

LCR 5600 Load Control Switch

Technical Support: 1-800-815-2258

Instructional Leaflet

Introduction

This instructional leaflet provides installation instructions for the LCR 5600 Load Control Switch. The LCR 5600 is used to control remote electrical loads and is activated by commands received from a FLEX paging transmitter. The accepted paging signals are broadcast in the 929 to 932 MHz range in 12.5 kHz increments. The LCR 5600 contains two 5 A relays and one 30 A relay.

Advanced security features provide both over-the-air and local port security. All local port connections and over-the-air commands are logged to provide traceability of actions.

The data log records the actual time of state changes, for the control relay and appliances, to provide improved granularity of runtime and shedtime information.

The LCR 5600 addressing must be configured for your demand response system prior to operation.



CAUTION Observe precautions for handling electrostatic sensitive devices.

MISE EN GARDE Respecter les précautions de manipulation des dispositifs électrostatiques sensibles.



WARNING Dangerous voltages are present. Equipment damage, personal injury, and death can result if safety precautions are not followed. Use authorized utility procedures to install, test, and service the LCR 5600.

AVERTISSEMENT Présence de tensions dangereuses. Tout défaut de se conformer aux mesures de sécurité peut entraîner un bris d'équipement, une blessure corporelle ou même la mort. Servez-vous des procédures autorisées par l'entreprise de services pour installer, tester et entretenir le LCR 5600.



SAFETY FOR LIFE



Cooper Power Systems™ products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Cooper Power Systems employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment and support our “Safety For Life” mission.

SAFETY INFORMATION

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This document may contain four types of hazard statements:



DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or equipment damage.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.



DANGER: Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high and low-voltage lines and equipment.

G103.3



DANGER: Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this document. Improper operation, handling, or maintenance can result in death, severe personal injury, and equipment damage.

G101.0



DANGER: This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury, and equipment damage.

G102.1



DANGER: Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install, or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.

G102.1



Installing the LCR 5600 Jumpers

This procedure describes how to configure the LCR 5600 for use with digital control systems on air conditioners, water heaters or other digitally controlled appliances.

NOTE: *If you are not connecting the LCR 5600 to a digitally controlled appliance, it is not necessary to perform this procedure. You may proceed with "Mounting the LCR 5600" on page 4.*

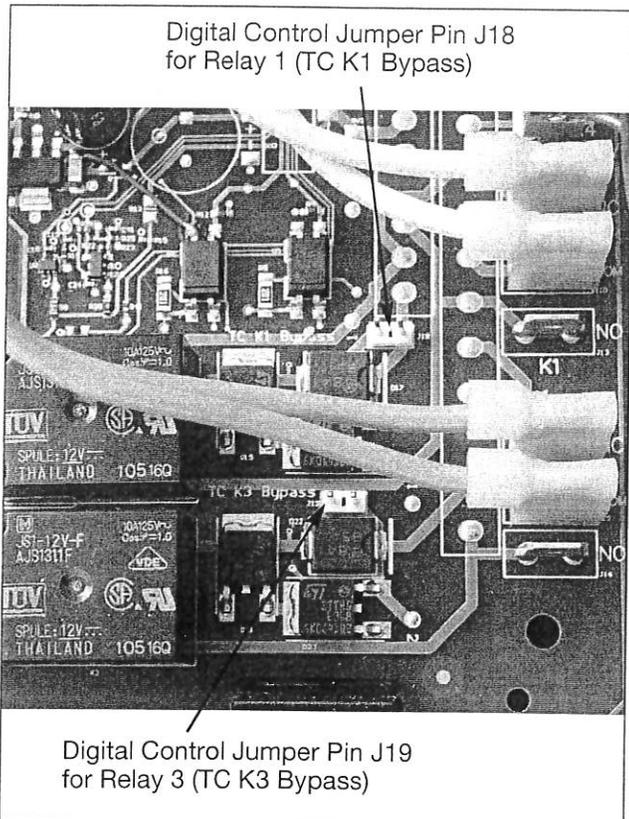
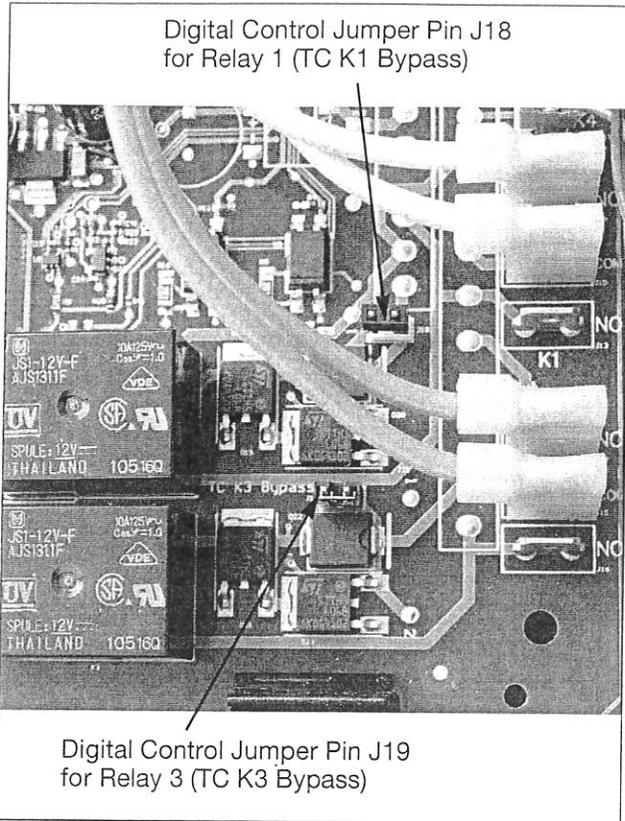
The jumpers and relays are related as follows:

