

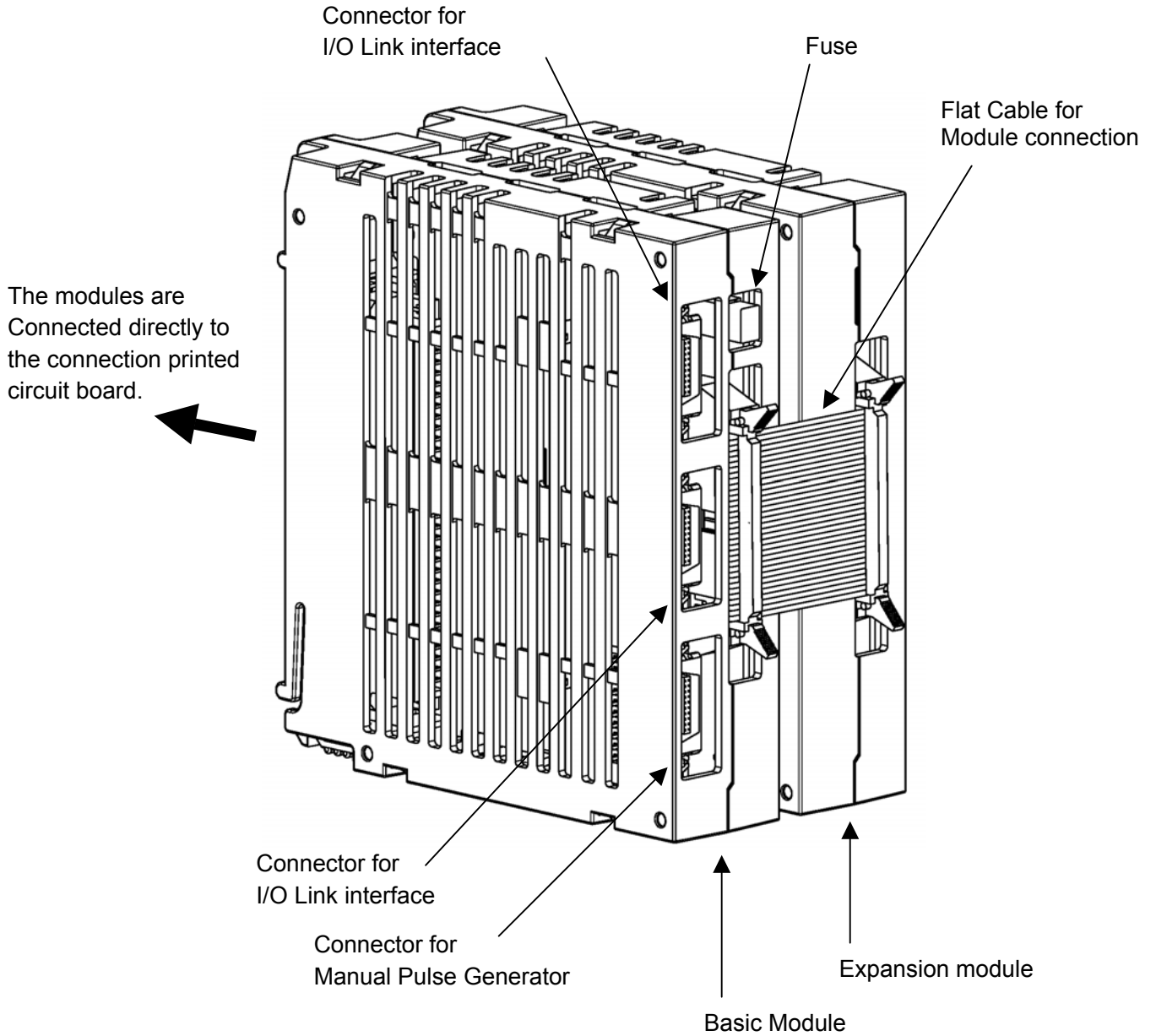
I/O Module type-2 for Connector Panel Connection Manual

— Contents —

1. Configuration
2. Connector layout diagram
3. Connection diagram
4. Module Specifications
5. Installation conditions
6. Power supply rating
7. DI/DO Connection Pin Assignment
8. DI(Input signal) Connection
9. DO(Output signal) Connection
10. DI/DO Signal Specifications
11. Power supply Connection
12. I/O Link connection
13. Manual Pulse Generator Connection
14. Connection of Basic and Expansion modules
15. Address allocation
16. DO(Output signal) alarm detection
17. Dimensions
18. Module installation
19. Connector panel printed circuit board
20. Connector panel Printed circuit board connector
(HONDA MRF-96FD) dimensions

				TITLE	I/O module type-2 for Connector board Connection manual
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EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET 1/29

1. Configuration



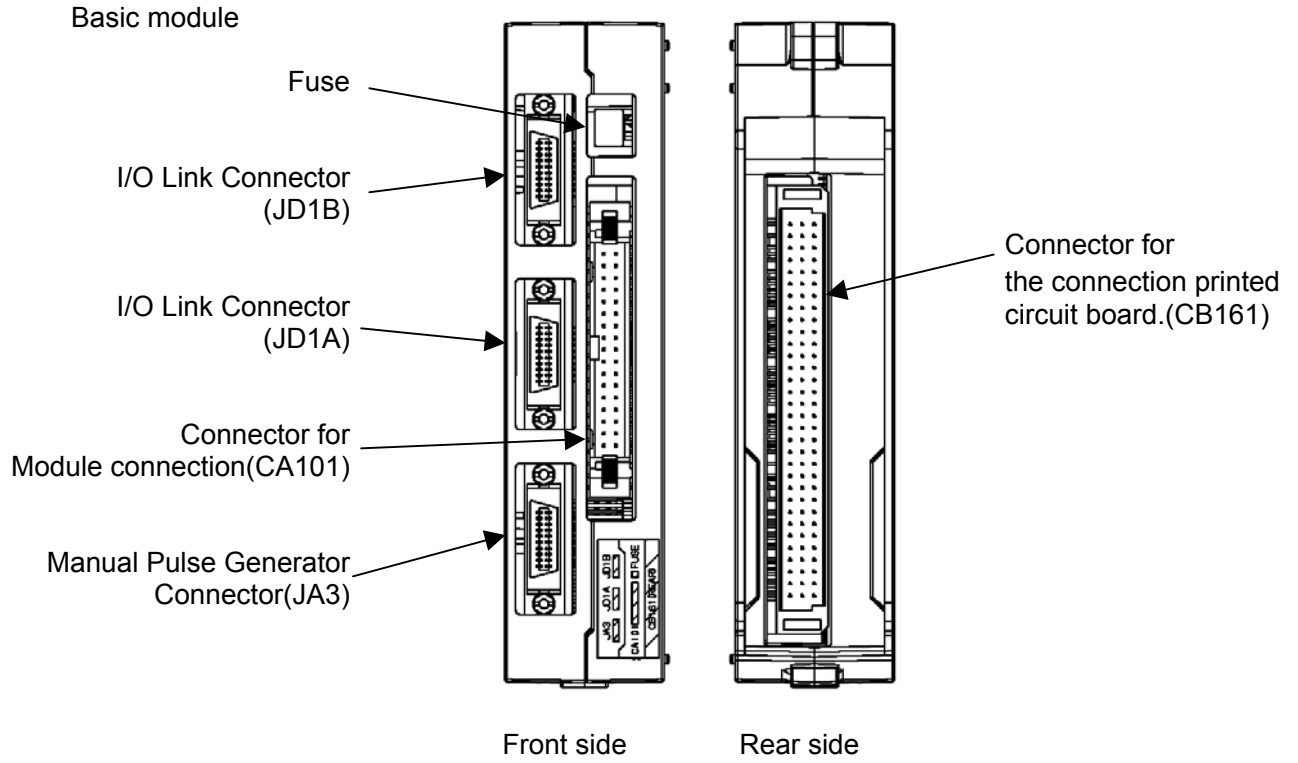
Note : Basic module must be installed to the left of Expansion module.

It is impossible to fix this module at the DIN rails..

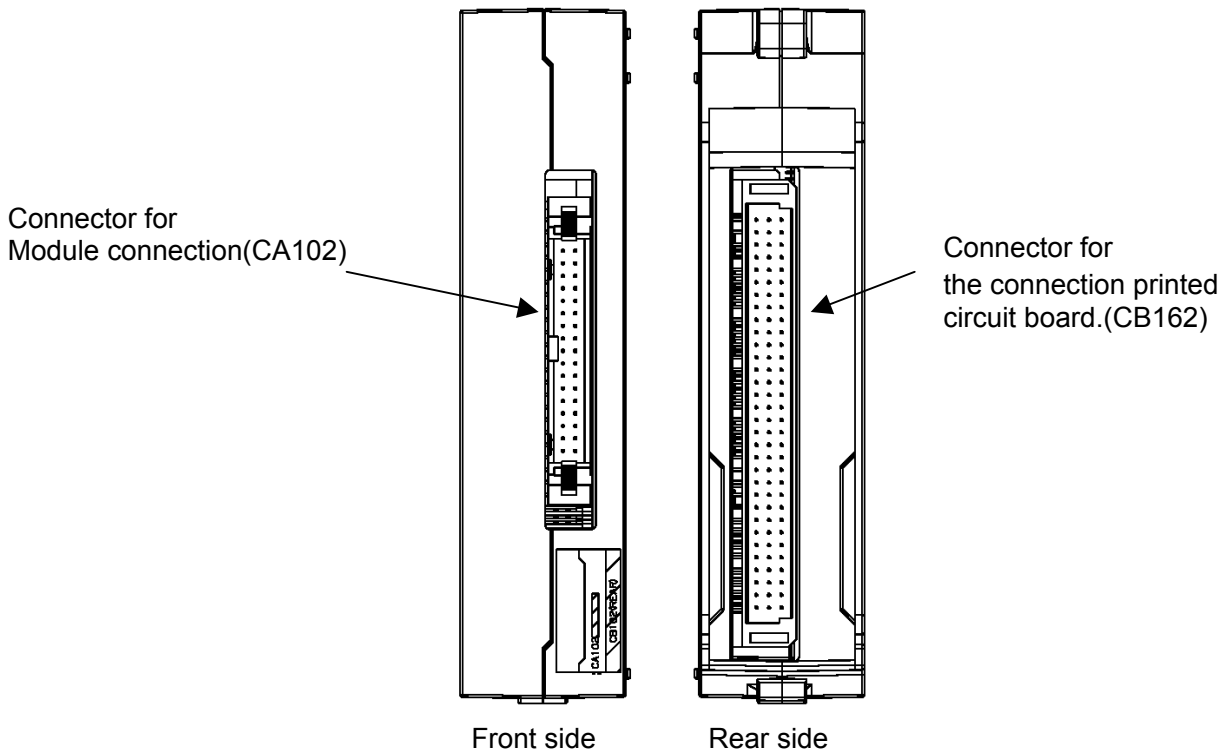
Maximum DI/DO = 96/64(One Base module + one Expansion module)

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 2/29

2. Connector layout diagram

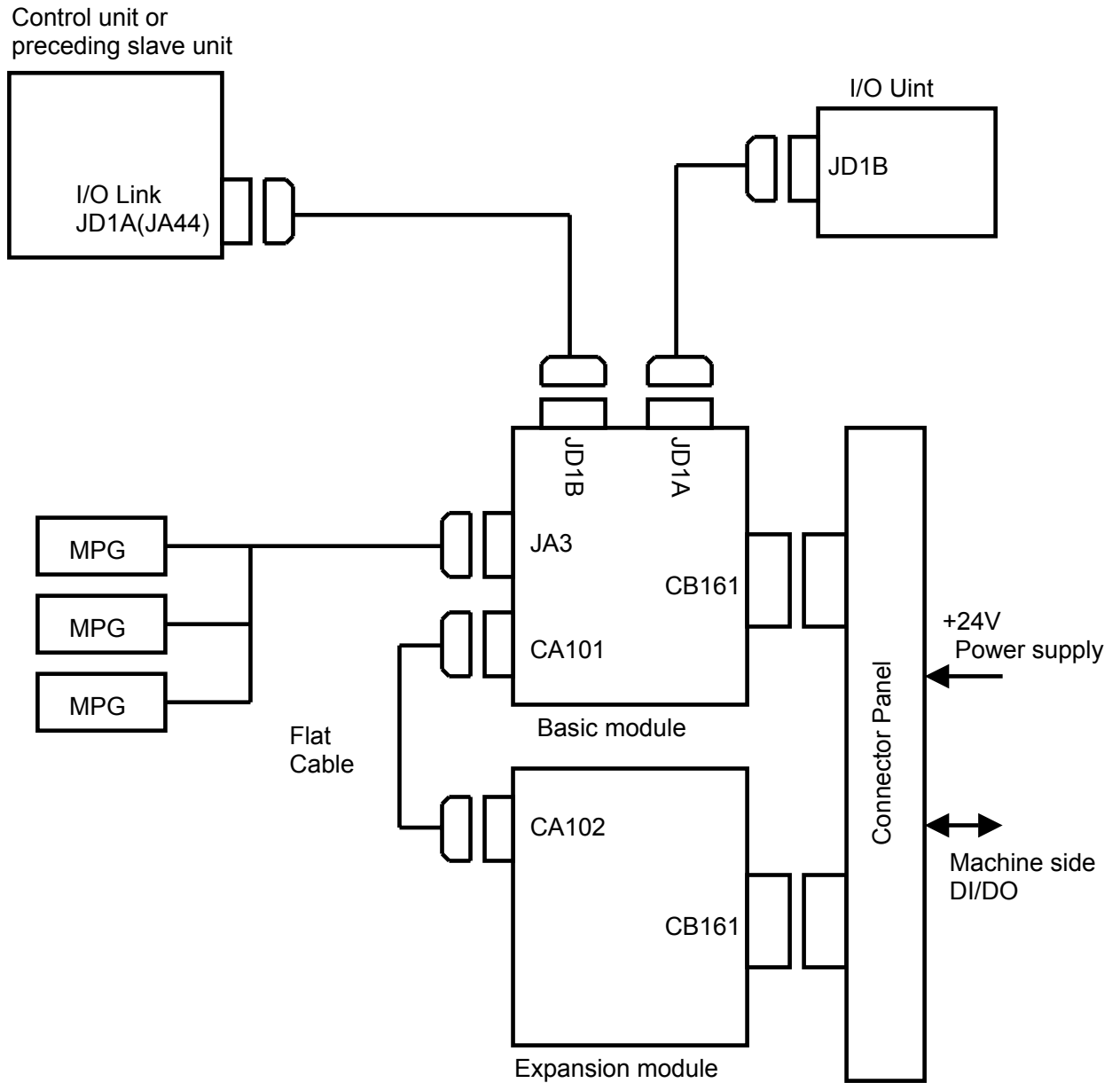


Expansion module



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				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	3/29

