Verasys® System Product Bulletin

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The Verasys® system provides bundled equipment and controls solutions that use recognized and trusted brands. Verasys is a plug and play solution that is part of the Johnson Controls® SMART Systems. The Verasys system features simple, configurable controllers that can be bundled with HVACR equipment from the factory or installed in the field. You can use Verasys to configure many HVACR controls applications for one building or an entire enterprise without using special programming tools or control engineering.

The Verasys system features advanced direct digital control (DDC) controllers bundled with Johnson Controls Single Packaged Units (SPU), actuators, sensors, and damper assemblies. All devices self-configure and the Verasys Smart Building Hub monitors the devices.Through the supervisory controller, the user has access to the system using either a laptop, smart phone, or tablet. The Smart Building Hub connects to an Ethernet backbone to enable remote connectivity and additional features like email and text alarms. Verasys supported devices are plug and play and automatically connect the point, alarm, trend, and graphical definitions. The points appear when connected to the system, thereby making Verasys an easy-to-use, light commercial building automation system.

Figure 1: Verasys System

Features and Benefits

- **Multi-Client Connectivity**—Access all identifiable devices connected to the BACnet® MS/TP trunk.
- **Browser-Based Interface**—Local display replacement solution so you can access device information through any supported web browser.
- **Wi-Fi Connectivity**—Commission, configure, and access building automation equipment using Wi-Fi-enabled smart devices or laptops.
- **Advanced Features**—View alarms, events, and trends. Modify schedules and commission devices.
- **Browser-Based Remote Building Management**—Remote management of building systems.
- **Simple Interlocks to IOM Controllers**—Connects different systems to the Verasys network, such as exhaust and lighting systems.
- **Schedule Synchronization**—Combines common schedules with the Schedule Synchronization feature.
- **Easy-to-Use Intuitive User Interface**—Uses color coded bars on point listings so that you can view the most important statuses from a long list of points quickly.
- **Wireless End Device Solutions**—Use the Verasys Pro Wireless system to connect the TEC3000 thermostats to a Smart Building Hub using wireless signals.

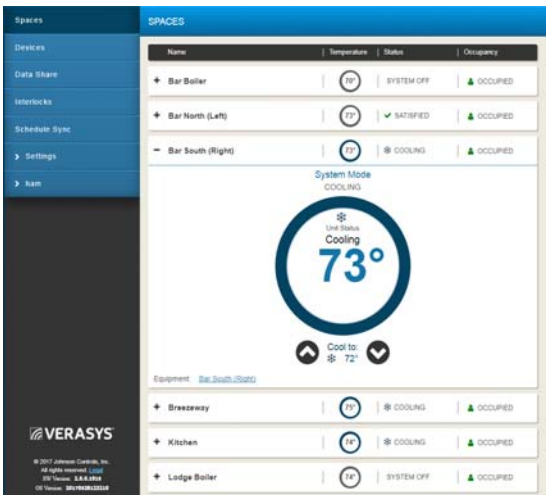
- **Enterprise Connectivity**—Verasys Enterprise is a cloud-based solution that provides a multi-site aggregation of equipment, data, alarms, setpoints, and schedules to authorized users. The Enterprise Application provides a holistic view of an enterprise and the information that is required to manage HVAC, lighting, energy, and input and output data for customers who have large building portfolios.
- **New User Experience for Spaces**—Offers continued improvement and equipment relationship for simple user view for end-users and contractors. There is a summary page for all spaces that includes indicators for **Name**, **Space Temperature**, **Status of Equipment**, and **Occupancy**, and a single area to change the setpoint of the space.
- **Data Share**—Share data from one source to multiple destinations. A typical use case is to share an outside air temperature (OAT) from a SMART Equipment rooftop unit (RTU) to multiple TEC3000 devices using only one OAT source.
- **Backup and Restore**—Provides a simple interface to back up all SMART Equipment devices within the system. To use this feature, all devices must be upgraded to the latest package files. Store the backup files on the Smart Building Hub or download the file to any smart mobile device or computer that is connected to the Smart Building Hub.
- **Support for European Light Commercial to Mid-Market Architecture**—Uses advanced Terminal Controllers (TC) and application specific, configurable Verasys controllers in Europe only. A typical application contains small mini chillers, boilers, an Air Handling Unit (AHU), and Fan Coil Units (FCU).
- **Support for European Light Commercial to Mid-Market by integration of York Mini-Chillers Fully Integrated to the Verasys system. Chiller Model Numbers:**
  - YMAA: software version 3.0.0.1112
  - YLAA: software version 3.0.0.1112
  - YLPA: software version 3.0.0.1112

Smart Building Hub User Interface

The Smart Building Hub provides a wireless, intuitive user interface optimized for mobile. The Circle of Comfort provides an at-a-glance status of a supported device on that device's **Home** screen.

Figure 2 shows the Spaces feature. Within this view, you can review the entire system to validate the conditions of the space by viewing temperature, mode, and occupancy.

Figure 2: Circle of Comfort



You can scale the Smart Building Hub user interface to the device you are using. The main menus and screens are side-by-side on a computer screen or tablet. On a phone display, you see either the menu or the screens you selected from that menu, for example, the TEC3000 **Home** screen. When you view the UI on a phone or smaller tablet, drag the screen from the left or right to display the required menu or screens.

Supported Controllers

The Verasys system supports only Verasys controllers, including the following:

- Zone and Bypass Damper Controllers
- ZEC410 VAV Controller
- Verasys Equipment and Application Controllers
- Smart Equipment Controllers
- TEC30xx/TEC36xx Thermostats

The controllers are described in more detail in the following sections.

Zone and Bypass Damper Controllers

The Zone Damper (ZEC310) and Bypass Damper (BYP200) Controllers are components of the Verasys zoning system. The Zone and Bypass Damper Controllers run a pre-engineered HVAC zoning application and provide the inputs and outputs required for this application. These controllers are factory-configured for field installation on a zone or bypass damper assembly when they are shipped.

The Zone and Bypass Damper Controllers include advanced operating modes and multiple features that ensure occupant comfort. A carbon dioxide (CO_2) demand controlled ventilation (DCV) mode in the Zone Damper regulates CO_2 levels within a zone by allowing fresh air into the zone during occupied times. Occupancy sensing capability enables the controller to switch from occupied mode to standby mode based on local activity. Standby mode maximizes energy savings by using setpoints that are higher than the occupied cooling setpoint and lower than occupied heating setpoints.

ZEC410 VAV Controller

The VAV Zone Controllers run a pre-engineered HVAC zoning sequence and provide the inputs and outputs that the VAV application requires.

The ZEC Controller contains multiple features to ensure occupant comfort. Because of an optional occupancy sensing capability, the ZEC controller can switch from occupied mode to standby mode based on zone activity. Standby mode maximizes energy savings by using setpoints that are higher and lower than occupied mode setpoints.

The ZEC410 Controller also uses plug and play technology to detect which network sensor types are connected.

To set up the ZEC410 controller, use the Verasys Smart Building Hub. The VAV controller commissions with either the Smart Building Hub or the VAV Balancing Thermostat.

Verasys Equipment and Application Controllers (VEC and VAC)

The Verasys Equipment and Application Controllers are part of the SMART Equipment Controller family. The VECs run pre-engineered applications that reside on the zone bus of a zone coordinator, and provide the inputs and outputs required to monitor and control HVAC equipment.

The Application Controllers run pre-engineered applications that reside on the system bus of a Smart Building Hub, and provide the inputs and outputs required to monitor and control various applications.

The Equipment and Application Controllers include an integral real-time clock that enables the controllers to monitor and control schedules, calendar trends, and to operate for extended periods of time as stand-alone controllers when they are offline from the system network.

