

The Phoenix Controls Celeris® MicroServer™ facilitates communication between the Celeris LONWORKS®-based environmental control system and the BACnet®-capable Building Management Systems (BMSs). The server performs bidirectional translations between LonTalk and BACnet to manage read requests and write commands between the BMS and the Celeris room-level devices, ensuring safe and reliable communications. The server functions as a room-level, suite level or floor-level data concentrator, collecting data from room-level devices and making these available to the BMS through a single Ethernet/IP connection.

The MicroServer is recommended for small- to medium-scale projects.

## FEATURES

- Integration flexibility with most BMS vendors offering BACnet
- Supports up to 35 devices or 350 points
- Small compact enclosure
- All solid-state design; no moving fans or hard drives
- Internal battery provides graceful shutdown on power loss and sustains the MicroServer over power fluctuations
- Flexible mounting options

## SPECIFICATIONS

### Enclosure

- Plastic, DIN rail or screw-mount chassis, plastic cover
- Cooling—Internal air convection

### Dimensions

4.820" H x 6.313" W x 2.438" D  
(12.24 mm H x 16.04 mm W x 6.19 mm D)

### Approx. Weight

1.7 lbs (0.8 kg)

### Operating Temperature Range

32-122 °F (0-50 °C)

### Storage Temperature Range

32-140 °F (0-60 °C)

### Operating Humidity Range

5-95%, non-condensing

### Power Requirements

The MicroServer requires 15 Vdc to operate. Choose from these power supply configurations:

- PWR—DIN rail mounted
  - 24 Vac/dc power supply module (8.5 VA AC/8.5W DC)
  - Connects to connector on right side of MicroServer
- WPX = Wall mount power modules (X represents different plug configurations)
  - Universal input—90-264 Vac @ 0.5A, 50/60 Hz
  - Output 15Vdc @ 1 A
  - Power cord is 70" (1.8 m) long
    - WPA—US/Japanese style plug
    - WPE—Europe/Asian style plug
    - WPU—UK style plug

### Microprocessor

IBM PowerPC 405EP 250 MHz processor

### Power Requirements

64MB SDRAM and 64 MB serial flash

### Data Ports

- 2 Ethernet ports, 10/100 mbps (RJ-45 connectors)
- 1 RS 232 Port (9 pin D-shell connector)
- 1 RS 485 non-isolated port (3-screw connector on base board)
- 1-78 kbps FTT10 A LonTalk (pluggable TP connector 22 AWG)

### Network Interface

- BACnet over Ethernet/IP 10/100 mbps
- LonTalk FTT-10A, 78 kbps

### Operating System

- QNX RTOS
- IBM J9 JVM Java Virtual Machine
- NiagaraAX

### Agency Listings

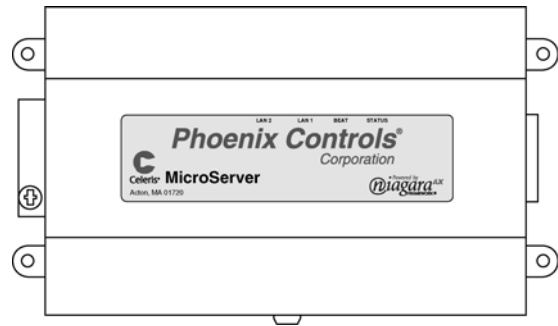
- UL 916, C-UL listed to Canadian Standards Association (CSA) C22.2 No. 205-M1983 "Signal Equipment"
- CE,
- FCC Part 15
- C-tick (Australia)

Celeris is an exclusive trademark of Phoenix Controls Corporation.  
BACnet is an exclusive trademark of ASHRAE.  
LonWorks is a trademark of Echelon Corporation.  
NiagaraAX is a trademark of Tridium, Inc.  
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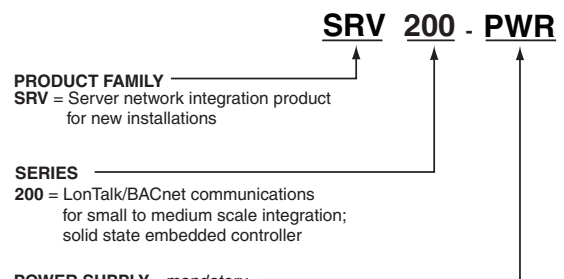
### FCC COMPLIANCE

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.