3. Connection diagram



Note: The maximum configuration per one group on I/O Link consists of one Basic module and one Expansion module.
 The maximum DI/DO per one group is 96 inputs and 64 outputs.
 If more DI/DO is necessary, connect another module by I/O Link.

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	4/29

4. Module Specifications

Name	Drawing No.	Specifications
I/O module type-2 (Basic module B1)	A03B-0815-C040	DI/DO=48/32 With MPG interface
I/O module type-2 (Basic module B2)	A03B-0815-C041	DI/DO=48/32 Without MPG interface
I/O module type-2 (Expansion module E1)	A03B-0815-C042	DI/DO=48/32
Fuse (accessory)	A03B-0815-K002	1A (For Basic module)
Inter-module Flat cable	A03B-0815-K102	35mm long Suitable module interval of 40mm

5. Installation conditions

Ambient temperature for the unit	Operation: 0°C to 55°C Storage and transportation: -20°C to 60°C
Temperature change	1.1°C/minute maximum
Humidity	Normal condition: 75%(relative humidity) Short term(within one month): 95% (relative humidity)
Vibration	Operation : 0.5G or less FANUC conducted evaluation test under the following conditions: 10 to 58Hz: 0.075mm(amplitude) 58 to 500Hz: 1G Direction of vibration: Each of the X,Y,Z directions Number of sweep cycles: 10 Conforminf to IEC68-2-6
Atmosphere	Normal machining factory environment(For use in an environment with relatively high levels of dust, coolant, organic solutions and so forth, additional measures are required.)
Other conditions	(1) Use each I/O module in a completely sealed cabinet. (2) For ventilation within each I/O module, module interval must be 40mm or more. Moreover for ventilation, allow a clearance of 50mm or more aboveand below each module. Never place a device that generates a large amount of heat below an I/O module. (3)Install Basic module left side of Expansion module in front view.

6. Power supply rating

Module	Power supply voltage	Power supply rating	Remarks
Basic module	DC24V±10% is fed through the I/O connector (CB161,CB162); ±10% includes momentary variations and ripples.	0.3A+7.3mA×DI	Number of DI points with DI=ON
Expansion module		0.2A+7.3mA×DI	Number of DI points with DI=ON

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 5/29

7. DI/DO Connection Pin Assignment

Base module
CB161(HONDA MRF-96ML)

	A	B	C
32	+24V	+24V	+24V
31	0V	0V	0V
30	0V	0V	0V
29		DICOM0	Xm+0.0
28	Xm+0.1	Xm+0.2	Xm+0.3
27	Xm+0.4	Xm+0.5	Xm+0.6
26	Xm+0.7	Xm+1.0	Xm+1.1
25	Xm+1.2	Xm+1.3	Xm+1.4
24	Xm+1.5	Xm+1.6	Xm+1.7
23	Xm+2.0	Xm+2.1	Xm+2.2
22	Xm+2.3	Xm+2.4	Xm+2.5
21	Xm+2.6	Xm+2.7	Xm+3.0
20	Xm+3.1	Xm+3.2	Xm+3.3
19	Xm+3.4	Xm+3.5	Xm+3.6
18	Xm+3.7	Xm+4.0	Xm+4.1
17	Xm+4.2	Xm+4.3	Xm+4.4
16	Xm+4.5	Xm+4.6	Xm+4.7
15	Xm+5.0	Xm+5.1	Xm+5.2
14	Xm+5.3	Xm+5.4	Xm+5.5
13	Xm+5.6	Xm+5.7	DICOM3
12	Yn+3.5	Yn+3.6	Yn+3.7
11	Yn+3.2	Yn+3.3	Yn+3.4
10	Yn+2.7	Yn+3.0	Yn+3.1
9	Yn+2.4	Yn+2.5	Yn+2.6
8	Yn+2.1	Yn+2.2	Yn+2.3
7	DOCOM23	DOCOM23	Yn+2.0
6	Yn+1.5	Yn+1.6	Yn+1.7
5	Yn+1.2	Yn+1.3	Yn+1.4
4	Yn+0.7	Yn+1.0	Yn+1.1
3	Yn+0.4	Yn+0.5	Yn+0.6
2	Yn+0.1	Yn+0.2	Yn+0.3
1	DOCOM0	DOCOM01	Yn+0.0

Expansion module
CB162(HONDA MRF-96ML)

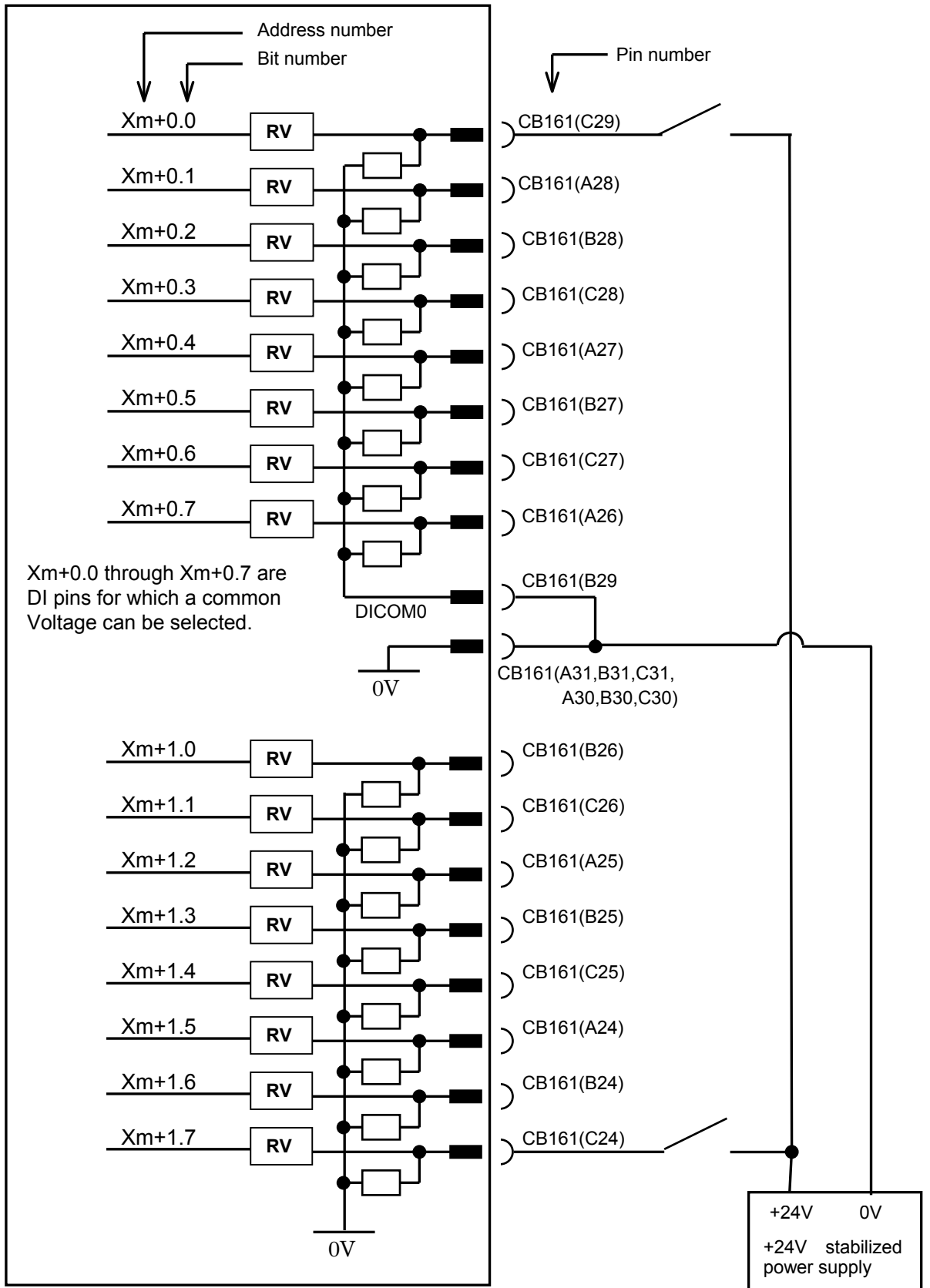
	A	B	C
32	+24V	+24V	+24V
31	0V	0V	0V
30	0V	0V	0V
29		DICOM6	Xm+6.0
28	Xm+6.1	Xm+6.2	Xm+6.3
27	Xm+6.4	Xm+6.5	Xm+6.6
26	Xm+6.7	Xm+7.0	Xm+7.1
25	Xm+7.2	Xm+7.3	Xm+7.4
24	Xm+7.5	Xm+7.6	Xm+7.7
23	Xm+8.0	Xm+8.1	Xm+8.2
22	Xm+8.3	Xm+8.4	Xm+8.5
21	Xm+8.6	Xm+8.7	Xm+9.0
20	Xm+9.1	Xm+9.2	Xm+9.3
19	Xm+9.4	Xm+9.5	Xm+9.6
18	Xm+9.7	Xm+10.0	Xm+10.1
17	Xm+10.2	Xm+10.3	Xm+10.4
16	Xm+10.5	Xm+10.6	Xm+10.7
15	Xm+11.0	Xm+11.1	Xm+11.2
14	Xm+11.3	Xm+11.4	Xm+11.5
13	Xm+11.6	Xm+11.7	DICOM9
12	Yn+7.5	Yn+7.6	Yn+7.7
11	Yn+7.2	Yn+7.3	Yn+7.4
10	Yn+6.7	Yn+7.0	Yn+7.1
9	Yn+6.4	Yn+6.5	Yn+6.6
8	Yn+6.1	Yn+6.2	Yn+6.3
7	DOCOM67	DOCOM67	Yn+6.0
6	Yn+5.5	Yn+5.6	Yn+5.7
5	Yn+5.2	Yn+5.3	Yn+5.4
4	Yn+4.7	Yn+5.0	Yn+5.1
3	Yn+4.4	Yn+4.5	Yn+4.6
2	Yn+4.1	Yn+4.2	Yn+4.3
1	DOCOM45	DOCOM45	Yn+4.0

