System 450 Series Modular Controls Catalog Page

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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.

A single C450 control module can be set up as a stand-alone control or connected to expansion modules to control up to ten On/Off relay and proportional analog outputs, based on any of the three available inputs.

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 subordinate 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 and benefits

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.

Control Modules with Bright Backlit LCDs and Four-Button Touchpad User Interfaces, Up to Three Hard-Wired Input Sensors and Up to Ten Relay or Analog Outputs (In Any Combination) per Control System

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.

An Extensive Suite of Compatible Temperature and Humidity Sensors and Pressure Transducers

Allows you to monitor and control a wide range of HVACR and process conditions in a variety of standard and global units of measurement.

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.

On/Off Delays

Allow the user to configure an on delay (the time between a setpoint trip and the energizing of a relay) and an off delay (the time between a setpoint trip and the de-energizing of a relay).

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.

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.

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, 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.

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- 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-400 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

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- 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 run-time 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.

Table 1: System 450 Control Module Capabilities

	System 450 Control Modules				
	Standard	Communications	Reset	Hybrid	Application Specific
Control by _____	C450CPN-4C C450CQN-4C C450CBN-4C C450CCN-4C	C450CEN-1C C450CRN-1C	C450RBN-3C C450RCN-3C	C450CPW-400C	C450CCU-4C Designed for walk-in coolers, freezer, and large display cases
Controlled Condition					
Temperature	X	X	X	X	X
Pressure	X	X	-	X	X
Humidity	X	X	X	X	-
Combination of Conditions	X	X	X	X	-
Control Capabilities					
On/Off Relay Control	X	X	X	X	X
Analog Proportional Control (Direct and Reverse Action)	X	X	X	X	-
Analog Proportional Plus Integral Control (Direct and Reverse Action)	X	X	X	X	-
Combination of On/Off Relay and Analog Output Control	X	X	X	X	-
Stand-Alone Control	X	-	X	X	X
Multi-Stage Control (Relay or Analog)	X	X	X	X	X
Network Communications	-	X	-	-	-
High Input Signal Selection	X	X	-	X	-
Differential Control	X	X	-	X	X
Output Signal Limiting Output Signal Update Rate Output Signal Deadband	X	X	-	-	-
Binary Input Control for Relay Outputs	X	X	-	-	-

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Table 1: System 450 Control Module Capabilities

Control by _____	System 450 Control Modules				
	Standard	Communications	Reset	Hybrid	Application Specific
	C450CPN-4C C450CQN-4C C450CBN-4C C450CCN-4C	C450CEN-1C C450CRN-1C	C450RBN-3C C450RCN-3C	C450CPW-400C	C450CCU-4C Designed for walk-in coolers, freezer, and large display cases
On/Off Duration Time Control Minimum On/Off Time On/Off Time Delay	X	X	-	-	-
Temperature and Humidity Reset Control	-	-	X	-	-
Scheduling and Temperature Setback Control	-	-	X	-	-
Reset Setpoint Control	-	-	X	-	-
Setback Scheduling	-	-	X	-	-
Run-Time Balancing	-	-	X	-	-
Hybrid Analog Output Control	-	-	-	X[1]	-

1 Only on output OUTA1.

Selection charts

Table 2: System 450 Modules and Accessories Ordering Information

Product Code Number	Product Description
C450CBN-4C	Standard Control Module with LCD, Four-Button Touchpad UI, and Relay Output; provides one relay output (SPDT line-voltage relay) for SPDT control.
C450CCN-4C	Standard Control Module with LCD, Four-Button Touchpad UI, and Relay Output; provides two relay outputs (SPDT line-voltage relays) for SPDT control.
C450CCU-4C	Condensing Unit Control Module with LCD, Four-Button Touchpad, UI; provides two relay outputs (SPDT line-voltage relays). Two A99BB-500C temperature sensors with 5.00 m (16-3/8 ft) cable length are included in the box with the Condensing Unit Control Module.
C450CPN-4C	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.
C450CQN-4C	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.
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.
C450SBG-4C	Relay Output Expansion Module; provides one SPDT low-voltage relay output.
C450SCG-4C	Relay Output Expansion Module; provides two SPDT low-voltage relay outputs.

