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SYSMAC Programmable Controllers

C200H

(CPU21-E/23-E/31-E)

INSTALLATION GUIDE

OMRON

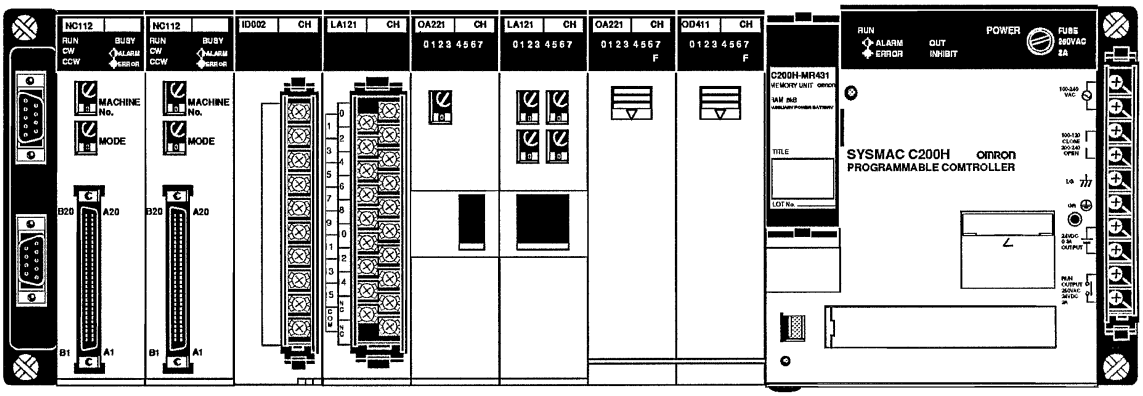
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C200H Programmable Controllers

Installation Guide

(For CPU21-E/23-E/31-E)

Revised April 2000



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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 property.

⚠DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

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.

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About this Manual:

This manual describes the installation C200H C-series Programmable Controllers using the C200H-CPU21-E, C200H-CPU23-E, or C200H-CPU31-E CPUs, and it includes the sections described below. Programming and operating information is provided in the *C200H (CPU21-E/23-E/31-E) Programmable Controller Operation Manual*.

Please read this manual completely and be sure you understand the information provide before attempting to install a C200H PC.

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 C200H. The names of all the individual parts of each Unit are given.

Section 3 explains how to assemble the C200H. A detailed description of how to mount each Unit is provided.

Section 4 outlines the system connections involved in installing a C200H Programmable Controller System. All I/O, including Remote I/O, is included.

Section 5 contains the requirements for the installation environment of the C200H. Suggestions for preventing electrical noise are included.

Section 6 explains the power considerations involved in installing the C200H.

Section 7 lists safety considerations that should be kept in mind while installing the C200H.

Section 8 outlines certain consumable items in a PC (such as fuses, Relays, or batteries) that need occasional replacement. This section explains how to replace each of these items.

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

⚠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.

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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.

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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 Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.

⚠ WARNING Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.

⚠ WARNING Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.

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4 Operating Environment Precautions

⚠ Caution Do not operate the control system in the following locations:

- Locations subject to direct sunlight.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation as the result of severe changes in temperature.
- Locations subject to corrosive or flammable gases.
- Locations subject to dust (especially iron dust) or salts.
- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to shock or vibration.

⚠ Caution Take appropriate and sufficient countermeasures when installing systems in the following locations:

- Locations subject to static electricity or other forms of noise.
- Locations subject to strong electromagnetic fields.
- Locations subject to possible exposure to radioactivity.
- Locations close to power supplies.

⚠ 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 system.

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

- Always ground the system to 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
- Always turn OFF the power supply to the PC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Mounting or dismounting I/O Units, CPU Units, Memory Units, or any other Units.
  - Assembling the Units.
  - Setting DIP switches or rotary switches.
  - Connecting cables or wiring the system.
  - Connecting or disconnecting the connectors.

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

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

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- Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer.
- Always use the power supply voltages specified in this manual. An incorrect voltage may result in malfunction or burning.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Disconnect the functional ground terminal when performing withstand voltage tests. Not disconnecting the functional ground terminal may result in burning.
- Be sure that all the mounting screws, terminal screws, and cable connector screws are tightened to the torque specified in this manual. Incorrect tightening torque may result in malfunction.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning.
- Wire correctly. Incorrect wiring may result in burning.
- Mount Units only after checking terminal blocks and connectors completely.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- Check the user program for proper execution before actually running it on the Unit. Not checking the program may result in an unexpected operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
    - Changing the operating mode of the PC.
    - Force-setting/force-resetting any bit in memory.
    - Changing the present value of any word or any set value in memory.
- Resume operation only after transferring to the new CPU Unit the contents of the DM Area, HR Area, and other data required for resuming operation. Not doing so may result in an unexpected operation.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables or other wiring lines. Doing so may break the cables.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static built-up. Not doing so may result in malfunction or damage.

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SECTION 1
Introduction

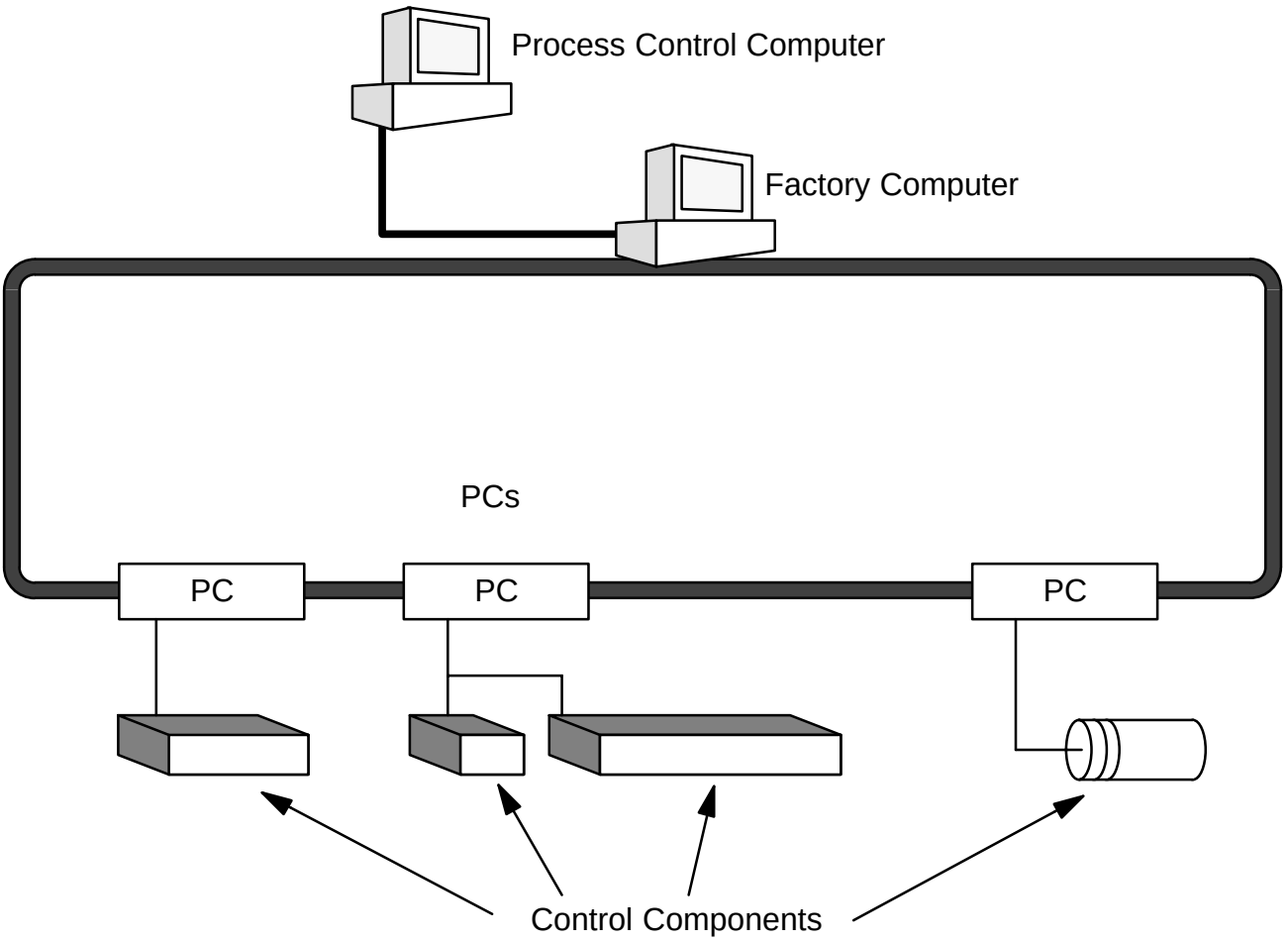
This section provides general information about Programmable Controllers (PCs) and how they fit into a Control System.

1-1 What is a Control System? 2
1-2 The Role of the PC 4
1-2-1 Input Devices 4
1-2-2 Output Devices 5
1-3 How Does a PC Work? 6

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1-1 What is a Control System?

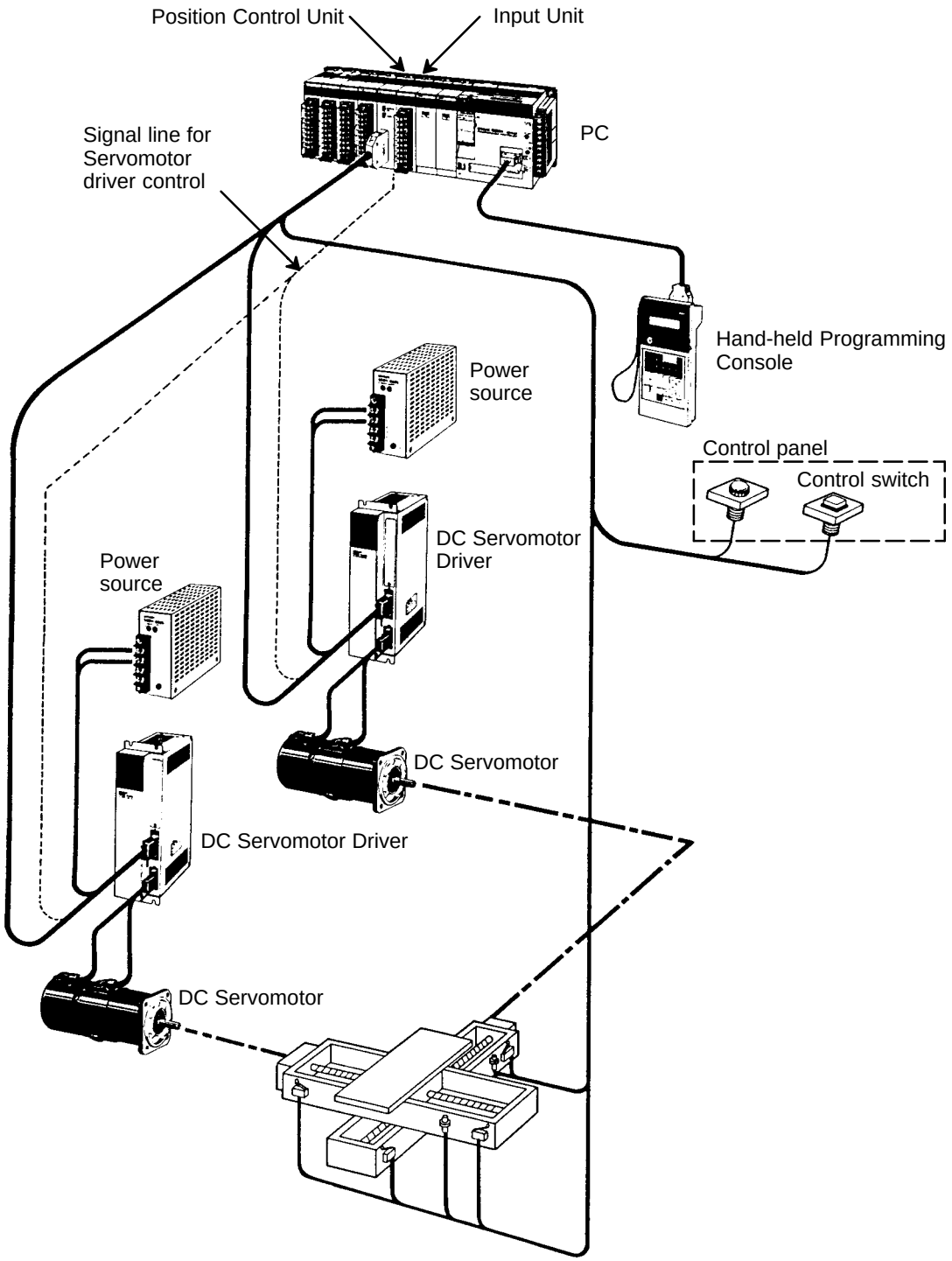
A Control System is the electronic equipment needed to control a particular process. It may include everything from a process control computer, if one is used, to the factory computer, down through the PCs (and there may be many of them networked together) and then on down through the network to the 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.

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A 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.

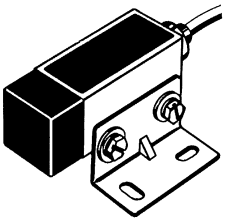
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1-2 The Role of the PC

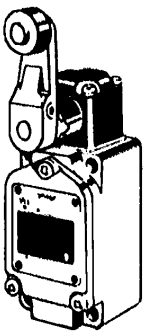
The PC is the part of the Control System that directly controls the manufacturing process. According to the program stored in its memory, the PC accepts data from the input devices connected to it, and uses this data to monitor the controlled system. When the program calls for some action to take place, 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

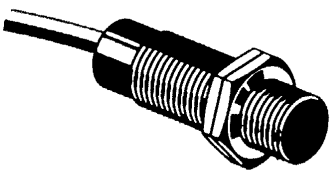
PCs can receive input from either automated or manual devices. The PC could receive data from the user via a pushbutton switch, keyboard, or similar device. Automated input could come from a variety of devices: microswitches, timers, encoders, photosensors, and so on. Some devices, like the Limit Switch shown below, turn ON or OFF when the equipment actually makes contact with it. 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

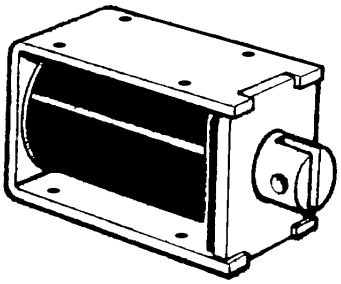


Proximity switch

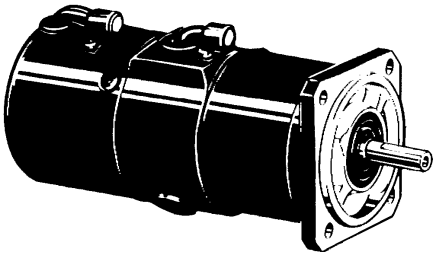
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1-2-2 Output Devices

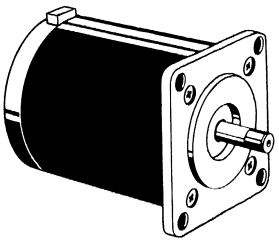
A PC can output to a myriad of devices for use in automated control. Almost anything that you can think of could be controlled (perhaps indirectly) by a PC. Some of the most common devices are motors, Solenoids, Servomotors, Stepping Motors, valves, switches, indicator lights, buzzers, and alarms. Some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



Servomotor



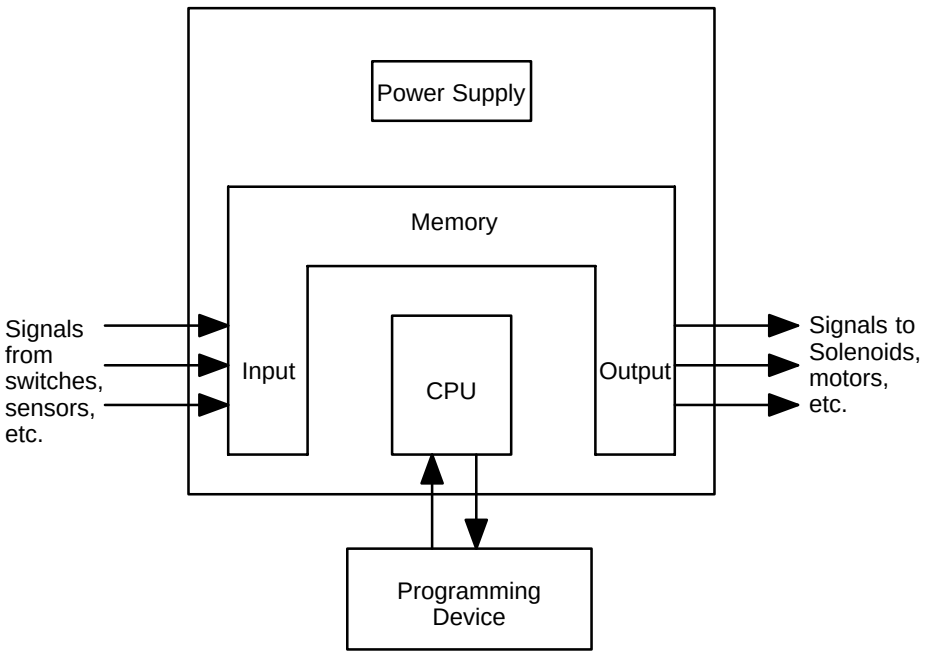
Stepping motor

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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.

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, 2, 3...

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.

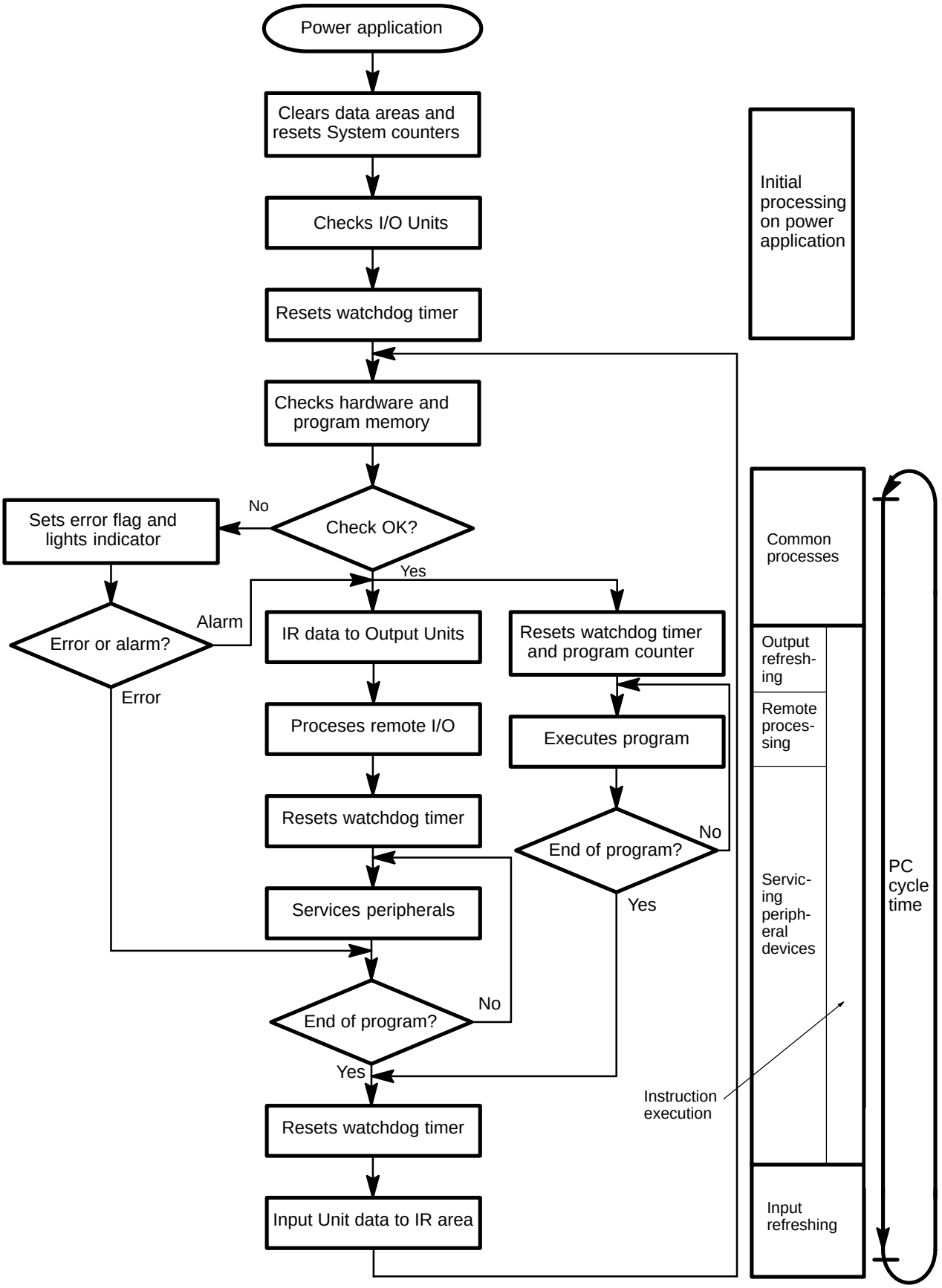
Timing is one of the most important factors in designing a Control System. For accurate operations, it is necessary to have answers to such questions as these:

- 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.

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PC Operation Flowchart



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SECTION 2
Unit Description

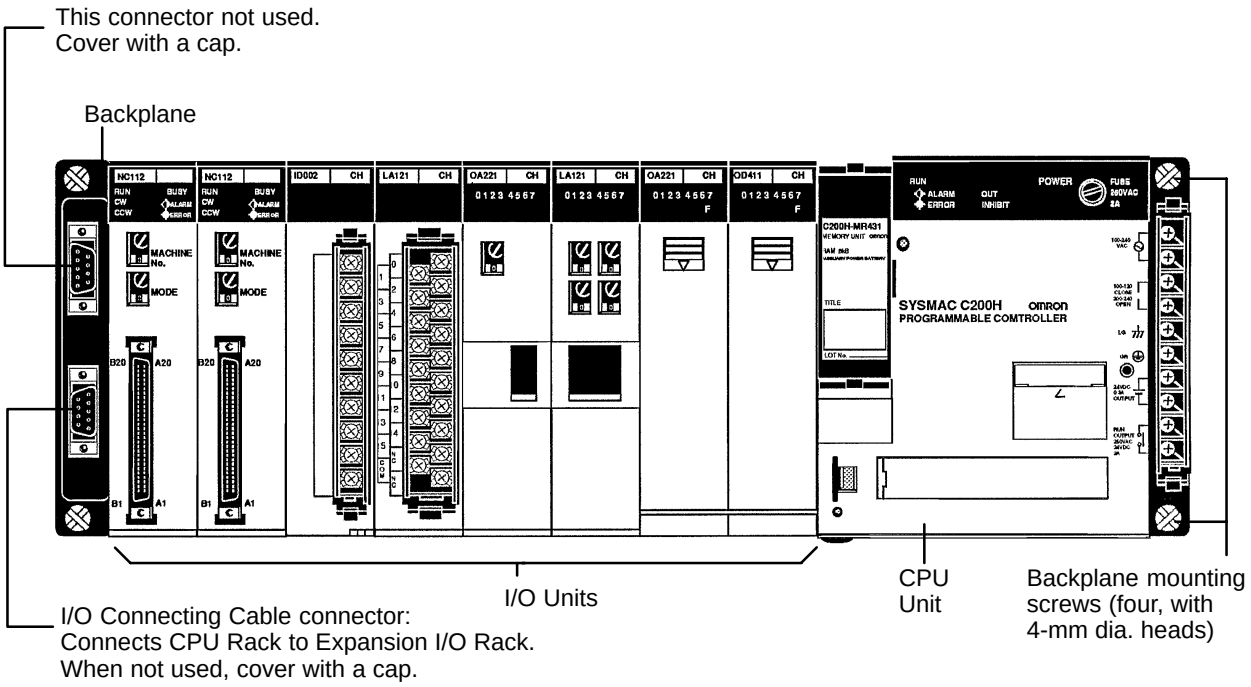
This section provides information about the individual Units that make up a PC. The names of all the parts of a Unit are given, followed by any details that apply to that Unit alone. For a description of how the Units fit together to become a PC, refer to *Section 3 Assembly Instructions*. For information about the model numbers of any of the parts described in this section, refer to *Appendix A Standard Models*.

2-1 CPU Rack 10
2-2 CPU Units 11
2-3 Expansion I/O Rack 16
2-4 Power Supplies 17
2-5 I/O Units 18
2-5-1 Standard I/O Units 18
2-5-2 Group-2 High-density I/O Units 20
2-5-3 High-density I/O Units Classified as Special I/O Units 21
2-6 Memory Units 23

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2-1 CPU Rack

The following figure shows the names of all the parts of a CPU Rack. There are four models of Backplanes available with 3, 5, 8 and 10 slots for I/O Units. You can use any of these Backplanes to build a CPU or Expansion I/O Rack. The C200H-OC225/OD212/OD21A 16-point Output Unit and the C200H-B7AO1 B7A Interface Unit must be mounted to a C200H-BC□□1-V1/V2 Backplane.



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2-2 CPU Units

This guide covers three C200H CPU Unit models: the C200H-CPU21-E, C200H-CPU23-E, and C200H-CPU31-E. The C200H-CPU21-E, CPU23-E, and CPU31-E basically correspond to the earlier C200H-CPU01-E, CPU03-E, and CPU11-E.

The C200H-CPU21-E/CPU23-E/CPU31-E CPU Units are based on the C200H-CPU11-E CPU Unit, except only the CPU31-E supports Network Instructions. All of the CPU Units covered in this manual also support a group of High-density I/O Units called Group-2 High-density I/O Units. Group-2 High-density I/O Units are classified by themselves and are not classified as Special I/O Units.

The following table lists the capabilities of the various C200H CPU Units.

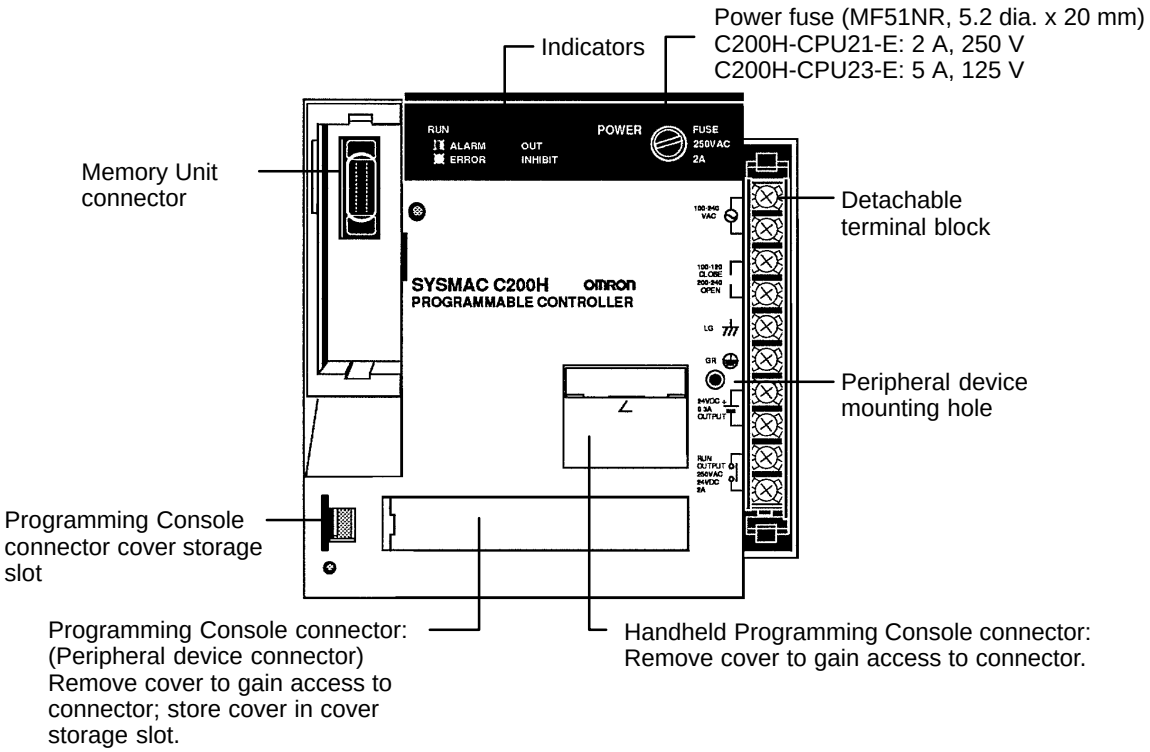
Function	CPU01-E	CPU03-E	CPU11-E	CPU21-E	CPU23-E	CPU31-E
Compatible with Group-2 High-density I/O Units (C200H-ID111/ID216/ID217/OD218/OD219) Compatible with Group-2 B7A Interface Units. Note: Cannot be mounted to Slave Racks.	No	No	No	**Yes**	**Yes**	**Yes**
Can process GROUP-2 HIGH-DENSITY I/O REFRESH – MPRF(61)	No	No	No	**Yes**	**Yes**	**Yes**
Compatible with Memory Units: C200H-MR433/MR833/ME432	**Yes**[1]	**Yes**[1]	**Yes**[2]	**Yes**	**Yes**	**Yes**[2]
Compatible with Memory Unit C200H-ME832	No	No	No	**Yes**	**Yes**	**Yes**[2]
Error history	No	No	**Yes**	**Yes**	**Yes**	**Yes**
Clock/calendar	No	No	**Yes**	**Yes**[3]	**Yes**[3]	**Yes**
Forced Status Hold Bit (SR 25211)	No	No	**Yes**	**Yes**	**Yes**	**Yes**
Can set TERMINAL mode in Programming Console	No	No	**Yes**	**Yes**	**Yes**	**Yes**
Additional instructions: REVERSIBLE WORD SHIFT – RWS(17) CYCLE TIME – SCAN(18) MULTI-WORD COMPARE – MCMP(19) LONG MESSAGE – LMSG(47) TERMINAL MODE – TERM(48) SET SYSTEM – SET(49) DOUBLE COMPARE – CMPL(60) COLUMN-TO-WORD – CTW(63) WORD-TO-COLUMN – WTC(64) HOURS-TO-SECONDS – HTS(65) SECONDS-TO-HOURS – STH(66) VALUE CALCULATE – VCAL(69)	No	No	**Yes**	**Yes**	**Yes**	**Yes**
SYSMAC NET Link/SYSMAC LINK Instructions: NETWORK SEND – SEND(90) NETWORK RECEIVE – RECV(98)	No	No	**Yes**	No	No	**Yes**[4]
Power Supply	AC	DC	AC	AC	DC	AC

Note

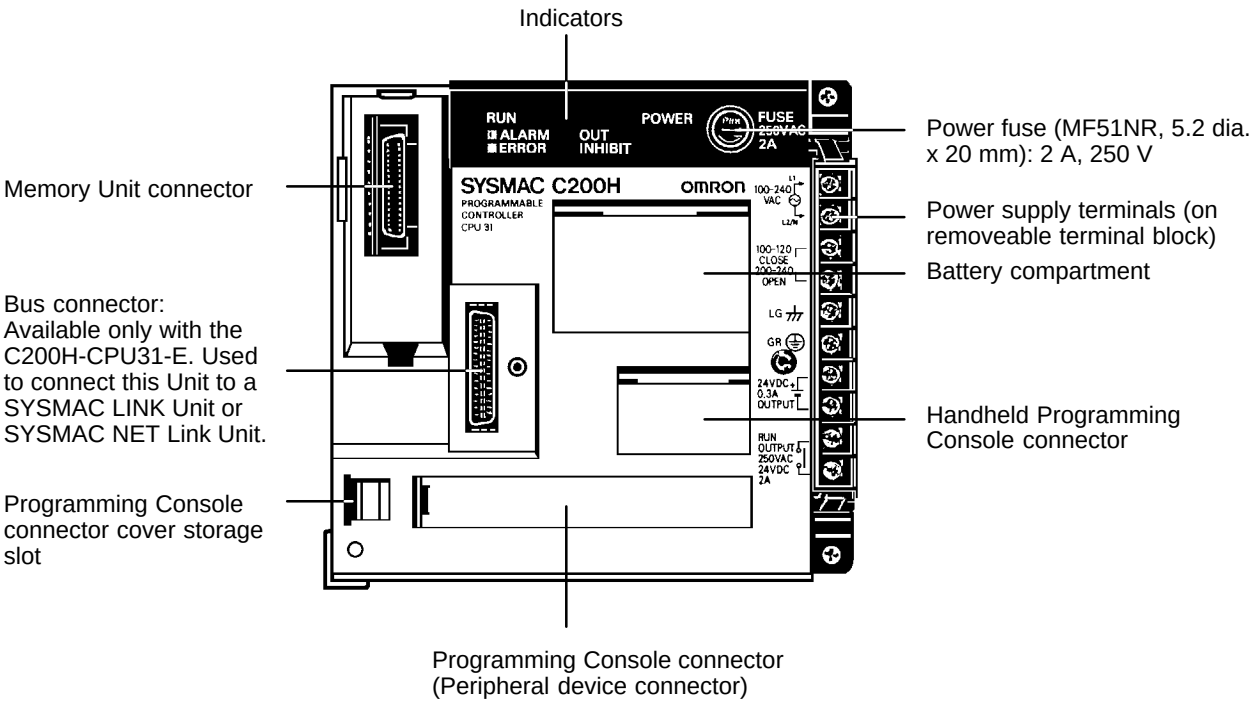
1. The C200H-CPU01-E and C200H-CPU03-E cannot use the Memory Units' clock/calendar.
2. The C200H-CPU11-E and C200H-CPU31-E CPU Units have a built-in clock/calendar.
3. The C200H-CPU21-E and C200H-CPU23-E can use the C200H-MR433/MR833/ME432 Memory Units' clock/calendar.
4. Up to two SYSMAC LINK Unit and/or SYSMAC NET Link Units can be connected to the C200H-CPU31-E CPU Unit. These two Units can be mounted to either of the two slots located directly to the left of the the CPU Unit and connected to the CPU Unit via a bus connector. A separate Unit, the bus connector Unit, is required to connect the SYSMAC NET Link Unit or the SYSMAC LINK Unit to the CPU Unit.

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C200H-CPU21-E/23-E



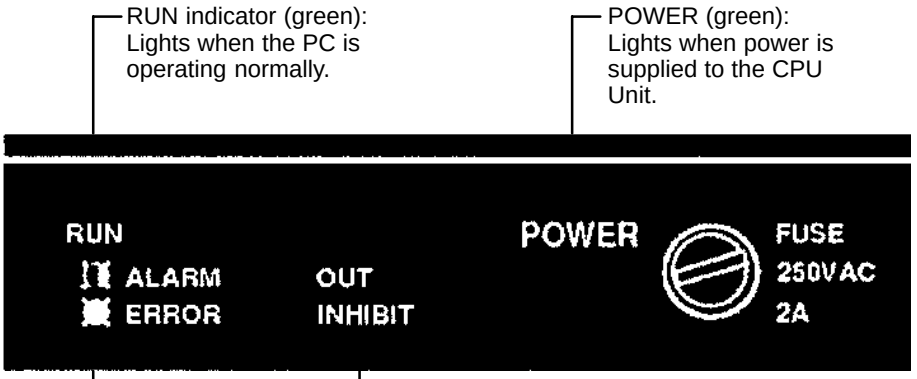
C200H-CPU31-E



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CPU Unit Indicators

The following figure shows the indicators that are located on the front panel of the three CPU Unit models.



RUN indicator (green): Lights when the PC is operating normally.

POWER (green): Lights when power is supplied to the CPU Unit.

OUT INHIBIT (red): Lights when the Load OFF flag (SR bit 25215) turns ON, at which time all the outputs are turned OFF.

ALARM (flashes red): Flashes if an error occurs that does not stop the CPU Unit.

ERROR (solid red): Lights if an error occurs that stops the CPU Unit, at which time the RUN indicator turns OFF and the outputs are turned OFF.

Peripheral Device Connectors

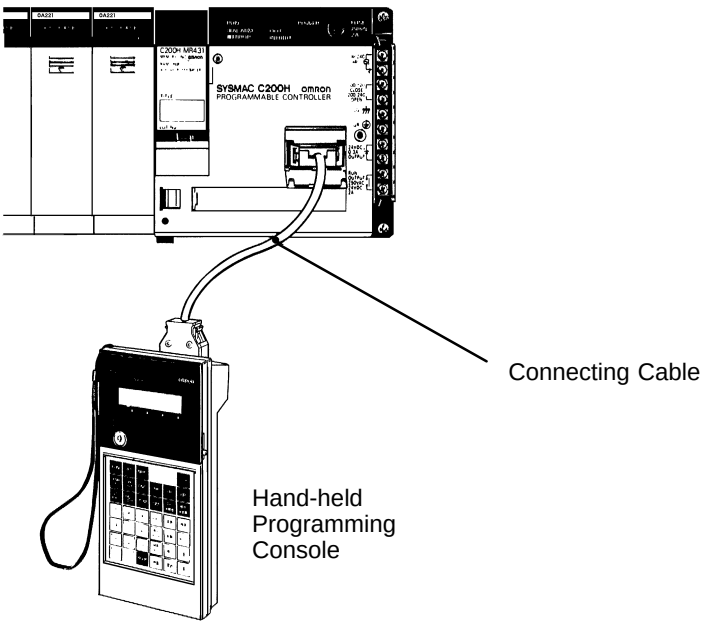
All three CPU Unit models are equipped with two connectors for peripheral devices. One is used for the Handheld Programming Console or the Data Access Console; the other is used for the CPU Unit-mounting Programming Console. The C200H-CPU31-E, however, has a third connector that is used for connecting the SYSMAC LINK Unit or the SYSMAC NET Link Unit to the CPU Unit.

To connect the Handheld Programming Console to the CPU Unit, a Connecting Cable is required, as shown in the following diagram.

Note If you are using the SYSMAC LINK Unit or SYSMAC NET Link Unit in your system, you must use model C200H-CPU31-E as the CPU Unit. The other two models mentioned above are not equipped with the appropriate connectors.

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Cable Connection



The CPU Unit-mounting Programming Console can be mounted directly to the CPU Unit and does not require a Connecting Cable. To mount the CPU Unit-mounting Programming Console (or any other peripheral device) directly to the CPU Unit, follow the steps below.

Direct Mounting

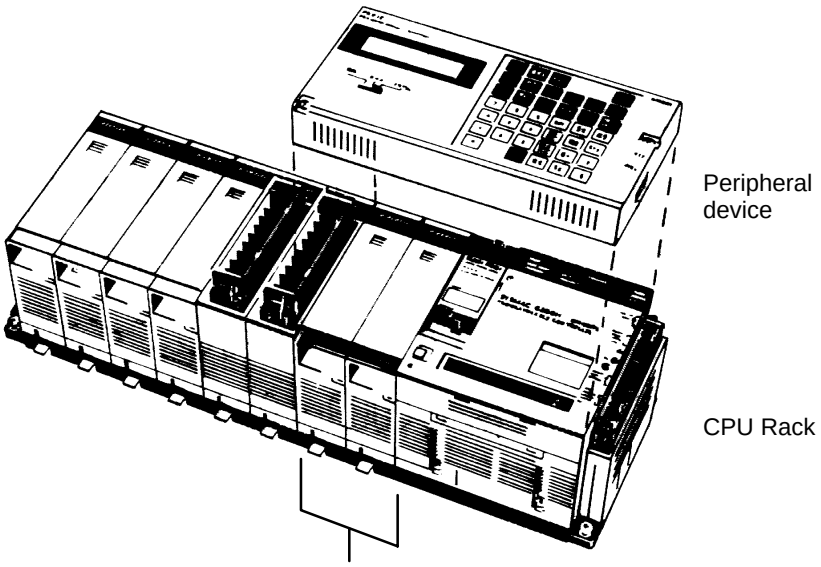
The CPU Unit-mounting Programming Console, when mounted to the CPU Unit, covers the two I/O Units located directly to the left of the CPU Unit. For this reason it is important to know which shapes can be mounted to these slots.

Notice, in the following diagram, that the two I/O Units mounted directly to the left of the CPU Unit are A-shape Units. The CPU Unit-mounting Programming Console can be mounted to the CPU Unit provided A-shape I/O Units are mounted to these two slots. Make sure the protective covers of the two I/O Units are in place to avoid electrical interference with the CPU Unit.

Because the surface of B-shape and E-shape I/O Units protrudes a few centimeters from surface of the CPU Unit, B-shape and E-shape I/O Units cannot be mounted to the two slots to the left of the CPU Unit unless a Programming Console Base Unit is first mounted to the CPU Unit to increase the mounting height of the Programming Console.

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If you are using the C200H-CPU31-E, a SYSMAC LINK Unit or a SYSMAC LINK Unit can be mounted to either of the two slots to the left of the CPU Unit. They are then connected to the CPU Unit with the Bus Connector Unit.



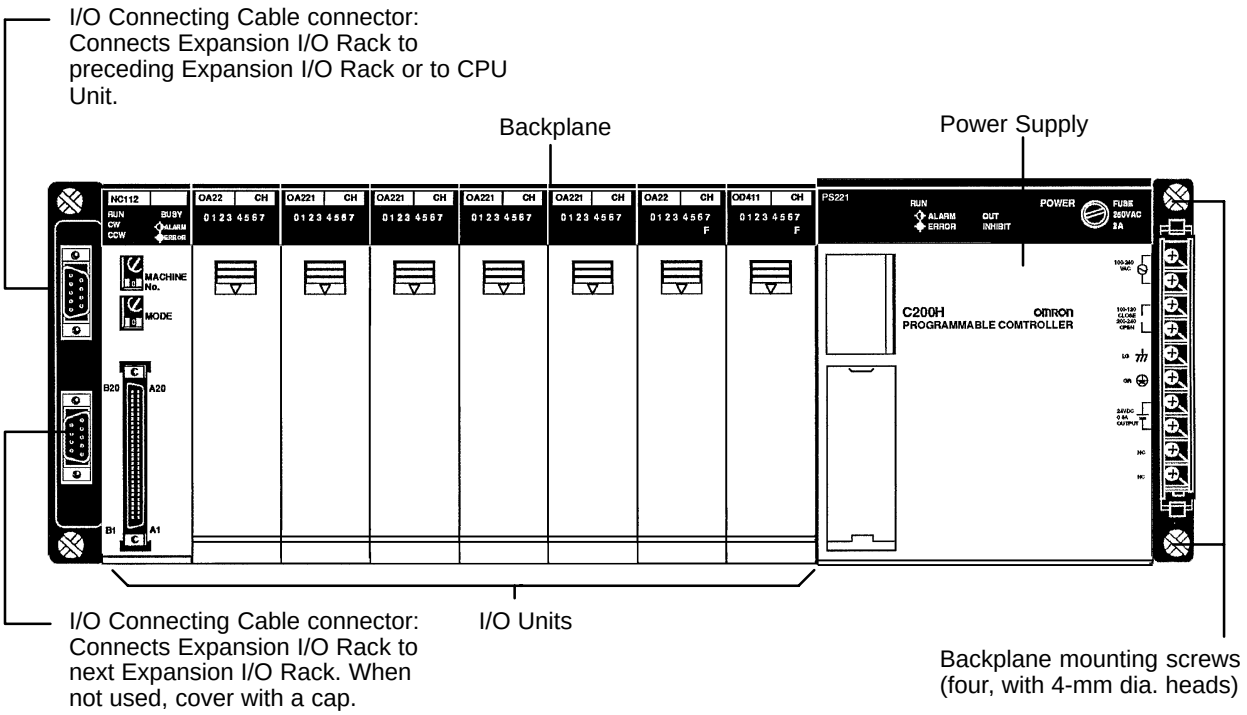
1, 2, 3...

1. Remove the cover from the peripheral device connector with a standard screwdriver.
2. Connect the CPU Unit-mounting Programming Console to the peripheral device connector.
3. Attach the CPU Unit-mounting Programming Console to the CPU Unit by tightening the mounting screws.

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2-3 Expansion I/O Rack

The Backplane used to construct a CPU Rack is also used to construct an Expansion I/O Rack. An Expansion I/O Rack is identical to a CPU Rack, except the CPU Unit has been replaced with a Power Supply. The parts of an Expansion I/O Rack are shown in the following diagram.

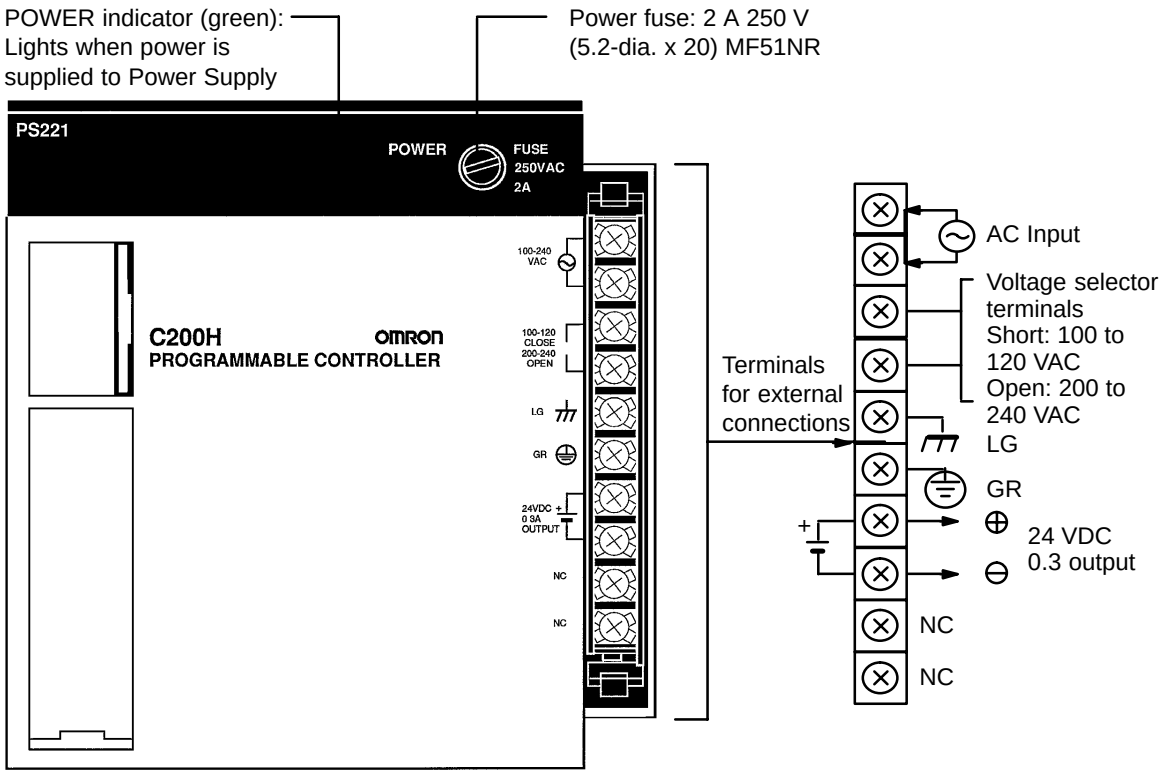


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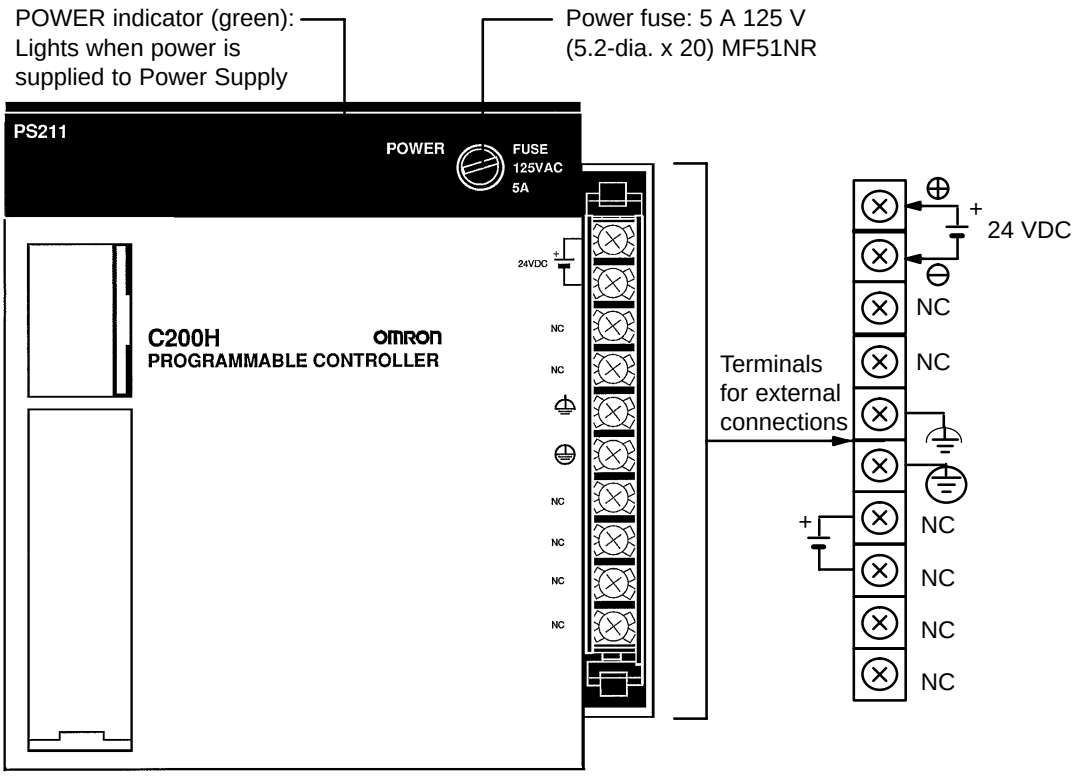
2-4 Power Supplies

The Power Supply used for Expansion I/O Racks is available in two models. One runs on 100 to 120 or 200 to 240 VAC, and the other runs on 24 VDC.

AC Power Supply



DC Power Supply



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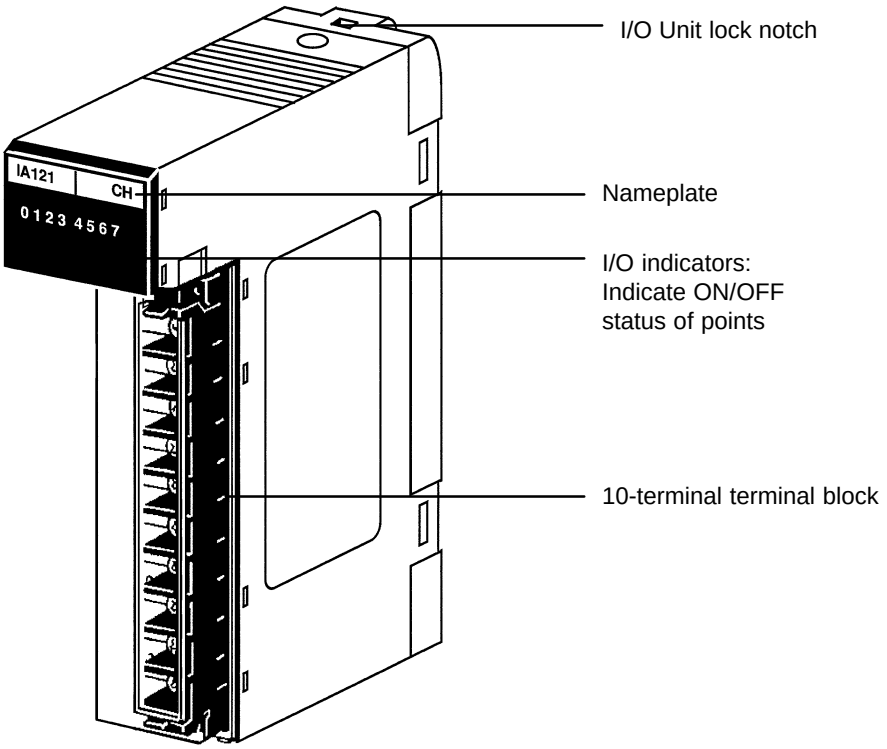
2-5 I/O Units

I/O Units are divided into three groups based on the way that I/O words they use are allocated. Standard I/O Units are allocated I/O words according to the Unit's location on the CPU or Expansion I/O Rack. Group-2 High-density I/O Units are allocated I/O words according to I/O number set on each Unit. High-density I/O Units classified as Special I/O Unit are allocated I/O words according to the unit number set on each Unit.

2-5-1 Standard I/O Units

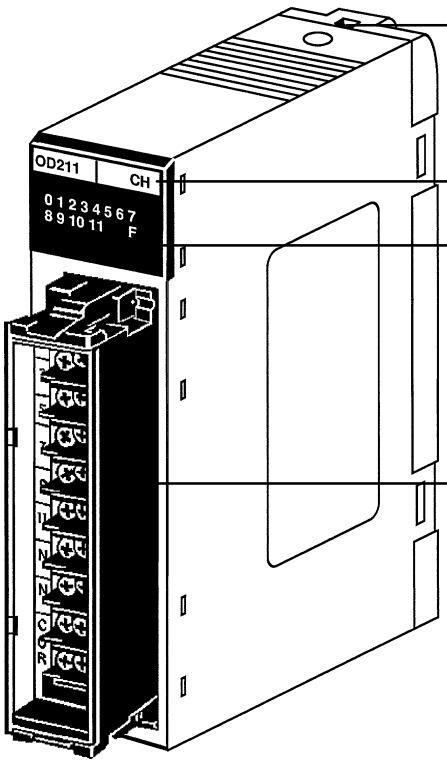
Standard I/O Units come in three shapes; A-shape, B-shape, and E-shape. Refer to *Appendix B Specifications* for the dimensions of each Unit.

A-shape I/O Unit



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B-shape I/O Unit



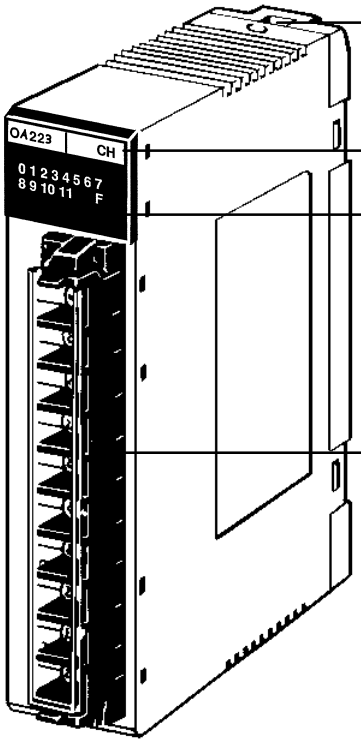
I/O Unit lock notch

Nameplate

I/O indicators:
Indicate ON/OFF
status of points

19-terminal terminal block

E-shape I/O Unit (10-terminal Terminal Block)



I/O Unit lock notch

Nameplate

I/O indicators
Indicate ON/OFF
status of points

10-terminal terminal block

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2-5-2 Group-2 High-density I/O Units

Group-2 High-density I/O Units come in two varieties; C-shape and D-shape. The shape of the two varieties is the same, but C-shape Units have only one connector, while the D-shape Units have two. C-shape Units have 32 I/O points and D-shape Units have 64 I/O points.

