The Bard BrightStat Room Controllers

Introduction

Smart energy management has never been easier than with the BrightStat Room Controllers for Bard Air Conditioning and Heat Pump applications. Designed for schools, light commercial, and modular projects, the Room Controllers dramatically decrease project delivery costs by reducing installation, configuration and commissioning time. No complex software or tools are required to customize functionality to meet your applications requirements. The Room Controllers provide all the advanced features and monitoring functions required by modern building automation systems in a simple compact enclosure.

Thermostat Features

Standard Features

- Color touch screen interface
- 5 selectable screen colors
- Supports the upload of a custom standby screen
- Supports the display of custom messages when integrated via BACnet MS/TP
- English, French, Spanish, Chinese, Russian and other selectable languages
- Interchange between °C/°F
- Universal inputs and outputs including:
  - CO2 sensor input
  - Fresh air station input
- Configurable Scheduler with On/Off ventilation control.
- 2 wire BACnet or Modbus communication.

Options and accessories

- On-board occupancy sensor (optional)
- RH sensor with dehumidification control (optional)
- CO_2 card for modulating or On/Off ventilation control based on CO_2 level in the room (optional).
- Can be used with ZigBee Pro wireless card (optional)

Additional Features

Application-specific and programmable
The BrightStat Room Controllers are both Bard-specific AND programmable. This enables the modification of pre-configured control sequences, or the creation of entirely new control sequences for HVAC, lighting and other applications. The BrightStat Room Controllers provide exceptional control of staged heating and cooling equipment such as Bard I-TEC and TS Series. Their configurable control sequences, economizer, and scheduler functionalities deliver all the flexibility necessary for optimal indoor air quality applications.

Touch screen with customizable user experience
The touch screen of the BrightStat Room Controller offers a customizable user experience with selection of languages, temperature scales, buttons, and screen colors. Using the Uploader tool, it also supports the upload of an image or logo that becomes the default standby screen of the device. Custom messages can also be displayed on-screen using BACnet® objects when the BrightStat is integrated via a BACnet MS/TP system.

Optional passive infrared motion (PIR) sensor
All models can be equipped with a discrete optional Passive Infrared (PIR) motion sensor. With the embedded sensor, the BrightStat Room Controller uses advanced occupancy routines to generate automatic energy savings during occupied and unoccupied periods without sacrificing occupant comfort.

Supported networking protocols
- BACnet MS/TP (B) (selectable)
- Modbus (B) (selectable)
- ZigBee Pro wireless mesh network (P) (optional with communication module purchased separately)

Integration to BMS systems
BrightStat can be integrated with Building Management Systems (BMS)
- Direct wired integration to BACnet MS/TP
- ZigBee Pro integration to ZigBee gateway device
- ZigBee gateway device integration to BACnet IP, oBIX and EWS

Architects and designers can match their decor
- Five screen colors are selectable through the interface

> 5 configurable screen color schemes

12 Different Display Settings

BrightStat Room Controller Part Numbers

Control	Temperature	Humidity	Motion Sensor	BACnet/Modbus	Optional ZigBee card	Optional CO2 card
8403-081	X	X	X	X	X	X
8403-082	X		X	X	X	X
8403-083	X	X		X	X	X

