

# MAKE-UP AIR – BLOWER INLET MODULE

This is a self-contained package with a permanent (washable) air filter, electric heating element, modulating element temperature control, and blower. This product has been designed specifically for **outside air inlet**. The components, finned rod electric elements, inside insulation, etc. have been selected for make-up air.

The specification table lists various performance parameters and installation details for the three sizes or models. The model number for your unit is on the bottom cover.

All models include the WarmFlo Comfort Module electronic outlet temperature sensor and associated control circuitry to modulate the electric elements for a fixed outlet temperature. This means the electric element is only used to “make-up” or heat the outside fresh air to the preset temperature point. There is no overheating or inefficient use of the electric element.

Also all models include a variable speed blower function, see Installation Setup section for proper blower speed adjustment.

Drawings:        **EH903 p.1 & 2**  
                      **ES904**  
                      **ES905**  
                      **XX017**



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## MAKE-UP AIR – BLOWER MODULE

Model	Cabinet	Shipping Lbs.	In/Out Duct	Voltage	kW	I	Service	Drawing
EM-WH0212J	37L x 13¼H x 13½D	64	8"	240V	2.5kW	10	15A	ES903
EM-WH0515J	37L x 13¼H x 13½D	66	8"	240V	5kW	21	30A	ES903
EM-WH1025K	40L x 20½H x 16D	104	10"	240V	10kW	42	60A	ES904

### Airflow Temperature Rise

#### EM-WH0515J – 5 kW

<u>Blower</u>	<u>SP</u>	<u>CFM</u>	<u>Temp. Rise (°F)</u>
Full	.10	400	41
Full*	.20	352	45
Full	.30	300	53
Full	.40	245	65
180 v.	.20	290	55
160 v.	.20	270	59

#### EM-WH1025K – 10 kW

<u>Blower</u>	<u>SP</u>	<u>CFM</u>	<u>Temp. Rise (°F)</u>
Full	.10	665	44
Full**	.20	625	47
Full	.30	588	50
Full	.40	535	55
180 v.	.20	480	62
180 v.	.40	390	75

\*8" x 8ft. pipe outlet, 8" x 8ft. inlet insulated H & C flex.

\*\*10" x 12ft. outlet, 10" x 6ft. inlet insulated H & C flex.

## Mechanical Installation

**Zero clearance** – basically this product is designed for zero clearance, but use the following mounting and spacing criteria:

- A. Make mounting provisions for a ½” air space at the top. Typically this can be accomplished by having a ½” to ¾” “cleat” at each end mounting holes.
  - B. The sides, any location, can be in direct contact with wood framing materials.
  - C. No materials shall be in contact with the cabinet housing which has a flame point less than wood (300°F).
1. Select a location which will provide minimal noise vibration and minimal blower noise to the building occupants.
  2. The outside hood, inlet damper (see next section under Optional Control Devices), and ducting material are not included with this unit. It is the installer’s responsibility to provide the necessary weather protection for the inlet.
    - Inlet damper is strongly suggested.
    - Insulated ducting **must** be used between the outside inlet air hood and the inlet of this unit.
  3. Mount unit with a slight air inlet incline (housing outlet end is ¼” higher than inlet end). Depending upon the location within the building, temperature and humidity surrounding this unit, frost or moisture may or may not collect on the metal parts. The inlet damper and insulated inlet pipe will prevent cold air migration and the slight incline will keep this moisture collection at the inlet end.
  4. The unit can be mounted within the ceiling (between joists where it will fit) or ceiling hung, at any convenient location between the outside inlet hood and the fresh air discharge connection.
    - The “discharge connection” is wherever the conditioned fresh air is distributed within the building – furnace cold air return, special ducting, hallway register, etc.
  5. The inlet and outlet ducting size is specified according to the model size and is shown in the above table. The 2½ kW unit comes with 8-inch starter collars, but it can be reduced to 6-inch.

