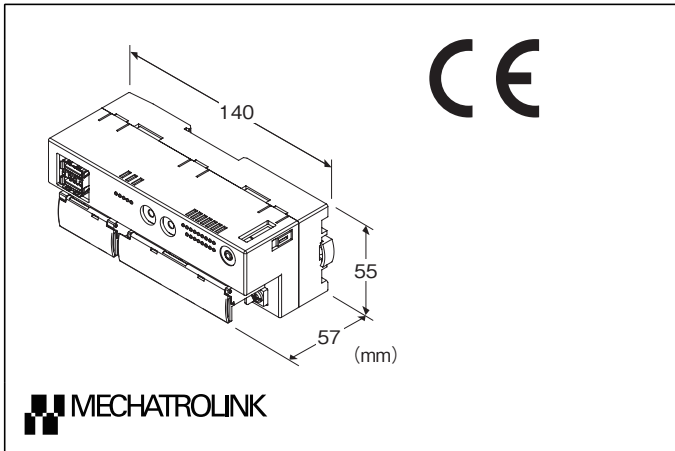


Remote I/O R7G4H Series

MECHATROLINK I/O MODULE

(MECHATROLINK-I/-II)



MODEL: R7G4HML-6-[1]-R[2]

ORDERING INFORMATION

- Code number: R7G4HML-6-[1]-R[2]
Specify a code from below for each of [1] and [2].
(e.g. R7G4HML-6-YVF4-R/Q)
- Specify the specification for option code /Q
(e.g. /C01)

TERMINAL BLOCK: 6

Screw terminal block for power supply
Connector for MECHATROLINK-I/-II
Screw terminal block for I/O

[1] I/O TYPE

- SVF4:** DC voltage /current input (10 V/20 mA),
high speed, 4 points
- SVF8N:** DC voltage input, high speed, 8 points
(no isolation between channels)
- YVF4:** DC voltage output, high speed, 4 points

POWER INPUT

DC power
R: 24 V DC

[2] OPTIONS

blank: none
/Q: With options (specify the specification)

SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to M-System's web site.)

- /C01: Silicone coating
- /C02: Polyurethane coating
- /C03: Rubber coating

FUNCTIONS & FEATURES

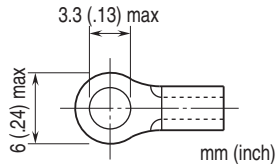
MECHATROLINK I/O module, R7G4HML interfaces discrete I/Os and PLC or PC via MECHATROLINK-I/-II. Removable terminal blocks make the module replaceable without disconnection of wiring

RELATED PRODUCTS

- PC configurator software (model: R7CFG)
Downloadable at M-System's 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

- **Common Specifications**
- Power input:** 24 V DC $\pm 10\%$; ripple 10 %p-p max.
- Insulation resistance:** $\geq 100\text{ M}\Omega$ with 500 V DC
- Dielectric strength:** 1500 V AC @1 minute
(between isolated circuits)
- Operating temperature:** 0 to 55°C (32 to 131°F)
- Operating humidity:** 30 to 90 %RH (non-condensing)
- Atmosphere:** No corrosive gas or heavy dust
- Mounting:** DIN rail (35 mm wide) or wall
- Connection**
- MECHATROLINK:** MECHATROLINK-I/-II connector
- Power & I/O:** M3 separable screw terminals
(torque 0.5 N·m)
- Screw terminal material:** Nickel-plated steel
- Recommended solderless terminal:**
- Applicable wire size:** 0.25 to 1.65 mm² (AWG 22 to 16)
- Recommended manufacturer:** Japan Solderless Terminal MFG.Co.,Ltd, Nichifu Co.,Ltd
- Housing material:** Flame-resistant resin (gray)
- Status indicator LEDs:** PWR, RUN, ERR, SD, RD
(Refer to the instruction manual for details)
- **Current Consumption (at 24 V DC) & Weight**
- R7G4HML-6-SVF4: Approx. 70 mA, 220 g (0.49 lb)
- R7G4HML-6-SVF8N: Approx. 40 mA, 220 g (0.49 lb)
- R7G4HML-6-YVF4: Approx. 100 mA, 220 g (0.49 lb)
- **Recommended solderless terminal**



MECHATROLINK COMMUNICATION

■ MECHATROLINK:

Mode: Set with DIP switches

(MECHATROLINK-I or -II, data length; Factory setting:

MECHATROLINK-II; data length (17 bytes)

(Refer to the instruction manual)

Station address: 60H - 7FH

(Function selected with Rotary SW. Factory setting: 61H).

