WarmFlo Make-Up Air & Mini-Boiler Sensor Temperature Settings

The electric elements are modulated based upon the warm air temperature sensor and the temperature value is selectable by an internal screwdriver switch, 8 positions (Ø to 7).

Each model series or program chip number has a specific temperature range.

Each of the Ø to 7 positions represent a specific temperature value and relate to the table below. The identifying letter is on the chip decal.

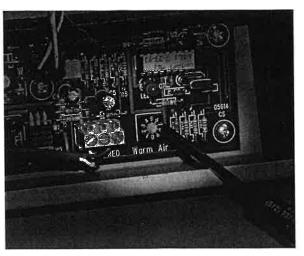
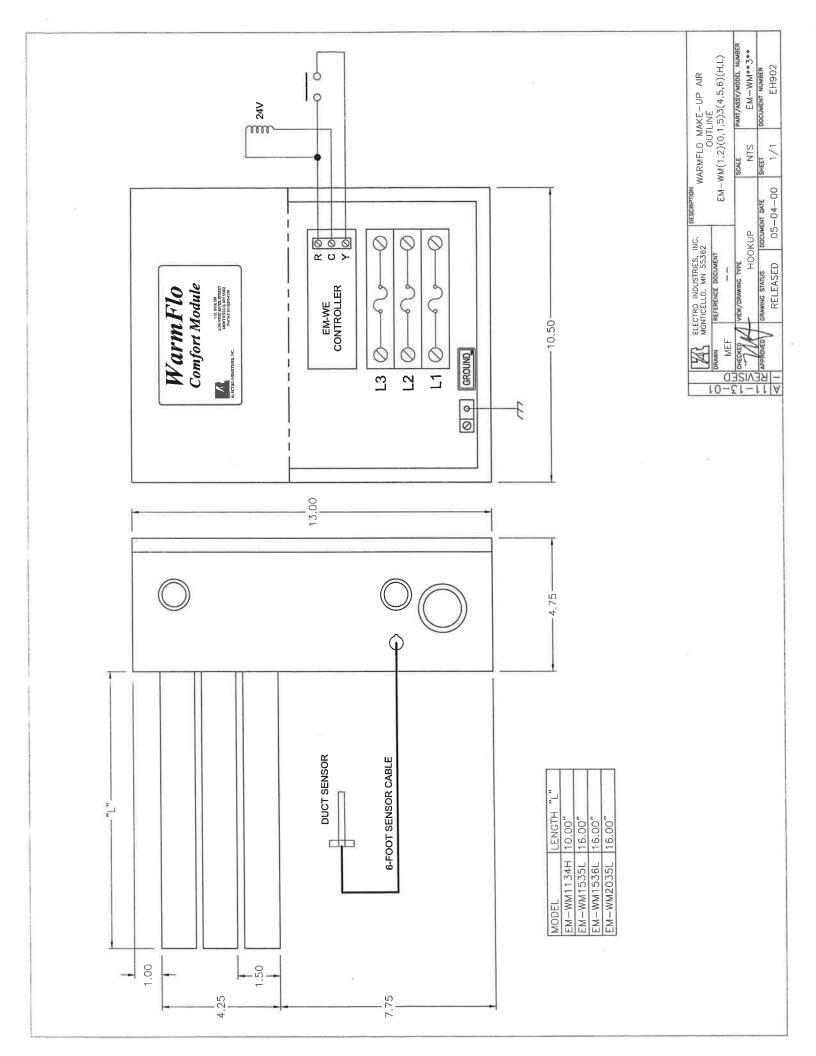


Photo shows small screwdriver for adjusting this step switch.

Switch Position	T	A	В	C	E	Н	D	WFMU	UB
0	110	85	96	20	60	88	40	30	0
1	120	95	100	25	65	90	52	38	6
2	130	105	104	30	70	92	64	46	12
3	140	115	108	35	75	94	76	54	18
4	150	125	112	40	80	96	88	62	88
5	160	135	116	45	85	98	100	80	100
6	170	145	120	50	90	100	112	88	112
7	180	150	124	55	95	102	124	96	124

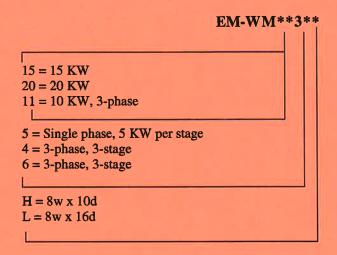
Factory default – unless noted at the time of order, the various model series are shipped with temperature group codes shown.