Unit	Specifications	Shape	Model
DC Input Unit	12 VDC; 64 pts	D	C200H-ID111
	24 VDC; 32 pts	C	C200H-ID216
	24 VDC; 64 pts	D	C200H-ID217
Transistor Output Unit	4.5 VDC,16 mA to 26.4 VDC,100 mA; 32 pts	C	C200H-OD218
	4.5 VDC,16 mA to 26.4 VDC,100 mA; 64 pts	D	C200H-OD219

Note Refer to *Optional Products, Appendix A* for a list of external connectors.

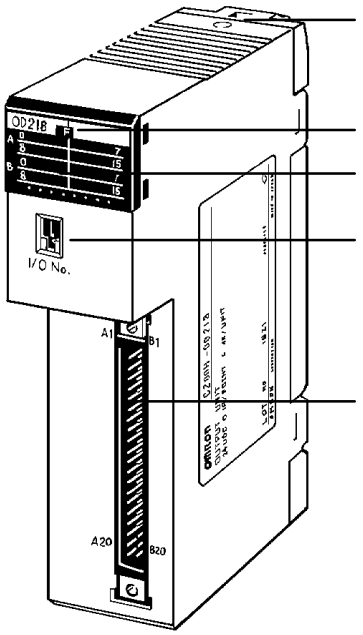
Group-2 High-density I/O Units are allocated I/O words in the IR Area (IR 030 to IR 049) by setting the I/O number switch on the front of each Unit. C-shape Units are allocated 2 words and D-shape Units are allocated 4 words beginning with m, where m = IR 030 + 2 × I/O number.

For C-shape Units the 16 I/O bits in m are allocated to the A side of the connector, and the I/O bits in m+1 are allocated to the B side of the connector. For D-shape Units the I/O bits in m are allocated to the A side of connector 1, the I/O bits in m+1 are allocated to the B side of connector 1, the I/O bits in m+2 are allocated to the A side of connector 2, the I/O bits in m+3 are allocated to the B side of connector 2. Refer to the *C200H Operation Manual (CPU21-E/23-E/31-E)* for more details on I/O word allocation.

Always turn the PC power off before changing a Unit's I/O number. The new I/O number will not be recognized unless the PC has been turned off. Do not set more than one Unit to the same I/O number or set I/O numbers so that the same I/O word is allocated to more than one Unit, e.g., if you set a 64-point Unit to I/O number 0, you cannot use I/O number 1 for any Unit.

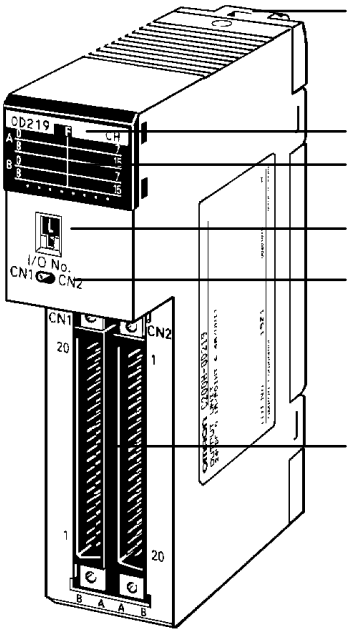
Refer to *Appendix B Specifications* for the specifications and dimensions of the Units.

C-shape Units (32-point Units)



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D-shape Units (64-point Units)



2-5-3 High-density I/O Units Classified as Special I/O Units

Some High-density I/O Units are classified as Special I/O Units. Up to 10 Special I/O Units can be connected to a PC. The Units have two 24-pin connectors. In general, these Units control 32 I/O points, although some Units can control 128 I/O points when set for dynamic operation.

Refer to *Appendix B Specifications* for detailed specifications and dimensions of the Units.

Unit	Specifications	Model Number	Remarks
TTL Input Unit	5 VDC, 32 inputs	C200H-ID501	8 pts can be set as high-speed inputs.
DC Input Unit	24 VDC; 32 inputs	C200H-ID215	
TTL Output Unit	5 VDC, 32 outputs	C200H-OD501	Can be set for 128 dynamic outputs.
Transistor Output Unit	24 VDC; 32 outputs	C200H-OD215	
TTL I/O Unit	5 VDC, 16 inputs, 16 outputs	C200H-MD501	8 pts can be set as high-speed inputs.
DC Input/Transistor Output Unit	12 VDC; 16 inputs, 16 outputs	C200H-MD115	Can be set for 128 dynamic inputs.
	24 VDC; 16 inputs, 16 outputs	C200H-MD215	

Note Refer to *Optional Products, Appendix A* for a list of external connectors.

Setting the Unit Number

High-density I/O Units are each allocated 10 I/O words in the IR Area (IR 100 to IR 199) by setting the unit number switch on the front of each Unit. The 10 words begin with n, where n = IR 100 + 10 × unit number. For example, a Special I/O Unit with a unit number of 3 would be allocated IR 130 to IR 139.

Always turn the PC power off before changing a Unit's unit number. The new unit number (0 to 9) will not be recognized unless the PC has been turned off.

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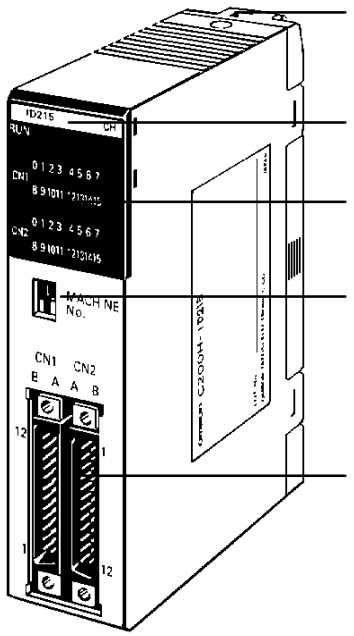
Setting the DIP Switch

The operation of High-density I/O Units is controlled by setting the pins of the DIP switch on the back panel. The following table shows the function of each pin and applicable Units.

Pin	Function	Applicable Units	Setting	
			ON	OFF
1	Operating mode	C200H-OD501/OD215	128 dynamic outputs	32 outputs
		C200H-MD501/MD115/MD215	128 dynamic inputs	16 inputs, 16 outputs
2	High-speed input[1]	C200H-ID501/ID215	Inputs 08 to 15 of CN2 are high-speed inputs.	Normal inputs
		C200H-MD501/MD115/MD215	Inputs 08 to 15 of CN2 are high-speed inputs.	Normal inputs
3	High-speed input minimum pulse width[2]	C200H-ID501/ID215 C200H-MD501/MD115/MD215	4 ms	1 ms
4	Input response time[3]	C200H-ID501/ID215 C200H-MD501/MD115/MD215	15 ms max.	2.5 ms max.
5	Data output mode[4]	C200H-OD501/OD215	Positive logic	Negative logic
6	Not used.	---	---	---

Note

1. Used in the C200H-MD501/MD115/MD215 only when pin 1 is OFF, setting the Unit to static mode.
2. Used in the C200H-ID501/215, C200H-MD501/MD215/MD115/MD215 only when pin 2 is ON, setting the Unit to High-speed input mode.
3. Sets the input response time for normal inputs. When pin 2 is ON, CN2 08 to 15 are pulse-catch inputs. Other inputs can be used as normal inputs.
4. Used when pin 1 is ON, setting the C200H-OD501/OD215 to dynamic output mode.



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2-6 Memory Units

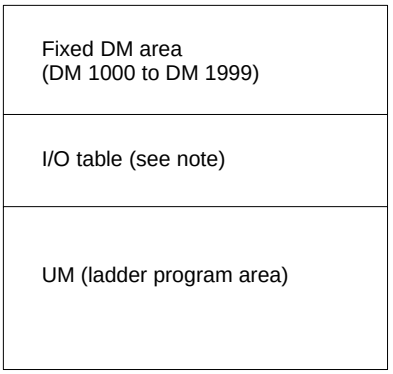
There are three types of Memory Units, having three different types of memory. The three types of memory are EPROM, EEPROM, and RAM.

Memory	Model	Capacity	Maximum program size	Backup	Clock[1]
EPROM	C200H-MP831	8K words	6,974 words	---	NO
EEPROM	C200H-ME431	4K words	2,878 words		
	C200H-ME831	8K words	6,974 words		
	C200H-ME432	4K words	2,878 words	Battery	YES
	C200H-ME832[2]	8K words	6,974 words		
RAM	C200H-MR431	4K words	2,878 words	Battery	NO
	C200H-MR831	8K words	6,974 words		
	C200H-MR432	4K words	2,878 words	Capacitor	
	C200H-MR832	8K words	6,974 words		
	C200H-MR433	4K words	2,878 words	Battery	YES
	C200H-MR833	8K words	6,974 words		

Note

1. With the C200H-CPU21-E and C200H-CPU23-E CPU Units, a Memory Unit with the clock must be installed to use the clock/calendar and error history functions.
2. The C200H-ME832 Memory Unit cannot be used with the C200H-CPU01-E/03-E/11-E CPU Units.
3. The C200H-CPU31-E CPU Unit has a built-in clock.

Contents for Memory Unit Registration



Note I/O tables are also saved in the Memory Unit at the time of creation. Therefore, if the Memory Unit is set to write-protect, it will be impossible to create an I/O table.

EPROM Unit

The data that you wish to store in an EPROM Unit must first be written to an EPROM Chip, using the PROM Writer. Then the EPROM Chip must be mounted to the inside of the EPROM Unit.

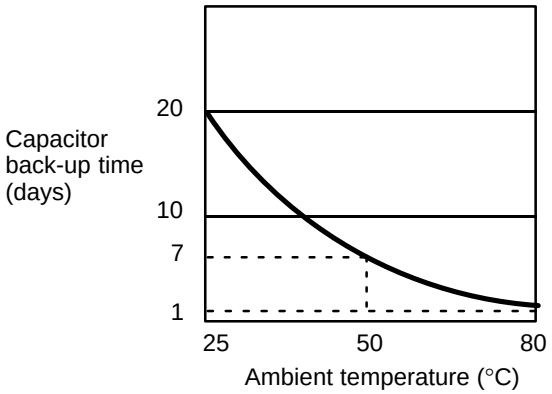
EEPROM Unit

Data can be stored in the EEPROM Unit while the Unit is mounted to the PC. The data is retained indefinitely when the power is turned OFF.

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RAM Unit

Data can be randomly written to and read from the RAM Unit. However, the Unit requires battery or capacitor back-up in order to retain the information when the power is OFF. Units with battery back-up can retain their data for approximately five years at room temperature (25°C). Units with capacitor back-up retain their data for approximately 20 days at room temperature, but the length of time varies with temperature as shown below.

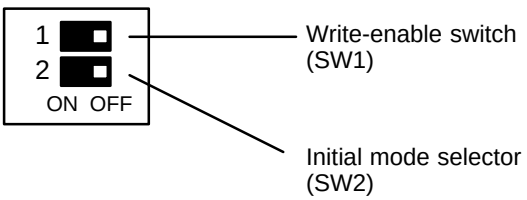


⚠ Caution Be sure to turn off the power when mounting or dismounting a Memory Unit, or an error will result and the internal circuitry may be damaged.

Note A memory error might occur when a RAM Unit is installed in a C200H-CPU21-E/23-E/31-E CPU Unit with data written using a C200H-CPU01-E/03-E/11-E CPU Unit or a GPC and C500-PRW06 PROM Writer. Turn the PC power off and on again to clear the error.

Switches on Memory Units

Two switches are provided on Memory Units, as shown below.



SW1 (the write-enable switch) only has an effect if the Unit is a RAM Unit or EEPROM Unit. Peripheral devices can only write data to these Memory Units if SW1 is ON. When you wish to write data to this Memory Unit, make sure SW1 is set to the ON position. After you have finished writing the data to the Memory Unit, turn SW1 to the OFF position so that the data will be protected from any further changes. If you try to write data to the Memory Unit while SW1 is in the OFF position, the message “DISABLED ROM” will appear on the Programming Console.

SW2 Selects what operating mode the PC will be in when power is applied to the System. If there is no peripheral device connected to the CPU Unit, the PC will enter RUN mode when power is applied. If a Programming Console is connected to the CPU Unit, the PC will enter the mode that the Programming Console is set to. If a peripheral device other than the Programming Console is connected to the CPU Unit, the PC will enter the mode specified by SW2.

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Battery Failure Flag

The C200H-CPU31-E, unlike the other two CPU Unit models, has an additional battery connected to the CPU Unit. A flag, assigned to the bits listed in the following table, indicates where battery failure occurred (in the RAM Unit, EEPROM Unit, or in the CPU Unit) and in which Unit.

Model	Bit	Function
C200H-CPU21-E/23-E	25308	Battery failure in RAM/EEPROM Unit
C200H-CPU31-E	25308	Battery failure in RAM/EEPROM Unit or CPU Unit
	AR2404	Battery failure in CPU Unit

In the following table, the ON/OFF status of the bits indicate where battery failure took place in the C200H-CPU31-E. For example, when bit 25308 is ON the battery in the CPU Unit failed.

25308	AR2404	Unit in which the battery failed
ON	ON	CPU Unit
ON	OFF	RAM/EEPROM Unit

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SECTION 3
Assembly Instructions

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.

3-1 Mounting the Units 28
3-2 Memory Units 30
3-3 System Configurations 33

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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 C200H is shown below.



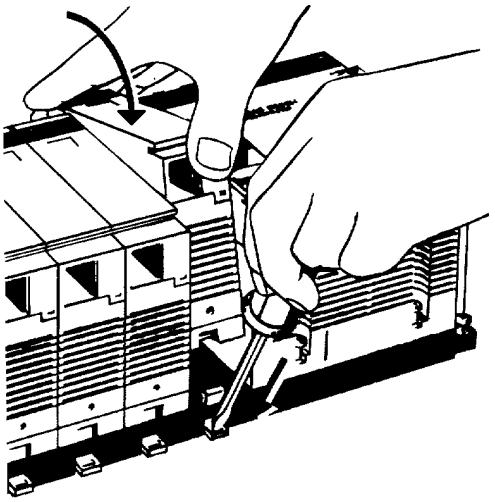
C200H Backplane

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 core of the PC is the CPU Unit. The CPU Unit contains the program consisting of the series of steps necessary for the control task. The CPU Unit has a built-in power supply, and fits into the rightmost position of the Backplane.

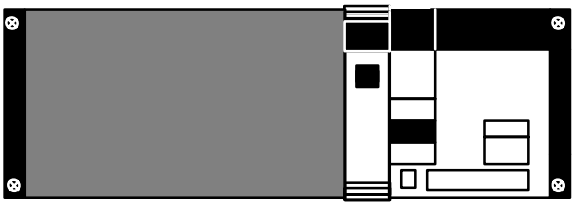


The CPU Unit of the C200H has no I/O points built in. So, in order to complete the PC we need to mount one or more I/O Units to the Backplane. Mount the I/O Unit to the Backplane by locking the top of the I/O Unit into the slot on the Backplane and rotating the I/O Unit downwards as shown in the following diagram. Press down on the yellow tab at the bottom of the slot, press the I/O Unit firmly into position, and then release the yellow tab.

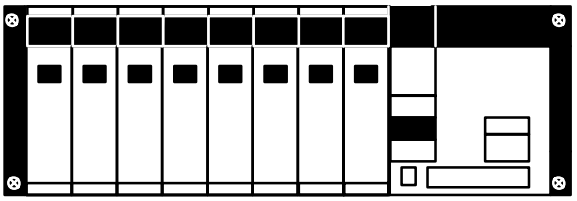


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The figure below shows one I/O Unit mounted directly to the left of the CPU Unit.



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 above, there is still some space available on the left side of the Backplane. This space is for any additional I/O Units that may be required.



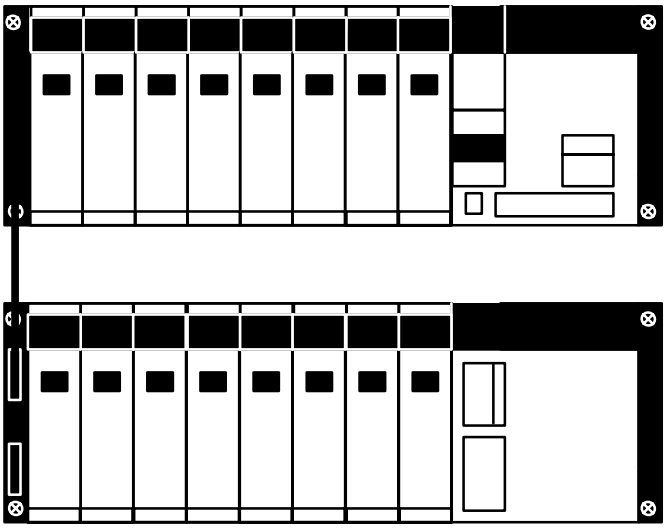
The figure above shows a total of eight I/O Units mounted to the Backplane. I/O Units come in five shapes; A-, B-, C-, D-, and E-shapes (refer to *Appendix B Specifications* for dimensions). Normally, only A-shape I/O Units can be mounted to the two rightmost I/O Unit positions on the Backplane (the ones next to the CPU Unit). This is so that there will be enough room to mount peripheral devices such as a Programming Console to the CPU Unit. However, if you use a Programming Console Base Unit to increase the mounting height of the Programming Console, you will be able to mount the Programming Console to the CPU Unit even if there are other-shape I/O Units mounted to the two rightmost slots.

When using 16-point Output Units (C200H-OC225/OD212/OD21A) and B7A Interface Unit (C200H-B7AO1), mount them to a C200H-BC□□1-V1/V2 Backplane. If a Backplane other than this model is used, the Units will not operate properly.

Backplanes are available in different lengths (three, five, eight, ten slots), and can hold a different number of I/O Units accordingly (refer to *Appendix B Specifications* for dimensions). Of course, not all I/O Units look exactly alike, but the ones in the figure show their typical appearance. This configuration of Backplane, CPU Unit, 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 additional Backplane.

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This Backplane has I/O Units mounted to it, but it has no CPU Unit of its own. The additional Backplane must also have an Expansion I/O Power Supply mounted to its rightmost position. This configuration of additional Backplane, Expansion I/O Power Supply, and I/O Units is called an Expansion I/O Rack.



The CPU Rack and Expansion I/O Rack shown above are connected by a Connecting Cable (the length of Cable between individual Racks can be up to 10 m, but the total length of Cable between all Racks must be within 12 m).

Remember that this whole configuration is still referred to as one PC. It is possible to add up to two Expansion I/O Racks to one CPU Rack. When installing I/O Connecting Cables, cover any unused connectors with the caps provided.

3-2 Memory Units

The CPU Unit has a removable Memory Unit that stores the user program. Memory Units are available with three types of memory; EPROM, EEPROM, and RAM (refer to *Section 2-6 Memory Units*). If this is your first C200H, then you must have a RAM Unit in order to write and test the program you are going to use. If this is not your first C200H and you have a complete, tested program already, you can copy the program to an EPROM or EEPROM Unit for use on this C200H. The EEPROM chip can be written to without removing the chip from the Memory Unit by using an appropriate peripheral device (refer to *Appendix A Standard Models*). The EPROM Chip may be programmed using a PROM Writer or a FIT Ladder Unit. Then the EPROM Chip must be mounted inside the EPROM Unit.

Note Only PROM Writer Model C500-PRW06 may be used with the C200H.

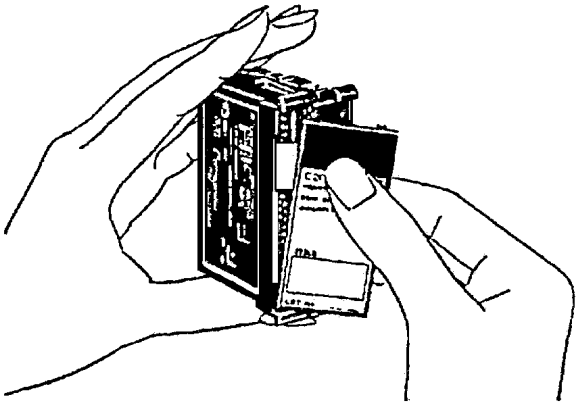
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How to Mount an EPROM Chip to the Memory Unit

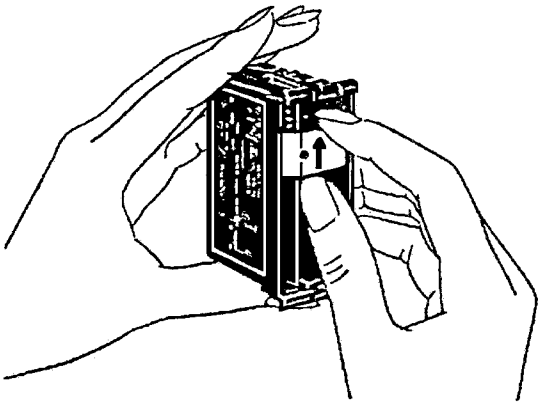
After the data has been written to the EPROM Chip, mount it to the inside of the EPROM Unit by following these steps.

1, 2, 3...

1. Remove the cover of the EPROM Unit as shown below.



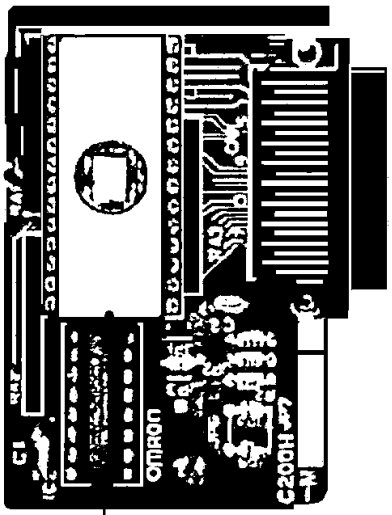
2. Unlock the holding bracket and slide it upward to remove it as shown below



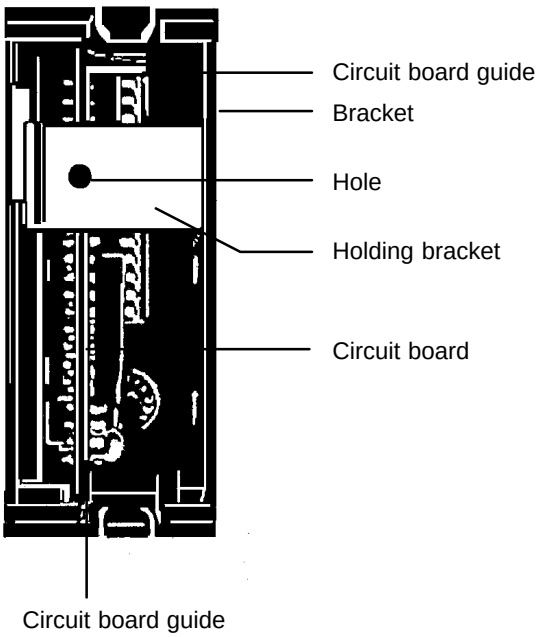
3. Pull the printed circuit board out of the EPROM Unit.

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4. On the printed circuit board there is a socket for the EPROM Chip. On the socket you will find a notch. Align the notch on the socket with the notch on the EPROM Chip and mount the EPROM Chip to the socket as shown below.



5. Reassemble the EPROM Unit in the reverse order of disassembly. During reassembly, ensure that the circuit board is inserted along the guides on the top and bottom of the Unit housing and that the projections on the housing fit into the holes in the holding bracket. Be sure to lock the holding bracket into the right side of the housing. When reassembled, the Unit should appear as shown below.



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How to Mount the Memory Unit to the CPU Unit

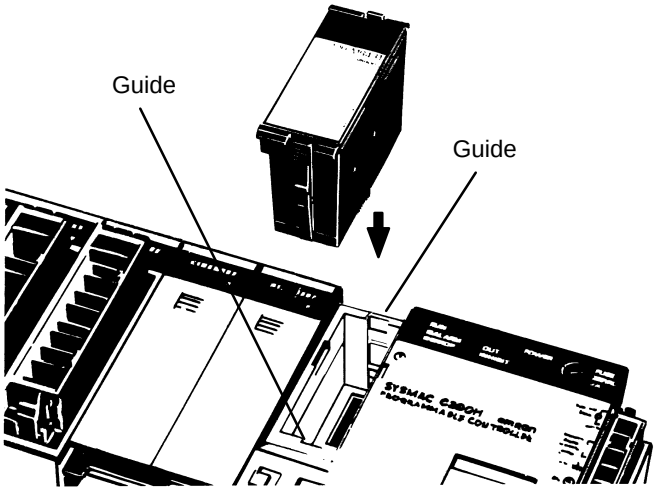
Mount the Memory Unit to the CPU Unit by following the steps below.

1, 2, 3...

1. Turn OFF the power to the PC.

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

2. Set the selector switches on the Memory Unit to the desired positions (refer to *2-6 Memory Units*).
3. Insert the Memory Unit into its compartment as shown below. As you do this, you will feel a slight resistance as the connector on the Memory Unit mates with the connector on the CPU Unit. Continue pushing on the Memory Unit until it is inserted completely into the CPU Unit.



3-3 System Configurations

When building your C200H system there may be some restrictions depending on the Unit you are using and the Rack you are mounting it to. The following figure shows an assembled CPU Rack, Expansion I/O Rack, and Remote I/O Slave Rack. Use it as a quick reference when assembling your PC. For details about the individual Units, refer to that Unit's operation manual.

The items listed below should be kept in mind.

- The SYSMAC LINK Unit and the SYSMAC NET Link Unit are always mounted to either of the two slots to the left of the C200H-CPU31-E CPU Unit. When using SYSMAC NET, an Auxiliary Power Supply Unit is mounted to the left of the Units.
- The 16-point Output Units (C200H-OC225/OD212/OD21A) and B7A Interface Unit (C200H-B7AO1) can only be mounted to a C200H-BC□□1-V1/V2 Backplane.
- Group-2 High-density I/O Units and Group-2 B7A Interface Units can be mounted only to a C200H-CPU21-E/23-E/31-E or Expansion I/O Rack. They cannot be mounted to a Slave Rack.

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Special I/O Units

- Up to ten Special I/O Units can be mounted.
- Mount Special I/O Units to any slot on the CPU Rack (except the two slots to the left of the CPU Unit), the Expansion I/O Rack, or Slave Rack.

Host Link Unit and Remote I/O Master Unit

- Up to two Units can be mounted.
- Host Link Units and Remote I/O Master Units can be mounted to any slot on the CPU Rack (except the two slots to the left of the CPU Unit) or the the Expansion I/O Rack.

I/O Units

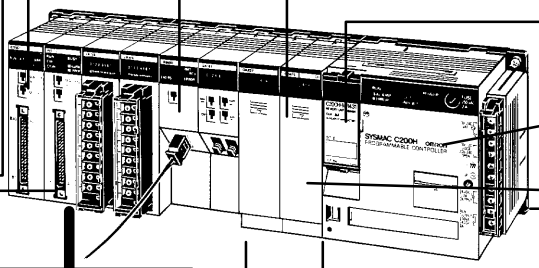
- I/O Units with 5, 8, 12, or 16 points. Standard B7A Interface Units available also.
- Units with 10- or 19-terminal terminal blocks.
- Units with 5 and 8 points have 10-terminal terminal blocks and Units with 10 and 12 points have 19-terminal terminal blocks.
- There are some restrictions on the mounting position of 19-terminal I/O Units (refer to *Appendix B Specifications).*

Memory Units

- RAM, EPROM, or EEPROM Units available.
- EEPROM requires an optional EEPROM Chip.
- EPROM requires a separately available EPROM Chip.

Group-2 High-density I/O Units and Group-2 B7A Interface Units

- Up to ten 32-point or five 64-point Units can be mounted.
- Mount the Units to any slot on the CPU Rack (except the two slots to the left of the CPU Unit) or the Expansion I/O Rack.



CPU Unit

Built-in power supply

I/O Unit cover

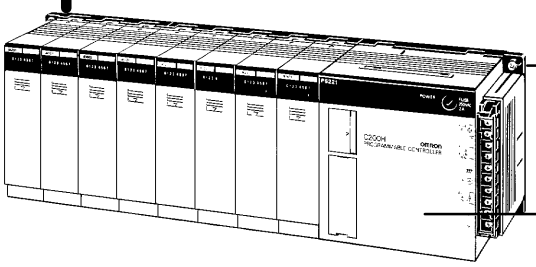
For 10-terminal block I/O Units

Backplane

3-, 5-, 8-, 10-slot types available

SYSMAC NET LINK Unit and SYSMAC LINK Unit

- Use up to two Units, mounted to either of the two slots to the left of the CPU Unit.
- When using either of these two Units the use of peripheral devices is limited. Refer to *Section 4-3 Maximum Current and Power Supplied.*



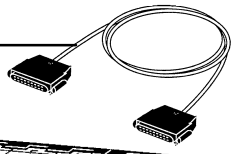
Expansion I/O Racks

Up to two Expansion I/O Racks can be connected to one CPU Rack.

Expansion I/O Power Supply

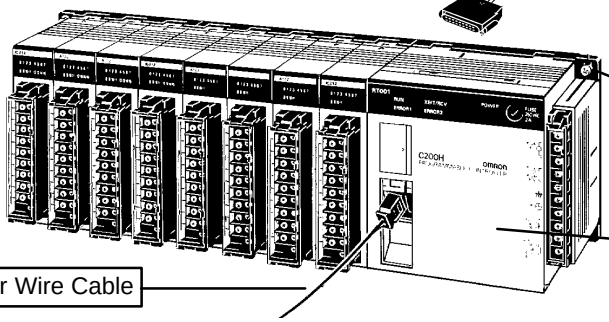
I/O Connecting Cable

- Available in lengths from 30 cm to 10 m.
- Total length of I/O Connecting Cables between all Racks must not exceed 12 m.



Slave Rack

Up to five Racks can be connected. Group-2 High-density I/O Units and Group-2 B7A Interface Units cannot be mounted to Slave Racks.



Backplane

3-, 5-, 8-, or 10-slot types available

Remote I/O Slave Unit

Power supply built-in

Optical Fiber Cable or Wire Cable

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SECTION 4
System Connections

In the preceding sections we have covered what all the parts of a PC are and how they should be assembled. This section provides detailed information about the types of considerations involved in making all of the PC connections. Also included in this section are considerations that should be kept in mind when using the C200H-CPU31-E as the CPU Unit.

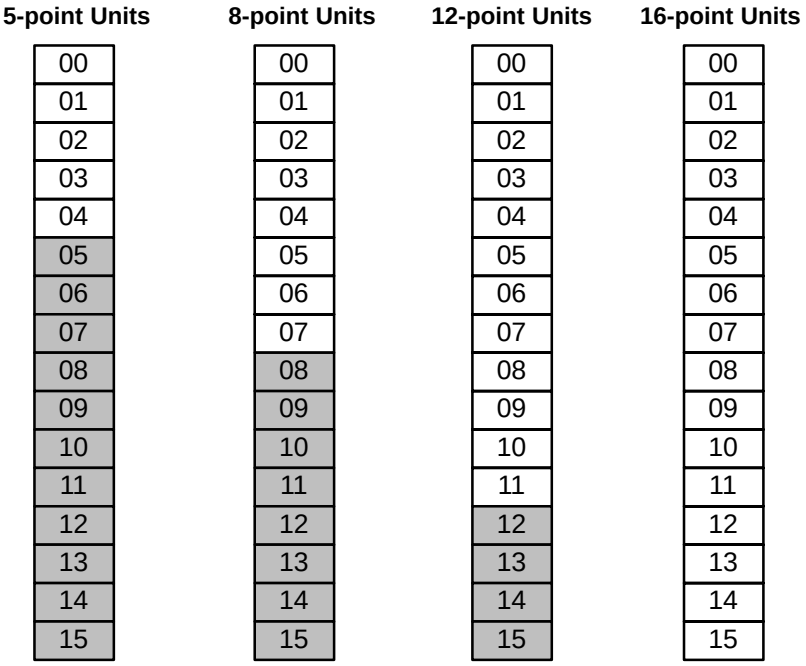
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4-4 I/O Connections 47

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4-1 I/O Word Allocation

Standard I/O Units

Each slot of the Backplane is assigned a fixed word in memory. This word is accessible for I/O use only in the given slot. However, Standard I/O Units are available in 5-, 8-, 12-, and 16-point models. If an I/O Unit other than a 16-point model is mounted, the unused points of that word are accessible only as “work bits” (refer to the C200H Operation Manual). The number of I/O bits available for the entire system, therefore, varies according to the model of I/O Units used, as well as the model of Backplanes used. The figure below shows the relationship between the model of I/O Unit and work bits. The shaded bits can only be used as work bits.



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The CPU Rack begins with word 000 at the leftmost slot. The first Expansion I/O Rack begins with word 010, and the second Expansion I/O Rack with word 020. The first word of each Rack is fixed, regardless of the model of Backplane used. As with the I/O bits unused by individual I/O Units, the bits of the I/O words unused by a Backplane can be used as work bits. The following figure shows the relationship between the model of Backplane and I/O words. The shaded bits can only be used as work bits.

C200H-BC031-V1/V2 Backplane

Word	000	001	002	003	004	005	006	007	008	009
Bits	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15

C200H-BC051-V1/V2 Backplane

Word	000	001	002	003	004	005	006	007	008	009
Bits	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15

C200H-BC081-V1/V2 Backplane

Word	000	001	002	003	004	005	006	007	008	009
Bits	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15	00 ⟆ 15

Note The C200H-OC225, C200H-OD212, and C200H-OD21A 16-point Output Units must be mounted to a C200H-BC□□1-V1/V2 Backplane.

For example, if a PC consists of three 8-slot Racks with 8-point I/O Units mounted to all I/O Unit mounting positions, the number of I/O points for the entire PC will be:

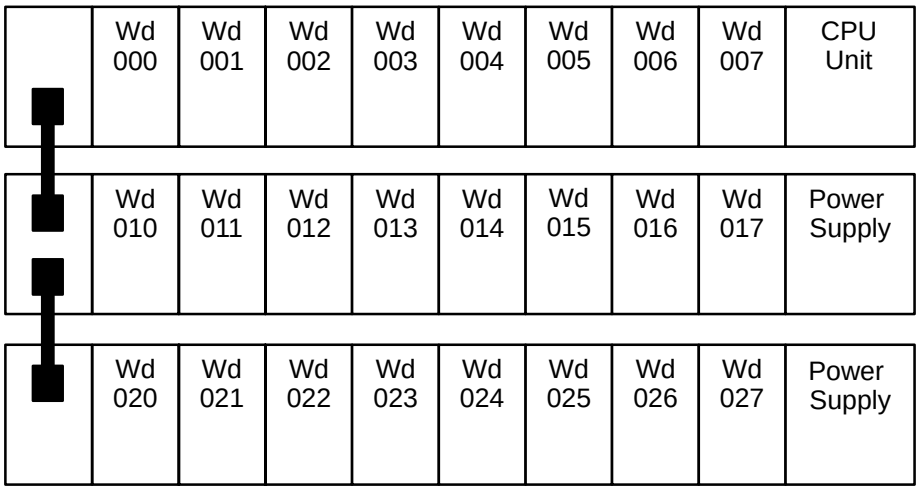
8 points x 8 slots x 3 Racks = 192 points

If a PC consists of three 8-slot Racks with the I/O Unit mounting positions equally divided between 16-point Input Units and 12-point Output Units, the number of I/O points for the entire PC will be:

Input points = 16 points x 4 slots x 3 Racks = 192 points
Output points = 12 points x 4 slots x 3 Racks = 144 points
Total I/O points = 192 + 144 = 336

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The following figure shows the word allocation for a fully expanded C200H with three 8-slot Backplanes.



Allocation for Special I/O Units and Slave Racks

Up to ten Special I/O Units may be mounted in any slot of the CPU Rack or Expansion I/O Racks. Up to five Slave Racks may be used, whether one or two Masters are used. IR area words are allocated to Special I/O Units and Slave Racks by the unit number on the Unit, as shown in the following tables.

Special I/O Units

Unit number	IR address
0	100 to 109
1	110 to 119
2	120 to 129
3	130 to 139
4	140 to 149
5	150 to 159
6	160 to 169
7	170 to 179
8	180 to 189
9	190 to 199

Slave Racks

Unit number	IR address
0	050 to 059
1	060 to 069
2	070 to 079
3	080 to 089
4	090 to 099

The C500-RT001/002-(P)V1 Remote I/O Slave Rack may be used, but it requires 20 I/O words, not 10, and therefore occupies the I/O words allocated to 2 C200H Slave Racks, both the words allocated to the unit number set on the rack and the words allocated to the following unit number. When using a C200H CPU Unit, do not set the unit number on a C500 Slave Rack to 4, because there is no unit number 5. I/O words are allocated only to installed Units, from left to right, and not to slots as in the C200H system.

Allocation for Optical I/O Units

I/O words between IR 200 and IR 231 are allocated to Optical I/O Units by unit number. The I/O word allocated to each Unit is IR 200+n, where n is the unit number set on the Unit.

Allocation for Remote I/O Master and Link Units

Remote Master I/O Units, SYSMAC LINK Units, SYSMAC NET Link Units, and Host Link Units do not use I/O words, and the PC Link Units use the LR area, so words allocated to the slots in which these Units are mounted are available as work words.

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Allocation for Group-2 High-density I/O Units

Group-2 High-density I/O Units are allocated words between IR 030 and IR 049 according to I/O number settings made on them and do not use the words allocated to the slots in which they are mounted. For 32-point Units, each Unit is allocated two words; for 64-point Units, each Unit is allocated four words. The words allocated for each I/O number are in the following tables. Any words or part of words not used for I/O can be used as work words or bits in programming.

32-point Units		64-point Units	
I/O number	**Words**	**I/O number**	**Words**
0	IR 30 to IR 31	0	IR 30 to IR 33
1	IR 32 to IR 33	1	IR 32 to IR 35
2	IR 34 to IR 35	2	IR 34 to IR 37
3	IR 36 to IR 37	3	IR 36 to IR 39
4	IR 38 to IR 39	4	IR 38 to IR 41
5	IR 40 to IR 41	5	IR 40 to IR 43
6	IR 42 to IR 43	6	IR 42 to IR 45
7	IR 44 to IR 45	7	IR 44 to IR 47
8	IR 46 to IR 47	8	IR 46 to IR 49
9	IR 48 to IR 49	9	Cannot be used.

When setting I/O numbers on the High-density I/O Units, be sure that the settings will not cause the same words to be allocated to more than one Unit. For example, if I/O number 0 is allocated to a 64-point Unit, I/O number 1 cannot be used for any Unit in the system.

Group-2 High-density I/O Units are not considered Special I/O Units and do not affect the limit to the number of Special I/O Units allowed in the System, regardless of the number used.

The words allocated to Group-2 High-density I/O Units correspond to the connectors on the Units as shown in the following table.

Unit	Word	Connector/row
32-point Units	First	Row A
	Second	Row B
64-point Units	First	CN1, row A
	Second	CN1, row B
	Third	CN2, row A
	Forth	CN2, row B

Note Group-2 High-density I/O Units cannot be mounted to Slave Racks and cannot be used with the C200H-CPU01-E, C200H-CPU03-E, and C200H-CPU11-E.

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Allocation for Group-2 B7A Interface Units

Group-2 B7A Interface Units are allocated words between IR 030 and IR 049 according to I/O number settings made on them and do not use the words allocated to the slots in which they are mounted. For 32-point Units, each Unit is allocated two words; for 64-point Units, each Unit is allocated four words. The words allocated for each I/O number are in the following tables. Any words or part of words not used for I/O can be used as work words or bits in programming.

32-point Units		64-point Units	
I/O number	**Words**	**I/O number**	**Words**
0	IR 30 to IR 31	0	IR 30 to IR 33
1	IR 32 to IR 33	1	IR 32 to IR 35
2	IR 34 to IR 35	2	IR 34 to IR 37
3	IR 36 to IR 37	3	IR 36 to IR 39
4	IR 38 to IR 39	4	IR 38 to IR 41
5	IR 40 to IR 41	5	IR 40 to IR 43
6	IR 42 to IR 43	6	IR 42 to IR 45
7	IR 44 to IR 45	7	IR 44 to IR 47
8	IR 46 to IR 47	8	IR 46 to IR 49
9	IR 48 to IR 49	9	Cannot be used.

When setting I/O numbers on the B7A Interface Units, be sure that the settings will not cause the same words to be allocated to more than one Unit. For example, if I/O number 0 is allocated to a 64-point Unit, I/O number 1 cannot be used for any Unit in the system.

Group-2 B7A Interface Units are not considered Special I/O Units and do not affect the limit to the number of Special I/O Units allowed in the System, regardless of the number used.

4-2 Remote I/O

There are limits to how long the normal wiring between the PC and its Expansion I/O Racks can be. A Remote I/O Unit can extend this distance greatly, so that the PC and its Expansion I/O Racks can even be located in separate buildings. There are two types of Remote I/O Systems, optical and wired.

By locating a Rack farther from the CPU Rack, a Remote I/O System eliminates the time and mess in wiring (or changing wiring) to many devices that are separated from the CPU Rack. Although all I/O points must ultimately be wired individually, the question is one of distance: Do you want to wire dozens of terminals all the way across a factory complex or do you want to run a single cable for most of the distance and then wire individual terminals locally? A PC with an Expansion I/O System is called an Expanded PC.

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I/O words 100 through 199 and DM words 1000 through 1999 are allocated to Special I/O Units. There are limitations to the number and model of Special I/O Units that can be mounted to a Remote I/O Slave Rack. For example, Group-2 High-density I/O Units and B7A Interface Units cannot be mounted to a Remote I/O Slave Rack. Provided no other models of Special I/O Units are mounted to a Remote I/O Slave Rack, the maximum number of Special I/O Units that can be mounted is shown below for each model.

Group	Units	Total number
A	High-speed Counter, Position Control (NC111/NC112), ASCII, Analog I/O, ID Sensor, Fuzzy Logic Unit	4 Units
B	High-density and Mixed I/O, Cam Positioner, Temperature Control, PID Control, Heat/Cool Temperature Control	8 Units
C	Temperature Sensor, Voice	6 Units
D	Position Control (NC221)	2 Units

When using a combination of A, B, C, and D Units on a Remote I/O Slave Rack, the number of each model of Unit being used must satisfy the following two formulas.

$$3A + B + C + 6D \leq 12$$
$$A + B + C + D \leq 8$$

In addition, when PC Link Units are used, a maximum of ten Special I/O Units and PC Link Units total can be mounted to one Expanded PC. When a High-density I/O Unit is mounted to a Remote I/O Slave Rack, the RM001-PV1 or RM201 Remote I/O Master Unit must be used.

4-3 Maximum Current and Power Supplied

The power supplies, including those built in the CPU Units, are limited in the total current they can supply to I/O Units.

The table below shows the maximum currents supplied by each power supply. There are three categories in the “Maximum current supplied”:

1, 2, 3...

1. The 5-V internal logic current powers I/O Cards and communications cards.
2. The 26-V relay current powers relay output cards and ID Sensor Units.
3. Finally, the external 24-VDC power supply on the CPU Unit powers external input devices.

The total wattage of all three categories cannot exceed the wattage listed in the last column, “Maximum power.”

You should not exceed any of the individual current ratings for the voltage supplied by any single Unit, nor should you exceed the total maximum power output.

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Current Supplied

Name	Model number	Max. current supplied (See note 1)			Maximum power
		5 V (internal logic current)	26 V (relay current)	24 V (No-voltage contact current)	
CPU Rack	C200H-CPU21-E	3.2 A	0.6 A	0.8 A	20 to 23 W (See note 2)
	C200H-CPU23-E	1.6 A	0.6 A	---	18 W
	C200H-CPU31-E	3.0 A	0.6 A	0.8 A	19 to 22 W (See note 2)
Expansion I/O Rack	C200H-PS221	2.7 A	0.6 A	0.8 A	28 W
	C200H-PS211			---	23 W
Slave Rack	C200H-RT001-P	2.7 A	0.6 A	0.8 A	28 W
	C200H-RT002-P			---	23 W
	C200H-RT201			0.8 A	28 W
	C200H-RT202			---	23 W

Note 1. The figures shown in the “maximum current supplied” and “maximum power supplied” columns are computed with the power consumed by the Backplanes, CPU Unit, Memory Cassettes, Peripheral Devices, I/O Power Supply Units, and Slave Units already calculated.

Design the system so that the following two conditions are satisfied.

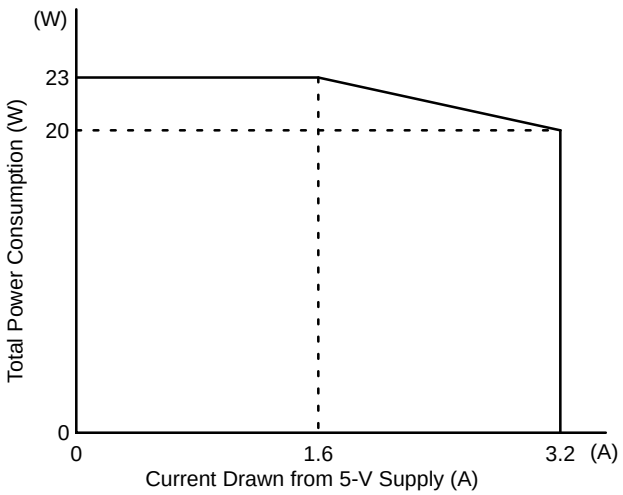
Condition 1
(1) (Total current consumption of all Units in the 5-V system) ≤ (the figure in the 5-V column)
(2) (Total current consumption of all Units in the 26-V system) ≤ (the figure in the 26-V column)
(3) (Total current consumption of all Units in the 24-V system) ≤ (the figure in the 24-V column)

Condition 2
(1) x 5 V + (2) x 26 V + (3) x 24 ≤ (maximum power supplied)

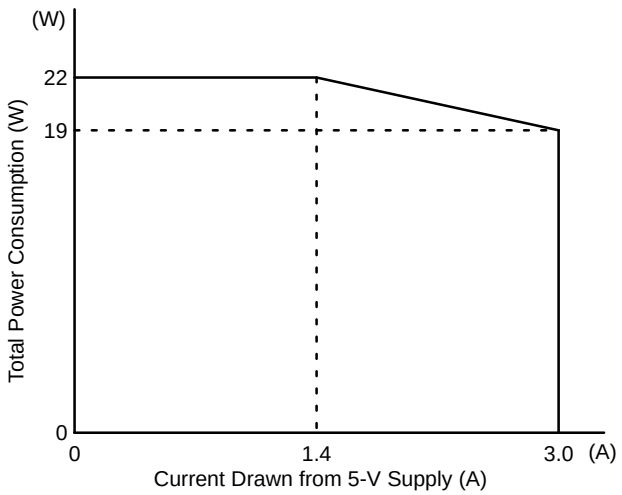
2. In the C200H-CPU21-E and C200H-CPU31-E, the maximum power drawn from the 5-V supply depends upon the current, as shown below.

Max. Power vs. Current Supplied

C200H-CPU21-E



C200H-CPU31-E



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Current Drawn from 5-V Supply (Standard I/O Units)

Unit	Model number	Current consumption
DC Input	C200H-ID211	0.01 A each
	C200H-ID212	
No-Voltage Contact Input	C200H-ID001	
	C200H-ID002	
AC Input	C200H-IA121	
	C200H-IA122/IA122V	
	C200H-IA221	
	C200H-IA222/IA222V	
AC/DC Input	C200H-IM211	
	C200H-IM212	
Contact Output	C200H-OC221	
	C200H-OC222	
	C200H-OC223	
	C200H-OC224	
	C200H-OC225	0.05 A
Transistor Output	C200H-OD411	0.14 A
	C200H-OD211	0.16 A
	C200H-OD212	0.18 A
	C200H-OD213	0.14 A
	C200H-OD214	
	C200H-OD216	0.01 A each
	C200H-OD217	
	C200H-OD21A	0.16 A
Triac Output	C200H-OA121-E	0.14 A
	C200H-OA122-E	0.18 A
	C200H-OA221	0.14 A
	C200H-OA223	0.18 A
	C200H-OA222V	0.20 A
	C200H-OA224	0.27 A
Analog Timer Unit	C200H-TM001	0.06 A
B7A Interface Unit (Standard Units)	C200H-B7AI1	0.10 A
	C200H-B7AO1	

Current Drawn from 5-V Supply for Group-2 High-density I/O Units

Unit	Model number	Current consumption
DC Input	C200H-ID111	0.12 A
	C200H-ID216	0.1 A
	C200H-ID217	0.12 A
	C200H-ID218	0.1 A
	C200H-ID219	0.12 A
Transistor Output	C200H-OD218	0.18 A
	C200H-OD219	0.27 A
	C200H-OD21B	0.18 A

Current Drawn from 5-V Supply for Group-2 B7A Interface Units

Unit	Model number	Current consumption
B7A Interface Unit (Group-2 Units)	C200H-B7A12/02	0.10 A
	C200H-B7A21/22	

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Current Drawn from 5-V Supply for Special I/O Units

Unit	Model number	Current consumption
TTL Input	C200H-ID501	0.13 A
DC Input	C200H-ID215	
TTL Output	C200H-OD501	0.22 A
Transistor Output	C200H-OD215	
TTL I/O	C200H-MD501	0.18 A
DC Input/Transistor Output	C200H-MD115	
	C200H-MD215	
High-speed Counter	C200H-CT001-V1	0.30 A
	C200H-CT002	
	C200H-CT021	0.40
Position Control	C200H-NC111	0.15 A
	C200H-NC112	
	C200H-NC211	0.50 A
Analog Input	C200H-AD001	0.55 A
	C200H-AD002	0.45 A
Analog Output	C200H-DA001	0.65 A
	C200H-DA002	0.6 A
Temperature Control	C200H-TC001	0.33 A
	C200H-TC002	
	C200H-TC003	
	C200H-TC101	
	C200H-TC102	
	C200H-TC103	
Heat/Cool Temperature Control	C200H-TV001	0.33 A
	C200H-TV002	
	C200H-TV003	
	C200H-TV101	
	C200H-TV102	
	C200H-TV103	
PID Control	C200H-PID01	0.33 A
	C200H-PID02	
	C200H-PID03	
Temperature Sensor	C200H-TS001/TS002	0.45 A
	C200H-TS101/TS102	
ASCII	C200H-ASC02	0.20 A
Voice	C200H-OV001	0.30 A
ID Sensor	C200H-IDS01-V1	0.25 A
	C200H-IDS21	
Fuzzy Logic	C200H-FZ001	0.30 A
Cam Positioner	C200H-CP114	0.30 A

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Current Drawn from 5-V Supply for Other Units

Unit	Model number	Current consumption
Host Link	C200H-LK101-PV1	0.25 A
	C200H-LK201-V1	0.15 A
	C200H-LK202-V1	0.25 A
PC Link	C200H-LK401	0.35 A
Remote Master	C200H-RM001-PV1	0.20 A
	C200H-RM201	0.25 A
SYSMAC LINK Unit	C200HW-SLK13/SLK14/SLK23/ SLK24	0.8 A
SYSMAC NET Link Unit	C200HS-SNT32	1.0 A
Feed Adapter	C200H-APS01/ASP02/ASP03	0 A

Current Drawn from 26-V Supply

Unit	Model number	Current consumption
Contact Output	C200H-OC221/OC222/OC223/ OC224/OC225	0.075 A*
Transistor Output	C200H-OD216/OD217	
ID Sensor	C200H-IDS01-V1/IDS21	0.12 A

Note *With all eight outputs ON simultaneously.

Current Drawn from 24-V Supply

Unit	Model number	Current consumption
No-Voltage Contact Input Units	C200H-ID001/ID002	0.06 A

Calculation Examples

The total power consumption for each Rack can be obtained from the following formulas

$$\text{CPU Rack} = \frac{\text{Total power consumption for each Unit} + 7\ (8)}{0.6 \times 0.55\ (1)}\ \text{(VA)}$$

7 = CPU Unit power consumption, (8) = Power consumption of the CPU21-E/23-E
0.6 = 60% efficiency
0.55 (1) = Power rate (Number in parentheses: when CPU31-E is used.)

$$\text{All other Racks} = \frac{\text{Total power consumption for each Unit} + 2}{0.6 \times 0.55\ (1)}\ \text{(VA)}$$

2 = I/O Power Supply Unit (Remote I/O Slave Unit) power consumption
0.6 = 60% efficiency
0.55 (1) = Power rate (Number in parentheses: when PS211, RT002-P or RT202 is used.)

Example 1

Assume that four Contact Output Units, three No-Voltage Contact Input Units, and one Host Link Unit are mounted to a Rack, along with CPU21-E. The following table shows how the total power consumption is calculated.

Voltage	Current consumption	Power consumption
5 V	(1) 0.01 x 7 + 0.25 = 0.32 A (≤ 3.2 A)	(1) x 5 V = 1.6 W
26 V	(2) 0.075 x 4 = 0.30 A (≤ 0.6 A)	(2) x 26 V = 7.8 W
24 V	(3) 0.06 x 3 + 0.3 = 0.48 A (≤ 0.8 A)	(3) x 24 V = 11.52 W
Total	---	20.92 W (≤ 23 W)

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Example 2

Assume that six DC Input Units and two High-speed Counter Units are mounted to a Rack, along with the PS221 Power Supply. The following table shows how the total power consumption is calculated.

Voltage	Current consumption	Power consumption
5 V	(1) 0.01 x 6 + 0.3 x 2 = 0.66 A (≤ 2.7 A)	(1) x 5 V = 3.3 W
26 V	(2) 0	(2) 0
24 V	(3) Service power supply = 0.8 A (≤ 0.8A)	(3) x 24 V = 19.2 W
Total	---	22.5 W (≤ 28 W)

Example 3

Assume that the following Units are mounted to a Rack to which a C200H-CPU31-E is mounted. The following table shows how the total power consumption is calculated.

- SYSMAC LINK Units (SLK23): 1
- Contact Output Units (OC221): 4
- High-density Input Units (ID217): 1
- High-density Output Units (OD219): 1
- High-speed Counter Units (CT002): 1
- Current for ID217: 0.3 A

Voltage	Current consumption	Power consumption
5 V	(1) 0.6 + 0.01 x 4 + 0.12 + 0.27 + 0.3 = 1.33 A (≤ 3.0 A)	(1) x 5 V = 6.65 W
26 V	(2) 0.075 x 4=0.30 A (≤0.6 A)	(2) x 26 V = 7.8 W
24 V	(3) Service power supply = 0.3 A (≤ 0.8A)	(3) x 24 V = 7.2 W
Total	---	21.65 W (≤ 22 W)

Example 4

Assume that the following Units are mounted to a rack to which is mounted the C200H-CPU31-E. The following table shows how the total power consumption is calculated.