(Refer to the instruction manual)

• MECHATROLINK-I

Baud rate: 4 Mbps

Transmission distance: 50 m max.

Distance between stations: 30 cm min.

Transmission media: MECHATROLINK cable (Model JEPMC-W6003-x-E, Yaskawa Controls Co., Ltd.)

Max. number of slaves: 15

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

Transmission cycle: 2 msec. (fixed)

Data length: 17 bytes

• MECHATROLINK-II

Baud rate: 10 Mbps

Transmission distance: 50 m max.

Distance between stations: 50 cm min.

Transmission media: MECHATROLINK cable (Model JEPMC-W6003-x-E, Yaskawa Controls Co., Ltd.)

Max. number of slaves: 30

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

Transmission cycle: 0.5 msec., 1 msec., 1.5 msec., 2 msec., 4 msec., 8 msec.

Data length: 17 bytes / 32 bytes selectable (Must choose identical data size for all stations on one network)

STANDARDS & APPROVALS

EU conformity:

EMC Directive

EMI EN 61000-6-4

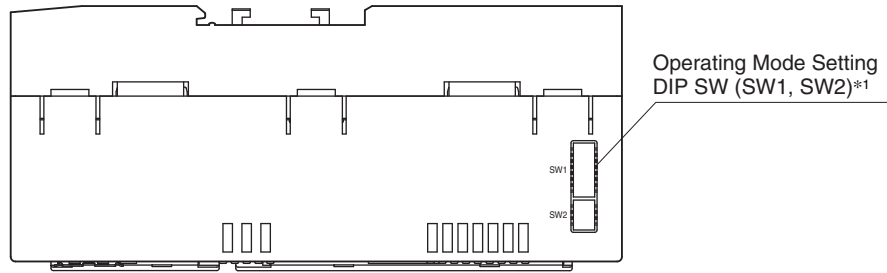
EMS EN 61000-6-2

RoHS Directive

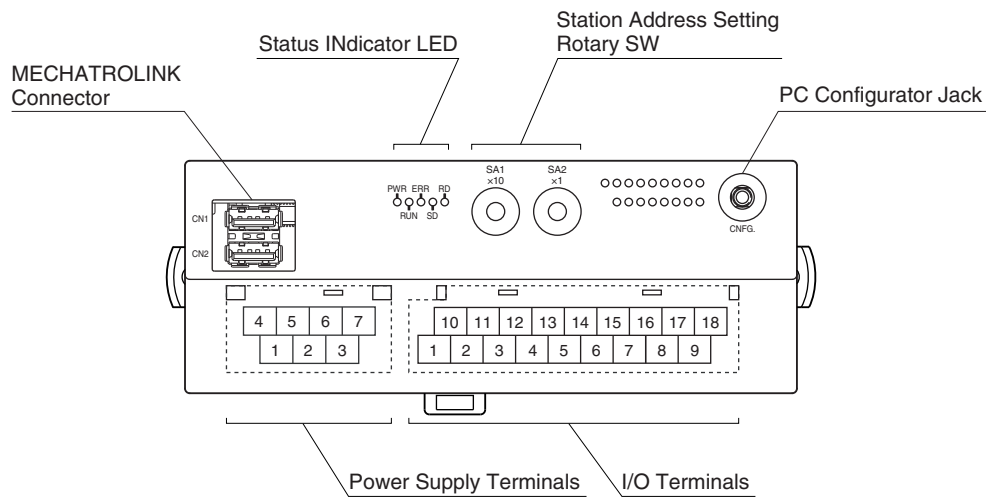
EN 50581

EXTERNAL VIEW

TOP VIEW



FRONT VIEW



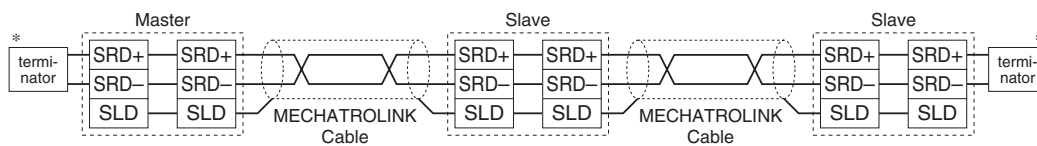
*1. For R7G4HML-6-SVF8N, SW2 is not available.

CONNECTION DIAGRAMS

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

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

MECHATROLINK CONNECTION



*Terminator

Be sure to connect the terminating resistors to the unit at both ends of transmission line.

