KMC Controls BAC-5900A Series BACnet General Purpose Controllers Owner's Manual

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KMC Controls BAC-5900A Series BACnet General Purpose Controllers

Specifications:

- Dimensions:
  - A: 6.750 inches (171 mm)
  - B: 5.500 inches (140 mm)
  - C: 5.000 inches (127 mm)
  - D: 6.000 inches (152 mm)
  - E: 2.012 inches (51 mm)
  - F: 6.300 inches (160 mm)
- Inputs:
  - Universal Inputs: 8 on Terminal Blocks
  - Resolution: 16-bit analog-to-digital conversion
  - Protection: Overvoltage protection (24 VAC, continuous)
  - Termination: Configurable as analog, binary, or accumulator objects
- Outputs:
  - Universal Outputs: 8 on Terminal Blocks
  - Configurable as analog (0 to 12 VDC) or binary object (0 or 12 VDC, on/off)

Product Usage Instructions

Setup Choices:
The BAC-5900A series controllers offer menu-driven setup choices using the STE-9000 series digital sensor. Alternatively, NFC can be used for quick configuration from a smart device even when the controller is unpowered.

Configuration:
The BAC-5901ACE can be configured by connecting an HTML5-compatible web browser to the built-in configuration web pages.

Custom Programming:
To meet specific automation requirements, custom configuration and programming can be done using KMC Connect software and KMC Converge module for Niagara Workbench.

Applications:
The controllers can be used with various equipment including AHU, chillers, boilers, cooling towers, pumps,

lighting, FCU, HPU, RTU, unit ventilators, and other HVAC systems.

FAQ:

1. **Q: Can additional inputs and outputs be added to the BAC-5900A series controllers?**
   A: Yes, up to 72 inputs and 40 outputs can be achieved by using CAN-5900 Series Expansion Modules with the controllers.
2. **Q: How can I configure the BAC-5901ACE controller?**
   A: The BAC-5901ACE controller can be configured by connecting an HTML5-compatible web browser to the built-in configuration web pages.
3. **Q: What programming options are available for these controllers?**
   A: Custom configuration and programming can be done using KMC Connect software and KMC Converge module for Niagara Workbench.

DESCRIPTION

KMC Conquest™ BAC-5900A series controllers are designed to control building systems and HVAC equipment. The integrated alarming, scheduling, and trending enable these BACnet Advanced Application Controllers to be powerful edge devices for the modern smart building ecosystem.
The controllers feature simple, menu-driven setup choices using an STE-9000 series digital sensor, which can be installed permanently as the room sensor or used temporarily as a technician's service tool.
Alternately, quick configuration of controller properties can be done using NFC (Near Field Communication) from a smart phone, tablet, or computer (using KMC Connect Lite™ app) while the controller is unpowered.
The Ethernet-enabled BAC-5901ACE can also be configured by connecting an HTML5-compatible web browser to the built-in configuration web pages.
To meet the most demanding building automation custom requirements, these controllers are also fully programmable. Custom configuration and programming, with wizards for application programming selection/configuration, are enabled by KMC Connect™ software and the KMC Converge™ module for Niagara Workbench.
KMC Converge and TotalControl™ software additionally provide the capability of creating custom graphical web pages (hosted on a remote web server) to use as a custom user-interface for the controllers.
The 10 inputs and 8 outputs can be expanded up to 72 inputs and 40 outputs using CAN-5900 Series Expansion Modules.

APPLICATIONS

Can be used with the following types of equipment:

- Air handling units
- Boilers
- Chillers
- Chilled beams
- Cooling towers
- Fan coil units
- Heat pump units
- Pumps
- Roof top units
- Unit ventilators
- Other HVAC and building automation system equipmen

