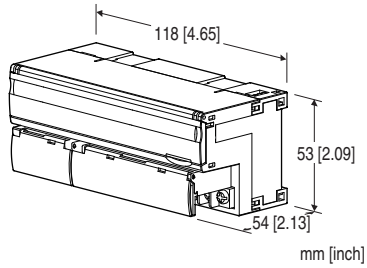
Remote I/O R7 Series

MECHATROLINK I/O MODULE

(DC current output, 2 points, isolated, MECHATROLINK-I / -II use)

Functions & Features

• 2 points DC current output module for MECHATROLINK -I/ -II
• Extension module can be connected
• Individual channels, zero adjustment, span adjustment, and scaling can be set with the configurator software (model: R7CON)



MODEL:R7ML–YS2-R[1]

ORDERING INFORMATION

• Code number: R7ML-YS2-R[1]
Specify a code from below for [1].
(e.g. R7ML-YS2-R/Q)
• Specify the specification for option code /Q
(e.g. /C01)

I/O TYPE

YS2: DC current output, 2 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: With options (specify the specification)

SPECIFICATIONS OF OPTION: Q

COATING (For the detail, refer to our web site.)
/C01: Silicone coating
/C02: Polyurethane coating
/C03: Rubber coating

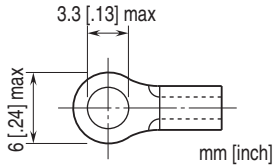
RELATED PRODUCTS

• PC Configurator cable (model: MCN-CON or COP-US)
• PC configurator software (model: R7CON)
Downloadable at our web site.
• Discrete input extension module (model: R7ML-EAx)
• Discrete output extension module (model: R7ML-ECx)

GENERAL SPECIFICATIONS

Connection
MECHATROLINK: MECHATROLINK-I/-II connector
Power input, output: 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: Output 0 to output 1 to MECHATROLINK or FG to power
Zero adjustments: Configurable via R7CON
Span adjustments: Configurable via R7CON
Extension: No extension (*), Discrete input 8 or 16 points, Discrete output 8 or 16 points
Selectable with the front DIP SW
(*) Factory default setting
Output at the loss of communication:
Hold the output (*), Reset the output
Selectable with the front DIP SW
(*) Factory default setting
Status indicator LEDs: PWR, RUN, ERR, SD, RD
(Refer to the instruction manual)
Configurator connection: 2.5 dia. miniature jack

■Recommended solderless terminal



MECHATROLINK COMMUNICATION

MECHATROLINK mode: Set with DIP switches
(MECHATROLINK-I or -II, data length; Factory default setting: MECHATROLINK-II; data length (17 bytes)
(Refer to the instruction manual)
Station address: 60H - 7FH
(Function selected with Rotary SW. Factory default setting: 60H) (Refer to the instruction manual)

■ MECHATROLINK-I

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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 Subordinate Devices: 15
(The maximum number of Subordinate Devices might change depending on the Main Device unit. Refer to the manual of the Main Device 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 Subordinate Devices: 30
(The maximum number of Subordinate Devices might change depending on the Main Device unit. Refer to the manual of the Main Device 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)

OUTPUT SPECIFICATIONS

Output range: 4 to 20 mA DC
Load resistance: ≤ 600 Ω
Operational range: -15 to +115 % of output range

INSTALLATION

Current consumption
•**DC**: Approx. 130 mA
Operating temperature: 0 to 55°C (32 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: DIN rail (35 mm rail)
Weight: 200 g (0.44 lb)

PERFORMANCE

Conversion accuracy: ±0.1 %
Data range: 0 – 10000 of the output range
(Scaling of converted data is configurable with the configurator software (model: R7CON))
Temp. coefficient: ±0.015 %/°C (±0.008 %/°F)
Response time: 250 msec. (0 – 90 %)
Insulation resistance: ≥ 100 MΩ with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute
(output 0 to output 1 to power)
500 V AC @ 1 minute (MECHATROLINK or FG to output or power)

FUNCTIONS

Output hold function:
Output at the loss of communication is selectable from output clear (fix the output at -15 %) and output hold (last normally received data) with DIP switch.
At the startup, it outputs -15 % until the communication is established and normal data is received.

