

System 450™ Series Modular Controls

Description

System 450™ is a family of modular, digital electronic controls that is easily assembled and set up to provide reliable temperature, pressure, and humidity control for a wide variety of HVAC/R applications, commercial process applications, and industrial process applications.

The System 450 control system is designed to replace System 350™ and System 27 control systems, and to provide many additional features and benefits with fewer than twenty model variations.

System 450 control modules provide a field-configurable out-of-the-box solution. Most System 450 control modules can control temperature, pressure, and humidity systems simultaneously.

System 450 Control Modules with Communications enable you to connect System 450 control systems to Modbus® or Ethernet networks for remote monitoring and setup. The Modbus communications control module is an RS485, RTU-compliant slave device. The Ethernet communications control module has an integral web server that can deliver web pages by means of a direct connection, on your LAN, or across the Internet.

System 450 Reset Control Modules provide many of the features of the standard models for temperature and humidity control. In addition, these modules provide setpoint reset, real-time setback scheduling, and run-time balancing (equal run time) capability.

The System 450 Control Module with Hybrid Analog Output has a single self-selecting analog output to optimize and extend the controlled speed range of variable speed electronically commutated (EC) motors.

Refer to the following documents for important product application information.

- *System 450™ Series Modular Controls Product Bulletin (LIT-12011458)*
- *System 450™ Series Modular Control Systems with Standard Control Modules Technical Bulletin (LIT-12011459)*
- *System 450™ Series Modular Control Systems with Reset Control Modules Technical Bulletin (LIT-12011842)*
- *System 450™ Series Modular Control Systems with Communications Control Modules Technical Bulletin (LIT-12011826)*

Features

- durable, compact, interchangeable modular components with plug-together connectors and DIN rail or direct wall mount capability eliminate field wiring between modules and allow you to quickly and easily design, assemble, install, and upgrade your control systems.
- versatile, multipurpose, field-configurable control modules and expansion modules designed for global use allow you to create a wide variety of application-specific control systems capable of controlling temperature, pressure, or humidity, or all three conditions simultaneously, with only a small suite of module models.
- up to three hard-wired input sensors and up to ten relay or analog outputs (in any combination) per control system allow you to build complex custom control systems while reducing your control system cost to only the cost of the required components.
- control Modules with bright backlit LCDs and four-button touch pad user interfaces provide quick, clear, visual status of your System 450 control system inputs and outputs with the touch of a button and enable you to quickly and easily set up and adjust your control system.



System 450 Control System with a Control, Power, and Expansion Module

- multipurpose, all-in-one control modules enable simple stand-alone, single-module control systems that are temperature, pressure, and humidity capable out of the box and easy to set up in the field to replace a wide variety of OEM HVAC/R and process controls.
- an extensive suite of compatible temperature and humidity sensors, and pressure transducers allows you to monitor and control a wide range of HVAC/R and process conditions in a variety of standard and global units of measurement.
- high input signal selection enables your control system to monitor a temperature, pressure, or humidity condition with two or three sensors (of the same type) and control your system outputs based on the highest condition value sensed by the referenced sensors.
- differential control enables your control system to monitor and maintain a temperature, pressure, or humidity differential between two sensor points within a system, process, or space.

The Reset Control modules have additional features:

- adjustable minimum and maximum setpoint temperatures (reset control modules only) enable compliance with the manufacturer's specifications for your controlled HVAC/R and process equipment.
- selectable shutdown-high and shutdown-low temperature settings (reset control modules only) saves you energy by shutting down controlled equipment when the ambient temperature either rises or drops to a point where heating or cooling is no longer required.
- real time clock and adjustable setback temperature (reset control modules only) save you energy by setting back heating, cooling, or humidity setpoints during scheduled unoccupied periods (24-hour day, 7-day week schedule).
- user-defined reset control capability (reset control modules only) saves you energy in a wide variety of temperature and humidity reset control applications by adjusting the temperature or humidity control loop, based on changes in ambient outdoor temperature or other uncontrolled condition.



System 450™ Series Modular Controls (Continued)

The Control Modules with Communications have additional features:

- Ethernet communication capability through a built-in web server (Ethernet Control Modules only) allows you to monitor your control system status and set up or change the parameters by means of a direct Ethernet cable connection, through a LAN connection, or over the Internet. The built in web server delivers user-friendly web pages to client browsers on a desktop, laptop, tablet, or smart device.
- The Web page server on Ethernet communication modules provides a simple, intuitive web interface for easy remote monitoring, setup, adjustment and remote monitoring of your control systems across Ethernet networks.
- RS485, RTU-compliant Modbus® network communication capability (Modbus control modules only) enables a head-end RS485 Modbus master controller to read and write control system status and setup parameters to the System 450 Modbus communication control module.
- Password protection for local access (Ethernet and Modbus control modules only) and password protection for remote access (Ethernet control module only) deters unauthorized changes to the control system settings, but allows local and remote monitoring of your control system status.
- Analog output signal limiting features (communication control modules only) allow you to select the rate and condition range at which the control updates the analog output signal, potentially reducing wear on the controlled equipment.
- Binary input with time delay (communication control modules only) allows you to use an external set of dry contacts and selectable time delays to control relay outputs.

