



YASNAC PC NC Connecting Manual

Version: Beta 1.0

SAFETY INFORMATION

PRECAUTIONS

1. Read this instruction manual in its entirety before using the YASNAC PC NC Connecting Manual.
2. The following warning symbols are used to indicate precautions that the user must be aware of to safely use this equipment. Failure to follow these precautions can result in serious or possibly even fatal injury and damage to products or related equipment or system.



This symbol indicates the presence of a potentially *hazardous condition* which, if not avoided, could result in serious personal injury or death.



This precautionary symbol appears in labels attached to YASNAC products to alert the user to conditions requiring concern for safety.

SPECIAL SAFETY NOTE: This symbol indicates that **ELECTRICAL SHOCK HAZARD** condition exists. **DO NOT TOUCH** any electrical connection terminals when the power is ON, and for at least 5 minutes **after** switching off the power supply.



This symbol indicates the presence of a potentially *hazardous condition* which, if not avoided, could result in minor or moderate personal injury and/or damage to equipment.

NOTICE

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Table of Contents

1. GENERALS

1.1	System Configuration	1 - 2
1.1.1	System Configuration	1 - 2
1.1.2	Connection between Devices	1 - 3
1.1.3	Connector Layout NC side	1 - 4
1.1.4	Connector Layout PC side	1 - 5
1.2	General Specifications	1 - 6
1.3	Thermal Design of Enclosure	1 - 7
1.3.1	Thermal Design.	1 - 7
1.3.2	Dust Proof Design.	1 - 11
1.3.3	Countermeasure Against Magnetic Fields	1 - 12
1.4	Cable Clamp and Shielding.	1 - 13
1.5	Packaging	1 - 14
1.5.1	General Notes	1 - 14
1.5.2	Installation of CNC Unit.	1 - 15
1.5.3	Installation of Feed/Spindle Servopacks.	1 - 16

2. POWER SUPPLY CONNECTIONS

2.1	Connection between Devices	2 - 2
2.1.1	Power Supply specifications for PCNC and I/O units	2 - 2
2.1.2	Power Supply connections to PCNC	2 - 3
2.1.3	Power Supply Connections to PCNC and I/O units	2 - 3
2.1.4	Power Supply to Converter unit	2 - 4
2.2	Detailed Connections	2 - 5
2.2.1	Power Supply to PCNC unit	2 - 5

2.2.2	Power Supply to Converter	2 - 7
2.2.3	Example of Circuit Diagram	2 - 8
2.3	LED for Power Input /Output	2 - 9
2.3.1	LED for PCNC Power Input	2 - 10
3. CONNECTION OF PCNC OPERATION PANEL		
3.1	Connection between Devices	3 - 2
3.1.1	Connection with the Operation panel	3 - 2
3.2	Detailed Connection of PCNC Operation panel	3 - 3
3.2.1	Connection with Operation panel	3 - 3
3.3	General notes on Connection with operation Panel	3 - 8
3.3.1	JANCD-JSPO4/JANCD-J861	3 - 8
3.3.2	PCNC Connections Layout	3 - 9
4. CONNECTION OF MANUAL PULSE GENERATOR		
4.1	Connection between Devices	4 - 2
4.1.1	Connection with CNC Operation Panel	4 - 2
4.2	Detailed Connection of Manual Pulse Generator	4 - 3
4.2.1	Parallel I/F	4 - 3
4.2.2	Non-Parallel I/F	4 - 4
5. CONNECTION OF POWER ON/OFF EXCLUSIVE SIGNAL		
5.1	Connection between Devices	5 - 2
5.1.1	Connection to PCNC Unit	5 - 2
5.2	Detailed Connection of Power ON/OFF Exclusive Signal	5 - 3
5.2.1	Connection to PCNC Unit	5 - 3
5.3	Details of Signal	5 - 4

5.3.1	Servo Power ON (SVMX), Brake Release (BKK) Output	5 - 4
5.3.2	Emergency Stop (*ESP) Input	5 - 5
5.3.3	External Power ON/OFF (EON, EOF, ECOM) Input.	5 - 5

6. CONNECTION WITH SERVOPACK

6.1	Connection between Devices	6 - 2
6.1.1	Connection between PCNC Unit, Servopack and Motor	6 - 2
6.2	Connection Details	6 - 3
6.2.1	Connection between PCNC Unit and Servopack	6 - 3
6.2.2	Connection of the Servomotor	6 - 4
6.2.3	Connection of the Spindle Motor	6 - 7
6.2.4	Selection of the Converter.	6 - 9

7. CONNECTION OF RS-232C

8. CONNECTION OF DIRECT IN/OUT SIGNALS TO THE PCNC UNIT

8.1	Connection between Devices	8 - 2
8.1.1	Connection to the CNC Unit.	8 - 2
8.2	Detailed Connection of Direct IN/OUT	8 - 2
8.2.1	Connection to the CNC Unit.	8 - 2
8.2.2	Description of Signal	8 - 4
8.2.3	I/O Circuits on CNC side	8 - 4

9. CONNECTION OF I/O MODULE

9.1	Connection between Devices.	9 - 2
9.1.1	Connection between Units	9 - 2

9.2	Detailed Connection of I/O Module	9 - 3
9.2.1	Connection between Units	9 - 3
9.3	Connection between Additional I/O Module devices	9 - 4
9.3.1	Connection between Units	9 - 4
9.4	Detailed Connection of Additional I/O Module	9 - 5
9.4.1	Connection between Units	9 - 5

10. CONNECTION OF GENERAL PURPOSE I/O

10.1	Connection between Devices	10 - 2
10.1.1	Connection of Signal Line with I/O Module	10 - 2
10.1.2	Connection between Devices	10 - 3
10.2	Detailed Connection of General Purpose I/O	10 - 4
10.2.1	FC810/FC815/FC860 Module	10 - 4
10.2.2	FC861 Module	10 - 27
10.2.3	JSP02/JSP04 Module	10 - 36
10.3	Description of General Purpose I/O Signal	10 - 45
10.3.1	I/O Port	10 - 45
10.3.2	I/O Circuit of I/O Port	10 - 47
10.3.3	Power Supply for I/O Signal	10 - 57

11. REPLACEMENT OF BATTERY/FUSE

11.1	Battery Replacement	11 - 2
11.1.1	Checking the battery life	11 - 2
11.1.2	Replacement procedure of battery	11 - 3
11.2	Fuse Replacement	11 - 4

APPENDIX 1. DIMENSIONS

1.1	PCNC Module.....	A1-3
	1.1.1 PCNC UNIT (JZNC-JPCRKM□ - □□□□ - □□)	A1-3
1.2	Power Supply Unit	A1-4
	1.2.1 Power Supply Unit type (UPS00004)	A1-4
1.3	Operation Panel.....	A1-5
	1.3.1 Display Unit Type (JZNC-JCOP-□□□ -□□)	A1-5
1.4	I/O Module	A1-6
	1.4.1 ANCD-FC810/FC815/FC860 Model-	A1-6
	1.4.2 JZNC-IAU59 (JANCD-FC861) Model.....	A1-6
1.5	AC Servopack (including Converter and Spindle Drive)	A1-7
1.6	AC Servomotor S Series (Model SGMG, for 200VAC)	A1-9
	1.6.1 Standard Specifications.....	A1-9
	1.6.2 Dimensions	A1-10
1.7	Spindle Motor M5 Series (Model UAASKA for 200VAC)	A1-11
	1.7.1 Flange-mounted type Motor Dimensions	A1-11
	1.7.2 Foot-mounted type Motor Dimensions(Drwg. 1.1.1)	A1-13
1.8	Power Supply Unit for Brake (OPR109F, OPR109A)	A1-15
1.9	Noise Filter	A1-16
1.10	Manual Pulse Generator (OSM-01-2GA-15)	A1-17
1.11	Spindle Pulse Generator	A1-18
	1.11.1 NE-1024-2MDF-068-11 (6000 r/min)	
	NE-1024-2MDF-068-12 (6000 r/min)	A1-18
	1.11.2 NE-1024-2MD-11 (6000 r/min)	A1-19
1.12	Heat Exchanger.....	A1-20
	1.12.1 External Dimensions of REX1550	A1-20
	1.12.2 HEATEX02.....	A1-21
1.13	AC Reator (UZBA-B: for Input, for 50.60Hz).....	A1-22

APPENDIX 2.CABLE SPECIFICATIONS

2.1	Cable Manufacturing Drawings	A2-3
2.1.1	Connection with the Power Supply	A2-3
2.1.2	Connection with the Operation Panel	A2-5
2.1.3	Connection with the Pulse Generator	A2-11
2.1.4	Connection with the Power ON/OFF Circuit	A2-11
2.1.5	Connection of the Direct IN Signals	A2-12
2.1.6	Connection with I/O Boards	A2-12
2.1.7	Connection between I/O Boards	A2-13
2.1.8	Connection with the Servo Unit	A2-15
2.2	Cable Specifications	A2-17
2.2.1	Cable Drwg. No. DE 8400093 (KQVV-SB Type, 0.2mm ² x 20 pairs) ..	A2-17
2.2.2	Cable Drwg. No. DE 8402398 (VCT Type, 0.2mm ² x 5 pairs)	A2-18
2.2.3	Cable Drwg. No. DE9405671	A2-19
2.3	Cable and Connector Details	A2-2
2.3.1	Main Power Cable (UWR00264-1)	A2-3
2.3.2	Floppy Disk data cable (UWR00265-1)	A2-4
2.3.3	Floppy Disk Power Cable (UWR00266-1)	A2-5
2.3.4	Touchscreen Power Cable (UWR00267-1)	A2-6
2.3.5	Video Extension cable (UWR00270-1)	A2-7
2.3.6	Touchscreen Data Cable (UWR00271-1)	A2-8
2.3.7	Servo ON/OFF Main Cable (UWR00272-1)	A2-9
2.3.8	Push-button switch harness cable (UWR00273-1)	A2-10
2.3.9	PS/2 Port Extension Cable (UWR00275-1)	A2-11
2.3.10	CPU Rack Power cable (UWR00276-1)	A2-12

2.3.11	CRT Power Cable (UWR00262-1)	A2-13
2.3.12	Serial Mouse Data Cable (UWR00318-1)	A2-14
2.3.13	NC Power Supply AC Input Cable (UWR00229-1).	A2-15
2.3.14	NC Power Supply Output Cable (UWR00228-3).	A2-16
2.3.15	Yenet Servo Cable (UWR00249-2).	A2-17
2.3.16	Yenet I/O Cable (UWR00251-4).	A2-18
2.3.17	Servo Drive I/O Cable (UWR00214-2)	A2-19
2.3.18	Power ON Sequence Cable (UWR00263-1).	A2-20
2.3.19	I/O Board Power Output Cable (UWR00258-7).	A2-21
2.3.20	Drive Jumper Connectors (UWR00219-2)	A2-22
2.3.21	I/O Cable (UWR00305-7).	A2-23
2.3.22	I/O Cable (UWR00306-3).	A2-24
2.3.23	I/O Cable (UWR00307-3).	A2-25

USING THIS MANUAL

This manual describes the procedures for connecting the *YASNAC PC NC* to machines, machine interfaces and peripheral equipment.

Connections provided by the machine tool builder differ from the types provided in Yaskawa CNC enclosures. Therefore, it may be necessary to make connection changes in accordance with the needs of standard cabinets and integrated equipment.

The programmable controller system (hereafter called PLC) is installed in the *YASNAC PC NC* unit. For PLC details, refer to the *YASNAC PC NC PLC Programming Manual*.

RELATED INFORMATION SOURCES

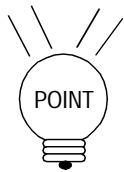
For additional information, refer to the following manuals:

Title Of Document	Contents
YASNAC PCNC Operating Manual (YEA-SIA-C844-2.1)	Basic configuration and operating procedures also describes Human machine interface(HMI)
YASNAC PCNC Programming Manual (YEA-SIA-C844-2.2)	PCNC Program creation instructions
YASNAC PCNC PLC Programming Manual (YEA-SIA-C844-0.1)	PLC Program creation instructions
YASNAC PCNC I/O Signal Function (YEA-SIA-C844-2.3)	Describes functions between PCNC, PLC and Machine Tool
YASNAC PCNC Connecting Manual (YEA-SIA-C844-0.2)	Instructions for connecting PCNC with machines, machine interface and peripheral equipment
MEMOCON GL120,G130 120 Series I/O Module User's Manual (Document No. SIEZ-C825-20.22)	Describes I/O connections and power supply specifications
MEMOCON GL120,G130 Hardware User's Manual (Document No. SIEZ-C825-20.1)	Describes the AC input power supply specifications for I/O.
YASNAC PCNC Maintenance Manual (YEA-SIA-C844-2.9)	Describes service and maintenance procedures.

NOTES FOR SAFE OPERATION

It is important that the user should read this connecting manual before installing, operating, performing any maintenance or inspecting the *YASNAC PCNC*. Also, the functions and performance of a NC machine tool are not determined by the PCNC unit itself, therefore, thoroughly read and familiarize yourself with the machine builder's documentation concerning the safe and most efficient ways to use the machine tool.

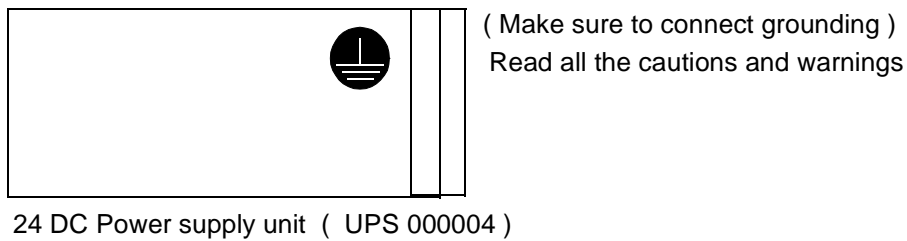
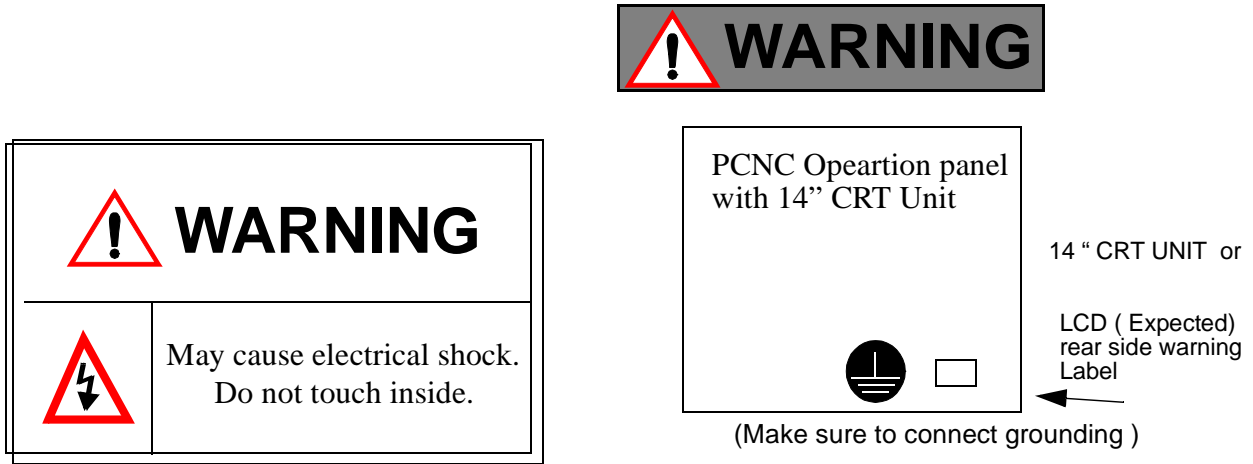
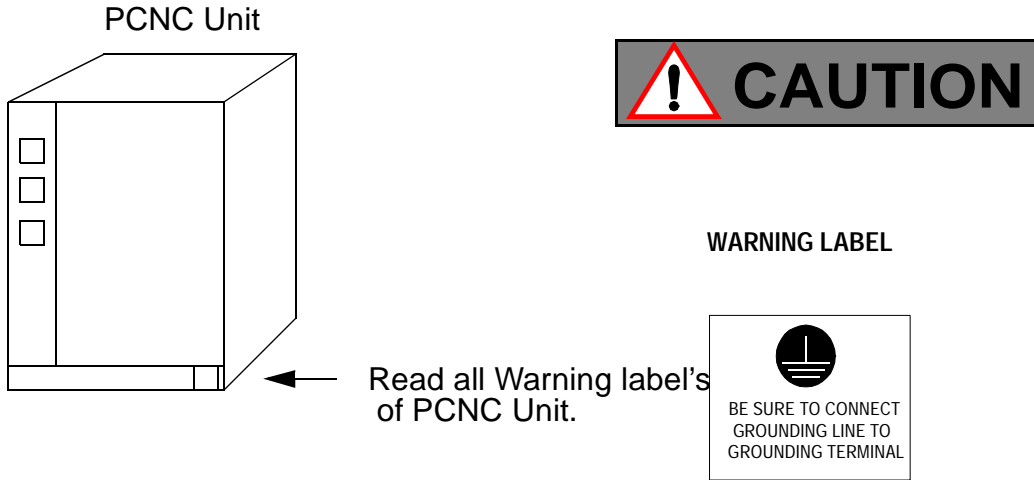
The following symbols are used in this connection manual to emphasize particular information to the user:



Indicates important information to be remembered, i.e., precautionary alarm displays to prevent damaging devices.

OPERATING SAFETY WARNINGS

In this *YASNAC PCNC* Connecting Manual, warnings regarding safe use are categorized as **WARNING** and **CAUTION** (refer to Page 1 for an explanation of these terms). An example of this warning method is as follows:



TRANSPORT PRECAUTIONS

- When moving the product, do not lift by the cable.
- Once the product has been installed on the machine and the eyebolts have been removed, insert suitable size machine bolts in the mounting holes.
- The product should not be exposed to harmful environmental conditions, i.e., water, harmful gases or liquids.

Failure to observe these precautions may result in personal injury or product damage.

STORAGE

- This product should not be exposed to harmful environmental conditions, i.e, water, harmful gases or liquids.
- Product should be stored in a clean indoor area that meets the following temperature and humidity conditions:
 - Ambient temperature: -15°C to 65°C (-5°F to 149°F)
 - Relative humidity : 10% to 90%
 - Altitude : 1000 m or less (10000ft or less)

Failure to observe these precautions may result in personal injury or product damage.

INSTALLATION

- Install peripheral equipment in accordance with the following:
 1. A rust preventative substance has been applied to the motor shaft's end and flange. Remove the substance using a clean cloth.
 2. When connecting the motor shaft to a driven machine, be sure to center-align accurately to prevent vibration.
 3. Mount the servo unit(Converter,Inverter and Amplifier) vertically and fasten firmly in place with screws or bolts.
 4. Since the servo unit (Converter,Inverter and Amplifier) will generate heat, install the unit with sufficient clearance for cooling air flow.
 5. In order to reduce heat generation, position the servo unit's(Converter,Inverter and Amplifier) cooling fan outside of the enclosure for exposure to the external atmosphere for cooling.
 6. When circulating air inside of the enclosure, do not blow air directly onto the servo unit since dust contamination could occur.
 7. Position and mount components so that they are easily accessible for inspection and maintenance.

Failure to observe these precautions may result in product failure.



- When installing this product, do not close the intake or exhaust ports, but take precautions to prevent foreign matter from entering this device
- Do not subject this product to any strong physical impacts.
- Set the power line capacity *higher* than this product's power consumption level.

Failure to observe these precautions may result in personal injury or product damage.

WIRING

- Use the shortest wires when making connections. *This helps prevent malfunction.*
- Connect the +24V DC power supply to the PC NC unit.
 1. The power supply should be provided at the customer's site.
(The power supply unit, UPS000004, is available as an option.)
 2. Supply the power in the range of +24V DC $\pm 10\%$ to the PC NC unit's inlet (CN05).
- Do not run the I/O signal wires with power wires or in the same duct. Ample separation of signal wires from power wires will reduce the noise influence.
- If noise occurs, use a noise suppressor to eliminate it. Refer to the section in this connection manual for noise filter specifications and capacities. *Use of the correct noise filter will reduce noise influence.*
- Be sure to complete the end-terminal-processing to the last module of the remote I/O module. Set the "TERMINATION" shorting pin to "ON".

Failure to follow these instructions could result in malfunction.



- Electrical wiring and connections should be performed by qualified personnel only.
Failure to observe this precaution could result in product failure, fire and/ or personal injury or death due to electrical shock.
- Never connect a three-phase power supply to motor output terminals, U, V or W of the drive unit. Damage to the device will occur if incorrectly connected.
- Select the type and size of wire based on your requirements and current capacity. When the ambient temperature exceeds 30°C (86°F), the allowable current drops. Select the cable size to conform to the local electrical codes and cable manufacturer's specifications.

Failure to comply could result in an electrical fire.
- Use twisted wire or multi-core twisted pair shielded wire for general signal wires and feedback signal wires for the encoder.

These wire types help prevent malfunction.

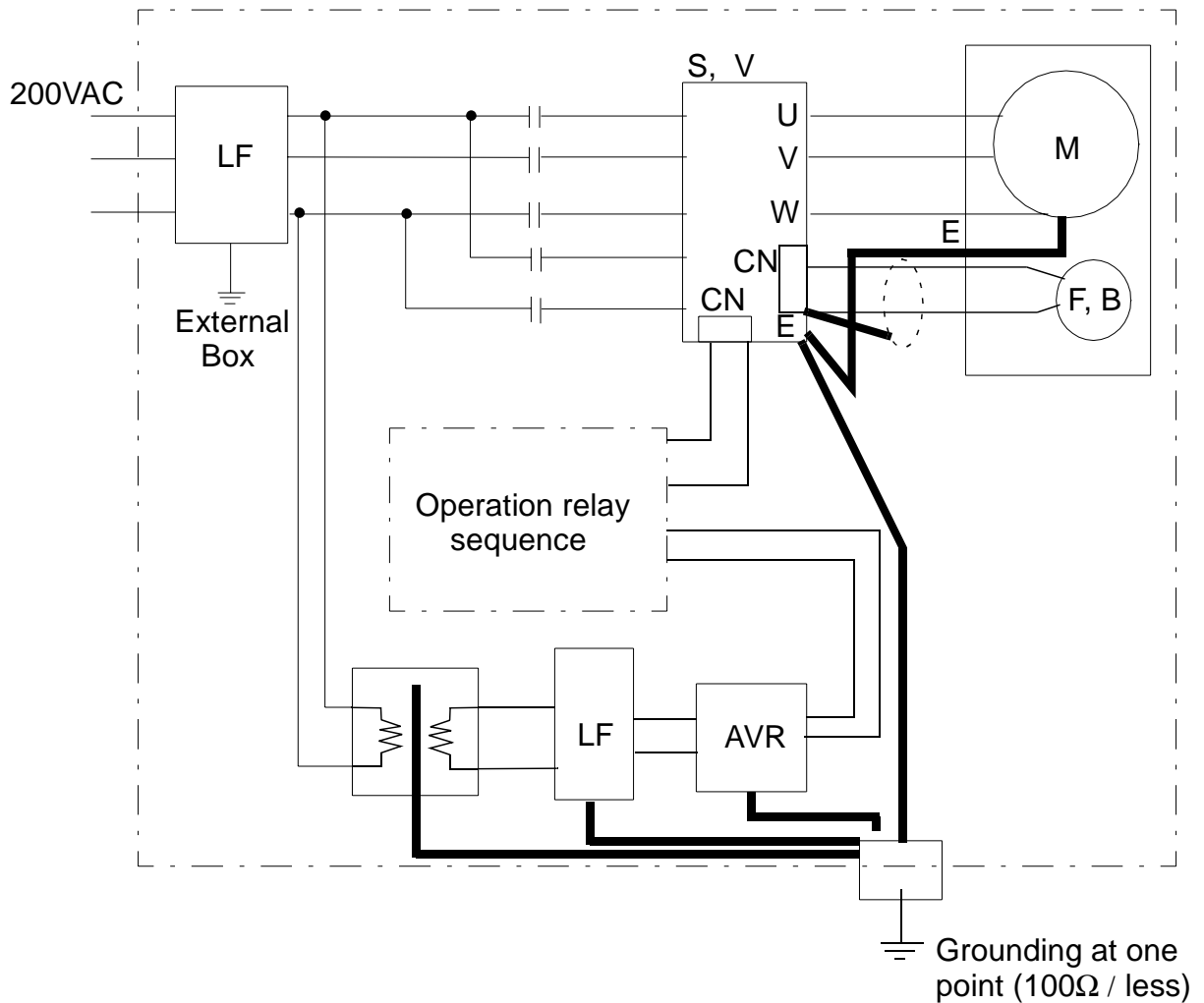


- The current capacity of 24V DC (external power unit for input/output contacts) is determined by the number of contact points to be used. When the current capacity is low, install an additional external power unit.
- An enclosure for this product should be designed and constructed to meet the following:
 1. Use an airtight enclosure.
 2. Limit the average temperature rise of air within the enclosure to less than 10°C (50°F) compared to the ambient temperature.
 3. Use a UL approved fan to circulate the air in a closed enclosure to improve cooling efficiency, and to prevent abnormal heat rise.
 4. Seal the cable inlet, door, etc. completely.
 5. Since a CRT display attracts airborne particles due to its high voltage that could result in malfunction, therefore, provide an enclosure capable of preventing dust from entering the CPU.
 6. Ambient magnetic field may cause CRT screen fluctuations, therefore, prevent this with a layout and magnetism shield.
 7. In PC NC Unit, printed circuit boards, various units may accumulate dust from air, may result in malfunction, therefore, make structures to prevent the entry of dust.
 8. Install packing on the cable inlet, doors, back covers, etc. to eliminate gaps or openings.

Failure to observe these precautions may result in product failure.



- Connect each unit's grounding line individually to the housing or grounding plate.
See the following example:



- Select the wire for grounding in conformance with local electrical codes.
- Be sure to connect the motor's grounding terminal to the drive unit's grounding terminal.
- Ground at one point. (Ground resistance 100Ω or less).
- Be sure to separate the grounding line of the unit from the power unit's grounding line.

Failure to perform correct grounding can lead to malfunction.

APPLICATION SAFETY PRECAUTIONS

- When operating the unit, be sure to observe the following electrical safety procedures
 1. Do not touch the unit or terminal wire while the unit is operating.
 2. Even though the unit has been turned OFF, it is still in charged status, so do not touch any component parts for a minimum of five minutes.

Failure to observe this precaution could result in product failure, fire and/ or personal injury or death due to electrical shock.

- Do not mishandle, pinch or cause excessive stress to cables.

Excessive load on the cable could cause electric shock.

- While the unit is turned ON, never touch any rotating parts.

Failure to observe this precaution could result in personal injury.

Never modify the product

Free from explosive gases or steam

Free from oil, organic solvent, corrosive liquids etc.

Vibration under (0.5 G).

Never disassemble or modify the components of the unit.

Never change the set values of the components and any variable resistors used in control panel.

Failure to observe this warning could result product failure, fire and/ or personal injury or death due to electrical shock.

1

General Installation And Electrical Connection

This section addresses the basic system: configuration, specifications, enclosure design, electrical connections and installation.

1.1	System Configuration	1 - 2
1.1.1	System Configuration	1 - 2
1.1.2	Connection between Devices	1 - 3
1.1.3	Connector Layout NC side	1 - 4
1.1.4	Connector Layout PC side	1 - 5
1.2	General Specifications	1 - 6
1.3	Thermal Design of Enclosure	1 - 7
1.3.1	Thermal Design.	1 - 7
1.3.2	Dust Proof Design.	1 - 11
1.3.3	Countermeasure Against Magnetic Fields	1 - 12
1.4	Cable Clamp and Shielding	1 - 13
1.5	Packaging	1 - 14
1.5.1	General Notes	1 - 14
1.5.2	Installation of PCNC Unit.	1 - 15
1.5.3	Installation of Feed/Spindle Servopacks.	1 - 16

1.1 System Configuration

1.1.1 System Configuration

The PCNC unit of the YASNAC which is hatched in the diagram below is composed of two boards: JCP20 and JFC20 (JZNC-JFC10). It is inserted to a PC extended bus (ISA) inside PC case.

Its I/O module, servo unit, spindle drive and motor are the same as those of the YASNAC J100 CNC UNIT.

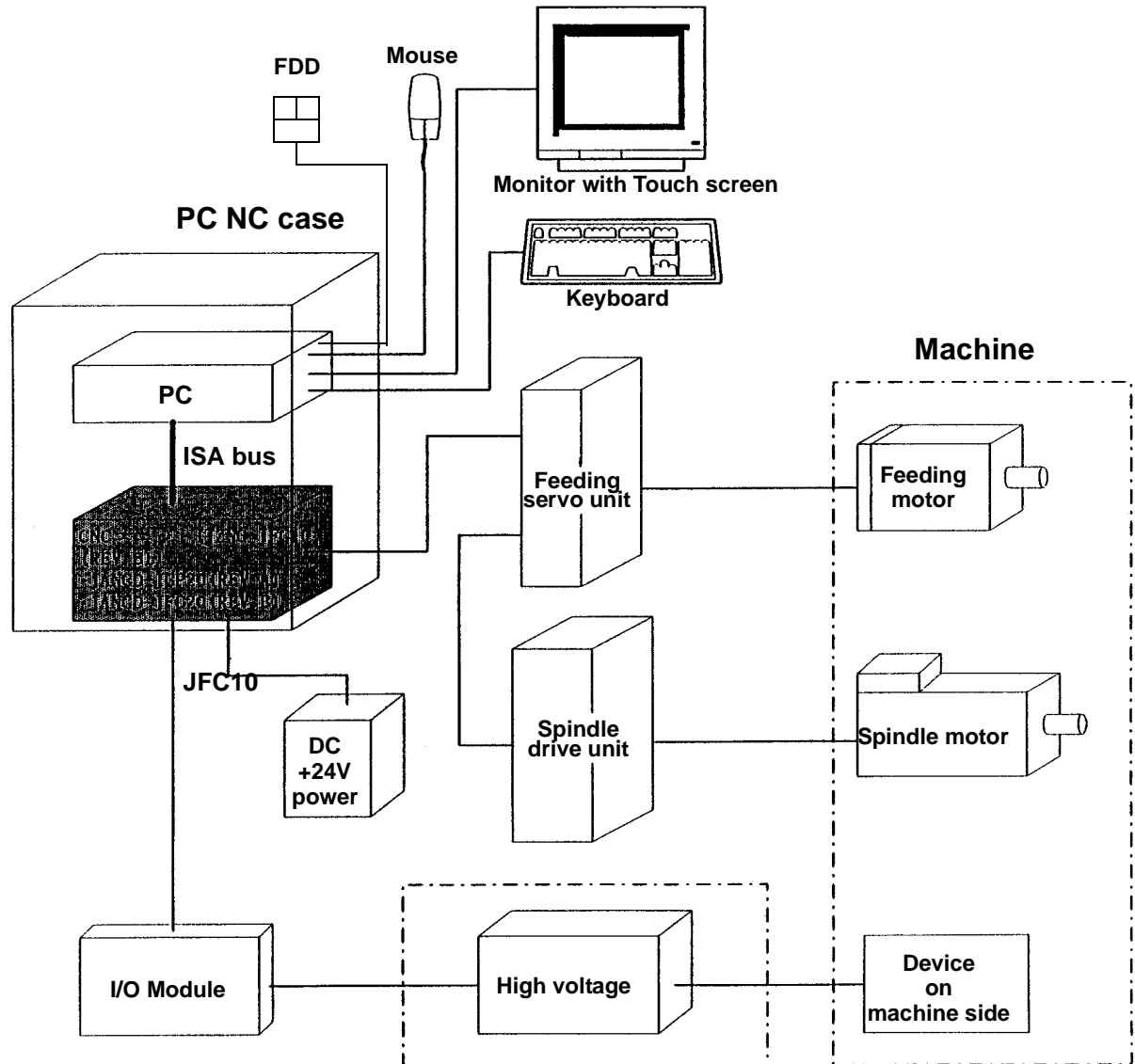


Figure 1.1.1 YASNAC PCNC System Structure Diagram

1.1.2 Connection Between Devices

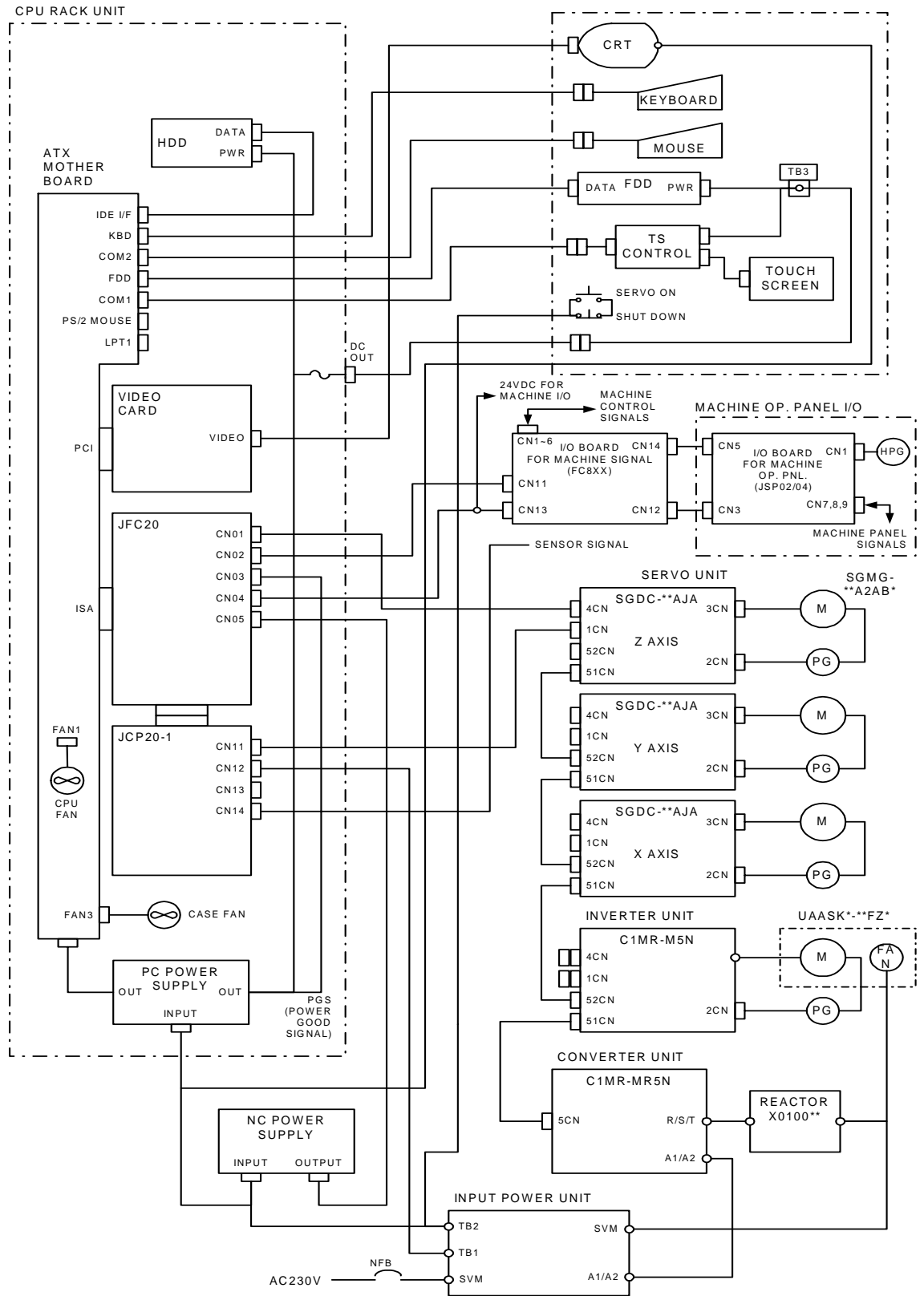


Figure 1.1.2.1 Detail Connection of PCNC Unit with various devices.

1.1.3 Connector Layout NC Side

The following figure gives the detail Connectors Layout of YASNAC JZNC-JFC10 board.

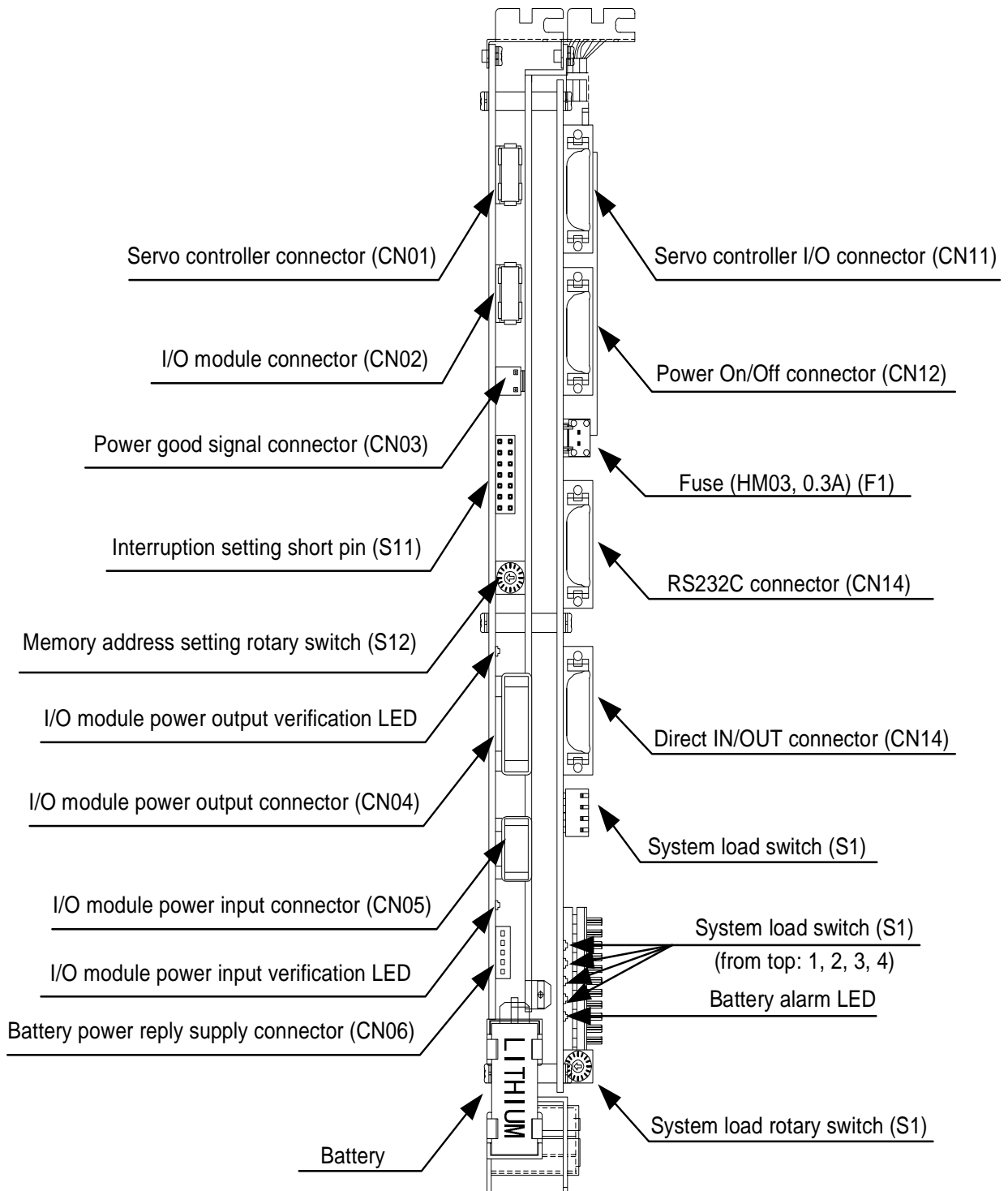


FIGURE 1.1.3.1: Details Layout of YASNAC JZNC-JFC10 Board

1.1.4 Connector Layout PC Side

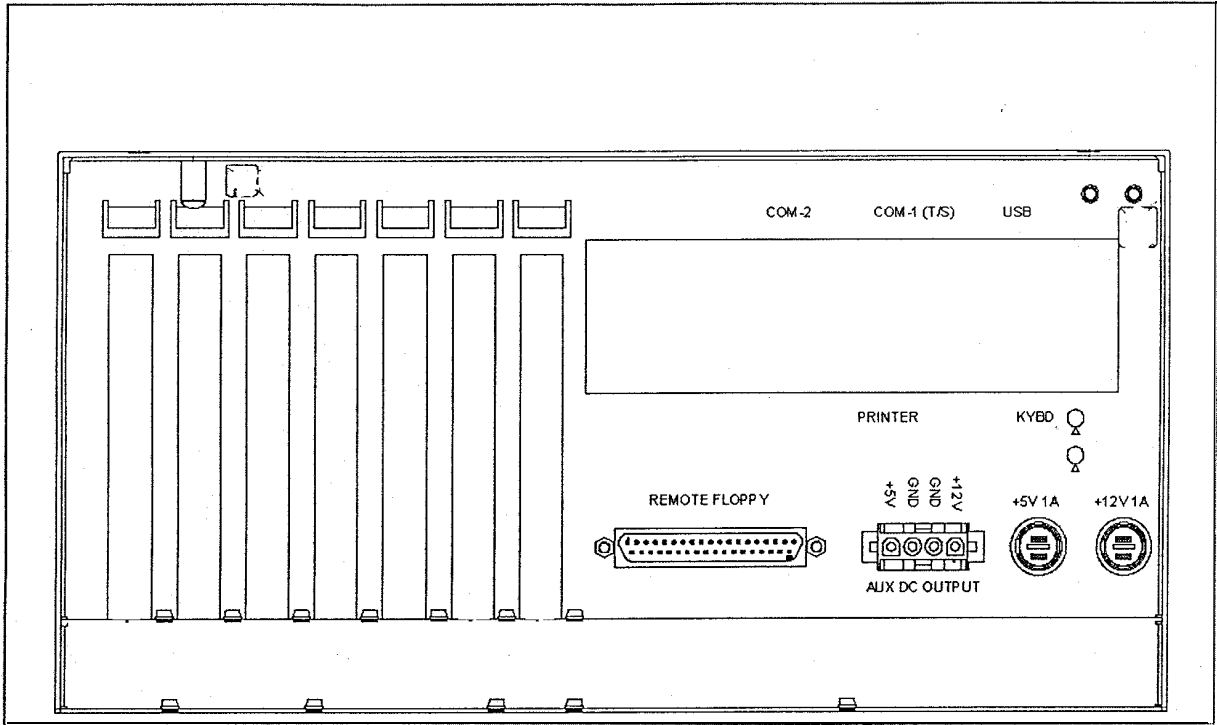


FIGURE 1.1.4.1: Connector Layout on the top view of the PCNC CPU rack

1.2 General Specifications

The enclosure should be designed to meet all of the following conditions.

Table 1.2.1: Specifications

Item		Specifications		
Ambient Conditions	Temperature*	Storage and Transportation	-15°C to +65°C	
		Operating (around enclosure)	PCNC unit I/O module Servopack 14" Color monitor with touch screen	0°C to +53°C
	Humidity		20% to 80% RH (with operation) 10% to 90% RH (with non-operation)	
	Vibration during operation		Less than 4.9m/s	
	Others		Free from dust, coolant or organic solvent	
	PCNC Unit input power supply		+24VDC±10% 180V-264V AC	
	Power Supply Unit UPS000004		<ul style="list-style-type: none"> • Input power supply voltage: 180V-264VAC • Frequency: 47 Hz to 63 Hz • Momentary interruption: 0.5 cycle (0 VDC) 	

Note: Avoid installing the control panel in a location subject to direct sunlight, near heat generating devices or outdoors even if the ambient temperature is within the specified range.

1.3 Thermal Design of Enclosure

1.3.1 Thermal Design

Design of the enclosure should be made on the basis that the average temperature increase of air within the enclosure (containing the PC NC unit and other components) should be 10°C below the external air temperature.

(1) Temperature Increase within the Enclosure (Average Temperature Increase)

The internal temperature increase (sheet metal enclosure) is generally as follows:

$$\Delta T = \frac{P}{q_e} = \frac{P}{k \cdot A}$$

where,

ΔT : Internal temperature increase (°C)

P : Heat generation in enclosure (W)

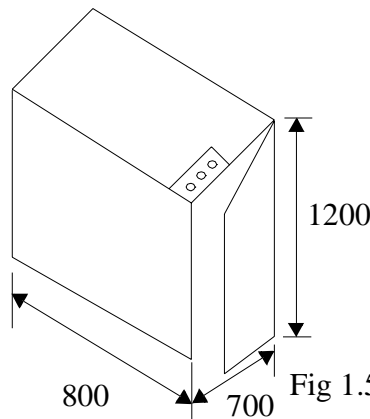
q_e : Enclosure heat percolation ratio (W/°C)

k : Heat transit ratio of sheetmetal (W/m²°C)

6W/m²°C: With internal cooling fan

4W/m²°C: Without internal cooling fan

A : Efficient heat diffusion area of enclosure (m²)



All dimensions in millimeters

Fig 1.5 Dimensions of Enclosure

Efficient heat diffusion area is independently located, so bottom area is excluded.

$$A = 4.16 \text{ m}^2$$

If the heat generation in the enclosure is supposed to be 246W (113 W in CNC portion, 104 W in servo portion, and 29 W in I/o portion),

$$\begin{aligned} \Delta T &= \frac{P}{q_e} = \frac{P}{k \cdot A} \\ &= \frac{246}{6 \times 4.16} = 9.9 \text{ (}^\circ\text{C)} \end{aligned}$$

(2) Heat Exchanger Cooling Capacity

Where cooling capacity is insufficient even with a circulating fan mounted in the enclosure, Yaskawa can provide heat exchangers.

Table 1.3.1.1: Heat Exchangers

Heat Exchanger	Cooling Capacity	External Dimensions (mm)
REX1550	100W /10°C	295 width x 890 height x 50 depth
HEATEX02	250W /10°C	440 width x 924 height x 50 depth

The heat generation indicated in the above table is the allowable heat generated when the internal temperature increase in the enclosure is limited to under 10°C.

Example: Allowable Heat Generated in the Enclosure with Heat Exchanger

The amount of internal heat generated to make the internal temperature under 10°C when the enclosure is equipped with a HEATEX02 Heat Exchanger is expressed by the following equation:

$$\begin{aligned}
 P &= k \cdot A \cdot \Delta T + 250 \text{ W}/10^\circ\text{C} \\
 &= 6 \times 4.16 \times 10 + 250 \\
 &= 499 \text{ W}/10^\circ\text{C}
 \end{aligned}$$

therefore, it is necessary to be under 499W.

(3) Mounting Heat Exchanger

Heat exchanger should be mounted on the enclosure provided by the machine tool builder. Fig. 1.5 shows a mounting example. Mount the exchanger so that the internal air is drawn from the upper portion and discharged through the lower portion, while external air is drawn in from the lower portion and discharged through the upper portion.

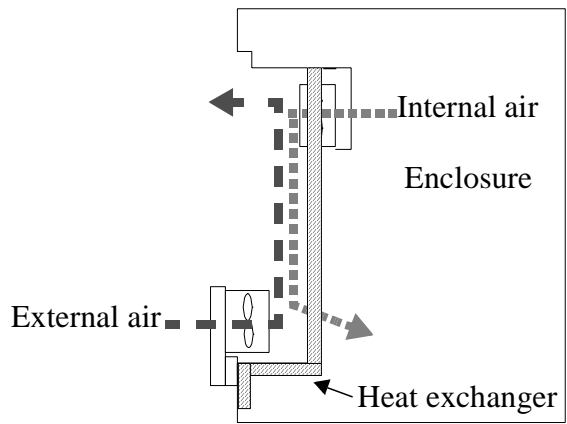
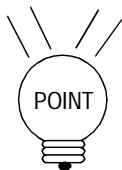


Fig 1.3.1.1: Mounting of Heat Exchanger on the enclosure made by Machine builder

(4) Heat Generation by Respective Units

Unit	Type	Total Heat Generation (W)	Internal Heat Generation (W)	Minimum Wind Velocity for Cooling
PCNC rack	JZNC-JPCRKM_ _			
14" Color CRT with Touchscreen	JZNC-JPCOP- _ _ _			
I/O Module	JANCD-FC810*	29	29	0
	JANCD-FC860*	29	29	0
	JANCD-FC861*	14.5	14.5	0
Converter	CIMR-MR5N23P7	84	44	2.5
	CIMR-MR5N25P5	84	44	
	CIMR-MR5N27P5	119	61	
	CIMR-MR5N2011	152	70	
	CIMR-MR5N2015	204	88	
	CIMR-MR5N2018	273	108	
	CIMR-MR5N2022	335	132	
	CIMR-MR5N2030	392	160	
Spindle Inverter	CIMR-MR5N23P7	84	44	2.5
	CIMR-MR5N25P5	185	58	
	CIMR-MR5N27P5	244	77	
	CIMR-MR5N2011	307	89	
	CIMR-MR5N2015	454	119	
	CIMR-MR5N2018	565	144	
	CIMR-MR5N2022	717	180	
	CIMR-MR5N2030	869	219	
Reactor	UZBA-B 20A 0.53 mH	35	35	0
	UZBA-B 30A 0.35 mH	45	45	0
	UZBA-B 40A 0.265 mH	50	50	0
	UZBA-B 60A 0.18 mH	65	65	0
	UZBA-B 80A 0.13 mH	75	75	0
	UZBA-B 90A 0.12 mH	90	90	0
	UZBA-B 120A 0.09 mH	90	90	0
	UZBA-B 160A 0.07 mH	100	100	0

Unit	Type	Total Heat Generation (W)	Internal Heat Generation (W)	Minimum Wind Velocity for Cooling
Servo Unit	SGDC-05AJ A	28	10	2.5
	SGDC-10AJ A	48	12	
	SGDC-15AJ A	73	15	
	SGDC-20AJ A	108	18	
	SGDC-30AJ A	148	22	
	SGDC-50AJ A	208	28	



1. The heat generated by the CNC unit varies depending on the addition of options. The heat generated by the I/O module varies with I/O status.
2. Internal heat generation is the heat remaining inside of the enclosure when the servo unit's fin is exposed outside of the enclosure, and when the external air is applied to the fin at greater than 2.5m/s
3. Thermal design of the enclosure to house the servo unit varies with machine specifications, but is acknowledged to use a value of 70% of the load factor.

1.3.2 Dust proof Design

Dust proof Design and Construction

PCNC units and other components (especially CRTs) housed in a machine tool enclosure are exposed to an environment with airborne matter, e.g., dust, oil, coolant mist, etc. Since these elements could cause control component malfunction, enclosures should be designed and built to prevent such matter from entering as follows:

- Use an air-tight enclosure.
- Seal the cabinet inlet with packing material. Refer to Fig. 1.3.2.1.
- Secure the rear door lid with packing material. Refer to Fig. 1.3.2.2.
- The enclosure's front surfaces with PCNC operating panels are dust proof, but do not install them where liquid coolants are present. The periphery should be sealed with suitable materials.

The CRT unit's high voltage will attract airborne dust, so when mounting the CRT unit's pendant box please take note of the following:

1. Seal the cable inlet, door, rear lid opening clearances with packing material.
2. The CRT Unit's mounting surface has been factory sealed.
3. Seal any other openings.
4. Since oil will enter the enclosure through screw holes and collect on the internal ceiling surface, apply suitable packing material to seal these holes.

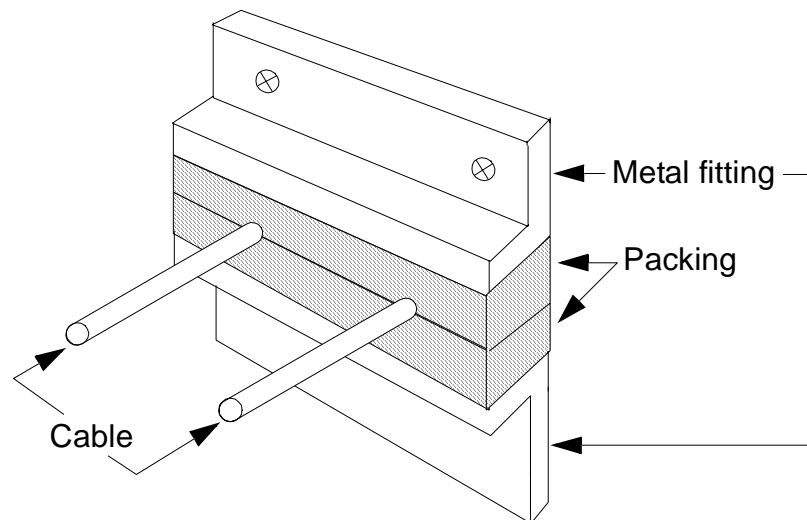


Fig. 1.3.2.1 Cable Inlet

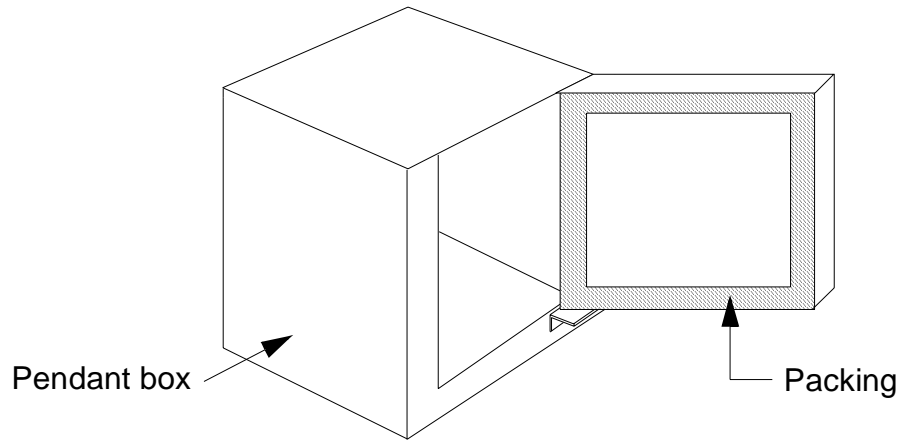


Fig. 1.3.2.2 Door Packing

1.3.3 Countermeasures against Magnetic Fields

The CRT screen's display may fluctuate due to ambient magnetic fields. To prevent this, keep magnetic generating materials, e.g., transformers, reactors, fans, electro-magnetic switches, solenoid relays, exchange power cables, etc. a minimum of 300mm from the CRT.

The value of 300mm is a general standard and could vary depending on the situation, therefore, be aware of the presence of magnetic generating sources when positioning the CRT unit.

1.4 Cable Clamp and Shielding

If the cables wired to the PCNC unit need to be shielded, they must be grounded using the grounding plate with cable clamp hardware. Because this clamp serves both as cable support and shielding, they must be installed carefully so that safe system motion can be assured.

1. Peel the cable coating to expose the cable where it connects the grounding plate with the cable clamp.
2. The cable clamps (with the cables) must be installed to the grounding plate as shown in the following diagram:

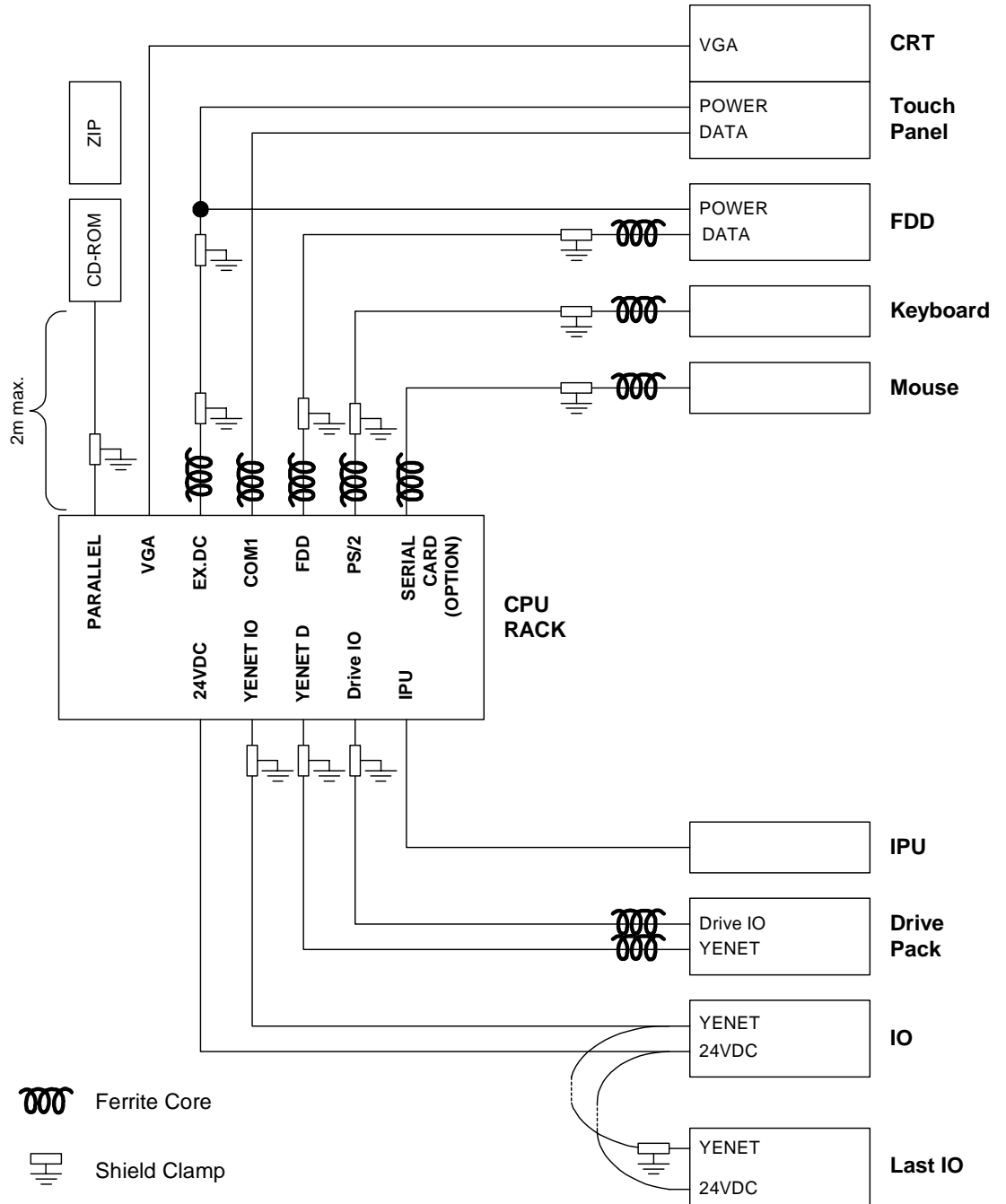


FIGURE 1.4.1: Yasnac PCNC Shielding and Ferrite core clamping points

1.5 Packaging

When designing the enclosure to house the CNC unit and other equipment, the construction should provide for the following:

1.5.1 General Notes:

- The enclosure must be air-tight.
- Internal layout of components should provide for ease of mounting, inspection maintenance, and removal.
- There should be a physical gap of 100mm between components and the enclosure's wall so not to restrict air flow for cooling.
- If the operation panel is built into the machine's enclosure door, provisions to prevent vibration from the machine is necessary.
- The average temperature increase in the enclosure should be limited to 10°C compared to the external air.
- Use a fan to circulate air to improve cooling efficiency within the enclosure. As a general rule, the fan should blow air upward at 1m/s over the p.c. board's surface.
- The fan should not blow air directly onto the p.c.board.
- To prevent malfunctions due to noises, keep noise generating elements 10m away from AC power supply cables and components (over 90VDC).
- When wiring, separate AC from DC lines, and separate primary side from the transformers's secondary side, line filter, etc.

1.5.2 Installing the PCNC Unit

- The PCNC unit has a built-in fan that blows air (1 m/s) over the upper side of the PCNC unit.
- Provide clearances of 50 mm minimum above the 100 mm minimum below the PCNC unit for ventilation and maintenance.

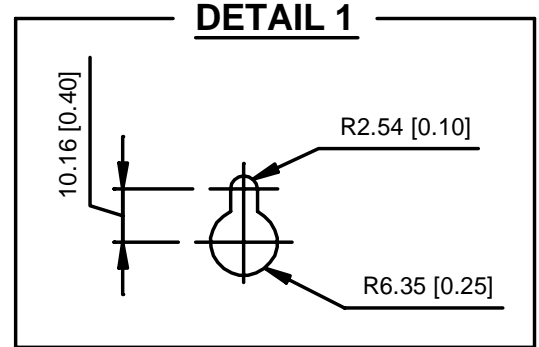
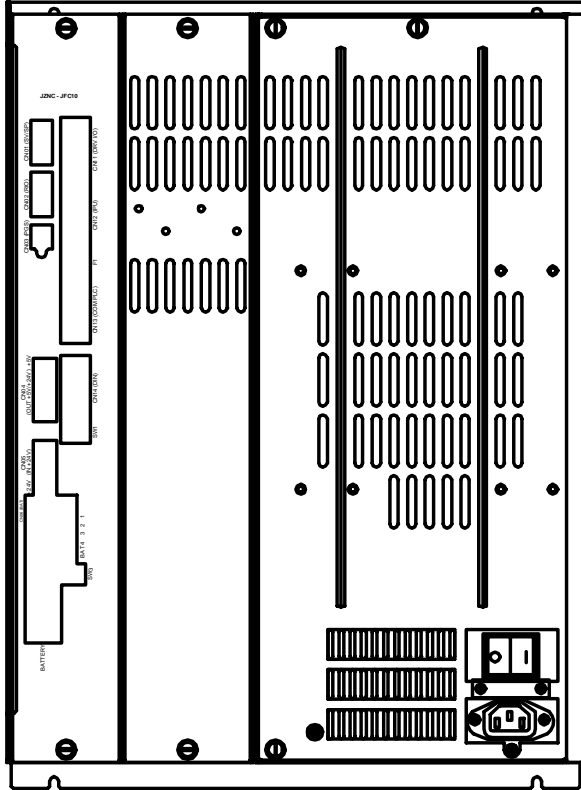


FIGURE 1.5.2.1: Mounting of PCNC Unit

1.5.3 Installing the Feed/Spindle Servopacks (Amplifiers)

- The Servopack is to be wall-mounted vertically using screws or bolts.
- Locate the Servopack so that inspection, maintenance and part replacement can be easily made.
- The Servopack will generate some heat, so mount with sufficient space around the unit.
- To reduce heat generation, mount the cooling fin external to the Servopack's enclosure with the fan blowing air on the cooling fin @ 2.5m/s.
- Internal air should not be blown directly onto the Servopack since this could cause dust contamination.

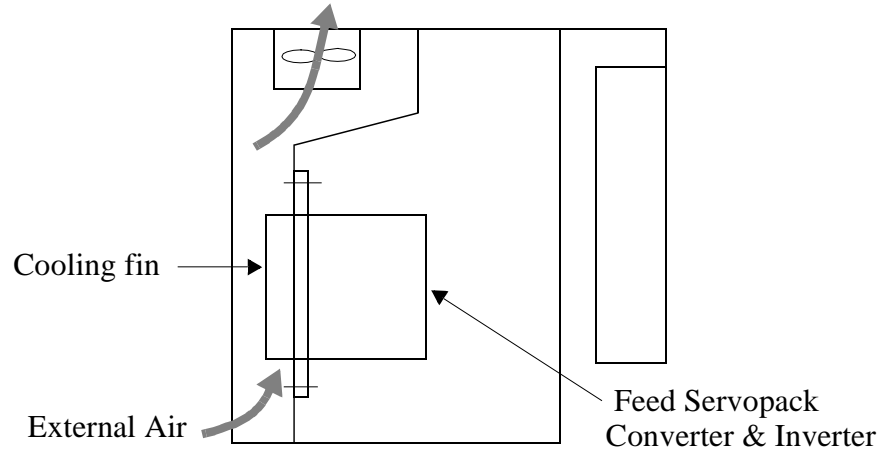


Fig. 1.5.3.1 Cooling Fin Installed Outside of Enclosure

2

Power Supply Connection

Connecting Power Supply To Components. This section addresses the following electrical connections: power supply to components, detailed connections and LED connections.

2.1	Connection between Devices	2 - 2
2.1.1	Power Supply specifications for PCNC and I/O units	2 - 2
2.1.2	Power Supply connections to PCNC	2 - 3
2.1.3	Power Supply Connections to PCNC and I/O units	2 - 3
2.1.4	Power Supply to Converter unit	2 - 4
2.2	Detailed Connections	2 - 5
2.2.1	Power Supply to PCNC unit	2 - 5
2.2.2	Power Supply to Converter	2 - 7
2.2.3	Example of Circuit Diagram	2 - 8
2.3	LED for Power Input /Output	2 - 9
2.3.1	LED for PCNC Power Input	2 - 10

2.1 Connection between Devices

This section describes connections between devices, connector numbers and connector type. For power supply connection use a commercially available standard power supply or Power Supply Model UPS000004.

2.1.1 Power Supply specifications for PCNC Unit and I/O units.

Power supply connection to the PCNC unit differs depending on whether using a commercially available standard power supply for both PCNC and I/O units or use a recommended power supply unit only for PCNC and use another power supply for I/O units.

(1) Selection of Power Supply

(a) Using a Standard Power Supply

Excluding +24V power supply for I/O input and output, 90W is required for the total PCNC system. Select a suitable power supply with consideration for temperature derating characteristics.

- Power supply for I/O input and output
Select a suitable power supply by referring to the calculation example shown in Section 10.3.3 “Power Supply for I/O Signal”.
- Power supply for PCNC Unit
In order to provide 90W power capacity or greater when the internal panel temperature is 55°C, a +24V output power supply with capacity of 150W and greater is required: (Recommended UPS000004 is rated for 150 Watts.)

Select a power supply with the following specifications:

Power capacity of 150W or greater.