Use the terminating resistor dedicated for MECHATROLINK: Model JEPMC-W6022, Yaskawa Controls Co., Ltd.

Certain types of Master units may have incorporated terminating resistors. Consult the instruction manual for the Master.

DATA CONVERSION

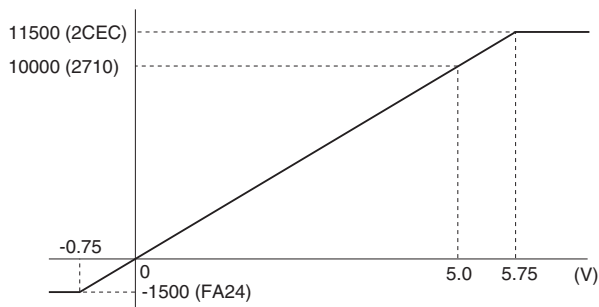
■ 0 – 100% DATA CONVERSION

Analog input data is converted into digital representations of 0 – 100% proportional to each scaled range. The converted % values are multiplied by 100 and expressed in 16 bits.

Overrange input is possible from -15 to +115% of the nominal range. When the signal exceeds the limit, the data is fixed at -15% or +115% respectively.

• Input Range 0 – 5V DC

Input Value	Input %	Converted Data, Decimal	Converted Data, Hex
≤ -0.75V	-15%	-1500	FA24
0V	0%	0	0
5V	100%	10000	2710
≥ 5.75V	115%	11500	2CEC



Analog output is converted in the reverse order of the input data. The output range 0 – 5V DC is expressed as 10000 at 5.0V (100%) and 0 at 0V (0%).

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.

Response time of analog output module is time from when 0 to 100% stepwise signal change is received by the communication ASIC of the module (slave) till when the analog output signal reaches 90 %.

T_{COM} : MECHATROLINK-II transmission cycle set at master

(depends on system and configuration)

T_i : Delay of input module \leq Delay of input circuit (T_a) + Conversion time^{*1} (T_b) + Input internal processing delay time (T_c) (one transmission cycle)

T_{INF} : Response time of input module $\leq T_i + T_{COM}$

T_o : Delay of output module \leq Output internal processing delay time (T_d) (one minimum transmission cycle the unit can handle) + Conversion time (T_e) + Delay of output circuit (T_f)

T_{OUT} : Response time of output module $\leq T_o + T_{COM}$

*1. For R7G4HML-6-SVF4 and R7G4HML-6-SVF8N, Conversion time x Averaging

E.g.1: R7G4HML-6-SVF4 (Averaging: 1), MECHATROLINK-II transmission cycle of 0.5 msec.

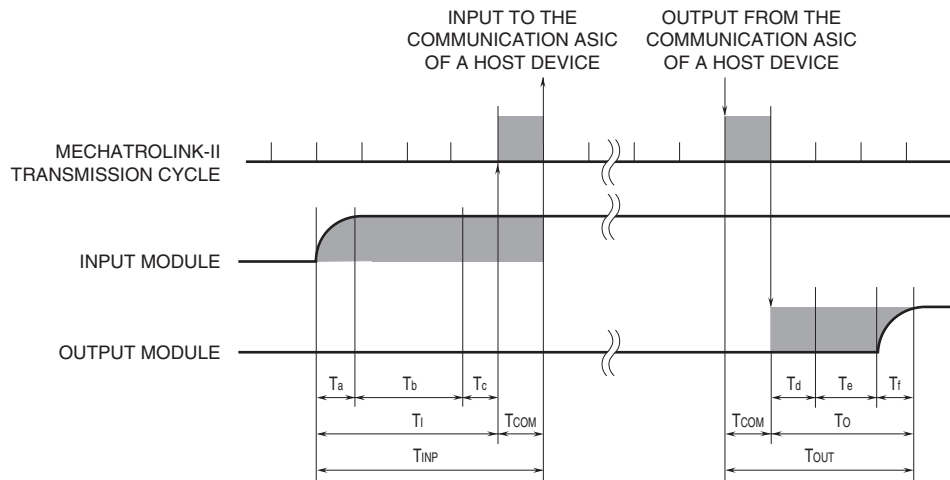
Delay of input module (T_i): Delay of input circuit (1 msec.) + Conversion time (1 msec.) x Averaging (1)
+ Input internal processing delay time (0.5 msec.) = 2.5 [msec.]

Response time of input module (T_{INF}): T_i (2.5 msec.) + T_{COM} (0.5 msec.) = 3.0 [msec.]

