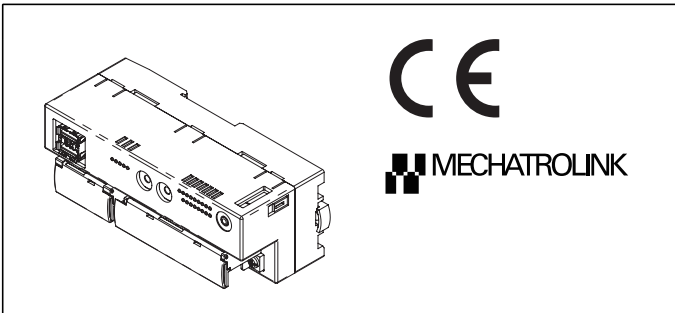


## Remote I/O R7G4HML Series

### 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 [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  
**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

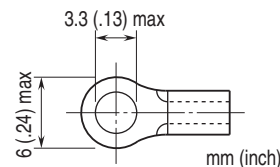
MECHATROLINK I/O module, R7G4HML interfaces discrete I/Os and PLC or PC via MECHATROLINK-I/-II.  
Removable terminal blocks make the module replaceable without disconnection of wiring

#### 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 mm<sup>2</sup> (AWG 22 to 16)  
**Recommended manufacturer:** Japan Solderless Terminal MFG.Co.,Ltd, Nichifu Co.,Ltd  
**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-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