Table 2: System 450 Modules and Accessories Ordering Information

Product Code Number	Product Description
C450CEN-1C	Control Module with Ethernet Communications, LCD, and Four-Button Touchpad UI. (No onboard outputs available on control modules with network communications capabilities.)
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.)
C450CPW-400C	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-400C as the control module.
C450SBN-4C	Relay Output Expansion Module; provides one SPDT line-voltage relay output.
C450SCN-4C	Relay Output Expansion Module; provides two SPDT line-voltage relay outputs.
C450SBG-4C	Relay Output Expansion Module; provides one SPDT low voltage/current output.
C450SCG-4C	Relay Output Expansion Module; provides two SPDT low voltage/current relay outputs.
C450SPN-4C	Analog Output Expansion Module; provides one analog output (0 to 10 VDC or 4 to 20 mA self-selecting signal) for proportional control.
C450SQN-4C	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

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Table 3: System 450 Compatible A99B Temperature Sensors and Accessories Ordering Information

Product Code Number	Product Description[1]
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)
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)* for more information.

Table 4: 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 *TE-6000 Series Temperature Sensing Elements Product Bulletin (LIT-216288)*. (System 450 Sensor Types HI°C and HI°F)

Table 5: 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 *TE-6300 Series Temperature Sensors Product Bulletin (LIT-216320)*. (System 450 Sensor Types HI°C and HI ° F)

Table 6: 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 *TE-6800 Series Temperature Sensors Product Bulletin (LIT-12011542)*. **Note:** For correct readings, set the temperature sensor to HI°C or HI°F.

Table 7: System 450 Compatible HE69xx Type Humidity Sensors With 100 ohm NTC Nickel Temperature Sensor Ordering Information

Product Code Number	Product Description[1]
HE-69Sx0NP	Duct Mount Humidity Sensor with 1,000 ohm NTC nickel temperature sensor: 10 to 90% RH; 0 to 60°C (32 to 140°F)

1 The HE-69xx sensors require 24 VAC input and must use the 0–5 VDC output. Refer to the *HE-69xx Surface-Mount Duct Humidity and Temperature Sensors Product Bulletin (LIT-12012444)* for more information, including technical specifications and mounting accessories.

Figure 1: HE-69xx



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Table 8: System 450 Compatible HE6800 Series Humidity Transmitters with Temperature Sensor Ordering Information

Product Code Number	Product Description[1]
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)* for more information, including technical specifications and mounting accessories.

Table 9: System 450 Compatible Low Pressure Differential Transducer Ordering Information

Product Code Number	Product Description[1,2]
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* 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* for more information.

3 Used only with Communications Control Modules.

Table 10: WHA-PKD3 Wire Harnesses Ordering Information

Product Code Number	Product Description
WHA-PKD3-200C	Plug and Three-Wire Harness for P599 Electronic Pressure Transducers: 2.0 m (6-1/2 ft) cable
WHA-PKD3-400C	Plug and Three-Wire Harness for P599 Electronic Pressure Transducers: 4.0 m (13 ft) cable
WHA-PKD3-600C	Plug and Three-Wire Harness for P599 Electronic Pressure Transducers: 6.0 m (19-5/8 ft) cable

Table 11: System 450 Compatible P599 Series Transducers with 1/4 in. SAE 45 Flare Internal Thread with Depressor (Style 47) Ordering Information

Product Code Number	Product Description[1]
P599RCPS401C	-1 to 8 bar; order WHA-PKD3 wiring harness separately.
P599RCPS402C	-1 to 15 bar; order WH A-PKD3 wiring harness separately.
P599RCPS404C	0 to 30 bar; order WHA-PKD3 wiring harness separately.
P599RCPS405C	0 to 50 bar; order WHA-PKD3 wiring harness separately.

Table 11: System 450 Compatible P599 Series Transducers with 1/4 in. SAE 45 Flare Internal Thread with Depressor (Style 47) Ordering Information

Product Code Number	Product Description[1]
P599RCPS100C	-10 to 100 psis; order WHA-PKD3 wiring harness separately.
P599RCPS100K	-10 to 100 psis; WHA-PKD3 wiring harness included.
P599RCPS101C	0 to 100 psis; order WHA-PKD3 wiring harness separately.
P599RCPS101K	0 to 100 psis; WHA-PKD3 wiring harness included.
P599RCPS102K	0 to 200 psis; WHA-PKD3 wiring harness included.
P599RCPS105C	0 to 500 psis; order WHA-PKD3 wiring harness separately.
P599RCPS105K	0 to 500 psis; WHA-PKD3 wiring harness included.
P599RAPS107K	0 to 750 psis; WHA-PKD3 wiring harness included.
P599RCPS107C	0 to 750 psi; order WHA-PKD3 wiring harness separately.
P599RCPS107K	0 to 750 psi; WHA-PKD3-200C wiring harness included.
P599RCPS102C	0 to 200 psis; sealed for wet, and freeze and thaw applications; order WHA-PKD3 wiring harness separately.