E.g.2: YVF4 module: MECHATROLINK-II transmission cycle of 1 msec.

Delay of output module (T_0): Internal processing delay time (0.5 msec.) + Conversion time (0.25 msec.) + Delay of output circuit (0.25 msec.) = 1.0 [msec.]

Response time of output module (T_{OUT}): T_0 (1.0 msec.) + T_{COM} (1.0 msec.) = 2.0 [msec.]



I/O DATA DESCRIPTIONS

Scaling of analog I/O module is configurable with the configurator software (model: R7CFG). Refer to the software manual for details.

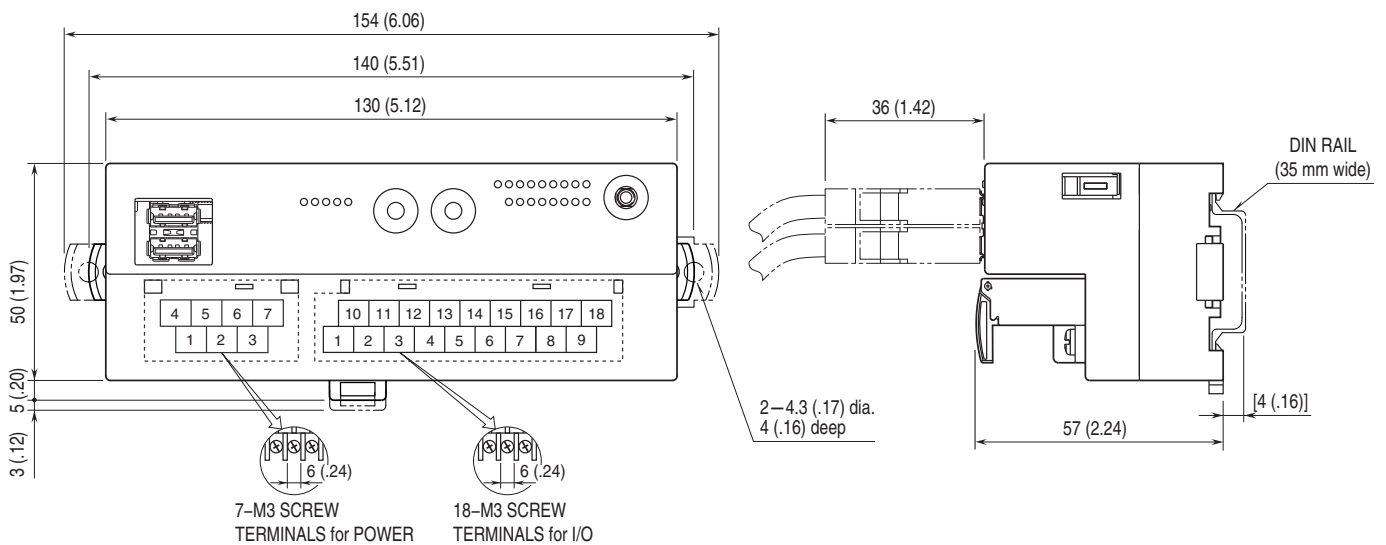
ANALOG I/O



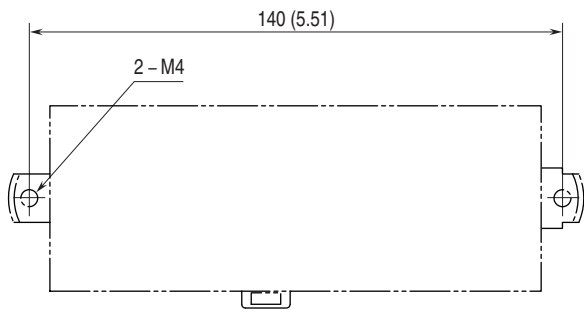
16-bit binary data
Negative values represented in 2's complements

Note: 8-bit unsigned binary data when R7G4HML-6-SVF8N is used in the MECHATROLINK-I or MECHATROLINK-II in the 17-byte mode.