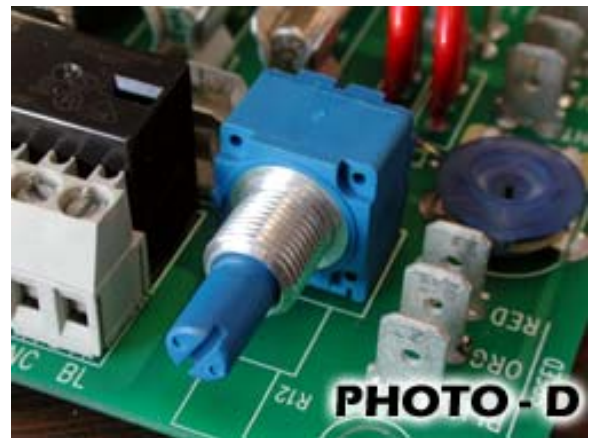
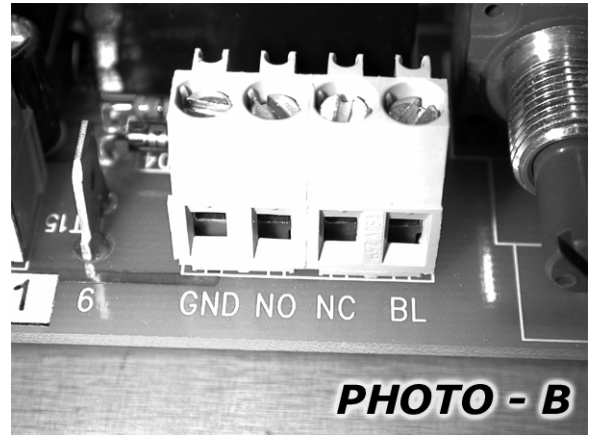
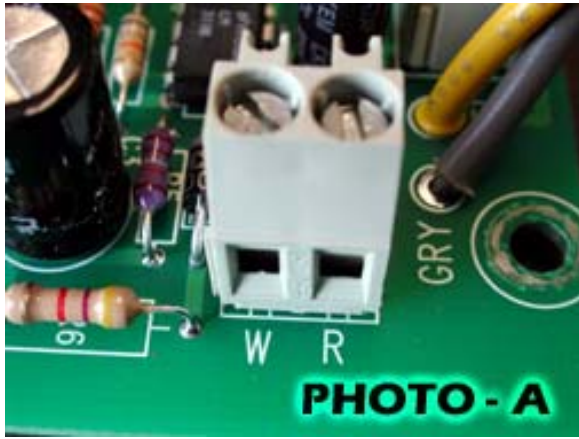
## Electrical Installation

**Power source** – see specification table (page 2) for the normal operating current (I) and service size to determine wire size. The exact wire type and wire size is determined by the licensed electrician installer.

- Assuming the unit is ceiling hung, open bottom door and remove two small access plates at the outlet end. The “J-box” marked LINE is the power service connection point. The other access plate and appropriate end plate knockout is for the low voltage control hookup.
- All functions are 240, neutral is not required.
- The LINE voltage hookup for the **2.5 kW** and the **5 kW** have a black and red pair for electric elements (heavy wire) and an 18 gauge black and red pair for control and blower. Simply wire nut together with the incoming power service leads.
- The LINE voltage hookup for the **10 kW** uses a terminal block marked L1 and L2 respectively. Connect incoming power directly to this terminal block.

**Operating control** – in its simplest form, this unit turns on and off with a contact closure across R and W.

- See photo A – R and W is at the end of the PC board.
- This “on and off” control contact applied across R and W depends upon installation requirements and can take on several possibilities – end switch within inlet damper, pressure differential switch, current level detection switch, relay across exhaust blower motor, end switch associated with exhaust damper/motor, etc. See Optional Control Devices.



**Interlock furnace blower** – relay contact on this unit can be used to operate central furnace blower whenever this units blower is on. See Photo B, connect to the furnace fan center and the G from the roomstat as shown on this table. **Comment:** When using this connection you cannot use this same contact to operate inlet damper, see below.

Blower Inlet (Photo B)	Furnace Fan Center	Roomstat
NO	R	-
BL	G	-
NC	-	G

## Optional Control Devices

**Inlet Damper, Power** – there are a variety of possibilities and field wiring combinations.

A. Power damper with dry contact end switch.

1. Operate damper from its own system turn-on device and power source, independent of this product.
  - Selected damper needs to be isolated or “dry contact” end switch. Connect this dry contact to this product’s R and W.
2. Operate damper from this product’s internal 24-volt transformer and terminal block. In this case there also must be an external “turn on and off” device.
  - See Photo C, reference 6-screw terminal block (in this case R and W, Photo A, is **not** used).
  - R and W1 – contact closure from turn on and off device (see above “operating control”).
  - DM and C – two wires going to 24-volt damper motor.
  - 1 and 2 – the isolated contact end switch.

**Caution:** The maximum 24-volt power available is 5VA.

B. Provided relay contact, external and independent 24-volt power damper.

1. At terminal block “BL/NC/NO” is a Form C contact which operates whenever the blower is running, see photo B. Using an external power source, these two screw terminals (BL) and (NO) can be used as a switch contact.
2. This same contact (screw terminal BL and NO) can be used with the onboard 24-volt transformer to operate a 24-volt power damper.

Terminal Block 1	Terminal Block 2	Power Damper
BL	R	-
NO	-	Damper – 24
GND	-	Damper common

C. Exhaust Blower/Fan Motor Current Switch – strip motor power lead through CT and hookup as follows.

8034	EM-WH*****
N/A	R
N/A	GND
Switch	R
Switch	W

**Note:** This is an on/off switch only, not level detector. This will not control blower speed.

**Airflow, or pressure differential, on/off (P/N 5730)** – this pressure differential switch has two tab terminals, extend these two terminals to the **R and W** terminal screws, see photo A.

