

## 2.2 Model And Configuration

Table 1 Model and configuration

Model	Power voltage	No. of I/O points	Output type	Built-in power
EC20-1616ERA	220Vac	16/16	Relay	Yes
EC20-1616ETA	220Vac	16/16	transistor	Yes

## 2.3 Power Specification

To ensure normal system operation, power the active I/O extension module before or together with the basic module. The active I/O extension module is working normally when the POWER indicator is on, abnormal when gleaming or off.

The specs. of built-in power supply, power for output and capacity calculation for extension connection are introduced in the text below.

### Built-in power supply

Table 2 EC20-1616ERA/ETA PLC power supply spec.

Item	Unit	Min.	Norm	Max.	Remark	
Input voltage range	Vac	90	220	264	Normal power up and operation	
Maximum input voltage	Vac	85	/	280	Capable of operating at 280V for 3 hours. Each output can be 55% loaded at 264Vac ~ 280Vac	
Input current	A	/	/	1.5	90Vac input, full load output	
Output voltage range	5V/GND	Vdc	4.75	5	5.25	Output1
	24V/GND	Vdc	21.6	24	26.4	Output2
	24V/COM	Vdc	21.6	24	26.4	Output3
Output rated current	5V/GND	mA	/	1000	/	The sum of basic module and extension module. Max. output power: 35W (sum of all outputs). Natural cooling
	24V/GND	mA	/	650	/	
	24V/COM	mA	/	600	/	

### Power for output

Table 3 Internal consumption vs. power for output

Model	Power for logic circuit				Asistant power	
	5V/GND		24V/GND		24V/COM	
	Inner	Output	Inner	Output	Inner	Output
EC20-1616ERA	120mA	880mA	75mA	575mA	9mA	510mA
EC20-1616ETA	200mA	800mA	0	650mA		

The "Inner" column in the above table is the average current needed by the inner circuit of the active I/O extension module. The "Output" column is the capacity for external extension modules.

The figures above are based on the constant ambient temperature of 25°C. Derating is required if the input power voltage is outside the rated range, or the ambient temperature is above +50°C. Generally the derating is realized by reducing the capacity for output.

# EC20 Series PLC Active I/O Extension Module User Manual

**Warning** To reduce the chance of accident, please carefully read the operation instructions and notes in this book 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 General Description

The appearance and structure of EC20 PLC active I/O extension module (or active I/O extension module) is shown in Figure 1.

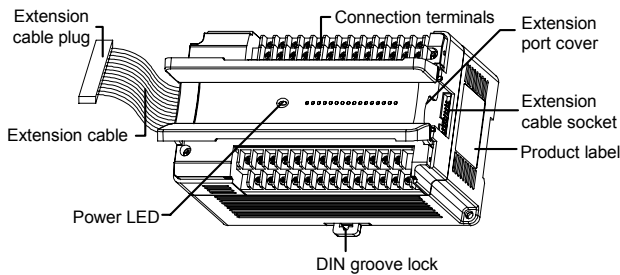
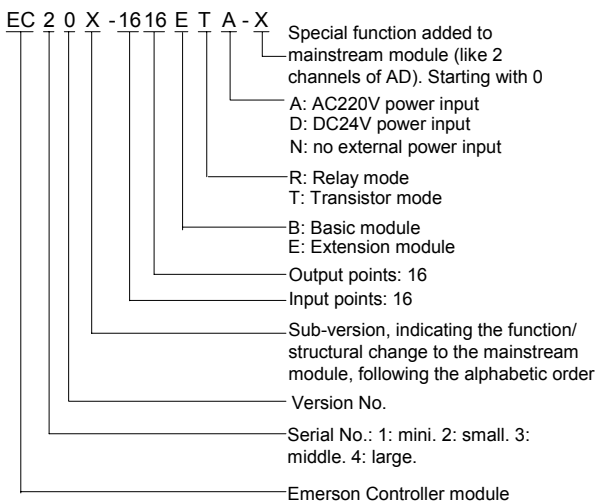


Figure 1 Appearance and structure

## 2 Specification

### 2.1 Model Description

The model description is shown in the following.



### Calculating the power capacity for extension connection

The active I/O extension module can power not only itself, but also, with its 5Vdc, 24Vdc/GND and 24Vdc/COM outputs, the source free extension modules behind it.

Before connecting the source free extension module, you need to calculate the sum of the load and make sure the output capacity of the active I/O extension module is bigger than the load at various outputs and avoid overload.

