OpenBAS
BUILDING
AUTOMATION
SYSTEM

OpenBAS-HV-NXCORE
Protocol Converter

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1.0   Introduction

This document provides information on installing the OpenBAS-HV-NXCORE Protocol Converter.

1.1   OpenBAS-HV-NXCORE Protocol Converter

Mircom's OpenBAS-HV-NXCORE Protocol Converter is an HVAC controller with an integrated PLC (programmable logic controller) and scheduler. It includes 2 RS-485 field bus connections, 1 USB port, and 1 I^2C bus.

1.2   Features

Mircom's OpenBAS-HV-NXCORE Protocol Converter integrates into Mircom's unified platform for automating HVAC and mechanical rooms as well as incorporating energy management features and lighting control to offer building owners and managers a seamless operation with the following features:
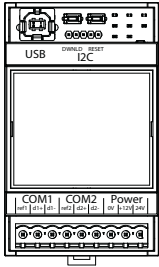
- Modular design to cover any small, medium or large project.
- Industry standard field bus protocols to integrate into any existing BAS system, such as BACnet, Modbus, Optomux, N2-Open, and ASCII.
- Advanced Networking to integrate into IP networks and use the most advanced features and protocols such as distributed computing, USB and Cloud storage, HTML5, JavaScript, XML, Ajax, SMS, and GSM.
- Modular add-ons for every Building Automation System solution.
- The OpenBAS software which provides owners and managers a single solution for managing all their building's automation needs.

2.0　Overview

2.1　OpenBAS-HV-NXCORE Components

2.1.1　Controllers

Table 1　OpenBAS-HV-NXCORE Controllers

Picture	Model	Description
USB　I2C　COM1　COM2　Power	OpenBAS-HV-NXCORE	Analog output expansion • Integrated programmable logic controller and scheduler • 2 RS-485 field bus connection • USB and 1²C buses

2.1.2　Accessories

Accessories are powered from the controller.

Table 2　OpenBAS-HV-NXCORE Accessories

Model	Description
OpenBAS-ACC-RS485	Optically isolated RS-485 converter
OpenBAS-ACC-RS232	RS-232 converter
OpenBAS-ACC-DB9	DB9 adapter
OBS-ACC-32K128	128 KB plus 32 KB memory expansion

2.1.3　Compatible Modules

Compatible modules are mounted separately from the controller.

Table 3　OpenBAS-HV-NXCORE Compatible Modules

Model	Description
OpenBAS-HV-RF433R	Wireless 433 MHz RF receiver that integrates up to 10 wireless transmitters and thermostats into OpenBAS-HV-NXCORE controllers Mounts in a DIN rail-mounted box
OpenBAS-NWK-ETH3	Ethernet controller with support for multiple protocols • 2 field bus connections • 1 I^2C connection • Mounts in a DIN rail-mounted box • Powered separately

3.0 Installation

> **Note:** Installation of OpenBAS-HV-NXCORE controllers should be in accordance with the Canadian Electrical Code or the National Electrical Code, and comply with all local regulations. Final acceptance is subject to the Local Authority Having Jurisdiction (AHJ).

3.1 Parts of the Enclosure

Cover

Enclosure

Circuit board

Base with mounting clip
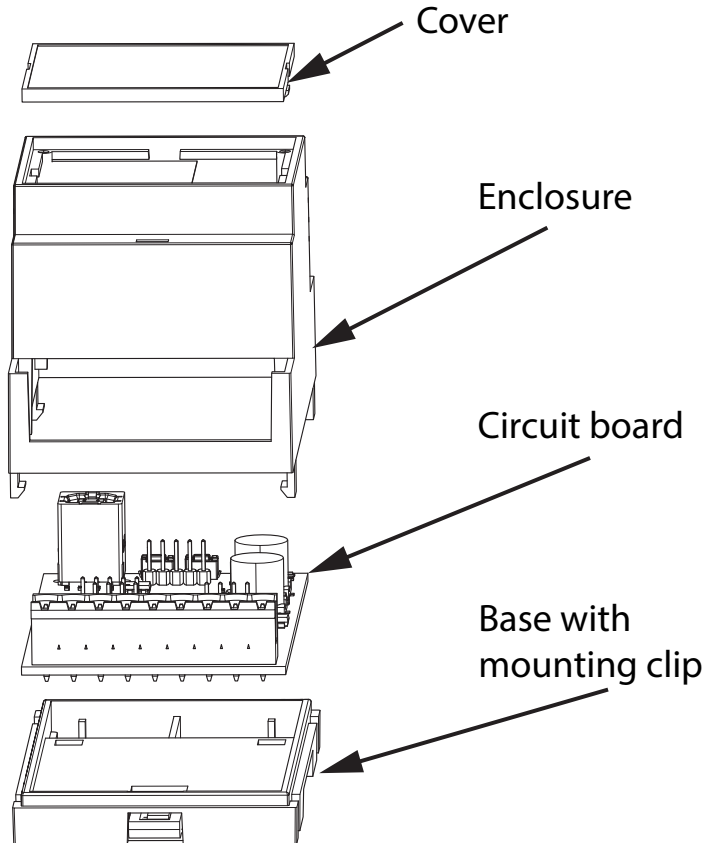
Figure 1   Parts of the enclosure

To remove the circuit board from the enclosure

⚠	**Caution:**	**Risk of Electric Shock.** Disconnect the mains power and disconnect the controller from all wiring before opening the enclosure.