- This device can sense the operating of the building **exhaust** blower so that it will control this product to maintain air balancing.
- The differential switch two air tube ports must sense the pressure differential across the **exhaust** blower.
- Factory setting is 0.05” WC.

## Installation Setup

**Blower Delay/Control** – the control board has provisions to delay the blower turn on point, allows metal rod electric element to warm up. This is approximately 20 seconds. Conversely, at the end of the R and W control the blower continues to run for approximately 30 seconds to cool off the electric element.

The input R and W control and electric element operation can be more effectively observed at the LED monitor lights rather than listening to the blower.

**LED Monitor Lights** – WarmFlo Control Board

- Green full on – electric elements are at full operating power.
- Green pulsing – whenever the LED is on the elements have power, LED off the elements have 0 volts.
- Green full off – no power at the electric element.

**Outlet Temperature** – On the inside temperature control board is a small screwdriver switch with settings marked 0 through 9. Only settings 0 through 7 are usable (never use 8 and 9). Unless otherwise specified during the time of order, this unit is equipped with a “C” chip. Assuming this to be the case, the temperature settings relating to the rotary switch positions are:

**Figure 2 – Outlet Temp. Setting**

0 = 20°	4 = 40°
1 = 25°	5 = 45°
2 = 30°	6 = 50°
3 = 35°	7 = 55°

**Figure 3 – Other Available (Special Order) Temperature Range Chips are as follows:**

Switch Position	E	H
0	68	88
1	72	90
2	76	92
3	80	94
4	84	96
5	88	98
6	92	100
7	96	102

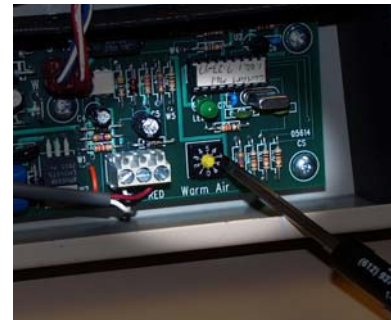


Photo shows small screwdriver for adjusting this step switch.

**Blower Speed Adjustment** – the PC board has a blue shaft adjustment control (see Photo D) for blower speed. Airflow Temperature Rise (page 2) shows airflow at various blower speeds. If you do not need the full CFM of your specific model number unit and desire a larger temperature rise, the blower speed can be reduced with this blue shaft control. However, you must realize the CFM is being reduced and you must maintain the appropriate requirement for balancing the building inlet to the outlet mechanical driven air.

Voltage at the blower motor and the static pressure (SP) within the system determine CFM airflow. CFM airflow determines temperature rise. Static pressure is an installation variable and is also a function of airflow.

Typically there are two methods for evaluating and adjusting temperature rise:

- A. **Measure static pressure, measure blower voltage, use table** – The factory calculated information really only has value if you have the ability to determine static pressure within the system and use a volt meter to measure blower voltage. Adjusting the blue shaft control to some arbitrary position does not represent a reliable method of determining airflow. The blower voltage can be measured at the transformer circuit board, find the two wires which lead through the grommet going to the blower motor (tabs “Wht” and “Blu”).
- B. **Operate on a cold day (cold inlet) and do actual temperature rise measurement at full capacity.** Using cool air inlet and the following procedure, it becomes quite easy to convert CFM to temperature rise. This procedure may be a little detailed, but if followed step by step the blower speed versus temperature rise can be controlled.

**Comment:** The formula below assumes nominal 240 volts and nominal tolerance electric element. If your application is 208 volts or any other lower voltage, adjust the top number accordingly.

EM-WH0515J	$\text{CFM} = \frac{17070}{\text{Temp rise} \times 1.08}$	$\text{Temp. Rise} = \frac{17070}{\text{CFM} \times 1.08}$
EM-WH1025K	$\text{CFM} = \frac{34140}{\text{Temp rise} \times 1.08}$	$\text{Temp. Rise} = \frac{34140}{\text{CFM} \times 1.08}$

1. Inlet air must be below 40°F.
2. The unit must be setup at full heating capacity, bypassing the outlet sensor modulation control function. This can electrically be accomplished by adding a jumper between the two circuit boards. At the thermostat W screw terminal, add a wire and plug into the “E” tab on the temperature control board.
3. Insert your temperature sensing probe for the air inlet and the air outlet. Temperature rise is the difference between the two.
4. Suggest beginning with the blue shaft CW, maximum airflow.
5. Condition system for continuous on, either jumper R and W or activate external sensor for closed circuit R and W.
6. Allow at least 10-minute element operation and temperature sensing stability.
7. Slightly decrease fan speed (blue shaft control) to an anticipated setting. Allow temperature stabilization. The change in blower speed and its effect on the electric element, temperature sensing probes, etc. is a very slow process. Again you will probably need to wait at least 5 minutes to recheck the temperature differential and determine your next blower adjustment setting.
8. Continue the above until you arrive at the temperature rise (calculated CFM from the formula) you desire.
9. If you have access to a “drop” of paint, place on the blue shaft and threaded shoulder to act as a marking point or “sealing” process to make sure the adjustment is not changed at a later point.

