other devices into commonly used DC signals and provides isolated single or dual output. This model features a fast response time of 80μs (0-90%) with voltage output or 150μs (0-90%) with current output.

ORDERING CODE

MS3743 - □ - □ □ □

Model

Power Supply

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

Input

7: 0 to 50mV DC
2: 0 to 100mV DC
7W: ±50mV 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

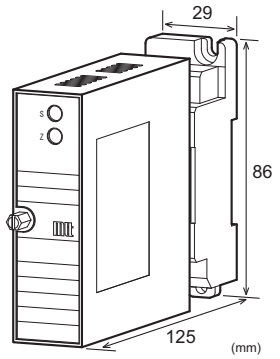
No code: None
The codes are the same as for Output 1.

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.

CE



ORDERING INFORMATION

To place an order, please use the ordering code format as shown on the left.
(e.g.) MS3743-A-244

Other Ordering Examples:
For an input code of "0": MS3743-A-044 (Input: 0 to 75mV)
For an output code of "0": MS3743-A-240 (Output: 2 to 10V)
For an option code of "X": MS3743-A-24/X (Response frequency: 5kHz)

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.0VA max	1.6W max	4.8W max
Dual Output	5.0VA max	1.8W max	6.0W max

●INPUT SECTION

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

Ranges Available

Input Range (DC)	-200mV to 200mV
Input Span (DC)	20mV* to 400mV
Input Bias	-100 to 100%

Note: For any input range including negative input signals, the input span ranges from *40mV 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 -20 to 80mV input, the input span is 100mV and the bias -20%.

●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% 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%

Note: 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	Voltage output: 80μs max. (0 to 90%) with a step input at 100% (Frequency characteristics: 10kHz-3dB). Current output: 150μs max. (0 to 90%) with a step input at 100% (Frequency characteristics: 3kHz-3dB).
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

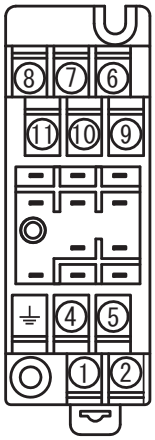
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

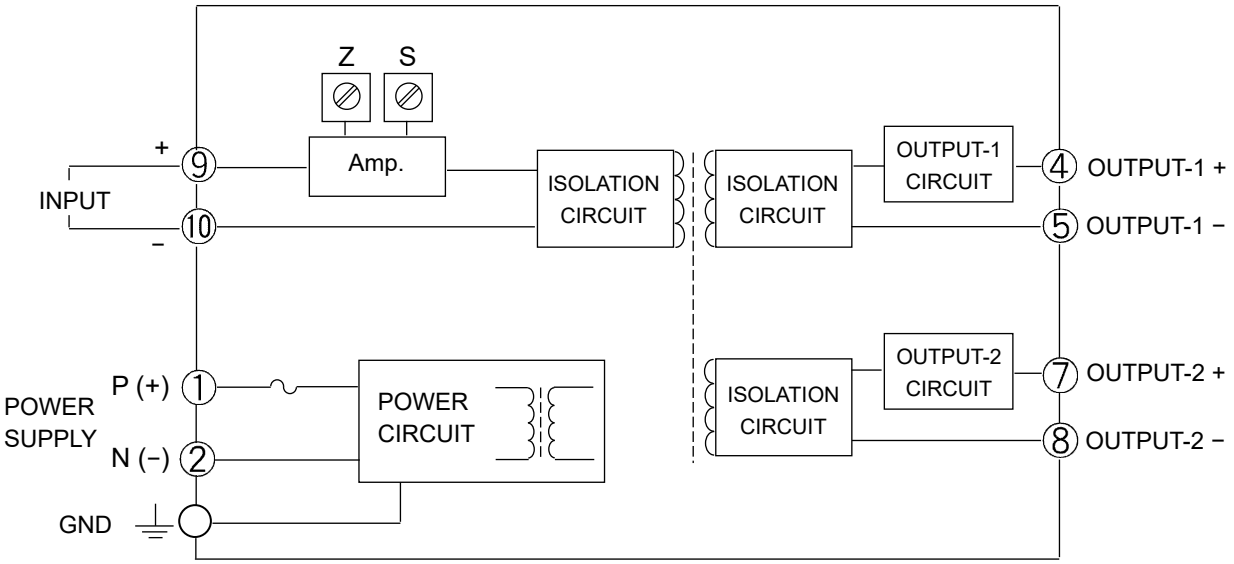
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

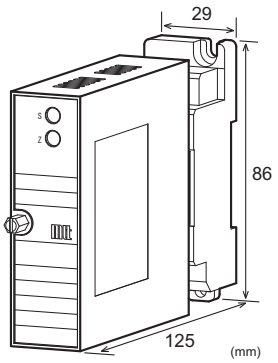


Product Specification Sheet Model: MS3744

Slim Plug-In High-Level Signal Conditioner with Isolated Single/Dual Output (Fast Response Model)

DESCRIPTION

The MS3744 is a slim, plug-in high-level signal conditioner that converts DC current or voltage signals into commonly used DC signals and provides isolated single or dual output. This model features a fast response time of 80μs (0-90%) with voltage output or 150μs (0-90%) with current output.



ORDERING CODE

MS3744 - □ - □ □ □

Model

Power Supply

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

Input

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

No code: None
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
/C: CE compliant.
/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.) MS3744-A-4W4W4W

Other Ordering Examples:
For an input code of "0": MS3744-A-066/C (Input: 0.2 to 1V)
For an output code of "0": MS3744-A-E60/C (Output: 2 to 5V)
For an option code of "X": MS3744-A-66/CX (Response frequency: 5kHz)

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.0VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.6W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	50Ω
	2 to 10mA	250Ω
	1 to 5 mA	100Ω
	0 to 20mA	50Ω
	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%.

Note: The input range of -30 to +30V is subject to CE approval.

●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%

Note: 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	When the Output 1 is voltage: 80μs max. (0 to 90%) with a step input at 100% (Frequency characteristics: 10kHz-3dB). When the Output 1 is current: 150μs max. (0 to 90%) with a step input at 100% (Frequency characteristics: 3kHz-3dB).
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
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

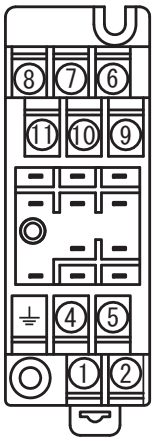
●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

●STANDARDS CONFORMITY

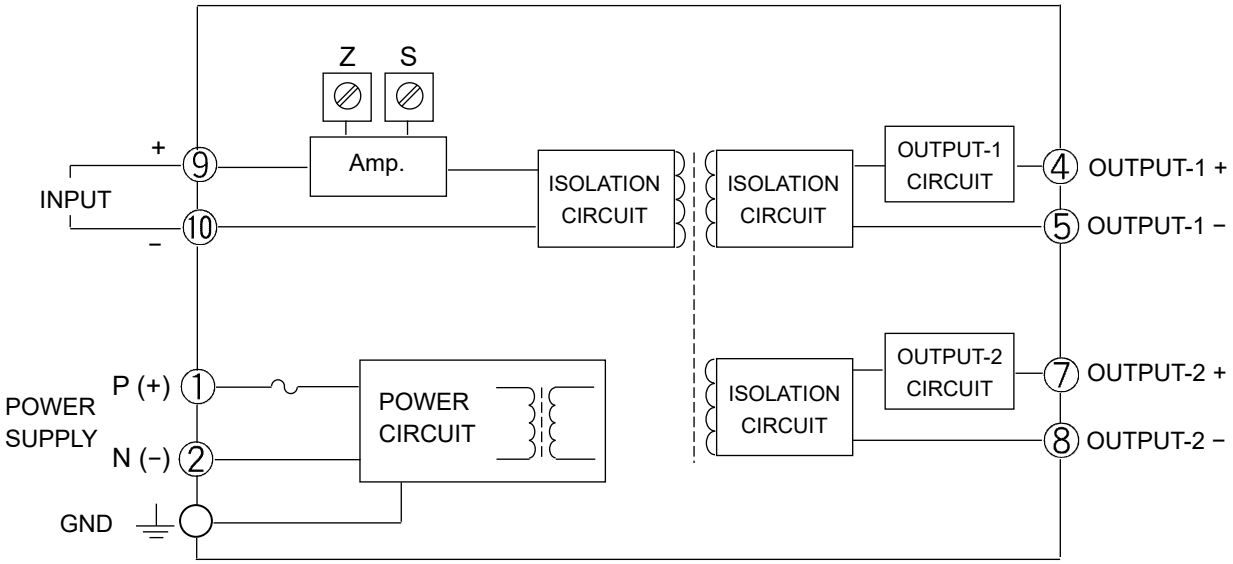
EC Directive Conformity	EMC Directive (2014/30/EU) EN61326-1:2013 Low Voltage Directive (2014/35/EU) IEC61010-1 EN61010-1:2010/A1:2019 Installation Category II Pollution Degree 2 Maximum operating voltage 300V Reinforced insulation between [input/output/GND] and power.

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

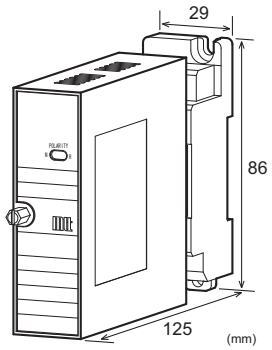


Product Specification Sheet Model: MS3749

Slim Plug-In High Frequency Pulse Shaper (Pulse Isolator) with Isolated Single/Dual Output

DESCRIPTION

The MS3749 is a slim, plug-in high frequency pulse shaper (pulse isolator) that accepts pulse train signals from sensors or other devices, shapes these pulses or converts signal levels, and provides isolated single or dual output. This model accepts line driver signals and features high frequency up to 200kHz with voltage pulse output.



ORDERING CODE

MS3749 - □ - □ □ □

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. 12V, 3.3kΩ)
A: AC voltage pulse
(Threshold voltage: Approx. 0.06Vp-p)
D: DC voltage pulse
(Threshold voltage: Approx. 2V)
I : 4-20mA DC pulse
(Threshold current: Approx. 8mA)
L: Line driver pulse
(Receiving IC: Receiver equivalent to RS-422)
Y: Other input signal and/or threshold voltage

Output 1

1: TTL level
2: Open collector
3: Voltage pulse 10V±10%
4: Voltage pulse 12V±10%

Output 2

No code: None
Codes 1-4 are the same as for Output 1.
5: Line driver pulse (RS-422 driver output)

Note 1: Code 5 is applicalbe only to Output 2.
Note 2: When a combination of TTL level or voltage pulse is selected for Outputs 1 and 2, the voltage levels for both outputs should be the same.

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
/T: Pulse Hold Function provided.
/H: Polyurethane conformal coating
/X: Others (Special order)
Note: When the code L (line driver pulse) is selected for input, an optional sensor power supply cannot be selected.
* 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.) MS3749-A-D11/AT

Other Ordering Examples:
For an input code of "Y": MS3749-A-Y11 (Input DC voltage pulse: 0 to 12V / SH = 8V, SL = 3V)
For an input code of "Y": MS3749-A-Y11 (Input AC voltage pulse: 200Vp-p / S = 2Vp-p)
* SH = Threshold level HI, SL = Threshold level LO, S = Threshold level
For an option code of "T": MS3749-A-D11/AT (Pulse hold time: 200ms, rising edge detection)
Note 1: Specify a pulse width between 200µs and 500ms, and also choose whether to detect a rising edge or falling edge of an input signal.
Note 2: For DC current pulse input, current values must be specified between 0-100µA and 0-100mA.
Note 3: If you wish to include multiple options in your order, specify the option codes in series (e.g. /AX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	7.0VA max	3.0W max	9.0W max
Dual Output	9.0VA max	3.2W max	9.6W max

●INPUT SECTION

Input Resistance	
Voltage Input Model	With power: 1MΩ min. (Standard, 5V input) Without power: 10kΩ min.
Line Driver Pulse Model	Termination resistance: 120Ω
Current Input Model	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	50V DC max., continuous.
DC Current Input Model	40mA DC max., continuous.
AC Voltage Input Model	200Vp-p AC (±100V with reference to 0V) max., continuous.
Input Pulse Width	2.5μs min. (for both ON and OFF)
Maximum Sensor Supply Current	24V: 30mA 12V: 60mA 5V: 120mA

Ranges Available

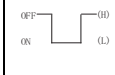
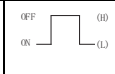
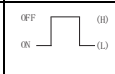
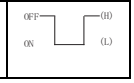
	AC Voltage Pulse	DC Voltage Pulse
Input Range	-300 to 300V	0 to 300V
Input Voltage Span	0.1 to 600Vp-p	1 to 300V
Input Bias	N/A	0 to +300%
Threshold Voltage	50mVp-p min.	Hi-Lo range: 0.2V min.

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

●OUTPUT SECTION

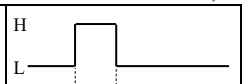
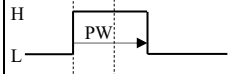
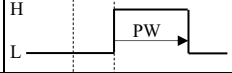
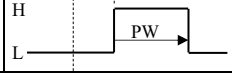
Allowable Output Load	
TTL Level	(Maximum output 10mA @ 3.5V)
Voltage Pulse 10V	(Maximum output 7mA @ ±10%)
Voltage Pulse 12V	(Maximum output 7mA @ ±10%)
Line Driver Pulse	(Per TIA/EIA-422-B)
Maximum Rating	Open collector (Maximum rating: 30V, 100mA)
Maximum Output Frequency without Pulse Hold Function	Voltage Pulse Output: 200kHz Line Driver Pulse Output: 200kHz Open Collector Output: 100kHz with a load resistance of up to 2KΩ (For all of the above, the conditions are as follows: input pulse duty ratio 50% and standard threshold voltage.)
Maximum Output Frequency with Pulse Hold Function	When a pulse hold time is specified, the maximum possible output frequency is determined by the following equation: Hz = 1 / (T × 1.2 + 2.5μs*) *2.5μs: Polarity reversing switch set to NORMAL and output pulse Lo level (rising edge) for TTL and voltage pulse outputs, output pulse ON for open collector output, or output pulse Hi level for line driver pulse output. (Example) When a pulse hold time of 200ms is set, the maximum output frequency is: 1 / (0.2×1.2+0.0000025) = 4.166Hz
Duty Ratio	50% typical (Input pulse duty ratio 50%, standard threshold voltage) DC voltage pulse: 0-5V/1kHz input AC voltage pulse: 5Vp-p/1kHz input Open collector: 1kHz input Line driver pulse: 1kHz input
Polarity Reversing Function	See the Output Logic Table below.

●OUTPUT LOGIC

Input Signal	Input Waveform	Polarity Reversing Switch	Voltage Pulse Output	Open Collector Output *
Voltage/ Current Pulse or between Line Driver A and GND		NORMAL		
		REVERSE		
Open Collector or Dry Contact		NORMAL		
		REVERSE		

*(Between Line Driver Y and GND)

●OUTPUT LOGIC (w/ PULSE HOLD FUNCTION)

Input Waveform		
Output Waveform	Rising edge detection Polarity reversing switch: NORMAL	
	Falling edge detection Polarity reversing switch: NORMAL	
	Rising edge detection Polarity reversing switch: REVERSE	
	Falling edge detection Polarity reversing switch: REVERSE	

PW = User-specified pulse width

●PERFORMANCE

Output Pulse Hold Time Accuracy	Better than ±20% of a user-specified value.
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)
Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

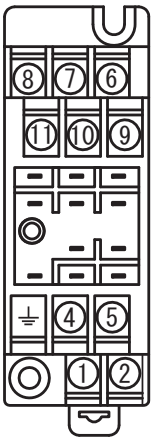
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

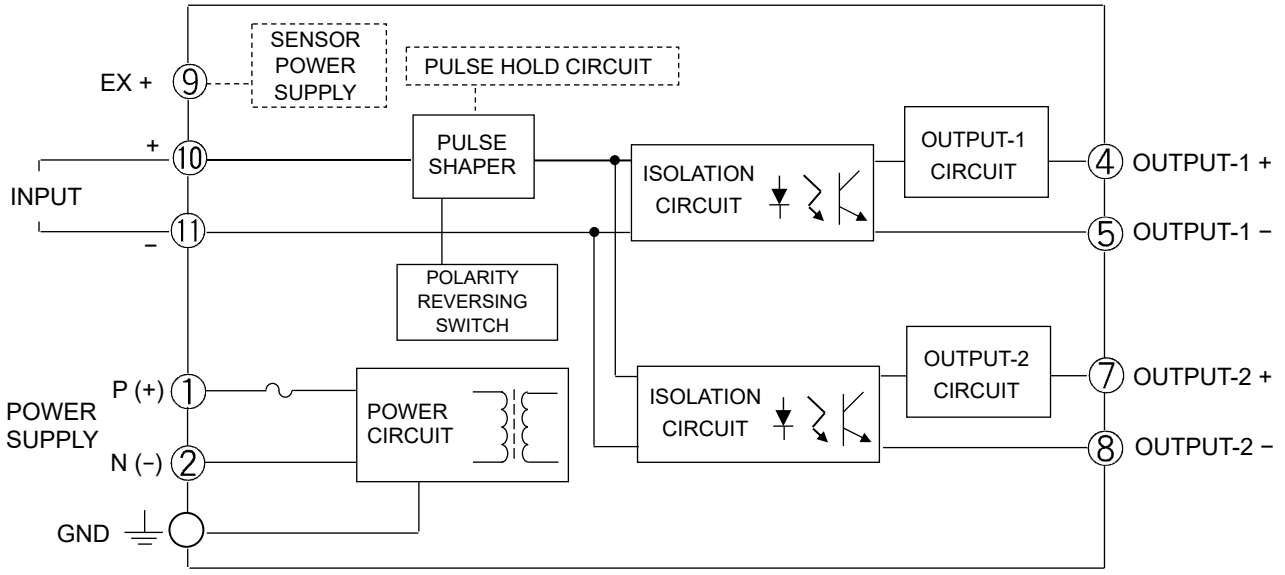


①	P (+) / N (−) POWER	
②		
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	OUTPUT 2 Y
⑦	+ OUTPUT 2	OUTPUT 2 Z
⑧	− OUTPUT 2	OUTPUT 2 COM
⑨	EX (*1)	INPUT A
⑩	+ INPUT	INPUT B
⑪	INPUT COM	INPUT COM

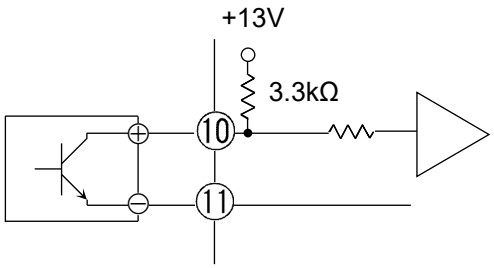
*1: Substituted by N.C. if no external power supply is specified.

Note: The terminal assignments in the dotted frame are as follows:
Terminals #9 - #11: Signal assignments for line driver pulse input
Terminals #6 - #8: Signal assignments for line driver pulse output (output 2)

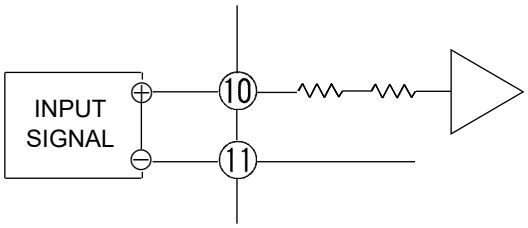
BLOCK DIAGRAM



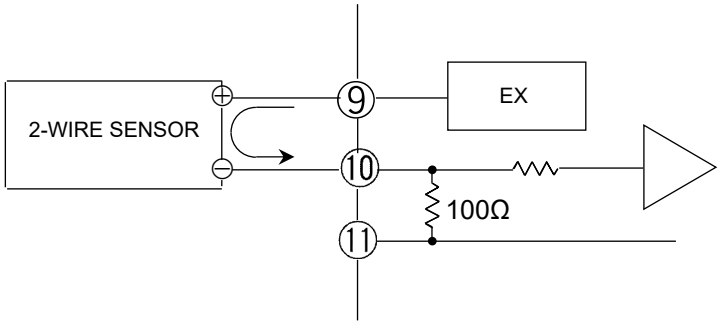
For dry contact or open collector input:



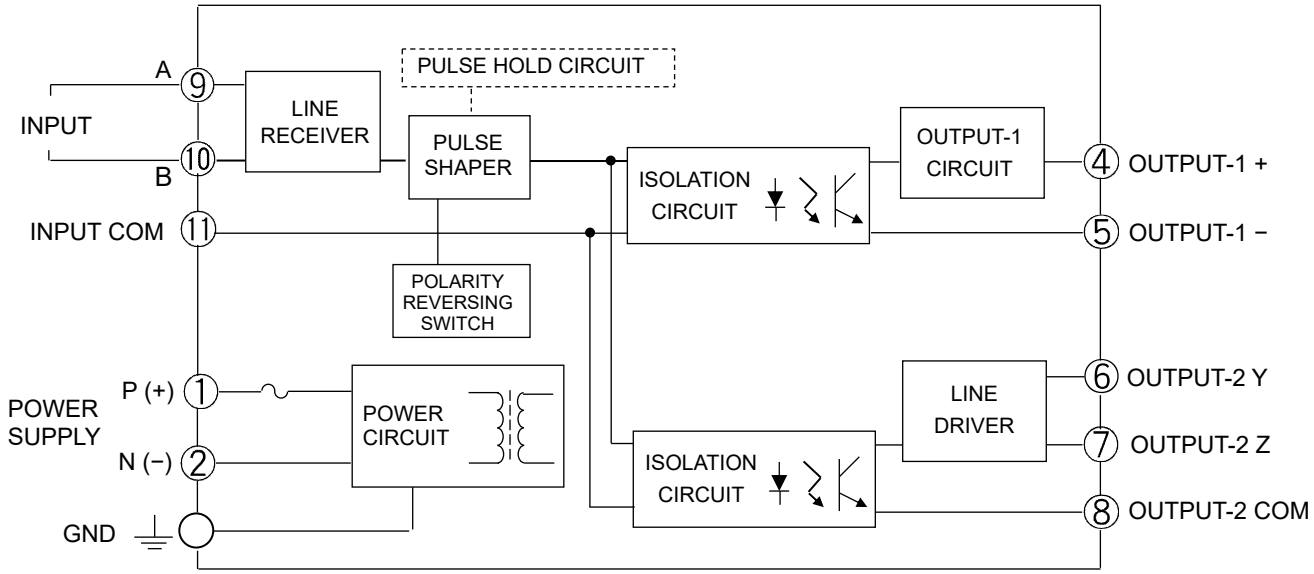
For voltage pulse input:



When a 2-wire sensor is used:
Note: The connections may vary depending on the type of the sensor used.



Block diagram for the following configurations:
Input: Line driver pulse
Output 2: Line driver pulse



Slim Plug-In Pulse to Relay Contact Converter with Isolated Dual Output

DESCRIPTION

The MS3759 is a slim, plug-in pulse to relay contact converter that converts dry contact signals including open collector or wet contact signals into relay contact (form A or C contact) signals and provides an isolated dual output.

