clarity 3 Programmable Controller

BACnet General Purpose Controllers (B-AAC)

DESCRIPTION

Taco Clarity³™ FPC 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 NS-100/200 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 while the controller is unpowered.

The Ethernet-enabled model 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 Taco software.

The Taco Programming 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.

Image Coming Soon

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 equipment

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

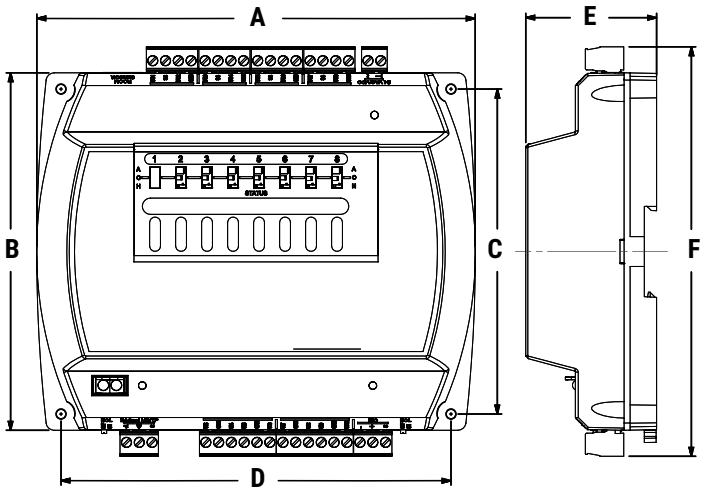
MODELS

APPLICATIONS	INPUTS*	OUTPUTS*	FEATURES			MODEL
			Real Time Clock (RTC)	Ethernet Port	MS/TP Port	
AHU, chillers, boilers, cooling towers, pumps, lighting, FCU, HPU, RTU, unit ventila-tors, other HVAC	10 total: • 2 analog (temperature sensor port) • 8 universal inputs (software configurable as analog, binary, or accumulator on terminals)	8 universal: • Software configur-able as analog or binary • Override boards give additional options**	✔		✔	CLAR-FPC
				✔		CLAR-FPCIP

*Up to four CLAR-EM-FPC series I/O expansion modules can be used with CLAR-FPC series controllers to provide up to (internal and exter-nal) 42 inputs and 40 outputs.

**ACC-7700 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 CLAR-EM-FPC.

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

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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 NS-100/200 series digital wall sensors or STE-6010/6014/6017 analog temperature sensors
Cable	Uses standard Ethernet patch cable up to 150 feet (45 meters)

(Optional) Ethernet Ports (Changed from One to Two in 2016)

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

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
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 (optional)	On “E” model only, 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)

MS/TP (optional)	One EIA-485 port (removable terminal block) for BACnet MS/TP, operating at 9.6, 19.2, 38.4, 57.6, or 76.8 kilobaud; max. length of up to 4,000 feet (1,200 meters) of 18 AWG shielded twisted-pair, no more than 51 pf/ft (167 pf/m); use repeaters for longer distances
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 CLAR-NS series digital sensors and CLAR-RS analog sensors

Configurability

OBJECTS*	MAXIMUM #
Inputs and Outputs	
Analog, binary, or accumulator input	42
Analog or binary output	40
Values	
Analog value	120
Binary value	80
Multi-state value	40
Program and Control	
Program (Control Basic)	10
PID loop	10
Schedules	
Schedule	2
Calendar	1
Logs	
Trend log	20
Trend log multiple (must be created)	4 (default 0)
Alarms and Events	
Notification class	5
Event enrollment	40

*Configuration allows creation and deletion of objects (maximum number of objects shown). The number and configuration of default objects depends on the selected application. See also the PIC statement for all supported BACnet objects.

Configuring, Programming, and Designing

SETUP PROCESS			IES CONTROLS TOOL
Configuration	**Programming (Control Basic)**	**Web Page Graphics***	
✔			Clarity NetSensor
✔			Internal configuration web pages in Conquest Ethernet “E” models**
✔			Taco Vision Lite™ (NFC) app***
✔	✔		Taco software
✔****	✔****	✔	Taco GCE Software

*Custom graphical user-interface web pages can be hosted on a remote web server, but not in the controller.

Clarity Ethernet-enabled “IP” 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 **Clarity Ethernet Controller Configuration Web Pages Application Guide.

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, MS/TP and CAN communication, and Ethernet status
MS/TP bulbs	One network bulb assembly indicates reversed polarity and isolates circuit
Switches	EOL (end of line) for MS/TP and 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	14 ounces (0.4 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

Taco 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 (pending)

CAN (External Inputs Outputs) Protocol

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

Regulatory Approvals

UL	UL 916 Energy Management Equipment listed
CE	CE compliant
RoHS 2	RoHS 2 compliant (pending)
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.

Communications

BACROUTER	Single port router

I/O Expansion and Output Override Boards

CLAR-EM-FPC	Input/output expansion module, 8 x 8
ACC-7701	Triac output w/ zero-cross switching (AC only)
ACC-7702	0–10 VDC analog with adjustable override potentiometer
ACC-7703	Relay, NO contacts (AC/DC)
ACC-7704	4–20 mA DC current loop with adjust-able override potentiometer
ACC-7705	Relay, NC contacts (AC/DC)

Room Sensors, Analog

CLAR-RS-W CLAR-RS-W-SP	Temperature sensor, white Sensor with rotary setpoint dial, white
CLAR-RS-W-SP/OR	Sensor with rotary setpoint dial and override button, white

Room Sensors, Digital (LCD Display)

NS- 100/200 Series	Taco NetSensor digital room temp. sensors for viewing and configuration and optional humidity, occupancy, and CO_2 sensing (see CLAR NS series data sheet for op-tions)
HPO-9001	NetSensor distribution module (fu-ture release)