| Jumper Pins | Relay |
|-------------|------------|
| J18 | K1 Relay 1 |
| J19 | K3 Relay 3 |

Prior to mounting or connecting power to the LCR 5600, perform the following steps to install the appropriate jumper(s) on the LCR circuit board:

1. Open the cover of the LCR 5600.
2. Locate the jumper pins for each relay as identified in the following figure.

3. Install the jumper on the relay or relays that will be wired to the digital control as shown in the following figure.



4. You are now ready to proceed with "Mounting the LCR 5600" on page 4.

Mounting the LCR 5600

Perform the following steps to mount an LCR 5600:

1. Determine which knockout(s) are to be used.
The LCR 5600 contains five knockouts for input and load wiring:

- Knockouts A, C, D and E – Enters the Class 2 wiring compartment (Class 1, if the divider is not present). These knockouts are for 0.5 inch (1.25 cm) conduit.
- Knockout B – Enters the Class 1 wiring compartment. Knockout B is for 0.75 inch (1.905 cm) conduit.

2. Remove the knockout prior to mounting by using a drill and a conduit-style step drill bit. The dimple in the center of the knockout allows you to accurately position the step-drill bit in the center of the knockout for a clean hole. The knockout may also be removed by inserting a screwdriver into the knockout slot at several points and prying it out. Do not hit the knockout directly, as this may damage the case.

For added flexibility, the LCR enclosure allows side-entry access holes, D and E, to be used for accessing the wiring compartment.

A 0.75 inch (1.905 cm) threaded nipple accessory is available for knockout B.

3. Mount the LCR 5600 at the desired mounting location, which is preferably a flat, non-vibrating surface. Tightening the screws on an irregular surface may distort the mounting tabs. This can cause the tabs to break or can defeat the rain-tight seal.

