FX80 Supervisory Controller Installation Instructions

Applications

This document describes how to mount and wire the following:

- DIN-mount, 24 VAC/DC powered FX80 controller
- Wall-mount, Class 2 universal AC power adapter supplying 24 VAC

Note: The FX80 controller requires, at a minimum, FX Supervisory Release 14.1. A maximum of four total option card modules are supported. Separate limits may exist in the controller's license to further limit functionality.

Figure 1: FX80 Controller



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.

Part No. 24-10143-861 Rev. A

2019-03-22

(barcode for factory use only)

FX-SC8BASE-0, FX-SC8BASE-700

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

Unpack the FX80 controller and inspect the contents of the package for damaged or missing components. If the controller is damaged, contact the Johnson Controls® Product Sales Operations team and return any damaged components for repair or replacement.

Parts included

- FX80 controller
- MicroSD card installed in the controller
- Coax-mount 2.4 GHz antenna for Wi-Fi, two 3-position RS-485 connector plugs, and a grounding wire
- 2-position 24 VAC/DC connector plug
- This FX80 Installation Sheet
- FX80 IT Security Notice

Special tools needed

- One of the following:
  - UL listed, Class 2, 24 VAC transformer, rated at minimum of 20 VA
  - 24 VDC power supply, capable of supplying at least 1A (24W)
  - FX-SC8XPS-0 wall-mount AC power adapter with barrel connector plug

  ⓘ **Note:** A dedicated transformer is required (it cannot power additional equipment).
- DIN rail, type NS35/7.5 (35mm x 7.5mm) and DIN rail end-clips (stop clips), recommended for any installation that includes option modules.
- Suitable tools and fasteners for mounting the unit and any accessories.

Precautions

General precautions

⚠ Warning

Risk of Electric Shock.
Disconnect the power supply before making electrical connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

⚠ Warning

Risque de décharge électrique.
Débrancher l'alimentation avant de réaliser tout branchement électrique. Tout contact avec des composants conducteurs de tensions dangereuses risque d'entraîner une décharge électrique et de provoquer des blessures graves, voire mortelles.

➤ **Important:** Use copper conductors only. Make all wiring in accordance with local, national, and regional regulations. Do not exceed the FX80 Supervisory Controller's electrical ratings.

➤ **Important:** Remove all power to controller before attaching (plug in) or detaching (unplug) any option card module, to prevent possible equipment damage.

Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The microprocessors and associated circuitry within the devices are sensitive to static discharge.

ⓘ **Note:** Removal of the cover is not required. The controller contains no configurable or user-serviceable items (such as jumpers).

Mounting

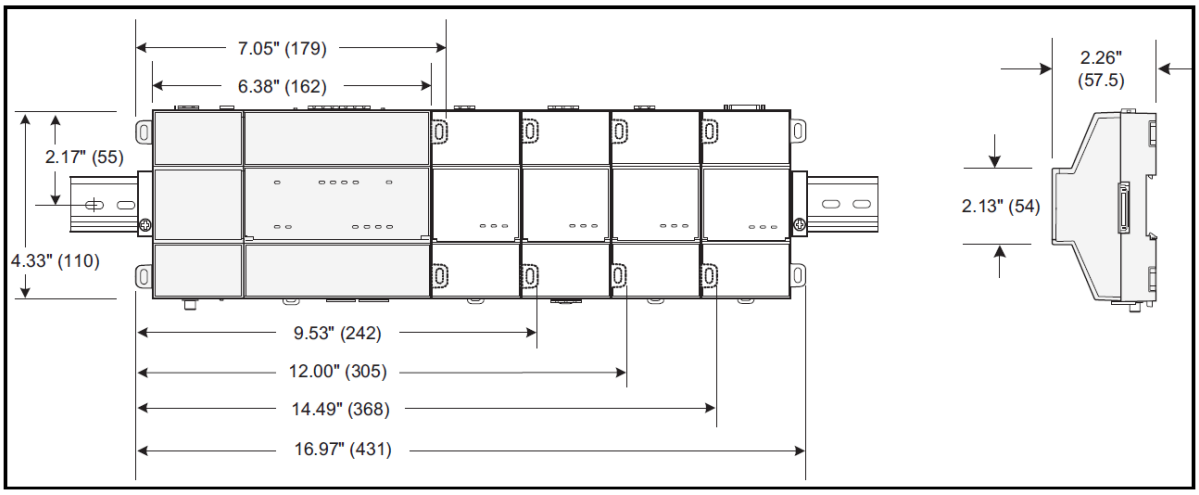
Mount the controller in a location that allows clearance for wiring, servicing, and module removal.

