M·SYSTEM CO.,LTD.

THERMOCOUPLE & DC INPUT MODULE
(8 points; isolated)

MODEL **R1MS-GH3**

MODEL & SUFFIX CODE SELECTION

R1MS–GH3T–❏

MODEL ─────────
I/O TYPE ─────────
GH3 : Thermocouple or DC input, 8 points
Channel-to-channel isolation
FIELD TERMINAL TYPE ─────────
T : M3 screw terminals
POWER INPUT ─────────
M2: 100 – 240V AC
R : 24V DC

175 (6.89)
40 (1.57)
115 (4.53)
mm (inch)

Functions & Features
• 8-point thermocouple or DC inputs
• Complete channel-to-channel isolation
• Trigger input and alarm contact output
• Filtering protection against 50/60 Hz noise
• Modbus RS-485 and RS-232C interface
• Easy system expansion via Modbus RTU
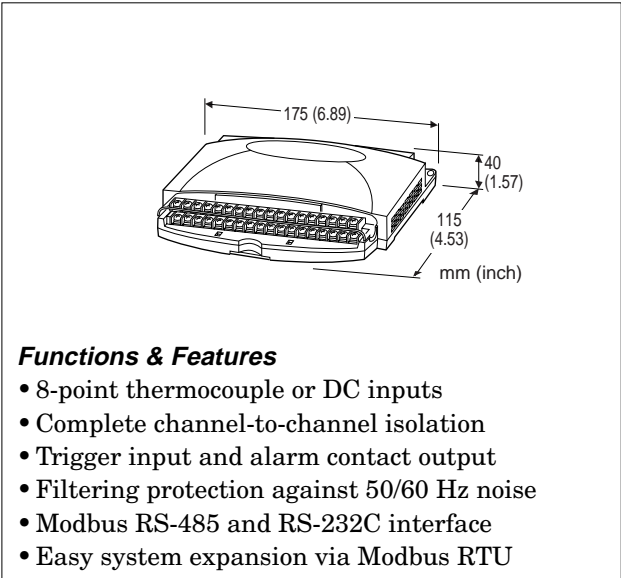
ORDERING INFORMATION

Specify code number. (e.g. R1MS-GH3T-M2)

RELATED PRODUCTS

• Resistor module (model: REM3-250)
• R1X configurator software (model: R1CON)
    Downloadable at M-System's web site:
    http://www.m-system.co.jp
• PC configurator cable (model: MCN-CON)

GENERAL SPECIFICATIONS

Connection
  Power input, transmission: Terminal block (wire size 0.14 – 1.5 mm² or AWG26 – 16 for both stranded and single-core cables)
  RS-232C: 9-pin D-sub connector (male)
  I/O: M3 screw terminals
    Separate sets of terminals for DC and TC are assigned to each channel, however, DO NOT connect both sets of terminals for the same channel at once for time-sharing measurement.
  PC Configurator: Miniature jack, RS-232C level
Isolation: Input 1 to input 2 to input 3 to input 4 to input 5 to input 6 to input 7 to input 8 to trigger input to alarm output to RS-232C or RS-485 or configurator jack to power to FG
Address setting: Rotary switch; 1 – F
Operating mode setting: Rotary switch; burnout type and line noise frequency setting
RUN indicator LED: Green light blinks in normal conditions.
Burnout: Upscale, downscale or no burnout selectable with the operating mode setting rotary switch (default: No). Set to 'No Burnout' when other devices are connected in parallel to the R1MS.
Line noise filtering: Specifying line frequency to 50 Hz or 60 Hz in order to increase normal mode noise rejection ratio. (default: 50/60 Hz for use with both frequencies)

COMMUNICATION SPECIFICATIONS

Baud rate: 38.4 kbps
Communication: Half-duplex, asynchronous, no procedure
Protocol: Modbus RTU
Refer to Modbus Protocol Reference Guide (EM-5650) for supported functions.

■RS-232C
Standard: Conforms to RS-232C, EIA
Transmission distance: 10 meters max.