Power supply with the derating characteristics of 60% or greater when the internal panel temperature is 55°C. ($150W \times .06 = 90W$)

- Recommended Power Supply:

UPS000004

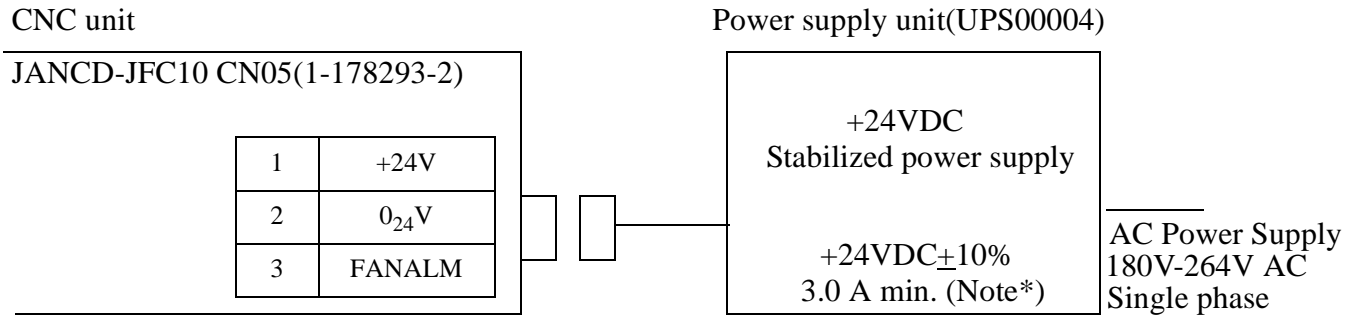
Operating Conditions:

At 50°C - 100% (Output rated Current 6.5 Amps)

At 55°C - 80 % (Derated Output Current)

For more details contact the power supply manufacturer.

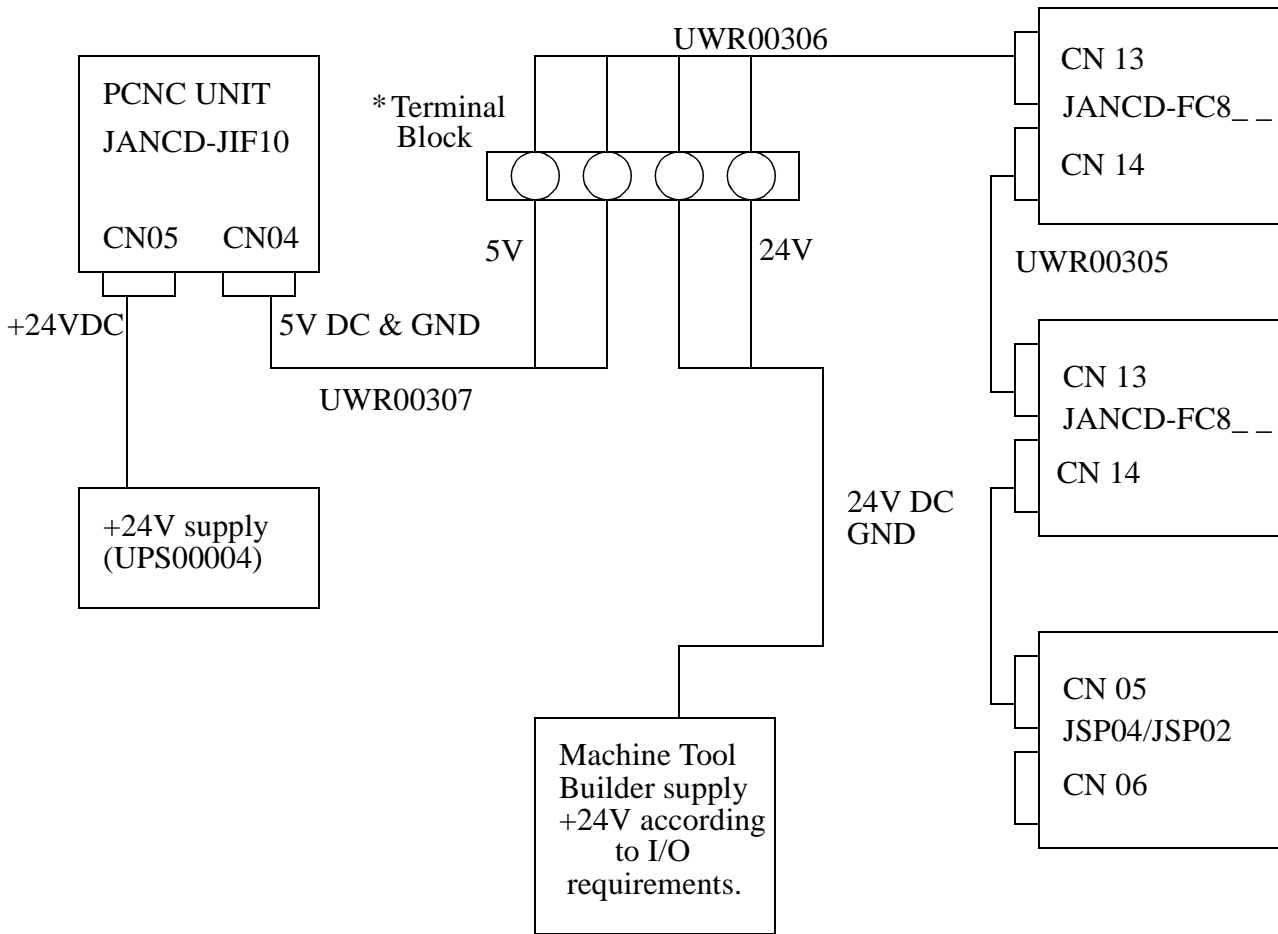
2.1.2 Power Supply Connections to PCNC



*Note: Derating for ambient temperature should be considered.

FIGURE 2.1.2.1 Power Supply to PCNC Unit when using recommended Power Supply Unit.

2.1.3 Power Supply Connections to PCNC and I/O Units



* To be provided by Machine Tool builder

FIGURE 2.1.3.1 Power Supply to PCNC unit when using recommended Power Supply Unit

2.1.4 Power Supply to Converter Unit

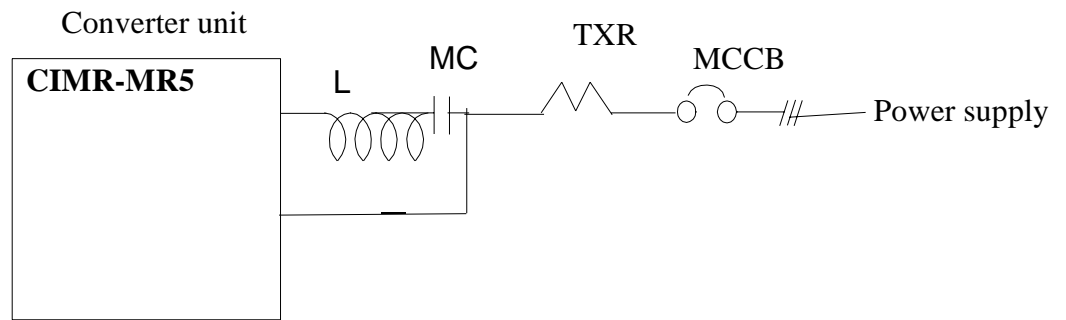


FIGURE 2.1.4.2 Connection between Devices

Table 2.1.4.2 Component Selection for Power Supply Circuit

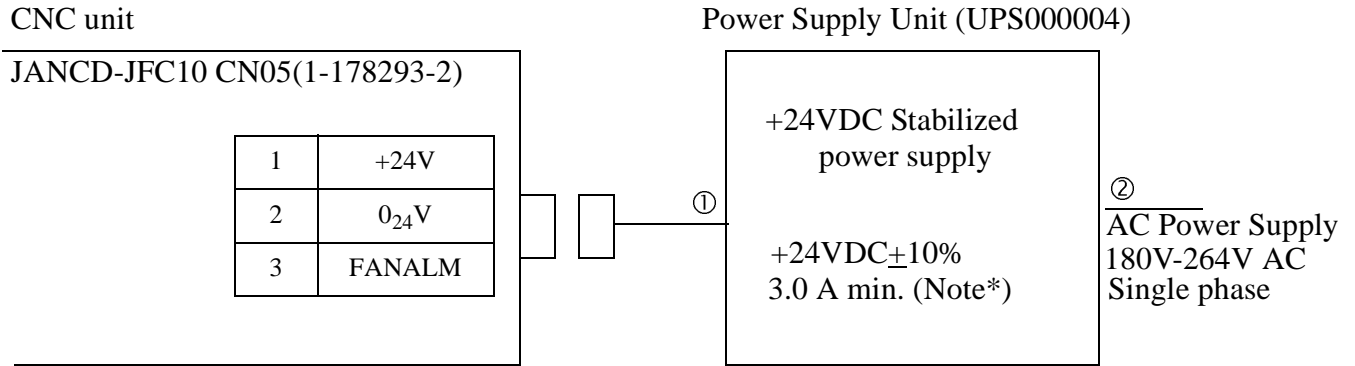
Converter Type CIMR-MR5N2□□□	Applicable Capacity (kW)	Output Capacity (kW)	Power Source Capacity (KVA)	Breaker 1MCCB	Electro-magnetic Contactor 1MC	Reator* 1L
3P7	3.7	4.6	7	30A	20A	20 A 0.53 mH (x 002491) (x 010057)
5P5	5.5	6.8	9	40A	30A	30 A 0.35 mH (x 002492) (x 010058)
7P5	7.5	9.3	12	50A	40A	40 A 0.265 mH (x 002493) (x 010059)
011	11	13.6	19	75A	60A	60 A 0.18 mH (x 002495) (x 010060)
015	15	18.6	24	100A	75A	80 A 0.13 mH (x 002497) (x 010061)
018	18.5	22.9	30	125A	100A	90 A 0.12 mH (x 002498) (x 010062)
022	22	27.2	36	150A	125A	120 A 0.09 mH (x 002555) (x 010063)
030	30	37.1	48	175A	150A	160 A 0.07 mH (x 002556) (x 010064)

*Note: Code in upper row: with leads
Code in lower row : with terminals

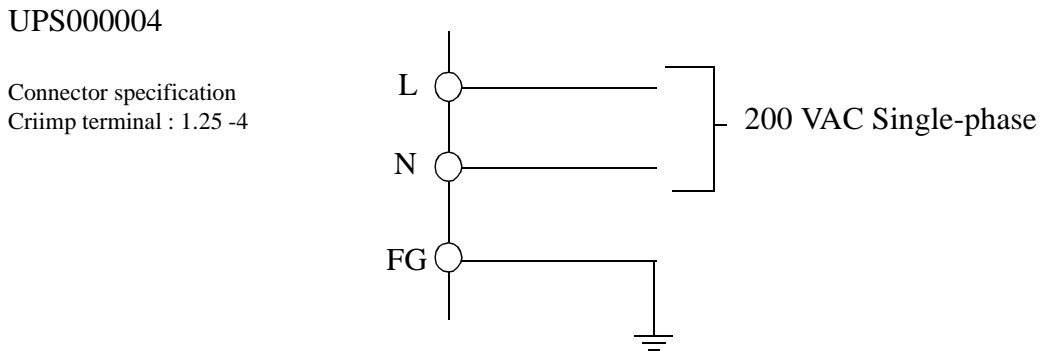
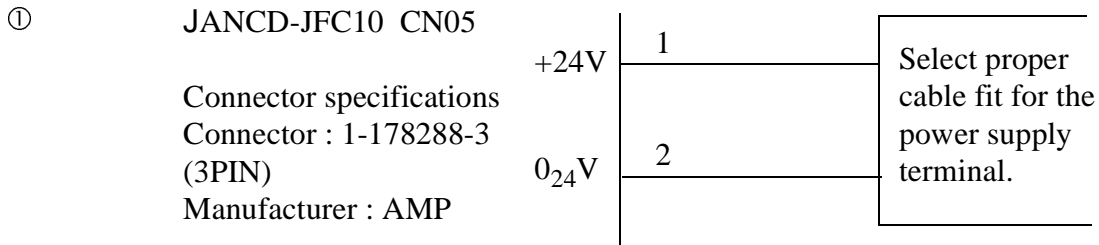
2.2 Detailed Connection

This section describes the detailed connection of power supply.

2.2.1 Power Supply to PCNC unit

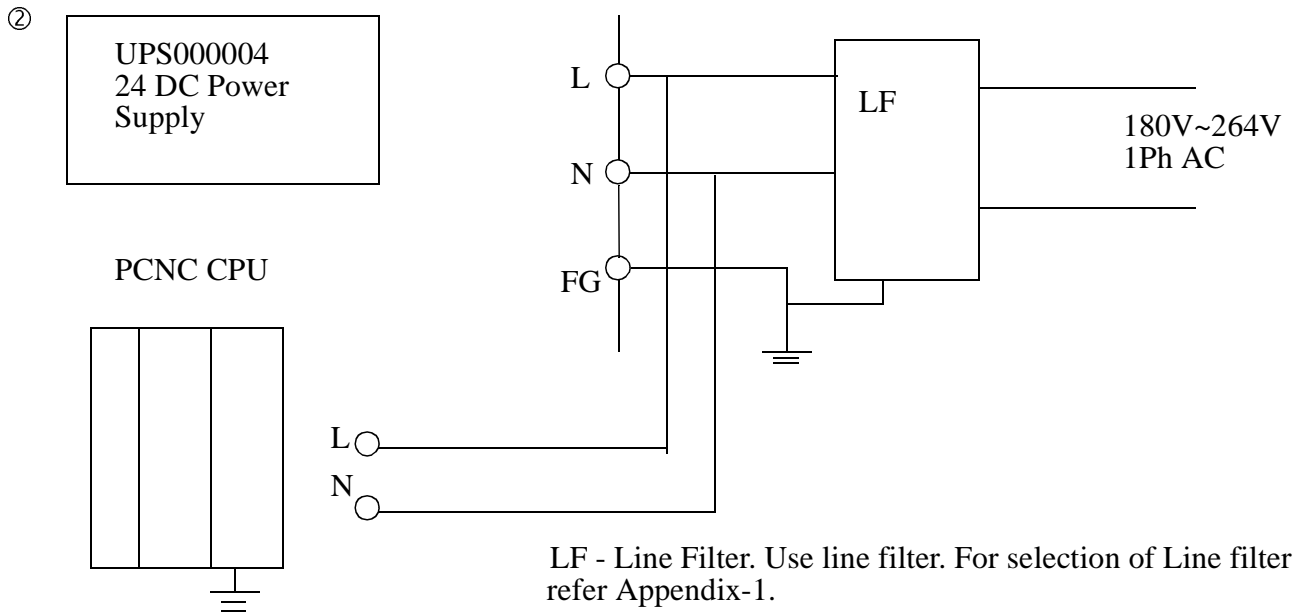


*Note: Derating for ambient temperature should be considered.



Recommended cable : VCT type, 2mm² x 5 cores (DE8402398)

FIGURE 2.2.1.1 Power supply connections to PCNC Unit and 24V DC Power supply unit.



LF - Line Filter. Use line filter. For selection of Line filter refer Appendix-1.

Note: Use 3.5mm sq or more for the Frame ground wire

FIGURE 2.2.1.2 Power supply connections to PCNC Unit and 24V DC Power supply

PCNC Power Socket and Frame ground details

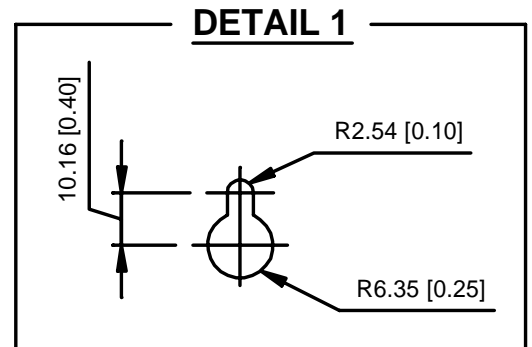
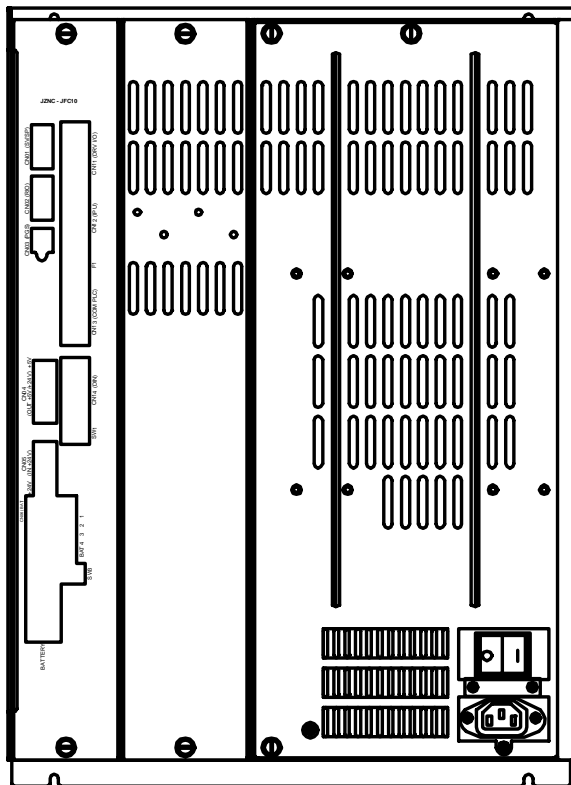


FIGURE 2.2.1.3 PCNC unit frame ground wire to be connected

Note: Please follow the Frame Ground connection details for the machine and electrical cabinet.

1. Connect FG Cable from customers main grounding point to Machine's electrical cabinet where PCNC is mounted.
2. Connect FG cable from customers mains

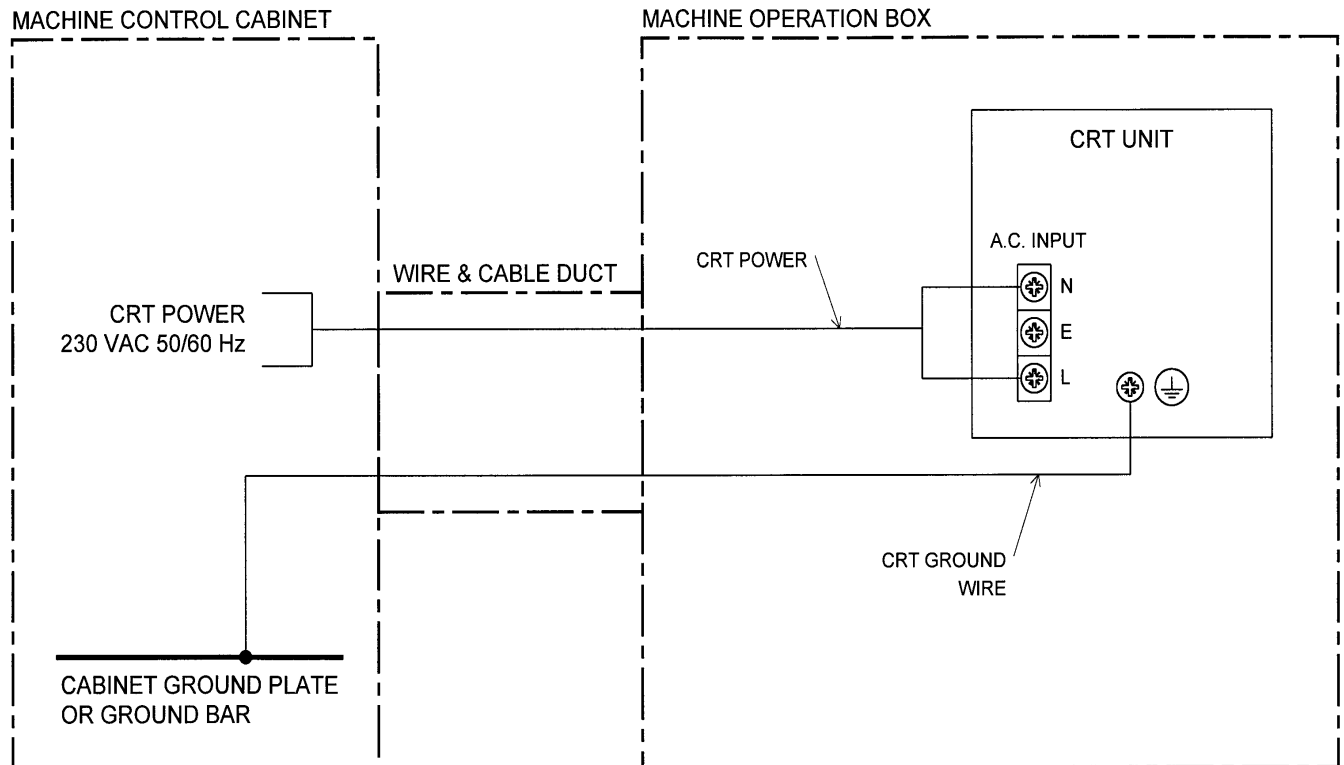


FIGURE 2.2.1.4 YASNAC PCNC CRT Power and Ground Wiring

- Note:
1. Connect CRT ground wire only to the CRT chassis ground terminal. Do NOT connect ground wire to terminal “E” on the main power terminal block of the CRT unit.
 2. CRT Ground wire must be a separate wire directly connected to the main cabinet ground plate or ground bar. Any other connections to the machine operation box should be done using separate ground wires.

2.2.2 Power Supply to Converter Unit

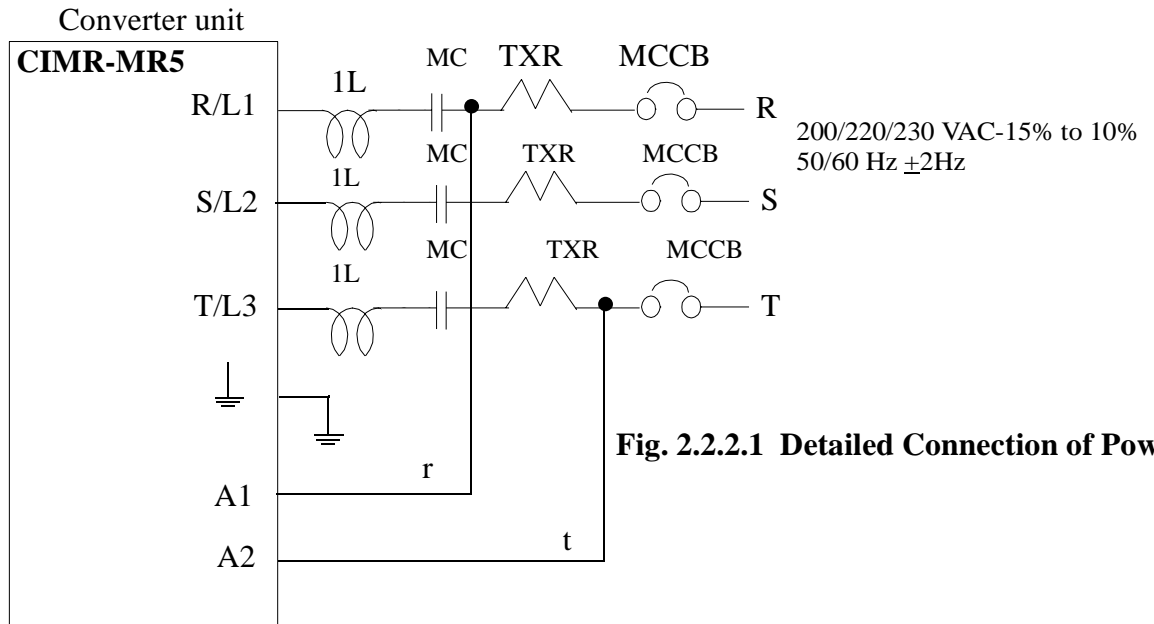
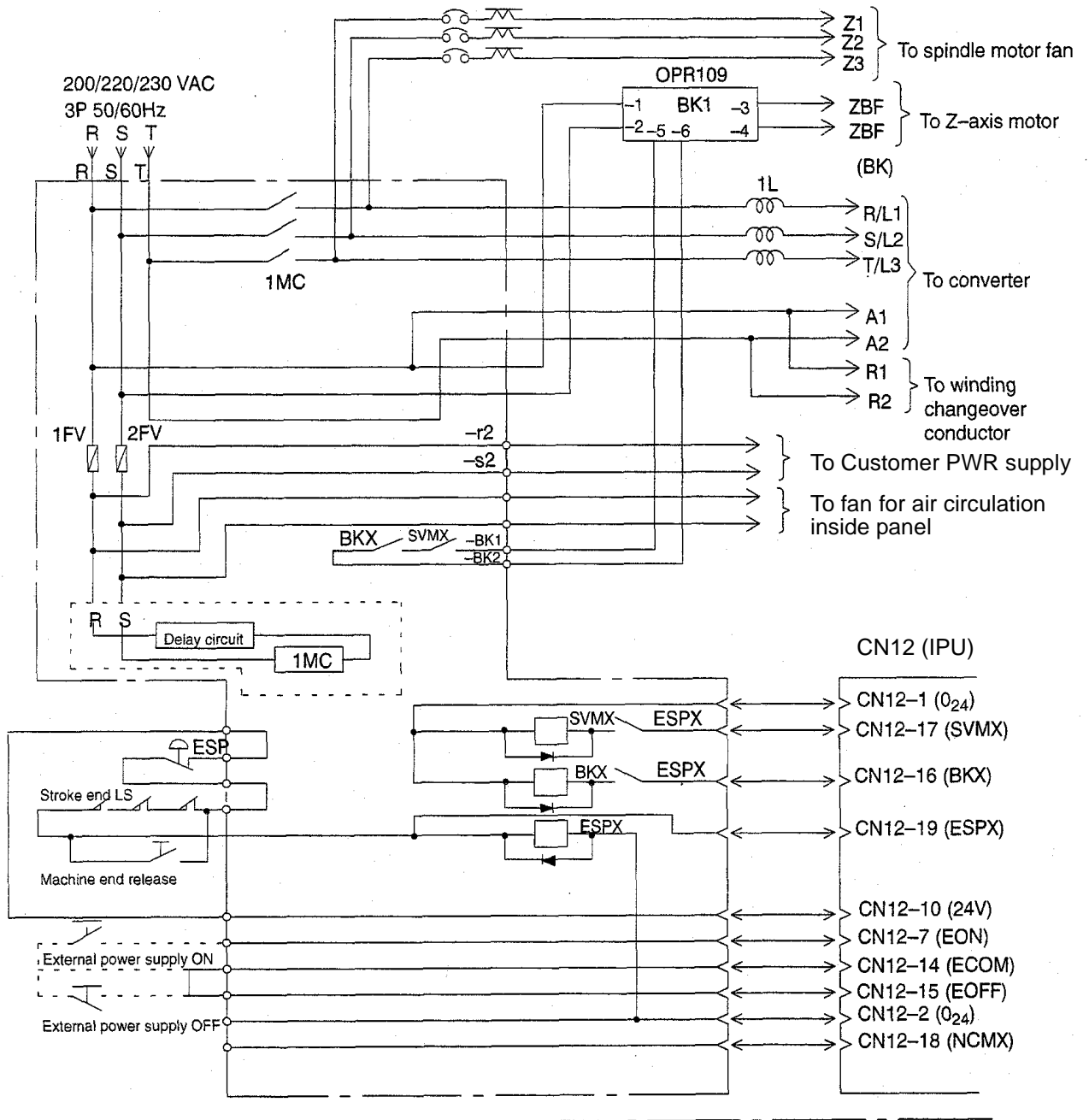


Fig. 2.2.2.1 Detailed Connection of Power

FIGURE 2.2.2.1 Detailed Connection of Power

2.2.3 Circuit Diagram Example (Power magnets & PCNC CN12 Control Signals)



Wiring example of delay circuit
(Differs depending on the delay circuit)

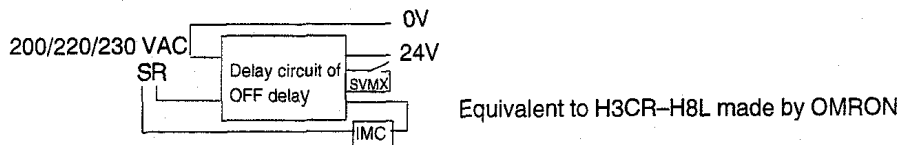


FIGURE 2.2.3.2 Circuit Diagram Example

2.3 LED for Power Input/Output

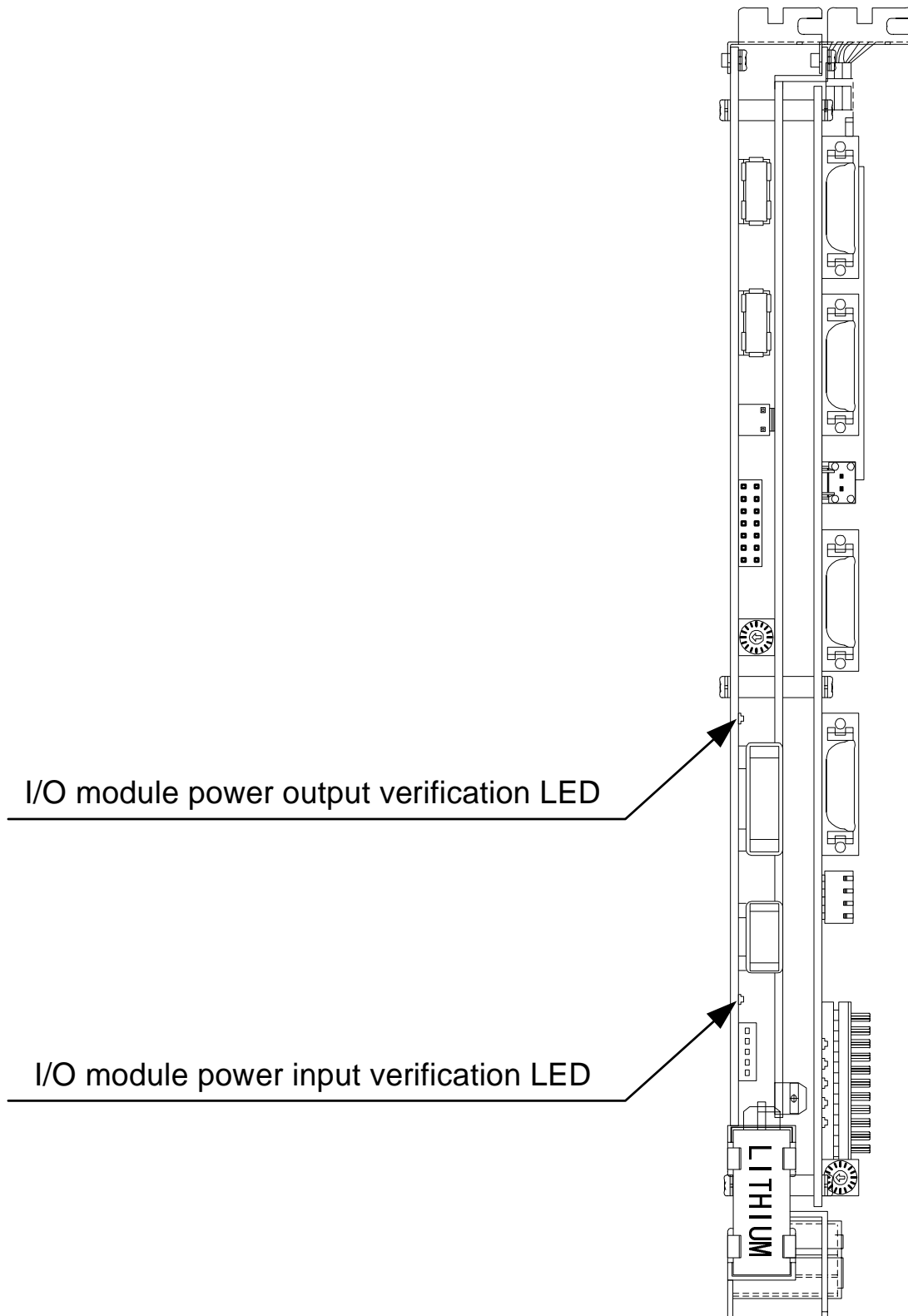


FIGURE 2.3.0.1 LED for PCNC Input/Output Power Indication on JCNC-JFC10 Board

2.3.0 LED for PCNC Power input

The status of +24V power supply to the CNC unit can be confirmed by the LED.

The LED is lit when +24V power is supplied properly.

When +24V power is not supplied or when the fuse inside the PCNC unit is blown out due to a fault of PCNC unit, the LED will be unlit.

3

Connection of PCNC Operation Panel

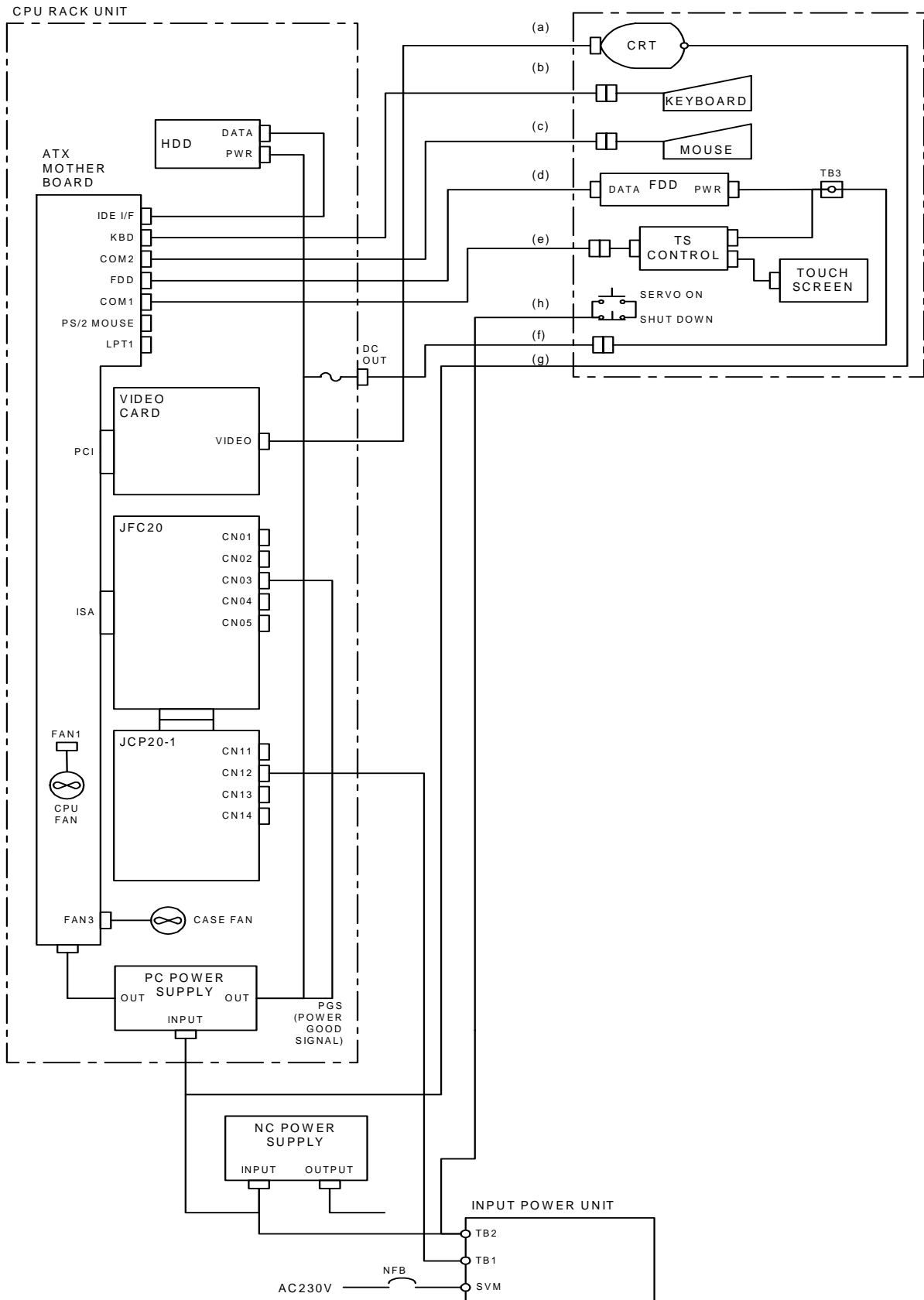
CONNECTING PCNC OPERATOR PANEL AND PCNC

This section addresses the electrical connection between the PCNC unit and the CNC Operator panel.

3.1	Connection between Devices	3 - 2
3.1.1	Connection with the Operation panel	3 - 2
3.2	Detailed Connection of PCNC Operation panel	3 - 3
3.2.1	Connection with Operation panel	3 - 3
3.3	General notes on Connection with operation Panel	3 - 8
3.3.1	JANCD-JSPO4/JANCD-J861	3 - 8
3.3.2	PCNC Connections Layout.	3 - 9
3.3.3	Extended I/O board FC861 and Remote Machine Pendant connections . . .	3 - 10

3.1 Connection Between Devices

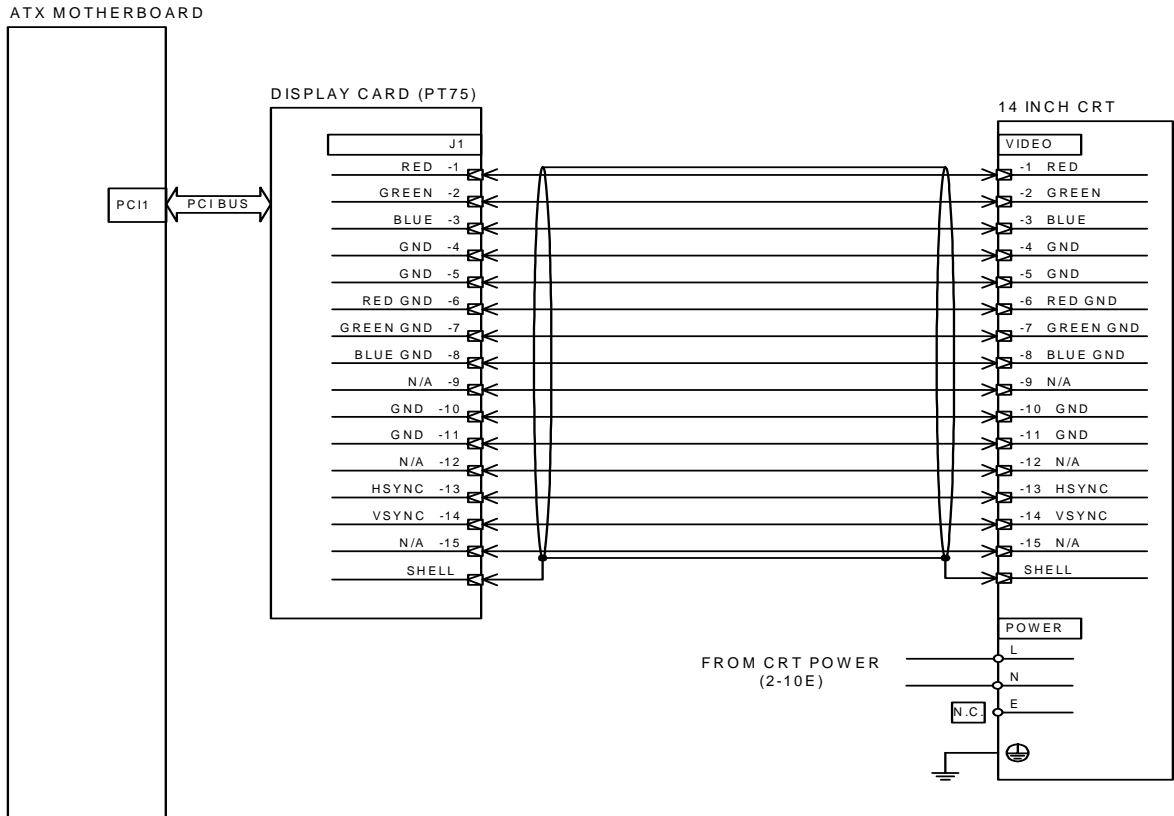
3.1.1 Connection with Operation Panel



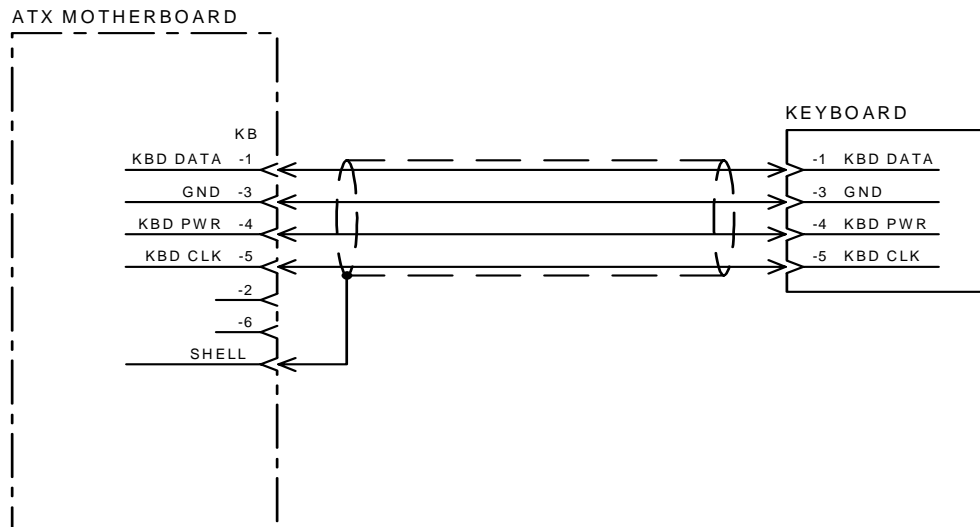
3.2 Detailed Connection of PCNC Operation Panel

3.2.1 Connection with Operation Panel

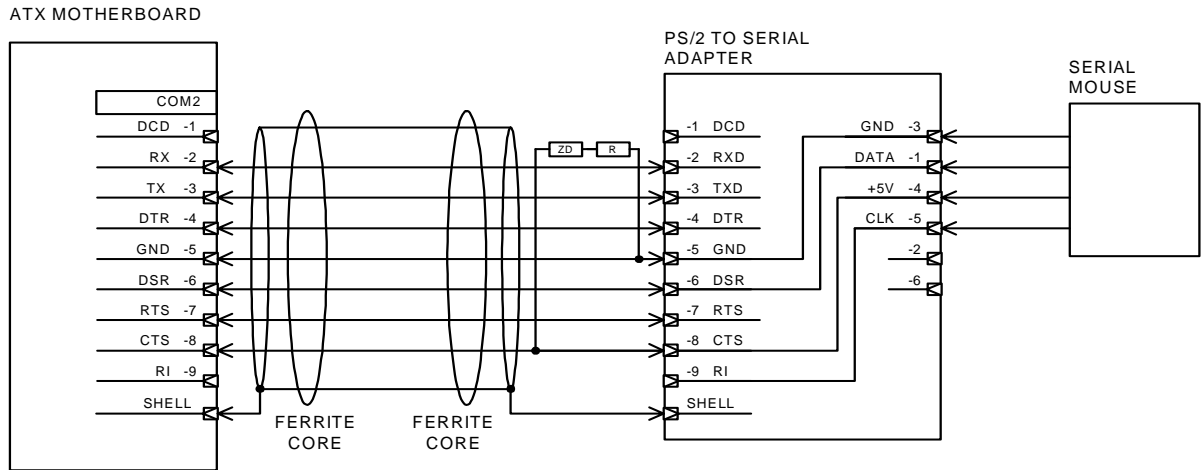
(a) Connection details between PCNC CPU unit and CRT display unit



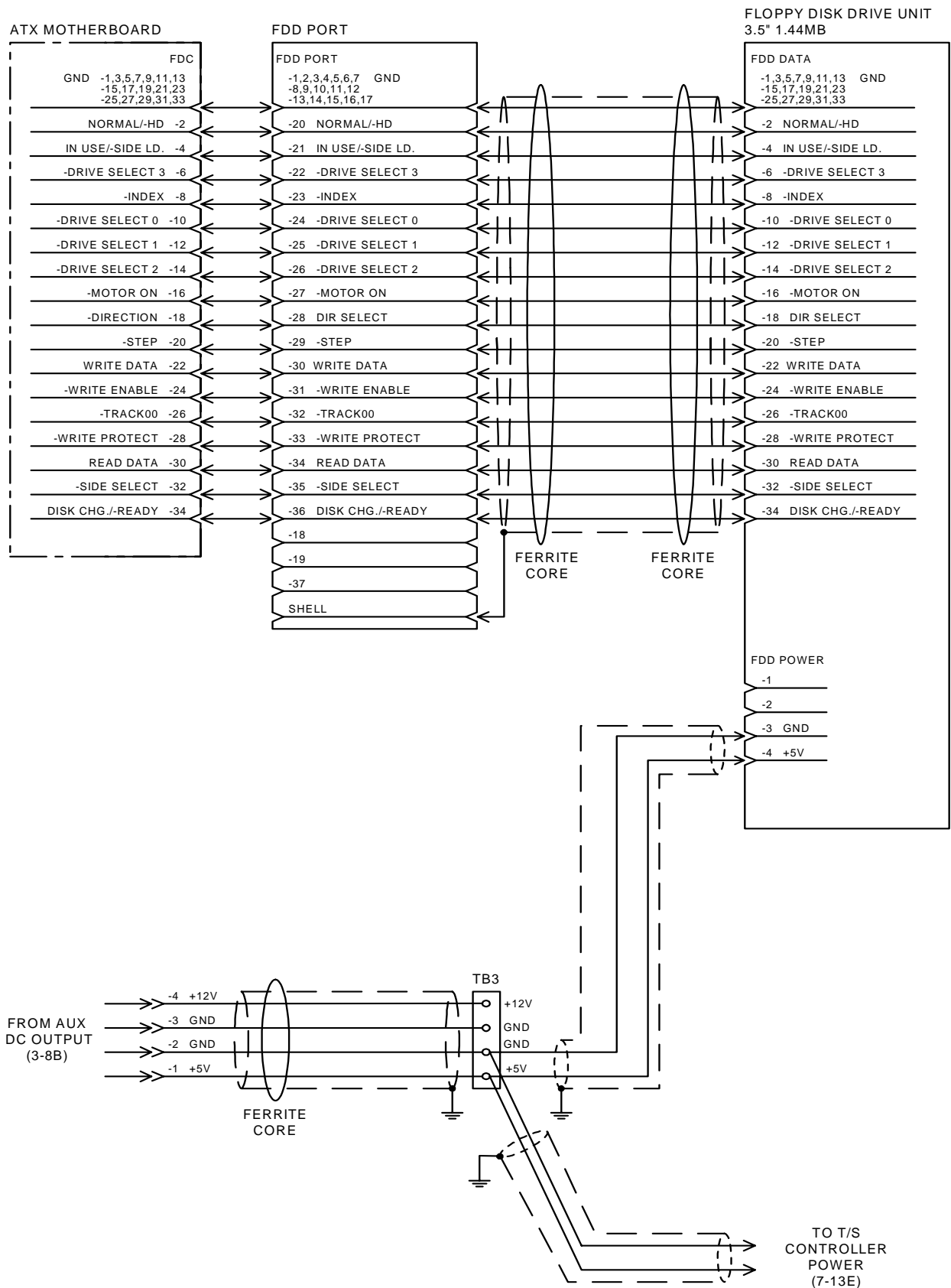
(b) Connection detail between PCNC CPU Unit and Key board



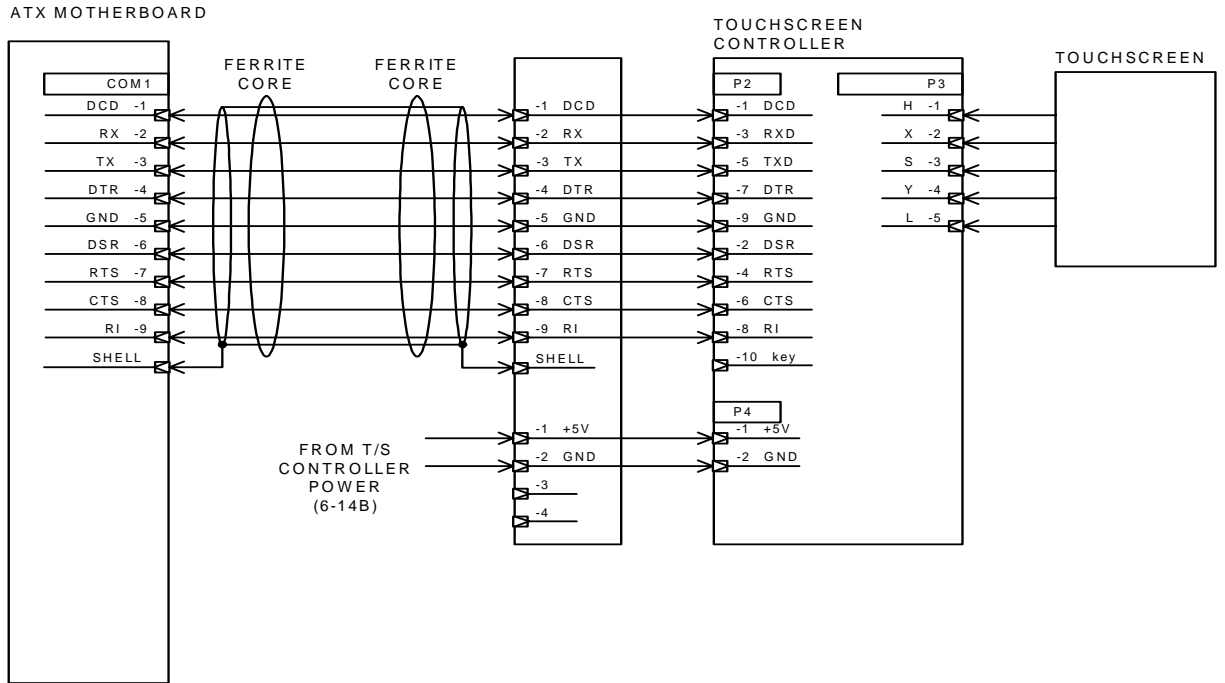
(c) Connection detail between PCNC CPU Unit and Serial Mouse



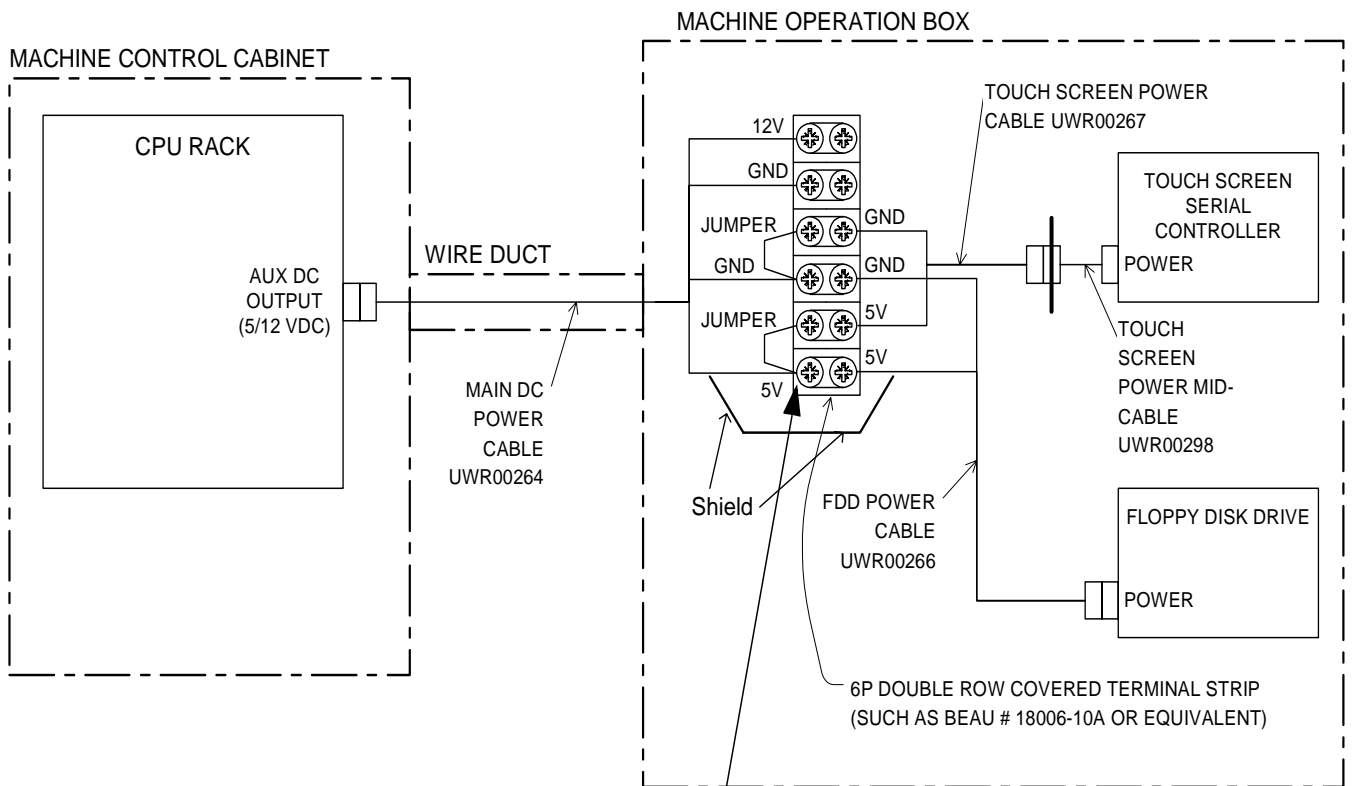
(d) Connection details between PCNC CPU unit and FDD



(e) Connection details Between PCNC CPU unit and Touch screen

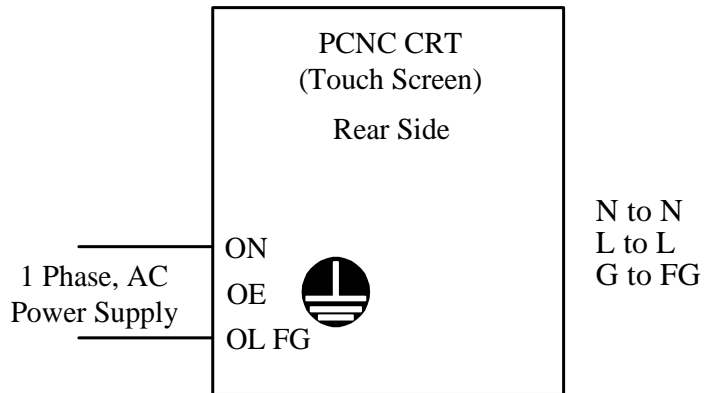
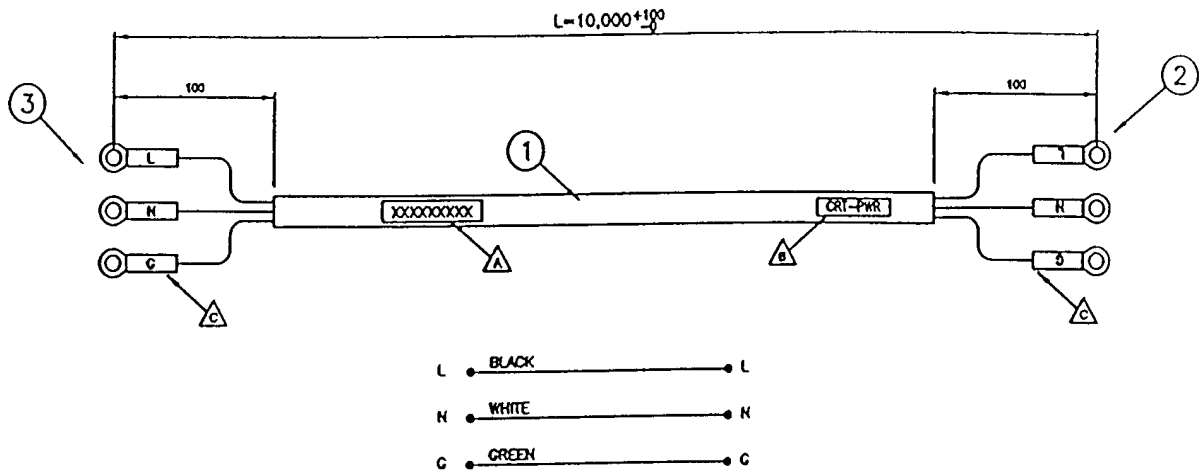


(f) Connection detailed between PCNC CPU UNIT and SERVO ON/ SHUT DOWN



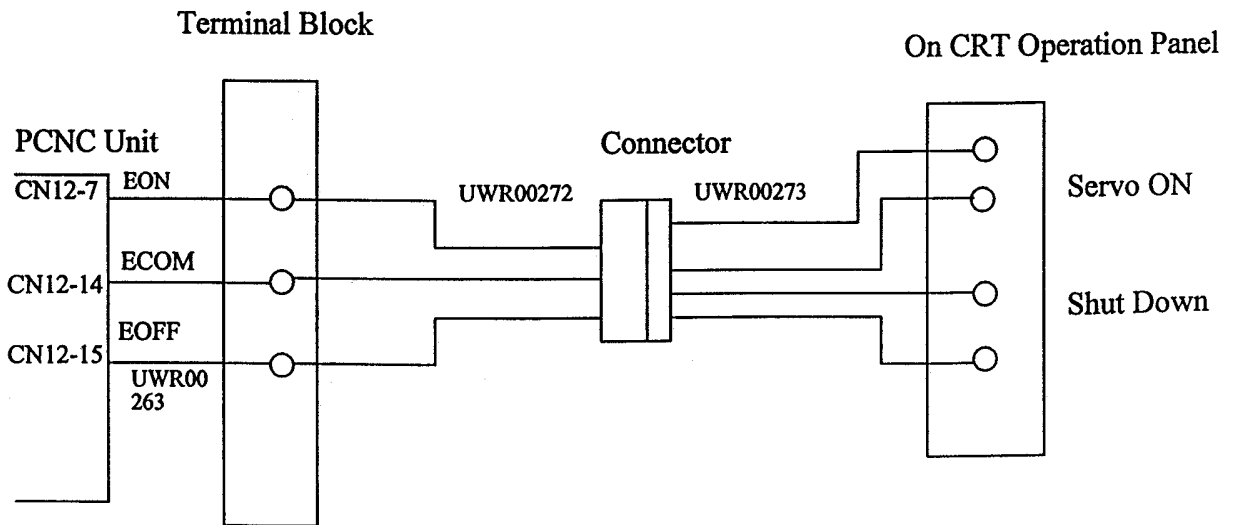
Terminal block
To be arranged by MTB

(g) CRT Power Cable



(Ground wire to be connected to FG)

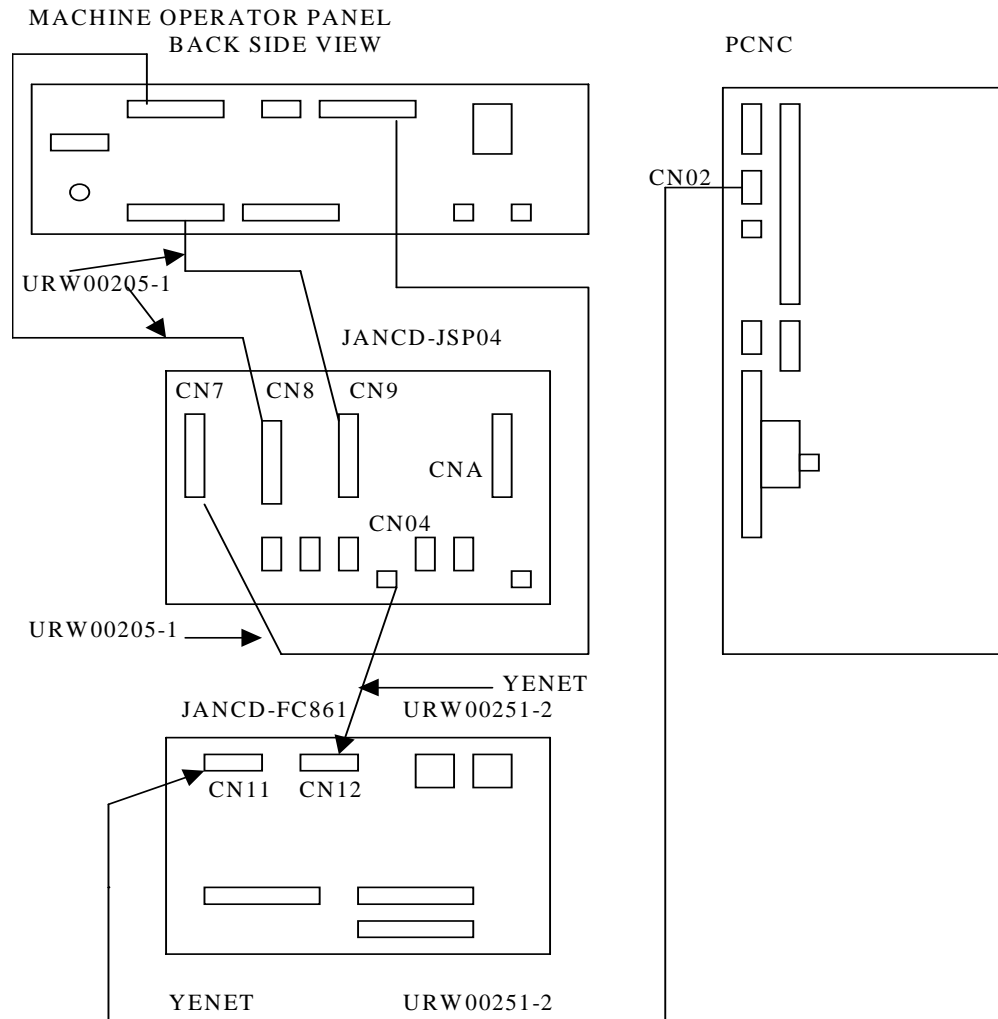
(h) Servo ON/OFF



(To be provided by MTB)

3.3 General Notes on Connection with Operation Panel

3.3.1 JANCD-JSP04 and Operator Panel



This figure gives the general I/O card connections with PCNC.

1. Extended I/O board, FC 861, needs to be connected by a YENET cable from CN02 of PCNC unit to the CN11 of FC 861 unit
2. Extended I/O board FC 861 is then connected by a YENET cable from CN04 of JSP04 to CN12 of FC 861 unit.

3.3.2 PCNC Connection Layout (Top View)

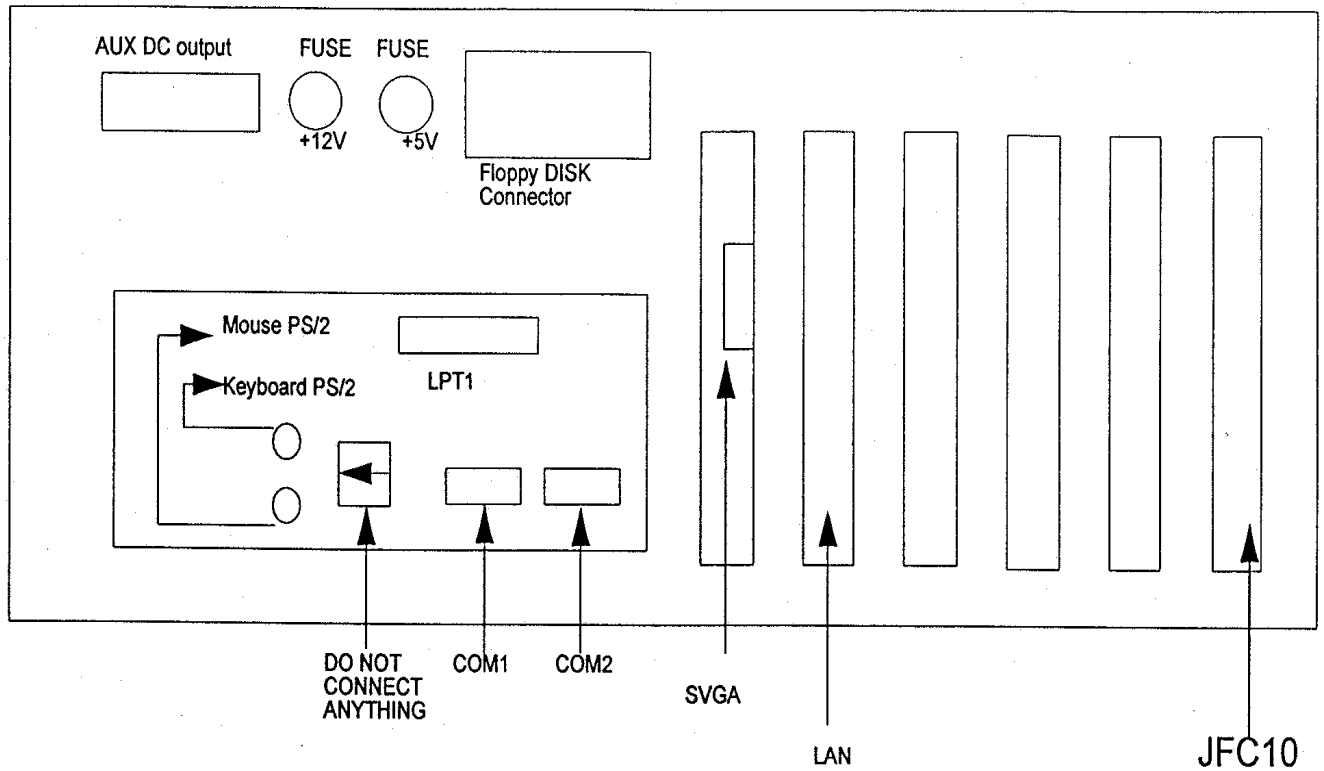


FIGURE 3.3.2.1 PCNC Connections Layout to CRT and PC Accessories

3.3.3 Extended I/O board FC861 and Remote machine pendent connections

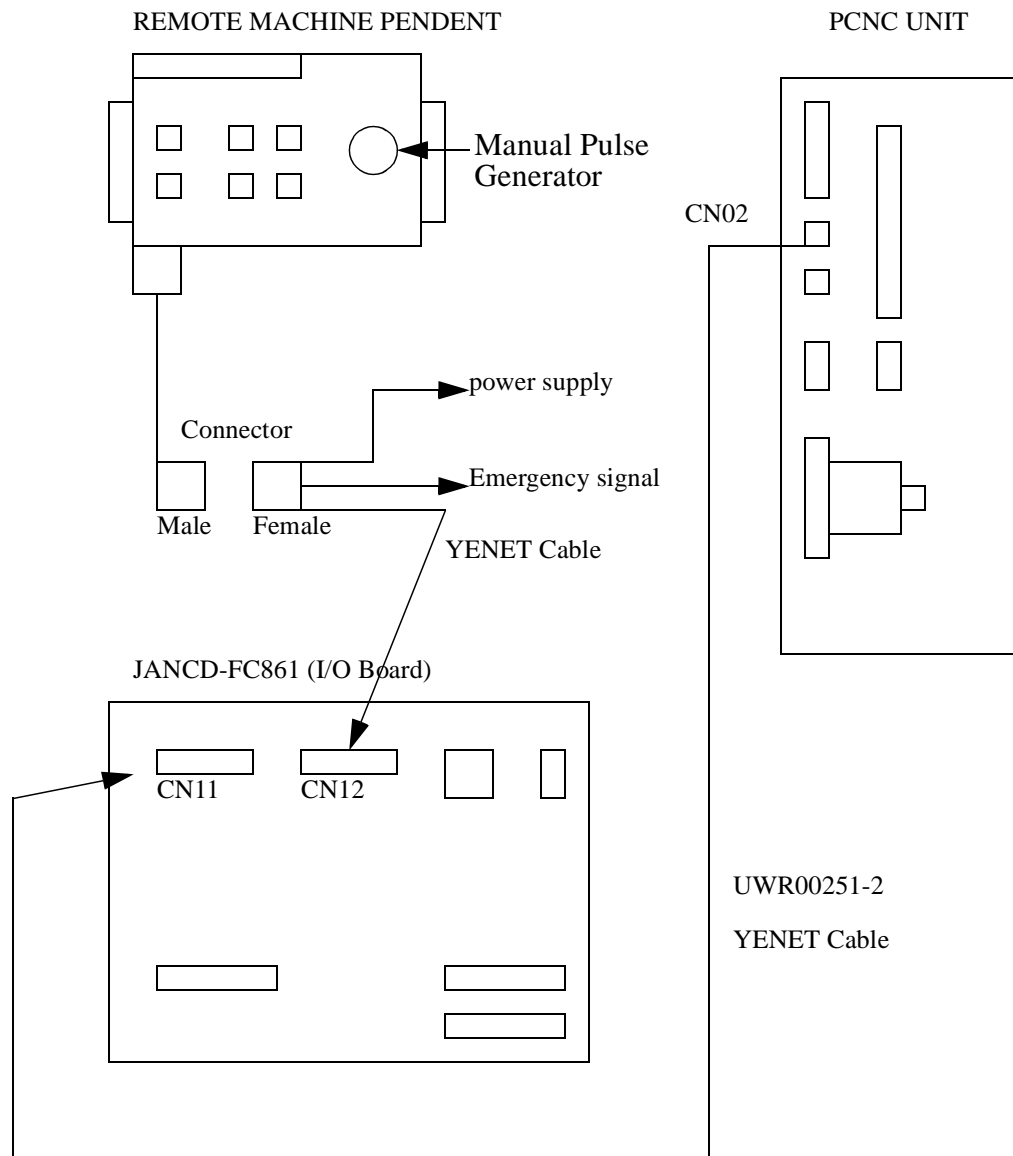


FIGURE 3.3.3.1 External FC861, Remote Machine Pendant, and PCNC connections

The figure illustrates the general I/O card and Remote Machine Pendant card connections with the PCNC Unit.

