

EasyIO Neo Series Communication and Signal Module Installation Guide

CM-485, SM-16UI, SM-16DI, SM-8AO, SM-8DO

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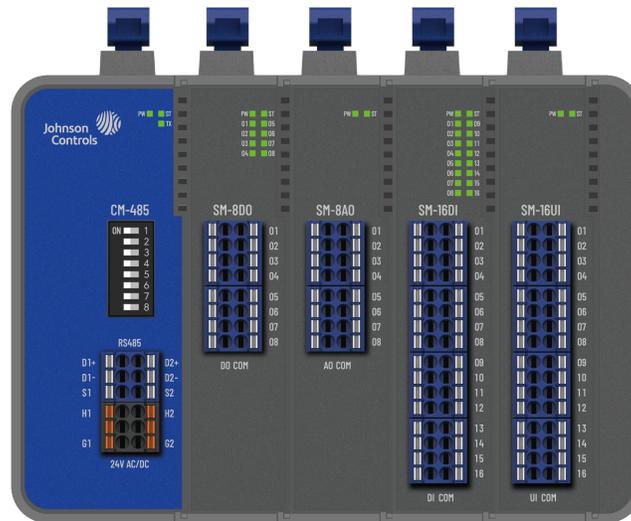
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Communication and Signal Module overview

The EasyIO Neo Series Communication and Signal Module is a configurable unit that consists of specific input and output modules based on user requirements. Use this guide to complete the following tasks:

- Mount and install the modules
- Understand the module components
- Mount the modules on a DIN rail
- View wiring diagrams of the modules in a system

Figure 1: EasyIO Neo Series Communication and Signal Module unit



Communication and Signal Module dimensions

Figure 2: Communication and Signal module dimensions, front view (mm)

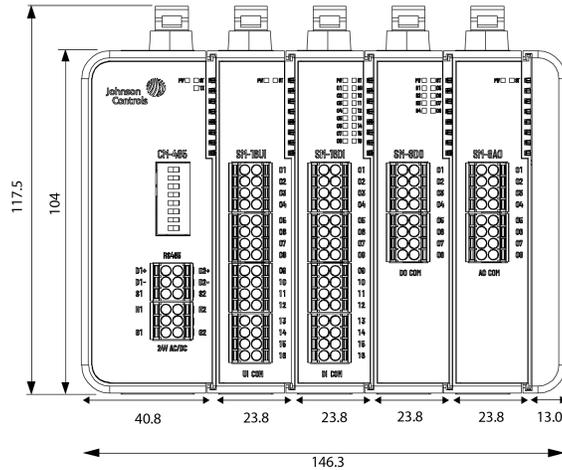
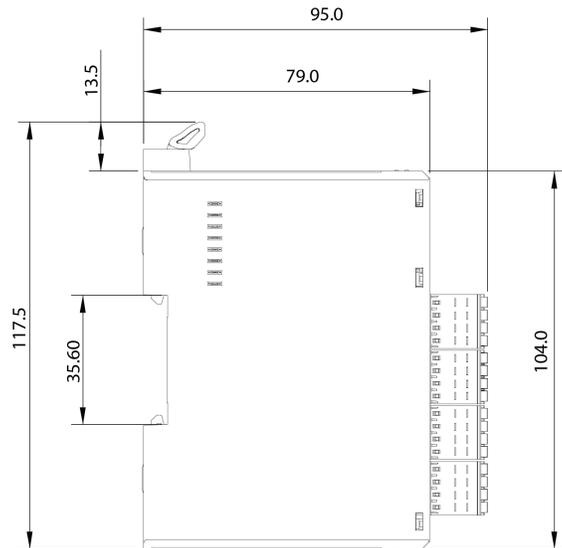


Figure 3: Communication and Signal Module dimensions, side view (mm)



Parts included

- One CM-485 Communication Module with removable terminal blocks, or one Signal Module (16UI, 16DI, 8AO, or 8-DO) with removable terminal blocks
- One pack sheet

Required tools and parts

- One small flathead screwdriver, or similar, to secure wires to terminal blocks
- 24 AWG to 20 AWG electrical wire
- Tubular crimp terminals, 1.1 mm to 1.5 mm diameter, minimum 12 mm input length, to enable wiring input to terminal blocks
- Wire stripping length, 9.5 mm to 11.5 mm