■RS-485
Standard: Conforms to RS-485, EIA
Transmission distance: 500 meters max.
Transmission media: Shielded twisted-pair cable (CPEV-S 0.9 dia.)

INPUT & OUTPUT

Input: Thermocouple or DC input within ±10V, 8 points
Input resistance
   Thermocouple: ≥1MΩ when powered;
         ≥200kΩ when not powered
   DC: ≥800kΩ when powered;
         ≥700kΩ when not powered
Thermocouple types: PR, K, E, J, T, B, R, S, C, N, U, L, P
Sampling rate: 50 millisec./8 points
Trigger input: Dry contact; detected ON at ≤1.5V
   Sensing: approx. 3V DC @0.8mA
Alarm output: PhotoMOSFET relay (no polarity);
         ≤50Ω at ON, ≥1MΩ at OFF;
         OFF when not powered
   Peak load voltage: 50V max.
   Continuous load current: 50mA max.
   Peak load current: 300mA max. (≤0.1 sec.)
Burnout detecting: ≤45nA for upscale or downscale;
         ≤5nA with no burnout (when measuring 0°C)
Burnout response: ≤10 seconds

INSTALLATION

Power input
   AC: Operational voltage range 85 – 264V;
         47 – 66 Hz, approx. 9VA
   DC: Operational voltage range 24V ±10%;
         ripple 10% p-p max., approx. 3.5W
Operating temperature: -5 to +60°C (23 to +140°F)
Operating humidity: 30 to 90% RH (non-condensing)
Mounting: Surface or DIN rail
Dimensions: W175×H115×D40 mm
         (6.89"×4.53"×1.57")
Weight: 450 g (0.99 lbs)

Specifications subject to change without notice.

PERFORMANCE (% of measuring range)

Accuracy
   DC input: ±0.05% (±10mV)
   Thermocouple input

T/C	USABLE RANGE (°C)	CONFORMANCE RANGE (°C)	ACCURACY (°C)
(PR)	0 to 1770	400 to 1770	±4.6
K (CA)	-270 to +1370	0 to 1370	±1.5
E (CRC)	-270 to +1000	0 to 1000	±0.8
J (IC)	-210 to +1200	0 to 1200	±1.0
T (CC)	-270 to +400	0 to 400	±1.3
B (RH)	100 to 1820	700 to 1820	±7.2
R	-50 to +1760	400 to 1760	±4.8
S	-50 to +1760	400 to 1760	±5.3
C (WRe 5-26)	0 to 2320	0 to 2320	±4.9
N	-270 to +1300	0 to 1300	±1.9
U	-200 to +600	0 to 600	±1.3
L	-200 to +900	0 to 900	±1.0
P (Platinel II)	0 to 1395	0 to 1395	±1.7

T/C	USABLE RANGE (°F)	CONFORMANCE RANGE (°F)	ACCURACY (°F)
(PR)	32 to 3218	752 to 3218	±8.28
K (CA)	-454 to +2498	32 to 2498	±2.7
E (CRC)	-454 to +1832	32 to 1832	±1.44
J (IC)	-346 to +2192	32 to 2192	±1.8
T (CC)	-454 to +752	32 to 752	±2.34
B (RH)	212 to 3308	1292 to 3308	±13.0
R	-58 to +3200	752 to 3200	±8.64
S	-58 to +3200	752 to 3200	±9.54
C (WRe 5-26)	32 to 4208	32 to 4208	±8.82
N	-454 to +2372	32 to 2372	±3.42
U	-328 to +1112	32 to 1112	±2.34
L	-328 to +1652	32 to 1652	±1.8
P (Platinel II)	32 to 2543	32 to 2543	±3.06

Remark 1) Measuring accuracy at 50μV emf.
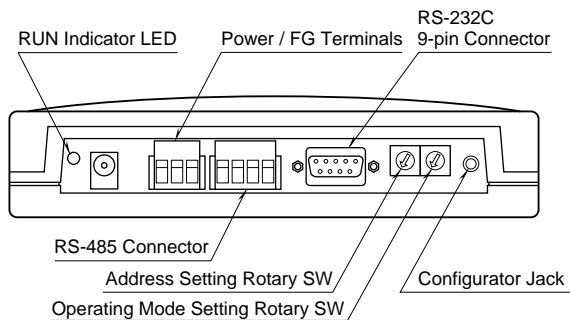Remark 2) CJC error is not included.