## Maintenance

This unit includes an inlet filter. However, this is a permanent and washable filter.

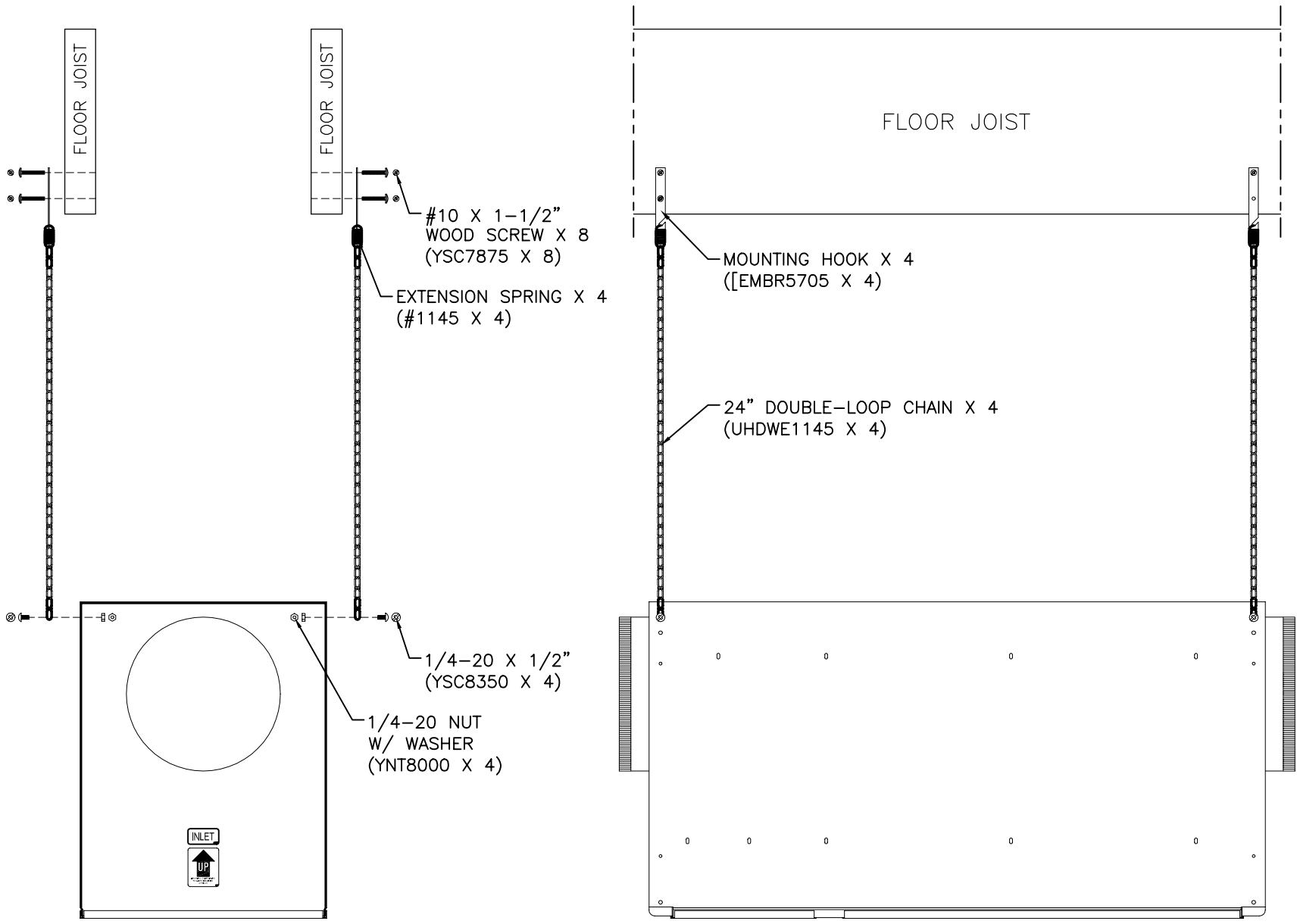
Suggest at least twice per year, remove filter and use standard household water pressure to remove collected dust/debris.

- Open smaller door.
- Filter is simply held within channels.
- Note arrows on filter for washing water flow direction and returned installation airflow direction.
- Maintain decal in filter for future reference.