Table 1: Rated connection capacities for wiring

With crimp terminal	Without crimp terminal
24 AWG to 20 AWG (UL standard)	28 AWG to 16 AWG solid and strand wire (UL standard)
0.34 mm ² to 0.75 mm ² solid and strand wire (IEC standard)	0.34 mm ² to 1.5 mm ² solid and strand wire (IEC standard)

Mounting guidelines

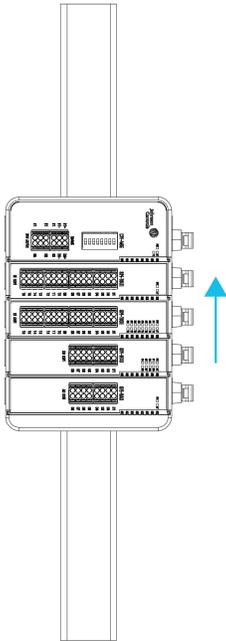
The following section lists location and orientation considerations, and how to mount the module on a DIN rail.

Mounting locations

For optimal performance, avoid the following mounting locations:

- Areas with excessive moisture, corrosive fumes, or explosive vapors
 - Locations where excessive vibration or shock occurs
 - Locations with excessive electrical noise, such as large magnetic interference or variable speed drive modules
- **Important:** To avoid excessive accumulation of heat, you must install the Communication and Signal Module in a horizontal orientation. Do not mount the modules vertically, see the following figure:

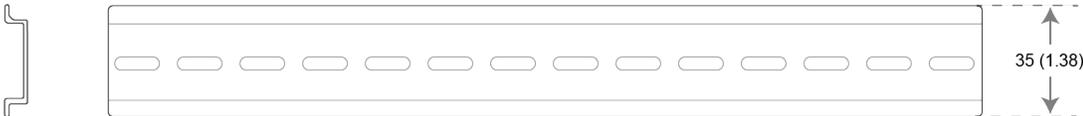
Figure 4: Incorrect mounting of modules



Mounting the module on a DIN rail

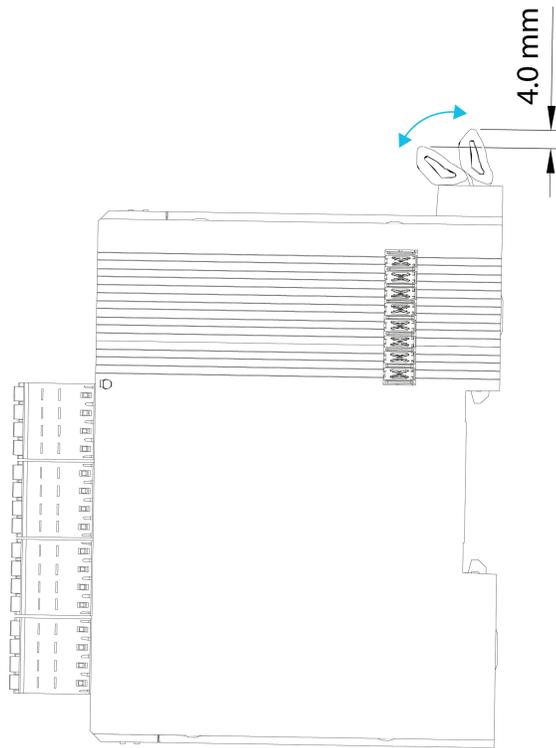
1. Mount a section of 35 mm (1.38 in.) DIN rail horizontally on the enclosure base plate.

Figure 5: 35 mm DIN rail



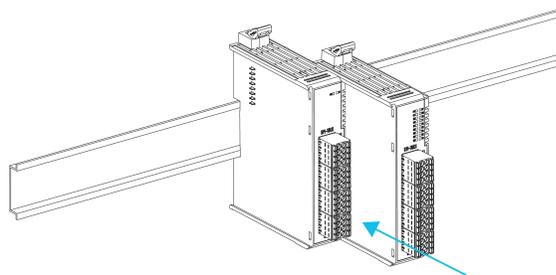
2. Open the securing clips on top of the modules.