Verasys Equipment Controller (VEC100)

The Verasys Equipment Controller controls either VAV or Change Over Bypass (COBP) units. You can use this single controller when the unit is not a Simplicity Smart Equipment unit. Index the controller to either VAV or COBP to set the control of the zone coordinator and the system. You can use the controller options to control an economizer, up to 2 stages of heat, and 4 stages of cooling. The controller starts automatically to use analog sensors when it is connected to the controller. If you connect a return air sensor to the controller and the system is a VAV system, the morning warm-up feature is integrated for control. If a CO_2 sensor is connected and an economizer is defined, demand ventilation control sequences are available. For more information on the sequences that this controller covers please refer to the *Verasys System Operation Overview (LIT-12012370).*

Verasys Lighting Controller (VAC1001)

The Verasys Lighting Controller (VAC1001) is a Verasys Application Controller that controls up to nine lighting contactors that are grouped in zones. You can control and schedule up to eight zones from a light level sensor. The user can connect either a binary or analog light level sensor and drive the zone control based on light level. The zone also has an associated schedule that can drive the output of the zone. Users can drive contactors for outside lights because of the flexibility of the controller; lights come on when it is dark and turn off at a fixed time or drive other zones based on the schedule. The first seven zones have a binary input that can override the zone output. The binary input can be momentary and allow a set amount of time for the override, or the input can be maintained for a more permanent override.

Input/Output Module

The Input/Output Module is a Verasys Application Controller (VAC1002). The VAC1002 is a simple point multiplexer that monitors up to five analog inputs and four binary inputs. The controller controls up to nine binary outputs, and connects to up to five wired or wireless NS sensors and up to four Johnson Controls' energy meters. The VAC1002 uses the Verasys Smart Building Hub to monitor and control auxiliary points in a facility.

You can configure analog, binary, and NS sensor inputs for trending and alarming. The analog trend samples are set to 200. The binary trend samples are set to 20 but you can adjust the trend interval. The user can configure each input for alarming. For binary inputs, you can define which state triggers the alarm. For analog inputs, you can set high and low alarm limits. The alarm message is adjustable for binary and analog types.

You can connect smart edge devices to the VAC1002. The energy meter is compatible with the controller and the meter monitors the voltage, amperage, demand, and consumption for each phase of incoming power. The energy meter and all inputs are available to use with the interlock features of the Smart Building Hub. The user can control all the outputs on the VAC1002 with the interlock feature or with the Smart Building Hub's scheduling feature.

Controller Features

- Integrate facility loads, such as lighting or exhaust fans, into building occupancy schedules
- Circuitry and connectors for the five analog inputs, four binary inputs, nine binary outputs, five wired or wireless NS sensors, and four energy meters
- Point interlocking for advanced control of multiple conditions, such as temperature, humidity, CO_2, fan status, occupancy status, and control mode
- Customizable alarming for monitoring devices, conditions or spaces
- Power monitoring to help you understand power usage in a facility

Verasys Zone Coordinator

The Verasys Zone Coordinator is used for multi-zone applications as an engine to coordinate a complete VAV or COBP system. You can order an individual Verasys Zone Coordinator or a panel version. The Verasys Zone Coordinator automatically recognizes the unit configuration, and switches to either VAV or COBP based on the system type.

TEC30xx or TEC36xx Thermostat Controllers

The TEC30xx and TEC36xx Series Thermostat Controllers are Verasys Pro Wireless or BACnet MS/TP thermostats that provide on and off, floating, and proportional control of the following elements:

- Local hydronic reheat valves
- Pressure-dependent VAV equipment with or without local reheat
- Two or four-pipe fan coils
- Cabinet unit heaters
- Other zoning equipment using an on and off, floating, or 0 VDC to 10 VDC proportional control input

Models also provide single or two-stage control of unitary RTUs with or without economizers and heat pumps.

The TEC30xx Thermostat Controllers are Verasys Pro Wireless models that require additional devices for the Pro Wireless network connection to the Smart Building Hub.

Verasys Pro Wireless Field Bus System

The Verasys Pro Wireless Field Bus System uses Zigbee technology to wirelessly monitor HVAC equipment that uses the BACnet protocol. The Verasys system creates a wireless mesh network that enhances reliability. A resilient, self-healing function in the system uses automatically forming, multiple transmission paths for the data.

The MS/TP trunk and device limits for the Verasys Smart Building Hub are the same for hard-wired products, wireless products, or a combination of hard-wired and wireless products. The wireless mesh network is independent of any building infrastructure and does not require any preexisting wireless infrastructure.

Ideal Applications

The wireless products within a Verasys system are ideal for any location where it is cost-prohibitive, difficult, or aesthetically unappealing to hardwire between products. Examples of these locations include the following:

- Office buildings, university campuses, educational facilities, and other commercial structures with brick or solid concrete walls and ceilings that impede hard-wired applications

- Retail stores, and other commercial real estate where tenant turnover is frequent and temporary walls and ceilings are common
- Museums, historical buildings, atriums, and other sites where building aesthetics and historical preservation are important
- Gymnasiums and other locations with large, open spaces
- Buildings with marble, granite, glass, mirrored, wood veneer, or other decorative surfaces that present challenges to hard-wiring
- Buildings with asbestos or other hazardous materials that must not be disturbed
- Buildings with occupants sensitive to disruptions to business
- Regions with high labor costs
- Refrigerator and freezer storage containers

Applications to Avoid

Locations or applications that prohibit cellular telephones or Wi-Fi systems are unsuitable for the wireless Verasys products. Examples of these locations include the following:

- Operating rooms or radiation therapy rooms
- Validated environments
- UL 864 applications
- Department of Defense applications requiring Diacap certification, such as military bases and military hospitals

Do not use the wireless products in applications that cannot tolerate intermittent interference, or in the following situations:

- Critical control features that impact life-safety or result in large monetary loss, including secondary backup
- Life-safety applications
- Data centers, production lines, or critical areas that shut down
- Loss of critical control that results from loss of data from humidity or temperature sensor communications
- Operating exhaust fans or AHUs that impair a purge or pressurization mode
- When missing data invalidates reporting required by the customer
- Monitored security points

Verasys Application Coverage

The following tables provide information about the Verasys Application coverage.

Table 1: Supported VAV and COBP Unit Controllers

Feature	Simplicity Smart Equipment	3rd Party Controller (VEC100)
Up to 2 Stage Cooling	Yes	Yes
Up to 4 Stage Cooling	Yes	Yes
Modulated Cooling	No	No
Up to 2 Stage Heating	Yes	Yes
Up to 3 Stage Heating	Yes	No
Modulated Heating	Yes	No
Heat Pump	Yes	No
Economizer	Yes	Yes
Title 24 Economizer	Yes	No
Demand Ventilation Control	Yes	Yes
Dehumidification	Yes	No
Humidification	No	No
Variable Frequency Drive For COBP	Yes	No

Table 2: Supported Single Zone Unit Controllers

Feature	Simplicity Smart Equipment	TEC3000
Up to 2 Stage Cooling	Yes	Yes
Up to 4 Stage Cooling	Yes	No
Modulated Cooling	No	No
Up to 2 Stage Heating	Yes	Yes
Up to 3 Stage Heating	Yes	No
Modulated Heating	Yes	No
Heat Pump	Yes	Yes
Economizer	Yes	Yes
Title 24 Economizer	Yes	No
Demand Ventilation Control	Yes	No
Dehumidification	Yes	No
Humidification	No	No
Fixed Variable Fan	Yes	No

Table 3: Supported VAV Controllers

Feature	LC-ZEC410-1	LC-ZEC410-2	LC-ZEC410-3
Up to 3 Stages of Box Heat	Yes	No	No
Incremental Valve for Box Heat	No	Yes	No
Proportional Signal for Box Heat (SCR or Valve)	No	No	Yes
Supports No Fan	Yes	Yes	Yes
Supports Series Fan	Yes	Yes	Yes
Supports Parallel Fan	Yes	Yes	Yes
Discharge Temp Monitoring	Yes	Yes	Yes
Occupancy Sensing Input	Yes	Yes	Yes
Up to 5 Net Sensors (Averaging)	Yes	Yes	Yes
Up to 5 CO2 Sensors (High Select)	Yes	Yes	Yes
Staged Supplemental Heat	Yes	No	No
Incremental Supplemental Heat	No	Yes	Yes

Table 4: Supported COBP Controller (Part 1 of 2)

Feature	LC-ZEC310-0
Modulated Box Heat	No
On/Off Box Heat[1]	No
Modulated Supplemental Heat[2]	No
PWM Supplement Heat (10 Sec Duty Cycle)	No
On/Off Supplemental Heat	Yes
Occupancy Sensing Input	Yes
Up to 5 Net sensors (Averaging)	Yes

Table 4: Supported COBP Controller (Part 2 of 2)

Feature	LC-ZEC310-0
Up to 5 CO2 sensors (High Select)	Yes
Extra Output for Second Damper Actuator	Yes

1. Box heat is any heat source that is located in the duct.
2. Supplement heat is any heat source that is located outside the duct.

