



***Keep This Manual
With Unit***

***KLLC100
LEAD LAG CONTROLLER***

***INSTALLATION &
OPERATOR'S MANUAL***

CAUTION

**BEFORE INSTALLING AND
USING THIS LEAD LAG
CONTROLLER, IT IS IMPORTANT
THAT THIS MANUAL BE READ
AND UNDERSTOOD
THOROUGHLY**



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I. Installation

Warning

This controller should be only used with Kooltronic air conditioning units that have a 24 VAC relay (Option D) designed for use with a 24 VAC external control system.

- 1) Determine mounting location for KLLC100 Lead Lag Controller inside of cabinet. Location should provide access to a 15A - 120VAC power source as well as sufficient space for future servicing and adjustment.
- 2) Remove four (4) Phillips head screws from rear of thermostat housing and separate housing. Retain screws for re-assembly of thermostat housing.
- 3) Strip 5/16" of the insulation off the end of the control wires from the air conditioner and route through hole in cover of Lead Lag Controller.
- 4) Connect wires from air conditioner to terminal strip on circuit board of Lead Lag Controller by lifting white locking arm of appropriate terminal and inserting wire into the opening on the side. Push locking arm down to secure wire. The cooling function should be connected to the "Y" and "C" terminals (see section IV. Wiring).
- 5) Check the jumper settings and adjust if necessary.
 - a. The "RT" jumper at the upper left of the board should be in the "R" position.
 - b. The "TEST MODE" jumper at the lower left corner should be in the open position.
 - c. The jumpers to set the timing mode are located in the left center of the circuit board and should be factory set for 7 days. This may be field reset for 0, 1, 3, 7, 14, or 28 days by moving jumper.
 - d. Refer to VI. Control Unit Layout.
- 6) Re-assemble Lead Lag Controller securing top to base with the four (4) Phillips head screws removed previously.
- 7) Secure Lead Lag Controller to inside of enclosure.
- 8) Locate temperature probe near top of enclosure as close to the mid point distance between the two air conditioners.
- 9) Plug cord from power supply into socket on lower right side of lead lag controller and plug transformer into 120 volt outlet.
- 10) Turn Lead Lag Control on with switch on front of controller. Lead unit LED should illuminate to indicate unit is functioning.

II. Specifications

Controller Specifications

Electrical

Input

- Nominal Voltage: 18 to 30 VAC
- Frequency: 50 to 60 Hz

Output

- Type: Triac
- Quantity: Four (4) outputs
- Rating: 2 amps per output @ nominal 24 VAC

Operational

Heat/Cool Staging

- First Stage Heat (H1): deadband setting below thermostat setting (C1)
- Second Stage Heat (H2): 2°F below H1
- First Stage Cool (C1): equal to thermostat setpoint
- Second Stage Cool (C2): 2°F above C1

Deadband

- Adjustable 2°F to 20°F

Anti-Short Cycle Protection

- Stage 1: Three (3) minutes
- Stage 2: Four (4) minutes

Setpoint (C1)

- Adjustable: 55°F to 90°F

Advance Sequencer

- Jumper Selectable: Alternates every 0, 1, 3, 7, 14, or 28 Days, or fixed
- Pushbutton: Manually alternate sequence

