3.2.4
Connecting the Input Power Supply

Considering the robot power capacity and the circuit breaker capacity, connect the power supply whose voltage conforms to the installation conditions to the terminal located above the circuit breaker.

Be sure to ground the work table or jig used by an arc welding robot or the like so that it can handle a large current.

Selection of an input transformer tap is necessary depending on the input voltage.

The tap is set before shipment. However, check it referring to section 6.2 in "Maintenance" when changing the input voltage and before supplying power (before the breaker switch is turned on).

The square of cable must be over than 6 mm^2.

Select the cable which is able to withstand the stress given by the external influence.

	Maximum short current
i−cabinet, M−410i (operation box)	375 A
B−cabinet	340 A
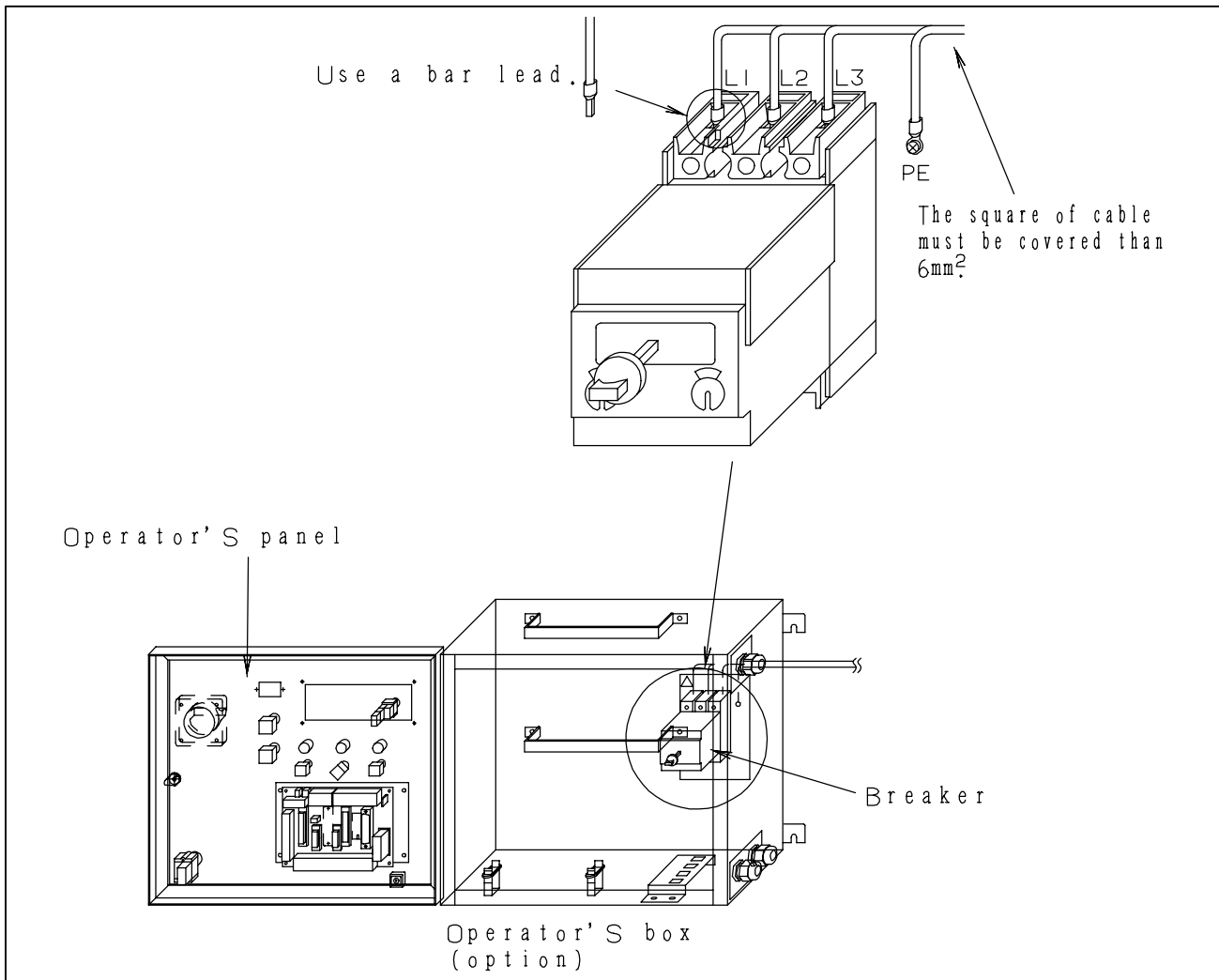
Fig.3.2.4 (a) Input Power Supply Connection (Operator's box−breaker)

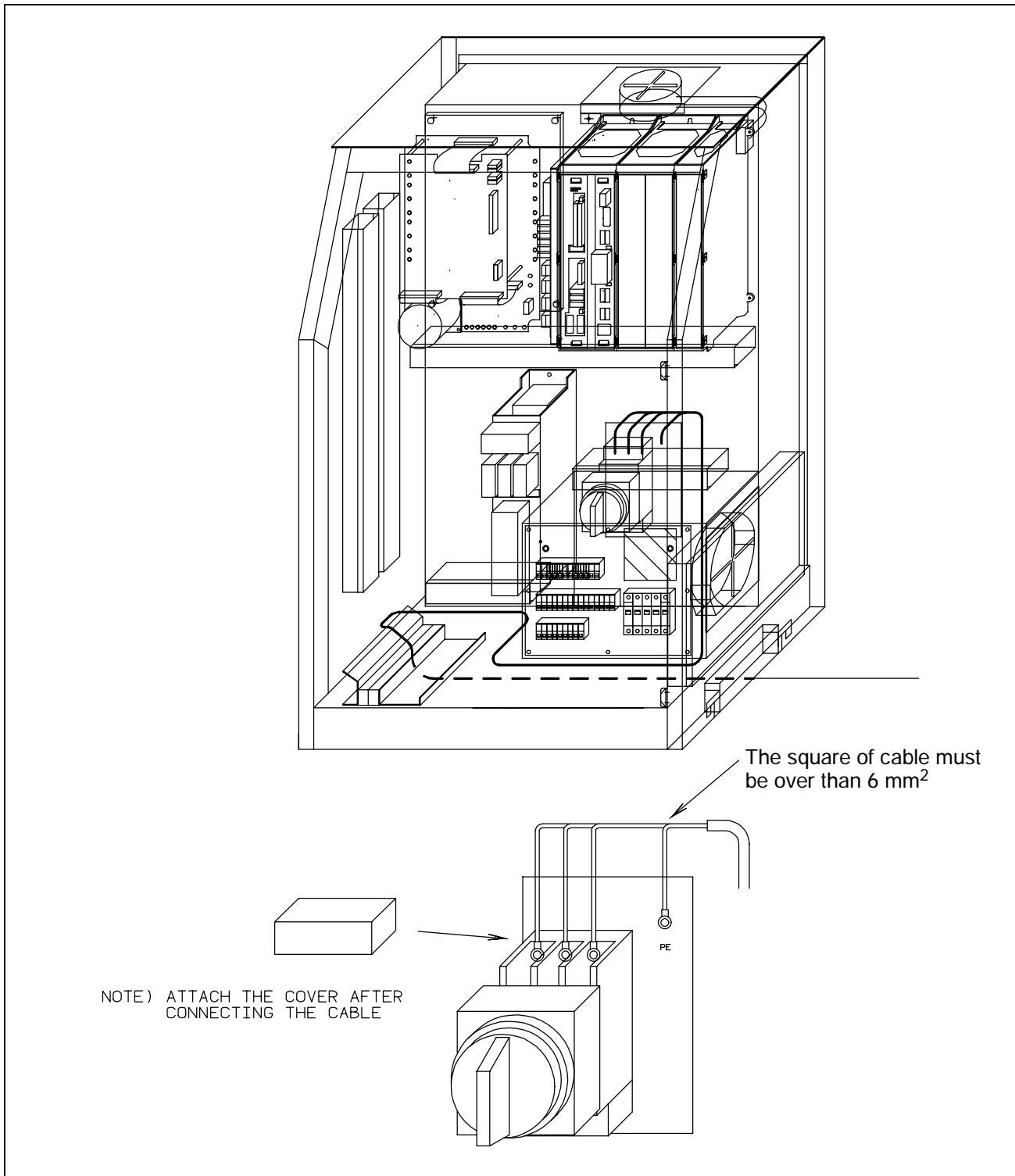The square of cable must
be over than 6 mm^2

NOTE) ATTACH THE COVER AFTER
CONNECTING THE CABLE

PE

Fig.3.2.4 (b) Input Power Supply Connection (B cabinet)

3.2.5
Connecting the External Power Supply on/off Switch

The External Power On/Off signal turns on and off the power supply from the outside the control unit, and is connected as follows.
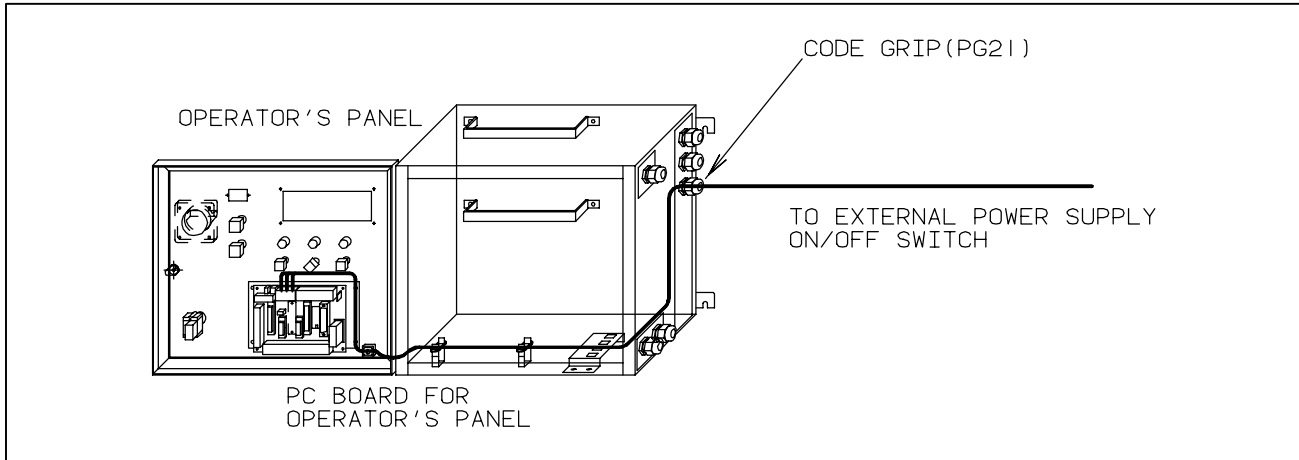

Fig.3.2.5 (a) Connecting the External Power Supply ON/OFF Switch (Operator's Box)
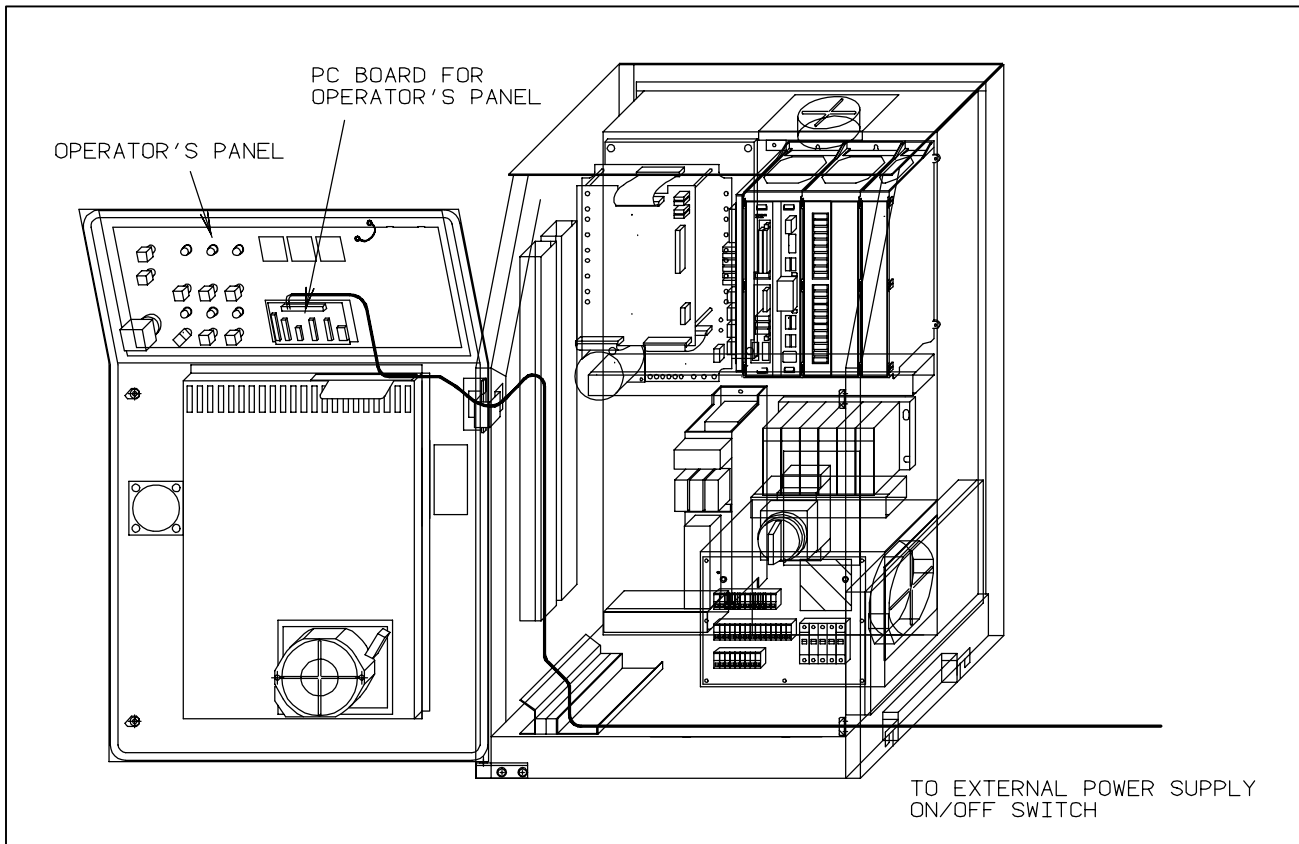
Fig.3.2.5 (b) Connecting the External Power Supply ON/OFF Switch (B caibnet)

REMOVE THE JUMPER WHEN THE EXTERNAL
POWER SUPPLY ON/OFF SWITCH IS USED.

ON
COM
OFF

POWER ON   POWER OFF

EXTERNAL POWER SUPPLY ON/OFF SWITCH

PC BOARD FOR OPERATOR'S PANEL

USE A CONTACT CONFORMING TO THE FOLLOWING:VOLTAGE RATING:50VDC,
CURRENT:100mA OR MORE. THE POWER SUPPLY ON/OFF TIMING CHART IS
AS FOLLOWS.

T_{ON}

T_{OFF} T_{OFF-ON}

EX-ON – EX-COM

EX-OFF – EX-COM

POWER ON

$T_{ON} \geqq 0.5sec, T_{OFF} \geqq 0.5sec, T_{OFF-ON} \geqq 5sec$

Fig.3.2.5 External Power Supply ON/OFF Switch Connection

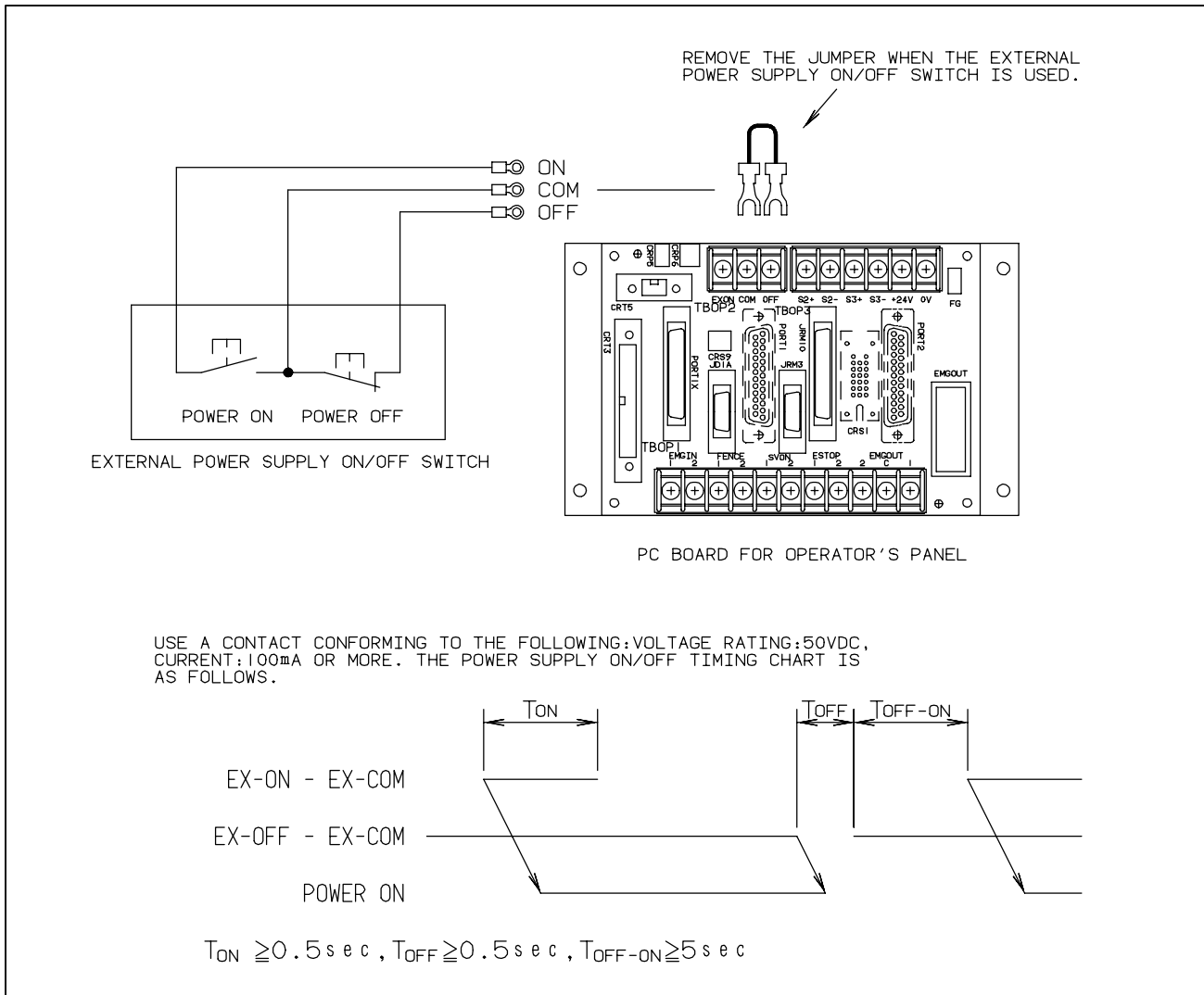## 3.2.6
Connecting the
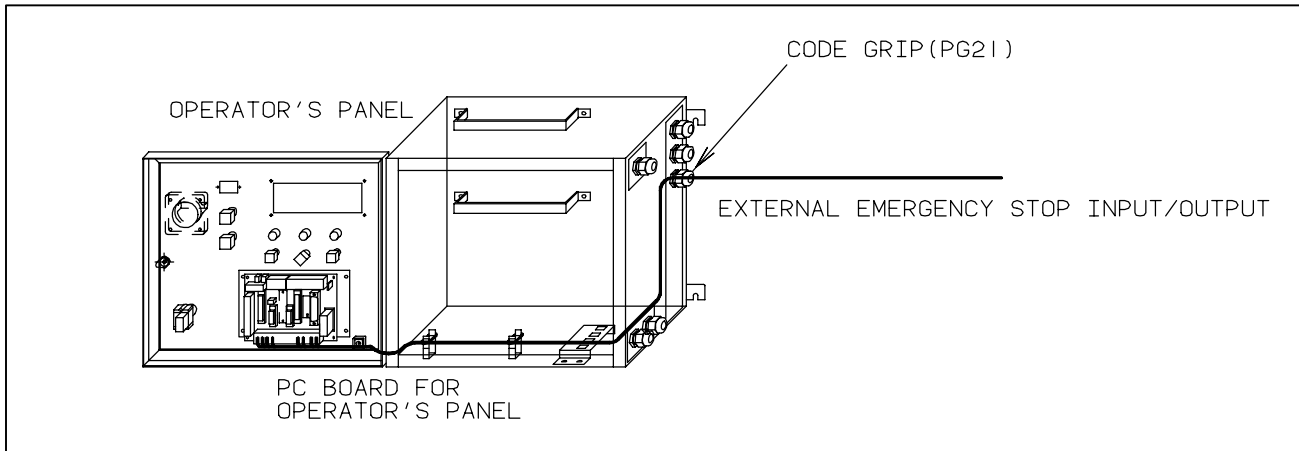## External Emergency
Stop

Fig.3.2.6 **(a) Connecting the External Emergency Stop (Operator's Box)**
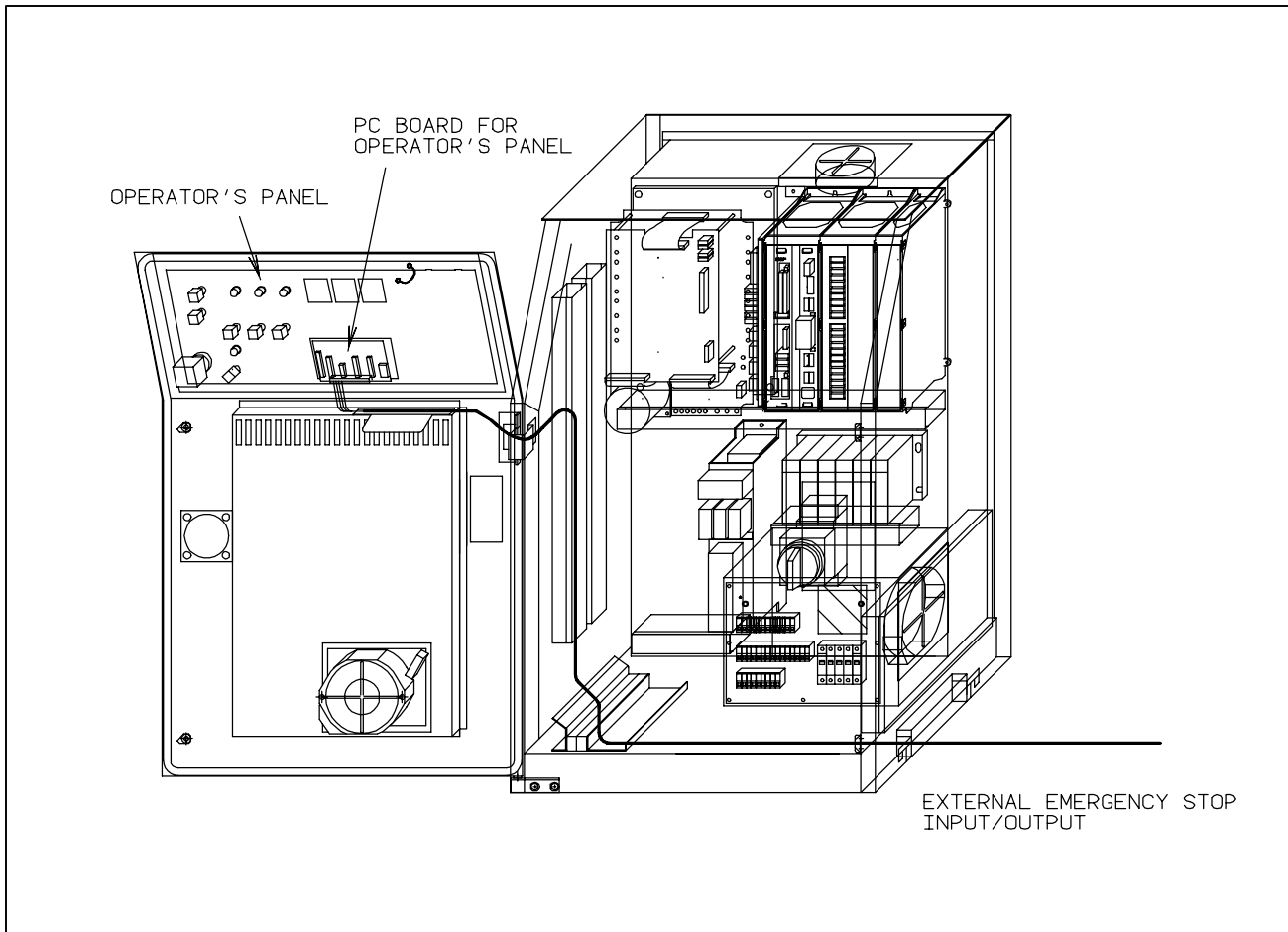

Fig.3.2.6 (b) Connecting the External Emergency Stop (B cabinet)

EXTERNAL EMERGENCY STOP OUTPUT
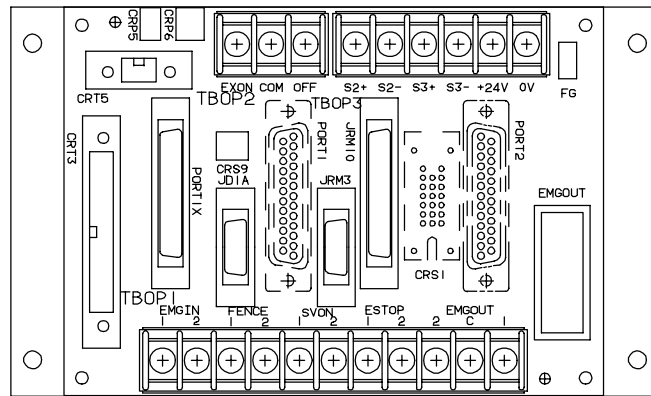
SIGNAL	DESCRIPTION	CURRENT,VOLTAGE
EMGOUT1 EMGOUTC	IN THIS CONTACT IS BROKEN, EMERGENCY STOP OR POWER OFF CONDITION. IN THIS CONTACT IS CLOSED, NO-EMER-GENCY STOP CONDITION.	RATED CONTACT: 250VAC,5A RESISTOR LOAD
EMGOUT2 EMGOUTC	IN THIS CONTACT IS CLOSED, EMERGENCY STOP OR POWER OFF CONDITION. IN THIS CONTACT IS BROKEN, NO-EMER-GENCY STOP CONDITION.	
ESTOP1 ESTOP2	THIS IS EMERGENCY OUTPUT SIGNAL THAT IS BROKEN WHEN OPERATOR'S PANEL OR TEACH PENDANT EMERGENCY STOP BUTTON IS PUSHED.	RATED CONTACT: 24VDC,0.1A RESISTOR LOAD

M4 SCREW ARE PROVIDED ON THE TEMINALS
USE CRIMP TERMINALS 9 mm WIDE OR LESS.

Fig.3.2.6 (c) Connecting the External Emergency Stop

EXTERNAL EMERGENCY STOP INPUT

REMOVE THE JUMPER PRIOR TO USE.

EXTERNAL EMERGENCY STOP SWITCH

EMGIN1

EMGIN2

SAFETY FENCE

FENCE1

FENCE2

SIGNAL	DESCRIPTION	CURRENT VOLTAGE
EMGIN1 EMGIN2	Connect the contacts of the external emergency stop switch to these terminals. When using the contacts of a relay or contactor instead of the switch, connect a spark killer to the coil of the relay or contactor, to suppress noise. When these terminals are not used, jumper them.	24DVC 0.1A OPEN/ CLOSE
FENCE1 FENCE2	THESE SIGNALS ARE USED TO STOP THE ROBOT WHEN THE SAFETY FENCE IS OPEN. WHEN T1 OR T2 MODE IS SELECTED BY MODE SELECTION SWITCH, THIS SIGNAL IS IGNORED AND EMERGENCY STOP DOES NOT OCCUR.	24VDC 0.1A OPEN/ CLOSE

M4 SCREWS ARE PROVIDED ON THE TERMINAL.
USE CRIMP TERMINALS 9mm WIDE OR LESS.

Servo on input

After connecting a servo on input switch, be sure to check the operations of the switch, the emergency stop switch on the operator's panel, and the emergency stop switch on the teach pendant.

Connected at the factory.
Remove the jumperprior
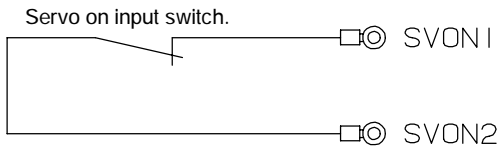to use.

Servo on input switch.