## Replacement Parts List

Cat. #	Description	EM-WH02	EM-WH05	EM-WH10
@EMBRM5711	PCB MAKE-UP AIR BL RLY/TRANS	1	1	1
@WFCD25614	PCB WF-CM 2 STG DUCT SENSOR ONLY	1	1	1
WFS3	SENSOR DIGITAL ST 17"	1	1	1
@EMR1B8102B	PCB EM-DI 25A RELAY			1
4037	TRIAC SSR 50AMP 24-280VAC	1	1	1
5620	ELEMENT 2500W @ 240VAC SPIN FIN			4
5621	ELEMENT EM 2500W@240V 8" RND	1	2	
5636	LIMIT O-135/C-120 25A@240V DP-CLSD	1	1	2
5717	BLOWER/MOTOR 300 CFM 240 V	1	1	
5719	BLOWER/MOTOR 700 CFM 240 PSC			1
6630	LIMIT O-150/O-180 25A@240V ST-CLSD	1	1	2
9481	PHASE CNT 240AC 6A TABS SSAC	1	1	1
5712	FILTER PERM A+2006 13" X 11"	1	1	
5722	FILTER PERM A+2006 19"X15.5"			1

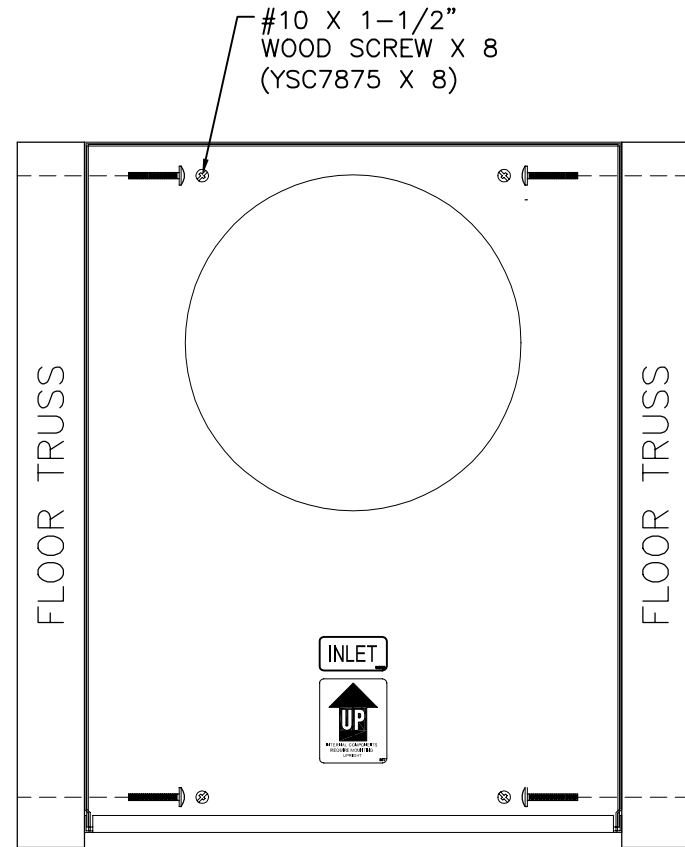
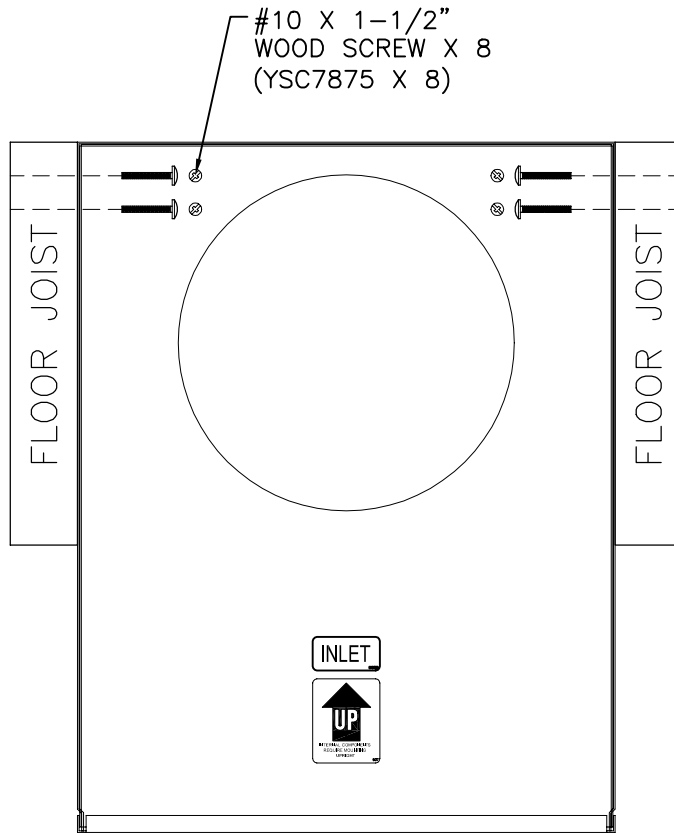





NOTE: THIS DRAWING APPLIES TO 5KW AND 10KW MODELS. EM-WH1025K (10KW) MODEL SHOWN.