Applications

You can create a wide variety of custom, application-specific control systems with System 450 modules. The following are some common control application examples:

- Temperature control
- Pressure control
- Humidity control
- Multipurpose control
- Reset and setback control
- High input-signal selection
- Differential control

Temperature Control

- Temperature monitoring and alarming
- On/Off staged control of boilers and chillers
- Proportional stage control of boilers and chillers
- Boiler and chiller pump control
- Heating and cooling control with deadband
- Floating temperature control of damper and valve actuators
- Cooling tower fan speed/stage control based on water temperature
- Supply, make-up, and mixed air temperature control
- Temperature actuated valve control
- Supply and make-up air damper and fan control
- Condenser fan staging or speed control based on condenser temperature

Refrigerant Pressure Control

- Condenser fan cycling and stage control
- Multispeed condenser fan control
- Floating pressure control of damper and valve actuators
- Condenser fan speed and damper control
- High and low pressure cutout control
- Staged compressor control
- Cooling tower fan speed control based on high-side pressure
- Direct speed control of electronically commutated (EC) condenser fan motors (C450CPW-100 model)

Other Pressure Control

- Relief damper and fan control for building pressurization
- Constant static pressure control

Humidity Control

- On/Off humidification and dehumidification control
- Proportional humidification and dehumidification control
- Multistage humidification and dehumidification control
- Humidity monitoring and alarming

Multipurpose Control

- Temperature and pressure based refrigeration rack control
- Temperature and humidity control of wine cellars and greenhouses
- Temperature, humidity, and static pressure control of clean rooms and greenhouses
- Dehumidification with reheat control

Reset Control

- Boiler supply water temperature reset control based on outside air temperature
- Chiller supply water temperature reset control based on outside air temperature
- VAV zone temperature control based on outside air temperature
- Humidity reset based on outside air temperature
- Staged applications with runtime balancing
- Real-time Occupied/Unoccupied Setback

High Input Signal Selection

- Pressure-based fan speed or fan cycling control on multi-circuit condensers
- Temperature-based fan speed or fan cycling control on multi-circuit condensers

Differential Control

- Air and fluid pump-flow monitoring and alarming
- Air and fluid filter status monitoring and alarming
- Chiller barrel flow monitoring, control, and alarming
- Solar air and water heating applications

Note: Communications modules add network communication to any application of your choosing, except those requiring reset, setback, or EC motor control.

Repair Information

If a System 450 module fails to operate within its specifications, replace the module. For a replacement module, contact your Johnson Controls® representative.



System 450 Control Series

System 450™ Series Modular Controls (Continued)

System 450 Control Module Capabilities

Control by _____	System 450 Control Modules			
	Standard	Communications	Reset	Hybrid
	C450CPN-3C C450CQN-3C C450CBN-3C C450CCN-3C	C450CEN-1C C450CRN-1C	C450RBN-3C C450RCN-3C	C450CPW-100C
Controlled Condition				
Temperature	✓	✓	✓	✓
Pressure	✓	✓	-	✓
Humidity	✓	✓	✓	✓
Combination of Conditions	✓	✓	✓	✓
Control Capabilities				
On/Off Relay Control	✓	✓	✓	✓
Analog Proportional Control (Direct and Reverse Action)	✓	✓	✓	✓
Analog Proportional Plus Integral Control (Direct and Reverse Action)	✓	✓	✓	✓
Combination of On/Off Relay and Analog Output Control	✓	✓	✓	✓
Stand-Alone Control	✓	-	✓	✓
Multi-Stage Control (Relay or Analog)	✓	✓	✓	✓
Network Communications	-	✓	-	-
High Input Signal Selection	✓	✓	-	✓
Differential Control	✓	✓	-	✓
Output Signal Limiting Output Signal Update Rate Output Signal Deadband	-	✓	-	-
Binary Input Control for Relay Outputs	-	✓	-	-
On/Off Duration Time Control	-	✓	-	-
Temperature and Humidity Reset Control	-	-	✓	-
Scheduling and Temperature Setback Control	-	-	✓	-
Reset Setpoint Control	-	-	✓	-
Setback Scheduling	-	-	✓	-
Run-Time Balancing	-	-	✓	-
Hybrid Analog Output Control	-	-	-	✓ ¹

1. Only on output OUTA1.



System 450 Control Series

System 450™ Series Modular Controls (Continued)