Product Series	Type	Chip P/N	Chip Version	Product Std. Temp. Group
EM-WX0111R	716	9769	11.33	D
EM-WC0*	716	9769	11.32	D
EM-WX0*	716	9769	11.32	D
EM-WC10/WX10	716	9769	12.31	D
EM-WH**	716	9769	12.31	C
EM-WM** (old)	57	9268	5.01	C
EM-WM**	74	9266	3.22	D
EMB-W-9	716	9769	13.21	A
WF-CM1	716	9769	11.32	Н
HE-A-**	74	9266	2.36	WFMU



ELECTRIC MAKE-UP AIR

WITH WARMFLO CONTROLLER



Specific Application – forced air duct requiring a temperature rise with a fixed temperature outlet.

Reference: EH902

ES502 XX017

NOTE: This manual revision and date pertains to controller chip version 5.00. The controller chip is the plug-in integrated circuit on the PC board with the printed label.



Description

This is more than a traditional duct heater. The control box and electric elements may appear to be a standard duct heater, but the internal WarmFlo controller and its companion solid state temperature sensor modulate the duct heater elements to produce a constant outlet temperature at the sensor.

This unit applies to forced air ducts (blower within system). Do not install in a fresh air duct which depends upon gravity or building pressure differential flow. See Table 1 for min. CFM.

240-Volt Rating - Single Phase - Models

When operating at a lower source voltage the output may be reduced.

Example: 10 KW unit assuming normal element tolerances.

- 220-volt source 16.8 KW, 76 amps
- 208-volt source 15.1 KW, 72 amps

208-Volt Rating - Three Phase - Models

When all elements are on, it is a three phase balance load. Measure current in each leg and apply three phase formula to determine kW.

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.

Mechanical Installation

Warning - In order to provide maximum electric element life, the airflow through all electric elements must be uniform.

Typical installation is within a horizontal forced air duct. The element rack for these models is 8x16" deep.

Observe airflow arrow decal and orientate the unit so the airflow is through the elements as represented by the airflow decal arrow.

Using correct placement and deflectors, make every effort to make sure at least 90% of the air passes through the element rack.

If installation is within 4 feet of any elbow, plenum or tee; turning veins will be required to make sure there is uniform airflow through the element rack.

Secure control box to duct.

Clearance - Duct Surface Areas, Duct Installation, Etc.

When installed within air handler plenum or furnace/A-coil plenum, the codes and rules relating to clearance apply.

When installed in an "inline" duct or round pipe adapter for a general distribution boost heater or air makeup application, observe the following guidelines:

- 1. This product must be installed in a metal duct, size of the element rack.
- 2. There shall be no insulation on the inside of this sheet metal duct section.
- 3. Any flex-pipe or other insulated pipe must be at least 24" from the electric element.
- 4. Mounting there must be at least 2" air clearance around all sides of this sheet metal duct section.
- 5. If there is a need to insulate this duct section for moisture condensation or in an unheated compartment, it is permissible to wrap insulation around the exterior of this metal duct section.
- 6. The control box must be positioned so it will not receive water dripping or collection of moisture.
- 7. See next section on duct sensor installation.

Specification – Table 1

Model	Nor. Kw	Phase	Current +	MIN CFM	Internal Fuse	Ship Weight
1535L	14.4	1	60	900	30 & 50	19
2035L	19.2	1	80	1200	50 & 50	21
1134H	10.8	3	30	600	40 (3)	20
1536L	15	3	42	900	50 (3)	21

⁺ At full rated voltage.

CFM Chart - Table 2

Temp. Rise Needed	80	70	60	50	40	30
Model Number 1535L 2035L	<u>CFM</u> 600 800	<u>CFM</u> 700 900	<u>CFM</u> 790 1050	<u>CFM</u> 950 1260	<u>CFM</u> 1180 1600	CFM 1600 2100
1134H	425	500	570	680	850	1140
1536L	600	700	790	950	1180	1600

Temperature Rise Comments

Typically the maximum temperature rise for this product is 40°F for room air inlet or 20°F for elevated supply temperature from a typical heat pump.

If it is air make-up, outside air, larger temperature rises are permissible, see table above.

