

LX Application Specific, Remote I/O, and Free Programmable Controllers

Installation Instructions

LX-RTUL-1, LX-FCUL-1, LX-UVL-1, LX-HPUL-1, LX-IOxxx-1,
LX-PRG5xx-1, LX-PRG4xx-1, LX-PRG300-1, LX-PRG203-1

Code No. LIT-12011498

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Supersedes November 5, 2012

Refer to the [QuickLIT Web site](#) for the most up-to-date version of this document.

Application Requirements

Follow these recommendations for proper installation and subsequent operation of each controller:

- Properly inspect the product for shipping damage. Do not install damaged controllers.
- Record the Neuron® ID located on both sides of the device to commission the device later.
- Operate the controller under the following conditions:
 - Ambient temperature: 32 to 158°F (0 to 70°C)
 - Relative humidity: 0 to 90%, noncondensing

IMPORTANT: Prevent any static electric discharge to the controller. Static discharge can damage the controller and void the warranties.

North American Emissions Compliance

United States

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.

Canada

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

Industry Canada Statement

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

Installation

Dimensions

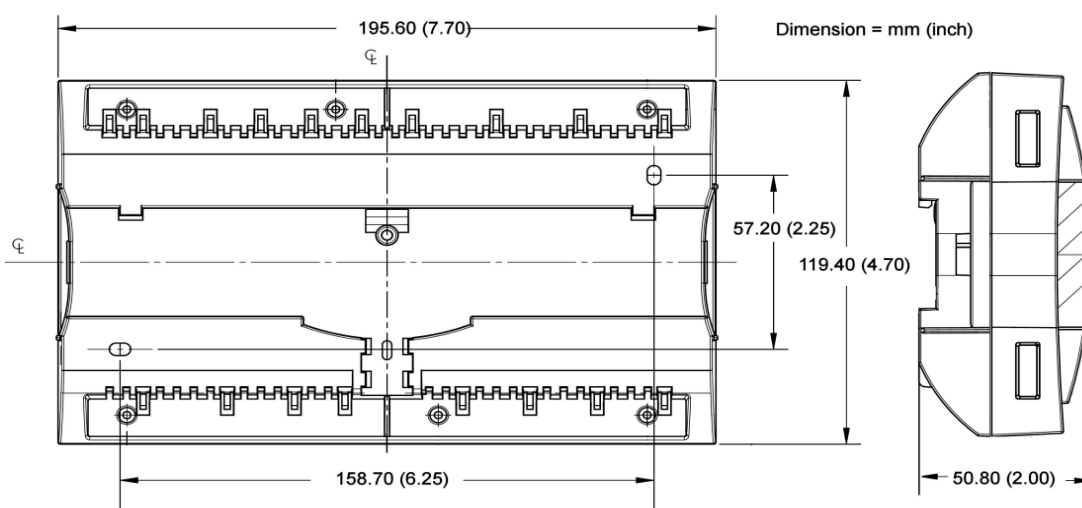


Figure 1: Dimensions - Remote I/O 401 and 520 Controllers

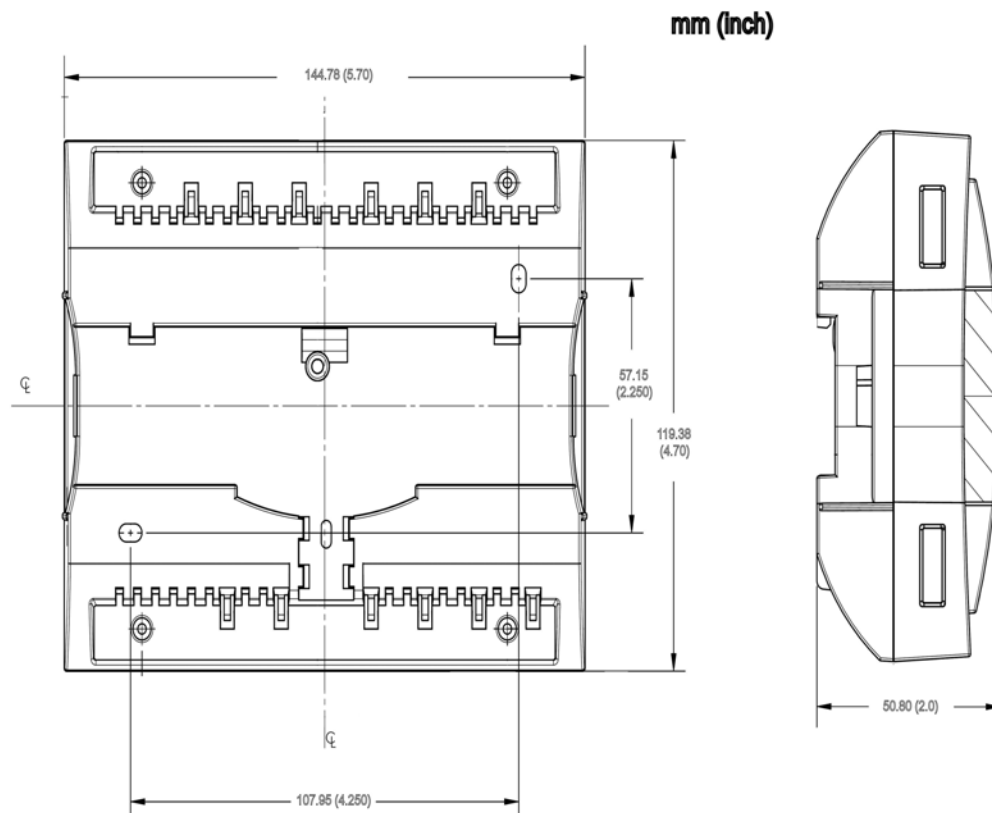


Figure 2: Dimensions - Remote I/O 301 Controllers

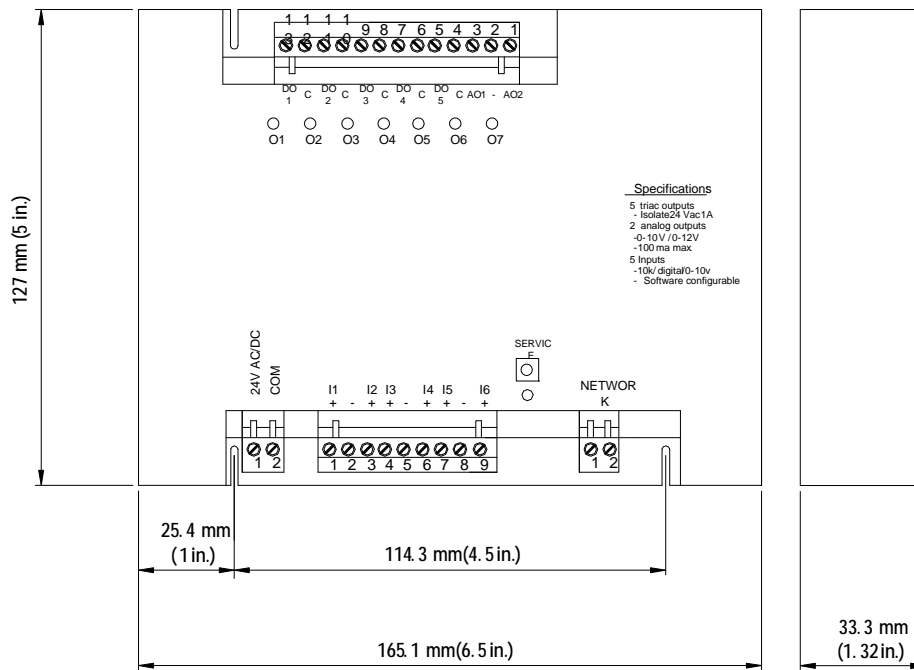


Figure 3: Dimensions - LX Application Specific Controllers

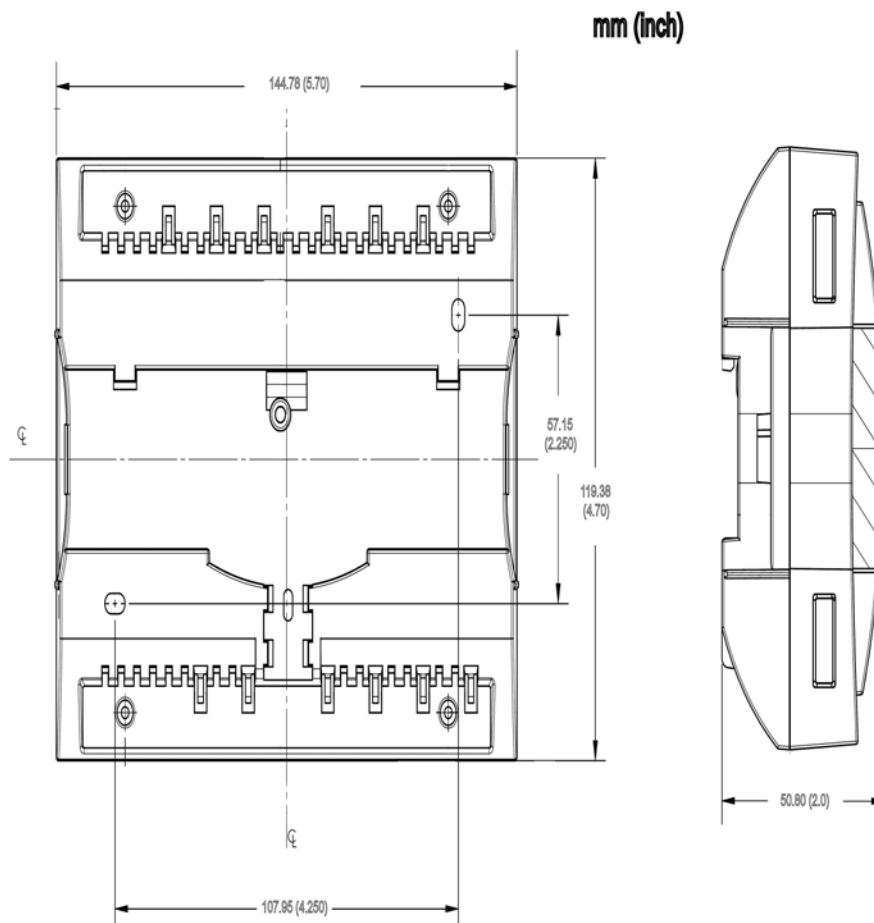


Figure 4: LX-PRG203-1 and LX-PRG300-1 Dimensions

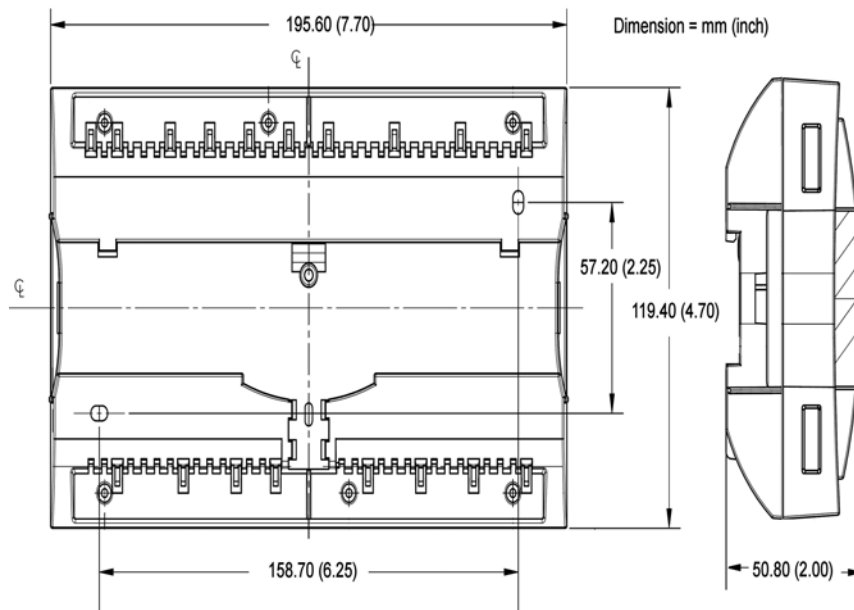


Figure 5: LX-PRG4x0-1 and LX-PRG5x0-1 Dimensions

Mounting

You can mount each controller on a DIN rail, in a panel, or on a wall. The controllers are equipped with two mounting holes 0.25 x 0.165 in. (6.35 x 4.191 mm).