ORDERING CODE

MS3759 - □ - □ □

Model

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

Input
- **O1**: Switch-selectable between dry contact / open collector and wet contact (Pull-up: Approx. 13V, 3.3kΩ)
- **O2**: Switch-selectable between dry contact / open collector and wet contact (Pull-up: Approx. 24V, 6.2kΩ)

Outputs 1&2
- **5**: Form A contact (Photo MOS FET relay)
- **No code**: Form C contact (Mechanical relay)

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.) MS3759-A-O15

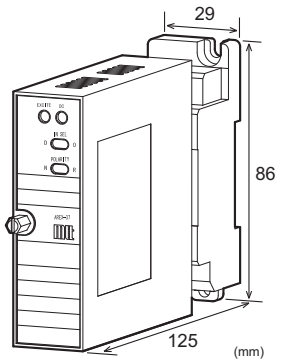
* The default settings are as follows:
Input: Wet contact, Relay activation: NORMAL

Other Ordering Examples:
For an option code of "X": MS3759-D-O25/X (Relay start-up limitation: 5 sec.)
For a specific input setting: MS3759-A-O15 (Input: Dry contact or open collector)
For a specific relay activation: MS3759-D-O15 (Relay activation: REVERSE)

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 is installed (standard).		
Power Consumption			
Power	100-240V AC 4.5VA max	24V DC 1.5W max	100-240V DC 2.0W max

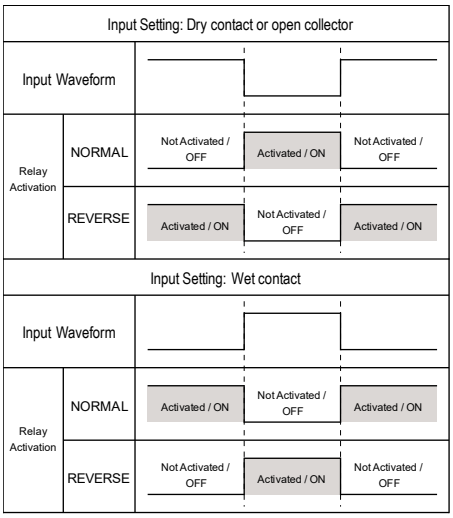
●INPUT SECTION

Input Signal	Dry contact or open collector: Pull-up: Input code "O1": Approx. 13V, 3.3kΩ Input code "O2": Approx. 24V, 6.2kΩ Wet contact: High voltage level: 5 to 30V DC Low voltage level: 0 to 1V DC (Input is selectable between the dry contact and wet contact using the front-accessible switch.)
Input Setting Indicator LED	Green LED is ON when the wet contact is selected.
Input Resistance	With power: 1MΩ min. (5V DC input) Without power: 10kΩ min.
Allowable Input Voltage	30V DC max., continuous.
Threshold Voltage	Approx. 2V
Maximum Frequency	1Hz
Input Pulse Width	30ms min.

●OUTPUT SECTION

Output Signal	Two independent relay contact closure signals: Form A contact (Photo MOS FET relay) Form C contact (Mechanical relay)
Output Indicator	Red LED is ON when the relay is activated.
Relay Activation without Power	Form A contact: OFF Form C contact: NC and COM are closed; NO and COM are open.
Relay Start-up Limitation	The relay gets ready for action about 2 seconds after power-up.

Output Operation



*Relay Activation: Form C / A contact

●PERFORMANCE

Response Time	30ms max.
Isolation	4-way isolation between input, output 1, output 2, and power.
Insulation Resistance	100MΩ min. 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: 5.0mA) Output 1 / Output 2: 500V AC for 1 minute (Cutoff current: 0.5mA)

Relay Contact

Form A contact:

Maximum Load Voltage	350V (Peak AC/DC)
Maximum Continuous Load Current	120mA (Peak AC/DC)
Off-state Leakage Current	1μA max.
ON resistance	50Ω max. (Load current 120mA)

Form C contact:

Maximum Allowable Voltage	250V AC, 220V DC
Maximum Allowable Current	2A
Maximum Allowable Power	125VA, 30W
Minimum Applicable Load	10μA, 10mV DC
Electrical Life	0.1A, 50V DC (Resistive load): 10^6 cycles at 85°C, 5Hz. 10mA, 10V DC (Resistive load): 10^6 cycles at 85°C, 2Hz.
Mechanical Life	100 × 10^6 cycles

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

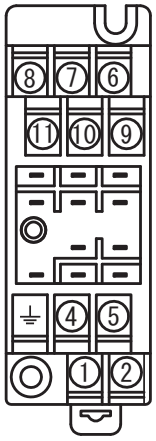
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



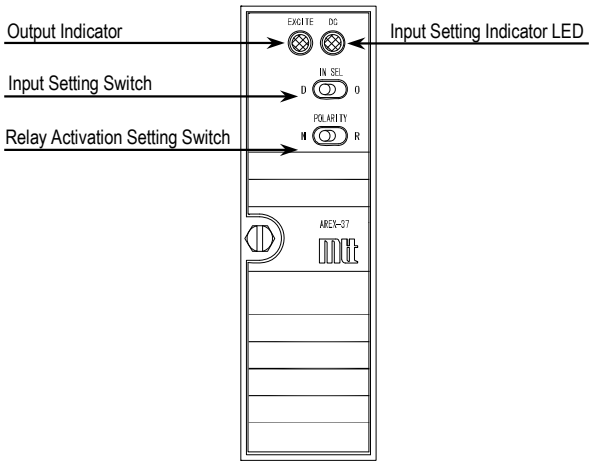
Form A Contact Output

①	P (+)	POWER
②	N (−)	
⏚	GND	
④	NC	
⑤	OUT 1	
⑥	OUT 1	
⑦	OUT 2	
⑧	OUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	NC	

Form C Contact Output

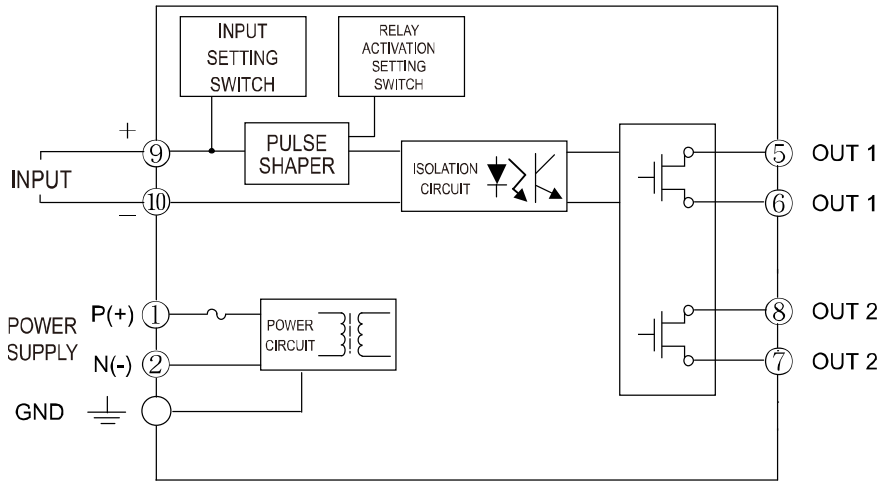
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	NC OUT 1	
⑤	NO OUT 1	
⑥	COM OUT 1	
⑦	COM OUT 2	
⑧	NO OUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	NC OUT 2	

FRONT VIEW

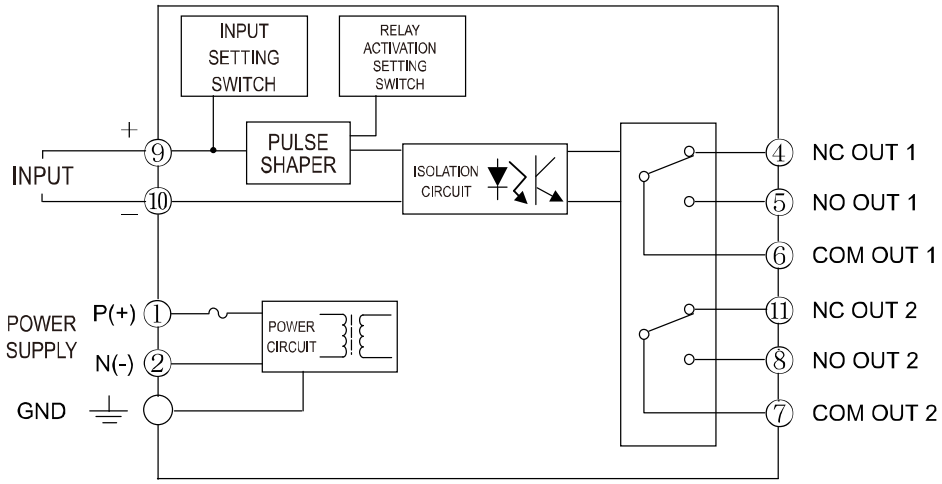


BLOCK DIAGRAM

FORM A CONTACT

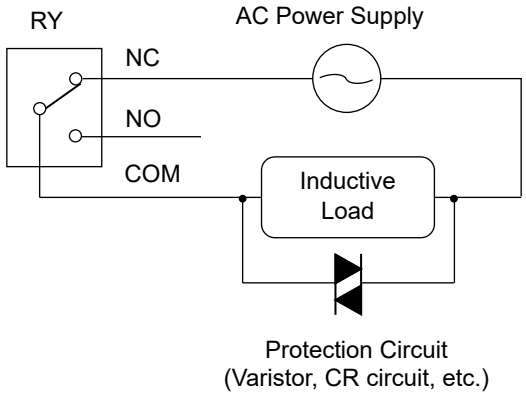


FORM C CONTACT

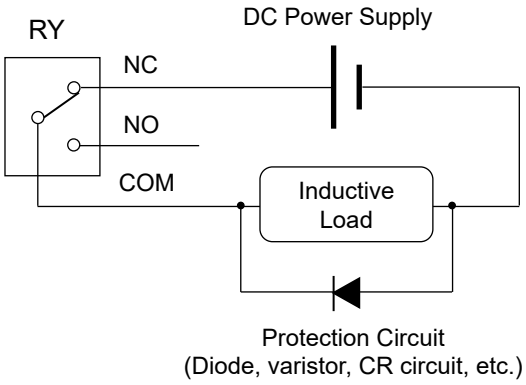


Note: When an inductive load, such as an electric motor, is connected to the output, a relay contact protection circuit must be connected across the load.

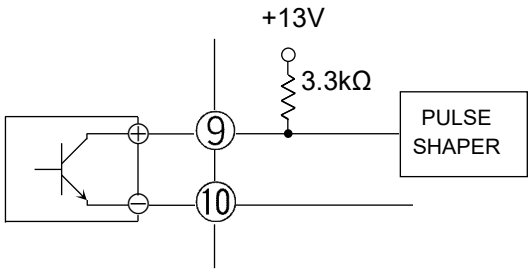
Example of AC Power Connection:



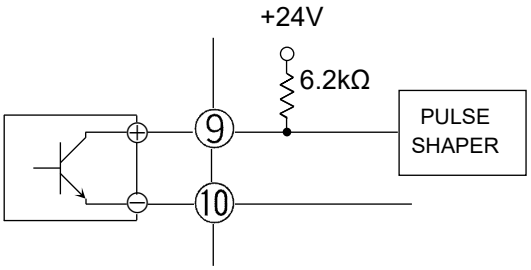
Example of DC Power Connection:



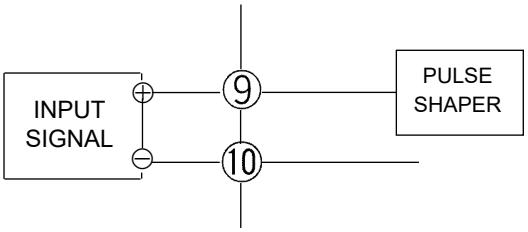
For dry contact or open collector input:
(Pull-up: Approx. 13V, 3.3kΩ)



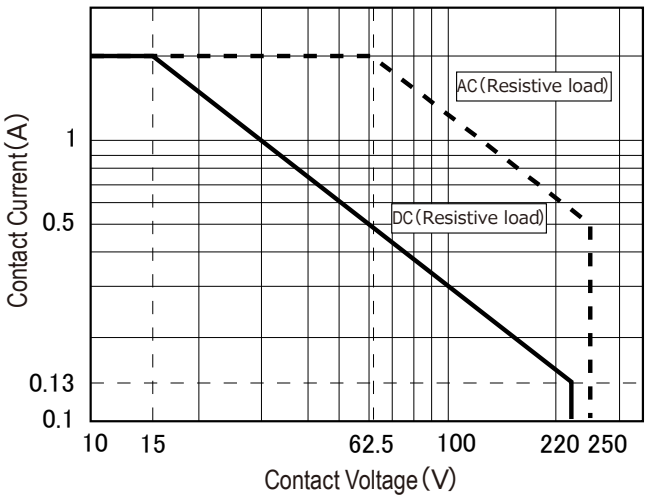
For dry contact or open collector input:
(Pull-up: Approx. 24V, 6.2kΩ)



For wet contact input:



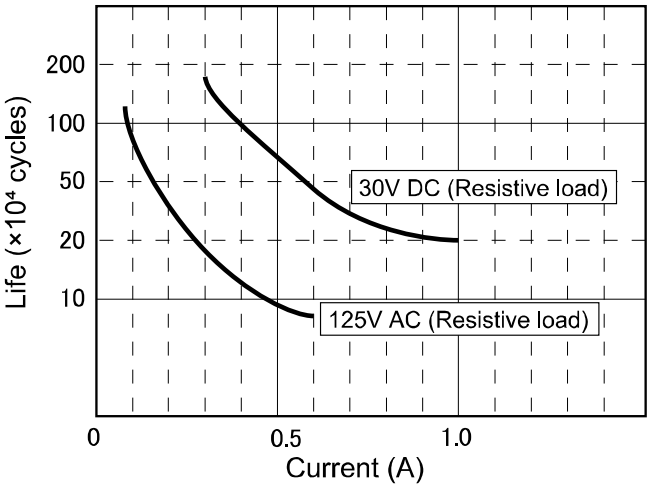
RATED LOAD CURVE FOR CONTACT (FORM C CONTACT)



Contact voltage 15V: Transition in DC (resistive load)
Contact voltage 62.5V: Transition in AC (resistive load)

LIFE CURVE (FORM C CONTACT)

The data is for reference purposes only.



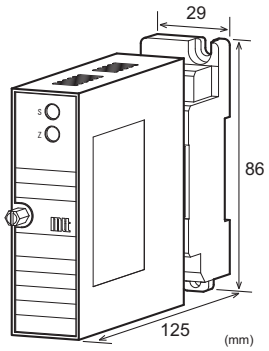
Inductive load life data (for reference): 100,000 cycles with inductive load 100V AC, 100mA, L/R = 1.4ms
Form A contact relays (photo MOS relays) are recommended for applications involving a large number of opening and closing actions.

Product Specification Sheet Model: MS3761

Slim Plug-In Adder with Isolated Single/Dual Output

DESCRIPTION

The MS3761 is a slim, plug-in adder that receives two DC current or voltage signals and outputs a signal proportional to the sum of those signals. The unit provides isolated single or dual output.



ORDERING CODE

MS3761 - □ - □ □ □

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

No code: None
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.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 Input-1 and Input-2 factors (K1, K2)*.
(e.g.) MS3761-A-6A6 (K1 = 1.0 / K2 = 1.0)

* Note that the Input-1 and Input-2 factors (K1, K2) should be specified between 0.1 and 2.0 (0.4 ≤ K1 + K2).

Other Ordering Examples:
For an input code of "Z": MS3761-A-ZAA (K1 = 1.0 / K2 = 1.0 / Input: 8 to 20mA)
For an output code of "0": MS3761-A-A60 (K1 = 1.0 / K2 = 1.0 / Output: 2 to 5V)
For an option code of "X": MS3761-A-66/X (K1 = 1.0 / K2 = 1.0 / 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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.4W max	4.8W max
Dual Output	5.5VA max	1.7W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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. (for a span up to 10V)
Current Input Model	40mA DC max., continuous. (for 4 to 20mA)

Ranges Available	Current Signal	Voltage Signal
Input Range (DC)	-100 to 100mA	-10 to 10V
Input Span (DC)	100μA[*1] to 200mA	200mV[*2] to 20V
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 20V, 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% span. (Adjustable by the front-accessible trimmer.)
Output Range	0 to approx. 120%

Equation

Output (%) = IN1 (%) × K1 + IN2 (%) × K2

where

IN1: Input 1 (%), K1: Input-1 factor

IN2: Input 2 (%), K2: Input-2 factor

* IN1 & IN2: 0 to 120%

(Example)

Input: 1 to 5V / Output: 0 to 10V, K1: 0.7, K2: 0.3

When the Input 1 is 3V (50%) and the Input 2 is 2V (25%), the output is:

50% × 0.7 + 25% × 0.3 = 42.5% (4.25V)

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%

Note: 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

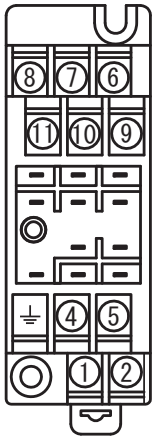
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

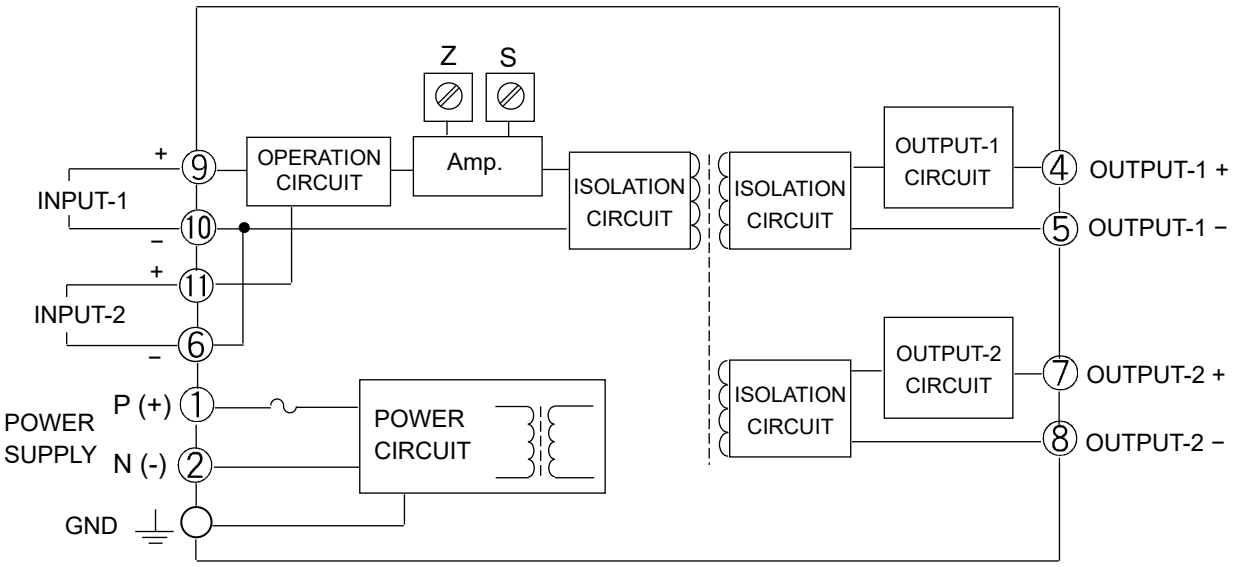
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

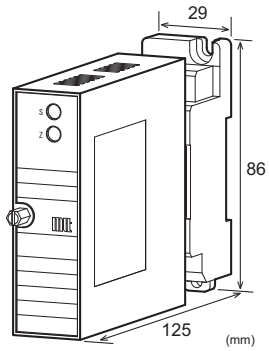


Product Specification Sheet Model: MS3762

Slim Plug-In Subtractor with Isolated Single/Dual Output

DESCRIPTION

The MS3762 is a slim, plug-in subtractor that receives two DC current or voltage signals and outputs a signal proportional to the difference between those signals. The unit provides isolated single or dual output.



ORDERING CODE

MS3762 - □ - □ □ □

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

No code: None
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.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 Input-1 and Input-2 factors (K1, K2)*.
(e.g.) MS3762-A-6A6 (K1 = 1.0 / K2 = 1.0)

* Note that the Input-1 factor (K1) should be specified between 0.4 and 2.0, and the Input-2 factor (K2) between 0.1 and 2.0.

Other Ordering Examples:
For an input code of "0": MS3762-A-0AA (K1 = 1.0 / K2 = 1.0 / Input: 0.2 to 1V)
For an output code of "0": MS3762-A-A60 (K1 = 1.0 / K2 = 1.0 / Output: 2 to 5V)
For an option code of "X": MS3762-A-66/X (K1 = 1.0 / K2 = 1.0 / 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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.5VA max	1.4W max	4.8W max
Dual Output	5.5VA max	1.7W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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. (for a span up to 10V)
Current Input Model	40mA DC max., continuous. (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% span. (Adjustable by the front-accessible trimmer.)
Output Range	0 to approx. 120%

Equation

Output (%) = IN1 (%) × K1 - IN2 (%) × K2

where

IN1: Input 1 (%), K1: Input-1 factor

IN2: Input 2 (%), K2: Input-2 factor

* IN1 & IN2: 0 to 120%

(Example)

Input: 1 to 5V / Output: 0 to 10V, K1: 0.7, K2: 0.3

When the Input 1 is 3V (50%) and the Input 2 is 2V (25%), the output is:

50% × 0.7 - 25% × 0.3 = 27.5% (2.75V)

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%

Note: 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

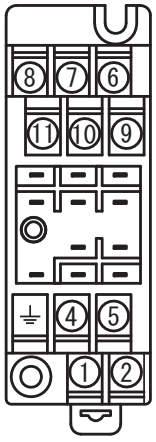
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

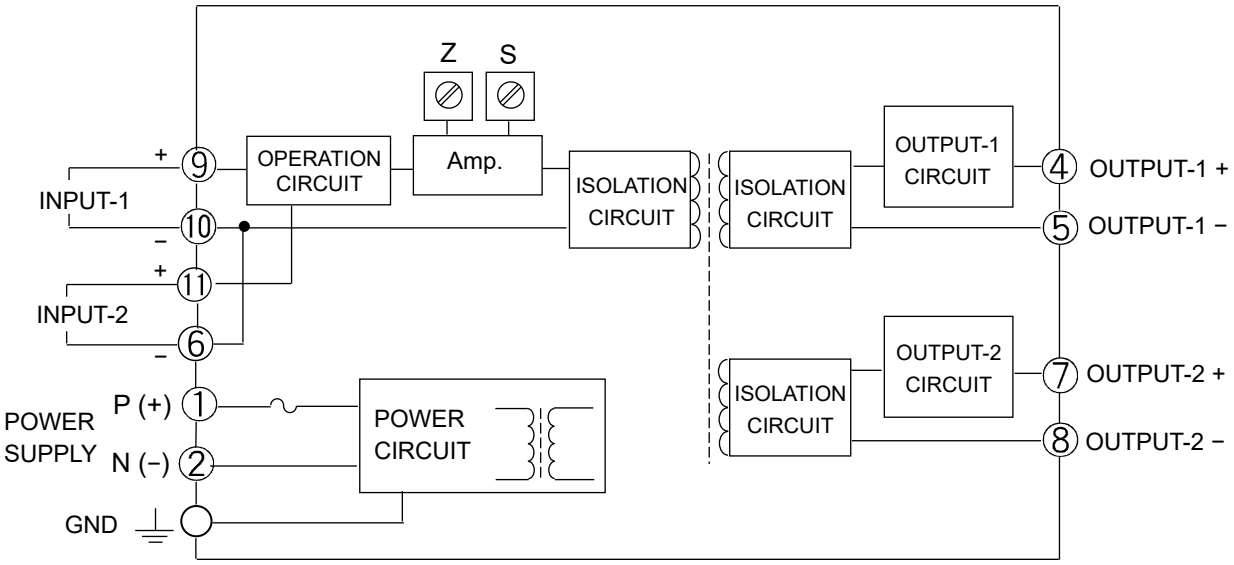
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

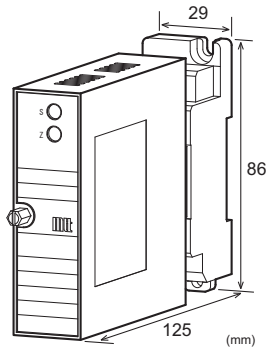


Product Specification Sheet Model: MS3762F

Slim Plug-In Subtractor with Isolated Single/Dual Output
(Fast Response Model)

DESCRIPTION

The MS3762F is a slim, plug-in subtractor (fast response model) that receives two DC current or voltage signals and outputs a signal proportional to the difference between those signals. The unit provides isolated single or dual output.



