BASstat221 – BACnet Communicating Thermostat for Multi-Stage Heating/Cooling

The BASstat series of BACnet-compliant wired or wireless communicating thermostats are BTL listed to ensure effortless integration into BACnet/IP (Wi-Fi) or BACnet MS/TP (EIA-485) networks. These thermostats are suited for single or multi-stage heating, cooling and ventilation binary output control applications such as RTU or AHU. Configurable control algorithm parameters allow adaptability to the specific application. Adaptive control algorithm applied to multi-stage on/off control saves energy and ensures seamless comfort for the occupants. Built in temperature sensor, input for remote temperature sensor, or temperature override network command from Building Automation System. A built-in relative humidity sensor (in 221CH models) allows the thermostat to display relative humidity on the screen as well as serve it as a BACnet object, dew point calculation is also served as a BACnet object (no control action is taken based on humidity). Occupancy status can be set from thermostat buttons or over the BACnet network. Thermostat buttons are optionally lockable to prevent unauthorized control. Digital display with graphical icons is easy to read and understand.

BACnet MS/TP

Wi-Fi

BTL BACnet Testing Laboratories

Versatile Communication in Two Distinct Models

- Both models are BTL listed with B-ASC device profile
- BACnet MS/TP in *B2* model MS/TP baud rates 9.6kbps - 76.8kbps
- BACnet/IP in *BW2* model 802.11 b/g/n 2.4GHz Wi-Fi

Flexible Installation

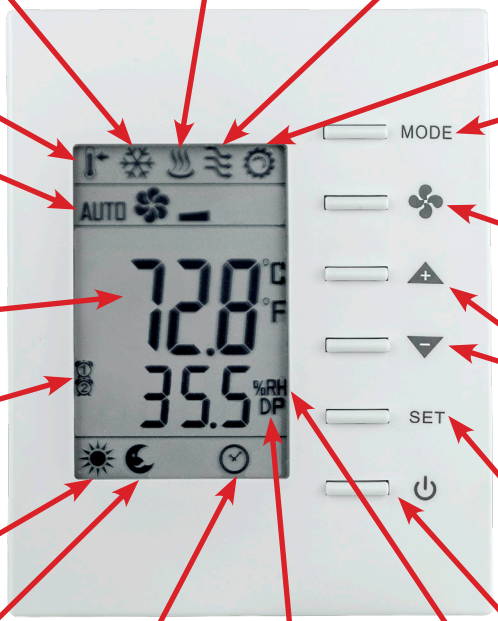
- 24VAC (+/-10%) power input
- Digital Display with graphical icons of operation, °C or °F display
- Single or Multistage, Binary Outputs for RTU or AHU applications
- Manual or Auto-changeover modes
- Occupied / Unoccupied modes with 2 sets of Cool/Heat set points
- Effective run time accumulation for energy consumption calculations
- Built-in temperature sensor
- Built-in relative humidity sensor and dew point calculation value (in 221CH models)
- Remote temperature sensor input (NTC Thermistor 3kΩ)
- Networked current temperature override from BACnet client (BMS)
- Fully Configurable Algorithm control parameters: Deadband, Proportional Gain, Integral Rate, Stage Trip Points, Stage Widths, Short Cycle Delay, Maximum Cycles Per Hour
- Stand-alone operation with setpoints reset and schedule from BACnet BMS or optional full BACnet BMS control
- Non-volatile memory (EEPROM) retains user settings during power loss

- Lockable buttons / user interface
- Operating Environment:
  - 0-50°C, 5-95% RH (non-condensing)
- Wiring: 14 to 22 AWG wires or up to 2x 1.5mm wires
- Dimensions: 94×118×34 mm (W × H × D)
- Mounts directly onto wall, panel, standard 65× 65 mm junction box (hole pitch 60 mm) or standard 2×4 inch vertical junction box (hole pitch 83.5 mm)

BASstat – Overview

The BASstat's white backlit LCD display is large and easy to read, even from a distance. It incorporates graphical icons to aid visual indication of current state of operation. Several icons indicate parameters such as: Active Mode, Cooling stage 1 or 2, Heating stage 1 or 2, Ventilation Only, Fan Active, Occupied / Unoccupied state, and Clock icon to indicate Short Cycle Delay or Max Cycles per hour active waiting state. These icons are very useful in indicating the thermostat's current state of operation.

Six buttons on the BASstat allow users to manipulate temperature set point, change HVAC modes, turn the thermostat ON/OFF, and more. Pressing the Set and Up/ Down buttons can manually toggle the thermostat from occupied/unoccupied modes, where BACnet occupancy command is not an option. All 6 of these buttons are lockable in a configurable manner to prevent unauthorized configuration change. Some or all buttons can be locked for application flexibility, making the stat suitable for applications where limited user control is allowed.