- Note:
1. FC861 board needs to be connected by a YENET cable from CN02 of the PCNC Unit to CN11 of the FC861 I/O board.
 2. Remote Machine Pendant is connected via a YENET cable from CN12 of the FC861 I/O board to female connector for the Remote Machine Pendant.

4

Connection of Manual Pulse Generator

Connecting PCNC Operation Panel And Manual Pulse Generator

This section addresses the electrical connection of the Manual Pulse Generator.

4.1	Connection between Devices	4 - 2
4.1.1	Connection with PCNC Operation Panel	4 - 2
4.2	Detailed Connection of Manual Pulse Generator	4 - 3
4.2.1	Parallel I/F	4 - 3
4.2.2	Non-Parallel I/F	4 - 4

4.1 Connection Between Devices

This section describes the connection between the PCNC Operator Panel and the Manual Pulse Generator, the type of connector and cable specifications.

4.1.1 Connection of the PCNC operator Panel to the Manual Pulse Generator.

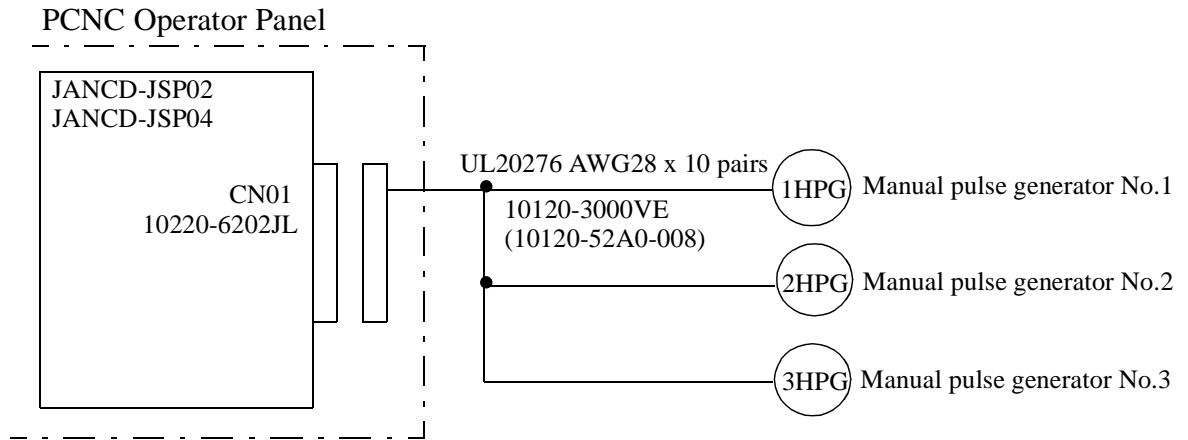


FIGURE 4.1.1.1 Connection Between Devices

4.2 Connection Details of Manual Pulse Generator

Following connection details between the PCNC Operator Panel and the Manual pulse generator

4.2.1 Parallel I / F

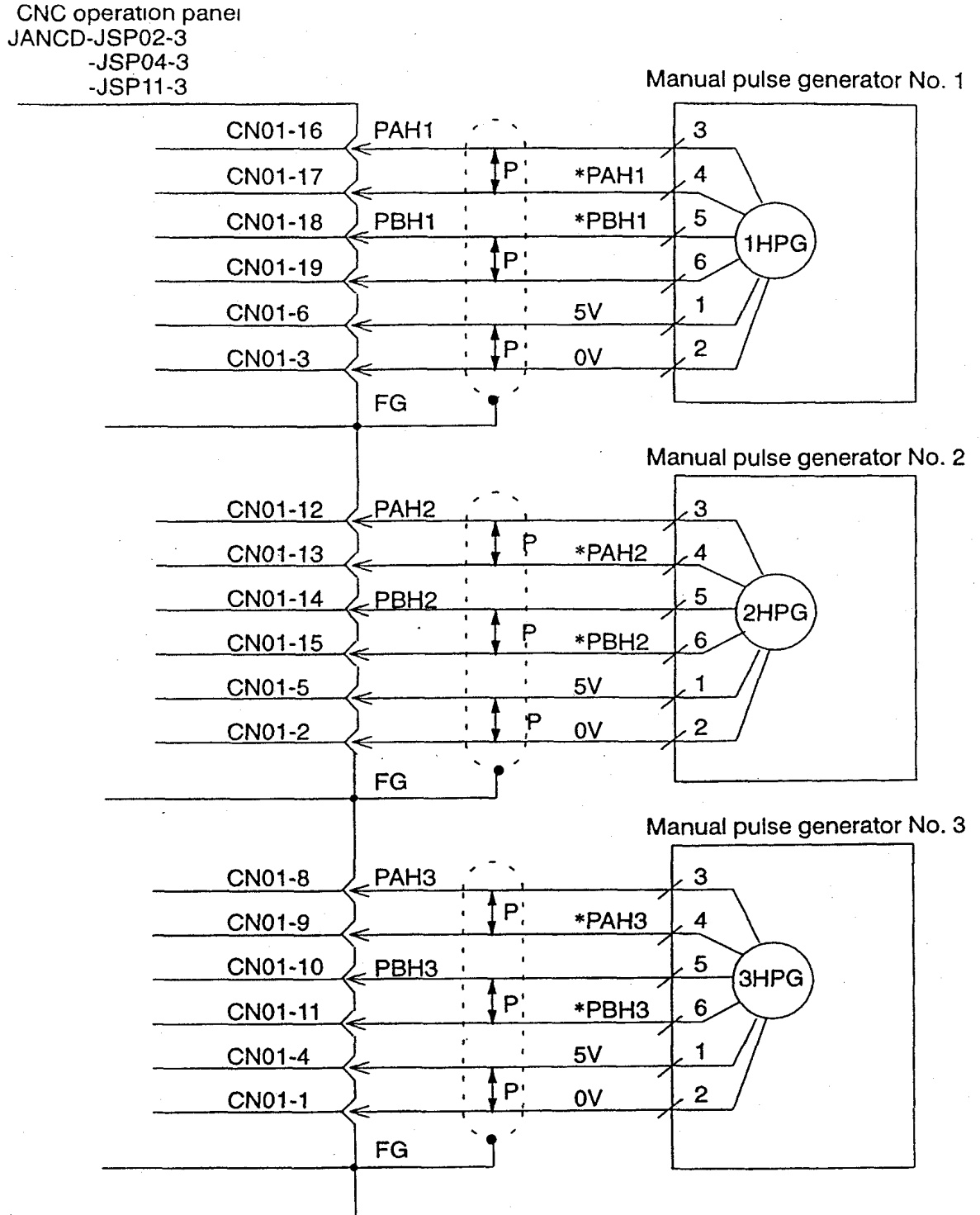


FIGURE 4.2.1.1 Detailed Connection of Manual Pulse Generator (Parallel I/F)

4.2.2 Non - parallel I / F

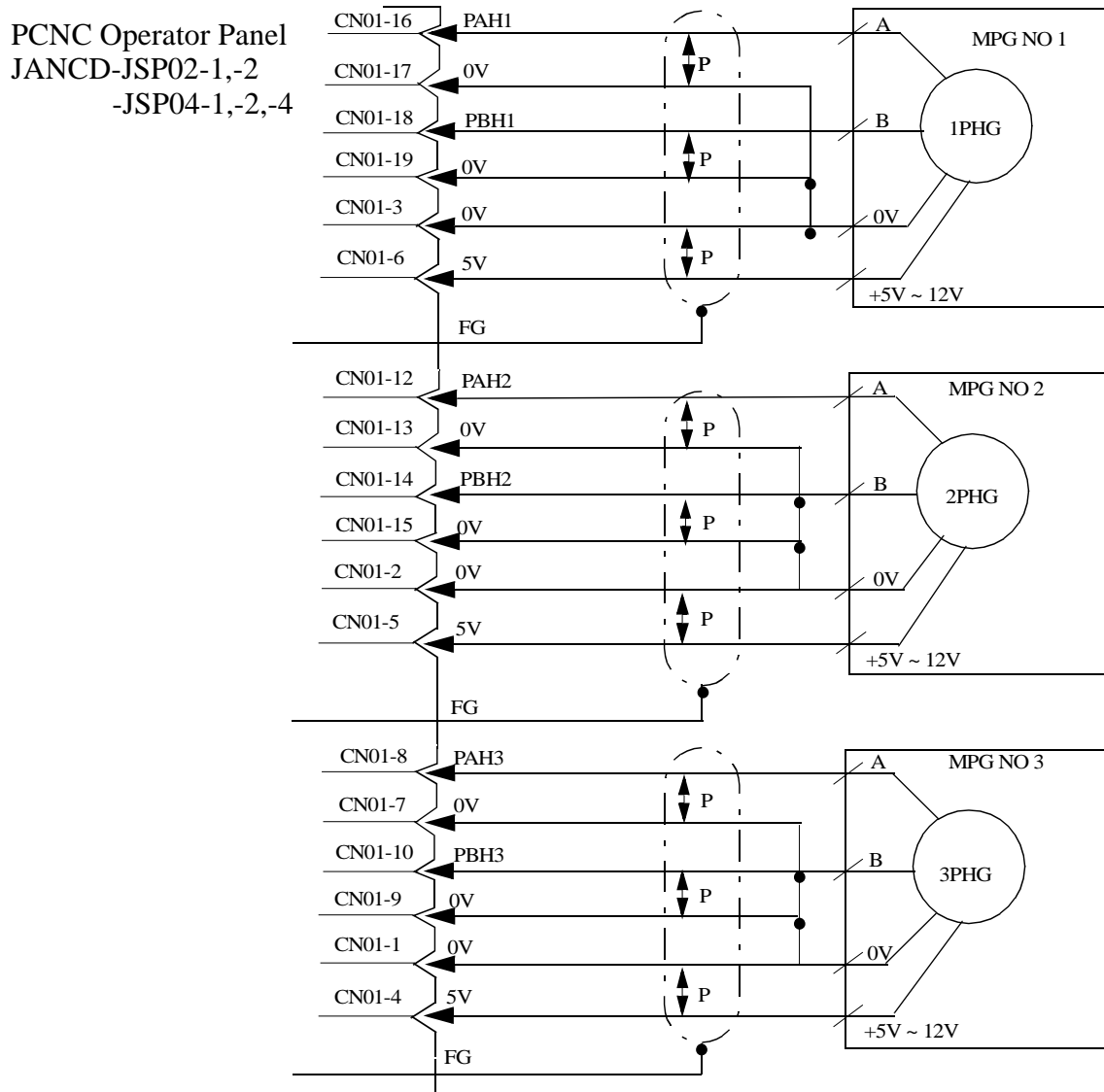


FIGURE 4.2.2.1 Manual Pulse Generator Connection Details



1. JSP02-1, JSP02-2, JSP04-1, JSP04-2, JSP04-4 are provided with non-parallel I/F. With JSP02-1, JSP04-1 only one manual pulse generator can be connected (one axis). With JSP02-2, JSP04-2, JSP04-4 three manual pulse generators can be connected (three axis).
2. Use the cable within 5 meters for non-parallel type I/F. Connect FG and the cable to the case using a metal cable clamp fitting.

5

Connection of Power ON/OFF Exclusive Signal

This section addresses the connection of the Power On/Off Exclusive Signal

5.1	Connection between Devices	5 - 2
5.1.1	Connection to PCNC Unit	5 - 2
5.2	Detailed Connection of Power ON/OFF Exclusive Signal	5 - 3
5.2.1	Connection to PCNC Unit	5 - 3
5.3	Details of Signal	5 - 4
5.3.1	Servo Power ON (SVMX), Brake Release (BKX) Output	5 - 4
5.3.2	Emergency Stop (*ESP) Input	5 - 5
5.3.3	External Power ON/OFF (EON, EOF, ECOM) Input	5 - 5

5.1 Connection between Devices

This section describes the connection between devices related to the Servo ON Shut Down Exclusive signal, type of connector and cable specifications.

5.1.1 Connection to the PCNC Unit

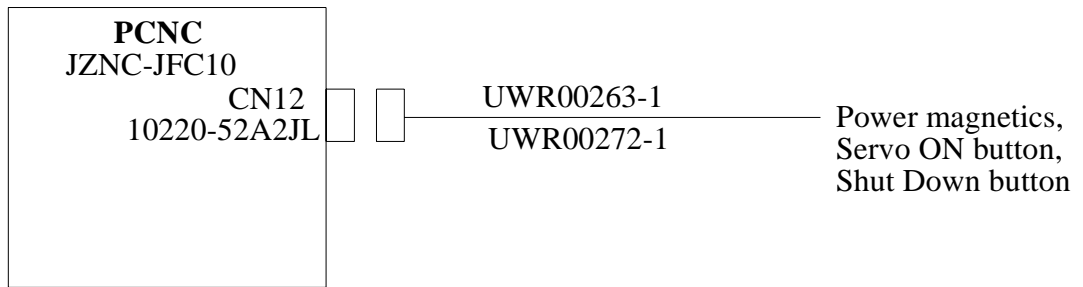


FIGURE 5.1.1.1 Connection between Devices

5.2 Power ON/OFF Exclusive Signal Connection Details

This section describes the Power ON/OFF Exclusive Signal.

5.2.1 Connection to PCNC Unit

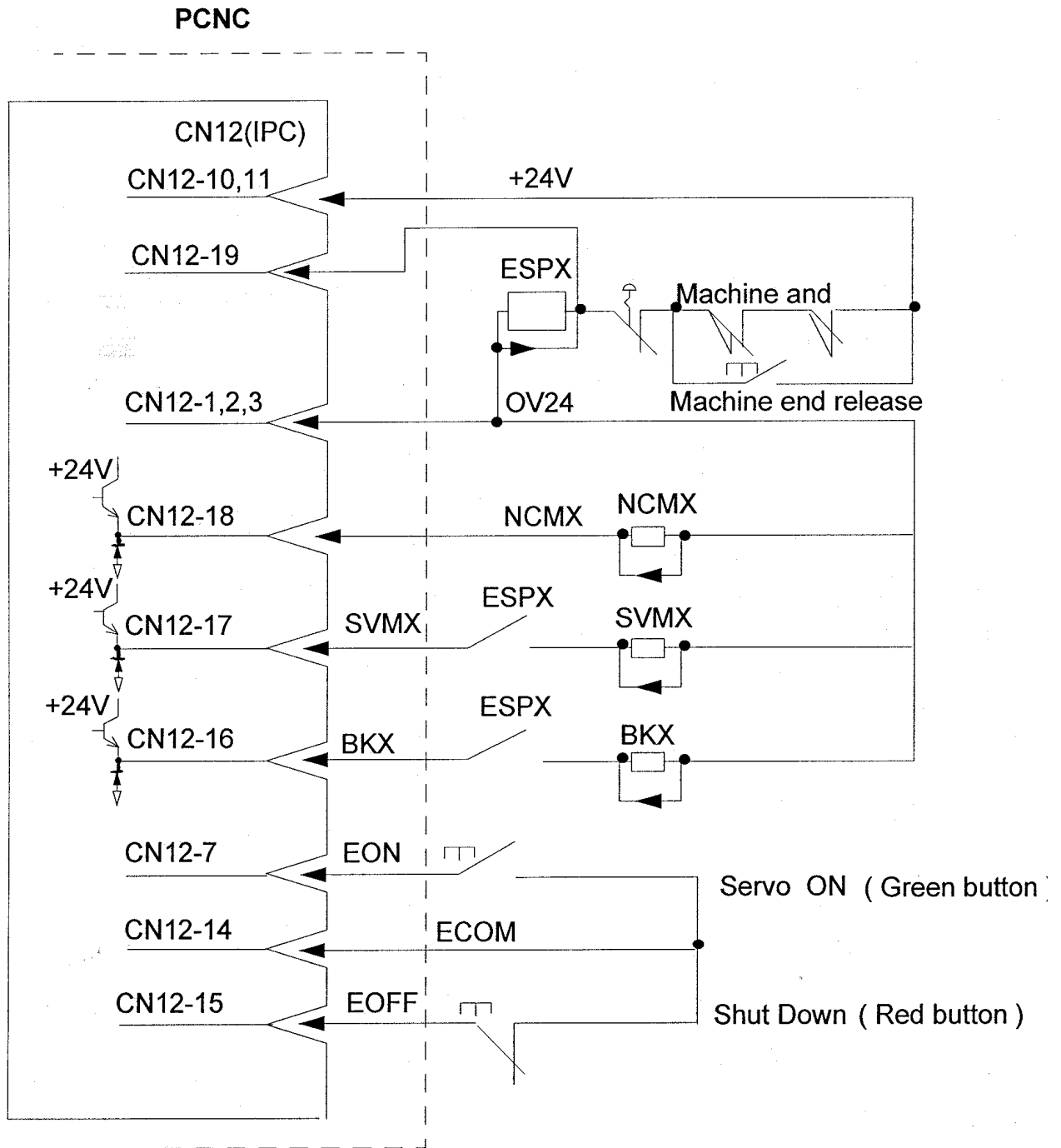
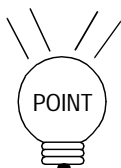


FIGURE 5.2.1.1 Power ON/OFF Exclusive Connection Details



For the relay of SVMX, NCMX and BKX use miniature relay 24V DC. (Recommended part: Omron MY-4Z)

5.3 Details of signals

This section describes the signals used in the power supply sequence.

5.3.1 Servo Power ON (SVMX) and Brake Release (BKX) Output

(1) Signal Names and Descriptions

SVMX: This output signal is closed when we press Power ON button after PCNC boots up. The PLC starts working as soon as PCNC boots up. Use SVMX to turn ON the main Contactor MC or (1MC) to feed main power to the Servo Pack.

BKX: This is the output to release the holding brake of the feed axis (vertical axis).

(2) Power Supply Sequence

Power supply sequence is executed as shown below:

- a. Turn ON the power to the PCNC controller and I/O Power (DC 24V) simultaneously. Power will be supplied to JCNC-JFC10 CNC board from the ISA bus of the PC. PCNC will start booting up.
- b. When the PCNC boots up, perform the Servo ON operation (“closed” between EON and ECOM). SVMX output is closed and the servo power is turned ON.
- c. After completion of servo ready (servo clamp status), BKX output is closed after the time set by parameter. For the motor equipped with a brake, release the brake by this signal.
- d. After SVMX output is closed and the controller is ready, if external preparation has been completed, close the MRD (machine ready completed) input of the general purpose output module. Now Alarm lamp icon on the PCNC CRT is green and operation is now possible.

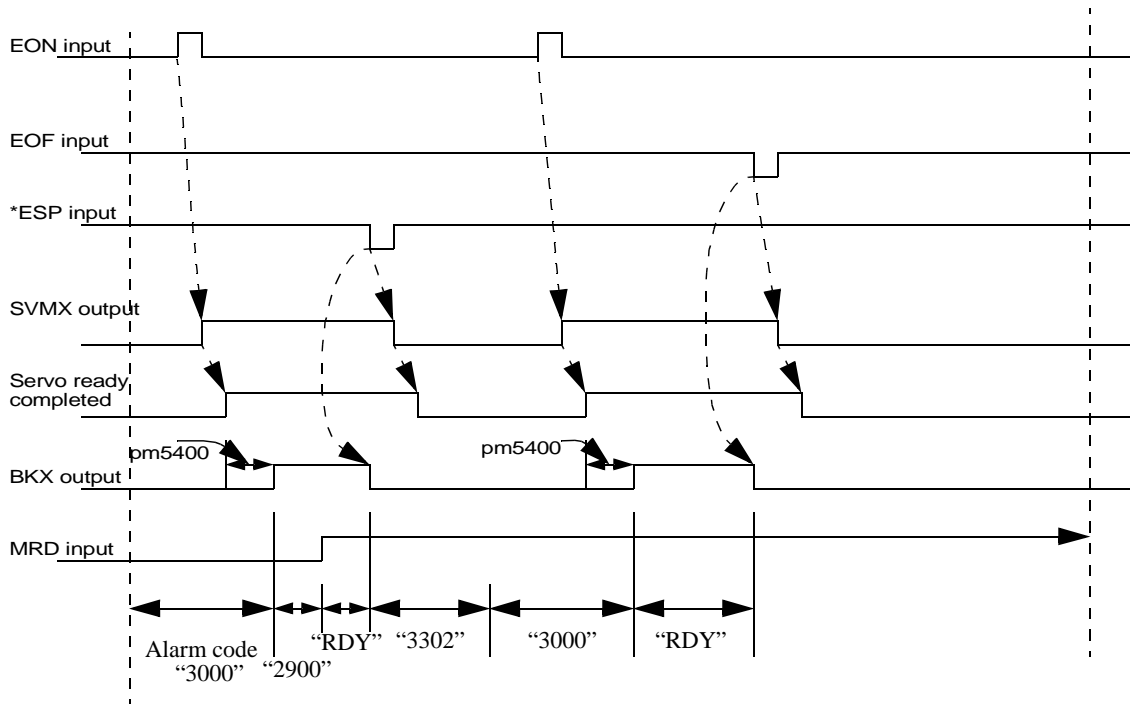


FIGURE 5.3.1.1 Power ON Sequence of Servo with PCNC Unit

5.3.2 Emergency Stop (*ESP) Input

When the emergency stop input circuit is opened, the controller stops all of the actions and turns SVMX and BKX Off. During emergency stop of the general purpose I/O module, it makes output (*ESP) “open”.

In response to the emergency stop input, the servo should DB stop, and the spindle stop with brake using the delay circuit. (The spindle coasts after the main connector 1MC is “opened” by the delay timer).

5.3.3 External Power ON/OFF (ECON, EOF, ECOM) Input

The controller may be turned ON/OFF by external input just like through the POWER ON/OFF push button on the PCNC operator panel.

Setting the portion between EON and ECOM “closed” is like when the EOF and ECOM is “closed” turns ON the logic circuit of the controller or the servo power.

Setting the portion between EON and ECOM “open” turns OFF the logic circuit of the controller or the servo power.

6

Connection With The Servopack

Connection of the ServoPack to the PCNC Unit.
This section addresses the connection of the Servopack (Servo unit, Inverter, and Converter Unit).

6.1	Connection between Devices	6 - 2
6.1.1	Connection between PCNC Unit, Servopack and Motor	6 - 2
6.2	Connection Details	6 - 3
6.2.1	Connection between PCNC Unit and Servopack	6 - 3
6.2.2	Connection of the Servomotor	6 - 4
6.2.3	Connection of the Spindle Motor	6 - 7
6.2.4	Selection of the Converter	6 - 9

6.1 Connection between Devices

6.1.1 Connection between PCNC, Servopack (Servo, Inverter and Converter units) and Motor

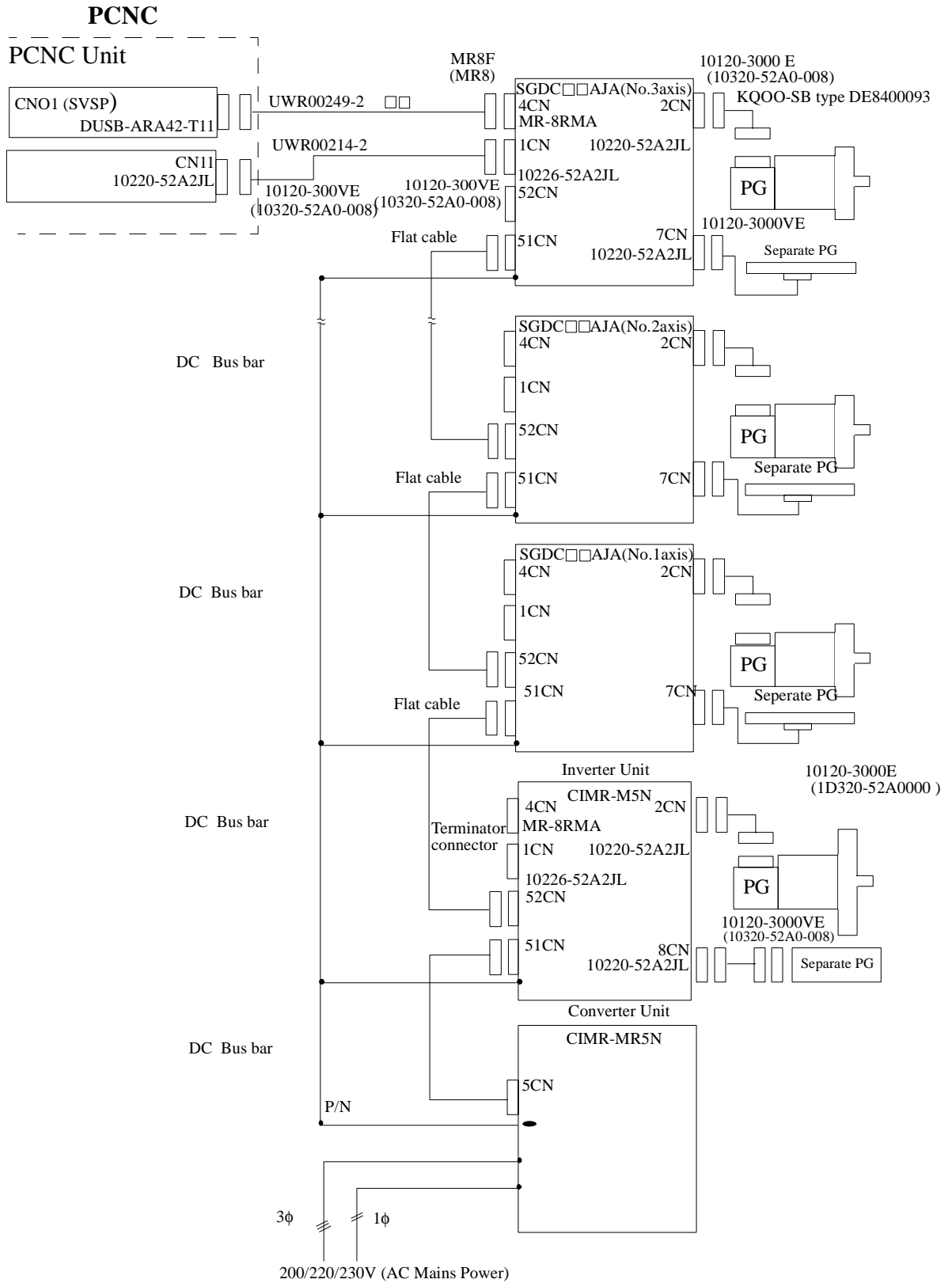


FIGURE 6.1.1.1 Connection between PCNC unit, Servopack and Motor

6.2 Connection Details

This section contains connection diagrams of the PCNC unit to the Servopack.

6.2.1 Connection Between PCNC Unit and Servopack

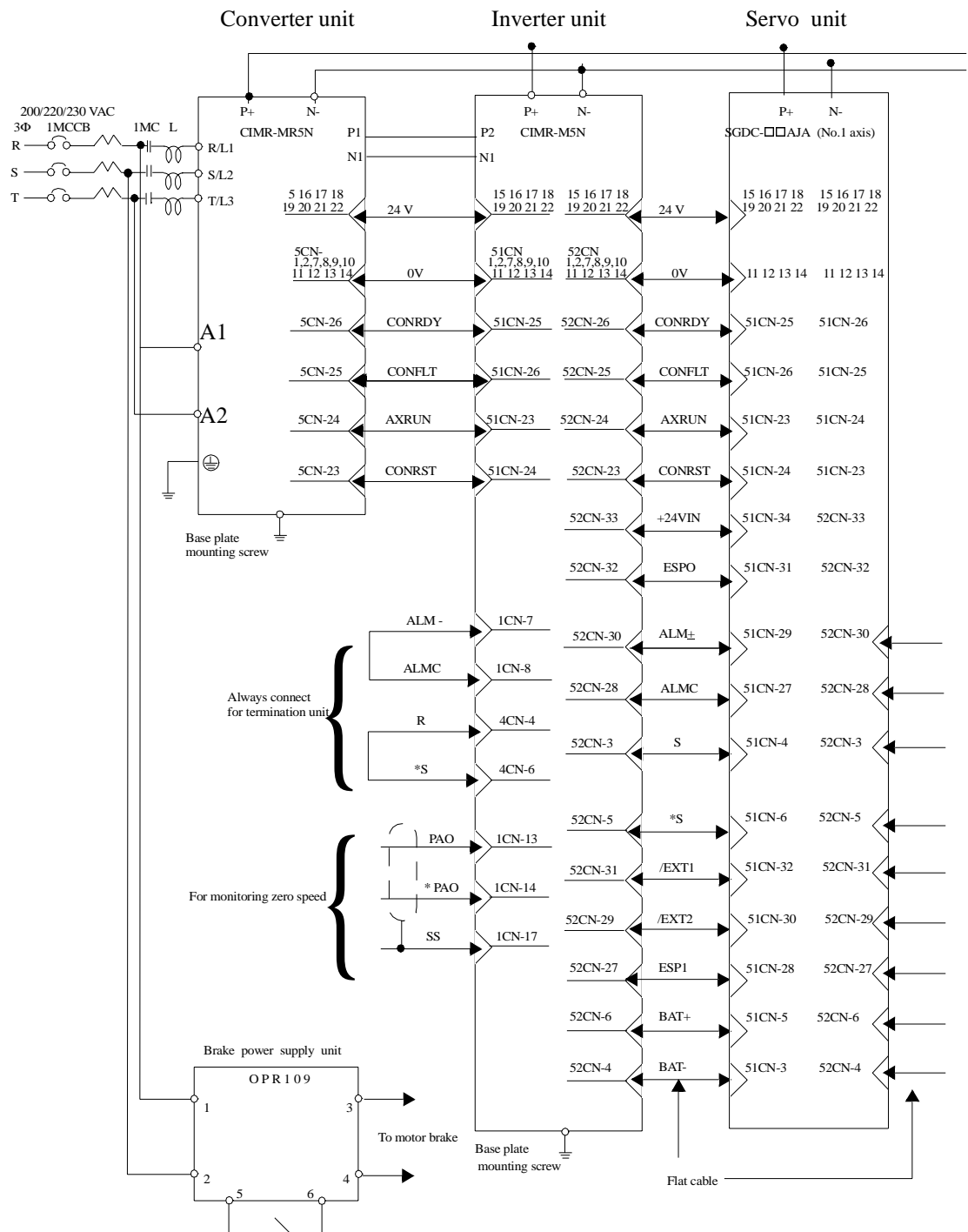


FIGURE 6.2.1.1 Connection between PCNC unit and Servopack

For the I/O signals directly connected to the inverter previously, use the general purpose I/O ports. The I/O addresses at the PCNC are shown below. For details of the signals, refer to the inverter's instruction manual.

Table 6.2.1.1 No. 1 Spindle Control Inputs with M-series (PLC → CNC)

Signal No.	Bit No.	Symbol	Name
3120	D0	SPRDY-1	Machine ready
	D1	SPEMG-1	Emergency stop
	D2	SPFWD-1	Forward rotation
	D3	SPREV-1	Reverse rotation
	D4	SPTLH-1	Torque limit H
	D5	SPTLL-1	Torque limit L
	D6	SPSSC-1	Soft start cancel
3121	D0	SPCHW-1	Winding changeover signal
	D1	SPPPI-1	Speed controller P-PI changeover signal
	D2	SPORT-1	Orientation signal
	D3	SPLGR-1	L gear selection signal
	D4	SPMGR-1	M gear selection signal

Table 6.2.1.2 No. 1 Spindle Control Outputs with M-series (PLC → CNC)

Signal No.	Bit No.	Symbol	Name
3660	D0	SPZSPD-1	Zero-speed signal
	D1	SPAGR-1	Speed match signal
	D2	SPSDET-1	Speed detection signal
	D3	SPTDET-1	Torque detection signal
	D4	SPTLE-1	In torque limit signal
	D5	SPORG-1	Load axis zero point signal
	D6	SPORE-1	Orientation completed signal
	D7	SPCHWE-1	Winding changeover signal
3661	D0	SPFLT-1	Fault signal
	D1	SPTALM-1	Error/Alarm signal

6.2.2 Servomotor Connection

(1) Servomotor with Built-in PG (common to both absolute and incremental encoders).

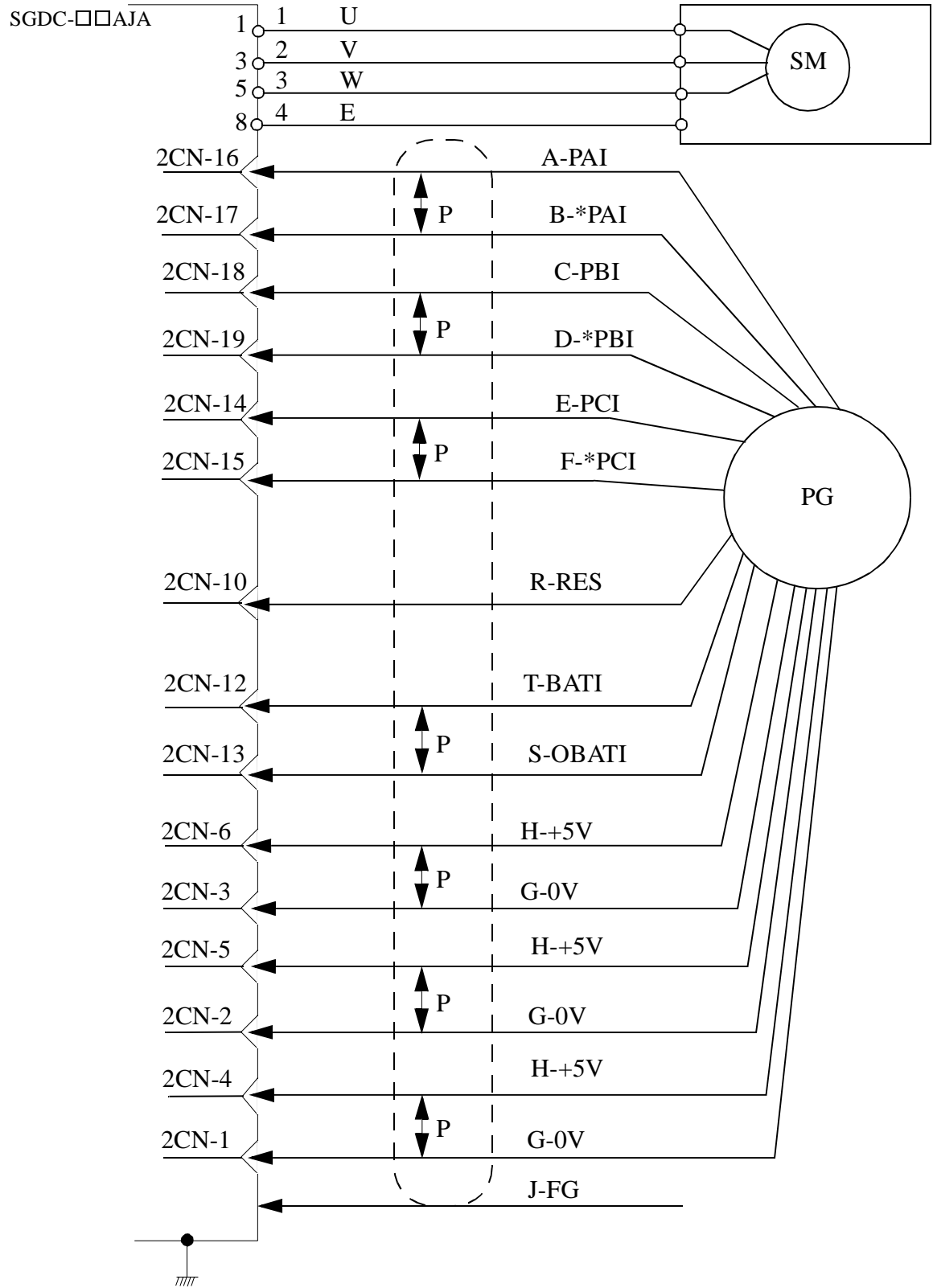


FIGURE 6.2.2.1 Connection of the Servopack (with built-in PG)

(2) Servomotor With Separate Feedback Unit

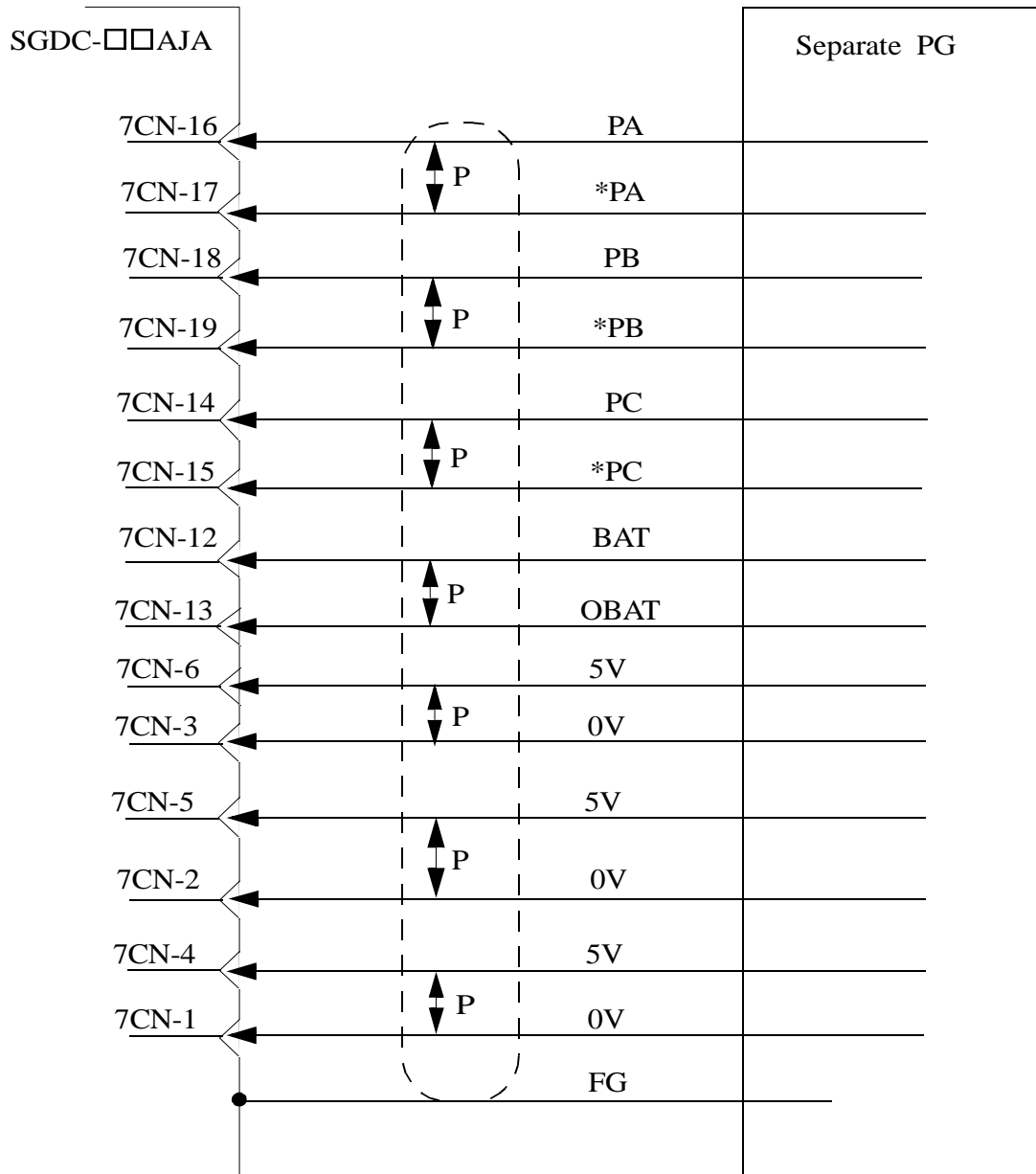


FIGURE 6.2.2.2 Connection of the Servopack (with Separate Feedback Unit)

6.2.3 Spindle Motor Connection

(1) Spindle Motor with Built-in PG

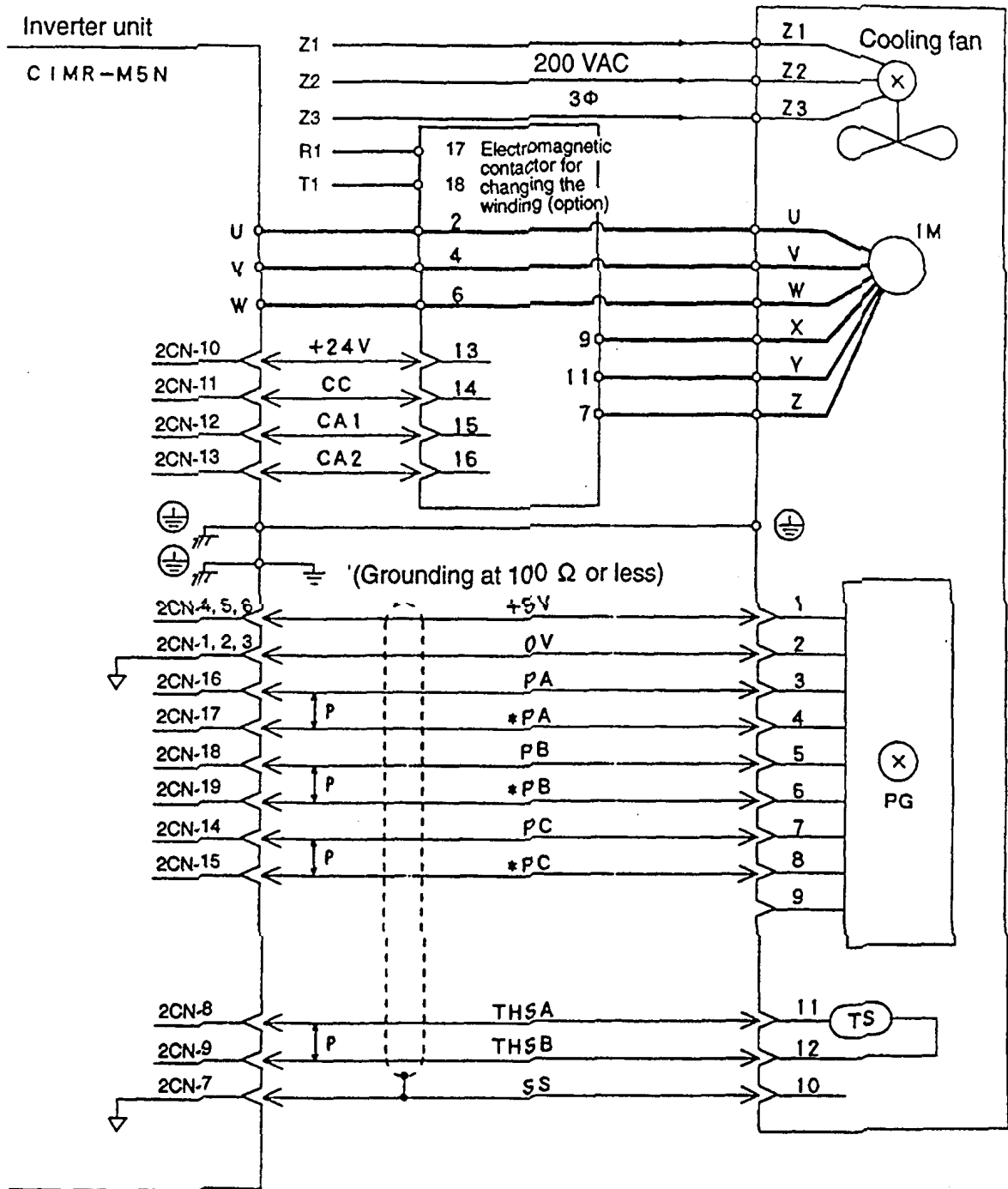


FIGURE 6.2.3.1 Connection of the Spindle Motor (with Built-in PG)

(2) Separate Spindle Drive PG

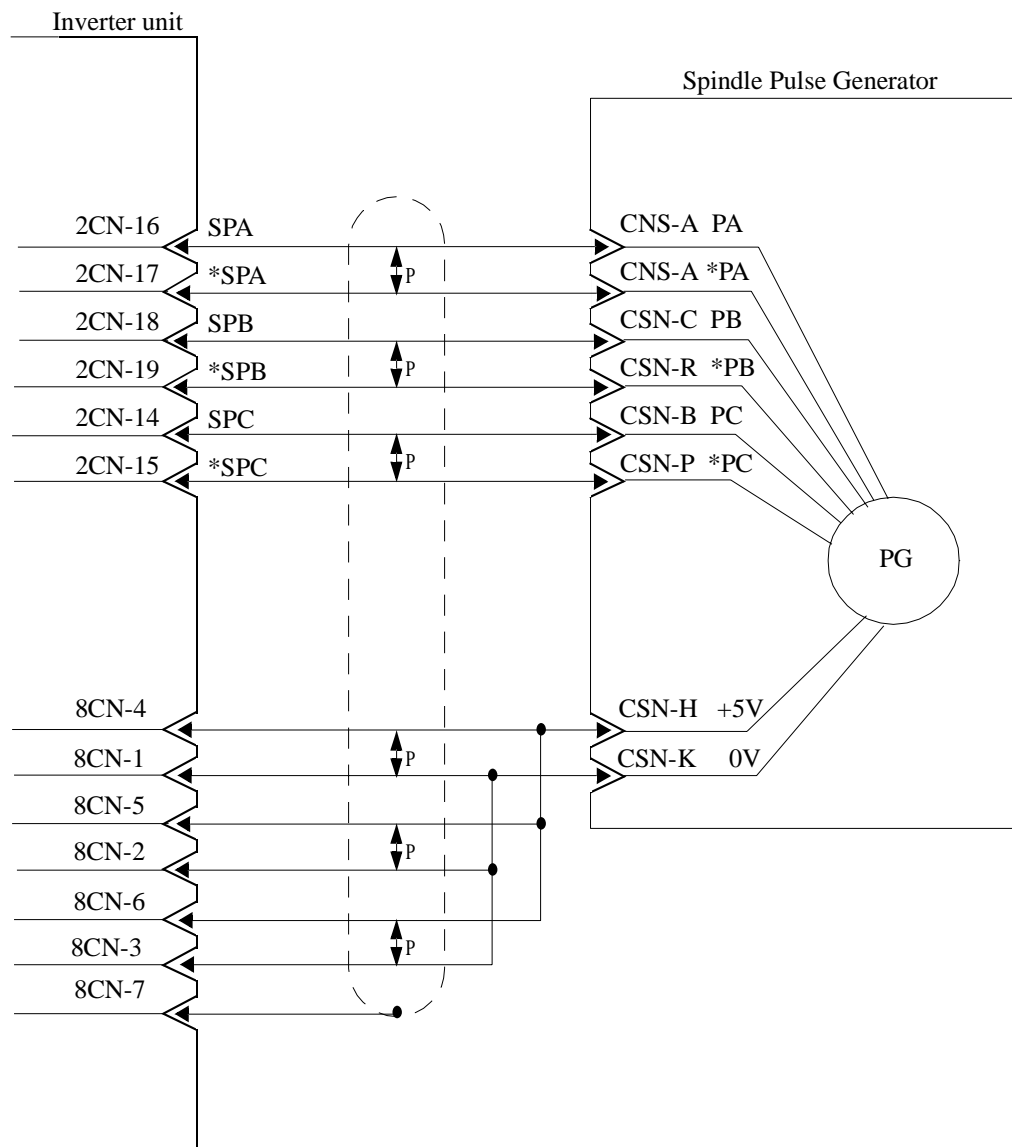


FIGURE 6.2.3.2 Connection of the Spindle Motor (with Separate Spindle Drive PG)

6.2.4 Selection of the Converter

It is necessary to select the converter based on satisfying the following three conditions:

CONDITION 1:

- The rated output of the selected converter must be larger than the following value:

$$(\text{Rated spindle output} \times 1.1) + (\text{Total rated servomotor's outputs} \times 0.6)$$

CONDITION 2:

- The one second rating of the selected converter (2 times the continuous rating) must be greater than the value shown below.

CONDITION 3:

- The one minute rating of the selected converter (1.2 times the continuous rating) must be larger than the momentary max. output value of spindle motor.

An example of converter selection procedure is show below:

Motors used: X-axis: SGMG-20 (Max. 2000 r/min)
 Y-axis: SGMG-20 (Max. 2000 r/min)
 Z-axis: SGMG-30 (Max. 1500 r/min)
 Spindle: UAASWD-22CX1:
 7.5kW (10HP)(cont. rating)
 11 kW (15HP)(30 min. rating)
 26 kW (34.8HP)(1 min. rating)

- Continuous rating:
 $7.5\text{kW} \times 1.1 + (1.08\text{kW} \times 2 + 1.74\text{kW}) = 12.12\text{kW}$ (Selected 15 kw Converter)
- Maximum momentary servo output:
 $5.99\text{kW} \times 2 + 7.12 \text{ kW} = 19.1\text{kW}$ (Selected 11 kW converter)
- Spindle acceleration/deceleration
 Momentary max. output value of spindle motor: 26kW : (22 kW * 1.2)
 (converter with 22kW ratings)

From the calculation indicated above, the converter with 22kW rating that satisfies all conditions that should be selected.

7

Connection of RS-232C

(Awaiting technical details. Contact Yaskawa Electric America)

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8

Connection of Direct IN-OUT Signal to the CNC Unit

This section addresses the connection of the direct IN/OUT signals to be input/output directly to and from the CNC unit.

8.1	Connection between Devices	8 - 2
8.1.1	Connection to the CNC Unit.....	8 - 2
8.2	Detailed Connection of Direct IN/OUT	8 - 2
8.2.1	Connection to the CNC Unit.....	8 - 2
8.2.2	Description of Signal	8 - 4
8.2.3	I/O Circuits on CNC side	8 - 4

8.1 Connection between Devices

This section addresses the connection of direct IN/OUT signals to be input/output directly to and from the PCNC unit, the type of connector and the cable specifications.

8.1.1 Connection to the PCNC Unit

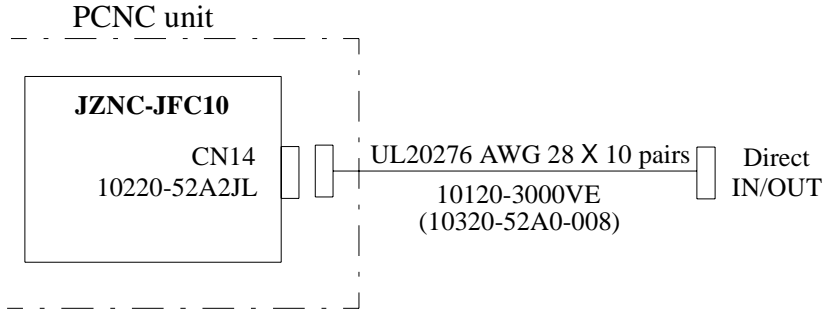


FIGURE 8.1.1.1 Connection between Devices

8.2 Detailed Connection of Direct-IN/OUT

This section describes the detailed connection of the direct IN/OUT signals to be input/output directly to and from the PCNC unit.

8.2.1 Connection to the PCNC Unit

(1) Connection of Direct IN Signal

(a) For 0 V Common

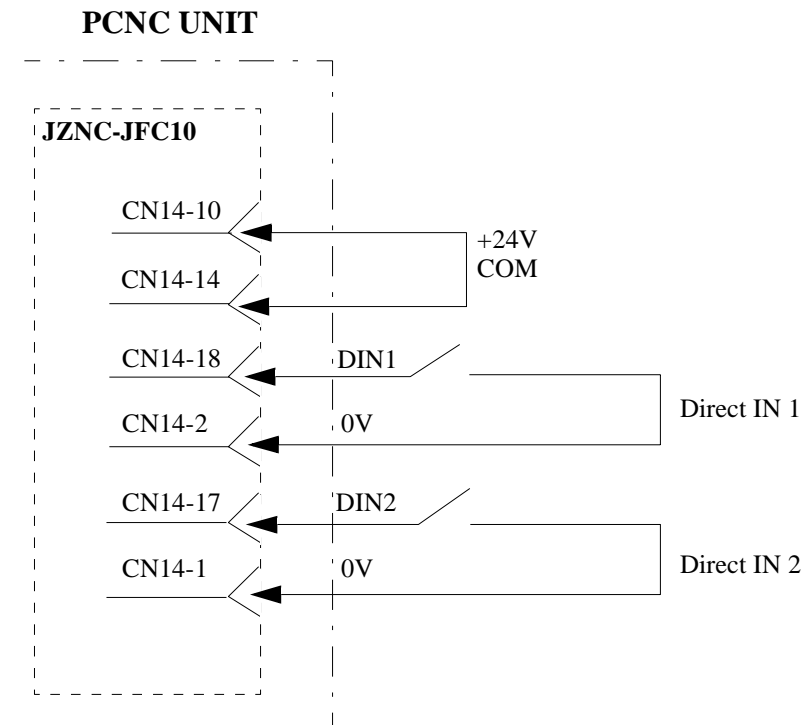


FIGURE 8.2.1.1 Connection Details of Direct IN (for 0V Common)

(b) For +24V common

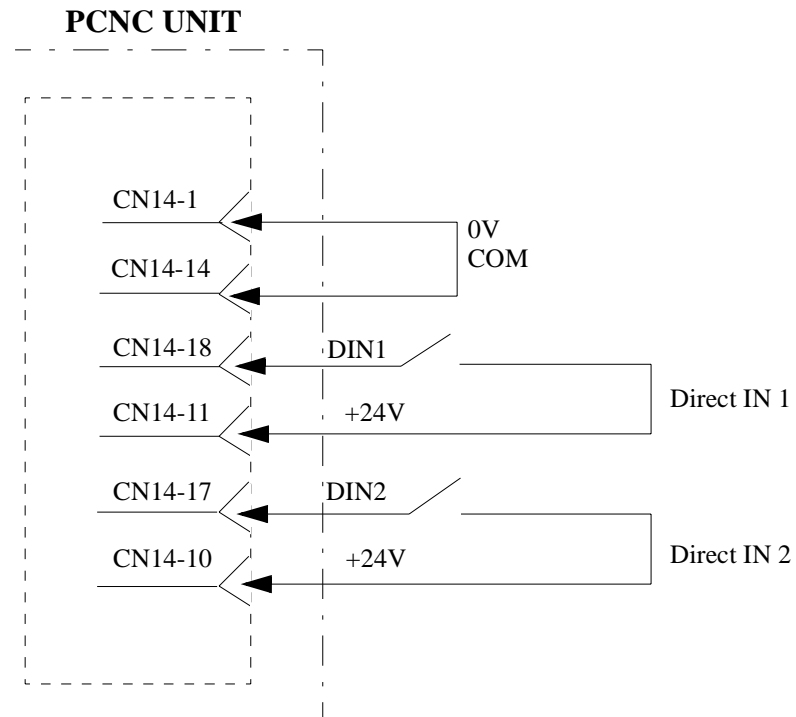


FIGURE 8.2.1.2 Connection Details of Direct IN (for 24V Common)

(2) Connection of Direct OUT Signal

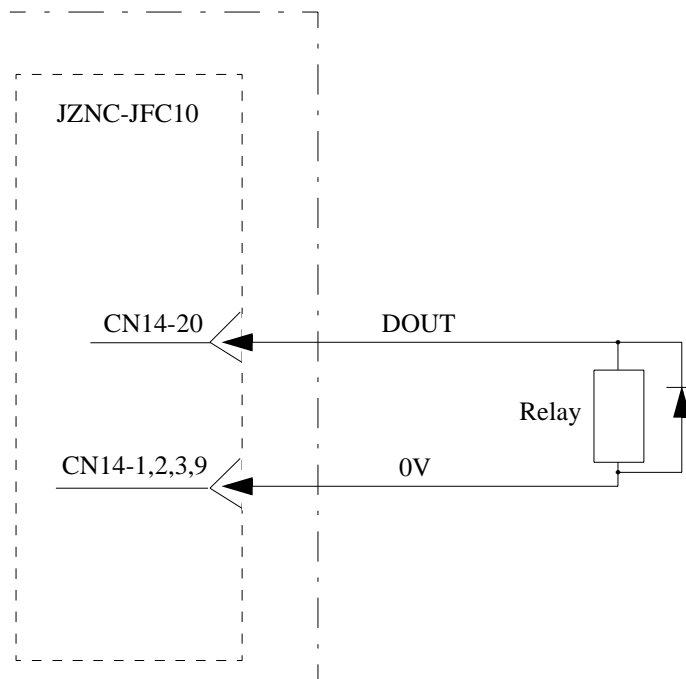


FIGURE 8.2.1.3 Connection Details of Direct OUT

8.3 Description of Signal

This section addresses the contents of Direct IN/OUT signals to be input/output directly to/from the PCNC unit.

8.3.1 I/O Circuits on PCNC side

(1) Input Circuit of Direct IN Signals

The time chart of direct IN signal is shown below.

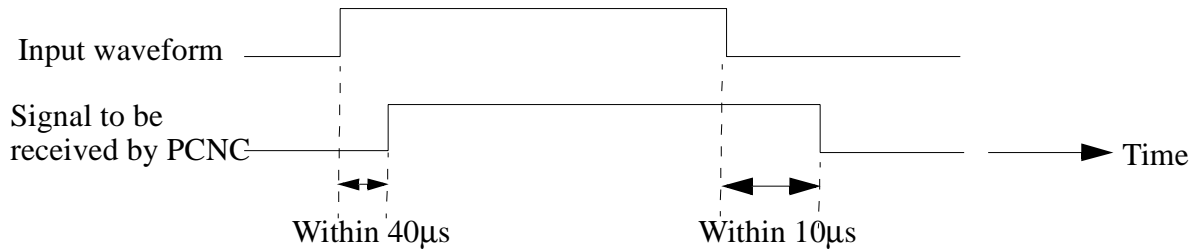


FIGURE 8.3.1.1 Time Chart

(a) For 0V common

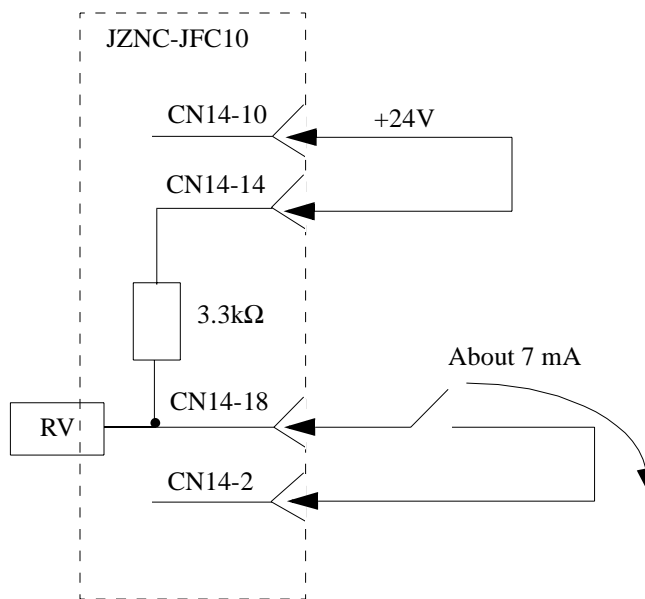


FIGURE 8.3.1.2 Input Circuit (for 0V Common)

(b) For 24V common

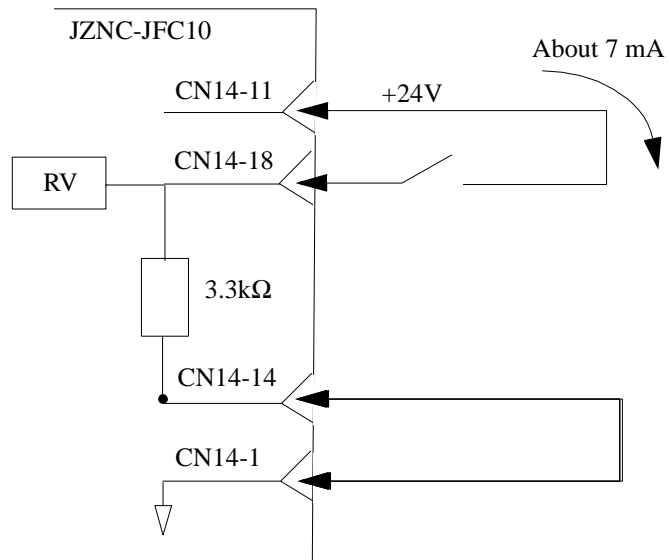


FIGURE 8.3.1.3 Input Circuit (for 24V Common)

(2) Output Circuit of Direct OUT Signal

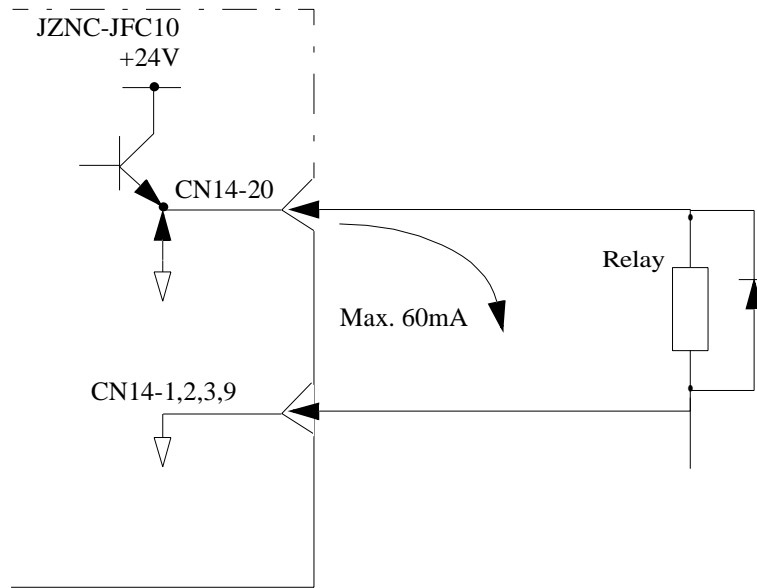


FIGURE 8.3.1.4 Output Circuit (Direct OUT Signal)

9

Connection of I/O Module

Connection of I/O Modules And Devices

This section addresses the connections between the CNC unit and I/O module.

9.1	Connection between Devices	9 - 2
9.1.1	Connection between Units	9 - 2
9.2	Detailed Connection of I/O Module	9 - 3
9.2.1	Connection between Units	9 - 3
9.3	Connection between Additional I/O Module devices.....	9 - 4
9.3.1	Connection between Units	9 - 4
9.4	Detailed Connection of Additional I/O Module	9 - 5
9.4.1	Connection between Units	9 - 5

9.1 Connection between Devices

This section describes the connection between the PCNC unit and the I/O module, connector type and cable specifications.

For a method to connect the I/O module, refer to the “YASNAC Module I/O Connecting Manual”(Document No. DE9410364).