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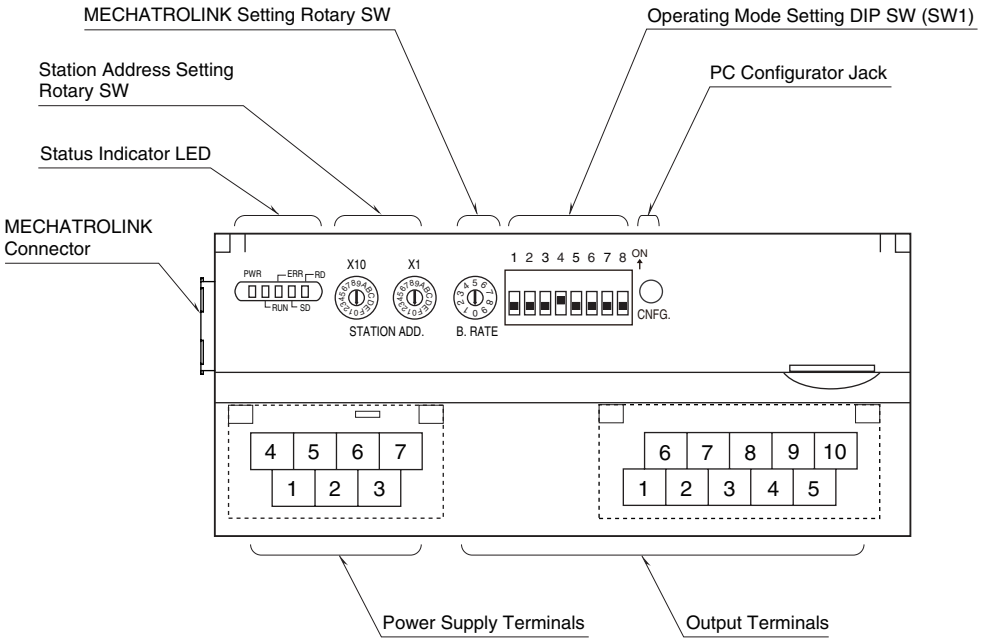
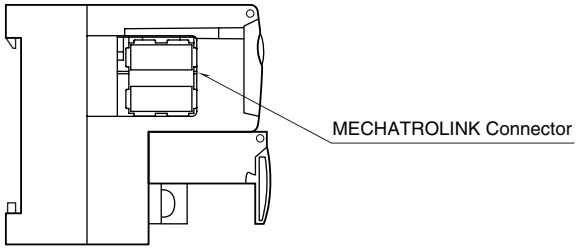
EXTERNAL VIEW

■ FRONT VIEW

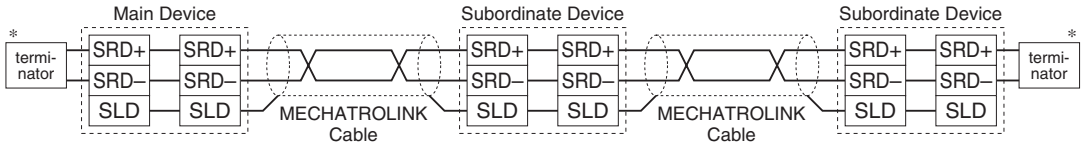


■ SIDE VIEW



COMMUNICATION CABLE CONNECTIONS

■ 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 Main Device units may have incorporated terminating resistors. Consult the instruction manual for the Main Device.

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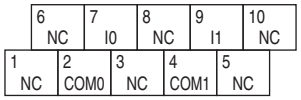
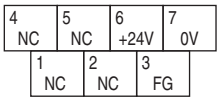
TERMINAL ASSIGNMENTS

■OUTPUT TERMINAL ASSIGNMENT



NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	NC	No connection	6	NC	No connection
2	COM0	Common 0	7	I0	Current 0
3	NC	No connection	8	NC	No connection
4	COM1	Common 1	9	I1	Current 0
5	NC	No connection	10	NC	No connection

■ POWER SUPPLY TERMINAL ASSIGNMENT



NO.	ID	FUNCTION, NOTES
1	NC	----
2	NC	----
3	FG	FG
4	NC	----
5	NC	----
6	+24V	Power input (24V DC)
7	0 V	Power input (0V)

MECHATROLINK RELATED COMMANDS

Related commands are as follows.
Command of MECHATROLINK has a two-layer structure, which is composed of Data Link Layer (upper layer) and Application Layer (lower layer). All the Application Layer Commands are located in lower layer of Data Link Layer (CDRW).