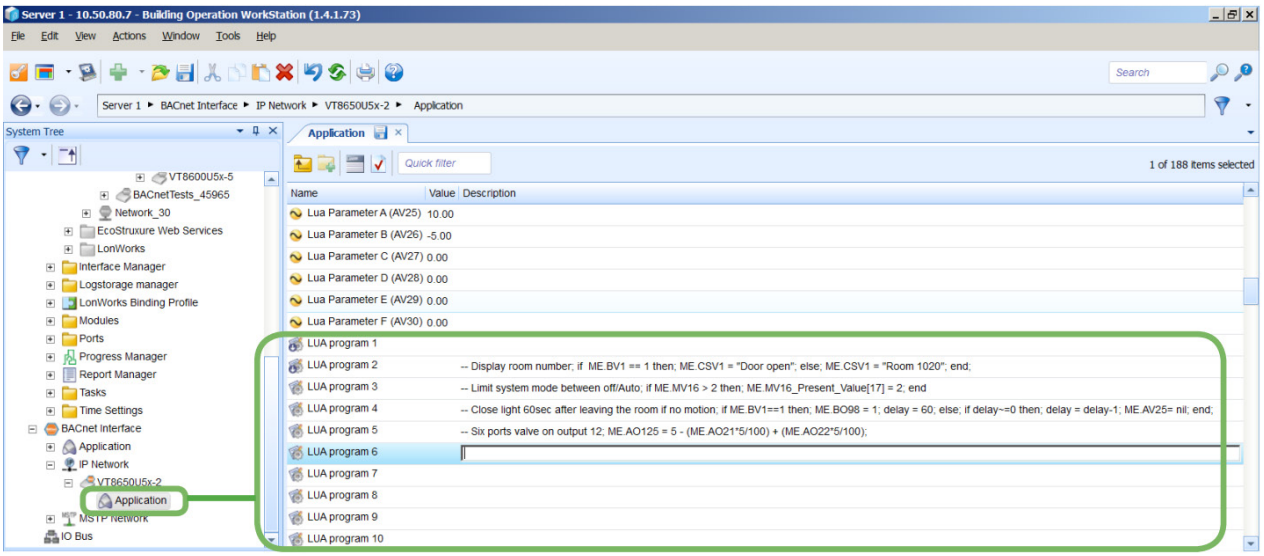
Programming the BrightStat with Lua

The BrightStat Room Controllers are programmable using the open programming language Lua. Although BMS often use open protocols and standards, their Program BACnet objects and scripting features remain proprietary and incompatible with third party devices. The BrightStat Room Controllers use of an open language enables interoperability with all systems.

Programming with BMS Integration

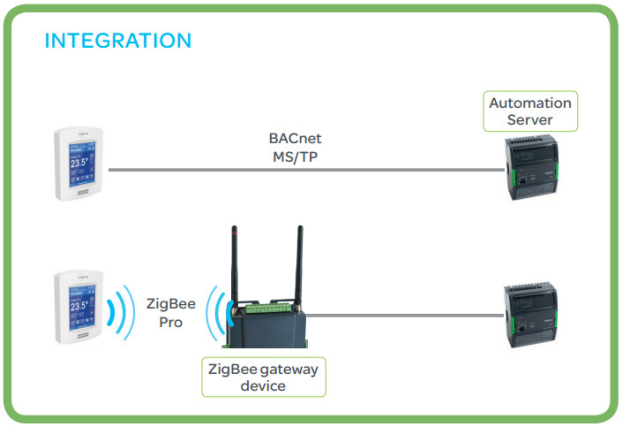
When integrated into a BACnet MS/TP BMS, the BrightStat offers 10 Program BACnet objects able to contain 480 characters each. No special software, license or tool is required.

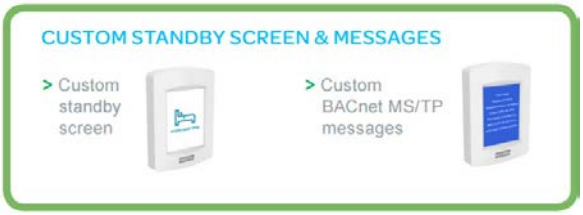
- BACnet MS/TP integration into BMS
- 10 Program BACnet objects (Lua scripts)
- Each object can contain 480 characters max



Programming without Integration

When there is no BACnet MS/TP integration, a Lua script can be uploaded directly into the BrightStat unit using the Uploader tool. Unlike the 10 PG objects used when the unit is integrated via BACnet MS/TP, there is only one script, which can contain up to 16KB.





Heat Pump Operation

- Selectable single or dual stage compressor stages.
- High balance point: Locks out auxiliary heating when outside air temperature is above this value.
- Low balance point: Locks out heat pump compressor operation when outside air temperature is below this value.
- Comfort/economy mode: In economy mode, heat pump use is maximized before turning On auxiliary heating.
- Compressor/auxiliary interlock: Adds flexibility by locking out heat pump operation during auxiliary heating to prevent high pressure trip when the coil is downstream of the auxiliary heat source.