Power Supply Specifications

Input

- Nominal Voltage: 120 VAC
- Frequency: 60 HZ

Output

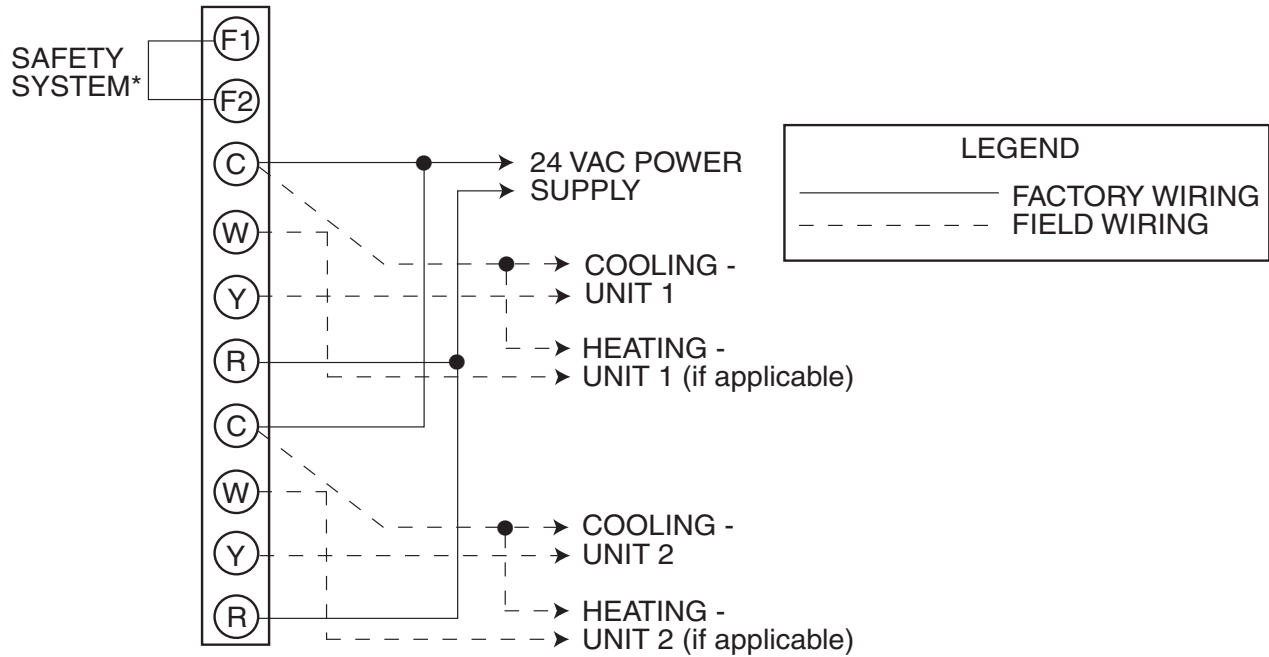
- Nominal Voltage: 24 VAC
- Current: 450 mA

III. Operation

Main steps for programming the Lead Lag Controller:

- 1) Temperature Selection Pot (Potentiometer):** This selection pot sets the temperature above which the cooling cycle begins. In cooling mode, the green “call for cool” indicator light - C1 (and C2 if second stage cooling is required) stays on. Each light corresponds to one stage of cooling. The temperature spacing between these lights is approximately 2° F. In heating mode, the red “call for heat” indicator lights, H1 and H2, operate similarly. The temperature spacing between cooling and heating modes is the deadband setting.
- 2) Deadband Pot:** The deadband is the range where neither heating nor cooling is necessary. The deadband adjustment moves the heating setpoints in relation to the cooling setpoints. At its minimum position (counterclockwise) the deadband is 2°F. At its maximum position the deadband is 20° F.
- 3) Advance Sequencer:** For 2-stage alternating installations, the advance sequencer demands equal operating time from group A and B. Select the time interval by placing a jumper over one of the jumper pair posts. The jumper labeled "0" disables the advance timing; use it when the controller is connected to a single heating/ cooling group, or when alternating operation between two heater/cooler groups is not desired. In Test Mode, (when the test mode jumper is installed) the advance times are accelerated (see the values shown in the Test Mode Advance Time Table). In normal mode, (Test Mode Jumper removed) advance times are in days as printed on the PCB (i.e. 0, 1, 3, 7, 14, 28). Setting the controller for 7 days is appropriate for most installations.
- 4) Advance Switch:** The advance switch is a pushbutton switch provided to override the timing and instantaneously switch the lead group. The two red LED's indicate which group will start first. The LED on the left is group A and the LED on the right is group B (See diagram on page 7). Pressing the switch not only changes the lead group, but also restarts the short-cycle delay-on-make, and sets the main timer to zero. This feature can be used to reset the timer so the next advance time will be known.
- 5) Test Mode Jumper:** The Test Mode provides for accelerated testing of the advance (override) function of the controller and the output delay-on-make times. When the Test Mode Jumper is installed the advance time conversion is from days to seconds. Accelerated short cycle delay-on-make times are 1 second for stage one heating/cooling, and 4 seconds for stage two heating/cooling.

