LN Series Remote Input/Output (I/O) Controller

Product Bulletin

LN-IO520-1, LN-IO401-1, LN-IO301-1

The LN Series Remote Input/Output (I/O) controller extends the capability of the LN Series system as well as monitors and controls various Heating, Ventilating, and Air Conditioning (HVAC) applications.

The LN Remote I/O controllers are based on LONWORKS® technology for interoperability and peer-to-peer communication between controllers without any intermediary but also integrate seamlessly into the Metasys® system.

Figure 1: LN-IO520-1 Controller

Table 1: Features and Benefits

Features	Benefits
Configurable Software	Features an LNS® plug-in that provides the ability to easily configure inputs and outputs. You can also configure input and output properties and hardware Simple Network Variable Types (SNVTs).
Robust Hardware	Features a light-weight fire retardant plastic enclosure, software configurable universal inputs, Pulse Width Modulation (PWM) or digit triac outputs, a status indicator on each output, and a fuse-protected power supply.
Interoperability	Features peer-to-peer communication between controllers based on LONWORKS technology. The Remote I/O controller is LONMARK® certified according to the Interoperability Guidelines Version 3.4.

LN Remote I/O Controller Overview

You can configure the Remote I/O controller by using LNS based software, such as LN-Builder 3 software. The LN-Builder 3 configuration interface is designed to simplify the configuration of inputer and output properties, such as input types, input minimum/input maximum values, output types, and network variable types.

LNS LN-Configure Plug-in

This powerful and intuitive LNS plug-in provides easy customization of hardware I/O, control sequences, and communication schemes.

Easily configure all of the devices' parameters, including inputs, outputs, heating and cooling set points, variable airflow, and PID control loops. You can also enable and configure built-in features such as load shedding, flow calibration, frost protection, and slave operation mode.
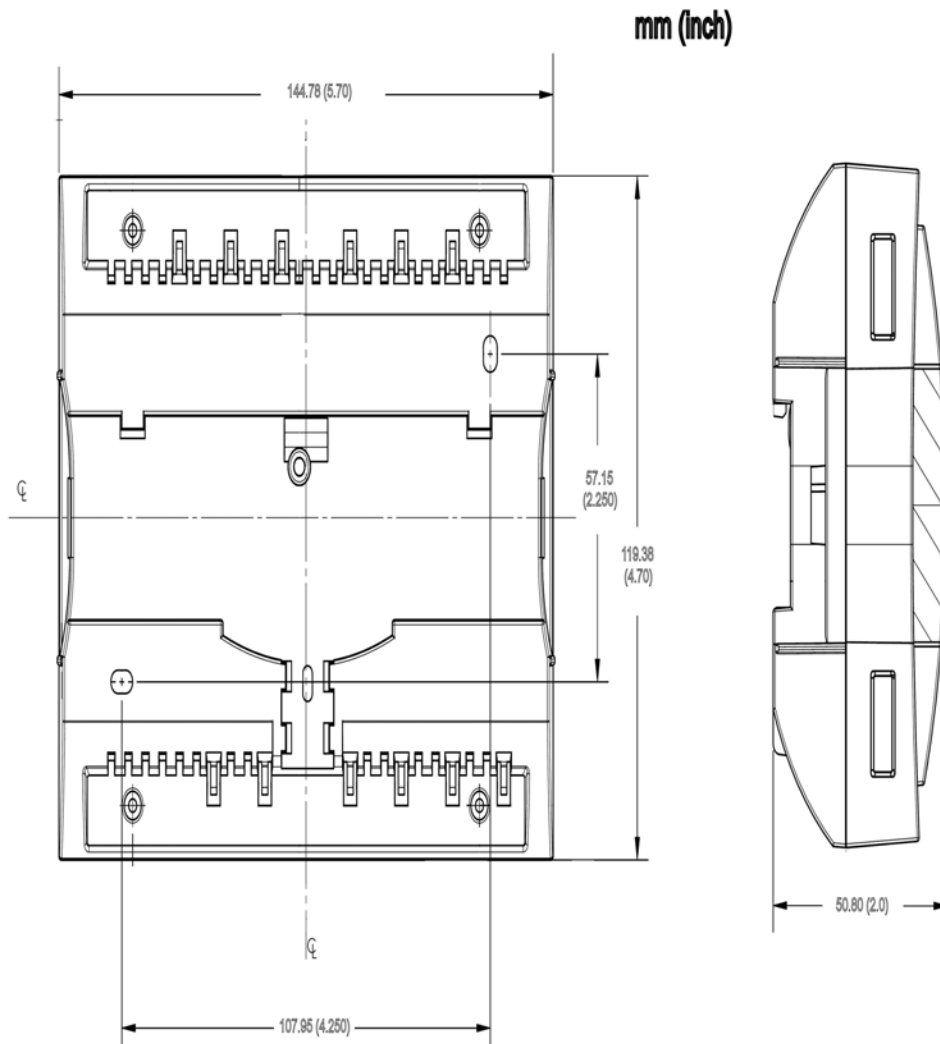

