

**Andover Controls**

**LCX 810  
Installation Guide**

## Version C

**Reproduction or distribution forbidden.  
Copyright © 1997 by Andover Controls.  
Subject to change without notice.**

Order No. 30-3001-172

Copyright © 1997  
Andover Controls Corporation  
300 Brickstone Square  
Andover, Massachusetts 01810  
All Rights Reserved.

Published by the Engineering Department at Andover Controls Corporation.

### ***IMPORTANT NOTICE***

This product is subject to change without notice. This document does not constitute any warranty, express or implied. Andover Controls Corporation reserves the right to alter capabilities, performance, and presentation of this product at any time.

## ***Preface***

The LCX 810 Installation Guide presents instructions for installing the LCX 810 on an Infinet network. It first presents site preparation information and then step-by-step installation instructions.



## Contents

### ***Setting Up the LCX 810 Controller and Infinet***

Site/System Setup Requirements .....	6
Controller Dimensions and Weight .....	7
Power Requirements .....	7
Cable Limitations .....	7
Lightning Protection .....	8
Building Ground Requirements .....	8
Inspecting the Ground .....	9
Environmental Requirements .....	9
Output Equipment Requirements .....	9
Input Circuit Specifications .....	10
Special Factors for Thermistors .....	10
Laying Out the Site Setup .....	12
Installing the LCX 810 .....	13
Unpacking .....	13
Parts Required .....	13
Mounting .....	13
Connecting the Battery .....	15
Connecting the AC Power .....	17
Wiring the Infinet to the LCX 810 .....	18
Wiring the Infinet to the <i>Infinity</i> CX 9000 .....	19
Setting the Input Reference Resistor Switches .....	19

Wiring the Inputs .....	19
Wiring the Outputs .....	23
Wiring Form C Outputs .....	23
Setting the Override Switches .....	24
Connecting Modules to the Expansion Port .....	24
Powering Up the LCX 810 .....	25
Reset Button .....	26
Adjusting the LCD View Angle .....	26
Completing the Installation .....	26
Connecting the Andover Controls Service Tool .....	27

## **Figures**

Figure 1.	The Front Cover of the LCX 810 .....	14
Figure 2.	Locations of Openings in Cabinet and Parts Inside Controller .....	16
Figure 3.	Metal Plate and Screw for Power Supply Wire .....	18
Figure 4.	Infinet Cable Wiring .....	18
Figure 5.	Schematic of Input Wiring for Thermistor .....	21
Figure 6.	Schematic of Wiring for Counter or Digital Input .....	22
Figure 7.	Schematic of Wiring for Voltage Input .....	22
Figure 8.	Wiring Diagram for Current Input .....	22
Figure 9.	Schematic of Form C Output Wiring .....	24

## **Tables**

Table 1.	Wire Gauges and Corresponding Maximum Runs for Sensing Temperatures Up to 70° F .....	11
Table 2.	Wire Gauges and Corresponding Maximum Runs for Sensing Temperatures Up to 100° F .....	11
Table 3.	Wire Gauges and Corresponding Maximum Runs for Sensing Temperatures Up to 150° F .....	12



# ***Setting Up the LCX 810 Controller and Infinet***

This manual covers the following:

- Site/System Setup Requirements
- Installing the *LCX 810*
- Powering Up the *LCX 810*

---

## **Warranty Registration**

Your warranty is effective for 18 months starting on the date the system is shipped.

---

---

## **Warning**

All wiring and installations must comply with local, state, and national electrical codes.

---

# ***Site/System Setup Requirements***

Before you proceed to install the system, you should map out where you plan to install each controller, terminal/workstation, and modem. When planning the sites, be aware of any electrical interference that may occur. You also need to be aware of cabinet dimensions, power requirements, cable limitations, and environmental requirements.

---

## **Note**

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 the 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 instructions in this 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 own expense.

---

## **Note**

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

---

## **Avis**

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

## ***Controller Dimensions and Weight***

Each *LCX 810* is 11.75 × 8.9 × 2.75 in. and weighs 5 lbs.

## ***Power Requirements***

---

### **Caution**

The *LCX 810* should receive power from its own independent, unswitched circuit.

---

The *LCX 810* operates on a power supply of 24 VAC +/- 20% 50/60 Hz.

The *LCX 810* consumes 18 VA of power.

## ***Cable Limitations***

The maximum cable length for all buses is 4,000 ft at 19,200 baud (up to 32 *Infinet* controllers). You can extend buses beyond 4,000 ft or put more than 32 *Infinet* controllers on less than 4,000 ft by using the *InfiLink 200* amplification module.