Electrical Hookup

Reference: Drawing HH316, the electrical requirements are quite straight forward – element power, 240 or 208 and very basic 24-volt control. The following should give you the necessary information.

1. ELEMENT POWER 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 source power. Connect to fuse block/input terminals.

- 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. 24 VOLT SOURCE Connect the system 24v transformer to "R" and "C". Typically this is from the Fan Center. If this is tied in with an existing thermostat system and furnace air handler, do not add a separate transformer for this unit. If this is a stand alone makeup air unit, you will need a 24-volt transformer to operate this unit.
- 4. THERMOSTAT OR TURN-ON CONTROL This unit is activated (elements turn on and off) when a contact is applied to the terminal block "Y" and "R". Using either a roomstat thermostat W connection, or an external relay contact (relating to blower operation); close "Y" to "R"for basic on/off operation.

Comment: Electro Industries stocks pressure differential (set at 0.2 static) airflow detecting turnon switch (P/N 5009) or current sensing switch with adjustable detection (P/N WF-ISW). If these "turn-on" devices would be a help in your installation, call factory.

Duct Sensor

This unit is equipped with a remote temperature-sensing probe. This is a solid state probe (actually mini-micro computer chip at the end of the probe), handle with care.

Suggested installation is in the main warm air stream approximately 20 to 24 airflow inches away from the electric element. Simply drill a ½" hole in the duct, insert probe, and screw in place.

Comment: The sensor tip within the tube should be at the end of the tube or slightly extending beyond the tube. If this is not the case, very carefully push the cable (do not grab the sensor tip with pliers) until the sensor tip can effectively sample the warm air.

This duct sensor has a 6-wire cable. It should be connected to the Red, ST, and COM screw terminals. The "OT" screw terminal is **not** used for this product application.

WARNING - If the black and red sensor wires are crossed or incorrectly installed at the terminal block and power is turned on, burnout damage can result within the sensor probe.

Temperature Set Point

The inside circuit board contains a screwdriver switch setting marked \emptyset through 9. This is usable only for \emptyset through 7. Unless otherwise specified during the time of order, this unit is equipped with a default "D" chip. This is a broad range temperature with settings at 12° steps. If you would like a more precise temperature setting, the "plug-in chip" can be changed for a temperature range selection. Order a specific temperature range chip code as shown below.

Ø = 40°	4 = 88°
1 = 52°	5 = 100°
2 = 64°	6 = 112°
3 = 76°	7 = 124°

Other Available (Special Order) Temperature Range Chips are as follows:

Switch Position	A	В	С	E	Н
0	90	96	20	60	88
1	100	100	25	65	90
2	110	104	30	70	92
3	120	108	35	75	94
4	130	112	40	80	96
5	140	116	45	85	98
6	150	120	50	90	100
7	160	124	55	95	102

Operational Tips

Monitor Lights

Main Control Board (WarmFlo)

Green Monitor LED - When illuminated the WarmFlo controller is receiving 24 volts at the R and C terminals. Under all normal operating modes, this should be solid green.

As a secondary function this green LED provides status of the remote sensors. If a sensor is inoperative, incorrectly wired, or malfunctioning; this monitor light is in a blinking or pulsing mode.

Upper Left, Monitor LED - The three red LED's next to the output connector, indicate stage 1, 2, and 3 operation (stage 1 is on the right).

Fuse – The WarmFlo board itself does not contain a traditional fuse, but at the "R" input terminal is a automatic reset, short current protection device. If there has been a short circuit condition, and the green LED is off, at least 2 to 3 minutes "cool off time" is required for this "fuse" to reset.

Electric Power Module (EPM)