SVON1

SVON2
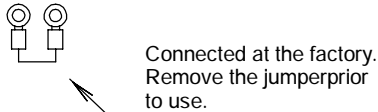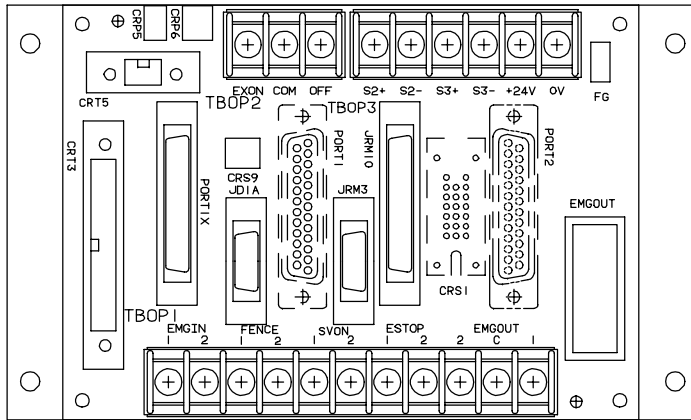
CAUTION

- FOR CONNECTION TO DRY CONTACTS ONLY.
- SERIOUS DAMAGE MAY RESULT IF CONNECTED TO POWER SOURCE.

Signal	Description	Current, voltage
SVON1 SVON2	Connect the contacts of the servo–on input switch to these terminals. When using the contacts of a relay or contactor instead of the switch, connect a spark killer to the coil of the relay or contactor, to suppress noise. When these terminals are not used, jumper them.	24 VDC/0.1 A switch on/off

M4 screws are provided on the terminal. Use crimp terminals 9mm wide or less.

4 PERIPHERAL DEVICE, ARC WELDING, AND END EFFECTOR INTERFACES

R-J2 I/O peripheral device interfaces include printed circuit boards and a unit selected according to the applications. Table 4 lists the printed circuit boards and unit. Fig. 4 shows their locations.

Table 4 Peripheral Device Interface Types

No.	Name	Drawing number	Number of I/O points				Remarks
			DI	DO	D/A	A/D	
1	Process I/O printed circuit board CA	A05B-2300-J030	40	40	2	6	Backplane installation type (with welding interface)
2	Process I/O printed circuit board CB	A05B-2300-J031	40	40	–	–	Backplane installation type (without welding interface)
3	Process I/O printed circuit board DA	A05B-2300-J035	Note 80	Note 80	–	–	Backplane installation type (without welding interface)
4	Process I/O printed circuit board EA	A05B-2300-J040	40	40	2	6	For ARC Mate 100i Operator's box installation type (with welding interface)
5	I/O unit model A	–	Depending on a selected I/O model.				(Note 3)
6	I/O unit model B	AO5B–2300–J001	Depending on a selected unit.				Interface unit

> **NOTE**
> 1 Process I/O printed circuit board DA of i cabinet has 96 input points and 96 output points. Because of cable restrictions, only 80 input points and 80 output points can be used.
> 2 General purpose I/O (SDI/SDO) is a number which subtract an exclusive signal from the table value.
>   Example: Process I/O printed circuit board CA
>   Table value   Exclusive DI   General purpose DI
>   DI;   40   –   18   =   22 points
>   Table value   Exclusive DO   General purpose DO
>   DO;   40   –   20   =   20 points
> 3 When you want to mount I/O unit model A in the operation box, consult FANUC.

Operator's box
(option)

Note) Some operator's boxes
support the connection of
I/O unit model A. For details,
contact your FANUC
sales representative.

Basic unit of
I/O unit model B

Process I/O
CA/CB/DA

To peripheral device

Interface unit of I/O unit model B
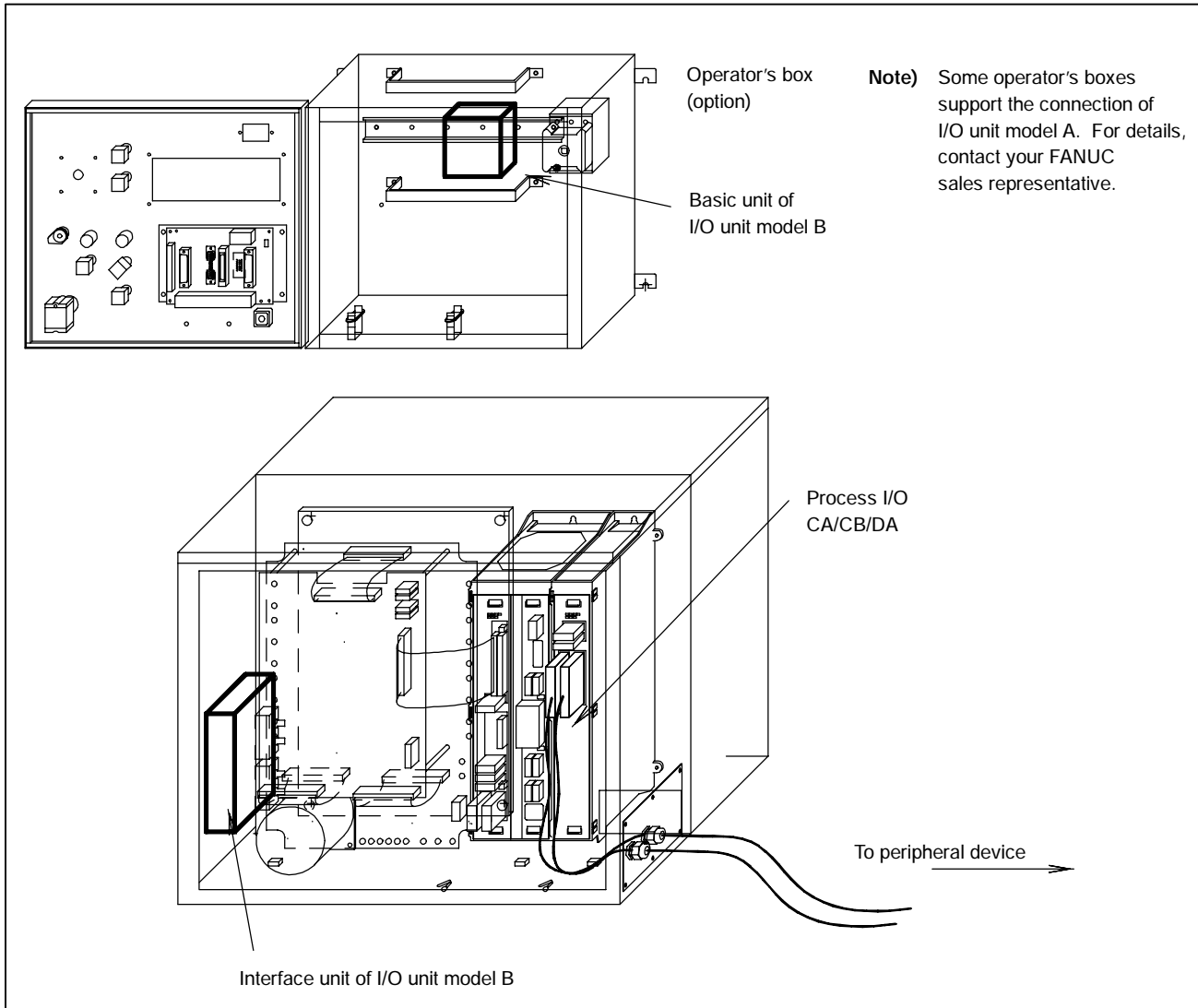
Fig.4 (a) Locations of Peripheral Device Interfaces (i cabinet)

CRW I

Operator's box

Process I/O EA

CRM2B

CRM2A

To peripheral device
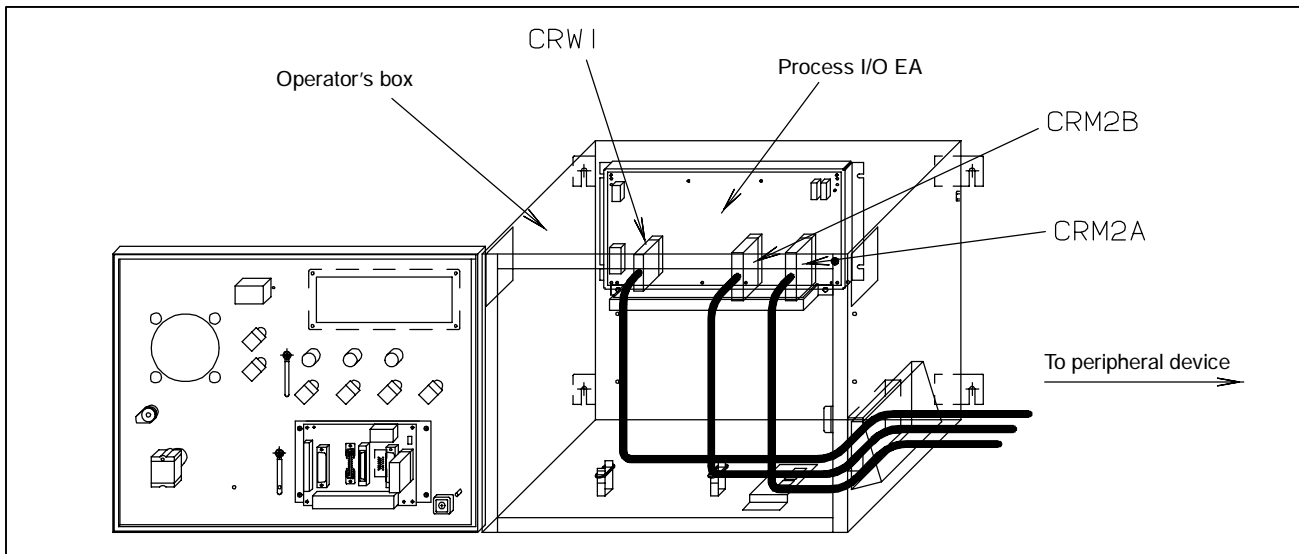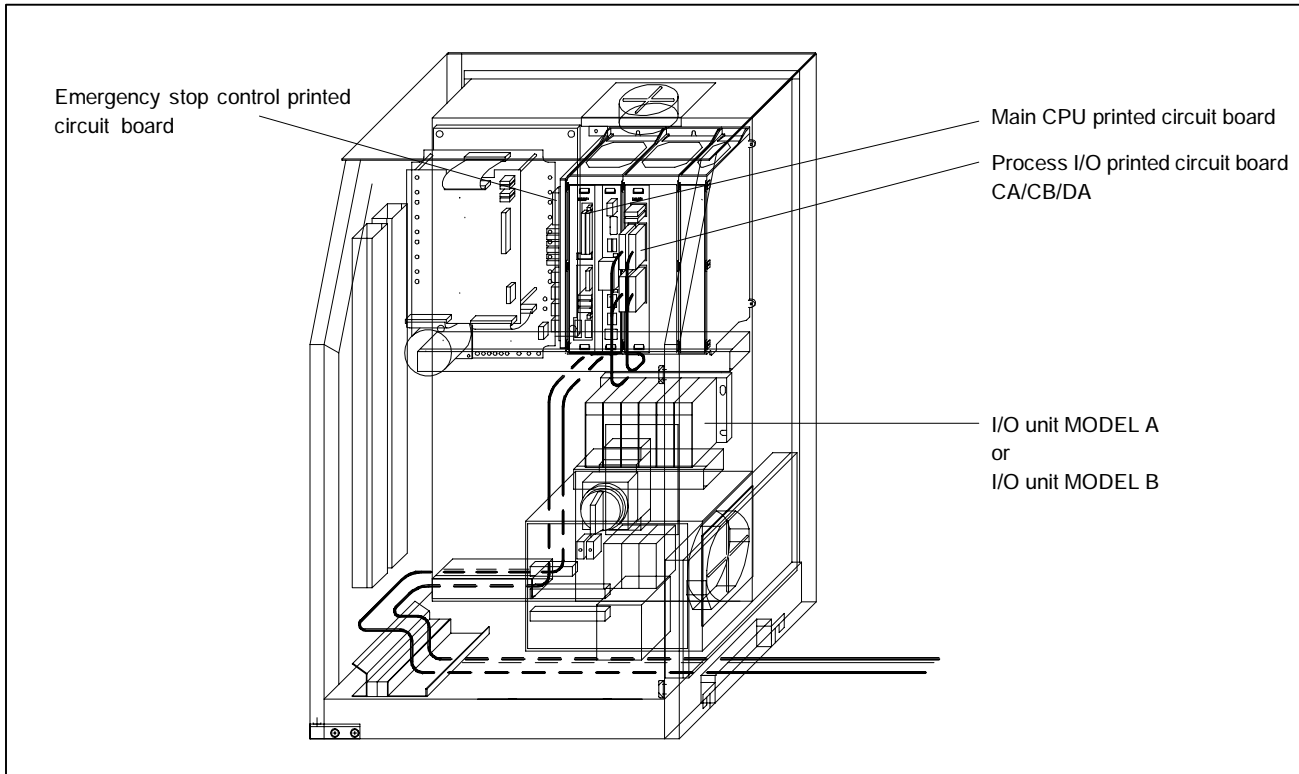
Fig.4 (b) Locations of Peripheral Device Interfaces (B cabinet)
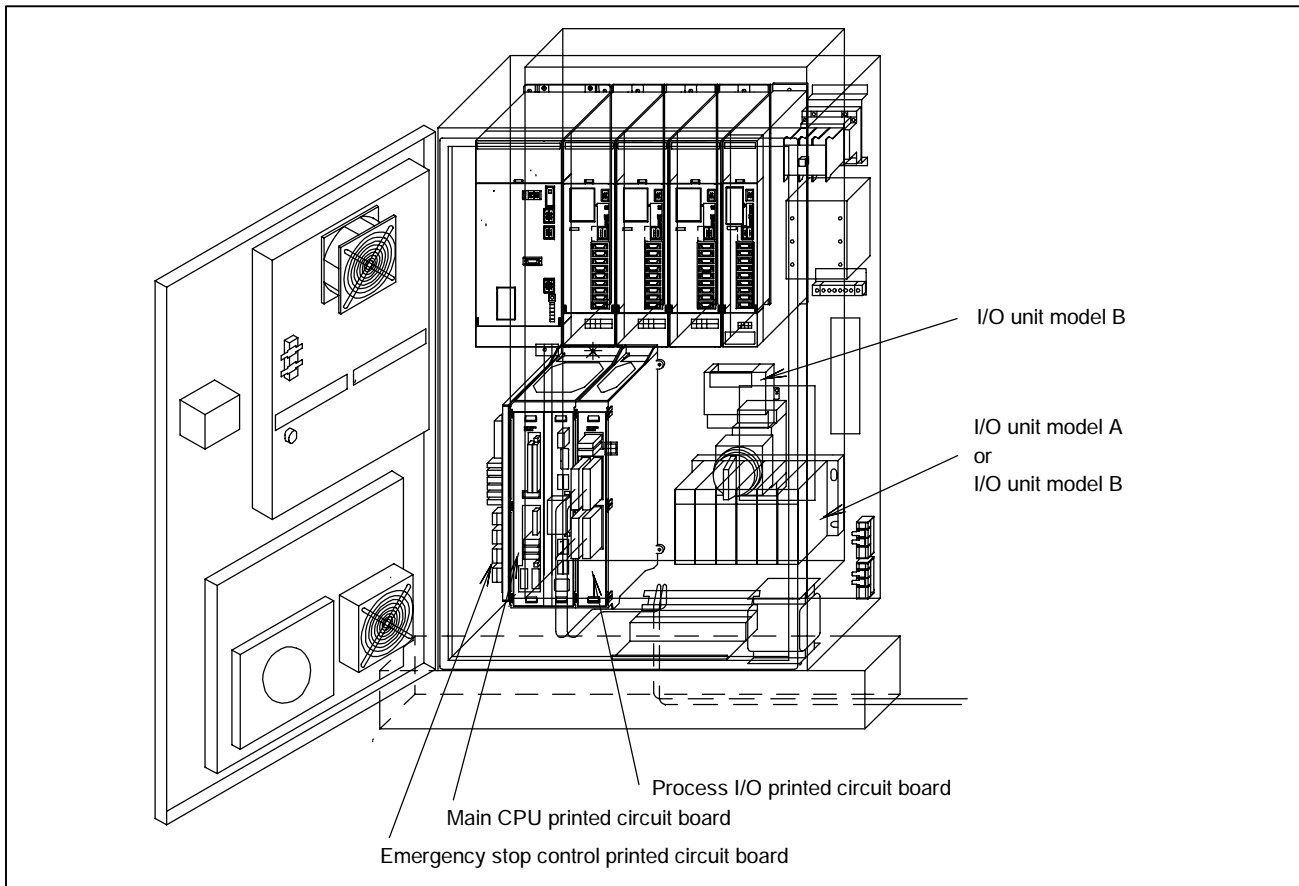
Fig.4 (c) Locations of Peripheral Device Interfaces (Cabinet for M−410*i*)

4.1
PERIPHERAL
DEVICE INTERFACE
BLOCK DIAGRAM

4.1.1
When Process I/O
Printed Circuit Board
CA, CB or EA is Used

```
┌──────────────────────────────────────────────────────────────────────────────────────┐
│                                                                                        │
│   ┌────────────────┐                 ┌───────────────────┐                             │
│   │ Main CPU printed│                │ Process I/O printed│                            │
│   │ circuit board   │                │ circuit board      │                           │
│   │                 │                │ (CA/CB/EA)         │                            │
│   │                 │       K10      │                    │        K50A               │
│   │          JD1A ┤├────────────┤├ JD4A         CRM2A ┤├──────────┤├ Peripheral device │
│   │                 │                │                    │        K50B               │
│   │                 │                │              CRM2B ┤├──────────┤├ Peripheral device│
│   │               ┤├ JD4B           │               CRW1 ┤├──────────┤ Wolder          │
│   │                 │                │              CRW2 ┤├          │                 │
│   └────────────────┘                 └───────────────────┘                             │
│                                                                                        │
└──────────────────────────────────────────────────────────────────────────────────────┘
```
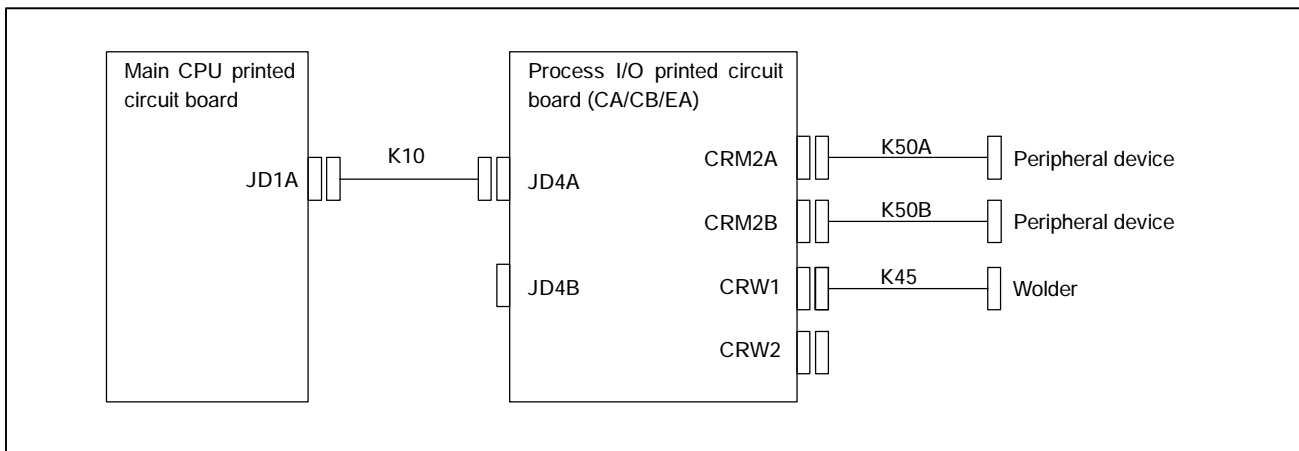
CRW1 and CRW2 are not provided for process I/O printed circuit board CB.

In case of i cabinet
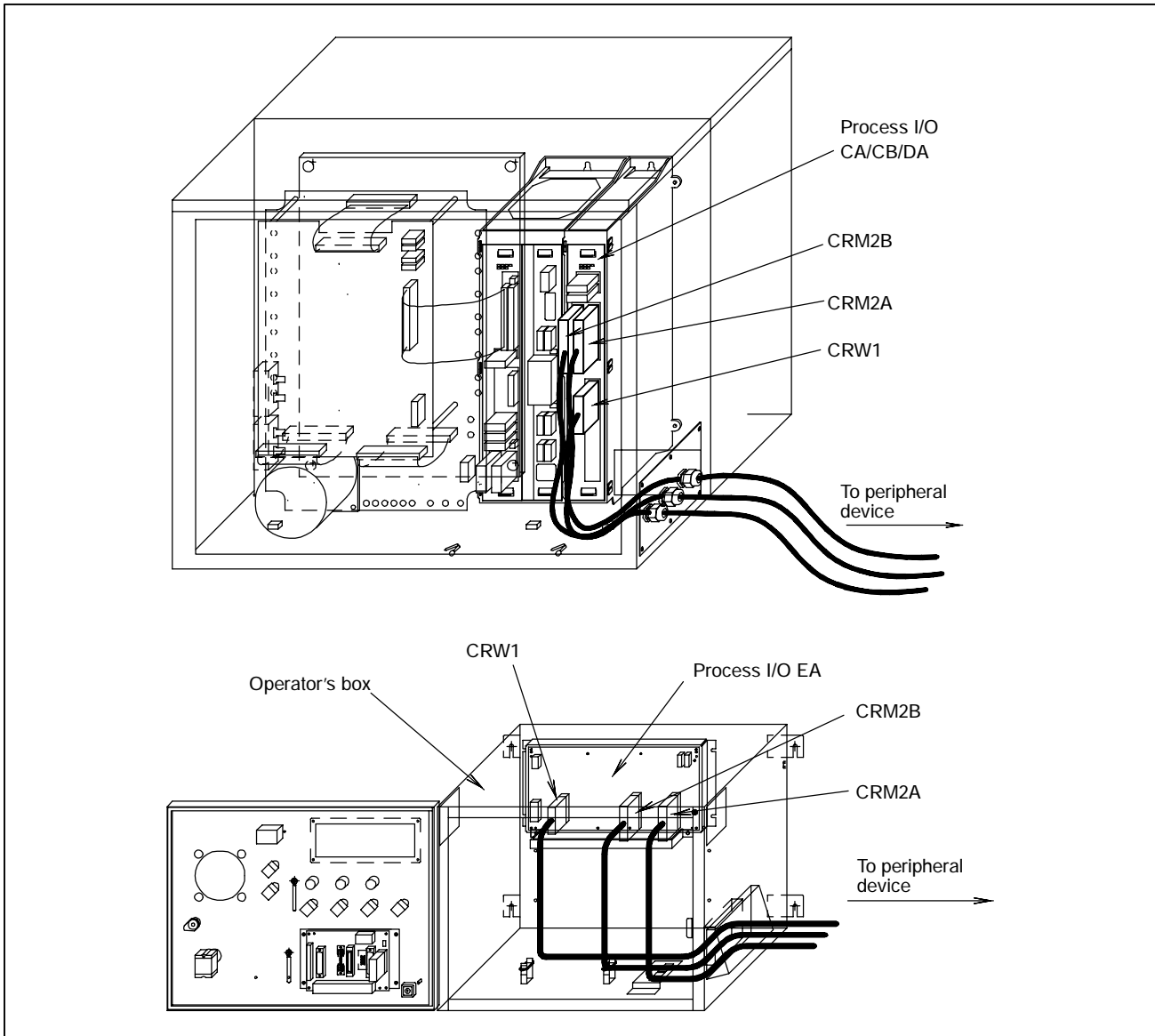
Process I/O
CA/CB/DA

CRM2B

CRM2A

CRW1

To peripheral
device

CRW1

Operator's box

Process I/O EA

CRM2B

CRM2A

To peripheral
device

	Cable number	Name	Drawing number	Remarks
	K10	Process I/O connection cable A	A05B–2350–J100	R–J2 controller internal cable
Process I/O PC board for CA	K50A K50B K45	Peripheral device connection cable	A05B–2350–J210	Connected length : 7m Honda Tsushin, 50,34pins : one to one
		Peripheral device connection cable	A05B–2350–J211	Connected length : 14m Honda Tsushin, 50,34pins : one to one
Process I/O PC board for CB	K50A K50B	Peripheral device connection cable	A05B–2350–J200	Connected length : 7m Honda Tsushin, 50pins : one to one
		Peripheral device connection cable	A05B–2350–J201	Connected length : 14m Honda Tsushin, 50pins : one to one
Process I/O PC board for EA	K50A K50B K45	Peripheral device connection cable	A05B–2350–J260	Connected length : 7m Honda Tsushin, 50,34pins : one to one
		Peripheral device connection cable	A05B–2350–J261	Connected length : 14m Honda Tsushin, 50,34pins : one to one

In case of B–cabinet, cabinet for M–410*i*
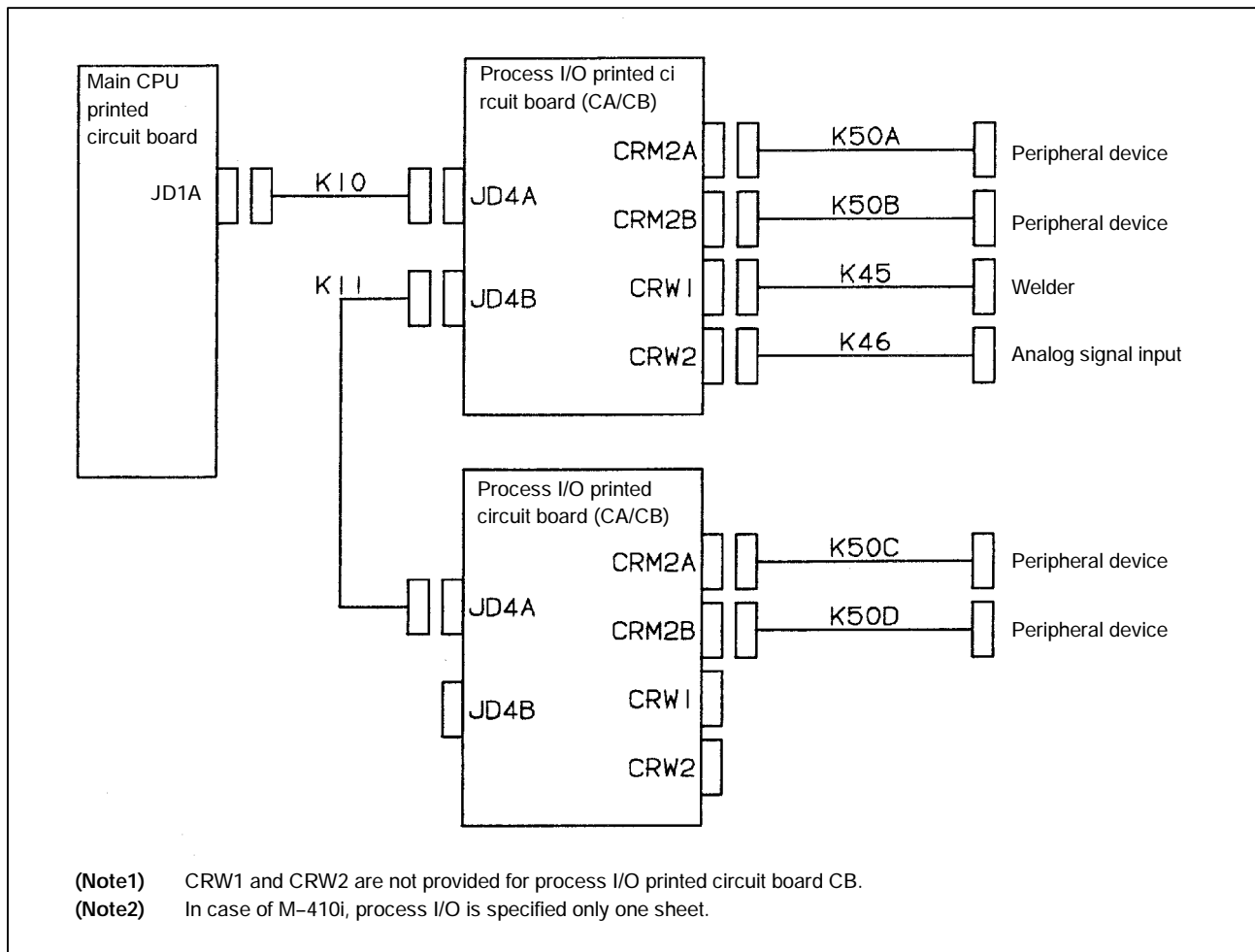
(Note1)   CRW1 and CRW2 are not provided for process I/O printed circuit board CB.
(Note2)   In case of M–410i, process I/O is specified only one sheet.

