IOM3711 Input/Output Module Installation Guide

Part No. 24-10144-84 Rev. N

2019-10-01

Application

The IOM37 input/output expansion module is a part of the *Metasys*® system Field Equipment Controller family. Input/Output Module (IOM) expansion modules expand the number of I/O points connected to a Network Automation Engine (NAE), Network Control Engine (NCE), Field Equipment Controller (FEC), VAV Modular Assembly (VMA), or Advanced Application Field Equipment Controller (FAC) to monitor and control a wide variety of HVAC equipment.

IOM expansion modules operate on an RS-485 BACnet® MS/TP Bus and integrate into Johnson Controls® and third-party BACnet systems.

Note: At CCT Release 10.1 and later, a new capability was introduced allowing VMAs, FECs, and FACs to communicate by using either the BACnet or the N2 field bus networking protocol. The operation of the Input/Output Module (IOM) is not affected by the selection of the BACnet or the N2 protocol in the host controller, when the (IOM) is connected to the host controller using the SA bus. Only the BACnet protocol is supported when the (IOM) is connected directly to the trunk using the FC bus.

Important: In *Metasys* system smoke control applications, use only the MS-IOM3710-0U and MS-IOM3711-0U at *Metasys* Release 8.1 that are UL 864 UUKL/UUKLC 10th Edition Smoke Control Listed. For *Metasys* system smoke control applications, you must refer to the *Metasys System UL 864 UUKL Tenth Edition Smoke Control System Technical Bulletin (LIT-12012487)* for detailed requirements and procedures for installing, commissioning, and operating UL 864 UUKL Listed *Metasys* system devices. The UL 864 UUKL listing for Smoke Control Equipment is voided if (1) you do not use the required software tools at the required versions; or (2) you do not meet the requirements or do not follow the procedures as documented in the *Metasys System UL 864 UUKL Tenth Edition Smoke Control System Technical Bulletin (LIT-12012487)*.

North American Emissions Compliance

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.

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.

Installation

Observe these guidelines when installing an expansion module:

- Transport the expansion module in the original container to minimize vibration and shock damage.
- Verify that all parts shipped with the expansion module.
- Do not drop the expansion module or subject it to physical shock.

Parts included

- One expansion module with removable terminal blocks (Power and SA/FC bus are removable)
- One installation instructions sheet

Materials and special tools needed

- Three fasteners appropriate for the mounting surface (M4 screws or #8 screws)
- One 20 cm (8 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

Physical feature graphic and table

(barcode for factory use only)

Figure 1: IOM3711 physical features

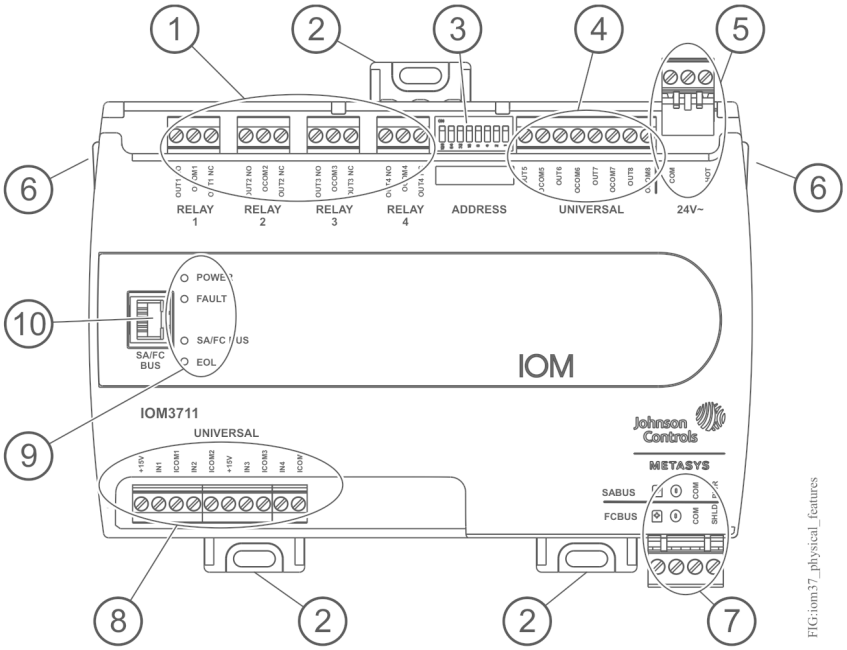


Table 1: IOM3711 Physical features

Callout	Physical features: description and references
1	Relay Output Terminal Blocks (See Table 2)
2	Mounting Clip
3	Device Address DIP Switch Block (See Setting the device addresses)
4	Universal Outputs (UOs) Terminal Blocks (See Input and Output terminal blocks)
5	24 VAC, Class 2 Supply Power Terminal Block (See Table 4)
6	Cover Lift Tab (See Removing the Expansion Module cover)
7	Sensor Actuator (SA) Bus or Field Controller (FC) Bus Terminal Block (See Table 4)
8	Universal Inputs (UI) Terminal Blocks (See Table 2)
9	Light-Emitting Diode (LED) Status Indicators (See Table 7)
10	Sensor Actuator (SA) Bus / Field Controller (FC) Bus Port (RJ-12 6-pin Modular Jack) (See Table 4)

Mounting

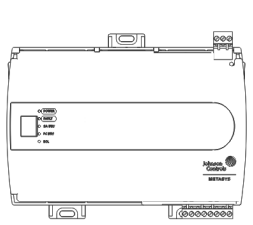
Observe these guidelines when mounting an expansion module:

- Ensure the mounting surface can support the expansion module, DIN rail, and any user-supplied enclosure.
- Mount the expansion module horizontally on 35 mm DIN rail whenever possible.
- Mount the expansion module in the proper mounting position (Figure 2).
- Mount the expansion module on a hard, even surface whenever possible in wall-mount applications.
- Use shims or washers to mount the expansion module securely and evenly on the mounting surface.
- Mount the expansion module in an area free of corrosive vapors and observe the Ambient Conditions requirements in Table 10.
- Provide for sufficient space around the expansion module for cable and wire connections for easy cover removal and good ventilation through the expansion module (50 mm [2 in.] minimum on the top, bottom, and front of the expansion module).
- Do not mount the expansion module on surfaces prone to vibration, such as duct work.
- Do not mount the expansion module in areas where electromagnetic emissions from other devices or wiring can interfere with expansion module communication.