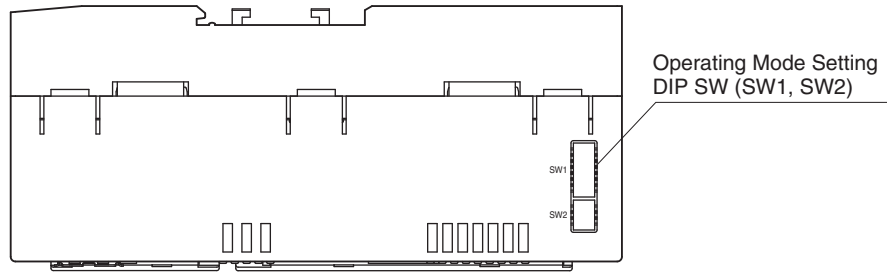
EMS EN 61000-6-2

RoHS Directive

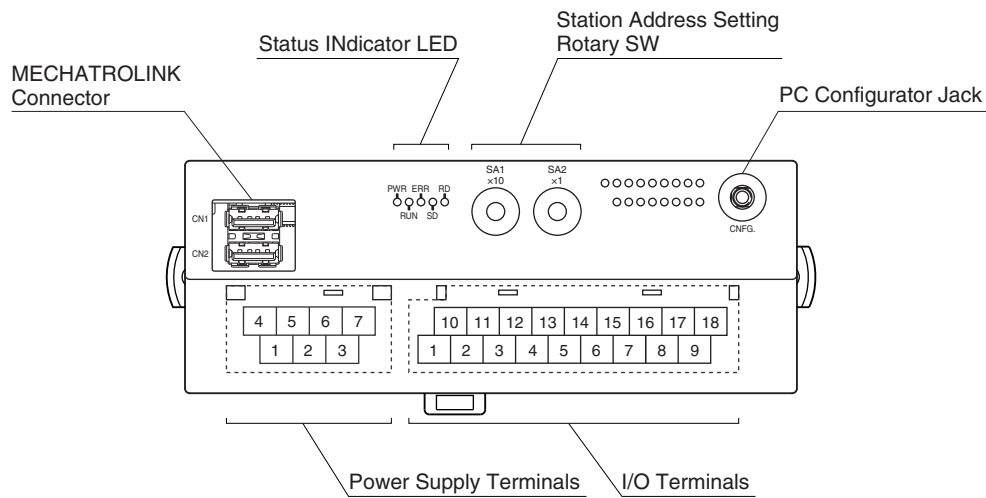
EN 50581

## EXTERNAL VIEW

### TOP VIEW



### FRONT VIEW



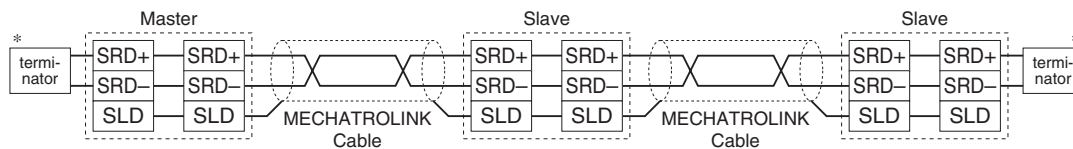
## CONNECTION DIAGRAMS

### POWER SUPPLY TERMINAL ASSIGNMENT

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

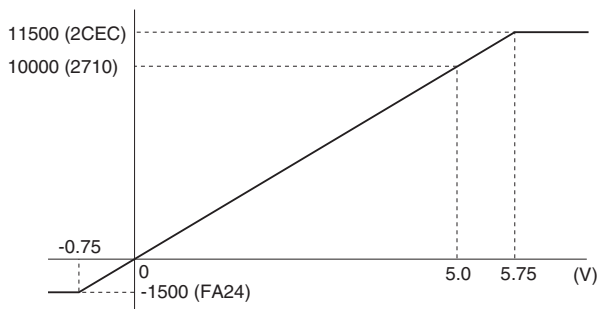
### ■ 0 – 100% DATA CONVERSION

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<sup>\*1</sup> ( $T_b$ ) + 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, Conversion time x Averaging

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

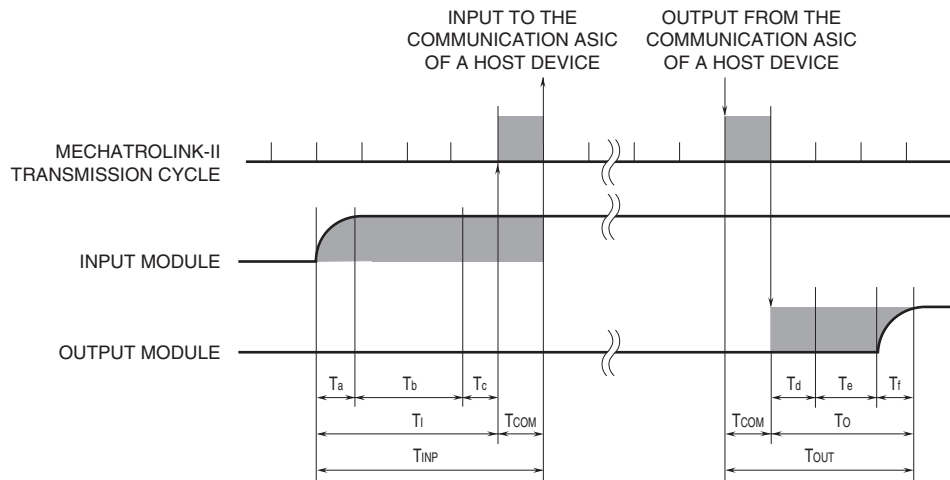
Delay of input module ( $T_i$ ): Delay of input circuit (1 msec.) + Conversion time (1 msec.) x Averaging (1) + Input internal processing delay time (0.5 msec.) = 2.5 [msec.]

Response time of input module ( $T_{INF}$ ):  $T_i$  (2.0 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