NOTE

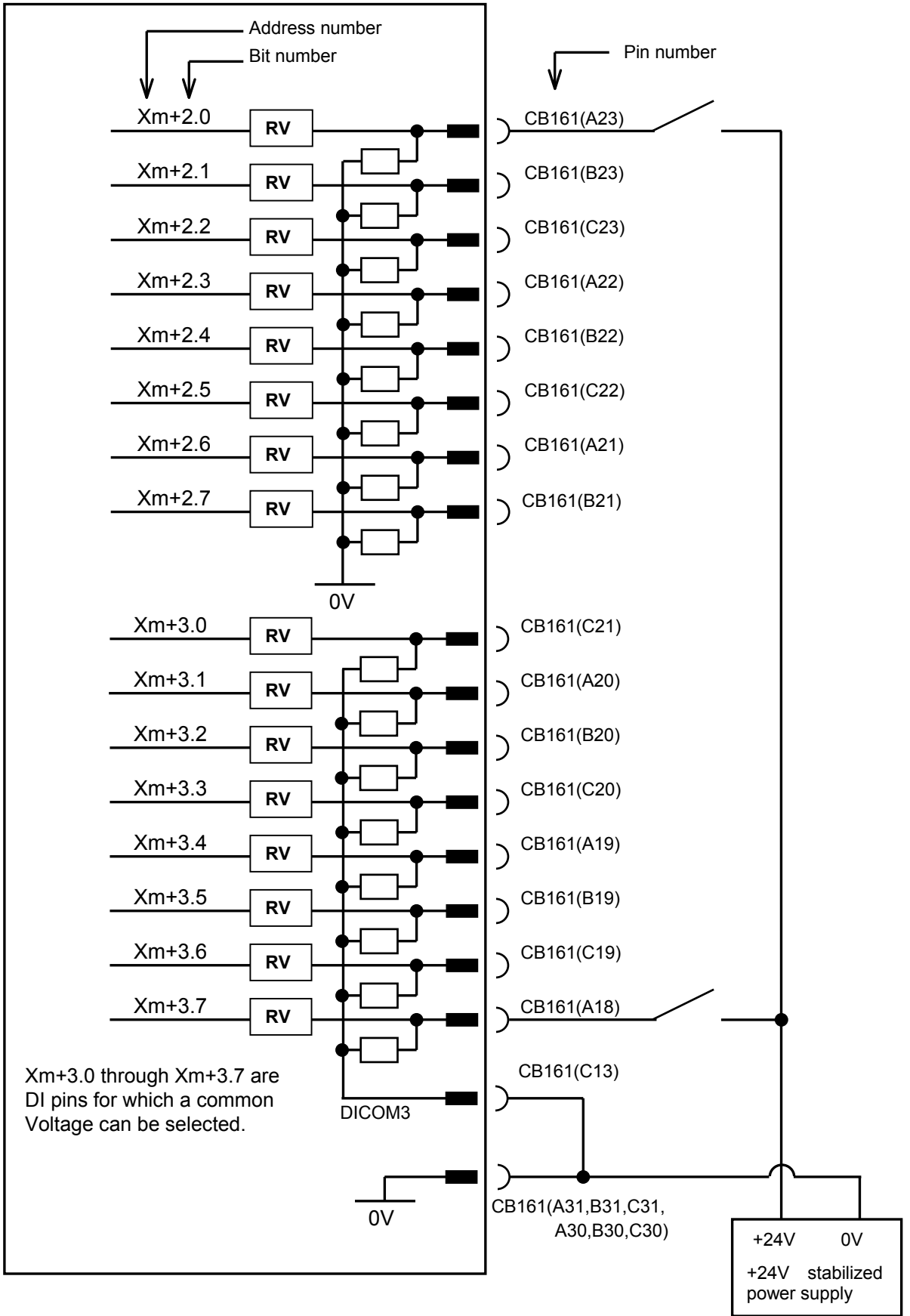
1. Xm and Yn are the start address allocated to I/O Link.
2. Pins A32, B32, C32 of connector CB161 and CB162 are used to supply 24V externally to a module. Be sure to connect these pins because the +24V supplied to the module is used internally.

