



# BAC-A1616BC

## BACnet Building Controller

### Description and Application

The BACnet Building Controller (B-BC) is a **high-performance, native BACnet direct digital controller**. As part of a complete interoperable building automation system, this 16 x 16 B-BC provides precise monitoring and control of connected points. Integrated into this native BACnet device is BACnet **router**, **web server**, and **expandable I/O** capability.

### Router Functions

- ◆ Routes traffic between two MS/TP ports, one BACnet PTP (point-to-point) port, four (logical) BACnet IP ports, and one (logical) BACnet Ethernet port (BACnet IP and BACnet Ethernet are logical ports on the Ethernet physical port)
- ◆ Supports BACnet IP foreign device registration and Broadcast Management Device (BBMD), supports PTP modem communications, and performs IP packet assembling/disassembling (PAD) routing for up to four BACnet IP PAD networks
- ◆ Each of the four (logical) BACnet IP ports can be configured for BACnet IP, BBMD, foreign device registration, or PAD

### Web Functions

- ◆ Built-in web configuration pages allow web browser to configure I/Os and objects, monitor values and alarms (configuration/monitoring also available through TotalControl), and set-up users and passwords.
- ◆ Custom graphic interface (created/published in TotalControl, ver. 1.7 or higher) for remote web browser
- ◆ Firmware easily upgradable (without requiring physical access) through the Internet or local Ethernet connection



### I/O Expansion Capability

- ◆ Up to seven CAN-A168EIO expansion modules can be added, each providing an additional 16 universal inputs and 8 universal outputs (for a maximum total of 128 inputs and 72 outputs)
- ◆ I/O expansion modules are connected via standard shielded twisted-pair wire and can be installed up to 200 feet from the B-BC
- ◆ Onboard and remote expansion I/O consolidates control of central mechanical plants, air handling units, and other equipment requiring single-point coordination and control of process loops

### Other Features and Benefits

- ◆ Email notifications of alarms and events, using external or (with license) internal SMTP "server"
- ◆ Up to 32 Control Basic custom program sequences for optimal control of a central plant, air handlers, and other connected equipment
- ◆ High-performance 32-bit processor
- ◆ Use of programmable nonvolatile memory allows safe data and program back-up and controller shut-down during power failure (in conjunction with a UPS—future upgrade)
- ◆ Dynamic allocation of memory resources provides flexible use of scheduling, trending, and exception reporting in small- to medium-sized buildings without requiring a personal computer
- ◆ Meets or exceeds the specifications in ANSI/ASHRAE BACnet Standard 135-2004 for BACnet Building Controllers
- ◆ BTL-certified as a B-BC controller type

## Communication Ports

- ◆ One 10/100BaseT Ethernet connector for BACnet IP and Ethernet 802.3 (ISO 8802-3); segmentation supported
- ◆ Two EIA-485 ports (terminal blocks) for BACnet MS/TP, operating up to 76.8 kilobaud (9.6, 19.2, 38.4, 57.6, or 76.8 kilobaud)
- ◆ Two EIA-232 connectors (one DB-9 connector and one terminal block) for BACnet point-to-point connections
- ◆ One serial bus connection (terminal block) for daisy-chaining I/O expansion modules
- ◆ One USB 2.0 port with Type A connector (future firmware upgrade)
- ◆ One UPS signal interface (future upgrade)

## Inputs/Outputs

- ◆ Onboard 16 universal inputs and 16 universal outputs (expandable with up to seven I/O expansion modules for a total of 128 inputs and 72 outputs), software selectable as analog, binary, or accumulator objects
- ◆ Standard and custom units of measure
- ◆ Removable screw terminal blocks, wire size 14–22 AWG

### Inputs

- ◆ Inputs can be configured via a jumper for 1K or 10K ohm pull-up resistors (for unpowered contacts or devices), 0–12 VDC, or 4–20 mA
- ◆ Analog inputs accept industry-standard 1K ohm platinum and 10K ohm thermistor sensors, 0–12 VDC devices, or 4–20 mA devices
- ◆ Binary inputs accept 0 or 12 VDC (on/off)
- ◆ Pulse (passive or active up to 12 VDC) counting to 16 Hz
- ◆ Input overvoltage protection (24 volts AC, continuous)
- ◆ 16-bit analog-to-digital conversion on inputs