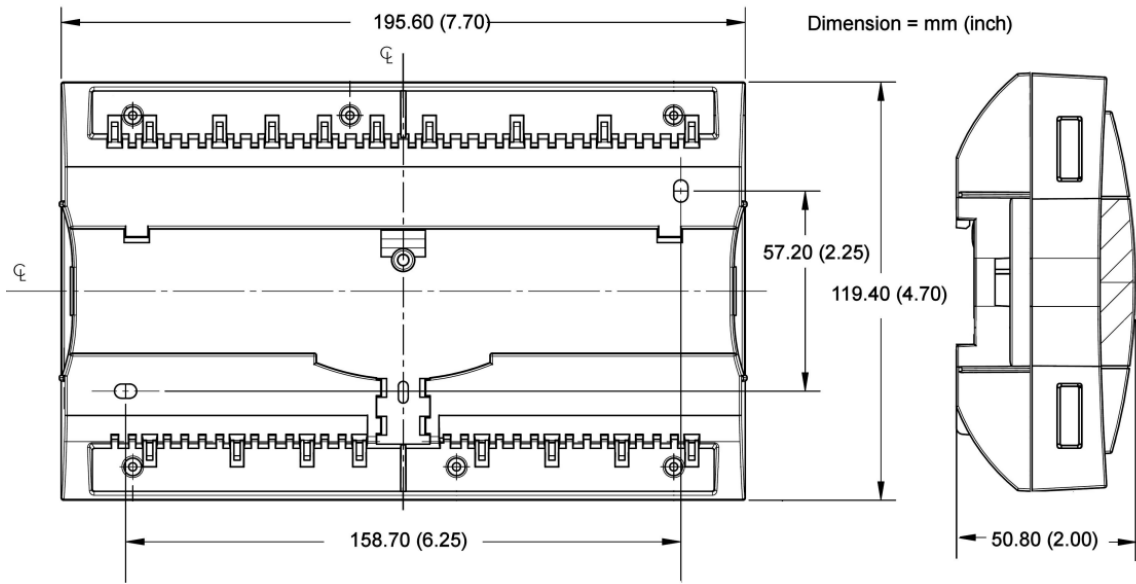**Figure 2: Dimensions - Remote I/O 301 Controllers**

Figure 3: Dimensions - Remote I/O 401 and 520 Controllers

Output Configuration and Remote I/O Controller Selection Guide

The LN Remote I/O controllers comprise three different devices, each having its own output configuration, but all having identical input, power, environmental and general specifications.

Table 2:   LN-IO301-1

Inputs	8
Outputs	8 Digital Triac 1.0 A @ 24 VAC External power supply PWM output: adjustable period from 2 seconds to 15 minutes
Output Resolution	12-bit digital/analog converter

Table 3:   LN-IO401-1

Inputs	12
Outputs	12 Digital Triac 1.0 A @ 24 VAC External power supply PWM output: adjustable period from 2 seconds to 15 minutes
Output Resolution	12-bit digital/analog converter

Table 4:   LN-IO520-1

Inputs	16
Outputs	0
Wizard	LNS Plug-in

LONMARK Objects and Network Variables

Figure 4 shows the LONMARK Objects and Network Variables.