Cable number	Name	Drawing number	Remarks
K10	Process I/O connection cable	A05B–2300–J013	Internal cable of R–J control unit
K11	Process I/O connection cable	A05B–2300–J014	Internal cable of R–J control unit For connecting additional PC board
K50A K50B K50C K50D	Peripheral device connecting cable	A05B–2302–J113	Connected length : 7m Honda Tsushin, 50pins : one to one
		A05B–2302–J114	Connected length : 14m Honda Tsushin, 50pins : one to one
		A05B–2302–J115	Connected length : 30m Honda Tsushin, 50pins : one to one
K45	Welder connecting cable	A05B–2302–J273	Connected length : 3m
		A05B–2302–J274	Connected length : 6m
		A05B–2302–J275	Connected length : 13m In case of Tig welding it is impossible to use
K46	Peripheral device connecting cable	– – – –	This cable is not included It must be supplied by customer

4.1.2
When Process I/O
Printed Cricuit Board
DA is Used
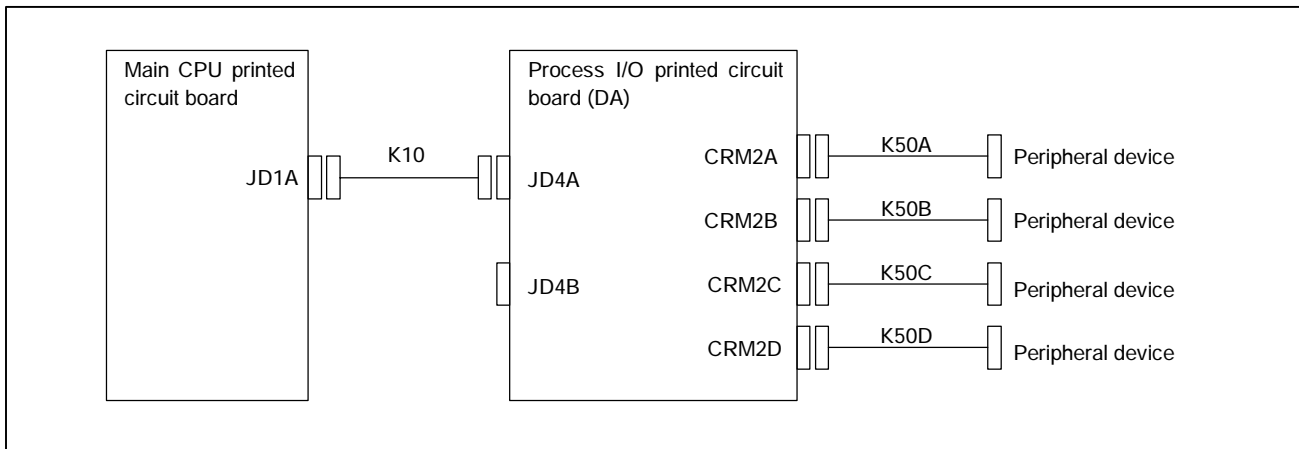
(i cabinet)

CRM2B
CRM2A
CRM2D
CRM2C

To peripheral device →

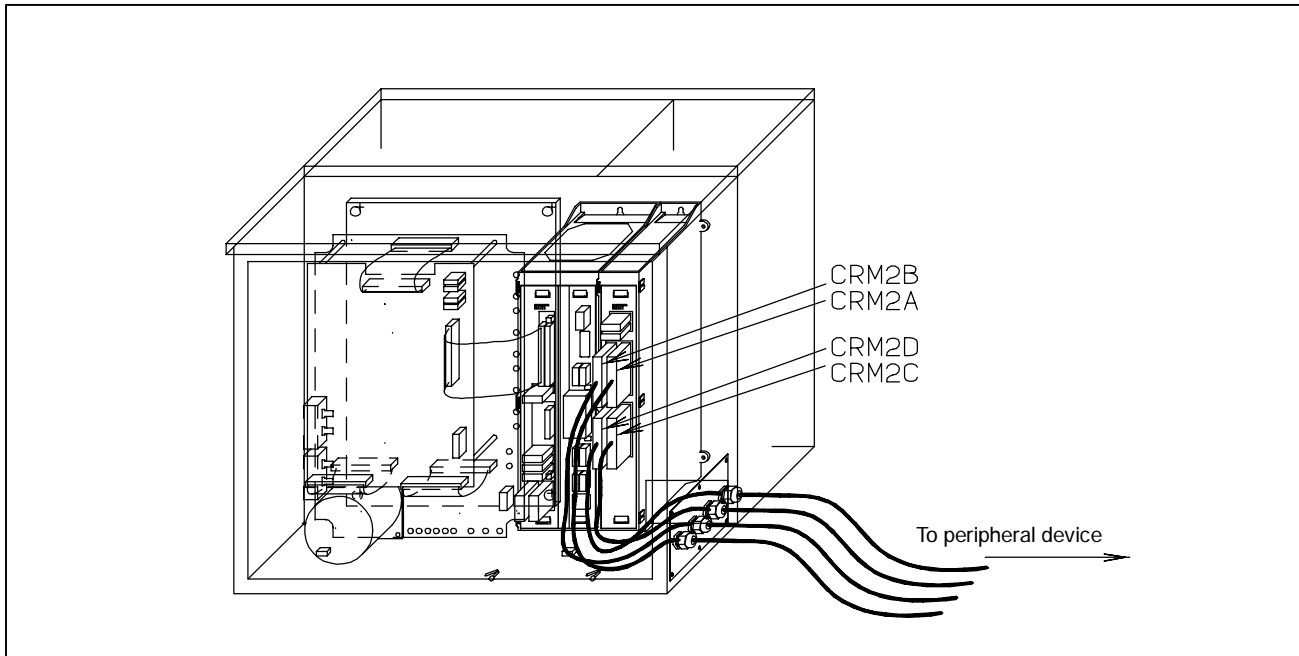|	Cable number	Name	Group	Drawing number	Remarks
	K10	Process I/O connection cable A	PB1	A05B–2350–J100	R–J2 controller internal cable
Process I/O PC board for DA	K50A K50B K50C K50D	Peripheral device connection cable	PC7	A05B–2350–J220	Connected length : 7m Honda Tsushin, 50pins : one to one
		Peripheral device connection cable	PC8	A05B–2350–J221	Connected length : 14m Honda Tsushin, 50pins : one to one

In case of B cabinet, cabinet for M–410*i*
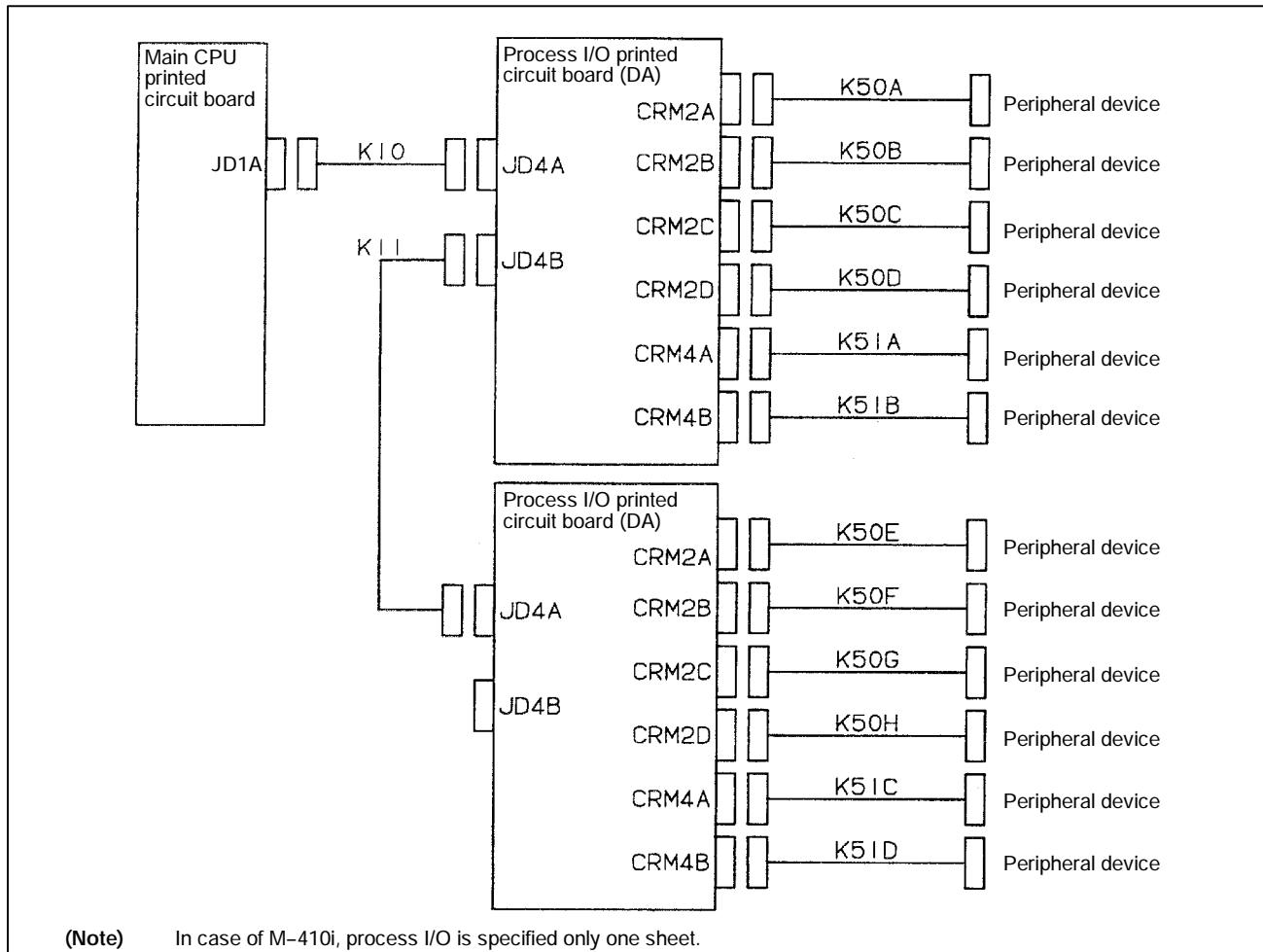
(Note)   In case of M–410i, process I/O is specified only one sheet.

Cable number	Name	Drawing number	Remarks
K10	Process I/O connection cable	A05B–2300–J013	Internal cable of R–J control unit
K11	Process I/O connection cable	A05B–2300–J014	Internal cable of R–J control unit For connecting additional printed circuit board
K50 A–H	Peripheral device connecting cable	A05B–2302–J113	Connected length : 7m Honda Tsushin, 50pins : one to one
		A05B–2302–J114	Connected length : 14m Honda Tsushin, 50pins : one to one
		A05B–2302–J115	Connected length : 30m Honda Tsushin, 50pins : one to one
K51 A–D	Welder connection cable	A05B–2302–J120	Connected length : 7m Honda Tsushin, 20pins : one to one
		A05B–2302–J121	Connected length : 14m Honda Tsushin, 20pins : one to one
		A05B–2302–J122	Connected length : 30m Honda Tsushin, 20pins : one to one

4.1.3
When I/O Unit Model A is Used

In case of i cabinet

Main CPU printed circuit board

JD1A

Printed circuit board panel

JRM10

JD1A

Operator's box (Note)

+24V
0V   TBOP3

I/O unit model A connection cable

I/O unit model A power connection cable

JD1A   JD1B   CP32

I/O base unit

Back plane

K54   Peripheral device welder

K54

K54

K54

K54

I/O unit model A is mounted in the operator's box.

Refer to I/O model A manual for more details.
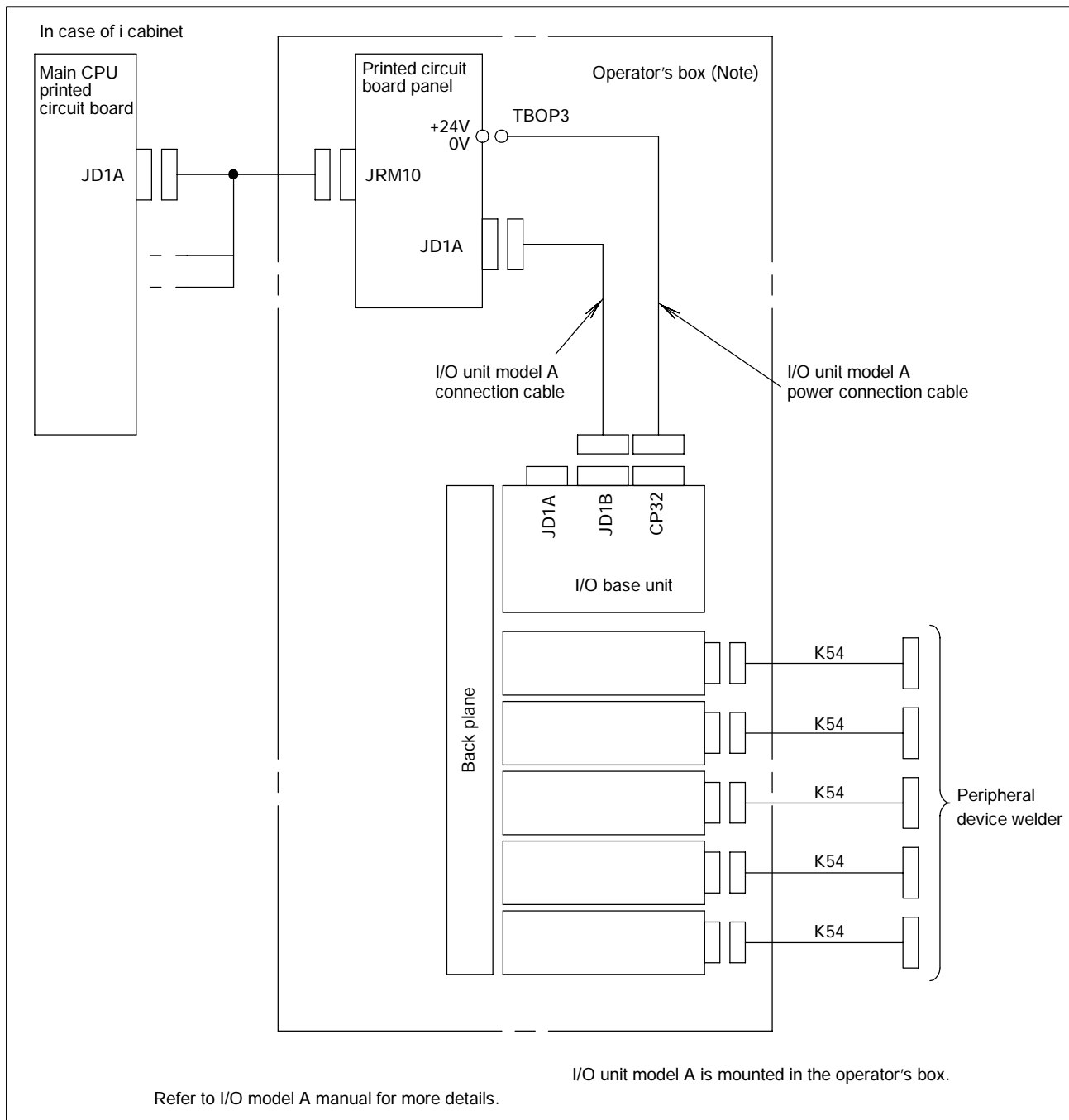
Cable number	Name	Group	Drawing number	Remarks
–	I/O unit model A connection cable	–	— — — —	Operator's box internal cable. Attached to the I/O unit mainframe.
–	I/O unit model A power connection cable	–	— — — —	Operator's box internal cable. Attached to the I/O unit mainframe.
–	Peripheral device connection cable	–	— — — —	Not included. Must be supplied by the customer.

In case of B cabinet/cabinet for M–410*i*

Power supply unit

CP5 ——— K16

Main CPU PC board

JD1A ——— K15

JD1A   JD1B   CP32

I/O base unit

Back plane

K54 — Peripheral device Welder
K54
K54
K54
K54

Refer to I/O model A manual for more details.
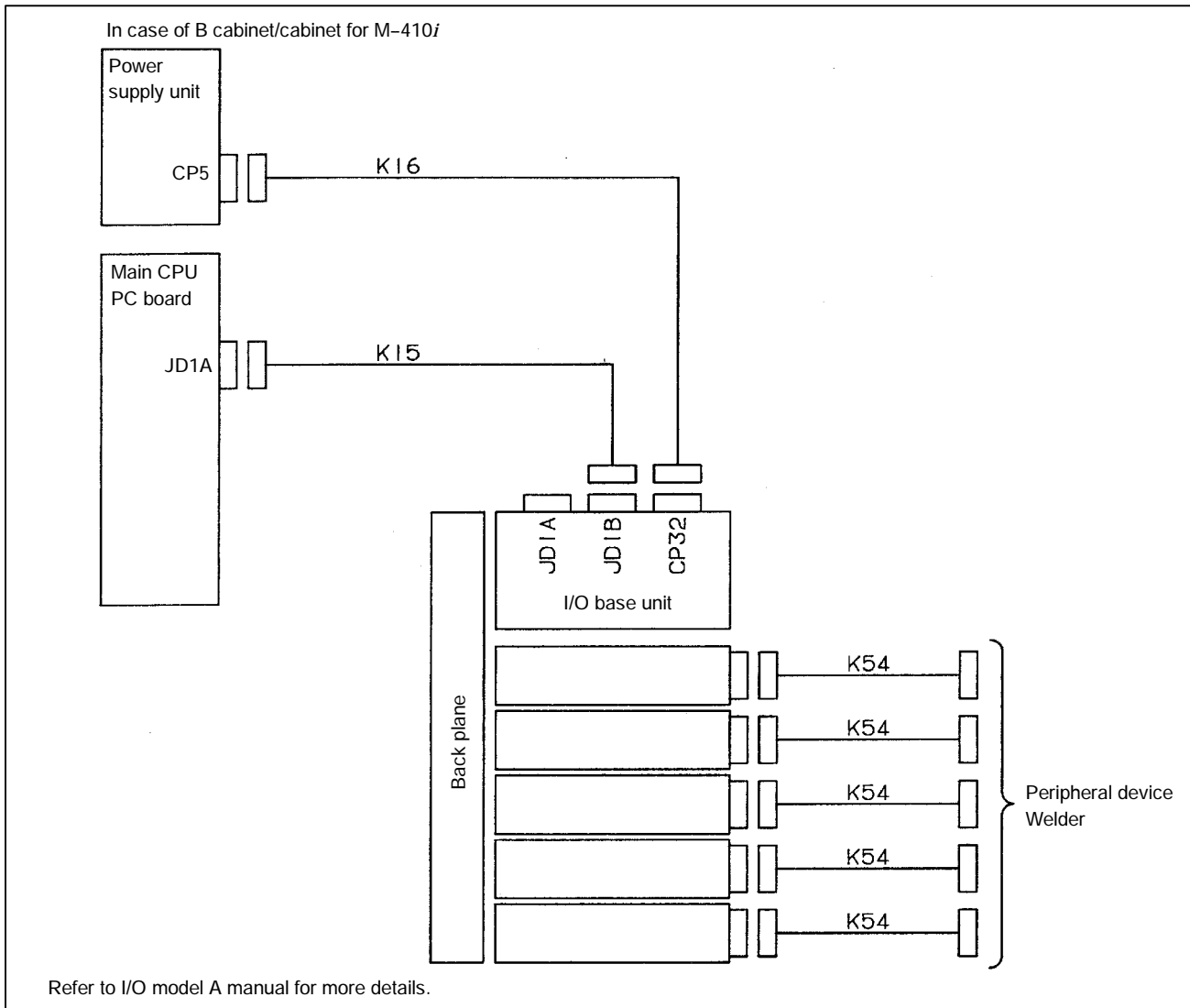
Cable number	Name	Drawing number	Remarks
K15	I/O unit model A connection cable	– – – –	Internal cable of R–J control unit Attached to I/O unit mainframe
K16	I/O unit model A connection cable	– – – –	Internal cable of R–J control unit Attached to I/O unit mainframe
K54	Peripheral device connecting cable	– – – –	This cable is not included It must be supplied by customer

4.1.4
When I/O Unit Model B is Used

Connection to I/O Unit Model B, installed in the operator's box

(a) **Connect terminals S2+ and S2– of terminal block TBOP3 on the panel PCB to terminals S+ and S– of the Model B, as shown below.**

(b) **Connect terminals +24V and 0V of terminal block TBOP3 on the panel PCB to terminals +24V and 0V of the Model B, as shown below.**

(c) **When the +24 V power of the panel PCB is used for LV, the maximum current is 2 A. If a current exceeding 2 A is required, use other DC power units to supply power to LV.**

Operator's box (option)

Panel printed board
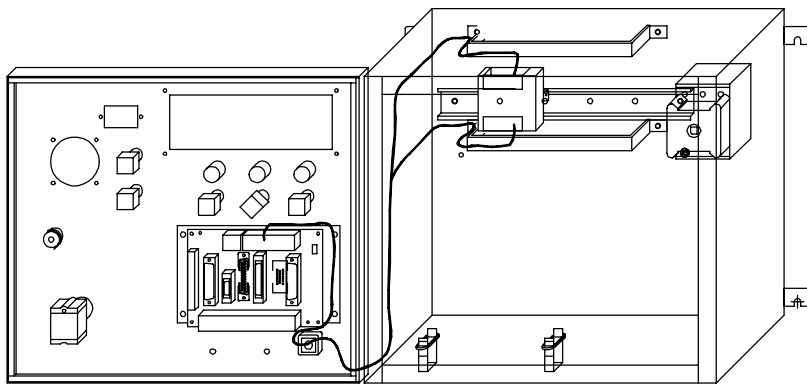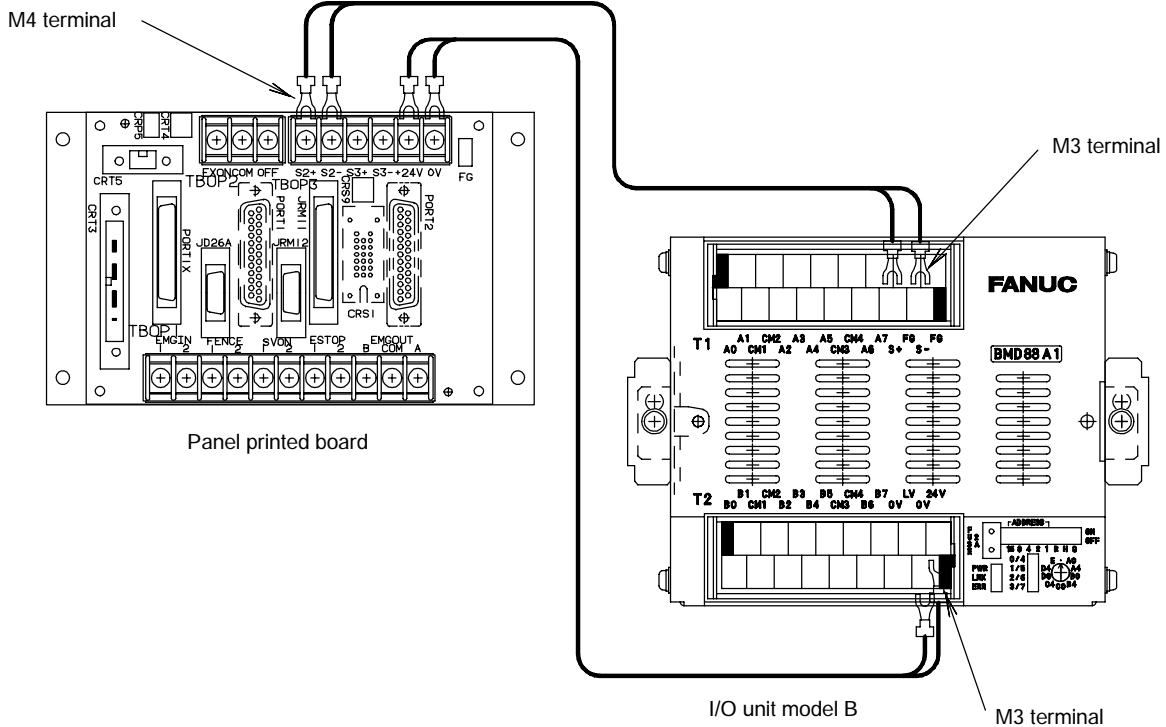
I/O unit model B

In case of i cabinet
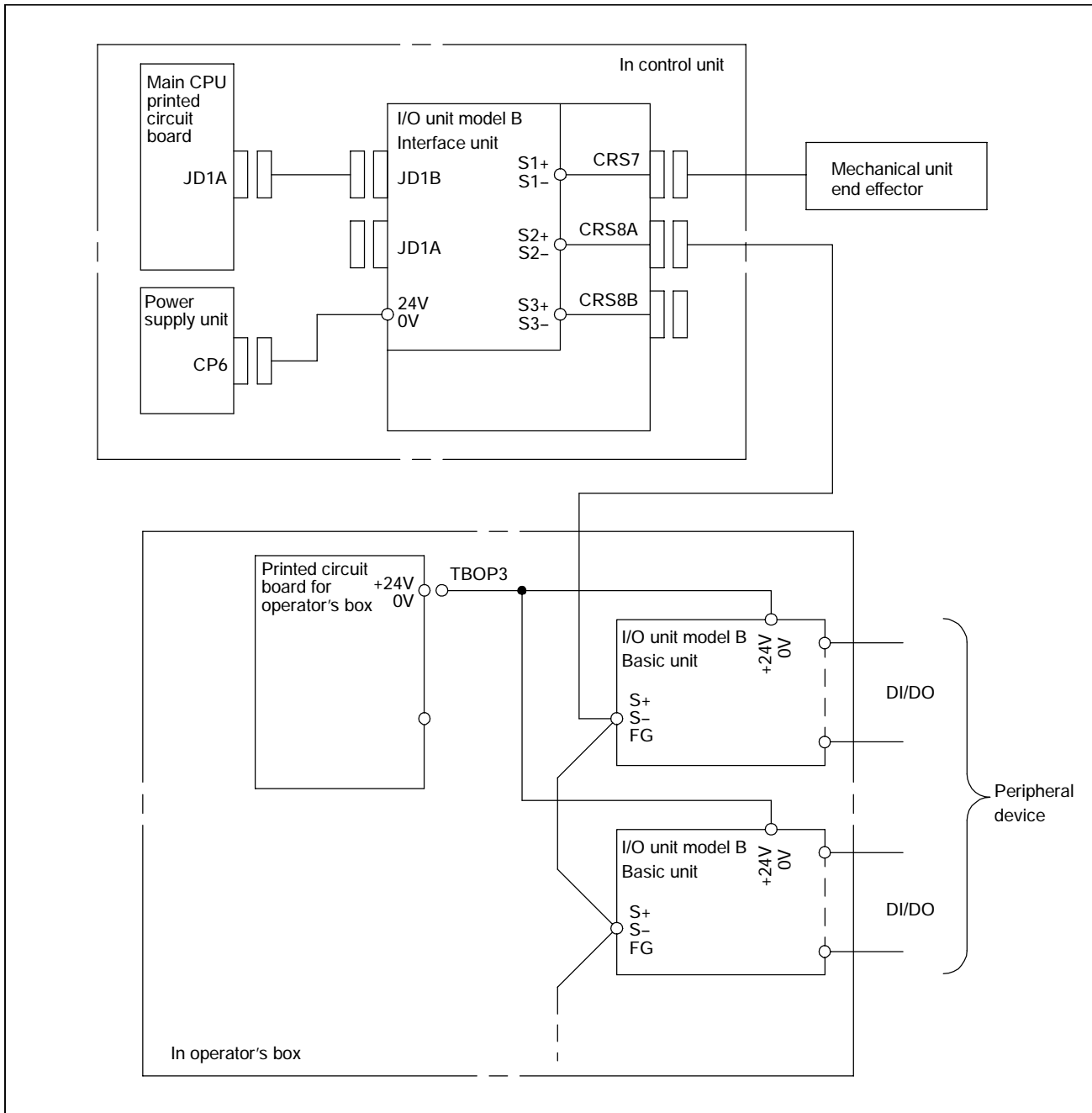
Cable number	Name	Group	Drawing number	Remarks
–	I/O unit model B connection cable	–	____	R-J2 controller unit internal cable
–	I/O unit model B connection cable	–	____	R-J2 controller unit internal cable
–	Peripheral device connection cable	–	____	Not included. Must be supplied by the customer

In case of B cabinet/cabinet for M–410*i*
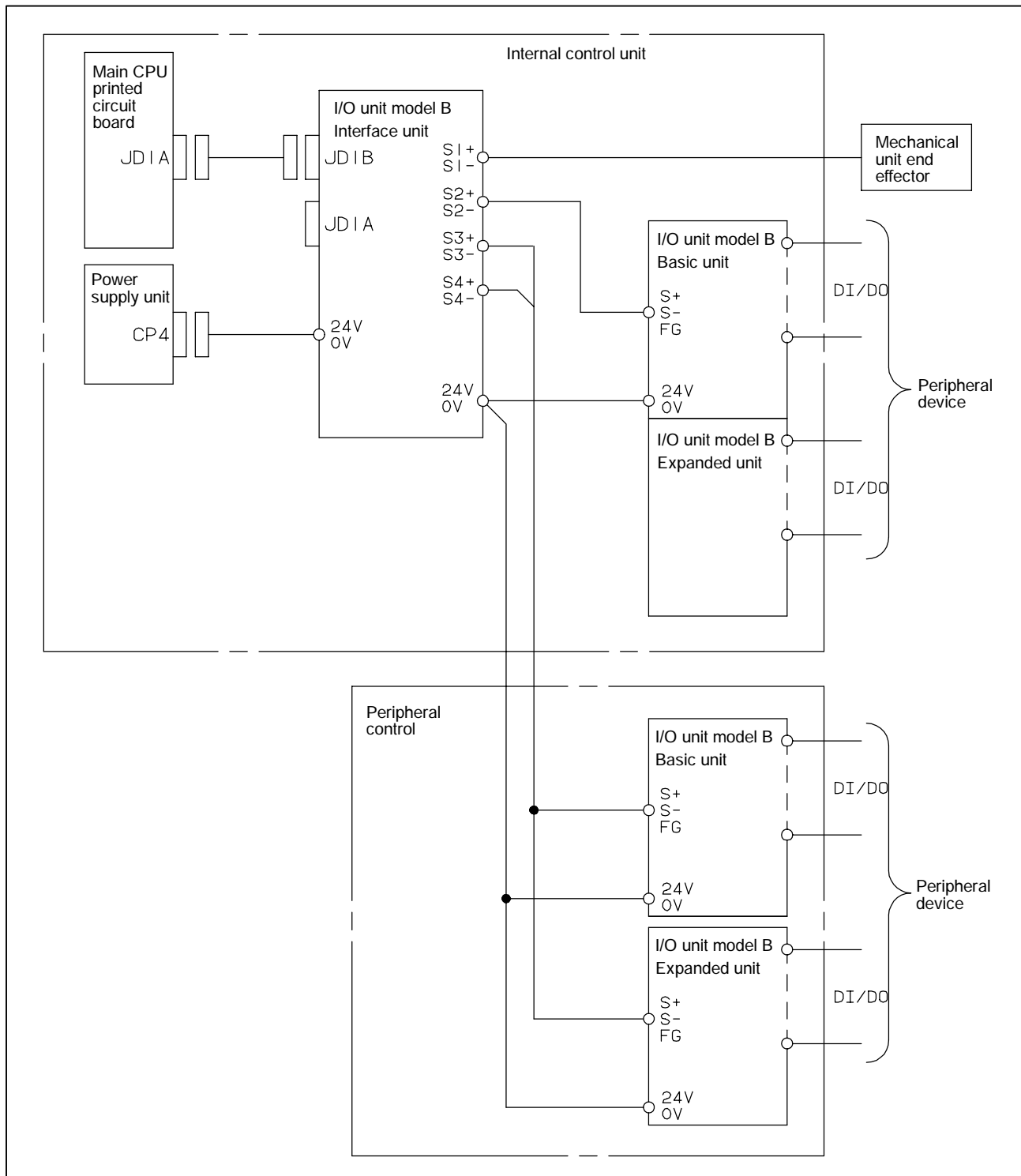
Cable number	Name	Group	Drawing number	Remarks
K**	I/O unit model B connection cable	–	_ _ _ _	Internal cable of R–J control unit
K**	I/O unit model B connection cable	–	_ _ _ _	Internal cable of R–J control unit
K**	Peripheral device connection cable	–	_ _ _ _	This cable is not included It must be supplied by customer

4.1.5

When Two or More Process I/O Printed Circuit Boards and I/O Unit (Model A or Model B) are Used

(a) In case of cabinet i

The following figure shows the connection when two or more process I/O printed circuit boards and I/O unit (model A or model B) are used.

