

OpenBAS

BUILDING
AUTOMATION
SYSTEM

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1.0 Frequently Asked Questions

1.1 What is a Building Automation System?

Building Automation Systems (BAS) are centralized, interlinked networks of hardware and software which monitor and control the environment in industrial, commercial, or residential applications. While managing various building systems, the automation system ensures optimal operational performance of the facility, comfort and safety of building occupants, and increases energy efficiency.

1.2 What is OpenBAS?

Mircom's OpenBAS (Building Automation System) is a wide selection of UL/ULC listed controllers and supporting accessories that can be easily integrated into any industrial, commercial, or residential applications. OpenBAS delivers HVAC (heating, ventilation, and air conditioning), Lighting, Power Metering, and VAV Fan & Coil control to optimize comfort and energy management within a facility. OpenBAS controllers are programmable and configurable with advanced functions to accommodate any custom application.

1.3 Which systems in a building can OpenBAS control?

OpenBAS delivers HVAC (heating, ventilation, and air conditioning), Lighting, Power Metering, and VAV Fan & Coil control to optimize comfort and energy management within a facility.

1.4 Is OpenBAS recognized by any listing agencies?

OpenBAS equipment is certified by listing agencies, such as: UL, ULC, CSA, and FCC.

1.5 How many PLCs (Programmable Logic Controllers) can I have on my network?

Depending on the network type, different capabilities are offered. TCP/IP networks have the number of devices limited by the number of IP addresses available on each network; however, routers can be used to span multiple networks allowing an unlimited number of devices. On RS-485 networks, the different protocols supported offer device capabilities between 127 and 250 devices on each individual sub network.

1.6 Can I integrate with 3rd party hardware such as fire panels, lighting controllers, etc.?

OpenBAS supports main stream open protocols, allowing third party hardware and software to be integrated into OpenBAS networks. OpenBAS equipment can also be integrated into third party networks.

1.7 What are the 3rd party integration softwares available?

Schneider's StruxureWare, NiagaraAX Framework®, BACnet Explorer, Modbus poll, etc.

1.8 Do I have access to the configuration library?

The OpenBAS configurator software includes an EZ wizard application builder with prebuilt and ready-to-use solutions for applications in HVAC, mechanical rooms, lighting control, power metering, protocol conversion, etc.

1.9 Do I have to purchase the configurator tool or software?

The OpenBAS configurator software is free to download from the Mircom website and includes all the modules required to configure and commission all OpenBAS.

1.10 Is the OpenBAS literature available online?

Yes, OpenBAS literature is available for download on the Mircom website.

www.mircom.com/building-automation-systems

1.11 What is the programming language?

OpenBAS controllers can be programmed using ladder logic instructions; they also have integrated script compilers supporting multiple languages other than English. The script can be written in French, Spanish, German, Italian, and Dutch. The EZ wizard application builder creates initial templates of scripts ready to be compiled, downloaded to the controllers and further modified to meet the application requirements.

1.12 Is there a quoting tool? How many devices do I need in my building?

There is a quoting tool available to recommend the base equipment and optional accessories required. Please contact our sales representatives to aid you in selecting the appropriate products to meet your needs.

1.13 What happens if there is a network outage?

OpenBAS controllers are microprocessor-based and programmed individually so they can still operate when offline.

1.14 Does Mircom's OpenBAS include field devices such as chilled water valves, dampers, VAV controllers, and temperature thermostats?

Mircom is an authorized distributor for Schneider products, which include valves, actuators, various sensors, VAV controllers, dampers, and thermostats. OpenBAS offers VAV controllers and temperature thermostats.

1.15 Are there any training modules for the OpenBAS system?

Yes. Mircom offers both online and in-class training for OpenBAS. Part of the in-class training will include a free Learning Module (OpenBAS-HV-LEARN) coupled with the configuration software to provide simulated field scenarios.

2.0 OpenBAS Wiring Guidelines



Note: Wire 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).

2.1 USB

5 m (16 ft 5") for high speed devices

3 m (9 ft 10") for low speed devices

2.2 Ethernet

100 m (328 ft)

2.3 SPI Connection

28 AWG, 20 cm (8")

2.4 I2C Connection

28 AWG, 20 cm (8")

2.5 RS-485 for COM1, COM2 and COM3 Ports

22 AWG twisted pair, maximum length: 1219.2 m (4000 ft)

Mircom recommends shielded cable.