Node
Object Type #0

Mandatory Network Variables

nviRequest
SNVT_obj_request

nvoStatus
SNVT_obj_status

Optional Network Variables

nvoFileDirectory
SNVT_address

Configuration Properties
Device Major Version (optional)
Device Minor Version (optional)
Location (optional)
Maximum Send Time (optional)

Manufacturer Network Variables

nvoRMIOstate
SNVT_state_64

nvoRMIOalarm
SNVT_state_64

Manufacturer Configuration Properties
Hardware Information

Hardware Input
Object Type #1

Mandatory Network Variables

nvoHwInputx (x=1,...)
SNVT_temp_f
(Changeable type)

Configuration Properties

Minimum Send Delta (optional)
Override Value (optional)
Minimum Range (optional)
Maximum Range (optional)

Manufacturer Configuration Properties

Maximum Send Time
Maximum NV Length
NV Type
Minimum Send Time
Default Value
Valid Input Signal Types
Input Signal Types
Input Signal Interpretation
Offset
Thermistor Type
Hardware Input Options
Translation Table
Object Major Version
Object Minor Version

Hardware Output
Object Type #3

nviHwOutputx (x=1,..)
SNVT_switch

Mandatory Network Variables

nviOvrHwOutx (x=1,..)
SNVT_switch

Optional Network Variables

nvoFbHwOutx (x=1,..)
SNVT_switch

Configuration Properties

Override Value (optional)
Default Value (optional)

Manufacturer Configuration Properties

Maximum Receive Time
Maximum Send Time
Minimum Send Time
Minimum Range
Maximum Range
Valid Output Signal Types
Output Signal Type
Hardware Output Options
Object Major Version
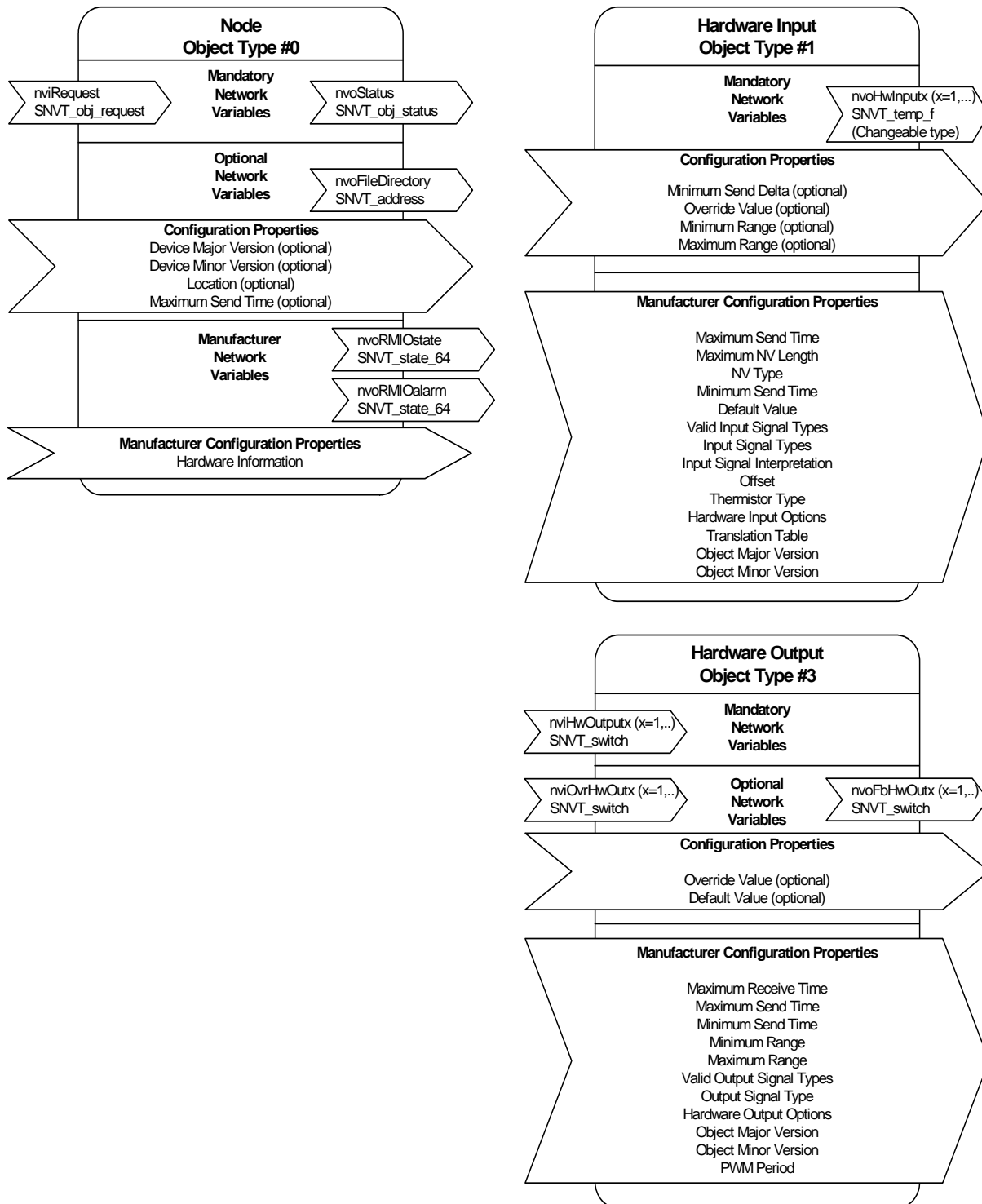Object Minor Version
PWM Period