---

### **Note**

You must use shielded cables for *Infinet* to ensure compliance with the Class A FCC limits and to provide reliable communications.

---

Cables that form *Infinet* are 24-gauge, single-twisted-pair, tinned, shielded copper wire. Use the following cables<sup>1</sup> or their equivalents:

- Brand Rex # H 9002 (single-pair)
- Anixter # 9J2401021 (single-pair plenum cable)

The cable should have a nominal impedance of 100 Ohms and a nominal velocity of propagation of 78%.

---

1. You can also use any cables you may already have in place for ACNET or LBU.

Capacitance of *Infinet* cable should be nominal, below 12.5 pF/ft between conductors and below 22 pF/ft between the conductor connected to ground and the next conductor.

## ***Lightning Protection***

Lightning arresters are required at each point where a bus cable enters or exits a building. Use the following arrester:

Two pair gas tube arrester, Andover Controls # 01-2100-299

## ***Building Ground Requirements***

---

### **Warning**

Be sure that all *Infinity* products from Andover Controls Corporation are grounded to true earth ground. This kind of ground protects the equipment from transients and other power surges in the area.

We cannot guarantee that the controller system will operate as documented unless you properly ground all controllers.

---

---

### **Warning**

*Be sure to have your grounds inspected before you begin the installation process to be sure your municipality follows the National Electrical Code. Many municipalities do not and often have substandard electrical grounds.*

---

An example of a substandard ground is a galvanized steel cold water pipe. As the pipe corrodes, it does not act as a true ground. The corrosion acts as an insulator, raising the potential of the pipe with respect to the ground.

When lightning strikes in the area of the installation, it drastically changes the potential of the earth. Since properly grounded Andover Controls units respond to changes in potential more rapidly than poorly grounded electrical systems, a poorly grounded building tries to reach

ground through the Andover Controls system. The surge of current can destroy electronic components on the controller board.

Surges of much lower potential than lightning also impact the reliability of Andover Controls equipment.

## ***Inspecting the Ground***

You can check your ground as follows:

1. Check your ground by first inspecting the building power distribution panel for earth ground termination. If the ground termination is any of the following, it is not adequate and must be corrected:
  - Does not exist.
  - Is connected to a corroded or galvanized pipe.
  - Is connected using a small gauge wire (less than 14 AWG).
2. Be sure your Andover Controls cabinet is connected to the ground with a copper conductor that terminates at the distribution panel.

## ***Environmental Requirements***

The *LCX 810* operates in rooms with temperatures ranging from 32 to 120°F and with humidity between 10 and 95%, non-condensing.

The controller must be in an Underwriter Laboratories listed enclosure.

## ***Output Equipment Requirements***

The eight outputs on the *LCX 810* are Form C and provide direct digital control for digital devices.

In addition to standard ON/OFF, digital outputs have pulse width modulation (PWM). PWM allows you to modulate valves and dampers to 0.1 sec resolution.

All outputs are programmable. Eight override slide switches let you either manually control each output or set it to A or AUTO so the controller can control it.

The Form C relay of each output is rated for 5 A at 50 VAC.

## ***Input Circuit Specifications***

---

### **Caution**

Andover Controls inputs are designed to be used with two-wire devices and do not provide sufficient power to operate sensors or transducers requiring an external power supply.

---

The following specifications apply to the eight *LCX 810* inputs:

- Voltage Range—0 to 10.000 V
- Resolution—0.0025 V
- Accuracy— $\pm 0.005$  V
- Maximum Pulse Frequency—5 Hz at a duty cycle of 50% with a minimum pulse width of 100 ms
- Input Impedance—30.1K $\Omega$  referenced to 10.000 V or 10 M $\Omega$  referenced to ground with the input reference resistor switch set to OUT
- Filtering—Corner Frequency at 16 Hz  $-20$  db/decade
- Over-Voltage Protection—120 VAC RMS or 120 VDC indefinitely on any single channel;  $\pm 1500$  V transient for 50  $\mu$ s on all channels
- Calibration—Permanent (factory)

### ***Special Factors for Thermistors***

To keep thermistor errors minimal, lay out your site so you can limit the length of wire runs to the maximum for the gauge wire you select.

Table 1 shows the maximum runs for wires of various gauges to keep errors within .5°F, .25°F, and .10°F when sensing temperatures up to 70°F.

**Table 1. Wire Gauges and Corresponding Maximum Runs for Sensing Temperatures Up to 70 °F**

Gauge	1/2° F Error	1/4° F Error	1/10° F Error
#14	26,700 ft	13,300 ft	5300 ft
#16	16,800 ft	8400 ft	3300 ft
#18	10,500 ft	5200 ft	2100 ft
#20	6600 ft	3300 ft	1300 ft
#22	4100 ft	2000 ft	800 ft

Table 2 shows the maximum runs for wires of various gauge to keep errors minimal when sensing temperatures up to 100°F.