Set-Point Icon
Displays set-point temperature while flashing

Snowflake Icon
Indicates working in Cooling mode

Rising Steam Icon
Indicates working in Heating mode

Wind Icon
Indicates working in Ventilation mode

Working Icon
Indicates mechanical Cooling/Heating Stage is engaged

Fan Status Icons
Indicate Fan status AUTO or Continuous. AUTO state when displayed. Fan active when icon is spinning. Fan speed indicator bars (some models are 1 speed only).

LCD
Displays temperature and working status

"1" Icon
"2" Icon
Cooling/Heating stage 1 on
Cooling/Heating stage 2 on

MODE Button
Changes modes Heat/Cool/Vent and used for accept/confirm button in Engineering menu

FAN Button
Toggle to change Fan mode: Auto or Continuous

UP & DOWN Buttons
Increase & decrease setting or previous/next item. Hold both buttons for 5 sec. to enter Engineering mode.

SET Button
Toggle Occupied/ Unoccupied Setting

ON/OFF Button
Turn thermostat On or Off

RH%
Value reading (221CH models only)

Sun Icon
Indicates Occupied status

Moon Icon
Indicates Unoccupied Status

Clock Icon
Indicates Short Cycle Delay or Max. Cycles per Hour for mechanical stages

DP
Wi-Fi ACTIVE and connecting to network when flashing. Icon disappears upon successful connection. (BW2 Wi-Fi model only)

Configuration

Initial configuration differs depending on whether you are using the BACnet MS/TP model or BACnet/IP over Wi-Fi model. Full details can be found in the installation guide included in the product box or in the User Manual available on our website. All configuration parameters are settable through use of the buttons on thermostat and the engineer menu, or once installed on the BACnet network with unique device parameters, configuration can be altered using BACnet commands. Network command-based configuration can also be accomplished on the bench using a BACnet router (*B2* MS/TP model) or Wi-Fi enabled laptop/computer (*BW2* Wi-Fi model).

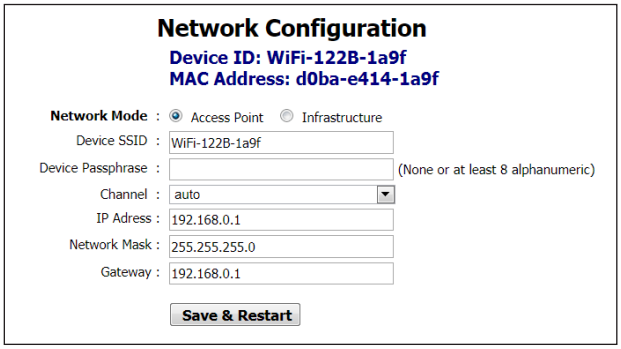
B2 model - MS/TP Configuration

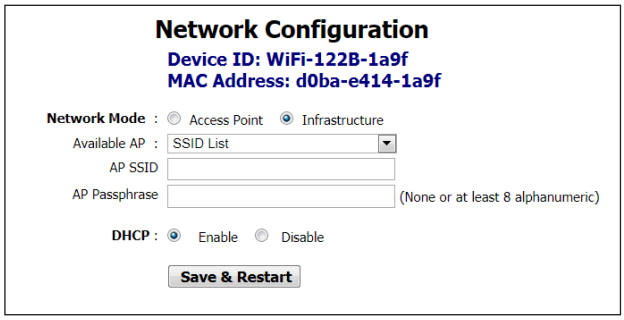
BACnet MS/TP model configuration requires setting the baud rate or using the default baud rate of 38.4kbps. A unique MS/TP *MAC address* is required to distinguish it from other MS/TP devices on the bus (default MAC address is 1). When more than one BASstat is installed at the same time, their MAC addresses must be configured prior to installing on the MS/TP bus or communication will fail due to duplicate MAC addresses. A unique *Device Instance Number* throughout the entire BACnet internetwork is also required to distinguish the device from all other BACnet devices. The BASstat does not provide End-of-Line termination. If the BASstat is the first or last device on the MS/TP bus, a termination resistor (120Ω) must be applied across pins 16 and 17 of the input terminal. Thanks to its EEPROM, the BASstat will store configuration in the event of power loss. All settings can be reset back to default from Engineering Menu item (rSt).

