FANUC

GE Fanuc Automation

Computer Numerical Control Products

Machine Operator's Panel

Connection Manual

Warnings, Cautions, and Notes
as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software, nor to provide for every possible contingency in connection with installation, operation, or maintenance. Features may be described herein which are not present in all hardware and software systems. GE Fanuc Automation assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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Machine Operator's Panel Connection Manual

-Item-

EDIT	DATE	DESIG.	DESCRIPTION		FANUC LTD	SHEET	1 / 42
04	00.07.10	Tsurutani	1-(Marked ④ is added) , 32-34,36,37,42/42　Koike	TITLE	Machine operator's panel Connection manual		
03	00.06.05	Tsurutani	1-(Marked ③ is added) , 2,18,31,32,33,40/40　Koike				
02	00.01.18	Tsurutani	Add outlines of Main panel A.　Koike	DRAW.NO.	A-80502E	CUST	

1. Overview

Machine operator's panel is connected with **i** series CNC by I/O Link, which is composed by some following operator's panels.

Main panel A/A1
This operator's panel incorporated with MDI with full alphabet keys. And that has 55 keys. All key tops are detachable. MTB can customize keys and make his original key layout easily.

Main panel B/B1
The part of keyboard of machine operation in Main panel A.

Sub panel A
This operator's panel has power ON/OFF, emergency stop, program protect, and two rotary switches.

Sub panel B
This operator's panel has emergency stop, program protect, and rotary switch.

Sub panel C
This operator's panel has power ON/OFF, emergency stop, program protect, rotary switch, and MPG.

(3) **Sub panel B1**
This operator's panel has emergency stop, program protect, two rotary switches,.

(3) Note) When Main panel A "A02B-0236-C230" or Main panel B "A02B-0236-C240" is used, editions of **i** series CNC software must be as follows.

Basic function

Series/Type	Edition
B1F2/FS16**i**-TA	06 or later
B0F2/FS16**i**-MA	06 or later
BEF2/FS18**i**-TA	06 or later
BDF2/FS18**i**-MA	06 or later
DEF2/FS21**i**-TA	06 or later
DDF2/FS21**i**-MA	06 or later

System boot function

Series	Edition
60M3	14 or later

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03	00.06.05	Tsurutani	Marked 3 is added.	DRAW NO A-80502E		CUST
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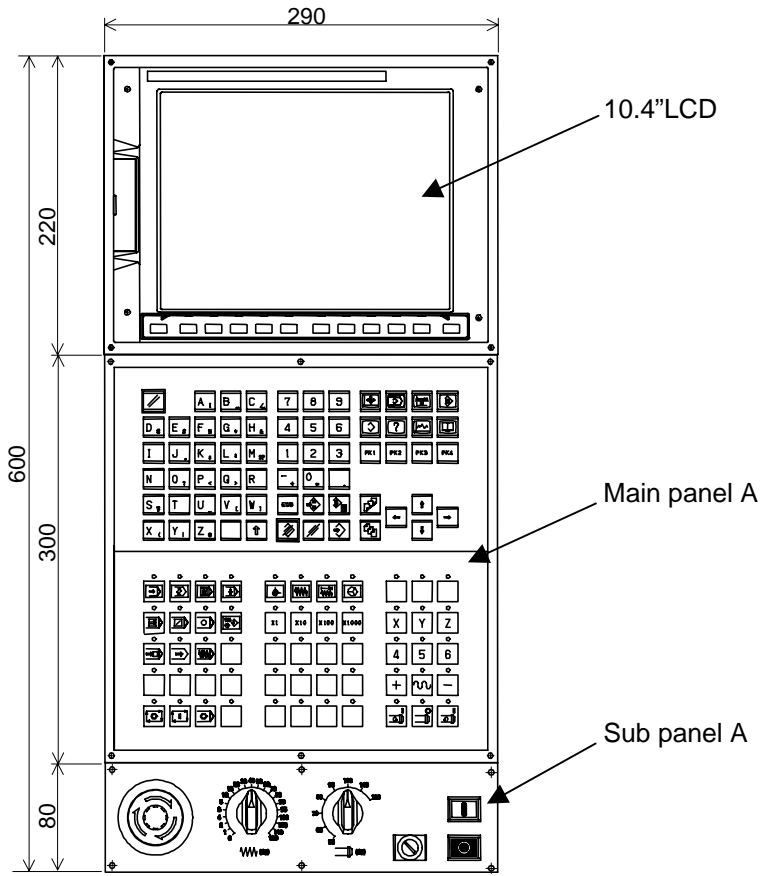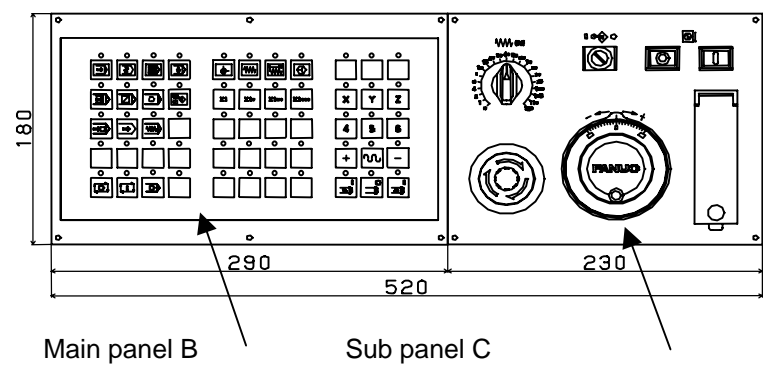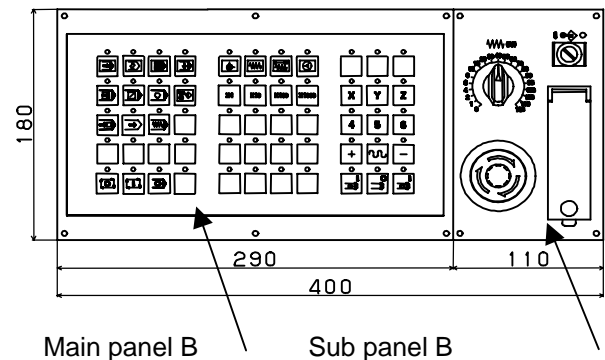
290

10.4"LCD

220

600

300

Main panel A

Sub panel A

80

Unit=mm

180

290

110

400

Main panel B   Sub panel B

180

290

230

520

Main panel B   Sub panel C

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2. Total connection diagram
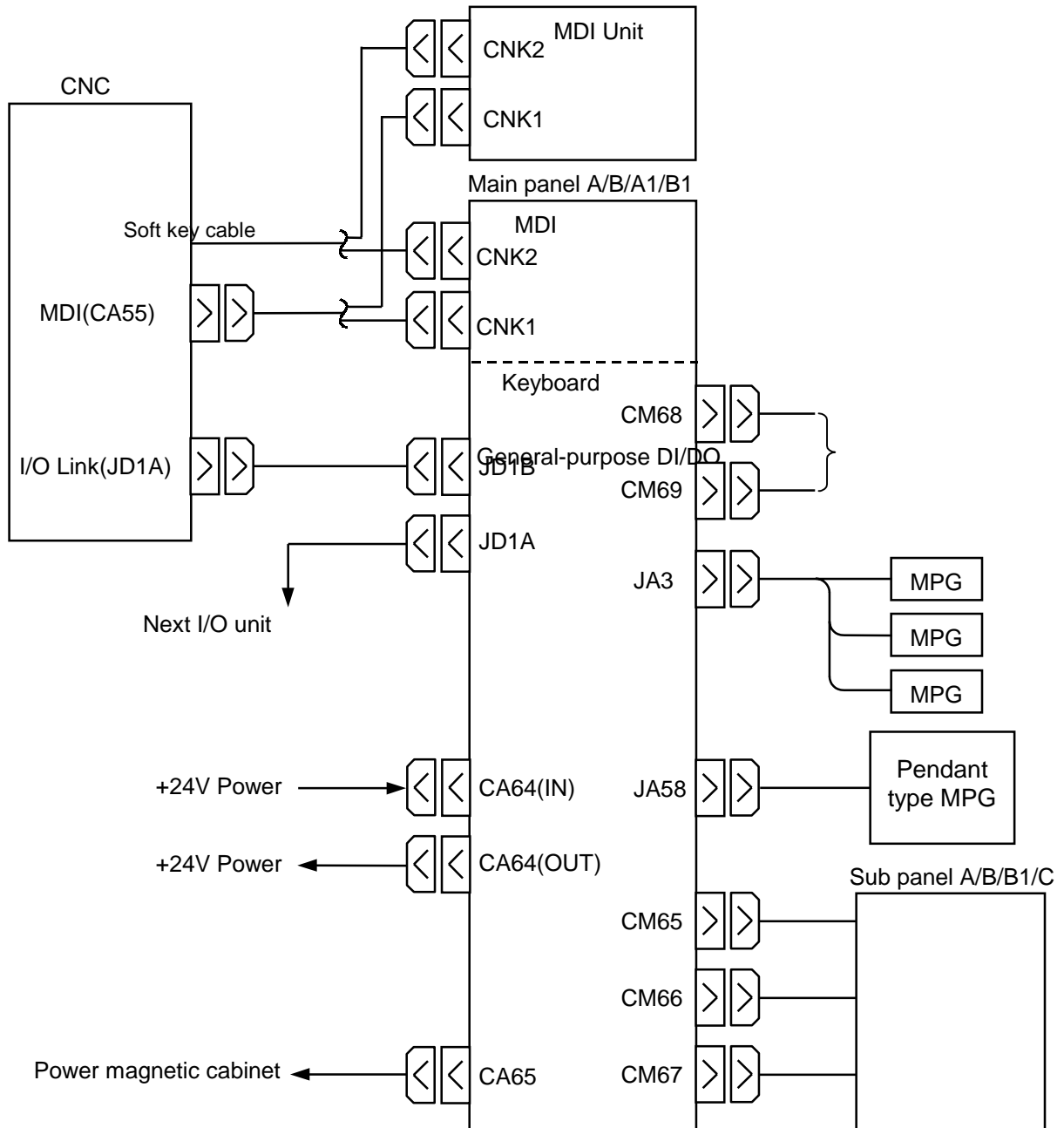
Note) i series CNC is only possible to use the MPG interface on this operator's panel. If i series CNC uses some I/O unit having MPG interface (ex. Dispersion type I/O module for panel) and this operator's panel, the MPG interface nearest the CNC is only available on the I/O Link connection.

Note) MPG cannot be connected with either of JA3 and JA58.

Note) Connect FANUC standard MDI unit in case of Main panel B/B1.

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3. Each connections
3.1 Pin assignment

CA64 (Power source)

3		2	0V	1	+24V
6		5	0V	4	+24V

Recommended connector for cable:
Housing : AMP 1-178288-3 (3 pins type)
Contact : AMP 1-175218-5

CM67(ON/OFF,Program protect,ESP)

A01	EON	B01	EOFF
A02	COM1	B02	COM2
A03	Xm+1.4	B03	KEYCOM
A04	*ESP	B04	ESPCM1
A05	TR1	B05	TR2

Recommended connector for cable:
Housing : AMP 178289-5
Contact : AMP 1-175218-5

CA65 (Power magnetic cabinet)

A01	EON	B01	EOFF
A02	COM1	B02	COM2
A03	*ESP	B03	ESPCM1
A04	TR1	B04	TR2
A05	TR3	B05	TR4
A06	TR5	B06	TR6
A07	TR7	B07	TR8
A08		B08	
A09		B09	
A10		B10	

Recommended connector for cable:
Hirose electric : HIF3BA-20D-2.54R

CM65 (General-purpose DI)

A01		B01	
A02		B02	Xm+0.5
A03	Xm+0.1	B03	Xm+0.3
A04	+24V	B04	Xm+0.4
A05	Xm+0.2	B05	Xm+0.0

Recommended connector for cable:
Hirose electric : HIF3BA-10D-2.54R

CM66 (General-purpose DI)

A01		B01	
A02		B02	Xm+1.3
A03	Xm+0.7	B03	Xm+1.1
A04	+24V	B04	Xm+1.2
A05	Xm+1.0	B05	Xm+0.6

Recommended connector for cable:
Hirose electric : HIF3BA-10D-2.54R

CM68 (General-purpose DI/DO)

A01	+24V	B01	Xm+1.5
A02	Xm+1.6	B02	Xm+1.7
A03	Xm+2.0	B03	Xm+2.1
A04	Xm+2.2	B04	Xm+2.3
A05	Xm+2.4	B05	Xm+2.5
A06	TR3	B06	TR4
A07	TR5	B07	TR6
A08	Yn+5.3	B08	Yn+5.7
A09	Yn+6.3	B09	Yn+6.7
A10	DOCOM	B10	0V

Recommended connector for cable:
Housing : AMP 178289-8
Contact : AMP 1-175218-5

CM69 (General-purpose DI/DO)

A01	+24V	B01	Xm+2.6
A02	Xm+2.7	B02	Xm+3.0
A03	Xm+3.1	B03	Xm+3.2
A04	Xm+3.3	B04	Xm+3.4
A05	Xm+3.5	B05	Xm+3.6
A06	Xm+3.7	B06	DICOM
A07	TR7	B07	TR8
A08	Yn+7.3	B08	Yn+7.4
A09	Yn+7.5	B09	Yn+7.6
A10	DOCOM	B10	0V

Recommended connector for cable:
Housing : AMP 178289-8
Contact : AMP 1-175218-5

Note) Input/output Pins shaded by [   ] e in pairs. Only one in each pair is usable.
Note) Pins shaded by [■] are those for forwarding signals. Pins with the same name are connected directly to one another.