❗	**Attention:**	**Always hold circuit boards by the edges to prevent damage from static electricity. Always wear an anti-static bracelet when handling circuit boards.**

1. Insert a flathead screwdriver under the tabs on the enclosure, shown in Figure 2, in order to lift the tabs and remove the base.

Figure 2   Tabs on enclosure

2. Hold the circuit board with one hand, and with the other hand lift the tabs so that you can remove the circuit board from the enclosure. See Figure 3.

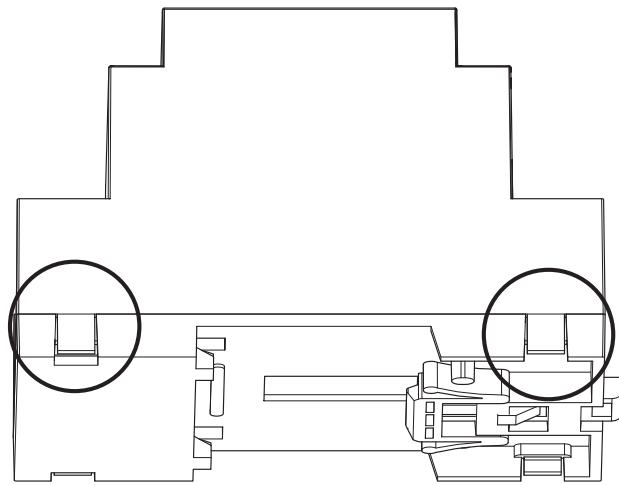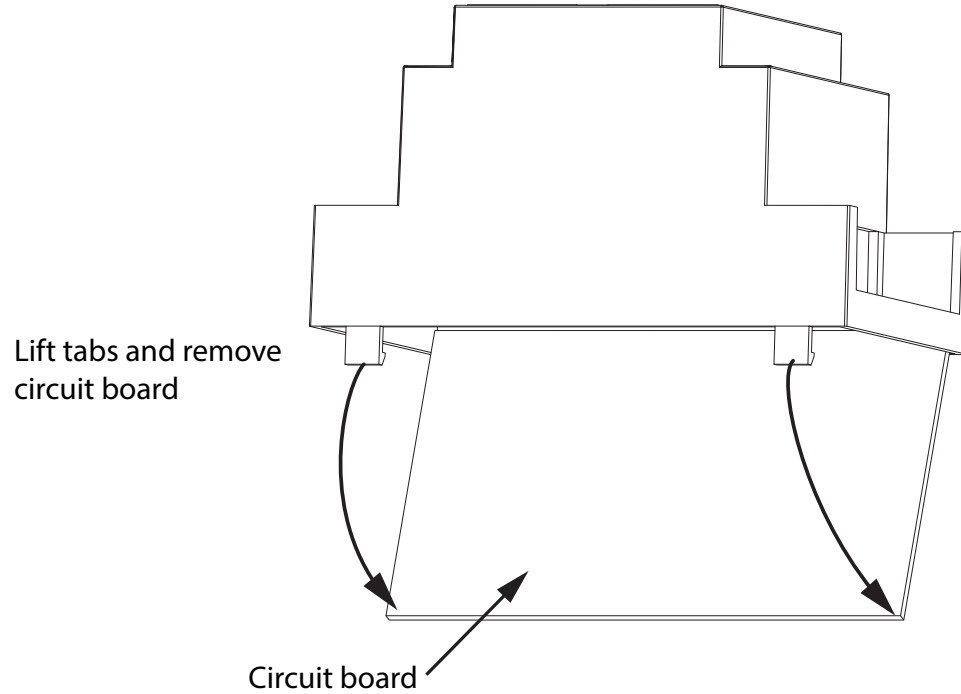Lift tabs and remove circuit board