Ordering Information

Contact your Johnson Controls representative to order Verasys system or related products. See the following table for product code numbers and product descriptions.

Table 5: Ordering Information

Product Code Number	Description
LC-SBH200-0	Smart Building Hub, Wi-Fi adapter; mounting options include DIN rail or surface mounting
LC-VZC100-0	Verasys Zone Coordinator for VAV and COBP applications
LC-VZCPNL-0	Verasys Zone Coordinator for VAV and COBP applications — panel version
LC-VEC100-0	Third-party RTU (VAV, COBP)
LC-ZEC410-1	Configurable VAV Box Controller, all fan types, stage box heating
LC-ZEC410-2	Configurable VAV Box Controller, all fan types, incremental box heating
LC-ZEC410-3	Configurable VAV Box Controller, all fan types, proportional box heating
LC-ZEC310-0	Field-installed zone controller, no damper
LC-BYP200-0	Field-installed bypass damper controller, no damper
LC-VAC1000-0	Application Controller with no application
LC-VAC1100-0	Application Controller with no application
LC-VAC3000-0	Application Controller with no application
LC-VAC1001-0	Application Controller with Lighting Application
LC-VAC1002-0	Application Controller with Input and Output module application
LC-VLP100-0	Lighting Panel with VAC1001, without relays, without contactors
LC-VLP110-0	Lighting Panel with VAC1001, with relays, without contactors
LC-VLP120-0	Lighting Panel with VAC1001, with relays, with contactors
LC-IOP200-0	Input Output Panel with VAC1002, with 96 VA power supply
LC-ZFR1825-0	Wireless coordinator
LC-ZFR1822-0B	Wireless Repeater Kit Wall Mount Type
LC-ZFR1821-0B	Wireless Repeater Kit Flag Mount Type

Note: You can order the LC-BYP200-0 and LC-ZEC31-0 controllers mounted on round dampers.

Table 6: Smart Building Hub Accessories

Product Code Number	Description
ACC-PWRKIT-1A24	Verasys LC-SBH200-0 power supply for North America
ACC-WIFIKIT-0DU	Verasys LC-SBH200-0 USB Wi-Fi adapter for North America and Europe

Table 7: Zone Controller Accessories

Product Code Number	Description
Zone Temperature Sensors (Hard-wired) ZEC310 Only	
TE-68NT-0N00S	Wall temperature sensor, 1000 ohm, nickel with temperature occupancy button
TE-68NT-1N00S	Wall temperature sensor, 1000 ohm, nickel with warmer and cooler (W/C) adjustment and temperature occupancy pushbutton
Zone CO_2 Sensor	
NS-BCN7004-0	BACnet network CO_2 sensor designed to function directly with Johnson Controls BACnet MS/TP digital controllers, in a 80 mm x 120 mm (3 in. x 4.5 in.) enclosure with terminal block and modular jack wiring connections. Addresses 212 to 214 only are supported.
Second Zone Damper Actuator[1]	
M9106-GGA-2	6 N•m torque non-spring return damper actuator
Network Sensors for Zone Temperature	
NS-BTB7003-0	Network sensor, 120 mm x 80 mm, JCI logo, local setpoint, terminals
NS-BTB7003-2	Network sensor, 120 mm x 80 mm, no logo, local setpoint, terminals
NS-BTN7003-0	Network sensor, 120 mm x 80 mm, no logo, no setpoint, terminals
NS-BTN7003-2	Network sensor, 120 mm x 80 mm, no logo, no setpoint, terminals.
NS-BTP7002-0	Network sensor, 120 mm x 80 mm, JCI logo, warmer and cooler adjustment, terminals
NS-BTP7002-2	Network sensor, 120 mm x 80 mm, no logo, warmer and cooler adjustment, terminals
Occupancy Lighting Switch	
NS-BCN7004	Occupancy sensing light switch for control of indoor incandescent and fluorescent lights
RIBU1C	Enclosed relay for OLS-2100-1 sensor

1. You must purchase the actuator and add it to a damper without a ZEC310 controller.

Table 8: Verasys Pro Wireless Thermostat Controller Models (Part 1 of 2)

Code Number	Johnson Controls Logo	Control Output	Onboard Occupancy Sensor	Dehumidification Capability
TEC3010-00-000	Yes	On, off, or floating fan coil and zoning	No	No
TEC3010-01-000	No	On, off, or floating fan coil and zoning	No	No
TEC3011-00-000	Yes	On, off, or floating fan coil and zoning	Yes	No
TEC3011-01-000	No	On, off, or floating fan coil and zoning	Yes	No
TEC3012-00-000	Yes	On, off, or floating fan coil and zoning	No	Yes
TEC3012-01-000	No	On, off, or floating fan coil and zoning	No	Yes
TEC3013-00-000	Yes	On, off, or floating fan coil and zoning	Yes	Yes

Table 8: Verasys Pro Wireless Thermostat Controller Models (Part 2 of 2)

Code Number	Johnson Controls Logo	Control Output	Onboard Occupancy Sensor	Dehumidification Capability
TEC3013-01-000	No	On, off, or floating fan coil and zoning	Yes	Yes
TEC3020-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	No	No
TEC3020-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	No	No
TEC3021-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	Yes	No
TEC3021-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	Yes	No
TEC3022-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	No	Yes
TEC3022-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	No	Yes
TEC3023-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	Yes	Yes
TEC3023-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	Yes	Yes
TEC3030-00-000	Yes	Single or two-stage RTU/heat pump with economizer	No	No
TEC3030-01-000	No	Single or two-stage RTU/heat pump with economizer	No	No
TEC3031-00-000	Yes	Single or two-stage RTU/heat pump with economizer	Yes	No
TEC3031-01-000	No	Single or two-stage RTU/heat pump with economizer	Yes	No

Table 9: Field-Selectable BACnet MS/TP or N2 Networked Thermostat Controller Models[1] (Part 1 of 2)

Code Number	Johnson Controls Logo	Control Output	Onboard Occupancy Sensor	Dehumidification Capability
TEC3610-00-000	Yes	On, off, or floating fan coil and zoning	No	No
TEC3610-01-000	No	On, off, or floating fan coil and zoning	No	No
TEC3611-00-000	Yes	On, off, or floating fan coil and zoning	Yes	No
TEC3611-01-000	No	On, off, or floating fan coil and zoning	Yes	No
TEC3612-00-000	Yes	On, off, or floating fan coil and zoning	No	Yes
TEC3612-01-000	No	On, off, or floating fan coil and zoning	No	Yes

Table 9: Field-Selectable BACnet MS/TP or N2 Networked Thermostat Controller Models[1] (Part 2 of 2)