ORDERING CODE

MS3762F - □ - □ □ □

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
No code: None
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: 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 Input-1 and Input-2 factors (K1, K2)*.
(e.g.) MS3762F-A-6A6 (K1 = 1.0 / K2 = 1.0)

* Note that the Input-1 factor (K1) should be specified between 0.4 and 2.0, and the Input-2 factor (K2) between 0.1 and 2.0.

Other Ordering Examples:
For an input code of "0": MS3762F-A-0AA (K1 = 1.0 / K2 = 1.0 / Input: 0.2 to 1V)
For an output code of "0": MS3762F-A-A60 (K1 = 1.0 / K2 = 1.0 / Output: 2 to 5V)

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.8W max	2.2W max
Dual Output	6.3VA max	2.0W max	2.5W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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. (for a span up to 10V)
Current Input Model	40mA DC max., continuous. (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% span. (Adjustable by the front-accessible trimmer.)
Output Range	0 to approx. 120%

Equation

Output (%) = IN1 (%) × K1 - IN2 (%) × K2

where

IN1: Input 1 (%), K1: Input-1 factor

IN2: Input 2 (%), K2: Input-2 factor

* IN1 & IN2: 0 to 120%

(Example)

Input: 1 to 5V / Output: 0 to 10V, K1: 0.7, K2: 0.3

When the Input 1 is 3V (50%) and the Input 2 is 2V (25%), the output is:

50% × 0.7 - 25% × 0.3 = 27.5% (2.75V)

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%

Note: 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	400μs 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

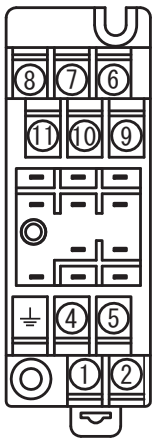
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

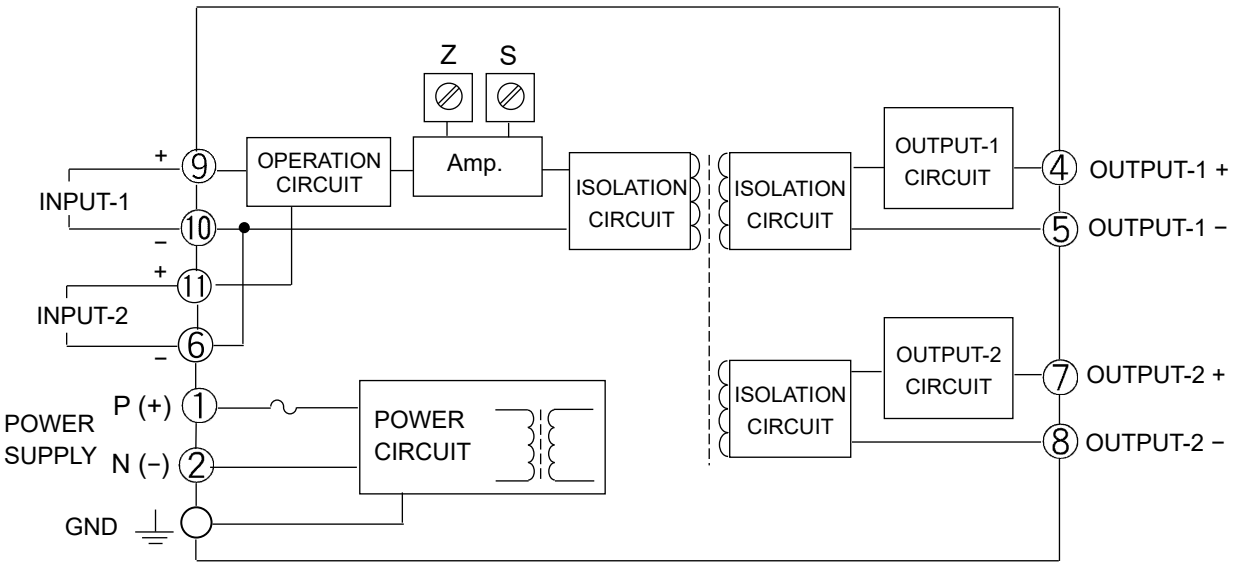
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

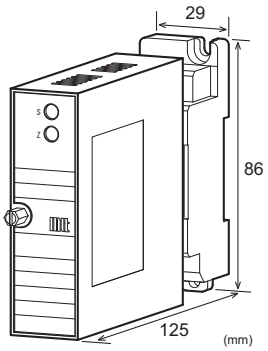


Product Specification Sheet Model: MS3763

Slim Plug-In RTD Differential Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3763 is a slim, plug-in RTD differential temperature transmitter that detects a temperature difference between two 2-wire RTD's, converts the difference into commonly used DC signals, and provides isolated single or dual output.



ORDERING CODE

MS3763 - □ - □ □ □

Model

Power Supply

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

Input

2 × RTD input (2-wire; JIS standard)
P1: Pt 100Ω **J**: JPt 100Ω

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

No code: None
The codes are the same as for Output 1.

Note 1: When 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.)
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3763-A-P1A6

Other Ordering Examples:
For an output code of "0": MS3763-A-P1A0 (Output: 2 to 10V)
For an option code of "X": MS3763-A-P1A6/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.5W max	6.0W max
Dual Output	6.5VA max	1.8W max	7.2W max

●INPUT SECTION

Measuring Temperature Range	0 to 50°C (fixed)
Input Temperature Difference	0 to 20°C (fixed)
Excitation Current	Approx. 2mA
Lead Wire Resistance	50Ω max. per wire

●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, H, L, and COM 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%

Note: 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 with an input range of 15 to 35°C (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	200ms 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

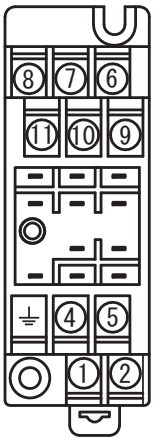
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

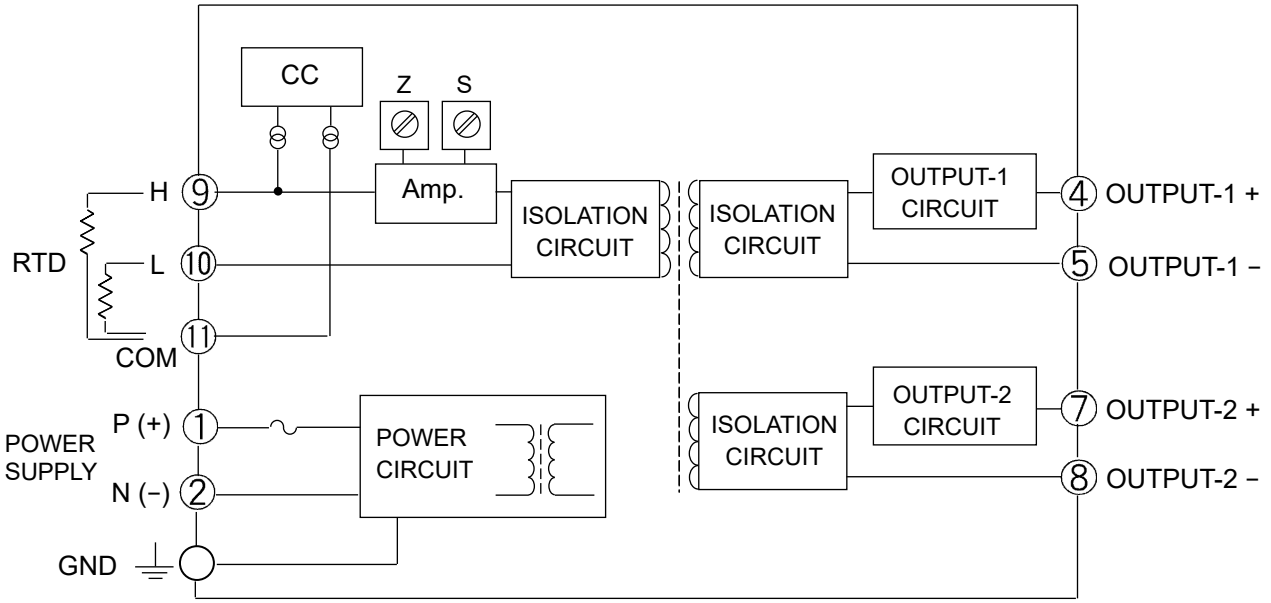
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	RTD H	
⑩	RTD L	
⑪	COM	

BLOCK DIAGRAM

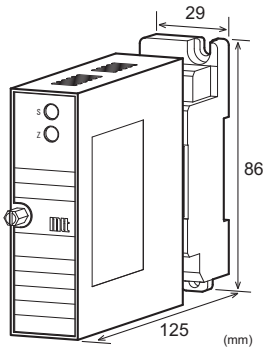


Product Specification Sheet Model: MS3763B

Slim Plug-In RTD Differential Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3763B is a slim, plug-in RTD differential temperature transmitter that detects a temperature difference between two 2-wire RTD's, converts the difference into commonly used DC signals, and provides isolated single or dual output.



ORDERING CODE

MS3763B - □ - □ □ □ □

Model

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

Input
2-wire RTD Pt 100Ω

Measuring Temperature Range
A: -20 to 30°C **C**: 50 to 100°C
B: 0 to 50°C **Y**: Other than those above.

Input Temperature Difference (RTD A – RTD B)
D: ±10°C **G**: 0 to 50°C
E: ±20°C **Y**: Other than those above.
F: 0 to 20°C

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
No code: None
The codes are the same as for the 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
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3763B-A-ADA6

Other Ordering Examples:
For an output code of "0": MS3763B-A-BEA0 (Output: 2 to 10V)
For an option code of "X": MS3763B-A-CFA6/X (JPt 100Ω)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.5VA max	1.5W max	6.0W max
Dual Output	6.5VA max	1.8W max	7.2W max

●INPUT SECTION

Excitation Current	Approx. 2mA
Lead Wire Resistance	50Ω max. per wire

●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, RTD A, RTD B and COM 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%

Note: 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

<Standard Specifications> (at ambient temp. 25°C±5°C)

Temperature Range	Input Temp. Difference	Accuracy
-20 to 30°C 0 to 50°C 50 to 100°C	0 to 20°C	Better than ±1.0% of span.
	0 to 50°C	Better than ±0.5% of span.
	±10°C	Better than ±1.0% of span.
	±20°C	Better than ±1.0% of span.

For any other temperature ranges and input temperature differences, ask MTT for availability.

Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	300ms 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

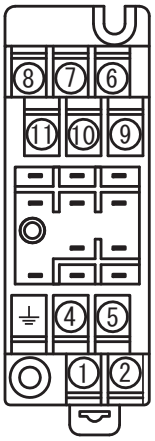
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

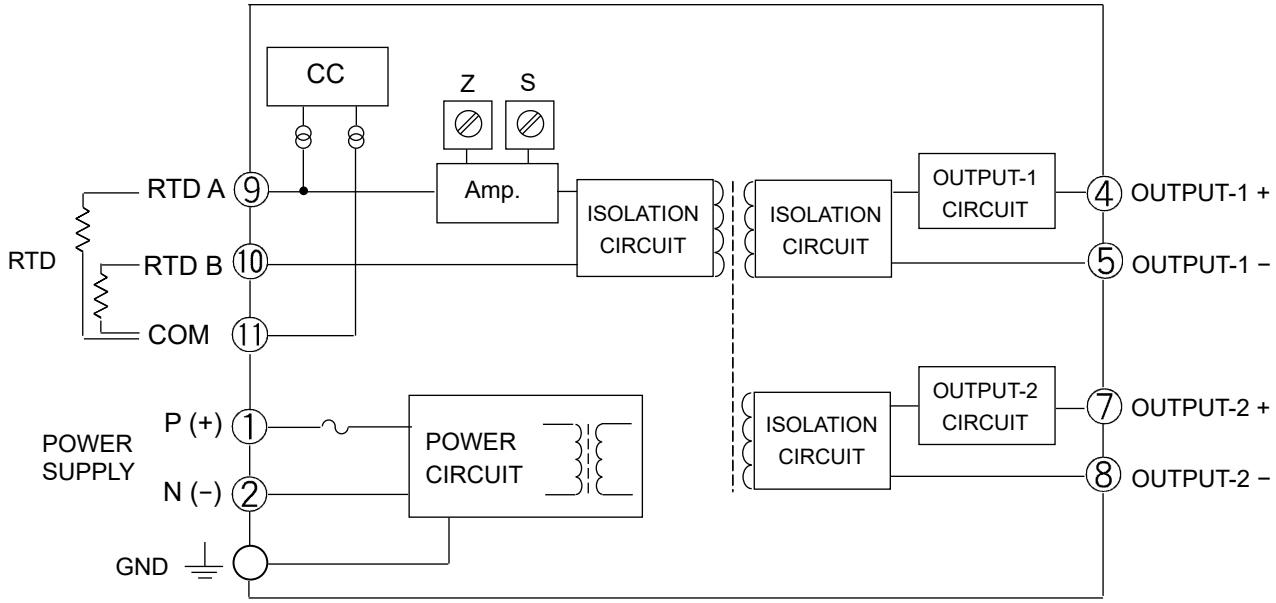
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



* Input Temperature Difference = RTD A– RTD B

(Example) When the following configurations are specified:

Measuring temperature range: 50 to 100°C

Input temperature difference: ±10°C

Output 1: ±10V

Output 2: 0 to 10V

RTD A	RTD B	RTD A – RTD B	Output 1	Output 2
75°C	75°C	75°C – 75°C = 0°C	0V	5V
75°C	65°C	75°C – 65°C = 10°C	10V	10V
65°C	75°C	65°C – 75°C = -10°C	-10V	0V

Product Specification Sheet Model: MS3764

Slim Plug-In Loop-Powered Isolator
(2-Channel Model)

DESCRIPTION

The MS3764 is a slim, plug-in dual-channel loop-powered isolator that takes the power from its input current loop.

ORDERING CODE

MS3764 - □

Model

Input (Channel 1 / Channel 2)
4 to 20mA DC / 4 to 20mA DC

Output (Channel 1 / Channel 2)
A: 4 to 20mA DC / 4 to 20mA DC
V: 1 to 5V DC / 1 to 5V DC

Options
No code: None
/H: Polyurethane conformal coating

ORDERING INFORMATION

To place an order, please use the ordering code format as shown above.
(e.g.) MS3764-V

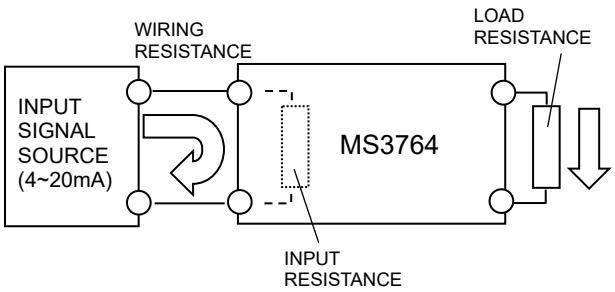
INPUT RESISTANCE CALCULATION

The input resistance for the current output model is calculated by the following equation:

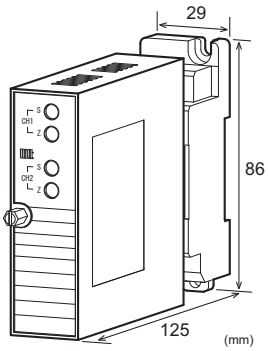
Input resistance = Approx. 230Ω + Load resistance (for 20mA DC input)
Maximum output load: 350Ω
(Allowable load resistance: 50 to 350Ω)

(Example) Input resistance with a load resistance of 250Ω
Input resistance = Approx. 230Ω + 250Ω = Approx. 480Ω (for 20mA DC input)

The allowable load resistance of an input signal source must be not less than the resistance calculated above, added with the wiring resistance.



Note: The input resistance for the voltage output model is fixed to approx. 250Ω (for 20mA DC input).



SPECIFICATIONS

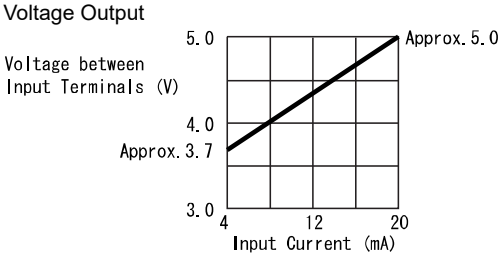
●INPUT SECTION

Input Signal	4 to 20mA DC	
Input Resistance		
Voltage Output Model	Approx. 250Ω (for 20mA DC input)	
Current Output Model	Approx. 230Ω + Load resistance (for 20mA DC input)	
Allowable Input Current	30mA DC max.	

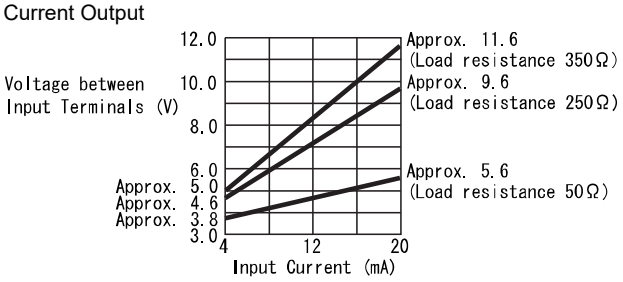
●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)		50kΩ min.
Current Output (DC)	4 to 20mA	350Ω max.
	(Allowable load resistance: 50 to 350Ω)	
Zero Adjustment		
Voltage Output Model	Approx. ±2.5% of span.	
Current Output Model	Approx. ±0.5% of span. (Adjustable by the front-accessible trimmer.)	
Span Adjustment		
Voltage Output Model	Approx. ±2.5% of span.	
Current Output Model	Approx. ±1.5% of span. (Adjustable by the front-accessible trimmer.)	

Voltage Output



Current Output



●PERFORMANCE

Accuracy Rating	Better than ±0.15% of span.
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	15ms max. (0 to 90%) with a step input at 100%.
Output Variation due to Load Change	0.01%/Ω (50 to 150Ω) 0.005%/Ω (150 to 350Ω) * Adjusted at 250Ω for shipment.
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	Isolation between input and output, and channels.
Insulation Resistance	100MΩ min. (@ 500V DC) between input and output, and channels.
Dielectric Strength	Input / Output: 1500V AC for 1 minute (Cutoff current: 0.5mA) Channel to Channel: 1500V 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

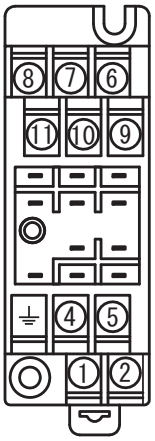
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 100g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

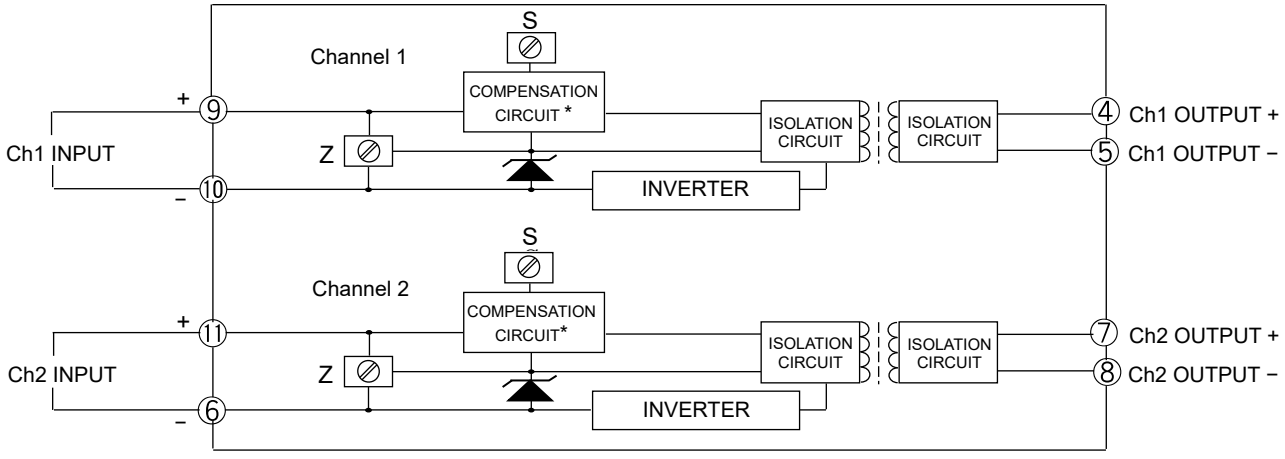
TERMINAL ASSIGNMENTS



①	N.C.
②	N.C.
⏚	N.C.
④	+ OUTPUT Ch 1
⑤	− OUTPUT Ch 1
⑥	− INPUT Ch 2
⑦	+ OUTPUT Ch 2
⑧	− OUTPUT Ch 2
⑨	+ INPUT Ch 1
⑩	− INPUT Ch 1
⑪	+ INPUT Ch 2

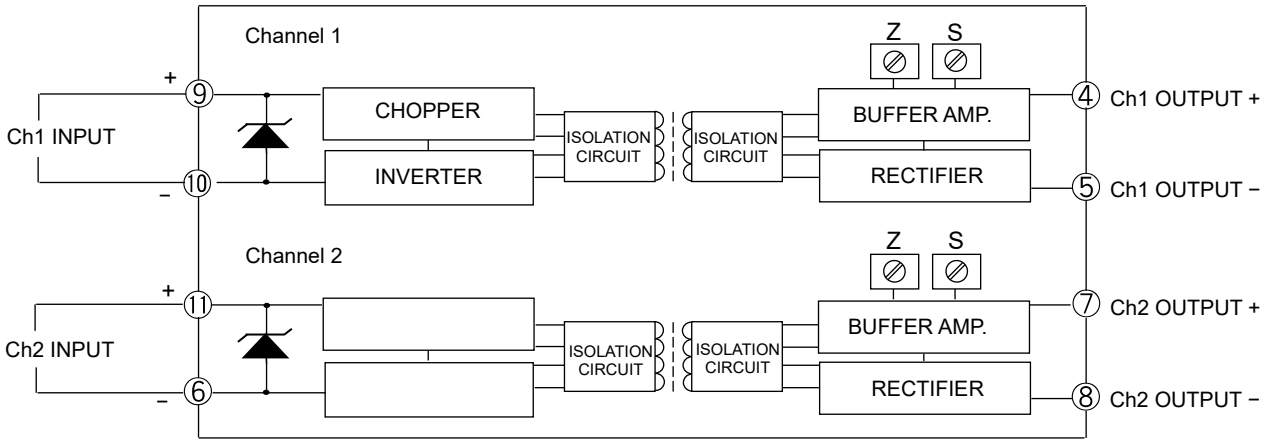
BLOCK DIAGRAM

Current Input / Current Output Model:



* CIRCUIT FOR COMPENSATING FOR OUTPUT VARIATION DUE TO LOAD CHANGE

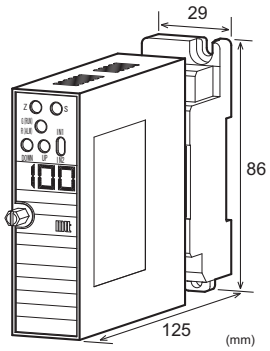
Current Input / Voltage Output Model:



Slim Plug-In Arithmetic Operation Unit with Isolated Single/Dual Output

DESCRIPTION

The MS3765 is a slim, plug-in arithmetic operation unit that receives two DC current or voltage signals and outputs a signal proportional to the result (sum, difference, product, or quotient) of an arithmetic operation (addition, subtraction, multiplication, or division). The unit provides isolated single or dual output.