## ORDERING GUIDE



- PWR = 24 Vac/Vdc DIN-mounted power supply module; connects to MicroServer with 20-pin plug
- WPA = 90-264 Vac wall-mounted power supply module; North American/Japanese style plug with 6-foot cable
- WPE = 90-264 Vac wall-mounted power supply module; European style plug with 6-foot cable
- WPU = 90-264 Vac wall-mounted power supply module; United Kingdom style plug with 6-foot cable

## Communication Protocols

BMS Network Protocol	
BMS protocol	BACnet over Ethernet BACnet over IP
BMS network connection	RJ-45
Implementation	Conformance Class 3 BIBBS—BBC (BACnet Building Controller)
Data transfer rates (points per second)	Read requests/second: • 50 sustained • 100 peak Write commands/second: 30 maximum
Celeris Network Protocol	
Building network	ANSI 709.1—LonTalk protocol TP1250 transceiver
Celeris network connection	22 AWG, Level IV, twisted-pair cable (no shield)

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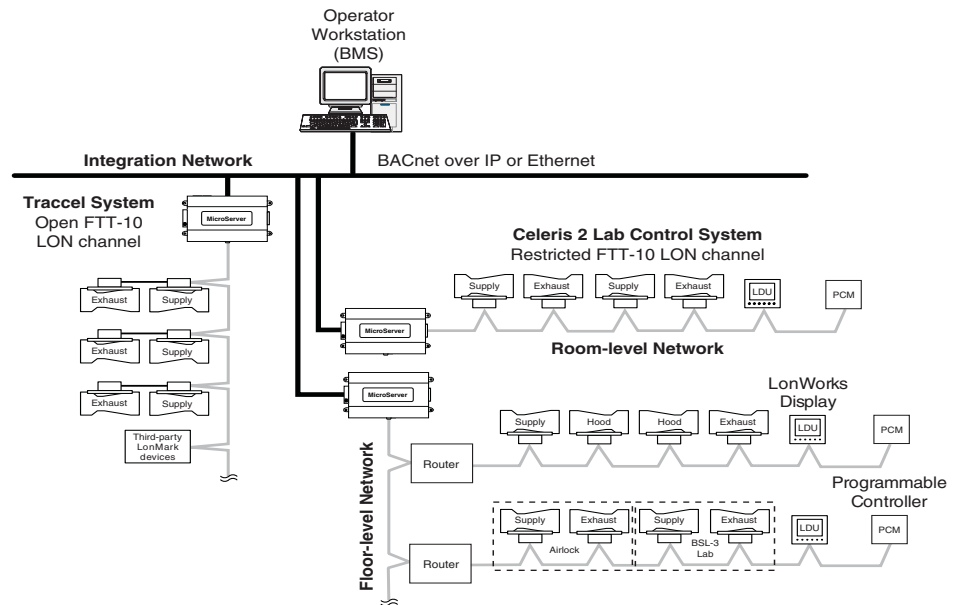
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## APPLICATIONS

The MicroServer provides seamless integration of the Celeris Environmental Control System and the Building Automation System (BAS). It connects to the Celeris building-level (*communications*) network and the building Ethernet or IP (*integration*) network. The MicroServer functions as a server to the BACnet network and represents a single BACnet device containing device and input and output objects for each Celeris controller on the room-level network(s).

Based on the level of functionality of the BAS, the MicroServer will use one or more BACnet Data Sharing Services to exchange data [see BACnet Interoperability

Building Blocks (BIBBs) in the table, *BACnet Functionality of the MicroServer*, on page 10]. The MicroServer exceeds the functionality requirements of a BACnet Building Controller (B-BC). Any BACnet client on the Ethernet or IP network may request data, command set points, or subscribe for change of value or event notification services from the Celeris network. The MicroServer includes tools to *filter* the data that is made available to the BAS, assign BACnet addresses, edit device and object properties, and validate proper integration. A BACnet client tool is included to validate server performance.