Figure 6: Open the securing clips



3. To assemble the device, slide the required modules together.

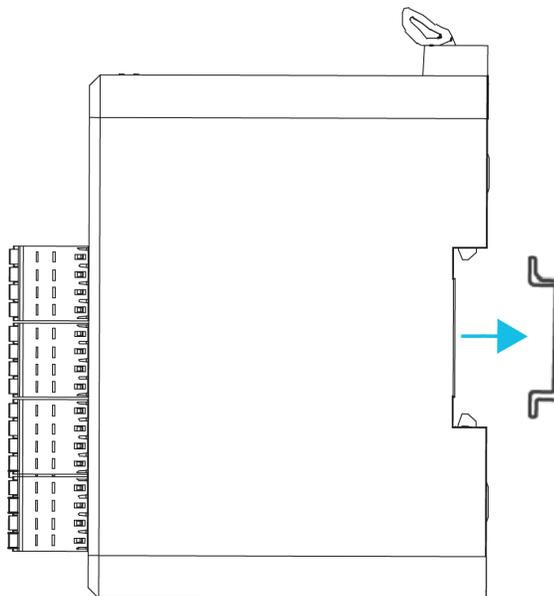
Figure 7: Slide the modules together



► **Important:** To avoid a hot plug-in, you must ensure power is off for the CM and IO modules.

4. Use the hooks at the top of the DIN rail channel on the back of the modules to hang the modules on the DIN rail. Position the module firmly against the DIN rail until it clicks into place.

Figure 8: Place the module on the DIN rail



5. To secure the modules to the DIN rail, push the securing clip down again until it clicks into place.
6. Slide the module cover, which is provided with the communication module, onto the end of the device after you complete the CM and IO module assembly.
7. **Optional:** For added security, use DIN rail end clips.

Input, output, and 24 VAC Class 2 transformer power input wiring diagrams

WARNING

Risk of Electric Shock

Disconnect the power supply before you make electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

NOTICE

Risk of Property Damage

Do not apply power to the module before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

Important

Do not exceed module electrical ratings, this can result in permanent damage to the module and void warranties.

➤ Important

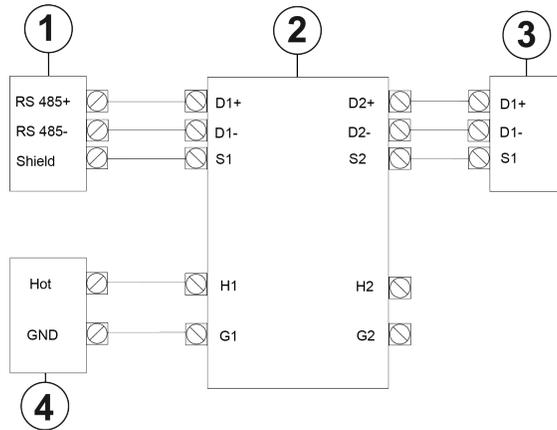
Only use copper conductors. Wire the module in accordance with local, national, and regional regulations.

➤ Important

Use the correct electrostatic discharge precautions throughout installation, setup, and service to avoid damage to the module and module components.

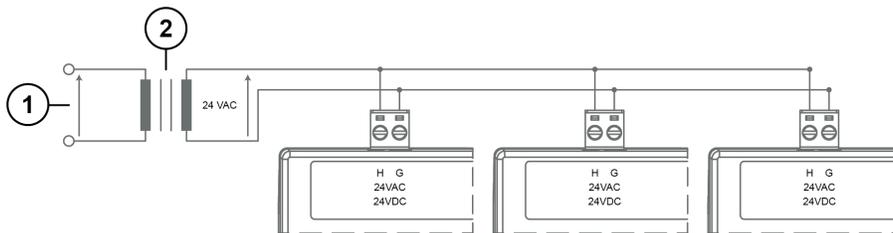
Communication and Signal Module basic input, output, power, and Signal Modules wiring setup