ORDERING CODE

MS3765 - □ - □ □ □ □

Model

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

Input 1

A: 4 to 20mA DC	**3**: 0 to 1V DC
B: 2 to 10mA DC	**4**: 0 to 10V DC
C: 1 to 5mA DC	**5**: 0 to 5V DC
D: 0 to 20mA DC	**6**: 1 to 5V DC
E: 4 to 20mA DC *1	**4W**: ±10V DC
H: 10 to 50mA DC	**5W**: ±5V DC
Z: Other DC current signals	**0**: Other DC voltage signals

*1: Shunt resistor 50Ω

Input 2
The codes are the same as for Input 1.

Output 1

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

Output 2
No code: None
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 d 350Ω maximum for Output 2.

Options
No code: None
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3765-A-66A

* Default settings: Addition, K1 = 1.0, K2 = 1.0

Other Ordering Examples:
For an input code of "0": MS3765-A-0AA (Input: 0.2 to 1V)
For an output code of "Z": MS3765-A-A6Z (Output: 8 to 20mA)
For specific settings (Type of arithmetic operation / Input-1 factor / Input-2 factor): MS3765-A-66A (Subtraction / K1 = 2.0 / K2 = 2.0)
Note: If you wish to include multiple options in your order, specify the option codes in series (e.g. /LX).

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 is installed (standard).		
Power Consumption			
Power	100-240V AC	24V DC	100-240V DC
Single Output	6.0VA max	1.7W max	6.0W max
Dual Output	6.5VA max	2.1W max	7.2W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	100Ω
	0 to 20mA	250Ω
	10 to 50mA	10Ω
Allowable Input Voltage		
Voltage Input Model	30V DC max., continuous (for a span up to 10V)	
Current Input Model	40mA DC max., continuous (for 4 to 20mA)	
Input Range	0 to 120%	

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.)
Output Range	0 to approx. 120%

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%

Note: 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

Equations

Addition	Y = (IN1 × K1) + (IN2 × K2)
Subtraction	Y = (IN1 × K1) – (IN2 × K2)
Multiplication	Y = (IN1 × K1) × (IN2 × K2)
Division	Y = (IN1 × K1) / (IN2 × K2)

Where
Y: Output (%)
K1: Input-1 factor, K2: Input-2 factor
IN1: Input 1 (%), IN2: Input 2 (%)

Factor Setting Range

The factors K1 and K2 should be set in steps of 0.01 within the following respective ranges.

Addition	K1 = 0.10 to 2.00 K2 = 0.10 to 2.00 (K1 + K2 ≥ 0.40)
Subtraction	K1 = 0.40 to 2.00 K2 = 0.10 to 2.00
Multiplication	K1 = 0.20 to 2.00 K2 = 0.20 to 2.00 (0.4 ≤ K1 × K2 ≤ 2.00)
Division	K1 = 0.10 to 2.00 K2 = 0.10 to 2.00 (0.4 ≤ K1/K2 ≤ 2.00)

Accuracy Rating	(at 25°C±5°C)
Addition	If K1 ≤ 1.00 and K2 ≤ 1.00: Better than ±0.2% of span. If K1 > 1.00 or K2 > 1.00: Better than ±0.4% of span.
Subtraction	If K1 ≤ 1.00 and K2 ≤ 1.00: Better than ±0.2% of span. If K1 > 1.00 or K2 > 1.00: Better than ±0.4% of span.
Multiplication	If K1 × K2 ≤ 1.00: Better than ±0.2% of span. If K1 × K2 > 1.00: Better than ±0.4% of span.
Division	If K1/K2 ≤ 1.00 (IN2 ≥ 20%): Better than ±1.0% of span. If K1/K2 > 1.00 (IN2 ≥ 20%): Better than ±2.0% of span.
Temperature Effect	Better than ±0.15% of span per 10°C change in ambient.
Response Time	150ms max. (0 to 90%) with a step input at 100%.
Factor Indicator	Red LED, digit height 8.0mm, 3 digits.
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

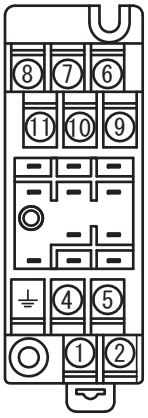
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

●MATERIAL

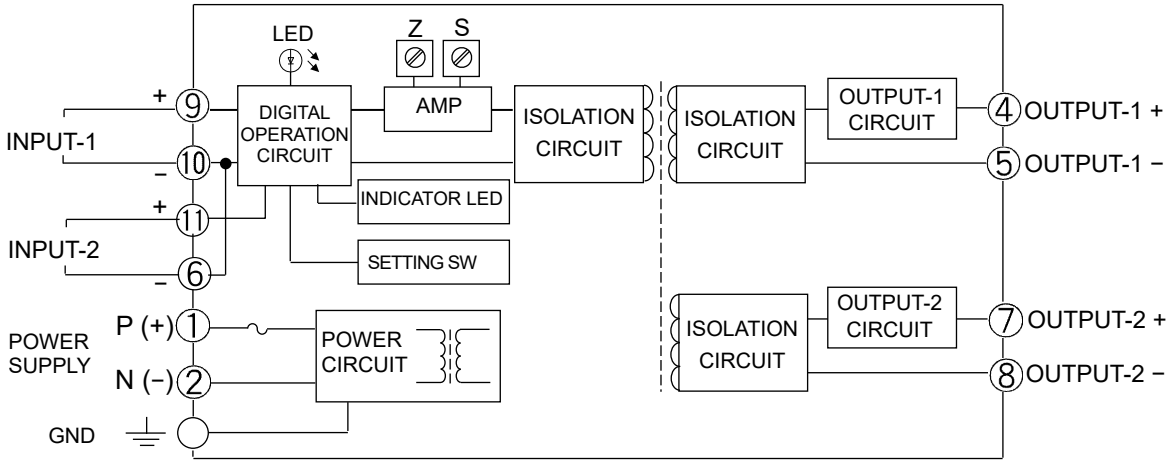
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

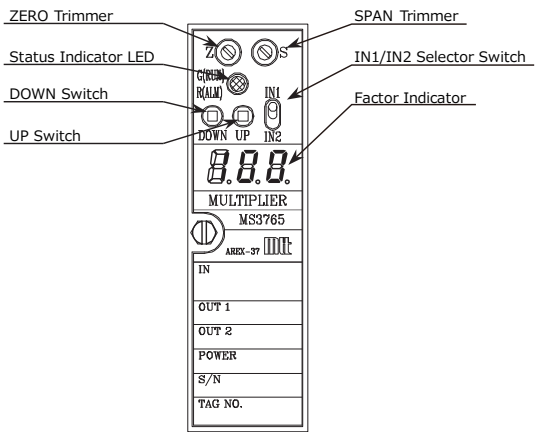


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	− INPUT 2	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT 1	
⑩	− INPUT 1	
⑪	+ INPUT 2	

BLOCK DIAGRAM



FRONT VIEW



SETTING

●EQUATION SETTING

Setting Procedure

Setting an equation involves the following steps:

1. Turn on the power while pressing the DOWN Switch.
2. The Status Indicator LED will blink alternately red and green with the Factor Indicator off. Then, release the DOWN Switch within five seconds.
3. Any of the numbers 1 through 4 will appear only in the middle digit of the Factor Indicator except for the following cases. In such cases, you should try again from the beginning.
   - The Status Indicator LED did not repeatedly light red and green after the power is turned on.
   - The DOWN Switch was pressed and held for more than five seconds.

4. The number (arithmetic operation code) displayed represents the currently selected equation. Use the UP or DOWN Switch to change the equation. The arithmetic operation codes and corresponding equations are as shown below.

Arithmetic Operation Code	Equation	
1	Addition	Y = (IN1 × K1) + (IN2 × K2)
2	Subtraction	Y = (IN1 × K1) – (IN2 × K2)
3	Multiplication	Y = (IN1 × K1) × (IN2 × K2)
4	Division	Y = (IN1 × K1) / (IN2 × K2)

5. After selecting the arithmetic operation code, set the IN1/IN2 Selector Switch to the opposite position to where it is located so that the selected code will be saved in the unit.
   Note: Failure to do this will prevent the code from being saved.
   Immediately after the IN1/IN2 Selector Switch is operated, the Factor Indicator will be off for approx. 0.5 second.
6. Turn the power off and on again, and the unit will start its operation according to the set equation.

Factory Default Setting

Unless otherwise requested, the arithmetic operation will be set to the factory default, “addition”.

●FACTOR SETTING

Setting Procedure

When the IN1/IN2 Selector Switch is set to the IN1 position, the Factor Indicator shows the current IN1 factor. This factor value can be changed to a desired value by pressing the UP/DOWN switch.
When the IN1/IN2 Selector Switch is set to the IN2 position, the Factor Indicator shows the current IN2 factor. This factor value can be changed to a desired value by pressing the UP/DOWN switch.
The set factors will be separately saved for each equation.

Indicator

The Factor Indicator goes OFF if no switch is operated for one minute.

UP/DOWN Switch

The switch is of a push button type. Pressing and holding the switch changes the value faster.

Factory Default Setting

If not specified, the IN1 and IN2 factors will be both set to the factory default, 1.00.

LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Factor Indicator (7-segment LED)	Status Indicator LED	Output	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle), then displays an arithmetic operation code for 1 second.	Green LED turns ON for 1 second and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	OFF	Green LED is ON.	Normal	–
3	Factor setting	Set value	Green LED is ON.	Normal	–
4	DAC error	Error code: 01	Red LED blinks at 0.25 second intervals.	Typically 0%, but may vary.	None
5	ADC compensated value error	Error code: 02	Red LED blinks at 1 second intervals.	0%	None
6	Arithmetic operation mode setting error	Error code: 04	Red LED blinks at 1 second intervals.	0%	Reconfig-uration
7	Input factor error	Error code: 08	Red LED blinks at 1 second intervals.	0%	Reconfig-uration
8	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0%, but may vary.	None

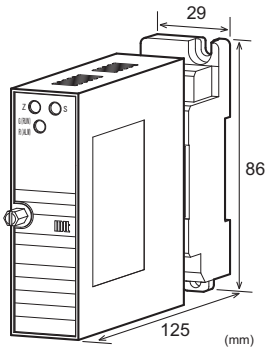
Notes:
No. 1: When the Factor Indicator is turned ON, a 3-digit number “888” with dots is displayed.
No. 4 -7: Only the last two digits are displayed in the event of an error.
No. 8: The red LED may fail to light up.

Product Specification Sheet Model: MS3766

Slim Plug-In Analog Memory with Isolated Single Output

DESCRIPTION

The MS3766 is a slim, plug-in analog memory that holds an output signal using external hold input and provides an isolated single output.



ORDERING CODE

MS3766 -□-□□-□□□

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

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

Hold Input

2: Contact input (Internal pull-up: 24V DC @ 10mA)
5: Contact input (Internal pull-up: 5V DC @ 2mA)
T: TTL input

Hold Mode of Operation

OP: Contact input; hold with an open circuit
CL: Contact input; hold with a closed circuit
VH: TTL input; hold at HI level
VL: TTL input; hold at LO level

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 on the left.
(e.g.) MS3766-A-66-TVH

Other Ordering Examples:
For an input code of "0": MS3766-A-06-TVH (Input: 2 to 10V)
For an output code of "Z": MS3766-A-6Z-TVH (Output:8 to 20mA)

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 is installed (standard).		
Power Consumption			
Power	100-240V AC 6.5VA max	24V DC 1.8W max	100-240V DC 7.2W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	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)	
Hold Input		
Contact Input Model	Dry contact; internal pull-up 5V DC @ 2mA or 24V DC @ 10mA	
TTL Input Model	Operated by external TTL input	

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)		750Ω 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%

Note: 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	400ms max. (0 to 90%) with a step input at 100%.
Memory Backup Function	Hold commands allow held values to be saved in the built-in flash memory.
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	Isolation between input, hold input, output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, hold input, output, power, and ground.
Dielectric Strength	Input / [Output, Hold input] / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5mA) Output / Hold input: 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

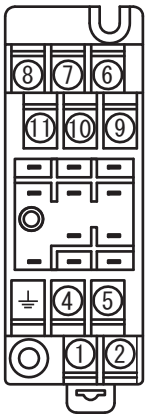
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

●MATERIAL

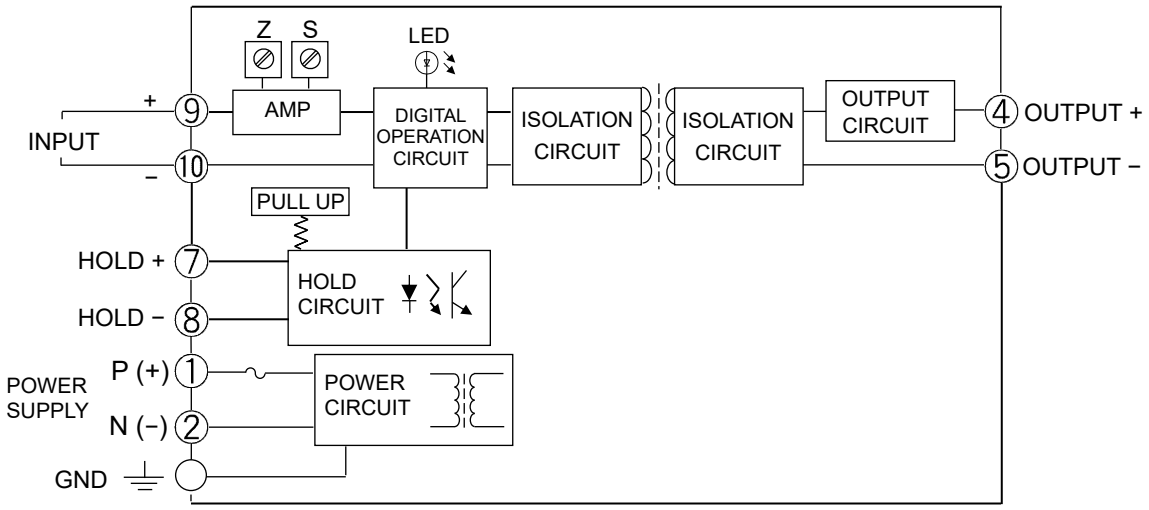
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

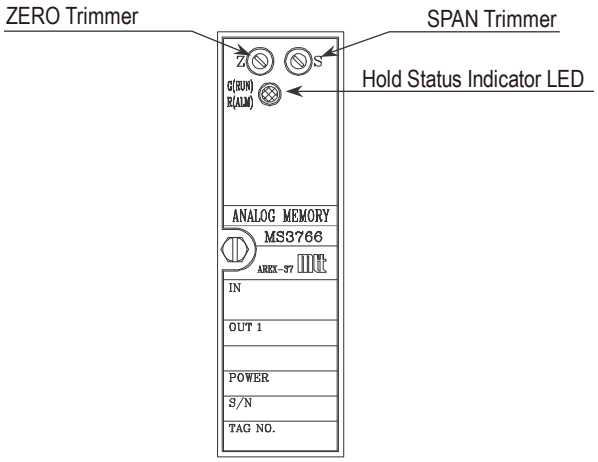


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	− OUTPUT	
⑥	N.C.	
⑦	+ HOLD	
⑧	− HOLD	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



FRONT VIEW



LED STATUS INDICATORS

●INDICATOR PATTERNS

No.	Event	Hold Status Indicator LED	Output	Recovery Operation
1	Power ON	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	Green LED is ON.	Normal	–
3	Hold operation	Green LED blinks at 1 second intervals.	Held value	–
4	Held value recording error	Red LED blinks at 1 second intervals.	Held value: 0% or less	Cancel the hold mode.
5	DAC error	Red LED blinks at 0.25 second intervals.	Typically 0% or less, but may vary.	None
6	System error	Red LED is ON; Green LED is not defined.	Typically 0% or less, but may vary.	None

Note:
No. 6: The red LED may fail to light up.

Slim Plug-In Analog Memory with Isolated Single Output

DESCRIPTION

The MS3766H is a slim, plug-in analog memory that holds an output signal using external hold input and provides an isolated single output.

ORDERING CODE

MS3766H - □ - □ □

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

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

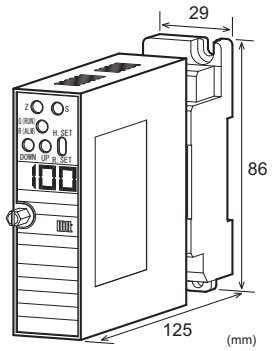
Options

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.) MS3766H-A-6A

Other Ordering Examples:
For an input code of "Z": MS3766H-A-ZA (Input: 8 to 20mA)
For an output code of "0": MS3766H-A-A0 (Output:2 to 5V)



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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
	6.5VA max	1.8W max	7.2W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	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%.

Control Input	
Dry contact; Internal pull-up 24V DC @ 20mA	
Hold Signal	When terminals #7 and #8 are closed: Normal operation (Output is proportional to input.) When terminals #7 and #8 are open: Hold operation (Holding an output value)
UP Signal	Increases output by closing terminals #11 and #8.
DOWN Signal	Decreases output by closing terminals #6 and #8.

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	1V span and up	2mA max.
	10mV	10kΩ min.
	100mV	100kΩ min.
Current Output (DC)		750Ω 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%

Note: 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%.

Output Range	0 to 100% Note: Any input under 0% will result in 0% output, while any input over 100% will result in 100% output.

●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	400ms max. (0 to 90%) with a step input at 100%.
Output Delay	Under normal operation, output delay can be set in steps of 1s within the range of 0 to 30s. When it is set to 0, the response time will be 400ms max.
Memory Backup Function	Hold commands allow held values to be saved in the built-in flash memory.
Held Value Control Function	In Hold operation mode, each push of the UP/DOWN Switch or input of control signal (UP/DOWN) to the terminal block changes the held value by 5% within the range of 0% to 100% output. Note: Pressing and holding the UP/DOWN Switch changes the value from 0% to 100% in 20 seconds.
Number of Iterations of Writing Held Value	1.5 million min. Note: This is supported from firmware ver. 1.1 onwards. (100,000 on firmware ver. 1.0 or earlier)
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	Isolation between input, [HOLD input, UP terminal, DOWN terminal], output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, [HOLD input, UP terminal, DOWN terminal], output, power, and ground.
Dielectric Strength	Input / [Output, HOLD input, UP terminal, DOWN terminal] / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 5mA) Output / [HOLD input, Up terminal, DOWN terminal]: 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

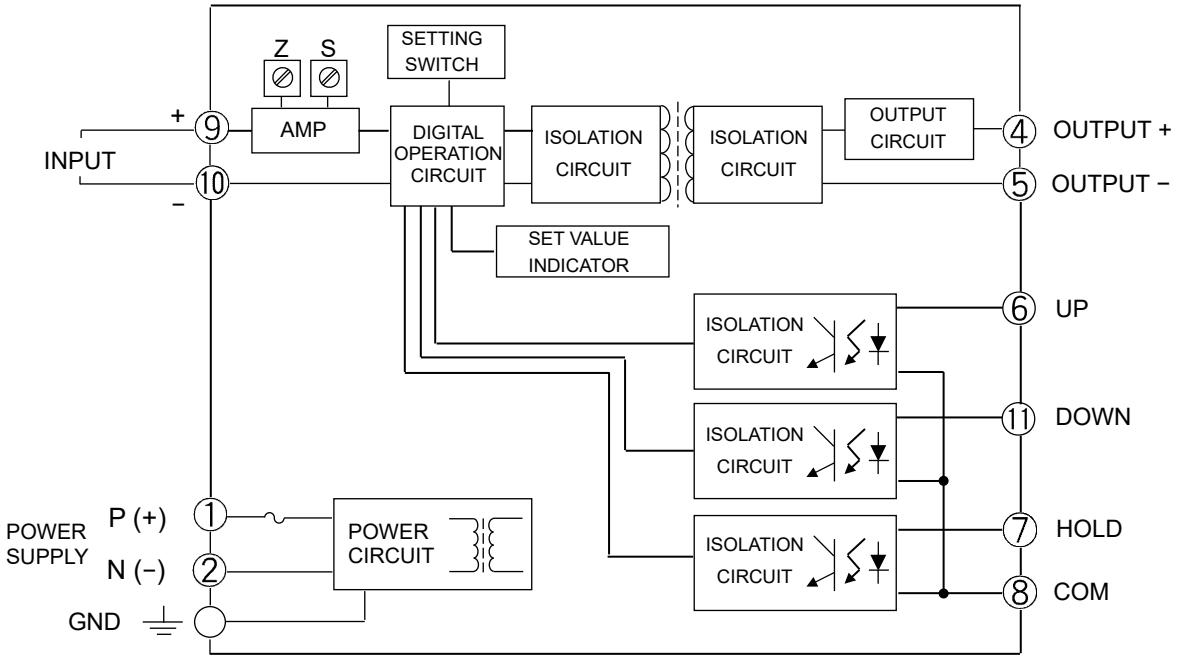
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

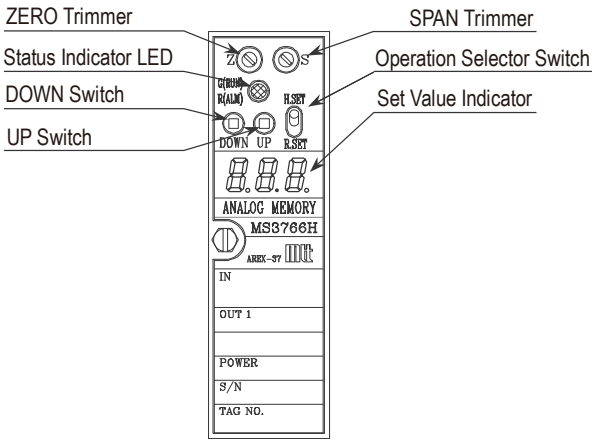
BLOCK DIAGRAM



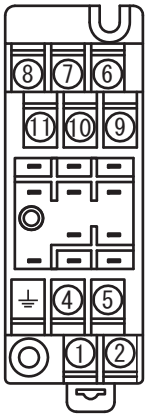
Notes:

1. Closing the terminals #11 and #8 is equivalent to pushing the UP Switch.
2. Closing the terminals #6 and #8 is equivalent to pushing the DOWN Switch.
3. Avoid continuing closing the terminals #11 and #8 and the terminals #6 and #8 simultaneously.

FRONT VIEW



TERMINAL ASSIGNMENTS



①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT	
⑤	− OUTPUT	
⑥	DOWN	
⑦	+ HOLD	
⑧	COM	
⑨	+ INPUT	
⑩	− INPUT	
⑪	UP	

SETTING

●OPERATION SELECTOR SWITCH

When the Operation Selector Switch is set to the “H. Set” position, the Hold operation mode is activated. Pushing the UP/DOWN Switch changes the held value in steps of 0.5% of span. Additionally, pressing and holding the UP/DOWN Switch changes the value from 0% to 100% in approx. 20 seconds.
When the Operation Selector Switch is set to the “R. Set” position, the Set Value Indicator shows the current output delay. This delay can be changed to a desired value by pressing the UP/DOWN Switch.