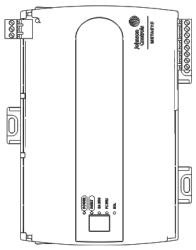
Observe these additional guidelines when mounting a expansion module in a panel or enclosure:

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

Figure 2: Expansion Module mounting positions



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



Vertical Mount Position
Acceptable for Wall Mounting

DIN rail mount applications

Mounting the expansion module horizontal on 35 mm DIN rail is the preferred mounting method.
To mount a expansion module on 35 mm DIN rail:

1. Securely mount a 20 cm (8 in.) or longer section of 35 mm DIN rail horizontal and centered in the desired space so that the expansion module mounts in the horizontal position shown in Figure 2.
2. Pull the two bottom mounting clips outward from the expansion module to the extended position (Figure 3).
3. Hang the expansion module on the DIN rail by the hooks at the top of the (DIN rail) channel on the back of the expansion module (Figure 3), and position the expansion module snugly against the DIN rail.
4. Push the bottom mounting clips inward (up) to secure the expansion module on the DIN rail.

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

Wall mount applications

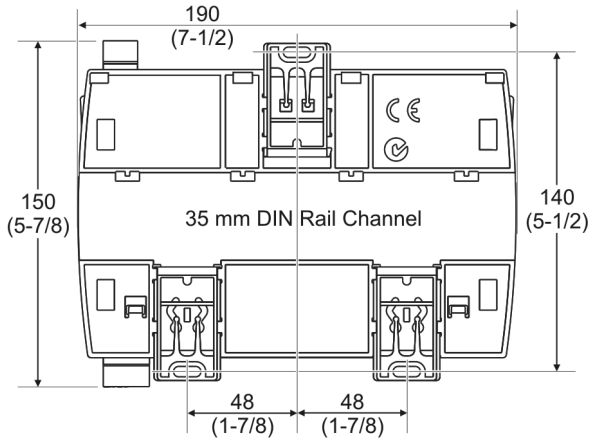
To mount a expansion module directly on a wall or other flat vertical surface:

1. Pull the two bottom mounting clips outward and ensure they are locked in the extended position as shown in Figure 3.
2. Mark the mounting hole locations on the wall using the dimensions in Figure 3 and one of the mount positions shown in Figure 2. Or hold the expansion module up to the wall or surface in a proper mount position and mark 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 expansion module 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.

Mounting features and dimensions

Figure 3: Back of Expansion Module showing extended mounting clips, DIN rail channel, and mounting dimensions, mm (in.)



Wiring

Warning

Risk of Electric Shock:

Disconnect or isolate all power supplies before making electrical connections. More than one disconnection or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

Avertissement

Risque de décharge électrique:

Débrancher ou isoler toute alimentation avant de réaliser un branchement électrique. Plusieurs isolations et débranchements sont peut-être nécessaires pour -couper entièrement l'alimentation de l'équipement. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

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

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 expansion module electrical ratings. Exceeding expansion module electrical ratings can result in permanent damage to the expansion module 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 expansion module components. Use proper electrostatic discharge precautions during installation, setup, and servicing to avoid damaging the expansion module.

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

Terminal blocks and bus ports

See Figure 1 for terminal block and bus port locations on the expansion module. Observe the following guidelines when wiring an expansion module.

Input and Output terminal blocks

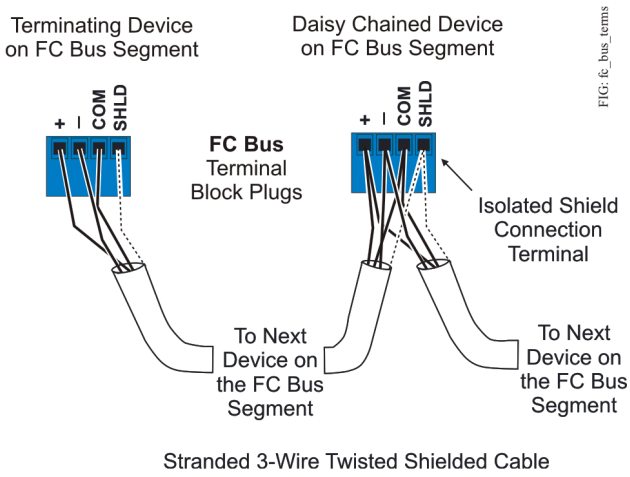
Most of the input terminal blocks are mounted on the bottom of the expansion module and the output terminal blocks are mounted on the top of the expansion module. See Table 2 for more information about I/O terminal functions, requirements, and ratings.

SA/FC bus terminal block

An IOM can be connected to a Sensor/Actuator (SA) bus or a Field Controller (FC) bus, but not to both buses simultaneously. The SA/FC bus terminal block is a removable, 4-terminal plug that fits into a board-mounted jack.

When connecting the IOM to an FC bus, wire the bus terminal block plugs on the expansion module, and the other expansion modules in a daisy-chain configuration using 3-wire twisted, shielded cable as shown in Figure 4. See Table 4 for more information.

