FAC4911 Advanced Application Field Equipment Controller Installation Guide

Part No. 24-10143-1086 Rev. C

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Application

The FAC4911 Advanced Application Field Equipment Controller is part of the *Metasys*® system Field EquipmentController family. The FAC4911 equipment controllers run pre-engineered and user-programmed applications, and provide the inputs and outputs required to monitor and control a wide variety of HVAC equipment.

FAC4911 controllers operate on BACnet®/IP networks and integrate into Johnson Controls® and third-party systems. The controllers include an integral real-time clock, which enables the controllers to monitor and control schedules, calendars, and trends, and operate for extended periods of time as stand-alone controllers when offline from the *Metasys* system network.

The *Metasys* system FAC family controllers and network sensors communicate using the BACnet protocol. The BACnet protocol is a standard for ANSI, ASHRAE, and the International Standards Organization (ISO) for building controls. FAC equipment controllers are BTL-listed and certified as BACnet Advanced Application Controllers (B-AACs).

North American emissions compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the users will be required to correct the interference at their own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Installation

Observe the following guidelines when installing a field controller:

- To minimize vibration and shock damage, transport the controller in the original container.
- Verify that all parts shipped with the controller.
- Do not drop the controller or subject it to physical shock.

Parts included

- One field Controller. (Power and SA bus terminal blocks are removable)
- One installation instructions sheet.

Materials and special tools needed

- Three fasteners appropriate for the mounting surface (M4 screws or #8 screws)
- One 23 cm (9.125 in.) or longer piece of 35 mm DIN rail and appropriate hardware for DIN rail mount (only)
- Small straight-blade screwdriver for securing wires in the terminal blocks

FAC4911 physical features

The following figure displays the physical features of FAC4911, and the accompanying table provides a description of the physical features and a reference to further information where required.

Figure 1: Physical Features

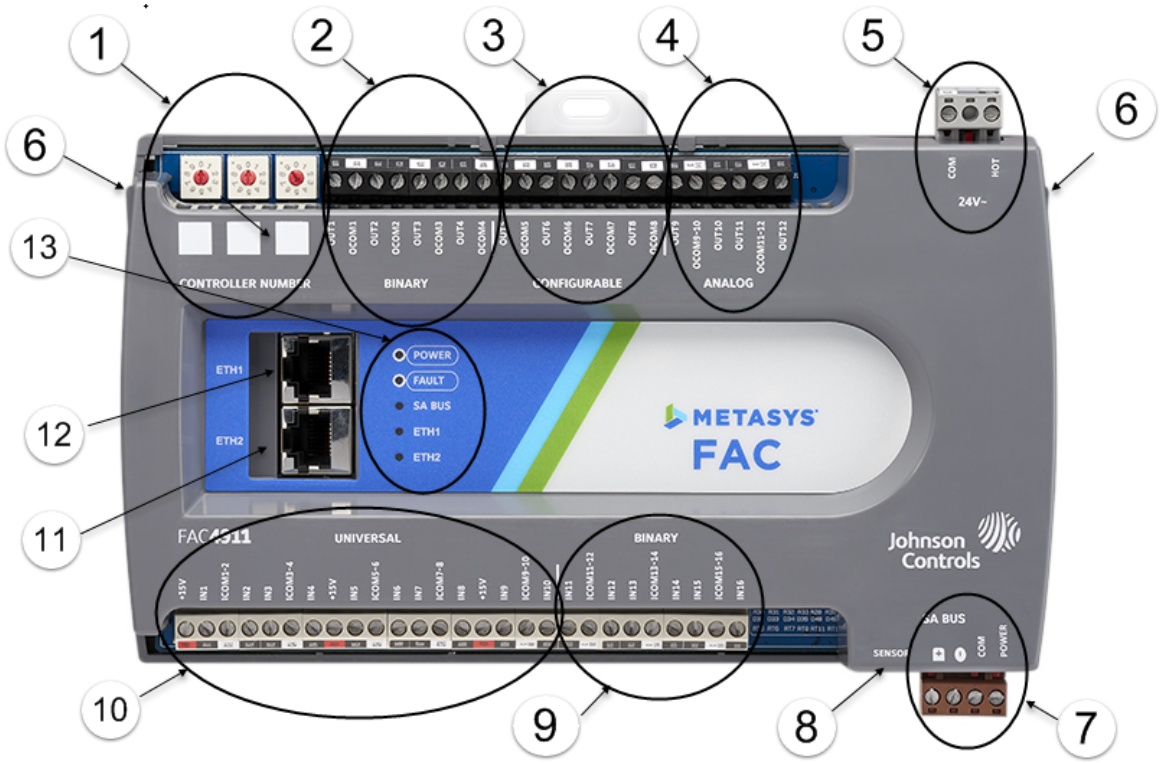


Table 1: Physical features

	Physical feature: description and references
1	Controller Number Rotary Switches: can be numbered from 000 to 999 (see Setting the Controller Number)
2	Binary Outputs (BO) Terminal Block: 24 VAC Triac (see I/O terminal blocks, ratings, and requirements)
3	Configurable Outputs (CO) Terminal Block: 0–10 VDC or 24 VAC Triac (see I/O terminal blocks, ratings, and requirements)
4	Analog Output (AO) Terminal Block: Can be defined as Voltage Analog Output (0–10 VDC) or Current Analog Output (4–20 mA) (see I/O terminal blocks, ratings, and requirements)
5	24 VAC, Class 2/SELV Supply Power Terminal Block (see Supply power terminal block).
6	Cover Lift Tab (One of Two)
7	LED Status Indicators (see Troubleshooting Field Controllers)
8	SA Bus Terminal Block (see SA bus terminal block)
9	Sensor Port: (SA Bus) RJ-12 6-Pin Modular Jack (see SA bus terminal block)
10	Binary Input (BI) Terminal Block: Dry Contact Maintained or Pulse Counter/Accumulator Mode (see I/O terminal blocks, ratings, and requirements)

Table 1: Physical features

	Physical feature: description and references
11	Universal Inputs (UI) Terminal Block: Can be defined as Voltage Analog Input (0–10 VDC), Current Analog Input (4–20 mA), Resistive Analog Inputs (0–600kΩ), or Dry Contact Binary Input (see Input and output wiring guidelines)
12	ETH2 Ethernet Port for BACnet IP Communications
13	ETH1 Ethernet Port for BACnet IP Communications

FAC4911 model information (including point type counts)

Table 2: FAC4911 model information (including point type counts)

Communication Protocol		BACnet/IP
Engines		Engines NAE55, NAE85, ODS
Modular Jacks		6-Pin SA Bus with four communicating sensors
Point Types	**Signals Accepted**	**Number of Points**
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA Analog Input, Resistive Mode, 0–2k ohm, resistance temperature detector (RTD) (1k NI [Johnson Controls], 1k PT, A99B SI), negative temperature coefficient (NTC) (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode	10
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	6
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Current Mode, 4–20 mA	4
Binary Output (BO)	24 VAC Triac	4
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	4