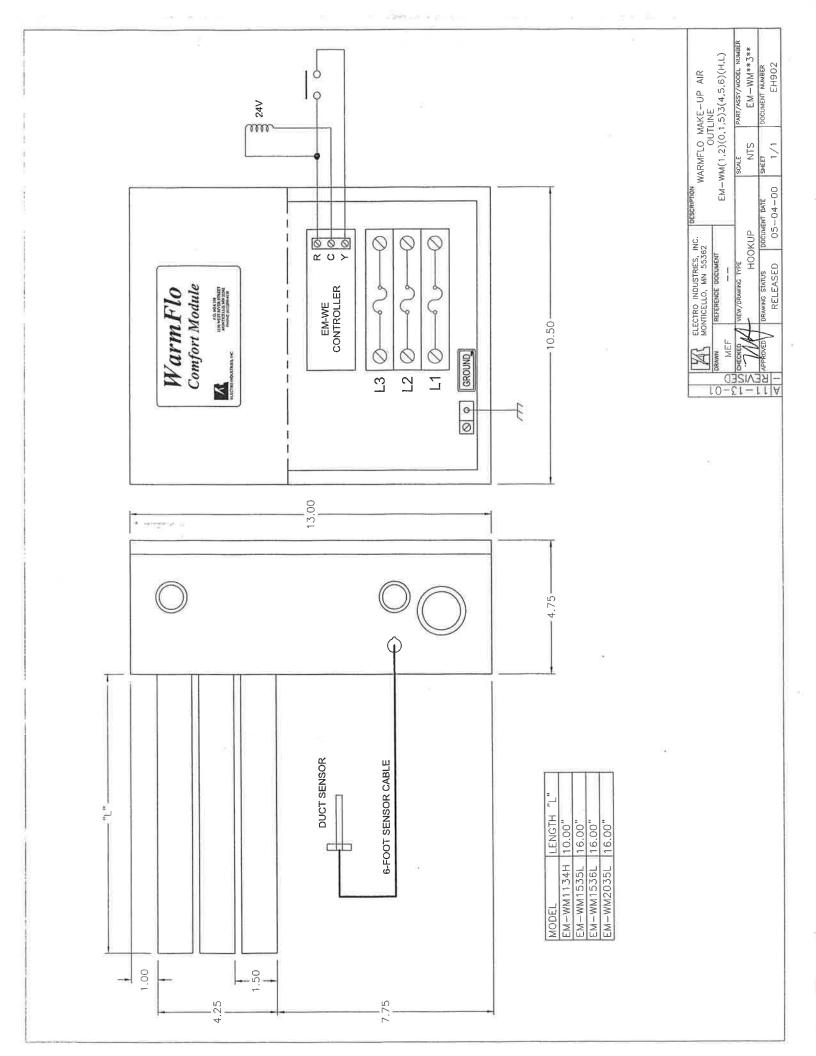
Red LED – on relay board – Illuminates when the low voltage hi-limit sensor probe opens. This applies only after thermostat heat call and WarmFlo controller is stepping on the various element stages. If there is a hi-limit condition, red LED is illuminated. As soon as the hi-limit cools and snaps back in, red LED extinguishes.

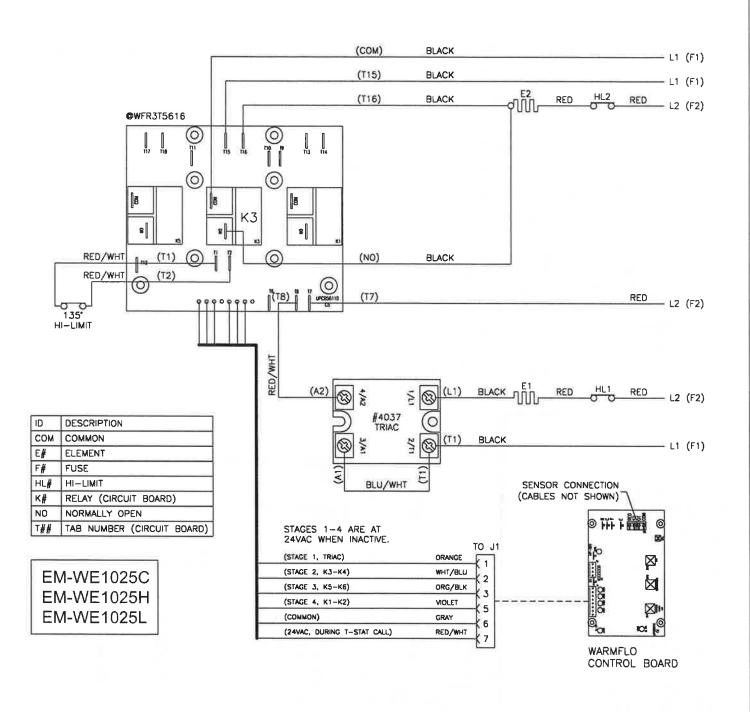
Summer Operation

Provisions will need to be made to make sure these elements cannot come on (interrupting Y input) during cooling season.