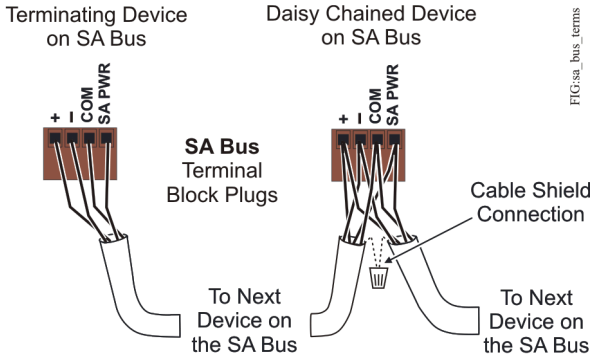
Figure 4: FC bus terminal block wiring



Stranded 3-Wire Twisted Shielded Cable

When connecting the IOM to an SA bus, wire the bus terminal block plugs on the expansion module, and other SA bus devices in a daisy-chain configuration using 4-wire twisted, shielded cable as shown in Figure 5. See I/O wiring ratings and requirements table for more information.

Figure 5: SA bus terminal block wiring



Stranded, 4-Wire (2 Twisted Pair) Shielded Cable
(One twisted pair is the + and - leads.
The second pair is COM and SA PWR.)

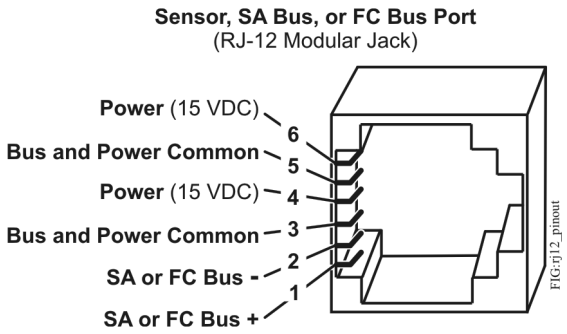
Note: The SA PWR/SHLD terminal does not supply 15 VDC. The SA PWR/SHLD terminal is isolated and can be used to connect (daisy chain) the 15 VDC power leads on the SA bus (Figure 5) or the cable shields on the FC bus (Figure 4). The SA bus supervisor supplies 15 VDC to devices on the SA bus requiring power.

SA/FC bus port

The SA/FC bus port on the front of the expansion module is an RJ-12, 6-position modular jack that provides a connection for devices on the SA bus, a Wireless Commissioning Converter, a ZFR/ZFR Pro Wireless Router (depending on which bus the IOM is operating on).

The SA/FC bus port is connected internally to the SA/FC bus terminal block. See Table 4 for more information. The SA/FC bus port pin assignment is shown in Figure 6.

Figure 6: Pin number assignments for sensor, SA bus and FC bus ports on Expansion Modules

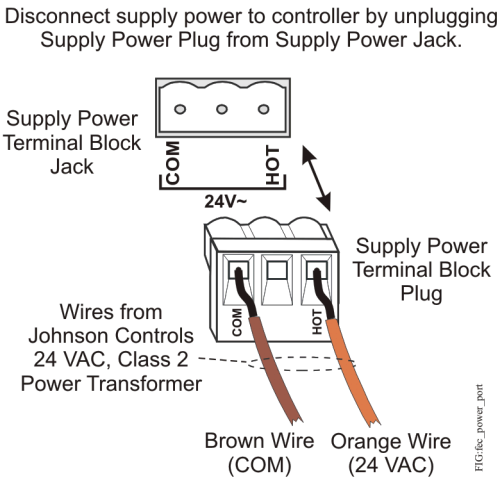


Supply power terminal block

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 expansion module.

Wire the 24 VAC supply power wires from the transformer to the HOT and COM terminals on the terminal plug as shown in Figure 7. The middle terminal on the supply power terminal block is not used. See Table 4 for more information about the Supply Terminal Block.

Figure 7: 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 expansion module 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 expansion module does not require an earth ground connection.

Wireless network applications

The expansion module can also be installed in a wireless application using a ZFR/ZFR Pro Wireless Field Bus Router.

Important: Wireless operation is not approved for smoke control applications. Refer to the *Metasys System UL 864 UUKL Tenth Edition Smoke Control System Technical Bulletin (LIT-12012487)* for detailed requirements and procedures for installing, commissioning, and operating UL 864 UUKL/UUKLC Listed *Metasys* system devices.

To configure a expansion module for use with the ZFR/ZFR Pro Series Wireless Field Bus system:

Note: IOMs can talk wirelessly on the FC bus only.

1. Connect the ZFR/ZFR Pro Wireless Field Bus Router to the FC bus port (RJ-12 modular jack) on the front of the expansion module.
2. Ensure that the expansion module's device address DIP switches are set to the correct device address. See Setting the device addresses.
3. Set DIP switch 128 to ON, which enables wireless operation on the expansion module.

For more information on the ZFR Pro Wireless Field Bus system, refer to the *WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320)*.

For more information on the ZFR 1800 Wireless Field Bus system, refer to the *ZFR1800 Series Wireless Field Bus System Product Bulletin (LIT-12011336)*.

Terminal Wiring Guidelines, Functions, Ratings, and Requirements

Input and Output wiring guidelines

Table 2 provides information and guidelines about the functions, ratings, and requirements for the expansion module input and output terminals; and references guidelines for determining proper wire sizes and cable lengths.

