



GE Fanuc Automation

Computer Numerical Control Products

I/O Unit - Model B

Connection Manual

B-62163EN/03

November 1998

Warnings and notices for this publication

GFLE-003

Warning

In this manual we have tried as much as possible to describe all the various matters. However, we cannot describe all the matters which must not be done, or which cannot be done, because there are so many possibilities.

Therefore, matters which are not especially described as possible in this manual should be regarded as “impossible”.

Notice

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

GE Fanuc Automation makes no representation or warranty, expressed, implied, or statutory with respect to, and assumes no responsibility for accuracy, completeness, sufficiency, or usefulness of the information contained herein. No warranties of merchantability or fitness for purpose shall apply.

The following are Registered Trademarks of GE Fanuc Automation

CIMPLICITY®

Genius®

The following are Trademarks of GE Fanuc Automation

Alarm Master

PROMACRO

CIMSTAR

Series Five

Field Control

Series 90

Genet

Series One

Helpmate

Series Six

LogicMaster

Series Three

Modelmaster

VuMaster

PowerMotion

Workmaster

ProLoop

© Copyright 1998 FANUC Ltd.

Authorized Reproduction GE Fanuc Automation Europe S.A.

All Rights Reserved

No part of this manual may be reproduced in any form.

All specifications and designs are subject to change without notice.

Table of Contents

PREFACE	p-1
----------------------	------------

I. CONNECTION

1. SYSTEM CONFIGURATION	3
1.1 OVERVIEW	4
1.2 CONFIGURATION	5
2. SPECIFICATIONS	6
2.1 SYSTEM	7
2.2 COMMUNICATION OF THE INTERFACE UNIT	8
2.3 DI/DO UNIT	9
3. INSTALLATION	10
3.1 ENVIRONMENTAL CONDITIONS	11
3.1.1 Interface Unit	11
3.1.1.1 Installation location	11
3.1.1.2 Ambient temperature	11
3.1.1.3 Variations in temperature	11
3.1.1.4 Humidity	11
3.1.1.5 Vibration	11
3.1.2 DI/DO Unit	11
3.1.2.1 Installation location	11
3.1.2.2 Ambient temperature	11
3.1.2.3 Variations in temperature	11
3.1.2.4 Humidity	12
3.1.2.5 Vibration	12
3.1.2.6 Altitude	12
3.1.2.7 Electrical isolation (for AC unit)	12
3.2 DIMENSIONS	13
3.2.1 Dimensions for Permanent Installation (Direct Installation without DIN Rail)	13
3.2.1.1 Interface unit	13
3.2.1.2 Basic unit	14
3.2.1.3 Basic unit with extension unit	15
3.2.2 Dimensions for Installation on the DIN Rail (Use a DIN Rail That is 35mm Wide and 7.5mm High.)	16
3.3 INSTALLING THE UNIT ON THE DIN RAIL (USE A RAIL THAT IS 35MM WIDE AND 7.5MM HIGH.)	17
3.3.1 Installing the Interface Unit or Basic Unit	17
3.3.2 Installing the Movable Basic Unit with an Extension Unit on the DIN Rail	18
3.4 INSTALLING THE IMMOVABLE BASIC UNIT WITH AN EXTENSION UNIT ON THE DIN RAIL	19
3.5 HEAT VALUE OF EACH UNIT AND TERMINAL BOX	20
3.5.1 Heat Value of Each Unit	20
3.5.2 Terminal Box	20

4. CONNECTION	21
4.1 CONNECTION DIAGRAM	22
4.2 GROUND CONNECTION	23
4.2.1 Mounting the I/O Unit-B Directly to the Power Magnetics Cabinet	23
4.2.2 Mounting the I/O Unit-B on the DIN Rail	23
4.3 CONNECTION WITH THE I/O LINK	24
4.3.1 Input/Output Points for the Interface Unit	24
4.3.2 Power On/Off Information	25
4.4 CONNECTING A DISTRIBUTED LINK	26
4.4.1 Branching the Communications Cable	26
4.4.2 Communications Distance	26
4.4.3 Connecting DI/DO Units	26
4.4.4 Installing a Terminating Resistor	26
4.4.5 Unit Number	26
4.5 CONNECTING THE INTERFACE UNIT	27
4.6 CONNECTING THE BASIC UNIT	28
4.6.1 Connecting the DI/DO Cable	30
4.6.2 Communication Cable	30
4.6.2.1 Communication cable specification	30
4.6.2.2 Connecting the communications cable	31
4.6.3 Connecting the Power Cable	32
4.6.3.1 DC input and output unit, DC output unit, DC input unit	32
4.6.3.2 AC output unit	33
4.7 CONNECTING THE EXTENSION UNIT	34
4.7.1 Connecting the DI/DO Cable	36
4.7.2 Connecting the Power Cable	36
4.7.2.1 DC input and output unit, DC output unit, DC input unit	36
4.7.2.2 AC input unit	37
4.8 POWER SUPPLY CAPACITY OF EACH UNIT	38
5. SETTING THE INTERFACE AND BASIC UNITS, AND LED INDICATIONS ...	39
5.1 INTERFACE UNIT	40
5.1.1 Setting the DIP Switch	41
5.1.1.1 EDSP (selecting the error display method)	41
5.1.1.2 Q and H (setting the communication speed)	41
5.1.1.3 URDY (setting the power on/off information of each unit)	41
5.1.1.4 R (installing a terminating resistor)	42
5.1.2 LED Indications	42
5.2 BASIC UNIT	44
5.2.1 Setting the DIP Switch	45
5.2.1.1 Switches 1, 2, 4, 8, and 16 (setting the unit number)	45
5.2.1.2 R (installing a terminating resistor)	45
5.2.1.3 Q and H (setting the communication speed)	45
5.2.2 LED Indications	46
6. UNITS	47

7. BASIC AND EXTENSION UNITS	48
7.1 INPUT AND OUTPUT SIGNALS AND THEIR ADDRESSES	49
7.2 SPECIFICATIONS OF THE BASIC AND EXTENSION UNITS	51
8. CAUTIONS	64
8.1 WHEN NOISE IS INDUCED ON DC SUPPLY VOLTAGE	65
8.2 DC OUTPUT PROTECTION	66
8.3 DC OUTPUT OVERVOLTAGE	67
8.4 POWER ON/OFF	68
8.5 INPUT SECTION (DI) WIRING	69
8.6 NOISE SUPPRESSOR	70
9. SAFETY FOR USING AC	71
9.1 INSTALLATION ENVIRONMENT	72
9.1.1 Installation Category (Overvoltage Category)	72
9.1.2 Pollution Degree	72
9.2 AC OUTPUT UNIT	73

II. PMC PROGRAMMING

1. GENERAL	77
2. APPLIED SOFTWARE	78
2.1 PMC CONTROL SOFTWARE / BUILT-IN LADDER EDITING SOFTWARE	79
2.2 OFFLINE PROGRAMMER	80
3. ADDRESS ASSIGNMENT	82
3.1 SPECIFICATION OF CONNECTING POSITION	83
3.2 PMC ADDRESS	85
3.3 MODULE NAME	86
4. OPERATION	87
4.1 SCREEN COMPOSITION	88
4.1.1 Built-in Editing Function	88
4.1.2 FAPT LADDER for Personal Computer	89
4.2 OPERATION	90
4.3 ERROR AND WARNING MESSAGE WHEN ASSIGNMENT DATA IS EDITED	91

PREFACE



This manual describe the following products :

Name of products	Abbreviation
FANUC I/O Unit-MODEL B	I/O Unit-B

I. CONNECTION

1

SYSTEM CONFIGURATION



1.1 OVERVIEW

The FANUC I/O Unit-MODEL B (I/O Unit-B) consists of an interface unit and DI/DO units. A single DI/DO unit consists of a basic unit with or without an extension unit. The basic unit sends or receives data to or from the interface unit. The extension unit receives data from the basic unit to which it is connected by a connector.

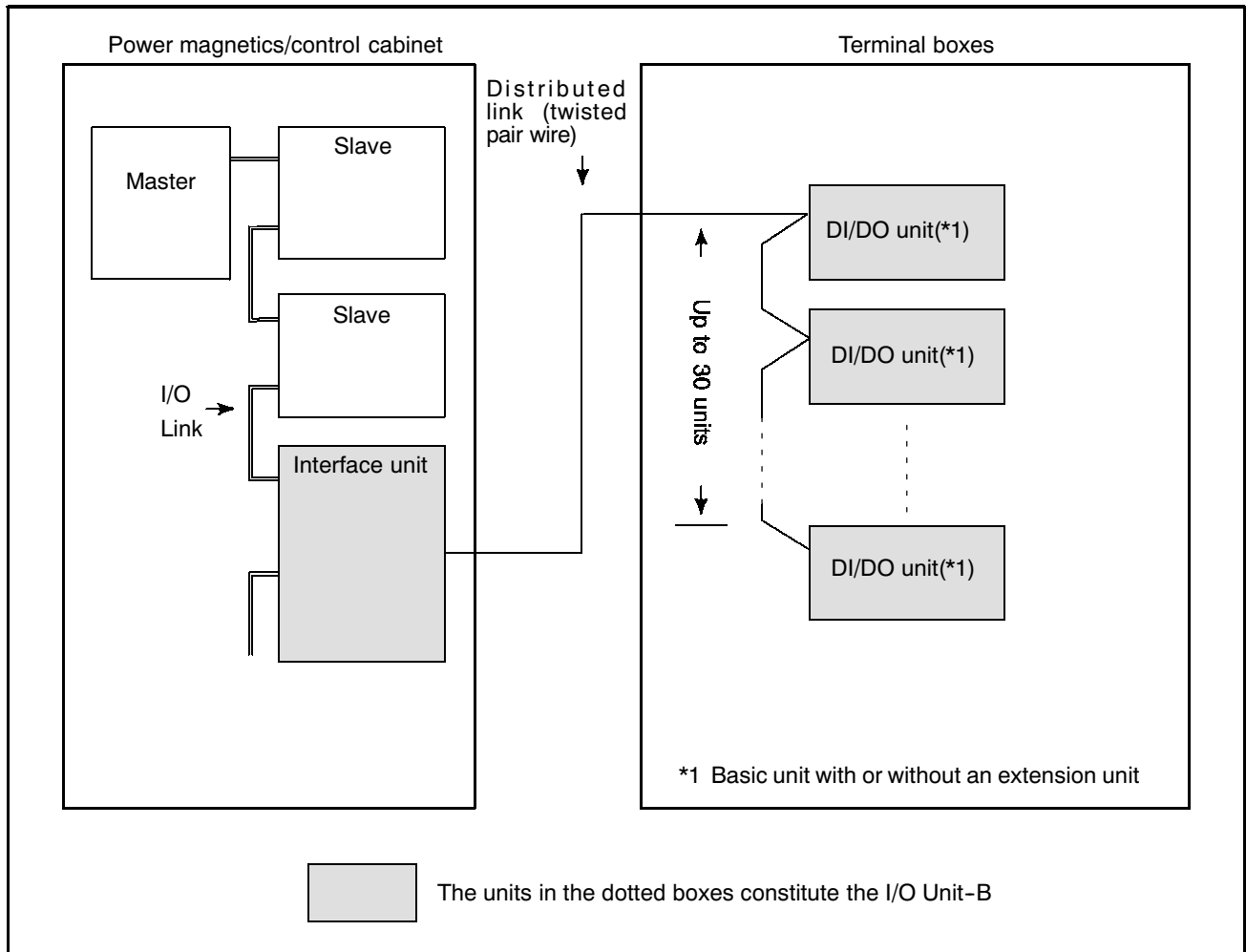
The interface unit controls communication and is installed in the power magnetics/control cabinet. The DI/DO unit is installed in the terminal box near the devices to be interfaced and controlled. The interface unit can be connected to the FANUC I/O Link (I/O Link). The interface unit is connected to the DI/DO unit by a shielded twisted pair wire. The interface unit and DI/DO unit establish a distributed link.

As the power magnetics/control cabinet and the terminal boxes are connected through a communications cable, the need for extensive wiring is eliminated and the wiring cost is reduced.

As for the Interface Module “AIF02C” of FANUC I/O Unit-MODEL A/B, refer to “FANUC I/O Unit-MODEL A CONNECTION·MAINTENANCE MANUAL (B-61813E)”.

1.2 CONFIGURATION

The I/O Unit-B provides a distributed link under the I/O Link. DI/DO units are connected to the distributed link.



2 SPECIFICATIONS



2.1 SYSTEM

The table below lists the specifications of the I/O Unit-B. The maximum number of DI points is 224. This is because 32 points (four bytes) are used for the power on/off information indicating whether the interface unit communicates with the DI/DO unit. (For details, see Section 4.3.2, "Power on/off information.")

Item	Description	Remarks
Connection to the CNC, Robot control or etc.	Connected to the master I/O link through the interface unit	
Maximum DI/DO points	DI : 224, DO : 256	The system occupies up to 256 points for both input and output. (See Section 4.3 "CONNECTION WITH THE I/O LINK")
Maximum DI/DO units that can be connected	30 max	
Maximum total length of the communications cable per channel.	100m max	

2.2 COMMUNICATION OF THE INTERFACE UNIT

The table below lists the specifications of the communication of the distributed link established by the interface unit.

Item	Description	Remarks
Communication speed	1.2 Mbps	
Typical communication cycle	2ms :224 DI points and 256 DO points, up to 20 units 4ms :224 DI points and 256 DO points, 21 to 30 units (upper limit)	
Transmission system	Half duplex	
Transmission error check	CRC and other methods	
Communications cable	Shielded twisted pair wire	
Connection to the communications line	Multidrop	Two or more nodes are connected on a single communications line.

2.3 DI/DO UNIT

The table below lists the specifications of the DI/DO unit.
As for expansion unit, this manual.

Item	Description	Remarks
DI/DO of the basic unit	DC input and output unit (DC 8 input points + DC 8 output points)	
	DC input unit (DC 16 input points)	
	DC output unit (DC 16 output points)	
	AC output unit (AC 12 output points)	
DI/DO of the extension unit	DC input and output unit (DC 8 input points + DC 8 output points)	
	DC input unit (DC 16 input points)	
	DC output unit (DC 16 output points)	
	AC input unit (AC 16 input points)	
DI Power	DC input (24VDC, 7.5mA)	
	AC input (100 to 115VAC, 50 to 60Hz)	
DO Power	DC output (12 to 24VDC, 0.6A)	With overheat and overcurrent protection functions
	AC output (100 to 230VAC, 0.3A, 50 to 60Hz)	0.5 A when up to 8 points are used
Power supply for the control and input circuits	24V DC $\pm 10\%$	Use a stable power supply.
DI/DO terminal	Two-row screw terminal board (M3)	Screw tightening torque: 5 kg·cm
Power on/off	Can be executed at any time.	
Unit number	Specified by a DIP switch.	Of 1 to 30, select a desired number for each unit. (Each unit must have a unique number.)
When the NC power is turned off while the power of the DI/DO unit is on	The output is cleared.	
Installation	The DIN rail can be used.	Use a DIN rail which is 35mm wide and 7.5mm high.
Installation location	In the terminal box	IP-54 (Recommended rating)

3

INSTALLATION



3.1 ENVIRONMENTAL CONDITIONS

Install the I/O Unit-B where the following conditions are satisfied.

3.1.1 Interface Unit

**3.1.1.1
Installation location** Install the interface unit in the power magnetics/control cabinet.

**3.1.1.2
Ambient temperature**

In operation	:	0°C to 55°C (temperature in the power magnetics cabinet)
In storage or transportation	:	-20°C to 60°C

**3.1.1.3
Variations in temperature** Up to 1.1°C per minute

**3.1.1.4
Humidity**

General condition	:	75% or lower (relative humidity)
Short-period condition (up to one month)	:	Up to 95%

**3.1.1.5
Vibration** In operation: 0.5 G

3.1.2 DI/DO Unit

**3.1.2.1
Installation location** The DI/DO unit is not resistant to dust or oil. Install it in a terminal box. The terminal box must be dust-proof and oil-proof. (Design the terminal box so that it will keep out dust, mist, coolant, and organic solvent.) Recommended rating of IP-54 or better. The ID degree required is dependent on the circumstances of machine tool, so please choose the adequate degree in accordance with such environment.

**3.1.2.2
Ambient temperature**

In operation	:	0°C to 55°C (temperature in the terminal box)
In storage or transportation	:	-20°C to 60°C

**3.1.2.3
Variations in temperature** Up to 1.1°C per minute

**3.1.2.4
Humidity**

General condition : 75% or less (relative humidity)
Short-period condition (up to one month) : Up to 95%

**3.1.2.5
Vibration**

In operation of the basic unit without an extension unit : 3 G
In operation of the basic unit with an extension unit : 1.5 G

**3.1.2.6
Altitude**

Maximum altitude in operation : 2000m

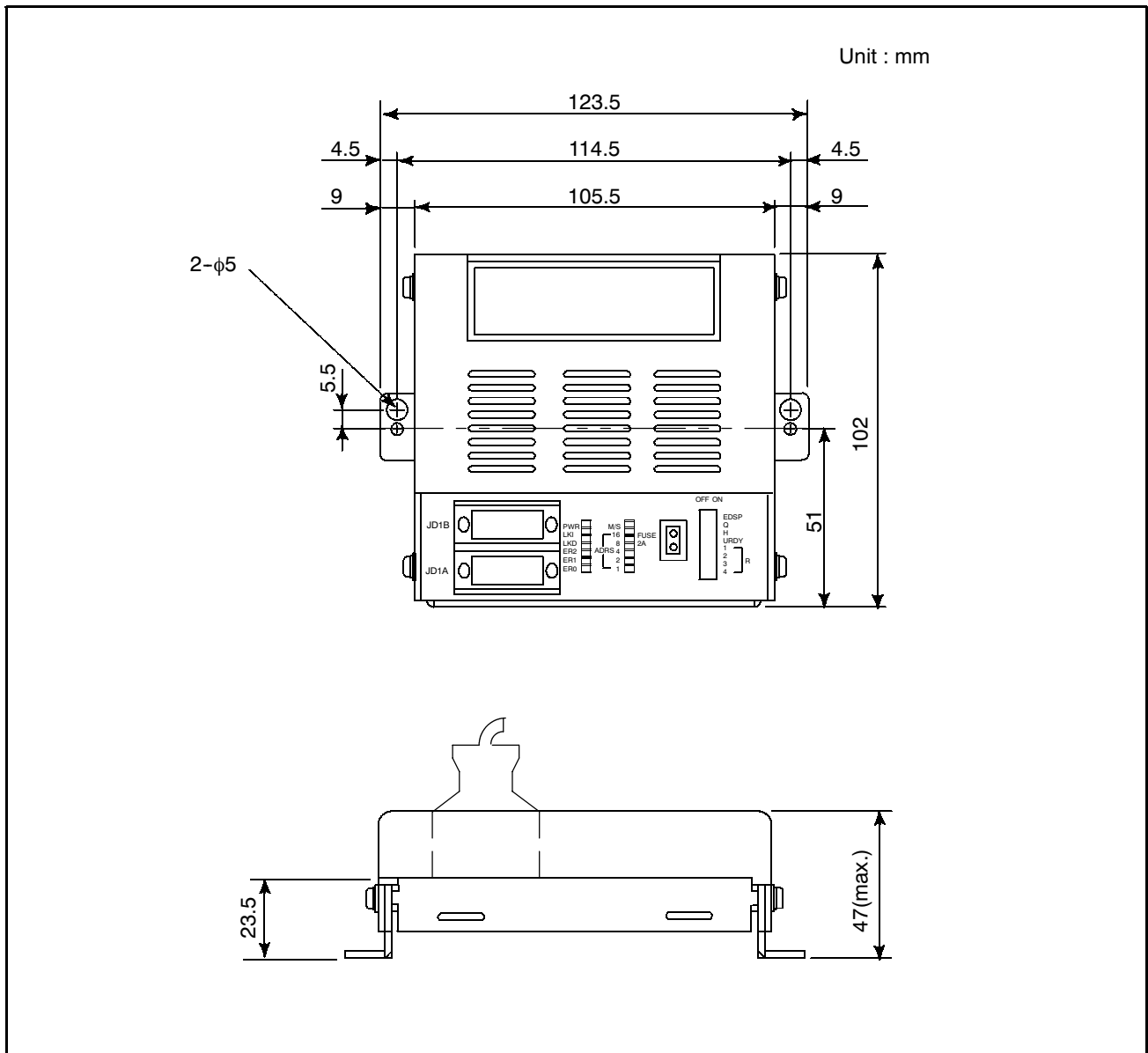
**3.1.2.7
Electrical isolation
(for AC unit)**

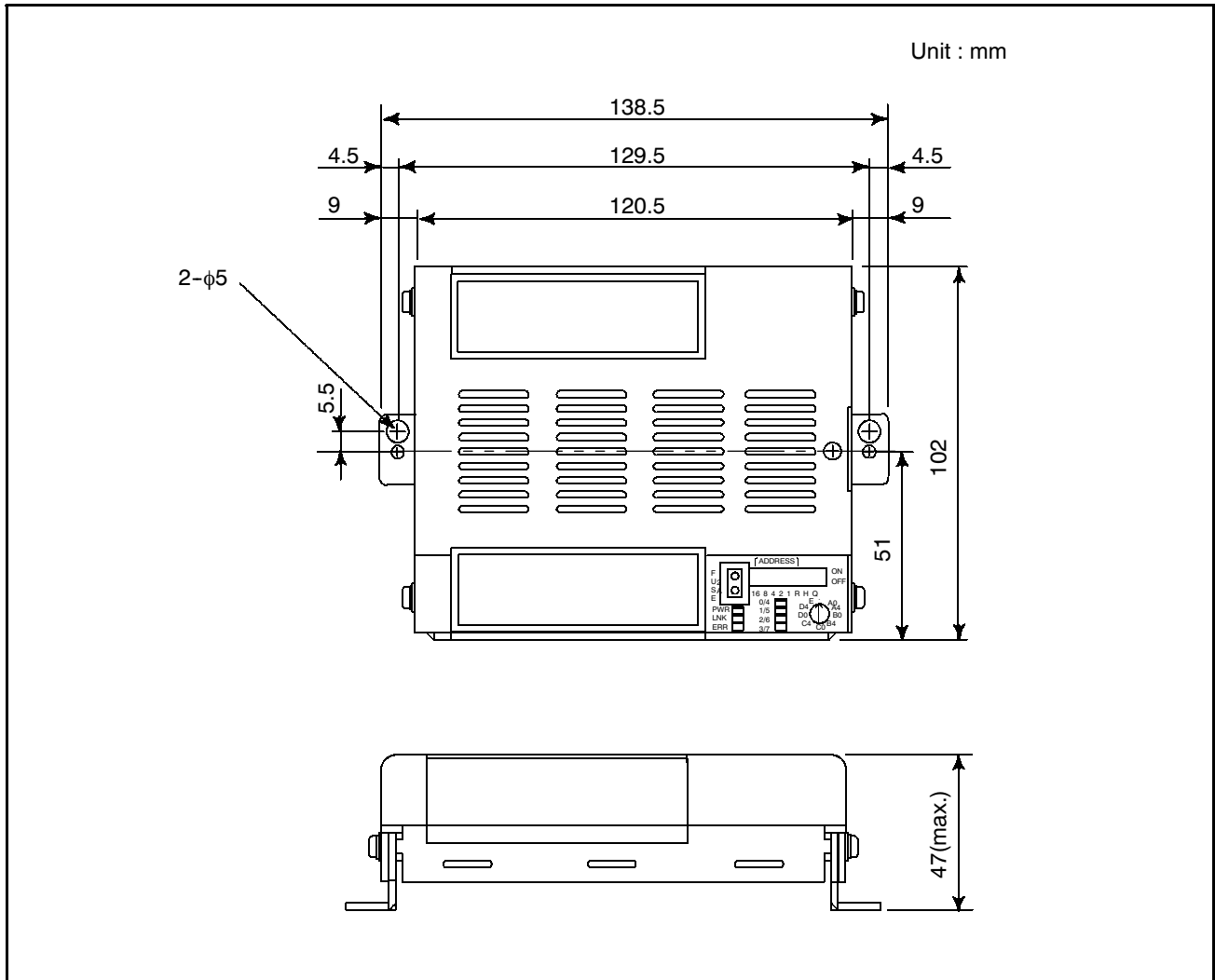
100 VAC is used for AC input unit, and 100 VAC or 200 VAC is used for AC output unit.
Protective separation is featured between 100 VAC or 200 VAC and DC (24V or 5V).

3.2 DIMENSIONS

3.2.1 Dimensions for Permanent Installation (Direct Installation without DIN Rail)

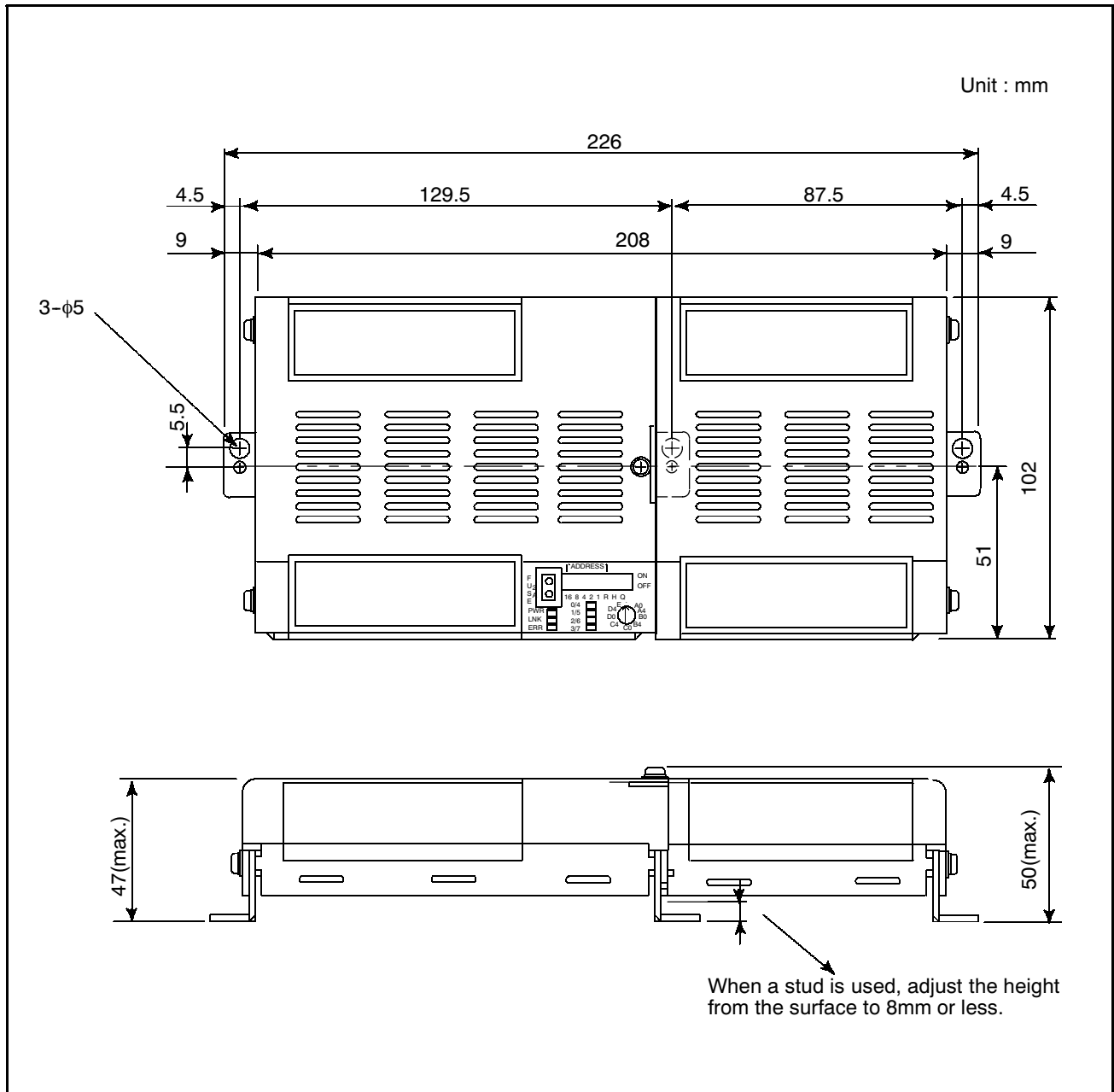
3.2.1.1 Interface unit



3.2.1.2**Basic unit**

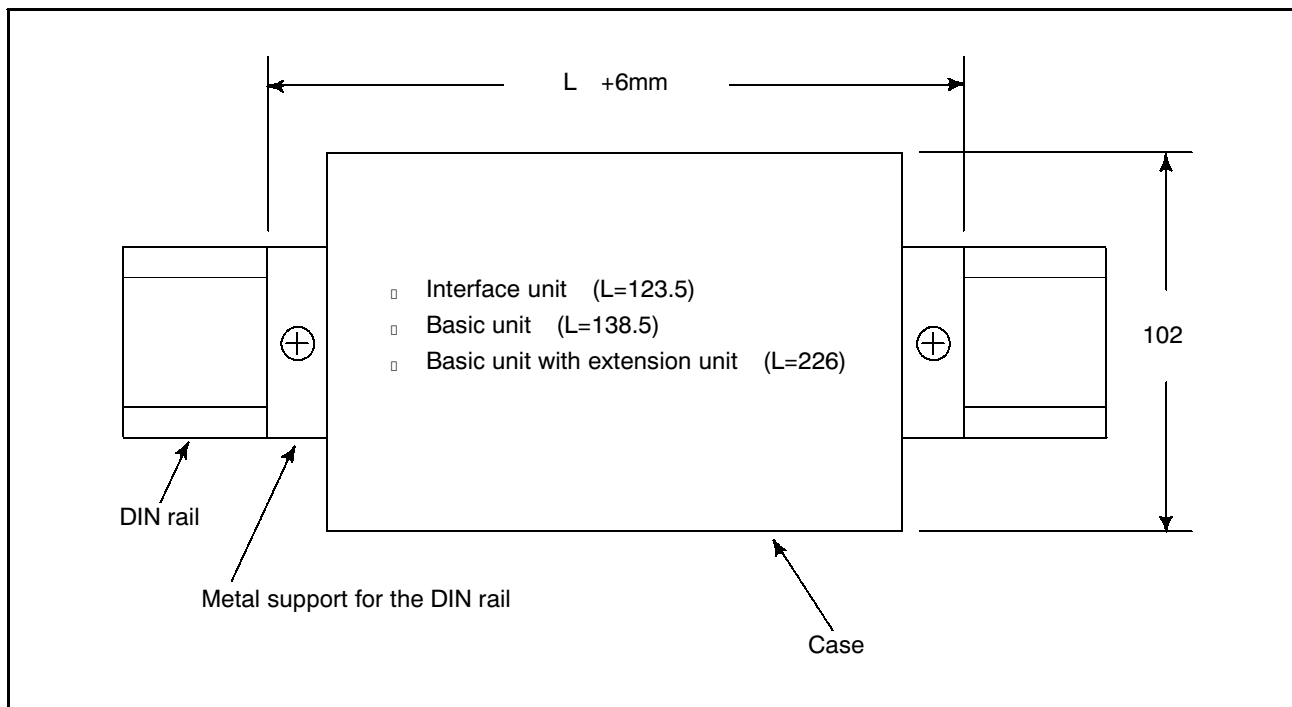
3.2.1.3

Basic unit with extension unit

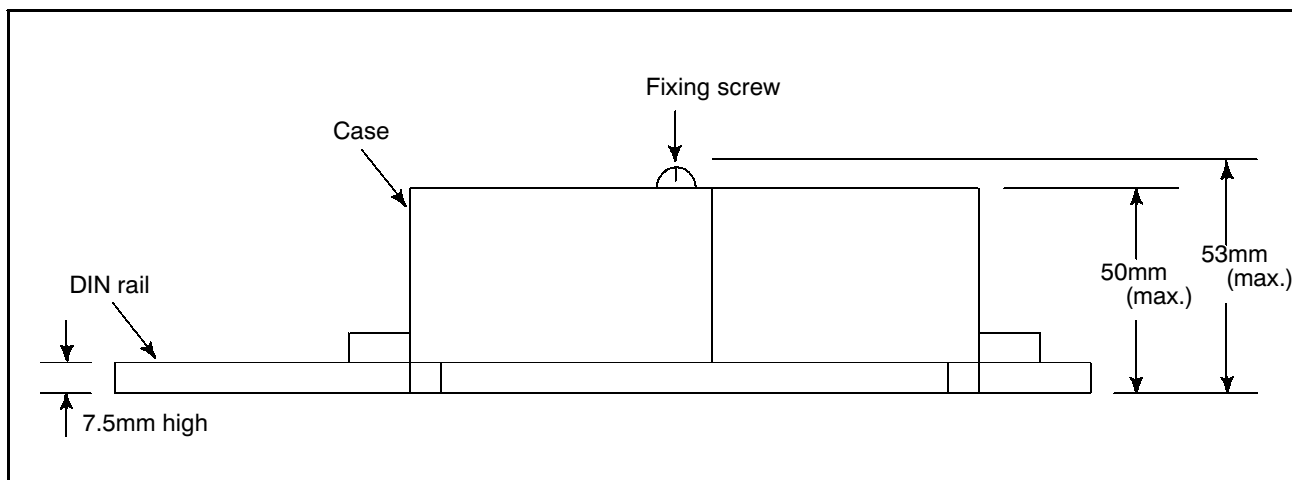


3.2.2 Dimensions for Installation on the DIN Rail (Use a DIN Rail That is 35mm Wide and 7.5mm High.)

Metal supports are provided to install the unit on the DIN rail. The total width is 6mm greater than the dimension for direct installation. (See the following figure.)

