

# MODEL: R7K4DML-B-DAC32A

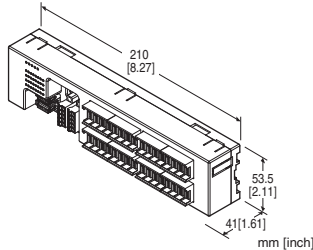
## Remote I/O R7K4D Series

### MECHATROLINK I/O MODULE

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

#### Functions & Features

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



## MODEL: R7K4DML-B-DAC32A-R[1]

### ORDERING INFORMATION

- Code number: R7K4DML-B-DAC32A-R[1]  
Specify a code from below for [1].  
(e.g. R7K4DML-B-DAC32A-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

**DAC32A:** PNP 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 M-System's 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:** Negative common (PNP) 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.,  
 $\leq 2$  A (including discrete input load charge); rated current  
8 A  
**ON voltage / current:**  $\geq 15$  V DC (X0 through XF to GND) /  
 $\geq 3.5$  mA  
**OFF voltage / current:**  $\leq 5$  V DC (X0 through XF to GND) /  
 $\leq 1$  mA  
**Input current:**  $\leq 5.5$  mA per point at 24 V DC  
**Input resistance:** Approx. 4.4 k $\Omega$   
**ON delay:**  $\leq 0.5$  msec.  
**OFF delay:**  $\leq 1.0$  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.,  
 $\leq 2$  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:**  $\leq 1.2$  V  
**Leakage current:**  $\leq 0.1$  mA  
**ON delay:**  $\leq 0.5$  msec.  
**OFF delay:**  $\leq 1.0$  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

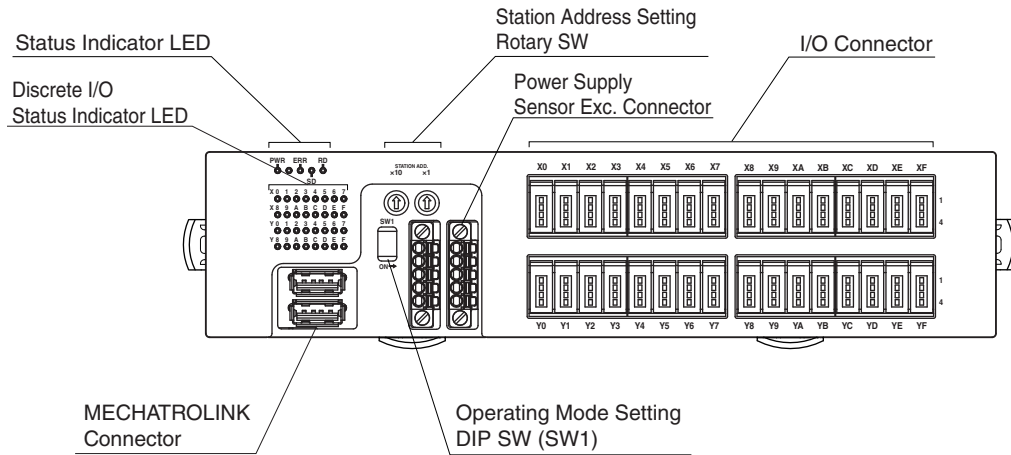
**Power consumption:** Approx. 75 mA (rated current 2 A)  
**Operating temperature:** 0 to 55°C (32 to 131°F)  
**Storage temperature:** -20 to +65°C (-4 to +149°F)  
**Operating humidity:** 30 to 90 %RH (non-condensing)  
**Atmosphere:** No corrosive gas or heavy dust  
**Mounting:** Surface or DIN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

## PERFORMANCE

**Insulation resistance:**  $\geq 100$  M $\Omega$  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-DAC32A

## EXTERNAL VIEW



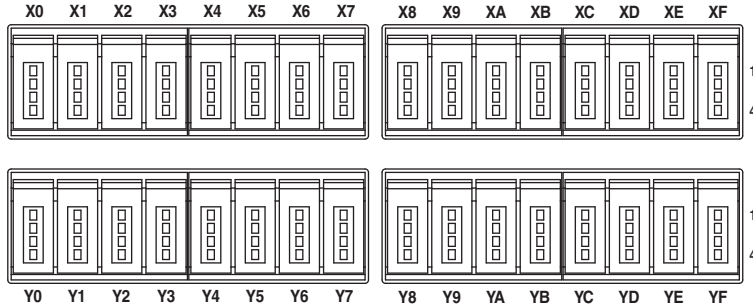
## TERMINAL ASSIGNMENTS

### 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

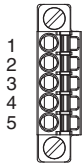
**Cable connector:** FMC1,5 / 5-STF-3,5

(Phoenix Contact) (included in the package)