Mounting

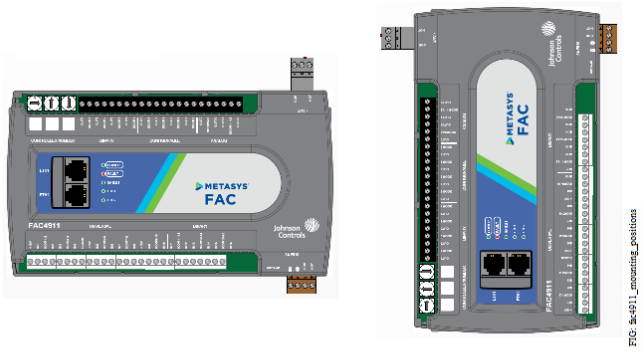
Observe the following guidelines when mounting a field controller:

- Ensure the mounting surface can support the controller, DIN rail, and any user-supplied enclosure.
- Mount the controller horizontally on 35 mm DIN rail whenever possible.
- Mount the controller in the correct mounting position (Figure 2).
- Whenever possible in wall-mount applications, mount the controller on a hard, even surface.
- Use shims or washers to mount the controller securely and evenly on the mounting surface.
- Mount the controller in an area free of corrosive vapors and observe the ambient conditions requirements in Technical specifications.
- Provide sufficient space around the controller for cable and wire connections, easy cover removal, and good ventilation through the controller (50 mm [2 in.] minimum on the top, bottom, and front of the controller).
- Do not mount the controller on surfaces prone to vibration, such as ductwork.
- Do not mount the controller in areas where electromagnetic emissions from other devices or wiring can interfere with controller communication.

Observe these additional guidelines when mounting a field controller in a panel or enclosure:

- Mount the controller so that the enclosure walls do not obstruct cover removal or ventilation through the controller.
- Mount the controller so that the power transformer and other devices do not radiate excessive heat to the controller.
- Do not install the controller in an airtight enclosure.

Figure 2: Controller Mounting Positions



Horizontal Mount Position
Preferred for Wall Mounting
Required for DIN Rail Mounting

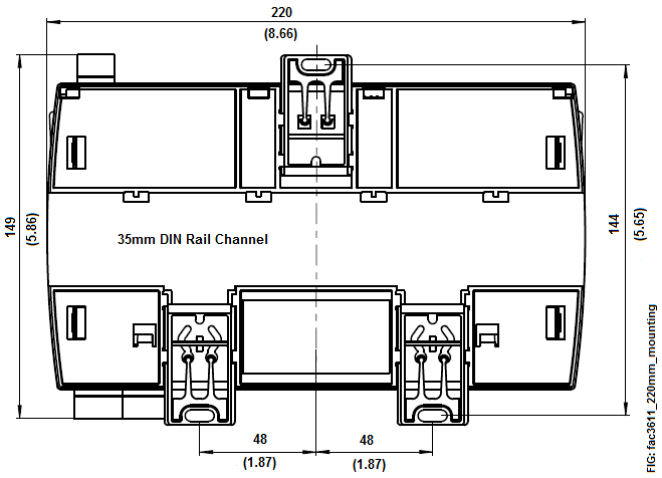
Vertical Mount Position
Acceptable for Wall Mounting

Mounting Features and Dimensions

See Figure 3 for mounting dimensions in millimeters and inches. Inches are listed in parenthesis. Figure 3 also

illustrates the DIN rail channel and the mounting clips in an extended position.

Figure 3: Back of Controller



DIN Rail mount applications

Mounting the field controller horizontally on 35 mm DIN rail is the preferred mounting method.
To mount a field controller on 35 mm DIN rail, complete the following steps:

1. Securely mount a 23 cm (9.125 in.) or longer section of 35 mm DIN rail, horizontally and centered in the desired space, so that the controller mounts in the position shown in Figure 2.
2. Pull the two bottom mounting clips outward from the controller to the extended position (Figure 3).
3. Hang the controller on the DIN rail by the hooks at the top of the (DIN rail) channel on the back of the controller (Figure 3), and position the controller snugly against the DIN rail.
4. Push the bottom mounting clips inward (up) to secure the controller on the DIN rail.

To remove the controller from the DIN rail, pull the bottom mounting clips out to the extended position and carefully lift the controller off the DIN rail.

Wall mount applications

To mount a field controller directly on a wall or other flat vertical surface, complete the following steps:

1. Pull the two bottom mounting clips outward and ensure they are locked in the extended position.
2. Mark the mounting hole locations on the wall in either the horizontal or vertical mounting position. Or hold the controller up to the wall or surface in a proper mount position and msark the hole locations through the mounting clips.
3. Drill holes in the wall or surface at the marked locations, and insert appropriate wall anchors in the holes (if necessary).
4. Hold the controller in place, and insert the screws through the mounting clips and into the holes (or anchors). Carefully tighten all of the screws.

➤ **Important:** Do not overtighten the mounting screws. Overtightening the screws may damage the mounting clips.

Wiring

CAUTION

Risk of Electric Shock:

Disconnect the power supply before making electrical connections to avoid electric shock

ATTENTION

Mise En Garde: Risque de décharge électrique

Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

CAUTION

Risk of Property Damage:

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

ATTENTION

Mise En Garde: Risque de dégâts matériels

Ne pas mettre le système sous tension avant d'avoir vérifié tous les raccords de câblage. Des fils formant un court-circuit ou connectés de façon incorrecte risquent d'endommager irrémédiablement l'équipement.

➤ **Important:** Do not exceed the controller electrical ratings. Exceeding controller electrical ratings can result in permanent damage to the controller and void any warranty.

- **Important:** Use copper conductors only. Make all wiring in accordance with local, national, and regional regulations.
- **Important:** Electrostatic discharge can damage controller components. Use proper electrostatic discharge precautions during installation, setup, and servicing to avoid damaging the controller.

For detailed information about configuring and wiring an MS/TP bus, FC bus and SA bus, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

Network topology

FAC4911 controllers may be connected to a building automation network in multiple ways: as daisy-chained devices, as part of a star (also called home run) network, or as part of a ring network.

To daisy-chain FAC4911 controllers, connect the controllers to the bus supervisor in a chain with the Ethernet cable connecting to the FAC4911 at the ETH1 or ETH2 port and connecting to the next device from the other port. Benefits of daisy-chained networks are that they require less physical wiring and new devices can be added easily to the network.

In a star network, each FAC4911 controller is connected directly back to a main switch. This configuration reduces the possibility of network failure but requires more wiring to install.

A ring network is a chain of controllers virtually closed by a software component in an Ethernet switch. Not all switches support the ring topology. The dual-port controller from Johnson Controls supports Media Redundancy Protocol (MRP). MRP allows a chain of Ethernet devices to overcome any single communication failure, with a recovery time faster than in a BACnet system.

For more information about network topologies for the BACnet/IP Controllers, refer to the *Metasys IP Networks for BACnet/IP Controllers Configuration Guide Technical Bulletin (LIT-12012458)*.

Terminal blocks and bus ports

See for terminal block and bus port locations on the controller. Observe the following guidelines when wiring a controller.