### Outputs

- ◆ Each short-circuit protected output capable of driving up to 100 mA (at 0–12 VDC) or 600 mA total for all outputs
- ◆ 16 slots for output override cards (e.g., triac, relay, 4–20 mA) for large relays or devices that cannot be powered from a standard universal output
- ◆ 12-bit digital-to-analog conversion on outputs

## Configurability

### General

- ◆ See PIC statement for all supported BACnet objects
- ◆ One **device** object
- ◆ 16 customizable conversion **tables** for inputs and 8 tables for Control Basic

### I/O

- ◆ 16 default (onboard) and up to 128 **analog, binary, or accumulator input** objects (with expansion I/O modules)
- ◆ 16 default and up to 72 **analog or binary output** objects (with expansion I/O modules)

### Value

- ◆ 100 default and up to 1,000 **analog** value objects
- ◆ 100 default and up to 1,000 **binary** value objects
- ◆ 10 default and up to 256 **multi-state** value objects (with up to 16 states each)

### Program and control

- ◆ 16 default and up to 128 **PID loop** objects
- ◆ 32 **program** objects (Control Basic programming initially requires TotalControl compiler)

### Schedules and trends

- ◆ 10 default and up to 100 **schedule** objects
- ◆ 10 default and up to 32 **calendar** objects
- ◆ 64 default and up to 256 **trend** objects, each of which holds 256 samples

### Alarms and events

- ◆ 10 default and up to 128 **notification** (alarm/event) objects
- ◆ 10 default and up to 512 **event enrollment** objects

## Power Loss

- ◆ Power-fail auto-shutdown with auto-restart capabilities (in conjunction with an Uninterruptible Power Supply—future upgrade)
- ◆ Real time clock with (onboard battery) power backup for 72 hours

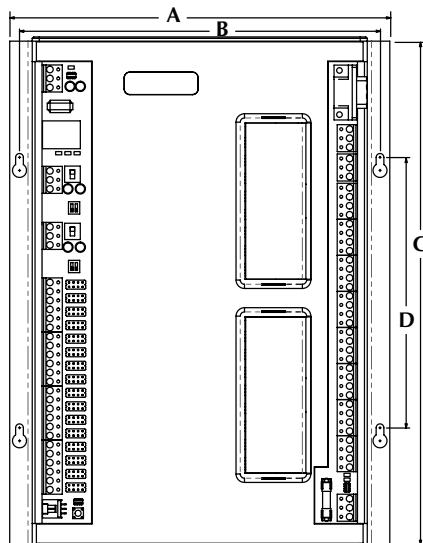
## Memory

- ◆ 64 MB nonvolatile flash memory and 256 MB SDRAM
- ◆ Programs and configuration parameters are stored in nonvolatile memory

## Dimensions

A	B
8.4 in.	8.0 in.
214 mm	203 mm

C	D
11.2 in.	6.0 in.
283 mm	152 mm



## Installation

### Dimensions

8.4 x 11.2 x 1.1 (w/o HPO output card covers or 1.9 w/ covers) inches (283 x 214 x 27/48 mm)

### Weight

2.3 lb. (1.0 kg)

### Supply Voltage

24 VAC (-15%/+20%), Class 2 only, 35 VA @ 28.8 VAC

### Case material

Black powder-coated steel  
5 years (from mfg. date code)

### Warranty

## Indicators, Fuses, and Jumpers

### LED Indicators

Expansion I/O Module Communication, MS/TP 1 Communication, MS/TP 2 Communication, Device Status, Fault, and (3) Ethernet Status

### Network Bulbs

Two per MS/TP port and two for expansion I/O port for reversed polarity and overload protection/ indication

### Fuse Jumpers

1.6 A, fast-acting, 5 x 20 mm Power, Input Selectors

## Environmental Limits

### Operating Temp.

32 to 140° F (0 to 60° C)

### Shipping Temp.

-40 to 160° F (-40 to 71° C)

### Humidity

0 to 95% rel. humidity, non-condensing

## Models

BAC-A1616BC-000 BACnet Building Controller  
BAC-A1616BC-001 B-BC w/ web graphics pages

## Regulatory

- ◆ CE compliant
- ◆ Complies with Canadian ICES-003
- ◆ BACnet Testing Laboratory (BTL) listed
- ◆ UL 916 Energy Management Equipment
- ◆ FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A\*\*

\*\*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.

## Options and Accessories

NOTE: For more information about these accessories, see the **BAC-A1616BC Applications Guide**.

