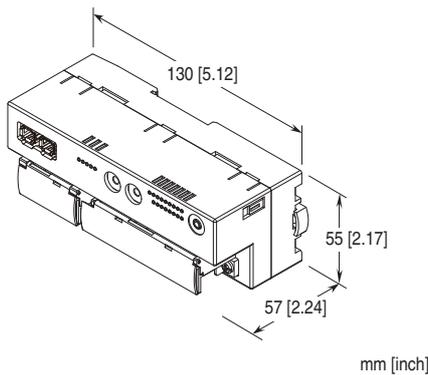# MODEL: R7G4HML3-6-TS4

Remote I/O R7G4H Series

MECHATROLINK I/O MODULE

(thermocouple input, 4 points, isolated, screw terminal block, MECHATROLINK- III use)

Functions & Features
• 4 points thermocouple input for MECHATROLINK- III
• Easy parameter setting of individual channels with the configurator software

130 [5.12]
55 [2.17]
57 [2.24]
mm [inch]

CE

MECHATROLINK

MODEL: R7G4HML3-6-TS4–R[1]

ORDERING INFORMATION
• Code number: R7G4HML3-6-TS4-R[1]
Specify a code from below for [1].
  (e.g. R7G4HML3-6-TS4-R/Q)
• Specify the specification for option code /Q
  (e.g. /C01/SET)

TERMINAL BLOCK
6: Screw terminal block for power supply
   Connector for MECHATROLINK- III
   Screw terminal block for I/O

I/O TYPE
TS4: Thermocouple input, 4 points

POWER INPUT
DC Power
R: 24 V DC
(Operational voltage range 24 V ±10 %, ripple 10 %p-p max.)

[1] OPTIONS
blank: none
/Q: Options other than the above (specify the specification)

SPECIFICATIONS OF OPTION: Q (multiple selections)
COATING (For the detail, refer to our web site.)
/C01: Silicone coating
/C02: Polyurethane coating
/C03: Rubber coating
EX-FACTORY SETTING
/SET: Preset according to the Ordering Information Sheet (No. ESU-7772-TS4)

RELATED PRODUCTS
• PC configurator software (model: R7CFG)
Downloadable at our web site.
A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

GENERAL SPECIFICATIONS
Connection
  MECHATROLINK-III: MECHATROLINK-III connector
  Power input, input: M3 separable screw terminal (torque 0.5 N·m)
Solderless terminal: Refer to the drawing at the end of the section.
  Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd
  Applicable wire size: 0.25 to 1.65 mm^2 (AWG 22 to 16)
Screw terminal: Nickel-plated steel
Housing material: Flame-resistant resin (gray)
Isolation: Input 0 to input 1 to input 2 to input 3 to MECHATROLINK or FE to power
Zero adjustments: Configurable via R7CFG
Span adjustments: Configurable via R7CFG
Temperature unit: Configurable via R7CFG
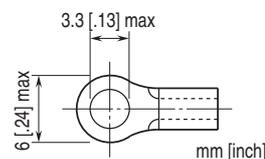Thermocouple setting: Configurable via R7CFG
Burnout setting: Configurable via R7CFG
Linearization: Standard
Cold junction compensation: CJC sensor attached to the input terminals
Status indicator LEDs: PWR, ERR, CON, LNK1, LNK2
 (Refer to the instruction manual for details)
■Recommended solderless terminal

3.3 [.13] max
6 [.24] max
mm [inch]

MG CO., LTD.
www.mgco.jp

MODEL: R7G4HML3-6-TS4

MECHATROLINK-III COMMUNICATION

Baud rate: 100 Mbps

Transmission distance: 6300 m max.

Distance between stations: 100 m max.

Transmission media: MECHATROLINK cable (Model JEPMC-W6013-x-E, Yaskawa Controls Co., Ltd.)

Connector: TYCO AMP Industrial mini I/O connector

Max. number of slaves: 62

(The maximum number of slaves might change depending on the master unit. Refer to the manual of the master unit)

Transmission cycle: 125 μsec., 250 μsec., 500 μsec., 1 – 64 msec. (with 1 msec. increments)

Communication cycle: 125 μsec. through 64 msec.

