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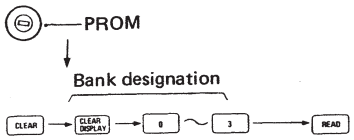
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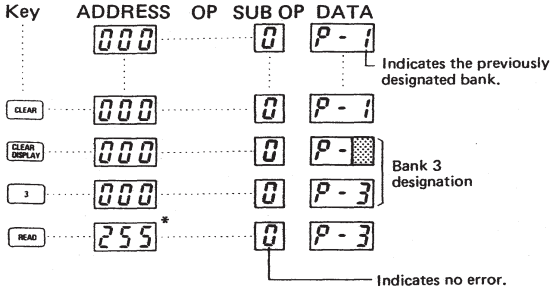
6.16 EPROM Read Operation

This operation is to transfer the contents of the specified EPROM bank to the RAM.

- **Operating procedure**



- **Display**



NOTES:

1. Bank designation is not required if the same bank as that previously set is to be used. Therefore, the only required key operation in this case is as follows.

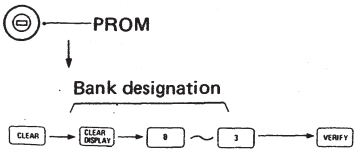
   CLEAR → READ

2. * Upon depression of the READ key, the ADDRESS display shows "255," indicating that the EPROM read operation has been completed (instantaneously) up to address 255.
3. During the EPROM Read operation, if the power is turned off or the EPROM chip is removed, the EPROM read will be interrupted. In such a case, retry the operation from the beginning.

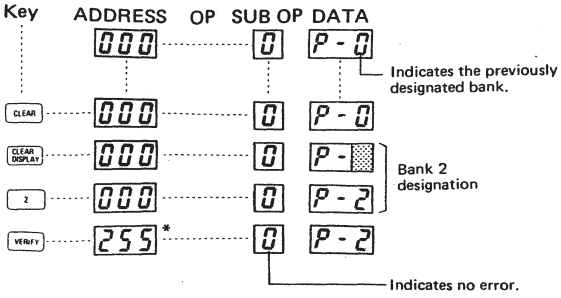
6.17 EPROM Verify Operation

This operation is to verify the contents of the specified EPROM bank against the contents of the RAM.

- **Operating procedure**



- **Display**



NOTES:

1. Bank designation is not required if the same bank as that previously set is to be used. Therefore, the only required key operation in this case is as follows.

   CLEAR → VERIFY

2. * When the contents of the specified EPROM bank agree with the contents of the RAM, the ADDRESS display shows 255, indicating that the EPROM verify operation has been completed (instantaneously) up to address 255.
3. During the EPROM Verify operation, if the power is turned off, or EPROM is removed, the EPROM Verify operation will be interrupted. In such a case, retry the operation from the beginning.

6.18 Errors in PROM Mode

During an EPROM Write, Read or Verify operation, one of the following error messages may appear on the SUB OP display when the ERROR indicator illuminates. The description of each message is as follows.

EPROM Write	7	• EPROM is not inserted. • EPROM is inserted with its dip facing downward. • EPROM is inserted but its specified bank has not been erased.
EPROM Read	7	• Nothing has been written into the specified bank of the inserted EPROM.
	8	• EPROM is not inserted.
EPROM Verify	6	• The contents of the specified EPROM bank do not agree with the contents of the RAM.
	7	• Nothing has been written into the specified EPROM bank. (Can be used as Erase check of each EPROM bank.)
	8	• EPROM is not inserted.

NOTES:

1. Numerics appearing in the ADDRESS display indicates the address where the initial error has occurred.
2. When EPROM Read operation is performed with the EPROM chip inserted upside down, the ERROR indicator does not illuminate, but the data different from the contents of the EPROM will be transferred to the RAM. Therefore, pay attention to the inserted direction of the EPROM chip.
3. To confirm whether or not the specified EPROM bank has been erased, the following key operation is possible.

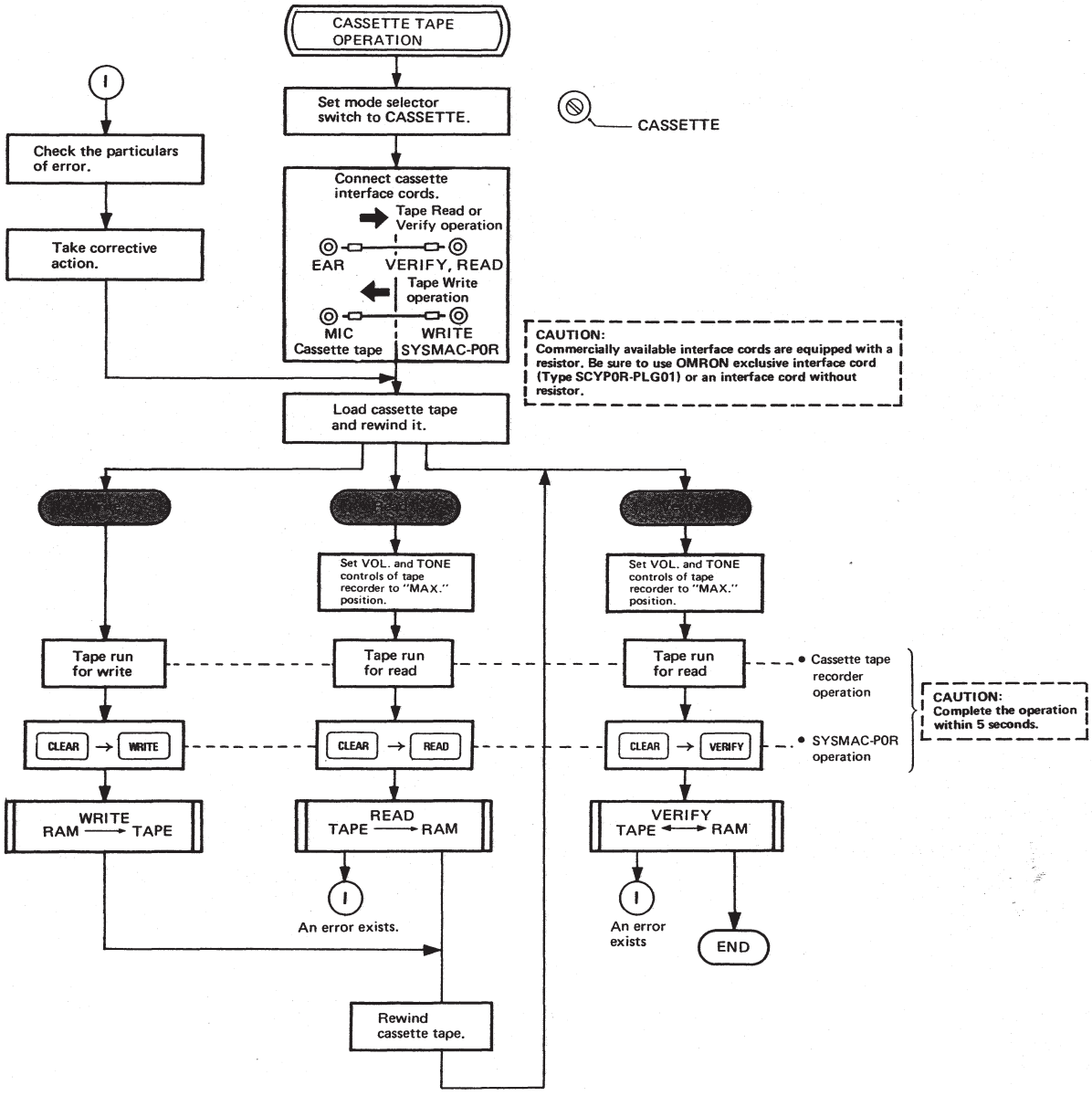
   CLEAR → Bank designation → VERIFY

   When ERROR indicator illuminates and error message 7 is displayed, it indicates that EPROM has been erased.

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6.19 Cassette Tape Handling

As a method of keeping user programs in storage, data may be recorded on a cassette tape by using a commercially available cassette tape recorder.
In the following, a general operational flowchart is shown.



NOTES:
1. Be sure to use a monaural cassette tape recorder.
2. Use a new battery for the cassette tape recorder.
3. Always use a new cassette tape for recording. Note that the presence of scratches or other damage on the tape surface prevents data from being written or read properly.
4. Voltage drop of the battery in the cassette tape recorder results in a decrease in the output level and consequently a failure in signal descrimination.

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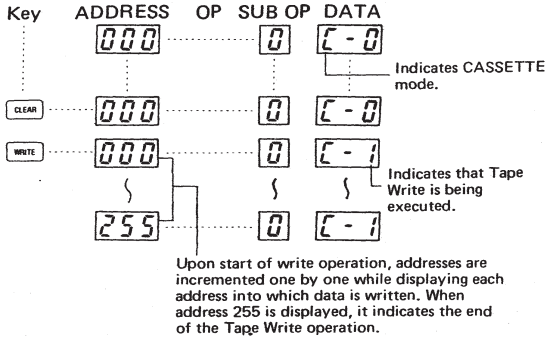
6.20 Tape Write Operation

This operation is to record the contents of the RAM (program memory) on a cassette tape.