CAN-A168EIO	I/O Expansion Module (see the next page)
HCO-1035	Steel control panel enclosure, 20 W x 24 H x 6" D
HCO-1036	Steel control panel enclosure, 24 W x 36 H x 6" D
HPO-0054	Replacement fuse bulb
HPO-0063	Replacement two-pin jumper
HPO-0070	Twelve-output transient suppressor board
HPO-0071	Eight-input transient suppressor board
HPO-6701	Output override card, triac
HPO-6702	Output override card, 0–10 VDC analog, adjustable override pot.
HPO-6703	Output override card, NO relay
HPO-6704	Output override card, 4–20 mA
HPO-6705	NC relay output override board
HPO-6705	Output override card, NC relay
HPO-6802	Raised cover, with labels, for output override board
KMD-5567	Network surge suppressor
KMD-5569	Modem (for dial-up point-to-point)
KMD-5575	Network repeater/isolator
KMD-5672	EIA-232 to female DB-9 PC connector cable (for Serial 2 port)
XEE-6000 Series	Transformers

# CAN-A168EIO Expansion Module

## Features

- ◆ Can be installed up to 200 feet away from the BAC-A1616BC using standard shielded twisted-pair wiring on a serial bus connection
- ◆ One serial bus connection (terminal block) for daisy-chaining up to 7 expansion I/O modules
- ◆ Expansion I/O modules addressed with DIP switches
- ◆ Removable screw terminal blocks, wire size 14–22 AWG
- ◆ Environmental limits information the same as the BAC-A1616BC

## Inputs/Outputs

Inputs and outputs have the same specifications as the BAC-A1616BC with the following **exceptions** (in bold):

- ◆ Onboard 16 universal inputs and **8** universal outputs, software selectable as analog or binary objects
- ◆ Each short-circuit protected output capable of driving up to 100 mA (at 0–12 VDC) or **450** mA total for all outputs
- ◆ **8** slots for output override cards (e.g., triac, relays, 4–20 mA) for large relays or devices that cannot be powered from a standard universal output (see HPO-6700 series under Options and Accessories on the previous page)

## Indicators, Fuses, and Jumpers

LED Indicators	Ready/Status, Expansion I/O Communication
Network Bulbs	Two per communication port for reversed polarity and overload protection/ indication
Fuse Jumpers	1.6 A, fast-acting, 5 x 20 mm (1) Power, (16) Input Selectors

## Installation

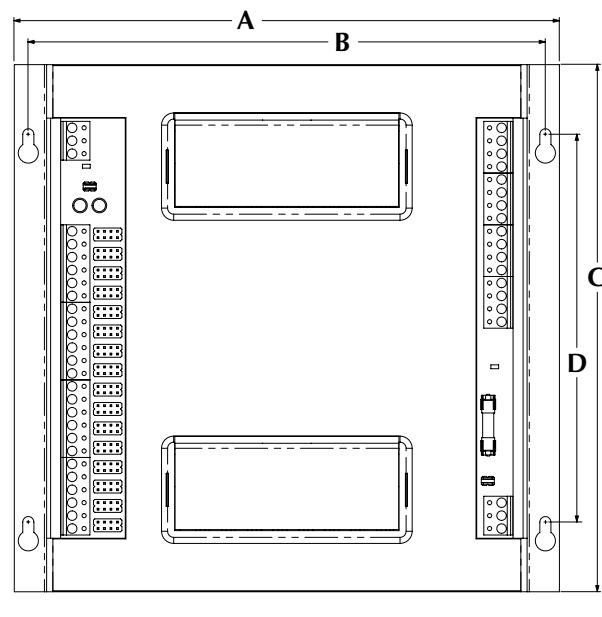
Dimensions	8.4 x 8.2 x 1.1 (without HPO output card covers or 1.9 with covers) inches (214 x 207 x 27/48 mm)
Weight Supply Voltage	1.6 lb. (0.7 kg) 24 VAC (-15%/+20%), Class 2 only, 19 VA @ 28.8 VAC
Case Material	Black powder-coated steel



## Regulatory

- ◆ CE Compliant
- ◆ UL 916 Energy Management Equipment
- ◆ FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class A\*\*

## Dimensions



A	B	C	D
8.4 in. 214 mm	8.0 in. 203 mm	8.2 in. 207 mm	6.0 in. 152 mm

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