**Example 1:** The model of the active I/O extension module is EC20-1616ERA. Calculate to see whether it is alright if: 1) Ambient temperature: 25°C. 2) The loads include: two EC20-0808ETNs, two EC20-4ADs, one EC20-4DA and one C20-4TC. The calculating process is shown below:

Table 4 Calculation of extension connection feasibility

Power loop	Output current	Actual current consumption	Remark
5V/GND	880mA	$(80 \times 2 + 50 \times 2 + 50 + 50) = 360\text{mA}$	OK
24V/GND	575mA	$(0 \times 2 + 0 \times 2 + 0 + 0) = 0\text{mA}$	OK
24V/COM	510mA	$(50 \times 2 + 25 \times 2 + 110 + 25) = 285\text{mA}$	OK

As shown above, the total consumption of the source free extension modules is smaller than the allowable output of the active extension module. The connection plan is feasible.

## 3 Installation

### 3.1 Sizes

The installation dimensions of EC20-1616ERA/ETA are shown in Figure 2.

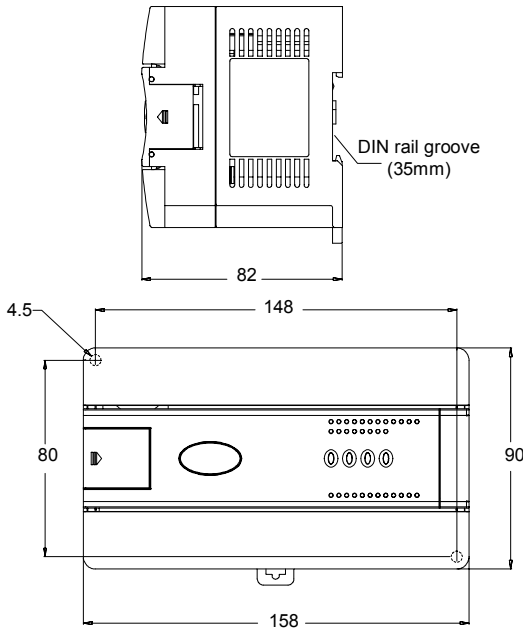


Figure 2 Installation dimensions

### 3.2 Installation

#### DIN rail installation

Use the 35mm wide DIN rail for installation, as shown in Figure 3.

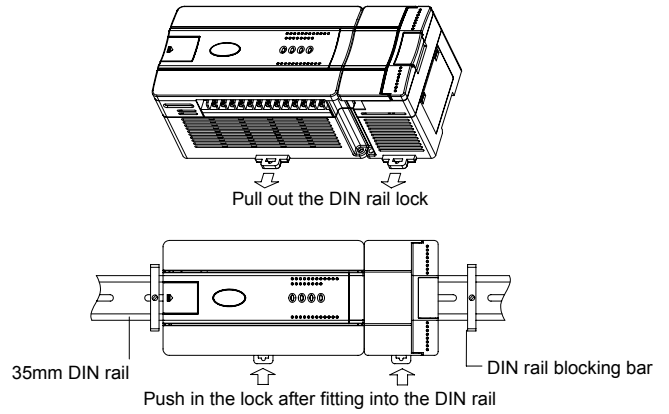


Figure 3 DIN rail installation

The specific installation procedures are listed below:

1. Fix the DIN rail horizontally to the backboard
2. Pull out the DIN rail lock from under the module
3. Fix the module to the DIN rail
4. Push back the lock to fasten the module
5. Use two blocking bars at the two sides of the module to avoid sliding sideways

All EC20 series PLC modules can be DIN rail-mounted through the same procedures.

#### Installation with screws

On locations subject to impact, installation with screws is recommended. Use two  $\Phi 4$  screws to fasten the module to the cabinet backboard through the two holes on the module.

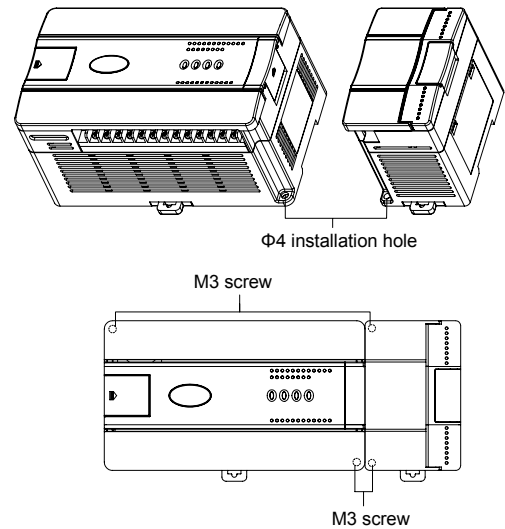


Figure 4 Installation with screws

## 4 Input Characteristic

### 4.1 User Port Definition

The appearance, port location and functions of EC20-1616ERA and EC20-1616ETA are the same. Figure 5 shows the port definition.