IV. Wiring



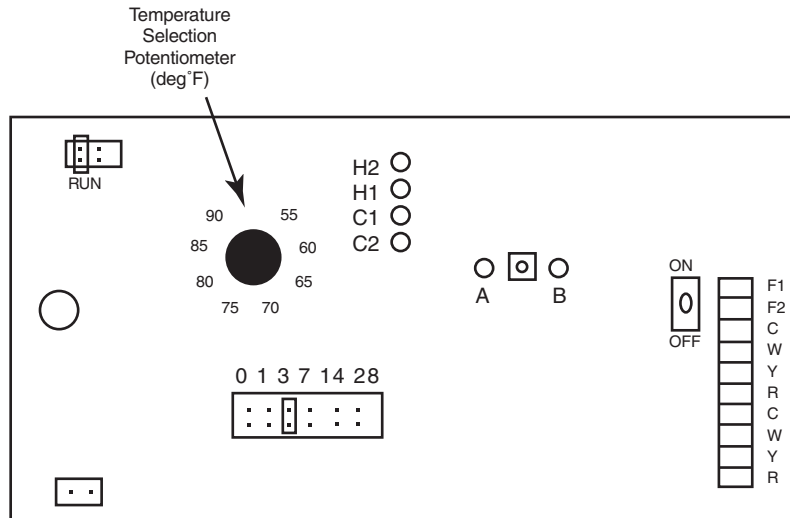
*SHORT F1 AND F2 IF YOU DO NOT HAVE SAFETY SWITCHES.

V. Replacement Parts

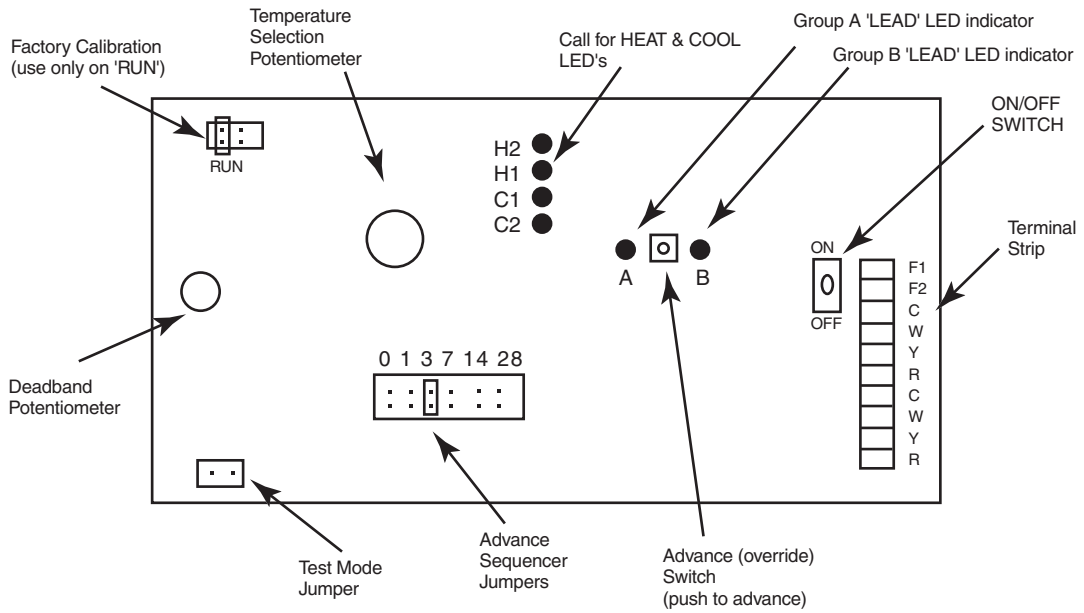
<u>Item</u>	<u>Kooltronic Part No.</u>
Control Unit	0750-83
Power Supply	0750-84

