

MODEL: R7K4DML-B-DAC32C

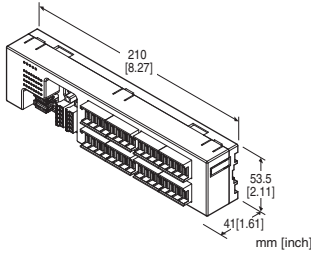
Remote I/O R7K4D Series

MECHATROLINK I/O MODULE

(NPN discrete input, NPN transistor output, 16 points each, e-CON connector, MECHATROLINK- I/- II use)

Functions & Features

- 16 points NPN discrete input & 16 points NPN transistor output module for MECHATROLINK- I/- II



MODEL: R7K4DML-B-DAC32C-R[1]

ORDERING INFORMATION

- Code number: R7K4DML-B-DAC32C-R[1]
Specify a code from below for [1].
(e.g. R7K4DML-B-DAC32C-R/Q)
- Specify the specification for option code /Q
(e.g. /C01)

TERMINAL BLOCK

B: Tension clamp terminal block for power supply
Connector for MECHATROLINK- I/- II for communication
e-CON connector for I/O

I/O TYPE

DAC32C: NPN discrete input &
NPN transistor output, 16 points each

POWER INPUT

DC Power
R: 24 V DC
(Operational voltage range 24 V \pm 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

GENERAL SPECIFICATIONS

Connection

MECHATROLINK: MECHATROLINK- I/- II connector

Power & Sensor excitation: Separable screwless spring terminal

I/O: e-CON connector

Housing material: Flame-resistant resin (gray)

Isolation: Input or output or sensor excitation to MECHATROLINK or FE to power

Status indicator LED: PWR, ERR, SD, RD

(Refer to the instruction manual for details)

Discrete I/O status indicator LED: Green LED turns on with I/O ON

MECHATROLINK COMMUNICATION

MECHATROLINK mode: Set with DIP switches

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

MECHATROLINK-II, data length 32 byte)

(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 JEMC-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 JEMC-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., 2.5 msec., 3 msec., 4 msec., 8 msec.

Data length: 17 byte / 32 byte selectable (Must choose identical data size for all stations within the network)

INPUT SPECIFICATIONS

Common: Positive common (NPN) per 16 points
Maximum inputs applicable at once: No limit (at 24V DC)
Sensor excitation: 24 V DC $\pm 10\%$; ripple 5 %p-p max.,
 ≤ 2 A (including discrete input load charge); rated current
8 A
ON voltage / current: ≥ 15 V DC (X0 through XF to +24V) /
 ≥ 3.5 mA
OFF voltage / current: ≤ 5 V DC (X0 through XF to +24V) /
 ≤ 1 mA
Input current: ≤ 5.5 mA per point at 24 V DC
Input resistance: Approx. 4.4 k Ω
ON delay: ≤ 0.5 msec.
OFF delay: ≤ 1.0 msec.

STANDARDS & APPROVALS

EU conformity:
EMC Directive
EMI EN 61000-6-4
EMS EN 61000-6-2
RoHS Directive

OUTPUT SPECIFICATIONS

Common: Negative common (NPN) per 16 points
Maximum outputs applicable at once: No limit (at 24 V DC)
Sensor Excitation: 24 V DC $\pm 10\%$, ripple 5 %p-p max.,
 ≤ 2 A (including discrete output load charge); rated current
8 A
Rated output current: 0.1 A per point, 1.6 A per common
Residual voltage: ≤ 1.2 V
Leakage current: ≤ 0.1 mA
ON delay: ≤ 0.5 msec.
OFF delay: ≤ 1.0 msec.
Overload current protection function: Limits the current
value when overcurrent is detected
Overheat protection function: Turns OFF the outputs when
overheat is detected
(When driving an inductive load, connect a diode in parallel
with the load.)

