DANGER

Power Supply Safety

Power Supply Stability: Ensure that the input power supply voltage and frequency of the PLC meet specifications to prevent damage to equipment caused by overvoltage, undervoltage, or surges.

Grounding Protection: Strictly follow specifications for grounding (PE line) to prevent dangerous situations caused by static electricity accumulation or leakage.

Wiring Specifications

Signal Isolation: Separate high-voltage (e.g., 220V AC) and low-voltage (e.g., sensor signals) wiring to prevent interference or short circuits.

Short-Circuit Protection: Install fuses or circuit breakers at the input/output ports to prevent overload damage to PLC modules.

Cable Shielding: Use shielded cables and ensure reliable grounding to reduce the impact of electromagnetic interference (EMI) on signals.

Lightning and Static Protection

Install surge protection devices (SPD) in areas prone to lightning strikes to prevent lightning from entering the PLC through communication lines.

Maintenance and Troubleshooting Safety

Pre-Power Off Confirmation: Ensure the system is in a safe state (e.g., motors stopped, mechanical reset) before turning off the power.

Pre-Power Off Inspection: Check for loose terminals, normal module cooling, and promptly clean dust or replace aged components.

The installation, operation, repair, and maintenance of electrical equipment shall be performed only by qualified personnel.

SYSTEME shall not be liable for any consequences arising from the use of this information.

Table 1 Basic specifications

Reference	Rated supply voltage	Supply voltage limits	Power dissipation protection	Display	Program memory	RTC	Cycle time	Backup time	Clock drift	Checks	Tightening torque
SR1						Build in, accuracy: ±2S/day, Hold-up time 14 days (25℃ typical time) without power.	＜50ms	Permanent（25℃）	±2S/day	Program memory on each power up	4.43 lbf.in (0.5N.m)
ZR1PB00P7	220V AC	220±15%VAC	✔	×	512KB(Flash)+ 192KB RAM						
ZR1PB00BD	24V DC	24V±15%VDC	✔	×							
ZR1PP00BD2A	24V DC	24±15%VDC	✔	×							
ZR1PA00P7	220V AC	220±15%VAC	✔	×							
ZR1PA00BD	24V DC	24±15%VDC	✔	×							
ZR1PP00BD4A	24V DC	24±15%VDC	✔	×							
SR2											
ZR2PB11P7	220V AC	220±15%VAC	✔	✔	2MB (Flash) + 512KB RAM						
ZR2PA11BD	24V DC	24±15%VDC	✔	✔							
ZR2PP11BD2A	24V DC	24±15%VDC	✔	✔							
ZR2PP11P7	220V AC	220±15%VAC	✔	✔							
ZR2PP11BD	24V DC	24±15%VDC	✔	✔							
SM172											
SM172PS11BDR	24V DC	24±15%VDC	✔	✔	2MB (Flash) + 512KB RAM						
SM172PS11BDT	24V DC	24±15%VDC	✔	✔							
SM172PS11BDM	24V DC	24±15%VDC	✔	✔							
Extension module						/	/	/	/	/	
SM172EMIO2800	24V DC	24±15%VDC	✔	×	/						
SM172EMIO1000	24V DC	24±15%VDC	✔	×	/						
SM172EDM2800	24V DC	24±15%VDC	✔	×	/						
SM172EDM1600	24V DC	24±15%VDC	✔	×	/						
SM172EDM0800	24V DC	24±15%VDC	✔	×	/						
SM172EDM0810	24V DC	24±15%VDC	✔	×	/						
SM172EDM0800P7	220V AC	220±15%VAC	✔	×	/						
SM172EAM0800	24V DC	24±15%VDC	✔	×	/						

Table 2 Interface specifications

Reference	Description	Digital inputs	Digital outputs	Analog inputs	Analog outputs	Communication ports
SR1 (not support extension modules)						
ZR1PB00P7	Controller	8	4 (Relay, 3A)	/	/	**2**（1*RS485, 1*USB C）
ZR1PB00BD	Controller	8	4 (Relay, 3A)	/	/	**2**（1*RS485, 1*USB C）
ZR1PP00BD2A	Controller	6	4 (Relay, 3A)	2	/	**2**（1*RS485, 1*USB C）
ZR1PA00P7	Controller	16	8 (Relay, 3A)	/	/	**2**（1*RS485, 1*USB C）
ZR1PA00BD	Controller	16	8 (Relay, 3A)	/	/	**2**（1*RS485, 1*USB C）
ZR1PP00BD4A	Controller	12	8 (Relay, 3A)	4	/	**2**（1*RS485, 1*USB C）
SR2 (support extension modules)						
ZR2PB11P7	Controller	8	4 (Relay, 3A)	/	/	**3**（1*Ethernet, 1*RS485, 1*USB C）
ZR2PA11BD	Controller	8 (UI as DI)	4 (2*Relay, 3 A and 2*Trans)	8 (UI as AI)	/	**3**（1*Ethernet, 1*RS485, 1*USB C）
ZR2PP11BD2A	Controller	6	4 (Relay, 3A)	2	/	**3**（1*Ethernet, 1*RS485, 1*USB C）
ZR2PP11P7	Controller	16	12 (Relay, 3A)	/	/	**4**（1*Ethernet, 1*RS485, 1*USB C, 1*USB A）
ZR2PP11BD	Controller	16	12 (Relay, 3A)	/	/	**4**（1*Ethernet, 1*RS485, 1*USB C, 1*USB A）
SM172 (support extension modules)						
SM172PS11BDR	Controller	8	8 (Relay, 3A)	8	4	**5**（1*Ethernet, 2*RS485, 1*USB C, 1*USB A）