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 6/29

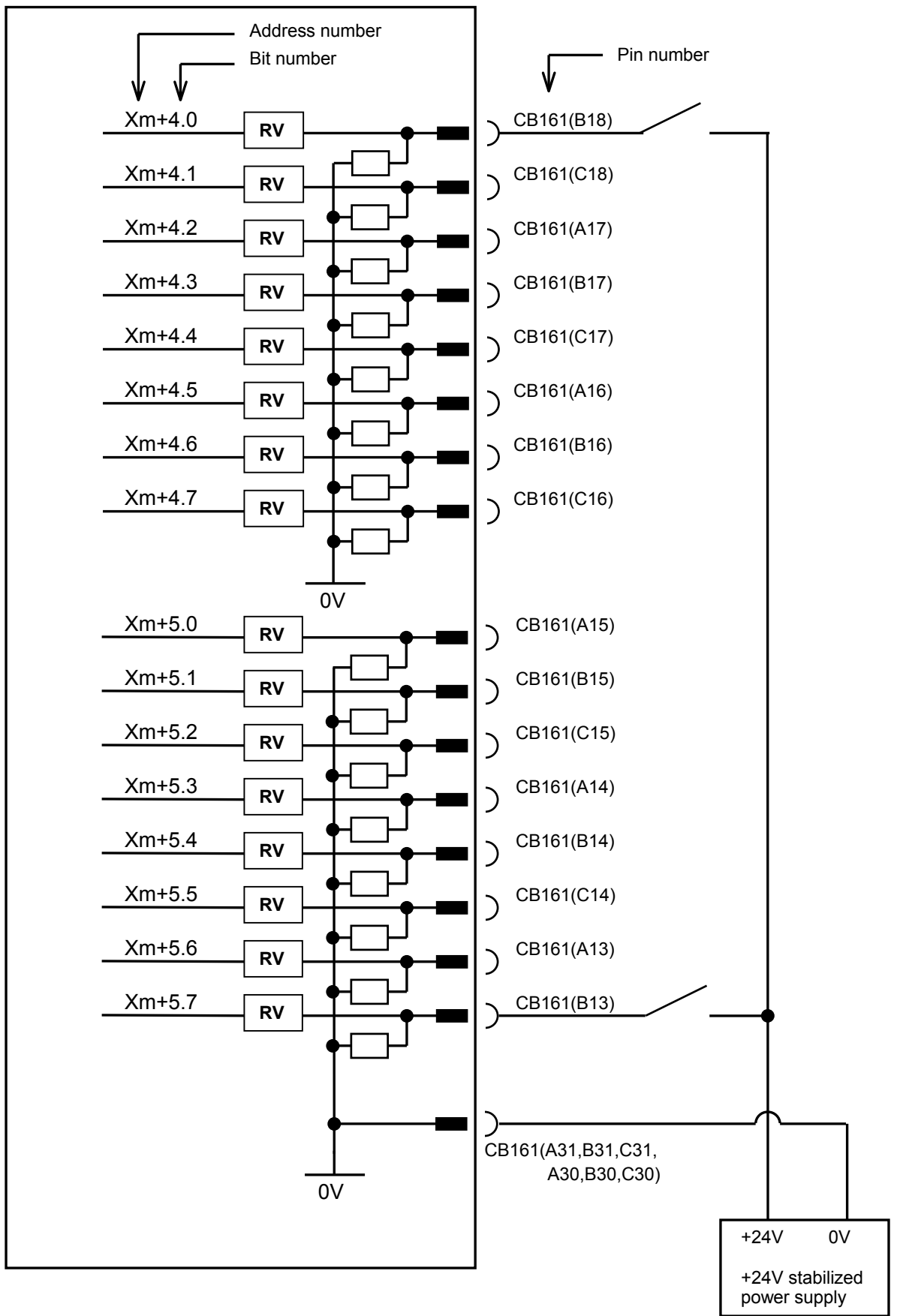
8. DI(Input signal) Connection



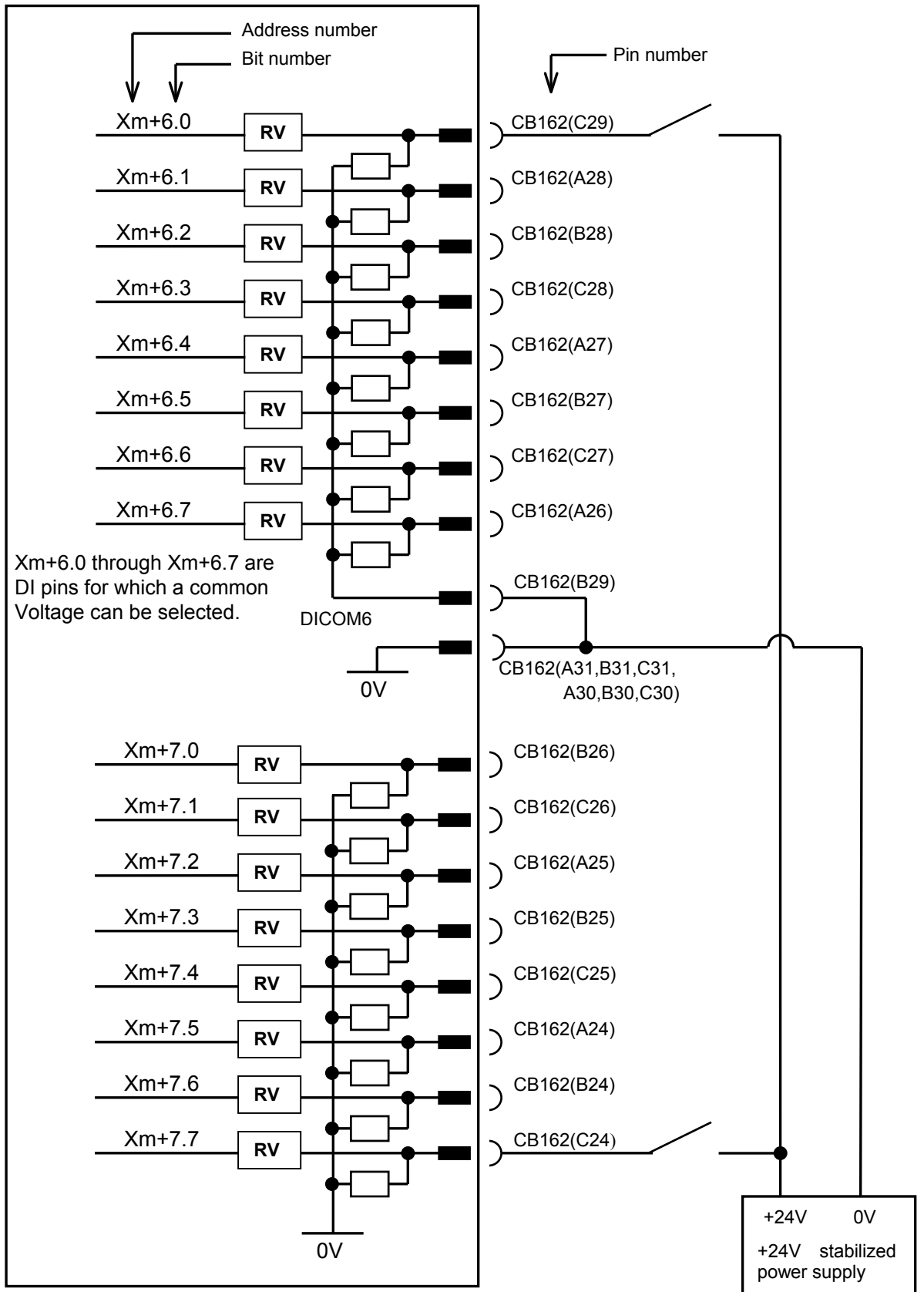
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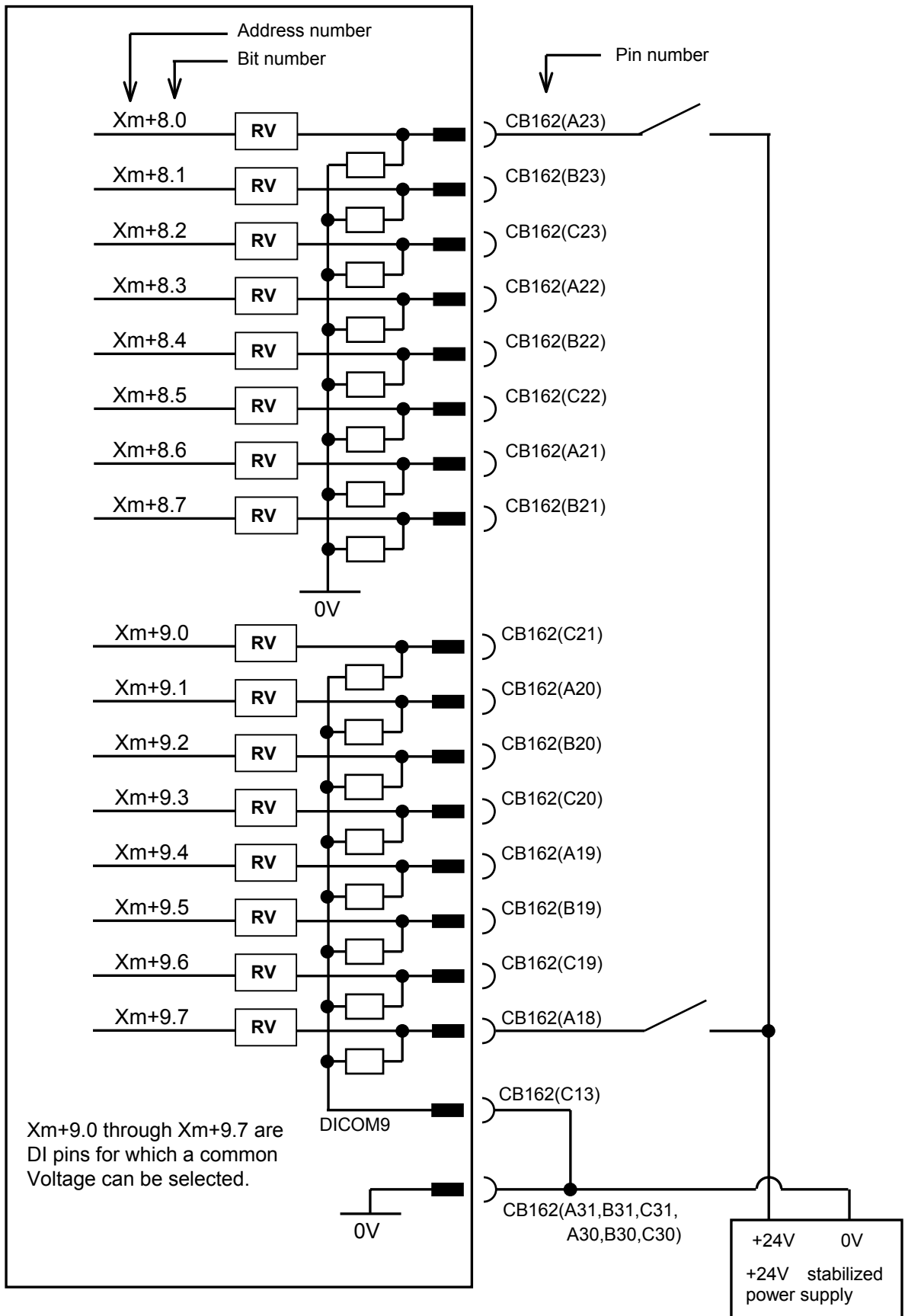
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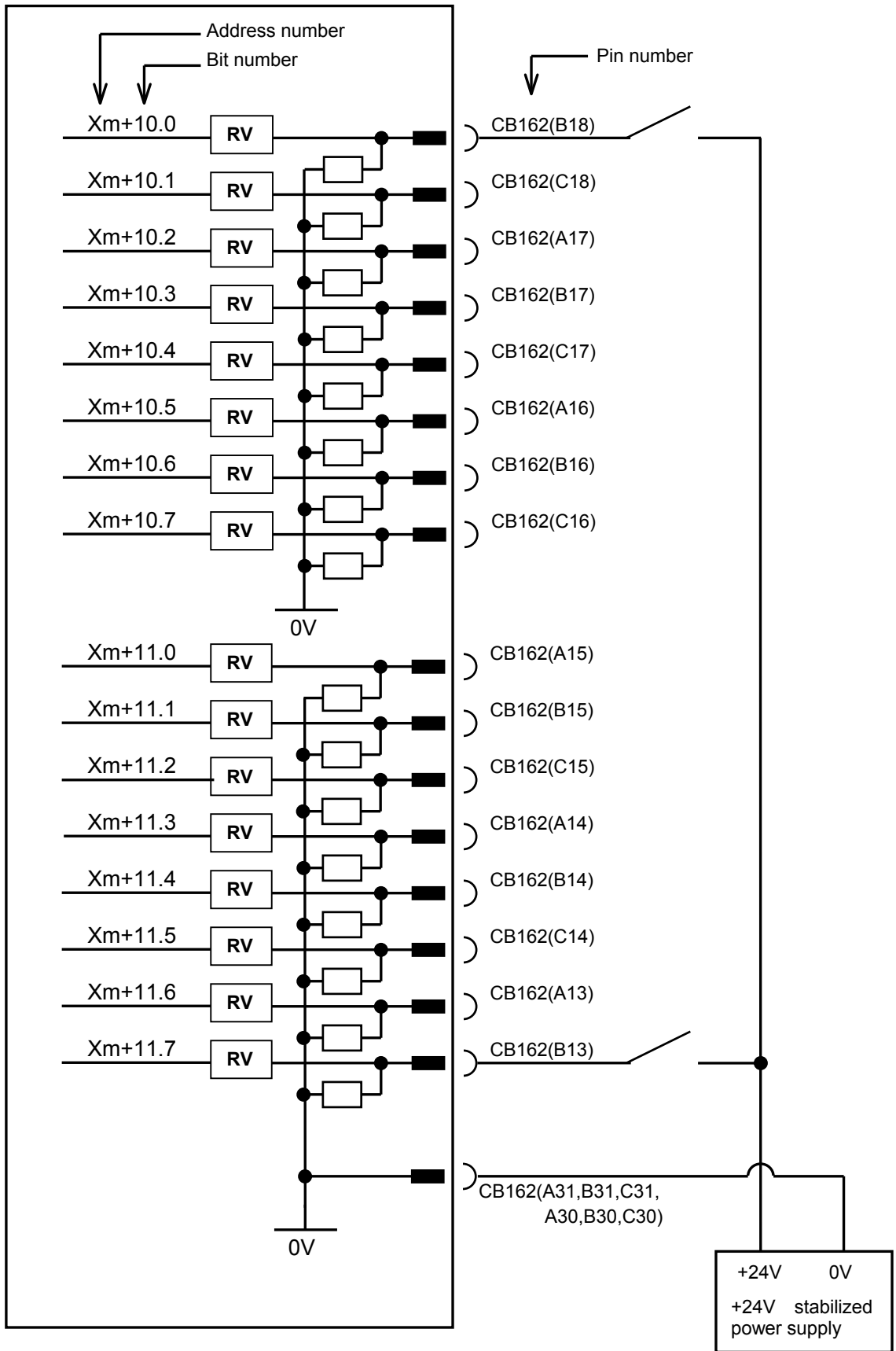
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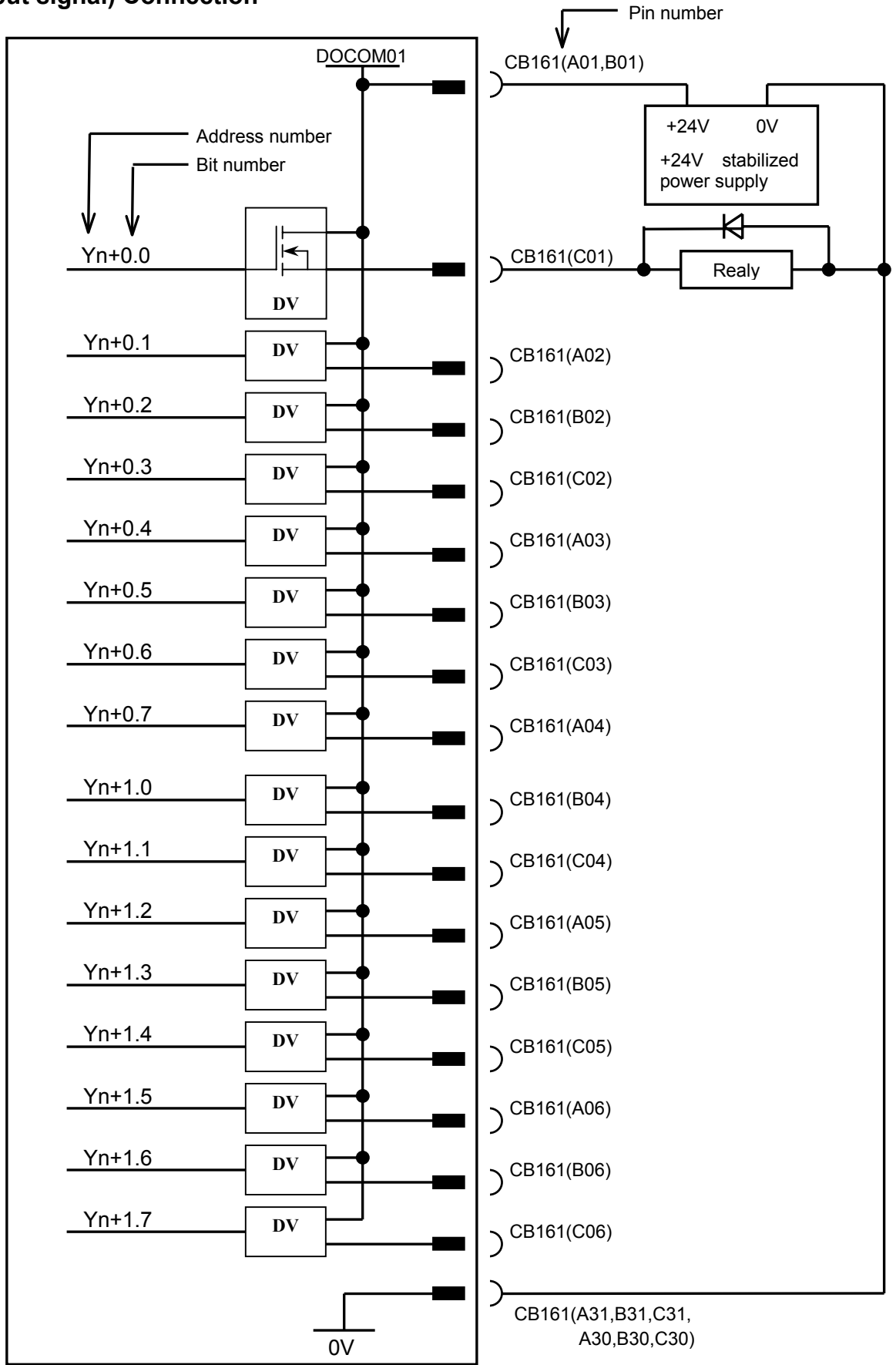


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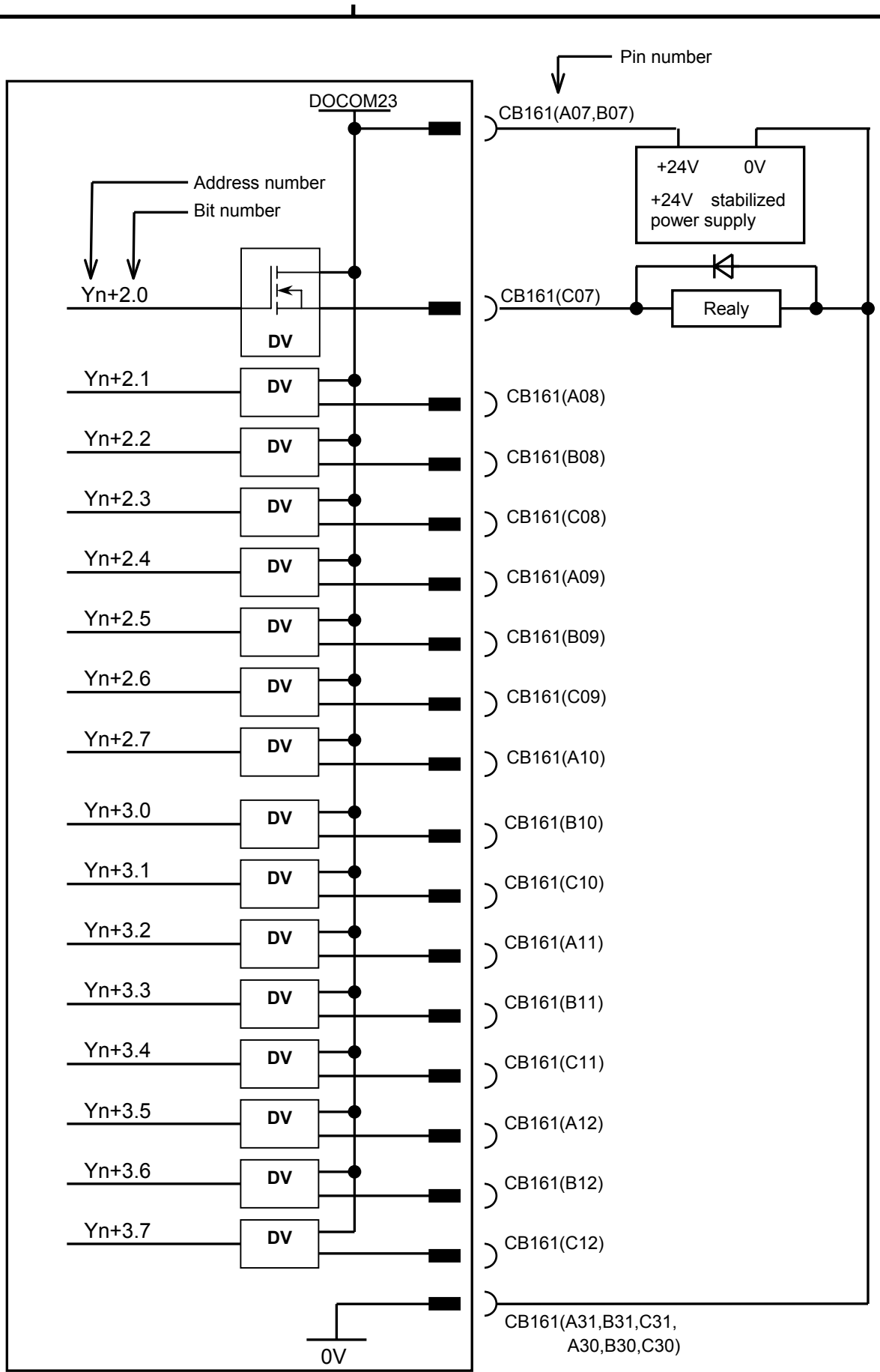