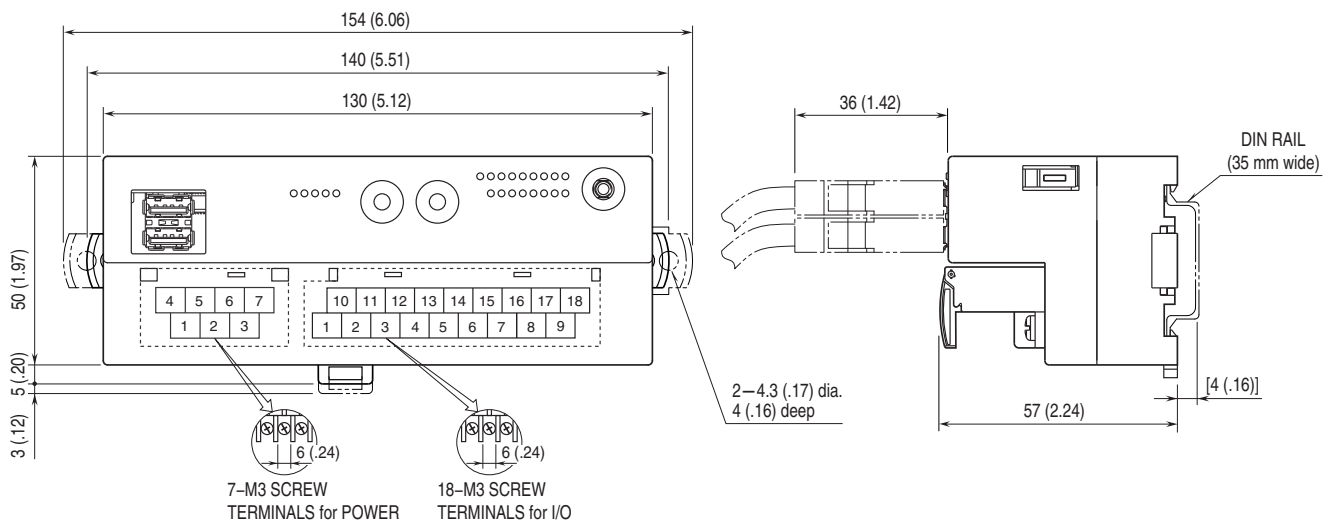
Scaling of analog I/O module is configurable with the configurator software (model: R7CFG). Refer to the software manual for details.

### ANALOG I/O

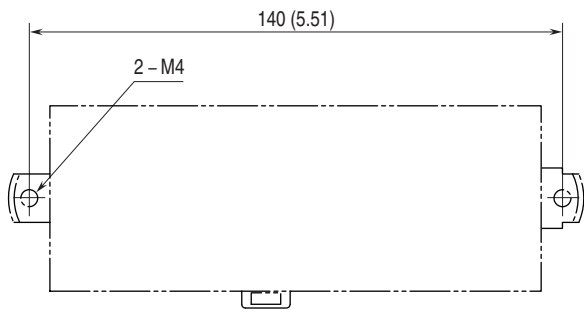


16-bit binary data  
Negative values represented in 2's complements

## DIMENSIONS 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	AVAILABLE RANGE	FACTORY 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 adjustment	-320.00 - +320.00 (%)	0.00 (%)
Gain adjustment	-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	AVAILABLE RANGE	FACTORY SETTING
Averaging	1, 2, 4, 8, 16, 32, 64, 128, 256	1

#### OPERATING MODE SETTING

(\*) Factory setting

Caution ! - SW4-1 through 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

**TERMINAL ASSIGNMENTS**

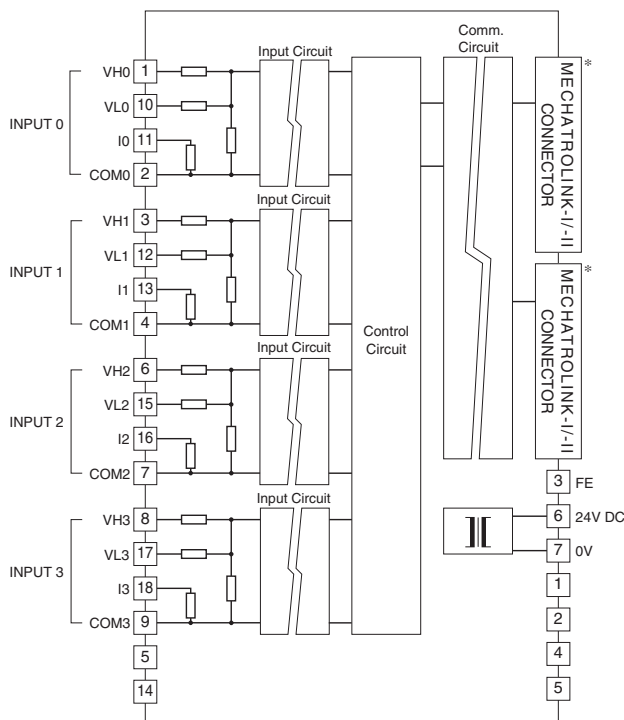
10	11	12	13	14	15	16	17	18
VL0	IO	VL1	I1	NC	VL2	I2	VL3	I3
1	2	3	4	5	6	7	8	9
VH0	COM0	VH1	COM1	NC	VH2	COM2	VH3	COM3