In addition to the wiring guidelines in Table 2, observe these guidelines when wiring expansion module 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 recommended for input and output cables that are exposed to high electromagnetic or radio frequency noise.
- Inputs/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 wiring ratings and requirements table

Table 2: IOM37 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 +15 V terminal.
	IN*n*	**Analog Input - Voltage Mode (0–10 VDC)** 10 VDC maximum input voltage Internal 75k ohm Pull-down	See Guideline **A** in Table 3.
		Analog Input - Current Mode (4–20 mA) Internal 100 ohm load impedance	See Guideline **B** in Table 3.
		Analog Input - Resistive Mode (0–600k ohm) Internal 12 V. 15k ohm pull up Qualified Sensors: 0-2k ohm potentiometer, RTD (1k Nickel [Johnson Controls sensor], 1k Platinum, and A99B Silicon Temperature Sensor) Negative Temperature Coefficient (NTC) Sensor (10k Type L, 10k JCI Type II, 2.252k Type II)	See Guideline **A** in Table 3.
		Binary Input - Dry Contact Maintained Mode 1 second minimum pulse width Internal 12 V. 15k ohm pull up	See Guideline **A** in Table 3.
	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.	Same as (Universal) **IN***n*
RELAY*n* (Outputs)	**OUT NO***n*	**Normally Open Contact** Connects OCOM to OUT NO when activated. **UL Listed** (-0 model only) 1/4 hp 120 VAC, 1/2 hp 240 VAC 360 VA Pilot Duty at 120/240 VAC (B300) 3 A Non-inductive 24–240 VAC **CE Marking** (-2 model only): 6 (4) A N.O. or N.C. only, 240 VAC	The Relay output terminals can accommodate the following maximum wire sizes: Two wires per terminal: 1.0 mm (18 AWG) maximum wire size **or** One wire per terminal: 2.0 mm (12 AWG) maximum **Note:** You must determine the **required** wire size for the high-voltage (>30 V) terminals according to relay ratings, the applied load, and the local, national, or regional electrical codes.
	OCOM*n*	**Relay Common** Isolated from all other terminal commons, including other Relay Commons.	
	OUT NC*n*	**Normally Closed Contact** Connects OCOM to OUT NC when activated. **UL Listed**(-0 model only) 1/4 hp 120 VAC, 1/2 hp 240 VAC 360 VA Pilot Duty at 120/240 VAC (B300) 3 A Non-inductive 24–240 VAC **CE Marking** (-2 model only): 6 (4) A N.O. or N.C. only, 240 VAC	

Table 2: IOM37 terminal blocks, functions, ratings, requirements, and cables

Terminal block label	Terminal label	Function, ratings, requirements	Determine wire size and maximum cable length
Universal (Outputs)	**OUT***n*	**Analog Output - Voltage Mode (0–10 VDC)** 10 VDC maximum output voltage 10 mA maximum output current Requires an external load of 1,000 ohm or more. ⓘ **Note:** The AO operates in Voltage Mode when connected to devices with impedances greater than 1,000 ohm. Devices that drop below 1,000 ohm may not operate as intended for Voltage Mode applications.	See Guideline A in Table 3.
		Analog Output - Current Mode (4–20 mA) Requires an external load between 0–300 ohm. ⓘ **Note:** The AO operates in Current Mode when connected to devices with impedances less than 300 ohm. Devices that exceed 300 ohm may not operate as intended for Current Mode applications.	See Guideline B in Table 3.
		Binary Output Mode - 24 VAC/DC Field-effect Transistor (FET) Connects OUT to OCOM when activated. 30 V AC/DC maximum output voltage 0.5 A maximum output current 40 mA minimum load current (hold current)	See Guideline B in Table 3.
	OCOM*n*	**Universal Output (UO) Common** Isolated from all other terminal commons, including other UO commons.	Same as OUT

Cable and wire length guidelines

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

Table 3: Cable length guidelines for recommended wire sizes for low-voltage (<30 V) Inputs and Outputs

Guideline	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 8 to select wire size/gauge. Use stranded copper wire	See Figure 8 to determine cable length. Use twisted wire cable.	N/A

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.

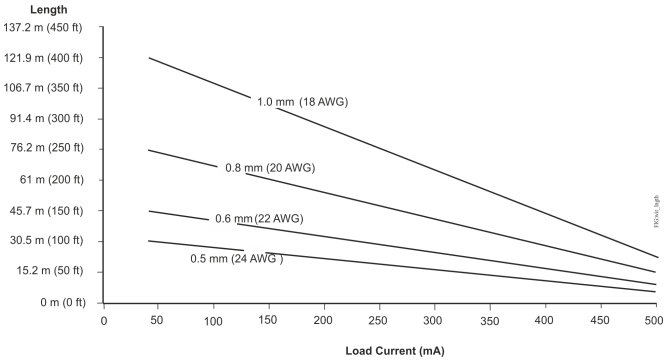
Maximum cable length versus load current

Use Figure 8 to estimate the maximum cable length relative to the wire size and the load current (in mA) when wiring inputs and outputs.

Note: Figure 8 applies to low-voltage (<30 V) inputs and outputs only. The required wire size and length for high-voltage (>30 V) Relay Outputs is determined by the load connected to the relay and local electrical codes.

Max wire length by current and wire size graphic

Figure 8: Maximum wire length for low-voltage (<30 V) Inputs and Outputs by current and wire Size



SA/FC bus and supply power wiring guidelines

Table 4 provides information about the functions, ratings, and requirements for the communication bus and supply power terminals; and guidelines for wire sizes, cable types, and cable lengths when wiring the expansion module's communication buses and supply power.

In addition to the guidelines in Table 4, observe these guidelines when wiring 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 the SA and FC buses.

Table 4: 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
FCBUS or **SABUS**	**+** **-**	FC or SA Bus Communications	FC Bus: 0.6 mm (22 AWG) stranded, 3-wire twisted, shielded cable recommended. SA Bus: 0.6 mm (22 AWG) stranded, 4-wire (2 twisted-pairs), shielded cable recommended. **Note:** On the SA Bus, the + and - wire are one twisted pair, and the COM and SA PWR are the second twisted pair of wires.
	COM	Signal Reference (Common) for FC or SA Bus communications	
	SHLD or **SAPWR**	**SHLD on FC Bus:** Isolated terminal (optional shield drain connection **SAP WR on SA Bus:** 15 VDC power lead connection **Note:** The SA PWR terminal on an IOM expansion module does not supply 15 VDC. The SA bus supervisor supplies 15 VDC to devices on the SA bus requiring power.	
SA/FC BUS (Port)		RJ-12 6-Position Modular Connector provides: FC or SA Bus Communications FC or SA Bus Signal Reference and 15 VDC Common Commissioning Converter or ZFR181x/ZFR 182x Wireless Router (Maximum total current draw for SA Bus is 240 mA.)	Wireless Commissioning Converter retractable cable or 24 AWG 3-pair CAT 3 Cable <30.5 m (100 ft)

Table 4: 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
24~	HOT	**24 VAC Power Supply - Hot** Supplies 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 expansion module.)	