- SYSMAC NET Link Units (SNT32): 1
- Central Power Supply Adapter (Current 0): 1
- Contact Output Units (OC221): 2
- DC Input Units (ID212): 3
- High-speed Counter Units (CT002): 1
- Current for ID212: 0.4 A

Voltage	Current consumption	Power consumption
5 V	(1) 1.0 + 0.01 x 5 + 0.3 = 1.35 A (≤ 3.0 A)	(1) x 5 V = 6.75 W
26 V	(2) 0.075 x 2=0.15 A (≤0.6 A)	(2) x 26 V = 3.9 W
24 V	(3) Current=0.4 A(≤0.8 A)	(3) x 24 V = 9.6 W
Total	---	20.25 W (≤ 22 W)

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Calculation of Power Consumption for Each Rack (Examples)

The total power consumption for each Rack can be obtained from the following formulas:

- CPU Rack: $\frac{\text{Total power consumption for each Unit + 7 (8)}}{\text{0.6 x 0.55 (1)}}$ (VA)

  Where:
  7 = Power consumption of the CPU Unit,
  (8) = Power consumption of the CPU21-E/23-E,
  0.6 = 60% efficiency, and
  0.55 (1) = Power rate (Number in parentheses: when CPU31-E is used.)

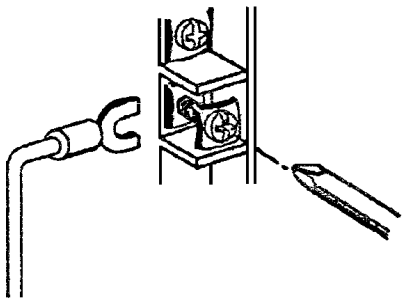
- Expansion I/O Power Supply/Remote I/O Slave Unit:

  $$\frac{\text{Total power consumption for each Unit + 2}}{\text{0.6 x 0.55 (1)}} \text{ (VA)}$$

  Where:
  2 = Power consumption of the I/O Power Supply or Remote I/O Slave Unit,
  0.6 = 60% efficiency, and
  0.55 (1) = Power rate (Number in parentheses: when PS211, RT002-P or RT202 is used.)

4-4 I/O Connections

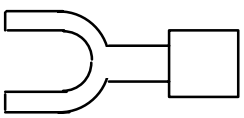
Connect the I/O Devices to the I/O Units using AWG 22 (cross-sectional area of 0.3 mm^2) for 19-terminal terminal blocks and AWG 22 to AWG 18 lead wire (cross-sectional area of 0.3 to 0.75 mm^2) for 10-terminal terminal blocks. The terminals have screws with 3.5-mm diameter heads and self-raising pressure plates. Connect the lead wires to the terminals as shown below. Tighten the screws with a torque of 0.8 N • m.

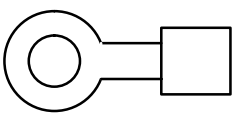


Power Supply Wiring

Use 1.25-mm^2 cables or larger. The terminal blocks have screws with 3.5-mm diameter heads and self-raising pressure plates. For connecting to the terminal blocks, use round crimp terminals for 3.5-mm diameter heads. Directly connecting stranded wires to the terminal blocks may cause a short-circuit.

Tighten the terminals on the terminal blocks to the torque of 0.8 N • m.

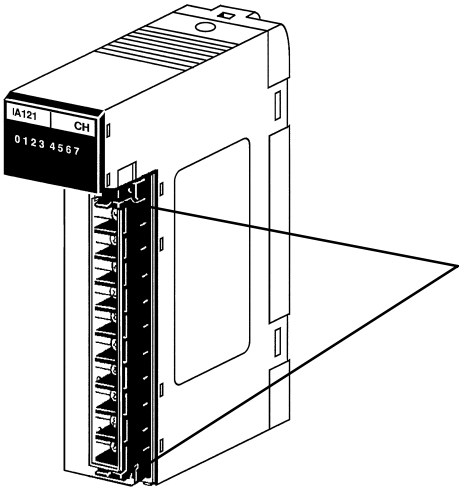




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Terminal Block

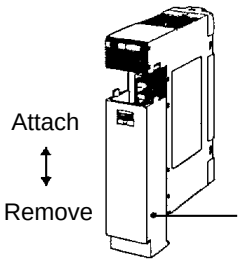
The terminal block of an I/O Unit can be removed by loosening the mounting screws. You do not have to remove the lead wires from the terminal block in order to remove it from an I/O Unit.



Locks for terminal block. Unlock to remove the terminal block from the I/O Unit. Make sure the terminal block is locked securely after wiring is complete.

I/O Unit Cover

A C200H-COV11 Cover is provided as an I/O Unit cover for Units that use 10P terminal block connectors. After the I/O wiring has been completed, slide the cover up from the bottom, as shown in the illustration below.



DC Two-wire Sensor Connection Precautions

If a two-wire sensor is used with a 12-VDC or 24-VDC input device, make sure that the following conditions are satisfied. Malfunctions will occur if these conditions are not satisfied.

- The relationship between the PC ON voltage and the sensor residual voltage is as follows:

  $V_{ON} \leq V_{CC} - V_R$

- The relationship between the PC ON current and the sensor control output (load current) is as follows:

  $I_{OUT\ (min)} \leq I_{ON} \leq I_{OUT\ (max)}$
  $I_{ON} = (V_{CC} - V_R - 1.5\ (\text{PC internal residual voltage}))/R_{IN}$
  Connect R bleeder resistance if I_{ON} is less than $I_{OUT\ (min)}$.
  The constant for bleeder resistance is determined by the following equation.

  $R \leq (V_{CC} - V_R)/(I_{OUT\ (min)} - I_{ON})$
  Power $W \geq (V_{CC} - V_R)^2/R \times 4$ (margin)

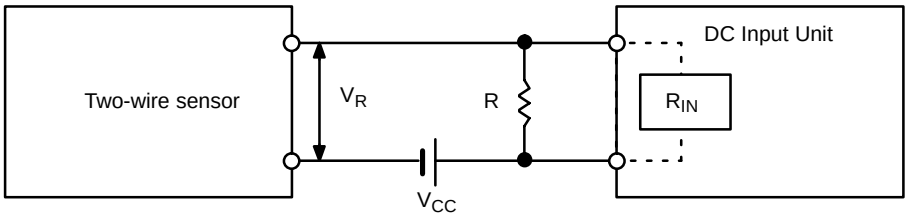
- The relationship between the PC OFF current and sensor leakage current is as follows:

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$I_{OFF} \geq I_{leak}$

Refer to the information on input and output leakage current shown below.

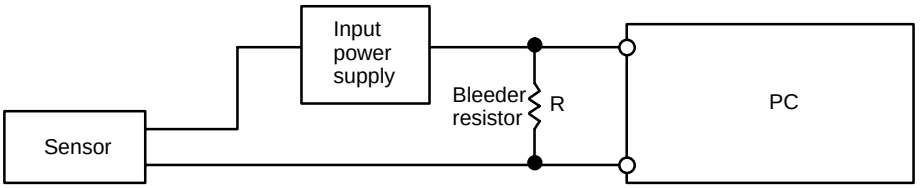
The value of I_{OFF} depends on the Unit used. For Input Units that have an unspecified OFF current, however, the value of I_{OFF} is always 1.8 mA.



V_{CC}:	Power supply voltage	V_R:	Sensor output residual voltage
V_{ON}:	PC ON voltage	I_{OUT}:	Sensor control output (load current)
I_{ON}:	PC OFF current	I_{leak}:	Sensor leakage current
I_{OFF}:	PC OFF current	R:	Bleeder resistance
R_{IN}:	PC input impedance		

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.

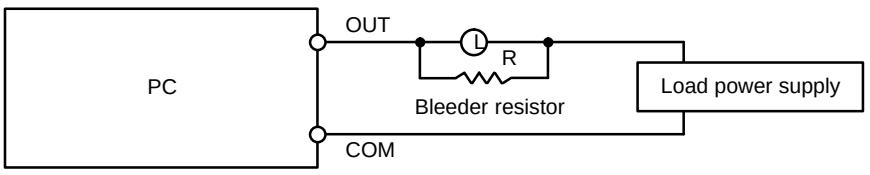
I = leakage current in mA

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

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

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.

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

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Where

E_{on} = ON voltage of the load

I = leakage current in mA

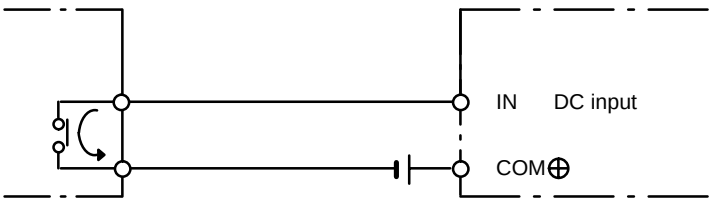
R = bleeder resistance

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*).

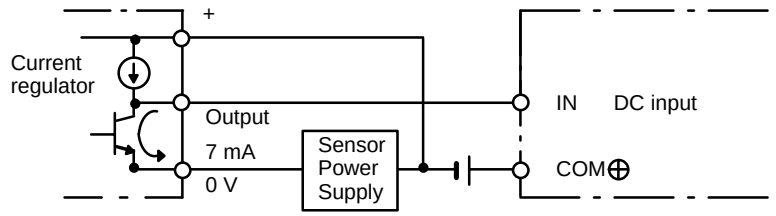
DC Input Units

Contact output

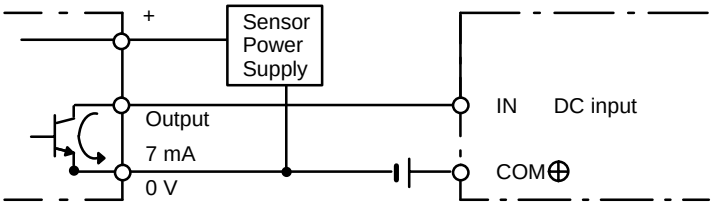


When using the NPN-current-output configuration shown below, the sensor and Input Unit should receive their power from the same supply.

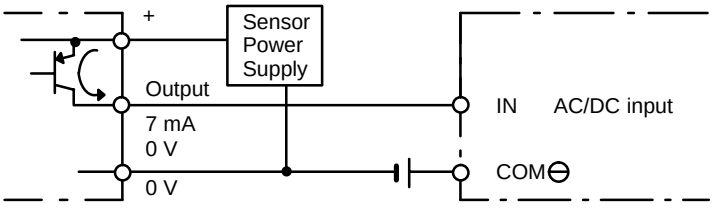
NPN current output



NPN open-collector output

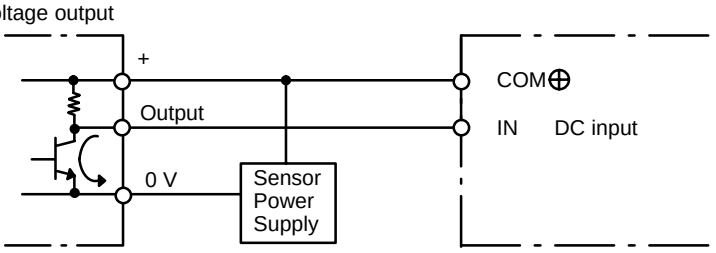


PNP current output



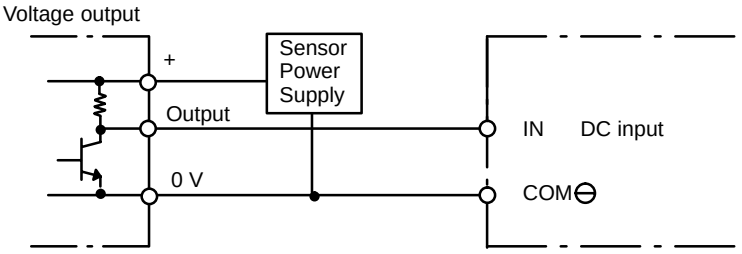
The circuit below should be used for I/O devices having a voltage output.

Voltage output

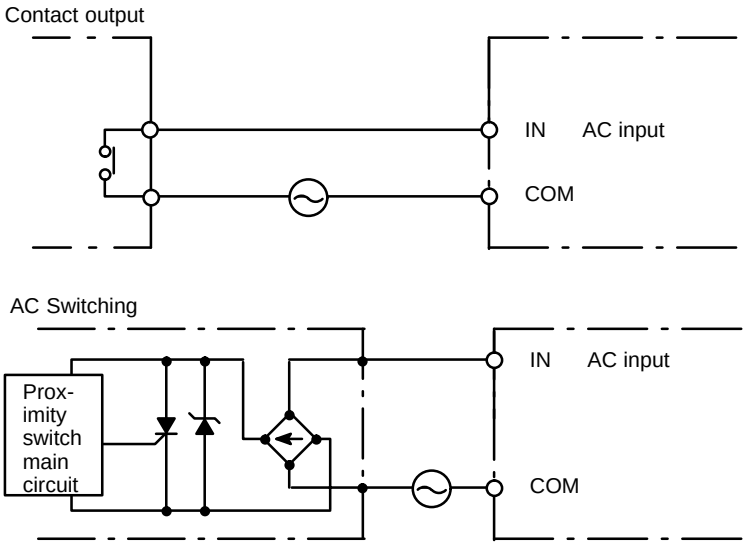


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The circuit below should **NOT** be used for I/O devices having a voltage output.



AC Input Units



Note When using a reed switch as an input contact for an AC Input Unit, the allowable current of the switch must be 1 A or greater. The contacts will be fused due to inrush current if reed switches with a lower current capacity are used.

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. Although some Units have a built-in fuse, it is recommended that you connect an external fuse to each Output Unit for extra safety and ease of maintenance.

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SECTION 5
Installation Environment

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 *2-4 Power Supply* and *3-3 System Configurations*.

5-1 Installation Environment 54
5-2 Mounting Requirements 55
5-3 Duct Work 57
5-4 Preventing Noise 58

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5-1 Installation Environment

This section details the necessary environmental conditions for installing the PC.

⚠ Caution Static electricity can damage 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 metal water pipe, in order to discharge any static build-up.

Ambient Conditions

Do not install the PC in any of the following locations. Doing so will affect PC life and may affect operating performance.

- Locations subject to ambient temperatures lower than 0°C or higher than 55°C.
- Locations subject to drastic temperature changes or condensation.
- Locations subject to ambient humidity lower than 10% or higher than 90%.
- Locations subject to corrosive or flammable gases.
- Locations subject to excessive dust (especially iron dust) or chloride.
- Locations that would subject the CPU Unit to direct shock or vibration.
- Locations that would subject the PC to water, oil, or chemical reagents.
- Locations exposed to direct sunlight.

Cooling

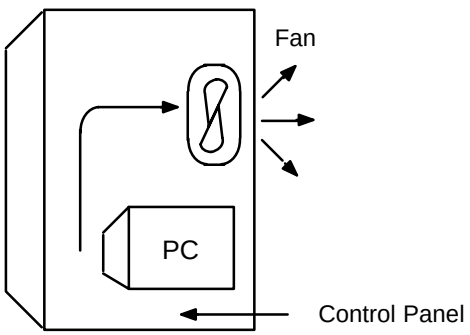
There are two points to consider in order to ensure that the PC does not overheat. The first is the clearance between Racks, and the second is installation of a cooling fan.

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 close enough to each other that the length of the Connecting Cable between any two Racks does not exceed 10 m, and the total length of the Connecting Cables between all Racks does not exceed 12 m. As a general rule, about 70 to120 mm should be left between any two Racks.

Cooling Fan

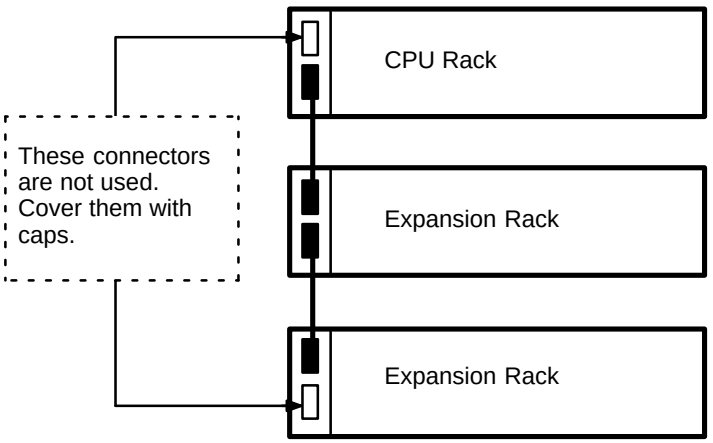
A cooling fan is not always necessary, but may be needed in some installations. Try to avoid mounting the PC in a warm area, or over a source of heat. A cooling fan is needed if the ambient temperature may become higher than that specified (refer to *Appendix B Specifications*). If the PC is mounted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



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5-2 Mounting Requirements

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

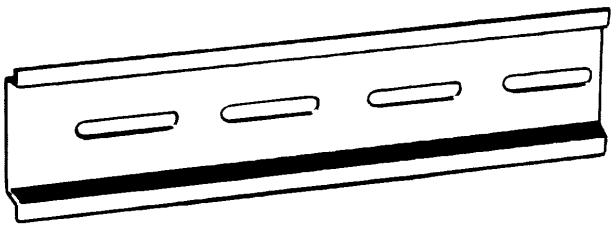


The C200H is approved by Underwriters Laboratories under the condition that, "The device must be mounted vertically for ventilation purposes."

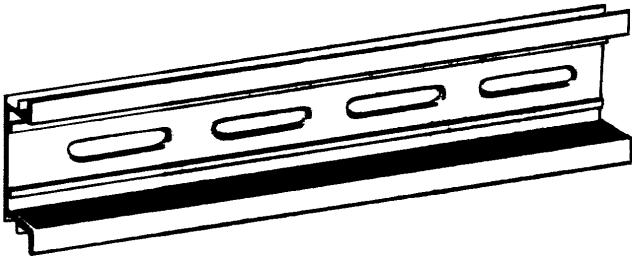
DIN Track Mounting

The PC may be mounted using DIN Track if desired. This type of mounting is not required, and the PC may be directly mounted to any sturdy support meeting the environmental specifications (refer to *Appendix B Specifications*). If you want to mount the PC on DIN Track, you can order a DIN Track from OMRON (refer to *Appendix A Standard Models*). DIN Tracks come in the two heights shown below.

7.3-mm Height



16-mm Height



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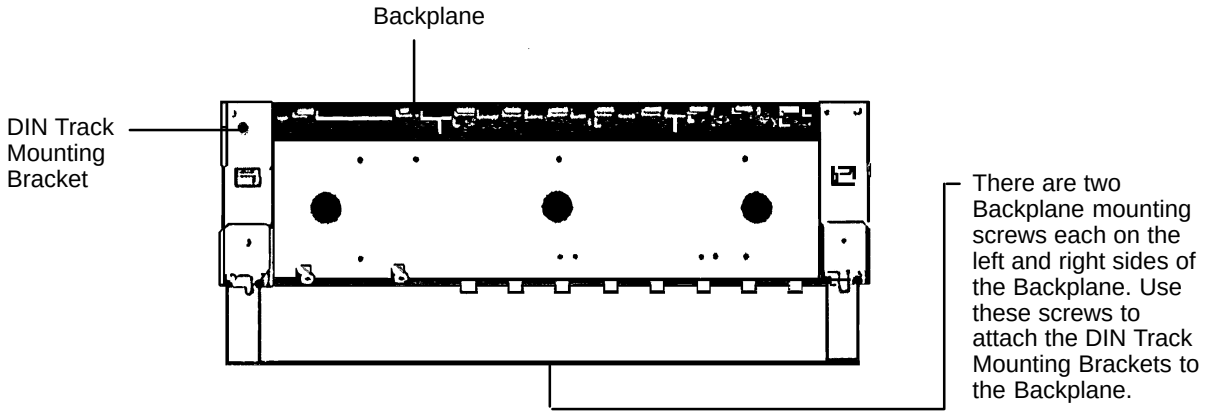
DIN Track Mounting Bracket The DIN Track Mounting Bracket shown below is necessary for mounting the PC to the DIN Track.



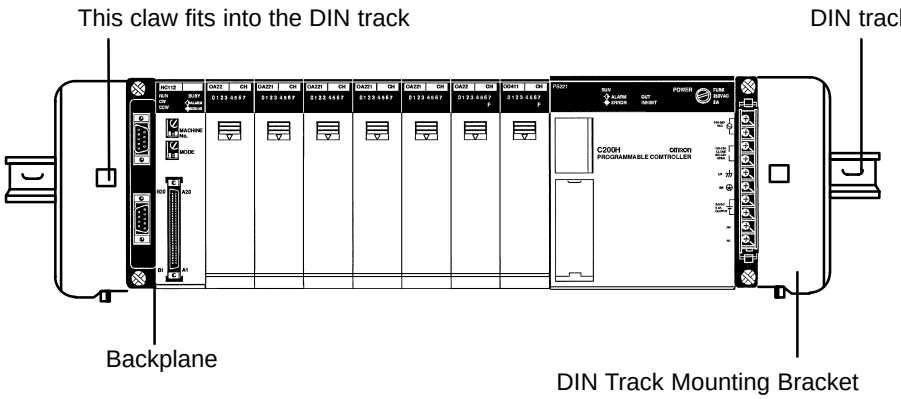
	Specification	Model
DIN Track Mounting Bracket	One set (two brackets)	C200H-DIN01
DIN	50 cm long, 7.3 mm high	PFP-50N
	1 m long, 7.3 mm high	PFP-100N
	1 m long, 16 mm high	PFP-100N2

Procedure

1, 2, 3... 1. The following diagram is a view of the back of the Backplane. Attach one Mounting Bracket to the left and right sides of the Backplane as shown below.

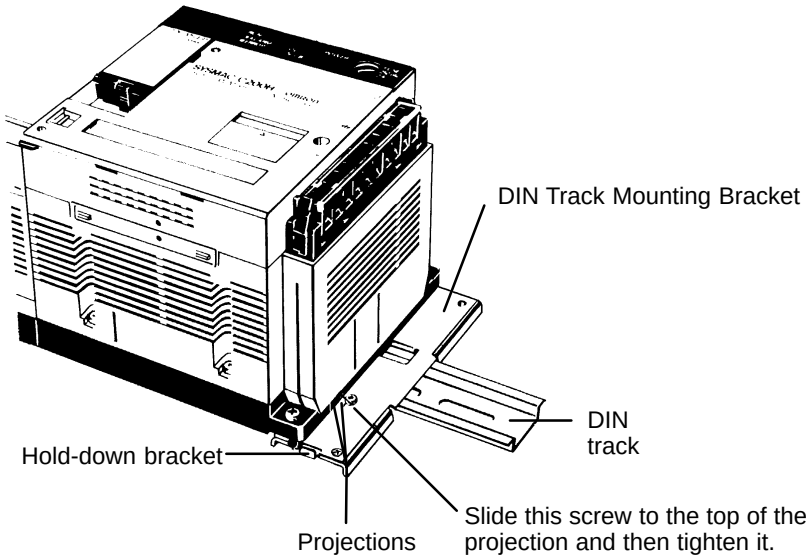


2. Mount the Backplane to the DIN Track so that the claws on the Mounting Brackets fit into the upper portion of the DIN Track as shown below.



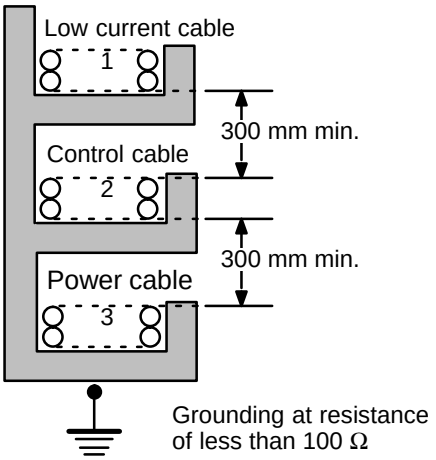
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3. Loosen the screws attaching the Mounting Brackets to the Backplane. Slide the Backplane upward as shown below so that the Mounting Bracket and Backplane clamp securely onto the DIN Track. Tighten the screws.



5-3 Duct Work

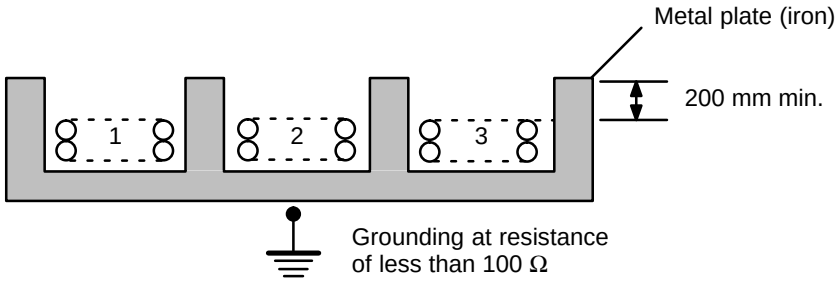
If power cables carrying more than 10 A 400 V, or 20 A 220 V must be run alongside the I/O wiring (that is, in parallel with it), at least 300 mm must be left between the power cables and the I/O wiring as shown below.



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

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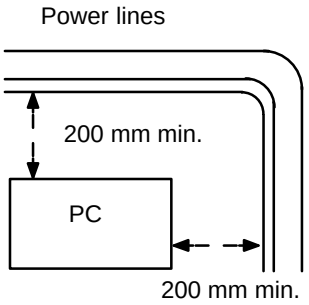
If the I/O wiring and power cables must be placed in the same duct (for example, where they are connected to the equipment), they must be shielded from each other using grounded metal plates.



Where: 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 of at least 2 mm^2). 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 in the following diagram.



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.

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SECTION 6
Power Considerations

Use a commercially available 100 to 120 VAC, 200 to 240 VAC, or 24 VDC power source, according to the model of 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.

6-1 Grounding 60
6-2 Insulation 60
6-3 Emergency Stop 60
6-4 Wiring 61

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6-1 Grounding

To avoid electrical shock, attach a grounded (earth ground) AWG 14 wire (cross-sectional area of at least 2 mm^2) 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.

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.

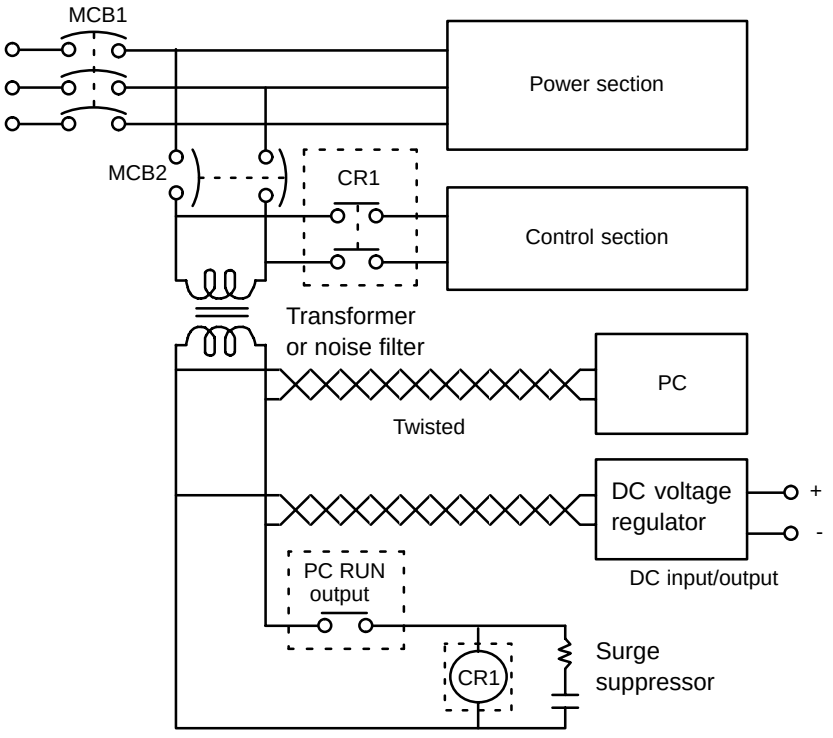
PC operation may be adversely affected if the ground wire is shared with other equipment, or if the ground wire is attached to the metal structure of a building. When using an Expansion I/O Rack, the Rack must also be grounded to the GR terminal. The same ground can be used for all connections.

6-2 Insulation

If a separate ground is being supplied to different Racks, Backplane Insulating Plates must be used to insulate the Racks from each other. Insulating Plates are supplied as an accessory (refer to *Appendix B Specifications*).

6-3 Emergency Stop

An external relay should be used to form an emergency stop circuit that turns the power to the PC OFF in the event of an emergency. An emergency stop routine in the PC program is not sufficient to ensure safety. The circuit shown below is an example of an emergency stop circuit.



Power Failure

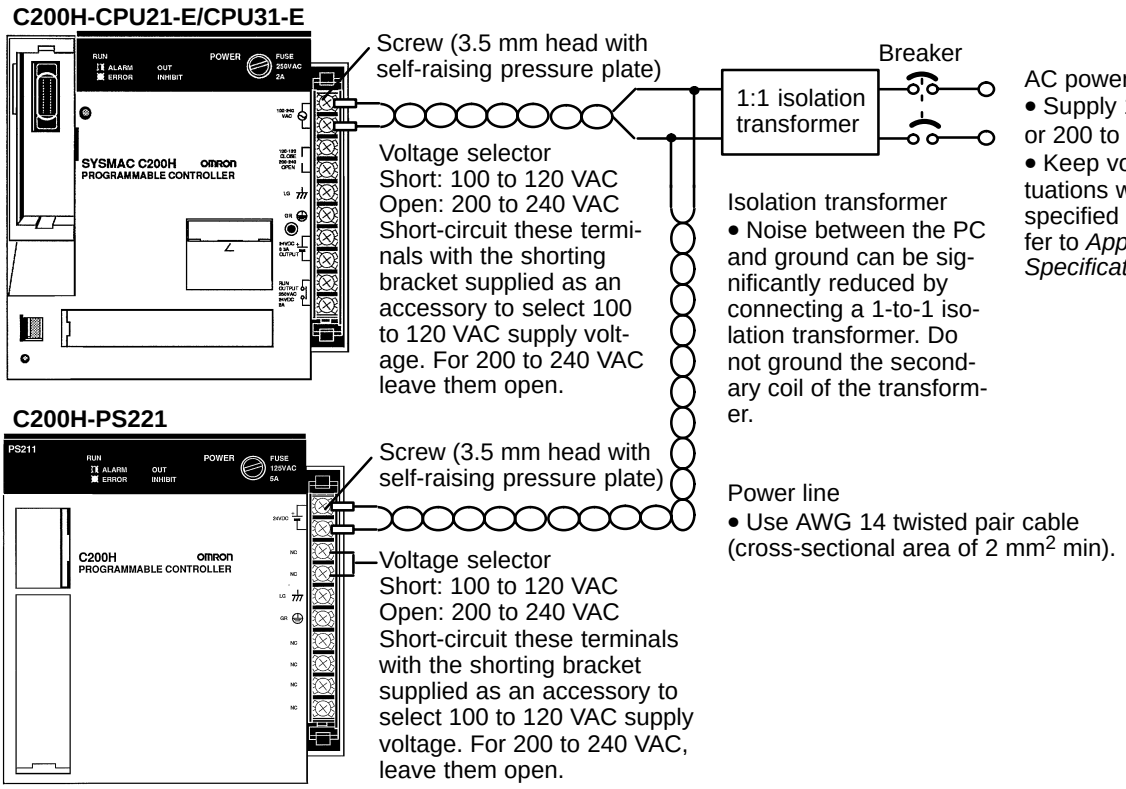
A sequential circuit is built into the PC to handle power interruptions. This circuit prevents malfunctions due to momentary power loss or voltage drops. A timing diagram for the operation of this circuit is shown below.

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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.

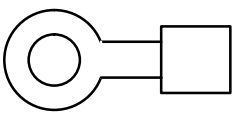
6-4 Wiring

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



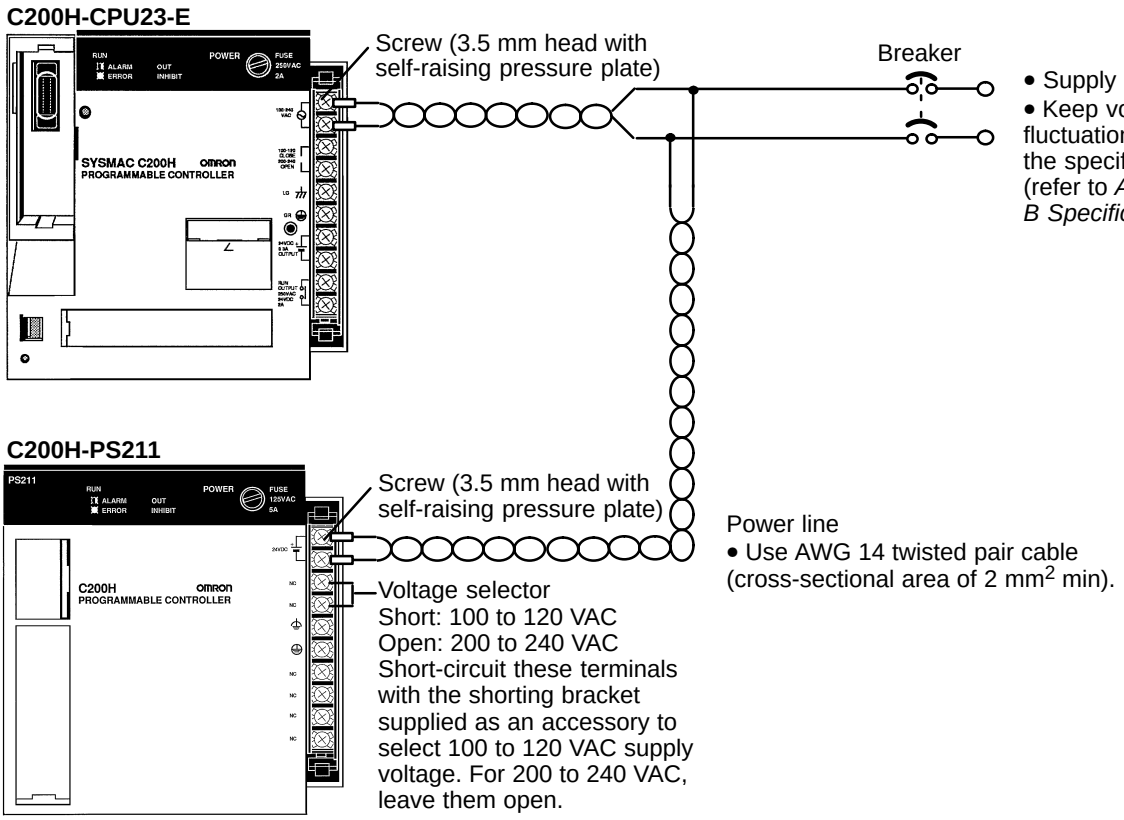
AC Power Supply Wiring

Use 1.25-mm^2 cables or larger. The terminal blocks have screws with 3.5-mm diameter heads and self-raising pressure plates. For connecting to the terminal blocks, use round crimp terminals for 3.5-mm diameter heads. Directly connecting stranded wires to the terminal blocks may cause a short-circuit.



⚠ Caution Tighten the AC Power Supply terminals on the terminal blocks to the torque of 0.8 N • m. Insufficient tightening may cause short-circuiting, malfunction, or burning.

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Power Supply Wiring

Use 1.25-mm^2 cables or larger. The terminal blocks have screws with 3.5-mm diameter heads and self-raising pressure plates. For connecting to the terminal blocks, use round crimp terminals for 3.5-mm diameter heads. Directly connecting stranded wires to the terminal blocks may cause a short-circuit.

Tighten the terminals on the terminal blocks to the torque of 0.8 N • m.



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SECTION 7
Safety Considerations

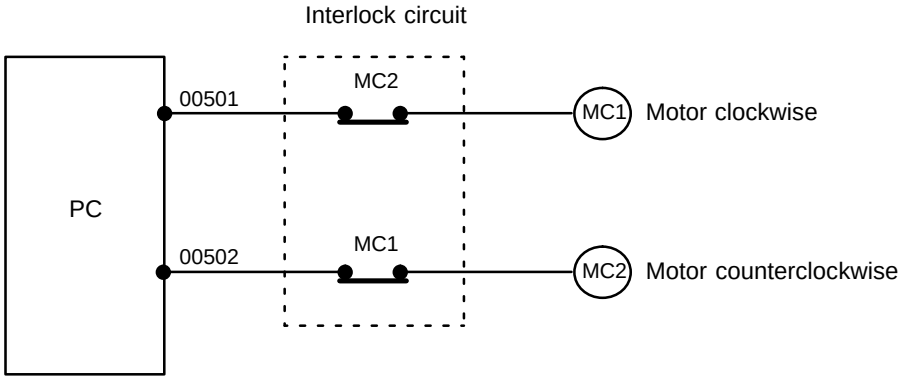
There are certain safety requirements to be considered when installing the PC. Some of these, such as the emergency stop circuit (refer to *Section 6 Power Considerations*), are part of the initial wiring. The considerations described below should be kept in mind when operating the PC and when connecting I/O devices to the PC.

7-1 Interlock Circuits 64
7-2 Power Supply Output 64
7-3 Input Circuits 64
7-4 Output Circuits 65
7-5 Electrical Noise 66

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7-1 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 ever both being ON at the same time. Even if the PC is programmed improperly or malfunctions, the motor is protected.

7-2 Power Supply Output

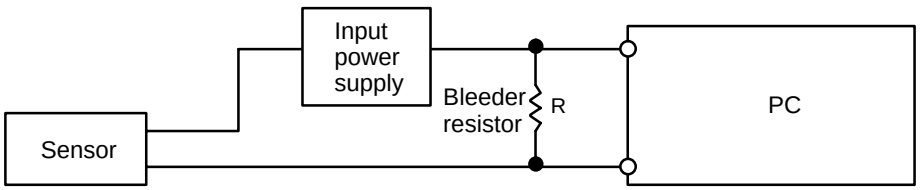
Power Supply Output

The 12 or 24 VDC output of the CPU Unit 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.

7-3 Input Circuits

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 resistance and power rating for the bleeder resistor using the following formulas.

For standard I/O Units:

I = leakage current in mA

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

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

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For High-density I/O Units:

I = leakage current in mA

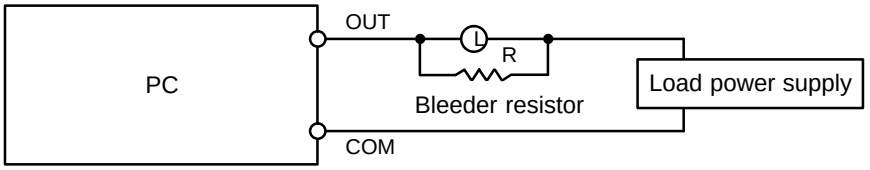
$$R = \frac{29.3}{5.9 \times I - 5} \quad k\Omega \text{ max.}$$

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

7-4 Output Circuits

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

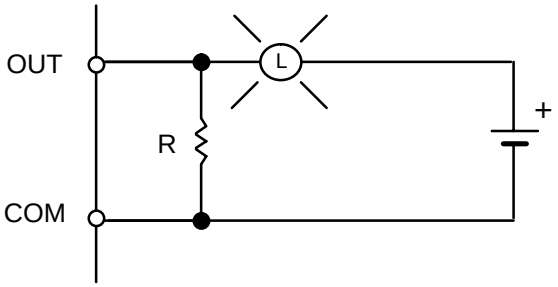
E_{on} = ON voltage of the load in V

I = leakage current in mA

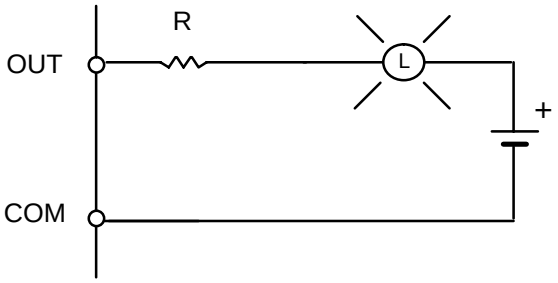
R = bleeder resistance in kΩ

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.



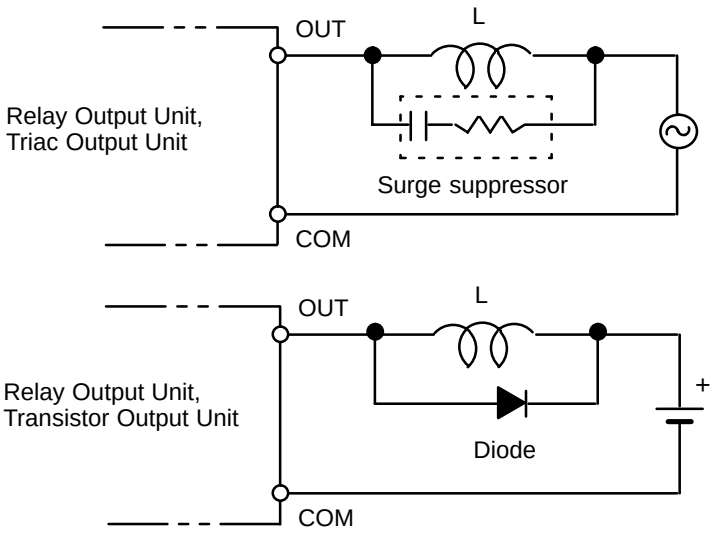
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Transistor Output Residual Voltage

When connecting TTL circuits to transistor Output Units, it is necessary to 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, it is necessary to connect a surge suppressor or diode in parallel with the load as shown below. This is so that the back EMF generated by the load will be absorbed.



7-5 Electrical Noise

Be sure to 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 off of 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, be sure to provide a solid ground the mounting plate. The mounting plate must be plated with a highly conductive surface in order to ensure noise immunity.

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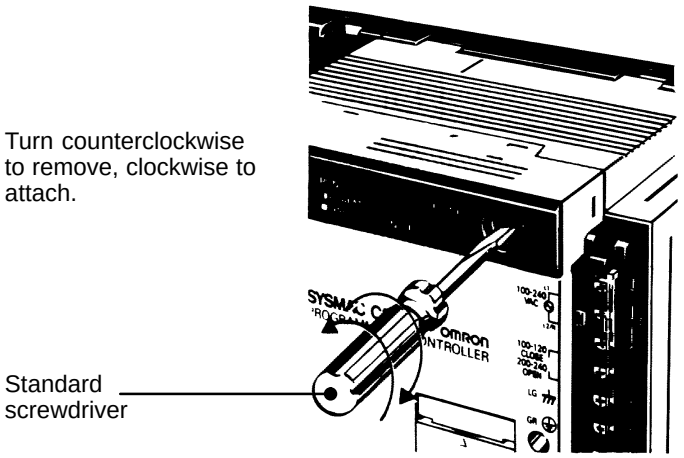
SECTION 8
Inspection and Maintenance

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

8-1 CPU Unit and Power Supply Fuses 68
8-2 Output Unit Fuses 68
8-3 Output Unit Relays 69
8-4 Batteries 71

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8-1 CPU Unit and Power Supply Fuses



To replace a fuse, follow the steps below:

1, 2, 3...

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.

8-2 Output Unit Fuses

To replace a fuse, follow the steps below. Use only UL/CSA certified replacement fuses.

Fuse Specifications (5.2-dia. x 20)

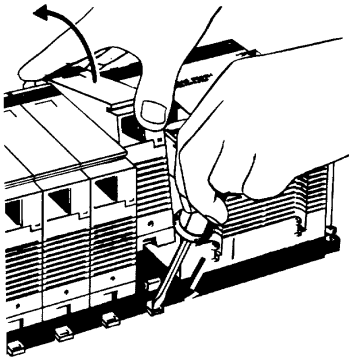
Model	F indicator (fuse blowout detection circuit)	Rating
C200H-OD411	Yes	5 A 125 V
C200H-OD211	No	
C200H-OD212	No	8 A 125 V
C200H-OD213	Yes	
C200H-OA121-E	Yes	5 A 125 V
C200H-OA122-E	Yes	
C200H-OA221	Yes	5 A 250 V
C200H-OA222V	No	3 A 250 V
C200H-OA223	Yes	5 A 250 V
C200H-OA224	No	3.15 A 250 V

1, 2, 3...

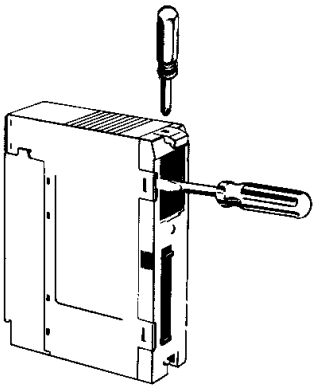
1. Turn OFF the power to the PC.
2. Detach the terminal block by unlocking the lock levers at the top and bottom of the terminal block.

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3. While pushing down the lock lever on the Backplane with a screwdriver as shown below, remove the Output Unit.



4. Using a Phillips screwdriver, remove the screw from the top of the Unit.
5. Using a flat-blade screwdriver, detach the case from the Unit.



6. Pull out the printed circuit board.
7. Insert a new fuse. A spare fuse is provided inside the rear of the case when the Unit is delivered.
8. Reassemble in reverse order of assembly.

Note
1. In North America, use UL or CSA approved fuses.
2. Fuses in High-density I/O Units cannot be replaced by the user. Refer to your OMRON dealer for service.

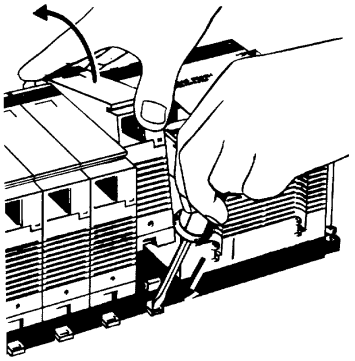
8-3 Output Unit Relays

To replace a Relay, follow the steps below:

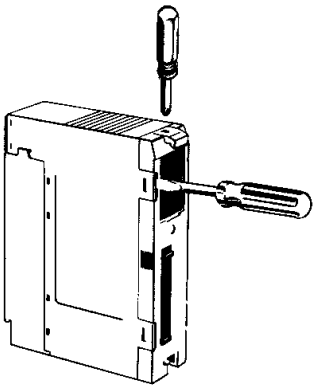
1, 2, 3...
1. Turn OFF the power to the PC.
2. Detach the terminal block by unlocking the lock levers at the top and bottom of the terminal block.

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3. While pushing down the lock lever on the Backplane with a screwdriver as shown below, remove the Output Unit.

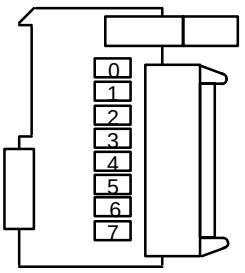


4. Using a Phillips screwdriver, remove the screw from the top of the Unit.
5. Using a flat-blade screwdriver, detach the case from the Unit.

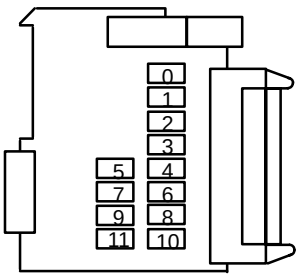


6. Pull out the printed circuit board. The Relays are placed on the PC boards of individual Units as shown in the figures below.

OC221/OC224

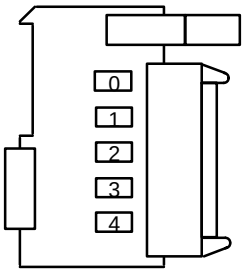


OC222

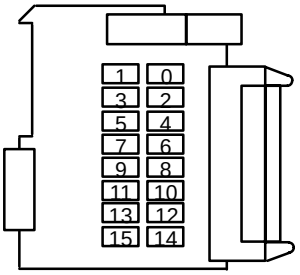


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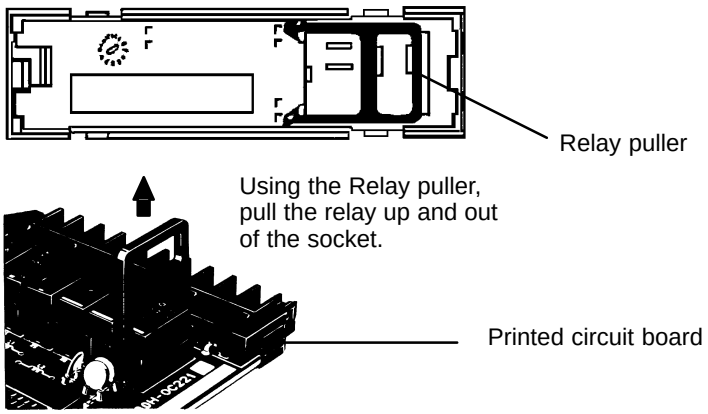
OC223



OC225



7. A Relay puller is provided inside the rear of the case when the Unit is delivered. Use the Relay puller to pull out the Relay as shown below. Insert a new Relay.



8. Reassemble in reverse order of assembly.

8-4 Batteries

Some RAM Units use a battery (refer to *Appendix B* for specifications). When the battery is nearly discharged, the ALARM indicator blinks and the message “BATT FAIL” appears on the Programming Console. When this occurs, replace the battery within one week to avoid loss of data. The battery comes together with its 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.

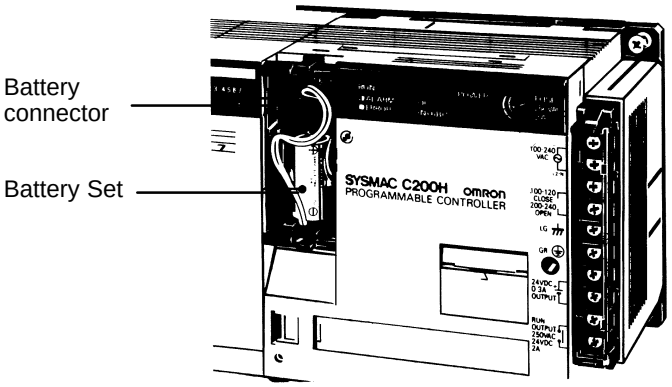
If you are using model C200H-CPU31-E as the CPU Unit, the battery is installed in the Unit upon delivery.

1, 2, 3...

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.)

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2. Remove the cover from the battery compartment of the RAM Unit.
3. Remove the old Battery Set.
4. Install the new Battery Set as shown shown in the following diagram.



5. Replace the cover of the battery compartment.
6. Press CLR, FUN, MONTR, MONTR or just turn the power to the PC OFF and then ON again to clear the error message on the Programming Console.

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Appendix A
Standard Models

C200H Racks

Name		Specifications		Model number
Backplane (same for all Racks)		10 slots		C200H-BC101-V2
		8 slots		C200H-BC081-V2
		5 slots		C200H-BC051-V2
		3 slots		C200H-BC031-V2
CPU Rack	CPU Units	w/built-in power supply (100 to 120/200 to 240 VAC); Output current: 4.6 A (3.2 A to I/O Units)		C200H-CPU21-E
		w/built-in power supply (24 VDC); Output current: 3 A (1.6 A to I/O Units)		C200H-CPU23-E
		w/built-in power supply (100 to 120/200 to 240 VAC); Output current: 4.6 A (3.0 A to I/O Units); Can support SYSMAC NET Link/SYSMAC LINK Units.		C200H-CPU31-E
	Memory Units	CMOS-RAM Units; battery back-up	UM: 3K words; DM: 1K words	C200H-MR431
			UM: 7K words; DM: 1K words	C200H-MR831
		CMOS-RAM Units; battery back-up; with clock	UM: 3K words; DM: 1K words	C200H-MR433
			UM: 7K words; DM: 1K words	C200H-MR833
		CMOS-RAM Units; capacitor back-up	UM: 3K words; DM: 1K words	C200H-MR432
			UM: 7K words; DM: 1K words	C200H-MR832
		EPROM Unit (EPROM ordered separately)	UM: 7K words; DM: 1K words	C200H-MP831
		EEPROM Units	UM: 3K words; DM: 1K words	C200H-ME431
			UM: 7K words; DM: 1K words	C200H-ME831
		EEPROM Units with clock	UM: 3K words; DM: 1K words	C200H-ME432
			UM: 7K words; DM: 1K words	C200H-ME832
	EPROM	27128; 150 ns; write voltage: 12.5 V		ROM-ID-B
Expansion I/O Racks	I/O Power Supply Units	100 to 120/200 to 240 VAC (selectable)		C200H-PS221
		24 VDC		C200H-PS211
	I/O Connecting Cables (max. total length: 12 m)	30 cm		C200H-CN311
		70 cm		C200H-CN711
		2 m		C200H-CN221
		5 m		C200H-CN521
		10 m		C200H-CN131

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C200H Standard I/O Units

Name		Specifications		Model number
Input Units	AC Input Units	8 pts	100 to 120 VAC	C200H-IA121
		16 pts	100 to 120 VAC	C200H-IA122/IA122V
		8 pts	200 to 240 VAC	C200H-IA221
		16 pts	200 to 240 VAC	C200H-IA222/IA222V
	DC Input Units	8 pts	No-voltage contact; NPN	C200H-ID001
		8 pts	No-voltage contact; PNP	C200H-ID002
		8 pts	12 to 24 VDC	C200H-ID211
		16 pts	24 VDC	C200H-ID212
	AC/DC Input Units	8 pts	12 to 24 VAC/DC	C200H-IM211
		16 pts	24 VAC/DC	C200H-IM212
Output Units	Relay Output Units	8 pts	2 A, 250 VAC/24 VDC (For resistive loads)	C200H-OC221
		12 pts	2 A, 250 VAC/24 VDC (For resistive loads)	C200H-OC222
		16 pts	2 A, 250 VAC/24 VAC (For resistive loads)	C200H-OC225[1, 2]
		5 pts	2 A, 250 VAC/24 VDC (For resistive loads) Independent commons	C200H-OC223
		8 pts	2 A, 250 VAC/24 VDC (For resistive loads) Independent commons	C200H-OC224
	Triac Output Units	8 pts	1 A, 120 VAC	C200H-OA121-E
		8 pts	1.2 A, 120 VAC	C200H-OA122-E
		8 pts	1 A, 250 VAC	C200H-OA221
		8 pts	1.2 A 250 VAC	C200H-OA223
		12 pts	0.3 A, 250 VAC	C200H-OA222V
		12 pts	0.5 A, 250 VAC	C200H-OA224
	Transistor Output Units	8 pts	1 A, 12 to 48 VDC	C200H-OD411
		12 pts	0.3 A, 24 VDC	C200H-OD211
		16 pts	0.3 A, 24 VDC	C200H-OD212[1]
		8 pts	2.1 A, 24 VDC	C200H-OD213
		8 pts	0.8 A, 24 VDC; source type (PNP); with load short protection	C200H-OD214
		8 pts	0.3 A, 5 to 24 VDC; source type (PNP)	C200H-OD216
		12 pts	0.3 A, 5 to 24 VDC; source type (PNP)	C200H-OD217
		12 pts	1 A, 24 VDC; source type (PNP); with load short protection	C200H-OD21A
Analog Timer Unit		4 timer pts	0.1 to 1 s, 1 to 10 s, 10 to 60 s, or 1 min to 10 min (switchable)	C200H-TM001
	Variable Resistor Connector (Related Product)		Connector with lead wire (2 m) for 1 external resistor	C4K-CN223
Standard B7A Interface Units		16 input pts	Connects to B7A Link Terminals.	C200H-B7AI1
		16 output pts		C200H-B7AO1[1]

Note 1. C200H-OD212/OD21A Transistor Output Unit, C200H-OC225 Contact Output Unit and C200H-B7AO1 B7A Interface Unit must be mounted to either a C200H-BC031-V1/V2, C200H-BC051-V1/V2, C200H-BC081-V1/V2, or C200H-BC101-V1/V2 Backplane.

