Maple Systems

USER MANUAL

MAPLE MODULAR PLC
Digital IO Modules

- IO-SD3200I
- IO-SD0032PI
- IO-SD1616PI
- IO-SD0808R
- IO-SD0016R
- IO-SD0032PPWM

1010-1160 REV 2.1

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- For your safety and the safe operation of this product, please read this manual before using the product. The manual is subject to change without notice.
- Please review the product specifications in this manual to determine the suitability of this product for its intended use.
- For your safety only qualified persons should perform electrical and wiring attachments to this product.

Before You Start

This manual contains important information on the use and operation of this device. Please read all the information carefully for optimal performance and to prevent any damage or misuse of the device.

To keep products safe, all activities including product installation, wiring operation, and maintenance are required to be treated by trained personnel.

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Safety symbols are classified into two categories, “WARNING” and “CAUTION”.

Warning: This symbol describes situations that could cause major or fatal injury to the user.

Caution: This symbol describes situations that may cause minor injury or damage to the device.

SAFETY SYMBOLS USED IN THIS PRODUCT MEAN:

This symbol warns the user of potential hazards.

This symbol warns the user of uninsulated voltage within the unit that can cause dangerous electric shock.

Keep this manual near the operating devices so it can be easily checked.

Design Precautions (⚠ Warning)

Please install a safety circuit to protect the entire control system in case of an unexpected power shutdown or PLC module malfunction. Such anomalies may severely compromise the integrity of the overall system.

External to the PLC, please install circuits and switches to safeguard the system from mechanical damages (ex. emergency stop, upper/lower limit switches, forward/reverse direction interlocking circuits, etc)

When the PLC detects either of the following failure conditions, it may stop operation and turn off all outputs.

- The overcurrent protection or overvoltage protection of the power supply module is activated.

- The PLC CPU detected a failure, such as the watchdog timer error or module installation failure, with its self-diagnostic function.

In addition, all outputs may be turned on when there is a failure that the PLC CPU cannot detect, such as in the relay or TR terminal. Build an extra monitoring circuit that will monitor any output signal that could cause serious accidents.

A greater than normal current passed through the PLC for an extended period of time, or a short-circuited load flowing through the output module may cause a fire.

Build a circuit that turns on the external power supply after the PLC power supply is turned on. If the external power supply is turned on first, it could result in output failure or malfunction.

In order to ensure that the system operates safely, please configure an interlock circuit in the scan program for the following situations:

- When exchanging data with a computer or other devices.

- When operated by a computer or other devices.

Not doing so could result in output failure or malfunction.

Precautions for design (⚠ Caution)

Do not bundle the input/output signal or communication cables with the main circuit and power cables. They should be installed at least more than 100 mm (3.94 inches) apart. Not doing so could result in output failure or malfunction.

Precautions for mounting (Caution)

Use the PLC in an environment that meets the general specifications given in this manual.

Using this PLC in any environment outside the range of the general specifications could result in electric shock, fire, malfunction, or damage to or deterioration of the product.

Please ensure that each module is installed correctly in its place. Loosely or incorrectly installed pieces may result in malfunction, failure, or free-fall.

The PLC power supply should be turned off before mounting the module. Not doing so could cause an electric shock or damage to the device.

Install I/O devices or extension connectors correctly. If they are installed incorrectly, it may result in an input or output failure.

Do not convey direct vibration into the PLC. Doing so could cause electric shock, fire or malfunctions.

After wiring work, please make sure to close the terminal cover before turning on the power for the PLC system.

Precautions for wiring (Warning)

Make sure to check the device's rated voltage and circuit arrangement before wiring. Failure to do so may cause electric shock or damage to the device.

Make sure to close the terminal cover before turning on the power of the PLC system after wiring work. Failure to do so may cause electric shock.

Precautions for wiring (Caution)

Make sure to check the device's regular voltage and sequence of terminals. Failure to do so may cause fire, electric shock and malfunctions.

When grounding the FG ground terminals, be sure to conduct the product with at least D type (Class 3) grounding. Not doing so could result in electric shock or malfunctions.

When wiring, make sure that wiring debris does not enter the module. Failure to do so may cause fire, equipment damage or malfunctions.

