

# SF2N 系列无电源 I/O 扩展模块用户手册

感谢您购买可编程控制器（PLC），在使用我公司 SF2N 系列 PLC 产品前，请您仔细阅读本手册，以便更清楚地掌握产品的特性，正确地进行安装使用。更安全地应用，充分利用本产品丰富的功能。

## 注意：

在开始使用之前，请仔细阅读操作指示、注意事项，以减少意外的发生。负责产品安装、操作的人员必须经严格培训，遵守相关行业的安全规范，严格遵守本手册提供的相关设备注意事项和特殊安全指示，按正确的操作方法进行设备的各项操作。

## 1 产品介绍

### 1.1 外形结构

I/O 扩展模块的外形结构如下图所示。

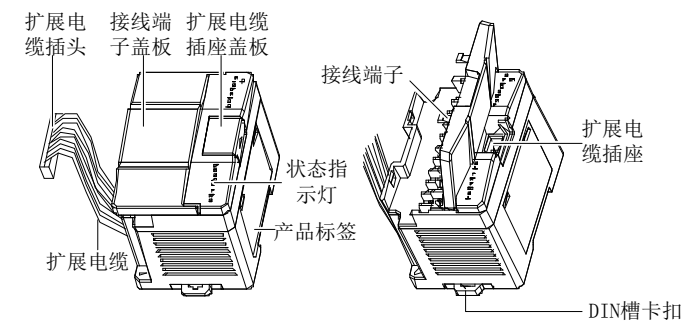


图 1-1 I/O 扩展模块的外形结构与部件

### 1.2 型号说明

产品型号说明如图 1-2 所示。

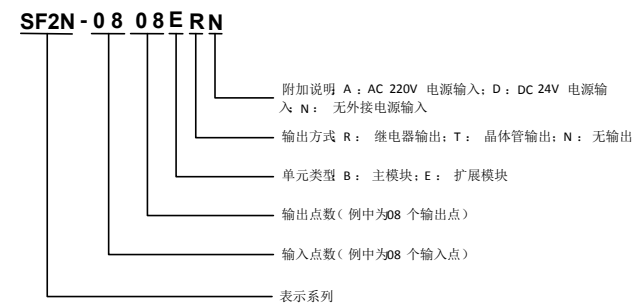


图 1-2 PLC 型号说明

## 1.3 端子介绍

SF2N-0808ERN、SF2N-0808ETN

引脚标识	功能说明
S/S	提供给用户进行输入方式的选择，与 +24V 连接表示支持漏型输入方式，与 COM 连接表示支持源型输入方式
●	空端子，作隔离用，请不要接线
X0~X7	开关量信号输入端子，与 COM 端配合使用产生输入信号
Y0~Y7、COM0	控制输出端子

SF2N-0800ENN

引脚标识	功能说明
S/S	提供给用户进行输入方式的选择，与 +24V 连接表示支持漏型输入方式，与 COM 连接表示支持源型输入方式
●	空端子，作隔离用，请不要接线
X0~X7	开关量信号输入端子，与 COM 端配合使用产生输入信号

SF2N-0008ERN、SF2N-0008ETN

引脚标识	功能说明
●	空端子，作隔离用，请不要接线
Y0~Y7、COM0	控制输出端子

SF2N-0016ERN、SF2N-0016ETN

引脚标识	功能说明
●	空端子，作隔离用，请不要接线
Y0~Y7、COM0 Y10~Y17、COM1	控制输出端子

SF2N-1600ENN

引脚标识	功能说明
S/S	提供给用户进行输入方式的选择，与 +24V 连接表示支持漏型输入方式，与 COM 连接表示支持源型输入方式
●	空端子，作隔离用，请不要接线
X0~X7、 X10~X17	开关量信号输入端子，与 COM 端配合使用产生输入信号

## 2 产品规格

表 2-1 I/O 扩展模块类型及配置

型号	电源电压 Vac	输入/输出点数	输出类型
SF2N-0800ENN	/	8/0	/
SF2N-0808ERN	/	8/8	继电器
SF2N-0808ETN	/	8/8	晶体管
SF2N-0008ERN	/	0/8	继电器
SF2N-0008ETN	/	0/8	晶体管
SF2N-1600ENN	/	16/0	/
SF2N-0016ERN	/	0/16	继电器
SF2N-0016ETN	/	0/16	晶体管