9.1.1 Connection between Units

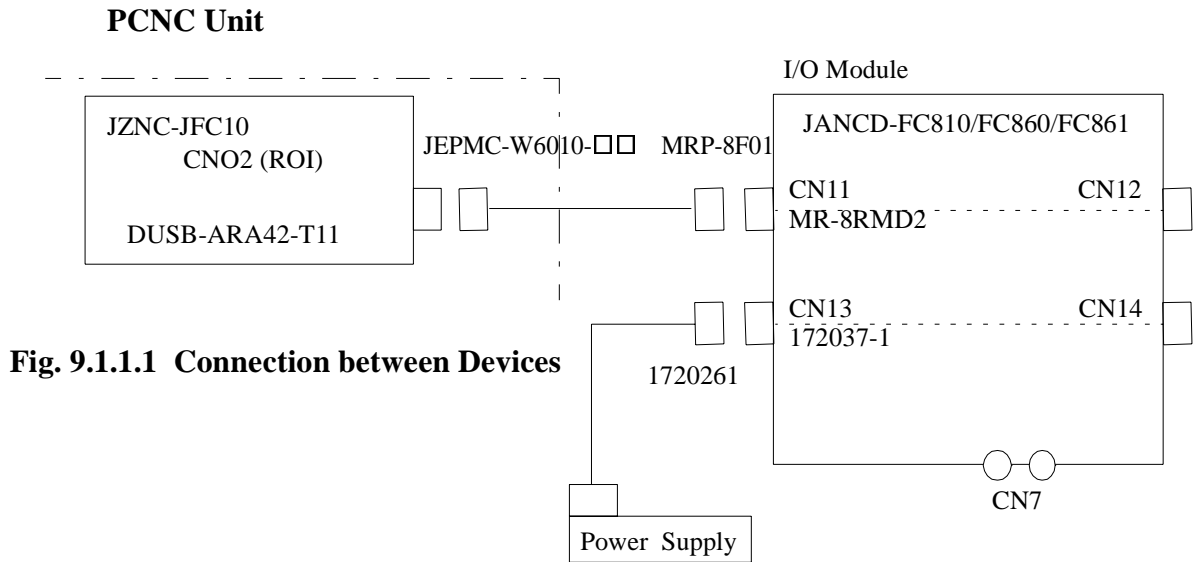
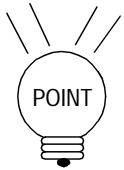


Fig. 9.1.1.1 Connection between Devices

FIGURE 9.1.1.1 Connection between Devices



The length of the wiring between the PCNC unit and the I/O module should be as short as possible.

9.2 I/O Module Connection Details

This section describes the connection details between the CNC unit and the I/O module.

9.2.1 Connection between Units

If FC810, FC815 or FC860 is used, +24V of standard power supply unit is output to CN7-1 and CN7-2 terminals. Use the twisted-pair shielded cable with characteristic impedance of 120Ω for the signal cable of /SIG AND SIG signals.

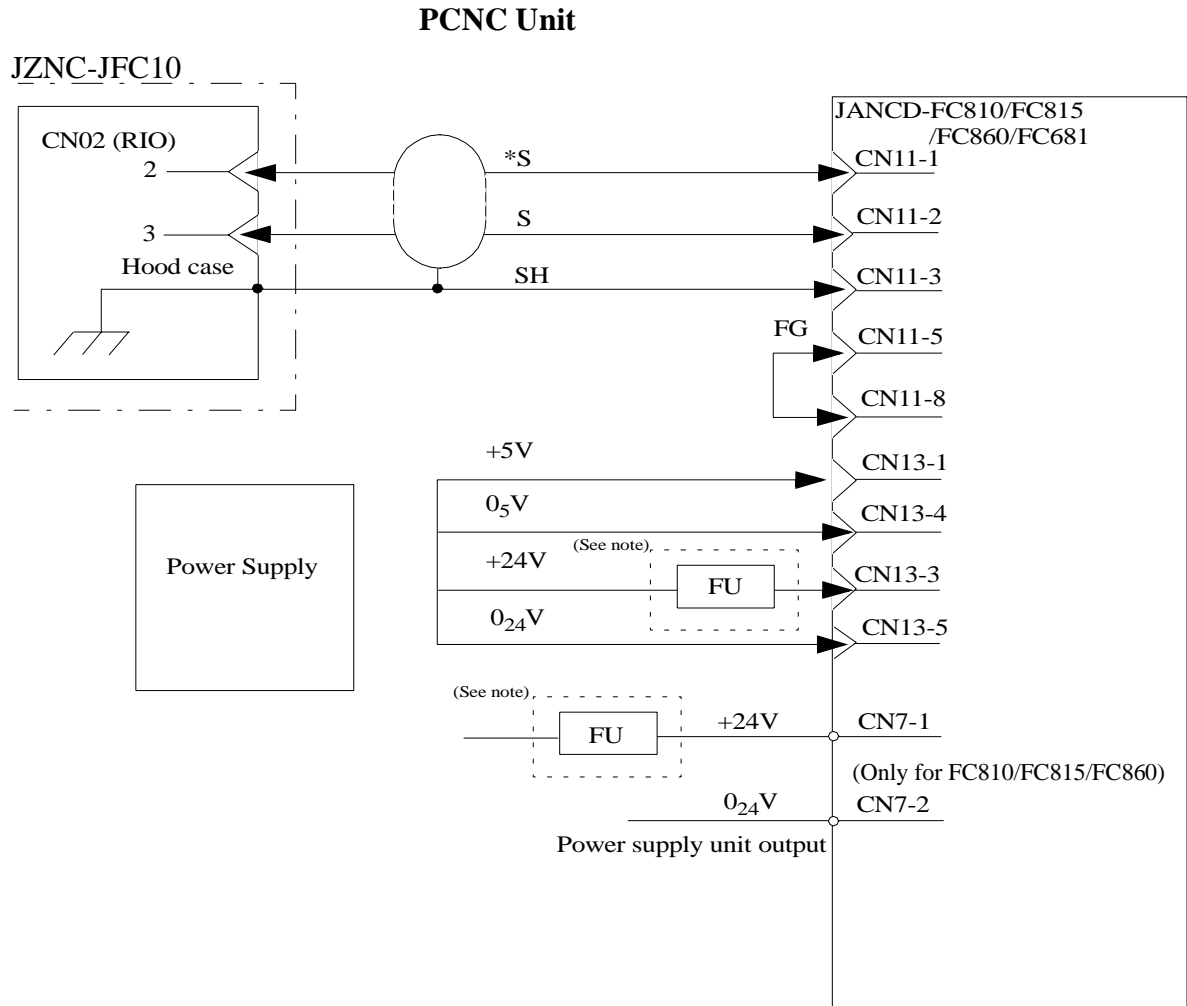


FIGURE 9.2.1.1 Connection Details of I/O Module

Note: Without the power supply having overcurrent protection or overcurrent protection countermeasure for output signal (Section 10.3.2 “I/O Circuit of I/O Port”), a fuse should be installed in the +24V line for I/O overcurrent protection. As the required capacity of the fuse changes depending on the I/O points, refer to Section 10.3.3 “Power Supply for I/O Signal” for details (e.g. A 7.5 Amp fuse is required for 112 inputs and 96 outputs).

9.3 Connection between Devices of Additional I/O Modules

This section describes the connection details between additional I/O modules, type of connector and cable specifications.

9.3.1 Connection between Units

CN7 is provided only in FC810, FC815, FC860 and is a 24V output terminal from the power supply unit. When a power supply unit is used, supply the power from this terminal.

Note that CN7 is not arranged in FC861.

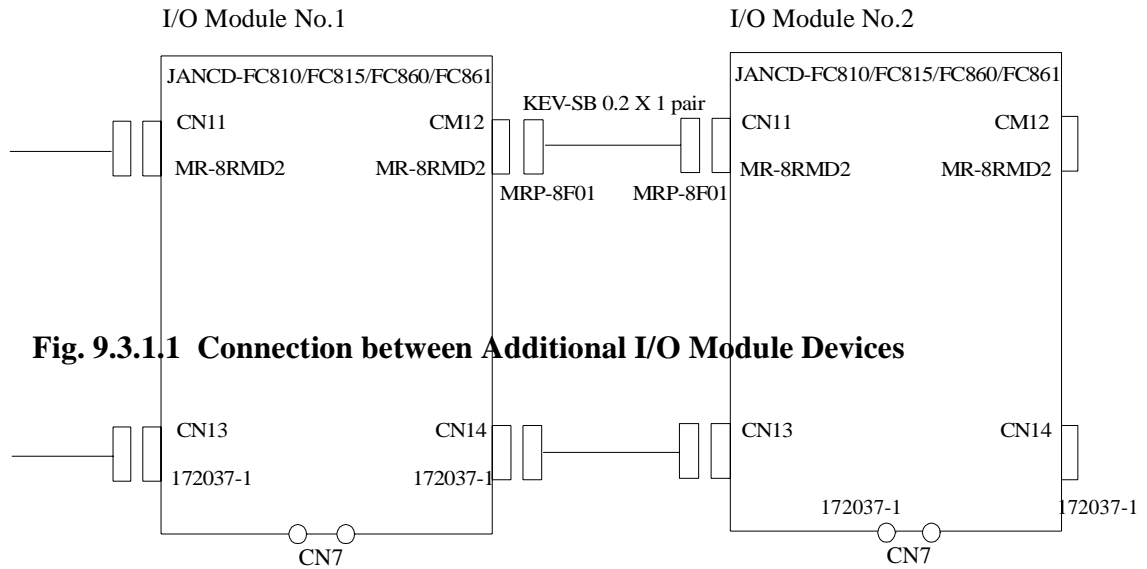


Fig. 9.3.1.1 Connection between Additional I/O Module Devices

FIGURE 9.3.1.1 Connection between Additional I/O Module Devices

9.4 Connection Details of Additional I/O Modules

This section describes the connection details between the additional I/O modules.

9.4.1 Connection between Units

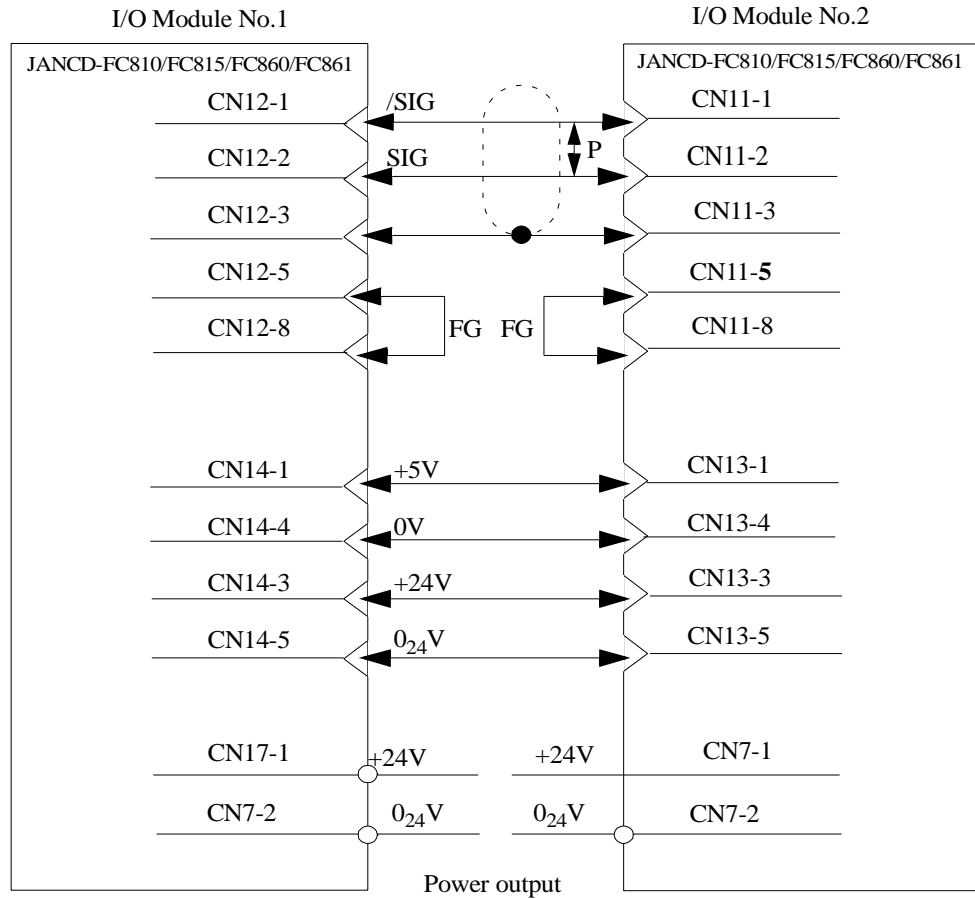
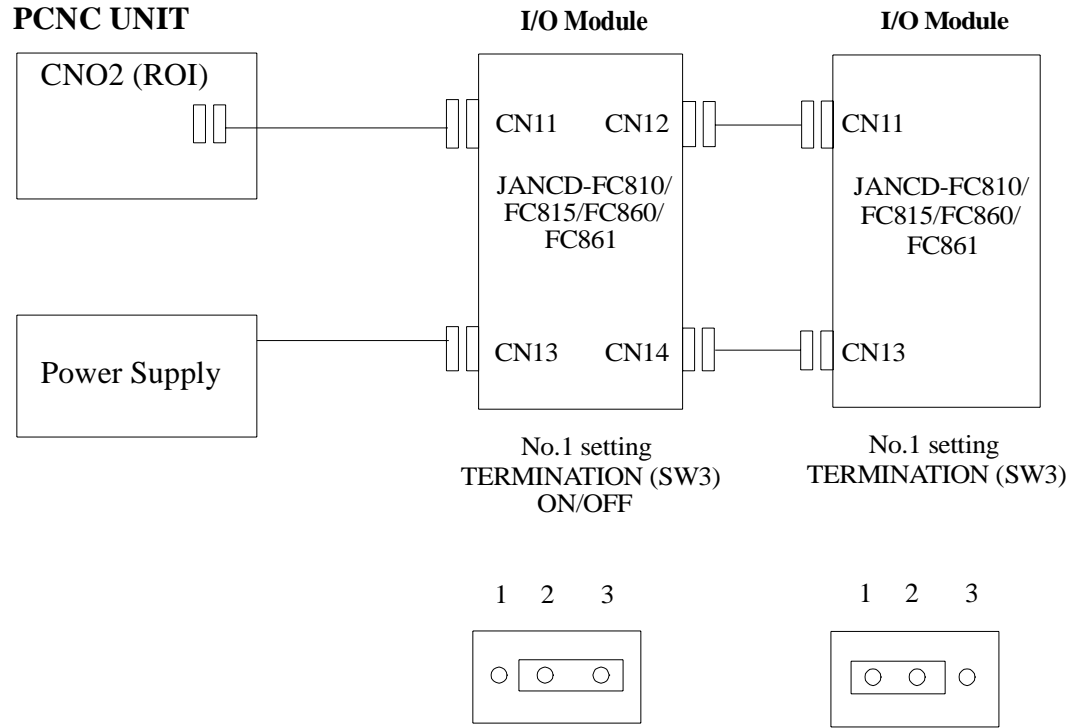


FIGURE 9.4.1.1 Connection Details of Additional I/O ModuleDevice

(1) Connection of General Purpose I/O Module

- Up to four (4) general purpose I/O modules can be connected (when using FC810, FC815 or FC860).
- It is necessary to carry-out end processing at the last module of the general purpose I/O modules.



(When transferring to another I/O module) (For the last I/O module)
FIGURE 9.4.1.2 Connection of General Purpose I/O Module Device

(2) Setting of Short Pin (SW2)

By setting shorting pin SW2 of the I/O module (FC810, FC815, FC860, FC861), it is possible to make logic “1” when the input contact is “closed” irrespective of common 0V/24V.

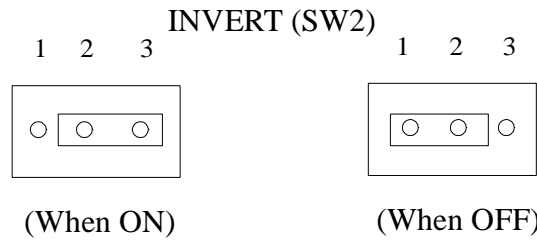


FIGURE 9.4.1.3 Setting of Short Pin

(3) Address setting of I/O module

I/O port address of I/O module can be set by the rotary switch (SW1).

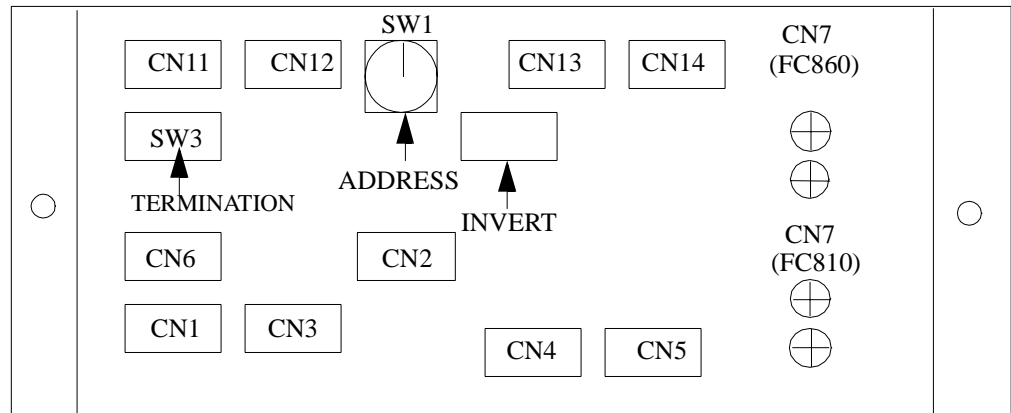


FIGURE 9.4.1.4 I/O Module (JANCD-FC810, FC815, FC860)

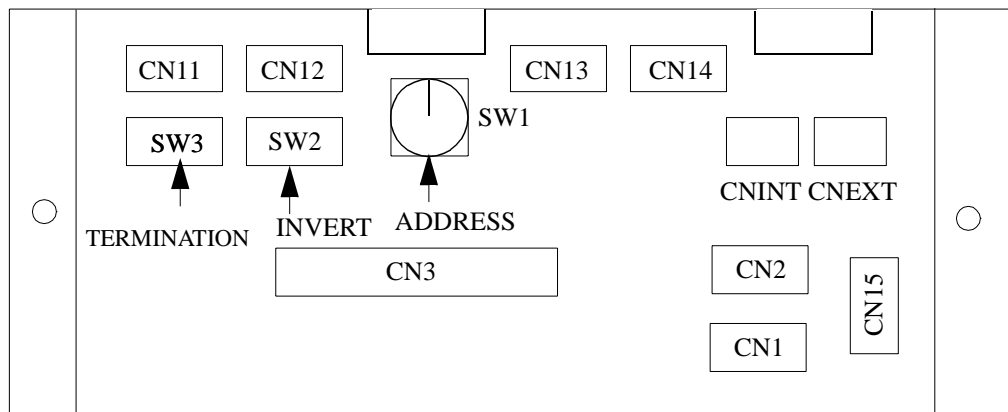


FIGURE 9.4.1.5 I/O Module (JANCD-FC861)

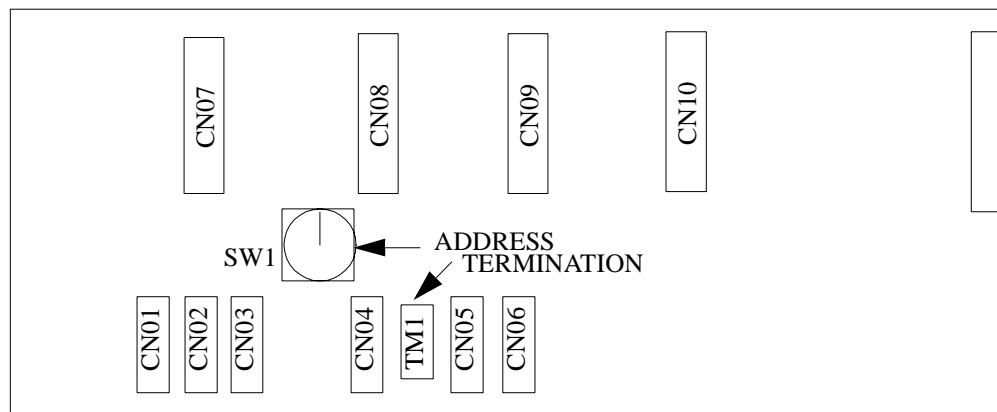


FIGURE 9.4.1.6 I/O Module (JANCD-JSP02, JSP04)

(4) Reverse Bit Area of the Board

The reverse bit area by the common status of each board is shown in Tables 9.4.1.1 and 9.4.1.2.

Table 9.4.1.1: Table of Bit Reverse Area

Common Connector Terminal Name	FC810, FC815, FC860 Reverse Area				
	SW1=1	SW1=3	SW1=5	SW1=7	SW1=9
COM30	#1000, #1001	#1016, #1017	#1032, #1033	#1048, #1049	#1064, #1065
COM31	#1002, #1003	#1018, #1019	#1034, #1035	#1050, #1051	#1066, #1067
COM32	#1004	#1020	#1036	#1052	#1068
COM40	#1005, #1006	#1021, #1022	#1037, #1038	#1053, #1054	#1069, #1070
COM41	#1007, #1008	#1023, #1024	#1039, #1040	#1055, #1056	#1071, #1072
COM42	#1009	#1025	#1041	#1057	#1073
COM20	#1010, #1011	#1026, #1027	#1042, #1043	#1058, #1059	#1074, #1075
COM21	#1012	#1028	#1044	#1060	#1076
COM30	#1013	#1029	#1045	#1061	#1077

Table 9.4.1.2: Table of Bit Reverse Area

Common Connector Terminal Name	FC861 Reverse Area				
	SW1=1	SW1=2	SW1=3	SW1=4	SW1=5
COM00	#1000, #1001	#1016, #1017	#1032, #1033	#1048, #1049	#1064, #1065
COM01	#1002, #1003	#1018, #1019	#1034, #1035	#1050, #1051	#1066, #1067
COM02	#1004	#1020	#1036	#1052	#1068
COM03	#1005, #1006	#1021, #1022	#1037, #1038	#1053, #1054	#1069, #1070
COM04	#1007, #1008	#1023, #1024	#1039, #1040	#1055, #1056	#1071, #1072
-	SW1=6	SW1=7	SW1=8	SW1=9	SW1=A
COM00	#1040, #1041	#1048, #1049	#1056, #1057	#1064, #1065	#1072 #1073
COM01	#1042	#1050	#1058	#1066	#1074
COM02	#1043, #1044	#1051, #1052	#1059, #1060	#1067, #1068	#1075 #1076
COM03	#1045	#1053	#1061	#1069	#1077
COM04	#1046, #1047	#1054, #1055	#1062, #1063	#1070, #1071	#1078, #1079

10

Connection of General Purpose I/O

This section addresses the connections of general purpose I/O.

10.1	Connection between Devices	10 - 2
10.1.1	Connection of Signal Line with I/O Module	10 - 2
10.1.2	Connection between Devices	10 - 3
10.2	Detailed Connection of General Purpose I/O	10 - 4
10.2.1	FC810/FC815/FC860 Module	10 - 4
10.2.2	FC861 Module	10 - 27
10.2.3	JSP02/JSP04 Module	10 - 36
10.3	Description of General Purpose I/O Signal	10 - 45
10.3.1	I/O Port	10 - 45
10.3.2	I/O Circuit of I/O Port.	10 - 47
10.3.3	Power Supply for I/O Signal.	10 - 57

10.1 Connection Between Devices

This section describes the connection details between the I/O module and the I/O signal device, type of connector and the cable specifications.

10.1.1 Connection of the Signal Line with I/O Module

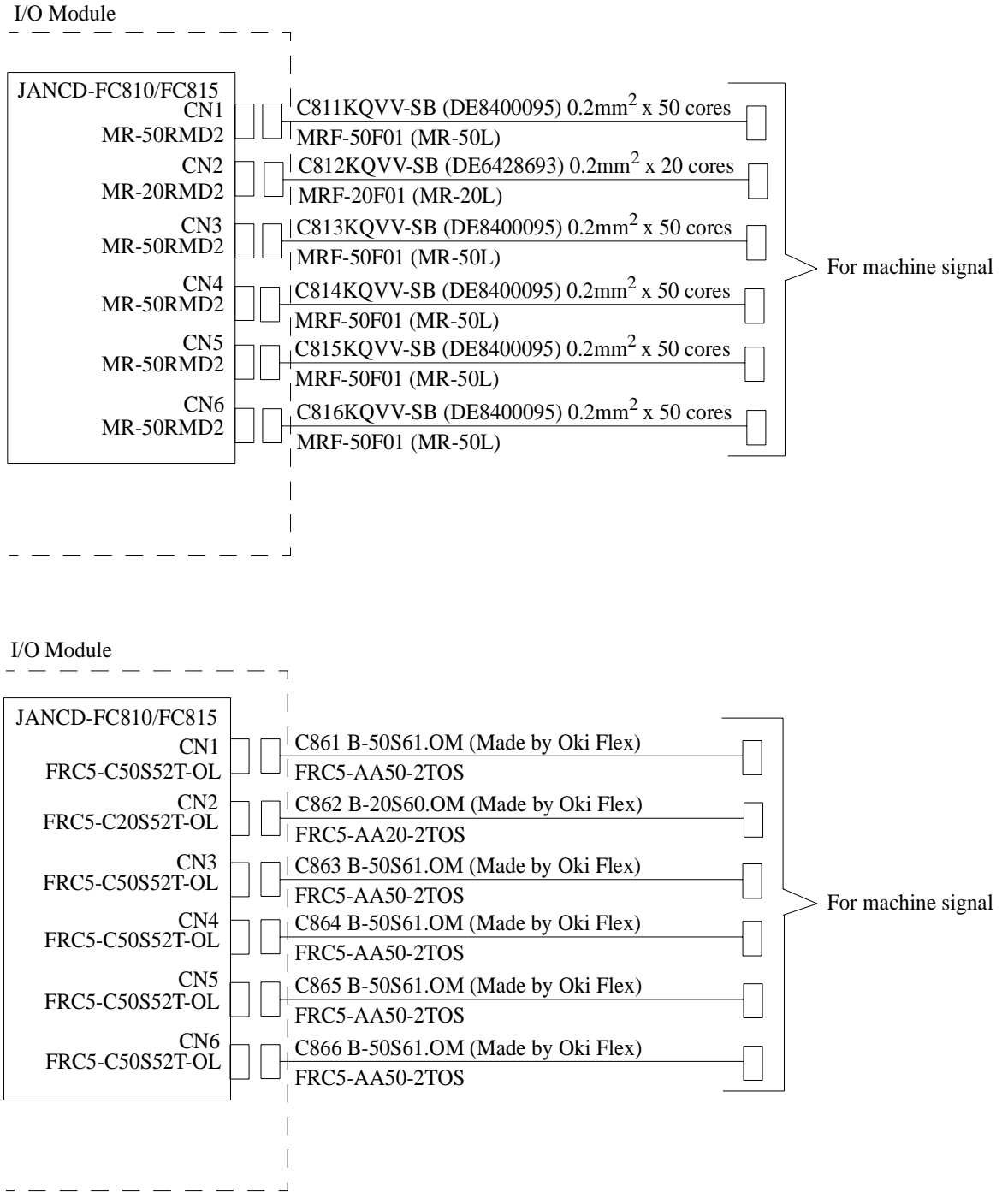


FIGURE 10.1.1.1 Connection between Devices

10.1.2 Connection between Devices

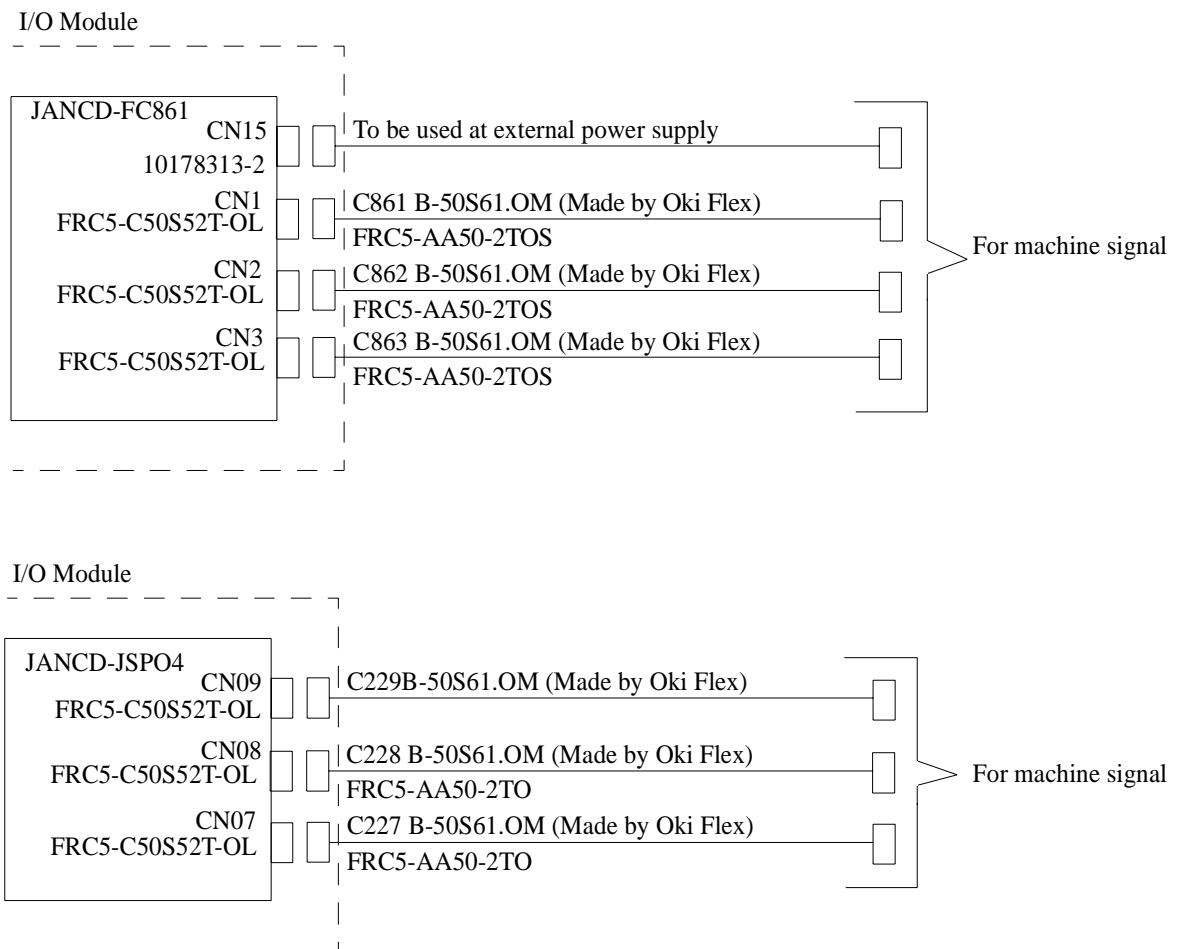
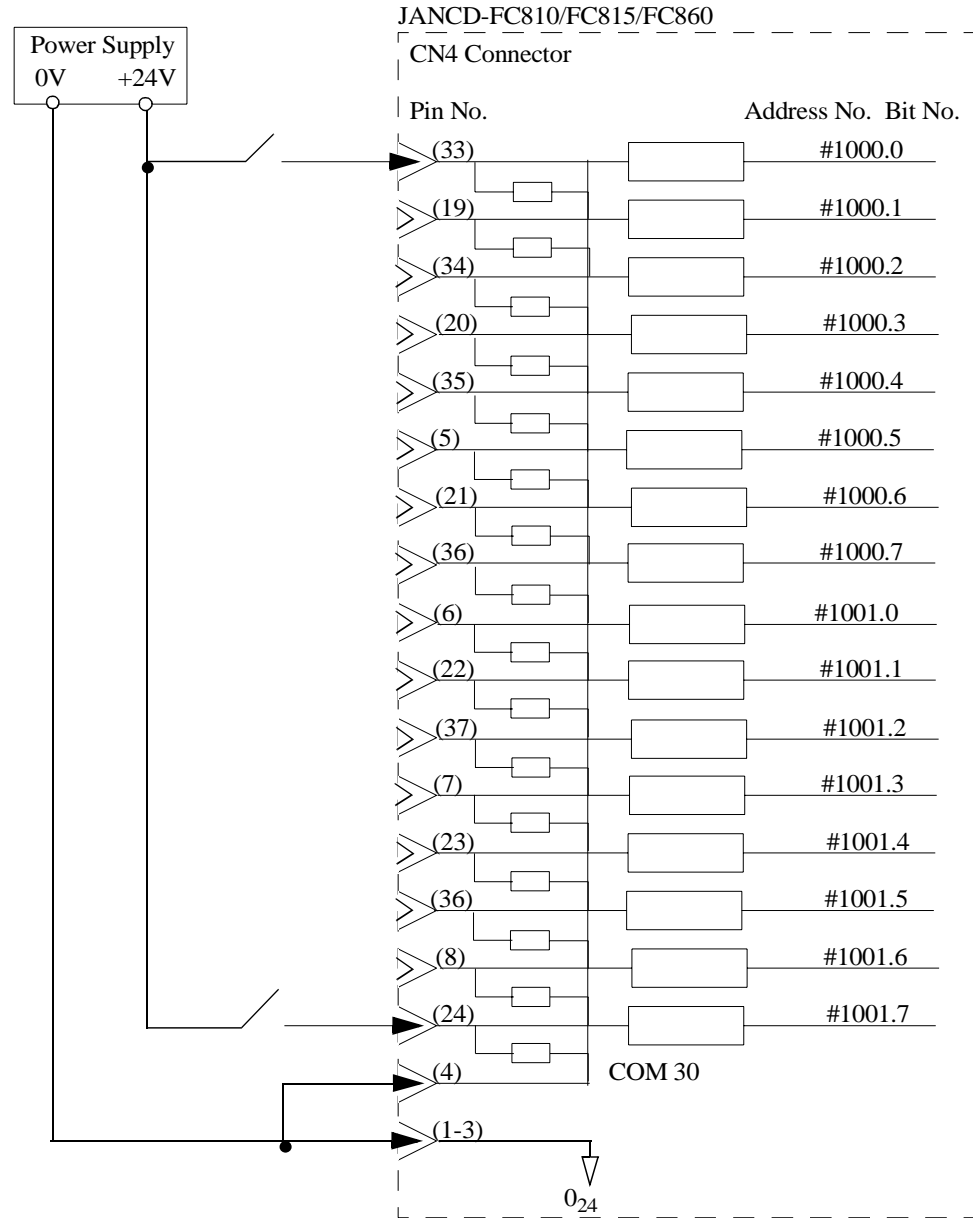


FIGURE 10.1.2.1 Connection between Devices

10.2 Connection Details of General Purpose I/O

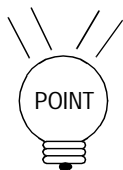
This section describes the connection details between the I/O module and the I/O signal device.

10.2.1 FC810/FC816/FC860 Module

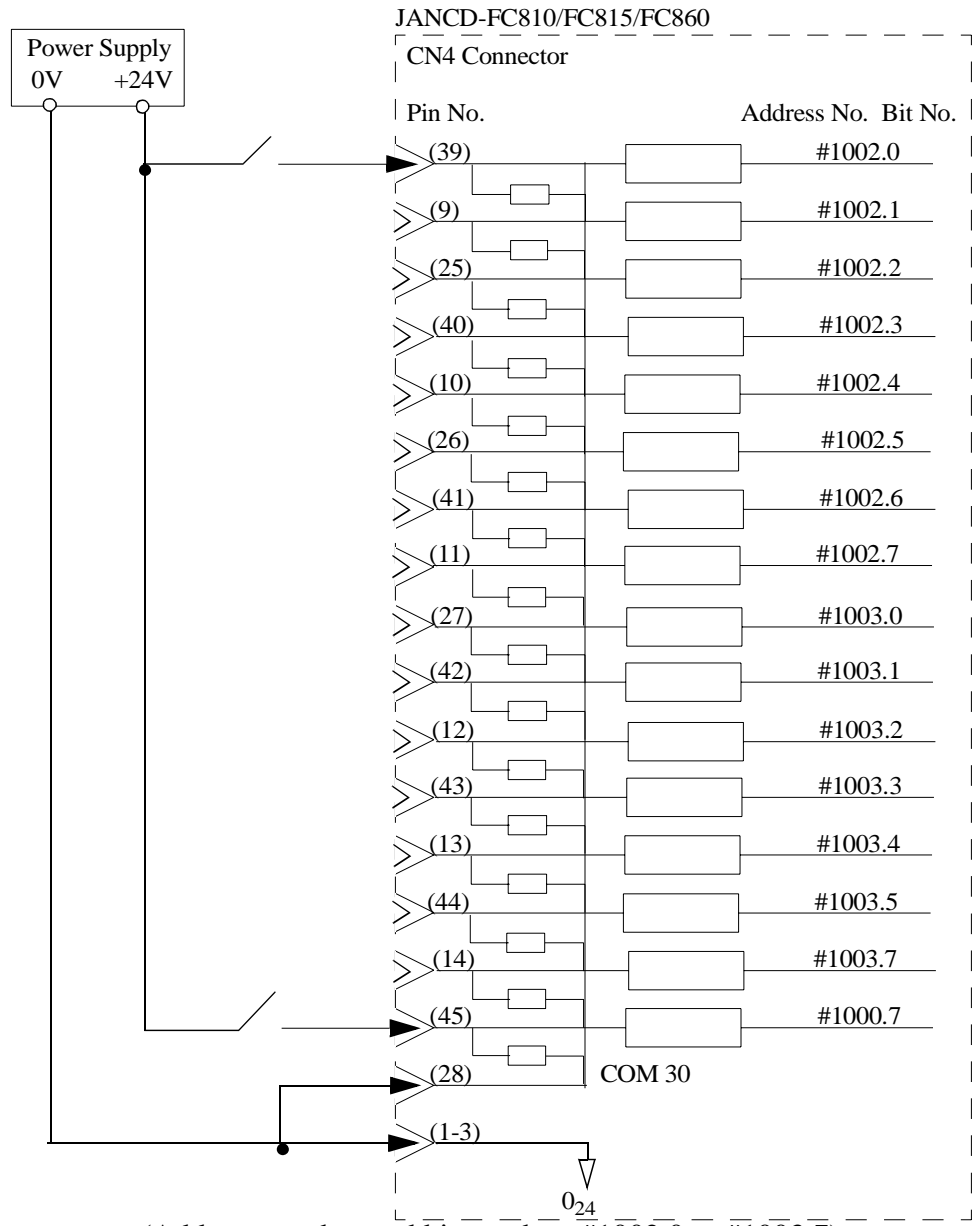


(Address number and bit number: #1000.0 to #1001.7)

FIGURE 10.2.1.1 FC810/FC815/FC860 Module Connection

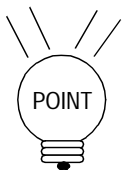


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1000.0 to #1001.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

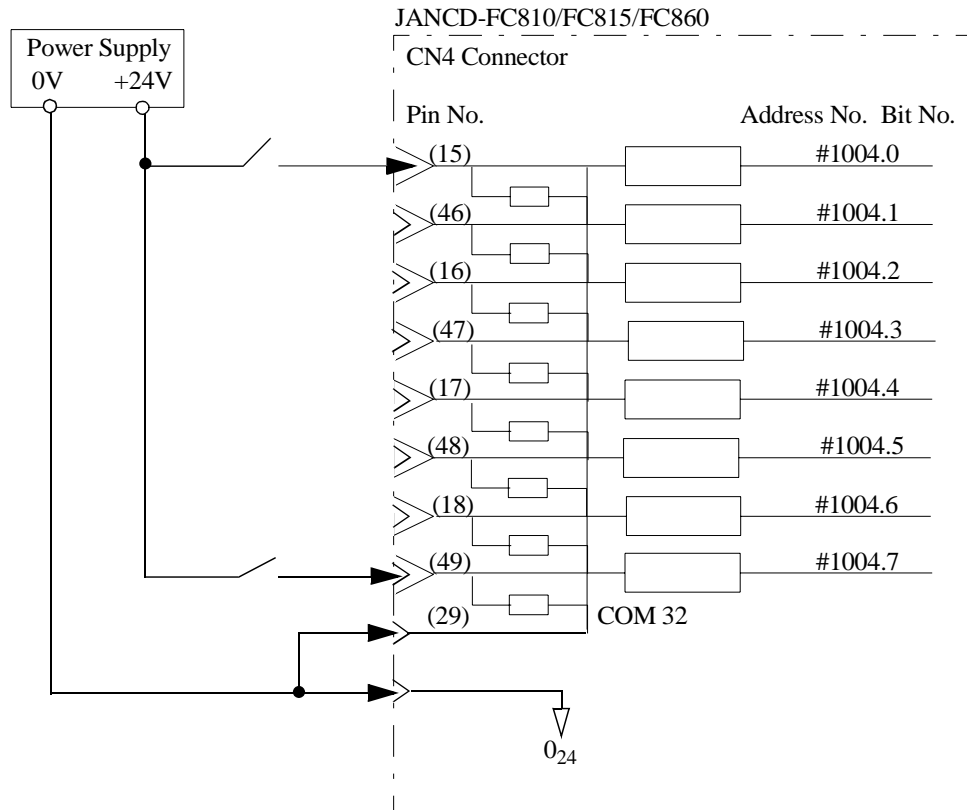


(Address number and bit number: #1002.0 to #1003.7)

FIGURE 10.2.1.2 FC810/FC815/FC860 Module Connection

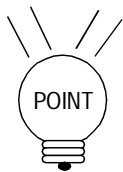


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1002.0 to #1003.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

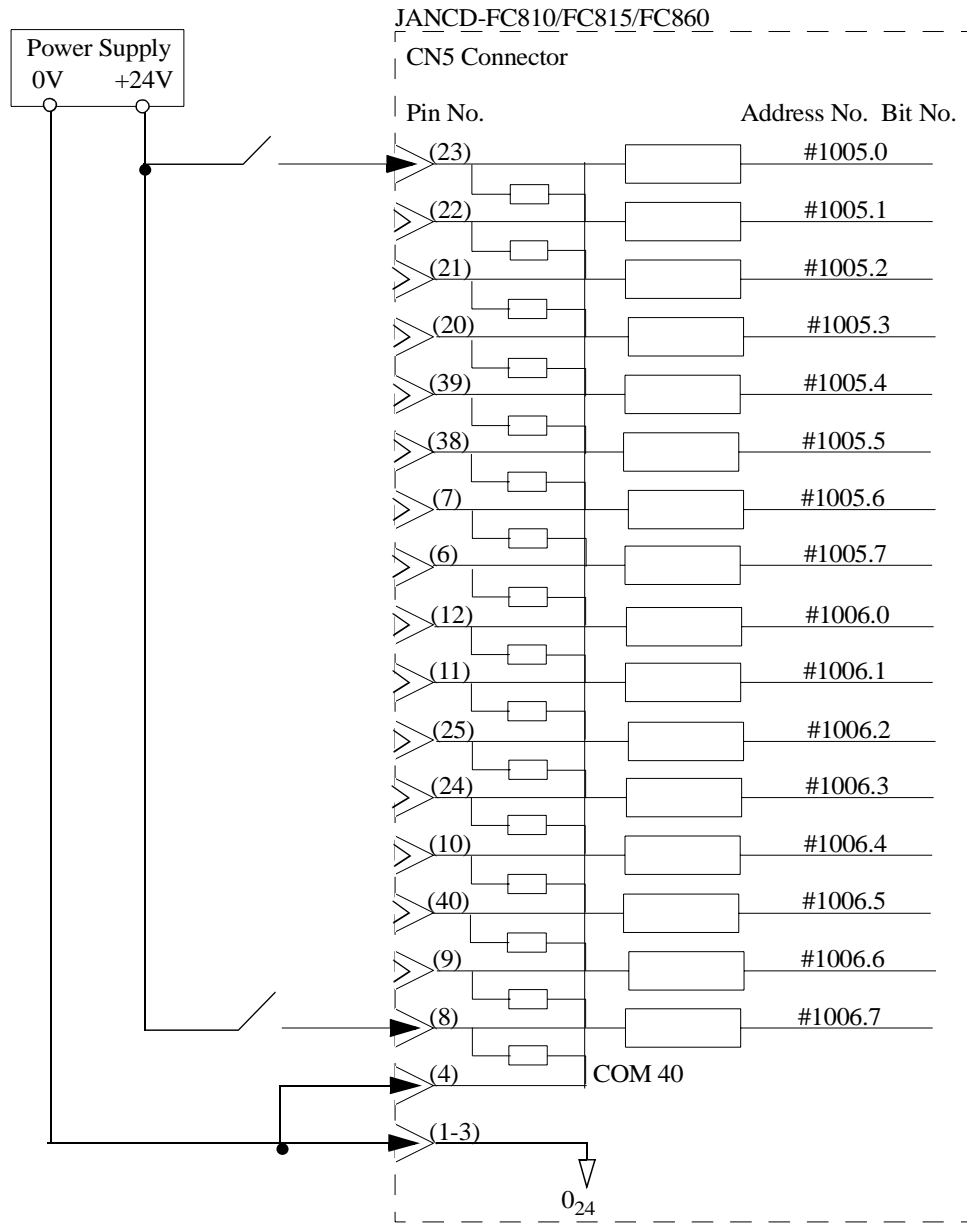


(Address number and bit number: #1004.0 to #1004.7)

FIGURE 10.2.1.3 FC810/FC815/FC860 Module Connection

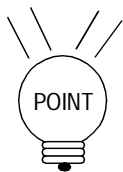


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1004.0 to #1004.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

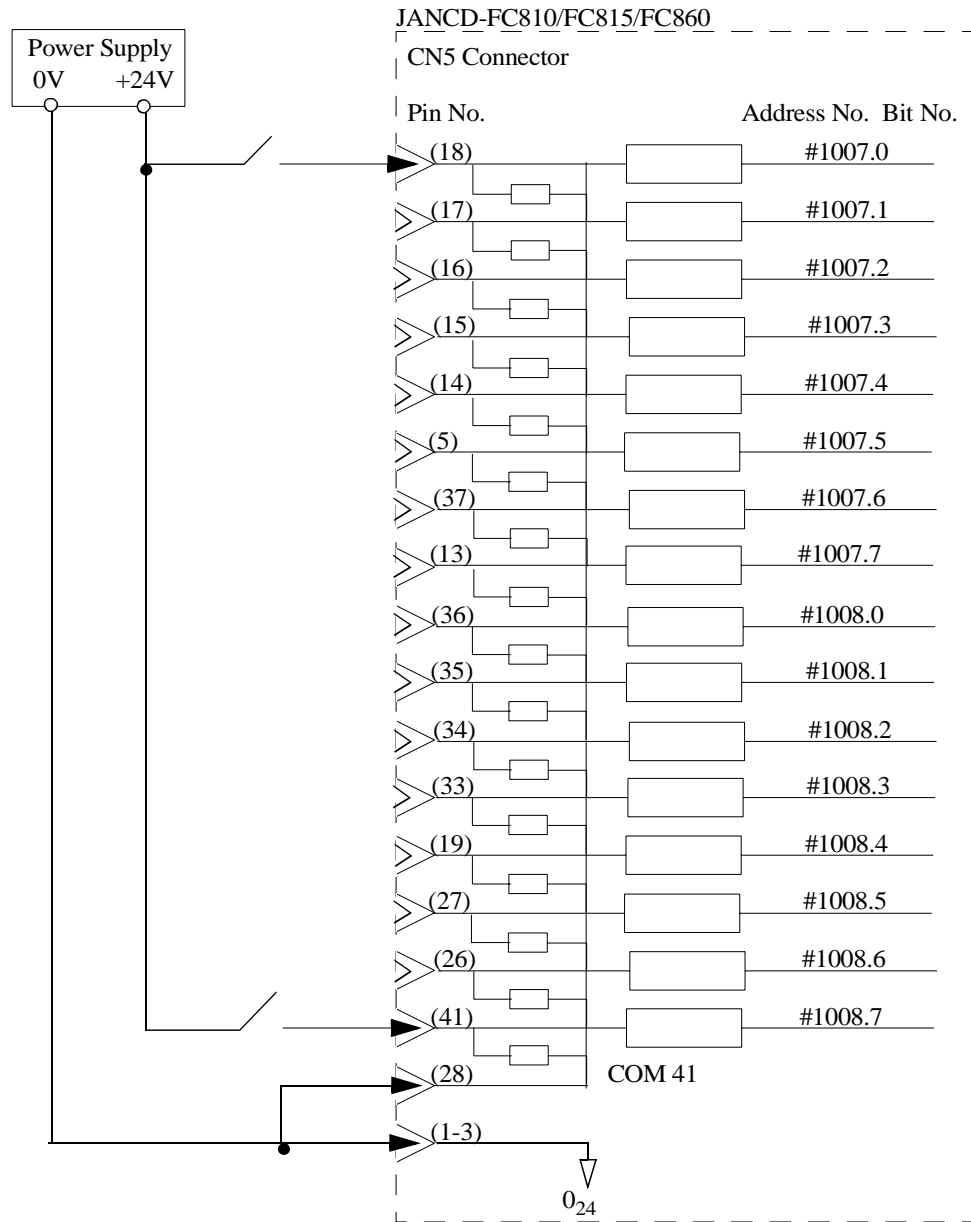


(Address number and bit number: #1005.0 to #1006.7)

FIGURE 10.2.1.4 FC810/FC815/FC860 Module Connection

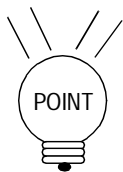


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1005.0 to #1006.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

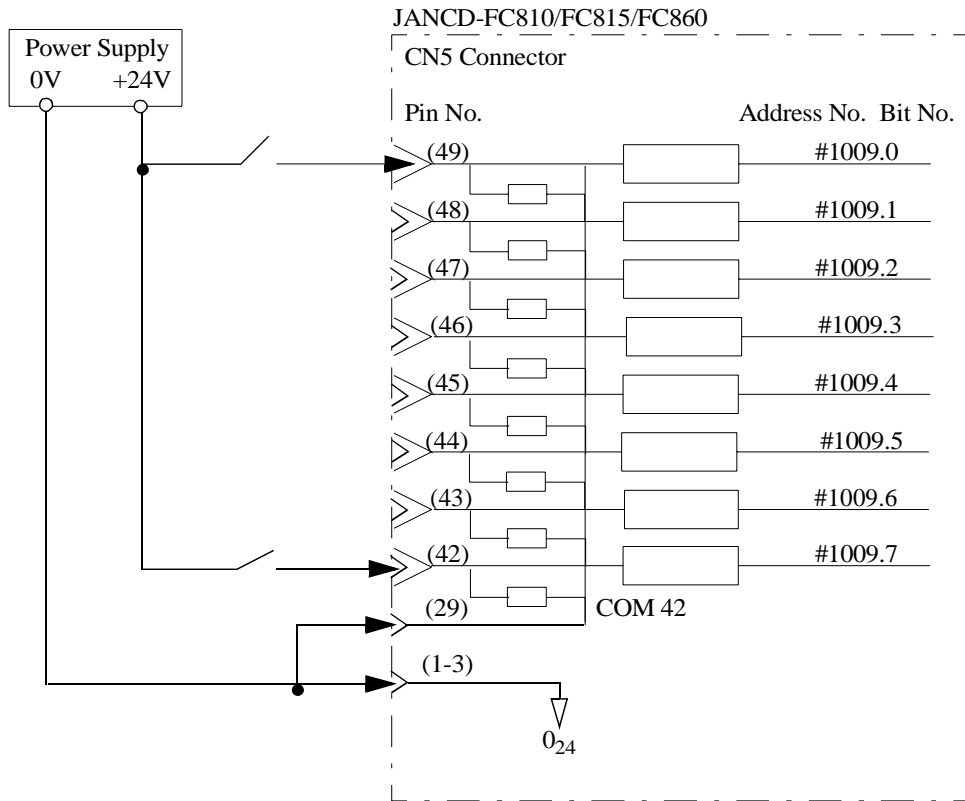


(Address number and bit number: #1007.0 to #1008.7)

FIGURE 10.2.1.5 FC810/FC815/FC860 Module Connection

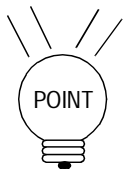


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1007.0 to #1008.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

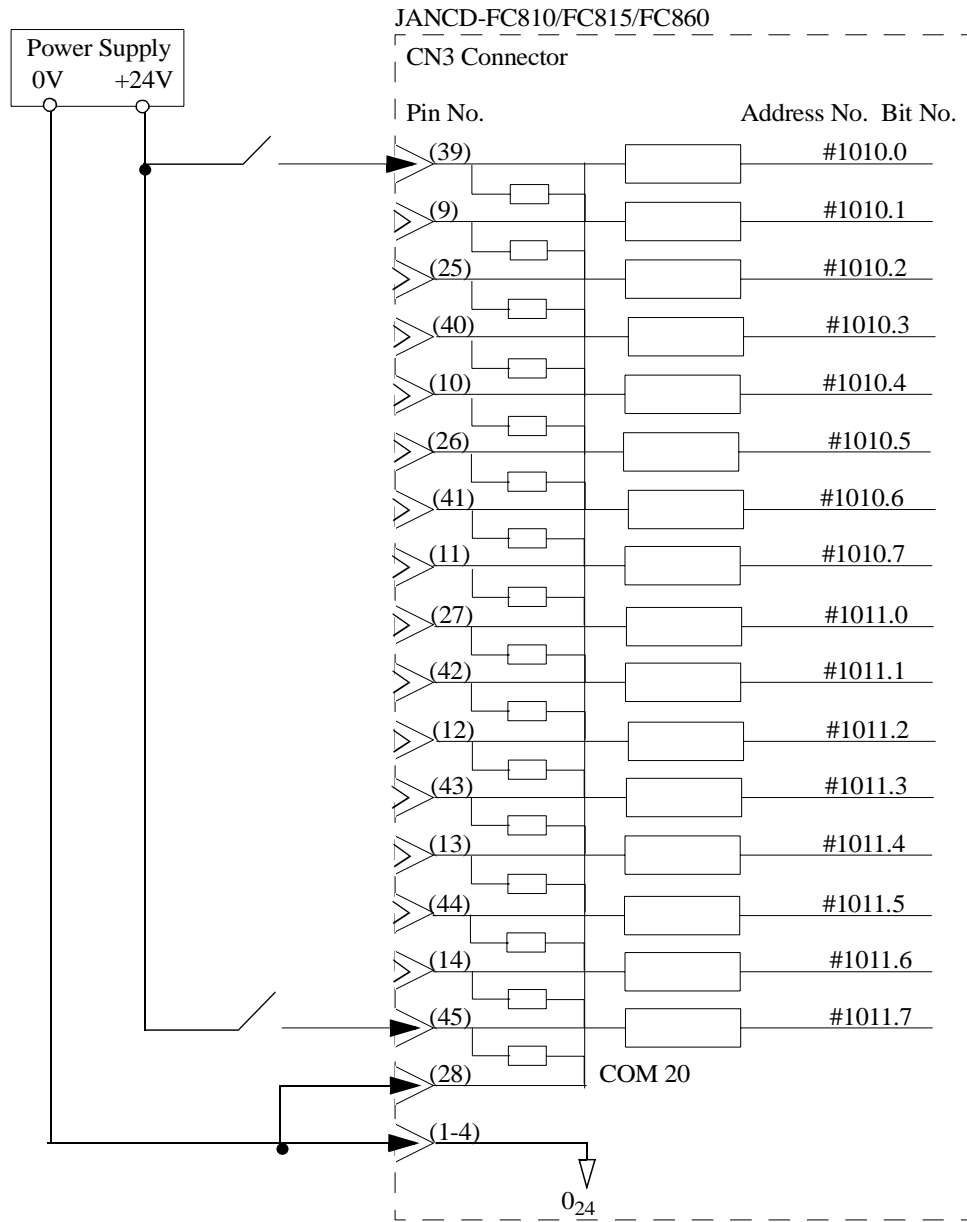


(Address number and bit number: #1009.0 to #1009.7)

FIGURE 10.2.1.6 FC810/FC815/FC860 Module Connection



1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1009.0 to #1009.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

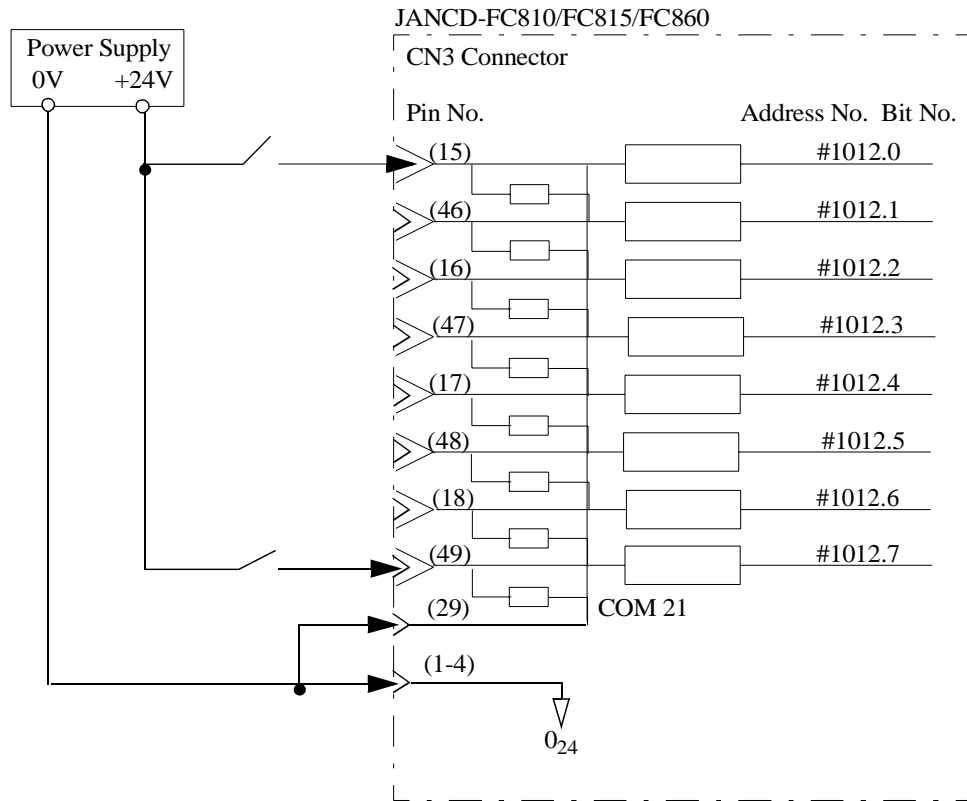


(Address number and bit number: #1010.0 to #1011.7)

FIGURE 10.2.1.7 FC810/FC815/FC860 Module Connection

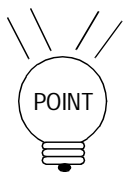


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1010.0 to #1011.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

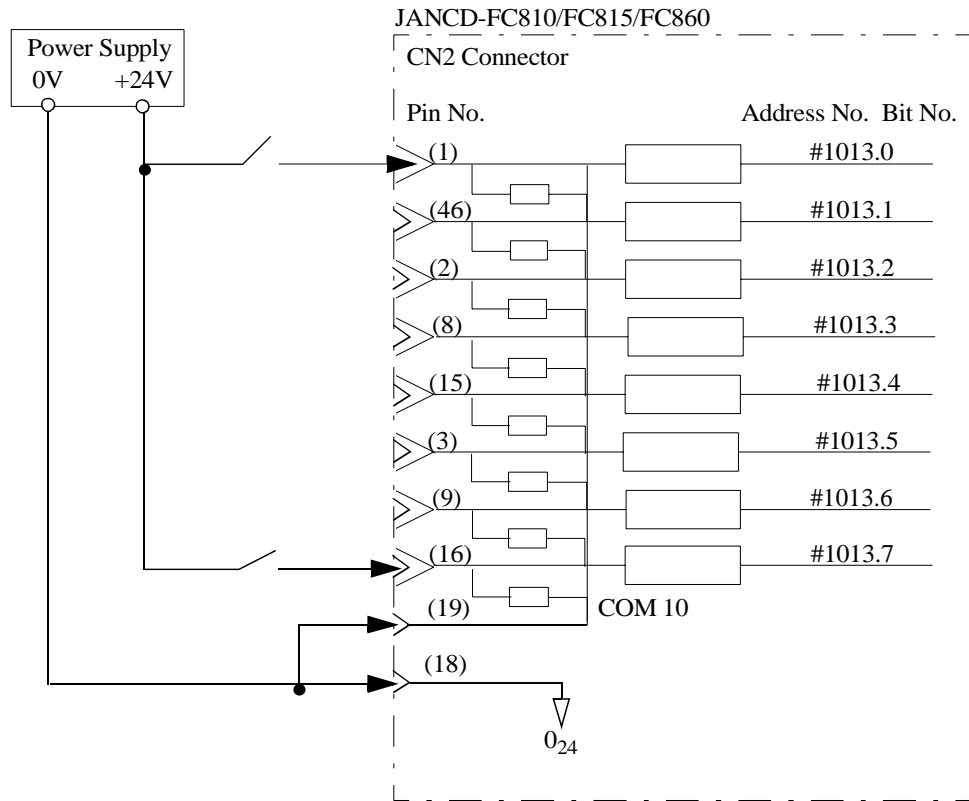


(Address number and bit number: #1012.0 to #1012.7)

FIGURE 10.2.1.8 FC810/FC815/FC860 Module Connection

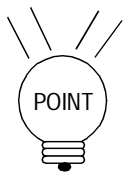


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1012.0 to #1012.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.



(Address number and bit number: #1013.0 to #1013.7)

FIGURE 10.2.1.9 FC810/FC815/FC860 Module Connection



1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC810/FC815/FC860).”
2. The address is that of module No. 1 (#1013.0 to #1013.7). In modules Nos. 2 and 3, the layout is as shown above starting from the smaller address number. For details, refer to “10.3.1 I/O Port”.

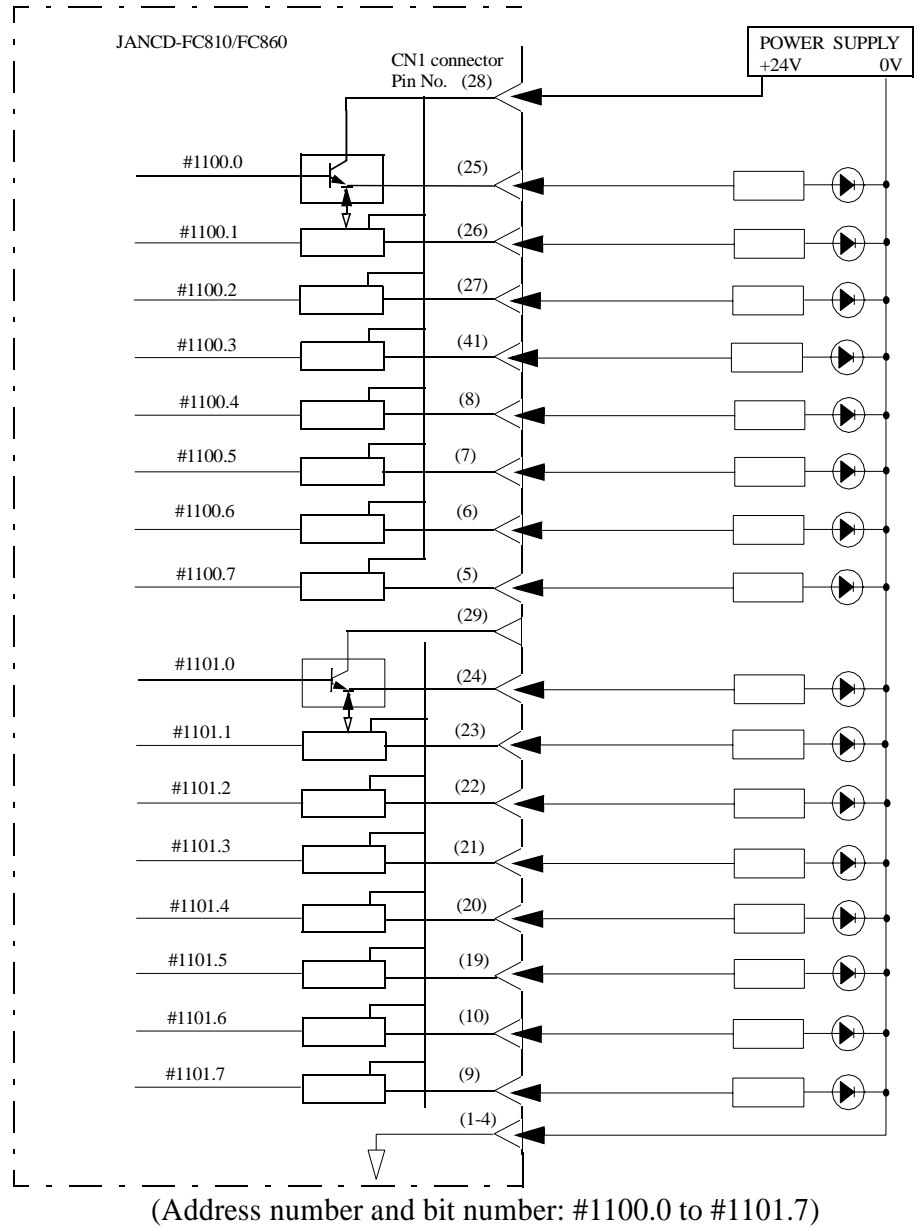
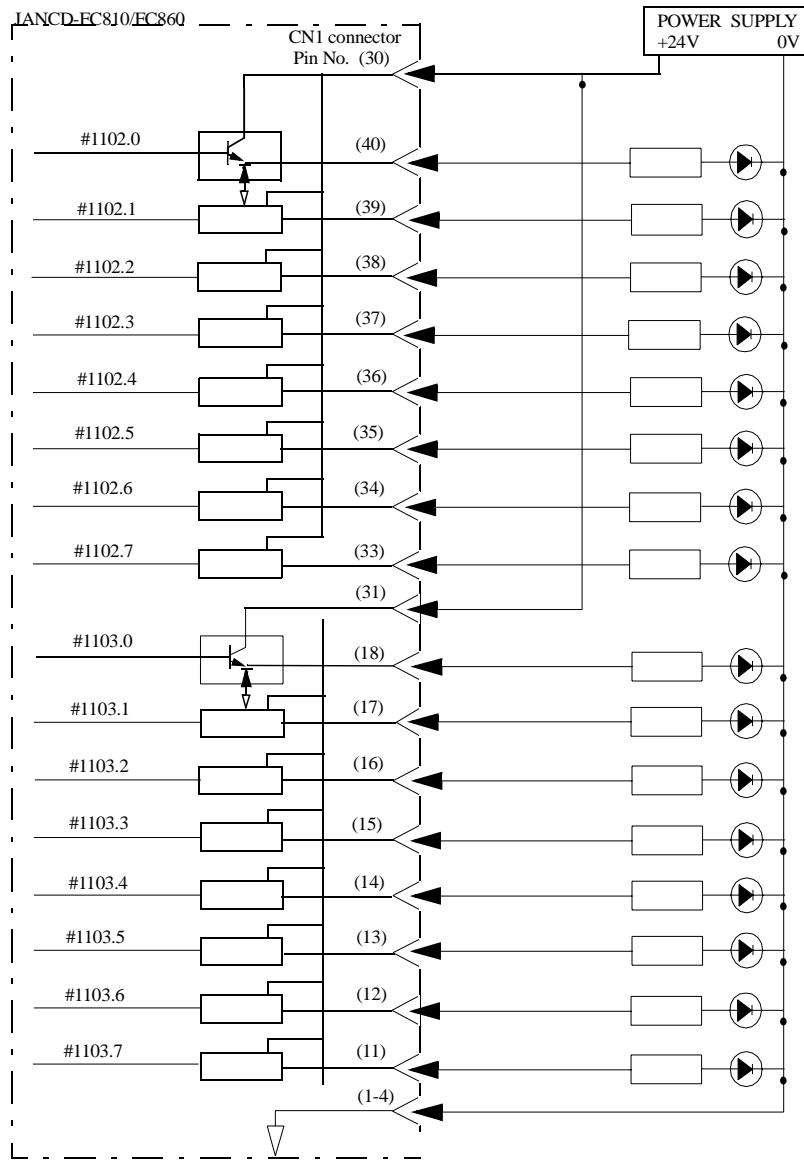


FIGURE 10.2.1.10 FC810/FC860 Module Connection

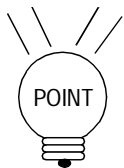


The address is that of Module No.1 (#1100.0 to 1101.7).
For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address.



