WARMFLO®

COMFORT MODULE

Specific Application

- Air exchanger, temperature boost
- Make-up air
- Temperature comfort boost
- Air source HP comfort boost

Comment

This module is a heating element and controller to "temper" the supply air and bring it to a comfortable level. For general duct temperature boost or heat pump comfort, this unit raises the warm air supply temperature to the set point temperature value desired. In the make-up air application the supply or inlet is actually outside air. This unit contains a built in controller with duct sensor to modulate the electric element (part of this unit) using only the required electric energy to reach comfort level. This is more than basic on/off.

This is a single (duct temperature) WarmFlo sensor product. If you need the outdoor sensor WarmFlo controller, call factory for other models.

MODELS

EM-WCØ515H	4,8ØØ WATT AT 24Ø VOLT, SINGLE PHASE
EM-WCØ515L	4,8ØØ WATT AT 24Ø VOLT, SINGLE PHASE
EM-WC1025H	9,6ØØ WATT AT 24Ø VOLT, SINGLE PHASE
EM-WC1025L	9,6ØØ WATT AT 24Ø VOLT, SINGLE PHASE

Drawings: **HH313**
HH315
HH321
XX017

ELECTRO INDUSTRIES, INC.
2150 West River Street, PO Box 538, Monticello, MN 55362
763.295.4138 • 800.922.4138 • fax 763.295.4434
sales@electromn.com • www.electromn.com

GENERAL

This is a completely functional electric heat element package with the built-in WarmFlo, **duct sensing**, controller. It is installed in the main distribution duct or external to the heat pump unit/air handler.

This module can be installed upflow, downflow, or horizontal. However, it must always be on the warm air side of the HP coil.

If you desire the outside temperature sensing WarmFlo Smart Controller with its various application modules (total electric, dual fuel, HP add-on, load management, etc.) this is the wrong product. Call the factory for further WarmFlo information.

Purpose

When comfort level requires a slight increase in the heat pump air delivery temperature, this module "tempers" the warm air by raising the warm air temperature a very small number of degrees to produce comfort level.

Concept (Heat Pump Application)

1. One piece unit, including the electric element.
2. No outdoor sensor.
3. Modulates its own electric element, based upon remote duct sensor and installer set comfort level temperature.
4. Totally external to the heat pump air handler product.
5. Existing or standard heat pump room thermostat, air handler, strip heat, compressor, etc.; all remain without modification or functional change.
6. Anyone can install (non HP trade).
7. Adds the comfort level increase in temperature whenever the compressor is on (roomstat stage 1) **and** before roomstat stage 2 activates strip heat.
8. Electric element power usage is controlled by duct sensor and comfort level. Electric element Power is not wasted or turned on in banks.
9. Does not necessarily add to the building service panel loading because as soon as the normal strip heat turns on (stat stage 2) and raises the temperature, this unit automatically shuts off.
10. Internal logic or chip begins with reset at each "Y" heat call.

ELECTRICAL REQUIREMENTS

EM-WCØ515* - 3ØA Panel Breaker, 2ØA Nominal Amp
EM-WC1025* - 6ØA Panel Breaker, 4ØA Nominal Amp

* H = 10" long element; L = 16" long element

208 Volt application – the elements within the standard product are rated a 240 volts. If operating at 208, there will be approximately 25% reduced capacity. The internal transformer may or may not adequately operate the control system from a 208 source. Voltage measurements between "R" and "C" must be 22VAC or greater when the system is in the complete operational mode.

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.