Physical mounting

The following applies when you physically mount the unit.

- Horizontal mounting is **strongly recommended** to achieve maximum heat dissipation and meet the operating temperature upper limit. Any other mounting orientation reduces the upper limit.
- Mounting on a 35 mm wide DIN rail is recommended. The controller's unit base has a molded DIN rail slot and locking clip, as do option modules. DIN rail mounting ensures alignment of the connectors between the devices.
- Up to four option modules are supported.
- Dimensions of a unit appear in the following figure.

Figure 2: Mounting dimensions of Controller and option modules



Environmental requirements

Note: This product is for **indoor use only** (altitude to 2,000 m [6,562 ft]).

Ambient conditions must be within the range of:

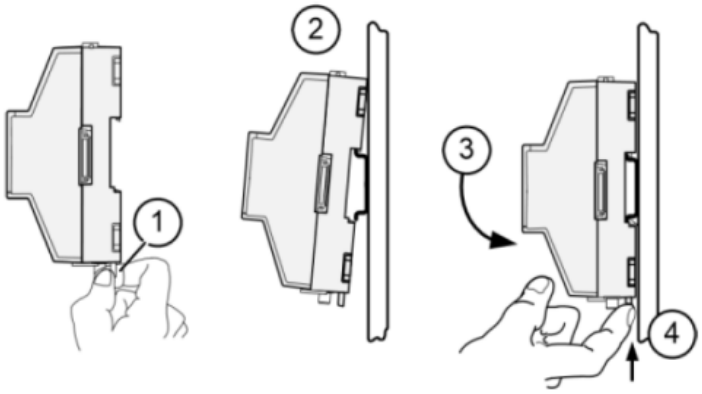
- Operating Temperature: -20°C to 60°C (-4°F to 140°F)
- Storage Temperature: -40°C to 85°C (-40°F to 185°F)
- Relative Humidity: 5% to 95% non-condensing. Pollution Degree 3
- Supply (mains) voltage requirements are as follows:
  - Allowable voltage fluctuation to -15%, +10%
  - Temporary overvoltages +/- 15%

Note: Horizontal mounting is strongly recommended to achieve maximum heat dissipation and meet the operating temperature upper limit. Any other mounting orientation reduces this upper limit.

Mounting on the DIN rail

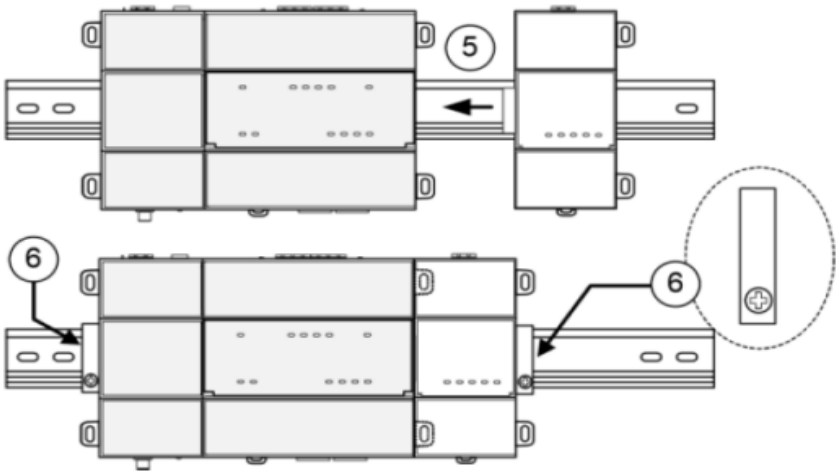
1. Pull the controller's locking clip down.