- **Operating procedure**

Refer to 6.19 Cassette Handling

- **Display**



NOTES:
1. Upon completion of the Tape Write operation, be sure to perform the Tape Verify operation to confirm that the data have been recorded on the tape properly.
2. Error detection cannot be performed during the Tape Write operation.
   Even if the tape does not run, data will be transferred unilaterally from the RAM. So, be sure to confirm that the tape is running smoothly.
3. If the power is turned off or the cassette is ejected during the Tape Write operation, the tape write will be interrupted. Retry the tape write operation from the beginning.
4. During the Tape Write operation, no PROGRAM key input will be accepted.
5. For the Tape Write operation, use the WRITE → MIC jack to connect one of the cassette tape interface cords. For subsequent verify operation, use VERIFY READ ← EAR jack.

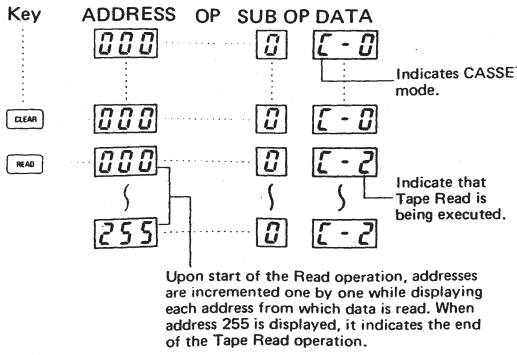
6.21 Tape Read Operation

This operation is to transfer the program data recorded on the cassette tape into the RAM.

- **Operating procedure**

Refer to 6.19, Cassette Tape Handling

- **Display**



NOTES:
1. Upon completion of the Tape Read operation, be sure to perform the Tape Verify operation to confirm that the data have been transferred from the tape to the RAM.
2. If the power is turned off or the cassette is ejected during the Tape Read operation, the tape read will be interrupted. Retry the tape read operation from the beginning.
3. During the Tape Read operation, no PROGRAM key input will be accepted.
4. Be sure to set the volume control and tone control of the cassette tape recorder to maximum.

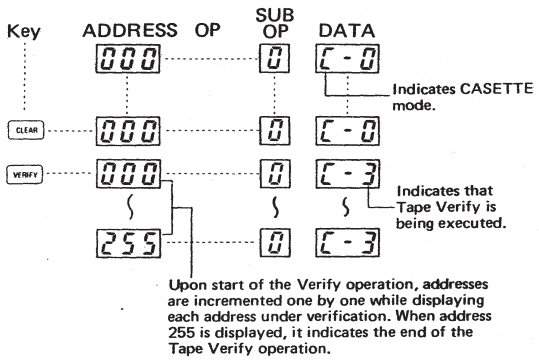
6.22 Tape Verify Operation

This operation is to verify the contents of the RAM against the programmed data recorded on a cassette tape.

- **Operating procedure**

Refer to 6.19 Cassette Handling

- **Display**

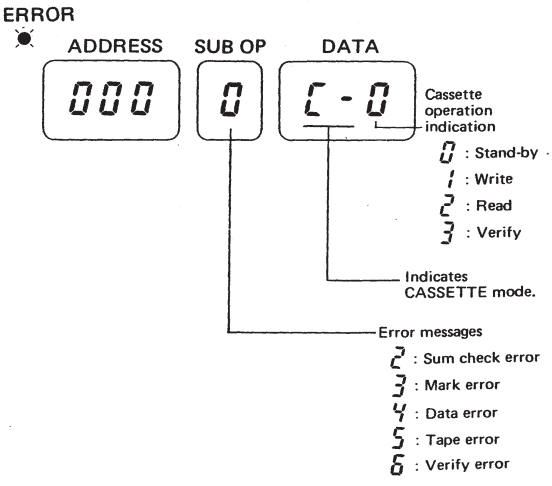


NOTES:
1. If the power is turned off or the cassette tape is ejected during the Tape Verify operation, the tape read will be interrupted. Retry the tape verify operation from the beginning.
2. During the Tape Verify operation, no PROGRAM key input will be accepted.
3. Be sure to set the volume control and tone control of the cassette tape recorder to maximum.

6.23 Errors in Cassette Mode

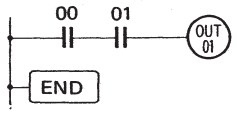
During a Tape Read, or Verify operation, one of the following error messages appears on the SUB OP display when the ERROR indicator illuminates. The description of each message is shown below.

- **Display**



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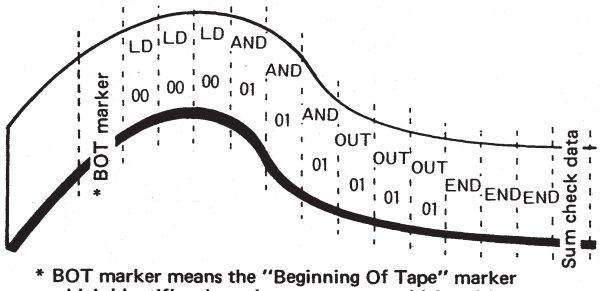
- **Tape data format**



Coding

000	LD		00
001	AND		01
002	OUT		01
003	END		
⋮			

Tape format containing the above circuit data



* BOT marker means the "Beginning Of Tape" marker which identifies the point on a tape at which writing or reading can begin.

- **Errors in tape read operation**

Operation	Error message	Description of message
Tape Read	2	**(SUM CHECK ERROR)** The contents of the cassette tape are read to the end of the program, and the number of logical "1" memory bits composing each instruction is added and checked. If it agrees with the sum check data recorded on the tape during the WRITE operation, the CPU checks whether or not the contents of the tape are correct. If both data do not coincide, the CPU judges that a sum check error exists.
	3	**(MARK ERROR)** On a cassette tape, a BOT (Beginning of tape) marker is recorded at the beginning of the tape in the WRITE operation. If this BOT marker does not appear within a given time after the start of the READ operation, the CPU judges that a mark error exists the tape.
	4	**(DATA ERROR)** When recording data on a cassette tape, the same data (i.e., instruction) is recorded 3 times consecutively. When the three same instructions are read, the CPU checks whether or not all the three data are the same. If two of them do not coincide, the CPU judges that a data error exists.
	5	**(TAPE ERROR)** When recording data on a cassette tape, the same data (i.e., instruction) is recorded 3 times consecutively. When the three same instructions are read, the CPU checks whether or not all the three data are the same. If only one of them does not coincide, the CPU judges that a tape error exists.

- **Errors in tape verify operation**

Operation	Error message	Description of message
Tape Verify	3	**(MARK ERROR)** On a cassette tape, a BOT marker is recorded at the beginning of the tape in the WRITE operation. If this BOT marker does not appear within a given time after the start of the READ operation, the CPU judges that a mark error exists in the tape.
	4	**(DATA ERROR)** When recording data on a cassette tape, the same data (i.e., instruction) is recorded 3 times consecutively. When the three same instructions are read, the CPU checks whether or not all the three data are the same. If two of them do not coincide, the CPU judges that a data error exists.
	5	**(TAPE ERROR)** When recording data on a cassette tape, the same data (i.e., instruction) is recorded 3 times consecutively. When the three same instructions are read, the CPU checks whether or not all the three data are the same. If only one of them does not coincide, the CPU judges that a tape error exists.
	6	**(VERIFY ERROR)** During the Verify operation, if the contents of the cassette tape do not coincide with the contents of the RAM, the CPU judges this condition as a verify error.

6.24 Functions of I/O Checker

The I/O checker is available for user program check and for manual operation of the SYSMAC-P0R.

■ **FEATURES**

- **Convenient for program debugging**
  Program debugging of the SYSMAC-P0R is possible while it is in the RUN mode by inhibiting external inputs and in turn providing the SYSMAC-P0R with dummy inputs through the switch operation of the I/O checker.
- **Forced output ON/OFF operation is possible.**
  While the SYSMAC-P0R is in the STOP mode, external outputs can be forced to turn on or off with the I/O checker.

■ **FUNCTIONS**

Connect the I/O checker to the I/O unit connector of the SYSMAC-P0R, and the I/O checker will function as follows.

1. With SYSMAC-P0R in RUN mode

I/O CHECKER Switch	SYSMAC-P0R Mode	Function
OFF	ON or OFF	SYSMAC-P0R accepts signals from the external input terminals and ignores input signals from the checker.
ON	ON or OFF	SYSMAC-P0R ignores signals from the external input terminals and accepts the ON/OFF states of the I/O checker switches corresponding to the input terminals of the SYSMAC-P0R as inputs.

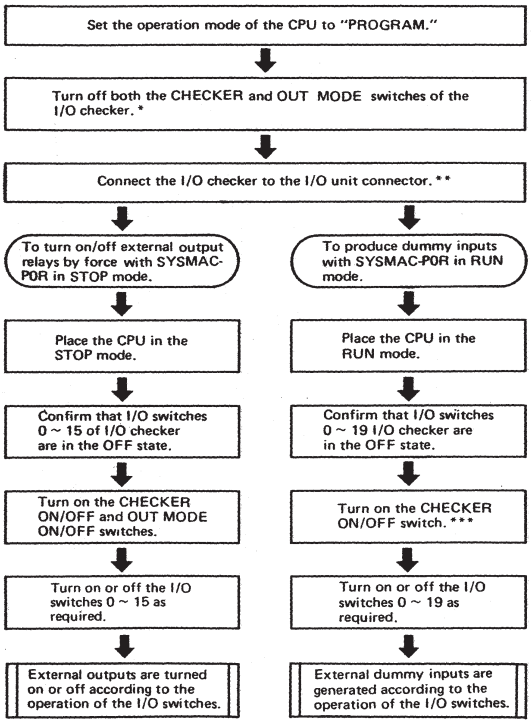
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2. With SYSMAC-P0R in STOP mode

CHECKER switch	OUT MODE switch	Function
OFF	ON or OFF	SYSMAC-P0R does not operate irrespective of the ON/OFF states of the I/O checker switches.
ON	OFF	Ditto
ON	ON	Output relays can be forced to turn on or off according to the ON/OFF states of the I/O checker switches corresponding to the output relay numbers of the SYSMAC-P0R.