Applicable profile: Standard I/O profile (cyclic communication)

 Event-driven communication acquiring ID profile (event-driven communication)

Transmission bytes: 16 bytes

Station address: 03H through EFH (set with rotary switches)

Cyclic communication: Available

Event-driven communication: Available

Slave monitoring: None

INPUT SPECIFICATIONS

Input resistance: 30 kΩ min.

Burnout sensing: 0.1 μA

T/C	BURNOUT INDICATION (°C)		CONFORMANCE RANGE (°C)
	Downscale	Upscale	
K (CA)	-272	+1472	-150 to +1370
E (CRC)	-272	+1120	-170 to +1000
J (IC)	-260	+1300	-180 to +1200
T (CC)	-272	+ 500	-170 to + 400
B (RH)	24	1920	400 to 1760
R	-100	+1860	200 to 1760
S	-100	+1860	0 to 1760
C (WRe 5-26)	-52	+2416	0 to 2315
N	-272	+1400	-130 to +1300
U	-252	+ 700	-200 to +600
L	-252	+1000	-200 to +900
P (Platinel II)	-52	+1496	0 to 1395
(PR)	-52	+1860	0 to 1760

T/C	BURNOUT INDICATION (°F)		CONFORMANCE RANGE (°F)
	Downscale	Upscale	
K (CA)	-458	+2682	-238 to +2498
E (CRC)	-458	+2048	-274 to +1832
J (IC)	-436	+2372	-292 to +2192
T (CC)	-458	+932	-274 to +752
B (RH)	75	3488	752 to 3200
R	-148	+3380	392 to 3200
S	-148	+3380	32 to 3200
C (WRe 5-26)	-62	+4381	32 to 4199
N	-458	+2552	-202 to +2372
U	-422	+1292	-328 to +1112
L	-422	+1832	-328 to +1652
P (Platinel II)	-62	+2725	32 to 2543
(PR)	-62	+3380	32 to 3200

INSTALLATION

Current consumption

•**DC**: Approx. 100 mA

Operating temperature: -10 to +55°C (14 to 131°F)

Storage temperature: -20 to +65°C (-4 to +149°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Atmosphere: No corrosive gas or heavy dust

Mounting: Surface or DIN rail (35 mm rail)

Weight: 220 g (0.49 lb)

PERFORMANCE

Conversion accuracy: ±1°C (±1.8°F) except ±2.0°C (±3.6°F) for B, R, S, C, PR

Conversion rate: 240 msec.

Converted data range

Engineering unit value: (°C, K) × 10(integer);

 No multiplication for °F

Scaling: Refere to the R7CFG operation manual for details.

Cold junction compensation error: ±1.0°C maximum (at

25°C ±10°C); ±1.8°F maximum (at 77°F ±18°F)
(±1.5°C or ±2.7°F for R, S, PR)
Cold junction compensation is not available for B
thermocouple.
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)
 R, S, C & PR; ±0.03 %/°C (±0.02 %/°F)
 B: ±0.05 %/°C (±0.03 %/°F)
Input delay time: ≤ 60 msec. (0 - 90 %)
Burnout response time: ≤ 1 sec.
Insulation resistance: ≥ 100 MΩ with 500 V DC
Isolation: 1500 V AC @ 1 minute
(input 0 to input 1 to input 2 to input 3 MECHATROLINK or
FE to power)

STANDARDS & APPROVALS

EU conformity:
EMC Directive
  EMI EN 61000-6-4
  EMS EN 61000-6-2
RoHS Directive