Input and Output terminal blocks

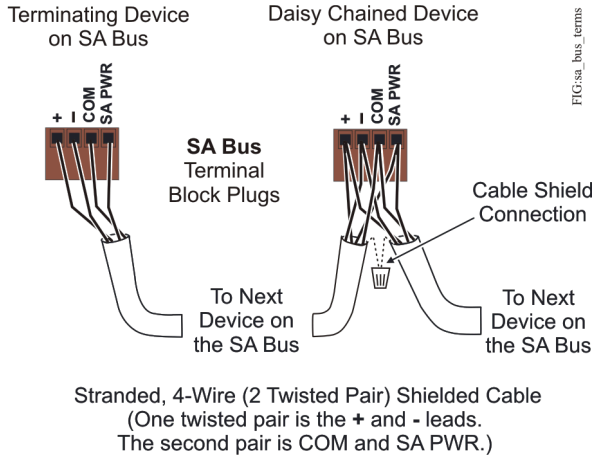
The fixed input terminal blocks are located on the bottom of the controller, and the output terminal blocks are located on the top of the controller. See Table for more information about I/O terminal functions, requirements, and ratings.

SA bus terminal block

The SA Bus terminal block is a brown, removable, 4-terminal plug that fits into a board-mounted jack.

Wire the removable SA Bus terminal block plugs on the controller, and other SA bus devices in a daisy-chain configuration using 4-wire twisted, shielded cable as shown in Figure 4. For more information about the SA Bus terminal function, requirements, and ratings, see .

Figure 4: SA bus terminal block wiring



Note: The SA PWR terminal supplies 15 VDC. The SA PWR terminal can be used to connect (daisy chain) the 15 VDC power leads on the SA bus.

SA Bus Port

The Sensor (SA Bus) port on the bottom of the controller is an RJ-12, 6-position modular jack that provides a connection for the Wireless Commissioning Converter, the VAV Balancing Tool, specified network sensors, or other SA Bus devices with RJ-12 plugs. When the FEC is configured for N2 network communication, the SA Bus port must be used to download and commission the controller.

A DIS1710 Local Controller Display also can be connected to the SA Bus port.

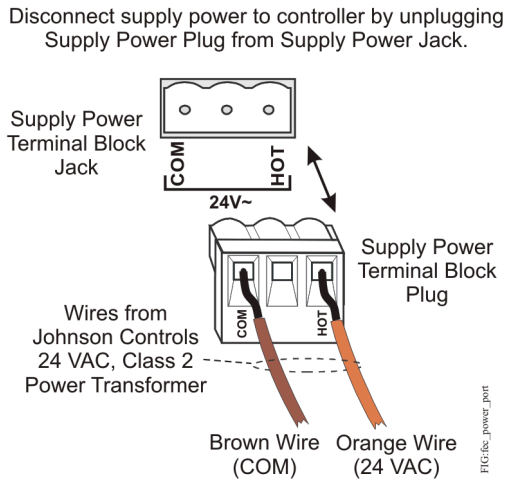
The Sensor port is connected internally to the SA bus terminal block.

Supply power terminal block

The 24 VAC supply power terminal block is a gray, removable, 3-terminal plug that fits into a board-mounted jack on the top right of the controller.

Wire the 24 VAC supply power wires from the transformer to the HOT and COM terminals on the terminal plug as shown in Figure 5. Do not use the middle terminal on the supply power terminal block. See for more information about the Supply Power Terminal Block.

Figure 5: 24 VAC supply power terminal block wiring



Note: The supply power wire colors may be different on transformers from other manufacturers. Refer to the transformer manufacturer's instructions and the project installation drawings for wiring details.

Important: Connect 24 VAC supply power to the field controller and all other network devices so that transformer phasing is uniform across the network devices. Powering network devices with uniform 24 VAC supply power phasing reduces noise, interference, and ground loop problems. The field controller does not require an earth ground connection.

Terminal Wiring Guidelines, Functions, Ratings, and Requirements

Input and output wiring guidelines

The following table provides information and guidelines about the functions, ratings, and requirements for the controller input and output terminals; and references guidelines for determining proper wire sizes and cable lengths.

In addition to the wiring guidelines in the following table, observe these guidelines when wiring controller inputs and outputs:

- Run all low-voltage wiring and cables separate from high-voltage wiring.
- All input and output cables, regardless of wire size or number of wires, should consist of stranded, insulated, and twisted copper wires.
- Shielded cable is not required for input or output cables.
- Shielded cable is required for input and output cables that are exposed to high electromagnetic or radio frequency noise.
- Inputs or outputs with cables less than 30 m (100 ft) typically do not require an offset in the software setup. Cable runs over 30 m (100 ft) may require an offset in the input/output software setup.

I/O terminal blocks, ratings, and requirements

Table 3: I/O terminal blocks, functions, ratings, requirements, and cables

Terminal block label	Terminal label	Function, ratings, requirements	Determine wire size and maximum cable length
UNIVERSAL (Inputs)	**+15 V**	**15 VDC Power Source** for active (3-wire) input devices connected to the Universal IN*n* terminals. Provides 100 mA total current	Same as (Universal) **IN***n* **Note:** Use 3-wire cable for devices that source power from the +15V terminal.
	IN*n*	**Analog Input - Voltage Mode (0–10 VDC)** 10 VDC maximum input voltage Internal 75kΩ pull-down	See Guideline **A** in Table .
		Analog Input - Current Mode (4–20 mA) Internal 100 Ω load impedance. See . **Note:** A current loop fail-safe jumper must be in the Enable position to maintain a closed 4 to 20 mA current loop. See .	See Guideline **B** in Table .
		Analog Input - Resistive Mode (60–600kΩ) Internal 12 V. 15k Ω pull-up Qualified Sensors: 0–2kΩ potentiometer, RTD (1k Nickel [Johnson Controls sensor], 1k Platinum, and A99B Silicon Temperature Sensor) Negative Temperature Coefficient (NTC) Sensor	See Guideline **A** in Table .
		Binary Input - Dry Contact Maintained Mode 1 second minimum pulse width Internal 12 V. 15kΩ pull-up	See Guideline **A** in Table .
	ICOM*n*	**Universal Input Common** for all Universal Input terminals **Note:** All Universal ICOM*n* terminals share a common, which is isolated from all other commons, except the SA bus common. One common screw terminal point is provided for every two input screw terminal points.	Same as (Universal) **IN***n*
BINARY (Inputs)	**IN***n*	**Binary Input - Dry Contact Maintained Mode** 0.01 second minimum pulse width Internal 18 V. 3k Ω pull-up	See Guideline **A** in Table .
		Binary Input - Pulse Counter/Accumulator Mode 0.01 second minimum pulse width (50 Hz at 50% duty cycle) Internal 18 V. 3kΩ pull-up	
	ICOM*n*	**Binary Input Common** for all Binary Input (IN) terminals **Note:** All Binary ICOM*n* terminals share a common, which is isolated from all other commons.	