DIN Rail

To mount the controller on a DIN rail:

1. Ensure the DIN rail is properly mounted on the wall.
2. Clip the controller onto the DIN rail.

Wall Mount

To mount the controller on a wall:

1. Use the side clips to separate the controller's front and back plates.
2. Use the holes on the back plate to mark the wall location.
3. Drill the holes.
4. Clean the surface and mount the controller using the appropriate screws.

Location Considerations

- Ensure you have proper clearance of controller enclosures, wiring terminals, and service pin for easy access, hardware configuration, and maintenance.
- Ensure proper ventilation of each controller and avoid areas where corroding; deteriorating; or explosive vapors, fumes, or gases may be present. Orient each controller with the ventilation slots and power supply/output terminal block connector towards the top to permit proper heat dissipation.

Wiring



CAUTION: Risk of Electric Shock.

Disconnect power supply before making electrical connections to avoid electric shock.

MISE EN GARDE : Risque de décharge électrique.

Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

Follow these wiring recommendations:

- Remove the front plate from the back plate to help with the wiring process. Use a small flat screwdriver to tighten the terminal connector screws once the wires are inserted.
- Keep power cables apart from other types of wiring to avoid ambient noise transmission to other wires.
- Use wires or flat cables ranging from 22 to 14 AWG (0.644-1.630 mm) per pole. Power cables must remain between 18 to 14 AWG (1.024-1.630 mm) diameter.
- Do not connect the universal inputs, analog/digital outputs, or common terminals to earth or chassis ground unless otherwise stated.
- Use a floating transformer configuration for the transformer powering each controller.

Power Wiring

When you are powering devices, use the following method to calculate the power requirements of the required transformer:

1. Add up the maximum power consumption of all controllers and multiply this sum by 1.3.
2. If the resulting number is higher than 100 VA, consider using multiple transformers.

Use an external fuse on the 24 VAC/DC side (secondary side) of the transformer to protect all controllers against power link spikes.

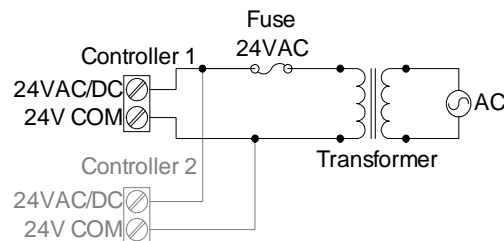


Figure 6: Power Wiring - AC

IMPORTANT: Maintain consistent polarity when you connect the controllers and devices to the transformer. Connect the COM terminal of each controller and each peripheral to the same terminal on the secondary side of the transformer.

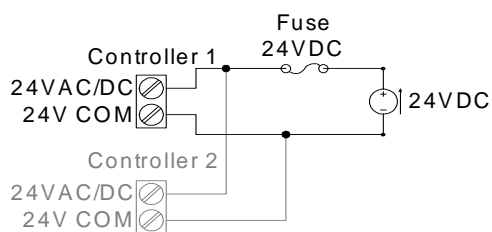


Figure 7: Power Wiring - DC

Input Wiring

Each controller has physical connections for inputs that are software configurable from LX wizards. You can configure each input in the software wizard to ensure proper input readings.

Wiring Digital and Resistive 10k Ohm Inputs

Use this input configuration to monitor digital dry contacts as well as 10k ohm potentiometers and 10k ohm NTC thermistors.

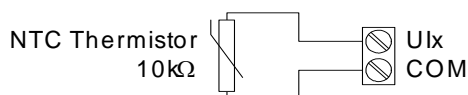


Figure 8: 10K Ohm Thermistor Input

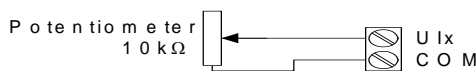


Figure 9: 10k Ohm Potentiometer Input

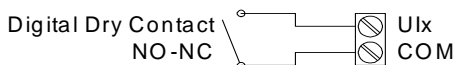


Figure 10: Digital Dry Contact (Normally Open [NO] and Normally Closed [NC])

Resistive 1k Ohm Inputs

Figure 11 shows an input configuration used to monitor 1k ohm platinum Resistive Temperature Detector (RTDs).

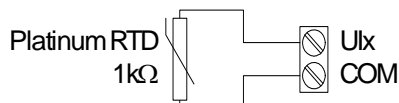


Figure 11: 1k Ohm Platinum RTD Input

Resistive PT100 Inputs

Figure 12 shows an input configuration used to monitor PT100 platinum RTDs.

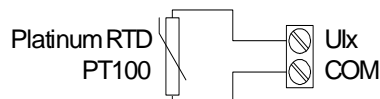


Figure 12: PT100 Platinum RTD Input

Note: The LX-RTUL-1, LX-FCUL-1, LX-UVL-1, LX-HPUL-1, and LX-PRG203-1 controllers do not have resistive 1k ohm or PT100 inputs.

Wiring Current Inputs

Current inputs have a range of 4 to 20 mA. Connect the current input according to Figure 13 if you are using a 2-wire or 4-wire 20mA transducer.

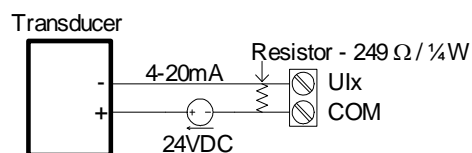


Figure 13: Current Input - 2-Wire Transducer

Note: On the LX-PRG400-1, LX-PRG410-1, LX-PRG500-1, and LX-PRG510-1 controllers you can use the onboard 15 VDC output to supply the current loop (Figure 14).

Connect the current input according to Figure 15 if the transducer is powered by its own power source.

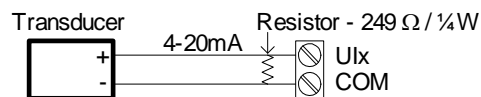


Figure 14: Current Input - Transducer with Own Power Source

Wiring Voltage Inputs

Voltage inputs have a range of 0 to 10 VDC. Connect the voltage input according to Figure 15.

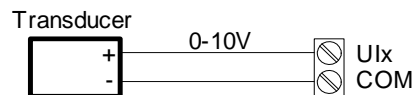


Figure 15: Voltage Input - Transducer with Own Power Source

Output Wiring

Each controller has physical connections for triac outputs and/or universal outputs, depending on the type and model (excluding the LX-IO520-1 controller). The outputs are all software configurable. Table 1 shows the controller outputs.