INSTALLATION

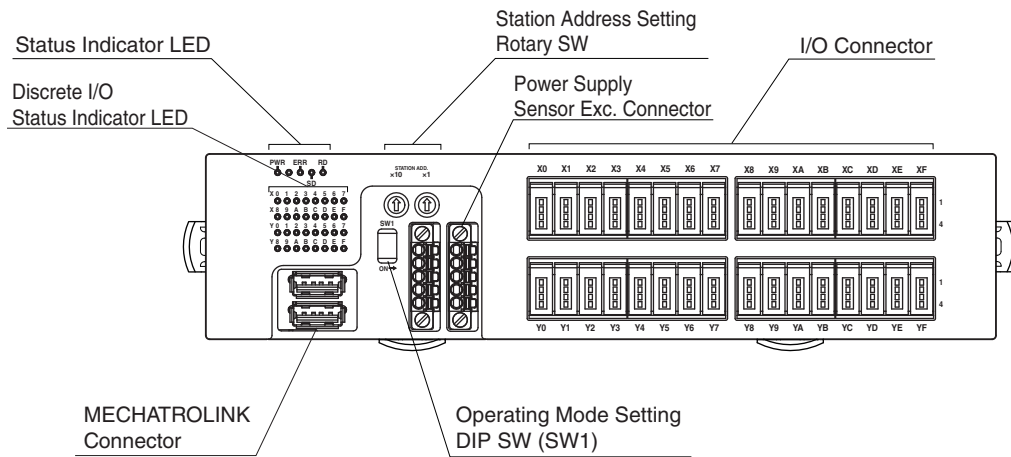
Power consumption: Approx. 75 mA (rated current 2 A)
Operating temperature: 0 to 55°C (32 to 131°F)
Storage temperature: -20 to +65°C (-4 to +149°F)
Operating humidity: 30 to 90 %RH (non-condensing)
Atmosphere: No corrosive gas or heavy dust
Mounting: Surface or DIN rail (35 mm rail)
Weight: 200 g (0.44 lb)

PERFORMANCE

Insulation resistance: ≥ 100 M Ω with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute
(input or output or sensor excitation to power)
500 V AC @ 1 minute (MECHATROLINK or FE to input or
output or sensor excitation or power)

MODEL: R7K4DML-B-DAC32C

EXTERNAL VIEW



MODEL: R7K4DML-B-DAC32C

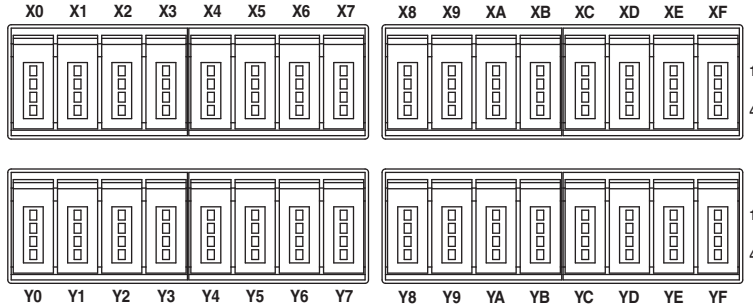
TERMINAL ASSIGNMENTS

■ I/O TERMINAL ASSIGNMENT

- e-CON connector

Recommended cable connector: 37104-()-000FL (3M Company)

(The cable connector is not included in the package. Specify wire size instead of (); refer to the specifications of the product.)



| No. | ID | FUNCTION | No. | ID | FUNCTION |
|-----|----|-------------|-----|----|-------------|
| X0 | 1 | +24V 24V DC | X8 | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X0 Input 0 | | 4 | X8 Input 8 |
| X1 | 1 | +24V 24V DC | X9 | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X1 Input 1 | | 4 | X9 Input 9 |
| X2 | 1 | +24V 24V DC | XA | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X2 Input 2 | | 4 | XA Input 10 |
| X3 | 1 | +24V 24V DC | XB | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X3 Input 3 | | 4 | XB Input 11 |
| X4 | 1 | +24V 24V DC | XC | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X4 Input 4 | | 4 | XC Input 12 |
| X5 | 1 | +24V 24V DC | XD | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X5 Input 5 | | 4 | XD Input 13 |
| X6 | 1 | +24V 24V DC | XE | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X6 Input 6 | | 4 | XE Input 14 |
| X7 | 1 | +24V 24V DC | XF | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | GND 0V | | 3 | GND 0V |
| | 4 | X7 Input 7 | | 4 | XF Input 15 |

| No. | ID | FUNCTION | No. | ID | FUNCTION |
|-----|----|-------------|-----|----|--------------|
| Y0 | 1 | +24V 24V DC | Y8 | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y0 Output 0 | | 4 | Y8 Output 8 |
| Y1 | 1 | +24V 24V DC | Y9 | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y1 Output 1 | | 4 | Y9 Output 9 |
| Y2 | 1 | +24V 24V DC | YA | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y2 Output 2 | | 4 | YA Output 10 |
| Y3 | 1 | +24V 24V DC | YB | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y3 Output 3 | | 4 | YB Output 11 |
| Y4 | 1 | +24V 24V DC | YC | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y4 Output 4 | | 4 | YC Output 12 |
| Y5 | 1 | +24V 24V DC | YD | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y5 Output 5 | | 4 | YD Output 13 |
| Y6 | 1 | +24V 24V DC | YE | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y6 Output 6 | | 4 | YE Output 14 |
| Y7 | 1 | +24V 24V DC | YF | 1 | +24V 24V DC |
| | 2 | NC Unused | | 2 | NC Unused |
| | 3 | NC Unused | | 3 | NC Unused |
| | 4 | Y7 Output 7 | | 4 | YF Output 15 |