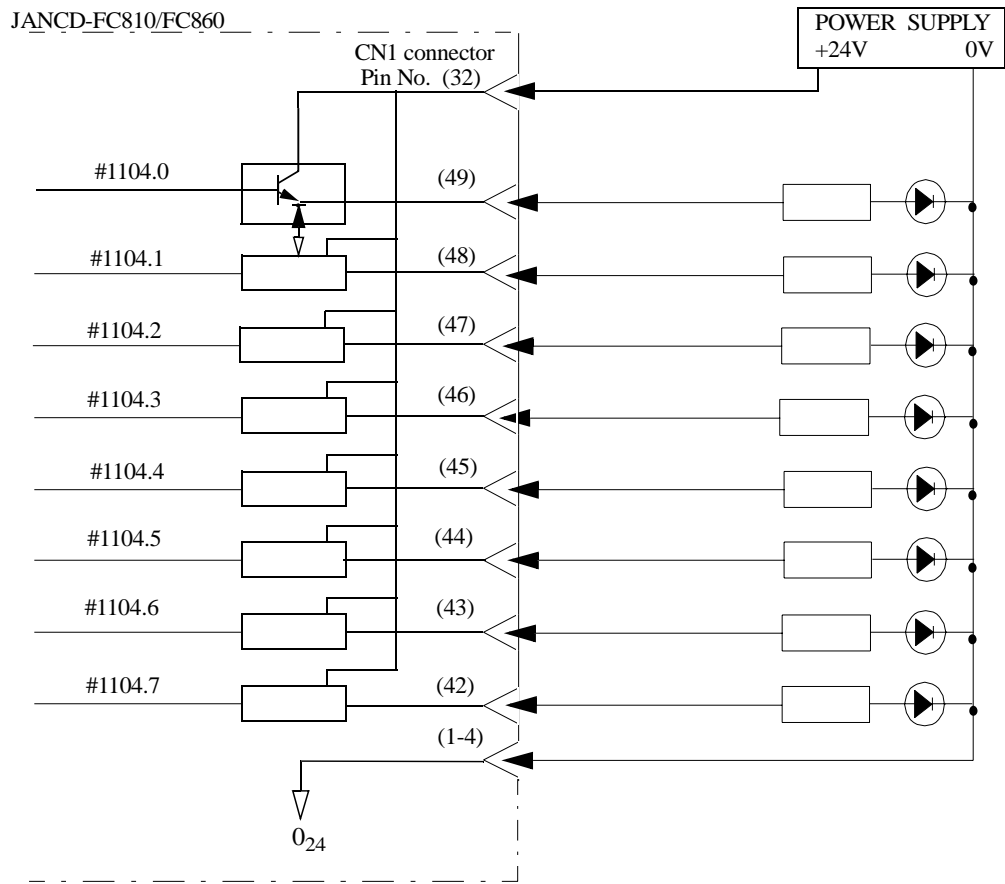
(Address number and bit number: #1102.0 to #1103.7)

FIGURE 10.2.1.11 FC810/FC860 Module Connection



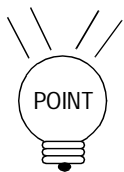
The address is that of Module No.1 (#1102.0 to 1103.7).

For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

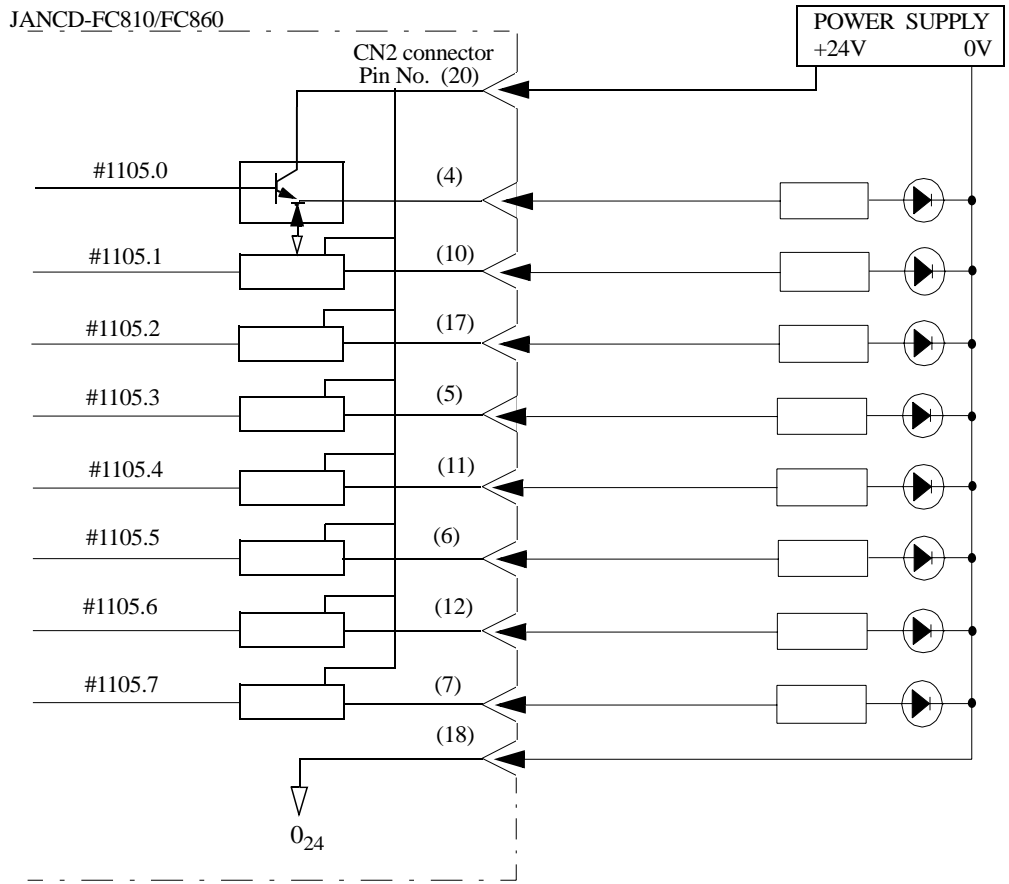


(Address number and bit number: #1104.0 to #1104.7)

FIGURE 10.2.1.12 FC810/FC860 Module Connection



The address is that of Module No.1 (#1104.0 to 1104.7).
 For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

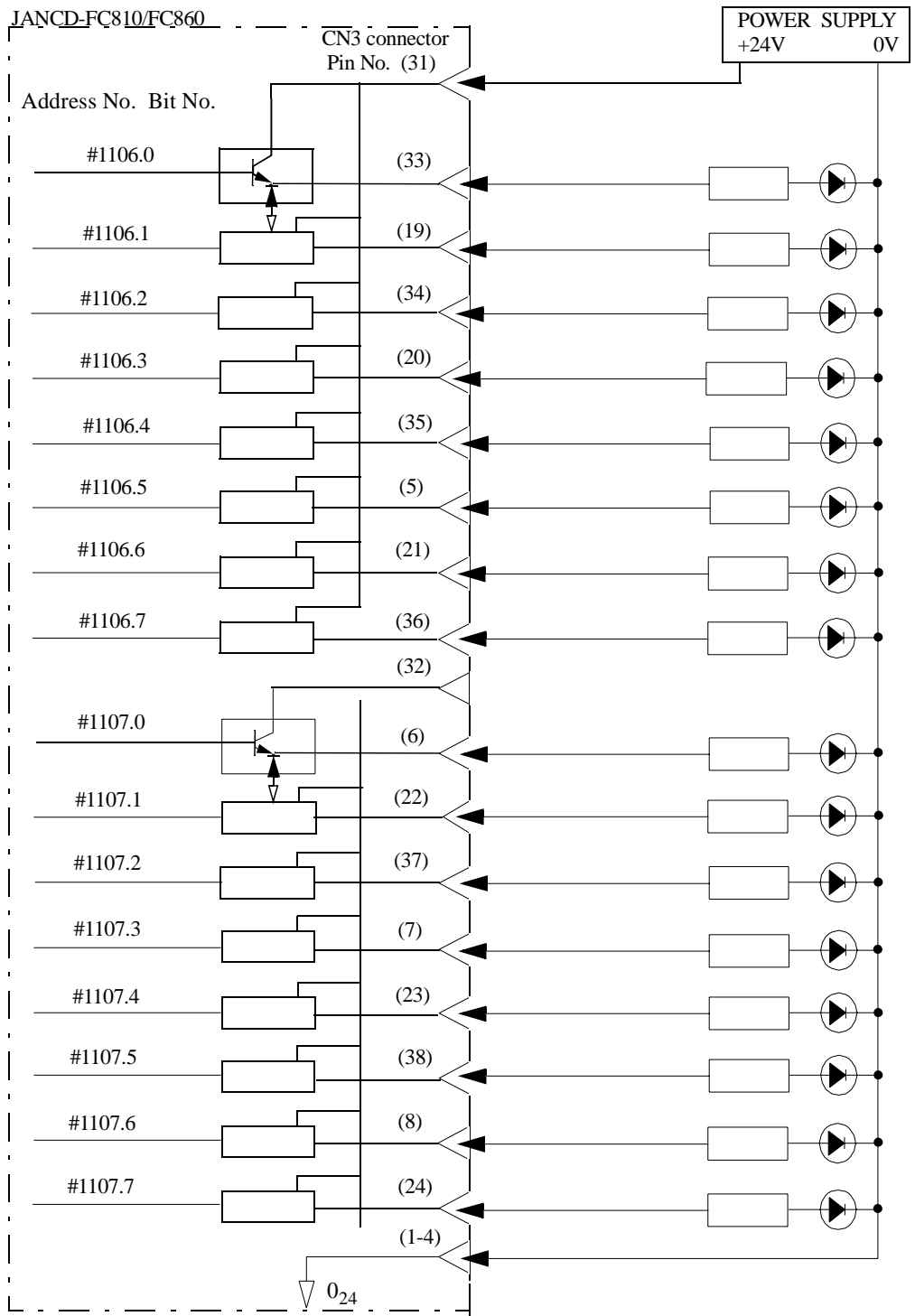


(Address number and bit number: #1105.0 to #1105.7)

FIGURE 10.2.1.13 FC810/FC860 Module Connection



The address is that of Module No.1 (#1105.0 to 1105.7).
 For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

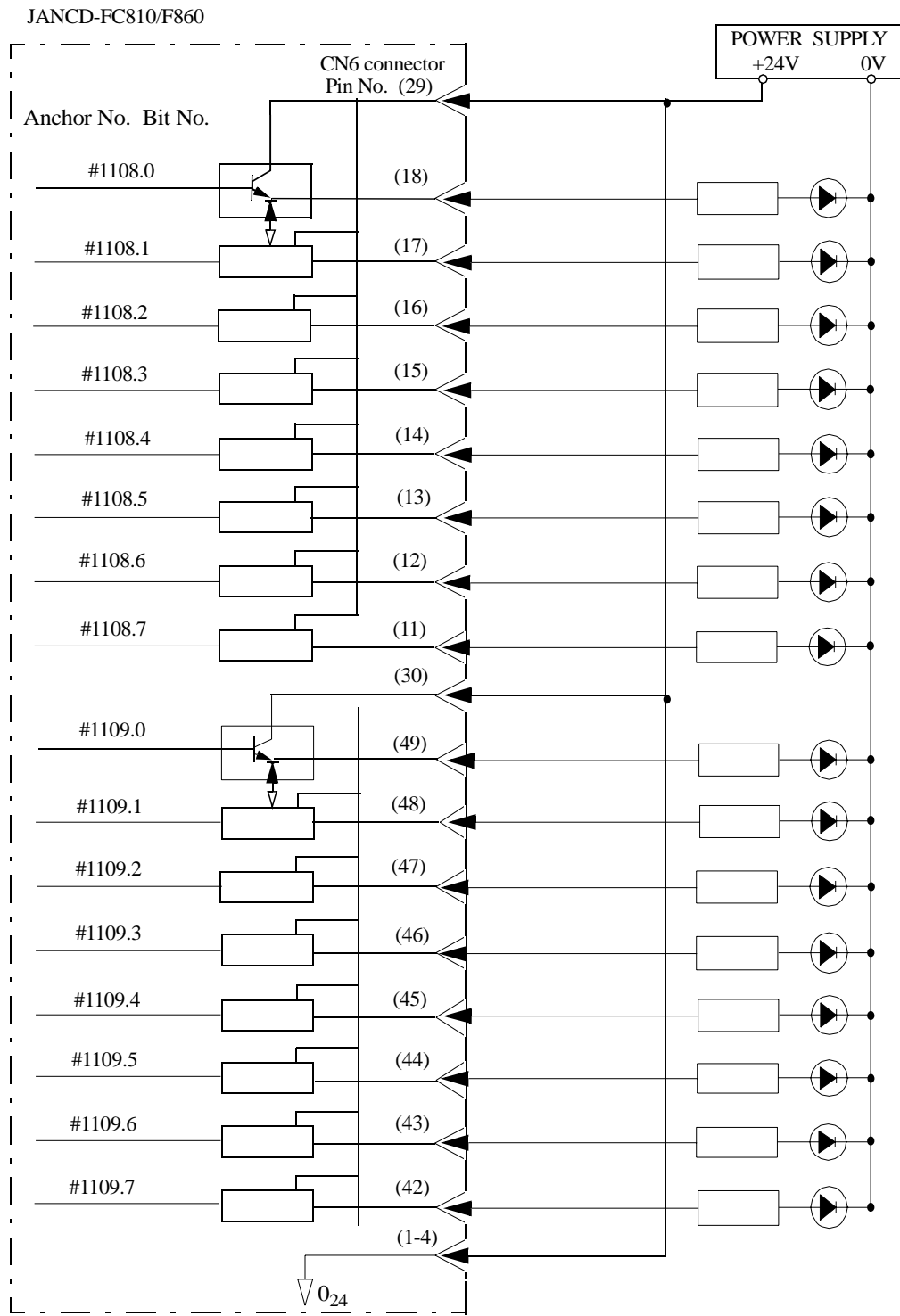


(Address number and bit number: #1106.0 to #1107.7)

FIGURE 10.2.1.14 FC810/FC860 Module Connection

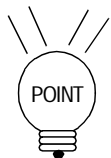


The address is that of Module No.1 (#1106.0 to 1107.7).
For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

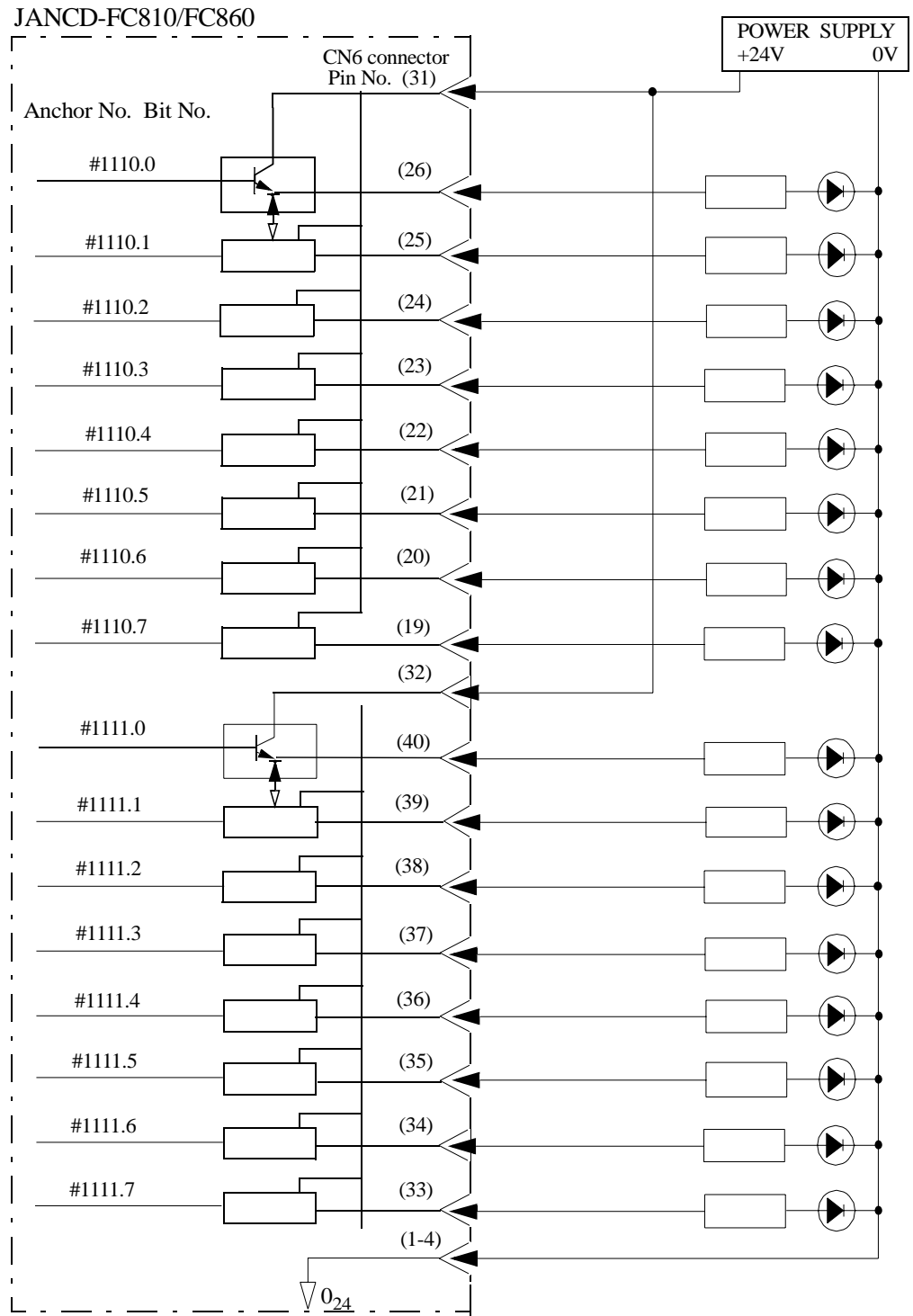


(Address number and bit number: #1108.0 to #1109.7)

FIGURE 10.2.1.15 FC810/FC860 Module Connection



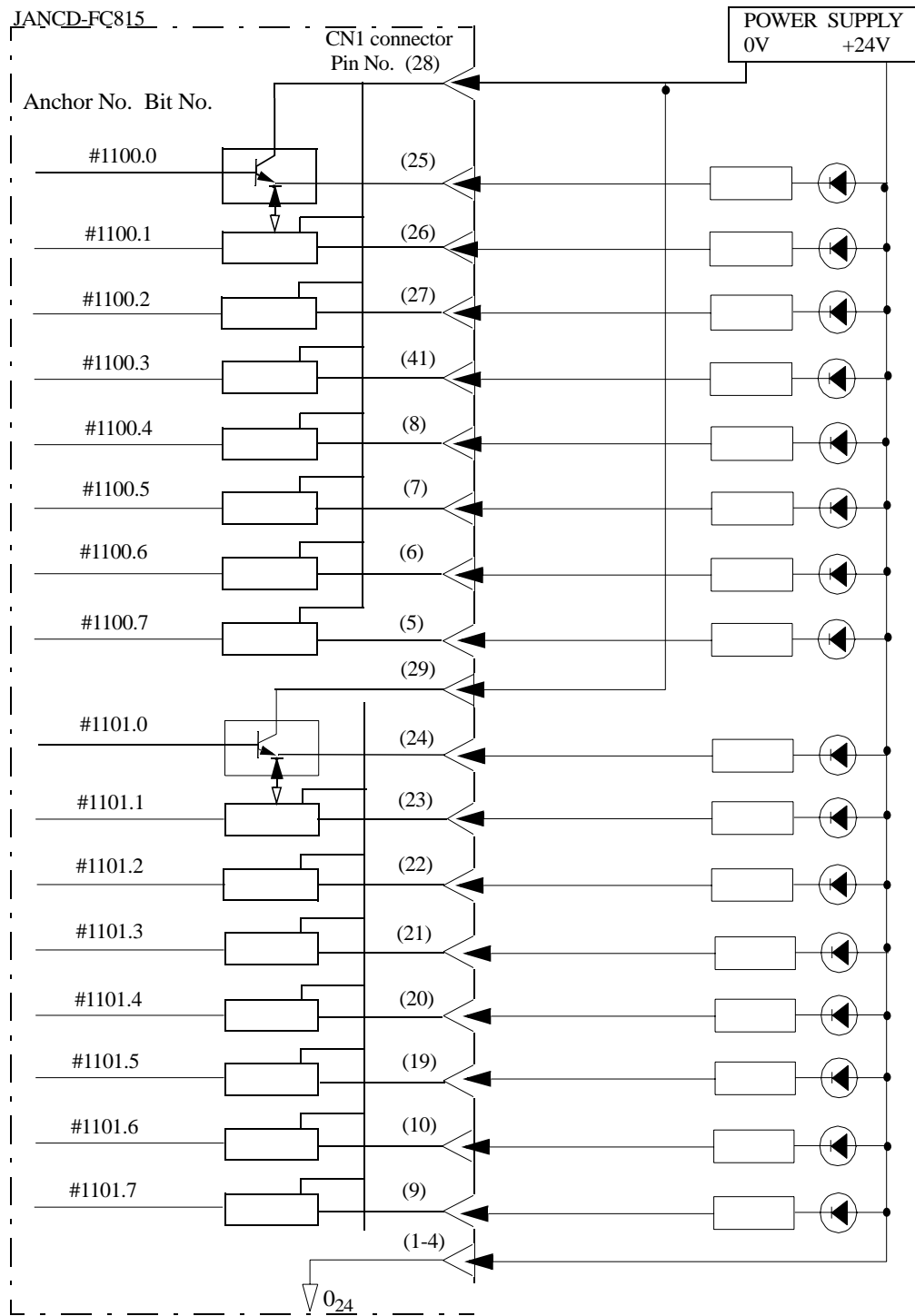
The address is that of Module No.1 (#1108.0 to 1109.7).
For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1110.0 to #1111.7)
FIGURE 10.2.1.16 FC810/FC860 Module Connection

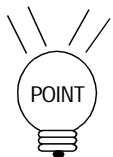


The address is that of Module No.1 (#1110.0 to 1111.7).
 For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

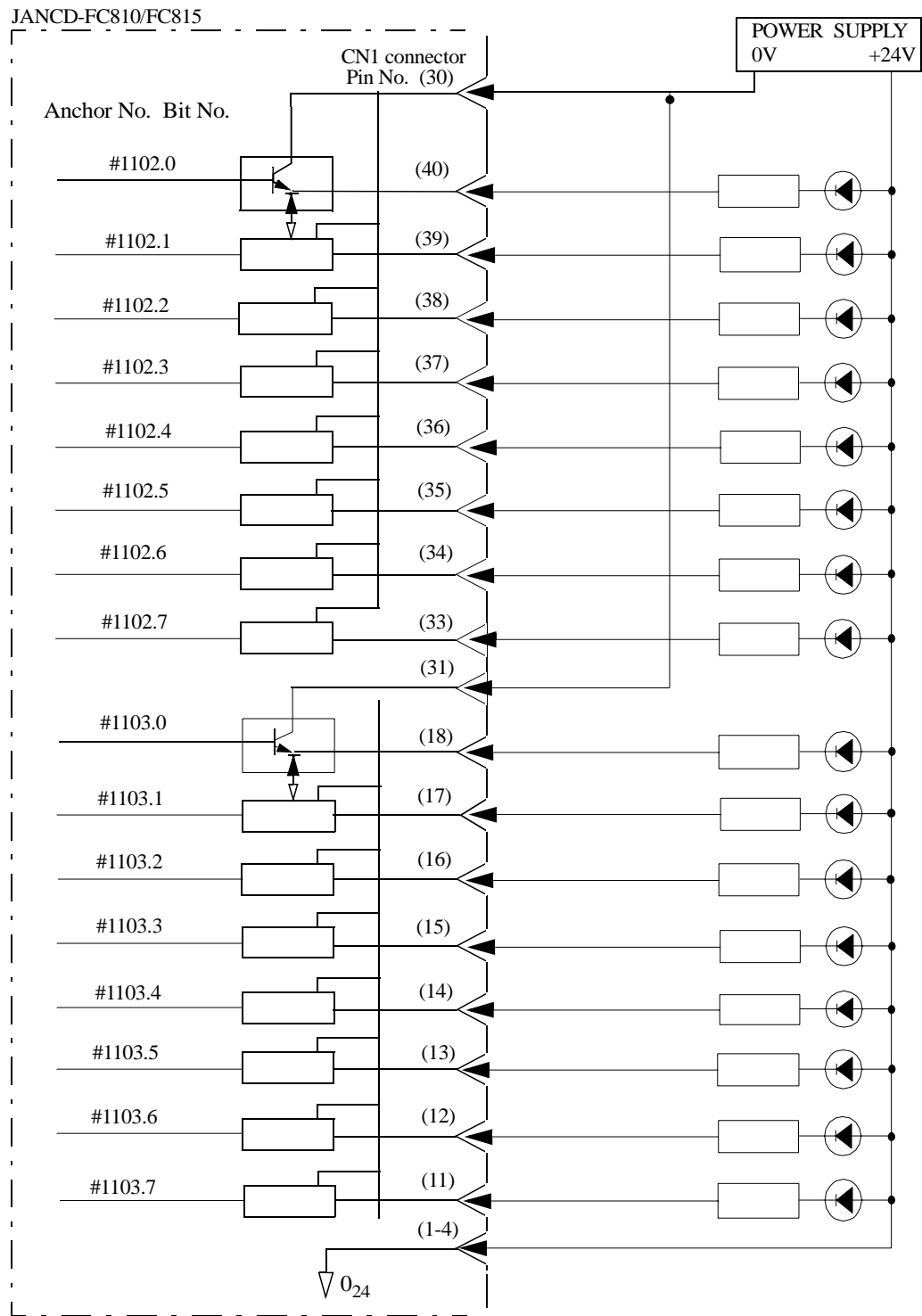


(Address number and bit number: #1100.0 to #1101.7)

FIGURE 10.2.1.17 FC815 Module Connection



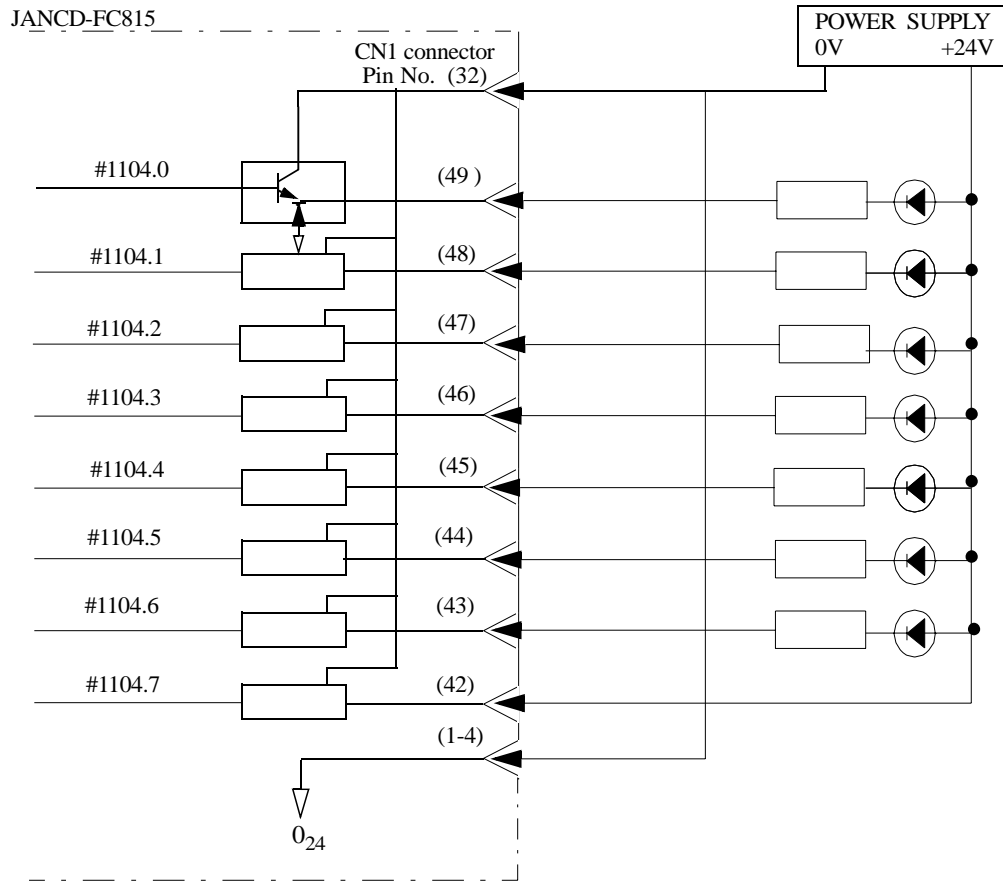
The address is that of Module No.1 (#1100.0 to 1110.7).
For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1102.0 to #1103.7)
FIGURE 10.2.1.18 FC815 Module Connection



The address is that of Module No.1 (#1102.0 to 1103.7).
 For Module Nos.2 and 3, the layout is as shown above starting from the smaller address number.

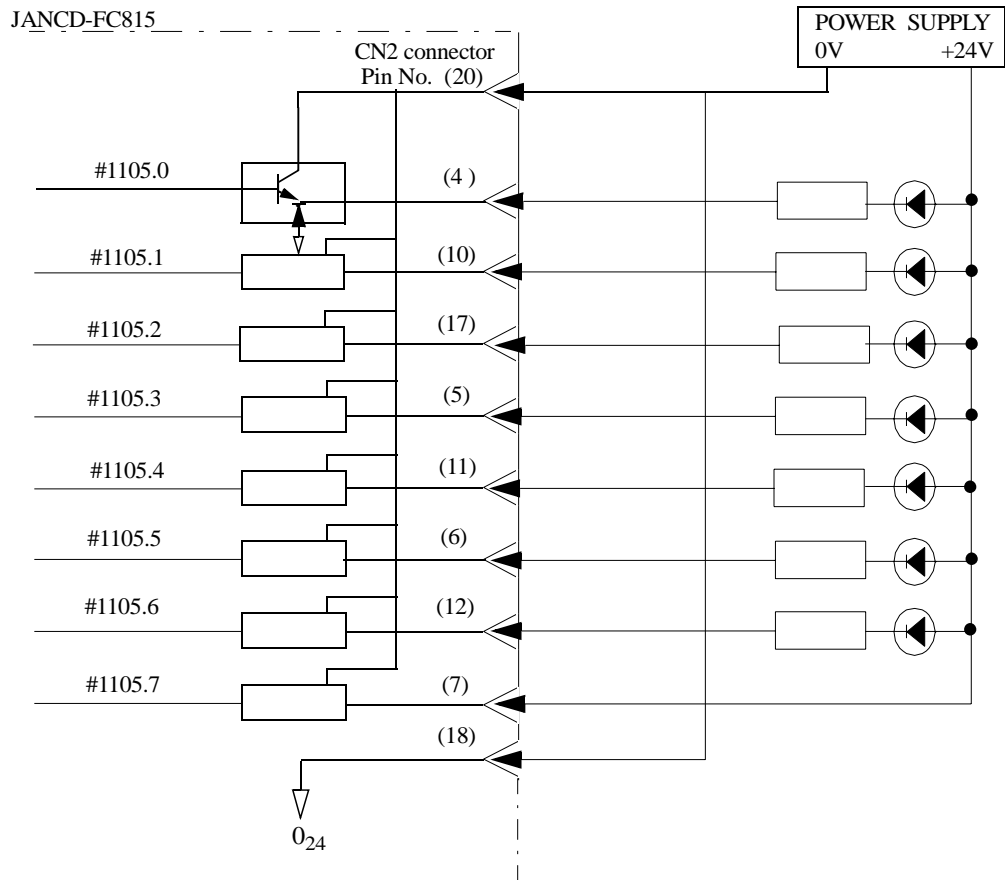


(Address number and bit number: #1104.0 to #1104.7)

FIGURE 10.2.1.19 FC815 Module Connection

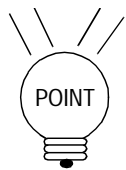


The address is that of Module No.1 (#1104.0 to 1104.7).
 For Module Nos.2 and 3, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1105.0 to #1105.7)

FIGURE 10.2.1.20 FC815 Module Connection



The address is that of Module No.1 (#1105.0 to 1105.7).
 For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

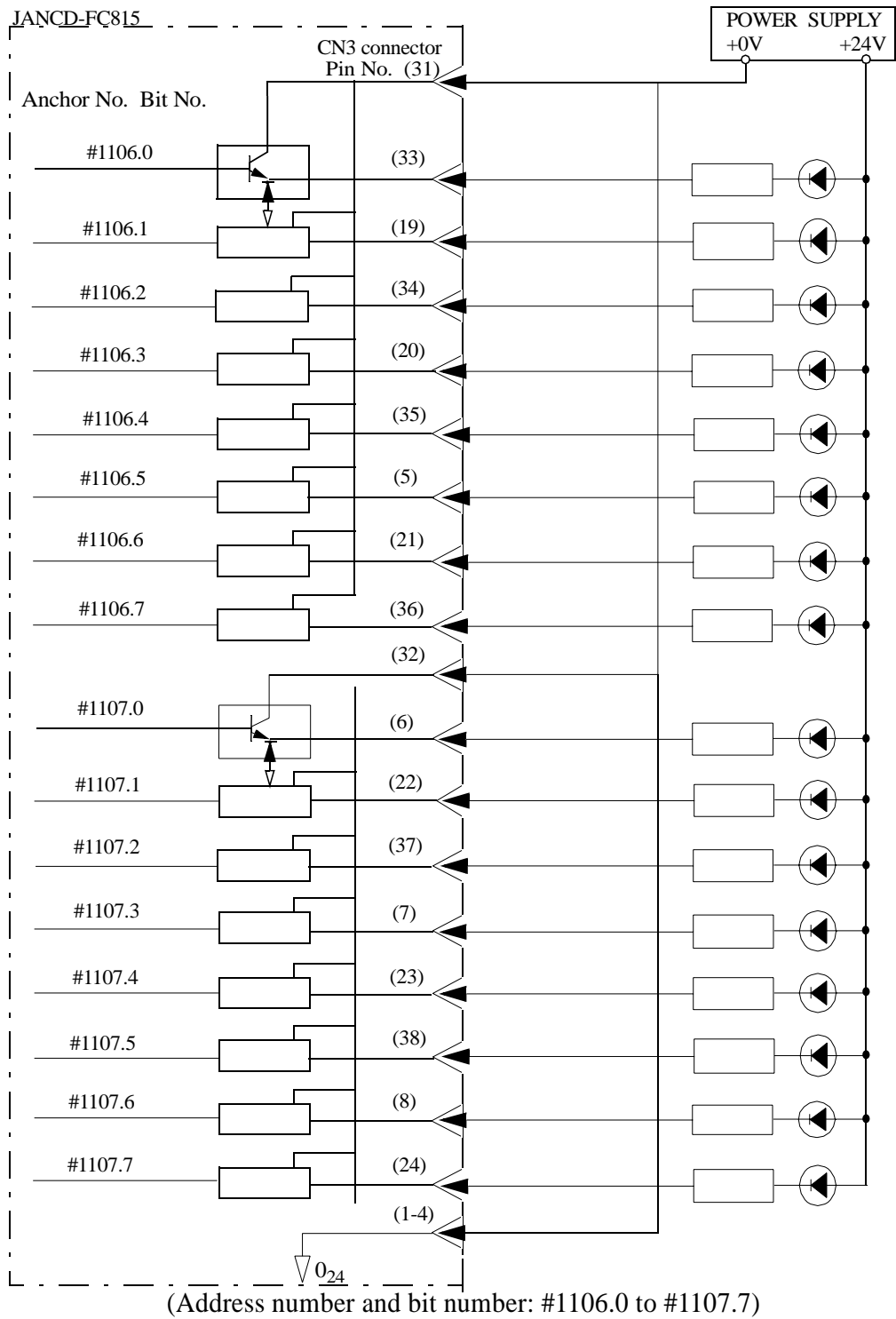
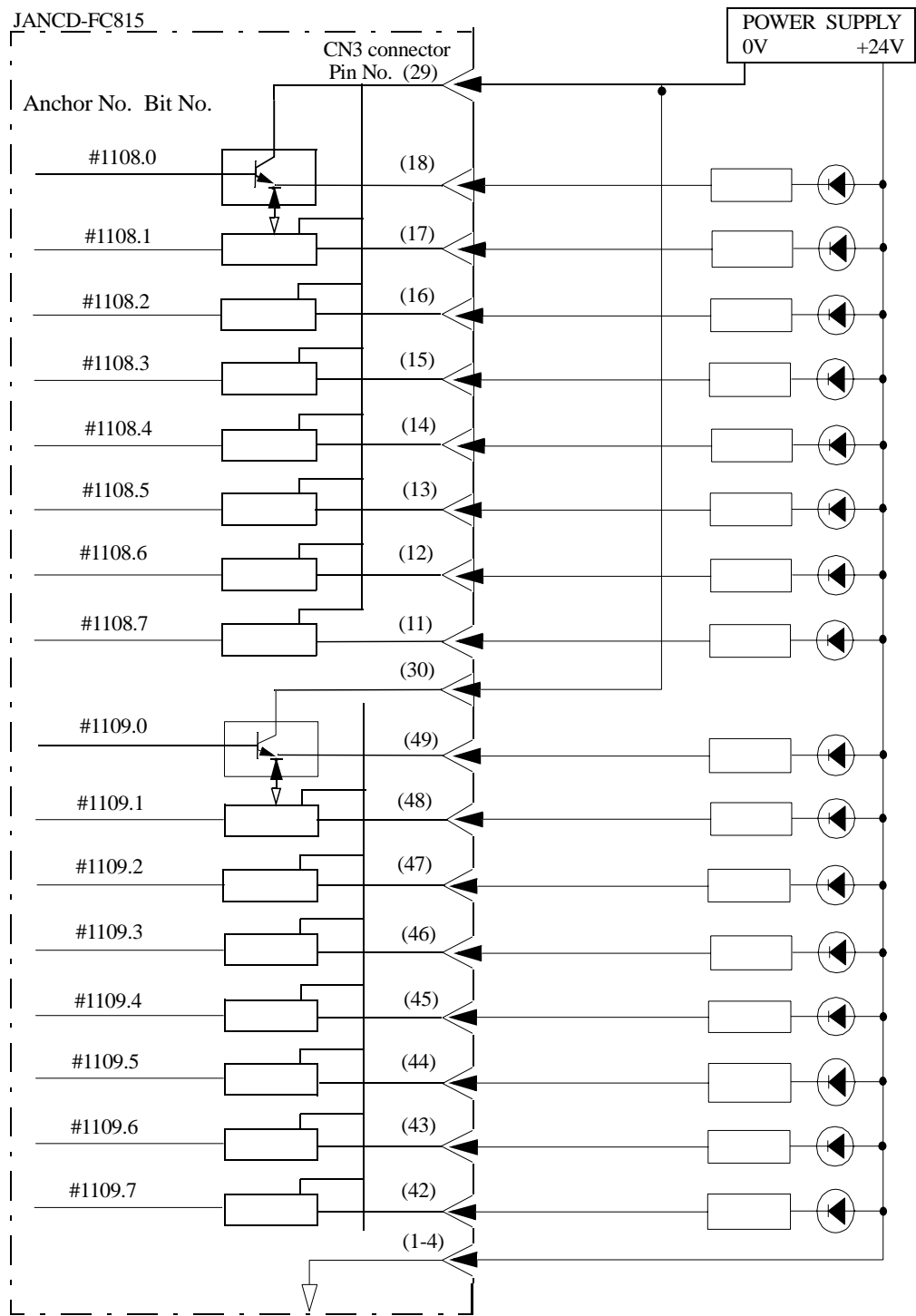


FIGURE 10.2.1.21 FC815 Module Connection



The address is that of Module No.1 (#1106.0 to 1107.7).
 For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

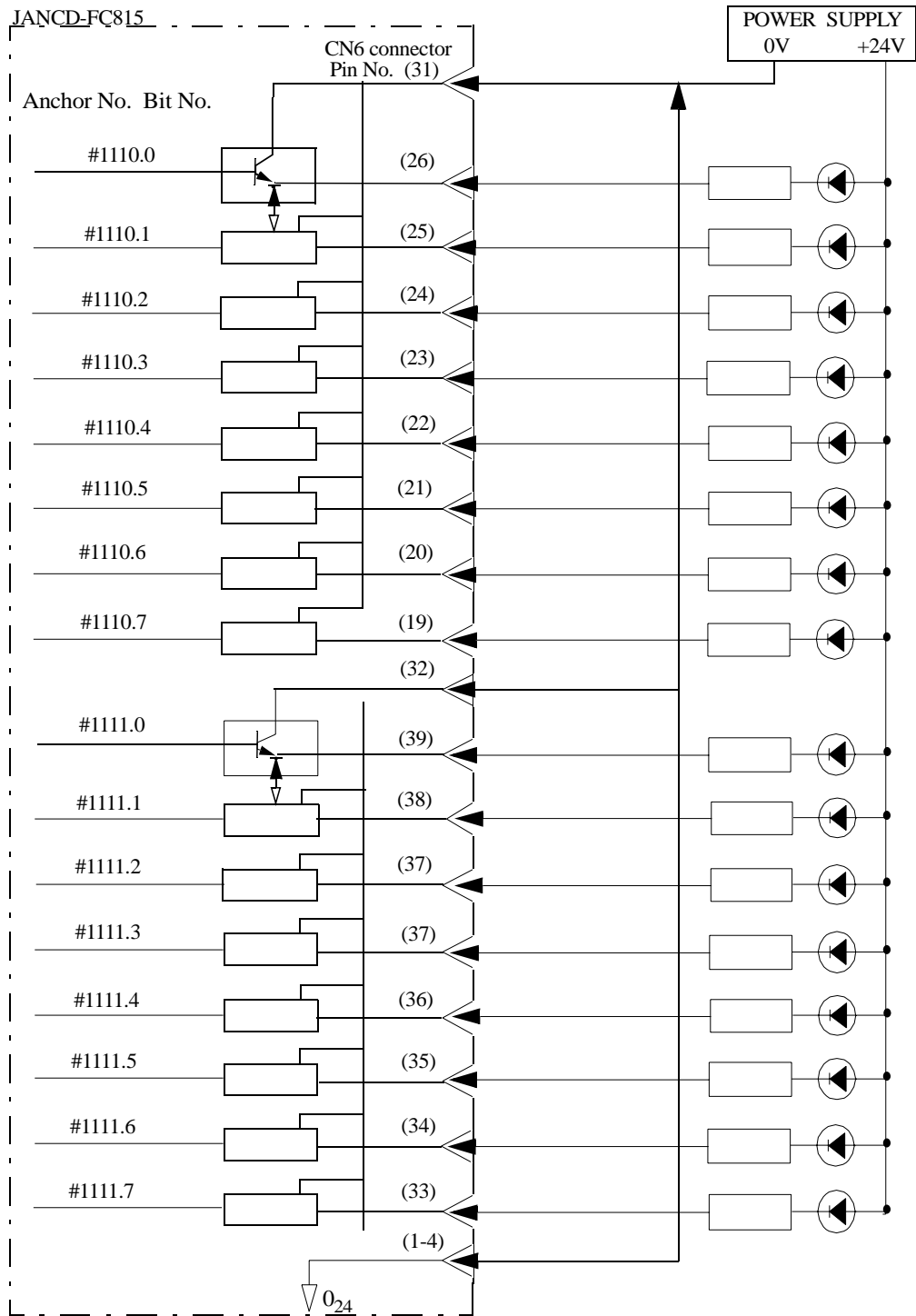


(Address number and bit number: #1108.0 to #1109.7)

FIGURE 10.2.1.22 FC815 Module Connection



The address is that of Module No.1 (#1108.0 to 1109.7).
 For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1110.0 to #1111.7)

FIGURE 10.2.1.23 FC815 Module Connection



The address is that of Module No.1 (#1110.0 to 1111.7).

For Module Nos. 2 and 3, the layout is as shown above starting from the smaller address number.

10.2.2 FC861 Module

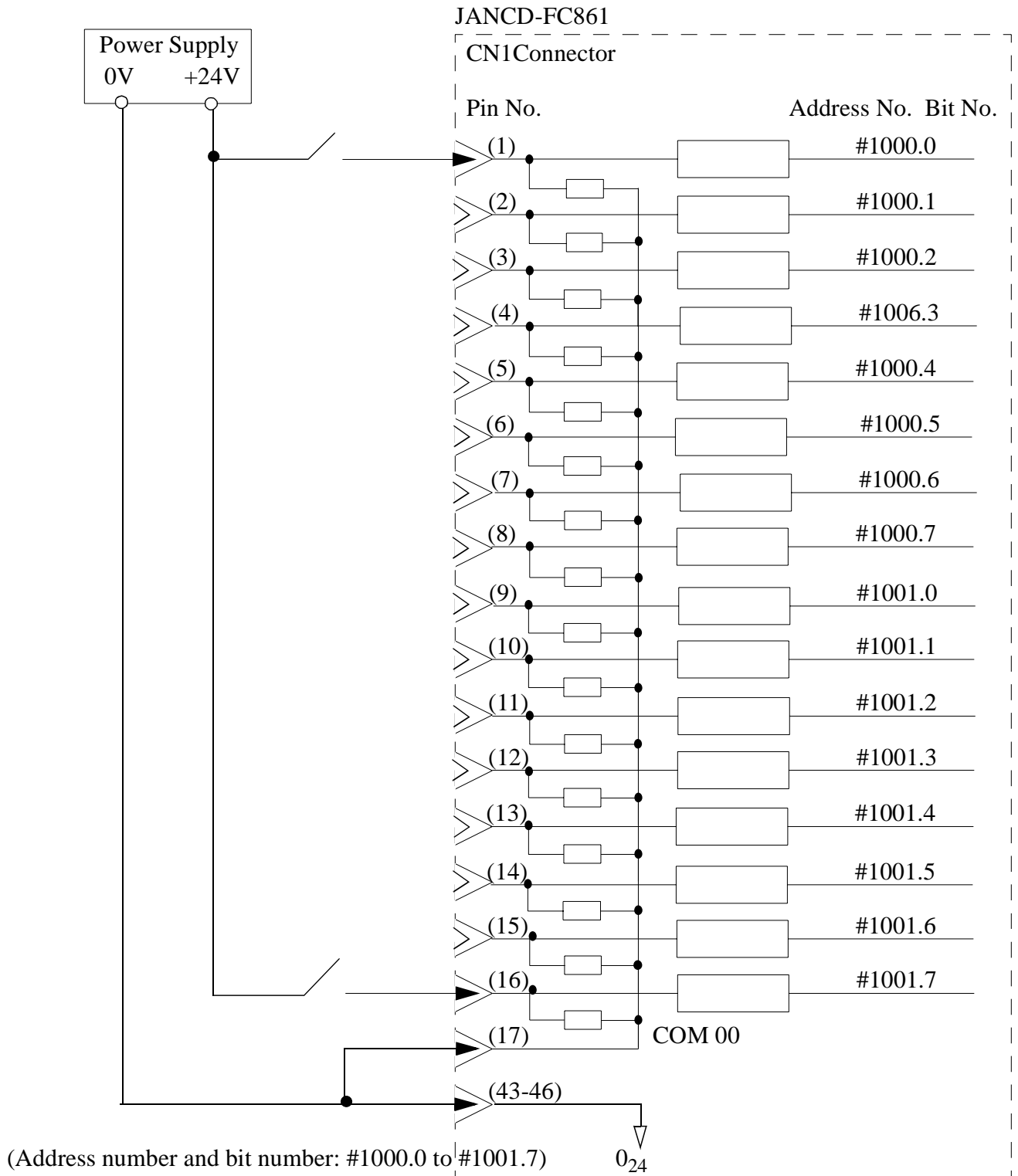
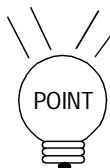
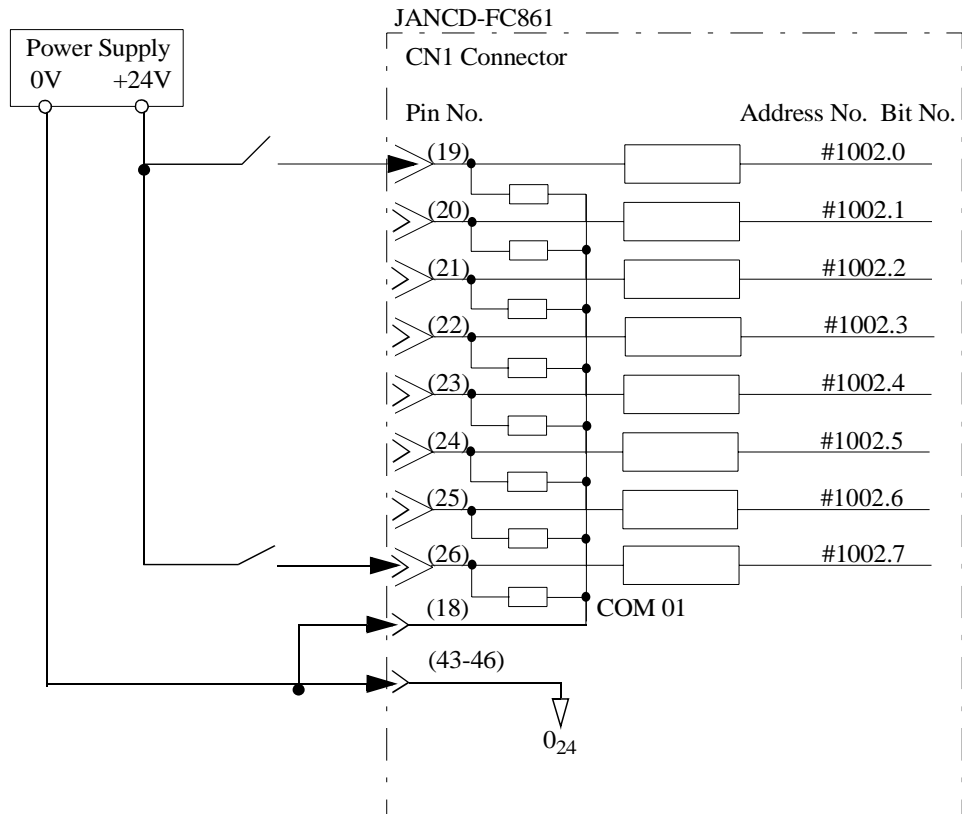


FIGURE 10.2.2.1 FC861 Module Connection

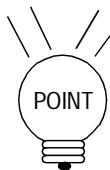


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC861).”
2. The address is that of module No. 1-1 (#1000.0 to #1001.7). For Modules Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

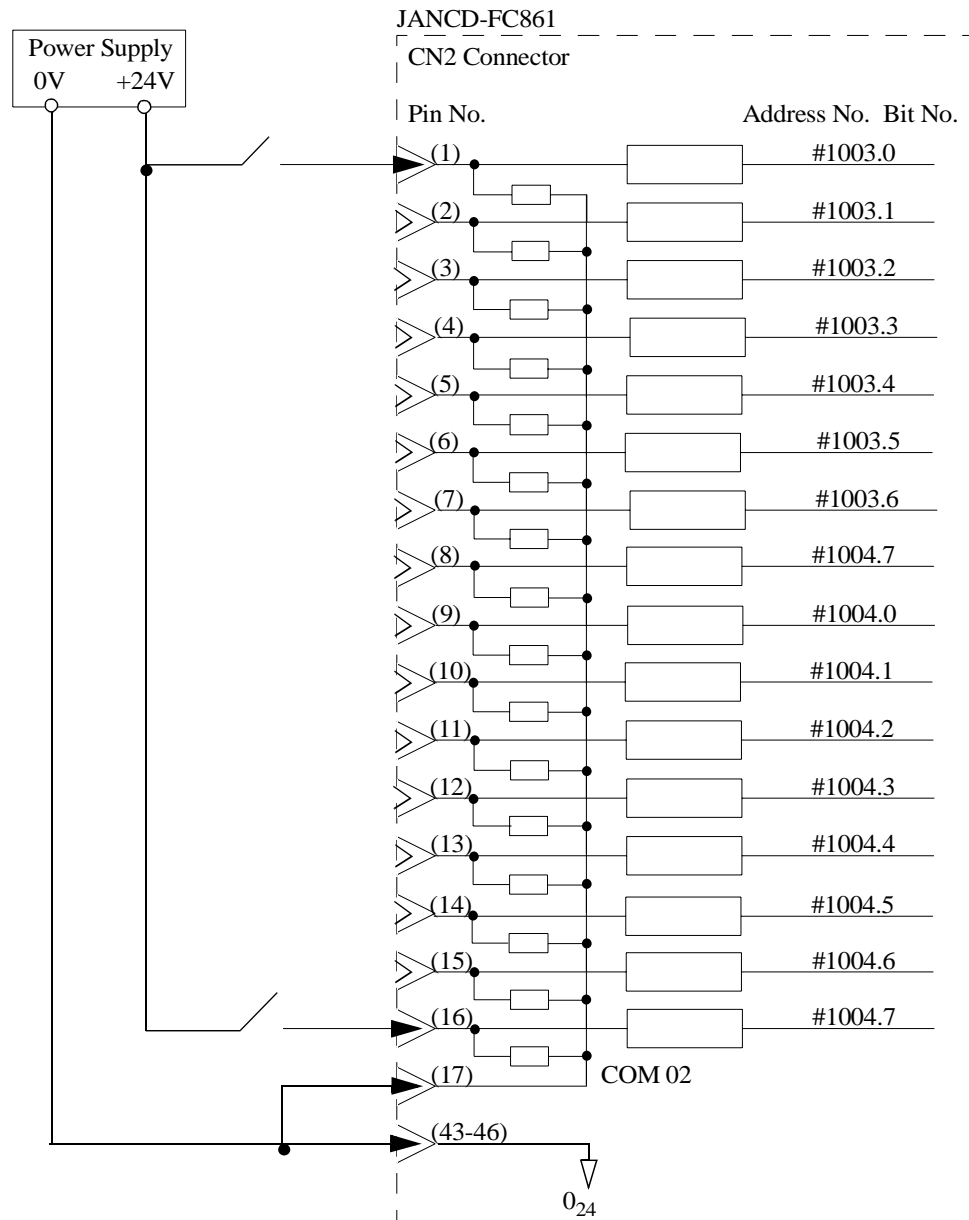


(Address number and bit number: #1002.0 to #1002.7)

FIGURE 10.2.2.2 FC861 Module Connection

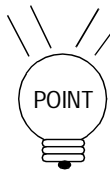


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (2) Module (JANCD-FC861).”
2. The address is that of module No. 1-1 (#1002.0 to #1002.7). For Modules Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

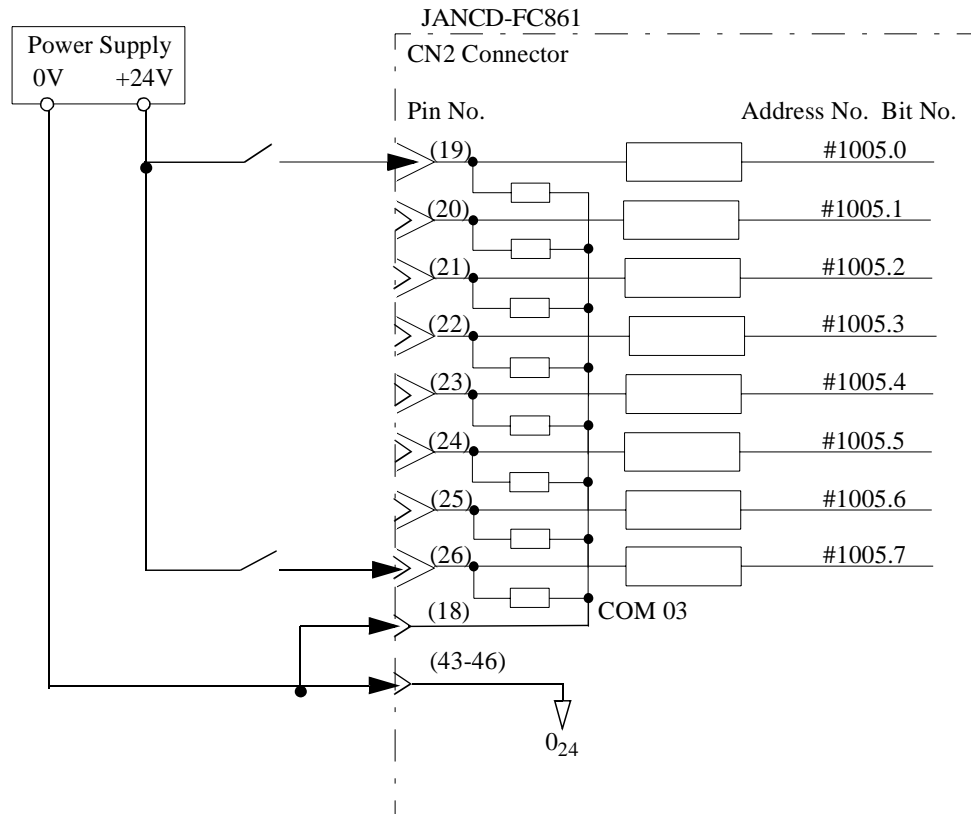


(Address number and bit number: #1003.0 to #1004.7)

FIGURE 10.2.2.3 FC861 Module Connection

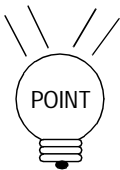


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (1) Module (JANCD-FC861).”
2. The address is that of module No. 1-1 (#1003.0 to #1004.7). For Modules Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

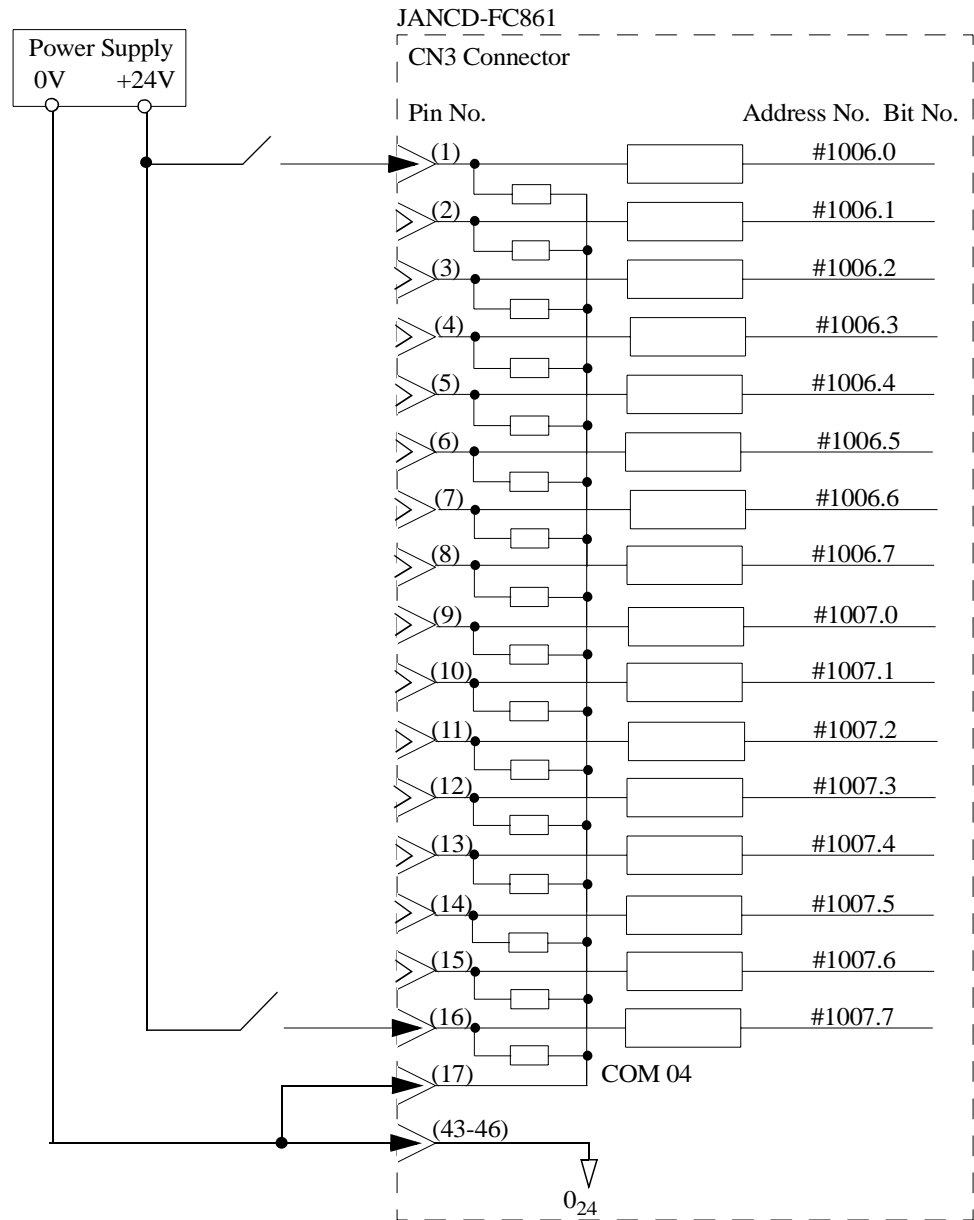


(Address number and bit number: #1005.0 to #1005.7)

FIGURE 10.2.2.4 FC861 Module Connection

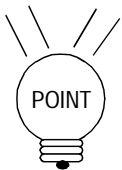


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (2) Module (JANCD-FC861).”
2. The address is that of module No. 1-1 (#1005.0 to #1005.7). For Modules Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

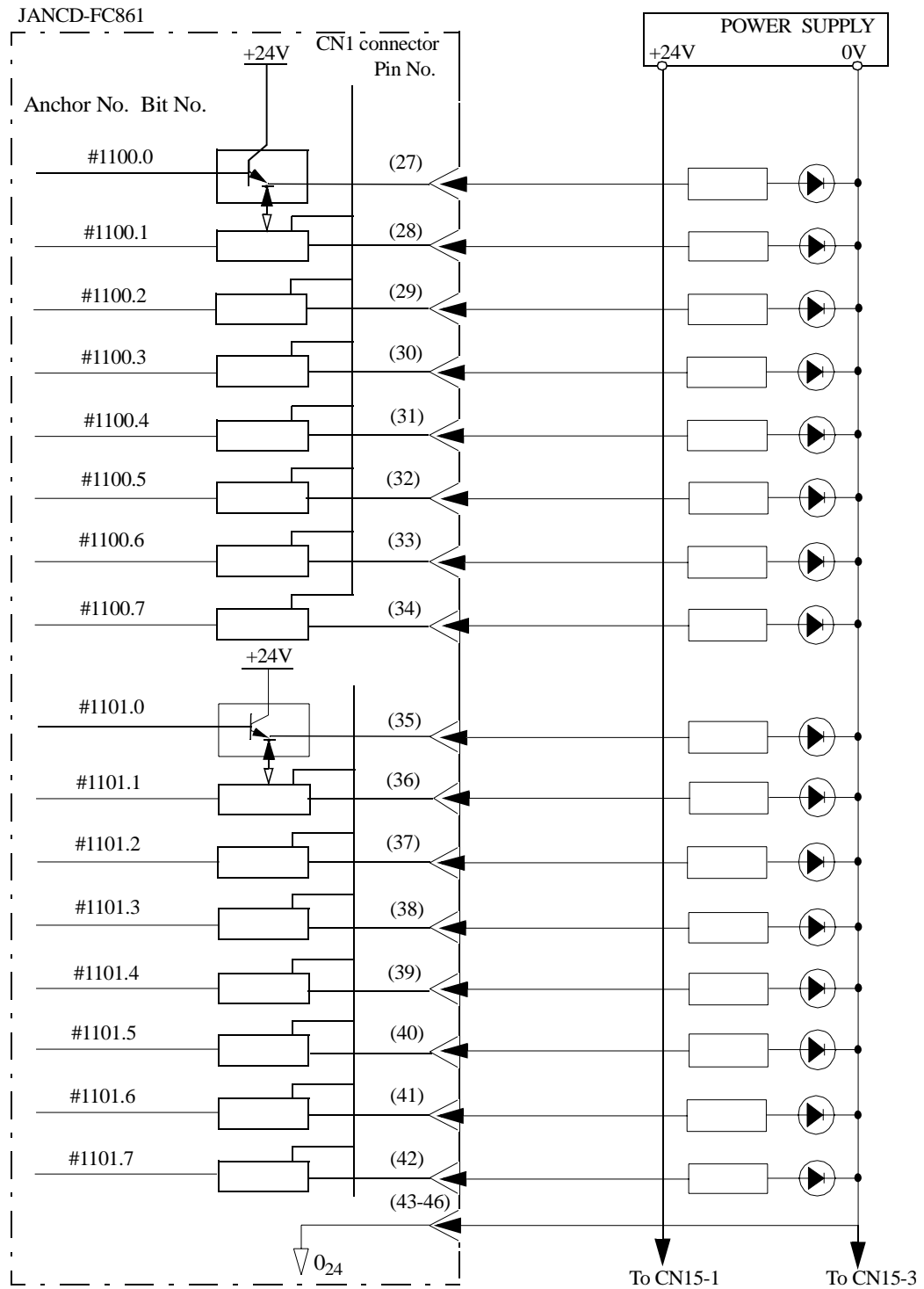


(Address number and bit number: #1006.0 to #1007.7)