2. The C200H-OC225 might overheat if more than 8 outputs are turned ON simultaneously.

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C200H Group-2 High-density I/O Units

Name	Specifications		Model number
DC Input Unit	64 pts	12 VDC	C200H-ID111
	32 pts.	24 VDC	C200H-ID216
	64 pts.	24 VDC	C200H-ID217
Transistor Output Units	32 pts.	16 mA 4.5 VDC to 100 mA 26.4 VDC	C200H-OD218
	64 pts.	16 mA 4.5 VDC to 100 mA 26.4 VDC	C200H-OD219

C200H Group-2 B7A Interface Units

Name	Specifications		Model number
Group-2 B7A Interface Units	32 input pts	Connects to B7A Link Terminals.	C200H-B7A12
	32 output pts		C200H-B7A02
	16 input pts and 16 output points		C200H-B7A21
	32 input pts and 32 output points		C200H-B7A22

C200H Special I/O Units

All of the following are classified as Special I/O Units except for the ASCII Unit, which is an Intelligent I/O Unit.

Name		Specifications		Model number
High-density I/O Units	DC Input Units	32 pts	5 VDC (TTL inputs); with high-speed input function	C200H-ID501
		32 pts	24 VDC; with high-speed inputs	C200H-ID215
	Transistor Output Units	32 pts	0.1 A, 24 VDC (usable as 128-point dynamic output unit)	C200H-OD215
		32 pts	35 mA, 5 VDC (TTL outputs) (usable as 128-point dynamic output unit)	C200H-OD501
	DC Input/ Transistor Output Units	16 input/ 16 output pts	12-VDC inputs; with high-speed input function 0.1 A , 12-VDC outputs (usable as 128-point dynamic input unit)	C200H-MD115
		16 input/ 16 output pts	24-VDC inputs; with high-speed input function 0.1 A , 24-VDC outputs (usable as 128-point dynamic input unit)	C200H-MD215
		16 input/ 16 output pts	5 VDC (TTL inputs); with high speed input function 35 mA, 5 VDC Output (TTL outputs) (usable as 128-point dynamic input unit)	C200H-MD501
Analog I/O Units	Analog Input Units	4 to 20 mA, 1 to 5/0 to 10 V; 4 inputs		C200H-AD001
		4 to 20 mA, 1 to 5/0 to 10/–10 to 10 V; 8 inputs		C200H-AD002
	Analog Output Unit	4 to 20 mA, 1 to 5/0 to 10 V; 2 outputs		C200H-DA001
		4 to 20 mA, –10 to 10 V; 4 outputs		C200H-DA002
Temperature Sensor Units		Thermocouple (K(CA) or J(IC)) (switchable); 4 inputs		C200H-TS001
		Thermocouple (K(CA) or L(Fe-CuNi)) (switchable); 4 inputs		C200H-TS002
		Platinum resistance thermometer (JPt) (switchable), DIN standards; 4 inputs		C200H-TS101
		Platinum resistance thermometer (Pt) (switchable); 4 inputs		C200H-TS102
Temperature Control Units		Thermocouple	Transistor output	C200H-TC001
			Voltage output	C200H-TC002
			Current output	C200H-TC003
		Platinum resistance thermometer	Transistor output	C200H-TC101
			Voltage output	C200H-TC102
			Current output	C200H-TC103

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Name	Specifications		Model number
Heat/Cool Temperature Control Units	Thermocouple	Transistor output	C200H-TV001
		Voltage output	C200H-TV002
		Current output	C200H-TV003
	Platinum resistance thermometer	Transistor output	C200H-TV101
		Voltage output	C200H-TV102
		Current output	C200H-TV103
PID Control Units	Transistor output (open collector); 4 to 20 mA/1 to 5 V/0 to 5V/0 to 10 V inputs (selectable)		C200H-PID01
	Voltage output; 4 to 20 mA/1 to 5 V/0 to 5V/0 to 10 V inputs (selectable)		C200H-PID02
	Current output; 4 to 20 mA/1 to 5 V/0 to 5V/0 to 10 V inputs (selectable)		C200H-PID03
Position Control Units	1 axis	Pulse output; speeds: 1 to 100,000 pps	C200H-NC111
	1 axis	Pulse output; directly connectable to servomotor driver; compatible with line driver; speeds: 1 to 250,000 pps	C200H-NC112
	2 axis	Pulse output; 1 to 250,000 pps, 53 pts per axis	C200H-NC211
Cam Positioner Unit	Detects angles of rotation by means of a resolver and provides ON and OFF outputs at specified angles. A maximum of 48 cam outputs (16 external outputs and 32 internal outputs) maximum are available.		C200H-CP114
High-speed Counter Units	1 axis	Pulse input; counting speed: 50 kcps; 5 VDC/12 VDC/24 VDC	C200H-CT001-V1
	1 axis	Pulse input; counting speed: 75 kcps; RS-422 line driver	C200H-CT002
	2 axis	Pulse input; counting speed: 75 kcps; RS-422 line driver; 7-digit BCD	C200H-CT021
ASCII Unit	24K-byte RAM and 24K-byte EEPROM are built-in.		C200H-ASC02
Connecting Cable	RS-232C For connecting the ASCII Unit to the FIT10 (9P/25P) Cable length: 2 m		CV500-CN228
ID Sensor Units	Local application, electromagnetic coupling		C200H-IDS01-V1
	Remote application, microwave transmissions		C200H-IDS21
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□□
Voice Unit	60 messages max.; message length: 32, 48, or 64 s (switchable)		C200H-OV001
Connecting Cable	RS-232C For connecting the Voice Unit to the FIT10 (6P/25P) Cable length: 2 m		C200H-CN224
Fuzzy Logic Unit	Up to 8 inputs and 4 outputs. (I/O to and from specified data area words)		C200H-FZ001

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*.

C200H Link Units

Name	Specifications			Model number
Host Link Units	Rack-mounting	C200H only	APF/PCF	C200H-LK101-PV1
			RS-422	C200H-LK202-V1
			RS-232C	C200H-LK201-V1
	CPU Unit-mounting	C1000H/C2000H	PCF	3G2A6-LK101-EV1
		C500	APF/PCF	3G2A6-LK101-PEV1

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Name	Specifications			Model number
		C200H C120	RS-232C	3G2A6-LK201-EV1
			RS-422	3G2A6-LK202-EV1
PC Link Unit	Single level: 32 Units Multilevel: 16 Units		RS-485	C200H-LK401
Remote I/O Master Units	Up to two per PC; connectable to up to 5 Slaves per PC total		APF/PCF	C200H-RM001-PV1
			Wired	C200H-RM201
Remote I/O Slave Units	100 to 120/200 to 240 VAC (switchable)		APF/PCF	C200H-RT001-P
	24 VDC			C200H-RT002-P
	100 to 120/200 to 240 VAC (switchable)		Wired	C200H-RT201
	24 VDC			C200H-RT202

Optional Products

Name	Specifications		Model number
I/O Unit Cover	Cover for 10-pin terminal block		C200H-COV11
Terminal Block Covers	Short protection for 10-pin terminal block (package of 10 covers); 8 pts		C200H-COV02
	Short protection for 19-pin terminal block (package of 10 covers); 12 pts		C200H-COV03
Connector Cover	Protective cover for unused I/O Connecting Cable connectors		C500-COV01
Space Unit	Used for vacant slots		C200H-SP001
Battery Set	For: C200H-MR□31/MR□33 RAM Memory Units C200H-ME□32 EEPROM Memory Unit C200H-CPU31-E CPU Unit		C200H-BAT09
Relay	24 VDC		G6B-1174P-FD-US DC24
Backplane Insulation Plates	For 10-slot Backplane		C200H-ATTA1
	For 8-slot Backplane		C200H-ATT81
	For 5-slot Backplane		C200H-ATT51
	For 3-slot Backplane		C200H-ATT31
I/O Brackets	For 5-slot Backplane		C200H-ATT53
	For 8-slot Backplane		C200H-ATT83
	For 3-slot Backplane		C200H-ATT33
Memory Unit Lock Fitting	To secure Memory Unit to CPU Unit		C200H-ATT03
External Connectors	Solder terminal; 40 pin with connector cover	Straight type	C500-CE401
		Right-angle type	C500-CE404
	Solderless terminal (crimp-type); 40 pin with connector cover	Straight type	C500-CE402
		Right-angle type	C500-CE405
	Pressure welded terminal; 40 pin		C500-CE403
	Solder terminal; 24 pin with connector cover		C500-CE241
	Solderless terminal; 24 pin with connector cover (crimp-type)		C500-CE242
	Pressure welded terminal; 24 pin		C500-CE243

Note 1. When ordering, specify the model name (any component of which is not sold separately).
2. Order the pressfit tool from the manufacturer.

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Optical Units

Name		Specifications			Model no.
Optical I/O Units	No-voltage Input Units	8 pts.	100 to 120 VAC power supply	APF/PCF	3G5A2-ID001-PE
				PCF	3G5A2-ID001-E
	AC/DC Input Units	12 to 24 VAC/DC 8 pts.		APF/PCF	3G5A2-IM211-PE
				PCF	3G5A2-IM211-E
	AC Input Units	100 to 120 VAC 8 pts.		APF/PCF	3G5A2-IA121-PE
				PCF	3G5A2-IA121-E
	Relay Output Units	2A, 250 VAC/24 VDC (w/relay socket) 8 pts.	100 to 120/200 to 240 VAC power supply	APF/PCF	3G5A2-OC221-PE
				PCF	3G5A2-OC221-E
	Triac Output Units	1A, 100 to 120/200 to 240 VAC (w/built-in surge killer) 8 pts.		APF/PCF	3G5A2-OA222-PE
				PCF	3G5A2-OA222-E
Repeater Units		Connected between 32nd and 33rd Units when connecting more than 33 Units in a Remote Subsystem; power supply: 85 to 250 VAC.		APF/PCF	3G5A2-RPT01-PE
				PCF	3G5A2-RPT01-E

Link Adapters

Name	Specifications	Model no.
Link Adapters	3 RS-422 connectors	3G2A9-AL001
	3 optical connectors (APF/PCF)	3G2A9-AL002-PE
	3 optical connectors (PCF)	3G2A9-AL002-E
	1 connector each for APF/PCF, RS-422, and RS-232C	3G2A9-AL004-PE
	1 connector each for PCF, RS-422, and RS-232C	3G2A9-AL004-E
	1 connector each for APF/PCF and APF	3G2A9-AL005-PE
	1 connector each for PCF and AGF	3G2A9-AL005-E
	O/E converter; 1 connector for RS-485, 1 connector each for APF/PCF	B500-AL007-PE
	Used for on-line removal of FIT or SYSMAC NET Link Units from the SYSMAC NET Link System, SYSMAC NET Optical Link Adapter 3 connectors for APF/PCF.	B700-AL001

DIN Products

Name	Specifications	Model number
DIN Track Mounting Bracket	1 set (2 included)	C200H-DIN01
DIN Track	Length: 50 cm; height: 7.3 cm	PFP-50N
	Length: 1 m; height: 7.3 cm	PFP-100N
	Length: 1 m; height: 16 mm	PFP-100N2
End Plate	---	PFP-M
Spacer	---	PFP-S

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Optical Fiber Cable

Plastic Optical Fiber Cable (APF) APF stands for "All-Plastic Fiber." This cable can be used to connect only Units having the suffix "-P" in their model number. The maximum length is 20 m. The 3G5A2-PF002 cable comes without connectors and must be assembled by the user.

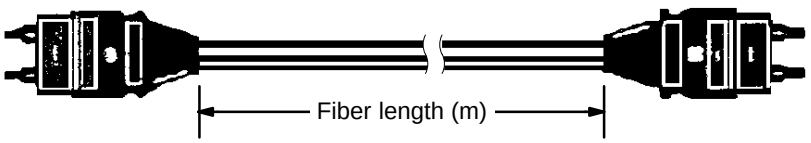
Product	Description	Model no.
Plastic Optical Fiber Cable	Cable only (optical connectors not provided) Order in units of 5 m for cable less than 100 m, or in units of 200 m or 500 m.	3G5A2-PF002
Optical Connector A	2 pcs (brown),for plastic Optical fiber 10 m long max.	3G5A2-CO001
Optical Connector B	2 pcs (black) for plastic Optical fiber 8 to 20 m long	3G5A2-CO002
Plastic Optical Fiber Cable	1 m, w/optical connector A provided at both ends	3G5A2-PF101
Optical Fiber Processing Kit	Accessory: 125-mm nipper (Muromoto Tekko's 550M) for APF	3G2A9-TL101

Plastic-Clad Optical Fiber Cable (PCF) PCF stands for "Plastic-Clad Fiber." This cable can be used to connect any Units. The maximum length for Units having the suffix "-P" in their model number is 200 m. The maximum length for Units without the suffix "-P" in their model number is 800 m.

Product	Description		Model no.
Optical Fiber Cables (for indoors)	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 (for outdoors)	1 to 500 m (Order in Units of 10 m)	Ambient temperature: –10° to 70°C	3G5A2-OF002
	501 to 800 m (Order in Units of 10 m)	Ambient temperature: 0° to 55°C (Must not be subjected to direct sunlight)	

Crystal Optical Fiber Cable (AGF) AGF stands for "All-Glass Fiber." Crystal optical fiber cable is not available from OMRON.

Cable Length The connectors may be difficult to attach to the cables. Therefore, always leave a little extra length when cutting the cable. The lengths given for pre-assembled cables are as shown below.



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Peripheral Devices

Name	Specifications		Model number
Hand-held Programming Console	Vertical, w/backlight Connecting cable required; sold separately		C200H-PRO27-E
Data Access Console	Vertical, w/backlight Connecting cable required; sold separately		C200H-DAC01-E
Programming and Data Access Console Connecting Cables	For handheld console, 2 m		C200H-CN222
	For handheld console, 4 m		C200H-CN422
Panel Mounting Bracket	Mounts Hand-held Programming Console or Data Access Console to a panel.		C200H-ATT01
Programming Console Mounting Bases	Used to mount 16- or 32-point I/O Units to rightmost two slots when mounting peripherals directly to CPU Unit.	29-mm height	C200H-BP001
		49-mm height	C200H-BP002
Data Setting Console	Used for data input and process value display for the C200H-TC□□□/C200H-TV□□□/C200H-PID□□.		C200H-DSC01
Data Setting Console Connecting Cables	For C200H-DSC01	2 m	C200H-CN225
		4 m	C200H-CN425
PROM Writer	Applicable to all C-series PCs. Write voltages: 12.5 or 21 V		C500-PRW06
Floppy Disk Interface Unit	Applicable to all C-series PCs.		3G2C5-FDI03-E
Printer Interface Unit	Applicable to all C-series PCs.		3G2A5-PRT01-E
Memory Pack	Applicable to C200H, C1000H, or C2000H.		C2000-MP103-EV3
Peripheral Interface Unit	Connects the C200H CPU Unit to a GPC or FIT. Connecting Cable sold separately.		C200H-IP006
Graphic Programming Consoles	100- to 120-VAC power supply (Comments supported.)		3G2C5-GPC03-E
Memory Pack	Applicable to C200H, C1000H, or C2000H.		3G2C5-MP304-EV3
CRT Interface Unit	For connection between GPC and CRT		C500-GDI01

SYSMAC Support Software (SSS)

Product	Description	Model no.
SYSMAC Support Software	3.5”, 2HD for IBM PC/AT compatible	C500-ZL3AT1-E
	Connection Cable	CQM1-CIF02
		CV500-CIF01

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SYSMAC LINK Units and SYSMAC NET Link Units

Name		Specifications			Model number
SYSMAC LINK Unit		Wired via coaxial cable. Must be mounted to rightmost 2 slots on Rack with C200H-CPU31-E		918 data link words	C200HW-SLK23
				2,966 data link words	C200HW-SLK24
		Wired via optical fiber cable. Bus Connection Unit required separately. May be used with APS Power Supply Unit.		918 data link words	C200HW-SLK13
				2,966 data link words	C200HW-SLK14
	Terminator	One required for each node at ends of System			C1000H-TER01
	Attachment Stirrup	Provided with SYSMAC LINK Unit			C200H-TL001
	F Adapter	---			C1000H-CE001
	F Adapter Cover	---			C1000H-COV01
	Communications Cable	Coaxial cables	Manufactured by Hitachi		ECXF5C-2V
			Manufactured by Fujigura		5C-2V
	Auxiliary Power Supply Unit	Supplies backup power to either one or two SYSMAC LINK Units. One C200H-CN111 Power Connecting Cable included.			C200H-APS03
SYSMAC NET Link Unit		Must be mounted to rightmost 2 slots on Rack with C200H-CPU31-E			C200HS-SNT32
	Power Supply Adapter	Required when supplying power from Central Power Supply		For 1 Unit	C200H-APS01
				For 2 Units	C200H-APS02
	Power Cable	Connects Power Supply Adapter and SYSMAC NET Link Unit		For 1 Unit	C200H-CN111
				For 2 Units	C200H-CN211
Bus Connection Unit		Connects SYSMAC LINK Unit or SYSMAC NET Link Unit to CPU Unit		For 1 Unit	C200H-CE001
				For 2 Units	C200H-CE002

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Appendix B
Specifications

The following figures and tables provide specifications for each Unit of the C200H. I/O Units may take on one of three different shapes and are sometimes referred to as A-shape Units, B-shape Units, or E-shape Units. Group-2 High-density I/O Units take on one of two different shapes and are sometimes referred to as C-shape Units or D-shape Units. Refer to the figures at the end of the I/O Unit specifications for the exact dimensions of these five shapes of I/O Unit.

CPU Units and Power Supplies

General Specifications

Item	C200H-CPU21-E/CPU31-E, PS221	C200H-CPU23-E, PS211
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	120 VA max.	40 W max.
Surge Current	30 A max.	30 A max.
Output Capacity	CPU-21-E: 4.6 A 5 VDC (3.2 A supplied to I/O Units) CPU-23-E: 3 A 5 VDC (1.6 A supplied to I/O Units) CPU-31-E: 4.6 A 5 VDC (3.0 A supplied to I/O Units) Expansion I/O Rack: 3 A 5 VDC (2.7 A supplied to I/O Units)	
Fuse	2 A 250 V 5.2 dia. x 20 (MF51NR)	2 A 125 V 5.2 dia. x 20 (MF51NR)
24 VDC Output	0.3 A 24 VDC $^{+10\%}/_{-20\%}$	None
Insulation Resistance*	20 MΩ between AC terminals and the GR terminal at 500 VDC	See caution.
Dielectric Strength*	2,000 VAC 50/60 Hz for 1 minute between AC terminals and housing 500 VAC 50/60 Hz for 1 minute between DC terminals and housing Leakage current: 10 mA max.	
Noise Immunity	1,500 Vp-p, pulse width: 100 ns to 1 μs, rise time: 1 ns	
Vibration	Mechanical durability: 10 to 35 Hz, 1 mm double amplitude (24.5 m/s^2) in X, Y, and Z directions, for 2 hours each (When mounted on DIN track, 16.7 Hz, 1 mm double amplitude (4.9 m/s^2) in X, Y, and Z directions, for 1 hour each) Malfunction durability: 2 to 55 Hz, 19.6 m/s^2, in X, Y, and Z directions, for 20 minutes each (When mounted on DIN track, 2 to 55 Hz, 2.94 m/s^2, in X, Y, and Z directions, for 20 minutes each)	
Shock	98 m/s^2 in X, Y, and Z directions, 3 times each	
Ambient Temperature	Operating: 0° to 55°C (0° to 45°C for Programming Console) Storage: –20° to 65°C	
Humidity	35% to 85% (without condensation)	
Atmosphere	Must be free of the following: • Corrosive gases • Abrupt temperature changes • Direct sunlight • Dust, salt, or metal filings • Water, oil, or chemicals	
Grounding	Less than 100 Ω	
Enclosure Rating	Mounted in a panel	
Weight	6 kg max.	

⚠ Caution *Internal components might be damaged if insulation resistance or dielectric strength tests for the AC power supply are repeated many times with the LG and GR terminals connected. Do not conduct a dielectric strength test on the C200H-CPU23-E, PS211, RT002-P, or RT202 Units. The power supply input line and internal circuit of the 24 VDC Power Supply are not isolated from each other; do not conduct insulation resistance or dielectric strength tests. If an insulation resistance test or dielectric strength test over 50 VDC is conducted, the Power Supply will be damaged.

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CPU Unit Specifications

Main Control Element	MPU, CMOS, LS-TTL				
Programming Method	Ladder diagram				
Instruction Length	1 address/instruction, 1 to 4 words/instruction				
Number of Instructions	CPU21-E/23-E 168 (12 basic instructions + 156 special instructions) CPU31-E 172 (12 basic instructions + 160 special instructions)				
Execution Time	Basic instructions: 0.75 to 2.25 μs Special instructions: 34 to 724 μs				
Memory Capacity	6,974 words (with 8k-word memory)				
IR Area: I/O bits	480 bits (00000 through 02915)	I/O bits for Group-2 High-density Units and Group-2 B7A Interface Units: 320 bits (03000 through 04915)	I/O bits for I/O Units mounted to Slave Racks: 800 bits (05000 through 09915)	I/O bits for Special I/O Units: 1,600 bits (10000 through 19915)	I/O bits for Optical I/O Units: 512 bits (20000 through 23115)
IR Area: Work bits	3,296 bits (03000 through 23515)				
SR bits	312 (23600 through 25507)				
TR bits	8 (TR 0 through 7)				
HR bits	1,600 (HR bits 0000 through 9915)				
AR bits	448 (AR 0000 through 2715)				
LR bits	1,024 (LR 0000 through 6315)				
Timers/Counters	512 (TIM/CNT 000 through 511) TIMs: 0 through 999.9 s TIMHs: 0 through 99.99 s CNT: 0 through 9999 counts				
DM words	Read/write: 1,000 (DM 0000 through 0999) Read only: 1,000 (DM 1000 through 1999) DM area is in Memory Pack.				
RUN Output	Contacts are closed while PC is in RUN mode and operating. Max. switching capacity: 2A 250 VAC (resistive load) 0.5 A 250 VAC (inductive load, cosϕ = 0.4) 2 A 24 VDC				
Power failure backup function	Holds HR, AR, CNT, and DM contents. The memory backup period varies with the Memory Unit.				
Memory Protection	RAM Pack, battery back-up: Program (including clock function) and data areas protected. EEPROM Pack (with clock function): Clock function and data areas protected. C200H-CPU31-E: Program and data areas (including clock function) protected. Battery life expectancy is 5 yrs at 25°C. Life expectancy decreases with higher temperature. Refer to *2-6 Memory Units* for more details.				
	RAM Pack, capacitor back-up: Program and data areas protected. EPROM Pack: Data areas protected. EEPROM Pack (without clock function): Data areas protected. Memory is protected for 20 days without PC power at 25°C. Length of protection decreases at higher temperature. Refer to *Section 2-6 Memory Units* for more details.				
Self-diagnostic Functions	CPU Unit failure (watchdog timer) Battery failure Cycle time error Memory failure I/O bus failure Host Link error Remote I/O error, etc.				
Program Check	Program check (executed on start of RUN operation): END missing Instruction errors (Program can be checked by Programming Console or GPC at three levels.)				

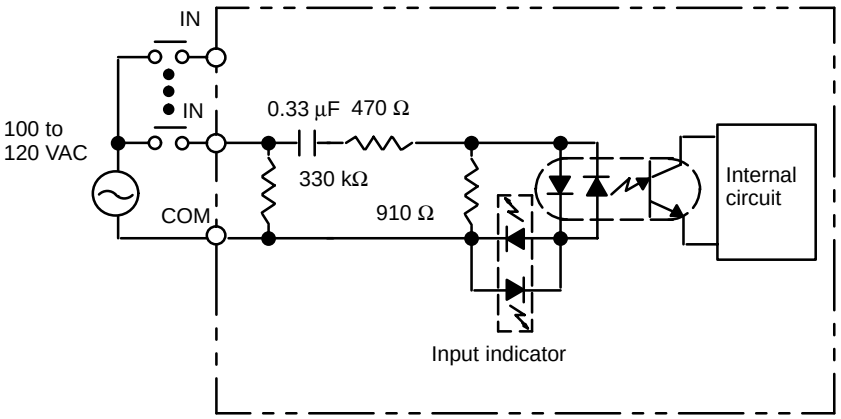
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Standard I/O Units

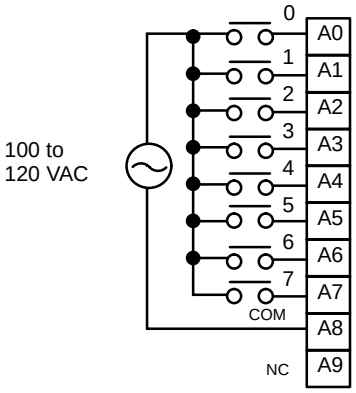
AC Input Unit C200H-IA121

Rated Input Voltage	100 to 120 VAC 50/60 Hz
Operating Input Voltage	85 to 132 VAC 50/60 Hz
Input Impedance	9.7 kΩ (50 Hz), 8 kΩ (60 Hz)
Input Current	10 mA typical (at 100 VAC)
ON Voltage	60 VAC min.
OFF Voltage	20 VAC max.
ON Response Time	35 ms max. (at 100 VAC, 25°C)
OFF Response Time	55 ms max. (at 100 VAC, 25°C)
No. of Circuits	1 (8 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections

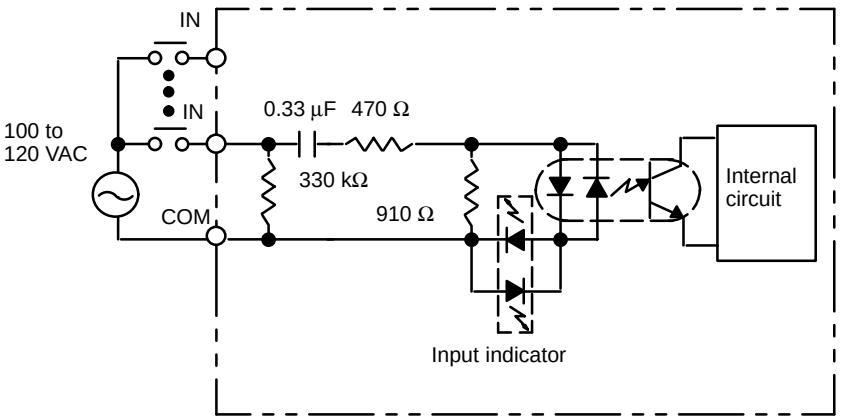


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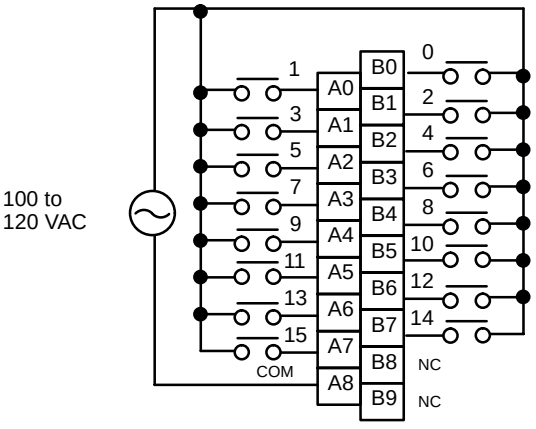
AC Input Unit C200H-IA122/IA122V

Rated Input Voltage	100 to 120 VAC 50/60 Hz
Operating Input Voltage	85 to 132 VAC 50/60 Hz
Input Impedance	9.7 kΩ (50 Hz), 8 kΩ (60 Hz)
Input Current	10 mA typical (at 100 VAC)
ON Voltage	60 VAC min.
OFF Voltage	20 VAC max.
ON Response Time	35 ms max. (at 100 VAC, 25°C)
OFF Response Time	55 ms max. (at 100 VAC, 25°C)
No. of Circuits	1 (16 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	300 g max./400 g max. (IA122V)
Dimensions	B-shape

Circuit Configuration



Terminal Connections

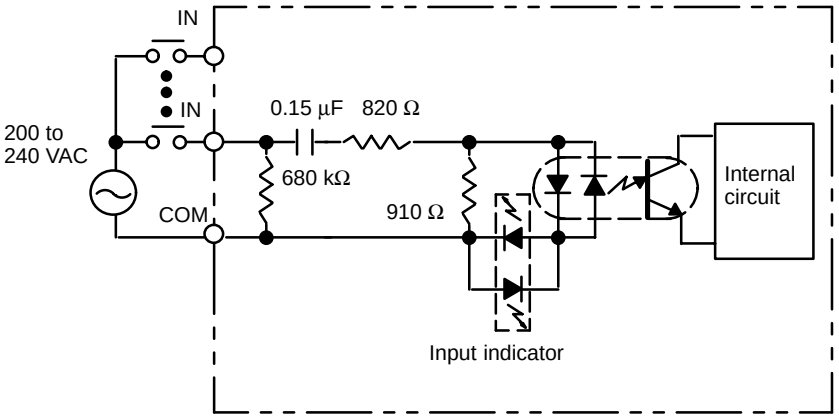


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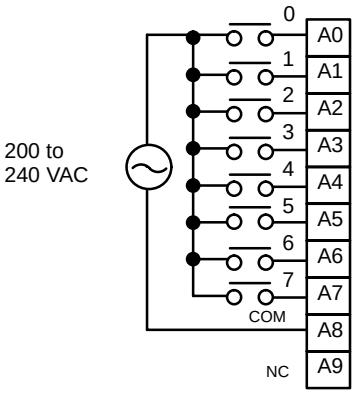
AC Input Unit C200H-IA221

Rated Input Voltage	200 to 240 VAC 50/60 Hz
Operating Input Voltage	170 to 264 VAC 50/60 Hz
Input Impedance	21 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	10 mA typical (at 200 VAC)
ON Voltage	120 VAC min.
OFF Voltage	40 VAC max.
ON Response Time	35 ms max. (at 200 VAC, 25°C)
OFF Response Time	55 ms max. (at 200 VAC, 25°C)
No. of Circuits	1 (8 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections

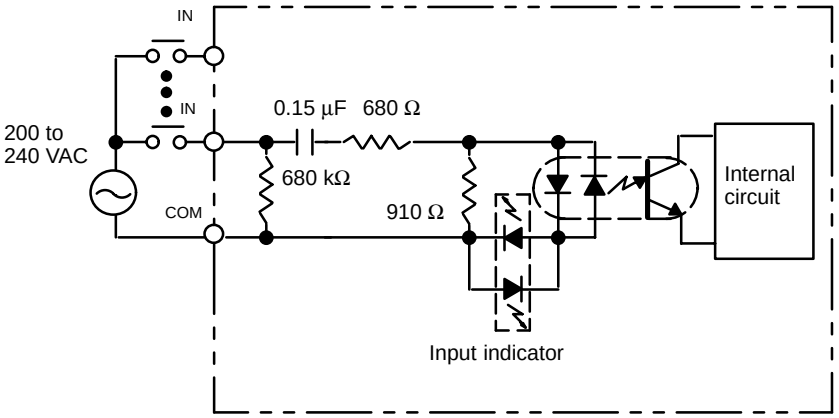


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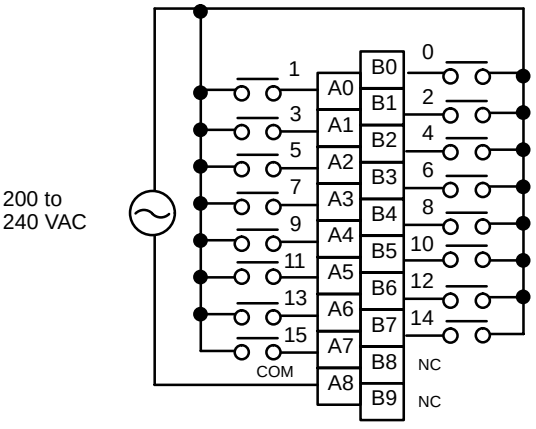
AC Input Unit C200H-IA222/IA222V

Rated Input Voltage	200 to 240 VAC 50/60 Hz
Operating Input Voltage	170 to 264 VAC 50/60 Hz
Input Impedance	21 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	10 mA typical (at 200 VAC)
ON Voltage	120 VAC min.
OFF Voltage	40 VAC max.
ON Response Time	35 ms max. (at 200 VAC, 25°C)
OFF Response Time	55 ms max. (at 200 VAC, 25°C)
No. of Circuits	1 (16 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	300 g max./400 g max. (IA222V)
Dimensions	B-shape

Circuit Configuration



Terminal Connections

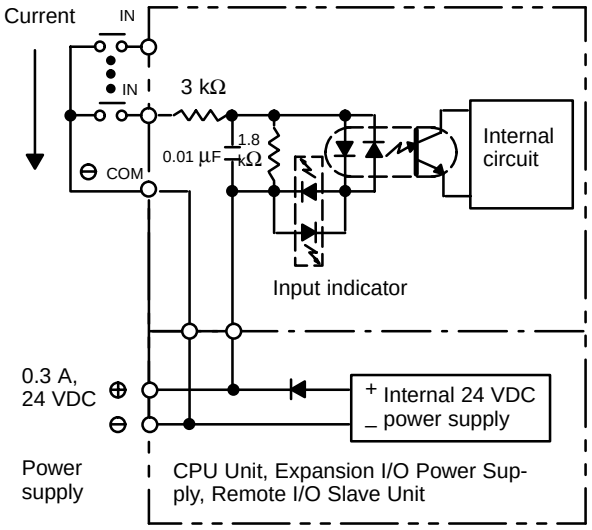


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No-Voltage Contact Input Unit C200H-ID001

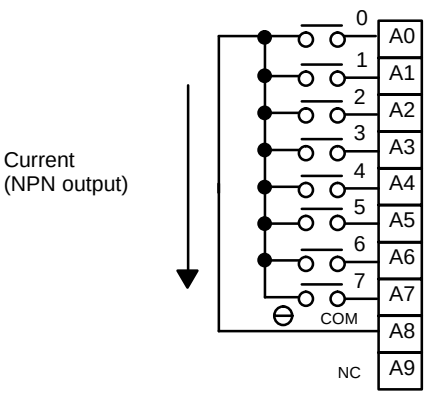
Input Voltage	No-voltage contact/NPN output type (negative common)
Input Impedance	3 kΩ
Input Current	7 mA typical
ON Voltage	(14.4 VDC min.)
OFF Voltage	(5.0 VDC max.)
ON Response Time	1.5 ms max. (no-voltage contact, at 25°C)
OFF Response Time	1.5 ms max. (no-voltage contact, at 25°C)
No. of Circuits	1 (8 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	200 g max.
Dimensions	A-shape

Circuit Configuration



Note The power is supplied to the Input Units from the 24 VDC output of the Power Supply of the CPU Unit, Expansion I/O Unit, or Remote I/O Unit. Never connect 24 VDC output terminals to the input terminals or COM terminals.

Terminal Connections

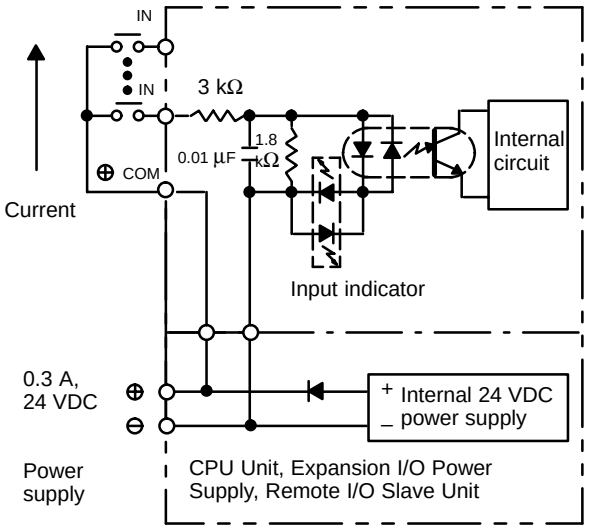


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No-Voltage Contact Input Unit C200H-ID002

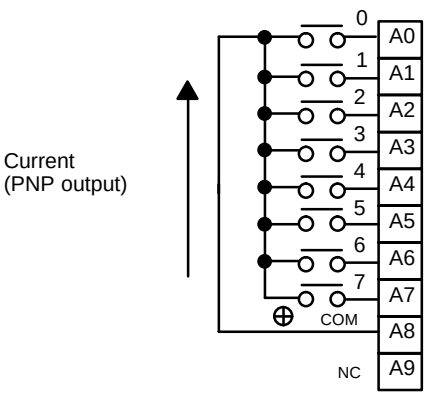
Input Voltage	No-voltage contact/NPN output type (positive common)
Input Impedance	3 kΩ
Input Current	7 mA typical
ON Voltage	(14.4 VDC min.)
OFF Voltage	(5.0 VDC max.)
ON Response Time	1.5 ms max. (no-voltage contact, at 25°C)
OFF Response Time	1.5 ms max. (no-voltage contact, at 25°C)
No. of Circuits	1 (8 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	200 g max.
Dimensions	A-shape

Circuit Configuration



Note The power is supplied to the Input Units from the 24 VDC output of the Power Supply of the CPU Unit, Expansion I/O Unit, or Remote I/O Unit. Never connect 24 VDC output terminals to the input terminals or COM terminals.

Terminal Connections

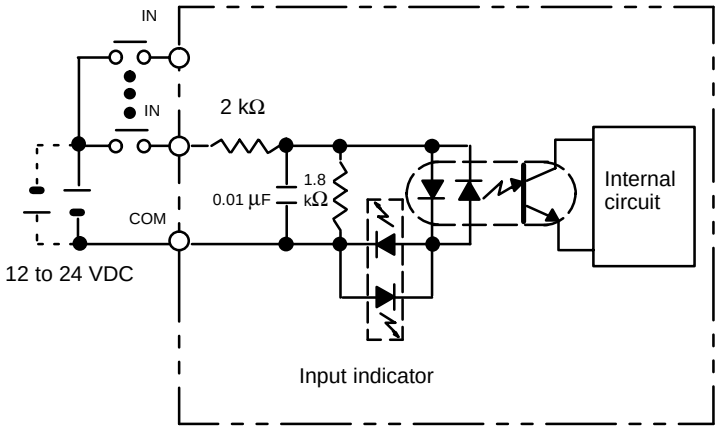


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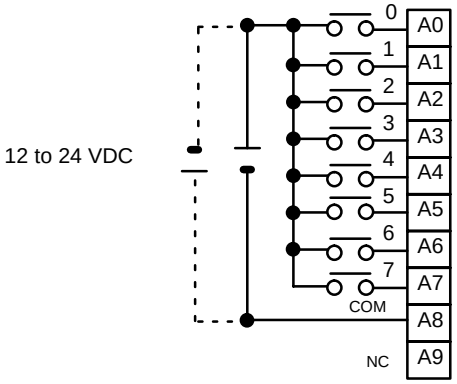
DC Input Unit C200H-ID211

Rated Input Voltage	12 to 24 VDC
Operating Input Voltage	10.2 to 26.4 VDC
Input Impedance	2 kΩ
Input Current	10 mA (at 24 VDC)
ON Voltage	10.2 VDC min.
OFF Voltage	3.0 VDC max.
ON Response Time	1.5 ms max. (at 24 VDC, 25°C)
OFF Response Time	1.5 ms max. (at 24 VDC, 25°C)
No. of Circuits	1 (8 point/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	200 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections

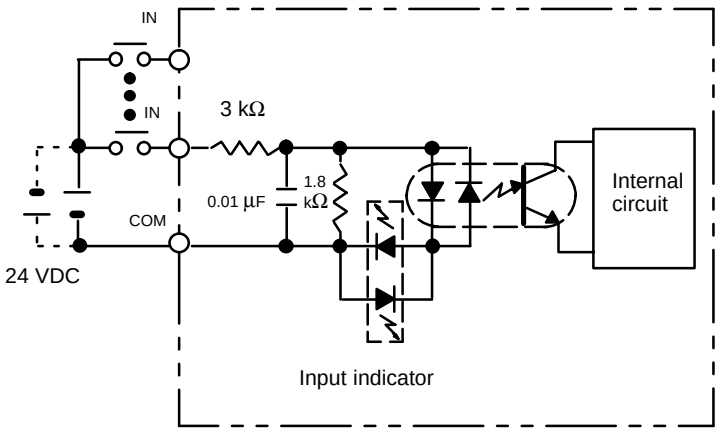


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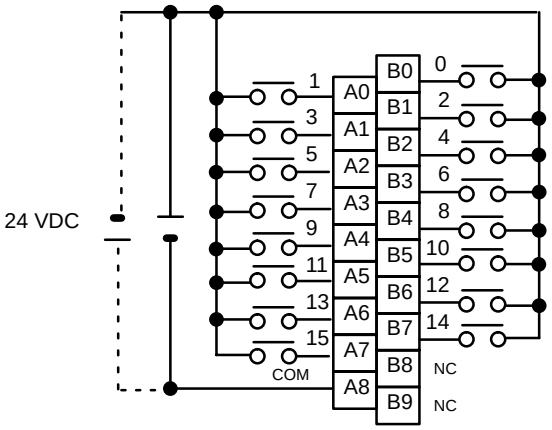
DC Input Unit C200H-ID212

Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VDC
Input Impedance	3 kΩ
Input Current	7 mA (at 24 VDC)
ON Voltage	14.4 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	1.5 ms max. (at 24 VDC, 25°C)
OFF Response Time	1.5 ms max. (at 24 VDC, 25°C)
No. of Circuits	1 (16 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	300 g max.
Dimensions	B-shape

Circuit Configuration



Terminal Connections

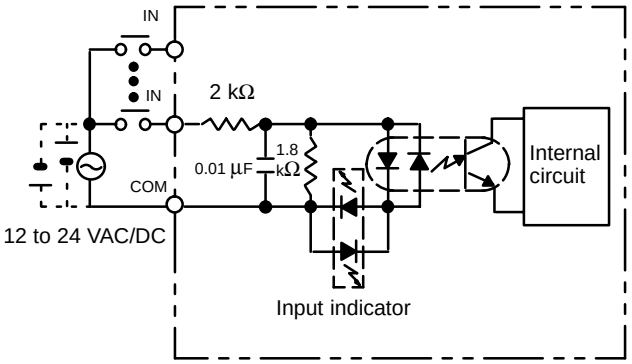


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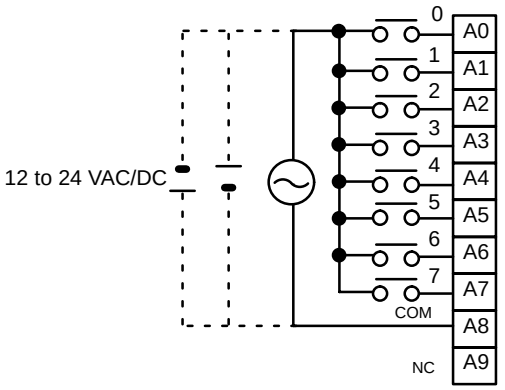
AC/DC Input Unit C200H-IM211

Rated Input Voltage	12 to 24 VDC
Operating Input Voltage	10.2 to 26.4 VAC/DC 50/60 Hz
Input Impedance	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. (at 24 VDC, 25°C)
OFF Response Time	15 ms max. (at 24 VDC, 25°C)
No. of Circuits	1 (8 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	200 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections

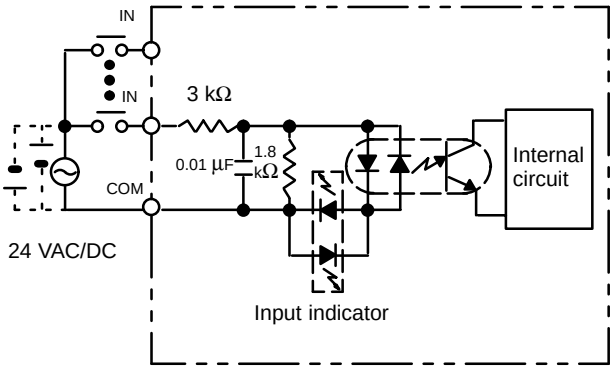


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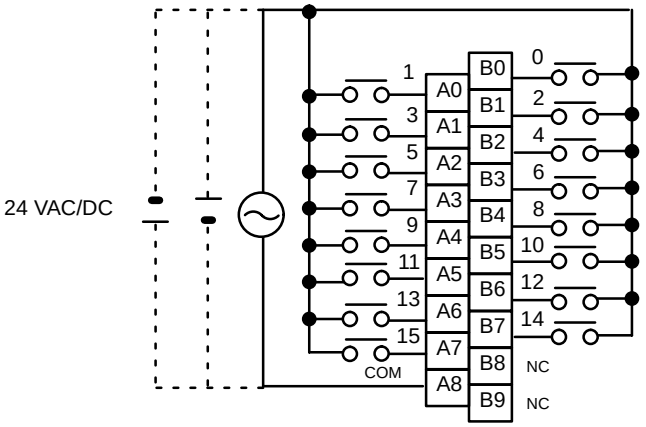
AC/DC Input Unit C200H-IM212

Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VAC/DC 50/60 Hz
Input Impedance	3 kΩ
Input Current	7 mA typical (at 24 VDC)
ON Voltage	14.4 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	15 ms max. (at 24 VDC, 25°C)
OFF Response Time	15 ms max. (at 24 VDC, 25°C)
No. of Circuits	1 (16 points/common)
Internal Current Consumption	10 mA 5 VDC max.
Weight	250 g max.
Dimensions	B-shape

Circuit Configuration



Terminal Connections

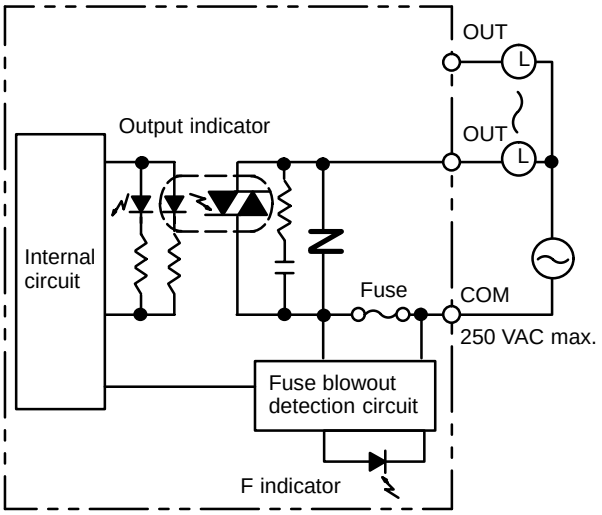


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Triac Output Unit C200H-OA221

Max. Switching Capacity	1 A 250 VAC, 50/60 Hz (4 A/Unit)
Min. Switching Capacity	10 mA (resistive load)/40 mA (inductive load) 10 VAC
Leakage Current	3 mA (100 VAC) max./6 mA (200 VAC) max.
Residual Voltage	1.2 V max.
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency or less.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	140 mA 5 VDC max.
Fuse Rating	5 A 250 V (5.2-dia.x20)
Power for External Supply	N/A
Weight	250 g max.
Dimensions	A-shape

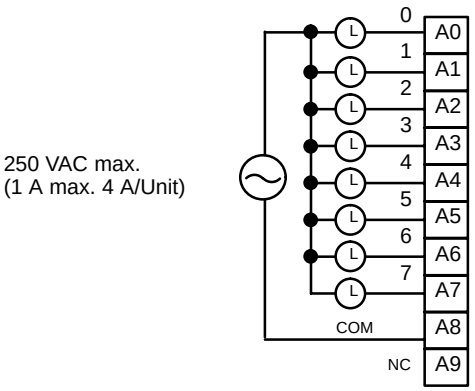
Circuit Configuration



Fuse: 5 A 250 V (5.2-dia.x20) MF51SH (JIS)

Note When the fuse blows, the F indicator lights and bit 08 turns ON. Bits 08 through 15 cannot be used as IR bits.

Terminal Connections

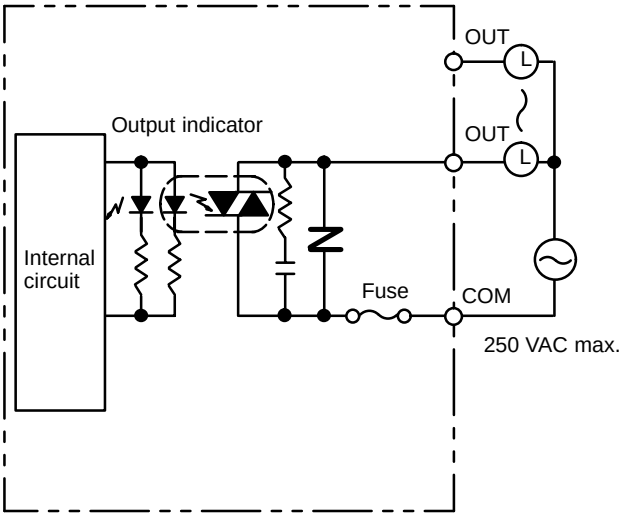


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Triac Output Unit C200H-OA222V

Max. Switching Capacity	0.3 A 250 VAC, 50/60 Hz (2 A/Unit)
Min. Switching Capacity	10 mA (resistive load)/40 mA (inductive load) 10 VAC
Leakage Current	3 mA (100 VAC) max./6 mA (200 VAC) max.
Residual Voltage	1.2 V max.
ON Response Time	1/2 of load frequency or less.
OFF Response Time	1/2 of load frequency or less.
No. of Circuits	1 (12 points/common)
Internal Current Consumption	200 mA 5 VDC max.
Fuse Rating	3 A 250 V (5.2-dia.x20)
Power for External Supply	N/A
Weight	400 g max.
Dimensions	B-shape

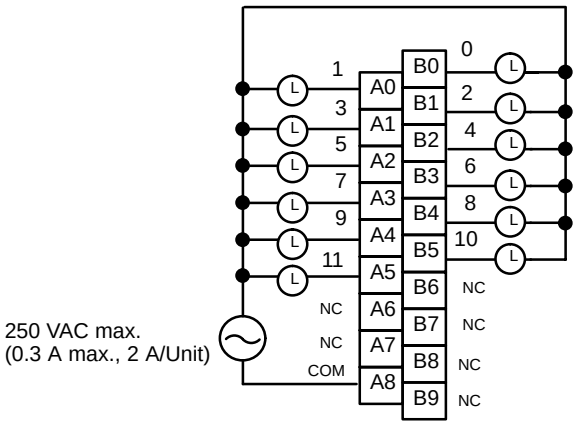
Circuit Configuration



Fuse: 3 A 250 V (5.2-dia.x20) MF51SH (JIS)

Note No blown fuse detector circuit is provided.

Terminal Connections

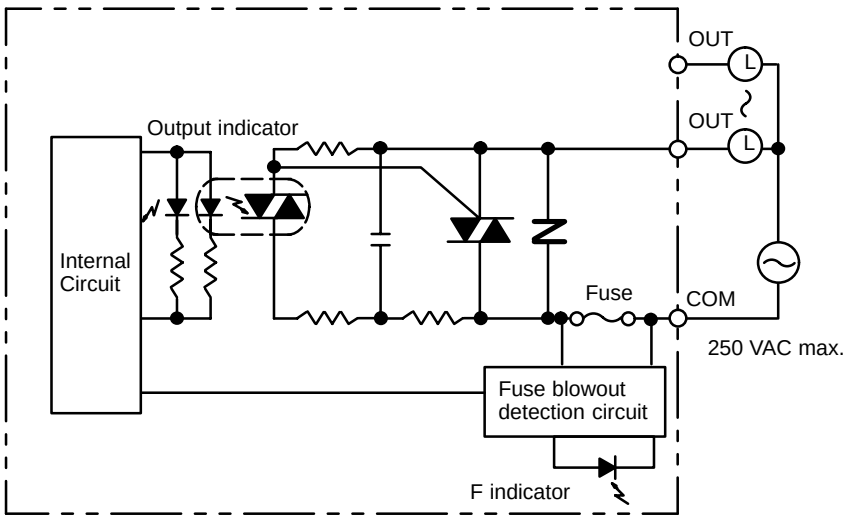


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Triac Output Unit C200H-OA223

Max. Switching Capacity	1.2 A 250 VAC, 50/60 Hz (4 A/Unit)
Max. Inrush Current	15 A (pulse width: 100 ms) 30 A (pulse width: 10 ms)
Min. Switching Capacity	100 mA 10 VAC/50 mA 24 VAC/10 mA 100 VAC min.
Leakage Current	1.5 mA (120 VAC) max./3 mA (240 VAC) max.
Residual Voltage	1.5 VAC max. (50 to 1,200 mA)/ 5 VAC max. (10 to 50 mA)
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency+1 ms or less.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	180 mA 5 VDC max.
Fuse Rating	5 A 250 V (5.2-dia.x20)
Power for External Supply	N/A
Weight	300 g max.
Dimensions	E-shape

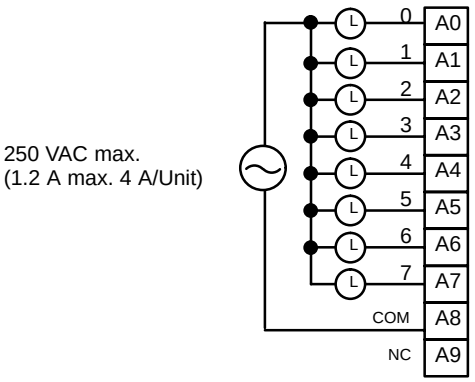
Circuit Configuration



Fuse: 5 A 250 V (5.2-dia.x20) HT (SOC)

Note When the fuse blows, the F indicator lights and bit 08 turns ON. Bits 08 through 15 cannot be used as IR bits.