NOTES:
1. The OUT MODE switch is effective only when the SYSMAC-P0R is in the STOP mode. This switch is turned on in the manual operation mode of the SYSMAC-P0R. With this switch turned on, the output relays 00 ~ 15 of the SYSMAC-P0R can be forced to turn on or off.
2. The CHECKER switch supplies power to the I/O checker. However, note that when the cable is connected with this switch on, the I/O checker will not be placed in the ON state if the power is turned off and then on again. In this case, turn off the CHECKER switch once and then turn it on again to place the I/O checker in the ON state.

6.25 I/O Checker Handling



NOTES:
* Even if the I/O checker is connected to the I/O unit connector with the CHECKER and OUT MODE switches turned on, the I/O checker will not operate for protection of external devices. To place the I/O checker in the ON state, the CHECKER switch must be turned OFF once from the ON position and then turned ON again.
** I/O unit connecting connector has an identically designed fitting at each end and can thus be connected from either end.
*** To change the operation mode of the SYSMAC-P0R from "RUN" to "PROGRAM" while it is receiving dummy inputs from the I/O checker, be sure to turn off the CHECKER switch. Outputs can be generated from the I/O checker only when the SYSMAC-P0R is in the STOP mode.

6.26 Cautions in Operating SYSMAC-P0R

When operating the SYSMAC-P0R, pay attention to the following points.

CAUTIONS:
- **Before connecting the CPU with the I/O unit, be sure to turn off the AC power to the SYSMAC-P0R.**
- **Before power application, be sure to set the desired supply voltage using the voltage selector socket with a fuse. (The rated voltage is factory-set to AC 240V prior to shipment.)**
- **The key inserted into the mode selector switch can be removed at either the RUN or STOP position. However, when the key inserted into the mode selector switch is removed at the RUN position, the SYSMAC-P0R is capable of performing such operations as search, monitor, trace, etc.**
- **With the mode selector switch in the STOP position, all the functions of the SYSMAC-P0R are disabled.**

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7. Installation and Wiring

The SYSMAC-P0R is a highly reliable programmable controller which is resistant to adverse environmental conditions. However, in order to permit the programmable controller to fully exhibit its functions, as well as to enhance its reliability, care must be exercised on the following points when installing the programmable controller.

7.1 Mounting Locations and Environmental Conditions

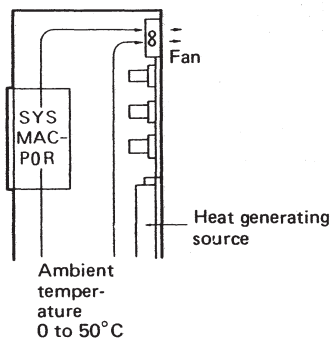
When installing the SYSMAC-P0R programmable controller, avoid the following locations.

- Location where the ambient temperature is beyond the range of 0 to 50°C.
- Location where temperature changes abruptly, thus resulting in condensation.
- Location where relative humidity exceeds the range of 30 to 90%.
- Location subject to corrosive gas or flammable gas.
- Location subject to excessive dust, salt, or iron particles.
- Location subject to vibration and shock.
- Location subject to direct sunlight.

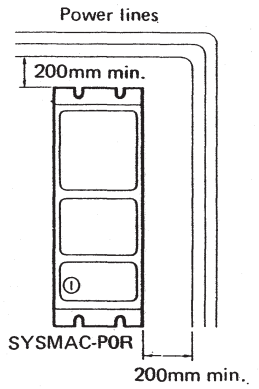
7.2 Mounting Positions within Control Panels

When mounting the SYSMAC-P0R in a control panel, take into consideration the operability, maintenability and environmental resistance of the programmable controller.

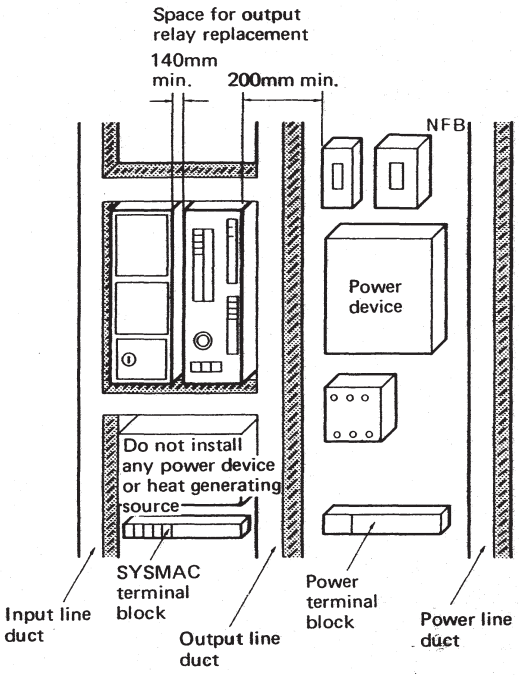
1. To permit the use of the SYSMAC-P0R within the ambient operating temperature range, pay attention to the following points.
   a. Provide the programmable controller with adequate space for ventilation.
   b. Avoid mounting the controller directly above any heat generating sources (heater, transformer, resistor of high capacity).
   c. Install a fan for forced ventilation if the ambient temperature exceeds 50°C.



2. Avoid mounting the SYSMAC-P0R in a panel in which high-tension equipment is installed.
3. Provide a distance of more than 200mm between the high-tension or power lines and the SYSMAC-P0R.



4. Mount the SYSMAC-P0R as far away as possible from high-tension equipment or power devices for the sake of safety in maintenance and operation.



5. Mounting the SYSMAC-P0R at a height 1,000 to 1,600mm above the installed surface of the control panel will facilitate the operation of the programmable controller.

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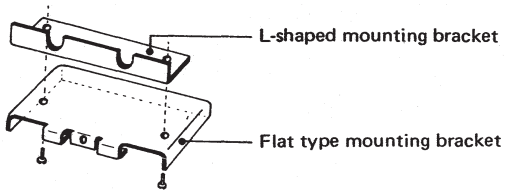
7.3 How to Install within Control Panel

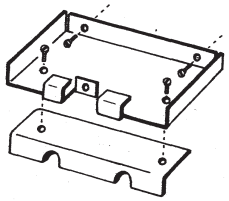
The SYSMAC-P0R can be installed with the I/O unit separated from the CPU, or with both units integrated. The I/O unit and the CPU are connected with a 10-pin flat cable. The flat cable is available in two types; 3m cable (Type SCYP0R-CN300) and 20cm cable (Type SCYP0R-CN020). Be sure to use either of the two OMRON supplied cables.

CAUTION:
Before connecting or disconnecting the flat cable, be sure to turn off the main power source.

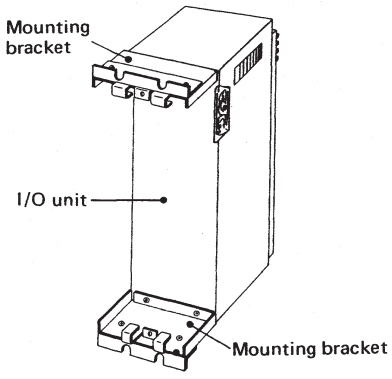
- **Assembly procedure**

1. Assemble a pair of L-shaped mounting brackets with a pair of flat type mounting brackets as shown below.

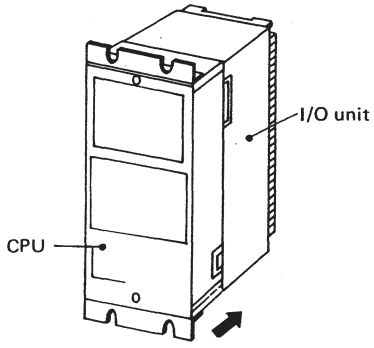




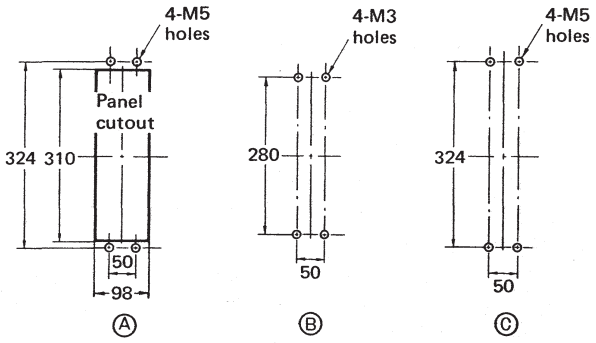
2. Secure the assembled pairs of mounting brackets respectively to the upper and lower parts of the I/O unit.