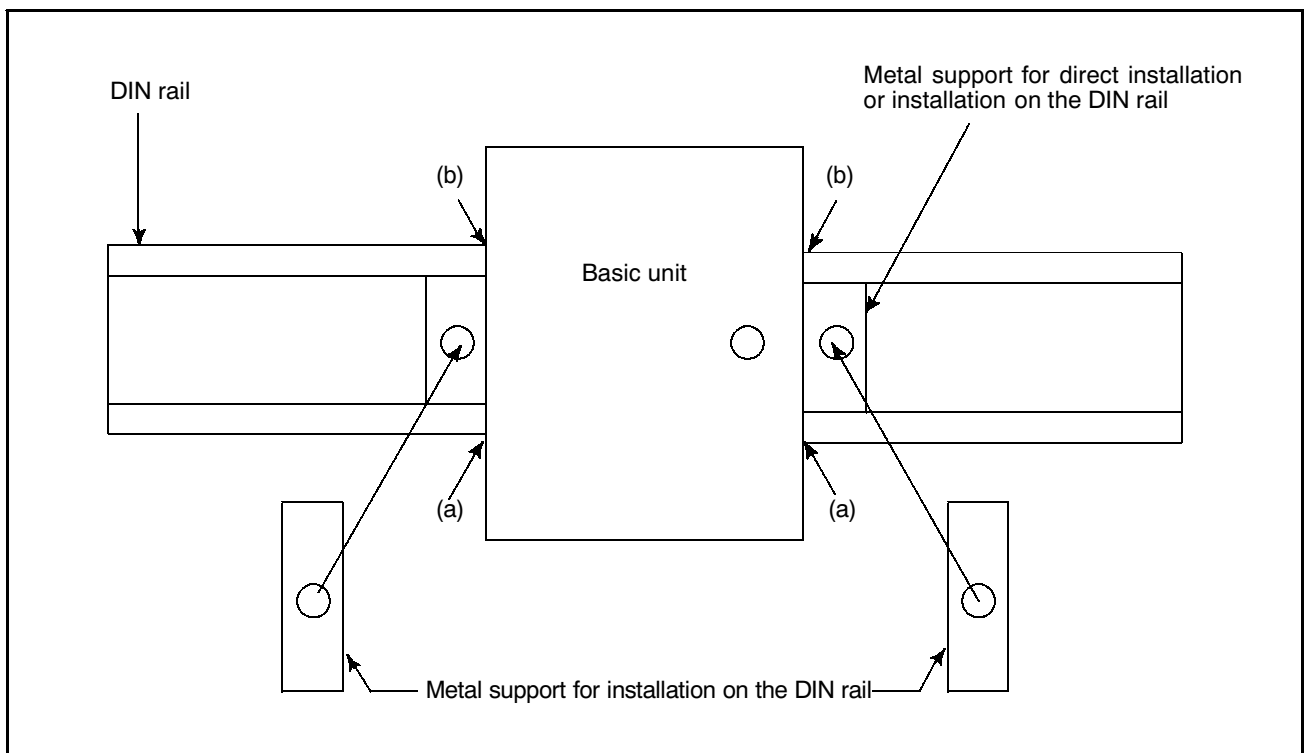


When the unit is installed on the DIN rail which is 35mm wide and 7.5mm high, the total height is 3mm greater than the dimension for direct installation. (See the figure below.)



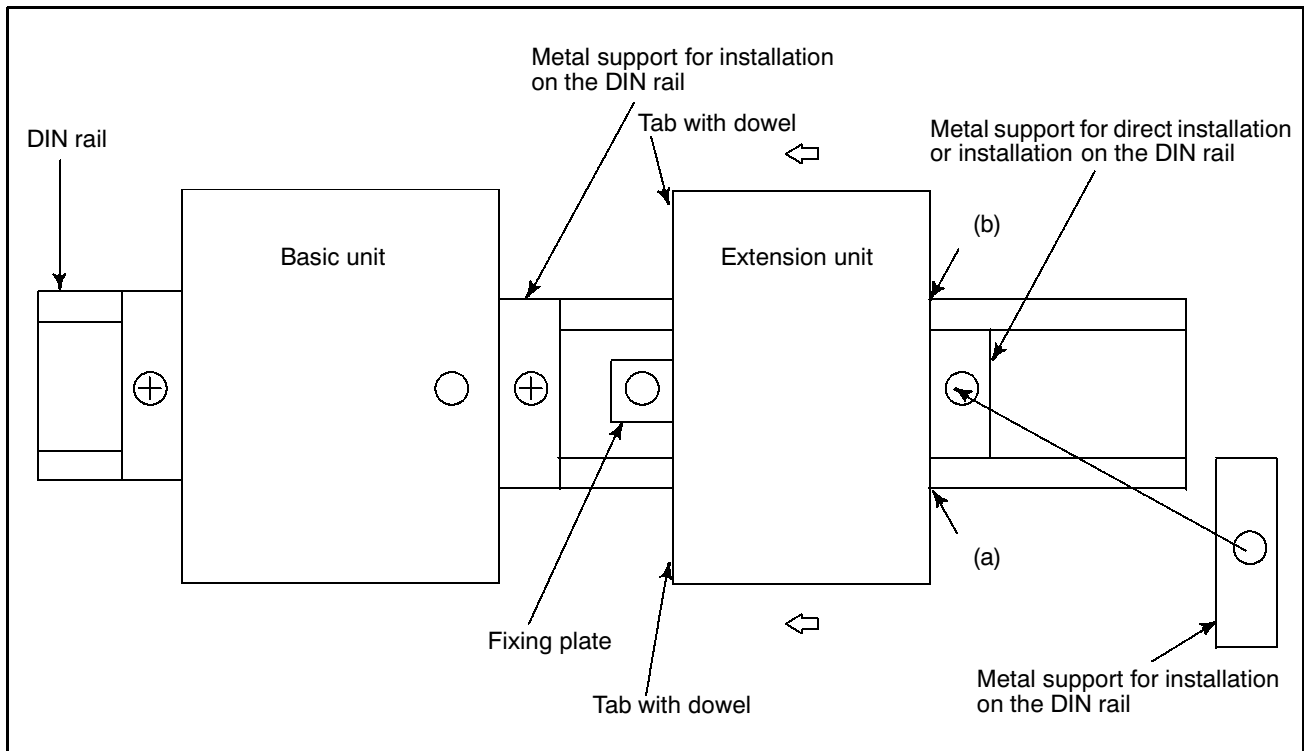
3.3 INSTALLING THE UNIT ON THE DIN RAIL (USE A RAIL THAT IS 35MM WIDE AND 7.5MM HIGH.)

3.3.1 Installing the Interface Unit or Basic Unit



- (1) Put the lower tabs (a) of the metal support for direct installation or installation on the DIN rail of the basic unit in the lower DIN rail. Raise the unit a little so that the upper tabs (b) are placed in the upper DIN rail. Pull down the unit (toward the (a) side) so that the upper tabs (b) are caught in the DIN rail.
- (2) Place the metal supports for installation on the DIN rail on the metal supports for direct installation or installation on the DIN rail. Then fasten the metal supports with screws.

3.3.2 Installing the Movable Basic Unit with an Extension Unit on the DIN Rail



- (1) Put the lower tab (a) of the metal support for direct installation or installation on the DIN rail of the extension unit in the lower DIN rail. Raise the unit a little so that the upper tab (b) is placed in the upper DIN rail. Pull down the unit (toward the (a) side) so that the upper tab (b) is caught in the DIN rail. Then, move the extension unit toward the basic unit and connect the two units.
- (2) Align the connectors of the extension unit and the basic unit. Move the extension unit in the direction of the arrow until the connectors mate with each other. Check whether the two tabs with dowels are in position.
- (3) Align the tapped hole of the fixing plate of the extension unit with the bolt hole of the basic unit. Then, fasten a screw to tightly connect the basic unit and extension unit with each other. (The screw is in the tapped hole of the fixing plate of the extension unit. Remove it from the tapped hole, and use it to connect the two units.)
- (4) Place the metal support for installation on the DIN rail on the metal support for direct installation or installation on the DIN rail. Fasten them with a screw.

3.4 INSTALLING THE IMMOVABLE BASIC UNIT WITH AN EXTENSION UNIT ON THE DIN RAIL

To install the basic unit with an extension unit so it cannot be moved, first install the basic unit with its right and left metal supports for direct installation or installation on the DIN rail. Then, install the extension unit.

3.5 HEAT VALUE OF EACH UNIT AND TERMINAL BOX

3.5.1 Heat Value of Each Unit

Heat value of each unit of I/O Unit-B is shown in table below.

Table 3.5.1 Heat value of each unit

Unit name	Basic heat value (W)	Heat value per 1 input (W/pt)	Heat value per 1 output (W/pt)
BIF04A1	1.6	-	-
AIF02C	1.2	-	-
BMD88A1	1.3	0.23	$0.13+0.3 \times IL^2$
BMD88B1	1.3	0.23	$0.13+0.3 \times IL^2$
BID16A1	1.5	0.23	-
BID16B1	1.5	0.23	-
BOD16A1	1.0	-	$0.13+0.3 \times IL^2$
BOD12A1	0.9	-	$0.09+1.1 \times IL^2$
BMD88P1	0.4	0.23	$0.13+0.3 \times IL^2$
BMD88Q1	0.4	0.23	$0.13+0.3 \times IL^2$
BID16P1	0.6	0.23	-
BID16Q1	0.6	0.23	-
BOD16P1	0.3	-	$0.13+0.3 \times IL^2$
BIA16P1	0.1	0.21	-

- IL : Load current of output
- Total “Heat value per 1 input” and “Heat value per 1 output” for simultaneous ON points plus “Basic heat value” is the heat value of the unit.

[Example of calculation]

When 6 points at 0.1A and 6 points at 0.5A for outputs and 12 points for inputs are used as to BMD88A1 and BMD88P1.

$$P = 1.3 + 0.4 + (0.13 + 0.3 \times 0.1^2) \times 6 + (0.13 + 0.3 \times 0.5^2) \times 6 + 0.23 \times 12 = 6.49(\text{W})$$

3.5.2 Terminal Box

Terminal box should be designed so that the value of the numerical expression described below can be less than 55°C when the units of I/O Unit-B are used in terminal box.

$$K \times P(\text{W}) \div S(\text{m}^2) + T_a(^{\circ}\text{C}) \leq 55(^{\circ}\text{C})$$

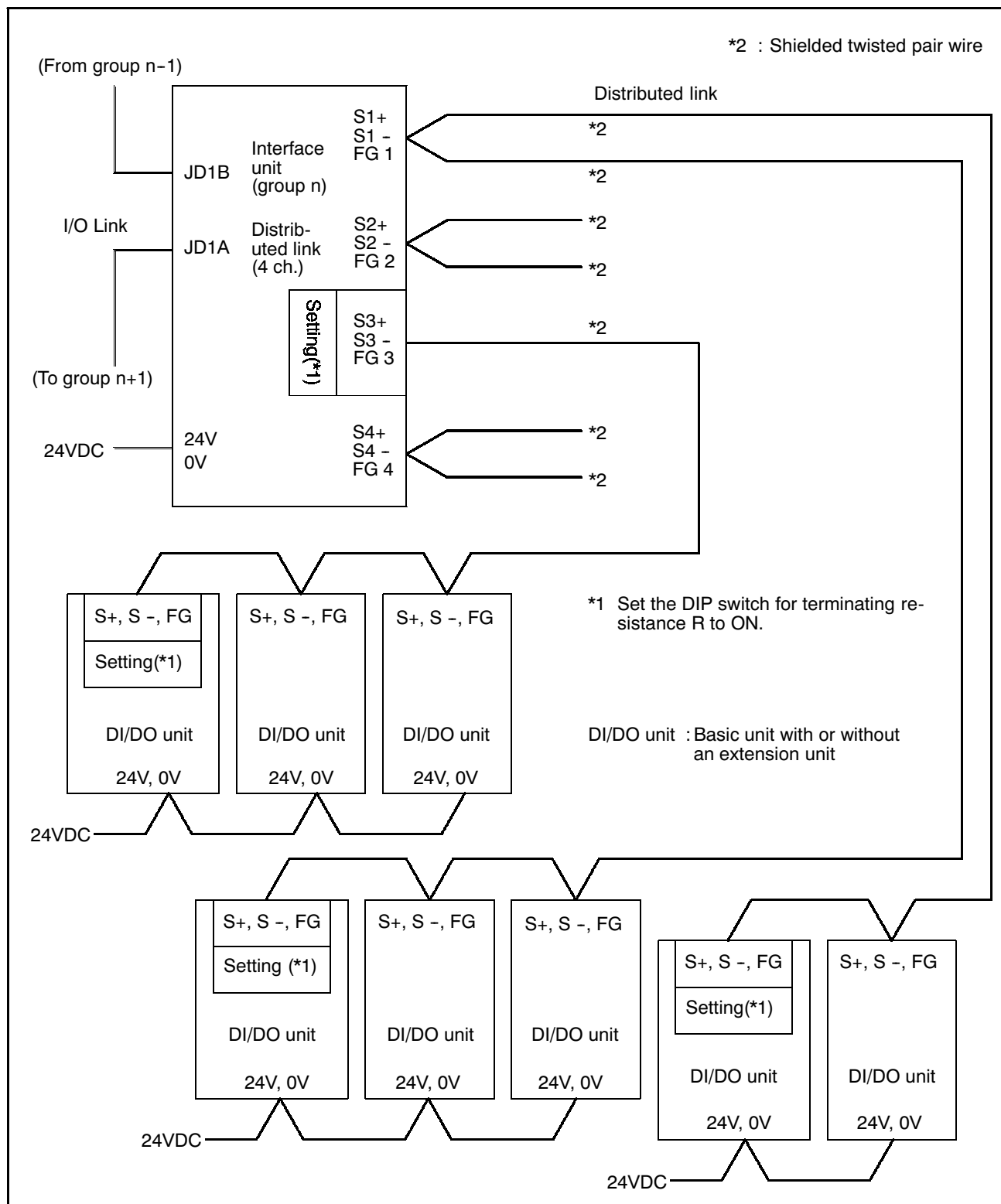
- K : Coefficient of temperature rise = $0.22 (^{\circ}\text{C} \cdot \text{m}^2/\text{W})$
- P : Total heat value in terminal box
- S : Surface dimensions of terminal box
- T_a : Ambient temperature around terminal box

4

CONNECTION



4.1 CONNECTION DIAGRAM



As for cable of I/O Link, refer to “CONNECTION·MAINTENANCE MANUAL (B-61813E) of FANUC I/O Unit-MODEL A”.

4.2 GROUND CONNECTION

Each unit of I/O Unit-B must be properly grounded. This is particularly important for the reasons listed below.

- A low resistance path from all parts of a system to earth minimizes exposure to shock in the event of short circuits or equipment malfunction.
- I/O Unit-B requires proper grounding in order to operate correctly.

If ground wire is needed, ground wire should be as short and as large as possible. Braided straps or ground cables can be used to minimize resistance. Conductors must always be large enough to carry the maximum short circuit current of the path being considered. (Ground wire must have the cross-sectional area of conductor in AC supply wire or larger. However, if the conductor of AC supply wire is narrow than 2mm², the conductor in ground wire must have 2mm² cross-sectional area or larger.)

4.2.1 Mounting the I/O Unit-B Directly to the Power Magnetics Cabinet

- (1) When the I/O Unit-B is mounted on a properly grounded metal portion of the power magnetics cabinet, it is grounded via a “Metal support for direct installation or installation on the DIN rail” (Refer to 3.3.1 and 3.3.2.). Be sure to fix the I/O Unit-B securely.
- (2) When the I/O Unit-B is mounted on a non metal or non grounded metal portion of the power magnetics cabinet, it is necessary to connect a ground wire to the “Metal support for direct installation or installation on the DIN rail” of a basic unit. It is necessary to connect a ground wire to the “Metal support for direct installation or installation on the DIN rail” of an extension unit. It is also necessary to connect the ground wires to substantial earth ground.

4.2.2 Mounting the I/O Unit-B on the DIN Rail

- (1) When a metal DIN rail is attached to a properly grounded metal portion, the I/O Unit-B is grounded via a “Metal support for direct installation or installation on the DIN rail”. Be sure to fix the I/O Unit-B securely.
- (2) When a nonmetal DIN rail is used, or a metal DIN rail is mounted onto a nongrounded plate, it is necessary to connect a ground wire to the “Metal support for direct installation or installation on the DIN rail” of a basic unit. It is necessary to connect a ground wire to the “Metal support for direct installation or installation on the DIN rail” of an extension unit. It is also necessary to connect the ground wires to substantial earth ground.

4.3 CONNECTION WITH THE I/O LINK

The interface unit is connected to the I/O Link. The interface unit is assumed to be group. The interface unit can be connected to any group. Up to 16 groups, namely up to 16 interface units, can be connected to a single I/O Link.

The interface unit is provided with two I/O Link connectors, JD1A and JD1B. The JD1B connector of the interface unit must be connected to the JD1A connector of the I/O Link master or that of a slave in the previous group.

The JD1A connector of the interface unit should be connected to the JD1B connector of the subsequent group. If the interface unit is connected to the last I/O Link group, keep the JD1A connector of the interface unit open.

4.3.1 Input/Output Points for the Interface Unit

The I/O Link has 1024 input points and 1024 output points, as viewed from the master. So, the total of input or output points that can be occupied by all slaves cannot exceed 1024. One I/O Link group has up to 256 input and output points. For the interface unit, however, the number of input points that can be occupied is limited to within 224, because 32 input points are already used for power on/off information. (The number of output points remains to be up to 256.)

The actual number of input/output points are:

Number of input points : Total number of input points of the input units and those of the input and output units.

Number of output points : Total number of output points of the output units and those of the input and output units.

The following tables list the number of I/O Link's input and output points occupied by an interface unit.

[Input points]

Total of actual input points usable for one interface unit	Number of occupied input points
0	32
8 to 32	64
40 to 96	128
104 to 224	256

NOTE

Even when the number of actual input points is 0, 32 input points are used for power on/off information.

[Output points]

Total of actual output points usable for one interface unit	Number of occupied output points
0 to 32	32
40 to 64	64
72 to 128	128
136 to 256	256

NOTE

When calculating the number of actual output points, assume that the BOA12A1 occupies 16 points.

If the number of input points occupied by an interface unit is less than the number of output points occupied by the same interface unit, it is assumed that the number of input points is equal to the number of output points.

4.3.2 Power On/Off Information

The number of input points occupied by a single interface unit is at least 32 more than the number of actual input points. Those 32 or more input points are used for the power on/off information. The table below gives the correspondence between the power on/off signals and unit numbers. When data is sent or received, the corresponding signal is set to 1. When the power is turned off, the corresponding signal is set to 0. When the system retries an operation and detects the predetermined number of errors or more errors than the predetermined number of errors, the error status is established and the ERINF signal is set to 1.

The detail of address assignment for power on/off information are described in “II PMC Programing 3.1 (2)” on this manual.

ADDRESS	7	6	5	4	3	2	1	0
Xn	No.8	No.7	No.6	No.5	No.4	No.3	No.2	No.1
Xn+1	No.16	No.15	No.14	No.13	No.12	No.11	No.10	No.9
Xn+2	No.24	No.23	No.22	No.21	No.20	No.19	No.18	No.17
Xn+3	ERINF		No.30	No.29	No.28	No.27	No.26	No.25

4.4 CONNECTING A DISTRIBUTED LINK

4.4.1 Branching the Communications Cable

The interface unit has four communications terminals, or channels, for distributed links. (See Section 4.1, "Connection Diagram.") Two communications cables (shielded twisted pair wire) can be connected to each channel. To a single interface unit, up to eight communications cables can be connected.

4.4.2 Communications Distance

The total length of cables connected to a single channel must be 100m or less. (When two communications cables are connected to a single channel, the total length of the two cables combined must not exceed 100m.)

4.4.3 Connecting DI/DO Units

A total of 30 DI/DO units can be connected to the four channels.

Examples

When 30 units are connected to the first communications cable : No units can be connected to the second to eighth cables.

When 10 units are connected to the first communications cable, 15 units to the second, and 5 units to the third : No units can be connected to the fourth to eighth cables.

4.4.4 Installing a Terminating Resistor

When a single communications cable is connected to a single channel, install terminating resistors on both the interface unit and the basic unit on the other end of the communications cable. The terminating resistor can be connected by setting the DIP switch.

When two communications cables are connected to a single channel, install terminating resistors on both basic units connected at the end of the cables. (Do not install the terminating resistor on the interface unit.) The terminating resistor can be connected by setting the DIP switch.

Install a terminating resistor on an unused channel.

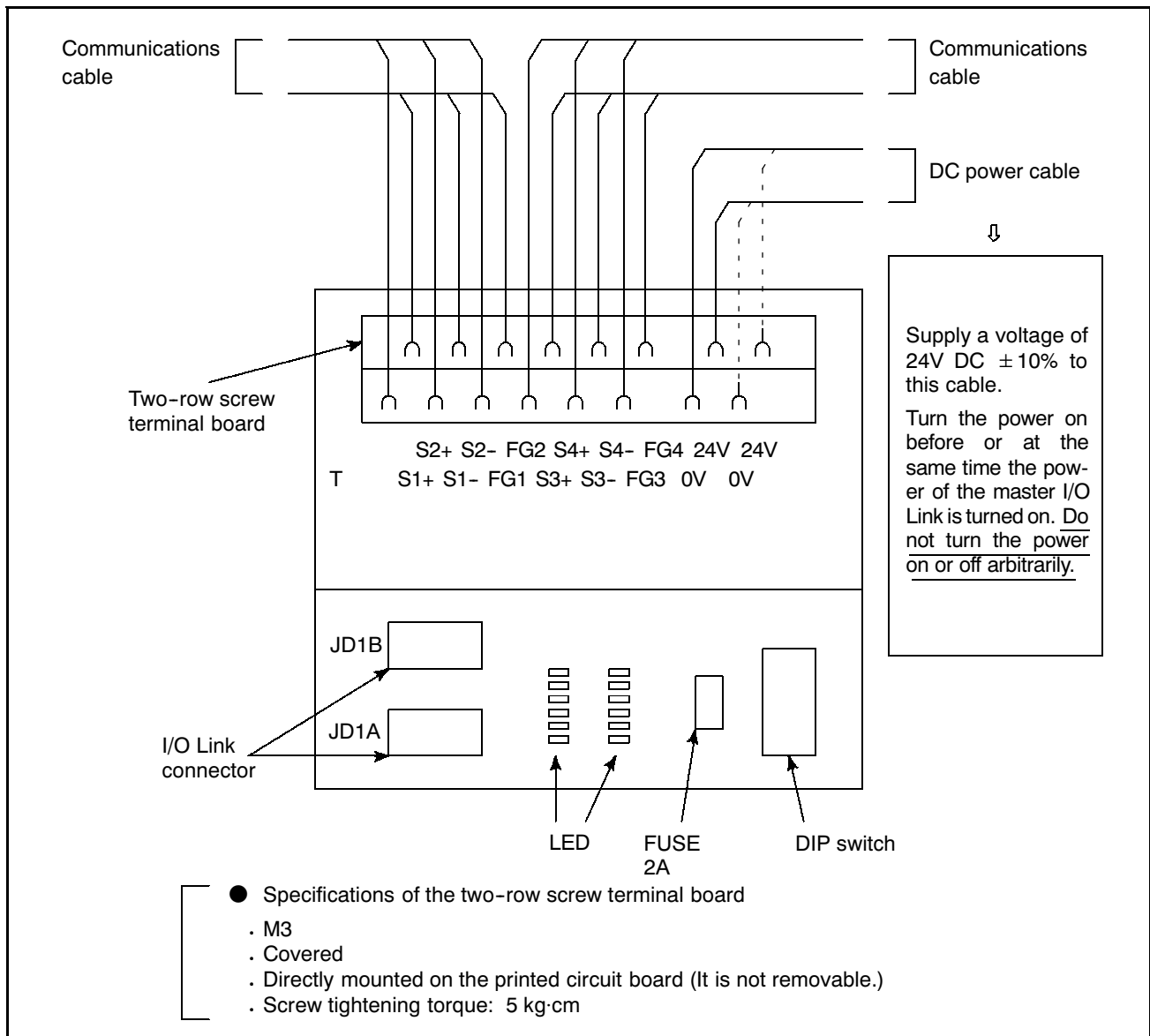
4.4.5 Unit Number

All DI/DO units must have unique unit numbers even if they are connected to different channels.

4.5 CONNECTING THE INTERFACE UNIT

Connect the I/O Link cable from the previous group to JD1B. Connect the I/O Link cable to the next group to JD1A. (For details of the connection of the I/O Link, refer to Chapter 1, "FANUC I/O Link" of the "FANUC I/O Unit-MODEL A, Connection Maintenance Manual.")

Connect the communications cable of a distributed link to any of the four terminal groups : S1+, S1- and FG1, S2+, S2- and FG2, S3+, S3- and FG3 and S4+, S4- and FG4. Connect the power cable to either pair of 24V and 0V terminals.



FUSE specification

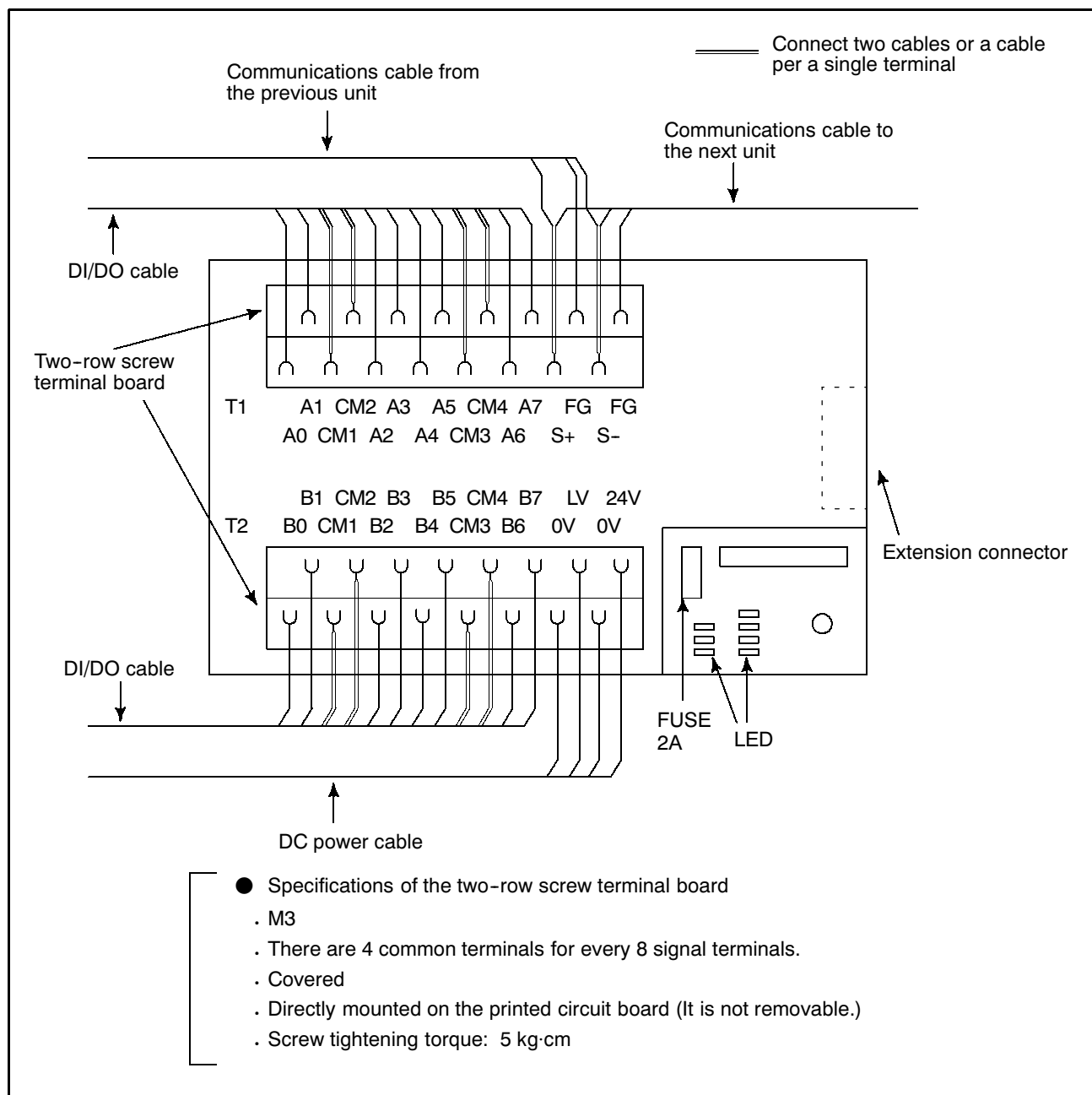
Rating	Part number	Manufacturer
2A	LM20	Daito Communication Apparatus Co.

NOTE

The two-row screw terminal board has terminal numbers (starting at A1 and B1) marked on its resin portion. These numbers do not match the terminal names printed on the case.

4.6 CONNECTING THE BASIC UNIT

- (1) DC input and output unit, DC output unit, DC input unit.
Refer to 4.6.1, 4.6.2 and 4.6.3 as to detailed wiring.



FUSE specification

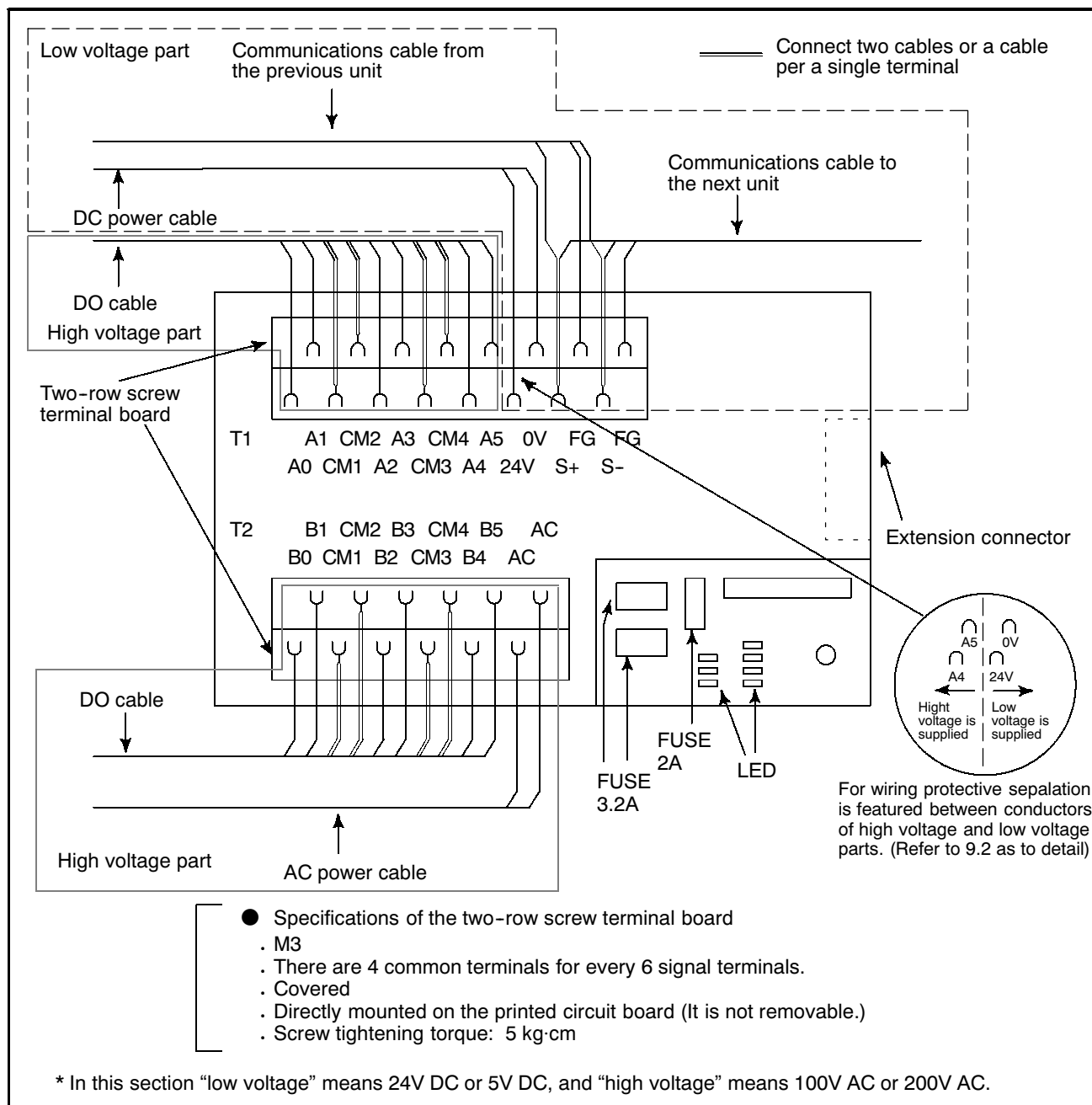
Rating	Part number	Manufacturer
2A	LM20	Daito Communication Apparatus Co.