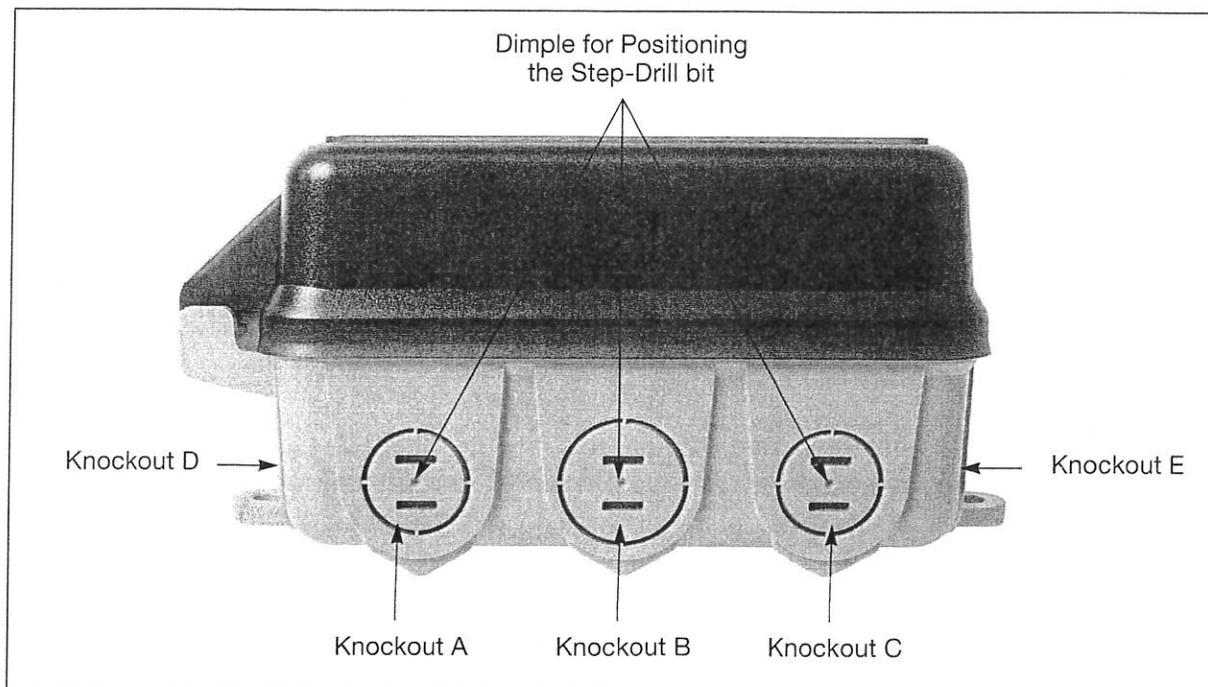
For best reception, mount the LCR four feet or higher above the ground, on the exterior of a structure, and away from metal surfaces.

Ensure that the front door has room to open at least 90 degrees. The minimum required clearance is 8 inches (20.3 cm) in front of the mounting surface.

The LCR provides three pre-drilled mounting tabs. Cooper Power Systems recommends #10 pan head screws for mounting the LCR. The diameter of the mounting holes is 0.25 inches (0.635 cm).

For a rain-tight rating, mount the LCR so that Knockouts A, B and C are located at the bottom of the unit facing the ground.

4. Perform the LCR installation and wiring instructions described on the next page.





Installing the LCR 5600

Perform the following steps to complete the LCR installation:

1. Remove electrical power from the AC circuits that are to supply the LCR and the load(s) to be controlled.



WARNING Dangerous voltages are present. Multiple disconnects may be required to de-energize all circuits.

MISE EN GARDE Tensions dangereuses sont présentes. Multiples déconnecte mai être nécessaire de mettre hors tension tous les circuits.

2. Wire the LCR 5600 according to the wiring diagram located inside the LCR enclosure.

NOTE: To wire the LCR 5600 to a Dual Stage air conditioner and perform Dual Stage TrueCycle control, wire the output lead from Relay 1 (K1) to the primary compressor and wire the output lead from Relay 3 (K3) to the secondary compressor.

3. Connect the red and black leads to the 120/240 VAC power source as shown in the wiring diagram.
4. Apply electrical power to the LCR 5600.
5. If cold load pick-up is enabled, the appropriate relays energize and the red LEDs are lit.
6. If desired, perform a test shed as described in the section "Test Button" on page 7.
7. Record the LCR address and other necessary information.
8. Close the LCR door, secure the latch, and install a utility seal.

LCR 5600 Wiring Connections

Install the wiring within a 1/2 inch liquid-tight, non-metallic, flexible conduit or make sure the wiring is close nipped into an approved junction box or wiring compartment.

All wiring connections are made to factory-installed, color-coded leads that are rated for 300 VAC, 105°C. The table below lists the color codes and gauges for the LCR leads.

Extended leads are available in longer lengths and are used for connection outside the enclosure. The same gauges apply for any available length of extended leads. Consult Cooper Power Systems for information about nonstandard lead length options.

Two output leads are supplied for each relay. No polarity requirements apply. All relay leads are attached via push-on connectors.