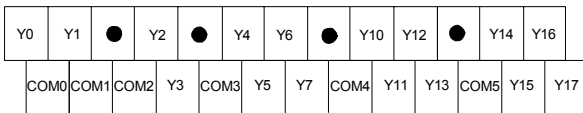
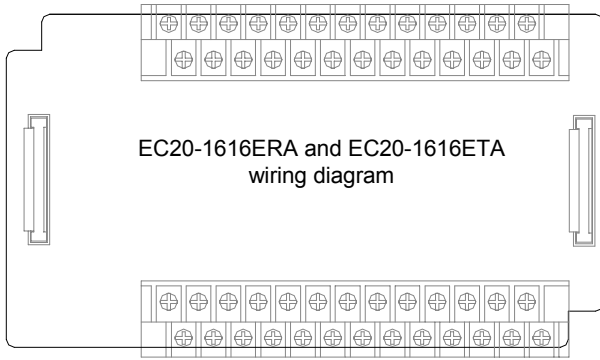
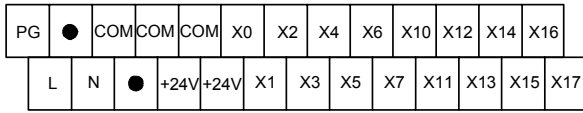


Figure 5 Port definition of EC20-1616ERA/ETA

The pin functions of EC20-1616ERA and EC20-1616ETA are described in Table 5.

Table 5 EC20-1616ERA/ETA pin function

Pin	Function	
L/N	220Vac inputs for live line and neutral line	
PG	Grounding	
	Empty, for isolation, not for cable connection	
COM	Common terminal, both the negative pole of the +24Vdc output and the common terminal for input signal. Three COM terminals are connected within PLC	
+ 24Vdc	The assistant power supply for user external devices, used together with COM	
Y0, COM0	Control output terminal, Group 0	Note: the COMs of various output groups are insulated from each other
Y1, COM1	Control output terminal, Group 1	
Y2, Y3, COM2	Control output terminal, Group 2	
Y4~Y7, COM3	Control output terminal, Group	
Y10~Y13, COM4	Control output terminal, Group 4	
Y14~Y17, COM5	Control output terminal, Group 5	

## 4.2 Input State Indicator

The user input state is displayed through the Input State indicator, which is on when the input terminal is closed, and off otherwise.

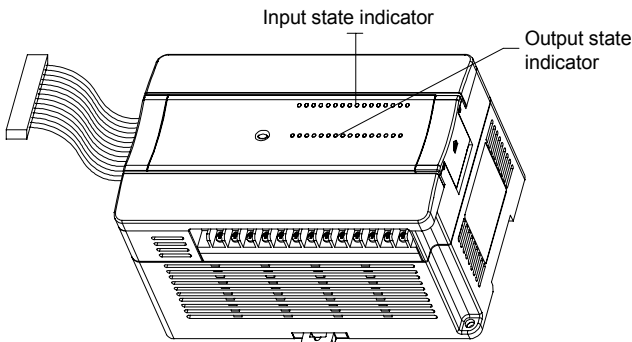


Figure 6 State indicators

## 4.3 Example Of Input Connection

Figure 7 is an example of realizing simple location control by connecting an EC20-2012BTA and an EC20-1616ERA.

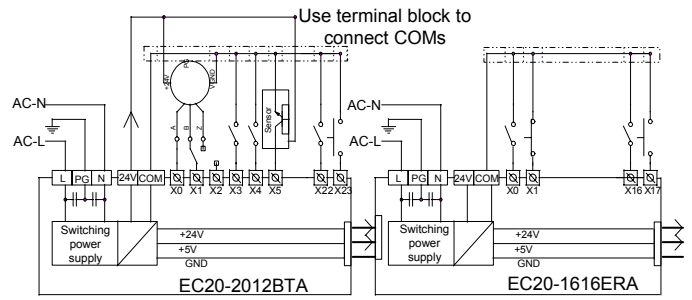


Figure 7 EC20-2012BTA and EC20-1616ERA connection

## 5 Output Characteristic

### 5.1 Output Port Electrical Specification

Table 6 Electrical specifications of output port

Item	Relay output port	Transistor output port
Voltage	250Vac, <30Vdc	5 ~ 24Vdc
Circuit insulation	Relay physical insulation	Optical-coupling insulation
Action indication	LED turns on when the relay output contact is closed	The LED turns on when the optical coupling is driven
Open circuit leakage current	/	< 0.1mA/30Vdc
Min. load	2mA/5Vdc	5mA (5 ~ 24Vdc)
Max output current	Resistive load	2A/1 point Common terminal of 8A/4-point group Common terminal of 8A/8-point group
	Inductive load	0.3A/1 point, 0.8A/4-point, 1.6A/8-point. above 8 points, each point can add 0.1A to the total current
	Electric light load	220Vac, 80VA 220Vac, 100W
ON response time	20ms Max	Max. 0.5ms
OFF response time	20ms Max	Max. 0.5ms
Output common terminal	Y0-COM0; Y1-COM1; Y2, Y3-COM2, Y4~Y17: every 4 terminals share one common terminal. All common terminals are isolated from each other	
Fuse protection	None	

### 5.2 Output State Indicator

As shown in Figure 6, the control output state is indicated by the Output State LED, which is on when the output port is closed (i.e., when Yn and COMn are connected), or off otherwise.