●UP/DOWN SWITCH

The UP and DOWN Switches are of a push button type. Pressing and holding the switch changes the value faster. Simultaneous pushing of the two switches keeps the value from being changed.

●INDICATOR

The Set Value Indicator lights green under normal operation and blinks green in the Hold operation mode. It goes off if no switch is operated for about one minute, but lights again when any of the switches is operated.

HOLD STATUS SETTING WITHOUT POWER

●HOLD STATUS SETTING WITHOUT POWER

Setting Hold status without power involves the following steps:

1. Turn on the power while pressing the DOWN Switch.
2. The Status Indicator LED will blink alternately red and green with the Set Value Indicator off. Then, release the DOWN Switch within five seconds.
3. Either 0 or 1 will appear only in the middle digit of the Set Value Indicator except for the following cases. In such cases, you should try again from the beginning.
   - The Status Indicator LED did not blink alternately red and green after the power is turned on.
   - The DOWN Switch was pressed and held for more than five seconds.
4. The middle-digit number represents the current Hold status setting. Use the UP or DOWN Switch to change the Hold status setting. The indicator values and corresponding Hold status settings are as shown below.

Indicator Value	Hold Status Setting
0	Hold mode: Hold a value before power goes off.
1	Release mode: Output 0%

5. After setting the Hold status, set the Operation Selector Switch to the opposite position to where it is located, and the Hold status setting will be saved in the unit.
   Note: Failure to do this will prevent the updated value from being saved.
   Immediately after the Operation Selector Switch is operated, the Set Value Indicator will be off for approx. 0.5 second.
6. Turn the power off and on again, and the unit will start its operation according to the updated Hold status setting.

DEFAULT SETTINGS

The factory default settings are as follows:

Operation Selector Switch: R. Set
Output Delay: 0
Hold Status without Power: Hold

If you specify values for these parameters when ordering, your product will be preconfigured to your specification and shipped. The following example shows how to specify parameter values.

(Example)
Operation Selector Switch: H. Set
Output Delay: 10 s
Hold Status without Power: Release

LED STATUS INDICATORS

●INDICATOR PATTERNS

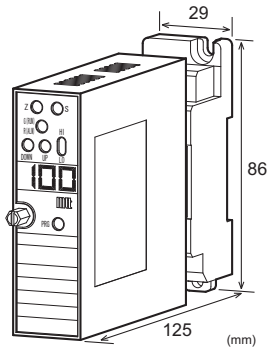
No.	Event	Set Value Indicator (7-segment LED)	Status Indicator LED	Output	Recovery Operation
1	Power ON or switch operation	Blinks 3 times (1 s ON - 0.5 s OFF cycle).	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	OFF	Green LED is ON.	Normal	–
3	Output delay setting	Set value	Green LED is ON.	Normal	–
4	Hold operation	OFF	Green LED blinks at 1 second intervals.	Held value	–
5	DAC error	Error code: 1	Red LED blinks at 1 second intervals.	Typically 0% or less, but may vary.	None
6	Error in internal compensated value	Error code: 2	Red LED blinks at 1 second intervals.	0% or less	None
7	Hold operation mode error	Error code: 4	Red LED blinks at 1 second intervals.	0% or less	Reconfigu-ration
8	Held value recording error	Error code: 6	Red LED blinks at 1 second intervals.	0% or less	Cancel the hold mode.
9	Output delay recording error	Error code: 8	Red LED blinks at 1 second intervals.	0% or less	Reconfigu-ration
10	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0% or less, but may vary.	None
11	Excess updates of held value	OFF	Red and green LEDs alternately tuns on at 0.5 second intervals.	Held value	None

Notes:
No. 1: When the Set Value Indicator is turned ON, a 3-digit number “888” with dots is displayed.
No. 10: The red LED may fail to light up.
No. 11: This feature is supported from firmware ver. 1.1 onwards and not supported on ver. 1.0 or earlier. It is activated when the internal memory has updated held values more than 1.5 million times in hold mode of operation. It is recommended that you replace the product before the total number of updates reaches 2 million.

Slim Plug-In Temperature/Pressure Compensator with Isolated Single Output

DESCRIPTION

The MS3767 is a slim, plug-in temperature/pressure compensator that compensates for variations in temperature, pressure, or differential pressure for accurate flow rate calculation and provides an isolated single output.



ORDERING CODE

MS3767 □ - □ - □ □

Model

Equation

- **A**: Temperature/Pressure compensation
- **B**: Temperature compensation
- **D**: Temperature/Pressure compensation (w/o square-root extraction of IN1)
- **E**: Temperature compensation (w/o square-root extraction of IN1)
- **F**: Temperature/Pressure compensation (w/o square-root extraction)
- **G**: Temperature compensation (w/o square-root extraction)

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

- **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

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 on the left, and also our Specification Order Form.

(e.g.) MS3767A-A-66 (Specification Order Form)

* For details, refer to page 4.

Other Ordering Examples:
For an input code of "Z": MS3767A-A-ZA (Input: 8 to 20mA)
For an output code of "0": MS3767A-A-A0 (Output:2 to 5V)

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
	5.5VA max	1.6W max	6.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA (std.)	250Ω
	2 to 10mA	250Ω
	1 to 5mA	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)

Input Range	0 to 120% Note: Any input signal under 0% is assumed to be 0%, while any input signal over 120% is assumed to be 120%.

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 to 20mA	750Ω 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.)	
Accuracy for Setting Dropout Range	±0.5% of span (set value) Better than -0.4% of span (hysteresis)	
Accuracy for Output Clamping Level	Better than ±0.5% of span.	

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%

Note: 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

Equations

Temperature/Pressure Compensation:

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot\frac{((P_F-P_Z)\cdot X_3+P_Z)+101.32}{P_B+101.32}}\cdot X_1$$

Temperature/Pressure Compensation (without square-root extraction of IN1):

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot\frac{((P_F-P_Z)\cdot X_3+P_Z)+101.32}{P_B+101.32}}\cdot X_1$$

Temperature/Pressure Compensation (without square-root extraction):

$$X_0=\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot\frac{((P_F-P_Z)\cdot X_3+P_Z)+101.32}{P_B+101.32}\cdot X_1$$

Temperature Compensation:

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}}\cdot X_1$$

Temperature Compensation (without square-root extraction of IN1):

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}}\cdot X_1$$

Temperature Compensation (without square-root extraction):

$$X_0=\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot X_1$$

X_0: Calculated output (%)
X_1: Differential pressure input (IN1) (%)
X_2: Temperature input (IN2) (%)
X_3: Pressure input (IN3) (%)
T_B: Reference temperature for compensation (°C)
T_Z: Temperature input 0% (°C)
T_F: Temperature input 100% (°C)
P_B: Reference pressure for compensation (kPa)
P_Z: Pressure input 0% (kPa)
P_F: Pressure input 100% (kPa)

Accuracy Rating	Input accuracy: ±0.1% of span Output accuracy: ±0.2% of span
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	1s max. (0 to 90%) with a step input at 100%.
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	3-way isolation between input, output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output, power, and ground.
Dielectric Strength	Input / Output / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 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

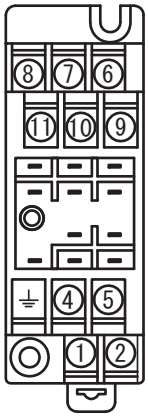
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 130g max. Socket: 80g max.

●MATERIAL

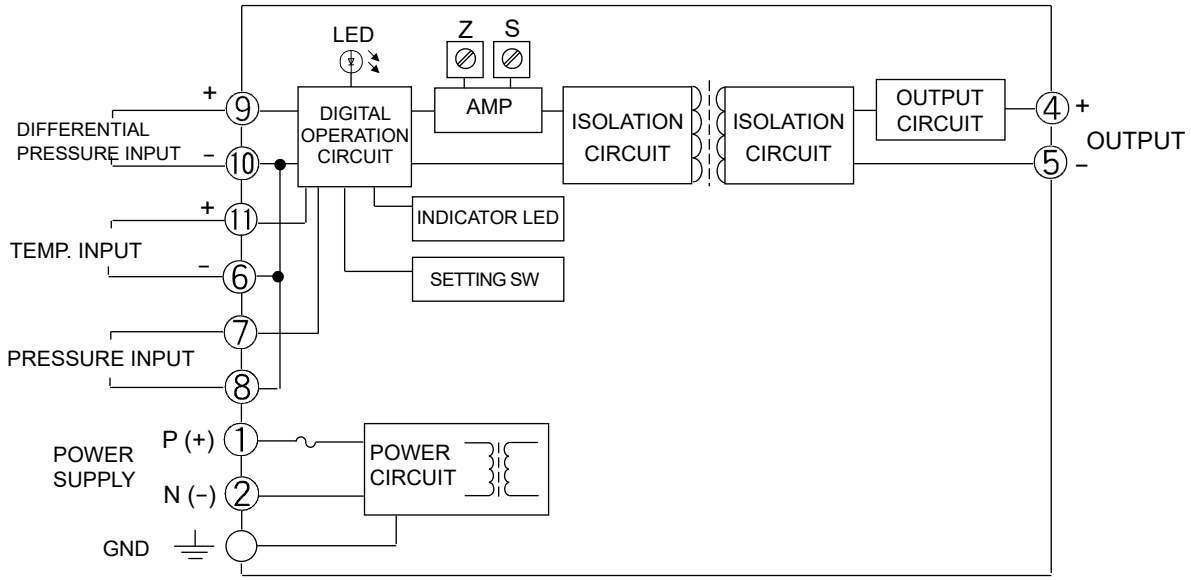
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

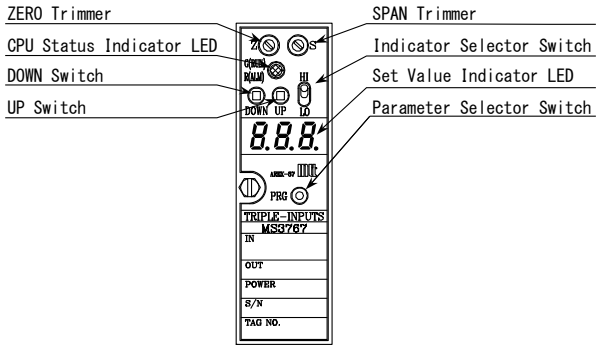


①	P (+) POWER
②	N (−)
⏚	GND
④	+ OUTPUT
⑤	− OUTPUT
⑥	− INPUT 2 (Temp. input)
⑦	+ INPUT 3 (Pressure input)
⑧	− INPUT 3 (Pressure input)
⑨	+ INPUT 1 (Differential pressure input)
⑩	− INPUT 1 (Differential pressure input)
⑪	+ INPUT 2 (Temp. input)

BLOCK DIAGRAM



FRONT VIEW



Reference temperature for compensation (Example: 100.00°C)
* Range available: -250.00 to 999.99°C; Default: 0.00°C
Reference pressure for compensation (Example: 101.32kPa)
* Range available: 0 to 9999.99kPa; Default: 0.00kPa
Input temperature range for compensation (Example: 0 to 250°C)
* Range available: -250.00 to 999.99°C, with a minimum span of 100.00°C; Default: 0 to 100.00°C
Input pressure range for compensation (Example: 0 to 1000.00kPa)
* Range available: 0 to 9999.99kPa, with a minimum span of 10.00kPa; Default: 0 to 101.32kPa
Dropout level (Example: 5%)
* Range available: 5 to 15%; Default: 10%
Note: Set values have a hysteresis of approx. -0.4%.
Output clamping level (Example: 2%)
* Range available: 0 to 10% (Below dropout setting); Default: 0%

ADDITIONAL ORDERING INFORMATION

Temperature/Pressure Compensation:

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot\frac{((P_F-P_Z)\cdot X_3+P_Z)+101.32}{P_B+101.32}}\cdot X_1$$

Temperature/Pressure Compensation (without square-root extraction of IN1):

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot\frac{((P_F-P_Z)\cdot X_3+P_Z)+101.32}{P_B+101.32}}$$

Temperature/Pressure Compensation (without square-root extraction):

$$X_0=\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot\frac{((P_F-P_Z)\cdot X_3+P_Z)+101.32}{P_B+101.32}\cdot X_1$$

X_0: Calculated output (%)
X_1: Differential pressure input (IN1) (%)
X_2: Temperature input (IN2) (%)
X_3: Pressure input (IN3) (%)
T_B: Reference temperature for compensation (°C)
T_Z: Temperature input 0% (°C)
T_F: Temperature input 100% (°C)
P_B: Reference pressure for compensation (kPa)
P_Z: Pressure input 0% (kPa)
P_F: Pressure input 100% (kPa)

	Item	User Specified	Unit	Example	Range Available	Default
1	Reference temperature for compensation		°C	100.00°C	-250.00 to 999.99°C	0.00°C
2	Reference pressure for compensation		kPa	101.32kPa	0 to 9999.99kPa	0.00kPa
3	Input temperature range for compensation		°C	0 to 250°C	-250.00 to 999.99°C	0 to 100.00°C
4	Input pressure range for compensation		kPa	0 to 1000.00kPa	0 to 9999.99kPa	0 to 101.32kPa
5	Dropout level		%	5%	5 to 15%	10%
6	Output clamping level		%	2%	0 to 10%	0%

Temperature Compensation:

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}}\cdot X_1$$

Temperature Compensation (without square-root extraction of IN1):

$$X_0=\sqrt{\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}}\cdot X_1$$

Temperature Compensation (without square-root extraction):

$$X_0=\frac{T_B+273.15}{((T_F-T_Z)\cdot X_2+T_Z)+273.15}\cdot X_1$$

X_0: Calculated output (%)
X_1: Differential pressure input (IN1) (%)
X_2: Temperature input (IN2) (%)
T_B: Reference temperature for compensation (°C)
T_Z: Temperature input 0% (°C)
T_F: Temperature input 100% (°C)

	Item	User Specified	Unit	Example	Range Available	Default
1	Reference temperature for compensation		°C	100.00°C	-250.00 to 999.99°C	0.00°C
2	Input temperature range for compensation		°C	0 to 250°C	-250.00 to 999.99°C	0 to 100.00°C
3	Dropout level		%	5%	5 to 15%	10%
4	Output clamping level		%	2%	0 to 10%	0%

LED STATUS INDICATORS

●INDICATOR PATTERNS

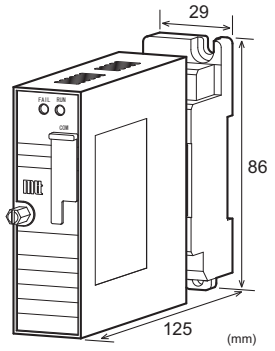
No.	Event	Set Value Indicator (7-segment LED)	CPU Status Indicator LED	Output	Recovery Operation
1	Power ON or start of constant setting	Blinks 3 times (1 s ON - 0.5 s OFF cycle), then displays an equation code for 1 second.	Green LED turns ON for 1 second, and then red LED turns ON for 0.5 second. This cycle is repeated 3 times.	Normal	–
2	Normal operation	OFF	Green LED is ON.	Normal	–
3	Dropout operation	OFF	Red and green LEDs alternately blink at 1 second intervals.	Clamp value	–
4	Constant setting	Constant	Red LED blinks at 1 second intervals when the constant is positive; Green LED blinks at 1 second intervals when it is negative.	Value before setting	End of setting
5	DAC error	Error code: 1	Red LED is ON.	Typically 0%, but may vary.	None
6	Internal parameter error	Error code: 2	Red LED is ON.	Typically 0%, but may vary.	None
7	Equation parameter error	Error code: 4	Red LED is ON.	Typically 0%, but may vary.	Reconfiguration
8	Temperature constant parameter error	Error code: 8	Red LED is ON.	Typically 0%, but may vary.	Reconfiguration
9	Pressure constant parameter error	Error code: 16	Red LED is ON.	Typically 0%, but may vary.	Reconfiguration
10	Dropout/clamping parameter error	Error code: 32	Red LED is ON.	Typically 0%, but may vary.	Reconfiguration
11	System error	Not defined.	Red LED is ON; Green LED is not defined.	Typically 0%, but may vary.	None

Notes:
No. 1: When the Set Value Indicator is tuned ON, a 3-digit number “888” with dots is displayed.
No. 5 - 10: If multiple errors occur, the sum of error code numbers is displayed.
No. 11: The red LED may fail to light up.

Slim Plug-In Programmable Linearizer with Isolated Single/Dual Output

DESCRIPTION

The MS3768 is a slim, plug-in programmable linearizer that accepts non-linear DC current or voltage input and provides linearized isolated single or dual output. Up to 21 breakpoints can be configured for segment approximation and those points as well as input and output ranges can be changed using configuration software running on a personal computer.



ORDERING CODE

MS3768 - □ - □ □ - □

Model

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

Input Range (Max. Measuring Range)
A: 2mA DC (±2mA DC)
B: 4mA DC (±4mA DC)
C: 8mA DC (±8mA DC)
D: 16mA DC (±16mA DC)
E: 32mA DC (±32mA DC)
F: 50mA DC (-32 to +50mA DC)
1: 4V DC (±4V DC) **2**: 8V DC (±8V DC)
3: 16V DC (±16V DC) **4**: 32V DC (±32V DC)
5: 60V DC (±60V DC)

Output

Single Output Model
A: 4 to 20mA DC (Output load 750Ω) *1
4: 0 to 10V DC *2 **5**: 0 to 5V DC *2
6: 1 to 5V DC *2

Dual Output Model
A1: 4 to 20mA DC / 1 to 5V DC *1
A2: 4 to 20mA DC / 4 to 20mA DC *1
4W: 0 to 10V DC / 0 to 10V DC*2
5W: 0 to 5V DC / 0 to 5V DC *2
6W: 1 to 5V DC / 1 to 5V DC *2

*1: Fixed output(s). The output range cannot be changed.
*2: The output range can be changed.

Breakpoint
XY: Breakpoints specified. *
N: No breakpoints specified.
* Up to 21 breakpoints can be specified within the range of -15 to 115% for both the X axis (input) and Y axis (output). Specify breakpoints to two decimal places. (Use a Specification Order Form.)
Note: Although the breakpoints can be specified within the range of -15 to 115%, the output range will be from -10 to 110%.

Options
No code: None
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 an input range* and breakpoints.
(e.g.) MS3768-A-36W-XY (Input range: 2 to 10V)
Attached Order Form (Breakpoints)

* Note that the input range should be specified within the maximum measuring range and span requirements indicated below.

Input Range Code	Code shown on Configuration Window	Maximum Measuring Range	Specifiable Span	
			Min.	Max.
A	Input Range 2mA	±2mA	1mA	4mA
B	Input Range 4mA	±4mA	2mA	8mA
C	Input Range 8mA	±8mA	4mA	16mA
D	Input Range 16mA	±16mA	8mA	32mA
E	Input Range 32mA	±32mA	16mA	50mA
F	Input Range 50mA	-32 to +50mA	32mA	50mA
1	Input Range 4V	±4V	2V	8V
2	Input Range 8V	±8V	4V	16V
3	Input Range 16V	±16V	8V	32V
4	Input Range 32V	±32V	16V	60V
5	Input Range 60V	±60V	32V	60V

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 is installed (standard).		
Power Consumption			
Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	1.2W max	4.8W max
Dual Output	5.0VA max	1.6W max	6.0W max

●INPUT SECTION

Input Resistance	
Voltage Input (DC)	1MΩ min. with or without power.
Current Input (DC)	10Ω
Allowable Input Voltage	
Voltage Input Model	120V DC, continuous.
Current Input Model	100mA DC, continuous.
Factory Default Settings	Input range code: 2 (8V) Measuring input range: 0 to 5V

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	2mA max.	
Current Output (DC)	4-20mA single output	750Ω max.
	4-20mA dual output	Output 1: 550Ω max. Output 2: 350Ω max.
Zero Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Span Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Output Range	-10 to 110%	
Factory Default Settings (Voltage Output Model)	Single output model: Output code: 6 (1 to 5V DC) Dual output model: Output code: 6W (1 to 5V DC / 1 to 5V DC)	

●SOFTWARE CONFIGURATION PARAMETERS

Configurable Parameters	- Linearizer ON/OFF - ADC range (Input range) - Measuring input range - Output range - Limitation function - Zero/Span adjustment (Approx. ±4% of span) - PAUSE status - Coefficient setting (up to 21 breakpoints) (All of the above are configurable by PC via RS-232-C.)

●PERFORMANCE

Accuracy Rating	
Segment gain < 1: Better than ± (Input accuracy + Output accuracy) %	
Segment gain ≥ 1: Better than ± (Input accuracy + Output accuracy) × Maximum segment gain %	
Input Accuracy	(2 × Range / Span) × 0.02%
Output Accuracy	0.04%
Maximum Segment Gain	$\lvert (Y_{n+1} - Y_n) / (X_{n+1} - X_n) \rvert$
Temperature Effect	100ppm/°C max.
Response Time	260ms max. (0 to 90%) with a step input at 100%.
Calculation Method	Segment approximation*

* The missing values between breakpoints are calculated by linear interpolation.

Note: If a breakpoint of -10% or 110% is not specified on the X axis, the output will be proportional to the adjacent segment.

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, RS-232C Port] / [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) Input / RS-232C Port: 50V DC for 1 minute (Cutoff current: 1.0mA)
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

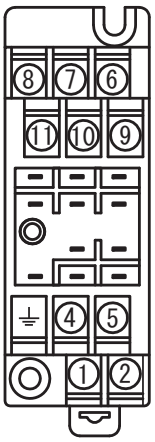
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

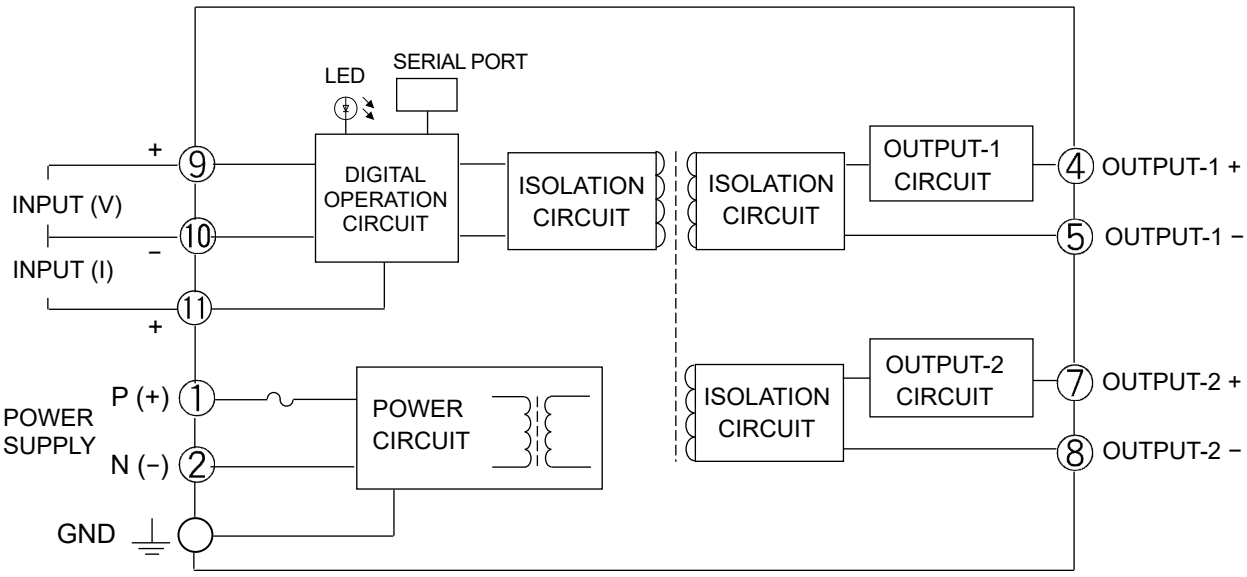
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

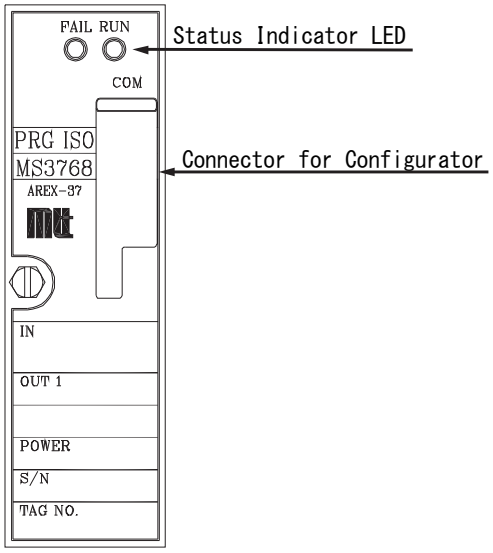


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT (V)	
⑩	− INPUT	
⑪	+ INPUT (I)	

BLOCK DIAGRAM



FRONT VIEW



CONNECTOR

●COM (CONNECTOR FOR CONFIGURATOR)

The COM port is used to connect the transmitter to a personal computer through serial communication (RS-232C).
An optional communication cable, MTT's MS-CBL01 (with a 9-pin D-subminiature female connector for PC connection) is required for the connection.
If the USB port is used, it is recommended that a USB conversion adapter REX-USB60F (made by RATOC Systems) be used with the MS-CBL01.