NOTE

The two-row screw terminal board has terminal numbers (starting at A1 and B1) marked on its resin portion. These numbers do not match the terminal names printed on the case.

(2) AC output unit.

Refer to 4.6.1, 4.6.2, 4.6.3 and 9.2 as to detailed wiring.

**FUSE specification**

Rating	Part number	Manufacturer
2A	LM20	Daito Communication Apparatus Co.
3.2A	HM32	

NOTE

The two-row screw terminal board has terminal numbers (starting at A1 and B1) marked on its resin portion. These numbers do not match the terminal names printed on the case.

4.6.1 Connecting the DI/DO Cable

See the connection diagram of each basic unit in Section 7.2, “Specifications of the Basic and Extension Units.”

The recommended terminal screw tightening torque is 5 kg·cm.

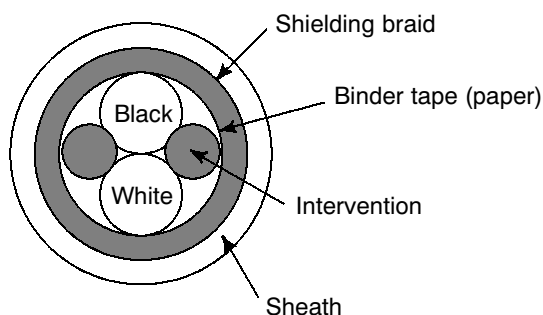
4.6.2 CommunicationCable

4.6.2.1 Communication cable specification

Use the following recommended twisted pair cable for the communication line.

Recommended cable

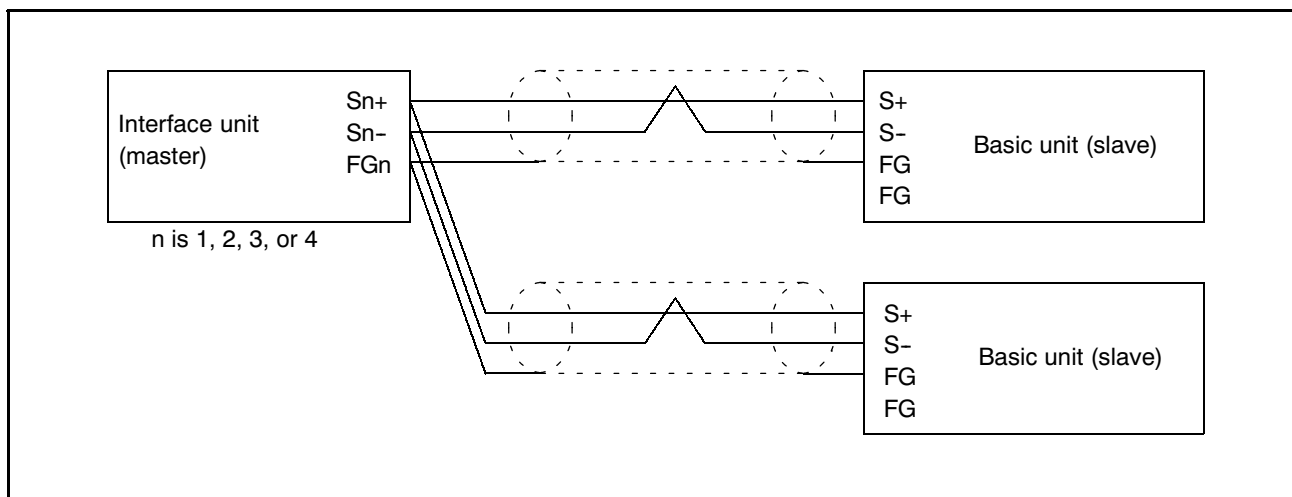
Specification code : A66L-0001-0344
 Manufacturer : Oki Electric Cable Co., Ltd.
 Product code : 2 x 20/0.18A PEF40X-SV K
 Remark : 1P x 0.5 mm²
 Characteristics : See the following table.



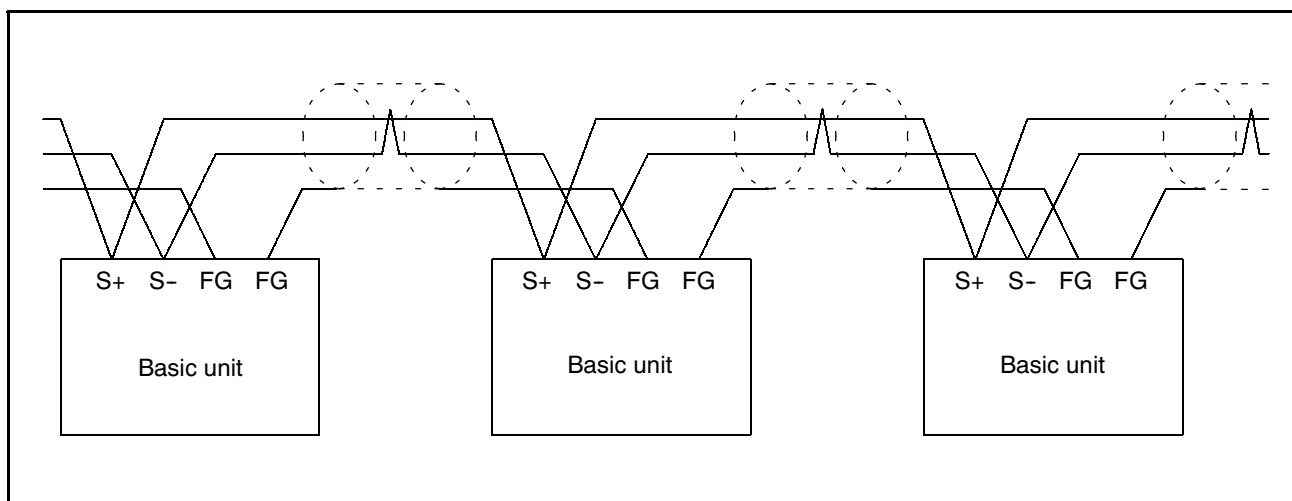
Item		Characteristic
Electrical performance	Conductor resistance	37 Ω /km or less
	Insulation resistance	1000 MΩ km or greater
	Withstand voltage	500 VAC or higher
	Characteristic impedance (typical)	105 Ω
	Capacitance (for reference only)	44pF/m
Conductor	Structure	20 conductors/0.18 mm
	External diameter (typical)	0.93 mm
Insulation	Color	White and black
	Thickness (typical)	0.58 mm
	External diameter (typical)	2.1 mm
Pair twisting	Structure	White and black
	Twisting direction	Clockwise
	Taping	Twisted pair wrapped with binder tape (paper)
	External diameter (typical)	4.2 mm
Shielding braid	Strand diameter (typical)	0.1 mm
	Braiding density (typical)	80 %
	External diameter	4.8 mm
Sheath	Color	Black
	Thickness	1.0 mm or greater
	External diameter (typical)	7 mm

4.6.2.2 Connecting the communications cable

Connect the communications cable coming from the interface unit to the S+ and S- terminals of the basic unit. Connect the FG terminal of the interface unit to one of the two FG terminals of the basic unit.



Between basic units, connect the S+ and S- terminals of a basic unit to the corresponding terminals of the next unit. Connect the FG terminal of the previous basic unit to one of the two FG terminals of the basic unit. Then, connect the other FG terminal of the basic unit to one of the two FG terminals of the next basic unit as shown below. FG should be connected at both ends to eliminate high frequency noise.



4.6.3 Connecting the Power Cable

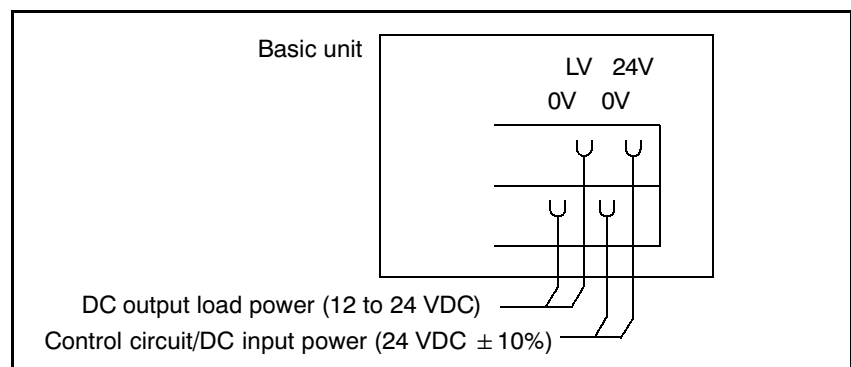
4.6.3.1 DC input and output unit, DC output unit, DC input unit

Supply power to the control circuit/DC inputs (24V/0V), and DC output loads (LV/0V).

For the control circuit/DC inputs, apply 24 VDC $\pm 10\%$ between 24V and 0V. The voltage applied between these terminals is fed to the control circuit (basic unit) and the DC inputs (basic and extension units). External power need not be supplied to the DC inputs, because internal power is supplied to them. (See Section 7.2.)

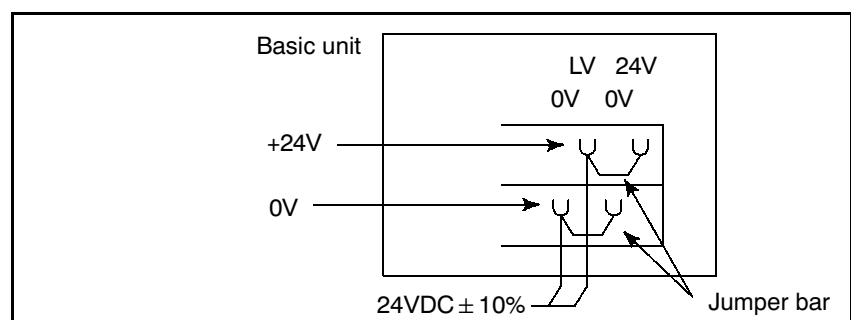
This power supply can be turned on and off at any time. The DI point of the PMC (Programmable Machine Control) can be used to check whether the power of each unit is on or off. (See Section 4.3.2.) If the power for the control circuit/input circuit is off, all DI points are assumed to be 0. The power for the DC output load is used to drive the load connected to the DC output. For the DC input and output unit and the DC output unit, apply 12 to 24 VDC between LV and 0V. For the DC input unit, load power for LV and 0V need not be supplied.

- (1) If separate power supplies are used for the control circuit/DC input and the DC output load



If the basic unit contains only DC inputs, the DC output load power need not be connected.

- (2) If the same power supply is used for both the control circuit/DC input and the DC output load (Note that a sufficient power source must be provided based on load device requirements.)



Connect the control circuit/DC input power terminals to the DC output load power terminals on the terminal board by installing jumper bars.

4.6.3.2

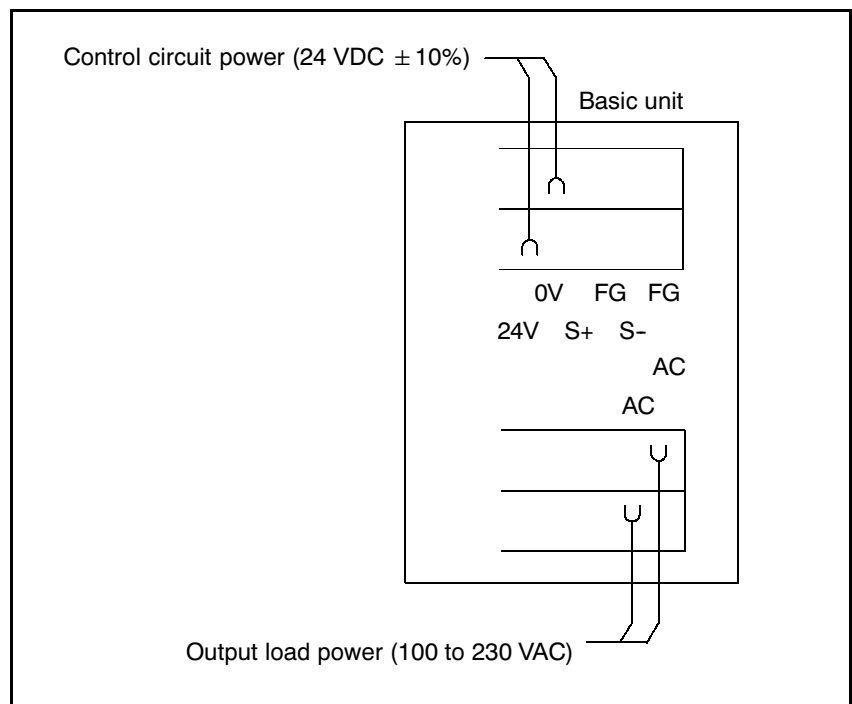
AC output unit

Supply power to the control circuit and AC output load.

For the control circuit of a unit, apply 24 VDC $\pm 10\%$ between 24V and 0V. The voltage applied between 24V and 0V is fed to the control circuit.

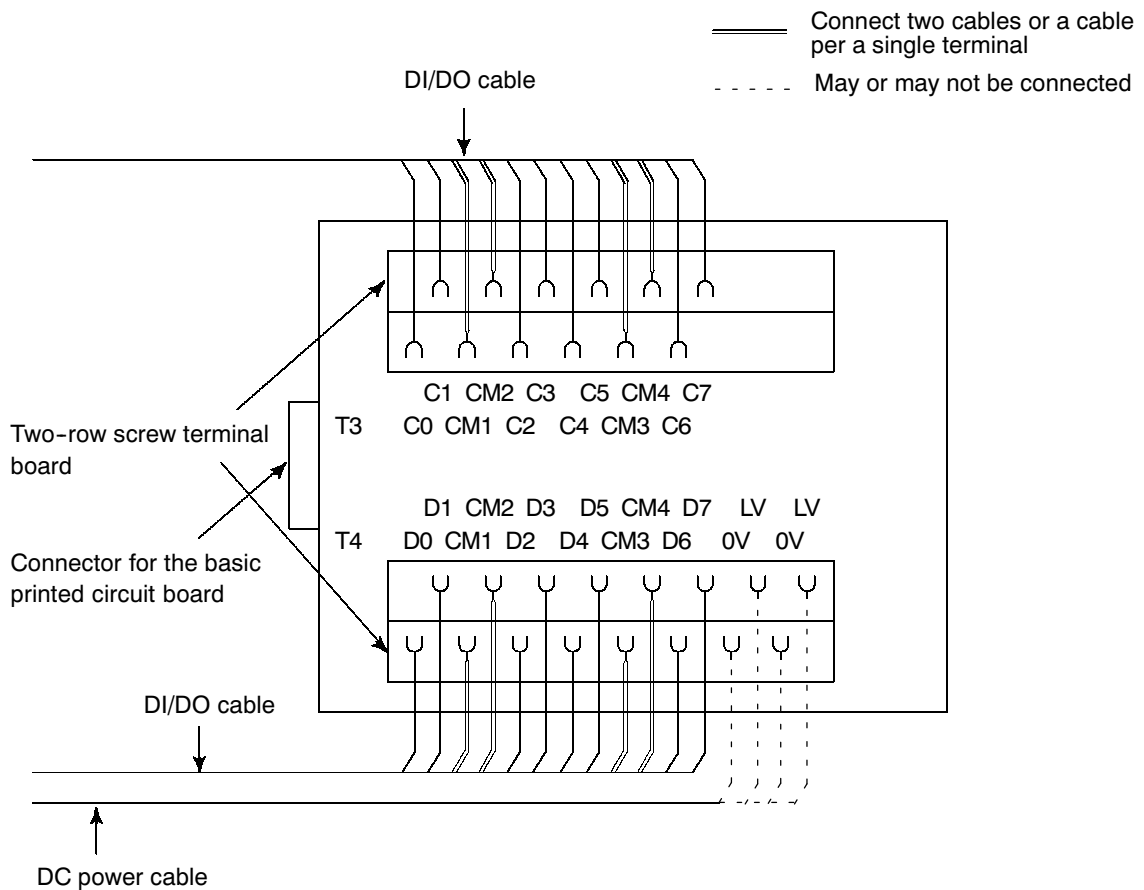
This power supply can be turned on and off at any time. The DI point of the PMC can be used to check whether the power of each unit is on or off. (See Section 4.3.2.)

The power for the AC output load is used to drive the load connected to the AC output. Apply 100 to 230 VAC between AC and AC.



4.7 CONNECTING THE EXTENSION UNIT

- (1) DC input and output unit, DC output unit, DC input unit
Refer to 4.7.1 and 4.7.2 as to detailed wiring.



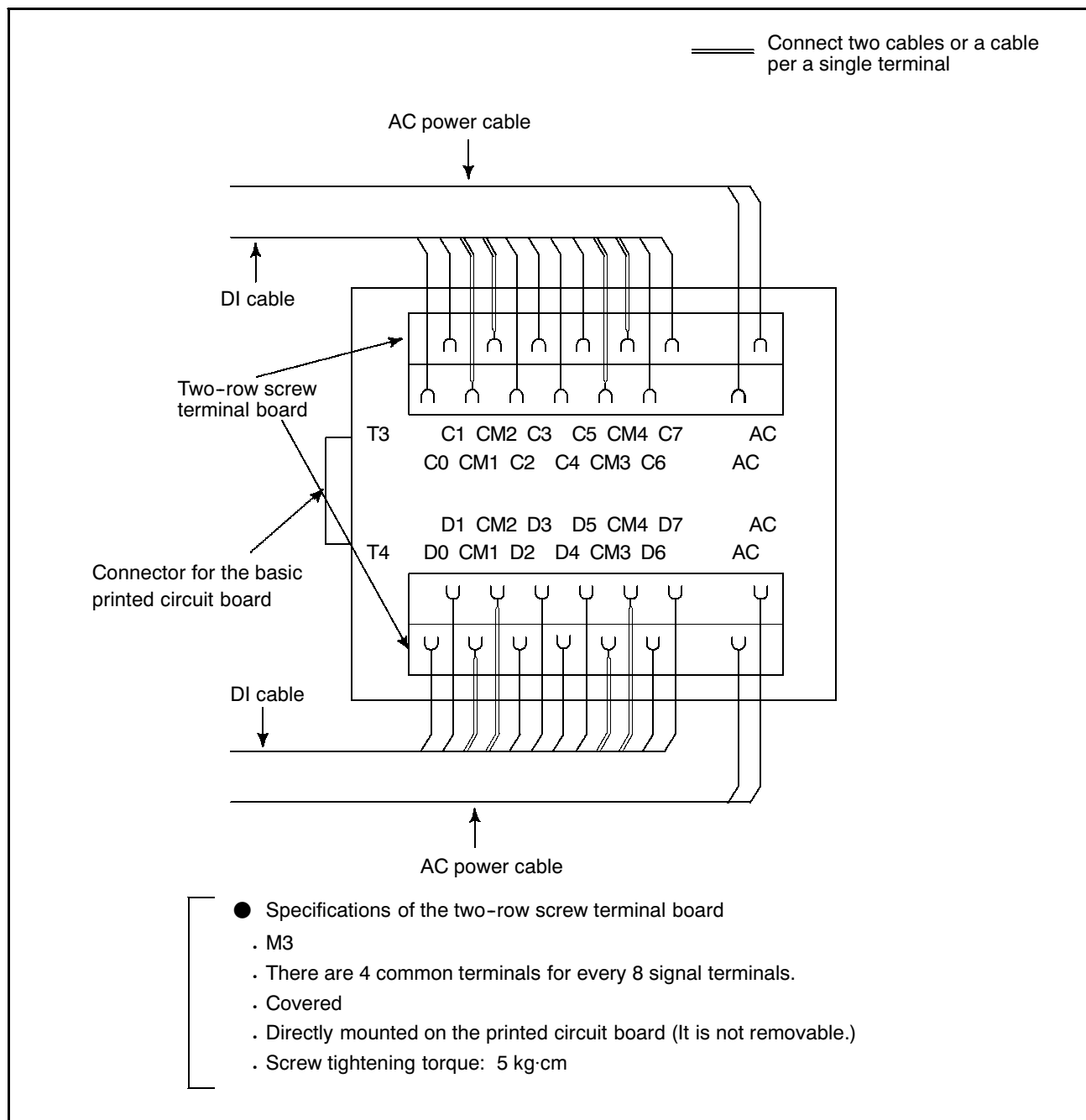
- Specifications of the two-row screw terminal board
 - . M3
 - . There are 4 common terminals for every 8 signal terminals.
 - . Covered
 - . Directly mounted on the printed circuit board (It is not removable.)
 - . Screw tightening torque: 5 kg·cm

NOTE

The two-row screw terminal board has terminal numbers (starting at A1 and B1) marked on its resin portion. These numbers do not match the terminal names printed on the case.

(2) AC input unit.

Refer to 4.7.1 and 4.7.2 as to detailed wiring.

**NOTE**

The two-row screw terminal board has terminal numbers (starting at A1 and B1) marked on its resin portion. These numbers do not match the terminal names printed on the case.

4.7.1 Connecting the DI/DO Cable

See the connection diagram of each extension unit in Section 7.2, “Specifications of the Basic and Extension Units.”

The recommended terminal screw tightening torque is 5kg·cm.

4.7.2 Connecting the Power Cable

4.7.2.1 DC input and output unit, DC output unit, DC input unit

The DC output load power supply is used to drive the load connected to the DC output. For the DC input and output unit and the DC output unit, apply 12 to 24 VDC between LV and 0V. For the DC input unit, power need not be supplied.

If the control circuit/DC input circuit power for the basic unit is turned off, all DI points are assumed to be 0.

- (1) When only DC input points are used

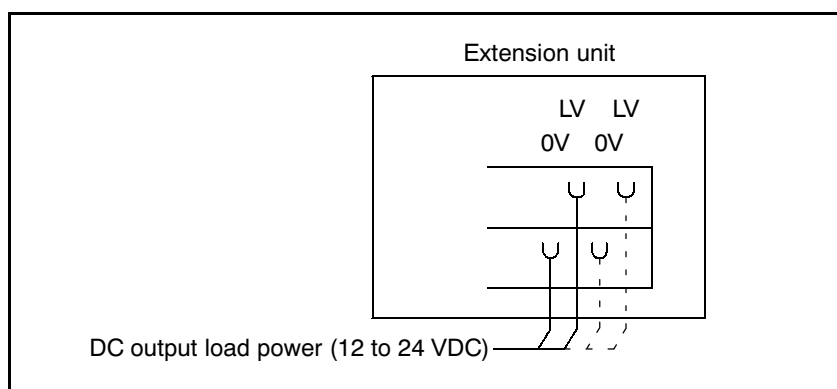
The DC output load power need not be connected.

- (2) When DC output points are used

Connect 12 to 24 VDC between LV and 0V as DC output load power. Use either of the following connection method according to the load current.

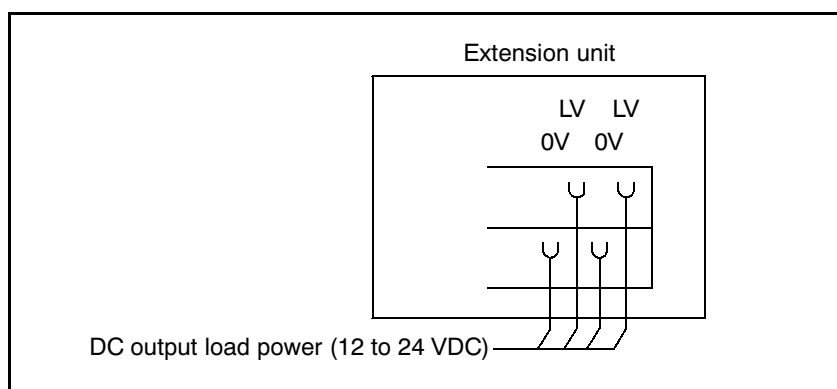
- 1) If the DC output load current is below 8 A

Connect the DC output load power to either set of LV and 0V.



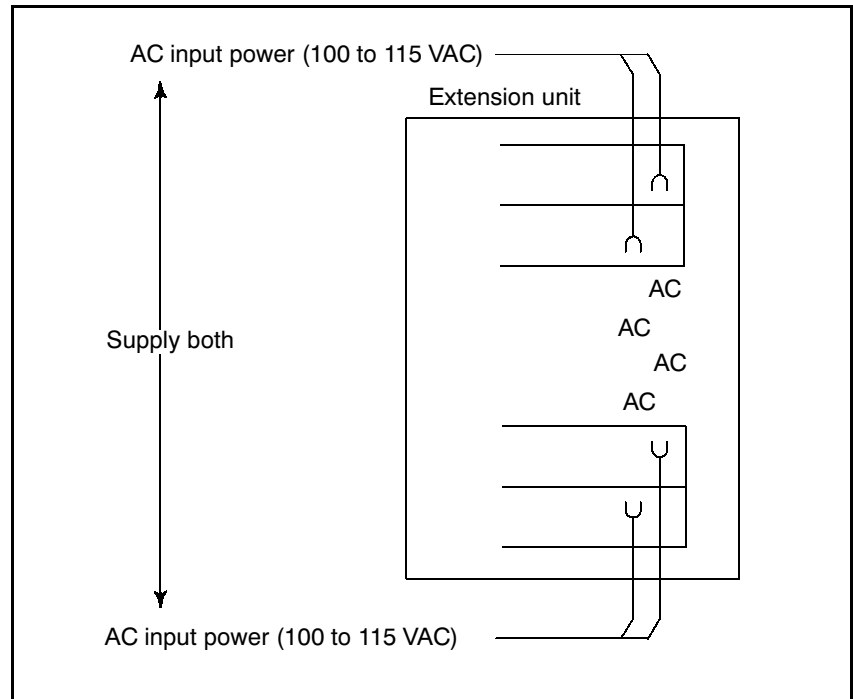
- 2) If the DC output load current is 8 A or above

Connect the DC output load power to both sets of LV and 0V.



4.7.2.2 AC input unit

Connect 100 to 115 VAC between AC and AC as AC input power.



4.8 POWER SUPPLY CAPACITY OF EACH UNIT

The power supply capacity (consumption current) of 24 volts supplied to each unit is shown table 4.8.

Table 4.8 Power supply capacity of each unit

Unit name	Basic current (mA)	Rated current (Input) (W/pt)	Rated current (Output) (W/pt)
BIF04A1	65	-	-
AIF02C	50	-	-
BMD88A1	55	9	5.5
BMD88B1	55	9	5.5
BID16A1	60	9	-
BID16B1	60	9	-
BOD16A1	40	-	5.5
BOD12A1	35	-	4
BMD88P1	15	9	5.5
BMD88Q1	15	9	5.5
BID16P1	25	9	-
BID16Q1	25	9	-
BOD16P1	10	-	5.5
BIA16P1	5	9	-

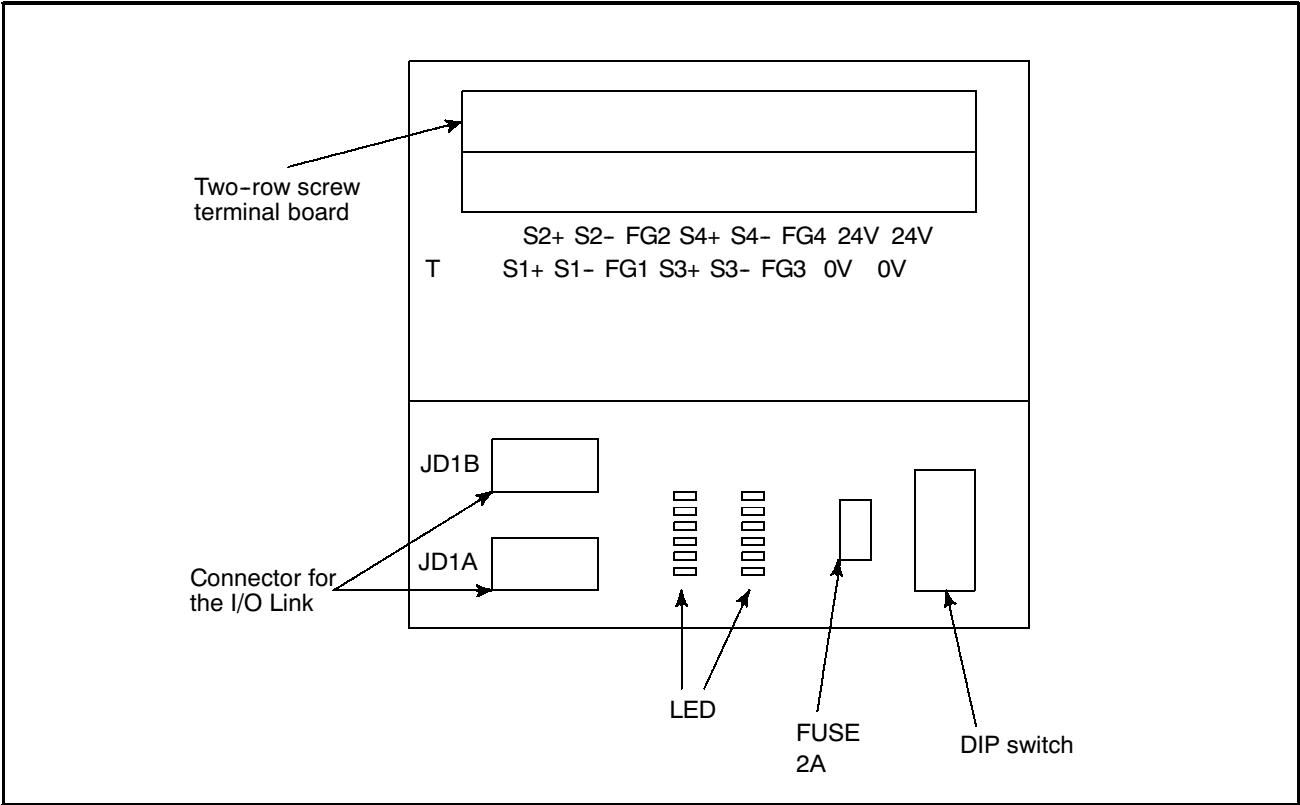
5

SETTING THE INTERFACE AND BASIC UNITS, AND LED INDICATIONS



5.1

INTERFACE UNIT

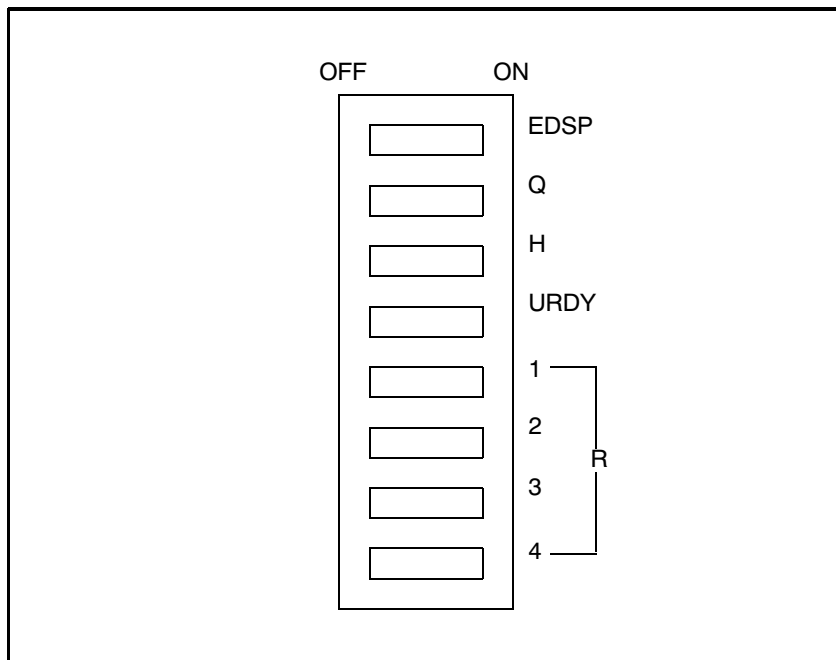


FUSE specification

Rating	Part number	Manufacturer
2A	LM20	Daito Communication Apparatus Co.