1 process I/O CA/CB/DAs and 1 I/O unit model A or I/O unit model B can be installed in one cabinet, operator's box.
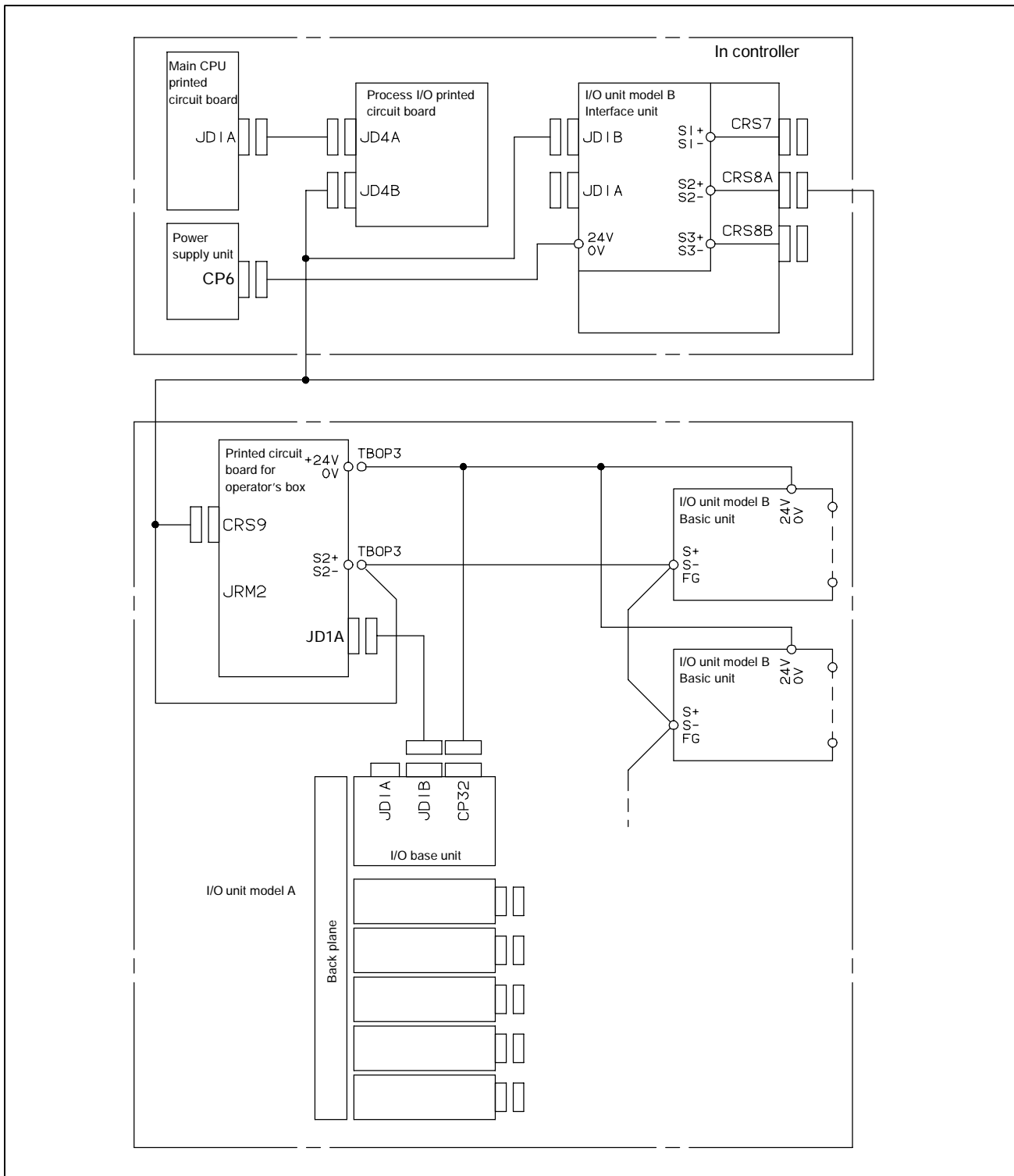
(b) B cabinet and M−410*i* cabinet

When several units of the process I/O PCB, I/O Unit Model A, or I/O Unit Model B are used, connect them as shown below.

One cabinet can include two units of the process I/O PCB (CA, CB, or DA) and one unit of I/O Unit Model A or B.
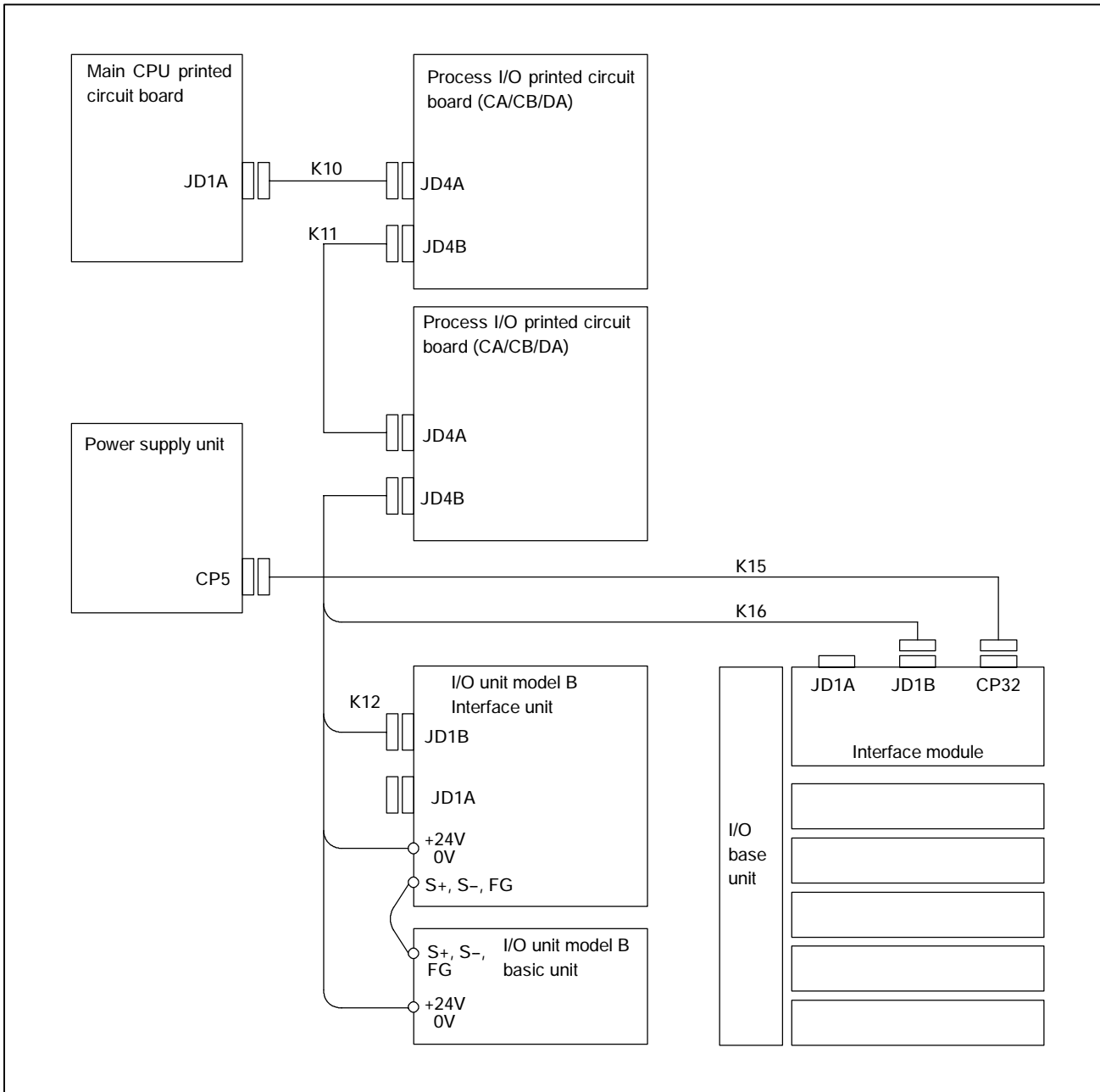
Cable number	Name	Drawing number	Remarks
K12	Process I/O connection cable	− − − −	Internal cable of R−J control unit For connecting additional pc board
others	See 4.1.1 to 4.1.3		

4.2
PERIPHERAL
DEVICE INTERFACE
COMBINATION

The peripheral device interface can be used with combinations of process I/O printed circuit boards CA, CB, and DA, as well as I/O unit models A and B.

Fig. 4.2 shows the combinations.

(a) i cabinet

[1-board]

Combination A	Combination B	Combination C	Combination D
CA/CB/EA(40 points)	DA (80 points)	I/O unit model A	I/O unit model B

[2-board combination]

Combination AC	Combination AD	Combination BC	Combination B
CA/CB (40 points) + I/O unit model A	CA/CB (40 points) + I/O unit model B	DA (80 points) + I/O unit model A	DA (80 points) + I/O unit model B

Fig.4.2 Peripheral Device Interface Combination

(b) B cabinet, M410*i* cabinet

[1-board]

Combination C	Combination D	Combination E
CA/CB (40 points)	DA (96 points)	I/O unit model A or model B

[2-board combination]

Combination CC	Combination CE
CA/CB (40 points) + CA/CB (40 points)	CA/CB (40 points) + I/O unit model A or model B

Combination DC	Combination DD	Combination DE
DA (96 points) + CA/CB (40 points)	DA (96 points) + DA (96 points)	DA (96 points) + I/O unit model A or model B

[3-board combination]

Combination CCE	Combination DCE	Combination DDE
CA/CB (40 points) + CA/CB (40 points) + I/O unit model A or model B	DA (96 points) + CA/CB (40 points) + I/O unit model A or model B	DA (96 points) + DA (96 points) + I/O unit model A or model B

4.3
PROCESS I/O
PRINTED CIRCUIT
BOARD SIGNALS

There are 18 exclusive data inputs (DI) and 20 exclusive data outputs (DO) for a process I/O printed circuit board.

These signals are allocated to the process I/O printed circuit board connected first when two or more printed boards are combined. (General signals SDI/SDO are allocated to the second and the following process I/O printed circuit boards.)

The common voltage of the DI signals input to pins 1 to 4 of connector CRM2A is clamped +24 V (common) in each process I/O printed circuit board.

Table 4.3 shows signals of a process I/O printed circuit board.

Table 4.3 Process I/O Printed Circuit Board Signals

(DI signals)

Connector number	Signal name	Description	Remarks
CRM2A-1	*IMSTP	Immediate stop	Clamped at +24 V common
CRM2A-2	*HOLD	Temporary stop	Clamped at +24 V common
CRM2A-3	*SFSD	Safe speed	Clamped at +24 V common
CRM2A-4	CSTOPI	Cycle stop	Clamped at +24 V common
CRM2A-5	FAULT RESET	External reset	
CRM2A-6	START	Start	
CRM2A-7	HOME	Return to home position	
CRM2A-8	ENBL	Operation enabled	
CRM2A-9	RSR1	Robot service request	
	PNS1	Program number selection	Option
CRM2A-10	RSR2	Robot service request	
	PNS2	Program number selection	Option
CRM2A-11	RSR3	Robot service request	
	PNS3	Program number selection	Option
CRM2A-12	RSR4	Robot service request	
	PNS4	Program number selection	Option
CRM2A-13	RSR5	Robot service request	
	PNS5	Program number selection	Option
CRM2A-14	RSR6	Robot service request	
	PNS6	Program number selection	Option
CRM2A-15	RSR7	Robot service request	
	PNS7	Program number selection	Option
CRM2A-16	RSR8	Robot service request	
	PNS8	Program number selection	Option

Table4.3 Process I/O Printed Circuit Board Signals (Continued)

(DI signals)

Connector number	Signal name	Description	Remarks
CRM2A-29	PNSTROBE	PNS strobe	
CRM2A-30	PROD START	Start of automatic operation	
CRM2A-31	SDI01	Peripheral device status	General signal
CRM2A-32	SDI02		
CRM2B-1	SDI03		
CRM2B-2	SDI04		
CRM2B-3	SDI05		
CRM2B-4	SDI06		
CRM2B-5	SDI07		
CRM2B-6	SDI08		
CRM2B-7	SDI09		
CRM2B-8	SDI10		
CRMSB-9	SDI11		
CRM2B-10	SDI12		
CRM2B-11	SDI13		
CRM2B-12	SDI14		
CRM2B-13	SDI15		
CRM2B-14	SDI16		
CRM2B-15	SDI17		
CRM2B-16	SDI18		
CRM2B-29	SDI19		
CRM2B-30	SDI20		
CRM2B-31	SDI21		
CRM2B-32	SDI22		

Table4.3 Process I/O Printed Circuit Board Signals (Continued)

(DO signals)

Connector number	Signal name	Description	Remarks
CRM2A-33	CMDENBL	During automatic operation	
CRM2A-34	SYSRDY	Preparation completed	
CRM2A-35	PROGRUN	During regeneration	
CRM2A-36	PAUSED	Program being interrupted	
CRM2A-38	HELD	During temporary stop	
CRM2A-39	FAULT	Alarm	
CRM2A-40	ATPERCH	Home position	
CRM2A-41	TPENBL	Teach pendant enabled	
CRM2A-43	BATALM	Battery voltage drop	
CRM2A-44	BUSY	During operation	
CRM2A-45	ACK1	Robot service request acceptance	
	SNO1	Selected program number	Option
CRM2A-46	ACK2	Robot service request acceptance	
	SNO2	Selected program number	Option
CRM2A-19	ACK3	Robot service request acceptance	
	SNO3	Selected program number	Option
CRM2A-20	ACK4	Robot service request acceptance	
	SNO4	Selected program number	Option
CRM2A-21	ACK5	Robot service request acceptance	
	SNO5	Selected program number	Option
CRM2A-22	ACK6	Robot service request acceptance	
	SNO6	Selected program number	Option
CRM2A-24	ACK7	Robot service request acceptance	
	SNO7	Selected program number	Option
CRM2A-25	ACK8	Robot service request acceptance	
	SNO8	Selected program number	Option
CRM2A-26	SNACK	Response signal to PNS	
CRM2A-27	RESERVED		

Table4.3 Process I/O Printed Circuit Board Signals (Continued)

(DO signals)

Connector number	Signal name	Description	Remarks
CRM2B-33	SDO01	Peripheral device control signal	General signal
CRM2B-34	SDO02		
CRM2B-35	SDO03		
CRM2B-36	SDO04		
CRM2B-38	SDO05		
CRM2B-39	SDO06		
CRM2B-40	SDO07		
CRM2B-41	SDO08		
CRM2B-43	SDO09		
CRM2B-44	SDO10		
CRMSB-45	SDO11		
CRM2B-46	SDO12		
CRM2B-19	SDO13		
CRM2B-20	SDO14		
CRM2B-21	SDO15		
CRM2B-22	SDO16		
CRM2B-24	SDO17		
CRM2B-25	SDO18		
CRM2B-26	SDO19		
CRM2B-27	SDO20		

4.4
INTERFACE FOR PERIPHERAL DEVICES, END EFFECTORS, AND WELDERS

4.4.1
Peripheral Device and Control Unit Connection

Control unit

Peripheral device control interface A1
CRM2A

Pin	Signal	Pin	Signal	Pin	Signal
1	*IMSTP			33	CMDENBL
2	*HOLD			34	SYSRDY
3	*SFSPD	19	ACK3/SNO3	35	PROGRUN
4	CSTOPI	20	ACK4/SNO4	36	PAUSED
5	FAULT RESET	21	ACK5/SNO5	37	COM−A1
6	START	22	ACK6/SNO6	38	HELD
7	HOME	23	COM−A4	39	FAULT
8	ENBL	24	ACK7/SNO7	40	ATPERCH
9	RSR1/PNS1	25	ACK8/SNO8	41	TPENBL
10	RSR2/PNS2	26	SNACK	42	COM−A2
11	RSR3/PNS3	27	RESERVED	43	BATALM
12	RSR4/PNS4	28	COM−A5	44	BUSY
13	RSR5/PNS5	29	PNSTROBE	45	ACK1/SNO1
14	RSR6/PNS6	30	PROD START	46	ACK2/SNO2
15	RSR7/PNS7	31	SDI01	47	COM−A3
16	RSR8/PNS8	32	SDI02	48	
17	0V			49	+24E
18	0V			50	+24E

Pripheral device A1

Peripheral device control interface A2
CRM2B

Pin	Signal	Pin	Signal	Pin	Signal
1	SDI03			33	SDO01
2	SDI04			34	SDO02
3	SDI05	19	SDI03	35	SDO03
4	SDI06	20	SDI14	36	SDO04
5	SDI07	21	SDI15	37	COM−B1
6	SDI08	22	SDI16	38	SDO05
7	SDI09	23	COM−B4	39	SDO06
8	SDI10	24	SDI17	40	SDO07
9	SDI1	25	SDI18	41	SDO08
10	SDI12	26	SDI19	42	COM−B2
11	SDI13	27	SD20	43	SDO09
12	SDI14	28	COM−B5	44	SDO10
13	SDI15	29	SDI19	45	SDO11
14	SDI16	30	SDI20	46	SDO12
15	SDI17	31	SDI21	47	COM−B3
16	SDI18	32	SDI22	48	
17	0V			49	+24E
18	0V			50	+24E

Pripheral device A2

> **NOTE**
> 1 The peripheral device connection cables are optional.
> 2 All of COM-** are connected to 0 V.

Applicable process I/O printed circuit board

Type	Specifications	CRM2 A	CRM2 B
CA	A16B-2201-0470	○	○
CB	A16B-2201-0472	○	○
DA	A16B-2201-0480	○	○
EA	A16B-3200-0230	○	○

Control unit

Peripheral device control interface A3
CRM2C

Pin	Signal		Pin	Signal		Pin	Signal
1	SDI23					33	SDO21
2	SDI24		19	SDO33		34	SDO22
3	SDI25		20	SDO		35	SDO23
4	SDI26		21	SDO		36	SDO24
5	SDI27		22	SDO		37	COM−C1
6	SDI28		23	COM−C4		38	SDO25
7	SDI29		24	SDO37		39	SDO26
8	SDI30		25	SDO38		40	SDO27
9	SDI31		26	SDO39		41	SDO28
10	SDI32		27	SDO40		42	COM−C2
11	SDI33		28	COM−C5		43	SDO29
12	SDI34		29	SDI39		44	SDO30
13	SDI35		30	SDI40		45	SDO31
14	SDI36		31	SDI41		46	SDO32
15	SDI37		32	SDI42		47	COM−C3
16	SDI38					48	
17	0V					49	+24E
18	0V					50	+24E

Pripheral device A3

Peripheral device control interface A4
CRM2D

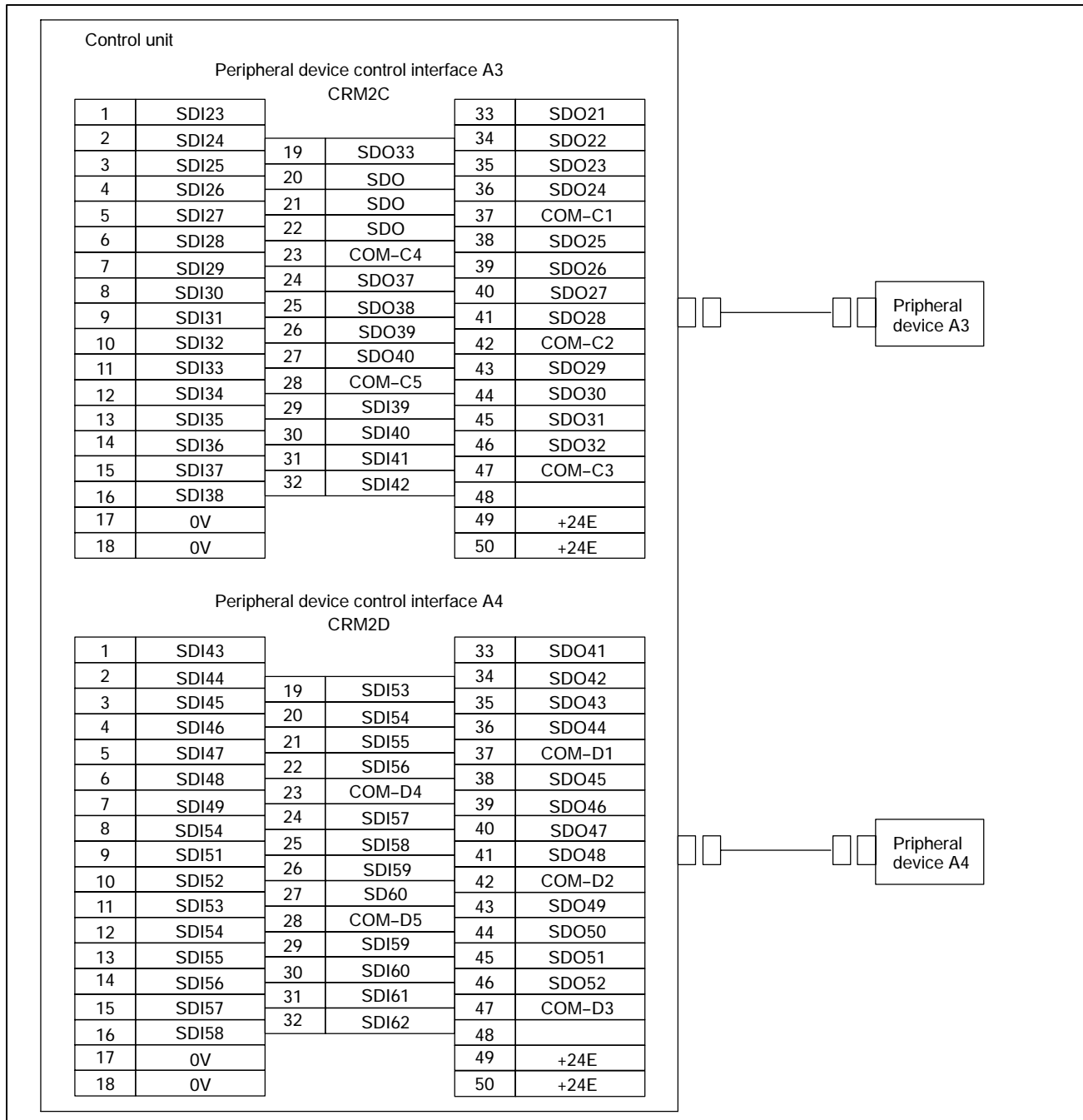| Pin	Signal		Pin	Signal		Pin	Signal
1	SDI43					33	SDO41
2	SDI44		19	SDI53		34	SDO42
3	SDI45		20	SDI54		35	SDO43
4	SDI46		21	SDI55		36	SDO44
5	SDI47		22	SDI56		37	COM−D1
6	SDI48		23	COM−D4		38	SDO45
7	SDI49		24	SDI57		39	SDO46
8	SDI54		25	SDI58		40	SDO47
9	SDI51		26	SDI59		41	SDO48
10	SDI52		27	SD60		42	COM−D2
11	SDI53		28	COM−D5		43	SDO49
12	SDI54		29	SDI59		44	SDO50
13	SDI55		30	SDI60		45	SDO51
14	SDI56		31	SDI61		46	SDO52
15	SDI57		32	SDI62		47	COM−D3
16	SDI58					48	
17	0V					49	+24E
18	0V					50	+24E

Pripheral device A4

NOTE
1 The peripheral device connection cables are optional.
2 All of COM-** are connected to 0 V.

Applicable process I/O printed circuit board

Type	Specifications	CRM2C	CRM2D
CA	A16B−2201−0470		
CB	A16B−2201−0472		
DA	A16B−2201−0480	○	○
EA	A16B−3200−0230		

Control unit
(peripheral device control interface A1)

Connector pin No.

Peripheral device

+24E
CRM2A (49,50)

Receiver circuit

Signal	Pin
*IMSTP	RV — CRM2A (1)
*HOLD	RV — CRM2A (2)
*SFSPD	RV — CRM2A (3)
CSTOPI	RV — CRM2A (4)

0V

Signal	Pin
FAULT RESET	RV — CRM2A (5)
START	RV — CRM2A (6)
HOME	RV — CRM2A (7)
ENBL	RV — CRM2A (8)
RSR1/PNS1	RV — CRM2A (9)
RSR2/PNS2	RV — CRM2A (10)
RSR3/PNS3	RV — CRM2A (11)
RSR4/PNS4	RV — CRM2A (12)
RSR5/PNS5	RV — CRM2A (13)
RSR6/PNS6	RV — CRM2A (14)
RSR7/PNS7	RV — CRM2A (15)
RSR8/PNS8	RV — CRM2A (16)
PNSROBE	RV — CRM2A (29)
PROD START	RV — CRM2A (30)
SDI01	RV — CRM2A (31)
SDI02	RV — CRM2A (32)

+24E B   A
common setting
pin (ICOMI)   0V

NOTE
This is a connection diagram for +24v common.

Control unit
(peripheral device control interface A1)

Connector pin No.

Peripheral device

Receiver circuit

CMDENBL	DV / 0V	CRM2A (33)	LOAD / RELAY
SYSRDY	DV	CRM2A (34)	LOAD
PROGRUN	DV	CRM2A (35)	LOAD
PAUSED	DV	CRM2A (36)	LOAD
HELD	DV	CRM2A (38)	LOAD
FAULT	DV	CRM2A (39)	LOAD
ATPERCH	DV	CRM2A (40)	LOAD
TPENBL	DV	CRM2A (41)	LOAD
BATALM	DV	CRM2A (43)	LOAD
BUSY	DV	CRM2A (44)	LOAD
ACK1/SNO1	DV	CRM2A (45)	LOAD
ACK2/SNO2	DV	CRM2A (46)	LOAD
ACK3/SNO3	DV	CRM2A (19)	LOAD
ACK4/SNO4	DV	CRM2A (20)	LOAD
ACK5/SNO5	DV	CRM2A (21)	LOAD
ACK6/SNO6	DV	CRM2A (22)	LOAD
ACK7/SNO7	DV	CRM2A (24)	LOAD
ACK8/SNO8	DV	CRM2A (25)	LOAD
SNACK	DV	CRM2A (26)	LOAD
RESERVED	DV	CRM2A (27)	LOAD

CRM2A (23, 28, 37, 42, 47)

0V

0V   +24V

+24 V regulated
power supply

Control unit
(peripheral device control interface A1)

Connector pin No.