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JA3 (Manual pulse generator)

1	HA1	11	
2	HB1	12	0V
3	HA2	13	
4	HB2	14	0V
5	HA3	15	
6	HB3	16	0V
7		17	
8		18	+5V
9	+5V	19	
10		20	+5V

JA58 (Pendant type manual pulse generator)

1	HA1	11	Xm+1.5
2	HB1	12	0V
3	Xm+2.2	13	Xm+1.6
4	Xm+2.3	14	0V
5	Xm+2.4	15	Xm+1.7
6	Xm+2.5	16	0V
7	Yn+5.3	17	Xm+2.0
8	Xm+2.1	18	+5V
9	+5V	19	+24V
10	+24V	20	+5V

Recommended connector for cable of JA3 and JA58

When the depth of the operator's panel is 60mm min.
Recommended connector for cable:
Hirose electric FI40B-2015S (Connector)
FI-20-CV (Case)
When the depth of the operator's panel is 80mm min.
Recommended connector for cable of JA3:
Hirose electric : FI40B-2015S (Connector)
FI-20-CV (Case)
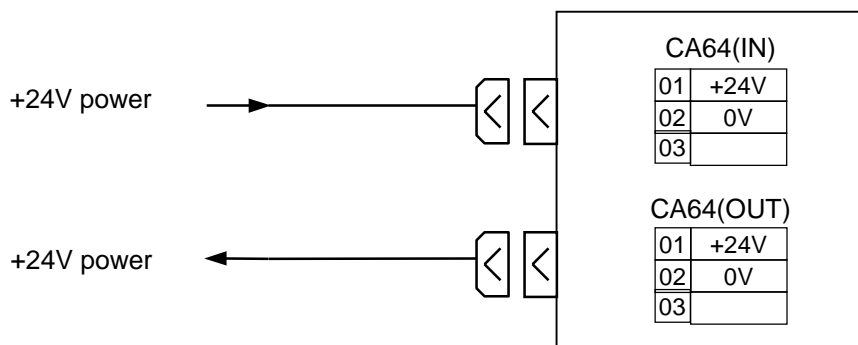Recommended connector for cable of JA58:
Honda : PCR-E20FA (Connector)
PCR-V20LA (Case)
Hirose electric : FI30-20S (Connector)
FI-20-CV2 (Case)
Fujitsu : FCN-247J020-G/E (Connector)
FCN-240C020-Y/S (Case)
Molex : 52622-2011 (Connector)
52624-2015 (Case)

3.2 Power supply connection

+24V power →

CA64(IN)

01	+24V
02	0V
03	

+24V power ←

CA64(OUT)

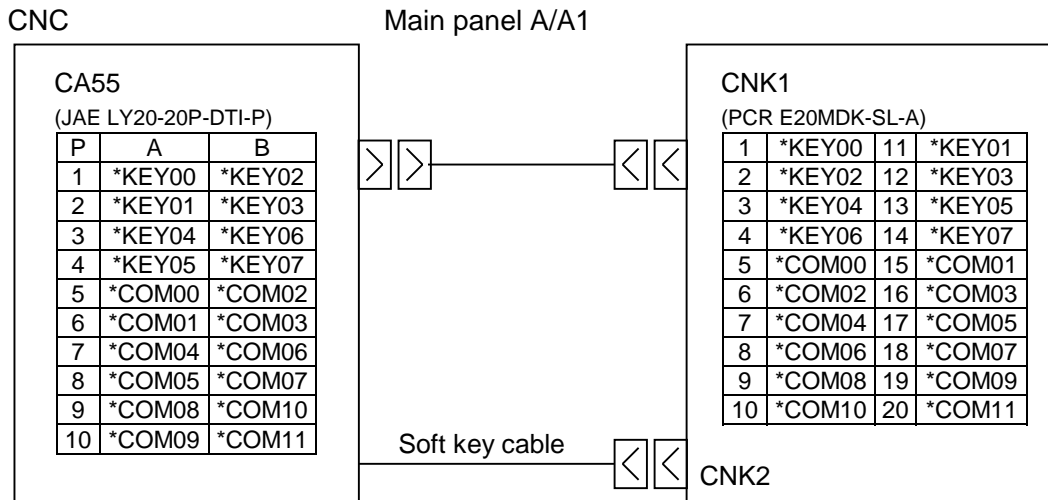| 01	+24V
02	0V
03	

Note) Both connectors CA64(IN) and CA64(OUT) are same specification. And there is not indication of (IN) and (OUT) on the PCB.

Note) Power supply for the operator's panel must not turn off at operation. If +24V is turned off at operation, CNC happen to get system alarm(Communication alarm between CNC and operator's panel). +24V for operator's panel must be supplied before or same time CNC power on.

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3.3 MDI connection

CNC   Main panel A/A1

CA55
(JAE LY20-20P-DTI-P)

P	A	B
1	*KEY00	*KEY02
2	*KEY01	*KEY03
3	*KEY04	*KEY06
4	*KEY05	*KEY07
5	*COM00	*COM02
6	*COM01	*COM03
7	*COM04	*COM06
8	*COM05	*COM07
9	*COM08	*COM10
10	*COM09	*COM11

CNK1
(PCR E20MDK-SL-A)

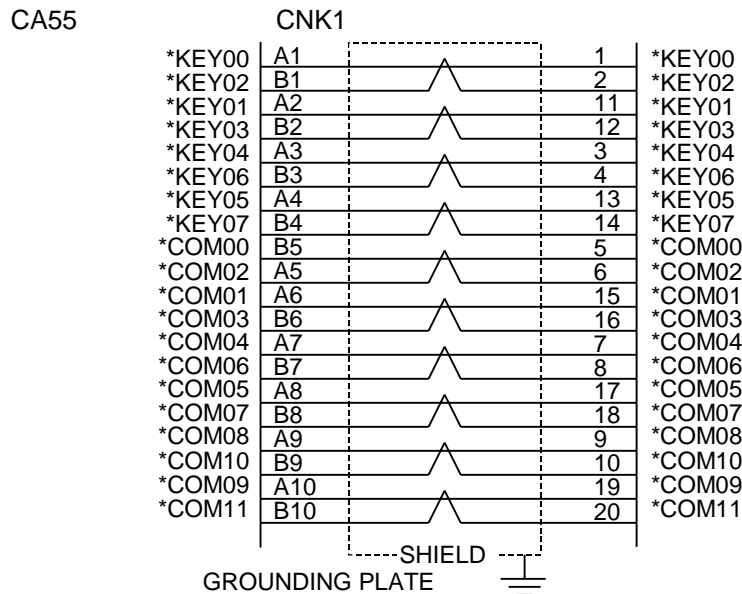| 1	*KEY00	11	*KEY01
2	*KEY02	12	*KEY03
3	*KEY04	13	*KEY05
4	*KEY06	14	*KEY07
5	*COM00	15	*COM01
6	*COM02	16	*COM03
7	*COM04	17	*COM05
8	*COM06	18	*COM07
9	*COM08	19	*COM09
10	*COM10	20	*COM11

Soft key cable

CNK2

Recommended connector for cable of CA55:
Japan Aviation Electronics
LY10-DC20 (Housing)
LY10-C2-3 (Contact)
A02B-0236-K303

Recommended connector for cable of CNK1:
HIROSE Electric
FI30-20S (Connector)
FI-20-CV7 (Case)

CA55   CNK1

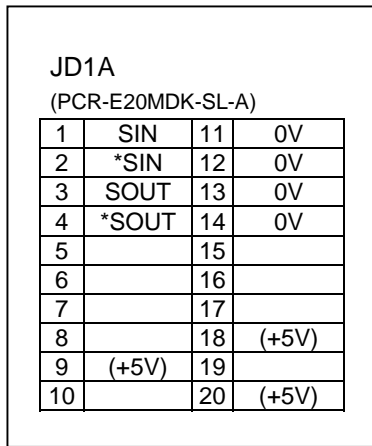|	CNK1		
*KEY00	A1	1	*KEY00
*KEY02	B1	2	*KEY02
*KEY01	A2	11	*KEY01
*KEY03	B2	12	*KEY03
*KEY04	A3	3	*KEY04
*KEY06	B3	4	*KEY06
*KEY05	A4	13	*KEY05
*KEY07	B4	14	*KEY07
*COM00	B5	5	*COM00
*COM02	A5	6	*COM02
*COM01	A6	15	*COM01
*COM03	B6	16	*COM03
*COM04	A7	7	*COM04
*COM06	B7	8	*COM06
*COM05	A8	17	*COM05
*COM07	B8	18	*COM07
*COM08	A9	9	*COM08
*COM10	B9	10	*COM10
*COM09	A10	19	*COM09
*COM11	B10	20	*COM11

----SHIELD----
GROUNDING PLATE

Recommended cable specification:
A02B-0236-K812 (25 cm)
A02B-0236-K813 (45 cm)
Recommended wire specification:
A66L-0001-0284#10P (#AWG28 x 10 pairs)

Note) For MDI cable connector mating on the CA55 side, a simple lock mechanism is
employed. Ensure that a load greater than 1kg is not applied to the connectors.
Moreover, clamp the cable so that excessive force is not applied due to vibration.
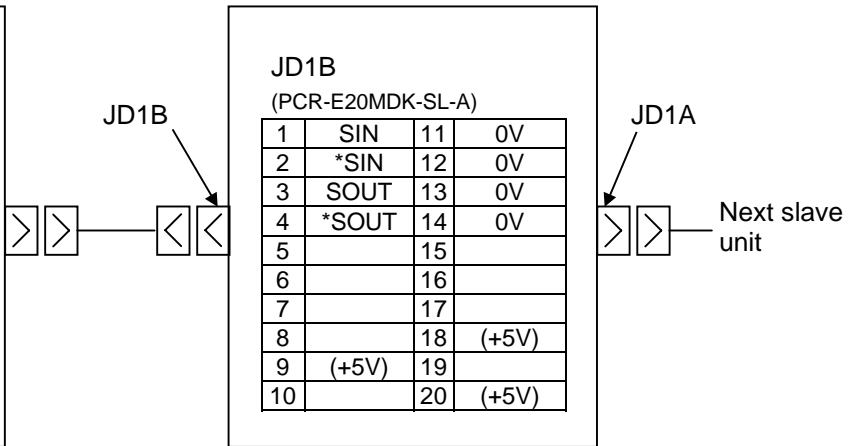However, shielding and clamping are not required for a cable of up to 50 cm.

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3.4 I/O Link Connection

Control unit preceding slave unit   Main panel A/B/A1/B1

JD1A
(PCR-E20MDK-SL-A)

1	SIN	11	0V
2	*SIN	12	0V
3	SOUT	13	0V
4	*SOUT	14	0V
5		15	
6		16	
7		17	
8		18	(+5V)
9	(+5V)	19	
10		20	(+5V)

JD1B

JD1B
(PCR-E20MDK-SL-A)

1	SIN	11	0V
2	*SIN	12	0V
3	SOUT	13	0V
4	*SOUT	14	0V
5		15	
6		16	
7		17	
8		18	(+5V)
9	(+5V)	19	
10		20	(+5V)

JD1A

Next slave unit

Recommended connector for cable of JD1A and JD1B on Main panel A/B/A1/B1

When the depth of the operator's panel is 60mm min.
Recommended connector for cable:
Hirose electric FI40B-2015S (Connector)
FI-20-CV (Case)
When the depth of the operator's panel is 80mm min.
Recommended connector for cable:
Honda : PCR-E20FA (Connector)
PCR-V20LA (Case)
Hirose electric : FI30-20S (Connector)
FI-20-CV2 (Case)
Fujitsu : FCN-247J020-G/E (Connector)
FCN-240C020-Y/S (Case)
Molex : 52622-2011 (Connector)
52624-2015 (Case)

+5V terminals are for an optical I/O Link adapter. They are not necessary when connecting with a metal cable.
A line for the +5V terminal is not required when the Optical I/O Link Adapter is not used.

JD1A   JD1B
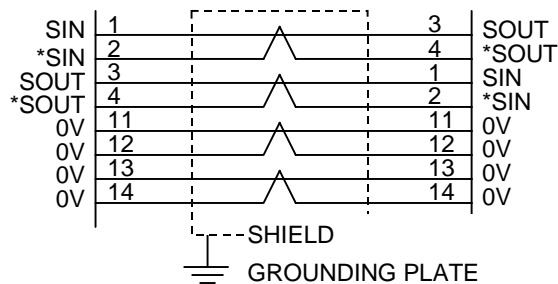
SIN	1		3	SOUT
*SIN	2		4	*SOUT
SOUT	3		1	SIN
*SOUT	4		2	*SIN
0V	11		11	0V
0V	12		12	0V
0V	13		13	0V
0V	14		14	0V

SHIELD
GROUNDING PLATE

Recommended wire material:
A66L-0001-0284#10P (AWG28 x 10 pairs)

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3.5 Emergency stop signal connection

A signal generated by the emergency stop switch on the machine operator's panel can be sent to the power magnetic cabinet. (This signal cannot be sent to the FANUC I/O Link.)
When MTB uses the Sub panel A/BB1//C, wiring to the emergency stop switch is contained in the Sub panel A/B/B1/C.
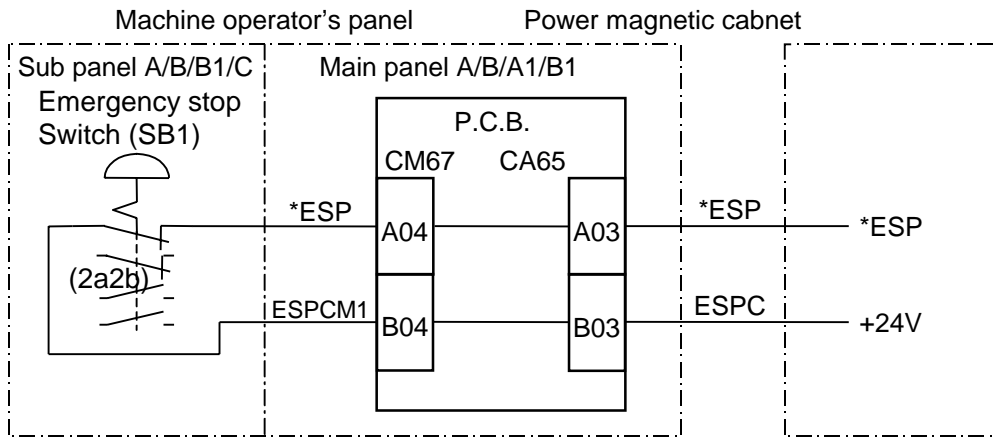