**Applicable wire size:** 0.2 – 1.5 mm<sup>2</sup>; stripped length 10 mm

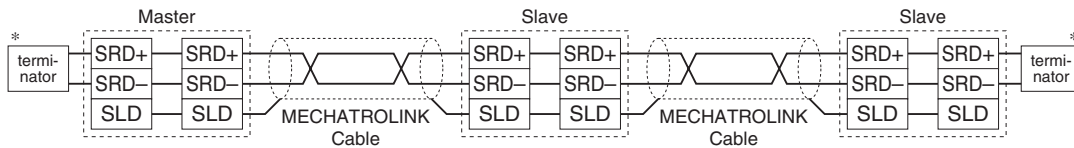
### Recommended solderless terminal

- AI0,25-10YE 0.25 mm<sup>2</sup> (Phoenix Contact)
- AI0,34-10TQ 0.34 mm<sup>2</sup> (Phoenix Contact)
- AI0,5-10WH 0.5 mm<sup>2</sup> (Phoenix Contact)
- AI0,75-10GY 0.75 mm<sup>2</sup> (Phoenix Contact)
- A1-10 1.0 mm<sup>2</sup> (Phoenix Contact)
- A1,5-10 1.5 mm<sup>2</sup> (Phoenix Contact)



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

#### •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

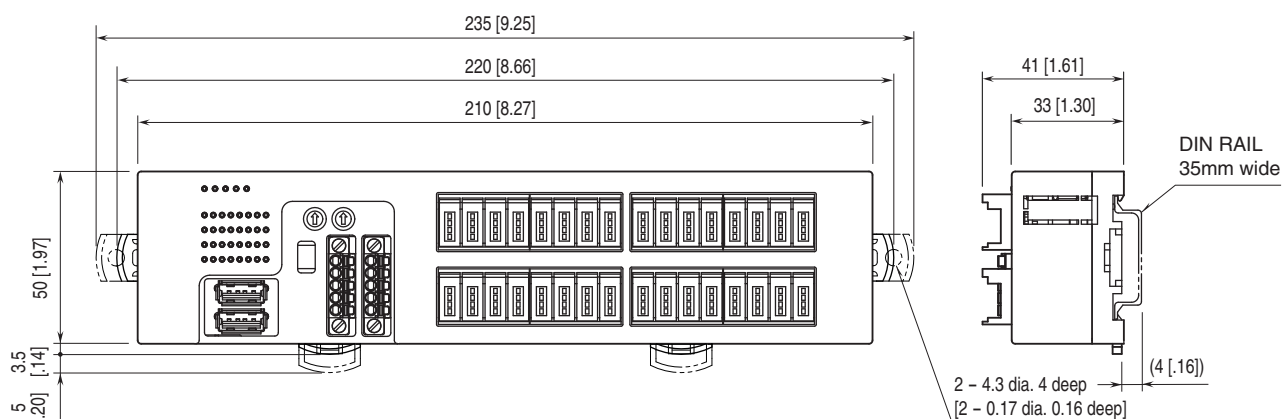
#### •16 points output data

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

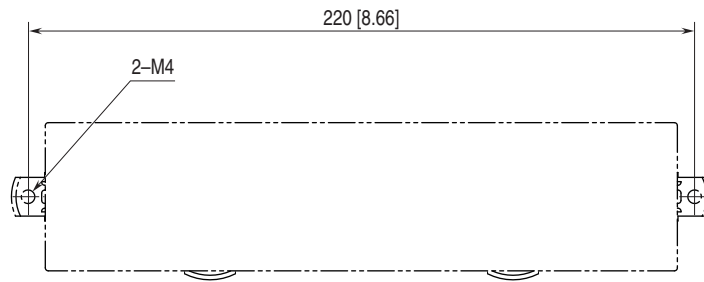
At the loss of communication, output is hold. (last data correctly received is hold)

