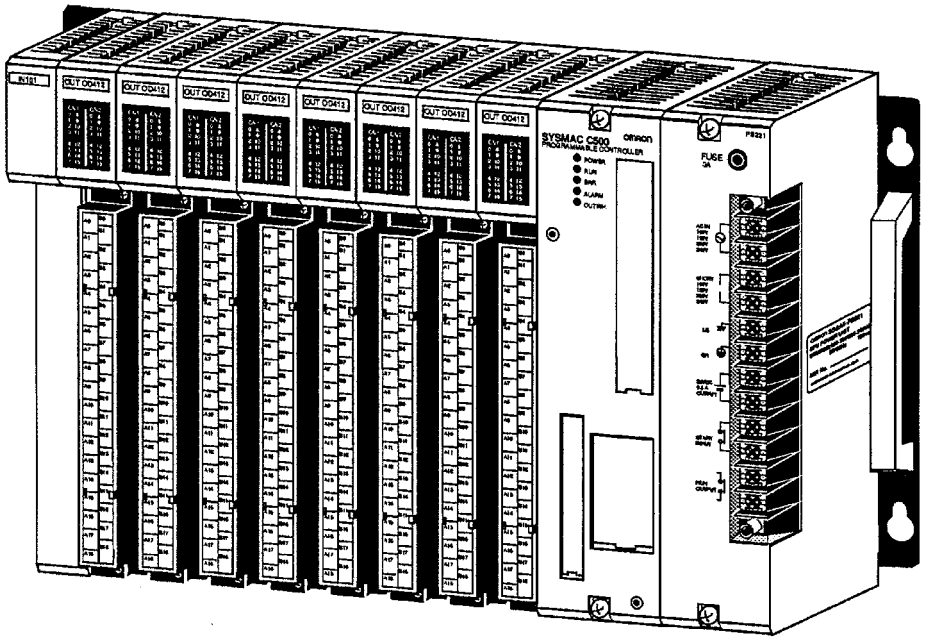
C500 Programmable Controller

Installation Guide

Revised February 1997



Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to the product.

⚠ DANGER Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

⚠ WARNING Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

⚠ Caution Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

About this Manual:

This manual describes the installation of the C500 Programmable Controller and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the C500 Programmable Controller. **Be sure to read the following section before operating the C500 Programmable Controller.**

Section 1 is an introduction to Programmable Controllers. General information about what a Programmable Controller can do and how a Programmable Controller works is provided.

Section 2 provides a description of all the components of the C500. The names of all the individual parts of each Unit are given.

Section 3 explains how to assemble the C500. A detailed description of how to mount each Unit is provided.

Section 4 outlines the system connections involved in installing a C500 Programmable Controller Systems.

Section 5 contains the requirements for the installation environment of the C500. Suggestions for preventing electrical noise are included.

Section 6 explains the power considerations involved in installing the C500.

Section 7 lists safety considerations that should be kept in mind while installing the C500.

Appendixes, a ***Glossary***, and an ***Index*** are also included.

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

TABLE OF CONTENTS

PRECAUTIONS

This section provides general precautions for using the Programmable Controller (PC) and related devices.

The information contained in this section is important for the safe and reliable application of the PC. You must read this section and understand the information contained before attempting to set up or operate a PC system.

1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for programming and operating OMRON PCs. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

⚠ WARNING It is extremely important that a PC and all PC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PC System to the abovementioned applications.

3 Safety Precautions

⚠ WARNING Never attempt to disassemble any Units while power is being supplied. Doing so may result in serious electrical shock or electrocution.

⚠ WARNING Never touch any of the terminals while power is being supplied. Doing so may result in serious electrical shock or electrocution.

4 Operating Environment Precautions

Do not operate the control system in the following places.

- Where the PC is exposed to direct sunlight.
- Where the ambient temperature is below 0°C or over 55°C.
- Where the PC may be affected by condensation due to radical temperature changes.
- Where the ambient humidity is below 10% or over 90%.
- Where there is any corrosive or inflammable gas.
- Where there is excessive dust, saline air, or metal powder.
- Where the PC is affected by vibration or shock.
- Where any water, oil, or chemical may splash on the PC.

⚠ Caution The operating environment of the PC System can have a large effect on the longevity and reliability of the system. Improper operating environments can lead to malfunction, failure, and other unforeseeable problems with the PC System. Be sure that the operating environment is within the specified conditions at installation and remains within the specified conditions during the life of the system.

5 Application Precautions

Observe the following precautions when using the PC.

⚠ WARNING Failure to abide by the following precautions could lead to serious or possibly fatal injury. Always heed these precautions.

- Always ground the system to 100 Ω or less when installing the system to protect against electrical shock.
- Always turn off the power supply to the PC before attempting any of the following. Performing any of the following with the power supply turned on may lead to electrical shock:
  - Mounting or removing any Units (e.g., I/O Units, CPU Unit, etc.) or memory cassettes.
  - Assembling any devices or racks.
  - Setting any DIP or rotary switches.
  - Connecting or disconnecting any cables or wiring.

⚠ Caution Failure to abide by the following precautions could lead to faulty operation or the PC or the system or could damage the PC or PC Units. Always heed these precautions.

- Always tighten AC power supply terminals to the torque specified in the manuals. Loose terminals can cause shorts, faulty operation, or damage.
- Use the Units only with the power supplies and voltages specified in the operation manuals. Other power supplies and voltages may damage the Units.
- Always tighten all screws on Backplanes, terminal blocks, and cables to the torque specified in the manual.
- Always use crimp terminals to connect wires to terminals. Do not connect loose wires.
- Always double-check all wiring before supplying power.
- Check the direction and polarity of all terminal blocks and connectors before attempting to connect them.
- Do not do any of the following without first confirming that the overall system will not be affected.
  - Change the PC operating mode.
  - Force-set/reset bits.
  - Change word contents (SV or PV) in memory.
- Take measures to stabilize the power supply to conform to the rated supply if it is not stable.
- Provide circuit breakers and other safety measures to provide protection against shorts in external wiring.
- Do not apply voltages exceeding the rated input voltage to Input Units. The Input Units may be destroyed.
- Do not apply voltages exceeding the maximum switching capacity to Output Units. The Output Units may be destroyed.

- Always disconnect the LG terminal when performing withstand voltage tests.
- Install all Units according to instructions in the operation manuals. Improper installation may cause faulty operation.
- Provide proper shielding when installing in the following locations:
  - Locations subject to static electricity or other sources of noise.
  - Locations subject to strong electromagnetic fields.
  - Locations subject to possible exposure to radiation.
  - Locations near to power supply lines.
- Be sure to tighten Backplane screws, terminal screws, and cable connector screws securely.
- Do not attempt to take any Units apart, to repair any Units, or to modify any Units in any way.
- Do not pull on cables or cords or place heavy objects on them. The wired inside the cable may break.

⚠ Caution The following precautions are necessary to ensure the general safety of the system. Always heed these precautions.

- Provide double safety mechanisms to handle incorrect signals that can be generated by broken signal lines or momentary power interruptions.
- Provide external interlock circuits, limit circuits, and other safety circuits in addition to any provided within the PC to ensure safety.

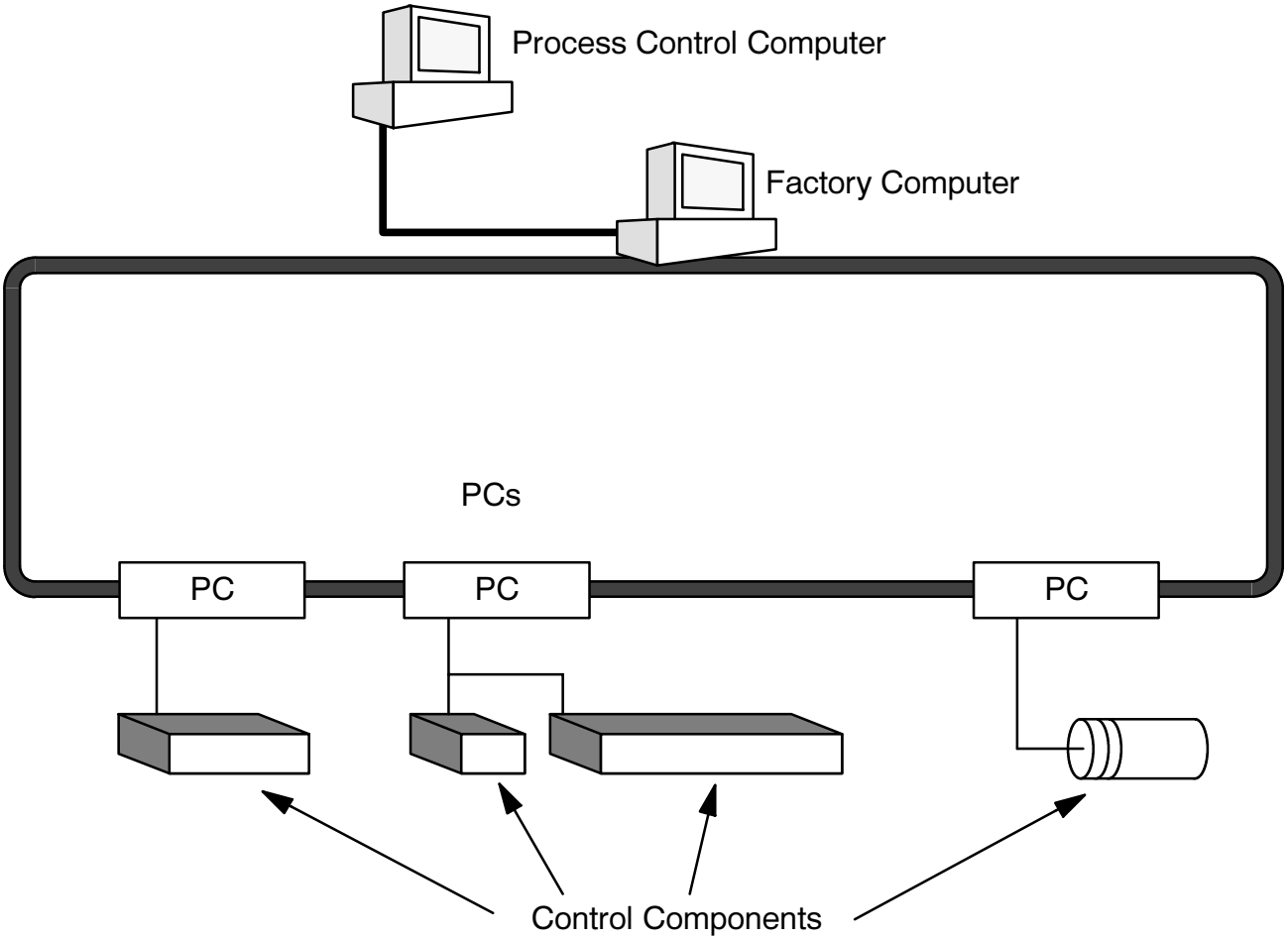
SECTION 1
Introduction

Introduction

This section provides general information about Programmable Controllers (Systems) and how they fit into a Control System.

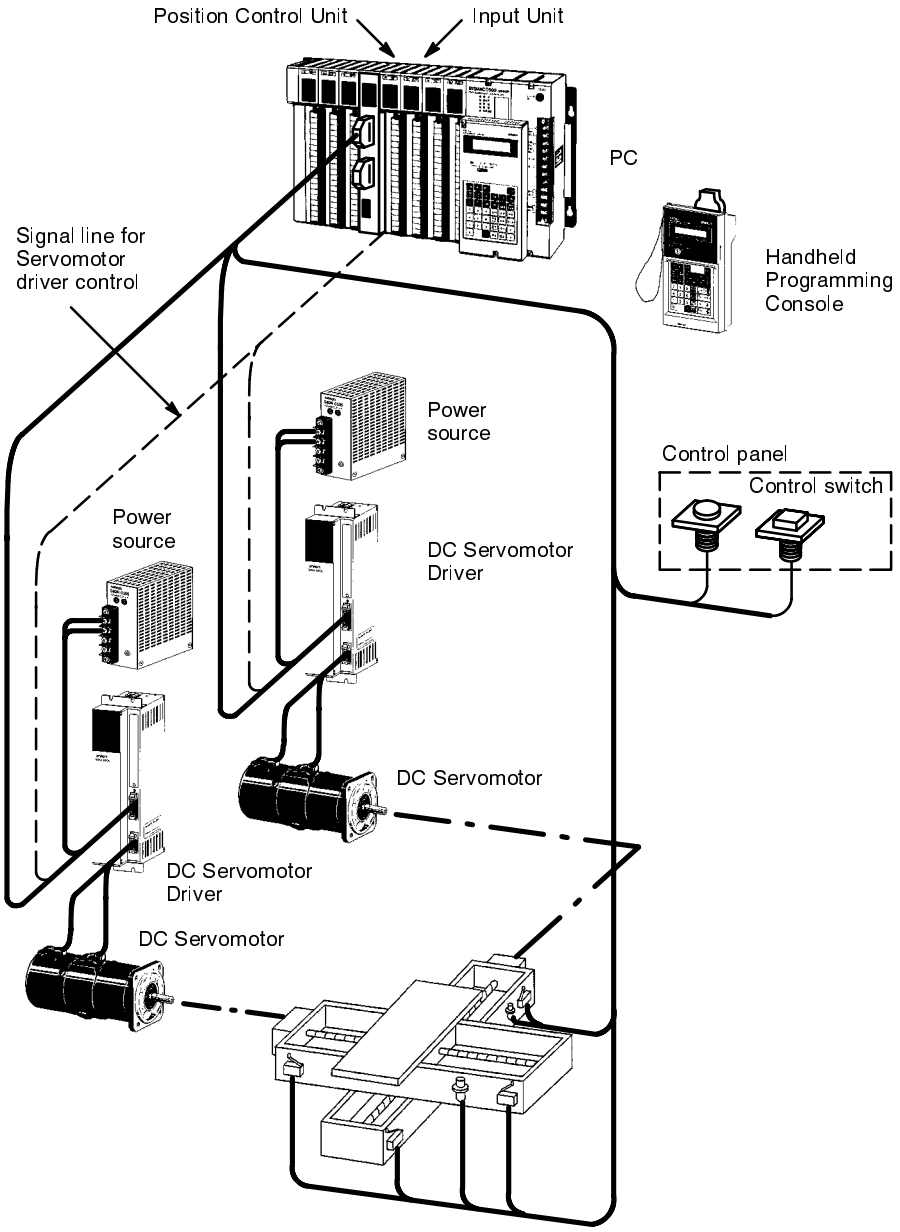
1-1 What is a Control System?

A Control System is the electronic equipment needed to control a particular process. It may include everything from a process control computer, if one is used, to the factory computer, down through the PCs (and there may be many of them networked together), and then on down through the network to the control components: the switches, stepping motors, solenoids, and sensors which monitor and control the mechanical operations.



A Control System can involve very large applications where many different models of PC are networked together or it could be an application as small as a single PC controlling a single output device.

Position Control System



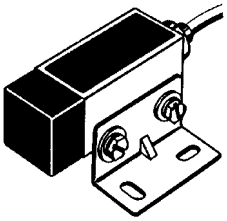
In the typical Control System example shown above, a PC controls the movement of the workpiece bed across two horizontal axes using Limit Switches and Servomotors to monitor and control movement.

1-2 The Role of the PC

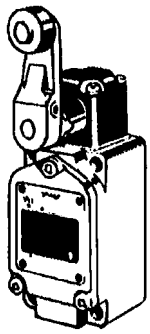
The PC is the part of the Control System that directly controls the manufacturing process. According to the program stored in its memory, the PC accepts data from the input devices connected to it, and uses this data to monitor the controlled system. When the program calls for some action to take place, the PC sends data to the output devices connected to it to cause that action to take place. The PC may be used to control a simple, repetitive task, or it may be connected to other PCs, or to a host computer in order to integrate the control of a complex process.

1-2-1 Input Devices

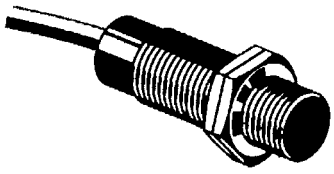
PCs can receive input from either automated or manual devices. The PC could receive data from the user via a pushbutton switch, keyboard, or similar device. Automated input could come from a variety of devices: microswitches, timers, encoders, photosensors, and so on. Some devices, like the Limit Switch shown below, turn ON or OFF when the equipment actually makes contact with them. Other devices, like the Photoelectric Switch and Proximity Switch shown below, use other means, such as light or inductance, in order to get information about the equipment being monitored.



Photoelectric Switch



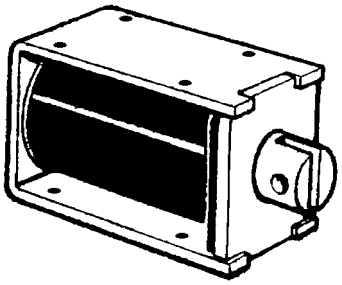
Limit Switch



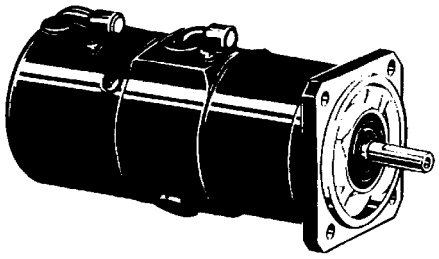
Proximity Switch

1-2-2 Output Devices

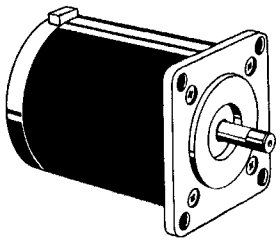
A PC can output to a myriad of devices for use in automated control. Almost anything that you can think of could be controlled (perhaps indirectly) by a PC. Some of the most common devices are motors, Solenoids, Servomotors, Stepping Motors, valves, switches, indicator lights, buzzers, and alarms. Some of these output devices, such as the motors, Solenoids, Servomotors, Stepping Motors, and valves, affect the controlled system directly. Others, such as the indicator lights, buzzers, and alarms, provide output to notify personnel.



Solenoid



ervomotor

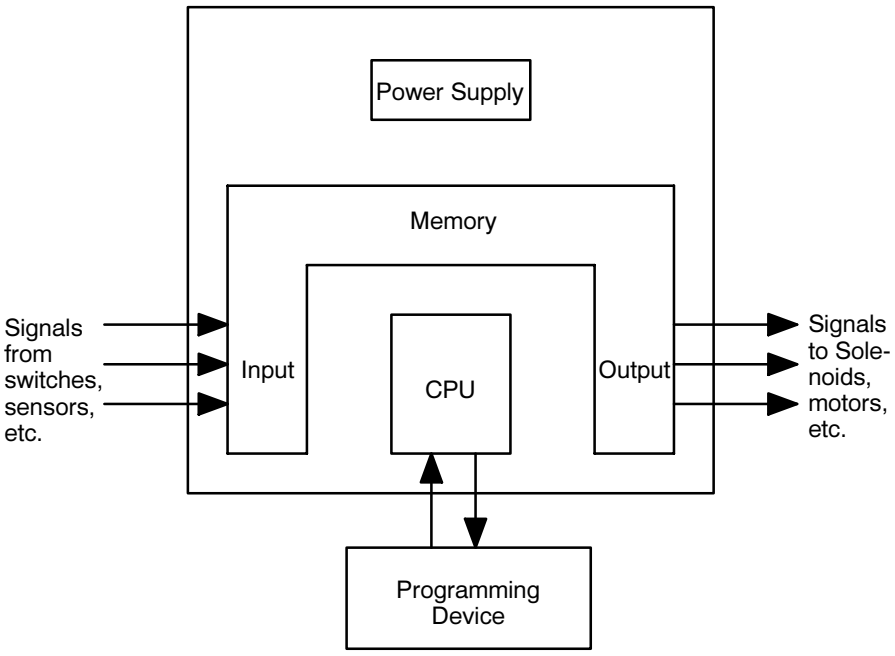


Stepping Motor

1-3 How Does a PC Work?

PCs operate by monitoring input signals and providing output signals. When changes are detected in the signals, the PC reacts, through the user-programmed internal logic, to produce output signals. The PC continually cycles the program in its memory to achieve this control.

Block Diagram of PC



A program for your applications must be designed, and stored in the PC. This program is then executed as part of the cycle of internal operations of the PC.

Scanning Cycle

When a PC operates, that is, when it executes its program to control an external system, a series of operations are performed inside the PC. These internal operations can be broadly classified into the following four categories:

1. Common (or overseeing) processes, such as watchdog timer operation and testing the program memory.
2. Data input and output.
3. Instruction execution.
4. Peripheral device servicing.

Cycle Time

The total time required for a PC to perform all these internal operations is called the cycle time. The flowchart and diagram on page 7 illustrate these internal operations for a typical PC.

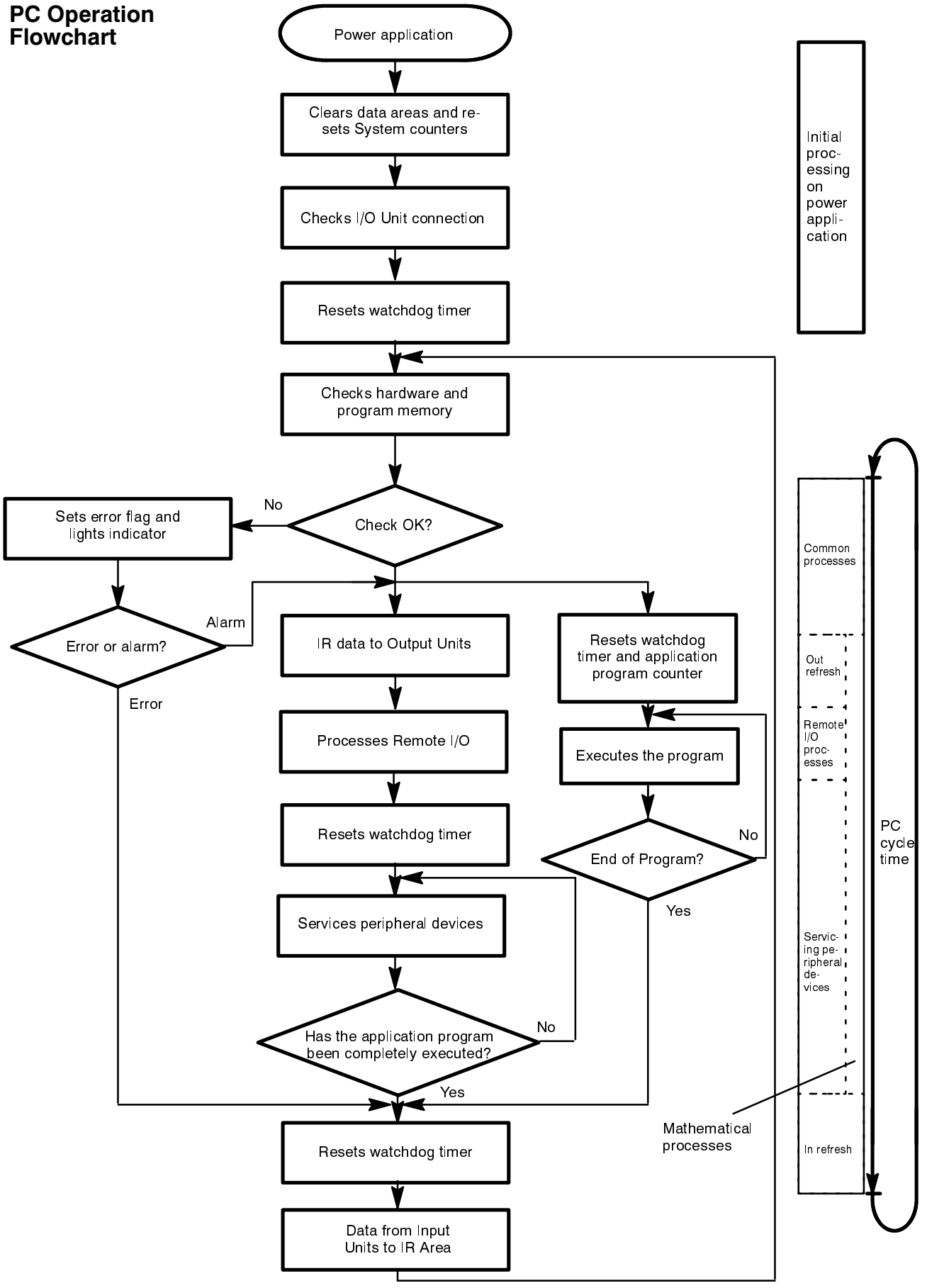
Timing is one of the most important factors in designing a Control System. For accurate operations, it is necessary to have answers to such questions as these:

- How long does it take for the PC to execute all the instructions in its memory?

- How long does it take for the PC to produce a control output in response to a given input signal?

The cycle time of the PC can be automatically calculated and monitored, but it is necessary to have an understanding of the timing relationships within the PC for effective System design and programming.

PC Operation Flowchart



SECTION 2
Description of All Components

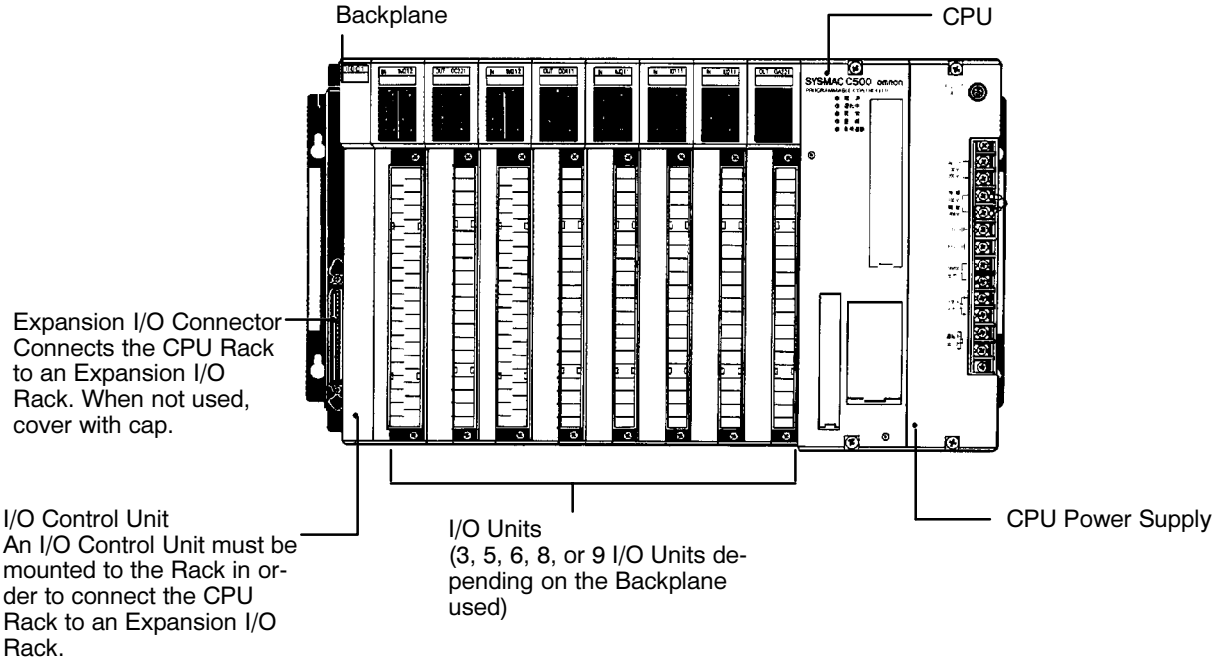
Introduction

This section provides information about the individual Units that make up the C500 PC. First the names of all the parts of the PC are given, followed by any details that apply to the Units that make up the PC. For a description of how the Units fit together to become a PC, refer to *3-3 System Configurations*. For information about the model numbers of any of the parts described in this section, refer to *Appendix C Standard Models*.

2-1 CPU Rack

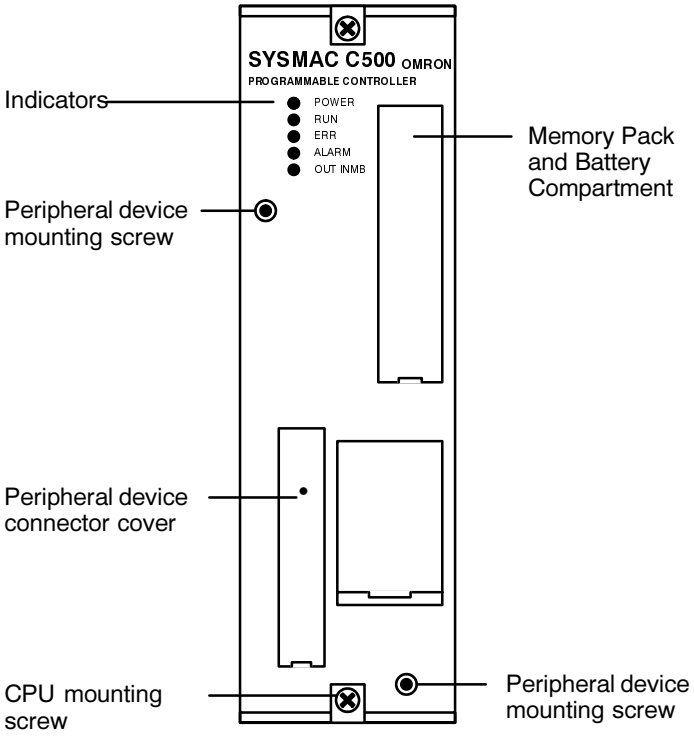
The following figure shows the names of all the parts of the CPU Rack.

There are seven models of CPU Racks available for the C500 PC. Choose a Backplane with 3, 5 (2 models), 6, 8 (2 models), or 9 I/O slots, depending on your application. Connect the CPU Backplane to an Expansion I/O Rack via the Expansion I/O Connector.



CPU

The CPU executes the user program. The model available for the C500 PC does not have a built-in Power Supply or Memory Pack. Choose the Power Supply and memory pack suitable for your application. A peripheral device connector and a memory pack compartment are provided.



Peripheral Device Connector

The CPU is equipped with one connector for peripheral devices. A peripheral device, such as the CPU-Mounting Programming Console, can be mounted directly to the CPU and does not require a connecting cable. To mount the CPU-Mounting Programming Console or any other peripheral device directly to the CPU, follow these steps:

1. Detach the cover of the peripheral device connector with a standard screwdriver.
2. Connect the CPU-Mounting Programming Console to the peripheral device connector.
3. To ensure a positive connection, secure the Programming Console to the CPU by tightening the mounting screws located on the surface of the CPU.

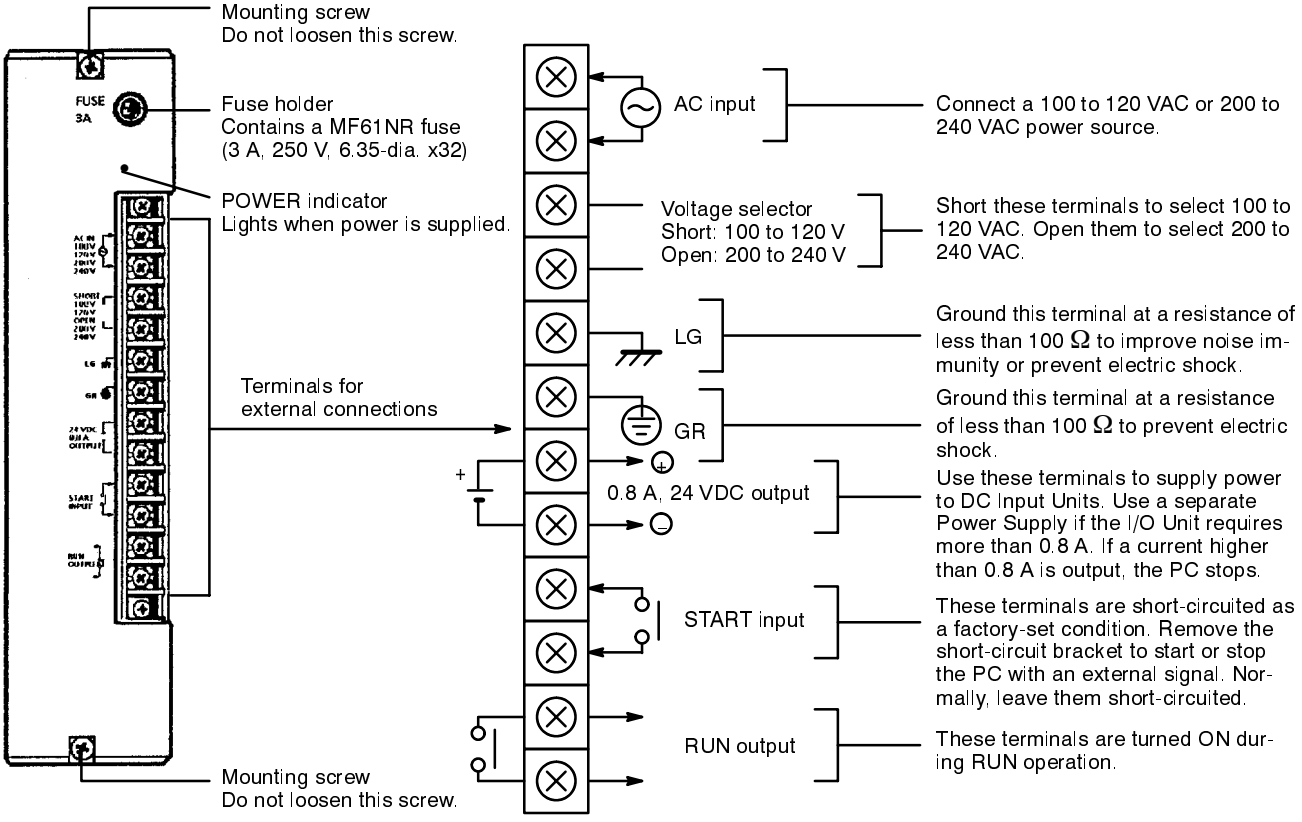
2-2 CPU Power Supply

The CPU Power Supply is mounted to the rightmost slot of the CPU Rack. Three models of Power Supplies are available: 100 to 120 VAC, 200 to 240 VAC, and 24 VDC. The following table summarizes the output capacity of the three models and the current available for I/O Units mounted on the CPU Rack.

