LN Series Free Programmable Controllers

Product Bulletin

LN-PRG203-2, LN-PRG300-2, LN-PRG4x0-2, LN-PRG5x0-2

Code No. LIT-12011317
Software Release 5.1
Issued October 4, 2010
Supersedes November 16, 2009

The LN Series Free Programmable Controllers are microprocessor-based free programmable controllers, designed to control various Heating, Ventilating, and Air Conditioning (HVAC) applications.

The Metasys® system LN Series Free Programmable controllers product family is built to meet rigorous quality standards. The complete family of Metasys system LN Series controllers is designed for use with any LONWORKS® network open and interoperable system.

Figure 1: LN-PRG500 Controller

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 128k 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 Functionality	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 14 wireless inputs, which allow you to create wire-free installations.

Johnson Controls

LN Series Free Programmable Controllers Overview

You can control equipment, such as roof top units, fan coils, heat pumps, ventilator units, and terminal units, with the LN Series Free Programmable Controllers (Figure 1). The LN Series Free Programmable Controller line can be programmed using the LN-Free Programming Plug-in or the LN Graphical Programming Interface (GPI) Plug-in with LN-Builder 3.2 software.

LNS LN-Free Programming Plug-in

The LN-Free Programming Plug-in tool is unique in the controls industry because it combines a user-friendly Graphical User Interface (GUI) with the power and flexibility of a code editor and compiler. The LN-Free Programming Plug-in tool uses a simplified version of BASIC that is custom made to suit control requirements.

LNS LN Graphical Programming Interface (GPI) Plug-in

The LN Graphical Programming Interface Plug-in tool is a programming tool that allows for the building of control sequences by dragging and dropping block objects and then linking the objects with a simple click, select, and release. With a user-friendly interface and intuitive programming environment, GPI makes Heating, Ventilating, and Air Conditioning (HVAC) programming easier than ever.

LNS LN-Scheduler Plug-in

The LN-Scheduler plug-in allows you to easily configure a weekly based schedule and a special day schedule for holidays. Easily add and remove the special day event into the calendar by a simple click of the mouse.

Selection Chart

Table 2 describes all of the LN Series Free Programmable Controller options.

Table 2: Selection Chart

Code Number	Description
LN-PRG203-2	LONMARK certified Programmable Controller with 6 Universal Inputs (UIs), 5 Digital Outputs (DOs), 3 Universal Outputs (UOs), and LNS plug-in, 24 VAC, wireless option.
LN-PRG300-2	LONMARK certified Programmable Controller with 10 UI, 8 UO, and LNS plug-in, 24 VAC, wireless option.
LN-PRG400-2	LONMARK certified Programmable Controller with 12 UI, 12 UO, and LNS plug-in, 24 VAC, wireless option.
LN-PRG410-2	LONMARK certified Programmable Controller with 12 UI, 12 UO, Hands-Off-Auto (HOA) Switches, and LNS plug-in, 24 VAC, wireless option.
LN-PRG500-2	LONMARK certified Programmable Controller with 16 UI, 12 UO, and LNS plug-in, 24 VAC, wireless option.
LN-PRG510-2	LONMARK certified Programmable Controller with 16 UI, 12 UO, HOA Switches, and LNS plug-in, 24 VAC, wireless option.

Dimensions

Figure 2 shows the dimensions for the LN-PRG203-2 and LN-PRG300-2 controllers.

Figure 3 shows the dimensions for the LN-PRG4x0-2 and LN-PRG5x0-2 controllers.

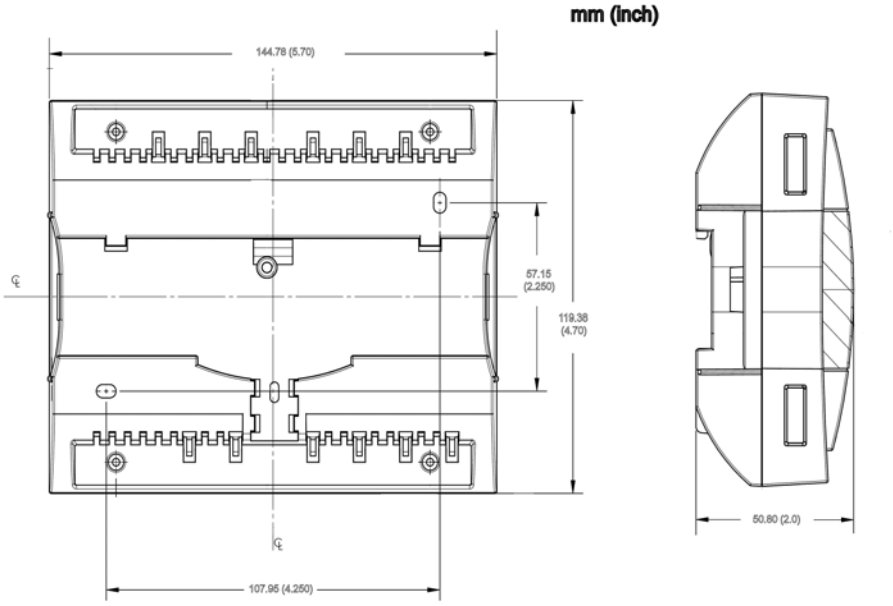

Figure 2: LN-PRG203-2 and LN-PRG300-2 Dimensions

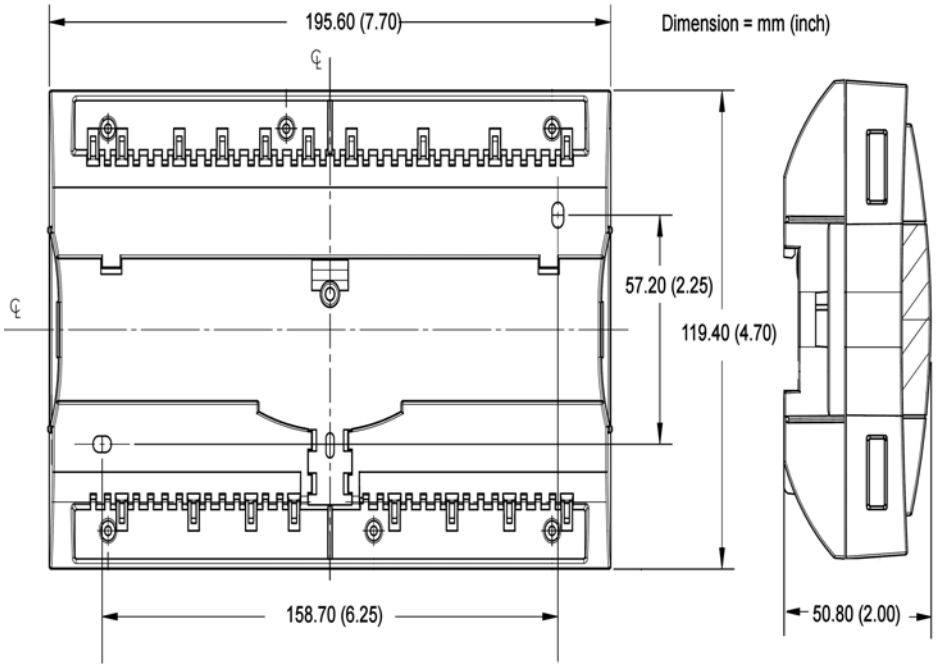

Figure 3: LN-PRG4x0-2 and LN-PRG5x0-2 Dimensions

LONMARK Objects and Network Variables

LN-Free Programming Plug-in

The following figures show the LONMARK Objects and Network Variables for the LN Free Programmable Controllers when you use the LNS LN-Free Programming Plug-in.