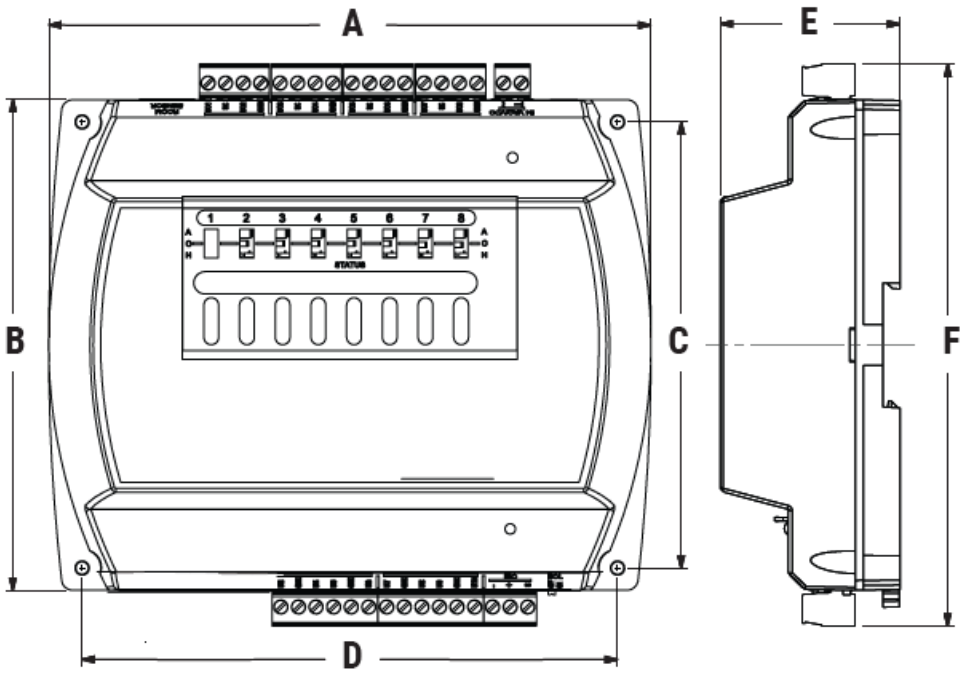
NOTE: Applications generally require custom programming. (See also Sample Installation on page 6.)

MODEL

APPLICATIONS	INPUTS*	OUTPUTS*	FEATURES		MODEL
			Real Time Clock (RTC)	Ethernet Port	
AHU, chillers, boilers, cooling towers, pumps, lighting, FCU, HPU, RTU, unit ventilators, other HVAC	10 total: • 2 analog (temperature sensor port) • 8 universal inputs (software configurable as analog, binary, or accumulator on terminals)	8 universal: • Software configurable • as analog or binary • Override boards provide additional options**	✓	✓	BAC-5901ACE

*Up to four CAN-5900 series I/O expansion modules can be used with BAC-5900A series controllers to provide up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs.
**HPO-6700 series output override board series provide (triac, NC/NO relays, 4–20 mA, adjustable 0–10 VDC) options for devices that cannot be powered from a standard universal output. The boards can also be used with the CAN-5901.

SPECIFICATIONS



DIMENSIONS		
A	6.750 inches	171 mm
B	5.500 inches	140 mm
C	5.000 inches	127 mm
D	6.000 inches	152 mm
E	2.012 inches	51 mm
F	6.300 inches	160 mm

Inputs and Outputs

Inputs, Universal (8 on Terminal Blocks)

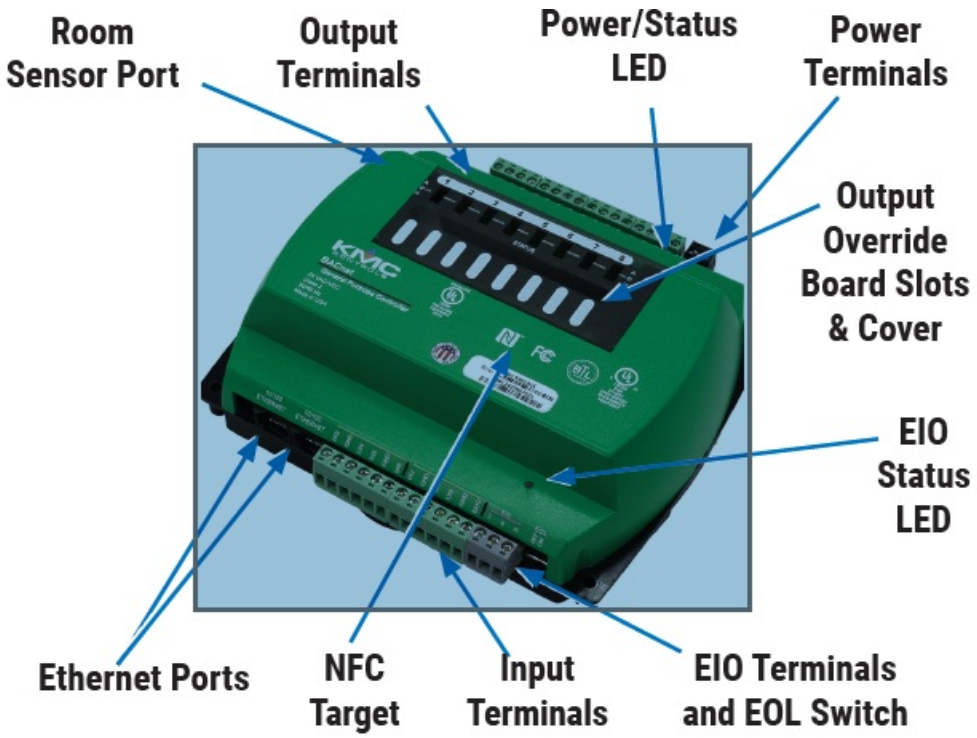
- Universal inputs Configurable as analog, binary, or accumulator objects
- Termination 1K and 10K ohm sensors, 0–12 VDC, or 0–20 mA (without need for an external resistor)
- Resolution 16-bit analog-to-digital conversion
- Protection Overvoltage protection (24 VAC, continuous)
- Wire size 12–24 AWG, copper, in removable screw terminal blocks

