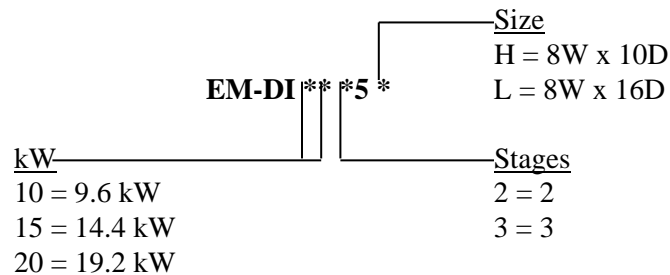


ELECTRO DUCT

BASIC INSTALLATION AND OPERATION MANUAL



NOTE:

This Duct Heater may have various installation applications. The nameplate specifies “use only with” make and model. When installed less than 48” from the blower, elbow, tee, etc., follow the detailed mechanical instructions and adhere to the “use only with” specifications.

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

Drawings: **EH503**
ES501
EI503-F1
EI503-F2
EI503-F3
EC001
XX017



DESCRIPTION

Generic forced air electric resistance heater designed for air handler, heat pump, or blower cabinet **outlet** duct installation. The relationship of the air moving blower to this insert heater must be according to the specific mechanical installation or instruction in detail of this manual.

Basically the minimum airflow through the element rack is 100 CFM per KW (assumes 100°F inlet from heat pump). All air volume which passes around or outside of the element rack insert must be discounted or added to the minimum 100 CFM per KW requirement. This manual provides the necessary details for duct/plenum deflectors and/or duct heater element rack position in relationship to the blower wheel to assure correct airflow through the elements.

Failure to follow the mechanical installation details of this manual may shorten element life and may void limited warranty provisions.

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 codes 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</u> <u>kW</u>	<u>CURRENT</u> +	<u>MIN.</u> <u>CFM*</u>	<u>ELEMENT</u> <u>CROSS</u> <u>SECTION</u>	<u>SOURC</u> <u>E CB</u>	<u>INTERNAL</u> <u>FUSE</u>	<u>SHIP</u> <u>WEIGHT</u>
EM-DI1025H	9.6	40	600	8W x 10D	50	N/A	12
EM-DI1535H	14.4	60	900	8W x 10D	75	30 & 50	16
EM-DI2035H	19.2	80	1200	8W x 10D	100	50 & 50	19
EM-DI1025L	9.6	40	600	8W x 16D	50	N/A	15
EM-DI1535L	14.4	60	900	8W x 16D	75	30 & 50	19
EM-DI2035L	19.2	80	1200	8W x 16D	100	50 & 50	21

Note: Model series EM-DI****C is the same element and control box assembly as model "L", but includes factory assembled starter plenum - 16 W x 16 D.

* 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. And 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 roomstat, no internal connection.

Y2 - Tie point only for wiring roomstat 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 roomstat 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 - Roomstat blower input wire, typically tied to roomstat "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

Note: When installing or mounting this duct heater within four feet of the blower outlet, the following steps **must** be followed as detailed and shown in the appropriate drawing. This is necessary because the airflow from the blower outlet, A-coil, T-Duct, elbows, etc., is very non-uniform. The elements themselves must be centered over the blower opening width (wheel width) and the element rack must be in line with the blower outlet outer edge, see Figure 2.

Models: EM-DI****H&L

Depending upon access and blower size, there are three possible insert locations. All reference is viewing the blower wheel end as shown on Figure 3.

These blower arrangements are detailed and shown for UPFLOW installation. Contact factory for DOWNFLOW application.

1. Blower End, Reference Figure 3 - Only use model number last digit "H". As shown on the drawing, the element rack right edge must line up with the blower outlet right edge. There shall be no opportunity for air to pass by the element rack on the right. Basically the blower opening or plenum width (area to the left of the element rack) is of little or no concern. All of the air coming off of the blower wheel is in the first 4 to 6 inches on the outer scroll of the blower.

The control box back edge must line up with the blower opening edge. This is shown on Figure 3 with the reference "in line". If the plenum section in which the Electro-Duct is inserted is larger than the blower opening so that this "in line" cannot take place, do not use this method of installation.

If the plenum depth (area behind the elements) is larger than about 11 inches, a V deflector will be required in the back of the plenum. See Figure 1 for examples of field constructed V deflector.

2. Insertion Over Blower, Reference Figure 2 - This is the preferred installation method if the blower width (wheel width) is 8 to 10 inches for the "H" model or 14 to 16 inches for the "L" model. Of greater concern is the opening depth (element rack length). The element rack must touch the back of the plenum when inserted.

Again, if the plenum is larger than the blower opening, this method may not work without V deflectors as shown on Figure 1.

3. Insertion from the Blower Back - This is opposite from Figure 2 where the control box edge would line up with the blower back outlet edge. Also with this method, the elements are centered on the wheel width and the hi-limit panel must be in line with the blower edge. Typically the blower opening depth (element rack length) is of little concern because all the air coming off of the blower wheel is at the scroll outer edge.
4. Plenums Larger Than Element Rack - Whenever the plenum or duct is larger than the element rack, field constructed or factory optional starter plenums are available for most major heat pump manufacturers, V deflectors are required to force the air through the element rack. Figure 1 is to be considered an example. This internal deflector must be complete and installed as shown. Do not simply use "an angled piece of tin". You must have the top section carried back to the side of the plenum to prevent eddy currents. Basically the installer is simply providing an internal scoop with the outer edge lined up with the bottom element. This will direct the air properly through the element rack.