Peripheral device

+24E
CRM2B (49,50)

Receiver circuit

Signal		Pin
SDI03	RV	CRM2B (1)
SDI04	RV	CRM2B (2)
SDI05	RV	CRM2B (3)
SDI06	RV	CRM2B (4)
SDI07	RV	CRM2B (5)
SDI08	RV	CRM2B (6)
SDI09	RV	CRM2B (7)
SDI10	RV	CRM2B (8)
SDI11	RV	CRM2B (9)
SDI12	RV	CRM2B (10)
SDI13	RV	CRM2B (11)
SDI14	RV	CRM2B (12)
SDI15	RV	CRM2B (13)
SDI16	RV	CRM2B (14)
SDI17	RV	CRM2B (15)
SDI18	RV	CRM2B (16)
SDI19	RV	CRM2B (29)
SDI20	RV	CRM2B (30)
SDI21	RV	CRM2B (31)
SDI22	RV	CRM2B (32)

+24E   B   A
          common setting
          pin (ICOM2)   0V
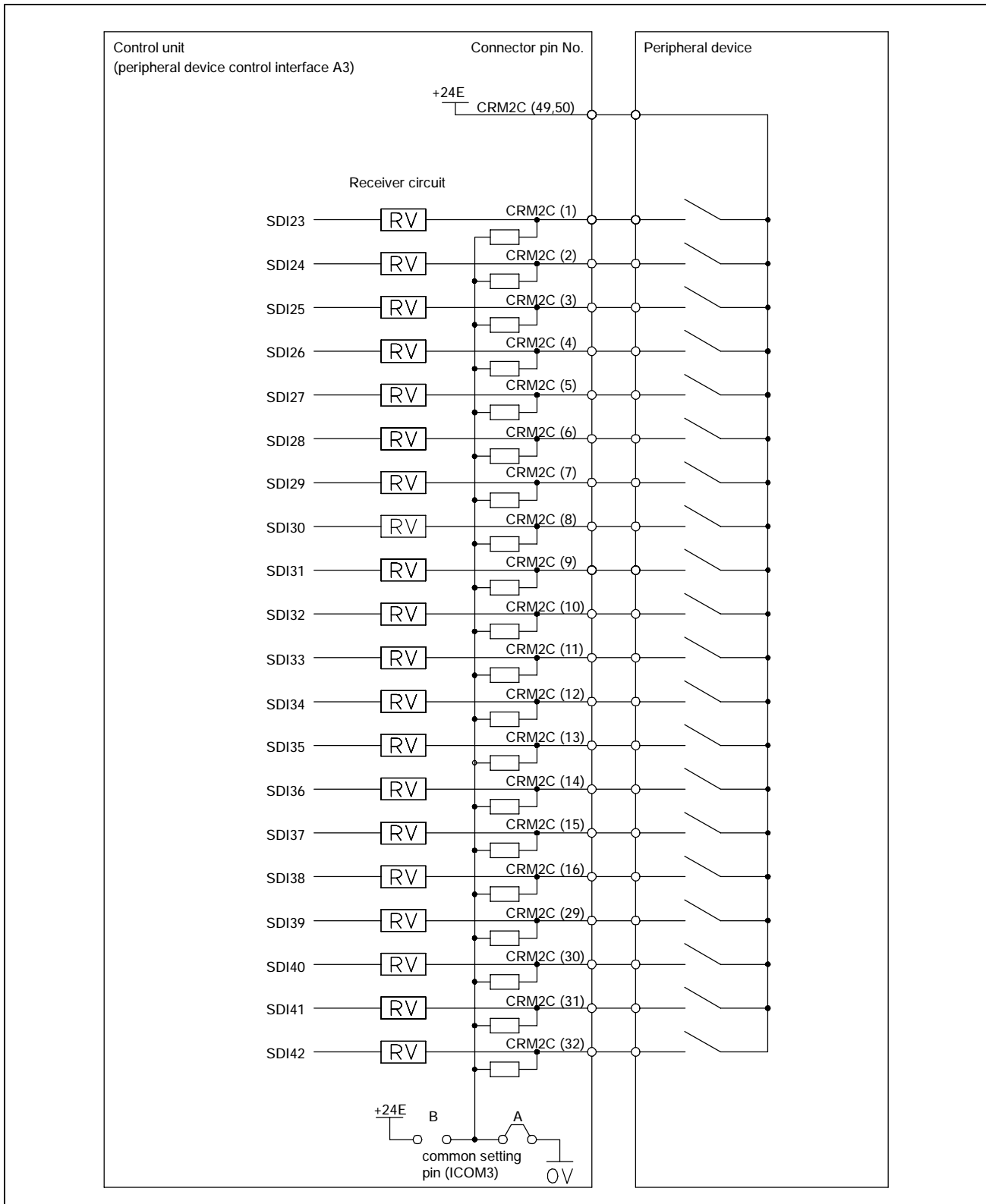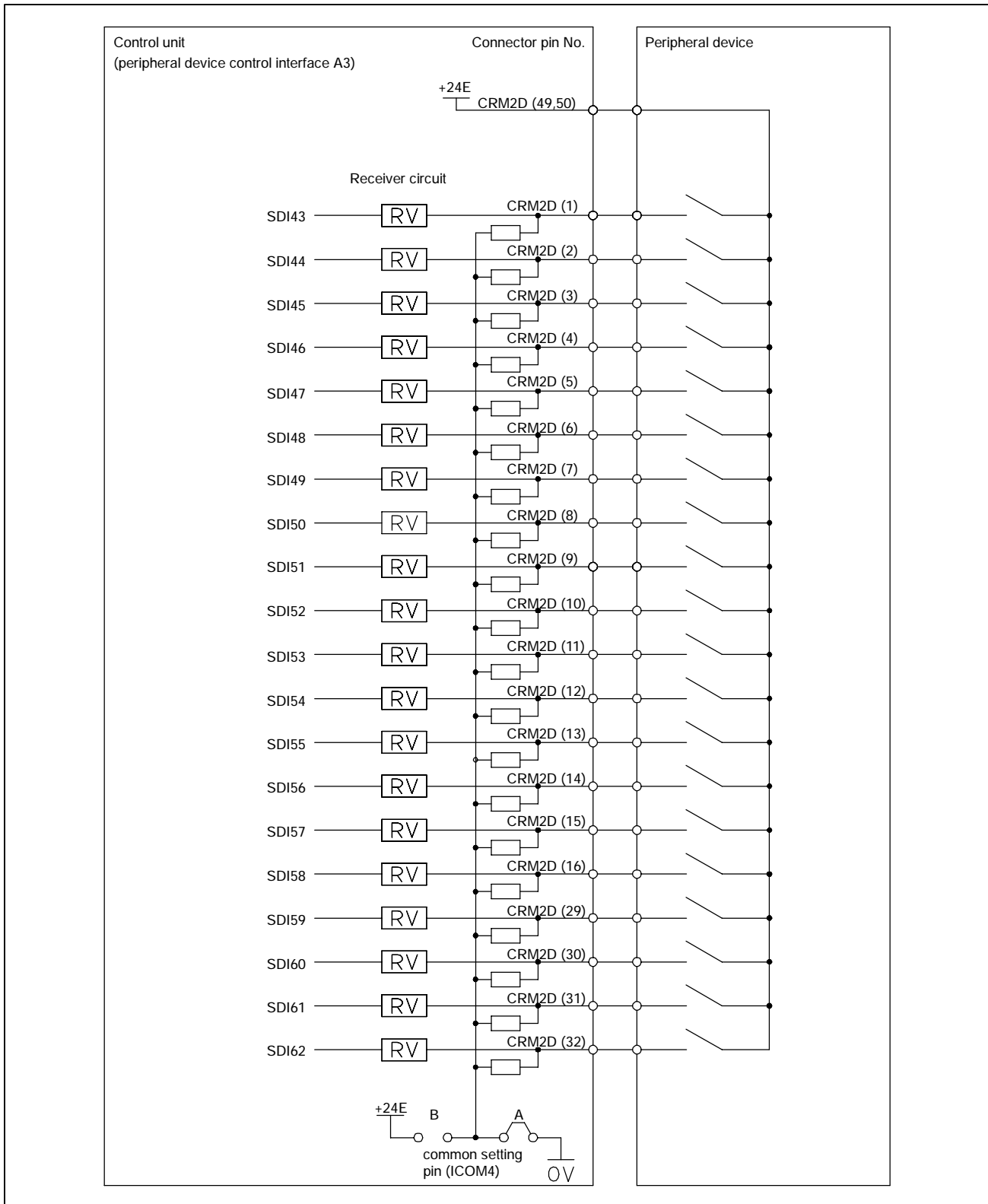
NOTE
   This is a connection diagram for +24V common.

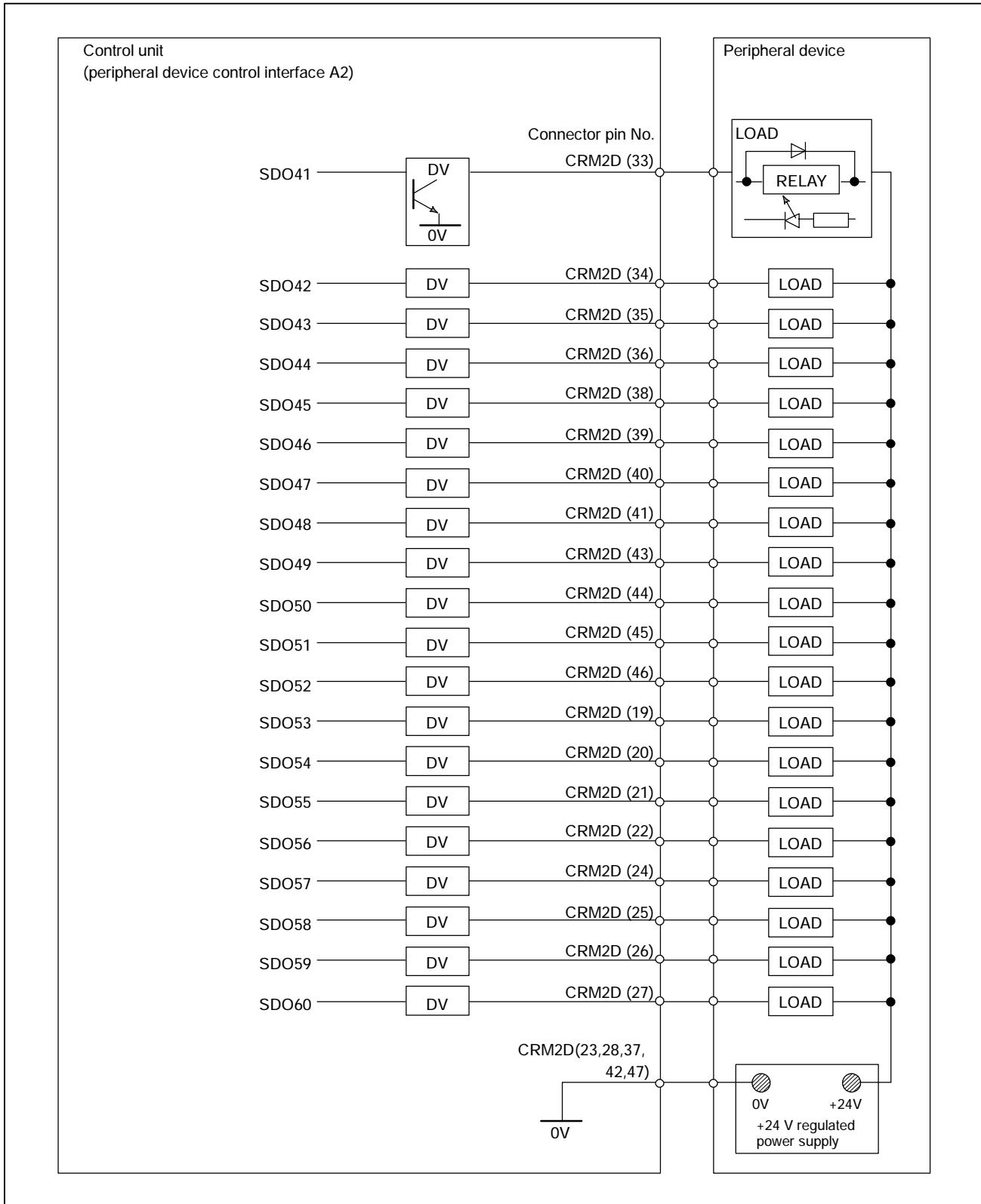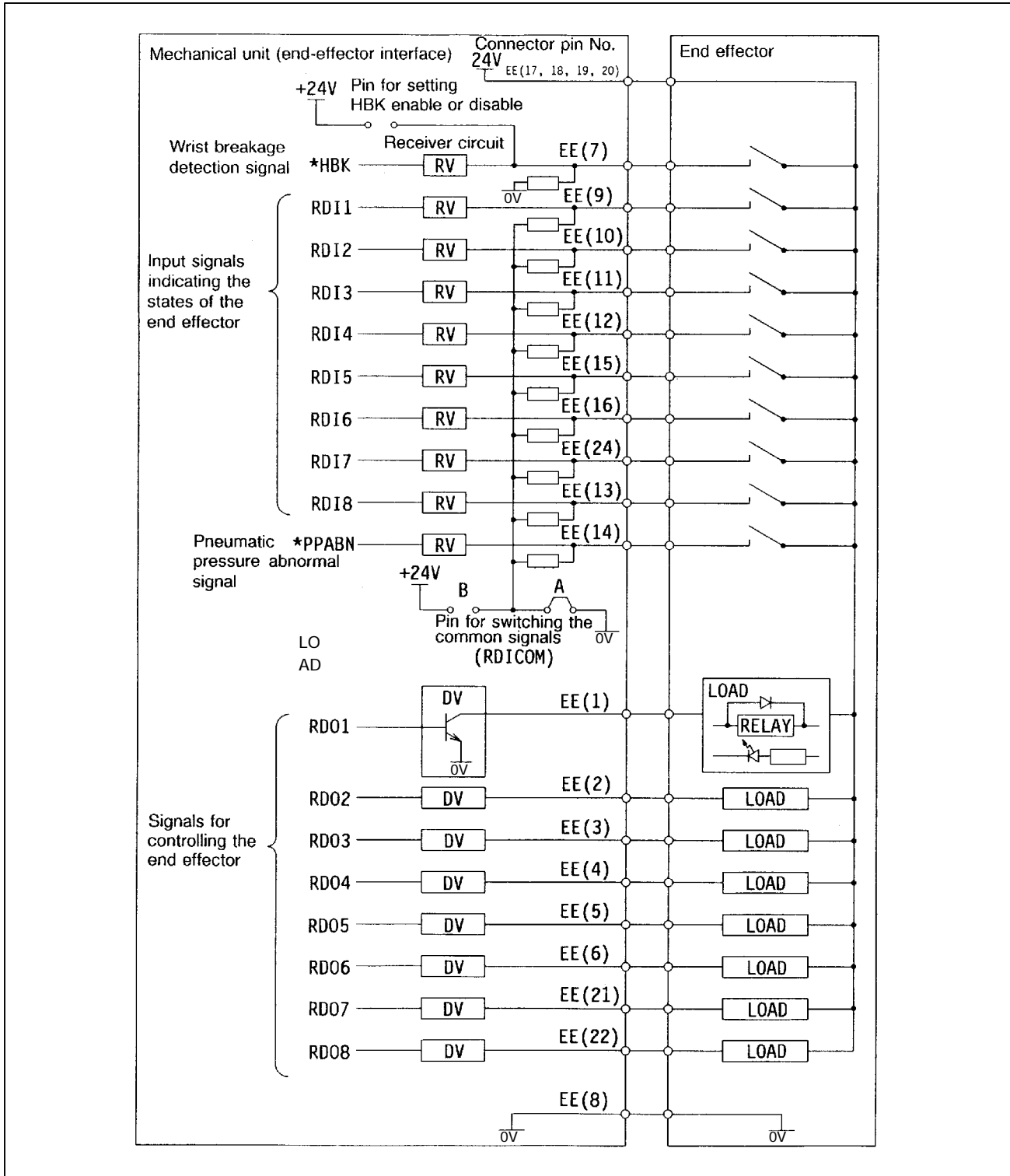Control unit
(peripheral device control interface A2)

Peripheral device

Connector pin No.

SDO01 — DV —	CRM2B (33)	LOAD / RELAY
SDO02 — DV —	CRM2B (34)	LOAD
SDO03 — DV —	CRM2B (35)	LOAD
SDO04 — DV —	CRM2B (36)	LOAD
SDO05 — DV —	CRM2B (38)	LOAD
SDO06 — DV —	CRM2B (39)	LOAD
SDO07 — DV —	CRM2B (40)	LOAD
SDO08 — DV —	CRM2B (41)	LOAD
SDO09 — DV —	CRM2B (43)	LOAD
SDO10 — DV —	CRM2B (44)	LOAD
SDO11 — DV —	CRM2B (45)	LOAD
SDO12 — DV —	CRM2B (46)	LOAD
SDO13 — DV —	CRM2B (19)	LOAD
SDO14 — DV —	CRM2B (20)	LOAD
SDO15 — DV —	CRM2B (21)	LOAD
SDO16 — DV —	CRM2B (22)	LOAD
SDO17 — DV —	CRM2B (24)	LOAD
SDO18 — DV —	CRM2B (25)	LOAD
SDO19 — DV —	CRM2B (26)	LOAD
SDO20 — DV —	CRM2B (27)	LOAD

CRM2A (23,28,37,
42,47)

0V

0V   +24V

+24 V regulated
power supply

Connector pin No.

Peripheral device

+24E
CRM2C (49,50)

Receiver circuit

SDI23	RV	CRM2C (1)
SDI24	RV	CRM2C (2)
SDI25	RV	CRM2C (3)
SDI26	RV	CRM2C (4)
SDI27	RV	CRM2C (5)
SDI28	RV	CRM2C (6)
SDI29	RV	CRM2C (7)
SDI30	RV	CRM2C (8)
SDI31	RV	CRM2C (9)
SDI32	RV	CRM2C (10)
SDI33	RV	CRM2C (11)
SDI34	RV	CRM2C (12)
SDI35	RV	CRM2C (13)
SDI36	RV	CRM2C (14)
SDI37	RV	CRM2C (15)
SDI38	RV	CRM2C (16)
SDI39	RV	CRM2C (29)
SDI40	RV	CRM2C (30)
SDI41	RV	CRM2C (31)
SDI42	RV	CRM2C (32)

+24E   B   A

common setting
pin (ICOM3)   0V

NOTE
  This is a connection diagram for +24V common.

Control unit
(peripheral device control interface A2)

Peripheral device

Connector pin No.

LOAD

SDO21 — DV / 0V — CRM2C (33) — LOAD RELAY

SDO22 — DV — CRM2C (34) — LOAD
SDO23 — DV — CRM2C (35) — LOAD
SDO24 — DV — CRM2C (36) — LOAD
SDO25 — DV — CRM2C (38) — LOAD
SDO26 — DV — CRM2C (39) — LOAD
SDO27 — DV — CRM2C (40) — LOAD
SDO28 — DV — CRM2C (41) — LOAD
SDO29 — DV — CRM2C (43) — LOAD
SDO30 — DV — CRM2C (44) — LOAD
SDO31 — DV — CRM2C (45) — LOAD
SDO32 — DV — CRM2C (46) — LOAD
SDO33 — DV — CRM2C (19) — LOAD
SDO34 — DV — CRM2C (20) — LOAD
SDO35 — DV — CRM2C (21) — LOAD
SDO36 — DV — CRM2C (22) — LOAD
SDO37 — DV — CRM2C (24) — LOAD
SDO38 — DV — CRM2C (25) — LOAD
SDO39 — DV — CRM2C (26) — LOAD
SDO40 — DV — CRM2C (27) — LOAD

CRM2C(23,28,37,
42,47)

0V

0V   +24V

+24 V regulated
power supply

NOTE
This is a connection diagram for +24V common.

Control unit
(peripheral device control interface A2)

Peripheral device

Connector pin No.

LOAD

SDO41 ——— DV / 0V ——— CRM2D (33) ——— RELAY / LOAD

SDO42 ——— DV ——— CRM2D (34) ——— LOAD
SDO43 ——— DV ——— CRM2D (35) ——— LOAD
SDO44 ——— DV ——— CRM2D (36) ——— LOAD
SDO45 ——— DV ——— CRM2D (38) ——— LOAD
SDO46 ——— DV ——— CRM2D (39) ——— LOAD
SDO47 ——— DV ——— CRM2D (40) ——— LOAD
SDO48 ——— DV ——— CRM2D (41) ——— LOAD
SDO49 ——— DV ——— CRM2D (43) ——— LOAD
SDO50 ——— DV ——— CRM2D (44) ——— LOAD
SDO51 ——— DV ——— CRM2D (45) ——— LOAD
SDO52 ——— DV ——— CRM2D (46) ——— LOAD
SDO53 ——— DV ——— CRM2D (19) ——— LOAD
SDO54 ——— DV ——— CRM2D (20) ——— LOAD
SDO55 ——— DV ——— CRM2D (21) ——— LOAD
SDO56 ——— DV ——— CRM2D (22) ——— LOAD
SDO57 ——— DV ——— CRM2D (24) ——— LOAD
SDO58 ——— DV ——— CRM2D (25) ——— LOAD
SDO59 ——— DV ——— CRM2D (26) ——— LOAD
SDO60 ——— DV ——— CRM2D (27) ——— LOAD

CRM2D(23,28,37,
42,47)

0V

0V   +24V

+24 V regulated
power supply

4.4.2
Connection Between
the Mechanical Unit
and End Effector

Mechanical unit

E E

1	2	3	4		
RDO1	RDO2	RDO3	RDO4		

5	6	7	8	9	
RDO5	RDO6	*HBK	0V	RDI1	

10	11	12	13	14	15
RDI2	RDI3	RDI4	RDI8	*PPABN	RDI5

16	17	18	19	20	
RDI6	+24E	+24E	+24E	+24E	

21	22	23	24	
RDO7	RDO8		RDI7	

End effector

Mechanical unit (end-effector interface)

Connector pin No.
24V   EE(17, 18, 19, 20)

End effector

+24V   Pin for setting HBK enable or disable

Wrist breakage detection signal   *HBK — RV   Receiver circuit   EE(7)

0V   EE(9)

Input signals indicating the states of the end effector

RDI1 — RV   EE(9)
RDI2 — RV   EE(10)
RDI3 — RV   EE(11)
RDI4 — RV   EE(12)
RDI5 — RV   EE(15)
RDI6 — RV   EE(16)
RDI7 — RV   EE(24)
RDI8 — RV   EE(13)

Pneumatic pressure abnormal signal   *PPABN — RV   EE(14)

+24V
B   A
Pin for switching the common signals   0V
(RDICOM)

LO
AD

RDO1   DV   EE(1)   LOAD / RELAY

Signals for controlling the end effector

RDO2 — DV   EE(2)   LOAD
RDO3 — DV   EE(3)   LOAD
RDO4 — DV   EE(4)   LOAD
RDO5 — DV   EE(5)   LOAD
RDO6 — DV   EE(6)   LOAD
RDO7 — DV   EE(21)   LOAD
RDO8 — DV   EE(22)   LOAD

EE(8)

0V   0V

NOTE
1 This is a connection diagram for +24V common.
2 The connector pin numbers of the end effector depend on the robot.

4.4.3
Connection Between the Control Unit and Welder

Control unit

Welder interface
CRW1

01	DACH1			23	WDO1
02	COMAD1	13	ADCH1	24	WDO2
03	DACH2	14	COMAD1	25	WDO3
04	COMAD2	15	ADCH2	26	WDO4
05	WDI1	16	COMAD2	27	WDO5
06	WDI2	17		28	WDO6
07	WDI3	18		29	WDO7
08	WDI4	19	0V	30	WDO8
09	WDI5	20	0V	31	WDI+
10	WDI6	21	0V	32	WDI−
11	WDI7	22	0V	33	+24E
12	WDI8			34	+24E

Welder

Analog input interface
CRW2

01				14	ADCH3
02		08	ADCH6	15	COMAD3
03		09	COMAD6	16	ADCH3
04		10		17	COMAD4
05		11		18	ADCH5
06		12		19	COMAD5
07		13		20	

Peripheral device

Applicable process I/O printed circuit board

Type	Drawing number	CRW1	CRW2
CA	A16B−2201−0470		
CB	A16B−2201−0472	○	○
DA	A16B−2201−0480		
EA	A16B−3200−0230	○	○

Note1)   Welder and peripheral device connection cable is option.

Control unit
(Analog input interface)

| | | | Peripheral device |

ADCH3 —— CRW2(14)

CAMAD3 —— CRW2(15)

ADCH4 —— CRW2(16)

CAMAD4 —— CRW2(17)

ADCH5 —— CRW2(18)

CAMAD5 —— CRW2(19)

ADCH6 —— CRW2(8)

CAMAD6 —— CRW2(9)

0V

Output signals without ripples.

4.5
DIGITAL I/O SIGNAL SPECIFICATIONS

This section describes the specifications of the digital I/O signals interfaced with the peripheral device, end effector, and arc welder.

4.5.1
Peripheral Device Interface

**(1) Output signals in peripheral device interface A
Example of connection**

Electrical specifications

Rated voltage	**: 24 VDC**
Maximum applied voltage	**: 30 VDC**
Maximum load current	**: 0.2 A**
Transistor type	**: Open collector NPN**
Saturation voltage at connection	**: 1.0 V (approx.)**

Spark killer diode

Rated peak reverse voltage	**: 100 V or more**
Rated effective forward current	**: 1 A or more**

Note on use

Do not use the +24 V power supply of the robot.
When loading a relay, solenoid, and so on directly, connect them in parallel with diodes for preventing back electromotive force.
If a load is connected causing a surge current when a lamp is turned on, use a protective resistance.

Applicable signals

Output signals of process I/O printed circuit board CRM2
CMDENBL, SYSRDY, PROGRUN, PAUSED, HELD, FAULT, ATPERCH, TPENBL, BATALM, BUSY, ACK1 to ACK8, SNO1 to SNO8, SNACK, SDO1 to SDO20

(2) Input signals in peripheral device interface A

Example of connection

Electrical specifications of the receiver

Type	**: Grounded voltage receiver**
Rated input voltage	**: Contact close**
	: +20 V to +28 V
	Contact open
	: 0 V to +4 V
Maximum applied input voltage	**: +28 VDC**
Input impedance	**: 3.3 kΩ (approx.)**
Response time	**: 5 ms to 20 ms**

Specifications of the peripheral device contact

|	
Rated contact capacity	**: 30 VDC, 50 mA or more**
Input signal width	**: 200 ms or more (on/off)**
Chattering time	**: 5 ms or less**
Closed circuit resistance	**: 100 Ω or less**
Opened circuit resistance	**: 100 kΩ or more**
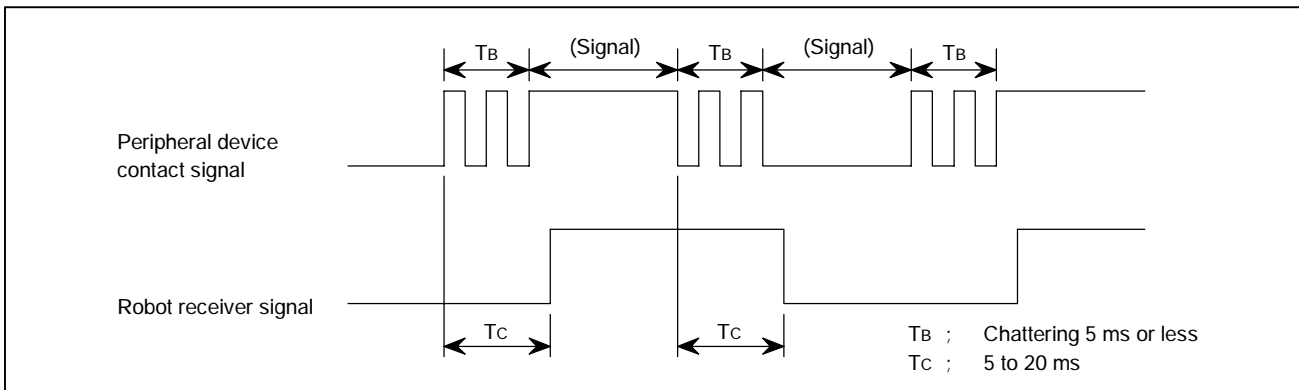
Note on use

Apply the +24 V power at the robot to the receiver.
However, the above signal specifications must be satisfied at the robot receiver.

Applicable signals

Input signals of process I/O printed circuit board CRM2
*IMSTP, *HOLD, *SFSD, CSTOPI, FAULT RESET, START, HOME, ENBL, RSR1 to RSR8, PNS1 to PNS8, PNSTROBE, PROD START, SDI1 to SDI22

4.5.2
End Effector Control
Interface

(1) Output signals

Example of connection

Electrical specifications

Rated voltage	**: 24 VDC**
Maximum applied voltage	**: 30 VDC**
Maximum load current	**: 0.2 A**
Transistor type	**: Open collector NPN**
Saturation voltage at connection	**: 1.0 V (approx.)**

Spark killer diode

Rated peak reverse voltage	**: 100 V or more**
Rated effective forward current	**: 1 A or more**

Note on use

The +24 V power supply at the robot can be used when the total
current of the welding interface and end effector interface is 0.7 A or
less.
When loading a relay, solenoid, and so on directly, connect them in
parallel with diodes for preventing back electromotive force.
If a load is connected causing a surge current when a lamp is turned
on, use a protective resistance.