Figure 9: CM-485 wiring



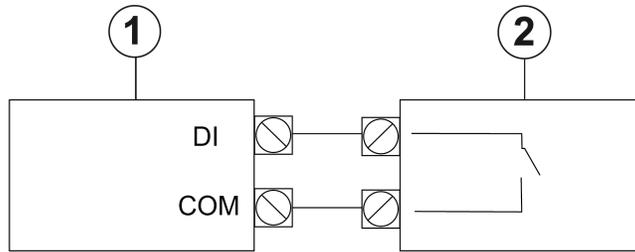
Callout	Description
1	Controller
2	CM-485
3	Other RS485 device
4	Power supply

Figure 10: Multiple controllers on a single transformer wiring



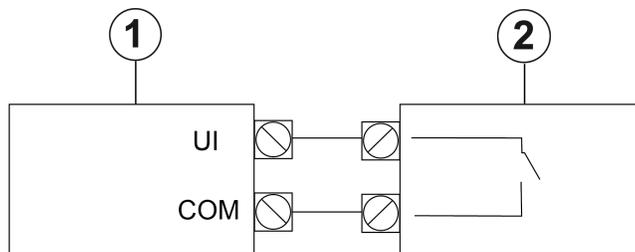
Callout	Description
1	Primary AC supply
2	Stepdown transformer 50/60 Hz

Figure 11: SM-16DI dry contact / pulse input wiring



Callout	Description
1	SM-16DI
2	Field device

Figure 12: SM-16UI dry contact / pulse input wiring



Callout	Description
1	SM-16UI
2	Field device

Figure 13: Pulse input minimum on-off time

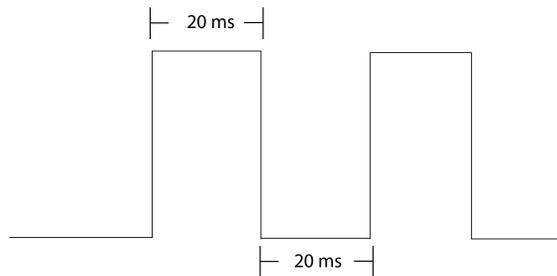
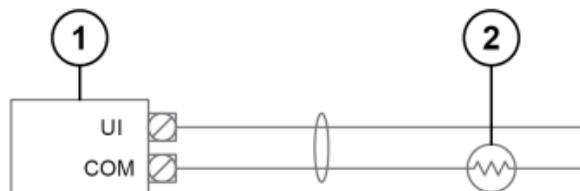


Figure 14: SM-16UI resistance input wiring



Callout	Description
1	SM-16UI
2	Thermistor, RTD, or potentiometer

Voltage input

Voltage input mode has a working range of 0 V to 10 V. The minimum input impedance is 10k Ω .

Figure 15: Voltage input wiring

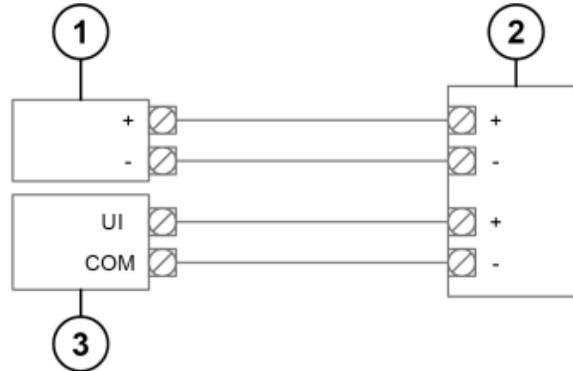


Callout	Description
1	SM-16UI
2	Field device

Current input

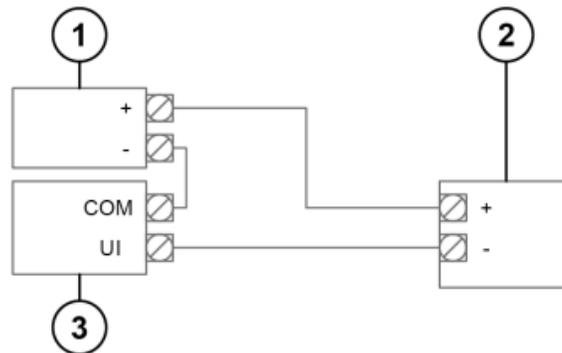
Current input mode has a working range of 0 mA to 20 mA. The current input impedance is 100 Ω.

