

CNC

MELDAS REMOTE I/O UNIT FCU6-DX561

CONNECTION AND MAINTENANCE MANUAL



Precautions for Safety

Always read the specifications issued by the machine maker, this manual, related manuals and enclosed documents before starting installation, operation, programming, maintenance or inspection to ensure correct usage. Thoroughly understand the basics, safety information and precautions of this numerical controller before using the unit.

This manual ranks the safety precautions into  **DANGER**,  **WARNING** and  **CAUTION**.

DANGER

When there is a great risk that the user could be subject to fatalities or serious injuries if handling is mistaken.

WARNING

When the user could be subject to fatalities or serious injuries if handling is mistaken.

CAUTION

When the user could be subject to injuries or when physical damage could occur if handling is mistaken.

Note that even if the item is ranked as  **CAUTION**, serious results could occur depending on the state. Always observe the described matters.

DANGER

Not applicable in this manual.

WARNING

1. Items related to prevention of electric shocks

-  Do not operate the switches with wet hands, as this may lead to electric shocks.
-  Do not damage, apply excessive stress, place heavy things on or sandwich the cables, as this may lead to electric shocks.

2. Items related to smoke prevention

-  Incorrect wiring or connections could burn the device.

⚠ CAUTION

1. Items related to noise

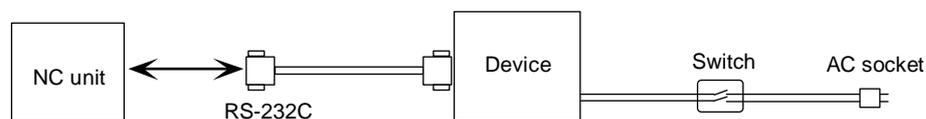
- ⚠ Always treat the shield cables indicated in this manual with grounding measures such as cable clamps.
- ⚠ Separate the signal wire from the drive line/power line when wiring.

2. Items related to installation

- ⚠ Install the unit on noncombustible material. Installation directly on or near combustible material may lead to fires.
- ⚠ Always observe the installation direction.
- ⚠ Do not install or operate a unit that is damaged or that have missing parts.
- ⚠ Do not allow conductive foreign matter such as screws or metal chips or combustible foreign matter such as oil enter the unit.
- ⚠ The unit is a precision device so does not drop or apply strong impacts on them.
- ⚠ Do not install the unit where it may be subject to cutting oil.

3. Items related to connection

- ⚠ Do not apply voltages other than those indicated in this manual on the connector. Doing so may lead to destruction or damage.
- ⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- ⚠ When using an inductive load such as relays, always connect a diode in parallel to the load as a noise measure.
- ⚠ When using a capacitive load such as a lamp, always connect a protective resistor serially to the load to suppress rush currents.
- ⚠ Do not connect or disconnect the connection cables between each unit while the power is ON.
- ⚠ When using an RS-232C device as a peripheral device, caution will be required when connecting and disconnecting the connector.
Always use a double-OFF type AC power supply switch on the device side, and connect/disconnect the connector with the AC power supply on the device side OFF.



FCU6-DX561 CONNECTION AND MAINTENANCE MANUAL

CONTENTS

I. CONNECTION MANUAL

- 1. OUTLINE I-1**
- 2. CONFIGURATION I-2**
 - 2.1 System Configuration I-2
- 3. INSTALLATION I-3**
 - 3.1 General Specification I-3
 - 3.2 Noise Countermeasures..... I-4
 - 3.2.1 Connection of FG (Frame Ground) I-4
 - 3.2.2 Shield Clamping of Cables..... I-5
 - 3.2.3 Connecting Spark Killers..... I-6
 - 3.3 Installation I-7
 - 3.4 Mounting Conditions..... I-8
- 4. SYSTEM CONNECTION..... I-9**
 - 4.1 General System Diagram I-9
- 5. CONNECTION OF UNIT I-10**
 - 5.1 Names of Each Part I-10
 - 5.2 Unit Connection System Diagram I-11
 - 5.3 Connection of Base I/O Unit..... I-12
 - 5.4 Connection of RIO Unit I-13
 - 5.5 Connection of Power Supply I-14
 - 5.6 Connection of Encoder Speed Signal I-15
 - 5.7 Connection of Machine Input/Output Signal..... I-17
- APPENDIX 1 UNIT OUTLINE DRAWINGS AND INSTALLATION DIMENSIONS I-21**
- APPENDIX 2 LIST OF CONNECTOR SETS..... I-22**
- APPENDIX 3 CABLE MANUFACTURING DRAWING I-23**
 - Appendix 3.1 FCUA-R000 Cable Manufacturing Drawing I-25
 - Appendix 3.2 FCUA-R211 Cable Manufacturing Drawing I-26
 - Appendix 3.3 FCUA-R220 Cable Manufacturing Drawing I-27
 - Appendix 3.4 R300 Cable Manufacturing Drawing..... I-28
 - Appendix 3.5 R301 Cable Manufacturing Drawing..... I-29
 - Appendix 3.6 R-TM Manufacturing Drawing..... I-30
- APPENDIX 4 PRECAUTIONS FOR COMPLYING WITH UL/c-UL STANDARDS I-31**

II. MAINTENANCE MANUAL

1. EXPLANATION OF MODULE FUNCTIONS	II-1
1.1 FX2N-80BMT-NC Card	II-1
2. FAULT DIAGNOSIS.....	II-3
2.1 List of Unit LEDs.....	II-3
2.2 Troubleshooting.....	II-4
2.2.1 Confirmation of trouble state.....	II-4
2.2.2 When in trouble.....	II-5
2.2.3 Behavior of independent faults	II-9
3. DAILY MAINTENANCE AND PERIODIC INSPECTION AND MAINTENANCE	II-10
3.1 Maintenance Tools	II-10
3.2 Replacement Methods	II-11
3.2.1 Cable.....	II-11
3.2.2 Unit.....	II-13

I. CONNECTION MANUAL

1. OUTLINE

1. OUTLINE

This manual explains the items required for installing and connecting the remote I/O unit (FCU6-DX561). The FCU6-DX561 is a remote I/O unit with PLC functions. This unit is used as to monitor both the machine signals and the spindle speed.

Read this manual thoroughly and understand the product's functions and performance before starting use.

Refer to the following documents for explanations on the functions.

FX2N Hardware Manual (JY992D66301G)

FX Programming Manual (JY992D88101A)

MELDAS AC Servo/Spindle MDS-C1 Series Specifications Manual (BNP-C3000)

Refer to the following material for details on EMC Directives for the European CE Marking.

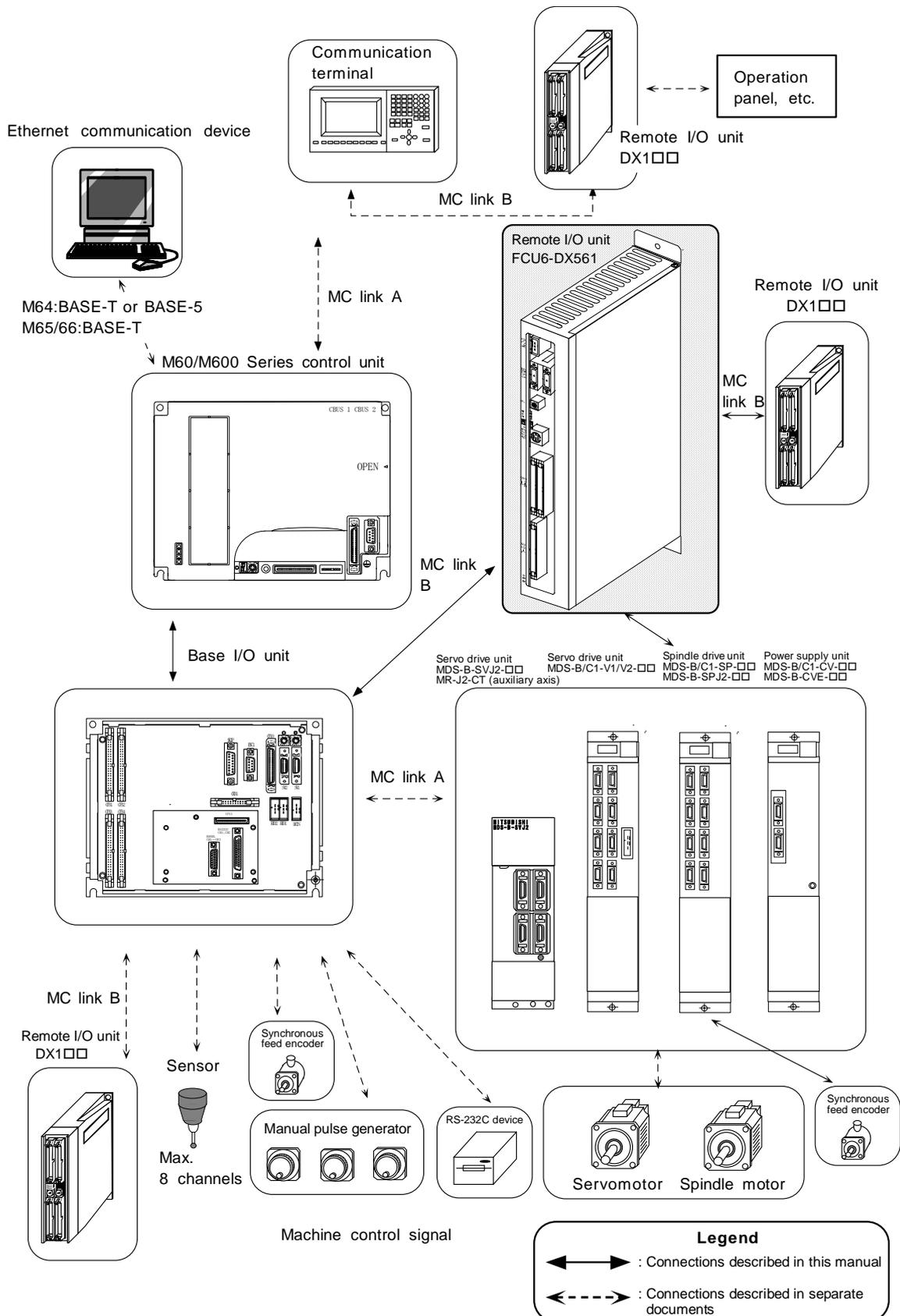
EMC Installation Guideline (BNP-B2230)

2. CONFIGURATION

2.1 System Configuration

2. CONFIGURATION

2.1 System Configuration



3. INSTALLATION
3.1 General Specification

3. INSTALLATION

3.1 General Specification

Unit name		Remote I/O unit	
Type name		FCU6-DX561	
General specifications	Ambient temperature	During operation	0 to 55°C * Note
		During storage	-20 to 60°C
	Ambient humidity	During operation	45 to 75% RH (with no dew condensation)
		During storage	45 to 80% RH (with no dew condensation)
	Vibration resistance		4.9m/s ² or less (during operation)
	Shock resistance		29.4m/s ² or less (during operation) 98m/s ² or less (during transportation)
	Working atmosphere		No corrosive gases, or high levels of dust or oil mist
	Power noise		1kVA (P-P)
	Withstand voltage		500VAC for one minute Across entire output terminal batch and grounding terminal
	Insulation resistance		5MΩ or more with 500VDC megger tester Across entire output terminal batch and grounding terminal
Grounding		Class D grounding Use without grounding is possible if grounding is not possible.	
Power specifications	Power voltage		24VDC +10%/-15% (Must be insulated from 100VAC and 200VAC power supply)
	Instantaneous stop tolerance time		Operation continues when power instantaneously stops for 4ms or less.
	Power fuse		Chip type fuse incorporated (SSTC 0.8A Maker: SOC UL198G approved, CSA C22.2 No. 59.2)
	Power consumption		Approx. 10W (Only control section; excludes input/output section)
	Rush current		Approx. 20A/1ms, approx. 5A/10ms
	Sensor power		None
	Weight		1.8kg
	Unit size		Refer to Appendix.

* **Note** If the ambient temperature is 55°C or more, lower to 55°C or less with forced cooling.

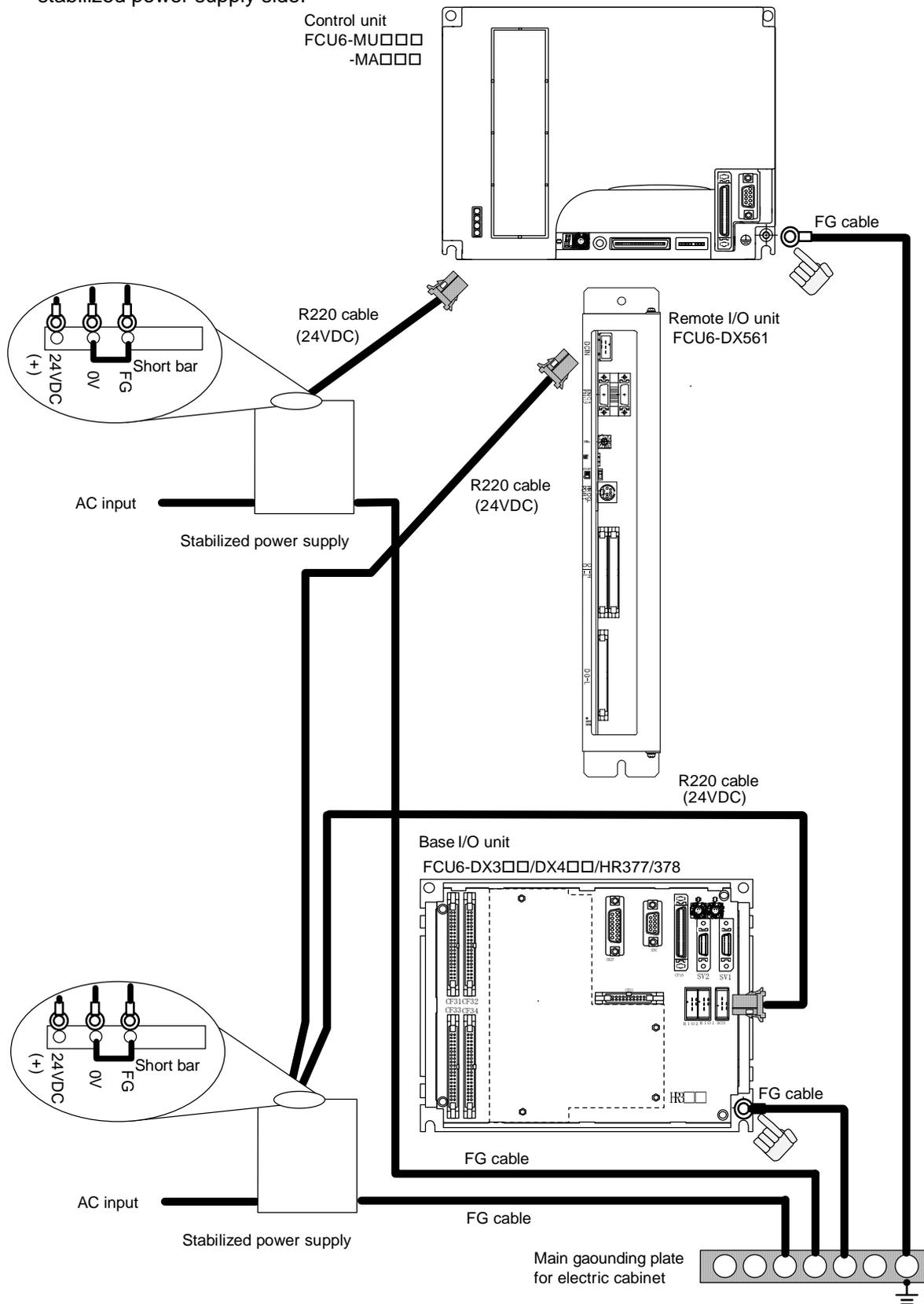
3. INSTALLATION

3.2 Noise Countermeasures

3.2 Noise Countermeasures

3.2.1 Connection of FG (Frame Ground)

The frame should basically be grounded at one ground point.
Connect the control unit and base I/O unit's and remote I/O unit's 0V (RG) to the FG on the 24VDC stabilized power supply side.