Input, Dedicated Room Sensor Port

- Connector Modular connector for STE-9xx1 series digital wall sensors or STE- 6010/6014/6017 analog temperature sensors
- Cable Uses standard Ethernet patch cable up to 150 feet (45 meters)

Outputs, Universal (8 on Terminal Blocks)

- Universal outputs Configurable as an analog (0 to 12 VDC) or binary object (0 or 12 VDC, on/off); alternately, an output override board is installed for devices that cannot be powered from a standard universal output



TERMINAL COLOR CODE	
Black	24 VAC/VDC Power
Gray	CAN Communications
Green	Inputs and Outputs

- Power/protection Each short-circuit protected universal output capable of driving up to 100 mA (at 0–12 VDC) or 300 mA total for all outputs
- Resolution 12-bit digital-to-analog conversion
- Wire size 12–24 AWG, copper, in removable screw terminal blocks

Communications

- Auxiliary One serial port with mini Type B connector (reserved for future use)
- Expansion (EIO) One CAN serial bus connection (terminal block) for daisy-chaining I/O expansion modules up to 200 feet (61 meters) from the controller via
  standard shielded twisted-pair wire
- Ethernet Two 10/100BaseT Ethernet connectors for BACnet IP, Foreign Device, and Ethernet 802.3 (ISO 8802-3); segmentation supported; up to 328 ft (100 m) between controllers (using T568B Category 5 or better cable)
- NFC NFC (Near Field Communication) up to 1 inch (2.54 cm) from the top of the enclosure
- Room sensor Modular STE connection jack for STE-9000 series digital sensors and STE-6010/6014/6017 analog sensors

Configurability

OBJECTS*	MAXIMUM #**
Inputs and Outputs	
Analog, binary, or accumulator input	106
Analog or binary output	40
Values	
Analog value	300
Binary value	300
Multi-state value	100
Program and Control	
Program (Control Basic)	30
PID loop	50
Schedules	
Schedule	20
Calendar	10
Logs	
Trend log	40
Trend log multiple	20
Alarms and Events	
Notification class	20
Event enrollment	100
Tables	
Input tables	20
Control Basic tables	20

*Configuration allows creation and deletion of objects (with the maximum number of objects shown). The number and configuration of default objects depends on the selected application. For lists of default objects, see the **KMC Conquest Controller Application Guide**. See also the PIC statement for all supported BACnet objects.
**Maximum number values are for 4 MB expanded-memory BAC- 5900 series controllers that started shipping on May 1, 2018.
Earlier controllers had 2 MB memory and a reduced maximum number of objects. Up to four CAN-5900 series I/O expansion modules can be added to provide up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs.

Configuring, Programming, and Designing

SETUP PROCESS			KMC CONTROLS TOOL
Configuration	**Programming (Control Basic)**	**Web Page Graphics***	
✓			Conquest NetSensor
✓			Internal configuration web pages in Conquest Ethernet “E” models**
✓			KMC Connect Lite™ (NFC) app***
✓	✓		KMC Connect™ software
✓ ****	✓ ****	✓	TotalControl™ software
✓	✓		KMC Converge™ module for Niagara WorkBench
		✓	KMC Converge **GFX** module for Niagara WorkBench

*Custom graphical user-interface web pages can be hosted on a remote web server, but not in the controller.
Conquest Ethernet-enabled “E” models with the latest firmware can be configured with an HTML5 compatible web browser from pages served from within the controller. For information, see the **Conquest Ethernet Controller Configuration Web Pages Application Guide.
***Near Field Communication via enabled smart phone or tablet running the KMC Connect Lite app.
****Full configuration and programming of KMC Conquest controllers is supported starting with TotalControl ver. 4.0.