Figure 4: LONMARK Objects and Network Variables - LN Remote I/O Controllers

Technical Specifications

LN-VAVLFS and LN-VVTLFS

Product Codes	LN-IO301-1, LN-IO401-1, LN-IO520-1
Power Requirements	Voltage: 24 VAC/DC; ±15%, 50/60 Hz, Class 2
	Protection: 1.35 A auto-reset fuse
	Consumption: 6 VA
	Maximum Consumption: 15 VA
Ambient Storage Conditions	Ambient Operating Temperature: 0 to 70^oC (32 to 158^oF)
	Ambient Storage Temperature: -20 to 70^oC (-4 to 158^oF)
	Ambient Relative Humidity: 0 to 90% noncondensing
General	Processor: Neuron® 3150®, 8 bits, 10 MHz
	Memory: Nonvolatile Flash 64k (APB application), Nonvolatile Flash 64k (storage)
	Communication: LonTalk® protocol
	Transceiver: FTX-1
	Channel: TP/FT-10; 78 Kbps
	Status Indicator: Green LED: power status and LON TX
	Orange LED: sevice and LON RX
	Communication Jack: LON audio jack mono 1/8 in. (3.5 mm)
Enclosure (Housing)	Material: ABS PA-765A
	Dimensions (with screws): 301: 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm)
	401/520: 7.7 x 4.7 x 2.0 in. (195.6 x 119.4 x 50.8 mm)
	Shipping Weight: 301: 0.77 lb (0.35 kg), 401/520: 0.86 lb (0.39 kg)
	Installation: Direct DIN-rail mounting or wall mounting through mounting holes
Inputs	Quantity: universal (software configurable)
	Input Types:
	Digital: 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), Accuracy: ±0.5%
	Resistor Support:
	Thermistor: Types 2, & 3 10k ohms
	Range: -40 to 150^oC, (-40 to 302^oF)
	Accuracy: $±0.5^oC$, $±0.9^oF$
	Resolution: 0.1 to 0.18^o F (10k ohms to 10k ohms supported using translation table)
	Platinum: RTD 1k ohm
	Range: -40 to 150^oC, (-40 to 302^oF)
	Accuracy: $±1.0^oC$, $±1.8^oF$,
	PT100: 100 ohms
	Range: -40 to 135^oC, (-40 to 275^oF)
	Accuracy: $±1.0^oC$, $±1.8^o$ F
	Potentiometer:
	Translation table configurable on several points, Accuracy: ±0.5%
	Input Resolution: 16 bit analog/digital converter
Compliance	CE: Emission: EN55022: 1998 class B
	Immunity: EN61000-4-2: 1995, level 3 in air
	EN61000-4-2: 1995, level 2 by contact
	EN61000-4-3: 1996, level 2
	EN61000-4-4: 1995, level 2
	EN61000-4-6: 1996, level 2
	ENV 50204: 1995, level 2
	United States: UL Listed UL916 Energy management equipment, material: UL94-5VA

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.