■ POWER SUPPLY, SENSOR EXCITATION

Cable connector: FMC1,5 / 5-STF-3,5

(Phoenix Contact) (included in the package)

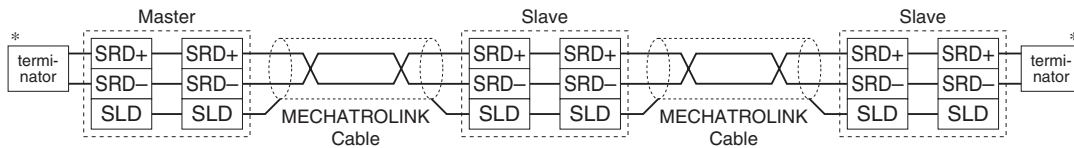
Applicable wire size: 0.2 – 1.5 mm²; stripped length 10 mm

Recommended solderless terminal

- AI0,25-10YE 0.25 mm² (Phoenix Contact)
- AI0,34-10TQ 0.34 mm² (Phoenix Contact)
- AI0,5-10WH 0.5 mm² (Phoenix Contact)
- AI0,75-10GY 0.75 mm² (Phoenix Contact)
- A1-10 1.0 mm² (Phoenix Contact)
- A1,5-10 1.5 mm² (Phoenix Contact)

| | | | |
|---|---|--------------|----------------------------|
| 1 | ○ | 1. PWR+ | Power Supply (24V DC) |
| 2 | ○ | 2. PWR- | Power Supply (0V) |
| 3 | ○ | 3. FE | Functional earth |
| 4 | ○ | 4. SNSR.EXC+ | Sensor excitation (24V DC) |
| 5 | ○ | 5. SNSR.EXC- | Sensor excitation (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 of the Master unit.

MECHATROLINK RELATED COMMANDS

R7K4DML (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 R7K4DML interchanges I/O data via data link layer.

■ MECHATROLINK DATA LINK LAYER COMMAND DESCRIPTIONS

The following tables explain the two Commands supported by the R7K4DML.

• 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 | | |
| 4 | 0 | 0 | All 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 | | | |
| 17 | | | 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 | (Out Data: Highest) | (In Data: Highest) | |

MODEL: R7K4DML-B-DAC32C

I/O DATA DESCRIPTIONS

■ 17-BYTE MODE

•16 points input 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 | 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 | 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 |

•16 points output 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | Out7 | Out6 | Out5 | Out4 | Out3 | Out2 | Out1 | Out0 |
| 16 | Out15 | Out14 | Out13 | Out12 | Out11 | Out10 | Out9 | Out8 |

■ 32-BYTE MODE

•16 points input 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 | 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 | 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 |

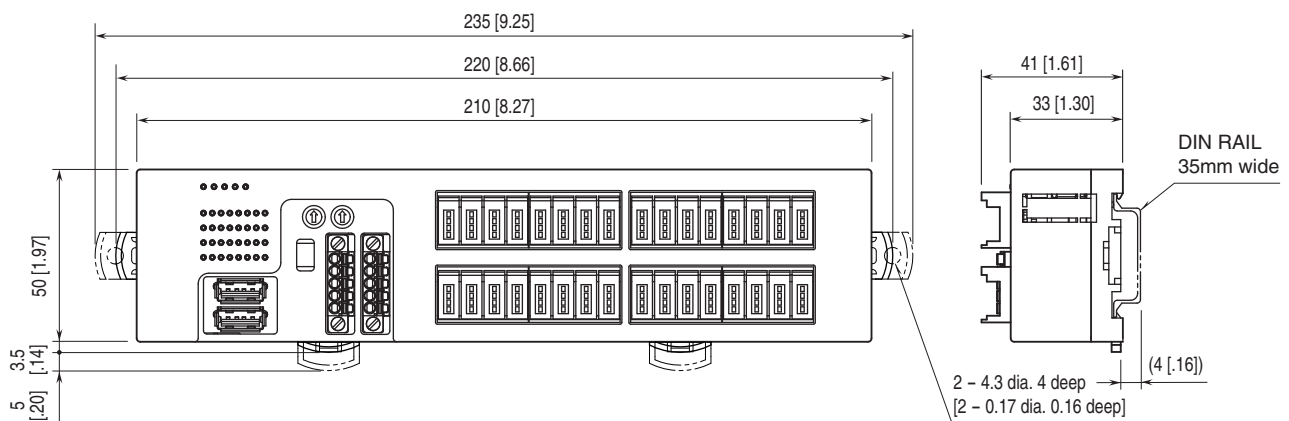
•16 points output data

| 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | Out7 | Out6 | Out5 | Out4 | Out3 | Out2 | Out1 | Out0 |
| 32 | Out15 | Out14 | Out13 | Out12 | Out11 | Out10 | Out9 | Out8 |