PC CONFIGURATOR

The following parameters can be set with using PC
Configurator Software (model: R7CFG)
Refer to the users manual for the R7CFG for detailed
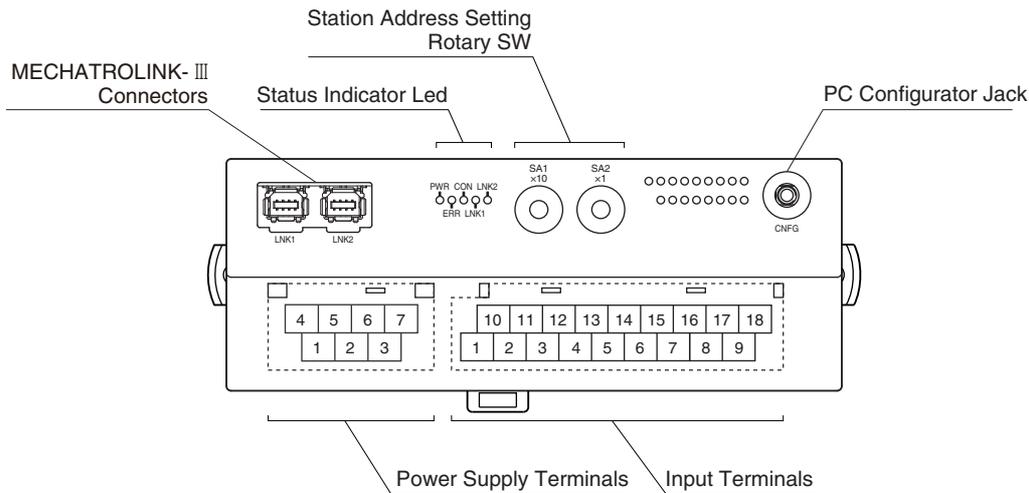operation of the software program.

■ SETTINGS FOR INDIVIDUAL CHANNELS

PARAMETER	SETTING RANGE	DEFAULT SETTING
Validating/ Invalidating	Valid Invalid	Valid
Sensor type	K (CA) E (CRC) J (IC) T (CC) B (RH) R S C (WRe 5-26) N U L P (Platinel II) (PR)	K (CA)
Temperature unit	°C °F K	°C
Burnout	Up Down	Up
Bias adjustment	-320.00 – +320.00 (%)	0.00 (%)
Gain adjustment	-3.2000 – +3.2000	1.0000
Zero scale	-32000 – +32000	0
Full scale	-32000 – +32000	10000
Input 0 %	Depends on sensor type	0.00
Input 100 %	Depends on sensor type	0.00

■ SETTINGS FOR ALL CHANNELS

PARAMETER	SETTING RANGE	DEFAULT SETTING
Averaging	Valid Invalid	Valid

EXTERNAL VIEW

MECHATROLINK-Ⅲ Connectors
Status Indicator Led
Station Address Setting Rotary SW
PC Configurator Jack

Power Supply Terminals — Input Terminals

TERMINAL ASSIGNMENTS

■ INPUT TERMINAL ASSIGNMENT

10 +IN0	11 −IN0	12 +IN1	13 −IN1	14 NC	15 +IN2	16 −IN2	17 +IN3	18 −IN3
1 +CJ0	2 −CJ0	3 +CJ1	4 −CJ1	5 NC	6 +CJ2	7 −CJ2	8 +CJ3	9 −CJ3

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	+CJ0	CJC + 0	10	+IN0	T/C + 0
2	−CJ0	CJC − 0	11	−IN0	T/C − 0
3	+CJ1	CJC + 1	12	+IN1	T/C + 1
4	−CJ1	CJC − 1	13	−IN1	T/C − 1
5	NC	No connection	14	NC	No connection
6	+CJ2	CJC + 2	15	+IN2	T/C + 2
7	−CJ2	CJC − 2	16	−IN2	T/C − 2
8	+CJ3	CJC + 3	17	+IN3	T/C + 3
9	−CJ3	CJC − 3	18	−IN3	T/C − 3

■POWER SUPPLY TERMINAL ASSIGNMENT

4 NC	5 NC	6 +24V	7 0V
1 NC	2 NC	3 FE	

1. NC —
2. NC —
3. FE Functional earth
4. NC —
5. NC —
6. +24V Power supply (24V DC)
7. 0V Power supply (0V)

MG CO., LTD.
www.mgco.jp

MECHATROLINK RELATED COMMANDS

Commands available with the unit are as follow.

| PROFILE	COMMAND	CODE	FUNCTION
Common command	NOP	00H	No operation command
	ID_RD	03H	Read ID command
	CONFIG	04H	Setup device command
	ALM_RD	05H	Read alarm or warning command
	ALM_CLR	06H	Clear alarm or warning command
	CONNECT	0EH	Establish connection command
	DISCONNECT	0FH	Release connection command
Standard I/O profile	DATA_RWA	20H	Transmit I/O data

DATA CONVERSION

■ **INPUT RANGE AND DATA CONVERSION (FACTORY DEFAULT SETTING)**

Engineering unit value °C or K is multiplied by 10 and expressed in 16 bits. °F data is represented in engineering unit value, without multiplication. Negative value is represented in 2's complements.