表 2-2 I/O 扩展模块的电气绝缘规格

名称	测试条件
用户输出（继电器型）对扩展母线	能承受 50Hz、有效值为 2830Vac 的交流电压或等效直流电压 1 分钟，无击穿或飞弧现象；漏电流 ≤ 5mA
用户输入对用户输出（继电器型）	能承受 50Hz、有效值为 2830Vac 的交流电压或等效直流电压 1 分钟，无击穿或飞弧现象；漏电流 ≤ 5mA
用户输入端口与扩展母线	按超低电压电路要求设计

表 2-3 I/O 扩展模块电源要求

型号	5Vdc/GND	24Vdc/GND	24Vdc/COM
SF2N-0800ENN	85mA	0	50mA
SF2N-0808ERN	70mA	50mA	50mA
SF2N-0808ETN	170mA	0	50mA
SF2N-0008ERN	65mA	50mA	0
SF2N-0008ETN	165mA	0	0
SF2N-1600ENN	70mA	0	60mA
SF2N-0016ERN	70mA	100mA	0
SF2N-0016ETN	170mA	0	0

备注：  
1. 5Vdc/GND：扩展模块的逻辑电路工作电源，由扩展母线提供  
2. 24Vdc/COM：输入状态检测电源，由 S/S 端子引入  
3. 24Vdc/GND：扩展模块的继电器电路工作电源，由扩展母线提供

扩展模块接入主模块前，必须计算扩展模块的各路电源所耗电流之和，保证各路电源电流小于主模块对应电源能提供的输出电流，避免主模块电源过载。

## 3 输入特性

### 3.1 内部等效输入电路

I/O 扩展模块需外部接入用户开关状态检测电源（24Vdc），输入电路的内部等效电阻约 4.3kΩ，信号的检测采用双向光耦，用户可采用源型或漏型，只需接入干接点开关信号即可，若要