Precautions for wiring of Digital Input/Output Module (⚠Caution)

Select a cable considering ambient temperature and allowable current AWG 22 (0.3 mm^2) or more is recommended.

If the wiring is too close to a heat-generating device or directly contacted with oil for long periods of time it may cause a short circuit, breakdown or malfunction.

Precautions for test run and repair (⚠Warning)

Please do not touch the terminals when the power is on. Doing so could cause an electric shock or malfunctions.

When cleaning or tightening the screws, turn off the power of the PLC and all other systems. Failure to do so could cause an electric shock or malfunctions.

Do not charge, disassemble, heat up, short, or solder the battery. Doing so could cause the battery to heat up, rupture, or ignite, thereby harming the user.

Precautions for test run and repair (⚠ Caution)

Do not dissociate the PCB from the module's casing or make any modifications to the device. Doing so may cause fire, electric shock, or malfunction.

When mounting or separating the module, make sure to turn off power to the PLC and all other devices. Failure to do so could cause an electric shock or malfunctions.

Use radio, walkie-talkie, or cellphone devices at least 30cm away from the PLC. Not doing so could result in malfunction.

Precautions for disposal (⚠Caution)

When the product is disposed of, it should be done according to your country's regulations for similar types of industrial waste. Not doing so may cause an occurrence of toxic substances or explosions.

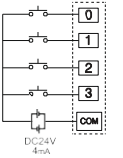
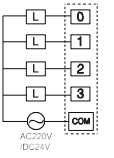
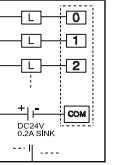
Digital IO Module List

Category	Model Name	I/O Points	Detail
Input Module	IO-SD3200I	DI-32	DI 32 points, DC 24 V, Sink/Source (Terminal Block Type)
Output Module	IO-SD0032PI	DO-32	DO 32 points, DC 12/24 V, TR Source (Terminal Block Type)
	IO-SD0016R	DO-16	DO, DC 24V, Relay Output 16pts, 2A
Input/Output Module	IO-SD0808R	DI-8, DO8	DI 8pts, DC 24V, Relay Output 8pts, 2A
	IO-SD1616PI	DI-16, DO-16	DI 16 points, DO 16 points, DC 24V (TR Source, Terminal Block Type)
PWM Output Module	IO-SD0032PPWM	DO-32 (Including PWM)	DO 32 points. DC 12/24 V (TR Source) PWM Output 12 points (Frequency: 1~4000 Hz Duty Cycle Resolution: 1/1000)

General Specifications

<table>
<tr><th>Items</th><th colspan="8">Specification</th><th>Standards</th></tr>
<tr><td>Ambient Temp.</td><td colspan="8">-10℃–65℃</td><td>-</td></tr>
<tr><td>Storage Temp.</td><td colspan="8">-25℃–80℃</td><td>-</td></tr>
<tr><td>Ambient Humidity</td><td colspan="8">5–95% RH, Not Condensed</td><td>-</td></tr>
<tr><td>Storage Humidity</td><td colspan="8">5–95% RH, Not Condensed</td><td>-</td></tr>
<tr><td rowspan="8">Vibration</td><td colspan="8">For Discontinuous Vibration</td><td rowspan="8">IEC 61131-2</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td><td colspan="4">Times</td></tr>
<tr><td>5 ≤ f < 9 Hz</td><td colspan="2">-</td><td>3.5 mm</td><td colspan="4" rowspan="2">X, Y, Z Each direction, 10 times</td></tr>
<tr><td>9 ≤ f ≤ 150 Hz</td><td colspan="2">9.8 m/s² (1G)</td><td>-</td></tr>
<tr><td colspan="8">Continuous Vibration</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td><td colspan="4">Times</td></tr>
<tr><td>5 ≤ f < 9 Hz</td><td colspan="2">-</td><td>1.75 mm</td><td colspan="4" rowspan="2">X, Y, Z Each direction, 10 times</td></tr>
<tr><td>9 ≤ f ≤ 150 Hz</td><td colspan="2">4.9 m/s² (0.5G)</td><td>-</td></tr>
<tr><td>Shock</td><td colspan="8">Max. impact acceleration: 147 m/s² (15G)
Authorized time: 11 ms
Pulse wave: Sign half-wave pulse (3 times each in X, Y, Z)</td><td>IEC 61131-2</td></tr>
<tr><td rowspan="5">Noise</td><td colspan="2">Square Wave Impulse Noise</td><td colspan="5">±2 kV</td><td>-</td></tr>
<tr><td colspan="2">Electrostatic Discharge</td><td colspan="5">Voltage: ±4 kV (contact), ±8 kV (air)</td><td>IEC 61131-2
IEC 61000-4-2</td></tr>
<tr><td colspan="2">Radiated Electromagnetic Field Noise</td><td colspan="5">80–1000 MHz, 10 V/m</td><td>IEC 61131-2
IEC 61000-4-3</td></tr>
<tr><td colspan="2" rowspan="2">Fast Transient Burst Noise</td><td>Unit</td><td>Power Module</td><td>Digital I/O (24 V or more)</td><td colspan="2">Digital I/O (less than 24V) Analog I/O Comm. interface</td><td rowspan="2">IEC61131-2
IEC61000-4-4</td></tr>
<tr><td>Voltage</td><td>2 kV</td><td>2 kV</td><td colspan="2">1 kV</td></tr>
<tr><td>Ambient Conditions</td><td colspan="8">No corrosive gas or dust</td><td></td></tr>
<tr><td>Altitude</td><td colspan="8">2,000 m or less</td><td></td></tr>
<tr><td>Pollution</td><td colspan="8">Pollution Degree 2 or less</td><td></td></tr>
<tr><td>Cooling Type</td><td colspan="8">Natural air cooling</td><td></td></tr>
</table>