Selection Charts

System 450 Modules and Accessories Ordering Information

Product Code Number	Product Description
C450CBN-3C	Standard Control Module with LCD, Four-Button Touchpad UI, and Relay Output; provides one relay output (SPDT line-voltage relay) for SPDT control.
C450CCN-3C	Standard Control Module with LCD, Four-Button Touchpad UI, and Relay Output; provides two relay outputs (SPDT line-voltage relays) for SPDT control.
C450CEN-1C	Control Module with Ethernet Communications, LCD, and Four-Button Touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
C450CPN-3C	Standard Control Module with LCD, Four-Button Touchpad UI, and Analog Output; provides one analog output (0 to 10 VDC or 4 to 20 mA self-selecting signal) for proportional control.
C450CPW-100C	Hybrid Analog Output Control Module with LCD, Four-Button Touchpad UI, Hybrid Analog Output and Optional High Input Signal Select; provides one hybrid analog output and optional high input signal select primarily used for variable-speed EC motor speed control. Only Analog Output 1 (OUTA1) can be configured as a hybrid analog output and/or use the High Input Signal Selection feature. These features are not available for any of the other outputs in a System 450 control system that uses the C450CPW-100C as the control module.
C450CQN-3C	Standard Control Module with LCD and Four-Button Touchpad UI, and Analog Output; provides two analog outputs (0 to 10 VDC or 4 to 20 mA self-selecting signals) for proportional control.
C450CRN-1C	Control Module with RS485 Modbus Communications, LCD, and Four-Button Touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
C450RBN-3C	Reset Control Module with LCD, Four-Button Touchpad UI, and SPDT relay output; provides one SPDT output relay. One A99BC-25C temperature sensor with 0.25 m (9-1/4 in.) silicon leads and one A99BC-300C temperature sensor with 3 m (9 ft 10 in.) silicon leads are included in the box with the Reset Control Module.
C450RCN-3C	Reset Control Module with LCD, Four-Button Touchpad UI, and SPDT relay output; provides two SPDT output relays. One A99BC-25C temperature sensor with 0.25 m (9-1/4 in.) silicon leads and one A99BC-300C temperature sensor with 3 m (9 ft 10 in.) silicon leads are included in the box with the Reset Control Module.
C450SBN-3C	Relay Output Expansion Module; provides one SPDT line-voltage relay output.
C450SCN-3C	Relay Output Expansion Module; provides two SPDT line-voltage relay outputs.
C450SPN-1C	Analog Output Expansion Module; provides one analog output (0 to 10 VDC or 4 to 20 mA self-selecting signal) for proportional control.
C450SQN-1C	Analog Output Expansion Module; provides two analog outputs (0 to 10 VDC or 4 to 20 mA self-selecting signals) for proportional control.
C450YNN-1C	Power Module; provides 24 V to System 450 Module Assembly; 120 VAC or 240 VAC supply power input terminals.
BKT287-1R	DIN Rail; 0.30 m (12 in.) long
BKT287-2R	DIN Rail; 1 m (39-1/3 in.) long
BKT287-3R	DIN Rail; 0.61 m (24 in.) long
BKT287-4R	DIN Rail; 0.36 m (14 in.) long
PLT344-1R	DIN Rail End Clamps (2 clamps)
WHA-C450-100C	System 450 module connection extension cable, 100 cm (3.3 ft) long

System 450 Compatible A99B Temperature Sensors and Accessories Ordering Information¹ (Part 1 of 2)

Product Code Number	Product Description
A99BA-200C	PTC Silicon Sensor with Shielded Cable; Cable Length 2 m (6-1/2 ft); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Temperature Range: -40 to 100°C (-40 to 212°F)
A99BB-25C	PTC Silicon Sensor with PVC Cable; Cable Length 0.25 m (9-3/4 in.); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Temperature Range: -40 to 100°C (-40 to 212°F)
A99BB-200C	PTC Silicon Sensor with PVC Cable; Cable Length 2 m (6-1/2 ft); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Temperature Range: -40 to 100°C (-40 to 212°F)
A99BB-300C	PTC Silicon Sensor with PVC Cable; Cable Length 3 m (9-3/4 ft); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Temperature Range: -40 to 100°C (-40 to 212°F)
A99BB-500C	PTC Silicon Sensor with PVC Cable; Cable Length 5 m (16-3/8 ft); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Temperature Range: -40 to 100°C (-40 to 212°F)
A99BB-600C	PTC Silicon Sensor with PVC Cable; Cable Length 6 m (19-1/2 ft); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Temperature Range: -40 to 100°C (-40 to 212°F)
A99BC-25C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable Length 0.25 m (9-3/4 in.); Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Rated for Full Sensor Temperature Range.
A99BC-300C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable Length 3 m (9-3/4 ft) Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Rated for Full Sensor Temperature Range.
A99BC-1500C	PTC Silicon Sensor with High Temperature Silicon Cable; Cable Length 15 m (49 ft) Sensor Temperature Range: -40 to 120°C (-40 to 250°F) Cable Jacket Rated for Full Sensor Temperature Range.
BOX10A-600R	PVC Enclosure for A99 Sensor; Includes Wire Nuts and Conduit Connector (for Outdoor Sensor)