Code Number	Johnson Controls Logo	Control Output	Onboard Occupancy Sensor	Dehumidification Capability
TEC3613-00-000	Yes	On, off, or floating fan coil and zoning	Yes	Yes
TEC3613-01-000	No	On, off, or floating fan coil and zoning	Yes	Yes
TEC3620-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	No	No
TEC3620-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	No	No
TEC3621-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	Yes	No
TEC3621-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	Yes	No
TEC3622-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	No	Yes
TEC3622-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	No	Yes
TEC3623-00-000	Yes	0 VDC to 10 VDC proportional fan coil and zoning	Yes	Yes
TEC3623-01-000	No	0 VDC to 10 VDC proportional fan coil and zoning	Yes	Yes
TEC3630-00-000	Yes	Single or two-stage RTU/heat pump with economizer	No	No
TEC3630-01-000	No	Single or two-stage RTU/heat pump with economizer	No	No
TEC3631-00-000	Yes	Single or two-stage RTU/heat pump with economizer	Yes	No
TEC3631-01-000	No	Single or two-stage RTU/heat pump with economizer	Yes	No

1. Multiple fan configurations are supported for fan coil equipment types.

Table 10: TEC3000 Accessories (Order Separately)

Code Number	Description
TEC-WALLPLT	Wallplate for retrofitting existing installations or concealing mounting surface damage; can be used with any TEC3000 Series Thermostat Controller
T-4000-119	Allen-head adjustment tool (30 per bag)

Table 11: Verasys Pro Series Wireless Field Bus System Components Selection Chart

Code Number	Description
LC-ZFR1825-0	The LC-ZFR1825-0 kit is comprised of the following components: • ZFR1825 coordinator and mounting base with 110/220 VAC power supply • ZFR1825 antenna with mounting bracket
LC-ZFR1821-0B	The LC-ZFR1821-0B kit is comprised of the following components: • ZFR1821 Pro Router, electrical mechanical tubing (EMT) mount, with 3 ft RJ-12 connecting cable • 24 VAC to 15 VDC power supply for the router • Box mount for ZFR1821 Pro Router Use the ZFR1821 EMT mount repeater above the ceiling mounting. Use the alternative ZFR1822 Pro Router for flush wall-mount or below the ceiling-mount applications. **Note:** A field-provided ceiling clip is required to mount the ZFR1822 Pro Router below grid ceilings.
LC-ZFR1822-0B	The LC-ZFR1822-0B kit is comprised of the following components: • ZFR1822 Pro Router, wall-mount, with 10 ft RJ-12 connecting cable • 24 VAC to 15 VDC power supply for the router • Drywall-mounting hardware- ceiling clips not provided due to variety of ceiling types **Note:** Use the ZFR1822 Pro Router for flush wall-mount or below the ceiling-mount applications. Use a field-provided ceiling clip to mount the ZFR1822 Pro Router below grid ceilings. Use the alternative ZFR1821 Pro Router, EMT mount for above the ceiling mounting.
LC-ZFR1821-0	The LC-ZFR1821-0 kit is comprised of the following components: • ZFR1821 Pro Router, EMT mount, functions with *Metasys*® BACnet Wireless-Enabled Field Controller (WEFC) and WRZ Series Sensors • Box mount for ZFR1821 **Note:** Use the ZFR1821 EMT mount repeater for above the ceiling mounting. Use the alternative ZFR1822 Pro Router for flush wall-mount or below the ceiling-mount applications. Use a field-provided ceiling clip to mount the ZFR1822 Pro Router below grid ceilings.
LC-ZFR1822-0	The LC-ZFR1822-0 kit is comprised of the following components: • ZFR1822 Pro Router and wall-mount • Drywall-mounting hardware- ceiling clips not provided due to variety of ceiling types **Note:** Use the ZFR1822 Pro Router for flush wall-mount or below the ceiling-mount applications. Use a field-provided ceiling clip to mount the ZFR1822 Pro Router below grid ceilings. Use the alternative ZFR1821 EMT mount repeater for above the ceiling mounting.

Table 12: Verasys Application Controller Selection Chart (Part 1 of 2)

Code Number	Description
LC-VAC1000-0	18 point 24 VAC Application Controller with no application loaded
LC-VAC1001-0	18 point 24 VAC Application Controller with lighting controller application loaded
LC-VAC1002-0	18 point 24 VAC Application Controller with input and output controller application loaded
LC-VAC1100-0	18 point 240 VAC Application Controller with no application loaded
LC-VAC3000-0	32 point 24 VAC Application Controller with no application loaded
LC-VLP100-0	16 in. x 20in. panel with LC-VAC1001-0 Controller, with 96 VA power supply
LC-VLP110-0	24 in. x 24 in. panel with LC-VAC1001-0 Controller, with pilot relays, without contactors

Table 12: Verasys Application Controller Selection Chart (Part 2 of 2)

Code Number	Description
LC-VLP120-0	24 in. x 36 in. panel with LC-VAC1001-0 Controller, with pilot relays, with contactors
LC-IOP100-0	16 in. x 20 in. panel with LC-VAC1002-0, with 96 VA power supply

Table 13: ZFR1825 Accessories (Order Separately)

Product Code Number	Product Description
TP-2420	Transformer, Wall Plug Mount, 120 VAC to 24 VAC, 20 VA, Class 2
WRZ-SST-120	Wireless Sensing System Tool. Requires WRZ Series Sensor to function as a site survey tool for ZFR1800 Wireless Field Bus System, or for WRZ-7860-0 One-to-One Room Sensing System.
Y65T31-0[1]	Transformer, 120/208/240 VAC to 24 VAC, 40 VA, Class 2, Foot Mount, 20 cm (8 in.) Primary Leads and Secondary Screw Terminals
ZFR-USBHA-0	USB Dongle with ZFR Driver provides a wireless connection through the CCT to allow wireless commissioning of the wireless enabled FAC, FEC, IOM, and VMA16 controllers. Use the USB ZFR Dongle with the ZFR Checkout Tool to troubleshoot and validate ZFR wireless meshes using a laptop computer.
ZFR-1810ANT-700	Replacement antenna kit for ZFR1825 Wireless Field Bus Coordinator. Includes antenna, coaxial cable, and mounting hardware.

1. Additional Y60 Series Transformers are available from Johnson Controls.

Table 14: ZFR1821/ZFR1822 Accessories (Order Separately)

Product Code Number	Product Description
ZFR-CBLEXT-0-0	The ZFR-CBLEXT-0 10 ft extension cable is an optional accessory of the ZFR Pro Series Wireless Field Bus System. It is a 10 ft passthrough cable with an RJ-12 connector on both ends and is inserted between the wireless controller and the ZFR Pro Router using the included straight through female-female RJ-12 coupler.
ZFR-WallCover	The ZFR-Wall Cover is an optional accessory of the ZFR Pro Series Wireless Field Bus System and enables mounting of the ZFR1822 Pro Wall Mount Router to a site-supplied single gang electrical box or mud ring.