• Input TYPE K Thermocouple

Input Value	Converted Data, Decimal	Converted Data, Hex
≤ -272°C	-2720	F560
-150°C	-1500	FA24
1370°C	13700	3584
≥ 1472°C	14720	3980

MG CO., LTD.
www.mgco.jp
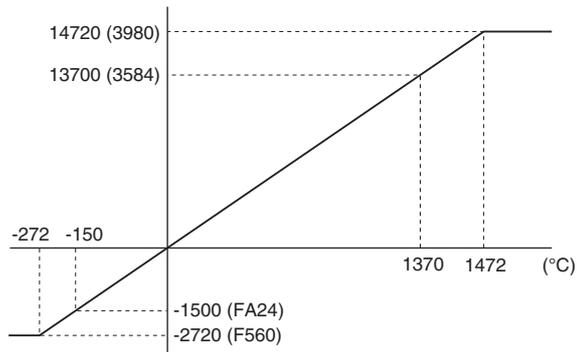
RESPONSE TIME

Response time of analog input module is time from when 0 to 100% stepwise signal change is applied to the analog module till when the communication ASIC of the module (slave) transmits 90% of input signal.

T_{COM}: MECHATROLINK-III transmission cycle set at master
(depends on system and configuration)

T_{INP}: Input module response time $\leq$ Input Delay time (Ta) + Conversion rate[*1] (Tb) + input internal processing delay time (Tc)
(two transmission cycle)

*1. Averaging: Conversion rate × 3

E.g.: MECHATROLINK-III transmission cycle: 0.5 msec.
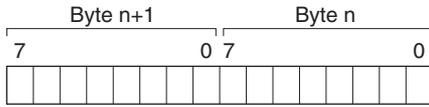Response of input module (T_{INP}): input delay time (60 msec.) + conversion rate (240 msec.) × 3
+ input internal processing delay time (0.5 msec. × 2) = 781 [msec.]

MG CO., LTD.
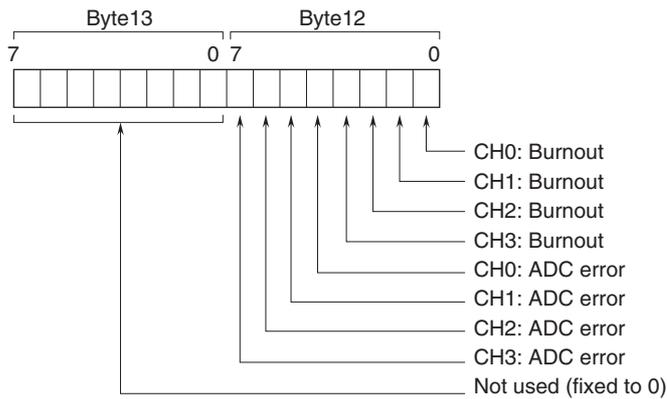www.mgco.jp
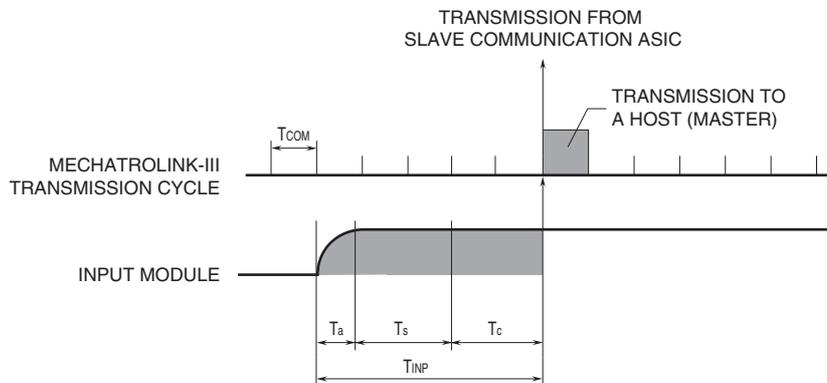
I/O DATA DESCRIPTIONS