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System 450 Control Series

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System 450 Compatible A99B Temperature Sensors and Accessories Ordering Information¹ (Part 2 of 2)

Product Code Number	Product Description
WEL11A-601R	Immersion Well for A99 Sensor Liquid Sensing Applications
A99-CLP-1	Mounting Clip for A99 Temperature Sensor
ADP11A-600R	Conduit Adaptor, 1/2 in. Snap-Fit EMT Conduit Adaptor (box of 10)
TE-6001-1	Duct Mounting Hardware with Handy Box for A99 Sensor
TE-6001-11	Duct Mounting Hardware without Handy Box for A99 Sensor
SHL10A-603R	Sun Shield (for Use with Outside A99 Sensors in Sunny Locations)

1. Refer to the *A99B Series Temperature Sensors Product/Technical Bulletin (LIT-125186)* on the Johnson Controls® Product Literature website for more information.

System 450 Compatible TE-6000 Series 1,000 Ohm Nickel Temperature Sensors and Accessories Ordering Information

Product Code Number	Product Description
TE-6000-x	TE6000 Series 1,000 ohm at 70°F nickel temperature sensors (only). Only the TE-6000-6 sensor can be used for the entire HI°C and HI°F temperature range. Different sensing element packages are available for various applications. For a complete list of compatible 1,000 ohm nickel sensors, including sensor descriptions, technical specifications, and mounting accessories, refer to the <i>TE-6000 Series Temperature Sensing Elements Product Bulletin (LIT-216288)</i> . (System 450 Sensor Types HI°C and HI°F)

System 450 Compatible TE-6300 Series 1,000 Ohm Nickel Temperature Sensors and Accessories Ordering Information

Product Code Number	Product Description
TE-631xx-x	TE6300 Series 1,000 ohm at 70°F nickel averaging and 1,000 ohm thin-film nickel temperature sensors (only). For a complete list of compatible 1,000 ohm nickel averaging and thin-film nickel sensors, including sensor descriptions, technical specifications, and mounting accessories, refer to the <i>TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)</i> . (System 450 Sensor Types HI°C and HI°F)

System 450 Compatible TE-68NT-0N00S 1,000 Ohm Nickel Temperature Sensor Ordering Information

Product Code Number	Product Description
TE-68NT-0N00S	TE6800 Series 1,000 ohm nickel temperature sensor for wall-mount applications. For more information, including sensor description, technical specifications, and mounting accessories, refer to the <i>TE-6800 Series Temperature Sensors Product Bulletin (LIT-12011542)</i> . (System 450 Sensor Types HI°C and HI°F)

System 450 Compatible HE67S3 Type Humidity Sensors with Integral A99B Temperature Sensor Ordering Information¹

Product Code Number	Product Description
HE-67S3-0N0BT	Wall Mount Humidity Sensor with A99B Type Temperature Sensor: 10 to 90% RH; 0 to 60°C (32 to 140°F)
HE-67S3-0N00P	Duct Mount Humidity Sensor with A99B Type Temperature Sensor: 10 to 90% RH; 0 to 60°C (32 to 140°F)

1. The HE-67S3 sensors require 24 VAC input and must use the 0–5 VDC output. Refer to the *TrueRH Series HE-67xx Humidity Element with Temperature Sensors Product Bulletin (LIT-216245)* on the Johnson Controls Product Literature website for more information, including technical specifications and mounting accessories.

System 450 Compatible HE6800 Series Humidity Transmitters with Temperature Sensor Ordering Information¹

Product Code Number	Product Description
HE-68N2-0N00WS	Wall Mount Humidity Transmitter with Nickel Temperature Sensor: 10 to 90 ±2% RH; 0 to 55°C (32 to 131°F)
HE-68N3-0N00WS	Wall Mount Humidity Transmitter with Nickel Temperature Sensor: 10 to 90 ±3% RH; 0 to 55°C (32 to 131°F)

1. The HE-6800 transmitters require 24 VAC input and must use the 0–5 VDC output. Refer to the *HE-6800 Series Humidity Transmitters with Temperature Sensor Product Bulletin (LIT-12011625)* on the Johnson Controls Product Literature website for more information, including technical specifications and mounting accessories.