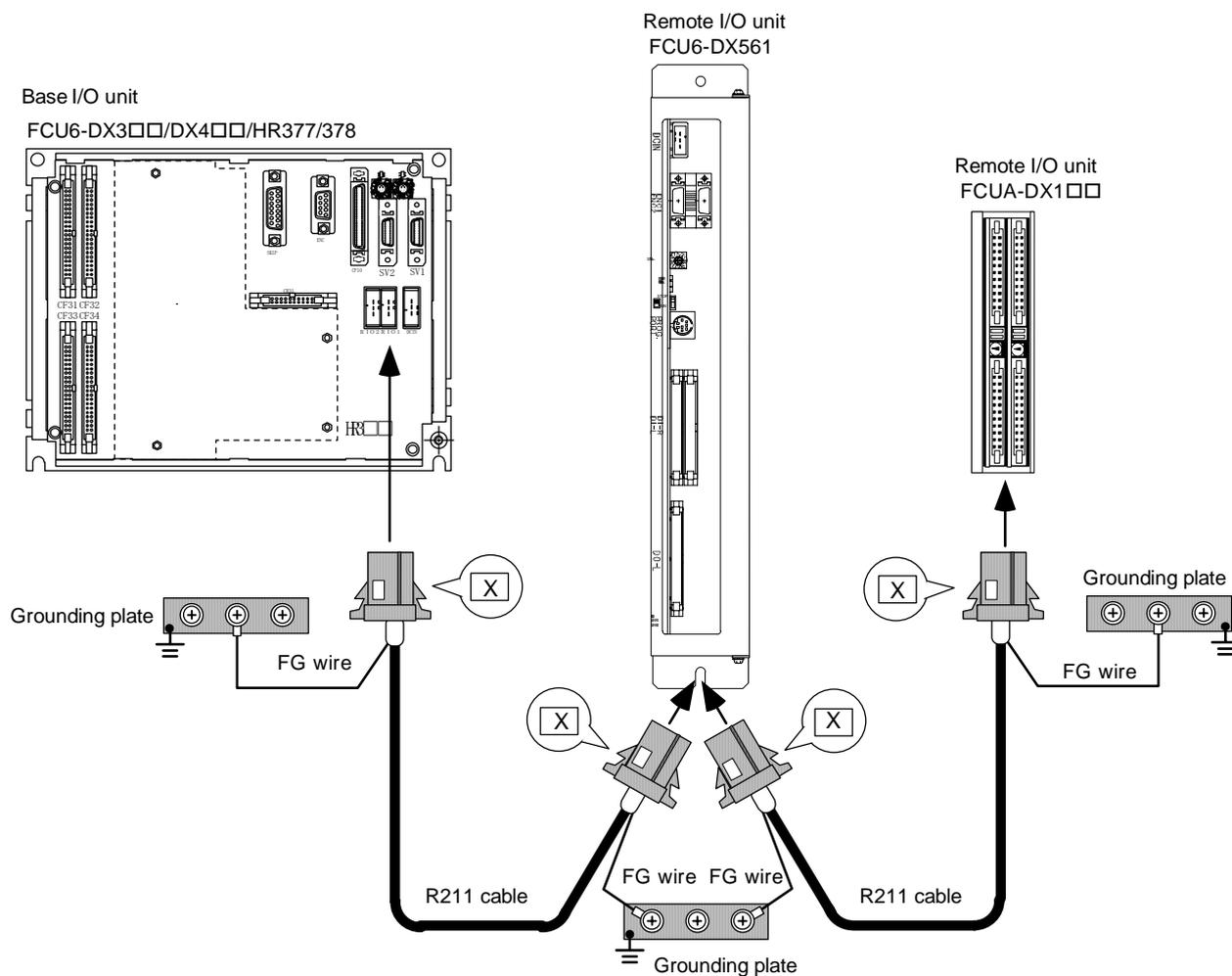
3. INSTALLATION

3.2 Noise Countermeasures

3.2.2 Shield Clamping of Cables

(1) Cables requiring ground connection with lead wire

The FG wire of the RIO cable (R211) connected between the base I/O and each remote I/O unit must be connected to the grounding plate near the unit.



(2) Cables which require shield clamp with connector cases

The shield of encoder cable (R000) for the speed signal input must be clamped with the connector case.

<Shield clamp method>

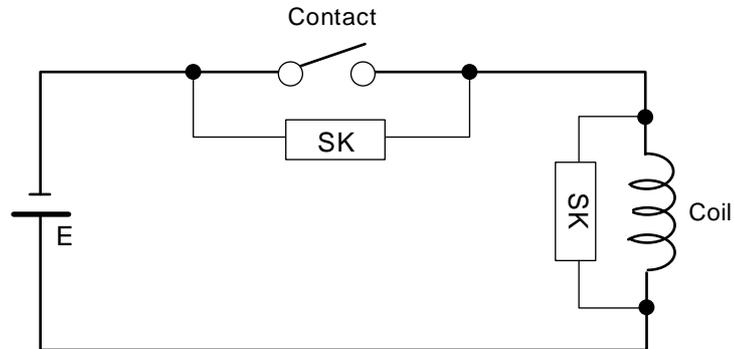
Fold the cable shield on the sheath, and wrap copper foil tape over it. Connect with the connector GND plate.

3. INSTALLATION

3.2 Noise Countermeasures

3.2.3 Connecting Spark Killers

Connect a spark killer on the coil or contact in parallel for noise countermeasures.
Use spark killers which are 0.033 to 0.1 μ F, 10 to 120 Ω .



3. INSTALLATION

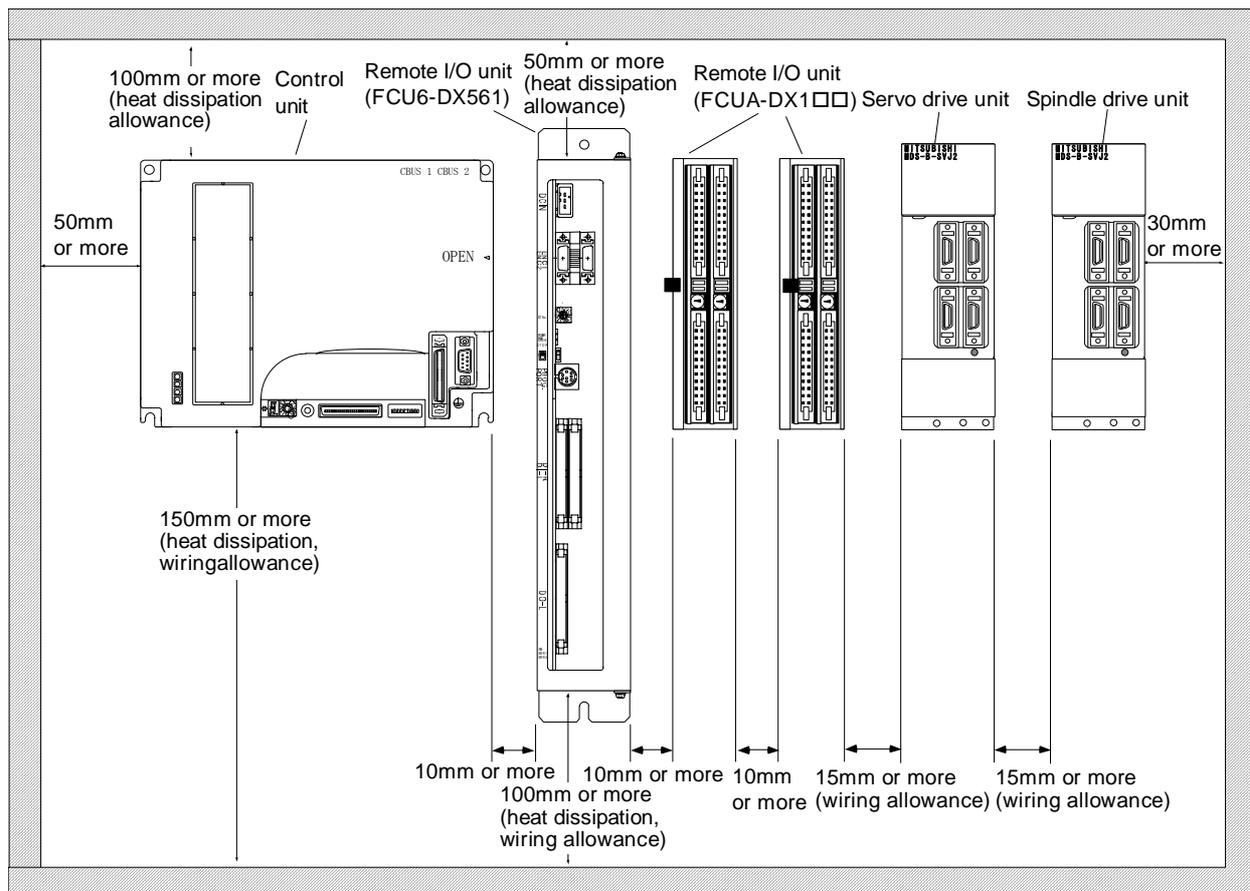
3.3 Installation

3.3 Installation

Each unit is installed in the sealed structure cabinet as a principle. When installing into the cabinet, refer to the following drawings to consider the unit's heat dissipation and wiring, and secure enough space for ventilation.

- (1) Install the unit vertically so that the front is visible.
- (2) Refer to the following drawings to consider the unit's heat dissipation and wiring, and secure enough space for ventilation.

(Top)



(Bottom)

CAUTION

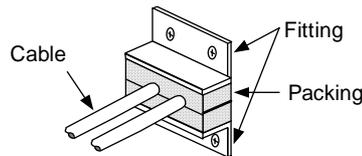
- ⚠ **Install the unit on noncombustible material.**
Installation directly on or near combustible material may lead to fires.
- ⚠ **Always observe the installation direction.**
- ⚠ **Do not install or operate a unit that is damaged or that has missing parts.**
- ⚠ **The unit is a precision device so do not drop or apply strong impacts on it.**

3. INSTALLATION

3.4 Mounting Conditions

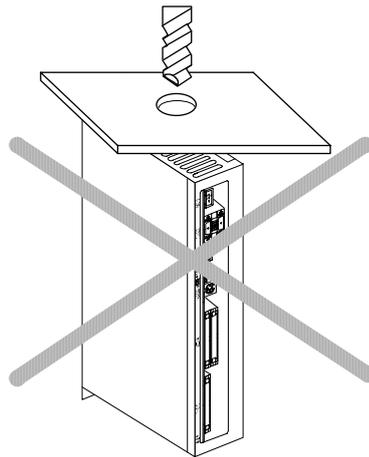
3.4 Mounting Conditions

- (1) Parts, highly susceptible to dust, are mounted with a high density inside the unit. Always use a sealed structure for the cabinet, and provide the following treatments.
 - Always plug the cable inlet with packing, etc., to prevent dust and oil from entering.
 - Take care so that outdoor air does not enter the heat dissipation holes, etc.
 - Plug all clearances.
 - Always install door packing.
 - If there is a back lid, always install packing.
 - Oil will easily accumulate at the ceiling, and can enter the cabinet from the screw holes. Always take special measures such as using oil-preventing packing.



Cable inlet (Example)

- (2) Avoid machining in the area after installing each unit. Cutting chips, etc., could get on the electronic parts and cause damage.



- (3) Design so that the cabinet's internal temperature rise is 10°C or less in respect to the outdoor temperature, and so that it is within the unit's temperature conditions.

CAUTION

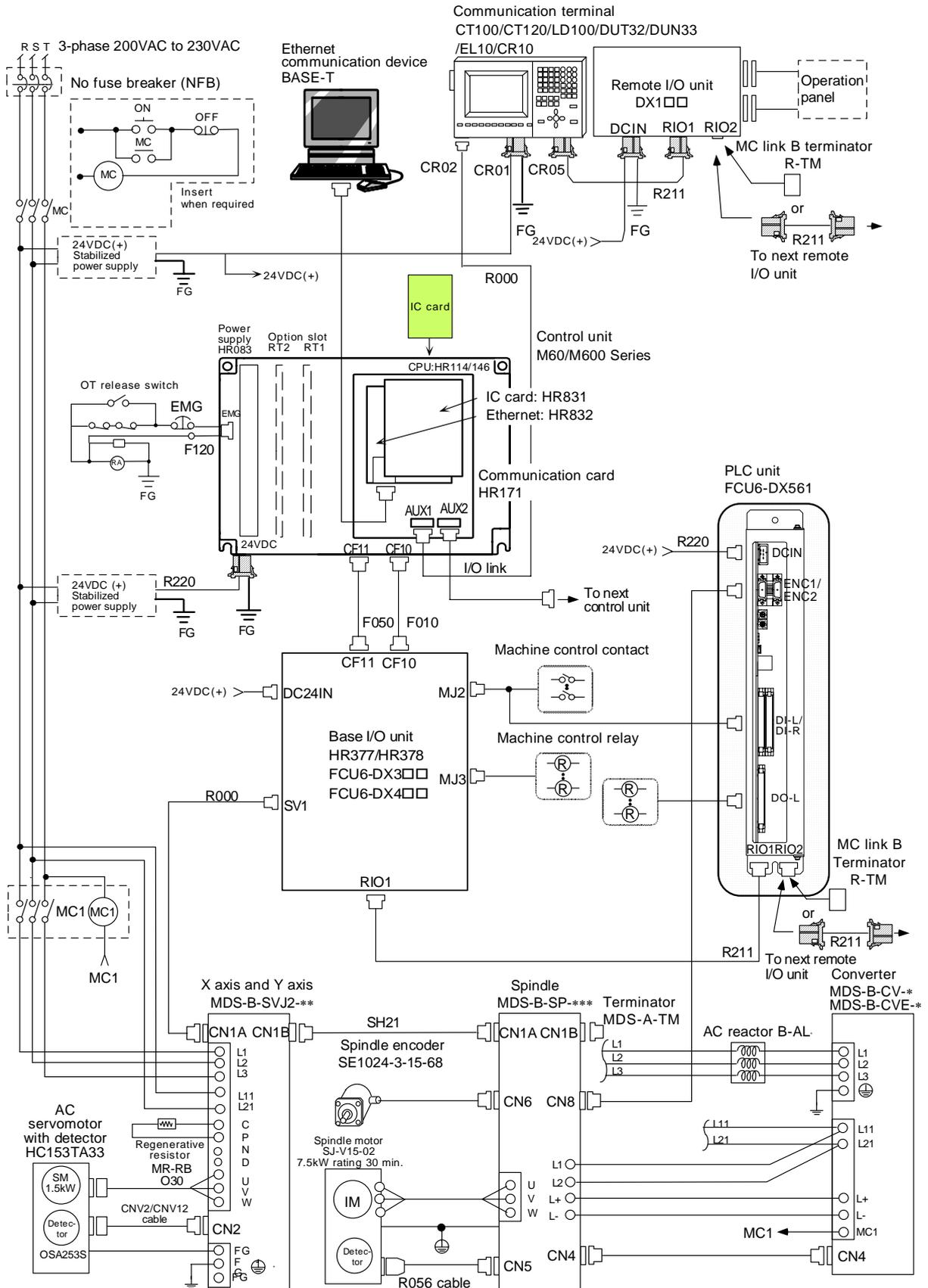
-  Do not allow conductive foreign matter such as screws or metal chips or combustible foreign matter such as oil enter the unit.

4. SYSTEM CONNECTION

4.1 General System Diagram

4. SYSTEM CONNECTION

4.1 General System Diagram



(Note) This drawing is an example of the general connection for the M60/M600 Series. The actual connection will differ according to the specifications.

5. CONNECTION OF UNIT
5.1 Names of Each Part

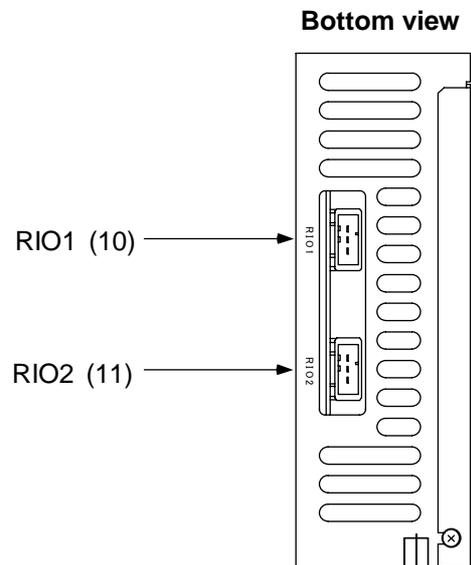
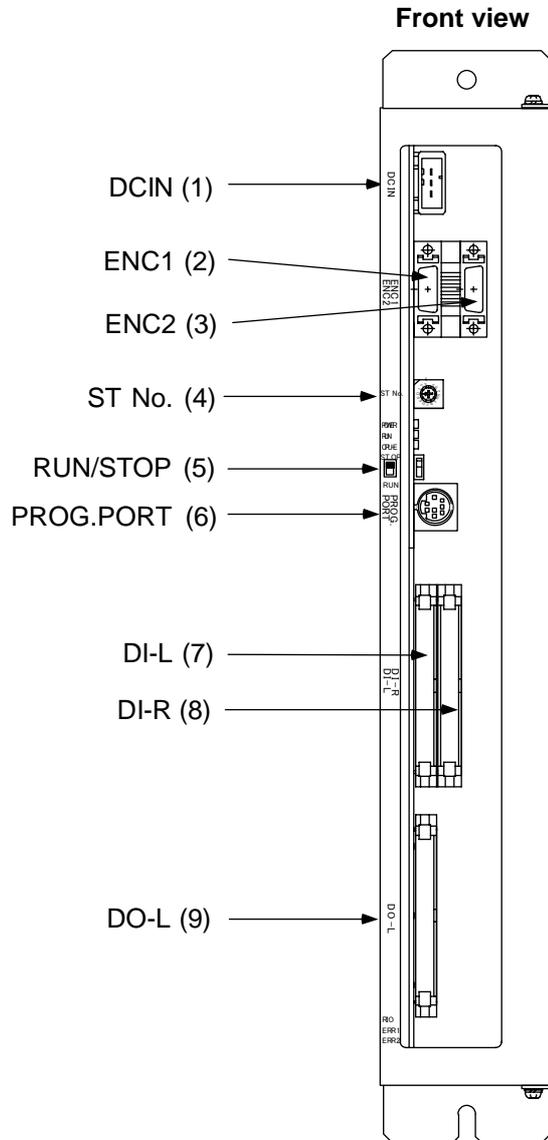
5. CONNECTION OF UNIT

The methods for connecting to each unit and device are briefly explained in this chapter.