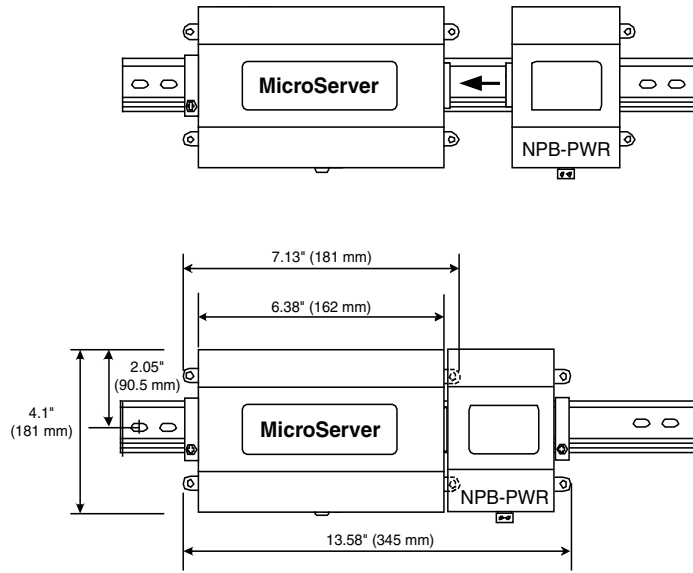
## INSTALLATION

- The MacroServer components are shown in the diagrams below.
- Choosing a location:
  - If practical, place the MicroServer as close to the middle of the FTT-10 (*communications*) channel as possible.
  - Locate within 328 feet (100 m) of an Ethernet connection.
- To mount the MicroServer on a DIN rail:
  - Securely install the DIN rail using at least two screws.
  - Position the MicroServer on the rail.
  - Mount any accessories (-PWR) onto the DIN rail in the same manner.
  - Slide the accessory along the DIN rail to connect its 20-position plug into the MicroServer.
  - To keep the final assembly together, secure at both ends with DIN rail end-clips provided by the DIN rail vendor
- To mount the MicroServer using the screw tabs:
  - There are two options for mounting the MicroServer and PWR module using screws in lieu of the DIN rail:
    - Use the 4 mounting tabs on the MicroServer housing and 2 tabs on the -PWR housing.
    - Use the 2 keyhole mounting holes located in the MicroServer and PWR housings.
  - Refer to the *Tab Mounting Dimensions* diagram for screw hole locations. Clearance is for #6 or M4 size screws.
  - Mount the MicroServer first.
  - Carefully place the PWR module so that the 20 pin connectors are fully engaged; then mount the PWR module.
- There are no mounting requirements for the WPX power supply modules as these plug directly into the wall outlet and includes a 70" (1.8-m) cable and molded connector for the MicroServer.

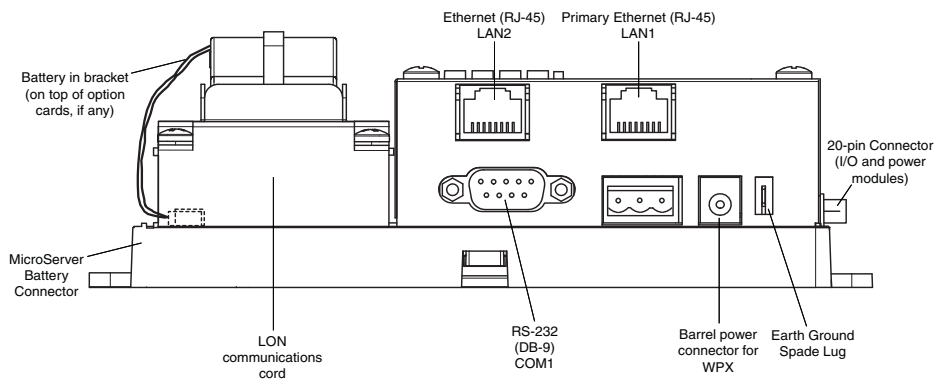
### IMPORTANT:

- Place the MicroServer where it will be protected from:
- Direct sunlight, rain or moisture
  - Corrosive gases or liquids
  - Extreme temperatures
  - Vibration, airborne dust or metallic particles