BrightStat Unit Controller Specifications and Mounting Information

Specifications

Dimensions
12cm/4.72in (H) x 8.6cm/3.38in (W) x 2.5cm/1in (D)

Power Requirements
Input: 24Vac ±15%, 50/60Hz
Device consumption: 6 VA
Maximum rating: 100 VA, 4.17 A

Output Ratings
Maximum total output: 94 VA
Relay rating: 28 Vac 50/60Hz, 1.0 Amp., in-rush = 3.0 Amps; pins 1, 2, 3, 4, 5, 8, 9
Digital optomos output rating: 28 Vac 50/60Hz, 0.3 Amp., in-rush = 1.5 Amps; pins 9, 10, 11, 12
Analog: 0 - 10 Vdc in 2 kilo-ohm resistance minimum load (maximum 5 mA); pins 9, 10, 11, 12

Operating Conditions
0 °C - 50 °C (32 °F - 122 °F)
0% - 95% R.H. non-condensing

Storage Conditions
-30 °C - 50 °C (-22 °F - 122 °F)
0% - 95% R.H. non-condensing

Temperature Sensor
Local 10 K NTC type 2 thermistor

Temperature Sensor Resolution
± 0.1 °C (± 0.2 °F)

Temperature Control Accuracy
±0.5 ° C (± 0.9 °F)@ 21 °C (70 °F) typical calibrated

Humidity Sensor and Calibration
Single point calibrated bulk polymer type sensor

Humidity Sensor Precision
Reading range from 10-90 % R.H. non-condensing
10 to 20% precision: 10%
20% to 80% precision: 5%
80% to 90% precision: 10%

Humidity Sensor Stability
Less than 1.0 % yearly (typical drift)

Dehumidification Setpoint Range
30% - 95% R.H.

Occ, Stand-By and Unocc Cooling Setpoint Range
12.0 - 37.5 °C (54 - 100 °F)

Occ, Stand-By and Unocc Heating Setpoint Range
4.5 °C - 32 °C (40 °F - 90 °F)

Room and Outdoor Air Temperature Display Range
-40 °C - 50 °C (-40 °F - 122 °F)

Proportional Band for Room Temperature control
Cooling and Heating: Default: 1.8°C (3.2°F)

Analog Inputs
Modulating 0-10 vdc across UI19 to Common

Binary Inputs
Dry contact across terminals UI16, UI17 and UI19 to Common

Remote Temperature Sensor Requirements
10 K NTC type 2 thermistor

Wire Gauge
Power supply: 18 gauge or larger,
Communications: 24 gauge or larger

Approximate Shipping Weight
0.34 kg (0.75 lb)

Safety Standards All Models
LVD Directive 2006/95/EC
EN 60950-1:2006/A2:2013UL 873
CSA C22.2 No. 24-93