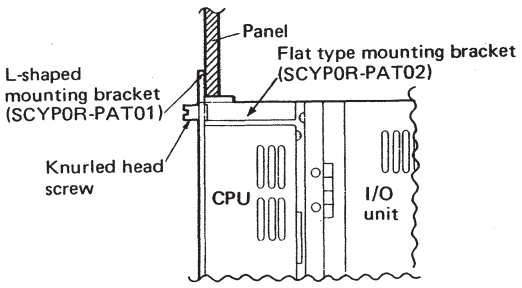


3. Mount the CPU.

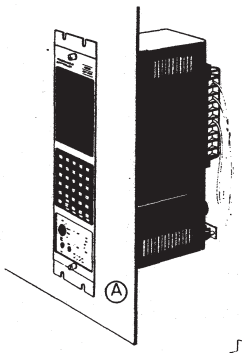


- **Mounting dimensions**

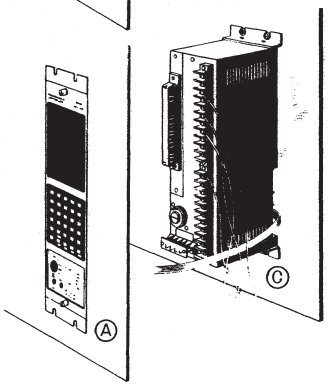




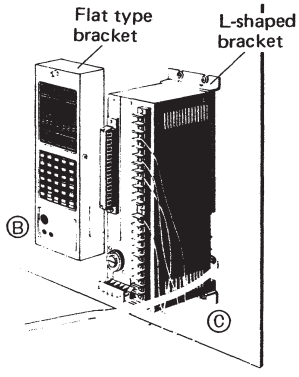
Mounting brackets required for integrated, flush mounting
L-shaped ..... 1 set
Flat type ..... 1 set



Mounting brackets required for separated mounting
L-shaped ..... 2 sets
Flat type ..... 1 set



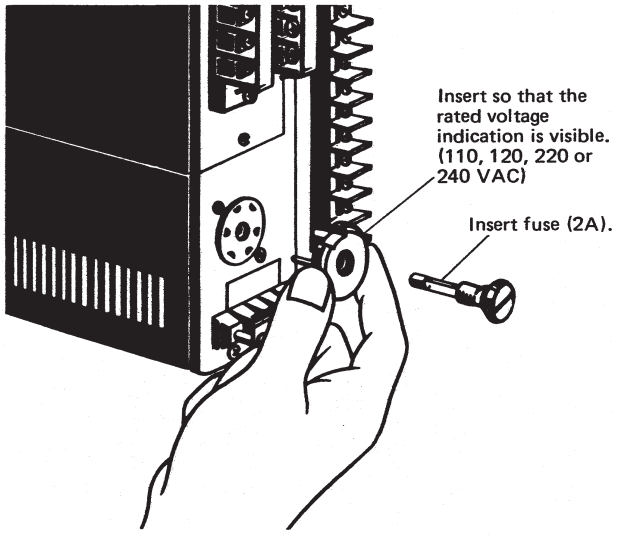
Mounting brackets required for separated mounting
L-shaped ..... 1 set
Flat type ..... 1 set



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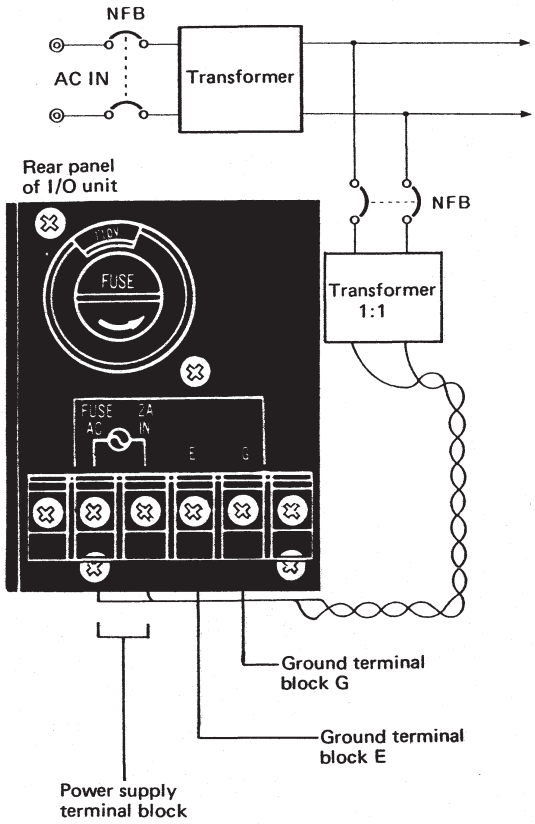
7.4 Processing of Wiring within Control Panel

1. Power supply and wiring
   - Before power application, be sure to set desired supply voltage using the voltage selector socket with a fuse. (The rated voltage is factory-set to AC 240V prior to shipment.)



Voltage Setting Method

- As the power supply line of the SYSMAC-P0R, employ a wire of 2mm^2 min. so as to prevent voltage drop. (Use of twisted pair wires is recommended.)
- For general noise on the power supply line, the noise suppressing circuit in the SYSMAC-P0R is sufficient. However, supplying power through a transformer having a transformer voltage ratio of 1:1 will help reduce equipment-to-ground noise to a great extent and installation of such a transformer is recommended.
  Terminal G of the I/O unit is a ground terminal used for prevention of electric shock. Use an exclusive ground wire (having a conductor cross-sectional area of 2mm^2 min.) for grounding at a grounding resistance of less than 100Ω.
  Terminal E is a noise filter neutral terminal and the grounding is not basically required. In case of a large noise which may cause an erroneous operation, E and G are short-circuited for exclusive grounding (at a grounding resistance of less than 100Ω).



Note that common use of the grounding line with other equipment or connecting to the beam of the building may adversely affect the system.
Keep the length of the ground wire within 20m.
Care must be taken to the grounding resistance as it varies depending on the nature of ground, water content, seasons and the time elapsed after the underground laying of the ground wire.

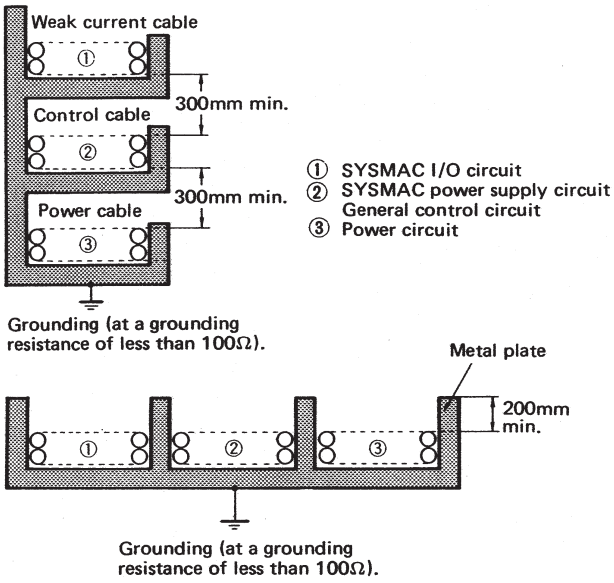
7.5 Operation at Power Failure

1. As the power supply of the SYSMAC-P0R, supply power within +10%, −15% of the supply voltage.
2. The power sequence circuit is incorporated in the power supply unit of the SYSMAC-P0R to prevent the programmable controller from malfunctioning due to a momentary power failure or a decrease in the supply voltage.
   a. Supply voltage drop
      If the supply voltage drops below its 85%, the alarm buzzer sounds and the operation of the SYSMAC-P0R stops, causing external output relays to turn off.
   b. Momentary power failure
      If a momentary power failure of more than 1 cycle or a voltage drop to less than 85% of the supply voltage occurs, the power failure detecting circuit of the SYSMAC-P0R functions to stop the programmable controller automatically.
   c. Automatic reset
      The SYSMAC-P0R will automatically resume its operation after the supply voltage (more than 85%) is restored.

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7.6 External Wiring

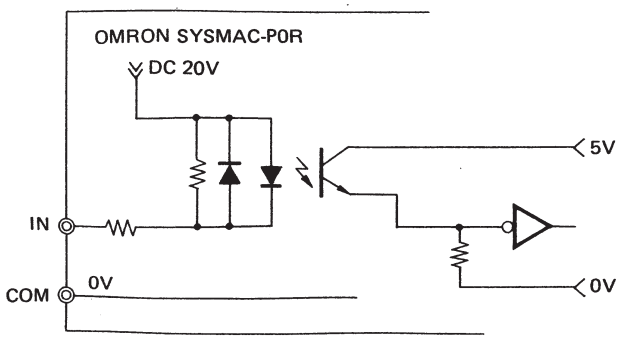
1. Be sure to process the input/output lines of the SYSMAC-P0R separately from other control lines. (Do not share the conductors of the I/O cable with others.)
2. To process the cables for the SYSMAC-P0R with power cables rated at 400V 10A max. or 220V 20A max.:
   a. Be sure to provide a minimum distance of 300mm between both cables when their racks are paralleled.
   b. Be sure to screen them with a grounded metal plate when both cables are placed in the same duct at the termination process of the cable laying work.