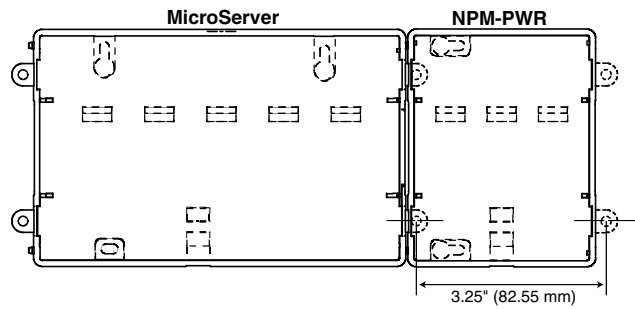
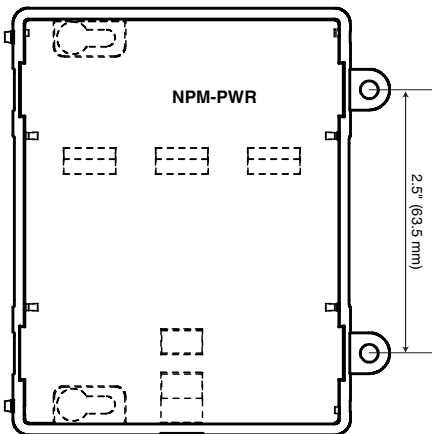
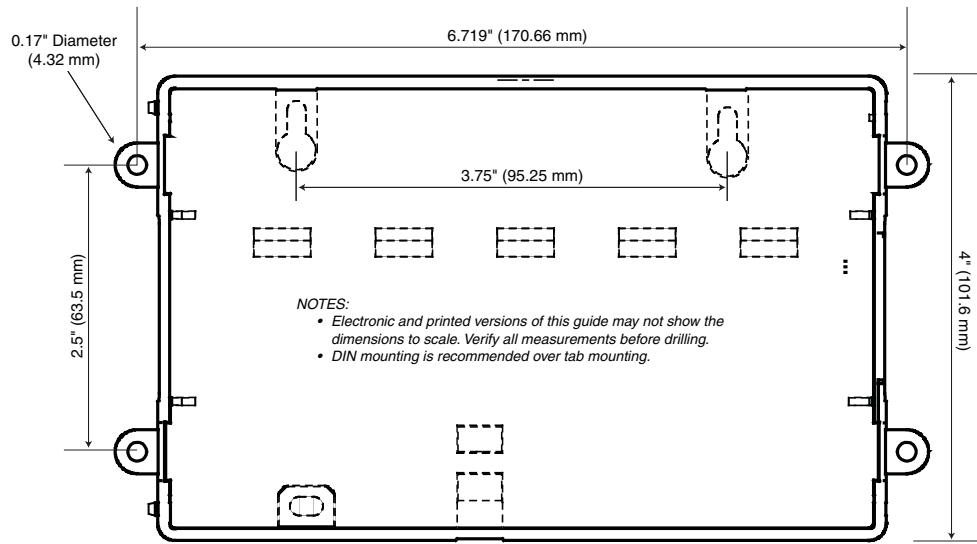
### Mounting the MicroServer on a DIN Rail



### Bottom of MicroServer with Cover Removed



## Tab Mounting Dimensions



## WIRING

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Refer to wiring diagrams below. Make electrical connections in the following order:

1. Connect the LON communications cable.
2. Connect the BACnet communications cable.
3. Connect the backup battery to the MicroServer battery connector.
4. Apply power to the unit.

### Phoenix Controls Wiring Recommendations

- Use cables recommended by Phoenix Controls.
- Stranded wire is strongly recommended for ease of installation.
- Follow good wiring practices:
  - Do not run the signal cable in the same conduit or wireway as the power cables.
  - If the signal cable must cross power cables, it is best to do so at a 90-degree angle.
  - Shield or drain wires, if required, should be wrapped with insulating tape to prevent contact with exposed conductors or contacts.
  - Maintain a consistent color code or polarity all the way through the wiring system.
  - All connections to the Celeris valve controller (LVC) must meet the requirements of an NEC Class 2 circuit.
  - Local and national electrical codes take precedence.

For LonTalk communications:

- Attach the FTT-10 network wiring to the removable terminal block on the bottom of the MicroServer.
- The network cable must be a 22 AWG (0.65 mm) NEMA Level IV unshielded twisted pair. This is the only cable type tested and approved by Echelon.
- Use a bus topology for connecting the routers (RTR200-XXX) at the top of the room-level networks.
- Use a bus topology for connecting Celeris controllers to the room-level network.
- Network segments may not exceed 4500 feet (1400 meters) in length.
- Repeaters may *not* be used to extend the network.

For BACnet communications:

- Connect one end of the BACnet/Ethernet (CAT-5) cable to the RJ-45 connector on the bottom of the MicroServer
- Connect the other end of the CAT-5 cable to any available building Ethernet connection or hub.
- The network cable connecting the MicroServer to the network may not exceed 328 feet (100 meters).

### Connect the MicroServer power source

- Connect supplied earth grounding wires (with spade connector) from the earth ground lug on the MicroServer and any accessory modules (if used) to a nearby earth grounding point.
- Prepare power wiring (leave the unit powered off). The MicroServer does not have an on/off switch the power connection serves are the means of removing power from the device.
- There are two methods for supplying power for the MicroServer:
  - PWR 24Vac/Vdc power supply module
  - WPX wall-mount power supply

#### CAUTION:

Do not connect the WPX and PWR supplies at the same time. Equipment damage may result.