Circuit board

Figure 3   Lift tabs and remove circuit board

! **Attention: Be careful not to break the tabs. Do not apply excessive force.**

3.2 Controller Board Connections
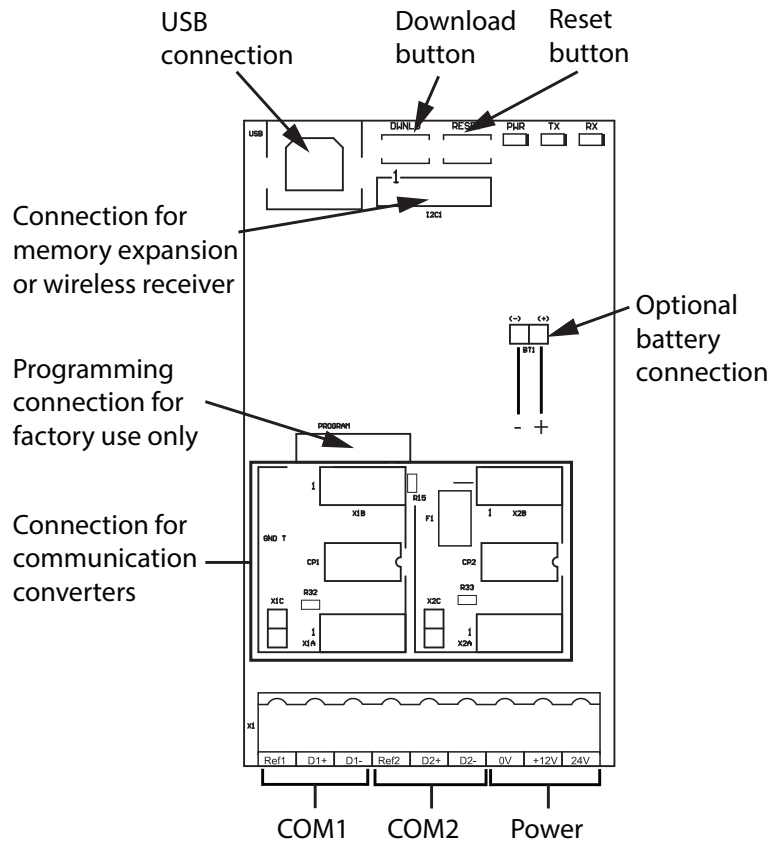
Figure 4   Board connections

3.3 Installing Accessories

> **!**
>
> **Attention: This job must be performed only by a certified technician as dangerous voltages might be present inside of the enclosure.**
> **Always disconnect the power before installing accessories.**

3.3.1 Communication Converters (OpenBAS-ACC-RS485, OpenBAS-ACC-RS232)

By default, the field bus communication terminals are configured as RS-485 through a factory-installed module. They can be changed to RS-232 or optically isolated RS-485 by installing the OpenBAS-ACC-RS232 or OpenBAS-ACC-RS485 converter.

The communication converters OpenBAS-ACC-RS485 and OpenBAS-ACC-RS232 connect to the connections labeled P1 and P2 in Figure 5 below. Figure 5 also shows the relationship between the 2 P connections and the field bus connections (labeled COM1 and COM2). P1 controls COM1 and P2 controls COM2.
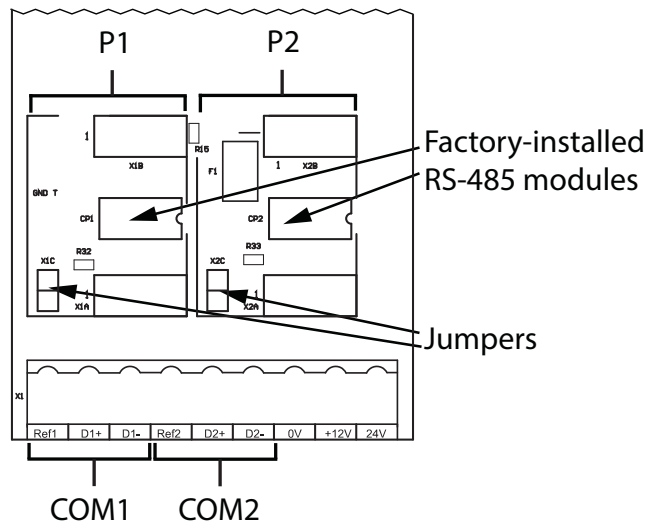
Figure 5   Location of factory-installed modules and jumpers

For example, if OpenBAS-ACC-RS485 is installed in P1 and OpenBAS-ACC-RS232 is installed in P2, then COM1 functions as optically isolated RS-485, and COM2 functions as RS-232.

To install a communication converter

1. Remove the jumper.

2. Remove the factory-installed RS-485 module.
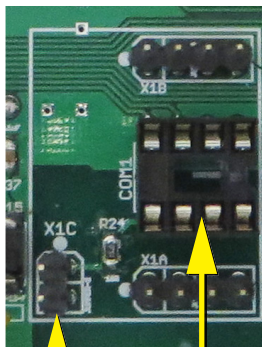
Jumper removed   Factory-installed RS-485 module removed

Figure 6   The jumper and RS-485 module are removed from P1

3. Install the communication converter.

OpenBAS-ACC-RS232

Figure 7   OpenBAS-ACC-RS232 is installed

3.3.2 Memory Expansion Card (OBS-ACC-32K128) and Wireless Receiver (OpenBAS-HV-RF433R)

Connect the memory expansion cards to the I2C connector shown in Figure 4.

i

Note: When connecting the I2C ports on 2 devices, make sure to connect pin 1 on the first device to pin 1 on the second device. Pin 1 is marked by a dot or a "1".

3.4   Optional Battery

!