Connector Pin Assignments

Pin No.	Signal Name
1	DVdd
2	SHDN
3	N.C.
4	N.C.
5	TX
6	RX
7	ISOCOM
8	ISOCOM

STATUS INDICATOR LED

●INDICATOR PATTERNS

Module Status	Description	LED		Remarks
		Blue (RUN)	Red (FAIL)	
INIT		●	●	
RUN	Normal operation	●	-	
	Under scale	◎		Blink pattern: ●●○○●●○○
	Over scale	◎		Blink pattern: ●○●○●○●○
PAUSE	Common to all commands	◎	-	Blink pattern: ●●●●○○○○
ERROR	ADC error	-	◎	Blink pattern: ●●●●○○○○●○
	DA output error	-	◎	Blink pattern: ●●●●○○○○●○●○
	Power error	-	◎	Blink pattern: ●●●●○○○○
HALT	WDT	-	●	May fail to turn ON.
	Memory	-	●	May fail to turn ON.
	Power error	-	●	May fail to turn ON.

Notes:
1. OFF: - or ○, ON: ●, Blink: ◎
2. Each of the circle symbols (○, ●) shown in the Remarks column indicates a duration of 0.25 s.

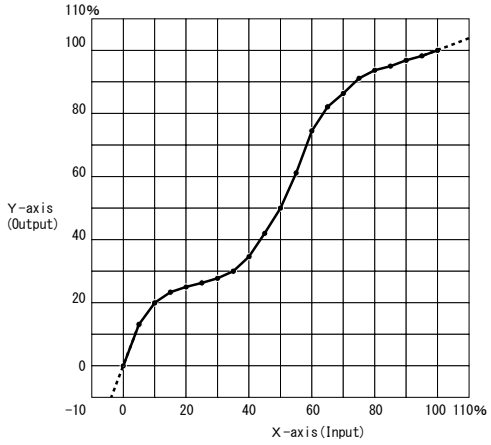
BREAKPOINT SPECIFICATIONS

Up to 21 breakpoints can be specified within the range of -15 to 115% for both the X axis (input) and Y axis (output). Specify breakpoints to two decimal places.

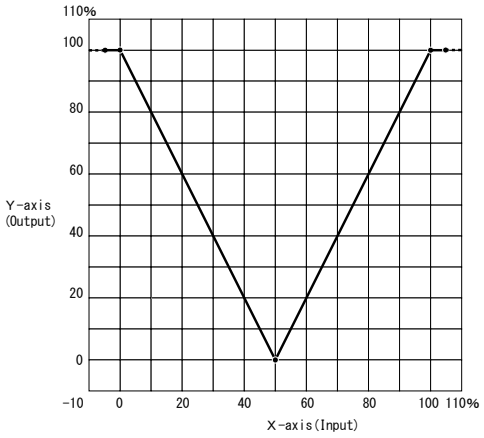
$(X_0.Y_0)$, $(X_1.Y_1)$, $(X_2.Y_2)$, …, $(X_n.Y_n)$, $(X_{n+1}.Y_{n+1})$, $(X_{n+2}.Y_{n+2})$, …,

where $X_n < X_{n+1}$

Note: Although the breakpoints can be specified within the range of -15 to 115%, the output range will be from -10 to 110%.



(Example 1)
21 breakpoints specified:
(0.0), (5.13), (10.20),
(15.24), (20.25), (25.26),
(30.28), (35.31), (40.35),
(45.42), (50.50), (55.61),
(60.75), (65.82), (70.87),
(75.91), (80.93), (85.95),
(90.98), (95.99), (100.100)



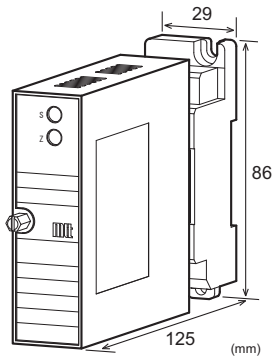
(Example 2)
V-shaped conversion with an upper limitation value
(-5.100), (0.100), (50.0),
(100.100), (105.100)

Product Specification Sheet Model: MS3769

Slim Plug-In Absolute Value Signal Conditioner with Isolated Single/Dual Output

DESCRIPTION

The MS3769 is a slim, plug-in absolute value signal conditioner that converts DC current or voltage signals with polarity into absolute value signals and provides isolated single or dual output.



ORDERING CODE

MS3769 - □ - □ □ □

Model

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

Input
D: ABS 0 to 20mA DC
Z: Other DC current signals
3: ABS 0 to 1V DC
4: ABS 0 to 10V DC
5: ABS 0 to 5V 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
0: Other DC voltage signals

Output 2
No code: None
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.) MS3769-A-DA6

Other Ordering Examples:
For an input code of "Z": MS3769-A-ZAA (Input: 0 to 10mA)
For an output code of "0": MS3769-A-D60 (Output: 2 to 5V)
For an option code of "X": MS3769-A-56/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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	4.0VA max	1.5W max	2.5W max
Dual Output	5.0VA max	2.0W max	3.0W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	0 to 20mA	250Ω

Allowable Input Voltage

Voltage Input Model	30V DC max., continuous. (Standard for a span up to 10V)
Current Input Model	40mA DC max., continuous. (0 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

Note: 0mA or 0V corresponds to 0%.
Input values at -100% and 100% have the same absolute value.

●OUTPUT SECTION

Maximum 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%

Note: 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

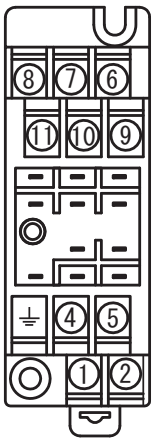
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

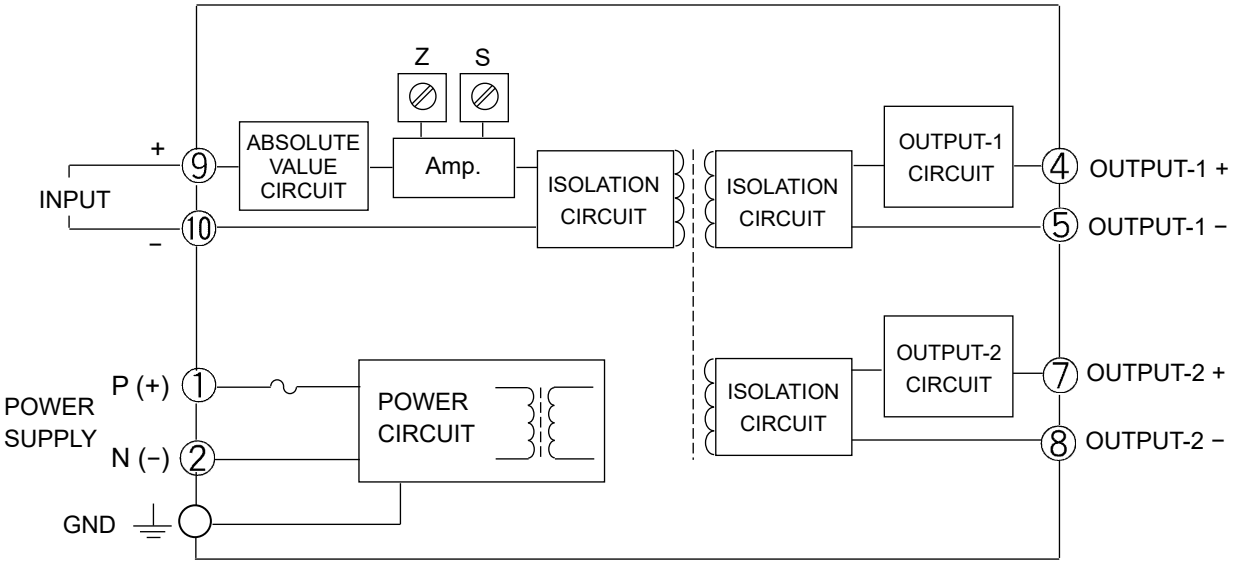
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



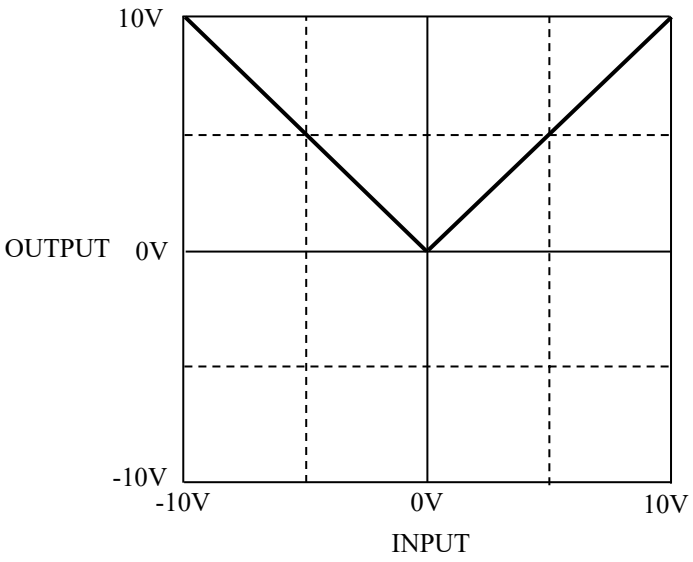
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



INPUT/OUTPUT CHARACTERISTICS

Input: ABS 0 to 10V
Output: 0 to 10V



Product Specification Sheet Model: MS3770

Slim Plug-In Split-Range Transmitter with Isolated Dual Output

DESCRIPTION

The MS3770 is a slim, plug-in split-range transmitter that amplifies DC current or voltage input signals, converts them into split range control signals, and provides isolated dual output. It is available in two ordering options: V-shaped or parallel characteristics.

ORDERING CODE

MS3770 - □ - □ □ □ □

Model

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

Output Characteristics
V: V-shaped characteristics
P: Parallel characteristics

Input
A: 4 to 20mA DC **4**: 0 to 10V DC **6**: 1 to 5V DC

Output 1
A: 4 to 20mA DC **4**: 0 to 10V DC **6**: 1 to 5V DC

Output 2
The codes are the same as for Output 1.

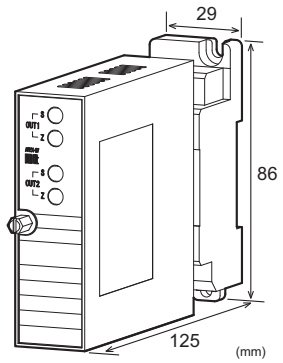
Note: The Outputs 1 and 2 must have the same code.

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.) MS3770-A-VAAA

Another Ordering Example:
For an option code of "X": MS3770-A-P444/X (0-90% response time: 300ms 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 is installed (standard).		
Power Consumption			
Power	100-240V AC 6.5VA max	24V DC 2.0W max	100-240V DC 2.5W max

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
Current Input (DC)	4 to 20mA	250Ω
Allowable Input Voltage		
Voltage Input Model	30V DC max., continuous.	
Current Input Model	40mA DC max., continuous.	

●OUTPUT SECTION

Maximum Output Load	
Voltage Output (DC)	2mA max.
Current Output (DC)	600Ω max.
Zero Adjustment	Output 1: Approx. ±1% of span with 100% input. Output 2: Approx. ±1% of span with 0% input. (Adjustable by the front-accessible trimmer.)
Span Adjustment	
Output 1	(Adjustable by the front-accessible trimmer.)
V-shaped:	Output can be set to 0% within the input range of 0 to 65%.
Parallel:	Output can be set to 0% within the input range of 0 to 65%.
Output 2	(Adjustable by the front-accessible trimmer.)
V-shaped:	Output can be set to 0% within the input range of 35 to 100%.
Parallel:	Output can be set to 100% within the input range of 35 to 100%.

●PERFORMANCE

Accuracy Rating	Better than ±0.3% of span (at 25°C±5°C; gain = 1 or -1).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	500ms max. (0 to 90%) with a step input at 100%.
CMRR	100dB min. (500V AC, 50/60Hz)
Isolation	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)
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

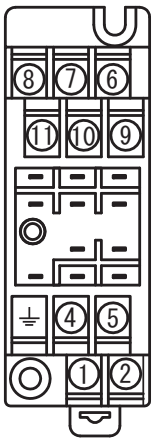
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

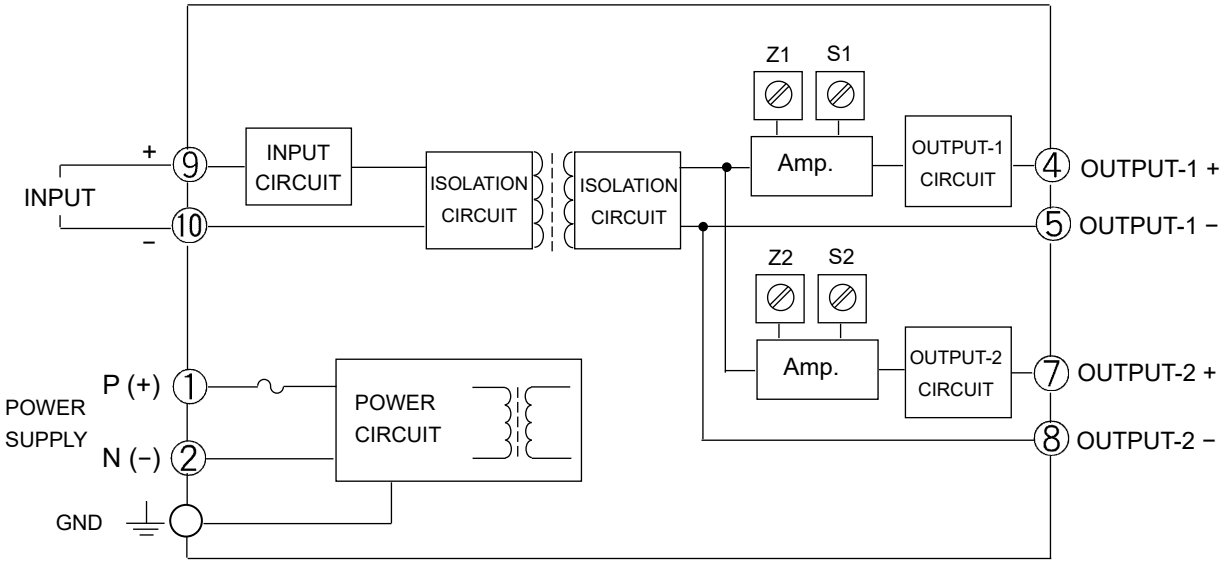
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



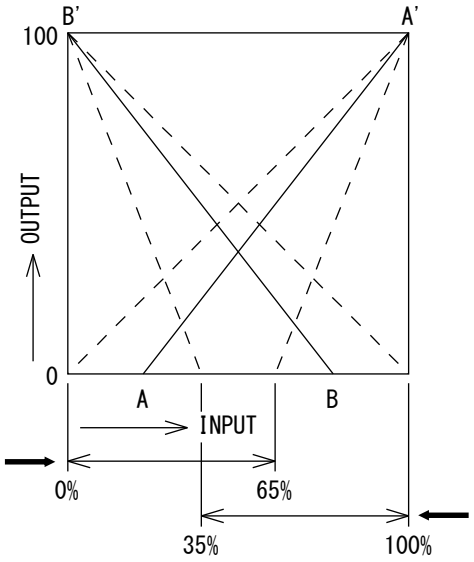
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



INPUT/OUTPUT CHARACTERISTICS

●V-SHAPED CHARACTERISTICS



Output 1:
Output can be set to 0% within the input range of 0 to 65%.

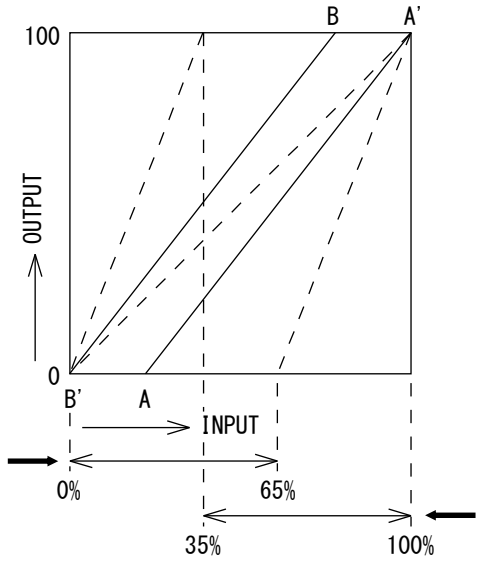
Output 2:
Output can be set to 0% within the input range of 35 to 100%.

The solid lines indicate examples of I/O characteristic settings, and the broken lines indicate the limits of the setting range.

Point A: Input set value corresponding to 0% of Output 1
Line A-A': I/O characteristics for Output 1
Point B: Input set value corresponding to 0% of Output 2
Line B-B': I/O characteristics for Output 2

Note: The output is from 0 to 100% with no fixed limitation values. If the input is open, the Output 1 gives 0% or smaller output and the Output 2 gives 100% or greater.

●PARALLEL CHARACTERISTICS



Output 1:
Output can be set to 0% within the input range of 0 to 65%.

Output 2:
Output can be set to 100% within the input range of 35 to 100%.

The solid lines indicate examples of I/O characteristic settings, and the broken lines indicate the limits of the setting range.

Point A: Input set value corresponding to 0% of Output 1
Line A-A': I/O characteristics for Output 1
Point B: Input set value corresponding to 100% of Output 2
Line B-B': I/O characteristics for Output 2

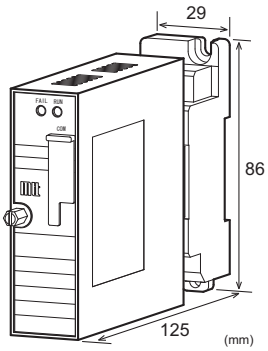
Note: The output is from 0 to 100% with no fixed limitation values. If the input is open, both the Output 1 and Output 2 give 0% or smaller output.

Product Specification Sheet Model: MS3771

Slim Plug-In Programmable Thermocouple Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3771 is a slim, plug-in programmable thermocouple temperature transmitter that converts input signals from a thermocouple into commonly used DC signals and provides isolated single or dual output. The input and/or output settings of the unit can be easily configured using configuration software running on a personal computer.



ORDERING CODE

MS3771 - □ - □ □

Model

Power Supply

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

Input (Measuring Temperature Range)

K: Type K thermocouple (-200 to 1200°C)
E: Type E thermocouple (-200 to 800°C)
J: Type J thermocouple (0 to 750°C)
T: Type T thermocouple (-200 to 350°C)
B: Type B thermocouple (600 to 1700°C)
R: Type R thermocouple (0 to 1600°C)
S: Type S thermocouple (0 to 1600°C)
N: Type N thermocouple (-200 to 1200°C)
W97: W97Re3-W75Re25 (ASTM E988) (0 to 2000°C)
W95: W95Re5-W74Re26 (ASTM E988) (0 to 2000°C)
* For any other special specifications, consult MTT.

Output

Single Output Model

A: 4 to 20mA DC *1
4: 0 to 10V DC *2
5: 0 to 5V DC *2
6: 1 to 5V DC *2

Dual Output Model

A1: 4 to 20mA DC / 1 to 5V DC *1
A2: 4 to 20mA DC / 4 to 20mA DC *1
4W: 0 to 10V DC / 0 to 10V DC *2
5W: 0 to 5V DC / 0 to 5V DC *2
6W: 1 to 5V DC / 1 to 5V DC *2

*1: Fixed output(s). The output range cannot be changed.
*2: The output range can be changed.

Options

No code: None (Upscale burnout protection will apply if no option is specified.)
/U: Upscale burnout protection
/D: Downscale burnout protection
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3771-A-K4W (0 to 500°C)

* Note that the temperature range should be specified in °C within the range listed below.

Input Code	Measuring Temperature Range	Code shown on Configuration Window
K	-200 to 1200°C	K
E	-200 to 800°C	E
J	0 to 750°C	J
T	-200 to 350°C	T
B	600 to 1700°C	B
R	0 to 1600°C	R
S	0 to 1600°C	S
N	-200 to 1200°C	N
W97	0 to 2000°C	W3Re/W25Re
W95	0 to 2000°C	W5Re/W26Re

Note: The measuring temperature range should be equivalent to an input span of 3mV or greater.

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	1.1W max	4.8W max
Dual Output	5.0VA max	1.5W max	6.0W max

●INPUT SECTION

Input Resistance	1MΩ min. (Without power: 1MΩ min. at rated input.)
Burnout Protection	Selectable from upscale, downscale and no burnout protection. (Detection current: Approx. 25nA)

Burnout Drive Time	20s max.
Allowable Input Voltage	25V DC, continuous.
Cold Junction Compensation	Cold junction compensation sensor, stuck to the input terminal of the supplied socket.
Cold Junction Compensation Error	±0.5°C max. (25°C±15°C)
Factory Default Settings	The factory default settings are as follows: Input code: K Measuring temperature range: 0 to 1200°C Burnout protection: Upscale

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	2mA max.	
Current Output (DC)	4-20mA single output	750Ω max.
	4-20mA dual output	Output 1: 550Ω max. Output 2: 350Ω max.
Zero Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Span Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Factory Default Settings	The factory default settings for voltage output models are as follows: Single output model: Output code: 6 (1 to 5V DC) Dual output model: Output code: 6W (1 to 5V DC / 1 to 5V DC)	

●SOFTWARE CONFIGURATION PARAMETERS

Configurable Parameters	- Thermocouple type - ADC range (Input range) - Measuring temperature range - Burnout protection - Output range - Zero/Span adjustment (Approx. ±4% of span) - PAUSE status (All of the above are configurable by PC via RS-232C.)

Note: Any ADC range setting should satisfy:
Electromotive force value* × 1.1 < ADC range
(Example)
If the thermocouple is type K and the temperature range is from 0 to 100°C:
41276μV × 1.1 = 45403μV (= Approx. 46mV)
Therefore, the ADC range selection should be set to "80mV".

* For the electromotive force of thermocouples (type K - type N), refer to the EMF Table of JIS C 1602.

