IOM3733 Input/Output Module Installation Guide

Part No. 24-10143-1140 Rev. D

2019-10-01

Application

The MS-IOM3733 input/output expansion module is part of the *Metasys*® system Field Equipment Controller family. Input/Output expansion modules (IOMs) expand the number of input/output points connected to either a Network Automation Engine (NAE), Network Control Engine (NCE), Advanced Application Field Equipment Controller (FAC), Field Equipment Controller (FEC), or Variable Air Volume Modular Assembly (VMA) to monitor and control a wide variety of HVAC equipment.

Note: The IOM3733 model is only available in certain regions. Contact your local Johnson Controls representative for more information.

IOM expansion modules operate on an RS-485 BACnet® MS/TP bus and integrate into IOMs communicate using the BACnet MS/TP protocol when directly connected to the FC bus.

Note: With Release 10.1 and later of the Controller Configuration Tool (CCT), VMAs, FECs, and FACs can be configured to communicate by using either the BACnet MS/TP or the N2 field bus networking protocol. The operation of the IOM is not affected by the selection of the BACnet MS/TP or the N2 protocol in the host controller, when the IOM is connected to the host controller using the SA bus.

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 these guidelines when installing a controller:

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

Parts included

- One controller with removable terminal blocks
- 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

(barcode for factory use only)

Physical features

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

Figure 1: IOM3733 physical features

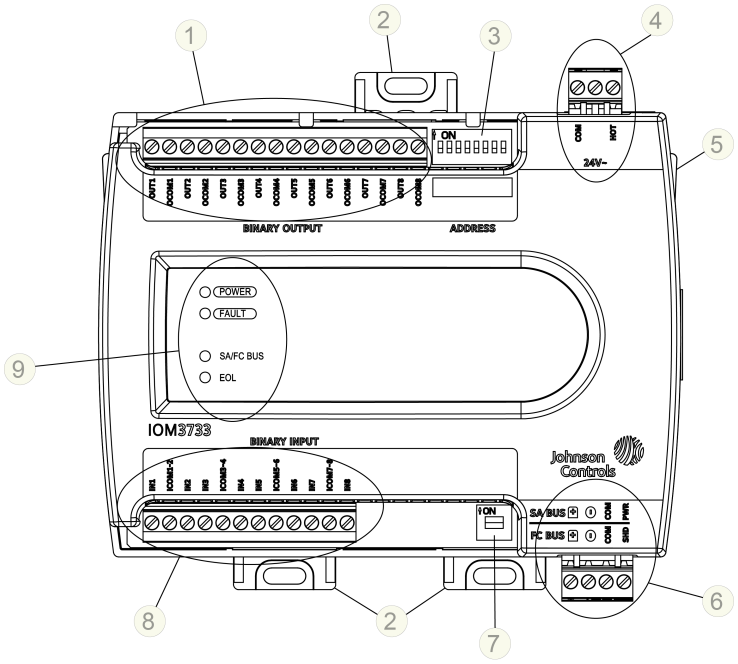


Table 1: IOM3733 feature callouts and descriptions

Callout	Physical feature: description and references
1	Binary Output (BO) Terminal Block (see Table 2)
2	Mounting Clip (Three Total) (see Figure 1)
3	Device Address DIP Switch Block (see)
4	24 VAC, Class 2 Supply Power Terminal Block (see Supply Power Terminal Block)
5	Cover Lift Tab (One of Two) (see Removing the expansion module cover)
6	Sensor Actuator (SA) Bus / Field Controller (FC) Bus Terminal Block (see SA/FC bus terminal block)
7	End-of-Line (EOL) Termination Switch (see Setting the End-of-Line (EOL) switch)
8	Binary Input (BI) Terminal Block (see Table 2)
9	LED Status Indicators

Mounting

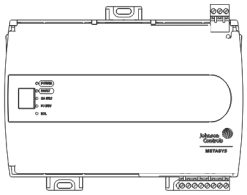
Observe these guidelines when mounting a controller.

- 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 proper mounting position.
- Mount the controller on a hard, even surface whenever possible in wall-mount applications.
- 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 for sufficient space around the controller for cable and wire connections for 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 duct work.
- Do not mount the controller in areas where electromagnetic emissions from other devices or wiring can interfere with controller communication.