Attention: Caution – The battery used in this device may present a risk of fire or chemical burn if mistreated. Do no disassemble, heat above 60°C (140°F), o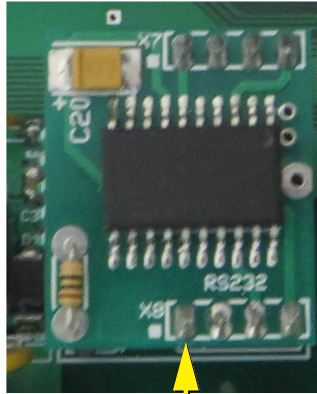r incinerate. Replace battery with FDK Corporation ML2430 batteries only. Use of another battery may present a risk of fire or explosion.

The OpenBAS-HV-NXCORE has connections for an optional battery, shown in Figure 4. Since the OpenBAS-HV-NXCORE is normally configured as a slave, it receives the time from the master, so it does not require a battery. Connect a battery if the controller is configured as a master or is used as a standalone controller. The Mircom part number for the battery is BT-025.

To install or replace the battery

1. Disconnect the mains power and open the mains breaker.

2. Disconnect all wiring from the unit.

3. Remove the top cover as described on page 9.

4. Disconnect the old battery.

5. Dispose of the used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire.

6. Connect the new battery to the connection shown in Figure 4. The battery wire can be connected only one way.

3.5 USB

The full speed USB 2.0 connection is shown in Figure 4. Connect a computer to this port in order to configure the controller.

3.6 Reset and Download Buttons

Press the **RESET** button to restart the controller.

The **DWNLD** button is used for loading firmware on to the controller.

Refer to the OpenBAS Programming Manual for information on upgrading controllers.

3.7 Enclosure Dimensions
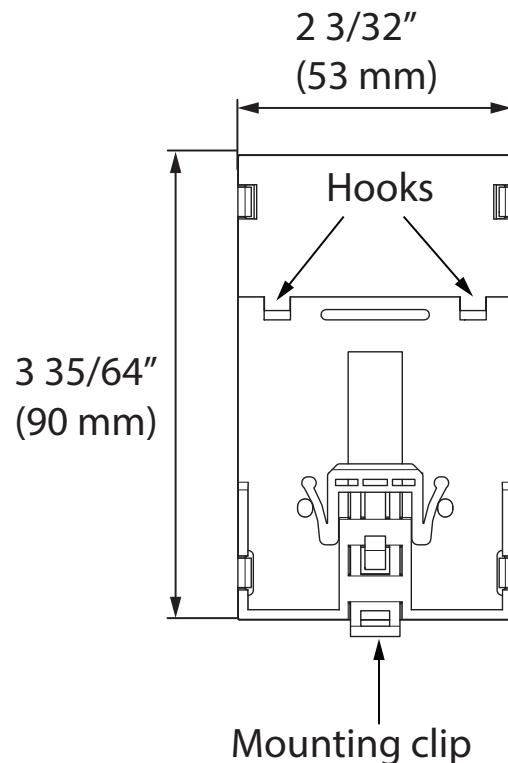
Figure 8   Enclosure (back view)

3.8   Assembly

To put the circuit board in the enclosure

1. Hold the circuit board with one hand, and with the other hand lift the tabs so that you can fit the circuit board into the enclosure as shown below.

i   **Note:**   Make sure that the board is the right way up: the terminal labels on the enclosure must match the terminal labels on the circuit board.

Circuit board

Figure 9   Fit the circuit board in enclosure

2. Snap the base onto the enclosure. Make sure that the mounting clip is on the bottom.

3. Snap the cover in place. Make sure that the Mircom logo is the right way up.

!   **Attention: Always hold circuit boards by the edges to prevent damage from static electricity. Always wear an anti-static bracelet when handling circuit boards.**

3.9 Mounting the Enclosure

> **!**
>
> **Attention:** Mount the enclosure on a DIN rail in a UL-compliant metal box. Do not drill holes in the enclosure or modify the enclosure in any way.
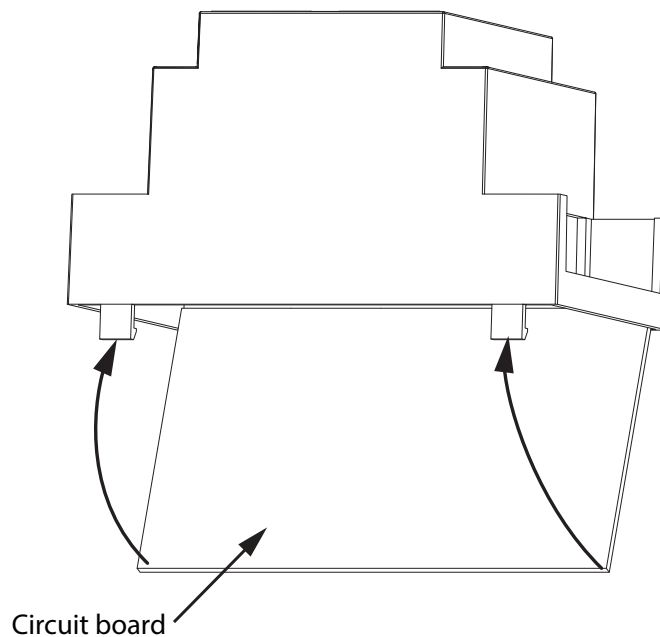
To mount the enclosure on a DIN rail

Mount the enclosure so that the terminal labels are the right way up and the mounting clip is on the bottom, as shown in Figure 12.

