PRO-iO2 I/O Extension Module Installation Guide

DR3-XT*****

Thank you for purchasing Pro-face's PRO-iO2 I/O extension module. To ensure correct use of this module's features, be sure to read this Installation Guide and the PRO-iO2 User Manual.

Safety Precautions

This guide contains a variety of safety markings related to the safe and correct operation of this module. Be sure to read this guide and any related manuals carefully to fully understand how to correctly use this module's features.

■ Safety Symbols

This guide uses the following symbols for important information related to the safe and correct operation of this module. Please pay attention to these symbols and follow the instructions given.

Safety symbols and their meanings:

⚠ DANGER	A hazardous situation that will result in serious injury or even death if instructions are not followed.

⚠ WARNING	A potentially hazardous situation that could result in serious injury or even death if instructions are not followed.

⚠ CAUTION	A potentially hazardous situation that could result in minor injury or equipment damage if instructions are not followed.

⚠ DANGER

- An emergency stop circuit and an interlock circuit should be constructed outside of this module. Constructing these circuits inside this module may cause a runaway situation, system failure, or an accident due to module failure.
- A breakdown or malfunction in the output relay can lead to the output signal remaining ON or OFF. To prevent a module malfunction, be sure to install an external circuit or device that will monitor the signal status and guarantee system operation safety.
- Systems using this module should be designed so that output signals which could cause a serious accident are monitored from outside this module.
- This module is designed to be a general-purpose device for general industries, and is neither designed nor produced to be used with equipment or systems in potentially life-threatening situations. If you are considering using this module for special uses, including nuclear power control devices, electric power devices, aerospace equipment, medical life support equipment, or transportation vehicles, please contact your local PRO-iO2 distributor.

⚠ WARNING

- Whenever installing, dismantling, wiring and conducting maintenance or inspections, be sure to disconnect power to module unit to prevent the possibility of electric shock or fire.
- Do not disassemble or remodel this module, since it may lead to an electric shock or fire.
- Do not use this module in an environment that contains flammable gases, since an explosion may occur.
- Do not use this module in an environment that is not specified in either this guide or the PRO-iO2 User Manual. Otherwise, an electric shock, fire, malfunction or other failure may occur.
- Because of the possibility of an electric shock or malfunction, do not touch any power terminals while the module is operating.

⚠ CAUTION

- Communication cables or I/O signal lines must be wired separately from the main circuit (High-voltage, high-current line), high-frequency lines such as inverter lines and power lines. Otherwise, a malfunction may occur due to noise.
- Be sure to install this module according to directions in this guide and the PRO-iO2 User Manual. Improper installation may cause the module to malfunction or fail.
- Be sure to wire this module according to directions in this guide and the PRO-iO2 User Manual. Improper wiring may cause a malfunction, failure or electric shock.
- Do not allow foreign substances, including chips, wire pieces, water, or liquids to enter inside this module's case. Otherwise, a malfunction, failure, electric shock or fire may occur.
- Be sure this module is operated only by personnel trained in control system programming and design.

⚠ CAUTIONS

- Do not touch this module with wet hands or wipe it with a wet cloth. Doing so may cause a fire or an electric shock.
- Be sure to install a fuse, breaker etc. in each of the power, input and output circuits. Failure to do so can lead to a fire if an overload occurs.
- Power and voltage specifications vary depending on the PRO-iO2 unit's model. Be sure to carefully read the directions in this guide and the PRO-iO2 User Manual before turning ON this module's power.
- When disposing off this module, be sure to do so according to your country's standards for industrial waste disposal.
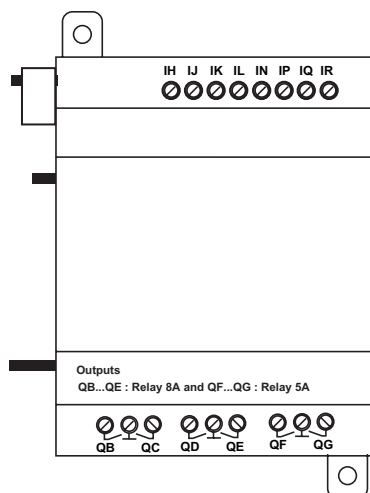
■ To Prevent PRO-iO2 I/O Extension Module Damage