North American Emissions Compliance

United States

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

LX Series Remote Input/Output (I/O) Controller

Product Bulletin

LX-IO520-1, LX-IO401-1, LX-IO301-1

The LX Series Remote Input/Output (I/O) controller extends the capability of the LX Series system as well as monitors and controls various Heating, Ventilating, and Air Conditioning (HVAC) applications.

The LX Remote I/O controllers are based on LONWORKS® technology for interoperability and peer-to-peer communication between controllers without any intermediary but also integrate seamlessly into Facility Explorer.

Figure 1: LX-IO520-1 Controller

Table 1: Features and Benefits

Features	Benefits
Configurable Software	Features wizards that provide the ability to easily configure inputs and outputs. You can also configure input and output properties and hardware Simple Network Variable Types (SNVTs).
Robust Hardware	Features a light-weight, fire retardant plastic enclosure; software configurable universal inputs; Pulse Width Modulation (PWM) or digital triac outputs; a status indicator on each output; and a fuse-protected power supply.
Interoperability	Features peer-to-peer communication between controllers based on LONWORKS technology. The Remote I/O controller is LONMARK® certified according to the Interoperability Guidelines Version 3.4.

LX Remote I/O Controller Overview

You can configure the Remote I/O controller by using LX wizards and Facility Explorer. The wizard configuration interface is designed to simplify the configuration of input and output properties such as input types, input minimum/input maximum values, output types, and network variable types.

Remote I/O Configuration Wizard

This powerful and intuitive wizard provides easy customization of hardware I/O, and communication schemes. Easily configure all of the devices' parameters, including inputs and outputs.
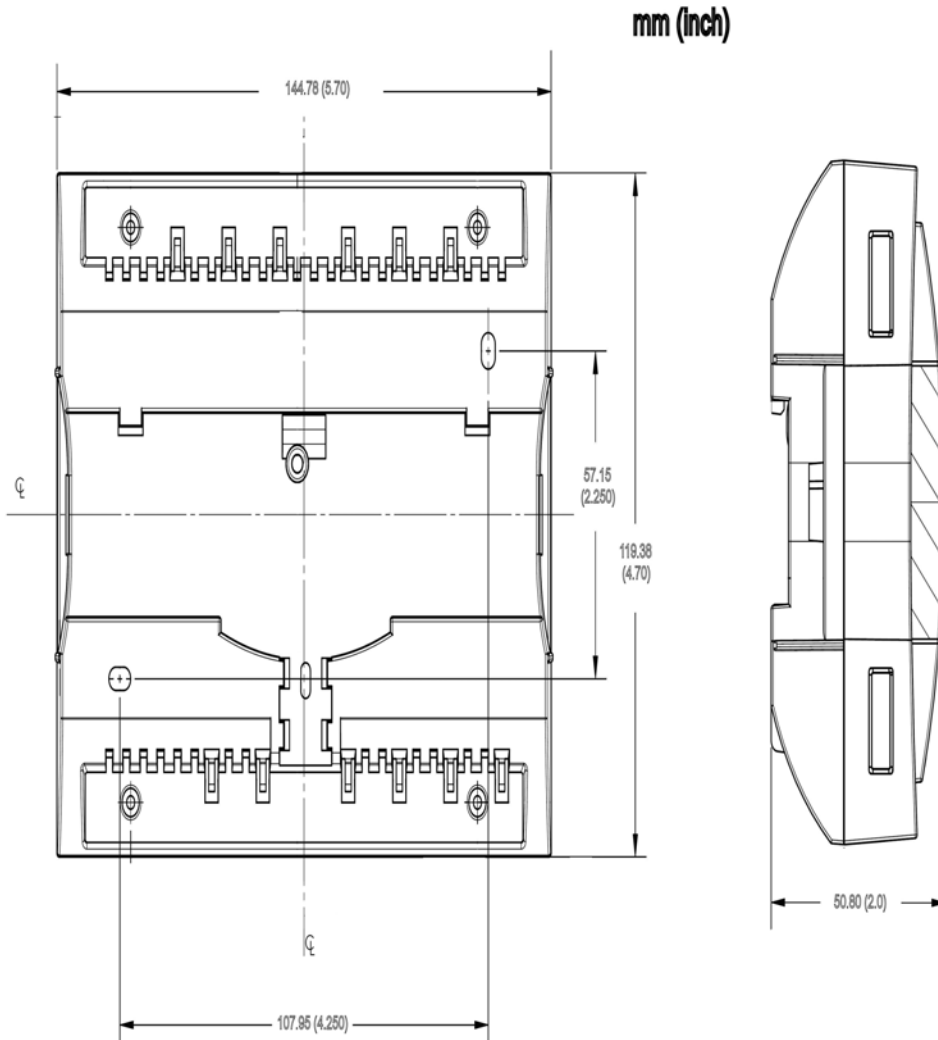

