

MECHATROLINK I/O MODULE
(NPN/PNP discrete input, 32 points, screw terminal block,
MECHATROLINK-I/-II use)**MODEL R7K4FML-6-DA32****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 input 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 \pm 10%, approx. 55mA

■ GENERAL PRECAUTIONS

- Before you remove the unit or mount it, turn off the power supply and input signal for safety.
- Before you remove the terminal block or mount it, make sure to turn off the power supply and input 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.

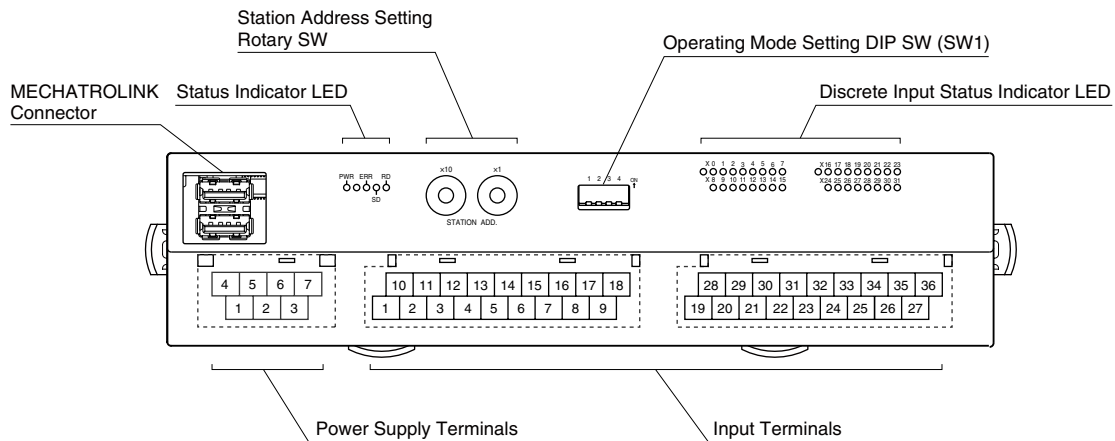
■ WIRING

- 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 INPUT STATUS INDICATOR LED

LED green indicators shows the signal status.

ON : LED ON

OFF : LED OFF

■ STATION ADDRESS

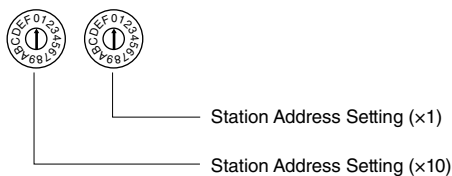
Station Address is selected between 60H and 7FH (Simple I/O) in hexadecimal.

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.



■ 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	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)

INPUT TERMINAL ASSIGNMENT

10	11	12	13	14	15	16	17	18
COM	X1	X3	X5	X7	X9	X11	X13	X15
1	2	3	4	5	6	7	8	9
COM	X0	X2	X4	X6	X8	X10	X12	X14

28	29	30	31	32	33	34	35	36
COM	X17	X19	X21	X23	X25	X27	X29	X31
19	20	21	22	23	24	25	26	27
COM	X16	X18	X20	X22	X24	X26	X28	X30

NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	COM	Common	10	COM	Common
2	X0	Input 0	11	X1	Input 1
3	X2	Input 2	12	X3	Input 3
4	X4	Input 4	13	X5	Input 5
5	X6	Input 6	14	X7	Input 7
6	X8	Input 8	15	X9	Input 9
7	X10	Input 10	16	X11	Input 11
8	X12	Input 12	17	X13	Input 13
9	X14	Input 14	18	X15	Input 15

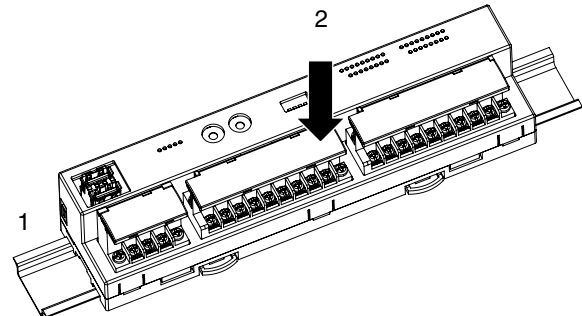
NO.	ID	FUNCTION	NO.	ID	FUNCTION
19	COM	Common	28	COM	Common
20	X16	Input 16	29	X17	Input 17
21	X18	Input 18	30	X19	Input 19
22	X20	Input 20	31	X21	Input 21
23	X22	Input 22	32	X23	Input 23
24	X24	Input 24	33	X25	Input 25
25	X26	Input 26	34	X27	Input 27
26	X28	Input 28	35	X29	Input 29
27	X30	Input 30	36	X31	Input 31