Technical Specifications

Items		DC Input	Relay Output	TR Output
Rated I/O Voltage		DC 24 V	AC 220 V / DC 24 V	DC 12V/ 24 V
Rated I/O Current		4mA	1 point 2 A COM 5 A	1 point 0.2 A COM 2 A
On Voltage/Current		DC 19 V/3 mA	-	-
Off Voltage/Current		DC 6 V/1 mA	-	-
Response Time	Off → On	3 ms or less	10 ms or less	1 ms or less
	On → Off	3 ms or less	5 ms or less	1 ms or less
Operation Indication		LED will be ON when the input is ON		
Insulation Type		Photocoupler insulation	Relay insulation	Photocoupler insulation
Input Type		Sink/Source	-	-
Output Type		-	Relay	Source
Diagram				

※ The relay output must be less than 64 points per station.

※ Maximum expansion number of IO-SD0016R is up to 2 modules.

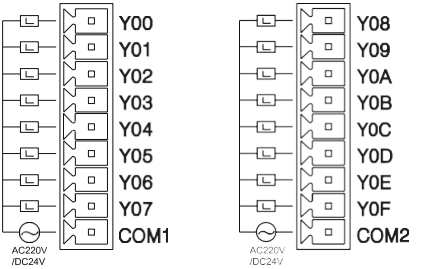
※ Maximum expansion number of IO-SD0808R is up to 4 modules.

Technical Specifications – PWM Module

Items	PWM Output
Frequency Range (DUTY Ratio)	1 Hz–4000 Hz
DUTY Ratio Resolution	0.0–100.0% (resolution 1/1000)
RAMP Control	Frequency RAMP, DUTY ratio RAMP control

