MECHATROLINK I/O MODULE
(NPN transistor output, 32 points, screw terminal block, MECHATROLINK-I/-II use)

MODEL **R7K4FML-6-DC32A**

BEFORE USE ....

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact our sales office or representatives.

■ PACKAGE INCLUDES:

Discrete output module ....(1)
Mounter slider ....(2)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

• The equipment must be mounted inside the instrument panel of a metal enclosure.
• The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures to ensure the CE conformity.

■ POWER INPUT RATING & OPERATIONAL RANGE

• Locate the power input rating marked on the product and confirm its operational range as indicated below:
  24V DC rating: 24V ±10%, approx. 60mA

■ GENERAL PRECAUTIONS

• Before you remove the unit or mount it, turn off the power supply and output signal for safety.
• Before you remove the terminal block or mount it, make sure to turn off the power supply and output signal for safety.
• DO NOT set the switches on the module while the power is supplied. The switches are used only for maintenance without the power.

■ ENVIRONMENT

• Indoor use.
• When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
• Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
• Environmental temperature must be within 0 to 55°C (32 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

■ WIRING

• Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
• Do not bind these cables together with those in which noises are present. Do not install them in the same duct.
• Be sure to close the terminal cover for safety.

■ AND ....

• The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

COMPONENT IDENTIFICATION
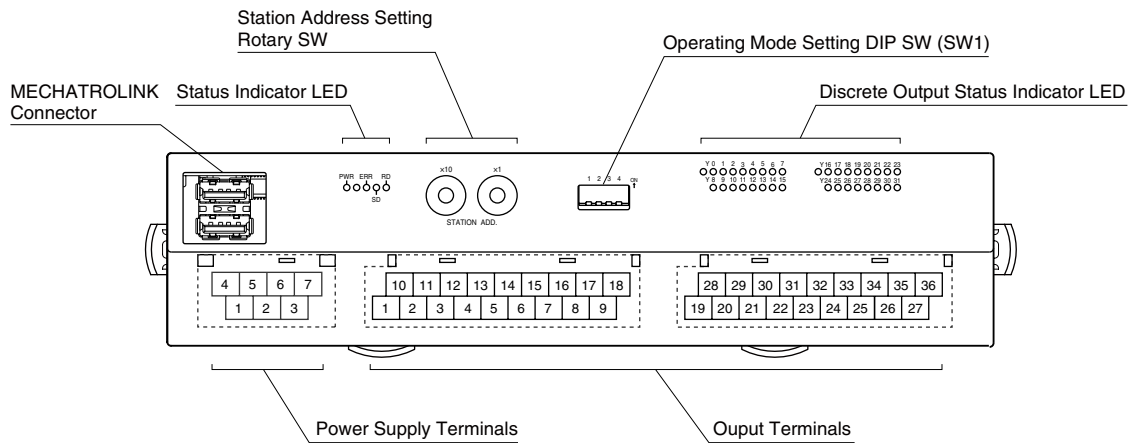
■ STATUS INDICATOR LED

ID	COLOR	FUNCTION
PWR	Green	Turns on when the internal power is supplied normally.
ERR	Red	Turns on in no station address setting error.
SD	Green	Turns on when the module is transmitting.
RD	Green	Turns on when the module is receiving.

■ DISCRETE OUTPUT STATUS INDICATOR LED

LED green indicators shows the signal status.
   ON : LED ON
   OFF : LED OFF

■ STATION ADDRESS

Station Address is selected between 60H and 7FH (Simple I/O) in hexadecimal.
The left switch and the right switch determine the MSD and the LSD of the address, respectively.
(Factory setting: 61H)
Certain numbers may not be selectable depending on the master types.
Refer to the instruction manual of the master unit for detail.

Station Address Setting (×1)

Station Address Setting (×10)
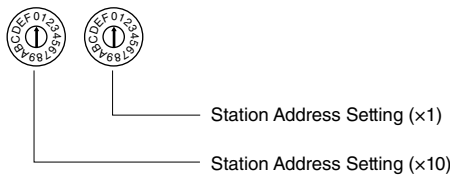
■ OPERATING MODE

• MECHATROLINK mode: SW1-1, 1-2

Choose MECHATROLINK-I or -II, and the data size.
SW1-1 and SW1-2 are used.