#### *PWR power supply module*

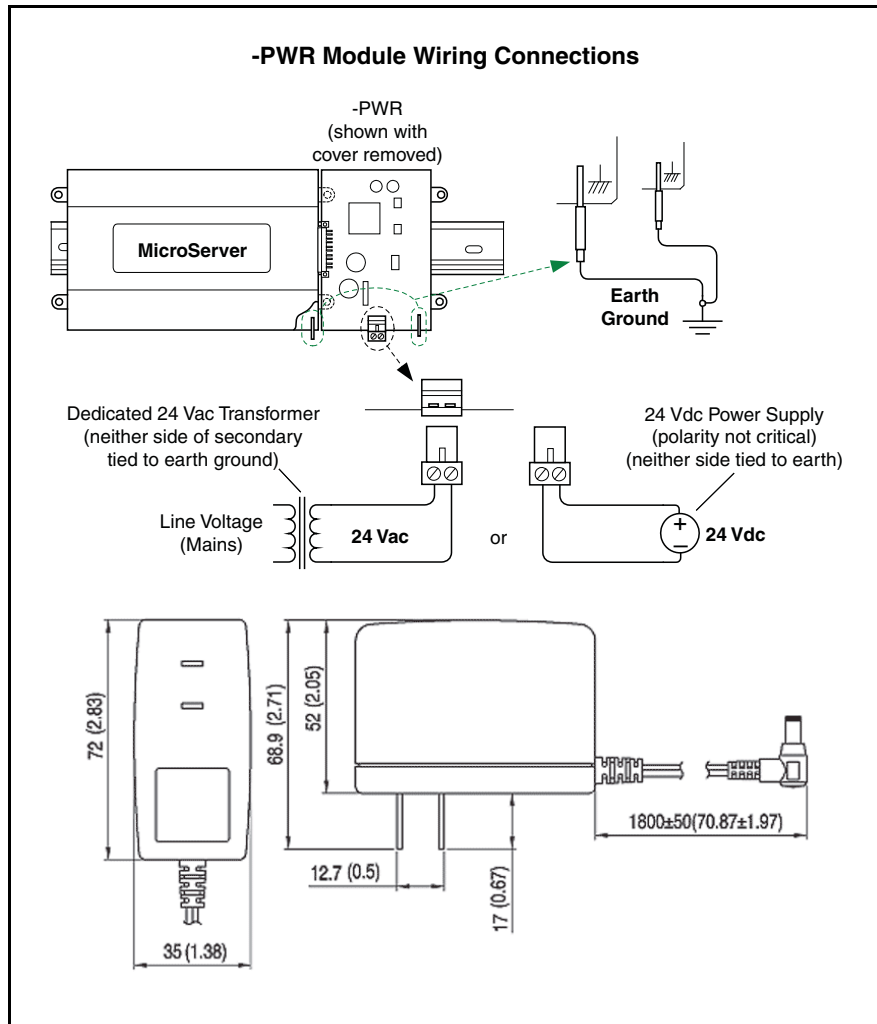
- Connect supplied earth grounding wires (with spade connector).
- Unplug 2-conductor power plug from bottom of the power supply module.
- Prepare 24 Vac or 24 Vdc power connections (see diagram).
- Do not apply power until ready to commission the MicroServer.

*NOTE: If powering from a 24-volt transformer, use a dedicated transformer (do not power any other equipment with it. Otherwise, conducted noise problems may result.*

- The transformer *must* be isolated. *Do not* ground either side of the transformer's 24-volt secondary.

*WPX wall-mounted power supply module*

- The WPX includes a 70" (1.8-m) cable with a 0.217" (5.5-mm) barrel connector.
- Plug the wall-mounted power supply into the wall outlet.
- Route the power cable to prevent a trip hazard.
- Do not plug the barrel connector into the MicroServer until ready to commission the device.