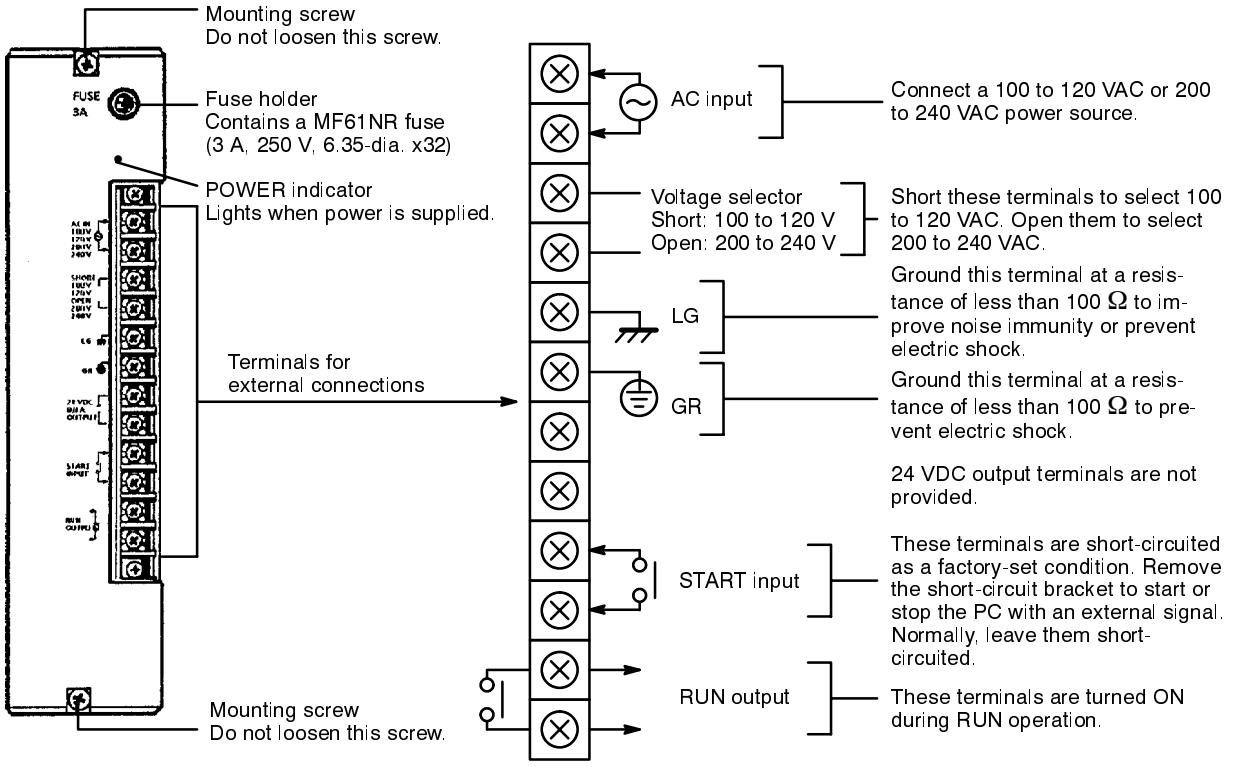
Model	Supply Voltage	Output Capacity	Available Current for I/O Units	24 VDC Output Terminal
3G2A5-PS221-E	100 to 120/ 200 to 240 VAC (selectable)	7 A 5 VDC	5 A	Provided
3G2A5-PS223-E		12 A 5 VDC	10 A	Not provided
3G2A5-PS213-E	24 VDC	9 A 5 VDC	5 A	Not provided

Note Be sure to keep the total power consumed by all the Units mounted on a Rack within the value stated in the table above. For example, do not mount I/O Units with a total current consumption of 6 A to a Rack supplied by a 7 A Power Supply. As shown in the table above, the available current for I/O Units is only 5 A. For details concerning current consumption, refer to *Section 4 System Connections*.

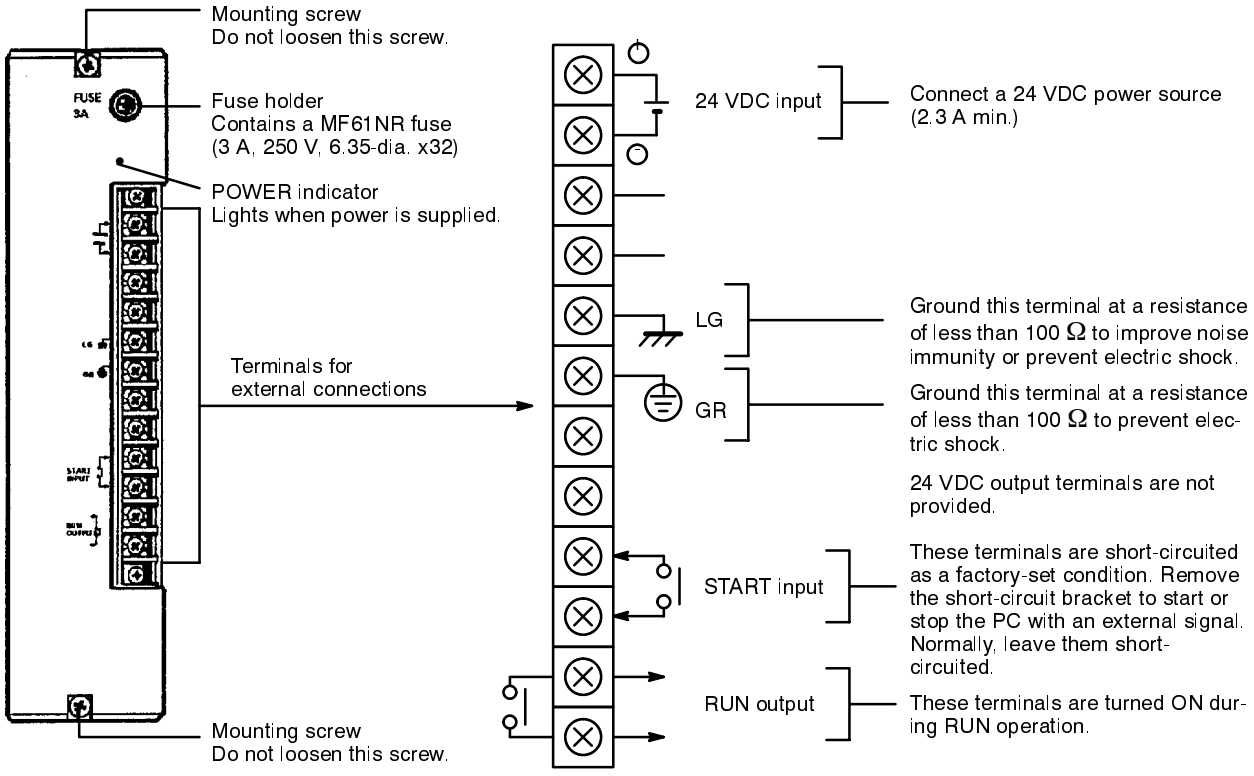
3G2A5-PS221-E



3G2A5-PS223-E

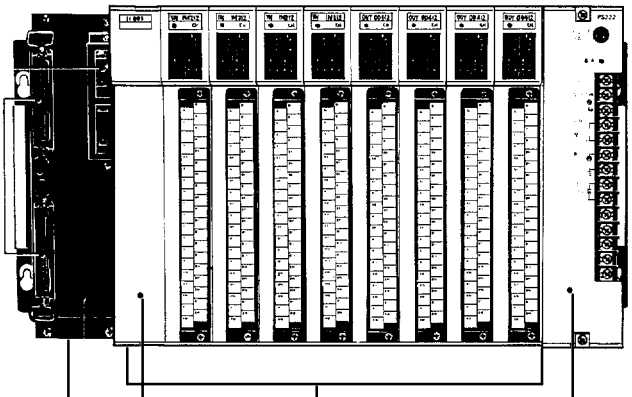


3G2A5-PS213-E



2-3 Expansion I/O Backplane

The Expansion I/O Backplane shown in the following diagram, can be used to expand the C500 PC. An Expansion I/O Rack is just like a CPU Rack, except a CPU is not mounted. However, a Power Supply is needed for each Expansion I/O Rack. There are three models of Expansion I/O Backplane available.



Expansion I/O Power Supply

I/O Units

I/O Interface Unit
An I/O Interface Unit must be mounted to an Expansion I/O Rack in order to connect the Expansion I/O Rack to another Expansion I/O Rack.

Expansion I/O Backplane

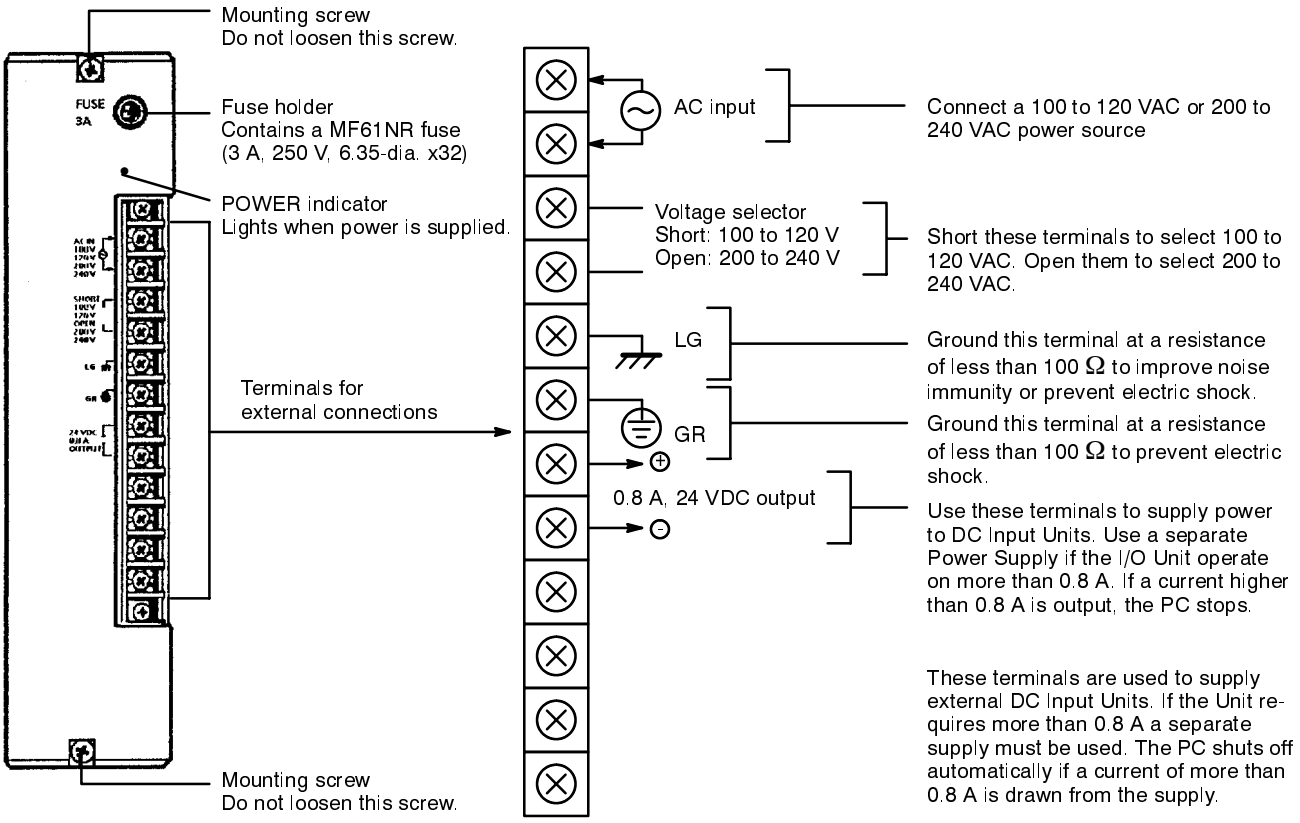
2-4 I/O Power Supply

Just as a Power Supply must be mounted to the CPU Rack, a Power Supply must also be mounted to each Expansion I/O Backplane. There are two Power Supplies available; 100 to 120/200 to 240 VAC and 24 VDC, both of which are explained below. For details, refer to *Appendix B Specifications*.

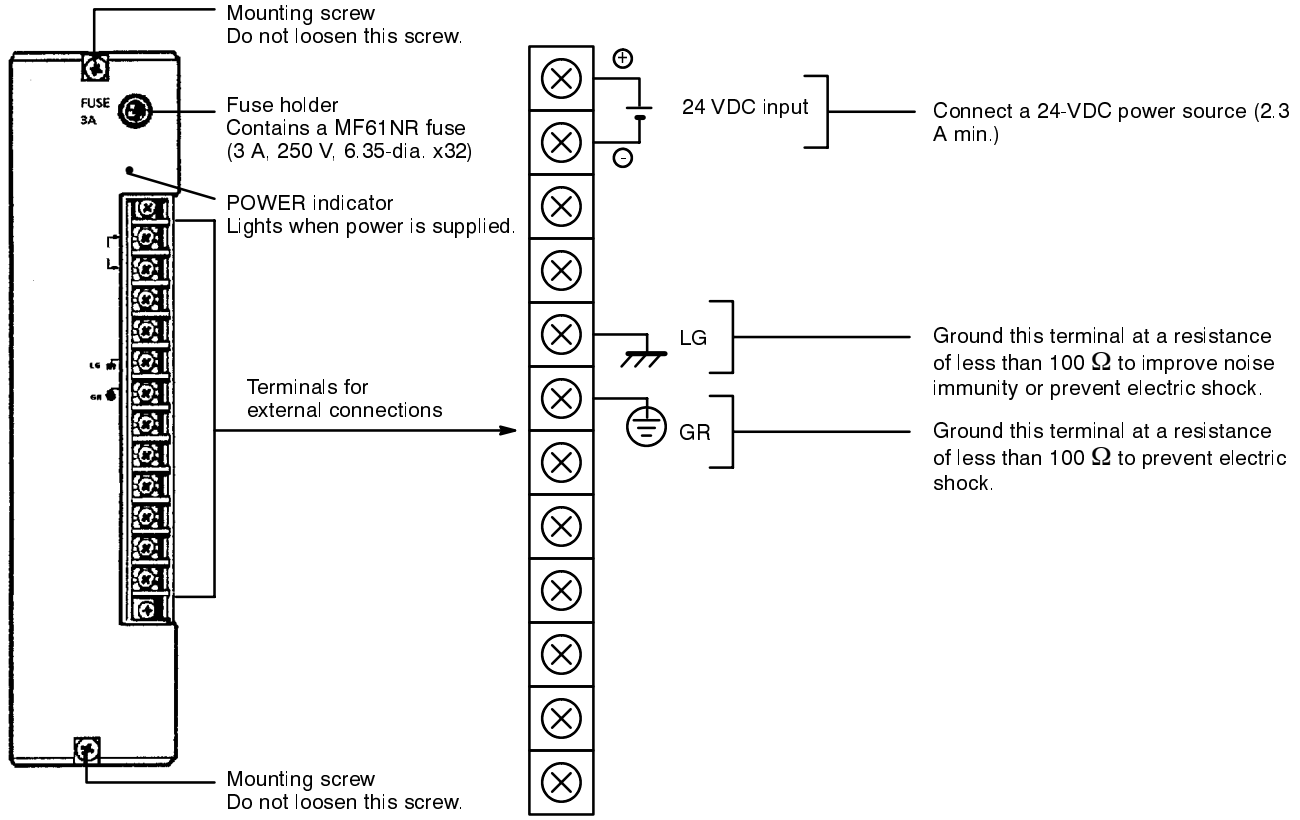
Model	Supply Voltage	Output Capacity	Available Current for I/O Units	240 VDC Output Terminal
3G2A5-PS222-E	100 to 120/200 to 240 VAC (selectable)	7A 5 VDC	6.5 A	Provided
3G2A5-PS212-E	24 VDC	7 A 5 VDC	6.5 A	Not provided

Note Be sure to keep the total power consumed by all the Units mounted on a Rack within the value stated in the table above. For example, do not mount I/O Units with a total current consumption of 7A to a Rack supplied by a 7 A Power Supply. As shown in the table above, the available current for I/O Units is only 6.5 A. For details concerning current consumption, refer to *Section 4 System Connections*.

3G2A5-PS222-E



3G2A5-PS212-E



2-5 I/O Control Unit

An I/O Control Unit must be mounted to the CPU Rack in order to connect the CPU Rack to an Expansion I/O Rack. An I/O Control Unit can be mounted even if no Expansion I/O Rack is used.

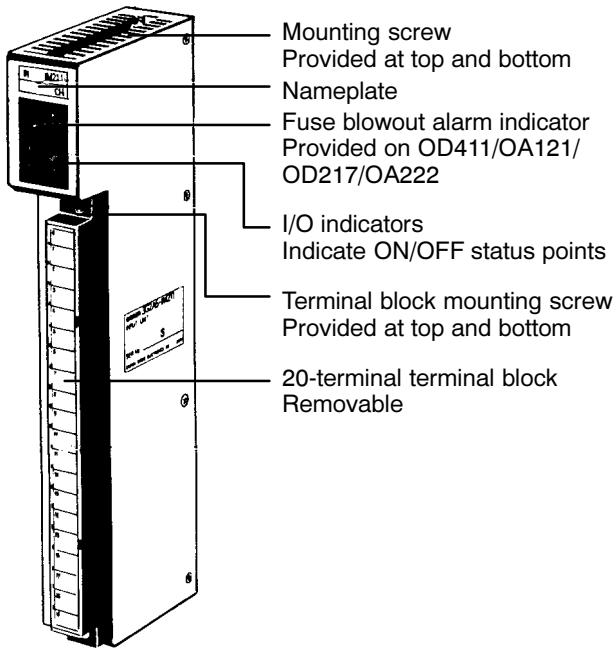
2-6 I/O Interface Unit

An I/O Interface Unit is needed on each Expansion I/O Rack, in order to expand the PC. If there is not an I/O Interface Unit on each Expansion I/O Rack, data communication cannot take place. The I/O Interface Unit is mounted to the leftmost I/O position on the Expansion I/O Backplane.

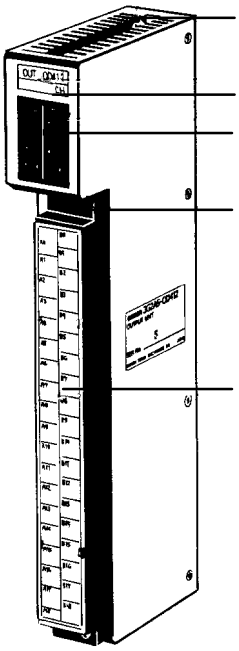
2-7 I/O Units

I/O Units come in 5 shapes; A-shape, B-shape, C-shape, D-shape, and E-shape. Refer to *Appendix B Specifications* for the dimensions of each Unit.

A-shape



B-shape



Mounting screw
Provided at top and bottom

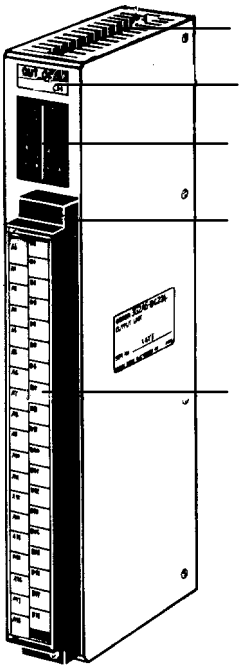
Nameplate

I/O indicators
Indicate ON/OFF status of I/O signal

Terminal block mounting screw
Provided at top and bottom

38-terminal terminal block
Removable

C-shape



Mounting screw
Provided at top and bottom

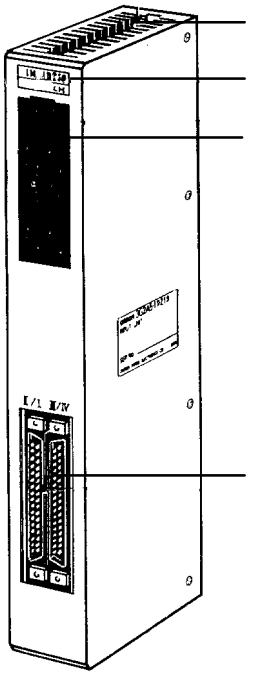
Nameplate

I/O indicators
Indicate ON/OFF status of points

Terminal block mounting screw
Provided at top and bottom

38-terminal terminal block
Removable

D-shape



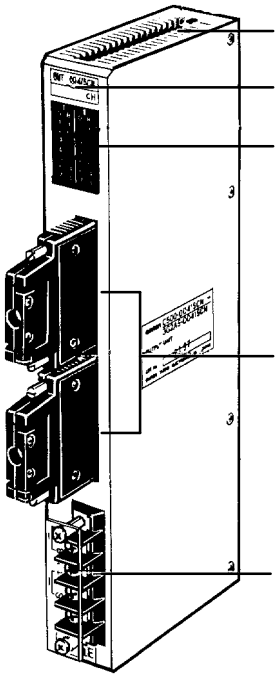
Mounting screw
Provided at top and bottom

Nameplate

I/O indicators
Indicate ON/OFF status of points

Two 40-terminal terminal block connectors
Removable

E-shape



Mounting screw
Provided at top and bottom

Nameplate

I/O indicators
Indicate ON/OFF status of points

Two 24-terminal terminal block plugs

4-terminal terminal block

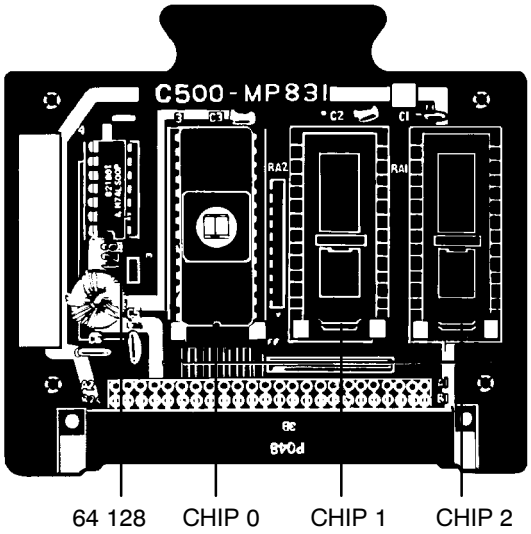
2-8 Memory Packs

The Memory Pack fits into the slot located on the left side of the CPU. Because the Memory Pack is not provided with the PC upon delivery, a Memory Pack must be selected and installed in the CPU. There are two Memory Packs available, either RAM or ROM, that can be used in the C500H PC.

RAM Pack

Data can be randomly written to and read from the RAM Pack, making it possible to enter your own program into the CPU. However, because this is not a fixed program, the memory of the RAM Pack is erased when power is not supplied to the CPU or when the RAM Pack is removed from the CPU.

⚠ Caution Do not remove the battery in the CPU when the RAM Pack has been removed from the CPU.



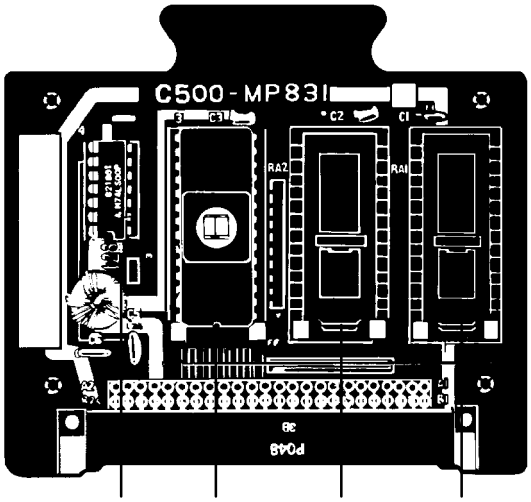
RAM Pack

Two models of RAM Packs are available, which vary in memory capacity: 16K, and 24K words. Refer to *Appendix C Standard Models* for model numbers.

Using a Programming Console, execute FUN (01) and a search operation to check the amount of memory available.

ROM Pack

Data contained in the ROM Pack is stored on EPROM chips and cannot be altered or erased during the CPU's operation. Write the user's program to the EPROM chips and mount the chips (3 max.) on the ROM chip. The entire pack is installed in the CPU. Once the data is written to the chip the data will not be lost when the power to the PC is OFF.



RAM Pack

SECTION 3
Assembly

Introduction

When we speak of a PC, we usually think of it as a single object. But actually even the simplest PCs are usually composed of several different devices. In fact a single PC can be physically spread throughout a building, but we still call it one PC.

In this section, we will start with a Backplane and use all the Units discussed in *Section 2 Description of All Components* to build a PC.

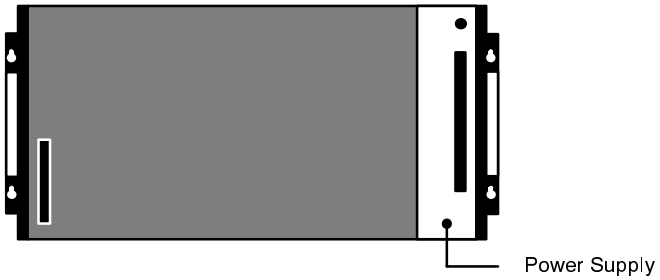
3-1 Mounting the Units

There is no single Unit that can be said to constitute a Rack PC. To build a Rack PC, we start with a Backplane. The Backplane for the C500 is shown below.

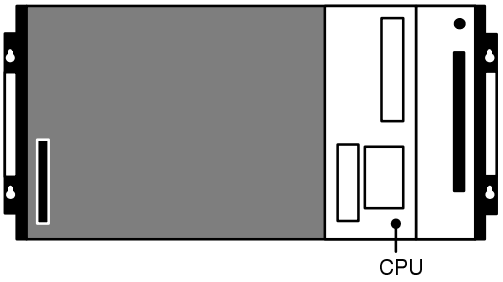
C500 Backplane

The Backplane is a simple device having two functions. The first is to provide physical support for the Units to be mounted to it. The second is to provide the connectors and electrical pathways necessary for connecting the Units mounted to it.

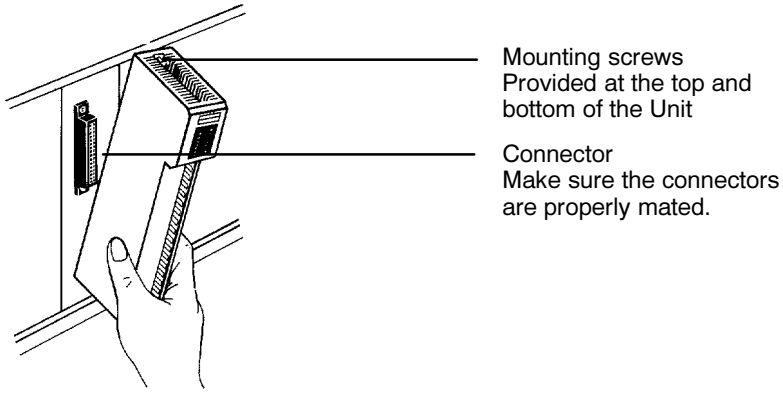
The first device we will add to the Backplane is a Power Supply. The Power Supply fits into the rightmost position on the Backplane and provides electricity at the voltages required by the other Units of the PC. It can also be used to power devices other than the PC if necessary.



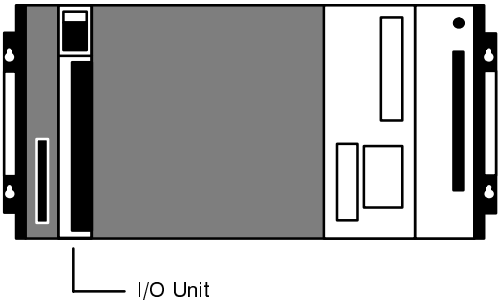
The core of the PC is the CPU. The CPU contains the program consisting of the series of steps necessary for the control task. The CPU fits into the position directly to the left of the Power Supply.



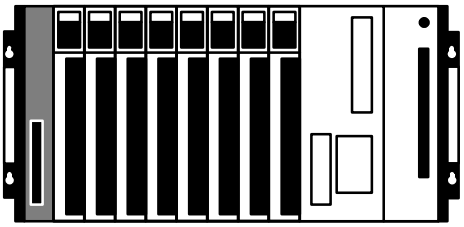
Unlike the CPU of the Package-type PC, the CPU of the Rack PC has no I/O points built in. So, in order to complete this kind of PC we need to mount one or more I/O Units to the Backplane. Mount the I/O Units to the Backplane by pressing the I/O Unit firmly into position, making sure the connectors are properly mated. Secure the Unit by tightening the mounting screws located on the top and bottom of the Unit.



The figure below shows one I/O Unit mounted directly to the left slot of the CPU Rack.

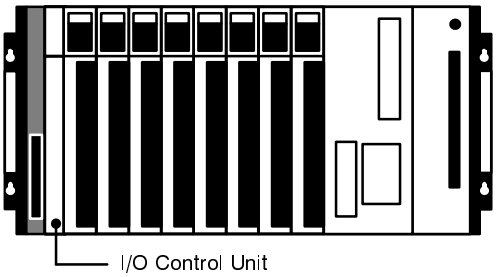


I/O Units are where the control connections are made from the PC to all the various input devices and output devices. As you can see from the figure, there is still some space available on the right side of the Backplane. This space is for any additional I/O Units that may be required.

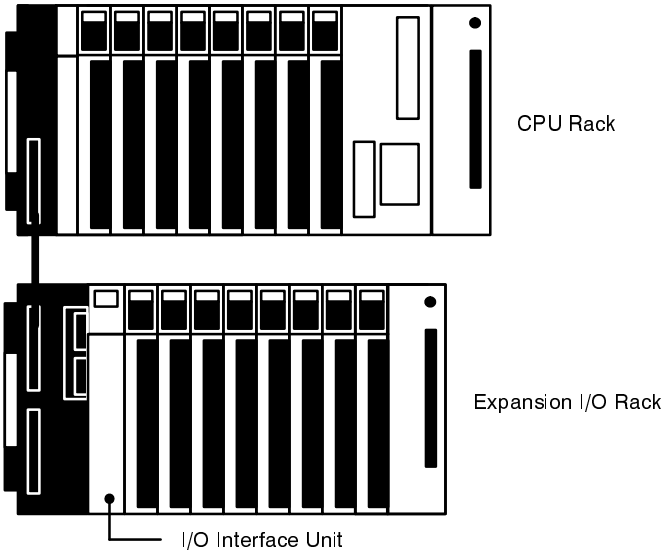


The figure above shows a total of eight I/O Units mounted to the Backplane. Backplanes are available in different lengths, and can hold a different number of I/O Units accordingly. Of course, not all I/O Units look exactly alike, but the ones in the figure show their typical appearance. This configuration of Backplane, Power Supply, CPU, and I/O Units is called a CPU Rack. This term refers to the Backplane and all the Units mounted to it. However, if we want to include more than eight I/O Units in our configuration we can add an addi-

tional Backplane. First, though, we have to mount an I/O Control Unit to the leftmost slot of the CPU Rack.



Now we can use a cable to connect the CPU Rack to another Backplane. This Backplane has a Power Supply and I/O Units mounted to it, but it has no CPU of its own. The additional Backplane must also have an I/O Interface Unit mounted to its leftmost position. This configuration of additional Backplane, Power Supply, I/O Units, and I/O Interface Unit is called an Expansion I/O Rack.



The CPU Rack and Expansion I/O Rack shown above are connected by a cable. Remember that this whole configuration is still referred to as one PC. It is possible to keep adding Expansion I/O Racks in this way until the maximum number of I/O points for the system is reached. Each Expansion I/O Rack needs an I/O Interface Unit.

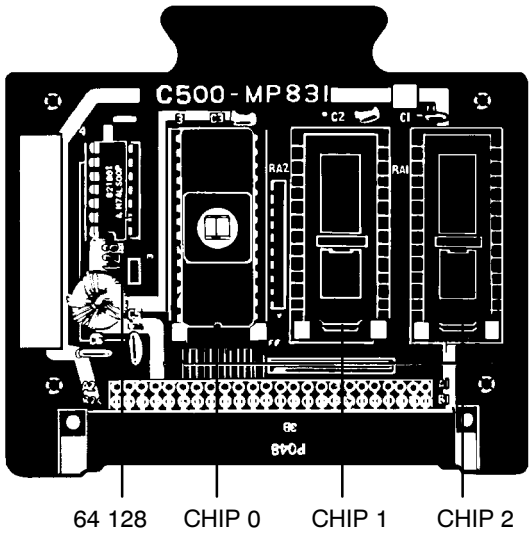
3-2 Memory Packs

The CPU has a removable Memory Pack that stores the user program. Two Memory Packs are available, in either RAM or ROM. You can write your own program into the RAM Pack or you can copy a program that has already been written to an EPROM chip and mount it in the ROM Pack. The EPROM Chip must be mounted to the PROM Writer in order for the program to be written to it. Then the EPROM Chip must be mounted to the ROM Pack.