Table 3: I/O terminal blocks, functions, ratings, requirements, and cables

Terminal block label	Terminal label	Function, ratings, requirements	Determine wire size and maximum cable length
ANALOG (Outputs)	O	**Analog Output - Voltage Mode (0–10 VDC)** 10 VDC maximum output voltage 10 mA maximum output current Requires an external load of 1,000 Ω or more. ⓘ **Note:** The Analog Output (AO) operates in the Voltage Mode when connected may not operate as intended for Voltage Mode applications.	See Guideline **C** in Table .
		. ⓘ **Note:** The Analog Output (AO) operates in the Current Mode when connected to devices with impedances less than 300 Ω. Devices that exceed below 300 Ω may not operate as intended for Current Mode applications.	
	OCOM*n*	**Analog Output Signal Common** for all Analog OUT terminals. ⓘ **Note:** All Analog Output Common terminals (OCOM*n*) share a common, which is isolated from all other commons. One common screw terminal point is provided for every two output screw terminal points.	
BINARY (Output)	**OUT***n*	**Binary Output - 24 VAC Triac** Class 2, 24 V, 500 mA (External Power Source) Connects OUT*n* to OCOM*n* when activated. External Power Source Requirements: 30 VAC maximum output voltage 0.5 A maximum output current 1.3 A at 25% duty cycle 40 mA minimum load current	See Guideline **C** in Table .
	OCOM*n*	**Binary Output Common** (for OUT*n* terminal) ⓘ **Note:** Each Binary Output Common terminal (OCOM*n*) is isolated from **all** other commons, including other Binary Output Common terminals.	
CONFIGURABLE (Output)	**OUT***n*	**Analog Output - Voltage Mode (0–10 VDC)** 10 VDC maximum output voltage or more.	See Guideline **A** in Table
		Binary Output - 24 VAC Triac (External Power Source only) Connects OUTn to OCOMn when activated. External Power Source Requirements: 30 VAC maximum output voltage 0.5 A maximum output current 1.3 A at 25% duty cycle 40 mA minimum load current	See Guideline **C** in Table
	OCOM*n*	**Analog and Binary Output Signal Common** All Configurable Outputs (COs) defined as Binary Outputs are isolated from all other commons, including other CO commons.	Same as (Configurable) **OUT***n*

Cable and wire length guidelines

The following table defines cable length guidelines for the various wire sizes that may be used for wiring low-voltage (<30 V) input and outputs.

Note: The required wire sizes and lengths for high-voltage (>30 V) Relay Outputs are determined by the load connected to the relay, and local, national, or regional electrical codes.

Table 4: Cable length guidelines for recommended wire sizes for low-voltage (<30 V) Inputs and Outputs

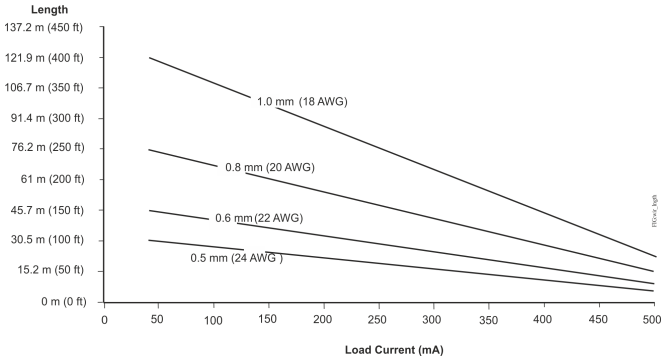
	Wire size/Gauge and type	Maximum cable length and type	Assumptions
A	1.0 mm (18 AWG) stranded copper	457 m (1,500 ft) twisted wire	100 mV maximum voltage drop Depending on cable and the connected input or output device, you may have to define an offset in the setup software for the input or output point.
	0.8 mm (20 AWG) stranded copper	297 m (975 ft) twisted wire	
	0.6 mm (22 AWG) stranded copper	183 m (600 ft) twisted wire	
	0.5 mm (24 AWG) stranded copper	107 m (350 ft) twisted wire	
B	1.0 mm (18 AWG) stranded copper	229 m (750 ft) twisted wire	100 mV maximum voltage drop Depending on cable and the connected input or output device, you may have to define an offset in the setup software for the input or output point.
	0.8 mm (20 AWG) stranded copper	137 m (450 ft) twisted wire	
	0.6 mm (22 AWG) stranded copper	91 m (300 ft) twisted wire	
	0.5 mm (24 AWG) stranded copper	61 m (200 ft) twisted wire	
C	See Figure 6 to select wire size/gauge. Use stranded copper wire	See Figure 6 to determine cable length. Use twisted wire cable.	N/A

Maximum cable length versus load current

Use Figure 6 to estimate the maximum cable length relative to the wire size and the load current (in mA) when wiring inputs and outputs.

Note: Figure 6 applies to low-voltage (<30 V) inputs and outputs only.

Figure 6: Maximum wire length for low-voltage (<30 V) Inputs and Outputs by current and wire size



Communications bus and supply power wiring guidelines

The provides information about the functions, ratings, and requirements for the communication bus and supply power terminals. The table also provides guidelines for wire sizes, cable types, and cable lengths for when you wire the controller's communication buses and supply power.

In addition, observe these guidelines when you wire an SA or FC bus and the 24 VAC supply power:

- Run all low-voltage wiring and cables separate from high-voltage wiring.
- All SA and FC bus cables, regardless of wire size, should be twisted, insulated, stranded copper wire.
- Shielded cable is strongly recommended for all SA and FC bus cables.
- Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)* for detailed information regarding wire size and cable length requirements for SA and FC buses.

Communications Bus and supply power terminal blocks, ratings, and requirements

Table 5: Communications Bus and supply power terminal blocks, functions, ratings, requirements, and cables

Terminal block/Port label	Terminal labels	Function, electrical ratings/ requirements	Recommended cable type
SA BUS	**+** **-**	SA Bus Communications	0.6 mm (22 AWG) stranded, 4-wire (2 twisted-pairs), shielded cable recommended. ⓘ **Note:** The + and - wire are one twisted pair, and the COM and SA PWR are the second twisted pair of wires.
	COM	SA Bus Signal Reference and 15 VDC Common	
	SA PWR	15 VDC Supply Power for Devices on the SA Bus (Maximum total current draw for SA Bus is 240 mA.)	
Sensor (Port)	**Sensor**	RJ-12 6-Position Modular Connector provides: SA Bus Communications SA Bus Signal Reference and 15 VDC Common 15 VDC Power for devices on the SA bus and BTCVT	24 AWG 3-pair CAT3 cable <30.5 m (100 ft)
Ethernet (Ports)	**ETH1** **ETH2**	Connect to BACnet IP Network	Ethernet ports; 10/100 Mbps; 8-pin RJ-45 connector
24~	**HOT**	**24 VAC Power Supply - Hot** Supply 20–30 VAC (Nominal 24 VAC)	0.8 mm to 1.0 mm (18 AWG) 2-wire
	COM	**24 VAC Power Supply Common** (Isolated from all other Common terminals on controller) 14 VA	

ⓘ **Note:** The SA Bus wiring recommendations are for MS/TP bus communications at 38.4k baud. For more information, refer to the .

ⓘ **Note:** The MAP Gateway serves as a replacement for the BTCVT, which is no longer available for purchase, but continues to be supported.

Termination diagrams

A set of Johnson Controls termination diagrams provides details for wiring inputs and outputs to the controllers.

See the figures in this section for the applicable termination diagrams.