Technical Specifications

Smart Building Hub (Part 1 of 2)

Product Code	LC-SBH200-x
Power Consumption	38 W maximum
Ambient Temperature Conditions	**Operating:** 0°C to 50°C (32°F to 122°F) **Operating Survival:** -30°C to 60°C (-22°F to 140°F) **Non-Operating:** -40°C to 70°C (-40°F to 158°F)
Ambient Humidity Conditions	**Storage:** 5% to 95% RH 30°C (86°F) maximum dew point conditions **Operating:** 10% to 90% RH, 30°C (86°F) maximum dew point conditions
Transmission Speeds	**Serial Communication (SA/FC Bus):** 9600, 19.2k, 67.8k, or 115.2k bps **Ethernet Communication:** 10, 100 Mbps, 1 Gbps
Transmission Range (Typical)	**Wireless Communication:** 30 m (100 ft) line-of-sight indoors 91 m (300 ft) line-of-sight outdoors

Smart Building Hub (Part 2 of 2)

Network and Serial Interfaces	2 SA/FC ports (RJ12 6-pin port; connects with 1.5 m [4.9 ft] RJ-12 field bus cable, and one Screw terminal plug, 4-pin). 3 USB ports (one Micro-B port, and two USB A ports). All support USB 2.0 and Open Host Controller Interface [Open HCI] specification.
Dimensions (H x W x D)	190 mm x 125 x 44.5 mm (7.48 in. x 4.92 in. x 1.75 in.)
Housing	White polycarbonate and arylonitrile butadiene styrene (ABS) blend
Weight	**Unit alone:** 0.10 kg (0.22 lb) **Unit in shell:** 0.15 kg (0.33 lb) **Note:** Weights do not include any peripheral components such as cables, lanyard, or an external power supply.
Web Browser Requirements for Computers and Handheld Devices	**Computer:** Windows® Internet Explorer® 10 and Windows Internet Explorer 11, or Google® Chrome™ **Handheld Device:** The handheld device must run either Internet Explorer Mobile for Windows® Mobile version 5 or 6 operating system (OS), Android™ or Google Chrome. Other web browsers may display the UI, but the functionality is not guaranteed.
Compliance	**United States:** UL Listed File E107041, CCN PAZX, UL 916, Energy Management Equipment, FCC Compliant to CFR47, Part 15, Subpart B, Class A.
	Canada: UL listed file E107041, CCN PAZX7, CAN/CSA C22.2 No.205,Signal Equipment; Industry Canada Compliant.

TEC3000 Series BACnet MS/TP or Wireless Thermostat Controllers (Part 1 of 2)

Power Requirements	19 VAC to 30 VAC, 50/60 Hz, 4 VA at 24 VAC nominal, Class 2 or safety extra-low voltage (SELV)
USB Port Power Rating	120 mA to 250 mA current draw supported
Analog Output Rating (Proportional Control Models)	0 VDC to 10 VDC into 2000 ohm resistance (minimum)
Relay Contact Rating (On/Off, Floating, or Staged Economizer Control Models)	19 VAC to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush, Class 2 or SELV
Fan Relay Output Rating (On/Off, Floating, and Proportional Control Models)	19 VAC to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush
Auxiliary Output Rating/Triac Output (On/Off, Floating, and Proportional Control Models)	19 VAC to 30 VAC, 1.0 A maximum, 15 mA minimum, 3.0 A in-rush
Binary Inputs	Dry contact across terminal COM to terminals BI1, BI2, or COS
Analog Inputs	Nickel, platinum, A99B, 2.25k ohm negative temperature coefficient (NTC), 10,000 ohm NTC, 10,000 ohm NTC Type 3 across terminal COM to terminals R SEN or COS
Temperature Sensor Type	Local 1000 ohm platinum sensor
Wire Size	18 AWG (1.0 mm diameter) maximum, 22 AWG (0.6 mm diameter) recommended
MS/TP Network Guidelines	Up to 100 devices maximum per Network Automation Engine (NAE); 4,000 ft (1,219 m) maximum cable length (repeaters can be added to extend this length)

TEC3000 Series BACnet MS/TP or Wireless Thermostat Controllers (Part 2 of 2)

Wireless Band		Direct-sequence spread-spectrum 2.4 GHz ISM bands
Transmission Power		10 mW maximum
Transmission Range		50 ft (15.2 m) recommended indoor
		250 ft (76.2 m) line of sight, maximum
Temperature Range	**Backlit Display**	-40.0°F/-40.0°C to 122.0°F/50.0°C in 0.5° increments
	Heating Control	40.0°F/4.5°C to 90.0°F/32.0°C
	Cooling Control	54.0°F/12.0°C to 100.0°F/38.0°C
Accuracy	**Temperature**	±0.9F°/±0.5C° at 70.0°F/21.0°C typical calibrated
	Humidity (On/Off, Floating, and Proportional Control Models)	±5% RH from 20% to 80% RH at 50°F to 90°F (10°C to 32°C)
Minimum Deadband		2F°/1C° between heating and cooling
Occupancy Sensor Motion Detection (Occupancy Sensing Models)		Minimum of 94 angular degrees up to a distance of 15 ft (4.6 m); based on a clear line of sight
Ambient Conditions	**Operating**	32°F to 122°F (0 to 50°C); 95% RH maximum, noncondensing
	Storage	-22°F to 122°F (-30 to 50°C); 95% RH maximum, noncondensing
Compliance	**BACnet International**	BACnet Testing Laboratories™ (BTL) 135-2001 Listed BACnet Application Specific Controller (B-ASC)
	United States	UL Listed, File E27734, CCN XAPX, under UL60730
		Transmission complies with FCC Part 15.247 regulations for low power unlicensed transmitters; transmitter identification FCC: OEJ-WRZRADIO
	Canada	UL Listed, File E27734, CCN XAPX7 under E60730
		Industry Canada (IC) RSS-210; transmitter identification ZFR1810-1: IC: 279A-WRZRADIO
CE	**Europe TEC36xx-0x-000**	CE Mark—Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the Radio Equipment Directive (RED), the Low Voltage Directive (LVD), the EMC Directive, and the RoHS Directive.
	Australia and New Zealand	RCM Mark, Australia/NZ Emissions Compliant
Shipping Weight	**Models without Occupancy Sensor**	0.75 lb (0.34 kg)
	Models with Occupancy Sensor	0.77 lb (0.35 kg)

Zone Damper and Bypass Damper Controllers (Part 1 of 2)

Product Code Number	LC-ZEC310-0: Field Installed, Zone Damper Controller LC-BYP200-0: Field Installed Bypass Damper Controller
Power Supply Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50 to 60 Hz, Class 2 power supply (North America) or Safety Extra-Low Voltage (SELV) (Europe)

Zone Damper and Bypass Damper Controllers (Part 2 of 2)

Power Consumption	10 VA (not including external load) VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	Ambient Operating Conditions: 0°C to 50°C (32°F to 122°F) Ambient Storage Conditions: -40°C to 70°C (-40°F to 158°F)
Processor	RX630 32-bit Renesas® microcontroller
Memory	1 MB flash memory and 512 KB Random Access Memory (RAM)
Input and Output Capabilities	1 - Universal Input: Defined as 0-10 VDC, 4-20 mA, 0-600k Ohm, or Binary Dry Contact 3 - Binary Outputs: Defined as 24 VAC Triac (internal power source) 2 - Configurable Outputs: Defined as 0-10 VDC or 24 VAC Triac BO
Analog Input/Analog Output Accuracy	Analog Input: 15-bit resolution on UIs Analog Output: 0-10 VDC ± 200 mV
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw
Actuator Rating	4 N•m (35 lb•in) minimum shaft length = 44 (1-3/4 in)
Dimensions (Height x Width x Depth)	165 mm x 125 mm x 73 mm (6.5 in. x 4.92 in. x 2.9 in.)
Differential Pressure Transducer (BYP200 only)	Range: 1.5 in. to 1.5 in. W.C. Performance Characteristics: Accuracy ±1.3% Full Span Maximum (± 039 in. W.C.) Typical accuracy at zero (null) pressure is ±-.02% full scale
Shipping Weight	0.65 kg (1.45 lb)
Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003

ZEC410 VAV Controller (Part 1 of 2)

Product Code Number	**LC-ZEC410-x** **Note:** Refer to the *CCS Variable Air Volume (VAV) Zone Pressure Independent Damper Controller Catalog Page (LIT-1900750)* for product code numbers, application numbers, and ordering information.
Power Supply Requirement	20 VAC to 30 VAC at 50 Hz to 60 Hz, Class 2 power supply or Safety Extra-Low Voltage (SELV) at 50/60 Hz (20 VAC minimum)
Power Consumption	3 VA (not including external load)
Ambient Conditions	Ambient Operating Conditions: 0°C to 50°C (32°F to 122°F); 10% to 90% RH condensing Ambient Storage Conditions: -40°C to 85°C (-40°F to 185°F); 10% to 90% RH
Processor	20 MHz Renesas® H8S2398 processor
Memory	1 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 512,000 Synchronous Random Access Memory (SRAM) for operations data dynamic memory