Mounting the EPROM Chip to the ROM Pack

Depending on the amount of memory required for your application, use 1, 2, or 3 chips. Refer to *Appendix B Specifications* for specifications of the EPROM chips.

Using the diagram and the table below as a reference, mount the EPROM chips to the correct IC sockets.



RAM Pack

The table below summarizes the programming capacity.

Memory size	Jumper setting	IC Socket		
		CHIP 0	CHIP 1	CHIP 2
8K bytes	128 / 64	2764	–	–
16K bytes		2764	2764	–
24K bytes		2764	2764	2764
16K bytes	128 / 64	27128	–	–
24K bytes		27128	–	2764

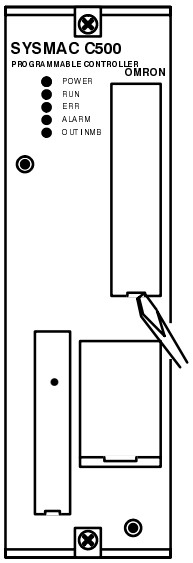
How to Install the Memory Pack

Take the following steps to install the Memory Pack in the CPU.

1. Turn the power to the PC OFF.

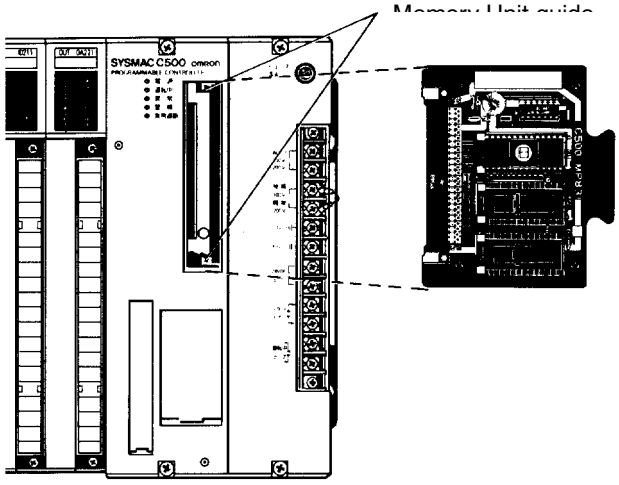
⚠ Caution Do not attempt to install the Memory Pack in the CPU while the power to the PC is ON. Doing so may cause data to be lost, or may damage the CPU or Memory Pack.

2. Using a standard screwdriver, remove the Memory Pack compartment cover located on the front panel of the CPU. Push in the latch on the cover and slide the cover upward.



Use a standard screwdriver to remove the Memory Pack compartment cover.

3. Insert the Memory Pack (component side facing left) into the Memory compartment. When the Unit is almost completely inserted into the CPU, there may be a slight resistance as the Memory Pack connector mates with the connector inside the CPU. Continue pushing on the Memory Pack until it is inserted completely into the CPU.



Memory Pack
(ROM or RAM Pack)

4. Reattach the memory compartment cover.

How to Remove the Memory Pack

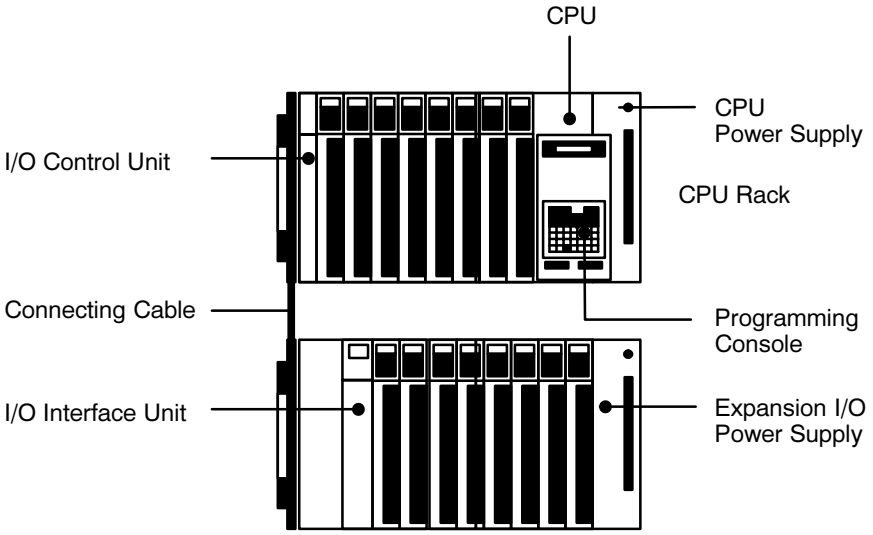
Follow the steps below to remove the Memory Pack from the CPU.

1. Turn the power to the PC OFF.
2. Using a standard screwdriver, remove the Memory Pack compartment cover located on the front panel of the CPU. Push in the latch on the cover and slide the cover upward.
3. Pull the Memory Pack up and out.

Note Memory in the RAM Pack is erased when the Memory Pack is removed from the CPU and when the CPU Unit is removed from the Rack.

3-3 System Configurations

The following figure shows an assembled C500 CPU Rack and one Expansion I/O Rack. When three Expansion I/O Racks are connected to a CPU Rack, a maximum of 512 I/O points are available. (Include the Remote I/O Units)



Where I/O Units Can Be Mounted

The table below summarizes the Units that can be used in the systems described in this manual.

Special I/O Units	The number of Special I/O Units that can be used depends upon the number of points available and the number of points the Special I/O Unit requires.
Host Link Units	Up to one Host Link Units can be mounted. Only one Rack-Mounting Host Link Unit can be mounted to the CPU Rack. A CPU-Mounting Host Link Unit can also be mounted directly to the CPU. Host Link Units cannot be mounted to Expansion I/O Racks. However, these Units cannot be mounted when the SYSMAC Net Link Unit is mounted.
I/O Units	Standard I/O Units are available with 16, 32, or 64 points. Refer to *Section 2 Description of All Components* for details.
Memory Packs	RAM or ROM Packs are available. The ROM Pack requires a separately available EPROM chip.
Remote I/O Master Unit	Up to four Remote I/O Master Units can be mounted to both the I/O Rack and the Expansion I/O Racks. When the Remote I/O Unit is mounted to a Rack, a Rack number must be set so that the CPU can identify the Remote I/O Unit. Mount the Remote I/O Slave Unit to the leftmost position (the I/O Interface Unit position) on the Slave Rack. For details, refer to the C500 Operation Manual.

The following table summarizes specific Units that can and cannot be mounted in the CPU and Expansion Racks and the number that can be used in each PC. For more information about the Units, refer to the *C500 Operation Manual*.

Unit	CPU Rack	Expansion Rack
16-, 32-, 64-point I/O	YES	YES
Special I/O	YES	YES
I/O Link	YES	YES
PC Link	YES (2 max.)	NO
Host Link	YES (2 max.)*	NO
SYSMAC Net Link	YES (1 max.)	NO
Remote I/O Master	YES	YES
Remote I/O Slave	NO	YES

*One Rack-mounting Host Link Unit can be mounted to the CPU Rack and one CPU-mounting Host Link Unit can be mounted directly to the CPU Unit.

Notes

1. The Position Control Unit and the PID Unit each require two I/O slots on the CPU Rack and the Expansion I/O Racks
2. The following Units can only be mounted to one of the three or five rightmost slots on the CPU Backplane, depending on which Backplane is used.
   PC Link
   Host Link
   SYSMAC Net Link
3. When two or more PCs are linked by the PC Link Unit, a maximum of 32 PC Link Units can be used (linking 31 PCs), in any number of subsystems.
4. SYSMAC Net Link and Host Link cannot be mounted simultaneously.

SECTION 4
System Connections

Introduction

In the preceding sections we have covered all the parts of a PC and how they should be assembled. This section provides detailed information on PC connections.

4-1 Current Consumption

The Power Supplies are limited in the total current they can supply to I/O Units. The following table shows the maximum currents allowed.

Power Supplies

Unit	Model	Output Capacity	Current Available for I/O Units
CPU Power Supply	3G2A5-PS221-E	7 A 5 VDC	5 A
	3G2A5-PS213-E	9 A 5 VDC	
	3G2A5-PS223-E	12 A 5 VDC	10 A
I/O Power Supply	3G2A5-PS222-E	7 A 5 VDC	6.5 A
	3G2A5-PS212-E		

Note Do not exceed the maximum current ratings for each of the voltages supplied by any single Unit listed above. In addition, do not exceed the total maximum power output for any single Unit listed above. Refer to the tables on the following page for the current consumption of individual I/O Units.

Input Units

Unit	Model	Current Consumption (A)
DC Input	3G2A5-ID112	0.01
	C500-ID114	0.34
	3G2A5-ID213	0.02
	3G2A5-ID215	0.16
	3G2A5-ID218	0.16
	C500-ID218CN	0.2
	3G2A5-ID212	0.3
	3G2A5-ID219	0.34
AC Input	3G2A5-IA121	0.01
	3G2A5-IA222	0.012
	C500-IA223	0.06
	3G2A5-IA122	0.06
TTL Input	C500-ID501CN	0.2
AC/DC Input	3G2A5-IM211	0.01
	3G2A5-IM212	0.2

Output Units

Unit	Model	Current Consumption (A)
Contact Output	3G2A5-OC221	0.1
	3G2A5-OC223	0.1
	3G2A5-OC224	0.2
Transistor Output	3G2A5-OD411	0.16
	3G2A5-OD215	0.2
	3G2A5-OD412	0.23
	3G2A5-OD212	0.23
	3G2A5-OD211	0.3
	3G2A5-OD213	0.46
	C500-OD217	0.16
	C500-OD218	0.23
	C500-OD219	0.16
	C500-OD415CN	0.23
Triac Output	3G2A5-OA121	0.3
	3G2A5-OA222	0.3
	3G2A5-OA223	0.45
	C500-OA225	0.2
	C500-OA226	0.45
TTL Output	C500-OD501CN	0.25
DC Input/Transistor Output Unit	C500-MD211CN	0.26
Dummy I/O	3G2A5-DUM01	0.035

Special I/O Units

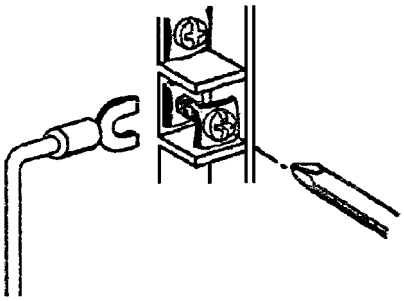
Unit	Model	Current Consumption (A)
A/D Converter Input	3G2A5-AD001 to- AD005	0.3 each
	3G2A5-AD006	0.75 each
	3G2A5-AD007	
	C500-AD101	0.88
	C500-AD501	1.2
D/A Converter Output	3G2A5-DA001 to -DA005	0.55 each
	C500-DA101	1.3
High-speed Counter	3G2A5-CT001	0.3
	3G2A5-CT012	0.55
	C500-CT041	1.0
Magnetic Card Reader	3G2A5-MGC01	1.0
PID	3G2A5-PID01-E	1.4
Position Control	3G2A5-NC103-E	Total 1.4
	3G2A5-TU001-E	
	3G2A5-NC111-EV1	Total 1.0
	3G2A5-TU001-E	
	3G2A5-NC221-E	Total 1.3
	3G2A5-TU001	
ASCII	C500-ASC04	0.5 each
ID Sensor	C500-IDS01-V2/IDS02-V1	0.4 each
	C500-IDS21/IDS22	
Ladder Program I/O	3G2A5-LDP01-V1	0.8
File Memory	C1000H-FMR11	0.35 each
	C1000H-FMR21	
Cam Positioner	C500-CP131	0.35

Link Units and Remote I/O Units

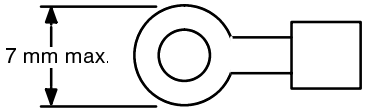
Unit	Model	Current Consumption (A)
I/O Link	3G2A5-LK010-(P)E	0.6
PC Link	C500-LK009-V1	0.9
Host Link	C500-LK103 (-P)	1.0 each
	C500-LK203	
Optical Remote I/O Master	3G2A5-RM001-(P)EV1	0.7
SYSMAC Net Link	C500-SNT31-V4	1.4
Wired Remote I/O Master	C500-RM201	0.3

4-2 I/O Connections

Connect the I/O Devices to the I/O Units using AWG (cross-sectional area: 0.3 mm^2) for 19-terminal terminal blocks and AWG 22 to lead wire (cross-sectional area: 0.3 to 0.75 mm^2) for 10-terminal terminal blocks. The terminals have screws with 3.5-mm diameter heads and self-raising pressure plates. Connect the lead wires to the terminals as shown. Always use solderless (crimp) terminals. Tighten the screws to a torque of 8 kg-cm maximum.



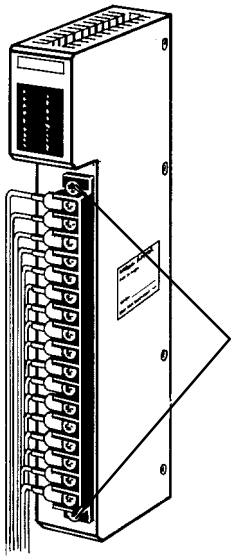
Always attach solderless (crimp) terminals to the ends of the lead wires before attaching them to the terminals. Never attach loose or twisted wires. Use terminals having the following dimensions shown.



Terminal Block

The terminal block of an I/O Unit can be removed by loosening the mounting screws. You do not have to remove the lead wires from the terminal block in order to remove it from an I/O Unit.

Note Putting I/O Lines and high-tension lines or power lines in the same duct or conduit may cause the I/O Lines to be affected by noise. This may cause a malfunction in the I/O Unit or may cause damage to the I/O Unit or I/O devices.



Terminal block mounting screws

Loosen the terminal block mounting screws to remove the terminal block from the I/O Unit. Make sure the mounting screws on the terminal block are tightened after wiring is complete, and the terminal block is remounted to the I/O Unit.

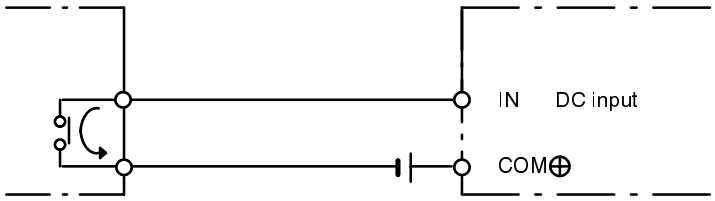
Note When a Triac Output Unit is used to drive a low-current load, the load may not turn completely OFF due to a leakage current. To compensate for the leakage current, connect a bleeder resistor in parallel with the load.

Wiring Examples

The following are examples of how to connect I/O devices to I/O Units. During wiring, work slowly and carefully. If an input device is connected to an Output Unit, damage may result. Check all I/O devices to make sure they meet the specifications (refer to *Appendix B Specifications*). Be sure to allow for leakage current and load inductance.

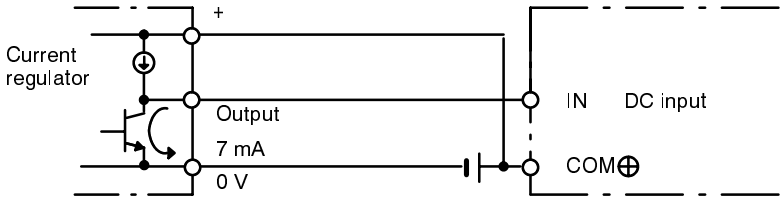
DC Input Units

Contact output

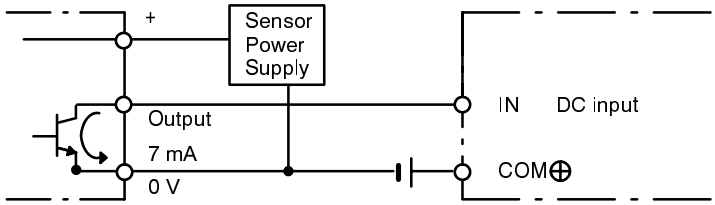


When using the following configurations, the sensor and Input Unit should receive their power from the same supply.

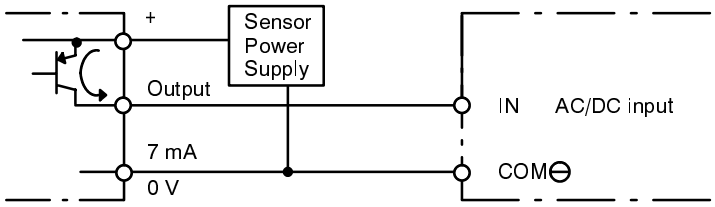
NPN current output



NPN open-collector output

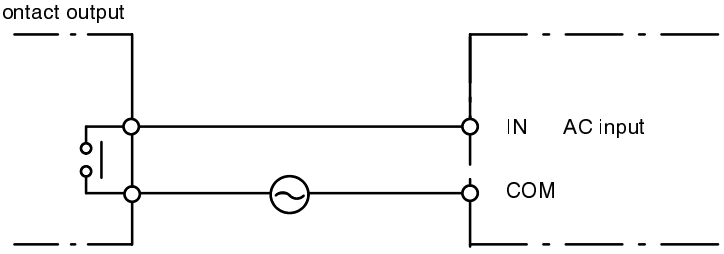


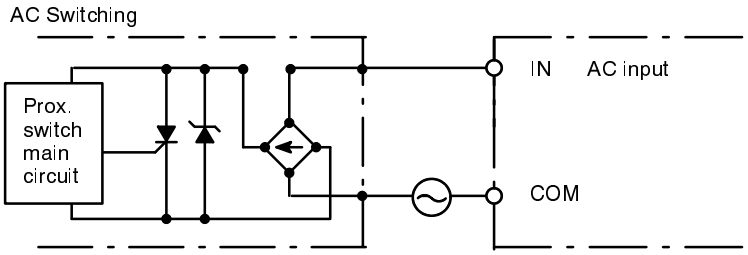
PNP current output



AC Input

Contact output

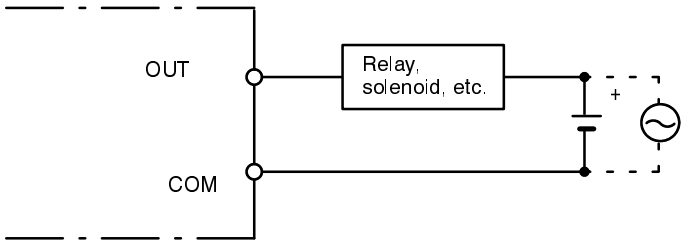




Note If a reed switch is used as the input contact of the AC Input Unit, the reed switch must have a permissible current capacity of 1 A minimum, otherwise contact weld may result due to inrush current.

Output Units

A fuse placed in the output circuit will protect the output element, circuit board, etc., in the event of a short circuit in the output circuit.



SECTION 5
Installation Environment

Introduction

This section details the necessary environment and conditions for installation of the PC. For specific instructions on mounting Units and wiring for I/O and power, refer to *Section 3-3 System Configurations* and *4-2 I/O Connections*.

⚠ Caution Static electricity can cause damage to PC components. Your body can carry an electrostatic charge, especially when the humidity is low. Before touching the PC be sure to first touch a grounded metallic object, such as a water pipe, in order to discharge any static build-up.

5-1 Cooling

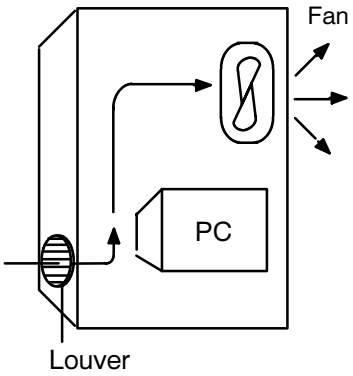
There are two points to consider in order to ensure that the PC does not overheat. The first is the clearance between the Racks, and the second is installation of a cooling fan.

Clearance Between Racks

The Racks need to have sufficient room between each other to allow for I/O wiring, and additional room to ensure that the I/O wiring does not hamper cooling. However, the Racks must be mounted so that the length of the connecting cable does not exceed **2 m**, and the total length of the Connecting Cables between all Racks does not exceed 12 m. For details about cable lengths, refer to *Appendix C Standard Models*. As a general rule, about 70 to 120 mm should be left between any two Racks.

Cooling Fan

A cooling fan is not always necessary, but may be needed in some installations. Try to avoid mounting the PC in a warm area, or over a source of heat. A cooling fan is needed if the ambient temperature may become higher than that specified (refer to *Appendix B Specifications*). If the PC is mounted in an enclosure install a cooling fan, as shown in the following diagram, to maintain the ambient temperature within specifications.

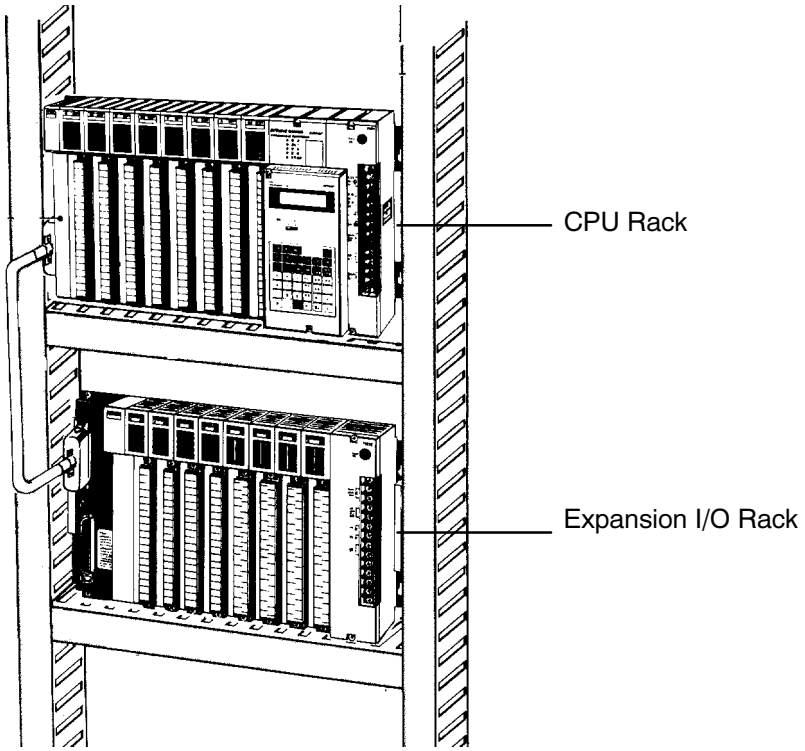


5-2 Mounting Requirements

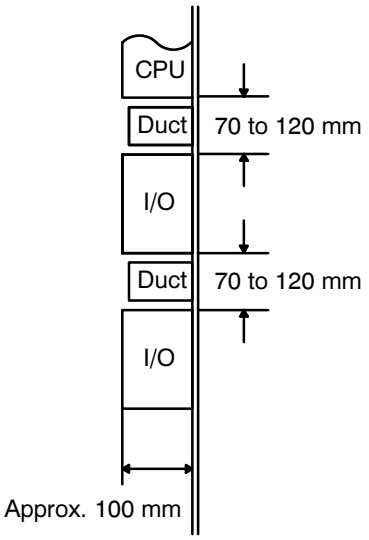
The PC consists of from one to nine Racks. Each Rack must be mounted vertically, that is with the printing on the front panels oriented as it would normally read. The Racks should be mounted one above the other with the CPU Rack uppermost.

The PC may be directly mounted to any sturdy support meeting the environmental specifications (refer to *Appendix B Specifications*).

The duct work shown in the following diagram is not used for mounting the Racks. Although optional, the duct work can be used to house the wires from the I/O Units that run along the sides of the Racks, keeping the wires from becoming entangled with other machines. The figures illustrate the correct way to mount the Racks.

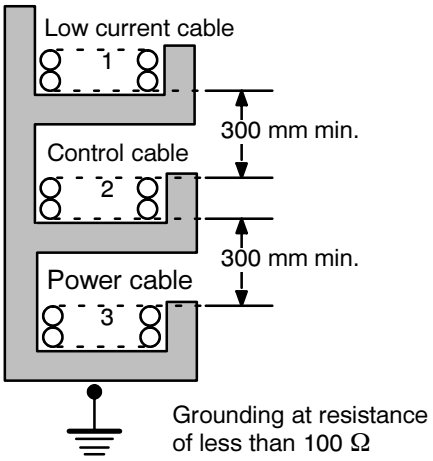


The following figure shows a side view of a mounted CPU and two Expansion I/O Racks. There should be a distance of 70 to 120 mm between the mounted Units.



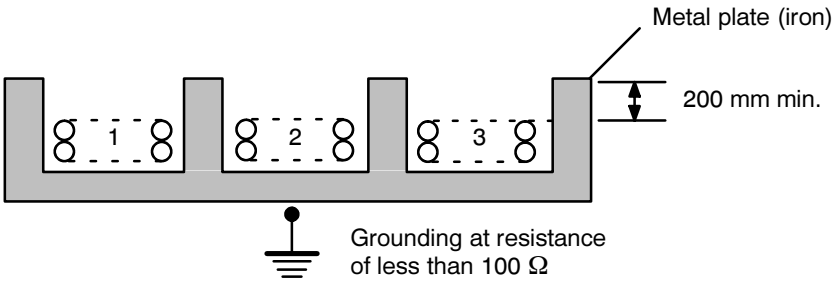
5-3 Duct Work

If power cables carrying more than 10 A 400 V, or 20 A 220 V must be run alongside the I/O wiring (that is, parallel to it), leave at least 300 mm between the power cables and the I/O wiring as shown below.



1 = I/O wiring
2 = General control wiring
3 = Power cables

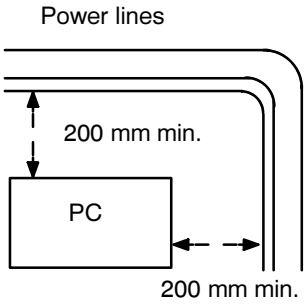
If the I/O wiring and power cables must be placed in the same duct (for example, where they are connected to the equipment), shield them from each other using grounded metal plates.



1 = I/O wiring
2 = General control wiring
3 = Power cables

5-4 Preventing Noise

In order to prevent noise from interfering with the operation of the PC, use AWG 14 twisted-pair cables (cross-sectional area: 2 mm^2 min.). Avoid mounting the PC close to high-power equipment, and make sure the point of installation is at least 200 mm away from power cables as shown below.



Whenever possible, use wiring conduit to hold the I/O wiring. Standard wiring conduit should be used, and it should be long enough to completely contain the I/O wiring and keep it separated from other cables.

SECTION 6
Power Considerations

Introduction

Use a commercially available 100 to 120 VAC, 200 to 240 VAC, or 24 VDC power source, according to the PC you are using (refer to *Appendix B Specifications*). Expansion I/O Racks, if used, must also be connected to the power source. If possible, use independent power sources for the PC, input devices, and output devices. All Racks of the PC may be connected to one power source.

Grounding

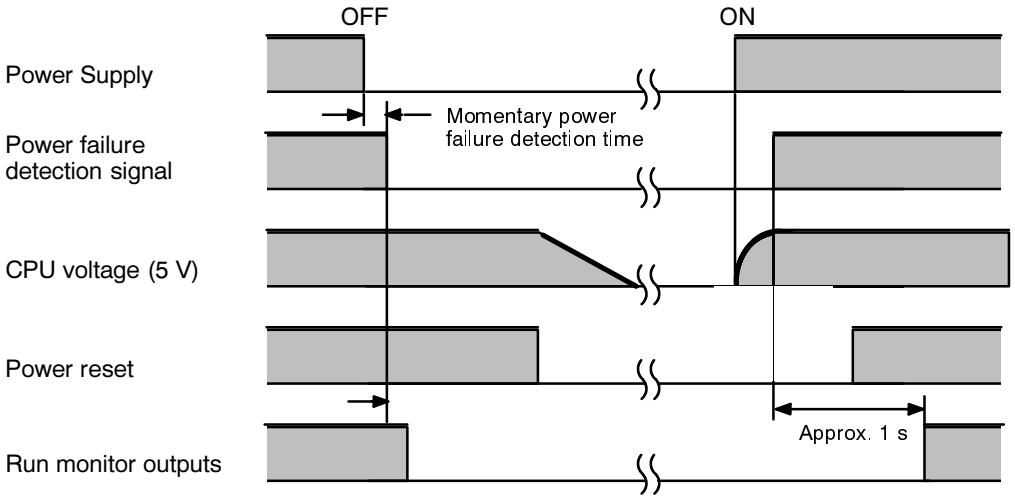
The Line Ground (LG) terminal is a noise-filtered neutral terminal that does not normally require grounding. If electrical noise is a problem, however, this terminal should be connected to the Ground (GR) terminal.

To avoid electrical shock, attach a grounded (earth ground) AWG 14 wire (cross-sectional area: 2 mm^2 min.) to the GR terminal. The resistance to ground must be less than 100 Ω. Do not use a wire longer than 20 m. Care must be taken, because ground resistance is affected by environmental conditions such as soil composition, water content, time of year, and the length of time since the wire was laid underground.

PC operation may be adversely affected if the ground wire is shared with other equipment, or if the ground wire is attached to the metal structure of a building. When using an Expansion I/O Rack, the Rack must also be grounded to the GR terminal. The same ground can be used for all connections.

Power Failure

A sequential circuit is built into the PC to handle power interruptions. This circuit prevents malfunctions due to momentary power loss or voltage drops. A timing diagram for the operation of this circuit is shown below.



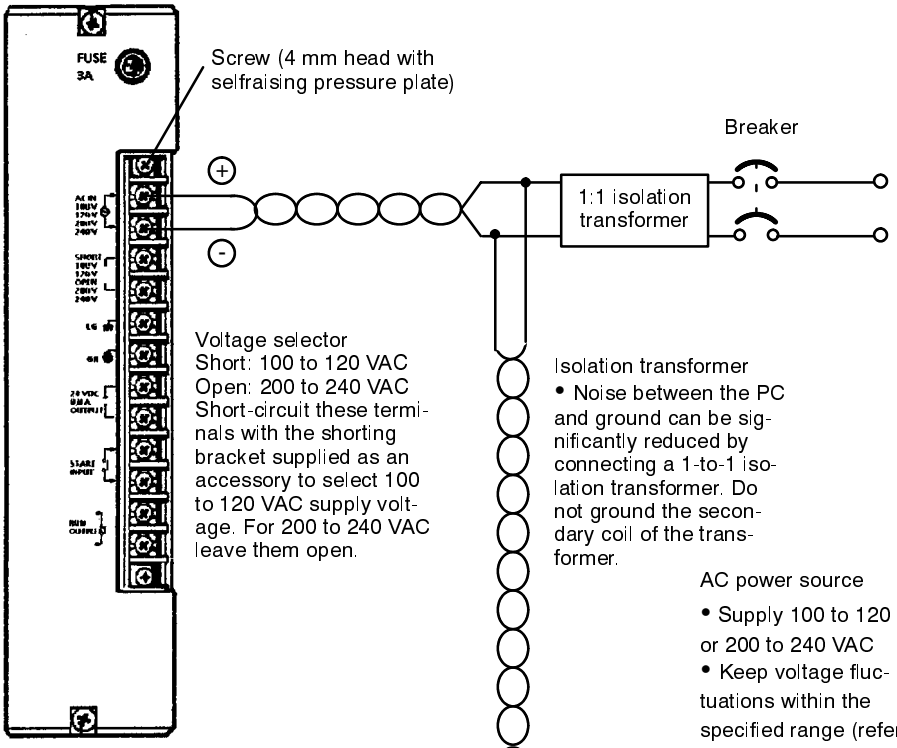
The PC ignores all momentary power failures if the interruption lasts no longer than 10 ms. If the interruption lasts between 10 and 25 ms, the interruption may or may not be detected. If the supply voltage drops below 85% of the rated voltage for longer that 25 ms (less for the DC Power Supply), the PC will stop operating and the external outputs will be automatically turned OFF. Operation is resumed automatically when the voltage is restored to more than 85% of the rated value.

Wiring

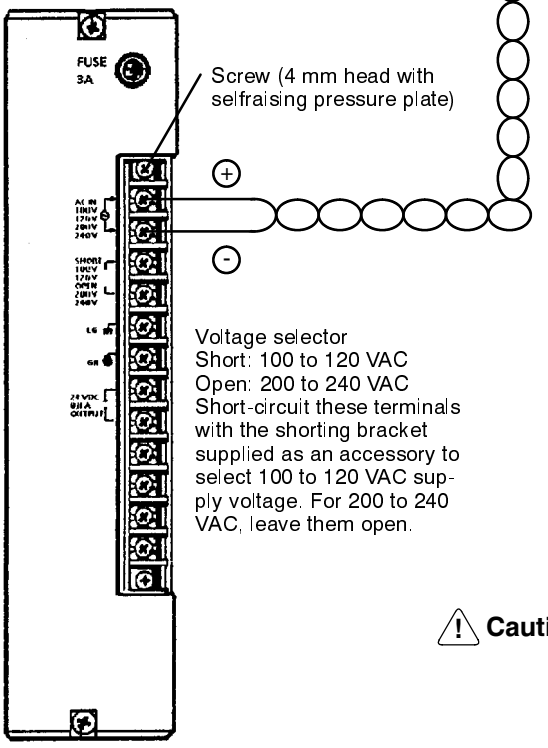
The following diagrams show the proper way to connect the power source to the PC. The terminals marked “NC” are not connected internally.