1. Mount a section of DIN rail so that there is enough space for the enclosure to be mounted.

2. Slide the hooks under the rail and push the enclosure to secure it on the DIN rail. The mounting clip locks it in place.
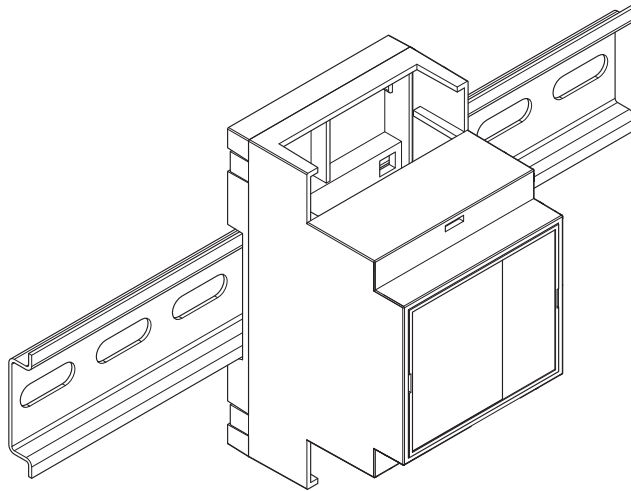
Figure 10   Enclosure mounted on DIN rail (circuit board not shown)

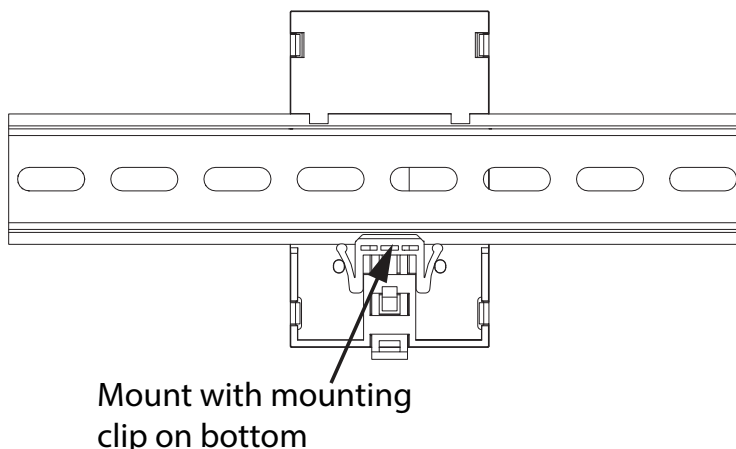Mount with mounting clip on bottom

Figure 11   Enclosure mounted on DIN rail (back view)
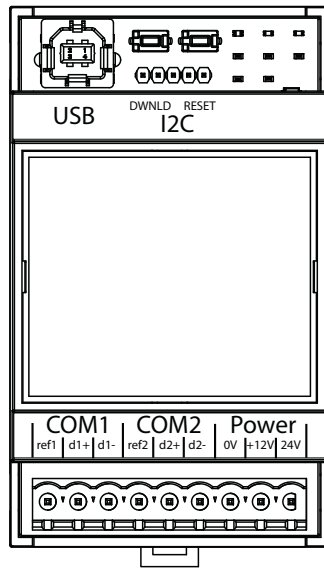
Figure 12   OpenBAS-HV-NXCORE mounting orientation

To remove the enclosure from the DIN rail

- With your hands or with a small flathead screwdriver, pull the mounting clip to release the enclosure from the DIN rail, and carefully pull the enclosure off the DIN rail.

4.0 Field Wiring

> **Note:** Installation of OpenBAS-HV-NXCORE automation controllers must be in accordance with the Canadian Electrical Code or the National Electrical Code, and comply with all local regulations. Final acceptance is subject to the Local Authority Having Jurisdiction (AHJ).

4.1 Wiring the Terminals

Figure 4 on page 11 shows the location of the terminals. The terminals are depluggable for ease of wiring.

4.1.1 Required Tools

Tools needed:

- Precision or jeweler's screwdriver set
- Wire cutter
- Wire stripper

4.1.2 Installation Tips

- Perform visual inspection of circuit board and parts for obvious issues.
- Use a wire tie to group wires for easy identification and neatness.

4.2 Power Supply Connection

Figure 13   Power supply connection

The OpenBAS-HV-NXCORE series controller can be powered 3 ways.

- 12 Vdc, 52 mA max., or 24 Vdc, 52 mA max., or 24 Vac 50/60 Hz, 161 mA max.