Figure 16: Current input with internal source wiring



Callout	Description
1	Power supply
2	Field device
3	SM-16UI

Figure 17: SM-16UI current input with external source wiring



Callout	Description
1	Power supply
2	Field device
3	Controller

SM-8AO current / voltage output

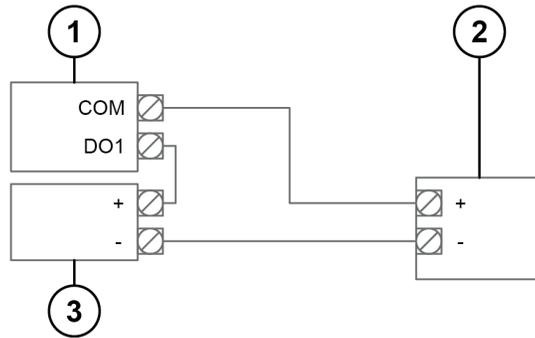
Figure 18: SM-8AO current or voltage output wiring



Callout	Description
1	SM-8AO
2	Field device

SM-8DO digital output

Figure 19: SM-8DO output wiring



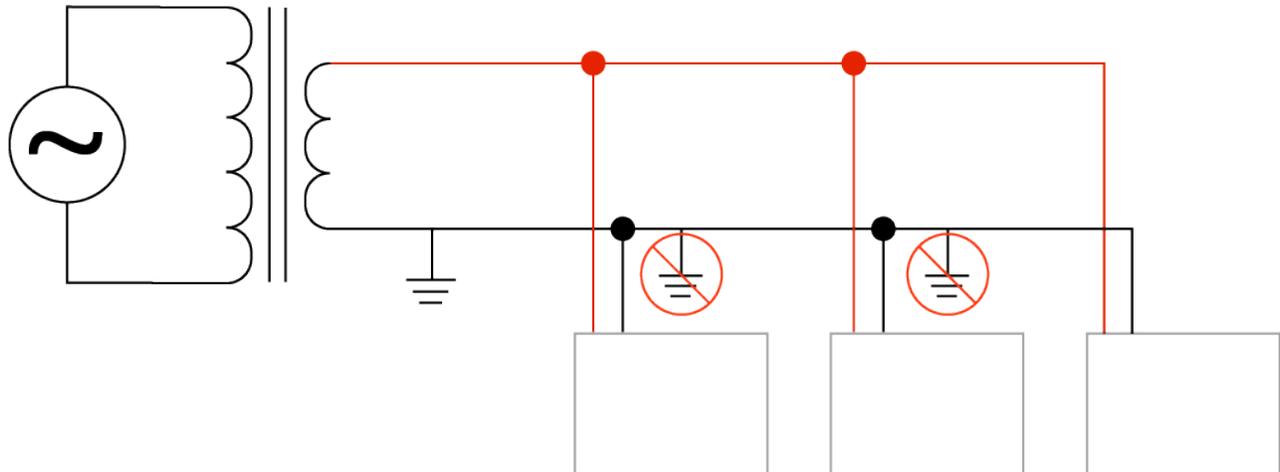
Callout	Description
1	SM-8DO
2	Field device
3	Power supply

Power supply terminal wiring

Connect the 24 VAC supply power wires from the transformer to the H and G power terminals as shown in [Figure 20](#).

- ❗ **Note:** The supply power wire colors may differ on transformers from other manufacturers. Refer to the transformer manufacturer’s instructions and the project installation drawings for wiring details.
- **Important:** To reduce noise, interference, and ground loop problems, connect a 24 VAC supply power to the module and to all other network devices so that transformer phasing is uniform across network devices. The module does not require an earth ground connection. However, when you need to ground the secondary of the 24 VAC transformer, make only one ground connection near the transformer. For more information, see the following figure.