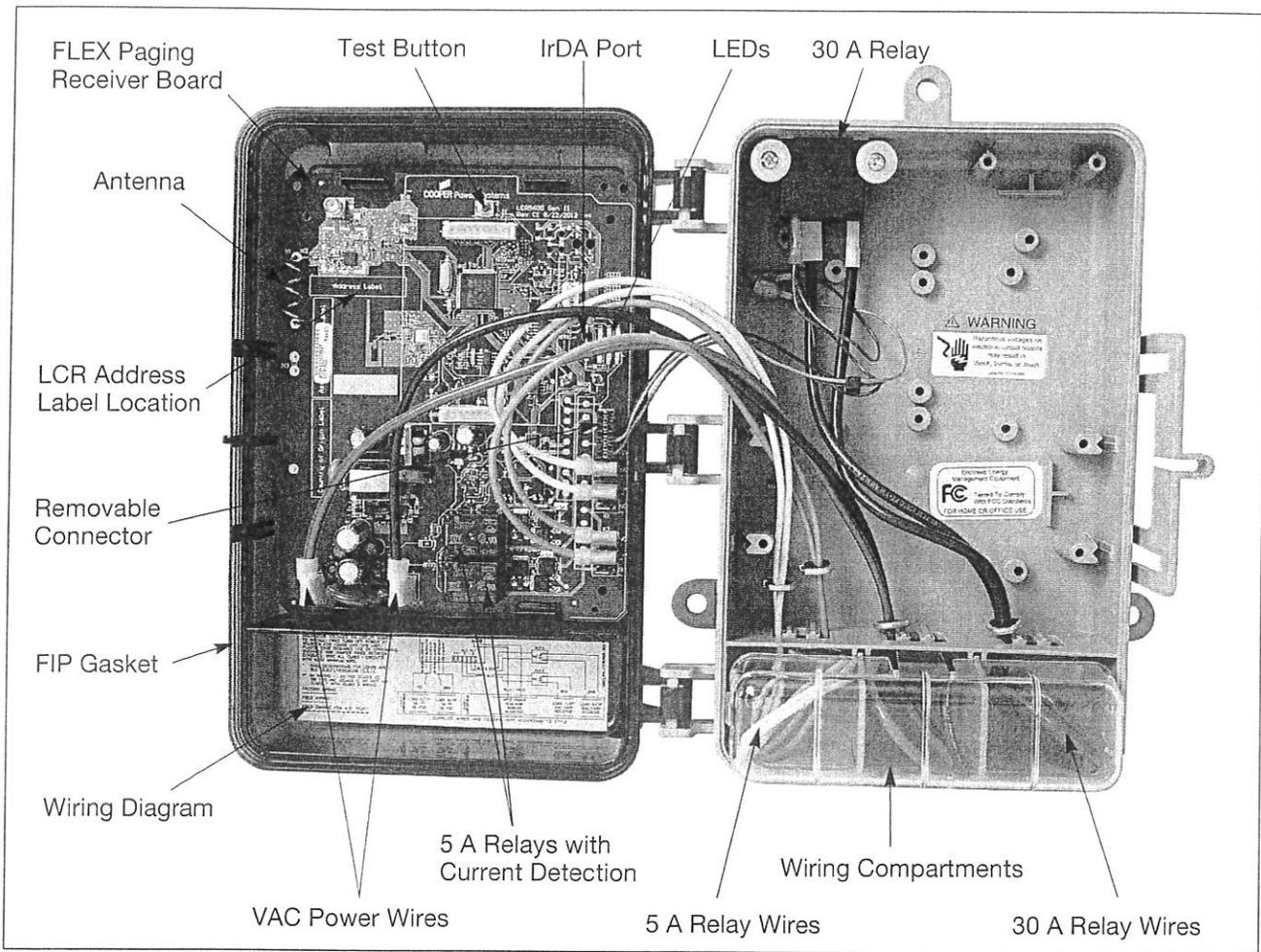
CAUTION Incorrect connections can damage the LCR when power is applied. Follow all applicable Local and National Electrical Codes when wiring the LCR.

MISE EN GARDE Un branchement incorrect à la puissance d'entrée peut endommager le LCR au moment de la mise sous tension. Conformez-vous à tous les codes de l'électricité locaux et nationaux pertinents pour procéder au branchement du LCR.

| Connection | Lead Color | Standard Gauge | Extended Gauge |
|----------------------|------------|----------------|----------------|
| L1 Power | Black | 18 | 14 |
| L2 Power | Red | 18 | 14 |
| Relay 1 | Yellow | 18 | 14 |
| Relay 2 | Blue | 10 | – |
| Relay 3 (Low Power) | Orange | 18 | 14 |
| Relay 3 (High Power) | Orange | 10 | – |

Both standard length and extended length leads are available. The standard lead length is 8 inches (20.32 cm) and these leads are for connections within the enclosure wiring compartment.