3.6 Power ON/OFF control signal connection

Signal generated by the power ON/OFF control switches on the machine operator's panel can be sent to the power magnetic cabinet. (This signal cannot be sent to the FANUC I/O Link.)
When MTB uses the Sub panel A/C, wiring to the ON/OFF control switches are contained in the Sub panel A/C.
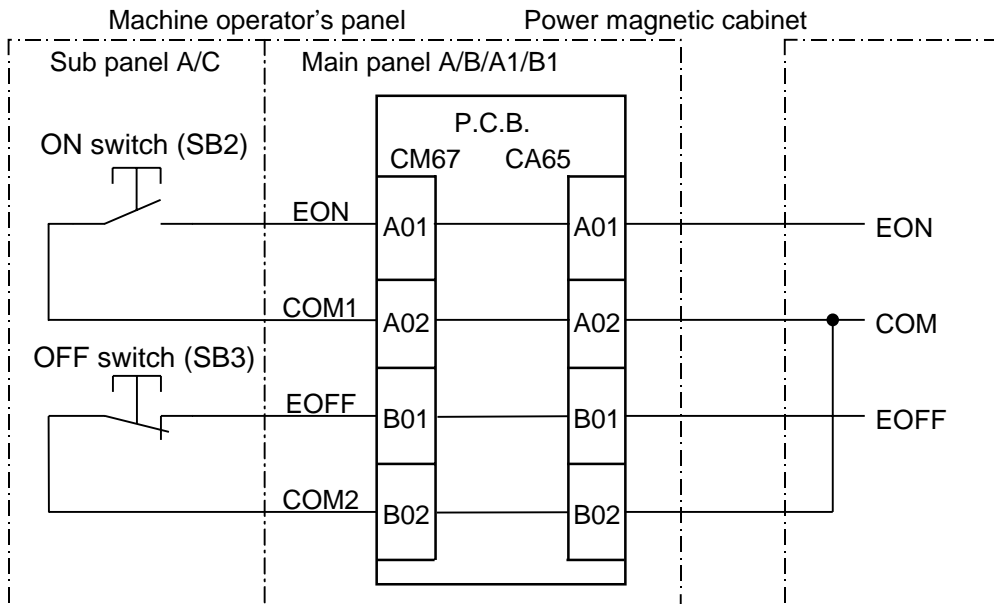
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3.7 DI (Input signal) connection
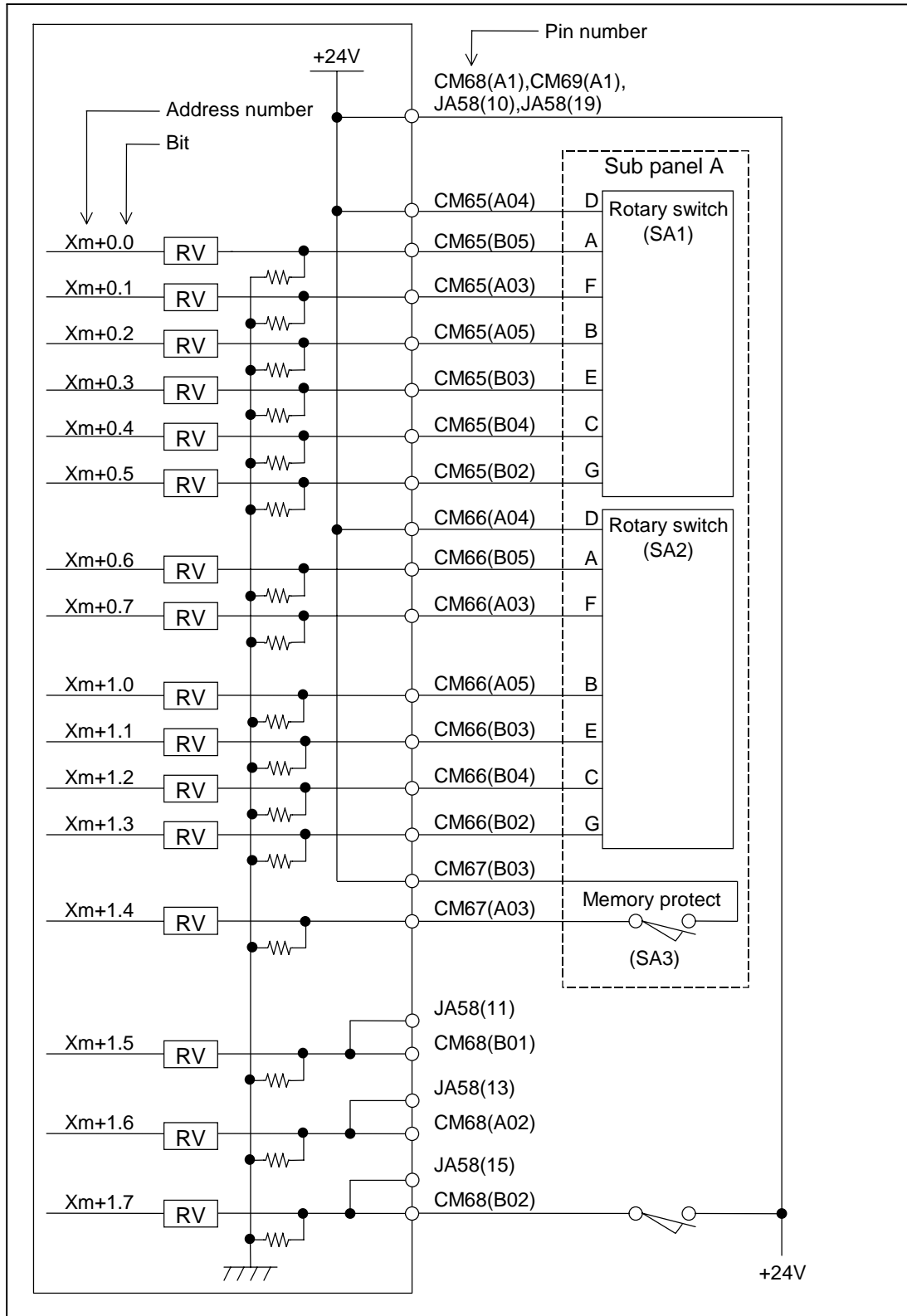
Note) Connection of Xm+0.0~Xm+0.7, Xm+1.0~Xm+1.4 shows when the Sub panel A is used.

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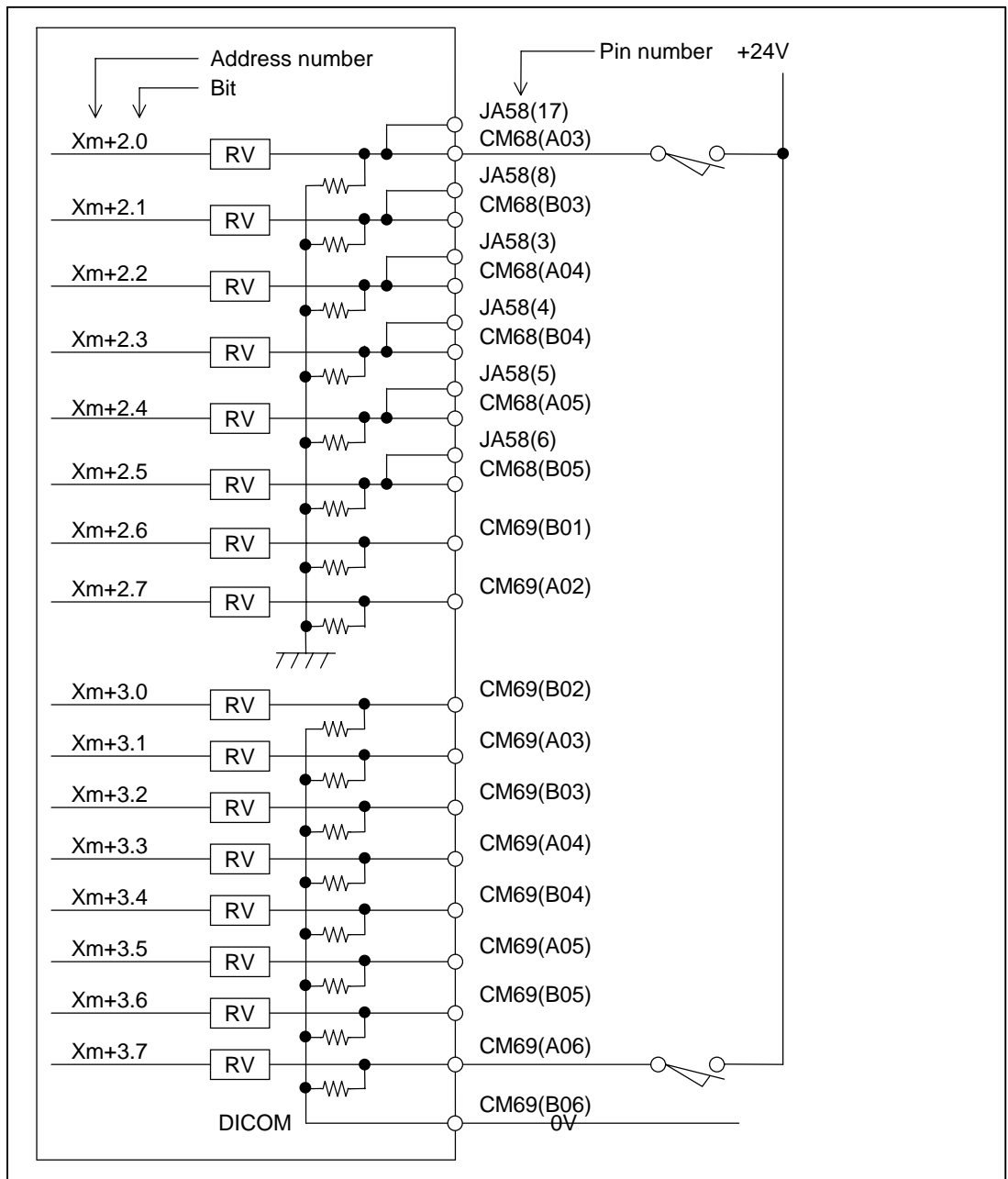
Note) Xm+3.0~3.7 have a common line that is possible to select the source/sink type. If DICOM (CM69-B06pin) is connected to +24V, the DI signal logic is negative. But in this connection, if the DI signal wires happen to drop the ground level, the status of the DI signal is same as the DI signal is "ON". From the safety viewpoint, DICOM should be connected 0V.

Note) From the safety viewpoint, Emergency Stop signal must be assigned on the address Xm+0.0~0.7 or Xm+1.0~1.7 or Xm+2.0~2.7. As refer to the **5. DI/DO mapping**, assign the Emergency stop DI.

Note) Xm+0.0~0.7, Xm+1.0~1.7 and Xm+2.0~0.7 common lines are fixed. So, if these DI pins in this address open, the status of these one stay "0". And in case of Xm+3.0~3.7 which have a selectable common line, if the DICOM(CM69-B06pin) is connected to 0V and these DI pins open, the status of these one stay "0". And if the DICOM are connected to +24V and these DI pins open, the status of these one stay "1". And if the DICOM is not connected to 0V or +24V and these DI pins open, the status of these one don't care.

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3.8 DO (output signal) connection
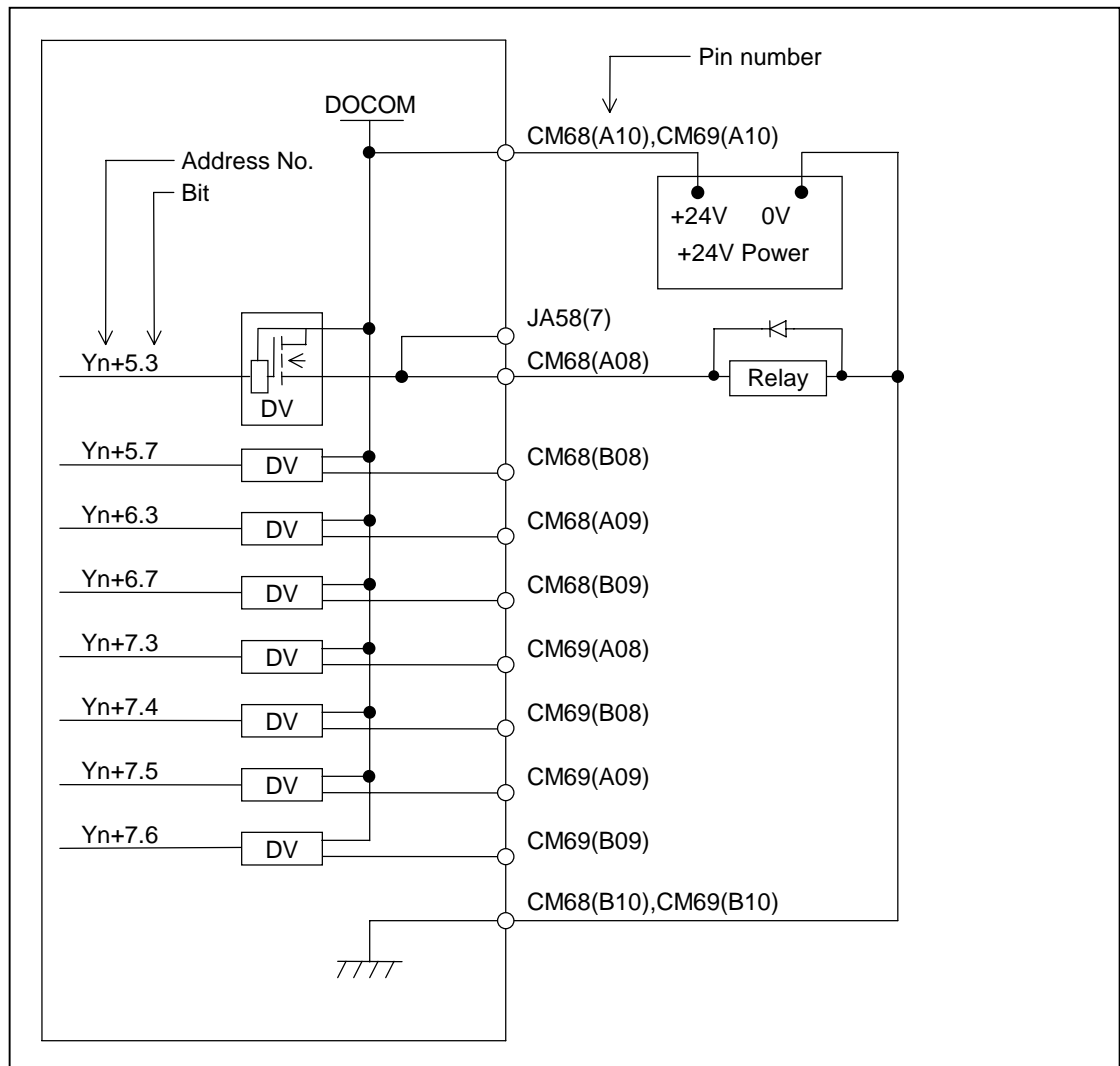
3.9 Manual pulse generator connection

3.9.1 When only the manual pulse generator.

Example of the 3 Manual pulse Generator connection is as follows. i series CNC is only possible to use the MPG interface. If i series CNC uses some I/O unit having MPG interface (ex. Dispersion type I/O module for panel) and this operator's panel, the MPG interface nearest the CNC is only available on the I/O Link connection.

Main panel A/B

JA3
(PCR-E20MDK-SL-A)

1	HA1	11	
2	HB1	12	0V
3	HA2	13	
4	HB2	14	0V
5	HA3	15	
6	HB3	16	0V
7		17	
8		18	+5V
9	+5V	19	
10		20	+5V

3	4	5	6
+5V	0V	HA1	HB1

Manual pulse generator # 1
(M3 Screw)

3	4	5	6
+5V	0V	HA1	HB1

Manual pulse generator # 2
(M3 Screw)

3	4	5	6
+5V	0V	HA1	HB1

Manual pulse generator # 3
(M3 Screw)

Cable   Terminal   Manual pulse generator

Cable		Terminal			Wiring		
HA1	1	7BK		HA1	5	#1	HA1
HB1	2	7WH		HB1	6		HB1
+5V	9	5RD		+5V	3		+5V
0V	12	5BK		0V	4		0V
HA2	3	8RD		HA2	5	#2	HA2
HB2	4	8BK		HB2	6		HB2
+5V	18	4RD		+5V	3		+5V
0V	14	3BK		0V	4		0V
HA3	5	9BK		HA3	5	#3	HA3
HB3	6	9WH		HB3	6		HB3
+5V	20	6RD		+5V	3		+5V
0V	16	1BK		0V	4		0V

Ground   Cable   Wiring
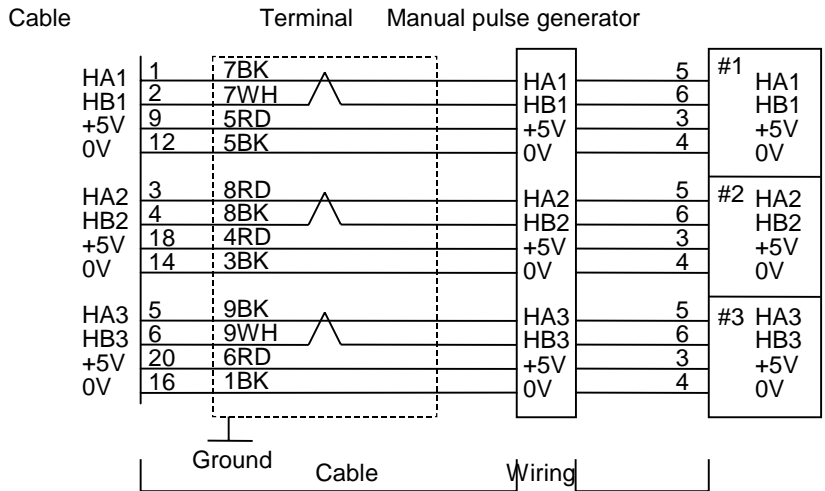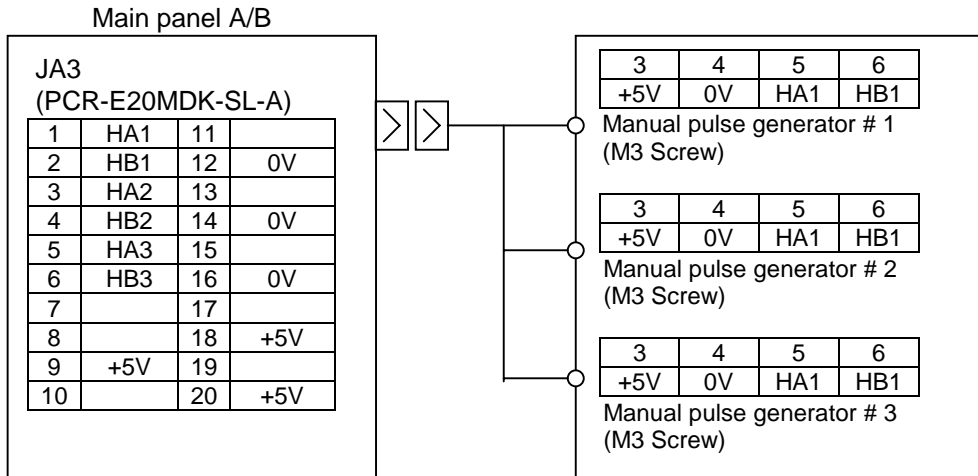
When the depth of the operator's panel is 80mm min.
    Recommended wire material : A66L-0001-0286(#20AWGx6+#24AWGx3pairs)
    Recommended connector : A02B-0120-K303(Including below connector and case)
              (Connector : HIROSE FI40B-2015S Soldering type)
              (Case   : HIROSE FI-20-CV)
    Recommended cable : A02B-0120-K841(7m) (MPG 3 units)
              A02B-0120-K848(7m) (MPG 2 units)
              A02B-0120-K847(7m) (MPG 1 unit)
              (These cables don't include the wiring part in the figure.)