System 450 Compatible Low Pressure Differential Transducer Ordering Information^{1 2}

Product Code Number	Product Description
DPT2650-R25B-AB	Low Pressure Differential Transducer: -0.25 to 0.25 in. W.C. (System 450 Sensor Type: P 0.25) ³
DPT2650-0R5D-AB	Low Pressure Differential Transducer: 0 to 0.5 in. W.C. (System 450 Sensor Type: P 0.5)
DPT2650-2R5D-AB	Low Pressure Differential Transducer: 0 to 2.5 in. W.C. (System 450 Sensor Type: P 2.5)
DPT2650-005D-AB	Low Pressure Differential Transducer: 0 to 5.0 in. W.C. (System 450 Sensor Type: P 5)
DPT2650-10D-AB	Low Pressure Differential Transducer: 0 to 10 in. W.C. (System 450 Sensor Type: P 10)

1. Refer to the *Setra Systems Model DPT265 Very Low Differential Pressure Transducer Catalog Page* on the Johnson Controls Product Literature website for more information.
2. The DPT265 sensors require 24 VAC input and must use the 0–5 VDC output. Refer to the *Setra Systems Model DPT265 Very Low Differential Pressure Transducer Catalog Page* on the Johnson Controls Product Literature website for more information.
3. Used only with Communications Control Modules.



System 450 Control Series

System 450™ Series Modular Controls (Continued)

System 450 Compatible P499 Series Transducers with 1/4 in. SAE 45 Flare Internal Thread with Depressor (Style 47) Ordering Information¹

Product Code Number	Product Description
P499RCP-401C	-1 to 8 bar; order WHA-PKD3 type wire harness separately
P499RCP-402C	-1 to 15 bar; order WHA-PKD3 type wire harness separately
P499RCP-404C	0 to 30 bar; order WHA-PKD3 type wire harness separately
P499RCP-405C	0 to 50 bar; order WHA-PKD3 type wire harness separately
P499RCPS100C	-10 to 100 psis (sealed for wet and freeze/thaw applications); order WHA-PKD3 type wire harness separately
P499RCPS100K	-10 to 100 psis (sealed for wet and freeze/thaw applications); WHA-PKD3-200C wire harness included
P499RCPS102C	0 to 200 psis (sealed for wet and freeze/thaw applications); order WHA-PKD3 type wire harness separately
P499RCPS102K	0 to 200 psis (sealed for wet and freeze/thaw applications); WHA-PKD3-200C wire harness included
P499RCP-101C	0 to 100 psi; order WHA-PKD3 type wire harness separately
P499RCP-101K	0 to 100 psi; WHA-PKD3-200C wire harness included
P499RCP-105C	0 to 500 psi; order WHA-PKD3 type wire harness separately
P499RCP-105K	0 to 500 psi; WHA-PKD3-200C wire harness included
P499RCP-107C	0 to 750 psi; order WHA-PKD3 type wire harness separately
P499RCP-107K	0 to 750 psi; WHA-PKD3-200C wire harness included

1. The P499 sensors must be powered with the +5 VDC and C terminals and the output is 0.5 to 4.5 VDC. Refer to the *P499 Series Electronic Pressure Transducers Product/Technical Bulletin (LIT-12011190)* on the Johnson Controls Product Literature website for more information.

System 450 Compatible P499 Series Transducers with 1/8 in. 27 NPT External Thread (Style 49) Ordering Information¹

Product Code Number	Product Description
P499RAPS100C	-10 to 100 psis (sealed for wet and freeze/thaw applications); order WHA-PKD3 type wire harness separately
P499RAPS100K	-10 to 100 psis (sealed for wet and freeze/thaw applications); WHA-PKD3-200C wire harness included
P499RAPS102C	0 to 200 psis (sealed for wet and freeze/thaw applications); order WHA-PKD3 type wire harness separately
P499RAPS102K	0 to 200 psis (sealed for wet and freeze/thaw applications); WHA-PKD3-200C wire harness included
P499RAP-101C	0 to 100 psi; order WHA-PKD3 type wire harness separately
P499RAP-101K	0 to 100 psi; WHA-PKD3-200C wire harness included
P499RAP-102C	0 to 200 psi; order WHA-PKD3 type wire harness separately
P499RAP-105C	0 to 500 psi; order WHA-PKD3 type wire harness separately
P499RAP-105K	0 to 500 psi; WHA-PKD3-200C wire harness included
P499RAP-107C	0 to 750 psi; order WHA-PKD3 type wire harness separately
P499RAP-107K	0 to 750 psi; WHA-PKD3-200C wire harness included

1. The P499 sensors must be powered with the +5 VDC and C terminals and the output is 0.5 to 4.5 VDC. Refer to the *P499 Series Electronic Pressure Transducers Product/Technical Bulletin (LIT-12011190)* on the Johnson Controls Product Literature website for more information.