Hardware Features

Processor, Memory, and Clock

- Processor 32-bit ARM® Cortex-M4
- Memory Programs and configuration parameters are stored in nonvolatile memory; auto restart on power failure
- RTC Real time clock with (capacitor) power backup for 72 hours (“C” model only) for network time synchronization or full stand-alone operation

Indicators and Isolation

- LED indicators Power/status, EIO (CAN) communication, Ethernet status
- Switches EIO (CAN bus)

Installation

Power

- Supply voltage 24 VAC (50/60 Hz) or 24 VDC; –15%, +20%; Class 2 only; non-supervised (all circuits, including supply voltage, are power limited circuits)
- Required power 14 VA, plus external loads
- Wire size 12–24 AWG, copper, in a removable screw terminal block

Enclosure and Mounting

- Weight 13.8 ounces (0.39 kg)
- Case material Green and black flame retardant plastic
- Mounting Direct mounting to panels or DIN rails

Environmental Limits

- Operating 32 to 120° F (0 to 49° C)
- Shipping –40 to 160° F (–40 to 71° C)
- Humidity 0 to 95% relative humidity (non-condensing)

Warranty, Protocol, and Approvals

Warranty

- KMC Limited Warranty 5 years (from mfg. date code)

BACnet Protocol

- Standard Meets or exceeds the specifications in ANSI/ASHRAE BACnet Standard 135-2010 for Advanced Application Controllers
- Type BTL-certified as a B-AAC controller type

CAN (External Inputs Outputs) Protocol

- CAN CAN (Controller Area Network) bus on (EIO) terminals

Regulatory Approvals

- UL UL 916 Energy Management Equipment listed
  UL 864 Smoke Control Equipment listed (UUKL), 10th edition—for smoke control applications, see Smoke Control Manual for KMC Conquest Systems, P/N 000-035-18)
- BTL BACnet Testing Laboratory listed as Advanced Application Controller (B-AAC)
- CE CE compliant
- RoHS 2 RoHS 2 compliant
- FCC 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. (NFC operation meets FCC compliance while the controller is in an unpowered state.)

ACCESSORIES

NOTE: For accessory details, see the respective product data sheets and installation guides.

Actuators

- MEP-4xxx Actuators, 25 to 90 in-lb., fail-safe and non-fail-safe
- MEP-7xxx Actuators, 180 and 320 in-lb., fail-safe and non-fail-safe

Communications

- BAC-5051AE BACnet router with dual Ethernet/IP and single MS/TP ports
- HPO-0055 Replacement network bulb assembly (pack of 5)
- HPO-5551 Router technician cable kit
- HPO-9003 NFC Bluetooth/USB module (fob)
- HSO-9001 Ethernet patch cable, 50 feet
- HSO-9011 Ethernet patch cable, 50 feet, plenum rated
- HSO-9012 Ethernet patch cable, 75 feet, plenum rated
- KMD-5567 Network surge suppressor

I/O Expansion and Output Override Boards

- CAN-5901 8-input, 8-output expansion module*
- CAN-5902 16-input expansion module*
- HPO-6701 Triac output w/ zero-cross switching (AC only)**
- HPO-6702 0–10 VDC analog with adjustable override potentiometer
- HPO-6703 Relay, NO contacts (AC/DC)
- HPO-6704 4–20 mA DC current loop with adjustable override potentiometer**
- HPO-6705 Relay, NC contacts (AC/DC)

***NOTE:** Up to four CAN-5900 series I/O expansion modules can be used with BAC-5900 series controllers to provide up to 74 physical (Room Sensor port and terminal block) inputs and up to 40 outputs.
****NOTE:** Only the HPO-6701 and HPO-6704 of the HPO-6700 series output override boards are approved for smoke control applications.

Miscellaneous Hardware

- HCO-1103 Steel control enclosure (single controller) with DIN rail mounting, 10 x 7.5 x 2.5 inches (257 x 67 x 193 mm)
- HCO-1035 Steel control enclosure, 20 x 24 x 6 inches (508 x 610 x 152 mm)*
- HCO-1036 Steel control enclosure, 24 x 36 x 6 inches (610 x 914 x 152 mm)*

- HPO-0063 Replacement output (override board) jumper, 2-pin (pack of 5)
- HPO-9901 Controller replacement parts kit with terminal blocks (1 gray, 1 black, 2 green 3-terminal, 4 green 4-terminal, 2 green 5-terminal, 2 green 6-terminal) and DIN clips (2 small for router and 1 large for controllers)
- SP-001 (KMC branded) screwdriver with a hex end (for NetSensor cover screws) and a flat blade end (for controller terminals)

***NOTE:** For smoke control applications, the controller must be mounted in a UL Listed FSCS enclosure or listed enclosure with minimum dimensions. The HCO-1035 and HCO-1036 are approved for such applications.