Applicable signals

Output signals of the end effector control interface
RDO1 to RDO8

(2) Input signal

Example of connection
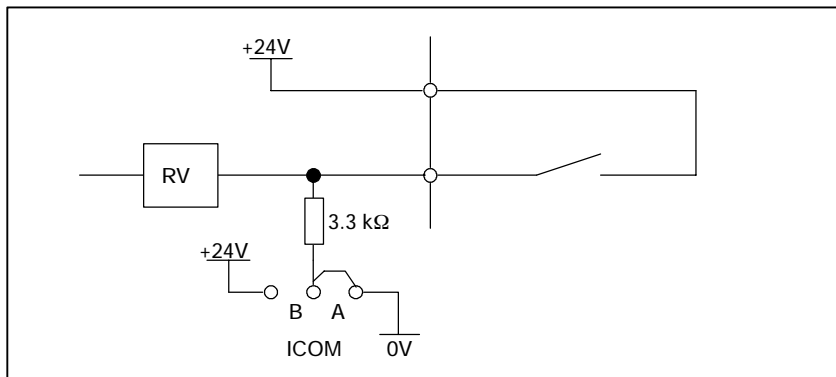
Electrical specifications of the receiver

Type	: Grounded voltage receiver
Rated input voltage : Contact close	: +20 V to +28 V
Contact open	: 0 V to +4 V
Maximum applied input voltage	: +28 VDC
Input impedance	: 3.3 kΩ (approx.)
Response time	: 5 ms to 20 ms

Specifications of peripheral device contact

Rated contact capacity	: 30 VDC, 50 mA or more
Input signal width	: 200 ms or more (on/off)
Chattering time	: 5 ms or less
Closed circuit resistance	: 100 Ω or less
Opened circuit resistance	: 100 kΩ or more

T_B ;   Chattering 5 ms or less
T_C ;   5 to 20 ms
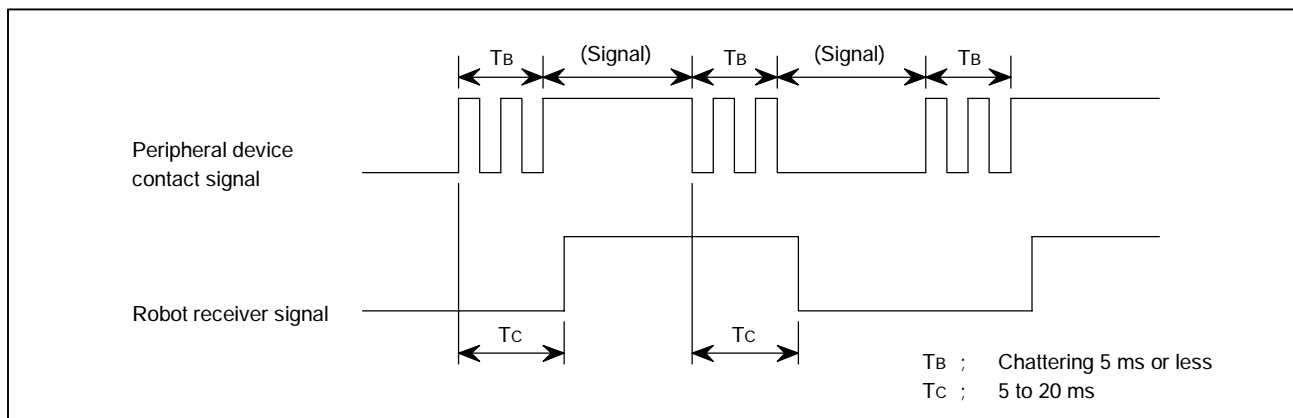
Note on use

Apply the +24 V power at the robot to the receiver.
However, the above signal specifications must be satisfied at the robot receiver.

Applicable signals

Input signals of the end effector control interface
RDI1 to RDI8, *HBK, *PPABN

4.5.3
I/O Signal
Specifications for
ARC–welding Interface

(1) Digital output signal specifications for arc–welding interface

Example connection

Spark killer diode

+24V

0.2 A or less

0V

0V
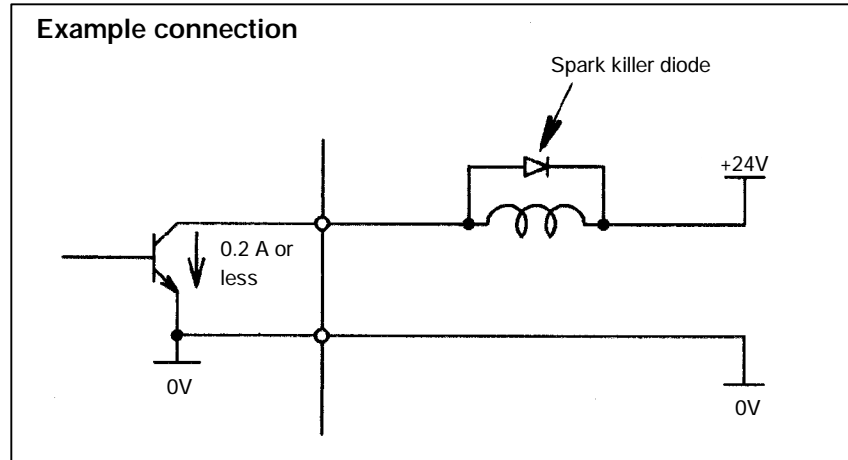
Electrical characteristics

> **Rated voltage: 24 VDC**
> **Maximum applied voltage: 30 VDC**
> **Maximum load current: 0.2 A**
> **Transistor type: Open–collector NPN**
> **Saturation voltage at on: About 1.0 V**

Spark killer diode

> **Rated peak reverse voltage: 100 V or more**
> **Rated effective forward current: 1 A or more**

NOTE on use

> **NOTE**
> A power voltage of +24 V, provided for the robot, can be used
> for interface signals of up to 0.7 A. This limit applies to the sum
> of the currents flowing through the arc–welding and
> end–effector control interfaces. To directly drive a relay or
> solenoid, connect a diode preventing back electromotive force
> to the load in parallel. To connect a load which generates an
> inrush current upon power–on connect a protective resistor.

Applicable signals
– Output signals on the arc–welding interface
– WDO1 to WDO8

(2) Digital input signal specifications for arc–welding interface

Example connection
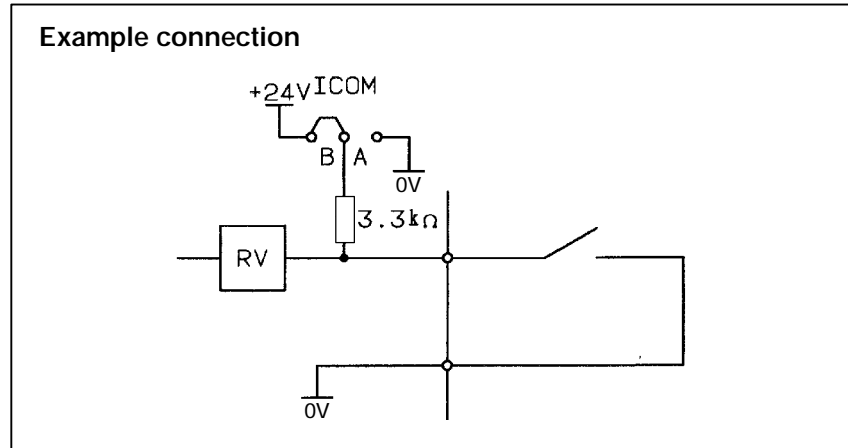
Electrical characteristics of receivers

> **Type: Grounded voltage receiver**
> **Rated input voltage: +20 to +28 V with contacts closed**
> **0 to +4 V when open**
> **Maximum input voltage: +28 VDC**
> **Input impedance: About 3.3 k**
> **Response time: 5 to 20 ms**

Contact specifications for peripherals

> **Rated contact capacity: 30 VDC, 50 mA or more**
> **Input signal width: 200 ms or more for on and off states**
> **Chattering period: 5 ms or less**
> **Closed–circuit resistance: 100 or less**
> **Open–circuit resistance: 100 k or more**

T_B: Chattering of 5 ms or less
T_C: 5 to 20 ms
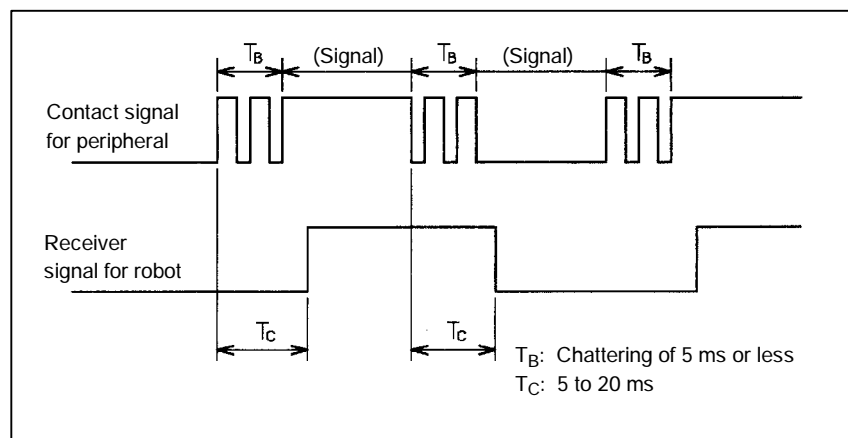
NOTE on use

> **NOTE**
> Supply the +24 V power, provided for the robot, to the receivers. The receiver signal on the robot must satisfy the signal timing specified above.

Applicable signals

- **Input signals for arc–welding interface**
- **WDI1 to WDI8**

(3) Analog output signal specifications for arc–welding interface (Welding voltage command, wire–feedrate command)

Example connection

Welder

0– –10V

0V
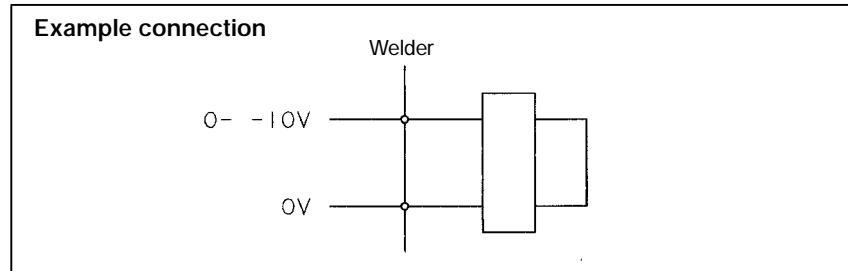
NOTE on use

NOTE
Input impedance: 3.3 k or more
Connect a high–pass filter.

(4) Analog input signal specifications for arc–welding interface (Welding–voltage detection, welding–current detection)

Example connection

Welder

0– +10V

0V
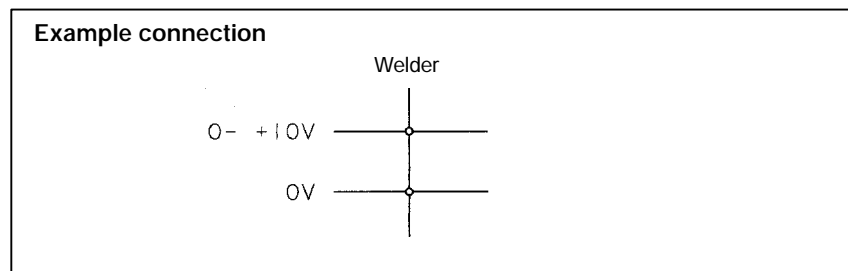
NOTE on use

NOTE
Output a signal with no ripple.

(Wire deposit detection: WDI+ and WDI–)

Example connection

Welder

max.
+15V   85mA

+

–
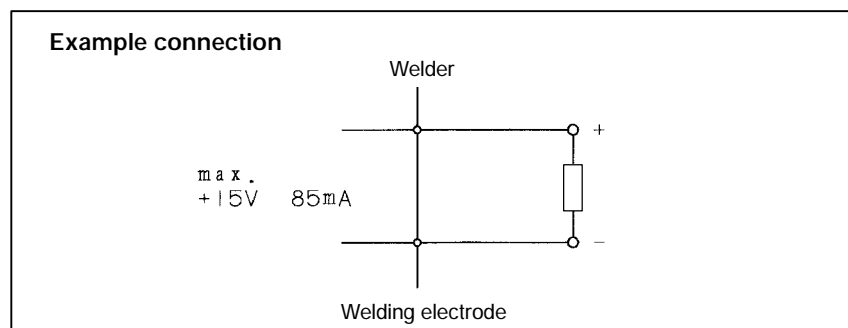
Welding electrode

NOTE on use

NOTE
Connect a resistor of 100 or more between the positive and negative electrodes of the welder. Isolate the deposit detection signals for TIG welding from the welding circuit, which uses high–frequency components. The dielectric withstand voltage of this circuit is 80 V.

4.6
SPECIFICATIONS OF THE CABLES USED FOR PERIPHERAL DEVICES AND WELDERS

If the customer manufactures cables, conform to the FANUC standard cables described in this section.

(See the description in "Peripheral Device Interface" in this manual for the specifications of the FANUC standard cables.)

4.6.1
Peripheral Device Interface a Cable (CRM2: Honda Tsushin, 50 Pins)
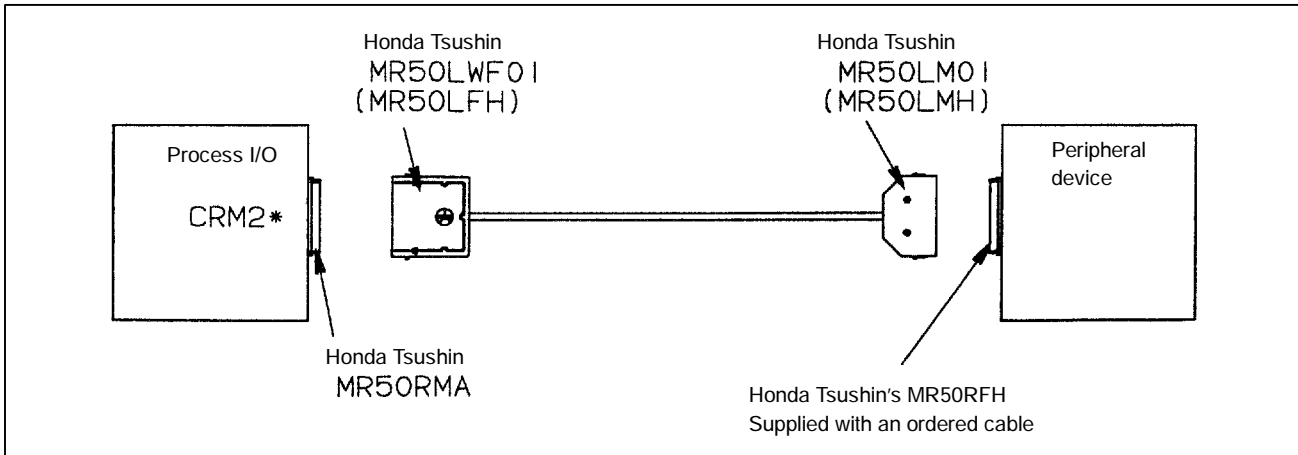
4.6.2
Peripheral Device Interface B Cable (CRM4: Honda Tsushin, 20 Pins)

4.6.3
ARC Weld Connection Cable (CRW1: Honda Tsushin, 34 Pins)
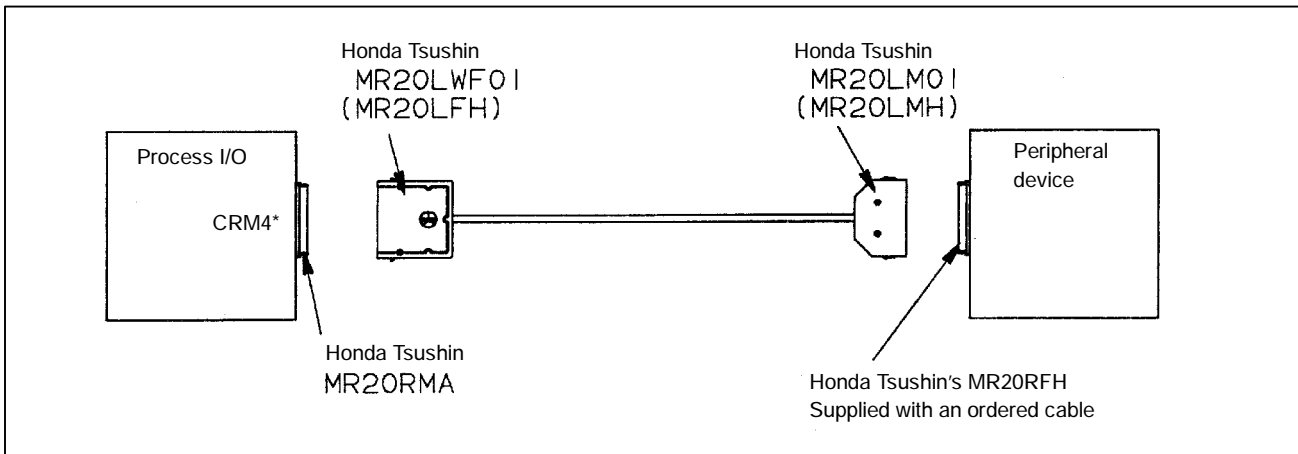
Be sure to use our cable for connection of welder.

Honda Tsushin
MRP34LWMO I

Process I/O

CRW I

Honda Tsushin
MR34RFA

ARC welder

Japan Aviation Electronics
Industry Ltd.
MS3108B28–21P
MS3057–16

Japan Aviation Electronics
Industry Ltd.
MS3102A28–21S
Standard position of guide key
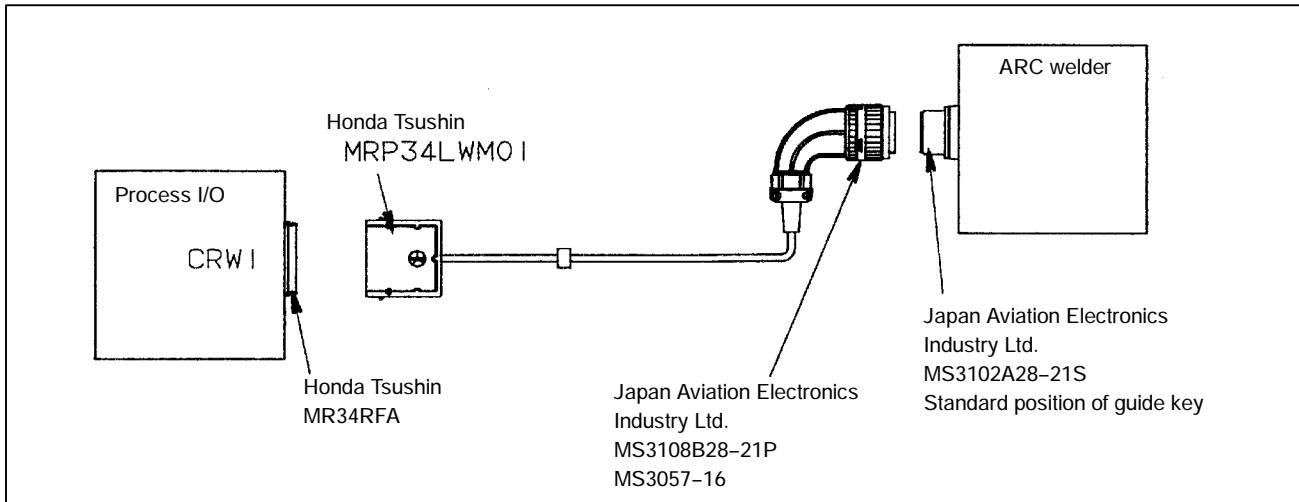
4.7
CABLE CONNECTION FOR THE PERIPHERAL DEVICES, END EFFECTORS, AND ARC WELDERS

4.7.1
Peripheral Device Connection Cable

Fig. 4.7.1 shows the connection of the peripheral device cable in the control unit.

Process I/O
CA/CB/DA

CRM2B

CRM2A

CRW1

To peripheral device

CRW1

Operator's box

Process I/O EA

CRM2B

CRM2A

To peripheral device
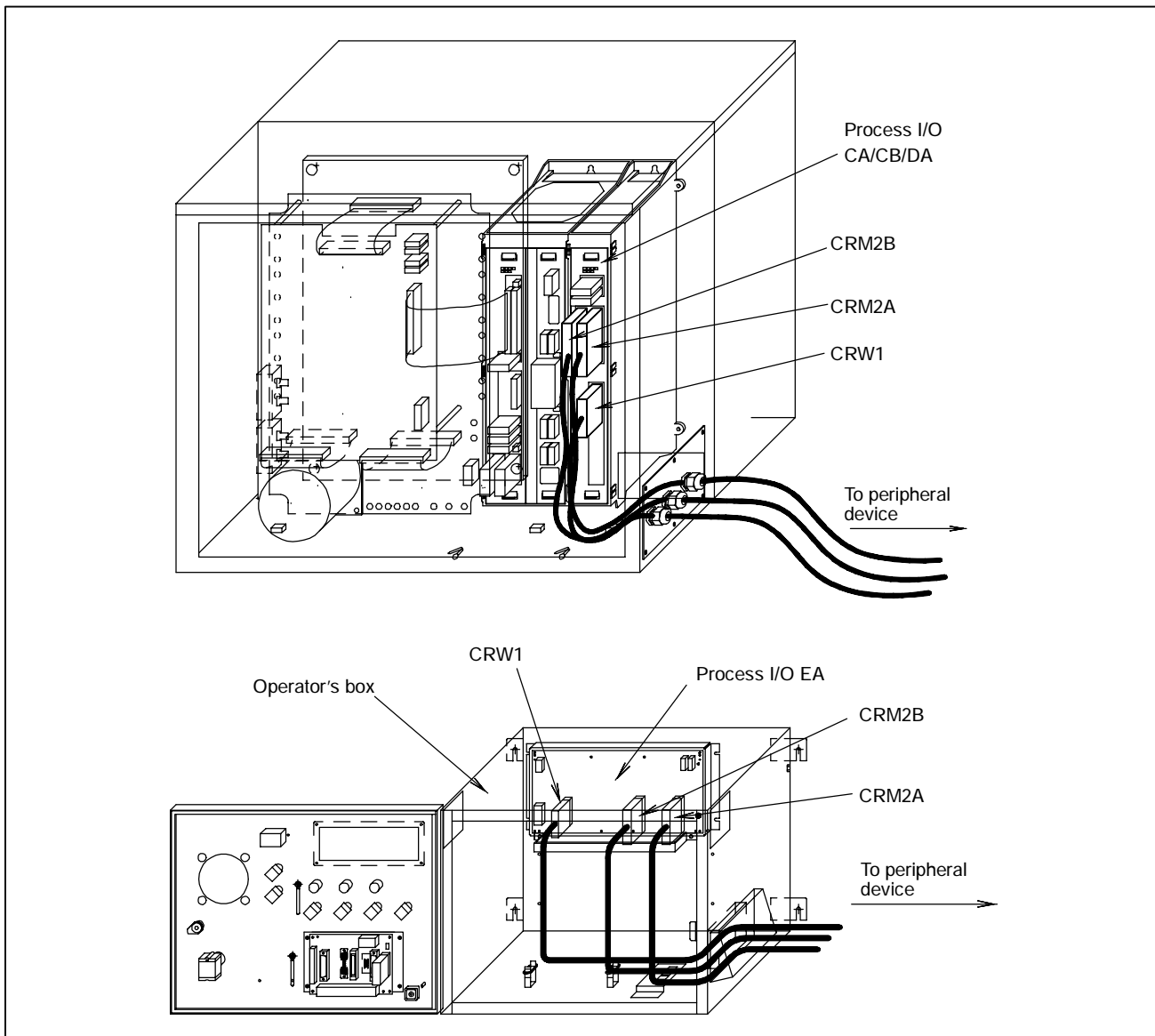
Fig.4.7.1 (a) Peripheral Device Cable Connection (i cabinet)

Process I/O printed circuit board
CA/CB/DA

I/O unit model A
or
I/O unit model B

Note: Tight the clamp with hand.
Do not use pliers.

Metallic clamp

External shield

Shield plate

Noise protection: Remove a part of the sheath of a peripheral cable to expose the outside shield.
Secure the cable to the shield plate with the metallic clamp at the exposed position.
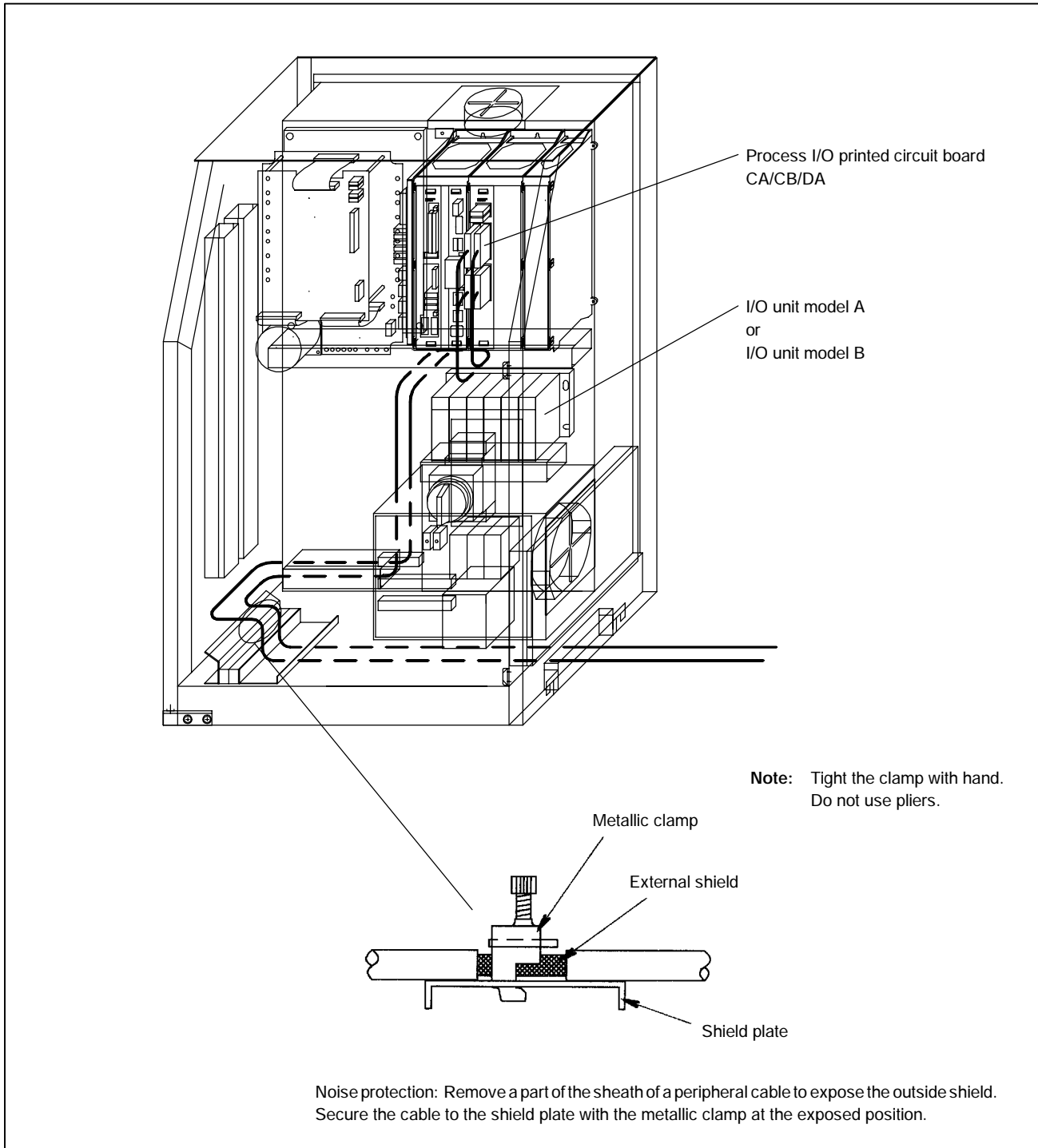
Fig.4.7.1 (b) Peripheral Device Cable Connection (B cabinet)

4.7.2
Peripheral Device Cable Connector

(1) Fig. 4.7.2 shows the connector for peripheral device cables A and B.