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)



MOUNTING REQUIREMENTS unit: mm (inch)



HIGH-SPEED DC VOLTAGE/CURRENT INPUT MODULE

(4 points, isolated; screw terminal block)

MODEL: R7G4HML-6-SVF4

SPECIFICATIONS

Isolation: Input 0 to input 1 to input 2 to input 3 to MECHATROLINK or FE to power input

Converted data range: 0 - 10000 of the input range

• **Input range**

Wide span voltage: -10 - +10 V DC, -5 - +5 V DC, 0 - 10 V DC, 0 - 5 V DC, 1 - 5 V DC

Narrow span voltage: -1 - +1 V DC, 0 - 1 V DC, -0.5 - +0.5 V DC

Current range: -20 - +20 mA DC, 0 - 20 mA DC, 4 - 20 mA DC

• **Input resistance**

Wide span voltage: > 1 MΩ

Narrow span voltage: > 100 kΩ

Current range: 50 Ω

Conversion accuracy: ±0.1 %

Conversion rate: 1 msec. / 4 channels

Input delay time: ≤ 1 msec. (0 - 90 %)

Temperature coefficient: ±0.015 %/°C (±0.008 %/°F)

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
Input range	-10 - +10 V DC -5 - +5 V DC -1 - +1 V DC 0 - 10 V DC 0 - 5 V DC 1 - 5 V DC 0 - 1 V DC -0.5 - +0.5 V DC -20 - +20 mA DC 0 - 20 mA DC 4 - 20 mA DC	-10 - +10 V DC
Bias	-320.00 - +320.00 (%)	0.00 (%)
Gain	-3.2000 - +3.2000	1.0000
Zero scale	-32 000 - +32 000	0
Full scale	-32 000 - +32 000	10 000

■ SETTINGS FOR ALL CHANNELS

PARAMETER	SETTING RANGE	DEFAULT SETTING
Number of times of averaging	1, 2, 4, 8, 16, 32, 64, 128, 256	1

OPERATING MODE SETTING

(*) Factory setting

Caution ! - SW1-1 through 1-4, SW2-3 and SW2-4 are unused. Be sure to turn off unused ones.

■ Input Range (SW1-5, 1-6, 1-7, 1-8)

SW1-5	SW1-6	SW1-7	SW1-8	Input range
OFF	OFF	OFF	OFF	-10 - +10 V DC (*)
ON	OFF	OFF	OFF	-5 - +5 V DC
OFF	ON	OFF	OFF	-1 - +1 V DC
ON	ON	OFF	OFF	0 - 10 V DC
OFF	OFF	ON	OFF	0 - 5 V DC
ON	OFF	ON	OFF	1 - 5 V DC
OFF	ON	ON	OFF	0 - 1 V DC
ON	ON	ON	OFF	-0.5 - +0.5 V DC
ON	OFF	OFF	ON	-20 - +20 mA DC
OFF	ON	OFF	ON	4 - 20 mA DC
ON	ON	OFF	ON	0 - 20 mA DC
ON	ON	ON	ON	PC Configurator setting

■ MECHATROLINK (SW2-1, 1-2)

SW2-1	SW2-2	MECHATROLINK
OFF	OFF	MECHATROLINK-II (17-byte mode). (*)
ON	OFF	MECHATROLINK-II (32-byte mode).
OFF	ON	MECHATROLINK-I (17-byte mode).

TERMINAL ASSIGNMENTS

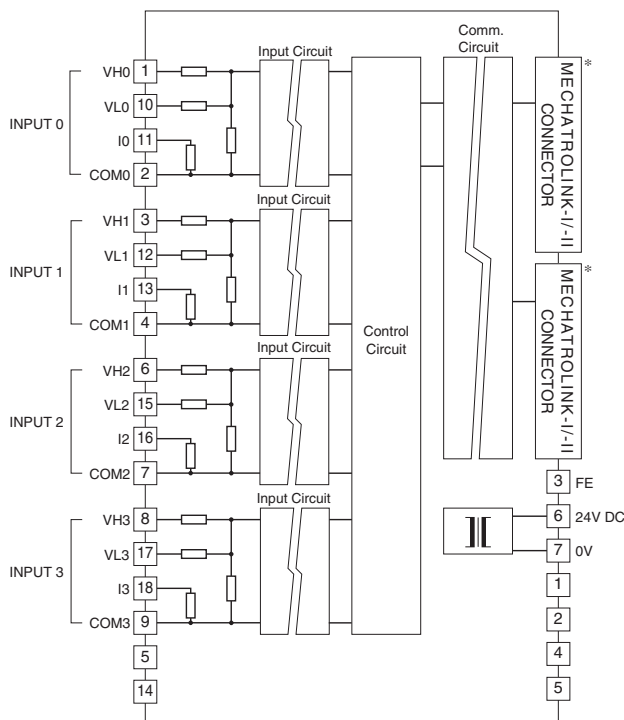
10	11	12	13	14	15	16	17	18
VL0	I0	VL1	I1	NC	VL2	I2	VL3	I3
1	2	3	4	5	6	7	8	9
VH0	COM0	VH1	COM1	NC	VH2	COM2	VH3	COM3