5.1 Names of Each Part

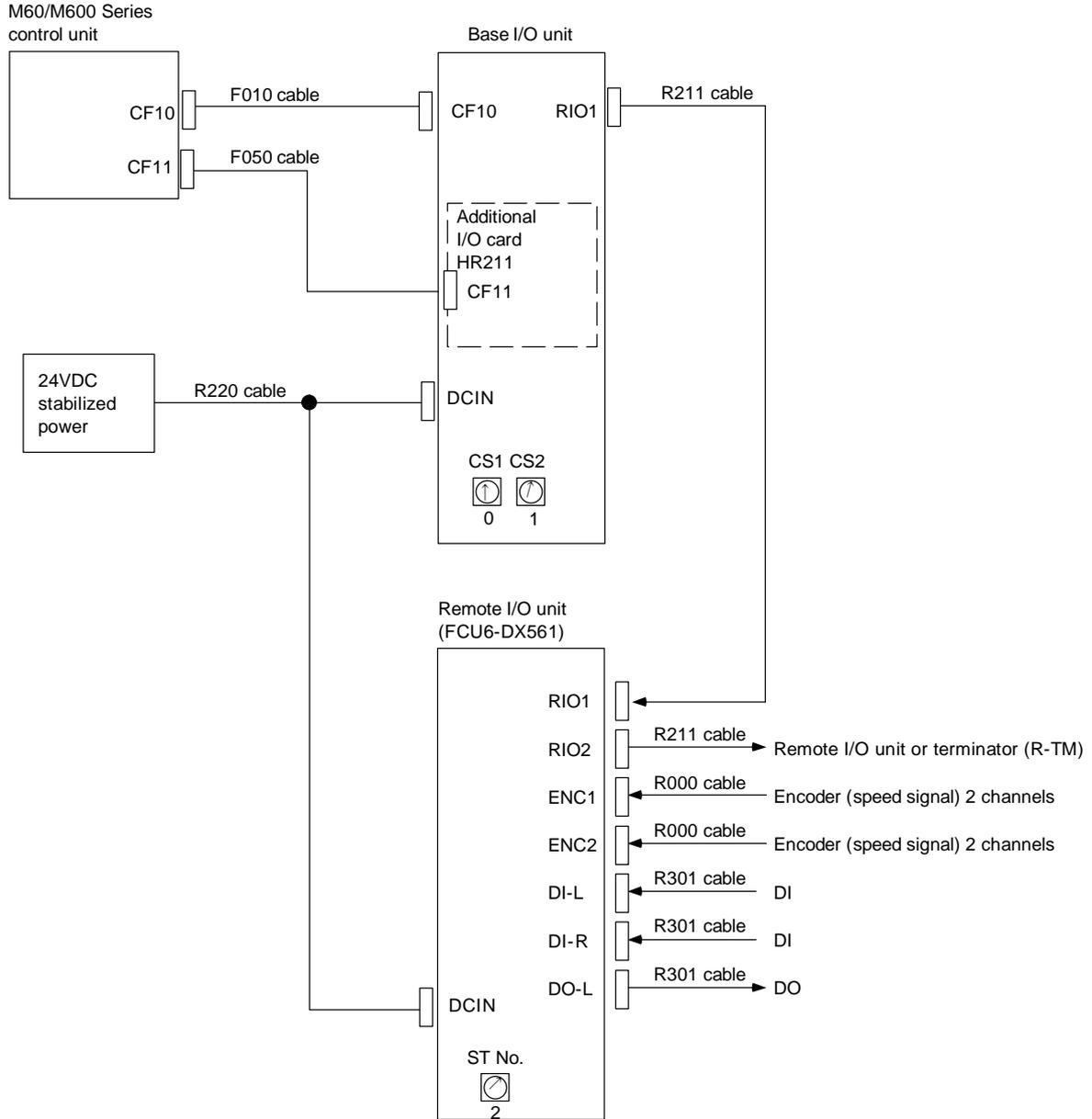
- (1) 24VDC input connector
- (2) Connector 1 for encoder (speed signal) connection **(Note)**
- (3) Connector 2 for encoder (speed signal) connection **(Note)**
- (4) Station No. setting rotary switch
- (5) RUN-STOP slide switch
- (6) Programming unit connection connector
- (7) Digital signal input connector
- (8) Digital signal input connector
- (9) Digital signal output connector
- (10) Remote I/O connection connector
- (11) Remote I/O connection connector

(Note) The encoder speed signal is connected via the spindle amplifier. As there is no power supply, the encoder cannot be directly connected to the connectors ENC1/ENC2.



5. CONNECTION OF UNIT
5.2 Unit Connection System Diagram

5.2 Unit Connection System Diagram



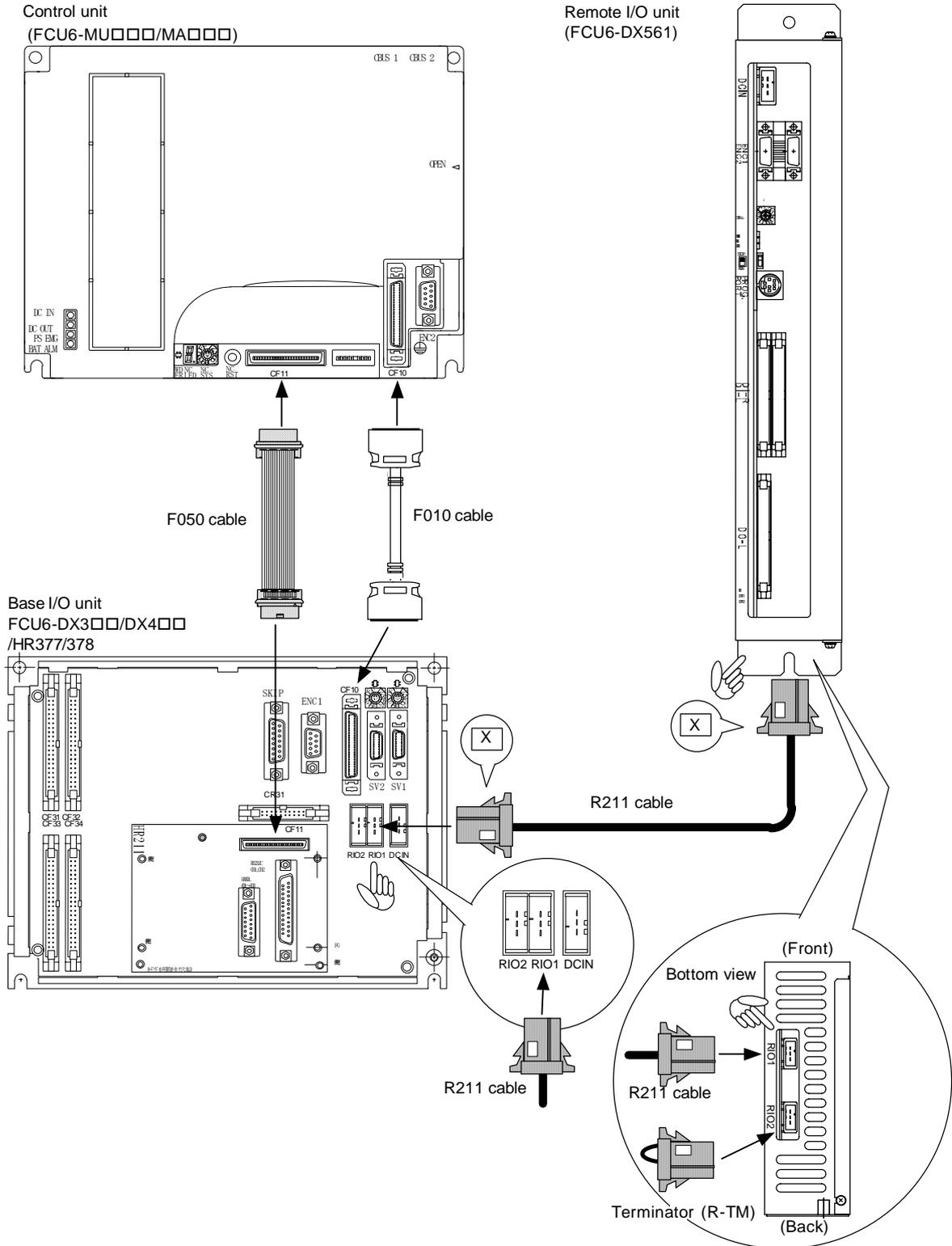
Name	Explanation
RIO1	This is connected to the base I/O unit.
RIO2	This is used to connect the terminator or to expand the remote I/O unit. The remote I/O unit can be expanded by up to four stations.
ENC1	Connected with encoder via spindle amplifier.
ENC2	Connected with encoder via spindle amplifier.
DI-L	DI: 28 (Sink/Source)
DI-R	DI: 16 (Sink/Source)
DO-L	DO: 32 (Source)
ST No.	Set the station No. In the above example, "0, 1" is set for the base I/O, so set to "2". As this unit occupies two stations, set this switch to an even number (0, 2, 4, 6). (Note) If an odd number (1, 3, 5, 9) is set, the station number for when an even number (0, 2, 4, 6) is set will be selected.

5. CONNECTION OF UNIT

5.3 Connection of Base I/O Unit

5.3 Connection of Base I/O Unit

The RIO1 connector is used for connection to the base I/O unit. Connect the R211 cable from the RIO1 connector on this unit to the RIO1 connector on the base I/O unit.



(Note) When not expanding the remote I/O units, connect the terminator (R-TM) to RIO2.

5. CONNECTION OF UNIT

5.4 Connection of RIO Unit

5.4 Connection of RIO Unit

The RIO2 connector is used to connect several remote I/O units. Connect the R211 cable from the RIO2 connector on this unit to RIO1 on the remote I/O unit.

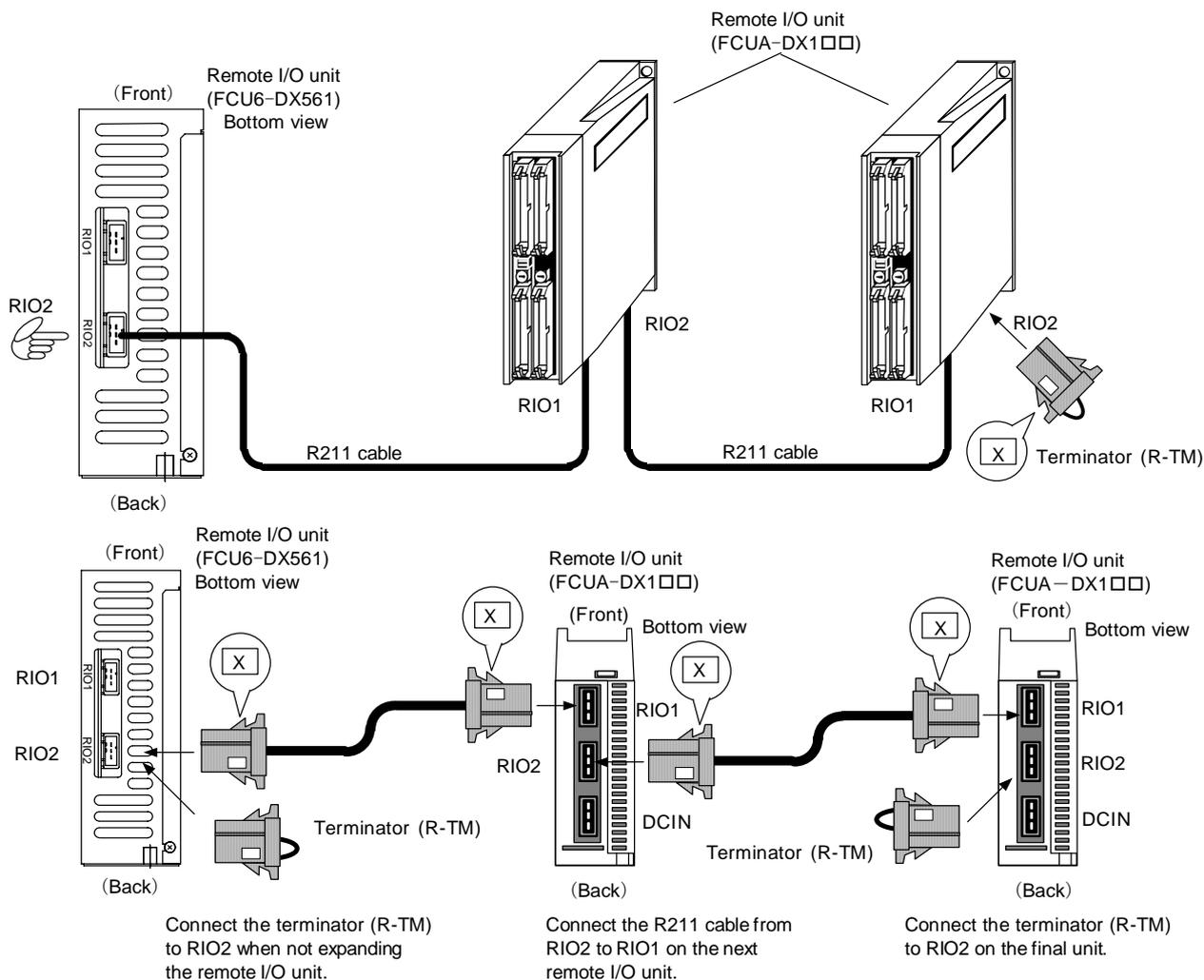
When connecting several remote I/O units, connect the R211 cable from the RIO2 connector on the remote I/O unit to the RIO1 connector on the next remote I/O unit.

Connect the terminator (R-TM) to the RIO2 connector on the final remote I/O unit.

When manufacturing the R211 cable, use the enclosed connector and contacts. If there are not enough accessories, use the single-ended connector CN211 (option, single-ended).

(Refer to the cable manufacturing drawings for details.)

(Example for expanding remote I/O units)



CAUTION

- ⚠ Incorrect connections could damage the device, so always connect the cable to the designated connector.
- ⊘ Do not connect or disconnect the connection cables between each unit while the power is ON.

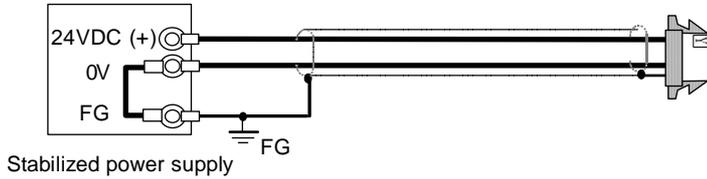
5. CONNECTION OF UNIT

5.5 Connection of Power Supply

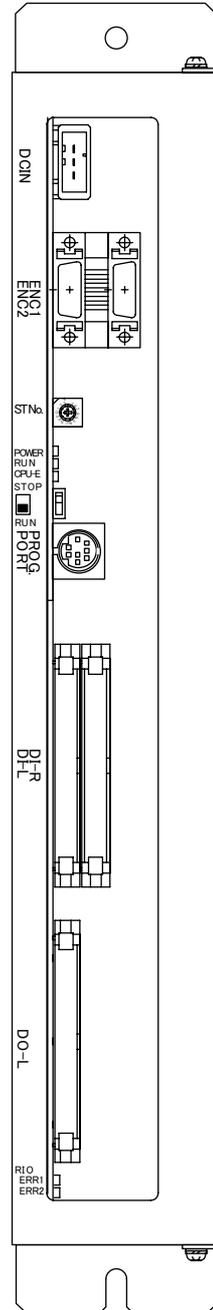
5.5 Connection of Power Supply

Supply the 24VDC power supply for the control circuit to the DCIN connector (DCIN). The 24VDC power for the input/output circuit is supplied from an external source. Supply to each connector (DI-L/R, DO-L).

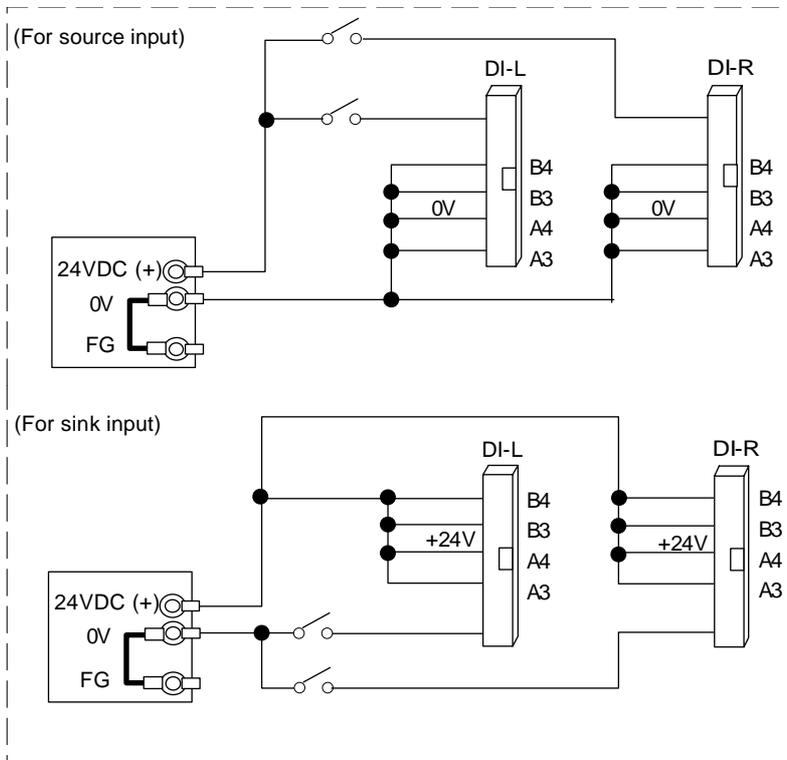
(1) DCIN power connection (for control circuit)



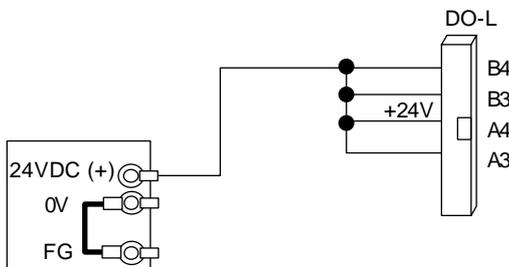
Remote I/O unit
(FCU6-DX561)



(2) DI-L/R power connection (for DI circuit)



**(3) DO-L power connection (for DO circuit)
(Fixed to source output)**



(Note) Connect the power or GND to all of the common pins on the DI-L/R and DO-L connector.