Cold junction compensation error: (°C)
         ≤ ± (1.0 + [Ambient Temp. – 20] × 0.04)
         in stable ambient temperature
         (e.g. ±1.4°C at 10°C and 30°C)
Sudden ambient temperature change affects the cold junction compensation. Be sure to place the R1MS in stable ambient.
Temp. coefficient: ≤ (Accuracy / 4) / °C
         (e.g. DC: ±0.0125%/°C or ±2.5mV/°C,
         TC: ±12.5μV/°C, ±0.2°C/°C with type E)
Response time: Approx. 0.55 sec. (0 – 90%)
Common mode noise rejection: ≥120 dB (50/60 Hz)
Normal mode noise rejection: ≥85 dB (50/60 Hz)
         with the filtering set to a specific frequency; ≥35 dB with 50/60 Hz setting
Insulation resistance: ≥100MΩ with 500V DC
Dielectric strength: 1500V AC @1 minute
         (input 1 to input 2 to input 3 to input 4 to input 5 to input 6 to input 7 to input 8 to trigger input to alarm output to RS-232C or RS-485 or configurator jack)
         2000V AC @1 minute (input or alarm output or RS-232C or RS-485 or configurator jack to power to FG)

REAR VIEW

RUN Indicator LED   Power / FG Terminals   RS-232C
                                             9-pin Connector

RS-485 Connector
Address Setting Rotary SW
Operating Mode Setting Rotary SW
Configurator Jack

■**RS-232C INTERFACE**

```
 1    5
 o o o o o
 o o o o
 6    9
```

ABBR.	PIN NO.	EXPLANATION OF FUNCTION
BA (SD)	2	Transmitted Data
BB (RD)	3	Received Data
AB (SG)	5	Signal Common
CB (CS)	7	Clear to Send
CA (RS)	8	Request to Send
	1	Not Used.
	4	DO NOT connect. Connecting may
	6	cause malfunctions.
	9	

■**OPERATING MODE SETTING**

COLD JUNCTION COMP. (T/C)	LINE NOISE FREQ.	BURNOUT (T/C)		
		NONE	UP	DOWN
With	50/60 Hz	1	2	3
	50 Hz	4	5	6
	60 Hz	7	8	9
Without	50 Hz	A	B	C
	60 Hz	D	E	F

Note 1: AD conversion rate is half as long as the line frequency.
Note 2: Specifying the exact frequency (50 Hz and 60 Hz) provides better protection than 50/60 Hz setting.
Note 3: Factory default setting is '1.'