Table 6: Termination details

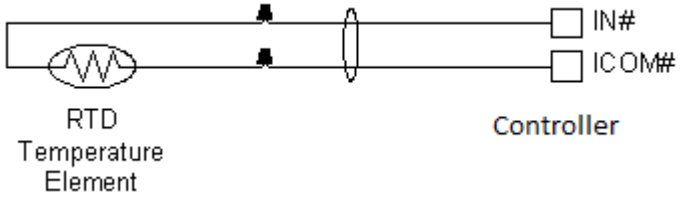
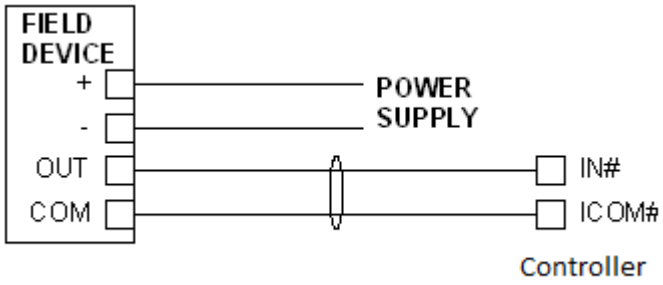
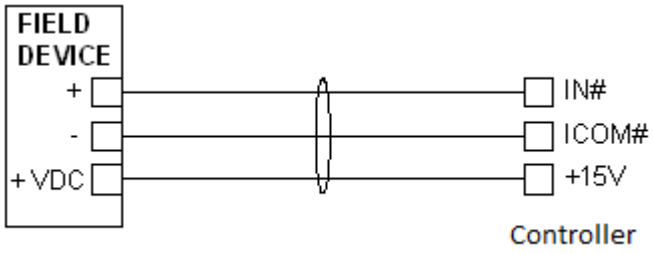
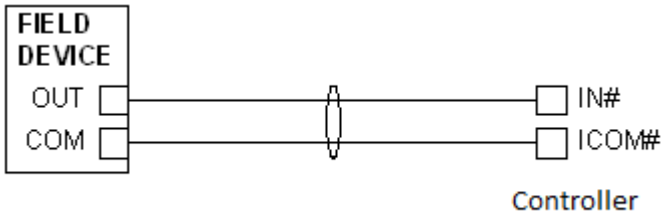
Type of field device	Type of Input/ Output	Termination diagrams
Temperature Sensor	UI	
Voltage Input - External Source	UI	
Voltage Input - Internal Source	UI	
Voltage Input (Self-Powered)	UI	

Table 6: Termination details

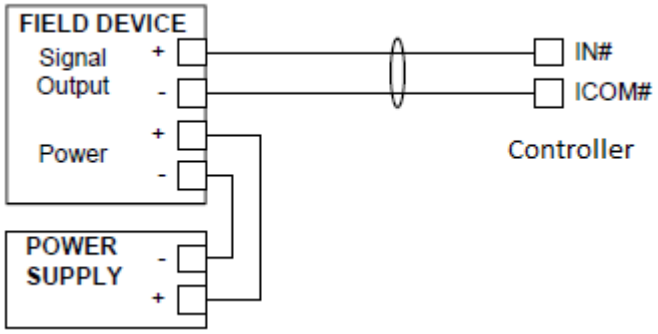
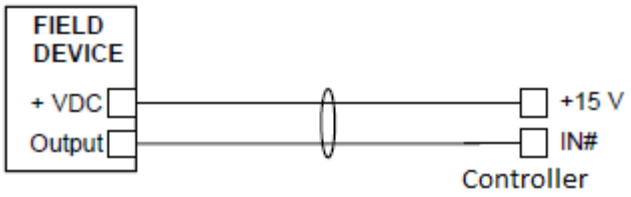
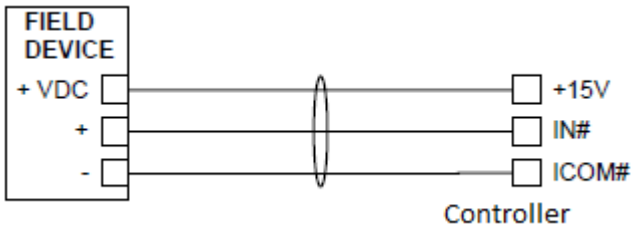
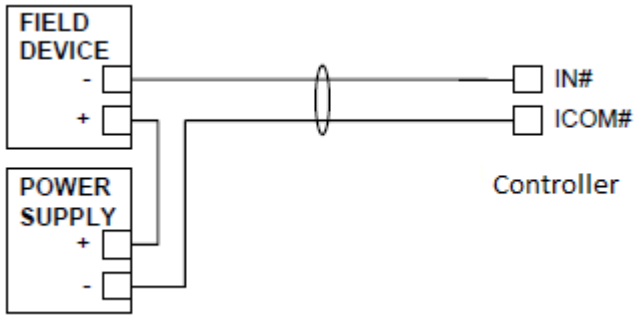
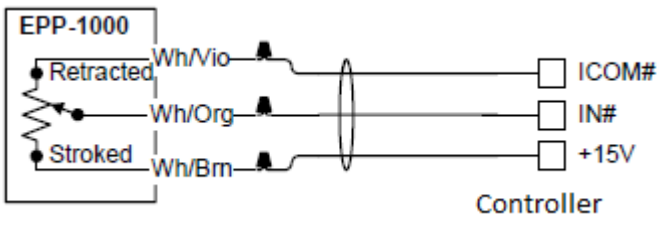
Type of field device	Type of Input/ Output	Termination diagrams
Current Input - External Source (Isolated)	UI	
Current Input - Internal Source (2-wire)	UI	
Current Input - Internal Source (3 wire)	UI	
Current Input - External Source (in Loop)	UI	
Feedback from EPP-1000	UI	

Table 6: Termination details

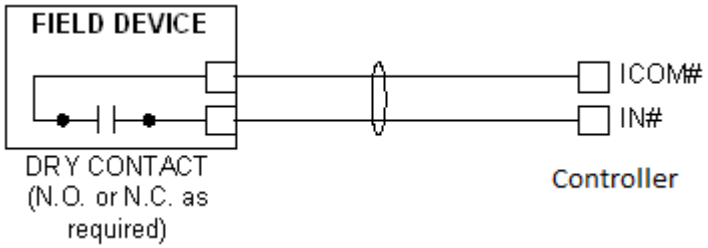
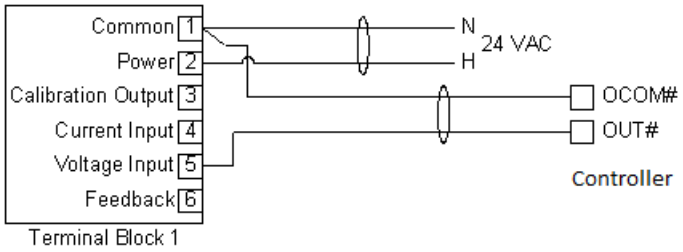
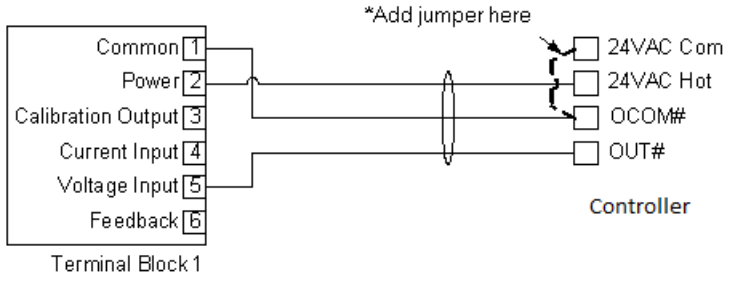
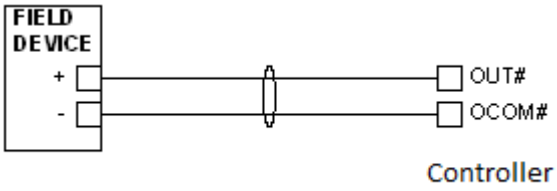
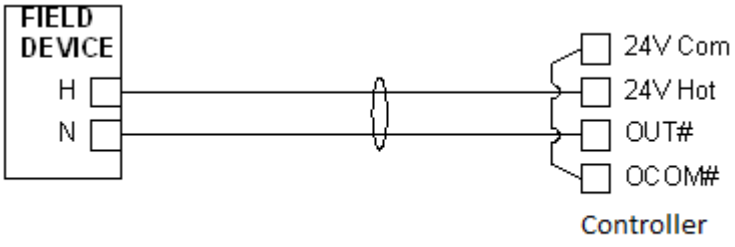
Type of field device	Type of Input/ Output	Termination diagrams
Dry Contact (Binary Input)	UI or BI	
0–10 VDC Output to Actuator (External Source)	CO or AO	
0–10 VDC Output to Actuator (Internal Source)	CO or AO	
Current Output	CO or AO	
24 VAC Triac Output (Switch Low, External Source)	CO or AO	