CAUTION

- ⚠ **Incorrect connections could damage the device, so always connect the cable to the designated connector.**
- ⊘ **Do not connect or disconnect the connection cables between each unit while the power is ON.**

5. CONNECTION OF UNIT
5.6 Connection of Encoder Speed Signal

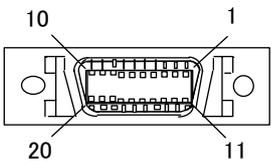
5.6 Connection of Encoder Speed Signal

Encoder
ENC1/2

(Note) Refer to following drawing.

<PCB side connector type>
 Receptacle : 52822-4011
 Maker : Molex

<Cable side connector type>
 Plug : 10120-3000VE
 Shell : 10320-52F0-008
 Recommended maker:
 Sumitomo 3M



ENC1

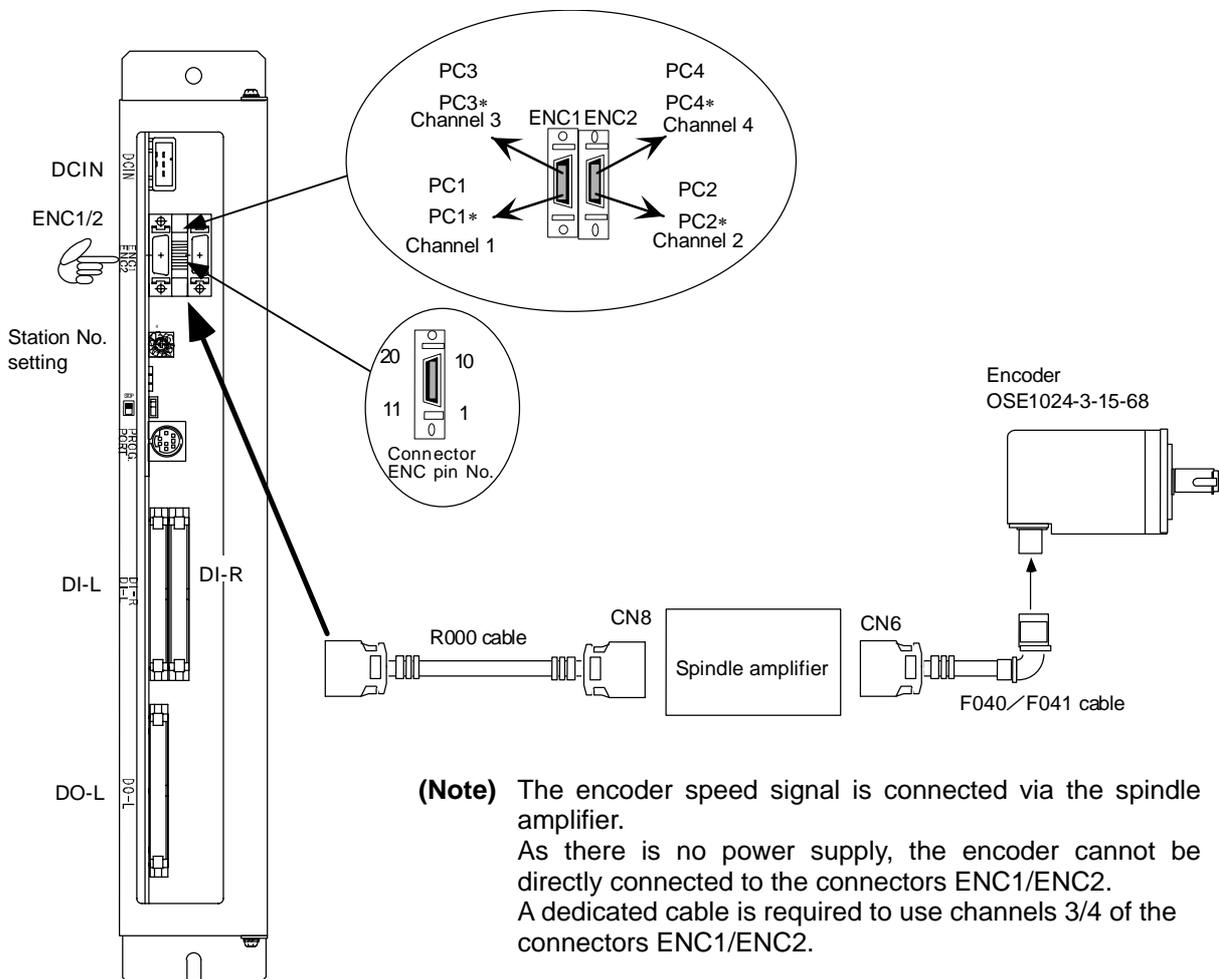
1		GND	11		GND
2	I	PC1	12	I	PC1*
3			13		
4			14		
5		GND	15		GND
6			16		
7	I	PC3	17	I	PC3*
8			18		
9			19		
10			20		

Connect the connector shell (frame) to the FG via the pattern on the PCB.

ENC2

1		GND	11		GND
2	I	PC2	12	I	PC2*
3			13		
4			14		
5		GND	15		GND
6			16		
7	I	PC4	17	I	PC4*
8			18		
9			19		
10			20		

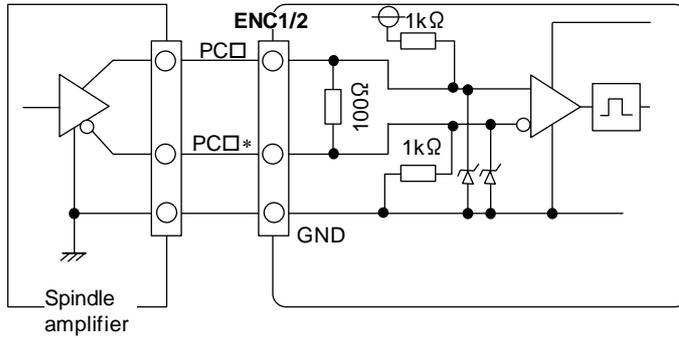
Connect the connector shell (frame) to the FG via the pattern on the PCB.



5. CONNECTION OF UNIT

5.6 Connection of Encoder Speed Signal

[Outline of connection]



[Signal assignment table]

1st channel	X00
2nd channel	X01
3rd channel	X02
4th channel	X03

[Input specifications]

Item	Specifications
Input voltage	Line receiver input (X00 to X03) (5VDC)
Input sensitivity	OFF → ON 4.5mA or more, ON → OFF 1.5mA or less
Input response time	X00 to X03 require 50μs or more for the second trigger to be validated. The input pulse is detected at  .
Circuit insulation	Not insulated

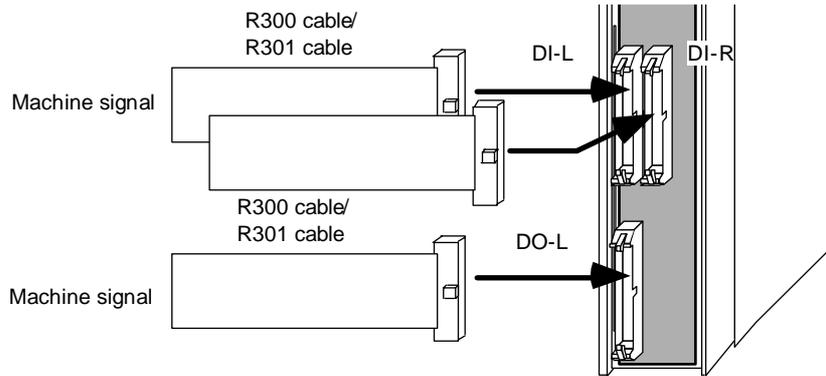
CAUTION

-  Separate the signal wire from the drive line/power line when wiring.
-  Incorrect connections could damage the device, so always connect the cable to the designated connector.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.

5. CONNECTION OF UNIT
5.7 Connection of Machine Input/Output Signal

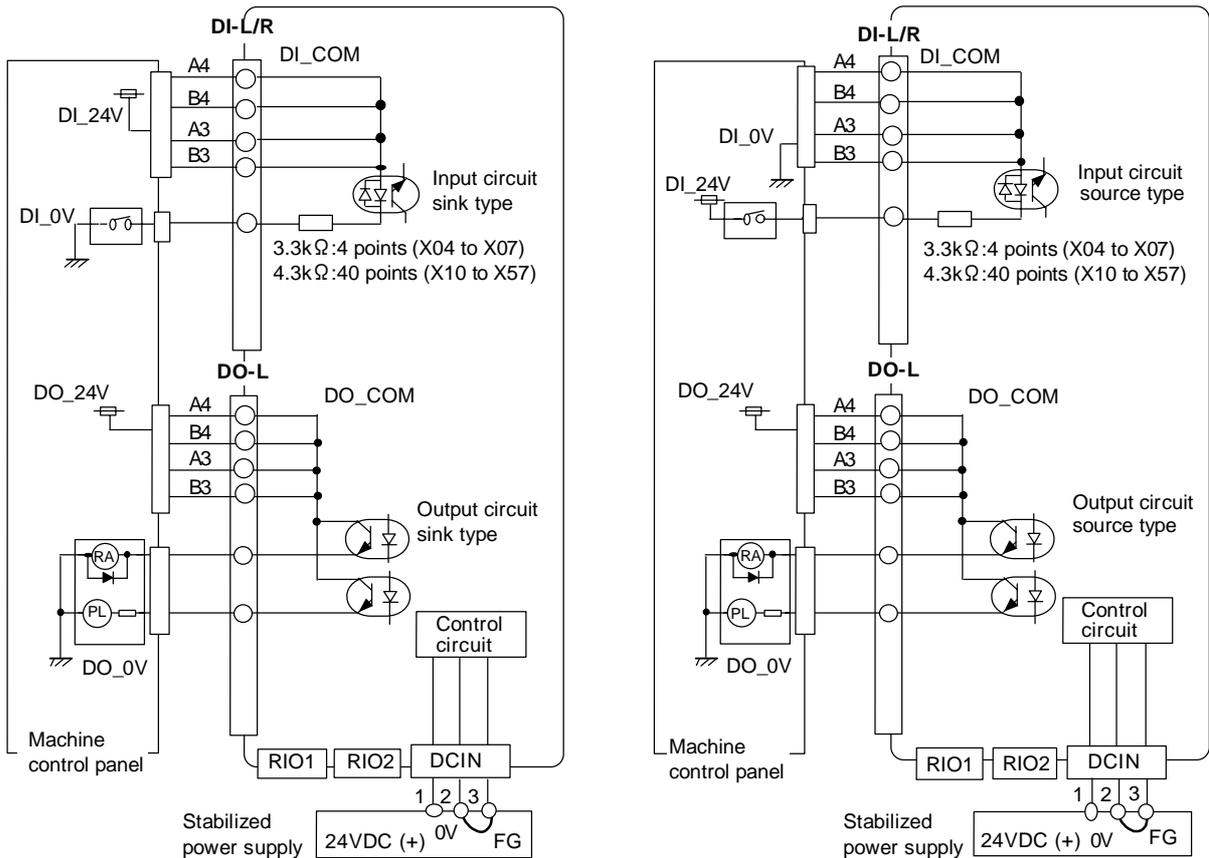
5.7 Connection of Machine Input/Output Signal

Machine input/output signal types and number of points	Input	Output	Number of occupied serial link stations
		44 points	32 points



[Outline of connection]

X00 to X07 and Y00 to Y37 below are indicated as octal values.



The input circuit can be switched to a sink type or source type with the connections. The output circuit is fixed to the source type.

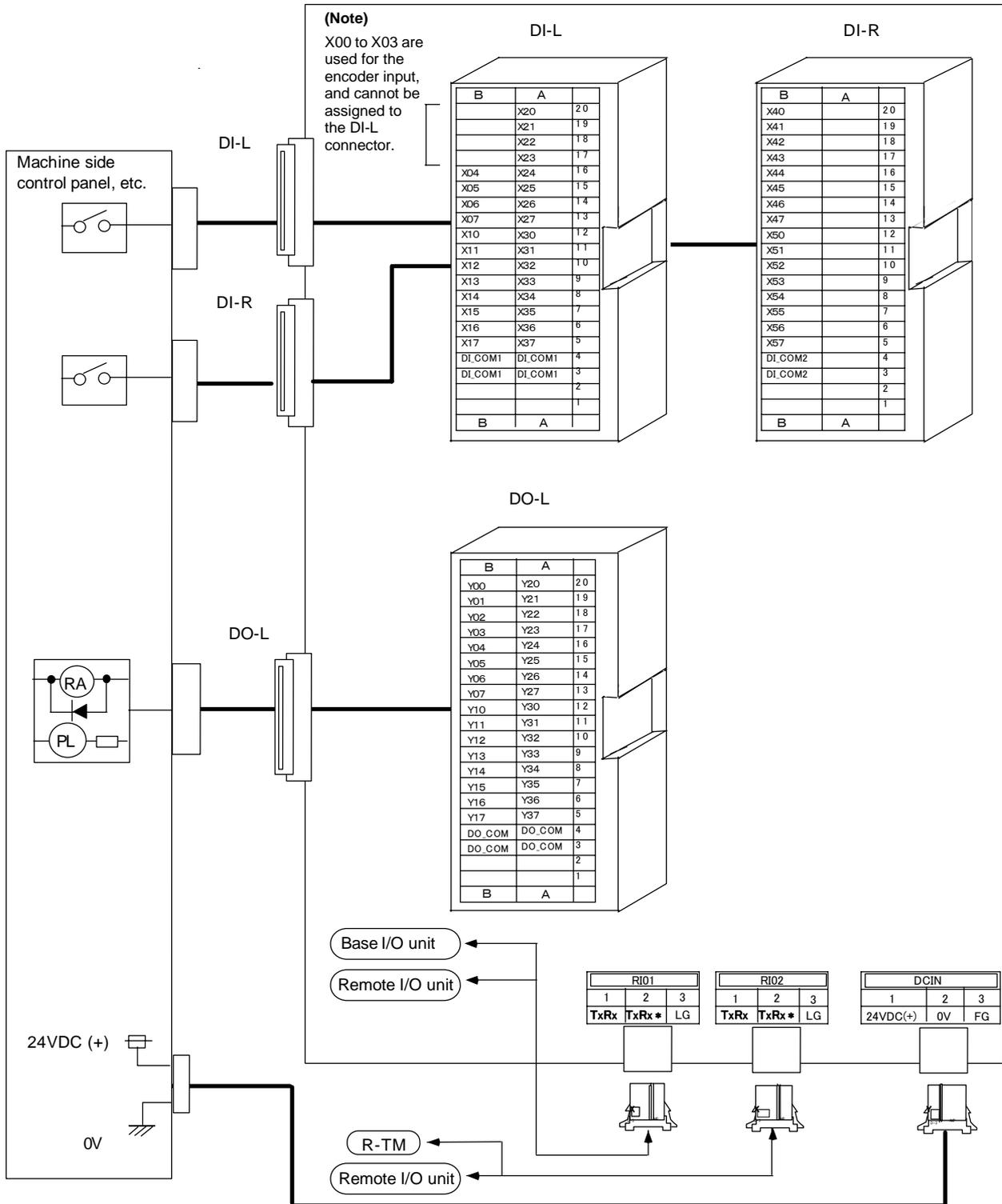
⚠ CAUTION

- ⚠ **Incorrect connections could damage the device, so always connect the cable to the designated connector.**
- ⊘ **Do not connect or disconnect the connection cables between each unit while the power is ON.**

5. CONNECTION OF UNIT

5.7 Connection of Machine Input/Output Signal

[Signal assignment table]