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	VH0	Wide span volt. 0	10	VL0	Narrow span volt. 0
2	COM0	Common 0	11	I0	Current range 0
3	VH1	Wide span volt. 1	12	VL1	Narrow span volt. 1
4	COM1	Common 1	13	I1	Current range 1
5	NC	No connection	14	NC	No connection
6	VH2	Wide span volt. 2	15	VL2	Narrow span volt. 2
7	COM2	Common 2	16	I2	Current range 2
8	VH3	Wide span volt. 3	17	VL3	Narrow span volt. 3
9	COM3	Common 3	18	I3	Current range 3

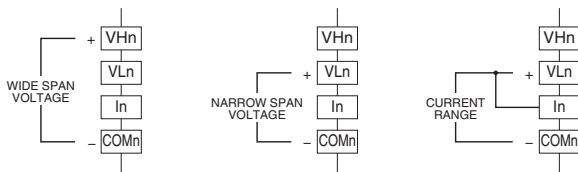
CIRCUIT DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.



INPUT CONNECTION EXAMPLES



Note: Be sure VL_n and I_n terminals are cross-wired at DC current input.

* MECHATROLINK connectors are internally connected.
The network cable can be connected to either one.

HIGH-SPEED DC VOLTAGE INPUT MODULE

(8 points, non-isolated, screw terminal block)

MODEL: R7G4HML-6-SVF8N

SPECIFICATIONS

Isolation: Input to MECHATROLINK or FE to power

Converted data range: 0 - 10000 in proportion to the input range

(Set the scaling value within the range of 0 - 255 when the module is used in MECHATROLINK-I or MECHATROLINK-II in the 17-byte mode)

Input range: -10 - +10 V DC, -5 - +5 V DC, 0 - 10 V DC, 0 - 5 V DC, 1 - 5 V DC

Input resistance: $\geq 1 \text{ M}\Omega$

Conversion accuracy: $\pm 0.1 \%$

Conversion rate: 2.5 msec. / 8 channels

Input delay time: $\leq 20 \text{ msec.}$ (0 - 90 %)

Temperature coefficient: $\pm 0.015 \%/^{\circ}\text{C}$ ($\pm 0.008 \%/^{\circ}\text{F}$)

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	AVAILABLE RANGE	FACTORY SETTING
Validating/ Invalidating	Valid Invalid	Valid
Input range	-10 - +10 V DC -5 - +5 V DC 0 - 10 V DC 0 - 5 V DC 1 - 5 V DC	-10 - +10 V DC
Bias	-320.00 - +320.00 (%)	0.00 (%)
Gain	-3.2000 - +3.2000	1.0000
Zero scale	-32 000 - +32 000 *	0
Full scale	-32 000 - +32 000 *	255

* Set within the range of 0 - 255 for use in MECHATROLINK-I or MECHATROLINK-II in the 17-byte mode.

SETTINGS FOR ALL CHANNELS

PARAMETER	AVAILABLE RANGE	FACTORY SETTING
Averaging	1, 2, 4, 8, 16, 32, 64, 128	1

OPERATING MODE SETTING

(*) Factory setting

Caution ! - SW1-3 and SW1-4 are unused. Be sure to turn off unused ones.

MECHATROLINK (SW1-1, 1-2)

SW1-1	SW1-2	MECHATROLINK
OFF	OFF	MECHATROLINK-II (17-byte mode). (*)
ON	OFF	MECHATROLINK-II (32-byte mode).
OFF	ON	MECHATROLINK-I (17-byte mode).

INPUT RANGE (SW1-5, 1-6, 1-7, 1-8)

SW1-5	SW1-6	SW1-7	SW1-8	INPUT RANGE
OFF	OFF	OFF	OFF	-10 - +10 V DC (*)
ON	OFF	OFF	OFF	-5 - +5 V DC
ON	ON	OFF	OFF	0 - 10 V DC
OFF	OFF	ON	OFF	0 - 5 V DC
ON	OFF	ON	OFF	1 - 5 V DC
ON	ON	ON	ON	PC Configurator setting