Note:

- The SA Bus and FC Bus wiring recommendations in this table are for MS/TP bus communications at 38,400 baud. For more information, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.
- See Table 3 to determine wire size and cable lengths for cables.

Termination details

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 5: Termination Details

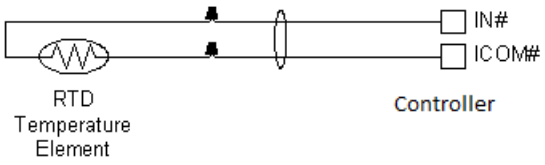
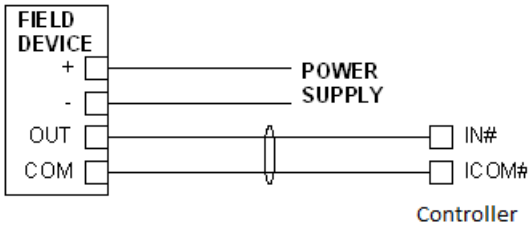
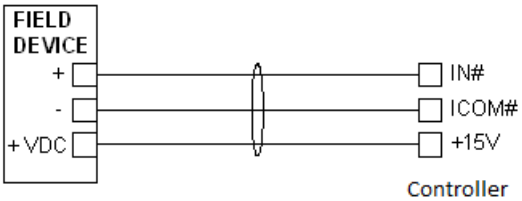
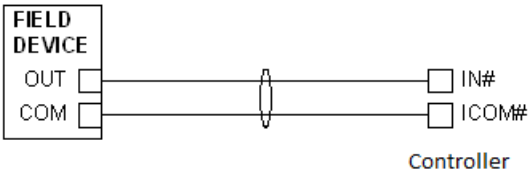
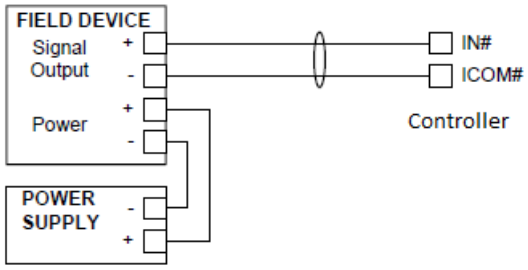
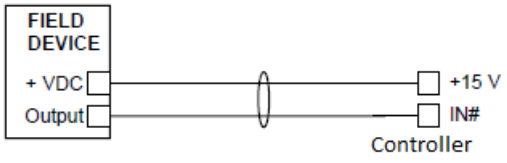
Type of Field Device	Type of Input/ Output	Termination diagrams
Temperature Sensor	UI	
Voltage Input - External Source	UI	
Voltage Input - Internal Source	UI	
Voltage Input (Self-Powered)	UI	
Current Input - External Source (Isolated)	UI	
Current Input - Internal Source (2-wire)	UI	

Table 5: Termination Details

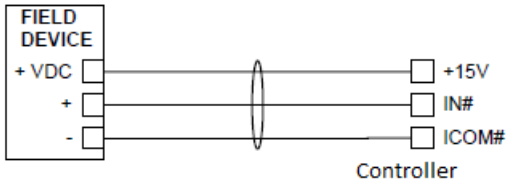
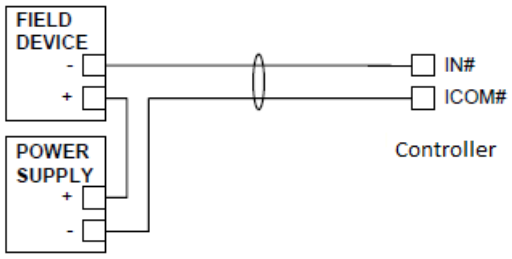
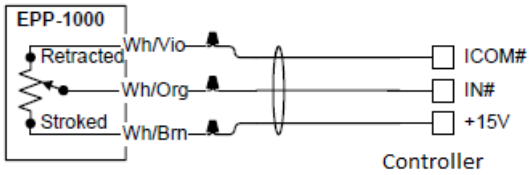
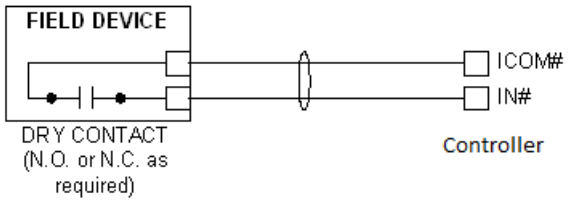
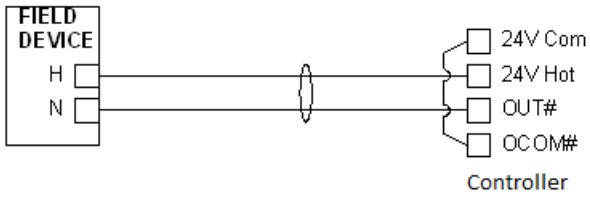
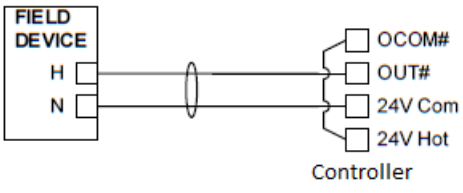
Type of Field Device	Type of Input/ Output	Termination diagrams
Current Input - Internal Source (3 wire)	UI	
Current Input - External Source (in Loop)	UI	
Feedback from EPP-100	UI	
Dry Contact (Binary Input)	UI	
24 VAC Binary Output (Switch Low, External Source)	UO or RO	
24 VAC Binary Output (Switch High, External Source	UO or RO	