FIGURE 10.2.2.5 FC861 Module Connection



1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (2) Module (JANCD-FC861).”
2. The address is that of module No. 1-1 (#1006.0 to #1007.7). For Modules Nos. 2 to 7, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1100.0 to #1101.7)

FIGURE 10.2.2.6 FC861 Module Connection



The above address is that of Module No.1-1 (#1100.0 to 1101.7). For Module Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

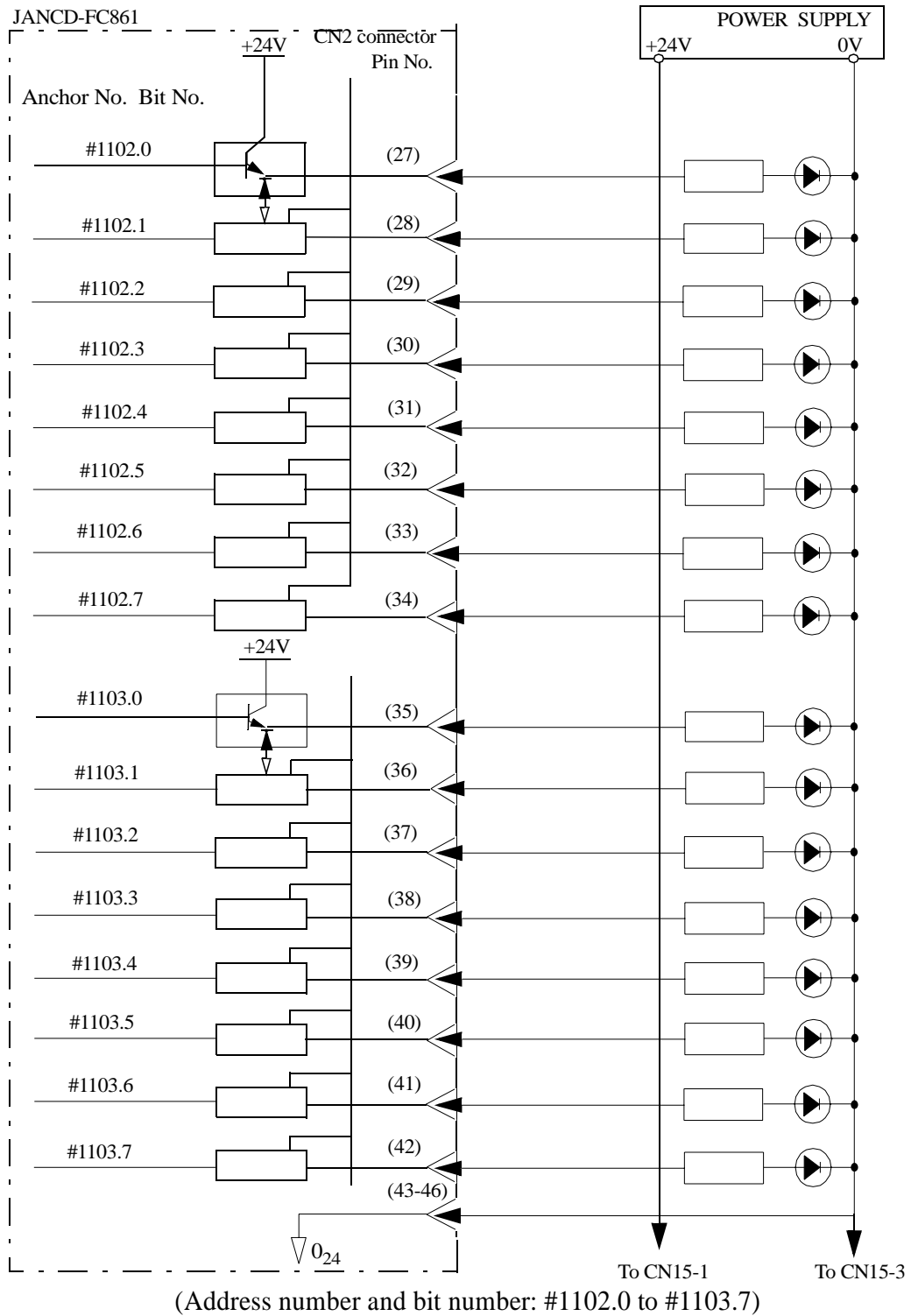


FIGURE 10.2.2.7 FC861 Module Connection



The above address is that of Module No.1-1 (#1102.0 to 1103.7).
 For Module Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

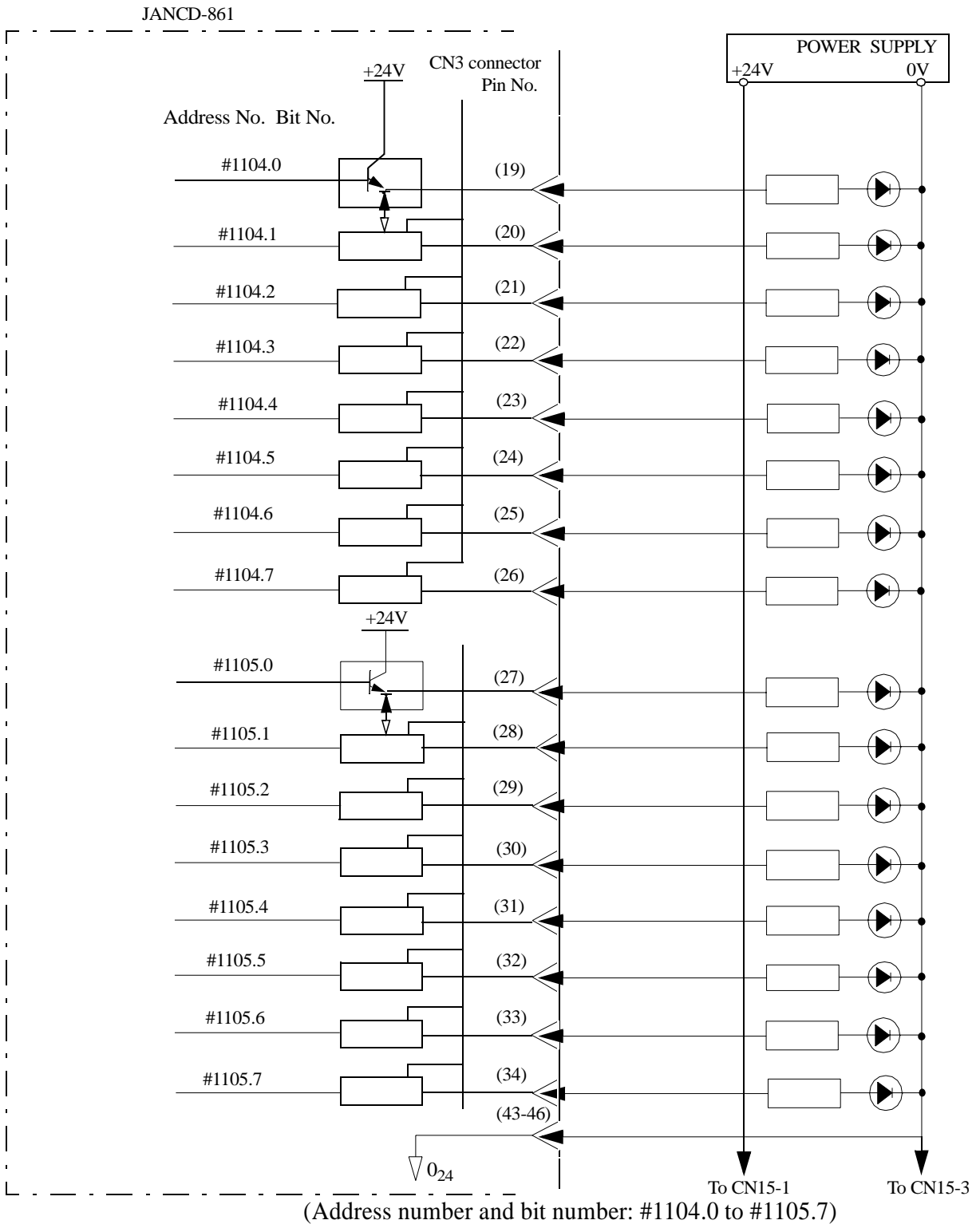
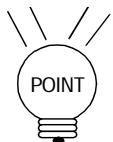
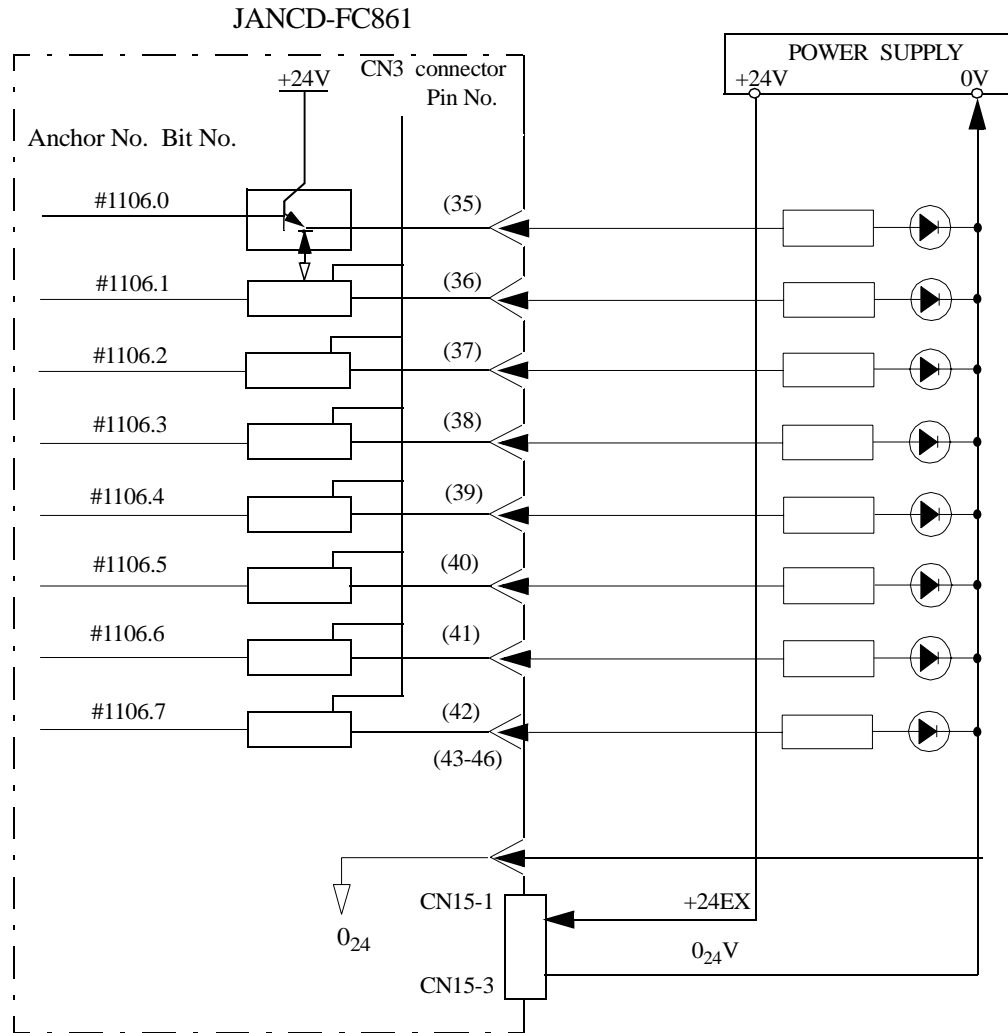


FIGURE 10.2.2.8 FC861 Module Connection

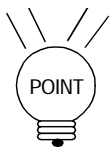


The above address is that of Module No.1-1 (#1104.0 to 1105.7).
 For Module Nos. 2 to 7, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1106.0 to #1106.7)

FIGURE 10.2.2.9 FC861 Module Connection



The address is that of Module No.1-1 (#1106.0 to 1106.7).
 For Module Nos. 2 to 7, the layout is as shown above starting from the smaller address number.

10.2.3 JSP02/JSP04 Module

The I/O ports in JSP02 and JSP04 modules are compatible with each other.

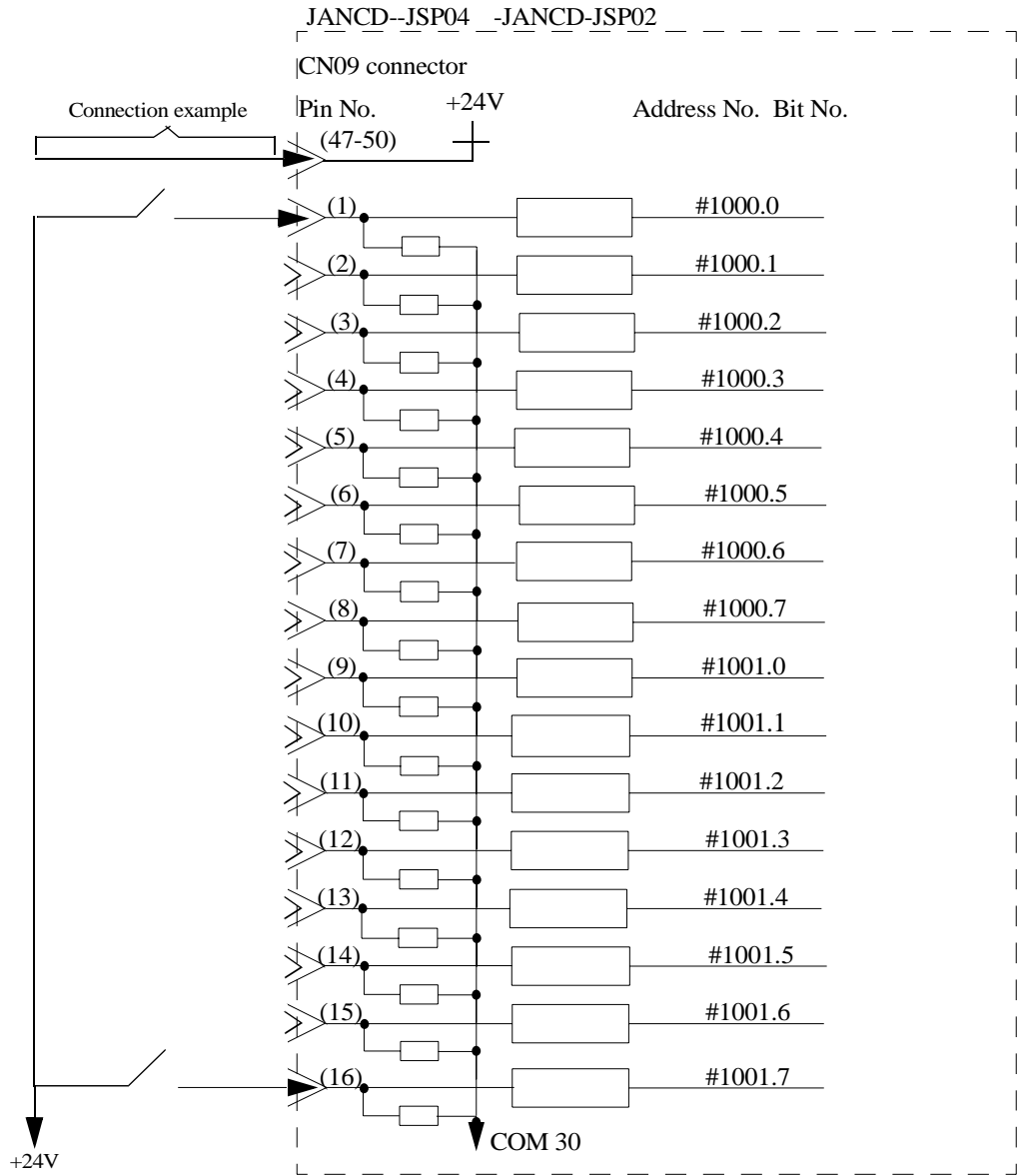
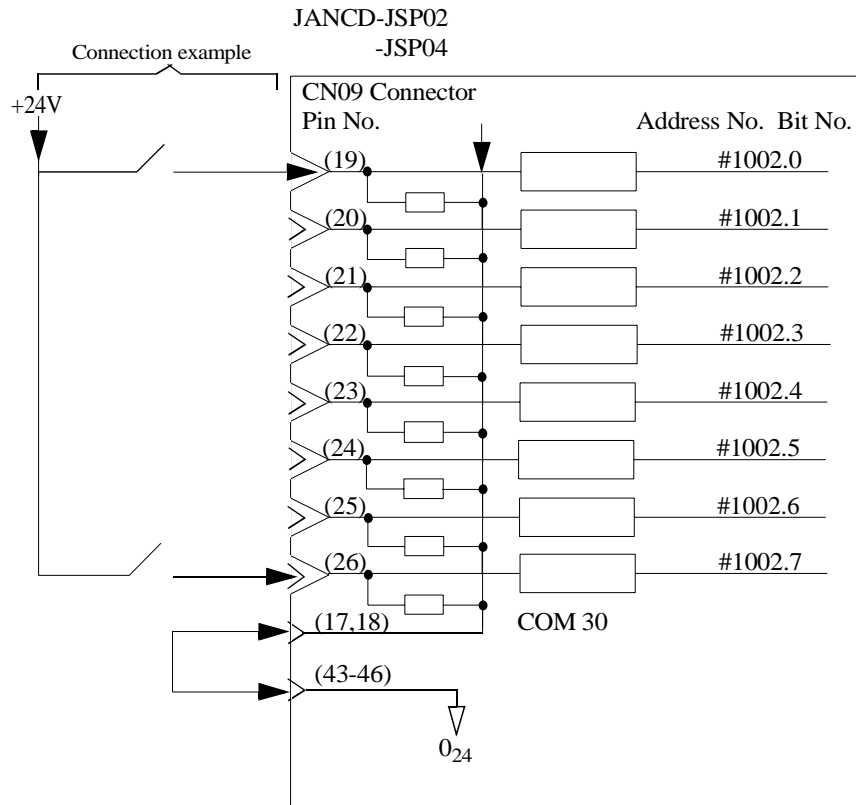


FIGURE 10.2.3.1 JSP02/JSP04 Module Connection

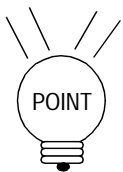


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (3) I/O Module (JSP02).”
2. The address is that of module No. 1-1 (#1000.0 to #1001.7). For Module Nos. 2 to 8, the layout is as shown above starting from the smaller address number.

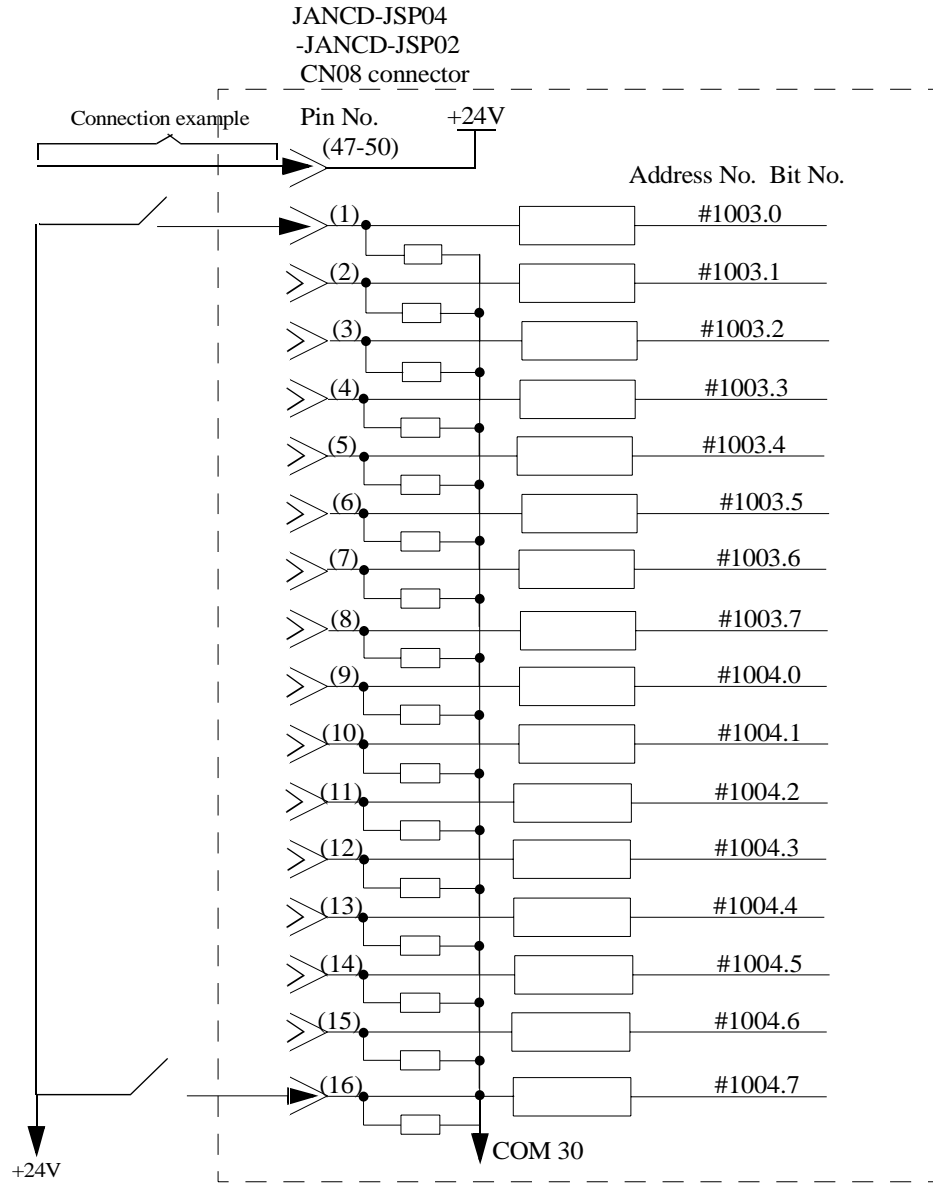


(Address number and bit number: #1002.0 to #1002.7)

FIGURE 10.2.3.2 JSP02/JSP04 Module Connection

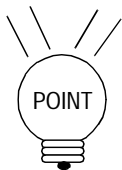


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (3) I/O Module (JSP02).”
2. The address is that of module No. 1-1 (#1002.0 to #1002.7). For Modules Nos. 2 to 8, the layout is as shown above starting from the smaller address number.

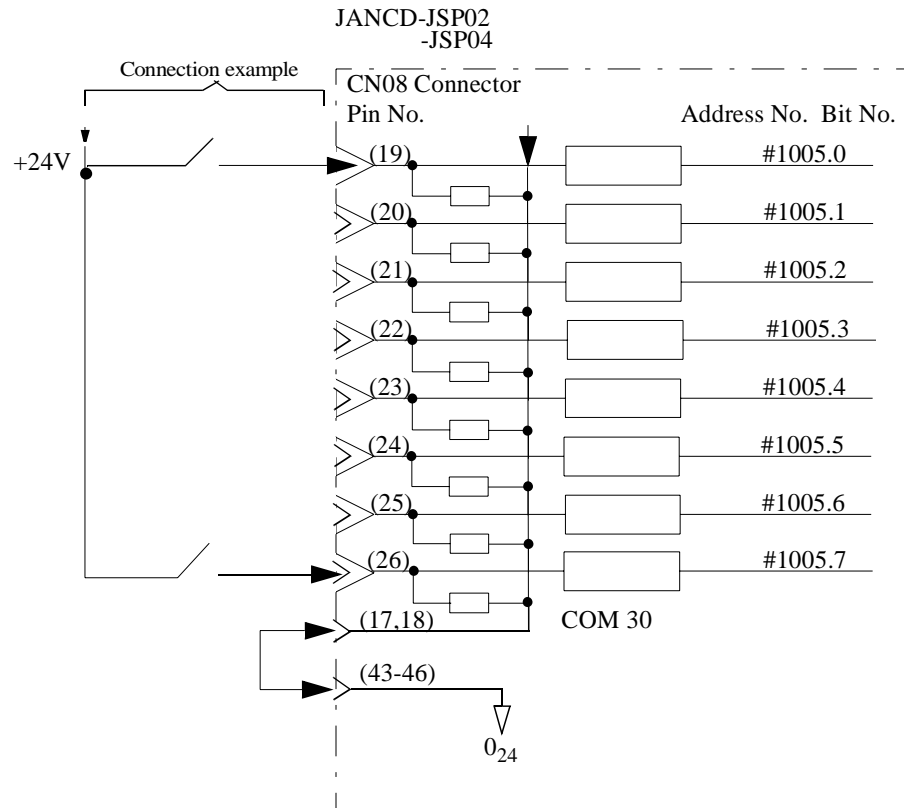


(Address number and bit number: #1003.0 to #1004.7)

FIGURE 10.2.3.3 JSP02/JSP04 Module Connection

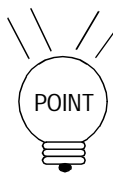


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (3) I/O Module (JSP02).”
2. The address is that of module No. 1-1 (#1003.0 to #1004.7).
For Modules Nos. 2 to 8, the layout is as shown above starting from the smaller address number.

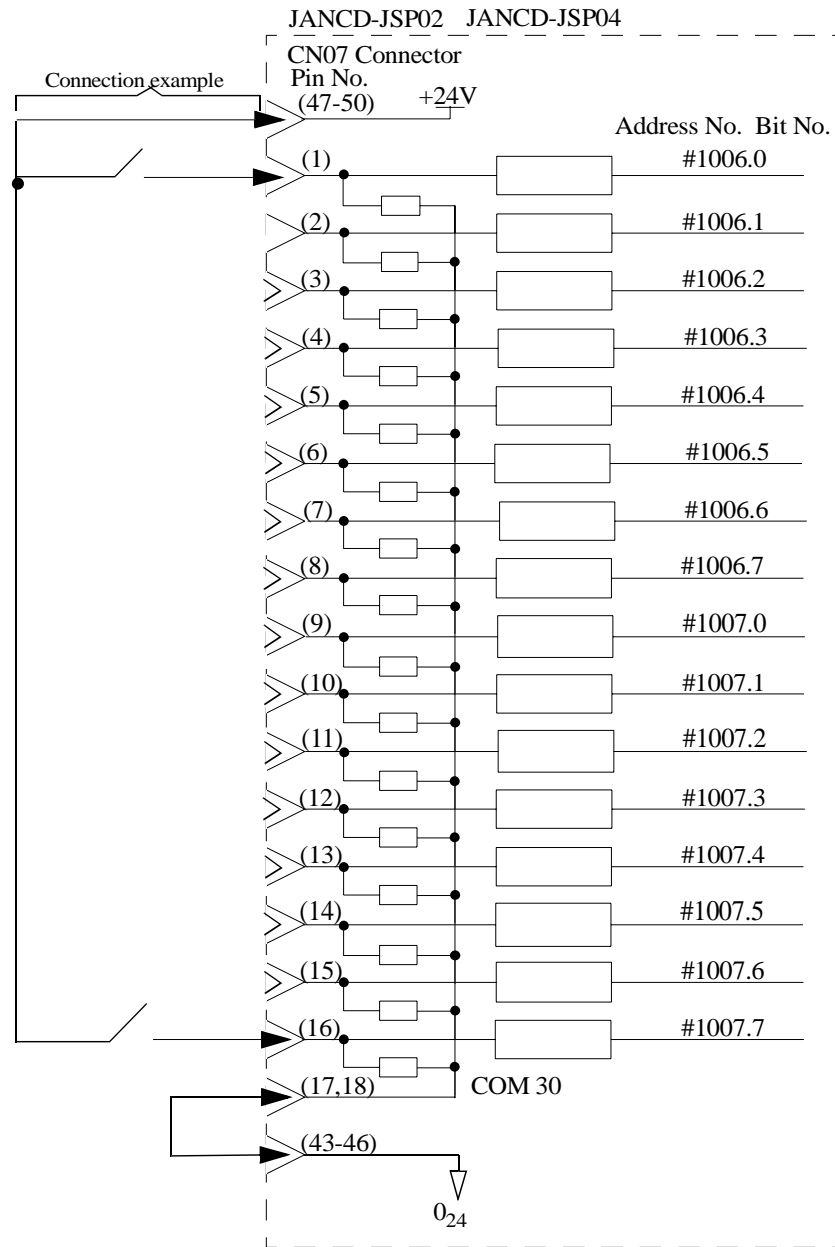


(Address number and bit number: #1005.0 to #1005.7)

FIGURE 10.2.3.4 JSP02/JSP04 Module Connection

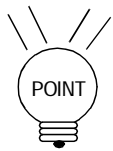


1. The above example shows one connection of +24V common. As for the connection of 0V common, refer to “10.3.2 (3) I/O Module (JSP02).”
2. The address is that of module No. 1-1 (#1005.0 to #1005.7). For Modules Nos. 2 to 8, the layout is as shown above starting from the smaller address number.



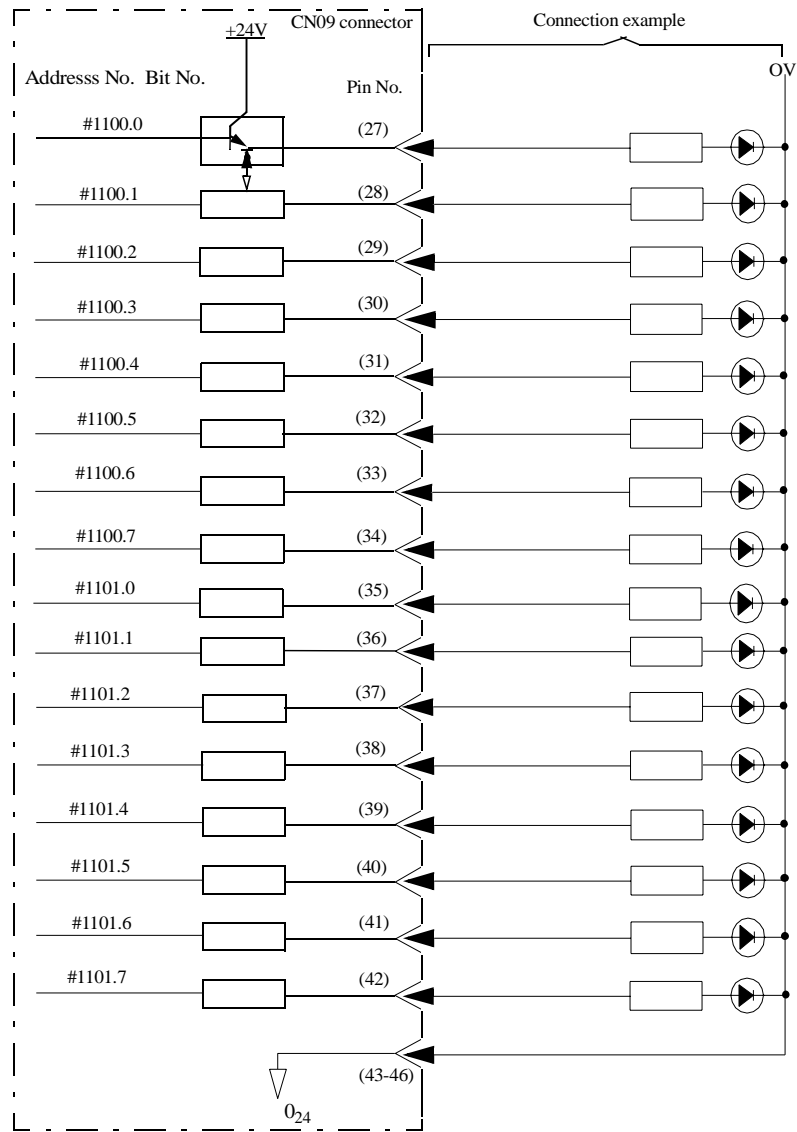
(Address number and bit number: #1006.0 to #1007.7)

FIGURE 10.2.3.5 JSP02/JSP04 Module Connection



1. The above example shows connection of +24V common. For the connection of OV common, refer to “10.3.2 (3) I/O Module (JSP02).”
2. The address is that of Module 1-1. (#1006.0 to 1007.7). For Module Nos. 2 to 8, the layout is as shown above, starting from the smaller address number.

JANCD-JSP02, JANCD-JSP04



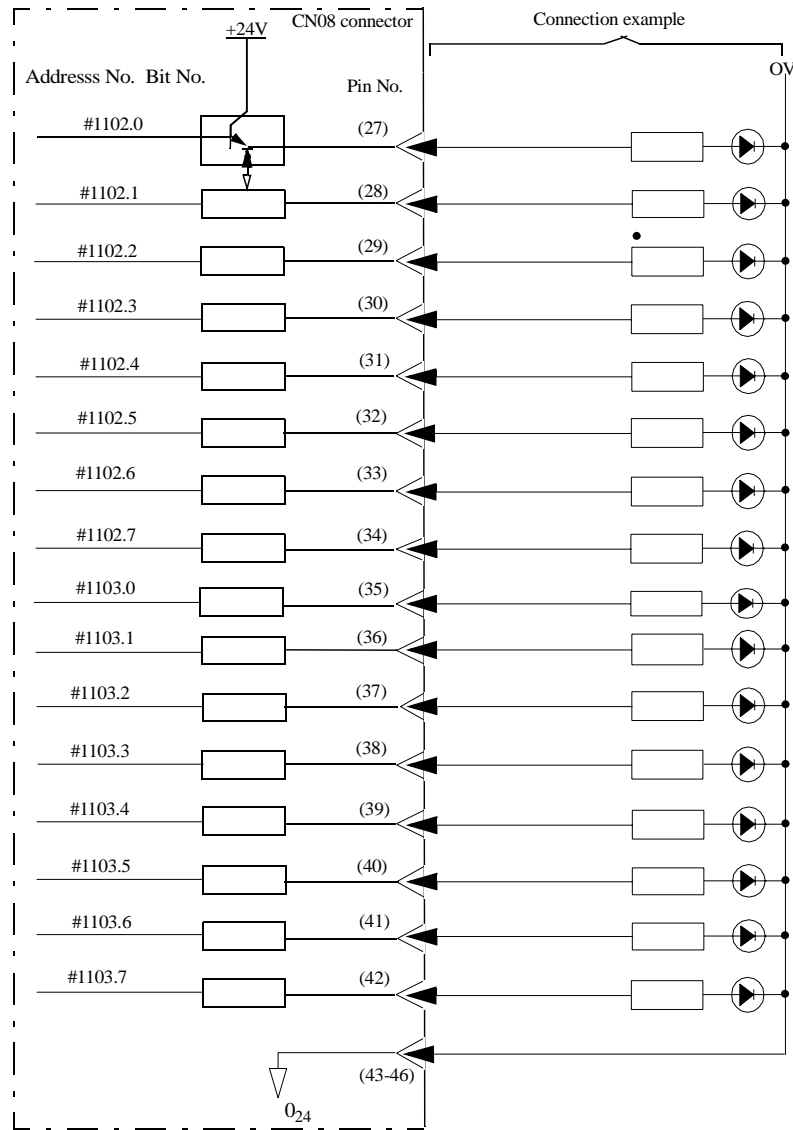
(Address number and bit number: #1100.0 to #1101.7)

FIGURE 10.2.3.6 JSP02/JSP04 Module Connection



The above address is that of Module No.1-1. (#1100.0 to 1101.7).
 For Module Nos. 2 to 8, the layout is as shown above starting from the smaller address number.

JANCD-JSP02
JANCD-JSP04

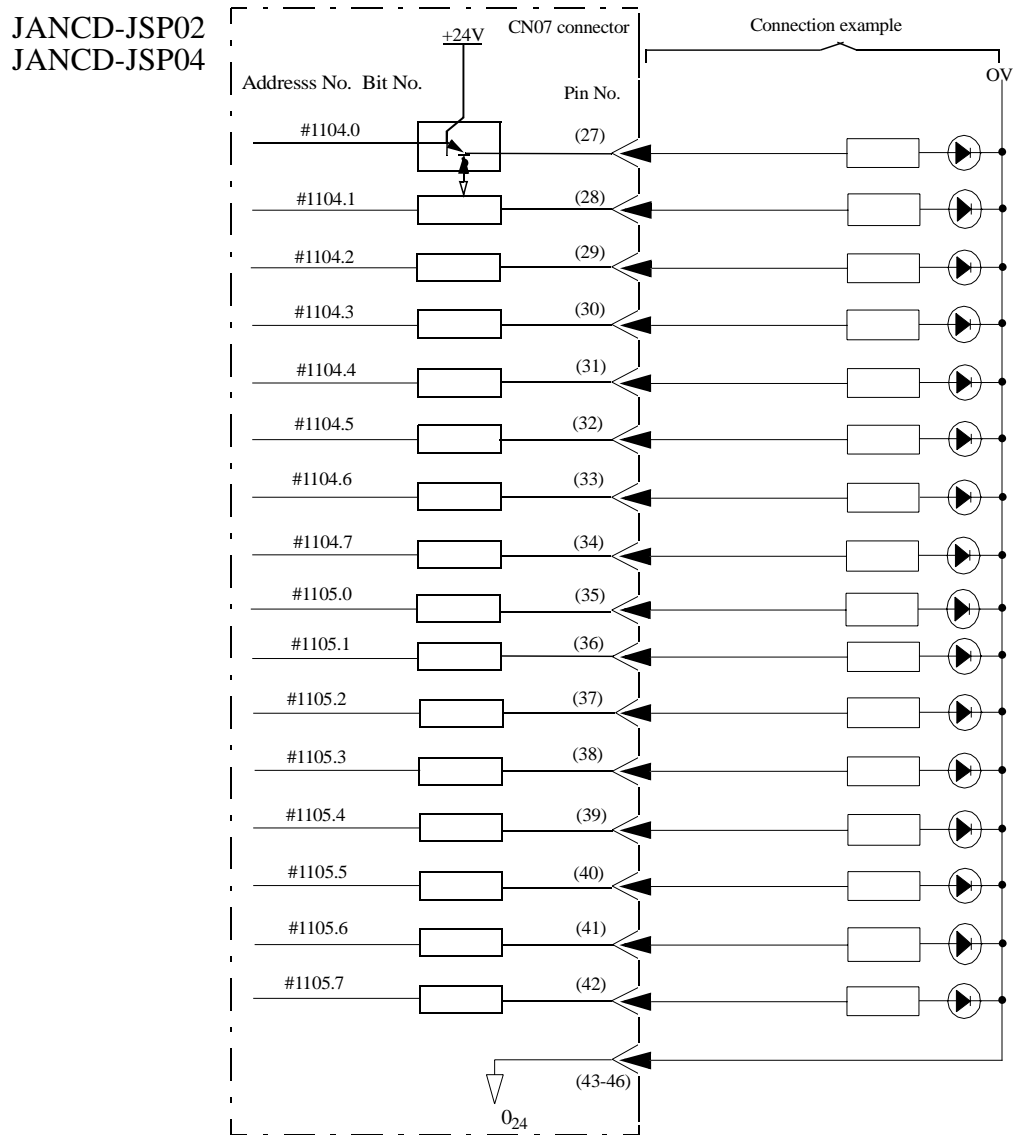


(Address number and bit number: #1102.0 to #1103.7)

FIGURE 10.2.3.7 JSP02/JSP04 Module Connection

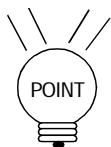


The address is that of Module No.1-1 (#1102.0 to 1103.7).
For Module Nos. 2 to 8, the layout is as shown above starting from the smaller address number.

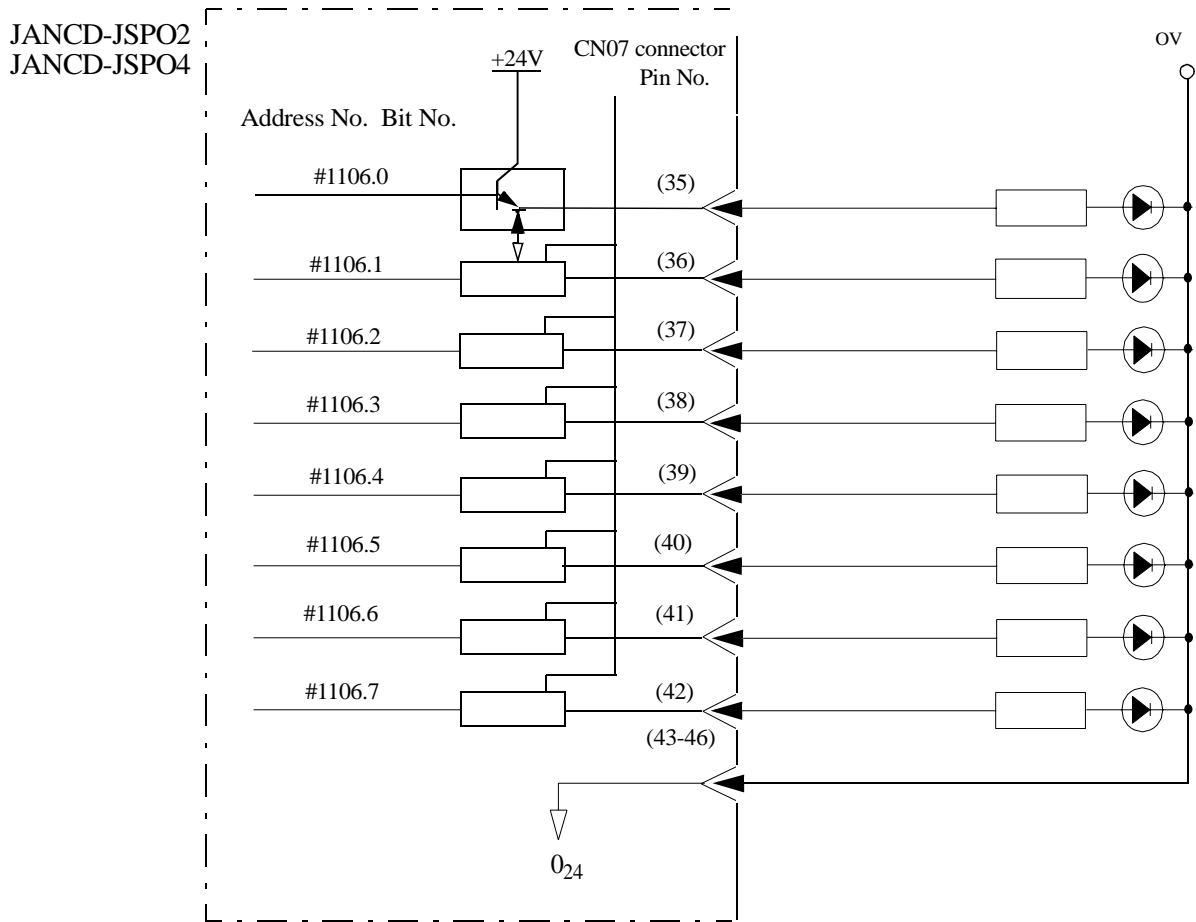


(Address number and bit number: #1104.0 to #1105.7)

FIGURE 10.2.3.8 JSP02/JSP04 Module Connection

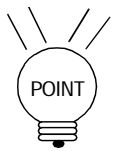


The above address is that of Module No.1-1 (#1104.0 to 1105.7).
 For Module Nos. 2 to 8, the layout is as shown above starting from the smaller address number.



(Address number and bit number: #1106.0 to #1106.7)

FIGURE 10.2.3.9 JSP02/JSP04 Module Connection



The above address is that of Module No.1-1 (#1106.0 to 1106.7).
For Module Nos. 2 to 8, the layout is as shown above starting from the smaller address number.

10.3 Description of General Purpose I/O Signal

This section describes I/O module and the machine side I/O signal.

10.3.1 I/O Port

YASNAC is a system with a built-in machine sequencer (PLC).

Therefore, when a machine tool builder designs a built-in sequencer, the assignment of external signals to the I/O port may be set freely.

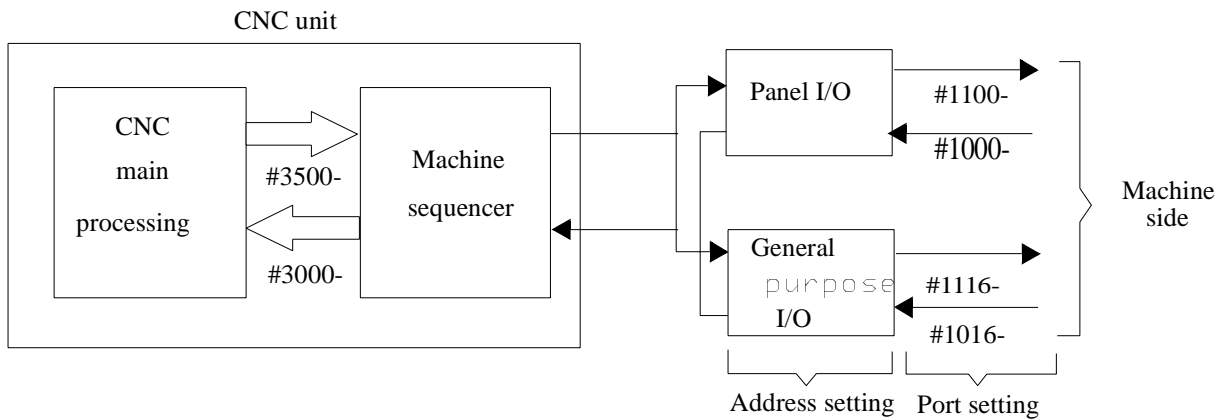


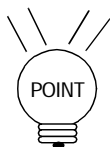
FIGURE 10.3.1.1 CNC Unit and External Signals

The general purpose I/O port is loaded on I/O modules (JANCD-FC810/FC815/FC860/FC891) and JSP02 or JSP04 of the CNC operation panel.

The number of I/O points to each module is shown in Table 10.3.1.2.

Table 10.3.1.1: Number of I/O Points to Each Module

Module Type JANCD-	Points of Input	Points of Output	Remarks
FC810,FC815,FC860	112	96	for machine panel
FC861	64	56	
JSP02,JSP04			



1. The I/O port is built-in the control board (JUSP02, JUSP04) of the CNC operation panel. Therefore, up to 4 sheets (maximum input: 512 points, maximum output: 440 points) may be connected for addition of FC810, FC815, FC860 and up to 9 sheets (maximum input: 640 points, maximum output: 560 points) may be connected for addition of FC861.
2. Mixture of each I/O module is possible, but they must be set so that there is no duplication in I/O area number.

(1) Address Setting

The address and connector are as shown in Table 10.2. Setting is made with port 1, so when specifying another port, the address should be changed. Refer to Tables 10.3 and 10.4.

Table 10.3.1.2: Address and Connector

Address		Panel I/O (JANCD-JASP02/JSP04)	General Purpose (JANCD-FC810/FC815/FC860)		General Purpose I/O (JANCD-FC861)		
Input	Output						
#1000		CN9	COM30	CN4	COM30	CN1	COM00
#1001		CN9		CN4		CN1	
#1002		CN9		CN4	COM31	CN1	COM01
#1003		CN8		CN4		CN2	COM02
#1004		CN8		CN4	COM32	CN2	
#1005		CN8		CN5	COM40	CN2	COM03
#1006		CN7		CN5		CN3	COM04
#1007		CN7		CN5	COM41	CN3	
#1008		-		CN5		-	
#1009		-		CN5	COM42	-	
#1010		-		CN3	COM20	-	
#1011		-		CN3		-	
#1012		-		CN3	COM21	-	
#1013		-		CN2	COM10	-	
	#1100	CN9		CN1		CN1	
	#1101	CN9		CN1		CN1	
	#1102	CN8		CN1		CN2	
	#1103	CN8		CN1		CN2	
	#1104	CN7		CN1		CN3	
	#1105	CN7		CN2		CN3	
	#1106	CN7		CN3		CN3	
	#1107	-		CN3		-	
	#1108	-		CN6		-	
	#1109	-		CN6		-	
	#1110	-		CN6		-	
	#1111	-		CN6		-	
Total		64 Inputs, 56 Outputs		112 Inputs, 96 Outputs		64 Inputs, 56 Outputs	

(2) Address Division

The address divisions of JSP02, FC861, FC810, /FC815 and FC860 are shown in Tables 10.3 and 10.4. With SW1, only the numbers listed in the table may be set.

Table 10.3.1.3: Input Port

JSP02/JSP04		FC861		FC810 /FC815/ FC860	
SW1	Address Port	SW1	Address Port	SW1	Address Port
1	#1000-#1007	1	#1000-#1007	1	#1000-#1013
2	#1008-#1015	2	#1008-#1015		
3	#1016-#1023	3	#1016-#1023	3	#1016-#1029
4	#1024-#1031	4	#1024-#1031		
5	#1032-#1039	5	#1032-#1039	5	#1032-#1045
6	#1040-#1047	6	#1040-#1047		
7	#1048-#1055	7	#1048-#1055	7	#1048-#1061
8	#1056-#1063	8	#1056-#1063		
9	#1064-#1071	9	#1064-#1071	9	#1064-#1077
A	#1072-#1079	A	#1072-#1079		

Table 10.3.1.4: Output Port

JSP02/JSP04		FC861		FC810 /FC815/ FC860	
SW1	Address Port	SW1	Address Port	SW1	Address Port
1	#1100-#1006	1	#1100-#1006	1	#1100-#1111
2	#1108-#1114	2	#1108-#1114		
3	#1116-#1122	3	#1116-#1122	3	#1116-#1127
4	#1124-#1130	4	#1124-#1130		
5	#1132-#1039	5	#1132-#1039	5	#1132-#1143
6	#1140-#1146	6	#1140-#1146		
7	#1148-#1154	7	#1148-#1154	7	#1148-#1159
8	#1156-#1162	8	#1156-#1162		
9	#1164-#1170	9	#1164-#1170	9	#1164-#1175
A	#1172-#1078	A	#1172-#1078		

10.3.2 I/O Circuit of I/O Port

(1) Input Module (JANCD-F810/FC815/FC860)

(a) Input circuit (FC815)

In the input circuit, 0V common and 24V common may be set externally. For 24V power, either the power supply unit (JZNC-JAU07(option)) or the external power supply may be used.

- When using a power supply unit:

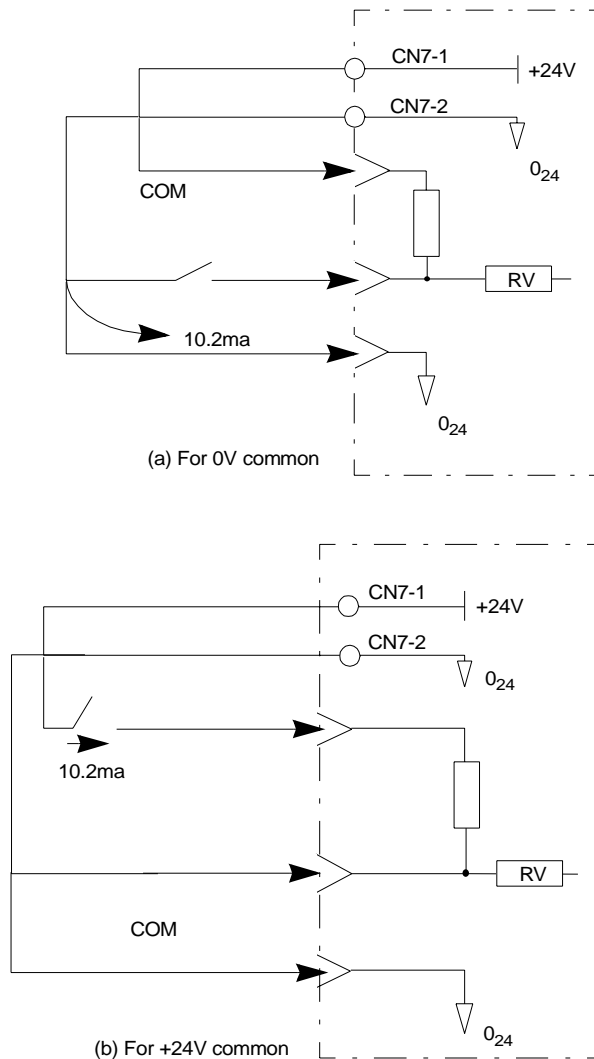
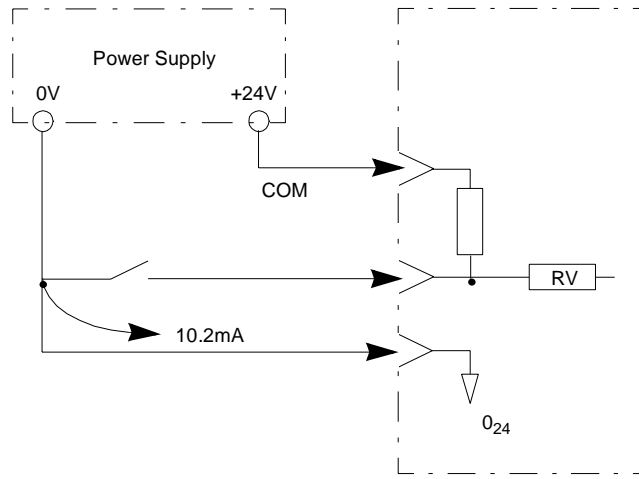


FIGURE 10.3.2.1 Input Circuit (when using a Power Supply Unit)



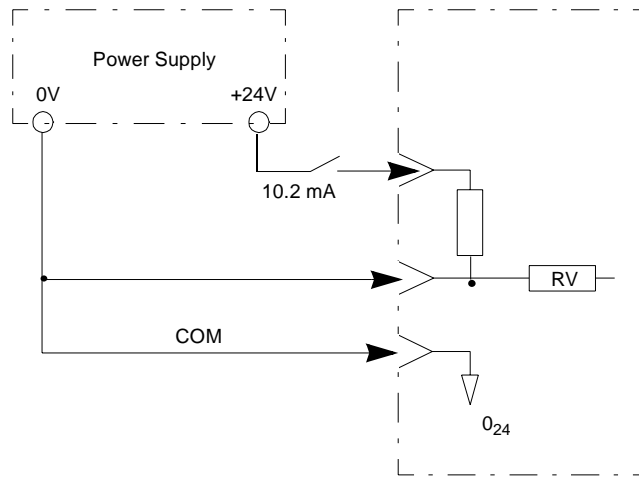
In the input circuits (e.g. COM10,COM20,COM21, — 9 in total), as shown in “10.2 Detailed Connection of General-purpose I/O”, +24V common or 0V common may be selected freely per 8 inputs or 16 inputs. For setting, use wire at the cable side.

- When using an external (customer's) power supply unit:



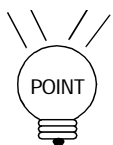
(a) For 0V common

FIGURE 10.3.2.2 Input Circuit (when using an External Power Supply)



(a) For 0V common

FIGURE 10.3.2.3 Input Circuit (when using an External Power Supply)



In the input circuits (e.g. COM10,COM20,COM21, — 9 in total), as shown in “10.2 Detailed Connection of General-purpose I/O”, +24V common or 0V common may be selected freely per 8 inputs or 16 inputs. For setting, use wire at the cable side.

(b) Output circuit (FC810/FC860)

Output uses non-contact polarity points. Limit the current at operation up to 60mA (per circuit). For 24V power, either the power supply unit (JZNC-JAU07(option)) or the external power supply may be used.

- When using a power supply unit:

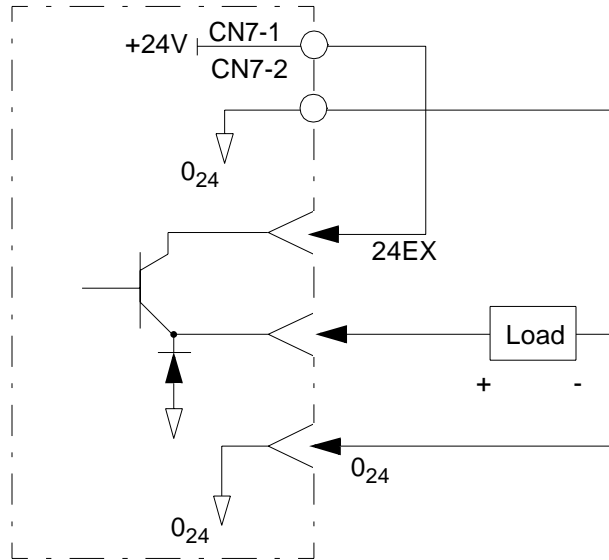


FIGURE 10.3.2.4 Output Circuit (when using a Power Supply Unit)

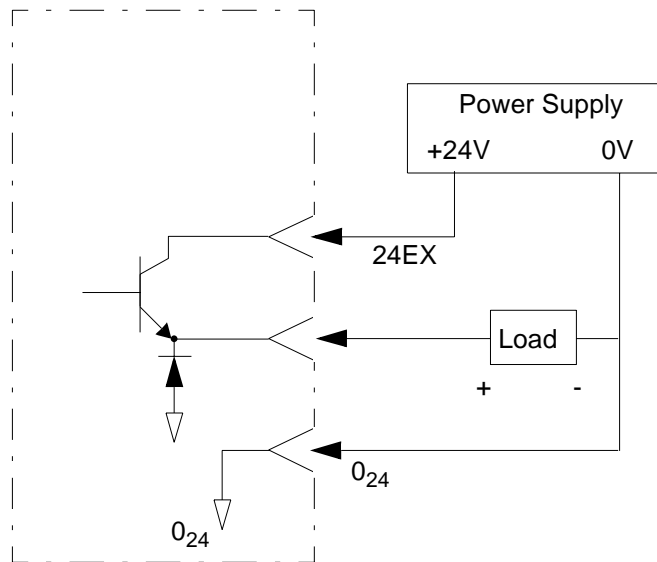


FIGURE 10.3.2.5 Output Circuit (when using a Power Supply Unit)



1. 96 outputs are non-contact polarity points (transistor, source driver), and limit the current at ON up to 60mA (per circuit). When the load current of each output signal might exceed 60mA, install a fuse of 0.1A for each circuit in order to protect the output IC.
2. For 96 outputs, every 8 outputs may be connected to more than one external power supply.
3. Up to 2.5A in the entire internal circuit (including JSP board) when using a power supply unit.

(c) Output circuit (FC815)

Output uses non-contact polarity points. Limit the current at operation up to 60mA (per circuit). For 24V power, both the power supply unit (JZNC-JAU07(option)) and the external power supply may be used.

- When using a power supply unit:

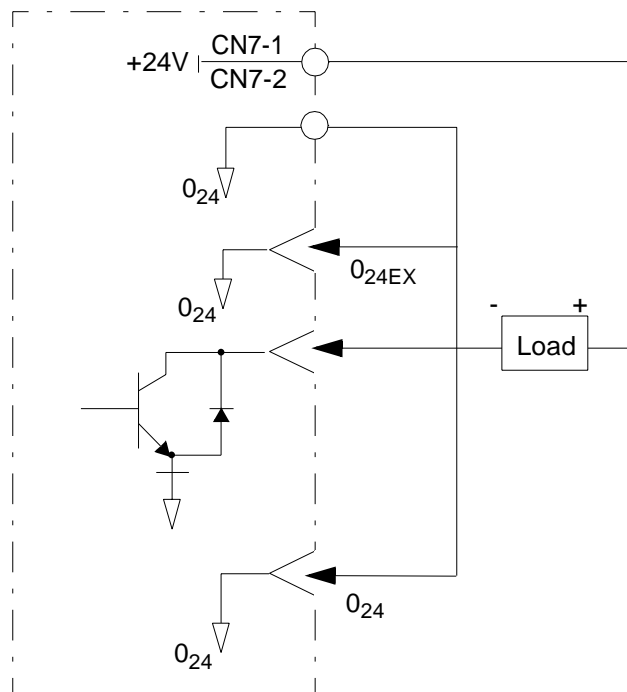


FIGURE 10.3.2.6 Output Circuit (when using a Power Supply Unit)

- When using an external power supply:

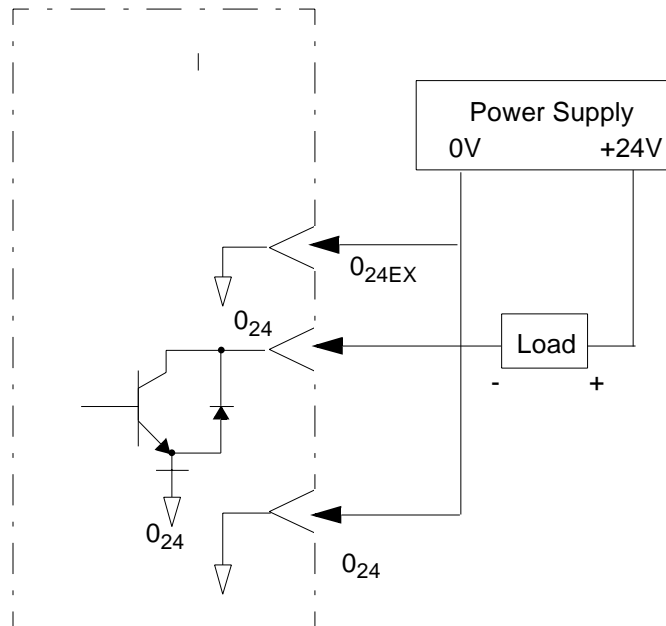


FIGURE 10.3.2.7 Output Circuit (when using a Power Supply Unit)



1. 96 outputs are non-contact polarity points (transistor, source driver), and limit the current at ON up to 60mA (per circuit). When the load current of each output signal might exceed 60mA, install a fuse of 0.1A for each circuit in order to protect the output IC.
2. For 96 outputs, every 8 outputs may be connected to more than one external power supply.
3. Up to 2.5A in the entire internal circuit (including JSP board) when using a power supply unit.

- When using an external power supply

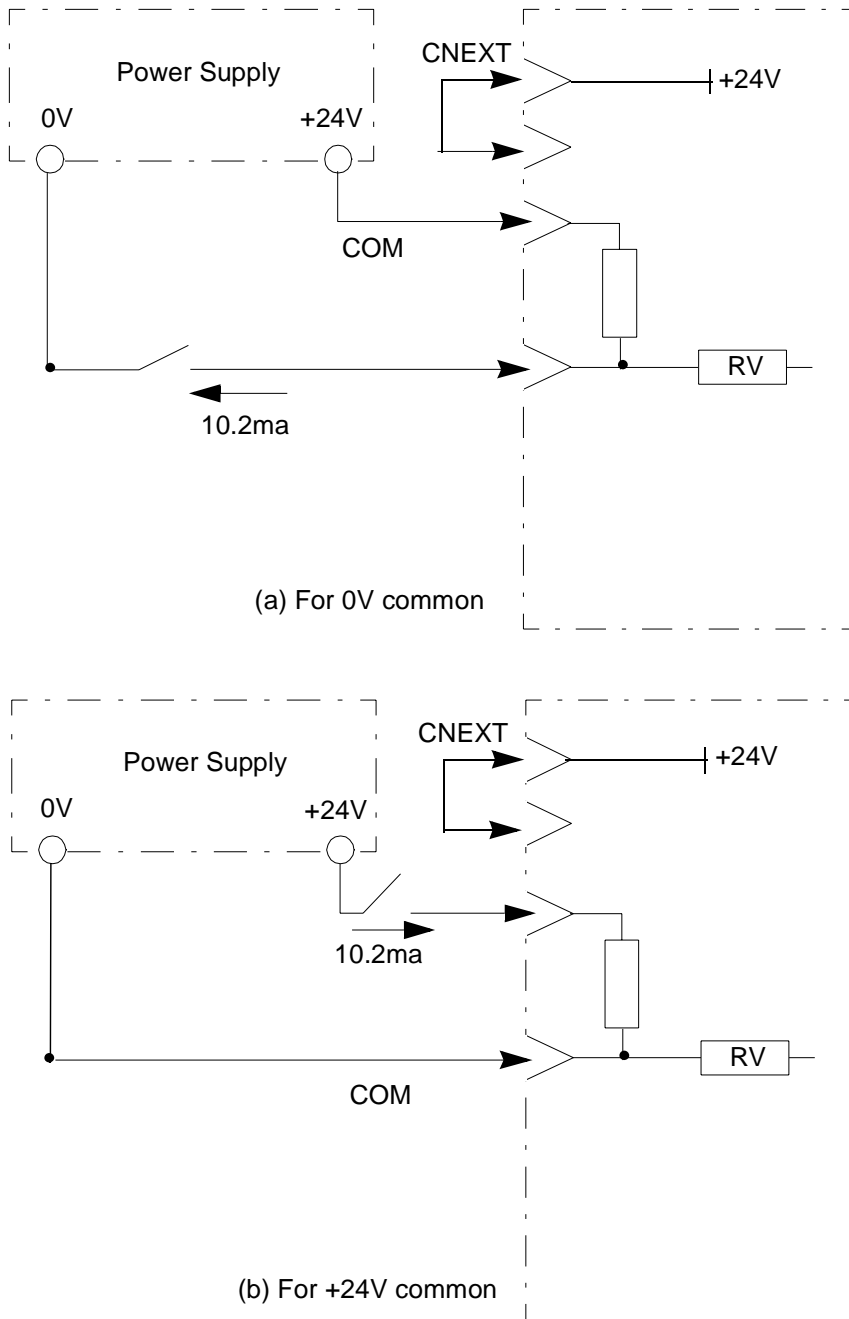


FIGURE 10.3.2.8 Input Circuit (when using an External Power Supply)



1. The power selection connector for CNINT AND CNEXT is installed on CNINT when the board is shipped.
2. In the input circuits (e.g. COM00, COM01, COM02, — 5 IN TOTAL), as shown in “10.2 Detailed Connection of General Purpose I/O”, +24V common or 0V common may be selected freely per 8 or 16 inputs. For setting, use wire at the cable side.