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

(*) Factory setting
Note: Be sure to set unused SW1-3 and 1-4 to OFF.

■ POWER SUPPLY TERMINAL ASSIGNMENT

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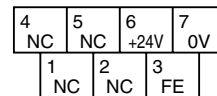
1. NC   –
2. NC   –
3. FE   Functional earth
4. NC   –
5. NC   –
6. +24V   Power supply (24V DC)
7. 0V   Power supply (0V)

■ **OUTPUT TERMINAL ASSIGNMENT**

10 V+	11 Y1	12 Y3	13 Y5	14 Y7	15 Y9	16 Y11	17 Y13	18 Y15
1 V–	2 Y0	3 Y2	4 Y4	5 Y6	6 Y8	7 Y10	8 Y12	9 Y14

28 V+	29 Y17	30 Y19	31 Y21	32 Y23	33 Y25	34 Y27	35 Y29	36 Y31
19 V–	20 Y16	21 Y18	22 Y20	23 Y22	24 Y24	25 Y26	26 Y28	27 Y30

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	V–	Out. Common	10	V+	External excitation
2	Y0	Output 0	11	Y1	Output 1
3	Y2	Output 2	12	Y3	Output 3
4	Y4	Output 4	13	Y5	Output 5
5	Y6	Output 6	14	Y7	Output 7
6	Y8	Output 8	15	Y9	Output 9
7	Y10	Output 10	16	Y11	Output 11
8	Y12	Output 12	17	Y13	Output 13
9	Y14	Output 14	18	Y15	Output 15

| NO.	ID	FUNCTION	NO.	ID	FUNCTION
19	V–	Out. Common	28	V+	External excitation
20	Y16	Output 16	29	Y17	Output 17
21	Y18	Output 18	30	Y19	Output 19
22	Y20	Output 20	31	Y21	Output 21
23	Y22	Output 22	32	Y23	Output 23
24	Y24	Output 24	33	Y25	Output 25
25	Y26	Output 26	34	Y27	Output 27
26	Y28	Output 28	35	Y29	Output 29
27	Y30	Output 30	36	Y31	Output 31

MOUNTING INSTRUCTIONS

■ **DIN RAIL MOUNTING**

• **Mounting**

1) Set the upper hook at the rear side of the unit on the DIN rail.

2) Push in the lower.
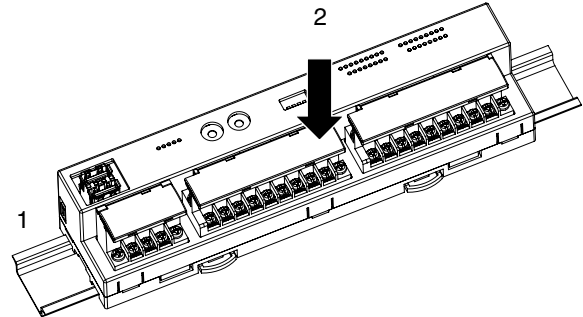
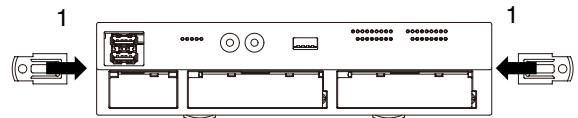
• **Dismounting**

1) Push down the DIN rail mounter slider with tip of a minus screwdriver.

2) Pull the lower of the unit.

3) Remove the upper hook of the unit from the DIN rail.
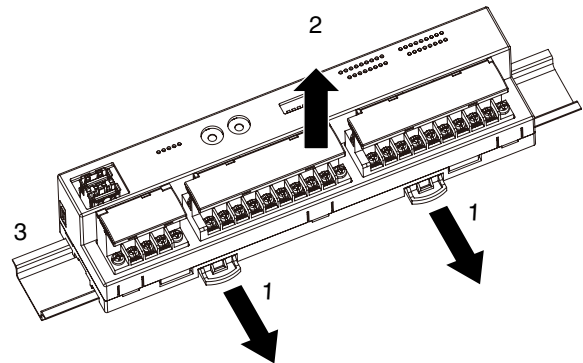
■ **SURFACE MOUNTING**

1) Insert the two DIN rail mounter sliders until it clicks once, as shown below.