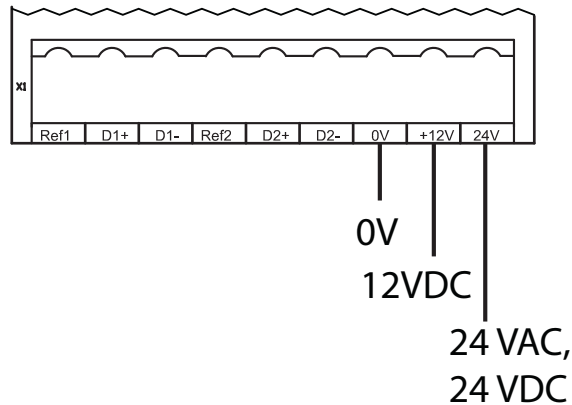> **Caution:** An appropriate UL listed class 2 power supply or transformer with necessary protection devices such as fuses or breakers should be used to limit the risk of fire. All local codes and regulations for installation must be observed.

4.3 Field Bus Connections and OpenBAS-ACC-DB9
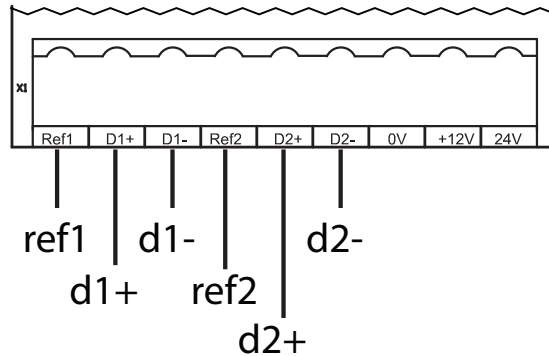
Figure 14   Field bus connections

This port allows the field replacement of the RS-485 module with the OpenBAS-ACC-RS485 optically isolated RS-485 module or OpenBAS-ACC-RS232 conversion module. See section 3.3.1 on page 11.

To avoid intermittent communication blackouts, the isolation provided by the OpenBAS-ACC-RS485 module is highly recommended for noisy environments, and to prevent damage to the boards in extreme cases, especially if the OpenBAS-HV-NXCORE controller is inside an enclosure containing high voltage wiring.

4.3.1 OpenBAS-ACC-DB9

OpenBAS-ACC-DB9 is a DB9 adapter which is installed in the field bus port.

4.4 Networking

Figure 15 shows 3 controllers networked with RS-485.

- 22 AWG twisted pair
- Maximum length: 1219.2 m (4000 feet)
- Mircom recommends shielded cable

Figure 15   Networking with RS-485

4.5   Circuit Board LEDs

- PWR: Is red when the unit is powered
- TX and RX: Flash green to indicate communication through ports COM1 and COM2

Figure 16   LEDs

5.0 Specifications

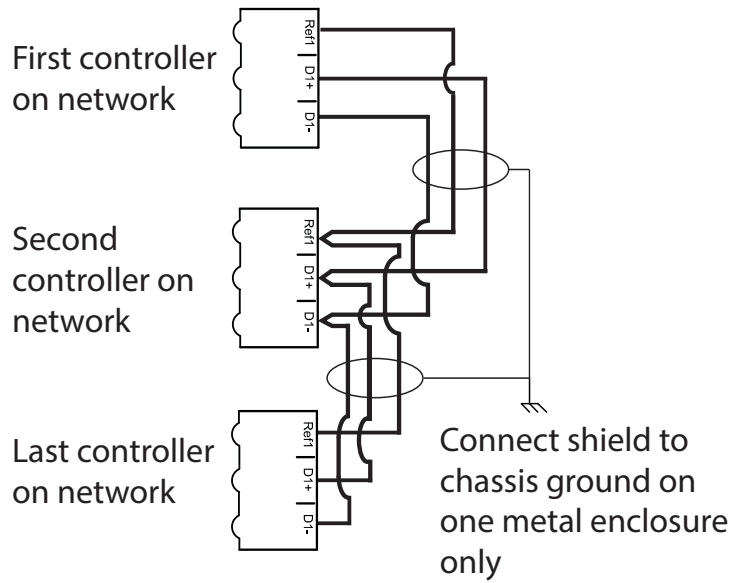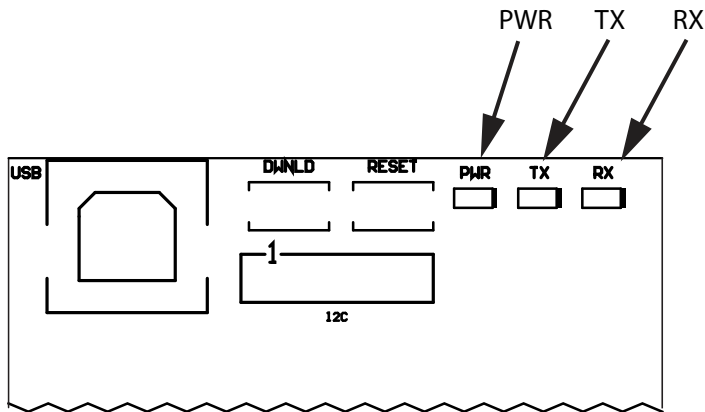|	
Standards:	UL 60730-1
Input:	12 Vdc, 52 mA max., or 24 Vdc, 52 mA max., or 24 Vac 50/60 Hz, 161 mA max.
Optional Battery:	FDK Corporation ML2430 Type: lithium Nominal capacity: 100 mAh Nominal voltage: 3 V Mircom part number: BT-025