AC Connections

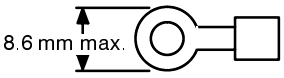
3G2A5-PS221-E/223-E



3G2A5-PS222-E



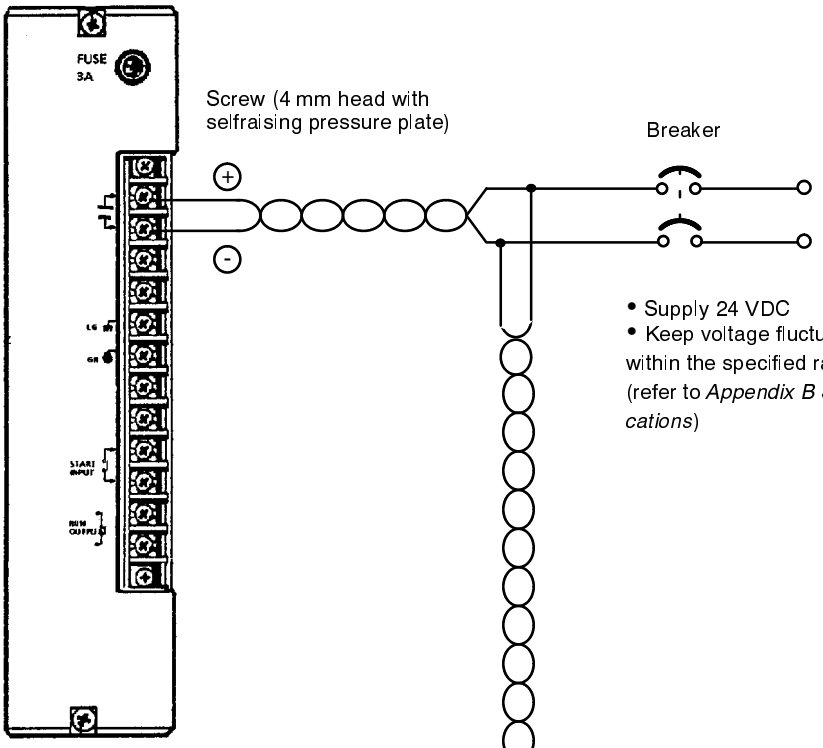
Always attach solderless (crimp) terminals to the ends of the lead wires before attaching them to the terminals. Never attach loose or twisted wires. Use terminals having the following shape and dimensions shown.



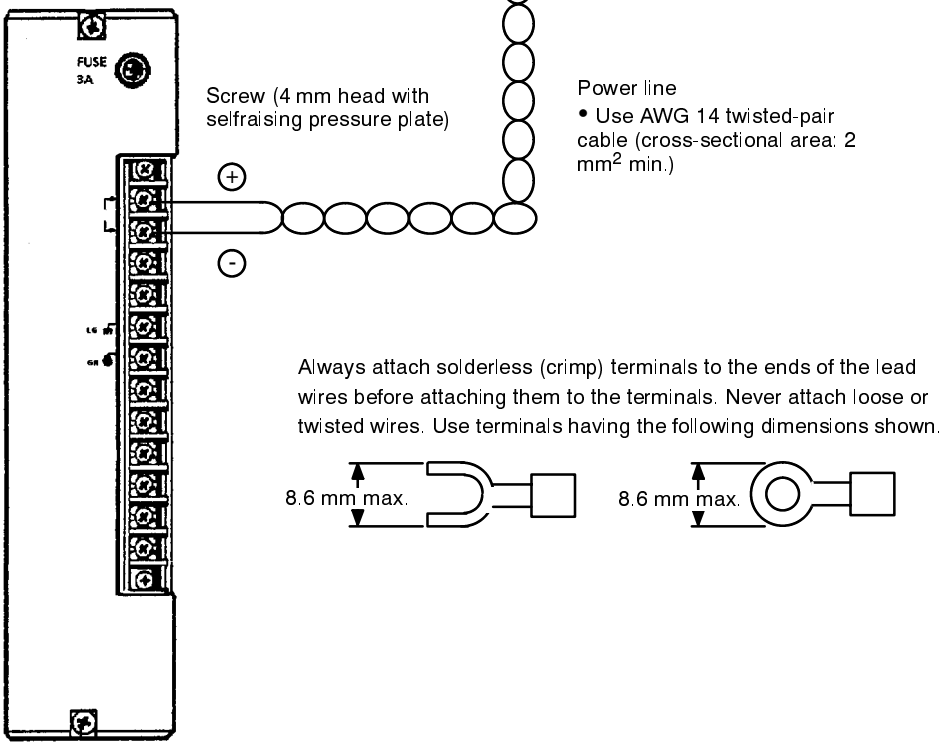
⚠ **Caution** Tighten AC power supply terminals to 1.2 N.m. Loose power supply terminals can cause short circuits, incorrect operation, or damage.

DC Connections

3G2A5-PS213-E



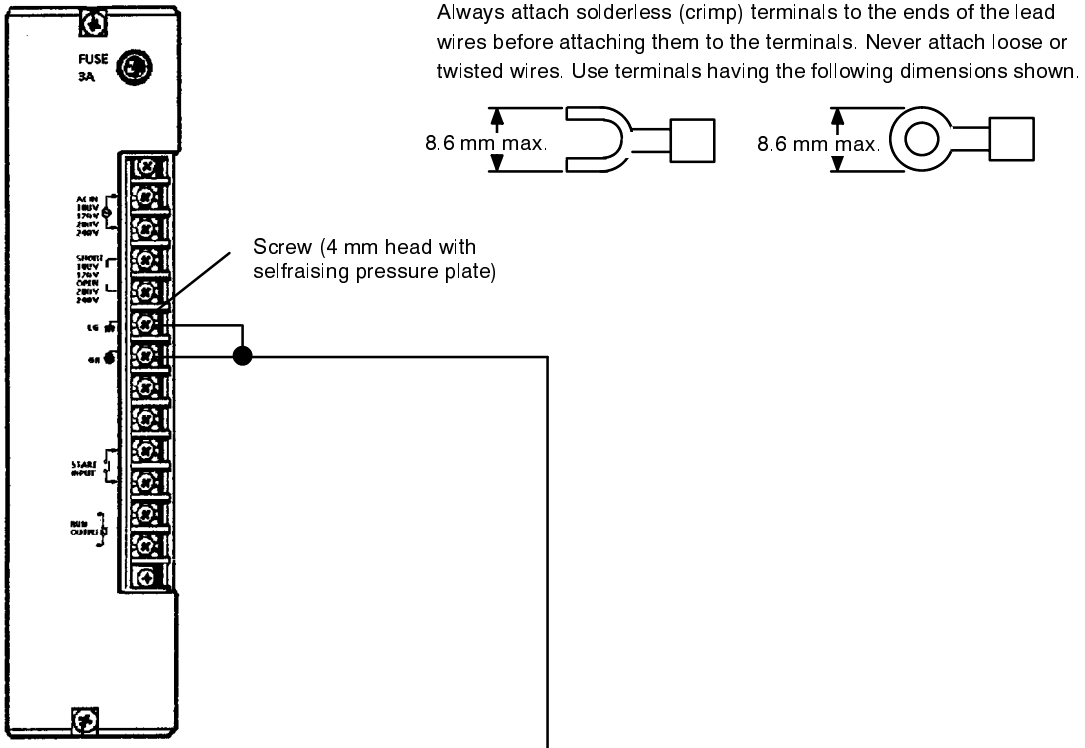
3G2A5-PS212-E



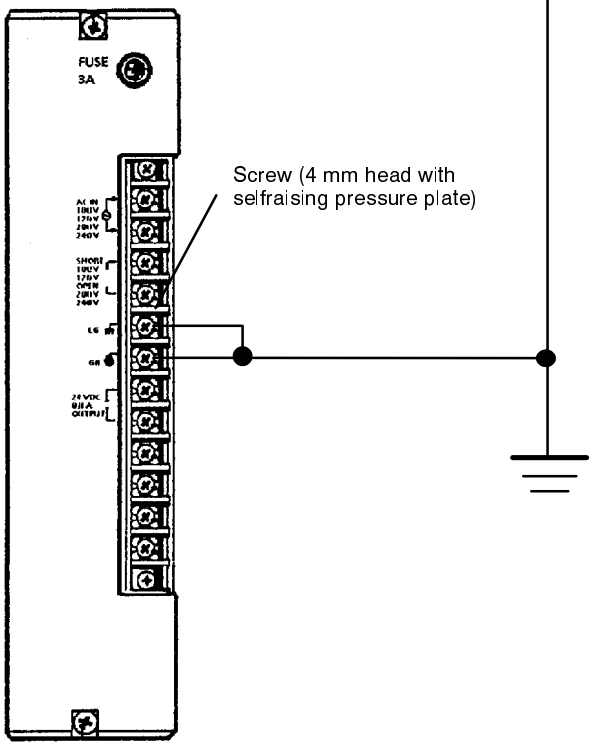
Always attach solderless (crimp) terminals to the ends of the lead wires before attaching them to the terminals. Never attach loose or twisted wires. Use terminals having the following dimensions shown.

Grounding Connections

3G2A5-PS223-E/221-E/213-E



3G2A5-PS222-E/212-E



⚠ **Caution** Ground the Power Supplies separately from peripheral devices.

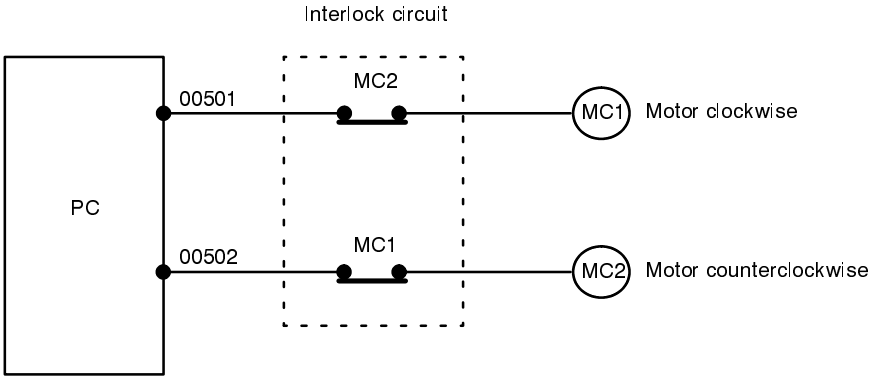
SECTION 7
Safety Considerations

Introduction

There are certain safety requirements to be considered when installing the PC. Some of these, such as the emergency stop circuit (refer to *Power Supply*), are part of the initial wiring. The considerations described below should be kept in mind when operating the PC and when connecting I/O devices to the PC.

Interlock Circuits

When the PC controls an operation such as the clockwise and counterclockwise operation of a motor, provide an external interlock such as the one shown below to prevent both the forward and reverse outputs from turning ON at the same time.



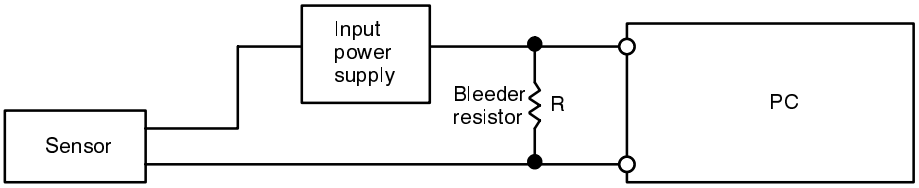
This circuit prevents outputs MC1 and MC2 from both being ON at the same time. Even if the PC is programmed improperly or malfunctions, the motor is protected.

Power Supply Output

The 24 VDC output of the CPU and Expansion I/O Power Supply may be used to power other devices. The output current of these supplies is limited to 0.3 A. A separate Power Supply must be provided if the devices being powered require a higher current.

Input Leakage Current

When two-wire sensors, such as photoelectric sensors, proximity sensors or limit switches with LEDs are connected to the PC as input devices, the input bit may be turned ON erroneously by leakage current. In order to prevent this, connect a bleeder resistor across the input as shown below.



If the leakage current is less than 1.3 mA, there should be no problem. If the leakage current is greater than 1.3 mA, determine the value and rating for the bleeder resistor using the following formulas.

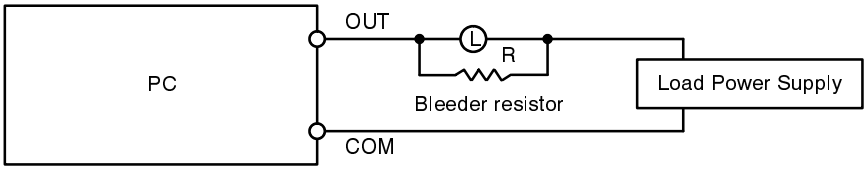
I = leakage current in mA

$$R = \frac{7.2}{2.4 \times I - 3} \text{ k}\Omega \text{ max.}$$

$$W = \frac{2.3}{R} \text{ W min.}$$

Output Leakage Current

If there is a possibility of leakage current causing a transistor or triac to malfunction, connect a bleeder resistor across the output as shown below.



Determine the value and rating for the bleeder resistor using the following formula.

$$R < \frac{E_{ON}}{I}$$

Where

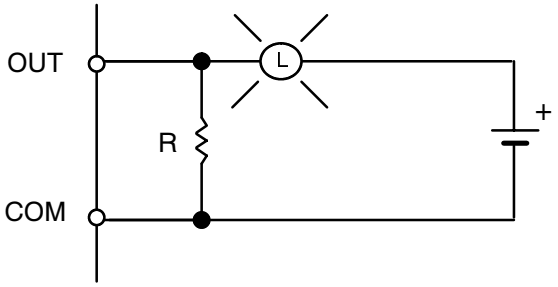
E_{on} = ON voltage of the load

I = leakage current in mA

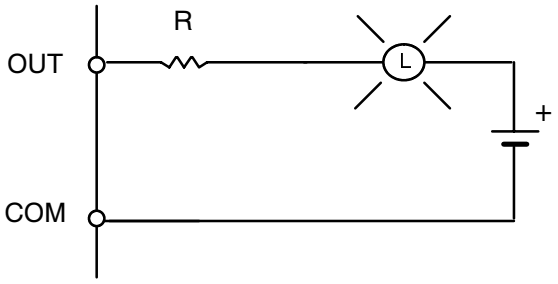
R = bleeder resistance

Output Surge Current

When connecting a transistor or triac Output Unit to an output device having a high surge current (such as an incandescent lamp), care must be taken to avoid damage to the Output Unit. The transistor and triac Output Units are capable of withstanding a surge current of ten times the rated current. If the surge current for a particular device exceeds this amount, use the circuit shown below to protect the Output Unit.



Another way of protecting the Output Unit lets the load draw a small current (about one third the rated current) while the output is OFF, significantly reducing the surge current. This circuit (shown below) not only reduces the surge current, but also reduces the voltage across the load at the same time.



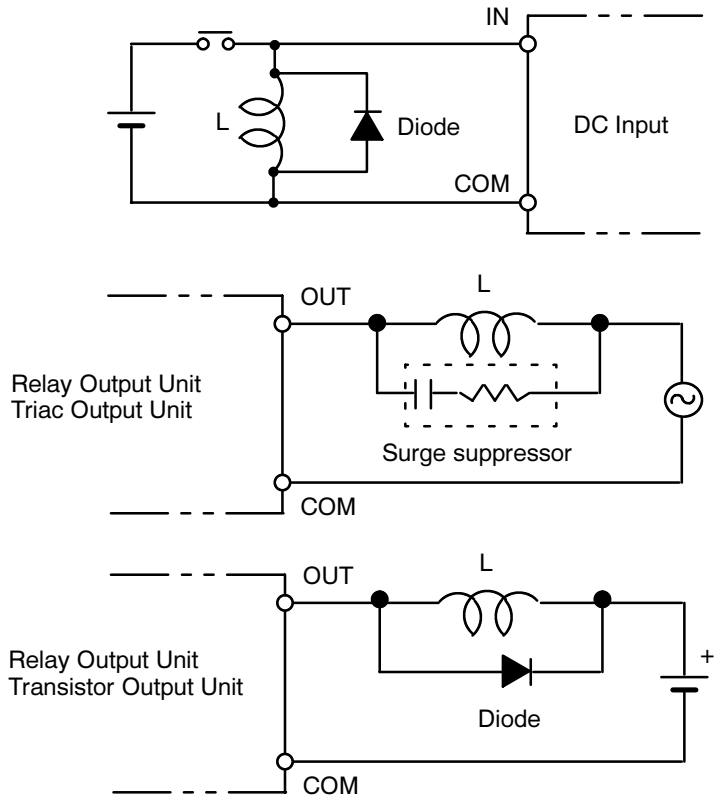
Transistor Output Residual Voltage

When connecting TTL circuits to transistor Output Units, connect a pull-up resistor and a CMOS IC between the two. This is because of the residual voltage left on the transistor output after the output turns OFF.

Inductive Load Surge Suppressor

When an inductive load is connected to an I/O Unit, connect a surge suppressor or diode in parallel with the load as shown in the following diagram. This is so that the back electromagnetic field generated by the load will be absorbed.

Resistor: 50 W
Capacitor: 0.47 μF
Voltage: 200 V
Diode: Must withstand voltages of more than three times the load voltage and an average current of 1 A



Electrical Noise

Take appropriate measures when any electrical device likely to produce noise is connected to the PC as a load. Devices generating noise of more than 1,200 V (such as electromagnetic relays and valves) require noise suppression. For noise sources running on AC power, connect a diode in parallel with the coil of each device.

When mounting a CPU Rack and an Expansion I/O Rack together on a mounting plate, provide a solid ground to the mounting plate. The mounting plate must be plated with a highly conductive surface in order to ensure noise immunity.

Appendices

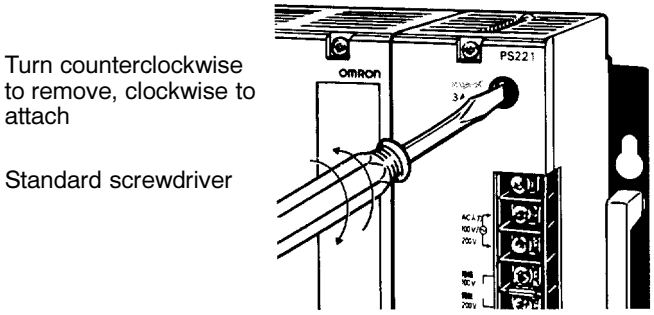
A Inspection and Maintenance

Certain consumable items in a PC (such as fuses, relays, or batteries) need occasional replacement. This Appendix explains how to replace each of these items. Refer to *Appendix B Specifications* for the specifications of individual consumable items. Always keep spare items on hand so that they can be used as immediate replacements.

CPU and Power Supply Fuses

To replace a fuse in the CPU or Power Supply, follow the steps below.

1. Turn OFF the power to the PC.
2. Remove the fuse holder by turning it approximately 50° counterclockwise with a standard screwdriver.
3. Remove the fuse from the holder.

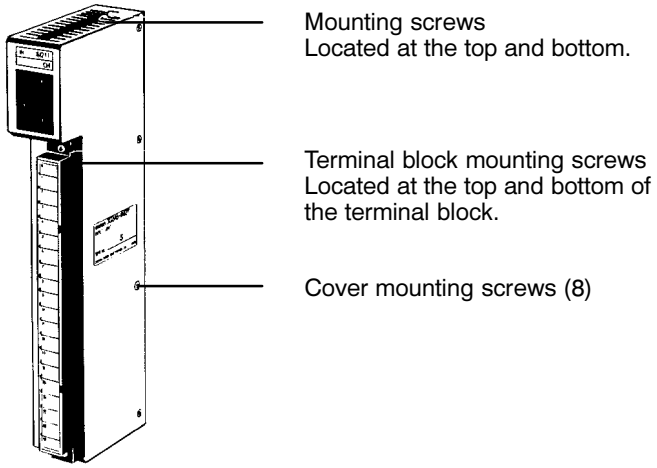


4. Insert a new fuse.
5. Reattach the fuse holder by turning it approximately 50° clockwise with a standard screwdriver.

Output Unit Fuses

To replace a fuse in an Output Unit, follow the steps below.

1. Turn OFF the power to the PC.
2. Detach the terminal block from the Output Unit, by removing the screws located at the top and bottom of the terminal block.

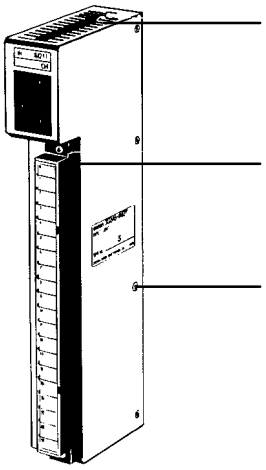


3. Remove the screws that mount the Output Unit to the Backplane. Pulling the Unit toward you, remove the Output Unit from the Backplane.
4. There are eight screws on each side of the Output Unit. Remove these screws to detach the case from the cover.
5. Pull out the printed circuit board.
6. Insert a new fuse.
7. Reassemble in reverse order.

Output Unit Relays

To replace a Relay in an Output Unit, follow the steps below.

1. Turn OFF the power to the PC.
2. Detach the terminal block from the Output Unit, by removing the screws located at the top and bottom of the terminal block.

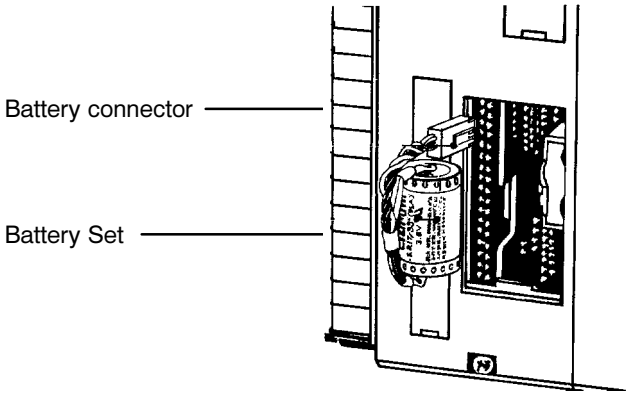


3. Remove the screws that mount the Output Unit to the Backplane. Pulling the Unit toward you remove the Output Unit from the Backplane.
4. There are eight screws on each side of the Output Unit. Remove these screws to detach the case from the cover.
5. Pull out the printed circuit board. Place the Relays on the circuit board.
6. Use the Relay Puller to pull out the Relay. Insert a new Relay.
7. Reassemble in reverse order.

Batteries

When the battery is nearly discharged, the ALARM indicator blinks and the message “BATT LOW” appears on the Programming Console. When this occurs, replace the battery within one week to avoid loss of data. The battery comes with its own connector as a set. To replace the Battery Set follow the steps below. The entire replacement must be completed within five minutes to ensure that the data will not be lost.

1. Turn OFF the power to the PC. (If the power was not already ON, turn the power ON for at least one minute before turning the power OFF.)
2. Remove the cover from the battery compartment.
3. Remove the old Battery Set.
4. Install the new Battery Set as shown below.



5. Replace the cover of the battery compartment.
6. When a Programming Console is mounted to the CPU after the battery has been replaced, “BATT LOW” will be displayed. This message can be cleared by pressing CLR, FUN, MONTR, or just turning the power to the PC OFF and the ON again to clear the error message on the Programming Console.

Note The service life of the battery is four years at 25°C.

B Specifications

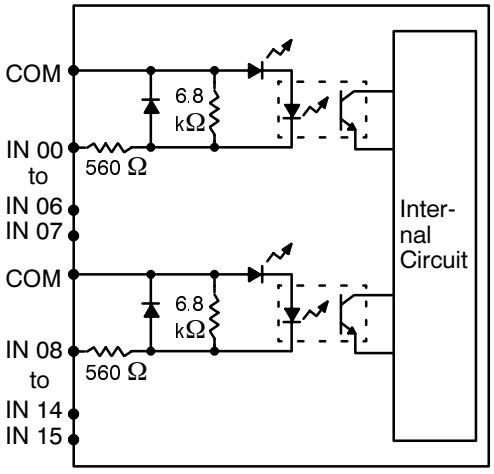
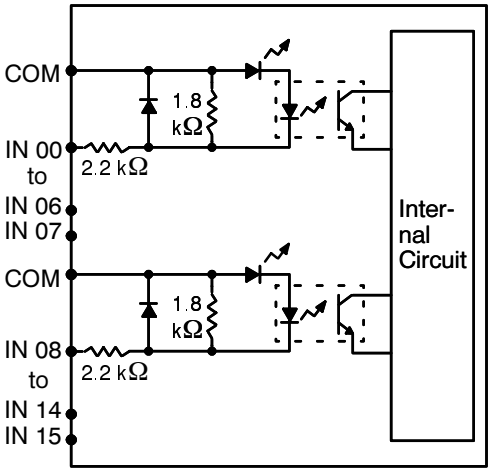
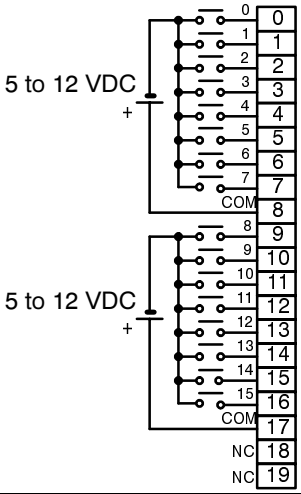
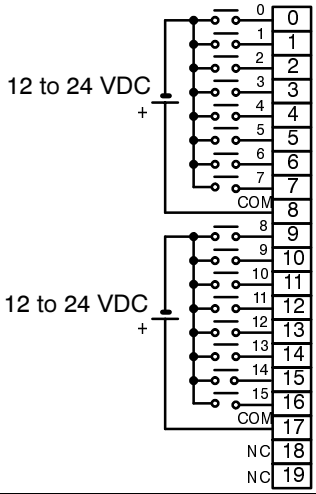
Power Supply Model	3G2A5-PS221-E/222-E/223-E	3G2A5-PS212-E/213-E
Supply Voltage	100 to 120/200 to 240 VAC (selectable) 50/60 Hz	24 VDC
Operating Voltage Range	85 to 132/170 to 264 VAC	20.4 to 26.4 VDC
Power Consumption	150 VA max.	55 W max.
Output Capacity	PS221: 7 A 5 VDC PS223: 120 A 5 VDC PS222: 7 A 5 VDC	PS213: 9 A 5 VDC PS212: 7 A 5 VDC
24 VDC Output*	0.8 A 24 VDC ±10%	Not provided
Insulation Resistance	5 MΩ min. (at 500 VDC) between AC terminals	
Dielectric Strength**	1,500 VAC 50/60 Hz for 1 minute (between AC and GR terminals) leakage current 10 m A max.	500 VAC 50/60 Hz for 1 minute (between DC and GR terminals) leakage current 1 mA max.
Noise Immunity	1,000 Vp-p, pulse width: 1 μs, rise time: 1 ns	
Vibration Resistance	Mechanical durability: 10 to 25 Hz, 2 mm double amplitude, in X, Y, and Z directions, for 2 hours each Electrical durability: 16.7 Hz, 1 mm double amplitude, in X, Y, and Z directions, for 10 minutes each	
Shock	10 G in downward direction, 3 times	
Ambient Temperature	Operating: 0° to 55°C Storage: −20° to 65°C	
Humidity	35% to 85% RH (without condensation)	
Atmosphere	Must be free from corrosive gasses	
Grounding	Less than 100 Ω	
Structure	Panel-mounted	
Weight	8 kilograms max.	

*This output is not provided on Model PS223-E.
**When performing the dielectic strength test or the insulation reistance test be sure to disconnect the LG terminals from the GR (ground) terminals to protect the program and internal parts from damage.

CPU Specifications

Programming Method	Ladder diagram
Instruction Length	1 address/instruction, (1 to 4 words/instruction)
Number of Instructions	71 (12 basic instructions + 59 special instructions)
Execution Time	3 to 8 μs (basic instructions)/22 to 504 μs (special instructions)
Memory Capacity	24K words
I/O bits	512 (0000 through 3115)
IR bits	416 (3200 through 5715)
SR bits	88 (5800 through 6307)
TR bits	8 (0 through 7)
HR bits	512 (0000 through 3115)
LR bits	512 (0000 through 3115) PC Link: max. configuration 8 PCs
Timers/Counters	128 (TIM/CNT 000 through 127) TIMs: 0 through 999.9 s TIMHs: 0 through 99.99 s CNT: 0 through 9999 counts
DM words	512 (0000 through 511) 16 bits/word
Control Input Signal	START INPUT (in RUN mode, PC operates when contacts are closed and stops when contacts are opened) Input Voltage: 24 mA 24 VDC
Control Output Signal	RUN INPUT (Contacts are closed while PC is in RUN mode) Max. switching capacity: 2 A 250 VAC (resistive load) 0.5 A 250 VAC (inductive load, cos of phase angle= 0.4) 2 A 24 VDC
Memory Protection	Status of HR bits, preset value of counters (CNT), and contents of data memory (DM) are retained during power failure. Length of memory protection depends on the Memory Pack model being used (refer to *Section 2-8 Memory Packs*).
Battery Life	4 years at 25°C, battery life is shortened at temperatures higher than 25°C. Replace battery with new one within 1 week when ALARM indicator blinks.
Self-diagnostic Functions	CPU failure (watchdog timer) Battery failure Cycle time error Memory failure I/O bus failure, etc.
Program Check	Program check (executed on start of RUN operation): END missing JMP-JME error Coil duplication Circuit error DIFU/DIFD over error IL/ILC error (Program can be checked by Programming Console or GPC.)