Figure 3: Fastening to the rail



2. Tilt the module to hook over the DIN rail.
3. Push down and in on the unit, fastening it to the rail.
4. Slide the module firmly into the controller’s connector (or existing option module) to seat.
5. Mount any option card module onto the DIN rail in the same way.

Figure 4: Slide module into Controller's connector



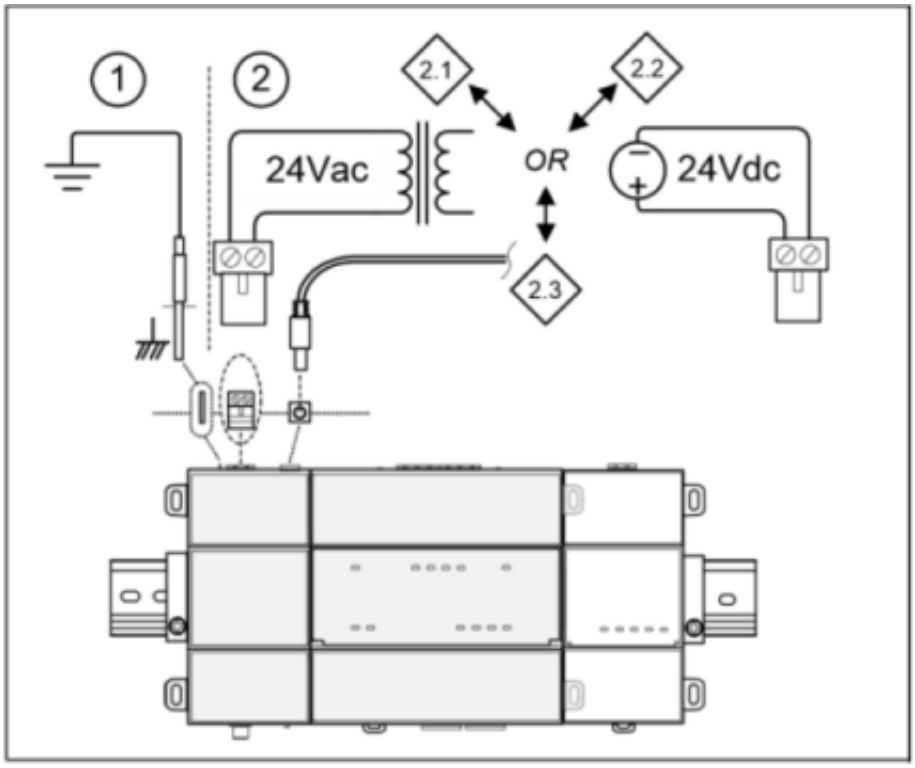
6. Slide the module firmly into the controller’s connector to seat. Repeat for other modules as needed (four maximum).
7. Secure both ends of the final assembly with DIN rail end-clips provided by the DIN rail vendor.

Wiring

Earth ground and power

Earth grounding provides protection from electrostatic discharge or other forms of EMI.

Figure 5: Earth ground and power options



Depending on the power source used:

- **2.1 (AC)**: Dedicated 24 V transformer required, with neither side of the transformer secondary tied to ground.
- **2.2 (DC):** Polarity is not important (uses onboard diode bridge), with neither leg tied to ground.
- **2.3** (Wall-mount AC adapter, FX-SC8XPS-0) instead of wiring 24 V to 2-position connector. Do not use the wall-mount AC adapter simultaneously with power wired 2-position connector.

Wiring earth ground and power

➤ **Important:** Before making power terminations, de-energize the 24 V power source. Do not restore power until completing all other mounting and wiring.

➤ **Important:** A grounding point must be present nearby.