- Do not store or operate this module in either direct sunlight or excessively dusty or dirty environments.
- Because this module is a precision instrument, do not store or use it in locations where excessive shocks or vibration may occur.
- Do not cover this module's ventilation holes, or operate it in an environment that may cause it to overheat.
- Do not operate this module in locations where sudden temperature changes can cause condensation to form inside the module.
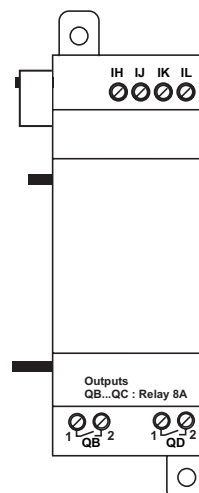- Do not use paint thinner or organic solvents to clean this module.

Package Contents

■ PRO-iO2 I/O Extension Module

Model DR3-XT141**

Model DR3-XT61**

IH IJ IK IL IN IP IQ IR

Outputs
QB...QE : Relay 8A and QF...QG : Relay 5A

QB QC QD QE QF QG

IH IJ IK IL

Outputs
QB...QC : Relay 8A

1 QB 2   1 QD 2

■ PRO-iO2 I/O Extension Module Installation Guide (this manual)

This module has been carefully packed, with special attention to quality. However, should you find anything damaged or missing, please contact your local PRO-iO2 distributor immediately.

UL/c-UL Application Notes

Modules DR3-XT61BD, DR3-XT141BD, DR3-XT61FU and DR3-XT141FU
are UL/c-UL listed products.
UL File No. E220851

      DR3-XT61BD   (UL Registration Model No.:DR3-XT61BD)
      DR3-XT141BD (UL Registration Model No.:DR3-XT141BD)
      DR3-XT61FU   (UL Registration Model No.:DR3-XT61FU)
      DR3-XT141FU (UL Registration Model No.:DR3-XT141FU)

The PRO-iO2 I/O extension module conforms to the following standards:
- **UL508 Electrical Control System for Industry**
- **CAN/CSA-C22.2, No.142-M1987 (c-UL listed) Electrical Control System for Industry**

<Notes>
Note the following when applying for UL recognition for equipment in which
the PRO-iO2 I/O extension module is installed.

- The PRO-iO2 I/O extension module is designed to be used only when installed in
  other equipment.

- If the module is installed in an area with no air conditioning system, be
  sure to install it in a vertical panel using a DIN rail or mounting holes.
  Also, be sure the module is installed so it is at least 100 mm away from any
  adjacent structures or devices. If these requirements are not met, the heat
  generated by the module's internal components may cause the module to fail
  to meet UL standard requirements.

- The power supply connected to the module must be a UL/c-UL approved
  Class 2 power supply unit or Class 2 transformer[*1].
  When the modules under load are operated with a single power supply, the
  amount of current consumption and full-load current of the modules must
  be within the rated load of the Class 2 power supply unit or Class 2 power
  supply transformer.
  Be aware that the number of points which can be turned ON simulta-
  neously may be limited, depending on the amount of load and the load
  current value.

CE Marking Notes

Modules DR3-XT61BD, DR3-XT141BD, DR3-XT61FU and DR3-XT141FU
are CE marked products that conform to EMC directives EN55011 Class B
EN61000-6-2 and EN61131-2.

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*1 Class 2 power supplies and Class 2 transformers should not exceed an output of 30V, and
at 8A or less, should not exceed 100VA. (National Electrical Code)*

1 PRO-iO2 I/O Extension Module Models

The PRO-iO2 I/O extension module's number of input/output points varies depending on the model number.

For how to identify your PRO-iO2 I/O extension module's model number

▼Reference▲ *"PRO-iO2 User Manual"*

Model	Voltage	No. of Input/ Output Points
DR3-XT61BD	24VDC	4/2
DR3-XT141BD	24VDC	8/6
DR3-XT61FU	100VAC to 240VAC	4/2
DR3-XT141FU	100VAC to 240VAC	8/6

2 When Connecting Modules

⚠ CAUTION

Be sure to follow the connection instructions given in the module's Installation Guide and in the User Manual. Connecting modules with incompatible electrical specifications may lead to a module malfunction or breakdown.

When connecting a main module to an extension module, be sure the extension module's model number is DR3-****** and has the same power supply voltage rating (AC or DC) as the main module.

The figures given below are the number of input/output points available when the I/O extension module is connected to the PRO-iO2 main module.