Table 1: Controller Outputs

Controller	Triac Outputs	Universal Outputs	Jumper 0-10 VDC/ 4-20mA
LX-FCUL-1	5	2	
LX-HPUL-1	5	2	
LX-RTUL-1	5	2	
LX-ULVL-1	5	2	
LX-PRG203-1	5	3	
LX-PRG300-1	0	8	
LX-PRG400-1	0	12	X
LX-PRG410-1	0	12	X
LX-PRG500-1	0	12	X
LX-PRG510-1	0	12	X
LX-IO301-1	8	0	
LX-IO401-1	12	0	
LX-IO520-1	0	0	

Note: Before you connect output equipment to the controller, refer to the installation instructions from the equipment manufacturer.

Wiring Triac Outputs

Digital outputs are all made of triacs and voltage is not present on the output terminals; therefore, you need to add an external power source, if necessary.

Note: You must connect an external load to measure the state of a triac output.

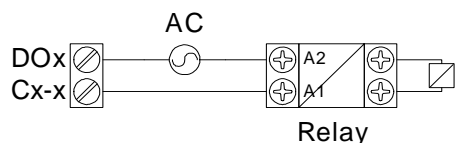


Figure 16: Digital Output with External Power Supply

Wiring Universal Outputs

You can configure universal outputs to provide either a linear signal ranging from 0 to 10 VDC or a 4 to 20 mA signal (LX-PRG400-1, LX-PRG410-1, LX-PRG500-1, and LX-PRG510-1 controllers only) or a discrete signal of 0 or 12 VDC. You can use the discrete signal to generate a Pulse Wave Modulation (PWM) or a simple two-state signal. The outputs are protected by an auto-reset fuse.

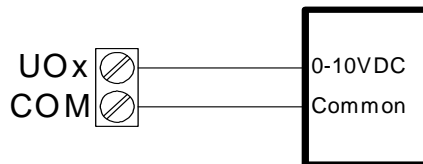


Figure 17: 0 to 10 VDC Analog Output

The 4 to 20 mA signal is configurable by jumper (only available for models LX-PRG400-1, LX-PRG410-1, LX-PRG500-1, and LX-PRG510-1).



Figure 18: 4 to 20 mA Analog Output and Jumper Configuration

You must connect a diode in parallel when controlling a relay with a universal output to protect the controller from back-emf current, which occurs when the relay is turned off. Use diodes that are part of the 1N400x family and place them closer to the relay.

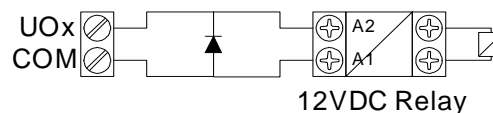


Figure 19: 0 or 12 VDC Discrete Output

Communications Wiring

The recommended cable type for LONWORKS® communications is 22 AWG (0.65 mm), twisted pair, unshielded. The LONWORKS communication wire is polarity insensitive and can be laid out in a bus, star, loop, or free topology. For loop topology, polarity is important, take special care when connecting the LONWORKS network to avoid a short circuit.

Note: Use the bus topology network configuration for all LON communication wiring; it allows you to troubleshoot the network easily.

Connect both wires to the LON 1 or 2 terminals of the controller. When you insert multiple wires into the terminals, ensure you properly twist the wires together prior to inserting them into the terminal connectors.

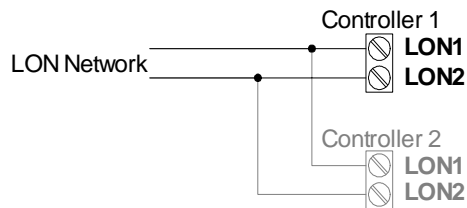


Figure 20: Communications Wiring

For more information and detailed explanations on network topology and wire length restrictions, please refer to the Echelon® Corporation document *Junction Box and Wiring Guideline for Twisted Pair LONWORKS® Networks*.

IMPORTANT: Use the proper network terminators for the network topology. Failure to use the correct network terminators may result in communication errors between controllers. Do not use multiple gauges of cable on the same communication bus.

Two network terminators are required for the bus topology network configuration. Place one network terminator at each end of the bus topology channel.

One network terminator is required for the free topology network configuration. You can put the network terminator anywhere on the channel.

Memory Erase Jumper

Each controller features a memory erase jumper. Use the memory erase jumper to erase the Neuron chip's memory. If an incorrect NXE file is loaded into the controller, the Neuron chip's memory is corrupted and you cannot communicate with the controller. Use the memory erase jumper to correct this problem by resetting the Neuron chip's memory; the chip is then in an application-less state. The memory erase jumper is labeled J2 on the ASCs and the LX-PRG203-1, J4 on the LX-IO301-1 and LX-PRG301-1 controllers; and J20 on the LX-IO401-1, LX-IO520-1, LX-PRG4xx-1, and LX-PRG5xx-1 controllers.

To erase the Neuron chip's memory using the memory erase jumper, do the following:

1. Disconnect the power to the controller.
2. Place a jumper on the proper pins on the controller.

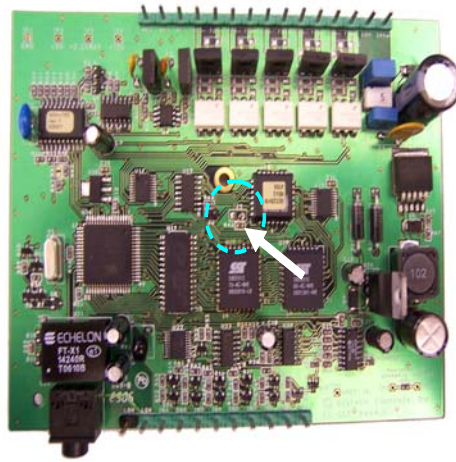


Figure 21: Memory Erase Jumper Location (J2) on ASCs and LX-PRG203-1 Controllers

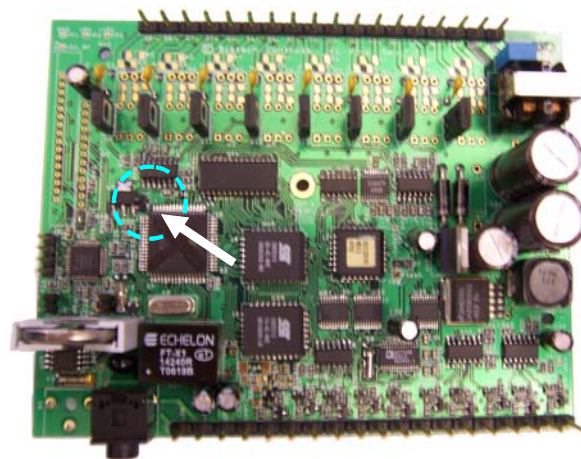


Figure 22: Memory Erase Jumper Location (J4) on LX-IO301-1 and LX-PRG300-1 Controllers