Note: The airflow must be in the direction of the decal airflow.

Model: EM-DI**C**

This model includes starter plenum. Position over the blower outlet with the blower discharge at the plenum right (facing Electro-Duct control box). In other words, when facing the control box, you will also be looking at the blower motor end.

Use as UPFLOW only.

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 EH5Ø3 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 roomstat ("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 is 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).

$$\text{CFM} = \frac{\text{Volts} \times \text{Amps} \times 3.4}{\text{Temp. Rise} \times 1.1}$$

OPTIONAL MODULES/CONFIGURATION

Commercial Duct Heater Package - When ordered with the IH-series controller, the system is shipped with manual number 4421.

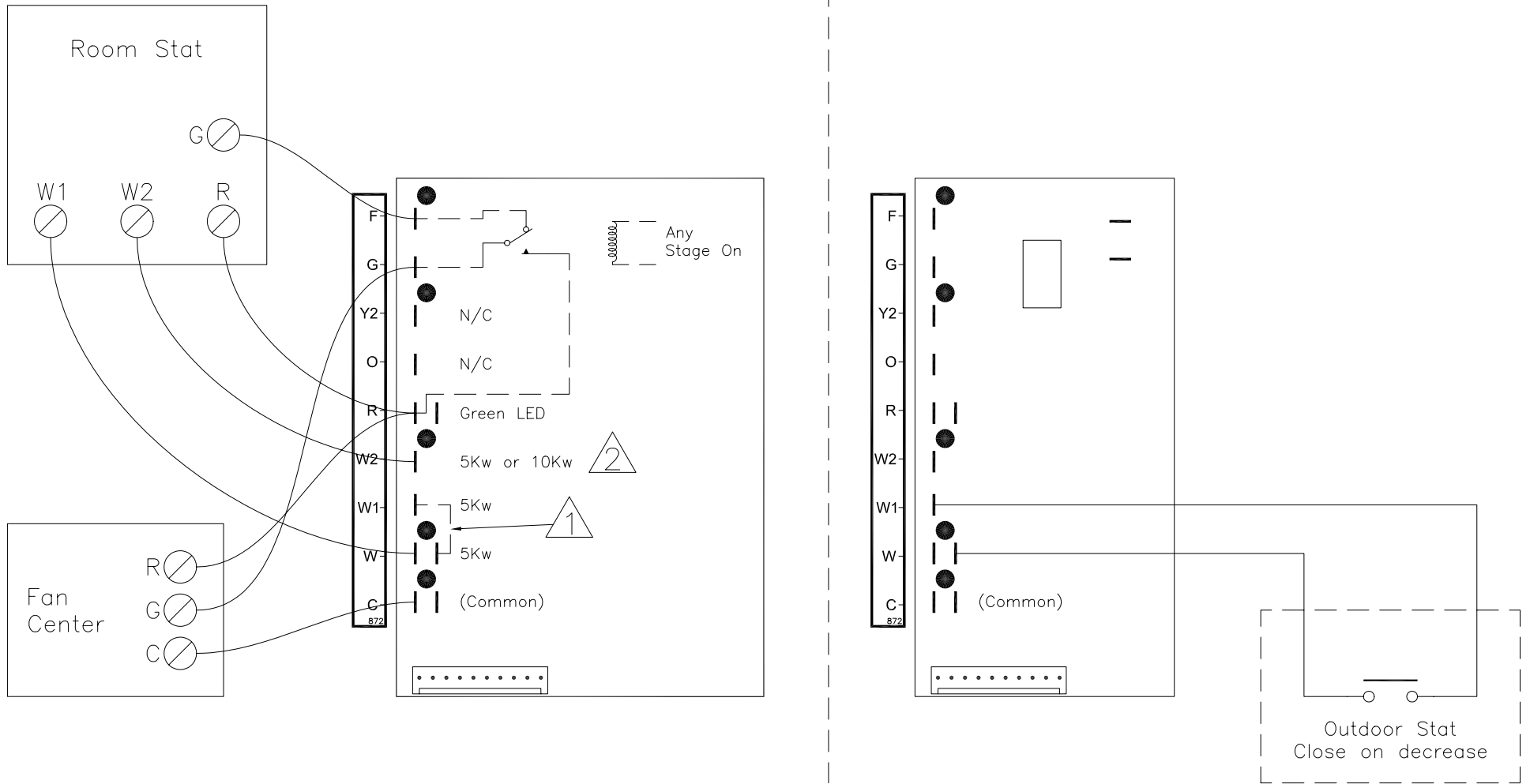
Dual Heat/Dual Fuel Application - When order with DFC module, instruction sheet ED105 is shipped with this module.