Table 6: Termination details

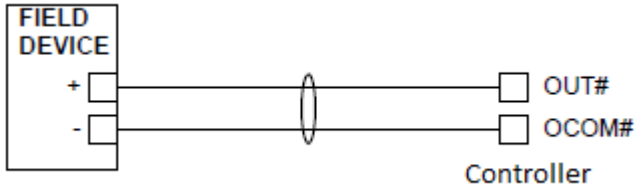
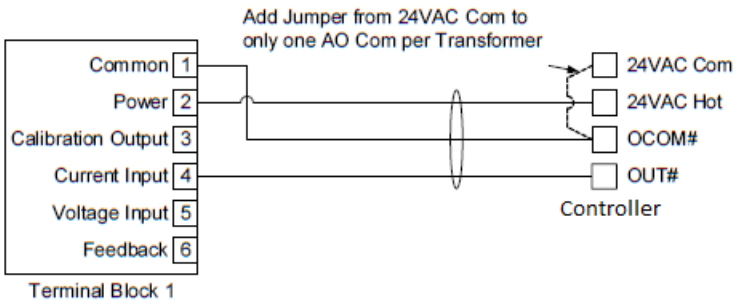
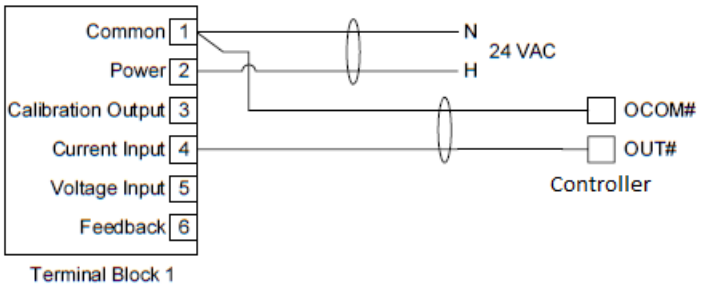
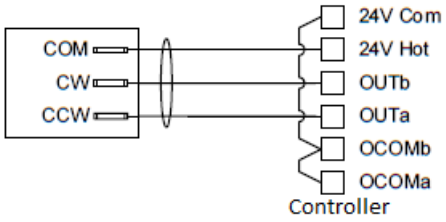
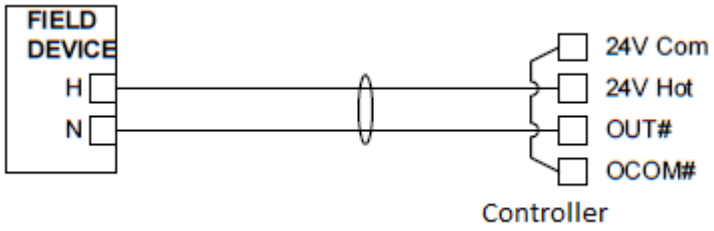
Type of field device	Type of Input/ Output	Termination diagrams
Analog Output (Current)	AO	
4–20 mA Output to Actuator	AO	
4–20 mA Output to Actuator	AO	
Incremental Control to Actuator (Switch Low, Externally Sourced)	BO	
24 VAC Binary Output (Switch Low, Externally Sourced)	BO	

Table 6: Termination details

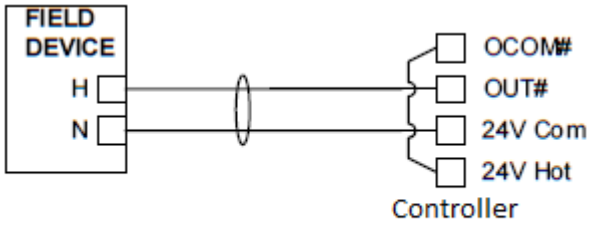
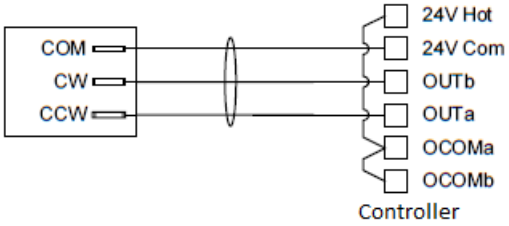
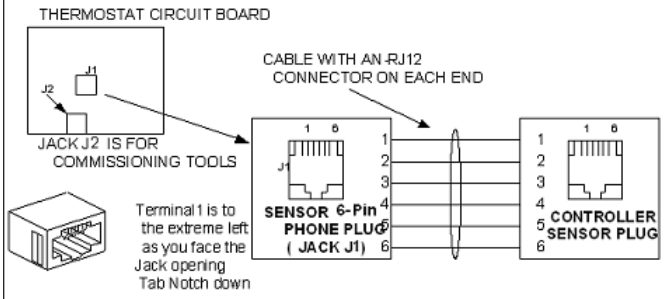
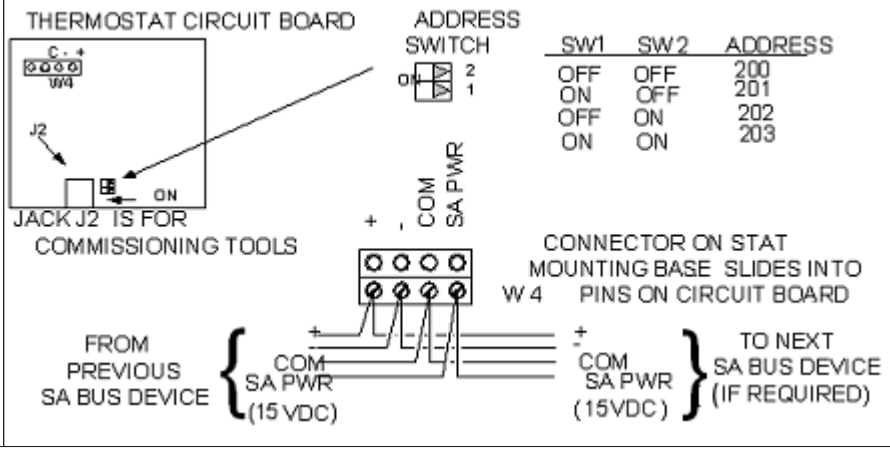
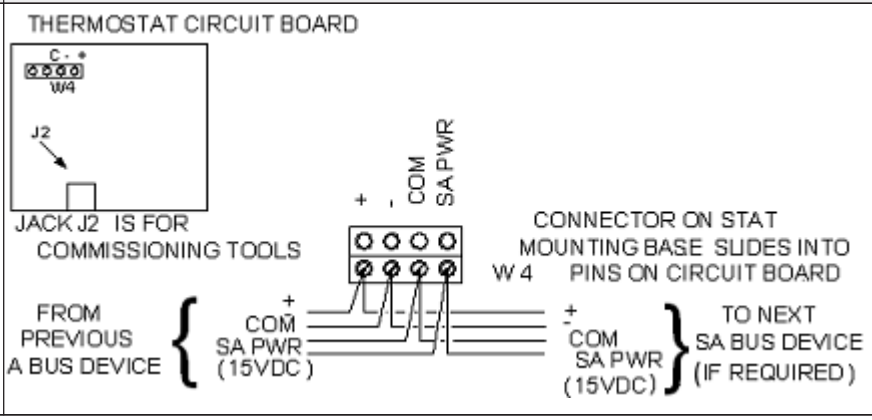
Type of field device	Type of Input/ Output	Termination diagrams
24 VAC Binary Output (Switch High, Externally Sourced)	BO	
Incremental Control to Actuator (Switch High, Externally Sourced)	BO	
Network Stat with Phone Jack (Fixed Address = 199)	SA Bus	 **Note:** The bottom jack (J2) on the TE-700 and TE-6x00 Series Sensors is not usable as a zone bus or an SAB connection.
Network Stat with Terminals Addressable	SA Bus	