Reference	Description	Digital inputs	Digital outputs	Analog inputs	Analog outputs	Communication ports
SM172PS11BDT	Controller	8	8 (Trans)	8	4	**5**（1*Ethernet, 2*RS485, 1*USB C, 1*USB A）
SM172PS11BDM	Controller	8	8(6*Relay, 3 A and 2*SSR)	8	4	**5**（1Ethernet，2*RS485，1*USB C, 1*USB A）
Extension module						
SM172EMIO2800	Mixed IO module	8	8 (Relay, 3A)	8	4	/
SM172EMIO1000	Mixed IO module	4	2 (Relay, 3A)	2	2	/
SM172EDM2800	Digital IO module;	16	12 (Relay, 3A)	/	/	/
SM172EDM1600	Digital IO module	8	8 (Relay, 3A)	/	/	/
SM172EDM0800	Digital IO module;	4	4 (Relay, 3A)	/	/	/
SM172EDM0810	Digital IO module	4	4 (Transistor)	/	/	/
SM172EDM0800P7	Digital IO module	4	4 (Relay, 3A)	/	/	/
SM172EAM0800	Analog IO module	/	/	4	4	/

Table 3 Discrete Input Specifications

Reference	Discrete input type	Discrete input voltage	Voltage state 1 guaranteed	Voltage state 0 guaranteed	DI input impedance	Turn on/ Turn off DI time	Input compatibility
SR1							
ZR1PB00P7	Resistive	220V AC	≥ 180V AC	≤ 60V AC	391kΩ	ON: ≤10ms. OFF: ≤10ms.	/
ZR1PB00BD	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
ZR1PP00BD2A	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
ZR1PA00P7	Resistive	220V AC	≥ 180V AC	≤ 60V AC	391kΩ	ON: ≤10ms. OFF: ≤10ms.	/
ZR1PA00BD	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
ZR1PP00BD4A	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SR2							
ZR2PB11P7	Resistive	220V AC	≥ 180V AC	≤ 60V AC	391kΩ	ON: ≤10ms. OFF: ≤10ms.	/
ZR2PA11BD	Dry Contact	/	/	/	/	/	/
ZR2PP11BD2A	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
ZR2PP11P7	Resistive	220V AC	≥ 180V AC	≤ 60V AC	391kΩ	ON: ≤10ms. OFF: ≤10ms.	/
ZR2PP11BD	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172							
SM172PS11BDR	PNP	24V DC	≥ 15V DC	≤ 5V DC	DI: 7.2kΩ. FDI：5.4kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172PS11BDT	PNP	24V DC	≥ 15V DC	≤ 5V DC	DI: 7.2kΩ. FDI：5.4kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172PS11BDM	PNP	24V DC	≥ 15V DC	≤ 5V DC	DI: 7.2kΩ. FDI：5.4kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
Extension module							
SM172EMIO2800	PNP	24V DC	≥ 15V DC	≤ 5V DC	7.2kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172EMIO1000	PNP	24V DC	≥ 15V DC	≤ 5V DC	7.2kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172EDM2800	PNP	24V DC	≥ 15V DC	≤ 5V DC	5.1kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172EDM1600	PNP	24V DC	≥ 15V DC	≤ 5V DC	7.2kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172EDM0800	PNP	24V DC	≥ 15V DC	≤ 5V DC	7.2kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172EDM0810	PNP	24V DC	≥ 15V DC	≤ 5V DC	7.2kΩ	ON: ≤2ms. OFF: ≤2ms.	3-wire proximity sensors PNP discrete input
SM172EDM0800P7	Resistive	220V AC	≥ 180V AC	≤ 60V AC	391kΩ	ON: ≤10ms. OFF: ≤10ms.	/
SM172EAM0800	/	/	/	/	/	/	/
（The firmware of all controller models features a 13ms filter for DI signals.）							

Table 4 Discrete output specifications

Reference	Contacts type and composition	Output voltage limits	Output thermal current	Response time
ZR1PB00P7 ZR1PB00BD ZR1PP00BD2A ZR1PA00P7 ZR1PA00BD ZR1PP00BD4A ZR2PB11P7	Electromagnetic relay outputs	5~250VAC or 5~30VDC	Relay: resistive load 3A	10ms from state 0 to state 1 10ms from state 1 to state 0
ZR2PA11BD	2-channel electromagnetic relay, outputs 2-channel transistor drain outputs	Relay output: 5~250VAC or 5~30VDC Transistor drain output: 20.4~28.8VDC	Relay: resistive load 3A Transistor: 0.5A	10ms from state 0 to state 1 relay output 10ms from state 1 to state 0 relay output 18μs from state 0 to state 1 transistor output 18μs from state 1 to state 0 transistor output
ZR2PP11BD2A ZR2PP11P7 ZR2PP11BD SM172PS11BDR	Electromagnetic relay outputs	5~250VAC or 5~30VDC	Relay: resistive load 3A	10ms from state 0 to state 1 10ms from state 1 to state 0
SM172PS11BDT	Transistor drain output DO1~DO2 are fast outputs(FDO, 30~30kHz)	20.4~28.8VDC	Transistor DO: 0.5A Transistor FDO: 0.3A	18μs from state 0 to state 1 18μs from state 1 to state 0
SM172PS11BDM	6 channel electromagnetic relay outputs, 2 channel solid-state relay outputs	Relay output: 5~250VAC or 5~30VDC Solid-state relay(SSR) output: 24-230VAC	Relay: resistive load 3A SSR: 0.3A	10ms from state 0 to state 1 10ms from state 1 to state 0
SM172EMIO2800 SM172EMIO1000	Electromagnetic relay outputs	5~250VAC or 5~30VDC	Relay: resistive load 3A	10ms from state 0 to state 1 10ms from state 1 to state 0

Reference	Contacts type and composition	Output voltage limits	Output thermal current	Response time
SM172EDM2800				
SM172EDM1600				
SM172EDM0800P7	Electromagnetic relay outputs	5~250VAC or 5~30VDC	Relay: resistive load 3A	10ms from state 0 to state 1 10ms from state 1 to state 0
SM172EDM0800				
SM172EDM0810	Transistor drain outputs	20.4~28.8VDC	Transistor: 0.5A	18μs from state 0 to state 1 18μs from state 1 to state 0
SM172EAM0800	/	/	/	/