When the depth of the operator's panel is 60mm min.
    Recommended wire material : A66L-0001-0284#10P(#28AWGx10pairs)
    Recommended connector : A02B-0236-K302(Including below connector and case)
              (Connector : HIROSE FI30-20S Stand wire press-mount type)
              (Case   : HIROSE FI-20-CV7)

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Note) Calculate the MPG cable max. Length as refer to the following calculation.

MPG needs a DC5V power supply and the voltage must be less than 0.2V dropping.
(the 0.2V dropping includes the resistance in the cable.)

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

Because

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

0.1 : MPG power supply current 0.1A
R   : Resistance per wire length(/m)
m   : Wire Number(Both 0V and 5V)
L   : Cable length(m)

Example: In case of cable A66L-0001-0286
It has 3 pairs signal wires and 6 power line wires(20/0.18, 0.0394 /m).
If the cable is used and each 3 wires are used for 0V and 5V power line, then
max. cable length is as follows.

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

The answer is 76.75m, if MPG unit is 1.
(But FANUC decide any cable must be less than 50m.)
The answer is 38.37m, if MPG units are 2.
The answer is 25.58m, if MPG units are 3.

And In case of cable A66L-0001-0284#10P
The answer is 12.88m, if MPG units are 1.
The answer is 6.44m, if MPG units are 2.
The answer is 4.29m, if MPG units are 3.

If the customer will use a some other vender's MPG ,not FANUC's MPG, the electrical
condition must be as follows.

HAn, HBn signals form MPG and CNC internal pulse are as follows. A cycle of the HA/HB
pulse T_1 must be more than 200μsec and $4/T_1$ must be more than 50μsec.
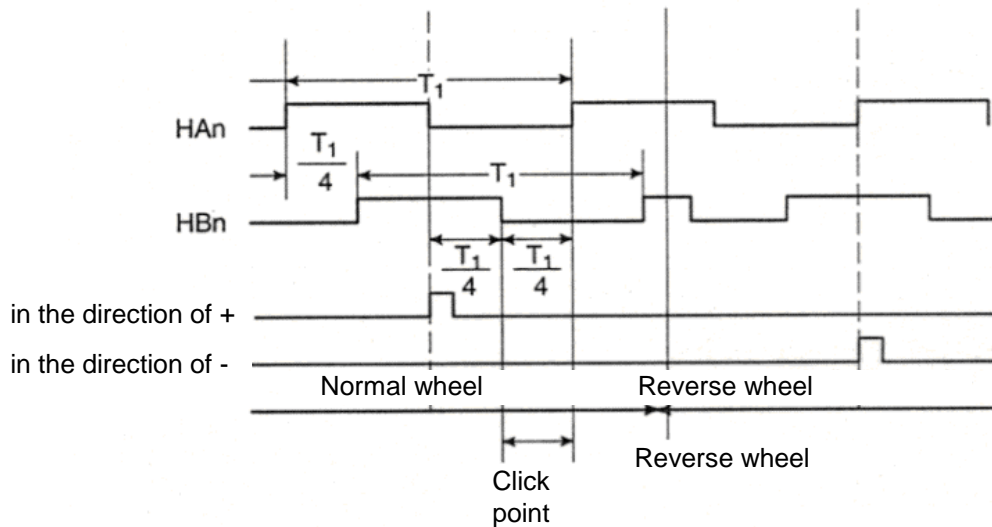
				TITLE Machine operator's panel connection manual		
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And the receiver circuit is as follows.
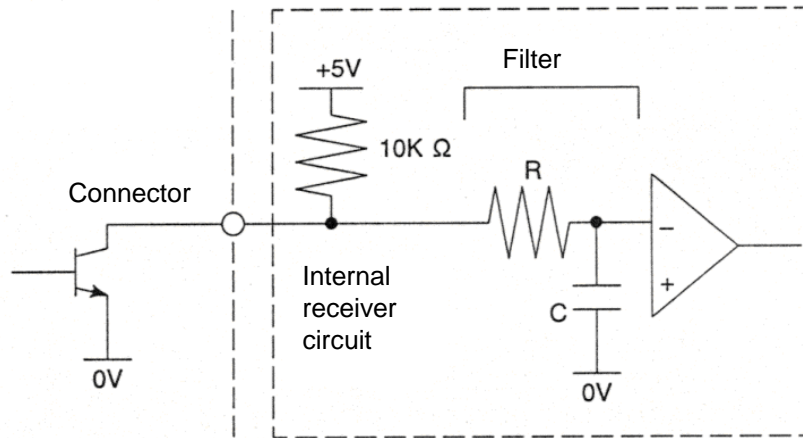
V_{IH}, V_{IL} level at Connector pin
If Vin low to high, V_{IH} must be higher than 3.7V.
If Vin high to low, V_{IL} must be lower than 1.5V.

3.9.2   When a pendant-type manual pulse generator
When a pendant-type manual pulse generator with including axis selection and multiplier setting functions is connected.
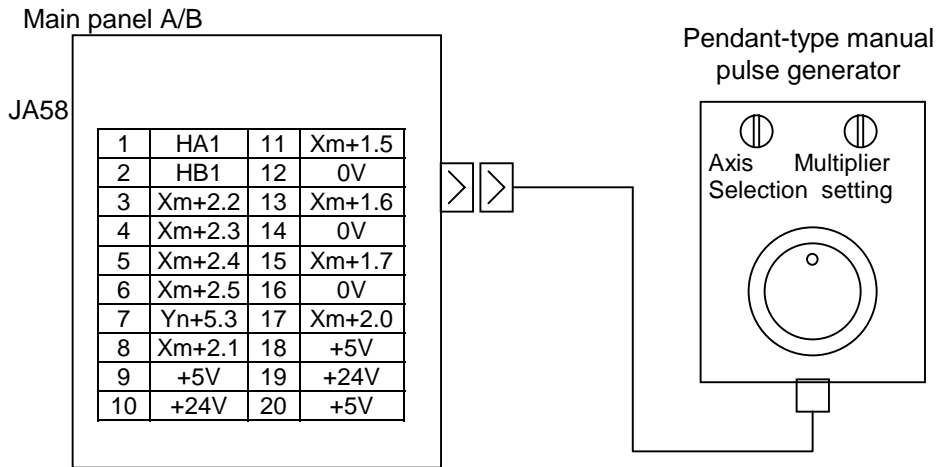
Recommended wire material : A66L-0001-0284#10P(#28AWGx10pairs)

Note) When Xm+1.5~Xm+2.5 of connector JA58 are allocated as the Dis used for the axis selection and multiplier setting, Xm+1.5~Xm+2.5 of connector CM68 cannot be used.

Note) One DO is available for the manual pulse generator side at the user's direction. When this is used, Yn+5.3 of CM68 cannot be used, as in the case for DIs above.

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3.10   Connector (on the cable side) specifications.

Connector	Maker Specification		Order specification
JD1A, JD1B, JA3, JA58 (Operator's panel depth=60mm min.)	Stand wire press-mount type	Hirose FI30-20S (Connector) FI-20-CV7 (Case)	A02B-0236-K302
JD1A, JD1B, JA58 (Operator's panel depth=80mm min.)	Soldering type	Honda PCR-E20FS (Connector) PCR-V20LA (Case)	A02B-0120-K301
		Hirose FI40B-20S (Connector) FI-20-CV2 (Case)	
	Stand wire press-mount type	Honda PCR-E20FA (Connector) PCR-V20LA (Case)	A02B-0120-K302
		Hirose FI30-20S (Connector) FI-20-CV2 (Case)	
JA3 (Operator's panel depth=80mm min.)	Soldering type	Hirose FI40B-2015S (Connector) FI-20-CV (Case)	A02B-0120-K303
CNK1	Stand wire press-mount type	Hirose FI30-20S (Connector) FI-20-CV7 (Case)	A02B-0236-K302
CA64 (IN), CA64 (OUT)	AMP 1-178288-3 (Housing) 1-175218-5 (Contact)		A02B-0120-K324
CM67	AMP 178289-5 (Housing) 1-175218-5 (Contact)		A02B-0236-K312
CM68, CM69	AMP 178289-8 (Housing) 1-175218-5 (Contact)		A02B-0236-K313
CM65, CM66	Hirose HIF3BA-10D-2.54R		A02B-0236-K314
CA65	Hirose HIF3BA-20D-2.54R		A02B-0120-K343
CA55	JAV LY10-DC10 (Housing) LY10-C2-3 (Contact)		A02B-0236-K303

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4. DI/DO address

4.1 Keyboard of Main panel

• DI/DO address of Keyswitches and LED on the keyboard of Main panel A/B/A1/B1 are as follows.

Key/LED BIT	7	6	5	4	3	2	1	0
Xm+4/Yn+0	B4	B3	B2	B1	A4	A3	A2	A1
Xm+5/Yn+1	D4	D3	D2	D1	D4	C3	C2	C1
Xm+6/Yn+2	A8	A7	A6	A5	E4	E3	E2	E1
Xm+7/Yn+3	C8	C7	C6	C5	B8	B7	B6	B5
Xm+8/Yn+4	E8	E7	E6	E5	D8	D7	D6	D5
Xm+9/Yn+5		B11	B10	B9		A11	A10	A9
Xm+10/Yn+6		D11	D10	D9		C11	C10	C9
Xm+11/Yn+7						E11	E10	E9

Keyswitches/LED position
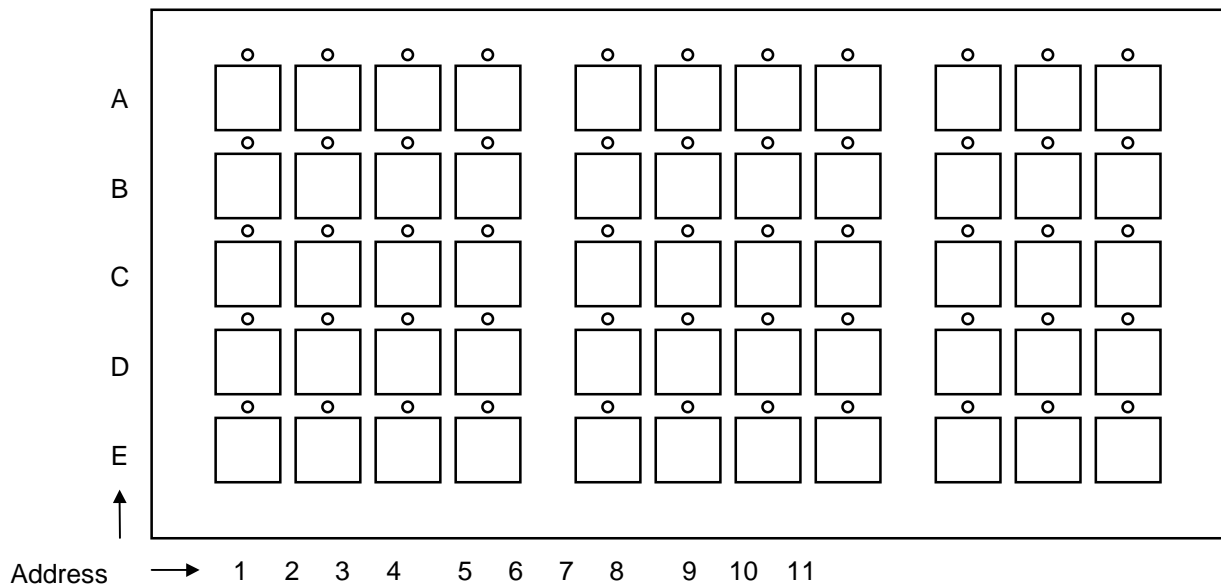
Address → 1 2 3 4   5 6 7 8   9 10 11

EDIT	DATE	DESIG.	DESCRIPTION	TITLE Machine operator's panel connection manual		
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4.2 Override signals

Table of gray code output is as follows when the Sub panel A/B/B1/C is used

Rotary switch (SA1)

%	0	1	2	4	6	8	10	15	20	30	40	50	60	70	80	90	95	100	105	110	120
Xm+0.0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
Xm+0.1	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1
Xm+0.2	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1
Xm+0.3	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Xm+0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Xm+0.5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0

Note) Xm+0.5 is a parity bit.

Rotary switch (SA2)

%	50	60	70	80	90	100	110	120
Xm+0.6	0	1	1	0	0	1	1	0
Xm+0.7	0	0	1	1	1	1	0	0
Xm+1.0	0	0	0	0	1	1	1	1
Xm+1.1	0	0	0	0	0	0	0	0
Xm+1.2	0	0	0	0	0	0	0	0
Xm+1.3	0	1	0	1	0	1	0	1

Note) Xm+1.3 is a parity bit.
Note) There is no Rotary switch(SA2) of Sub panel B/C.

5. DI/DO mapping

I/O address map is as follows.

DI map

Xm+0	General-purpose DI/DO
Xm+1	
Xm+2	
Xm+3	
Xm+4	Keyboard of Main panel (Keyswitches)
Xm+5	
Xm+6	
Xm+7	
Xm+8	
Xm+9	
Xm+10	
Xm+11	
Xm+12 (1st MPG)	MPG
Xm+13 (2nd MPG)	
Xm+14 (3rd MPG)	
Xm+15	Reserve

DO map

Yn+0	Keyboard (LED) Include general-Purpose DO
Yn+1	
Yn+2	
Yn+3	
Yn+4	
Yn+5	
Yn+6	
Yn+7	

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DI mapping should be assigned 1 group = 16 byte mapping and DO mapping should be assigned 1 group = 8 byte mapping. The reason is as follows.
 MPG interface(the counter for MPG) uses Xm+12~Xm+14 area and it is fixed. And if MPG interface will be used, Xm+12~Xm+14 area must be assigned. therefore, in case of i series and using MPG interface, DI mapping must be assigned 16 byte mapping. MPG counter area are directly processed by CNC software. So you must not use this area by customer ladder.
 It is possible to assign any address for this operator's panel. But in DI address, each CNC have some fixed address that is directly processed by CNC software. So, as refer to the following mention,assign the DI mapping.