Table 6: Termination details

Type of field device	Type of Input/ Output	Termination diagrams
Network Stat with Terminals (Fixed Address = 199)	SA Bus	

Setup and Adjustments

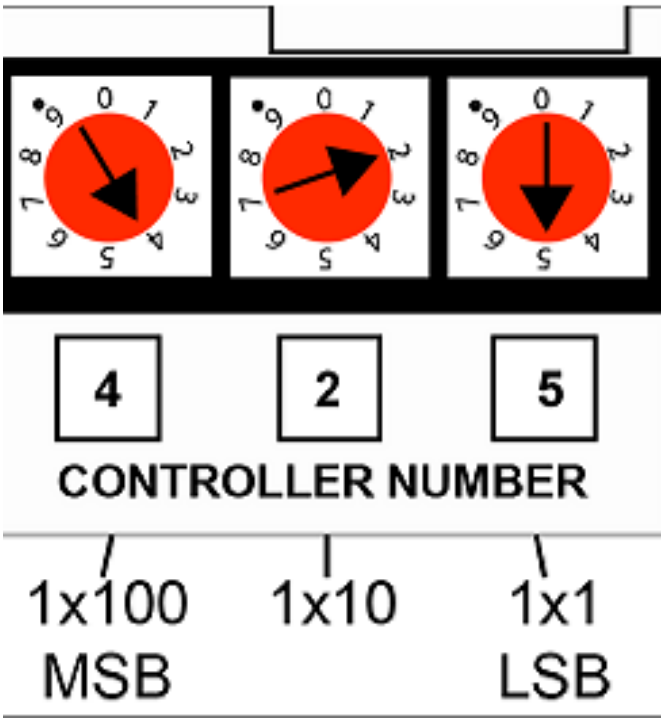
Setting the Controller Number

Each controller on a network must have a unique number on the subnet where it resides in order to identify it in the Controller Configuration Tool (CCT) for uploading, downloading, and commissioning.

The controller number is set using three rotary switches (Figure 7) and may be numbered from 000 to 999. The numbers are ordered from left to right, most significant bit (MSB) to least significant bit (LSB) when the controller is oriented as shown in FAC4911 physical features.

In the following figure the switches are set to 4 2 5, designating this controller as controller number 425. The controller number must match the controller number defined in CCT under ***Define Hardware > Network Settings***. The number of the controller can be written in the white squares provided so the controller number can be easily seen from a distance.

Figure 7: Rotary Switch for Setting Controller Numbers



Note: The BACnet device ID is calculated using the value of controller number added to 2000000 . The device ID configured in this manner does not require any configuration from CCT.

Removing the Controller cover

Important: Electrostatic discharge can damage controller components. Use proper electrostatic discharge precautions during installation, setup, and servicing to avoid damaging the controller.

Important: Disconnect all power sources to the controller before you remove the cover and change the position of any jumper or the EOL switch on the controller. Failure to disconnect power before changing a jumper or EOL switch position can result in damage to the controller and void any warranties.

The controller cover is held in place by four plastic latches that extend from the base and snap into slots on the inside of the housing cover.

To remove the controller cover, complete the following steps:

1. Place your fingertips under the two cover lift tabs on the sides of the housing cover and gently pry the top of the cover away from the base to release the cover from the two upper latches.
2. Pivot the top of the cover further to release it from the lower two latches.
3. Replace the cover by placing it squarely over the base, and then gently and evenly push the cover on to the latches until they snap into the latched position.

Setting the Input Jumpers

CAUTION

Risk of Electric Shock:

Disconnect supply power to the field controller before attempting to adjust the Binary Output Source Power Selection Jumpers. Failure to disconnect the supply power may result in electric shock.

ATTENTION

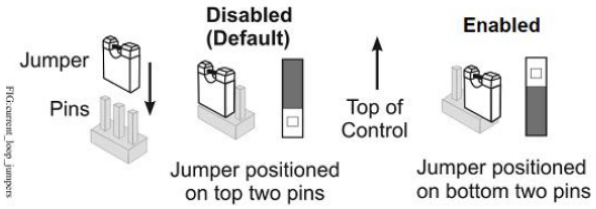
Risque de décharge électrique

Débrancher l'alimentation de l'controller avant tout réglage du Binary Output Source Power Selection Jumpers. Le non-respect de cette précaution risque de provoquer une décharge électrique.

UI current loop jumpers

The UI current loop fail-safe jumper pins are located on the circuit board under the controller cover near the UI terminals.

Figure 8: Current loop jumper positions



Set the current loop jumper to the Enabled position (Figure 8) to connect an internal 100 ohms resistor across the UI terminals, which maintains the 4–20 mA current loop circuit even when power to the controller is interrupted or off.

Important: Current loop jumpers must be in the Disabled (default) position for all UIs that are not set up to operate as 4–20 mA analog inputs.

The following table identifies the current loop switches associated with each UI on the controller.

Table 7: UI Inputs and Jumper Labels

IN1	J5
IN2	J6
IN3	J7
IN4	J8
IN5	J9
IN6	J10
IN7	J11
IN8	J12
IN9	J13
IN10	J14

Input/Output Wiring Validation

The FAC4911 controllers ship with a default state that can assist in validating the wiring of the input and output terminals prior to download of an application file. When the controller is powered on in this state, the Fault LED will flash in a pattern of two quick blinks and then a long pause (see Table 8).

To make use of this feature, ensure the rotary switches are set to the desired controller number and wire the input and output terminals. Apply power to the FAC controller and connect to the device with either a MAP Gateway or MS-DIS1710-0 Local Display to view the points in the controller. The FAC controller will report an Operational status even though there is no true application loaded. CCT will not be able to commission or upload the device as a result until a true application is downloaded. The application name displayed will be the controller number followed by the model of the controller and “Default State”.

For example, a FAC4911 controller whose rotary switches are set to 8 would have the default state application name of “8-FAC4911 Default State”.