BW2 model - Wi-Fi Configuration

BACnet/IP Wi-Fi model requires connecting to the thermostat as an access point for initial configuration. A Wi-Fi enabled laptop/computer can discover the BASstat initially as a Wi-Fi access point with SSID "WiFi-122B-xxxx" and no passphrase by default (simply click to connect to Access Point). The digits "xxxx" in "122B-xxxx" are the last 4 digits of the thermostat's Wi-Fi chip MAC address found written on the back side. This can assist when multiple Wi-Fi stats are installed (outlined in blue in image below).

Once connected to the thermostat, open its web page by typing 192.168.0.1 with *admin* for username and no password. Web page pictured below will be presented for network configuration. After initial connection using laptop, the Wi-Fi mode in the thermostat can be changed to *Infrastructure* and the local Wi-Fi network configuration can be entered and stored. A reboot of the thermostat is required, and the new Infrastructure mode with new settings will be used. A unique *Device Instance Number* throughout the entire BACnet internetwork is required to distinguish the device from all other BACnet devices. When more than one BASstat is installed at the same time, their *Device Instance Number* must be configured prior to connecting to the BACnet/IP network or BACnet communication will fail due to duplicate instances. Thanks to its EEPROM, the BASstat will store configuration in the event of power loss. If configuration fails or the thermostat needs to be configured to use a different Wi-Fi access point, the thermostat must be reset and reconfigured. Reset will restore all values to default and can be selected from Engineering Menu (rSt).





BACnet Protocol Implementation Conformance (PIC) Statement

CONTEMPORARY CONTROLS®

BASstat

BACnet MS/TP and BACnet/IP Thermostat Controller

BACnet Protocol Implementation Conformance Statement (Annex A)

Date: **April** 22, 2020
Vendor Name: Contemporary Controls
Product Name: BASstat
Product Model Number: BAST-221C B2 and BW2; BAST-221CH B2 and BW2
Applications Software Version: **1.0** **Firmware Revision:** 1.40 **BACnet Protocol Revision:** Version 1, Revision 12
Product Description: These series of thermostats/controllers are suitable for a variety of applications including RTU, AHU, Unit Heaters, and other HVAC unitary equipment of on/ off, controls.

BACnet Standardized Device Profile (Annex L):
- ☐ **BACnet Operator Workstation (B-OWS)**
- ☐ **BACnet Building Controller (B-BC)**
- ☐ **BACnet Advanced Application Controller (B-AAC)**
- ☒ **BACnet Application Specific Controller (B-ASC)**
- ☐ **BACnet Smart Sensor (B-SS)**
- ☐ **BACnet Smart Actuator (B-SA)**

List all BACnet Interoperability Building Block Supported (Annex K):
- DS-RP-B Data Sharing — ReadProperty – B
- DS-WP-B Data Sharing — WriteProperty – B
- DS-RPM-B Data Sharing — ReadPropertyMultiple – B
- DM-DDB-B Device Management — Dynamic Device Binding – B
- DM-DOB-B Device Management — Dynamic Object Binding – B
- DM-DCC-B Device Management — Device Communication Control – B

Segmentation Capability:
- ☐ Able to transmit segmented messages Window Size:
- ☐ Able to receive segmented messages Window Size:

Standard Object Types Supported:

Object Type Supported	Can Be Created Dynamically	Can Be Deleted Dynamically
Analog Input	No	No
Analog Value	No	No
Binary Input	No	No
Binary Value	No	No
Device	No	No
Multi-State Value	No	No

No optional properties are supported.

Data Link Layer Options:
- ☒ BACnet IP, (Annex J)
- ☐ BACnet IP, (Annex J), Foreign Device
- ☐ ISO 8802-3, Ethernet (Clause 7)
- ☐ ANSI/ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s):
- ☒ MS/TP master (Clause 9), baud rate(s):
- ☐ MS/TP slave (Clause 9), baud rate(s):
- ☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
- ☐ Point-To-Point, modem, (Clause 10), baud rate(s):
- ☐ LonTalk, (Clause 11), medium:
- ☐ Other:

Device Address Binding:
Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes ☒ No

Networking Options:
- ☐ Router, Clause 6 – List all routing configurations, e.g., ARCNET-Ethernet-MS/TP, etc.
- ☐ Annex H, BACnet Tunnelling Router over IP
- ☐ BACnet/IP Broadcast Management Device (BBMD)
  Does the BBMD support registrations by Foreign Devices? ☐ Yes ☐ No

Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
- ☒ ISO 10646 (UTF-8)
- ☐ ISO 10646 (UCS-2)
- ☐ IBM™/Microsoft™ DBCS
- ☐ ISO 10646 (UCS-4)
- ☐ ISO 8859-1
- ☐ JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:
No gateway support.