<Adaptive connector>

DCIN

Connector : 2-178288-3
Contact : 1-175218-5
Maker : Tyco Electronics AMP

RIO1/RIO2

Connector : 2-178288-3
Contact : 1-175218-5
Maker : Tyco Electronics AMP

**RI-L/DO-L
DI-R**

Crimp type connector:
7940-6500SC
Maker: Sumitomo 3M

**R-TM
(Terminator)**

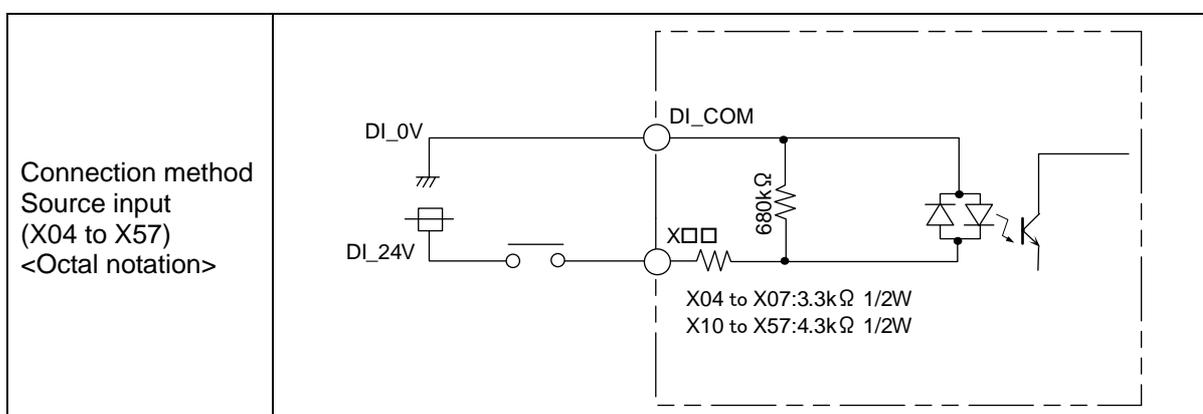
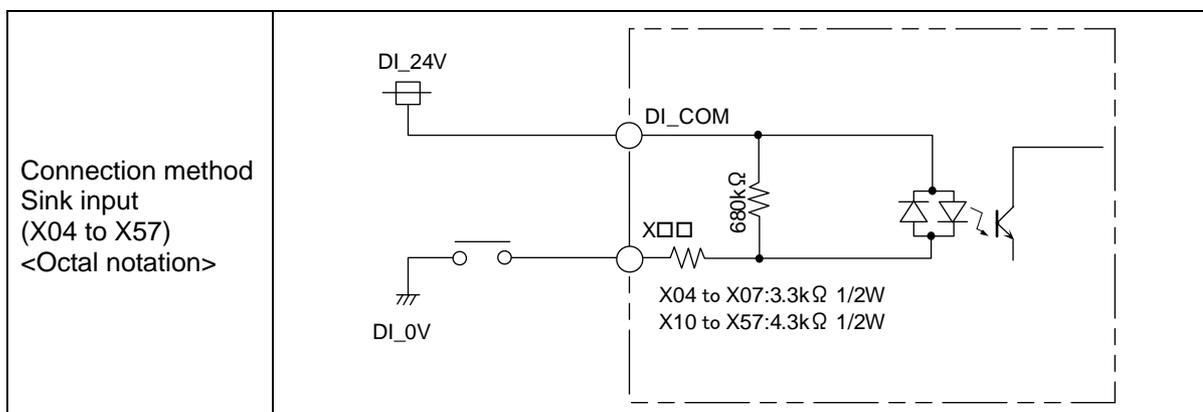


5. CONNECTION OF UNIT

5.7 Connection of Machine Input/Output Signal

[Outline of input circuit]

The digital signal input circuit includes the sink type and source type. These can be selected with each connector unit.



[Input specifications]

Item	Specifications
Input voltage, current	7mA/24VDC +10%, -15% (X04 to X07 sink/source changeover) (External power supply)
	5mA/24VDC +10%, -15% (X10 to X57 sink/source changeover) (External power supply)
Input sensitivity	OFF → ON 4.5mA or more, ON → OFF 1.5mA or less
Input response time	OFF → ON Approx. 4ms, ON → OFF Approx. 4ms (General input X20 to X57)
	X00 to X17 are incorporated in the digital filter. (Can be changed to 0 to 60ms; note that the minimum is 50μs) (Note)
	X00 to X03 require 50μs or more for the second trigger to be validated. The input pulse is detected at
Circuit insulation	Photo coupler insulation (* Excluding line receiver input)

(Note) The input filter value can be changed by rewriting the contents of the special data register D8020 between 0 and 60 using the MOV command, etc. (The contents of D8020 are automatically set to 10 (10ms) when the power is turned OFF and ON.)

D8020 value	Digital filter value
0	0ms
10	10ms
to	to
60	60ms

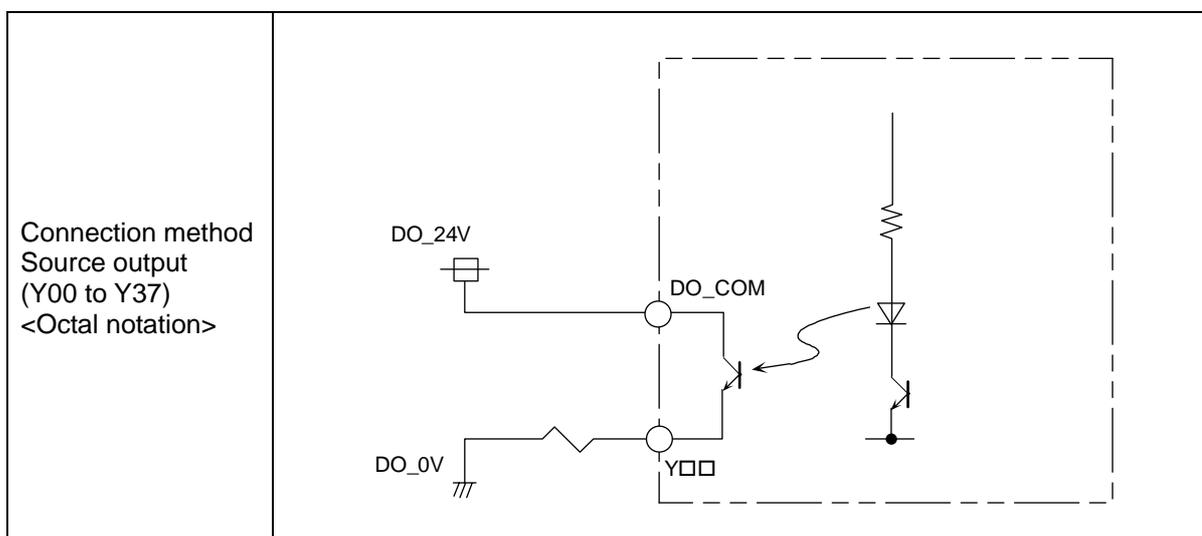
Note that in actual use, the minimum C-R filter is provided even on this input, and the value will not be lower than 50μs (20μs for X00 to X01). Refer to the FX2N Hardware Manual for details.

5. CONNECTION OF UNIT

5.7 Connection of Machine Input/Output Signal

[Outline of output circuit]

The digital signal output circuit is a source type.



[Output specifications]

Item	Specifications (per point)	
Rated voltage, current	5VDC to 30VDC, 0.1A	
Response time	0.2ms (at 24VDC, 0.1A energizing)	
Maximum load	Resistance load	60mA (200mA for Y0 to Y3)
	Inductive load	2.4W/24VDC (7.2W/24VDC for Y0 to Y3)
	Lamp load	0.3W/24VDC (0.9W/24VDC for Y0 to Y3)
Output saturation voltage	1.2V/0.1A	
Circuit insulation	Photo coupler insulation	

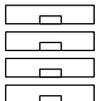
<Caution>

- * When using an inductive load such as a relay, always connect a diode (voltage resistance 100V or more, 100mA or more in reverse direction) in parallel to the load. Note that the device will be damaged if the diode orientation is incorrect.
- * When using a capacity load such as a lamp, always connect a protective resistor ($R = 150\Omega$) serially to the load to suppress rush currents. (Make sure that the current is less than the above tolerable current including the momentary current.)



- ❗ When using an inductive load such as a relay, always connect a diode in parallel to the load as a noise countermeasure.
- ❗ When using a capacity load such as a lamp, always connect a protective resistor serially to the load to suppress rush currents.

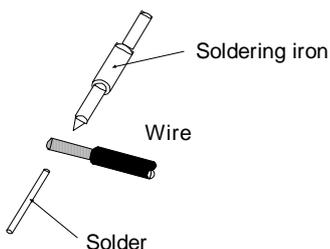
APPENDIX 2 LIST OF CONNECTOR SETS

		Package contents			
Type	Application				
FCUA- CS000	Remote I/O unit (FCU6-DX561) - Spindle amplifier (MDS-B/C1-SP□□ MDS-B-SPJ2-□□)	Connector (3M) 10120-3000VE x 2 pcs. 	Connector case (3M) 10230-52F0-008 x 2 pcs. 	/	/
FCUA- CS301	DIO connector - terminal block	Connector (3M) 7940-6500SC x 4 pcs. 	Strain relief (3M) 3448-7940 x 2 pcs. 	/	/
FCUA- CN211	I/O communication connector	Connector (Tyco Electronics AMP) 1-178288-3 x 1 pc. 	Metal contact (Tyco Electronics AMP) 1-175218-2 x 3 pcs. 	/	/
FCUA- CN220	24VDC power connector	Connector (Tyco Electronics AMP) 2-178288-3 x 1 pc. 	Tin contact (Tyco Electronics AMP) 1-175218-5 x 3 pcs. 	/	/
FCUA- CN300	DIO connector	Connector (3M) 7940-6500SC x 2 pcs. 	/	/	/

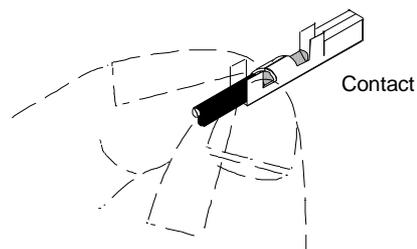
APPENDIX 3 CABLE MANUFACTURING DRAWING

As a rule, most F□□□/R□□□ cables used with this product are not sold by Mitsubishi. Thus, manufacture the required cables using the cable manufacturing drawings on the following pages as a reference. Note that the cable-compatible connectors can be purchased from Mitsubishi. If crimp tools are not available when manufacturing the power supply cable (R200, R220) and communication cable (R211), the cables can be manufactured by soldering a wire and connector as shown in the following procedure.

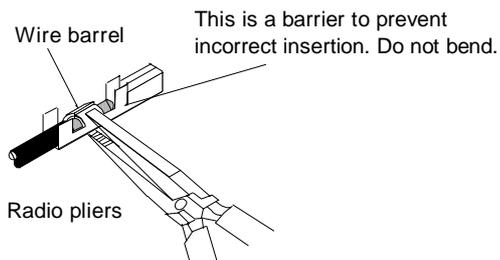
1. Carry out preparatory soldering onto the wire.
(Peel 3.5mm of the sheath.)



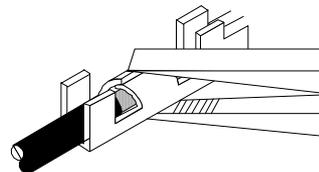
2. Insert the wire into the contact. Hold the sheath retainer.



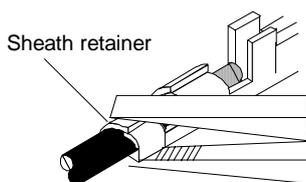
3. Lightly press down one side of the wire barrel using radio pliers.



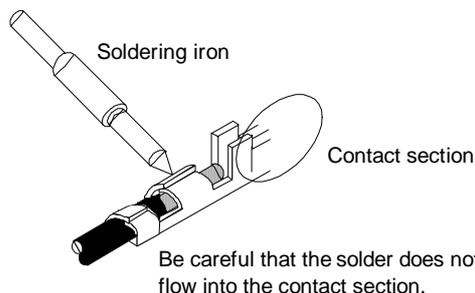
4. Firmly press down the other side of the wire barrel.
(Press firmly enough that the wire will not come out when pulled lightly.)



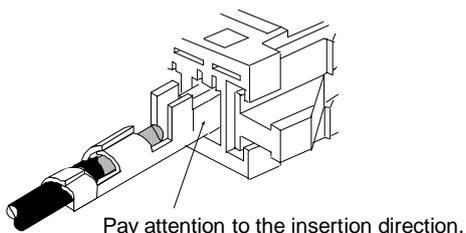
5. Firmly press down the sheath retainer in the same manner as the wire barrel.



6. Apply the soldering iron, and melt the preparatory solder inside.
Better results will be achieved if an additional, small amount of solder is applied.



7. Lastly, insert the soldered contact with wire into the housing.

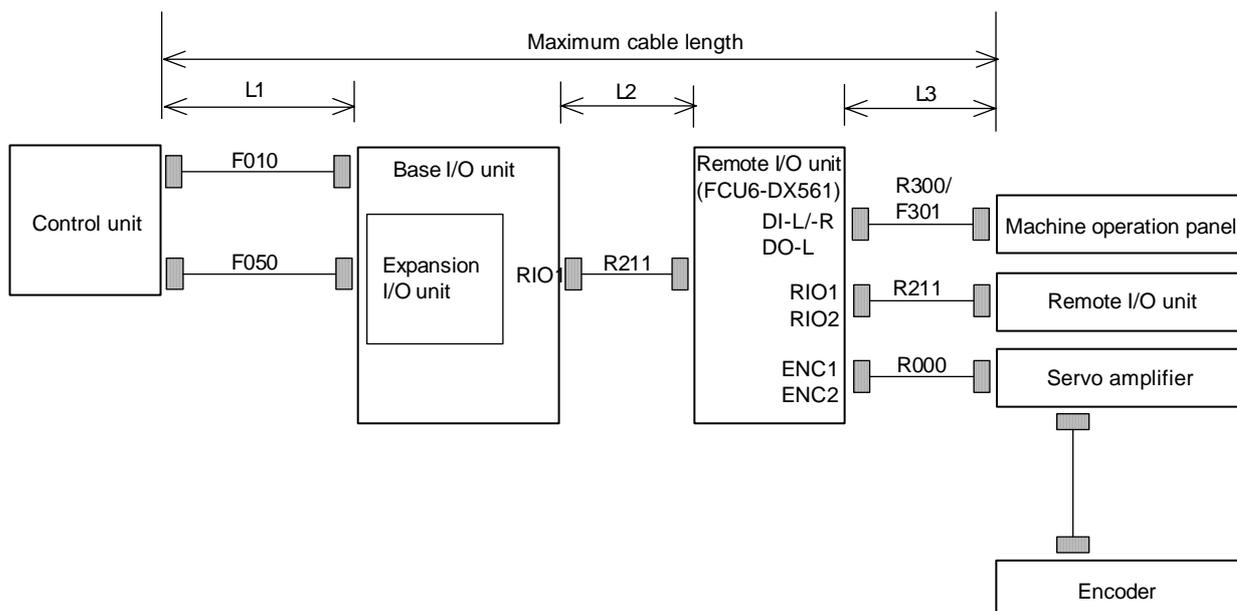


APPENDIX 3 CABLE MANUFACTURING DRAWINGS

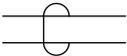
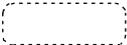
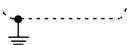
<Cable type name table>

Appendix No.	Cable type	Application	Max. length	Standard cable length
Appendix 3.1	R000 cable	Encoder : 2ch	30m	
Appendix 3.2	R211 cable	Remote I/O	*50m	
Appendix 3.3	R220 cable	+24V input	30m	
Appendix 3.4	R300 cable	DI/DO	20m	
Appendix 3.5	R301 cable	DI/DO	20m	
Appendix 3.6	R-TM terminator	RIO unit communication terminator		

(Note 1) For the cable with an asterisk (*) in the maximum cable length column, the total length (L1+ L2 + L3) of the cable length (L1) from the control unit to the base I/O unit, the cable length (L2) from the base I/O unit to this unit, and the cable length (L3) from this unit to each unit must be less than this value.



(Note 2) Symbols for writing cable drawings
The following symbols are used in the cable drawings.

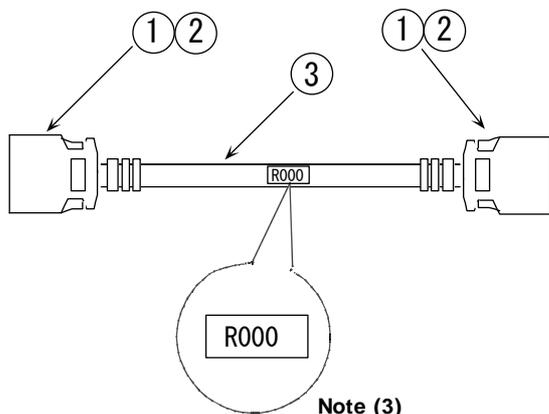
1.  indicates twist.
2.  indicates the shield sheath.
3.  indicates shield clamping to the ground plate.
4. In the cable drawings, the partner of the twisted pair cable is given a priority, so the pin Nos. of the connectors at both ends are not necessary in number of order.
5. Equivalent parts can be used for the connector, contact and wire material.