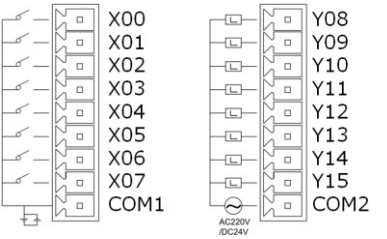
Wiring

- **IO-SD0016R**



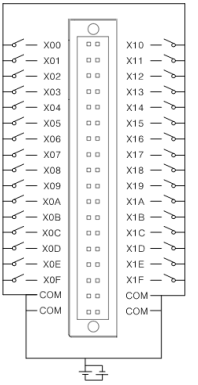
Wiring

- **IO-SD0808R**

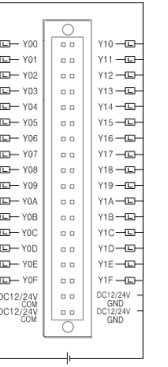


Wiring

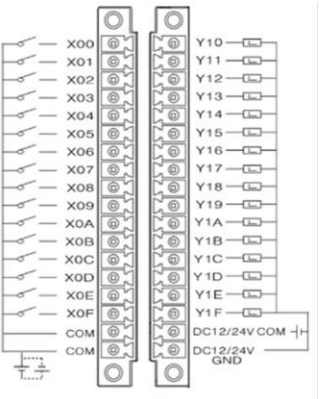
● **IO-SD3200I**



● **IO-SD0032PI**



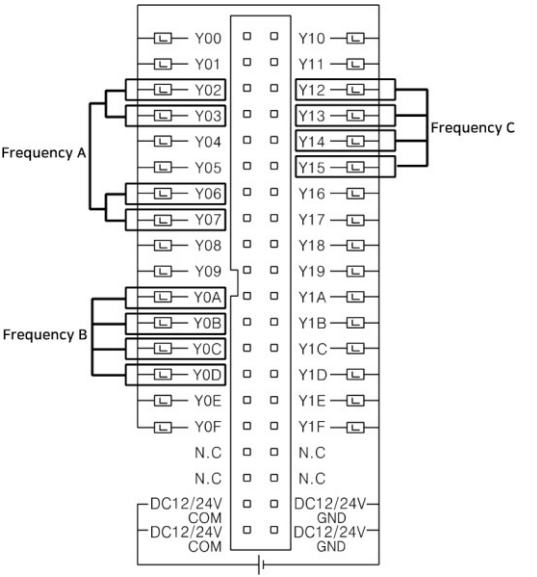
● **IO-SD1616PI**



Wiring

● **IO-SD0032PPWM**

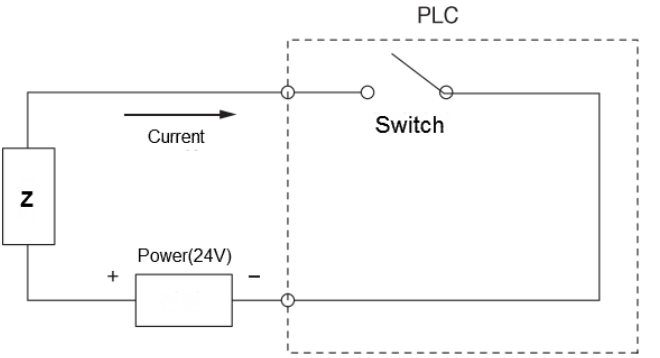
● PWM Output Points



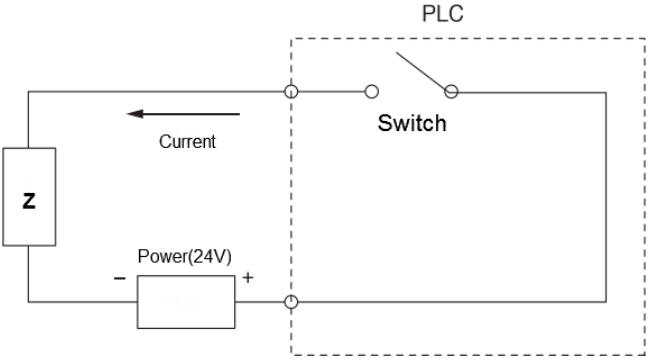
* All the other points can be used as normal output points.