Terminal Connections

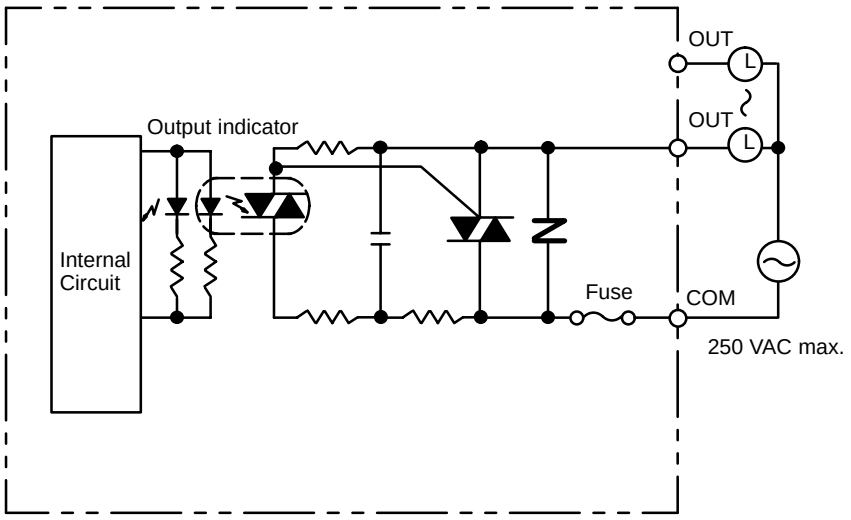


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Triac Output Unit C200H-OA224

Max. Switching Capacity	0.5 A 250 VAC, 50/60 Hz (2 A/Unit)
Max. Inrush Current	10 A (pulse width: 100ms) 20 A (pulse width: 10 ms)
Min. Switching Capacity	100 mA 10 VAC/50 mA 24 VAC/10 mA 100 VAC min.
Leakage Current	1.5 mA (120 VAC) max./3 mA (240 VAC) max.
Residual Voltage	1.5 VAC max. (50 to 500 mA)/5 VAC max. (10 to 50 mA)
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency + 1 ms or less.
No. of Circuits	1 (12 points/common)
Internal Current Consumption	270 mA 5 VDC max.
Fuse Rating	3.15 A 250 V (5.2-dia.x20)
Power for External Supply	N/A
Weight	300 g max.
Dimensions	B-shape

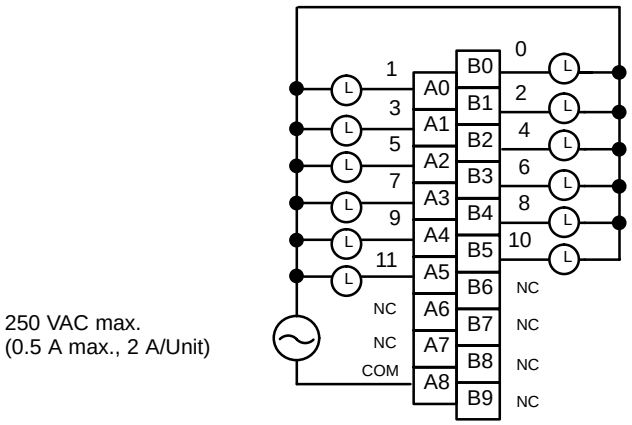
Circuit Configuration



Fuse: 3.15 A 250 V (5.2-dia.x20) MT4 (SOC)

Note 1. No blown fuse detector circuit is provided.
2. Check the fuse when there is no output.

Terminal Connections

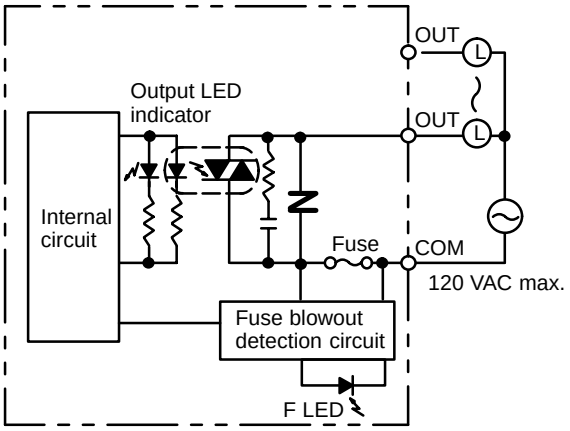


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Triac Output Unit C200H-OA121-E

Max. switching capacity	1 A 120 VAC, 50/60 Hz (4 A/Unit)
Min. switching capacity	10 mA (resistive load)/40 mA (inductive load) 10 VAC
Leakage Current	3 mA (100 VAC) max.
Residual Voltage	1.2 V max.
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency or less.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	140 mA 5 VDC max.
Fuse Rating	5 A 125 V (5.2-dia.x20)
Power for External Supply	N/A
Weight	250 g max.
Dimensions	A-shape

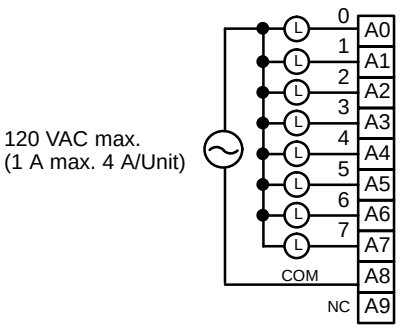
Circuit Configuration



Fuse: 5 A 125 V (5.2-dia.x20) GGS (Nagasawa)

Note When the fuse blows F LED lights and bit 08 turns ON. Bits 08 through15 cannot be used as IR bits.

Terminal Connections

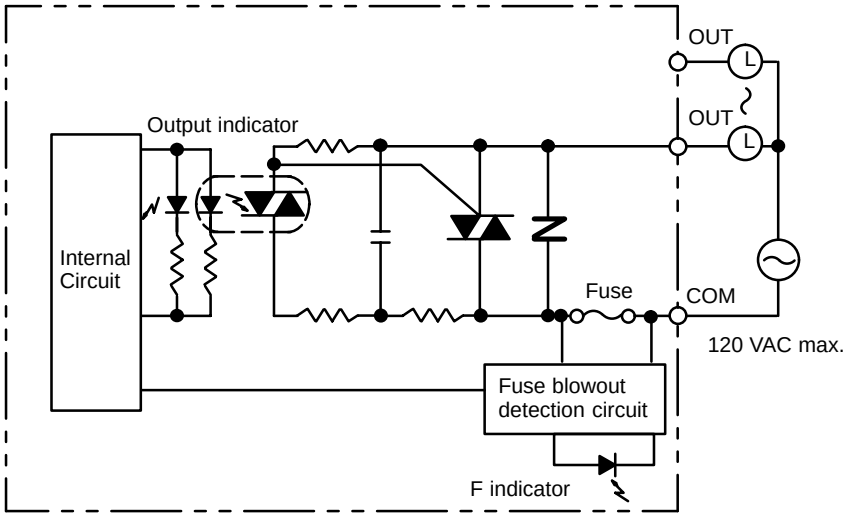


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Triac Output Unit C200H-OA122-E

Max. Switching Capacity	1.2 A 120 VAC, 50/60 Hz (4 A/Unit)
Max. Inrush Current	15 A (pulse width: 100 ms) 30 A (pulse width: 10 ms)
Min. Switching Capacity	100 mA 10 VAC/50 mA 24 VAC/10 mA 100 VAC min.
Leakage Current	1.5 mA (120 VAC) max.
Residual Voltage	1.5 VAC max. (50 to 1,200 mA)/ 5 VAC max. (10 to 50 mA)
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency+1 ms or less.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	180 mA 5 VDC max.
Fuse Rating	5 A 125 V (5.2-dia.x20)
Power for External Supply	N/A
Weight	300 g max.
Dimensions	E-shape

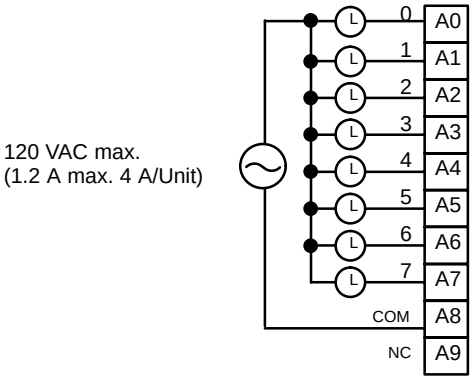
Circuit Configuration



Fuse: 5 A 125 V (5.2-dia.x20) GGS (Nagasawa)

Note When the fuse blows, the F indicator lights and bit 08 turns ON. Bits 08 through 15 cannot be used as IR bits.

Terminal Connections

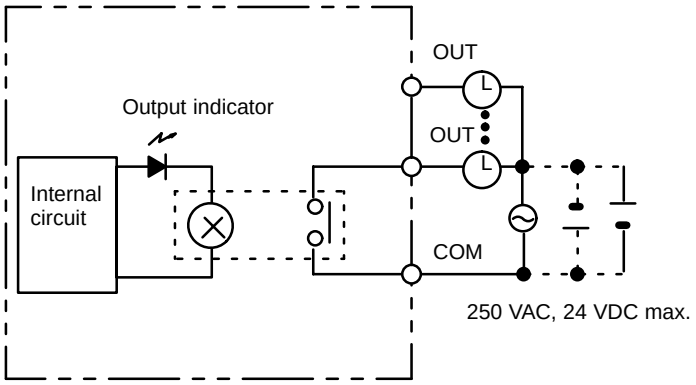


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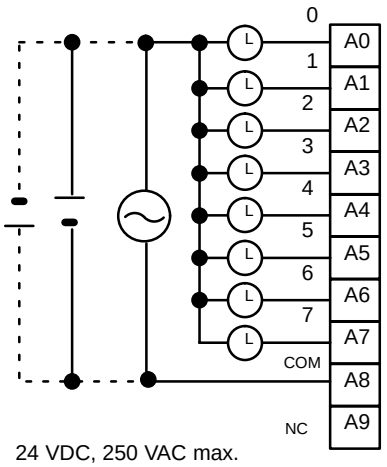
Contact Output Unit C200H-OC221

Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (8 A/Unit)
Min. Switching Capacity	10 mA 5 VDC
Relay	G6B-1174P-FD-US (24 VDC) w/socket
Service Life of Relay	Electrical: 500,000 operations (resistive load)/ 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	10 ms max.
OFF Response Time	10 ms max.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	10 mA 5 VDC max. 75 mA 25 VDC (8 points ON simultaneously.)
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections



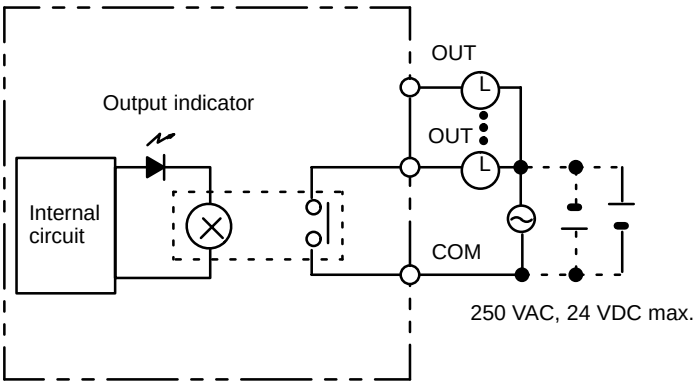
24 VDC, 250 VAC max.
(inductive load: 2 A resistive load: 2 A) (8 A/Unit)

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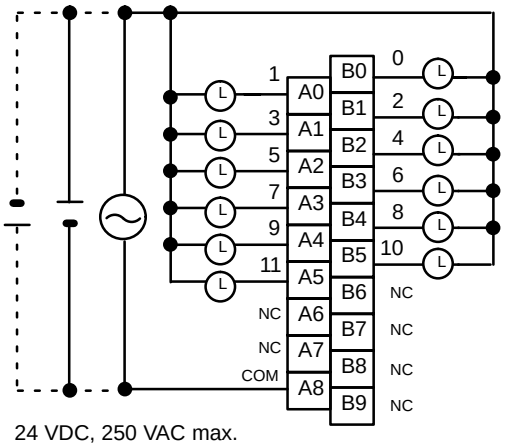
Contact Output Unit C200H-OC222

Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (8 A/Unit)
Min. Switching Capacity	10 mA 5 VDC
Relay	G6B-1174P-FD-US (24 VDC) w/socket
Service Life of Relay	Electrical: 500,000 operations (resistive load)/ 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	10 ms max.
OFF Response Time	10 ms max.
No. of Circuits	1 (12 points/common) 8 points max. can be ON simultaneously.
Internal Current Consumption	10 mA 5 VDC max. 75 mA 25 VDC (8 points ON simultaneously.)
Weight	300 g max.
Dimensions	B-shape

Circuit Configuration



Terminal Connections



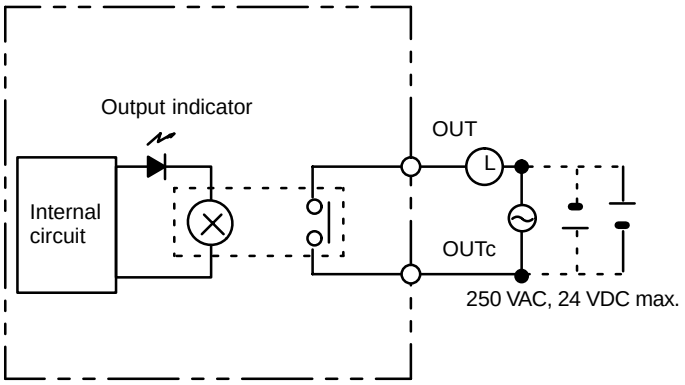
24 VDC, 250 VAC max.
(inductive load: 2 A resistive load: 2 A) (8 A/Unit)

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Contact Output Unit C200H-OC223

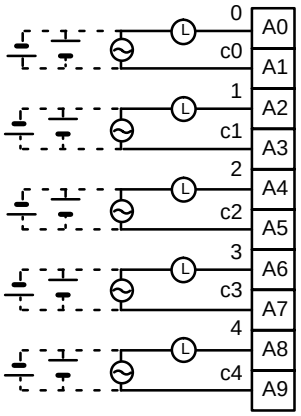
Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (10 A/Unit)
Min. Switching Capacity relay	10 mA 5 VDC
Relay	G6B-1174-P-FD-US (24 VDC) w/socket
Service Life of Relay	Electrical: 500,000 operations (resistive load)/ 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	10 ms max.
OFF Response Time	10 ms max.
No. of Circuits	5 independent contacts
Internal Current Consumption	10 mA 5 VDC max. 75 mA 25 VDC (8 points ON simultaneously.)
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections

24 VDC, 250VAC max.
(inductive load: 2 A,
resistive load: 2 A)
(8 A/Unit)

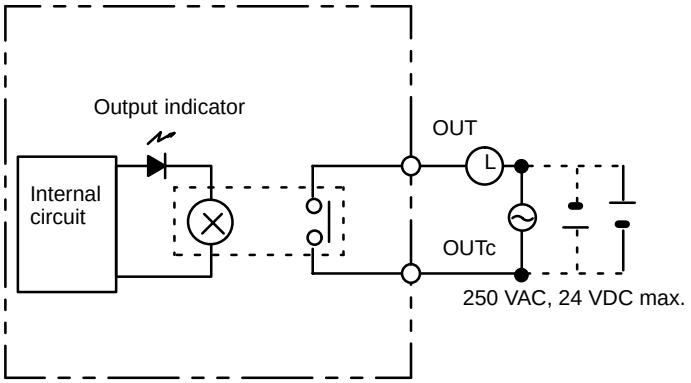


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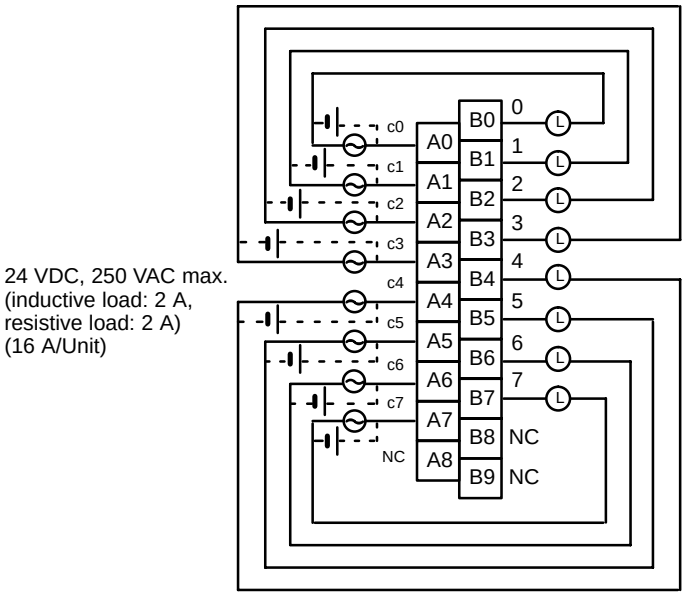
Contact Output Unit C200H-OC224

Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (16 A/Unit)
Min. Switching Capacity	10 mA 5 VDC
Relay	G6B-1174-P-FD-US (24 VDC) w/socket
Service Life of Relay	Electrical: 500,000 operations (resistive load)/ 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	10 ms max.
OFF Response Time	10 ms max.
No. of Circuits	8 independent contacts
Internal Current Consumption	10 mA 5 VDC max. 75 mA 26 VDC (8 points ON simultaneously.)
Weight	300 g max.
Dimensions	B-shape

Circuit Configuration



Terminal Connections

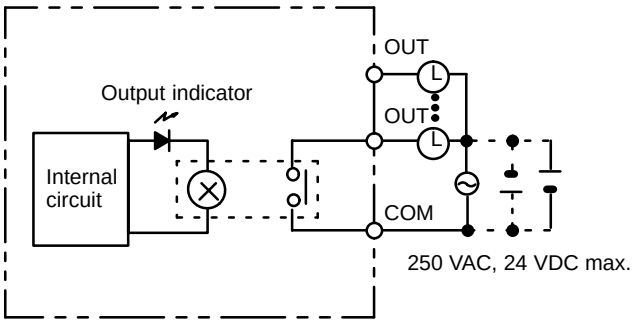


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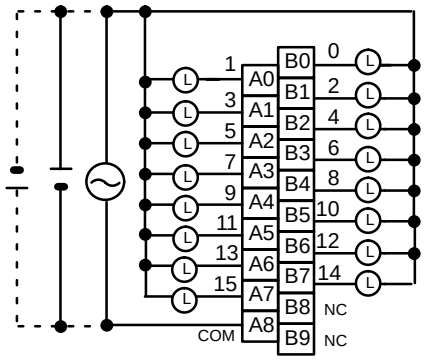
Contact Output Unit C200H-OC225

Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (8 A/Unit)
Min. Switching Capacity	10 mA 5 VDC
Relay	G6B-1174P-FD-US (24 VDC) w/socket
Service Life of Relay	Electrical: 500,000 operations (resistive load)/ 100,000 operations (inductive load) Mechanical: 50,000,000 operations
ON Response Time	10 ms max.
OFF Response Time	10 ms max.
No. of Circuits	1 (16 points/common) 8 points max. can be ON simultaneously.
Internal Current Consumption	50 mA 5 VDC max. 75 mA 26 VDC (8 points ON simultaneously.)
Weight	400 g max.
Dimensions	B-shape

Circuit Configuration



Terminal Connections



24 VDC, 250 VAC max.
(inductive load: 2 A resistive load: 2 A) (8 A/Unit)

Note 1. This Unit must be mounted to a C200H-BC□□1-V1/V2 Backplane.

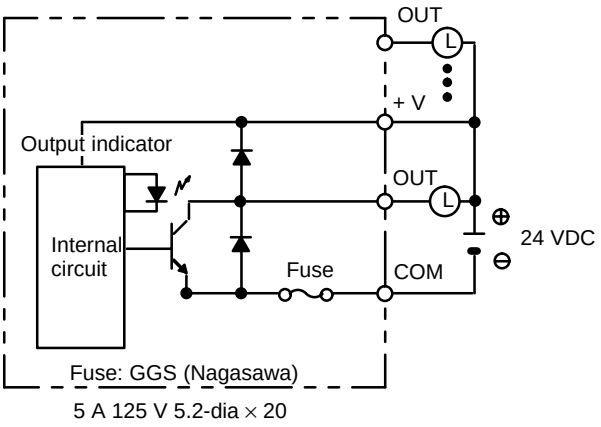
2. This Unit might overheat if more than 8 output points are turned ON simultaneously.

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Transistor Output Unit C200H-OD211

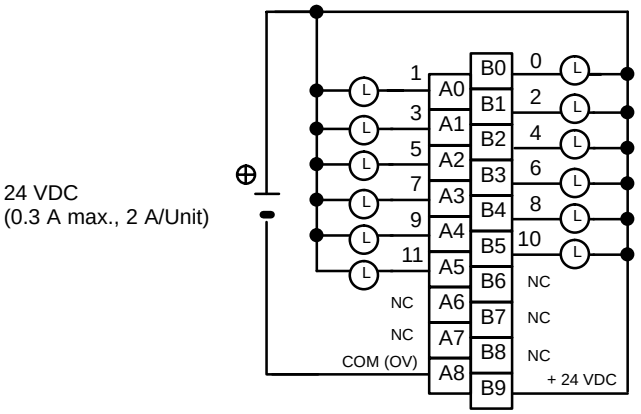
Max. Switching Capacity	0.3 A 24 VDC $^{+10\%}/_{-15\%}$ (2 A/Unit)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	1.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	1 (12 points/common)
Internal Current Consumption	160 mA 5 VDC max.
Fuse Rating	5 A 125 V (5.2-dia.x20)
Power for External Supply	25 mA 24 VDC $^{+10\%}/_{-15\%}$ min.
Weight	300 g max.
Dimensions	B-shape

Circuit Configuration



Note 1. No blown fuse detector circuit is provided.
2. Check the fuse when there is no output.

Terminal Connections



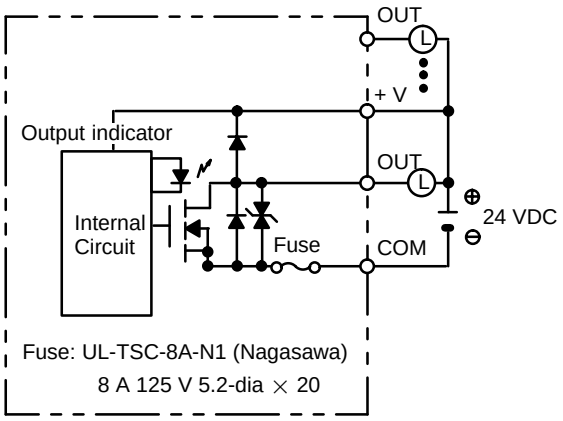
Note Be sure to supply power to B9; otherwise current will leak through the load while the output is OFF.

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Transistor Output Unit C200H-OD212

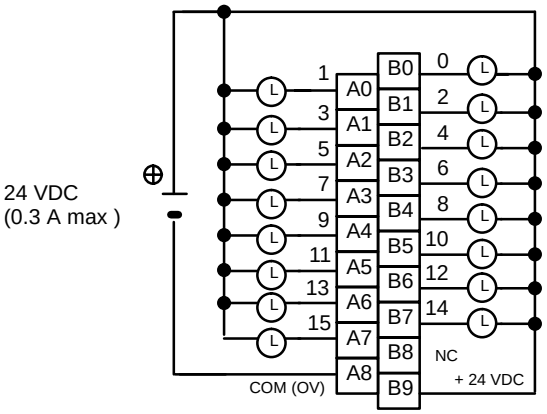
Max. Switching Capacity	0.3 A 24 VDC $^{+10\%}/_{-15\%}$ (4.8 A/Unit)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	1.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	1 (16 points/common)
Internal Current Consumption	180 mA 5 VDC max.
Fuse Rating	8 A 125 V (5.2-dia.x20)
Power for External Supply	35 mA 24 VDC $^{+10\%}/_{-15\%}$ min.
Weight	350 g max.
Dimensions	B-shape

Circuit Configuration



Note 1. No blown fuse detector circuit is provided.
2. Check the fuse when there is no output.

Terminal Connections



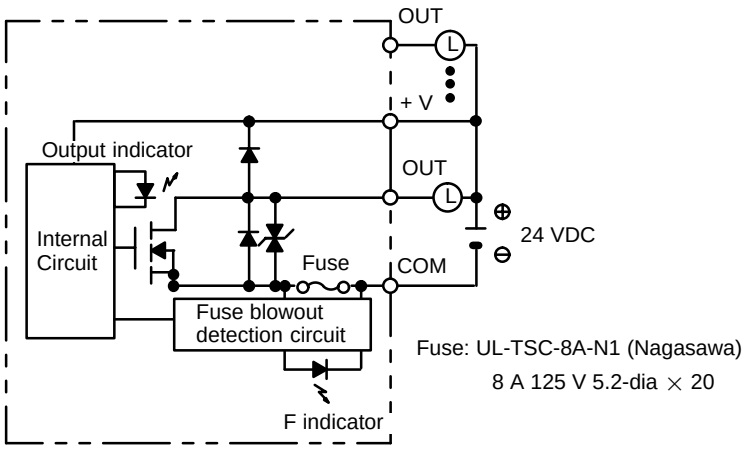
Note 1. Be sure to supply power to B9; otherwise current will leak through the load while the output is OFF.
2. This Unit must be mounted to a C200H-BC□□1-V1/V2 Backplane.

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Transistor Output Unit C200H-OD213

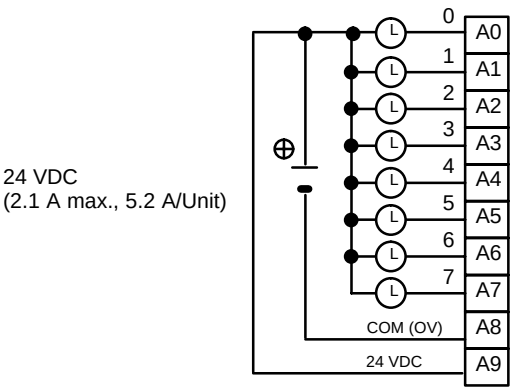
Max. Switching Capacity	2.1 A 24 VDC $^{+10\%}/_{-15\%}$ (5.2 A/Unit) NPN output
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	1.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	140 mA 5 VDC max.
Fuse Rating	8 A 125 V (5.2-dia.x20)
Power for External Supply	30 mA 24 VDC $^{+10\%}/_{-15\%}$ min.
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Note When the fuse blows, the F indicator lights and bit 08 turns ON. Bits 08 through 15 cannot be used as IR bits.

Terminal Connections



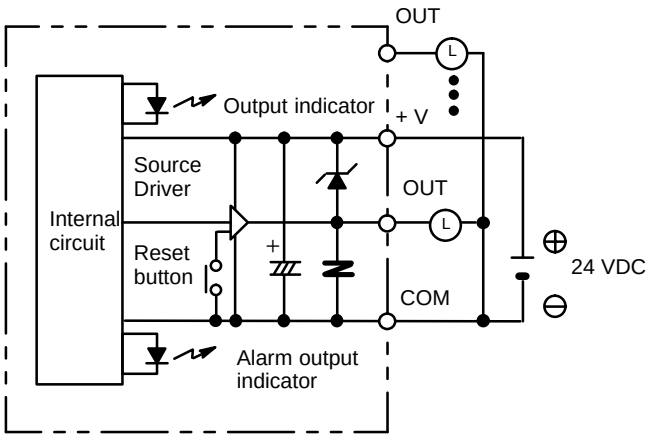
Note Be sure to supply power to A9; otherwise current will leak through the load while the output is OFF.

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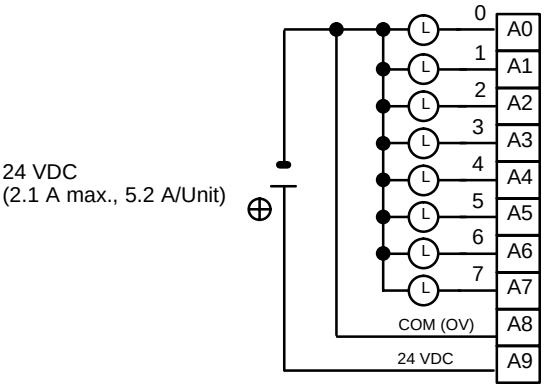
Transistor Output Unit C200H-OD214 (Load Short-circuit Protection Provided)

Max. Switching Capacity	24 VDC $^{+10\%}/_{-15\%}$ 0.8 A (2.4 A/Unit) surge current 2 A (source type) PNP output	
Min. Switching Capacity	None	
Leakage Current	1 mA max.	
Residual Voltage	1.5 V max.	
ON Response Time	1 ms max.	
OFF Response Time	1 ms max.	
No. of Circuits	1 (8 points/common)	
Internal Current Consumption	140 mA 5 VDC max.	
Fuse Rating	Short-circuit protection	Overcurrent protection
		Thermal protection
Power for External Supply	150 mA 24 VDC $^{+10\%}/_{-15\%}$ min.	
Weight	250 g max.	
Dimensions	A-shape	

Circuit Configuration



Terminal Connections



Note Be sure to supply power to A9; otherwise current will leak through the load while the output is OFF.

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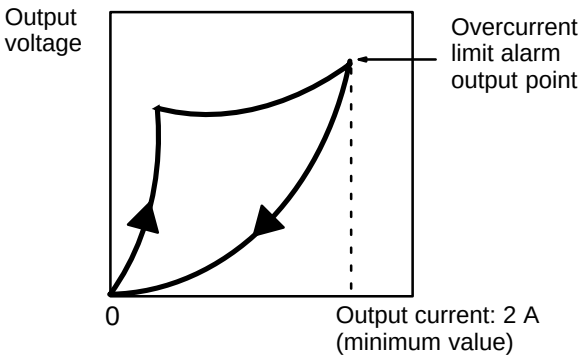
C200H-OD214 Short-Circuit Protection

The C200H-OD214 Output Unit is equipped with two types of short-circuit protection: overcurrent protection and thermal protection. Any short-circuit must be eliminated immediately in order to avoid damage to the Unit.

Overcurrent Protection When the output current reaches 2 A, the alarm output turns ON, and the alarm indicator lights. Make sure the surge current of the load does not exceed 2 A, or the alarm may be activated.

Thermal Protection When the junction temperature of the output transistor reaches its upper limit, the output turns OFF, the alarm output turns ON, and the alarm indicator blinks. But the output transistor is provided with a heat sink. So in some cases, when the output is short-circuited the thermal protection may not activate because the extra heat is dissipated by the heat sink. However, the alarm indicator will still light and the alarm output will still turn ON.

How It Works When the short-circuit protection activates, the output displays the characteristic shown below.

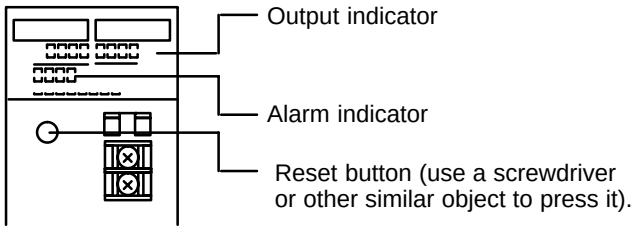


Each pair of outputs share one alarm indicator and one alarm output bit as shown below (bits 12 through 15 cannot be used as IR bits)

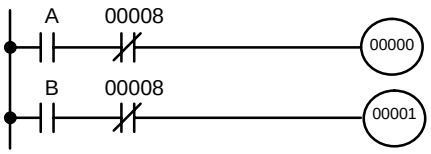
Output No.	0	1	2	3	4	5	6	7
Alarm indicator No.	0		2		4		6	
Alarm Output Point No.	08		09		10		11	

Both the alarm indicator and alarm output bit for the short-circuited output turn ON even if only one of the outputs is short-circuited. Both outputs should be disconnected until the short-circuit can be traced.

Clearing the Alarm When the short-circuit has been eliminated, reset the Unit by pressing the reset button. The alarm indicator will go out, the alarm output will turn OFF, and the output will be reset.



Programming Example If there is a short-circuit in an output, we want the program to turn that output OFF. Assume that the Unit is mounted at word 000. A program to turn OFF output bits 00 and 01 is shown below.



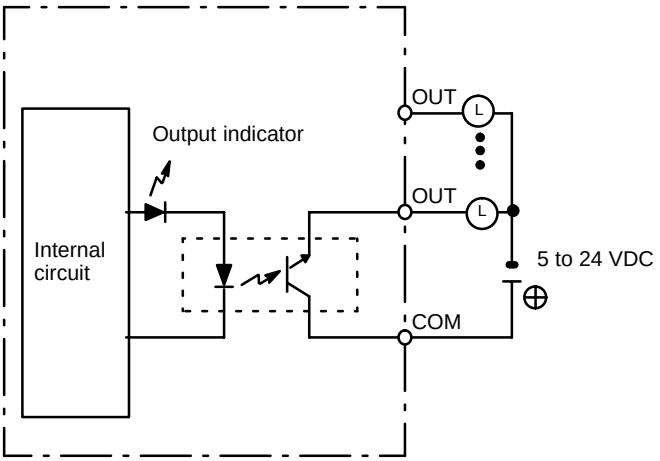
Since alarm output bit 08 covers both output bits 00 and 01, both these outputs are forced OFF as soon as output bit 08 turns ON (bits A and B can be any other bits required in the program).

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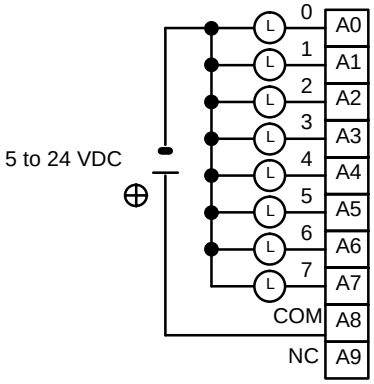
Transistor Output Unit C200H-OD216

Max. Switching Capacity	0.3 A 5 to 24 VDC
Min. Switching Capacity	10 mA 5 VDC
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	1.5 ms max.
OFF Response Time	2 ms max.
No. of Circuits	1 (8 points/common) positive common (source type)
Internal Current Consumption	10 mA 5 VDC max. 75 mA 26 VDC (8 points ON simultaneously.)
Fuse Rating	None
Power for External Supply	N/A
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Terminal Connections

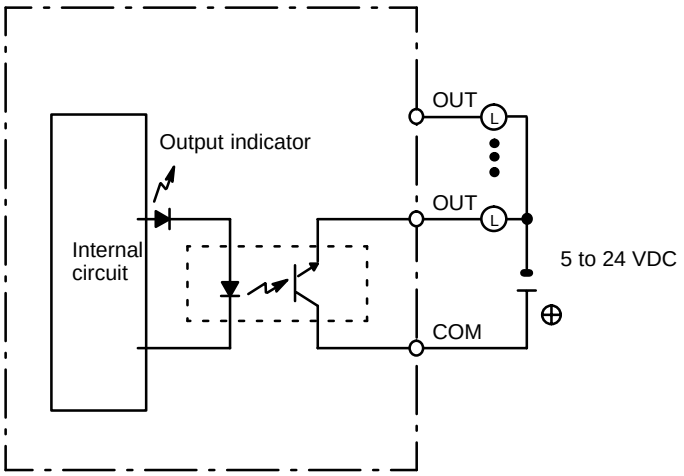


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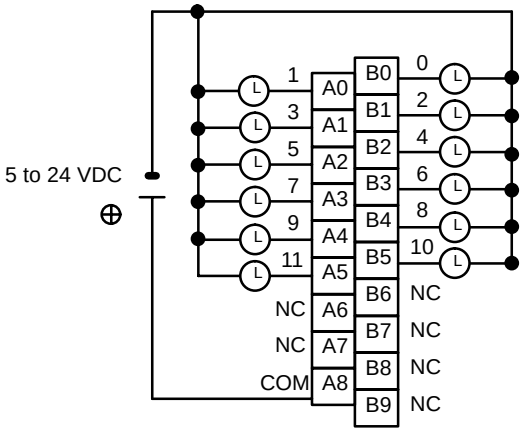
Transistor Output Unit C200H-OD217

Max. Switching Capacity	0.3 A 5 to 24 VDC
Min. Switching Capacity	10 mA 5 VDC
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	1.5 ms max.
OFF Response Time	2 ms max.
No. of Circuits	1 (12 points/common) positive common (source type)
Internal Current Consumption	10 mA 5 VDC max. 75 mA 26 VDC (8 points ON simultaneously.)
Fuse Rating	None
Power for External Supply	N/A
Weight	300 g max.
Dimensions	B-shape

Circuit Configuration



Terminal Connections

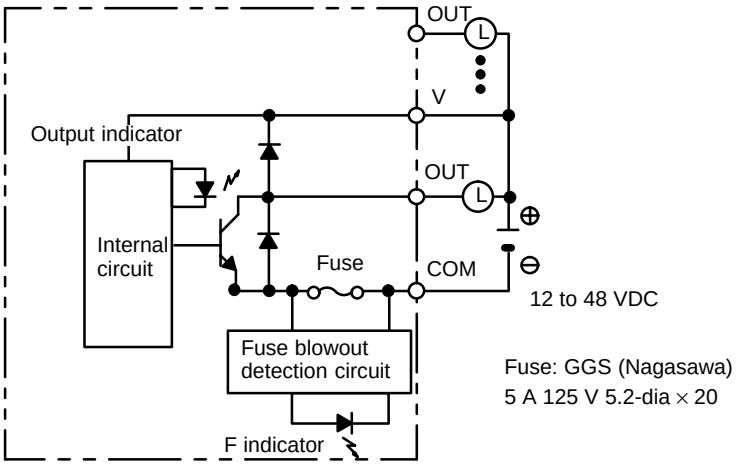


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Transistor Output Unit C200H-OD411

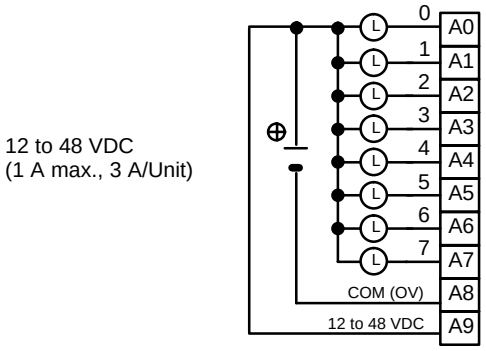
Max. Switching Capacity	12 to 48 VDC 1 A (3 A/Unit)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	1.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	1 (8 points/common)
Internal Current Consumption	140 mA 5 VDC max.
Fuse Rating	5 A 125 V (5.2-dia.x20)
Power for External Supply	30 mA 12 to 48 VDC min.
Weight	250 g max.
Dimensions	A-shape

Circuit Configuration



Note When the fuse blows, the F indicator lights and bit 08 turns ON. Bits 08 through 15 cannot be used as IR bits.

Terminal Connections



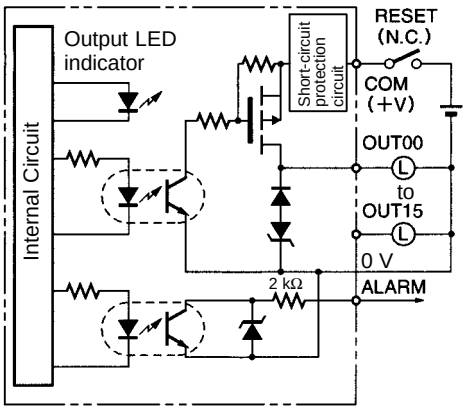
Note Be sure to supply power to A9; otherwise current will leak through the load while the output is OFF.

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Transistor Output Unit C200H-OD21A (Load Circuit Protection Provided)

Max. switching capacity	24 VDC $^{+10\%}/_{-15\%}$, 1.0 A (4 A/Unit) surge current 1.6 A (sourcing type) PNP output	No. of Circuits	1 (16 points/common)
Min. switching capacity	None	Internal Current Consumption	160 mA, 5 VDC max.
Leakage Current	0.1 mA max.	Load Short-circuit Protection	Detection current: 1.2 A min (1.6 A typical)
Residual Voltage	0.8 V max.	Power for External Supply	35 mA 24 VDC $^{+10\%}/_{-15\%}$ min.
ON Response Time	0.1 ms max.	Alarm Output (see note)	No. of outputs: 1 (2 kΩ internal resistor) Connectable Units: Only the following DC Input Units and alarm output LED indicators can be connected: C200H-ID001, ID211, ID212, IM211 (DC), IM212 (DC), ID215, ID501, MD115, MD215, MD501
OFF Response Time	0.3 ms max.	Weight	400 g max.
		Dimensions	B-shape

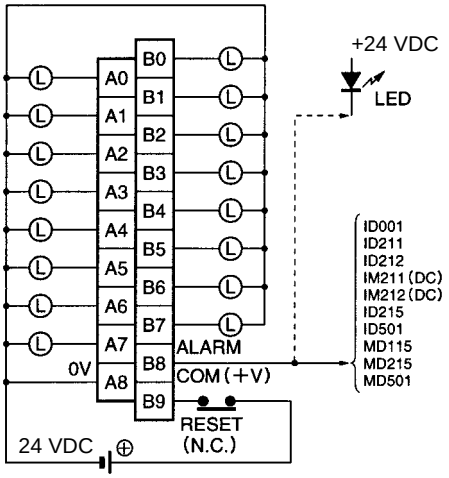
Circuit Configuration



Note When short-circuit/overload protection is activated, all 16 outputs will be switched OFF and the ALARM output becomes active (low level). The problem can be detected externally by connecting a DC Input Unit to the ALARM output or by connecting an alarm output indicator. It's not possible to connect both the Input Unit and the indicator at the same time.

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Terminal Connections



Note When the ALARM output turns ON, remove the cause of the high current and then shut off the external power supply for approx. 1 second. After confirming that the cause has been removed, turn ON the power supply again to reset the output. As shown in the diagram, it is recommended that a relay or switch that turns ON or OFF only the external power supply be connected right before the B9 (+V). Check that this relay or switch has a contact capacity higher than the external power supply current consumption (35 mA + load current min.).

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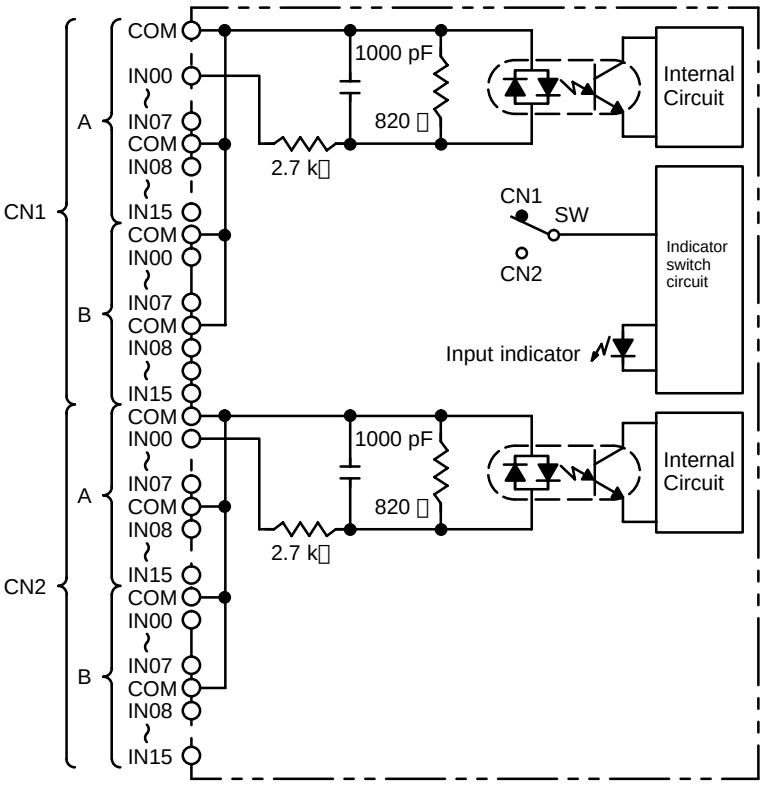
Group-2 High-density I/O Units

In the following diagrams, “m” is the first word allocated to the Unit in PC memory.

DC Input Unit C200H-ID111 (64 Points)

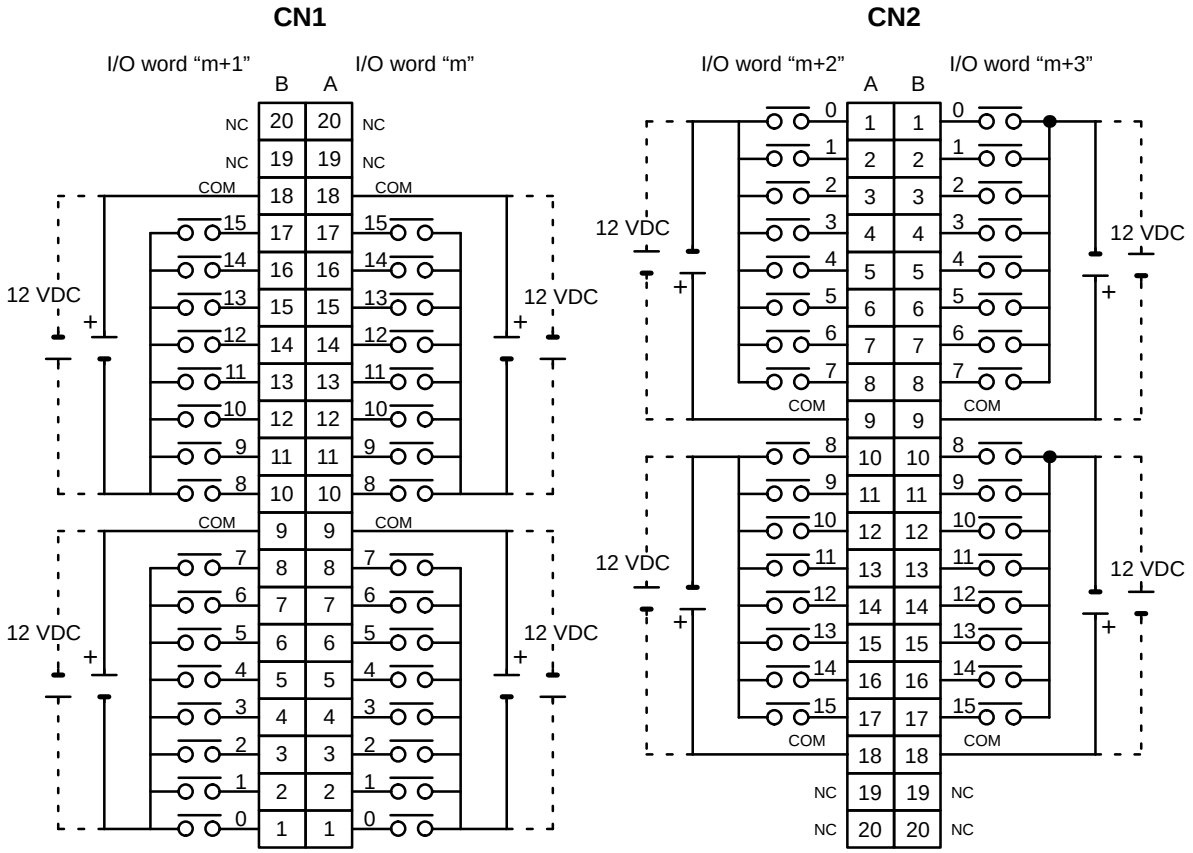
Rated Input Voltage	12 VDC
Operating Input Voltage	10.2 to 13.2 VDC
Input Impedance	2.7 kΩ
Input Current	4.1 mA (at 12 VDC)
ON Voltage	8.0 VDC min.
OFF Voltage	3.0 VDC max.
ON Response Time	1.0 ms max.
OFF Response Time	1.0 ms max.
No. of Circuits	2 (32 points/common)
Internal Current Consumption	120 mA 5 VDC max.
Weight	250 g max.
Dimensions	D-shape

Circuit Configuration



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Terminal Connections



Note 1. I/O word "m" is determined by the I/O number setting (m = IR 030 + 2 × I/O number).

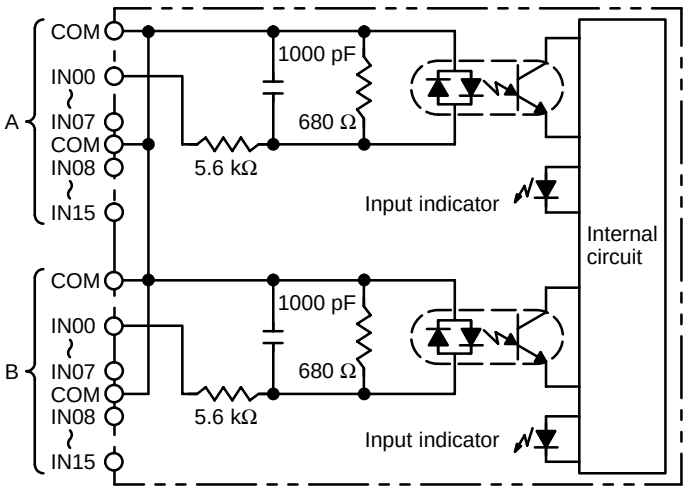
2. The power can be supplied in either polarity, but the same polarity must be used for all COM terminals in each connector. Connect power supply wiring to every COM terminal, even though the COM terminals in each connector are connected internally.

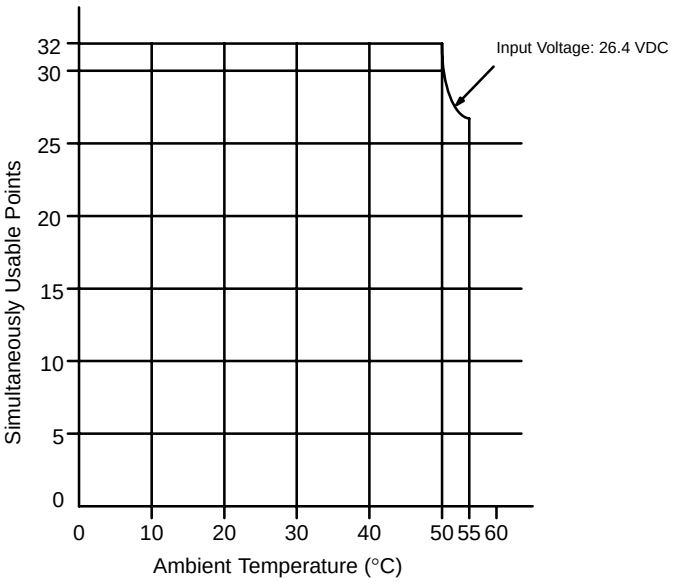
DC Input Unit C200H-ID216 (32 Points)

Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA (at 24 VDC)
ON Voltage	14.4 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	1.0 ms max.
OFF Response Time	1.0 ms max.
No. of Circuits	1 (32 points/common) All 32 points cannot be turned ON simultaneously at high temperatures. Refer to the graph below.
Internal Current Consumption	100 mA 5 VDC max.
Weight	180 g max.
Dimensions	C-shape

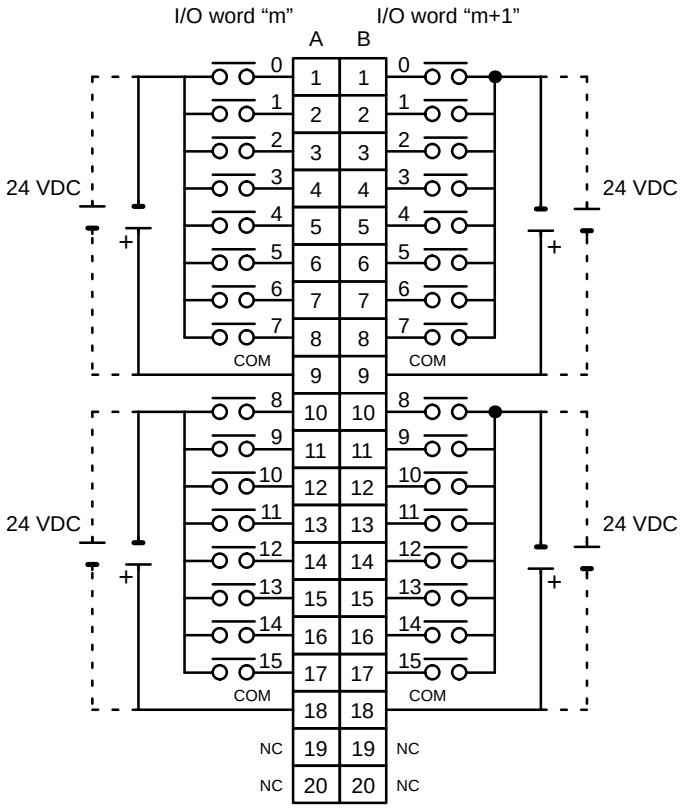
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Circuit Configuration and Simultaneously Usable Points





Terminal Connections



Note 1. I/O word "m" is determined by the I/O number setting (m = IR 030 + 2 × I/O number).

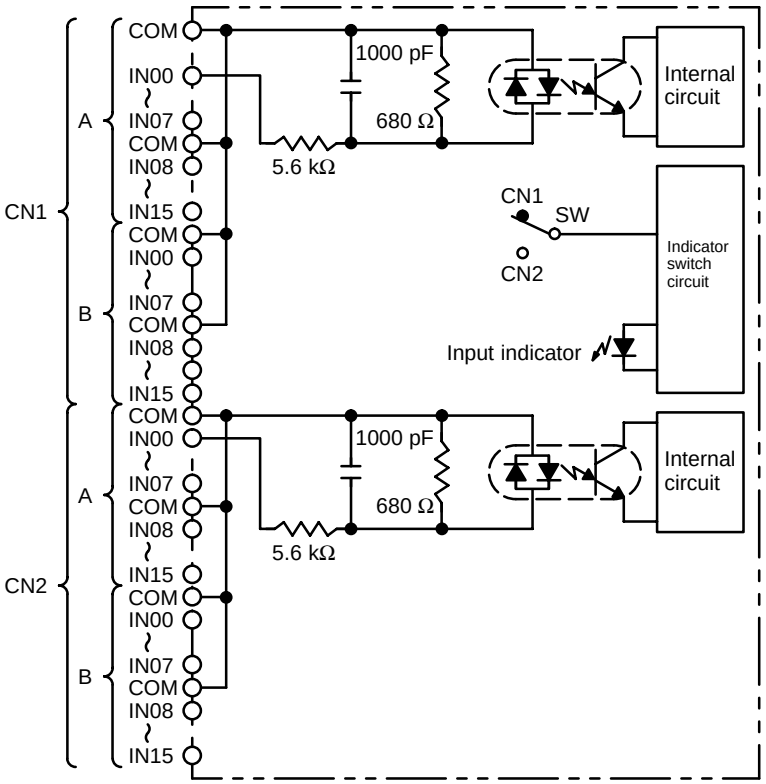
2. The power can be supplied in either polarity, but the same polarity must be used for all COM terminals. Connect power supply wiring to every COM terminal, even though the COM terminals are connected internally.