Connector specifications	Applicable interface	Dimensions				Remark
		A	**(B)**	**C**	**(D)**	
MR50LMH	CRM2	67.9	73.5	44.8	18	Honda Tsushin Kogyo, 50 pins
MR20LMH	CRM4	39.3	44.9	39.8	17	Honda Tsushin Kogyo, 20 pins

Symbol	Name
(1)	Connector cover
(2)	Cable clamp screw
(3)	Connector clamp spring
(4)	Connector clamp screw
(5)	Connector 50 pins (male) MR50MH 20 pins (male) MR20MH
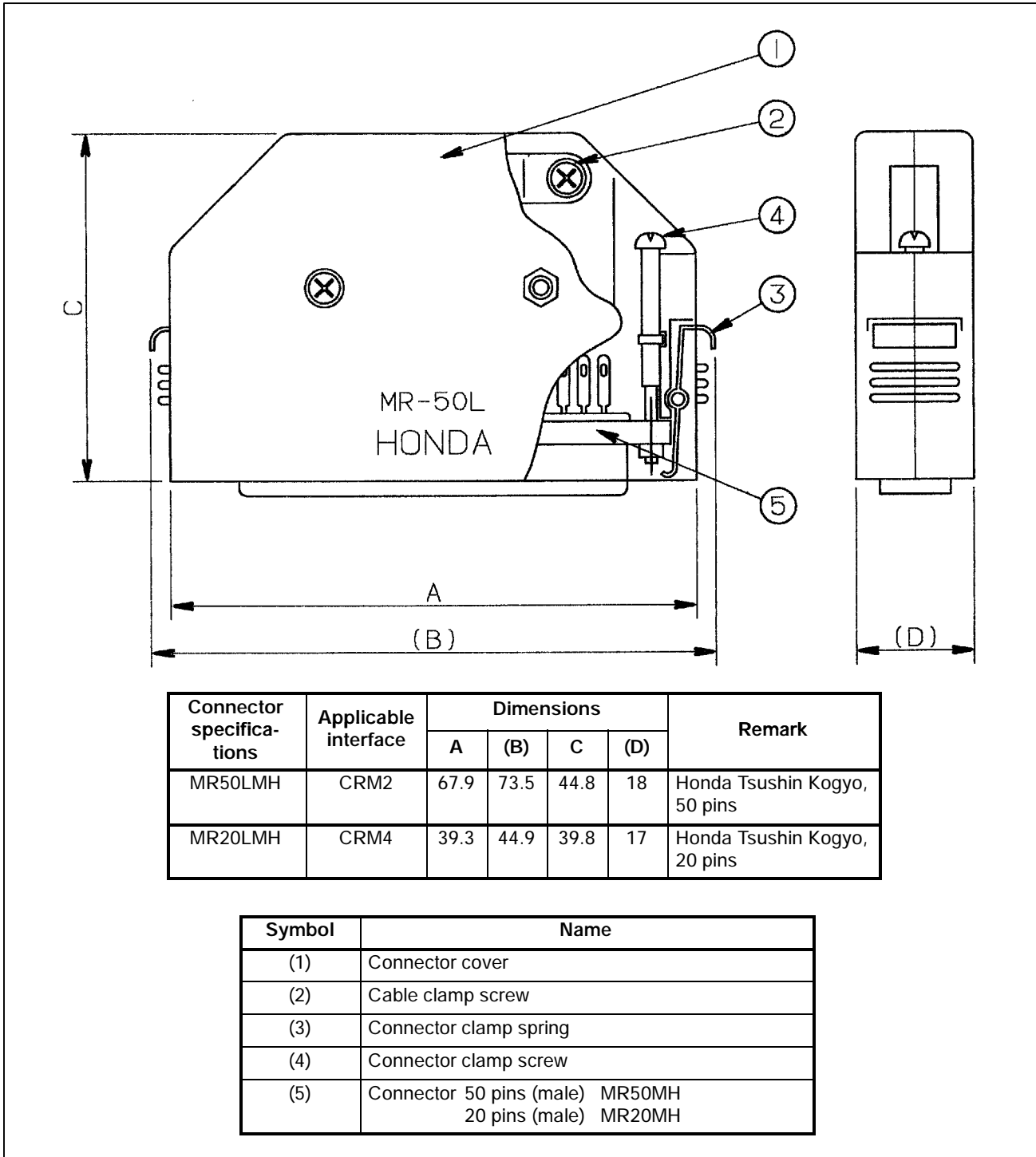
Fig.4.7.2 (a) Peripheral Device Cable Connector (Honda Tsushin Kogyo)

(2) Peripheral device connector

MR50RFH, MR20RFH

Connector specifications	Applicable interface	Dimensions		Remark
		A	B	
MR50RFH	(CRM2)	61.4	56.4	Honda Tsushin Kogyo, 50 pins
MR20RFH	(CRM4)	39.3	44.9	Honda Tsushin Kogyo, 20 pins

Symbol	Name
(1)	Connector clamp screw
(2)	Screw ø2.6×8
(3)	Connector (MR50RFH) (MR20RFH)
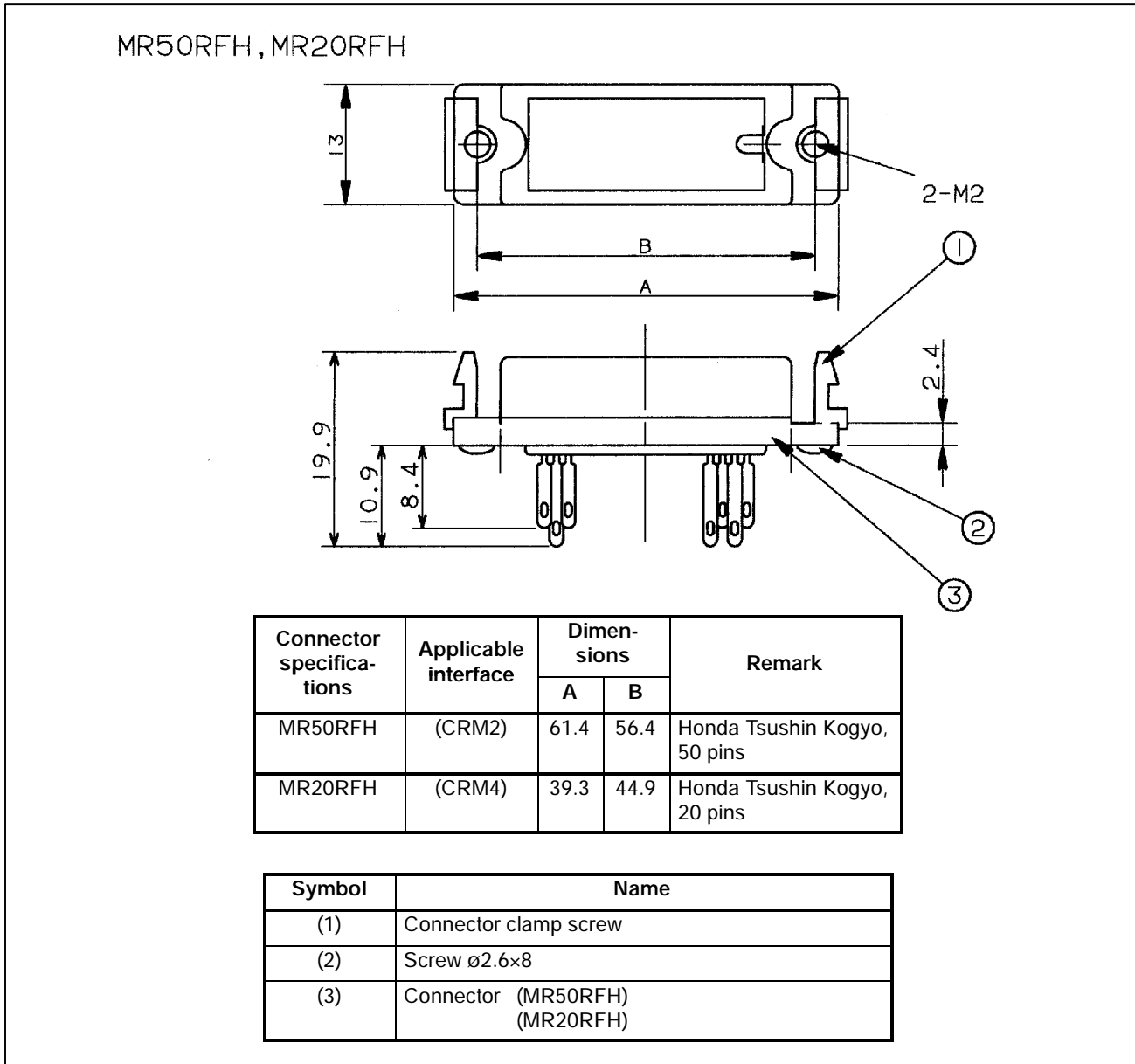
Fig.4.7.2 (b) Peripheral Device Connector (Honda Tsushin Kogyo)

4.7.3
End Effector Cable
Connector

(1) Connector

A : M30×1 E : ø33
B : 63.0 F : 11.2
C : 54.5 G : 24.7
D : 9.6 to 15.0 (Inside diameter)
Manufactured by Daiichi Denshi Kogyo   JMLP2524M
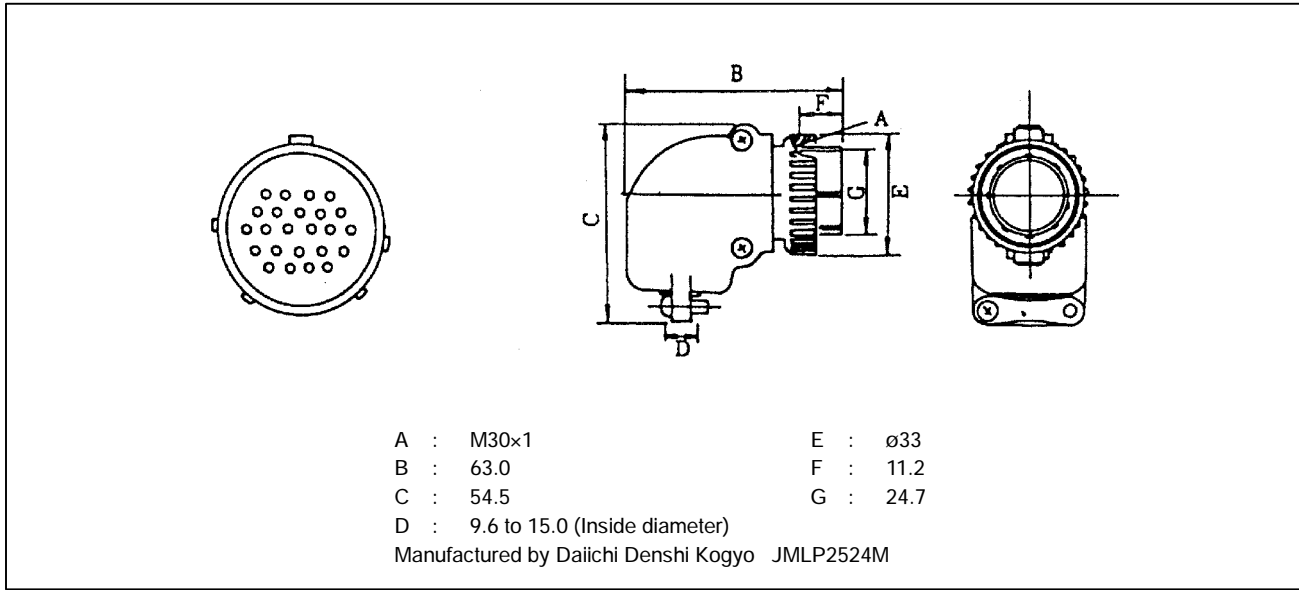
Fig.4.7.3 (a) Connector (Elbow type)

A : M30×1 E : ø33
B : 54.1 F : 11.2
C : 37.5 G : 24.7
D : 9.6 to 15.0 (Inside diameter)
Manufactured by Daiichi Denshi Kogyo   JMLP2524M
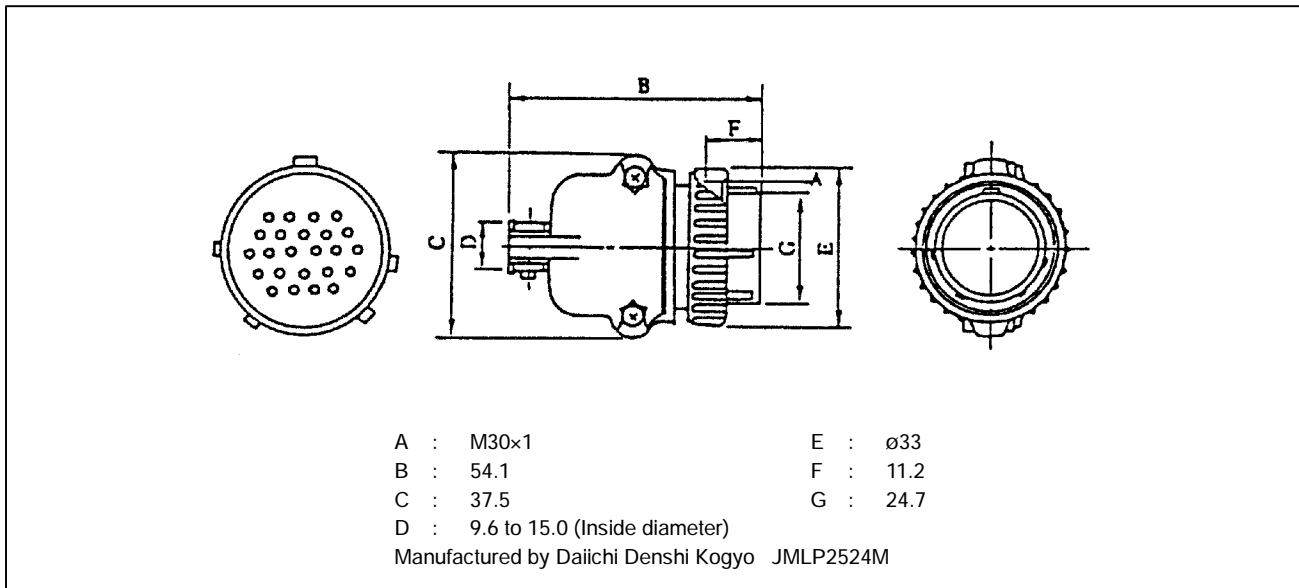
Fig.4.7.3 (b) Connector (Straight type)

4.7.4
Recommended Cables

(1) Peripheral device connection cable

Connect a peripheral device using a completely shielded, heavily protected cable conforming to the specifications in Table 4.7.5 (a).

Allow an extra 50 cm for routing the cable in the control unit.

The maximum cable length is 30 m.

Table 4.7.4 (a) Recommended Cable (for Peripheral Device Connection)

Number of wires	Wire specifications (FANUC specifications)	Conductor		Sheath thickness (mm)	Effective outside diameter (mm)	Electrical characteristics	
		Diameter (mm)	Configuration			Conductor resistance (Ω/km)	Allowable current (A)
50	A66L-0001-0042	ø1.05	7/0.18 AWG24	1.5	ø12.5	106	1.6
20	A66L-0001-0041	ø1.05	7/0.18 AWG24	1.5	ø10.5	106	1.6

(2) End effector connection cable

Connect an end effector using a heavily protected cable with a movable wire conforming to the specifications in Table 4.7.5 (b).

The cable length is determined so that the cable will not interfere with the end effector and the wrist can move through its full stroke.

Table 4.7.4 (b) Recommended Cable (for End Effector Connection)

Number of wires	Wire specifications (FANUC specifications)	Conductor		Sheath thickness (mm)	Effective outside diameter (mm)	Electrical characteristics	
		Diameter (mm)	Configuration			Conductor resistance (Ω/km)	Allowable current (A)
6	A66L-0001-0143	ø1.1	40/0.08 AWG24	1.0	ø5.3	91	3.7
20	A66L-0001-0144	ø1.1	40/0.08 AWG24	1.0	ø8.6	91	2.3

5

TRANSPORTATION AND INSTALLATION

5.1 TRANSPORTATION

The control unit is transported by a crane. Attach a rope to eye bolts at the top of the control unit.

NOTE
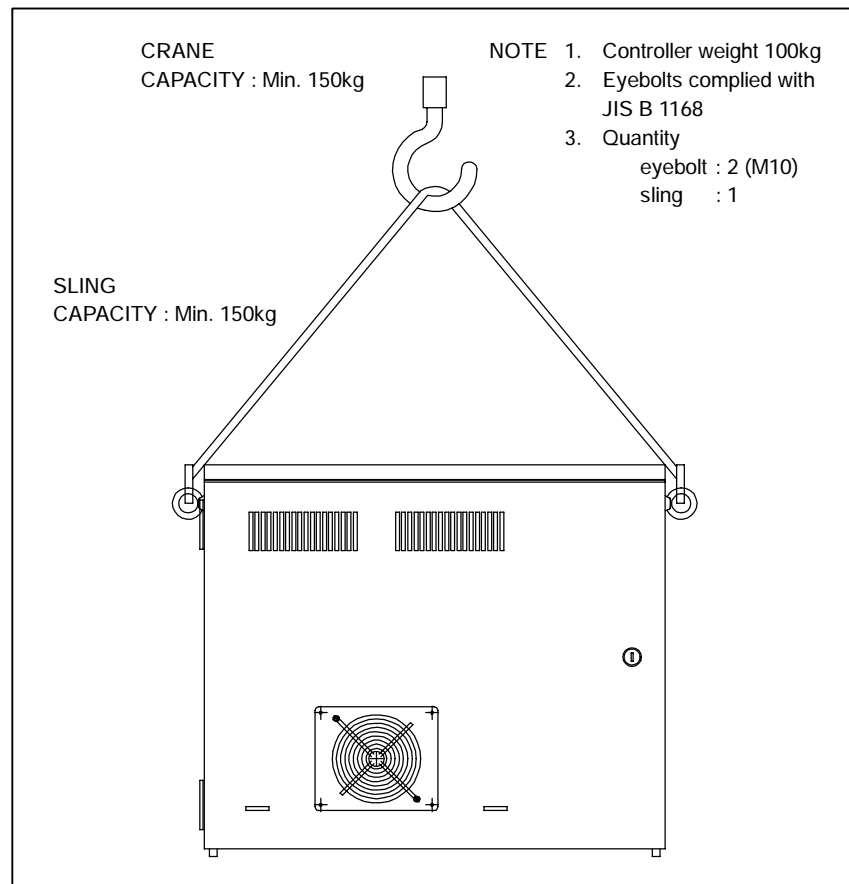A combination control unit is incorporated into the mechanical unit of the robot.

CRANE
CAPACITY : Min. 150kg

SLING
CAPACITY : Min. 150kg

NOTE 1. Controller weight 100kg
       2. Eyebolts complied with JIS B 1168
       3. Quantity
           eyebolt : 2 (M10)
           sling   : 1

Fig.5.1 (a) Transportation (Separate type cabinet)

SLING
CAPACITY : Min. 300kg

CRANE
CAPACITY : Min. 300kg

NOTE 1. CONTROLLER WEIGHT 180kg
      2. EYEBOLTS COMPLIED WITH JIS B 1168
      3. QUANTITY EYEBLOTS : 2 (M10)
              SLING : 1

Fig.5.1 **(b) Transportation**

CRANE
  CAPACITY:MIN. 500KG

SLING
 CAPACITY:MIN. 500KG

NOTE 1. CONTROLLER WEIGHT 300KG
     2. EYEBOLTS COMPLIED
       WITH JIS B 1168
     3. QUANTITY
       EYEBOLTS : 2(M12)
       SLING : 1

S–900

CRANE
  CAPACITY:MIN. 400KG

SLING
 CAPACITY:MIN. 400KG

NOTE 1. CONTROLLER WEIGHT 250KG
     2. EYEBOLTS COMPLIED
       WITH JIS B 1168
     3. QUANTITY
       EYEBOLTS : 2(M12)
       SLING : 1

M–500

Fig.5.1 (c) Transportation (S–900, M–500)

5.2
INSTALLATION

5.2.1
Installation Area

When installing the control unit, allow the space for maintenance shown in the following figure.
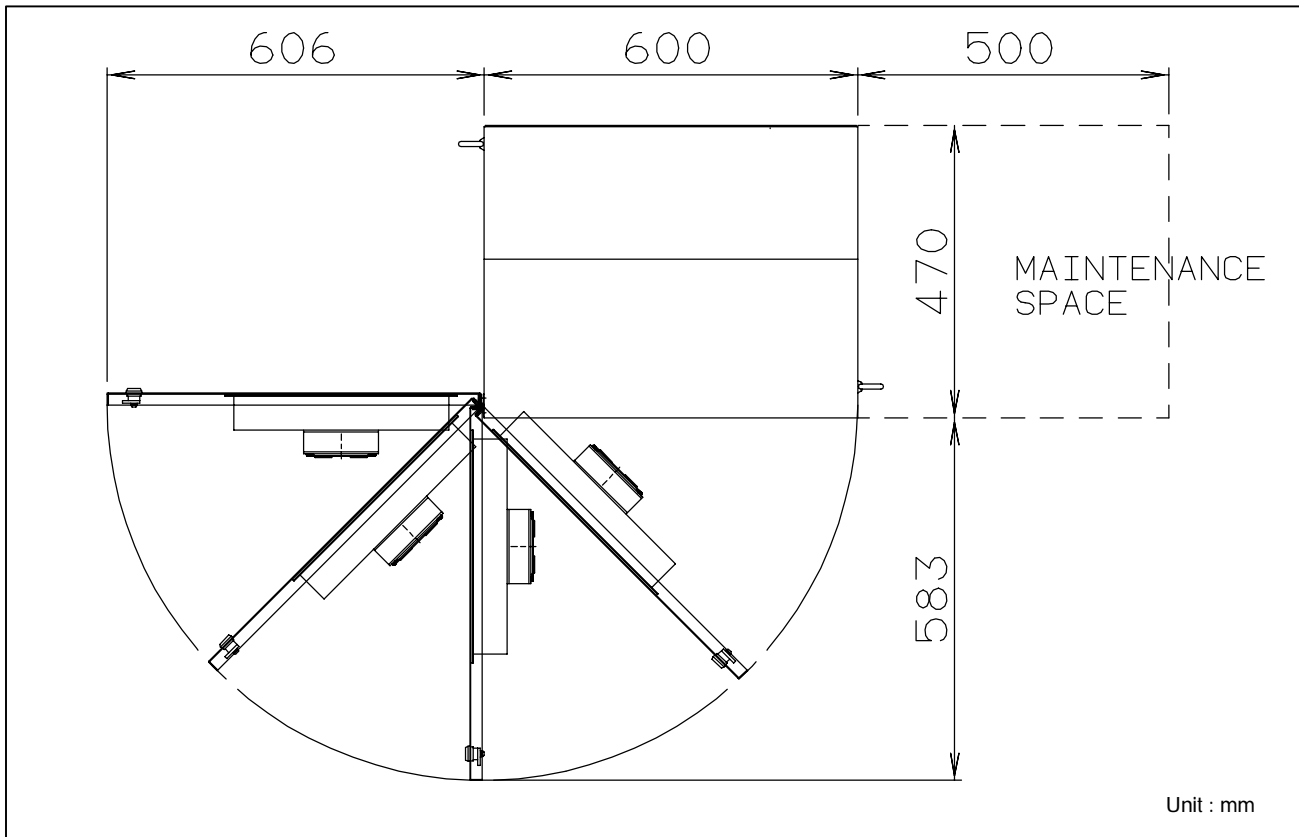
Fig.5.2.1 (a) Installation Area (Separate type i cabinet)
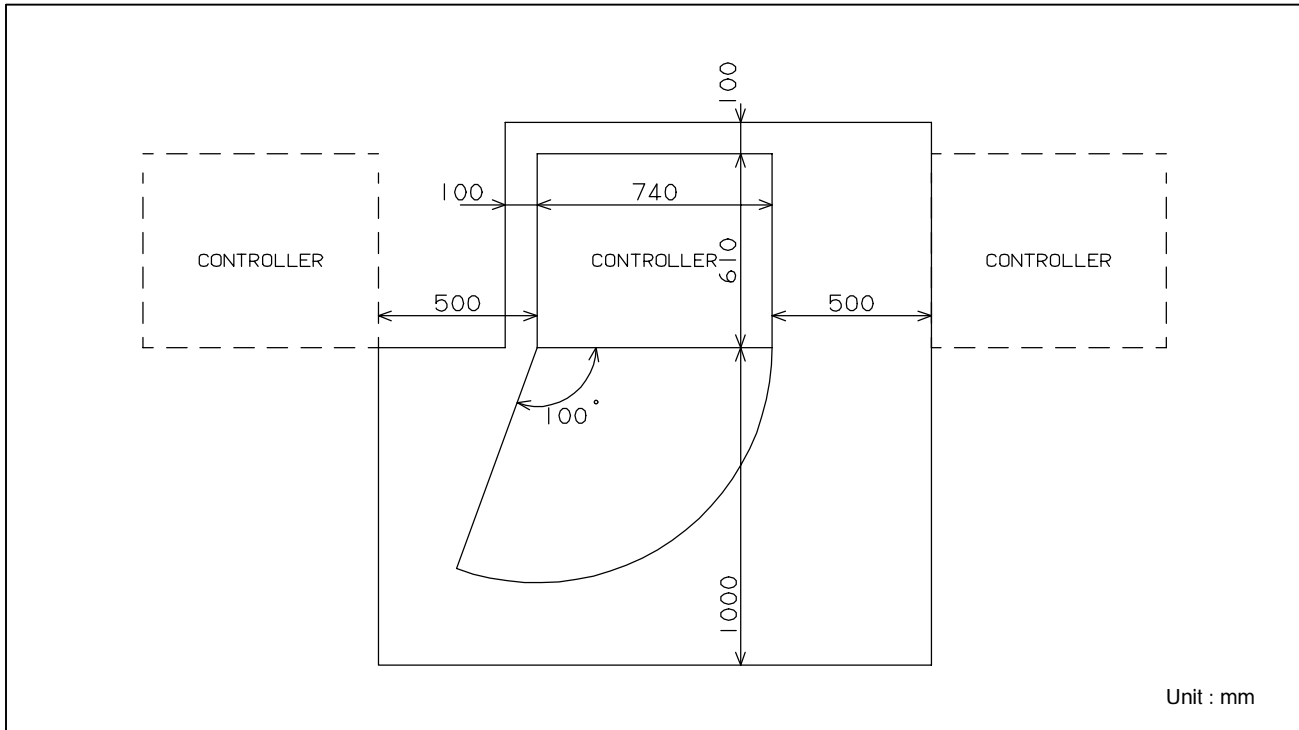
Fig.5.2.1 (b) Installation Area (B–Cabinet/ARC Mate 100, ARC Mate 120, ARC Mate 100*i*, ARC Mate 120*i*, S–6, S–12, M–6*i*, M–16*i*, S–420*i*, S–500, S–700, M–710*i*, A–520*i*)
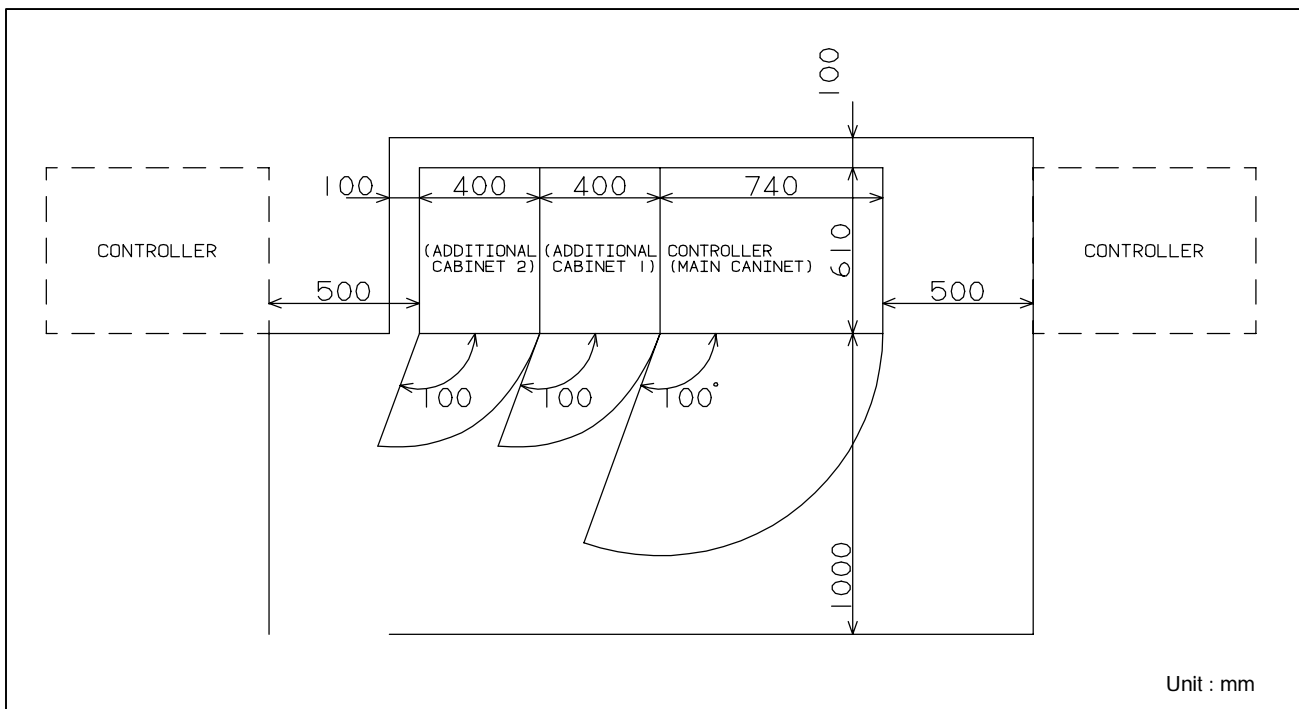
Fig.5.2.1 (c) Installation Area (S–900:with 2 additional cabinets, M–500:with 1 additional cabinet)
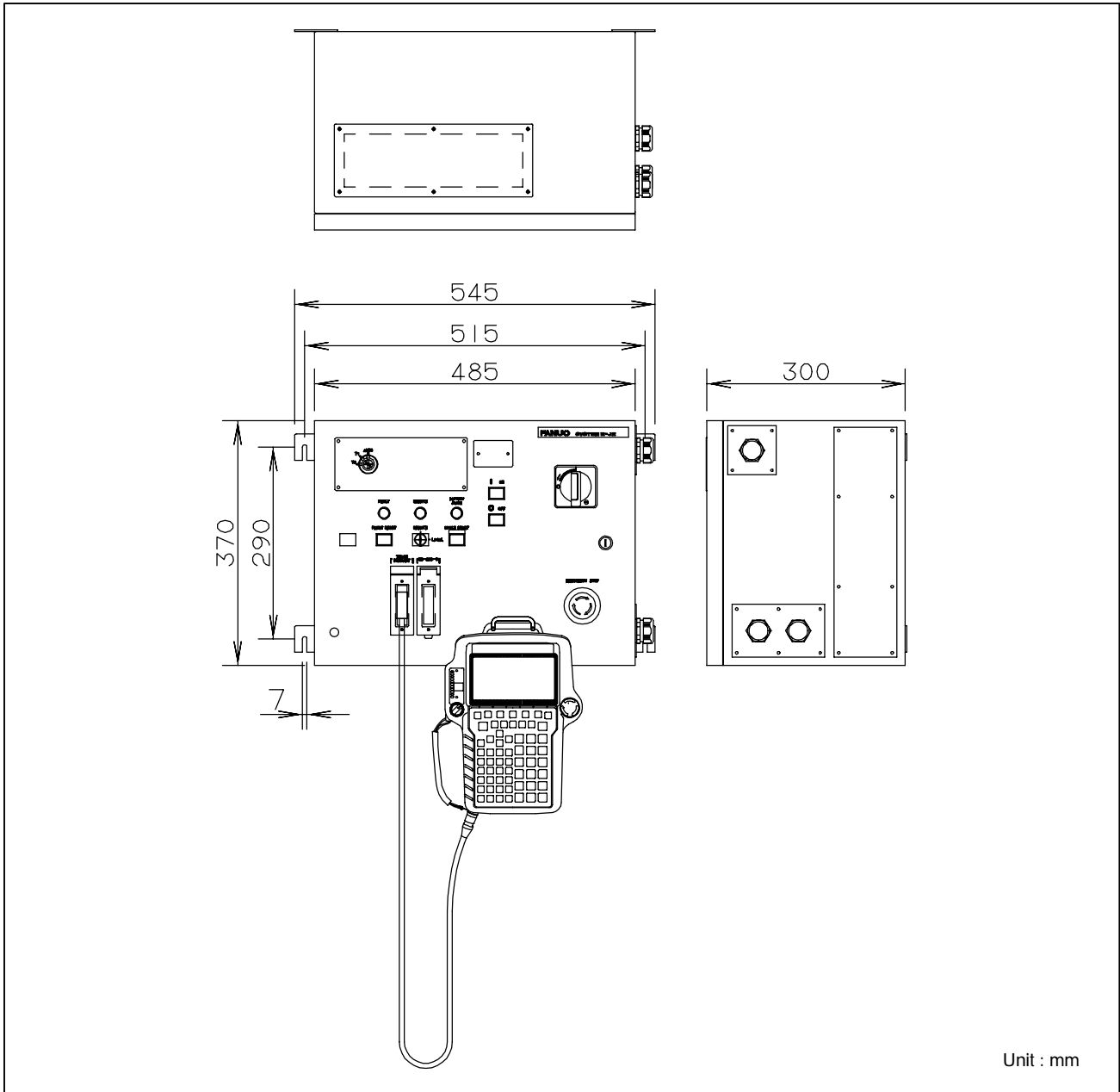
Fig.5.2.1 (d) Installation (Operator's Box)