LCR 5600 Features and Functions



LCR 5600 LEDs

The LCR 5600 LEDs have the following meanings:

LCR Status (Green)

- LED Off – No communications, system out of service, or LCR status LED is disabled.
- LED On – Received a message addressed to the LCR or with a matching Service Provider ID (SPID).
- LED Slow Blink – If all diagnostic routines passed without errors after a cold start-up, the LED blinks with a pattern of two seconds on and two seconds off for a configurable number of blinks (typically 3).

If the LED starts to blink continuously with a pattern of two seconds on and two seconds off, this means that a paging signal is present, but the received messages are not addressed to the LCR.

- LED Fast Blink – If the LED blinks with a pattern of half a second on and half a second off, this indicates a diagnostic error such as bad ROM checksum, RAM read/write error or brownout condition.

Load Status (Red)

- LED Off – Load not controlled.
- LED On – Load controlled.
- LED Fast Blink – If the LED blinks with a pattern of half a second on and half a second off, this indicates a possible circuit fault.

IrDA Port (Clear and Black)

- Allows for local communication with the LCR via a bridge, an Android™ compatible device and the Field Scout application.



Test Button

The Test button, located on the LCR board, can perform the following functions:

Cancel Cold Load Pickup at Power-On

Push and hold the Test button while applying power to the unit to cancel cold load pickup.

Test Relay Control

Push the Test button for less than 5 seconds and release to control the relay for 1 minute.

The relay control initiated by the Test button is implemented as a standard timed load control command, zero delay, and zero random extension. This overrides any other currently implemented or delayed control.

NOTE: *Pushing the Test button multiple times does not increment the control time by an additional amount of time.*

Change Active Cap Code and Frequency

Push and hold the Test button for at least 5 seconds, then release. The Green LCR Status LED will start blinking fast for 2 seconds.

To change the frequency, push the Test button again, within 2 seconds, while the Green LCR Status LED is blinking fast.

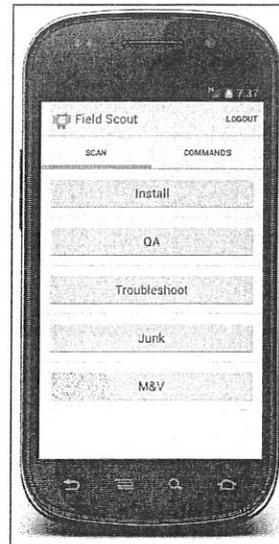
The Green LCR Status LED will blink once when switched to F1 (paging frequency 1) or twice when switched to F2 (paging frequency 2).

The LCR will remain on the current channel if the test button is not pushed for the second time within the 2 second period.

Field Scout Software

An Android™ phone or tablet, loaded with the Field Scout application, can perform the following tasks on an LCR 5600:

- Access the LCR over a WiFi connection through a communication bridge
- Store data on a secure Cloud environment
- View a tabular or graphical display of demand data
- Transmit configuration data
- Download configuration data
- Download historical data
- Download intelligent cycling parameters
- Download the hourly data log
- Set the active paging frequency
- Send shed/restore commands
- Send time sync commands
- Send In Service/Out of Service commands.



LCR 5600 Specifications

Communications

One-way communication over FLEX paging networks directly to the LCR using the ExpressCom protocol.

Paging Frequency:

929 to 932 MHz in 12.5 kHz increments

Operating Requirements

Power Source:

120 to 240 VAC at 50/60 Hz

Temperature:

-40° F to 140° F (-40° C to +60° C)

Relative Humidity:

0 to 95% non-condensing

Relay Control

Low Power:

Form C (SPDT) non-latching

Maximum Ratings:

5 A at 28 VDC or 120 VAC

30 A at 240 VAC Resistive or 28 VDC

Housing

IP56 rated, injection-molded, UV-stabilized polycarbonate plastic. Rain-tight per UL916.