APPENDIX 3 CABLE MANUFACTURING DRAWINGS
Appendix 3.1 FCUA-R000 Cable Manufacturing Drawing

Appendix 3.1 FCUA-R000 Cable Manufacturing Drawing

Application: Remote I/O unit (FCU6-DX561) to spindle connection
 Option (compatible connector set)
 FCUA-CS000

Assembly drawing

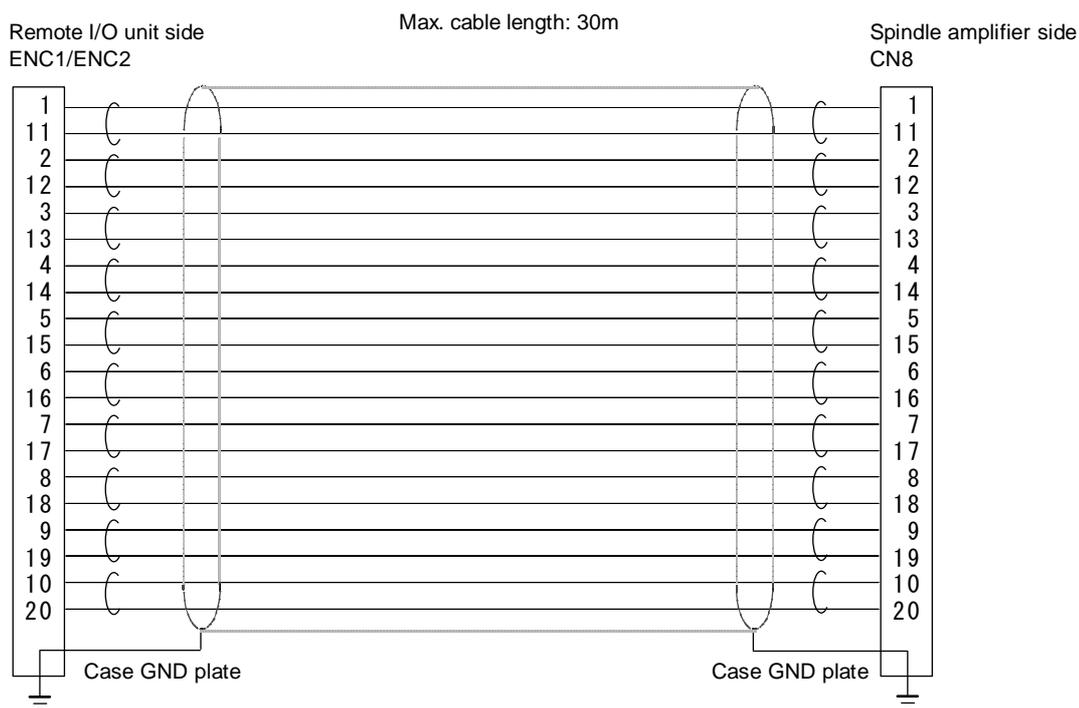


List of parts used

No.	Part name/model	Maker	Qty.
1	Connector 10120-6000EL	Sumitomo 3M	2
2	Connector case 10320-3210-000	Sumitomo 3M	2
3	Wire material UL20276 AWG28 x 10P	Note (1)	(1)

(Note) This cable is the same as the SH21 cable.

Connection diagram



Manufacturing precautions

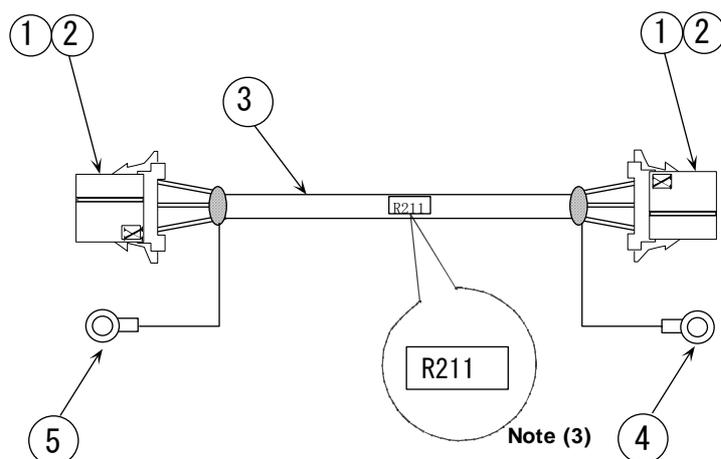
- (1) The wire material shall be a shielded, 10-pair stranded cable equivalent to UL20276 Standard AWG28 (0.08mm²).
- (2) The parts used shall be Mitsubishi recommended parts. Equivalent parts may be used providing they are compatible with the specifications.
- (3) Attach the nameplate (with protective cover stamped with the cable name) in the position designated in the assembly drawing.
- (4) Fold the wire material shield over the sheath, and wrap copper foil tape over it. Then clamp with the connector case frame.
- (5) Part No. 1 (connector) and part No. 2 (connector case) are solderless types. If soldering types are required, use parts 10120-3000VE for the connector and 10320-52F0-008 for the connector case (both parts manufactured by Sumitomo 3M).

APPENDIX 3 CABLE MANUFACTURING DRAWINGS
Appendix 3.2 FCUA-R211 Cable Manufacturing Drawing

Appendix 3.2 FCUA-R211 Cable Manufacturing Drawing

Application: Connection between base I/O unit and remote I/O unit (FCU6-DX561)
 Connection between remote I/O unit (FCU6-DX561) and remote I/O unit (FCUA-DX1□□)
 Connection between remote I/O unit (FCUA-DX1□□) and remote I/O unit (FCUA-DX1□□)
 Option (corresponding connector set)
 FCUA-CN211
 (Note that when a single-end connector and contact are used, there is no crimp terminal)

Assembly drawing

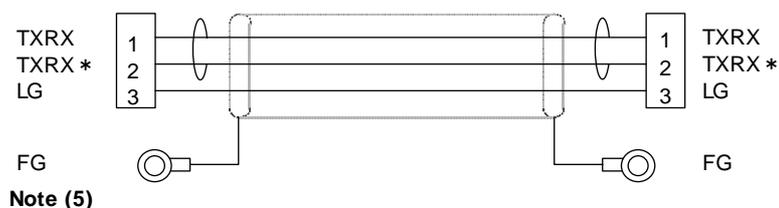


List of parts used

No.	Part name/type	Maker	Qty.
1	Connector 1-178288-3	Tyco Electronics AMP	2
2	Contact 1-175218-2	Tyco Electronics AMP	6
3	Wire material MIX3CHRV-SV-SB Twisted pair cable with compound 3-pair shield (TOA Electric Industry)	Note (1)	(1)
4	Crimp terminal V1.25-3	J.S.T.	1
5	Crimp terminal V1.25-5	J.S.T.	1

Connection diagram

Max. cable length: 50m



Manufacturing precautions

- (1) The wire material shall be a shielded 3-pair stranded pair cable equivalent to AWG20 (0.5mm²).
- (2) The parts used shall be Mitsubishi recommended parts. Equivalent parts may be used providing they are compatible with the specifications.
- (3) Attach the nameplate (with protective cover stamped with the cable name) in the position designated in the assembly drawing.
- (4) Install each crimp terminal side after stamping the name of each signal on the mark tube.
- (5) Protect both ends of the wire material with insulation bushing.
- (6) Use AWG18 (0.75mm²) or equivalent for the shield treatment wire material.
- (7) Ground the crimp terminal connected to the shield to the control unit or communication terminal frame ground.

Note that to improve the noise resistance, there may be cases when only one end is connected, both ends are connected, or neither end is connected.

APPENDIX 3 CABLE MANUFACTURING DRAWING
Appendix 3.3 FCUA-R220 Cable Manufacturing Drawing

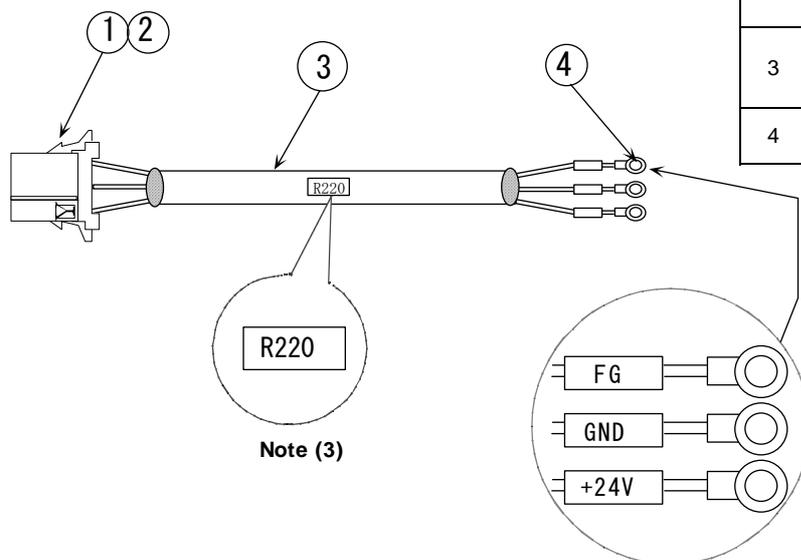
Appendix 3.3 FCUA-R220 Cable Manufacturing Drawing

Application: Supply of 24V to remote I/O unit (FCU6-DX561)
 Option (compatible connector set)
 FCUA-CN220
 (Note that this corresponds only to the connector on the remote I/O unit side.)

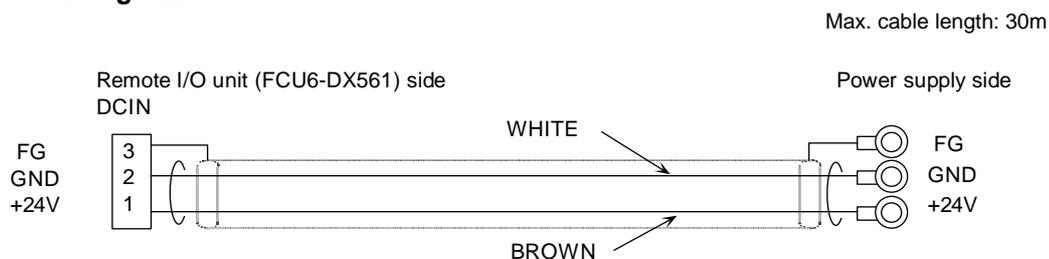
List of parts used

No.	Part name/model	Maker	Qty.
1	Connector 2-178288-3	Tyco Electronics AMP	1
2	Contact 1-175218-5	Tyco Electronics AMP	3
3	Wire material JPVV-SB 1P × 0.5mm ²	BANDO Electric Wire Note (1)	(1)
4	Solderless terminal V1.25-3	J.S.T.	3

Assembly drawing



Connection diagram



Manufacturing precautions

- (1) The wire material shall be a shielded 1-pair stranded cable equivalent to AWG20 (0.5mm²).
 (If the cable length exceeds 10m, use AWG16 (1.25mm²).)
- (2) The parts used shall be Mitsubishi recommended parts. Equivalent parts may be used providing they are compatible with the specifications.
- (3) Attach the nameplate (with protective cover stamped with the cable name) in the position designated in the assembly drawing.
- (4) Install each crimp terminal side after stamping the name of each signal on the mark tube.
- (5) Protect both ends of the wire material with insulation bushing.
- (6) Use AWG18 (0.75mm²) or equivalent for the shield treatment wire material.

APPENDIX 3 CABLE MANUFACTURING DRAWING
Appendix 3.4 R300 Cable Manufacturing Drawing

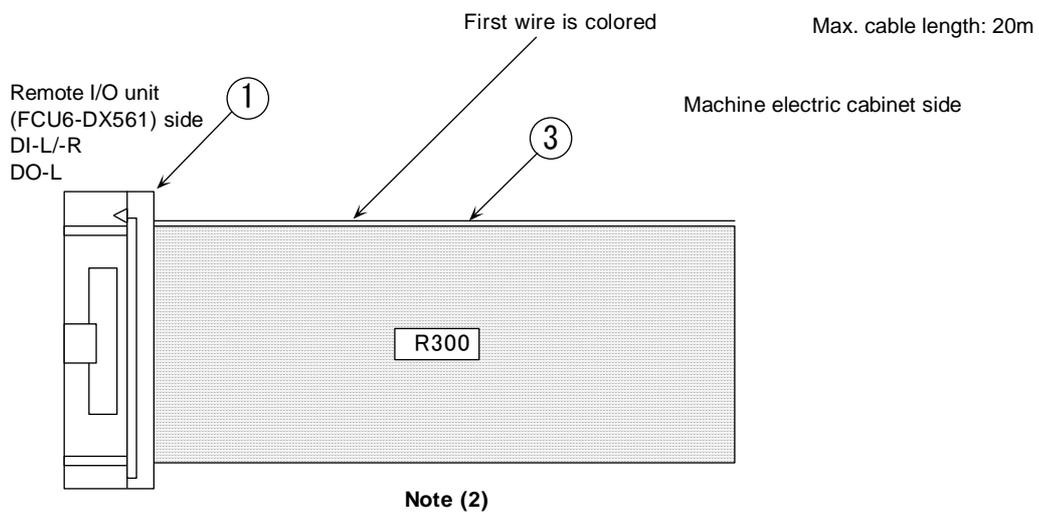
Appendix 3.4 R300 Cable Manufacturing Drawing

Application: DIO – Machine electric cabinet

List of parts used

No.	Part name/model	Maker	Qty.
1	Connector 7940-6500SC	Sumitomo 3M	1
2	Wire material B40-S	Note (1)	(1)

Assembly drawing



Manufacturing precautions

- (1) The parts used shall be Mitsubishi recommended parts. Equivalent parts may be used providing they are compatible with the specifications.
- (2) Attach the nameplate (with protective cover stamped with the cable name) in the position designated in the assembly drawing.
- (3) The cable is the same for DI and DO. However, stamp DI or DO on the connector to prevent incorrect insertion.

APPENDIX 3 CABLE MANUFACTURING DRAWING
Appendix 3.5 R301 Cable Manufacturing Drawing

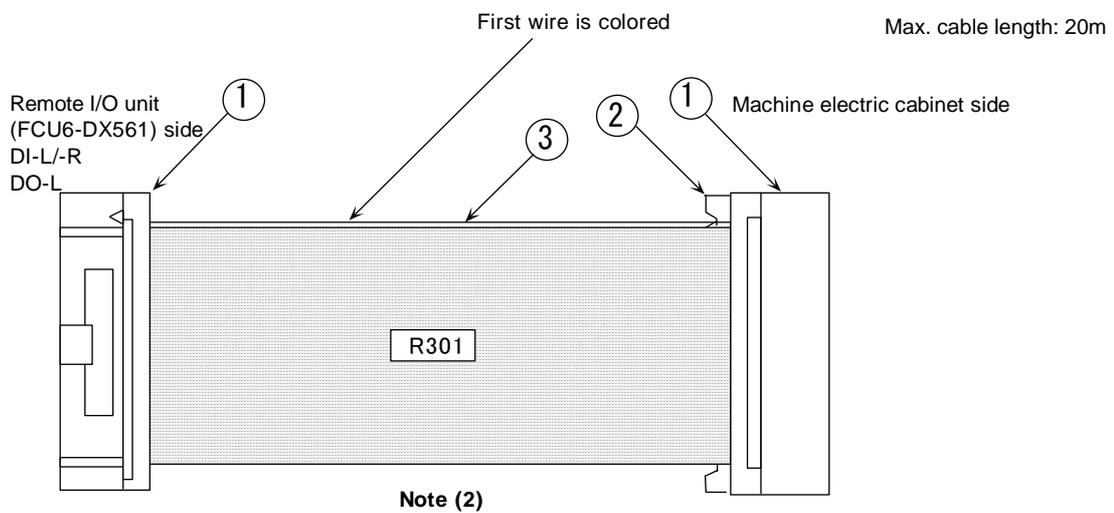
Appendix 3.5 R301 Cable Manufacturing Drawing

Application: DIO – Machine electric cabinet

List of parts used

No.	Part name/model	Maker	Qty.
1	Connector 7940-6500SC	Sumitomo 3M	2
2	Strain relief 3448-7940	Sumitomo 3M	1
3	Wire material B40-S	Note (1)	(1)

Assembly drawing



Manufacturing precautions

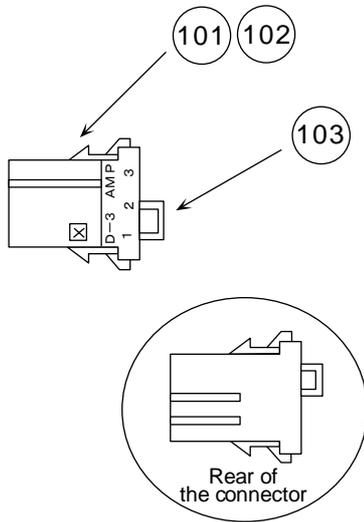
- (1) The parts used shall be Mitsubishi recommended parts. Equivalent parts may be used providing they are compatible with the specifications.
- (2) Attach the nameplate (with protective cover stamped with the cable name) in the position designated in the assembly drawing.
- (3) The cable is the same for DI and DO. However, stamp DI or DO on the connector to prevent incorrect insertion.

APPENDIX 3 CABLE MANUFACTURING DRAWING
Appendix 3.6 R-TM Manufacturing Drawing

Appendix 3.6 R-TM Manufacturing Drawing

Application: Terminator for MC link B remote I/O unit (FCU6-DX561) termination

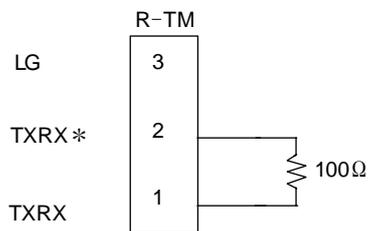
Assembly drawing



List of parts used

No.	Part name/model	Maker	Qty.
1	Connector 1-178288-3 (X type)	Tyco Electronics AMP	1
2	Contact 1-175216-2	Tyco Electronics AMP	2
3	Resistor 100Ω 1/4W	KOA	1

Connection diagram



Manufacturing precautions

- (1) The parts used shall be Mitsubishi recommended parts. Equivalent parts may be used providing they are compatible with the specifications.
- (2) Cover the 100Ω terminator with a black insulation tube.
- (3) Stamp the connector name "R-TM" in white on the rear of the connector.

