

LN Series Free Programmable LN-PRG6x0-12 Controllers and LN Series Input/Output (I/O) Extension Modules

Product Bulletin

LN-PRG600-12, LN-PRG610-12, LN-IOE400-0
LN-IOE410-0, LN-IOE420-0

Code No. LIT-12011800

Software Release 6.0

Issued June 14, 2013

Supersedes January 30, 2013

The LN Series Free Programmable LN-PRG600-12 and LN-PRG610-12 Controllers are microprocessor-based and designed to control various building systems, such as multi-zone air handling units and central plant applications. The LN-PRG6x0-12 controllers use the LonTalk® communication protocol.

The controllers work with sensors, including the LN Series Communicating Sensors, to control and monitor indoor temperature and fan speed, and to adjust the setpoint.

The LN-PRG6x0-12 controllers support up to two Input/Output (I/O) extension modules that operate on a separate subnetwork, providing the LN-PRG6x0-12 controllers with up to 40 universal inputs and 36 universal outputs.

The LN-PRG6x0-12 controllers are built to meet rigorous quality standards and are designed for use with any LONWORKS® network open and interoperable system.



Figure 1: LN-PRG6x0-12 Controllers and I/O Extension Modules

Table 1: Features and Benefits

Features	Benefits
Configurable Software	Features an LNS® plug-in that provides the ability to easily configure inputs, outputs, and sequence options. Configured device complies with LONMARK® Space Comfort Control (SCC) profile for interoperability with other LONMARK devices. Also features more than 60 network variables.
Robust Hardware	Features a fire-retardant plastic enclosure, a 1 MB Flash memory for the configuration and trending of up to 12,000 events, and a status indicator on each output.
Powerful Control Options	Allow easy configuration of all features, including input types, output types, heating and cooling stages, variable airflow, and Proportional plus Integral plus Derivative (PID) loops. The controller supports four input types: space temperature, setpoint adjustment, duct temperature, and occupancy bypass or window contacts.
Wireless Functionality¹	Features an optional EnOcean® wireless receiver (LN-WMOD315-0 or LN-WMOD868-0) that you can use with a variety of wireless sensors and switches. The wireless receiver (LN-WMODxxx-0) supports up to 28 wireless sensors, which allow you to create wire-free installations.

1. Wireless sensors with an override require two inputs.

Overview

The LN Series Free Programmable LN-PRG6x0-12 Controllers and LN Input/Output Extension Modules provide digital modulation, floating modulation, and Pulse Width Modulation (PWM), and proportional control for valves, pumps, heating elements, fan, and lighting applications. The LN-PRG610-12 controller also offers Hand-Off-Auto (HOA) switches and potentiometers for output manual override.

The LN Series Free Programmable LN-PRG6x0-12 Controllers can be programmed using the LN Graphical Programming Interface (GPI) Plug-in with LN Builder software.

LN Wireless Receiver

To reduce the cost of installation, and minimize the impact on existing partition walls, the LN Wireless Receiver enables the controller to communicate with a line of wireless, battery-less room sensors and switches. These devices include:

- the LN- WMOD315-0 receiver for EnOcean® 315 MHz wireless-enable sensors and switches
- the LN-WMOD868-0 receiver for EnOcean 315 MHz wireless-enable sensors and switches

Note: LN controllers have one wireless port to support a single LN Wireless Receiver. For more information about the EnOcean and Open-to-Wireless technologies, refer to the *LN Series Wireless Solution Guide Technical Bulletin (LIT-12011628)*.

LONWORKS® Network Services (LNS)

The LNS client-server platform allows multiple users, running different LNS-compatible applications, to access a common source for directory, installation, management, monitoring, and control services for the network system being managed. The Johnson Controls® LN Builder is an example of an LNS based network management tool that can use plug-ins to configure and monitor controllers and devices in the control system.

LN Graphical Programming Interface (GPI) Plug-In

The Johnson Controls GPI plug-in is a programming tool that allows you to quickly create control sequences by dragging and dropping block objects and then linking the objects with a simple click, select and release. Select objects from an extensive library of over 100 commonly used functions; you can also create your own custom blocks. With a user-friendly interface and intuitive programming environment, HVAC programming could not be easier. Refer to the *LN Graphical Interface Programming Tool (GPI) Technical Bulletin (LIT-12011449)* for more information.