Directly processed address by CNC (in case of FS16I, 18i, 21i)

	7	6	5	4	3	2	1	0
X0004	SKIP#1	ESKIP SKIP6#1	-MIT2#1 SKIP5#1	+MIT2#1 SKIP4#1	-MIT1#1 SKIP3#1	+MIT1#1 SKIP2#1	ZAE#1 SKIP8#1	XAE#1 SKIP7#1
	SKIP#1	ESKIP SKIP6#1	SKIP5#1	SKIP4#1	SKIP3#1	ZAE#1 SKIP2#1	YAE#1 SKIP8#1	XAE#1 SKIP7#1
X0005								
X0006								
X0007		*DEC7#2	*DEC6#2	*DEC5#2	*DEC4#2	*DEC3#2	*DEC2#2	*DEC1#2
X0008				*ESP				
X0009		*DEC7#1	*DEC6#1	*DEC5#1	*DEC4#1	*DEC3#1	*DEC2#1	*DEC1#1
X0010								
X0011								
X0012								
X0013	SKIP#2	SKIP6#2	-MIT2#2 SKIP5#2	+MIT2#2 SKIP4#2	-MIT1#2 SKIP3#2	+MIT1#2 SKIP2#2	ZAE#2 SKIP8#2	XAE#2 SKIP7#2
	SKIP#2	SKIP6#2	SKIP5#2	SKIP4#2	SKIP3#2	ZAE#2 SKIP2#2	YAE#2 SKIP8#2	XAE#2 SKIP7#2

#1 means the signales in 1st path. #2 means the signals in 2nd path. And up column means the T series signals and down column means the M series signals.

Ex. In case of 16 byte mapping start from X0006 for DI area.

X0006	General-purpose DI
X0007	
X0008	
X0009	
X0010	Keyboard of Main panel (Keyswitches)
X0011	
X0012	
X0013	
X0014	
X0015	
X0016	
X0017	
X0018 (1st MPG)	MPG
X0019 (2nd MPG)	
X0020 (3rd MPG)	
X0021	Reserve

*DECn#2 Fixed signals ← (pointing to X0007)
*ESP Fixed signal ← (pointing to X0008)
*DECn#1 Fixed signals ← (pointing to X0009)

 In case of mapping start from X0006, *DECn#1 and *DECn#2 singals which are address fixed signals can be used any time. And *ESP signal can be placed at +24V common fixed address.
 But SKIP signals can not be used.
 Don't map the *ESP signal matrix DI area.
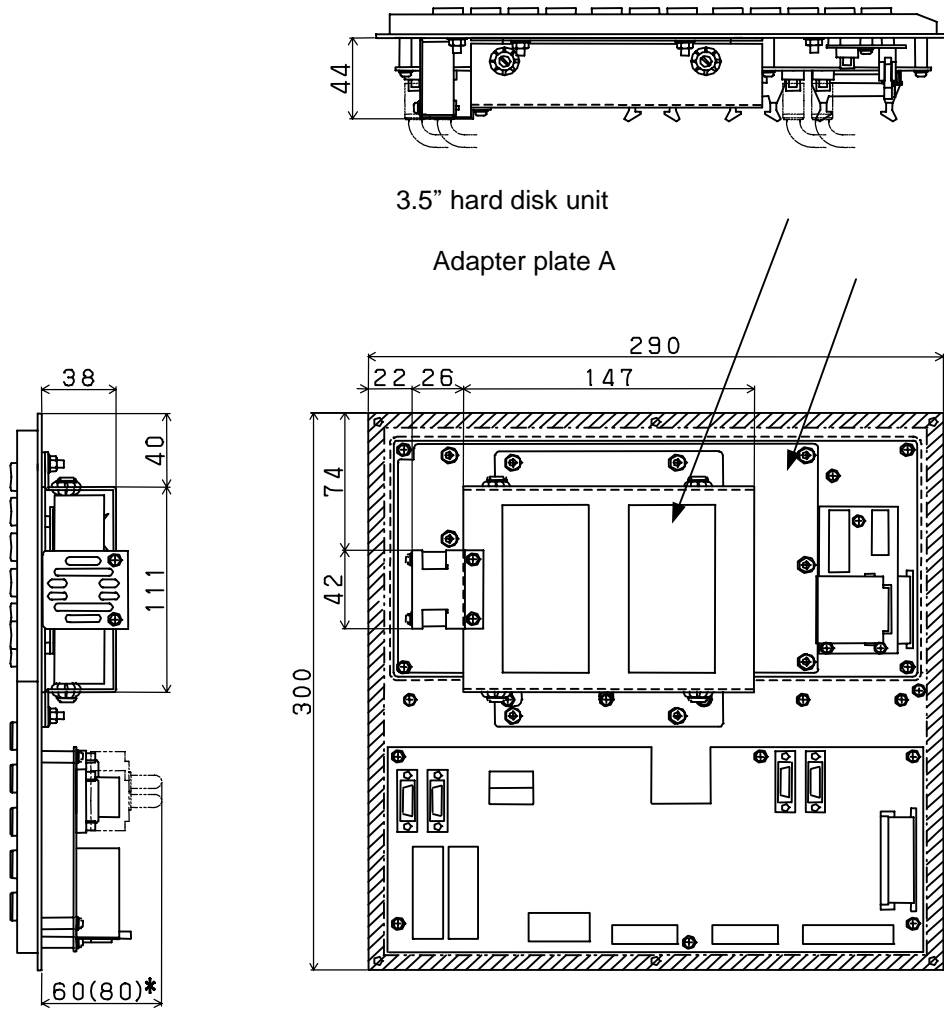
6. Outline
6.1 Outline of Main panel A

Note)
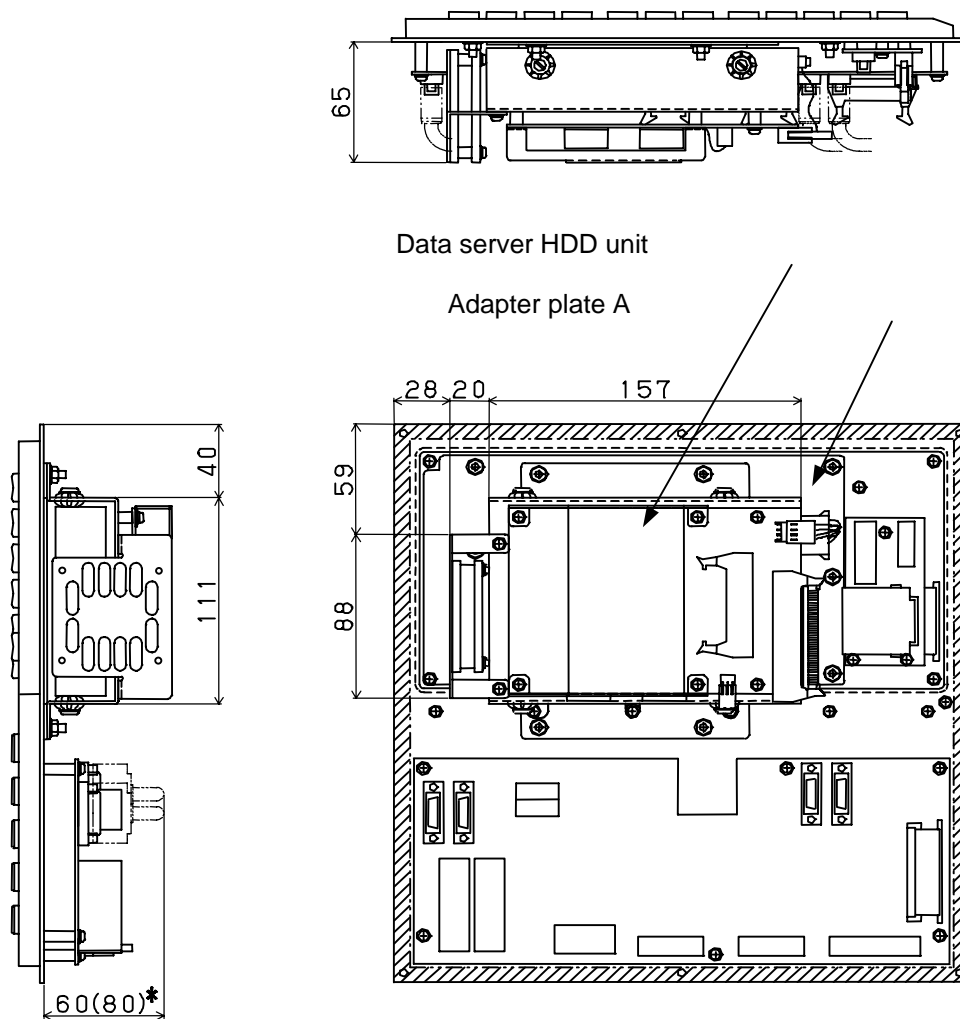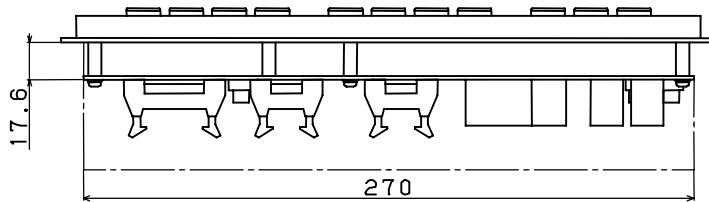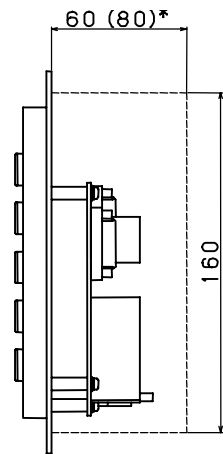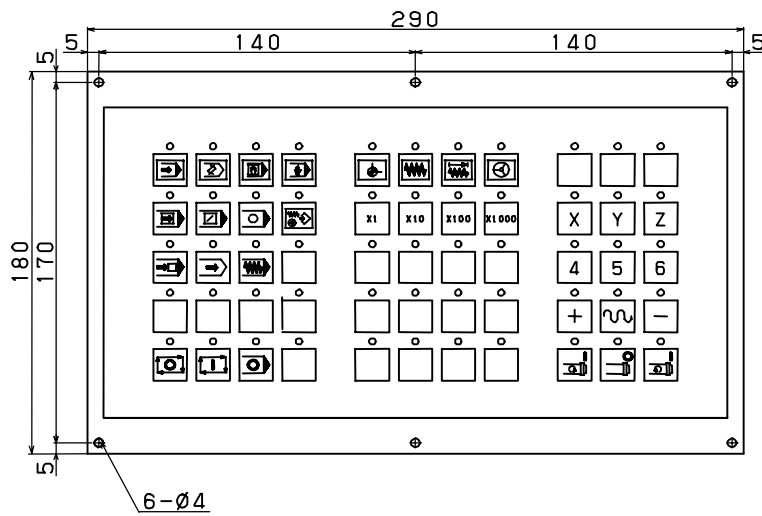When a low screw-fixing housing "HIROSE FI-20-CV7" is used, the depth is 60mm.
When a usual housing is used, the depth is 80mm.
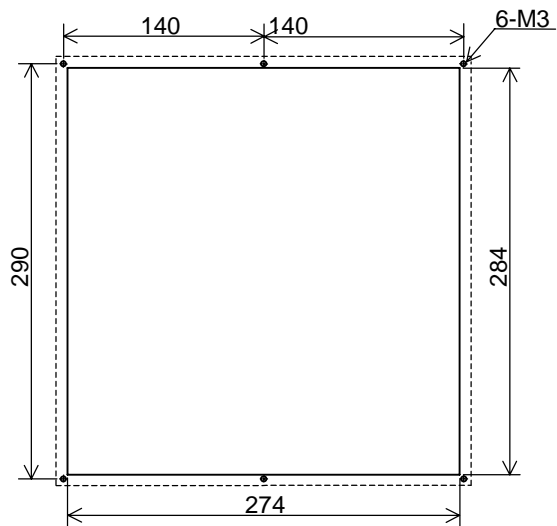
Panel cut drawing
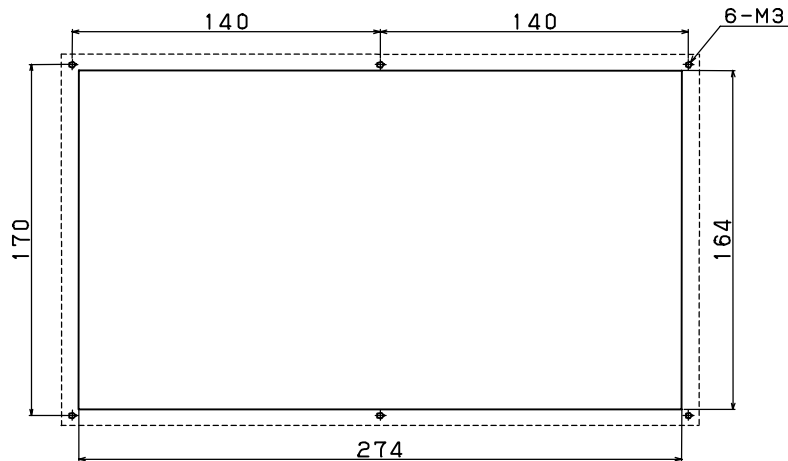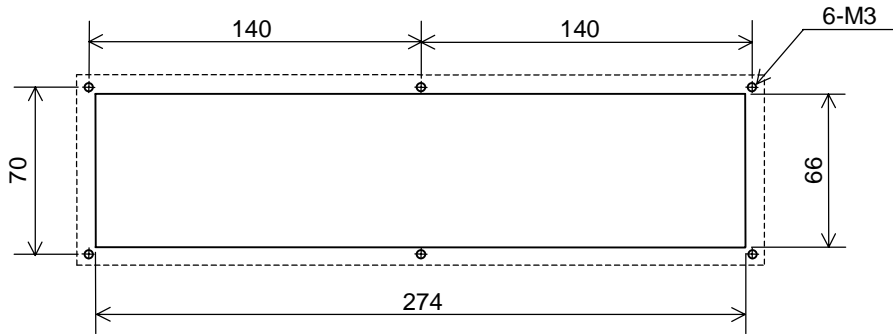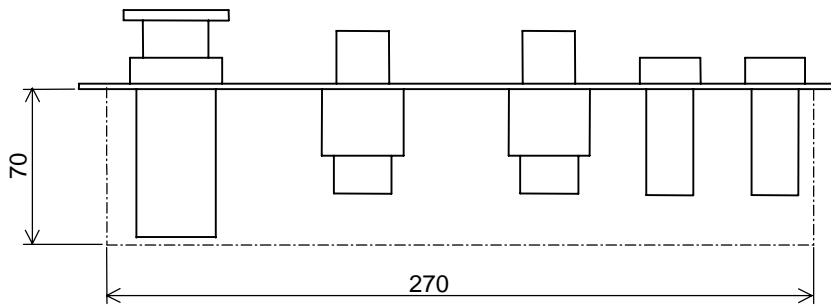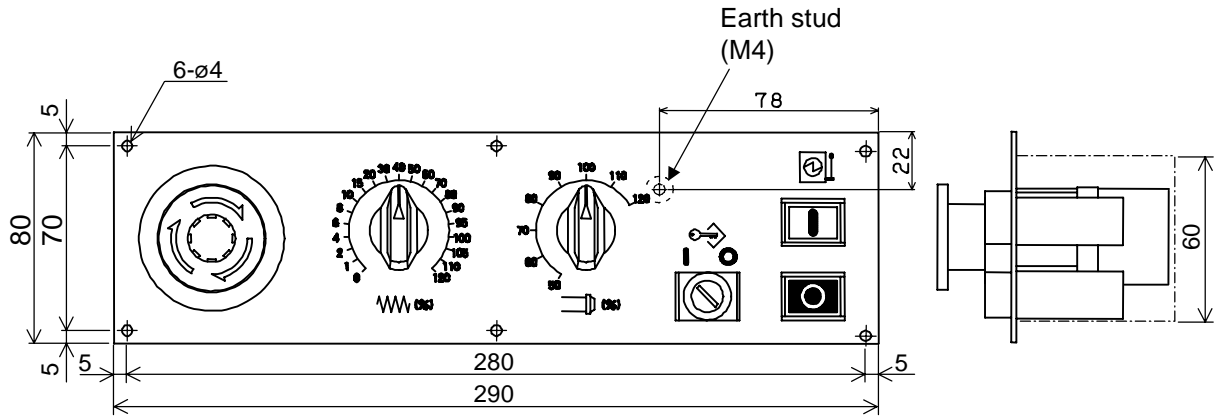
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6.1.1 Outline of Main panel A/A1
(with 3.5" hard disk unit + PC interface connection unit + ISA expansion unit)
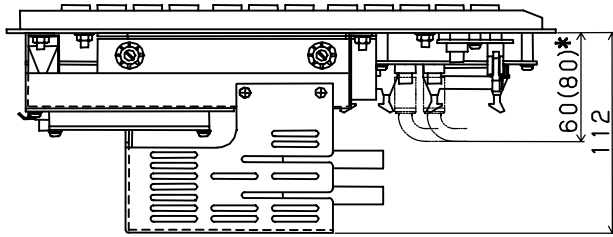
Note)
When a low screw-fixing housing "HIROSE FI-20-CV7" is used, the depth is 60mm.
When a usual housing is used, the depth is 80mm.