2) Mount the unit with M4 screws referring the Mounting Requirements. (Torque: 1.4 N·m)
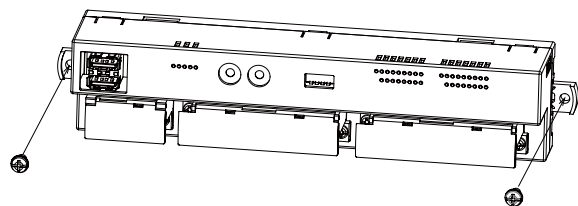
TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

■ **EXTERNAL DIMENSIONS unit: mm (inch)**

235 (9.25)
220 (8.66)
210 (8.27)
50 (1.97)
3.5 (.14)
5 (.2)
47 (1.85)
45 (1.77)
DIN RAIL 35mm wide
[4 (.16)]

2 – 4.3 dia.
4 deep
(2 – 1.17 dia.
.16 deep)

7–M3 SCREW
TERMINALS FOR POWER

36–M3 SCREW
TERMINALS FOR OUTPUT

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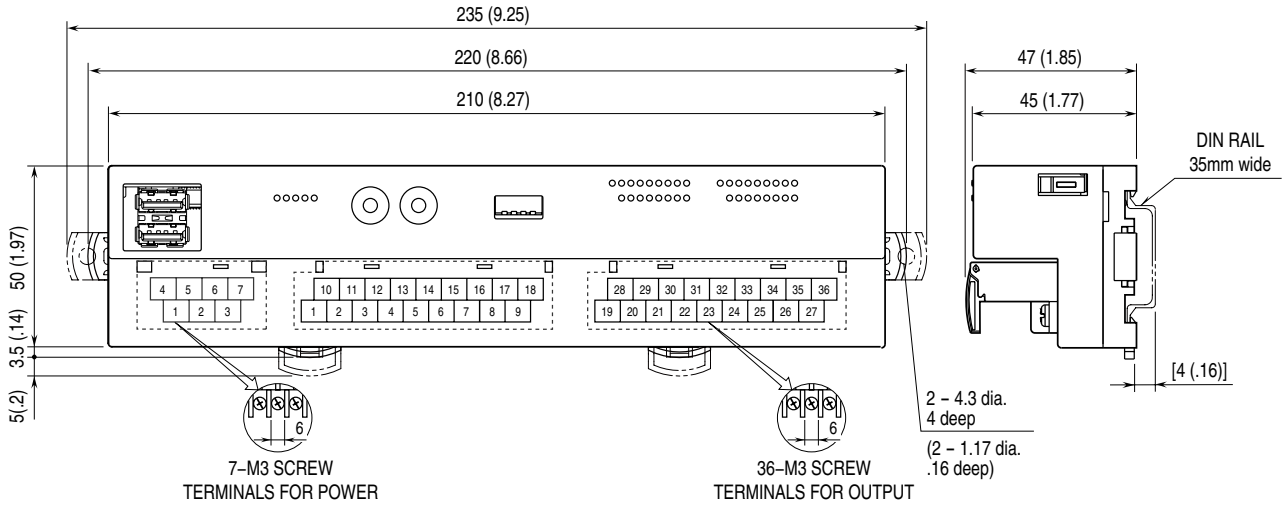
Note: In order to improve EMC performance, bond the FE terminal to ground.

Caution: FE terminal is NOT a protective conductor terminal.