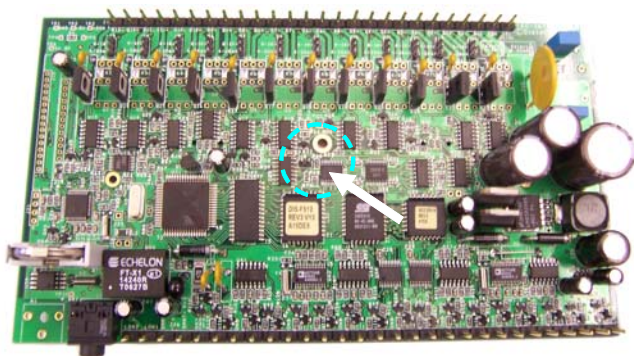


Figure 23: Memory Erase Jumper Location (J20) on LX-IO401-1, LX-IO520-1, LX-IO410-1, LX-PRG4xx-1, LX-PRG5xx-1 Controllers

3. Reconnect power to the controller.

Note: The orange colored service Light-Emitting Diode (LED) blinks rapidly indicating that it is erasing the Neuron chip's memory. When the service LED stops blinking and remains solid, the erase procedure is complete.

Note: The erase procedure normally takes between 2 and 10 seconds to complete.

4. Disconnect the power to the controller and remove the jumper.
5. Reconnect the power. The service LED blinks twice and becomes solid indicating the controller is application-less.
6. Download the correct NXE and XIF files.

Strain Relief and Terminal Block Cover

In certain jurisdictions, terminal block covers are required to meet local safety regulations. Strain reliefs and terminal block covers are available for controllers housed in the large enclosures and are used to relieve tension on the wiring and conceal the controllers' wire terminals. Strain reliefs and terminal block covers are optional and are sold separately.

Prior to connecting all wires, it is recommended that you install the strain relief. Three screws are provided for its installation under the bottom part of the enclosure. You can then use tie wraps to group wires together and attach them securely to the strain relief in an effort to relieve undue tension. If necessary, clip the terminal block cover to the strain relief as shown in Figure 24.

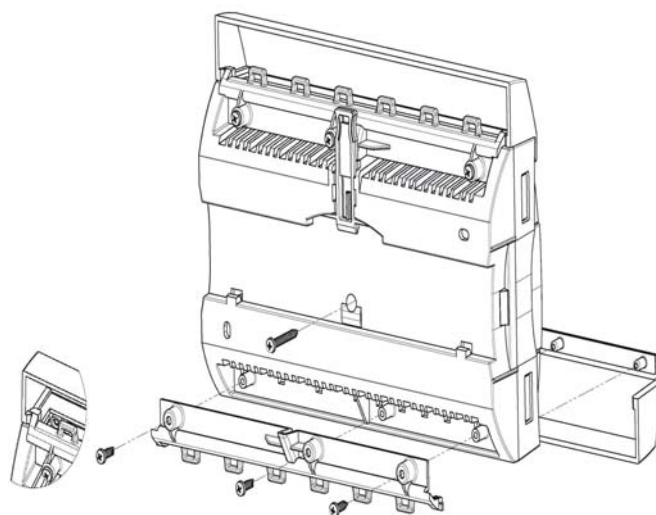


Figure 24: Large Enclosure Strain Relief and Terminal Block Cover Installation

Maintenance



CAUTION: Risk of Electric Shock.

Disconnect power supply before making any electrical connections to avoid electric shock.

MISE EN GARDE : Risque de décharge électrique.

Débrancher l'alimentation avant de réaliser tout raccordement électrique afin d'éviter tout risque de décharge électrique.

Each controller requires minimal maintenance, but it is important to:

- clean the outside of the front plate and/or the inside of the back plate, use a dry cloth.
- verify the tension of all wires and cables each time you service the controller.

Disposal

The Waste Electrical and Electronic Equipment (WEEE) Directive sets regulations for the recycling and disposal of products. The WEEE2002/96/EG Directive applies to stand-alone products that can function on their own and are not a part of another system or piece of equipment.

For this reason, Johnson Controls® products are exempt from the WEEE Directive. Nevertheless, they are marked with the WEEE symbol (Figure 25), indicating the devices are not disposed with municipal waste.

Dispose of products at the end of their useful life according to local regulations and the WEEE Directive.



**Figure 25:
WEEE Symbol**

Troubleshooting

Table 2 describes some troubleshooting scenarios.

Table 2: Troubleshooting (Part 1 of 2)

Problem	Possible Solution
Controller is powered but does not turn on.	
Fuse Is Blown	Check the fuse integrity; also ensure that the green power LED is on.
Power Supply Polarity	Verify that consistent polarity is maintained between all controllers and the transformer. Ensure that the COM terminal of each controller is connected to the same terminal on the secondary side of the transformer.
Controller cannot communicate on a FTT network.	
Absent or Incorrect Supply Voltage	Check power supply voltage between 24 VAC/DC $\pm 15\%$ and COM pins, and ensure that it is between acceptable limits. Check for tripped fuse or circuit breaker.
Overloaded Power Transformer	Verify the transformer is powerful enough to supply all controllers.
Network Not Wired Properly	Double-check the wire connections are correct.
Absent or Incorrect Network Termination	Check the network terminations.
Incorrect NXE File Has Been Loaded	Use the memory erase jumper to reset the Neuron chip's memory, then load the proper NXE into the controller using FX Workbench.
Controller communicates well over a short network but does not communicate on large network.	
Network Length	Check that the total wire length does not exceed the specifications of the <i>Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks</i> .
Wire Type	Check that the wire type agrees with the specification of the <i>LONWORKS Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks</i> .
Network Wiring Problem	Double check that the wire connections are correct.
Absent or Incorrect Network Termination	Check the termination(s). Incorrect or broken termination(s) make the communication integrity dependent upon a controller's position on the network.
Extra Capacitance	Ensure no extra capacitance is connected to the network other than the standard FTT circuit, and a maximum of a 3 meter stub (in bus topology).
Number of Devices on Network Segment Exceeded	The number of controllers on a channel should never exceed 64. Use a router or a repeater in accordance with <i>LONWORKS Junction Box and Wiring Guideline for Twisted Pair LONWORKS Networks</i> .
Network Traffic	Query node statistic to check errors. Use a LON protocol analyzer to check network traffic.
Hardware input is not reading the correct value.	
Input Wiring Problem	Check that the wiring is correct according to this manual and according to the peripheral device's manufacturer.