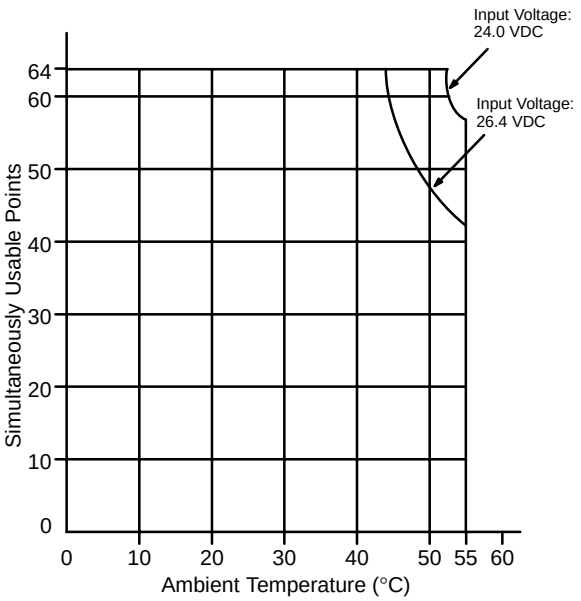
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DC Input Unit C200H-ID217 (64 Points)

Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA (at 24 VDC)
ON Voltage	14.4 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	1.0 ms max.
OFF Response Time	1.0 ms max.
No. of Circuits	2 (32 points/common) All 64 points cannot be turned ON simultaneously at high temperatures. Refer to the graph below.
Internal Current Consumption	120 mA 5 VDC max.
Weight	250 g max.
Dimensions	D-shape

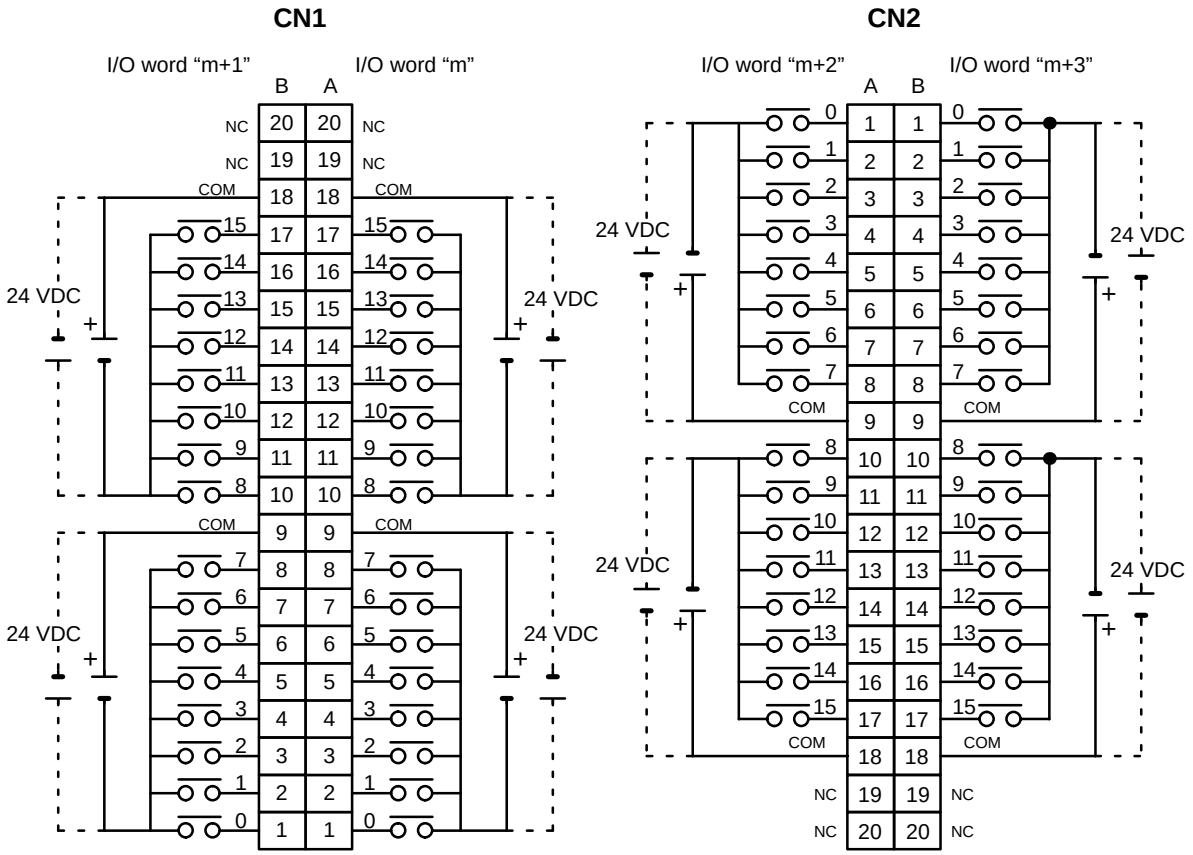
Circuit Configuration and Simultaneously Usable Points





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Terminal Connections



Note 1. I/O word "m" is determined by the I/O number setting (m = IR 030 + 2 × I/O number).

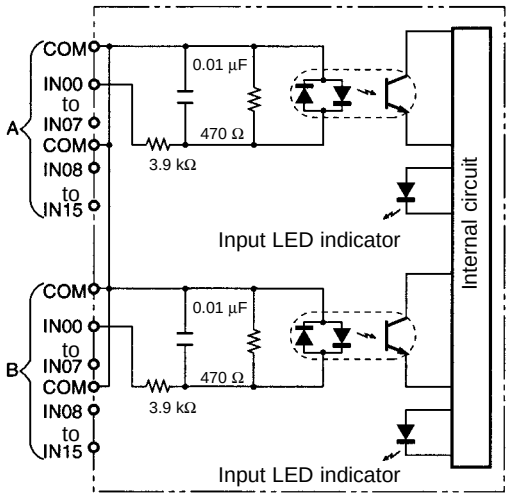
2. The power can be supplied in either polarity, but the same polarity must be used for all COM terminals in each connector. Connect power supply wiring to every COM terminal, even though the COM terminals in each connector are connected internally.

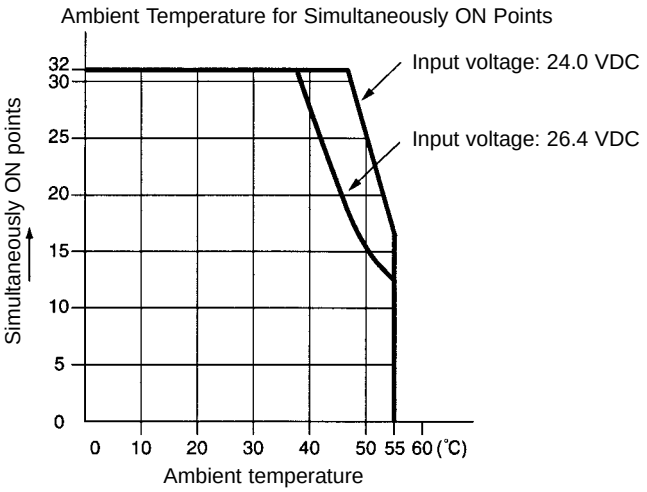
C200H-ID218 DC Input Unit (32 Points)

Rated Input Voltage	24 VDC $^{+10\%}/_{-15\%}$
Input Impedance	3.9 kΩ
Input Current	6 mA (at 24 VDC)
ON Voltage/ON Current	15.4 VDC min./3.5 mA min.
OFF Voltage/OFF Current	5.0 VDC max./1 mA max.
ON Response Time	1.0 ms max.
OFF Response Time	1.0 ms max.
No. of Circuits	32 (32 points/common) **Note** The number of points that can be ON simultaneously is limited according to the ambient temperature. Refer to the following diagram for details.
Internal Current Consumption	100 mA 5 VDC max.
Weight	180 g max.

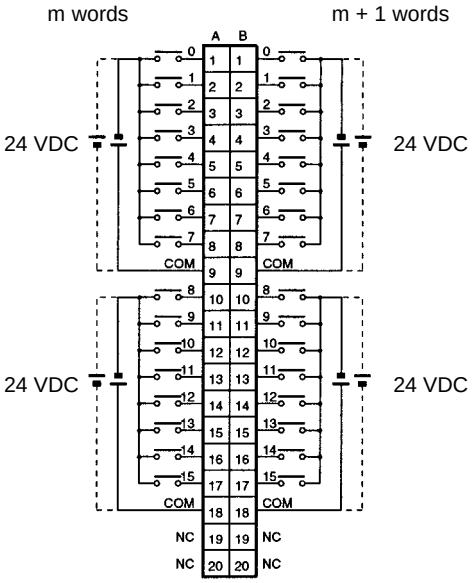
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Circuit Configuration





Terminal Connections



Note 1. The polarity of the input power supply can be either positive or negative. The polarity of all commons, however, must be the same.

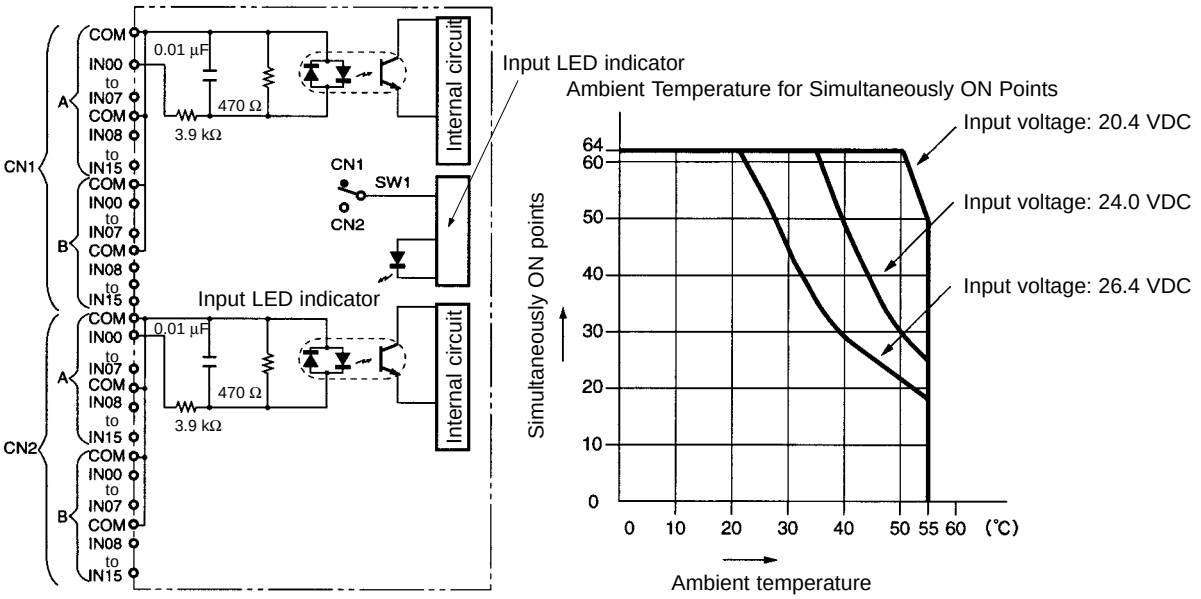
2. COM terminals must all be wired even though they are connected internally.

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C200H-ID219 DC Input Unit (64 Points)

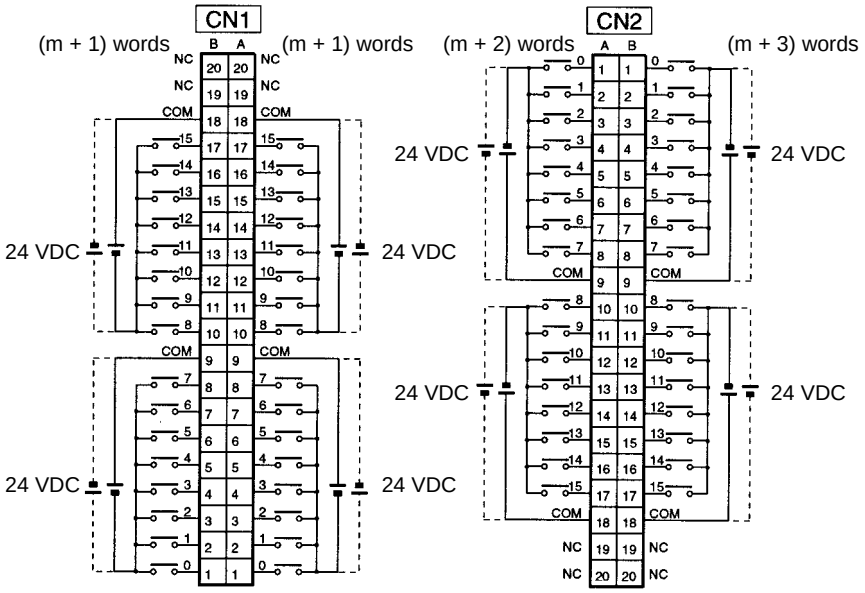
Rated Input Voltage	24 VDC $^{+10\%}/_{-15\%}$
Input Impedance	3.9 kΩ
Input Current	6 mA (at 24 VDC)
ON Voltage/ON Current	15.4 VDC min./3.5 mA min.
OFF Voltage/OFF Current	5.0 VDC max./1 mA max.
ON Response Time	1.0 ms max.
OFF Response Time	1.0 ms max.
No. of Circuits	64 (32 points/common) **Note** The number of points that can be ON simultaneously is limited according to the ambient temperature. Refer to the following diagram for details.
Internal Current Consumption	120 mA 5 VDC max.
Weight	250 g max.

Circuit Configuration



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Terminal Connections



Note 1. The polarity of the input power supply can be either positive or negative. The polarity of all commons for CN1 and CN2, however, must be the same.

2. COM terminals for CN1 and CN2 must all be wired even though they are connected internally.

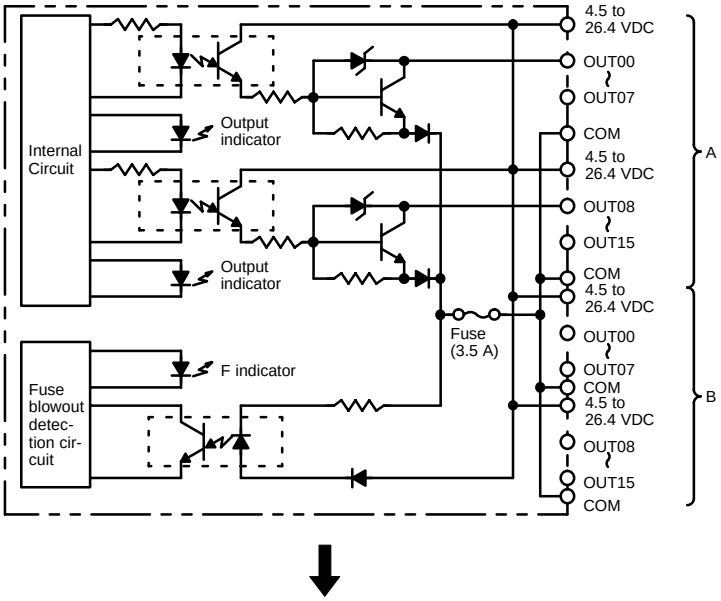
Transistor Output Unit C200H-OD218 (32 Points)

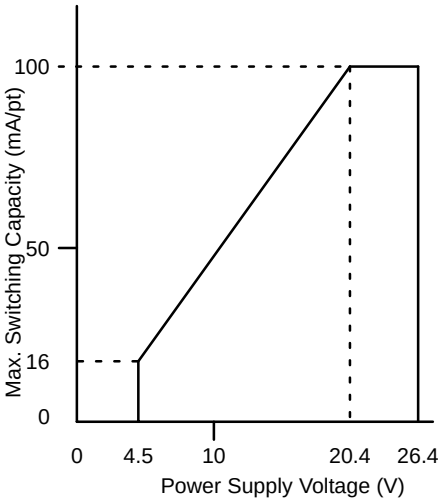
Max. Switching Capacity	16 mA 4.5 VDC to 100 mA 26.4 VDC (see below)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.8 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.4 ms max.
No. of Circuits	1 (32 points/common)
Internal Current Consumption	180 mA 5 VDC max.
Fuse Rating	3.5 A (The fuse is not user-replacable.)
Power for External Supply	110 mA 5 to 24 VDC±10% min. (3.4 mA × number of ON pts)
Weight	180 g max.
Dimensions	C-shape

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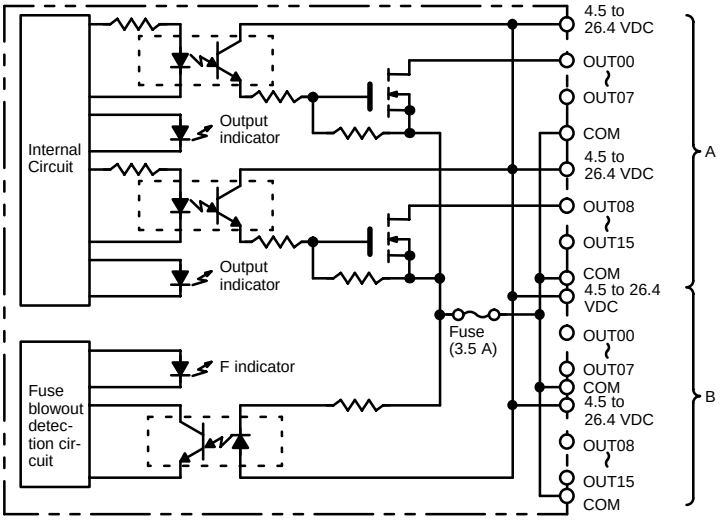
Circuit Configuration and Maximum Switching Capacity

Units manufactured on or before January 28th, 2000
(manufacturing numbers 2810 or earlier*)

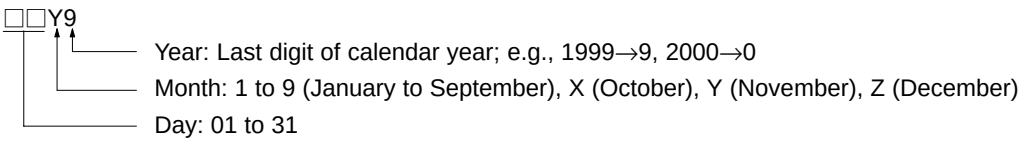




Units manufactured on or after January 31st, 2000
(manufacturing numbers 3110 or later*)

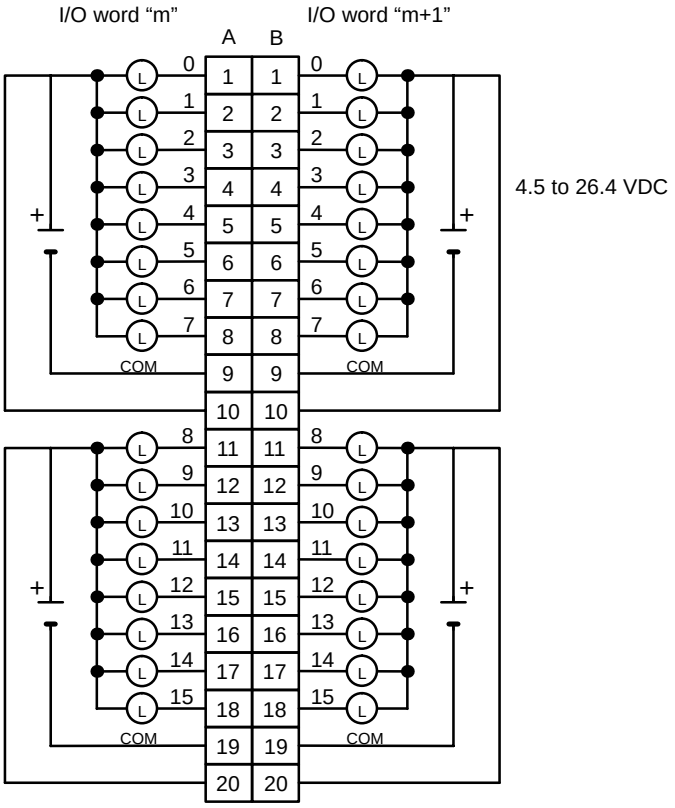


***Manufacturing Numbers**



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Terminal Connections



Note
1. I/O word “m” is determined by the I/O number setting (m = IR 030 + 2 × I/O number).
2. When the fuse blows, the F indicator lights and the error flag in AR 02 corresponding to the I/O number is turned ON. I/O numbers 0 to 9 correspond to AR 0205 to AR 0214.
3. The interruption of power from the external power supply is treated the same as a fuse blowout.
4. Connect power supply wiring to every COM terminal, even though the COM terminals are connected internally.
5. When wiring output circuits, be sure to use the correct polarity for the external power supplies. Wiring with incorrect polarity may result in erroneous operation of the load.

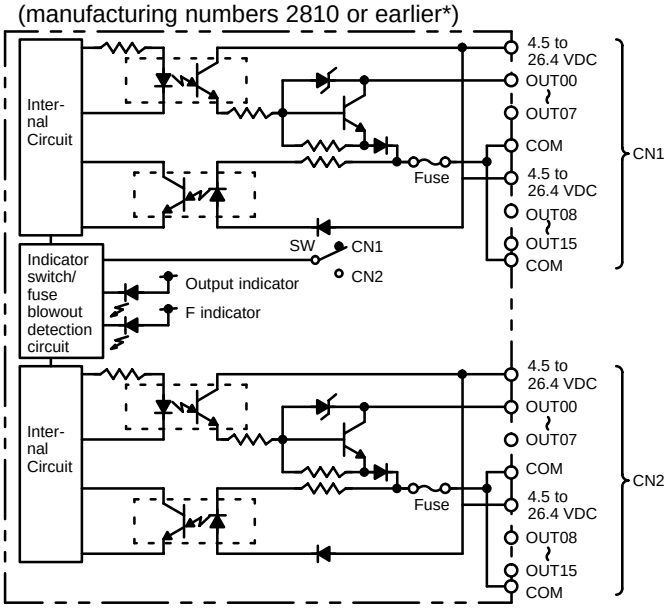
Transistor Output Unit C200H-OD219 (64 Points)

Max. Switching Capacity	16 mA 4.5 VDC to 100 mA 26.4 VDC (see below)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.8 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.4 ms max.
No. of Circuits	2 (32 points/common)
Internal Current Consumption	270 mA 5 VDC max.
Fuses	Two 3.5 A fuses (1 fuse/common) The fuses are not user-replacable.
Power for External Supply	220 mA 5 to 24 VDC±10% min. (3.4 mA × number of ON pts)
Weight	250 g max.
Dimensions	D-shape

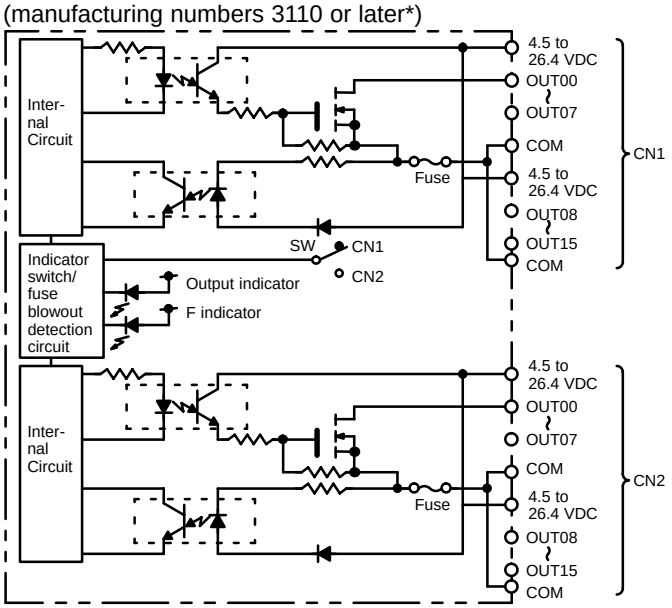
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Circuit Configuration

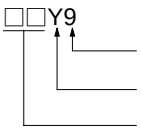
Units manufactured on or before January 28th, 2000
(manufacturing numbers 2810 or earlier*)



Units manufactured on or after January 31st, 2000
(manufacturing numbers 3110 or later*)



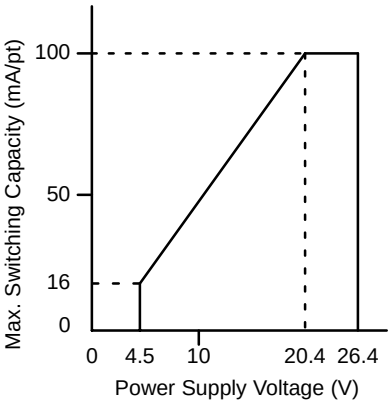
***Manufacturing Numbers**

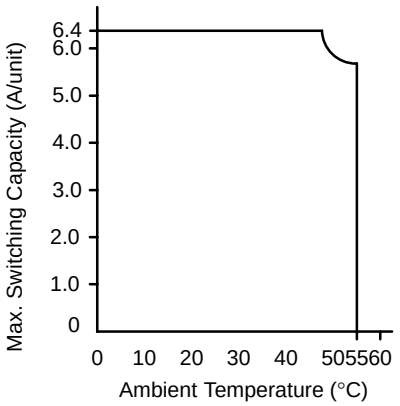


Year: Last digit of calendar year; e.g., 1999→9, 2000→0
Month: 1 to 9 (January to September), X (October), Y (November), Z (December)
Day: 01 to 31

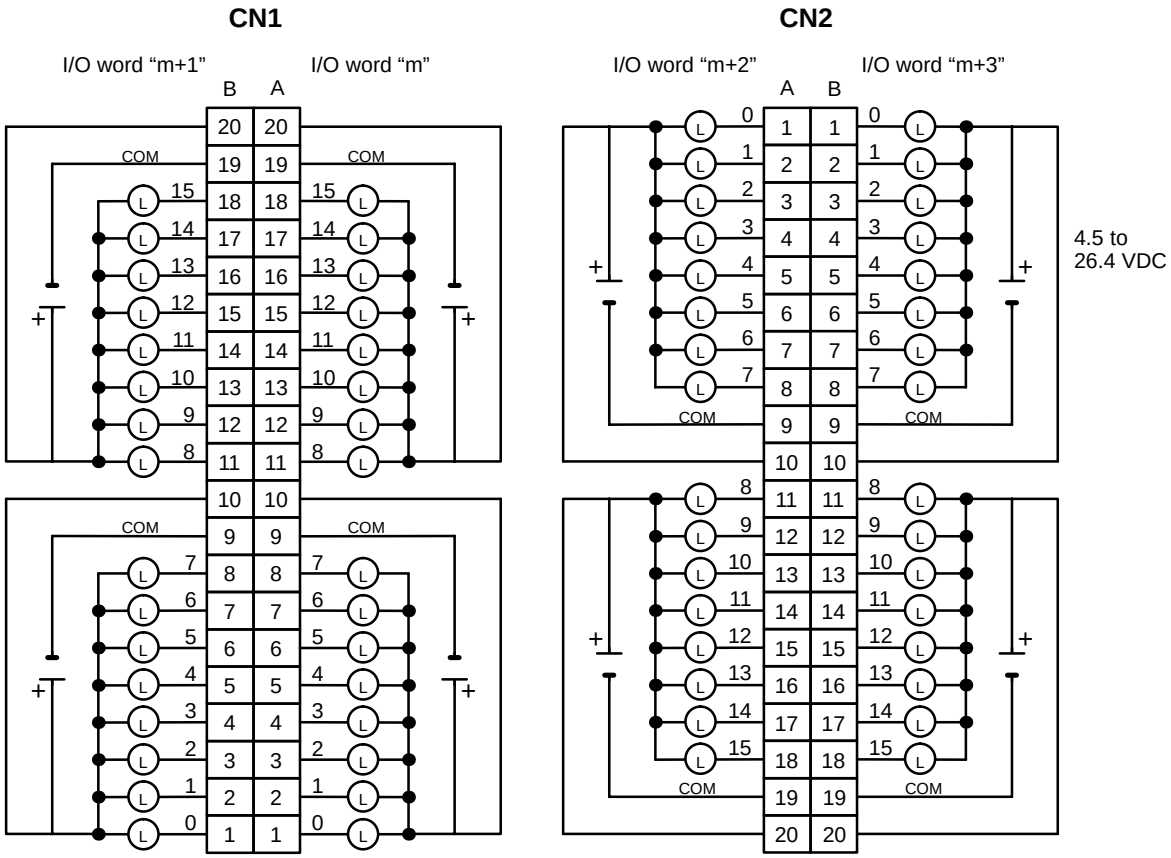
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Maximum Switching Capacity





Terminal Connections



Note
1. I/O word "m" is determined by the I/O number setting (m = IR 030 + 2 × I/O number).
2. When either fuse blows, the F indicator lights and the error flag in AR 02 corresponding to the I/O number is turned ON. I/O numbers 0 to 9 correspond to AR 0205 to AR 0214.
3. The interruption of power from the external power supply is treated the same as a fuse blowout.
4. Connect power supply wiring to every COM terminal, even though the COM terminals in each connector are connected internally.
5. When wiring output circuits, be sure to use the correct polarity for the external power supplies. Wiring with incorrect polarity may result in erroneous operation of the load.

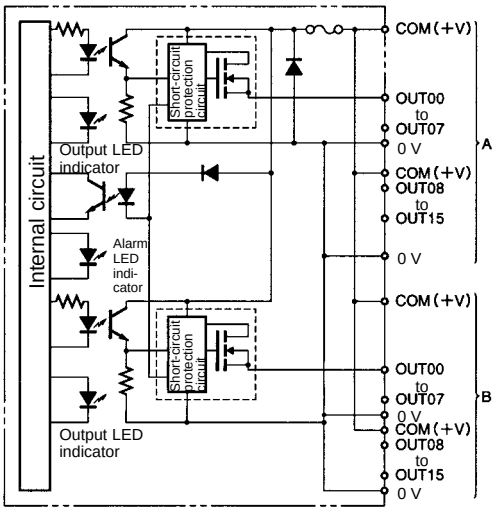
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Transistor Output Unit C200H-OD21B (32 Points) (Load Short-circuit Protection Provided)

Max. Switching Current	0.5 A 24 VDC $^{+10\%}/_{-15\%}$ (5 A/Unit)
Min. Switching Current	None
Leakage Current	0.1 mA max.
Residual Voltage	0.8 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	32 (32 points/common)
Internal Current Consumption	180 mA 5 VDC max.
Fuses	One 7 A fuse (1 fuse/common) The fuses are not user-replacable.
Power for External Supply	160 mA 24 VDC $^{+10\%}/_{-15\%}$ min. (5 mA × number of ON pts)
Weight	180 g max.
Alarm Indicator	Lamp F lights (unless fuse is broken).
Load Short-circuit Prevention (see note 1)	Detection current: 0.7 to 2.5 A Automatic restart after error clearance.
Dimensions	C-shape

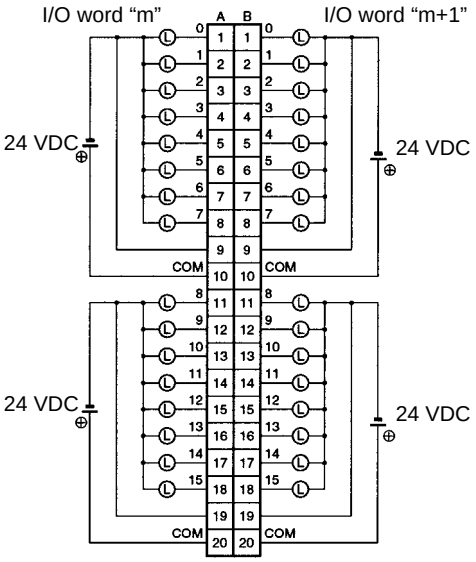
Note When the short-circuit/overload protection is activated for a contact point, the output for that point is turned OFF. At the same time, lamp "F" lights up, and the corresponding Flag in the Basic I/O Unit Information Area (AR0205 to AR0214) will turn ON. After the cause of the error has been removed, the alarm will be cleared automatically when the internal temperature of the element drops.

Circuit Configuration



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Terminal Connections



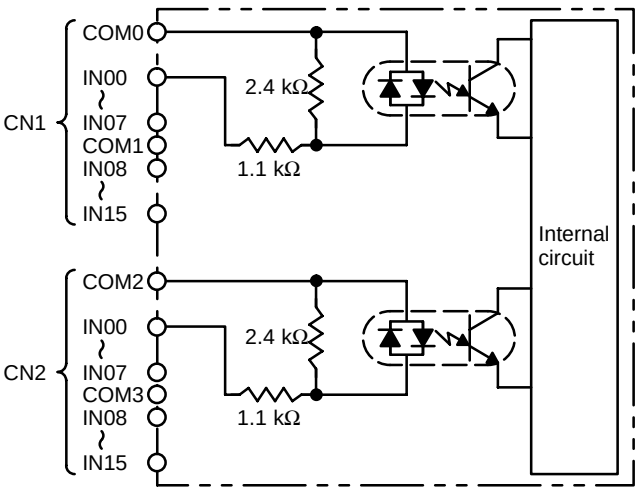
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High-density I/O Units (Special I/O Units)

TTL Input Unit C200H-ID501 (32 Points)

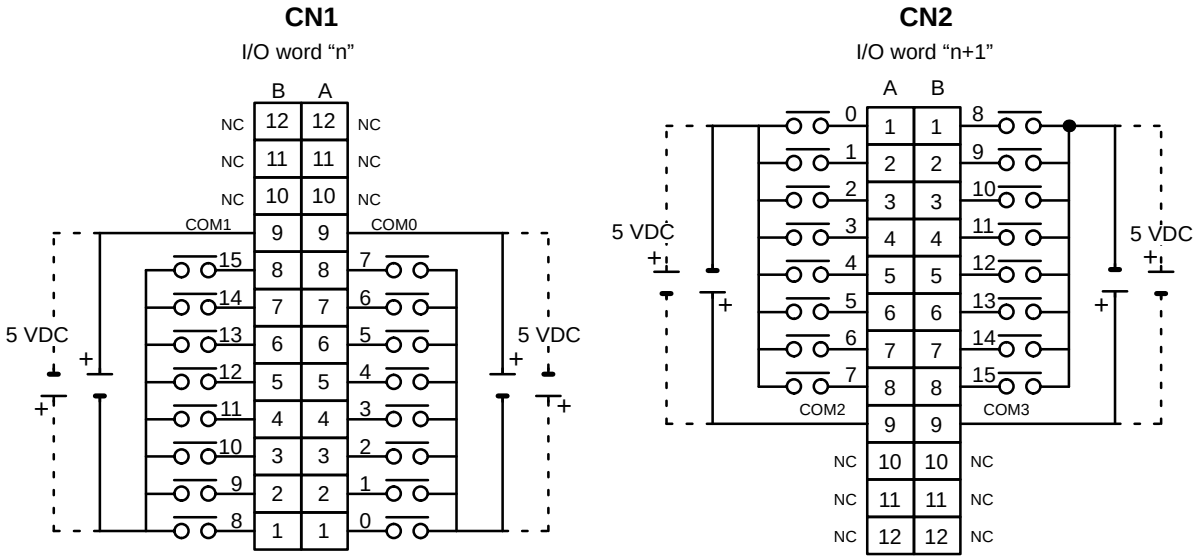
Rated Input Voltage	5 VDC
Operating Input Voltage	4.5 to 5.5 VDC
Input Impedance	1.1 kΩ
Input Current	3.5 mA (at 5 VDC)
ON Voltage	3.0 VDC min.
OFF Voltage	1.0 VDC max.
ON Response Time	2.5 ms/15 ms max. (switchable; at 24 VDC, 25°C)
OFF Response Time	2.5 ms/15 ms max. (switchable; at 24 VDC, 25°C)
No. of Circuits	4 (8 points/common)
High-speed Inputs	8 points (connector 2 terminals 8 to 15, when set) Pulse width: 1 ms/4 ms min. (switchable)
Internal Current Consumption	130 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration



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Terminal Connections



Note 1. I/O word “n” is determined by the unit number setting (n = IR 100 + 10 × unit number).

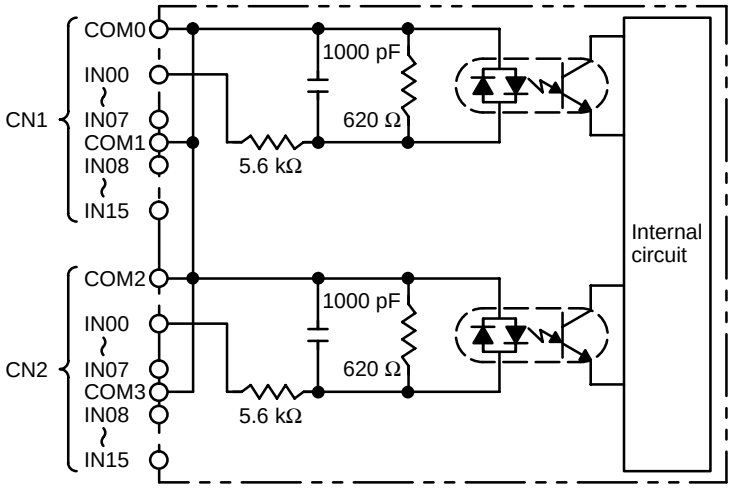
2. When pin 2 of the Unit’s DIP switch is ON, input points 08 to 15 in connector 2 are high-speed inputs.

DC Input Unit C200H-ID215 (32 Points)

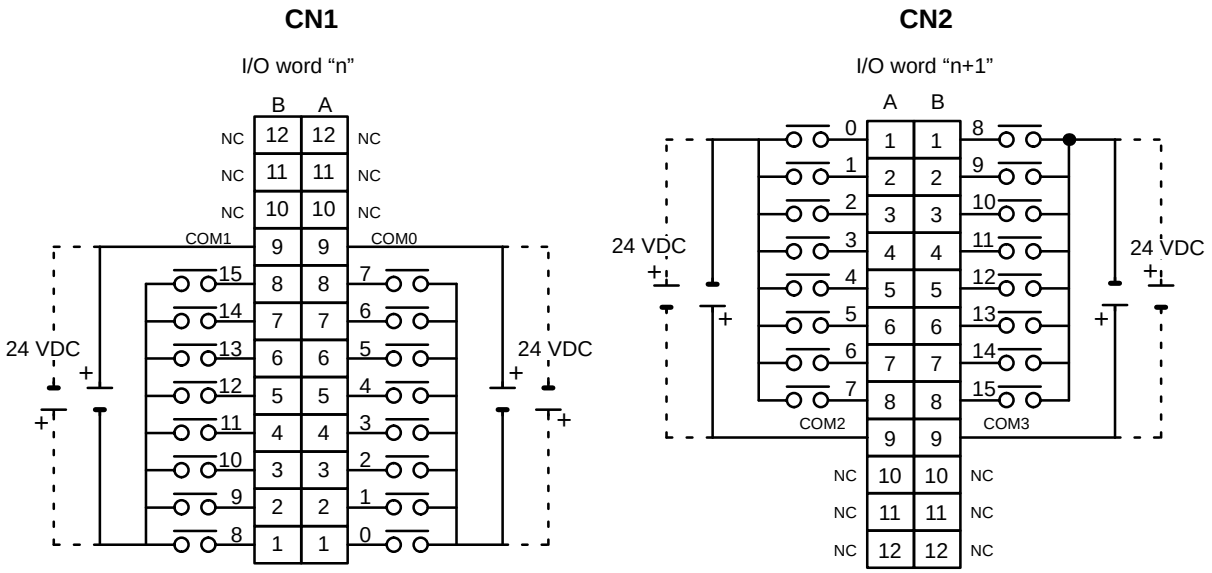
Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA (at 24 VDC)
ON Voltage	14.4 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	2.5 ms/15 ms max. (switchable; at 24 VDC, 25°C)
OFF Response Time	2.5 ms/15 ms max. (switchable; at 24 VDC, 25°C)
No. of Circuits	4 (8 points/common)
High-speed Inputs	8 points (connector 2 terminals 8 to 15, when set) Pulse width: 1 ms/4 ms min. (switchable)
Internal Current Consumption	130 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

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Circuit Configuration



Terminal Connections



Note 1. I/O word "n" is determined by the unit number setting (n = IR 100 + 10 × unit number).

2. When pin 2 of the Unit's DIP switch is ON, input points 08 to 15 in connector 2 are high-speed inputs.

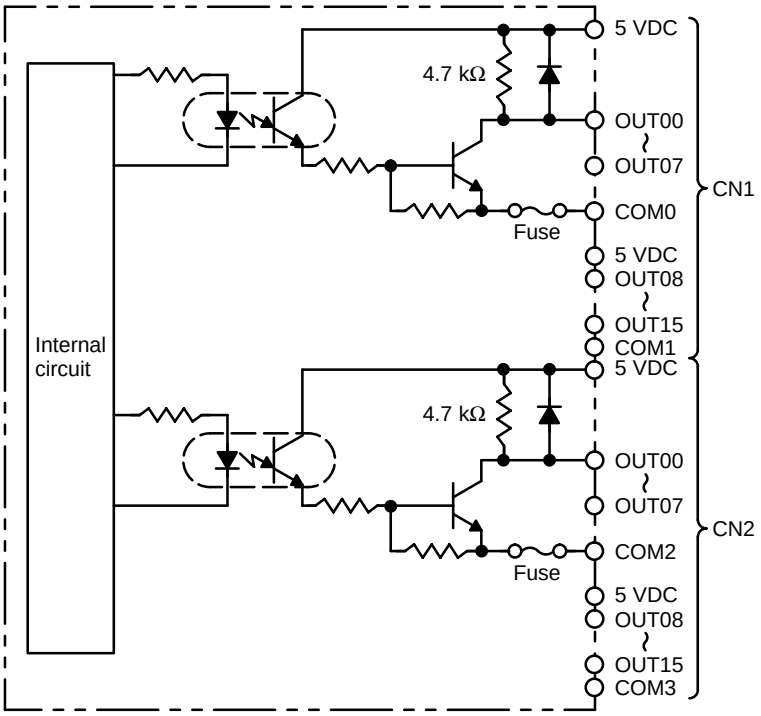
3. At high temperatures, the number of inputs that can be turned ON simultaneously is limited. Refer to the graphs on page 150 for details.

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TTL Output Unit C200H-OD501 (Used as a 32-point Output Unit)

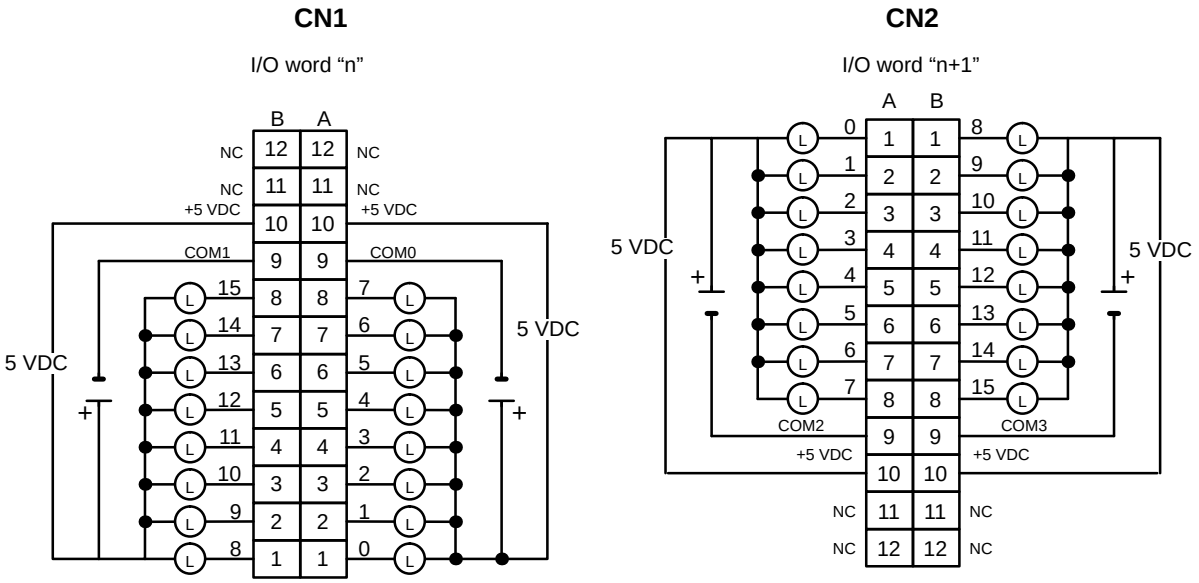
Max. Switching Capacity	5 VDC 35 mA (280 mA/common, 1.12 A/Unit; output resistance 4.7 kΩ)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	4 (8 points/common)
Internal Current Consumption	220 mA 5 VDC max.
Fuses	4 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	39 mA 5 VDC min. (1.2 mA × no. of outputs ON)
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration



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Terminal Connections



Note 1. I/O word "n" is determined by the unit number setting (n = IR 100 + 10 × unit number).

2. The Unit will have 32 static output points when pin 1 of it's DIP switch is OFF.

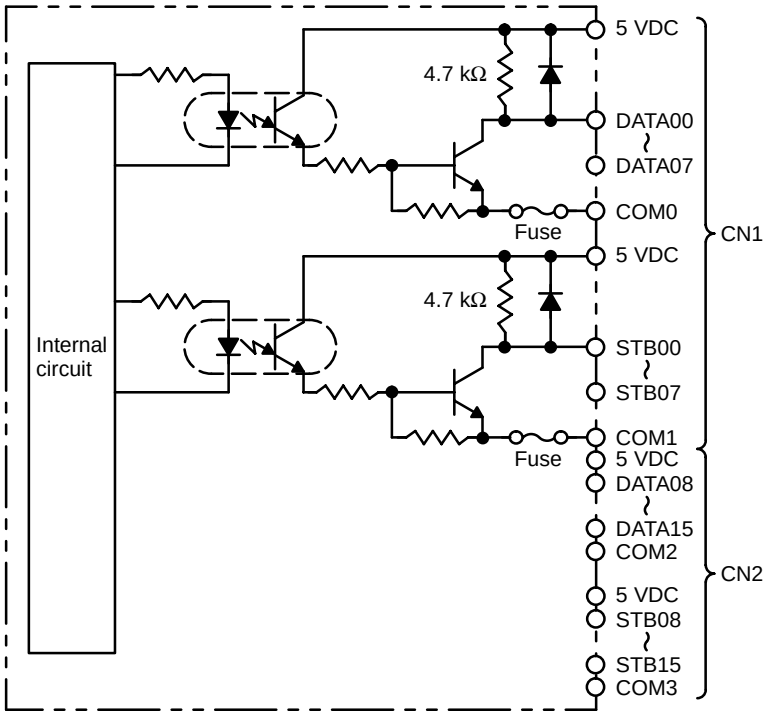
3. The outputs are negative logic outputs; when there is an output, the terminal has an "L" voltage level. Each output terminal has an output resistance of 4.7 kΩ.

TTL Output Unit C200H-OD501 (Used as 128-point Dynamic Output Unit)

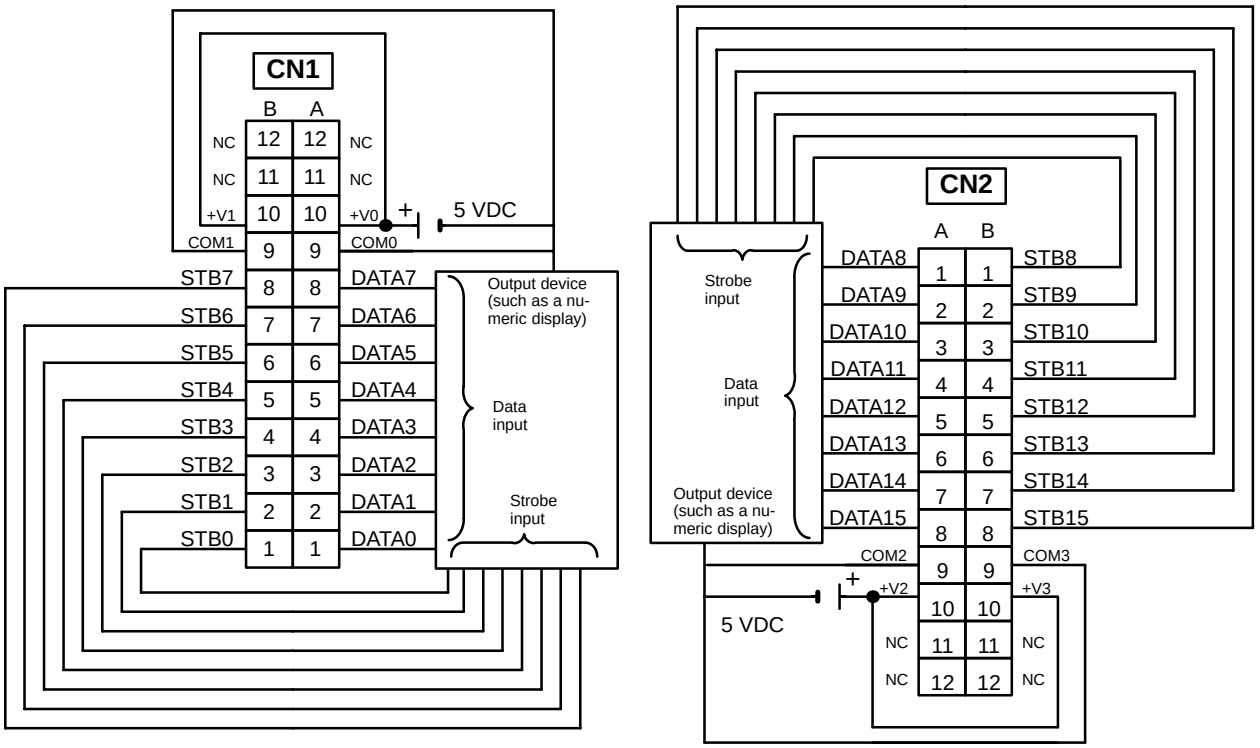
Max. Switching Capacity	5 VDC 35 mA (280 mA/common, 1.12 A/Unit; output resistance 4.7 kΩ)
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.4 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.3 ms max.
No. of Circuits	2 (dynamic, 64 points/circuit)
Internal Current Consumption	220 mA 5 VDC max.
Fuses	4 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	39 mA 5 VDC min. (1.2 mA × no. of outputs ON)
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

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Circuit Configuration



Terminal Connections



Note 1. Refer to the Unit's *Operation Manual* for details on I/O bit allocation.
2. The Unit will have 128 dynamic output points when pin 1 of it's DIP switch is ON.

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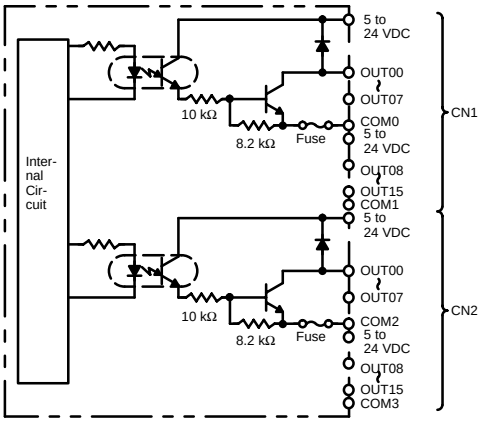
3. Set pin 5 of the Unit's DIP switch ON for positive logic outputs, or OFF for negative logic outputs. When set for negative logic outputs, the terminal has an "L" voltage level when there is an output. When set for positive logic outputs, the terminal has an "H" voltage level when there is an output.
4. The strobe signal has negative logic regardless of the setting of pin 5.
5. Each output terminal has an output resistance of 4.7 kΩ.

Transistor Output Unit C200H-OD215 (Used as 32-point Output Unit)

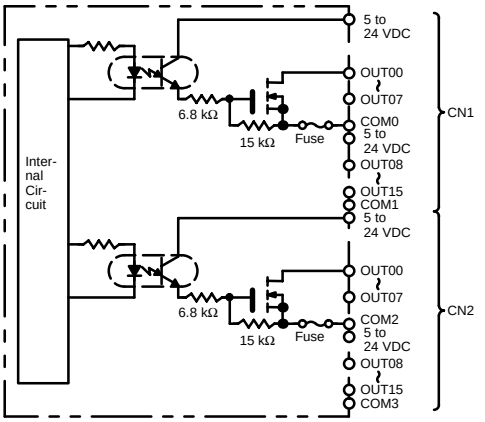
Max. Switching Capacity	16 mA 4.5 VDC to 100 mA 26.4 VDC (see below) 800 mA/common, 3.2 A/Unit
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.7 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.6 ms max.
No. of Circuits	4 (8 points/common)
Internal Current Consumption	220 mA 5 VDC max.
Fuses	4 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	90 mA 5 to 24 VDC±10% min. (2.8 mA × number of ON outputs)
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration

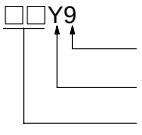
Units manufactured on or before November 29th, 1999 (manufacturing numbers 29Y9 or earlier*)



Units manufactured on or after November 30th, 1999 (manufacturing numbers 30Y9 or later*)



***Manufacturing Numbers**



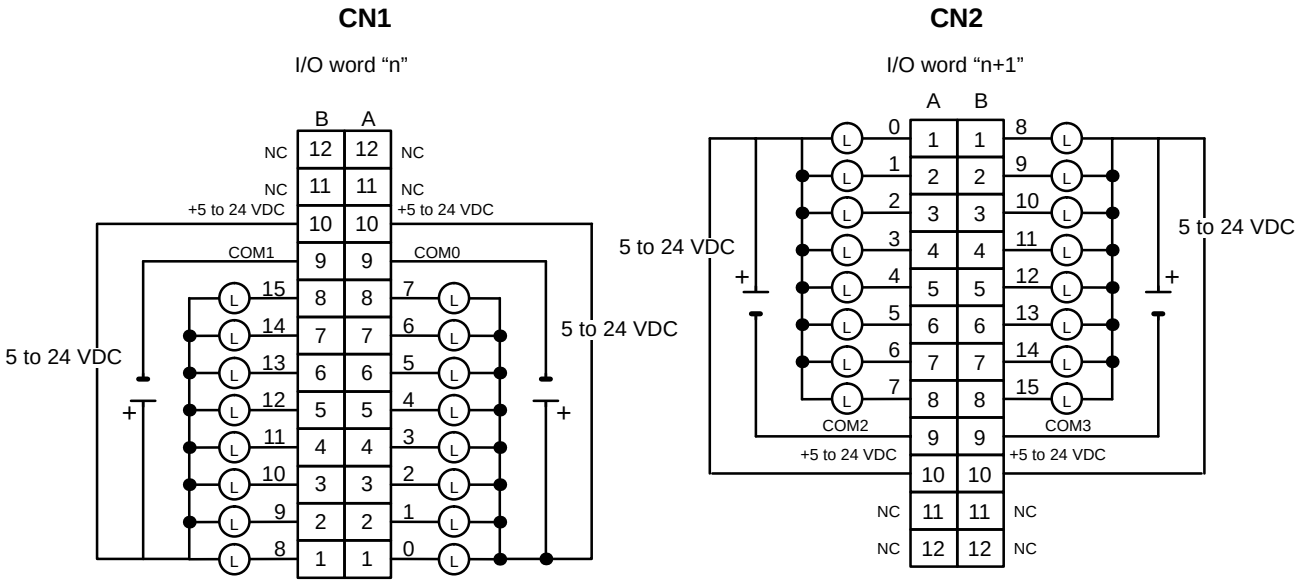
Year: Last digit of calendar year; e.g., 1999→9, 2000→0

Month: 1 to 9 (January to September), X (October), Y (November), Z (December)

Day: 01 to 31

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Terminal Connections



Note 1. I/O word “n” is determined by the unit number setting (n = IR 100 + 10 × unit number).