2.6 RS-232 for COM1, COM2 and COM3 Ports

22 AWG twisted pair, maximum length: 15.24 m (50 ft)

2.7 Universal Inputs and Analog Outputs

18-22 AWG braided cable, maximum length: 10 m (30 ft)

Unshielded twisted pair, maximum length: 18 m (50 ft)

Shielded twisted pair, maximum length: 50 m (150 ft)

For distances greater than 10 m, use individually jacketed cable for each input to prevent interference.

In general, follow these guidelines:

- Use 18 AWG stranded wire.

- Limit the distance between the field device and the controller to 10 m (30 ft). Mircom recommends shielded wire for noisy environments.
- If this distance is not possible, longer wire runs with shielded wire are allowed up to 30 m (100 ft). Connect the shield to any **0V** terminal on the controller, making sure to isolate the shield on the other end. Failing to do so creates ground loops.
- When possible, route the wiring inside metal piping and ground the piping for better results.
- Avoid running any analog signals near sources of electric noise such as: motors, ballasts, fluorescent lamps, variable frequency drives, high energy contacts, RF (radio frequency) transmitters, microwave ovens, and any other equipment that generates electromagnetic interference.
- Keep a minimum distance of 30 cm (1 ft) between analog output wiring and any conductor carrying more than 24 VAC.
- Fit the end of the wire with terminal connectors to provide a solid connection that can withstand temperature changes and vibration without becoming loose.
- Follow good wiring and installation practices, and follow all local regulations and electrical codes.

2.8 Digital Relay Outputs



Attention: Relay output connections can contain hazardous voltages that present the risk of electric shock. Exercise caution when handling these terminals. Only certified technicians should handle these terminals.

16-22 AWG braided cable, maximum length: 50 m (150 ft)

The gauge depends on the current that the relay output provides, and on the maximum allowable voltage drop.

This online voltage drop calculator can help select the maximum cable lengths for any given voltage, wire gauge and load: <http://www.calculator.net/voltage-drop-calculator.html>

In the following example, a 5% voltage drop is obtained with a 5 A at 120 VAC which should be acceptable for most local electrical codes.

Voltage Drop Calculator

Result

Voltage drop: 6.02
 Voltage drop percentage: 5.02%
 Voltage at the end: 113.98

Please note that the result is an estimation based on normal condition. The actual voltage drop can vary depend on the condition of the wire, the conduit being used, the temperature, the connector, the frequency etc. But, in most cases, it will be very close.

Wire Material: Copper

Figure 1 Voltage Drop Calculator

2.9 Power supply

18-22 AWG braided cable, maximum length: 10 m (30 ft)

Daisy chain power supplies, instead of using star connections, to avoid ground loops.

2.10 Wiring the Terminals

The terminals are depluggable for ease of wiring.

2.10.1 Required Tools

Tools needed:

- Precision or jeweler's screwdriver set
- Micro screwdriver, bladed, size: 0.4 x 2.0 x 60 mm (for OpenBAS-HV-WLSTH)
- Wire cutter
- Wire stripper

2.10.2 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.

2.11 Positioning Considerations for Wireless Devices

- If possible, orient each device so that it has line of sight with the devices it is communicating with.
- Do not install devices close to metal ducts or conduits. Do not install devices near large metal objects like refrigerators.
- The technician must use the commissioning software to determine that the receivers are linked to the transmitters.

3.0 OpenBAS-HV-WLSTH Wiring

Usually, only 1 OpenBAS-HV-WLSTH controller is connected to the OpenBAS-HV-VAVFC. However, up to 4 OpenBAS-HV-WLSTH controllers can be connected to the COM2 port of the OpenBAS-HV-VAVFC in order to obtain an average, minimum, or maximum values.