5.2.2
Connecting Cables at
Installation
(Combined Type of i
Cabinet)

OPERATOR'S BOX

INPUT POWER CABLE

TEACH PENDANT

PERIPHERAL DEVICE CONNECTION CABLE
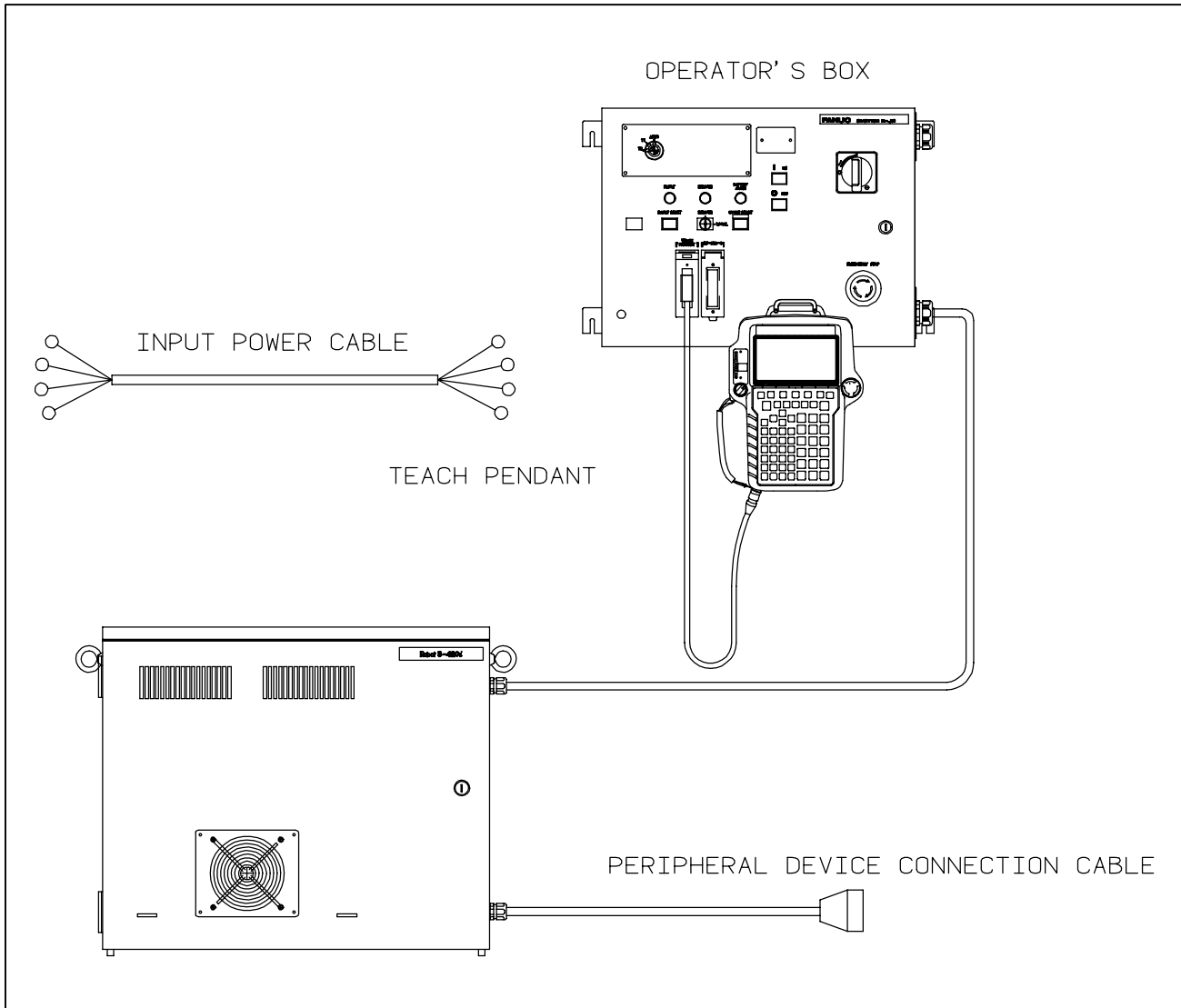
Fig.5.2.2 Connecting Cables at Installation

5.2.3
Connecting Cables at
Installation
(For Separate Type of i
Cabinet)
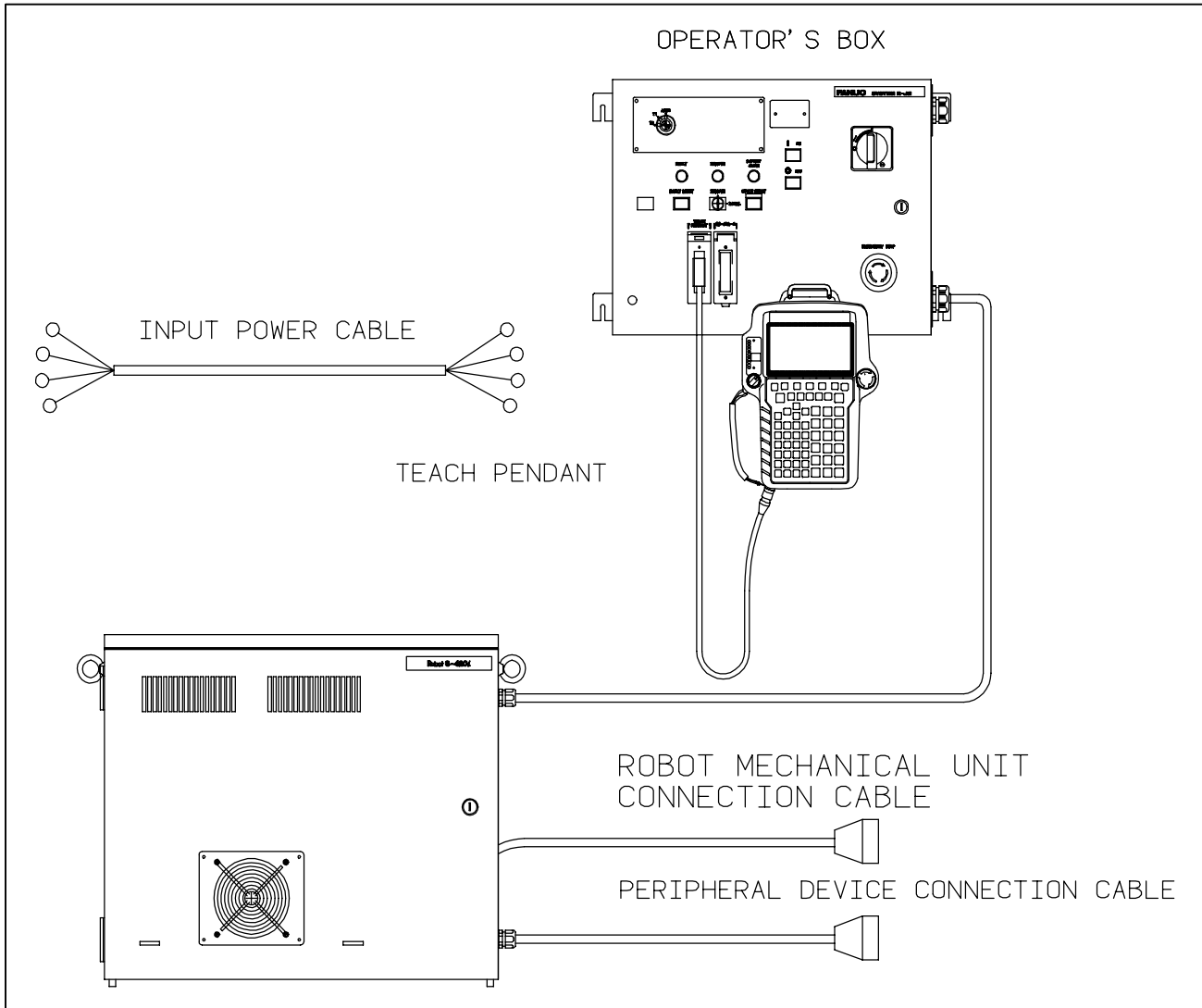
Fig.5.2.3 (a) Connecting Cables at Installation (i cabinet)

OPERATOR'S BOX

INPUT
POWER
CABLE

M-410i CABINET IS INSTALLED
IN THE ROBOT PEDESTAL.

PERIPHERAL DEVICE
CONNECTION CABLE
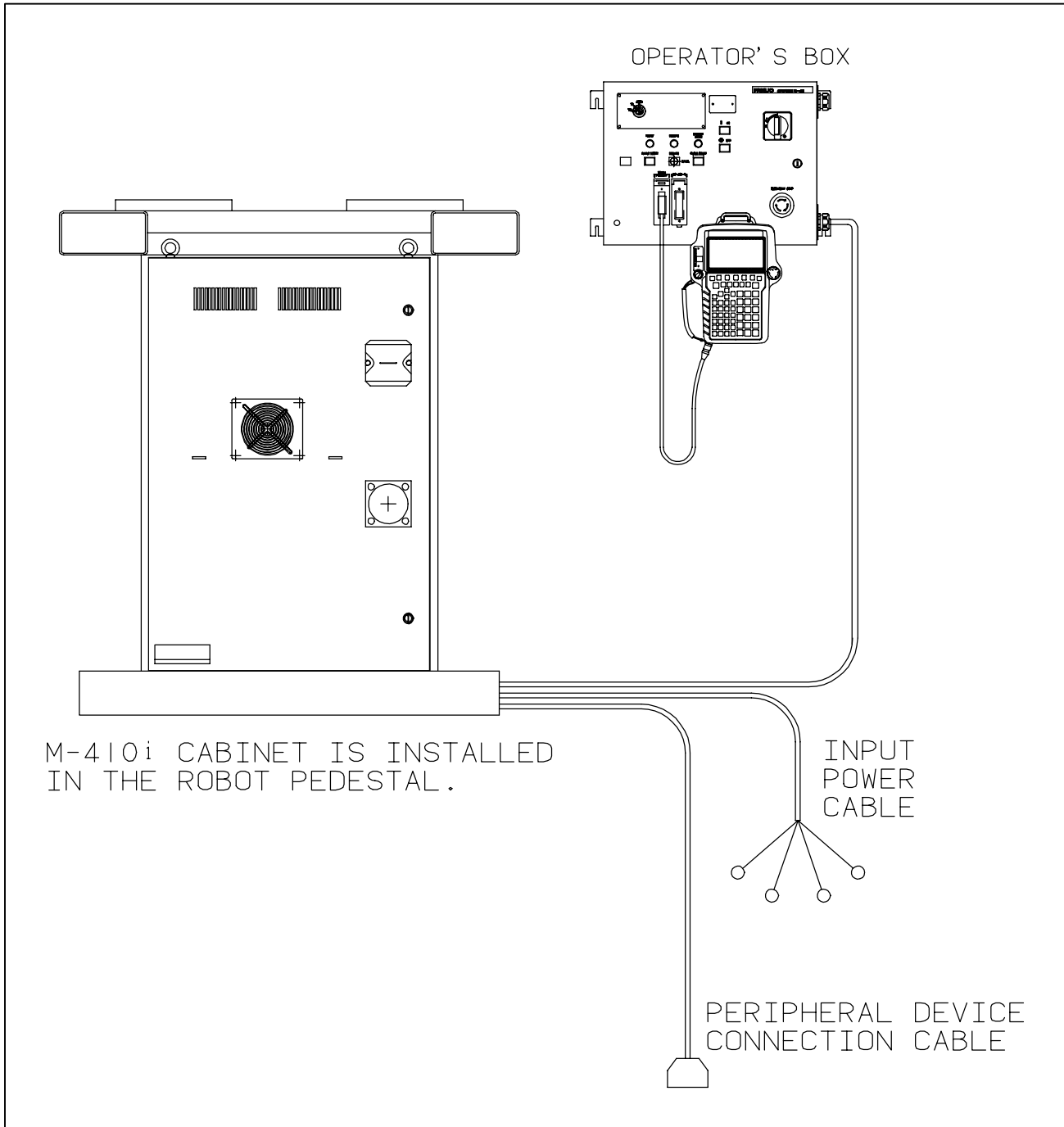
Fig.5.2.3 (b) Connecting Cables at Installation (M 410*i* cabinet)
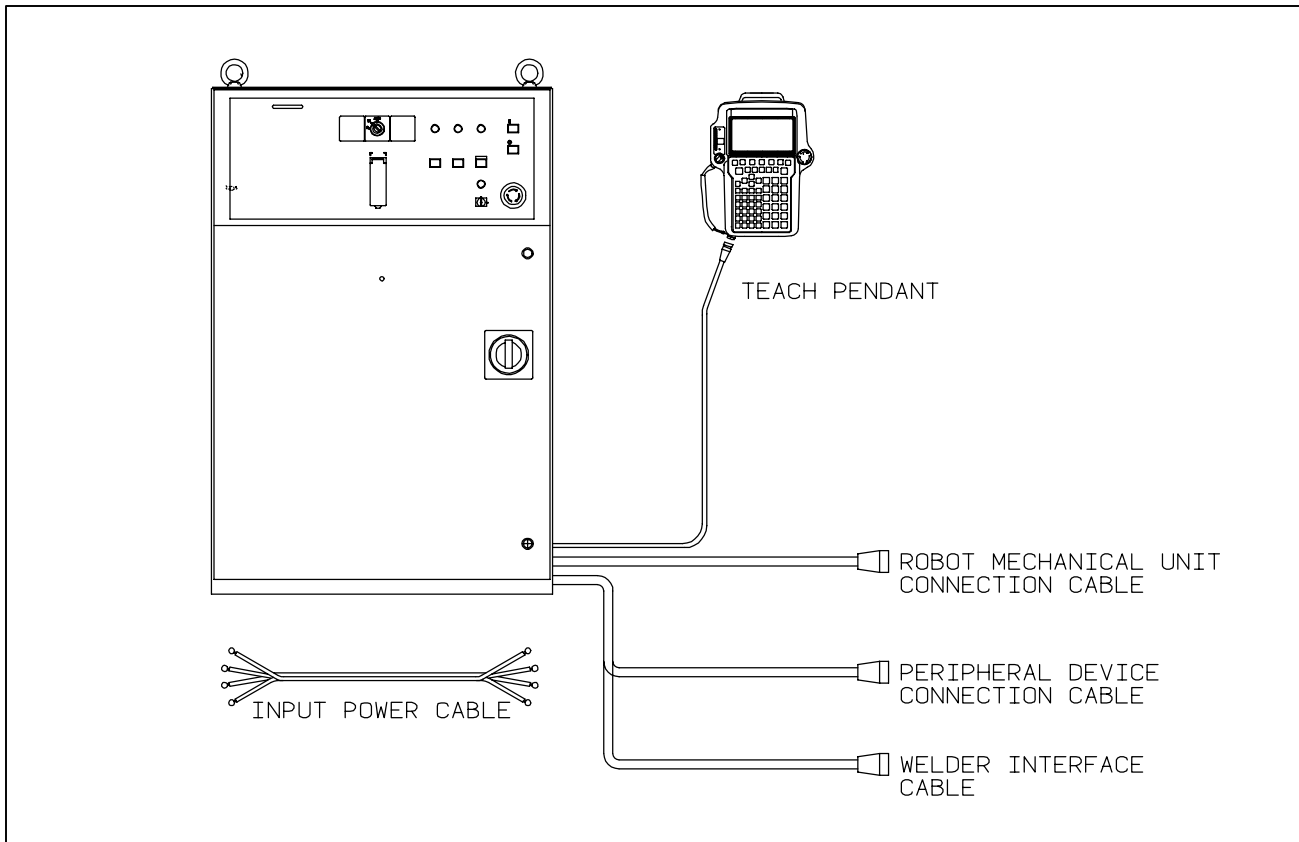
Fig.5.2.3 (c) Connecting Cables at Installation (B cabinet)

Separate−type control unit of i cabinet (ARC Mate100, ARC Mate120, ARC Mate 120*i*, S−6, S−12, M−16*i*, S420*i*, S−500, S−700)
The control unit can be separated from the robot. To enable separate installation of the control unit, an optional robot connection cable is required.

Robot

Robot connection cable
(option)

Controller
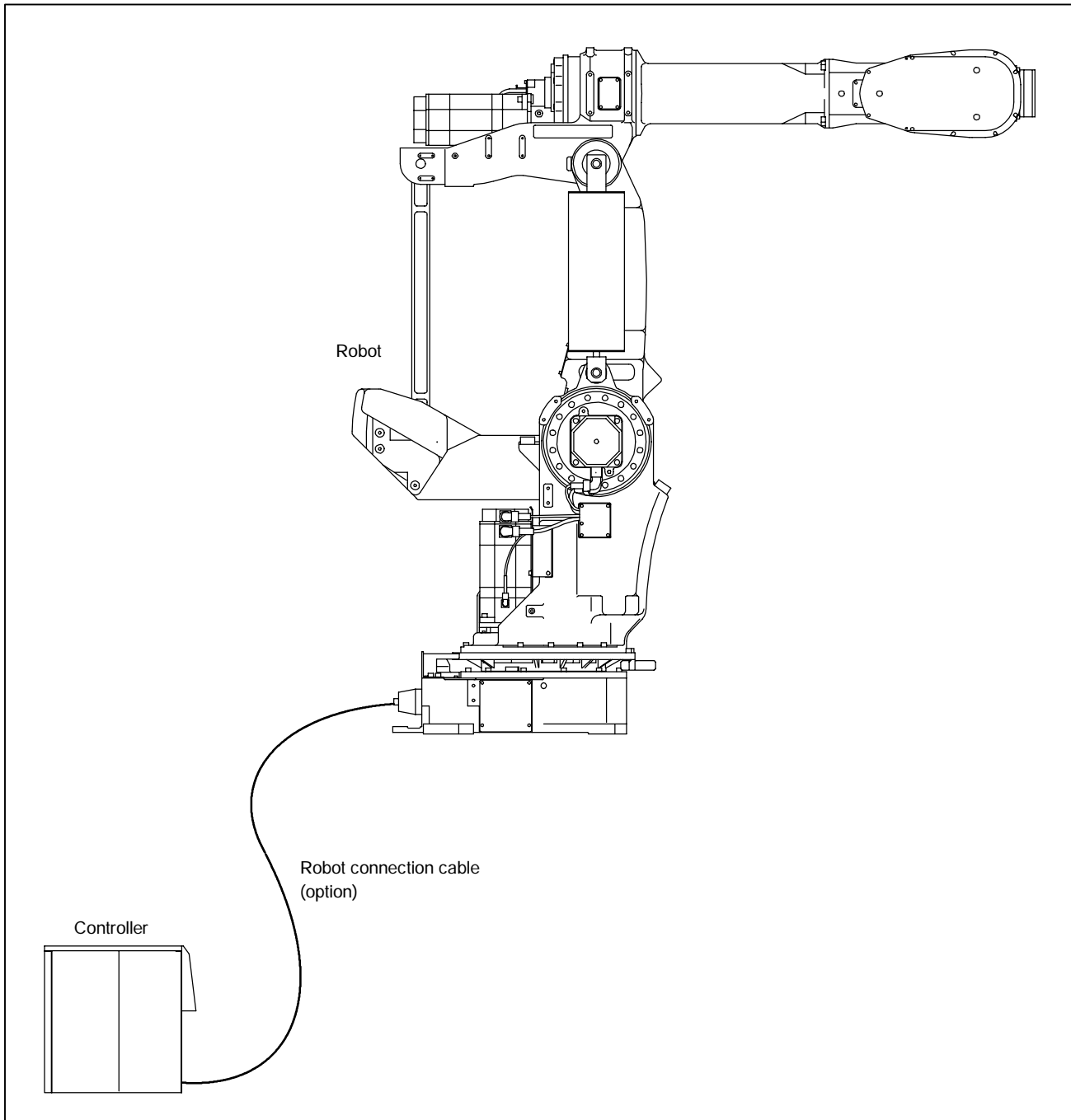
5.3
INSTALLATION CONDITION

Item	Model	Specifications/condition
Line filter	All models	Three–phase 200 VAC +10% –15%, 50 q1 Hz; three–phase 200 to 220 VAC +10% –15%, 60 q1 Hz
Transformer	All models	Three–phase 220, 240, 380, 415, 460, 480, 500, 550, or 575 V +10% –15%, 50/60 q1 Hz
Input power source capacity	ARC Mate 100, S–6, M–16*i*, ARC Mate 100*i*, M–6*i*	2.5kVA
	ARC Mate 120, ARC Mate 120*i*, S–12, A–520*i*	3kVA
	S–700, M–710*i*	6.5kVA
	S–500	7kVA
	S–420*i*, M–410*i*, M–500	12kVA
	S–900	18kVA
Average power consumption	ARC Mate 100, ARC Mate 120, ARC Mate 120*i*, S–6, S–12, M–16*i*, ARC Mate 100*i*, M–6*i*	1.0KW
	S–500, S–700, M–710*i*	1.7KW
	M–500	2.0KW
Average power consumption	S–420*i*, M–410*i*	2.5KW
	S–900	3.5KW
Permissible ambient temperature	All models	0°C to 45°C
Permissible ambient humidity	All models	75% RH or less, non–condensing, up to 95% RH for a limited period (within one month)
Surrounding gas	All models	No corrosive gas. When using the robot in an environment with a high concentration of dust or coolant, consult with your FANUC sales representative.
Vibration	All models	0.5 G or less. When using the robot in a location subject to serious vibration, consult with your FANUC sales representative.
Weight of control unit	B cabinet	About 180 kg
	i cabinet	About 100 kg (front cabinet: About 40 kg, rear cabinet: About 60 kg)

> **NOTE**
> As a continuous rating in the above capacity is enough though, when the robot is rapidly accelerated, the capacity of the power supply will momentarily need the capacity of about two times the continuous rating value.

5.4
ADJUSTMENT AND CHECKS AT INSTALLATION

Adjust the robot according to the following procedure at installation.

No.	Description
1	Visually check the inside and outside of the control unit.
2	Check if the screwed terminal is connected properly.
3	Check that the connectors and printed circuit boards are inserted correctly.
4	Check transformer tap setting. (See II MAINTENANCE 6.3)
5	Turn disconnector and the breaker off and connect the input power cable.
6	Check the input power voltage.
7	Press the EMERGENCY STOP button on the operator's box and turn the power on. Check the output voltage.
8	Check the interface signals between control unit and robot mechanical unit.
9	Check the parameters. If necessary, set them.
10	Release the EMERGENCY STOP button on the operator's box. Turn the power on.
11	Check the movement along each axis in the manual jog mode.
12	Check the end effector interface signals.
13	Check the peripheral device control interface signals.

5.5
RESETTING
OVERTRAVEL AND
EMERGENCY STOP
AT INSTALLATION

An overtravel and emergency stop occur when the robot is operated for the first time after it is installed and the mechanical and control units are wired. This section describes how to reset the overtravel and emergency stop.

Remove the red plate fastening the swiveling axis beforehand.
The J2 and J3 axes are pressed against the hard stops at shipment. Therefore, an overtravel alarm occurs when the power is turned on after installation.

The robot enters the emergency stop state when the peripheral device control interface is not connected.

5.5.1
Peripheral Device
Interface Processing

Take the following actions if signals *IMSTP, *HOLD, *SFSD, and ENBL are not used.
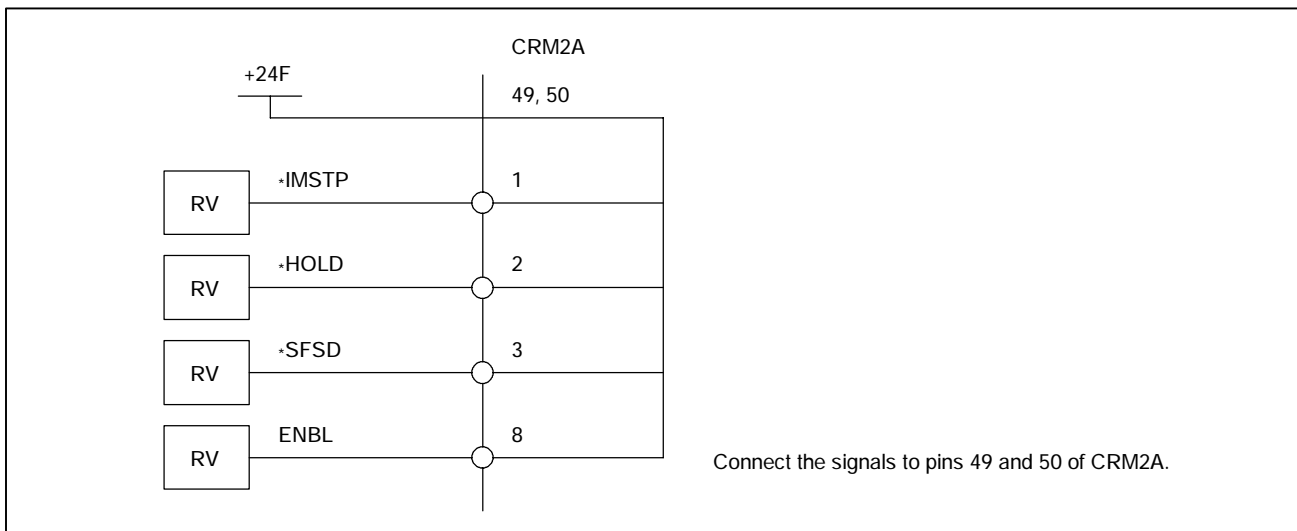
5.5.2
Resetting Overtravel

Press the reset switch on the operator's panel or the reset key on the teach pendant.

Manually move an axis that has overtraveled into the operating range while pressing the shift key on the teach pendant.

APPENDIX