5.1.1 Setting the DIP Switch

The interface unit has the DIP switch shown below. The following sections describe the functions of the switches on the DIP switch.



5.1.1.1 EDSP (selecting the error display method)

- ON : Always select the ON position.
(An error LED may flash during operation.)
- OFF : Do not select the OFF position.

5.1.1.2 Q and H (setting the communication speed)

The communication speed is 1.2Mbps. The same setting must be made on the interface unit and all basic units.

Q	H	Communication speed
OFF	OFF	1.2 Mbps

5.1.1.3 URDY (setting the power on/off information of each unit)

This switch is set to display the power on/off information of each basic unit with 32 DI points (four bytes).

- ON : Do not select the ON position.
- OFF : Always select the OFF position.

5.1.1.4 R (installing a terminating resistor)

When only one communications cable is connected to a communications channel of the interface unit, a terminating resistor must be installed. The interface unit has a built-in terminating resistor, which can be selected by the R switches. For the setting conditions, see Section 4.4.4, "Installing a terminating resistor."

Communications channel	R	
	Terminating resistor is provided	Terminating resistor is not provided
S1	(1) ON	(1) OFF
S2	(2) ON	(2) OFF
S3	(3) ON	(3) OFF
S4	(4) ON	(4) OFF

5.1.2 LED Indications

PWR	<input type="checkbox"/>	(Green)	M/S	<input type="checkbox"/>	(Green)
LKI	<input type="checkbox"/>	(Green)	16	<input type="checkbox"/>	(Green)
LKD	<input type="checkbox"/>	(Green)	8	<input type="checkbox"/>	(Green)
ER2	<input type="checkbox"/>	(Red)	No. 4	<input type="checkbox"/>	(Green)
ER1	<input type="checkbox"/>	(Red)	2	<input type="checkbox"/>	(Green)
ER0	<input type="checkbox"/>	(Red)	1	<input type="checkbox"/>	(Green)

- PWR : Lights when the power is turned on.
- LKI : Lights when the unit communicates with the master I/O Link.
- LKD : Lights when the unit communicates with a basic unit. (The color of the light is dim when the interface unit is connected to a small number of basic units.)
- ER0, ER1, ER2: Lights when an error occurs.
- M/S : If an error occurs, this LED is used to indicate the unit where the error is detected. The meaning of the LED indication is as follows:
 - ON : The error is detected in the interface unit.
 - OFF : The error is detected in the basic unit.
- Nos. 1, 2, 4, 8, 16 : Indicate the number of the unit in which the error is detected.

Examples
○ - ON
× - OFF

No.					Unit number
16	8	4	2	1	
×	×	×	×	○	1
×	×	○	×	○	5
×	○	×	○	×	10
○	×	○	×	×	20

When unit number LEDs 1 to 16 are off (o = on, x = off) and M/S is on, it means one of the following errors detected in the Interface unit.

M/S	ER2	ER1	ER0	Error	Description	Major cause of error
○	×	×	○	Interface unit peripheral error	The interface unit is abnormal.	Interface unit defective
○	×	○	×	Interface unit RAM parity error	The interface unit is abnormal.	Interface unit defective
○	○	×	×	I/O link error reception	An error occurred in a unit connected to the I/O link.	Another unit connected to the I/O link is defective.
○	○	×	○	I/O link framing error	The communication end signal in the I/O link is abnormal.	_____
○	○	○	×	I/O link CRC error	Communication data in the I/O link is abnormal.	_____
○	○	○	○	Interface unit watchdog error	I/O link communication with the host was interrupted.	_____

When unit number LEDs 1 to 16 are on (o = on, x = off), it means one of the following Basic unit errors.

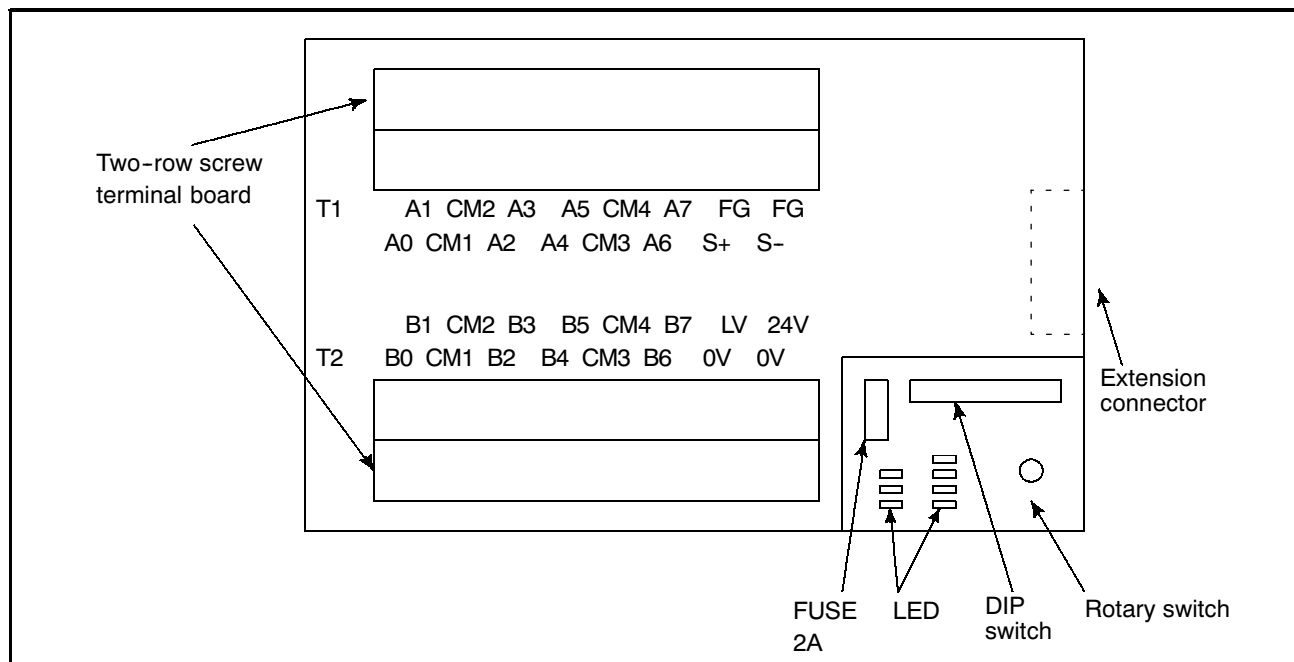
M/S	ER2	ER1	ER0	Error	Description	Major cause of error
×	×	×	○	Basic unit peripheral error	The basic unit is abnormal.	Basic unit defective
○	×	○	×	Basic unit number error	A unit with a wrong number responded to the interface unit.	_____
×	×	○	○	Basic unit reception data count error	The number of communication bytes is greater than 4.	Two or more units have the same unit number, or the terminator has not been set correctly.
×○ (*1)	○	×	×	Basic unit framing error	The communication end signal is abnormal.	Two or more units have the same unit number, or the terminator has not been set correctly.
×○ (*1)	○	×	○	Basic unit DMI error	The communication waveform was disturbed.	Two or more units have the same unit number, or the terminator has not been set correctly.
×○ (*1)	○	○	×	Basic unit CRC error	Communication data is abnormal.	Two or more units have the same unit number, or the terminator has not been set correctly.
×	○	○	○	Basic unit watchdog error	Communication with the interface unit was interrupted.	_____

NOTE

*1 When the M/S LED is on, it indicates that the error was detected in the interface unit. When it is off, it indicates that the error was detected in the basic unit.

5.2 BASIC UNIT

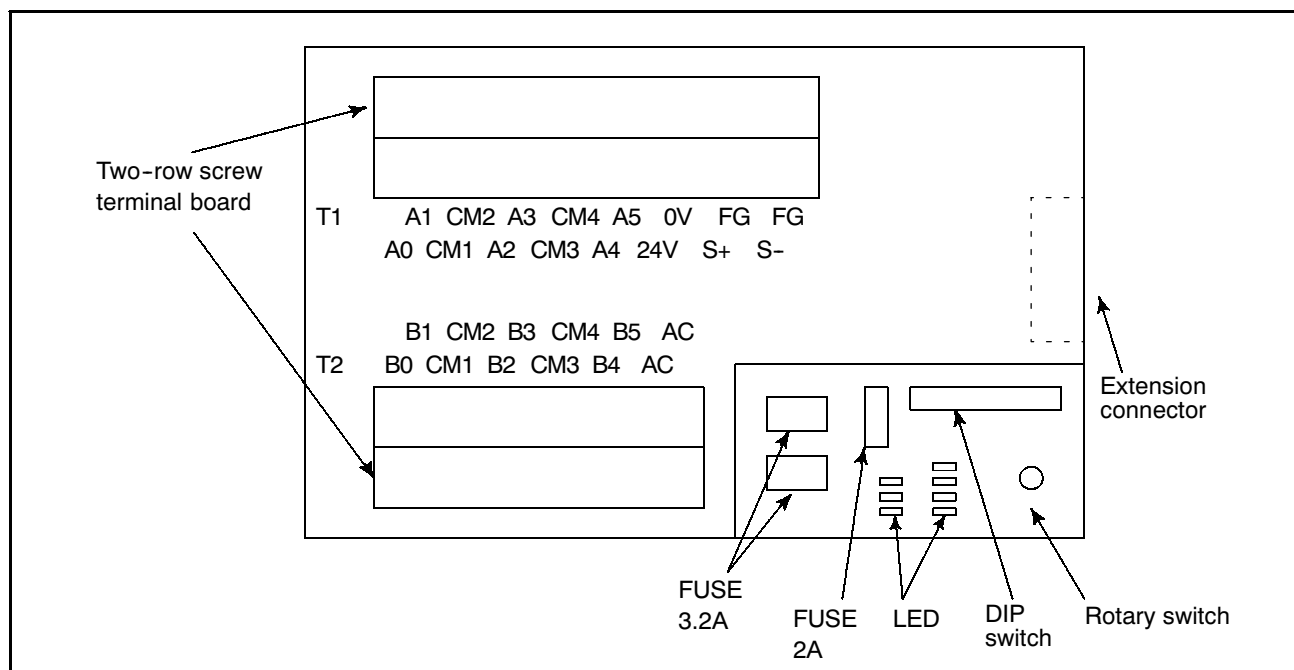
(1) DC input and output unit, DC output unit, DC input unit



FUSE specification

Rating	Part number	Manufacturer
2A	LM20	Daito Communication Apparatus Co.

(2) AC output unit

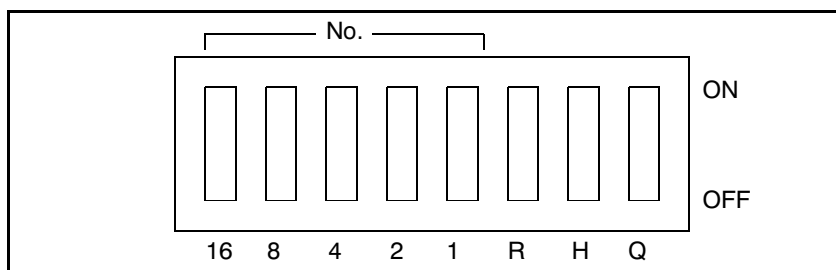


FUSE specification

Rating	Part number	Manufacturer
2A	LM20	Daito Communication Apparatus Co.
3.2A	HM32	

5.2.1 Setting the DIP Switch

The basic unit has the DIP switch shown below. The following sections describe the functions of the switches on the DIP switch.



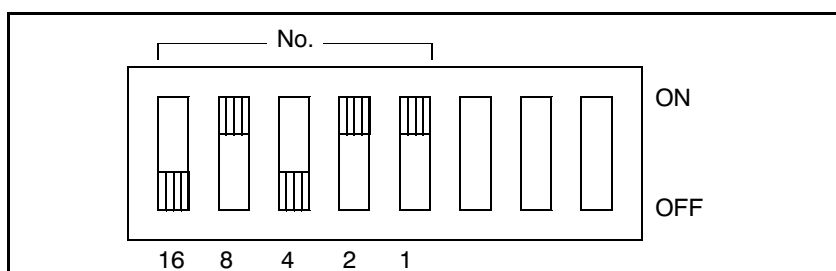
5.2.1.1 Switches 1, 2, 4, 8, and 16 (setting the unit number)

Switches 1, 2, 4, 8, and 16 set a unit number. Specify a desired unit number with these switches.

Examples

Unit number	Settings				
	16	8	4	2	1
1	OFF	OFF	OFF	OFF	ON
5	OFF	OFF	ON	OFF	ON
10	OFF	ON	OFF	ON	OFF
15	OFF	ON	ON	ON	ON
20	ON	OFF	ON	OFF	OFF
25	ON	ON	OFF	OFF	ON
30	ON	ON	ON	ON	OFF

Sample setting: To specify unit number 11, set switches 1, 2, 4, 8, and 16 switches as shown below:



5.2.1.2 R (installing a terminating resistor)

A terminating resistor must be installed on the basic unit at the end of the communications cable. The basic unit has a built-in terminating resistor, which can be connected by the R switch of the DIP switch. (Refer to section 4.4.4)

ON : The terminating resistor is provided.

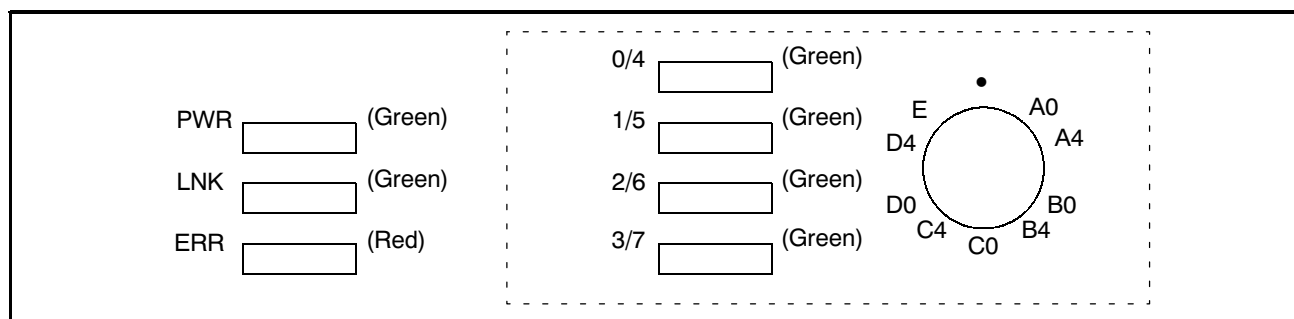
OFF : The terminating resistor is not provided.

5.2.1.3 Q and H (setting the communication speed)

The communication speed is 1.2Mbps. The same setting must be made on the interface unit and all basic units.

Q	H	Communication speed
OFF	OFF	1.2 Mbps

5.2.2 LED Indications



- PWR : Lights when the power is turned on.
- LNK : Lights when the unit communicates with the interface unit.
- ERR : Lights when an error occurs.
- 0/4, 1/5, 2/6, 3/7 : Indicate the setting of the rotary switch.

(1) When the rotary switch is set to the dot (●)

The LEDs do not light.

(2) When the rotary switch is set to one of A0 to D4

The LEDs indicate whether the input or output is on or off. (On : The LED lights. Off : The LED goes off.) When the rotary switch is set to x0 (x=A-D), the LEDs indicate the states of the corresponding four points, x0 to x3. When the rotary switch is set to x4, the LEDs indicate the states of the corresponding four points, x4 to x7. See below.

Example

When A0 is selected

The 0/4 LED corresponds to A0

The 1/5 LED corresponds to A1

The 2/6 LED corresponds to A2

The 3/7 LED corresponds to A3

When A4 is selected

The 0/4 LED corresponds to A4

The 1/5 LED corresponds to A5

The 2/6 LED corresponds to A6

The 3/7 LED corresponds to A7

(3) When the rotary switch is set to E

The LEDs indicate the details of the error.

(○ : The LED is on. - : The LED is off.)

3/7	2/6	1/5	0/4	Error	Description
-	-	-	-	-	When the ERR LED is off : The unit is correct.
-	-	-	-	Watch-dog error	When the ERR LED is on : The communication with the interface unit was cut off.
-	-	-	○	Peripheral error	The basic unit is defective.
-	-	○	○	Watch-dog error	The communication with the interface unit was cut off.
-	○	-	-	CRC error	The communication data is illegal.
-	○	-	○	DMI error	The communication waveform was corrupted.
-	○	○	-	Framing error	The communication termination signal is illegal.
-	○	○	○	Illegal number of received data items	The number of communication bytes exceeds four.

6 UNITS

Type				Name	Unit specification number	PC board specification number
Interface unit (4ch.)				BIF04A1	A03B-0808-C001	A20B-8000-0820
Interface module (1ch, I/O Unit-MODEL A built-in type) (*1)				AIF02C	A03B-0807-C013	A20B-8000-0710
Basic	DC input and output	DC 8 input points and DC 8 output points	20ms, POS/0. 6A, POS	BMD88A1	A03B-0808-C010	A20B-8000-0750
			2ms, POS/0. 6A, POS	BMD88B1	A03B-0808-C011	A20B-8000-0751
	DC input	DC 16 input points	20ms, POS	BID16A1	A03B-0808-C020	A20B-8000-0740
			2ms, POS	BID16B1	A03B-0808-C021	A20B-8000-0741
	DC output	DC 16 output points	0.6A, POS	BOD16A1	A03B-0808-C030	A20B-8000-0760
	AC output	AC 12 output points	0.3A (*2)	BOA12A1	A03B-0808-C040	A20B-8000-0880
Extension	DC input and output	DC 8 input points and DC 8 output points	20ms, POS/0.6A,POS	BMD88P1	A03B-0808-C200	A20B-8000-0730
			2ms, POS/0.6A,POS	BMD88Q1	A03B-0808-C201	A20B-8000-0731
	DC input	DC 16 input points	20ms, POS	BID16P1	A03B-0808-C210	A20B-9001-0680
			2ms, POS	BID16Q1	A03B-0808-C211	A20B-9001-0681
	DC output	DC 16 output points	0.6A, POS	BOD16P1	A03B-0808-C220	A20B-8000-0780
	AC input	AC 16 input points	100 to 115 VAC	BIA16P1	A03B-0808-C230	A20B-9001-0940

Polarity

Input POS : (current sink type) - Assumed to be on when the input is high.

Output POS : (current source type) - When it is on, the output goes high.

NOTE

*1 This module (AIF02C) is a re-formed version of the AIF01A, which is the interface module of the I/O Unit-MODEL A. The re-formed version was configured by removing the base expansion function from the AIF01A and adding the function for one channel of the I/O Unit-MODEL B interface unit to the AIF01A. Therefore, the AIF02C can be used only when the I/O Unit-MODEL A is used.

As for detail of this module (AIF02C), refer to "FANUC I/O Unit-MODEL A CONNECTION·MAINTENANCE MANUAL (B-61813E)".

*2 When the unit is used with 0.5 A, use it with 8 points at maximum. (Among 12 points (A0 to A5 and B0 to B5), the 8 points A0, A2, A4, A5, B0, B2, B4, and B5 should be used.)

7

BASIC AND EXTENSION UNITS

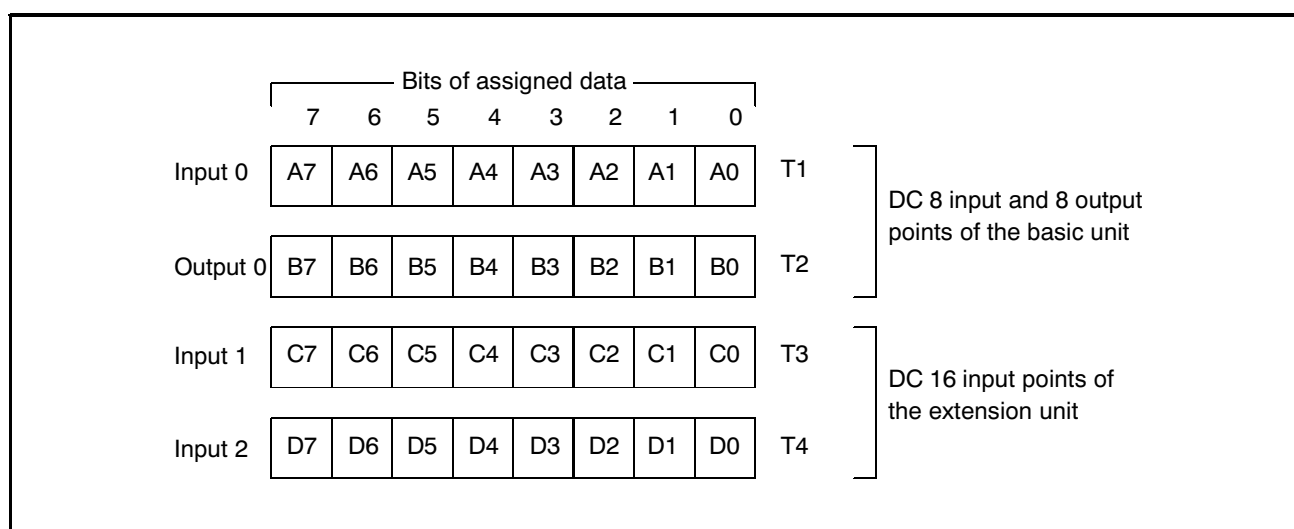


7.1 INPUT AND OUTPUT SIGNALS AND THEIR ADDRESSES

This section describes the relationship between the input and output points of the DI/DO unit and the input and output data of up to four bytes assigned to them (input 0 to 3, or output 0 to 3). See the example given below:

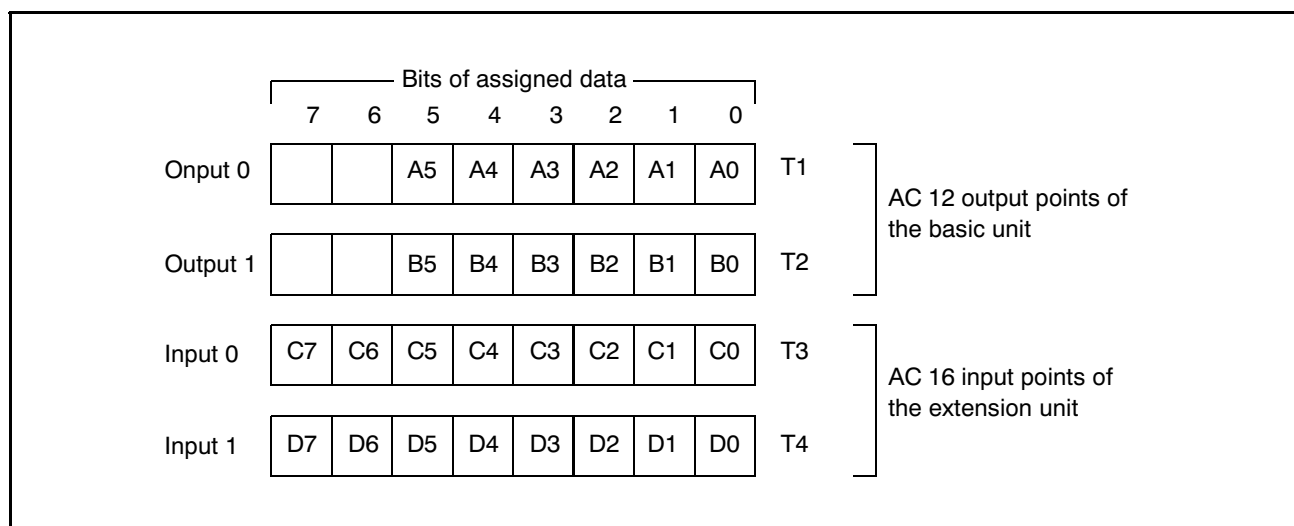
Example1

When the basic unit with DC 8 input and 8 output points, and the extension unit with DC 16 input points are installed, three bytes are used for input (input 0, 1, 2) and one byte is used for output (output 0). The figure below shows the use of the following four terminal boards: T1 (signals A0 to A7) and T2 (signals B0 to B7) of the basic unit, and T3 (signals C0 to C7) and T4 (signals D0 to D7) of the extension unit.



Example2

When the basic unit with AC 12 output points and the extension unit with AC 16 input points are installed, two bytes are used for input (input 0, 1) and two bytes are used for output (output 0, 1). The figure below shows the use of the following four terminal boards: T1 (signals A0 to A5) and T2 (signals B0 to B5) of the basic unit, and T3 (signals C0 to C7) and T4 (signals D0 to D7) of the extension unit.



The table below gives the correspondence between the combination of the basic and extension units and the use of the terminal boards.

		Terminal boards of the basic unit		Terminal boards of the extension unit	
Basic unit	Extension unit	T1 A0 to A7	T2 B0 to B7	T3 C0 to C7	T4 D0 to D7
8 input points and 8 output points	8 input points and 8 output points	Input 0	Output 0	Input 1	Output 1
	16 input points	Input 0	Output 0	Input 1	Input 2
	16 output points	Input 0	Output 0	Output 1	Output 2
16 input points	8 input points and 8 output points	Input 0	Input 1	Input 2	Output 0
	16 input points	Input 0	Input 1	Input 2	Input 3
	16 output points	Input 0	Input 1	Output 0	Output 1
16 output points or 12 output points	8 input points and 8 output points	Output 0	Output 1	Input 0	Output 2
	16 input points	Output 0	Output 1	Input 0	Input 1
	16 output points	Output 0	Output 1	Output 2	Output 3

7.2 SPECIFICATIONS OF THE BASIC AND EXTENSION UNITS

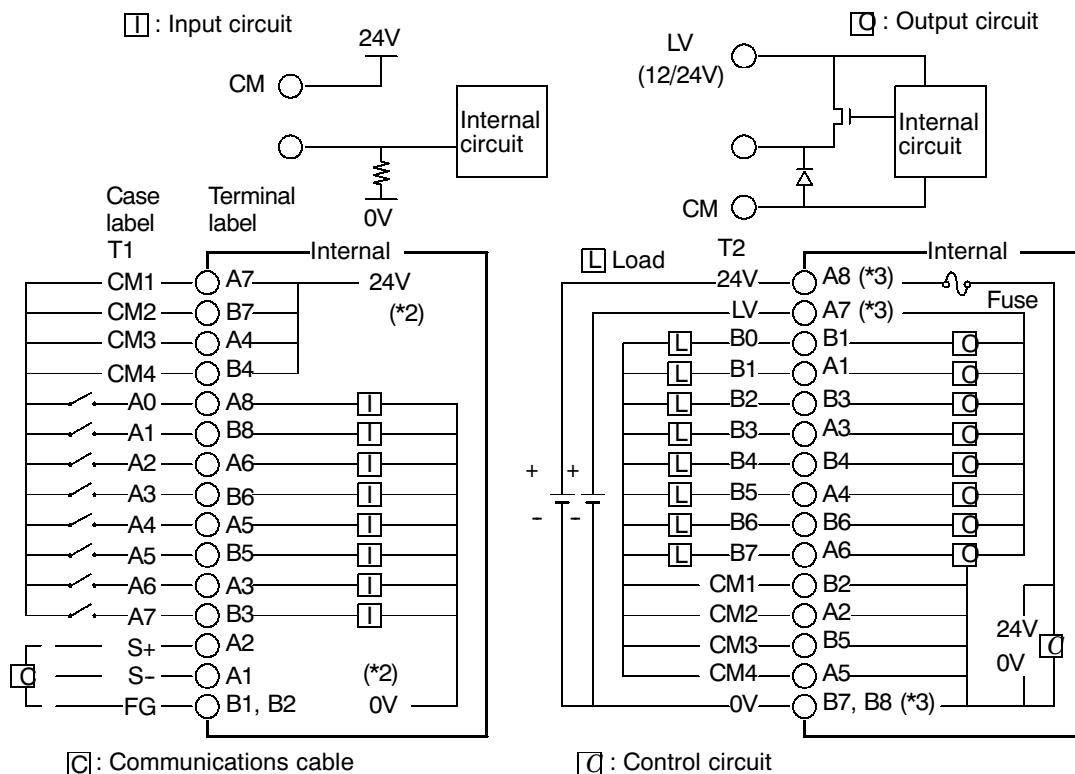
The following tables list the specifications of the basic and extension units.

(1) Basic unit	BMD88A1 : DC 8 input points (20ms) and DC 8 output points
(2) Basic unit	BMD88B1 : DC 8 input points (2ms) and DC 8 output points
(3) Basic unit	BID16A1 : DC 16 input points (20ms)
(4) Basic unit	BID16B1 : DC 16 input points (2ms)
(5) Basic unit	BOD16A1 : DC 16 output points
(6) Basic unit	BOA12A1 : AC 12 output points
(7) Extension unit	BMD88P1 : DC 8 input points (20ms) and DC 8 output points
(8) Extension unit	BMD88Q1 : DC 8 input points (2ms) and DC 8 output points
(9) Extension unit	BID16P1 : DC 16 input points (20ms)
(10) Extension unit	BID16Q1 : DC 16 input points (2ms)
(11) Extension unit	BOD16P1 : DC 16 output points
(12) Extension unit	BIA16P1 : AC 16 input points

(1) Basic unit BMD88A1 (8 input points and 8 output points)

Input		Output	
Item	Specifications	Item	Specifications
Signal	T1 : A0 to A7	Signal	T2 : B0 to B7
Points	8	Points	8
Points/common	8/common (4 common terminals)	Points/common	8/common (4 common terminals)
Current sink or source	Current sink type	Current sink or source	Current source type
-	-	Rated load voltage	LV : 12 to 24V DC, +20%, -15%
Average input current	7.5mA	Maximum load current	0.6A
Voltage and current in the on state	18V DC or higher, 6mA or higher	Maximum voltage drop in the on state	0.36V (load current \times 0.6 Ω)
Voltage and current in the off state	6V DC or lower, 1.5mA or lower	Maximum leakage current in the off state	0.1mA
Response time	Off -> On	Response time	Off -> On
	On -> Off		On -> Off
	20ms or less(*1)		1ms or less(*1)
	20ms or less(*1)		1ms or less(*1)
Input display	LED indications (selected by the rotary switch)	Output display	LED indications (selected by the rotary switch)
External connection	Terminal board (M3)	External connection	Terminal board (M3)
FUSE	2A (for commons/control circuit)	FUSE	Not used
-----	-----	Output protection function	With overheat and overcurrent protection functions

Terminal connection and circuitry



*1 The actual response time is the sum of this value and the scanning time determined by the system.

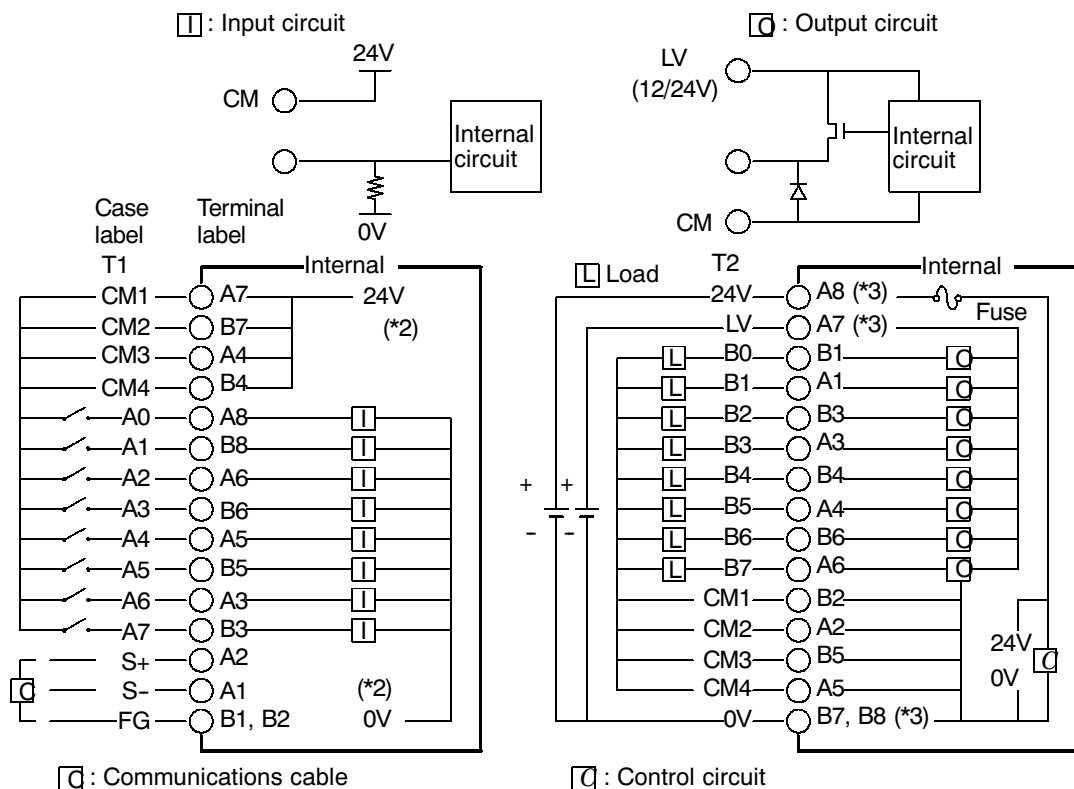
*2 24V and 0V of T2 are used.