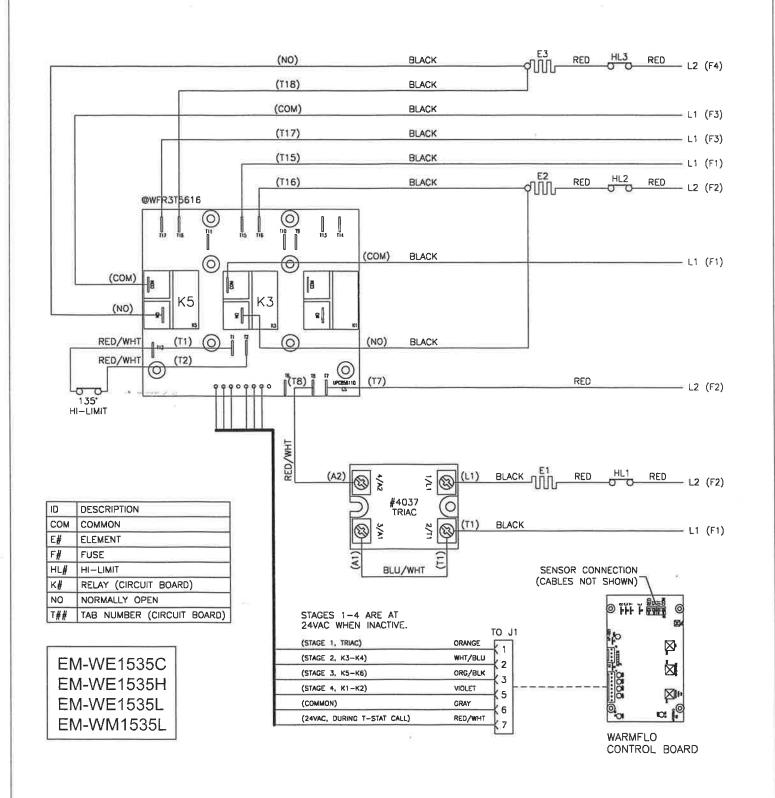
Sequence

- A. Contact applied to "Y" and "R" terminals.
- B. Stage 1 (5KW) turns on for at least 10 seconds.
- C. Based upon temperature at the duct sensor, the electric elements begin modulating or remain full on if temperature is 3° below set point.
- D. As the temperature rises, the Stage 1 (5KW) begins modulating (full on and then full off during a 10-second interval).
- E. If temperature does not reach set point, Stage 2 and/or Stage 3 comes on (Approximate 3 min. spacing).
- F. If the warm air temperature goes 3° above set point, Stage 3 and/or Stage 2 again turn off.
- G. Stage 1 will modulate $\pm 2^{\circ}$ around the set point.
- H. With the absence of the "Y" and "R" contact, all elements are off.
- I. At the next "Y" to "R" contact closure, the modulation rate and stage 2 or 3 activity returns to the same state.