COMMAND	COMMAND NAME	COMMAND (hexadecimal)	DESCRIPTION
Data Link Layer Command	MDS	04H	Product type reading
	CDRW	03H	Data transmission
Application Layer Command	NOP	00H	Invalid
	ID_RD	03H	Product information reading
	CONNECT	0EH	Communication start with Main Device
	DISCONNECT	0FH	Communication stop with Main Device
	DATA_RWA	50H	I/O data update

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■ DATA LINK LAYER COMMAND

• MDS (04H) Command Data Format

Reads product type.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
0	04H	90H	Product type reading
1	00H	00H	Reserved
2	00H	80H	Intelligent I/O
3 – 31	00H	00H	3 – 17 bytes at 17-byte mode

• CDRW (03H) Command Data Format

Data transmission command is located in upper layer of Application Layer Command.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
0	03H	90H	Data transmission
1	CMD	RCMD	CMD : Application Layer command RCMD : Response (Same value as Application Layer Command)
2	00H	ALARM	Error code (Refer to the following table)
3	00H	STATUS1	Transmission status (Refer to the following table)
4	00H	STATUS2	Reserved
5 – 31	XX	YY	Depend upon the Application Layer Command

• ALARM

Communication error codes at the Subordinate Device are sent to the Main Device.

ERROR CODE (hexadecimal)	DESCRIPTION	CLASSIFICATION
00H	MECHATROLINK communication is in normal status	----
01H	Unsupported command is received.	Warning
02H	Command execution conditions are not met.	Warning
03H	Data in the command is not correct.	Warning
04H	Synchronization Error	Error

• STATUS1

The status of the Subordinate Device is sent to the Main Device in accordance with the classification of the error codes at ALARM.

Bit	DEFINITION	DESCRIPTION
0	Error Bit	1 : Error, 0 : Normal
1	Warning Bit	1 : Warning, 0 : Normal
2	Command Ready Bit	1 : Command can be accepted (ready), 0 : Command cannot be accepted (busy)
3 – 7	Unused	----

■ APPLICATION LAYER COMMAND

Application Layer Command is located in lower layer of Data Link Layer Command (CDRW). Following tables are details on bytes 5 through 31 dependent upon Application Layer Command.

Note : At 17 bytes mode, bytes dependant upon Application Layer Command are to be 5 through 17.

• NOP (00H) Command Data Format

0, which indicates invalid command, is sent to the Main Device.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5 – 31	00H	00H	Invalid

• ID_RD (03) Command Data Format

Reads product information. (max. 8 bytes at a time) Repeat reading multiple times in order to read out all the data.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	DEVICE_CODE	DEVICE_CODE	DEVICE_CODE : Selection of product information 00 : Product model (data length : 32 bytes) 02 : Product version (data length : 32 bytes) 0F : Vendor code (data length : 48 bytes)
6	OFFSET	OFFSET	OFFSET : Specify read position
7	SIZE	SIZE	SIZE : Specify length of read data (max. 8 bytes)
8 – 15	00H	ID	Product information data
16 – 31	00H	00H	Unused

• **CONNECT (0EH) Command Data Format**

Starts communication with the Main Device.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	VER	VER	MODE : Selection of MECHATROLINK version 10 : MECHATROLINK - I 21 : MECHATROLINK - II
6	COM_MODE	COM_MODE	COM_MODE : Selection of data length 00 : 17-byte mode 80 : 32-byte mode
7	COM_TIME	COM_TIME	COM_TIME : Communication cycle (milliseconds) MECHATROLINK-I: Multiples of two (2) MECHATROLINK-II: Integral multiples of the transmission cycle
8 – 31	00H	00H	Unused