## CELERIS POINTS LIST

Recommended for Integration	Point Name	Description	Data Type	Writable?
<b>Alarm Points (available on any node)</b>				
	COM_FAILURE	LVC Neuron chip has lost communications	Binary	Read only
	SENSOR_FAILURE	LVC has detected a sensor failure on an input	Binary	Read only
*	JAM_ALARM	The valve is unable to reach the commanded set point	Binary	Read only
*	FLOW_ALARM	The pressure switch detected low static pressure	Binary	Read only
	UI_1_ALARM	UI 1 is configured as an alarm input	Binary	Read only
	UI_2_ALARM	UI 2 is configured as an alarm input	Binary	Read only
	UI_3_ALARM	UI 3 is configured as an alarm input	Binary	Read only
	DI_1_ALARM	DI 1 is configured as an alarm input	Binary	Read only
<b>Flow Points (available on any node)</b>				
*	EFF_VLV_CMD	Effective valve flow command	Analog	Read only
*	EFF_VLV_FLOW_FDBK	Effective flow feedback from valve	Analog	Read only
<b>Points Associated with a Hood Valve</b>				
*	BROKEN_SASH_CABLE	Alarm indicating sash sensor cable is broken	Binary	Read only
*	HOOD_OVERRIDE	Alarm indicating emergency override function on the fume hood monitor is active	Binary	Read only
*	SASH_HEIGHT_ALARM	Alarm indicating sash input signal exceeds maximum sash height set point	Binary	Read only
	AUXILIARY_AIR_SETPT	Tracking supply valve (MAV) flow set point	Analog	Read/write
	INVERSE_GEX_SETPT	Tracking inverse general exhaust valve (GEX) set point	Analog	Read/write
*	FACE_VELOCITY	Calculated face velocity	Analog	Read only
*	SASH_OPEN_PERCENT	Calculated Sash Opening (0-100%)	Analog	Read only
	SASH_SWITCH_STATE	Sash switch status (hood open or closed)	Binary	Read only
*	USER_STATUS_STATE	Fume hood normal or standby (setback) mode	Binary	Read only
<b>Points Associated with Occupancy Control</b>				
*	OCCUPANCY_CMD	Commanded occupancy state (occupied/unoccupied/standby)	Multi-state	Read/write
	BYPASS_TIME_REMAIN	Time remaining for occupancy override mode (bypass)	Analog	Read only
*	EFF_OCC_MODE	Present occupancy state (occupied/unoccupied/standby/bypass)	Multi-state	Read only
<b>Points Associated with Emergency Mode Control</b>				
	EMER_MODE_1	Alarm indicating emergency mode 1 is available	Binary	Read only
	EMER_MODE_2	Alarm indicating emergency mode 2 is available	Binary	Read only
	EMER_MODE_3	Alarm indicating emergency mode 3 is available	Binary	Read only
	EMER_MODE_4	Alarm indicating emergency mode 4 is available	Binary	Read only
*	EFF_EMER_MODE	Present emergency mode state (none, 1, 2, 3 or 4 active)	Multi-state	Read only
*	EMER_MODE_CMD	Commanded emergency mode state (1, 2, 3 or 4)	Multi-state	Read/write
<b>Points Associated with Humidity Control</b>				
*	EFF_HUMIDITY_SETPT	Effective humidity set point	Analog	Read only
	HUMIDITY_DEMAND	Relative humidity command	Analog	Read only
	HUMIDITY_SETPT	Humidity control set point	Analog	Read/write
*	SPACE_HUMIDITY	Relative humidity present value	Analog	Read only
<b>Points Associated with Temperature Control</b>				
*	OCC_COOL_SETPT	Cooling set point in the occupied mode	Analog	Read/write
*	OCC_HEAT_SETPT	Heating set point in the occupied mode	Analog	Read/write
*	UNOCC_COOL_SETPT	Cooling set point in the unoccupied mode	Analog	Read/write
*	UNOCC_HEAT_SETPT	Heating set point in the unoccupied mode	Analog	Read/write
	STNDBY_COOL_SETPT	Cooling set point in the standby mode	Analog	Read/write
	STNDBY_HEAT_SETPT	Heating set point in the standby mode	Analog	Read/write
*	EFF_TEMP_SETPT	Average of the cooling and heating set points	Analog	Read only
*	OCC_TEMP_SETPT	Occupied temperature set point	Analog	Read/write
	OCC_TOFFSET_SETPT	Occupied temperature set point offset for cooling and heating	Analog	Read/write
*	AVG_SPACE_TEMP	Average of temperature sensor inputs used for control	Analog	Read only
*	OFFSET_LVR_ENABLE	Enables or disables temperature offset lever	Binary	Read/write
	OFFSET_LVR_PERCENT_OF_RANGE	Scaling value (0 to 100%) of the configured offset lever set point range	Analog	Read/write
	AUX_TEMP_SETPT	Auxiliary temperature control set point	Analog	Read/write
	EFF_AUX_TEMP_SETPT	Effective auxiliary temperature control set point	Analog	Read only
	AUX_TEMP_CMD_STATE	Auxiliary temperature control demand output (on/off)	Analog	Read only