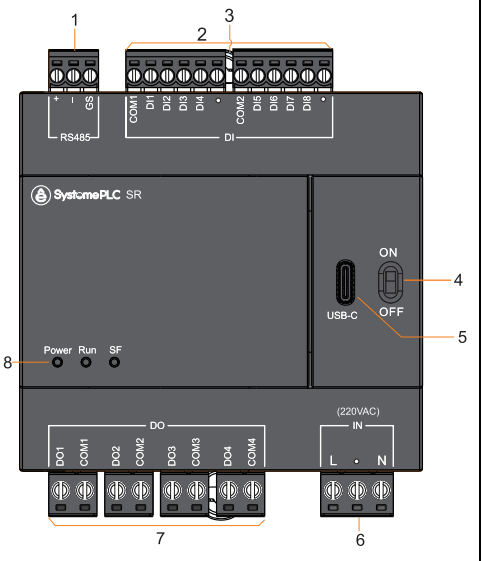
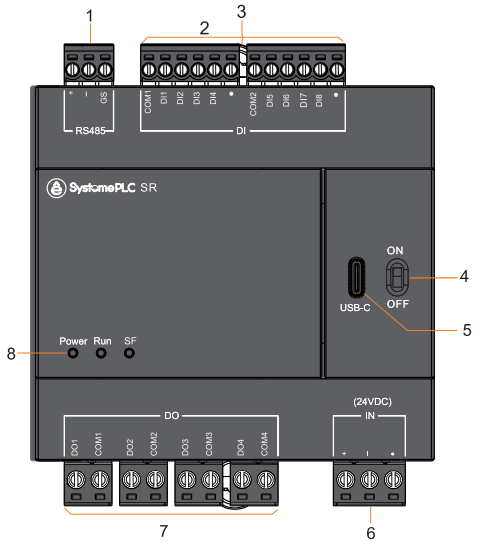
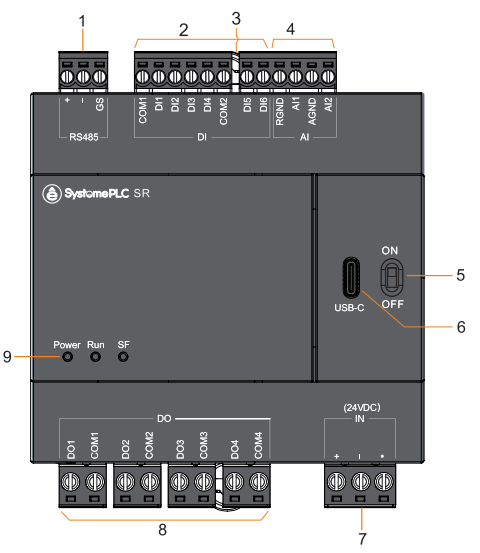
Table 5 Analog input/output specifications

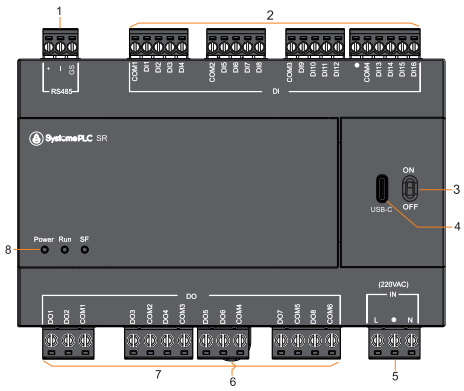
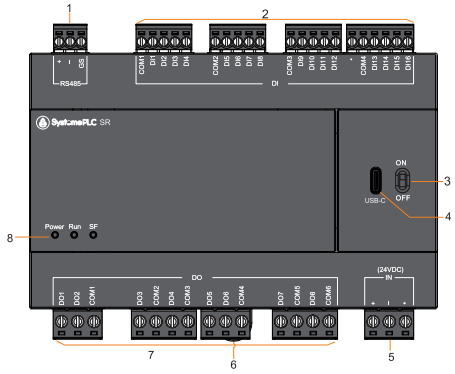
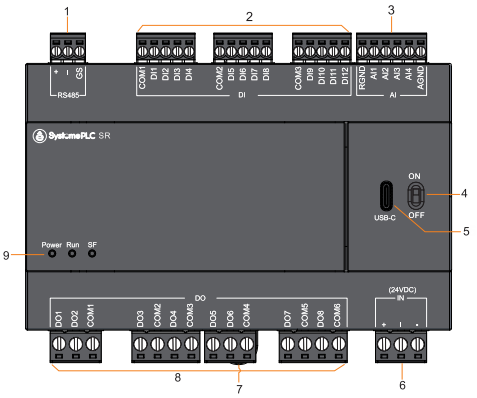
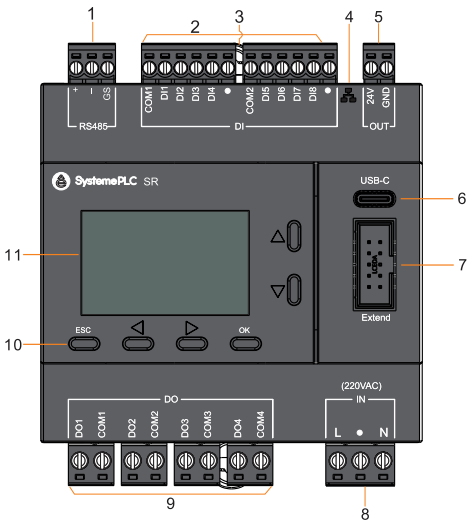
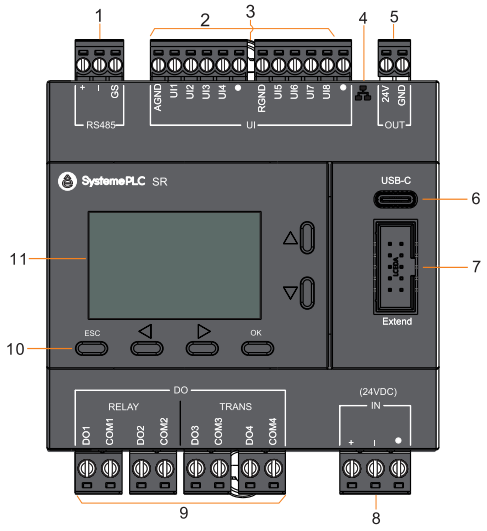
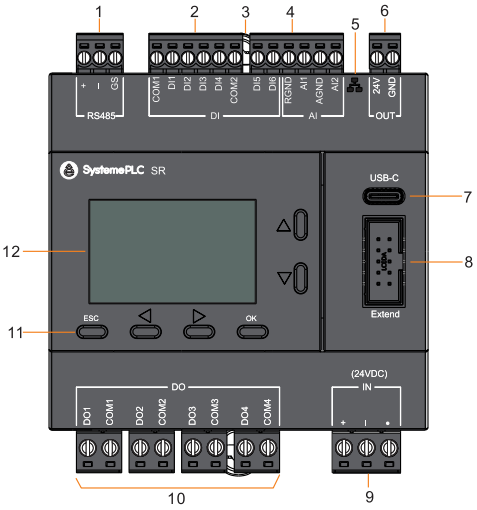
Analog input				Analog output	
AI type	Other	Conversion error	Repeat accuracy	Analog output type	load impedance
Voltage signal: 0-10VDC. Current signal: 4-20mA/0-20mA. Resistance signal: 0-30kΩ, support NTC_10K (3950) or PT1000, PT100.	Max. permissible voltage: 12V AI resolution: 16 bits LSB value: 153μV Conversion time: 140ms AI load impedance: voltage: > 10kΩ current: ⩽100Ω	Smart relay cycle time analogue input circuit	Voltage signal: 0-10VDC, error ±1% of full scale. Current signal: 4-20mA/0-20mA, error ±1% of full scale. Resistor signal: supports NTC10K. Allowable error: (-15℃~55℃: ±0.2℃. -25℃~15℃ and 55℃-70℃: ±0.4℃. -40℃~-25℃ and 70℃ ~110℃: ±1℃）. PT1000, Allowable error: -100℃ ~400℃: 0.3℃. -200℃ ~-100℃ and 400℃ ~600℃: 0.5℃ . 600℃ ~850℃: 1℃ PT100, Allowable error: -100℃~400℃: 3℃. -200℃ ~-100℃ and 400℃ ~600℃ : 5℃. 600℃ ~850℃: 10℃	Voltage signal: 0-10VDC, error ±1% of full scale. Current signal: 4-20mA, error ±1% of full scale AO resolution: 16 bits	voltage: ≥5kΩ current: ≤500Ω