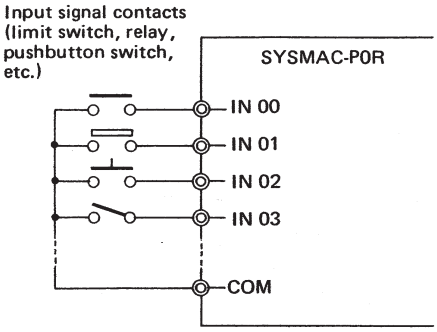
7.7 Output Forms of Input Switches and Methods of Interfacing SYSMAC-P0R

- **Input system: Sink type**

1. Input characteristics
   Input voltage: DC 20V (unregulated internal power supply)
   Input current: 10mA TYP.
   Input impedance: 1.6kΩ
   Input threshold level: [ON] 5mA min.
   [OFF] 2mA max.
2. Input circuit diagram

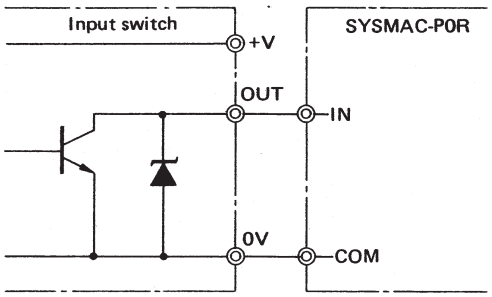


- **In case of contact input:**
  When a contact (no-voltage contact) input is employed, connect one of the input lines to the COM terminal and the others to the IN terminals (00 to 19).

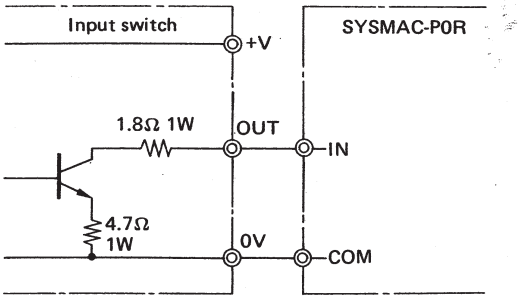


- **In case of solid-state input:**
  When using solid-state input switches, pay attention to the output forms of the respective input switches. The following are examples interfacing with OMRON proximity switches and photoelectric switches.

1. NPN open collector type: This type can be used.



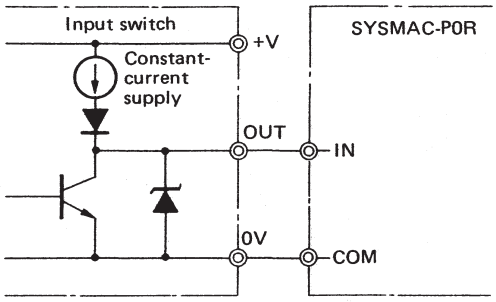
Applicable models
- OMRON proximity switches
  Type TL-XP□(M) series
  (+V: DC 10 to 30V)
  Type E2M-□P□ series
  (+V: DC 24V)



Applicable models
- OMRON proximity switches
  Type TL-LP50
  (+V: DC 10 to 30V)

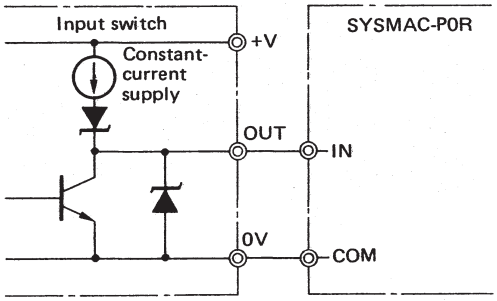
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2. NPN output type: This type can be used.



Applicable models
- OMRON proximity switches
  Type TL-X□E□ series
  (+V: DC 10 to 40V)

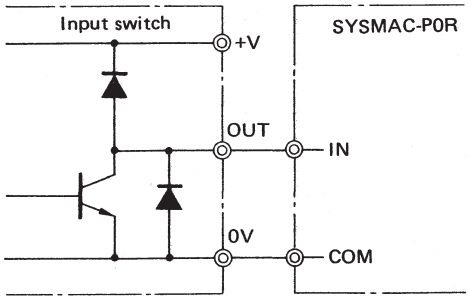
3. NPN output type: This type can be used conditionally.



Condition of use: DC 40V ≧ +V ≧ DC 24V

Applicable models
- OMRON photoelectric switches
  Model E3S series
  Model E3S-L series
  Model E3S-G series
  Model E3S-X series
  Model E3N series
  (+V: DC 12 to 24V)

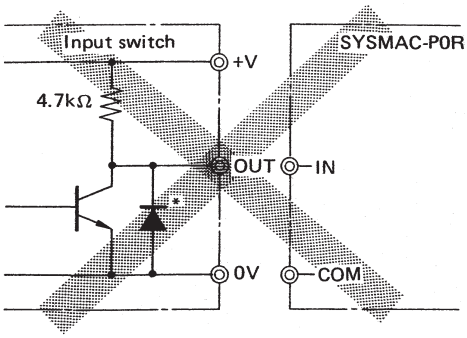
4. NPN output type: This type can be used conditionally.



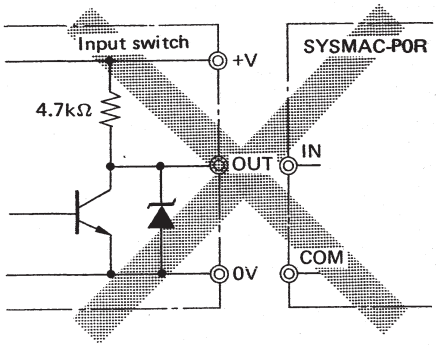
Condition of use: +V DC 24V ±10%

Applicable models
- OMRON proximity switches
  Type TL-P□, TL-PH□ series
  (+V: DC 24V)

5. NPN output type: This type cannot be used.

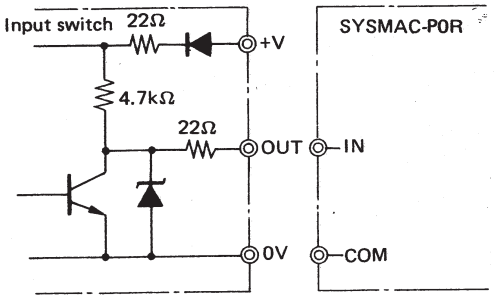


Models not applicable
- OMRON proximity switches
  Type TL-X□ (M) series
  (+V: DC 10 to 14V)
  Type TL-N□/-H□/-F□ series
  (+V: DC 12V)
  Type TL-G□/-Q□ series
  (+V: DC 12V)
  NOTE: For Type TL-G□, the diode marked * is not provided, but a capacitor (0.01μF) is incorporated instead.



Models not applicable
- OMRON proximity switches
  Type E2M-□□ series
  (+V: DC 12V)

6. NPN output type: This type can be used conditionally.

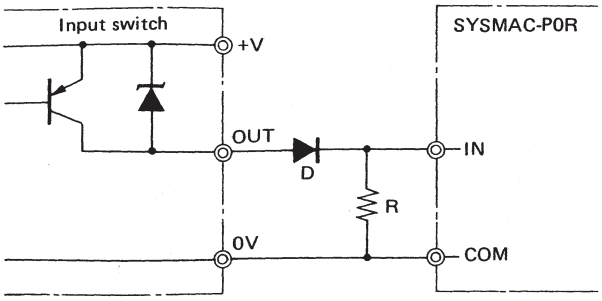


Condition of use: +V DC 24V ±20%

Applicable models
- OMRON proximity switches
  Type E2K-C25ME□ series
  (+V: DC 10 to 40V)

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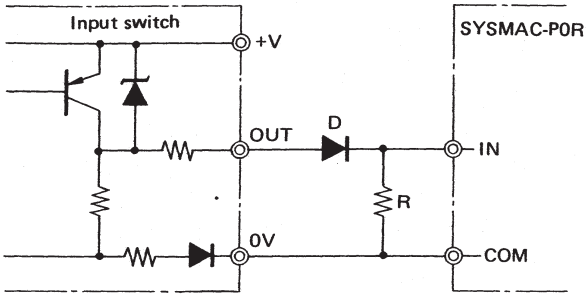
7. PNP open collector type: This type can be used conditionally.



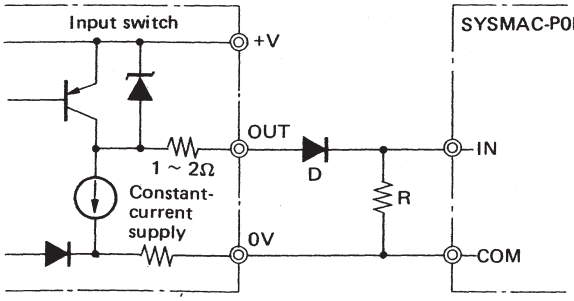
Condition of use: D: Capacity must be 30mA min.
R: 1kΩ, 2W
DC 40V ≧ +V ≧ DC 24V

Applicable models
- OMRON proximity switches
  Type TL-XP□P(M) series
  (+V: DC 10 to 30V)

8. PNP output type: This type can be used conditionally.



Applicable models
- OMRON proximity switches
  Type E2K-C25MF□ series
  (+V: DC 10 to 40V)



Condition of use: D: Capacity must be 30mA min.
R: 1kΩ, 2W
DC 40V ≧ +V ≧ DC 24V

Applicable models
- OMRON proximity switches
  Type TL-X□F□ series
  (+V: DC 10 to 40V)

For the methods of interfacing described in 3, 4, 7 and 8 as the types that can be used conditionally, if difficult to use, and in 5 and 6 as the types that cannot be used, interface the SYSMAC-P0R with the solid-state input switches through contact input as follows.

One way is to use the contact output of the OMRON Model S3S controller unit for OMRON proximity and photoelectric switches and the other to use an electromagnetic relay.