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	VH0	Wide span volt. 0	10	VL0	Narrow span volt. 0
2	COM0	Common 0	11	IO	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

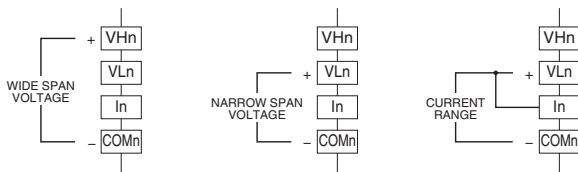
**CIRCUIT DIAGRAM**

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 VLn and In 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 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
Unused	CH used CH unused	CH used
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 adjustment	-320.00 - +320.00 (%)	0.00 (%)
Gain adjustment	-3.2000 - +3.2000	1.0000
Scaled range Zero	-32000 - +32000	0
Scaled range Span	-32000 - +32000	10000
Output reset value*1	-15.00 - +115.00 (%)	-15.00 (%)

#### ■ SETTINGS FOR ALL CHANNELS

PARAMETER	SETTING RANGE	FACTORY SETTING
Setting indication for output function at the loss of communication*2	Hold the output Output reset value	Hold the output

\*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, SW1-2 and SW1-3 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

#### TERMINAL ASSIGNMENTS

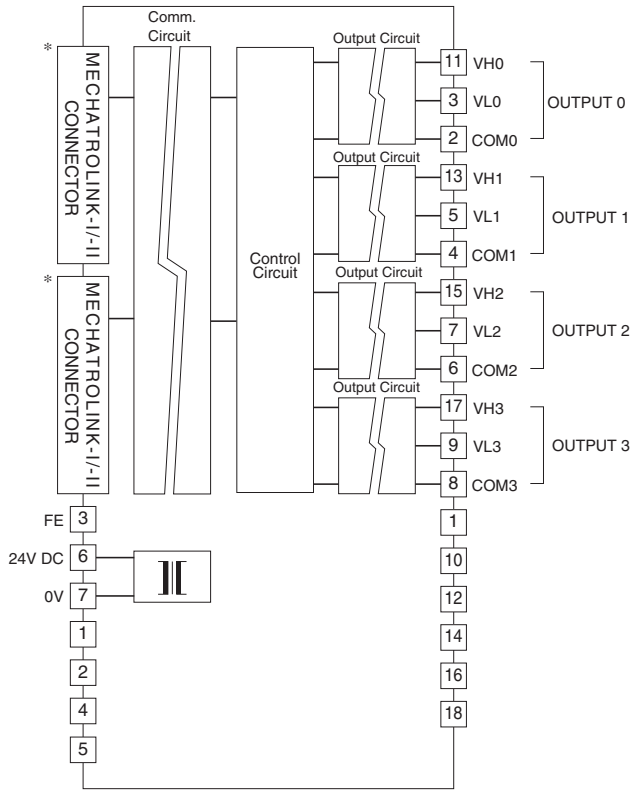
10	11	12	13	14	15	16	17	18
NC	VH0	NC	VH1	NC	VH2	NC	VH3	NC
1	2	3	4	5	6	7	8	9
NC	COM0	VL0	COM1	VL1	COM2	VL2	COM3	VL3

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.