REPLACEMENT PARTS

Part Number

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

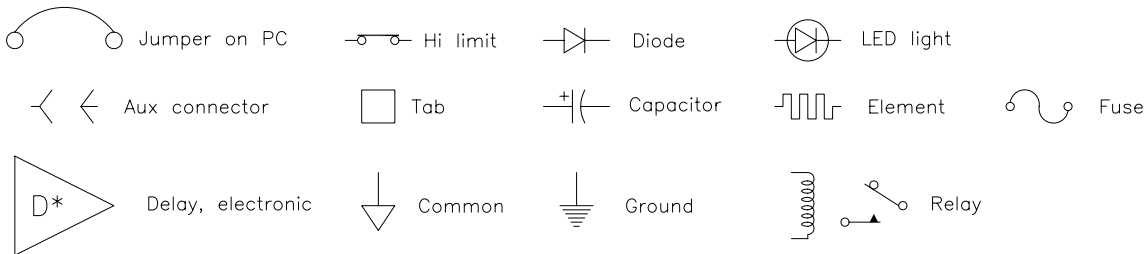
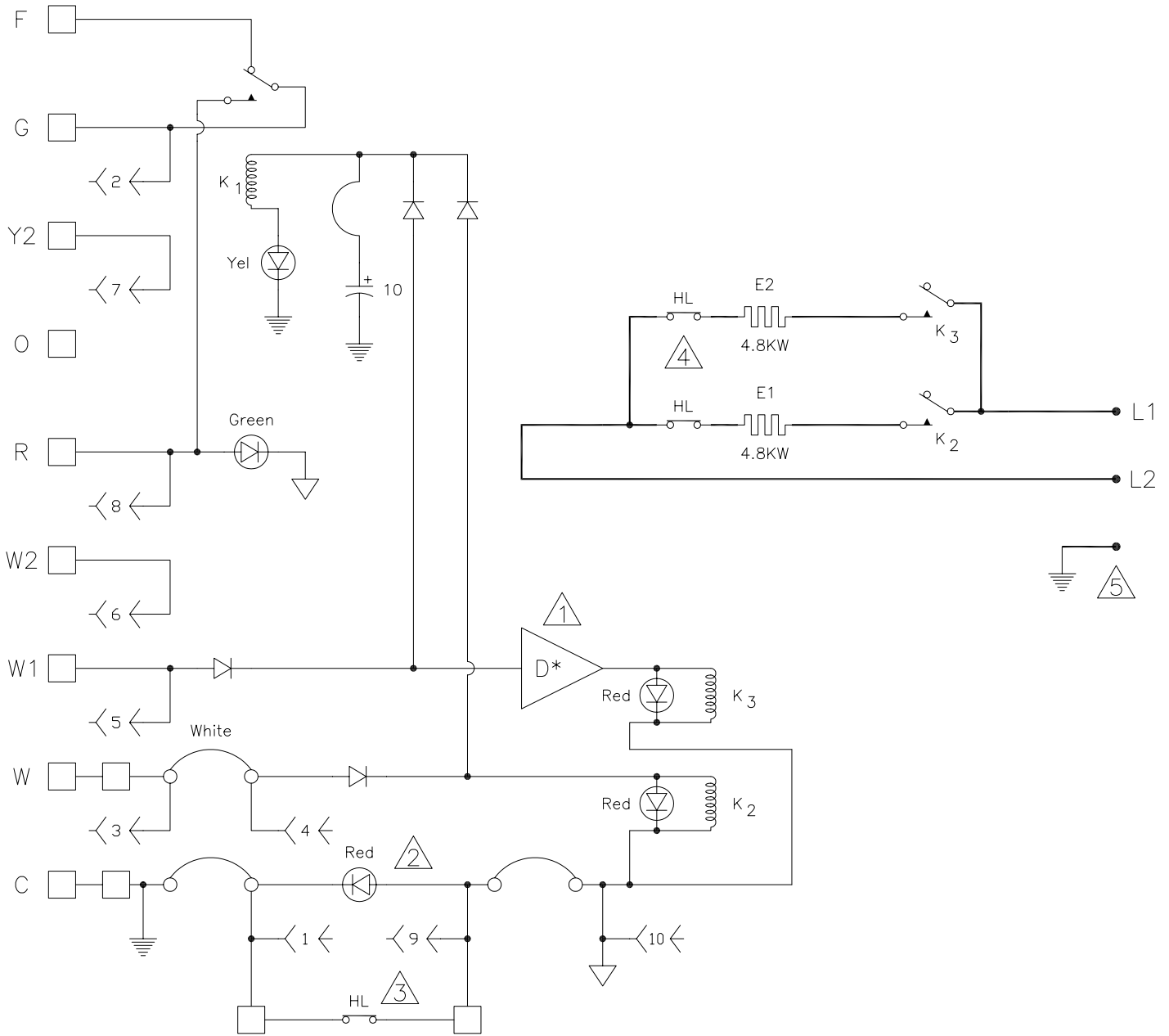
Figure A



Notes:

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

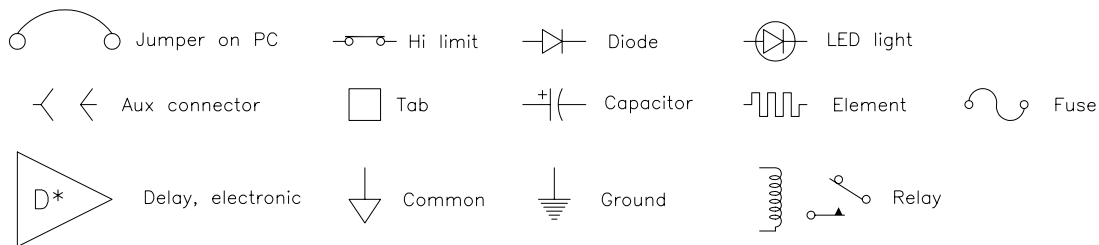
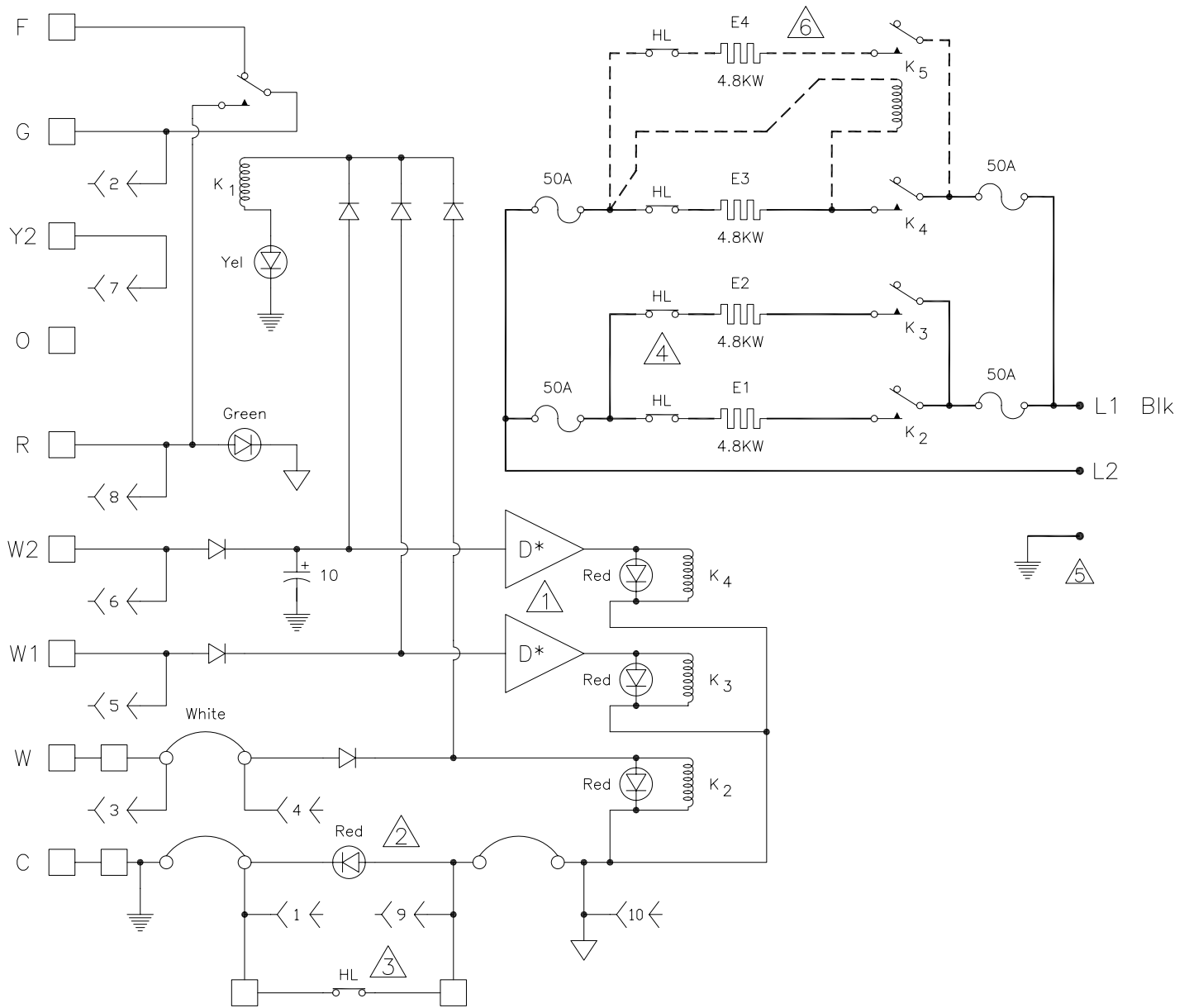
A06-20-97										Electro Industries Inc. Monticello, MN 55362										Description Duct Heater Basic Hookup Diagram																																																											
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---										4389										---										---										02-14-89										1/1										EH503																			



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.