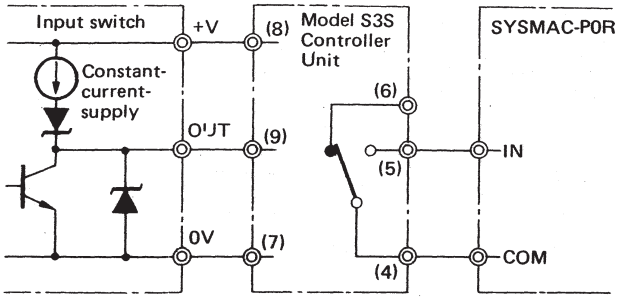
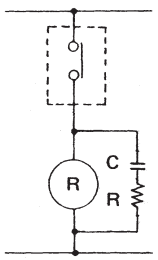


Figure in parentheses denotes terminal No.

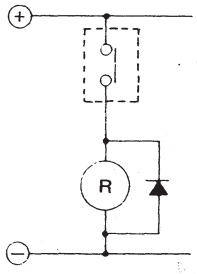
7.8 Hints on Use of Output Contacts

- If any electrical devices, which are likely to generate electric noise, are to be employed as the output loads of the SYSMAC-P0R, be sure to take measures to absorb such noise. For example, electromagnetic relays, valves, etc. generating a noise of 1,200 to 1,300V minimum are subject to noise suppression. For AC operated noise sources, connect a surge suppressor in parallel with the coil of each device. For DC operated noise sources, connect a diode in parallel with the coil of each device.



AC power source

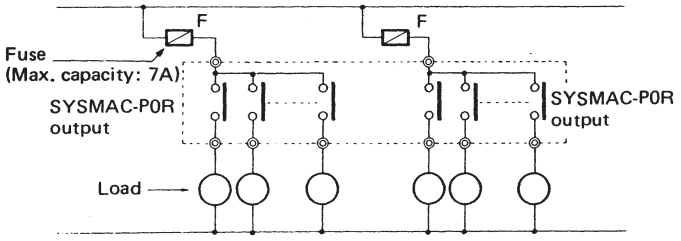
C: 0.5μF ±20% min.
Nonpolarity
Withstand voltage: 1,500V min.
R: 50Ω ±30%, 0.5W



DC power source

Select a diode with the breakdown voltage and current ratings according to the load.

- Since the output contacts (SPST-NO) of the SYSMAC-P0R consist of relay contacts which are packaged on a printed circuit board and connected to the terminal board, short-circuiting any of loads connected to the output contacts may result in the burning of, and consequent damage to, the P.C. board. Therefore, use of fuses is recommended for protection of the output contacts.



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8. Maintenance and Inspection

To sustain the proper system operation at all times, it is necessary to inspect the SYSMAC-P0R daily. If any trouble occurs in the SYSMAC-P0R, how the system should be protected and how soon it can be recovered from the failure become important. In this chapter, the items to be inspected on the SYSMAC-P0R and the actions to be taken if the SYSMAC-P0R fails are described.

8.1 Inspection

To make the most of the functions of the SYSMAC-P0R under the best condition, it is necessary to inspect the SYSMAC-P0R daily or periodically.

■ INSPECTION ITEMS

The SYSMAC-P0R employs semi-conductors as its main component elements and has little or no supplies with a limited service life. However, the semi-conductors may deteriorate depending on the environmental conditions and must therefore be inspected periodically. The standard inspection cycle is 6 months to 1 year. According to the environmental conditions, it is recommended to advance the date of inspection. As a result of the daily or periodical inspection, if the SYSMAC-P0R is found to be outside the criteria in the following table, be sure to correct the SYSMAC-P0R so that it falls within the prescribed criteria.

1	AC power supply (a) Voltage (b) Fluctuation	(1) Is the rated voltage available when measured within the CPU rack and at the AC input terminal block?	AC 110, 120, 220, or 240V +10%, −15%
		(2) Does a momentary power failure occur frequently or is there any sharp rise or drop in the supply voltage?	The supply voltage must be within the permissible fluctuation range described above.
2	Environmental conditions (a) Ambient temperature (b) Humidity (c) Vibration (d) Dust, etc.	Are the temperature and humidity within the ranges respectively? (When the SYSMAC-P0R is installed in a control panel, the temperature within the panel may be regarded as the ambient temperature of the programmable controller.	(a) 0 to +50°C (b) 30 to 90% RH (c) Must be free from vibration (d) Must be free from dust
3	Mounting conditions	(1) Are the I/O unit and CPU secured firmly?	The mounting screws must not be loose.
		(2) Are the flat cables for connection of the I/O unit and CPU inserted completely?	The flat cables must not be loose.
		(3) Is there any loose screw in the external wiring?	The screw terminals must not be loose.
		(4) Is there any broken cable in the external wiring?	Ther external wiring must be free from any abnormalities in the appearance.
		(5) Is there any broken conductor in the flat cable?	The flat cable must be free from any abnormalities in the appearance.
4	Service life	(1) Output relays in the I/O unit	Replace with new ones if defective.
		(2) Battery	2 years

CAUTION:
Be sure to turn off the power before replacing any unit (CPU orI/O unit) of the SYSMAC-P0R.

■ NOTES ON INSPECTION

1. If a defective unit is discovered and replaced, confirm whenever or not the replaced unit is abnormal.
2. In the event of a faulty contact of the flat cable, wipe the connector pins with a clean all-cotton cloth moistened with industrial alcohol. Be sure to plug in the flat cable after removing the cloth waste.

■ TOOLS AND TESTING EQUIPMENT REQUIRED FOR MAINTENANCE

In the maintenance of the SYSMAC-P0R, the following tools and testing equipment will facilitate the daily or periodic inspection of the programmable controller.

1. Tools and testing equipment recommended as mandatory equipments
   - Screwdrivers (Phillips and round blade)
   - Tester or digital voltmeter
   - Industrial alcohol and all-cotton cloth
2. Measuring instruments recommended only if required.
   - Synchroscope
   - Pen-recording oscilloscope

■ MAINTENANCE PARTS

1. I/O unit (Type SCYP0R-I/O01)
   If the SYSMAC-P0R fails, its repair is impossible without any spare parts no matter how early the trouble is discovered. So, it is recommended to have at least one I/O unit as the spare part.
2. Battery (Type SCY-BAT01)
   In general, the service life of a battery is regarded as the time when the capacity of the battery is reduced to 50% of its nominal capacity. The service life of a battery varies greatly depending on the ambient temperature of the battery, depth of discharging, discharge current, etc. With the SYSMAC-P0R, the life of the built-in battery is considered to be 2 years. Therefore, replace the battery with a new one every 2 years.
3. AC power fuse: Rated at 2A

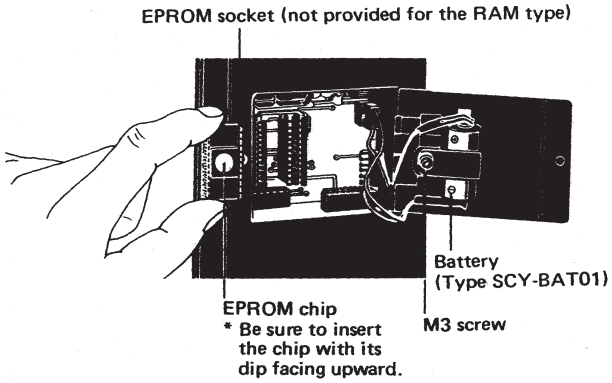
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8.2 Replacement of Battery

Be sure to replace the battery within 5 minutes.

- **Procedure:**

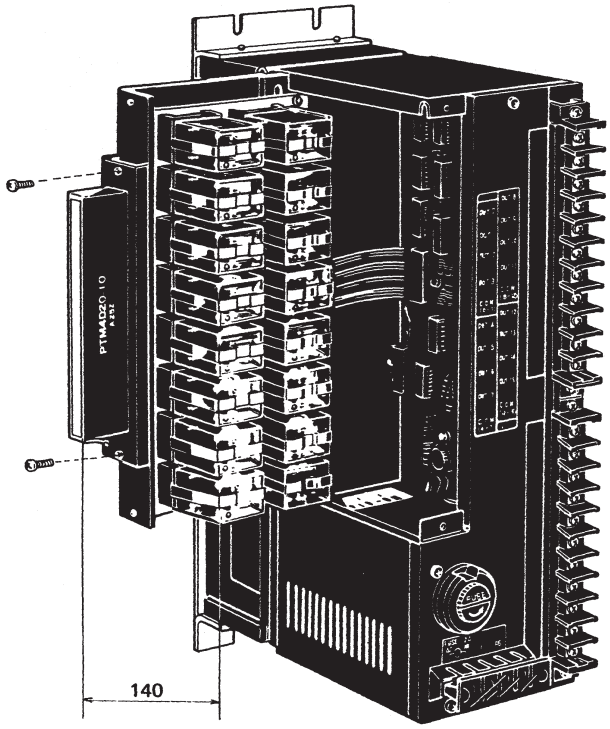
1. Prepare the replacement battery.
2. Turn off the AC power.
3. Remove the screw on the rear panel of the CPU and open the door as shown below.
4. Remove the M3 screw securing the battery and unplug the battery connector.
5. Plug in the connector of the new battery and then replace the battery.
6. Close the door, and secure it with the screw.
7. When the AC power is applied, the battery starts operating.



NOTE: When the AC power is not ON at the time of battery replacement, first apply the AC power for more than 10sec and then turn it off.