连接有源晶体管传感器的输出信号，需按集电极开路输出方式连接。I/O 扩展模块的内部等效电源及输入信号接线与主模块输入电路相似，如图 3-1 所示。

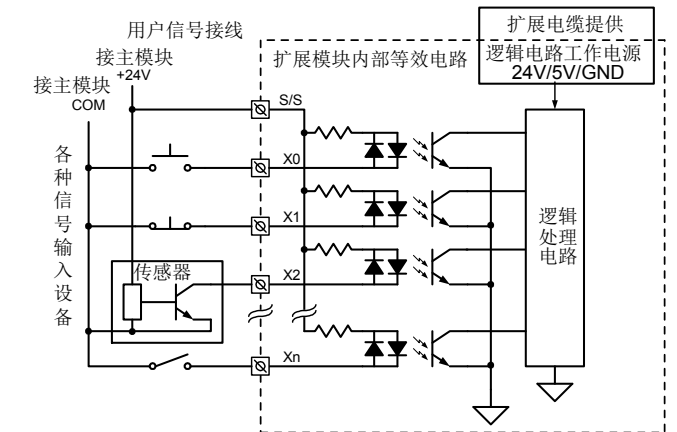


图 3-1 I/O 扩展模块内部等效输入电路

### 3.2 输入输出信号状态指示

用户输入端子状态可通过输入端子状态 LED 灯指示，当输入端口闭合（ON 状态）时，指示灯点亮，否则指示灯熄灭。

输出端口的状态由输出状态 LED 指示，当输出端口为闭合（ON）状态（Yn 与 COMn 之间呈闭合状态），指示灯点亮，否则熄灭，如图 3-2 所示。

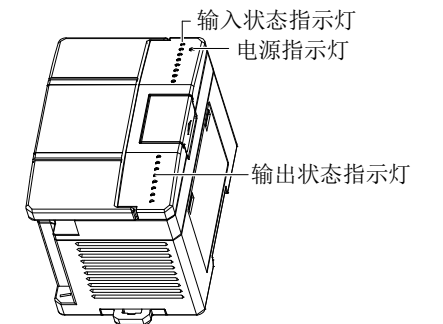


图 3-2 I/O 扩展模块状态指示灯

## 4 输出特性

### 4.1 继电器型输出端口电气规范

项目		继电器输出端口
外部电源		250Vac, 30Vdc 以下
电路绝缘		继电器机械绝缘
动作指示		继电器输出触点闭合 LED 点亮
开路时漏电流		/
最小负载		2mA/5Vdc
最大输出电流	电阻负载	2A/1 点；共 COM 端的 8 点总电流小于 8A
	感性负载	220Vac, 80VA
	电灯负载	220Vac, 100W

项目		继电器输出端口
响应时间	OFF→ON	最大 20ms
	ON→OFF	最大 20ms

## 4.2 晶体管型输出端口电气规范

表 4-2 晶体管型输出端口电气规范

项目		晶体管输出端口
外部电源		5~24Vdc
电路绝缘		光耦绝缘
动作指示		光耦被驱动时 LED 点亮
开路时漏电流		小于 0.1mA/30Vdc
最小负载		5mA (5~24Vdc)
最大输出电流	电阻负载	3A/1 点
		8A/4 点
		1.6A/8 点
		8 点以上每增加 1 点允许总电流增加 0.1A
电感性负载	24Vdc, 7.2W	
	电灯负载	24Vdc, 1.5W
响应时间	OFF→ON	最大 0.5ms (100mA/24Vdc)
	ON→OFF	最大 0.5ms (100mA/24Vdc)

## 4.3 输出连接示例

图 4-1 所示为 SF2N-1614BRA 加一个 SF2N-0808ERN 的连接方式。不同的输出组可接入不同的信号电压回路，有的输出组（如 Y0-COM0）可连接在 24Vdc 回路，且由本控制器的 24V/COM 供电；有的输出组（如 Y1—COM1）可连接在 5Vdc 低电压信号回路；而其它输出组（如 Y2~Y7）可连接在 220Vac 交流电压信号回路。即不同的输出组可工作于不同的电压等级回路。

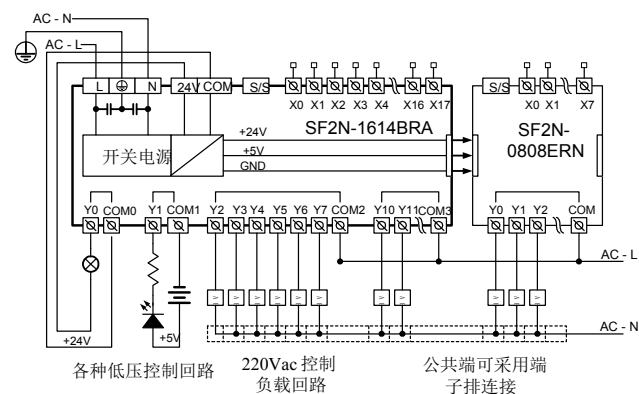


图 4-1 SF2N-1614BRA 与 SF2N-0808ERN 的电气连接示例

## 5 扩展连接

### 5.1 扩展母线连接

在主模块未通电的情况下，先卸下主模块右端的扩展电缆插口小盖板，再将扩展模块的母线电缆头插入插口内的电缆座。若接入多个扩展模块，可依次逐个连接。请注意扩展电缆插口小盖板为可脱落零件，拆卸时防止丢失。

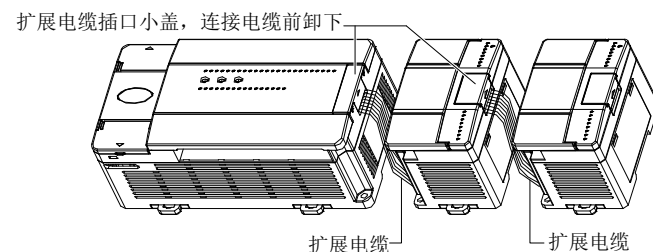


图 5-1 扩展模块级联方法

### 5.2 扩展模块编址

SF2N 系列 PLC 对接入的扩展模块可以自动辨识，自动顺序编址，无需用户干预。

自动编址操作在上电正常后即进行一次，此后运行中各扩展模块的地址保持不变。在 PLC 运行期间，不可将 I/O 扩展模块、特殊功能模块接入或拔掉，以免损坏 PLC，或导致运行异常。