●PERFORMANCE

Accuracy Rating	(Input accuracy + Output accuracy) * Refer to the table on page 3.
Temperature Effect	100ppm/°C max.
Response Time	260ms 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, RS-232C Port] / [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) Input / RS-232C Port: 50V DC for 1 minute (Cutoff current: 1.0mA)
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

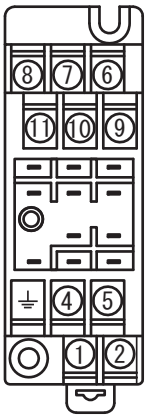
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



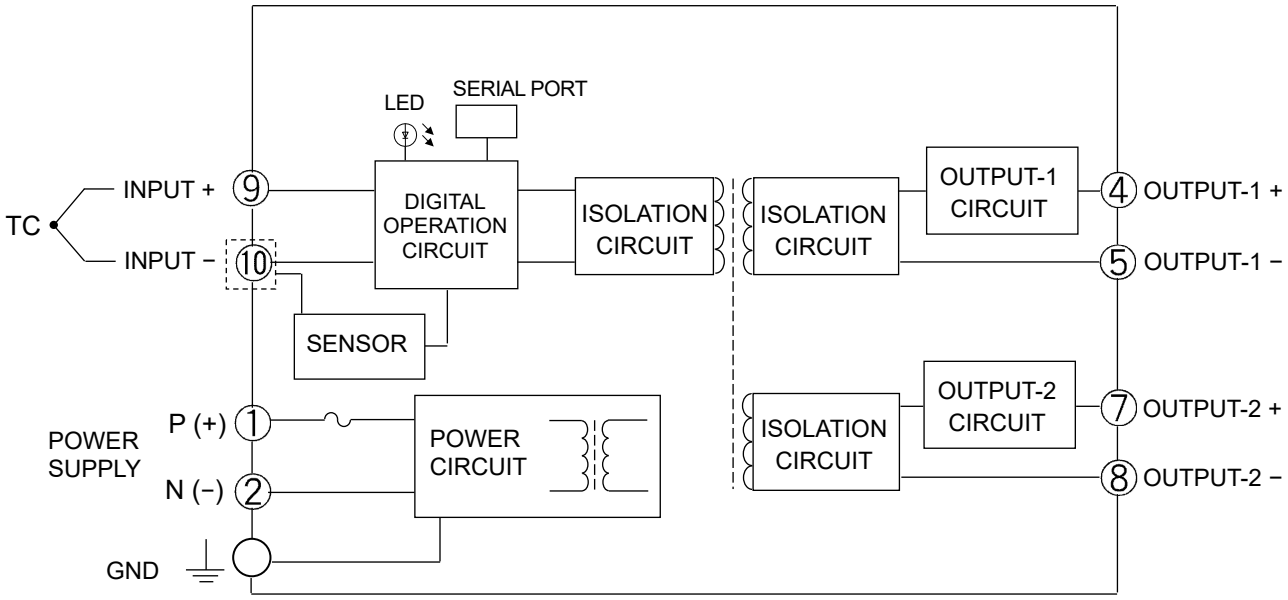
①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	TC +	
⑩	TC −	
⑪	N.C.	

ACCURACY RATING

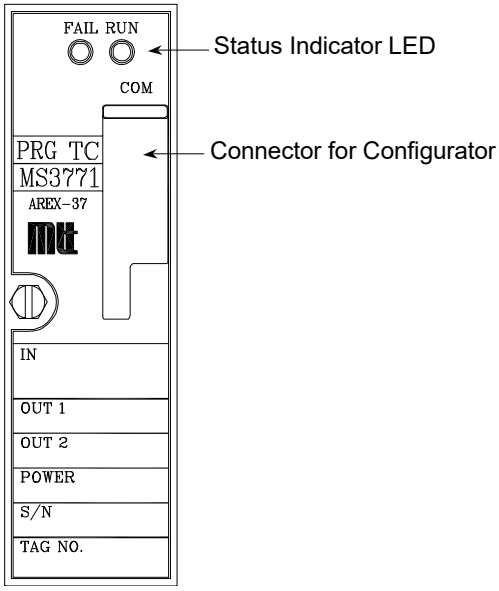
Thermocouple	Input Accuracy	Output Accuracy
K	1400°C (Fixed) / Input span (Measuring temperature range) × ±0.02%	±0.04% max.
E	1000°C (Fixed) / Input span (Measuring temperature range) × ±0.02%	±0.04% max.
J	750°C (Fixed) / Input span (Measuring temperature range) × ±0.02%	±0.04% max.
T	550°C (Fixed) / Input span (Measuring temperature range) × ±0.03%	±0.04% max.
R	1600°C (Fixed) / Input span (Measuring temperature range) × ±0.04%	±0.04% max.
S	1600°C (Fixed) / Input span (Measuring temperature range) × ±0.04%	±0.04% max.
B	1100°C (Fixed) / Input span (Measuring temperature range) × ±0.06%	±0.04% max.
N	1400°C (Fixed) / Input span (Measuring temperature range) × ±0.02%	±0.04% max.
W97Re3-W75Re25	2000°C (Fixed) / Input span (Measuring temperature range) × ±0.03%	±0.04% max.
W95Re5-W74Re26	2000°C (Fixed) / Input span (Measuring temperature range) × ±0.03%	±0.04% max.

Note: The measuring temperature range should be equivalent to an input span of 3mV or greater.

BLOCK DIAGRAM



FRONT VIEW



CONNECTOR

●COM (CONNECTOR FOR CONFIGURATOR)

The COM port is used to connect the transmitter to a personal computer through serial communication (RS-232C).
An optional communication cable, MTT's MS-CBL01 (with a 9-pin D-subminiature female connector for PC connection) is required for the connection.
If the USB port is used, it is recommended that a USB conversion adapter, REX-USB60F (made by RATOC Systems) be used with the MS-CBL01.

Connector Pin Assignments

Pin No.	Signal Name
1	DVdd
2	SHDN
3	N.C.
4	N.C.
5	TX
6	RX
7	ISOCOM
8	ISOCOM

LED STATUS INDICATORS

●INDICATOR PATTERNS

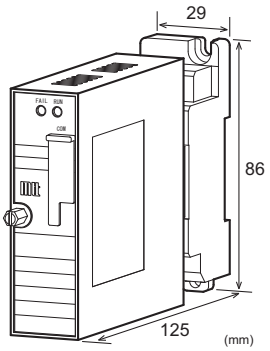
Module Status	Description	LED		Remarks
		Blue (RUN)	Red (FAIL)	
INIT		●	●	
RUN		●	-	
PAUSE	Common to all commands.	◎	-	Blink pattern: ●●●●○○○○
ERROR	ADC error	-	◎	Blink pattern: ●●●●○○○○●○
	DA output error	-	◎	Blink pattern: ●●●●○○○○●○●○
	Burnout	-	◎	Blink pattern: ●●●●○○○○●○●○●○
	Power error	-	◎	Blink pattern: ●●●●○○○○
HALT	WDT	-	●	May fail to turn ON.
	Memory	-	●	May fail to turn ON.
	Power error	-	●	May fail to turn ON.

Notes:
1. OFF: - or ○, ON: ●, Blink: ◎
2. Each of the circle symbols (○, ●) shown in the Remarks column indicates a duration of 0.25 s.

Slim Plug-In Programmable RTD Temperature Transmitter with Isolated Single/Dual Output

DESCRIPTION

The MS3772 is a slim, plug-in programmable RTD temperature transmitter that converts input signals from an RTD into commonly used DC signals and provides isolated single or dual output. The input and/or output settings of the unit can be easily configured using configuration software running on a personal computer.



ORDERING CODE

MS3772 - □ - □ □

Model

Power Supply

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

Input (Measuring Temperature Range)

P1: Pt 100Ω (ITS -90) --- (-200 to 660°C)
P2: Pt 100Ω (IPTS-68) --- (-200 to 660°C)
J: JPt 100Ω (JIS '89) --- (-200 to 510°C)
P5: Pt 50Ω (JIS '81) --- (-200 to 649°C)
* For any other special specifications, consult MTT.

Output

Single Output Model

A: 4 to 20mA DC (Output load 750Ω)*1
4: 0 to 10V DC *2
5: 0 to 5V DC *2
6: 1 to 5V DC *2

Dual Output Model

A1: 4 to 20mA DC / 1 to 5V DC *1
A2: 4 to 20mA DC / 4 to 20mA DC *1
4W: 0 to 10V DC / 0 to 10V DC *2
5W: 0 to 5V DC / 0 to 5V DC *2
6W: 1 to 5V DC / 1 to 5V DC *2
*1: Fixed output(s). The output range cannot be changed.
*2: The output range can be changed.

Options

No code: None
(Upscale burnout protection will apply if no option is specified.)
/U: Upscale burnout protection
/D: Downscale burnout protection
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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.) MS3772-D-P16W (0 to 150°C)

* Note that the temperature range should be specified in °C within the range listed below.

Input	Measuring Temperature Range	Code shown on Configuration Window
Pt 100Ω (ITS-90)	-200 to 660°C	Pt 100Ω (ITS-90)
Pt 100Ω (IPTS-68)	-200 to 660°C	Pt 100Ω (IPTS-68)
JPt 100Ω (JIS '89)	-200 to 510°C	JPt 100Ω
Pt 50Ω (JIS '81)	-200 to 649°C	Pt 50Ω

Note: Minimum input span should be 25°C.

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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	1.1W max	4.8W max
Dual Output	5.0VA max	1.5W max	6.0W max

●INPUT SECTION

Input Signal	3-wire RTD input (JIS standard, etc.)
Excitation Current	Approx. 1mA
Burnout Protection	Selectable from upscale, downscale (even if any of the three wires, A, B, and B' is opened), and no burnout protection.
Burnout Drive Time	10s max.
Allowable Lead Wire Resistance	200Ω max. per wire.

Factory Default Settings	The factory default settings are as follows: Input: Pt 100Ω (ITS-90) Measuring temperature range: 0 to 100°C Burnout protection: Upscale

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	2mA max.	
Current Output (DC)	4-20mA single output	750Ω max.
	4-20mA dual output	Output 1: 550Ω max. Output 2: 350Ω max.
Zero Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Span Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Factory Default Settings	The factory default settings for voltage output models are as follows: Single output model: Output code: 6 (1 to 5V DC) Dual output model: Output code: 6W (1 to 5V DC / 1 to 5V DC)	

●SOFTWARE CONFIGURATION PARAMETERS

Configurable Parameters	- RTD type - ADC range (Input range) - Measuring temperature range - Burnout protection - Output range - Zero/Span adjustment (Approx. ±4% of span) - PAUSE status (All of the above are configurable by PC via RS-232C.)

Note: Any ADC range setting should satisfy:
Excitation current (Approx. 1mA) × Resistance value* < ADC range
(Example)
For Pt 100Ω (0 to 100°C):
0.001(A) × 138.51(Ω) = 0.13851 (mV) × 1.1 = 0.152361 (= Approx. 153mV)
Therefore, the ADC range selection should be set to "160mV".

* For the resistance values of RTD's, refer to the JIS Resistance Value Table.

●PERFORMANCE

Accuracy Rating	(Input accuracy + Output accuracy)

Input Accuracy (inversely proportional to input span)

Pt 100Ω (ITS-90)	Factor 0.01%
Pt 100Ω (IPTS-68)	Factor 0.01%
JPt 100Ω (JIS '89)	Factor 0.01%
Pt 50Ω (JIS '81)	Factor 0.02%

Input Accuracy List

RTD	Input Accuracy
Pt 100Ω (JIS '97)	860°C / Input span (measuring temperature) × ±0.01%
Pt 100Ω (JIS '89)	860°C / Input span (measuring temperature) × ±0.01%
JPt 100Ω (JIS '89)	710°C / Input span (measuring temperature) × ±0.01%
Pt 50Ω (JIS '81)	849°C / Input span (measuring temperature) × ±0.02%

Note: Minimum input span should be 25°C.

Output Accuracy	±0.04% max.
Temperature Effect	100ppm/°C max.
Response Time	260ms 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, RS-232C Port] / [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) Input / RS-232C Port: 50V DC for 1 minute (Cutoff current: 1.0mA)
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

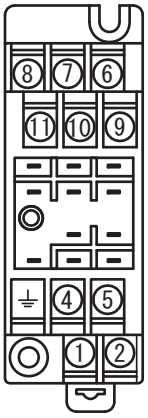
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

MATERIAL

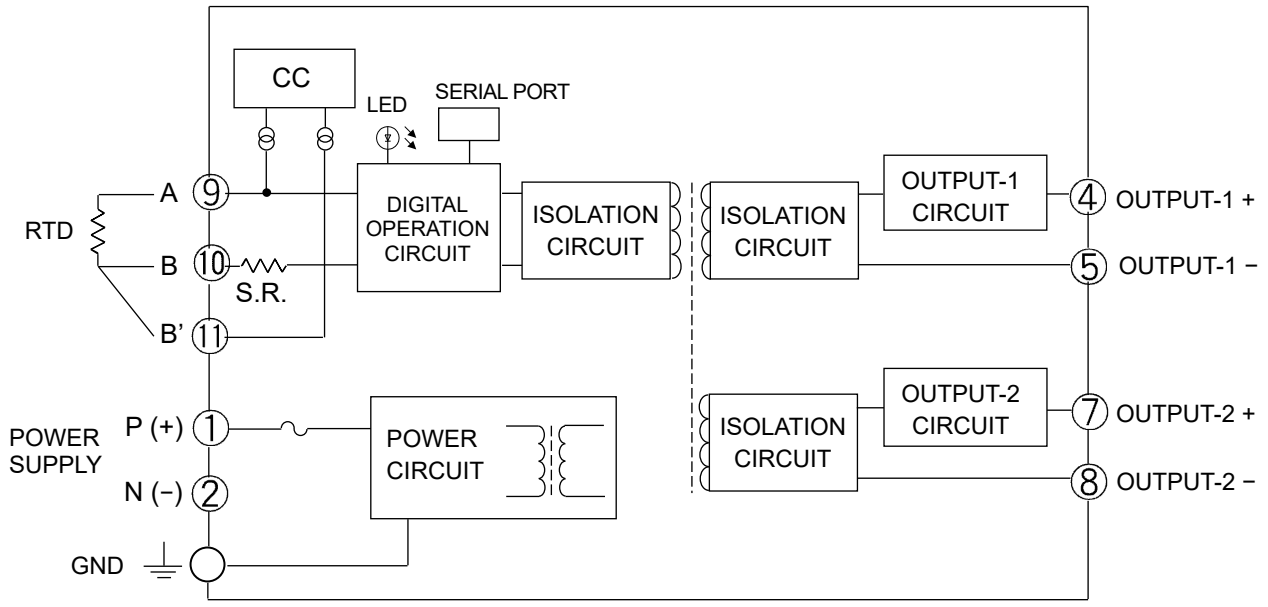
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

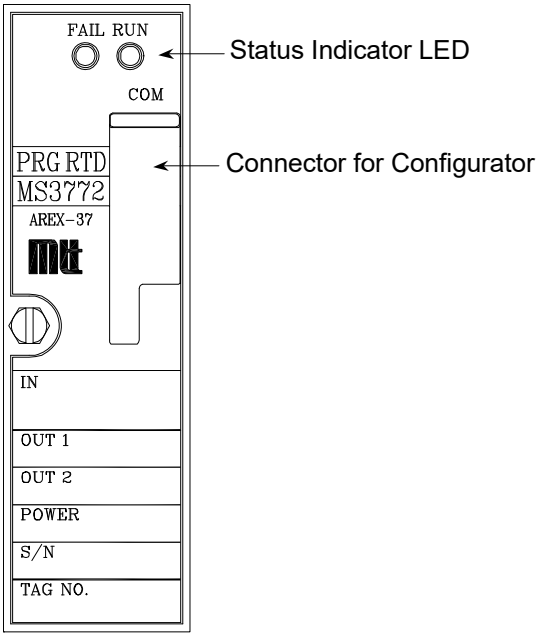


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	RTD A	
⑩	RTD B	
⑪	RTD B’	

BLOCK DIAGRAM



FRONT VIEW



CONNECTOR

●COM (CONNECTOR FOR CONFIGURATOR)

The COM port is used to connect the transmitter to a personal computer through serial communication (RS-232C).
An optional communication cable, MTT's MS-CBL01 (with a 9-pin D-subminiature female connector for PC connection) is required for the connection.
If the USB port is used, it is recommended that a USB conversion adapter, REX-USB60F (made by RATOC Systems) be used with the MS-CBL01.

Connector Pin Assignments

Pin No.	Signal Name
1	DVdd
2	SHDN
3	N.C.
4	N.C.
5	TX
6	RX
7	ISOCOM
8	ISOCOM

LED STATUS INDICATORS

●INDICATOR PATTERNS

Module Status	Description	LED		Remarks
		Blue (RUN)	Red (FAIL)	
INIT		●	●	
RUN		●	-	
PAUSE	Common to all commands	◎	-	Blink pattern: ●●●○○○○
ERROR	ADC fault	-	◎	Blink pattern: ●●●○○○○●○
	DA output error	-	◎	Blink pattern: ●●●○○○○●○●○
	Burnout	-	◎	Blink pattern: ●●●○○○○●○●○●○
	Power error	-	◎	Blink pattern: ●●●○○○○
HALT	WDT	-	●	May fail to turn ON.
	Memory	-	●	May fail to turn ON.
	Power error	-	●	May fail to turn ON.

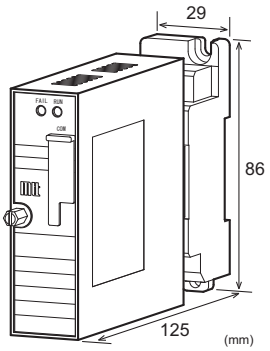
Notes:
1. OFF: - or ○, ON: ●, Blink: ◎
2. Each of the circle symbols (○, ●) shown in the Remarks column indicates a duration of 0.25s.

Product Specification Sheet Model: MS3773

Slim Plug-In Programmable Millivolt Isolator with Isolated Single/Dual Output

DESCRIPTION

The MS3773 is a slim, plug-in programmable millivolt isolator that converts DC mV signals from sensors into standard process signals and provides isolated single or dual output. The input and/or output settings of the unit can be easily configured using configuration software running on a personal computer.



ORDERING CODE

MS3773 - □ - □ □

Model

Power Supply

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

Input Range (Measuring Input Range)

1: 20mV (Refer to the table on the right.)
2: 40mV (Refer to the table on the right.)
3: 80mV (Refer to the table on the right.)
4: 160mV (Refer to the table on the right.)
5: 320mV (Refer to the table on the right.)
6: 640mV (Refer to the table on the right.)
7: 1V (Refer to the table on the right.)
8: 2V (Refer to the table on the right.)

* Linearization based on 6th-order polynomials can be optionally configured by configuration software.

Output

Single Output Model

A: 4 to 20mA DC *1
4: 0 to 10V DC *2
5: 0 to 5V DC *2
6: 1 to 5V DC *2

Dual Output Model

A1: 4 to 20mA DC / 1 to 5V DC *1
A2: 4 to 20mA DC / 4 to 20mA DC *1
4W: 0 to 10V DC / 0 to 10V DC *2
5W: 0 to 5V DC / 0 to 5V DC *2
6W: 1 to 5V DC / 1 to 5V DC *2

*1: Fixed output(s). The output range cannot be changed.
*2: The output range can be changed.

Options

No code: None
(Downscale burnout protection will apply if no option is specified.)
/U: Upscale burnout protection
/D: Downscale burnout protection
/L: Dual current output with high output load (OUT-1: 750Ω / OUT-2: 550Ω)
/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 input range*.
(e.g.) MS3773-A-5A1 (Measuring input range: 0 to 200mV)

* Note that the measuring input range should be specified within the requirements listed below.

Input Range Code	Code shown on Configuration Window	Maximum Measuring Range	Specifiable Span	
			Min.	Max.
1	Input Range 20mV	±9mV	5mV	18mV
2	Input Range 40mV	±18mV	19mV	36mV
3	Input Range 80mV	±36mV	37mV	72mV
4	Input Range 160mV	±72mV	73mV	144mV
5	Input Range 320mV	±144mV	145mV	288mV
6	Input Range 640mV	±288mV	289mV	576mV
7	Input Range 1.28V	±499mV	577mV	999mV
8	Input Range 2.56V	±1V	1V	2V

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 is installed (standard).		
Power Consumption			
Power	100-240V AC	24V DC	100-240V DC
Single Output	5.0VA max	1.1W max	4.8W max
Dual Output	5.0VA max	1.5W max	6.0W max

●INPUT SECTION

Input Resistance	1MΩ min. (Without power: 1MΩ at rated input)
Burnout Protection	Selectable from upscale, downscale and no burnout protection. (Detection current: Approx. 55nA)
Burnout Drive Time	80s max. 160s max. for 1V range 480s max. for 2V range
Allowable Input Voltage	25V DC, continuous.
Factory Default Settings	The factory default settings are as follows: Input range code: 5 Measuring input range: 0 to 100mV Burnout protection: Downscale

●OUTPUT SECTION

Allowable Output Load		
Voltage Output (DC)	2mA max.	
Current Output (DC)	4-20mA single output	750Ω max.
	4-20mA dual output	Output 1: 550Ω max. Output 2: 350Ω max.
Zero Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Span Adjustment	Approx. ±4% of span. (Adjustable by PC via RS-232C.)	
Factory Default Settings	The factory default settings for voltage output model are as follows: Single output model: Output code: 6 (1 to 5V DC) Dual output model: Output code: 6W (1 to 5V DC / 1 to 5V DC)	

●SOFTWARE CONFIGURATION PARAMETERS

Configurable Parameters	- Coefficient setting function (6-order polynomial) - ADC range (Input range) - Measuring input range - Burnout protection - Output range - PAUSE status - Zero/Span adjustment (Approx. ±4% of span) (All of the above are configurable by PC via RS-232C.)