Recommended for Integration	Point Name	Description	Data Type	Writable?
	AUX_TEMP_CMD_VALUE	Auxiliary temperature control demand output (0 to 100%)	Analog	Read only
	COOLING_DEMAND	Cooling demand output (-100% = cooling)	Analog	Read only
	HEATING_DEMAND	Heating demand output (+100% = heating)	Analog	Read only
	DUCT_TEMP	Present value of duct sensor (not used for control)	Analog	Read only
	DSCHRG_AIR_TEMP	Present value of discharge air temperature sensor	Analog	Read only
	DSCHRG_TEMP_SETPT	Discharge air temperature set point for thermal anticipatory control	Analog	Read only
	HEAT_DELIVERED	Present value of thermal energy (BTU) delivered to the space	Analog	Read only
*	TEMP_CTRL_MODE	Reports current temperature control state	Multi-state	Read only
	HVAC_MODE_OVERRIDE	Allows BMS to override temperature control to one of eight states	Multi-state	Read/write
<b>Points Associated with Zone Balance</b>				
	DIVERSITY_ALARM	Total exhaust has exceeded diversity alarm threshold	Binary	Read only
	OFFSET_SETPT	Zone offset set point	Analog	Read/write
*	OFFSET	Calculated zone offset	Analog	Read only
	OCC_MIN_SETPT	Occupied minimum ventilation flow set point	Analog	Read/write
*	UNOCC_MIN_SETPT	Unoccupied minimum ventilation flow set point	Analog	Read/write
*	TOTAL_ZONE_SUPPLY	Total of all networked and non-networked supply devices	Analog	Read only
*	TOTAL_ZONE_EXHAUST	Total of all network and non-network exhaust devices	Analog	Read only
	TOTAL_CNST_VOL_EXH_FLOW	Entered value of constant volume exhaust devices	Analog	Read only
	TOTAL_CNST_VOL_SUP_FLOW	Entered value of constant volume supply devices	Analog	Read only
	TOTAL_ADD_EXH_FLOW	Total of all hard-wired (non-networked) exhaust devices	Analog	Read only
	TOTAL_ADD_SUP_FLOW	Total of all hard-wired (non-networked) supply devices	Analog	Read only
<b>Points Associated with Pressure Control</b>				
*	SENSOR_FAILURE	Alarm indicating the pressure sensor is functioning or has failed	Binary	Read only
*	ZONE_PRES_ALARM	Alarm indicating over or under pressure alarm condition	Binary	Read only
*	EFF_PRES_SETPT	The set point to which the pressure control system will control	Analog	Read only
*	ZONE_PRES_DIF	Present value of the measured zone differential pressure	Analog	Read only
	ZONE_PRES_ABS	Present value of the measured zone absolute pressure	Analog	Read only
	POC_STATE	Present state of progressive offset control function	Multi-state	Read only
*	PRES_WARN_SETPT	Set point value for the over or loss of pressure warning function	Analog	Read/write
*	PRES_ALARM_SETPT	Set point value for the over pressure alarm function	Analog	Read/write
	FRZ_TIME_SETPT	Set point for duration of freeze mode if door remains open	Analog	Read/write
	FRZ_TIME_REMAIN	Time remaining before freeze mode terminates	Analog	Read only
	FRZ_MODE_OFFSET_SETPT	Set point for an alternate offset when the freeze mode is active	Analog	Read/write
<b>Network Inputs/Outputs (I/Os)</b>				
	REMOTE_AO_0	User configurable analog output for non-network device	Analog	Read only
	REMOTE_AO_1	User configurable analog output for non-networked device	Analog	Read only
	REMOTE_AO_2	User configurable analog output for non-networked device	Analog	Read only
	REMOTE_DO_0	User configurable digital output for non-networked device	Binary	Read only
	REMOTE_DO_1	User configurable digital output for non-networked device	Binary	Read only
	REMOTE_AI_0	User configurable analog input for non-networked device	Analog	Read/write
	REMOTE_AI_1	User configurable analog input for non-networked device	Analog	Read/write
	REMOTE_AI_2	User configurable analog input for non-networked device	Analog	Read/write
	REMOTE_AI_3	User configurable analog input for non-networked device	Analog	Read/write
	REMOTE_AI_4	User configurable analog input for non-networked device	Analog	Read/write
	REMOTE_DI_0	User configurable digital input for non-networked device	Binary	Read/write
	REMOTE_DI_1	User configurable digital input for non-networked device	Binary	Read/write
	REMOTE_DI_2	User configurable digital input for non-networked device	Binary	Read/write
Table Notes:				
* LabCompact and LabFull each have only one nviRemoteAI and one nviRemoteDI.				

## MAINTENANCE

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The MicroServer is provided with a custom 10-cell NiMH battery pack mounted to the unit (under the cover). This battery allows the MicroServer to continue operation through very short power bumps (a few seconds in duration). If a longer power outage occurs, the battery provides enough run time for the MicroServer to backup data and then shut down.

The MicroServer charges the battery during normal operation, until fully charged. The MicroServer ships from the factory with a completely discharged battery. Typically, the charge operation completes within 18 hours.