1. Install the included earth ground wire to the controller's earth ground spade lug, and terminate the other end to a nearby earth ground.
2. Unplug the controller's 2-position power connector plug and terminate the 24 V supply source (AC or DC) to the connector. Leave the connector unplugged.

Communications wiring

Figure 6: Communications ports on the Controller

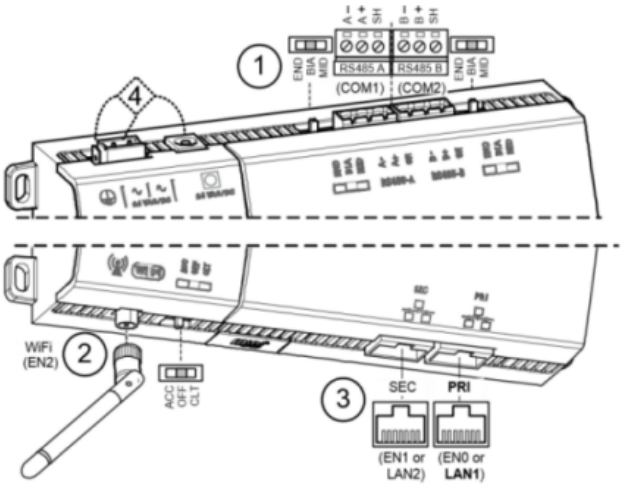


Table 1: Communications ports on the Controller

Callout	Description
1	RS-485 ports and bias switches
2	Wi-Fi adapter, settings switch, and antenna
3	Ethernet ports, 10/100-Mbit, RJ-45
4	Earth ground and 24 V power input

Wi-Fi

An integral Wi-Fi adapter provides wireless connectivity using the IEEE 802.11b/g/n standard, and provides an RP-SMA coax antenna connector.

The Wi-Fi configuration switch sets operation as follows:

- **OFF** - (Default, middle) Wi-Fi adapter is disabled.
- **ACC** - Controller provides operation as a Wi-Fi access point for up to 20 clients.
- **CLT** - Controller operates as a client to an existing 802.11b/g/n router or access point.

Note: By default, the Wi-Fi software is disabled. You must enable the WiFi within the software before it becomes available.

RS-485 wiring

On the controller's top side, two RS-485 ports operate as COM1 and COM2. Each port is capable of up to 115,200 baud, and uses a 3-position, screw terminal connector.

Use shielded, twisted-pair, 18-22 AWG cabling to wire in a continuous daisy chain fashion to other RS-485 devices: minus-to-minus, plus-to-plus, and shield-to-shield. Connect the shield wire to earth ground at one end only.

For more information about wiring guidelines, refer to *FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670)*.