(b) Output circuit

Output uses non-contact polarity points. Limit the current at operation up to 60mA (per circuit). For 24V power, either power supply unit (JZNC-JAU07 (option)) or the external power supply may be used.

- When using a power supply unit

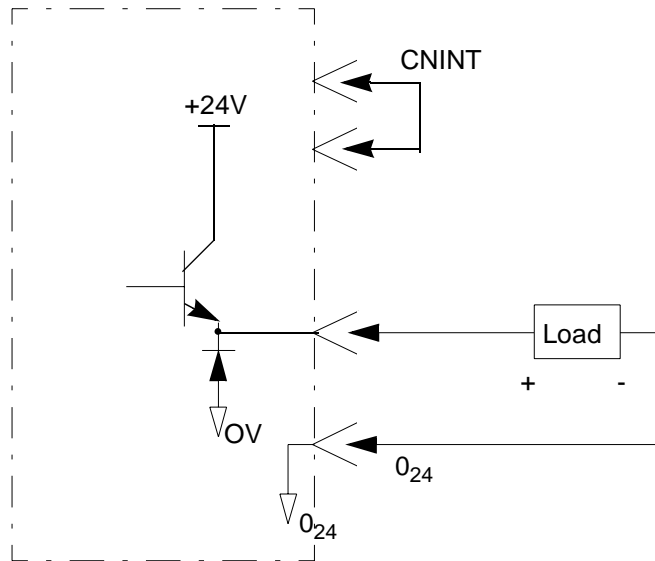


FIGURE 10.3.2.9 Output Circuit (when using a Power Supply Unit)

- When using an external power supply unit

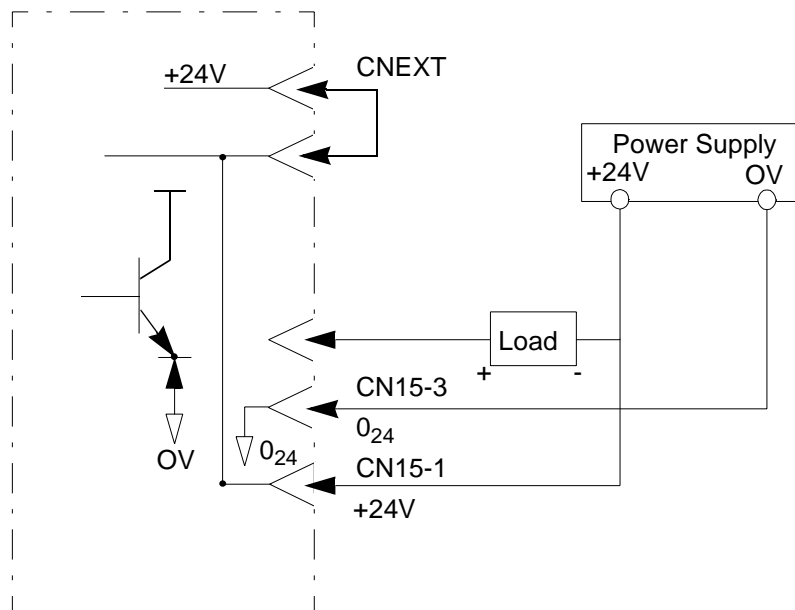
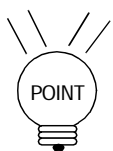


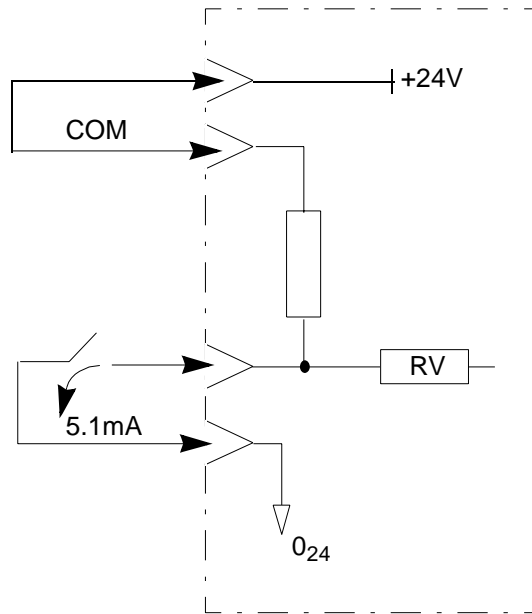
FIGURE 10.3.2.10 Output Circuit (when using a Power Supply Unit)



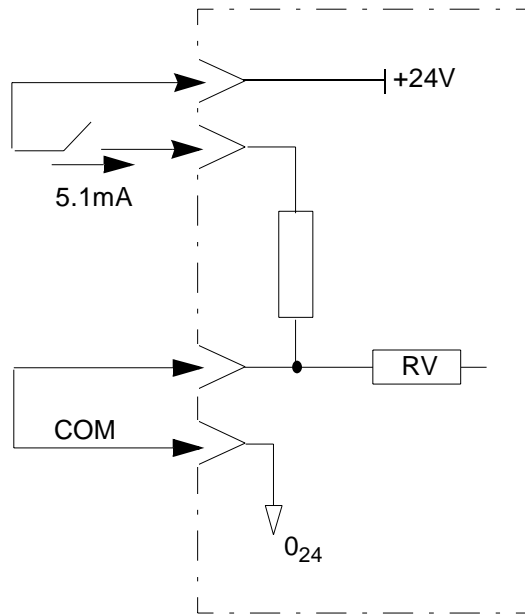
1. 56 output are non-contact polarity points (transistor, source driver), and limit the current at ON up to 60mA (per circuit). When the load current of each output current signal might exceed 60mA, install a fuse of 0.1A for each circuit in order to protect the output IC.
2. Up to 2.5A in the entire internal circuit (including JSP board) when using a power supply unit.

(3) I/O Module (JANCD-JSP02/JSP04)

(a) Input circuit



(a) For 0V common



(b) For +24V common

FIGURE 10.3.2.11 Input Circuit

(b) Output Circuit

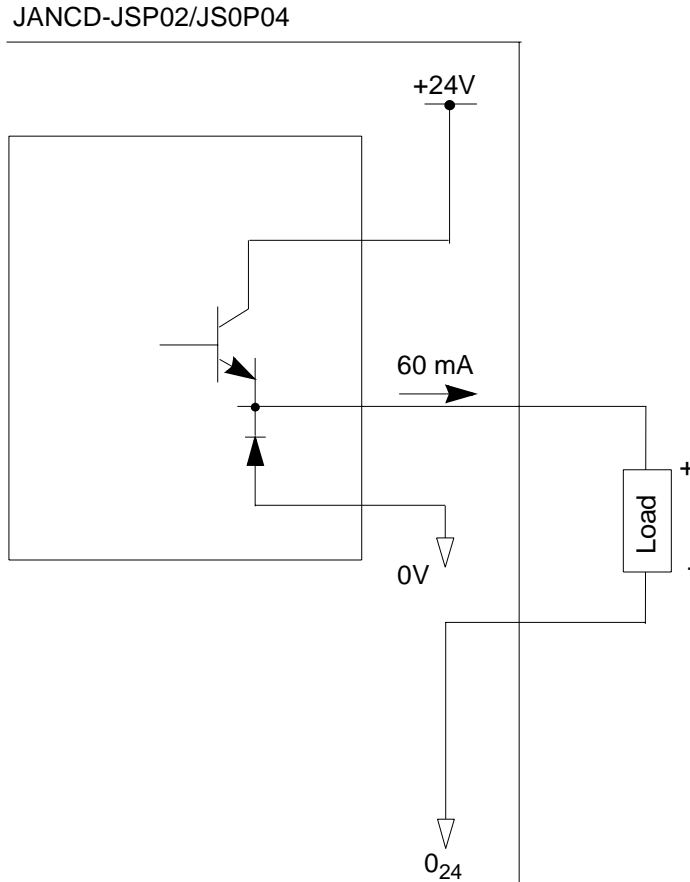


FIGURE 10.3.2.12 Output Circuit



1. 56 outputs are non-contact polarity points (transistor, source driver), and limit the current at ON up to 60mA (per circuit). When the load current of each output signal might exceed 60mA, install a fuse of 0.1A for each circuit in order to protect the output IC.
2. The I/O circuit of JSP02 and JSP04 boards is designed to have the following functions or the devices in the operation panel (very close to the JSP02 or JSP04 board): reading the operation switches, resistive load for LED indicators and for display devices.

10.3.3 Power Supply for I/O Signal

(1) Power Supply Unit Capacity Restriction

The +24V power supply for I/O, external power should be supplied by the machine tool builder.

Use of power supply unit is possible, but current capacity is restricted by the number of I/O ON points, therefore, calculate the load current by the number of I/O points and make sure it is within the allowable limit value.

+24V power supply unit current capacity: 2.5A

(a) Power On unit current consumption (when using power supply unit): 100mA

(b) Panel I/O JANCD-JSP02/JSP04 current consumption (when using power supply unit):

Input current (1 point) : 5.1 mA (at ON)

Output current (1 point) : Varies with load, but up to 60mA

(c) General-purpose I/O signal I/O module (JANCD-FC810/FC860/FC861)

Input current (1 point) : 10.2 mA (at ON)

Calculation example:

When all I/O points ON at JANCD-JSP02/JSP04 LED load (2.7kΩ)

$51 \text{ mA} \times 64 = 326.4 \text{ mA}$ (JANCD-JSP02/JSP04 input current consumption)

$24 \text{ V} / 2.7 \text{ K} \times 56 = 497.8 \text{ mA}$ (JANCD-JSP02/JSP04 output current consumption)

$2500 \text{ mA} - 326 \text{ mA} - 498 \text{ mA} - 100 \text{ mA} = 1576 \text{ mA}$ (feedable capacity)

In this status, if power is supplied to JANCD-FC810 from the power supply unit, over 154

inputs are ON, so overcurrent alarm of the power supply unit results.

$1576 \text{ mA} / 10.2 \text{ mA} = 154 \text{ inputs}$

(2) External Power Supply Specifications

Voltage 24VDC \pm 5%

Ripple 10%(9P-P)

Use power supply with overcurrent detection function.

11

Replacement Of Battery

Chapter 11 describes the replacement procedure of the battery and fuse

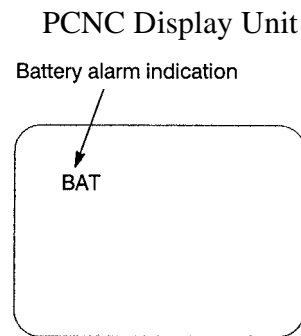
11.1	Battery Replacement	11 - 2
11.1.1	Checking the battery life	11 - 2
11.1.2	Replacement procedure of battery	11 - 3
11.2	Fuse Replacement	11 - 4

11.1 Battery Replacement

After turning the power ON, if there is a battery alarm, a broken battery icon is displayed in status of PCNC. Otherwise, a solid battery is displayed to indicate everything is normal. After two minutes this normal battery indicator will disappear. When battery alarm displays, the battery must be replaced immediately. When the red battery icon displays in the status bar, make sure to leave the PCNC unit power ON at least one hour every three days.

Standard batteries cannot be used. For a spare battery, contact your Yaskawa representative.

Battery type: ER6VC3, Parts code: BA510



Battery Icon - Green	Good
Battery Icon - Red	Bad

11.1.1 Checking the Battery Life

(1) Checking the Battery Which Needs Replacing

Follow the procedure indicated below to check whether or not battery must be replaced.

- ① Press the POWER OFF button.
- ② If a door interlock switch is installed, place the door interlock key in the OFF position. This makes power ON possible with the door opened.
- ③ Open the door so that the front part of the PCNC unit is visible.
- ④ Press the POWER ON button once again.
- ⑤ Check the red LED on the JZNC • JFC10 board. If it is lit, the battery must be replaced.

11.1.2 Replacement Battery Procedure

Replace the battery quickly in the following procedure.

- ① Turn the power OFF.
- ② Then, remove the battery from the holder.
- ③ Fit the new battery in the holder and insert the connector. Although the connector may be inserted in either direction, it must be securely inserted. Otherwise, the power will not be supplied by the battery. (See Fig. 11.1.2.1)

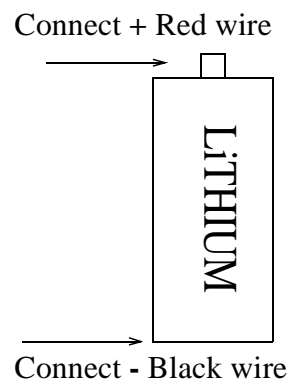


FIGURE 11.1.2.1: Connecting the Battery Connector

- ④ Turn the power ON.
- ⑤ Make sure that Green Battery icon is displayed on the PCNC's CRT screen and that the red LED on JZNC-JFC10 board is OFF.



1. If the red LED remains lit after replacing the battery, the connector might be inserted incorrectly or the battery might be faulty.
2. Power OFF operation is allowed a few seconds after turning the power ON.
3. After turning the power OFF, replace the battery quickly. If the NC unit is left with the battery removed, the data stored in the memory could be lost.

11.2 Fuse Replacement

Fuse F1 :

If the Servo ON/Shutdown buttons (refer to Chapter 5) and the direct signals (refer to Chapter 10) are not correctly connected, the Fuse F1 (0.3 A) could burn out.

When the Fuse F1 blows, the following abnormalities may occur.

1. “3002 Emergency stop” alarm will be displayed.
2. Servo power supply can not be turned ON.
3. +24V is not output from I/O.
4. Brake signal is not output.
5. Direct OUT signal is not output.
6. LED on JZNC-JFC10 board will not light.

When the Fuse F1 (0.3 A) is burnt out, check and correct the connection of the following signals, then replace the fuse. For the spare fuse, contact your Yaskawa representative.

1. SVMX signal (Connector CN-12 pin 17 : Refer to chapter 5)
2. NCMX signal (Connector CN12 pin 18 : Refer to Chapter 5)
3. BKK signal (Connector CN-12 pin 16 : Refer to Chapter 5)
4. ESP signal (Connector CN-12 pin 19 : Refer to Chapter 5)
5. DOUT Signal (Connector CN-14 pin 20 :Refer to Chapter 8)

Fuse F2 :

When the Fuse F2 blows, the following abnormalities may occur.

1. “3001 Servo alarm” will be displayed.
2. “3002 Emergency stop” alarm will be displayed.

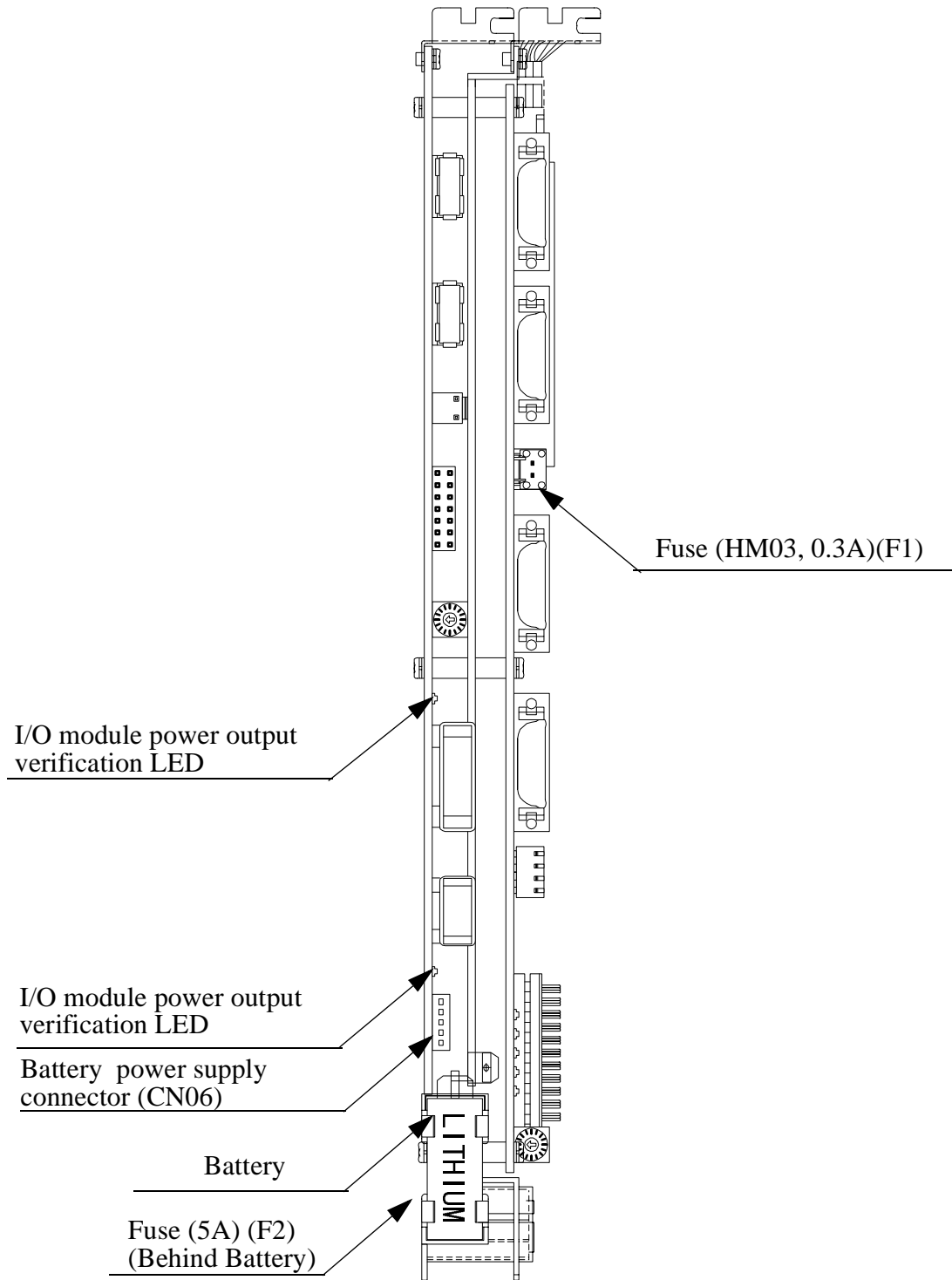


FIGURE 11.2.1: Location of the Battery, Fuse, and related LED

Appendix 1

Dimensions

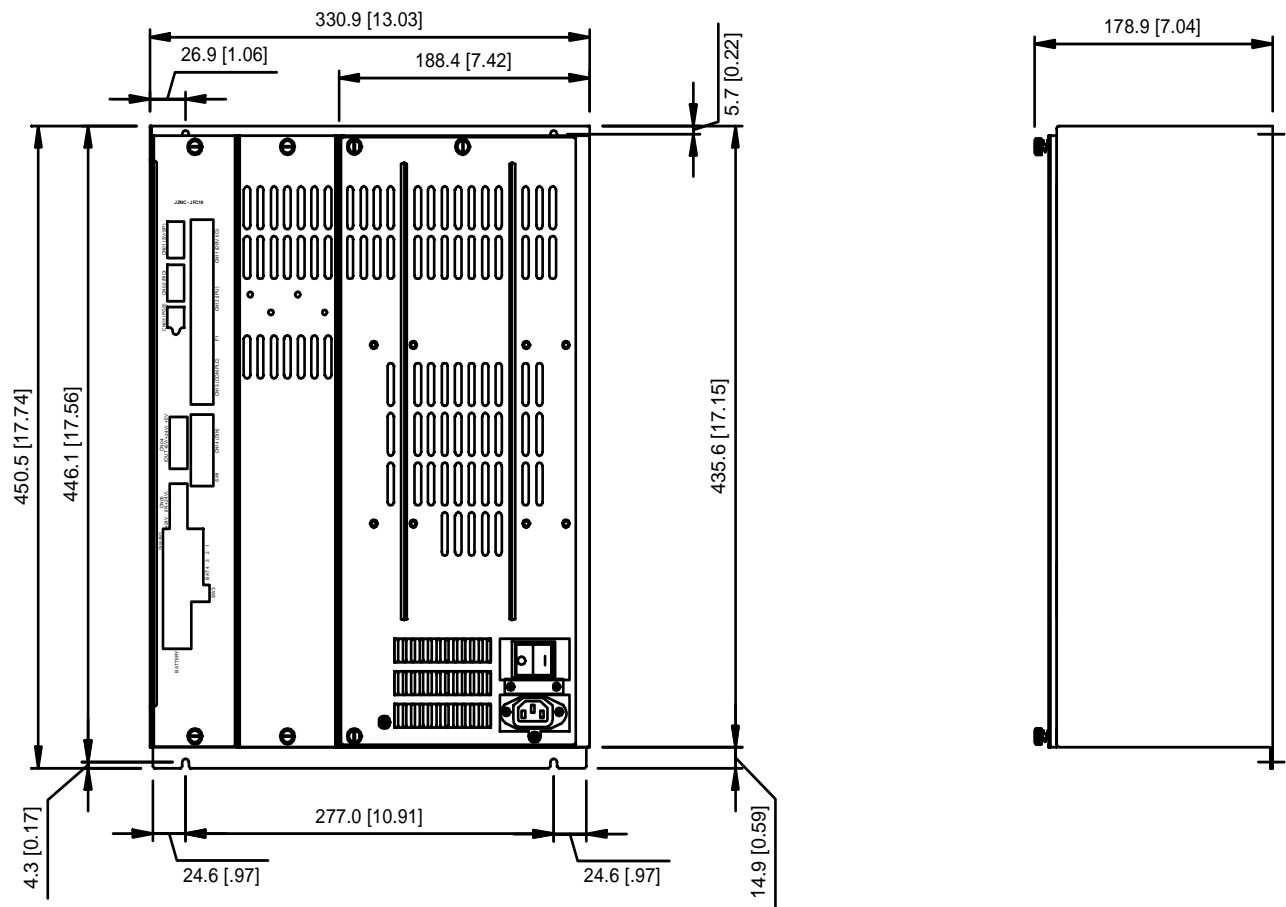
Appendix 1 shows the external dimensions of the PCNC component parts.

1.1	PCNC Module.....	A1-3
	1.1.1 PCNC UNIT (JZNC-JPCRKM□ - □□□□ - □□)	A1-3
1.2	Power Supply Unit	A1-4
	1.2.1 Power Supply Unit type (UPS000004)	A1-4
1.3	Operation Panel.....	A1-5
	1.3.1 Display Unit Type (JZNC-JPCOP-□□□ -□□)	A1-5
1.4	I/O Module	A1-6
	1.4.1 ANCD-FC810/FC815/FC860 Model-	A1-6
	1.4.2 JZNC-IAU59 (JANCD-FC861) Model.....	A1-6
1.5	AC Servopack (including Converter and Spindle Drive)	A1-7
1.6	AC Servomotor S Series (Model SGMG, for 200VAC)	A1-9
	1.6.1 Standard Specifications.....	A1-9
	1.6.2 Dimensions	A1-10
1.7	Spindle Motor M5 Series (Model UAASKA for 200VAC)	A1-11
	1.7.1 Flange-mounted type Motor Dimensions	A1-11
	1.7.2 Foot-mounted type Motor Dimensions (Drwg. 1.1.1)	A1-13
1.8	Power Supply Unit for Brake (OPR109F, OPR109A)	A1-15

1.9	Noise Filter	A1-16
1.10	Manual Pulse Generator (OSM-01-2GA-15)	A1-17
1.11	Spindle Pulse Generator	A1-18
1.11.1	NE-1024-2MDF-068-11 (6000 r/min)	
	NE-1024-2MDF-068-12 (6000 r/min)	A1-18
1.11.2	NE-1024-2MD-11 (6000 r/min)	A1-19
1.12	Heat Exchanger	A1-20
1.12.1	External Dimensions of REX1550	A1-20
1.12.2	HEATEX02	A1-21
1.13	AC Reactor (UZBA-B: for Input, for 50.60Hz)	A1-22

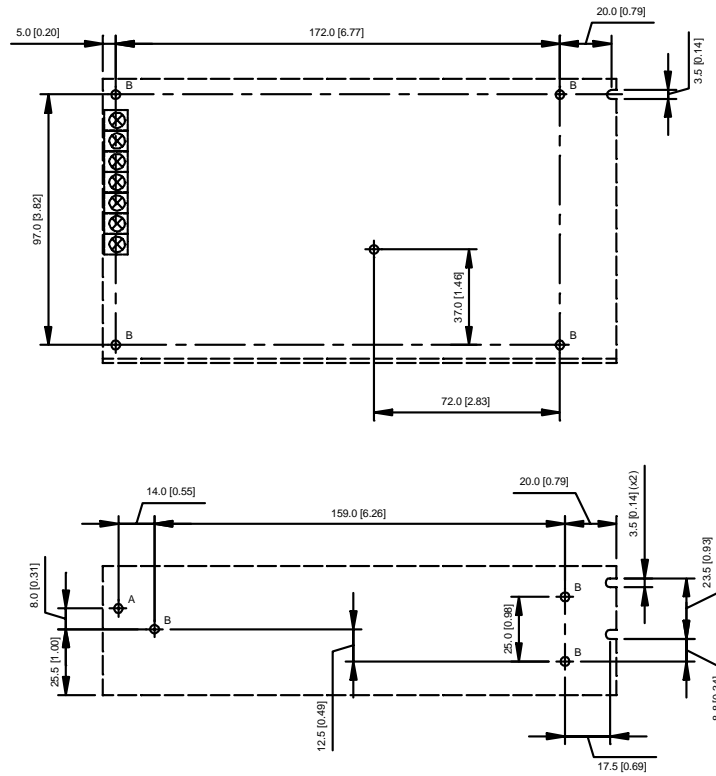
1.1 PCNC Module

1.1.1 PCNC UNIT (JZNC-JPCRKM□ - □□□□ - □□)



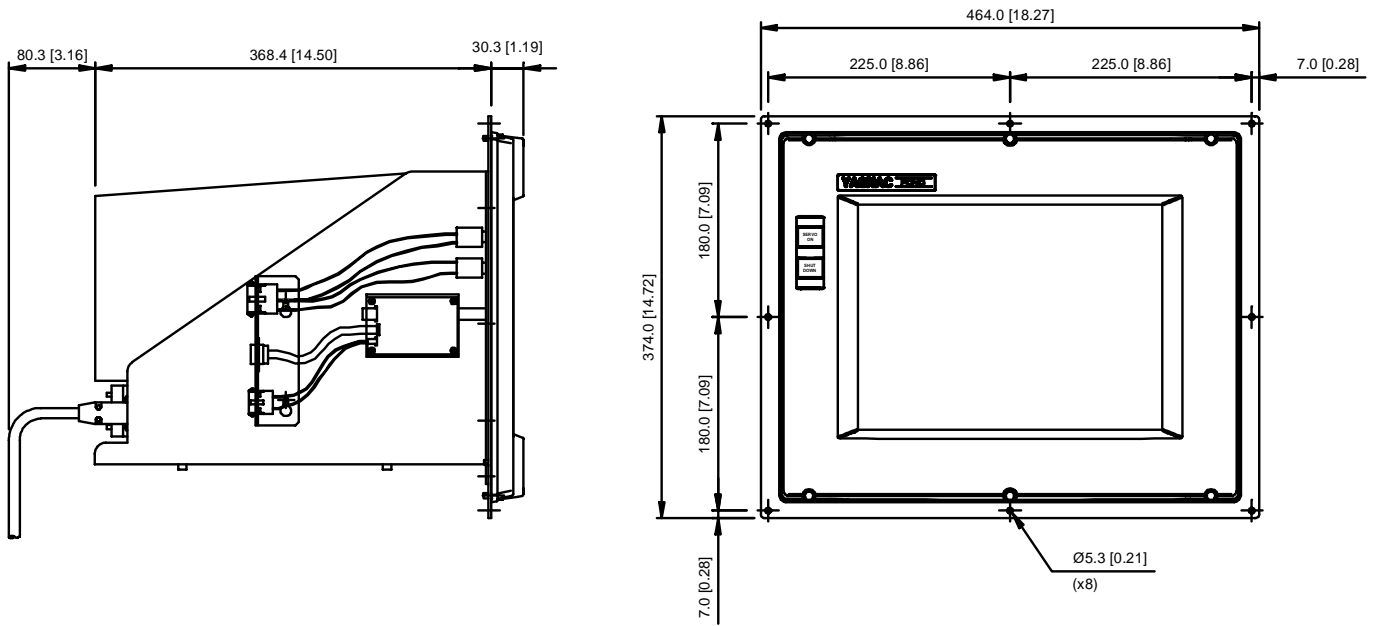
1.2 Power Supply Unit

1.2.1 Power Supply Unit type (UPS000004)



1.3 APPENDIX 1.3 Operation Panel

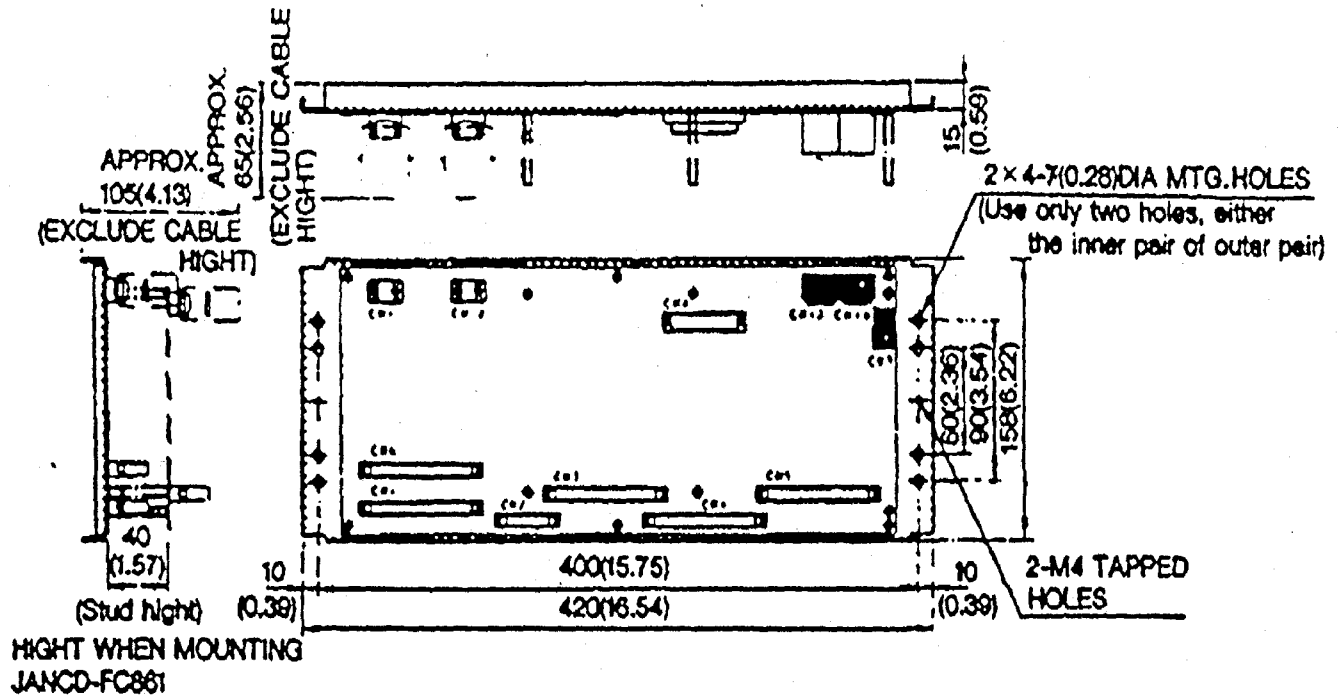
1.3.1 Display Unit Type (JZNC-JPCOP-□□□ -□□)



Dimensions in mm(inches)

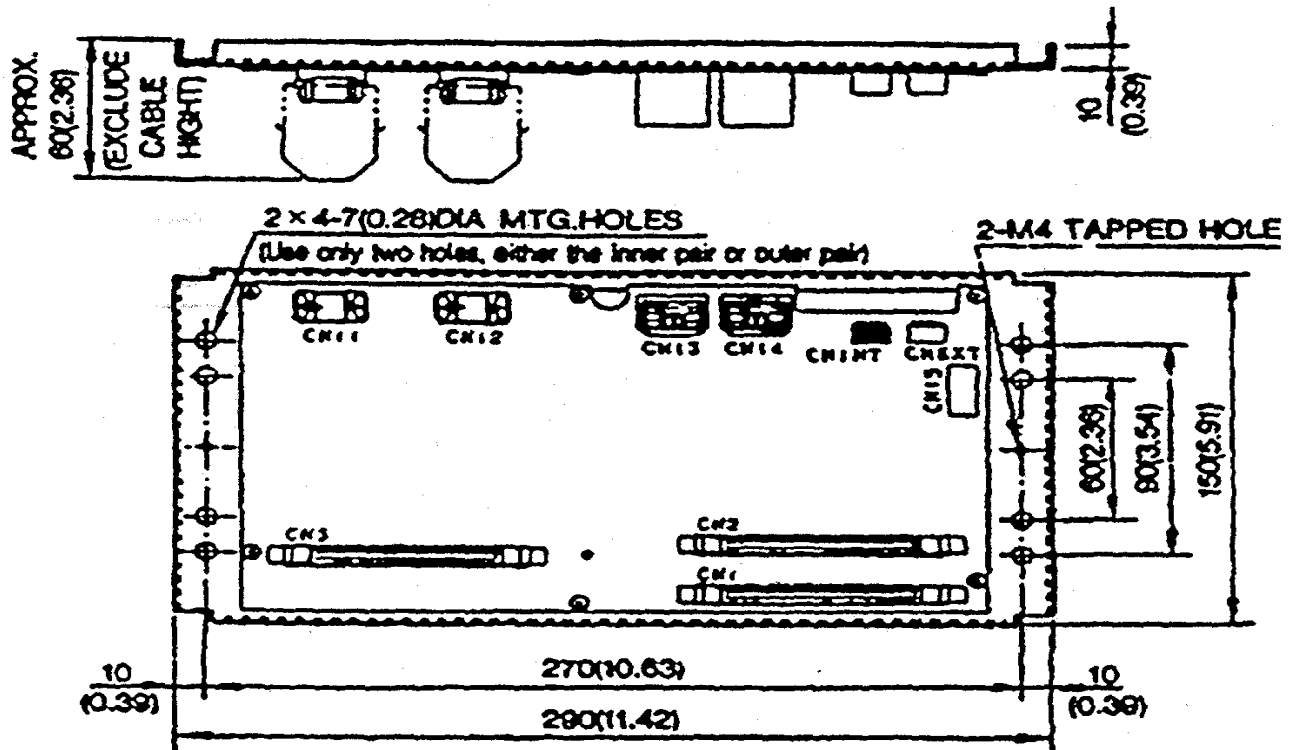
1.4 APPENDIX 1.4 I/O Module

1.4.1 JANCD- FC810/FC815/FC860 Model



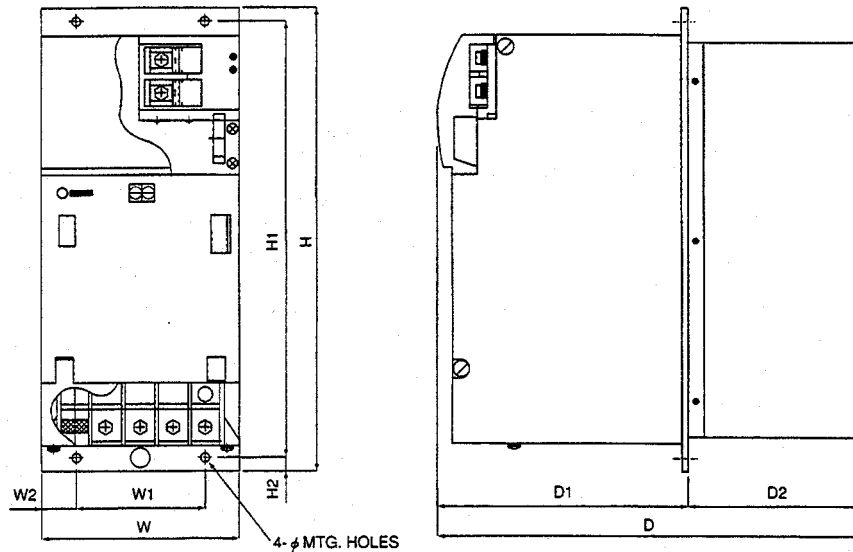
Dimensions in mm (inch)

1.4.2 JZNC-IAU59 (JANCD- FC861) Model



Dimensions in mm (inch)

1.5 AC Servopack (including Converter and Spindle Drive)



Unit	Capacity kW (HP)	Dimensions in mm (inches)									
		W	H	D	W1	W2	H1	H2	D1	D2	Φ
Converter	5.5 (7.5)	99	350	320	75	12	330	10	190	130	M5
	7.5 (10)	(3.90)	(13.78)	(12.60)	(2.95)	(0.47)	(12.99)	(0.39)	(7.48)	(5.12)	
	11(15)	149	350	320	100	24.5	330	10	190	130	
	15 (20)										
	18.5 (24.8)										
	22 (30)										
30 (40)	199	350	320	150	24.5	330	10	190	130		
Inverter (Spindle Axis)	3.7 (5)	99	350	320	75	12	330	10	190	130	M6
	5.5 (7.5)										
	7.5 (10)										
	11(15)	149	350	320	100	24.5	330	10	190	130	
	15 (20)										
	18.5 (24.8)										
	22 (30)										
30 (40)	199	350	320	150	24.5	320	10	190	130		

Unit	Capacity kW (HP)	Dimensions in mm (inches)									
		W	H	D	W1	W2	H1	H2	D1	D2	Φ
Servopack	0.5 (0.7)	50 (1.97)	350 (13.78)	320 (12.60)	-	25 (0.98)	330 (12.99)	10 (0.39)	190 (7.48)	130 (5.12)	M5
	1 (1.3)										
	1.5 (2)										
	2 (2.7)	50 (1.97)	350 (13.78)	320 (12.60)	-	25 (0.98)	330 (12.99)	10 (0.39)	190 (7.48)	130 (5.12)	
	3 (4)										
	5 (6.7)	75 (2.95)	350 (13.78)	320 (12.60)	50 (1.97)	12.5 (0.49)	330 (12.99)	10 (0.39)	190 (7.48)	130 (5.12)	

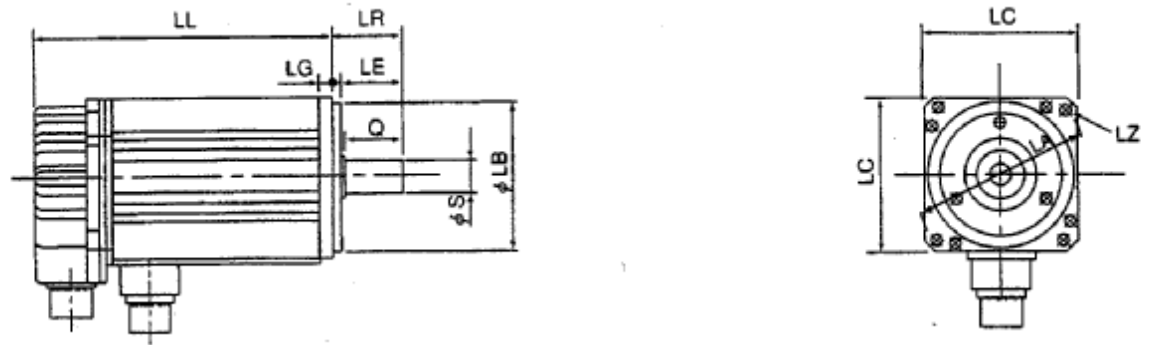
1.6 AC Servomotor Σ Series (Model SGMG for 200VAC)

1.6.1 Standard Specifications

Model SGMG-□□		-05	-09	-13	-20	-30	-44
Rated Output	kW	0.45	0.85	1.3	1.8	2.9	4.4
Rated Torque	N.m	2.84	5.39	8.34	11.5	18.6	28.4
	kgf.cm	29	55	86	117	190	290
Instantaneous Peak Torque	N.m	8.92	13.3	23.3	28.0	45.1	66.3
	kgf.cm	91	136	238	286	460	676
Rated Rotation Speed	r/min.	1500					
Maximum Rotation Speed	r/min.	3000					
Rotor GD ²	x 10 ⁻⁴ kg·m ²	7.37	14.1	20.9	31.9	47.3	69.4
	gfc·m·S ²	7.52	14.4	21.3	32.6	48.3	70.8
Rated Power Rating	kW/S	10.9	20.6	33.2	41.4	73.3	116

Items	Specifications
Time Rating	Continuous
Insulation Class	Class F
Withstand Voltage	AC 1500V 1 min.
Insulation Resistance	500VDC, 10MΩ or more
Enclosure	Totally-enclosed, self-cooled type
Ambient Temperature	0 to +40C
Ambient Humidity	20 to 80% (non-condensing)
Vibration	V15
Finish in Munsell Notation	N1.5
Excitation	Permanent magnet
Mounting	Flange mounting
Drive Method	Direct drive

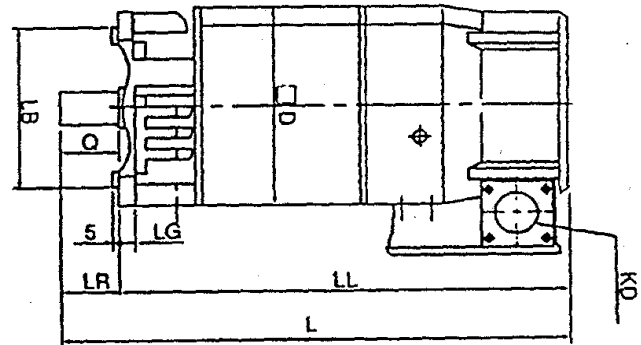
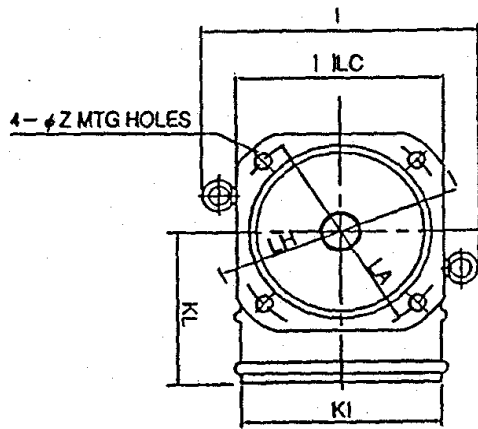
1.6.2 Dimensions



Model	LL	LC	LA	LZ	LG	LB	LE	Q	S	LR	Mass kg (lb.)
SGMG-05A212	134 (5.28)	130 (5.12)	145 (5.71)	9 (0.35)	12 (0.47)	110 ⁰ -0.035 (4.3307 ⁰ -0.0014)	6 (0.24)	40 (1.575)	19 ⁰ -0.013 (0.7489 ⁰ -0.0005)	58 (2.28)	6.5 (14.3)
SGMG-09A212	157 (6.18)										8.5 (18.7)
SGMG-13A212	181 (7.13)										10.5 (23.1)
SGMG-20A212	154 (6.06)	180 (7.09)	200 (7.87)	13.5 (0.53)	18 (0.71)	114.3 ⁰ -0.025 (4.5 ⁰ -0.001)	3.2 (0.13)	76 (2.992)	35 ^{+0.01} 0 (1.3779 ^{+0.0004} 0)	79 (3.11)	14.5 (32.0)
SGMG-30A212	180 (7.09)										18.5 (40.8)
SGMG-44A212	214 (8.43)										24 (52.9)

1.7 Spindle Motor M5 Series (Model UAASKA for 200VAC)

1.7.1 Flange-mounted Type Motor Dimensions



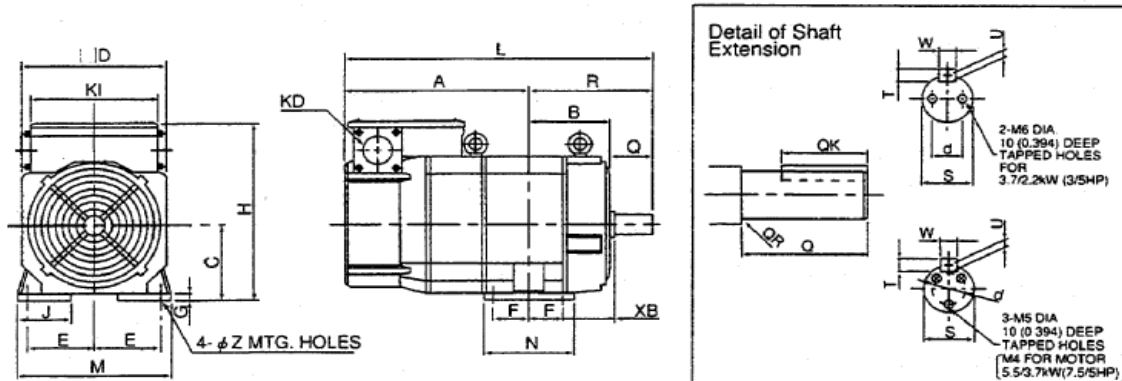
Dimensions in mm (inches)

Rated Output kw (HP)		L	LA	LB	LC	LG	LH	LL	LR	Z	D
30-min. Rating	Continuous Rating										
3.7 (5)	2.2 (3)	392 (15.4)						332 (13.1)			
5.5 (7.5)	3.7 (5)	502 (19.8)	185 (7.28)	150 ⁰ _{-0.040} (5.9 ⁰ _{-0.0016})	174 (6.85)	12 (0.47)	220 (8.66)	442 (17.4)	60 (2.36)	11 (0.43)	174 (6.85)
7.5 (10)	5.5 (7.5)	515 (20.3)						435 (17.1)	80 (3.15)		
11 (15)	7.5 (10)	585 (23.0)	215 (8.46)		204 (8.03)	16 (0.63)	250 (9.84)	475 (18.7)	110 (4.33)	15 (0.59)	204 (8.03)
15 (20)	11 (15)	568 (22.4)						458 (18.0)			
18.5 (25)	15 (20)	606 (23.8)	265 (10.4)		250 (9.84)	20 (0.79)	300 (11.8)	496 (19.5)	110 (4.33)	15 (0.59)	260 (10.2)
22 (30)	18.5 (25)	642 (25.3)						532 (20.9)			
30 (40)	22 (30)	794 (31.8)	350 (13.8)	300 ⁰ _{-0.052} (11.8 ⁰ _{-0.002})	320 (12.6)	20 (0.79)	385 (15.2)	654 (25.7)	140 (5.51)	19 (0.75)	320 (12.6)

I	KD	KL	KI	Shaft Extension (See above drawings)							
				Q	QK	QR	S	T	U	W	d
227 (8.94)	34 (1.34)	142 (5.59)	174 (6.85)	60 (2.36)	45 (1.77)	1 (0.04)	28j6 (1.1j6)	7 (0.28)	4 (0.16)	8 (0.31)	16 (0.63)
											22 (0.87)
270 (10.6)	42.5 (1.67)	159 (6.26)	204 (8.03)	80 (3.15)	70 (2.75)	1 (0.04)	28 ⁰ _{-0.013} 1.1 ⁰ _{-0.005}	8 (0.31)	5 (0.20)	10 (0.39)	22 (0.87)
											40 (1.57)
345 (13.6)	42.5 (1.67)	181 (7.12)	250 (9.84)	110 (4.33)	90 (3.54)	1 (0.04)	48 ⁰ _{-0.016} (1.89 ⁰ _{-0.006})	9 (0.35)	5.5 (0.22)	14 (0.55)	40 (1.57)
											45 (1.77)
442 (17.4)	61 (2.40)	223 (8.78)	320 (12.6)	140 (5.51)	110 (4.33)	2 (0.08)	60 ^{+0.035} _{-0.013} 2.36 ^{-0.0014} _{-0.005}	11 (0.43)	7 (0.28)	18 (0.71)	50 (1.97)

Note: Model 3.7/2.2kW (5/3 HP) is 15 minutes rating/continuous rating. This model is not furnished with eyebolts. Dimensions of the shaft extension key and keyway are based on JIS (Japan Industrial Standard) B1301.

1.7.2 Foot-mounted Type Motor Dimension



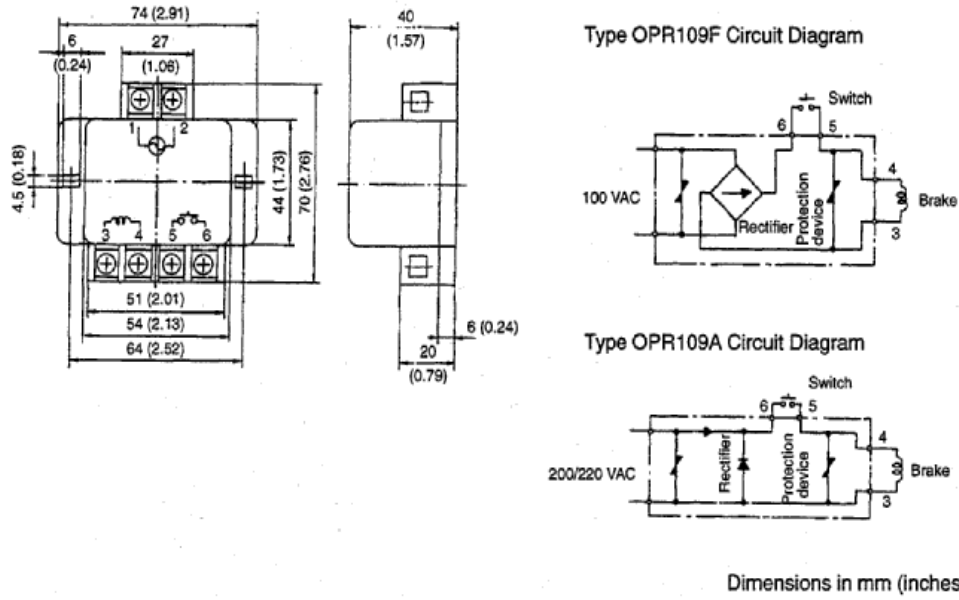
Rated Output kw (HP)		A	B	C*	D	E	F	G	H	J	KD	L
30-min. Rating	Continuous Rating											
3.7 (5)	2.2 (3)	237 (9.33)	93 (3.66)	100 (3.94)	174 (6.85)	80 (3.15)	50 (1.97)	9 (0.35)	241 (9.49)	34 (1.34)	34 (1.34)	392 (15.4)
5.5 (7.5)	3.7 (5)	308 (12.1)	132 (5.20)				100 (3.94)					502 (19.8)
7.5 (10)	5.5 (7.5)	295 (11.6)	137 (5.39)	112 (4.41)	204 (8.03)	95 (3.74)	70 (2.76)	10 (0.39)	267 (10.5)	75 (2.95)	42.5 (1.67)	515 (20.3)
11 (15)	7.5 (10)	315 (12.4)	157 (6.18)				9 (3.54)					585 (23)
15 (20)	11 (15)	261 (10.3)	198 (7.80)	160 (6.30)	260 (10.2)	127 (5)	89 (3.50)	16 (0.63)	341 (13.4)	55 (2.16)	42.5 (1.67)	568 (22.4)
18.5 (25)	15 (20)	283 (11.1)	212 (8.35)				105 (4.13)					605 (23.8)
22 (30)	18.5 (25)	297 (11.7)	234 (9.21)				127 (5)					642 (25.3)
30 (40)	22 (30)	406 (16.0)	245 (9.65)	180 (7.09)	320 (12.6)	139.5 (5.49)	127 (5)	16 (0.63)	403 (15.9)	55 (2.16)	61 (2.40)	764 (30.1)

* Tolerances: mm 0/-0.5 (inches 0/-0.02)

M	N	R	XB	Z	KI	Shaft Extension (See above drawings)						
						Q	QK	QR	S	T	U	W
188 (7.40)	125 (4.92)	155 (6.10)	45 (1.77)	12 (0.47)		60 (2.36)	45 (1.77)	1 (0.04)	28j6 (1.1j6)	7 (0.28)	4 (0.16)	8 (0.31)
	206 (8.11)	194 (7.64)										
220 (8.66)	177 (6.97)	220 (8.66)	70 (2.76)	12 (0.47)	204 (8.03)	80 (3.15)	70 (2.75)	1 (0.04)	28 ⁰ -0.013 (1.1 ⁰ -0.005)	8 (0.31)	5 (0.20)	10 (0.39)
	217 (8.54)	270 (10.6)										
290 (11.4)	224 (8.82)	307 (12.1)	108 (4.25)	15 (0.59)	250 (9.84)	110 (4.33)	90 (3.54)	1 (0.04)	48 ⁰ -0.016 (1.89 ⁰ -0.006)	9 (0.35)	5.5 (0.22)	14 (0.55)
	256 (10.1)	323 (12.7)										
	300 (11.8)	345 (13.6)										
320 (12.6)	298 (11.7)	388 (15.3)	121 (4.76)			140 (5.51)	110 (4.33)	2 (0.08)	60 ^{+0.035} -0.013 (2.36 ^{+0.014} -0.005)	11 (0.43)	7 (0.28)	18 (0.71)

Note: Model 3.7/2.2kW (5/3 HP) is 15 minutes rating/continuous rating. This model is not furnished with eyebolts. Dimensions of the shaft extension key and keyway are based on JIS (Japan Industrial Standard) B1301.

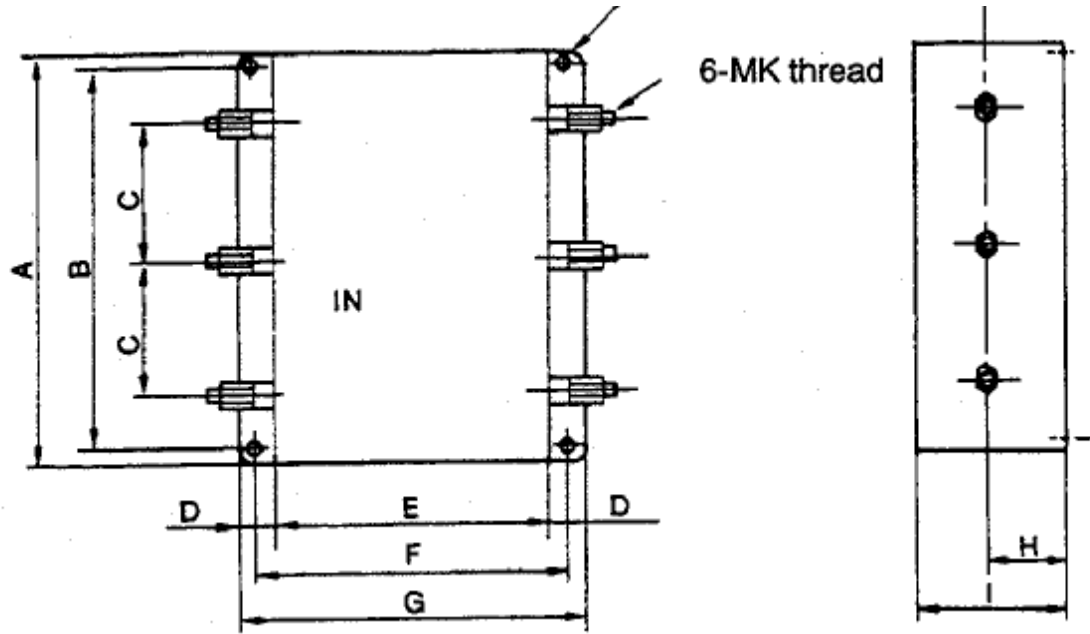
1.8 Power Supply Unit for Brake (OPR109A,OPR109F)



- Notes:
1. Do not short output terminals 3 and 4.
 2. Tighten the terminal block screws securely.
 3. An internal protection device is provided, so an external protection device is not required.
 4. The operating capacity of contacts used at “5” and “6” in the circuit diagram must be 5 to 10 times the brake’s current rating. Use the contact operating in DC.

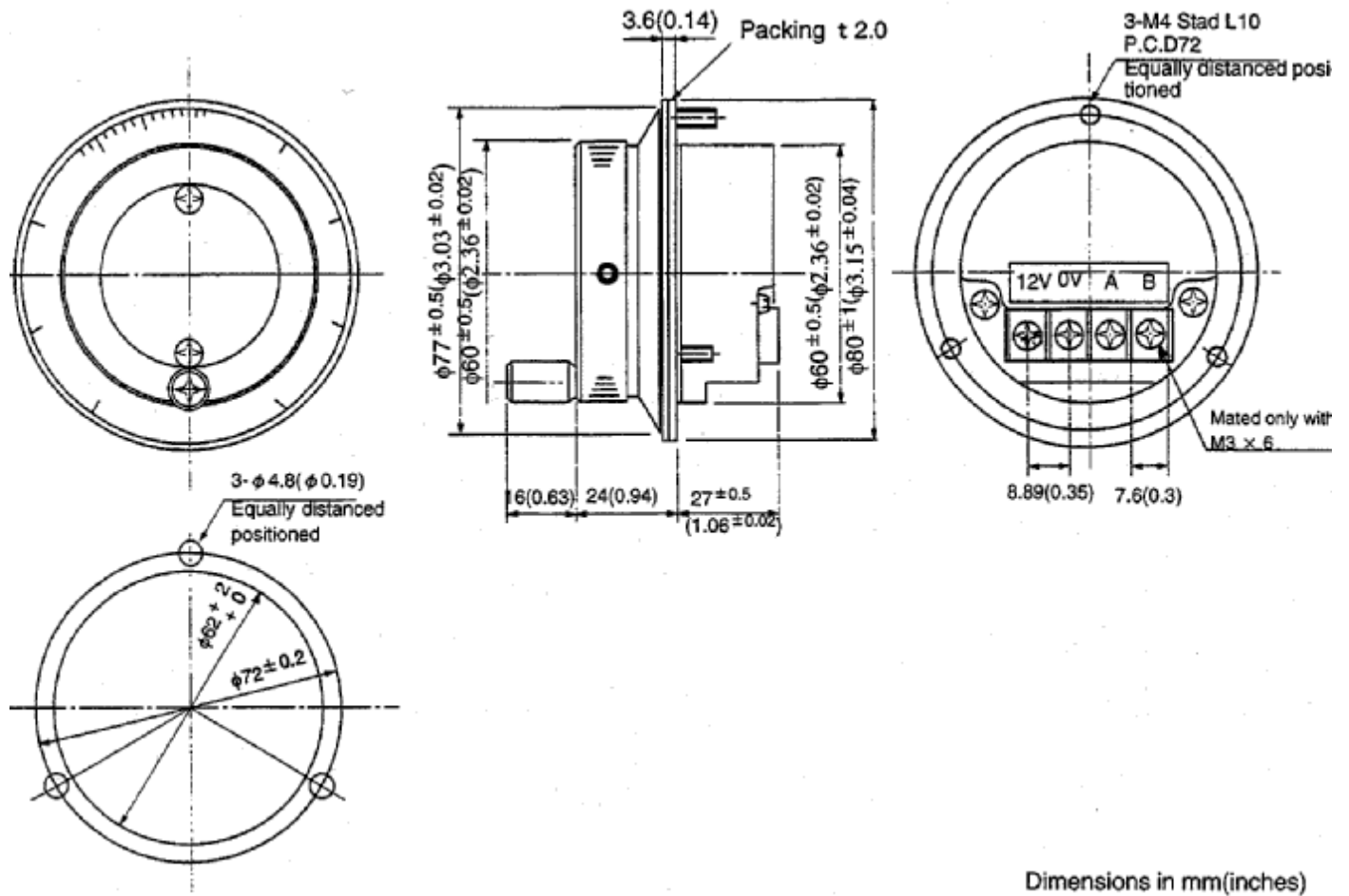
Type	Rectifying Method	Frequency Hz	AC Input Voltage (AC) V	DC Output Voltage (DC) V	DC Output Current A	Approximate Mass kg
OPR-109A	Single-phase half-wave	50/60	200	90	1	0.1
OPR-109F	Single-phase half-wave	50/60	100	90	1	0.1

1.9 Noise Filter



Part Name	A	B	C	D	E	F	G	H	I	J	K	Mass [kg (lbs.)]
LF310	180 (7.09)	170 (6.69)	60 (2.36)	25 (0.98)	120 (4.72)	135 (5.31)	150 (5.91)	35 (1.38)	65 (2.56)	4.5 (0.18)	4 (0.16)	1.9 (4.18)
LF320	180 (7.09)	170 (6.69)	60 (2.36)	29 (1.14)	120 (4.72)	135 (5.31)	150 (5.91)	35 (1.38)	65 (2.56)	4.5 (0.18)	6 (0.24)	2.4 (5.28)
LF330	180 (7.09)	170 (6.69)	60 (2.36)	29 (1.14)	120 (4.72)	135 (5.31)	150 (5.91)	35 (1.38)	65 (2.56)	4.5 (0.18)	6 (0.24)	2.4 (5.28)
LF340	180 (7.09)	160 (6.30)	50 (1.97)	30 (1.18)	200 (7.87)	220 (8.66)	240 (9.45)	40 (1.57)	80 (3.15)	6.5 (0.26)	6 (0.24)	5 (11)
LF350	180 (7.09)	160 (6.30)	50 (1.97)	30 (1.18)	200 (7.87)	220 (8.66)	240 (9.45)	40 (1.57)	80 (3.15)	6.5 (0.26)	6 (0.24)	5 (11)
LF360	200 (7.87)	180 (7.09)	60 (2.36)	30 (1.18)	300 (11.81)	320 (12.60)	340 (13.39)	50 (1.97)	100 (3.94)	6.5 (0.26)	6 (0.24)	7 (15.4)

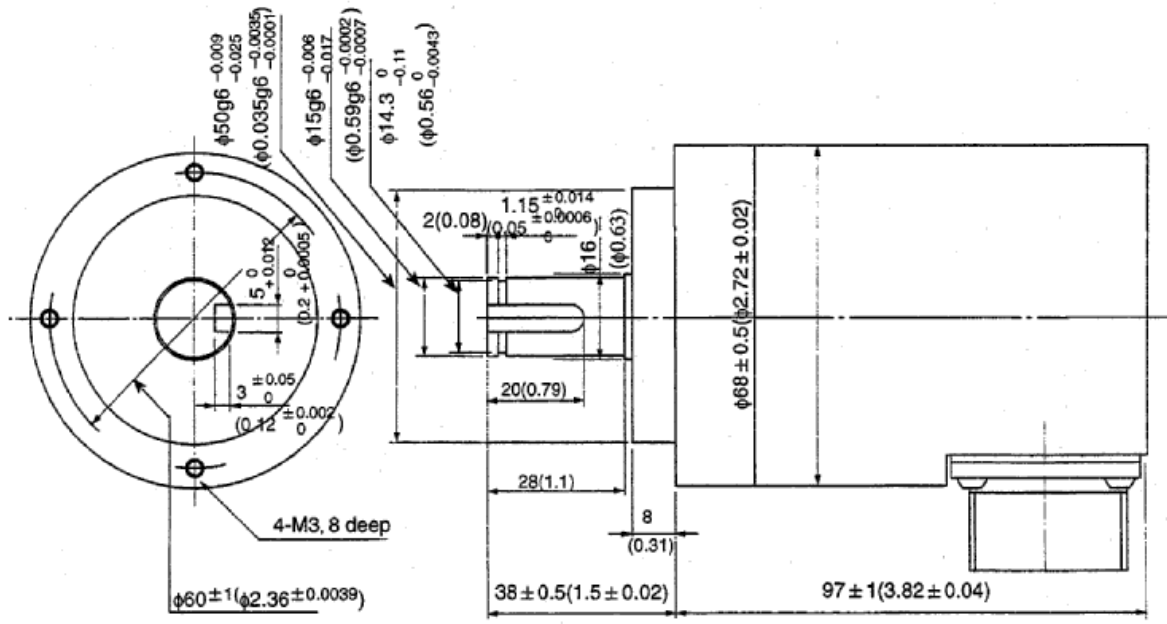
1.10 Manual Pulse Generator (OSM-01-2GA-15)



1.11 APPENDIX 1.11 Spindle Pulse Generator

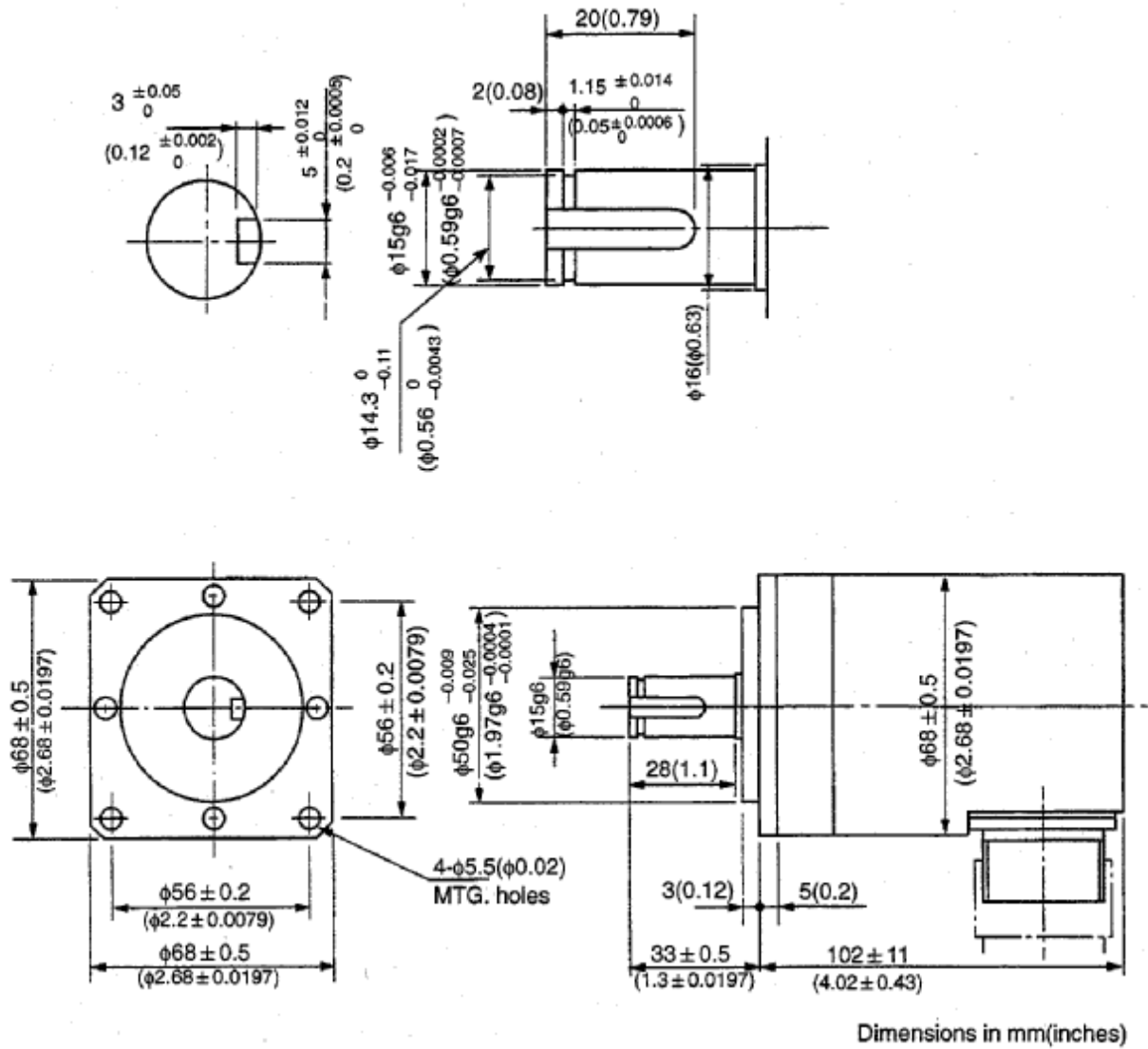
1.11.1 NE-1024-2MFD-068-11 (6000 r/min.)