**Table 2. Wire Gauges and Corresponding Maximum Runs for Sensing Temperatures Up to 100 °F**

Gauge	1/2° F Error	1/4° F Error	1/10° F Error
#14	12,700 ft	6300 ft	2500 ft
#16	7900 ft	3900 ft	1500 ft
#18	5000 ft	2500 ft	1000 ft
#20	3100 ft	1500 ft	600 ft
#22	1900 ft	900 ft	300 ft

Table 3 shows the maximum runs for wires of various gauges to keep errors minimal when sensing temperatures up to 150°F.

**Table 3. Wire Gauges and Corresponding Maximum Runs for Sensing Temperatures Up to 150 °F**

Gauge	1/2° F Error	1/4° F Error	1/10° F Error
#14	4100 ft	2000 ft	800 ft
#16	2600 ft	1300 ft	500 ft
#18	1600 ft	800 ft	300 ft
#20	1000 ft	500 ft	200 ft
#22	650 ft	300 ft	130 ft

## ***Laying Out the Site Setup***

You may want to draw a map of where you plan to put each controller and store it in a notebook.

Find the tag attached to each controller that gives the number of the controller. ***Before you remove any tags***, be sure the tag has all of the following information on it:

- Location of the controller.
- Serial number.
- Model name and number.
- Communications port the *Infinet* connects to on the *Infinity CX 9000*.

Then collect the tags. You will need to know where your controllers are located when you later assign a name to each controller and each input and output.



# ***Installing the LCX 810***

## ***Unpacking***

Be careful when unpacking the unit to not damage the packaging material—you must reuse it if you ship the product back for repair.

## ***Parts Required***

To install a single controller you start with the following parts:

- *LCX 810* Controller
- AC Power Cable
- *Infinet* Cable (twisted pair)
- *InfiLink 200s* as Hubs, Repeaters, or Cable Switching Boxes

## ***Mounting***

---

### **Caution**

You must encase the *LCX 810* in a UL listed cabinet to keep its Open Class rating.