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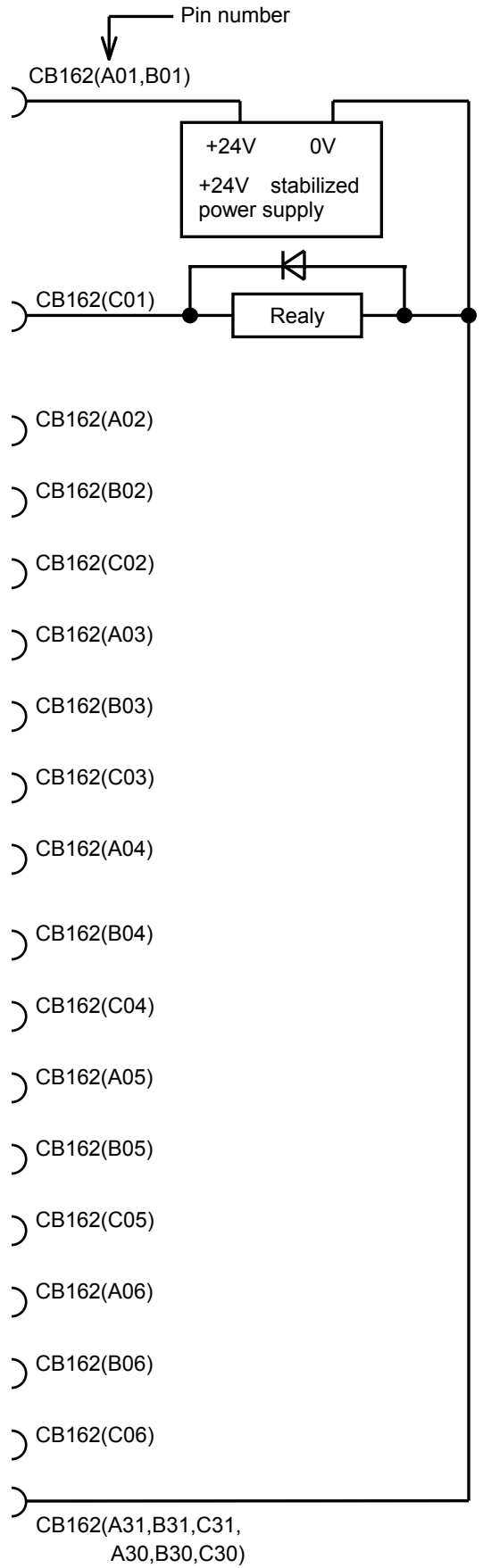
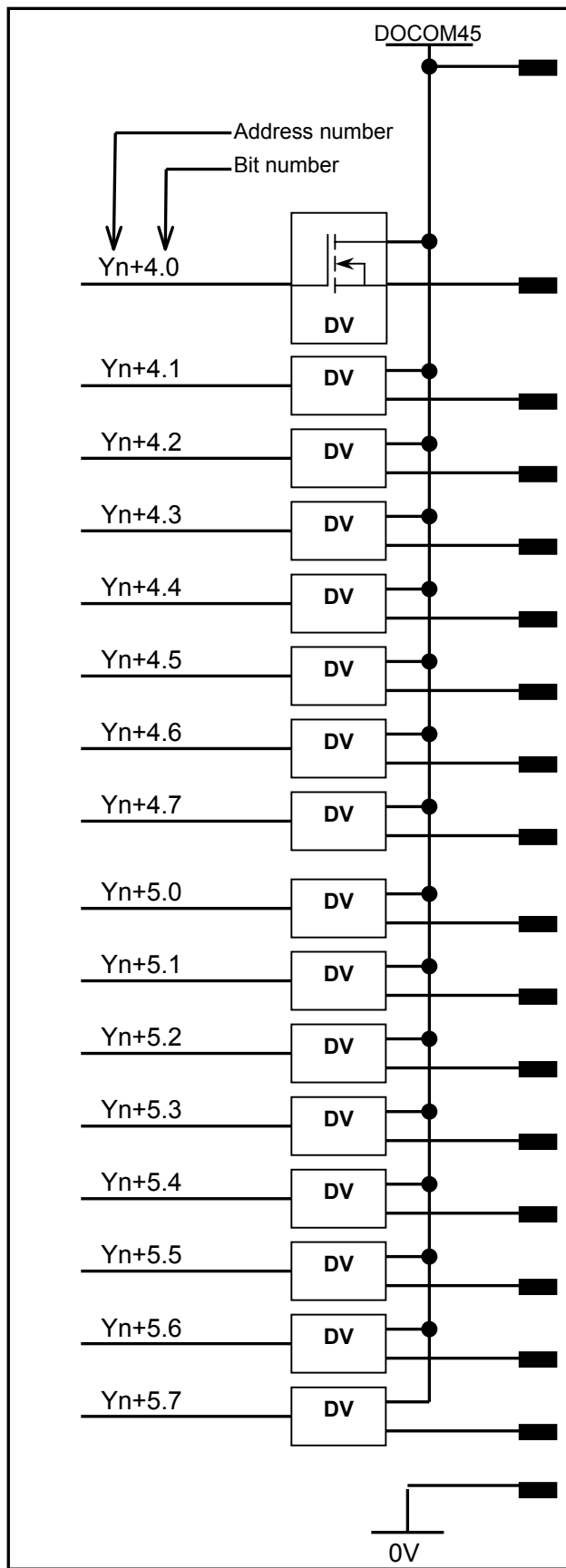
9. DO(Output signal) Connection



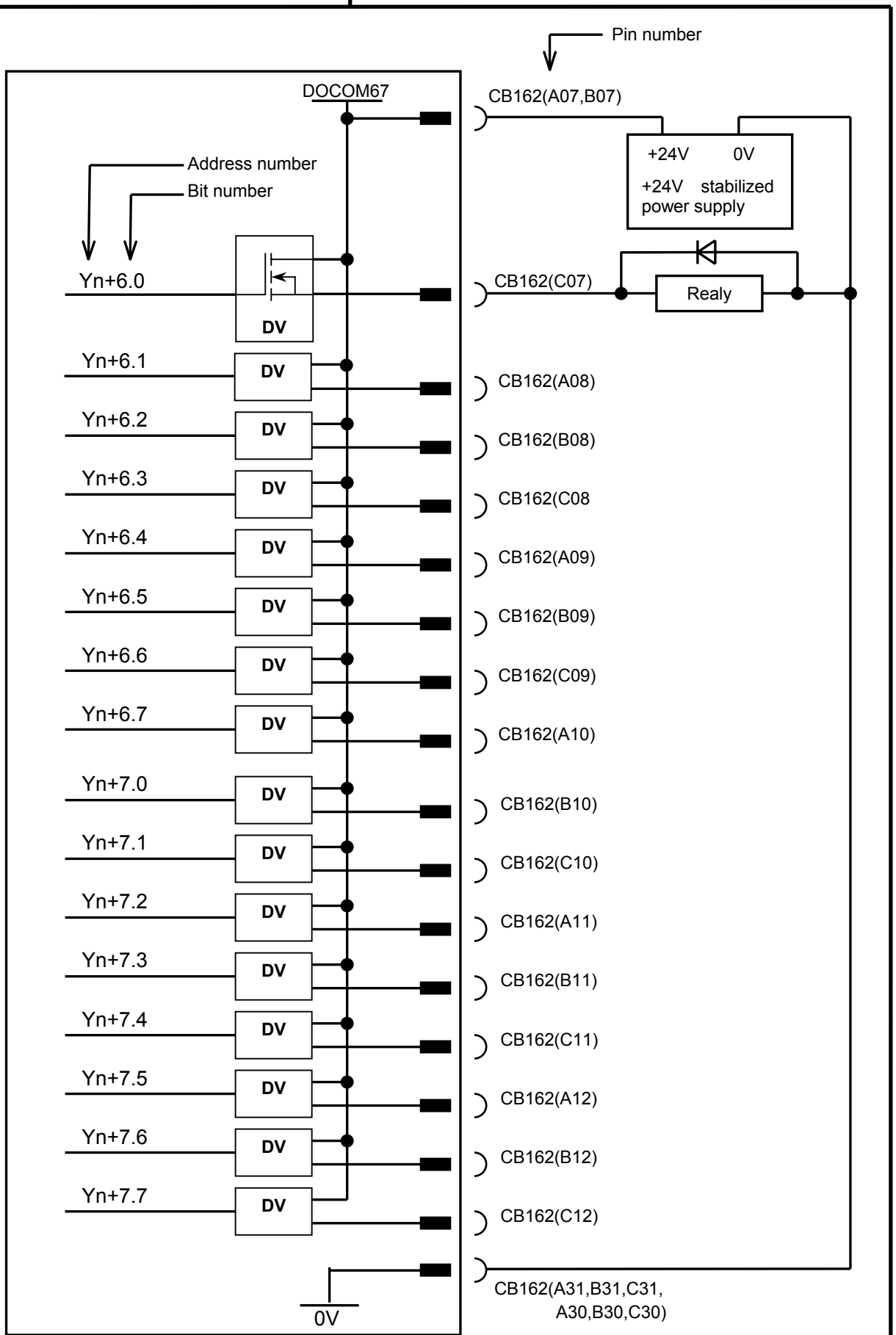
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				DRAW. NO.	A-80950E	CUST.
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				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
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EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	16/29

10. DI/DO Signal Specifications

The specifications of the DI/DO signals used with the basic module and expansion module are shown as below.

DI(Input signal specifications)

Number of points	48 points (per module)
Contact rating	DC30V、 16mA or more
Leakage current between Contacts when opened	1mA or less(26.4V)
Voltage decrease Between Contacts when closed	2V or less (including cable voltage decrease)
Delay time	The receiver delay is 2 ms(maximum). In addition, [I/O Link transfer time between CNC and I/O module(2msmaximum)] + [ladder scan period(depending on CNC)] must be considered.

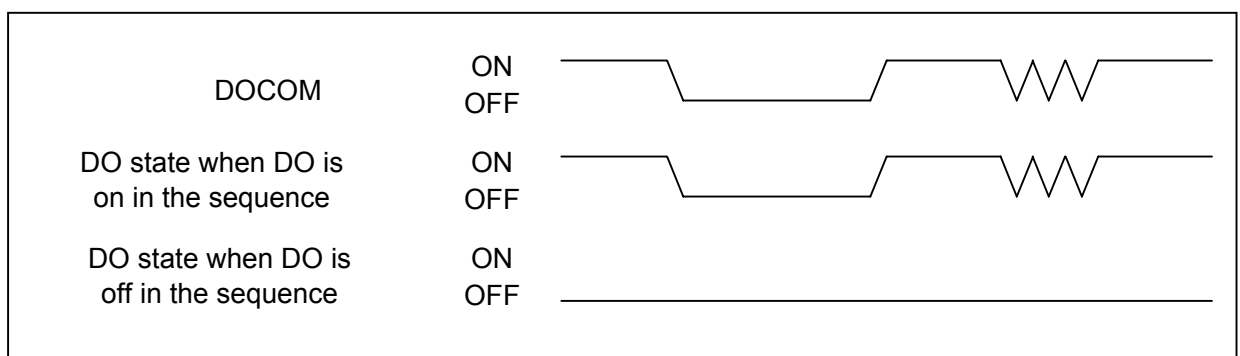
DO(Output signal specifications)

Number of points	32 pints (per module)
Maximum load current When ON	200mA or less including momentary variations
Saturation voltage When ON	1V(maximum) when the load current is 200mA
Withstand voltage	24V + 20% or less including momentary variations
Leakage current When OFF	20 μ A or less
Delay time	The receiver delay is 50 μ s(maximum). In addition, [I/O Link transfer time between CNC and I/O module(2msmaximum)] + [ladder scan period(depending on CNC)] must be considered.

ON/OFF of the power supply(DO common) for DO signals(output signals)

By turning off(opening) the power supply pin(DOCOM) for the DO signals(output signals),All the DO signals of each module can be turned off the same time.

At this time, The DO state is as shown below.

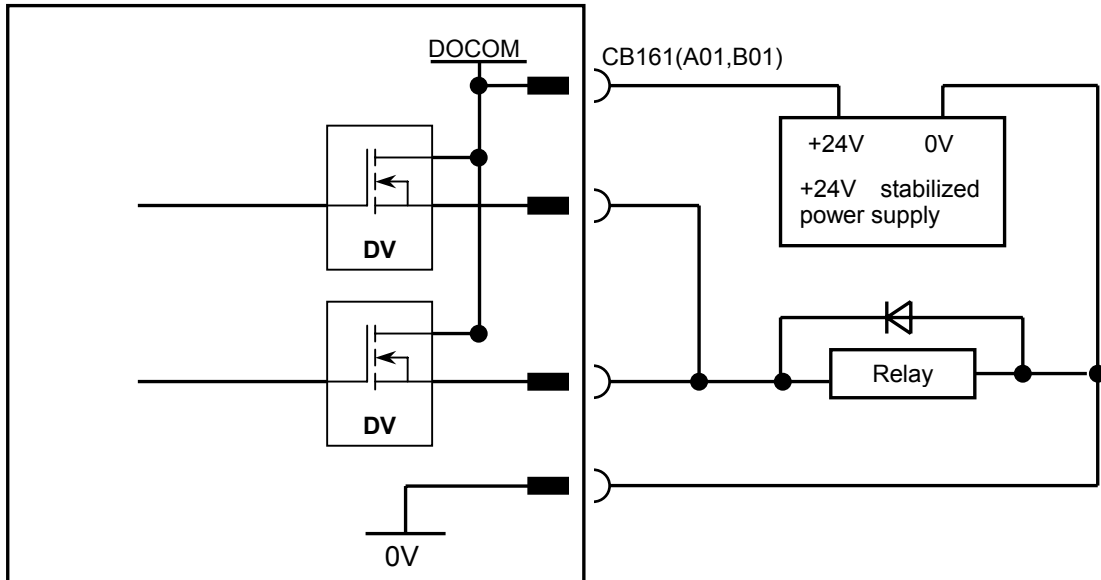


Note: When DO is on in the sequence, the ON/OFF state of DOCOM is directly reflected in the DO state.

