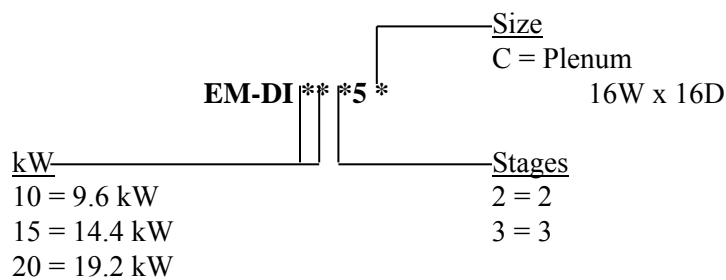


# ELECTRO DUCT

## INSTALLATION MANUAL, PLENUM



INTENDED USE – This product is approved and label certified for water source heat pumps or air handlers at the blower discharge, upflow only.

Drawings: **EH503**  
**ES501**  
**XX017**



## **APPLICATION**

This model series contains the starter plenum, its primary application is Econar manufactured water source heat pumps. However, it can easily be adapted to other manufacturers (ClimateMaster, etc.) having a 16 x 16 starting collar.

Electro Industries also has insert models (without starter plenum) primarily intended for Command-Aire or other water source heat pump brands. Contact factory for assistance.

For information, all units are rated at 240 volts AC. When operating at lower source voltage, the output may be reduced.

Example:                    9.6KW unit, assuming normal element tolerances  
                                  220 volt source - 8KW  
                                  208 volt source - 7.3KW

NOTE: The maximum inlet air temperature is 100° F. For inlet temperatures greater than 100°, contact the factory for special assistance.

## **NOTICE TO HOMEOWNER AND INSTALLER**

Hi-limit cycling two to ten minutes after initial turn on usually means improper deflector, baffle installation, or insufficient airflow - carefully study and follow mechanical installations.

### **INSTALLATION REQUIREMENTS**

1. All installation work must be performed by trained, qualified contractors or technicians. Electro Industries, Inc., sponsors installation and service schools to assist the installer.
2. All electrical wiring must be in accordance with National Electric Code and local electric codes, ordinances, and regulations.
3. Observe electric polarity and wiring colors. Failure to observe could cause electric shock and/or damage to the equipment.
4. This unit can only be used for its intended design as described in this manual. Any internal wiring changes, modifications to the circuit board, modifications or bypass of any controls, or installation practices not according to the details of this manual will void the product warranty, the ARL certification label, and manufacturer product liability. Electro Industries, Inc., cannot be held responsible for field modifications, incorrect installation, and conditions which may bypass or compromise the built-in safety features and controls.

## SPECIFICATIONS - TABLE 1

<u>MODEL</u>	<u>NOMINAL KW</u>	<u>MIN. CURRENT+</u>	<u>ELEMENT CFM*</u>	<u>SOURCE CROSS SECTION</u>	<u>INTERNAL CB</u>	<u>SHIP FUSE</u>	<u>WEIGHT</u>
EM-DI1025C	9.6	40	1000	8 W x 16 D	50	N/A	15
EM-DI1535C	14.4	60	1500	8 W x 16 D	75	30 & 50	19
EM-DI2035C	19.2	80	2000	8 W x 16 D	100	50 & 50	21

\* Assumes 100°F inlet and all air passes through element rack. If duct/plenum is larger than element rack (without factory deflector kit), the air volume external

(passing around) to the element rack must be added to this CFM requirement.

+ At 240 volt, single phase.

## FUNCTIONAL DESCRIPTION

Refer to drawing ES5Ø1 and the symbol definitions.

Thermostat Connections - The following descriptions begin at the 24 volt control points. These are the left lettered terminals on drawing ES5Ø1 shown as square dots.

- C - Common, must be tied to 24 volt system common.
- W1 - First stage heat, first 5KW section (10KW if "X" jumper is in place).
- X - Second 5KW stage, factory jumpered to the "W1" terminal. Typically the "W1" function controls the first 10KW. An outdoor stat (ODT) can be electrically installed in place of the "X" to "W1" jumper to keep 5KW off during warmer outside temperatures.
- W2 - Second stage heat, 5KW for 15KW model or 10KW for 20KW model.
- O - Tie point only for wiring from room stat, no internal connection.
- Y2 - Tie point only for wiring room stat compressor wire, basically no internal connection.
- R - 24 volt high side, not required for normal functions, can be used as thermostat wire tie point. Required if the room stat or air handler does not have internal blower "on" function.