WHA-PKD3 Wire Harnesses Ordering Information¹

Product Code Number	Product Description
WHA-PKD3-200C	Plug and Three-Wire Harness for P499 Electronic Pressure Transducers: 2.0 m (6-1/2 ft) cable
WHA-PKD3-400C	Plug and Three-Wire Harness for P499 Electronic Pressure Transducers: 4.0 m (13 ft) cable
WHA-PKD3-600C	Plug and Three-Wire Harness for P499 Electronic Pressure Transducers: 6.0 m (19-5/8 ft) cable

1. Refer to the *P499 Series Electronic Pressure Transducers Product/Technical Bulletin (LIT-12011190)* on the Johnson Controls Product Literature website for more information.

Technical Specifications

C450CPN-3C and C450CQN-3C Control Modules with Analog Output (Part 1 of 2)	
Product	C450CPN-3C and C450CQN-3C: System 450 Control Module models are sensing controls and operating controls with LCD, four-button touchpad, and SPDT analog output C450CPN-3C: Control Module with one analog output C450CQN-3C: Control Module with two analog outputs
Power Consumption	C450CPN-3C: 1.3 VA maximum using 0 to 10 V out; 1.5 VA maximum using 4 to 20 mA out C450CQN-3C: 2.0 VA maximum using 0 to 10 V out; 2.4 VA maximum using 4 to 20 mA out
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.



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C450CPN-3C and C450CQN-3C Control Modules with Analog Output (Part 2 of 2)	
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) when using 0–10 VDC outputs; -40 to 40°C (-40 to 104°F) when using 4–20 mA outputs Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Input Signal	0 to 5 VDC for humidity sensors and static pressure transducers 0.5 to 4.5 VDC for ratiometric pressure transducers 1,035 ohms at 25°C (77°F) for A99 PTC temperature sensors 1,000 ohms at 21.1°C (70°F) for TE-6xxx Nickel temperature sensors
Analog Output	Voltage Mode (0–10 VDC): 10 VDC maximum output voltage 10 mA maximum output current Requires an external load of 1,000 ohms or more The AO operates in Voltage Mode when connected to devices with impedance greater than 1,000 ohms. Devices that fall below 1,000 ohms may not operate as intended with Voltage Mode applications. Current Mode (4–20 mA): Requires an external load between 0 to 300 ohms The AO operates in Current Mode when connected to devices with impedance less than 300 ohms. Devices that rise above 300 ohms may not operate as intended with Current Mode applications.
Analog Input Accuracy	Resolution: 14 bits
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CPN-3C: 195 g (0.43 lb) C450CQN-3C: 195 g (0.43 lb)
Compliance	North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive. Australia: Mark: C-Tick Compliant (N1813)



C450CEN-1C Control Module with Ethernet Communications	
Product	C450CEN: System 450 control modules are sensing controls and operating controls with LCD and four-button touchpad UI, Ethernet communications capability, and no outputs. C450CEN-1C: Control module with Ethernet communications capability
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Input Signal	0 to 5 VDC; 1,035 ohms at 25°C (77°F) for an A99 PTC Temperature Sensor
Analog Input Accuracy	Resolution: 16 bits
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.
Dimensions (H x W x D)	127 x 63 x 63 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CEN-1C: 207 g (0.46 lb)
Compliance	North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive; Low Voltage Directive; CISPR22, class B. Australia: Mark: C-Tick Compliant (N1813)





System 450 Control Series

System 450™ Series Modular Controls (Continued)

C450CRN-1C Control Module with RS485 Modbus Communications	
Product	C450CRN-1C: System 450 control modules are sensing controls and operating controls with LCD and four-button touchpad UI and no outputs. This control module is an RS485, RTU compliant Modbus slave device.
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Input Signal	0 to 5 VDC; 1,035 ohms at 25°C (77°F) for an A99 PTC Temperature Sensor
Analog Input Accuracy	Resolution: 16 bits
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.
Dimensions (H x W x D)	127 x 63 x 63 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CRN-1C: 207 g (0.46 lb)
Compliance	North America: cULus Listed; UL 60730, File E27734: FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive; Low Voltage Directive; CISPR22, class B Australia: Mark: C-Tick Compliant (N1813)

C450CPW-100C Control Module with Hybrid Analog Output (Part 1 of 2)	
Product	C450CPW-100C System 450 control module is a sensing control and operating control with LCD, four-button touchpad, and analog output with pulse-width modulation capability.
Power Consumption	C450CPW-100C: 1.3 VA maximum using 0 to 10 V out; 1.5 VA maximum using 4 to 20 mA out
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) when using 0 to 10 VDC outputs; -40 to 40°C (-40 to 104°F) when using 4 to 20 mA outputs Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Input Signal	0 to 5 VDC for humidity sensors and static pressure transducers 0.5 to 4.5 VDC for ratiometric pressure transducers 1,035 ohms at 25°C (77°F) for A99 PTC temperature sensors 1,000 ohms at 21.1°C (70°F) for TE-6xxx Nickel temperature sensors
Analog Output	Voltage Mode (0–10 VDC): 10 VDC maximum output voltage 10 mA maximum output current Requires an external load of 1,000 ohms or more The AO operates in Voltage Mode when connected to devices with impedance greater than 1,000 ohms. Devices that fall below 1,000 ohms may not operate as intended with Voltage Mode applications. Current Mode (4–20 mA): Requires an external load between 0 to 300 ohms The AO operates in Current Mode when connected to devices with impedance less than 300 ohms. Devices that rise above 300 ohms may not operate as intended with Current Mode applications.
Analog Input Accuracy	Resolution: 14 bits
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CPW-100C: 195 g (0.43 lb)