Table 6 Environment

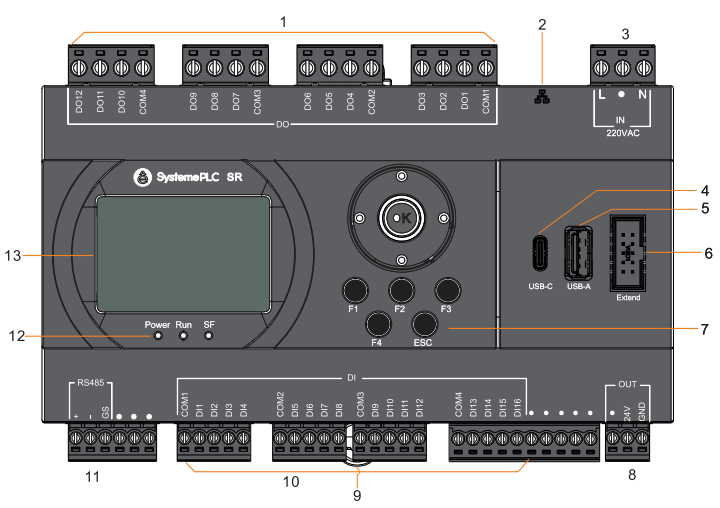
Immunity to microbreaks	Standards	IP degree of protection	Environmental characteristic	Disturbance radiated/conducted	Pollution degree	Ambient air temperature for operation	Ambient air temperature for storage	Operating altitude	Relative humidity	Warranty
1ms	EN/IEC 61000-4-5 EN/IEC 61000-4-6 level 3 EN/IEC 60068-2-6 Fc EN/IEC 61000-4-11 EN/IEC 61000-4-3 EN/IEC 61000-4-2 level 2 EN/IEC 60068-2-27Ea	IP20	EMC directive EN/IEC 61000-6-2. EMC directive EN/IEC 61131-2 zone B. Low voltage directive EN/IEC 61131-2.	Class B EN 55022-11 group 1	2 EN/IEC 61131-2	(-) 20℃ ~60℃	(-) 40℃~70℃	6561.68ft (2000m)	95% without condensation or dripping water	18months

Table 7 External interface

ZR1PB00P7	ZR1PB00BD	ZR1PP00BD2A
		
1-Serial line port (RS-485) 2-Inputs terminal block (digital) 3-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 4-System switch 5-USB C port 6-Power supply 7-Output terminal block (digital) 8-Status LED	1-Serial line port (RS-485) 2- Inputs terminal block (digital) 3-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 4-System switch 5-USB C port 6-Power supply 7-Output terminal block (digital) 8-Status LED	1-Serial line port (RS-485) 2- Inputs terminal block (digital) 3-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 4-Input terminal block (analog) 5-System switch 6-USB C port 7-Power supply 8-Output terminal block (digital) 9-Status LED