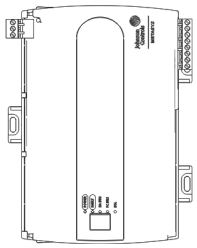
Observe these additional guidelines when mounting a controller in a panel or enclosure:

- 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



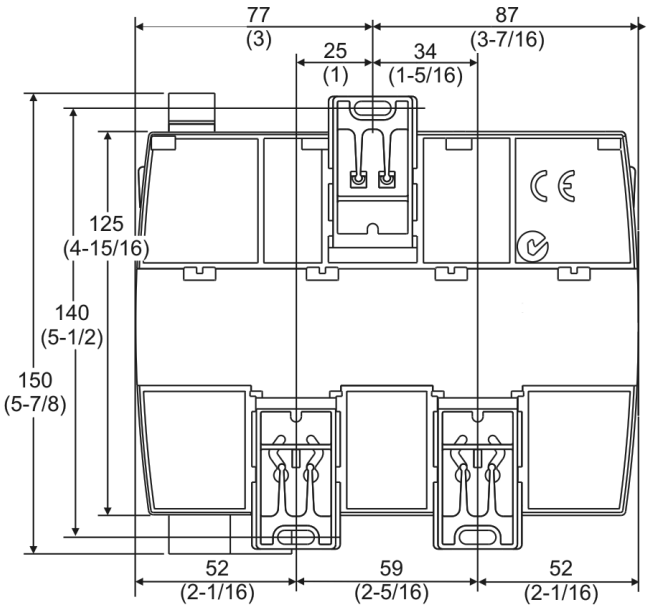
Horizontal Mount Position
Preferred for Wall Mounting
Required for DIN Rail Mounting



Vertical Mount Position
Acceptable for Wall Mounting

Mounting features and dimensions

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



DIN rail mount applications

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

1. Securely mount a 20 cm (8 in.) or longer section of 35 mm DIN rail horizontally and centered in the desired space so that the controller mounts in the horizontal position.
2. Pull the two bottom mounting clips outward from the controller to the extended position.
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, 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 the 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 using the dimensions in Figure 3 and one of the mount positions shown in Figure 2. Or hold the controller 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 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

Observe the following guidelines when wiring a controller:

⚠ 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 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 controller and the output terminal blocks are mounted on the top of the controller.

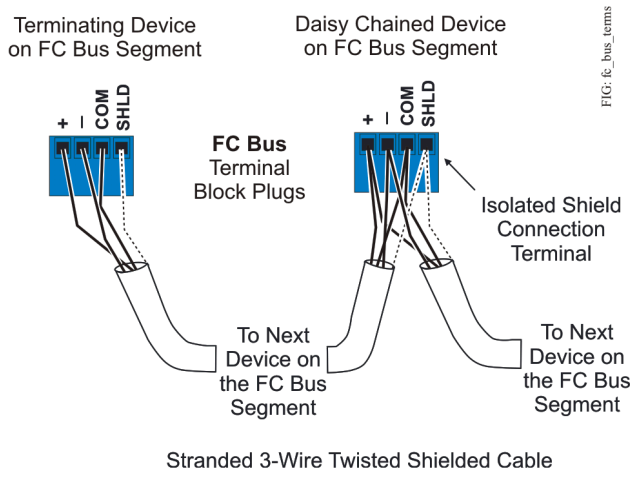
See Table for more information about I/O terminal functions, requirements, and ratings.

SA/FC bus terminal block

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

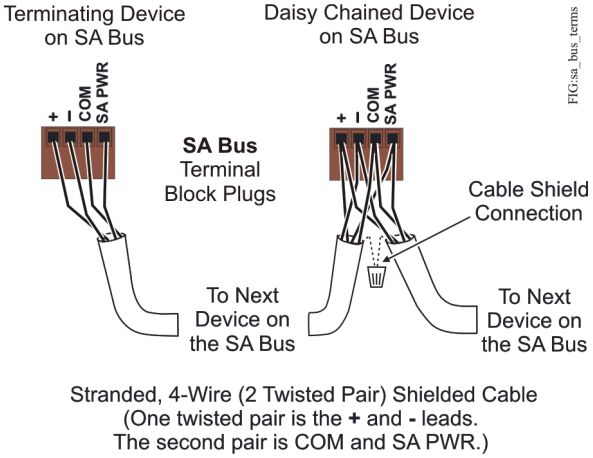
When connecting the IOM to an FC bus, wire the bus terminal block plugs on the expansion module, and the other controller and expansion modules in a daisy-chain configuration using 3-wire twisted, shielded cable as shown in Figure 4.