I/O 点编号采用八进制编码方案，编号如：

0, 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, ...，没有数字 8, 9。

主模块及 I/O 扩展模块的输入端口编号为：

X0, X1, X2, ...X7, X10, X11, ...，输出端口编号为：Y0, Y1, Y2, ...Y7, Y10, Y11, ...，编号依此顺序排列。

点数编号以 8 为一组，不足 8 点的部分将被空缺。

例如：SF2N-1410BRA 模块，输入点数为 14 点，编号为 X0~X15，编号为 X16~X17 的端子将不存在，后续扩展模块的 X 端子从 X20 开始编号；同理，输出点数为 10 点，编号为 Y0~Y11，编号为 Y12~Y17 的端子将不存在，后续扩展模块的 Y 端子将从 Y20 开始编号。

I/O 扩展模块依据与主模块的扩展连接电缆的连接顺序，对应 X 端子和 Y 端子依次递增编号。

主模块与 I/O 扩展模块的端口逻辑编号示例如下：

SF2N-1410BRA	SF2N-0808ETN	SF2N-0008ERN	SF2N-0800ENN	SF2N-0008ETN
X0-X15	X20-X27		X30-X47	
Y0-Y11	Y20-Y27	Y30-Y37		Y40-Y47

## 6 安装

### 6.1 尺寸规格

I/O 扩展模块包括 8 种型号：

SF2N-0800ENN、SF2N-0808ERN、SF2N-0808ETN、SF2N-0008ERN、SF2N-0008ETN、SF2N-1600ENN、SF2N-0016ERN 和 SF2N-0016ETN。它们的外形尺寸与安装孔位尺寸如图 6-1 所示。

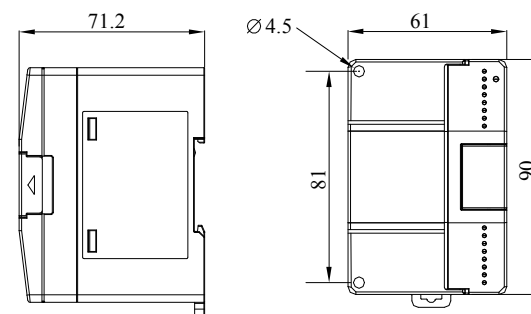


图 6-1 I/O 扩展模块外形尺寸与安装孔位尺寸（单位：mm）

### 6.2 安装方法

安装方法与主模块的方法的相同，具体描述请参考《SF2N 系列可编程控制器用户手册》。安装示意图如图 6-2 所示。

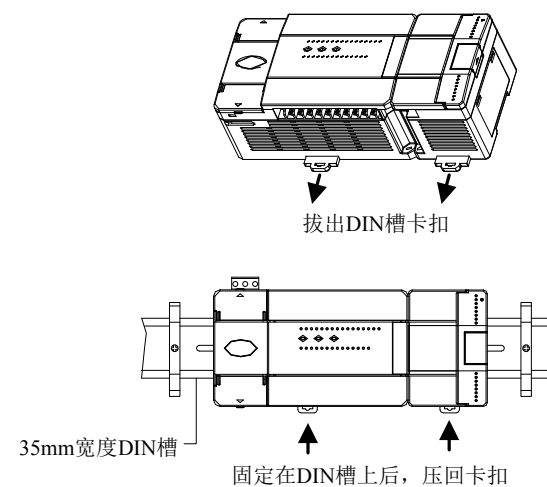


图 6-2 采用 DIN 槽安装固定

## 用户须知

1. 保修范围指可编程控制器本体。
2. **保修期为十八个月**，保修期内正常使用情况下，产品发生故障或损坏，我公司免费维修。
3. **保修期起始时间为产品制造出厂日期**，机器编码是判断保修期的唯一依据，无机器编码的设备按过保处理。
4. 即使在保修期内，如发生以下情况，将收取一定的维修费用：
  - 不按用户手册操作导致的机器故障；
  - 由于火灾、水灾、电压异常等造成的机器损坏；
  - 将可编程控制器用于非正常功能时造成的损坏。
5. 服务费按实际费用计算，如另有合同，以合同优先的原则处理。
6. 请您务必保留此卡，并在保修时出示给维修单位。
7. 如您有问题可与代理商联系，也可直接与我公司联系。