*3 For details, see Subsec. 4.6.3, "Connecting the power cable."

(2) Basic unit BMD88B1 (8 input points and 8 output points)

Input			Output		
Item		Specifications	Item		Specifications
Signal		T1 : A0 to A7	Signal		T2 : B0 to B7
Points		8	Points		8
Points/common		8/common (4 common terminals)	Points/common		8/common (4 common terminals)
Current sink or source		Current sink type	Current sink or source		Current source type
-		-	Rated load voltage		LV : 12 to 24V DC, +20%, -15%
Average input current		7.5mA	Maximum load current		0.6A
Voltage and current in the on state		18V DC or higher, 6mA or higher	Maximum voltage drop in the on state		0.36V (load current×0.6Ω)
Voltage and current in the off state		6V DC or lower, 1.5mA or lower	Maximum leakage current in the off state		0.1mA
Response time	Off → On	2ms or less(*1)	Response time	Off → On	1ms or less(*1)
	On → Off	2ms or less(*1)		On → Off	1ms or less(*1)
Input display		LED indications (selected by the rotary switch)	Output display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)	External connection		Terminal board (M3)
FUSE		2A (for commons/control circuit)	FUSE		Not used
-----		-----	Output protection function		With overheat and overcurrent protection functions

Terminal connection and circuitry



*1 The actual response time is the sum of this value and the scanning time determined by the system.

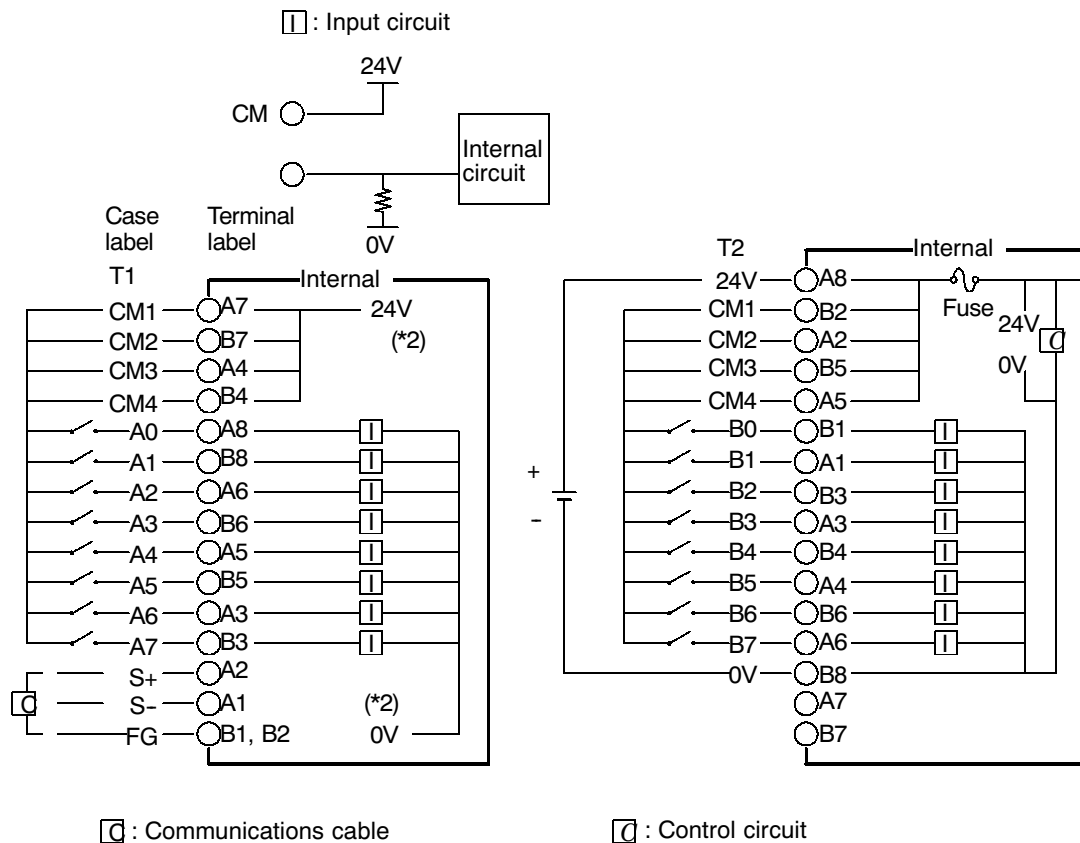
*2 24V and 0V of T2 are used.

*3 For details, see Subsec. 4.6.3, "Connecting the power cable."

(3) Basic unit BID16A1 (16 input points)

Item	Specifications
Signal	T1 : A0 to A7, T2 : B0 to B7
Points	16
Points/common	16/common (8 common terminals)
Current sink or source	Current sink type
Average input current	7.5mA
Voltage and current in the on state	18V DC or higher, 6mA or higher
Voltage and current in the off state	6V DC or lower, 1.5mA or lower
Response time	Off -> On 20ms or less(*1)
	On -> Off 20ms or less(*1)
Input display	LED indications (selected by the rotary switch)
External connection	Terminal board (M3)
FUSE	2A (for commons/control circuit)

Terminal connection and circuitry



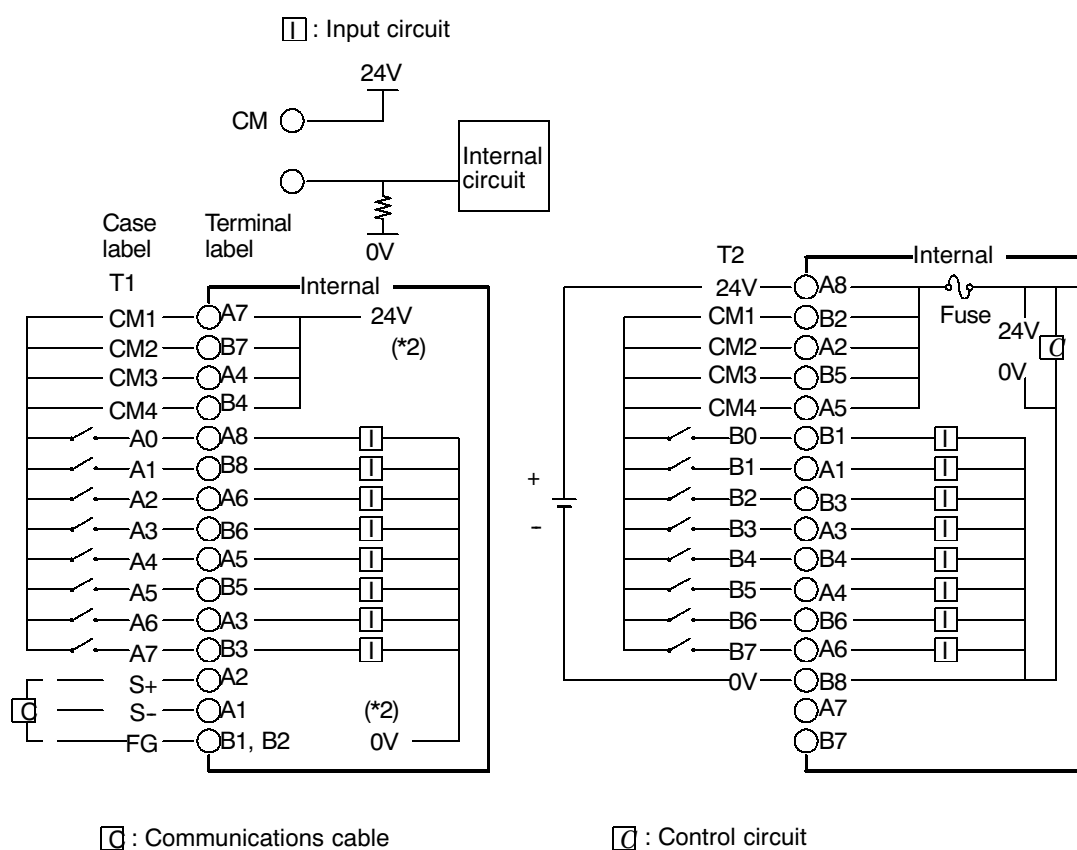
*1 The actual response time is the sum of this value and the scanning time determined by the system.

*2 24V and 0V of T2 are used.

(4) Basic unit BID16B1 (16 input points)

Item	Specifications	
Signal	T1 : A0 to A7, T2 : B0 to B7	
Points	16	
Points/common	16/common (8 common terminals)	
Current sink or source	Current sink type	
Average input current	7.5mA	
Voltage and current in the on state	18V DC or higher, 6mA or higher	
Voltage and current in the off state	6V DC or lower, 1.5mA or lower	
Response time	Off -> On	2ms or less(*1)
	On -> Off	2ms or less(*1)
Input display	LED indications (selected by the rotary switch)	
External connection	Terminal board (M3)	
FUSE	2A (for commons/control circuit)	

Terminal connection and circuitry



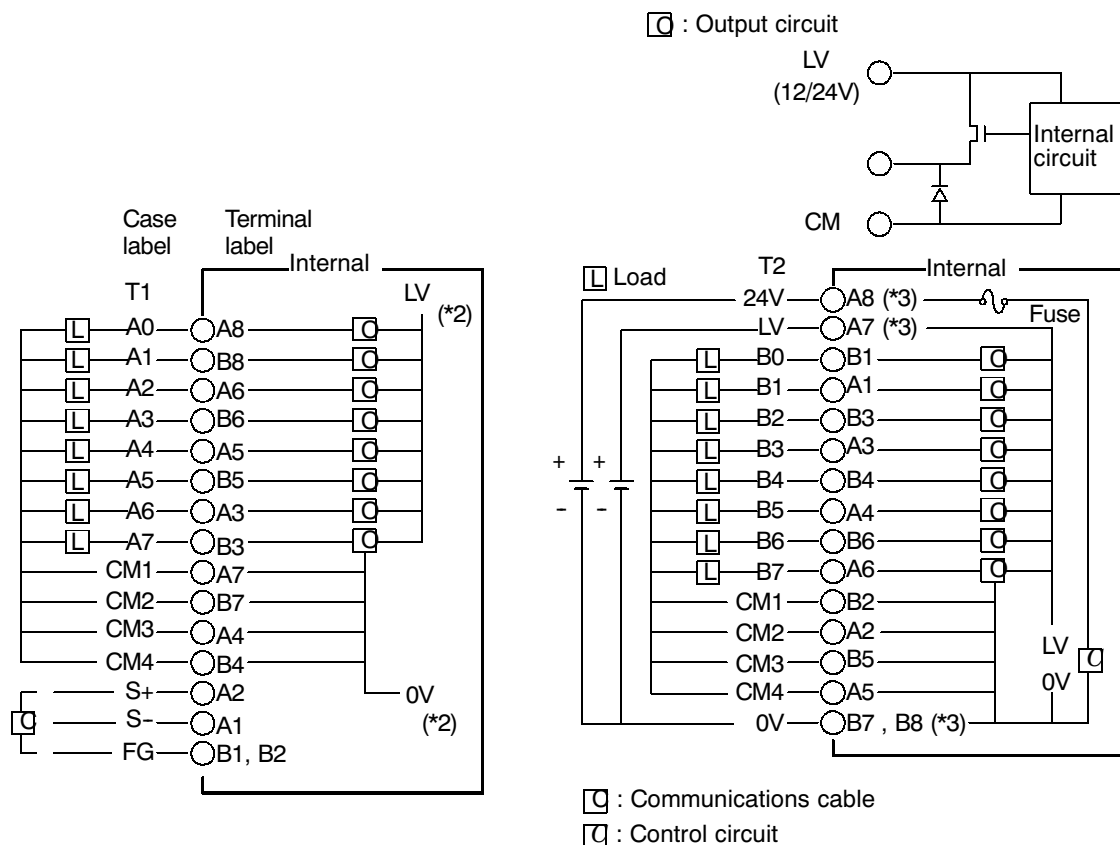
*1 The actual response time is the sum of this value and the scanning time determined by the system.

*2 24V and 0V of T2 are used.

(5) Basic unit BOD16A1 (16 output points)

Item		Specifications
Signal		T1 : A0 to A7, T2 : B0 to B7
Points		16
Points/common		16/common (8 common terminals)
Current sink or source		Current source type
Rated load voltage		LV : 12 to 24V DC, +20%, -15%
Maximum load current		0.6A
Maximum voltage drop in the on state		0.36V (load current \times 0.6 Ω)
Maximum leakage current in the off state		0.1mA
Response time	Off -> On	1ms or less(*1)
	On -> Off	1ms or less(*1)
Output display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)
FUSE		Not used (output) / 2A (for control circuit)
Output protection function		With overheat and overcurrent protection functions

Terminal connection and circuitry



*1 The actual response time is the sum of this value and the scanning time determined by the system.

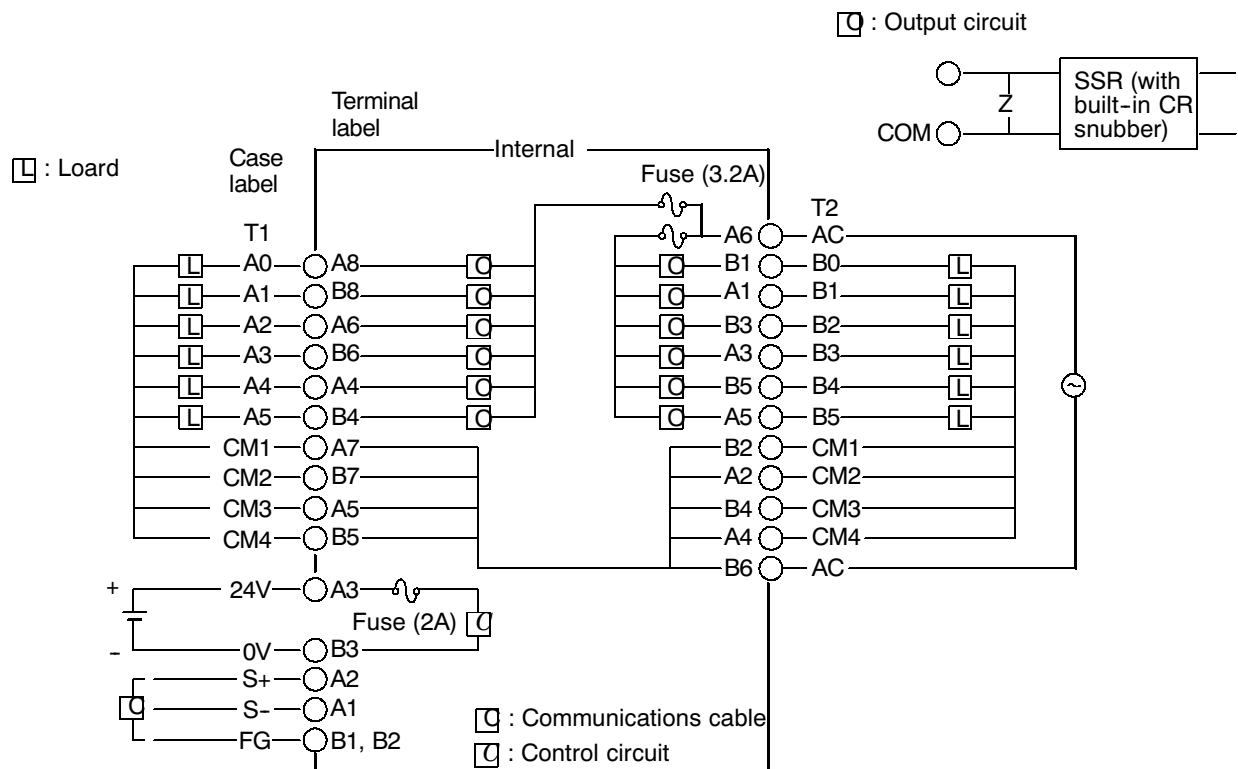
*2 LV and 0V of T2 are used.

*3 For details, see Subsec. 4.6.3, "Connecting the power cable."

(6) Basic unit BOA12A1 (12 output points)

Item		Specifications
Signal		T1 : A0 to A5, T2 : B0 to B5
Points		12
Points/common		12/common (8 common terminals)
Rated load voltage		100 to 230V AC, +15%, -15%, 50 to 60 Hz, +3 Hz, -3 Hz
Maximum load current		0.3A/point (Up to 12 points) 0.5A/point (Up to 8 points) Among the 12 points (A0 to A5 and B0 to B5), use the 8 points A0, A2, A4, A5, B0, B2, B4, and B5.
Maximum rush current		5A/point (1 cycle) (*1)
Maximum voltage drop in the on state		1.5 Vrms
Maximum leakage current in the off state		1.0mA (230VAC)
Response time	Off → On	Half or below the load frequency(with zero-cross control) *2
	On → Off	Half or below the load frequency(with zero-cross control) *2
Output display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)
FUSE		Two 3.2 A. (One fuse for each of the outputs A0 to A5 and B0 to B5.) 2A (for control circuit)

Terminal connection and circuitry



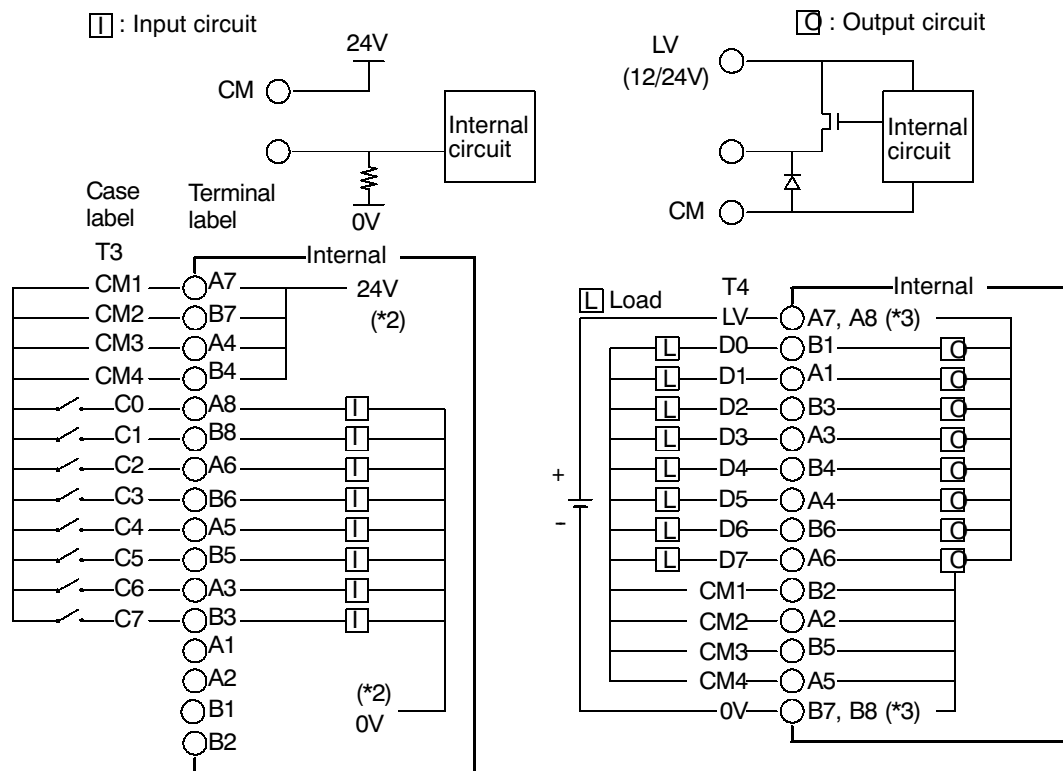
*1 Restrict the total rush current for A0 to A5 to within 15 A. Likewise, restrict the total rush current for B0 to B5 to within 15 A.

*2 The actual response time is the sum of this value and the scanning time determined by the system.

(7) Extension unit BMD88P1 (8 input points and 8 output points)

Input		Output	
Item	Specifications	Item	Specifications
Signal	T3 : C0 to C7	Signal	T4 : D0 to D7
Points	8	Points	8
Points/common	8/common (4 common terminals)	Points/common	8/common (4 common terminals)
Current sink or source	Current sink type	Current sink or source	Current source type
-	-	Rated load voltage	LV : 12 to 24 VDC, +20%, -15%
Average input current	7.5mA	Maximum load current	0.6A
Voltage and current in the on state	18V DC or higher, 6mA or higher	Maximum voltage drop in the on state	0.36V (load current \times 0.6 Ω)
Voltage and current in the off state	6V DC or lower, 1.5mA or lower	Maximum leakage current in the off state	0.1mA
Response time	Off -> On	Response time	Off -> On
	On -> Off	Response time	On -> Off
	20ms or less(*1)		1ms or less(*1)
	20ms or less(*1)		1ms or less(*1)
Input display	LED indications (selected by the rotary switch)	Output display	LED indications (selected by the rotary switch)
External connection	Terminal board (M3)	External connection	Terminal board (M3)
FUSE	Basic unit fuse used	FUSE	Not used
-----	-----	Output protection function	With overheat and overcurrent protection functions

Terminal connection and circuitry



*1 The actual response time is the sum of this value and the scanning time determined by the system.

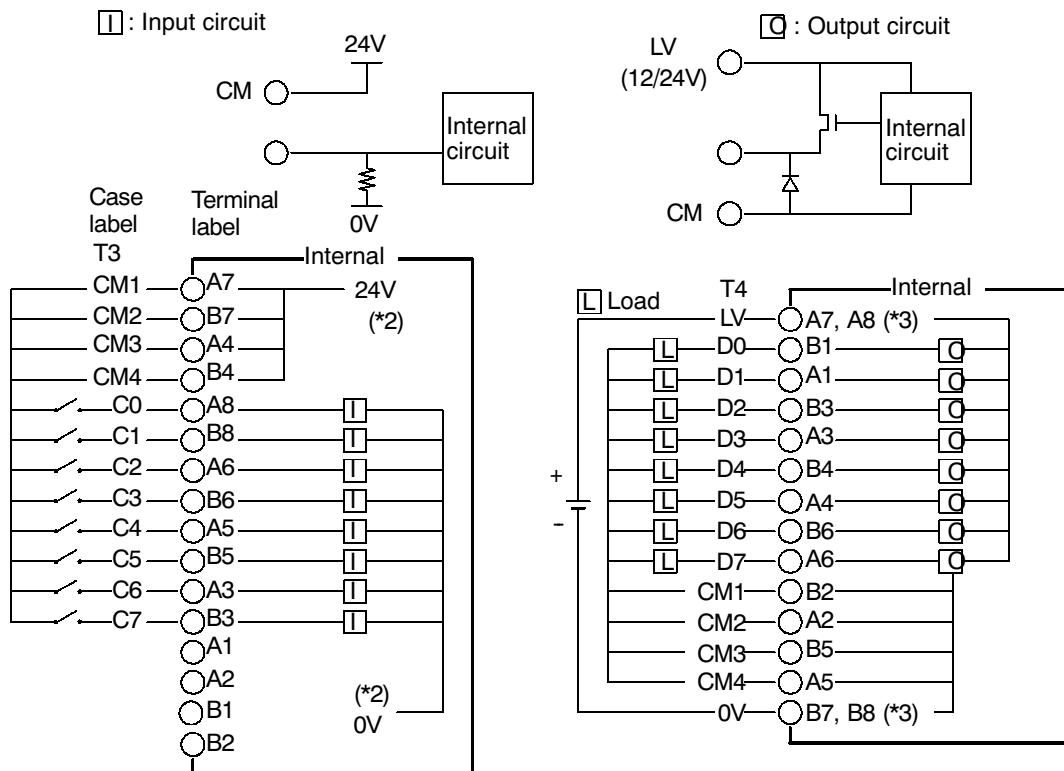
*2 As 24V and 0V of T2 are used (The basic unit supplies the power.), there is a possibility that the fuse of 2A on basic unit blows out when wiring is wrong.

*3 For details, see Subsec. 4.7.2, "Connecting the power cable."

(8) Extension unit BMD88Q1 (8 input points and 8 output points)

Input			Output		
Item		Specifications	Item		Specifications
Signal		T3 : C0 to C7	Signal		T4 : D0 to D7
Points		8	Points		8
Points/common		8/common (4 common terminals)	Points/common		8/common (4 common terminals)
Current sink or source		Current sink type	Current sink or source		Current source type
-		-	Rated load voltage		LV : 12 to 24 VDC, +20%, -15%
Average input current		7.5mA	Maximum load current		0.6A
Voltage and current in the on state		18V DC or higher, 6mA or higher	Maximum voltage drop in the on state		0.36V (load current×0.6Ω)
Voltage and current in the off state		6V DC or lower, 1.5mA or lower	Maximum leakage current in the off state		0.1mA
Response time	Off → On	2ms or less(*1)	Response time	Off → On	1ms or less(*1)
	On → Off	2ms or less(*1)		On → Off	1ms or less(*1)
Input display		LED indications (selected by the rotary switch)	Output display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)	External connection		Terminal board (M3)
FUSE		Basic unit fuse used	FUSE		Not used
-----		-----	Output protection function		With overheat and overcurrent protection functions

Terminal connection and circuitry



*1 The actual response time is the sum of this value and the scanning time determined by the system.

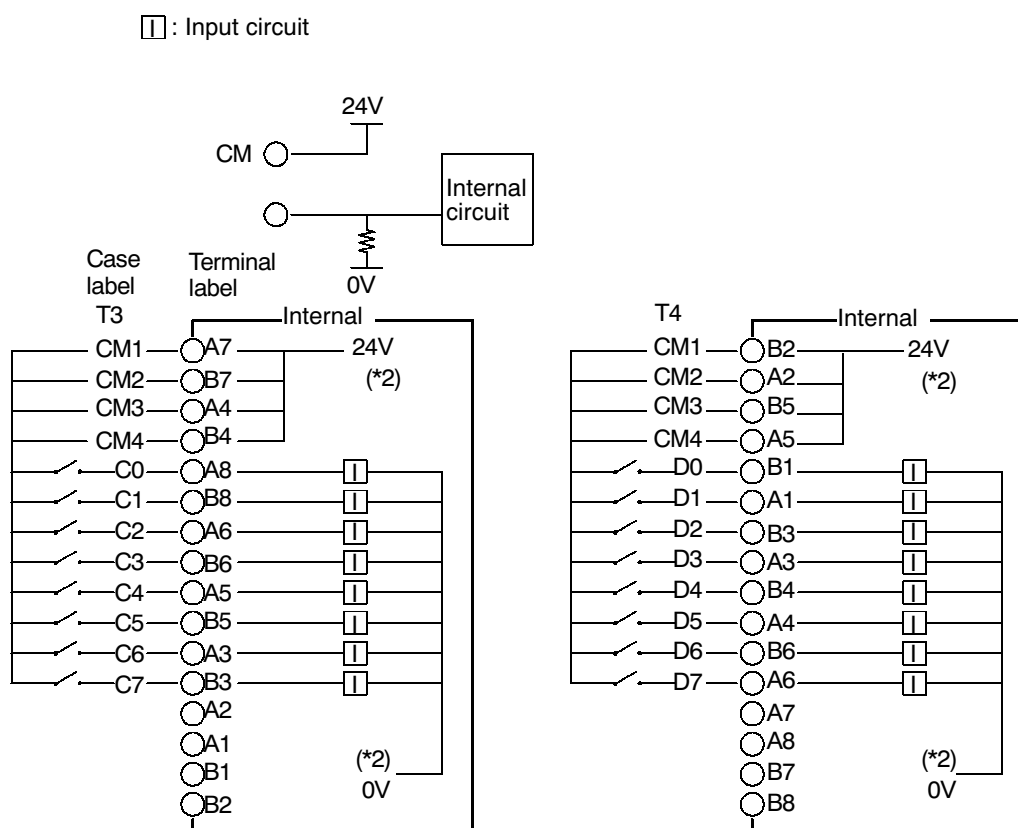
*2 As 24V and 0V of T2 are used (The basic unit supplies the power.), there is a possibility that the fuse of 2A on basic unit blows out when wiring is wrong.

*3 For details, see Subsec. 4.7.2, "Connecting the power cable."

(9) Extension unit BID16P1 (16 input points)

Item		Specifications
Signal		T3 : C0 to C7, T4 : D0 to D7
Points		16
Points/common		16/common (8 common terminals)
Current sink or source		Current sink type
Average input current		7.5mA
Voltage and current in the on state		18V DC or higher, 6mA or higher
Voltage and current in the off state		6V DC or lower, 1.5mA or lower
Response time	Off -> On	20ms or less(*1)
	On -> Off	20ms or less(*1)
Input display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)
FUSE		Basic unit fuse used

Terminal connection and circuitry



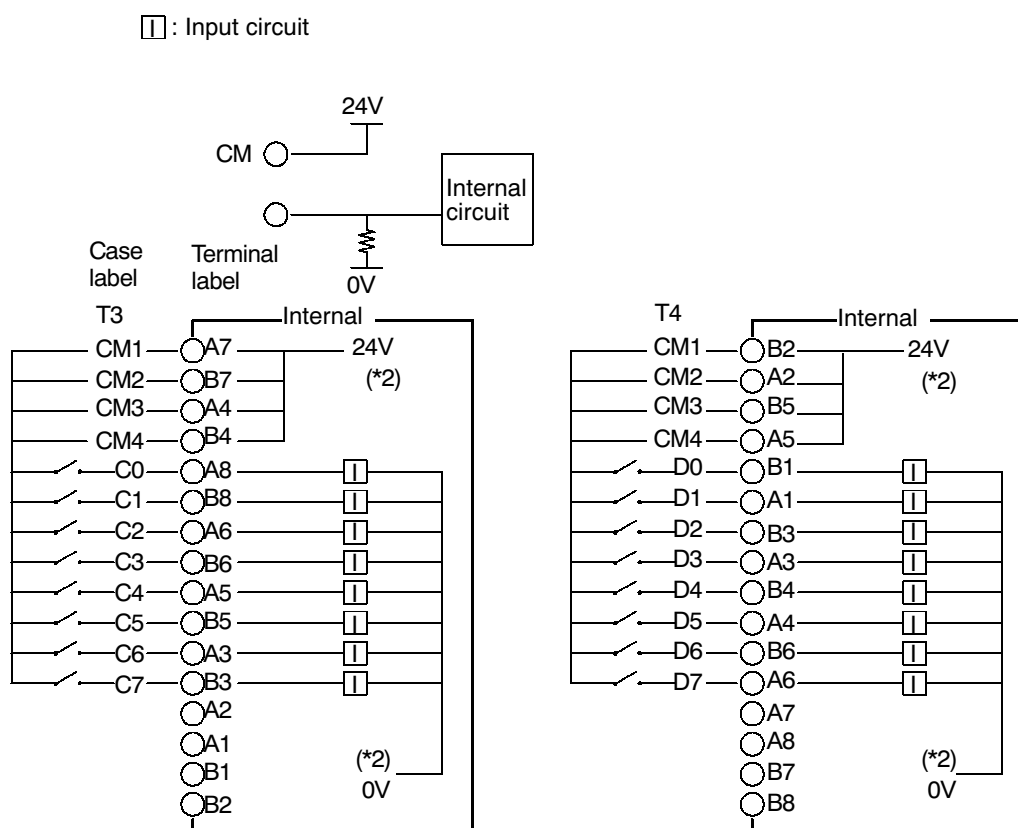
*1 The actual response time is the sum of this value and the scanning time determined by the system.

*2 As 24V and 0V of T2 are used (The basic unit supplies the power.), there is a possibility that the fuse of 2A on basic unit blows out when wiring is wrong.

(10) Extension unit BID16Q1 (16 input points)

Item		Specifications
Signal		T3 : C0 to C7, T4 : D0 to D7
Points		16
Points/common		16/common (8 common terminals)
Current sink or source		Current sink type
Average input current		7.5mA
Voltage and current in the on state		18V DC or higher, 6mA or higher
Voltage and current in the off state		6V DC or lower, 1.5mA or lower
Response time	Off -> On	2ms or less(*1)
	On -> Off	2ms or less(*1)
Input display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)
FUSE		Basic unit fuse used

Terminal connection and circuitry



*1 The actual response time is the sum of this value and the scanning time determined by the system.