■ **Output Connection Examples**

Terminal	Signal
1	V−
2	Y0
3	Y2
4	Y4
5	Y6
6	Y8
7	Y10
8	Y12
9	Y14
10	V+
11	Y1
12	Y3
13	Y5
14	Y7
15	Y9
16	Y11
17	Y13
18	Y15
19	V−
20	Y16
21	Y18
22	Y20
23	Y22
24	Y24
25	Y26
26	Y28
27	Y30
28	V+
29	Y17
30	Y19
31	Y21
32	Y23
33	Y25
34	Y27
35	Y29
36	Y31

* MECHATROLINK CONNECTOR
* MECHATROLINK CONNECTOR

FE 3
24V DC 6
0V 7

Output Connection Examples:
V+ 28
V+ 10
V− 19
V− 1
Y0 2
Y31 36
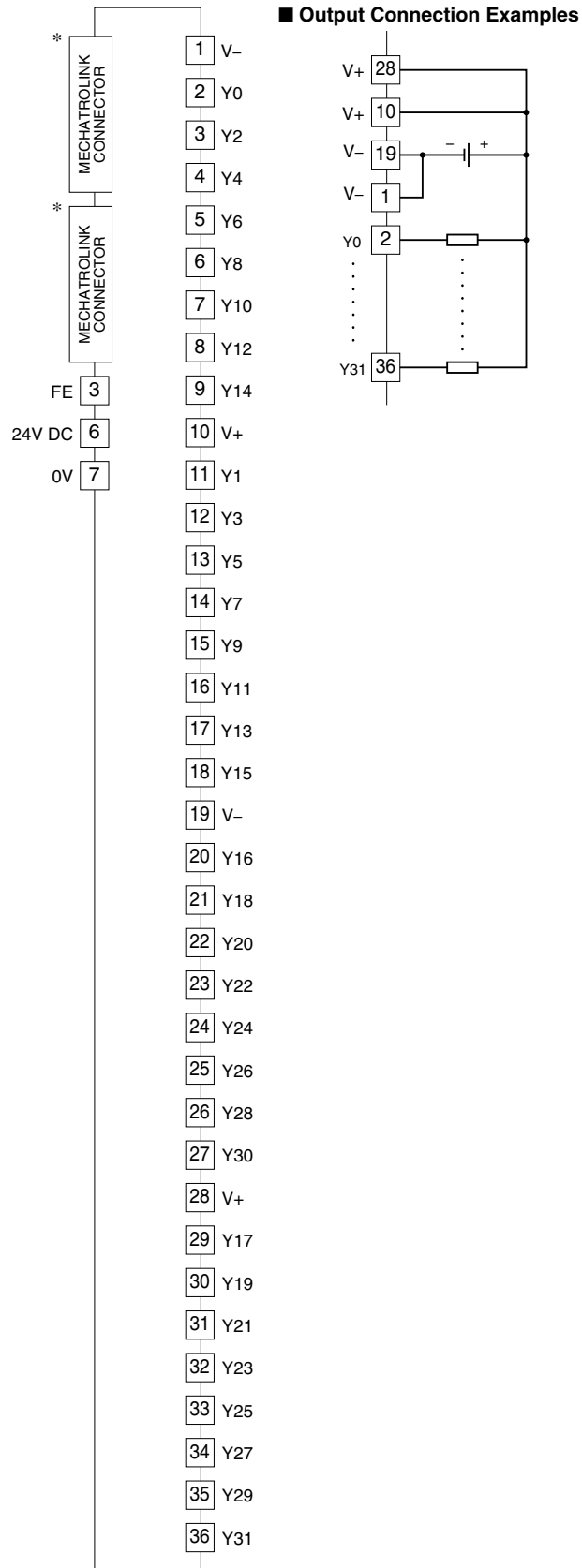
* MECHATROLINK connectors are internally connected. The network cable can be connected to either one.

MOUNTING REQUIREMENTS   unit: mm (inch)

220 (8.66)

2–M4
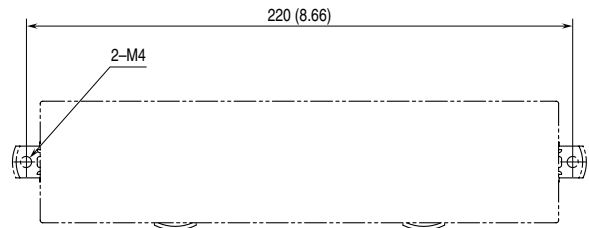
WIRING INSTRUCTIONS

■ TORQUE

Wiring screw for separable terminal: 0.5 N·m
Fixing screw for separable terminal: 0.5 N·m