1 The P599 sensors must be powered with the +5 VDC and C terminals and the output is 0.5 to 4.5 VDC. Refer to the *P599 Series Electronic Pressure Transducers Product/Technical Bulletin (LIT-12012446, Part No. 24-7664-3264)*.

Table 12: System 450 Compatible P599 Series Transducers with 1/8 in. 27 NPT External Thread (Style 49) Ordering Information

Product Code Number	Product Description[1]
P599RAPS100C	-10 to 100 psis; order WHA-PKD3 wiring harness separately.
P599RAPS100K	-10 to 100 psis; WHA-PKD3 wiring harness included.
P599RAPS101C	0 to 100 psis; order WHA-PKD3 wiring harness separately.
P599RAPS101K	0 to 100 psis; WHA-PKD3 wiring harness included.
P599RAPS102C	0 to 200 psis; order WHA-PKD3 wiring harness separately.
P599RAPS102K	0 to 200 psis; WHA-PKD3 wiring harness included.
P599RAPS105C	0 to 500 psis; order WHA-PKD3 wiring harness separately.
P599RAPS105K	0 to 500 psis; WHA-PKD3 wiring harness included.
P599RAPS107C	0 to 750 psis; order WHA-PKD3 wiring harness separately.
P599RAPS107K	0 to 750 psis; WHA-PKD3 wiring harness included.

1 The P599 sensors must be powered with the +5 VDC and C terminals and the output is 0.5 to 4.5 VDC. Refer to the *P599 Series Electronic Pressure Transducers Product/Technical Bulletin (LIT-12012446, Part No. 24-7664-3264)*.

Table 13: WHA-PKD3 Wire Harnesses Ordering Information

Product Code Number	Product Description[1]
WHA-PKD3-200C	Plug and 3-Wire Harness for P599 Electronic Pressure Transducers: 2.0 m (6.5 ft) cable
WHA-PKD3-400C	Plug and 3-Wire Harness for P599 Electronic Pressure Transducers: 4.0 m (13 ft) cable
WHA-PKD3-600C	Plug and 3-Wire Harness for P599 Electronic Pressure Transducers: 6.0 m (19.6 ft) cable

1 Refer to the *P599 Series Electronic Pressure Transducers Product/Technical Bulletin (LIT-12012446, Part No. 24-7664-3264)*.

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System 450 Series Modular Controls technical specifications

Table 14: C450CPN-4C and C450CQN-4C Control Modules with Analog Output Technical Specifications

Specification	Description
Product	C450CPN-4C and C450CQN-4C: System 450 Control Module models are sensing controls and operating controls with LCD, four-button touchpad, and SPDT analog output C450CPN-4C: Control Module with one analog output C450CQN-4C: Control Module with two analog outputs
Power Consumption	C450CPN-4C: 1.3 VA maximum using 0 to 10 V out; 1.5 VA maximum using 4 to 20 mA out C450CQN-4C: 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.
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
Enclosure	Type 1, IP20 High-Impact Thermoplastic
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CPN-4C: 195 g (0.43 lb) C450CQN-4C: 195 g (0.43 lb)
Compliance	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 15: C450CEN-1C Control Module with Ethernet Communications Technical Specifications

Specification	Description
Product	C450CEN-1: 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
Enclosure	Type 1, IP20 High-Impact Thermoplastic
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	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 16: C450CRN-1C Control Module with RS485 Modbus Communications Technical Specifications

Specification	Description
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 subordinate 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

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Table 16: C450CRN-1C Control Module with RS485 Modbus Communications Technical Specifications

Specification	Description
Enclosure	Type 1, IP20 High-Impact Thermoplastic
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	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 17: C450CPW-400C Control Module with Hybrid Analog Output Technical Specifications

Specification	Description
Product	C450CPW-400C 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-400C: 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
Enclosure	Type 1, IP20 High-Impact Thermoplastic
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CPW-400C: 195 g (0.43 lb)

Table 17: C450CPW-400C Control Module with Hybrid Analog Output Technical Specifications