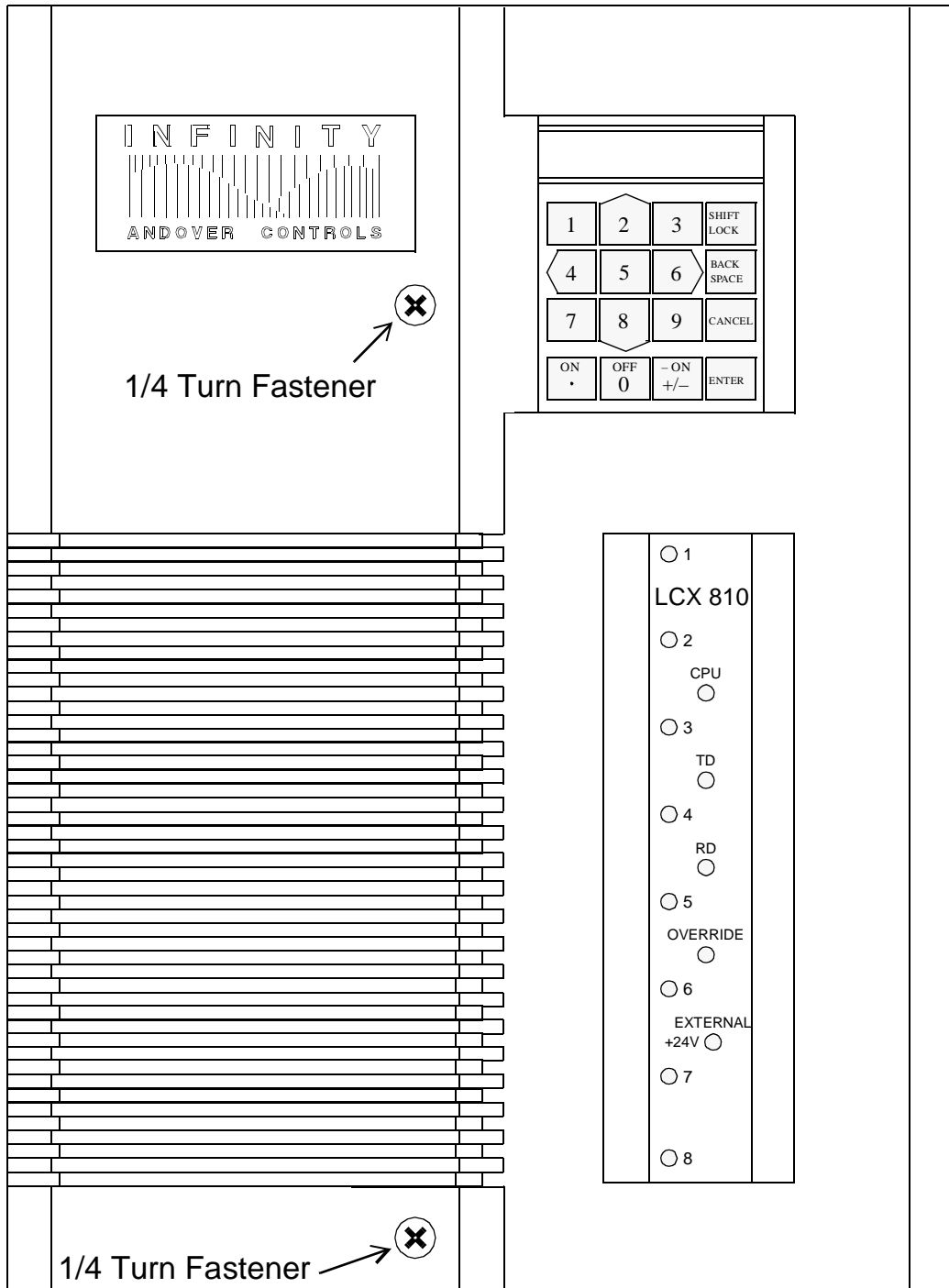
---

1. Before you begin, look at the front of the *LCX 810* cover.

Figure 1 shows the front of the *LCX 810*.

2. The front cover of the *LCX 810* has two Phillips head quarter turn fasteners aligned down the center, one above the middle and one at the bottom. Remove those fasteners, holding the cabinet firm so it does not fall.
3. Remove the cover and place it to one side.

**Figure 1. The Front Cover of the LCX 810**



---

## Warning

Never drill holes in the *LCX 810* cover or boards. A metal shaving could easily short circuit the electronics.

---

4. Screw the *LCX 810* to the wall using standard No. 8 screws in the pre-cut holes in the four corners of the base plate.

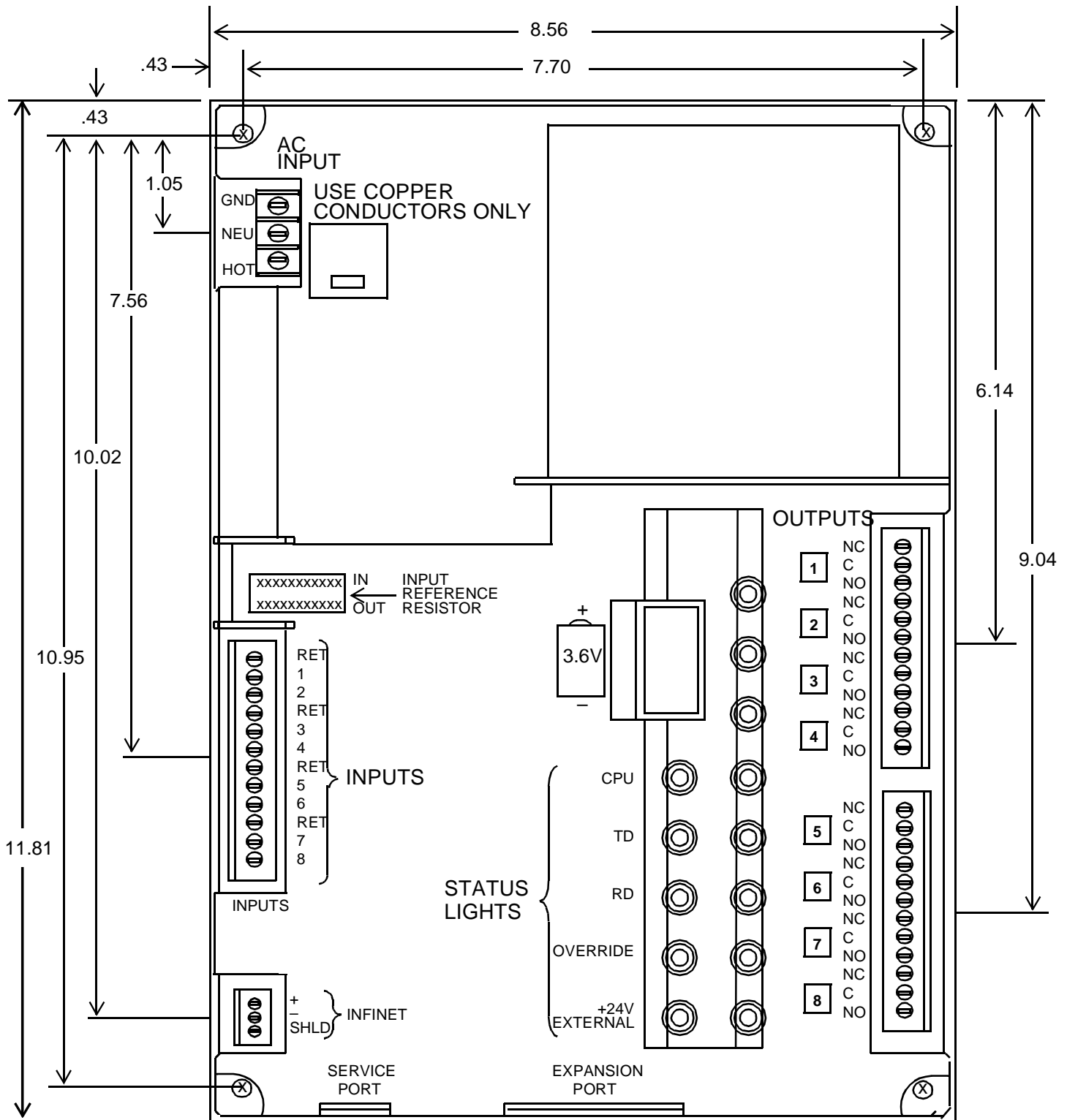
Figure 2 shows the location of the corner screw holes and measurements to all other openings in the cabinet. It also shows the locations of the override slide switches and other parts of the controller. You may want to refer to this figure for assistance during the installation process.