Table 5: Termination Details

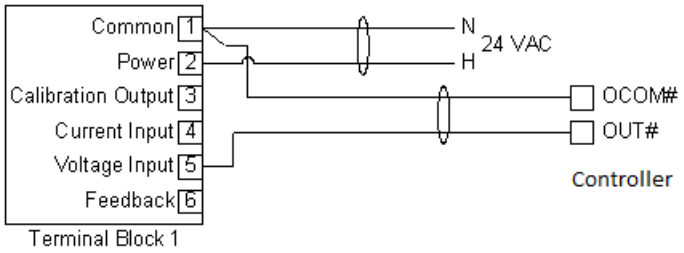
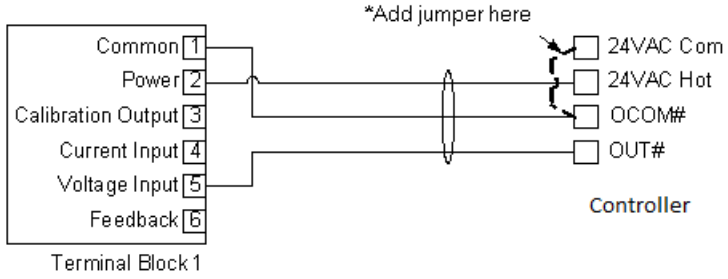
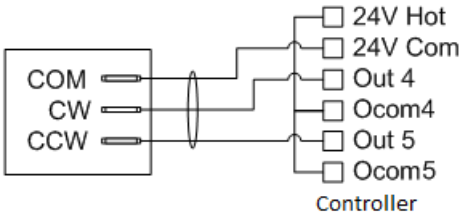
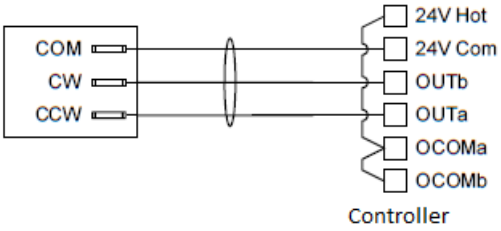
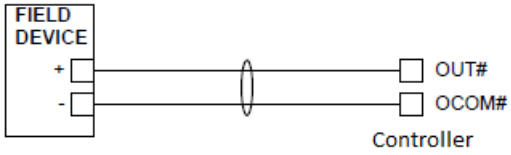
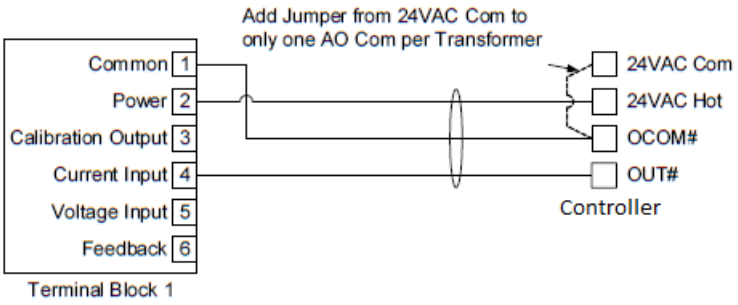
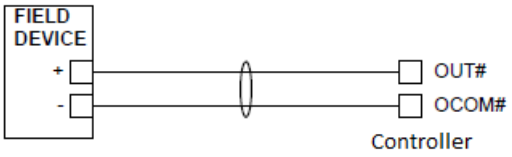
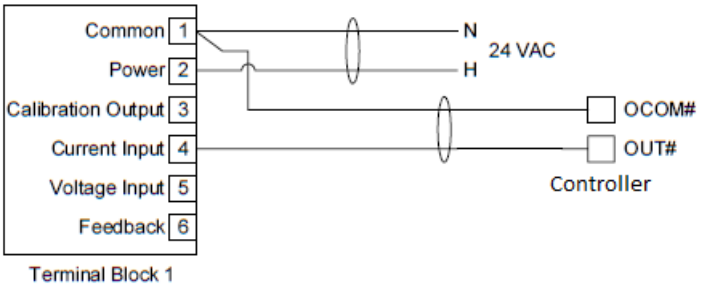
Type of Field Device	Type of Input/ Output	Termination diagrams
0–10 VDC Output to Actuator (External Source)	UO	
0–10 VDC Output to Actuator (Internal Source)	UO	
Incremental Control to Actuator(Switch Low, Externally Sourced)	UO	
Incremental control to Actuator (Switch High, Externally Sourced)	UO	
Voltage (Analog Output)	UO	

Table 5: Termination Details

Type of Field Device	Type of Input/ Output	Termination diagrams
4–20 mA Output to Actuator	UO	
Analog Output (Current)	UO	
4–20 mA Output to Actuator	UO	

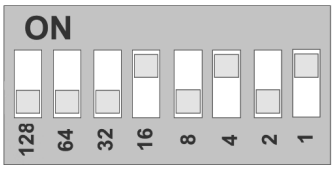
Setup and Adjustments

Setting the device addresses

Metasys field expansion modules are master devices on MS/TP (SA or FC) buses. Before operating expansion modules on a bus, you **must** set a valid and unique device address for each expansion module on the bus. You set a expansion module's device address by setting the positions of the switches on the DIP switch block at the top of the expansion module (Figure 1). Device addresses 4 through 127 are the valid addresses for these expansion modules.

The DIP switch block has eight switches numbered 128, 64, 32, 16, 8, 4, 2, and 1 (Figure 9). Switches 64 through 1 are device address switches. Switch 128 is a mode switch that enables a expansion module to operate on a ZFR/ZFR Pro Series Wireless Field Bus. Switch 128 must be set to off for all hard-wired SA and FC bus applications. Set switch 128 to ON for wireless FC bus applications **only**.