TERMINAL ASSIGNMENTS

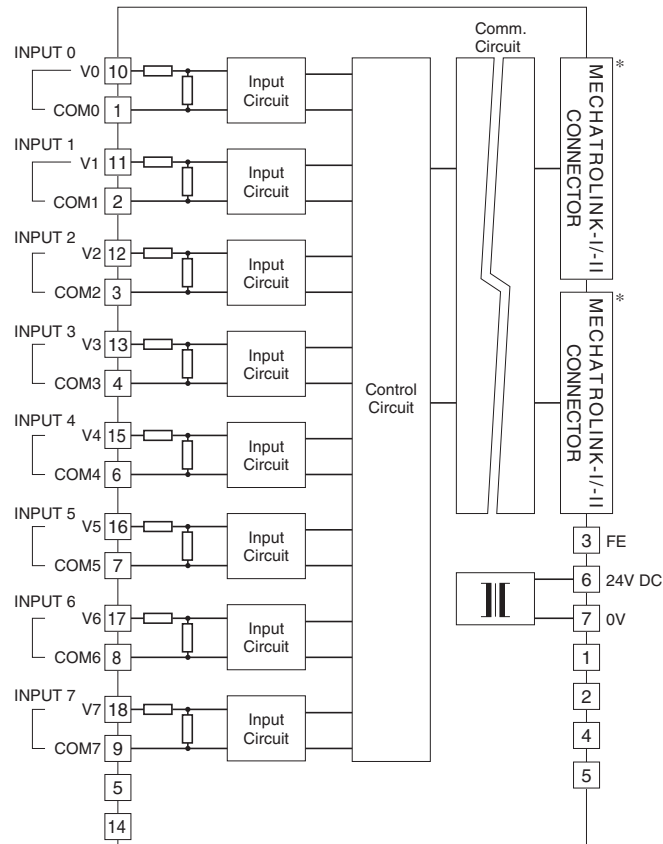
10 V0	11 V1	12 V2	13 V3	14 NC	15 V4	16 V5	17 V6	18 V7
1 COM0	2 COM1	3 COM2	4 COM3	5 NC	6 COM4	7 COM5	8 COM6	9 COM7

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	COM0	Common 0	10	V0	Voltage Input 0
2	COM1	Common 1	11	V1	Voltage Input 1
3	COM2	Common 2	12	V2	Voltage Input 2
4	COM3	Common 3	13	V3	Voltage Input 3
5	NC	No connection	14	NC	No connection
6	COM4	Common 4	15	V4	Voltage Input 4
7	COM5	Common 5	16	V5	Voltage Input 5
8	COM6	Common 6	17	V6	Voltage Input 6
9	COM7	Common 7	18	V7	Voltage Input 7

CIRCUIT DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.



* MECHATROLINK connectors are internally connected.
The network cable can be connected to either one.

HIGH-SPEED DC VOLTAGE OUTPUT MODULE

(4 points, isolated; screw terminal block)

MODEL: R7G4HML-6-YVF4

SPECIFICATIONS

Isolation: Output 0 to output 1 to output 2 to output 3 to MECHATROLINK or FE to power input

Converted data range: 0 - 10000 of the output range

Output range

Wide span voltage: -10 - +10 V DC, -5 - +5 V DC,

0 - 10 V DC, 0 - 5 V DC, 1 - 5 V DC

Narrow span voltage: -1 - +1 V DC, 0 - 1 V DC,

-0.5 - +0.5 V DC

Operational range: -15 - +115 % of the output range

(except -10 - +10 V DC);

approx. -11.5 - +11.5 V DC (-10 - +10 V DC)

Load resistance: $\geq 100 \text{ k}\Omega$

Conversion accuracy: $\pm 0.1 \%$

Conversion rate: 250 $\mu\text{sec.}$ / 4 channels

Output delay time: $\leq 250 \mu\text{sec.}$ (0 - 90 %)

Temperature coefficient: $\pm 0.015 \%/^{\circ}\text{C}$ ($\pm 0.008 \%/^{\circ}\text{F}$)

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	AVAILABLE RANGE	FACTORY SETTING
Validating/ Invalidating	Valid Invalid	Valid
Output range	-10 - +10 V DC -5 - +5 V DC -1 - +1 V DC 0 - 10 V DC 0 - 5 V DC 1 - 5 V DC 0 - 1 V DC -0.5 - +0.5 V DC	-10 - +10 V DC
Bias	-320.00 - +320.00 (%)	0.00 (%)
Gain	-3.2000 - +3.2000	1.0000
Zero scale	-32 000 - +32 000	0
Full scale	-32 000 - +32 000	10 000
Output reset value*1	-15.00 - +115.00 (%)	-15.00 (%)

■ SETTINGS FOR ALL CHANNELS

PARAMETER	SETTING RANGE	FACTORY SETTING
Setting output at the loss of communication*2	Hold Clear	Hold

*1. When output range is -10 - +10 V DC, approx.-11.5 V DC at approx.-7.5 - -15% and approx.+11.5 V DC at approx.107.5 - 115% are outputted respectively.