Figure 4: FC bus terminal block wiring



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.

Figure 5: SA bus terminal block wiring



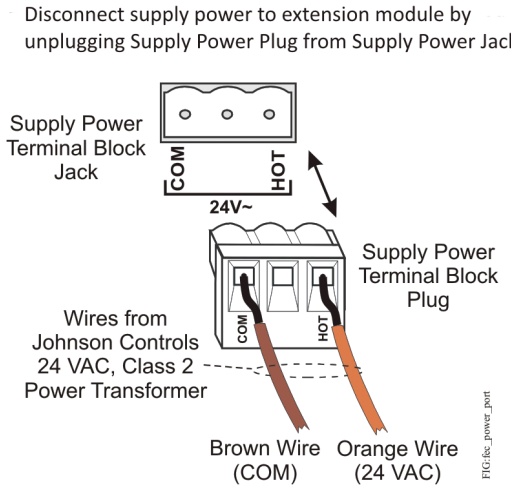
Note: The SA PWR/SHLD terminal does not supply 15 VDC. The SA PWR/SHLD terminal is isolated and can be used to connect (daisy chain) the 15 VDC power leads on the SA bus (Figure 5) or the cable shields on the FC bus (Figure 4). The SA bus supervisor (FAC, FEC, or VMA) supplies 15 VDC to devices on the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

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 the following figure:

Figure 6: 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 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 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

Table 2: IOM3733 terminal blocks, functions, ratings, requirements, and cables

Terminal block label	Terminal label	Function, ratings, requirements	Determine wire size and maximum cable length
BINARY INPUT	**IN***n*	**Binary Input - Dry Contact Maintained Mode** 0.01 second minimum pulse width Internal 16V, 10K ohm pull up	See Guideline A in Table 3.
		Binary Input - Pulse Counter/Accumulator Mode 0.01 second minimum pulse width (50 Hz at 50% duty cycle) Internal 16V, 10K ohm pull up	
	ICOM*n*	**Binary Input Common** for all Binary Input (IN) terminals	
BINARY OUPUT (External Power Source Only)	**OUT***n*	**Binary Output - 24 VAC Triac (External Power)** 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 3.
	OCOM*n*	**Binary Output Common** (for OUT*n* terminal)	

Cable length guidelines for required wire sizes

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

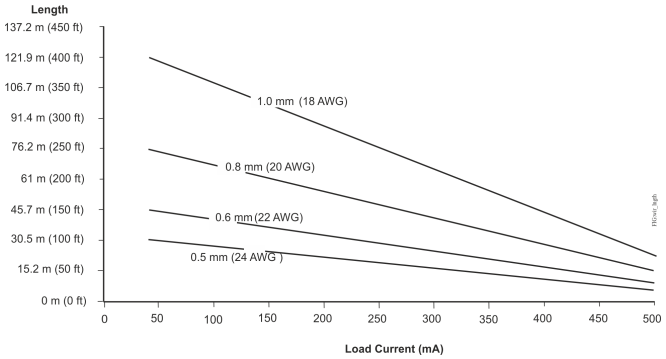
Table 3: Cable length guidelines for required wire sizes for low-voltage (<30 V) inputs and outputs

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 7 to select wire size/gauge. Use stranded copper wire	See Figure 7 to determine cable length. Use twisted wire cable.	N/A

Maximum wire length by current and wire size

Use the following figure to estimate the maximum cable length relative to the wire size and the load current (in mA) when wiring inputs and outputs. This figure applies to low-voltage (<30 V) inputs and outputs only.

Figure 7: Maximum wire length for low-voltage Inputs and Outputs by current and wire size



Communication bus and supply power wiring guidelines

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 controller's communication buses and 24 VAC supply power.

In addition, observe these guidelines when wiring an SA or FC bus and 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 required 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.