• **DISCONNECT (0FH) Command Data Format**

Stops communication with the Main Device.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5 – 31	00H	00H	Unused

• **DATA_RWA (50H) Command Data Format**

Transmits I/O data from/to the Main Device. Data allocation is as follows.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	Output 0 low 8 bits	Echo back of set value at command area	
6	Output 0 high 8 bits	Echo back of set value at command area	
7	Output 1 low 8 bits	Echo back of set value at command area	
8	Output 1 high 8 bits	Echo back of set value at command area	
9 – 12	00H	00H	Unused
13	Discrete output data of extension module low 8 bits	Discrete input data of extension module low 8 bits or echo back of set value at command area	
14	Discrete output data of extension module high 8 bits	Discrete input data of extension module high 8 bits or echo back of set value at command area	"0" for R7ML-EA8 and R7ML-EC8x
15 – 31	00H	00H	Unused

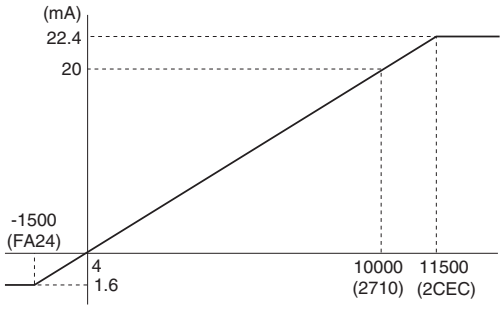
DATA CONVERSION

■ OUTPUT RANGE AND DATA CONVERSION (FACTORY DEFAULT SETTING)

Digital output data is converted into analog representations of 0 – 100% proportional to each scaled range.
Overrange output is possible from -15 to +115% of the nominal range.
When the signal exceeds the limit, the data is fixed at -15% or +115%.

• Output Range 4 – 20 mA DC

Digital Value, Decimal	Degital Value, HEX	Output Value, Engineering Unit	Output Value, %
-1500	FA24	≤ 1.6 mA	-15%
0	0	4 mA	0%
10000	2710	20 mA	100%
11500	2CEC	≥ 22.4 mA	115%