VI. Control Unit Layout

APPROXIMATE TEMPERATURE REFERENCE



BOARD LAYOUT



VII. Warranty

KOOLTRONIC products are warranted to be free of defects in workmanship, materials and components. The following warranty periods apply:

- Defects in material or workmanship for a period of one (1) year from the date of sale. The liability of the Seller is limited, at its option to repair, replace or issue a non-case credit for the purchase price of the goods which are proved to be defective.

The above warranty applies when the equipment is operated under the following conditions:

- Ambient temperature within the operating range of 0°F (-20°C) to 125°F (52°C) in normal atmosphere or as stated on product nameplate
- Voltage variation no greater than ±10% from nameplate rating
- Compliance to all other installation, maintenance and operating instructions, as supplied
- The purchaser assumes the responsibility of grounding the unit and installing it in accordance with local electrical and safety codes, as well as the National Electric Code (NEC) and OSHA

KOOLTRONIC assumes no liability beyond the repair or replacement of its own product. This Warranty does not cover:

- Labor or reimbursement of labor for evaluation, removal, installation, repair, or cost of any warranted part, unless authorized in writing by KOOLTRONIC
- Use of equipment for other than its designed purpose or operating conditions
- Operation in harsh, oily, corrosive or other abnormal environmental conditions, without the proper filtration, sealing, protective coatings and/or weather protection
- Customer modification or abuse
- Shipping damage or other accident (Claims for shipping damage are the responsibility of the customer. Timely claims must be filed by the customer with the freight carrier)
- Any and all conditions resulting from noncompliance with the preceding operating conditions
- Returned freight must be paid by customer
- **This standard warranty does not apply to custom products. Consult your KOOLTRONIC representative for limitations**

KOOLTRONIC cannot assume responsibility for mis-application of its products or the erroneous selection of an inappropriate product by a non-authorized KOOLTRONIC representative. Our applications engineers will gladly assist in the selection of the proper product, provided all required details of the application are furnished.

THIS WARRANTY CONSTITUTES THE ENTIRE WARRANTY WITH RESPECT TO THE PRODUCT AND IS IN LIEU OF ALL OTHERS, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND IN NO EVENT IS KOOLTRONIC RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER.

RETURN AUTHORIZATION (RA) PROCEDURE

- All returns require a Return Authorization number whether the return is for warranty or non-warranty repair, rotation of stock, damage or any other reason. Returns without an RA number will be refused.
- Customer must call Kooltronic After Sale Kare (ASK), Pennington, New Jersey (609•466•3400) to obtain an RA number, or email ask@kooltronic.com.
- The following information is required when an RA is requested:
 - Original customer Purchase Order number and date
 - Date product was received by customer
 - Number of parts to be returned
 - Product description, model and serial number
 - Reason for return
 - Action requested
- Contact name, telephone, FAX numbers and e-mail address
- Pack unit in a suitable container for shipment, preferably the original packaging if available. **Improper packaging may void warranty claim.**
- Mark carton prominently with KOOLTRONIC's Return Authorization Number.
- Enclose all pertinent documents.
- Freight charges on all products returned to KOOLTRONIC shall be paid by the customer. Unauthorized collect shipments will be refused.
- If a unit is repaired under Warranty, KOOLTRONIC will pay the freight charges both ways within the Continental USA at KOOLTRONIC's negotiated rates. Warranty repaired units will be returned to customer at Kooltronic expense only within the Continental USA.
- All authorized returns are subject to a restocking fee.