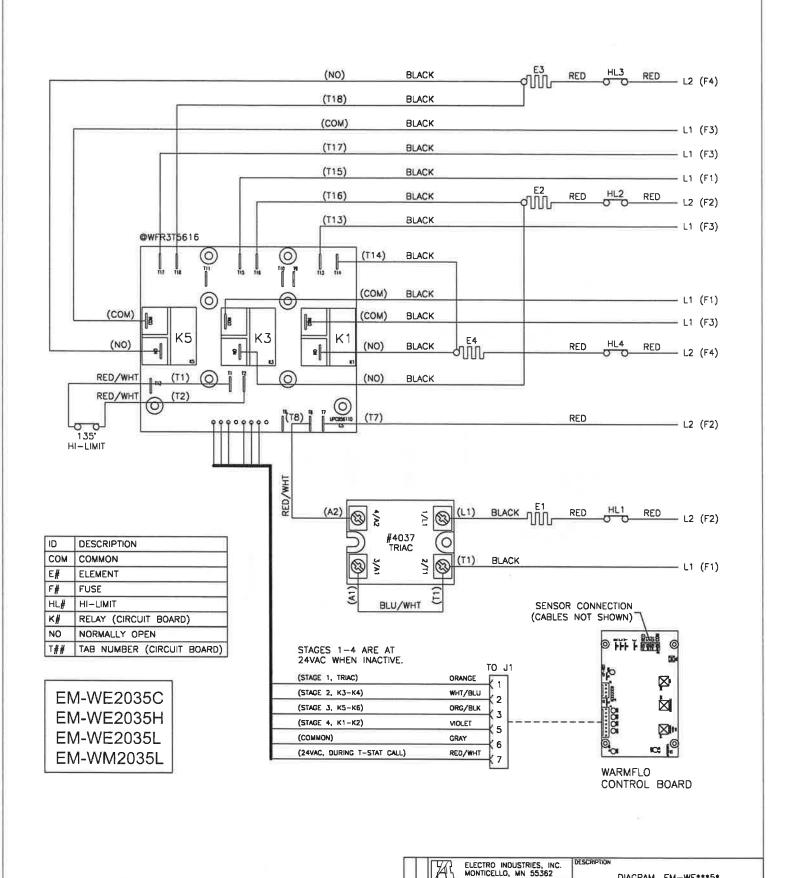




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DIAGRAM, EM-WE***5*

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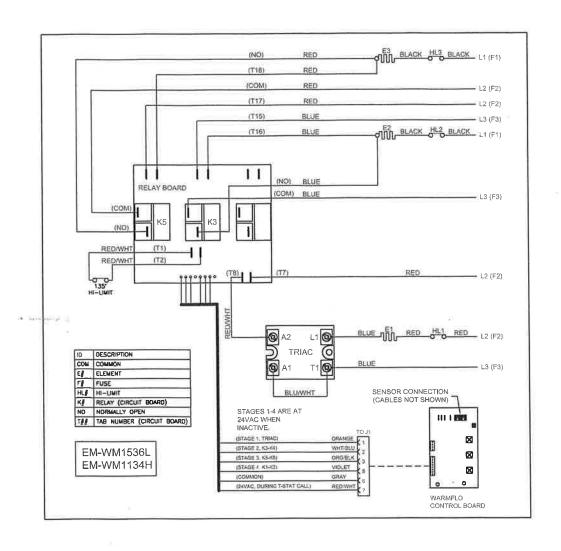
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Electro Industries, Inc. Residential Limited Product Warranty

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.



CONDITIONS AND LIMITATIONS:

- 1. This warranty is limited to residential, single family dwelling installations only. Any commercial or multi-unit dwelling installations fall under the Electro Industries Commercial Limited Product Warranty.
- 2. Electro Industries, Inc. shall not be liable for performance related issues resulting from improper installation, improper sizing, improper duct or distribution system, or any other installation deficiencies.
- 3. 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 the date the product is shipped from the factory and **NOT** the date of original purchase.
- 4. The product must have been sold and installed by a licensed electrician, plumbing, or heating contractor.
- 5. The application and installation of the product must be in compliance with Electro Industries, Inc. specifications, as stated in the installation and instruction manual, and all state, provincial and federal codes and statutes. If not, the warranty will be null and void.
- 6. 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.
- 7. All related heating components must be maintained in good operating condition.
- 8. All lines must be checked to confirm that all condensation drains properly from the unit.
- Replacement of a product or product part under this limited warranty does not extend the warranty term or period.
- 10. 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.
- 11. Before warranty claims will be honored, Electro Industries, Inc. 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, Inc. or its authorized representative.

THIS WARRANTY DOES NOT COVER:

- Costs for labor for diagnosis, removal or reinstallation of an alleged defective product or product part, transportation to Electro Industries, Inc., 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 or product part that has been damaged as a result of being improperly serviced or operated, including, but not limited to, the following: operated during construction phase, with insufficient water or air flow; allowed to freeze; subjected to flood conditions; subjected to improper voltages or power supplies; operated with air flow 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 or product part that has been damaged as a result of natural disasters, including, but not limited to, lightning, fire, earthquake, hurricanes, tornadoes or floods.
- 4. Any product or product part 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 or product part that has been defaced, abused or suffered unusual wear and tear as determined by Electro Industries, Inc. or its authorized representative.
- 6. Workmanship of any installer of the product or product part. This warranty does not assume any liability of any nature for unsatisfactory performance caused by improper installation.
- 7. Transportation charges for any replacement product, product part or component, service calls, normal maintenance; replacement of fuses, filters, refrigerant, etc.

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 OR PROVINCES 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 OR PROVINCIAL 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.

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