Unit=mm
3.5" hard disk unit
+
PC interface connection unit
+
ISA expansion unit

Adapter plate A
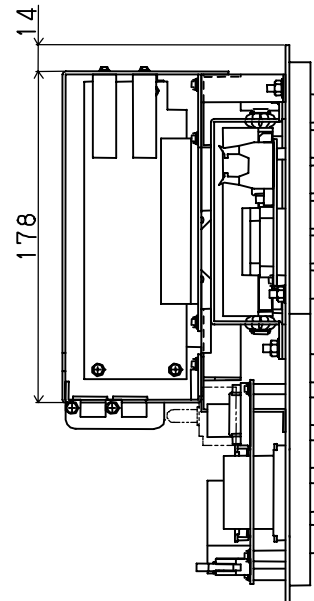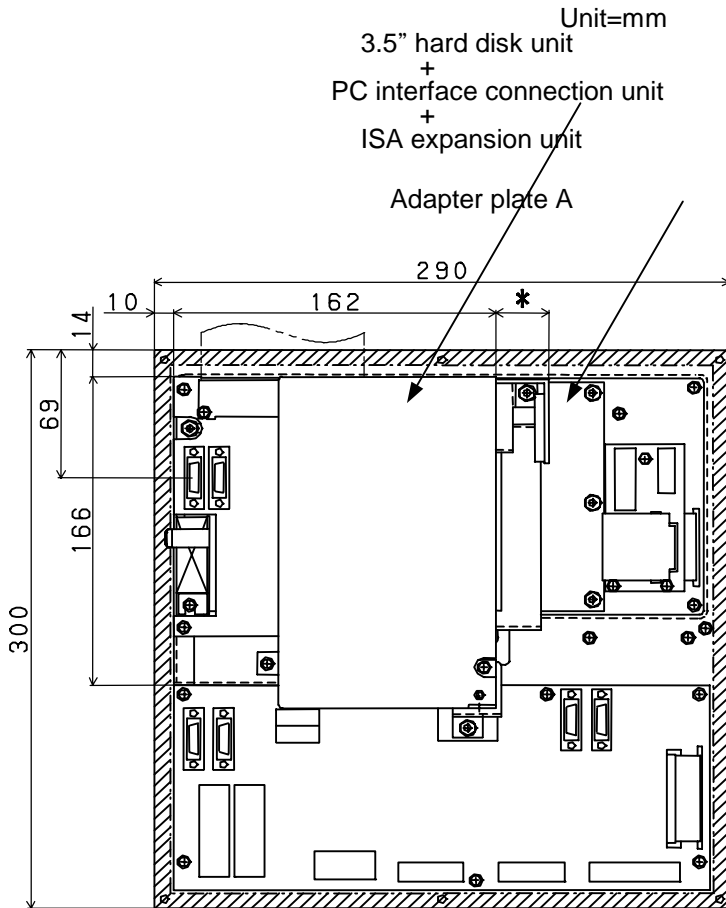
* Dependent on the used ISA board, and the connected cable.

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6.1.2 Outline of Main panel A/A1 (with 3.5" hard disk unit)

3.5" hard disk unit

Adapter plate A

290

22 26   147

38

40

74

111

42

300

60(80)*

* When a low screw-fixing housing "HIROSE FI-20-CV7"
  is used, the dimension is 60mm. When a usual housing
  is used, the dimension is 80mm.

44

				TITLE Machine operator's panel connection manual		
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6.1.3 Outline of Main panel A/A1 (with data server HDD unit)

65

Data server HDD unit

Adapter plate A

40

111

28 20 157

59

88

60(80)*

* When a low screw-fixing housing "HIROSE FI-20-CV7"
  is used, the dimension is 60mm. When a usual housing
  is used, the dimension is 80mm.

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				TITLE Machine operator's panel connection manual		
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6.1.4 Outline of Main panel A/A1 (with back up unit)
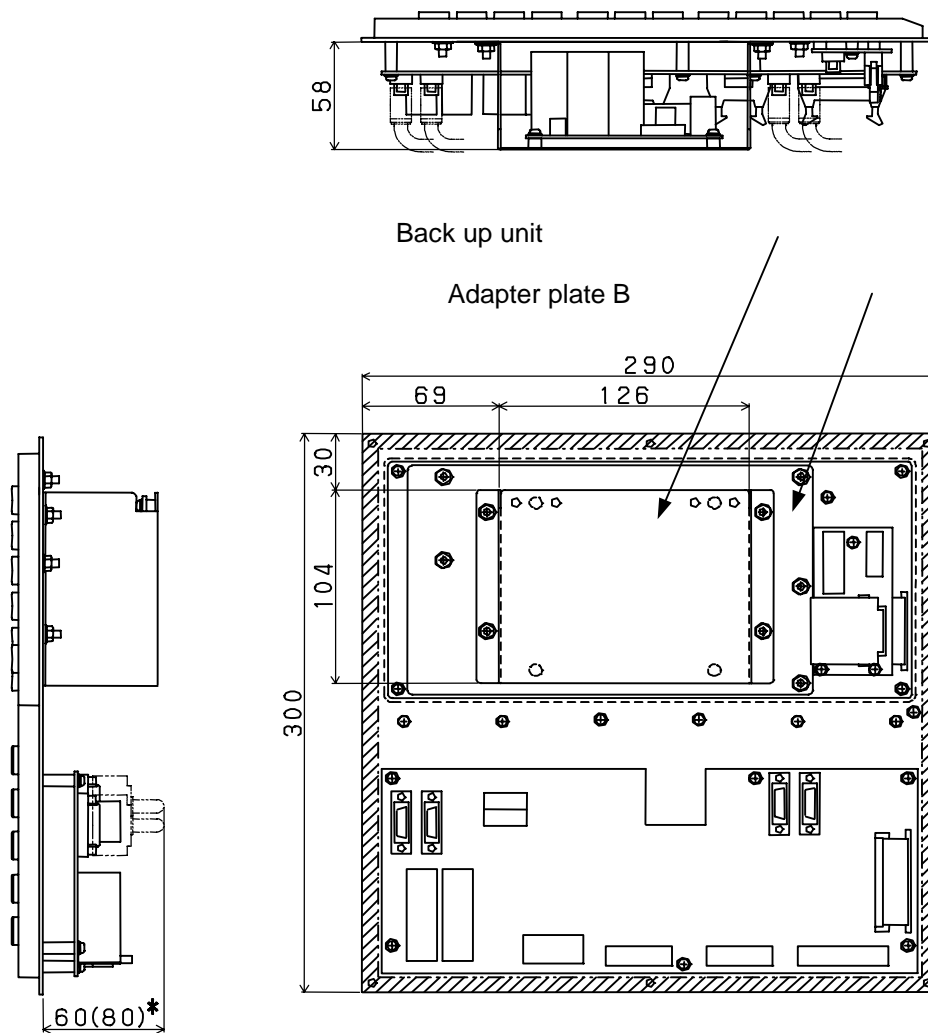
Back up unit

Adapter plate B

290

69   126

30

104

300

58

60(80)*

* When a low screw-fixing housing "HIROSE FI-20-CV7"
  is used, the dimension is 60mm. When a usual housing
  is used, the dimension is 80mm.

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6.2 Outline of Main panel B

290
140
140
5
5
5
180
170
5
6-Ø4

60 (80)*
160

17.6
270

Unit=mm

Note)
When a low screw-fixing housing
"HIROSE FI-20-CV7" is used, the
depth is 60mm.
When a usual housing is used,
the depth is 80mm.

140
140
6-M3
170
164
274

Panel cut drawing

6.3 Outline of Sub panel A
.

Earth stud
(M4)

6-ø4

78

5

80 70

22

60

5 5

280

5

290

70

270

140

140

6-M3

70

66

274

Panel cut drawing

Unit=mm

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6.4 Outline of Sub panel B.
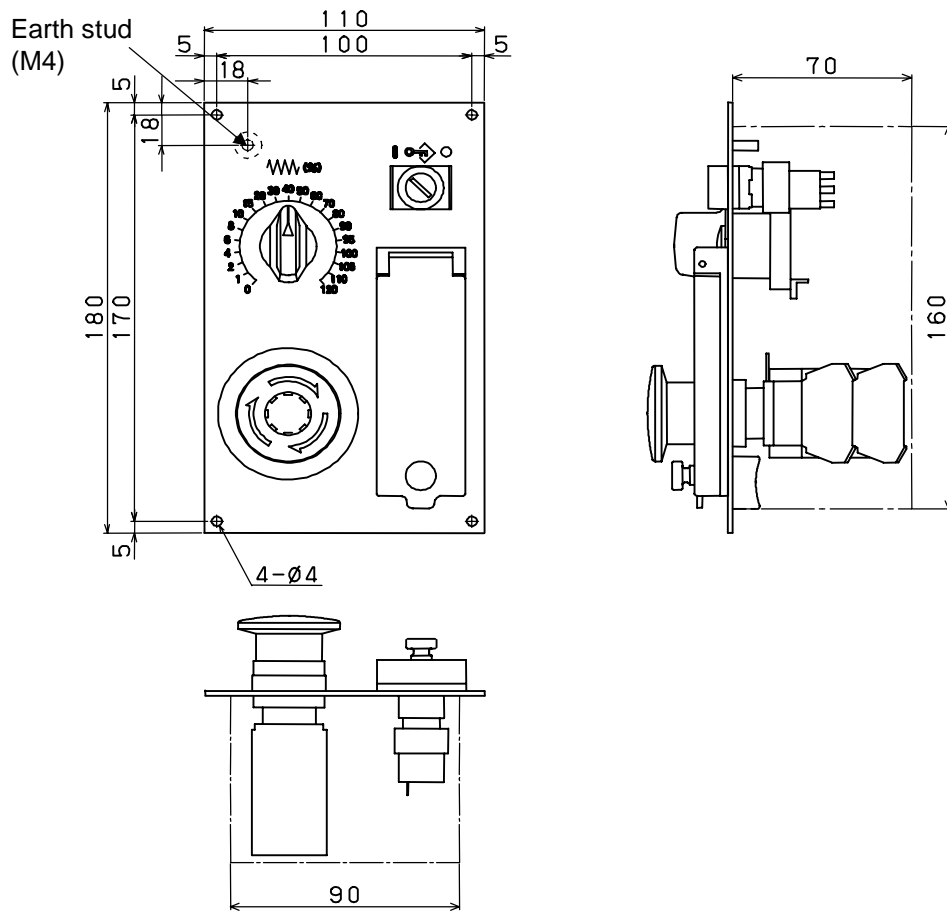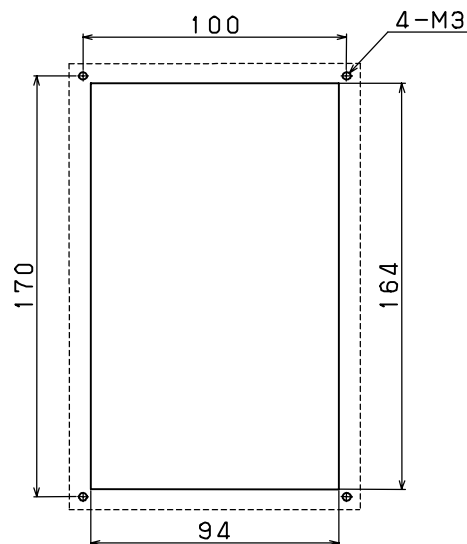
Earth stud
(M4)