Communications bus and supply power terminal blocks, ratings, and requirements provides information

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

Table 4: Communications bus and supply power terminal blocks, functions, ratings, requirements, and cables

Terminal block/Port label	Terminal labels	Function, electrical ratings/Requirements	required cable type
FC BUS or **SA BUS**	**+** **-**	FC or SA Bus Communications	FC Bus: 0.6 mm (22 AWG) stranded, 3-wire twisted, shielded cable required. SA Bus: 0.6 mm (22 AWG) stranded, 4-wire (2 twisted-pairs), shielded cable required. ⓘ **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 **SA PWR**	**SHLD on FC Bus:** Isolated terminal (optional shield drain connection) **SA PWR 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.	
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	

ⓘ **Note:** See Maximum wire length by current and wire size to determine wire size and cable lengths for cables.

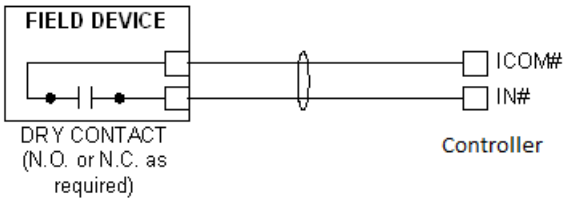
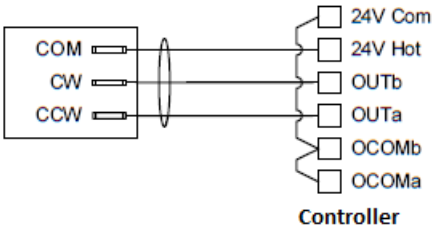
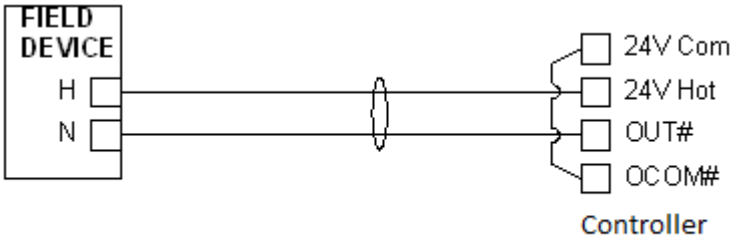
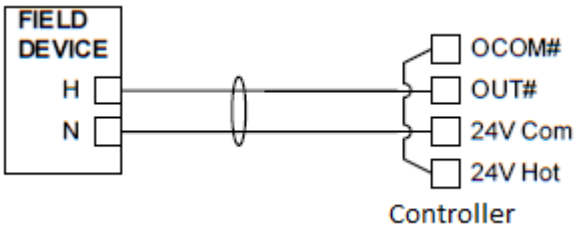
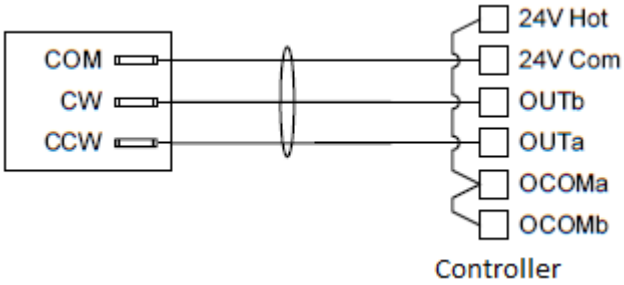
ⓘ **Note:** The SA Bus and FC Bus wiring recommendations in this table are for MS/TP bus at 38,400 baud. For more information, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

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 device	Type of Input/Output	Termination diagrams
Dry Contact (Binary Input)	BI	
Incremental Control to Actuator (Switch Low, Externally Sourced)	BO	
24 VAC Binary Output (Switch Low, Externally Sourced)	BO	
24 VAC Binary Output (Switch High, Externally Sourced)	BO	
Incremental Control to Actuator (Switch High, Externally Sourced)	BO	

Setup and Adjustments

Setting the device address

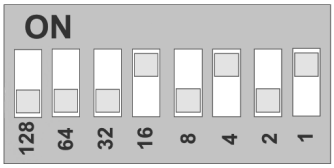
Metasys expansion modules are master devices on MS/TP (SA or FC) buses. Before operating an expansion module on a bus, set a valid and unique device address for each expansion module on the bus. You set an expansion module's device address by setting the positions of the switches on the DIP switch block at the top of the expansion module. Device addresses 4 through 127 are the valid addresses for these expansion modules. The following table describes the FC bus and SA bus device addresses for Johnson Controls MS/TP communications bus applications.