ZEC410 VAV Controller (Part 2 of 2)

Mounting	On a flat surface with screws
Dimensions (Height x Width x Depth)	140 mm x 140 mm x 25 mm (5-1/2 in. x 5-1/2 in. x 1 in.)
Shipping Weight	0.30 lb (0.14 kg)
Compliance	**United States** UL Listed, File E107041, CCN PAZX, UL 916 FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003

VEC Controller (Part 1 of 2)

Product Code Numbers	LC-VEC100-0 Verasys Equipment Controller 24 Volts with display
Supply Voltage	24 VAC, 20 VAC minimum, 30 VAC maximum, 50/60 Hz, power supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	**20 VA maximum** **Note:** VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	**Operating:** -20°C to 70°C (-4°F to 158°F); 10% to 95% RH noncondensing; Pollution Degree 2 **Storage:** -40°C to 85°C (-40°F to 185°F); 5% to 95% RH noncondensing
Addressing	**BACnet® MS/TP:** valid field controller device addresses 4–127 Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses. **N2:** Valid field controller device addresses 1 to 255
Communications Bus	**BACnet® MS/TP:** 3-wire FC Bus between the supervisory controller and field controller. 3-wire SA Bus between controller, network sensors and other sensor and actuator devices, includes a lead to source 15 VDC supply power from the controller to bus devices.
Processor	RX631 Renesas® 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM

VEC Controller (Part 2 of 2)

Input and Output Capabilities	**Five Universal Inputs:** user-configurable, 3 available modes: • Voltage Input: 0 to 10 VDC • Current Sense Input: 4 to 20 mA • Resistive inputs/Dry Contact inputs **Four Binary Inputs:** defined as Dry Contact maintained or Pulse Counter/ Accumulator Mode **Three Configurable Outputs:** user-configurable, 2 available modes: • Analog Output: 0 to 10 VDC, 10 mA • Triac Output: 24 VAC, 0.5 A (Externally sourced powered) **One Utility Output Power Port (24~ OUT):** ability to deliver 24 VAC **Four Binary Outputs (Relays):** Single-Pole, Single-Throw. Dry Contacts rated 240 VAC. • UL: 240 VAC 5A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, 70°C/158°F (30,000 cycles) • IEC: 240 VAC 3A Resistive, 3A Inductive, Cos=0.6, -20°C to 70°C (-4°F to 158°F) (100,000 cycles) **Note:** Reference all relay commons to the same pole of the supply circuit. **Two Binary Outputs (Triacs):** Output: 24 VAC or 240 VAC, 0.5 A (externally powered). **Note:** Reference all triac commons to the same pole of the supply circuit.
Analog Input/Analog Output Resolution and Accuracy	Analog Input: 15-bit resolution; Analog Output: 15-bit resolution; +/- 200 mV accuracy in 0 to 10 VDC applications
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	Enclosure material: Polycarbonate Lexan SABIC EXL9330)
Dimensions (H x W x D)	164 mm x 125 mm x 53 mm (6.45 in. x 4.92 in. x 2.08 in.) excluding terminals and mounting clips
Weight	0.5 kg (1.1 lb)
Compliance CE	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CRF47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CNN PAZX7 CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003
	Europe: Johnson Controls declares that this product is also in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive, declared as electronic independently mounted control, suitable for DIN rain mounting. Intended to mount in remote panel. Type 1.C (Micro-interruption), 330 V rated impulse voltage. 125°C ball pressure test.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)

Zone Coordinator Controller

Power Requirements	**Enclosure Model:** 120/240 VAC Primary 50/60 Hz, 24 VAC Secondary Transformer, +10%/-15%, 400 mA, nominal 12 VA **Board-Only Model:** 24 VAC(15%), Primary 50/60 Hz, 24 VAC Secondary Transformer (±15%), 400 mA, nominal 12 VA, 12 VDC (+50%/-2%)
Addressing	Addressing is selectable by the MAC Address Switch— 8 position DIP switch using switches 1 through 7; addressing range 1 to 127
Installation Environment	Protected, Dry
Ambient Operating Conditions	-40°C to 65°C (-40°F to 149°F); 0% to 95% RH, noncondensing
Ambient Storage Conditions	-40°C to 85°C (-40°F to 185°F); 0% to 95% RH, noncondensing
Power	**Enclosure Model:** One 3-position terminal block for 120/240 VAC supply power **Board-Only Model:** Removable Terminal Plug for 24 VAC supply power and removable terminal plug for 12 VDC supply power
Shipping Weight	**Enclosure Model:** 2 kg (4.5 lb) **Board-Only Model:** 227 g (8 oz)
Compliance CE	**United States:** UL Listed 916/FCC Part 15, conducted and radiated
	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 the Low Voltage Directive.

LC-VAC100x-0 (Part 1 of 3)

Product Code Numbers	LC-VAC100x-0 Verasys 18 point 24 V Application Controller with display
Supply Voltage	24 VAC, 20 VAC minimum and 30 VAC maximum, 50/60 Hz, power supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	20 VA maximum for LC-VAC100x-0 **Note:** VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs). This can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA maximum.
Ambient Conditions	**Operating:** -20°C to 70°C (-4°F to 158°F); 10% to 95% RH noncondensing; Pollution Degree 2 **Storage:** -40°C to 85°C (-40°F to 185°F); 5% to 95% RH noncondensing.
Addressing	**BACnet MS/TP:** Valid field controller device addresses 4–127 Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses. **N2:** Valid field controller device addresses 1 to 255
Communications Bus	**BACnet MS/TP, ModBus and N2 through RS-485:** • 3-wire System Bus between the supervisory controller and field controller • 3-wire Sensor Bus between controller, network sensors and other sensor/actuator devices, includes a lead to source 15 VDC supply power from controller to bus devices • 3-wire one Modbus communication half-duplex (Master RTU port)
Processor	RX631 Renesas® 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM

LC-VAC100x-0 (Part 2 of 3)

Input and Output Capabilities	**Five universal inputs:** User-configurable, 3 available modes: • Voltage input: 0 VDC to 10 VDC • Current sense input: 4 mA to 20 mA • Resistive inputs/dry contact inputs **Four binary inputs:** Defined as Dry Contact maintained or Pulse Counter/ Accumulator Mode **Three configurable outputs:** User-configurable, 2 available modes: • Analog output: 0 to 10 VDC, 10 mA • Triac output: 24 VAC, 0.5 A (externally sourced powered) **One utility output power port (24~ OUT):** Ability to deliver 24 VAC **Four binary outputs (relays):** Single-Pole, Single-Throw. Dry contacts rated 240 VAC. • UL: 240 VAC 5 A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, 70°C/158°F (30,000 cycles) • IEC: 240 VAC 3 A Resistive, 3A Inductive, Cos=0.6, -20°C to 70°C (-4°F to 158°F) (100,000 cycles) **Note:** Reference all relay commons to the same pole of the supply circuit. **Two Binary Outputs (Triacs):** Output: 24 VAC or 240 VAC, 0.5 A (externally powered) **Note:** Reference all triac commons to the same pole of the supply circuit.
Analog Input/Analog Output Resolution and Accuracy	Analog input: 12-bit resolution Analog output: 15-bit resolution; +/- 200 mV accuracy in 0 to 10 VDC applications
Terminations	Input/output: Fixed spade terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor bus tool port: RJ-12 6-pin modular jack **Field install option:** Input/output: Fixed solder terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus tool port: RJ-12 6-pin modular jack
Mounting	Horizontal on single 35 mm DIN rail mount is preferred, or screw mount on flat surface with three integral mounting clips on controller Mount the controller on a wall or DIN rail inside an enclosure rated at least IP20.
Housing	Enclosure material: Polycarbonate Lexan SABIC EXL9330
Dimensions (H x W x D)	164 mm x 125 mm x 53 mm (6.45 in. x 4.92 in. x 2.08 in.) excluding terminals and mounting clips
Weight	0.5 kg (1.1 lb)