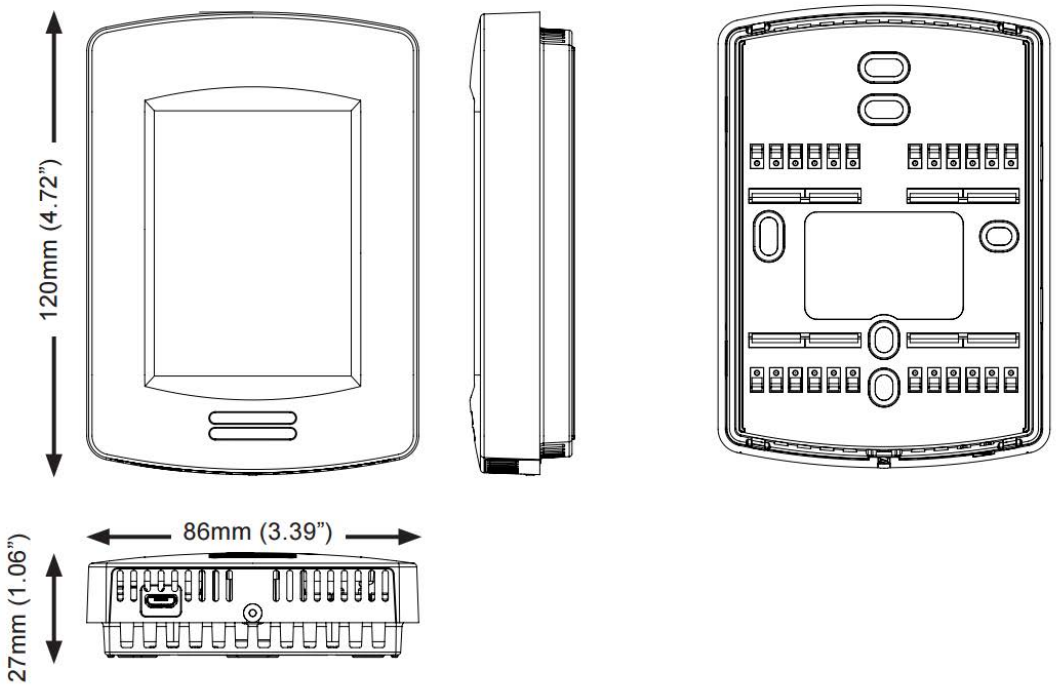
EMC Standards All Models
EMC Directive 2004/108/EC
IEC 61326-1:2005
FCC 15 Subpart B
ICES-003

Radio Standards (Wireless Models)
R&TTE Directive 1999/5/EC
ETSI EN 300 328 V1.8.1
ETSI EN 301 489-1 V1.9.2
ETSI EN 301 328 V1.8.1
FCC 15 Subpart C
RSS 210

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, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

Check with your local government for instruction on disposal of these products.

Dimensions



Typical Detection Pattern for PIR Lens

Recommended installation height for PIR sensor:

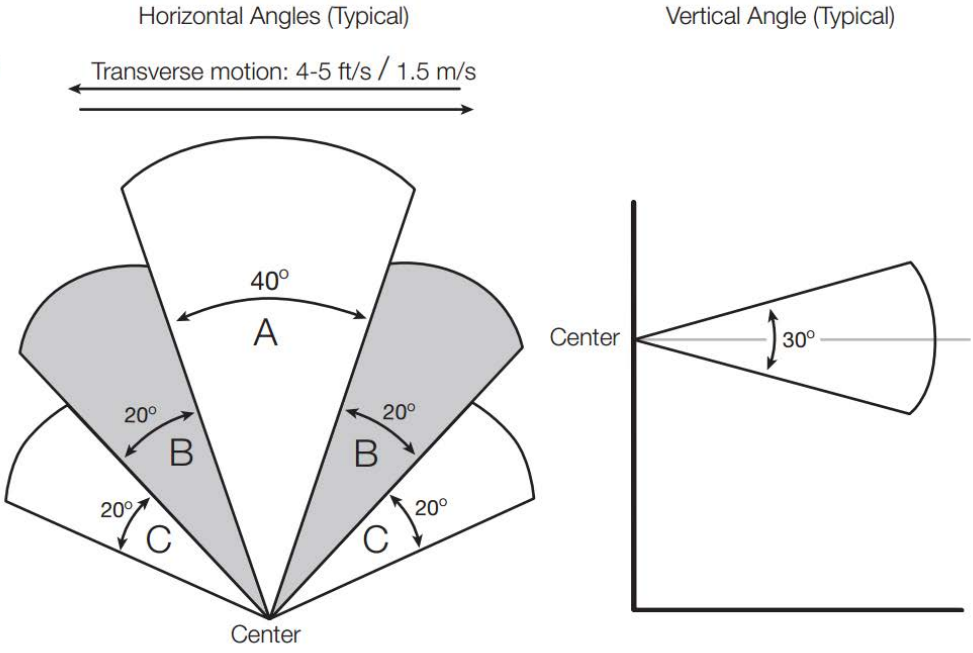
4 - 5 ft. / 1.2-1.5 m

Sensor Ranges

A = 20 ft. / 6.1 m

B = 14 ft. / 4.3 m

C = 11 ft. / 3.4 m



Accessories

BrightStat Optional Cards

Card	Description
8403-086	Modulating or on/off CO2 control card
8612-052	ZigBee wireless card

Note: Only one card can be used in the controller. If ZigBee card is used, an external CO2 sensor is required for ventilation CO2 control.