## ***Connecting the Battery***

When you have the controller mounted, find the  $\frac{1}{2}$  AA battery. Remove the plastic tab below the clip on the battery to activate the battery.

The battery is an 850 mA-hr 3.6 V primary lithium battery that runs the real-time clock and maintains RAM when AC power goes out.

**Figure 2. Locations of Openings in Cabinet and Parts Inside Controller**



## Connecting the AC Power

---

### Warning

Be sure the AC power cable is *not* connected to an electrical power source while you are wiring the controller, or you could receive an electrical shock that is life-threatening.

---

---

### Note

If the installation requires the secondary of the 24 V transformer to be grounded, always connect the "neutral" to ground and *only ground it at the transformer*.

---

The AC power connection is in the upper left corner of the controller. You must wire the AC cable to the three screws on the far left.

---

### Caution

Be sure to connect all three wires, HOT, NEUTRAL, and GROUND. Otherwise, the controller could malfunction.

---

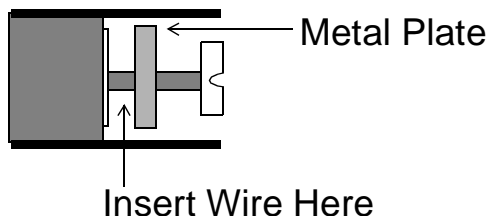
The three screws are labeled HOT NEU GND. The three wires at the end of your AC cord are black, white, and green.

1. Place the green wire under the metal plate behind the top screw, labeled GND.
2. Tighten the screw with a flathead screw driver.

Figure 3 shows the position of the plate, where to place the wire, and how the screw fits on the plate. You can see how the screw holds the plate in place once you tighten it.

3. Place the white wire under the metal plate behind the middle screw, labeled NEU.

**Figure 3. Metal Plate and Screw for Power Supply Wire**



4. Tighten the screw with a flathead screw driver.
5. Place the black wire under the metal plate behind the bottom screw, labeled HOT.
6. Tighten the screw with a flathead screw driver.

## **Wiring the Infinet to the LCX 810**

---

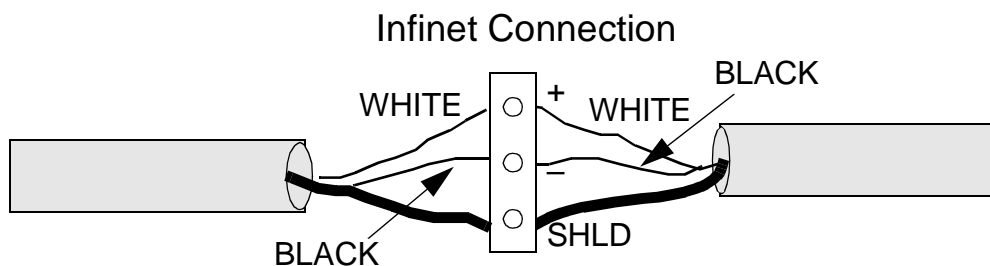
### **Note**

You must use shielded cables for *Infinet* to ensure compliance with the Class A FCC limits and to ensure reliable communications.