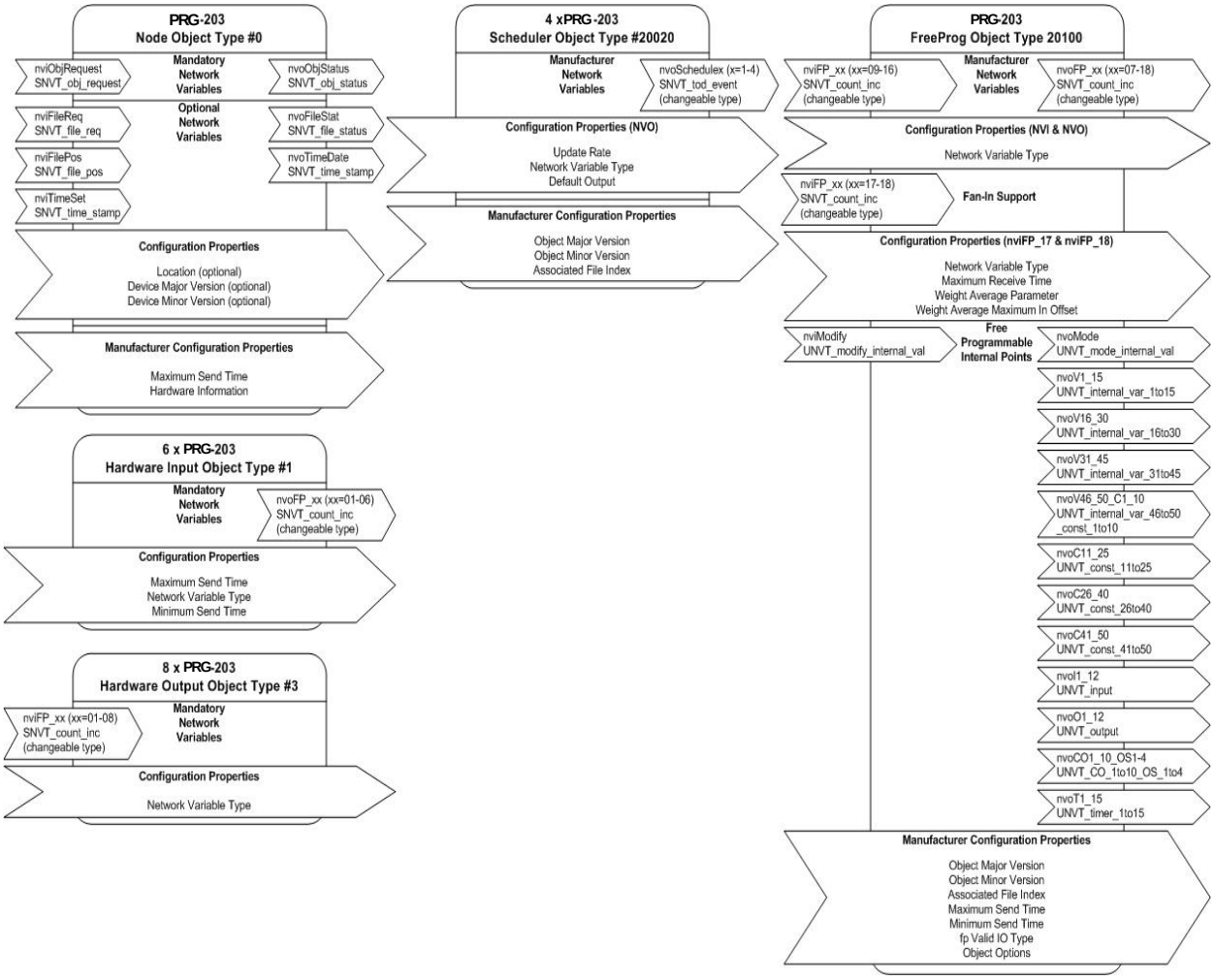

Figure 4: LN-Free Programming Plug-in LONMARK Objects and Network Variables - LN-PRG203-2