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# SF2N Series PLC Passive I/O Extension Module User Manual

Please allow us to congratulate you on choosing an programmable logic controller (PLC). Before using the SF2N series PLC product, please carefully read this book so as to fully understand its characteristics, use it safely and bring its functions into full play.

## Note:

To reduce the chance of accident, please carefully read the operating instructions and safety precautions prior to use. Only adequately trained personnel shall install or operate this product. In operation, strict compliance with applicable safety rules in the industry, the operating instructions and safety precautions in this book is required.

## 1 Introduction

### 1.1 Appearance And Structure

The appearance and structure of I/O extension module are shown in the following figure.

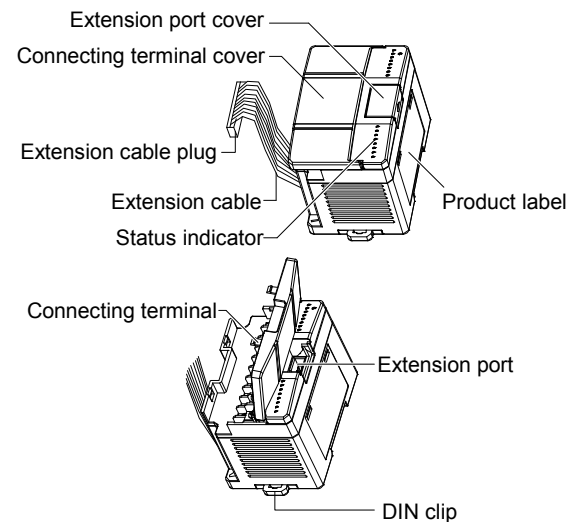


Figure 1-1 Appearance and structure

### 1.2 Model Designation

The model designation is shown in the following figure.

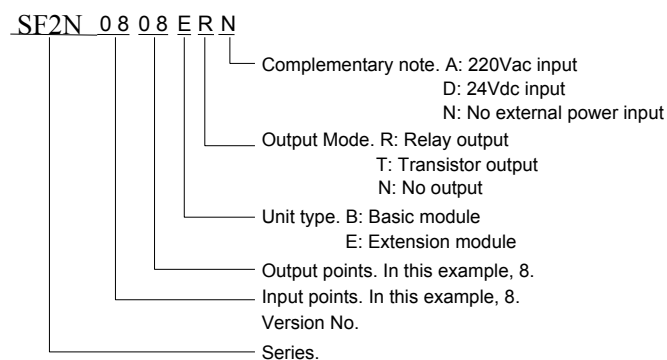


Figure 1-2 Model designation

## 1.3 Terminal Introduction

SF2N-0808ERN, SF2N-0808ETN

Pin	Function
S/S	Input mode selection: sink mode when connected with +24V, or source mode when connected with COM
•	Null, for isolation. Leave it suspended
X0 ~ X7	Digital input, work with COM to generate input signal
Y0 ~ Y7, COM0	Digital output

SF2N-0800ENN

Pin	Function
S/S	Input mode selection: sink mode when connected with +24V, or source mode when connected with COM
•	Null, for isolation. Leave it suspended
X0 ~ X7	Digital input, work with COM to generate input signal

SF2N-0008ERN, SF2N-0008ETN

Pin	Function
•	Null, for isolation. Leave it suspended
Y0 ~ Y7, COM0	Digital output

SF2N-0016ERN, SF2N-0016ETN

Pin	Function
•	Null, for isolation. Leave it suspended
Y0 ~ Y7, COM0	Control output terminal
Y10 ~ Y17, COM1	Control output terminal