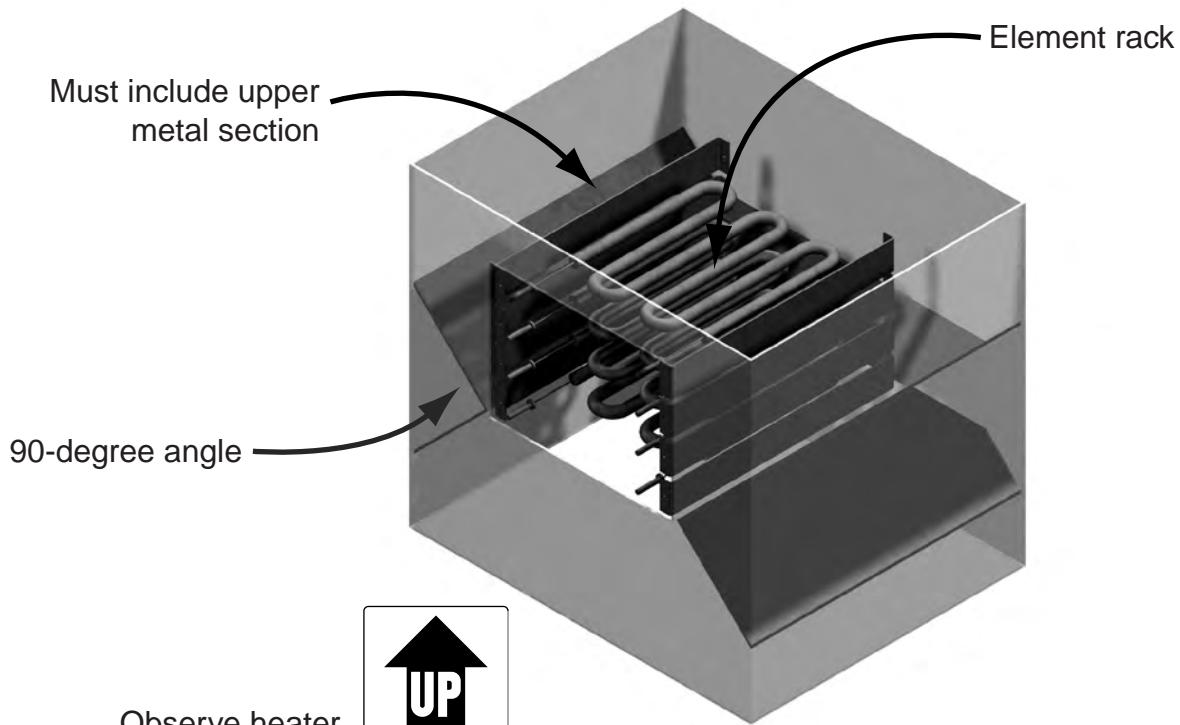
E 06-23-98 E 12-20-96 D 09-23-91 C B A	REV. DATE	ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362	DESCRIPTION		
	ENGINEERED		REFERENCE DOCUMENT		DIAGRAM, EM-DI1025* WIRING SCHEMATIC
	DRAWN	VIEW/DRAWING TYPE	SCALE	PART/ASSY/MODEL NUMBER	
	APPROVED	DRAWING STATUS	DOCUMENT DATE	PAGE	DOCUMENT NUMBER
	RELEASED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



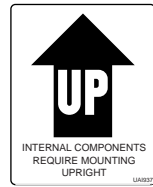
NOTES:

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.
6. 20KW MODEL - E4, K5, 4TH HL, 30 TO 50A FUSES.

E 06-23-98	D 12-20-96	C 09-23-91	B -	A -	REV. DATE	ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362	DESCRIPTION		
							DIAGRAM, EM-DI15*** & EM-DI20*** WIRING SCHEMATIC		
						ENGINEERED	REFERENCE DOCUMENT	SCALE	PART/ASSY/MODEL NUMBER
						--	4386	NTS	EM-DI***5*
						DRAWN	VIEW/DRAWING TYPE	PAGE	DOCUMENT NUMBER
						MEF	SCHEMATIC	2/2	ES501
						APPROVED	DRAWING STATUS	DOCUMENT DATE	
							RELEASED	08-15-89	



Observe heater
air flow label




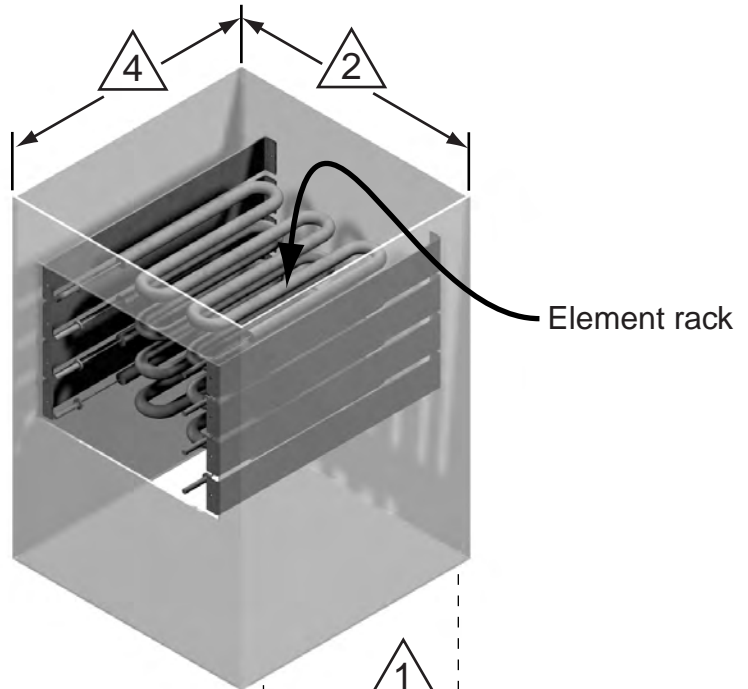
Notes:

1. Center heater elements over blower outlet.
2. To maintain warranty, deflectors must be installed as shown.

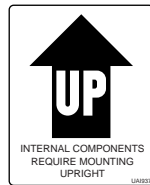


IMPORTANT NOTE: When mounting Duct Heater within four (4) feet of blower and plenum is larger than blower opening, you **MUST** follow this drawing in detail!

 ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362		DESCRIPTION		
DRAWN		SOURCE DOCUMENT		DUCT HEATER LARGE PLENUM
MEF		4383		
CHECKED	VIEW/DRAWING TYPE		SCALE	PART/ASSY/MODEL NUMBER
-	DECAL LAYOUT		1:1	-
APPROVED	DRAWING STATUS	DOCUMENT DATE	SHEET	DOCUMENT NUMBER
-	RELEASED	07-16-02	1/1	EI503-F1



Observe heater
air flow label



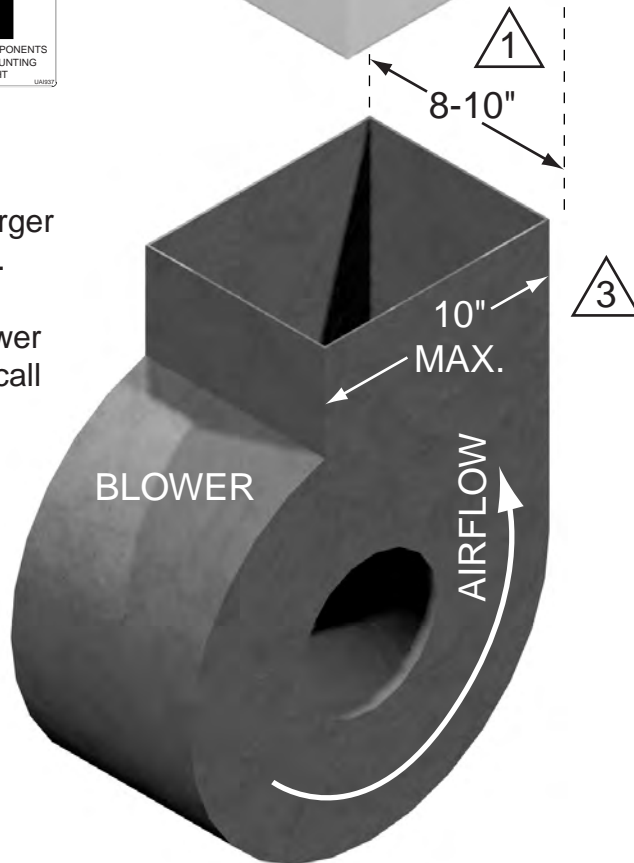
Notes:

1. Blower width range is 8" to 10". If larger than 10", must use side "V" deflectors.


2. If the plenum/duct is wider than blower opening, must use side "V" deflector, call factory for assistance.

3. If smaller than 10", plenum can center over blower outlet. Cannot be larger than 10"

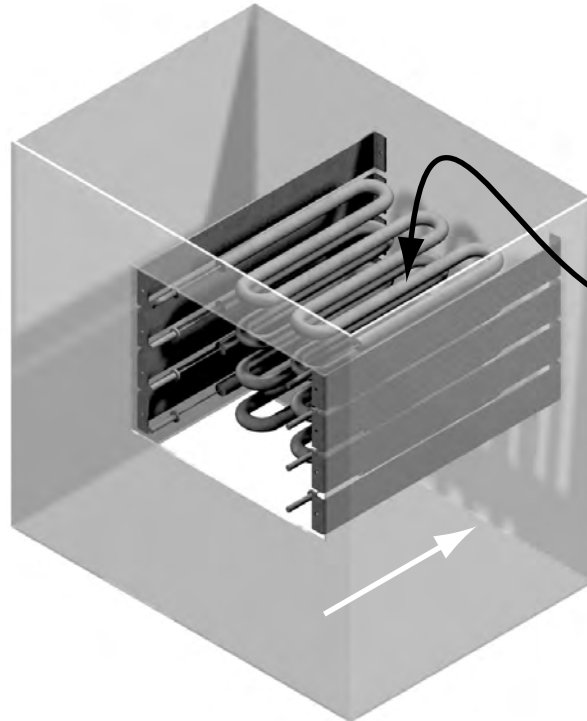
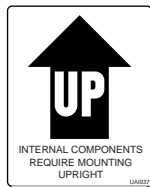
4. Max depth is 10". DO NOT use this insertion method unless element rack completely fills plenum.



IMPORTANT NOTE: When mounting Duct Heater within four (4) feet of blower and plenum is larger than blower opening, you **MUST** follow this drawing in detail!

 ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362		DESCRIPTION		
DRAWN		DUCT HEATER MECHANICAL INSTALLATION - FRONT		
MEF	SOURCE DOCUMENT			
	4384			
CHECKED	VIEW/DRAWING TYPE	SCALE	PART/ASSY/MODEL NUMBER	
-	DECAL LAYOUT	1:1	-	
APPROVED	DRAWING STATUS	DOCUMENT DATE	SHEET	DOCUMENT NUMBER
-	RELEASED	07-24-02	1/1	EI503-F2