Specification	Description
Compliance	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 18: C450CBN-4C and C450CCN-4C Control Modules with Relay Output Technical Specifications

Specification	Description
Product	C450CBN-4C and C450CCN-4C: System 450 Control Module models are sensing controls and operating controls with LCD, four-button touchpad, and SPDT relay output C450CBN-4C: Control Module with one SPDT output relay C450CCN-4C: Control Module with two SPDT output relays
Power Consumption	C450CBN-4C: 0.9 VA maximum C450CCN-4C: 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
	Specific: AC Motor Ratings 120 VAC • AC Full-Load Amperes: 9.8 A • AC Locked-Rotor Amperes: 58.8 A 208 / 240 VAC • AC Full-Load Amperes: 4.9 A • AC Locked-Rotor Amperes: 29.4 A 10 Amperes AC Noninductive at 24 / 240 VAC Pilot Duty: 125 VA at 24/240 VAC
Analog Input Accuracy	Resolution: 14 bits
Enclosure	Type 1, IP20 High-Impact Thermoplastic
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450CBN-4C: 209 g (0.46 lb) C450CCN-4C: 222 g (0.49 lb)
Compliance	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B

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Table 18: C450CBN-4C and C450CCN-4C Control Modules with Relay Output Technical Specifications

Specification	Description
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 19: C450RBN-3C and C450RCN-3C Reset Control Modules with Real-Time Clock and Relay Output Technical Specifications

Specification	Description
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 19: C450RBN-3C and C450RCN-3C Reset Control Modules with Real-Time Clock and Relay Output Technical Specifications

Specification	Description
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)
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: AC Motor Ratings 120 VAC • AC Full-Load Amperes: 9.8 A • AC Locked-Rotor Amperes: 58.8 A 208 / 240 VAC • AC Full-Load Amperes: 4.9 A • AC Locked-Rotor Amperes: 29.4 A 10 Amperes AC Noninductive 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
Enclosure	Type 1, IP20 High-Impact Thermoplastic
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	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B

Table 20: C450SPN-4C and C450SQN-4C Expansion Modules with Analog Output Technical Specifications

Specification	Description
Product	C450SPN-4C: System 450 Expansion Module with one Analog output C450SQN-4C: System 450 Expansion Module with two Analog outputs
Power consumption	C450SPN-4C: 1.1 VA max using 0 to 10 V out; 1.3 VA maximum using 4 to 20 mA out C450SQN-4C: 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.
Enclosure	Type 1, IP20 High-Impact Thermoplastic
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450SPN-4C: 150 g (0.33 lb) C450SQN-4C: 150 g (0.33 lb)
Compliance	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B

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Table 20: C450SPN-4C and C450SQN-4C Expansion Modules with Analog Output Technical Specifications

Specification	Description
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 21: C450SBN-4C and C450SCN-4C Expansion Modules with Relay Output Technical Specifications

Specification	Description
Product	C450SBN-4C: System 450 Expansion Module with one SPDT output relay C450SCN-4C: System 450 Expansion Module with two SPDT output relays
Power Consumption	C450SBN-4C: 0.8 VA maximum C450SCN-4C: 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: AC Motor Ratings 120 VAC • AC Full-Load Amperes: 9.8 A • AC Locked-Rotor Amperes: 58.8 A 208 / 240 VAC • AC Full-Load Amperes: 4.9 A • AC Locked-Rotor Amperes: 29.4 A 10 Amperes AC Noninductive at 24 / 240 VAC Pilot Duty: 125 VA at 24/240 VAC
Enclosure	Type 1, IP20 High-Impact Thermoplastic
Dimensions (H x W x D)	127 x 61 x 61 mm (5 x 2-3/8 x 2-3/8 in.)
Weight	C450SBN-4C: 172 g (0.38 lb) C450SCN-4C: 186 g (0.41 lb)
Compliance	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Table 22: C450YNN-1C Power Supply Module Technical Specifications

Specification	Description
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)
Enclosure	Type 1, IP20 High-Impact Thermoplastic
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	United States: cULus Listed; UL 60730-1, File E27734; FCC Compliant to CFR47, Part 15, Subpart B, Class B
	Canada: cULus Listed; CAN/CSA-E60730-1, File E27734; Industry Canada (IC) Compliant to Canadian ICES-003, Class B limits
CE	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.
	Australia and New Zealand: RCM mark, Australia/NZ Emissions Compliant

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

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