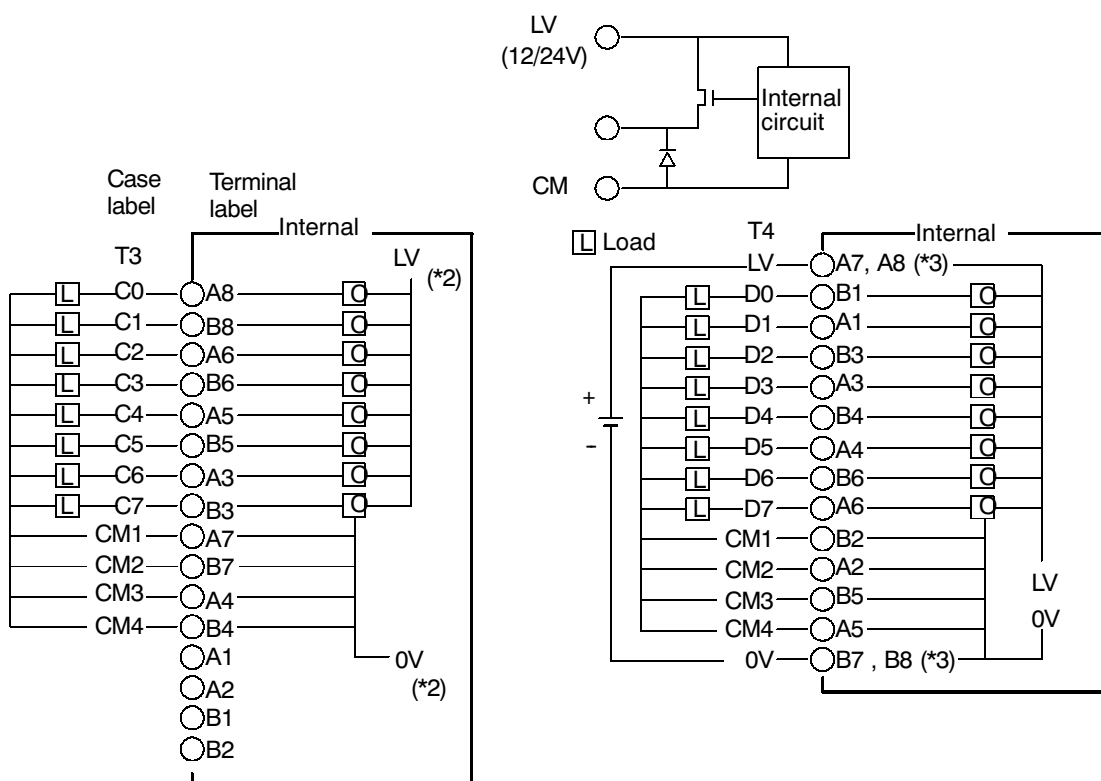
*2 As 24V and 0V of T2 are used (The basic unit supplies the power.), there is a possibility that the fuse of 2A on basic unit blows out when wiring is wrong.

(11) Extension unit BOD16P1 (16 output points)

Item		Specifications
Signal		T3 : C0 to C7, T4 : D0 to D7
Points		16
Points/common		16/common (8 common terminals)
Current sink or source		Current source type
Rated load voltage		LV : 12 to 24 VDC, +20%, -15%
Maximum load current		0.6A
Maximum voltage drop in the on state		0.36V (load current \times 0.6 Ω)
Maximum leakage current in the off state		0.1mA
Response time	Off -> On	1ms or less(*1)
	On -> Off	1ms or less(*1)
Output display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)
FUSE		Not used
Output protection function		With overheat and overcurrent protection functions

Terminal connection and circuitry

□ : Output circuit



*1 The actual response time is the sum of this value and the scanning time determined by the system.

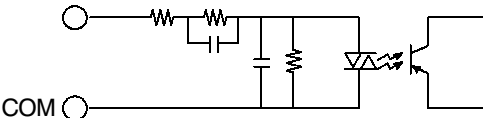
*2 LV and 0V of T2 are used.

*3 For details, see Subsec. 4.7.2, "Connecting the power cable."

(12) Extension unit BIA16P1 (16 input points)

Item		Specifications
Signal		T3 : C0 to C7, T4 : D0 to D7
Points		16
Points/common		8/common (4 common terminals)
Rated voltage		100V to 115 VAC +15%, -15%, 50 to 60Hz +3Hz, -3Hz
Maximum rated voltage		132Vrms, 50/60Hz
Input current		8mA _{rms} (100VAC, 60Hz)
Voltage and current in the on state		80Vrms or higher, 4.5mA _{rms} or higher
Voltage and current in the off state		30Vrms DC or lower, 2mA _{rms} or lower
Response time	Off -> On	25ms or less (*1)
	On -> Off	35ms or less (*1)
Input display		LED indications (selected by the rotary switch)
External connection		Terminal board (M3)
FUSE		Not used
Terminal connection and circuitry		

□ : Input circuit



T3

Case label	Terminal label	Internal
CM1	A7	Internal
CM2	B7	
CM3	A4	
CM4	B4	
C0	A8	□
C1	B8	□
C2	A6	□
C3	B6	□
C4	A5	□
C5	B5	□
C6	A3	□
C7	B3	□
	B2	
AC	B1	
	A2	
AC	A1	

T4

Case label	Terminal label	Internal
CM1	B2	Internal
CM2	A2	
CM3	B5	
CM4	A5	
D0	B1	□
D1	A1	□
D2	B3	□
D3	A3	□
D4	B4	□
D5	A4	□
D6	B6	□
D7	A6	□
	A7	
AC	A8	
	B7	
AC	B8	

*1 The actual response time is the sum of this value and the scanning time determined by the system.

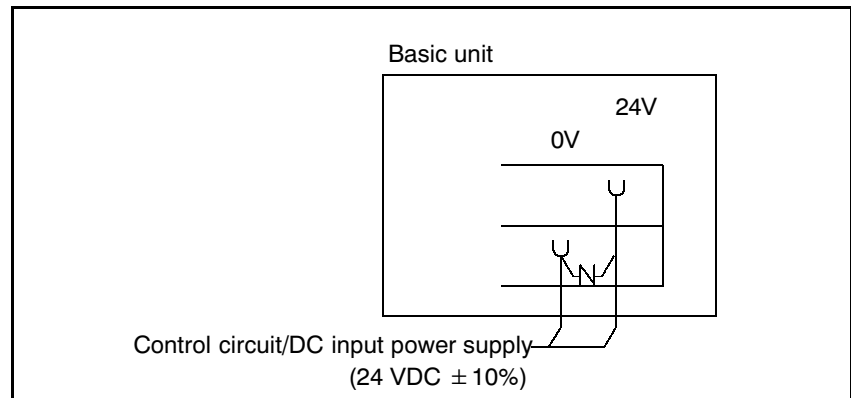
8

CAUTIONS



8.1 WHEN NOISE IS INDUCED ON DC SUPPLY VOLTAGE

If high noise voltage is induced in the DC power supply ($24\text{ V} \pm 10\%$) of a unit of the I/O Unit-B, the unit may be damaged. If high noise voltage is superimposed in the DC power supply, insert a surge absorber near the terminal board to kill the noise.



8.2 DC OUTPUT PROTECTION

The DC output unit and the DC input and output unit of the I/O Unit-B are provided with output protection functions, which are overheat and overcurrent protection functions.

When the overheat protection function works, the output circuit is turned off. When the temperature in the output circuit drops, the output circuit is turned on again. If overheat occurs again, the protection function works once again, turning off the output circuit. To sum up, the output circuit is turned on and off repeatedly, if temperature in unit is excessive.

The overcurrent protection function works similarly. When it works, it turns off the output circuit. After a certain period of time elapses, the output circuit is turned on in order to enable checking for overcurrent. If there is still an overcurrent condition, the output circuit is turned off again. To sum up, the output circuit is turned on and off repeatedly until the overcurrent condition is eliminated completely.

Note that when either protection function works, it is impossible to drive the load, because the output circuit is turned off.

8.3

DC OUTPUT OVERVOLTAGE

If a rated voltage is exceeded, the internal element protection circuit works to turn off the output circuit. When the rated voltage is recovered, the output circuit is turned on again. If the internal element protection circuit works to keep the output circuit turned off, the protection circuit can overheat. Be sure to keep in mind that overheat resulting from overvoltage can lead to damage of an internal element because the overheat protection circuit does not work.

Note that similarly to the other protection functions, when the overcurrent protection function works, it is impossible to drive the load because the output circuit is turned off.

8.4 POWER ON/OFF

(1) Interface unit

Unlike the power to the basic unit, the power to the interface unit cannot necessarily be turned on and off as you like. The interface unit power should be turned on simultaneously with or before the power to the I/O Link master unit. When turning off the interface unit power, turn off both the master and slaves.

(2) Basic (+ extension) unit

The control power to the basic unit or the basic plus extension unit can be turned on and off whenever you like.

8.5 INPUT SECTION (DI) WIRING

The positive pole of the DC power ($24\text{ V} \pm 10\%$) supplied to each unit is connected to the common terminals (CM1 to CM4) of the input section (DI). Be careful when wiring. Power to input devices should be wired from these common terminals (CM1 to CM4) to provide fuse protection of the input control hardware.

8.6 NOISE SUPPRESSOR

The AC/DC solenoids and relays are typically used in the power magnetics/control cabinet.

A high pulse voltage is caused by coil inductance when these devices are turned on or off.

This pulse voltage induced through the cable causes the electronic circuits to be disturbed.

To decrease this pulse voltage, use a spark killer for AC load such as AC motor and a diode for DC load such as DC relay.

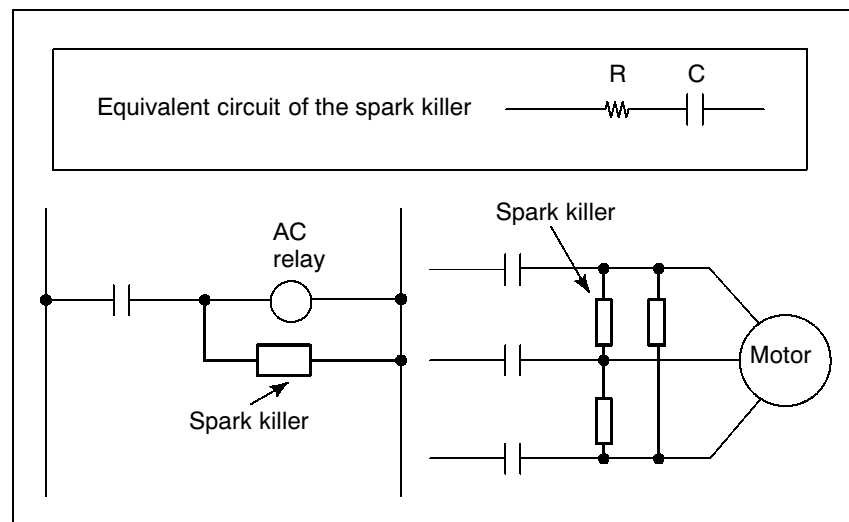
Notes on selecting the spark killer

- Use a spark killer consisting of a resistor and capacitor in series. This type of spark killer is called a CR spark killer. (Use it for AC load) (A varistor is useful in clamping the peak voltage of the pulse voltage, but cannot suppress the sudden rise of the pulse voltage. FANUC therefore recommends a CR spark killer.)
- The reference capacitance and resistance of the spark killer shall conform to the following based on the current (I (A)) and DC resistance of the stationary coil:

1) Resistance (R): Equivalent DC resistance of the coil

2) Capacitance (C): $\frac{I^2}{10} \sim \frac{I^2}{20}$ (μF)

I : Current at steady state of the coil



9

SAFETY FOR USING AC



If AC output unit or AC input unit is used, 9.1 is recommended for safety. As for AC output unit 9.2 is also recommended. If 9.1 and 9.2 must be observed for Europe.[conforming to EN50178]

9.1 INSTALLATION ENVIRONMENT

9.1.1 Installation Category (Overvoltage Category)

Install the unit in the environment of installation category (overvoltage category) II or better.

[DIN VDE 0110]

The available impulse surge level to the ground that appears in the power source is 2.5kV maximum.

(100VAC system power source is needed in AC input unit. According to the standard, the available impulse surge level to the ground is 1.5kV for this power source (voltage of which is 150VAC or less). However, for this unit, the available impulse surge level to the ground that appears in the power source is 2.5kV.)

Generally, an isolation transformer used for the main power source is regarded as an effective surge filter.

9.1.2 Pollution Degree

Install the unit in the environment of pollution degree 2 or better.
[EN50178]

In terminal box of IP-54 or better (described in 3.1.2.1), it can be considered as pollution degree 2 or better usually. The IP degree required is dependent on the circumstances of machine tool, so please choose the adequate degree in accordance with such environment.

9.2 AC OUTPUT UNIT

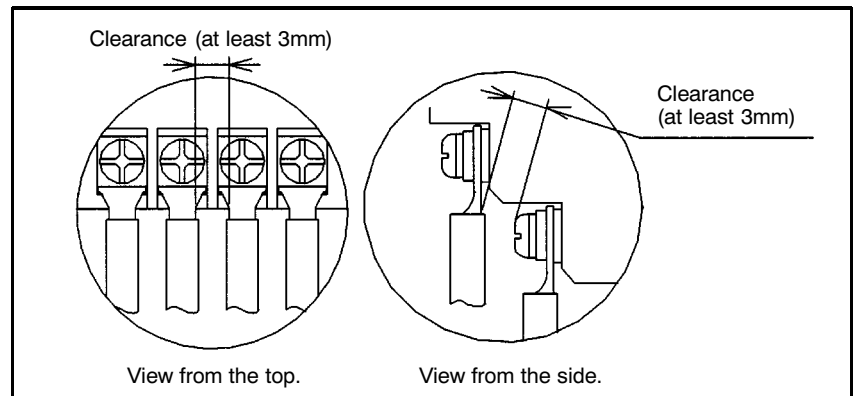
(In this section, “low voltage” means 24VDC or 5VDC. And “high voltage” means 100VAC or 200VAC.)

In AC output unit, there are both low voltage part and high voltage part on a terminal (T1). For safety it is important that the low voltage part must be protectively separated from high voltage.

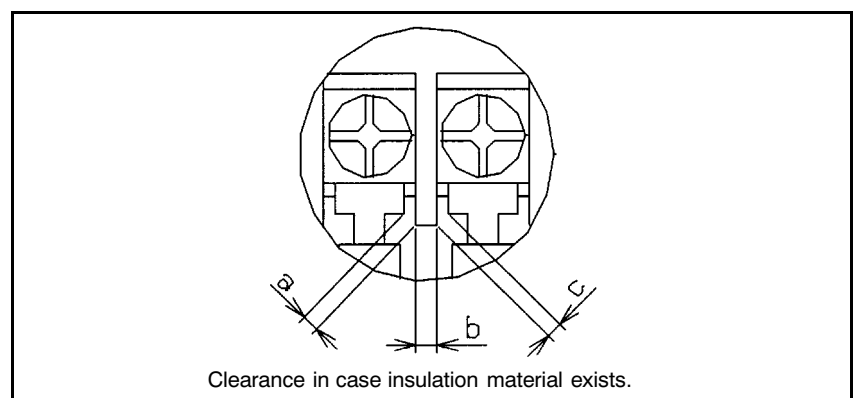
It is necessary to maintain a clearance of at least 3mm between the incoming high voltage and low voltage parts, like the figures below. For this unit, please be careful to maintain this clearance between high voltage terminals A4 & A5 and low voltage terminals 24V & 0V(Refer to 4.6-(2)).

It is also necessary to maintain a creepage distance of at least 5mm between the incoming high voltage and low voltage parts. The creepage distance means the distance along the surface of the insulation between two conductors (Refer to IEC664 as to definition of creepage distance).

Do not use exposed wire for wiring. In order to maintain the clearance and creepage distance, it is necessary to use an insulation sleeve.



If there is insulation material between the two conductors, the clearance is considered to be the distance measured around the insulation (for example in the figure below, the clearance is the distance equal to $a+b+c$).



II. PMC PROGRAMMING

1

GENERAL



This part is concerning the address assignment when FANUC I/O Unit-MODEL B (It is abbreviated as I/O Unit-B) is used.

2

APPLIED SOFTWARE



2.1

PMC CONTROL SOFTWARE / BUILT-IN LADDER EDITING SOFTWARE

NC model	PMC model	Applied series/edition	Note
FS15-A	PMC-N	4045/09	
FS15-B	PMC-NA PMC-NB PMC-NB,NB2	4046/07 4047/01 4048/01	
FS16-A	PMC-SB,SB2 PMC-SB3 PMC-SC,SC3	B002/14, B003/15, B004/08, B102/09, B103/19, B104/06, B304/06, B005/03, B105/02 B305/01, B009/01, B109/01 4062/ 10	PMC control software 4061/17 4063/03
FS18-A	PMC-SA1,SA2 PMC-SA3 LADDER editing module	BD01/11, BD02/03, BE01/14, BE02/06 BG01/10, BG21/08 BD03/01, BE03/01, BG03/01, BG23/01, BD09/01, BE09/01 4065/07	PMC control software 4070/10 4071/03
FS16-B FS18-B	PMC-SB3,SB4 PMC-SC3,SC4 LADDER editing card	4066/01 4068/01 4073/01	
FS16-C FS18-C	PMC-SB5,SB6 PMC-SC3,SC4 LADDER editing card	4067/01 4068/01 4090/01	
FS20-A	PMC-SA1,SA3 LADDER editing card	D001/01 D101/01 4081/01	PMC control software 4080/01
FS21T-A	PMC-PA1,PA3 LADDER editing card	8866/01 4076/02	PMC control software 4075/06
FS21T-B	PMC-SA1,SA3 LADDER editing card	DE01/01 4083/01	PMC control software 4082/01 4082/01
FS21M-B	PMC-SA1,SA3 LADDER editing card	D201/01 4081/01	PMC control software 4080/01
FS21M-B FS210T-B	PMC-SA1,SA3 LADDER editing card	4084/01 4085/01	
FS210T-B loader control	PMC-SA1 LADDER editing card	4086/01 4087/01	
Power Mate-D	PMC-PA1,PA3 LADDER editing card	8830/14, 8831/01, 8832/01 8834/01, 8835/01, 8836/01 8837/01 4076/02	PMC control software 4075/05
Power Mate-H	PMC-PA1,PA3 LADDER editing card	8880/01 4079/01	PMC control software 4078/01
F-D Mate	PMC-QA	4050/08 4051/03	
F-D Mate mini	PMC-QC	4054/02 4055/01	

2.2 OFFLINE PROGRAMMER

To use I/O Unit-B, the following programming software is necessary.

<FAPT LADDER>

No	floppy disk	Model	Drawing number	Edition	Note
1	FAPT LADDER PMC-N system floppy	PC98	A08B-9200-J501#JP	06.2	PMC-NA
				06.3	PMC-QA
		PC/AT	A08B-9201-J501#JP	06.2	PMC-NA
				06.3	PMC-QA
2	FAPT LADDER PMC-SB/SC system floppy	PC98	A08B-9200-J502#JP	06.1	PMC-SA1/SA2/SA3 SB/SB2/SB3 SC/SC3 PA1/PA3
				07.1	PMC-SB4/SC4
				08.5	PMC-SB5/SB6/NB2
		PC/AT	A08B-9201-J502#JP	06.1	PMC-SA1/SA2/SA3 SB/SB2/SB3 SC/SC3 PA1/PA3
				07.1	PMC-SB4/SC4
				08.5	PMC-SB5/SB6/NB2
3	FAPT LADDER PMC-SA1/SA3 module floppy Note 1)	PC98	A08B-9200-J603#JP	04.1	PMC-SA1/SA2/SA3 PA1/PA3
		PC/AT	A08B-9201-J603#JP	04.1	PMC-SA1/SA2/SA3 PA1/PA3
4	FAPT LADDER PMC-SB/SC module floppy Note 1)	PC98	A08B-9200-J604#JP	04.7	PMC-SB/SB2/SB3
				05.0	PMC-SB4
				07.0	PMC-SB5/SB6
		PC/AT	A08B-9201-J604#JP	04.7	PMC-SB/SB2/SB3
				05.0	PMC-SB4
				07.0	PMC-SB5/SB6
5	FAPT LADDER PMC-QC module floppy Note 1)	PC98	A08B-9200-J605#JP	01.1	PMC-QC
		PC/AT	A08B-9201-J605#EN	01.1	PMC-QC
6	FAPT LADDER PMC-NB module floppy Note 1)	PC98	A08B-9200-J606#JP	01.0	PMC-NB
				03.0	PMC-NB2
		PC/AT	A08B-9201-J606#JP	01.0	PMC-NB
				03.0	PMC-NB2

<FAPT LADDER-II>

No	floppy disk	Model	Drawing number	Edition	Note
7	FAPT LADDER-II	PC/AT	A08B-9201-J503#ZZ	01.0	PMC-SA3 SB3/SB4/SB5/SB6 SC3/SC4 QC NB/NB2

<Ladder Editing Package>

No	floppy disk	Model	Drawing number	Edition	Note
8	Ladder Editing Package	PC/AT	A08B-9201-J510#ZZ	01.0	PMC-SB3/SB4/SB5/SB6 SC3/SC4

NOTE

- 1 The No.1 "FAPT LADDER PMC-SB/SC system floppy" is necessary.
- 2 In P series, I/O Unit-B is not supported. When LADDER including assignment data for I/O Unit-B is edited by P series, the following limitations exist.
 - 1) The assignment data for I/O link DI/DO units cannot be edited.
 - 2) The assignment data is not correctly displayed.
 - 3) LADDER cannot be output in the source form.

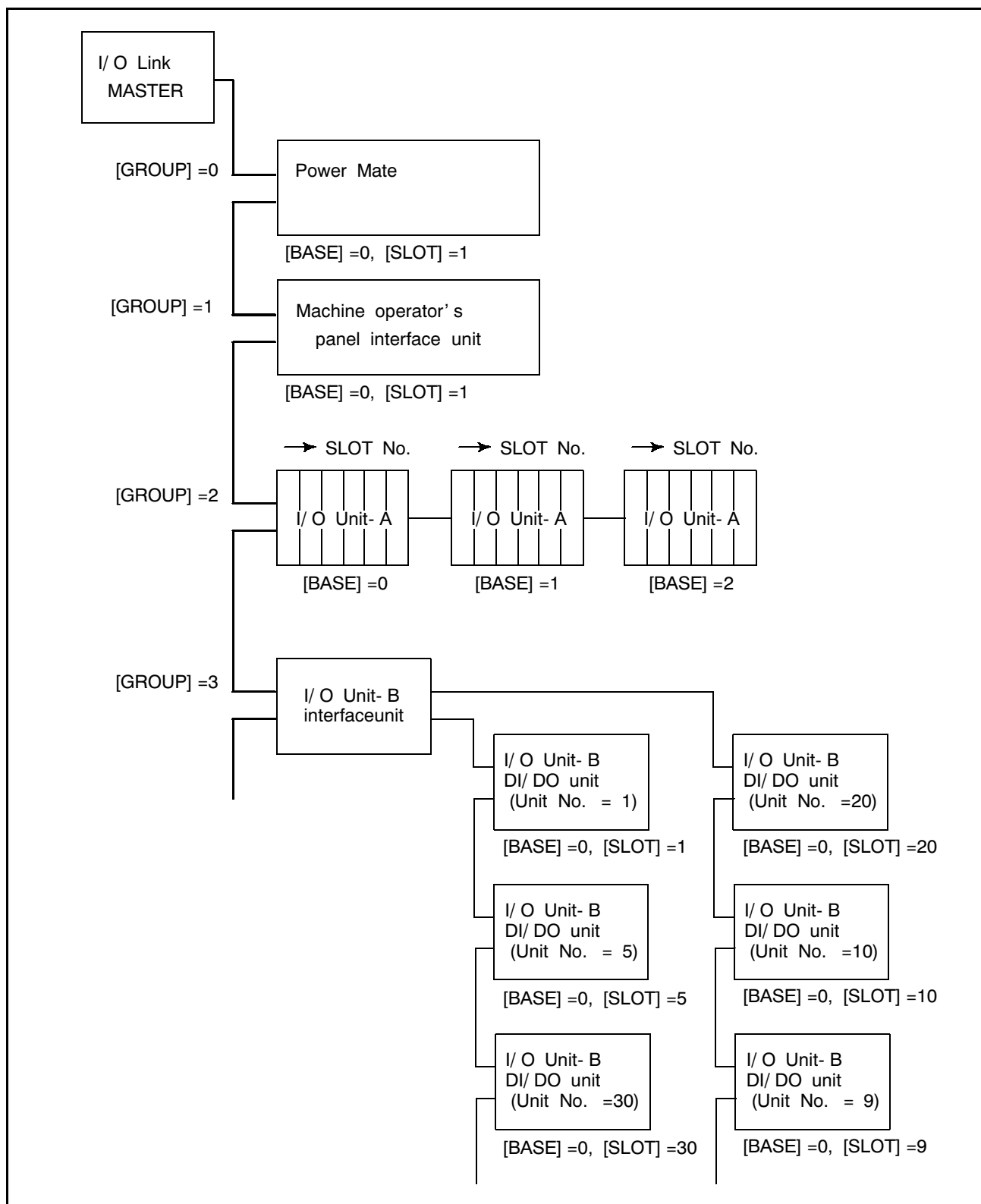
3

ADDRESS ASSIGNMENT



3.1 SPECIFICATION OF CONNECTING POSITION

You can use I/O Unit-B with current I/O Link DI/DO units like Power Mate, machine operator's panel interface unit, operator's panel connection unit and I/O Unit-A, etc. In this case, I/O Unit-B occupies one group. Therefore, no other unit except I/O Unit-B can exist in the same group. The connection example is shown in the following.



The position where the I/O Link DI/DO units is connected is specified by the GROUP number, the BASE number and the SLOT number. The I/O Link DI/DO units can be classified into following three types.

- (1) A type to be specified by GROUP number, BASE number and SLOT number

I/O Unit-A is of this type. The connecting position is specified by the GROUP number, the BASE number and the SLOT number. The value, which can be specified, is as follows.

GROUP = 0 - 15 ... Group number (serial number)

BASE = 0 - 3 ... Base number (serial number)

SLOT = 1 - 10 ... Slot number on I/O Unit-A base board

- (2) A type to be specified by GROUP number and SLOT number

I/O Unit-B is of this type. Always set the BASE number to 0. Set the SLOT number to the unit-number of I/O Unit-B. The value, which can be specified, is as follows.

GROUP = 0 - 15 ... Group number (serial number)

BASE = 0 ... Always set to 0.

SLOT = 0,1 - 30... Unit number (1-30) of I/O Unit-B DI/DO unit

When I/O Unit-B is used, power on/off information on the DI/DO unit can be read.

When you read power on/off information, set the SLOT number to 0 and use “##” as module NAME. The details of signal of power supply information are described in “I. CONNECTION 4.3.2 Power On/Off Information” on this manual.

- (3) A type to be specified by GROUP number

- Machine operator's panel interface unit
- Operator's panel connection unit
- I/O Link connecting unit
- Power Mate
- FS0 etc.

Any other I/O Link DI/DO units except I/O Unit-A and B are of this type. They occupy one group by one unit. When you use these units, set the BASE number to 0 and set the SLOT number to 1. The value, which can be specified, is as follows.

GROUP = 0 - 15 ... Group number (serial number)

BASE = 0 ... Always set 0.

SLOT = 1 ... Always set 1.

3.3 MODULE NAME

The module NAME of I/O Unit-B is shown in the following.

The number of byte [Basic unit]+[Extension unit]	Module NAME	The number of byte
1 byte	#1	Input or Output 1 byte
2 byte	#2	Input or Output 2 byte
3 byte	#3	Input or Output 3 byte
4 byte	#4	Input or Output 4 byte
6 byte	#6	Input or Output 6 byte
8 byte	#8	Input or Output 8 byte
10 byte	#10	Input or Output 10 byte
Power supply information	##	Input 4 byte

4

OPERATION

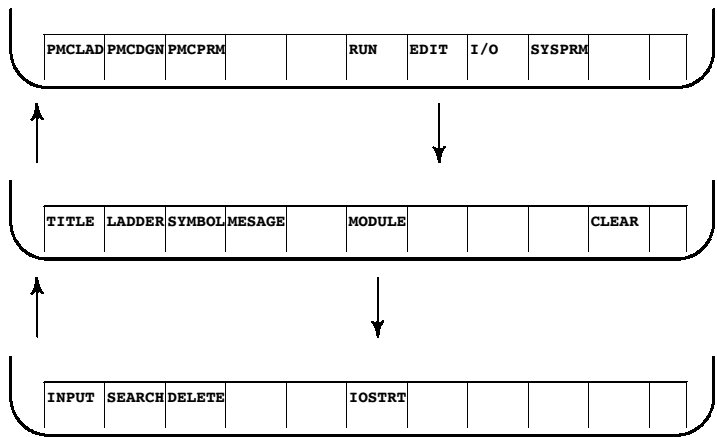


4.1
SCREEN
COMPOSITION

4.1.1
Built-in Editing
Function

- (1) PMC-NB,PMC-QC,PMC-SC,SC3,SC4
PMC-SA1,SA2,SA3,SB,SB2,SB3,SB4,SB5,SB6 with
LADDER editing function
PMC-PA1,PA3 with LADDER editing function

(a) Relation of soft key



(b) Setting screen

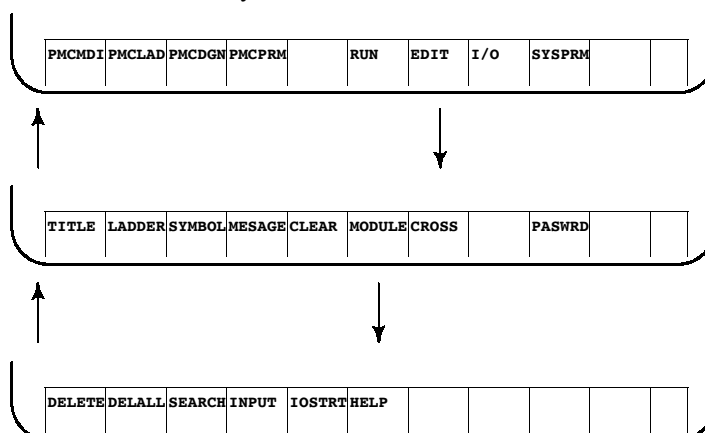
PMC I/O MODULE DATA									
ADDRESSGROUP	BASE	SLOT	NAME	ADDRESSGROUP	BASE	SLOT	NAME		
X0000	3	0	1	#1	Y0000	3	0	1	#1
X0001	3	0	5	#1	Y0001	3	0	5	#1
X0002	3	0	9	#2	Y0002				
X0003	3	0	9	#2	Y0003				
X0004	3	0	30	#2	Y0004	2	0	1	OD16C
X0005	3	0	30	#2	Y0005	2	0	1	OD16C
X0006	3	0	10	#2	Y0006	2	1	1	OD16C
X0007	3	0	10	#2	Y0007	2	1	1	OD16C
X0008	3	0	20	#2	Y0008	2	2	1	OD16C
X0009	3	0	20	#2	Y0009	2	2	1	OD16C
X0010	3	0	0	##	Y0010	2	3	1	OD16C
X0011	3	0	0	##	Y0011	2	3	1	OD16C
X0012	3	0	0	##	Y0012				
X0013	3	0	0	##	Y0013				
X0014	0	0	1	FS04A	Y0014	0	0	1	FS04A

GROUP.BASE.SLOT.NAME=
>

INPUT	SEARCH	DELETE		IOSTRT					
-------	--------	--------	--	--------	--	--	--	--	--

(2) PMC-N, PMC-NA, PMC-QA

(a) Relation of soft key



(b) Setting screen

PMC I/O MODULE DATA

ADDRESSGROUP	BASE	SLOT	NAME	ADDRESSGROUP	BASE	SLOT	NAME		
X000	3	0	1	#1	Y0000	3	0	1	#1
X001	3	0	5	#1	Y0001	3	0	5	#1
X002	3	0	9	#2	Y0002				
X003	3	0	9	#2	Y0003				
X004	3	0	30	#2	Y0004	2	0	1	OD16C
X005	3	0	30	#2	Y0005	2	0	1	OD16C
X006	3	0	10	#2	Y0006	2	1	1	OD16C
X007	3	0	10	#2	Y0007	2	1	1	OD16C
X008	3	0	20	#2	Y0008	2	2	1	OD16C
X009	3	0	20	#2	Y0009	2	2	1	OD16C
X010	3	0	0	##	Y0010	2	3	1	OD16C
X011	3	0	0	##	Y0011	2	3	1	OD16C
X012	3	0	0	##	Y0012				
X013	3	0	0	##	Y0013				
X014	0	0	1	FS04A	Y0014	0	0	1	FS04A

GROUP.BASE.SLOT.NAME=
>

DELETE DELALL SEARCH INPUT IOSTR HELP

4.1.2

FAPT LADDER for
Personal Computer

(1) Setting screen

EDIT (I/O MODULE) PMC-RB <O>[E:¥ LADDER¥ WORK¥
[CHANNEL 1]

ADDRESSGROUP	BASE	SLOT	NAME	ADDRESSGROUP	BASE	SLOT	NAME		
X0000	3	0	01	#1	Y0000	3	0	01	#1
X0001	3	0	05	#1	Y0001	3	0	05	#1
X0002	3	0	09	#2	Y0002				
X0003	3	0	09	#2	Y0003				
X0004	3	0	30	#2	Y0004	2	0	01	OD16C
X0005	3	0	30	#2	Y0005	2	0	01	OD16C
X0006	3	0	10	#2	Y0006	2	1	01	OD16C
X0007	3	0	10	#2	Y0007	2	1	01	OD16C
X0008	3	0	20	#2	Y0008	2	2	01	OD16C
X0009	3	0	20	#2	Y0009	2	2	01	OD16C
X0010	3	0	00	##	Y0010	2	3	01	OD16C
X0011	3	0	00	##	Y0011	2	3	01	OD16C
X0012	3	0	00	##	Y0012				
X0013	3	0	00	##	Y0013				
X0014	0	0	01	FS04A	Y0014	0	0	01	FS04A
X0015	0	0	01	FS04A	Y0015	0	0	01	FS04A

GROUP.BASE.SLOT.NAME=
>

SEARCH INPUT HELP DELETE DELALL END

4.2 OPERATION

- (1) Input of assignment data (INPUT)
 - a) Move the cursor to the address which you want to assign.
(page key, cursor key, and search function, etc.)
 - b) Input the GROUP number, the BASE number, the SLOT number and the module NAME of the unit which you want to assign for in format GROUP.BASE.SLOT.NAME. Use the period (.) for the delimitation between each data.
 - c) Press [INPUT] soft key.
 - d) The assignment data for the unit is automatically set at the cursor position.
- (2) Deletion of the assignment data (DELETE)
 - a) Move the cursor to the address which you want to delete.
(page key, cursor key, and search function, etc.)
 - b) Press the [DELETE] soft key.
 - c) The assignment data is automatically deleted.
- (3) Address search (SEARCH)
 - a) Input the address which you want to search.
 - b) Press the [SEARCH] soft key.
 - c) The cursor moves to the specified address.