System 450 Control Series

System 450™ Series Modular Controls (Continued)

C450CPW-100C Control Module with Hybrid Analog Output (Part 2 of 2)														
	North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits													
	Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.													
	Australia: Mark: C-Tick Compliant (N1813)													
C450CBN-3C and C450CCN-3C Control Modules with Relay Output														
Product	C450CBN-3C and C450CCN-3C: System 450 Control Module models are sensing controls and operating controls with LCD, four-button touchpad, and SPDT relay output C450CBN-3C: Control Module with one SPDT output relay C450CCN-3C: Control Module with two SPDT output relays													
Power Consumption	C450CBN-3C: 0.9 VA maximum C450CCN-3C: 1.3 VA maximum													
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.													
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)													
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)													
Input Signal	0 to 5 VDC for humidity sensors and static pressure transducers 0.5 to 4.5 VDC for ratiometric pressure transducers 1,035 ohms at 25°C (77°F) for A99 PTC temperature sensors 1,000 ohms at 21.1°C (70°F) for TE-6xxx Nickel temperature sensors													
Output Relay Contacts	General: 1/2 HP at 120/240 VAC, SPDT <table><tr><td>Specific:</td><td>AC Motor Ratings</td><td>120 VAC</td><td>208/240 VAC</td></tr><tr><td></td><td>AC Full-load Amperes:</td><td>9.8 A</td><td>4.9 A</td></tr><tr><td></td><td>Locked-Rotor Amperes:</td><td>58.8 A</td><td>29.4 A</td></tr></table> 10 Amperes AC Non-inductive at 24/240 VAC Pilot Duty: 125 VA at 24/240 VAC		Specific:	AC Motor Ratings	120 VAC	208/240 VAC		AC Full-load Amperes:	9.8 A	4.9 A		Locked-Rotor Amperes:	58.8 A	29.4 A
Specific:	AC Motor Ratings	120 VAC	208/240 VAC											
	AC Full-load Amperes:	9.8 A	4.9 A											
	Locked-Rotor Amperes:	58.8 A	29.4 A											
Analog Input Accuracy	Resolution: 14 bits													
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.													
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)													
Weight	C450CBN-3C: 209 g (0.46 lb) C450CCN-3C: 222 g (0.49 lb)													
	North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits													
	Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.													
	Australia: Mark: C-Tick Compliant (N1813)													
C450RBN-3C and C450RCN-3C Reset Control Modules with Real-Time Clock and Relay Output (Part 1 of 2)														
Product	C450RBN-3C and C450RCN-3C: System 450 Reset Control Module models are sensing controls and operating controls with LCD, four-button touchpad, and SPDT relay output C450RBN-3C: Control Module with one SPDT output relay C450RCN-3C: Control Module with two SPDT output relays													
Power Consumption	C450RBN-3C: 0.9 VA maximum C450RCN-3C: 1.3 VA maximum													
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.													
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)													
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)													



System 450 Control Series

System 450™ Series Modular Controls (Continued)

C450RBN-3C and C450RCN-3C Reset Control Modules with Real-Time Clock and Relay Output (Part 2 of 2)										
Input Signal	0 to 5 VDC for humidity sensors 1,035 ohms at 25°C (77°F) for A99 PTC temperature sensors									
Output Relay Contacts	General: 1/2 HP at 120/240 VAC, SPDT									
	Specific: <table><tr><td>AC Motor Ratings</td><td>120 VAC</td><td>208/240 VAC</td></tr><tr><td>AC Full-load Amperes:</td><td>9.8 A</td><td>4.9 A</td></tr><tr><td>AC Locked-Rotor Amperes:</td><td>58.8 A</td><td>29.4 A</td></tr></table>	AC Motor Ratings	120 VAC	208/240 VAC	AC Full-load Amperes:	9.8 A	4.9 A	AC Locked-Rotor Amperes:	58.8 A	29.4 A
	AC Motor Ratings	120 VAC	208/240 VAC							
AC Full-load Amperes:	9.8 A	4.9 A								
AC Locked-Rotor Amperes:	58.8 A	29.4 A								
10 Amperes AC Non-inductive at 24/240 VAC Pilot Duty: 125 VA at 24/240 VAC										
Clock Accuracy	±4 minutes per year									
Clock Backup Power	12 hours (capacitor reserve)									
Setback Events	One occupied and one unoccupied event per day; 7 day schedule									
Analog Input Accuracy	Resolution: 14 bits									
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.									
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)									
Weight	C450RBN-3C: 209 g (0.46 lb) C450RCN-3C: 222 g (0.49 lb)									
Compliance	 North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits									
	Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.									
	Australia: Mark: C-Tick Compliant (N1813)									