0: OFF, 1: ON

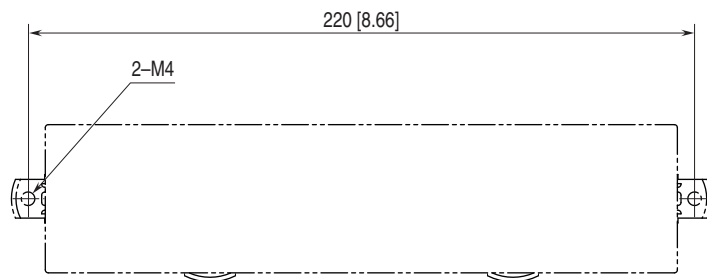
At the loss of communication, output is hold. (last data correctly received is hold)

EXTERNAL DIMENSIONS unit: mm [inch]



MODEL: R7K4DML-B-DAC32C

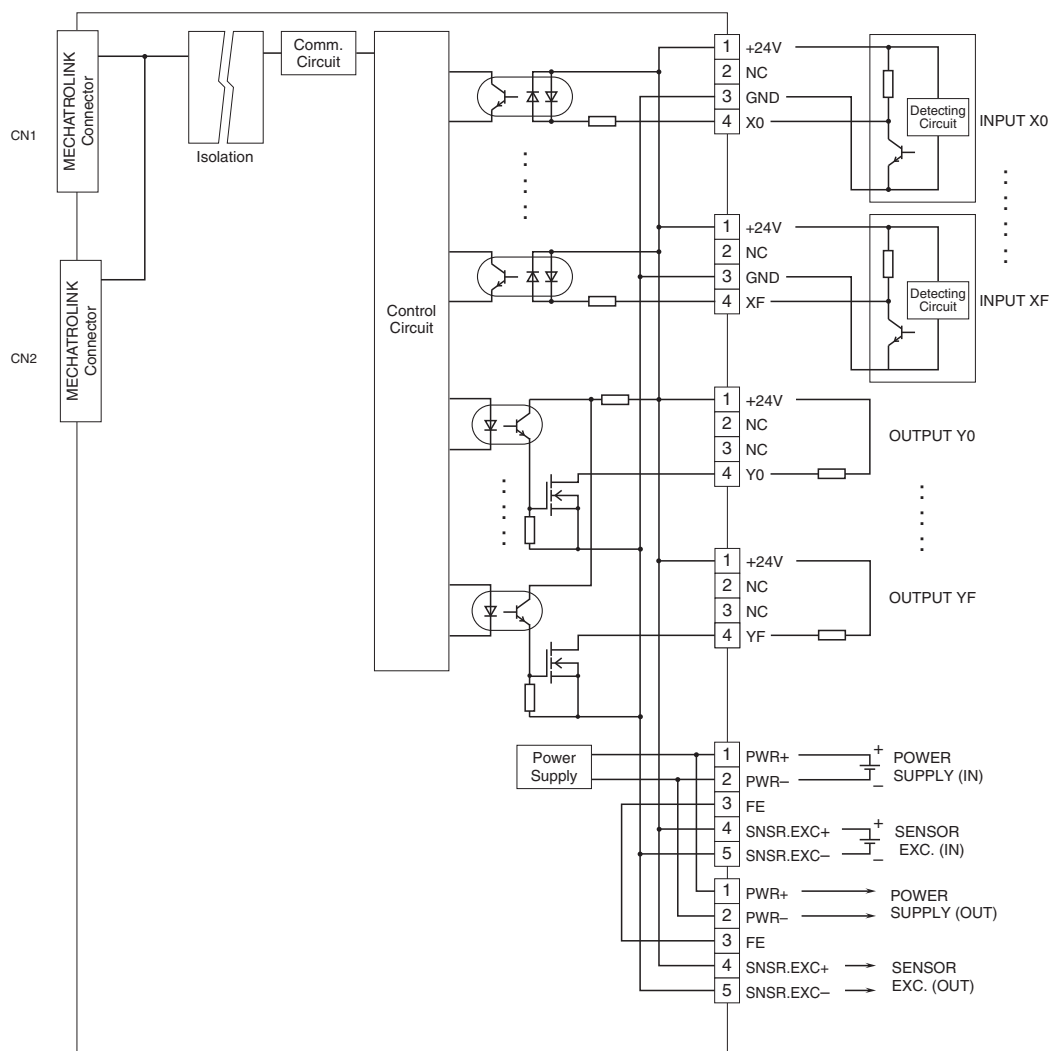
MOUNTING REQUIREMENTS unit: mm [inch]



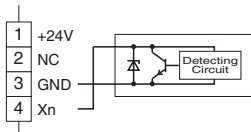
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

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

Caution: FE terminal is NOT a protective conductor terminal.



■ 2-Wire Sensor





Specifications are subject to change without notice.