Room Sensors, Analog

- STE-6010W10 Temperature sensor, white
- STE-6014W10 Sensor with rotary setpoint dial, white
- STE-6017W10 Sensor with rotary setpoint dial and override button, white
- HPO-9005 Room sensor adapter allows the use of other sensors and optional setpoint potentiometers (with wire leads or terminal blocks) to be used instead of STE-601x sensor models with modular jacks

NOTE: Other STE-6000 series sensors are not fully compatible with the dedicated sensor port. However, various other models can be used with an HPO-9005 adapter or with the controller screw terminals. See the STE-6000 series data sheet for more information. For digital sensor information, see the STE-9000 series.
NOTE: To order the STE-601x sensor with light almond color instead of white, drop the W on the end of the model number (e.g., STE-6010W is white and STE-6010 is light almond).

Room Sensors, Digital (LCD Display)

- STE-9000 Series KMC Conquest NetSensor digital room temperature sensors for viewing, configuring, and optional humidity, occupancy, and CO2 sensing
- HPO-9001 NetSensor distribution module

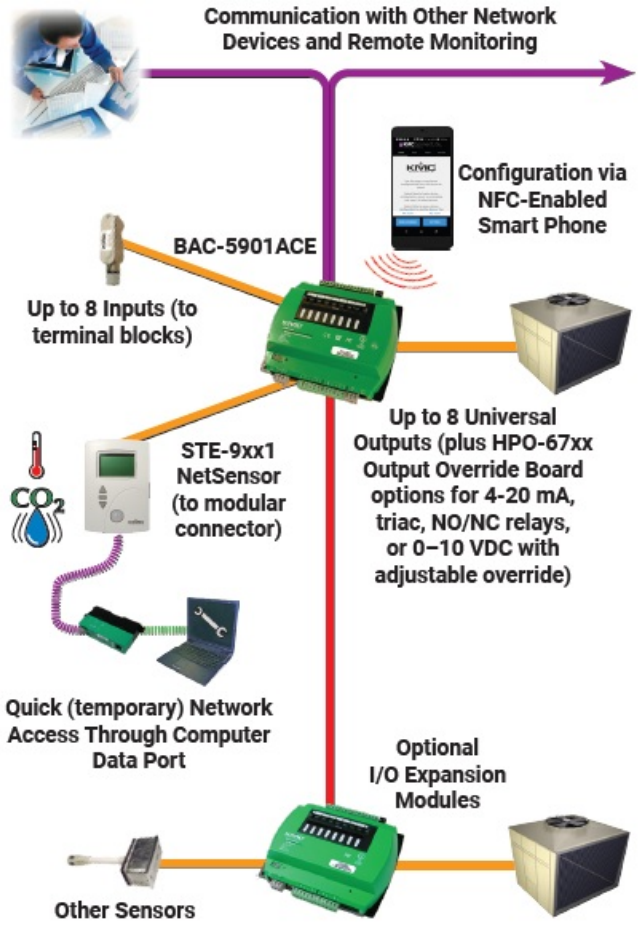
Sensors, Miscellaneous

- STE-1405 DAT sensor with plenum-rated cable
- STE-1451 OAT sensor

Transformers, 120 to 24 VAC

- XEE-6111-050 50 VA, single-hub
- XEE-6112-050 50 VA, dual-hub
- XEE-6112-100 96 VA, dual-hub (approved for smoke control applications)

SAMPLE INSTALLATION



For more information about installation and operation, see:

- BAC-5900 Series Controller Installation Guide
- KMC Conquest Controller Application Guide
- KMC Conquest Wiring: BAC-5900 Series Controllers (Video)
- Smoke Control Manual for KMC Conquest Systems

SUPPORT
Additional resources for installation, configuration, application, operation, programming, upgrading, and much more are available on the web at www.kmccontrols.com. Log-in to see all available files.

Specifications and design ar 6e subject to change without notice

Documents / Resources

	KMC Controls BAC-5900A Series BACnet General Purpose Controllers [pdf] Owner's Manual BAC-5900A Series BACnet General Purpose Controllers, BAC-5900A Series, BACnet General Purpose Controllers, General Purpose Controllers, Purpose Controllers, Controllers

References

- KMC Controls | Building Automation and Control Solutions
- User Manual