HEAT PUMP INSTALLATION – AIR FLOW REQUIREMENTS

Since this is a heat pump application and since this is typically a "temperature boost" electric heating unit, it is assumed the heat pump air handler capacity is larger than the basic requirement of this product. But as a verification, the minimum airflow required by this product is:

EM-WCØ515* 1000 CFM
EM-WC1025* 1500 CFM

This unit is installed in the warm air, discharge, plenum of the heat pump air handler or in the plenum above the A-coil (typically two units, one on each side). In all cases it must be **external** to the heat pump cabinet. The location within the plenum is determined by the following requirements:

1. Before any horizontal distribution duct, elbows, tee, etc.
2. Maximum practical distance from the HP air handler, but meeting the requirements of paragraph 1 above.
3. If the plenum is a straight discharge (no elbow, obstruction, tee, etc.) from the HP air handler, National Electric Code paragraph 424-59, four ft. rule, does **not** apply.
4. If the plenum is larger than 12" x 12" **and** there is a need to install this unit closer than 18 inches to the HP air handler discharge blower, call the factory for special baffling instructions.
5. HP air handler discharge blower – attempt to center the electric elements in the plenum and with the maximum practical distance from the blower discharge.
6. Above A-coil – typically one on each side, angled such that the discharge air from each A-coil "slab" goes through the element rack. Typically the heat pump airflow is significantly greater than required by these boost inserts (electric insert is typically small in capacity); therefore, baffling is not required, simply locate so the majority of the A-coil discharge air goes through the element rack.

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 make-up 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.

BOOST HEAT INSTALLATION

This section applies to any warm air duct or inlet/outlet of an air-to-air (HRV) heat exchanger. Also can be applied for fresh air inlets such as hood vents, small commercial fresh air, makeup air, etc.

Duct size needs to be approximately the size of the electric element rack. If the duct is more than approximately 2 inches larger for either depth or width, **baffling is required**. See drawing HH313 for the single element product or HH315 for the dual element, 10KW product.

1. **Air-to-air heat exchanger** – install the electric element rack within the discharge duct of the heat exchanger.
2. **Distribution duct, boost heater** – install the electric element rack within the air flow duct, locating a position to cause a majority of the forced air through the electric elements. If the distribution duct has a depth of 16" or more, we strongly suggest using the "L" model with the 8" x 16" element rack.

MAKE-UP AIR

Typically in this application outside air enters the inlet and this module gets used to bring up the mechanical ventilation temperature. You will probably want to use "C" chip, see next page. Use the following chart to provide additional temperature rise information.

CFM CHART

Temperature Rise Needed		80	70	60	50	40	30
Model Number	Watts*	CFM	CFM	CFM	CFM	CFM	CFM
EM-WC0515H	4800	189	216	252	302	378	504
EM-WC0515L	4800	189	216	252	302	378	504
EM-WC1025L	9600	378	432	504	604	756	1007

*At maximum capacity, duct sensor reduces watts as required.

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.

INSTALLATION

1. Locate the appropriate location where this element will temper all the air going to the room registers or distribution ducting.
2. Cut an 8.5" x 2" slot in the warm air plenum/duct.
3. Control box orientation is not critical.
4. Install duct sensor 2 to 4 air flow feet on the warm side of this module. Select a location where there is good air mixing.

5. Locate the 24 volt control system "common". Depending upon heat pump manufacturer, this could be a "C", "X" or in some cases "B" screw terminal (probably black or blue wire). Connect the black (18 gauge) control wire to this common point (this is a "tap" connection).
6. Locate the 1st stage call for heat or compressor turn-on wire. This is typically "Y" terminal (yellow wire). Connect the yellow wire to this terminal (this is a "tap" connection).
7. From the electrical panel breaker specified above, extend the 24Ø power to the bottom right control box compartment and connect as standard 24Ø volt L1 and L2 power wiring.
8. This power wire must contain a copper safety ground, terminate with green wire.

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, coil and tie excess. 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.

ELECTRICAL HOOKUP

240-volt source – from the model number and nameplate determine KW size and amp draw. According to local codes, building type, wiring length, etc. use appropriate wiring conductor size and source circuit breaker. Connect to the pigtail wires or terminal block.

Grounding – route and install appropriate size ground conductor between the ground lug and the building service panel ground bus. This must be a conductor size according to the total amp rating of the appropriate unit. Conduit is not an adequate ground conductor.