8.3 Replacement of Relays

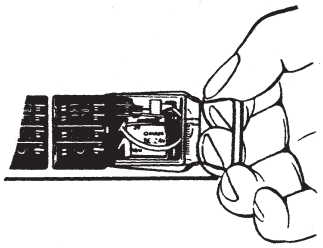
- **I/O unit**



NOTES:
1. Output relays can be replaced easily by removing the two screws as shown above.
2. A space of approx. 140mm is required on the left side of the I/O unit, for relay replacement.
3. Use OMRON Type MY2 (-US) rated at DC 24V as replacement relays. Turn off the power supply when replacing output relays.
4. The OMRON Type MY2 relay is interchangeable with the OMRON Type G3F-203S solid-state relay. When the solid-state relays are desired as output relays due to the requirement to switch loads at high frequency, use the Type G3F-203S relays in place of the Type MY2 relays. In this case, however, only the output terminal numbers 53, 54, 55, 59, 60, 61, 65, 66, 67; 70, 71, 72, 73, 77, 78, 79, 83, 84, 85, 89, 90, 91, 95, 96 and 97 are applicable.
The output specifications of the Type G3F-203 relays are as follows:

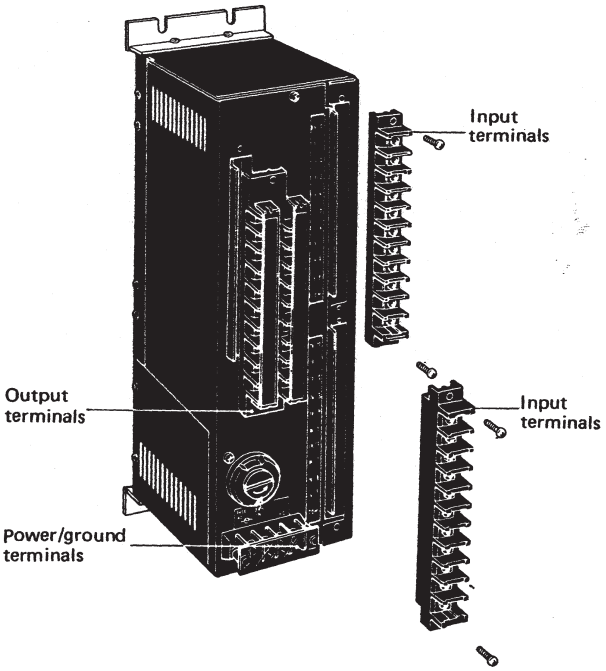
Operate and release times	Zero cross applied
Leakage current	5mA max. (at 100 VAC) 10mA max. (at 200 VAC)

NOTE: Since one common terminal permits connection of 3 output points, be sure to limit the current flowing through the common terminal to less than 4A.



8.4 How to Remove Terminal Block Connectors

- **I/O unit**



NOTE: Two input terminal blocks and one output terminal block are respectively secured to the I/O unit with two screws and are removable from the I/O unit. Therefore, it is unnecessary to disconnect the I/O wiring when replacing output relays, or reinstalling the I/O unit.

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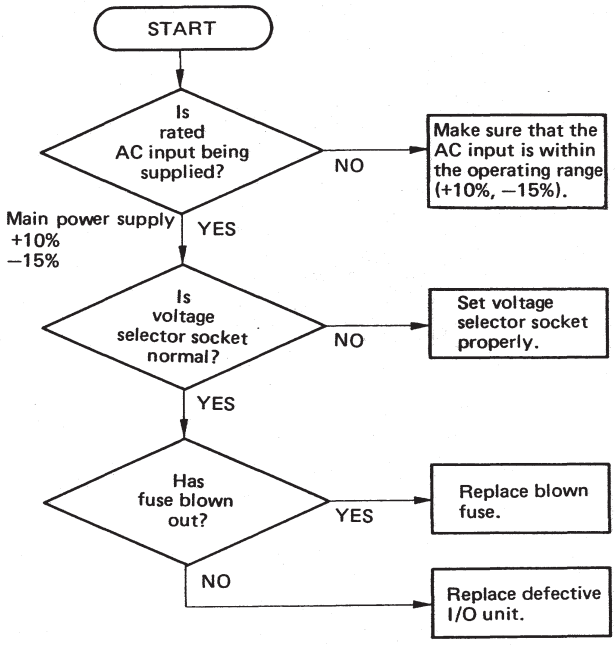
8.5 Troubleshooting

If any abnormality occurs in the SYSMAC-P0R, thoroughly grasp the condition of trouble, check whether the symptom is reproducible or is caused through relationship with other equipment, and then follow the troubleshooting flowcharts shown below.

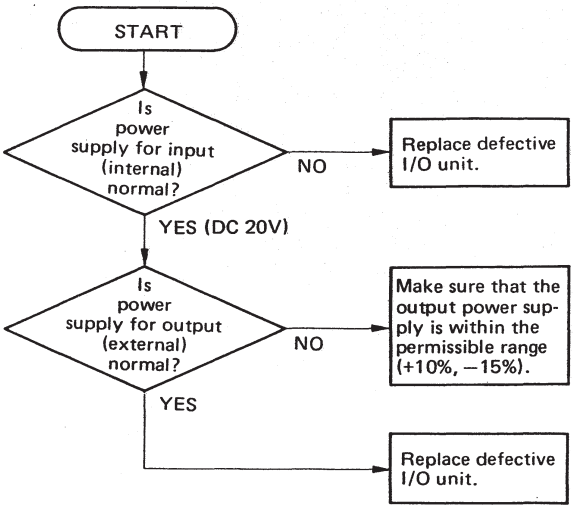
■ I/O UNIT

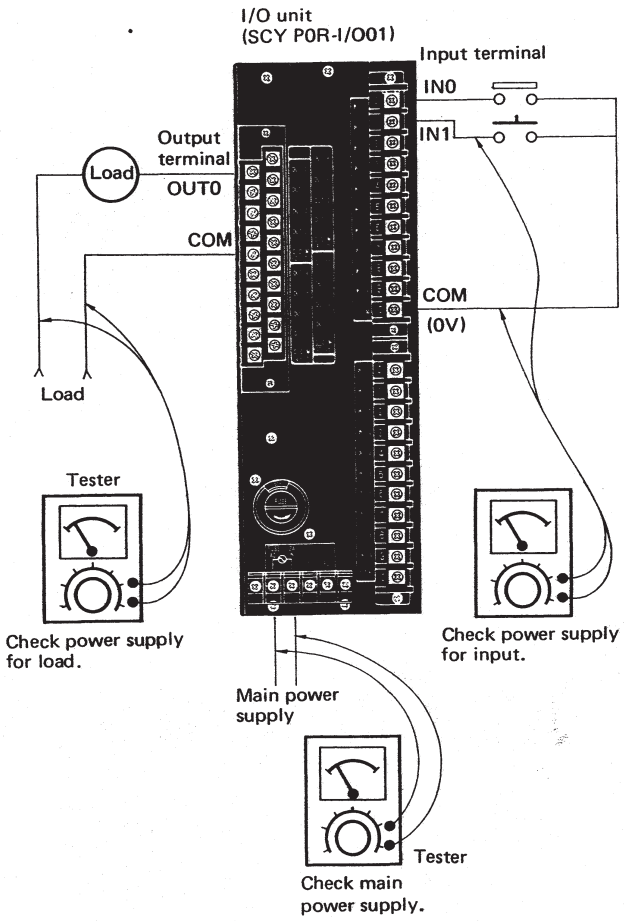
- **Main power supply check**

In this check, the AC power being supplied to the SYSMAC-P0R is confirmed if it is within the specified operating range.



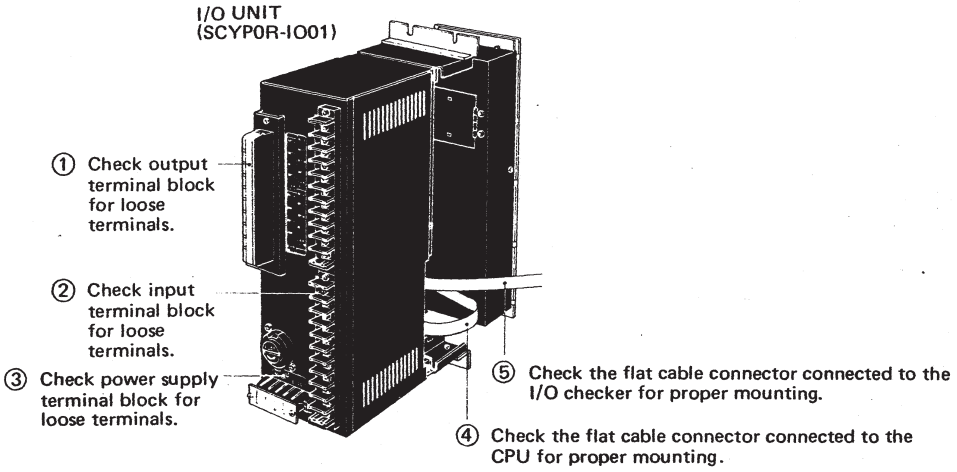
- **I/O device related power supply check**





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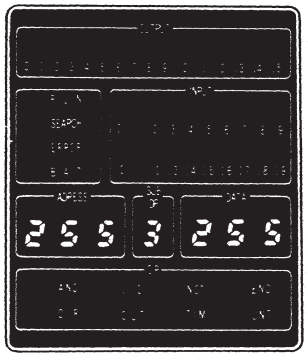
- **Loose terminal check**