Table 2: Troubleshooting (Part 2 of 2)

Problem	Possible Solution
Open Circuit or Short Circuit	Using a voltmeter, check the voltage on the input terminal. Short circuit (0V) and Open circuit (5V).
Configuration Problem	Using the controller configuration wizard, check the configuration of the input. Refer to the controller's user guide for more information.
Hardware output is not operating correctly.	
Output Wiring Problem	Check that the wiring is correct according to this manual and according to the peripheral device's manufacturer.
Configuration Problem	Using the controller configuration wizard, check the configuration of the input. Refer to the controller's user guide for more information.

Service Light Emitting Diode (LED) Operation Guide

Table 3: Service LED Operation Guide (Orange Color)

Operation	Service
Off (does not apply to PRG controllers)	The controller is in normal operation.
Repeated Blink (PRG controllers only)	The controller is in normal operation. The LED blinks according to the controller code execution time.
On	The controller is application-less. Appropriate action: reload the NXE.
Slow Blink (1 second On, 1 second Off)	The controller is not configured. Appropriate action: commission the controller.
Fast Blink (0.3 seconds On, 1 second Off)	Watchdog time-out. Application corrupted. Appropriate action: use the memory erase jumper to reset the Neuron chip's memory, then load the proper NXE into the controller using FX Workbench.

Repair Information

If the LX Series controller fails to operate within its specifications, replace the unit. For a replacement controller, contact the nearest Johnson Controls product representative.

Technical Specifications

LX Fan Coil Unit Controller (LX-FCUL-1)

Product Code	LX-FCUL-1
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 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-bit, 10 MHz Memory: Nonvolatile Flash 64k (APB application and configuration properties) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk® protocol Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
Enclosure	Material: Metal ABS PA-765A Dimensions: 144.8 x 119.4 x 50.8 mm (5.7 x 4.7 x 50.8 in.) Shipping Weight: 0.77 lb (0.35 kg)
Inputs	Quantity: 6 universal software configurable Input Types: Digital: Dry Contact Voltage: 0 to 10 VDC, Accuracy $\pm 0.5\%$ Current: 4 to 20 mA with 500 ohms external resistor Resistor Support: Thermistor: Type 2 and Type 3 10k ohms Range: -40 to 125°C, (-40 to 257°F) Accuracy: $\pm 0.5^\circ\text{C}$; $\pm 0.9^\circ\text{F}$ Resolution: 0.1°C; 0.18°F Min/Max linear configuration Potentiometer: 10K ohm Up to 16 point translation table configuration Input Resolution: 12-bit analog/digital converter
Outputs	Quantity: 7 5 Digital: Triac 1.0 A at 24 VAC External Power Supply 2 Tri-mode Analog: 0 to 10 VDC (linear), PWM or digital 0 to 12 VDC 60 mA maximum at 12 VDC (60°C; 140°F) Maximum load 200 ohm Auto reset fuse 60 mA at 60°C; 140°F, 100mA at 20°C; 68°F Analog Output Resolution: 8-bit digital/analog converter

LX Rooftop Unit Controller (LX-RTUL-1) (Part 1 of 2)

Product Code	LX-RTUL-1
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 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

LX Rooftop Unit Controller (LX-RTUL-1) (Part 2 of 2)

General	Processor: Neuron® 3150®, 8-bit, 10 MHz Memory: Nonvolatile Flash 64k (APB application and configuration properties) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk® protocol Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
Enclosure	Material: Metal ABS PA-765A Dimensions: 144.8 x 119.4 x 50.8 mm (5.7 x 4.7 x 50.8 in.) Shipping Weight: 0.77 lb (0.35 kg)
Inputs	Quantity: 6 universal software configurable Input Types: Digital: Dry Contact Voltage: 0 to 10 VDC, Accuracy $\pm 0.5\%$ Current: 4 to 20 mA with 500 ohms external resistor Resistor Support: Thermistor: Type 2 and Type 3 10k ohms Range: -40 to 125°C, (-40 to 257°F) Accuracy: $\pm 0.5^\circ\text{C}$; $\pm 0.9^\circ\text{F}$ Resolution: 0.1°C; 0.18°F Min/Max linear configuration Potentiometer: 10K ohm Up to 16 point translation table configuration Input Resolution: 12-bit analog/digital converter
Outputs	Quantity: 7 5 Digital: Triac 1.0 A at 24 VAC External Power Supply 2 Tri-mode Analog: 0 to 10 VDC (linear), PWM or digital 0 to 12 VDC 60 mA maximum at 12 VDC (60°C; 140°F) Maximum load 200 ohm Auto reset fuse 60 mA at 60°C; 140°F, 100mA at 20°C; 68°F Analog Output Resolution: 8-bit digital/analog converter

LX Heat Pump Unit Controller (LX-HPUL-1) (Part 1 of 2)

Product Code	LX-HPUL-1
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 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-bit, 10 MHz Memory: Nonvolatile Flash 64k (APB application and configuration properties) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk® protocol Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
Enclosure	Material: Metal ABS PA-765A Dimensions: 144.8 x 119.4 x 50.8 mm (5.7 x 4.7 x 50.8 in.) Shipping Weight: 0.77 lb (0.35 kg)

LX Heat Pump Unit Controller (LX-HPUL-1) (Part 2 of 2)