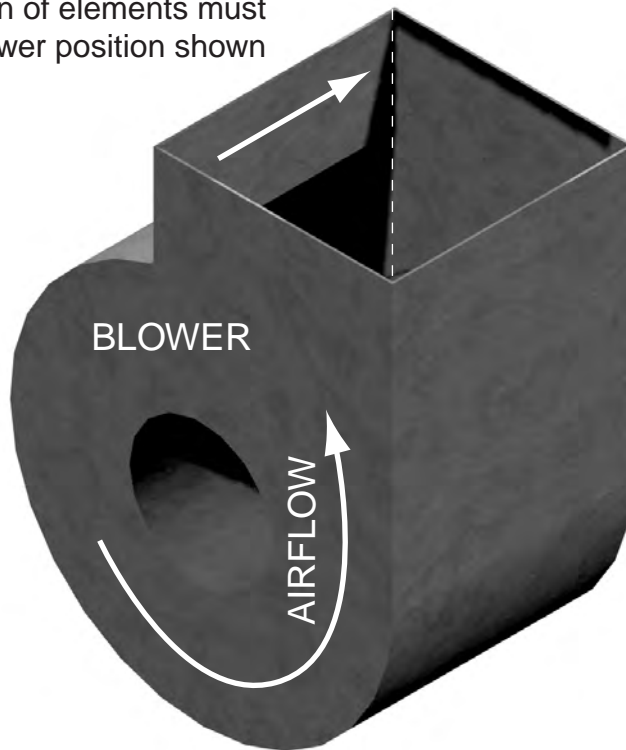
Observe heater
air flow label




Element rack

FOR PROPER AIR FLOW:
Right edge of element
duct heat heater **MUST** line
up with right edge of blower

Direction of elements must
match blower position shown



IMPORTANT NOTE: When mounting Duct Heater within four (4) feet of blower and plenum is larger than blower opening, you **MUST** follow this drawing in detail!

 ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362		DESCRIPTION		
DRAWN		SOURCE DOCUMENT		DUCT HEATER MECHANICAL INSTALLATION - SIDE
MEF	4385			
CHECKED	VIEW/DRAWING TYPE		SCALE	PART/ASSY/MODEL NUMBER
-	DECAL LAYOUT		1:1	-
APPROVED	DRAWING STATUS	DOCUMENT DATE	SHEET	DOCUMENT NUMBER
-	RELEASED	07-24-02	1/1	EI503-F3

Electro-HELPS XIII

DUCT SIZING TABLE

DUCT CAP. CFM	DUCT DIAM IN.	Equivalent Friction Rectangular Ducts (In.)								
1	2	3	4	5	6	7	8	9	10	11
80	5.3	5x5	6x4	9x3						
100	5.8	6x5	7x4	10x3						
125	6.3	6x6	7x5	9x4	12x3					
150	6.8	7x6	8x5	10x4	15x3					
175	7.2	7x6	9x5	11x4	17x3					
200	7.5	7x7	8x6	10x5	13x4	19x3				
225	7.9	8x7	9x6	11x5	14x4	21x3				
250	8.2	8x7	10x6	12x5	16x4	23x3				
275	8.5	8x8	9x7	10x6	13x6	17x4	25x3			
300	8.8	8x8	9x7	11x6	14x5	18x4	27x3			
350	9.3	9x8	11x7	13x6	16x5	21x4	32x3			
400	9.8	9x9	10x8	12x7	14x6	18x5	24x4	36x3		
450	10.2	10x9	11x8	13x7	15x6	19x5	26x4	40x3		
500	10.7	10x10	11x9	12x8	14x7	17x6	21x5	28x4	44x3	
550	11.0	10x10	11x9	13x8	15x7	18x6	23x5	32x4	48x3	
600	11.4	11x10	12x9	14x8	16x7	20x6	25x5	35x4	52x3	
650	11.8	11x11	12x10	13x9	15x8	17x7	21x6	27x5	37x4	
700	12.1	11x11	12x10	14x9	16x8	18x7	22x6	29x5	40x4	
750	12.3	12x11	13x10	15x9	17x8	20x7	24x6	30x5	42x4	
800	12.7	12x11	14x10	15x9	18x8	21x7	25x6	32x5	45x4	
850	13.0	12x12	13x11	14x10	16x9	18x8	21x7	26x6	35x5	
900	13.2	12x12	14x11	15x10	17x9	19x8	23x7	28x6	36x5	
950	13.6	13x12	14x11	16x10	18x9	20x8	24x7	30x6	38x5	
1000	13.9	13x12	15x11	16x10	18x9	21x8	25x7	31x6	40x5	
1100	14.3	13x13	14x12	16x11	18x10	20x9	23x8	27x7	33x6	43x5
1200	14.8	14x13	15x12	17x11	19x10	21x9	25x8	29x7	36x6	47x5
1300	15.2	14x14	15x13	16x12	18x11	20x10	23x9	26x8	31x7	39x6
1400	15.7	15x14	16x13	17x12	19x11	21x10	24x9	28x8	34x7	41x6

NOTE:

If sizing is in question, always go to the larger duct for CFM in question.

Grilles and registers shall be sized according to manufacturers performance data capable of handling the CFM of the duct at a throw based on room dimensions. Return air registers should be selected to provide for 450 FPM face velocity.

The above capacities assume individual duct static pressures of less than about 0.1. If the static pressure is higher, assume considerably reduced CFM.