Communication Ports:	2 RS-485 ports supporting the following protocols:
	• COM1
	  • BACnet/MSTP
	  • Modbus/RTU-Slave
	  • Modbus/RTU-Master
	  • N2-Open
	  • Optomux
	  • Arduino Query
	    Can be configured as RS-232 or optically isolated RS-485
	    BAUD Rate: 2400, 4800, 9600, 19200, 38400, 76800
	• COM2
	  • N2-Open
	  • Optomux
	  • N2/O22-master
	  • ASCII
	  • ECM
	  • Arduino Query
	    Can be configured as RS-232 or optically isolated RS-485
	    BAUD Rate: 2400, 4800, 9600, 19200, 38400, 76800
	1 USB 2.0 port supporting the following protocols:
	  • Optomux
	  • ASCII
	  • Arduino Query
	1 I2C port for memory expansion or OpenBAS-HV-RF433R

Physical Characteristics:	Weight: 360 g (12.8 oz) Enclosure dimensions: 2 3/32" x 3 35/64" x 2 17/64" (53 mm x 90 mm x 58 mm)
Ambient Conditions:	Operating Temperature: 0° to 40°C (32° to 104°F) Shipping and storage temperature: -40°C to 60°C (-40° to 140°F) Indoor Use Only
Purpose of Control:	Operating Control, HVAC Control
Construction of Control:	Independently Mounted, for Panel Mount
Action Type and additional features:	Type 1.C
Pollution Degree:	2
Software Class:	Class A
Rated Impulse Voltage:	2500V

6.0   Warranty and Warning Information

WARNING!

Please read this document **CAREFULLY**, as it contains important warnings, life-safety, and practical information about all products manufactured by the Mircom Group of Companies, including Mircom and Secutron branded products, which shall include without limitation all fire alarm, nurse call, building automation and access control and card access products (hereinafter individually or collectively, as applicable, referred to as "**Mircom System**").

NOTE TO ALL READERS:

1. **Nature of Warnings.** The within warnings are communicated to the reader out of an abundance of caution and create no legal obligation for Mircom Group of Companies, whatsoever. Without limiting the generality of the foregoing, this document shall NOT be construed as in any way altering the rights and obligations of the parties, governed by the legal documents that apply in any given circumstance.

2. **Application.** The warnings contained in this document apply to all Mircom System and shall be read in conjunction with:

    a. the product manual for the specific Mircom System that applies in given circumstances;

    b. legal documents that apply to the purchase and sale of a Mircom System, which may include the company's standard terms and conditions and warranty statements;

    c. other information about the Mircom System or the parties' rights and obligations as may be application to a given circumstance.

3. **Security and Insurance.** Regardless of its capabilities, no Mircom System is a substitute for property or life insurance. Nor is the system a substitute for property owners, renters, or other occupants to act prudently to prevent or minimize the harmful effects of an emergency situation. Building automation systems produced by the Mircom Group of Companies are not to be used as a fire, alarm, or life-safety system.

NOTE TO INSTALLERS:

All Mircom Systems have been carefully designed to be as effective as possible. However, there are circumstances where they may not provide protection. Some reasons for system failure include the following. As the only individual in contact with system users, please bring each item in this warning to the attention of the users of this Mircom System. Failure to properly inform system end-users of the circumstances in which the system might fail may result in over-reliance upon the system. As a result, it is imperative that you properly inform each customer for whom you install the system of the possible forms of failure:

4. **Inadequate Installation.** All Mircom Systems must be installed in accordance with all the applicable codes and standards in order to provide adequate protection. National standards require an inspection and approval to be conducted by the local authority having jurisdiction following the initial installation of the system and following any changes to the system. Such inspections ensure installation has been carried out properly.

5. **Inadequate Testing.** Most problems that would prevent an alarm a Mircom System from operating as intended can be discovered by regular testing and maintenance. The complete system should be tested by the local authority having jurisdiction immediately after a fire, storm, earthquake, accident, or any kind of construction activity inside or outside the premises.

The testing should include all sensing devices, keypads, consoles, alarm indicating devices and any other operational devices that are part of the system.

NOTE TO USERS:

All Mircom Systems have been carefully designed to be as effective as possible. However, there are circumstances where they may not provide protection. Some reasons for system failure include the following. The end user can minimize the occurrence of any of the following by proper training, testing and maintenance of the Mircom Systems:

6. **Inadequate Testing and Maintenance.** It is imperative that the systems be periodically tested and subjected to preventative maintenance. Best practices and local authority having jurisdiction determine the frequency and type of testing that is required at a minimum. Mircom System may not function properly, and the occurrence of other system failures identified below may not be minimized, if the periodic testing and maintenance of Mircom Systems is not completed with diligence and as required.