NOTE: This Electro-Duct blower turn on function cannot operate the air handler blower relay without 24 volts at "R".

G - Air handler blower relay control voltage.

F - Room stat blower input wire, typically tied to room stat "G" terminal.

Heater Turn-On Action - The external application of 24 volts AC between "W1" and "C" pulls K2 relay which acts as a switch for the top 4.6KW element (E1). The red LED next to the "W1" terminal illuminates. A signal is also diode coupled to K1 and yellow LED illuminates. K1 provides an electrical path between "R" and "G" to operate the air handler blower relay.

With external 24 volt AC between "X" and/or "W2", the same basic action follows switching on elements E2 and E3. However, these two stages or elements contain an electronic delay of approximately 10 seconds before K2 and/or K3 pull in. The LED opposite the appropriate terminal indicates the control system has the appropriate element switch relay closed.

First Level Hi-Limit - The upper off-set hi-limit is connected to the two tab terminals shown on diagram ES5Ø1 bottom left. If this limit opens due to low airflow, the top PC board red LED is illuminated and K2, K3, and K4 relays open disconnecting all element power. This is an automatic reset hi-limit which means it will again close (top LED off) re-establishing the element power. If this is a cycling function, damage will result to the element relay contacts and/or elements themselves.

Second Level Hi-Limit - The hi-limits in the current carrying leg (between fuse and element) is a dual function device. The automatic reset internal limit is set 50% below the fuse link internal function. In other words, if the automatic reset contacts weld, the one time (permanent open circuit) fuse link will prevent element overheating.

AUX 10 Pin Connector - For special OEM applications and for other plug-in optional devices, the 10 pin connector is represented by the various numbered terminals on the schematic diagram.

19.2KW Model - This is an added element to the 15KW shown. The fourth element has its own relay tied directly across E3 element power. Whenever K4 switches on the E3 element, the E4 follows immediately. The 30 amp fuse is changed to a 50 amp fuse.

## **MECHANICAL INSTALLATION**

The heat pump manufacturer's starter collar should be centered over the discharge blower. Generally the blower shaft is 90° to the facing front of this Electro-Duct. In other words, if you would be viewing the blower motor shaft, you would see the side of the electrical control box. Also blower centering means, the approximate 3 inch opening of the blower discharge is centered under the electric elements. It does not mean the complete blower housing discharge is centered, only the actual blower discharge opening itself.

In the case of the Econar unit, the Electro-Duct right side extended lip (facing Electro-Duct control box), simply laps on the right side of the Econar cabinet and the Electro-Duct center side hole alignment with Econar cabinet center side screw.

## **ELECTRICAL HOOKUP**

1. 240 VOLT SOURCE - Locate correct model number and KW size in Table 1 to determine operating current and minimum source circuit breaker size. According to local codes, building type, wiring run distance, etc., use the appropriate electric conductor size to bring over the 240 volt source power. Connect to fuse block/input terminals (10KW is terminal block only).
2. GROUNDING - Route and install the appropriate size ground conductor between the ground lug labeled "GROUND" and building service entrance panel ground buss. This must be a conductor sized according to the total amp rating of the appropriate model. Conduit is not a adequate ground conductor.
3. THERMOSTAT CONTROL - See drawing EH503 and previous Functional Description section for basic hookup:
  - A. Outdoor stat is not required, factory jumper is provided between "W1" and "X".
  - B. "W2" is not available on 10KW models.
  - C. 10KW model can be operated from a two stage room stat ("W1" and "X"). Remove jumper between "W1" and "X", connect stat "W1" to "W1" and "W2" to "X".

## OPERATIONAL MONITOR LIGHTS

Green - 24 volt at "R", reference to "C".

Amber - Internal blower relay is pulled based upon an input on either "W1", "X", or "W2".

Red (opposite stat terminal) - 24 volts (reference to "C") is at the terminal next to the red light.

Top Red Light - First level hi-limit is open, overheat condition, insufficient airflow, dirty filter, etc.