Box Dimensions (Including Mounting Tabs)

10.81 in. H x 7.68 in. W x 3.60 in. D

(27.46 cm H x 19.51 cm W x 9.14 cm D)



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General Guidelines:

This section outlines the general guidelines to be used by the contractor for installation of the LMS. The contractor shall utilize these general guidelines to determine how the LMS will be physically oriented, the priority of the preferred LMS mounting locations, and what criteria the proposed LMS mounting locations must meet prior to proceeding with the installation.

Note: Do NOT install an LMS on an air conditioner that uses a variable speed condenser motor. Please report to the Town where such air conditioning units are used; these can be exempted from the LMS program.

1. Physical Orientation:

All LMSs shall be physically oriented in accordance with the following:

- a. Units will be physically oriented in a vertical position.
- b. Do not install units
 - i. Hanging upside down
 - ii. Facing up
 - iii. Facing down
 - iv. In an inverted position
 - v. Any place where future access for testing or maintenance is limited such as attics, crawl spaces, locations requiring tools or access, etc.
- c. LMS mountings should allow for at least four inches of clearance from obstructions on the right side the LMS to allow for access for sealing and unsealing the LMS.
- d. The LMS should be in a place where the door can open completely which will allow repair of internal components.
- e. The LMS should be mounted so that the LEDs can be seen without the need for ladders or tools.

2. LMS Mounting Locations:

Attempt to install the unit in the following priority order:

- a. For a joint electric water heater/air conditioner installation, place the LMS outside the residence near the electric water heater if possible. Two (2) screws shall be used to secure the LMS in place to the supporting structure; one (1) screw at the top of the LMS, and one (1) at the bottom in the mounting holes provided.
- b. For an air conditioner/heat pump only, install the LMS near the condenser. The LMS shall be securely mounted to the supporting structure using two (2) screws.
- c. For a multi-family complex such as an apartment building, switches may be installed inside a common metering room with prior permission from the Town's Electric Utilities Department.



- d. If the home has multiple electric water heaters, multiple LMSs will be required.
- e. If the home has multiple zone air conditioners/heat pumps, each device should be connected to a LMS. Note that there are two relays in a standard LMS capable of controlling a heat pump, K1 and K3. (Refer to the LMS/AC and Water Heater Installation Guide) It is possible to use one LMS and control two heat pumps (gas heat) and one electric water heater.
- f. For all-electric heat pumps, the heating strip must be connected to a LMS. LMSs come from the factory to be used with gas heat pumps and must be re-programmed by the Town to be used for heat strips. The Town maintains a stock of re-programmed LMSs that have their K3 relay re-programmed to control heat strips. These re-programmed units will be labeled externally and on relay K3. Refer to the LMS/AC and Water Heater Installation Guide.

3. Wiring

- a. All wiring shall meet applicable sections of the NEC.
- b. The source voltage to an LMS feeding an electric water heater shall be the water heater circuit.
- c. The source voltage to an LMS not feeding an electric water heater shall be the air conditioner/heat pump load side of the disconnect switch if the LMS is mounted next to the disconnect switch. If the LMS is not near the disconnect switch, a special source voltage run of 120 VAC or 240 VAC is acceptable.
- d. All wiring connections shall be made with twist-type connectors, crimps, or lugs. Oxide inhibitors shall be used if aluminum conductors are present.
- e. Class 1 and Class 2 wiring compartments of the LMS shall be used instead of an external junction box for wiring connections. Wiring shall not be routed between Class 1 and Class 2 compartments inside the LMS. Persons or businesses bypassing LMS control wires are subject to fines from the Town of Apex. All wires from the thermostat shall come to the LMS and then to applicable air conditioning units or air handling units.

4. LMS Operational Checklist

- a. After installation of the LMS, reconnect the power circuits to the devices. This can be simulated on an existing LMS switch with power on by removing the ribbon cable to the circuit board inside the LMS and reconnecting it, or simply use the test button.
- b. Check the included Cannon Technologies bulletin (see subsequent pages of this document). It contains information on installation and basic operation, including how the LED's operate and what they mean, why there is a time delay after initial power-up before the relays return to normal, etc. It also explains operation of the test button and where to find this in a control.
- c. Check that the connected devices function normally.



- d. Check that 240 VAC is measured at the water heater for normal conditions. If the LMS is operating its relays, as on an initial power-up, the 240 VAC relay should separate, removing the 240 VAC continuity across relay K2.