SF2N-1600ENN

Pin	Function
S/S	Input mode selection: sink mode when connected with +24V, or source mode when connected with COM
•	Null, for isolation. Leave it suspended
X0 ~ X7, X10 ~ X17	Digital input, work with COM to generate input signal

## 2 Power Supply

Table 2-1 I/O extension module type and configuration

Type	Power supply voltage Vac	Number of I/O channels	Output type
SF2N-0800ENN	-	8/0	-
SF2N-0808ERN	-	8/8	Relay
SF2N-0808ETN	-	8/8	Transistor
SF2N-0008ERN	-	0/8	Relay
SF2N-0008ETN	-	0/8	Transistor
SF2N-1600ENN	/	16/0	/
SF2N-0016ERN	/	0/16	Relay
SF2N-0016ETN	/	0/16	Transistor

Table 2-2 I/O extension module insulation specifications

Name	Test condition
User output (relay) to extension bus	Capable of standing one minute of 2830Vac (50Hz) or RMS current with no breakdown or flashover. Leakage current $\leq 5\text{mA}$
User input to user output (relay)	Capable of standing one minute of 2830Vac (50Hz) or RMS current with no breakdown or flashover. Leakage current $\leq 5\text{mA}$
User input terminal and extension bus	Designed by following the SELV circuit requirements

Table 2-3 I/O extension module power requirement

Model	5Vdc/GND	24Vdc/GND	24Vdc/COM
SF2N-0800ENN	85mA	0	50mA
SF2N-0808ERN	70mA	50mA	50mA
SF2N-0808ETN	170mA	0	50mA
SF2N-0008ERN	70mA	50mA	0
SF2N-0008ETN	170mA	0	0
SF2N-1600ENN	85mA	0	50mA
SF2N-0016ERN	70mA	50mA	0
SF2N-0016ETN	170mA	0	0

Note:

- 5Vdc/GND: working power for logic circuit of extension module, provided by the extension bus
- 24Vdc/COM: input state detection power, through S/S terminal
- 24Vdc/GND: working power for relay circuit of extension module, provided by the extension bus

Before connecting the extension module to the basic module, calculate the total current of all extension module circuits. Make sure that the currents are smaller than the capacity of the corresponding power supply at the basic module to avoid overloading the basic module.

## 3 Input Features

### 3.1 Internal Equivalent Input Circuit

The extension module needs external power supply (+24Vdc) for detecting user switch status. The internal equivalent resistance of the input circuit is about 4.3k $\Omega$ , and bi-directional photo coupler is used for signal detection. You can use either sink mode or source mode, so long as dry contact digital signal is input. To connect to the output of active transistor sensor, you need to use the open collector output mode. The wiring of I/O extension module internal equivalent power and inputs is the same as those of the basic module, as shown in Figure 3-1.

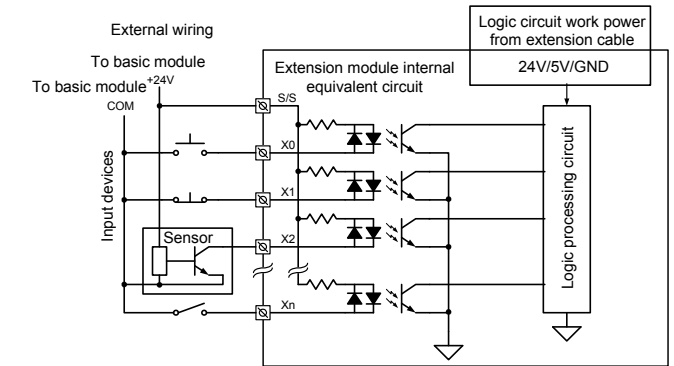


Figure 3-1 Internal equivalent input circuit

## 3.2 I/O Signal State Indicator

The input status indicator displays the status of input terminal. The indicator turns on when the input is in the ON state. Otherwise, the indicator is off.

The output status indicator displays the status of output terminal. The indicator turns on when the output is in the ON state (Yn is connected with COMn). Otherwise, the indicator is off. See Figure 3-2.