■ SOLDERLESS TERMINAL

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.
Applicable wire size: 0.25 to 1.65 mm² (AWG 22 to 16)
Recommended manufacturer: Japan Solderless Terminal MFG. Co., Ltd, Nichifu Co., Ltd

3.3 (.13) max
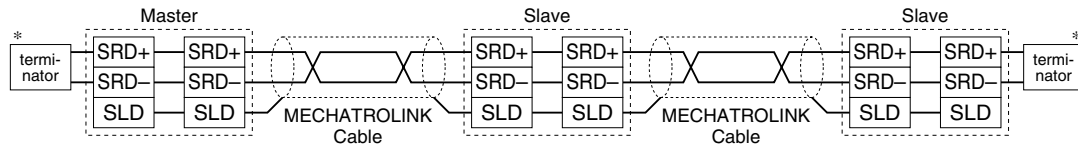6 (.24) max
mm (inch)
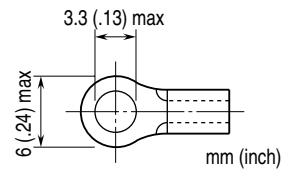
■ HOW TO UNMOUNT THE SEPARABLE TERMINAL

The separable terminal of the unit is 2 piece constructions. It is possible to remove the terminal by loosening two screws of terminal alternately.

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

MECHATROLINK COMMUNICATION

■ 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 byte

■ 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: 0.25 msec., 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 the same network)

MECHATROLINK RELATED COMMANDS

R7K4FML (Simple I/O) communicates with I/O service with no processor, therefore it uses a connectionless communication protocol. There is no application layer either; the R7K4FML interchanges I/O data via data link layer.

■ MECHATROLINK DATA LINK LAYER COMMAND DESCRIPTIONS

The following tables explain the two Commands supported by the R7K4FML.

• MDS Command (04H) Data Format

BYTE	COMMAND	RESPONSE	REMARKS
0	MDS (04H)	S(0) (90H)	Message Data Search (MDS) Command: Read the ID from slave station(s) S(0): Response to MDS
1	0	ID	
2	0		
3	0	0	All 0
4	0	0	
5	0	0	
6	0	0	
7	0	0	
8	0	0	
9	0	0	
10	0	0	
11	0	0	
12	0	0	
13	0	0	
14	0	0	
15	0	0	
16	0	0	
17 : 31	0 : 0	0 : 0	Byte 17 through 31 are always 0 in the 32-byte mode. These bytes are unavailable for MECHATROLINK-I and MECHATROLINK-II in the 17-byte mode.

• CDRW Command (03H) Data Format

BYTE	COMMAND	RESPONSE	REMARKS
0	CDRW (03H)	ACK (01H)	Cyclic Data Read/Write (CDRW) Command: Link transmission Acknowledge (ACK): Positive response to CDRW
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Out Data: Lowest 	In Data: Lowest 	Order of data: Little Endian
16	Out Data: Highest	In Data: Highest	
17 : 31	 (Out Data: Highest)	 (In Data: Highest)	Byte 17 through 31 are unavailable for MECHATROLINK-I and MECHATROLINK-II in the 17-byte mode. (Only available for MECHATROLINK-II in the 32-byte mode)

I/O DATA DESCRIPTIONS

■ **17-BYTE MODE**

• **32 points output data (Out Data)**

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
⋮	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0
13	Out7	Out6	Out5	Out4	Out3	Out2	Out1	Out0
14	Out15	Out14	Out13	Out12	Out11	Out10	Out9	Out8
15	Out23	Out22	Out21	Out20	Out19	Out18	Out17	Out16
16	Out31	Out30	Out29	Out28	Out27	Out26	Out25	Out24

■ **32-BYTE MODE**

• **32 points output data (Out Data)**

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
⋮	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
29	Out7	Out6	Out5	Out4	Out3	Out2	Out1	Out0
30	Out15	Out14	Out13	Out12	Out11	Out10	Out9	Out8
31	Out23	Out22	Out21	Out20	Out19	Out18	Out17	Out16
32	Out31	Out30	Out29	Out28	Out27	Out26	Out25	Out24

0: OFF, 1: ON

At the loss of communication, output is hold (last data correctly received is hold).