*2. Use the DIP switch to change the setting.

OPERATING MODE SETTING

(*) Factory setting

Caution ! - SW1-1 through 1-3, SW2-3 and SW2-4 are unused. Be sure to turn off unused ones.

■ Output at Loss of Communication (SW1-4)

SW1-4	Output at loss of communication
OFF	Hold the output (Hold the last received normal data) *
ON	Output reset value (Output is fixed to the output reset value)

■ Output Range (SW1-5, 1-6, 1-7, 1-8)

SW1-5	SW1-6	SW1-7	SW1-8	Output range
OFF	OFF	OFF	OFF	-10 - +10 V DC *
ON	OFF	OFF	OFF	-5 - +5 V DC
OFF	ON	OFF	OFF	-1 - +1 V DC
ON	ON	OFF	OFF	0 - 10 V DC
OFF	OFF	ON	OFF	0 - 5 V DC
ON	OFF	ON	OFF	1 - 5 V DC
OFF	ON	ON	OFF	0 - 1 V DC
ON	ON	ON	OFF	-0.5 - +0.5 V DC
ON	ON	ON	ON	PC Configurator setting

■ MECHATROLINK (SW2-1, 1-2)

SW2-1	SW2-2	MECHATROLINK
OFF	OFF	MECHATROLINK-II (17-byte mode). (*)
ON	OFF	MECHATROLINK-II (32-byte mode).
OFF	ON	MECHATROLINK-I (17-byte mode).

TERMINAL ASSIGNMENTS

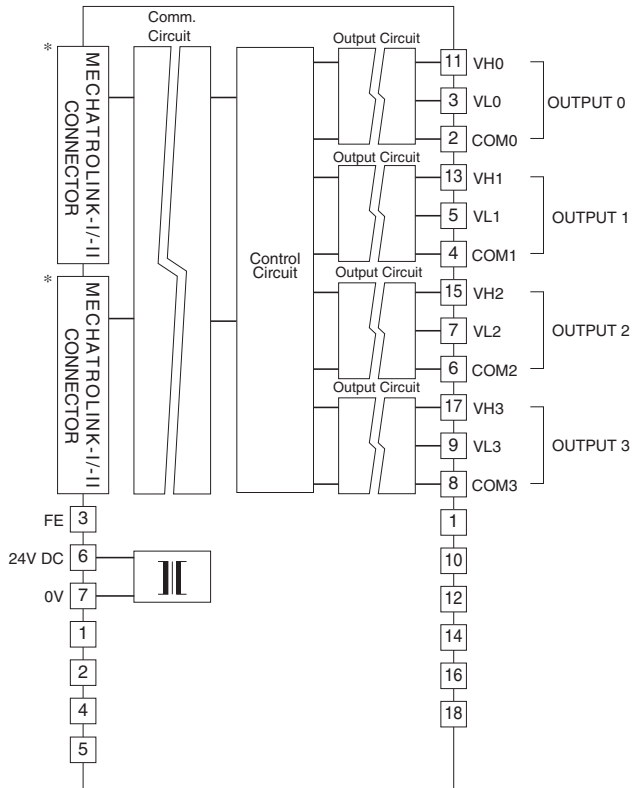
10	11	12	13	14	15	16	17	18
NC	VH0	NC	VH1	NC	VH2	NC	VH3	NC
1	2	3	4	5	6	7	8	9
NC	COM0	VL0	COM1	VL1	COM2	VL2	COM3	VL3

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	NC	No connection	10	NC	No connection
2	COM0	Common 0	11	VH0	Wide span volt. 0
3	VL0	Narrow span volt. 0	12	NC	No connection
4	COM1	Common 1	13	VH1	Wide span volt. 1
5	VL1	Narrow span volt. 1	14	NC	No connection
6	COM2	Common 2	15	VH2	Wide span volt. 2
7	VL2	Narrow span volt. 2	16	NC	No connection
8	COM3	Common 3	17	VH3	Wide span volt. 3
9	VL3	Narrow span volt. 3	18	NC	No connection

CIRCUIT DIAGRAM

Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.



* MECHATROLINK connectors are internally connected.
The network cable can be connected to either one.



Specifications are subject to change without notice.