APPENDIX 4 PRECAUTIONS FOR COMPLYING WITH UL/c-UL STANDARDS

Observe the following matters to comply with the UL/c-UL Standards.

(1) Selecting the external 24VDC power supply unit

The remote I/O unit (FCU6-DX561) complies with UL Standards on the condition that the external power supply unit for supplying 24VDC is a UL-approved part. Use a UL-approved part for the power supply unit supplying 24VDC to this unit.

(2) Unit ambient temperature

The remote I/O unit (FCU6-DX561) complies with UL Standards on the condition that it is used within the maximum ambient temperature given in "3.1 General Specifications" in Chapter 3 of this manual.

Design so that the maximum ambient temperature of this unit does not exceed the temperature given in "3.1 General Specifications" in Chapter 3 of this manual.

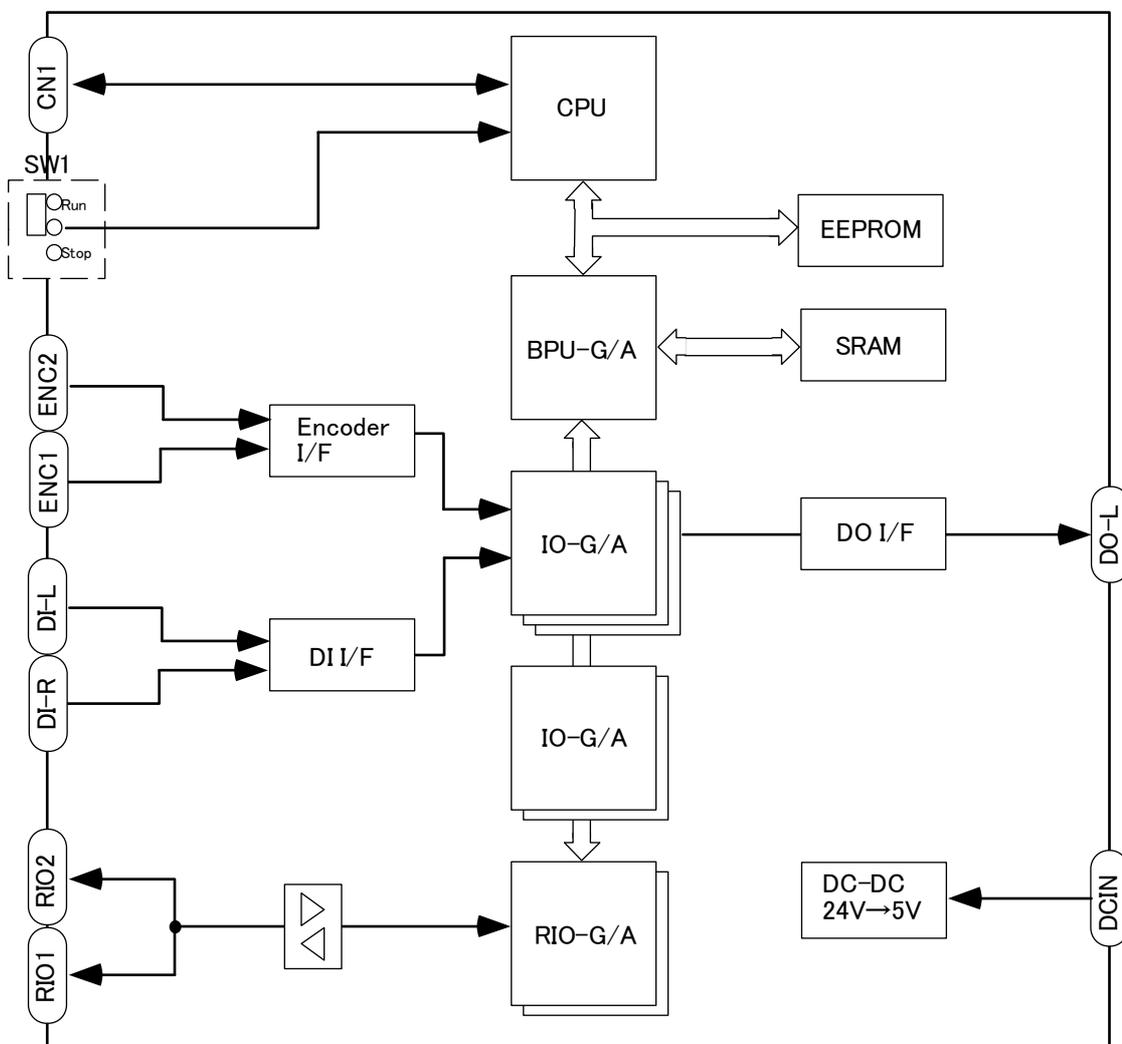
II. MAINTENANCE MANUAL

1. EXPLANATION OF MODULE FUNCTIONS
1.1 FX2N-80BMT-NC Card

1. EXPLANATION OF MODULE FUNCTIONS

1.1 FX2N-80BMT-NC Card

[Block diagram]



[Explanation of functions]

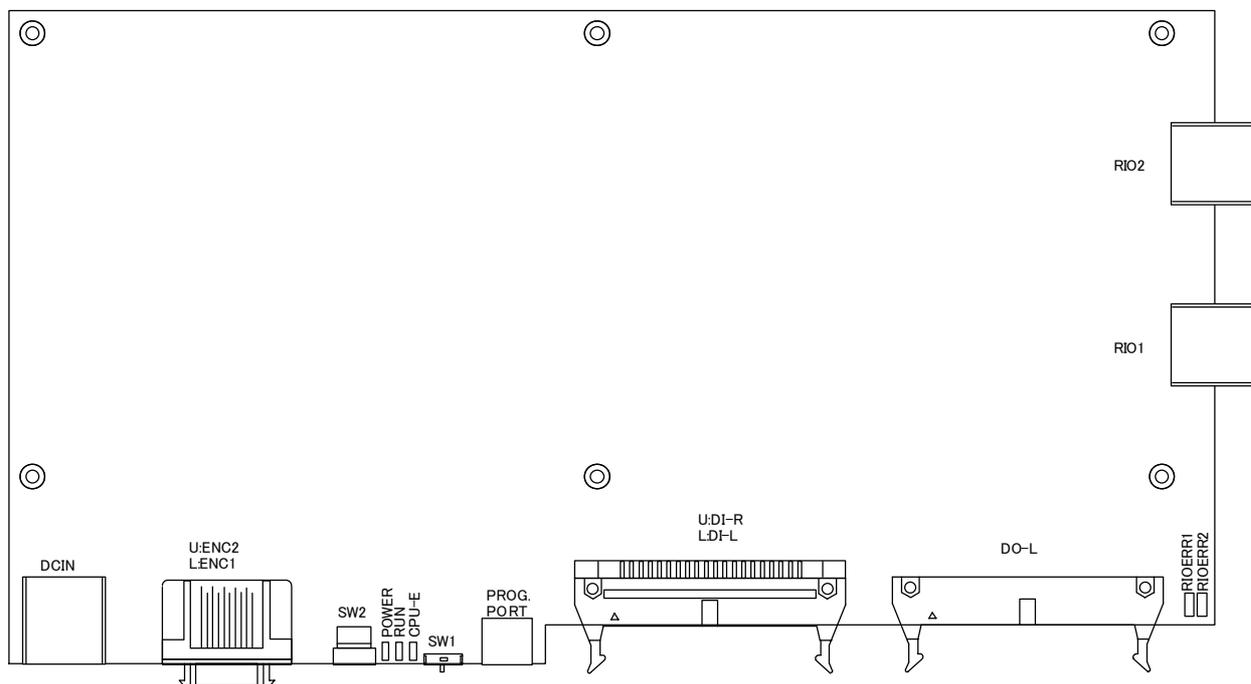
The FX2N-80BMT-NC card is based on the MELSEC PLC FX2N Series, and has two remote I/O controllers mounted. This functions as the remote I/O's slave station.

CPU	System control	
BPU-G/A	PLC operation	
IO-G/A	External I/O interface	
Memory	EEPROM	For ladder storage
	SRAM	Memory for execution
RIO-G/A	Remote I/O controller	Occupies two stations
I/O interface	ENC1/2 connector	Encoder speed signal connection: 4ch
	DI-L/-R connector	Input: 44 points
	DO-L connector	Output: 32 points
	RIO1/2 connector	Remote IO slave station
Power supply	DCIN connector	Input: 24VDC +15%/-10% : 0.6A

1. EXPLANATION OF MODULE FUNCTIONS

1.1 FX2N-80BMT-NC Card

[Connector layout diagram]



[Explanation of settings]

SW1	RUN-STOP slide switch	Starts running when the switch is set to RUN, and stops when set to OFF.
SW2	Remote I/O station No. setting rotary switch	0 to 7: Corresponds to the RIO station No. 0 to 7 (Set an even number) 8 and following: Loop back test mode (for testing) (If the base I/O occupies 0 and 1, set the switch to 2.)

[Explanation of LEDs]

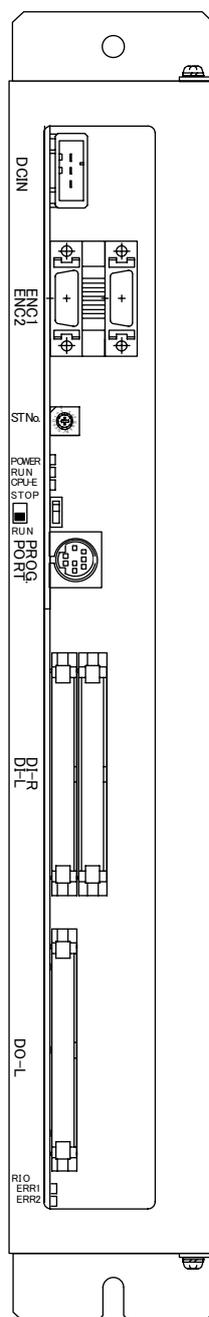
POWER	(Green) 5V power output display	This turns ON when the state is normal.
RUN	(Green) Operation display	When the unit power is turned ON, the self-diagnosis function activates. If there is no error, the operation state is entered ("RUN" LED turns ON).
CPU-E	(Red) CPU error display	
RIOERR1	(Red) Communication alarm in onboard RIO 0th station	
RIOERR2	(Red) Communication alarm in onboard RIO 1st station	

2. FAULT DIAGNOSIS

2.1 List of Unit LEDs

2. FAULT DIAGNOSIS

2.1 List of Unit LEDs



[Explanation of LED functions]

Name	Function	Color	Status		Correspondence for error
			When normal	During error	
POWER	5VDC output display	Green	Lit	Not lit	24VDC +10%/-15% Check the input
RUN	Operation display	Green	Lit	Not lit	Check the RUN-STOP slide switch setting
CPU-E	CPU error display	Red	Not lit	Lit	Refer to section 2.2.2.
RIOERR1	Onboard I/O 1st station communication alarm	Red	Not lit	Lit	Check the station No. setting rotary switch setting
RIOERR 2	Onboard I/O 2nd station communication alarm	Red	Not lit	Lit	

2.2 Troubleshooting

2.2.1 Confirmation of trouble state

Confirm "when", "when doing what", and "what kind of" trouble occurred.

(1) When?

What time did the trouble occur?

(2) When doing what?

What was the NC operation mode?

(3) What kind of trouble?

- What was displayed on the setting display unit's Alarm Diagnosis screen?
Display the Alarm Diagnosis screen, and check the alarm details.
- What was displayed for the machine sequence alarm?
- Is the CRT and LCD screen normal?

(4) How frequently?

- When did the trouble occur? What was the frequency? (Does it occur when other machines are operating?) If the trouble occurs infrequently or if it occurs during the operation of another machine, there may be an error in the power voltage or the trouble may be caused by noise, etc. Check whether the power voltage is normal (does it drop momentarily when other machines are operating?), and whether noise measures have been taken.
- Does the trouble occur during a specific mode?
- Does the trouble occur when the overhead crane is operating?
- What is the frequency in the same workpiece?
- Check whether the same trouble can be repeated during the same operation.
- Check whether the same trouble occurs when the conditions are changed.
(Try changing the override, program details, and operation procedures, etc.)
- What is the ambient temperature?
(Was there a sudden change in the temperature?)
- Is there any contact defect or insulation defect in the cables?
(Has any oil or cutting water splattered onto the cables?)

2. FAULT DIAGNOSIS

2.2 Troubleshooting

2.2.2 When in trouble

If the system does not operate as planned or if there is any trouble in the operation, confirm the following points and then contact the Mitsubishi Service Center.

– **Examples of trouble** –

- The power does not turn ON.
- The external power turns ON, but the control power does not turn ON.
- The power turns OFF.
- The communication alarm display "RIOERR1"/"RIOERR2" LED turns ON.
- The 5VDC output display "POWER" LED turns OFF.
- The CPU error display "CPU-E" turns ON (flickers).
- The operation display "RUN" LED does not turn ON.
- The load does not turn ON/OFF even though the corresponding output is turned ON or OFF in the ladder monitor.

2. FAULT DIAGNOSIS
2.2 Troubleshooting

(1) Problems related to the power supply

The power does not turn ON.	
Cause	Remedy
The door interlock is applied.	If the control panel door is not completely closed, close it. If the door interlock is applied even when the door is closed, the door interlock circuit is damaged.
The external power supply's input voltage is not as specified.	Check that the input voltage is within 200 to 230AC +10%/–15%. (Note) The power supply for this unit is 24VDC.
The external power supply is faulty.	Check that the power can be turned ON with just the external power supply. (Note) Depending on the external power supply, the power may not turn ON in the no-load state, so install a slight load and check.
The external power turns ON but the NC control power does not turn ON.	
Cause	Remedy
The external power supply output is not correct.	Disconnect the cable between the unit and the external power supply, and check that the external power supply output voltage is normal.
The power cable is disconnected or broken.	Check the cable between the unit and external power supply, and securely insert it. Check that the cable is not broken, and replace if broken.
There is a short circuit in the configuration card.	Check that no inductive foreign matter has entered the unit.
The power turns OFF.	
Cause	Remedy
There is a problem in the supplied power.	Check whether the voltage fluctuates at certain time zones. Check whether an instantaneous power failure has occurred.
A problem occurs when the peripheral device starts operating.	Check whether the voltage drops instantaneously when the peripheral device operation starts.

2. FAULT DIAGNOSIS

2.2 Troubleshooting

(2) Problems related to remote I/O unit (FCU6-DX561)

If any of the following problems occur, all points of the machine input/output data for the remote I/O unit (FCU6-DX561) will turn OFF or may become unreliable. Thus, detect "Mismatch of input" with the PLC for another unit (NC).

The communication alarm display "RIOERR1"/"RIOERR2" LED turns ON.	
Cause	Remedy
The remote I/O cable (R211) is not connected, is broken, or the connector has a contact fault.	Check the connection of the cable (R211) between the base I/O unit and remote I/O unit (FCU6-DX561).
The remote I/O cable (R211) is being affected by noise.	Separate the remote I/O cable (R211) from the drive line and power line. Always connect the FG wire to the grounding plate.
The station No. setting rotary switch (SW2) setting is duplicated with another unit.	Change the base I/O unit, remote I/O unit (FCU6-DX561) and other remote I/O unit (FCUA-DX1□□) station No. rotary switch settings so that the station numbers are not duplicated.
A fault has occurred in the internal circuit of the FX2N-80BMT-NC card.	Contact the Service Center and have the unit replaced.
The 5VDC output display "POWER" LED turns OFF. (Or, the CPU-E LED lights for an instant.)	
Cause	Remedy
The input power is not within the tolerable range, or there is a fault in the internal 5V output generation circuit.	Check that the input voltage is +20V or less, and that the voltage has not dropped for an instant. If the power is supplied correctly, contact the Service Center.
The CPU error display "CPU-E" turns ON (flickers).	
Cause	Remedy
If the CPU does not run properly because inductive foreign matter has entered or because of abnormal noise from an external source, or if the operation cycle exceeds 200ms, the watch dog timer error will occur and cause this LED to turn ON.	If the watch dog timer error has occurred, error code 6105 will be stored when D8061 is monitored with a peripheral device. Review the program to see whether the operation cycle is too long. (Monitor D8012 to find the maximum operation cycle.) Note that if the problem is caused by any other factor, a communication error will occur and online operations will not be possible when a peripheral device is connected. Check for the presence of an abnormal noise generation source and for the entry of inductive foreign matter. If this LED changes from a stable light to a flicker as a result of the inspection, check the program. (Check for circuit errors and syntax errors with the peripheral device's program check function.) If the "CPU-E" LED is still ON after completing all inspections, contact the Service Center.

CAUTION

-  Do not apply voltages other than those indicated in this manual on the connector. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect the PCBs while the power is ON.