To wire 4 OpenBAS-HV-WLSTH controllers to an OpenBAS-HV-VAVFC

1. Wire the 4 OpenBAS-HV-WLSTH controllers to COM2 of the OpenBAS-HV-VAVFC as shown in Figures 2 and 3.

RS-485 wiring requirements

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

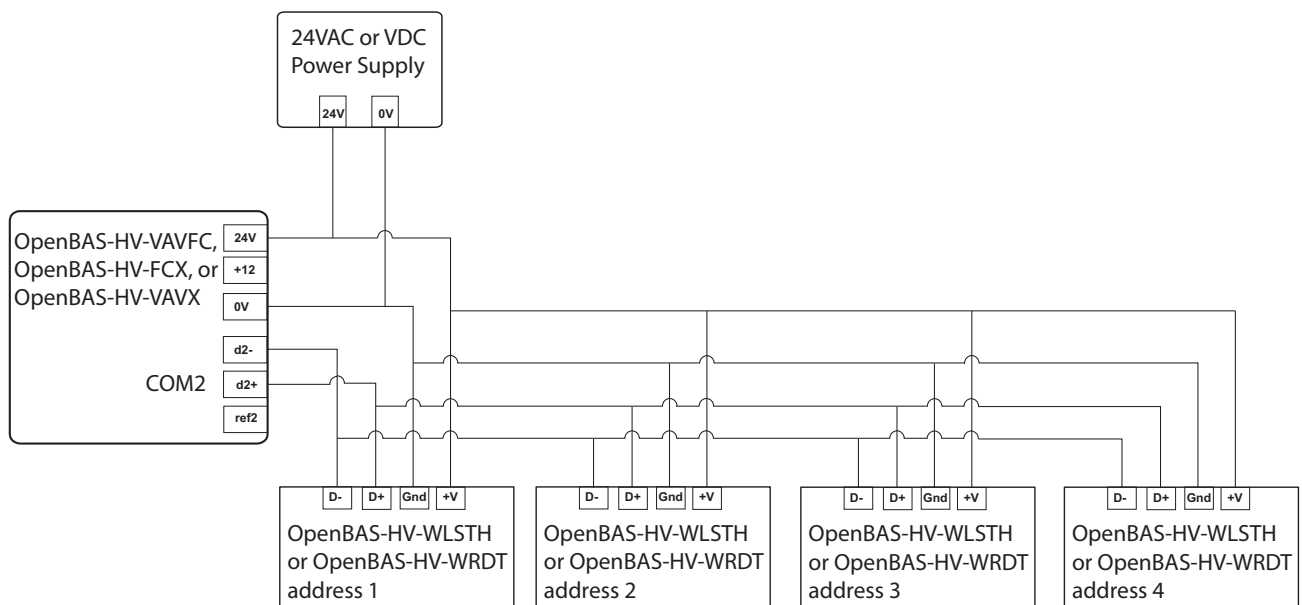


Figure 2 Wiring up to 4 OpenBAS-HV-WLSTH over 24 VAC/VDC

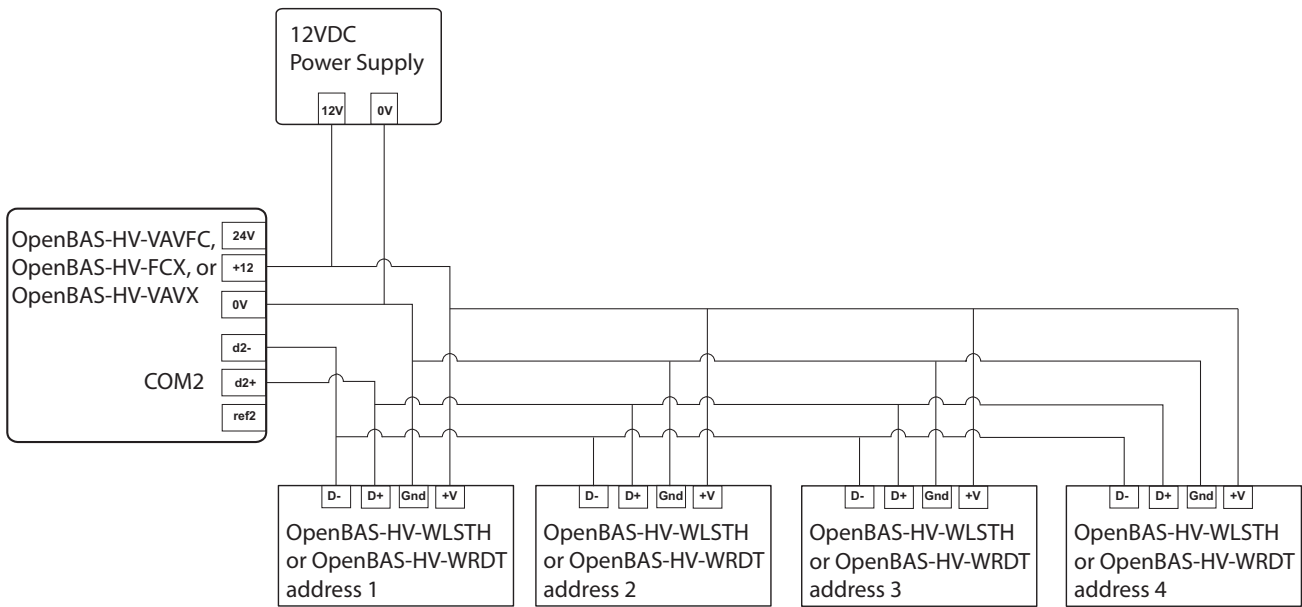


Figure 3 Wiring up to 4 OpenBAS-HV-WLSTH over 12 VDC

4.0 Glossary

A

Analog Input

An analog input provides a value such as temperature, pressure, and flow. Normally this type of input represents the real value, for instance 21.5 °C, 50 PSI, or 20.3 L/min.