BrightStat Optional Accessories

Accessory	Description
8612-056	Wireless ceiling motion sensor
8612-057	Wireless wall motion sensor
8612-060	ZigBee wirelss router with Ethernet. Required with use of ZigBee wireless cards

Note: Other accessories may be available. Contact Bard with special applications that may require additioanl accessories.

Note:
If one or multiple sensor(s) is/are connected into the RS terminal, the internal temperature sensor is automatically disabled. Disconnecting the sensor(s) in RS terminal will re-activate the internal sensor.

Remote mount temperature sensors inputs use 10K type 2 NTC thermistors.

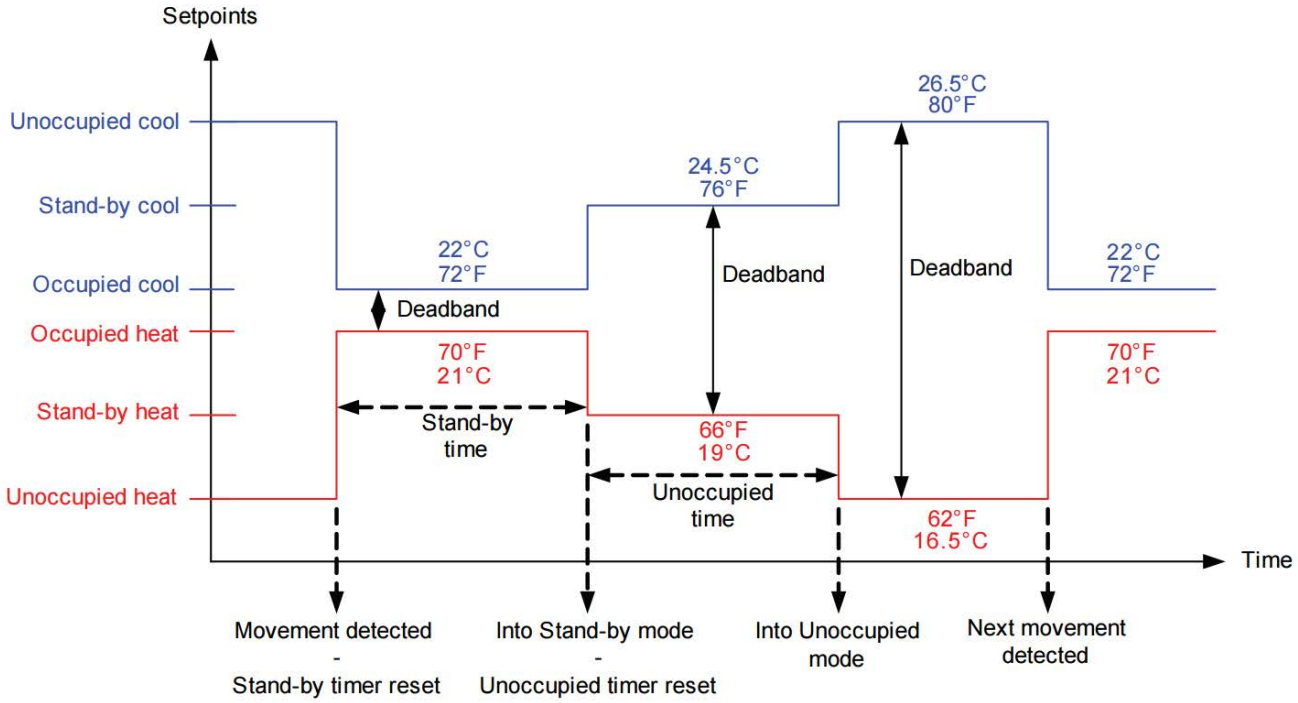
Features:
- Each sensor can be configured for various averaging combinations.