Figure 7: RS-485 wiring example

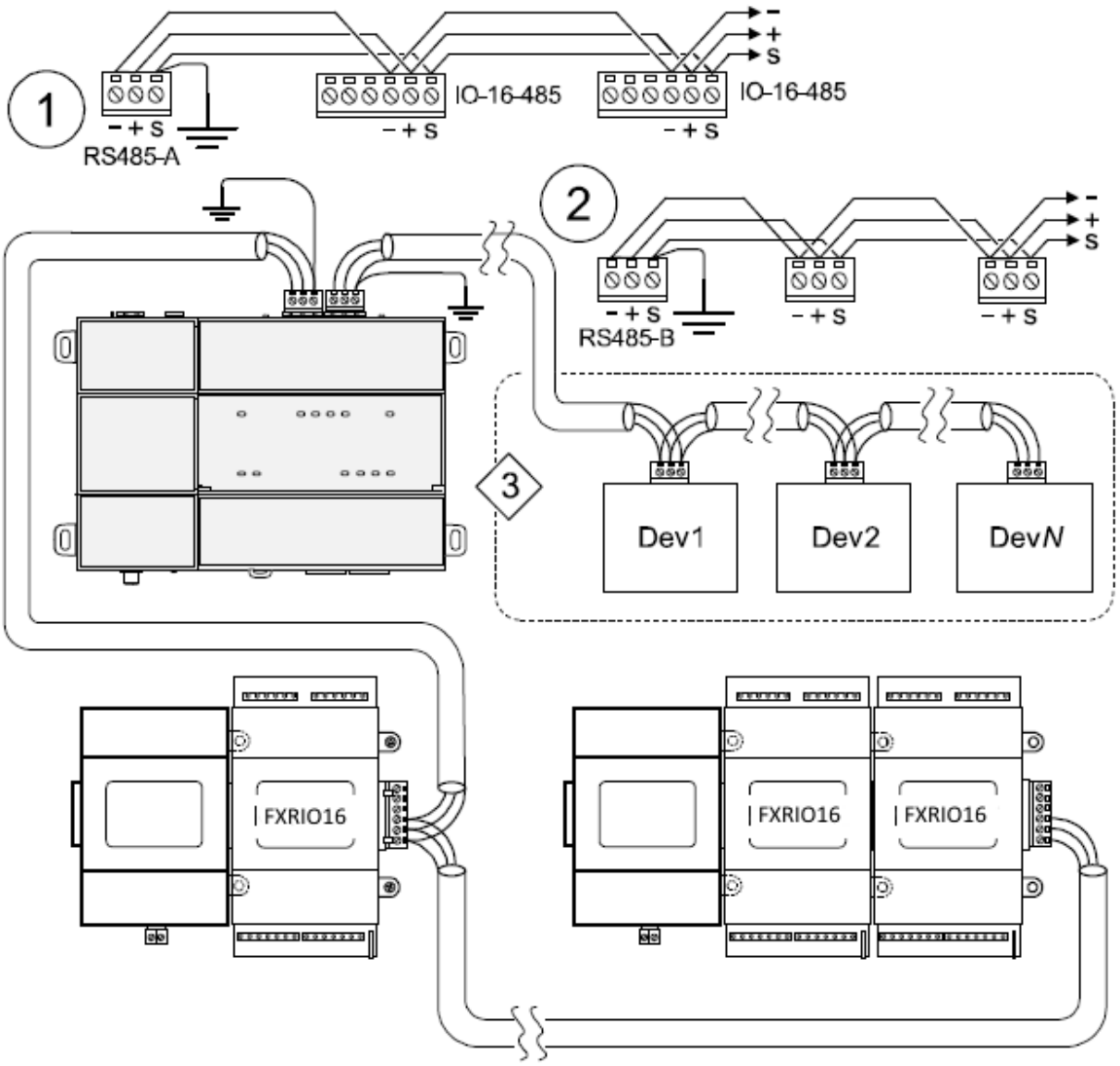


Table 2: RS485 wiring example

Callout	Description
1	RS-485 port A (COM1) is often used to support a trunk of LP-FXRIO16-0 modules. Do not mix LP-FXRIO16-0 modules with other types of RS-485 devices on the same RS-485 trunk.
2	RS-485 port B (COM2) supporting a network of other field devices using RS-485 field communication.
3	RS-485 devices on the same network should use the same protocol and baud rate. Up to 32 or more devices may be supported depending on device specifications.

RS-485 bias switches

Each RS-485 port has an adjacent 3-position biasing switch, with these settings:

- **BIA** - (Default, middle) Controller provides RS485 biasing, but without a termination resistor.

- **END** - Both RS485 biasing and a termination resistor are provided by the controller.
- **MID** - No RS485 biasing or termination resistor is provided by the controller.

Often, adding RS-485 biasing can improve communications by eliminating indeterminate idle states.

Note: FX-PC controllers implement biasing. When using RS485 for BACnet MS/TP with FX-PC controllers, we recommend using the **MID** position (with FX-PC controllers at the ends of the trunks with their EOLs set). The **BIA** position is not required for an all FX-PC controller trunks. For more information, refer to the *FX-PC Series Controllers MS/TP Communications Bus Technical Bulletin (LIT-12011670)*.