MOUNTING INSTRUCTIONS

■ DIN RAIL MOUNTING

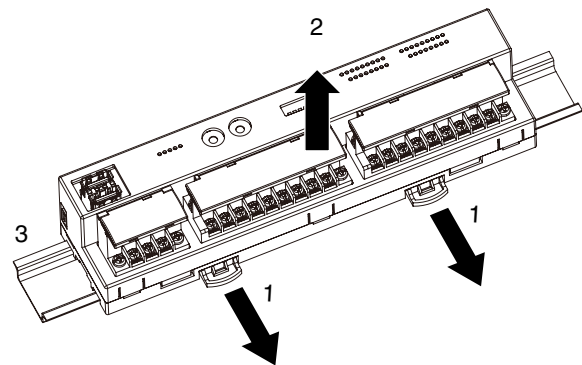
• Mounting

- 1) Set the upper hook at the rear side of the unit on the DIN rail.
- 2) Push in the lower.



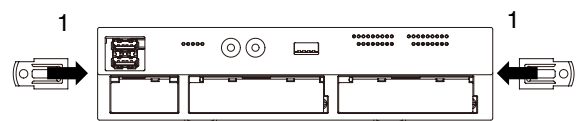
• Dismounting

- 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.

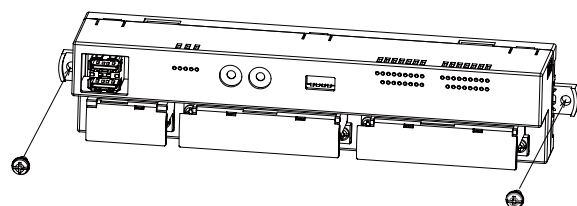


■ SURFACE MOUNTING

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



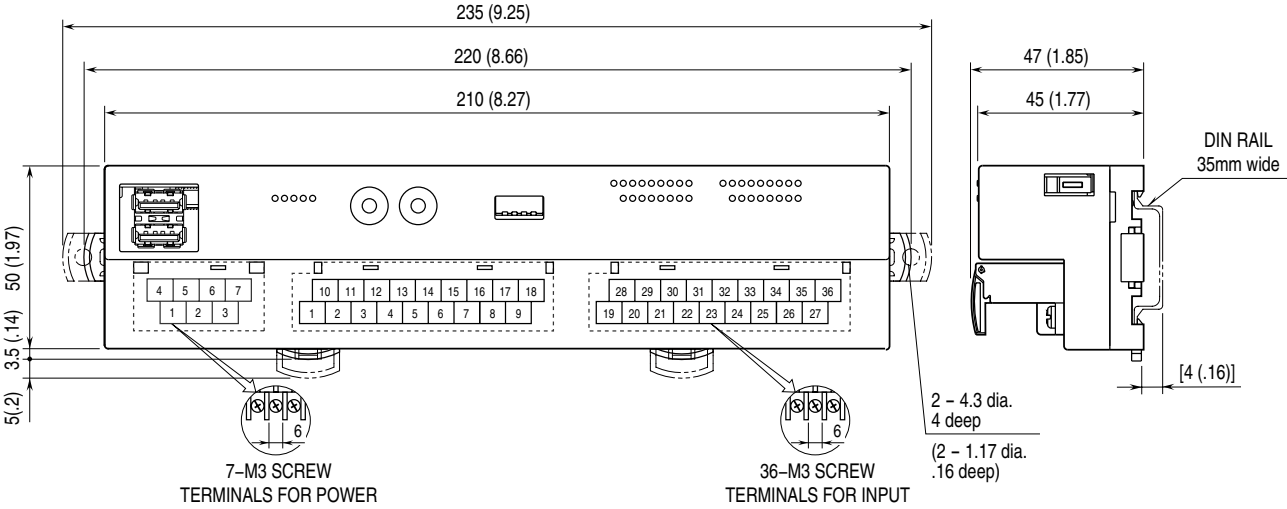
- 2) Mount the unit with M4 screws referring the Mounting Requirements. (Torque: 1.4 N·m)