The default state creates I/O points for all connections on the input and output terminals. It assumes all Universal Inputs (UIs) are Nickel temperature sensors. All Configurable Outputs (COs) are treated as Binary Outputs (BOs) with an initial value of 0. The default state also takes input from a Network Sensor at address 199. If there is no connected Network Sensor, the startup of this default state will be delayed by 30 seconds as the controller attempts to establish connection with the sensor.

Commissioning Field controllers

You commission controllers with the CCT software, either via a Bluetooth® Wireless Commissioning Converter, a ZFR wireless dongle, MAP 4.2+/ BACnet Router (Mobile Access Portal (MAP) Gateway at version 4.2 or above), or in passthrough mode when connected to an NAE or NCE. Refer to *Controller Tool Help (LIT-12011147)* for detailed information on commissioning field controllers.

Note: The MAP Gateway serves as a replacement for the BTCVT, which is no longer available for purchase, but continues to be supported.

Firmware Package File

The MS-FCP-0 equipment controller firmware package files are required for CCT to configure and commission the controllers. The firmware package files also allow you to upgrade an existing controller to the latest firmware release available for that controller.

Beginning at CCT Release 13, the firmware package files are orderable separately; they are not included with CCT. They are obtained from the *Metasys* software licensing portal, and are loaded and licensed on the computer/ server that is running CCT.

For additional information about the firmware package files, refer to the *CCT Installation Instructions (LIT-12011259)*.

Troubleshooting Field Controllers

Observe the Status LEDs on the front of the field controller and see the table below to troubleshoot the controller. To troubleshoot an integral or local controller display, refer to the *DIS1710 Local Controller Display Technical Bulletin (LIT-12011270)*.

LED status and description table

Table 8: Status LEDs and descriptions of LED States

LED label	LED color	Normal LED state	Description of LED states
POWER	Green	On Steady	Off Steady = No Supply Power or the controller's polyswitch/resettable fuse is open. Check Output wiring for short circuits and cycle power to controller. On Steady = Power Connected
FAULT	Red	Off Steady	Off Steady = No Faults On Steady = Device Fault; no application loaded; Main Code download required, if controller is in Boot mode, or a firmware mismatch exists between the FAC and the ZFR1811 Wireless Field Bus Router. Blink - 2 Hz = Download or Startup in progress, not ready for normal operation Rapid blink = SA Bus communications issue
SA BUS	Green	Blink - 2 Hz	Blink - 2 Hz = Data Transmission (normal communication) Off Steady = No Data Transmission (N/A - auto baud not supported) On Steady = Communication lost, waiting to join communication ring

Repair information

If a field controller fails to operate within its specifications, replace the controller. For a replacement controller, contact your Johnson Controls representative.

Accessories ordering information

Table 9: Accessories Ordering Information

Product Code Number	Description
IOM Series Controllers	Refer to the *Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)* for a complete list of available IOM Series Controllers.
Mobile Access Portal (MAP) Gateway	Refer to the *Mobile Access Portal Gateway Catalog Page (LIT-1900869)* to identify the appropriate product for your region. ⓘ **Note:** The MAP Gateway serves as a replacement for the BTCVT, which is no longer available for purchase, but continues to be supported.
TL-CCT-0	*Metasys* Controller Configuration Tool (CCT) Software
MS-FCP-0	*Metasys* Equipment Controller Firmware Package Files for CCT
MS-DIS1710-0	Local Controller Display
NS Series Network Sensors	Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* for specific sensor model descriptions.
TP-2420	Transformer, 120 VAC Primary to 24 VAC secondary, 20 VA, Wall Plug
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount, 8 in. Primary Leads and Secondary Screw Terminals, Class 2 ⓘ **Note:** Additional Y6x-x Series transformers are also available. Refer to the *Series Y63, Y64, Y65, Y66, and Y69 Transformers Product Bulletin (LIT-125755)*
AS-XFR050-0	for more information.Power transformer (Class 2, 24 VAC, 50 VA maximum output), no enclosure for more information.
AS-CBLTSTAT-0	Cable adapter for connecting to 8-pin TE-6700 Series sensors
AP-TBK4SA-0	Replacement SA Bus Terminal Blocks, 4-Position, Brown, Bulk Pack of 10
AP-TBK4FC-0	Replacement FC Bus Terminal Blocks, 4-Position, Blue, Bulk Pack of 10
AP-TBK3PW-0	Replacement Power Terminal Blocks, 3-Position, Gray, Bulk Pack of 10

Technical specifications

Table 10: FAC4911 Advanced Application Field Equipment Controller for BACnet IP Networks

Product Code Numbers	MS-FAC4911-0 Advanced Application Field Equipment Controller for BACnet/IP Networks
Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, power supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	14 VA maximum ⓘ **Note:** The VA rating does **not** include any power supplied to the peripheral devices connected to binary outputs (BOs) or configurable outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 72 VA (maximum).
Power Source	+15 VDC power source terminals provide 100 mA total current. Quantity 3 located in Universal IN terminals - for active (3-wire) input devices.
Ambient Conditions	**Operating:** 0°C to 50°C (32°F to 122°F); 10% to 90% RH noncondensing **Storage:** -40°C to 80°C (-40°F to 176°F); 5% to 95% RH noncondensing
Processor	32-Bit Renesas® microcontroller
Memory	16 MB flash memory and 8 MB RAM
Real-Time Clock Backup Power Supply	Super capacitor maintains power to the onboard real-time clock for a minimum of 72 hours when supply power to the controller is disconnected.
Input and Output Capabilities	**10 - Universal Inputs:** Defined as 0-10 VDC, 4-20 mA, 0-600k ohms, or Binary Dry Contact **6 - Binary Inputs:** Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode **4 - Binary Outputs:** Defined as 24 VAC Triac (external power source only) **4 - Analog Outputs:** Defined as 0-10 VDC or 4-20 mA **4 - Configurable Outputs:** Defined as 0-10 VDC or 4-20 mA
Analog Input/Analog Output Resolution and Accuracy	**Input:** 15-bit resolution **Output:** 15-bit resolution, +/- 200 mV accuracy in 0-10 VDC applications
Terminations	**Input/Output:** Fixed Screw Terminal Blocks **SA/FC Bus and Supply Power:** 4-Wire and 3-Wire Pluggable Screw Terminal Blocks **SA/FC Bus Port:** RJ-12 6-Pin Modular Jacks
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	**Enclosure material:** ABS and polycarbonate UL94 5VB; Self-extinguishing Protection Class: IP20 (IEC529)
Dimensions (Height x Width x Depth)	150 mm x 220 mm x 57.5 mm (5-7/8 in. x 8-3/4 in. x 2-3/8 in.) including terminals and mounting clips ⓘ **Note:** Mounting space requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	0.5 kg (1.1 lb)
Compliance CE	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7 CAN/CSA C22.2 No.205, Signal Equipment Industry Canada Compliant, ICES-003
	Europe: Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant
	BACnet Testing Laboratories™ (BTL) Protocol Revision 15 Listed and Certified BACnet Advanced Application Controller (B-AAC), based on the ANSI/ASHRAE 135-2016

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for

damages resulting from misapplication or misuse of its products.

Product warranty

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

Single point of contact

APAC	Europe	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIJANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS WESTENDHOF 3 45143 ESSEN GERMANY	JOHNSON CONTROLS 507 E MICHIGAN ST MILWAUKEE WI 53202 USA

For more contact information, refer to www.johnsoncontrols.com/locations.