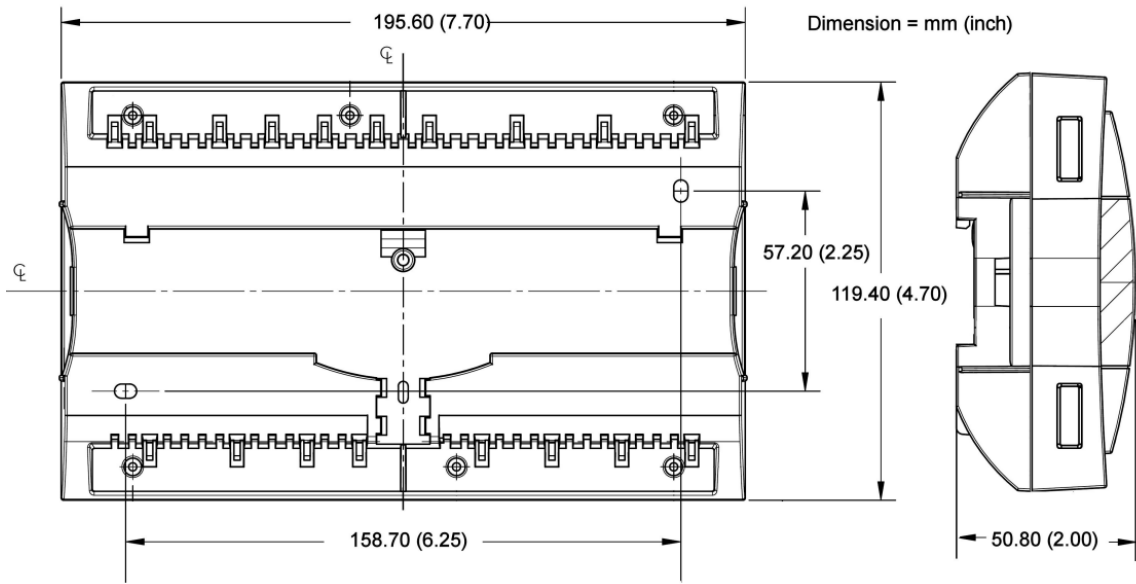**Figure 2: Dimensions - Remote I/O 301 Controllers**

Figure 3: Dimensions - Remote I/O 401 and 520 Controllers

Output Configuration and Remote I/O Controller Selection Guide

The LX Remote I/O controllers comprise three different devices, each having its own output configuration, but all having identical input, power, environmental, and general specifications.

Table 2:   LX-IO301-1

Inputs	8
Outputs	8 Digital Triac 1.0 A at 24 VAC External power supply PWM output: adjustable period from 2 seconds to 15 minutes
Output Resolution	12-bit digital/analog converter

Table 3:   LX-IO401-1

Inputs	12
Outputs	12 Digital Triac 1.0 A at 24 VAC External power supply PWM output: adjustable period from 2 seconds to 15 minutes
Output Resolution	12-bit digital/analog converter