CONNECTION DIAGRAM
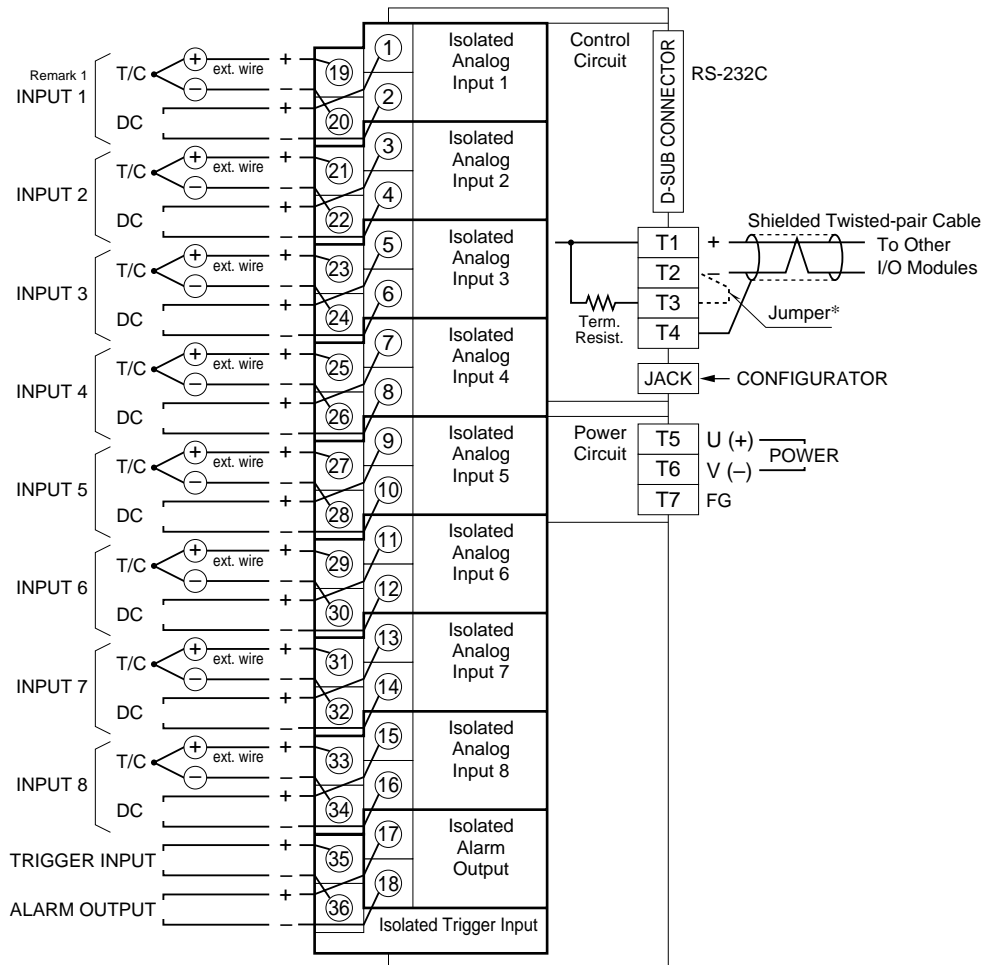
* When the device is located at the end of a transmission line via twisted-pair cable, (when there is no cross-wiring), close across the terminal T2 – T3 with the attached jumper pin (or with a leadwire). When the device is not at the end, remove the jumper pin.
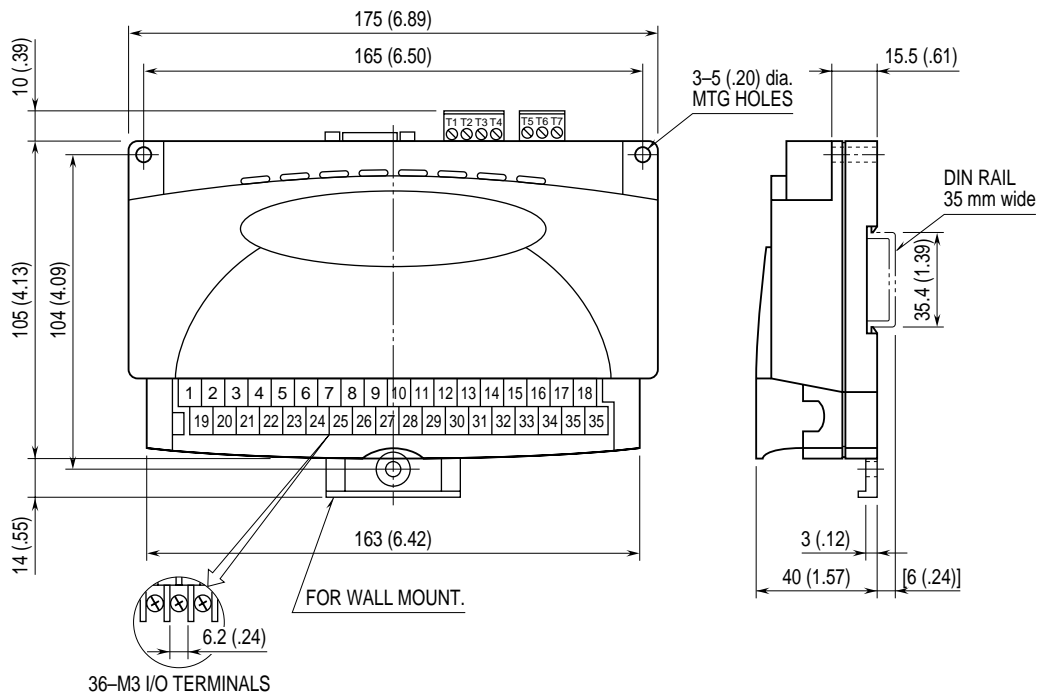
Remark 1: Separate sets of terminals for DC and TC are assigned to each channel, however, DO NOT connect to both sets of terminals at once. Duplicate connection may affect measuring accuracies. DC and TC can be mixed among eight channels.
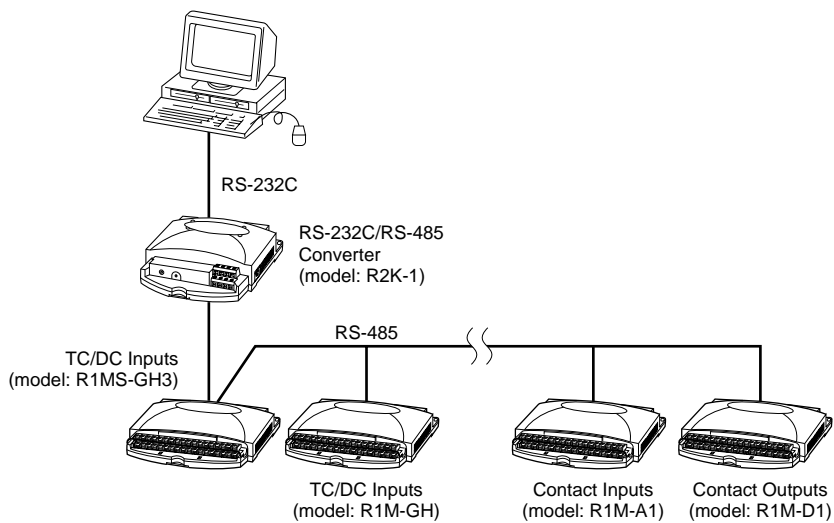Remark 2: Be careful to eliminate noise as much as possible by e.g. using shielded cables.
Remark 3: Be sure to earth the FG terminal and the cable shielding to a most stable earth point in the environment.
Remark 4: Resistor modules (model: REM3-250) can be used to convert current inputs into voltage. However, use of REM3 is not recommended when TC inputs are mixed because the heat developed on and around the REM3 affects the cold junction compensation performance.

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS mm (inch)

FOR WALL MOUNT.

36–M3 I/O TERMINALS

T1 T2 T3 T4   T5 T6 T7

175 (6.89)
165 (6.50)
3–5 (.20) dia. MTG HOLES
15.5 (.61)
10 (.39)
105 (4.13)
104 (4.09)
14 (.55)
163 (6.42)
6.2 (.24)
DIN RAIL 35 mm wide
35.4 (1.39)
3 (.12)
40 (1.57)
[6 (.24)]

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 35 |

SYSTEM CONFIGURATION EXAMPLE

RS-232C

RS-232C/RS-485 Converter (model: R2K-1)

RS-485

TC/DC Inputs (model: R1MS-GH3)

TC/DC Inputs (model: R1M-GH)

Contact Inputs (model: R1M-A1)

Contact Outputs (model: R1M-D1)

When the cable distance between the PC and the R1Ms is long, insert an RS-232C/RS-485 Converter for isolation.