Temperature vs. resistance chart for 10 Kohm NTC thermistor (R25°C = 10KΩ±3%, B25/85°C = 3975K±1.5%)

°C	°F	Kohm	°C	°F	Kohm	°C	°F	Kohm	°C	°F	Kohm	°C	°F	Kohm
-40	-40	324.3197	-20	-4	94.5149	0	32	32.1910	20	68	12.4601	40	104	5.3467
-35	-31	234.4009	-15	5	71.2430	5	41	25.1119	25	77	10.0000	45	113	4.3881
-30	-22	171.3474	-10	14	54.1988	10	50	19.7390	30	86	8.0694	50	122	3.6202
-25	-13	126.6109	-5	23	41.5956	15	59	15.6286	35	95	6.5499	55	131	3.0016

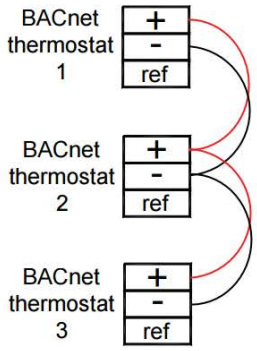
Sequence of Operation

CONTROLLERS' OCCUPANCY SEQUENCE OF OPERATION SCHEMATIC



BACnet Communication Connection

BACnet® communication wiring



Notes:
- Wiring should be daisy chained
- Respect polarity
- If using 2 conductors shielded wires, connect the shield of each feed together on the back of the controller. ONLY ground the shield at one location. DO NOT connect the shield to the ref terminal.

Wireless Communication

No communication wires required

Wireless Motion Sensors

Wireless ZigBee® Pro Motion Sensors

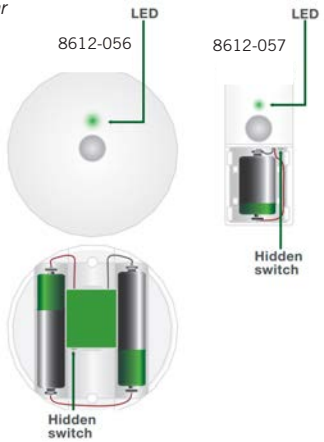
Conventional Unit, Heat Pump, and Indoor Air Quality Controllers with SED Series ZigBee® Pro wireless sensors can be used in stand alone mode, or with integration to a central management system, to allow for advanced functions such as central reservation and occupancy functions. Up to 10 different ZigBee motion sensors can be used with a BrightStat Room Controller. Using one or more wireless remote PIR motion sensors means that a wired PIR motion sensor cannot be used, and vice versa.

The sensors are factory delivered with batteries and are ready to be installed, configured, and used right out of the box. Due to the extremely small current consumption of the sensors, the expected battery life is approximately 10 years, which is equivalent to the battery shelf life. No tools are required for commissioning or servicing the ZigBee devices. A simple interface on the deviced with an on-board LED and hidden switch provides all required functions for local interaction. The BrightStat user interface has screens used to pair and configure ZigBee devices. Local information for battery life and connectivity (heartbeat)are also displayed through the ZigBee® Pro wireless network.

Model Selection

Sensor	Bard Part #
Wall mounted motion sensor	8612-057
Ceiling mounted motion sensor	8612-056

Wireless sensors include 10 year batteries and also have a LED light to verify unit functionality.

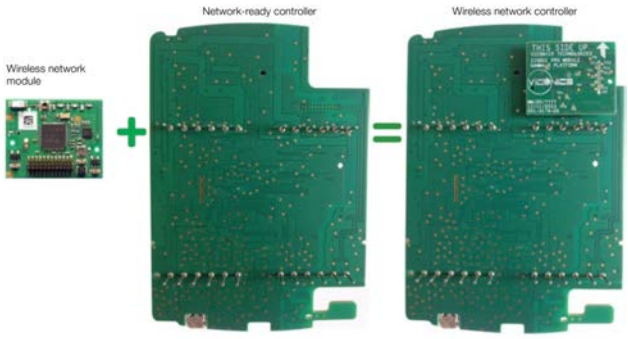


Field Installed ZigBee Pro Wireless Card

The ZigBee Pro wireless communication module allows the upgrade of all network-ready BrightStat Series Room Controllers to support networking communication using the ZigBee® Pro wireless protocol. This enables the controllers to be integrated into a 2.4 GHz ZigBee Pro wireless network.