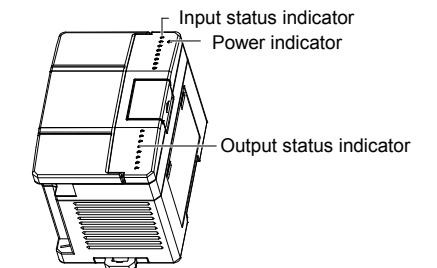


Figure 3-2 Status indicator

## 4 Output Features

### 4.1 Relay Output Electric Specifications

Table 4-1 Relay output terminal electric specifications

Item	Relay output terminal	
External power	Below 250Vac, 30Vdc	
Circuit isolation	By relay	
Operation indication	Relay output contacts closed, LED on	
Leakage current of open circuit	-	
Min. load	2mA/5Vdc	
Max. output current	Resistive load	2A/1 point, total current of 8 points (sharing one COM) < 8A
	Inductive load	220Vac, 80VA
	Illumination	220Vac, 100W
Response time	OFF→ON	Max.: 20ms
	ON→OFF	Max.: 20ms

### 4.2 Transistor Output Electric Specifications

Table 4-2 Transistor output electric specifications

Item	Transistor output terminal
External power	5 ~ 24Vdc
Circuit isolation	Photo coupler

Item		Transistor output terminal
Operation indication		LED is on when photo coupler is driven
Leakage current of open circuit		< 0.1mA/30Vdc
Min. load		5mA (5 ~ 24Vdc)
Max. output current	Resistive load	3A/1 point
		8A/4 points
		1.6A/8 points
Above 8 points, total current increases 0.1A at each point increase		
	Inductive load	24Vdc, 7.2W
	Illumination	24Vdc, 1.5W
Response time	OFF→ON	Max. 0.5ms (100mA/24Vdc)
	ON→OFF	Max. 0.5ms (100mA/24Vdc)

### 4.3 Output Connection Example

Connecting an SF2N-0808ERN to an SF2N-1614BRA is shown in Figure 4-1. Different output groups can be connected to different signal voltage circuits. For example, output group Y0-COM0 can be connected to the 24Vdc circuit, powered by the local 24V/COM; Y1-COM1, to the 5Vdc circuit; others, like Y2 ~ Y7, to the 220Vac circuit. That is, different output groups can work at circuits of different voltages.

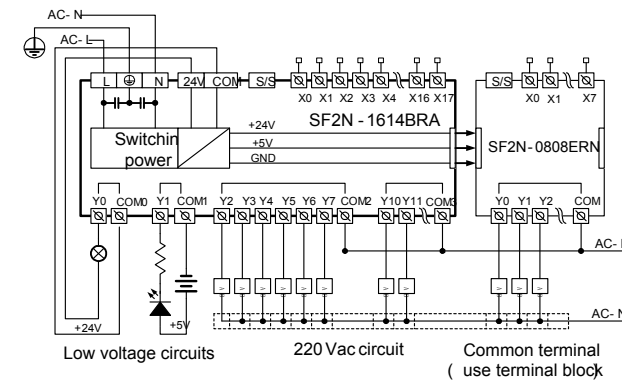


Figure 4-1 Connecting SF2N-1614BRA & SF2N-0808ERN

## 5 Extension Connection

### 5.1 Extension Bus Connection

Before power-on, remove the cover of the extension port at the right of the basic module. Insert the bus plug into the extension port. If there are more than one extension modules, connect them one by one. Note that the extension port cover is detachable. Do not have it lost.

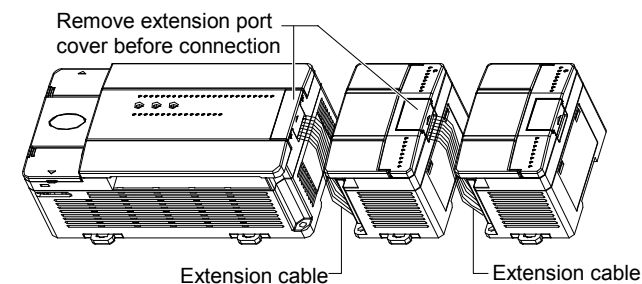


Figure 5-1 Cascade connection of extension module

### 5.2 Extension Module Addressing

SF2N series PLC can identify the connected extension module and address them by connection order automatically. The extension module address is set upon the first power on and remains unchanged. Therefore do not insert or remove the extension module during operation, otherwise abnormalities may occur, or PLC may be damaged. The addresses of I/O channels are in the octal system, numbered as 0, 1, . . . , 7, 10, 11 and so on, without numbers 8 and 9.