Scaling of analog input module is configurable with the configurator software (model: R7CFG). Refer to the software manual for details.
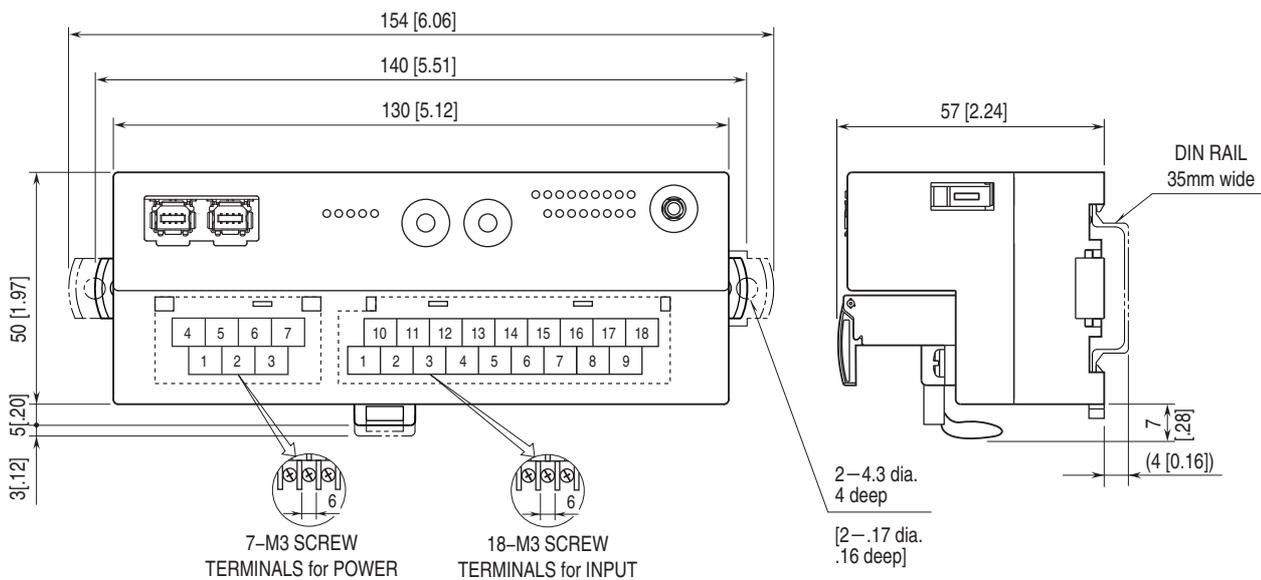
■ **ANALOG INPUT**

Byte n+1		Byte n	
7	0	7	0

Data is represented in 16-bit binary. Negative value is represented in 2's complements.

■ **STATUS**

Byte13		Byte12	
7	0	7	0

- CH0: Burnout
- CH1: Burnout
- CH2: Burnout
- CH3: Burnout
- CH0: ADC error
- CH1: ADC error
- CH2: ADC error
- CH3: ADC error
- Not used (fixed to 0)
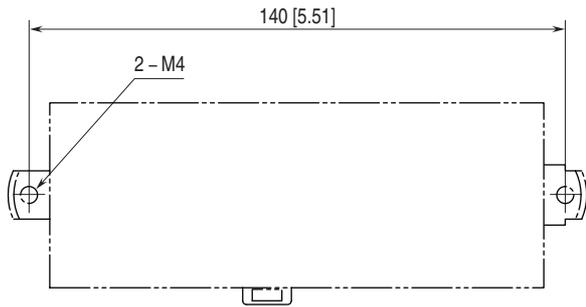
Burnout
 0: normal, 1: burnout
ADC error (no response from ADC)
 0: normal, 1: error

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS   unit: mm [inch]

154 [6.06]
140 [5.51]
130 [5.12]
57 [2.24]