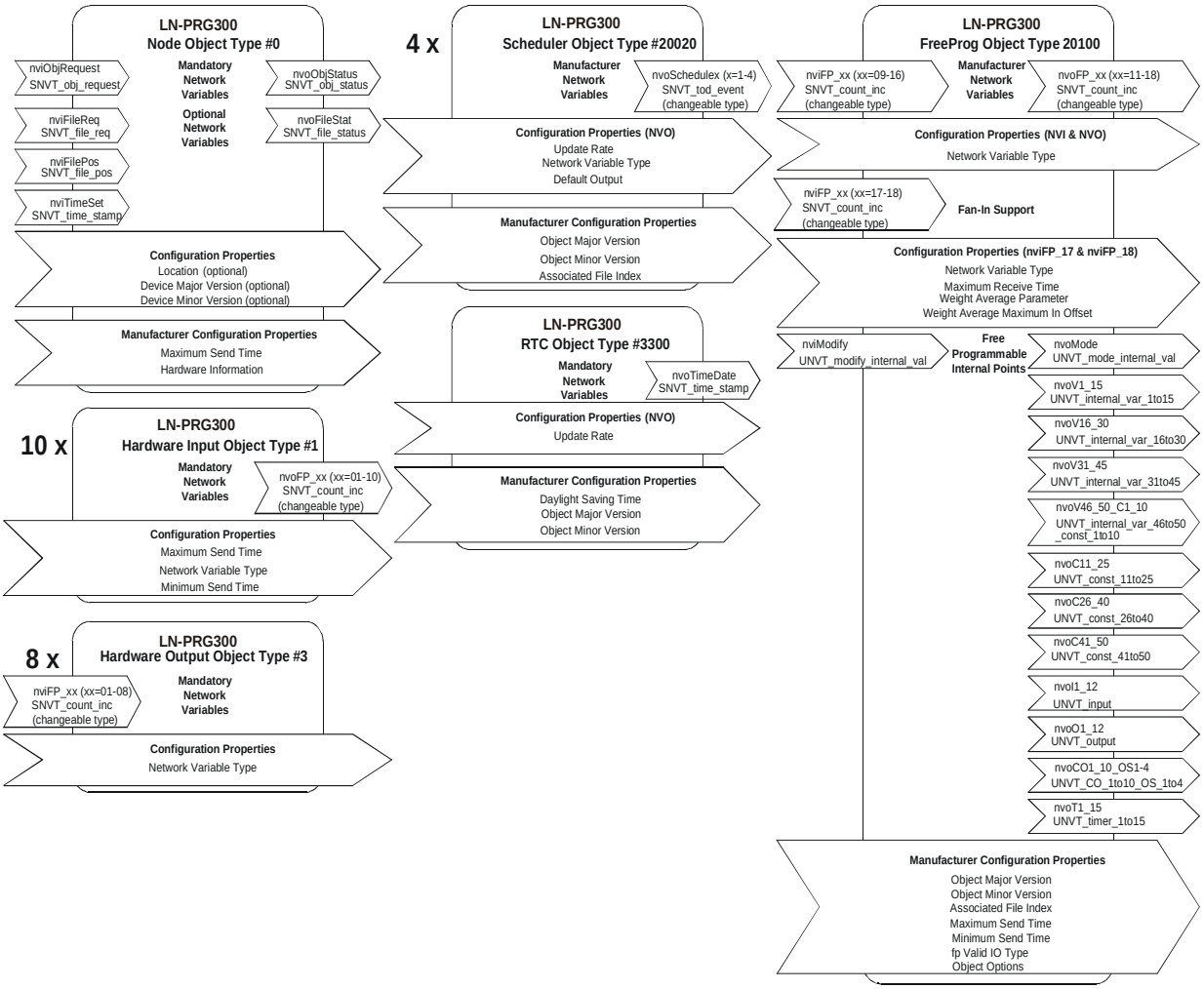

Figure 5: LN-Free Programming Plug-in LONMARK Objects and Network Variables - LN-PRG300-2

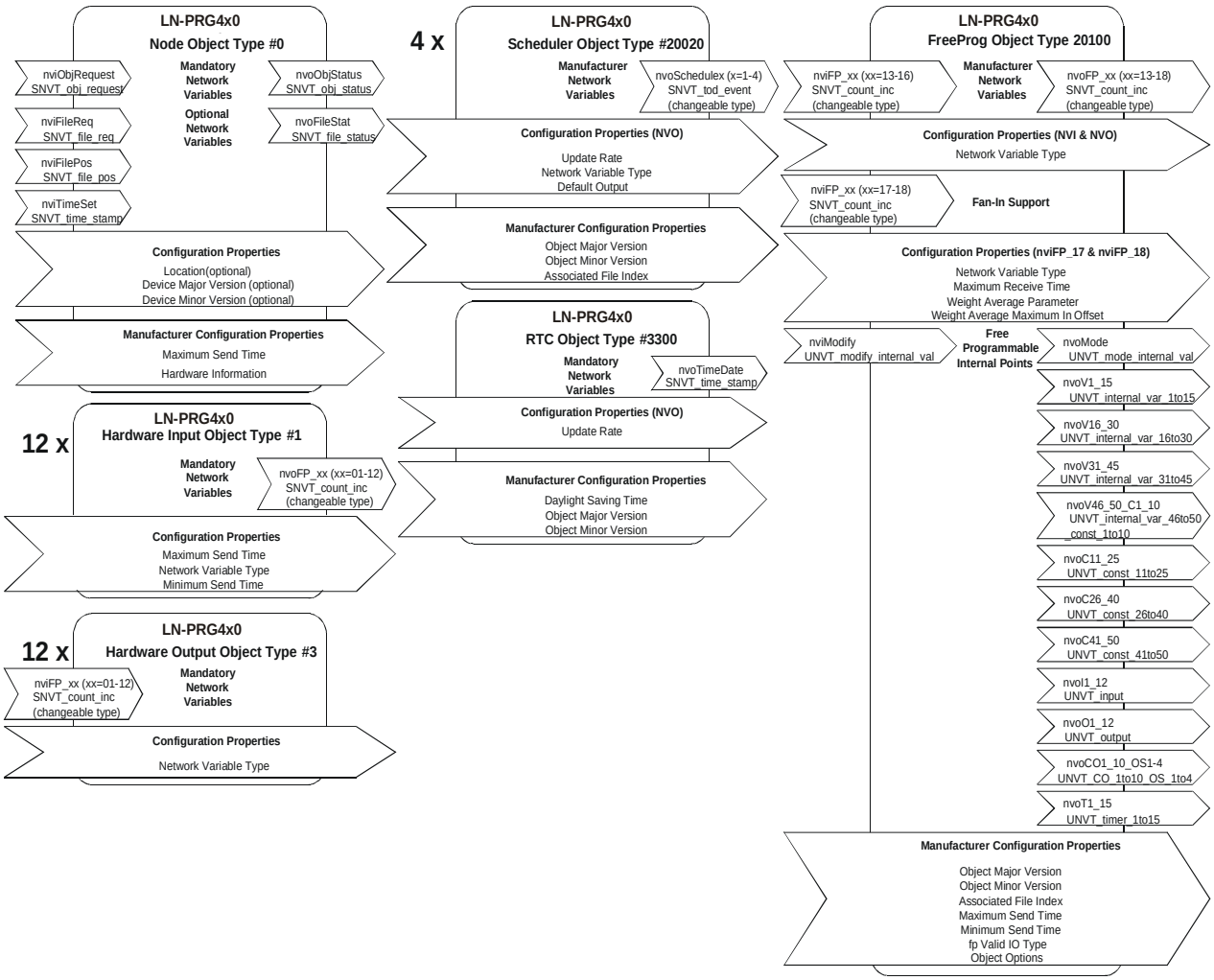

Figure 6: LN-Free Programming Plug-in LONMARK Objects and Network Variables - LN-PRG4x0-2