Ethernet wiring

Two RJ-45 10/100-Mbit Ethernet connectors are labeled PRI (LAN1) for **primary**, and SEC (LAN2) for **secondary**. Use a standard Ethernet patch cable to an Ethernet switch.

The factory-default IP address for PRI is **192.168.1.149**. The default subnet mask is **255.255.255.0**. By default, the SEC (LAN2) port is disabled.

Setup and adjustments

Power Up and initial checkout

1. **Apply power.** To do this, do one of the following:
   - Insert the 2-position 24 V power connector plug.
   - Insert the barrel plug of the wall-mount AC adapter (FX-SC8XPS-0).
2. **Check the STAT (Status) and BEAT (Heartbeat) LEDs.**
   When power is applied, the green **STAT** LED flashes. This LED indicates that the system is working, with power applied. During startup, the **BEAT** LED may blink at 1 Hz with a 90/10 percent on/off duty cycle. When startup completes, the platform daemon is started, and the normal 1 Hz flash at 50/50 percent on/off duty cycle of the **BEAT** LED returns.

LEDs

The controller provides a number of status LEDs. All but one of the LEDs are visible with the front access door closed.

Figure 8: LEDs and descriptions

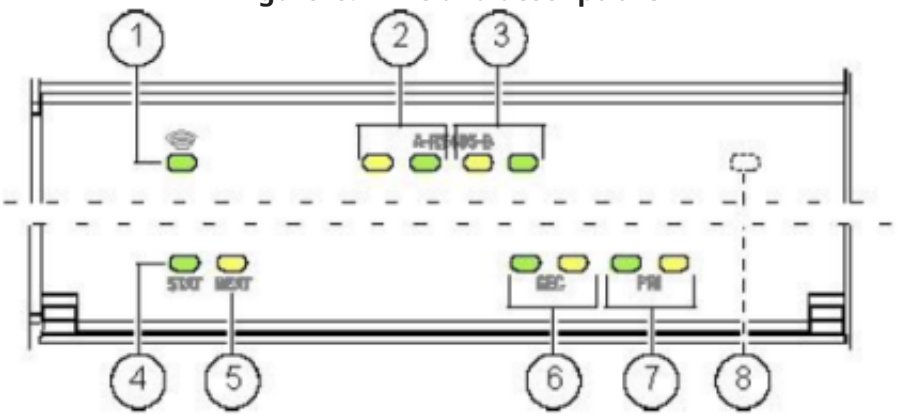


Table 3: LEDs and descriptions

Callout	Description
1	**Wi-Fi (Green)** - Lit when Wi-Fi configuration switch is not off
2	**RS-485 A (COM1)** - Transmit (TX) and Receive (RX)
3	**RS-485 B (COM2)** - Transmit (TX) and Receive (RX)
4	**STAT (Green)** - Remains lit when controller is powered
5	**BEAT (Yellow)** - Heartbeat, normally 1 Hz 50% duty cycle
6	**Secondary Ethernet** - SEC (LAN2) Link and Activity
7	**Primary Ethernet** - SEC (LAN1) Link and Activity
8	**(Behind door) BACKUP (Green)** - Typically off

If the **BEAT** LED stays on constantly, does not light, or blinks very fast, have your ABCS Distributor contact the FSC or your appropriate technical support group.

➤ **Important:** The 1 Hz, 90/10 percent on/off **BEAT** flash at startup also occurs during other critical operations, such as a firmware upgrade to the controller or any attached modules. To be safe, do not remove power from the controller while its **BEAT** LED flashes with a 90/10 percent on/off duty cycle. Wait for the normal (50/50 percent) flash to return before removing power.

Remove or replace the microSD flash memory card

If necessary, you may need to remove or replace microSD flash memory card.