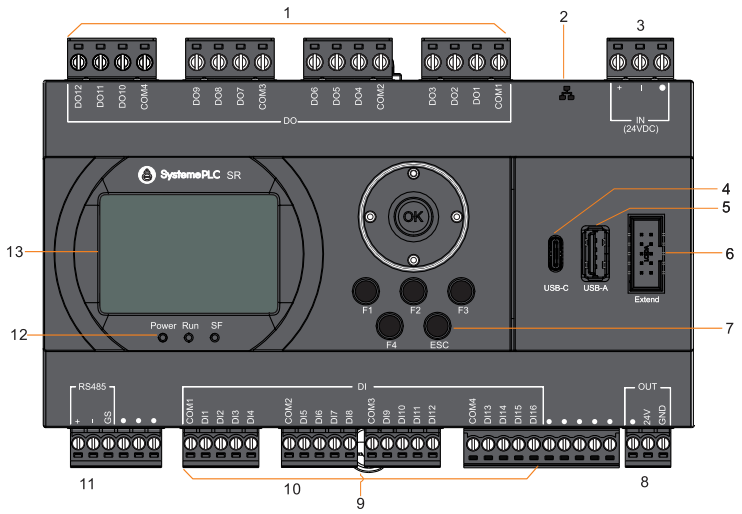
ZR1PA00P7	ZR1PA00BD	ZR1PP00BD4A
		
1-Serial line port (RS-485) 2-Inputs terminal block (digital) 3-System switch 4-USB C port 5-Power supply 6-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 7-Output terminal block (digital) 8-Status LED	1-Serial line port (RS-485) 2-Inputs terminal block (digital) 3-System switch 4-USB C port 5-Power supply 6-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 7-Output terminal block (digital) 8-Status LED	1-Serial line port (RS-485) 2-Inputs terminal block (digital) 3- Inputs terminal block(analog) 4-System switch 5-USB C port 6-Power supply 7- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 8- Output terminal block (digital) 9-Status LED
ZR2PB11P7	**ZR2PA11BD**	**ZR2PP11BD2A**
		
1-Serial line port (RS-485) 2-Inputs terminal block (digital) 3-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 4- Ethernet interface 5- Power Supply Output 6- USB C port 7- Expansion Module Interface 8-Power supply 9-Output terminal block (digital) 10-Keys 11- Display	1-Serial line port (RS-485) 2-Inputs terminal block (universal and can be used as DI or AI) 3-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 4- Ethernet interface 5- Power Supply Output 6- USB C port 7- Expansion Module Interface 8-Power supply 9-Output terminal block (digital) 10- Keys 11- Display	1-Serial line port (RS-485) 2-Inputs terminal block (digital) 3-Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 4- Inputs terminal block (analog) 5- Ethernet interface 6- Power Supply Output 7- USB C port 8- Expansion Module Interface 9- Power supply 10- Output terminal block (digital) 11- Keys 12- Display

ZR2PP11P7



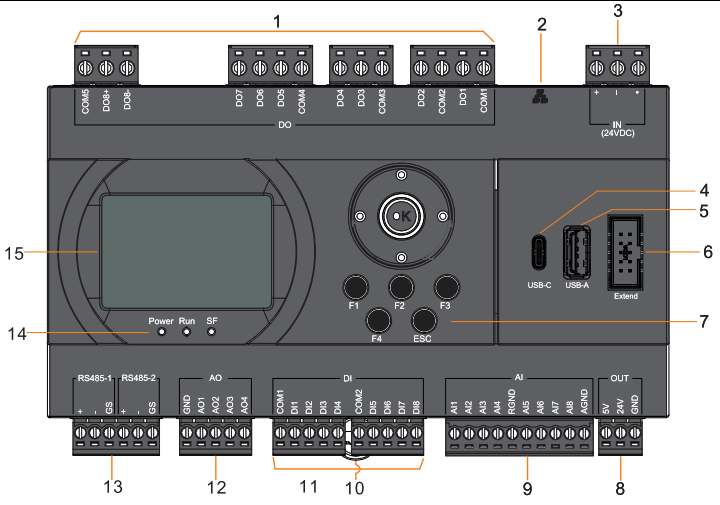
1- Output terminal block (digital)
2- Ethernet interface
3- Power supply
4- USB C port
5- USB A port
6- Expansion Module Interface
7- Keys
8- Power Supply Output
9- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)
10- Inputs terminal block (digital)
11- Serial line port (RS-485)
12- Status LED
13- Display

ZR2PP11BD



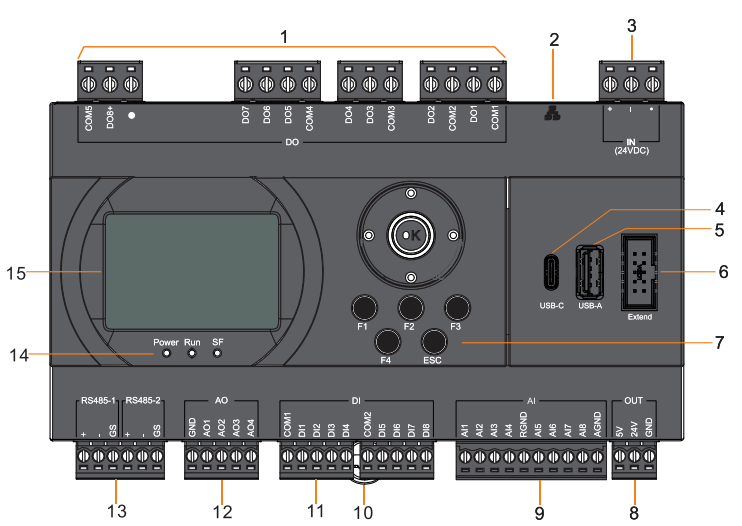
1- Output terminal block (digital)
2- Ethernet interface
3- Power supply
4- USB C port
5- USB A port
6- Expansion Module Interface
7- Keys
8- Power Supply Output
9- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)
10- Inputs terminal block (digital)
11- Serial line port (RS-485)
12- Status LED
13- Display