The GPI Plug-in offers these advantages:

- Johnson Controls supplies the plug-in as freeware with no associated licensing costs.
- The plug-in features live debugging, which allows you to view code execution and input/output values, and to detect errors in real-time.
- The plug-in contains a code library for managing your favorite or most commonly used code or code sections..



Figure 2: Block Objects

Configure Schedules and Holidays

Configure the controller's built-in schedules and holidays from LNS LN Series Programmable controllers, or directly from within the LN GPI plug-in with an easy-to-use point, drag, and click interface. It features a weekly schedule for regular, repeating, events by time-of-day and day-of-week, while a holiday schedule is available to define events for specific days. The LN-PRG6x0-12 controller allows you to:

- Configure schedules using a graphical slider.
- Copy and paste entries; and duplicate a schedule entry for Monday to Friday.
- Set exceptions to a schedule, such as holidays, with Special Events.
- Set holidays for recurring events such as the ninth day, or the third Thursday of a given month.
- Create a schedule as an effective period during which the schedule is active.
- Create a schedule that provides Next State and Time to Next State — ideal for use with programming functions such as Optimum Start and morning Warm Up.

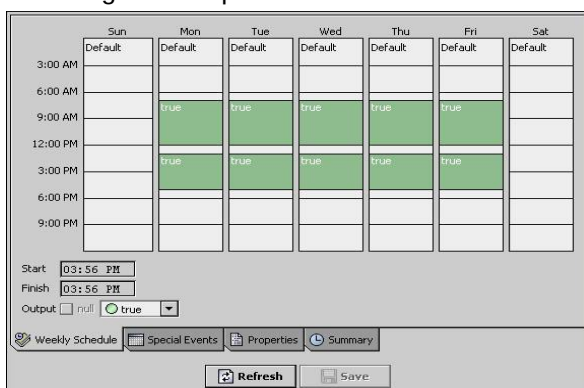


Figure 3: Built-In Scheduling Tool Screen

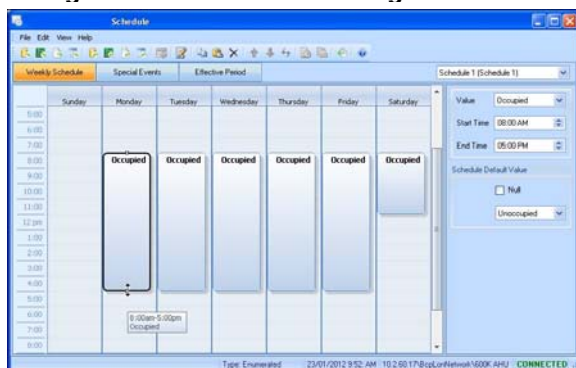


Figure 4: LN GPI Plug-In Screen

LN Series Communicating Sensors

These communicating sensors, which work with the LN-PRG6x0-12 controllers, feature a backlit display and graphical menus. A leaf icon shows the zone's energy-friendliness in real time.



Figure 5: Leaf Icon

The LN Series Communicating Sensors are available in two versions:

- The LN-SVSEN-0 room temperature sensor with backlight display, graphic menus, and leaf icon
- The LN-SVSENH-0 room temperature and humidity sensor with backlight display, graphic menus, and leaf icon.



Figure 6: LN Series Communicating Sensor

Dimensions

Figure 7 shows the dimensions for the LN Free Programmable LN-PRG6x0-12 Controllers and LN I/O Extension Modules.