---

Figure 4 illustrates how to wire the *Infinet* cable to the removable block terminal connector in the lower left corner of the *LCX 810*.

**Figure 4. Infinet Cable Wiring**



1. Trim back the shield over the wires.
2. Take the first wire for the incoming *Infinet* and the first wire for the outgoing *Infinet* and slip both in the hole beneath the screw labeled with a plus sign (top).

3. Tighten the screw down on them until the screw holds the wires in place.
4. Slip the second (usually black) wire from each *Infinet* cable under the screw labeled with a minus sign (middle) and tighten the screw down on them.
5. Slip the shields from the incoming and outgoing *Infinet* cables under the screw labeled SHLD (bottom) and tighten the screw down on them.

## ***Wiring the Infinet to the Infinity CX 9000***

You connect the last piece of *Infinet* cabling to the *Infinity CX 9000*. See the *Andover Controls Infinity CX 9000 Hardware Installation Guide* for instructions.

## ***Setting the Input Reference Resistor Switches***

The inputs are on the lower left side of the *LCX 810*. Above the inputs is a DIP switch, with small switches for each input. Look closely at the switch and notice that each small switch is numbered. Each small switch corresponds to the input with the same number.

If an input is either a thermistor or a digital input, switch its input reference resistor switch to IN. If you require that the input be high impedance (10 M $\Omega$ ), set its input reference resistor switch to OUT.

## ***Wiring the Inputs***

---

### **Caution**

Do *not* remotely ground any part of the sensor wiring. Remote grounds connected to the *LCX 810* return terminal could make the controller operate incorrectly or damage the equipment. The signal return is not true earth ground. It is an electronic reference point necessary to interpret the sensor properly. Do not externally ground sensor or switch terminals that return to the *LCX 810*.

---

---

## Caution

Although inputs usually function properly with unshielded sensor wire, you may need shielded wire if you run the wire as follows:

- In the same conduit with other noise-generating conductors such as 60 Hz AC power.
- In long runs close to large power-consuming or power-generating equipment that can produce 60 Hz noise.

We recommend you run input wiring in a conduit separate from AC power or output wiring and avoid long wiring runs.

---

---

## Caution

Follow the rules below when wiring inputs and outputs:

- Never lay wires across the surface of the printed circuit board. You should bring input wires in from the left and output wires in from the right.
- Bundle excess wires toward the back of the cabinet to avoid any contact with circuit boards.
- Wires should never be within 1 in. of any component on the printed circuit board.
- Keep cabinet free of foreign materials (extra power supplies, relays, and so on).
- Be careful when stripping wire not to drop small pieces of wire inside the cabinet.

If you violate any of these rules, the controller could malfunction.

---



---

## Caution

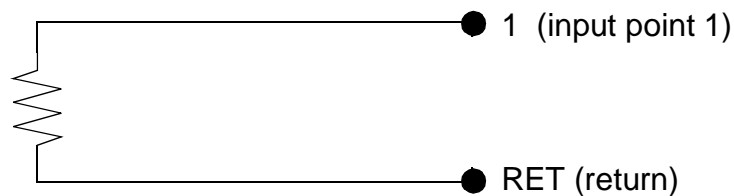
Never apply a voltage to a thermistor. Doing so alters the thermistor's accuracy and reliability. You should replace a thermistor that has had voltage applied to it. Never bring a soldering iron to within 3 inches of the thermistor's sensing tip.

---

The inputs are on the lower left side of the *LCX 810*. Notice that the inputs are labeled RET, 1, 2, RET, 3, 4, and so on. The first return terminal goes to the first two inputs, the second to the next two inputs, and so on.

Figure 5 shows a thermistor attached to an input point. One lead connects to the numbered input terminal, the other to a return terminal.

**Figure 5. Schematic of Input Wiring for Thermistor**



Follow these steps:

1. Slip the first wire for the first sensor under the input point screw for input 1 and tighten the screw down on it.
2. Slip the first wire for the second sensor under the input point screw for input 2 and tighten the screw down on it.
3. Slip the ground wires from both the first and second sensors under the RETURN screw above input point 1 and tighten the screw down on them.
4. Repeat the steps 1 through 3 for each pair of inputs.

Figure 6 shows a counter wired to an input point.

**Figure 6. Schematic of Wiring for Counter or Digital Input**



Figure 7 shows a voltage sensor wired to an input point.