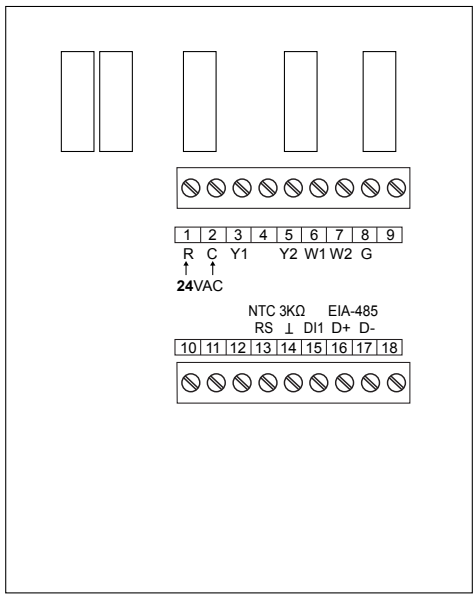
22 April 2020 PI-BASSTAT0-AA1

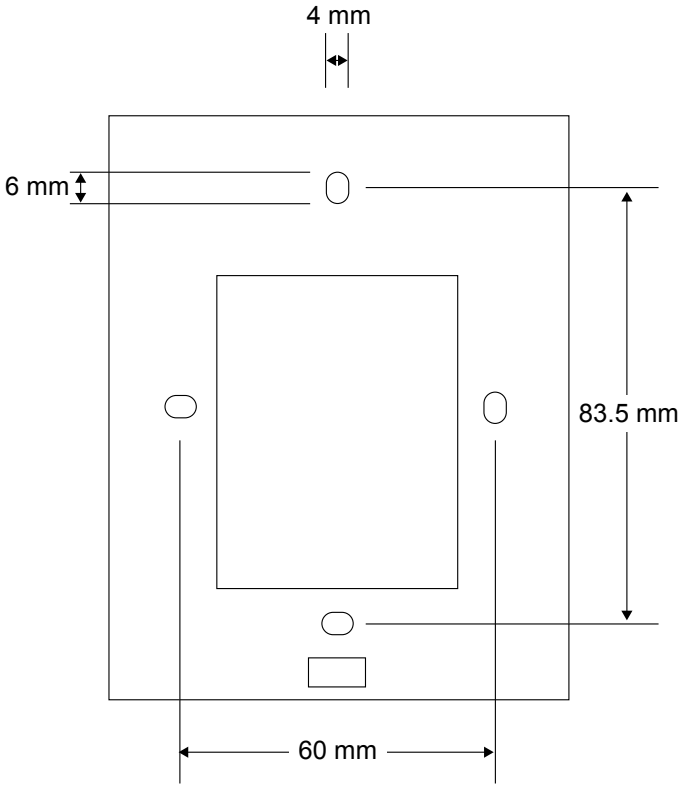
Wiring Diagram

Wiring: 14 to 22 AWG wires or up to 2x 1.5mm wires

Mounts directly onto wall, panel, standard 65×65mm junction box (hole pitch 60 mm) or standard 2×4 inch vertical junction box (hole pitch 83.5 mm)

EIA-485 connection to pins 16(+) and 17(-) applicable to B2 - BACnet MS/TP model only. BW2 model uses Wi-Fi connectivity

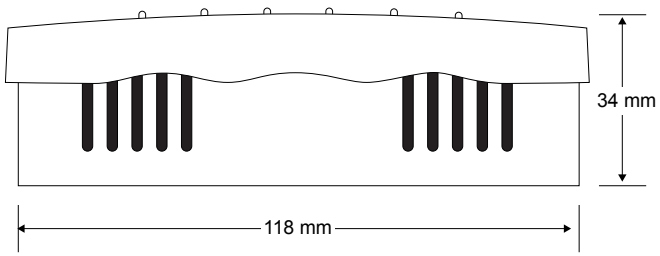


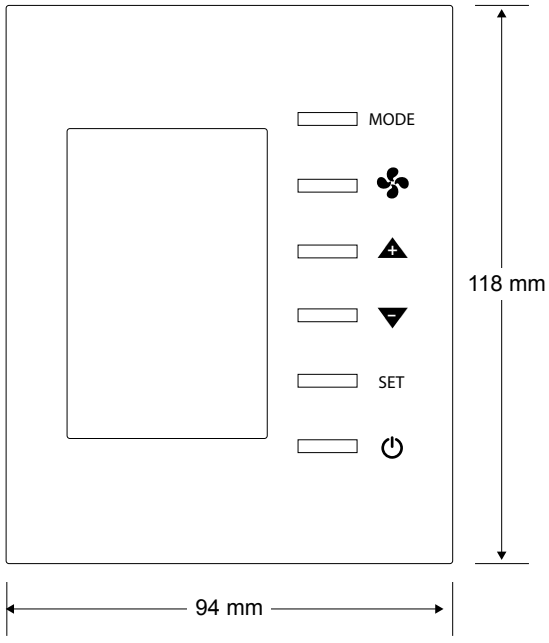


Dimensions (all dimensions are in mm)