●PERFORMANCE

Accuracy Rating (Input accuracy + Output accuracy)	
Input Accuracy	Range / Span × 0.02% (excluding a linearity error)
Output Accuracy	±0.04% max.
Temperature Effect	100ppm/°C max.
Response Time	260ms 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, RS-232C Port] / [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) Input / RS-232C Port: 50V DC for 1 minute (Cutoff current: 1.0mA)
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

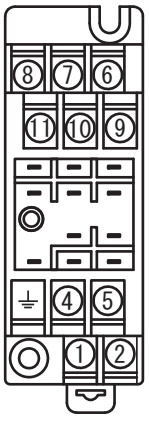
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

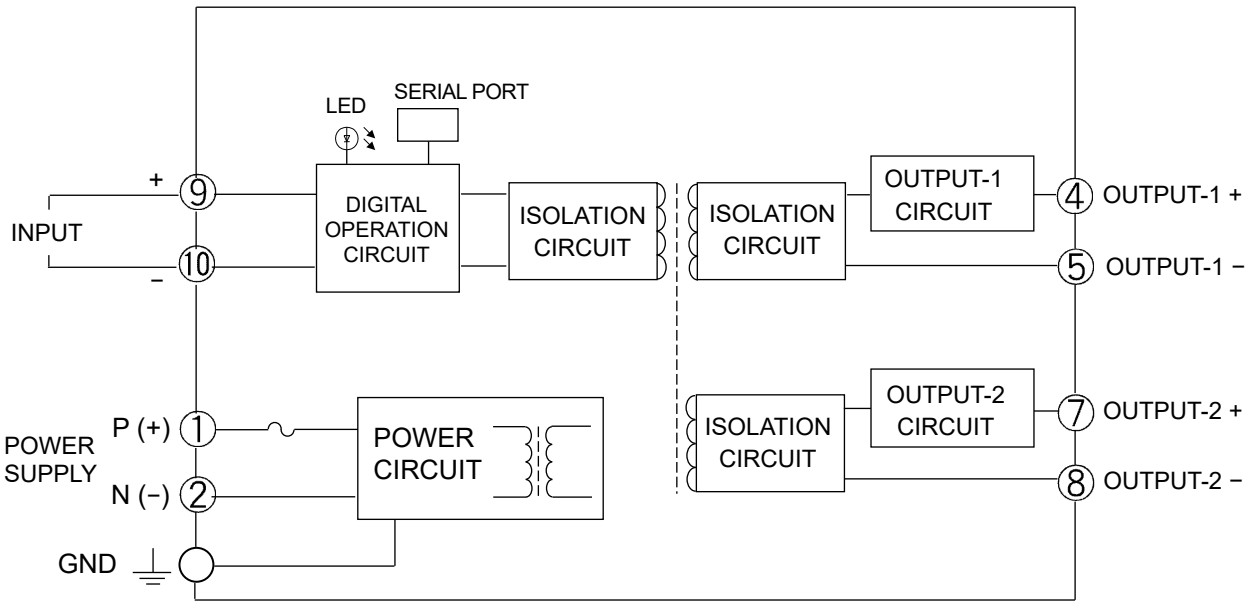
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

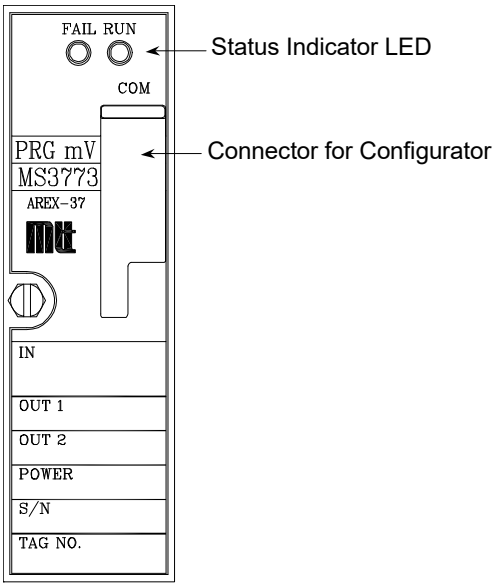


①	P (+)	POWER
②	N (−)	
⏚	GND	
④	+ OUTPUT 1	
⑤	− OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	− OUTPUT 2	
⑨	+ INPUT	
⑩	− INPUT	
⑪	N.C.	

BLOCK DIAGRAM



FRONT VIEW



CONNECTOR

●COM (CONNECTOR FOR CONFIGURATOR)

The COM port is used to connect the transmitter to a personal computer through serial communication (RS-232C).
An optional communication cable, MTT's MS-CBL01 (with a 9-pin D-subminiature female connector for PC connection) is required for the connection.
If the USB port is used, it is recommended that a USB conversion adapter, REX-USB60F (made by RATOC Systems) be used with the MS-CBL01.

Connector Pin Assignments

Pin No.	Signal Name
1	DVdd
2	SHDN
3	N.C.
4	N.C.
5	TX
6	RX
7	ISOCOM
8	ISOCOM

LED STATUS INDICATORS

●INDICATOR PATTERNS

Module Status	Description	LED		Remarks
		Blue (RUN)	Red (FAIL)	
INIT		●	●	
RUN		●	-	
PAUSE	Common to all commands	◎	-	Blink pattern: ●●●●○○○○
ERROR	ADC error	-	◎	Blink pattern: ●●●●○○○○●○
	DA output error	-	◎	Blink pattern: ●●●●○○○○●○●○
	Burnout	-	◎	Blink pattern: ●●●●○○○○●○●○●○
	Power error	-	◎	Blink pattern: ●●●●○○○○
HALT	WDT	-	●	May fail to turn ON.
	Memory	-	●	May fail to turn ON.
	Power error	-	●	May fail to turn ON.

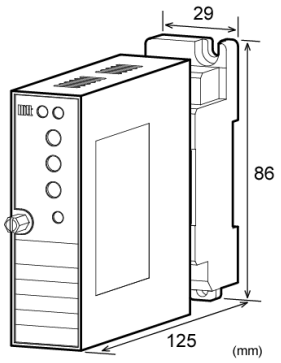
Notes:
1. OFF: - or ○, ON: ●, Blink: ◎
2. Each of the circle symbols (○, ●) shown in the Remarks column indicates a duration of 0.25s.

Product Specification Sheet Model: MS3781

Slim Plug-In Accumulator with Isolated Dual Output

DESCRIPTION

The MS3781 is a slim, plug-in accumulator that converts DC current or voltage signals into pulse train signals. The unit provides an isolated dual output.



ORDERING CODE

MS3781 - □ - □ □ 7

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

1: TTL level
2: Open collector

Output 2

Relay contacts (Form A contacts)

Options

No code: None
/S: Accumulation rate of 1 to 999 p/h
/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.) MS3781-A-627

Notes:
1. When you specify an accumulation rate, the product will be subjected to shipping inspection with the specified accumulation rate and then shipped with the accumulation rate set to it.
   If you specify an accumulation rate of less than 100 p/h, the product will be shipped with its accumulation rate set to your specified rate, but the shipping inspection will be performed with an accumulation rate of 100 p/h.
   If no accumulation rate is specified, the product will go through shipping inspection with the accumulation rate of 100 p/h and be shipped with the rate set to 0.
2. If not specified, the dropout level will be 5% of input span.
3. The accumulation rate and dropout level should be specified as shown in the example below.
   (Example) Accumulation rate: 200 p/h
   Dropout level: 1%

Continued:

Other Ordering Examples:
For an input code of "Z": MS3781-A-Z27 (Input: 8 to 20mA)
For an input code of "0": MS3781-A-017 (Input: 0 to 8V)

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 is installed (standard).
Power Indicator LED	Green LED is ON when the power supply is on.

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
	5.0VA max	1.5W max	2.5W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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	-10 to 10V
Input Span (DC)	100μA*1 to 200mA	200mV*2 to 20V
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 20V, 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

Maximum Output Load	TTL level: Maximum output 10mA at 3.5V
Maximum Rating	Open collector: 40V DC, 50mA
Pulse Width	125ms±20%
Output Indicator LED	Green LED is ON while pulses are output.
Relay Contacts	
Rated Load	125V AC 0.5A, 30V DC 2A (Resistive load) 125V AC 0.3A, 30V DC 1A (Inductive load)
Maximum Contact Voltage	250V AC, 220V DC
Maximum Contact Current	2A (Resistive load) 1A (Inductive load)
Electrical Life	500×10^3 cycles min. (Frequency at rated load: 1,800 cycles/h)
Mechanical Life	100×10^6 cycles min. (Frequency: 36,000 cycles/h)

●PERFORMANCE

Accuracy Rating	Better than ±0.5% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	Time to the first pulse with a 0 to 100% step input = (50ms + Pulse interval*) s max. * Pulse interval: 60 p/h setting: 60s 10 p/h setting: 360s
Accumulation Rate	Standard: 10 to 9990 p/h (in steps of 10 p/h) Option: 1 to 999 p/h (in steps of 1 p/h) (Adjustable by the front-accessible rotary switches.)
Dropout Level	0 to 20%* (Specify when ordering) * It can be specified in steps of 1%.
Accuracy	Better than ±0.5% of span.
Hysteresis	1% of span, max.
Response Time during Dropout	150ms max. (with a 1% set value, 100 to 0% step input) Note: If an input value is lower than or equal to the dropout level, the output will be 0 p/h and the red LED on the front panel will turn on. The accumulation is suspended during dropout and resumed upon return to normal operation.
Isolation	Isolation between input, output, and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output, power, and ground.
Dielectric Strength	Input / Output / [Power, Ground]: 2000V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 2000V AC for 1 minute (Cutoff current: 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

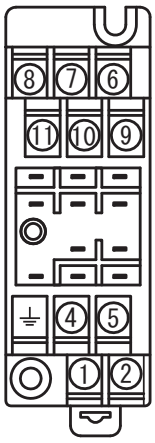
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

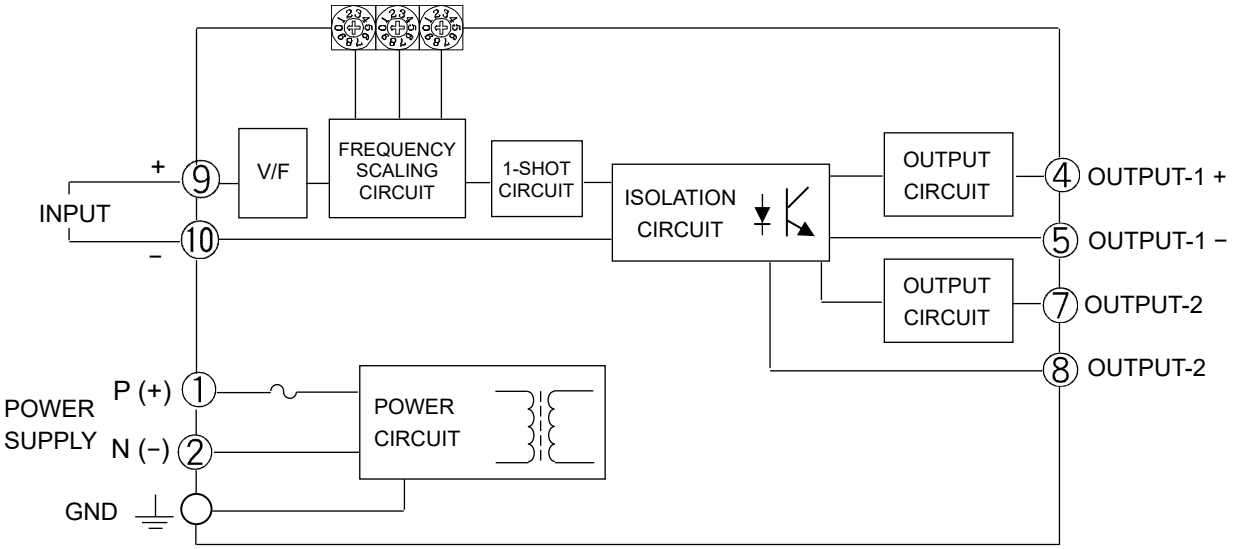
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM



Slim Plug-In PWM Converter with Isolated Single/Dual Output

DESCRIPTION

The MS3782 is a slim, plug-in PWM converter that converts DC current or voltage input signals into PWM signals and provides isolated single or dual output.

ORDERING CODE

MS3782 - □ - □ □ □

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

1: TTL level
2: Open collector
3: Voltage pulse 10V±10%
4: Voltage pulse 12V±10%

Output 2

No code: None
The codes are the same as for Output 1.

Note: When a combination of TTL level or voltage pulse is selected for Ouputs 1 amd 2, the voltage levels for both outputs should be the same.

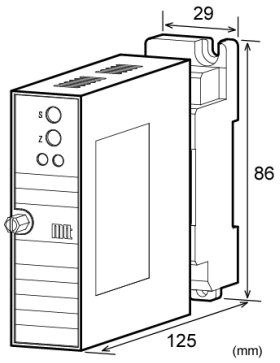
Options

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. Also specify an output frequency.
(e.g.) MS3782-A-44 (500Hz)

Other Ordering Examples:
For an input code of "Z": MS3782-A-Z44 (Input: 8 to 20mA / 500Hz)
For an input code of "0": MS3782-A-011 (Input: 0 to 8V/ 500Hz)



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 is installed (standard).

Power Consumption

Power	100-240V AC	24V DC	100-240V DC
Single Output	6.0VA max	1.8W max	2.0W max
Dual Output	6.5VA max	2.0W max	2.5W max

●INPUT SECTION

Input Resistance

Voltage Input (DC)	With or without power: 1MΩ min.	
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	-10 to 10V
Input Span (DC)	100μA*1 to 200mA	200mV*2 to 20V
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 20V, 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

Output Signal	PWM output ON duty 80 to 0% 0% input: Output duty 80% 100% input: Output duty 0% (Example 1) Voltage pulse 12V: ON = 12V±10% OFF = 0V±1V (Example 2) Open collector: ON = Low OFF = High Note: For any input less than 0%, the output duty will be 80%, and for any input more than 100%, it will be 0%.
Maximum Output Load	
TTL Level	Maximum output 10mA @ 3.5V
Voltage Pulse 10V	Maximum output 7mA @ ±10%
Voltage Pulse 12V	Single output model: Maximum output 15mA @ ±10% Dual output model: Maximum output 7mA @ ±10%
Maximum Rating	Open collector: 30V, 100mA
Output Frequency	Customer-specified value ±30% Specify between 10Hz and 1kHz.
Zero Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)
Span Adjustment	Approx. ±5% of span. (Adjustable by the front-accessible trimmer.)

●PERFORMANCE

Accuracy Rating	Better than ±1.5% of span (at 25°C±5°C).
Temperature Effect	Better than ±0.2% of span per 10°C change in ambient.
Response Time	1s max. (0 to 90%) with a step input at 100%.
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

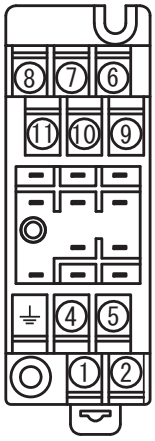
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

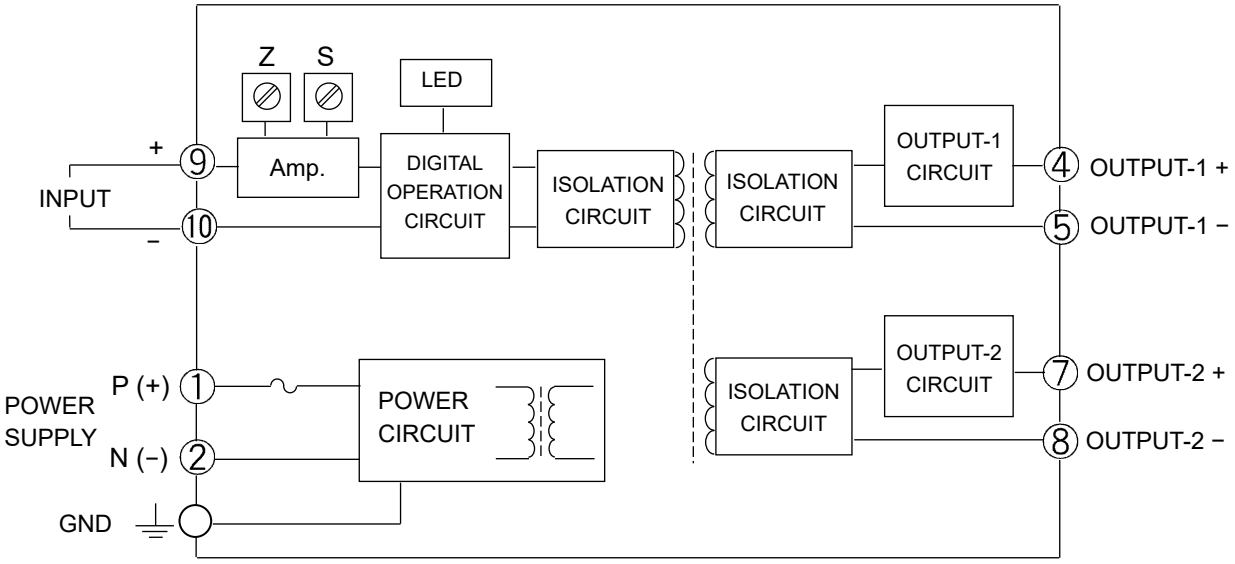
Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS



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

BLOCK DIAGRAM

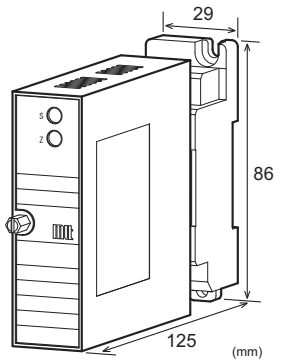


Product Specification Sheet **Model: MS3786** **MS3700**

Slim Plug-In Direct Current Signal Conditioner (Isolator) with Isolated Single Output (High Current Output Model)

DESCRIPTION

The MS3786 is a slim, plug-in DC signal transmitter that converts DC current or voltage signals into high DC current signals and provides an isolated single output.



ORDERING CODE

MS3786 -D- □ □

Model

Power Supply
D: 24V DC

Input

A: 4 to 20mA DC	**3**: 0 to 1V DC
B: 2 to 10mA DC	**4**: 0 to 10V DC
C: 1 to 5mA DC	**5**: 0 to 5V DC
D: 0 to 20mA DC	**6**: 1 to 5V DC
E: 4 to 20mA DC*1	**4W**: ±10V DC
H: 10 to 50mA DC	**5W**: ±5V DC
Z: Other DC current signals	**0**: Other DC voltage signals

* 1: Shunt resistor 50Ω

Output
Z (Output Specification)

Options
No code: None
/K: Fast response (10 to 90% response time: 10ms max.)
(Applicable only for positive output ranges.)
/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. Also specify an output range.
(e.g.) MS3786-D-AZ (20 to 160mA)

Other Ordering Examples:
For an input code of "Z": MS3786-D-ZZ (Input: 8 to 20mA / Output: 0 to 320mA)
For an option code of "X": MS3786-D-AZ/X (Output: 0 to 340mA)

SPECIFICATIONS

●POWER SECTION

Power Requirement	24V DC: 24V DC±10%
Power Sensitivity	Better than ±0.1% of span.
Power Line Fuse	1.6A fuse is installed (standard).
Power Consumption	6.5W max.

●INPUT SECTION

Input Resistance		
Voltage Input (DC)	With or without power: 1MΩ min.	
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
	Without power:	1MΩ min.
Allowable Input Signal		
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)	
Burnout Protection	Depends on input/output specifications. Refer to the "OPEN CIRCUIT BEHAVIOR" section on page 3.	
Open Circuit Detection (Current input only)	If the output is opened, the input circuit will be opened. Additionally, if the voltage between output terminals exceeds 11V, the open circuit detection function will be activated and the input circuit will be opened.	
Self-Diagnosis (Current input only)	If the supply voltage for the input/output circuit drops, the input circuit will be opened.	

Ranges Available	Current Signal	Voltage Signal
Input Range (DC)	-50 to 50mA	-10 to 10V
Input Span (DC)	100μA[*1] to 100mA	200mV[*2] to 20V
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 100mA and (*2)400mV to 20V, 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

Maximum Output Load

Resistance value by which the voltage between the output terminals is 10V or smaller:

R_L [Ω] = 10 [V] / Maximum Output Current [A]

200mA (100% output): 50Ω max.
10V/200mA = 50Ω

300mA (100% output): 33Ω max.
10V/300mA = 33.333Ω

320mA (100% output): 31Ω max.
10V/320mA = 31.25Ω

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

Ranges Available

Output Range (DC) -320 to 320mA

Note: Any output range including negative output signals must have input and output biases of -50%.
(Ex. 1) Input: -20 to 20mA / Output: -160 to 160mA
(Ex. 2) Input: -10 to 10V / Output: -320 to 320mA

Output Span (DC) 20 to 640mA

Output Bias -50 to 50%

Output Spec. Ex.1: For 100 to 300mA output, the output span is 200mA and the bias +50%.

Output Spec. Ex. 2: For -200 to 200mA output, the output span is 400mA and the bias -50%.

●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	160ms max. (0 to 90%) with a step input at 100%.
Isolation	Isolation between [input, output, open circuit detection, self-diagnosis], and power.
Insulation Resistance	100MΩ min. (@ 500V DC) between [input, output, open circuit detection, self-diagnosis], power, and ground.
Dielectric Strength	[Input, Output, Open Circuit Detection, Self-diagnosis] / [Power, Ground]: 500V AC for 1 minute (Cutoff current: 0.5mA) Power / Ground: 500V AC for 1 minute (Cutoff current: 5mA)
Operating Environment	Ambient temperature: -5 to 55°C Humidity: 5 to 90% RH (non-condensing)
Storage Temperature	-10 to 60°C

●FUNCTIONS

Open Circuit Detection	Photo MOS relay output (Maximum rating: 35V/10mA) If the output is opened, the relay will be opened. The open circuit detection function is also activated if the voltage between the output terminals exceeds 11V. When the output current is 0mA±0.01mA, the open circuit detection function is disabled.
Self-diagnosis	Photo MOS relay output (Maximum rating: 35V/10mA) If the supply voltage for the input/output circuit drops, the relay will be opened.

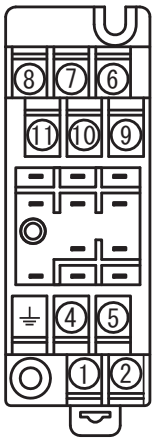
●PHYSICAL

Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125 mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIAL

Housing	ABS resin (UL 94V-0)
Terminal Block	PBT resin (UL 94V-0)
Terminal Block Cover	PC resin (UL 94V-2)
DIN Rail Stopper	PP resin (UL 94HB)
Screw Terminal	Nickel-plated steel
Contacts Material and Finish	Brass with 0.2μm gold plating
Printed Circuit Board	Glass fabric, epoxy resin (FR-4: UL 94V-0)

TERMINAL ASSIGNMENTS

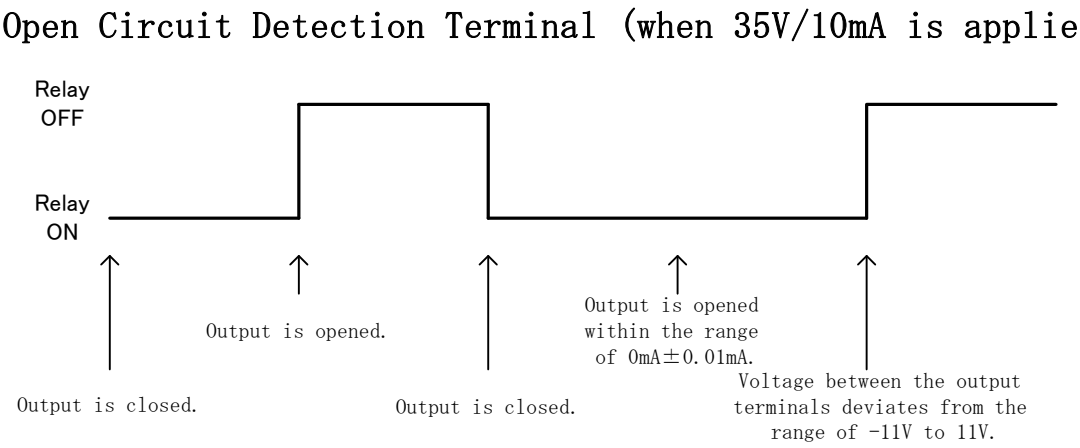


①	+ POWER
②	− 24V DC
⏚	GND
④	+ OUTPUT
⑤	− OUTPUT
⑥	DET GND
⑦	CHECK OPN. C
⑧	CHECK GND
⑨	+ INPUT
⑩	− INPUT
⑪	DET OPN. C

OPEN CIRCUIT BEHAVIOR

Input Specification	Output Specification	Output
2 to 10mA, 4 to 20mA, 1 to 5V	0 to 160mA, 0 to 320mA	Approx. -12%
	32 to 160mA, 64 to 320mA	Approx. -25%
0 to 20mA, 0 to 5V, 0 to 10V	0 to 160mA, 0 to 320mA	Approx. 0%
	32 to 160mA, 64 to 320mA	Approx. 0%
±20mA, ±5V, ±10V	0 to 160mA, 0 to 320mA	Approx. 50%
	32 to 160mA, 64 to 320mA	Approx. 50%
	±160mA, ±320mA	Approx. 0%

OPEN CIRCUIT DETECTION CHARACTERISTICS



BLOCK DIAGRAM