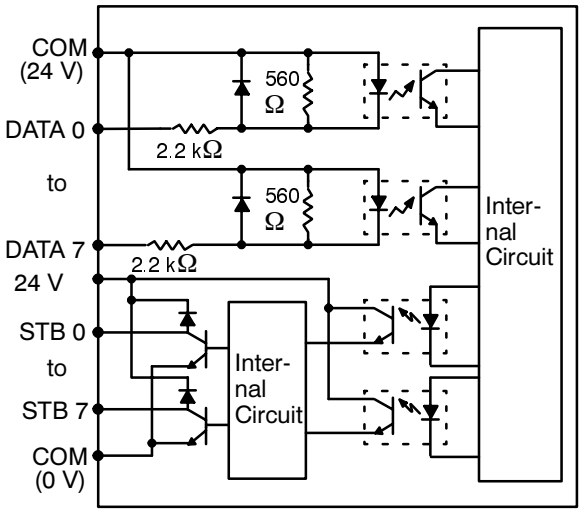
DC Input Units

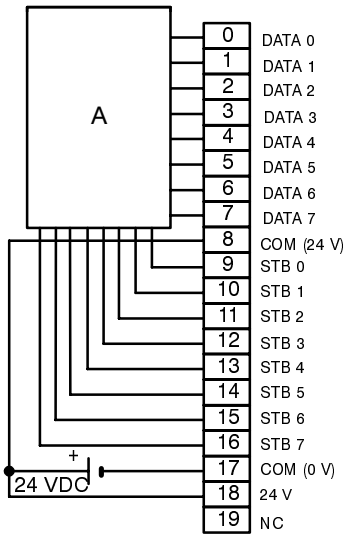
	3G2A5-ID112	3G2A5-ID213
Input Voltage	5 to 12 VAC $^{+10\%}/_{-15\%}$	12 to 24 VAC $^{+10\%}/_{-15\%}$
Input Impedance	560 Ω	2.2 kΩ
Input Current	16 mA typical (at 12 VDC)	10 mA typical (at 24 VDC)
ON Voltage	4.0 VDC min.	10.2 VDC min.
OFF Voltage	1.5 VDC max.	3.0 VDC max.
ON Response Time	1.5 ms max.	1.5 ms max.
OFF Response Time	1.5 ms max.	1.5 ms max.
No. of Points	16 (8 points/common, 2 circuits)	16 (8 points/common, 2 circuits)
Internal Current Consumption	10 mA 5 VDC max.	20 mA 5 VDC max.
Weight	450 grams max.	450 grams max.
Circuit Configuration	 Two-wire sensors cannot be connected.	
Terminal Connections		
Dimensions	A-shape	A-shape

DC Input Units
Continued

3G2A5-ID212 (Input)		3G2A5-ID212 (Output)	
Input Voltage	24 VDC $^{+10\%}_{-15\%}$	Max. Switching Capacity	0.1 A 24 VDC $^{+10\%}_{-15\%}$
Input Impedance	2.2 kΩ	Lekage Current	0.1 mA max.
Input Current	10 mA typical (at 24 VDC)	Residual Voltage	1.5 V max.
ON Voltage	10.2 VDC min.	ON Response Time	0.2 ms max.
OFF Voltage	3.0 VDC max.	OFF Response Time	0.3 ms max.
ON Response Time	1.5 ms max.	Power for External Supply	24 VDC ±10 %
OFF Response Time	1.5 ms max.	Terminal Connections	

Circuit Configuration

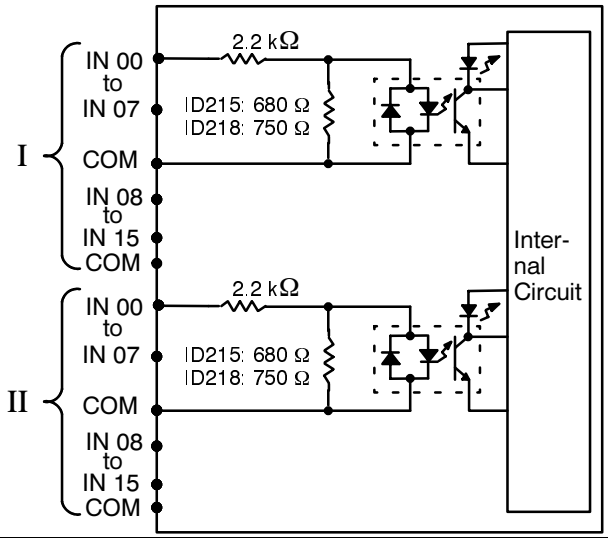
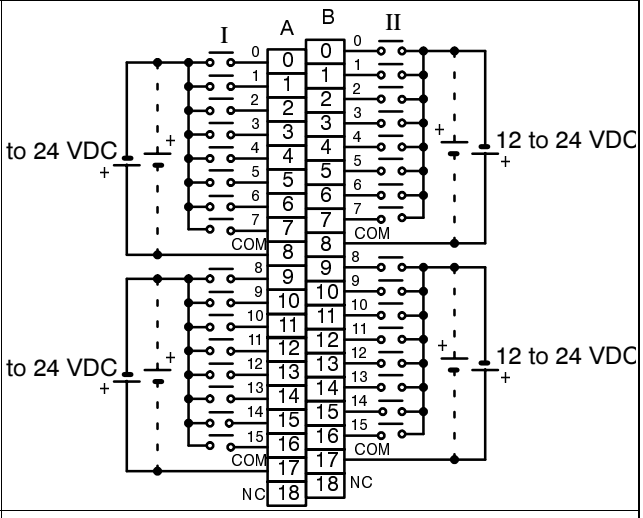




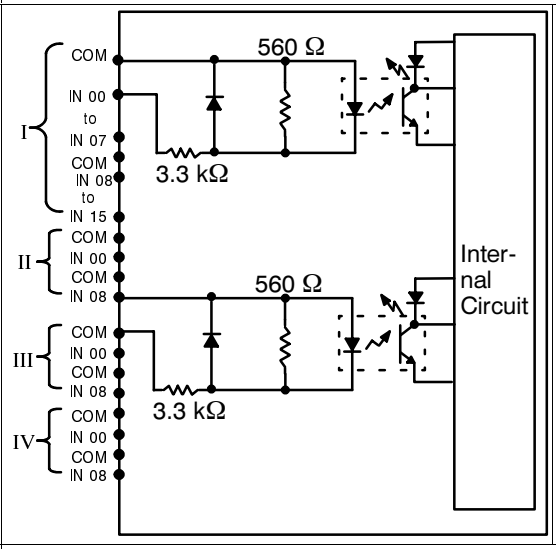
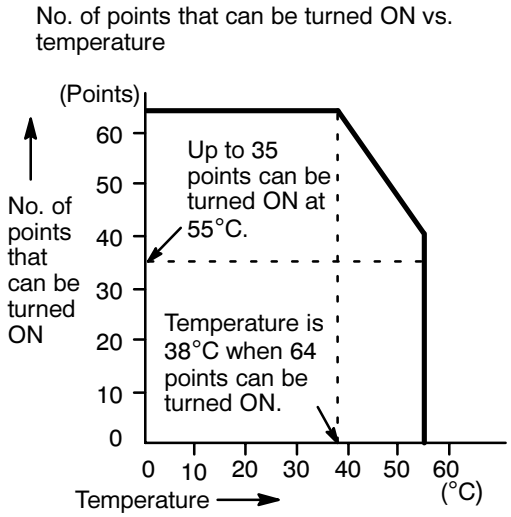
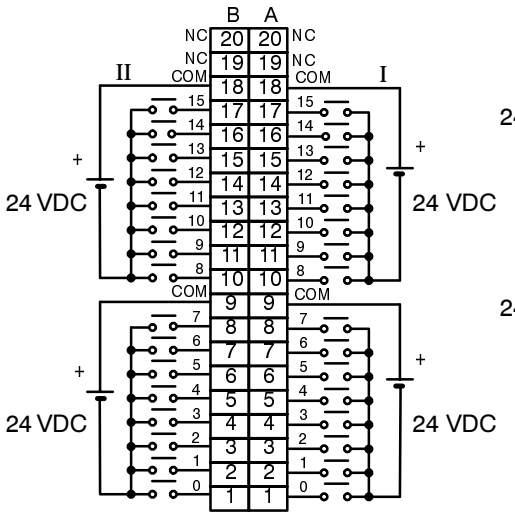
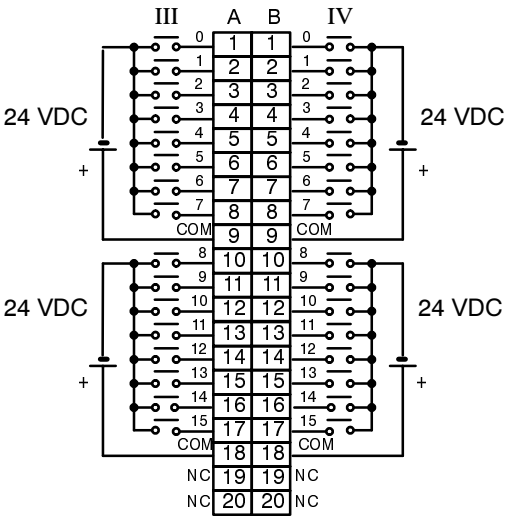
Refer to page 66 for connection.

No. of Points	64
Internal Current Consumption	300 mA 5 VDC max.
Weight	450 grams max.
Dimensions	A-shape

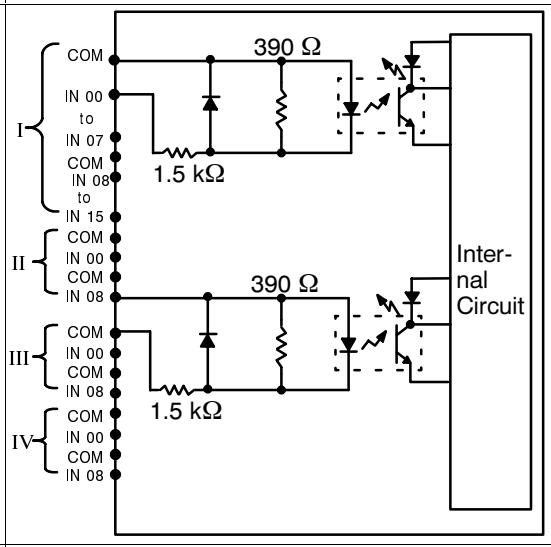
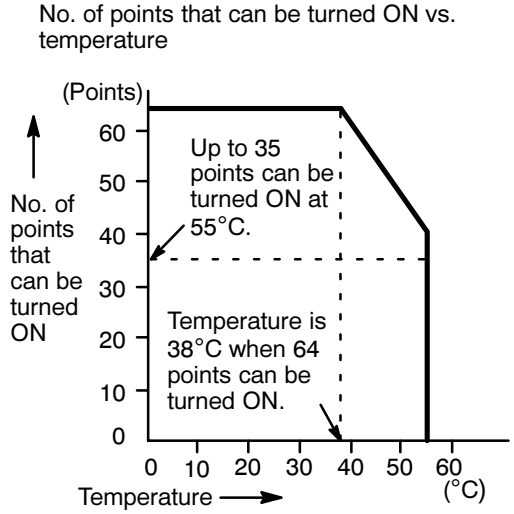
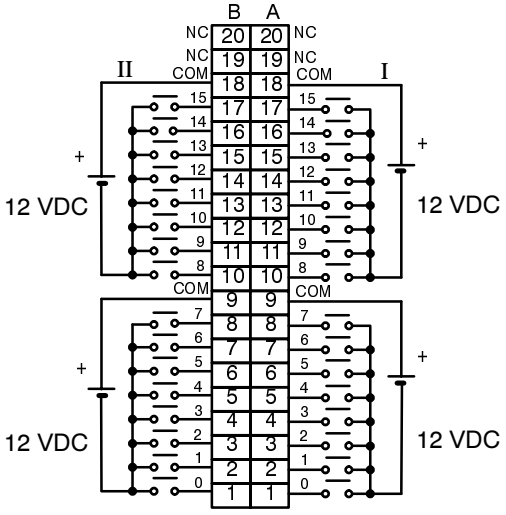
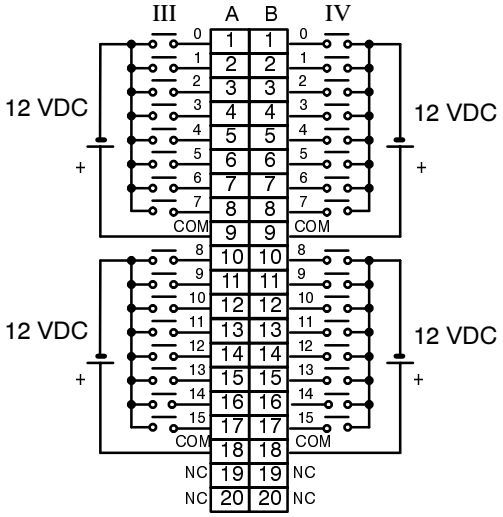
DC Input Units Continued

	3G2A5-ID215	3G2A5-ID218
Input Voltage	12 to 24 VDC $^{+10\%}/_{-15\%}$	
Input Impedance	2.2 kΩ	
Input Current	10 mA typical (at 24 VDC)	
ON Voltage	10.2 VDC min.	
OFF Voltage	3.0 VDC max.	
ON Response Time	15 ms max.	1.5 ms max.
OFF Response Time	15 ms max.	1.5 ms max.
No. of Points	32 (8 points/common, 4 circuits)	
Internal Current Consumption	160 mA 5 VDC max.	
Weight	450 grams max.	
Circuit Configuration		
Terminal Connections		
Dimensions	B-shape	

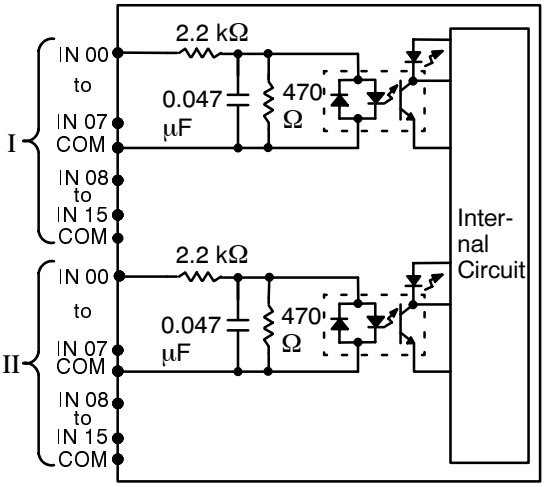
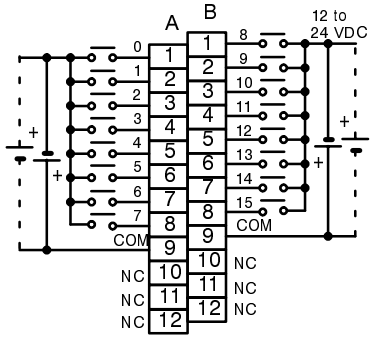
DC Input Units Continued

	3G2A5-ID219
Input Voltage	24 VDC $^{+10\%}_{-15\%}$
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 VDC)
ON Voltage	16.0 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	1.5 ms max.
OFF Response Time	1.5 ms max.
No. of Points	64 (8 points/common, 8 circuits) (No. of contacts that can be turned ON changes depending on ambient temperature. See the characteristic data below.)
Internal Current Consumption	
Weight	600 grams max.
Circuit Configuration	 
Terminal Connections	 
Dimensions	D-shape

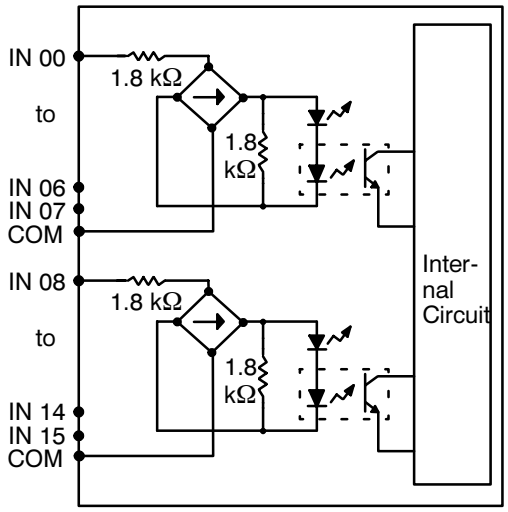
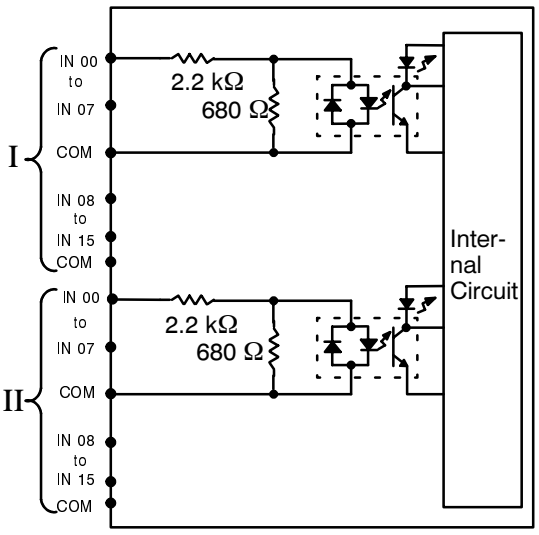
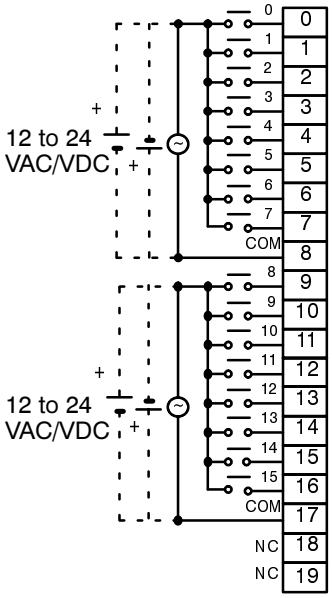
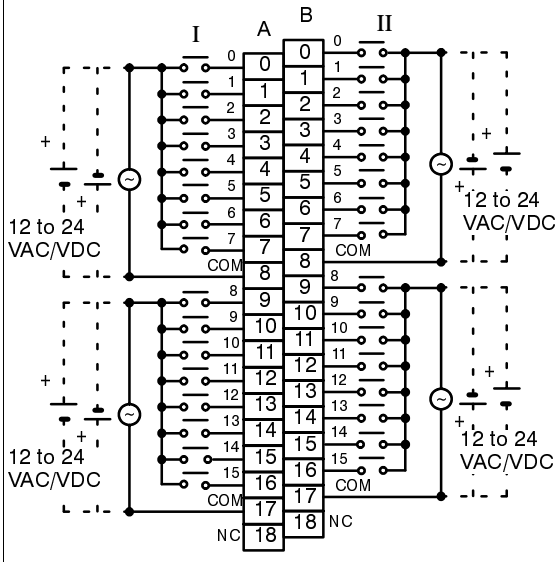
DC Input Units Continued

	3G2A5-ID114
Input Voltage	12 VDC $^{+10\%}_{-15\%}$
Input Impedance	1.6 kΩ
Input Current	7 mA typical (at 12 VDC)
ON Voltage	8.0 VDC min.
OFF Voltage	3.0 VDC max.
ON Response Time	1.5 ms max.
OFF Response Time	1.5 ms max.
No. of Points	64 (8 points/common, 8 circuits) (No. of contacts that can be turned ON changes depending on ambient temperature. See the characteristic data below.)
Internal Current Consumption	340 mA 5 VDC max.
Weight	600 grams max.
Circuit Configuration	 
Terminal Connections	 
Dimensions	D-shape

DC Input Units Continued

	C500-ID218CN
Input Voltage	12 to 24 VAC $^{+10\%}/_{-15\%}$
Input Impedance	2.2 kΩ
Input Current	10 mA typical (at 24 VDC)
ON Voltage	10.2 VDC min.
OFF Voltage	3.0 VDC max.
ON Response Time	1.5 ms max.
OFF Response Time	1.5 ms max.
No. of Points	32 (8 points/common, 4 circuits)
Internal Current Consumption	200 mA 5 VDC max.
Weight	450 grams max.
Circuit Configuration	
Terminal Connections	
Dimensions	E-shape, with no 4-terminal block

AC/DC Input Units

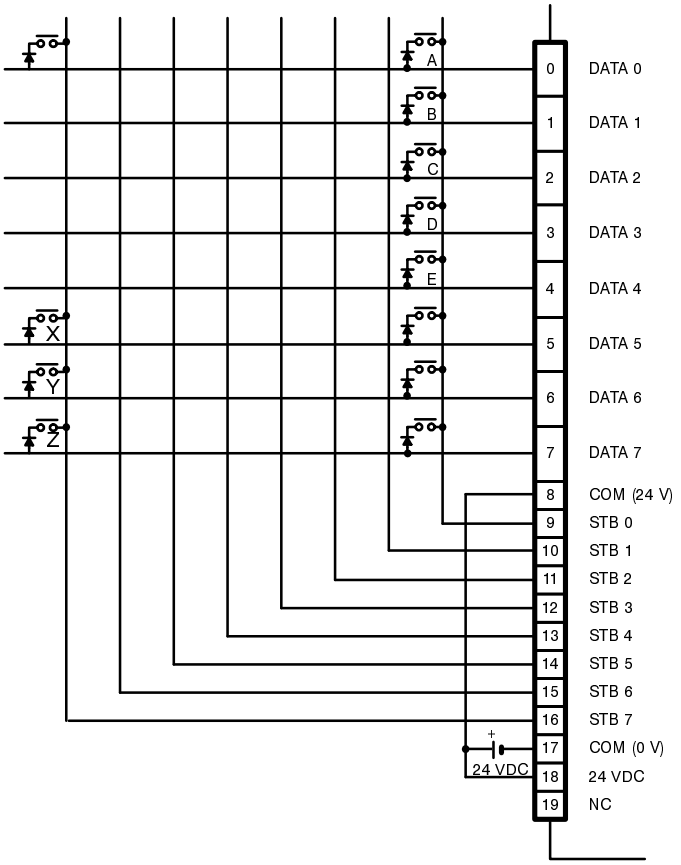
	3G2A5-IM211	3G2A5-IM212
Input Voltage	12 to 24 VAC/DC $^{+10\%}/_{-15\%}$ 50/60 Hz	12 to 24 VAC/DC $^{+10\%}/_{-15\%}$ 50/60 Hz
Input Impedance	1.8 Ω	2.2 kΩ
Input Current	10 mA typical (at 24 VDC)	10 mA typical (at 24 VDC)
ON Voltage	10.2 VDC min.	10.2 VDC min.
OFF Voltage	3.0 VDC max.	3.0 VDC max.
ON Response Time	15 ms max.	15 ms max.
OFF Response Time	15 ms max.	15 ms max.
No. of Points	16 (8 points/common, 2 circuits)	32 (8 points/common, 4 circuits)
Internal Current Consumption	10 mA 5 VDC max.	200 mA 5 VDC max.
Weight	450 grams max.	500 grams max.
Circuit Configuration		
Terminal Connections		
Dimensions	A-shape	A-shape

DC Input Unit 3G2A5-ID212

In the case where a large number of bits must be controlled, an ID212 DC Input Unit can simplify wiring by controlling up to 64 bits through only 16 points. Using digital switches or a specially wired keyboard, different combinations of points can access specific bits and words. Two examples of connections using digital switches or a keyboard are given.

Connection Example 1 (Keyboard)

The table below shows how the ID212 DC Input Unit can be wired using a specially wired keyboard. For example, if A on the keyboard is pressed, the combination of DATA0 and STB9 turn ON bit 00, word n. Similarly, the combination of DATA 7 and STB7 turn ON bit 15, word n+3. The value of word n depends on where the Unit is mounted on the Rack. For details, refer to the C500 Operation Manual.



The table below shows the combinations made possible when the keyboard is wired as shown in the figure above.

Point Number	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
word n												E	D	C	B	A
word n + 1																
word n + 2																
word n + 3	Z	Y	X													

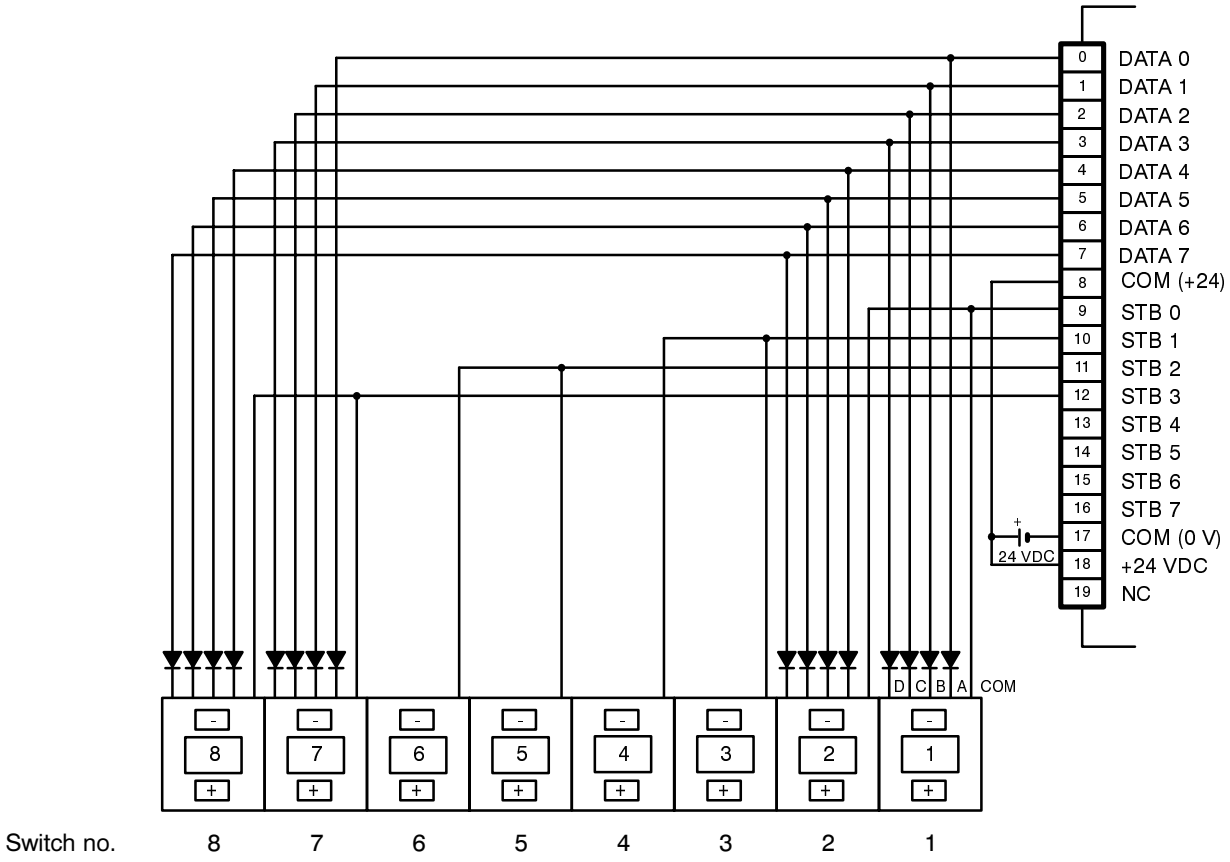
Note Because the DC Input Unit is operated on an extremely small current, make sure there is adequate distance between the DC Input Unit wires and high-tension equipment or power lines. If this cannot

be avoided, use shielded cables when wiring the DC Input Unit. Be sure to keep the total length of the wires less than 10 m.

Connection Example 2 (Digital Switches)

This example shows how the ID212 DC Input Unit can be wired using digital switches. Just as the keys on the keyboard can access different combinations of words and bits, the digital switches can access different combinations of words and bits. For example, the combination of switch no. 1 and point 00 access word bit 00, word n.

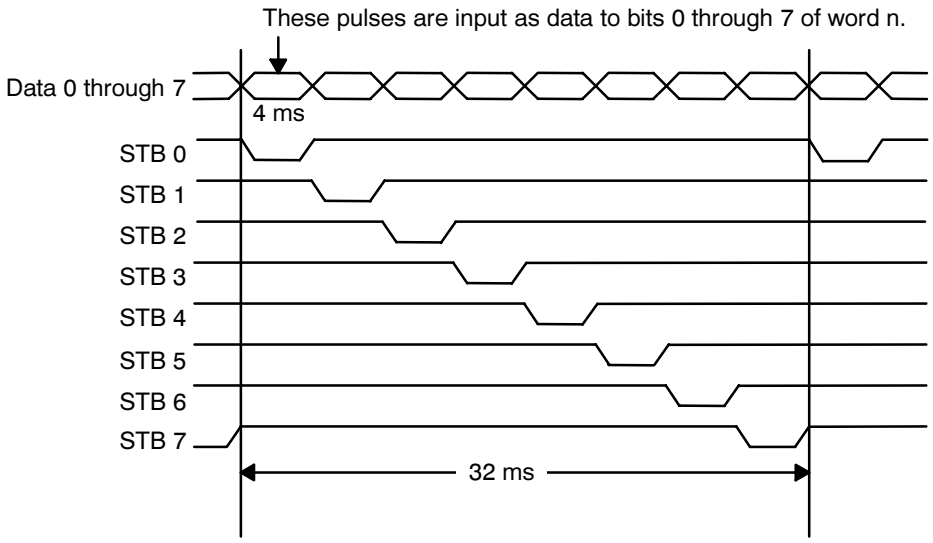
However, for the sake of simplicity the figure below shows the digital switches wired to control 32 bits instead of 64 bits as was shown in Example 1. Wire STB4, STB5, STB6, and STB7 to access an additional 32 bits.



The table below shows the combinations made possible when the digital switches are wired as shown in the figure above.

Point Number	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
word n	Switch no. 4				Switch no. 3				Switch no. 2				Switch no. 1			
	0	1	0	0	0	0	1	1	0	0	1	1	0	0	0	1
	STB 1								STB 0							
word n + 1	Switch no. 8				Switch no. 7				Switch no. 6				Switch no. 5			
word n + 1	1	0	0	0	0	1	1	1	0	1	1	0	0	1	0	1
	STB 3								STB 2							

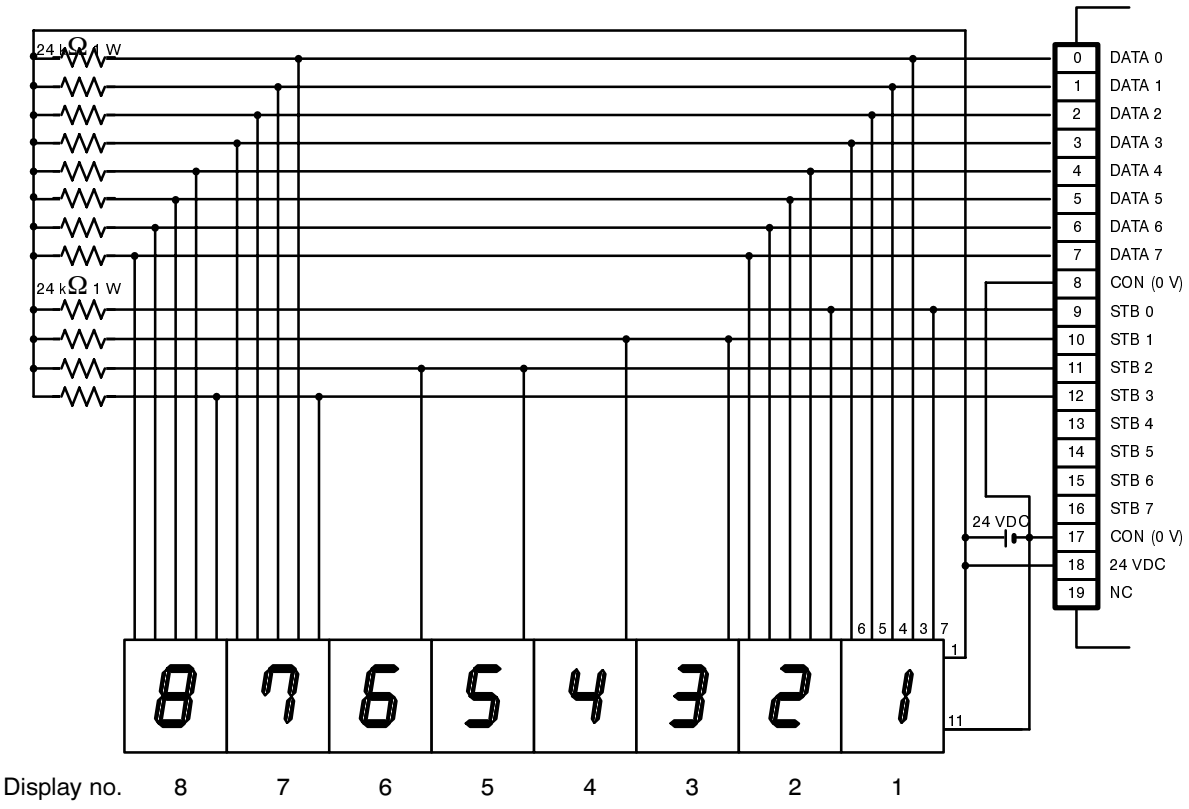
Timing



DC Output Unit 3G2A5-OD211

By using the OD211 DC Output Unit, a large number of bits can be controlled through only 16 points. Just like the ID211 DC Input Unit, different combinations of points can access bits and words to control different outputs. Using this type of Unit can simplify wiring when many bits must be controlled. Up to 64 bits can be accessed.

Because the output data is positive logic, the terminal output goes high when the output data is logical 1. The strobe output is negative logic, so when a signal is output, the corresponding terminal goes low. Use positive logic output devices for the load of this Unit. The strobe output is cyclically and automatically output.



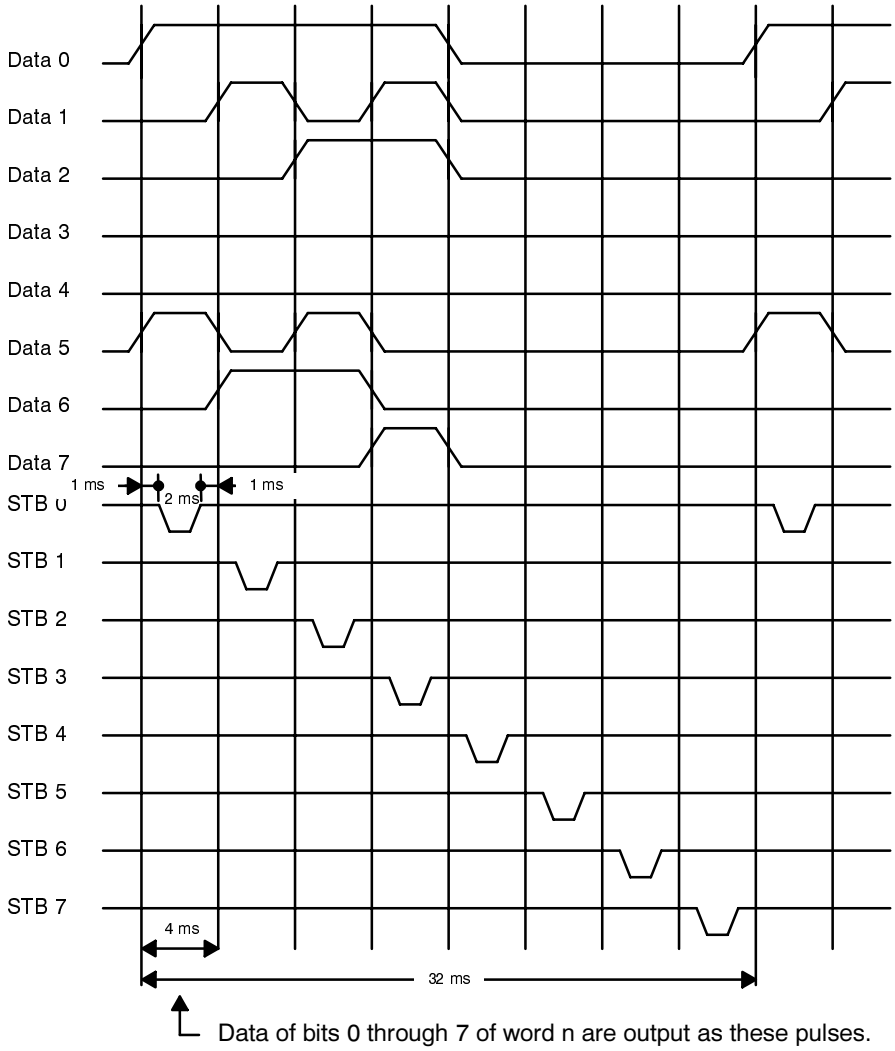
The table below shows the combinations made possible when the display is wired as shown in the figure on the preceding page. The value of word n depends on where the Unit is mounted on the Rack. For details, refer to the C500 Operation Manual.