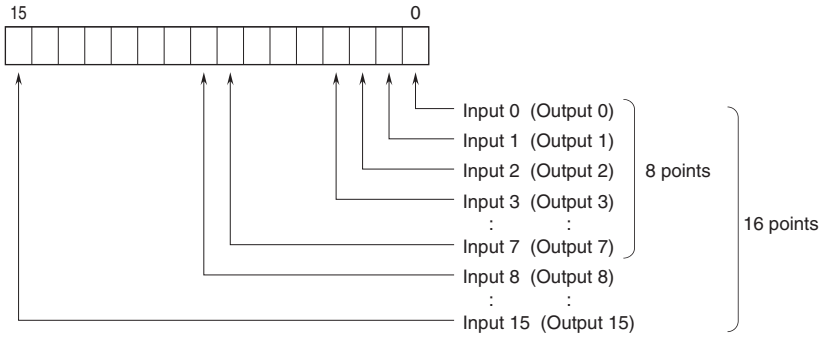


I/O DATA DESCRIPTIONS

■ **ANALOG OUTPUT**

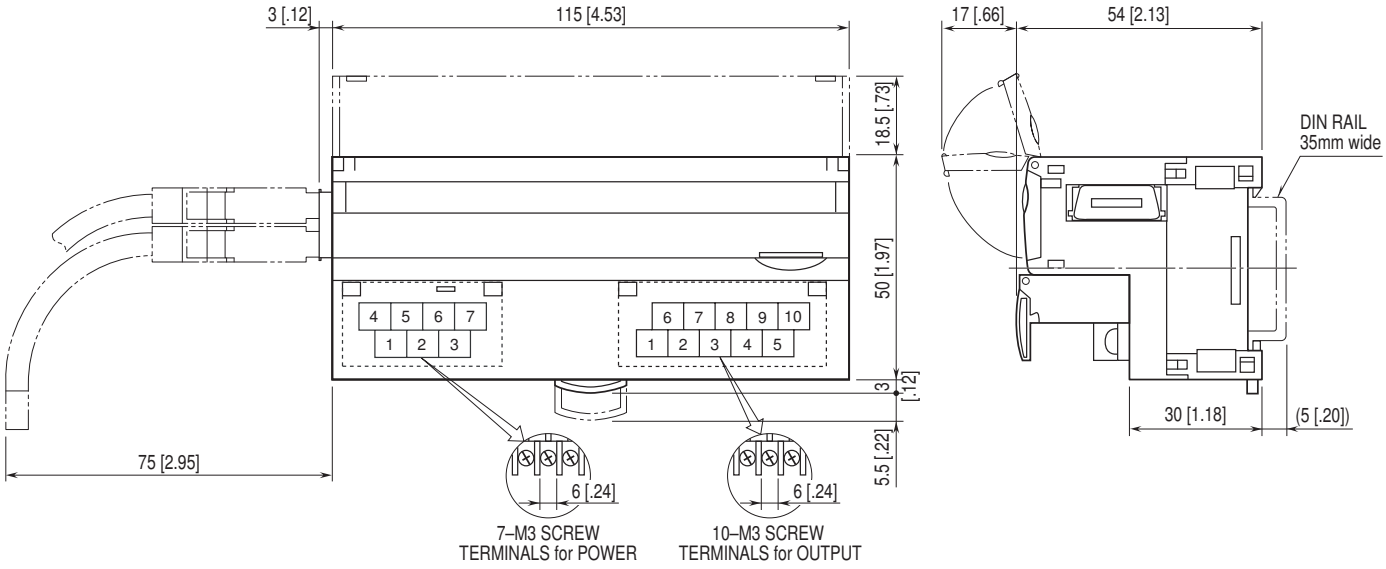
16-bit binary data
Negative values represented in 2's complements

■ **DISCRETE I/O**



0 : OFF
1 : ON

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



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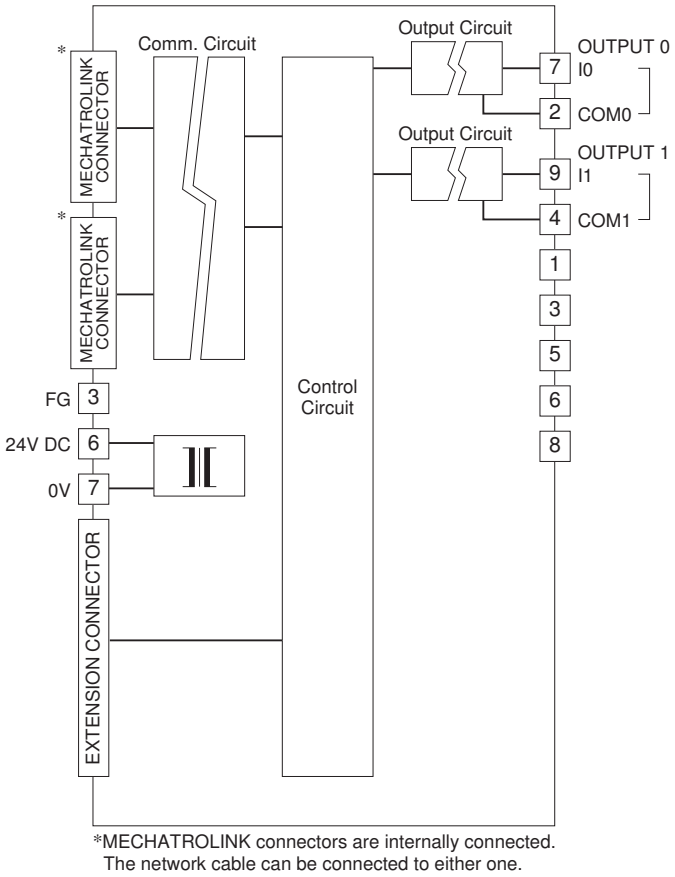
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

Caution: FG terminal is NOT a protective conductor terminal.



⚠ Specifications are subject to change without notice.

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