Figure 20: Transformer grounding



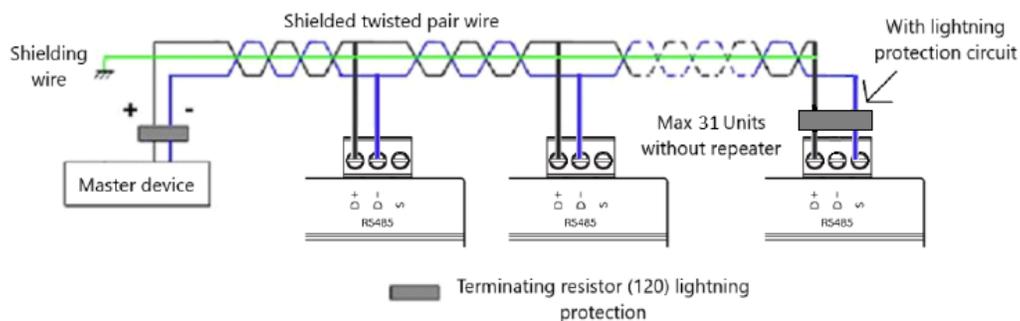
CAUTION

To avoid property damage, check all wiring connections before you apply power to the system. If you wire this terminal incorrectly, a short circuit can occur across the 24 VAC power supply on the module. A short circuit can cause a tripped circuit breaker or a blown fuse. If you use a transformer with a built-in fuse, you may need to replace the transformer.

Communication Module RS-485 bus terminals

You must terminate the RS-485 connection at both ends with a termination resistor, typically of 120 Ω. It is best practice to use shielded twisted pair wire (STP) for the wiring. For optimal performance, install a lightning protection circuit at one end of the wiring. Wire the controller in daisy chain network topology as shown in Figure 21. If you can avoid wire branch, keep it as short as possible, and never connect more than one device to the wire branch.

Figure 21: RS-485 wiring



RS-485 serial port settings

The Communication and Signal module comes with one RS-485 port, D+ and D-. The following table outlines the serial port configuration.

Table 2: RS 485 serial port settings

Port number	Protocol communications supported	Default serial port settings
RS485 port (D+, D-)	Modbus / BACnet®. Use DIP switch 8 to select a protocol. <ul style="list-style-type: none"> DIP 8 off = Modbus / BACnet DIP 8 on = Configuration mode 	Modbus
		Baud rate: 38.4 K
		Parity: none
		Data bits: 8
		Stop bit: 1 and 2
		BACnet
		Baud rate: 38.4 K

BACnet or Modbus selection and ID setting

Use the dual in-line package (DIP) switch to select the Modbus / BACnet or IO Manager configuration protocol. To select the IO Manager configuration mode, toggle switch 8 upwards to the **On** position. To select the Modbus / BACnet protocol, toggle switch 8 to the **Off** position.

Use the switches 1 to 7 to set the Modbus/BACnet address. Each of the switches 1 to 7 stand for a binary bit. Toggle the switches upwards to the **On** position to make that address digit 1 or leave it in the **Off** position to make that address digit 0. In [Table 3](#), the DIP switch configuration gives a device address of 0011101. If you convert this to a decimal representation, the device address is 29.

Table 3: Selecting DIP switch positions to assign device address

DIP switch number	Position
1	On (1)
2	Off (0)
3	On (1)
4	On (1)
5	On (1)
6	Off (0)
7	Off (0)

Communication and Signal Module LED states

The following table displays the Communication and Signal Module LED states:

Table 4: Communication and Signal Module LED states

LED label	LED color	Device	State	Description
ST	Green	CM-485	Slow blink at 1 Hz	Normal condition
		Signal modules	Slow blink at 1 Hz	Normal condition
			Rapid blink at 5 Hz	Bootloader mode
	Red	CM-485	Steady state	Internal error
			Slow blink at 1 Hz	Product test mode enabled
			Blink at 2 Hz	Occurs when you press the reset button and hold for 5 seconds. This indicates that configuration reset has occurred.
		Signal modules	Steady state	Internal error
			Slow blink at 1 Hz	Product test mode enabled
			Rapid blink at 5 Hz	Indicates error in bootloader mode
	Blue	CM-485	Slow blink at 1 Hz	Configuration mode
Rapid blink at 5 Hz			Configuration does not match that of connected devices	
Signal modules		Rapid blink at 5 Hz	Firmware is upgrading	
TX	Green	CM-485	Blink	Active communications
PW	Green	CM-485	Steady state	Power connected
		Signal modules		