Model	DR3-XT61BD	DR3-XT141BD	DR3-XT61FU	DR3-XT141FU
DR2-B121BD	-	-	-	-
DR2-B201BD	-	-	-	-
DR2-D101BD	-	-	-	-
DR2-D201BD	-	-	-	-
DR2-B121FU	-	-	-	-
DR2-B201FU	-	-	-	-
DR2-D101FU	-	-	-	-
DR2-D201FU	-	-	-	-
DR3-B101BD	10/6	14/10	-	-
DR3-B261BD	20/12	24/16	-	-
DR3-B101FU	-	-	10/6	14/10
DR3-B261FU	-	-	20/12	24/16

3 Extension Module Part Names
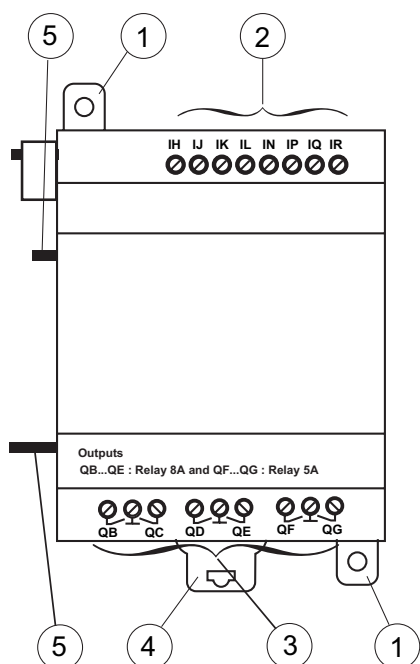
(1) **Module attachment tab (Retracting type)**

Used to fasten the module directly to the panel with a screw.

(2) **Input terminals**

Depending on the model, the I/O extension modules have 4 or 8 input terminals.

(3) **Relay output terminals**

Depending on the model, the I/O extension modules have 2 or 6 output terminals.
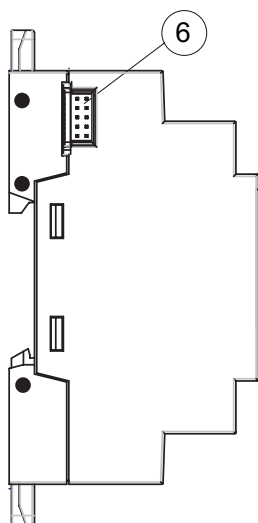
(4) **DIN Rail detachment hook**

Used when detaching the main module from a DIN Rail.

(5) **Guide pin**

Used as a guide when the I/O extension module is connected to the main module (PRO-iO2).

(6) **Main module connector**

Connected to the main module (PRO-iO2).

4   Dimensions
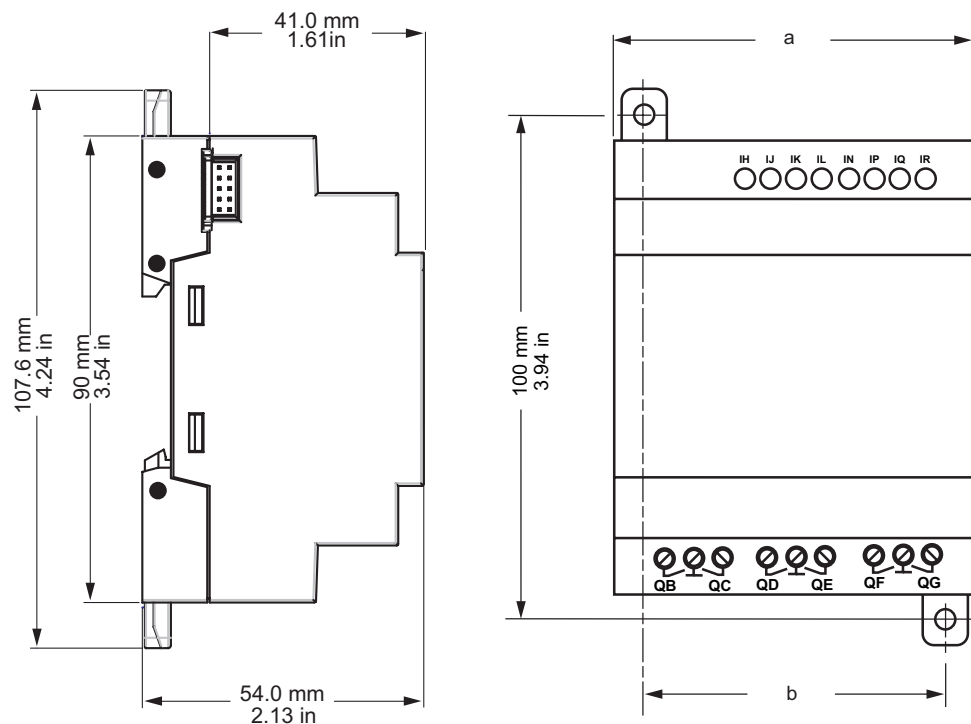
External dimensions for "a" and "b" vary depending on the model, as shown below:

	DR3-XT141**	DR3-XT61**
a	72.0 mm [2.83 in.]	35.5 mm [1.40 in.]
b	60.0 mm [2.36 in.]	25.0 mm [0.98 in.]

Note: **When attaching the PRO-iO2 I/O extension module to a panel, extend the module's attachment tabs. When attaching the PRO-iO2 I/O extension module to a DIN rail, retract the module's attachment tabs.**

5 Specifications

■ General

Model	DR3-XT***BD	DR3-XT***FU
Rated Voltage	24VDC	100VAC to 240VAC
Allowable Voltage Range	19.2VDC to 30VDC	85VAC to 264VAC
Rated Frequency	-	50/60Hz
Allowable Frequency Range	-	47Hz to 63Hz
Allowable Voltage Drop	1ms or less	10ms or less
Power Consumption	When connected with DR3-B101BD 8W When connected with DR3-B261BD 10W	When connected with DR3-B101FU 12VA When connected with DR3-B261FU 17VA
Insulation Endurance	1500VAC 5mA for 1 minute (Between output terminals and DIN rail)	
Insulation Resistance	500VDC 100MΩ or higher (Between output terminals and DIN rail)	
In-Rush Current	30A or less	
Ambient Temperature	0ºC to 55ºC	
Ambient Humidity	95%RH or less (No condensation) wet bulb tempreture: 39ºC or less	
Atmospheric Pressure (Operating Altitude)	800hPa to 1114hPa (At 2000m or less)	
Pollution Level	Level2	

■ DC Input Module (DR3-XT61BD, DR3-XT141BD)

Input Voltage		24VDC
Rated Current		4mA
Input Impedance		7.4kΩ (At ON)
No. of Input Points		4 Points (DR3-XT61BD)
		8 Points (DR3-XT141BD)
Operating Voltage	ON Voltage	15VDC or more (2.20mA or more)
	OFF Voltage	5VDC or less (0.75mA or less)
Input Delay (Letters in parentheses indicate filter setting)	OFF->ON	0.3ms (FAST)/3ms (SLOW)[1]
	ON->OFF	0.5ms (FAST)/5ms (SLOW)[1]
Input Signal Display		Shown on main unit LCD
Insulation Method		No insulation between input points, or between input points and power supply

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1 The delay time varies depending on the input filter setting. This setting is common for all points.

■ AC Input Module (DR3-XT61FU, DR3-XT141FU)

Input Voltage	100VAC to 240VAC	
Rated Frequency	50/60Hz	
Rated Current	0.6mA	
Input Impedance	350kΩ	
No. of Input Points	4 Points (DR3-XT61FU)	
	8 Points (DR3-XT141FU)	
Operating Voltage	**ON Voltage**	79VAC or more (0.1750mA or more)
	OFF Voltage	40VAC or less (0.05mA or less)
Input Delay	**OFF->ON**	50ms
	ON->OFF	50ms
Input Signal Display	Shown on main unit LCD	
Insulation Method	No insulation between input points, or between input points and power supply	

■ Relay Output

Output	QB to QE	QF, QG
Rated Output Voltage	5VDC to 30VDC, 24VAC to 250VAC	
No. of Output Points	2 Points (DR3-XT61**)	
	6 Points (DR3-XT141**)	
Load Current	8A/1 Point	5A/1 Point
Common	Independent Common[1]	
Mechanical Lifetime	10 million operations	
Electrical Lifetime	100,000 operations at contact rated load	
Min. Open/Close Load	12V, 10mA	
Built-in Fuse	None	
Voltage Endurance	4kV (IEC60947-1, IEC60664-1)	
Output Signal Display	Shown on main module LCD	
Short Circuit Protection	None	
Overvoltage and Overcurrent Protection	None	
Output Delay	**OFF->ON**	10ms or less
	ON->OFF	5ms or less