4.3 ERROR AND WARNING MESSAGE WHEN ASSIGNMENT DATA IS EDITED

- (1) PMC-NB, PMC-QC, PMC-SC, SC3, SC4
 PMC-SA1, SA2, SA3, SB, SB2, SB3, SB4, SB5, SB6 with
 LADDER editing function
 PMC-PA1, PA3 with LADDER editing function

No	Error and warning message		Contents
	Built-in editing function	FAPT LADDER for personal computer	
1	ERR: GROUP NO.(0-15)	Appointed Group Not Exist	The GROUP number must be 0 to 15.
2	ERR: BASE NO.(0-3)	Appointed Base Not Exist	The BASE number must be 0 to 3.
3	WARN: BASE NO. MUST BE 0	Invalid data, except '0', is specified at the base of I/O Unit-B.	The BASE number of I/O Unit-B must be 0. The BASE number was compulsorily set to 0.
4	ERR: SLOT NO.(1-10)	Appointed Slot Not Exist	The SLOT number of I/O Unit-A must be 1 to 10.
5	ERR: SLOT NO.(0,1-30)		The SLOT number of I/O Unit-B must be 0 or 1 to 30.
6	ERR: SLOT NO. MUST BE 0	Invalid data, except '0', is specified at the slot of '##' as I/O Unit-B.	When you assign addresses for power on/off information on I/O Unit-B, the SLOT number must be 0.
7	ERR: ILLEGAL NAME	Appointed ID Code Not Exist	The module NAME is illegal or the module is not supported. Input a correct name.
8	INPUT INVALID	Input Data Invalid	The input character string is illegal. Input one again in a correct format.
9	IMPOSSIBLE WRITE		You tried to edit ROM data. ROM data cannot be edited.
10	ERR: ADDRESS ALREADY ASSIGNED	Address Appoint Illegal	These addresses has already been assigned. Confirm other assignment data.
11	ERR: ADDRESS OVER		The assignment data exceeded maximum address (X127,Y127). Confirm number of byte of this unit.
12	ERR: SLOT ALREADY DEFINED	The same group, base and slot are already specified.	For this SLOT, addresses has already been assigned. Confirm other assignment data.
13	WARN: SLOT ALREADY DEFINED		
14	ERR: UNIT TYPE MIS-MATCH (IN OR OUT)	Input Data Invalid	X address cannot be assigned for the output module or Y address cannot be assigned for the input module.
15	WARN: UNIT TYPE MIS- MATCH (MODEL)	Both I/O Unit-A and Unit-B are specified in the same group.	I/O Unit-A and Unit-B were set to the same GROUP. They cannot exist in the same group.

(2) PMC-N, PMC-NA, PMC-QA

No	Error and warning message		Contents
	Built-in editing function	FAPT LADDER for personal computer	
1	GROUP DATA ERROR	Appointed Group Not Exist	The GROUP number must be 0 to 15.
2	BASE DATA ERROR	Appointed Base Not Exist	The BASE number must be 0 to 3.
3	BASE NO. MUST BE 0	Invalid data, except '0', is specified at the base of I/O Unit-B.	The BASE number of I/O Unit-B must be 0. The BASE number was compulsorily set to 0.
4	SLOT DATA ERROR	Appointed Slot Not Exist	The SLOT number of I/O Unit-A must be 1 to 10.
			The SLOT number of I/O Unit-B must be 0 or 1 to 30.
5	SLOT & BASE NO. MUST BE 0	Invalid data, except '0', is specified at the slot of '##' as I/O Unit-B.	When you assign addresses for power supply information on I/O Unit-B, the SLOT number must be 0.
6	NAME DATA ERROR	Appointed ID Code Not Exist	The module NAME is illegal or the module is not supported. Input a correct name.
7	DATA FORMAT ERROR	Input Data Invalid	The input character string is illegal. Input one again in a correct format.
8	NO DATA SPACE	Address Appoint Illegal	These addresses has already been assigned. Confirm other assignment data.
			The assignment data exceeded maximum address (X127,Y127). Confirm number of byte of this unit.
9		The same group, base and slot are already specified.	For this SLOT, addresses has already been assigned. Confirm other assignment data.
10		Input Data Invalid	X address cannot be assigned for the output module or Y address cannot be assigned for the input module.
11		Both I/O Unit-A and Unit-B are specified in the same group.	I/O Unit-A and Unit-B were set to the same GROUP. They cannot exist in the same group.

[A]

AC Input Unit, 37
 AC Output Unit, 33, 73
 Address Assignment, 82
 Altitude, 12
 Ambient Temperature, 11
 Applied Software, 78

[B]

Basic and Extension Units, 48
 Basic Unit, 14, 44
 Basic Unit with Extension Unit, 15
 Branching the Communications Cable, 26
 Built-in Editing Function, 88

[C]

Cautions, 64
 Communication Cable, 30
 Communication Cable Specification, 30
 Communication of the Interface Unit, 8
 Communications Distance, 26
 Configuration, 5
 Connecting a Distributed Link, 26
 Connecting DI/DO Units, 26
 Connecting the Basic Unit, 28
 Connecting the Communications Cable, 31
 Connecting the DI/DO Cable, 30, 36
 Connecting the Extension Unit, 34
 Connecting the Interface Unit, 27
 Connecting the Power Cable, 32, 36
 Connection, 21
 Connection Diagram, 22
 Connection with the I/O Link, 24

[D]

DC input and output unit, DC output unit, DC input unit, 32, 36
 DC Output Overvoltage, 67
 DC Output Protection, 66
 DI/DO Unit, 9, 11

Dimensions, 13

Dimensions for Installation on the DIN Rail (Use a DIN Rail That is 35mm Wide and 7.5mm High.), 16

Dimensions For Permanent Installation (Direct Installation without DIN Rail) , 13

[E]

EDSP (Selecting the Error Display Method), 41
 Electrical Isolation (for AC unit), 12
 Environmental Conditions, 11
 Error and Warning Message When Assignment Data is Edited, 91

[F]

FAPT LADDER for Personal Computer, 89

[G]

Ground Connection, 23

[H]

Heat Value of Each Unit, 20
 Heat Value of Each Unit and Terminal Box, 20
 Humidity, 11, 12

[I]

Input and Output Signals and Their Addresses, 49
 Input Section (DI) Wiring, 69
 Input/Output Points for the Interface Unit, 24
 Installation, 10
 Installation Category (Overvoltage Category), 72
 Installation Environment, 72
 Installation location, 11
 Installing a Terminating Resistor, 26
 Installing the Immovable Basic Unit with an Extension Unit on the DIN Rail, 19
 Installing the Interface Unit or Basic Unit, 17
 Installing the Movable Basic Unit with an Extension Unit on the DIN Rail, 18
 Installing the Unit On the DIN Rail (Use a Rail that is 35mm Wide and 7.5mm High.), 17
 Interface Unit, 11, 13, 40

[L]

LED Indications, 42, 46

[M]

Module Name, 86

Mounting the I/O Unit-B Directly to the Power Magnetism Cabinet, 23

Mounting the I/O Unit-B on the DIN Rail, 23

[N]

Noise Suppressor, 70

[O]

Offline Programmer, 80

Operation, 87, 90

[P]

PMC Address, 85

PMC Control Software / Built-in Ladder Editing Software, 79

Pollution Degree, 72

Power On/Off, 68

Power On/Off Information, 25

Power Supply Capacity of Each Unit, 38

[Q]

Q and H (Setting the Communication Speed), 41, 45

[R]

R (Installing a Terminating Resistor), 42, 45

[S]

Safety for Using AC, 71

Screen Composition, 88

Setting the DIP Switch, 41, 45

Setting the Interface and Basic Units, and Led Indications, 39

Specification of Connecting Position, 83

Specifications, 6

Specifications of the Basic and Extension Units, 51

Switches 1, 2, 4, 8, and 16 (Setting the Unit Number), 45

System, 7

System Configuration, 3

[T]

Terminal Box, 20

[U]

Unit Number, 26

Units, 47

URDY (Setting the Power On/Off Information of Each Unit), 41

[V]

Variations in temperature , 11

Vibration, 11, 12

[W]

When Noise is Induced on DC Supply Voltage, 65

Revision Record

FANUC I/O Unit- MODEL B CONNECTION MANUAL (B-62163E)

03	Nov., '98	"9 Safety for using AC" was added.					
02	Oct., '97	Total revision					
01	Mar., '93	<hr/>					
Edition	Date	Contents	Edition	Date	Contents		

Date Sept. 2000
General Manager of
Software Laboratory

FANUC I/O Unit-MODEL B CONNECTION MANUAL

1. Communicate this report to:

<input type="radio"/>	Your information only
<input type="radio"/>	GE Fanuc-N, GE Fanuc-E
<input type="radio"/>	FANUC Robotics
<input type="radio"/>	CINCINNATI MILACRON
<input type="radio"/>	Machine tool builder
<input type="radio"/>	Sales agency
<input type="radio"/>	End user

2. Summary for Sales Documents

3. Notice

FANUC I/O Unit-MODEL B CONNECTION MANUAL

4. Attached Document

Drawing No.	B-62163E/03-1 (Ed.02) (1/5~5/5)
----------------	---------------------------------

IDE

Original section of issue			
V.G.M	Department Manager	Section Manager	Person in Charge

FANUC

FANUC I/O Unit-MODEL B CONNECTION MANUAL

Type of applied technical documents

Name	FANUC I/O Unit-MODEL B CONNECTION MANUAL
Spec. No. /Ed.	B-62163E/03

Summary of Change

Group	Name/Outline	New, Add, Correct, Delete	Applicable Date
Basic Function	Correction of manual	Correct	Jun. 2000
Optional Function			
Unit			
Maintenance Parts			
Notice			
Correction			
Another			

				TITLE FANUC I/O Unit-MODEL B CONNECTION MANUAL	
02	00.08.03	Matsuo	Correction of a mistake in page 4		
01	00.06.01	Matsuo	Correction of manual Nagashima	DRAW.NO. B-62163E/03-1	CUST.
EDIT	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEE 1/5

FANUC I/O Unit-MODEL B
CONNECTION MANUAL

Table of Contents

1	Correction of manual.....	3
---	---------------------------	---

				TITLE FANUC I/O Unit-MODEL B CONNECTION MANUAL	
02	00.08.03	Matsuo	Correction of a mistake in page 4		
01	00.06.01	Matsuo	Correction of manual	DRAW.NO. B-62163E/03-1	CUST.
EDIT	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEE 2/5

1 Correction of manual

"II. 2.1 PMC CONTROL SOFTWARE / BUILT-IN LADDER EDITING SOFTWARE" is changed to the following sentences.

2.1 PMC CONTROL SOFTWARE / BUILT-IN LADDER EDITING SOFTWARE

NC model	PMC model	Applied series /edition	Maximum number of available groups	Maximum number of connection units per 1 group
FS15-A	PMC-N	4045/09 -	8	10
FS15-B	PMC-NA PMC-NB PMC-NB,NB2	4046/07 - 4047/01 - 4048/01 - 4049/01 -	8	10
FS16-A	PMC-SB,SB2 PMC-SB3 PMC-SC,SC3	4061/17 - 4063/03 - 4062/10 -	8	10
FS18-A	PMC-SA1,SA2 PMC-SA3 LADDER editing module	4070/10 - 4071/03 - 4065/07 -		
FS16-B FS18-B	PMC-SB3,SB4 PMC-SC3,SC4 Ladder editing card	4066/01 - 4068/01 - 4073/01 -	8	10
FS16-C FS18-C	PMC-SB5,SB6 PMC-SC3,SC4 Ladder editing card	4067/01 - 4068/01 - 4090/01 -	8	10
FS20-A	PMC-SA1,DA3 Ladder editing card	4080/01 - 4081/01 -	8	10
FS21T-A	PMC-PA1,PA3 Ladder editing card	4075/06 - 4076/02 -	8	10
FS21T-B	PMC-SA1,SA3 Ladder editing card	4082/01 - 4083/01 -	8	10
FS21M-B	PMC-SA1,SA3 Ladder editing card	4080/01 - 4081/01 -	8	10
FS21M-B FS210T-B	PMC-SA1,SA3 Ladder editing card	4084/01 - 4085/01 -	8	10
FS210T-B loader control	PMC-SA1,SA3 Ladder editing card	4086/01 - 4087/01 -	8	10

				TITLE	FANUC I/O Unit-MODEL B
02	00.08.03	Matsuo	Correction of a mistake in page 4	CONNECTION MANUAL	
01	00.06.01	Matsuo	Correction of manual	DRAW.NO. B-62163E/03-1	CUST.
EDIT	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEE 3/5

Power Mate-D	PMC-PA1,PA3	4075/06 -	8	10
	Ladder editing card	4076/02 -		
Power Mate-H	PMC-PA1,PA3	4078/01 -	8	10
	Ladder editing card	4079/01 -		
F-D Mate	PMC-QA	4050/08 - 4051/03 -	8	10
F-D Mate mini	PMC-QC	4054/02 - 4055/01 -	8	10
FS16i-A FS18i-A FS21i-A FS20i-A	PMC-SA1,SA5, SB5,SB6	406A/01 - 08	8 (*1)	10
		406A/09 -		30
	Ladder editing card	407A/01 -		(*2)
FS15i-A	PMC-SB6	404A/01 -	8	30
Power Mate i-D/H	PMC-SB5,SB6	407B/01 - 02	8	10
		407B/03 -		30
	Ladder editing card	407D/01 -		
FS0i-A	PMC-SA1,SA3	Unavailable	0	0
	Ladder editing card			

Note

- *1. When using the I/O Link expansion function, the maximum number of available total groups of 1st channel and 2nd channel is 8 or less.
- *2. In case of PMC-SA1, the maximum number of connection units per 1 group is 10 or less.

				TITLE FANUC I/O Unit-MODEL B CONNECTION MANUAL	
02	00.08.03	Matsuo	Correction of a mistake in page 4		
01	00.06.01	Matsuo	Correction of manual Nagashima	DRAW.NO. B-62163E/03-1	CUST.
EDIT	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEE 4/5

The following sentences are added to end of "I. 4.4.4 Installing a Terminating Resistor".

Caution

When terminating resistors are set below, there is no guarantee because communication line becomes unstable.

- Terminating resistors are not installed in the end of communication cable.
- Terminating resistors are installed in the middle of communication cable.

The following sentences are added to end of "I. 5.1.1.4 R(installing a terminating resistor)".

Caution

When terminating resistors are set below, there is no guarantee because communication line becomes unstable.

- Terminating resistors are not installed in the end of communication cable.
- Terminating resistors are installed in the middle of communication cable.

The following sentences are added to end of "I. 5.2.1.2 R(installing a terminating resistor)".

Caution

When terminating resistors are set below, there is no guarantee because communication line becomes unstable.

- Terminating resistors are not installed in the end of communication cable.
- Terminating resistors are installed in the middle of communication cable.

				TITLE	
02	00.08.03	Matsuo	Correction of a mistake in page 4	FANUC I/O Unit-MODEL B CONNECTION MANUAL	
01	00.06.01	Yamanaka	Correction of manual	DRAW.NO. B-62163E/03-1	CUST.
EDIT	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEE 5/5

Date Dec 5,2003
 General Manager of
 CNC Laboratory

FANUC I/O UNIT-MODEL B
 Addition basic unit (BZR88G1, BXD16D1, BYR16G1)

1. Communicate this report to :

<input type="radio"/>	Your information
<input type="radio"/>	GE Fanuc-N, GE Fanuc-E
<input type="radio"/>	FANUC Robotics
<input type="radio"/>	CINCINNATI MILACRON
<input type="radio"/>	Machine tool builder
<input type="radio"/>	Sales agency
<input type="radio"/>	End user

2. Summary for Sales Documents

3. Notice

4. Attached Document

Drawing No.	B-62163E/03-2 (001/16~016/16)
-------------	-------------------------------

ADE

Original section of issuer of issue			
Vice General Manager.	Department Manager	Section Manager	Person in Charge

<p style="text-align: center;">FANUC I/O Unit-MODEL B</p> <p style="text-align: center;">Additional basic unit (BZR88G1,BXD16D1,BYR16G1)</p>
--

1.Type of applied technical documents

Name	FANUC I/O Unit-MODEL B CONNECTING MANUAL
Spec.No./Version	B-62163E/03

2.Summary of change

Group	Name / Outline	New, Add, Correct, Delete	Applicable Date
Basic Function			
Optional Function	Basic unit (BZR88G1, BXD16D1, BYR16G1)	Add	2003.12
Unit			
Maintenance parts			
Notice			
Correction			
Another			

				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
01	03.12.02	Yamanaka	T. Koike	DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 1/16

Table of contents

1. Outline of additional basic unit (BZR88G1,BXD16D1,BYR16G1)
2. Ordering specification
3. Outer dimensions
4. Connection
 - 4.1 Connecting the DI/DO cables and the communication cable
 - 4.2 Connecting the Power cable
 - 4.3 Ground connection
 - (1) Mounting to a properly grounded metal portion
 - (2) Mounting to a non metal or non grounded metal portion
5. Setting and indications
 - 5.1 LED indications
 - 5.2 Setting the DIP switch
 - 5.2.1 No. (setting the unit number)
 - 5.2.2 R (installing terminal resistor)
 - 5.2.3 Q and H (setting the communication speed)
6. Specification of basic unit
 - (1) BZR88G1 (8 input points and 8 Relay output points)
 - (2) BXD16D1 (16 input points)
 - (3) BYR16G1 (16 Relay output points)
7. Power supply capacity
8. Detection when the fuse breaks.

				TITLE	FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO.	B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	F A N U C		SHEET 2/16

1. Outline of additional basic unit (BZR88G1,BXD16D1,BYR16G1)

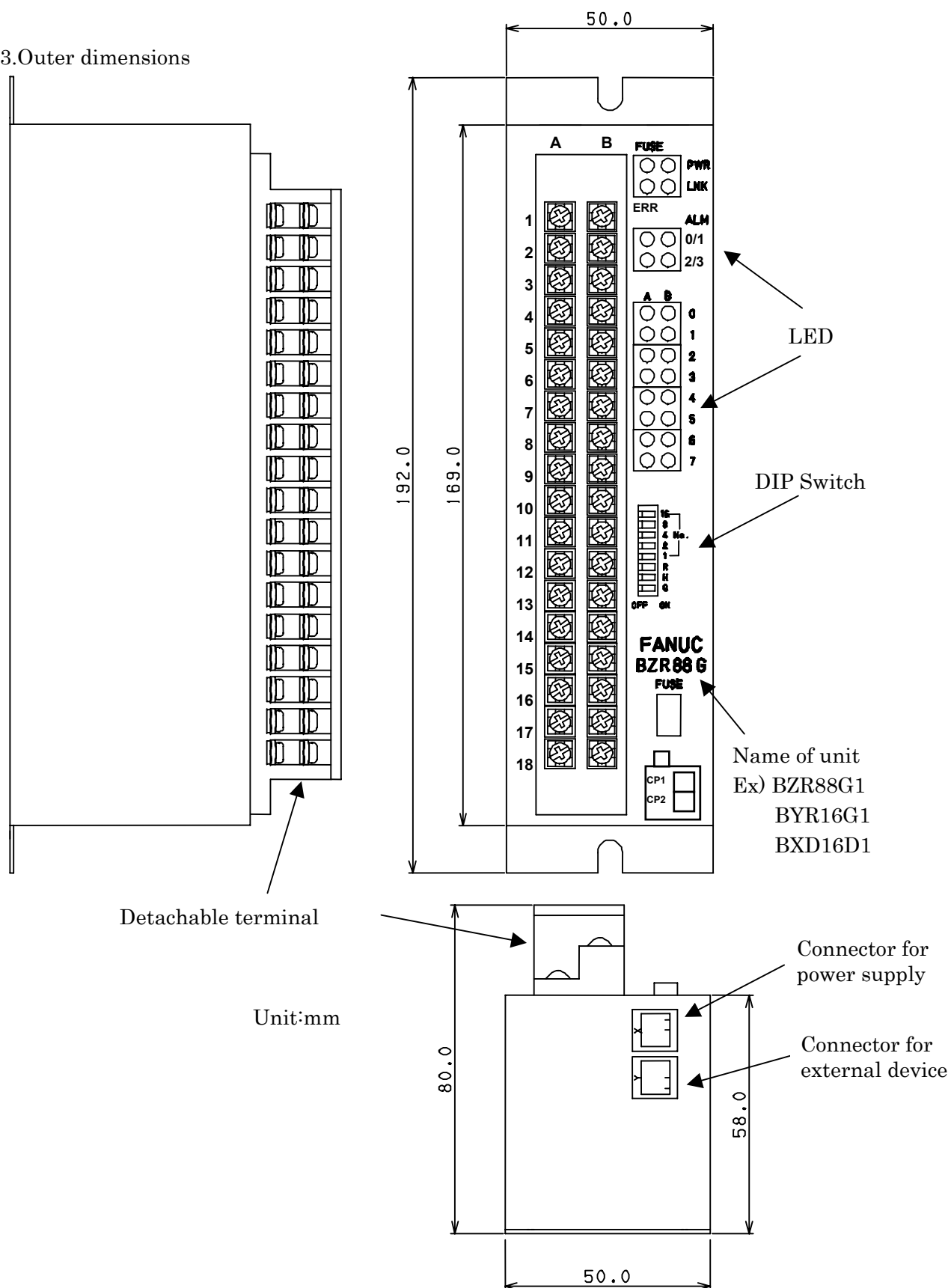
- The depth of these units is deep because it keeps setting area to small.
- Adoption of detachable terminal.
- Arrangement common terminal every input/output signal.
- All signals (input/output and communication) are put together one terminal.
- LED which indicates On/Off state every input/output signal.

2. Ordering specification

Name	Type of I/O	Ordering specification	PCB drawing No.
BZR88G1	8 input points and 8 Relay output points	A03B-0808-C310	A20B-8002-0340
BXD16D1	16 input points	A03B-0808-C320	A20B-8002-0360
BYR16G1	16 Relay output points	A03B-0808-C330	A20B-8002-0350

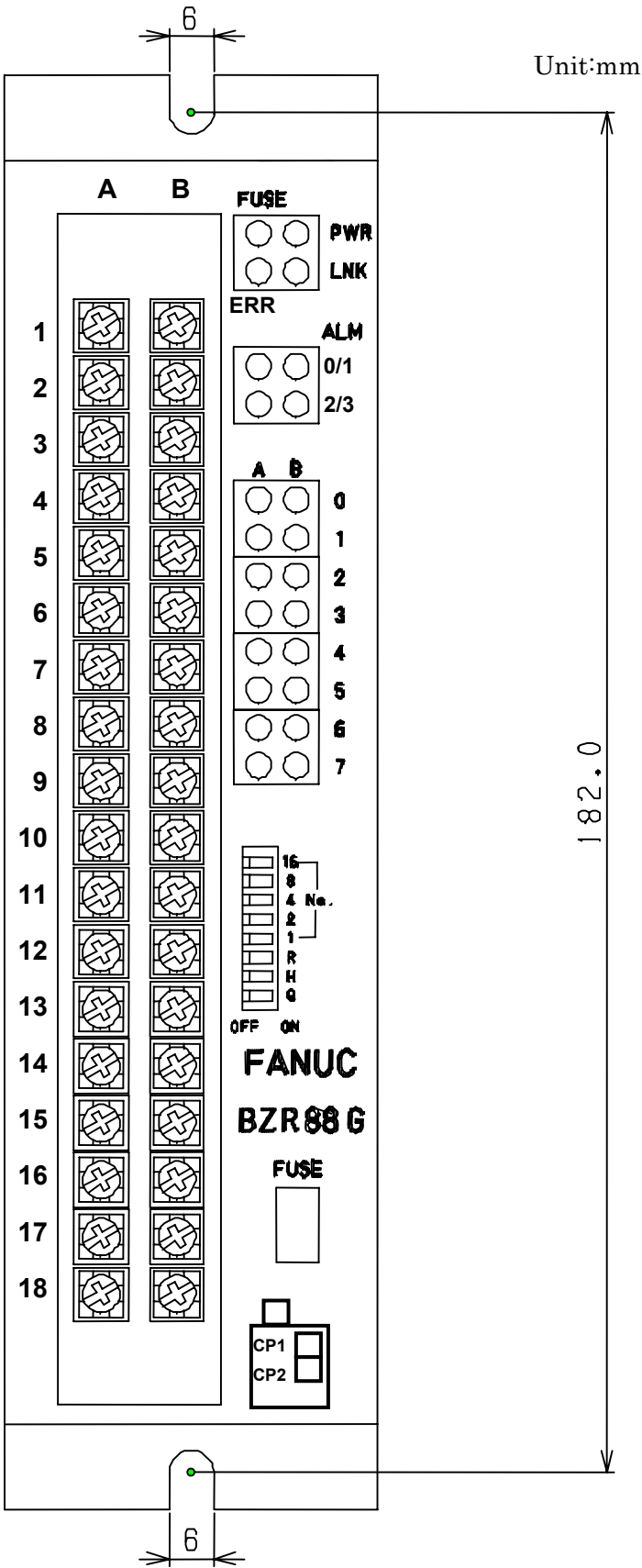
				TITLE	FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)		
				DRAW. NO.	B-62163E/03-2		CUST
EDIT	DATE	DESIG.	DESCRIPTION	F A N U C		SHEET	3/16

3.Outer dimensions



				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 4/16

-Installation



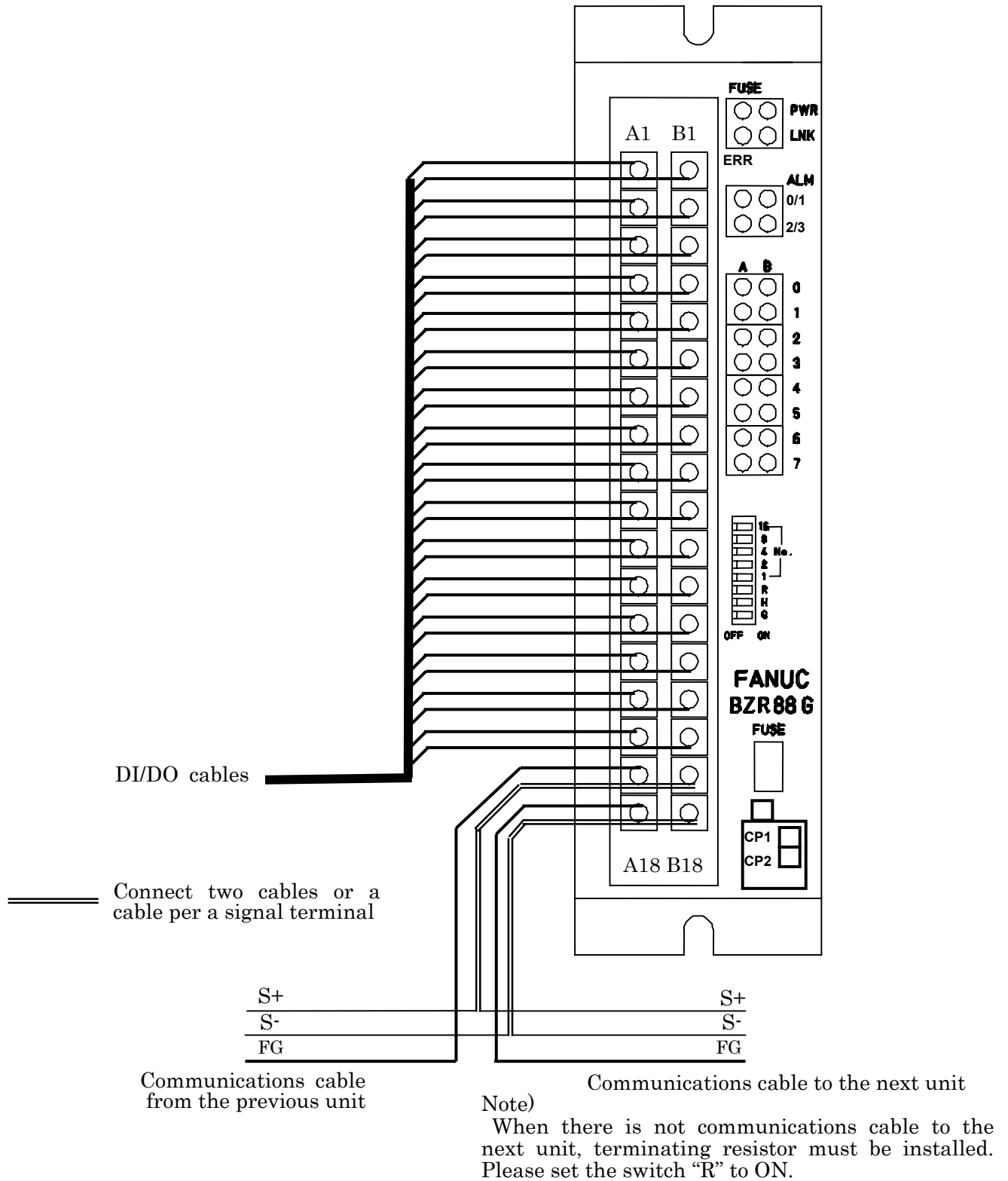
				TITLE	FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO.	B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	F A N U C		SHEET 5/16

4.Connection

Connecting to the Interface unit is the same way else basic unit now in use. So please refer to FANUC I/O Unit-MODEL B CONNECTING MANUAL (B-62813E/03).

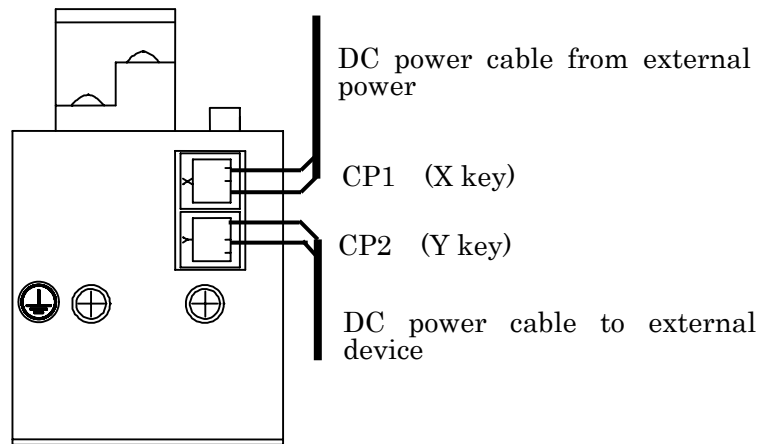
Details of connecting the DI/DO cables are described in item 6.