**Figure 7. Schematic of Wiring for Voltage Input**

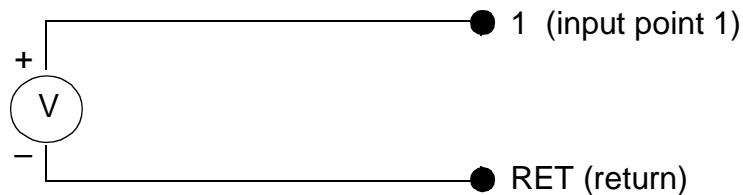
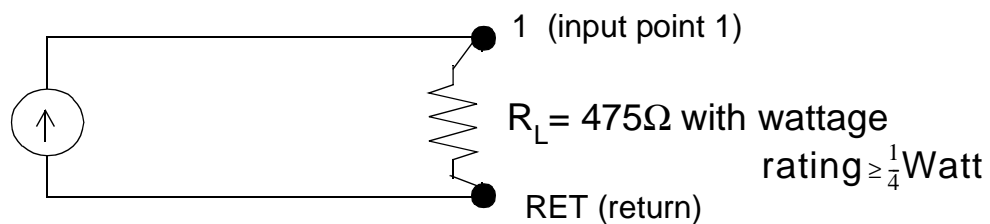


Figure 8 shows a current sensor wired to an input point. You must set the reference resistor switch to OUT for a current input. Then wire a resistor across the input.

**Figure 8. Wiring Diagram for Current Input**



The exact number of Ohms resistance required varies based on the range of current—while we recommend  $475\Omega$  for a 0 to 20 mA input, you can also calculate the appropriate resistance with the following formula:

$$R_{max} = \frac{V_{IN} (V)}{I_{max} (mA)} \times 1000$$

To account for the input current rising slightly above the maximum (such as slightly over 20 mA), you should choose a value slightly below the maximum resistance you calculate. For example, you calculate the resistance for 0 to 20 mA:

$$R_{max} = \frac{10}{20} \times 1000 = 500\Omega$$

You then select the next standard resistor, 475 $\Omega$ , with a 0.1% or 1% tolerance. (The accuracy of the input is directly proportional to the tolerance of the resistor. So the lower the tolerance, the greater the accuracy.) The wattage rating should be greater than or equal to  $\frac{1}{4}$  watt. Be sure you check the *Andover Controls Infinity CX Programmer's Guide* for details on how to convert the voltage from a current input to other units.

## ***Wiring the Outputs***

### ***Wiring Form C Outputs***

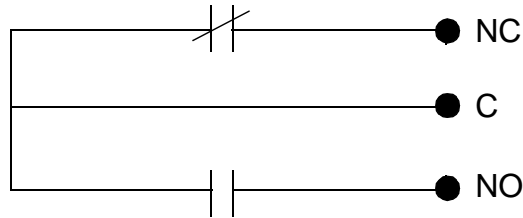
The outputs are along the upper right side of the *LCX 810*. All the outputs are Form C and are labeled NC, C, NO from top to bottom.

You wire the outputs as follows:

1. Slip the appropriate wire under the NC screw and tighten the screw down on it.
2. Slip the appropriate wire under the C screw and tighten the screw down on it.
3. Slip the appropriate wire under the NO screw and tighten the screw down on it.

Figure 9 shows the schematic for wiring a Form C output.

**Figure 9. Schematic of Form C Output Wiring**



4. When switching inductive loads (relays, contactors, motors, or valves), be sure to install metal oxide varistors across the coil of the device being switched.

### ***Setting the Override Switches***

The eight three-position override slide switches let you either manually control each output or set it to A or AUTO so the controller can control it.

### ***Connecting Modules to the Expansion Port***

The expansion port at the bottom center of the controller board allows you to connect modules to expand the capabilities of the controller. Contact your Andover Controls representative for more information on expansion modules.

# Powering Up the LCX 810

Before you power up the controller, be sure the following are correct:

1. Be sure the battery is connected.
2. Be sure the AC power is wired properly. Check to be sure all three wires have been connected.
3. Be sure the controller has a true earth ground.
4. Be sure you have used the proper cables and wires and correct lengths.
5. Be sure you have properly labeled the tag with the name of the controller before removing it.
6. Be sure the *Infinet* has been properly wired. Double check that the ground wire is under the negative screw.
7. Be sure that *Infinet* cable shields are properly connected.

If you have completed all previous sections in this manual, you are now ready to power up the controller.

Turn on the AC power source (or close the power connection) and the controller starts automatically. The following occurs (also occurs when you press RESET):

1. If the controller has been off, relays remain off. If you have pressed RESET, relays de-energize.
2. If you are pressing RESET, the OVERRIDE light turns on while you are pressing the button.
3. The CPU light begins flashing and flashes every .2 sec.
4. The TD light immediately starts flashing after you let go of the button to show data is being transmitted.
5. The RD light begins flashing only if data is being received from other controllers on the network. This may not happen immediately.