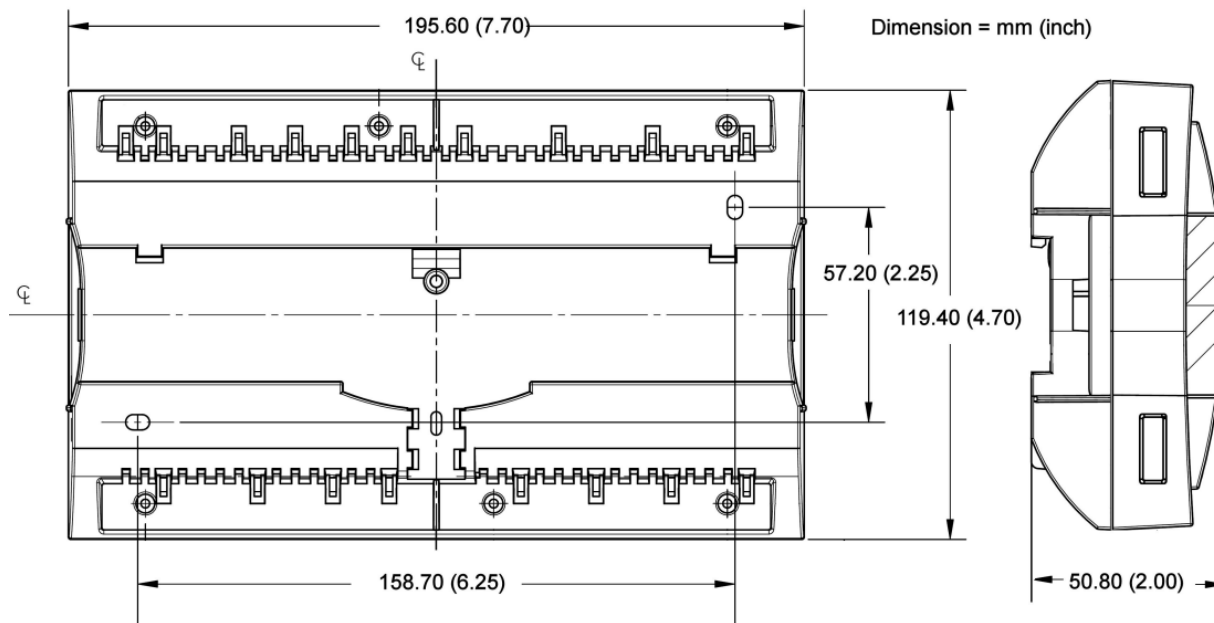


Figure 7: LNPRG600 Series Controller and LNIOE400 Series Extension Module
Dimensions, mm (in.)

LONMARK Objects and Network Variables

LN Graphical Programming Interface

Figure 8 shows the LONMARK Objects and Network Variables for the LN Free Programmable Controllers when you use GPI software.