Figure 9: Device address DIP switch block set to address 21



Note: Expansion module ships with switch 128 ON and the remaining address switches off rendering the expansion modules wired devices, which do not operate on MS/TP buses, but will not interfere with bus operation. Set a valid and unique device address on the expansion module before applying power to the expansion module on the bus.

To set the device addresses on *Metasys* field expansion modules:

1. Set **all** of the switches on the address DIP switch block (128 through 1) to off.

2. Set one or more of the seven address switches (64 though 1) to ON, so that the sum of the switch numbers set to ON equals the intended device address. See Table 6 for valid device addresses.

Set the highest number switch that is less than or equal to the intended device address to ON. Then continue setting lower numbered switches until the total equals the intended address. For example, if the intended device address is 21, set switch 16 to ON first, then set switch 4 ON, followed by switch 1 (16+4+1= 21). See Figure 9.

3. Set switch 128 to ON **only** for expansion modules on a ZFR/ZFR Pro Series Wireless Field Bus application. For all hard-wired SA and FC bus applications, ensure that switch 128 is set to Off.

ⓘ **Note:** Do **not** connect a expansion module with switch 128 set to ON to an active (hard-wired) SA or FC bus. When a expansion module with switch 128 set to ON and a device address from 4 to 127 is connected to a wired field bus, the entire field bus is rendered inoperable until the expansion module is disconnected or switch 128 is set to Off.

Refer to the *WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320)* for more information on device addresses in wireless applications.

4. Set a unique and sequential device address for each of the expansion modules connected on the SA or FC bus starting with device address 4.

To ensure the best bus performance, set sequential device addresses with no gaps in the device address range (4, 5, 6, 7, 8, 9, and so on). The expansion modules do **not** need to be physically connected on the bus in their numerical device address order.

5. Write each expansion module's device address on the white label below the DIP switch block on the expansion module's cover.

Table 6 describes the FC bus and SA bus devices addresses for Johnson Controls MS/TP communications bus applications.

Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)* for more information on controller device addresses and how to set them on MS/TP buses.

Table 6: SA/FC bus device address descriptions

Device address	Use on description
0 (Switch 128 Off)	Reserved for FC Bus Supervisory Controller (not for use on controllers).
1 to 3 (Switch 128 Off)	Reserved for peripheral devices (not for use on controllers).
4 to 127 (Switch 128 Off)	Used for MS/TP master devices (controllers) that are hardwired to an SA Bus or FC Bus.

Table 6: SA/FC bus device address descriptions

Device address	Use on description
0 to 3 (Switch 128 ON)	Reserved addresses for wired subordinate devices (not for use on controllers). ⓘ **Note:** *Metasys* field controllers ship with switch 128 ON and the remaining address switches off rendering the controllers wired devices, which do not operate on MS/TP buses.
4 to 127 (Switch 128 ON)	Valid for MS/TP Master controllers on **wireless FC Buses only**. ⓘ **Note:** Do **not** connect a controller with switch 128 ON to an active (**hard-wired**) SA or FC bus. When a controller with switch 128 ON and a device address from 4 to 127 is connected to a wired field bus, the entire bus is rendered inoperable until the controller is disconnected or switch 128 is set to Off.

Removing the Expansion Module cover

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

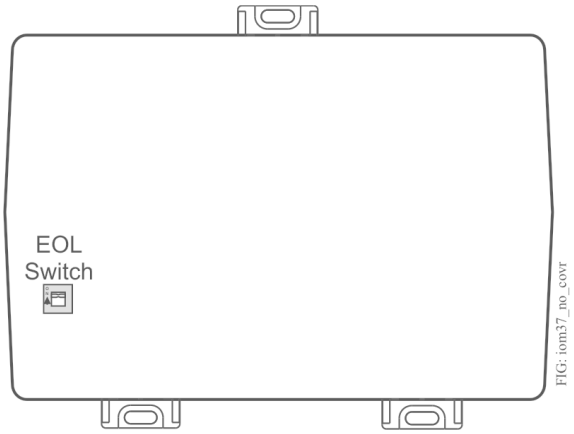
➤ **Important:** Disconnect all power sources to the expansion module before removing cover and changing the position of any jumper or the EOL switch on the expansion module. Failure to disconnect power before changing a jumper or EOL switch position can result in damage to the expansion module and void any warranties.

The expansion module 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 expansion module cover:

1. Place your fingernails under the two cover lift tabs (Figure 1) 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.

Figure 10: IOM37 with cover removed showing EOL switch location



Setting the End-of-Line (EOL) switch

Each expansion module has an EOL switch, which, when set to ON, sets the expansion module as a terminating device on the bus. See Figure for the EOL switch location. The default EOL switch position is Off.

Figure 11: End-of-Line switch positions

To set the EOL switch on an expansion module:

1. Determine the physical location of the expansion module on the SA or FC bus.
2. Determine if the expansion module must be set as a terminating device on the bus.

Note: The EOL termination rules for SA buses and FC buses are different. Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)* for detailed information regarding EOL termination rules and EOL switch settings on SA and FC buses.

3. If the expansion module is a terminating device on the FC bus, set the EOL switch to ON. If the expansion module is not a terminating device on the bus, set the EOL switch to Off.

When an expansion module is connected to power with its EOL switch set to ON, the amber EOL LED on the expansion module cover is lit.