2. FAULT DIAGNOSIS

2.2 Troubleshooting

The operation display "RUN" LED does not turn ON.	
Cause	Remedy
The RUN/STOP switch is set to STOP.	Set the RUN/STOP switch to RUN.
An error was detected by the unit's self-diagnosis function.	Check for circuit errors and syntax errors with the peripheral device's program check function. If the operation is stopped with a watch dog timer error, refer to the section "The CPU error display "CPU-E" turns ON (flickers)." on the previous page.
The load does not turn ON/OFF even though the corresponding output is turned ON or OFF in the ladder monitor.	
Cause	Remedy
The relay output contact has fused due to an overload, load short-circuit or the rush current of a capacity load, etc., or a contact fault has occurred due to a rough contact surface.	If the error occurs even after the relay is replaced or the cause of the relay output contact fusion is removed, contact the Service Center.
A fault has occurred in the FX2N-80BMT-NC card output circuit.	Check whether there are any causes of overcurrent, such as a load short-circuit. Measure the output voltage with a tester. If the specified voltage is not output, contact the Service Center and have the unit replaced.

 **CAUTION**

-  Do not apply voltages other than those indicated in this manual on the connector. Doing so may lead to destruction or damage.
-  Incorrect connections may damage the devices, so connect the cables to the specified connectors.
-  Do not connect or disconnect the connection cables between each unit while the power is ON.
-  Do not connect or disconnect the PCBs while the power is ON.

2. FAULT DIAGNOSIS

2.2 Troubleshooting

2.2.3 Behavior of independent faults

The EN954-1 Category 3 machine system must be designed so that the safety functions are not disabled when one of the safety-related parts fails independently. Precautions for the designs and examples of the behavior when an independent fault occurs are listed below.

<Precautions for design>

Set a safety circuit outside the FCU6-DX561 so that the entire system works safely even if an external power supply error or FCU6-DX561 fault, etc., occurs.

Detect a mismatch between PLCs or stop the machine system according to the behavior.

(1) Always configure circuits outside of the FCU6-DX561, such as an emergency stop circuit, protection circuit, interlock circuit for reciprocating operations such as forward/reverse run, and machine damage preventing interlock circuits such as positioning upper/lower limits.

(2) If the FCU6-DX561 CPU detects an error with a self-diagnosis function, such as a watch dog timer error, all DO outputs will turn OFF. Output control may be disabled when errors occur at sections, such as the input/output control section, which cannot be detected by the FCU6-DX561 CPU.

Design an external circuit or mechanism so that the machine will operate safely in this case.

(3) The output may stay ON or may stay OFF depending on faults that occur in the output circuit's photo coupler or transistor.

Design an external circuit or mechanism for the output signals that could lead to accidents so that the machine will operate safely.

Example of behavior during independent fault occurrence

Cause of fault	Behavior
The 24VDC power for control turned OFF (failed). The power cable was disconnected (broken).	The PLC will stop. The DO output will turn OFF.
The 24VDC power for DO turned OFF (failed)	The DO output will turn OFF.
The remote I/O cable was disconnected (broken). The remote I/O cable is affected by noise.	The RIO communication will stop. (The communication alarm display "RIOERR1" or "RIOERR2" LED will turn ON.)
The contact of the relay connected to DI fused, or a contact fault has occurred due to a rough contact surface.	Regardless of the machine signal's ON or OFF state, the DI input will turn OFF or ON.
The DI cable was disconnected (broken).	The DI input will turn OFF.
The contact of the relay connected to DI fused, or a contact fault has occurred due to a rough contact surface.	Regardless of the DO output's ON or OFF state, the relay will turn OFF or ON.
The DO cable was disconnected (broken).	The DO output will turn OFF.
The encoder failed. The spindle amplifier's encoder I/F circuit failed.	The encoder input data will become an abnormal value or will not be input.
The encoder cable between the encoder and spindle amplifier was disconnected (broken).	The encoder input data will not be input. (The encoder detection speed will become 0.)
The encoder cable between the spindle amplifier and FCU6-DX561 was disconnected (broken).	The encoder input data will not be input. (The encoder detection speed will become 0.)
A watch dog timer error occurred in the FCU6-DX561.	The PLC will stop, and the RIO communication will stop. The DO output will turn OFF. (The CPU error display "CPU-E" will turn ON.)
A fault occurred in the internal 5V output generation circuit.	The PLC will stop, and the RIO communication will stop. The DO output will turn OFF. (The 5VDC output display "POWER" will turn OFF.)

3. DAILY MAINTENANCE AND PERIODIC INSPECTION AND MAINTENANCE
3.1 Maintenance Tools

3. DAILY MAINTENANCE AND PERIODIC INSPECTION AND MAINTENANCE

3.1 Maintenance Tools

(1) Measuring instruments

The following measuring instruments are used to confirm that the voltage is being supplied correctly to the unit, to confirm that the wiring to the unit is correct, and to carry out simple troubleshooting.

Table 3.1 Maintenance tools

Tool	Condition	Application
Tester		To check that the wiring to the PLC unit is correct before turning the power ON.
AC voltmeter	Measure the AC power voltage. The tolerable error is $\pm 2\%$ or less.	To measure the AC power voltage being supplied to the external 24VDC power supply unit.
DC voltmeter	Max. scale 30V. The tolerable error is $\pm 2\%$ or less.	To measure the DC power voltage. External power supply 24V (control section, machine input/output interface)
Phase rotation meter		To check the connection order of the AC 3-phase input power supply.
Synchroscope		General measurement and simple troubleshooting

Note) Currently, a high-accuracy digital multi-meter is commonly used as a tester. This digital multi-meter can be used as both an AC voltmeter and a DC voltmeter.

(2) Tools

Screwdriver (large, medium, small)
Radio pliers

3. DAILY MAINTENANCE AND PERIODIC INSPECTION AND MAINTENANCE
3.2 Replacement Methods

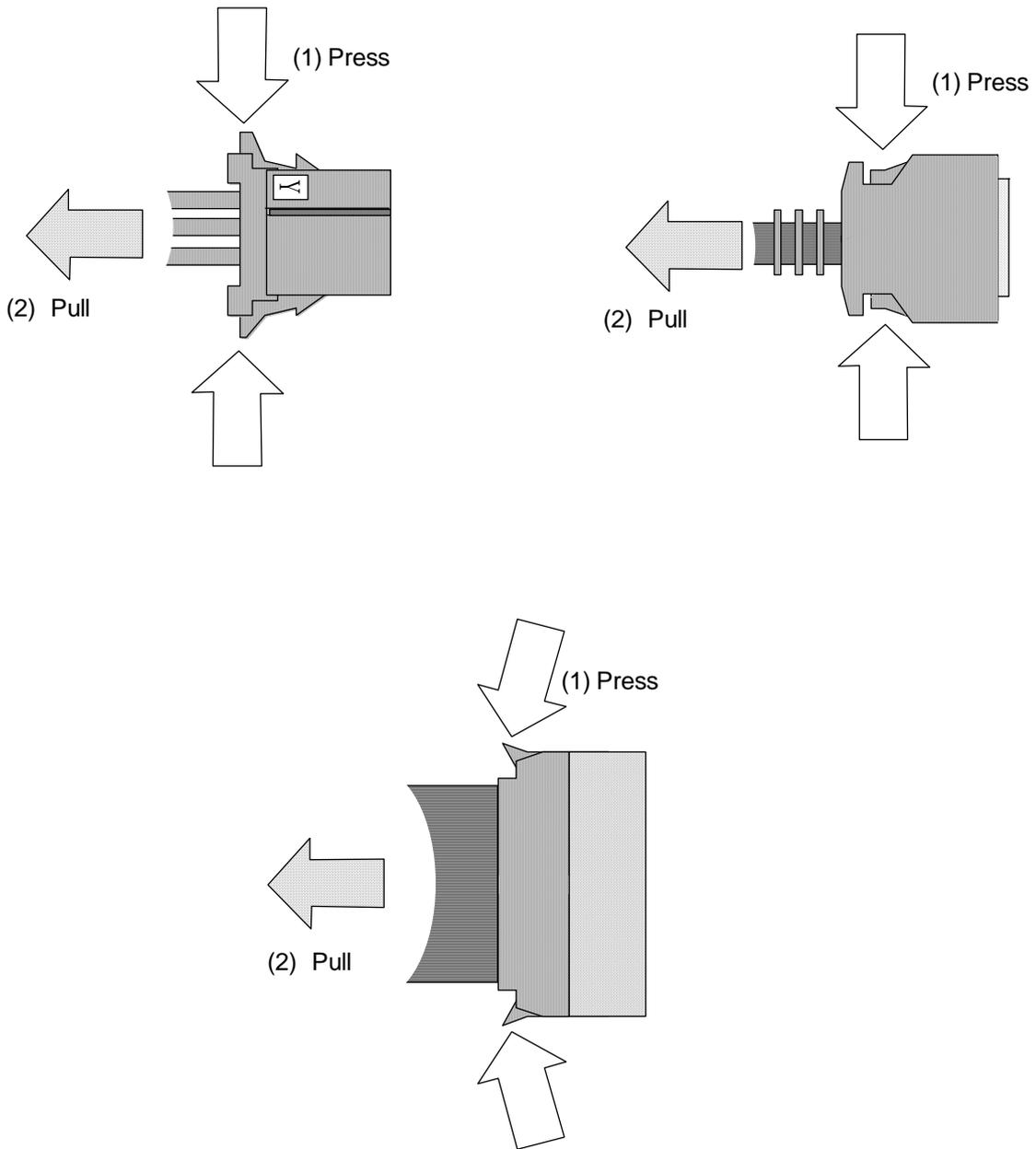
3.2 Replacement Methods

3.2.1 Cable

If the cable is replaced without turning the power OFF, the normal unit or peripheral devices could be damaged, and risks could be imposed.

Disconnect each cable with the following procedures.

- a) For the following type of connector, press the tabs with a thumb and forefinger in the direction of the arrow, and pull the connector off.



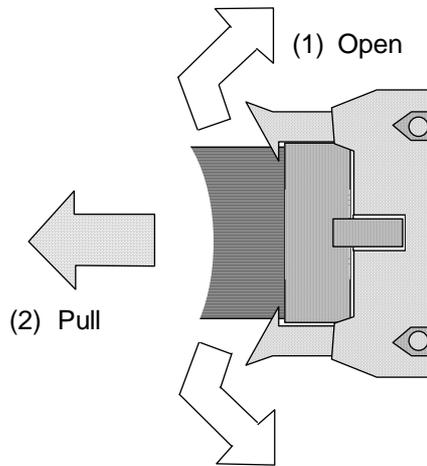
⚠ CAUTION

- ⊘ Do not connect or disconnect the connection cables between each unit while the power is ON.
- ⊘ Do not connect the cable by pulling on the cable wire.

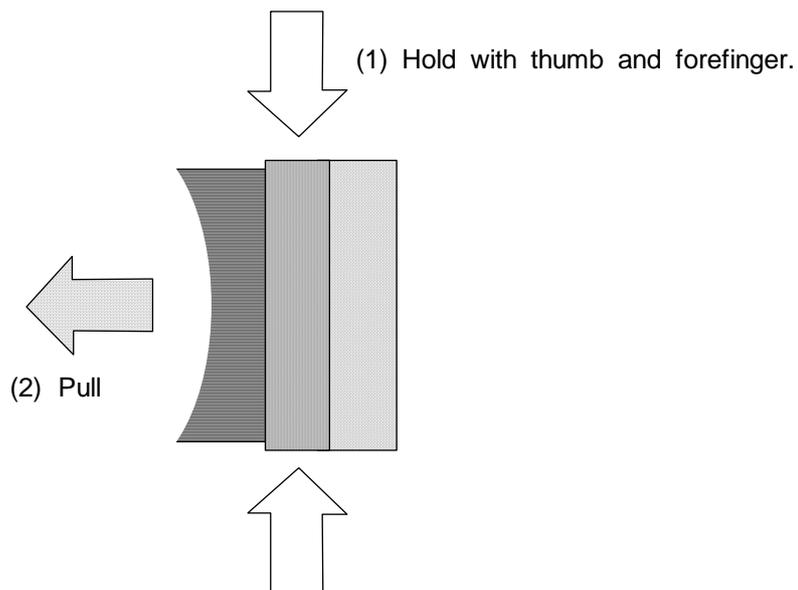
3. DAILY MAINTENANCE AND PERIODIC INSPECTION AND MAINTENANCE

3.2 Replacement Methods

- b) For a flat cable type connector with claws, open the claws in the directions of the arrows, and pull the connector off.



- c) For a flat cable type connector without claws, hold the connector with a thumb and forefinger, and pull the connector off.



CAUTION

- ⊘ Do not connect or disconnect the connection cables between each unit while the power is ON.
- ⊘ Do not connect the cable by pulling on the cable wire.

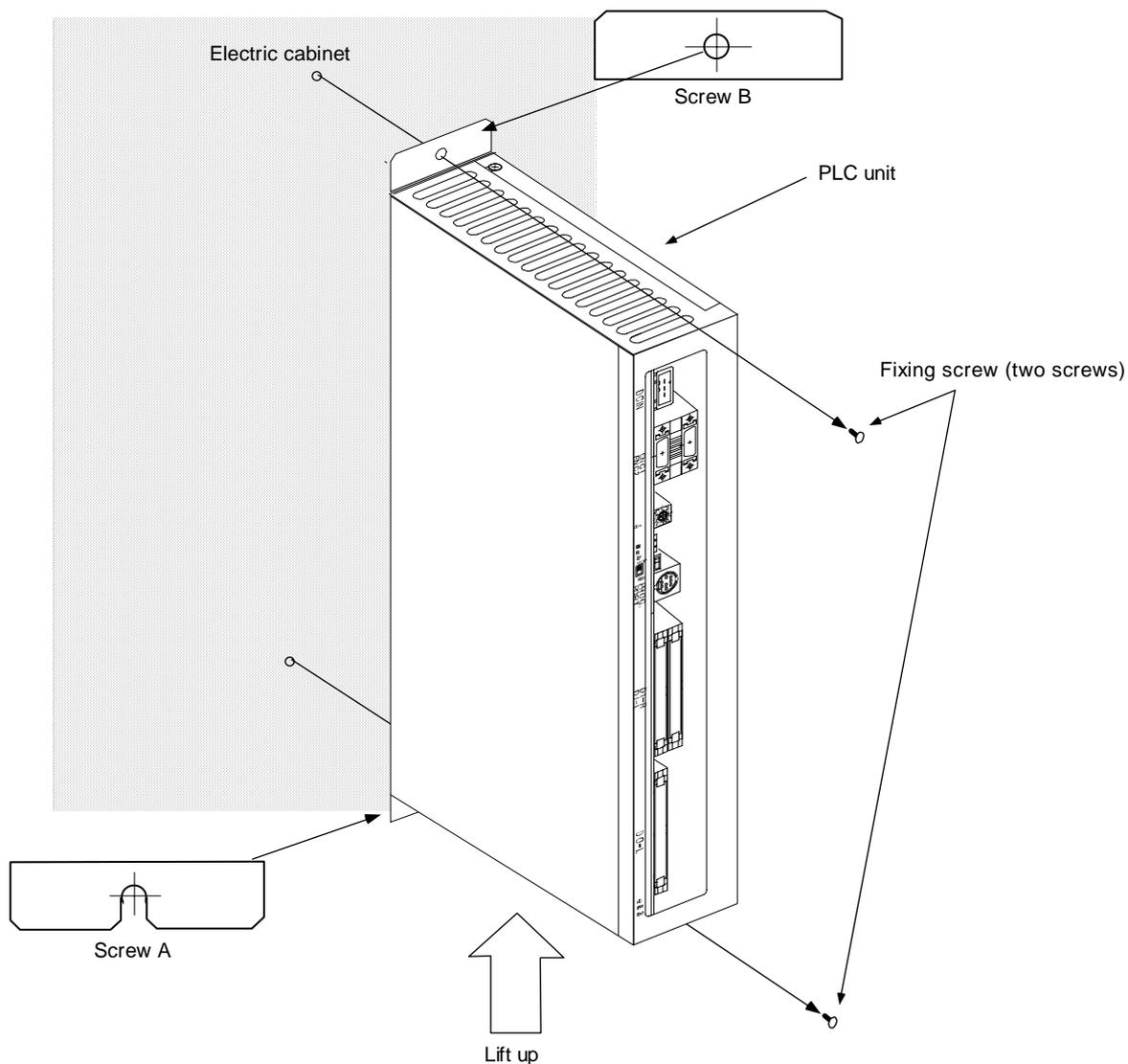
3. DAILY MAINTENANCE AND PERIODIC INSPECTION AND MAINTENANCE

3.2 Replacement Methods

3.2.2 Unit

Usually, the unit is installed on the electric cabinet side.
Always replace the unit with the machine power turned OFF.

- 1) Disconnect all cables connected to the unit.
- 2) Loosen screw A. (The screw does not need to be removed.)
- 3) While supporting the unit with a hand, remove screw B.
- 4) Lift the unit upward and remove it.
- 5) Replace with the new unit, and fix the unit with the fixing screw at the original position.
- 6) Reconnect the connected cables at the original positions.
(Connect the cables to the predetermined connectors.)
- 7) Check that all cables have been connected correctly, and then close the electric cabinet door.



CAUTION

- ⚠ Incorrect connections may damage the devices, so connect the cables to the specified connectors.
- ⚠ Do not replace the control unit while the power is ON.
- ⚠ Do not connect or disconnect the connection cables between each unit while the power is ON.

Revision history

Revision	Date of revision	Revision details
*	00/12/01	First edition issued



MODEL	REMOTE I/O UNIT·FCU6-DX561
MODEL CODE	008-165
Manual No.	BNP-B2302* (ENG)