Input / Output Type

● **Sink Type**

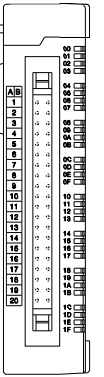


● **Source Type**

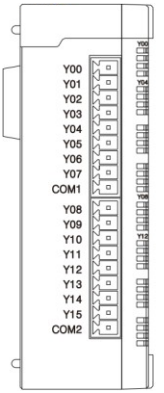


Appearance

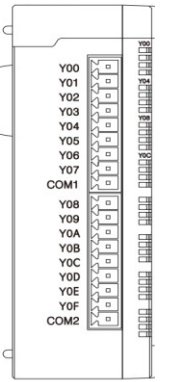
▶IO-SD0032PPWM



▶IO-SD0808R

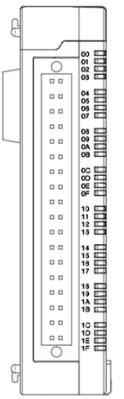


▶IO-SD0016R

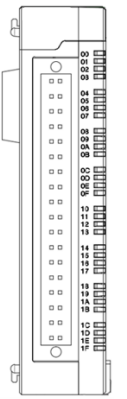


Appearance

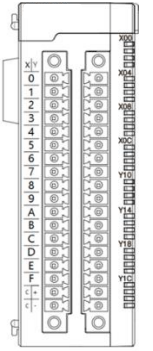
▶IO-SD0032PI



▶IO-SD3200I

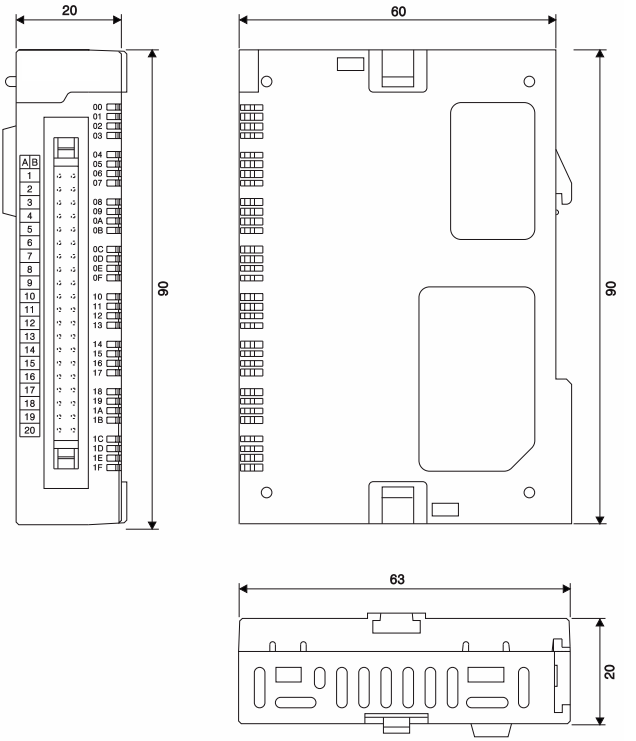


▶IO-SD1616PI



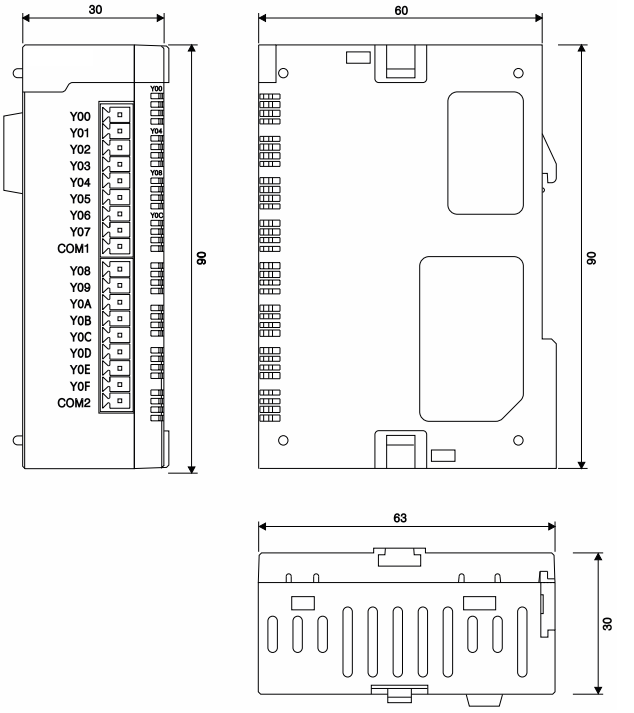
Dimensions

▶ **MODULES (IO-SD3200I, IO-SD0032PI, IO-SD0032PPWM)** (Unit: mm)



Dimensions

▶ **MODULES (IO-SD1616PI, IO-SD0808R, IO-SD0016R)** (Unit: mm)



Product Warranty

Warranty Statements are included with each unit at the time of purchase and are available at www.maplesystems.com.

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