LC-VAC100x-0 (Part 3 of 3)

Compliance CE	**United States:** cULus Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CRF47, Part 15, Subpart B, Class A
	Canada: cULus Listed, File E107041, CNN PAZX7 CAN/CSA C22.2 No.205, Signal Equipment Industry Canada Compliant, ICES-003
	Europe: Johnson Controls declares that this product is also in compliance with the essential requirements and other relevant provisions of the EMC Directive Declared as Electronic Independently mounted control, suitable for DIN rail mounting. Intended to mount in remote panel. Type 1.C (Micro-interruption), 330 V rated impulse voltage. 125°C ball pressure test.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 12 Listed BACnet Advanced Application Controller (B-AAC)

LC-VAC110x-0 (Part 1 of 3)

Product Code Numbers	LC-VAC110x-0 Verasys 18 point 240 V Application Controller 120/240 VAC with display
Supply Voltage	120/240 VAC, 50/60 Hz, power supply Class 1 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	**20 VA maximum for LC-VAC110x-0** **Note:** VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs). This can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	**Operating:** -20°C to 70°C (-4°F to 158°F); 10% to 95% RH noncondensing; Pollution Degree 2 **Storage:** -40°C to 85°C (-40°F to 185°F); 5% to 95% RH noncondensing.
Addressing	**BACnet MS/TP:** Valid field controller device addresses 4–127 Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses. **N2:** Valid field controller device addresses 1 to 255
Communications Bus	**BACnet MS/TP, ModBus and N2 through RS-485:** • 3-wire System Bus between the supervisory controller and field controller • 3-wire Sensor Bus between controller, network sensors, and other sensor and actuator devices, includes a lead to source 15 VDC supply power (from controller) to bus devices • 3-wire one Modbus communication half-duplex (Master RTU port)
Processor	RX631 Renesas 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM

LC-VAC110x-0 (Part 2 of 3)

Input and Output Capabilities	**Five universal inputs:** User-configurable, 3 available modes: • Voltage input: 0 VDC to 10 VDC • Current sense input: 4 mA to 20 mA • Resistive inputs/dry contact inputs **Four binary inputs:** Defined as Dry Contact maintained or Pulse Counter/ Accumulator Mode **Three configurable outputs:** User-configurable, 2 available modes: • Analog Output: 0 VDC to 10 VDC, 10 mA • Triac Output: 24 VAC, 0.5 A (externally sourced powered) **One utility output power port:** Ability to deliver 24 VAC **Four binary outputs (relays):** Single-Pole, Single-Throw. Dry contacts rated 240 VAC. • UL: 240 VAC, 5 A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, 70°C/158°F (30,000 cycles) • IEC: 240 VAC, 3 A Resistive, 3 A Inductive, Cos=0.6, -20°C to 70°C (-4°F to 158°F) (100,000 cycles) **Note:** Reference all relay commons to the same pole of the supply circuit. **Two Binary Outputs (Triacs):** Output: 24 VAC or 240 VAC, 0.5 A (externally powered) **Note:** Reference all triac commons to the same pole of the supply circuit.
Analog Input/Analog Output Resolution and Accuracy	Analog input: 12-bit resolution Analog output: 15-bit resolution, +/- 200 mV accuracy in 0 to 10 VDC applications
Terminations	Input/output: Fixed spade terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor bus tool port: RJ-12 6-pin modular jack **Field install option:** Input/output: Fixed solder terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus Tool Port: RJ-12 6-pin modular jack
Mounting	Horizontal on single 35 mm DIN rail mount is preferred, or screw mount on flat surface with three integral mounting clips on controller. Mount the controller on a wall or DIN rail inside an enclosure (rated at least IP20).
Method to Provide Earthing (Grounding)	Functional earthing: Terminal W44
Housing	Enclosure material: Polycarbonate Lexan SABIC EXL9330
Dimensions (H x W x D)	190 mm x 125 mm x 58 mm (7.48 in. x 4.92 in. x 2.28 in.) excluding terminals and mounting clips
Weight	0.5 kg (1.1 lb)

LC-VAC110x-0 (Part 3 of 3)

Compliance	**United States:** cULus Listed, File E107041, CCN PAZC, UL 916, Energy Management FCC Compliant to CRF47, Part 15, Subpart B, Class A
	Canada: cULus Listed, File E107041, CNN PAZX7 CAN/CSA C22.2 No.205, Signal Equipment Industry Canada Compliant, ICES-003
CE	**Europe:** Johnson Controls declares that this product is also in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive Declared as Electronic Independently mounted control, suitable for DIN rail mounting. Intended to mount in remote panel. Type 1.C (Micro-interruption) for relays, 2,500 V rated impulse voltage. 125°C ball pressure test.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 12 Listed BACnet Advanced Application Specific Controller (B-AAC)

LC-VAC300x-0 Controller (Part 1 of 3)

Product Code Numbers	LC-VAC300x-0 Controller 24 V with display
Supply Voltage	24 VAC, 20 VAC minimum/30 VAC maximum, 50/60 Hz, power supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe).
Power Consumption	**20 VA maximum** **Note:** VA rating does not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs). This can consume up to 12 VA for each BO or CO; for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	**Operating:** -20°C to 70°C (-4°F to 158°F); 10% to 95% Relative Humidity (RH) noncondensing; Pollution Degree 2. **Storage:** -40°C to 85°C (-40°F to 185°F); 5% to 95% RH noncondensing
Addressing	**BACnet MS/TP:** Valid field controller device addresses 4–127 Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses. **N2:** Valid field controller device addresses 1 to 255
Communications Bus	**BACnet MS/TP, MODBUS and N2 through RS-485:** • 3-wire System Bus between the supervisory controller and field controller addresses • 3-wire Sensor Bus between controller, network sensors and other sensor and actuator devices, includes a lead to source 15 VDC supply power (from controller) to bus devices • 3-wire one Modbus communication half-duplex (master RTU port)
Processor	RX631 Renesas 32-bit microcontroller
Memory	16 MB flash memory and 8 MB RAM

LC-VAC300x-0 Controller (Part 2 of 3)

Input and Output Capabilities	**Six Universal Inputs:** User-configurable, 3 available modes: • Voltage input: 0 to 10 VDC • Current sense input: 4 to 20 mA • Resistive inputs/dry contact inputs **12 Binary Inputs:** Defined as Dry Contact maintained or Pulse Counter/ Accumulator Mode **Four Configurable Outputs:** User-configurable, 2 available modes: • Analog Output: 0 to 10 VDC, 10 mA • Triac Output: 24 VAC, 0.5 A (externally sourced powered) **One Utility Output Power Port (24~ OUT):** Ability to deliver 24 VAC **Four Binary Outputs (Relays):** Single-Pole, Single-Throw. Dry Contacts rated 240 VAC • UL: 240 VAC 5A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, 70°C/158°F (30,000 cycles) • IEC: 240 VAC 3A Resistive, 3A Inductive, Cos=0.6, -20°C to 70°C (-4°F to 158°F) (100,000 cycles) **One Binary Outputs (Relays):** Single-Pole, Double-Throw, Dry Contacts rated 240 VAC • UL: 240 VAC 5A Resistive, 1.9 LA/11.1LRA, D300 Pilot Duty, 70°C/158°F (30,000 cycles) • IEC: 240 VAC 3A Resistive, 3A Inductive, Cos=0.6, -20°C to 70°C (-4°F to 158°F) (100,000 cycles) **One PWM Output Port:** 5 V, 12 V, 15 V selectable PWM output voltage, 10 mA (maximum) continuous current, 100 Hz **Note:** Reference all relay commons to the same pole of the supply circuit. **Four Binary Outputs (Triacs):** Output: 24 VAC or 240 VAC, 0.5 A (externally powered) **Note:** Reference all triac commons to the same pole of the supply circuit.
Analog Input/Analog Output Resolution and Accuracy	Analog Input: 12-bit resolution Analog Output: 15-bit resolution, +/- 200 mV accuracy in 0 to 10 VDC applications
Terminations	Input/Output: Fixed spade terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus Tool Port: RJ-12 6-pin modular jack **Field install option:** Input/output: Fixed solder terminals Sensor/System/Modbus: 4-wire and 3-wire pluggable screw terminal blocks Sensor Bus Tool Port: RJ-12 6-pin modular jack
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller. Mount the Verasys Controllers on a wall or DIN rail inside an enclosure (rated at least IP20).
Housing	Enclosure material: Polycarbonate LEXAN® SABIC EXL9330
Dimensions (H x W x D)	220 mm x 125 mm x 58 mm (8.66 in. x 4.92 in. x 2.28 in.)