Analog Output

An analog output controls speed, intensity or position of output devices or equipment. For example, it controls:

- The position of a modulating valve that can span between 0-100% to provide more or less water to a heating or cooling coil.
- The speed of a variable speed motor that can vary between 0-60 Hz.
- The mechanical position of an air damper that can be in any position, between fully closed to fully open spanning anywhere in the 0-100% range.
- The dimming value for a lamp that can vary its light intensity with a sliding control to any desired light intensity.

B

Building Automation Controller (BAC)

A Building Automation Controller is a device that incorporates all necessary inputs, outputs and communications to control all the aspects of a building, such as HVAC, energy metering and management, lighting, control of mechanical rooms such as chillers, boilers, and air handling units, and to provide the end user with comfort, good ambient lighting and ease of use.

To the manager it is an easy and accurate way of controlling, programming, scheduling and monitoring these features.

To the owner it means a reduced operating cost due to efficient use of HVAC equipment, lighting control and appropriate energy management.

Building Automation System (BAS)

A Building Automation system is a combination of hardware (controllers) and software that controls all aspects of a building, including HVAC, energy management, lighting, fire and safety, access control, CCTV, and security.

C

Communication Port (or Fieldbus)

A communication port is an RS-485 or RS-232 port which integrates industry standard protocols into the Building Automation Controller.

D

Digital Input

A digital (or binary) input represents the status of a device and can have only two states. For instance, a door can be open or closed, and a motor can be on or off.

Digital Relay Output

A digital relay (or binary) output operates loads and machinery. It can have only two states. For example:

- A single speed motor that can be only on or off.
- A smoke damper that can only be open or closed.
- A standard fluorescent lamp that can be only on or off.
- A door that can only be locked or unlocked.

H

HVAC

HVAC (Heating, Ventilation, and Air Conditioning) refers to the mechanical equipment used to ventilate, filter, humidify, dehumidify, heat, and cool the air of an area within specified parameters. Some of the most common equipment includes:

- | | |
|----------------------------|--|
| • AHU | Air Handling Units |
| • RTU | Roof Top Unit, include AHU and Chiller in same unit |
| • Split/Mini-split | Equipment with separate evaporator and condenser |
| • Water source / Heat Pump | Equipment that supplies either hot or cold water |
| • VAV | Variable Air Volume Boxes |
| • FCU | Fan and Coil Units |
| • Chillers | Equipment that cools water or air |
| • Boilers | Equipment that heats water |
| • Heaters | Equipment that heats air |
| • Humidifiers | Equipment that adds moisture to air |
| • Dehumidifiers | Equipment that removes moisture from air |
| • Compressors | Equipment that provides clean, dry compressed air or that compresses refrigerant gases to generate cooling |
| • Fan/Ventilator | Equipment that moves air |
| • Pump | Equipment with a motor that circulates water |

P

Programmable Logic Controller (PLC)

Programmable logic controllers are computers that are used in the building automation industry to control and program inputs and outputs.

Pulse (or Frequency) Input

A pulse input sends a binary signal (on/off) on a periodic basis. This signal represents a value that the Building Automation System totals over time. For example, a gas meter sends a pulse for every cubic feet consumed, a flow meter sends a pulse every time a liter flows, and a power meter sends a pulse for every kilowatt of energy consumed.

This pulse is summed in a register that can represent the total amount of a given product consumed, or if time is added to the equation, it can represent values such as liters per minute (L/min), cubic feet per minute (ft³/min), or kilowatts per hour (kWh).

R

Remote Point

A remote point is a value that does not reside physically in the Building Automation Controller but is acquired or commanded through a communication port that can be a Fieldbus port either wired through RS-485 or RS-232, wirelessly, or through a network interface card.

U

Universal Input (Analog, Digital or Pulse Input)

A universal input is a digital or analog hardware input to the Building Automation Controller that measures any type of industry standard sensor such as:

- Dry contacts, magnetic contacts, mechanical on/off switches, push buttons, mechanical flow switches, mechanical pressure switches (digital).
- Pulse gas meters, pulse water flow meter, substation electrical pulse kW meter (frequency and pulse counters).
- Resistive temperature sensors, pressure sensors, lighting LUX sensors, voltage sensors, current sensors, thermocouples (analog).



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