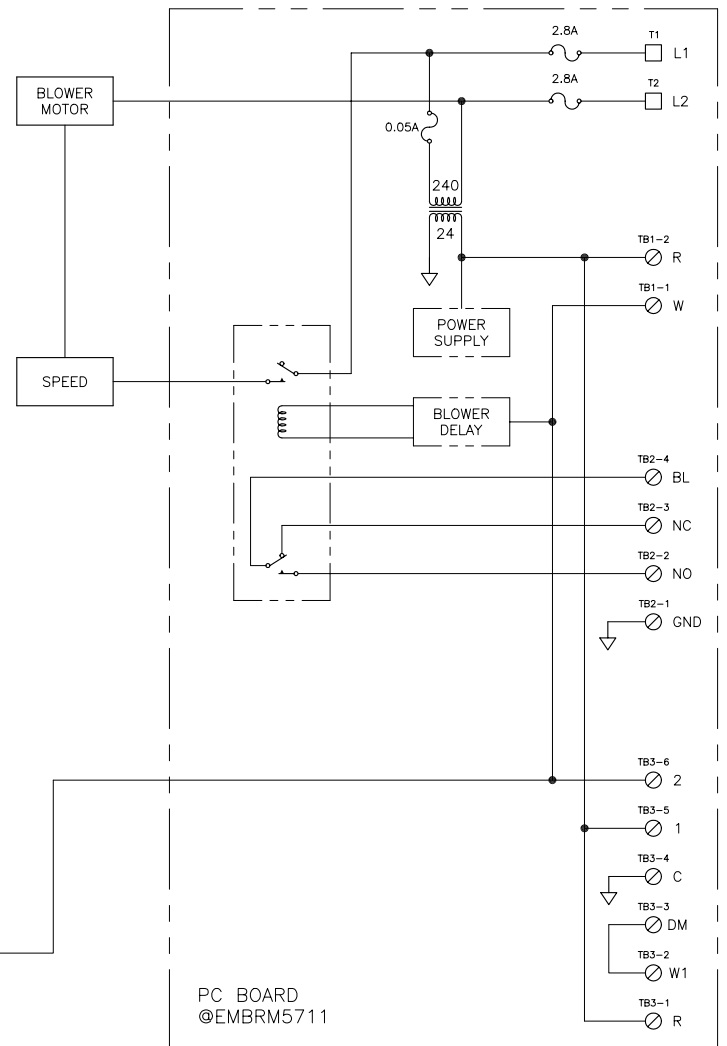
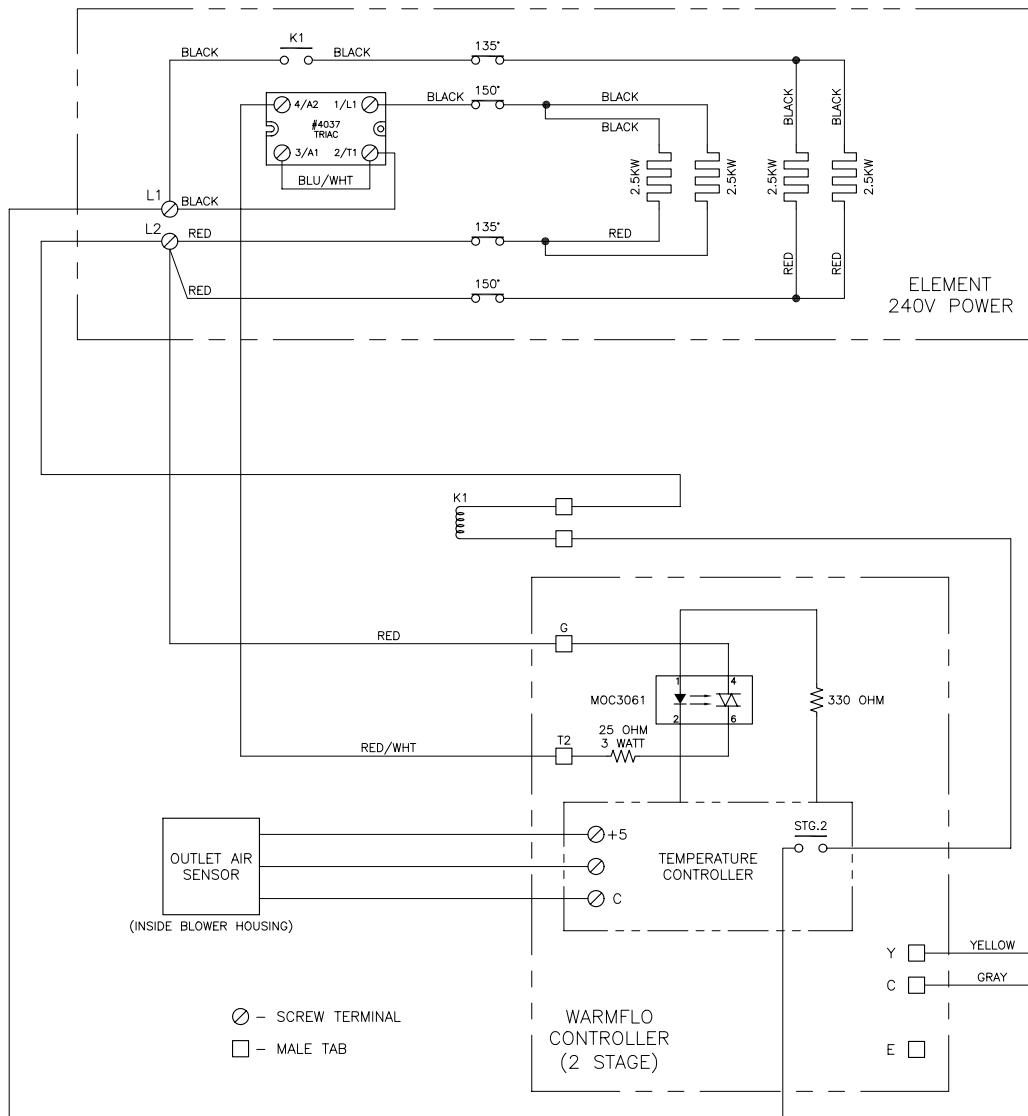
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	05-23-01	MEF	EW906	EM-WH(0515J, 1025K)	
	RELEASED	CHECKED	VIEW/DRAWING TYPE	SCALE	PART/ASSY/MODEL NUMBER
		HOOKUP/INSTALLATION	NTS	EM-WH*****	
	APPROVED	DRAWING STATUS	DOCUMENT DATE	SHEET	DOCUMENT NUMBER
		RELEASED	05-17-01	1/3	EH903