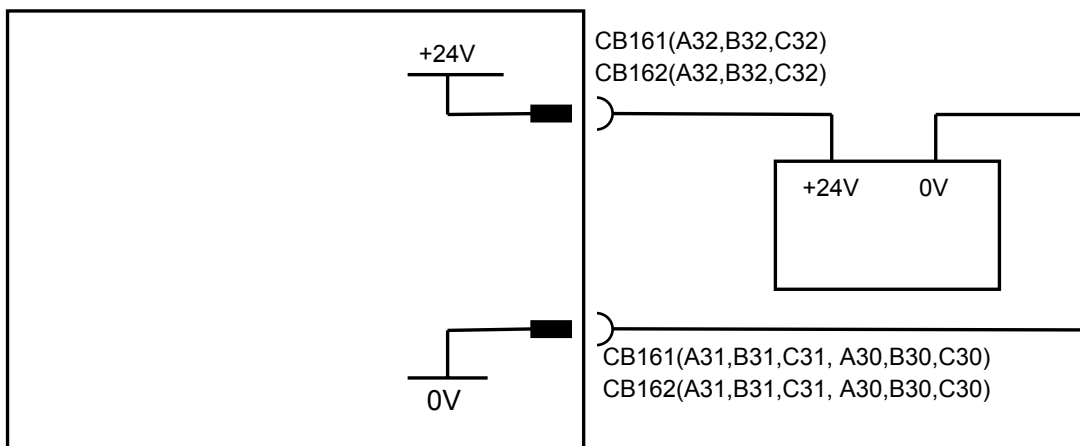
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				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 17/29

Parallel DO(output signal) connection

A DO load current of twice the level can be obtained by connecting DO points in parallel and exercising ON/OFF control at the same time in the sequence. Namely, the maximum load current per DO point is 200mA. By connecting two DO points in parallel and turning on the two DO points at the same time, 400mA can be obtained. In this case, however, the leakage current is doubled up to $40 \mu A$ when the DO points are turned off.



11. Power supply Connection

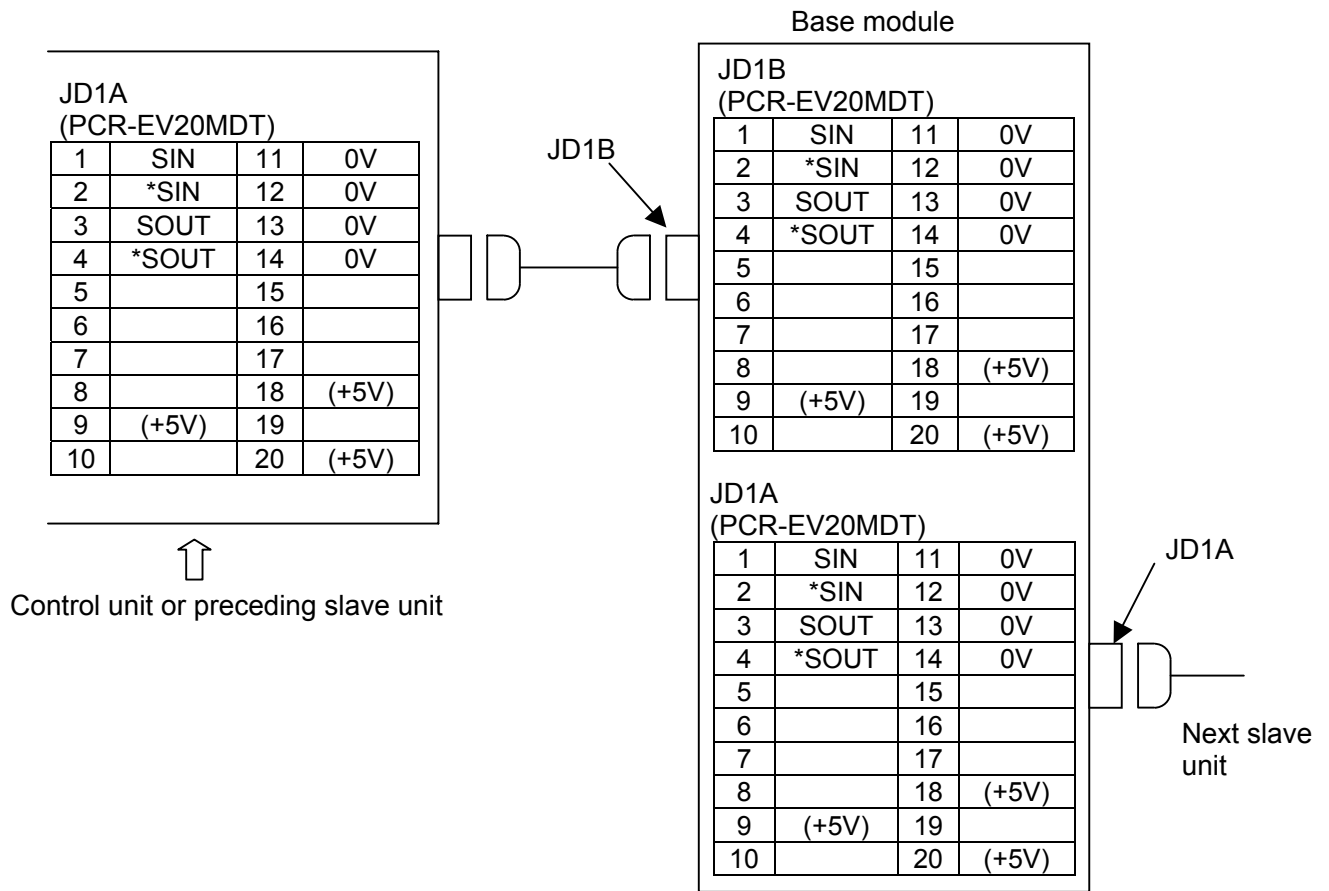


Note : The +24V signal to be supplied to the I/O module must not be turned off during operation. Otherwise, a CNC communication alarm is issued. Ensure that +24V is supplied either when or before the power to the CNC is turned on, and that +24V is removed either when or after the power to the CNC is turned off.

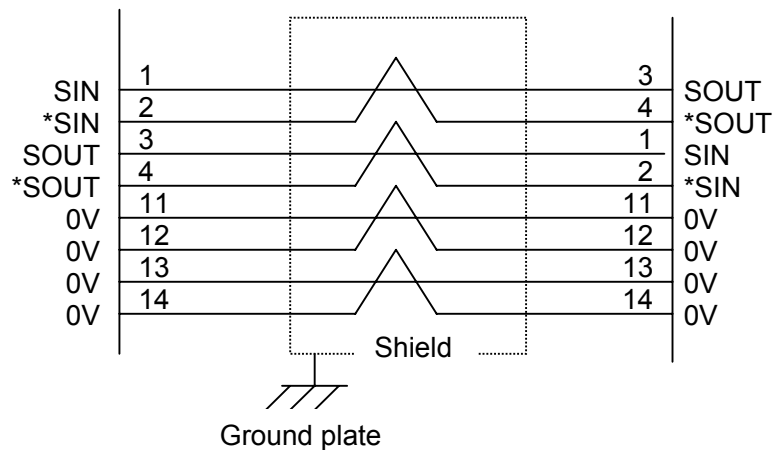
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				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	18/29

12. I/O Link connection

Connection is the same as connector panel I/O module(A03B-0815-C001)



Cable wiring

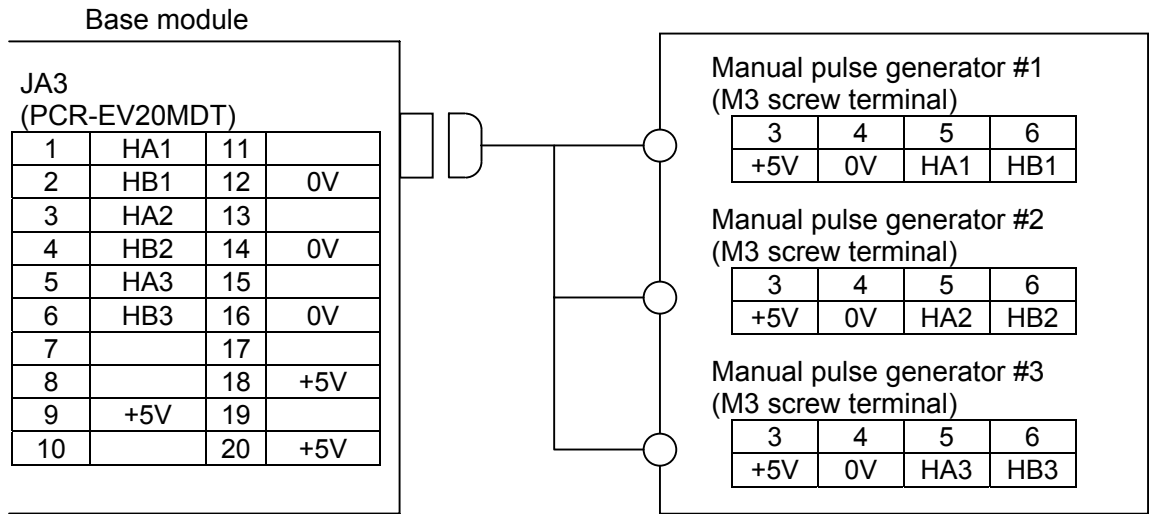


Recommended Cable Material
A66L-0001-0284#10P(#28AWG×10pair)

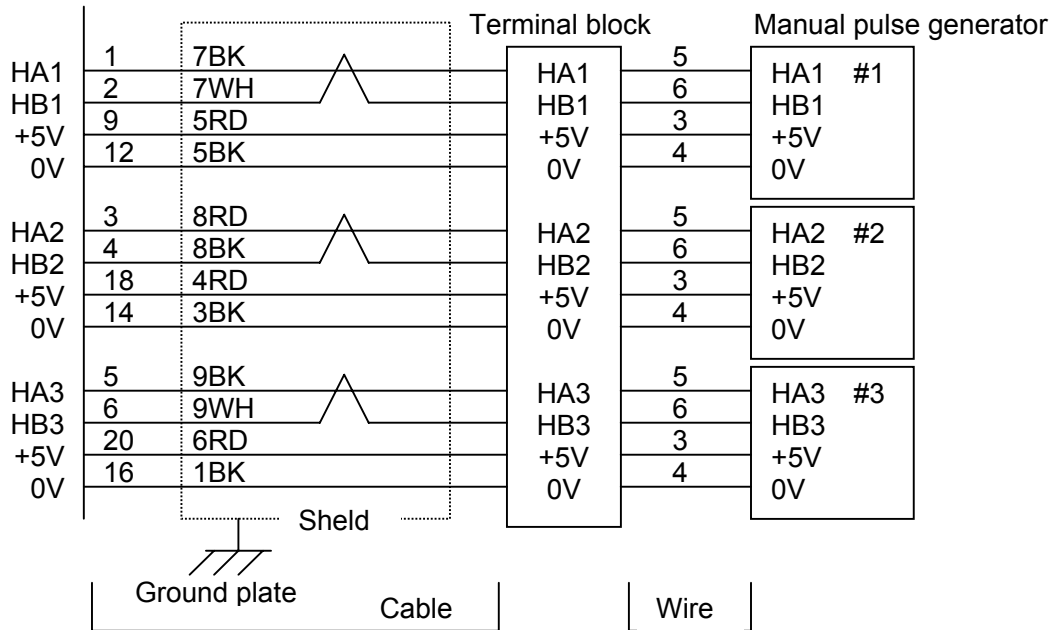
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				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 19/29

13. Manual Pulse Generator Connection

Connection is the same as connector panel I/O module(A03B-0815-C002)



Cable wiring



Recommended wire material : A66L-0001-0286(#20AWG×6 pair + #24AWG×3 pair)

Recommended Connector : A02B-0120-K303(including the follow connector and case)

(Connector : FI40B-2015S(Hirose Electric Co., Ltd))

(Case : FI-20-CV5(Hirose Electric Co., Ltd))

Recommended Cable : A02B-0120-K841(7m)(for connecting three manual pulse generator)

A02B-0120-K848(7m) (for connecting two manual pulse generator)

A02B-0120-K847(7m) (for connecting one manual pulse generator)

(These cables do not include the wire shown in the above figure)

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 20/29

Cable length for Manual pulse generator

The Manual pulse generator operates on 5VDC. The supply voltage drop due to the Cable resistance must be held below 0.2V(when 0-volt and 5-volt wires are combined), as expressed in the following expression:

$$0.2 \cong \frac{0.1 \times R \times 2L}{m}$$

Where

0.1: Manual pulse generator supply current(0.1A)

R : resistance per unit cable length (Ω/m)

M : number of 0-volt and 5-volt wires

L : cable length(m)

Therefore, the cable length can be determined using the following expression.

$$L \cong \frac{m}{R}$$

For Example, when cable A66L-0001-0286 is used.