*1With DR3-XT141** modules, QB-QC, QD-QE, and QF-QG use a single common line.*

6 Installation

■ Direct Installation

1. Remove the PRO-iO2 module's right-side protective cover and connect the two modules.
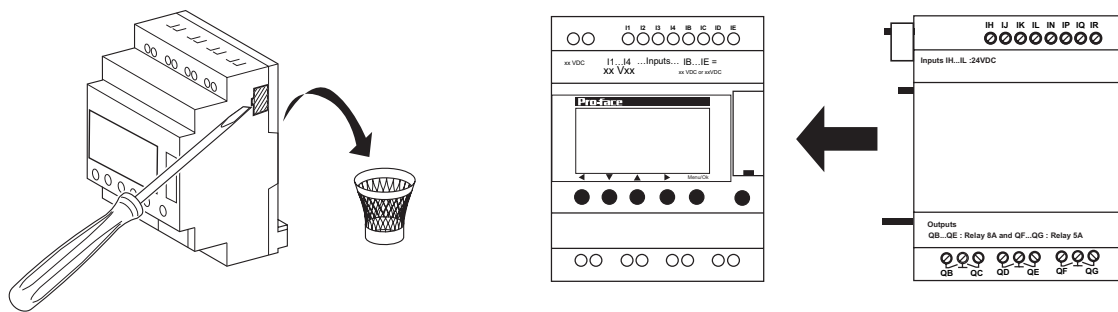
2. Create two attachment screw holes using the dimensions shown below, and position the module so that its module attachment tabs (Top and bottom) align with the attachment screw holes. Secure the module in place using M4 attachment screws, using a torque of 1 N•m.

Unit: mm [in.]
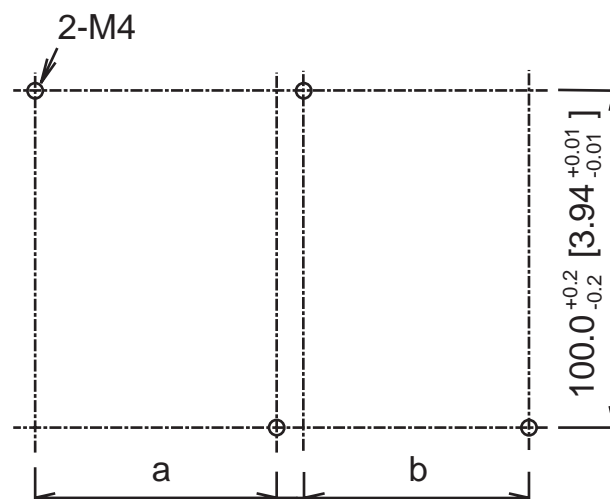
Dimensions for "a" and "b" in the diagram vary depending on the model, as shown in the table below:

	PRO-iO2		I/O Extension Module	
	DR3-B101**	DR3-B261**	DR3-XT61**	DR3-XT141**
a	59.9 $^{+0.2}_{-0.2}$ mm [2.36 $^{+0.01}_{-0.01}$ in.]	113.3 $^{+0.2}_{-0.2}$ mm [4.46 $^{+0.01}_{-0.01}$ in.]	-	-
b	-	-	25.0 $^{+0.2}_{-0.2}$ mm [0.98 $^{+0.01}_{-0.01}$ in.]	60.0 $^{+0.2}_{-0.2}$ mm [2.36 $^{+0.01}_{-0.01}$ in.]