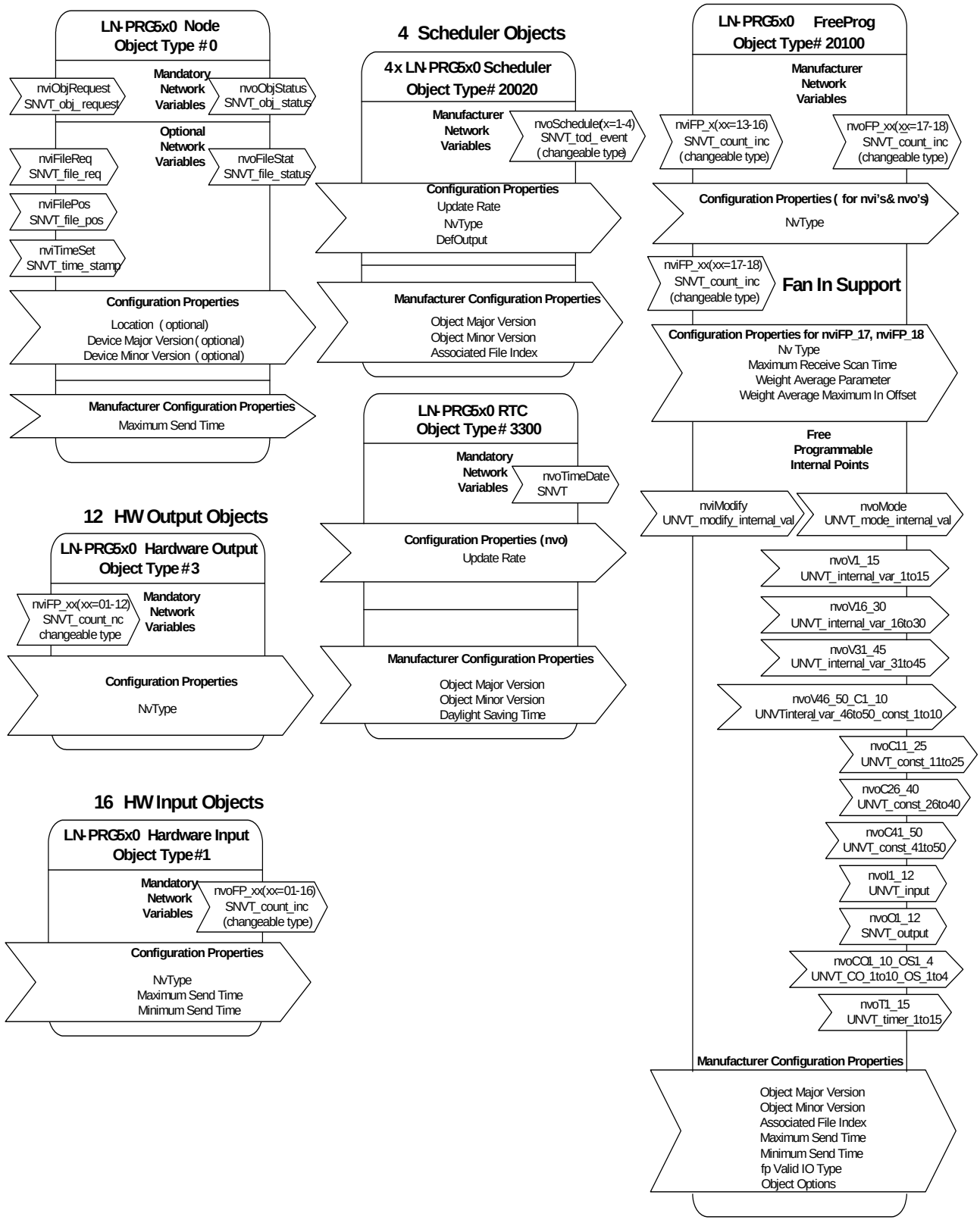

Figure 7: LN-Free Programming Plug-in LONMARK Objects and Network Variables--LN-PRG5x0-2

LN GPI

The following figures show the LONMARK Objects and Network Variables for the LN Free Programmable Controllers when you use GPI software.