SM172PS11BDR, SM172PS11BDM



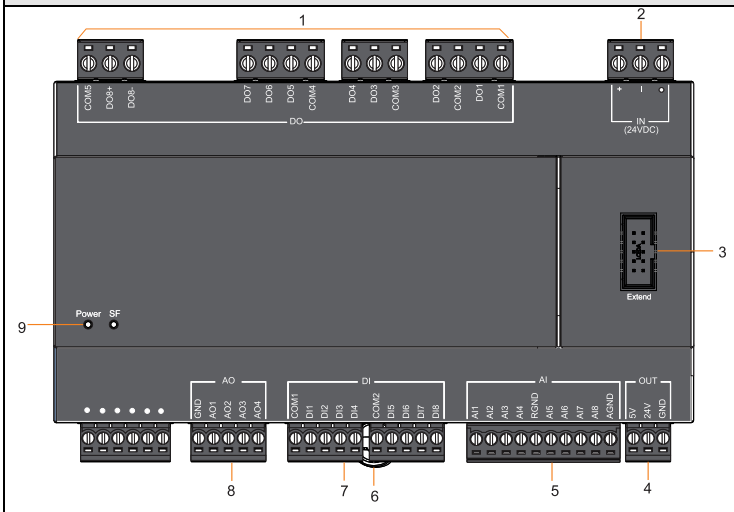
1- Output terminal block (digital)
2- Ethernet interface
3- Power supply
4- USB C port
5- USB A port
6- Expansion Module Interface
7- Keys
8- Power Supply Output

SM172PS11BDT



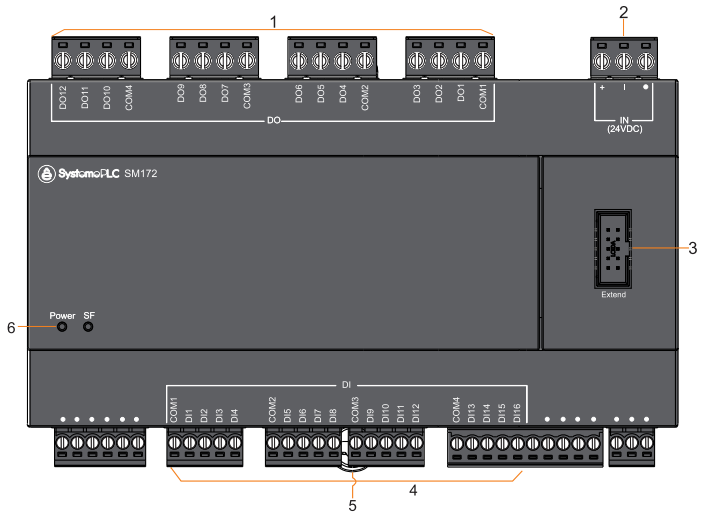
9- Inputs terminal block (analog)
10- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)
11- Inputs terminal block (digital, DI5~DI8 is FDI)
12- Output terminal block (analog)
13- Serial line port (RS-485)
14- Status LED
15-Display

SM172EMIO2800



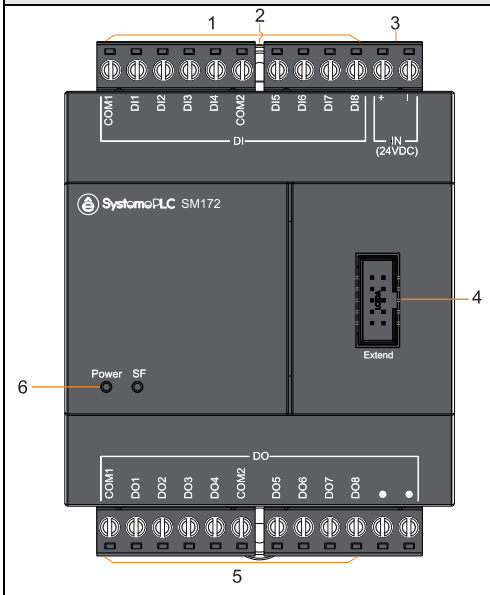
1- Output terminal block (digital)
2- Power supply
3- Expansion Module Interface
4- Power Supply Output
5- Inputs terminal block (analog)
6- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)
7- Inputs terminal block (digital)
8- Output terminal block (analog)
9- Status LED

SM172EDM2800



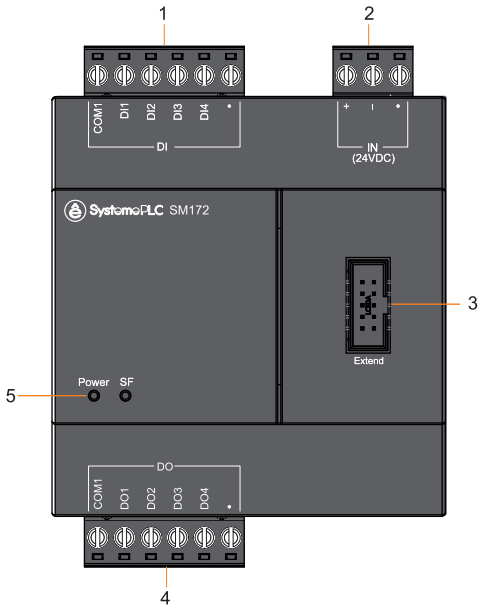
1- Output terminal block (digital)
2- Power supply
3- Expansion Module Interface
4- Inputs terminal block (digital)
5- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)
6- Status LED

SM172EDM1600



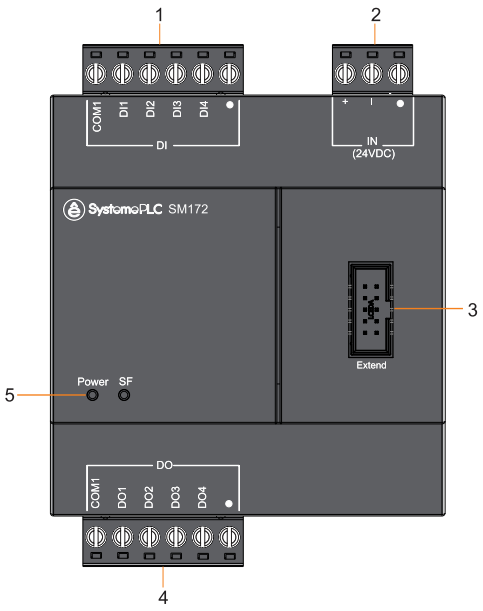
1- Inputs terminal block (digital)
2- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)
3- Power supply
4- Expansion Module Interface
5- Output terminal block (digital)
6- Status LED