110
100
5 _ _ 5
18

5
18

180
170

5

4-Ø4

70

160

90

Unit=mm

100
4-M3

170

164

94

Panel cut drawing

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6.5 Outline of Sub panel C.
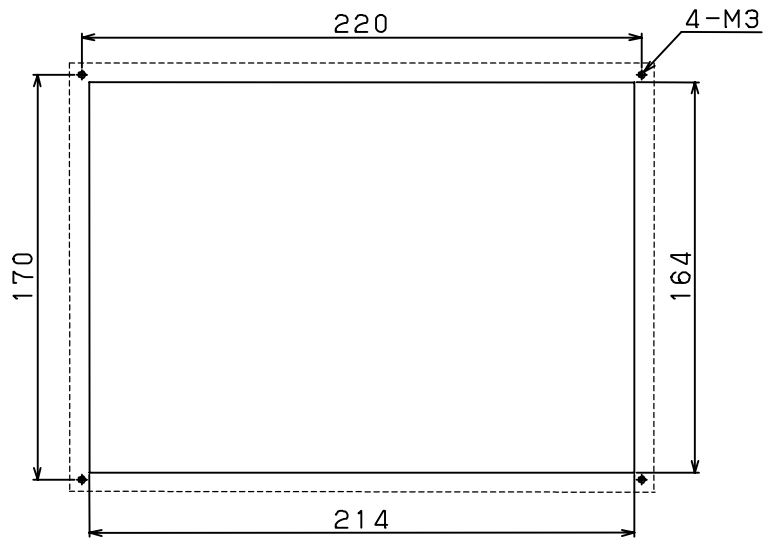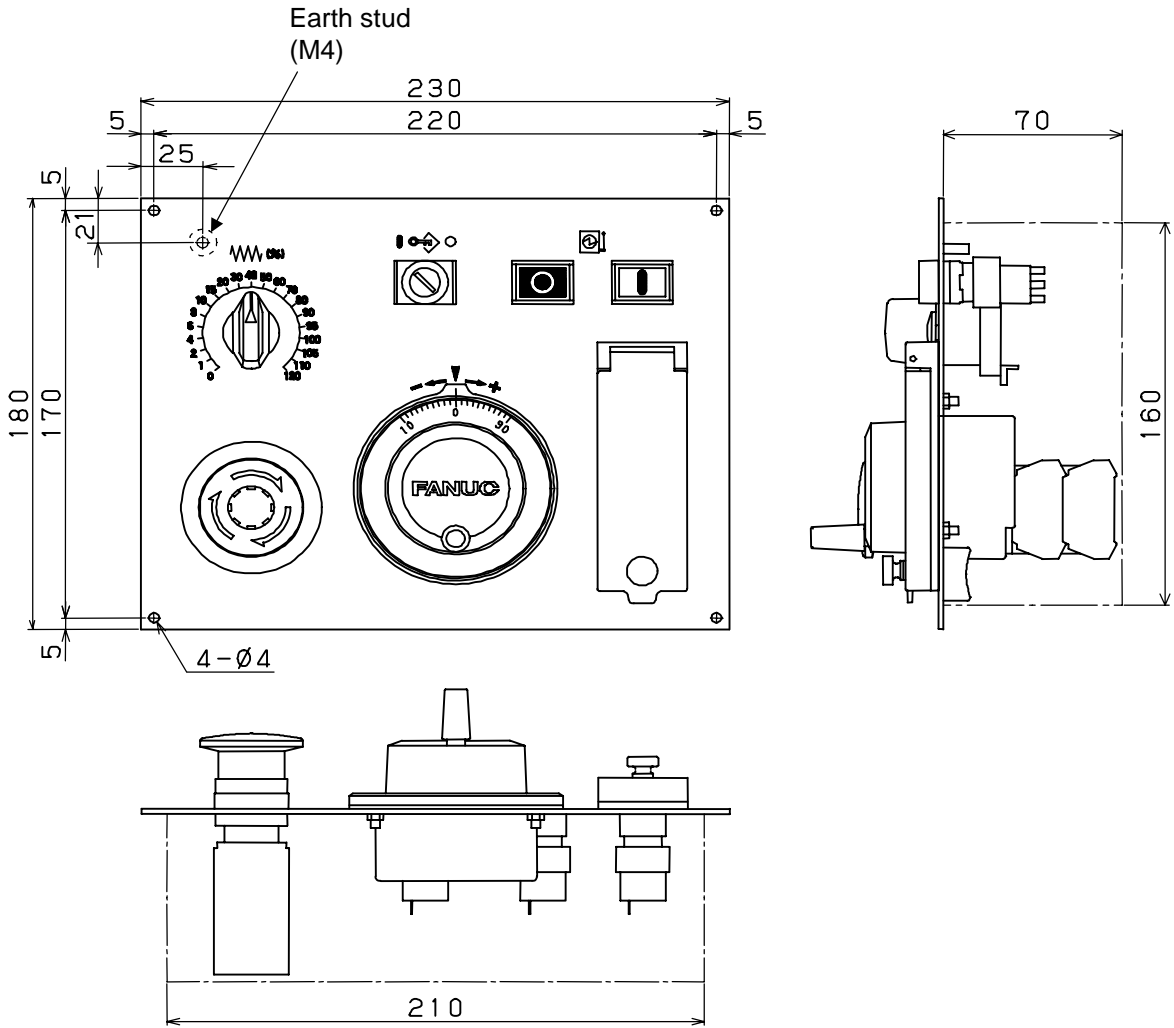
Earth stud
(M4)

230
220
5
5
25
5
21
180
170
5

WWW (M4)

4−Ø4

FANUC

70
160

210

220
4−M3

170
164

Unit=mm

214

Panel cut drawing

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6.6 Connector locations of Main panel A/A1.
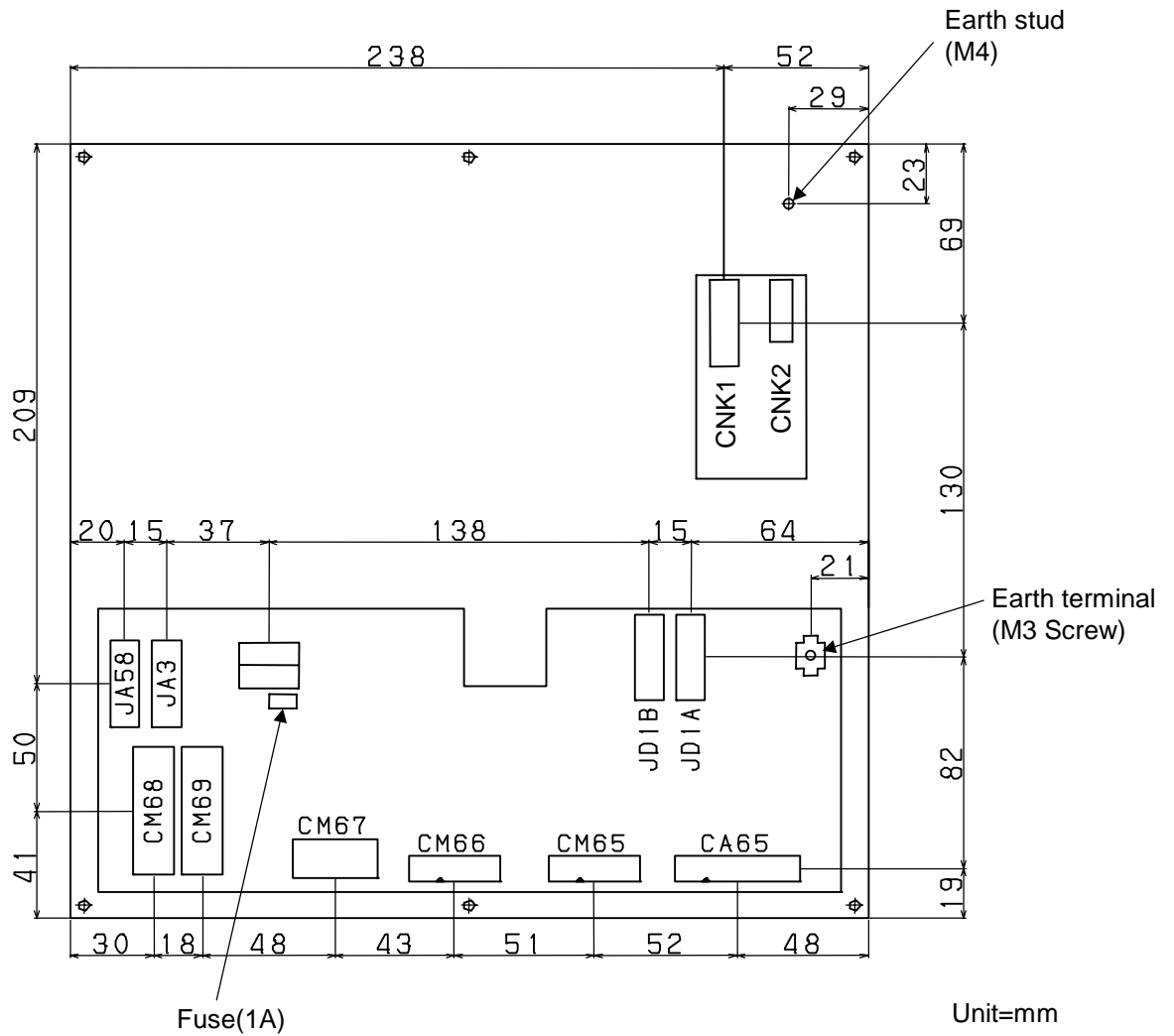
238

52

29

Earth stud
(M4)

23

69

209

CNK1

CNK2

130

20 15 37

138

15

64

21

Earth terminal
(M3 Screw)

JA58

JA3

JD1B

JD1A

50

82

CM68

CM69

CM67

CM66

CM65

CA65

41

19

30   18   48   43   51   52   48

Fuse(1A)

Unit=mm

View from rear side

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6.7 Connector locations of Main panel B/B1.
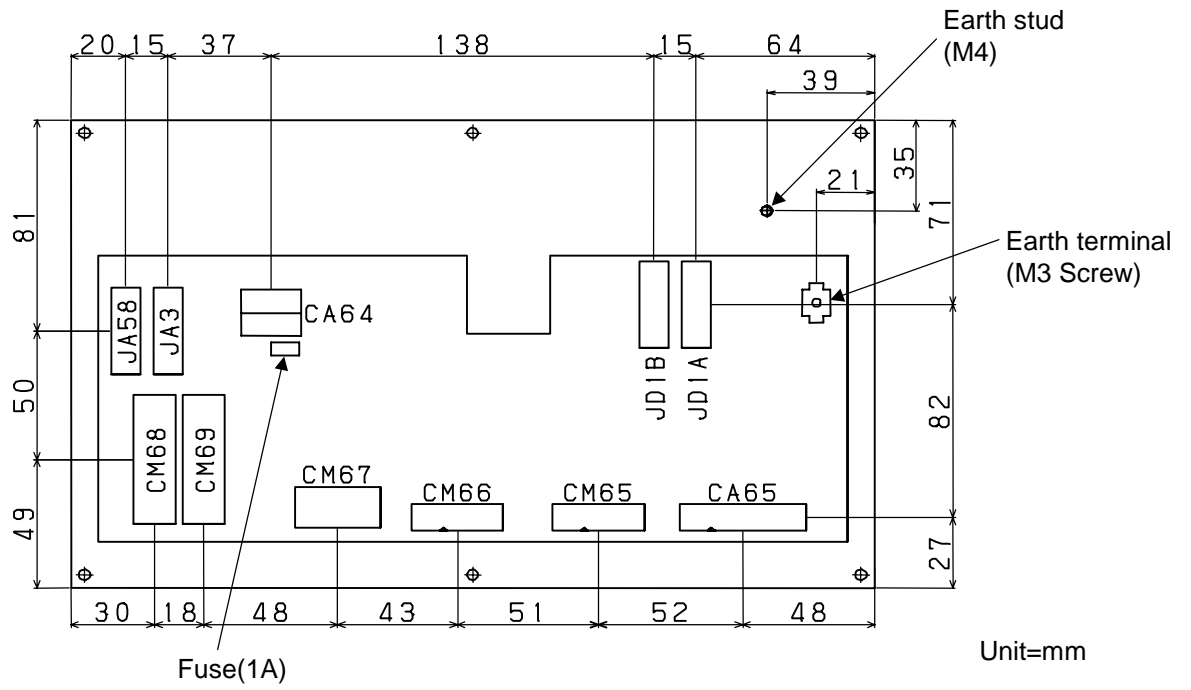
Earth stud (M4)

Earth terminal (M3 Screw)

20 15   37   138   15   64

39

35

81

JA58 JA3   CA64

JD1B JD1A

50

71

49

CM68 CM69

CM67   CM66   CM65   CA65

82

27

30 18   48   43   51   52   48

Fuse(1A)

Unit=mm

View from rear side

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				TITLE Machine operator's panel connection manual		
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				FANUC LTD	SHEET	30 / 42

6.8 Outline of Sub panel B1.

Earth stud
(M4)

110
100
5   5
43
19
5
5
180
170

70

160

4-Ø4

90

Unit=mm

100
4-M3

170

164

94

Panel cut drawing

6.9 Outline of Main panel A1.

Note)
When a low screw-fixing housing "HIROSE FI-20-CV7" is used, the depth is 60mm.
When a usual housing is used, the depth is 80mm.

Panel cut drawing

Unit=mm

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6.10 Outline of Main panel B1.

Note)
When a low screw-fixing housing "HIROSE FI-20-CV7" is used, the depth is 60mm.
When a usual housing is used, the depth is 80mm.

Unit=mm
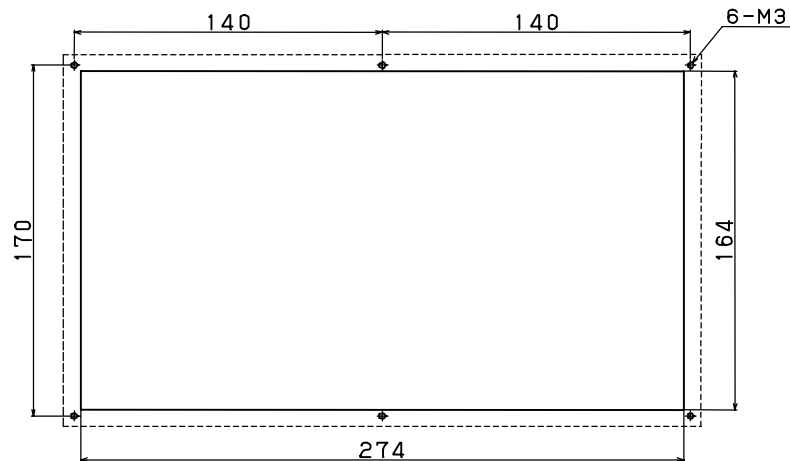
Panel cut drawing

				TITLE Machine operator's panel connection manual		
04	00.07.10	Tsurutani	This page is added.	DRAW NO A-80502E		CUST
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7. Specifications

7.1 Environmental Requirement

Temperature Around a unit	At operation 0°C~55°C Storing or transporting -20°C~60°C
Temperature variance	Max. 1.1°C/min
Humidity	Normally 75% or less (Relative humidity) Short time(Within one month) 95% or less (Relative humidity)
Vibration	Operating 0.5G or less
Atmosphere	Normal FA atmosphere(Consult us when using the system under environments with higher degree of dust, coolant, or organic solution.)

7.2 Order specification

	Name	Specification	Note
	Machine operator's panel Main panel A	A02B-0236-C230	Symbol key
	Machine operator's panel Main panel B	A02B-0236-C231	Symbol key
④	Machine operator's panel Main panel A1	A02B-0236-C240	English key
④	Machine operator's panel Main panel B1	A02B-0236-C241	English key
	Machine operator's panel Sub panel A	A02B-0236-C232	
	Machine operator's panel Sub panel B	A02B-0236-C233	
	Machine operator's panel Sub panel C	A02B-0236-C234	
③	Machine operator's panel Sub panel B1	A02B-0236-C235	
	Adapter plate A (Note)	A02B-0236-J410	3.5" HDD unit (A02B-0236-J266 or A02B-0236- J267 or A13B-0178-H031) PC interface connection unit (A02B-0236-J268) ISA extension unit (A02B-0236-J269) Data server HDD unit (A02B-0236-J118)
	Adapter plate B (Note)	A02B-0236-J411	Backup unit (A02B-0269-H051)
	Set of transparent key tops	A02B-0236-K170	55 key tops
	Set of blank key tops	A02B-0236-K171	55 key tops
	Set of symbolic key tops	A02B-0236-K172	With laser marking (34 symbol key tops + 21 blank key tops)
	Fuse(Spare part)	A03B-0815-K001	1A

Note) Adapter plate A and B are unnecessary when Main panel B is used,

7.3 Main panel A/B/A1/B2 specification

Item	Specification	Note
General-purpose DI points	32 points	24V type input
General-purpose DO points	8 points	24V type output
Keyswitches of MDI	65 keys	Full alphabet key (Only Main panel A)
Keyswitches of Machine operator's panel	55 keys	Matrix DI
LED	Color : Green	Attached to all keyswitches, Matrix DO
MPG interface	Max. 3 units	Only available for i series.
Interface to CNC	FANUC I/O Link connection	Max. 16 modules or total points max. 1024/1024 will be available.