## CFM CALCULATIONS

By measuring the temperature rise across this Electro-Duct (at a point high enough for proper air mixing) the actual CFM can be quite easily determined. If you are having difficulties sustaining hi-limit operation (clicking noise/top red LED) it may be a good idea to calculate the CFM according to the formula shown at the top of the next page. To arrive at a stable outlet temperature, you can turn off the source power and remove the smallest fuse. This will allow you to verify or calculate the CFM without reaching the hi-limit cycling. The full amount of elements are not required to use this formula. The accuracy of this formula will depend upon the ability to measure the outlet air at a properly mixed and uniform spot and the accuracy of both the clamp on amp meter (AC voltmeter).

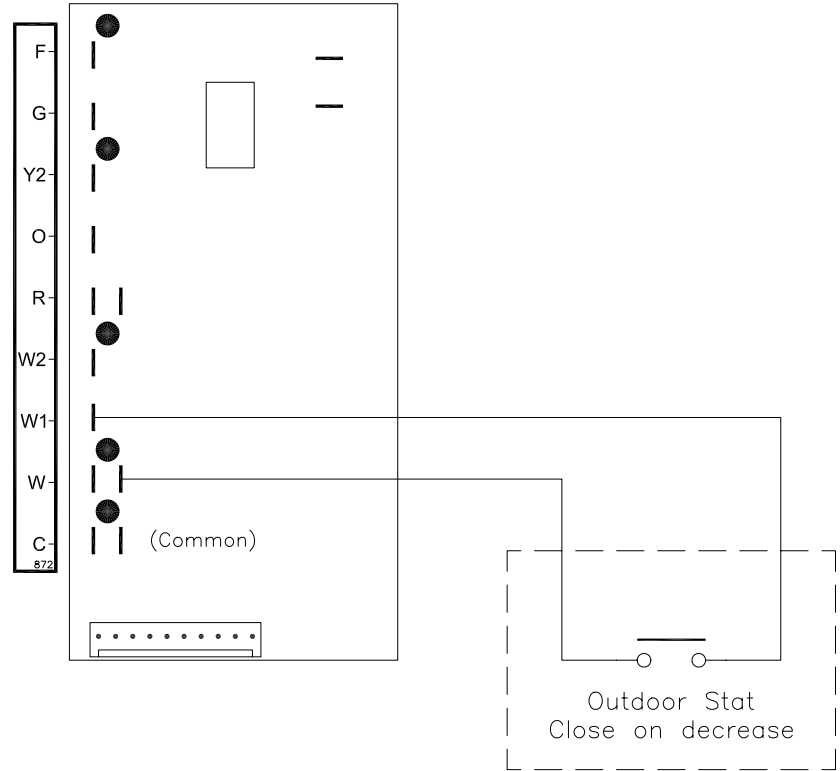
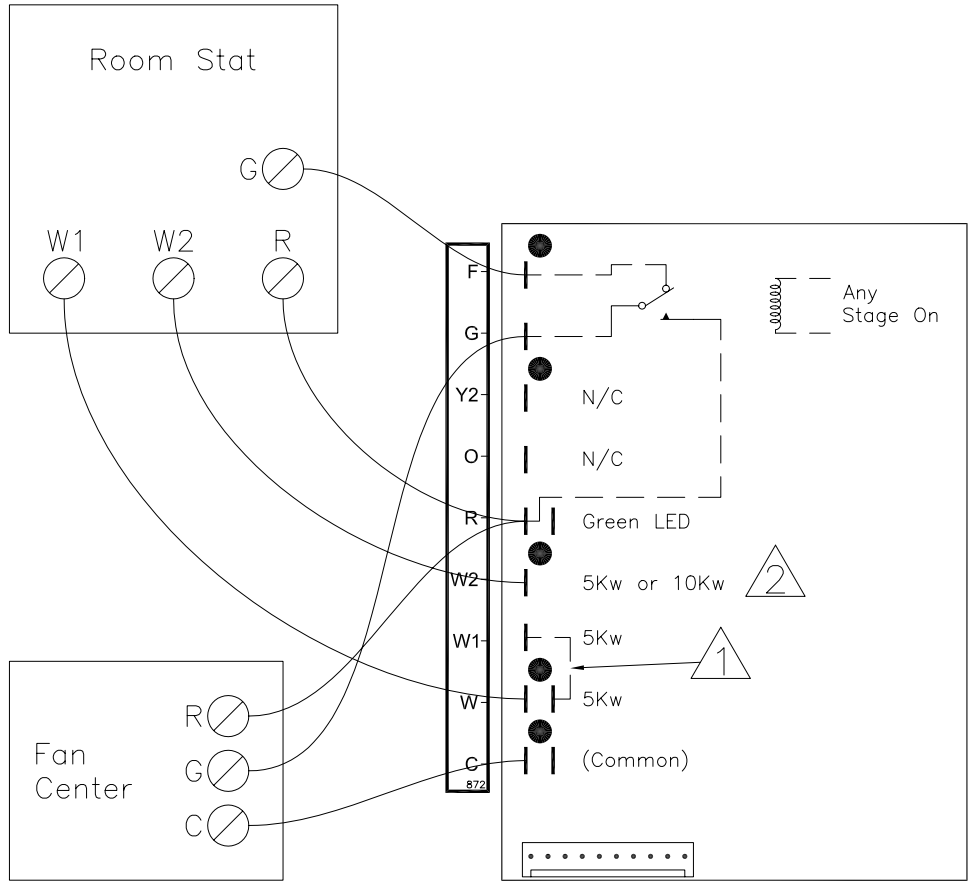
$$\text{CFM} = \frac{\text{volts} \times \text{amps} \times 3.4}{\text{temp. rise} \times 1.1}$$