7. **Improper Operation.** It is important that all system users be trained in the correct operation of the alarm system and that they know how to respond when the system indicates an alarm. A Mircom System may not function as intended during an emergency situation where the user is unable to operate a panic or emergency switch by reason of permanent or temporary physical disability, inability to reach the device in time, unfamiliarity with the correct operation, or related circumstances.

8. **Insufficient Time.** There may be circumstances when a Mircom System will operate as intended, yet the occupants will not be protected from the emergency due to their inability to respond to the warnings in a timely manner. If the system is monitored, the response may not occur in time enough to protect the occupants or their belongings.

9. **Carelessness or Safety Hazards.** Moreover, smoke detectors may not provide timely warning of fires caused by carelessness or safety hazards such as smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits or children playing with matches or arson.

10. **Power Failure.** Some Mircom System components require adequate electrical power supply to operate. Examples include: smoke detectors, beacons, HVAC, and lighting controllers. If a device operates only by AC power, any interruption, however brief, will render that device inoperative while it does not have power. Power interruptions of any length are often accompanied by voltage fluctuations which may damage Mircom Systems or other electronic equipment. After a power interruption has occurred, immediately conduct a complete system test to ensure that the system operates as intended.

11. **Battery Failure.** If the Mircom System or any device connected to the system operates from batteries it is possible for the batteries to fail. Even if the batteries have not failed, they must be fully charged, in good condition, and installed correctly. Some Mircom Systems use replaceable batteries, which have a limited life-span. The expected battery life is variable and in part dependent on the device environment, usage and type. Ambient conditions such as high humidity, high or low temperatures, or large temperature fluctuations may reduce the expected battery life. Moreover, some Mircom Systems do not have a battery monitor that would alert the user in the event that the battery is nearing its end of life. Regular testing and replacements are vital for ensuring that the batteries function as expected, whether or not a device has a low-battery monitor.

12. **Physical Obstructions.** Motion sensors that are part of a Mircom System must be kept clear of any obstacles which impede the sensors' ability to detect movement. Signals being communicated by a Mircom System may not reach the receiver if an item (such as metal, water, or concrete) is placed on or near the radio path. Deliberate jamming or other inadvertent radio signal interference can also negatively affect system operation.

13. **Wireless Devices Placement Proximity.** Moreover all wireless devices must be a minimum and maximum distance away from large metal objects, such as refrigerators. You are required to consult the specific Mircom System manual and application guide for any maximum distances required between devices and suggested placement of wireless devices for optimal functioning.

14. **Failure to Trigger Sensors.** Moreover, Mircom Systems may fail to operate as intended if motion, heat, or smoke sensors are not triggered.

    a. Sensors in a fire system may fail to be triggered when the fire is in a chimney, walls, roof, or on the other side of closed doors. Smoke and heat detectors may not detect smoke or heat from fires on another level of the residence or building. In this situation the control panel may not alert occupants of a fire.

    b. Sensors in a nurse call system may fail to be triggered when movement is occurring outside of the motion sensors' range. For example, if movement is occurring on the other side of closed doors or on another level of the residence or building the motion detector may not be triggered. In this situation the central controller may not register an alarm signal.

15. **Interference with Audible Notification Appliances.** Audible notification appliances may be interfered with by other noise sources such as stereos, radios, televisions, air conditioners, appliances, or passing traffic. Audible notification appliances, however loud, may not be heard by a hearing-impaired person.

16. **Other Impairments.** Alarm notification appliances such as sirens, bells, horns, or strobes may not warn or waken a sleeping occupant if there is an intervening wall or door. It is less likely that the occupants will be alerted or awakened when notification appliances are located on a different level of the residence or premise.

17. **Software Malfunction.** Most Mircom Systems contain software. No warranties are provided as to the software components of any products or stand-alone software products within a Mircom System. For a full statement of the warranties and exclusions and limitations of liability please refer to the company's standard Terms and Conditions and Warranties.

18. **Telephone Lines Malfunction.** Telephone service can cause system failure where telephone lines are relied upon by a Mircom System. Alarms and information coming from a Mircom System may not be transmitted if a phone line is out of service or busy for a certain period of time. Alarms and information may not be transmitted where telephone lines have been compromised by criminal tampering, local construction, storms or earthquakes.

19. **Component Failure.** Although every effort has been made to make this Mircom System as reliable as possible, the system may fail to function as intended due to the failure of a component.

20. **Integrated Products.** Mircom System might not function as intended if it is connected to a non-Mircom product or to a Mircom product that is deemed non-compatible with a particular Mircom System. A list of compatible products can be requested and obtained.

Warranty

Purchase of all Mircom products is governed by:

https://www.mircom.com/product-warranty

https://www.mircom.com/purchase-terms-and-conditions

https://www.mircom.com/software-license-terms-and-conditions