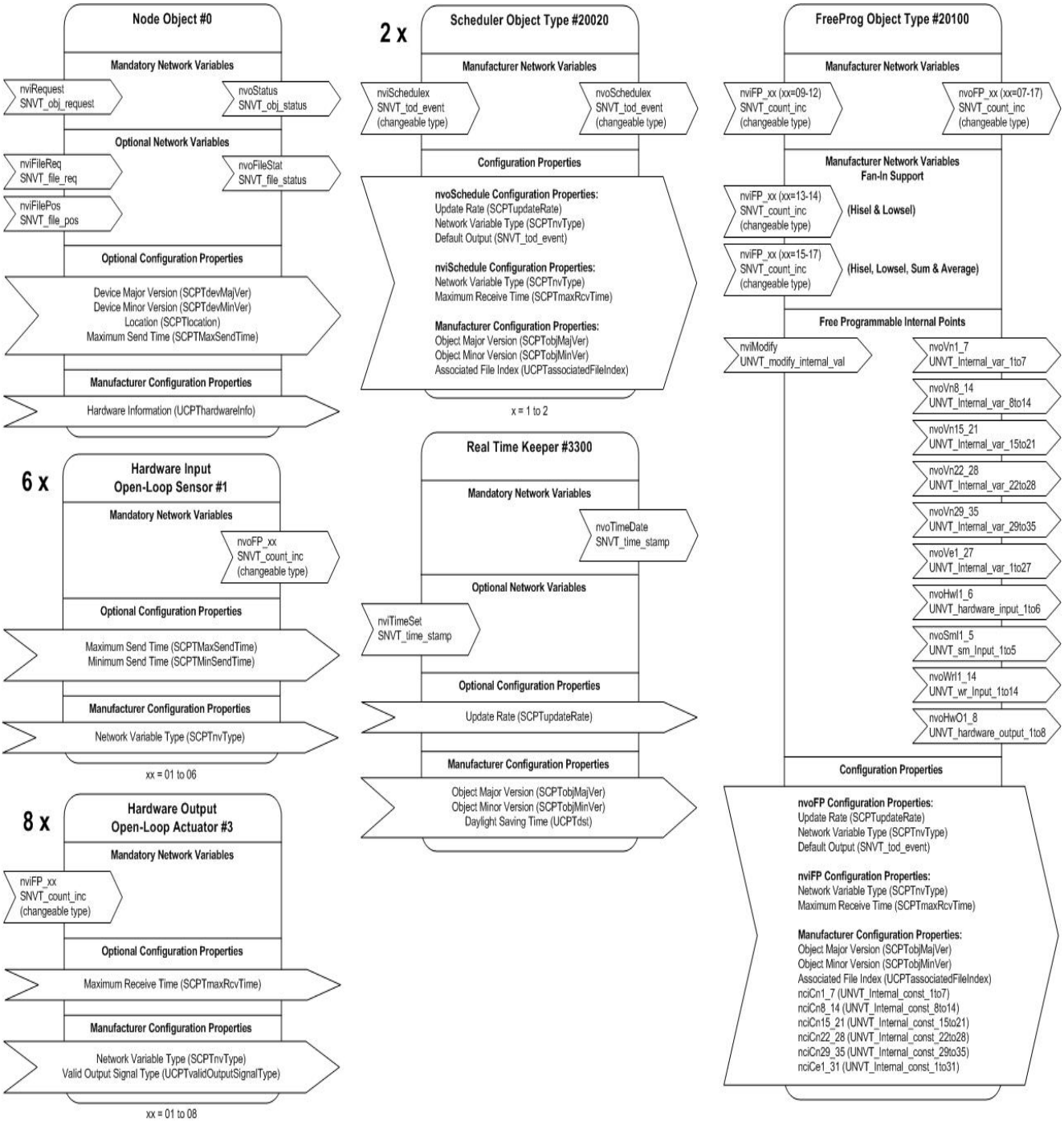

Figure 8: GPI LONMARK Objects and Network Variables - LN-PRG203-2

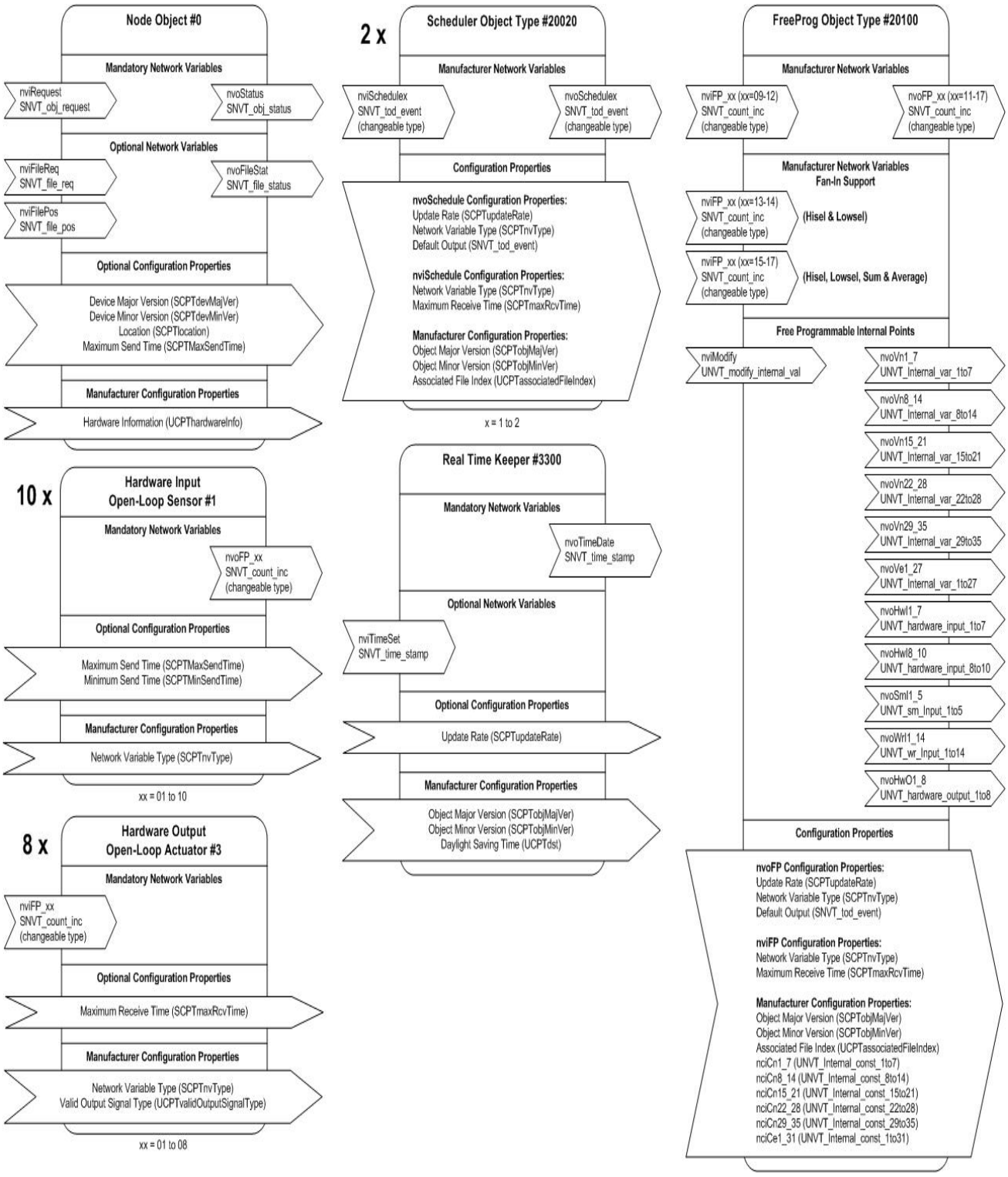

Figure 9: GPI LONMARK Objects and Network Variables - LN-PRG300-2

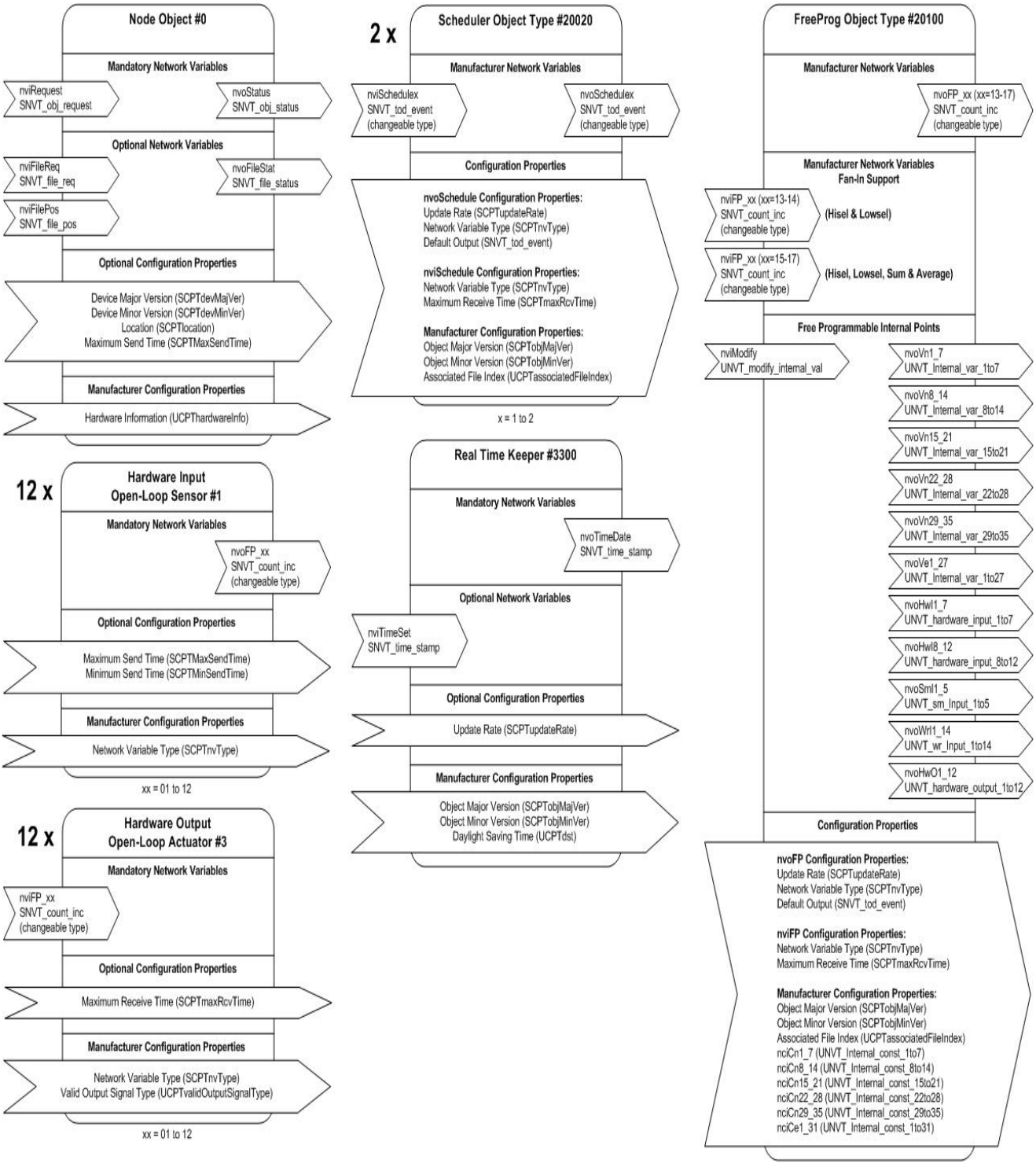