When installing the module with an orientation other than vertical (i.e. horizontal, etc.) be sure to install a fan, as shown in the right-side figure.
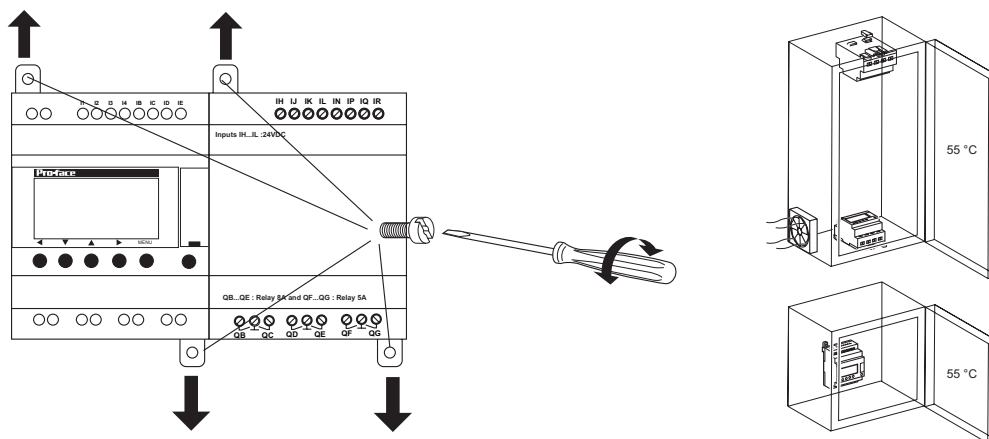
■ DIN Rail Installation

1. Remove the PRO-iO2 module's right-side protective cover. Refer to the previous section for cover removal procedures and cautions.

   ▼Reference▲ *"Direct Installation"*

2. Connect the PRO-iO2 module and the I/O extension modules individually to the DIN rail. Confirm that the DIN rail hooks are fastened in place and the modules are held securely. For module positioning information,

   ▼Reference▲ *"PRO-iO2 User Manual "*

**Installation**   **Removal**

7.5[0.30] or more
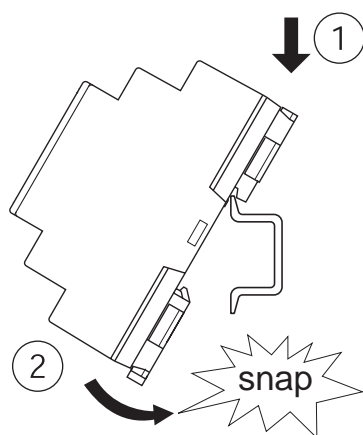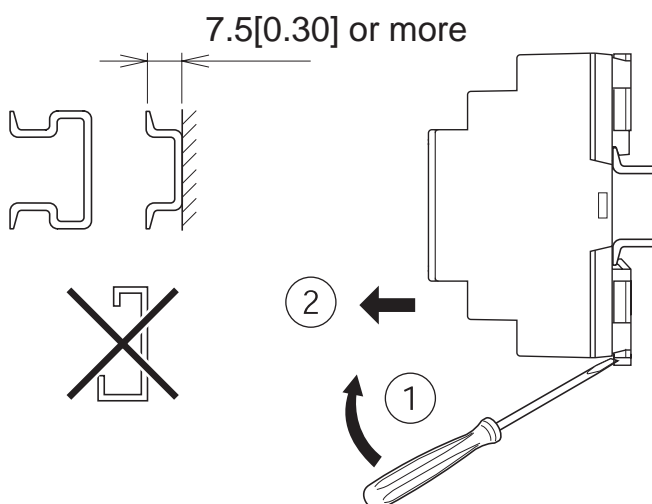
Note: **When attaching a PRO-iO2 I/O extension module to a panel, extend the unit's attachment tabs. When attaching a PRO-iO2 I/O extension module to a DIN rail, retract the PRO-iO2 I/O extension module's attachment tabs.**