## EXTERNAL DIMENSIONS unit: mm [inch]



# MODEL: R7K4DML-B-DAC32A

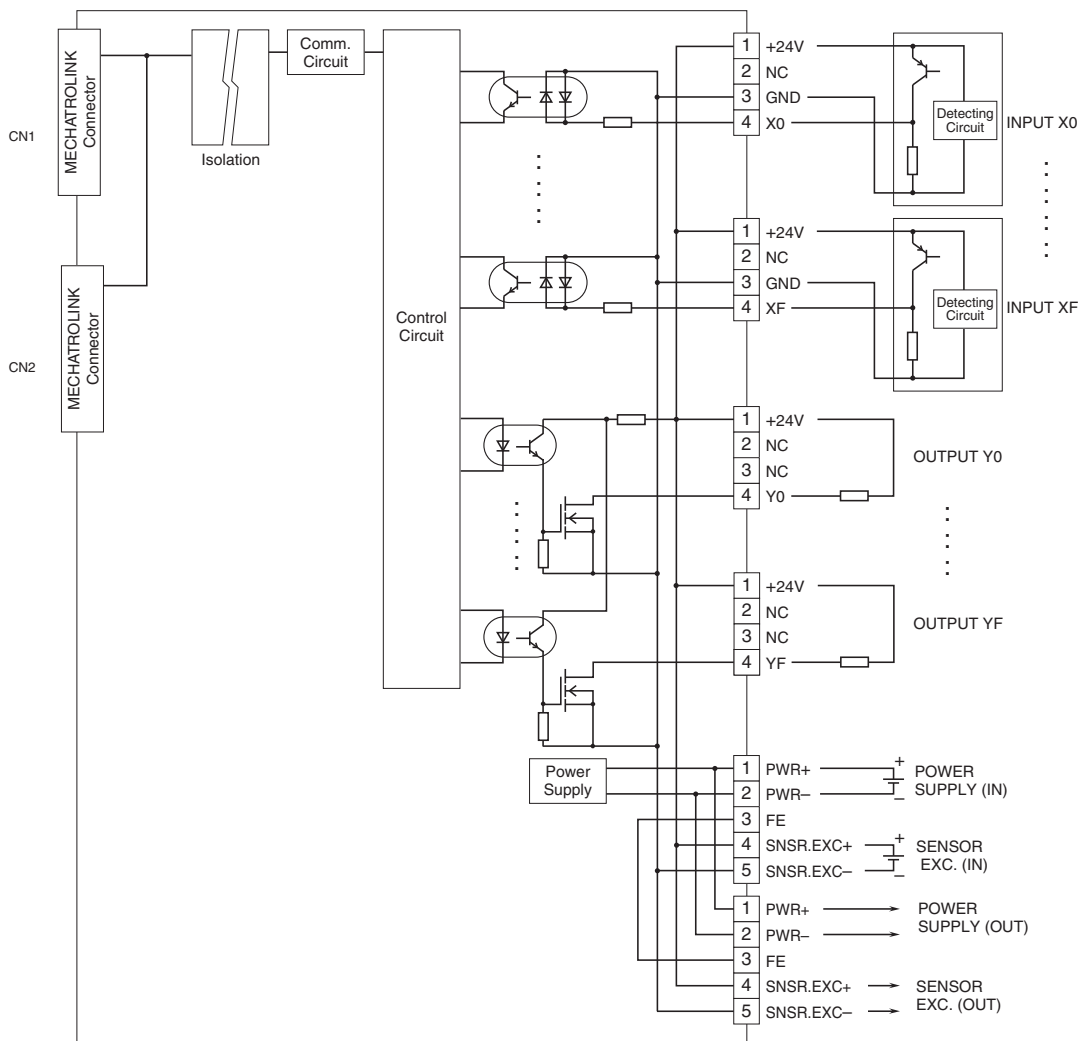
## MOUNTING REQUIREMENTS unit: mm [inch]



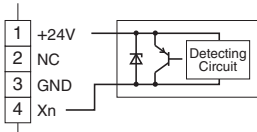
## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

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.