Dimensions:
Width: 94mm
Height: 118mm
Depth: 34mm

Mounts directly onto wall, panel, standard 65×65mm junction box (hole pitch 60 mm) or standard 2×4 inch vertical junction box (hole pitch 83.5 mm)





Specifications

Functional	*B2 model*	*BW2 model*
Compliance	EIA-485	IEEE 802.11b, 802.11g, 802.11n (single stream) 16.5dBm@11b, 14.5dBm@11g 13.5dBm@11n Frequency range: 2400MHz~2484MHz
Protocols supported	BACnet MS/TP	BACnet/IP
Cable length	4000 ft / 1200 m @76.8kbps (max)	N/A
Wi-Fi range	N/A	150ft. as defined by the standard (depending on obstructions) 54Mbps max data rate
Authentication	N/A	WEP, WPA/WPA2 PSK
Maximum Number of Devices	32 MS/TP devices (max)	N/A or depending on Wi-Fi router performance
Temperature Display Range	14 to 140°F (-10 to 60°C)	14 to 140°F (-10 to 60°C)
Temperature Display Resolution	0.1°F (0.1°C)	0.1°F (0.1°C)
Temperature Accuracy	±1.8°F (±1.0°C) with all outputs off	±1.8°F (±1.0°C) with all outputs off
Humidity Display Range (221CH models)	0 to 100 %RH	0 to 100 %RH
Humidity Display Resolution (221CH models)	0.1 %RH	0.1 %RH
Humidity Accuracy (221CH models)	± 2.0 %RH	± 2.0 %RH
Long-term Humidity Sense Drift (221CH models)	<0.25 %RH/year	<0.25 %RH/year

Electrical

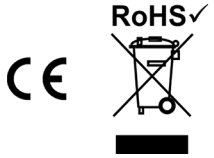
Input	AC only
Voltage (V, ± 10%)	24
Power	5 VA
Frequency	47–63 Hz

Environmental/Mechanical

Operating temperature	0°C to +50°C
Storage temperature	–40°C to +85°C
Relative humidity	5–95%, noncondensing
Protection	IP30
Weight	0.44 lbs. (.2 kg)

Regulatory Compliance

CE Mark; RoHS	
BW2 model Wi-Fi FCCID	P53-EMW3165-P



Electromagnetic Compatibility

The BASstat complies with the following specifications and bears the CE mark in accordance with the provisions of the Electromagnetic Compatibility (EMC) Directive 2004/108/EC based on the following specifications:

Standard	Test Method	Description
EN 61000-6-2	IEC 61000-4-2	Electrostatic Discharge Immunity
EN 61000-6-2	IEC 61000-4-3	Radiated, Radio-Frequency, Electromagnetic Field Immunity
EN 61000-6-2	IEC 61000-4-4	Electrical Fast Transit/Burst Immunity
EN 61000-6-2	IEC 61000-4-5	Voltage Surge Immunity
EN 61000-6-2	IEC 61000-4-6	Immunity to Conducted Disturbances
EN 61000-6-2	IEC 61000-4-8	Power Frequency Magnetic Field Immunity
EN 61000-6-2	IEC 61000-4-11	Voltage Dips and Interruptions
EN 61000-6-3	IEC 61000-3-2	Limits for Harmonic Current Emissions
EN 61000-6-3	IEC 61000-3-3	Limitation of Voltage Fluctuations and Flicker in Low Voltage Supply Systems

Ordering Information

Model	***Description***
BAST-221C-B2	BACnet MS/TP Thermostat 2-Heat, 2-Cool, 1-Fan, Wired
BAST-221C-BW2	BACnet/IP Thermostat 2-Heat, 2-Cool, 1-Fan, Wi-Fi
BAST-221CH-B2	BACnet MS/TP Thermostat 2-Heat/2-Cool/1-Fan/RH Wired
BAST-221CH-BW2	BACnet/IP Thermostat 2-Heat/2-Cool/1-Fan/RH Wi-Fi

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