# ZERO-CLEARANCE INSTALLATION

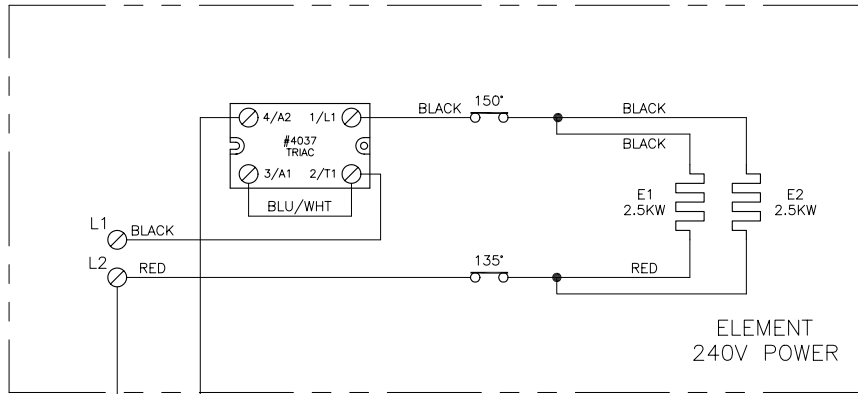


NOTE: THIS DRAWING APPLIES TO 5KW AND 10KW MODELS. EM-WH1025K (10KW) MODEL SHOWN.