3. Connect the I/O extension module to the PRO-iO2 module's connector, as shown below. For procedures and cautions, refer to the previous section.
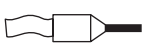
▼Reference▲ *"Direct Installation"*
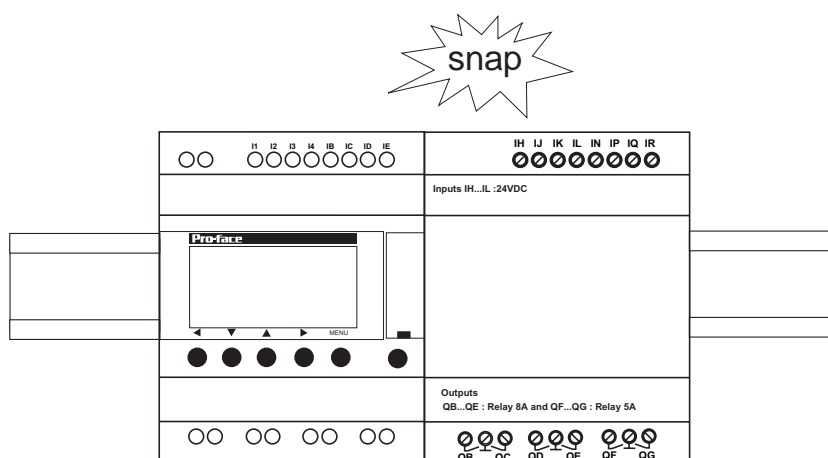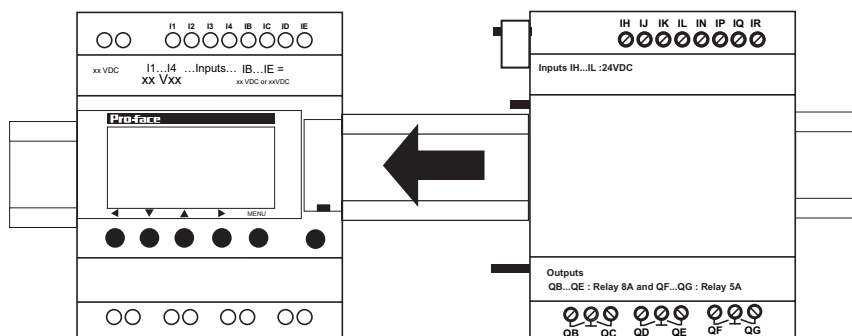
7 Wiring

■ Wiring

The following types of wires can be used:

Wire Type	Pin-type Terminal		Lay wire	Simple Wires	
mm^2	0.25 to 2.5	0.25 to 0.75	0.2 to 2.5	0.2 to 2.5	0.2 to 1.5
AWG[1]	24 to 14	24 to 18	25 to 14	25 to 14	25 to 16

1 AWG stands for "American Wire Gauge" and indicates conductor thickness.

> **Important**
> - **Strip the wire's plastic covering to expose approximately 6.8mm of wire.**
> - **When using a lay wire, Pro-face recommends you install a blade-type or pin-type terminal connector.**
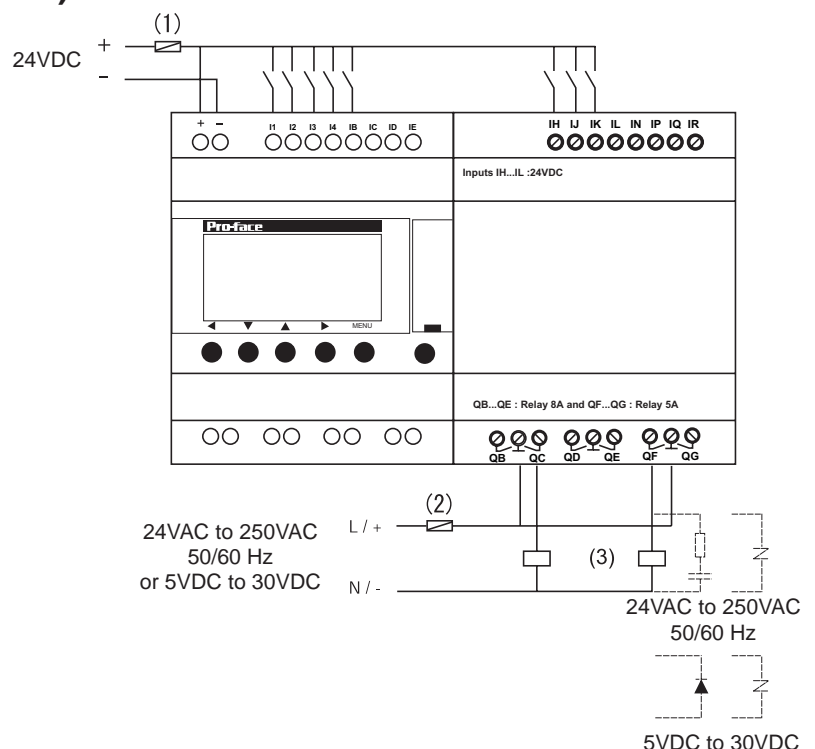> - **The torque required to secure a wire to a terminal is 0.5 N•m.**

⚠ CAUTION

Power and voltage specifications may vary depending on your PRO-iO2 module's model. Be sure to carefully read this Installation Guide and the PRO-iO2 User Manual before turning the module's power ON.