## REPLACEMENT PARTS

### Part Number

- PC Module, 2 stage	DI66Ø5
- PC Module, 3 stage	DI66Ø6
- Element, 4.8KW	EII# Ø6615
- First hi-limit, 135°F	EII# Ø5636
- Dual hi-limit	EII# Ø663Ø
- Fuse - 5ØA	EII# Ø664Ø
- Fuse - 3ØA	EII# Ø5141

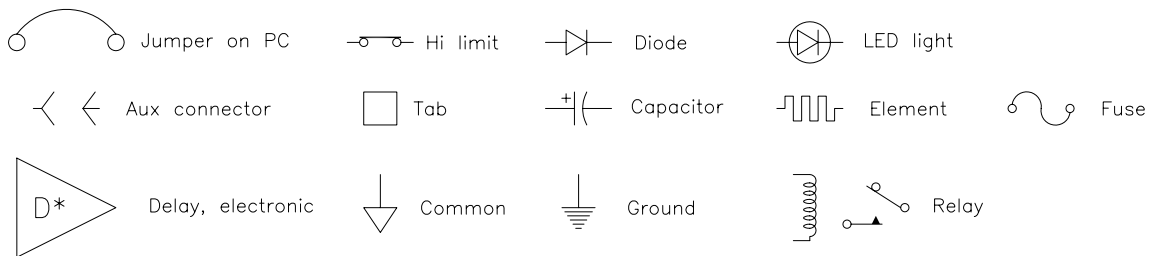
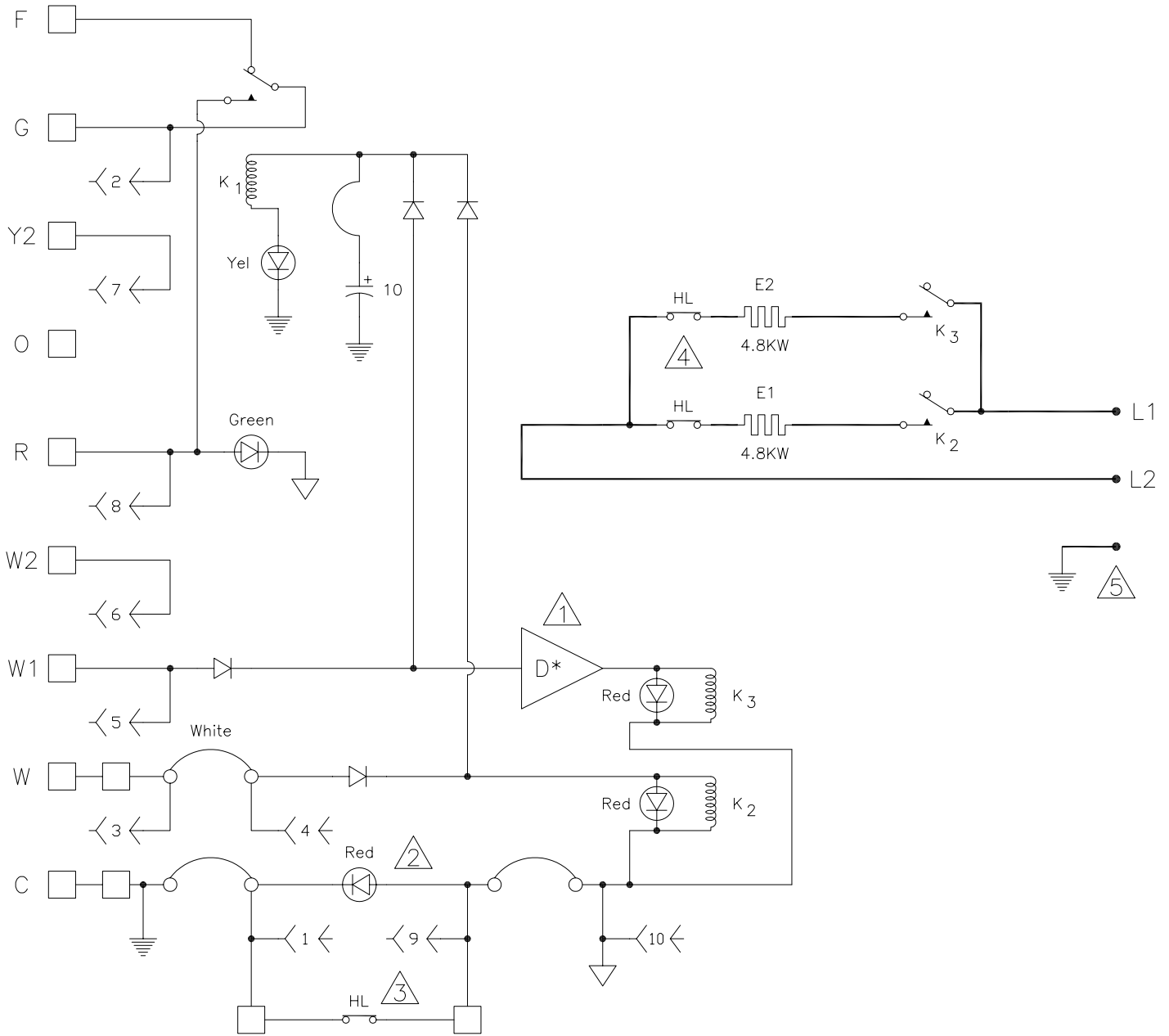
Figure A