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7.4 Sub panel A/B/B1/C specification

Item	Specification				Note
	Sub panel A	Sub panel B	③ Sub panel B1	Sub panel C	
Override rotary switch	2	1	2	1	5 bit Gray code output (with a parity bit)
Emergency stop switch	1	1	1	1	Number of Contact : 4 (NO x 2, NC x 2) M3.5 Screw
Program protect key	1	1	1	1	
ON/OFF switch	ON/OFF	-	-	ON/OFF	
MPG	-	-	-	1	

7.5 Power supply specification

Voltage	Capacity	Note
DC24V±10% (from Power connector CA64, including momentary values)	0.4A	Including all DI consumption

7.6 General-purpose DI signal definition

Capacity	DC30V, 16mA or more
Interconnect leakage current in closed circuit	1mA or less(at 26.4V)
Interconnect voltage drop in closed circuit	2V or less(including the voltage drop in the cables)
Delay time	Receiver delay : Max. 2ms Need to consider about the serial communication (I/O Link) delay between CNC and operator's panel 2ms(MAX)+Scan cycle of ladder(Scan cycle is different each CNCs).
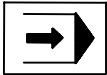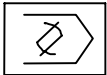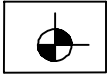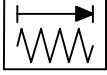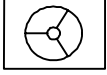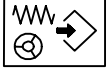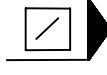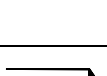
7.7 General-purpose DO signal definition

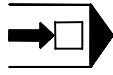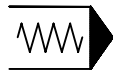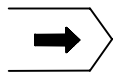| Maximum load current in ON state	200mA or less
Saturation voltage in ON state	Max. 1V (When load current is 200mA)
Withstand voltage	24V±20% or less (including momentary values)
Leakage current in OFF state	20mA or less
Delay time	Driver delay : Max. 50 s Need to consider about the serial communication (I/O Link) delay between CNC and operator's panel 2ms(MAX)+Scan cycle of ladder(Scan cycle is different each CNCs).

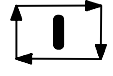| EDIT	DATE	DESIG.	DESCRIPTION	TITLE Machine operator's panel connection manual		
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8. Key symbol indication on machine operator's panel

8.1 Meaning of key symbols

|	Symbol	English④	Meaning of key
	→	AUTO	AUTO mode selection signal; Sets automatic operation mode.
	◇	EDIT	EDIT mode selection signal; Sets program edit operation mode.
	✋	MDI	MDI mode selection; Sets MDI mode.
	⏚	REMOTE	DNC operation mode; Sets DNC operation mode.
	⊕	REF RETURN	Reference position return mode selection; Sets reference position return mode.
	∿∿∿	JOG	JOG feed mode selection; Sets jog feed mode.
	∿∿∿	JOG INC	Step feed mode selection; Sets step feed mode.
	⊛	HANDLE	Manual handle feed mode selection; Sets manual handle feed mode.
	∿∿⊗◇	TEACH	Teach-in jog (reach-in handle) mode selection signal; Sets teach-in jog (teach-in handle) mode.
	→	SINGLE BLOCK	Single block signal; Executes program one by one. This key is used to check a program.
	/	BLOCK DELETE	Block delete (optional block skip); Skips the execution of the blocks starting with the first block prefixed with / and ending with the end of block (;) when this button is pressed during automatic operation.
	⬤	PRG STOP	Program stop(output only); Turns on the LED on the button when automatic operation is stopped by M00 specified in the program.
	◯	OPT STOP	Optional stop; Stops automatic operation after execution of the block of a program where M01 is specified in the program.

	Symbol	English④	Meaning of key
	➡️◻️▶	RESTART	Program restart; A program may be restart at a block by specifying the sequence number of the block, after automatic operation is stopped because of a broken tool or for holidays.
	⋁⋀⋀▶	DRY RUN	Dryrun; Sets the axis feedrate to the jog feedrate instead of a programmed feedrate when automatic operation is performed by setting this button to on. This function is used to check only the movement of the tool when no workpiece is mounted.
	➡️〉	MC LOCK	Machine lock; Updates only position display on the screen without making any axis movement, when automatic operation is performed by setting this button to on. This function is used to check a program.
	⌐|⌐	CYCLE START	Cycle start; Start automatic operation.
	⌐O⌐	CYCLE STOP	Cycle stop; Stops automatic operation.
	X1 X10 X100 X1000		Manual handle feed magnification: Magnification for manual handle feed. Magnified by 1, 10, 100, 1000.
	X Y Z 4 5 6		Manual feed axis selection; Axes are selected, when these buttons are set to on in the jog feed mode or step feed mode.
	+ −		Manual feed operation; Performs movement along selected axes when these buttons are set on in the jog feed mode or step feed mode.
	∿∿	TRVRS	Traverse; Performs jog feed at rapid traverse rate when this button is set to on.
	spindle symbol	SPDL CW	Positive spindle rotation direction; Rotates the spindle motor in the positive direction.
	spindle symbol	SPDL CCW	Negative spindle rotation direction; Rotates the spindle motor in the negative direction.
	spindle symbol	SPDL STOP	Spindle stop; Stops the spindle motor rotation.

8.2 Detachable key top

Keyboard of machine operator's panel has 55 keys. All key tops are detachable. MTB can customize keys and make his original key layout easily. And using transparent key top (optional), a film sheet with marking is inserted into the key.

Symbolic key top or Blank key top

Transparent key top

Film sheet*
(12.5mm×12.5mm, T=0.1mm Max.)
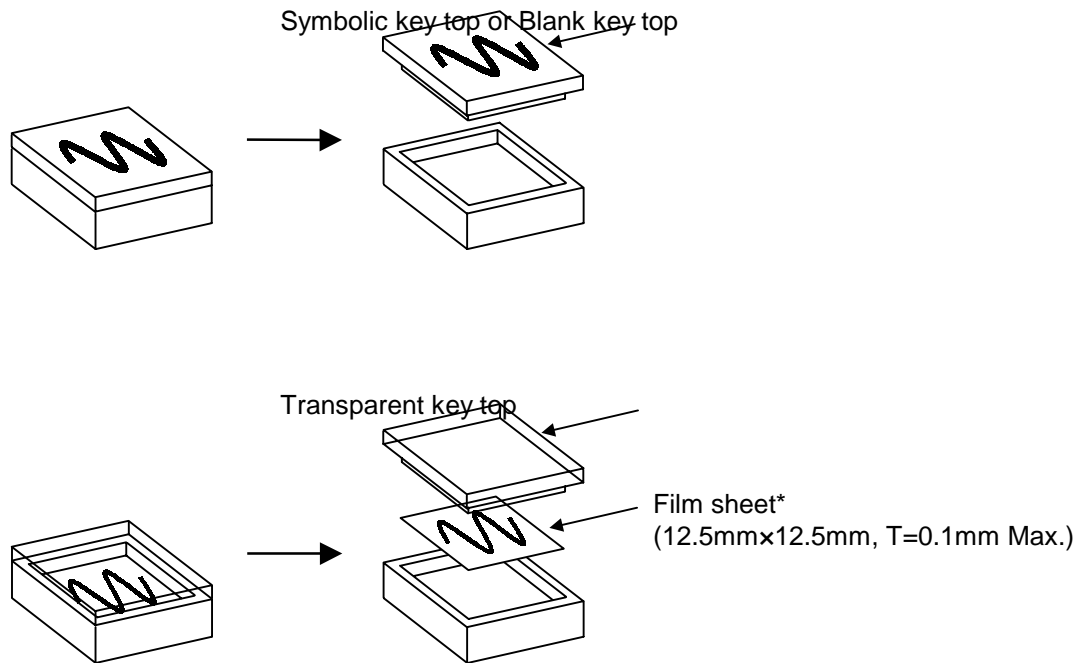
Note) Use the oil-proof sheet in the environment which oil is used for.

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9. Others

The keyboard of this operator's panel is a matrix composition. When three or more keys are pushed, the bypass current cause unrelated key to be available. This malfunction can be prevented with ladder program. One example is shown as follows.

(Elimination rule of malfunction)
When three keyinputs or more is input, all the keyinput since the third is made invalid.
However, when the number of all keyinput becomes two or less because keyinput was lost, all keyinputs are made effective.

(Operation of ladder program)
The example of the operation of ladder program is shown about matrix DI composed of 8bits x 8commons as follows.

State (a)　　State (b)　　State (c)

State (d)　　State (e)　　State (f)
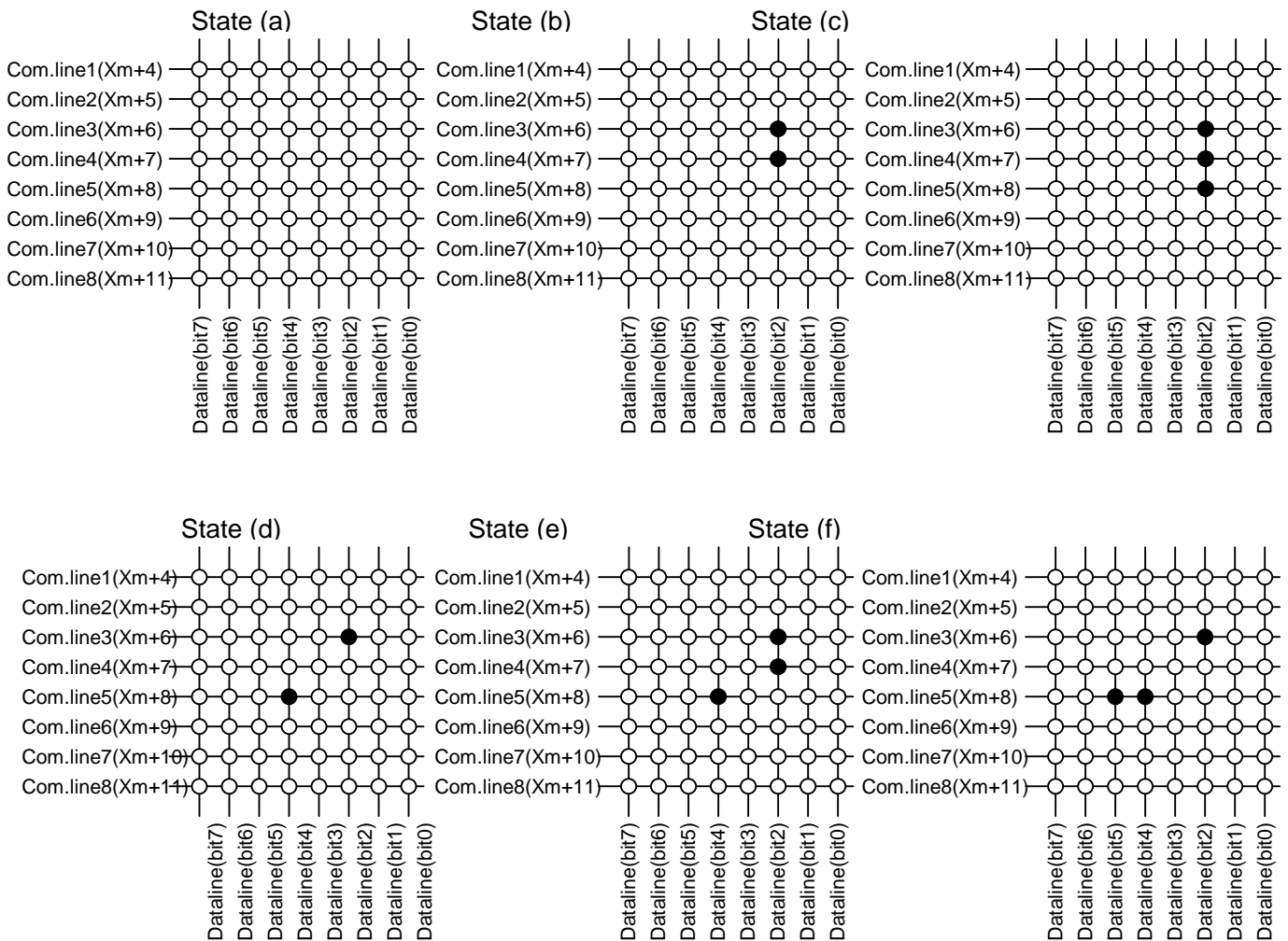
○ : Keyswitch OFF("0")　　● : Keyswitch ON("1")

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[1] The number of datalines where the keyinput exists is examined.

Logical add R1 of the data of all addresses is calculated. The number of bits which are "1" in the 8bits data of R1 corresponds to the number of datalines where the keyinput exists.

    (1) When the data of R1 is corresponding to 00h, there is no bit which is "1" in the data of R1.

   Ex. State (a) : R1=(00000000)   There is no dataline where input exists.

    (2) when the data of R1 is corresponding to the data in undermentioned datatable1., the number   of bits which are "1" in the data of R1 is one. Similarly, when the data of R1 is corresponding to

      the data in datatable2., the number of bits which are "1" in the data of R1 is two.

        Ex. State (b) or (c) : R1 = (00000100)   There is one dataline where input exists.

        Ex. State (d) or (e) : R1 = (00010100)   There are two datalines where input exists.

    (3) If the data of R1 is not corresponding to 00h and the both datatables, the number of bits which

      are "1" in the data of R1 is three or more.

        Ex. State (f) : R1 = (00110100)   There are three datalines where input exists.

Data table 1.

00000001	00000010
00000100	00001000
00010000	00100000
01000000	10000000

・・・Data table 2.

00000011	00000110	00001100	00011000
00110000	01100000	11000000	10000001
00000101	00001010	00010100	00101000
01010000	10100000	01000001	10000010
00001001	00010010	00100100	01001000
10010000	00100001	01000010	10000100

[2] Judgment 1

    (1) If there is no dataline where the keyinput exists.

        Any key switch is not pushed.   : Ex. State (a)

    (2) When the keyinput exists in two datalines or less.

        To [3]

    (3) When the keyinput exists in three data lines or more.

        There are three keyinputs or more. It is invalid keyinput.   : Ex. State (f)

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[3] When the keyinput exists in two datalines or less, it is examined whether two or more keyinput exists on the same dataline.
 The data of all addresses is subtracted from logical add R1 and subtraction result R2 is obtained. There are no two or more keyinput on the same dataline if it is R2=00h.

Ex. When there is one dataline where input exists.

State (b) : R2 = FCh

State (c) : R2 = F8h

When there are two datalines where input exists.

State (d) : R2 = 00h

State (e) : R2 = FCh

[4] Judgment 2

(1) In case of R2 = 00h   There are two or less datalines where input exists, and there are no two or more keyinputs on the same dataline. In this case, the numbers of all keyinputs are one or two. It is effective keyinput.

: Ex. State (d)

(2) In case of R2   00h   There are two or less datalines where input exists, and two or more keyinputs exists on the same dataline. To [5].

[5] Judgment 3

When there is one dataline where input exists   To [6].

When there are two datalines where input exists   There are three keyinputs or more.

It is invalid keyinput. : Ex. State (e)

[6] Subtraction result R2 is added to logical add R1. If this addition result is 00h, the number of all keyinputs is two.   Ex. State (b) : R1 + R2 = 04h + FCh = 00h

State (c) : R1 + R2 = 04h + F8h = FCh

[7]Judgment 4

In case of R1 + R2 = 00h   There is one dataline where input exists, and there are two keyinputs on this dataline.That is, because the numbers of all input are two keys, it is effective input.   : Ex. State (b)

In case of R1+R2   00h   There are three keyinputs or more on the same dataline. It is invalid keyinput.   : Ex. State (c)

[8] Only when the keyinput becomes effective because of judgment 1-4, all DI data (Xm+4-Xm+11) is used by the ladder program.

10. Maintenance parts

Exhaustion parts

	Name	Ordering code	Remarks
Fuse	For Main panel A/B/A1/B1	A60L-0001-0290#LM10	Rated at 1A

Repair parts

	Name	Ordering code	Remarks
I/O board	For Main panel A/B/A1/B1	A20B-8002-0020	
Main panel A		A02B-0236-C230	
Main panel B		A02B-0236-C231	
④ Main panel A1		A02B-0236-C240	
④ Main panel B1		A02B-0236-C241	
Sub panel A		A02B-0236-C232	
Sub panel B		A02B-0236-C233	
Sub panel C		A02B-0236-C234	
Sub panel B1		A02B-0236-C235	
Adapter plate A		A250-0892-T004	
Adapter plate B		A250-0892-T005	

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