2. The Unit will have 32 static output points when pin 1 of it’s DIP switch is OFF.

3. When wiring output circuits, be sure to use the correct polarity for the external power supplies. Wiring with incorrect polarity may result in erroneous operation of the load.

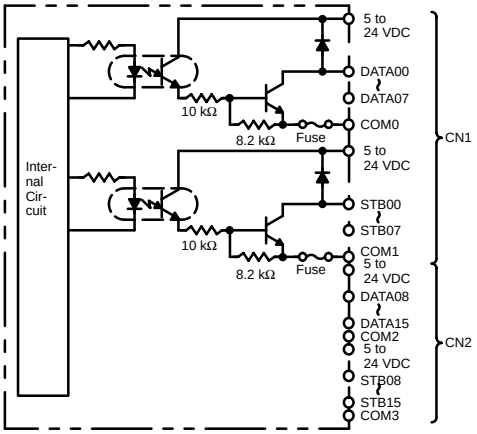
Transistor Output Unit C200H-OD215 (Used as 128-point Dynamic Output Unit)

Max. Switching Capacity	16 mA 4.5 VDC to 100 mA 26.4 VDC (see below) 800 mA/common, 3.2 A/Unit
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.7 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.6 ms max.
No. of Circuits	2 (dynamic, 64 points/circuit)
Internal Current Consumption	220 mA 5 VDC max.
Fuses	4 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	90 mA 5 to 24 VDC±10% min. (2.8 mA × number of ON outputs)
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

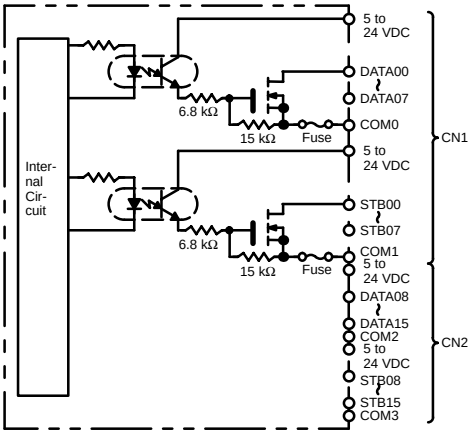
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Circuit Configuration

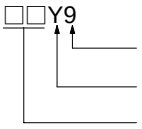
Units manufactured on or before November 29th, 1999 (manufacturing numbers 29Y9 or earlier*)



Units manufactured on or after November 30th, 1999 (manufacturing numbers 30Y9 or later*)

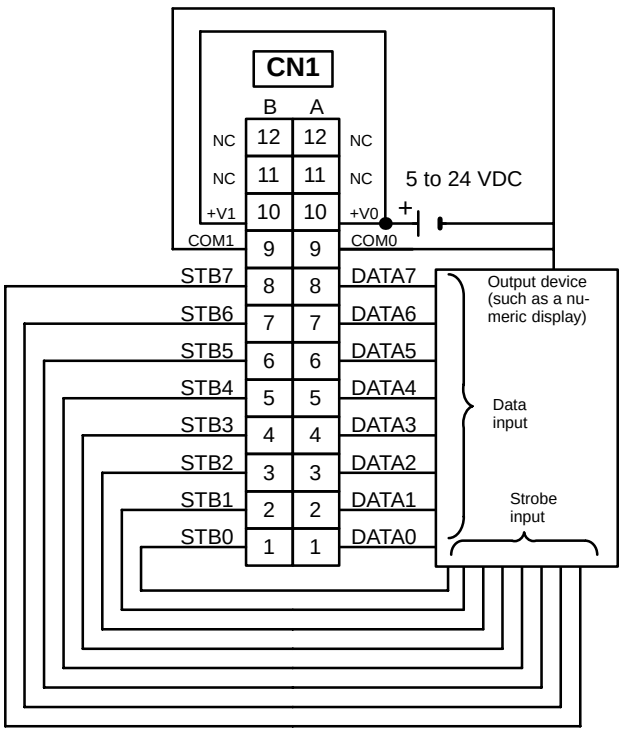


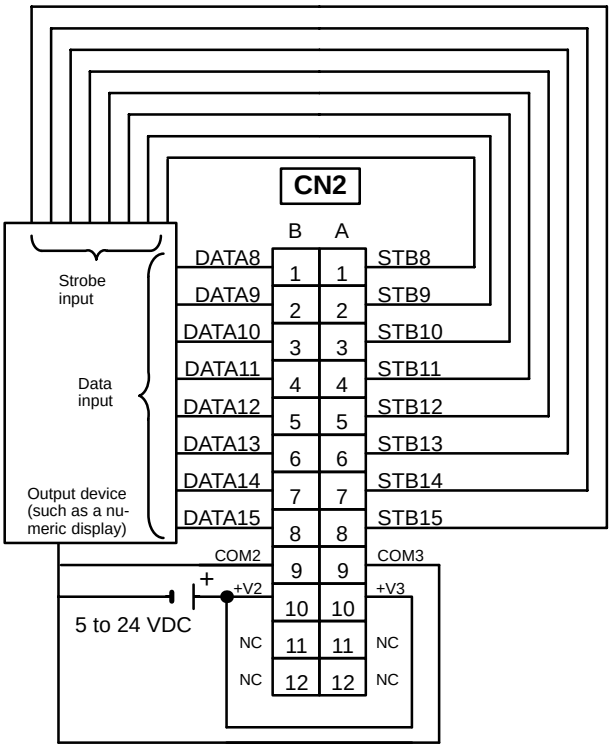
***Manufacturing Numbers**



Year: Last digit of calendar year; e.g., 1999→9, 2000→0
Month: 1 to 9 (January to September), X (October), Y (November), Z (December)
Day: 01 to 31

Terminal Connections





Note
1. Refer to the Unit's *Operation Manual* for details on I/O bit allocation.
2. The Unit will have 128 dynamic output points when pin 1 of it's DIP switch is ON.
3. When wiring output circuits, be sure to use the correct polarity for the external power supplies. Wiring with incorrect polarity may result in erroneous operation of the load.
4. Set pin 5 of the Unit's DIP switch ON for positive logic outputs, or OFF for negative logic outputs. When set for negative logic outputs, the terminal has an "L" voltage level when there is an output. When set for positive logic outputs, the terminal has an "H" voltage level when there is an output.

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5. The strobe signal has negative logic regardless of the setting of pin 5.
6. When the output device (such as a numeric display) does not have a pull-up resistor, it is necessary to add a pull-up resistor between the + terminal of the power supply and each data (0 to 15) and strobe (0 to 15) terminal.

TTL I/O Unit C200H-MD501 (Used as I/O Unit with 16 Inputs and 16 Outputs)

Output Specifications (Connector 1)

Max. Switching Capacity	5 VDC±10% 35 mA (280 mA/common, 560 mA/Unit; output resistance 4.7 kΩ)
Min. Switching Capacity	None
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 Circuits	2 (8 points/common)
Fuses	2 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	20 mA 5 VDC min. (1.2 mA × no. of outputs ON)

Input Specifications (Connector 2)

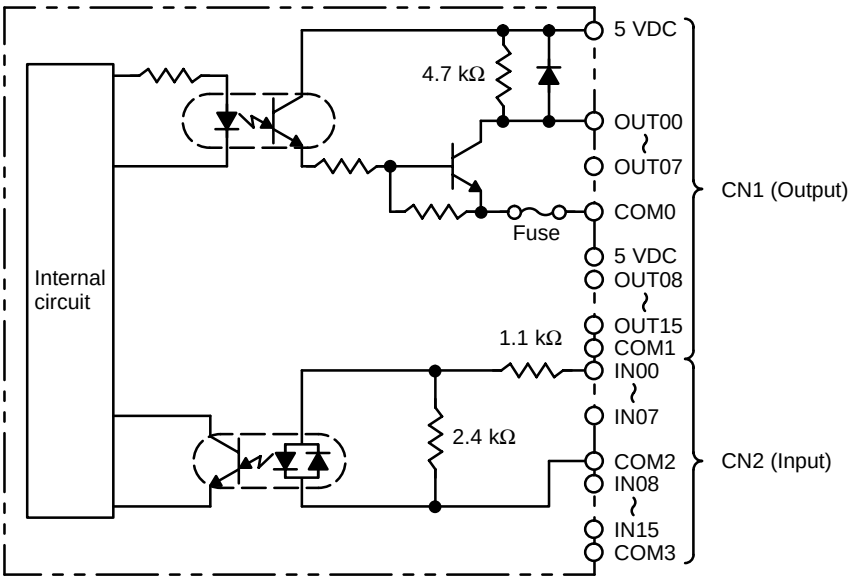
Rated Input Voltage	5 VDC±10%
Operating Input Voltage	4.5 to 5.5 VDC
Input Impedance	1.1 kΩ
Input Current	3.5 mA (at 5 VDC)
ON Voltage	3.0 VDC min.
OFF Voltage	1.0 VDC max.
ON Response Time	2.5 ms/15 ms max. (switchable)
OFF Response Time	2.5 ms/15 ms max. (switchable)
No. of Circuits	2 (8 points/common)
High-speed Inputs	8 points (connector 2 terminals 8 to 15, when set) Pulse width: 1 ms/4 ms min. (switchable)

General Specifications

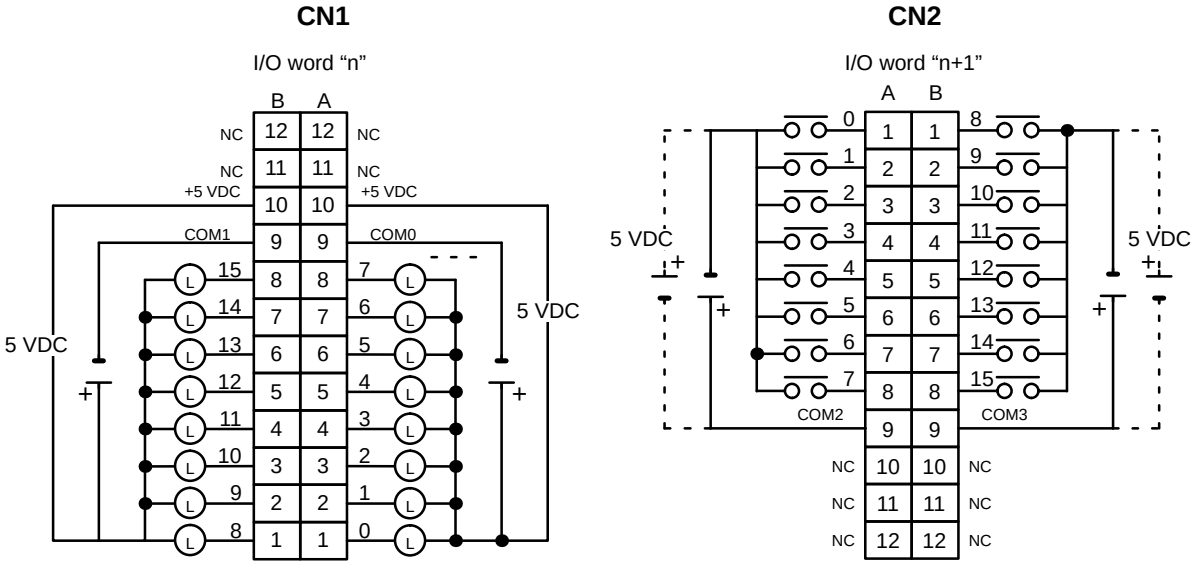
Internal Current Consumption	180 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

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Circuit Configuration



Terminal Connections



Note 1. I/O word "n" is determined by the unit number setting (n = IR 100 + 10 × unit number).

2. The Unit will have 16 static output and16 static input points when pin 1 of it's DIP switch is OFF.
3. When pin 2 of the Unit's DIP switch is ON, input points 08 to 15 in connector 2 are high-speed inputs.
4. The outputs are negative logic outputs; when there is an output, the terminal has an "L" voltage level. Each output terminal has an output resistance of 4.7 kΩ.
5. The user is not authorized to change the fuse.

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TTL I/O Unit C200H-MD501 (Used as 128-point Dynamic Input Unit)

Output Specifications (Connector 1)

Max. Switching Capacity	5 VDC±10% 35 mA (280 mA/common, 560 mA/Unit; output resistance 4.7 kΩ)
Min. Switching Capacity	None
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.
Fuses	2 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	20 mA 5 VDC min. (1.2 mA × no. of outputs ON)

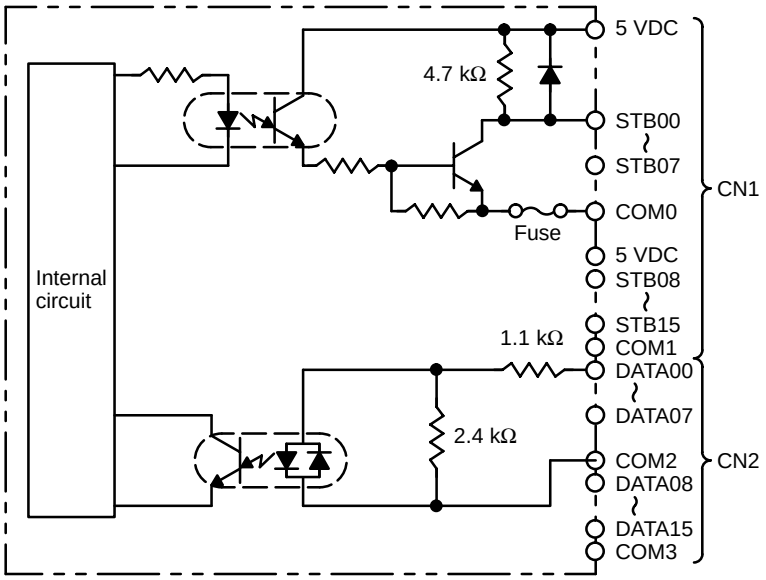
Input Specifications (Connector 2)

Rated Input Voltage	5 VDC±10%
Operating Input Voltage	4.5 to 5.5 VDC
Input Impedance	1.1 kΩ
Input Current	3.5 mA (at 5 VDC)
ON Voltage	3.0 VDC min.
OFF Voltage	1.0 VDC max.

General Specifications

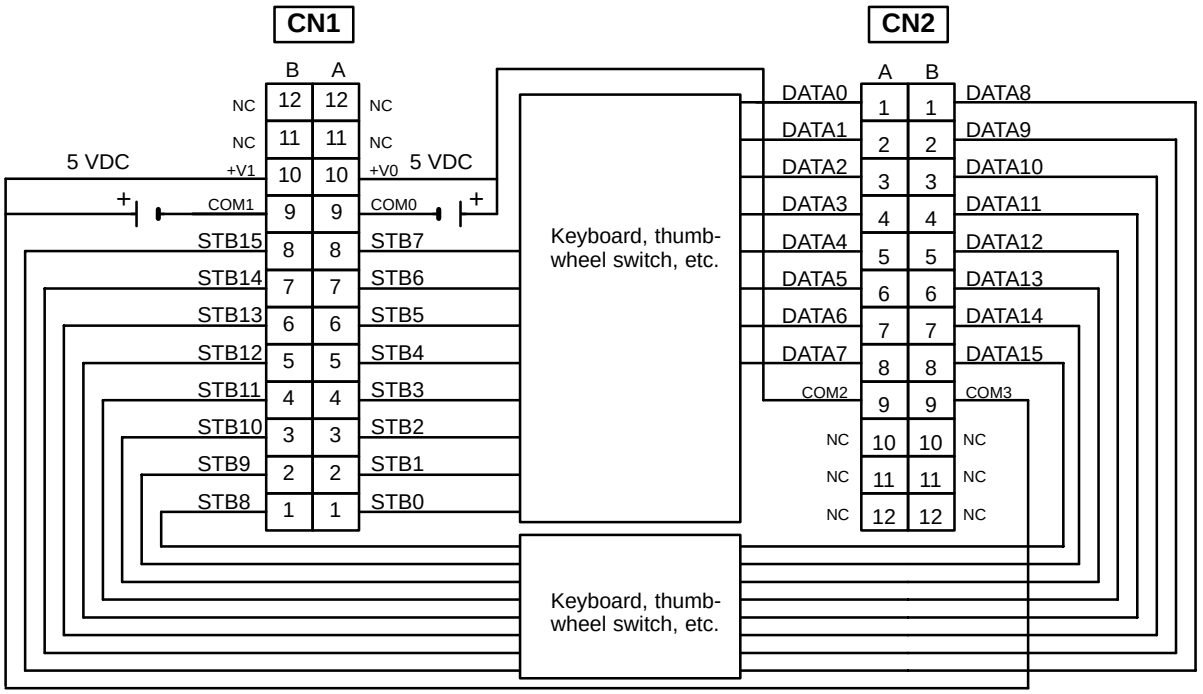
No. of Circuits	2 (dynamic, 64 points/circuit)
Internal Current Consumption	180 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration



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Terminal Connections



Note 1. Refer to the Unit's *Operation Manual* for details on I/O bit allocation.
2. The Unit will have 128 dynamic output points when pin 1 of it's DIP switch is ON.
3. Each output terminal has an output resistance of 4.7 kΩ.

12 VDC Input/Transistor Output Unit C200H-MD115 (Used as I/O Unit with 16 Inputs and 16 Outputs)

Output Specifications (Connector 1)

Max. Switching Capacity	16 mA 4.5 VDC to 100 mA 26.4 VDC (see page 149), 800 mA/common, 1.6 A/Unit
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.7 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.6 ms max.
No. of Circuits	2 (8 points/common)
Fuses	2 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	45 mA 5 to 24 VDC±10% min. (2.8 mA × number of ON outputs)

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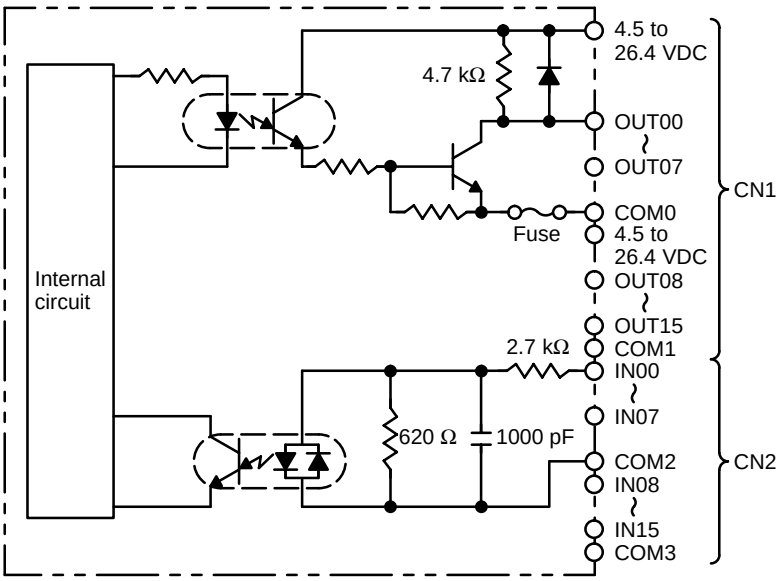
Input Specifications (Connector 2)

Rated Input Voltage	12 VDC $^{+10\%}/_{-15\%}$
Operating Input Voltage	10.2 to 13.2 VDC
Input Impedance	2.7 kΩ
Input Current	4.1 mA (at 12 VDC)
ON Voltage	8.0 VDC min.
OFF Voltage	3.0 VDC max.
ON Response Time	2.5 ms/15 ms max. (switchable)
OFF Response Time	2.5 ms/15 ms max. (switchable)
No. of Circuits	2 (8 points/common)
High-speed Inputs	8 points (connector 2 terminals 8 to 15, when set) Pulse width: 1 ms/4 ms min. (switchable)

General Specifications

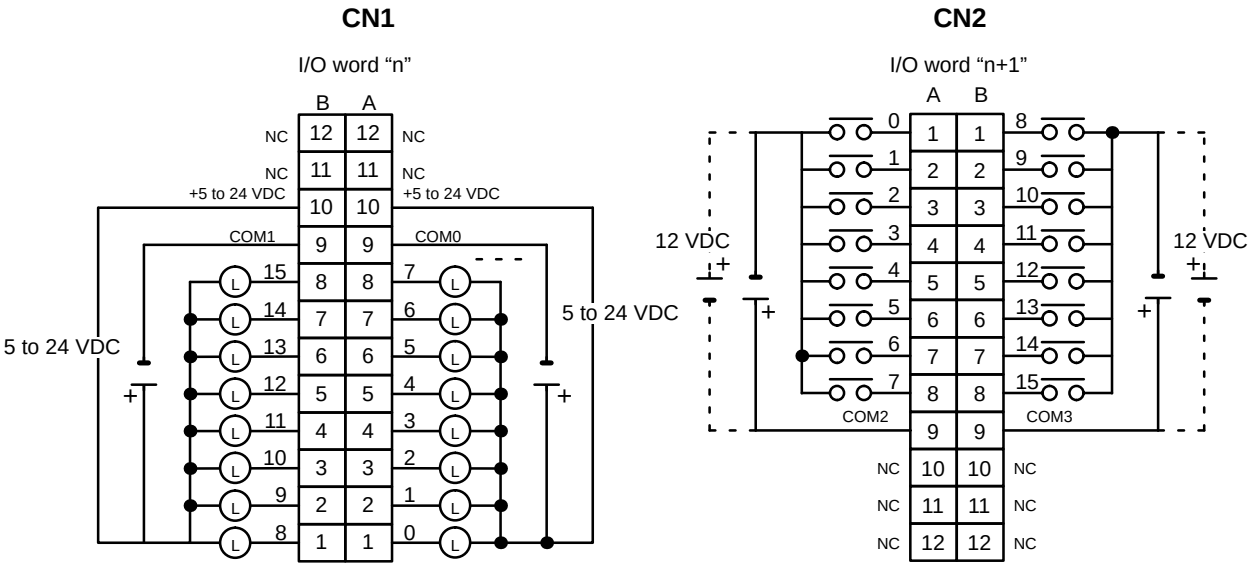
Internal Current Consumption	180 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration



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Terminal Connections



Note 1. I/O word "n" is determined by the unit number setting (n = IR 100 + 10 × unit number).
2. The Unit will have 16 static output and16 static input points when pin 1 of it's DIP switch is OFF.
3. When pin 2 of the Unit's DIP switch is ON, input points 08 to 15 in connector 2 are high-speed inputs.

12 VDC Input/Transistor Output Unit C200H-MD115 (Used as 128-point Dynamic Input Unit)

Output Specifications (Connector 1)

Max. Switching Capacity	50 mA 12 VDC, 400 mA/common, 0.8 A/Unit
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.7 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.6 ms max.
Fuses	2 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	45 mA 5 to 24 VDC±10% min. (2.8 mA × number of ON outputs)

Input Specifications (Connector 2)

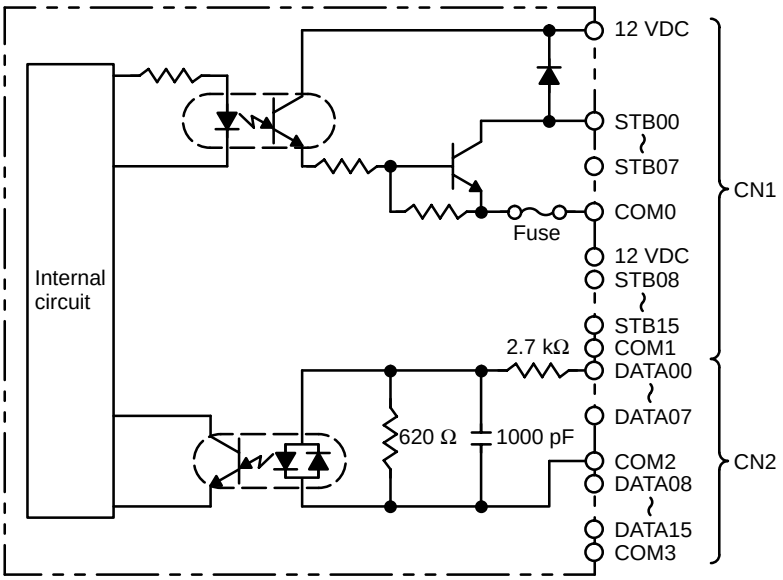
Rated Input Voltage	12 VDC
Operating Input Voltage	10.2 to 13.2 VDC
Input Impedance	2.7 kΩ
Input Current	4.1 mA (at 12 VDC)
ON Voltage	8.0 VDC min.
OFF Voltage	3.0 VDC max.

General Specifications

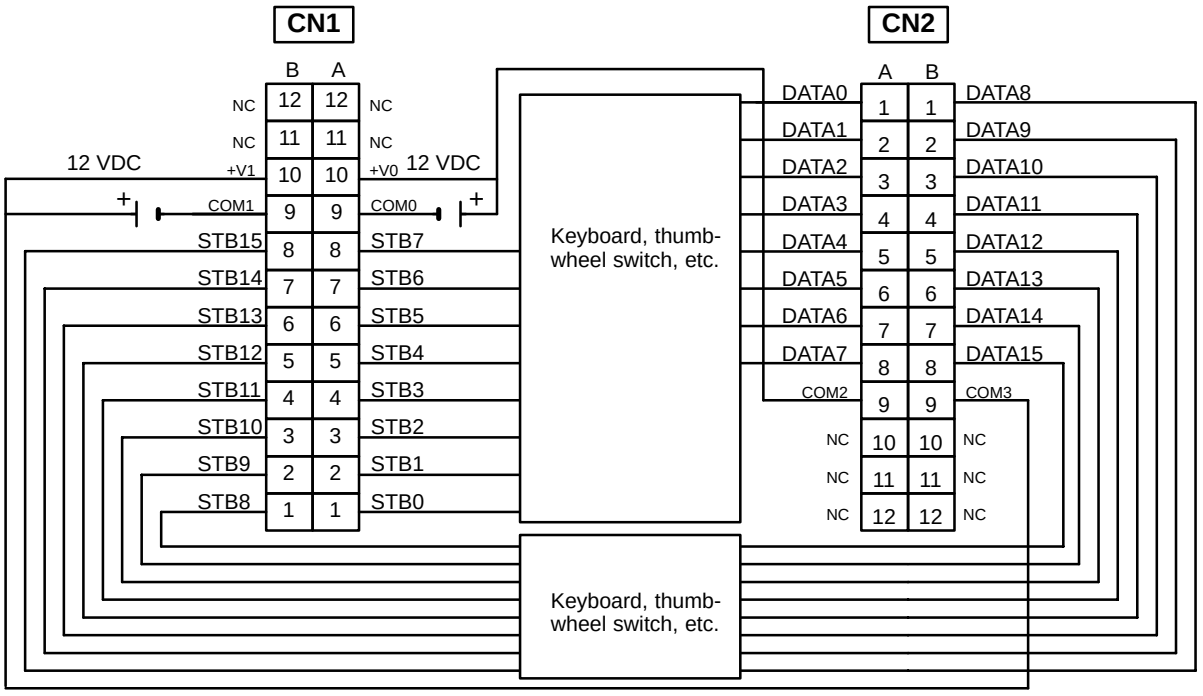
No. of Circuits	2 (dynamic, 64 points/circuit)
Internal Current Consumption	180 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

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Circuit Configuration



Terminal Connections



Note 1. Refer to the Unit's *Operation Manual* for details on I/O bit allocation.
2. The Unit will have 128 dynamic output points when pin 1 of it's DIP switch is ON.

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24 VDC Input/Transistor Output Unit C200H-MD215 (Used as I/O Unit with 16 Inputs and 16 Outputs)

Output Specifications (Connector 1)

Max. Switching Capacity	16 mA 4.5 VDC to 100 mA 26.4 VDC (see page 149), 800 mA/common, 1.6 A/Unit
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.7 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.6 ms max.
No. of Circuits	2 (8 points/common)
Fuses	2 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	45 mA 5 to 24 VDC±10% min. (2.8 mA × number of ON outputs)

Input Specifications (Connector 2)

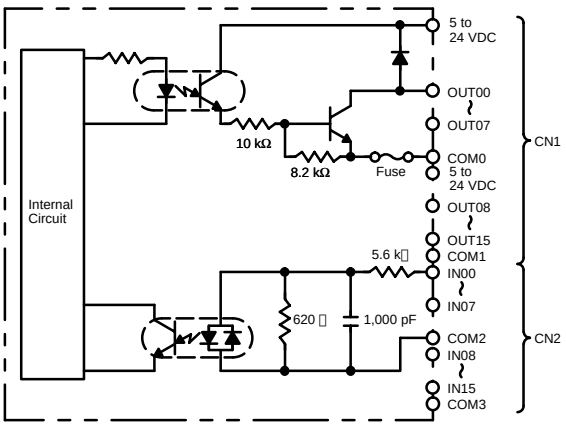
Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA (at 24 VDC)
ON Voltage	14.4.0 VDC min.
OFF Voltage	5.0 VDC max.
ON Response Time	2.5 ms/15 ms max. (switchable)
OFF Response Time	2.5 ms/15 ms max. (switchable)
No. of Circuits	2 (8 points/common)
High-speed Inputs	8 points (connector 2 terminals 8 to 15, when set) Pulse width: 1 ms/4 ms min. (switchable)

General Specifications

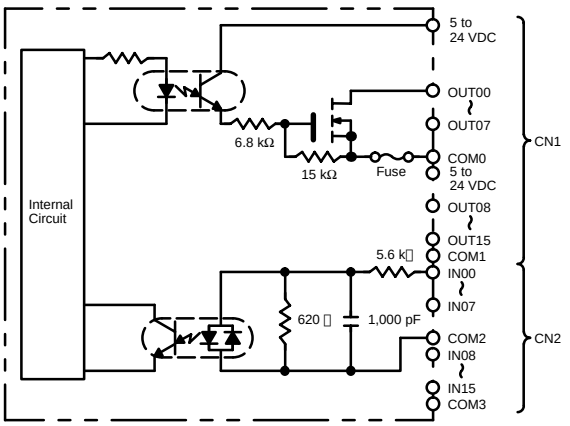
Internal Current Consumption	180 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration

Units manufactured on or before November 29th, 1999 (manufacturing numbers 29Y9 or earlier*)

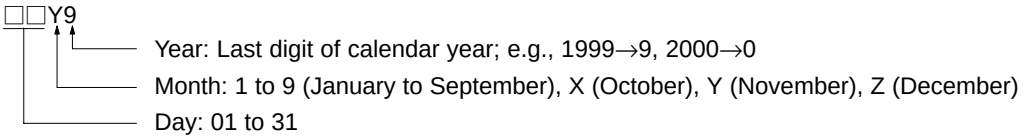


Units manufactured on or after November 30th, 1999 (manufacturing numbers 30Y9 or later*)

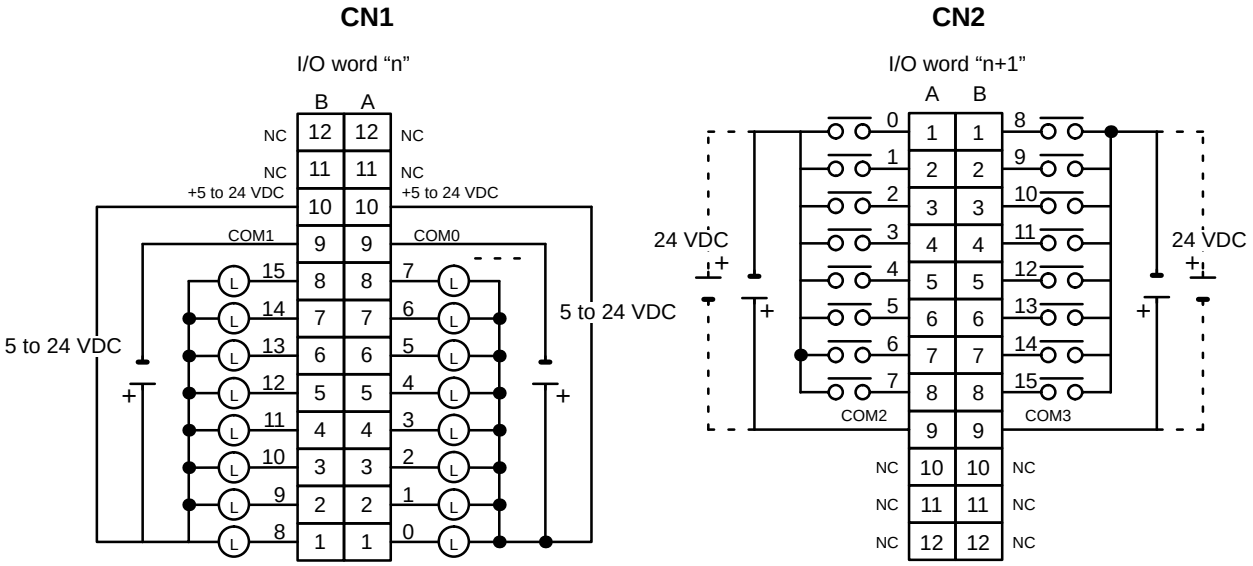


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***Manufacturing Numbers**



Terminal Connections



Note
1. I/O word "n" is determined by the unit number setting (n = IR 100 + 10 × unit number).
2. The Unit will have 16 static output and16 static input points when pin 1 of it's DIP switch is OFF.
3. At high temperatures, the number of inputs that can be turned ON simultaneously is limited. Refer to the graph on page 150 for details.
4. When pin 2 of the Unit's DIP switch is ON, input points 08 to 15 in connector 2 are high-speed inputs.
5. When wiring output circuits, be sure to use the correct polarity for the external power supplies. Wiring with incorrect polarity may result in erroneous operation of the load.

24 VDC Input/Transistor Output Unit C200H-MD215 (Used as 128-point Dynamic Input Unit)

Output Specifications (Connector 1)

Max. Switching Capacity	100 mA 24 VDC, 800 mA/common, 1.6 A/Unit
Min. Switching Capacity	None
Leakage Current	0.1 mA max.
Residual Voltage	0.7 V max.
ON Response Time	0.2 ms max.
OFF Response Time	0.6 ms max.
Fuses	2 (1 fuse/common; fuses are not user-replacable.)
Power for External Supply	45 mA 5 to 24 VDC±10% min. (2.8 mA × number of ON outputs)

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Input Specifications (Connector 2)

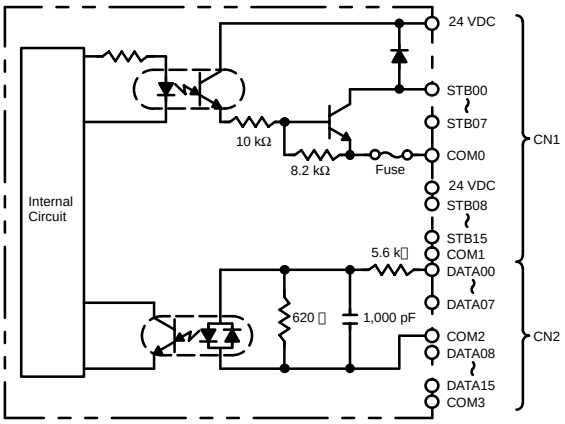
Rated Input Voltage	24 VDC
Operating Input Voltage	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA (at 24 VDC)
ON Voltage	14.4.0 VDC min.
OFF Voltage	5.0 VDC max.

General Specifications

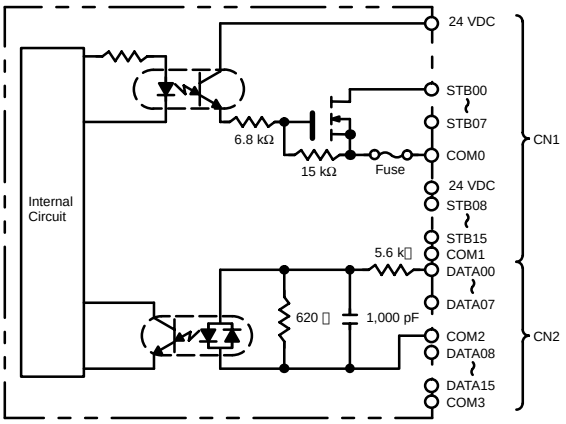
No. of Circuits	2 (dynamic, 64 points/circuit)
Internal Current Consumption	180 mA 5 VDC max.
Weight	300 g max.
Dimensions	130×34.5×100.5 (H×W×D, in millimeters)

Circuit Configuration

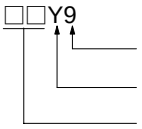
Units manufactured on or before November 29th, 1999 (manufacturing numbers 29Y9 or earlier*)



Units manufactured on or after November 30th, 1999 (manufacturing numbers 30Y9 or later*)



***Manufacturing Numbers**



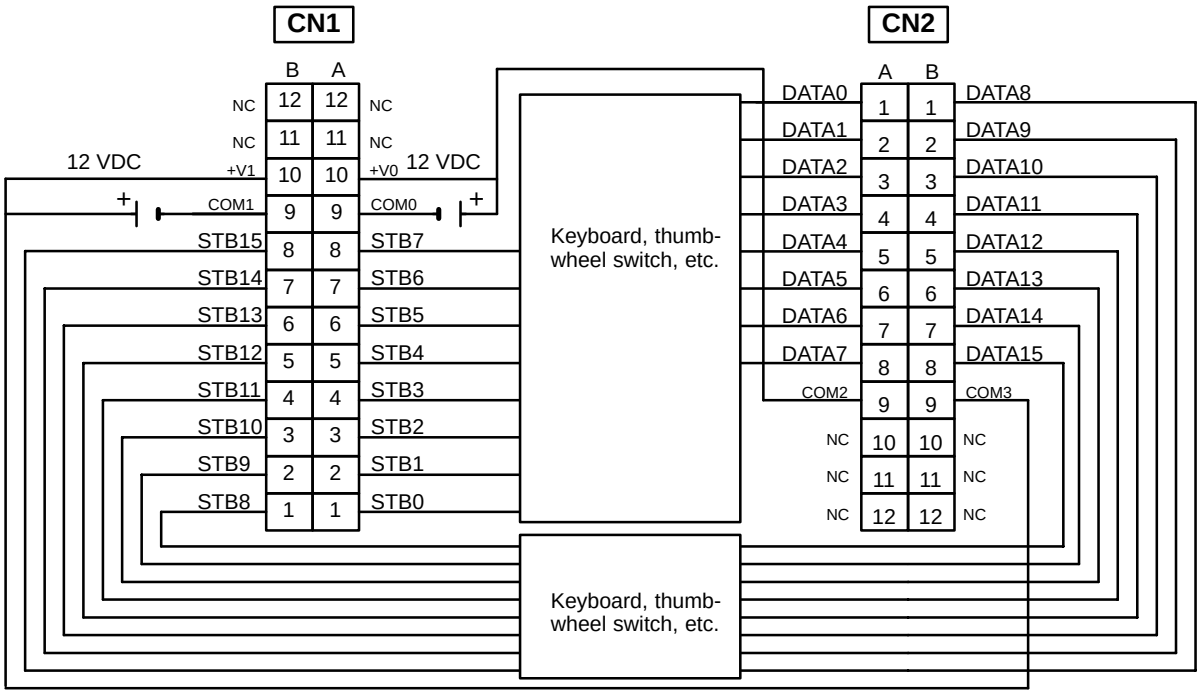
Year: Last digit of calendar year; e.g., 1999→9, 2000→0

Month: 1 to 9 (January to September), X (October), Y (November), Z (December)

Day: 01 to 31

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Terminal Connections



Note
1. Refer to the Unit's *Operation Manual* for details on I/O bit allocation.
2. The Unit will have 128 dynamic output points when pin 1 of it's DIP switch is ON.
3. Each output terminal has an output resistance of 4.7 kΩ.
4. At high temperatures, the number of inputs that can be turned ON simultaneously is limited. Refer to the graph on page 150 for details.
5. The user is not authorized to change the fuse.
6. When wiring output circuits, be sure to use the correct polarity for the external power supplies. Wiring with incorrect polarity may result in erroneous operation of the load.

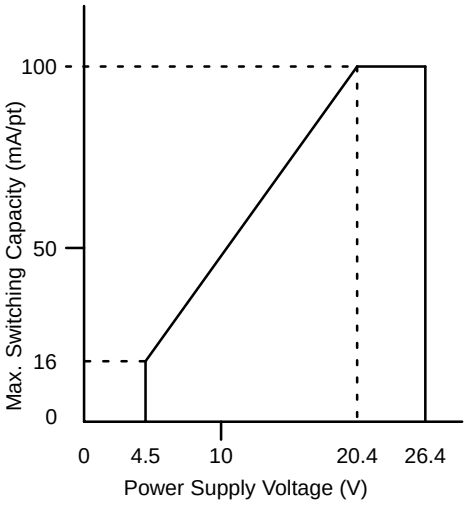
High-density I/O Unit Limitations

Limitations on the switching capacity of C200H-OD215/MD115/MD215 Transistor Output Units and the usable number of I/O points in the C200H-ID215 and C200H-MD215 are shown below.

Switching Capacity

The switching capacity of C200H-OD215/MD115/MD215 Transistor Output Units depends on the power supply voltage, as shown below.

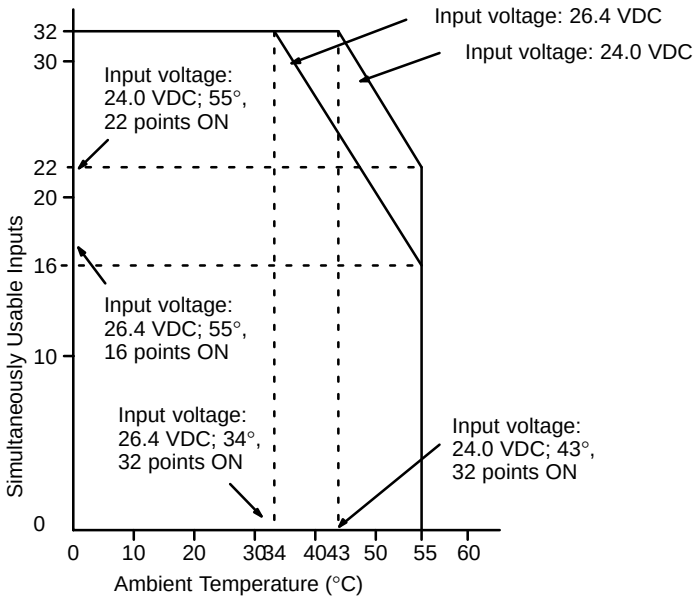
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Usable I/O Points (C200H-ID215)

To prevent overheating in the C200H-ID215 that can cause early failure of internal components, limit the number of input points that are ON simultaneously. As shown below, the number of points that can be on simultaneously depends on both the temperature and the input voltage.

For example, 22 pts with input voltage of 24.0 VDC can be ON at 55°C, but only 16 pts with input voltage of 26.4 VDC can be ON at 55°C. At 24.0 VDC, all 32 input pts can be ON up to 43°C, but at 26.4 VDC all 32 input pts can be ON up to 34°C.

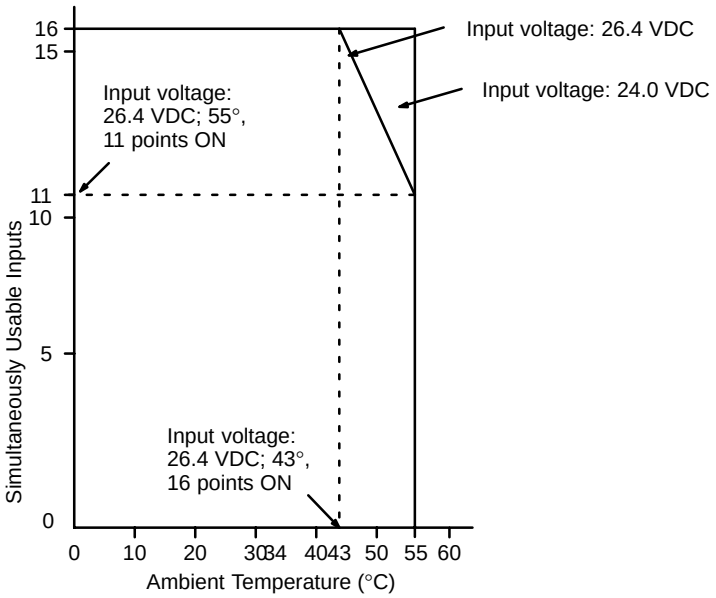


Note If the Unit is at room temperature it takes about 10 minutes for heat to build up. All inputs can thus be turned ON simultaneously for testing, provided that all inputs have been OFF for at least 2 hours.

Usable I/O Points (C200H-MD215)

To prevent overheating in the C200H-MD215 and prevent early failure of internal components, limit the number of input points ON simultaneously. The number of points that can be on simultaneously depends on both the temperature and the input voltage. (There is no limit to the number of output points that can be ON simultaneously.)

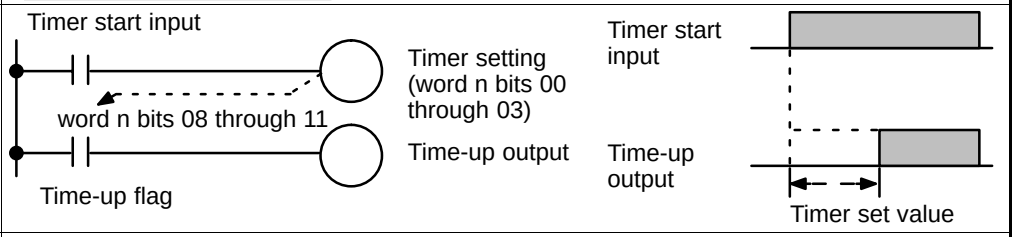
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Note If the Unit is at room temperature it takes about 10 minutes for heat to build up. All inputs can thus be turned ON simultaneously for testing, provided that all inputs have been OFF for at least 2 hours.

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Analog Timer Unit (C200H-TM001)

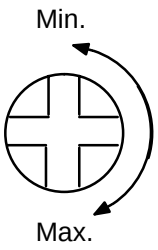
Item	Specifications
Oscillation Method	CR oscillation
Time Setting Range	Use the DIP switch to set any of the following four ranges, according to the chart shown on the next page. 0.1 to 1 second (typical) 1 to 10 seconds (typical) 10 to 60 seconds (typical) 1 to 10 minutes (typical)
Timer Pause Function	The timing operation can be paused if so specified by the program. Therefore, the timers can also be used as cumulative registers.
Number of Timer Points	4
Indicators	SET and TIME UP
External Variable Resistor	External variable resistors can be used to set the time value when the IN/EXT selector is set to OFF (EXT). Use 20 kΩ variable resistors.
Bit Allocation	The word is determined by the system configuration. Bit 00 (T0 start output) … Bit 03 (T3 start output): "1" when time is running Bit 04 (T0 pause output) … Bit 07 (T3 pause output): 0 = Operates, 1 = Stops Bit 08 (T0 time-up input) … Bit 11 (T3 time-up input): "1" when time is up Bit 12 … Bit 15: Cannot be used
Programming and Timing Chart	
Internal Current Consumption	60 mA 5 VDC max.

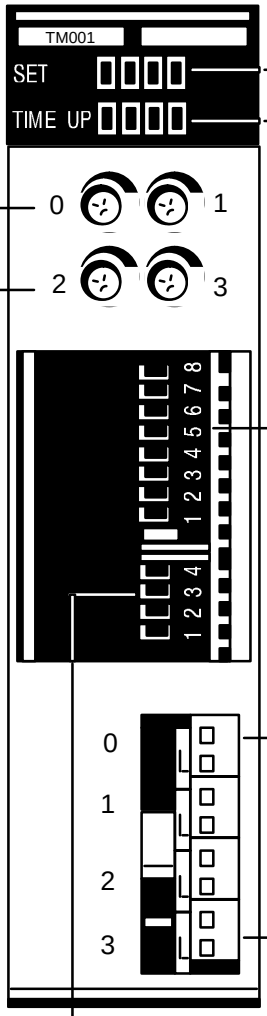
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C200H-TM001

Internal variable resistors

These variable resistors are used to set the timers. The settings of these resistors are effective only when the corresponding IN/EXT selector is ON. To set or adjust the time, use the screwdriver supplied with the Unit. Turn the variable resistor clockwise to increase the time value. The numbers 0 through 3 correspond to T0 through T3, respectively.





Indicators

The SET indicators in the top row light when the corresponding timer is operating. The TIME UP indicators in the bottom row light when the corresponding timer (T0 through T3) turns ON.

Time range setting

External variable resistor connectors

External variable resistors can also be used to set the timers. The IN/EXT selector pin must be set to the OFF position. Numbers 0 through 3 correspond to T0 through T3, respectively. Use 20-kΩ variable resistors and AWG 22 to 28 lead wires. The connector has solderless terminals and must be wired as shown below.

IN/EXT selectors

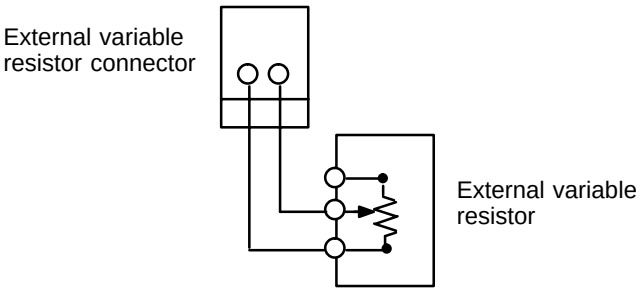
When the internal variable resistor is used, set the corresponding pin to ON; when an external variable resistor is used, set the corresponding pin to OFF. Pin numbers 4 through 1 correspond to T0 through T3, respectively.

Timers	Pin	0.1 to 1 s	0.1 to 10 s	10 to 60 s	1 to 10 m
T0	8	0	1	0	1
	7	0	0	1	1
T1	6	0	1	0	1
	5	0	0	1	1
T2	4	0	1	0	1
	3	0	0	1	1
T3	2	0	1	0	1
	1	0	0	1	1

(0: OFF 1: ON)

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Caution Ensure that the external variable resistor connectors are open when using the internal variable resistor.



Standard B7A Interface Units (C200H-B7AI1/B7AO1)

The B7A Interface Unit used with the B7A Link Terminal allows the transmission and reception of 16-point I/O data over two wires.

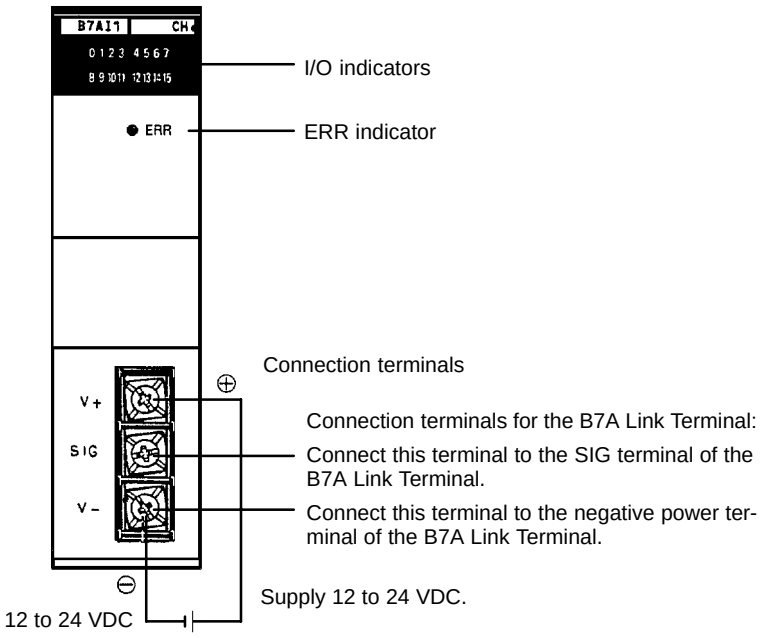
The following B7A Interface Units and B7A Link Terminal models are available.

B7A Interface Unit	B7A Link Terminals
16-point input: C200H-B7AI1	B7A-T6□1 (Screw terminal models) B7A-T6D2 (Modular models)
16-point output: C200H-B7AO1	B7A-R6□□1 (Screw terminal models) B7A-R6A52 (Modular models)

Mount the B7A Interface Unit (C200H-B7AO1) to the C200H-BC□□1-V1 or C200H-BC□□1-V2 Backplane.

Note 1. The B7A Interface Terminal can be connected only to 16-point B7A Link Terminals and then only if the Terminal has a standard transmission delay (i.e., 19.2 ms)

2. If the B7A Interface Unit is connected to the C200H-CPU23-E or C200H-PS211, supply 24 VDC from an independent power supply to the B7A Interface Unit or use a transformer to separate the power supply line to the B7A Interface Unit from the power supply lines to the CPU Unit and I/O Power Supply Unit.



I/O Indicators

Indicate the ON or OFF status of inputs from the B7A Link Terminal or the ON and OFF status of outputs to the B7A Link Terminal.

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ERR Indicator
Incorporated by the B7AI1 and lit when the B7AI1's data transmission or reception is abnormal.

Connection Terminals
SIG: Connects to the SIG terminal of the B7A Link Terminal.
V–: Connects to the negative power terminal of the B7A Link Terminal.

⚠ **Caution** If the terminals are not connected correctly, the internal circuitry of the B7A Link Terminal will be damaged.

Note 1. The transmission cable must be a VCTF cable with a thickness of 0.75 mm^2 minimum.
2. Do not wire power lines or high-tension lines along with the transmission cable in the same conduit.

Input Mode Selector
The B7AI1 incorporates an input mode selector on the back panel of the Unit, with which the following modes can be set.

Input mode		15 points + 1 error (switch set up)	16 points (switch set down)
Function		Fifteen-point input from the B7A Link Terminal is effective. Bit 15 is used as transmission error bit.	Sixteen-point input from the B7A Link Terminal is effective.
Switch setting		Upper side	Lower side
Bit no. allocation	00 to 14	Input 00 to input 14	Input 00 to input 14
	15	Transmission error bit	Input 15
Status of input indicator lamp 15		Not used	Lit when input 15 is ON. Not lit when input 15 is OFF.
Status of the ERR indicator		Lit when there is a transmission error and OFF during normal transmission	

The ERR indicator is lit when an error occurs. If the error is corrected, the ERR indicator is OFF at the next transmission cycle.

When there is a transmission error, the B7A Link Terminal will hold the data just before the occurrence of the transmission error. If there is a transmission error because the B7A Link Terminal is turned off, however, data 0 is transmitted in the first transmission cycle when the B7A Link Terminal is turned on again.

Transmission errors between the C200H-B7AO1 and B7A Link Terminal are detected by the B7A Link Terminal only. Check the ERR indicator and error bit for any error.