Point Number	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Data Number	07	06	05	04	03	02	01	00	07	06	05	04	03	02	01	00
word n	Display no. 4				Display no. 3				Display no. 2				Display no. 1			
	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	1
	STB 1								STB 0							
word n + 1	Display no. 8				Display no. 7				Display no. 6				Display no. 5			
	1	0	0	0	0	1	1	1	0	1	1	0	0	1	0	1
	STB 3								STB 2							

Note Because the DC Input Unit is operated on an extremely small current, make sure there is adequate distance between the DC Input Unit wires and high-tension equipment or power lines. If this cannot be avoided, use shielded cables when wiring the DC Input Unit. Be sure to keep the total length of the wires less than 10 m.

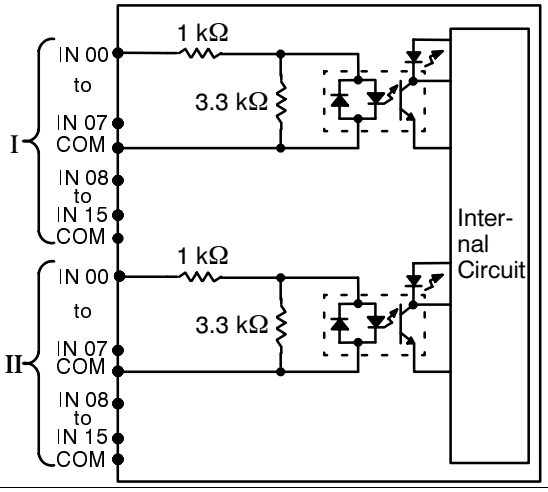
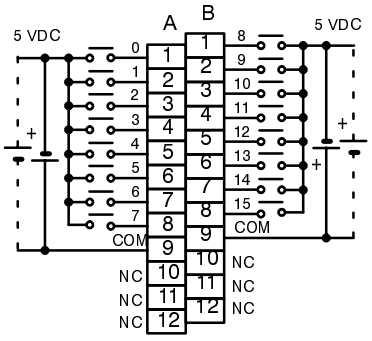
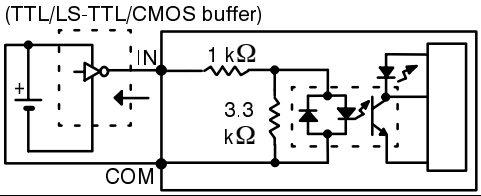
Timing

The following timing chart illustrates the operation of the Output Unit when wired as shown on the previous page.

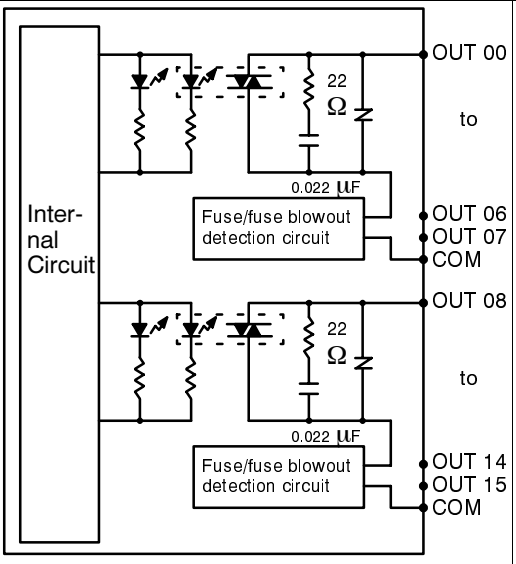
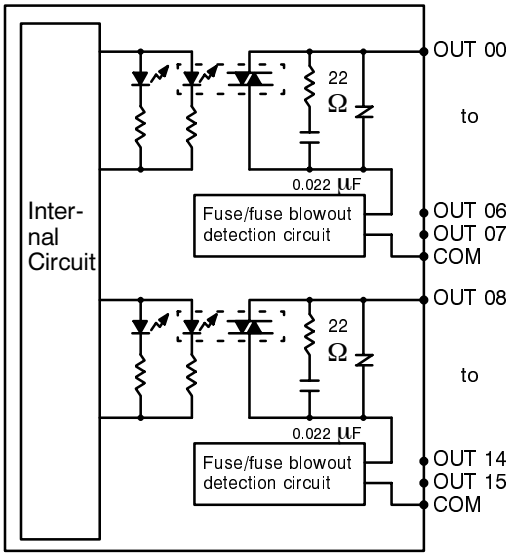
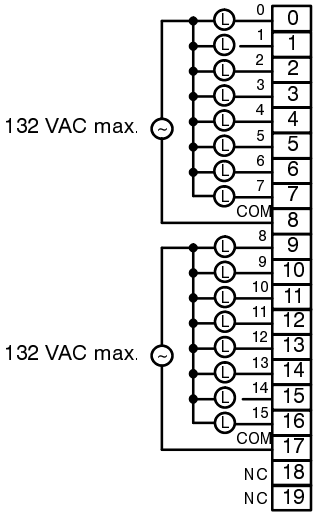
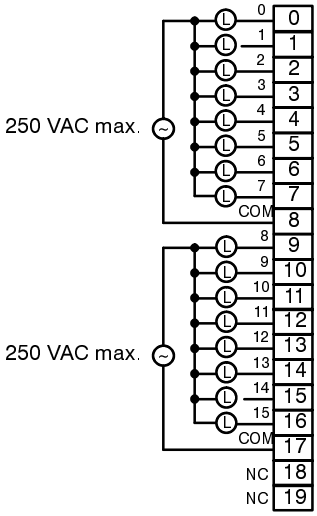


Data of bits 0 through 7 of word n are output as these pulses.

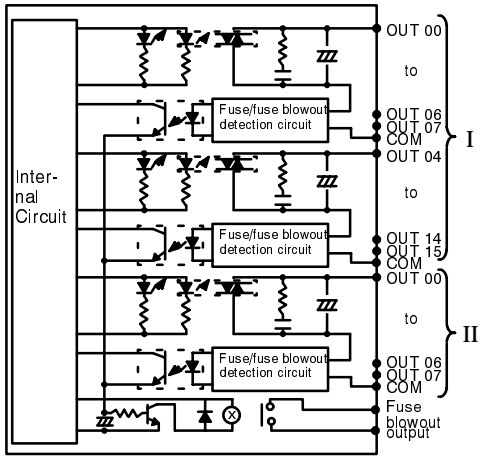
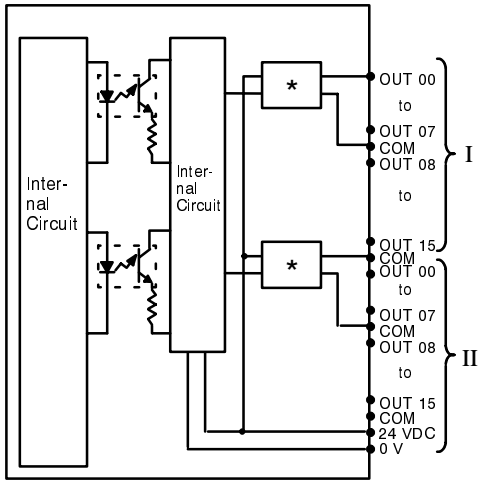
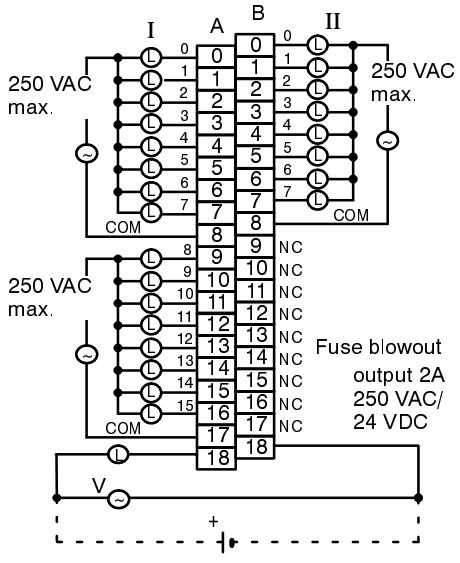
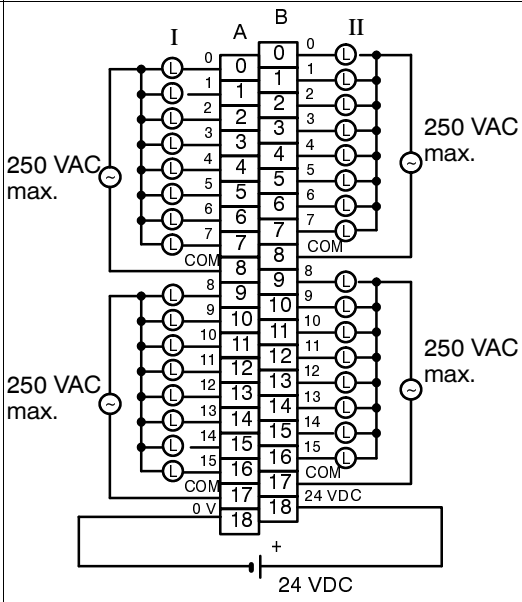
TTL Input Units

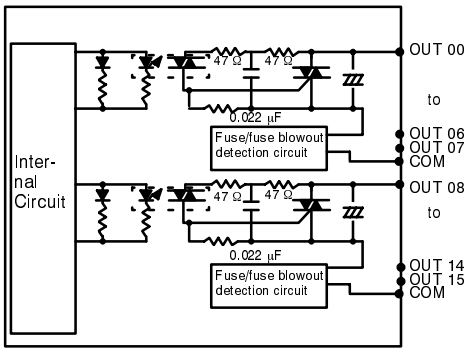
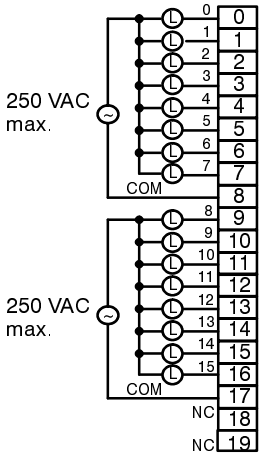
	C500-ID501CN
Input Voltage	5 VDC ±10%
Input Impedance	1 kΩ
Input Current	3.5 mA typical (at 24 VDC)
ON Voltage	3 VDC min.
OFF Voltage	1 VDC max.
ON Response Time	1.5 ms max.
OFF Response Time	1.5 ms max.
No. of Points	32 (8 points/common, 4 circuits)
Internal Current Consumption	200 mA 5 VDC max.
Weight	450 grams max.
Circuit Configuration	
Terminal Connections	 Use a synchronous TTL buffer. 
Dimensions	E-shape, with no 4-terminal block

Triac Output Units

	3G2A5-OA121	3G2A5-OA222
Max. switching Capacity	1 A 132 VAC, 50/60 Hz (4 A/common, 5 A/Unit)	1 A 250 VAC, 50/60 Hz (4 A/common, 5 A/Unit)
Min. switching Capacity	10 mA (resistive load) 40 mA (inductive load) 10 VAC	10 mA (resistive load) 40 mA (inductive load) 10 VAC
Leakage Current	3 mA (100 VAC) max.	3 mA (100 VAC) max., 6 mA (200 VAC) max.
Residual Voltage	1.2 V max.	1.2 V max.
ON Response Time	1 ms max.	1 ms max.
OFF Response Time	1/2 of load frequency max.	1/2 of load frequency max.
No. of Points	16 (8 points/common, 2 circuits)	16 (8 points/common, 2 circuits)
Internal Current Consumption	300 mA 5 VDC max.	300 mA 5 VDC max.
Fuse Capacity	5 A 250 V (two fuses)	5 A 250 V (two fuses)
Weight	500 grams max.	500 grams max.
Circuit Configuration	 The fuse used in this diagram is 5 A 250 V 6.35 dia. x 32.	 The fuse used in this diagram is 5 A 250 V 6.35 dia. x 32.
Terminal Connections		
Dimensions	A-shape	A-shape

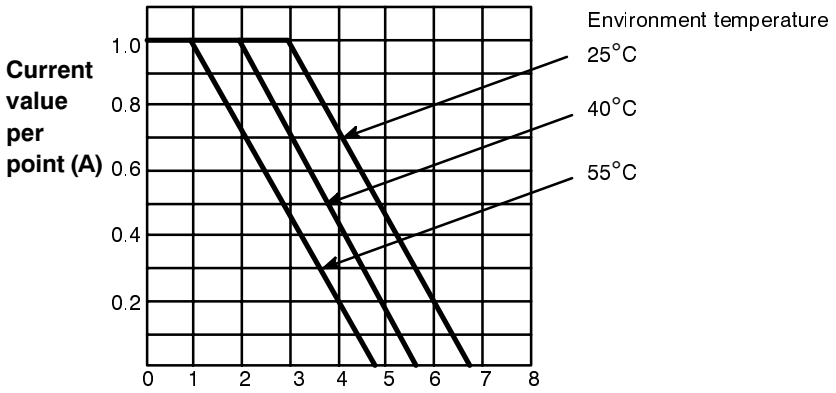
Triac Output Units Continued

	3G2A5-OA223	3G2A5-OA225
Max. switching Capacity	1 A 250 VAC, 50/60 Hz (4 A/common, 5 A/unit)	1 A 250 VAC, 50/60 Hz (4 A/common, 5 A/unit)
Min. switching Capacity	10 mA (resistive load) 40 mA (inductive load) 10 VAC	10 mA (resistive load) 40 mA (inductive load) 10 VAC
Leakage Current	3 mA (100 VAC) max., 6 mA (200 VAC) max.	2 mA (100 VAC) max., 5 mA (200 VAC) max.
Residual Voltage	1.2 V max.	1.6 V max.
ON Response Time	1 ms max.	1 ms max.
OFF Response Time	1/2 of load frequency max.	1/2 of load frequency max.
No. of Points	24 (8 points/common, 3 circuits)	32 (8 points/common, 4 circuits)
Internal Current Consumption	450 mA 5 VDC max.	200 mA 5 VDC max.
Fuse Capacity	5 A 250 V (three fuses)	Not provided
Power for External Supply	–	320 mA 5 VDC ±10% max.
Weight	600 grams max.	600 grams max.
Circuit Configuration		 * G3S-201PL 24 VDC
Terminal Connections		
Dimensions	C-shape	C-shape

	3G2A5-OA226
Max. Switching Capacity	1.2 A 250 VAC, 50/60 Hz (4 A/common, 5 A/unit)
Max. Surge Current	15 A for 100 ms pulse width, 30 A for 10 ms pulse width
Min. Switching Capacity	100 mA at 10 VAC, 50 mA at 24 VAC 10 mA at 100 VAC, 10 mA at 240 VAC
Leakage Current	1.5 mA (120 VAC, 60 Hz) max., 3.0 mA (240 VAC, 60 Hz) max.
Residual Voltage	1.5 VAC max. for 100 to 600 mA, 1.5 VAC for 50 to 100 mA, 5.0 VAC for 10 to 50 mA
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency + 1 ms max.
No. of Points	16 (8 points/common, 2 circuits)
Internal Current Consumption	450 mA at 5 VDC max.
Fuse Capacity	5 A, 250 V; 6.35 mm dia. x 32 mm (two fuses)
Power for External Supply	–
Weight	600 grams max.
Circuit Configuration	
Terminal Connections	
Dimensions	C-shape

Special Considerations for C500-OA225

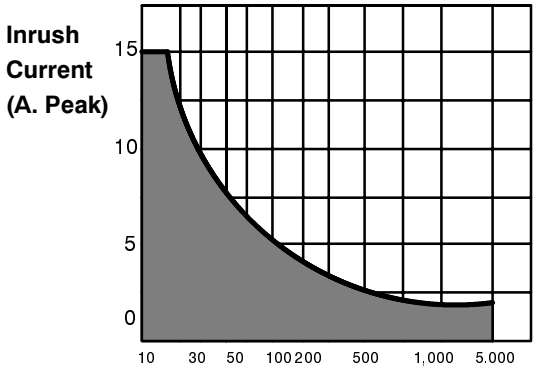
The maximum current value allowed per point differs depending on the ambient temperature and the number of points per common that are ON simultaneously. The graph below shows the relationship between the allowable current per point and the number of points ON per common. Be sure not to exceed the values depicted in the graph.



Number of points per common that can be turned ON simultaneously.

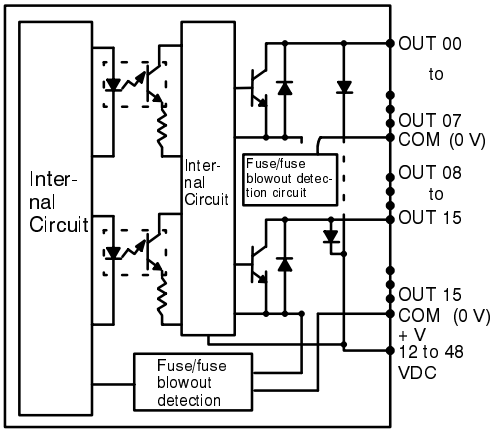
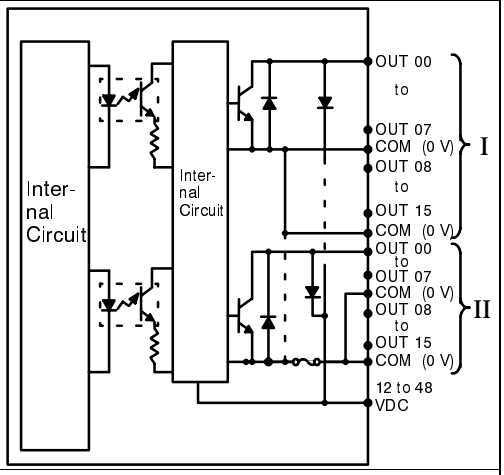
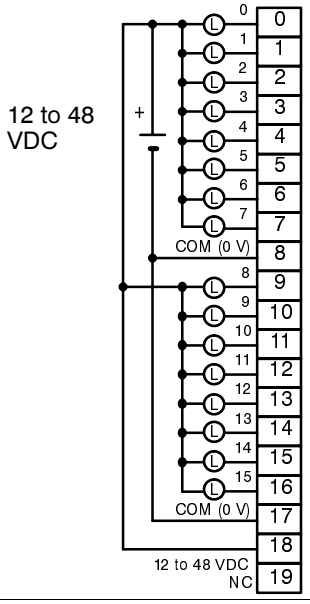
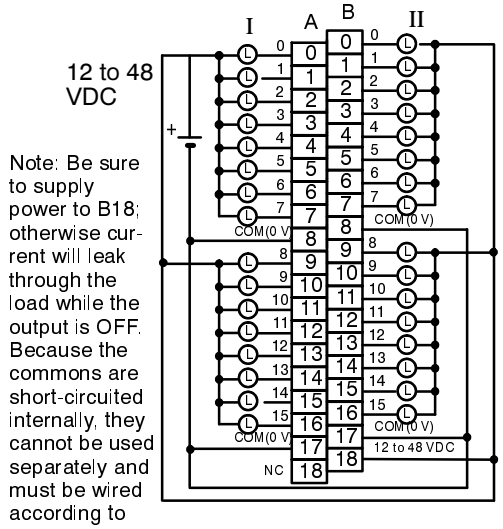
Number of Points Per Common Turned ON Simultaneously

The graph below shows the value of an surge current and the time it takes the current to level to a steady stream of current (current-carrying time). The curved line in the graph represents the maximum value of surge current at which the Unit can operate properly. It is suggested that when opening and closing a load with a large surge current, to keep the value of the surge current to half the value shown the graph (within the shaded area).

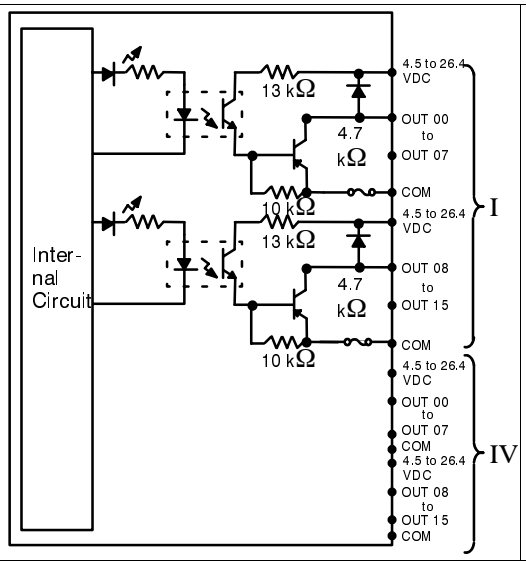
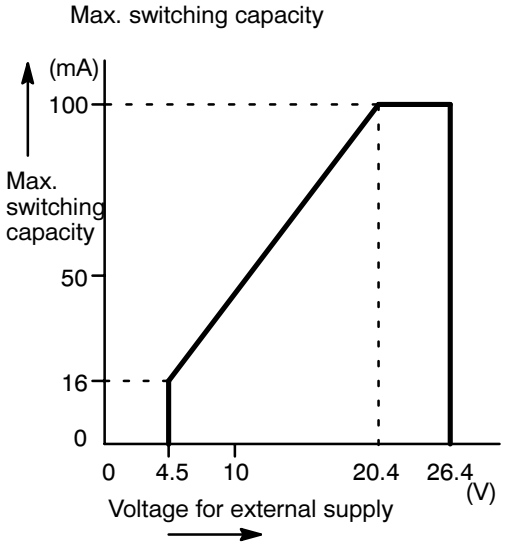
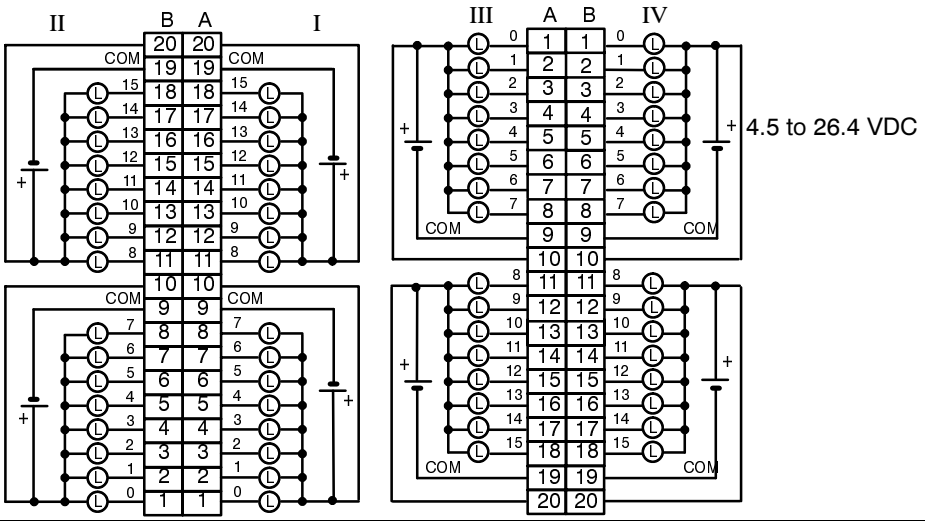


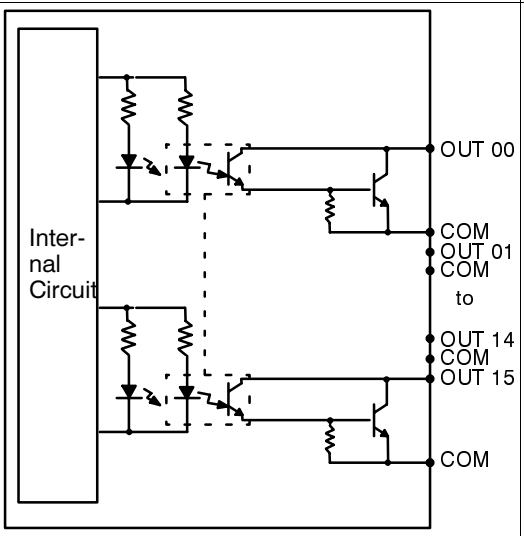
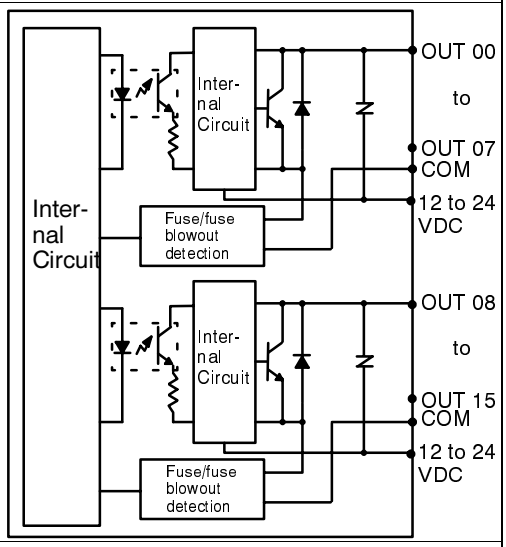
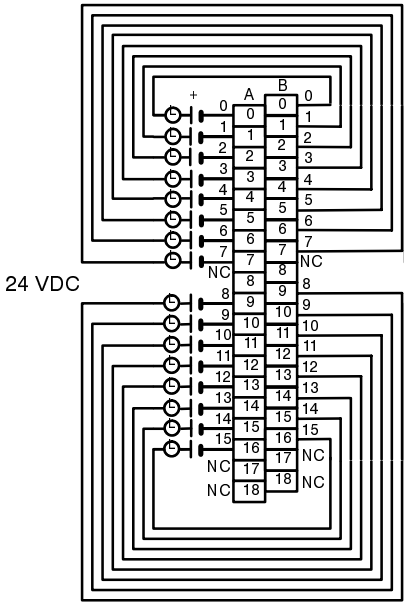
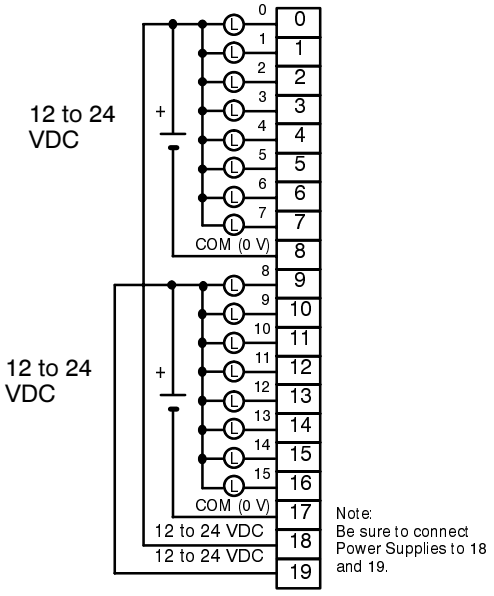
Current-carrying time (ms)

Transistor Output Units

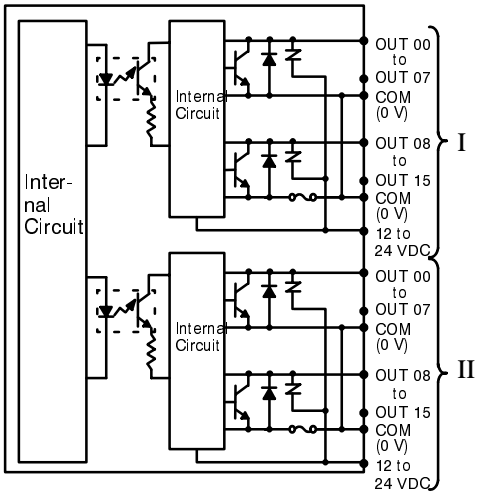
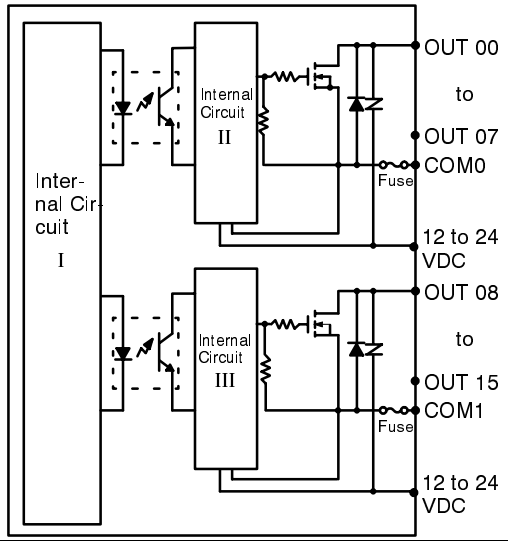
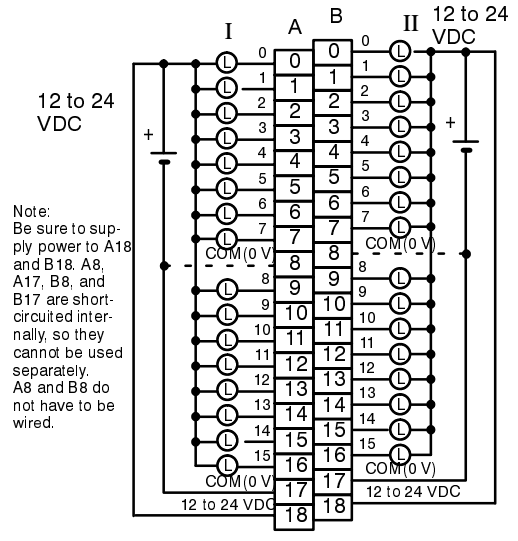
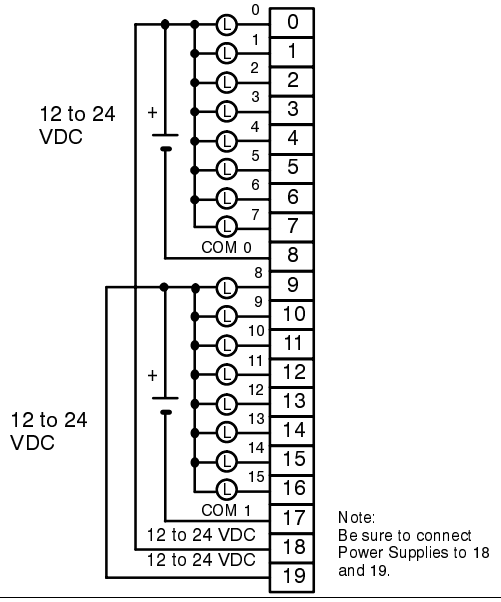
	3G2A5-OD411	3G2A5-OD412
Max. switching Capacity	12 to 48 VDC +10%, −15% 1A (4 A/common, 5 A/Unit)	12 to 48 VDC +10%, −15% 0.3 A (2.4 A/common, 4.8 A/Unit)
Leakage Current	0.1 mA max.	0.1 mA max.
Residual Voltage	1.4 V max.	1.5 V max.
ON Response Time	0.2 ms max.	0.2 ms max.
OFF Response Time	0.3 ms max.	0.3 ms max.
No. of Points	16 (16 points/common, 1 circuit)	32 (32 points/common, 1 circuit)
Internal Current Consumption	160 mA 5 VDC max.	230 mA 5 VDC max.
Fuse Capacity	5 A 250 V (two fuses)	1 per circuit, 1 total (not user replaceable)
Power for External Supply	50 mA 12 to 48 VDC ±10% max.	80 mA 12 to 48 VDC ±10% max.
Weight	500 grams max.	530 grams max.
Circuit Configuration		
Terminal Connections	 Note: Be sure to supply power to B18; otherwise current will leak through the load while the output is OFF. Because the commons are short-circuited internally, they cannot be used separately and must be wired according to the diagram.	 Note: Be sure to supply power to B18; otherwise current will leak through the load while the output is OFF. Because the commons are short-circuited internally, they cannot be used separately and must be wired according to the diagram.
Dimensions	A-shape	B-shape