EVALUATING AND SIZING DUCT WORK SYSTEMS

Quickie Method

- The trunkline duct work off of the plenum should have 70 square inches per ton for the supply side
- The return air plenum should have 80 square inches per ton

Standards Used

- Heat pumps require 400 CFM to 450 CFM per ton to operate
- Use a friction per 100 ft. of duct of .08 when sizing or evaluating supply duct work
- Use a friction per 100 ft. of duct of .06 when sizing or evaluating return air duct work
- Duct work is manufactured in 8 ft. lengths
- Rectangular duct work is normally 8 inches tall
- Return air grills are normally 8 inches high and the width of one or two joist spaces
- 7 inch round pipe will handle approximately 150 CFM
- 6 inch round pipe will handle approximately 100 CFM

Tips

- Never go larger than a 3 to 1 ratio on rectangular duct work width to height when figuring a duct work system
- Common branch duct round pipe is either 6 inch or 7 inch
- Never use branch duct piping smaller than 6 inch round pipe when using a heat pump system
- Normal practice when sizing new duct work is to use a friction per 100 ft. of duct of .08 for the supply line duct work and .06 for the return line duct work
- When doing a retrofit job you will more likely have problems with the distribution of air to the rooms than the size of the duct work

Evaluating Existing Duct Work

1. Perform a heat loss/gain calculation on the structure and obtain the size system needed and the CFM needed per room.
2. Figure the total CFM needed for the system room by room or: 400 CFM minimum to 450 CFM maximum x heat pump system tonnage.
3. Figure the CFM that can be supplied with each trunkline leaving the plenum using the duct calculator with a friction per 100 ft. of duct of .08.
4. The total CFM that the trunkline(s) can handle must equal or exceed the CFM required by the heat pump system. If it is not, the duct work will have to be replaced or changed.
5. If the trunkline is large enough, subtract the heat loss/gain CFM (whichever is larger) needed per room, fed by the first section of trunkline from the total provided. Then figure the size of the next piece of trunkline for the remaining CFM.
6. The return air duct work must handle the CFM put out by the supply side of the system. Using the duct calculator, figure the amount of air that can be handled by the existing system. Use a friction per 100 ft. of duct of .06. Figure the trunklines first, then branch ducts.

ELECTRO INDUSTRIES, INC.
2150 WEST RIVER STREET, P.O. BOX 538
MONTICELLO, MN 55362
(763) 295-4138

Electro Industries, Inc. Residential Limited Product Warranty

Effective November 1, 2009

Electro Industries, Inc. warrants to the original owner, at the original installation site, for a period of two (2) years from date of original purchase, that the product and product parts manufactured by Electro Industries, Inc. 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, Inc. If any product or product parts manufactured by Electro Industries, Inc. are found to have manufacturing defects in materials or workmanship, such will be repaired or replaced by Electro Industries, Inc. Electro Industries, Inc., shall have the opportunity to directly, or through its authorized representative, examine and inspect the alleged defective product or product parts. Electro Industries, Inc. may request that the materials be returned to Electro Industries, Inc. at 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, Inc. or its authorized representative.

Electro Industries, Inc. will cover labor costs according to the Repair / Replacement Labor Allowance Schedule for a period of ninety (90) days from the date of original purchase, to the original owner, at the original installation site. The Repair / Replacement Labor Allowance is designed to reduce the cost of repairs. This Repair / Replacement Labor Allowance may not cover the entire labor fee charged by your dealer / contractor.

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 original purchase. If any boiler elements or vessels are found to have a manufacturing defect in materials or workmanship, Electro Industries, Inc. 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 original purchase. If any spin fin elements are found to have a manufacturing defect in materials or workmanship, Electro Industries, Inc. 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 original purchase. If any open wire elements are found to have a manufacturing defect in materials or workmanship, Electro Industries, Inc. will replace them.



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.

THESE WARRANTIES DO NOT EXTEND TO ANYONE EXCEPT THE ORIGINAL PURCHASER AT RETAIL AND ONLY WHEN THE PRODUCT IS IN THE ORIGINAL INSTALLATION SITE. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE.

ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED WITH RESPECT TO ALL PURCHASERS OR OWNERS. ELECTRO INDUSTRIES, INC. IS NOT BOUND BY PROMISES MADE BY OTHERS BEYOND THE TERMS OF THESE WARRANTIES. FAILURE TO RETURN THE WARRANTY CARD SHALL HAVE NO EFFECT ON THE DISCLAIMER OF THESE IMPLIED WARRANTIES.

ALL EXPRESS WARRANTIES SHALL BE LIMITED TO THE DURATION OF THIS EXPRESS LIMITED WARRANTIES SET FORTH HEREIN AND EXCLUDE ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES RESULTING FROM THE BREACH THEREOF. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY. PRODUCTS OR PARTS OF OTHER MANUFACTURERS ATTACHED ARE SPECIFICALLY EXCLUDED FROM THE WARRANTY.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH VARY UNDER THE LAWS OF EACH STATE. IF ANY PROVISION OF THIS WARRANTY IS PROHIBITED OR INVALID UNDER APPLICABLE STATE LAW, THAT PROVISION SHALL BE INEFFECTIVE TO THE EXTENT OF THE PROHIBITION OR INVALIDITY WITHOUT INVALIDATING THE REMAINDER OF THE AFFECTED PROVISION OR THE OTHER PROVISIONS OF THIS WARRANTY.