### 5.3 Output Connection Example

Figure 8 shows the connection between an EC20-2012BRA and an EC20-1616ERA. Different output groups can connect to different signal voltage loops. Some, like Y0-COM0, can connect to +24Vdc loop and be powered by the 24V/COM of the controller itself, some (like Y1-COM1) can connect to +5Vdc low voltage

signal loop, while others (like Y2 ~ Y7) can connect to 220Vac voltage signal loop. That is to say, the output groups can work at different voltage levels.

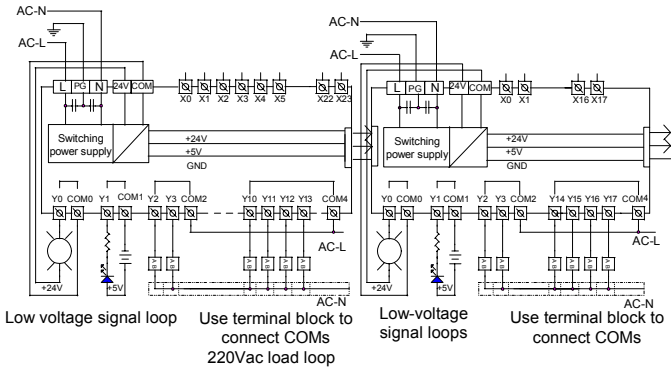


Figure 8 EC20-2012BRA and EC20-1616ERA connection

## 6 Extension Connection

### 6.1 Connecting Extension Bus

Power off the basic module, remove the cover of the extension port at the right end of the basic module and insert the extension cable of the extension module into this port, as shown in Figure 9. For the active extension module has big inner space, you can hide the extension cable in the module casing. If you need to connect more extension modules, just connect them one by one in the same way.

Removing extension port cover before connection

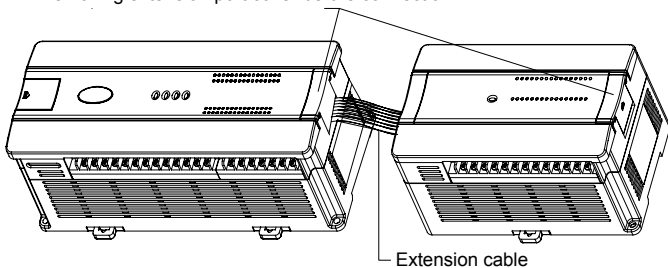


Figure 9 Cascade connection of extension module

### 6.2 Addressing Extension Module

EC20 series PLC can automatically identify and address the connected extension modules in sequence, with no need of user interference.

The automatic addressing is performed once and for all after power-on, and the address will not change afterwards in operation. When the PLC is in operation, it is not allowed to connect or disconnect any IO extension modules or special functional modules, as which may cause damage or malfunction to the PLC.

The active I/O extension module must be powered on at the same time as or before the basic module, so as to ensure reliable addressing.

The IO point coding adopts octal coding, i.e., 0, 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, ..., no 8 or 9.

The input port coding of the basic module and active IO extension module is: X0, X1, X2, ..., X7, X10, X11, ...; their output port coding is: Y0, Y1, Y2, ..., Y7, Y10, Y11, ...and so on. In

coding, the input ports are grouped in eights, the part falling short of eight are kept vacant.

Take the EC20-2012BRA module as an example, the input has 20 points, the coding is from X0 to X23, terminals from X24 to X27 do not exist, the X terminals of the extension modules added later start from X30; likewise, the output has 12 points, the coding is from Y0 to Y13, terminals from Y14 to Y17 do not exist, the Y terminals of the extension modules added later start from Y20.

The X and Y terminals of the active IO extension modules are coded in the sequence they are added into the system.

Example of logic coding of the basic module's and extension module's ports:

EC20-2012BRA	0808ET N	1600ENN	EC20-1616ERA	4AD	4AD	4DA	0016ERN	4TC
X0 -X23	X30 -X37	X40 -X57	X60 -X107	0	1	2	X60 -Y107	3
Y0 -Y13	Y20 -Y27	Y20 -Y27	Y30 -Y57				Y60 -Y107	

## Notice

1. The warranty range is confined to the PLC only.
2. **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.
3. **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.
4. 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.
5. The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.
6. Please keep this paper and show this paper to the maintenance unit when the product needs to be repaired.
7. If you have any question, please contact the distributor or our company directly.

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