Notes:

1. Factory jumpered (White.) If using outdoor staging stat, remove jumper and see Figure A.
2. 15 or 20Kw models.

A106-20-97										Electro Industries Inc. Monticello, MN 55362		Description Duct Heater Basic Hookup Diagram								
Revision Date										Drawing Location --		Model Shown EM-D ****		Engineered WJS		Drawn MEF	Checked	Approved	EII Part Number --	
Old Number										Reference Drawing --		Drawing Type Hookup		Scale --	Drawing Date 02-14-89		Page 1/1	Drawing Number EH503		
4389										View --										



NOTES:

1. All electronic parts are not shown.
2. Located at PC board top.
3. First limit, 135'.
4. Dual limit, includes fuse link.
5. Must be grounded.

E 06-23-98		E 12-20-96		D 09-23-91		C - - -		B - - -		A - - -		REV. DATE		ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362		DESCRIPTION	
DRAWN		MEF		VIEW/DRAWING TYPE		SCHEMATIC		SCALE		NTS		PART/ASSY/MODEL NUMBER		EM-DI***5*		DIAGRAM, EM-DI1025* WIRING SCHEMATIC	
APPROVED		RELEASED		DRAWING STATUS		DOCUMENT DATE		PAGE		1/2		DOCUMENT NUMBER		ES501		4389	
						08-15-89											





# **Electro Industries, Inc.**

## **Limited Product Warranty**

**Effective February 5, 2009**

Electro Industries, Inc. warrants to the original owner, at the original installation site, for a period of two (2) years from date of installation, that the product and product parts manufactured by Electro Industries are free from manufacturing defects in materials and workmanship, when used under normal conditions and when such product has not been modified or changed in any manner after leaving the plant of Electro Industries. If any product or product parts manufactured by Electro Industries are found to have manufacturing defects in materials or workmanship, such will be repaired or replaced by Electro Industries. Electro Industries shall have the opportunity to directly, or through its authorized representative, examine and inspect the alleged defective product or product parts. Electro Industries may request that the materials be returned to Electro Industries at the owner's expense for factory inspection. The determination as to whether product or product parts shall be repaired, or in the alternative replaced, shall be made by Electro Industries or its authorized representative. Electro Industries will cover reasonable labor costs to repair defective product or product parts for ninety (90) days after installation.

