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

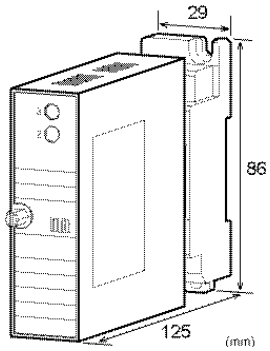
Input
- **O**: Dry contact or open collector (Pull-up: Approx. 13V, 3.3kΩ)
- **A**: AC voltage pulse (Threshold voltage for input full scale up to20kHz: Approx. 0.06Vp-p) (Threshold voltage for input full scale exceeding 20kHz: Approx. 1.50Vp-p)
- **D**: DC voltage pulse (Threshold voltage: Approx. 2V)
- **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 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 signal

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)
- **/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 voltage pulse: 200Vp-p / S=2Vp-p)
* SH= Threshold level HI, SL=Threshold level LO, S=Threshold level
Note 1: For a specific 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. /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

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 ±0.3% 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	Isolation between input, output [Output 1, Output 2], power, and ground.
Insulation Resistance	100MΩ min. (@ 500V DC) between input, output [Output 1, Output 2], power, and ground.
Dielectric Strength	Input / Output [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

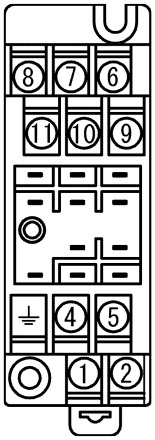
Installation	Wall/DIN rail mounting
Wiring	M3.5 screw terminal connection (with a power terminal block cover & drop-proof screws)
Screwing Torque	0.8 to 1.0 [Nm] * Recommended
External Dimensions	W29 × H86 × D125mm (including the mounting screw and socket)
Weight	Main unit: 120g max. Socket: 80g max.

●MATERIALS

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)
Conformal Coating	HumiSeal® 1A27NSLU (Polyurethane)

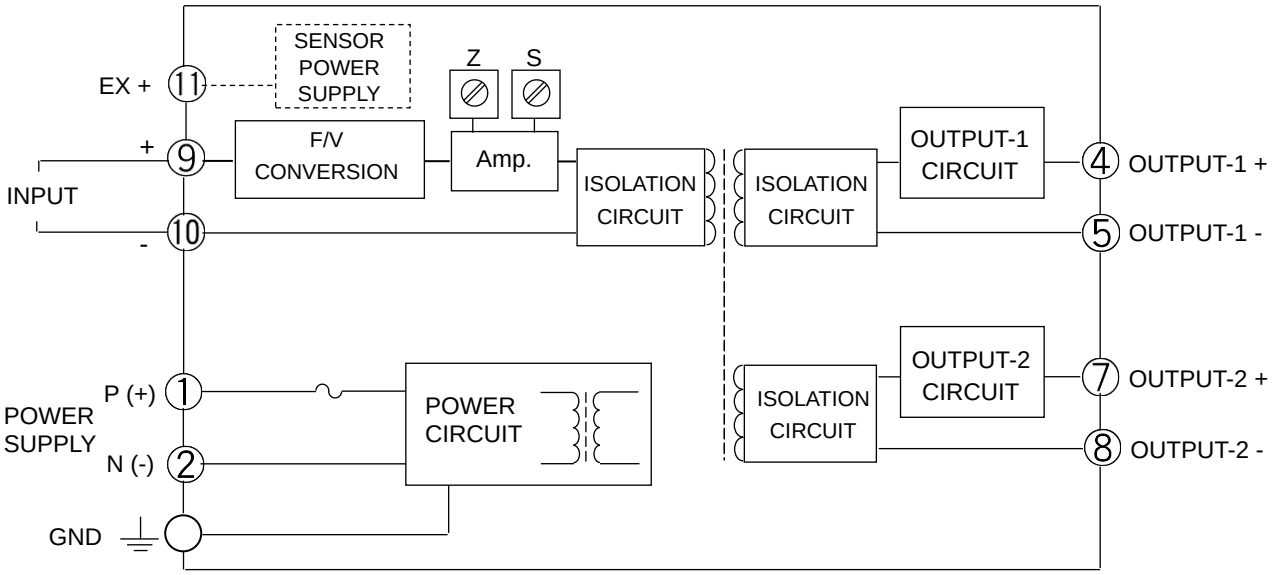
* HumiSeal® is a registered trademark of Chase Corporation.

TERMINAL ASSIGNMENT

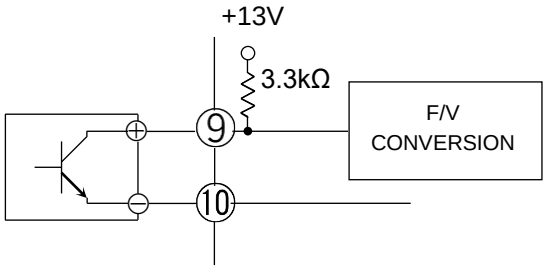


①	P (+)	POWER
②	N (-)	
⏚	GND	
④	+ OUTPUT 1	
⑤	- OUTPUT 1	
⑥	N.C.	
⑦	+ OUTPUT 2	
⑧	- OUTPUT 2	
⑨	+ INPUT	
⑩	- INPUT	
⑪	EX	

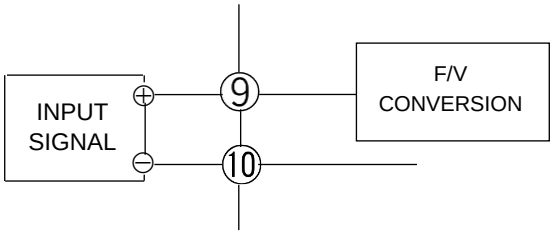
BLOCK DIAGRAM



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.