Inputs	Quantity: 6 universal software configurable Input Types: Digital: Dry Contact Voltage: 0 to 10 VDC, Accuracy $\pm 0.5\%$ Current: 4 to 20 mA with 500 ohms external resistor Resistor Support: Thermistor: Type 2 and Type 3 10k ohms Range: -40 to 125°C, (-40 to 257°F) Resolution: 0.1°C; 0.18°F Min/Max linear configuration Potentiometer: Up to 16 point translation table configuration Input Resolution: 12-bit analog/digital converter
Outputs	Quantity: 7 5 Digital: Triac 1.0 A at 24 VAC External Power Supply 2 Tri-mode Analog: 0 to 10 VDC (linear), PWM or digital 0 to 12 VDC 60 mA maximum at 12 VDC (60°C; 140°F) Maximum load 200 ohm Auto reset fuse 60 mA at 60°C; 140°F, 100mA at 20°C; 68°F Analog Output Resolution: 8-bit digital/analog converter

LX Unit Ventilator Controller (LX-UVL-1) (Part 1 of 2)

Product Code	LX-UVL-1
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 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-bit, 10 MHz Memory: Nonvolatile Flash 64k (APB application and configuration properties) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk® protocol Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
Enclosure	Material: Metal ABS PA-765A Dimensions: 144.8 x 119.4 x 50.8 mm (5.7 x 4.7 x 50.8 in.) Shipping Weight: 0.77 lb (0.35 kg)

LX Unit Ventilator Controller (LX-UVL-1) (Part 2 of 2)

Inputs	Quantity: 6 universal software configurable Input Types: Digital: Dry Contact Voltage: 0 to 10 VDC, Accuracy $\pm 0.5\%$ Current: 4 to 20 mA with 500 ohms external resistor Resistor Support: Thermistor: Type 2 and Type 3 10k ohms Range: -40 to 125°C, (-40 to 257°F) Resolution: 0.1°C; 0.18°F Min/Max linear configuration Potentiometer: Up to 16 point translation table configuration Input Resolution: 12-bit analog/digital converter
Outputs	Quantity: 7 5 Digital: Triac 1.0 A at 24 VAC External Power Supply 2 Tri-mode Analog: 0 to 10 VDC (linear), PWM or digital 0 to 12 VDC 60 mA maximum at 12 VDC (60°C; 140°F) Maximum load 200 ohm Auto reset fuse 60 mA at 60°C; 140°F, 100 mA at 20°C; 68°F Analog Output Resolution: 8-bit digital/analog converter

LX-Remote I/O Controllers (Part 1 of 2)

Product Codes	LX-IO301-1, LX-IO401-1, LX-IO520-1
Power Requirements	Voltage: 24 VAC/DC; $\pm 15\%$, 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: Echelon Free Toplogy Transceiver (FT-X1) 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

LX-Remote I/O Controllers (Part 2 of 2)

Inputs	<p>Quantity: universal (software configurable)</p> <p>Input Types:</p> <ul style="list-style-type: none"> Digital: Dry Contact, Analog Voltage: 0 to 10 VDC, Accuracy: $\pm 0.5\%$, Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Accuracy: $\pm 0.5\%$ Resistor Support: <p>Thermistor: Types 2 and 3 10k ohms</p> <ul style="list-style-type: none"> Range: -40 to 150°C, (-40 to 302°F) Accuracy: $\pm 0.5^\circ\text{C}$, $\pm 0.9^\circ\text{F}$ Resolution: 0.1 to 0.18°F (10k ohms to 10k ohms supported using translation table) <p>Platinum: RTD 1k ohm</p> <ul style="list-style-type: none"> Range: -40 to 150°C, (-40 to 302°F) Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$, PT100: 100 ohms Range: -40 to 135°C, (-40 to 275°F) Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$ <p>Potentiometer:</p> <ul style="list-style-type: none"> Translation table configurable on several points, Accuracy: $\pm 0.5\%$ <p>Input Resolution: 16-bit analog/digital converter</p>
Compliance	<p>CE: Emission: EN55022: 1998 class B</p> <ul style="list-style-type: none"> 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 <p>United States: UL Listed UL916 Energy management equipment, material: UL94-5VA</p>

LX-PRG203-1 (Part 1 of 2)

Product Code	LX-PRG203-1
Power Requirement	<p>Voltage: 24 VAC/DC; $\pm 15\%$, 50/60 Hz, Class 2</p> <p>Protection: 1.85 A auto-reset fuse</p> <p>Consumption: 5 VA</p> <p>Maximum Consumption: 18 VA</p>
Ambient Storage Conditions	<p>Ambient Operating Temperature: 0 to 70°C, (32 to 158°F)</p> <p>Ambient Storage Temperature: -20 to 70°C, (-4 to 158°F)</p> <p>Ambient Relative Humidity: 0 to 90% noncondensing</p>
General	<p>Processor: Neuron® 3150®, 8 bits, 10 MHz</p> <p>Memory: Nonvolatile Flash 64k (APB application); Non-volatile Flash 128K (storage)</p> <p>Media Channel: TP/FT-10; 78 Kbps</p> <p>Communication: LonTalk® protocol</p> <p>Status Indicator: Green LED - power status and LON TX, Orange LED - service and LON RX</p> <p>Communication Jack: LON audio jack mono 1/8 in (3.5 mm)</p> <p>Transceiver: Echelon Free Toplogy Transceiver (FT-X1)</p>
Enclosure	<p>Material: ABS type PA-765A</p> <p>Dimensions (with screws): 5.7 x 4.7 x 2.0 in. (144.8 x 119.4 x 50.8 mm)</p> <p>Shipping Weight: 0.97 lb (0.44 kg)</p>

LX-PRG203-1 (Part 2 of 2)

Electromagnetic Compatibility	CE Emission: EN55022: 1998 class B (conducted and radiated) CE 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
Agency	UL Listed: UL916 Energy management equipment Material: UL94-5VA
Inputs	Quantity: 6 universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact Voltage: 0 to 10 VDC, Current: 0 to 20 mA with 249 ohms external resistor (wired in parallel), Accuracy: $\pm 0.5\%$ Resistor Support: Thermistor: Type 2 and Type 3 10k ohms Range: -40 to 150°C, (-40 to 302°F) Platinum: PT1000 1k ohm Range: -40 to 150°C, (-40 to 302°F) PT100: 100 ohms Range: -40 to 135°C, (-40 to 275°F) Potentiometer: Translation table configurable on several points, Accuracy: $\pm 0.5\%$ Input Resolution: 16-bit analog/digital converter
Outputs	Quantity: 8 5 Digital: 24 VAC Triac, digital (on/off) or PWM 0.75A at 70°C; 158°F 1 A at 40°C; 104°F PWM control: adjustable period from 2 seconds to 15 minutes 3 Universal: 0-10 VDC, digital 0-12 VDC (on/off) or PWM PWM control: adjustable period from 2 seconds to 15 minutes 20 mA maximum at 12 VDC (60°C; 140°F) Auto reset fuse Maximum load 600 ohms Output Resolution: 10-bit digital/analog converter