The battery should be replaced approximately every three years or more often if the unit is in a high temperature environment.

No other components of the MicroServer require preventative or ongoing maintenance.

## TROUBLESHOOTING

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The MicroServer Client Tool may be used to evaluate the proper configuration and operation of the MicroServer either locally or remotely if the MicroServer is on the enterprise IP network and a port is opened to allow remote access.

Status LEDs on the front of the MicroServer provide information as to the functional and communications status of the MicroServer.

### Ethernet Ports

Each Ethernet port (LAN2, LAN1) has one green LED, which is visible on the top cover.

This LED indicates activity on that port as follows:

- Off—No Ethernet link is made.
- On—An Ethernet link is present, but there is no activity on the LAN.
- Blinking—An Ethernet link is present with data activity on the LAN.

### Heartbeats

A yellow *BEAT* LED is located at the right of the Ethernet status LEDs. Under normal operation, this LED should blink about once per second. If the heartbeat LED stays on constantly, does not light, or blinks very fast (more than once per second), contact Product Support for assistance.

### Status LEDs

A green *STATUS* LED is located at the right of the heartbeat (BEAT) LED. This LED provides a CPU machine status check, and should remain lit whenever the MicroServer is powered. If the STATUS LED does not light while power is applied, contact Product Support for assistance.

## BACnet Functionality of the MicroServer

Data Sharing			MicroServer	
BIBBS Acronym	Description	BACnet Service	Initiate	Execute
DS-RP-B	ReadProperty-B	ReadProperty		x
DS-RPM-B	ReadPropertyMultiple-B	ReadPropertyMultiple		x
DS-RPC-B	ReadPropertyConditional-B	ReadPropertyConditional	Not supported	
DS-WP-B	WriteProperty-B	WriteProperty		x
DS-WPM-B	WritePropertyMultiple-B	WritePropertyMultiple		x
DS-COV-B	Data Sharing-COV-B	SubscribeCOV		x
		ConfirmedCOVNotification	x	
		UnconfirmedCOVNotification	x	
DS-COVP-B	Data Sharing-COVP-B		Not supported	
DS-COVU-B	Data Sharing-COV-Unsolicited-B		x	

Alarm and Event-Notification			MicroServer	
BIBBS Acronym	Description	BACnet Service	Initiate	Execute
AE-N-I-B	Alarm and Event-Notification Internal-B	ConfirmedEventNotification	x	
		UnconfirmedEventNotification	x	
AE-N-E-B	Alarm and Event-Notification External-B		Not supported	
AE-ACK-B	Alarm and Event-ACK-B	AcknowledgeAlarm		x
AE-ASUM-B	Alarm and Event-Alarm Summary-B	GetAlarmSummary		x
AE-ESUM-B	Alarm and Event-Enrollment Summary-B		x	
AE-INFO-B	Alarm and Event-Information-B			x
AE-LS-B	Alarm and Event-LifeSafety-B		Not supported	

Scheduling BIBBs	Not supported
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Trending BIBBs	Not supported
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Device Management			MicroServer	
BIBBS Acronym	Description	BACnet Service	Initiate	Execute
DM-DDB-B	Dynamic Device Binding-B	Who-Is		x
		I-Am	x	
DM-DOB-B	Dynamic Object Binding-B	Who-Has		x
		I-Have	x	
DM-DCC-B	DeviceCommunicationControl-B		x	
DM-PT-B	Private Transfer-B		Not supported	
DM-TM-B	Text Message-B		Not supported	
DM-TS-B	TimeSynchronization-B	TimeSynchronization		x
DM-UTC-B	UTCTimeSynchronization			x
DM-RD-B	ReinitializeDevice-B		x	
DM-BR-B	Backup and Restore-B	AtomicReadFile	Not supported	
		AtomicWriteFile	Not supported	
DM-R-B	Restart-B		Not supported	
DM-LM-B	List Manipulation-B	AddListElement		x
		RemoveListElement		x
DM-OCD-B	Object Creation and Deletion-B		Not supported	
DM-VT-B	Virtual Terminal-B		Not supported	

Network Management			MicroServer	
BIBBS Acronym	Description	BACnet Network Layer Message	Initiate	Execute
NM-CE-A	Connection Establishment-A	Establish-Connection-To-Network	x	
		Disconnect-Connection-To-Network	x	
NM-RC-B	Router Configuration-B	Who-Is-Router-To-Network	x	x
		I-Am-Router-To-Network	x	x
		I-Could-Be-Router-To-Network		
		Initialize-Routing-Table		x
		Initialize-Routing-Table-Ack	x	