The cable consists of three pairs of signal lines and six power wires (20/0.18,0.0394 Ω/m).

When these three cables are used for 0V and 5V Lines, the cable length is:

$$L \cong \frac{3}{0.0394} = 76.75(m)$$

Thus, the length is 76.75m. (Because of applicable regulation of FANUC, however, the length is limited to 50m)

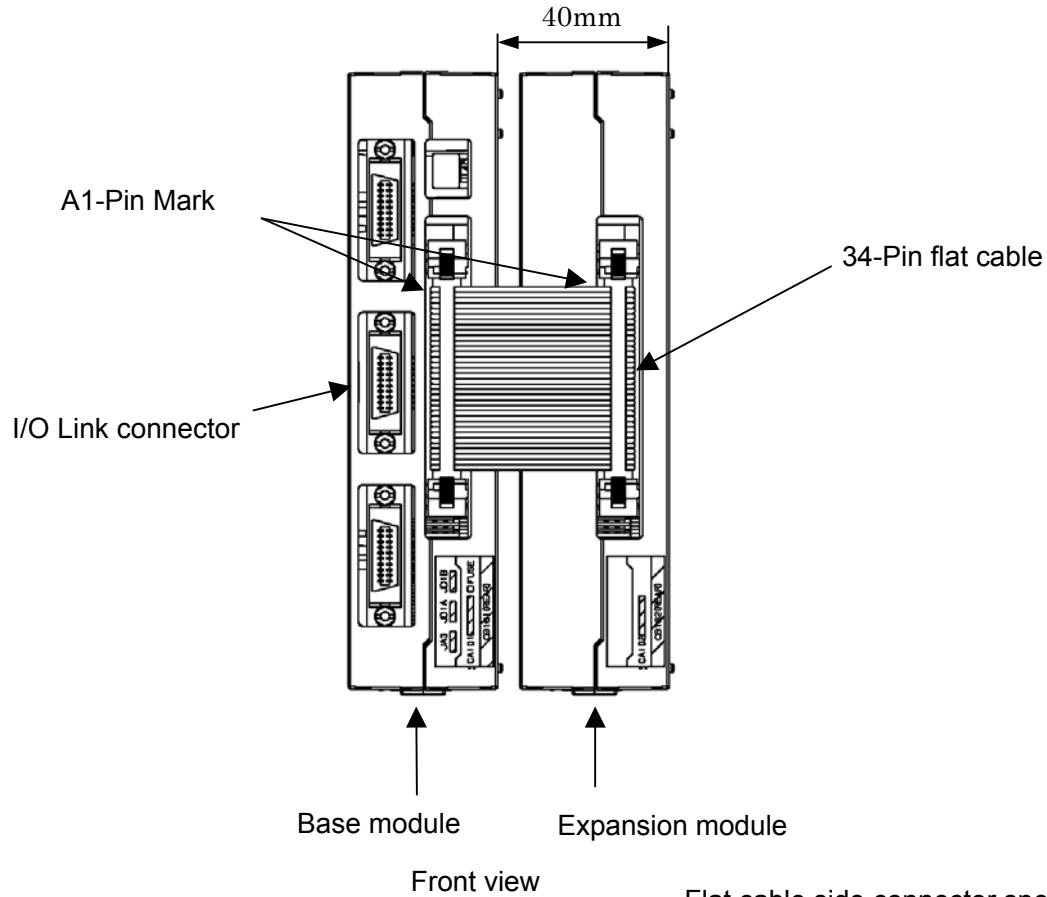
For two units, the cable can be extended to 38.37m.

For three units, it can be extended to 25.58m.

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	21/29

14. Connection of Basic and Expansion modules

Basic module and Expansion module are connected by using 34-pin flat cable.
 Install Basic module left side of Expansion module in order to prevent the I/O Link connector from being covered with the flat cable.



Flat cable side connector specification:

HIF3BA-34DA-2.54R(Hirose Electric Co., Ltd)

Module connector-side specification:

3BA-34PA-2.54DS(Hirose Electric Co., Ltd) or

FAP-3403-1202-0BS(Yamaichi Denki Co.,Ltd)

Connect all pins in the flat cable one to one.

It is necessary to leave a space at least 40mm between the modules. In this case a flat cable is about 35mm in length.

To install the modules further away from each other, the cable length will be as below.

$$\text{Flat cable length} = 35\text{mm} + ((\text{module distance}) - 40\text{mm})$$

Note that the maximum length of the flat cable is 300mm.

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	22/29

15. Address allocation

For the Connector panel I/O module , I/O addresses are mapped as follows.

DI space map		DO space map	
Xm	Basic module	Yn	Basic module
Xm + 1		Yn + 1	
Xm + 2		Yn + 2	
Xm + 3		Yn + 3	
Xm + 4		Yn + 4	Expansion module
Xm + 5		Yn + 5	
Xm + 6	Yn + 6		
Xm + 7	Expansion module	Yn + 7	
Xm + 8			
Xm + 9			
Xm + 10			
Xm + 11	Basic module		
Xm + 12(for 1st MPG)			
Xm + 13(for 2nd MPG)			
Xm + 14(for 3rd MPG)			
Xm + 15 (DO Alarm Detection)			

I/O module type-2 is allocated a group of DI addresses(16 bytes) and a group of DO addresses(8 bytes). Expansion module can be added or removed as required.

The reason for this address allocation is explained below.

The MPG interface (MPG counter) occupies a DI space from Xm + 12 through Xm + 14.

These address are fixed regardless of whether Expansion module is used, and Xm + 12 through Xm + 14 must be allocated as a DI work area to enable the use of the MPG. Therefore, when using a MPG, allocate DI addresses in units of 16 bytes. Do not use the DI space from Xm + 12 through Xm + 14 for Ladder; the CNC process the MPG counter value directly.

DI address Xm + 15 is used for detecting over current and overheating alarms that occur in the IC used in the DO driver. This address is fixed regardless of whether Expansion module is used, and it must be allocated as a work area before it can be used.

When using this area, therefore allocate DI addresses in unit of 16byte.

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	23/29

16. DO(Output signal) alarm detection

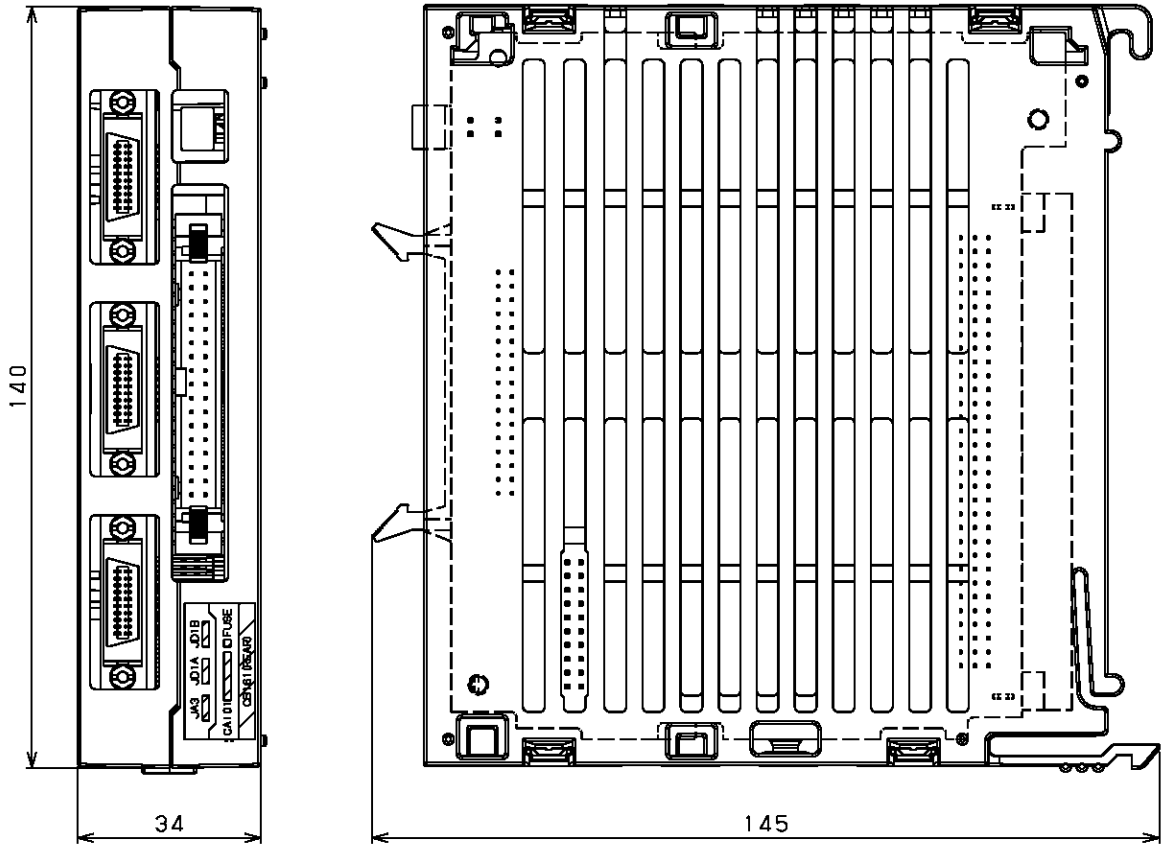
The DO driver of the Basic module and Expansion module is capable of detecting an over current and measuring its own temperature. If an accident, such as the connecting of the cable to ground, causes an abnormal increase in the load current or in the driver temperature, a protection circuit, which is provided for each DO driver(1 byte), is activated and keeps the DO signal for the relevant 1 byte in the OFF state until the cause of the problem is eliminated. Even if this occurs, the CNC and I/O module continue operating. The DI address($X_m + 15$) identifies the DO driver which has detected the alarm. The following table shows the correspondence between the DI address($X_m + 15$) bits and the DO addresses. Manage the alarm well by using Ladder program with bit signals in following table, when DO status becomes abnormal.

Alarm detection Address and bit	DO address	Location
$X_m + 15.0$	$Y_n + 0$	Basic module
$X_m + 15.1$	$Y_n + 1$	
$X_m + 15.2$	$Y_n + 2$	
$X_m + 15.3$	$Y_n + 3$	
$X_m + 15.4$	$Y_n + 4$	Expansion module
$X_m + 15.5$	$Y_n + 5$	
$X_m + 15.6$	$Y_n + 6$	
$X_m + 15.7$	$Y_n + 7$	

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 24/29

17. Dimensions

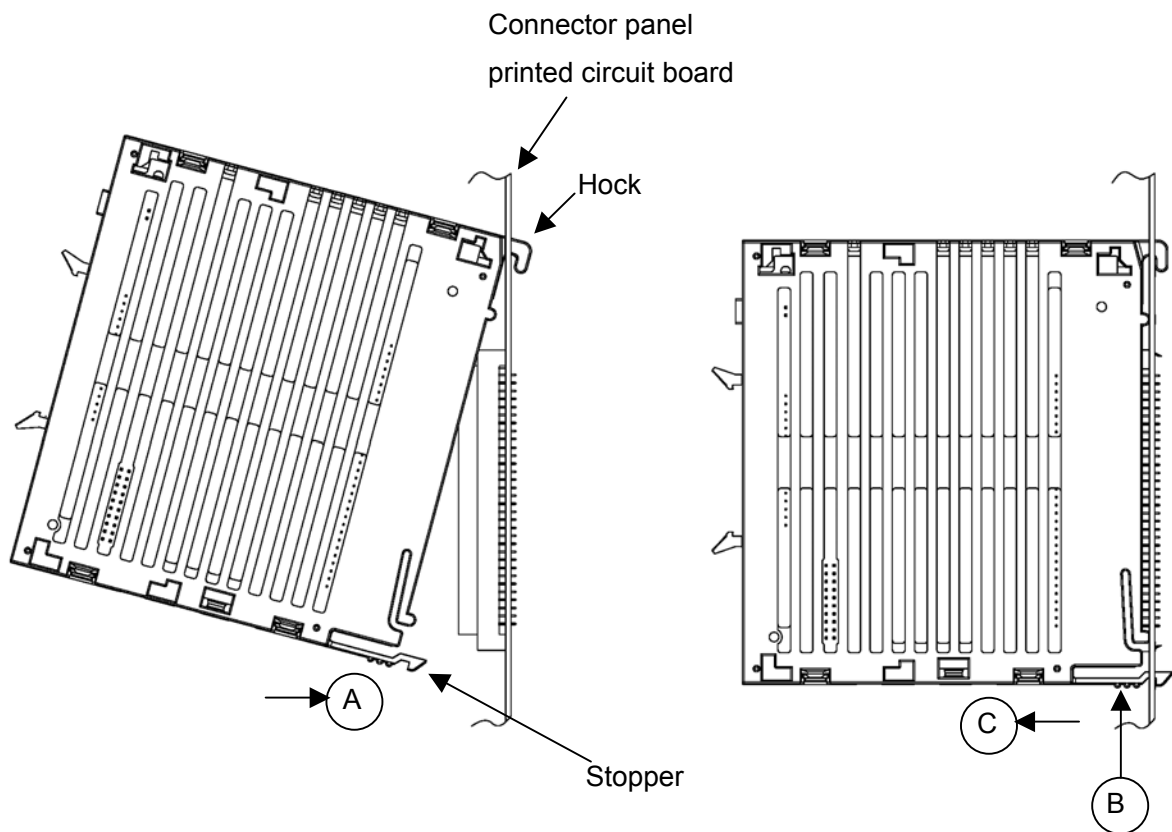
Dimensions of Basic module are same as Expansion module.