Troubleshooting

Table 5: Troubleshooting

Problem	Cause	Solution
<p>The module does not turn on due to one of the following problems:</p> <ul style="list-style-type: none"> The transformer trips. Power is available at the transformer primary and there is no voltage at the secondary. The breaker or fuse trips. Power is available at the transformer primary. You find 24 V at the secondary and 0 V at the breaker or fuse. 	<ul style="list-style-type: none"> The transformer shorted. The 24 VAC powered sensor is not wired with the same polarity as the module. The RS-485 bus device is not wired with the same polarity as the module. 	<ol style="list-style-type: none"> Ensure that the polarity of ~24 V COM on the module, auxiliary devices, and input and output devices is the same. Verify that the short circuit is resolved with an ohm-meter. Reset the breaker or fuse, or replace the transformer. <ul style="list-style-type: none"> Note: If you replace the transformer, replace it with a model that uses a resettable circuit breaker. A circuit breaker makes it easier to solve wiring problems. To verify the connection, complete the following steps: <ol style="list-style-type: none"> Disconnect the secondary of the 24 VAC transformer. Use an ohm-meter to measure between ~24 V H and G at the module. Ensure that no short circuit occurs. <ul style="list-style-type: none"> Note: If your installation requires that you earth ground the transformer secondary, verify that the earth ground connection is valid and not shared between multiple pieces of equipment.

Technical specifications

Table 6: CM-485 Communication Module UL certified ratings

Description	Specification
Power supply	24V AC, plus 20% or minus 15%, 50 / 60 Hz
	24V DC, plus 20% or minus 15%
Power consumption	< 2VA
Current rating	< 200 mA, for Communication Module
	< 5 A, max power for IO Modules assembly
RS-485 ports	1 x RS485 Isolated

Table 7: CM-485 Communication Module technical specifications

Description	Specification	
Controller processor and memory specifications		
Main processor	250 Mhz ARM Cortex-M33	
Flash memory	512 KB	
RAM	272 KB	
Real-time clock	Yes	
Product temperature and humidity specifications		
Operating temperature	0°C to 50°C (32°F to 122°F)	
Storage temperature	-40°C to 70°C (-40°F to 158°F)	
Operating humidity	10% to 90% relative humidity, non-condensing	
Storage humidity	5% to 95% relative humidity, non-condensing	
Physical specifications		
Dimensions	40.8 mm x 104 mm x 79 mm (1.6 in. x 4.09 in. x 3.11 in.)	
Material	UL certified	
Weight	Communication module, 138 g	
	Cover, 29 g	
MTBF	10 years	
CASE	Plastic shell, snap connection, color film, LED power / working state display	
IP Class	IP 20	
Communication protocols		
BACnet / MSTP	Baud rate	9600, 19200, 38400, 76800, 115200
Modbus / RTU		9600, 19200, 38400, 57600, 115200

Table 8: SM-16UI Signal Module technical specifications

Description	Specification	
Controller processor and memory specifications		
Main processor	64 Mhz ARM Cortex-M0+	
Flash memory	512 KB	
RAM	144 KB	
Power consumption	<1VA	
Universal input (16 x UI)		
Voltage	0 V to 10 V, 2 V to 10 V	0.5% accuracy
Current	0 mA to 20 mA, 4 mA to 20 mA	
Resistance	300 Ω to 600k Ω	0.2% accuracy
Digital	Voltage free signal	NO / NC
Pulse count	Max 25 pulse each second	25 Hz, 50% duty
Product temperature and humidity specifications		
Operating temperature	0°C to 50°C (32°F to 122°F)	
Storage temperature	-40°C to 70°C (-40°F to 158°F)	

Table 8: SM-16UI Signal Module technical specifications

Description	Specification
Operating humidity	10% to 90% relative humidity, non-condensing
Storage humidity	5% to 95% relative humidity, non-condensing
Physical specifications	
Dimensions	23.8 mm x 104 mm x 79 mm (0.94 in. x 4.09 in. x 3.11 in.)
Material	UL certified
Weight	110 g
MTBF	10 years
CASE	Plastic shell, snap connection, color film, LED power / working state display
IP Class	IP 20