Figure 10: GPI LONMARK Objects and Network Variables - LN-PRG4x0-2

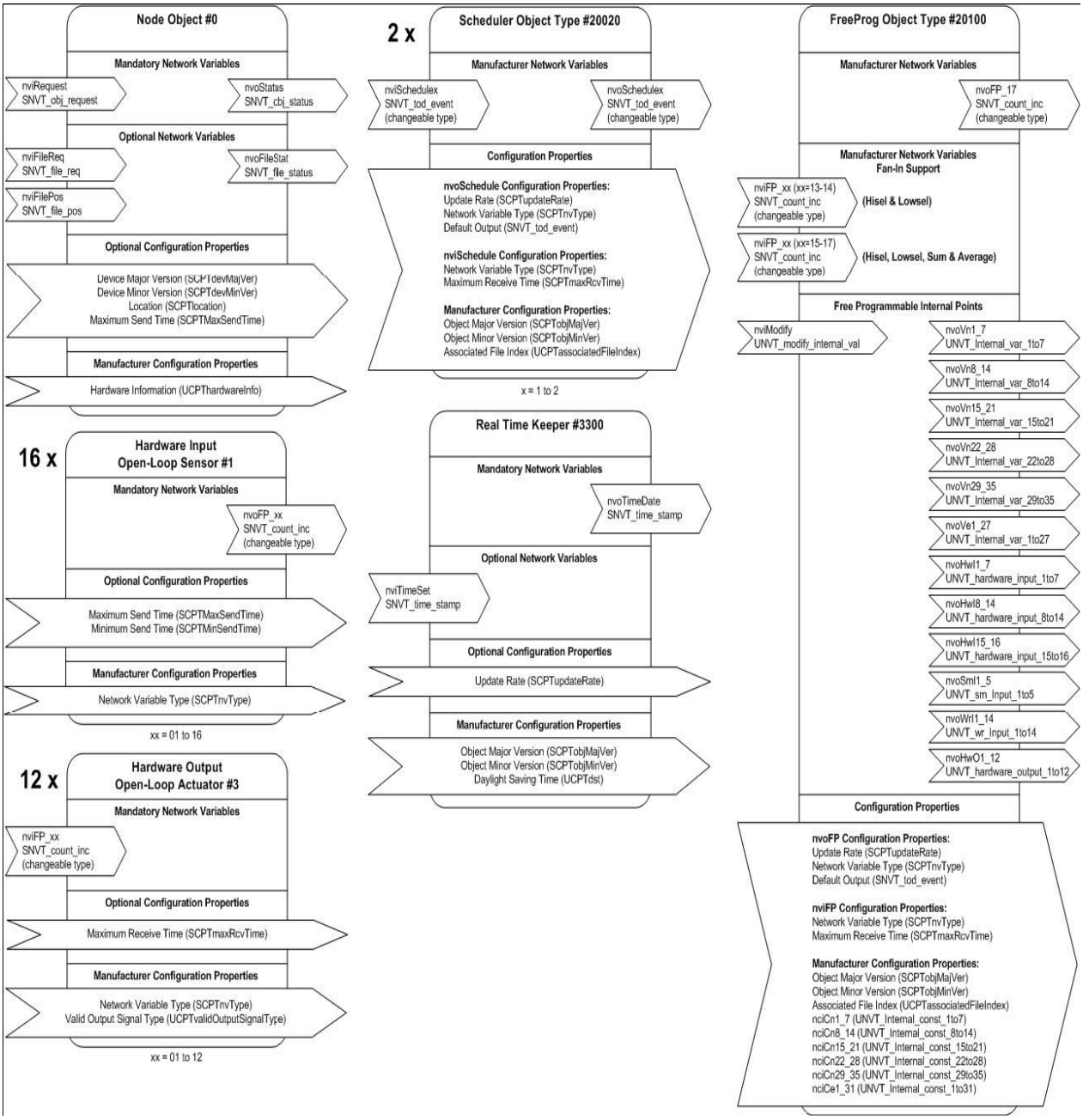

Figure 11: GPI LONMARK Objects and Network Variables--LN-PRG5x0-2

Technical Specifications

LN-PRG203-1 (Part 1 of 2)