Transistor Output Units Continued

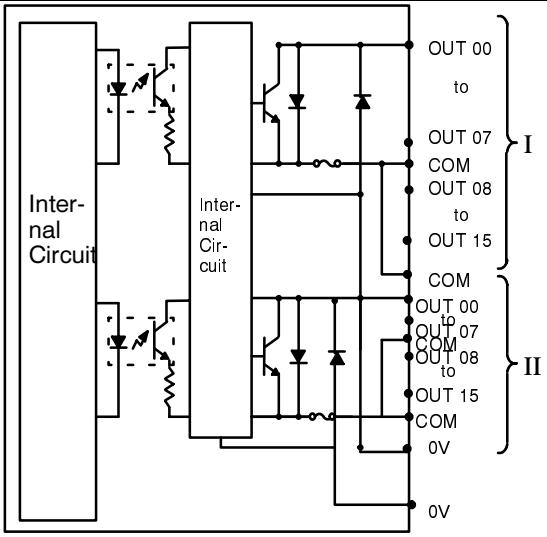
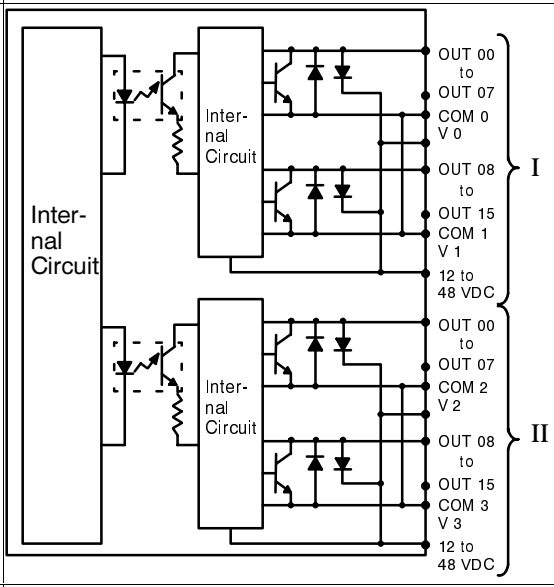
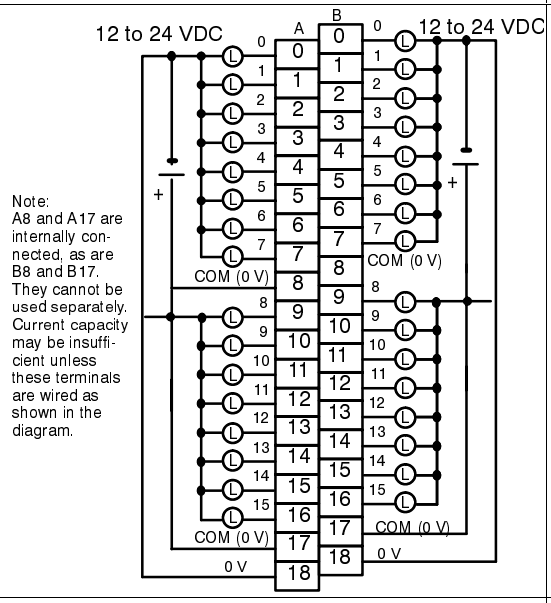
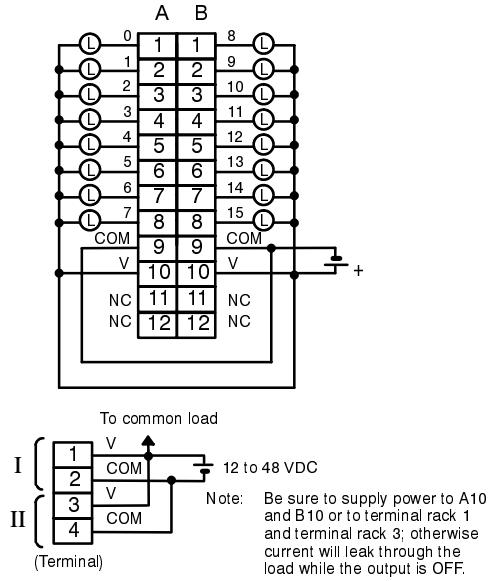
	3G2A5-OD213
Max. switching Capacity	16 mA/4.5 V to 100 mA/26.4 VDC (See chart below.) 800 mA/common, 6.4 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	0.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Points	64 (8 points/common, 8 circuits)
Internal Current Consumption	460 mA 5 VDC max. (140 mA + 5 mA x no. of ON points)
Fuse Capacity	1 per circuit, 8 total (not user replaceable)
Power for External Supply	170 mA 26.4 VDC max. (2.6 mA x no. of ON points)
Weight	550 grams max.
Circuit Configuration	 
Terminal Connections	
Dimensions	D-shape

	3G2A5-OD215	C500-OD217
Max. switching Capacity	24 VDC ±10%, 50 mA/point	12 to 24 VDC +10%, −15% 1 A (4 A/common, 5 A/Unit)
Leakage Current	---	0.1 mA max.
Residual Voltage	1.0 V max.	1.4 V max.
ON Response Time	0.2 ms max.	0.2 ms max.
OFF Response Time	0.3 ms max.	0.3 ms max.
No. of Points	16 (independent common)	16 (8 points/common, 2 circuits)
Internal Current Consumption	200 mA 5 VDC max.	160 mA 5 VDC max.
Fuse Capacity	Not provided	5 A 250 V (two fuses)
Power for External Supply	---	50 mA 12 to 24 VDC ±10% min.
Weight	530 grams max.	500 grams max.
Circuit Configuration		
Terminal Connections		
Dimensions	B-shape	A-shape

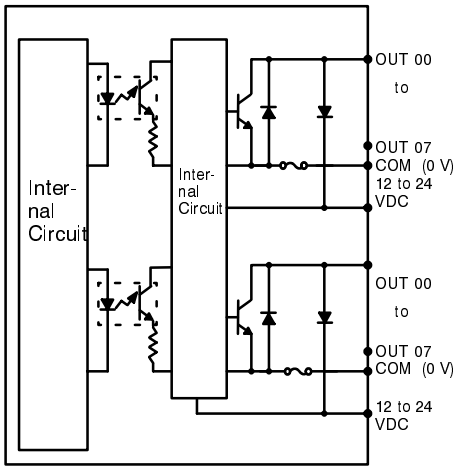
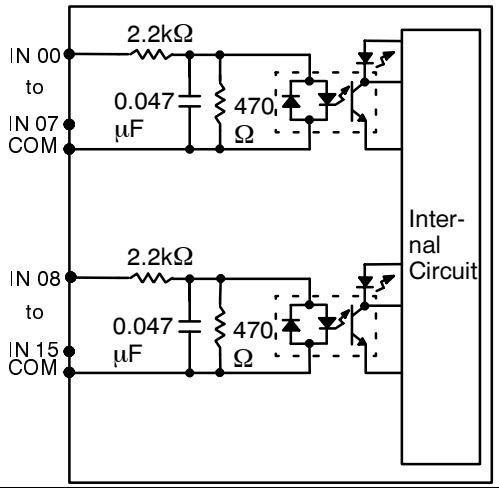
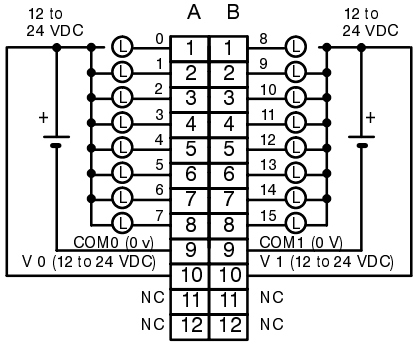
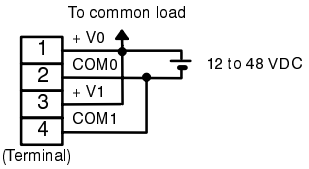
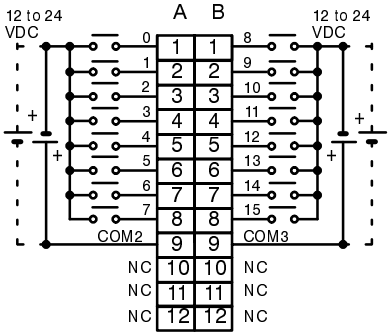
Transistor Output Units Continued

	C500-OD218	C500-OD219
Max. switching Capacity	12 to 24 VDC +10%, −15% 0.3 A (2.4 A/common, 4.8 A/Unit)	12 to 24 VDC +10%, −15% 2.1 A (8 A/common, 16 A/Unit)
Leakage Current	0.1 mA max.	0.1 mA max.
Residual Voltage	1.5 V max.	0.7 V max.
ON Response Time	0.2 ms max.	0.2 ms max.
OFF Response Time	0.3 ms max.	0.4 ms max.
No. of Points	32 (16 points/common, 2 circuits)	16 (8 points/common, 2 circuits)
Internal Current Consumption	230 mA 5 VDC max.	160 mA 5 VDC max.
Fuse Capacity	1 per circuit, 2 total (not user replaceable)	10 A 250 V (two fuses)
Power for External Supply	80 mA 12 to 24 VDC ±10% min.	100 mA 12 to 24 VDC ±10% min.
Weight	530 grams max.	550 grams max.
Circuit Configuration		
Terminal Connections		
Dimensions	B-shape	A-shape

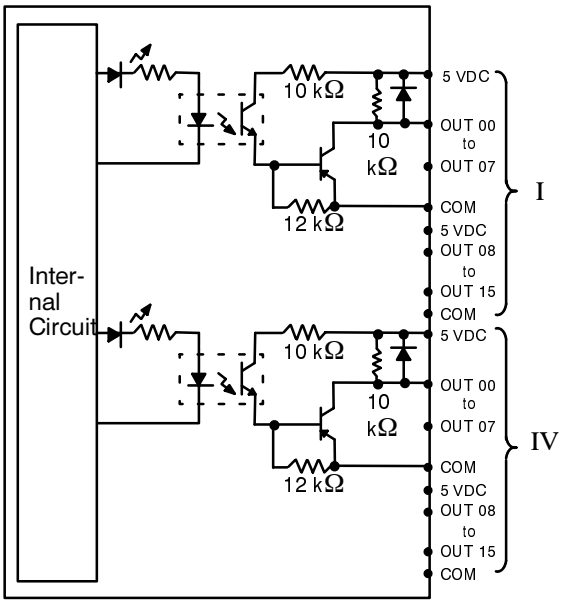
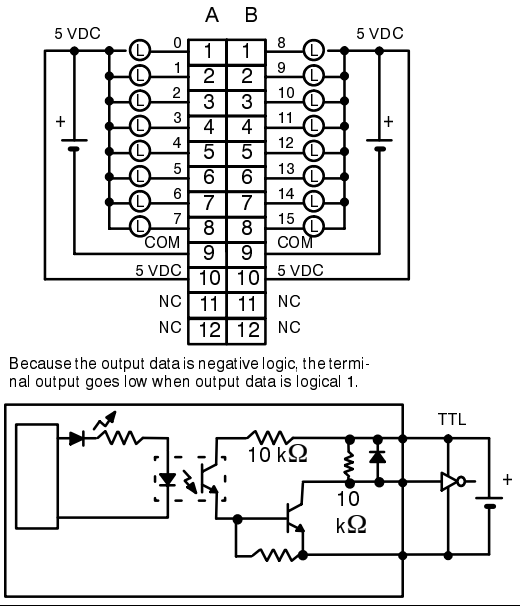
Transistor Output Units Continued

	C500-OD212	C500-OD415CN
Max. switching Capacity	12 to 24 VDC +10%, −15% 0.3 A (2.4 A/common, 4.8 A/Unit)	12 to 48 VDC +10%, −15% 0.3 A (2.4 A/common, 4.8 A/Unit)
Leakage Current	0.1 mA max.	0.1 mA max.
Residual Voltage	1.5 V max.	1.5 V max.
ON Response Time	0.2 ms max.	0.2 ms max.
OFF Response Time	0.3 ms max.	0.3 ms max.
No. of Points	32 (16 points/common, 2 circuits)	32 (16 points/common, 2 circuits)
Internal Current Consumption	230 mA 5 VDC max.	230 mA 5 VDC max.
Fuse Capacity	1 per circuit, 2 total (not user replaceable)	Not provided
Power for External Supply	50 mA 12 to 24 VDC ±10% min.	80 mA 12 to 48 VDC ±10% min.
Weight	530 grams max.	530 grams max.
Circuit Configuration		
Terminal Connections		
Dimensions	B-shape	E-shape

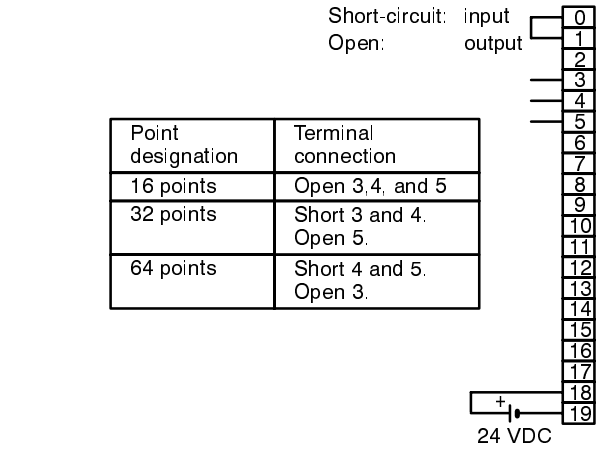
DC Input/Transistor Output Unit

C500-MD211CN			
Output (word n)		Input (word n+1)	
Max. switching Capacity	12 to 24 VDC +10%, −15% 0.3 A (2.4 A/common, 4.8 A/unit)	Input Voltage	12 to 24 VDC +10%, −15%
Leakage Current	0.1 mA max.	Input Impedance	2.2 Ω
Residual Voltage	1.5 V max.	Input Current	10 mA typical (at 24 VDC)
Fuse Capacity	1 per circuit, 2 total (not user replaceable)	ON Voltage	10.2 VDC min.
Power for External Supply	80 mA 12 to 24 VDC ±10% max.	OFF Voltage	3.0 VDC max.
ON Response Time	0.2 ms max.	ON Response Time	1.5 ms max.
OFF Response Time	0.3 ms max.	OFF Response Time	1.5 ms max.
No. of Points	16 (8 points/common, 2 circuits)	No. of Points	16 (8 points/common, 2 circuits)
Internal Current Consumption	260 mA 5 VDC max.		
Weight	520 grams max.		
Circuit Configuration			
Terminal Connections	 		 **Note** The maximum switching capacity for solderless connectors is 1 A/common.
Dimensions	E-shape		

TTL Output Units

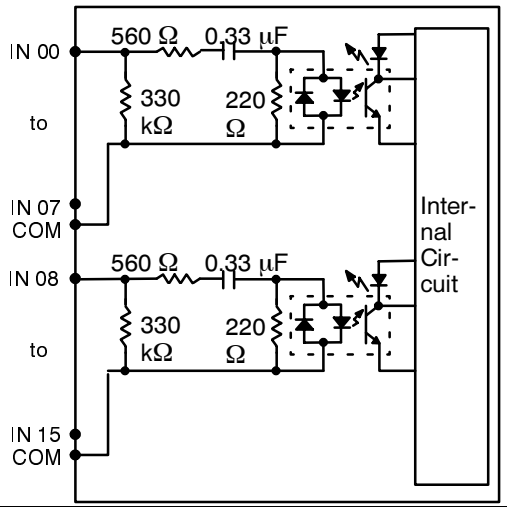
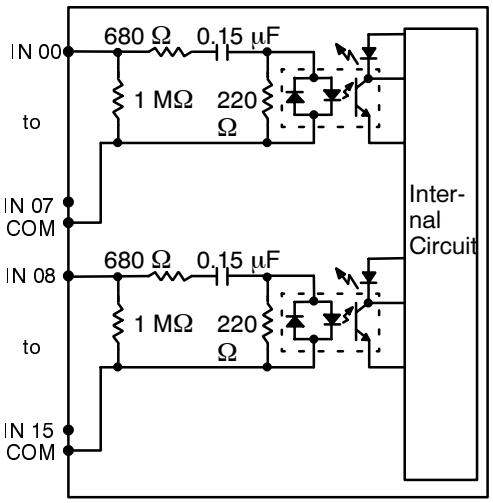
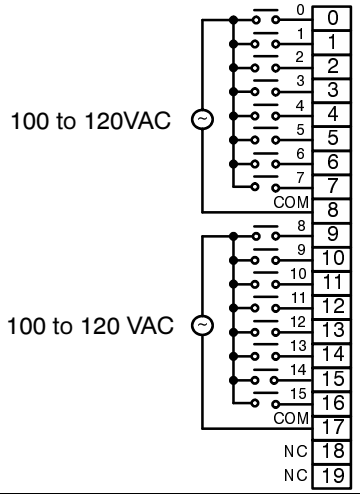
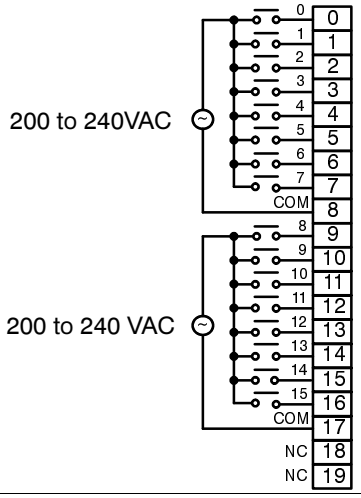
	C500-OD501CN
Max. switching Capacity	5 VDC ±10% 35 mA/point
Leakage Current	0.1 mA max.
Residual Voltage	0.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Points	32 (8 points/common, 4 circuits)
Internal Current Consumption	250 mA 5 VDC max.
Fuse Capacity	Not provided
Power for External Supply	32 mA 5 VDC ±10% min.
Weight	450 grams max.
Circuit Configuration	
Terminal Connections	
Dimensions	E-shape

Dummy I/O Unit

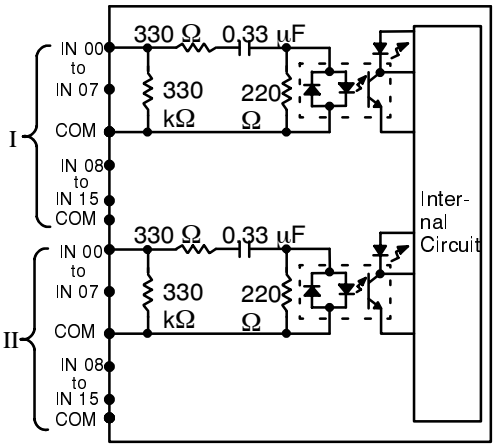
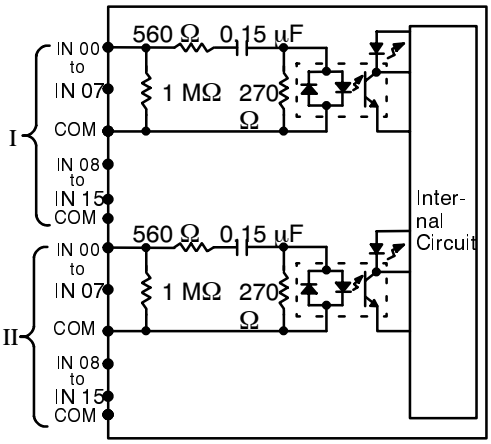
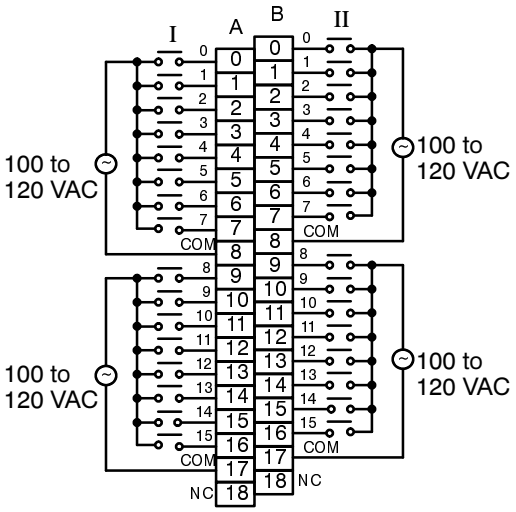
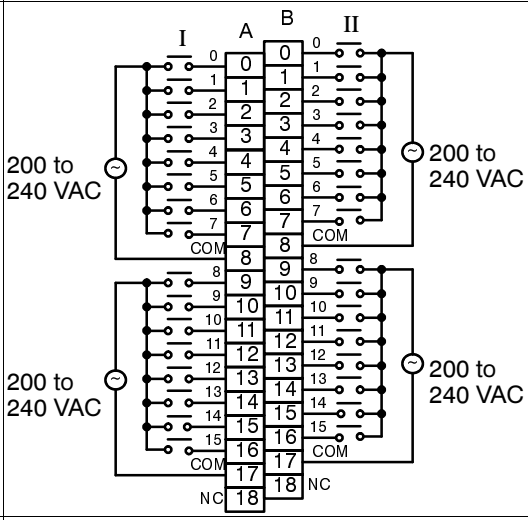
	3G2A5-DUM01
Selection Function	Unit designation: input/output Point designation: 16/32/64 points
Internal Current Consumption	35 mA 5 VDC max.
Power for External Supply	30 mA 24 VDC ±10% min.
Weight	450 grams max.
Terminal Connections	 Point designation / Terminal connection 16 points: Open 3,4, and 5 32 points: Short 3 and 4. Open 5. 64 points: Short 4 and 5. Open 3.
Dimensions	A-shape

Note Power is supplied to the Dummy I/O Unit from the 24 VDC output terminal of the Power Supply, which is mounted on the same Rack as the Dummy I/O Unit. Be sure to supply power to the Dummy I/O Unit before supplying power to the CPU. If power is supplied to the Dummy I/O Unit after power is supplied to the CPU, the Dummy I/O Unit is assumed to have only 16 I/O points, and may result in an I/O Verification Error or an I/O Setting Error.

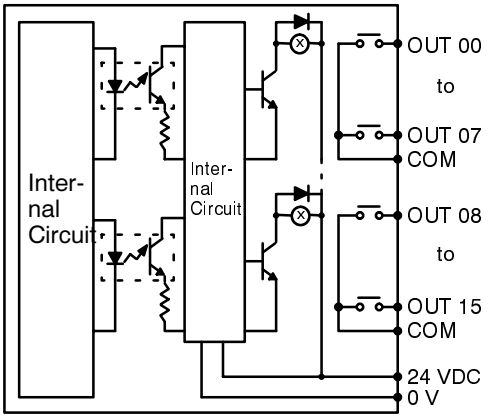
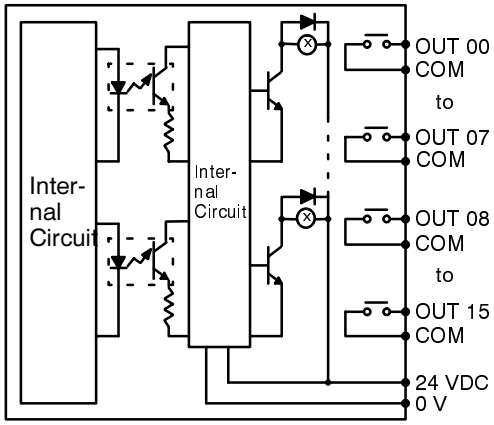
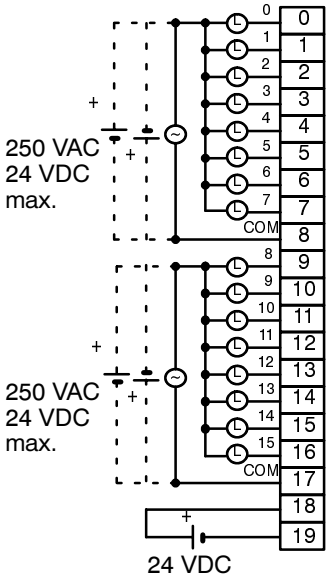
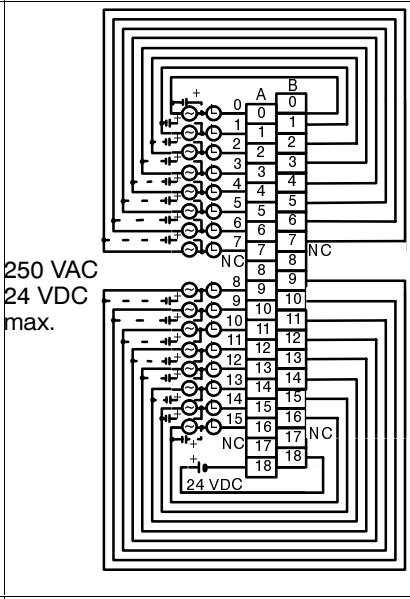
AC Input Units

	3G2A5-IA121	3G2A5-IA222
Input Voltage	100 to 120 VAC $^{+10\%}/_{-15\%}$ 50/60 Hz	200 to 240 VAC $^{+10\%}/_{-15\%}$ 50/60 Hz
Input Impedance	9.7 kΩ (50 Hz), 8 kΩ (60 Hz)	22 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	10 mA typical (at 100 VAC)	10 mA typical (at 200 VAC)
ON Voltage	60 VAC min.	120 VAC min.
OFF Voltage	20 VAC max.	40 VAC max.
ON Response Time	35 ms max.	35 ms max.
OFF Response Time	55 ms max.	55 ms max.
No. of Points	16 (8 points/common, 2 circuits)	16 (8 points/common, 2 circuits)
Internal Current Consumption	10 mA 5 VDC max.	12 mA 5 VDC max.
Weight	450 grams max.	450 grams max.
Circuit Configuration		
Terminal Connections		
Dimensions	A-shape	A-shape

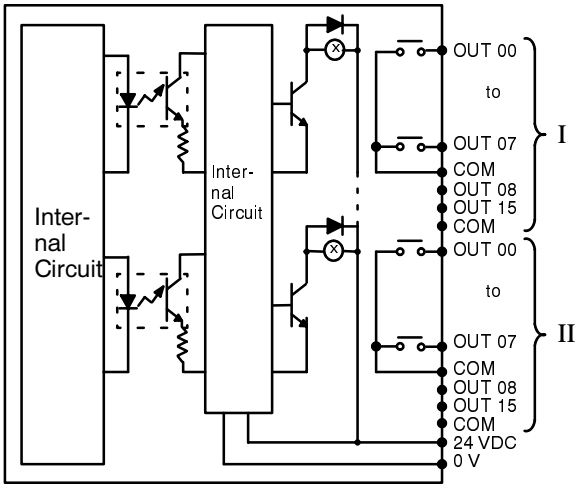
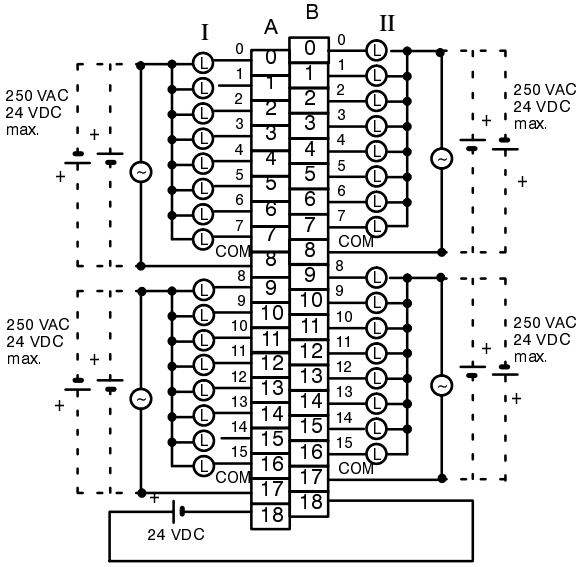
AC Input Units Continued

	3G2A5-IA122	3G2A5-IA223
Input Voltage	100 to 120 VAC $^{+10\%}/_{-15\%}$ 50/60 Hz	200 to 240 VAC $^{+10\%}/_{-15\%}$ 50/60 Hz
Input Impedance	9.7 kΩ (50 Hz), 8 kΩ (60 Hz)	22 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	10 mA typical (at 100 VAC)	10 mA typical (at 200 VAC)
ON Voltage	60 VAC min.	120 VAC min.
OFF Voltage	20 VAC max.	40 VAC max.
ON Response Time	35 ms max.	35 ms max.
OFF Response Time	55 ms max.	55 ms max.
No. of Points	32 (8 points/common, 4 circuits)	32 (8 points/common, 4 circuits)
Internal Current Consumption	60 mA 5 VDC max.	60 mA 5 VDC max.
Weight	600 grams max.	600 grams max.
Circuit Configuration		
Terminal Connections		
Dimensions	C-shape	C-shape

Contact Output Units

	3G2A5-OC221	3G2A5-OC223
Max. switching Capacity	2 A 250 VAC (cos of phase angle= 1), 0.5 A 250 VAC (cos of phase angle= 0.4), 2 A 24 VDC (8 A/common,16 A/Unit)	2 A 250 VAC (cos of phase angle= 1), 0.5 A 250 VAC (cos of phase angle= 0.4), 2 A 24 VDC (32 A/Unit)
Min. switching Capacity	10 mA 5 VDC	10 mA 5 VDC
Power for External Supply	Voltage: 24 VDC ±10 % Current: 10 mA/point, 160 mA/Unit	Voltage: 24 VDC ±10 % Current: 10 mA/point, 160 mA/Unit
Bit	G6B-114P-FD-US-M (24 VDC) w/socket	G6B-114P-FD-US-M (24 VDC) w/socket
Service Life of Relay	Electrical: 300,000 operations (resistive load) 100,000 operations (inductive load) Mechanical: 50,000,000 operations	Electrical: 300,000 operations (resistive load) 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	15 ms max.	15 ms max.
OFF Response Time	15 ms max.	15 ms max.
No. of Points	16 (8 points/common, 2 circuits)	16 (independent common)
Internal Current Consumption	100 mA 5 VDC max.	100 mA 5 VDC max.
Weight	450 grams max.	450 grams max.
Circuit Configuration	 Relays are mounted on sockets and are replaceable.	 Relays are mounted on sockets and are replaceable.
Terminal Connections		
Dimensions	A-shape	B-shape

Contact Output Units Continued

	3G2A5-OC224
Max. switching Capacity	2 A 250 VAC (cos of phase angle= 1), 0.5 A 250 VAC (cos of phase angle= 0.4), 2 A 24 VDC (8 A/common, 32 A/Unit)
Min. switching Capacity	10 mA 5 VDC
Power for External Supply	Voltage: 24 VDC ±10 % Current: 10 mA/point, 320 mA/Unit
Bit	G6B-114P-FD-US-M (24 VDC) w/socket
Service Life of Relay	Electrical: 300,000 operations (resistive load) 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
No. of Points	32 (8 points/common, 4 circuits)
Internal Current Consumption	200 mA 5 VDC max.
Weight	600 grams max.
Circuit Configuration	
Terminal Connections	
Dimensions	C-shape

Fuses

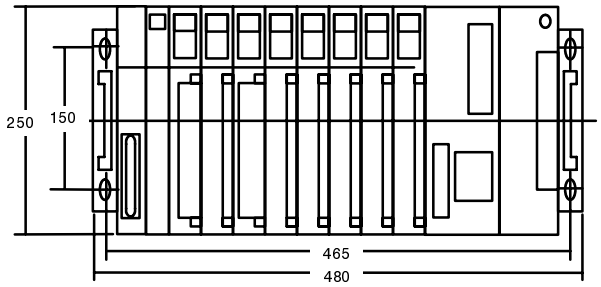
Unit Model	Fuse Specifications
C500-PS221 C500-PS222 C500-PS223	3 A 250 V (6.35 dia. x 32)
C500-PS211 C500-PS212	4 A 125 V (6.35 dia. x 32)
C500-OD411 C500-OD217 C500-OA223	5 A 250 V (5.2 dia. x 20)
C500-OA121 C500-OA222	5 A 250 V (6.35 dia. x 32)
C500-OD219	10 A 250 V

Dimensions

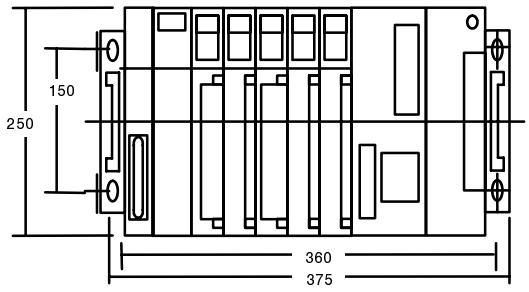
All dimensions are in millimeters unless stated otherwise.