TERMINAL CONNECTIONS

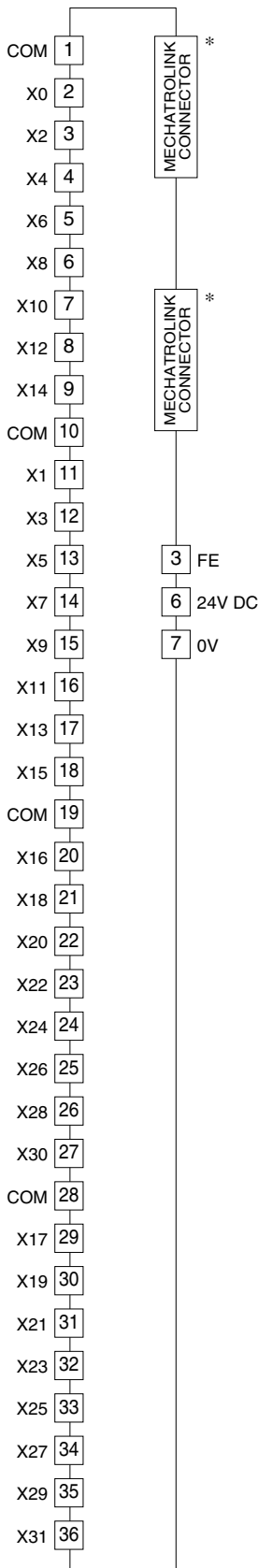
Connect the unit as in the diagram below.

■ EXTERNAL DIMENSIONS unit: mm (inch)

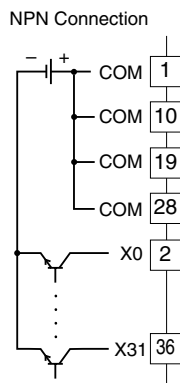
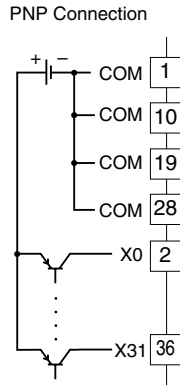


CONNECTION DIAGRAM

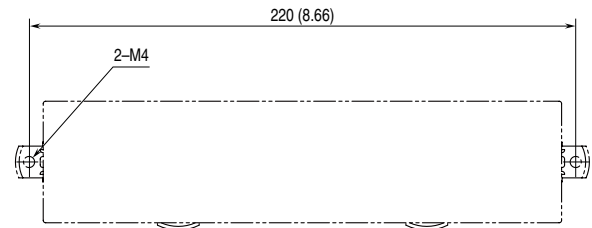
Note: In order to improve EMC performance, bond the FE terminal to ground.
 Caution: FE terminal is NOT a protective conductor terminal.



Input Connection Examples



MOUNTING REQUIREMENTS unit: mm (inch)



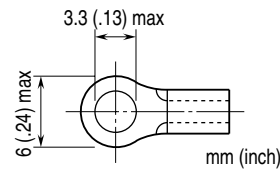
WIRING INSTRUCTIONS

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



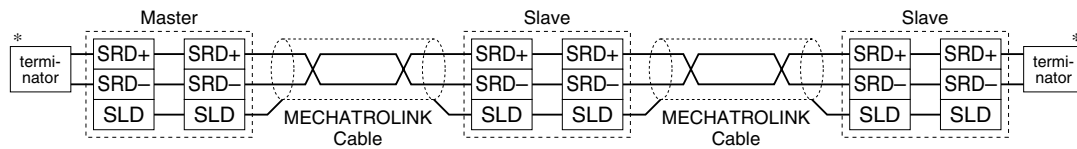
HOW TO UNMOUNT THE SEPARABLE TERMINAL

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

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

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	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.
:	:	:	
31	0	0	

• 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	Out Data: Lowest	In Data: Lowest	Order of data: Little Endian
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16	Out Data: Highest	In Data: Highest	
17	(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)
:			
31			

I/O DATA DESCRIPTIONS

■ 17-BYTE MODE

• 32 points input data (In Data)

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	In7	In6	In5	In4	In3	In2	In1	In0
2	In15	In14	In13	In12	In11	In10	In9	In8
3	In23	In22	In21	In20	In19	In18	In17	In16
4	In31	In30	In29	In28	In27	In26	In25	In24
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	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0

■ 32-BYTE MODE

• 32 points input data (In Data)

Byte	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	In7	In6	In5	In4	In3	In2	In1	In0
2	In15	In14	In13	In12	In11	In10	In9	In8
3	In23	In22	In21	In20	In19	In18	In17	In16
4	In31	In30	In29	In28	In27	In26	In25	In24
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	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0

0: OFF, 1: ON