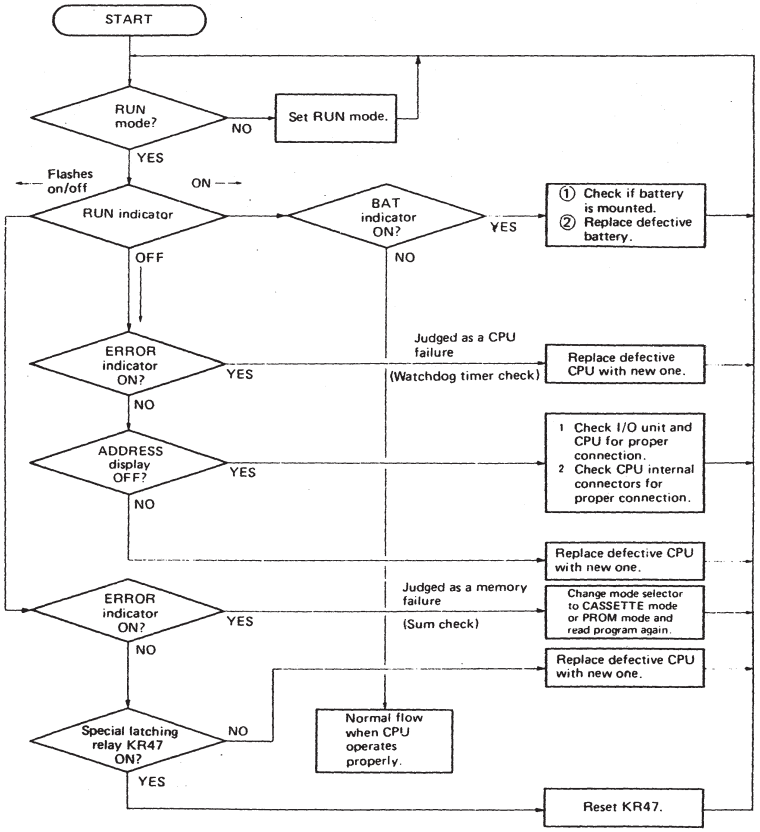


NOTE: The CPU connecting flat cable and I/O checker connecting cable may be connected to either the top or bottom side of the I/O unit connector.

■ CPU

When the CPU is normally operating, the RUN indicator lights, INPUT/OUTPUT indicators are ON or OFF according to the operation of each input/output, and the ADDRESS display indicates "000."
The following flowchart applies to the CPU if abnormality occurs in the unit while it is in the RUN mode.

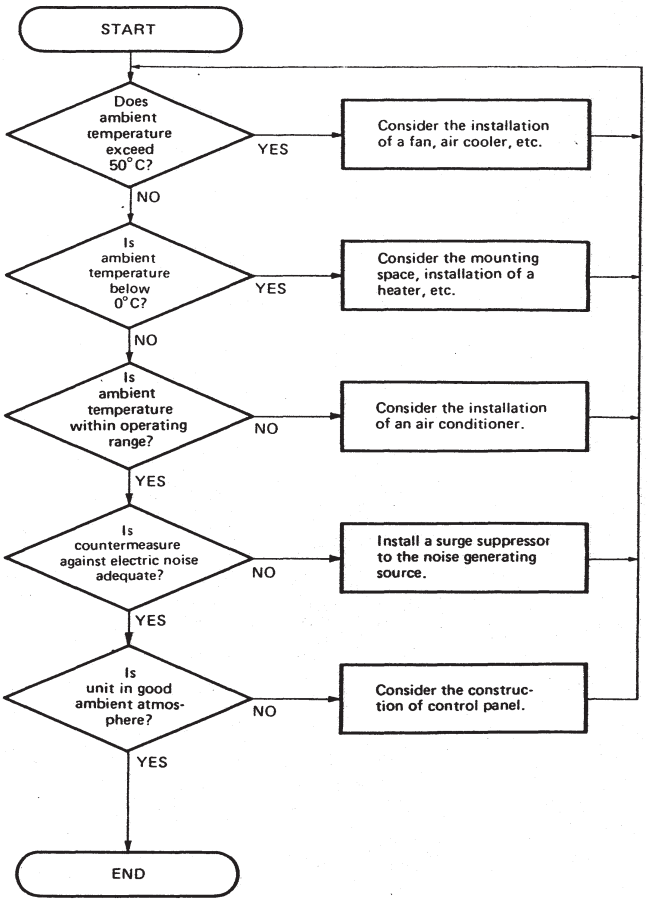




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■ EXTERNAL ENVIRONMENTS

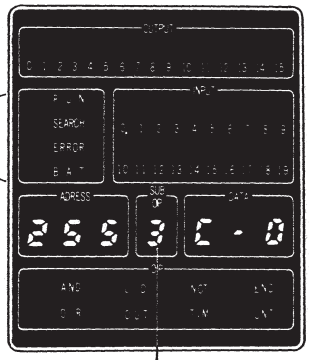
Confirm that the SYSMAC-P0R satisfies the environmental requirements described in Section 2.3, Specifications.



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■ LIST OF ERROR MESSAGES

An error message appears in the sub OP code display as shown on the right.



Mode	Symptom	Description or cause of condition or trouble	RUN indicator	ERROR indicator	BATTERY FAULT indicator	State of aux. relay	Message
RUN mode	No END instruction	Check the presence of END instruction at the end of a program.	✱	✱			9
	Memory failure	Sum check	✱	✱		MR63 ON	
	Battery failure	Rated battery voltage and battery mounting check	✱		✱	MR62 ON	
	CPU failure	Watchdog timer check		✱			
Program mode	No END instruction	Check the presence of END instruction at the end of a program.		✱			9
	Duplicate coil number	Check coil numbers for duplication.		✱			c
	Circuit error	Check the ladder diagram for proper circuit configuration or syntax.		✱			u
Cassette mode	Memory error	Sum check		✱			2
	Mark error	Faulty cassette tape recorder or incomplete tape rewind.		✱			3
	Data error	An abnormality occurs during program write into the tape, or the tape is defective due to deterioration.		✱			4
	Tape error	Ambiguous data exist in the tape. Rewrite programs into the tape.		✱			5
	Verify error	The contents of the tape do not coincide with those of the RAM.		✱			6
EPROM mode	Verify error	The contents of the RAM do not coincide with those of the EPROM.		✱			6
	Erase error	EPROM contains no data. (Erase check)		✱			7
	Read error	EPROM chip not inserted.		✱			8

✱ denotes that the indicator illuminates.
✱ denotes that the indicator flashes.

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I/O TERMINAL ASSIGNMENT TABLE FOR OMRON SYSMAC-P0R

Name		Model	Prepared by:	Inspected by:	Approved by:
Customer	Installation location	Drawing No. (Chip No.)			

Input			Output		
Terminal No.	Relay No.	Description of signal	Terminal No.	Relay No.	Description of signal
IN0	00		OUT0	OUT00	
IN1	01		OUT1	OUT01	
IN2	02		OUT2	OUT02	
IN3	03		OUT3	OUT03	
IN4	04		COM		
IN5	05		OUT4	OUT04	
IN6	06		OUT5	OUT05	
IN7	07		OUT6	OUT06	
IN8	08		OUT7	OUT07	
IN9	09		COM		
COM			OUT8	OUT08	
IN10	10		OUT9	OUT09	
IN11	11		OUT10	OUT10	
IN12	12		OUT11	OUT11	
IN13	13		COM		
IN14	14		OUT12	OUT12	
IN15	15		OUT13	OUT13	
IN16	16		OUT14	OUT14	
IN17	17		OUT15	OUT15	
IN18	18		COM		
IN19	19				
COM					

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OMRON SYSMAC-P0R CODING SHEET

Name		Model	Prepared by:	Inspected by:	Approved by:
Customer	Installation location	Drawing No. (Chip No.)			

Address	OP	Sub OP	Data	Address	OP	Sub OP	Data	Address	OP	Sub OP	Data	Address	OP	Sub OP	Data
000				064				128				192			
001				065				129				193			
002				066				130				194			
003				067				131				195			
004				068				132				196			
005				069				133				197			
006				070				134				198			
007				071				135				199			
008				072				136				200			
009				073				137				201			
010				074				138				202			
011				075				139				203			
012				076				140				204			
013				077				141				205			
014				078				142				206			
015				079				143				207			
016				080				144				208			
017				081				145				209			
018				082				146				210			
019				083				147				211			
020				084				148				212			
021				085				149				213			
022				086				150				214			
023				087				151				215			
024				088				152				216			
025				089				153				217			
026				090				154				218			
027				091				155				219			
028				092				156				220			
029				093				157				221			
030				094				158				222			
031				095				159				223			
032				096				160				224			
033				097				161				225			
034				098				162				226			
035				099				163				227			
036				100				164				228			
037				101				165				229			
038				102				166				230			
039				103				167				231			
040				104				168				232			
041				105				169				233			
042				106				170				234			
043				107				171				235			
044				108				172				236			
045				109				173				237			
046				110				174				238			
047				111				175				239			
048				112				176				240			
049				113				177				241			
050				114				178				242			
051				115				179				243			
052				116				180				244			
053				117				181				245			
054				118				182				246			
055				119				183				247			
056				120				184				248			
057				121				185				249			
058				122				186				250			
059				123				187				251			
060				124				188				252			
061				125				189				253			
062				126				190				254			
063				127				191				255			

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