The input terminals of all modules (basic and extension) are numbered as X0, X1, X2, . . . X7, X10, X11 and so on, while the output terminals are numbered as Y0, Y1, Y2, . . . Y7, Y10, Y11 and so on. Every eight channels form one group. If the remaining channels are less than 8, the unused numbers will be left unassigned.

For example, in module SF2N-1410BRA, its 14 input channels are numbered as X0 ~ X15, there will be no channels numbered as X16 or X17, because the input channels of the next extension module will start from X20. Likewise, if the module has 10 output channels that are numbered as Y0 ~ Y11, there will be no channels numbered as Y12 ~ Y17, because the output channels of the next extension module will start from Y20.

The extension modules' I/O channels are numbered in accordance with the module's connection order. See the following for a numbering example.

SF2N-1410BRA	SF2N-0808ETN	SF2N-0008ERN	SF2N-0800ENN	SF2N-0008ETN
X0~X15	X20~X27	X30~X37	X30~X47	
Y0~Y11	Y20~Y27	Y30~Y37		Y40~Y47

## 6 Installation

### 6.1 Sizes

There are eight I/O extension module models: SF2N-0800ENN, SF2N-0808ERN, SF2N-0808ETN, SF2N-0008ERN, SF2N-0008ETN, SF2N-1600ENN, SF2N-0016ERN and SF2N-0016ETN. Their sizes and installation holes are shown in Figure 6-1.

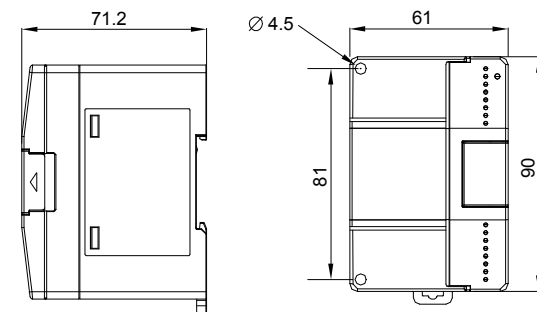


Figure 6-1 I/O extension module sizes and installation holes

### 6.2 Installation Method

The installation method of extension module is the same as that of the basic module. See SF2N PLC User Manual for details. See Figure 6-2 for the installation diagram.

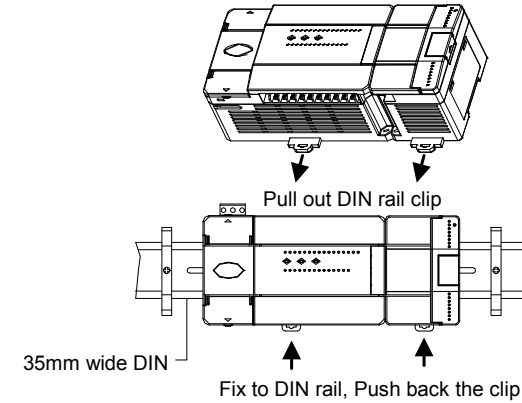


Figure 6-2 DIN rail mounting

### Notice

- The warranty range is confined to the PLC only.
- Warranty period is 18 months**, within which period Emerson Network Power conducts free maintenance and repairing to the PLC that has any fault or damage under the normal operation conditions.
- The start time of warranty period is the delivery date of the product**, of which the product SN is the sole basis of judgment. PLC without a product SN shall be regarded as out of warranty.
- Even within 18 months, maintenance will also be charged in the following situations:
  - Damages incurred to the PLC due to mis-operations, which are not in compliance with the User Manual;
  - Damages incurred to the PLC due to fire, flood, abnormal voltage, etc;
  - Damages incurred to the PLC due to the improper use of PLC functions.
- The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.
- Please keep this paper and show this paper to the maintenance unit when the product needs to be repaired.
- If you have any question, please contact the distributor or our company directly.

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