Table 4:   LX-IO520-1

Inputs	16
Outputs	0
Output Resolution	12-bit digital/analog converter

LONMARK Objects and Network Variables

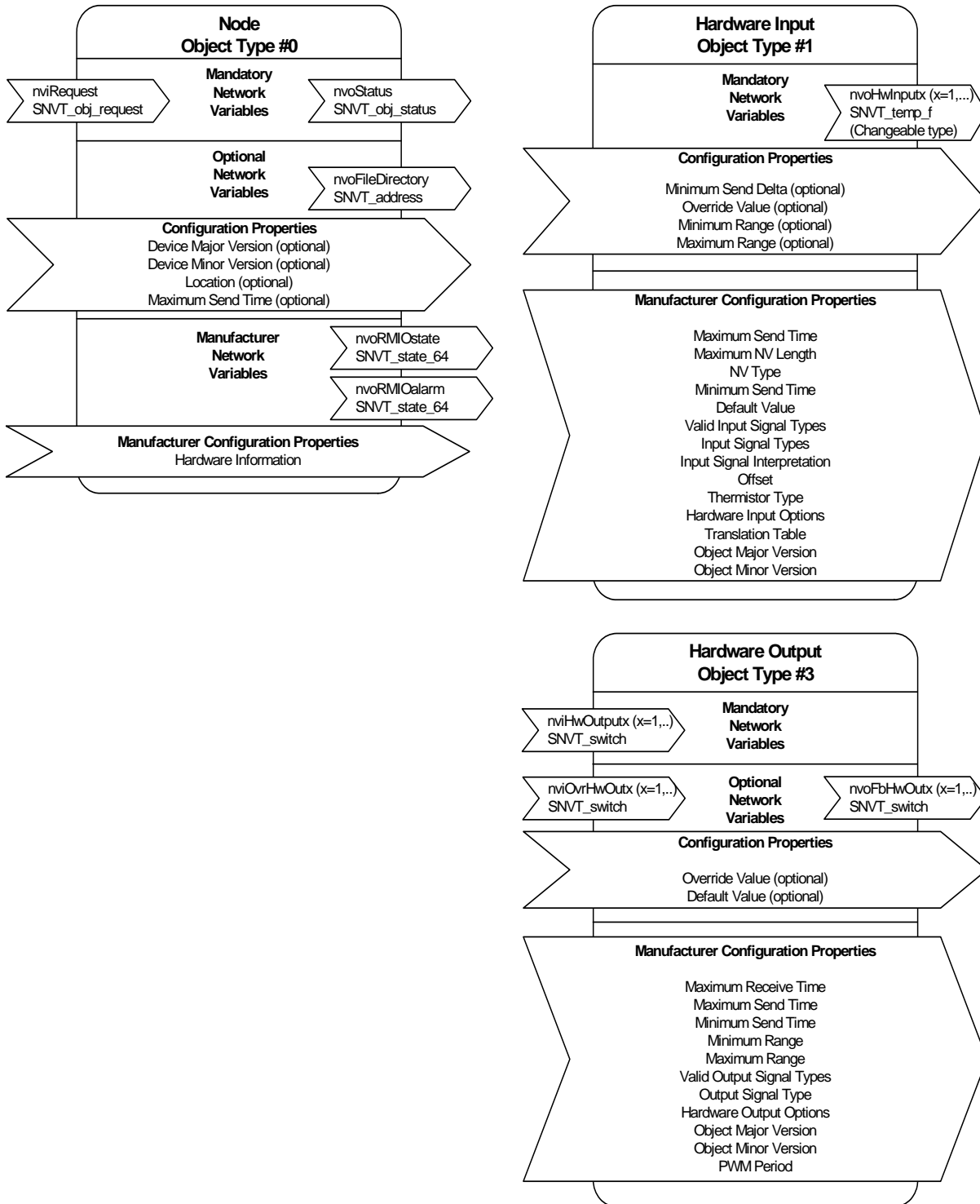Figure 4 shows the LX Remote I/O controller LONMARK Objects and Network Variables.