LC-VAC300x-0 Controller (Part 3 of 3)

Weight	0.5 kg (1.1 lb)
Compliance CE	**United States:** cULus Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CRF47, Part 15, Subpart B, Class A
	Canada: cULus Listed, File E107041, CNN PAZX7 CAN/CSA C22.2 No.205, Signal Equipment Industry Canada Compliant, ICES-003
	Europe: Johnson Controls declares that this product is also in compliance with the essential requirements and other relevant provisions of the EMC Directive and Declared as Electronic Independently mounted control, suitable for DIN rain mounting. Intended to mount in remote panel. Type 1.C (Micro-interruption), 330 V rated impulse voltage. 125°C ball pressure test.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 12 Listed BACnet Advanced Application Controller (B-AAC)

ZFR1825 Wireless Field Bus Controller (Part 1 of 2)

Product Code	MS-ZFR1825-x
Power Supply Input	**Select one of the following power supply inputs:** • 24 VAC +10%/-15%, 50/60 Hz, Class 2. Transformer allowance 2.5 VA maximum, 2 VA typical. Provided through the three-position 24 V~ screw terminal pluggable block. • 15 VDC, 180 mA (7 to 18 VDC, 185 maximum current draw) on the FC Bus provided through the FC/SA BUS IN RJ-12 jack from the FC Bus Jack on a Field Controller or NxE supervisory engine.
Power Supply Output	15 VDC provides power through the FC/SA BUS, FC/SA BUS OUT RJ-12 jack for external devices.
Addressing	DIP Switches, field adjustable
Wireless Band	Direct-Sequence Spread-Spectrum, 2.4 GHz ISM bands
Transmission Power	10 mW maximum
Transmission Range	76.2 m (250 ft) maximum Line-of-Sight 15 m (50 ft) (Best practice)
Ambient Conditions	Operating: 0°C to 50°C (32 to 122°F), 5% to 95% RH, noncondensing Storage: -20°C to 70°C (-4 to 158°F), 5% to 90% RH, noncondensing
Materials	Product complies with Plenum Rating per UL2043. Suitable for use in other environmental air space (Plenums) in accordance with section 300.22 © of the National Electric Code.

ZFR1825 Wireless Field Bus Controller (Part 2 of 2)

Terminations	Two spade terminals with three-position screw terminal pluggable block for 24 VAC power supply input Four spade terminals with four-position screw terminal pluggable block for RS-485 communications RJ-12 IN jack for 15 VDC power supply and communications connection from an NxE or FEC FC Bus jack RJ-12 OUT jack supplies 15 VDC and communications to BTCVT Wireless Commissioning Converter
Dimensions	146 mm x 122 mm x 52 mm (5.8 x 4.8 x 2.1 in.)
Mounting Hardware	Four no. 6 trade size sheet metal screws
Shipping Weights	0.45 kg (1.0 lb)
Compliance CE	**United States**: Intended for connection to an NEC Class 2 power Source; UL 916 Energy Management Plenum rating per UL 2043 FCC Compliant to CFR47, Part 15, Subpart B, Class A Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter Identification ZFR1825-0: FCC: TFB-MATRIXL Transmitter Identification ZFR1825-1: FCC: OEJ-WRZRADIO **Canada:** CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada (IC) Compliant to Canadian ICES-003, Class B Limits **Industry Canada (IC) RSS-210** Transmitter Identification ZFR1825-0: 5969A-MATRIXLP Transmitter Identification ZFR1825-1: 279A-WRZRADIO **Australia and New Zealand**: RCM Mark, Australia/NZ Emissions Compliant **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.

ZFR1821 and ZFR1822 Pro Wireless Field Bus Router-Repeater (Part 1 of 2)

Product Code	LC-ZFR1821-0: Wireless Field Bus Router, Conduit-Mount, for Field Controller Router Applications LC-ZFR1822-0: Wireless Field Bus Router, Wall-Mount, for Field Controller Router Applications LC-ZFR1821-0B: Wireless Field Bus Router, Conduit-Mount, with 24 VAC Power Supply for Field Controller Router Applications LC-ZFR1822-0B: Wireless Field Bus Router, Wall-Mount, with 24 VAC Power Supply for Field Controller Router Applications
Power Supply Input	15 VDC nominal. Provided through the RJ-12 cable connected from a field controller or repeater power supply.
Addressing	DIP Switches, field Adjustable
Wireless Band	Direct-Sequence Spread-Spectrum, 2.4 GHz ISM bands
Transmission Power	10 mW maximum
Transmission Range	76.2 m (250 ft) maximum Line-of-Sight 15 m (50 ft) - is best practice
Ambient Conditions	**Operating:** 0°C to 50°C (32 to 122°F), 5% to 95% RH, Noncondensing **Storage:** -20°C to 70°C (-4 to 158°F), 5% to 90% RH, Noncondensing
Materials	ZFR1821: White plastic housing with Plenum rating per UL1995 UL94-5VB flammability rating ZFR1822: White PC/ABS Cycoloy
Terminations	RJ-12 plug for connection to field controllers or Repeater Kit power supply
Dimensions	ZFR1821: 136 mm x 100 mm x 18 mm (5-3/8 in. x 3-15/16 in. x 3/4 in.) ZFR1822: 61 mm x 100 mm x 20.5 mm (5-3/8 in. x 3-15/16 in. x 3/4 in.)
Mounting Hardware	ZFR1821: 1/2 in. trade size EMT connector ZFR1822: Screw mounted

ZFR1821 and ZFR1822 Pro Wireless Field Bus Router-Repeater (Part 2 of 2)

Shipping Weights	ZFR1821: 0.095 kg (0.21 lb) ZFR1822: 0.113 kg (0.25 lb) Repeater Power Supply: 227 kg (0.50 lb)
Compliance	**United States:** UL 916 Energy Management Plenum-rated per UL1995 UL94-5VB Flammability Rating FCC Compliant to CFR47, Part 15, Subpart B, Class A Transmission Complies with FCC Part 15.247 Regulations for Low Power Unlicensed Transmitters Transmitter Identification ZFR1821/ZFR1822: FCC: OEJ-WRZRADIO **Canada:** CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada (IC) Compliant to Canadian ICES-003, Class B Limits Industry Canada (IC) RSS-210 Transmitter Identification ZFR1821/ZFR1822: 279A-WRZRADIO **Australia and New Zealand:** RCM Mark, Australia/NZ Emissions Compliant **Europe:** CE Mark – Johnson Controls declares that this product in compliance with the essential requirements and other relevant provisions of the EMC Directive.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

United States Emissions Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

Canadian Emissions Compliance

This Class (B) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (B) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Building Efficiency
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