DIN RAIL
35mm wide

50 [1.97]
5 [.20]
3 [.12]

4	5	6	7
1	2	3	

10	11	12	13	14	15	16	17	18
1	2	3	4	5	6	7	8	9

7 [.28]
(4 [0.16])

7–M3 SCREW
TERMINALS for POWER

18–M3 SCREW
TERMINALS for INPUT

2–4.3 dia.
4 deep

[2–.17 dia.
.16 deep]
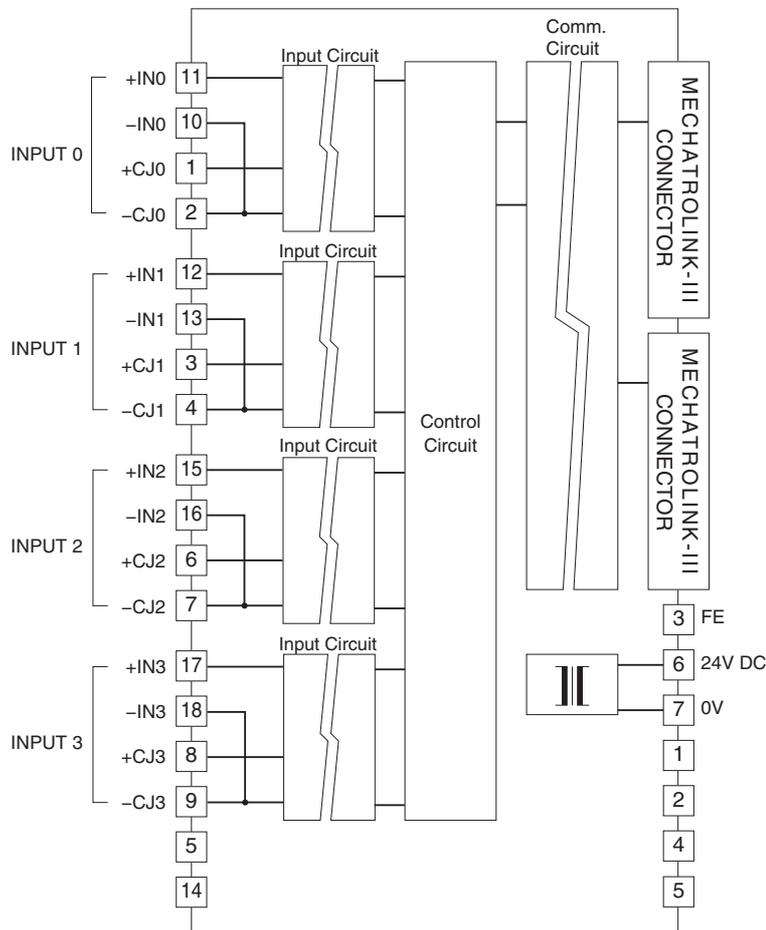
MG CO., LTD.
www.mgco.jp

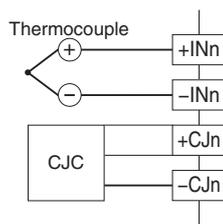## MOUNTING REQUIREMENTS   unit: mm [inch]

140 [5.51]

2 – M4

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.
Caution: FE terminal is NOT a protective conductor terminal.

INPUT 0	+IN0	11
	−IN0	10
	+CJ0	1
	−CJ0	2
INPUT 1	+IN1	12
	−IN1	13
	+CJ1	3
	−CJ1	4
INPUT 2	+IN2	15
	−IN2	16
	+CJ2	6
	−CJ2	7
INPUT 3	+IN3	17
	−IN3	18
	+CJ3	8
	−CJ3	9

Input Circuit

Control Circuit

Comm. Circuit

MECHATROLINK-III CONNECTOR

MECHATROLINK-III CONNECTOR

3 FE
6 24V DC
7 0V
1
2
4
5

5
14

■ **INPUT CONNECTION EXAMPLES**

Thermocouple
+ → +INn
− → −INn
CJC → +CJn
→ −CJn

MG CO., LTD.
www.mgco.jp

⚠ Specifications are subject to change without notice.

MG CO., LTD.
www.mgco.jp