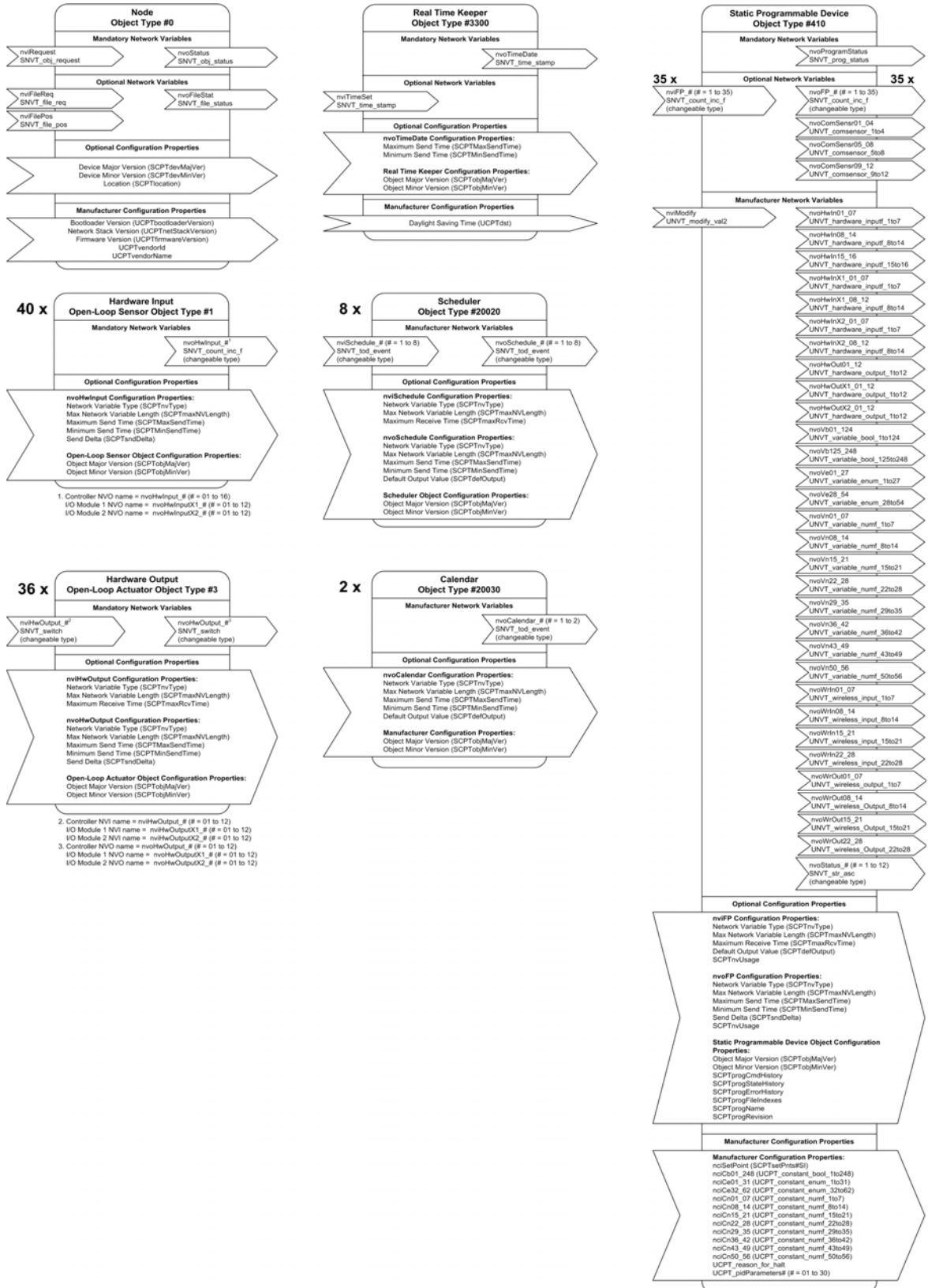


Figure 8: GPI LONMARK Objects and Network Variables – LN-PRG600-12 and LN-PRG610-12

Controller Models

Table 2 shows the available controller models and I/O extension modules within this series.

Table 2: Controller Models

Controller Features	LN-PRG600-12	LN-PRG610-12	LN-IOE400-0	LN-IOE410-0	LN-IOE420-0
Points	28	28	24	24	24
Universal Inputs	16 ¹	16 ¹	12	12	12
Wireless Inputs ²	28	28	14	14	14
15 VDC Power Supply	X	X	X	X	X
HOA Switch and Potentiometer	n/a	X	n/a	X	n/a
Number of I/O extension Modules	2	2	n/a	n/a	n/a
Universal Outputs	12	12	12	12	0

1. The first four inputs are software configurable for pulse counting up to 50 Hz and are compatible with an SO rate (optically-isolated) output.
2. Available when optional Wireless Receiver is connected to the controller.

Ordering Information

Contact the nearest Johnson Controls® representative to order the LN Series Free Programmable LN-PRG6x0-12 Controllers. See Table 3 for ordering codes.

Repair Information

If the LN Series Free Programmable LN-PRG6x0-12 Controller fails to operate within specifications, replace the unit. For a replacement unit, contact the nearest Johnson Controls® representative.

Table 3: LN Free Programmable LN-PRG6x0-12 Controllers

Product Code Number	Description
LN-PRG600-12	LONMARK® Certified Programmable Controller with 16 Universal Inputs (UI), 12 Universal Outputs (UO), and LNS Plug-in, 24 VAC, Wireless Option
LN-PRG610-12	LONMARK Certified Programmable Controller with 16 UI, 12 UO, Hand-Off-Auto (HOA) Switches, and LNS Plug-in, 24 VAC, Wireless Option
LN-IOE400-0	I/O Extension Module for LN-PRG6x0-2 with 12 UI, 12 UO, 24 VAC
LN-IOE410-0	I/O Extension Module for LN-PRG6x0-2 with 12 UI, 12 UO, 24 VAC, HOA Switches, 24 VAC
LN-IOE420-0	I/O Extension Module for LN-PRG6x0-2 with 12 UI, 24 VAC

Technical Specifications

LN-PRG600-12 and LN-PRG610-12 (Part 1 of 2)