Table 6: SA/FC Bus Device Address Descriptions

Device Address	Use on Descriptions
0 (Switch 128 Off)	Reserved for FC Bus Supervisory Controller (not for use on controllers or expansion modules).
1-3 (Switch 128 Off)	Reserved for peripheral devices (not for use on controllers or expansion modules).
4-127 (Switch 128 Off)	Used for MSTP master devices (controllers and expansion modules) that are hardwired to an SA bus or FC bus.

The DIP switch block has eight switches numbered 128, 64, 32, 16, 8, 4, 2, and 1. Switches 64 through 1 are device address switches. Switch 128 must be set to **OFF** for all hard-wired SA and FC Bus applications.

Figure 8: Device address DIP switch Block set to address 21



Note: *Metasys* field controllers ship with switch 128 ON and the remaining address switches off rendering the controllers wired subordinate devices, which do not operate on MSTP buses, but do 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* expansion modules, complete the following steps:

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, and ensure that switch 128 remains set to OFF.

Note: To do this, 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 switches 16, 4, and 1 to ON (16+4+1= 21) and all other switches to OFF.

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

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

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

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 the 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, complete the following steps:

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 onto the latches until they snap into the latched position.

Setting the End-of-Line (EOL) switch

Each controller has an EOL switch, which, when set to ON, sets the controller as a terminating device on the bus. The default EOL switch position is OFF.

Figure 9: End-of-Line switch positions

To set the EOL switch on a field controller, complete the following steps:

1. Determine the physical location of the field controller on the FC bus.
2. Determine if the controller must be set as a terminating device on the bus.

Note: For detailed information regarding EOL termination rules and EOL switch settings on FC buses, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

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

When a controller is connected to power with its EOL switch set to ON, the amber EOL LED on the controller cover is lit.

Commissioning the Controllers

Commission BACnet MS/TP field controllers with the controller (CCT) software, either via a Bluetooth® Wireless Commissioning Converter, a ZFR wireless adapter **(BACnet MS/TP only)**, or in BACnet routing mode when connected to an NAE or NCE.

Note: N2-capable controllers do not support Zone Bus or XT Bus. They do not support wireless connections to the N2 Bus.

Refer to the *Controller Tool Help (LIT-12011147)* for detailed information on commissioning field controllers.

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

Observe the Status LEDs on the front of the expansion module. Table 7 provides LED status indicator information for troubleshooting the expansion module.

LED status and states

Table 7: Status LEDs and description of LED states

LED label	LED color	Normal LED state	Description of LED states
POWER	Green	On Steady	Off Steady = No Supply Power. The expansion module's polyswitch/resettable fuse may be open. Check output wiring for short circuits and cycle power to expansion module. On Steady = Power Connected
FAULT	Red	Off Steady	Off Steady = No Faults On Steady = Device Fault 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 a controller fails to operate within its specifications, replace the controller. For a replacement controller, contact your Johnson Controls representative.

Accessories

Table 8: Accessories Ordering Information

Product Code Number	Description
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* Field Controller Firmware Package Files for CCT
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-CBLTSTAT	Cable adapter for connection to 8-pin TE-6700 Series sensors
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, Gray, Bulk Pack of 10

Technical specifications

Table 9: IOM3733 technical specifications

Product Code Number	MS-IOM3733-0 Input/Output Expansion Module ⓘ **Note:** This model is only available in certain regions. Contact your local Johnson Controls representative for more information.
Power Requirement	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
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
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 expansion modules (for MS/TP bus communications at 38,400 baud) 4-wire SA bus between expansion module, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power (from controller or expansion module) to bus devices (for MS/TP bus communications at 38,400 baud)
Processor	RX631 Renesas® 32-bit microcontroller
Memory	4 MB external serial flash memory and 768 KB internal flash and 128 KB internal RAM
Input and Output Capabilities	**8 - Binary Inputs:** Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode **8 - Binary Outputs:** Defined as 24 VAC Triac (external source power only)
Terminations	**Input/Output:** Fixed Screw Terminal Blocks **SA/FC Bus and Supply Power:** 4-Wire and 3-Wire Pluggable Screw Terminal Blocks
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 164 mm x 53 mm (5-7/8 in. x 6-1/2 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 the expansion module 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 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 International: BACnet Testing Laboratories (BTL) Protocol Revision 15 Listed and Certified BACnet Smart Actuator (B-SA)

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.