Node — Object Type #0

Mandatory Network Variables
- nviRequest — SNVT_obj_request
- nvoStatus — SNVT_obj_status

Optional Network Variables
- nvoFileDirectory — SNVT_address

Configuration Properties
- Device Major Version (optional)
- Device Minor Version (optional)
- Location (optional)
- Maximum Send Time (optional)

Manufacturer Network Variables
- nvoRMIOstate — SNVT_state_64
- nvoRMIOalarm — SNVT_state_64

Manufacturer Configuration Properties
- Hardware Information

Hardware Input — Object Type #1

Mandatory Network Variables
- nvoHwInputx (x=1,...) — SNVT_temp_f (Changeable type)

Configuration Properties
- Minimum Send Delta (optional)
- Override Value (optional)
- Minimum Range (optional)
- Maximum Range (optional)

Manufacturer Configuration Properties
- Maximum Send Time
- Maximum NV Length
- NV Type
- Minimum Send Time
- Default Value
- Valid Input Signal Types
- Input Signal Types
- Input Signal Interpretation
- Offset
- Thermistor Type
- Hardware Input Options
- Translation Table
- Object Major Version
- Object Minor Version

Hardware Output — Object Type #3

Mandatory Network Variables
- nviHwOutputx (x=1,..) — SNVT_switch

Optional Network Variables
- nviOvrHwOutx (x=1,..) — SNVT_switch
- nvoFbHwOutx (x=1,..) — SNVT_switch

Configuration Properties
- Override Value (optional)
- Default Value (optional)

Manufacturer Configuration Properties
- Maximum Receive Time
- Maximum Send Time
- Minimum Send Time
- Minimum Range
- Maximum Range
- Valid Output Signal Types
- Output Signal Type
- Hardware Output Options
- Object Major Version
- Object Minor Version
- PWM Period

Figure 4: LONMARK Objects and Network Variables - LX Remote I/O Controllers

Technical Specifications

LX-Remote I/O Controllers

Product Codes	LX-IO301-1, LX-IO401-1, LX-IO520-1
Power Requirements	Voltage: 24 VAC/DC; ±15%, 50/60 Hz, Class 2 Protection: 1.35 A auto-reset fuse Consumption: 6 VA Maximum Consumption: 15 VA
Ambient 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 64k (storage) Communication: LonTalk® protocol Transceiver: FTX-1 Channel: TP/FT-10; 78 Kbps 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)
Enclosure (Housing)	Material: ABS PA-765A Dimensions (with screws): LX-IO301-1: 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm) LX-IO401-1 and LN-IO520-1: 7.7 x 4.7 x 2.0 in. (195.6 x 119.4 x 50.8 mm) Shipping Weight: LX-IO301-1: 0.77 lb (0.35 kg), LX-IO401-1 and LN-IO520-1: 0.86 lb (0.39 kg) Installation: Direct DIN-rail mounting or wall mounting through mounting holes

Inputs	Quantity: universal (software configurable)
	Input Types:
	  Digital: Dry Contact,
	  Analog Voltage: 0 to 10 VDC, Accuracy: ±0.5%,
	  Analog current: 4 to 20 mA with 249 ohm external resistor (wired in parallel), Accuracy: ±0.5%
	  Resistor Support:
	Thermistor: Types 2 and 3 10k ohm
	  Range: -40 to 150°C, (-40 to 302°F)
	  Accuracy: ±0.5°C, ±0.9°F
	  Resolution: 0.1 to 0.18°F (10k ohm to 10k ohm supported using translation table)
	Platinum: RTD 1k ohm
	  Range: -40 to 150°C, (-40 to 302°F)
	  Accuracy: ±1.0°C, ±1.8°F,
	  PT100: 100 ohm
	  Range: -40 to 135°C, (-40 to 275°F)
	  Accuracy: ±1.0°C, ±1.8°F
	Potentiometer:
	  Translation table configurable on several points, Accuracy: ±0.5%
	Input Resolution: 16-bit analog/digital converter

Compliance	CE: Emission: EN55022: 1998 class B
	    Immunity: EN61000-4-2: 1995, level 3 in air
	                  EN61000-4-2: 1995, level 2 by contact
	                  EN61000-4-3: 1996, level 2
	                  EN61000-4-4: 1995, level 2
	                  EN61000-4-6: 1996, level 2
	                  ENV 50204: 1995, level 2
	United States: UL Listed UL916 Energy management equipment, material: UL94-5VA

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

*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.