Commissioning the Expansion Modules

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

LED status and description table

Table 7: 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 expansion module's polyswitch/resettable fuse is open. Check Output wiring for short circuits and cycle power to the expansion module. On Steady = Power Connected
FAULT	Red	Off Steady	Off Steady = No Faults On Steady = Device Fault; no application loaded; Main Code download required, if the expansion module is in Boot mode, or a firmware mismatch exists between the FEC and the ZFR1811 Wireless Field Bus Router. Blink - 2 Hz = Download or Startup in progress, not ready for normal operation
SA/FC 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
EOL	Amber	Off (Except on terminating devices)	On Steady = EOL switch in ON position Off Steady = EOL switch in Off position

Troubleshooting the expansion modules

Observe the Status LEDs on the front of the expansion module and see Table 7 to troubleshoot the expansion module.

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 expansion module's polyswitch/resettable fuse is open. Check Output wiring for short circuits and cycle power to the expansion module. On Steady = Power Connected
FAULT	Red	Off Steady	Off Steady = No Faults On Steady = Device Fault; no application loaded; Main Code download required, if the expansion module is in Boot mode, or a firmware mismatch exists between the FEC and the ZFR1811 Wireless Field Bus Router. Blink - 2 Hz = Download or Startup in progress, not ready for normal operation
SA/FC 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
EOL	Amber	Off (Except on terminating devices)	On Steady = EOL switch in ON position Off Steady = EOL switch in Off position

Repair information

If an expansion module fails to operate within its specifications, replace the expansion module. For a replacement expansion module, contact your Johnson Controls representative.

For the MS-IOM3710-0U and MS-IOM3711-0U models that are UL 864 10th Edition UUKL/ORD-C100-13 UUKLC listed for smoke control, contact the Johnson Controls Repair Center in Louisville, Kentucky, at 1-502-671-7312.

Accessories

Table 9: Accessories ordering information

Product code number	Description
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)* for more information.
AS-XFR050-0	Power transformer (Class 2, 24 VAC, 50 VA maximum output), no enclosure
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, Brown, Bulk Pack of 10
WNC1800/ZFR182x Pro Wireless field Bus System	This system is used for installations that support BACnet/IP but can also coexist with the ZFR1800 Series when installed under the same supervisor (i.e., network engine). Refer to the *WNC1800/ZFR182x Pro Series Wireless Field Bus System Product Bulletin (LIT-12012320)* for a list of available products.
ZFR1800 Series Wireless Field Bus System	This system is used for installations that only support BACnet MS/TP. Refer to the *ZFR1800 Series Wireless Field Bus System Product Bulletin (LIT-12011336)* for a list of available products.
NS Series Network Sensors	Refer to the *NS Series Network Sensors Product Bulletin (LIT-12011574)* for specific sensor model descriptions.
WRZ Series Wireless Room Sensors	Refer to the *WRZ Series Wireless Room Sensors Product Bulletin (LIT-12000653)* for specific sensor model descriptions.
Mobile Access Portal (MAP)Gateway	Refer to the *Mobile Access Portal Gateway Catalog Page (LIT-1900869)* to identify the appropriate product for your region.

Technical specifications

Table 10: IOM37 technical specifications

Product Code Number	MS-IOM3711-x Input/Output Module Smoke Control Models: MS-IOM3710-0U Input/Output Module MS-IOM3711-0U Input/Output Module
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 for IOM3711 only ⓘ **Note:** 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 48 VA (maximum).
Ambient Conditions	**Operating:** 0° to 50°C (32° to 122°F); 10% to 90% RH noncondensing **Storage:** -40° to 80°C (-40° to 176°F); 5% to 95% RH noncondensing
Addressing	DIP switch set; valid expansion module device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid expansion module addresses.)
Communications Bus	**BACnet® MS/TP, RS-485:** 3-wire FC bus between the supervisory controller and other controllers 4-wire SA bus between controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from controller) to bus devices.
Processor	H8SX/166xR Renesas® 32-bit microcontroller
Memory	512 KB Flash Memory and 128 KB Random Access Memory (RAM)
Input and Output Capabilities	**4 - Universal Inputs:** Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact **4 - Universal Outputs:** Defined as 0–10 VDC, 4–20 mA, or 24 VAC/DC Field-Effect Transistor (FET) BO **4 - Relay Outputs:** (Single-Pole, Double-Throw) **UL Listed (-0 model only)**: 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC **CE Marking (-2 model only)**: 6 (4) A N.O. or N.C. only, 240 VAC
Analog Input/Analog Output Resolution and Accuracy	**Input:** 16-bit resolution **Output:** 16-bit resolution, +/- 200 mV accuracy in 0–10 VDC applications
Terminations	**Input/Outputs:** 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 expansion module
Housing	Enclosure material: ABS and polycarbonate UL94 5VB; Self-extinguishing, Plenum Rated Protection Class: IP20 (IEC529)
Dimensions(Height x Width x Depth)	150 mm x 190 mm x 53 mm (5-7/8 in. x 7-1/2 in. x 2-1/8 in.) including terminals and mounting clips ⓘ **Note:** Mounting space requires an additional 50 mm (2 in.) space on top, bottom and front face of expansion module for easy cover removal, ventilation and wire terminations.
Weight	0.5 kg (1.1 lb)

Table 10: IOM37 technical specifications

Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; UL Listed, File S4977, UUKL 864 - 10th Edition, Smoke Control Equipment (MS-IOM3710-0U and MS-IOM3711-0U models only); FCC Compliant to CFR47, Part 15, Subpart B, Class A **Note:** Except IOM3711-2
	Canada: UL Listed, File E107041, CCN PAZX7 CAN/CSA C22.2 No.205, Signal Equipment; Industry Canada Compliant, ICES-003 **Note:** Except IOM3711-2
	Europe: Johnson Controls declares that this product is in compliance with the EMC Directive and Low Voltage Directive. Declared as Independently Mounted Intended for Panel Mounting, Operating Control Type 1.B, 4kV rated impulse voltage, 100.7°C ball pressure test. **Note:** Except IOM3711-0
CE	**Europe:** Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive. **Note:** Except IOM3711-0
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant **Note:** Except IOM3711-0
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC)

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.