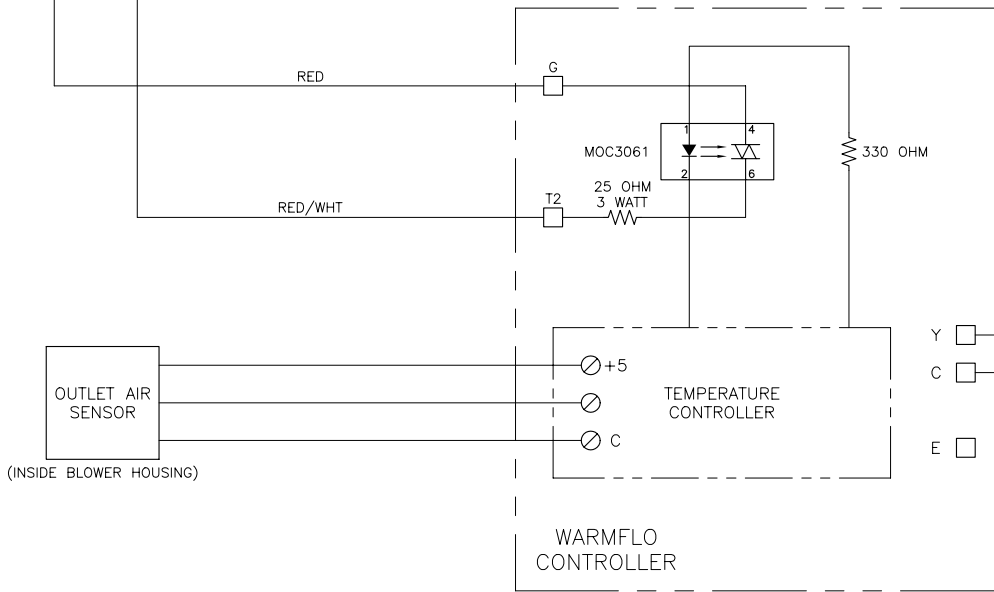
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			CHECKED	VIEW/DRAWING TYPE		SCALE
		HOOKUP/INSTALLATION		NTS	EM-WH*****	
	APPROVED	DRAWING STATUS	DOCUMENT DATE	SHEET	DOCUMENT NUMBER	
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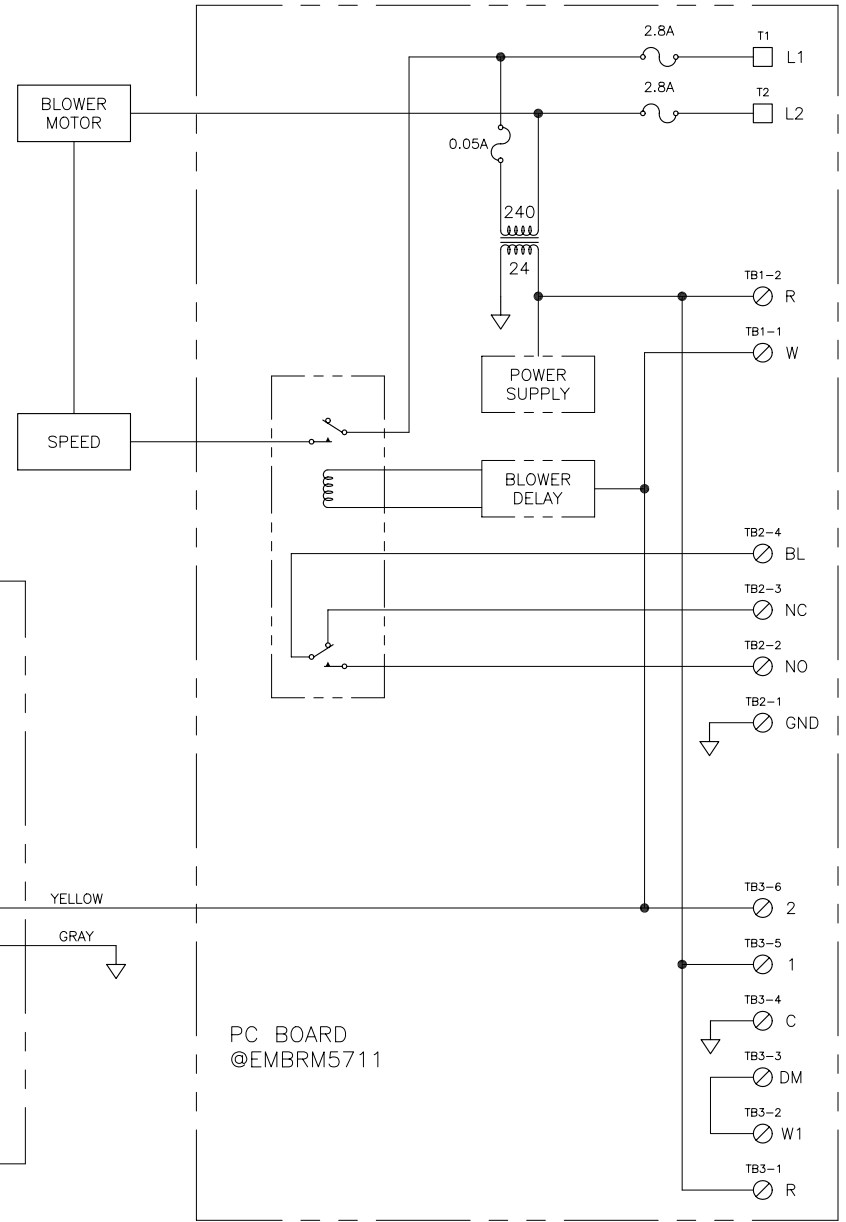
B106-25-03 REVISED 1	 ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362	DESCRIPTION MAKE-UP AIR MODULE (10KW) EM-WH1025K		
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	CHECKED	VIEW/DRAWING TYPE WIRING SCHEMATIC	DOCUMENT DATE 07-25-00	SHEET 1/1
	APPROVED	DRAWING STATUS RELEASED	DOCUMENT NUMBER ES904	DOCUMENT NUMBER ES904



ELEMENT  
240V POWER



WARMFLO  
CONTROLLER



PC BOARD  
©EMBRM5711

⊗ - SCREW TERMINAL  
□ - MALE TAB

B106-25-03 REVISED	ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362		DESCRIPTION	
	DRAWN	REFERENCE DOCUMENT	MAKE-UP AIR MODULE (2.5KW, 5KW)	
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	CHECKED	VIEW/DRAWING TYPE	SCALE	PART/ASSY/MODEL NUMBER
APPROVED	WIRING SCHEMATIC	NTS	EM-WHO*1*J	
	DRAWING STATUS	DOCUMENT DATE	SHEET	DOCUMENT NUMBER
	RELEASED	07-10-00	1/1	ES905

# **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.

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.

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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.