### **TWENTY YEAR (20) LIMITED WARRANTY ON BOILER ELEMENTS AND VESSELS**

Electro Industries, Inc. warrants that the boiler elements and vessels of its products are free from defects in materials and workmanship through the twentieth year following date of installation. If any boiler elements or vessels are found to have a manufacturing defect in materials or workmanship, Electro Industries will replace them.

### **TWENTY YEAR (20) LIMITED WARRANTY ON SPIN FIN ELEMENTS**

Electro Industries, Inc. warrants that the spin fin elements of its products are free from defects in materials and workmanship through the twentieth year following date of installation. If any spin fin elements are found to have a manufacturing defect in materials or workmanship, Electro Industries will replace them.

### **FIVE YEAR (5) LIMITED WARRANTY ON OPEN WIRE ELEMENTS**

Electro Industries, Inc. warrants that the open wire elements of its products are free from defects in materials and workmanship through the fifth year following date of installation. If any open wire elements are found to have a manufacturing defect in materials or workmanship, Electro Industries will replace them.



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## THESE WARRANTIES DO NOT COVER:

1. Costs for labor for removal and reinstallation of an alleged defective product or product parts, transportation to Electro Industries, and any other materials necessary to perform the exchange, except as stated in this warranty. Replacement material will be invoiced to the distributor in the usual manner and will be subject to adjustment upon verification of defect.
2. Any product that has been damaged as a result of being improperly serviced or operated, including, but not limited to, the following: operated with insufficient water or airflow, allowed to freeze, subjected to flood conditions, subjected to improper voltages or power supplies, operated with airflow or water conditions and/or fuels or additives which cause unusual deposits or corrosion in or on the product, chemical or galvanic erosion, improper maintenance or subject to any other abuse or negligence.
3. Any product that has been damaged as a result of natural disasters, including, but not limited to, the following: lightning, fire, earthquake, hurricanes, tornadoes or floods.
4. Any product that has been damaged as a result of shipment or handling by the freight carrier. It is the receiver's responsibility to claim and process freight damage with the carrier.
5. Any product that has been defaced, abused, or suffered unusual wear and tear as determined by Electro Industries or its authorized representative.
6. Workmanship of any installer of the product. This warranty does not assume any liability of any nature for unsatisfactory performance caused by improper installation.
7. Transportation charges for any replacement part or component, service calls, normal maintenance; replacement of fuses, filters, refrigerant, etc.

## CONDITIONS AND LIMITATIONS:

1. If at the time of a request for service the original owner cannot provide an original sales receipt or a warranty card registration then the warranty period for the product will have deemed to begin thirty (30) days after the date of manufacture and **NOT** the date of installation.
2. The product must have been sold and installed by a licensed electrical contractor, a licensed plumbing contractor, or a licensed heating contractor.
3. The application and installation of the product must be in compliance with Electro Industries' specifications as stated in the installation and instruction manual, and all state and federal codes and statutes. If not, the warranty will be null and void.
4. The purchaser shall have maintained the product in accordance with the manual that accompanies the unit. Annually, a qualified and licensed contractor must inspect the product to assure it is in proper working condition.
5. All related heating components must be maintained in good operating condition.
6. All lines must be checked to confirm that all condensation drains properly from the unit.
7. Replacement of a product or product part under this limited warranty does not extend the warranty term or period.
8. Replacement product parts are warranted to be free from defects in material and workmanship for ninety (90) days from the date of installation. All exclusions, conditions, and limitations expressed in this warranty apply.
9. Before warranty claims will be honored, Electro Industries shall have the opportunity to directly, or through its authorized representative, examine and inspect the alleged defective product or product parts. Remedies under this warranty are limited to repairing or replacing alleged defective product or product parts. The decision whether to repair or, in the alternative replace, products or product parts shall be made by Electro Industries or its authorized representative.

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