Product Code	LN-PRG203-2
Power Requirement	Voltage: 24 VAC/DC; ±15%, 50/60 Hz, Class 2 Protection: 1.85 A auto-reset fuse Typical Consumption: 18 VA with 2 triac outputs ON and 2 outputs with 20 mA load at 12 VDC Maximum Consumption: 25 VA
Ambient Storage Conditions	Ambient Operating Temperature: 0 to 70°C (32 to 158°F) Ambient Storage Temperature: -20 to 70°C (-4 to 158°F) Ambient Relative Humidity: 0 to 90% noncondensing
General	Processor: Neuron® 3150™, 8 bits, 10 MHz Memory: Nonvolatile Flash 64k (APB application); Nonvolatile Flash 128k (storage) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk® protocol Status Indicator: Green LED - power status and LON TX, Orange LED - service and LON RX Communication Jack: LON audio jack mono 1/8 in (3.5 mm) LONMARK Interoperability: Version 3.4 Device Class: Multi I/O Module LONMARK Functional Profile: Input Objects: Open-Loop Sensor #1, Output Objects: Open-Loop Sensor #3
Enclosure	Material: ABS type PA-765A Dimensions (with screws): 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) Shipping Weight: 0.97 lb (0.44 kg)
Electromagnetic Compatibility	CE Emission: EN61000-6-3: 2007; Generic standards for residential, commercial, and light-industrial environments. CE Immunity: EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments. FCC: This device complies with FCC rules part 15, subpart B, class B
Agency	UL Listed: UL916 Energy management equipment Material: UL94-5VA
Inputs	Universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact; 500 milliseconds minimum ON/OFF Voltage: 0 to 10 VDC, Current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Resistor Support: Thermistor: Type 2 and Type 3 10k ohms (10k ohms at 25°C [77°F]) Range: -40 to 150°C (-40 to 302°F) Platinum: PT1000 1k ohm (1k ohms at 0°C [32°F]) Range: -40 to 150°C (-40 to 302°F) PT100: 100 ohms (100 ohms at 0°C [32°F]) Range: -40 to 135°C (-40 to 275°F) Nickel: RTD Ni1000 (1k ohm at 0°C [32°F]) Range: -40 to 150°C (-40 to 302°F) Potentiometer: Translation table configurable on several points Input Resolution: 16-bit analog/digital converter

LN-PRG203-1 (Part 2 of 2)

Outputs	Digital: 24 VAC Triac, digital (on/off), PWM, or floating software configurable 0.5 A continuous 1.0 A at 15% duty cycle for a 10-minute period PWM control: adjustable period from 2 seconds to 15 minutes Floating control: requires two consecutive outputs minimum plus on/off: 500 milliseconds adjustable drive time period External or internal power supply (jumper selectable) Universal: 0-10 VDC, digital 0-12 VDC (on/off), PWM, or floating PWM control: adjustable period from 2 seconds to 15 minutes Floating control: requires two consecutive outputs minimum plus on/off: 500 milliseconds adjustable drive time period 60 mA maximum at 12 VDC (60°C [140°F]) minimum resistance 200 ohms Auto reset fuse 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) Output Resolution: 10-bit digital/analog converter
Wireless[1]	Communication: EnOcean® Wireless standard Number of Wireless Inputs: 14 (some sensors may require more than one wireless input) Supported Wireless Receivers: Wireless Receiver 315 (LN-WMOD315-0) and Wireless Receiver 868 (LN-WMOD868-0) Cable: Connector: 4P4C modular jack, Length: 3 ft (1 m)

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.

LN-PRG300-1 (Part 1 of 2)

Product Code	LN-PRG300-2
Power Requirement	Voltage: 24 VAC/DC; ±15%, 50/60 Hz, Class 2 Protection: 1.85 A auto-reset fuse Typical Consumption: 18 VA, all outputs with 20 mA load at 12 VDC Maximum Consumption: 33 VA
Ambient Storage Conditions	Ambient Operating Temperature: 0 to 70°C, (32 to 158°F) Ambient Storage Temperature: -20 to 70°C, (-4 to 158°F) Ambient Relative Humidity: 0 to 90% noncondensing
General	Processor: Neuron 3150, 8 bits, 10 MHz Memory: Nonvolatile Flash 64k (APB application), Nonvolatile Flash 128k (storage) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk protocol Clock: Real-time clock chip, CR2032 lithium battery (for clock) Status Indicator: Green LED - power status and LON TX, Orange LED - service and LON RX Communication Jack: LON audio jack mono 1/8 in (3.5 mm) LONMARK Interoperability: Version 3.4 Device Class: Multi I/O Module LONMARK Functional Profile: Input Objects: Open-Loop Sensor #1, Output Objects: Open-Loop Sensor #3

LN-PRG300-1 (Part 2 of 2)

Enclosure	Material: ABS type PA-765-A Dimensions (with screws): 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) Shipping Weight: 0.86 lb (0.39 kg)
Agency	UL Listed: UL916 Energy management equipment Material: UL94-5VA
Electromagnetic Compatibility	CE Emission: EN61000-6-3: 2007 Generic standards for residential, commercial, and light-industrial environments. CE Immunity: EN61000-6-1: 2007 Generic standards for residential, commercial, and light-industrial environments.
Inputs	Universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact, 500 ms minimum ON/OFF Analog Voltage: 0 to 10 VDC, Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Resistor Support: Thermistor: Type 2, Type 3 10k ohms (10k ohms @ 25ºC [77ºF]) Range: -40 to 150ºC, (-40 to 302ºF) Platinum: Pt1000 (1k ohm at 0ºC [32ºF]) Range: -40 to 150ºC (-40 to 302ºF) PT100: 100 ohms 1k ohm at 0ºC [32ºF]) Range: -40 to 135ºC (-40 to 275ºF) Nickel: Ni1000 (1k ohm at 0ºC [32ºF]) Range: -40 to 150ºC (-40 to 302ºF) Potentiometer: Translation table configurable on several points, Input Resolution: 16-bit analog/digital converter
Outputs	Quantity: 8 (software configurable) 0 to 10 VDC, digital 0 to12 VDC (on/off), PWM, or Floating PWM output: adjustable period from 2 seconds to 15 minutes Floating control: requires two consecutive outputs minimum pulse on/off: 500 milliseconds adjustable drive time period 60 mA maximum @ 12 VDC (60ºC [140ºF]) Minimum load 200 ohms Auto reset fuse 60 mA at 60ºC (140ºF) 100 mA at 20ºC (68ºF) Output Resolution: 10-bit digital/analog converter
Wireless[1]	Communication: EnOcean® Wireless standard Number of Wireless Inputs: 14 (some sensors may require more than one wireless input) Supported Wireless Receivers: Wireless Receiver 315 (LN-WMOD315-0) and Wireless Receiver 868 (LN-WMOD868-0) Cable: Connector: 4P4C modular jack, Length: 3 ft (1 m)

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.