Performance Specifications

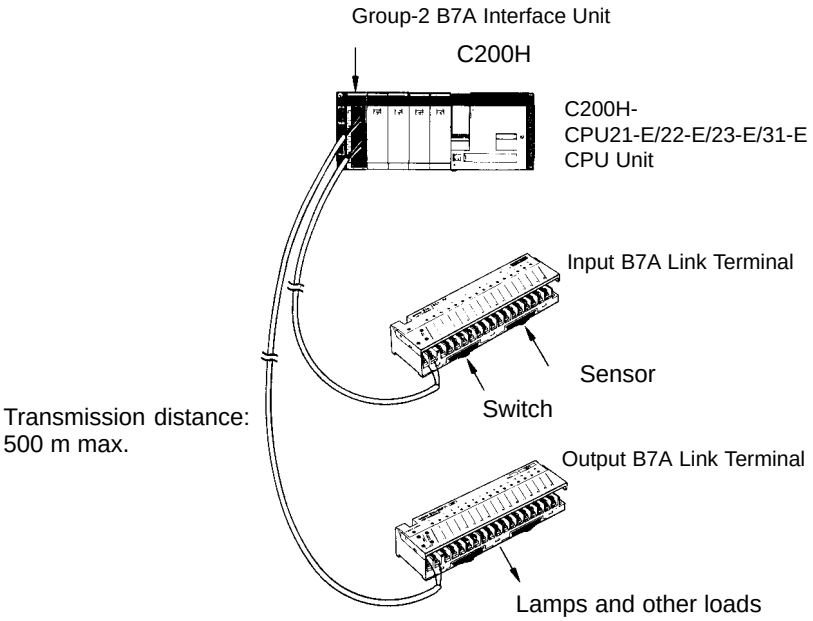
Item	C200H-B7AI1	C200H-B7AO1
I/O points	16 points or 15 points and 1 error input	16 output points
Transmission distance	500 m max. if power is supplied to the Interface Unit and B7A Link Terminal separately. 100 m max. if power is supplied to the Interface Unit and B7A Link Terminal from a single power supply. (24 VDC±10%)	
Transmission delay	Typ. 19.2 ms, 31 ms max.	
Minimum input time (see note 1)	---	16 ms
Internal current consumption	5 VDC, 100 mA max.	
External power supply (see note 2)	12 to 24 VDC ±10%, 10 mA min.	12 to 24 VDC ±10%, 30 mA min.
Weight	200 g max.	

Note 1. The minimum input time is the minimum time required to read input signals from the CPU Unit. The ON/OFF width of signals from the CPU Unit to the output relays of the B7A Interface Unit must be at least equal to the minimum input time.
2. The capacity of the external power supply does not include the capacity required by the B7A Link Terminal.

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Group-2 B7A Interface Units (C200H-B7A□□)

A Group-2 B7A Interface Unit used with two or four B7A Link Terminals allows the transmission and reception of 32-point or 64-point I/O data over two-conductor cables.



Group-2 B7A Interface Units can be mounted to a CPU Rack containing a C200H-CPU21-E/22-E/23-E/31-E CPU Unit or an I/O Expansion Rack for one of these CPU Units. They cannot be mounted to Slave Racks or to Racks controlled by any other CPU Units.

The words allocated to Group-2 B7A Interface Units are determined by I/O number set on the Units. Units with 32 I/O points are allocated two words; Units with 64 I/O points are allocated four words.

Refer to the *B7A Link Terminals Datasheet* for more information on B7A Link Terminals.

Models

The following Group-2 B7A Interface Units are available.

B7A Interface Unit	Inputs	Outputs
C200H-B7A12	32 points	None
C200H-B7A02	None	32 points
C200H-B7A21	16 points	16 points
C200H-B7A22	32 points	32 points

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Connectable B7A Link Terminals

Input Terminals

Type	Model	Transmission delay
Screw terminals	B7A-T6□1	Standard (19.2 ms)
	B7AS-T6□1	
	B7A-T6□6	High-speed (3 ms)
	B7AS-T6□6	
Modular	B7A-T6D2	Standard (19.2 ms)
	B7A-T6D7	High-speed (3 ms)
PC connectors	B7A-T□E3	Standard (19.2 ms)
	B7A-T□E8	High-speed (3 ms)

Output Terminals

Type	Model	Transmission delay
Screw terminals	B7A-R6□□1	Standard (19.2 ms)
	B7AS-R6□□1	
	B7A-R6□□6	High-speed (3 ms)
	B7AS-R6□□6	
Modular	B7A-R6A52	Standard (19.2 ms)
	B7A-R6A57	High-speed (3 ms)
PC connectors	B7A-R□A□3	Standard (19.2 ms)
	B7A-R□A□8	High-speed (3 ms)

Note 1. Do not connect Terminals with different transmission delays to the same Interface Unit. Doing so will cause a transmission error.

2. 10-point B7A Link Terminals and Mixed I/O (8 inputs/8 outputs) B7A Link Terminals cannot be connected to a B7A Interface Unit. 16-point B7A Link Terminals, 32-point B7A Link Terminals with a two-circuit configuration, and Mixed I/O B7A Link Terminals with a 16-point input/output configuration can be connected.

Comparison between Standard and Group-2 B7A Interface Units

Type	Models	CPU Unit	Word allocations	Connectable B7A Link Terminals		
				Transmission delay	Transmission errors	Points (see note 2)
Standard	C200H-B7AI1	Any C200H CPU Unit	Same as I/O Units (in order mounted).	Standard types only (19.2 ms)	Input status held automatically	16-point Terminals only (10-point, 32-point, and mixed I/O Terminals cannot be connected.
	C200H-B7AO2					
Group-2	C200H-B7A12	C200H-CPU21-E/22-E/23-E/ 31-E CPU Unit only	Words 030 to 049 allocated according to I/O number setting (see note 3) (same as Group-2 High-density I/O Units)	Standard (19.2 ms) and high-speed (3 ms) types (set via switch)	Switch setting to hold or reset Input status.	
	C200H-B7A02					
	C200H-B7A21					
	C200H-B7A22					

Note 1. Mount the B7A Interface Unit (C200H-B7AO1) to the C200H-BC□□1-V1 or C200H-BC□□1-V2 Backplane.

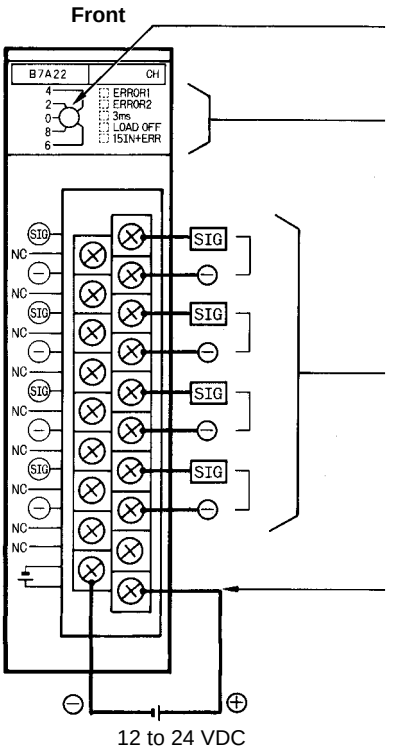
2. 10-point B7A Link Terminals and Mixed I/O B7A Link Terminals with an 8 input-8 output configuration cannot be connected to a B7A Interface Unit. 16-point B7A Link Terminals, 32-point B7A Link Terminals with a two-circuit configuration, and Mixed I/O B7A Link Terminals with a 16-point input or output configuration can be connected.

3. Words IR 030 to IR 049 (Group-2 High-density I/O Unit and B7A Interface Unit Area) are allocated to the inputs/outputs of Group-2 B7A Interface Units according to the setting of the I/O number switch on the front of the Unit, in the way shown in the following table (for Mixed I/O Units, words are allocated in the order output → input for each Unit).

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Unit	Models	Words allocated per Unit	Allocation order	Words allocated when I/O number = 0
32 inputs	C200H-B7A12	2	2 words allocated to inputs	IR 030: input
32 outputs	C200H-B7A02		2 words allocated to outputs	IR 030: output
16 outputs, 16 inputs	C200H-B7A21		1 word allocated to outputs → 1 word allocated to inputs	IR 030: output IR 031: input
32 outputs, 32 inputs	C200H-B7A22	4	2 words allocated to outputs → 2 words allocated to inputs	IR 030: output IR 031: output IR 032: input IR 033: input

Parts and Names (C200H-B7A22 shown below)



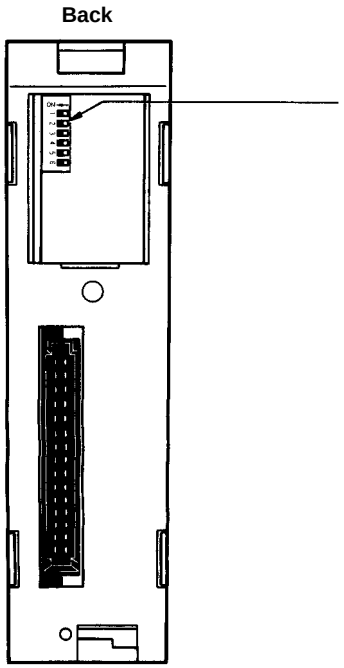
I/O number switch
This switch determines the words allocated to the Unit.

Status indicators
The indicators depend on the model of B7A Interface Unit.

Connection terminals
Connect to the SIG terminal of the B7A Link Terminal and to the negative power terminal of the B7A Link Terminal. The actual use of these terminals depends on the B7A Interface Unit.

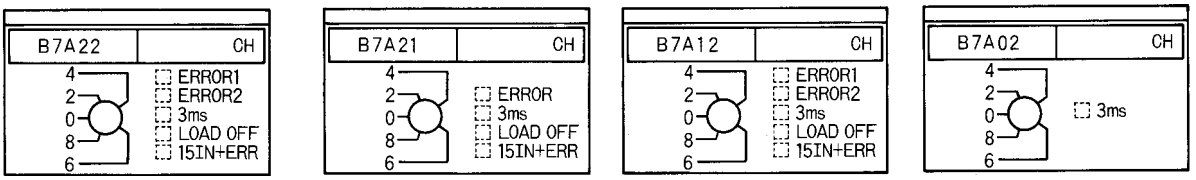
External Power Supply Terminals
Supply 12 to 24 VDC.

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Indicator Operation

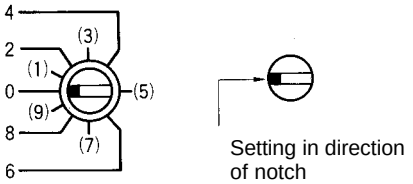
The indicators depend on the model of B7A Interface Unit, as shown below.



Name		Color	Function
ERROR 1 ERROR 2 ERROR	Input transmission error	Red	Lights when an error occurs in transmissions from an Input B7A Link Terminal. For the B7A12/22, ERROR 1 is for the first word allocated to the B7A Interface Unit; ERROR 2 is for the second word.
3ms	Transmission delay setting	Orange	Lit when the transmission delay is set to the high-speed setting (3 ms). Not lit when the transmission delay is set to the standard setting (19.2 ms).
LOAD OFF	Transmission error process	Orange	Lit when the processing for transmission errors is set to reset input status. Not lit when the processing for transmission errors is set to hold input status.
15IN+ERR	Input mode setting	Orange	Lit when the input mode mode is set to use 15 inputs and 1 error input. Not lit when the input mode mode is set to use 16 inputs.

I/O Number Setting

The setting of the I/O number determines the words allocated to the Interface Unit. Set the I/O number to between 0 and 9.



Note 1. Turn off the power supply to the PC before changing the I/O number setting. Any new setting will not be effective until the next time the power supply is turned on.

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2. Use a flat-blade screw driver to change the I/O number setting. Be careful not to leave the switch halfway between settings and be careful not to damage the switch.

The following table shows the words allocated according to the I/O number. The 32-point Units are the C200H-B7A12, C200H-B7A02, and C200H-B7A21. The 64-point Unit is the C200H-B7A22.

I/O No.	Words	
	32-point Units	64-point Unit
0	IR 030 and IR 031	IR 030 to IR 033
1	IR 032 and IR 033	IR 032 to IR 035
2	IR 034 and IR 035	IR 034 to IR 037
3	IR 036 and IR 037	IR 036 to IR 039
4	IR 038 and IR 039	IR 038 to IR 041
5	IR 040 and IR 041	IR 040 to IR 043
6	IR 042 and IR 043	IR 042 to IR 045
7	IR 044 and IR 045	IR 044 to IR 047
8	IR 046 and IR 047	IR 046 to IR 049
9	IR 048 and IR 049	Do not use.

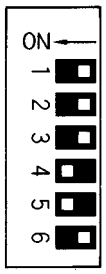
Note 1. Be sure that the same words are not allocated to more than one Unit. For example, if you set a 64-point Unit to I/O number 0, you cannot use I/O number 1 for any Unit.

2. The above words are also allocated to Group-2 High-density I/O Units. Be sure that the same words are not allocated to more than one Unit.

DIP Switch Settings

Set the DIP switch as described before for the various models of B7A Interface Units.

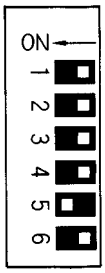
C200H-B7A22/12



Factory setting (pins 4 and 5 ON)

Pin	Function	OFF	ON
1	Transmission delay	Standard (19.2 ms)	High-speed (3 ms)
2	Transmission error process	Hold status	Reset Inputs
3	Input mode	16 inputs	15 inputs + error input
4	ERROR 1 indicator enable	Disabled	Enabled
5	ERROR 2 indicator enable	Disabled	Enabled
6	Not used.	NA	NA

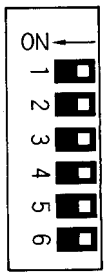
C200H-B7A21



Factory setting (pin 5 ON)

Pin	Function	OFF	ON
1	Transmission delay	Standard (19.2 ms)	High-speed (3 ms)
2	Transmission error process	Hold status	Reset Inputs
3	Input mode	16 inputs	15 inputs + error input
4	ERROR indicator enable	Disabled	Enabled
5	Not used.	NA	NA
6	Not used.	NA	NA

C200H-B7A02



Factory setting (all pins OFF)

Pin	Function	OFF	ON
1	Transmission delay	Standard (19.2 ms)	High-speed (3 ms)
2	Not used.	NA	NA
3	Not used.	NA	NA
4	Not used.	NA	NA
5	Not used.	NA	NA
6	Not used.	NA	NA

Transmission Delay

Pin 1 is used to set the transmission delay. The same delay is used for all words allocated to the Unit.

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Set the transmission delay to match that of the B7A Link Terminal. A transmission error will occur if the same transmission delay is not set.

The “3ms” indicator will be lit whenever the high-speed (3 ms) transmission delay is set.

Transmission Error Process
Pin 2 is used to turned ON to specify resetting input status when transmission errors occur. If pin 2 is turned OFF, input status will be held when transmission errors occur.

The LOAD OFF indicator will be lit whenever pin 2 is turned ON.

Input Mode
Pin 3 is turned ON to specify use of only 15 inputs and the use of bit 15 as a Transmission Error Flag. If pin 3 is OFF, 16 normal inputs can be used.

The “15IN+ERR” indicator will be lit whenever pin 3 is turned ON.

ERROR Indicators
Pin 4 or pins 4 and 5 are turned ON to enable the ERROR, ERROR 1, and/or ERROR 2 indicators. These indicators will not light even if a transmission error occurs if the corresponding pin is turned OFF.

Transmission Error Precautions

Startup
The Transmission Error Flag for the B7A Interface Unit will be OFF when power is turned on to the C200H. If normal transmissions with the B7A Link Terminal are not possible within about 10 ms, the Transmission Error Flag (bit 15) will turn ON (i.e., if its operation is enabled by the input mode setting).

All input bits will remain OFF until normal transmissions are achieved.

Inputs
When a transmission error occurs, input status will be either held or all inputs will be reset according to the setting for the transmission error process, and the Transmission Error Flag (bit 15) will turn ON (i.e., if its operation is enabled by the input mode setting). The Transmission Error Flag will go OFF and the input status will return to normal when normal transmissions are achieved again.

Outputs
Transmission errors for Output B7A Link Terminals are not detected at the B7A Interface Unit and must be confirmed using the error indicators or error outputs on the Link Terminal.

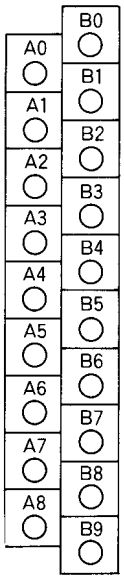
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Wiring

Terminal Names and Allocations

The use of the terminals depends on the model of the B7A Interface Unit. “m” indicates the first word allocated to the Unit according to the I/O number setting and can be calculated as follows:

m = 030 + (2 x I/O number)



C200H-B7A22

Terminal	Name	Function	Word
B0	SIG OUT1	Connect to SIG terminal on Output B7A Link Terminal.	m
B1	– OUT1	Connect to – power supply terminal on Output B7A Link Terminal.	
B2	SIG OUT2	Connect to SIG terminal on Output B7A Link Terminal.	m + 1
B3	– OUT2	Connect to – power supply terminal on Output B7A Link Terminal.	
B4	SIG IN1	Connect to SIG terminal on Input B7A Link Terminal.	m + 2
B5	– IN1	Connect to – power supply terminal on Input B7A Link Terminal.	
B6	SIG IN2	Connect to SIG terminal on Input B7A Link Terminal.	m + 3
B7	– IN2	Connect to – power supply terminal on Input B7A Link Terminal.	
B8	NC	Not used.	NA
A0 to A7			
B9	+V	Connect to + terminal on external power supply.	
A8	–V	Connect to – terminal on external power supply.	

C200H-B7A21

Terminal	Name	Function	Word
B0	SIG OUT1	Connect to SIG terminal on Output B7A Link Terminal.	m
B1	– OUT1	Connect to – power supply terminal on Output B7A Link Terminal.	
B2, B3	NC	Not used.	NA
B4	SIG IN1	Connect to SIG terminal on Input B7A Link Terminal.	m + 1
B5	– IN1	Connect to – power supply terminal on Input B7A Link Terminal.	
B6 to B8	NC	Not used.	NA
A0 to A7			
B9	+V	Connect to + terminal on external power supply.	
A8	–V	Connect to – terminal on external power supply.	

C200H-B7A12

Terminal	Name	Function	Word
B0	SIG IN1	Connect to SIG terminal on Input B7A Link Terminal.	m
B1	– IN1	Connect to – power supply terminal on Input B7A Link Terminal.	
B2, B3	NC	Not used.	NA
B4	SIG IN2	Connect to SIG terminal on Input B7A Link Terminal.	m + 1
B5	– IN2	Connect to – power supply terminal on Input B7A Link Terminal.	
B6 to B8	NC	Not used.	NA
A0 to A7			
B9	+V	Connect to + terminal on external power supply.	
A8	–V	Connect to – terminal on external power supply.	

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C200H-B7A02

Terminal	Name	Function	Word
B0	SIG OUT1	Connect to SIG terminal on Output B7A Link Terminal.	m
B1	– OUT1	Connect to – power supply terminal on Output B7A Link Terminal.	
B2, B3	NC	Not used.	NA
B4	SIG OUT2	Connect to SIG terminal on Output B7A Link Terminal.	m + 1
B5	– OUT2	Connect to – power supply terminal on Output B7A Link Terminal.	
B6 to B8	NC	Not used.	NA
A0 to A7			
B9	+V	Connect to + terminal on external power supply.	
A8	–V	Connect to – terminal on external power supply.	

Recommended Cables and Transmission Distance

The following cables are recommended to connect the B7A Interface Unit to B7A Link Terminals. The wiring method and transmission distance depend on the transmission delay and on whether or not a common power supply is being used for the B7A Link Terminal and the Interface Unit.

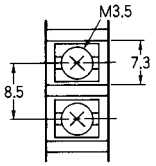
Standard Transmission Delays (19.2 ms): Cap-tire Cable

Power supply	Cable	Transmission distance
Common	VCTF, 0.75 mm^2 x 3 conductors	100 m max.
Separate	VCTF ,0.75 mm^2 x 2 conductors	500 m max.

High-speed Transmission Delays (3 ms): Shielded Cable

Power supply	Cable	Transmission distance
Common	Shielded cable, 0.75 mm^2 x 3 conductors	50 m max.
Separate	Shielded cable, 0.75 mm^2 x 2 conductors	100 m max.

Terminal Construction

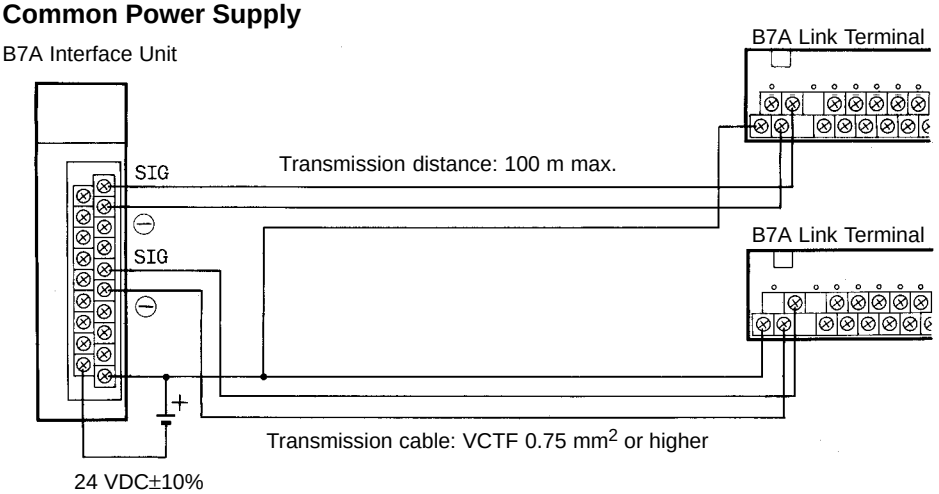


Use hook-type crimp connectors with a line thickness of 0.25 to 1.65 mm^2. The construction of the terminals is shown in the illustration.

Wiring Method

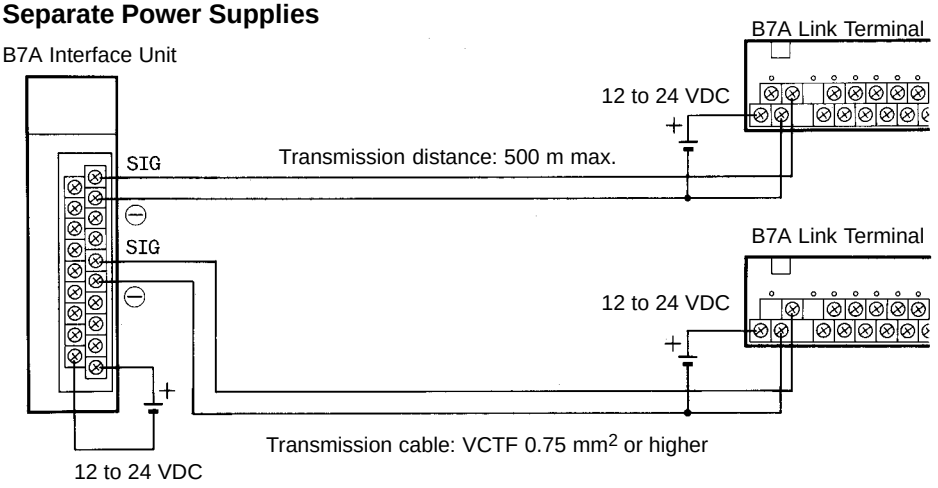
Standard Transmission Delays (19.2 ms)

Common Power Supply



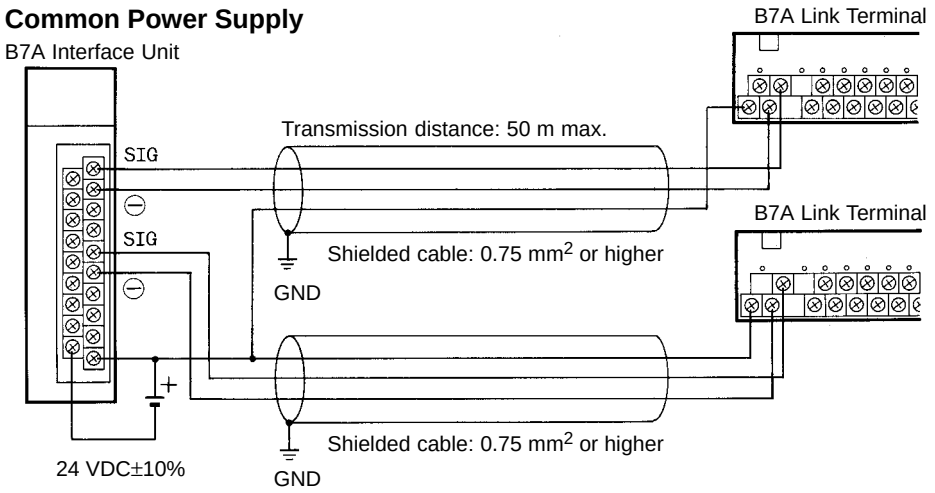
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Separate Power Supplies

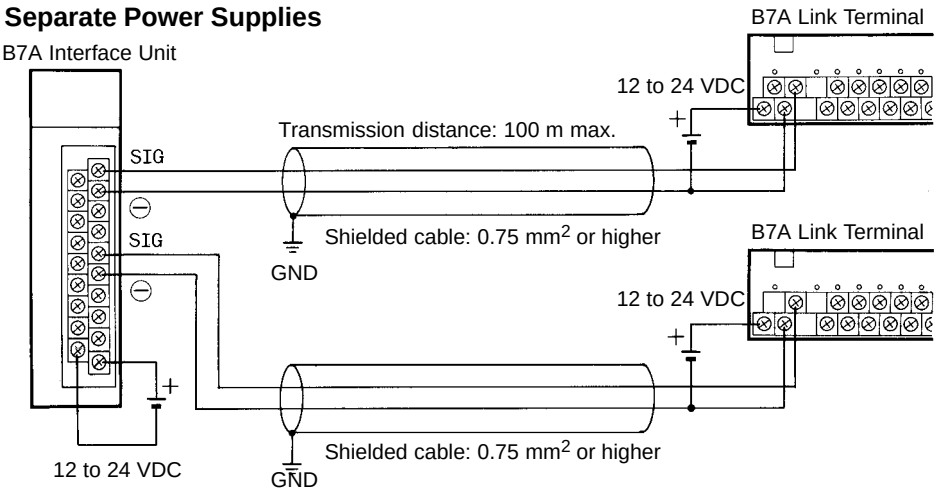


High-speed Transmission Delays (3 ms): Shielded Cable

Common Power Supply



Separate Power Supplies



Note 1. We recommend grounding the shielded cable.

2. If shielded cable is not used, the maximum transmission distance is 10 m regardless of whether a common or separate power supplies are used. Use 0.75 mm^2 or higher VCTF cable.
3. To prevent noise on the transmission cable, do not lay it near power cables or high-voltage lines.

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Specifications

Item	C200H-B7A12	C200H-B7A02	C200H-B7A21	C200H-B7A22
I/O points	32 input points or 30 input points and 2 error inputs	32 output points	16 output points and 16 input points or 15 input points + 1 error input	32 output points and 32 input points or 30 input points + 2 error inputs
Transmission method	One-way distributed multiplex transmission			
Transmission distance (see note 1)	Standard: 500 m max. High-speed: 100 m max.			
Transmission delay	Standard: Typ. 19.2 ms, 31 ms max. High-speed: Typ. 3 ms, 5 ms max.			
Minimum input time (see note 2)	Standard: 16 ms High-speed: 2.4 ms			
Internal current consumption	5 VDC, 100 mA max.			
External power supply (see note 3)	12 to 24 VDC ±10%			
	0.05 A min.	0.06 A min.	0.05 A min.	0.08 A min.
Weight	300 g max.			
Dimensions	35 x 130 x 128 mm (W x H x D)			

Note 1. The transmission distance also depends on whether a common or separate power supplies are used.

2. The minimum input time is the minimum time required to read input signals from the CPU Unit. The ON/OFF width of signals from the CPU Unit to the output relays of the B7A Interface Unit must be at least equal to the minimum input time.

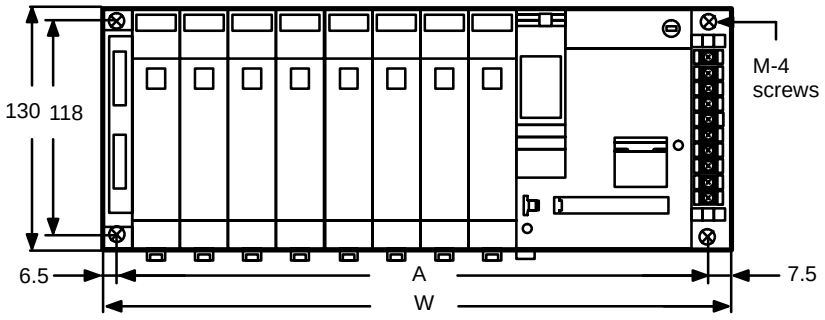
3. The capacity of the external power supply does not include the capacity required by the B7A Link Terminal.

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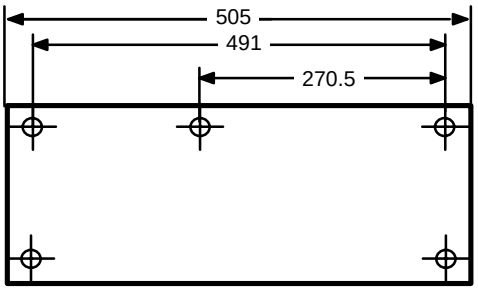
Dimensions

Racks

The dimensions shown below are for both the CPU Rack and Expansion I/O Rack. The C dimension for the Programming Console will increase by 30mm when the Programming Console Adapter C200H-BP001 is used, and will increase by 50 mm when the Programming Console Adapter C200H-BP002 is used.

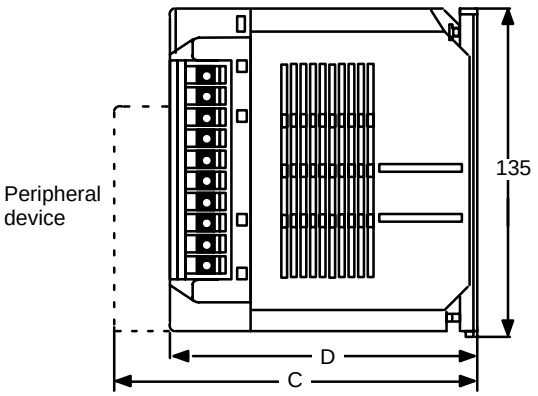


C200H-BC101-V2



Model	A	W
C200H-BC031-V2	246	260
C200H-BC051-V2	316	330
C200H-BC081-V2	421	435
C200H-BC101-V2	491	505

CPU Units



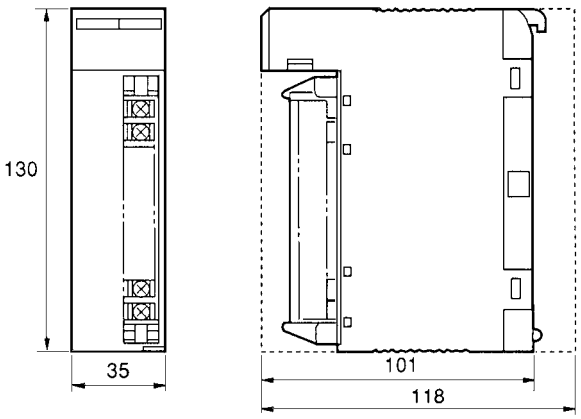
CPU Unit	D
C200H-CPU21-E/23-E	118
C200H-CPU31-E	143

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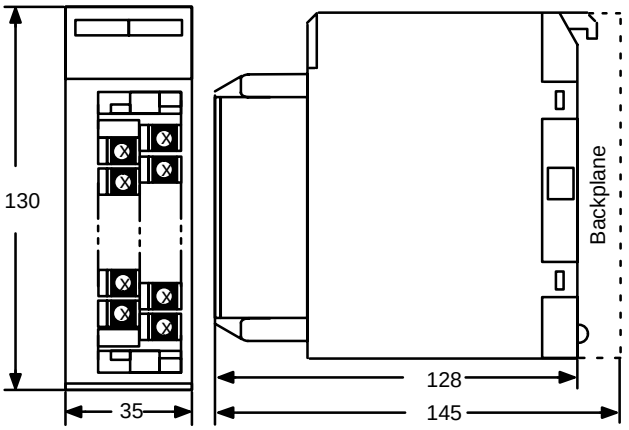
Peripheral Unit	C	
	CPU21-E/23-E	CPU31-E
Programming Console	148	173
Other peripheral device	160	185
B-shape I/O Unit	145	145
E-shape I/O Unit	138	138

Standard I/O Units The dimensions shown below are for the two shapes of Standard I/O Units mentioned throughout these specifications.

10-terminal Terminal Block (A-shape I/O Units)

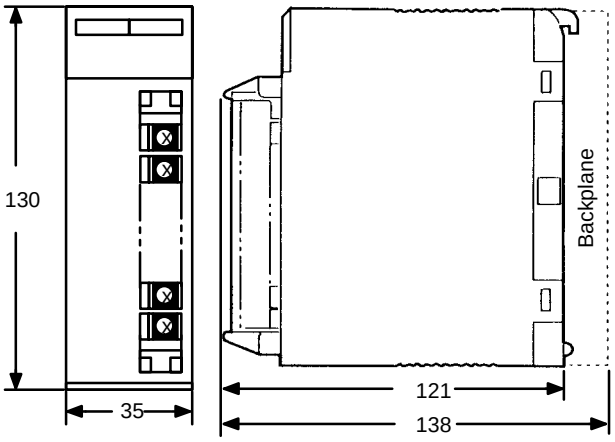


19-terminal Terminal Block (B-shape I/O Units)

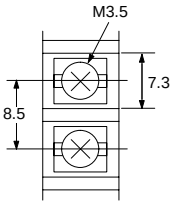


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10-terminal Terminal Block (E-shape I/O Units)

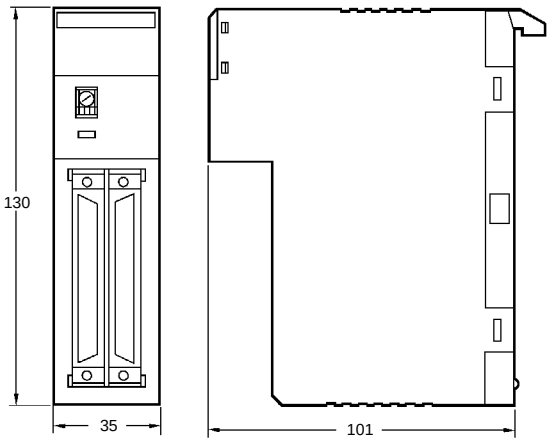


Terminal Dimensions

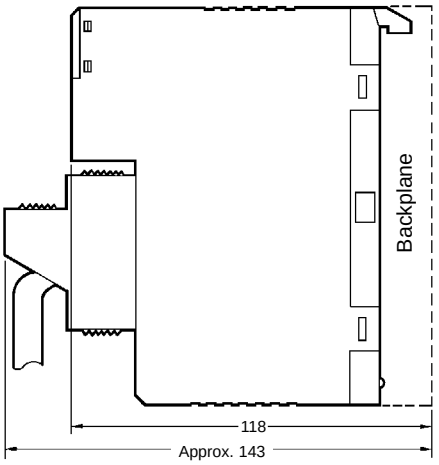


Group-2 High-density I/O Units The dimensions shown below are for the Group-2 High-density I/O Units.

Group-2 High-density I/O Units (C and D Types)

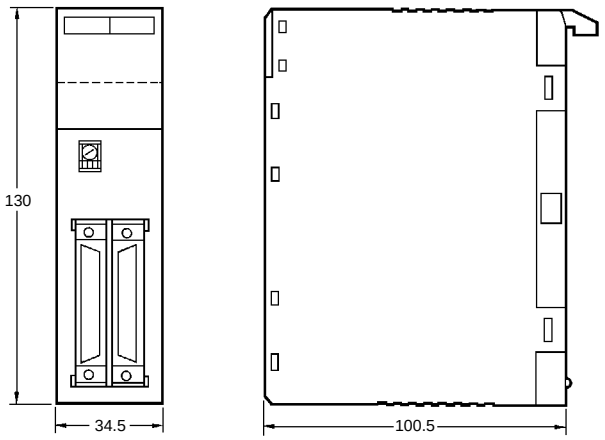


Dimensions with Unit Mounted



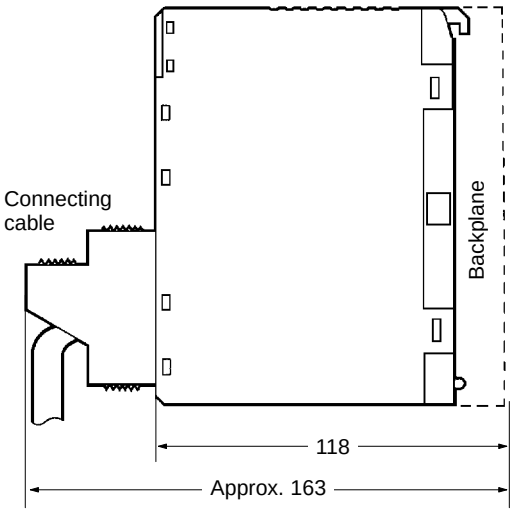
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High-density I/O Units (Special I/O Units) The dimensions shown below are for the High-density I/O Units classified as Special I/O Units.

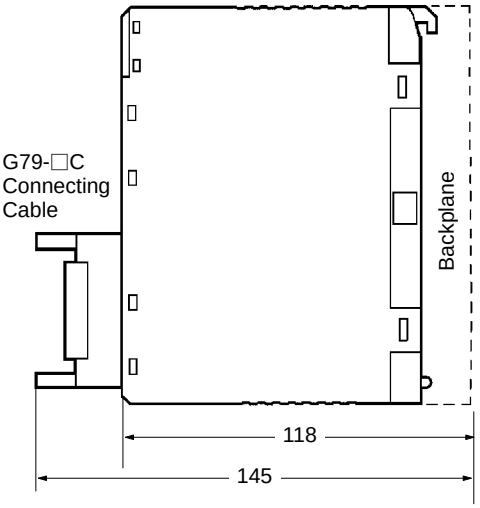


Dimensions with Unit Mounted

Fujitsu's Connector is Used

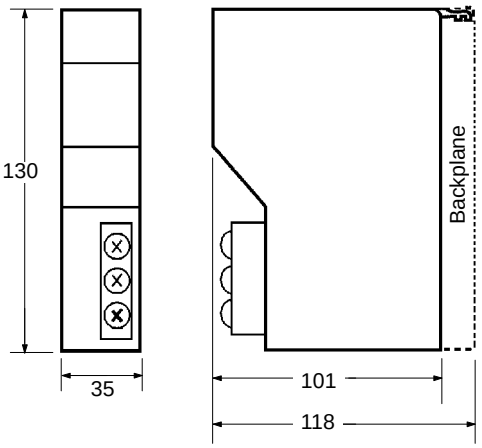


G79-□C Connecting Cable is Used



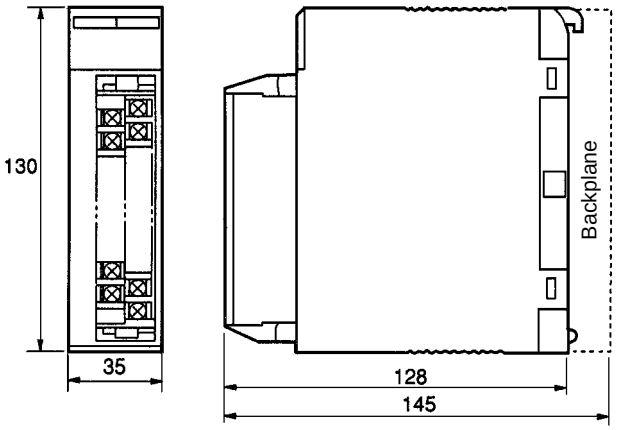
Standard B7A Interface Unit

The dimensions shown below are for the B7A Interface Unit classified as Special I/O Units.



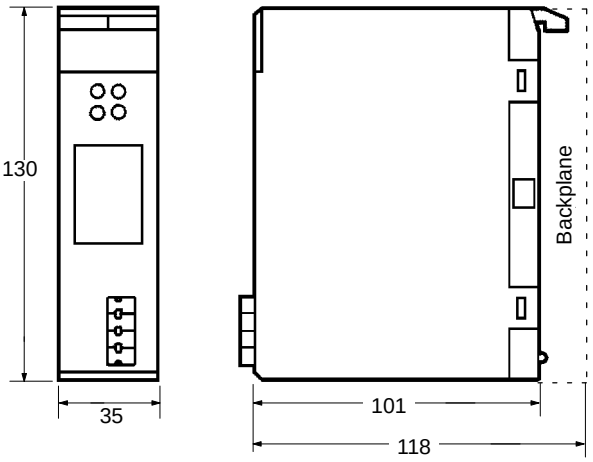
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Group-2 B7A Interface Units The dimensions shown below are for the Group-2 B7A Interface Units.



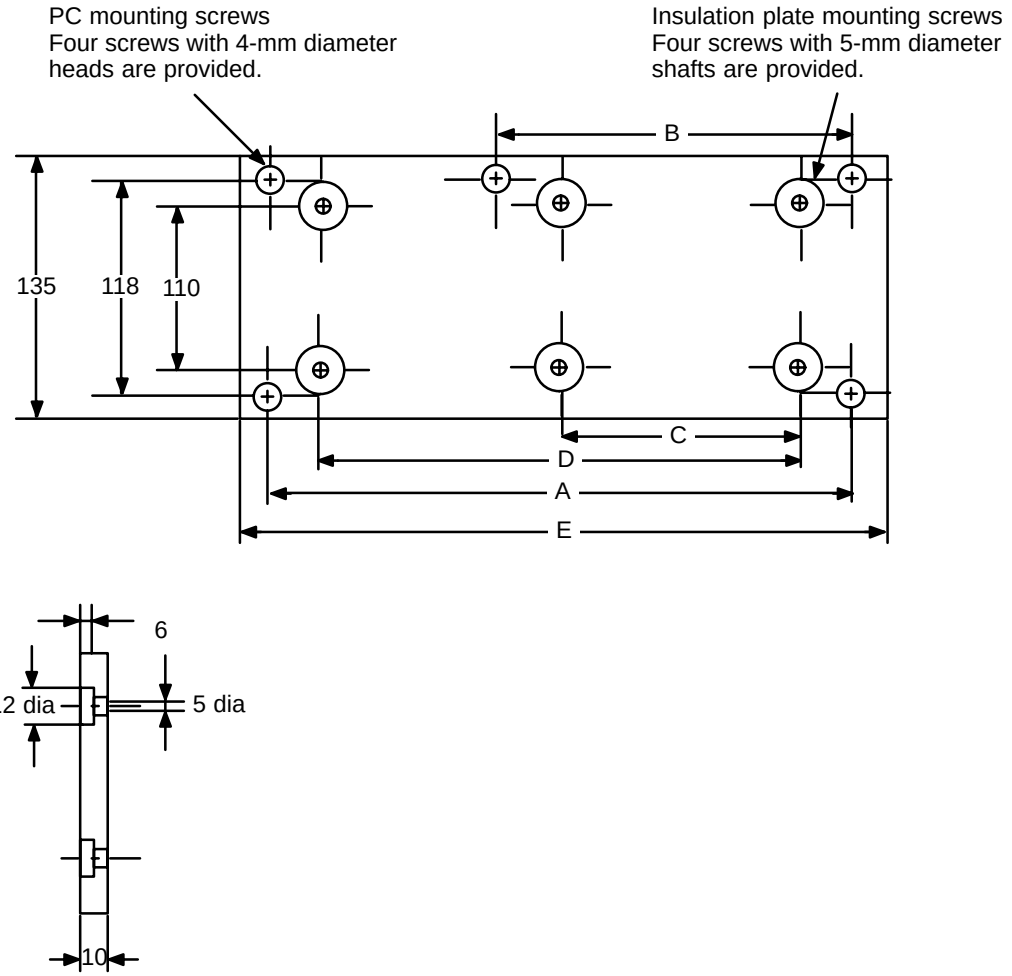
Analog Timer Unit

The dimensions shown below are for the Analog Timer Unit classified as Special I/O Units.



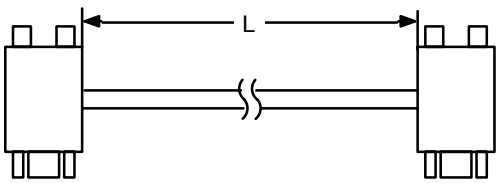
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Backplane Insulation Plates The dimensions shown below are for Backplane Insulation Plates.



Specifications	Model	D	E	C	A	B
3 slots	C200H-ATT31	210	261	---	246	---
5 slots	C200H-ATT51	280	331	---	316	---
8 slots	C200H-ATT81	385	436	---	421	---
10 slots	C200H-ATTA1	455	506	227.5	491	270.5

I/O Connecting Cables The dimensions shown below are for I/O Connecting Cables.



Cable	Length (L)
C200H-CN311	30 cm
C200H-CN711	70 cm
C200H-CN221	2 m
C200H-CN521	5 m
C200H-CN131	10 m

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Glossary

ASCII code	[A(merican) S(tandard) C(ode for) I(nformation) I(nterchange)] A standard computer code used to facilitate the interchange of information among various types of data-processing equipment.
ASCII Unit	An Intelligent I/O Unit. The ASCII Unit has its own CPU and 16 kilobytes of memory. This Unit enables communication between the PC and any other device which uses ASCII code. The ASCII Unit can be programmed in BASIC.
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 Unit 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.
baud rate	Transfer speed between two devices in a system measured in bits per second. For example, an optical sensor might be configured to send its information to the FIT at 9600 baud. It is important for both of the devices to be set to the same baud rate.
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.
counter	A PC function that counts the number of occurrences of a certain event.
CPU	An acronym for central processing unit.
cycle time	The total time it takes the PC to perform internal operations, i.e., reset the watchdog timer, read the program, receive input data, send output data, and execute instructions. Cycle time is monitored by the watchdog timer within the PC, and if it takes longer than a certain specified amount of time, an error message may be generated, or the CPU Unit may just stop. Cycle times will differ depending on the configuration of the system.
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 disk	Floppy disk used to store information such as programs or I/O tables. The data disk should be used in drive B of the FIT.

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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.

debugging The process of checking for errors in a program.

default condition The original condition of a function or system. For example, the FIT's default condition is to start from its hard drive, but this default condition can be changed so that it starts from a floppy disk drive.

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.

electrical noise Electric 'static' that can disturb electronic communications. The 'snow' that can appear on a TV screen is an example of the effects of electrical noise.

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.

flag A bit that is turned ON and OFF automatically by the system in order to provide status information.

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 AT/PC or compatible 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.

instruction line A succession of instructions which begins with a load instruction at the left bus bar and ends at a right bus bar.

interface An interface is the conceptual boundary between systems or devices and usually involves changes in the way the communicated data is represented. Interface devices such as NSBs perform operations such as changing the coding, format, or speed of data.

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

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	function to help control other devices, or they may be part of the controlled system if they interact directly with it.
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 table	Diagram written to the IR memory area listing the type of I/O units controlled by a PC. It must be cleared before programming or when I/O units are changed. Tables can be read, verified, or transferred to a EPROM.
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.
Limit Switch	A switch that detects when an object has reached the limit of its movement by actually making contact with the object. Limit Switches are fitted to electric elevators, traveling cranes, etc. to indicate when a certain part of the equipment has traveled to the specified limit.
Link Unit	Any of the Units used to connect a PC to a Link System. These are Remote I/O Units, I/O Link Units, PC Link Units, Host Link Units, and Net Link Units.
operating mode	The Display Terminal Unit can operate in five different modes: Page Read, Terminal. Dynamic Scan, Read/Write, and Self-Diagnosis.
page	One complete Display Terminal Unit screen. Two hundred screens can be stored on one RAM card**.**
parallel interface	The parallel interface uses the RS-232 connector, but is not serial communication. When parallel mode is selected as the communication mode, up to 16 Display Terminal Units can be connected to a PC in parallel.
PC	An acronym for Programmable Controller.
PCB	An acronym for printed circuit board.
PC Link Unit	A Unit used to connect two or more PCs together so that they can exchange data through their LR areas.
Photoelectric Switch	A switch that uses light to detect the presence of an object.
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.
printed circuit board	A board onto which electrical circuits are printed for mounting into a computer or electrical device.
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.
programming device	A peripheral device used to write programs and to input a program to a PC or to alter or monitor a program already stored in the PC. There are dedicated pro-

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	gramming devices, such as Programming Consoles, and there are non-dedicated programming devices, such as a host computer.
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.
Proximity Switch	A switch that uses magnetic induction to measure the distance of a metallic object from the front of the switch.
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.
register/registered	Storing text and graphics in the RAM/ROM card from a personal computer or the ASCII Unit. Graphics that have been written to the RAM/ROM card are referred to as registered messages.
Remote I/O Unit	A Unit that extends the distance an Expansion I/O Unit can be from the CPU Unit.
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.
switching capacity	The voltage/current that relay can switch ON and OFF.
stepping motor	An output device that rotates according to signals from the Control System. The rotation is very precise and occurs in pre-defined “steps.”
switch	An input device that sends either an ON or OFF signal to the Control System. A switch can be operated either by a person or by the movement of a piece of equipment or material.
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.
watchdog timer	A special timer inside the CPU Unit that monitors the PC’s cycle time. The watchdog timer sets a flag if the cycle time becomes longer than a certain specified value. This is useful if the correct operation of your System depends on a certain maximum cycle time.
word	In digital circuits, a group of bits. Usually a word consists of four, eight, or sixteen bits. In C-series PCs, a word consists of sixteen bits. Words can be used to store data, or they can be used for I/O.

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work bits Bits in the IR area that are not being used for input or output. These bits can be used in the program in any way desired.

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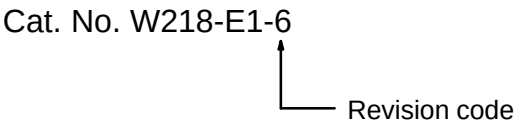
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Revision History

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	July 1992	Original production.
2	June 1993	The manual was converted to an A4 layout and the following corrections made. **Pages 19, 21:** Note about external connectors added. **Page 41:** SYSMAC LINK Unit model number corrected. **Page 54:** Ohm symbol restored in first paragraph. **Pages 70, 72:** Products added to standard-models tables. **Page 71:** Notes about ordering added. **Page 93:** Maximum switching capacity per Unit corrected. **Page 102:** A and B in the Terminal Connections CN1 diagram were switched. **Page 104:** "m+1" and "m" in the Terminal Connections diagram were switched.
2A	March 1994	Multipoint I/O changed to High-density I/O throughout the manual. Scan time changed to cycle time throughout the manual. C200H-BC□□1-V1 Backplane changed to C200H-BC□□1-V1/V2 Backplane throughout the manual. **Pages 10, 27, 31, 32, 35:** Corrections were made and C200H-B7AO1 B7A Interface Unit added to the text. **Page 32:** Reference corrected for SYSMAC NET Link Unit and SYSMAC LINK Unit. **Page 38:** Table updated. **Page 39:** Notes corrected. **Pages 40, 41:** Models added and updated. **Pages 42, 43:** Calculation examples text corrected. **Page 44:** I/O Unit Cover description added. **Page 46:** Bottom circuit diagram corrected. **Page 48:** Ambient conditions added. **Pages 67 to 72 :** Standard Models lists has been updated. **Page 90:** "8 A/Unit" in Terminal Connections changed to "16 A/Unit." **Page 130:** B7A Interface Unit specifications added.
3	February 1995	Group-2 B7A Interface Units were added beginning on page 139 and to the following pages: 11, 31, 32, 38, 40, 71, 80, and 140. The name of previous the B7A Interface Unit was changed to the Standard B7A Interface Unit and the C200H SYSMAC LINK and SYSMAC NET Units globally replaced with C200HS Units. **Page 47:** Note added concerning AC input devices. **Page 65:** Step added to fuse replacement procedure and illustration changed. **Page 66:** Step added to relay replacement procedure and illustration changed. **Page 76:** Small correction for LSS. SSS models added. **Page 79:** Insulation resistance and caution changed. **Page 142:** Backplane Installation Plate dimension "W" changed.
4	July 1996	**Pages 11, 19, 107:** C200H-ID111 added. **Pages 10, 27, 31, 35, 40, 70, 107:** C200H-OD21A added. **Pages 14, 18, 19, 27, 79, 149:** E-shape Units added. **Pages 41, 70, 84:** C200H-IA222V added. **Pages 41, 70, 92:** C200H-OA222V added. **Pages 41, 70, 92:** C200H-OA222 deleted. **Pages 41, 70, 94:** C200H-OA122-E added. **Pages 41, 70, 93:** C200H-OA223 added. **Pages 41, 94:** C200H-OA224 added. **Page 42:** C200H-DA002 added. **Pages 43, 44:** SYSMAC LINK Units updated. **Page 64:** Fuse specifications table added. **Pages 69 to 77:** Standard models updated. **Page 79:** Power consumption for C200H-CPU23-E, PS211 corrected. **Pages 89, 90:** Operating input voltage corrected. **Page 94:** Fuse voltage corrected for C200H-OA121-E circuit configuration. **Pages 117, 119, 120, 122, 124, 125, 127, 129, 131, 132:** Resistances removed from the circuit configuration. **Pages 123, 125:** Max. switching capacity and rated input voltage corrected for connectors 1 and 2. **Page 135:** Notes corrected **Pages 138, 146, 147, 148:** B7A and Group-2 B7A performance specifications added to. **Pages 149 to 151:** Dimensions corrected and added to. **Page 156:** Backplane Insulating Plate dimensions modified.
5	May 1997	*PRECAUTIONS* section added. **Pages 17:** Grounding symbol for DC Power Supply Unit changed. **Pages 42, 72:** C200H-CT021 added. **Page 45:** Tightening torque corrected for *4-4 I/O Connections*. **Pages 45, 57, 58:** Power supply wiring description added. **Page 79:** Enclosure rating corrected. **Pages 103, 104:** Circuit configuration changed.
6	April 2000	In addition to the inclusion of an index and this revision history, changes were made on the following pages. **Page v:** Minor changes to icons used for safety information. **Pages xii to xiv:** Major changes to safety information. **Page 17:** Minor changes to graphics. **Page 23:** Information on Memory Units added. **Page 41:** Information added to middle table. **Page 45:** "Maximum" removed from middle paragraph. **Page 46:** Information on DC two-wire sensor connection precautions added. **Page 79:** Minor changes to measurement units. **Page 110:** Information on alarm output, circuit configuration, and terminal connections added. **Page 115:** Information on DC Input Units added. **Pages 116-118, 125-127, 136-138:** Changes made to circuit configuration diagrams, and information on manufacturing numbers and wiring output circuits added. **Page 145:** Information on B7A Interface Units added.

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