C450SPN-1C and C450SQN-1C Expansion Modules with Analog Output	
Product	C450SPN-1C: System 450 Expansion Module with one Analog output C450SQN-1C: System 450 Expansion Module with two Analog outputs
Power Consumption	C450SPN-1C: 1.1 VA max using 0 to 10 V out; 1.3 VA maximum using 4 to 20 mA out C450SQN-1C: 1.8 VA max using 0 to 10 V out; 2.2 VA maximum using 4 to 20 mA out
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) when using 0 to 10 VDC outputs; -40 to 40°C (-40 to 104°F) when using 4 to 20 mA outputs Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Analog Output	Voltage Mode (0 to 10 VDC): 10 VDC maximum output voltage 10 mA maximum output current Requires an external load of 1,000 ohms or more The AO operates in Voltage Mode when connected to devices with impedance greater than 1,000 ohms. Devices that drop below 1,000 ohms may not operate as intended with Voltage Mode applications. Current Mode (4 to 20 mA): Requires an external load between 0 to 300 ohms The AO operates in Current Mode when connected to devices with impedances less than 300 ohms. Devices that exceed 300 ohms may not operate as intended with Current Mode applications.
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450SPN-1C: 150 g (0.33 lb) C450SQN-1C: 150 g (0.33 lb)
Compliance	 North America: cULus Listed; UL 60730, File E27734, Vol. 1; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
	Europe: CE Mark - Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the Low Voltage Directive and the EMC Directive.
	Australia: Mark: C-Tick Compliant (N1813)



System 450 Control Series

System 450™ Series Modular Controls (Continued)

C450SBN-3C and C450SCN-3C Expansion Modules with Relay Output											
Product	C450SBN-3C: System 450 Expansion Module with one SPDT output relay C450SCN-3C: System 450 Expansion Module with two SPDT output relays										
Power Consumption	C450SBN-3C: 0.8 VA maximum C450SCN-3C: 1.2 VA maximum										
Supply Power	Internal Supply Power: C450YNN-1C Power Supply Module External Supply Power: 24 VAC (20 to 30 VAC) Safety Extra-Low Voltage (SELV) (Europe), Class 2 (North America), 50/60 Hz, 10 VA minimum Note: A System 450 control module or module assembly can use an internal or an external supply power source, but must not be connected to both simultaneously.										
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)										
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)										
Output Relay Contacts	General: 1/2 HP at 120/240 VAC, SPDT Specific: <table><tr><td>AC Motor Ratings</td><td>120 VAC</td><td>208/240 VAC</td></tr><tr><td>AC Full-Load Amperes:</td><td>9.8 A</td><td>4.9 A</td></tr><tr><td>AC Locked-Rotor Amperes:</td><td>58.8 A</td><td>29.4 A</td></tr></table> 10 Amperes AC Noninductive at 24/240 VAC Pilot Duty: 125 VA at 24/240 VAC		AC Motor Ratings	120 VAC	208/240 VAC	AC Full-Load Amperes:	9.8 A	4.9 A	AC Locked-Rotor Amperes:	58.8 A	29.4 A
AC Motor Ratings	120 VAC	208/240 VAC									
AC Full-Load Amperes:	9.8 A	4.9 A									
AC Locked-Rotor Amperes:	58.8 A	29.4 A									
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.										
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)										
Weight	C450SBN-3C: 172 g (0.38 lb) C450SCN-3C: 186 g (0.41 lb)										
Compliance	 North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive. Australia: Mark: C-Tick Compliant (N1813)										

C450YNN-1C Power Supply Module	
Product	C450YNN-1C: System 450 Power Supply Module; 120 or 240 VAC stepdown to 24 VAC Class 2 (North America) or SELV (Europe)
Supply Power	110/120 VAC or 220/240 VAC at 50/60 Hz (100 mA maximum)
Secondary Power	24 VAC, 10 VA
Ambient Operating Conditions	Temperature: -40 to 66°C (-40 to 150°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Ambient Shipping and Storage Conditions	Temperature: -40 to 80°C (-40 to 176°F) Humidity: Up to 95% RH noncondensing; maximum dew point 29°C (85°F)
Control Construction	Independently mounted control, surface mounted with Lexan® 950 enclosure suitable for DIN rail mounting or direct mounting to a hard, even surface.
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450YNN-1C: 390 gm (0.86 lb)
Compliance	 North America: cULus Listed; UL 60730, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits Europe: CE Mark – Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive. Australia: Mark: C-Tick Compliant (N1813)