SM172EDM0800



1- Inputs terminal block (digital)
2- Power supply
3- Expansion Module Interface
4- Output terminal block (digital)
5- Status LED
Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)

SM172EDM0810



1- Inputs terminal block (digital)
2- Power supply
3- Expansion Module Interface
4- Output terminal block (digital)
5- Status LED
Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)

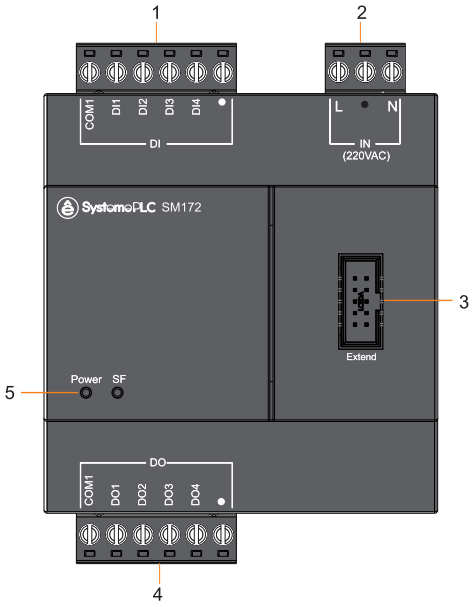
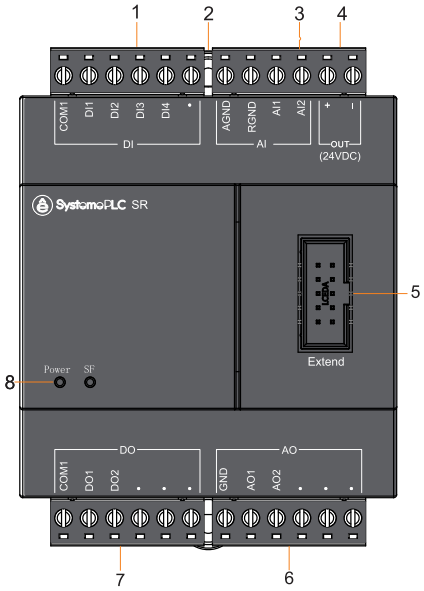
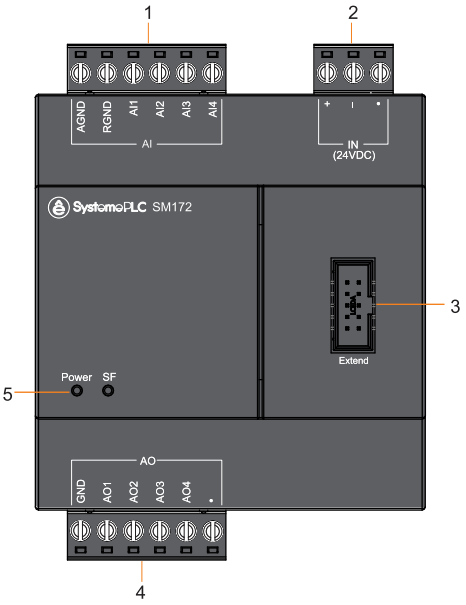
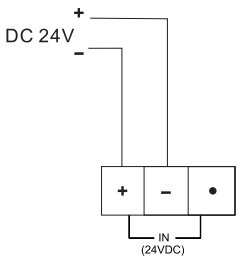
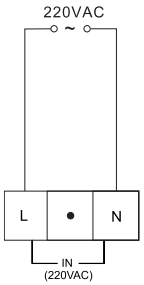
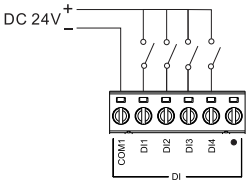
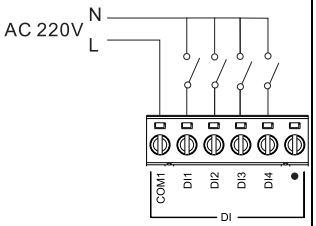
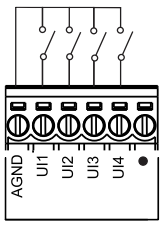
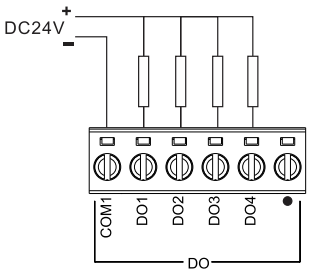
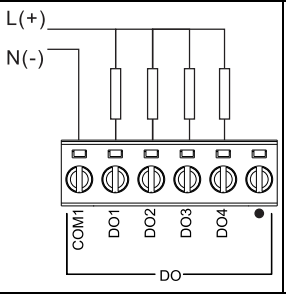
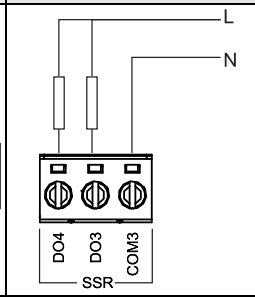
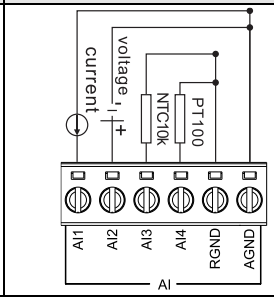
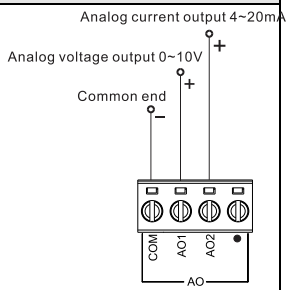
SM172EDM0800P7	SM172EMIO1000	SM172EAM0800
		
1- Inputs terminal block (digital) 2- Power supply 3- Expansion Module Interface 4- Output terminal block (digital) 5- Status LED Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)	1- Inputs terminal block (digital) 2- Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail) 3- Inputs terminal block (analog) 4- Power supply 5- Expansion Module Interface 6- Output terminal block (analog) 7- Output terminal block (digital) 8- Status LED	1- Inputs terminal block (analog) 2- Power supply 3- Expansion Module Interface 4- Output terminal block (analog) 5- Status LED Clip-on lock for 35-mm (1.38 in.) top hat section rail (DIN rail)