4.1Connecting the DI/DO cables and the communication cable

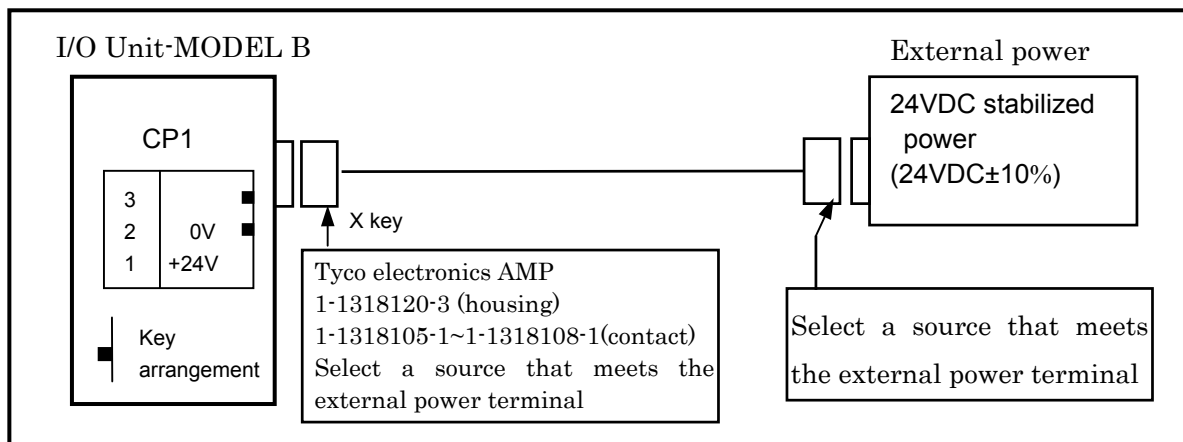


				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 6/16

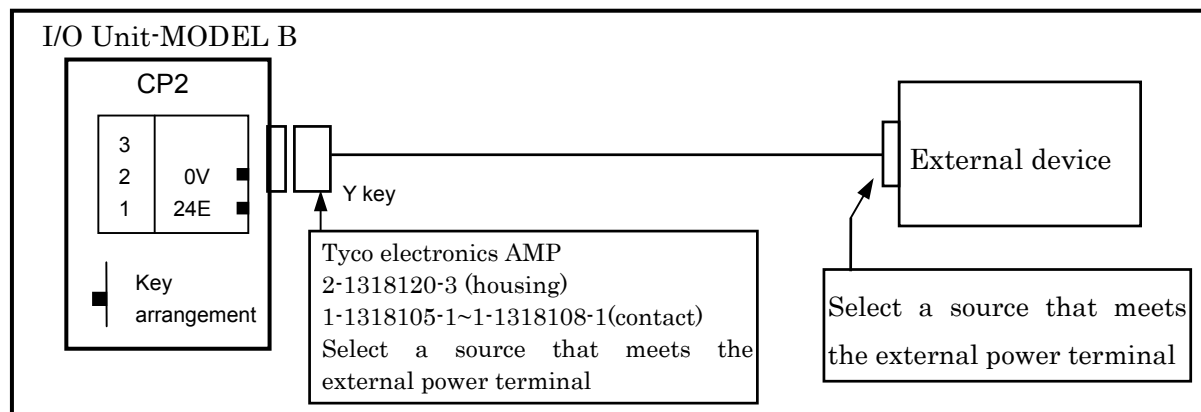
4.2 Connecting the Power cable



Supply power to this unit from CNC or external resource.



The 24V DC input to CP1 can be output from CP2 for use branching. The connection of CP2 is as shown below. In this case, the external 24V DC power supply should have a rating which is equal to the sum of the current consumed by the control unit and the current used via CP2.



				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1, BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 7/16

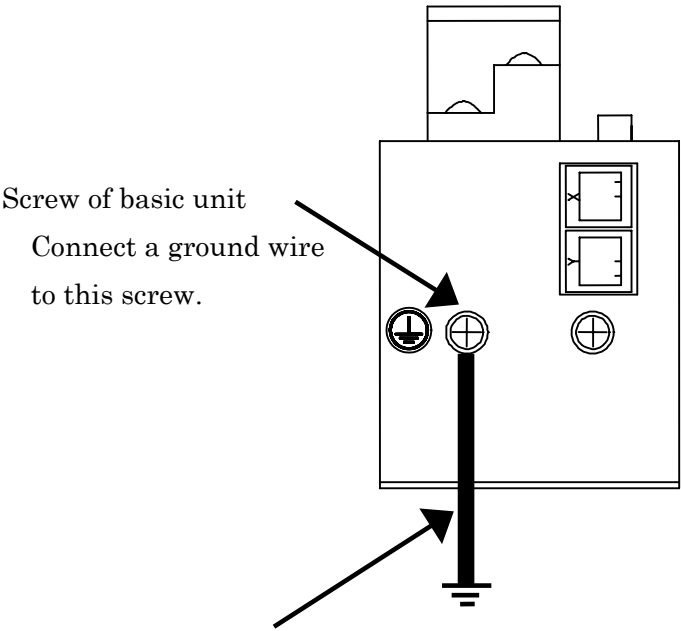
4.3 Ground connection

(1) Mounting to a properly grounded metal portion

When the base unit is mounted on a properly grounded metal portion of the power magnetics cabinet, it is grounded via a case of unit. Be sure to fix the base unit securely.

(2) Mounting to a non metal or non grounded metal portion

When the base unit is mounted on a non metal or non grounded metal portion of the power magnetics cabinet, it is necessary to connect a ground wire to the case of basic unit below. Please screw off the indicated the screw of basic unit below, connect the ground wires to substantial earth ground, and screw up securely.

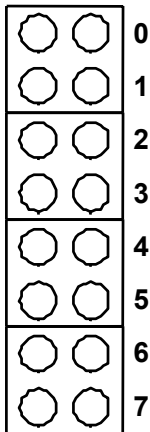
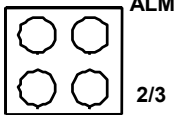
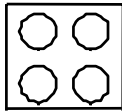


The conductor in ground wire must have 2mm² cross-sectional area or larger.

				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 8/16

5.Setting and indications

5.1 LED indications



PWR(Green):Lights when the power is turned in.

LNK(Green):Lights when the unit communicates with the Interface unit.

FUSE(Red):Lights when the fuse of output circuits breaks.

ERR(Red):Lights when an error occurs.

ALM0~3(Red):Indicate the details of the error.

As for the details of the error, refer to below table.

A0-7,B0-7(Green): The LED indicate whether the input or output is on or off

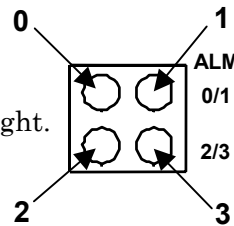
On : The LED lights

OFF : The LED goes off

-Details of the error

Bits of LED(0~3) correspond right.

("0":The LED is on. "-":The LED is off.)

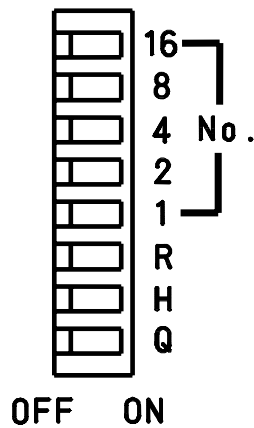


LED "ERR"	LED "ALM"				Error	Description
	0	1	2	3		
-	-	-	-	-	-	The unit is correct
0	-	-	-	-	Watch-dog error	The communication with the interface unit was cut off.
0	0	-	-	-	Peripheral error	The basic unit is defective.
0	0	-	0	-	Watch-dog error	The communication with the interface unit was cut off.
0	-	0	-	-	CRC error	The communication data is illegal.
0	0	0	-	-	DMI error	The communication waveform was corrupted.
0	-	0	0	-	Framing error	The communication termination signal is illegal.
0	0	0	0	-	Illegal number of received data items	The number of communication bytes exceeds four.

				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 9/16

5.2 Setting the DIP switch

The basic unit has the DIP switch shown below. The following sections describe the functions of the switches on the DIP switch.

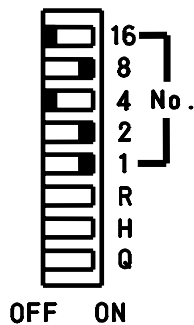


5.2.1 No. (setting the unit number)

Switches 1, 2, 4, 8, and 16 set a unit number. Specify a desired unit number with these switches.

Examples)

Unit number	Settings				
	16	8	4	2	1
1	OFF	OFF	OFF	OFF	
5	OFF	OFF		OFF	
1 0	OFF		OFF		OFF
1 5	OFF				
2 0		OFF		OFF	OFF
2 5			OFF	OFF	
3 0					OFF



Sample setting : To specify unit number 11, set switches 1, 2, 4, 8, and 16 switches as shown left.

Set “8”, “2” and “1” to “ON”. (8+2+1=11)

5.2.2 R (installing terminal resistor)

A terminating resistor must be installed on the basic unit at the end of the communications cable. The basic unit has a built-in terminating resistor, which can be connected by the R switch of the DIP switch.

ON : The terminating resistor is provided.-----basic unit at the end of the communications cable

OFF : The terminating resistor is not provided.----- basic unit at the middle of the communications cable

5.2.3 Q and H (setting the communication speed)

The communication speed is 1.2Mbps. The same setting must be made on the interface unit and all basic units.

Q	H	Communication speed
OFF	OFF	1.2Mbps

				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)		
				DRAW. NO. B-62163E/03-2	CUST	
EDIT	DATE	DESIG.	DESCRIPTION	F A N U C	SHEET	10/16

6. Specification of basic unit

-Common specification

Item	Specification	Remarks
Power supply for the control and input circuits	24V DC $\pm 10\%$	Use a stable power supply.
Terminal for DI/DO and communication cables	Two-row screw terminal board Detachable type.(M3:36poles)	Screw tightening torque: Screw for cables : 0.5~0.6Nm Screw for terminal block: 1.0~1.4Nm
Unit number	Specified by a DIP switch	-Of 1 to 30, select a desired number for each unit. -Each unit must have a unique number. -In case of several type of PMC, maximum number of connection units per 1 group is limited. Please refer to connecting manual of FANUC I/O Unit-MODEL B (B-62813E/03) as details of issue.
Power on/off	Can be executed at any time	When Power on/off information is assigned in DI area of PMC, it is easy to watch the unit which connects in distributed link.
When the NC power is turned off while the power of the basic unit is on	The output is cleared.	
Fuse	For control circuit LM10:(A60L-0001-0290#LM10) Daito Communication Apparatus Co.,Ltd. For output circuit MP50:(A60L-0001-0046#5.0) Daito Communication Apparatus Co.,Ltd.	This fuse (for output circuit) is not necessary for BXD16D1.

Item	Specification
Ambient temperature	In operation:0~55°C In storage or transportation:-20~60°C
Variations in temperature	Up to 1.1°C per minute
Humidity	General condition : 75% or lower (relative humidity) Short-period condition (up to one month) : Up to 95%
Vibration	3G
Altitude	Maximum altitude in operation: 2000m

				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST
EDIT	DATE	DESIG.	DESCRIPTION	FANUC	SHEET 11/16

(1)Basic unit BZR88G1(8 input points and 8 RELAY output points)

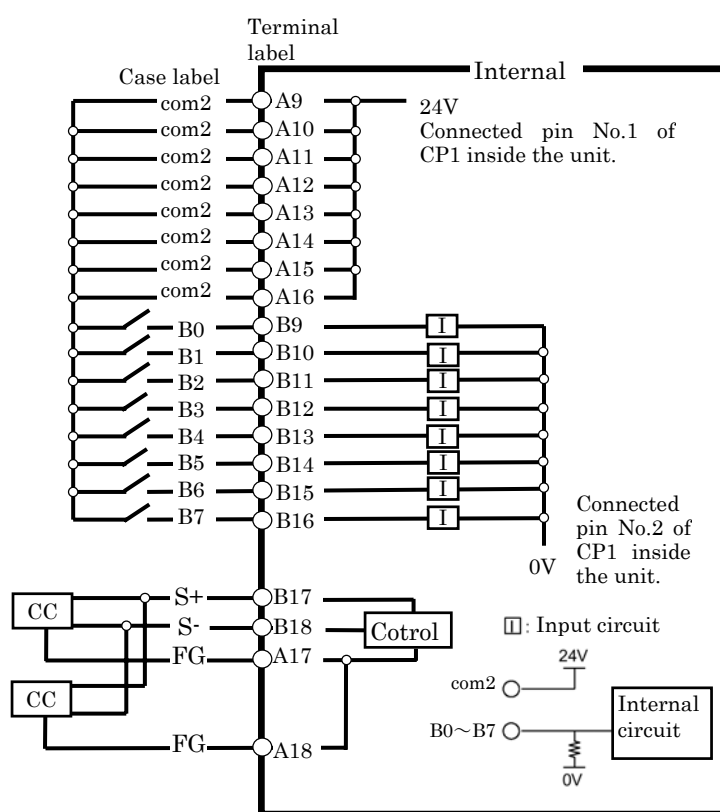
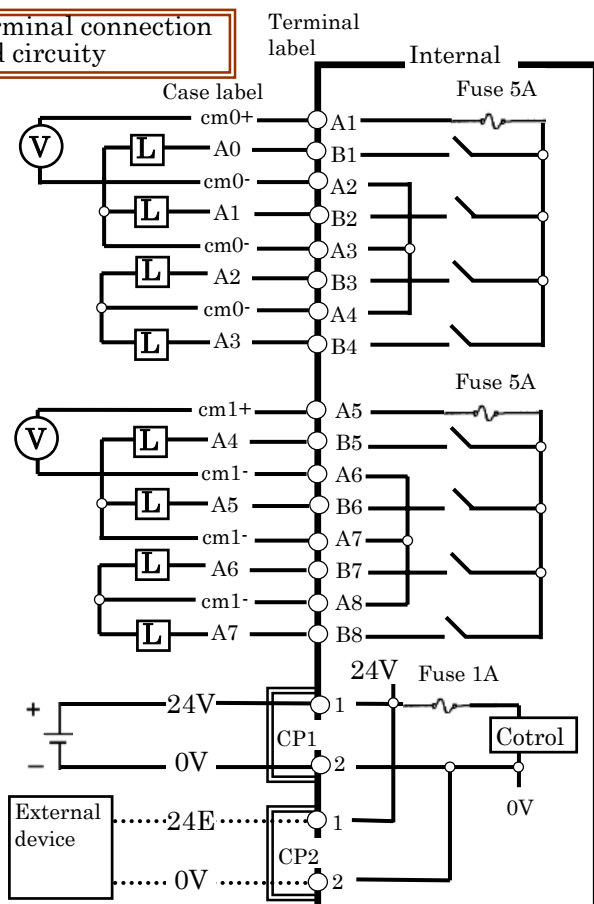
Output			Input	
Item	Specification		Item	Specification
Signal	A0~A7		Signal	B0~B7
Points	8		Points	8
Points/common	4points/common		Points/common	8points/common
Maximum load current	DC30V/AC125V,2A (resistance load) (However 4A/common)		Current sink or source	Current sink type
Minimum load	DC5V, 10mA		Input current	7.5mA
Limit of load	Refer to load reduction curve (fig.6.1)		ON voltage, current	Min.18VDC, min.6mA
Response time	off→on	Max 15msec(*1)	OFF voltage, current	Max.5VDC,min.1.5mA
	on→off	Max 15msec(*1)		
Output display			Input display	LED display
External connection			External connection	Terminal block connector
Fuse			Fuse	1A(Control circuit)
Relay life	Mechanical	Min.20,000,000 times	—	—
	Electrical	Min.100,000 times(resistance load)	—	—

*1 The actual response time is the sum of this value and the scanning time determined by the system.

-Signal assignment on terminal block

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	cm0+	cm0-	cm0-	cm0-	cm1+	cm1-	cm1-	cm1-	com2	com2	com2	com2	com2	com2	com2	com2	FG	FG
B	A0	A1	A2	A3	A4	A5	A6	A7	B0	B1	B2	B3	B4	B5	B6	B7	S+	S-

Terminal connection and circuitry



Cotrol : Cotrol circuit L : Load

CC : Communication cable

⊙ : Direct current power or alternating current power

				TITLE			
				FANUC I/O Unit-MODEL B			
				Basic unit			
				(BZR88G1,BXD16D1,BYR16G1)			
				DRAW. NO.		CUST.	
				B-62163E/03-2			
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET	12/16

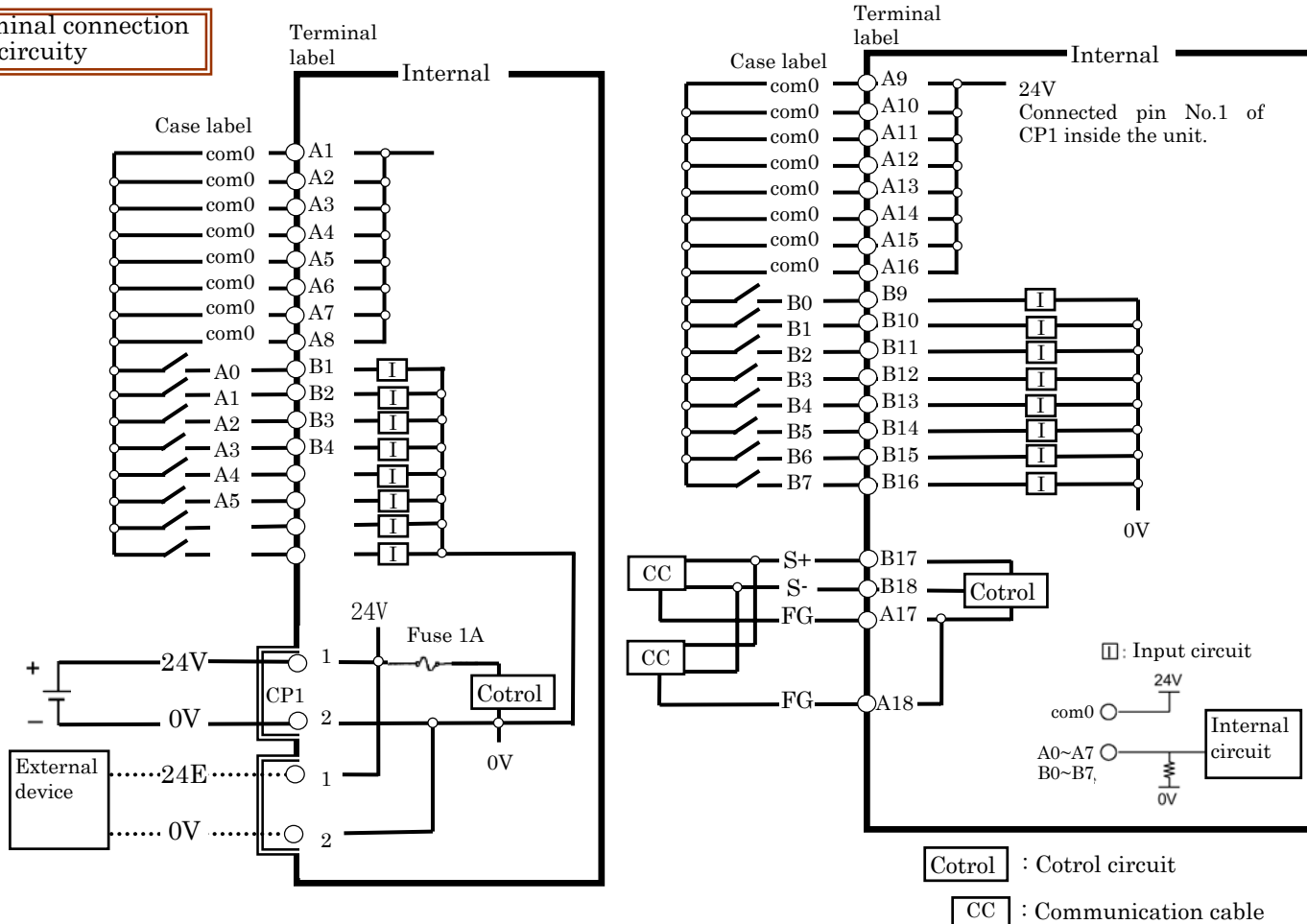
(2) Basic unit BXD16D1(16 input points)

Item				Specification	
Signal				A0~A7, B0~B7	
Points				16	
Points/common				16points/common	
Current sink or source				Current sink type	
Input current				7.5mA	
ON voltage, current				Min.18VDC, min.6mA	
OFF voltage, current				Max.5VDC,min.1.5mA	
Response time	off->on		Max 2msec	The actual response time is the sum of this value and the scanning time determined by the system.	
	on->off		Max 2msec		
Input display				LED display	
External connection				Terminal block connector	
Fuse				1A(Control circuit)	

- Signal assignment on terminal block

Signal assignment on terminal block																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	com0	FG	FG
B	A0	A1	A2	A3	A4	A5	A6	A7	B0	B1	B2	B3	B4	B5	B6	B7	S+	S-

Terminal connection and circuitry



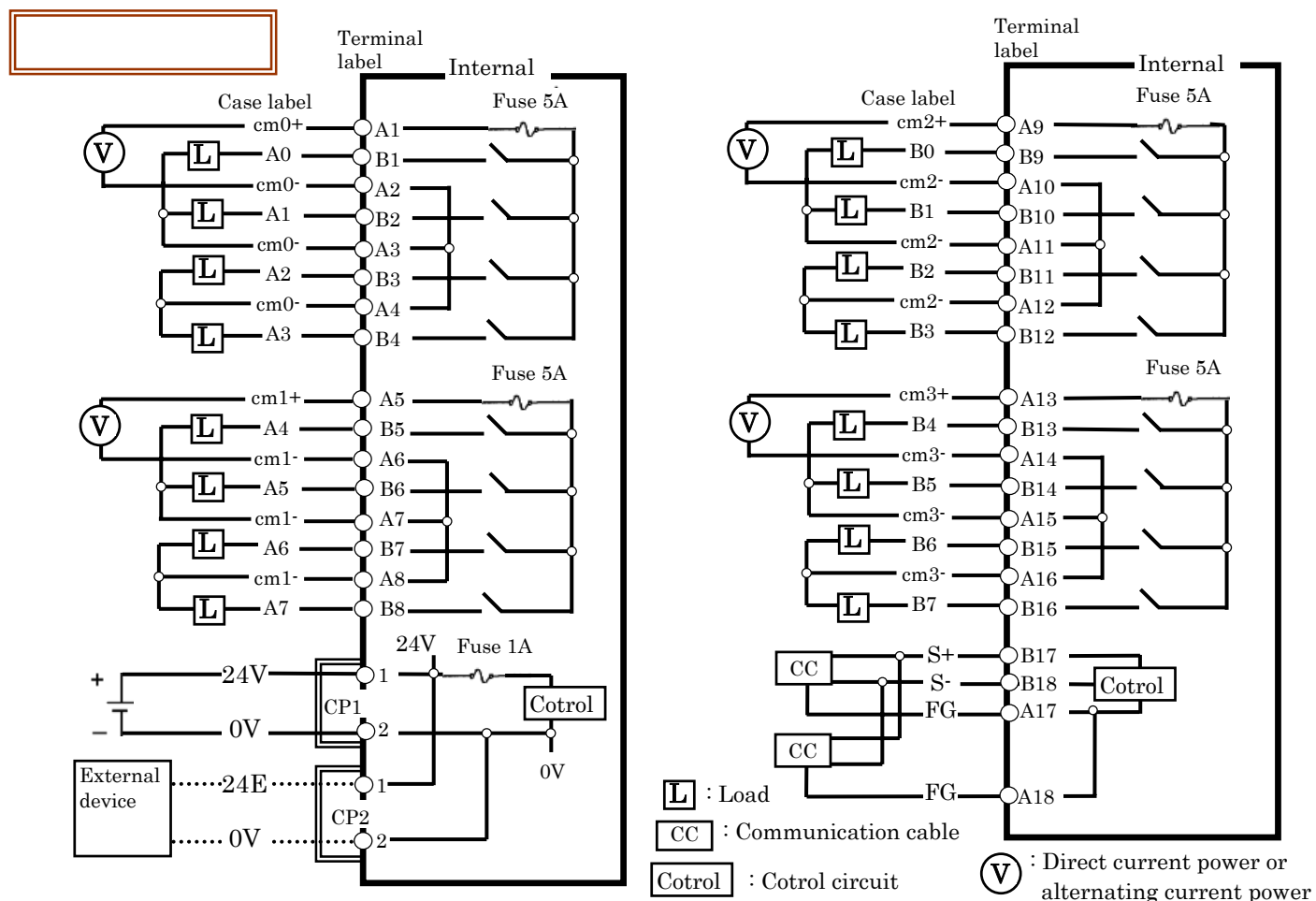
				TITLE FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO. B-62163E/03-2	CUST.
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD	SHEET 13/16

(3)Basic unit BYR16G1(16 RELAY output points)

Item		Specification	
Signal		A0~A7, B0~B7	
Points		16	
Points/common		4points/common	
Maximum load current		DC30V/AC125V,2A (resistance load) (however 4A/common)	
Minimum load		DC5V, 10mA	
Limit of load		Refer to load reduction curve (fig.6.2)	
Response time	off->on	Max 15msec	The actual response time is the sum of this value and the scanning time determined by the system.
	on->off	Max 15msec	
Output display		LED display	
External connection		Terminal block connector	
Relay life	Mechanical	Min.20,000,000 times	
	Electrical	Min.100,000 times(resistance load)	
Fuse		For output circuit : 5A,1 piece for each common For control circuit : 1A	

-Signal assignment on terminal block

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	cm0+	cm0-	cm0-	cm0-	cm1+	cm1-	cm1-	cm1-	cm2+	cm2-	cm2-	cm2-	cm3+	cm3-	cm3-	cm3-	FG	FG
B	A0	A1	A2	A3	A4	A5	A6	A7	B0	B1	B2	B3	B4	B5	B6	B7	S+	S-

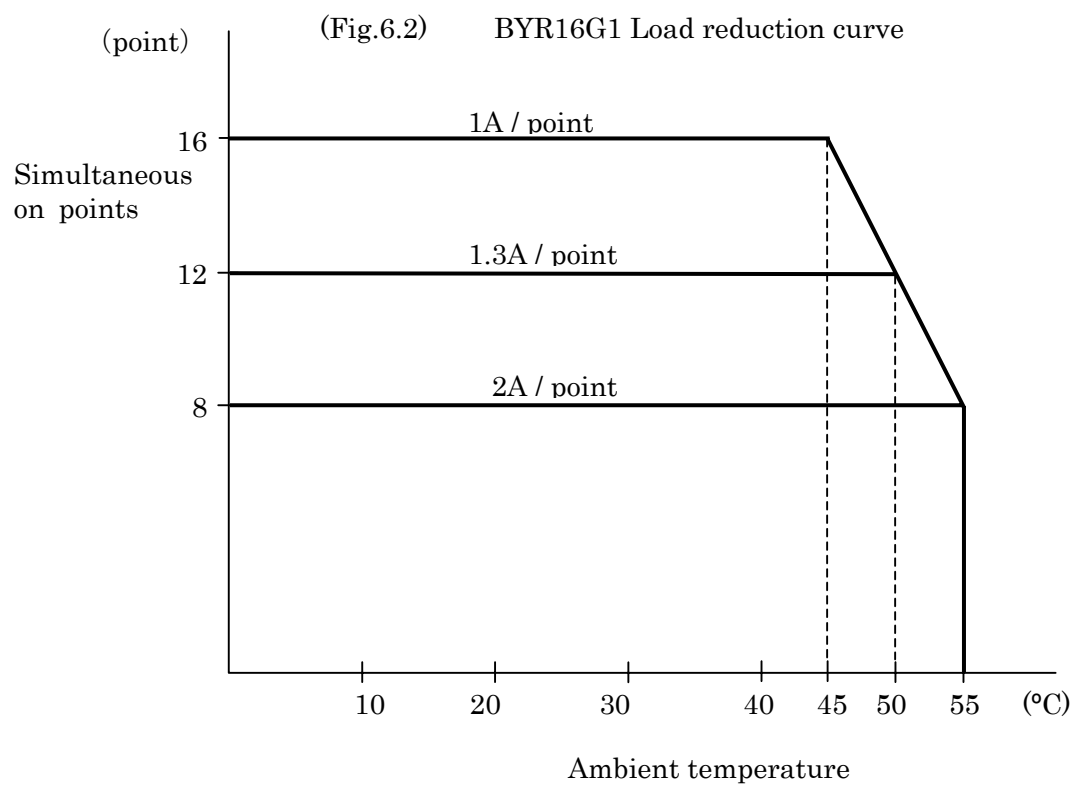
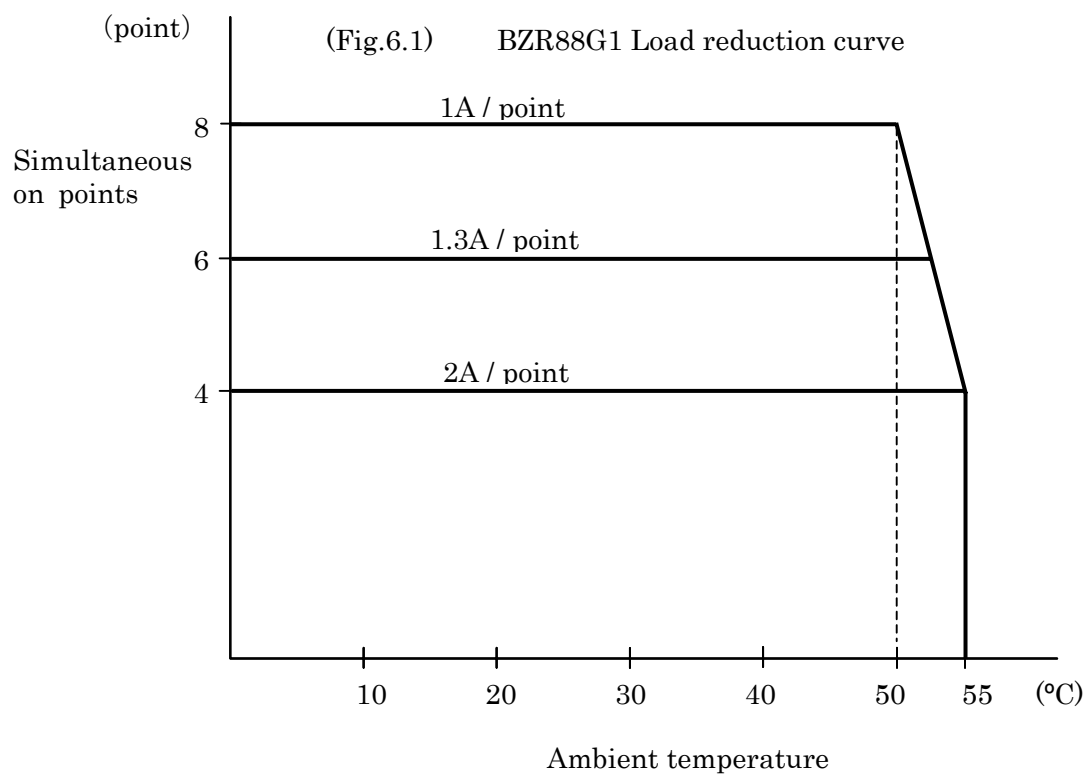


FANUC I/O Unit-MODEL B
Basic unit
(BZR88G1,BXD16D1,BYR16G1)

B-62163E/03-2

DATE

14/16



				TITLE	FANUC I/O Unit-MODEL B	
					Basic unit	
					(BZR88G1,BXD16D1,BYR16G1)	
				DRAW. NO.	B-62163E/03-2	CUST
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET 15/16

7. Power supply capacity

Unit name	Required current (mA) of +24V		
	A	B	C
BZR88G1	70	10 x N	10 x M
BXD16D1	70	10 x N	-
BYR16G1	70	-	10 x M

N : Number of the input points which turn ON simultaneously.

M : Number of the output points which turn ON simultaneously.

Add the sums of columns A, B and C for the unit to be used. The sum is the required current. (Unit mA)

(Example)

In case of BZR88G1,

Number of the input points which turn ON simultaneously is 6 points.

Number of the output points which turn ON simultaneously is 4 points.

$$70 + 10 \times 6 + 10 \times 4 = 170\text{mA}$$

8. Detection when the fuse breaks.

BZR88G1 and BYR16G1 has a function of detection when the fuse breaks.

When the fuse breaks, the corresponding signal of the power on/off information which is assigned in DI area of PMC is turned off.

(example) The units whose unit number is 12 and 23 are connected. When the fuse which is installed in unit number 23 break, 6 bit of address X+2 change "0".

Before break									After break									
address	7	6	5	4	3	2	1	0		address	7	6	5	4	3	2	1	0
X	0	0	0	0	0	0	0	0		X	0	0	0	0	0	0	0	0
X+1	0	0	0	0	1	0	0	0	→	X+1	0	0	0	0	1	0	0	0
X+2	0	1	0	0	0	0	0	0		X+2	0	0	0	0	0	0	0	0
X+3	0	0	0	0	0	0	0	0		X+3	0	0	0	0	0	0	0	0

Any fuse break at unit which has some fuses, the corresponding signal of the power on/off information is turned off. And the LED "FUSE"(Red) turns on.

As for the power on/off information, please refer to FANUC I/O Unit-MODEL B CONNECTING MANUAL (B-62813E/03).

				TITLE	FANUC I/O Unit-MODEL B Basic unit (BZR88G1,BXD16D1,BYR16G1)		
				DRAW. NO.	B-62163E/03-2		CUST
EDIT.	DATE	DESIG.	DESCRIPTION	FANUC LTD		SHEET	16/16