Product Codes	LN-PRG610-12 and LN-PRG600-12
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 50/60 Hz, Class 2 Protection: 3.0 A user-replaceable fuse Power Consumption: 22 VA typical plus all output loads Maximum Consumption: 60 VA
Environmental	Operating Temperature: 0 to 50°C, (32 to 122°F) Storage Temperature: -20 to 50°C, (-4 to 122°F) Relative Humidity: 0 to 90%
General	Processor: STM32 (ARM Cortex™ M3) MCU, 32 bit Processor Speed: 72 MHz Memory: 1 MB Nonvolatile Flash (applications), 2 MB Nonvolatile Flash (storage) 96 KB RAM Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk® protocol Transceiver: FT 5000 Free Topology Smart Transceiver Status Indicator: Green LED - power status and LON TX, Orange LED - service and LON RX Communication Jack: LON® mono audio jack LONMARK® Interoperability: Version 3.4 Device Class: Static Programmable Device LONMARK Functional Profile: Input Objects: Open-Loop Sensor #1, Output Objects: Open - Loop Sensor #3, Node Object: #0, Real Time Clock: Real Time Keeper #3300, Scheduler: Scheduler #20020, Calendar: Calendar #20030, Programmable Device: Static Programmable Device #410
Enclosure	Material: FR/ABS Dimensions (with screws): 7.7 x 4.7 x 2.0 in. (195.6 x 119.4 x 50.8 mm) Shipping Weight: 1.17 lb (0.53 kg)
Inputs	Input Types: universal software configurable Voltage: 0 to 10 VDC (40k ohm input impedance) 0 to 5 VDC (high input impedance) Current: 0 to 20 mA with 249 ohm jumper configurable internal resistor Digital: dry contact Pulse: UI1 to UI4; 50 Hz maximum; Minimum 10 ms on/10 ms off, SO output compatible; UI5 to UI12: 1 Hz maximum; Minimum 500 ms on/500 ms off, dry contact Resistor: 0 to 350k ohm. All thermistor types that operate within this range are supported. The following temperature sensors are pre-configured: Thermistor: Type 2 and Type 3 10k ohm (10k ohm at 25°C [77°F]) Platinum: PT1000 1k ohm (1k ohm at 0°C [32°F]) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohm at 21°C [69.8°F]) Input Resolution: 16-bit analog/digital converter Power Supply Output: 15 VDC; maximum 200 mA (16 inputs x 20 mA each)

LN-PRG600-12 and LN-PRG610-12 (Part 2 of 2)

Outputs	Universal: 0 to 10 VDC linear; digital (on/off), PWM, or floating (0 to 12 VDC) 0 to 20 mA (jumper configurable); software configurable. Built-in snubbing diode to protect against back EMF, for example, when used with a 12 VDC relay. PWM control: adjustable period from 2 to 65 seconds Floating control: minimum plus on/off: 500 ms adjustable drive time period HOA, Hand-Off-Auto switch (when equipped), hand position potentiometer range 0 to 12.5 VDC 60 mA maximum at 12 VDC (60°C; 140°F) Load Resistance: minimum resistance 200 ohm for 0 to 10 VDC and 0 to 12 VDC, maximum 500 ohm for 0 to 20 mA output Auto reset fuse: 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) Output Resolution: 10-bit digital/analog converter
Wireless¹	Communication: EnOcean® Wireless standard Number of Wireless Inputs: 28² Supported Wireless Receivers: LN-WMOD315-0 and LN-WMOD868-0 Telephone Cord Cable: Connector: 4P4C modular jack, Length: 6.5 ft (2 m)
LN Series Communicating Sensors	Communication: RS-485 Number of sensors per controller: up to 12, in daisy-chain configuration Cable: Cat 5e, 8 conductor twisted pair Connector: RJ-45
Electromagnetic Compatibility	CE Emission: EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments (pending). CE Immunity: EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments (pending). FCC: This device complies with FCC rules part 15, subpart B, class B (pending).
Compliance 	United States: UL Listed: UL916 Energy management equipment Material³: UL94-5VA Canada: UL Listed: UL916 Energy management equipment Material³: UL94-5VA Europe: CE Mark – Johnson Controls, Inc., declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

1. Available when an optional external Wireless Receiver is connected to the controller. Some wireless inputs may use more than one wireless input from the controller.
2. Some wireless modules may use more than one wireless input from the controller.
3. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive.