Weight : Basic module	280g
Expansion module	210g

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	25/29

18. Module installation



Mounting module

1. Insert the hock of the module into the square hole located at the upper part of the connector panel printed circuit board.
2. Using the hock as a fulcrum, push the module in the direction of (A) and attach the module's connector to the connector on the printed circuit board.
3. Push the stopper into the lower hole of printed circuit board until it clicks into place.

Dismounting module

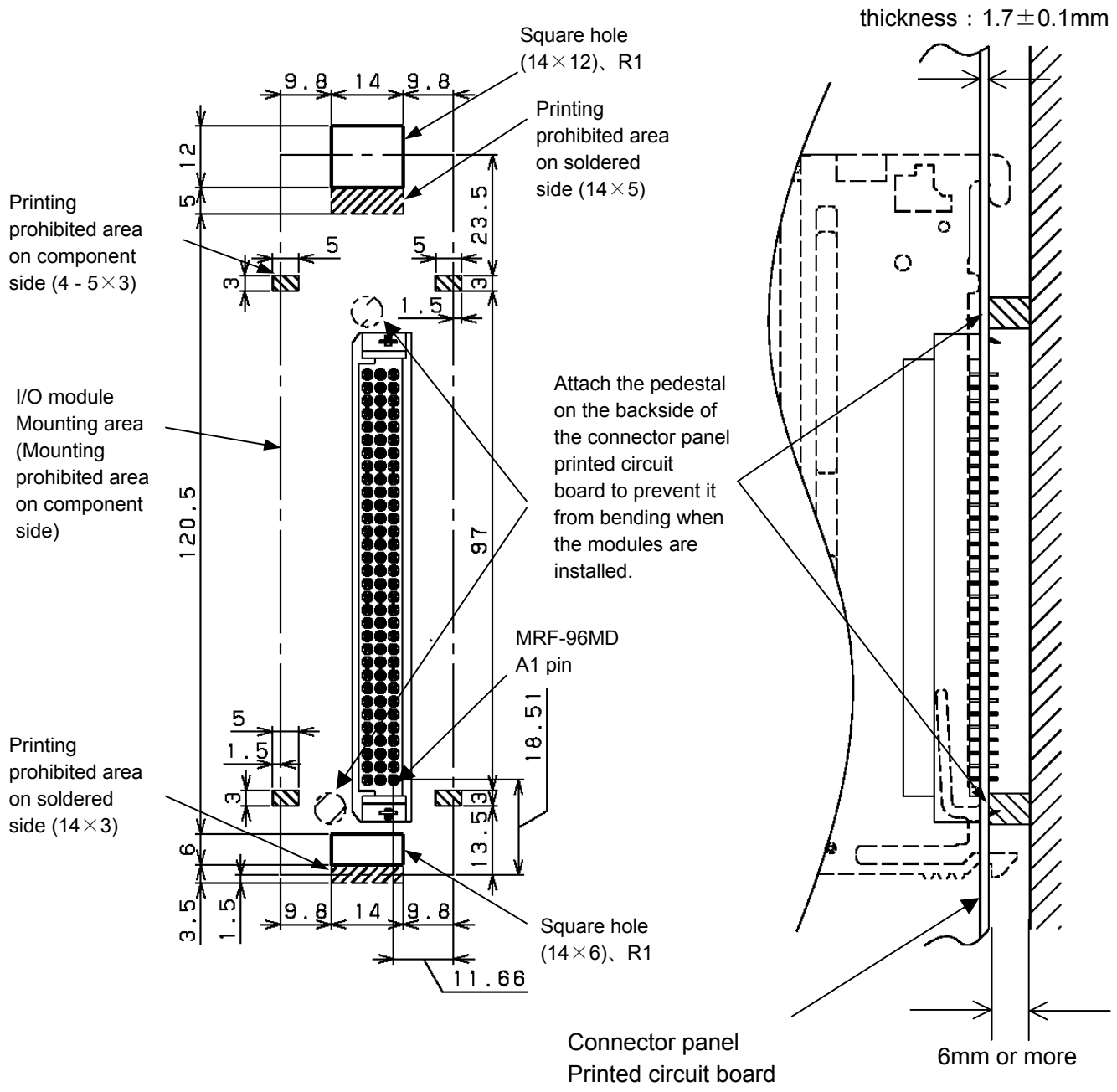
1. Press the stopper (B) upward.
2. Using the hock as a fulcrum, pull the lower part of the module in the direction of (C).

Note:

When mounting and dismounting a module, hold the module by its top and bottom surface.
Avoid applying force to the side where there are slits.

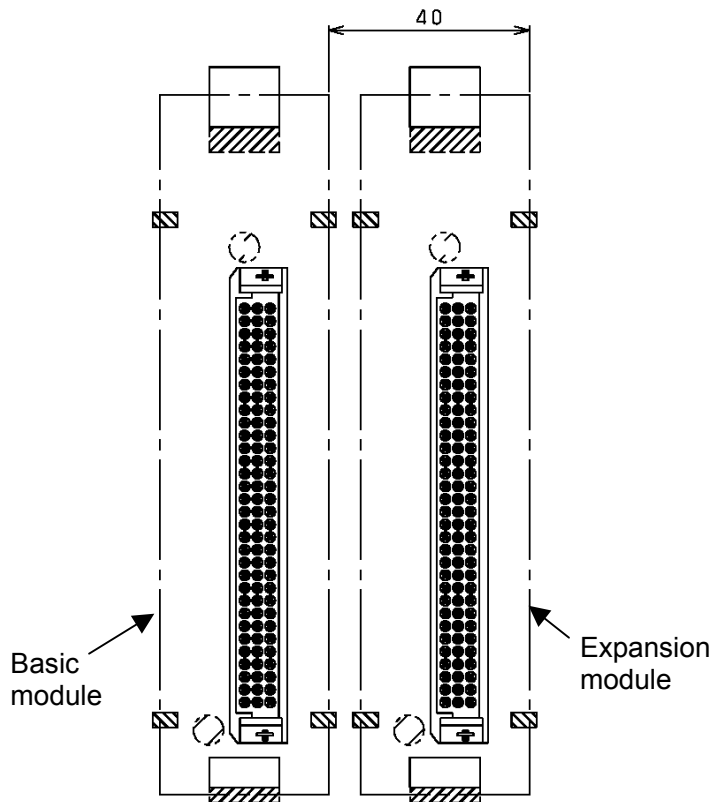
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19. Connector panel printed circuit board

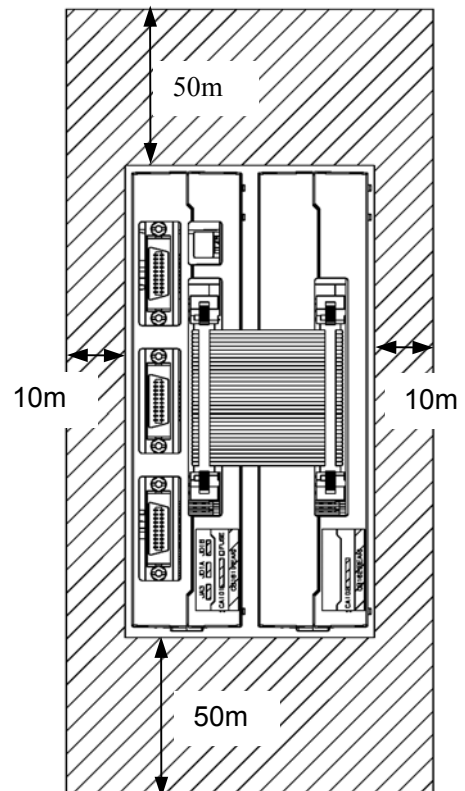


Connector specification on the Printed circuit board:
 HONDA MRF-96FD (96-pin female straight connector)

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	27/29



Modules need to be spaced at least 40mm.



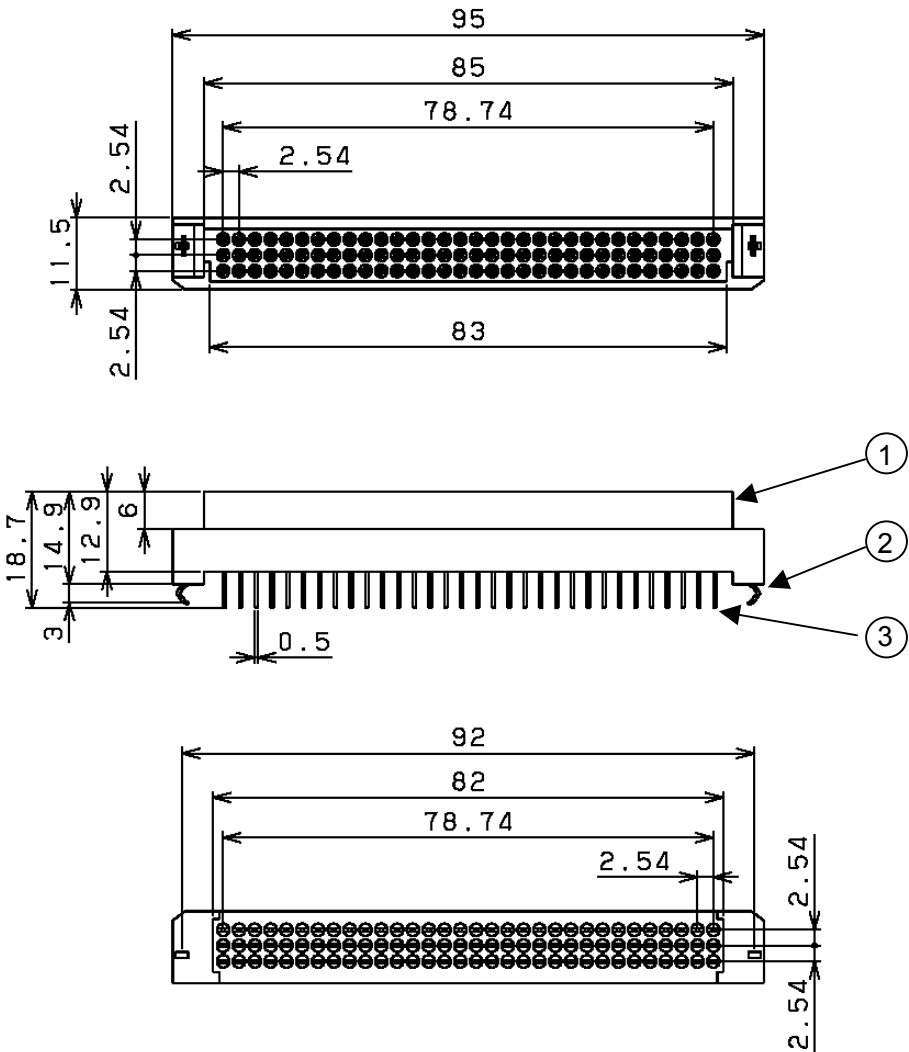
The spaces shown in above figure are required to ensure air flow

Note

- (1) For ventilation, leave a space at least 50mm on the upper and down side, and 10mm on the right and left side.
- (2) For wiring, leave a space at least 70mm on the front of module.
- (3) Leave a space at least 40mm between Basic module and Expansion module.
- (4) Leave a space at least 6mm backside of connector panel printed circuit board because hook and stopper protrude from the back side.
- (5) Basic module must be installed to the left of Expansion module
- (6) Attach the pedestal on the backside of the connector panel printed circuit board to prevent it from bending when the modules are installed.
- (7) Thickness of connector panel printed circuit board must be 1.7 ± 0.1 mm

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	28/29

20. Connector panel Printed circuit board connector(HONDA MRF-96FD) dimensions



Unit: mm

- ① Insulator
- ② lock
- ③ contact

				TITLE	I/O module type-2 for Connector board Connection manual	
				DRAW. NO.	A-80950E	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET	29/29