LX-PRG300-1 (Part 1 of 2)

Product Code	LX-PRG300-1
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 50/60 Hz, Class 2 Protection: 1.85 A auto-reset fuse Consumption: 5 VA Maximum Consumption: 18 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

LX-PRG300-1 (Part 2 of 2)

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) Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
Enclosure	Material: ABS Type PA-765-A Dimensions: 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: EN55022: 1998 class B (conducted and radiated) CE 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
Inputs	Quantity: 10 universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact Analog Voltage: 0 to 10 VDC, Accuracy: $\pm 0.5\%$, Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Accuracy: $\pm 0.5\%$ Resistor Support: Thermistor: Type 2, Type 3 10k ohms Range: -40 to 150°C, (-40 to 302°F) Accuracy: $\pm 0.5^\circ\text{C}$, $\pm 0.9^\circ\text{F}$ Platinum: RTD 1k ohm Range: -40 to 150°C, (-40 to 302°F) Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$, PT100: 100 ohms Range: -40 to 135°C, (-40 to 275°F) Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$ Resolution: 0.1°C to 0.18°F (10k ohms to 100k ohms supported using translation table) Potentiometer: Translation table configurable on several points, Accuracy: $\pm 0.5\%$ Accuracy $\pm 0.3\%$ full scale Input Resolution: 16-bit analog/digital converter
Outputs	Quantity: 8 (software configurable) 0 to 10 VDC, digital 0 to 12 VDC (on/off) or PWM PWM output: adjustable period from 2 seconds to 15 minutes 60 mA maximum at 12 VDC (60°C; 140°F) maximum 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

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

Product Codes	LX-PRG410-1 and LX-PRG400-1
Power Requirement	Voltage: 24 VAC/DC; $\pm 15\%$, 50/60 Hz, Class 2 Protection: 2.5 A auto-reset fuse Consumption: 5 VA Maximum Consumption: 18 VA Power Supply: 15 VDC output used to power 4 to 20 mA inputs
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) Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
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: 0.86 lb (0.39 kg)
Agency	UL Listed: UL916 Energy management equipment Material: UL94-5VA
Electromagnetic Compatibility	CE Emission: EN55022: 1998 class B (conducted and radiated) CE 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
Inputs	Quantity: 12 universal software configurable Input Types: Digital: Dry Contact Pulse: Dry Contact Analog Voltage: 0 to 10 VDC, Accuracy: $\pm 0.5\%$, Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Accuracy: $\pm 0.5\%$ Resistor Support: Thermistor: Type 2, Type 3 10k ohms Range: -40 to 150°C, (-40 to 302°F) Accuracy: $\pm 0.5^\circ\text{C}$, $\pm 0.9^\circ\text{F}$ Platinum: RTD 1k ohm Range: -40 to 150°C, (-40 to 302°F) Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$, PT100: 100 ohms Range: -40 to 135°C, (-40 to 275°F) Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$ Resolution: 0.1°C to 0.18°F (10k ohms to 100k ohms supported using translation table) Potentiometer: Translation table configurable on several points, Accuracy: $\pm 0.5\%$ Accuracy $\pm 0.3\%$ full scale Input Resolution: 16-bit analog/digital converter

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

Outputs	Quantity: 12 (software configurable) Analog 0 to10 VDC, digital 0 to12 VDC (on/off) or PWM PWM output: adjustable period from 2 seconds to 15 minutes 60 mA maximum at 12 VDC (60°C; 140°F) maximum 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
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LX-PRG510-1 and LX-PRG500-1 Controllers (Part 1 of 2)

Product Codes	LX-PRG510-1 and LX-PRG500-1
Power Requirement	Voltage: 24 VAC/DC; +/- 15%, 50/60 Hz, Class 2 Protection: 2.5 A removable fuse for triac when using the internal power supply Consumption: 5 VA Maximum Consumption: 18 VA Power Supply: 15 VDC output used to power 4 to 20 mA inputs
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 64k (storage) Media Channel: TP/FT-10; 78 Kbps Communication: LonTalk protocol Transceiver: Echelon Free Toplogy Transceiver (FT-X1)
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: EN55022: 1998 class B (conducted and radiated) CE 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

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

Inputs	<p>Quantity: 12 universal software configurable</p> <p>Input Types:</p> <ul style="list-style-type: none">Digital: Dry ContactPulse: Dry ContactAnalog Voltage: 0 to 10 VDC, Accuracy: $\pm 0.5\%$,Analog current: 4 to 20 mA with 249 ohms external resistor (wired in parallel), Accuracy: $\pm 0.5\%$Resistor Support:<ul style="list-style-type: none">Thermistor: Type 2, Type 3 10k ohmsRange: -40 to 150°C, (-40 to 302°F)Accuracy: $\pm 0.5^\circ\text{C}$, $\pm 0.9^\circ\text{F}$Platinum: RTD 1k ohmRange: -40 to 150°C, (-40 to 302°F)Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$,PT100: 100 ohmsRange: -40 to 135°C, (-40 to 275°F)Accuracy: $\pm 1.0^\circ\text{C}$, $\pm 1.8^\circ\text{F}$Resolution: 0.1°C to 0.18°F (10k ohms to 100 K ohms supported using translation table)Potentiometer:Translation table configurable on several points, Accuracy: $\pm 0.5\%$ <p>Accuracy $\pm 0.3\%$ full scale</p> <p>Input Resolution: 16-bit analog/digital converter</p>
Outputs	<p>Quantity: 12 (software configurable)</p> <p>Analog 0 to 10 VDC, digital 0 to 12 VDC (on/off) or PWM</p> <ul style="list-style-type: none">PWM output: adjustable period from 2 seconds to 15 minutes60 mA maximum at 12 VDC (60°C; 140°F)maximum load 200 ohmsAuto-reset fuse: 60 mA at 60°C; 140°F, 100 mA at 20°C; 68°F <p>Output Resolution: 10-bit digital/analog converter</p>



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