6. If any of the eight outputs is *not* set to AUTO, the overrides are enabled and the OVERRIDE light remains steadily on.
7. If the CPU light flashes every .1 sec, it means the CPU has failed a RAM or ROM test. See the *Andover Controls Infinet Controller Troubleshooting Guide*.
8. The EXTERNAL +24V light turns on and remains steadily on. When the EXTERNAL +24V light goes out, it means no power is being supplied to the expansion port. You may have to replace the fuse. See the *Andover Controls Infinet Controller Troubleshooting Guide*.
9. The eight status lights on the front of the controller each correspond to the output with the same number. They remain off until their corresponding outputs are turned ON by the controller programs. If no programs are running, the lights remain off. Pulsed outputs flash on for the duration of the pulse and then go off.

## ***Reset Button***

The RESET button is the red square button just left of the horizontal center of the board at the bottom. You press it to initiate a warm start. The same events occur for a warm start as for a cold start.

## ***Adjusting the LCD View Angle***

The LCD VIEW ANGLE adjustment screw is at the top in the center of the board. You turn the screw to adjust the angle of the LCD on the front cabinet.

The contrast changes at different viewing angles. Adjust it to your needs.

## ***Completing the Installation***

To complete the installation of your *LCX 810* replace the cabinet cover, using the two Phillips head quarter turn fasteners.

## ***Connecting the Andover Controls Service Tool***

The SERVICE PORT on the far left side of the bottom of the controller is to connect the Andover Controls Service Tool to a *LCX 810*. The service tool will access all *LCX 810*s and other *Infinet* controllers on the same network. For information on availability of the Andover Controls Service Tool, contact your Andover Controls representative.





# Index

## A

- AC power
  - connecting 17
- accuracy
  - wire gauge factors 11
- adjustment
  - LCD view angle 26
- Andover Controls Service Tool
  - using 27

## B

- backup power
  - connecting 15
- battery
  - connecting 15

## C

- cabinet
  - dimensions 7
  - weight 7
- cable
  - for Infinet 7
  - length 7
- circuit requirements for power 7
- configuration
  - planning 12
- counter inputs
  - wiring 22
- cover
  - removing front 13
  - replacing 26
- current sensors
  - resistor required 22
  - wiring 22

## D

- dimensions
  - cabinet 7
  - for mounting 16
- dimensions to knockouts 15

## E

- enclosure
  - Underwriter Laboratories requirements 13
- environments
  - for operating 9
- expansion modules
  - connecting 24
- expansion port
  - purpose 24

## F

- front cover
  - removing 13
  - replacing 26

## G

- ground
  - correcting 9
  - inspecting 9
  - requirements 8

## I

- Infinet cable
  - connecting 18
- Infinet cable numbers 7
- input reference resistor switch
  - setting 19
- inputs
  - circuit specifications 10
  - current
    - resistor tolerance 23
  - wiring rules 20

## K

- knockouts
  - dimensions 15
  - for mounting 16

## **L**

LCD view angle  
adjusting 26  
lightning  
protection from 8

## **M**

mounting  
dimensions 16

## **O**

outputs  
equipment requirements 9  
wiring 23  
wiring rules 20  
override slide switches  
setting 24

## **P**

points  
counter inputs 22  
thermistor inputs 21  
voltage inputs 22  
power  
battery backup 15  
power requirements  
circuit 7  
power surges  
preventing 8  
powering up  
preparations for 25

## **R**

RESET button 26  
resistors  
to wire across current inputs 22  
tolerance required 23

## **S**

screw holes  
locations for mounting 15  
sensors  
counter 22

thermistor 21  
voltage 22  
service port  
purpose of 27  
shields  
for Infinet cable  
connecting 19  
required for sensor wire 20

## **T**

temperatures  
for operating 9  
thermistors  
reducing errors 10  
wiring 21

## **U**

Underwriter Laboratories  
enclosure requirements 9, 13

## **V**

varistors  
when to use 24  
voltage sensors  
wiring 22

## **W**

weight  
cabinet 7  
wires  
gauge for thermistors 11  
wiring  
AC power connection 17  
connecting Infinet cable 18  
correct wire gauge for ground 9  
counter inputs 22  
current sensors 22  
inputs 19  
outputs 23  
rules for inputs and outputs 20  
thermistors 21  
voltage sensors 22

**30-3001-172** LCX 810 Installation Guide Rev C