NE-1024-2MFD-068-12 (8000 r/min.)



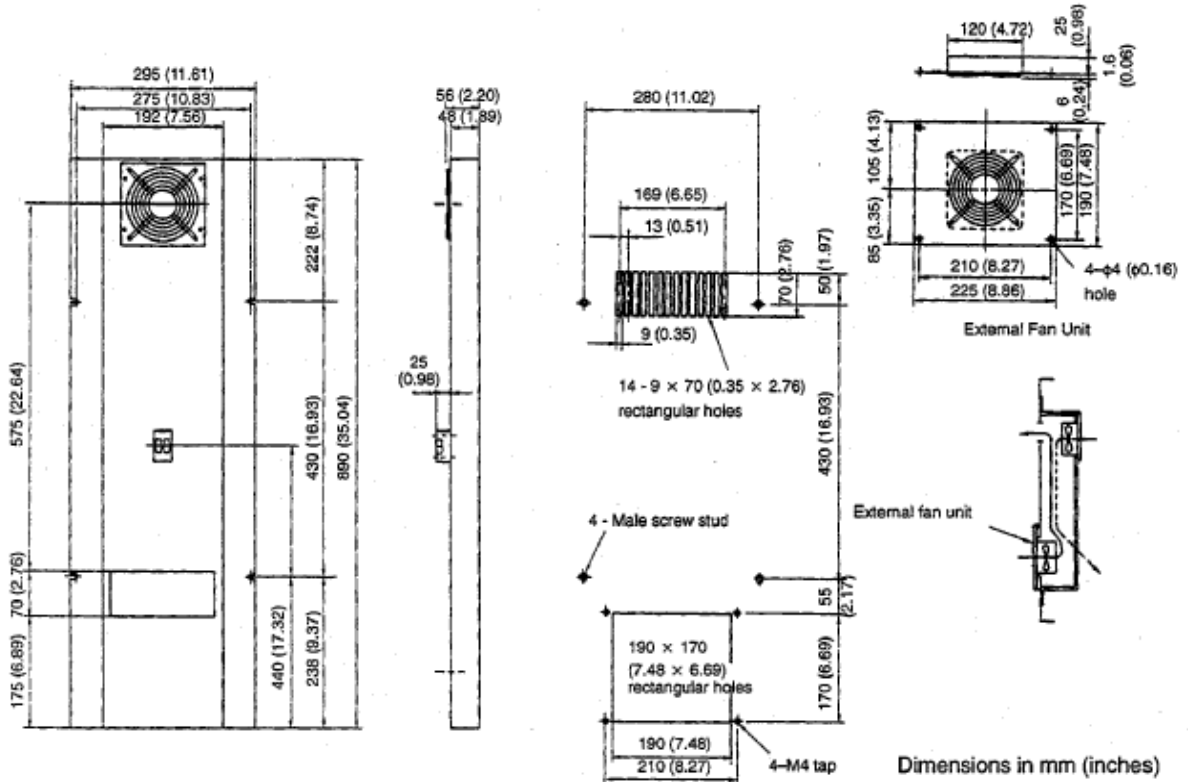
Dimensions in mm(inches)

1.11.2NE-1024-2MD-11 (6000r/min)



1.12 Heat Exchanger

1.12.11.12.1 External Dimensions of REX1550

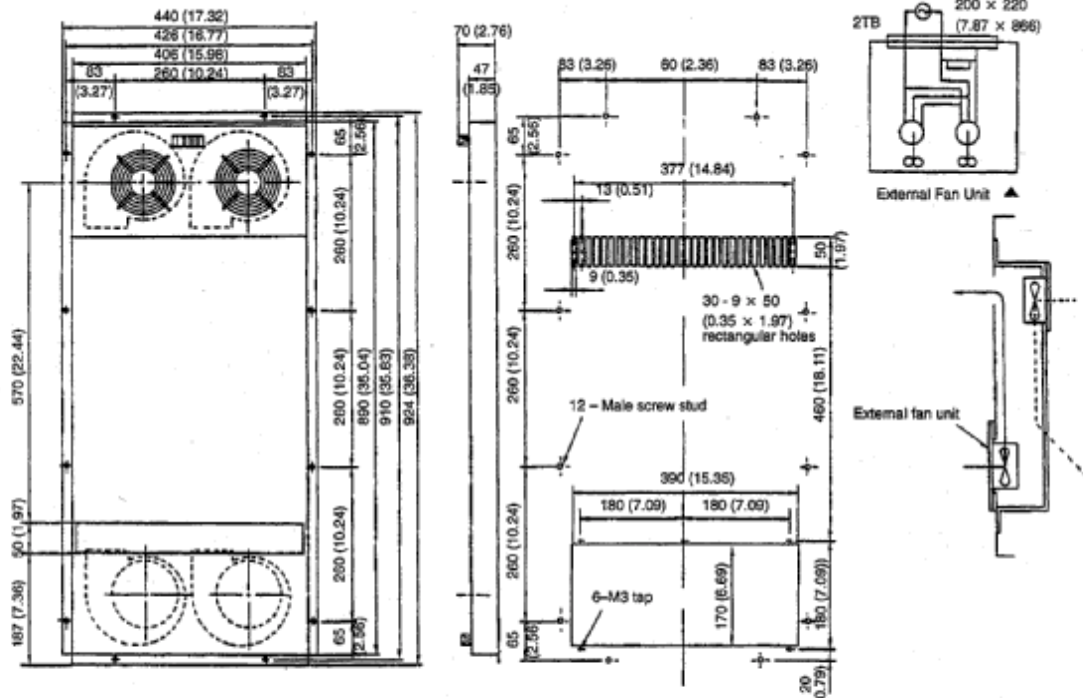


Mounting Hole Machining Drawing

Note 1: Fan power supply: 200/220 VAC

2: A mounting plate for external fan is not supplied with the heat exchanger. Please prepare the mounting plate at the machine tool builder.

1.12.2 Heat Exchanger



External Dimensions in mm (inches)

Mounting Hole Machining Drawing

Note 1: Connect the power supply (200/220 VAC) for the fan at #2 and #3 of 1TB and 2TB.

2: A mounting plate for external fan is not supplied with the heat exchanger. Please prepare the mounting plate at the machine tool builder.

3: The following parts used for the external fan unit are supplied as accessories.

- Fan motor 2 pcs.
- Fan motor starting capacitor 2 pcs.
- Fan guard 2 pcs.

1.13AC Reactor (UZBA-B: for Input, for 50/60Hz)

Select an AC reactor from the following tables according to converter (Model VS-656MR5)

Model CIMR- MR5N	Current A	Induct- ance mH	Code No.	Fig. No.	Dimensions in mm (inches)						
					A (Max.)	A1	B	B1 (Max.)	B2	C1	C2
23P7	20	0.53	X010057	1	130 (5.12)	-	88 (3.46)	60 (2.36)	44 (1.73)	105 ±5 (4.13 ±0.2)	25 (0.98)
25P5	30	0.35	X010058	1	130 (5.12)	-	88 (3.46)	60 (2.36)	40 (1.57)		40 (1.57)
27P5	40	0.265	X010059	2	130 (5.12)	150 (5.91)	98 (3.86)	65 (2.56)			
2011	60	0.18	X010060	1	160 (6.3)	-	105 (4.13)	75 (2.95)		130 ±5 (5.12 ±0.2)	
2015	80	0.13	X010061	1	180 (7.09)	-	100 (3.94)	85 (3.35)	50 (1.97)	150 ±5 (5.91 ±0.2)	42 (1.65)
2018	90	0.12	X010062	2		190 (7.48)		90 (3.54)			
2022	120	0.09	X010063	2		95 (3.74)					
2030	160	0.07	X010064	3	210 (8.23)	-		210 (8.27)	-	175 ±5 (6.89 ±0.2)	110 (4.33)

Model CIMR- MR5N	Dimensions in mm (inches)								Approx. Mass kg(lb)	Heat Loss W				
	D	E	F	I	J	K	L	M						
23P7	50 (1.97)	70 (2.76)	130 (5.12)	3.2 (0.13)	M6	9 (0.35)	7 (0.28)	M4	3 (6.62)	35				
25P5		80 (3.15)						M5		45				
27P5			M6						4 (8.83)	50				
2011	75 (2.95)	85 (3.35)	160 (6.3)	2.3 (0.09)		10 (0.39)		M6	M6	6 (13.25)	65			
2015		80 (3.15)	180 (7.09)							205 (8.07)	M8	75		
2018												8 (17.66)	90	
2022												M10	12 (26.49)	100
2030														

Fig. 1

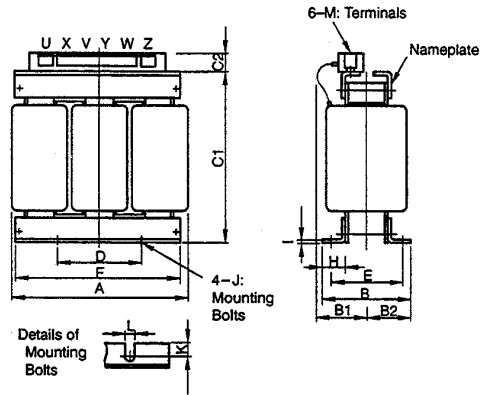


Fig. 2

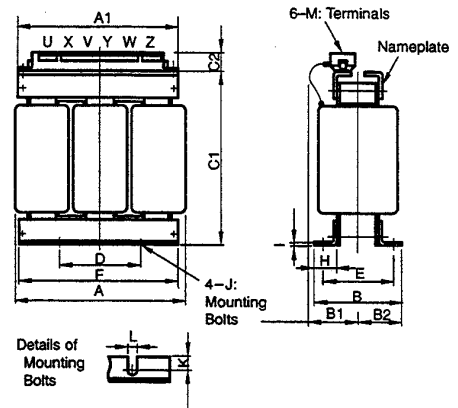
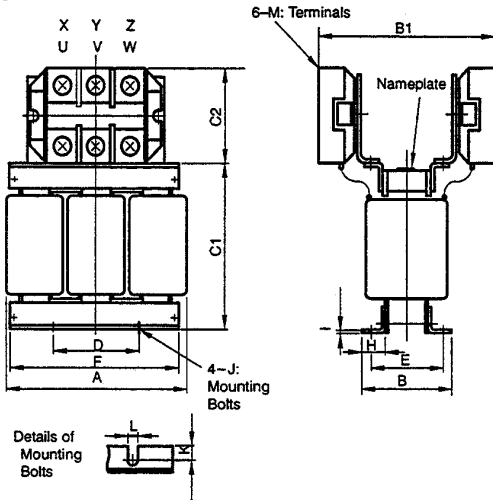


Fig. 3



Appendix 2

Cable Specifications

Appendix 2. shows the cable manufacturing drawings and the cable specifications

2.1	Cable Manufacturing Drawings	A2-3
2.1.1	Connection with the Power Supply	A2-3
2.1.2	Connection with the Operation Panel	A2-5
2.1.3	Connection with the Pulse Generator	A2-11
2.1.4	Connection with the Power ON/OFF Circuit	A2-11
2.1.5	Connection of the Direct IN Signals	A2-12
2.1.6	Connection with I/O Boards	A2-12
2.1.7	Connection between I/O Boards	A2-13
2.1.8	Connection with the Servo Unit	A2-15
2.2	Cable Specifications	A2-17
2.2.1	Cable Drwg. No. DE 8400093 (KQVV-SB Type, 0.2mm ² x 20 pairs) . . .	A2-17
2.2.2	Cable Drwg. No. DE 8402398 (VCT Type, 0.2mm ² x 5 pairs)	A2-18
2.2.3	Cable Drwg. No. DE9405671	A2-19

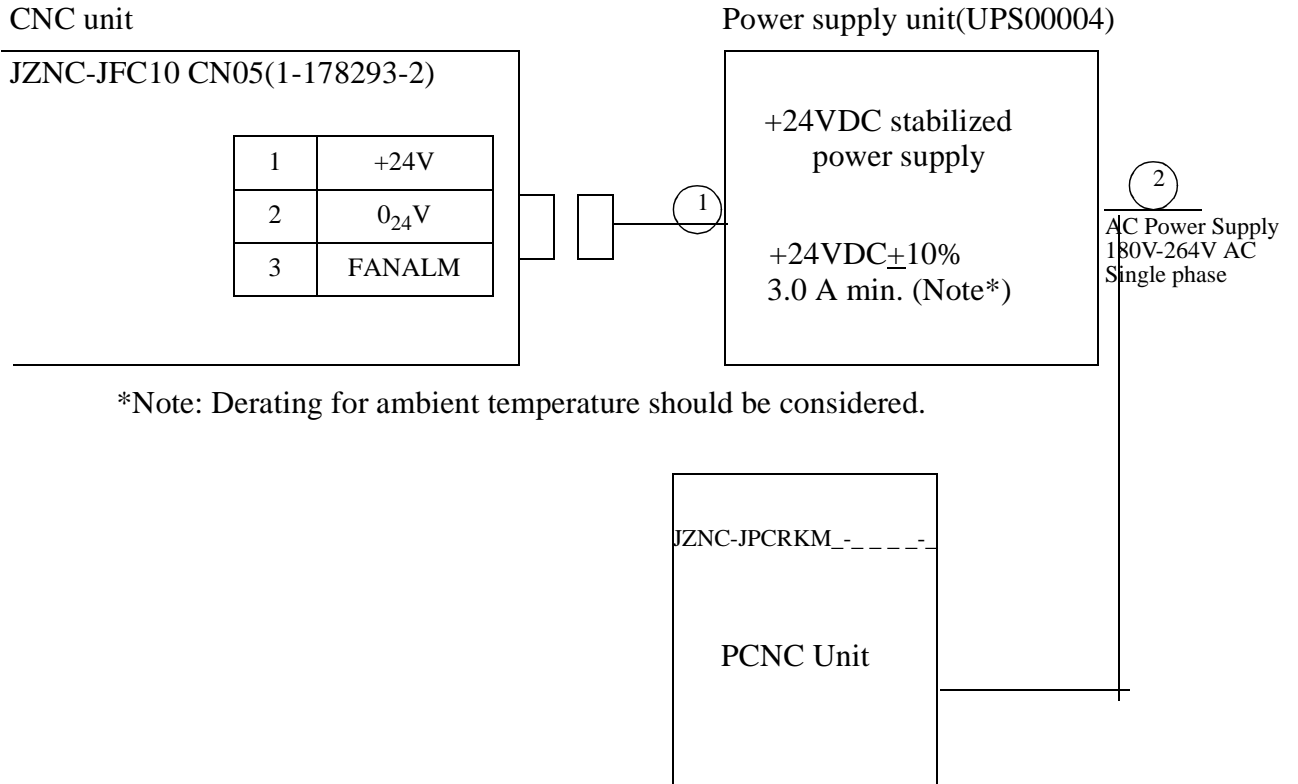
2.3	Cable and Connector Details	A2-2
2.3.1	Main Power Cable (UWR00264-1)	A2-3
2.3.2	Floppy Disk data cable (UWR00265-1).....	A2-4
2.3.3	Floppy Disk Power Cable (UWR00266-1)	A2-5
2.3.4	Touchscreen Power Cable (UWR00267-1)	A2-6
2.3.5	Video Extension cable (UWR00270-1)	A2-7
2.3.6	Touchscreen Data Cable (UWR00271-1)	A2-8
2.3.7	Servo ON/OFF Main Cable (UWR00272-1).....	A2-9
2.3.8	Push-button switch harness cable (UWR00273-1).....	A2-10
2.3.9	PS/2 Port Extension Cable (UWR00275-1)	A2-11
2.3.10	CPU Rack Power cable (UWR00276-1)	A2-12
2.3.11	CRT Power Cable (UWR00262-1).....	A2-13
2.3.12	Serial Mouse Data Cable (UWR00318-1)	A2-14
2.3.13	NC Power Supply AC Input Cable (UWR00229-1).....	A2-15
2.3.14	NC Power Supply Output Cable (UWR00228-3).....	A2-16
2.3.15	Yenet Servo Cable (UWR00249-2)	A2-17
2.3.16	Yenet I/O Cable (UWR00251-4)	A2-18
2.3.17	Servo Drive I/O Cable (UWR00214-2)	A2-19
2.3.18	Power ON Sequence Cable (UWR00263-1)	A2-20
2.3.19	I/O Board Power Output Cable (UWR00258-7)	A2-21
2.3.20	Drive Jumper Connectors (UWR00219-2).....	A2-22
2.3.21	I/O Cable (UWR00305-7)	A2-23
2.3.22	I/O Cable (UWR00306-3)	A2-24
2.3.23	I/O Cable (UWR00307-3)	A2-25

2.1 Cable Manufacturing Drawings

2.1.1 Connection with the Power Supply

(1) When using a Power Supply Unit(UPS000004)

(a) Connection diagram



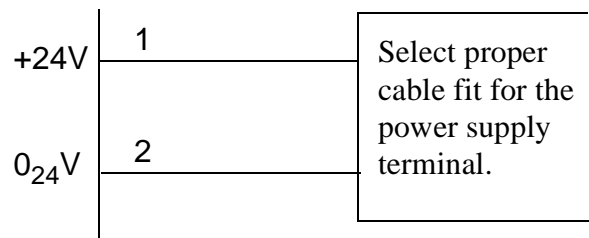
(b) Cable connection

JZNC-JFC10 CN05

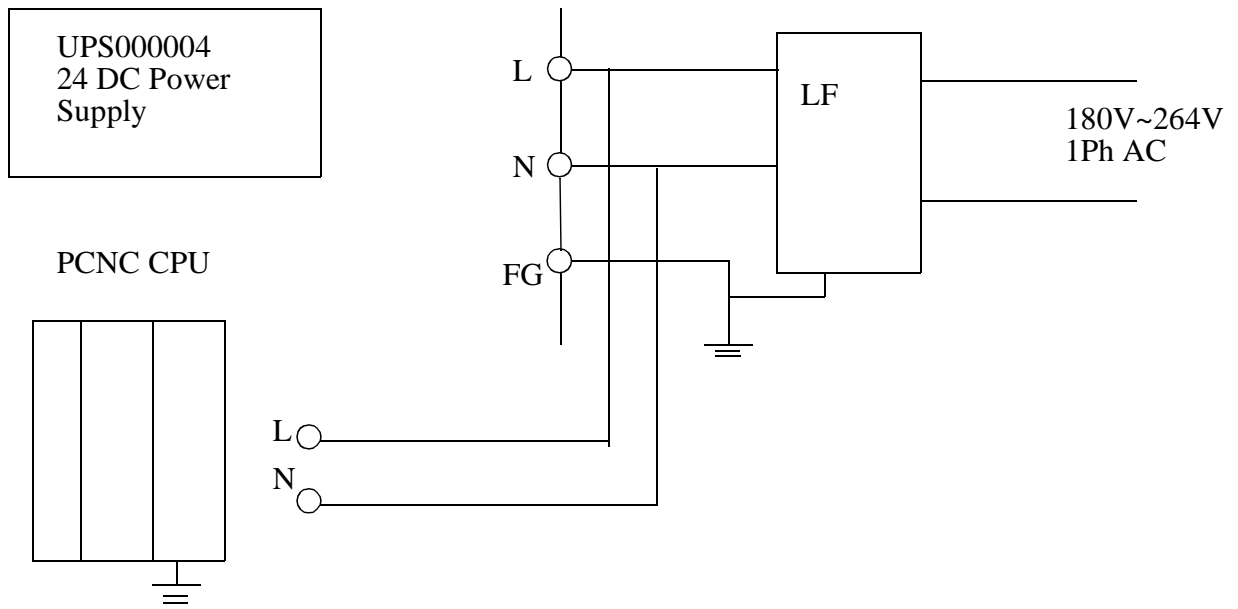
Connector specifications

Connector : 1-178288-3(3PIN)

Manufacturer : AMP

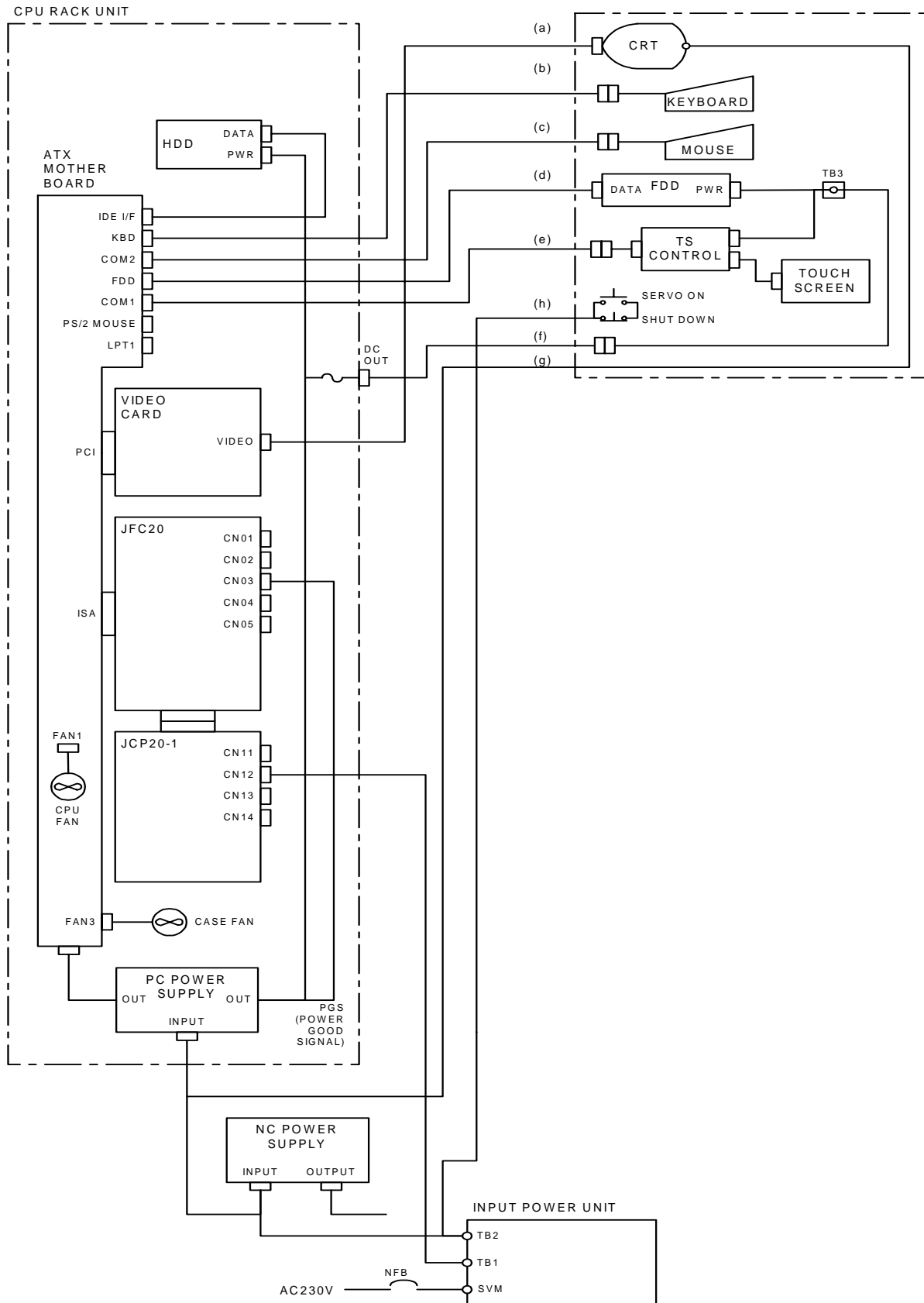


Recommended cable : 1.25mm² x 3 cores

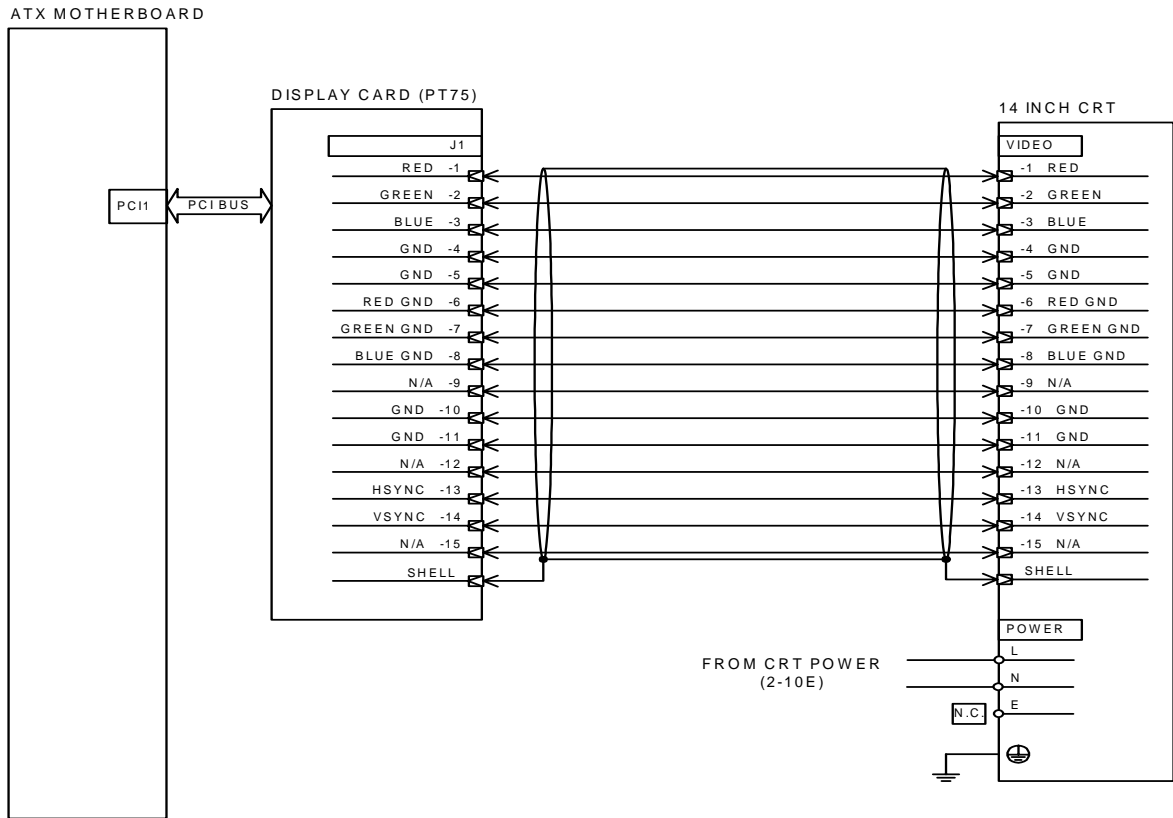


Recommended cable: VCT type, 2 mm² x 5 cores (DE8402398)

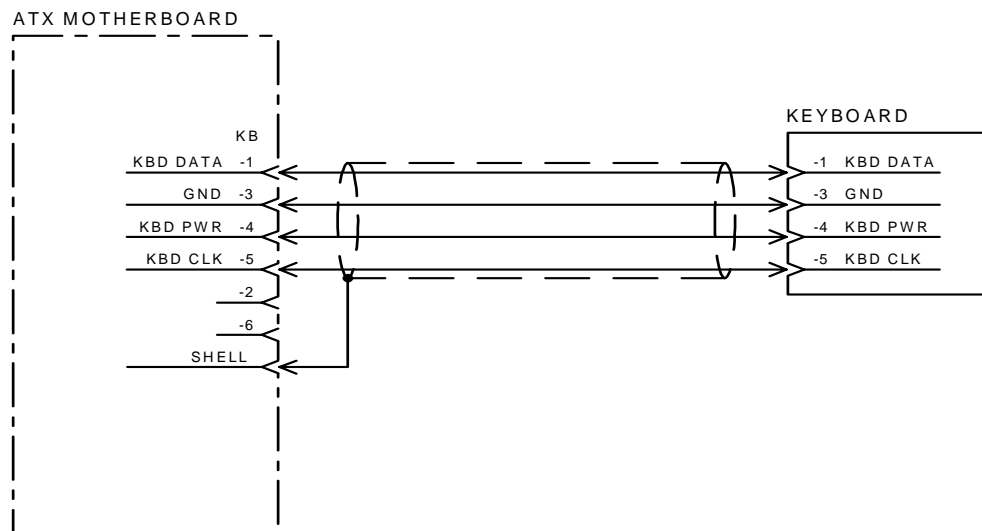
2.1.2 Connection with the Operation Panel



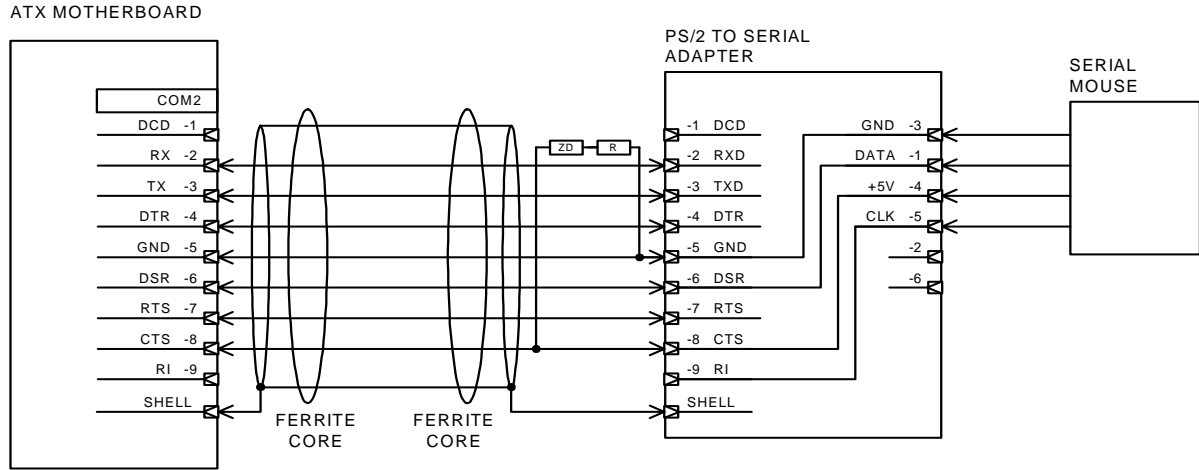
(a) Connection details between PCNC CPU unit and CRT display unit



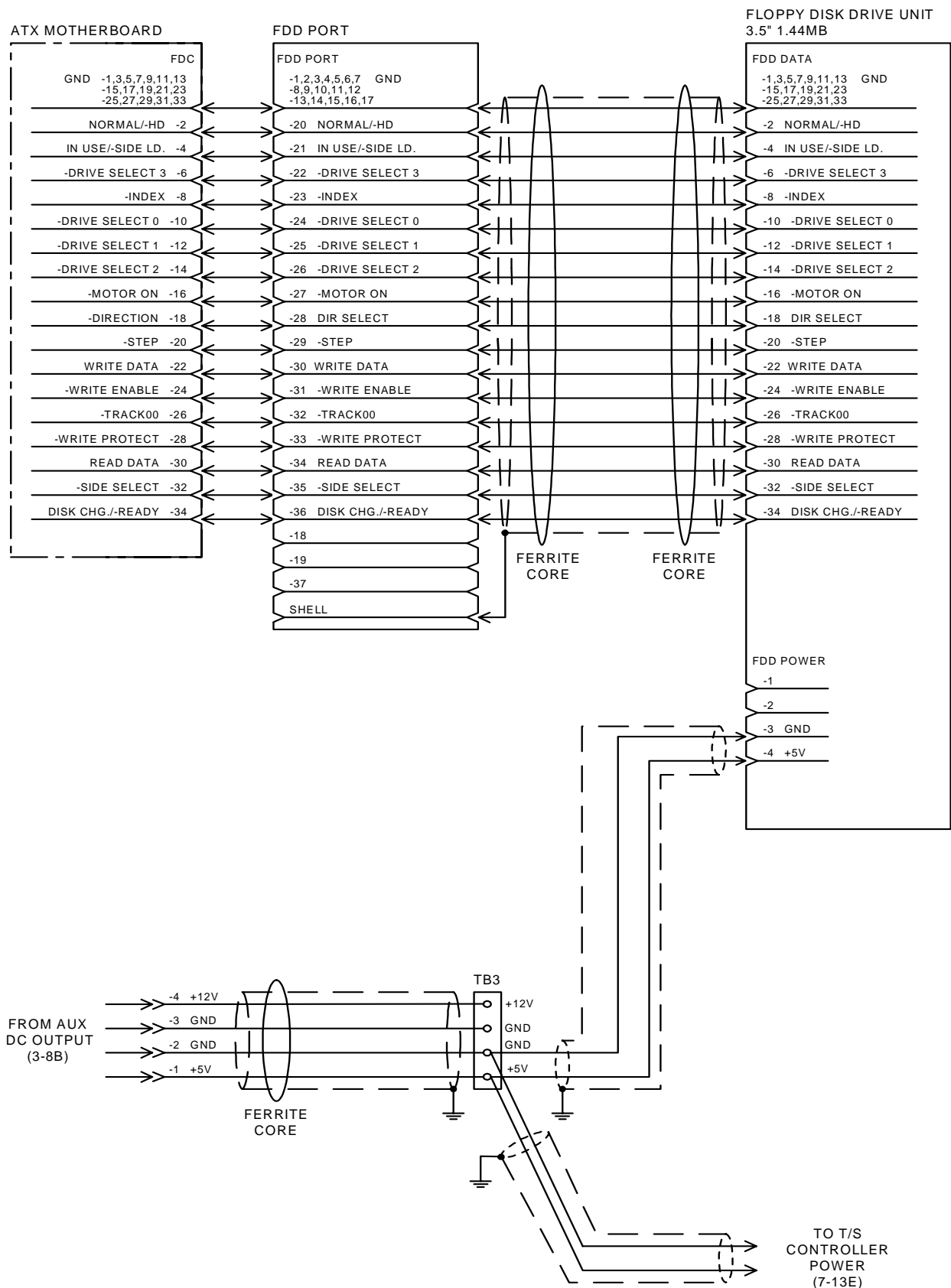
(b) Connection detail between PCNC CPU Unit and Key board



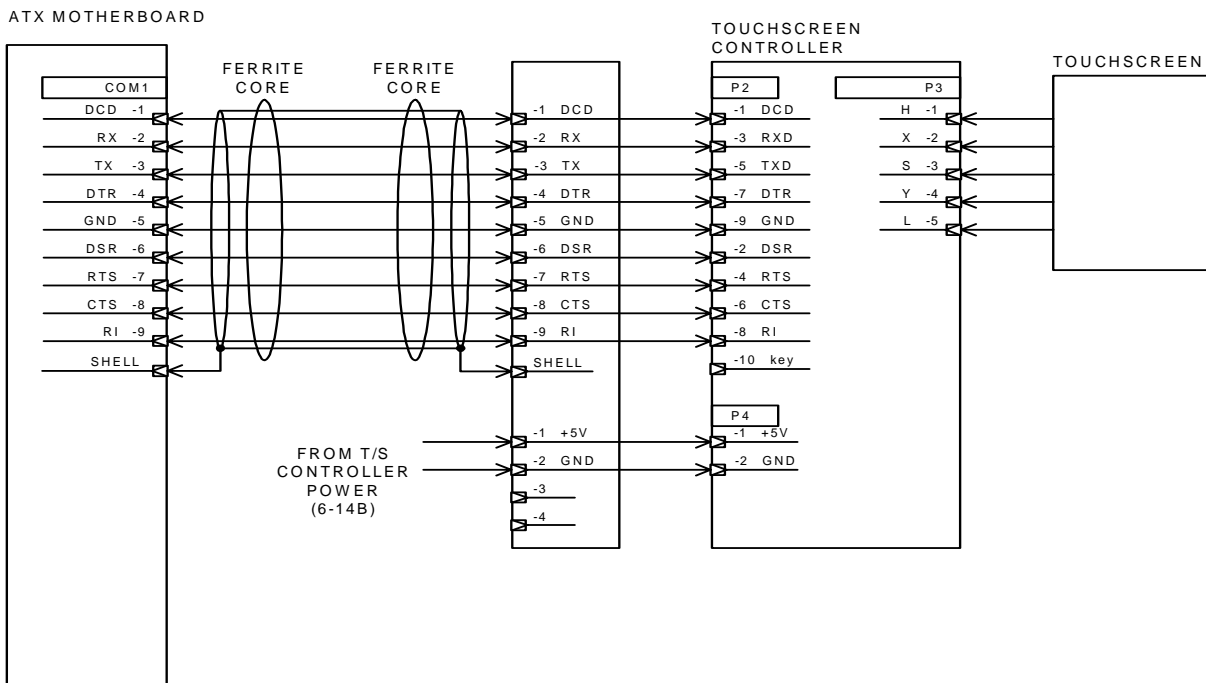
(c) Connection detail between PCNC CPU Unit and Serial Mouse



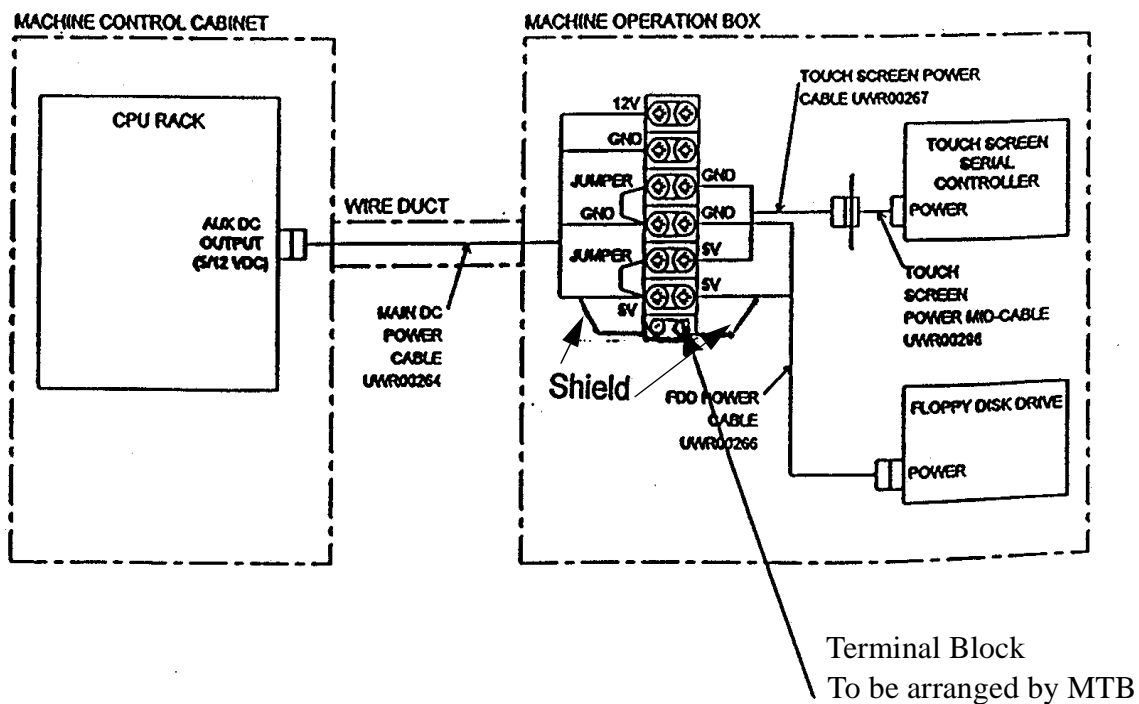
(d) Connection details between PCNC CPU unit and FDD



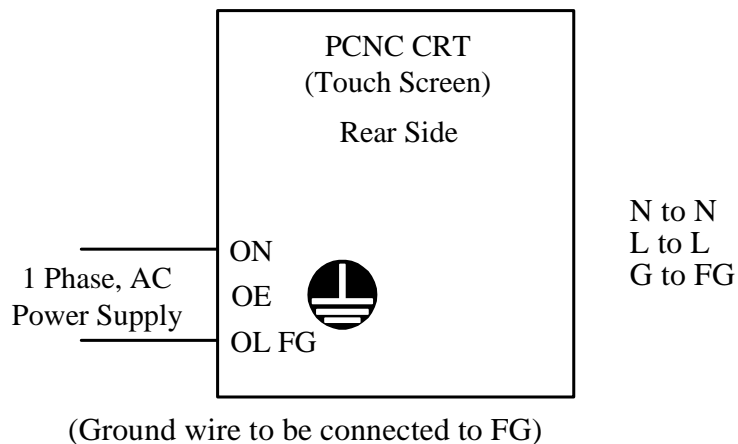
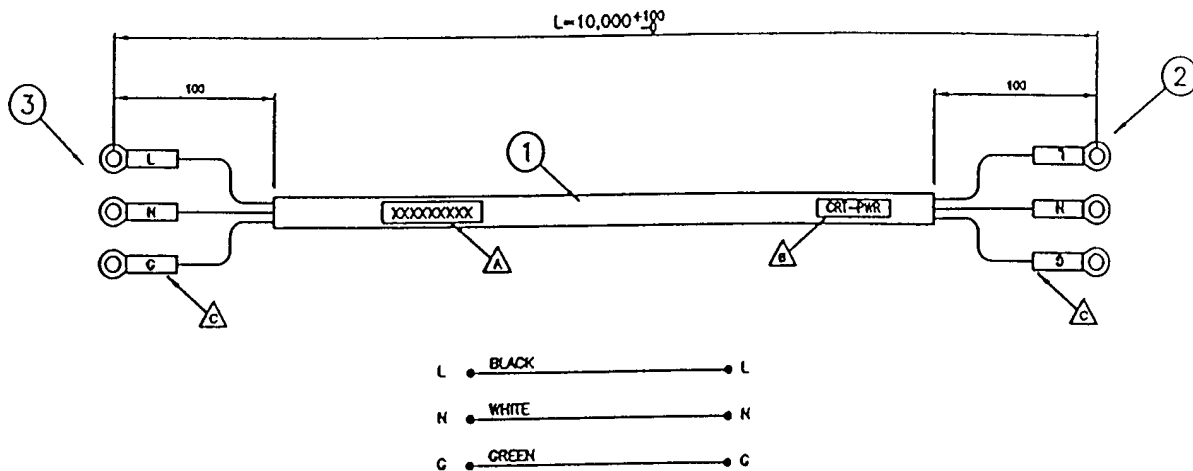
(e) Connection details Between PCNC CPU unit and Touch screen



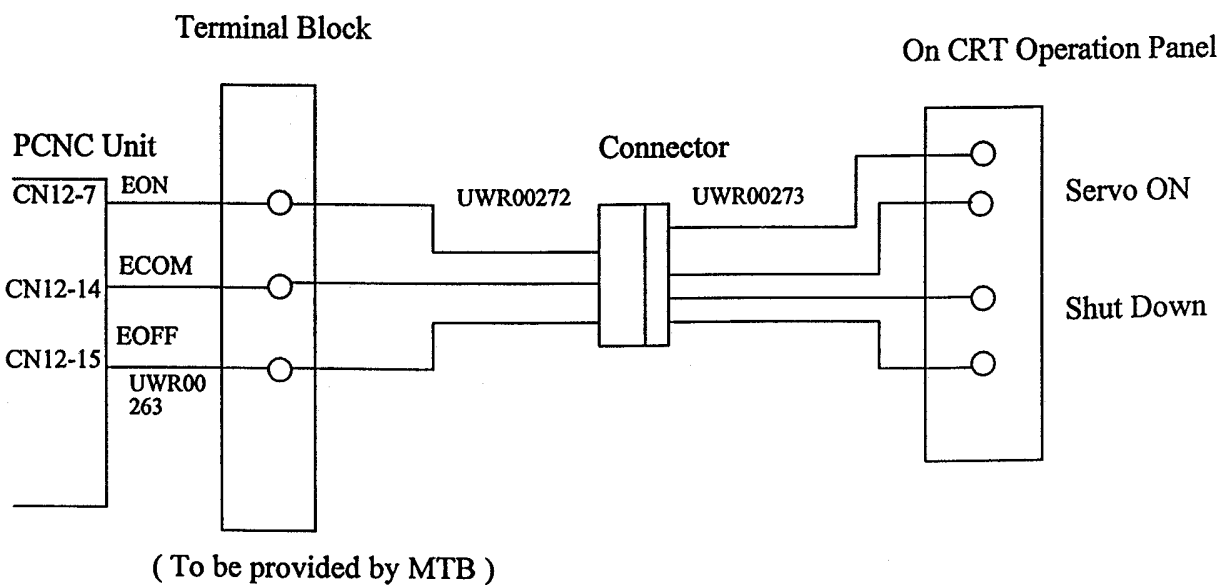
(f) Connection details between PCNC CPU UNIT and SERVO ON/ SHUT DOWN



(g) CRT Power Cable



(h) Servo ON/OFF

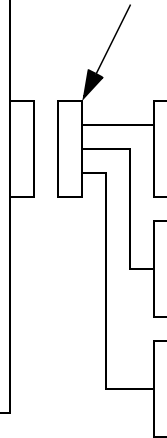


2.1.3 Connection with the Pulse Generator

JANCD-JSP04 N01(10220-52A2JL)

1	GND			11	
		2	GND		12
3	GND			13	/PAH2
		4	+5VPG		14
5	+5VPG			15	/PBH2
		6	+5VPG		16
7	/PAH3			17	/PAH1
		8	PAH3		18
9	/PBH3			19	PBH1
		10	PBH3		20

Cable side connector specifications
 Connector : 10120-3000VE (Soldered)
 Hood : 10320-52A0-008
 Manufacturer : Sumitomo 3M
 Recommended
 cable : UL20276 AWG28 x 3 pair

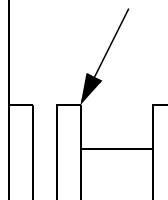


2.1.4 Connection with the Power ON/OFF Circuit

JANCD-JCP20 CN12(10220-52A2JL)

1	GND2			11	+24V2
		2	GND2		12
3	GND2			13	
		4			14
5				15	EOFF
		6			16
7	EON			17	/SVMX1
		8			18
9				19	/ESP1
		10	+24V2		20

Cable side connector specifications
 Connector : 10120-3000VE (Soldered)
 Hood : 10320-52A0-008
 Manufacturer : Sumitomo 3M
 Recommended
 cable : UL20276 AWG28 x 10 pairs

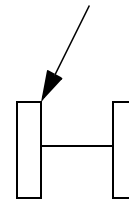


2.1.5 Connection with the Direct IN Signals

JANCD-JCP20 CN14(10220-52A2JL)

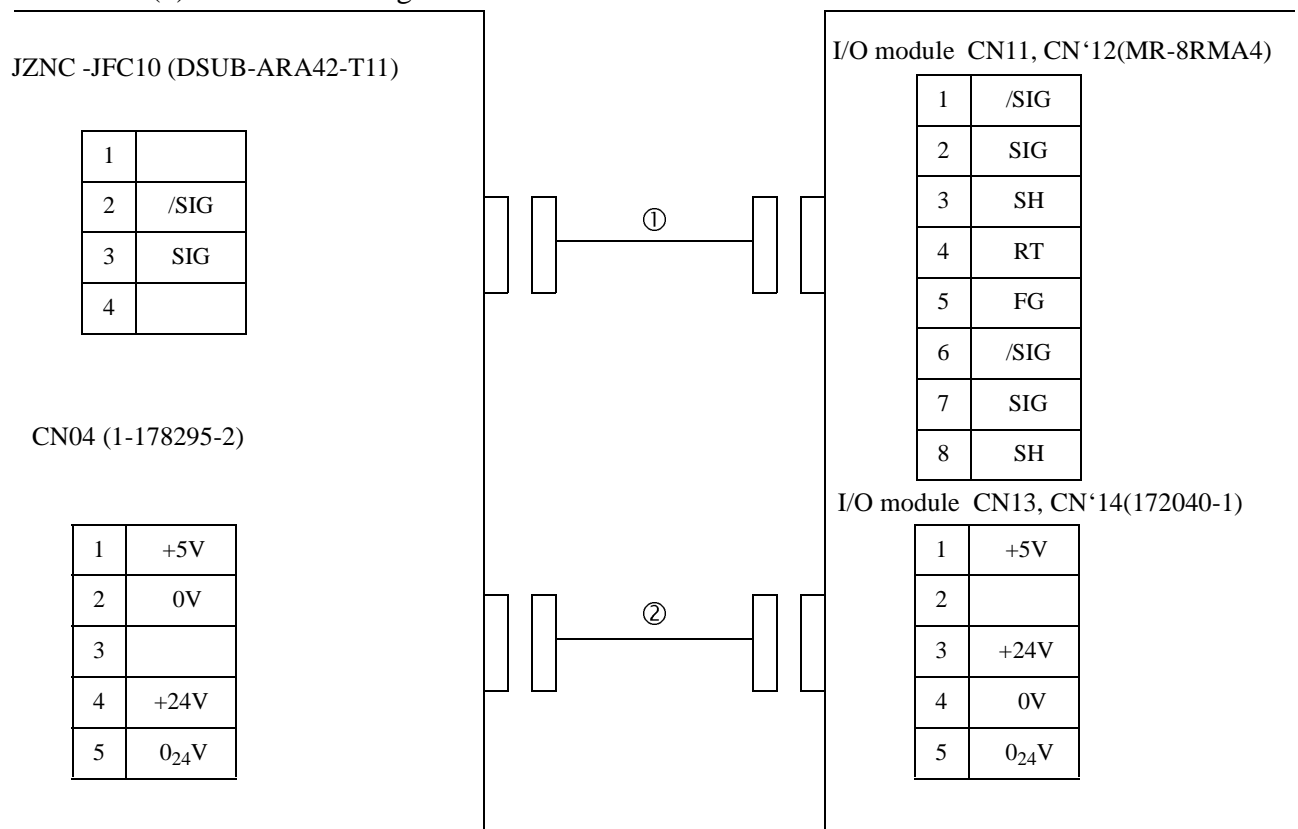
1	GND2			11	+24V3		
		2	GND2			12	+24V3
3	GND2			13	+24V3		
		4				14	DINCOM
5	TOUT1			15			
		6	TOUT0			16	
7				17	DIN1		
		8				18	DIN0
9	GND2			19			
		10	+24V3			20	DOUT

Cable side connector specifications
 Connector : 10120-3000VE (Soldered)
 Hood : 10320-52A0-008
 Manufacturer : Sumitomo 3M
 Recommended
 cable : UL20276 AWG28 x 10 pairs



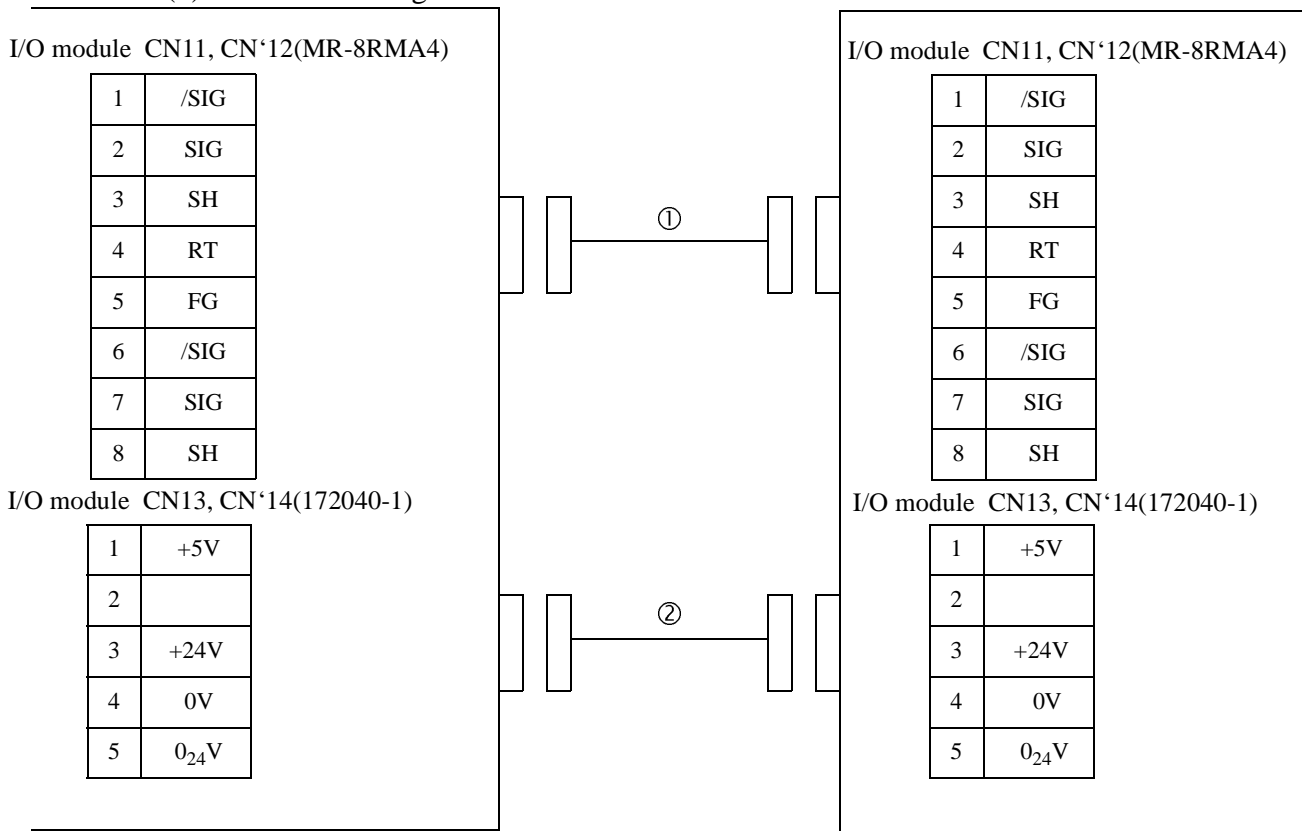
2.1.6 Connection with the I/O Board

(1) Connection Diagram



2.1.7 Connection Between I/O Boards

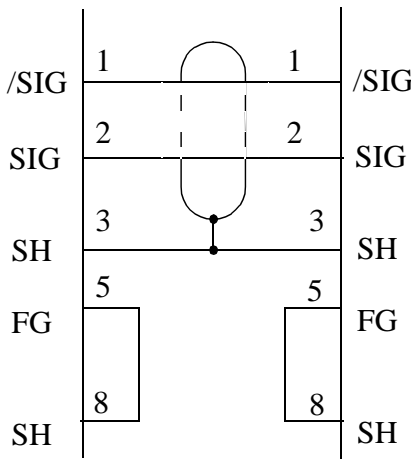
(1) Connection Diagram



(2) Cable Connection

I/O module CN11,CN12

Connector specifications
 Connector : MR-8F
 (Soldered)
 Hood : MR-8L
 Manufacturer : Honda Tsushin
 Kogyo, LTD.



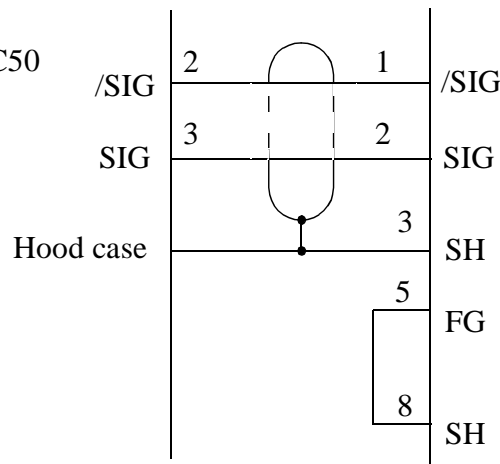
I/O module CN11,CN12

Connector specifications
 Connector : MR-8F
 (Soldered)
 Hood : MR-8L
 Manufacturer : Honda Tsushin
 Kogyo, LTD.

Recommended cable : KEV-SB type, 0.2mm² x 1 pair (DE9405671)

① JZNC - JFC10 CN02

Connector specifications
 Connector : DUSB-APA42-B1-C50
 (Soldered)
 Manufacturer : DDK

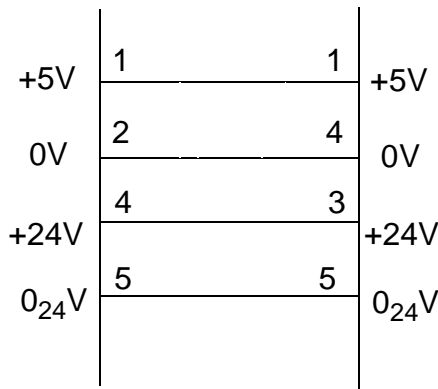


Recommended cable : SS-92026 (DE9403367)

② CN04

I/O module CN13,CN05

Connector specifications
 Connector : 1-178288-5(5PIN)
 Manufacturer : AMP



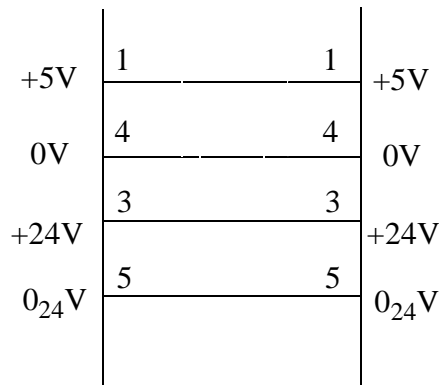
Connector specifications
 Connector : 172026-1(MIC5PIN)
 Manufacturer : AMP

Recommended cable : VCT type, 2mm² x 5 cores (DE8402398)

③ CN13,CN14

I/O module CN13,CN14

Connector specifications
 Connector : 1-178288-5(5PIN)
 Manufacturer : AMP



Connector specifications
 Connector : 172026-1(MIC5PIN)
 Manufacturer : AMP

Recommended cable : VCT type, 2mm² x 5 cores (DE8402398)

2.1.8 Connection with the Servo Unit

(1) Connection Diagram

JZNC-JFC10 CN11(10220-52A2JL)

1		11	BAT+
2		12	BAT-
3	SVALAM*	13	NCALMO
4		14	ALMC
5		15	
6		16	
7	EXT1	17	
8	/EXT2	18	
9	NCLAM*	19	
10		20	

JZNC-JFC10 CN03(DUSB-ARA42-T11)

1	
2	/SIG
3	SIG
4	

SERVO UNIT 1CN

1	/BK1+	14	BAT+
2	/BK11	15	BAT-
3	ALM+	16	
4	ALM-	17	
5		18	PSPO
6	+24VIN	19	ALMC
7	P-OT1	20	P-OT2
8	N-OT1	21	N-OT2
9	DEC1	22	DEC2
10	/EXT1	23	
11	/EXT2	24	
12	ESP1	25	
13	/BK2-	26	/BK2+

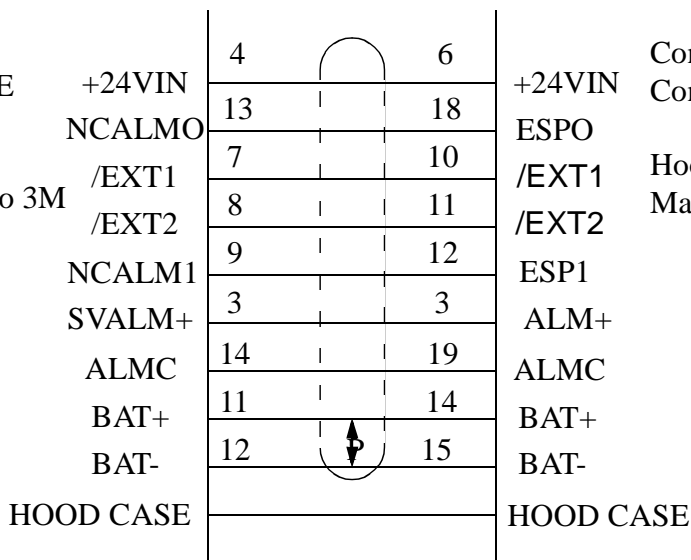
Servo unit 4CN

1	/SIG
2	SIG
3	SH
4	RT
5	FG
6	/SIG
7	SIG
8	SH

(2) Cable Connection

① JZNC-JFC10 CN11

Connector specifications
 Connector : 10120-3000E
 (Soldered)
 Hood : 10320-52A0-008
 Manufacturer : Sumitomo 3M



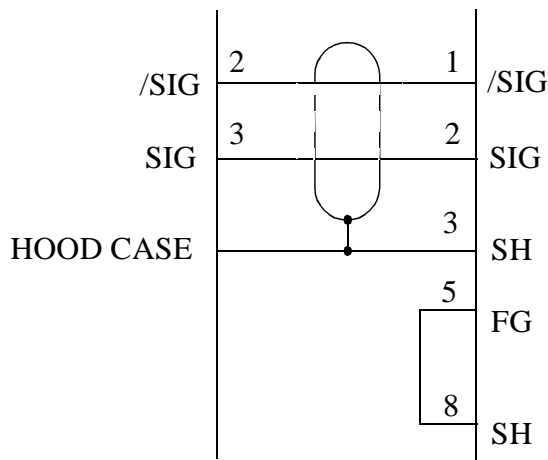
Servo unit 1CN

Connector specifications
 Connector : 10126-3000VE
 (Soldered)
 Hood : 10326-52A0-008
 Manufacturer : Sumitomo 3M

Recommended cable : AWG24(0.2sq), Cable finish outer diameter 120f and less

② JZNC - JFC10 CN01

Connector specifications
 Connector : DUSB-APA42-B1-C50
 (Soldered)
 Manufacturer : DDK



Servo unit 1CN

Connector specifications
 Connector : MR-8F
 (Soldered)
 Hood : MR-8L
 Manufacturer : Honda Tsushin
 Kogyo, LTD.

Recommended cable : SS-92026 (DE9403367)

2.2 Cable Specifications

2.2.1 Cable Drwg. No. DE8400093 (KQVV-SB Type, 0.2mm² x 20 pairs)

Appendix Table 2.1 Construction

Item		Cable Configuration
Number of Pairs		20
Conductor	Material	Tinned, annealed copper, stranded wire
	Nominal Section Area mm ²	0.2
	Number of Conductors (per mm)	16/0.12
	Dimensions (mm)	0.55
Insulation	Material	Cross-linked vinyl
	Thickness (mm)	0.3
Strand		Strand the cores in the following manner.
Winding		Paper tube lap wound
Sheath	Material and Color	Soft vinyl, black
	Thickness (mm)	1.2
Finished Cable Diameter		8.0
Continuous Operating Temperature Range °C		-30 to +60

Note: Place appropriate wadding in the cable if necessary.

Appendix Table 2.2 Characteristics

Item	Characteristic Value
Max. Conduction Resistance (20°C) W/km	113
Min. Insulation Resistance (20°C) MW·km	50
Withstand Voltage VAC/min.	1000
Continuous Operating Temperature Range °C	-30 to +60

2.2.2 Cable Drwg. No. DE8402398 (VCT Type, 0.2mm² x 5 pairs)

Appendix Table 2.3 Construction

Item		Cable Configuration
Number of Pairs		5
Conductor	Material	Tinned, annealed copper, stranded wire
	Nominal Section Area mm ²	2.0
	Number of Conductors (per mm)	37/0.26
	Dimensions (mm)	Approx. 1.8
Insulation	Material	Insulated vinyl
	Thickness (mm)	Approx. 0.8
	Diameter (mm)	Approx. 3.4
Stranding		Rightward twisted, cotton thread at the center as wadding, pitches: less than 20 times the layer core diameter. Outer diameter: Approx. 9.2mm
Sheath	Material and Color	Vinyl, black
	Thickness (mm)	Approx. 1.9
Finished Cable Diameter (mm)		Approx. 13.0

Appendix Table 2.4 Characteristics

Item	Characteristic Value
Max. Conduction Resistance (20°C) W/km	10.2
Min. Insulation Resistance (20°C) MW·km	50 or more
Withstand Voltage VAC/min.	3000

2.2.3 Cable Drwg. No. DE9405671

Appendix Table 2.1 Construction

Item		Cable Configuration
Number of Pairs		2
Conductor	Material	Tinned, annealed copper, stranded wire
	Nominal Section Area mm ²	0.2
	Number of Conductors (per mm)	7/0.2
	Dimensions (mm)	0.6
Insulation	Material	Polyethylene
	Thickness (mm)	0.3
Strand		O.D. 2.4mm
Winding		Polyester tape lap wound
Sheath	Material and Color	Oil-resistant soft vinyl
	Thickness (mm)	1.5
Finished Cable Diameter		Approx. 6.1
Approximate Mass kg/km		50

Note: Place appropriate wadding in the cable if necessary.

Appendix Table 2.2 Characteristics

Item	Characteristic Value
Max. Conduction Resistance (20°C) W/km	92.2
Min. Insulation Resistance (20°C) MW·km	2000
Withstand Voltage VAC/min.	1000



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