Table 8 Wiring

Power supply(24VDC)	Power supply(220VAC)	Digital inputs(PNP)	Digital inputs(Resistive)	Digital inputs(Dry Contact)
				
Digital outputs(Transistor)	**Digital outputs(Relay)**	**Digital outputs(SSR)**	**Analog inputs**	**Analog outputs**
				

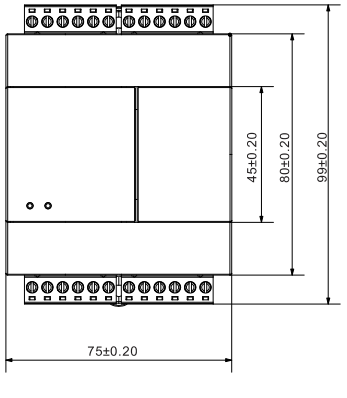
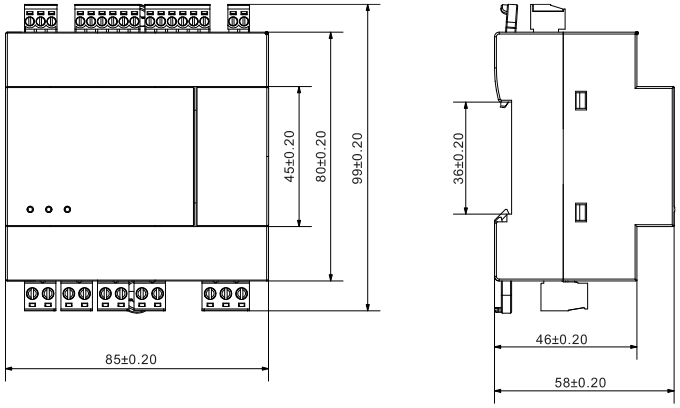
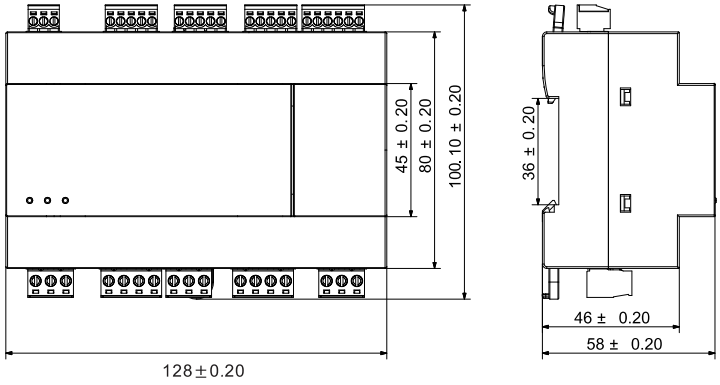
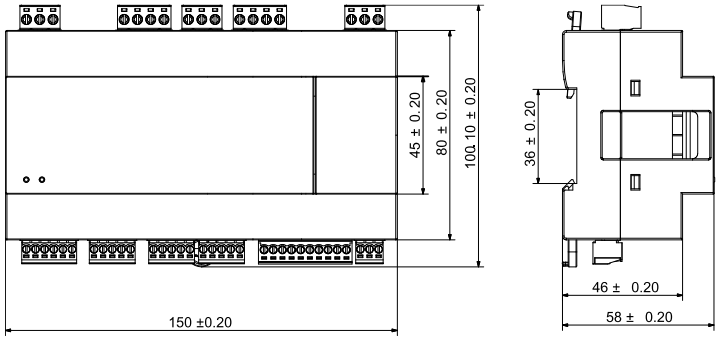
Notice: For Analog input, If there is a resistance input signal, the resistance input signal and the current, voltage input signals do not share the common terminal (RGND, AGND).

If there's only current or voltage or current and voltage input signals, you can connect to any common terminal (RGND, AGND).

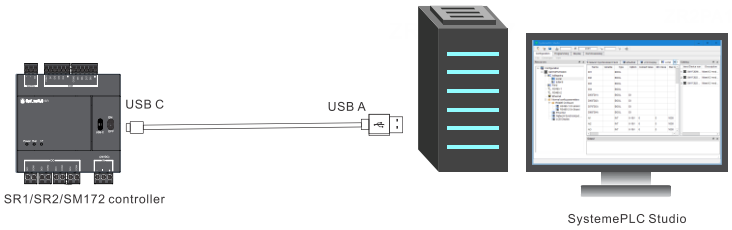
Connections – terminals: Screw terminals, 0.2~2.5 mm² (AWG 28~AWG12), Screw terminals, 0.5~1.5 mm² (AWG 28~AWG16)

DI Cable length: Max 500m (shielded), Max 300m (unshielded)

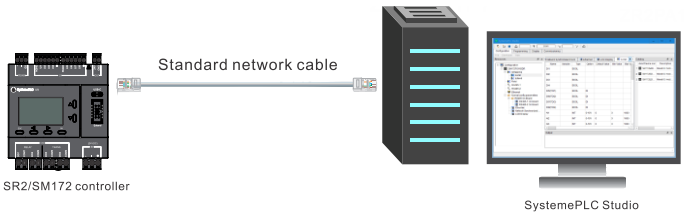
Table 9 Installation dimensions

SM172EMIO1000, SM172EDM1600, SM172EDM0800, SM172EDM0810, SM172EDM0800P7, SM172EAM0800	ZR1PB00P7, ZR1PB00BD, ZR1PP00BD2A, ZR2PB11P7, ZR2PA11BD, ZR2PP11BD2A
	
ZR1PA00P7, ZR1PA00BD, ZR1PP00BD4A	**ZR2PP11P7, ZR2PP11BD, SM172PS11BDR, SM172PS11BDM, SM172PS11BDT, SM172EMIO2800, SM172EDM2800**
	

Communication connection



USB C communication



Ethernet communication