Adding a communication module only takes a few minutes but provides a big advantage to existing installations that require new networking and integration functionality.

This approach provides the flexibility to add network communication strategies as budgets allow, or as building management needs change.



Field Installed CO2 Card

The easily installed CO_2 card allows the brightstat to control an on/off or modulating ventilation option based on CO_2 inside a classroom or occupied area.

Modulating CO_2 control limits fresh air intake to the amount needed based on room occupancy for select Bard products including the I-TEC. Refer to the Bard installation instructions for the product being installed to see if ventilation uses on/off or 0-10V modulating control.

ZigBee Pro Wireless Gateway Manager

The Zigbee Pro Wireless Gateway Manager and BrightStat Series Room Controllers are targeted for either retrofit or new construction applications where the addition of communicating field bus wiring within the building space is prohibitive.

The Gateway Manager and Communicating Room Controllers with a wireless field bus encourages the use of existing wiring utilized by existing electronic controller type controls.

The Gateway Manager , when utilized in conjunction with the Room Controllers, will offer the integrator simple BACnet IP objects to integrate over standard building automation systems using familiar integration toolsets.

The Gateway Manager has an aesthetic look, similar to a router, allowing for in-room deployment.

Part Number	Description
8612-060	ZigBee Pro Wireless Gateway Manager

Control features

- Wireless control of end-devices
- Wireless control of ZigBee Pro end-devices (optional, 30 peripherals per Gateway Manager)
- Supports up to 30 Room Controllers per Gateway Manager
- Points visible through BACnet® IP

Benefits

- Supports 30 Room Controllers with no new communication wiring required
- No special tools or training required
- Integrates into your preferred BACnet IP system
- Points visible through BACnet IP
- Provides fail-safe default functionality if network connectivity is offline and elimi nates the need for any additional communication wiring

ZigBee Pro Wireless Gateway Manager Specifications

Specifications

Power

Voltage
24VAC; ± 15%; 50/60HZ
24VDC ± 10%
Typical consumption
5 VA + Output (VAC), 1.6 W + Output (VDC)
Battery
CR1220 3v Lithium Coin Cell Battery

General

Processor
ARM9 32-bit, 400MHz
Memory
64MB flash
Storage
4GB flash for local storage
Real-time clock
Battery backed (10,000 hours)
Communication
ZigBee Pro, Ethernet (10/100 Mbps)

Enclosure

Material
Rigid ABS
Dimensions
116mm (4.57 in) x 191mm (7.52 in)
Rating
UL94V0-5VB
Mounting
Din-rail, wall or ceiling mount

Environmental

OperatingTemperature
0°C (32°F) - 60°C (140°F)
Storage Temperature
-20°C (-4°F) - 60°C (140°F)
Relative Humidity
0 to 90% non-condensing

Receiver Sensitivity
–95dBm
Conducted Output Power
5dBm
Range
Recommended: 45ft/15m
Line of sight: 100ft/30m
Antenna
External whip, RP SMA 0dBi

ZigBee Pro

Frequency
2400 – 2483.5MHz, 16RF channels
Data rate/Mod.type
250Kbps
Receiver Sensitivity
-101dBm/-105dBm (amplified)
Nominal Output Power
8dBm/18dBm (amplified)
Range
Recommended to GW2: 150ft/50m
Line of sight to GW2: 300ft/100m
Recommended to peripherals: 50ft/17m
Line of sight to peripherals: 100ft/30m
Antenna
External whip, RP SMA 2.5dbi

Building Expert

Software type
Embedded web interface
Local installation
None necessary
Browser compatibility
Firefox ESR
Internet Explorer 10 (only)
Google Chrome
Safari (Mac only)

Agency approvals

Energy Management Equipment, UL 916, Fourth Edition, December 23, 1998, rev. December 17, 2007

CSA Standard for Signal Equipment C22.2 No. 205-M1983 (R2004)

CFR47 FCC Part15, Subpart B:2009

ICES-003: Issue 4 (2004)

CE

Japanese Radio Law

RoHS

Disclaimer

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.