Table 9: SM-16DI Signal Module technical specifications

Description	Specification
Controller processor and memory specifications	
Main processor	64 Mhz ARM Cortex-M0+
Flash memory	512 KB
RAM	144 KB
Power consumption	<2VA
Digital input (16 x DI)	
Digital	Voltage free signal
Pulse count	Max 25 pulse each second
	NO / NC
	25 Hz, 50% duty
Product temperature and humidity specifications	
Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating humidity	10% to 90% relative humidity, non-condensing
Storage humidity	5% to 95% relative humidity, non-condensing
Physical specifications	
Dimensions	23.8 mm x 104 mm x 79 mm (0.94 in. x 4.09 in. x 3.11 in.)
Material	UL certified
Weight	108 g
MTBF	10 years
CASE	Plastic shell, snap connection, color film, LED power / working state display
IP Class	IP 20

Table 10: SM-8AO Signal Module technical specifications

Description	Specification
Controller processor and memory specifications	
Main processor	64 Mhz ARM Cortex-M0+
Flash memory	512 KB
RAM	144 KB

Table 10: SM-8AO Signal Module technical specifications

Description	Specification
Power consumption	<10VA
Analog output (8 x AO)	
Voltage	0 V to 10 V, 2 V to 10 V
Current	0 mA to 20 mA, 4 mA to 20 mA
1% accuracy	
Product temperature and humidity specifications	
Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating humidity	10% to 90% relative humidity, non-condensing
Storage humidity	5% to 95% relative humidity, non-condensing
Physical specifications	
Dimensions	23.8 mm x 104 mm x 79 mm (0.94 in. x 4.09 in. x 3.11 in.)
Material	UL certified
Weight	104 g
MTBF	10 years
CASE	Plastic shell, snap connection, color film, LED power / working state display
IP Class	IP 20

Table 11: SM-8DO Signal Module technical specifications

Description	Specification
Controller processor and memory specifications	
Main processor	64 Mhz ARM Cortex-M0+
Flash memory	512 KB
RAM	144 KB
Power consumption	<8VA
Digital output (8 x DO)	
Voltage	24V AC/DC, 1A
Product temperature and humidity specifications	
Operating temperature	0°C to 50°C (32°F to 122°F)
Storage temperature	-40°C to 70°C (-40°F to 158°F)
Operating humidity	10% to 90% relative humidity, non-condensing
Storage humidity	5% to 95% relative humidity, non-condensing
Physical specifications	
Dimensions	23.8 mm x 104 mm x 79 mm (0.94 in. x 4.09 in. x 3.11 in.)
Material	UL certified
Weight	110 g
MTBF	10 years

Table 11: SM-8DO Signal Module technical specifications

Description	Specification
CASE	Plastic shell, snap connection, color film, LED power / working state display
IP Class	IP 20

Compliance

Table 12: CM-485, SM-16UI, SM-16DI, SM-8AO, SM-8DO Compliance

North America: UL 916 Energy Management Equipment; FCC Class B, Part 15, Subpart B
<p>FCC</p> <p>This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:</p> <p>(1) This device may not cause interference.</p> <p>(2) This device must accept any interference, including interference that may cause undesired operation of the device.</p> <p>L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :</p> <p>1) L'appareil ne doit pas produire de brouillage;</p> <p>2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.</p>
CE Compliant
<p>UKCA</p> <p>Directive Electromagnetic Compatibility Regulations 2016: BS EN 55032:2015+A11:2020, BS EN IEC 61000-3-2:2019+A1:2021, BS EN 61000-3-3:2013+A1:2019+A2:2021, BS EN 55035:2017+A11:2020</p>

Table 13: RoHS hazardous substance listing

Part name	Hazardous substances					
-	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Plastic parts	O	O	O	O	O	O
PCBA	X	O	O	O	O	O
Metal parts	O	O	O	O	O	O

This table is made in accordance with the SJ/T 11364.

○: Indicates that concentration of hazardous substance in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that concentration of hazardous substance in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Contact information

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Contact Johnson Controls: www.johnsoncontrols.com/contact-us

Patents

Patents: <https://jciapat.com>

Single point of contact

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