Figure 9: MicroSD card location in Controller

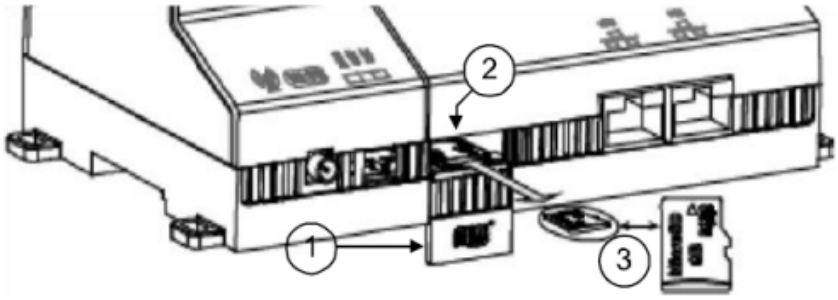


Table 4: MicroSD card location in Controller

Callout	Description
1	Access shutter for the microSD card (slide to open or close)
2	Card carrier inside the controller
3	MicroSD card to insert or remove from the card carrier

➤ **Important: Disconnect all power** to the controller **before removing or inserting** the microSD card. Otherwise, equipment damage is likely to occur.

Note: When you remove the miscroSD card, you must lightly press on the installed microSD card shutter to release it. Then carefully remove the card from the card carrier. When you replace a microSD card, place the card in the card carrier, and push the card carrier in the access shutter until it clicks.

Note: Data on the microSD card is encrypted by a special system password stored in the controller base. If you are swapping in a card from a previously configured unit, you must re-enter this same passphrase using a serial connection to the unit's debug port.

Note: Third-party microSD cards are not supported.

USB ports and pushbutton switches

Two USB ports, two pushbutton switches, and an associated LED are located behind the controller's front access door.

Figure 10: USB ports and switches behind the access door

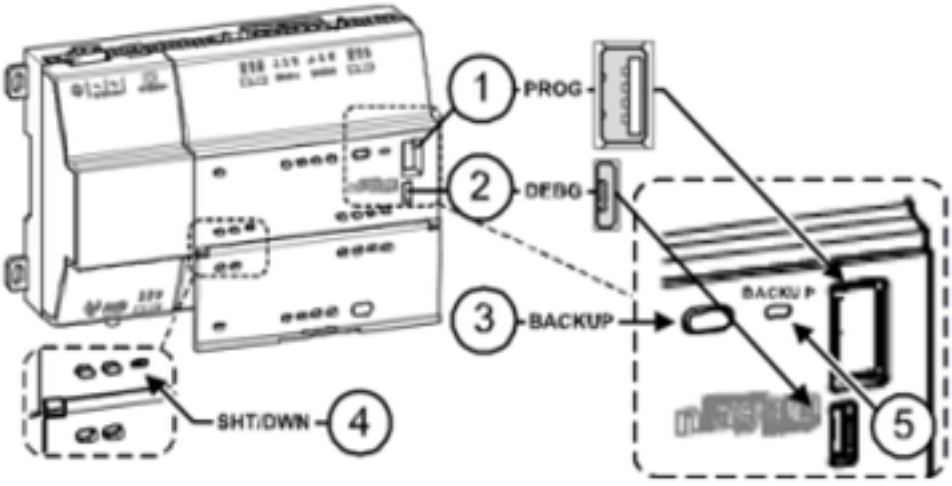


Table 5: USB ports and switches

Callout	Description
1	**PROG** - USB 2.0 to use with USB flash drive for backup
2	**DEBUG** - Micro-A USB for serial debug communication
3	**BACKUP** - Pushbutton switch to start a USB backup, or if pressed in during power up/startup, a factory recovery image
4	**SHT/DWN** - Recessed switch for controlled shutdown
5	**BACKUP** - LED to indicate USB media present, or a backup, restore, or factory recovery image in progress

The DEBUG port is a standard Micro-A type USB port for serial debug communications to the controller. Use a serial terminal program (for example: PuTTY) to access the controller's system shell menu. The system shell menu provides access to a few basic platform settings.

The default DEBUG port settings are 115200, 8, N, 1 (baud rate, data bits, parity, stop bits).

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