LN-PRG410-1 and LN-PRG400-1 (Part 1 of 2)

Product Codes	LN-PRG410-2 and LN-PRG400-2
Power Requirement	Voltage: 24 VAC/DC; ±15%, 50/60 Hz, Class 2 Protection: 3.0 A user-replaceable fuse Typical Consumption: 25 VA Maximum Consumption: 50 VA Power Supply: 15 VDC output used to power 4 to 20 mA inputs
Ambient Storage Conditions	Ambient Operating Temperature: 0 to 70ºC, (32 to 158ºF) Ambient Storage Temperature: -20 to 70ºC, (-4 to 158ºF) Ambient Relative Humidity: 0 to 90% noncondensing
General	Standard: LONMARK Functional Profile: SCC-VAV Controller #8502 Processor: Neuron 3150, 8 bits, 10 MHz Memory: Nonvolatile Flash 64k (APB application), Nonvolatile Flash 128k (storage) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk protocol Clock: Real-time clock chip, CR2032 lithium battery (for clock) Status Indicator: Green LED - power status and LON TX, Orange LED - service and LON RX Communication Jack: LON audio jack mono 1/8 in (3.5 mm) LONMARK Interoperability: Version 3.4 Device Class: Multi I/O Module LONMARK Functional Profile: Input Objects: Open-Loop Sensor #1, Output Objects: Open-Loop Sensor #3
Enclosure	Material: ABS type PA-765A 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)
Agency	UL Listed: UL916 Energy management equipment Material: UL94-5VA
Electromagnetic Compatibility	CE Emission: EN61000-6-3: 2007; Generic standards for residential, commercial, and light-industrial environments. CE Immunity: EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments.
Inputs	Universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact (500 milliseconds minimum ON/OFF) Analog Voltage: 0 to 10 VDC, Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Resistor Support: Thermistor: Type 2, Type 3 10k ohms (10k ohms at 25ºC [77ºF]) Range: -40 to 150ºC (-40 to 302ºF) Platinum: Pt1000 (1k ohm at 0ºC [32ºF]) Range: -40 to 150ºC (-40 to 302ºF) PT100: 100 ohms 1k ohm at 0ºC [32ºF]) Range: -40 to 135ºC (-40 to 275ºF) Nickel: Ni1000 (1k ohm at 0ºC [32ºF]) Range: -40 to 150°C (-40 to 302°F) Potentiometer: Translation table configurable on several points, Input Resolution: 16-bit analog/digital converter

LN-PRG410-1 and LN-PRG400-1 (Part 2 of 2)

Outputs	Software and jumper configurable 0 to 10 VDC, digital 0 to12 VDC (on/off), PWM, or Floating[1] PWM output: adjustable period from 2 seconds to 15 minutes Floating control: requires two consecutive outputs minimum pulse on/off: 500 milliseconds adjustable drive time period 60 mA maximum at 12 VDC (60°C [140°F]) Minimum load 200 ohms Auto reset fuse 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) Output Resolution: 10-bit digital/analog converter Power Supply Output: 15 VDC, maximum 240 mA
Wireless[2]	Communication: EnOcean® Wireless standard Number of Wireless Inputs: 14 (some sensors may require more than one wireless input) Supported Wireless Receivers: Wireless Receiver 315 (LN-WMOD315-0) and Wireless Receiver 868 (LN-WMOD868-0) Cable: Connector: 4P4C modular jack, Length: 3 ft (1 m)

1. Available when programmed with LN GPI software.
2. 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.

LN-PRG510-1 and LN-PRG500-1 Controllers (Part 1 of 2)

Product Codes	LN-PRG510-2 and LN-PRG500-2
Power Requirement	Voltage: 24 VAC/DC; +/- 15%, 50/60 Hz, Class 2 Protection: 3.0 A user-replaceable fuse Typical Consumption: 25 VA all outputs with 20mA load at 12 VDC and 15 VDC output 80mA (4 x 20 mA) Maximum Consumption: 50 VA
Ambient Storage Conditions	Ambient Operating Temperature: 0 to 70°C, (32 to 158°F) Ambient Storage Temperature: -20 to 70°C, (-4 to 158°F) Ambient Relative Humidity: 0 to 90% noncondensing
General	Standard: LONMARK Functional Profile: SCC-VAV Controller #8502 Processor: Neuron 3150, 8 bits, 10 MHz Memory: Nonvolatile Flash 64k (APB application), Nonvolatile Flash 64k (storage) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk protocol Transceiver: FTX-1 LONMARK Interoperability: Version 3.4 Device Class: Multi I/O Module LONMARK Functional Profile: Input Objects: Open-Loop Sensor #1, Output Objects: Open-Loop Sensor #3
Enclosure	Material: LEXAN® 500R (GE) Dimensions (with screws): 3.74 x 7.68 x 2.82 in. (95 x 195 x 72 mm) Shipping Weight: 1.76 lb (0.80 kg)
Agency	UL Listed: UL916 Energy management equipment Material: UL94-5VA
Electromagnetic Compatibility	CE Emission: EN61000-6-3: 2007; Generic standards for residential, commercial, and light-industrial environments. CE Immunity: EN61000-6-1: 2007; Generic standards for residential, commercial, and light-industrial environments.

LN-PRG510-1 and LN-PRG500-1 Controllers (Part 2 of 2)

Inputs	Universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact Analog Voltage: 0 to 10 VDC, Accuracy: ±0.5%, Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Resistor Support: Thermistor: Type 2, Type 3 10k ohms (10k ohms at 25°C [77°F]) Range: -40 to 150ºC (-40 to 302ºF) Platinum: Pt1000 (1k ohm at 0°C [32°F]) Range: -40 to 150°C (-40 to 302°F) PT100: 100 ohms 1k ohm at 0°C [32°F]) Range: -40 to 135°C (-40 to 275°F) Nickel: Ni1000 (1k ohm at 0°C [32°F]) Range: -40 to 150°C (-40 to 302°F) Potentiometer: Translation table configurable on several points Input Resolution: 16-bit analog/digital converter
Outputs	Universal 0 to 10 VDC, digital 0 to12 VDC (on/off), 0-20 mA, PWM, or floating[1] PWM output: adjustable period from 2 seconds to 15 minutes Floating control: requires two consecutive outputs minimum pulse on/off: 500 milliseconds adjustable drive time period 60 mA maximum at 12 VDC (60°C; 140°F) Minimum load 200 ohms Auto reset fuse 60 mA at 60°C (140°F) 100 mA at 20°C (68°F) Output Resolution:10-bit digital/analog converter Power Supply Output: 15 VDC, maximum 240 mA
Wireless[2]	Communication: EnOcean® Wireless standard Number of Wireless Inputs: 14 (some sensors may require more than one wireless input) Supported Wireless Receivers: Wireless Receiver 315 (LN-WMOD315-0) and Wireless Receiver 868 (LN-WMOD868-0) Cable: Connector: 4P4C modular jack, Length: 3 ft (1 m)

1. Available when programmed with LN GPI software.
2. 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.

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.*

Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202

Published in U.S.A.
www.johnsoncontrols.com