CPU Rack

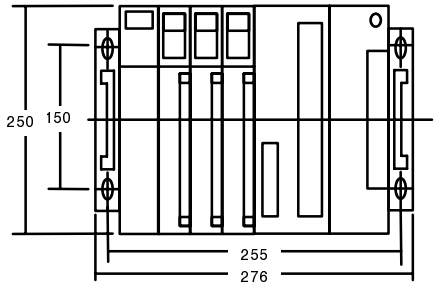
3G2A5-BC081
C500-BC082



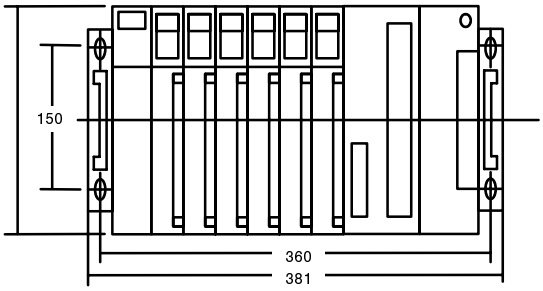
3G2A5-BC051
C500-BC052



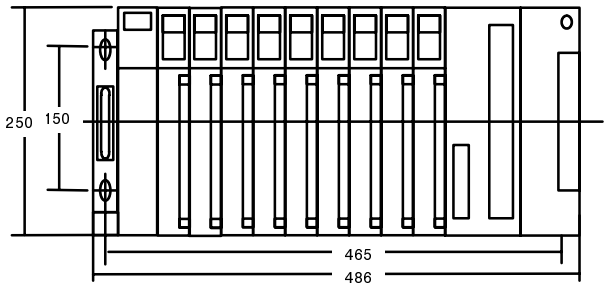
C500-BC031



C500-BC061

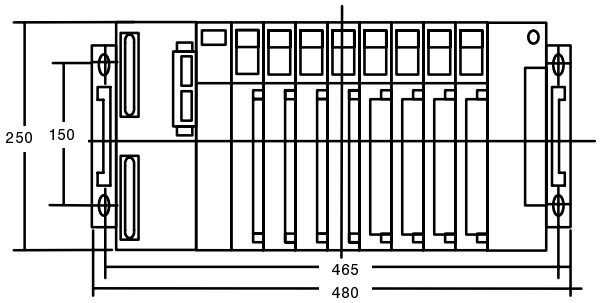


C500-BC091

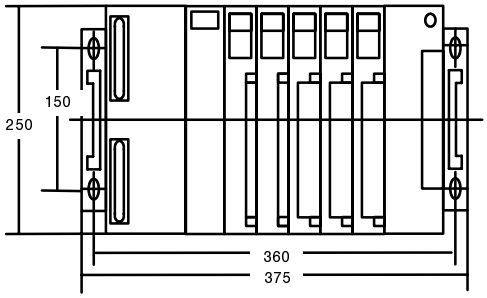


Expansion I/O Rack

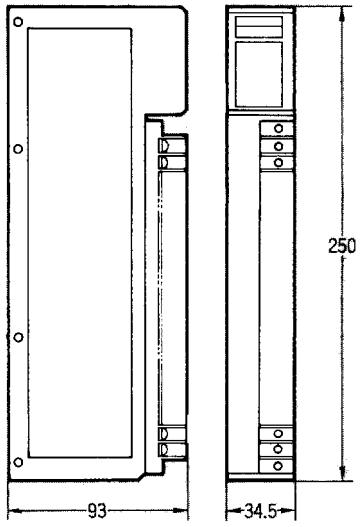
3G2A5-BI081



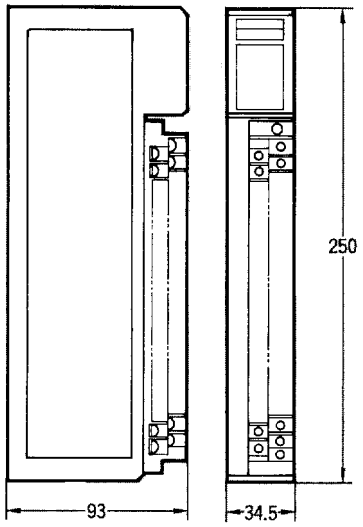
3G2A5-BI051



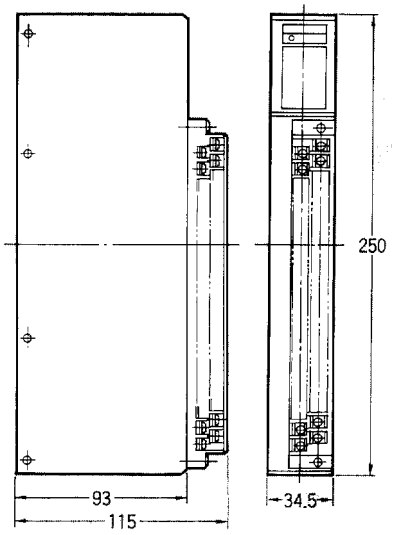
A-shape I/O Unit



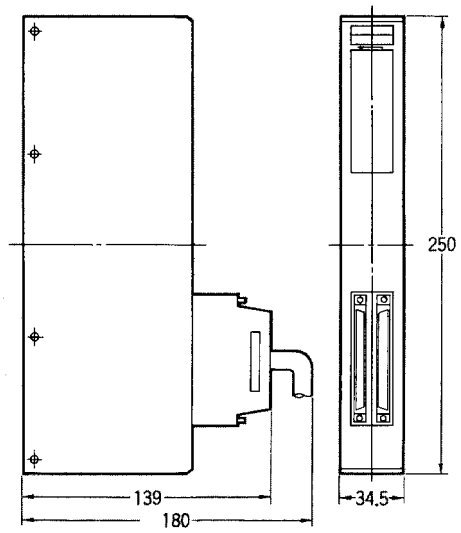
B-shape I/O Unit



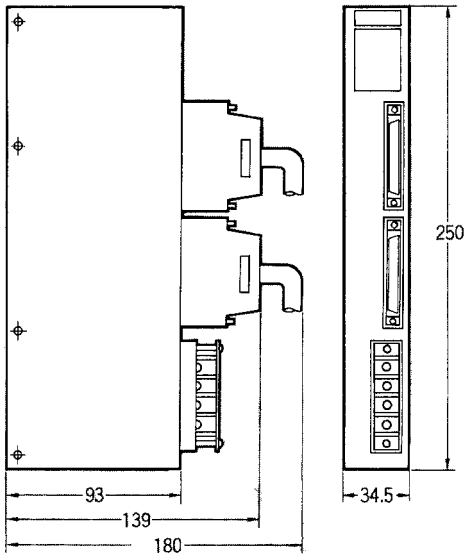
C-shape I/O Unit



D-shape I/O Unit



E-shape I/O Unit



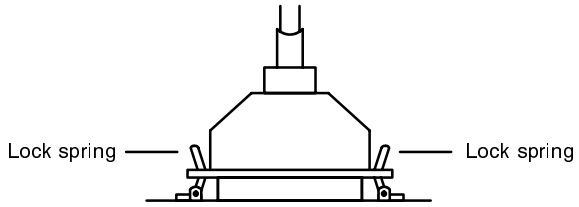
Unit Weights

Model	Weight (max.)
C500-CPU11-V1	1 kilogram
C500-PS221/PS222/PS223	each 1.1 kilograms
C500-PS211/PS212	
C500-II101	300 grams
C500-II002	350 grams
C500-BC081	each 2.6 kilograms
C500-BC082	
C500-BI081	
C500-BC051	each 2 kilograms
C500-BC052	
C500-BI051	
C500-BC091	2.8 kilograms
C500-BC061	2.2 kilograms
C500-BC031	1.8 kilograms

I/O Connecting Cables

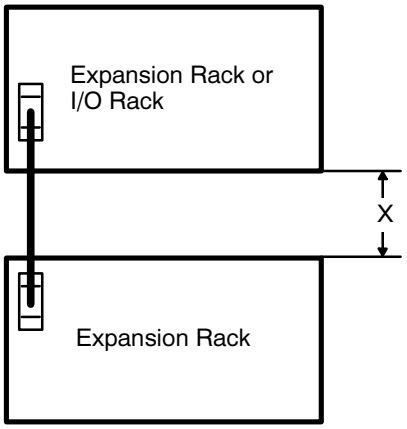
Use an I/O Connecting Cable to connect the CPU Rack to an Expansion I/O Backplane or to connect an Expansion I/O Backplane to additional Expansion I/O Backplane.

Fasten the connectors with the locks provided on the connectors to secure the connection between the cable connector and the connector on the Backplane. If the connectors are not properly connected or the I/O Connecting Cable is disconnected during CPU operation, errors such as I/O BUS error and I/O SETTING error will occur.

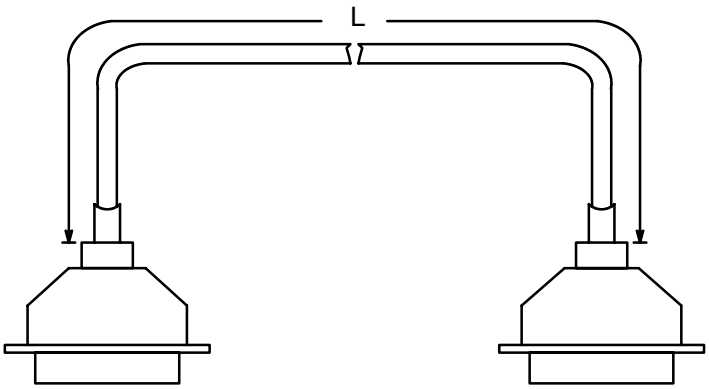


The length of the connecting cable depends on the distance between the two Racks to be connected. The length of the cable should be approximately 20 cm longer than the distance between the two Racks.

Cable Length (L)	Distance between Rack (max.) (X)
30 cm	10 cm
50 cm	30 cm
80 cm	60 cm
1 m	80 cm
2 m	180 cm



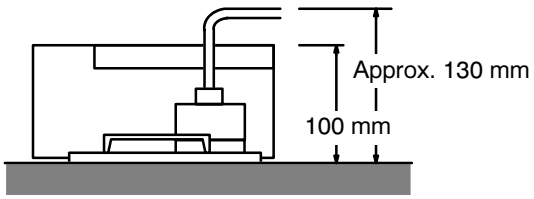
The figures below show the dimensions of the cable and the height of the connector when the cable is connected to the Backplane.



Model	Cable Length (L)
3G2A5-CN312N	30 cm
3G2A5-CN512N	50 cm
3G2A5-CN812N	80 cm
3G2A5-CN122N	1 m
3G2A5-CN222N	2 m

The length of an individual connecting cable can not be extended more than 2 m. Select each I/O cable and organize each device so the cable length is within 2 m.

Note Do not run the I/O connecting cable in the same duct with power lines or other I/O lines.



C Standard Models

CPU Backplane

Name	Remarks		Model
Backplane	9 I/O slots*	5 Link slots	C500-BC091
	8 I/O slots	3 Link slots	3G2A5-BC081
		5 Link slots	C500-BC082
	6 I/O slots	5 Link slots	C500-BC061
	5 I/O slots	3 Link slots	3G2A5-BC051
		5 Link slots	C500-BC052
	3 I/O slots	3 Link slots	C500-BC031
CPU	–		3G2C3-CPU11-EV1
RAM Pack	16K words		3G2A5-MR431
	24K words		3G2A5-MR831
ROM Pack	24K words max.		3G2A5-MP831
EPROM Chip	2764 250 ns	Writing voltage 21 V	ROM-H
	27128 250 ns		ROM-I
	2764 200 ns	Writing voltage 12.5 V	ROM-HB-B
	27128 200 ns		ROM-IB-B
CPU Power Supply	100 to 120/200 to 240 VAC (selectable)	Output: 7 A 5 VDC	3G2A5-PS221-E
		Output: 12 A 5 VDC	3G2A5-PS223-E
	24 VDC	Output: 7 A 5 VDC	3G2A5-PS211-E
		Output: 9 A 5 VDC	C500-PS213-E
Expansion I/O Power Supply	100 to 120/200 to 240 VAC (selectable)	Output: 7 A 5 VDC	3G2A5-PS222-E
	24 VDC	Output: 7 A 5 VDC	3G2A5-PS212-E
I/O Control Unit	Required to connect Expansion I/O Racks		3G2A5-II101

*The rightmost solt is only for Link Units.

Expansion I/O Backplane

Name	Remarks		Model
Expansion I/O Backplane	8 slots		3G2A5-BI081
	5 slots		3G2A5-BI051
Power Supply	100 to 120/200 to 240 VAC (selectable)	Output: 7 A 5 VDC	3G2A5-PS222-E
	24 VDC	Output: 7 A 5 VDC	3G2A5-PS212-E
I/O Interface Unit	–		3G2A5-II002
I/O Connecting Cable	30 cm		C500-CN312N
	50 cm		C500-CN512N
	80 cm		C500-CN812N
	1 m		C500-CN122N
	2 m		C500-CN222N

I/O Units

Name		Remarks			Model
Input Unit	DC	16 mA 5 to 12 VDC		16 pts	3G2A5-ID112
		10 mA 12 to 24 VDC		16 pts	3G2A5-ID213
		10 mA 12 to 24 VDC	ON response time: 15 ms max.	32 pts	3G2A5-ID215
			ON response time: 1.5 ms	32 pts	3G2A5-ID218
		10 mA 12 to 24 VDC		32 pts	3G2A5-ID218CN
		7 mA 12 VDC, static		64 pts	3G2A5-ID114
		10 mA 24 VDC, dynamic		64 pts	3G2A5-ID212
		7 mA 24 VDC, static		64 pts	3G2A5-ID219
	AC	10 mA 100 to 120 VAC		16 pts	3G2A5-IA121
		10 mA 200 to 240 VAC		16 pts	3G2A5-IA222
		10 mA 100 to 120 VAC		32 pts	3G2A5-IA122
		10 mA 200 to 240 VAC		32 pts	3G2A5-IA223
	AC/DC	10 mA 12 to 24 VAC/DC		16 pts	3G2A5-IM211
		10 mA 12 to 24 VAC/DC		32 pts	3G2A5-IM212
	TTL	3.5 mA 5 VDC		32 pts	3G2A5-ID501CN
	Interrupt	13 mA 12 to 24 VDC		8 pts	3G2A5-ID216
Output Unit	Contact	2A 250 VAC/24 VDC		16 pts	3G2A5-OC221
		2A 250 VAC/24 VDC (sep. commons)		16 pts	3G2A5-OC223
		2A 250 VAC/24 VDC		32 pts	3G2A5-OC224
	Transistor	1A 12 to 24 VDC		16 pts	3G2A5-OD217
		1A 12 to 48 VDC		16 pts	3G2A5-OD411
		50 mA 24 VDC (sep. commons)		16 pts	3G2A5-OD215
		0.3 A 12 to 24 VDC		32 pts	3G2A5-OD218
		2.1 A 12 to 24 VDC		16 pts	C500-OD219
		0.3 A 12 to 48 VDC		32 pts	3G2A5-OD412
		0.3 A 12 to 24 VDC, PNP output		32 pts	3G2A5-OD212
		0.3 A 12 to 48 VDC, I/O relay terminal can be connected.		32 pts	C500-OD415CN
		0.1 A 24 VDC, dynamic		64 pts	3G2A5-OD211
		0.1 A 24 VDC, static		64 pts	3G2A5-OD213
	Triac	1 A 132 VAC max. (production scheduled to stop)		16 pts	3G2A5-OA121
		1 A 250 VAC max. (production scheduled to stop)		16 pts	3G2A5-OA222
		1 A 250 VAC max.		24 pts	3G2A5-OA223
		1 A 250 VAC max.		32 pts	3G2A5-OA225
		1.2 A 250 VAC max.		16 pts	C500-OA226
Output Unit	TTL	3.5 mA 5 VDC		32 pts	3G2A5-OD501CN
DC Input/Transistor Output Unit		12 to 24 VDC	Input: 10 mA	16 pts each	3G2A5-MD211CN
			Output: 0.3 A		
Dummy I/O Unit		No. of I/O points is selectable		---	3G2A5-DUM01
A/D Conversion Input		4 to 20 mA 1 to 5 V		2 pts	3G2A5-AD001
		0 to 10 V		2 pts	3G2A5-AD002
		0 to 5 V		2 pts	3G2A5-AD003
		−10 to 10 V		2 pts	3G2A5-AD004
		−5 to 5 V		2 pts	3G2A5-AD005
		4 to 20 mA 1 to 5 V		4 pts	3G2A5-AD006
		0 to 10 V		4 pts	3G2A5-AD007
		0 to 10 V, 0 to 20 mA		8 pts	C500-AD101
		0 to 5 V, 0 to 10 V, −5 to 5 V, −10 to 10 V, 0 to 20 mA, −20 to 20 mA		16 pts	C500-AD501

Name		Remarks			Model
D/A Conversion Output		4 to 20 mA 1 to 5 V		2 pts	3G2A5-DA001
		0 to 10 V		2 pts	3G2A5-DA002
		0 to 5 V		2 pts	3G2A5-DA003
		−10 to 10 V		2 pts	3G2A5-DA004
		−5 to 5 V		2 pts	3G2A5-DA005
		4 to 20 mA, 1 to 5 V, 0 to 10 V		4 pts	C500-DA101
		−10 to 10 V		4 pts	C500-DA103
High-speed Counter		6 BCD digits, 50 K cps 1 Set value		1 pt	3G2A5-CT001
		6 BCD digits, 50 K cps 8 Set value		1 pt	3G2A5-CT012
		50 kcps, 7 modes		2 pts	C500-CT021
		4 Binary digits, 20 K cps 1 Set value		4 pt	C500-CT041
Magnetic Card Reader		---			3G2A5-MGC01
Connecting Cable		---			3G2A9-CN521
Card Reader		---			3S4YR-MAW2C-04
Card		---			3G2A5-MCD01
PID		---			3G2A5-PID01-E
Position Control		1-axis, for stepping/servo motor			3G2A5-NC103-E
		1-axis, for servo motor			3G2A5-NC111-EV1
		2-axis, for servo motor			C500-NC222-E
		Encoder Adapter			3G2A5-AE001
		Teaching Box	---		3G2A5-TU001-E
					3G2A5-TU002-E
		Connecting Cable for TU002	For NC222-E	2 m	C200H-CN222
				4 m	C200H-CN422
			For NC103-E/111-EV1/121	4 m	C500-CN422
ASCII Unit		RAM + EEPROM			C500-ASC04
Ladder Program I/O		---			C500-LDP01-V1
Cam Positioner		---			C500-CP131
Temperature Sensor Unit		For thermocouples			C500-TS501
		For temperature-resistance thermometers			C500-TS502
ID Sensor Unit		Electromagnetic type	General-purpose		C500-IDS01-V2
			Long-distance		C500-IDS02-V1
		Microwave type	General-purpose		C500-IDS21
			Long-distance		C500-IDS22
	ID Adapter	For the C500-IDS02-V1			C500-IDA02
		For the C500-IDS22			C500-IDA22
	Read/Write Head	Electromagnetic type			V600-H series
		Microwave type			V620-H series
	Data Carrier (see note)	SRAM type for V600-H series.			V600-D□□R□□
		EEPROM type for V600-H series.			V600-D□□P□□

Note For Read/Write Head and Data Carrier combinations, refer to the *V600 FA ID System R/W Heads and EEPROM Data Carriers Operation Manual and Supplement* or *V600 FA ID System R/W Heads and SRAM Data Carriers Operation Manual and Supplement*.

Link Units and Remote I/O Units

Name		Remarks				Model
Host Link	Rack-mounting	APF/PCF				3G2A5-LK101-PEV1
		PCF				3G2A5-LK101-EV1
		RS-232C/RS-422				3G2A5-LK201-EV1
		APF/PCF				C500-LK103-P
		PCF				C500-LK103
		RS-232C/RS-422				C500-LK203
	CPU-mounting	APF/PCF				3G2A6-LK101-PEV1
		PCF				3G2A6-LK101-EV1
		RS-232C				3G2A6-LK201-EV1
		RS-422				3G2A6-LK202-EV1
PC Link		Links up to 32 PCs				
SYSMAC Net		General-purpose				C500-SNT31-V4
Optical Remote I/O Master		APF/PCF				3G2A5-RM001-PEV1
		PCF				3G2A5-RM001-EV1
Optical Remote I/O Slave		APF/PCF	w/1 optical connector			3G2A5-RT001-PEV1
			w/2 optical connectors			3G2A5-RT002-PEV1
		PCF	w/1 optical connector			3G2A5-RT001-EV1
			w/2 optical connectors			3G2A5-RT002-EV1
Optical I/O Link		APF/PCF				3G2A5-LK010-PE
		PCF				3G2A5-LK010-E
Wired Remote I/O Master		–				3G2A5-RM201
Wired Remote I/O Slave		–				3G2A5-RT201
Remote Terminal		Input	Specify 12 VDC or 24 VDC.			G71-IC16
		Output				G71-OD16
Input Block	AC Input	Specify 100 VAC or 200 VAC.				G7TC-IA16
	DC Input	Specify 12 VDC or 24 VDC.				G7TC-ID16
Output Block	Output	Specify 12 VDC or 24 VDC.				G7TC-OC16
Optical Transmitting I/O		DC Input	No-voltage contact, 100 VAC	8 pts	APF/PCF	3G5A2-ID001-PE
					PCF	3G5A2-ID001-E
		AC/DC Input	12 to 24 VAC/DC 100 VAC	8 pts	APF/PCF	3G5A2-IM211-PE
					PCF	3G5A2-IM211-E
		AC Input	100 VAC 100 VAC	8 pts	APF/PCF	3G5A2-IA121-PE
					PCF	3G5A2-IA121-E
		Contact Output	2 A 250 VAC/ 24 VDC 100/200 VAC	8 pts	APF/PCF	3G5A2-OC221-PE
					PCF	3G5A2-OC221-E
		Triac Output	100/200 VAC 100/200 VAC	8 pts	APF/PCF	3G5A2-OA222-PE
					PCF	3G5A2-OA222-E
		Transistor Output	0.3 A 12 to 48 VDC 100/200 VAC	8 pts	APF/PCF	3G5A2-OD411-PE
					PCF	3G5A2-OD411-E

SYSMAC BUS

Name	Remarks	Model
Link Adapter	RS-422, 3 pcs	3G2A9-AL001
	Optical (APF/PCF), 3pcs	3G2A9-AL002-PE
	Optical (PCF), 3pcs	3G2A9-AL002-E
	Optical (APF/PCF), RS-422, RS-232C, 1 pc each	3G2A9-AL004-PE
	Optical (PCF), RS-422, RS-232C, 1 pc each	3G2A9-AL004-E
	Optical (APF/PCF), optical (AGF), 1 pc each	3G2A9-AL005-PE
	Optical (PCF), optical (AGF), 1 pc each	3G2A9-AL005-E
	Optical (APF/PCF), optical (AGF), 2 pcs each	3G2A9-AL006-PE
	Optical (APF/PCF), 1 pc, RS-485 1 pc for Wired Remote I/O system only	3G2A9-AL007-PE
Repeater	APF/PCF	3G5A2-RPT01-PE
	PCF	3G5A2-RPT01-E

All Plastic Optical Fiber Cable (APF)

Name	Remarks	Model
Plastilc Optical Fiber Cable	Cable only, 5 to 100 m in multiples of 5 meters or multiples of 200 or 500m	3G5A2-PF002
Optical Connector A	2 pcs (brown), for plastic optical fiber 10 m long max.	3G5A2-CO001
Optical Connector B	2 pcs (black) for plastic optical fiber 8 to 20 m long	3G5A2-CO002
Plastilc Optical Fiber Cable	1 m, w/optical connector A provided at both ends	3G5A2-PF101

Plactic-Clad Optical Fiber Cable (PCF)

Name	Remarks		Model
Optical Fiber Cable (indoor)	0.1 m, w/connector	Ambient temperature: −10° to 70°C	3G5A2-OF011
	1 m, w/connector		3G5A2-OF101
	2 m, w/connector		3G5A2-OF201
	3 m, w/connector		3G5A2-OF301
	5 m, w/connector		3G5A2-OF501
	10 m, w/connector		3G5A2-OF111
	20 m, w/connector		3G5A2-OF211
	30 m, w/connector		3G5A2-OF311
	40 m, w/connector		3G5A2-OF411
	50 m, w/connector		3G5A2-OF511
Optical Fiber Cable (indoor/outdoor)	1 to 500 m (Order in Units of 1 m)	Ambient temperature: −10° to 70°C	3G5A2-OF002
	501 to 800 m (Order in Units of 1 m)	Ambilent temperature: 0° to 55°C (Must not be subjected to direct sunlight)	

Peripheral Devices

Name	Remarks		Model
Programming Console	Vertical, w/backlight		3G2A5-PRO13-E
	Horizontal, w/backlight		3G2A6-PRO15-E
Programming Console Connecting Cable	For connecting Programming Console, GPC or FIT. (Only use CN221 [2 m] for Programming Console.)	2 m	3G2A2-CN221
		5 m	C500-CN523
		10 m	C500-CN131
		20 m	C500-CN231
		30 m	C500-CN331
		40 m	C500-CN431
		50 m	C500-CN531
Programming Console Adapter	For extending Programming Console. Connecting cable is separate.		3G2A5-AP001
Programming Console Base			3G2A5-BP001
Data Access Console	–		C200H-DAC01
Handheld Programming Console	–		C200H-PR027-E
Programming Console Adapter	Required for each Handheld Programming Console	–	C500-AP003
Connecting Cable		2 m	C200H-CN222
		4 m	C200H-CN422
PROM Writer	Write voltage 12.5/21 V applicable		C500-PRW06
Printer Interface Unit	Memory Pack is separate.		3G2A5-PRT01-E
Memory Pack (for Printer Interface)	–		C500-MP102-EV3
Printer Connecting Cable	2 m, for connecting printer		SCY-CN201
Floppy Disk Interface Unit			3G2A5-FD103-E
Peripheral Interface Unit	Connecting cable is separate.		3G2A5-IP006-E
Graphic Programming Console	100 to 120 VAC, 32 K, w/comments		3G2A5-GPC03-E
GPC Memory Pack	w/comments for C20, P-type, C120, C500		C500-MP303-EV2
CRT Interface Unit	For connecting GPC to CRT		C500-GD101
Cassette Recorder Connecting Cable	1 m		SCYPOR-PLG01
SYSMAC Support Software (SSS)	Ladder diagram programming software for IBM PC/AT or compatible computer.	3.5” 2DD	C500-ZL3AT1-E

Optional Products

Name	Remarks	Model
Battery	–	3G2A9-BAT08
Relay	24 VDC	G6B-1174P-FD-US-M
I/O Terminal Cover	For 38-pin block, special type	3G2A5-COV11
	For 38-pin block, standard	C500-COV12
	For 20-pin block, standard	C500-COV13
Connector Cover	For I/O connector	3G2A5-COV01
	For Link connector	3G2A5-COV02
	For I/O Control Unit / I/O Interface Unit connector	3G2A5-COV03

Glossary

Backplane	A base to which Units are mounted to form a Rack. Backplanes provide a series of connectors for these Units along with wiring to connect them to the CPU and Power Supply. Backplanes also provide connectors used to connect them to other Backplanes. In some Systems, different Backplanes are used for different Racks; in other Systems, Racks differ only by the Units mounted to them.
back-up	A copy of existing data which is valuable if data is accidentally erased.
bit	The smallest piece of information that can be represented on a computer. A bit has the value of either zero or one, corresponding to the electrical signals ON and OFF. A bit is one binary digit.
central processing unit	A device that is capable of storing a program and data, and executing the set of instructions contained in the program. In a PC System, the central processing unit executes the program, processes I/O signals, communicates with external devices, etc.
communication cable	Cable used to transfer data between components of a control system and conforming to the RS-232C or RS-422 standards.
Control System	All of the hardware and software components used to control other devices. A Control System includes the PC System, the PC programs, and all I/O devices that are used to control or obtain feedback from the controlled system.
CPU	An acronym for central processing unit.
CPU Backplane	A Backplane used to create a CPU Rack.
CPU Rack	Part of a Rack PC, the CPU Rack contains the CPU, a Power Supply, and other Units.
data area	An area in the PC's memory that is designed to hold a specific type of data, e.g., the LR area is designed to hold common data in a PC Link System.
data link	Allows for the connection of up to 32 PCs in a Net Link System where each is contributing information to a common memory area. Data links may be established in the LR and/or DM memory areas.
distributed control	An automation concept in which control of each portion of an automated system is located near the devices actually being controlled, i.e., control is decentralized and "distributed" over the system. Distributed control is a concept basic to PC Systems.
EEPROM	[E(lectrically) E(rasable) P(rogrammable) R(ead) O(nly) M(emory)] A type of ROM in which stored data can be erased and reprogrammed. This is accomplished using a special control lead connected to the EEPROM chip and can be done without having to remove the EEPROM chip from the device in which it is mounted.
EPROM	[E(rasable) P(rogrammable) R(ead) O(nly) M(emory)] A type of ROM in which stored data can be erased, by ultraviolet light or other means, and reprogrammed.
Expansion I/O Unit	An I/O Unit for a Package-type PC that provides more I/O points to the PC.
factory computer	A general-purpose computer, usually quite similar to a business computer, that is used in automated factory control.
High-speed Counter	A Special I/O Unit. A High Speed Counter Unit counts independently of the PC's cycle time. This allows counting of very short, fast signals.

host computer A computer that is used to transfer data to or receive data from a PC in a Host Link system. The host computer is used for data management and overall system control. Host computers are generally small personal or business computers.

IBM PC/XT or AT, or compatibles A computer that has similar architecture to, and is logically compatible with an IBM PC/XT computer; and that can run software designed for that computer.

I/O Expansion Backplane A Backplane used to create an Expansion I/O Rack.

I/O Control Unit A Unit mounted to the CPU Rack in certain PCs to monitor and control I/O points on Expansion I/O Units.

I/O devices The devices which are connected to the terminals on I/O Units, Special I/O Units, or Intelligent I/O Units. I/O devices may be part of the Control System if they function to help control other devices, or they may be part of the controlled system if they interact directly with it.

I/O Expansion Rack Part of a Rack PC, an Expansion I/O Rack is connected to a CPU Rack to increase the number of slots available for mounting Units.

I/O Interface Unit A Unit mounted to an Expansion I/O Rack in certain PCs to interface the Expansion I/O Rack to the CPU Rack. An I/O Interface Unit is needed when the first Expansion I/O Rack is connected to the CPU Rack via a Connecting Cable. Each Expansion I/O Rack needs an I/O Interface Unit.

I/O point The place at which an input signal enters the PC System or an output signal leaves the PC System. In physical terms, an I/O point corresponds to terminals or connector pins on a Unit; in terms of programming, an I/O point corresponds to an I/O bit in the IR area.

I/O Unit The most basic type of Unit mounted to a Backplane. I/O Units include Input Units and Output Units, each of which is available in a range of specifications. I/O Units do not include Special I/O Units, Link Units, etc.

PC An acronym for Programmable Controller.

PC Link Unit A Unit used to connect two or more PCs together so that they can exchange data through their LR areas.

Position Control Unit A Special I/O Unit used to control the operation of positioning devices such as Servomotors.

Power Supply A Unit that mounts to a Backplane in a Rack PC. It provides power at the voltage required by the other Units on the Rack.

Programmable Controller A small, computer-like device that can control peripheral equipment, such as an electric door or quality control devices, based on programming and peripheral input devices. Any process that can be controlled using electrical signals can be controlled by a PC. PCs can be used independently or networked together into a system to control more complex operations.

PROM [P(rogrammable) R(ead) O(nly) M(emory)] A type of ROM into which the program or data may be written after manufacture, by a customer, but which is fixed from that time on.

PROM Writer A PROM Writer is a device used to write data to ROM, PROM, and EPROM storage chips.

Rack An assembly that forms a functional unit in a Rack PC System. A Rack consists of a Backplane and the Units mounted to it. These Units include the Power Supply, CPU, and I/O Units. Racks include CPU Racks, Expansion I/O Racks, and I/O Racks. The CPU Rack is the Rack with the CPU mounted to it. An Expansion I/O Rack is an additional Rack that holds extra I/O Units. An I/O Rack is used in the C2000H Duplex System, because there is no room for any I/O Units on the CPU Rack in this System.

Rack PC

A PC that is composed of Units mounted to one or more Racks. This configuration is the most flexible, and most large PCs are Rack PCs. A Rack PC is the opposite of a Package-type PC, which has all of the basic I/O, storage, and control functions built into a single package.

RAM

[R(andom) A(ccess) M(emory)] RAM will not retain data when power is disconnected. Therefore data should not be stored in RAM.

Remote I/O Unit

A Unit that extends the distance an Expansion I/O Rack can be from the CPU.

ROM

[R(ead) O(nly) M(emory)] A type of digital storage that cannot be written to. A ROM chip is manufactured with its program or data already stored in it, and it can never be changed. However, the program or data can be read as many times as desired.

Special I/O Unit

A dedicated Unit that is designed for a specific purpose. Special I/O Units include Position Control Units, High-Speed Counters, Analog I/O Units, etc.

system configuration

The arrangement in which Units in a System are connected. This term refers to the conceptual arrangement and wiring together of all the devices needed to comprise the System. In OMRON terminology, system configuration is used to describe the arrangement and connection of the Units comprising a Control System that includes one or more PCs.

Unit

In OMRON PC terminology, the word Unit is capitalized to indicate any product sold for a PC System. though most of the names of these products end with the word Unit, not all do, e.g., a Remote Terminal is referred to in a collective sense as a Unit. Context generally makes any limitations of this word clear.

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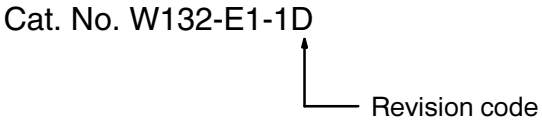
Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	June 1988	Original production
2	December 1988	Products added to pages 55, 58, 59, and 62.
3	July 1990	Complete revision based on format of W139-E1-2
3A	April 1991	**Page 33:** Optical and Remote I/O Slave Units have been deleted in the Link Units and Remote I/O table. **Page 82:** In the table listing AC Input Unit Specifications, the internal current consumption for the 3G2A5-IA222 has been changed to 12 mA 5 VDC. **Page 86:** A table of fuse specifications has been added. **Page 89:** A table of Unit weights for the has been added. **Pages 89 to 91:** The section on I/O Connecting Cables has been completely rewritten. **Page 92:** Horizontal I/O Connecting Cable Models have been deleted in the Expansion I/O Backplane table.
3B	October 1992	The CPU Power Supply Model number 3G2A5-PS211-E has been changed to 3G2A5-PS213-E throughout the manual.
3C	August 1996	Scan time changed to cycle time throughout the manual. *Appendix C Standard Models* completely updated. Minor layout changes made. **Page 16:** OA223 removed and OD217 added to A-shape. **Page 32:** C500-IDS01-V1 and C500-IDS02 upgraded to C500-IDS01-V2 and C500-IDS02-V1 respectively. C500-IDS21/IDS22 added. **Page 36:** AC switching diagram corrected and note added. **Page 74:** Circuit configuration for 3G2A5-OD411 corrected. **Page 77:** Circuit configuration for C500-OD219 corrected. **Page 80:** 4.7 kΩ corrected to 10 kΩ in the circuit configuration and terminal connections.
3D	February 1997	**Page xiii, xiv:** Precautions added. **Page 31, 94:** Added C500-OA226, note added for OA121 and OA222 (p 94). **Page 32:** Added C500-AD501. **Page 33, 46, 47:** Changed/Added description for using crimp terminals. **Page 45:** Added caution. **Page 55:** Removed caution. **Page 57:** “Degree of Protection” revised to “Structure.” **Page 61:** Resistance changed. **Page 73:** C500-OA226 added. **Page 74, 77, 79:** Fuse added. **Page 75:** Fuse added and resistances changed. **Page 78:** C500-OD212 added. **Page 97:** Name corrected to “SYSMAC BUS.”