■ DC Power Module (DR3-****BD)

(1) 1A Fuse
   (Fast-break type)
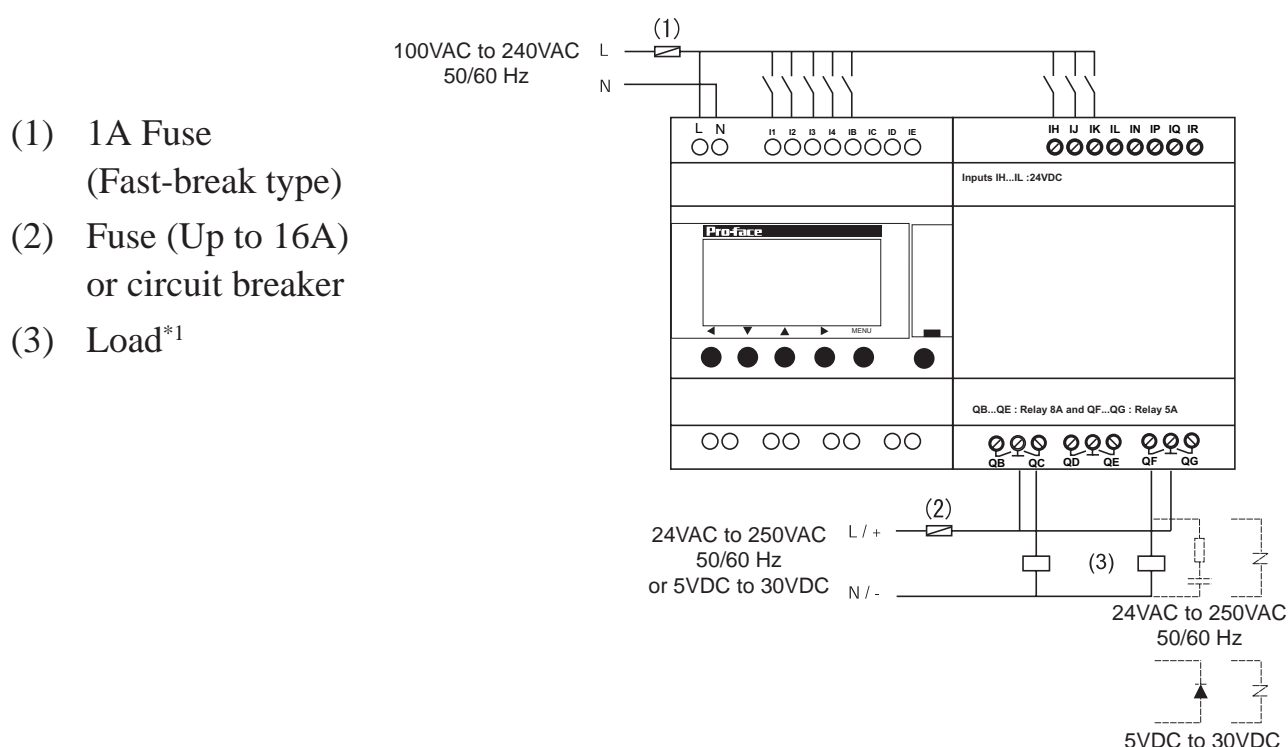
(2) Fuse (Up to 16A)
   or circuit breaker

(3) Load[1]

1 When operating devices with inductance loads, such as magnets and valves, Pro-face recommends you use a diode, surge killer or varistor.

■ AC Power Module (DR3-****FU)

> ### ⚠ WARNING
>
> ***There are two AC input terminals: L (Live, non-earthed), and N (Neutral, earthed). Be sure to connect the L terminal to the power supply's non-earthed terminal, and the N terminal to the power supply's earthed terminal.***
>
> ***If there is a fault in the power supply (E.g., the AC line and the earth line are shorted), the fuse connected to the L terminal will break and stop the flow of power.***

(1)   1A Fuse
       (Fast-break type)

(2)   Fuse (Up to 16A)
       or circuit breaker

(3)   Load*1

1 When operating devices with inductance loads, such as magnets and valves, Pro-face recommends you use a diode, surge killer or varistor.

> ### Note
> Please be aware that Digital Electronics Corporation shall not be held liable by the user for any damages, losses, or third party claims arising from the use of this product.