Input/Output (I/O) Extension Modules (Part 1 of 2)

Product Code	LN-IOE400-0, LN-IOE410-0, LN-IOE420-0
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 50/60 Hz, Class 2 Protection: 3.0A user-replaceable fuse Power Consumption: 400/410: 50 VA maximum, 22 VA typical on all loads 420: 16 VA maximum, 10 VA typical on all loads
Environmental	Operating Temperature: 0 to 50°C, (32 to 122°F) Storage Temperature: -20 to 50°C, (-4 to 122°F) Relative Humidity: 0 to 90% noncondensing
Hardware	Processor: STM32 (ARM Cortex™ M3) MCU, 32 bit, 64 MHz Memory: 64 KB nonvolatile Flash (applications and storage), 20 KB RAM Status Indicator: Green LEDs – power status and LAN TX; Orange LEDs – module status and LAN RX
Enclosure	Material: FR/ABS Dimensions (with screws): 7.7 x 4.7 x 2.0 in. (195.6 x 119.4 x 50.8 mm) Shipping Weight: 1.17 lb (0.53 kg)
Electromagnetic Compatibility	CE Emission: EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments (pending). CE Immunity: EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments (pending).
Inputs	Number of Inputs: 12 LN Series Communicating Sensors: 12 Input Types: universal; software configurable Voltage: 0 to 10 VDC (40k ohm input impedance), 0 to 5 VDC (high input impedance) Current: 0 to 20 mA with 249 ohm jumper configurable internal resistor Digital: dry contact Pulse: 1 Hz maximum 500 ms on/500 ms off, dry contact Resistor Support: 0 to 350k ohm. All thermistor types that operate in this range are supported. The following temperature sensors are pre-configured: Thermistor: Type II and Type III 10k ohm (10k ohm at 25°C [77°F]) Platinum: PT1000 1k ohm (1k ohm at 0°C [32°F]) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) RTD Ni1000 (1k ohm at 21°C [69.8°F]) Input Resolution: 16-bit analog/digital converter Power Supply Output: 15 VDC; maximum 240 mA (12 inputs x 20 mA each)

Input/Output (I/O) Extension Modules (Part 2 of 2)

Outputs (LN-IOE400-0 and LN-IOE410-0 Modules Only)	Universal Outputs: 12 Universal Output Characteristics: 0 to 10 VDC linear, digital 0 to 12 VDC (on/off), floating PWM, or 0 to 20 mA (jumper configurable); software configurable. Built-in snubbing diode to protect against back EMF, for example, when used with a 12 VDC relay. PWM control: adjustable period from 2 to 65 seconds Floating control: minimum plus on/off: 500 ms adjustable drive time period Hand-Off-Auto (HOA) switch (when equipped): hand position potentiometer range 0 to 12.5 VDC 60 mA maximum at 12 VDC (60°C; 140°F) Load Resistance: minimum resistance 200 ohm for 0 to 10 VDC and 0 to 12 VDC outputs, maximum 500k ohm for 0 to 20 mA output Auto reset fuse: 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) Output Resolution: 10-bit digital/analog converter
Compliance	United States: UL Listed: UL916 Energy management equipment Material¹: UL94-5VA Canada: UL Listed: UL916 Energy management equipment Material¹: UL94-5VA Europe: CE Mark – Johnson Controls, Inc. declares that the products are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.

1. All materials and manufacturing processes comply with the RoHS directive and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive.

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

United States Emissions Compliance

Compliance Statement (Part 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Warning (Part 15.21)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canadian Emissions Compliance

Industry Canada Statement(s)

The term IC before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Le terme « IC » précédant le numéro d'accréditation/inscription signifie simplement que le produit est conforme aux spécifications techniques d'Industry Canada.



Building Efficiency

507 E. Michigan Street, Milwaukee, WI 53202

Metasys® and Johnson Controls® are registered trademarks of Johnson Controls, Inc. All other marks herein are the marks of their respective owners. © 2013 Johnson Controls, Inc.