Operation – this unit "turns on" or heats when 24 volts are applied to the yellow and gray wires. Via an external 24-volt transformer or an external transformer applying 24 volts through a contact (airflow switch, thermostat, heat pump "Y" wire, etc.) arrange your control circuit to apply 24VAC power when you want boost heat.

SUMMER OR COOLING DISABLE

This module must be disabled during the cooling cycle to prevent adding heat to the air conditioning operation.

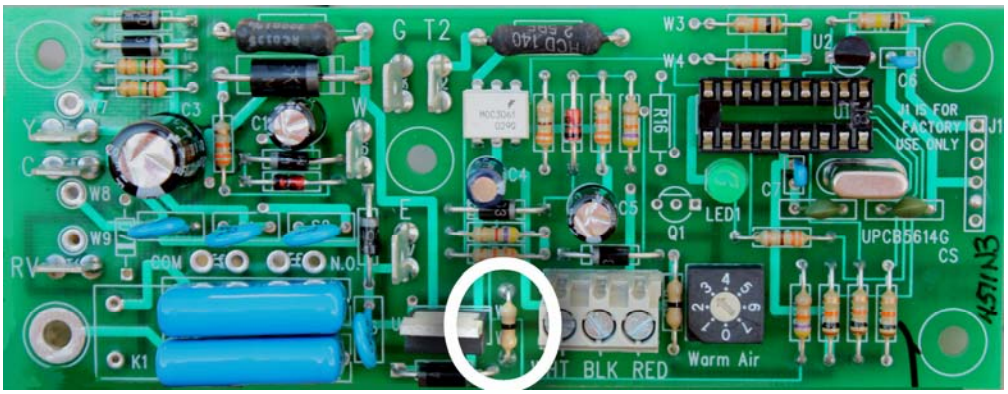
Select one of the following 3 installation techniques or methods

A. Extend HP reversing valve wire to the designated "RV" tab. **If** the heat pump logic is "logic high" for heating, cut the W1/W2 resistor on the control board with a side cutter. The location of this resistor is shown below. Review your heat pump's installation manual to make certain of your heat pump's reversing valve logic

B. Add a manual (summer) disable toggle switch between "R" and "RV" tab.

C. Simply turn off 24ØV breaker during the cooling season.

Method B or C should be used for boost heater applications.



The location of the W1/W2 resistor is circled above.

OPERATIONAL TIPS

Comfort Level Temperature Setting

The inside circuit board contains a screwdriver switch setting marked Ø through 9. This is usable only for Ø 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	B	C	E	H
0	90	96	20	68	88
1	100	100	25	72	90
2	110	104	30	76	92
3	120	108	35	80	94
4	130	112	40	84	96
5	140	116	45	88	98
6	150	120	50	92	100
7	160	124	55	96	102

Function

1. Electric element power is only used if the heat pump warm air temperature drops below the above selected setting.
2. Assuming the heat pump warm air temperature is below this setting, the duct sensor sends a signal to the internal circuit board requesting a boost in warm air temperature.
3. The built-in controller begins pulsing the electric element to add this temperature. The inside monitor LED indicates the pulsing duration and the electric element is turned on whenever the LED is on.
4. Except for the LED and/or clamp on amp meter monitor, there are no other indicators or troubleshooting aids.
5. See previous section titled "Summer or Cooling Disable".

Sequence (3 or 5KW)

A. Electric element is on for 20 seconds at the start of each "Y" start call.
B. Electric element turns off if the temperature is above warm air selected point.
C. If the temperature drops, the electric element modulates to bring it back to the desired temperature level.
B. If the electric element is fully on (LED constant), this unit cannot make up the air temperature required between heat pump output and comfort level temperature setting.

Sequence (10KW)

A - D. Same as above.
E. If element #1 is on for 10 min. (LED constant), element #2 turns on.

Option

This unit can be used as a 5Kw duct heater for room stat, **second stage** operation.

Internal to the circuit board is a "W" terminal. Connecting roomstat second stage heat function to this "W" terminal causes full electric element turn on (by-pass duct sensor).

Utility Company Load Control Requirement

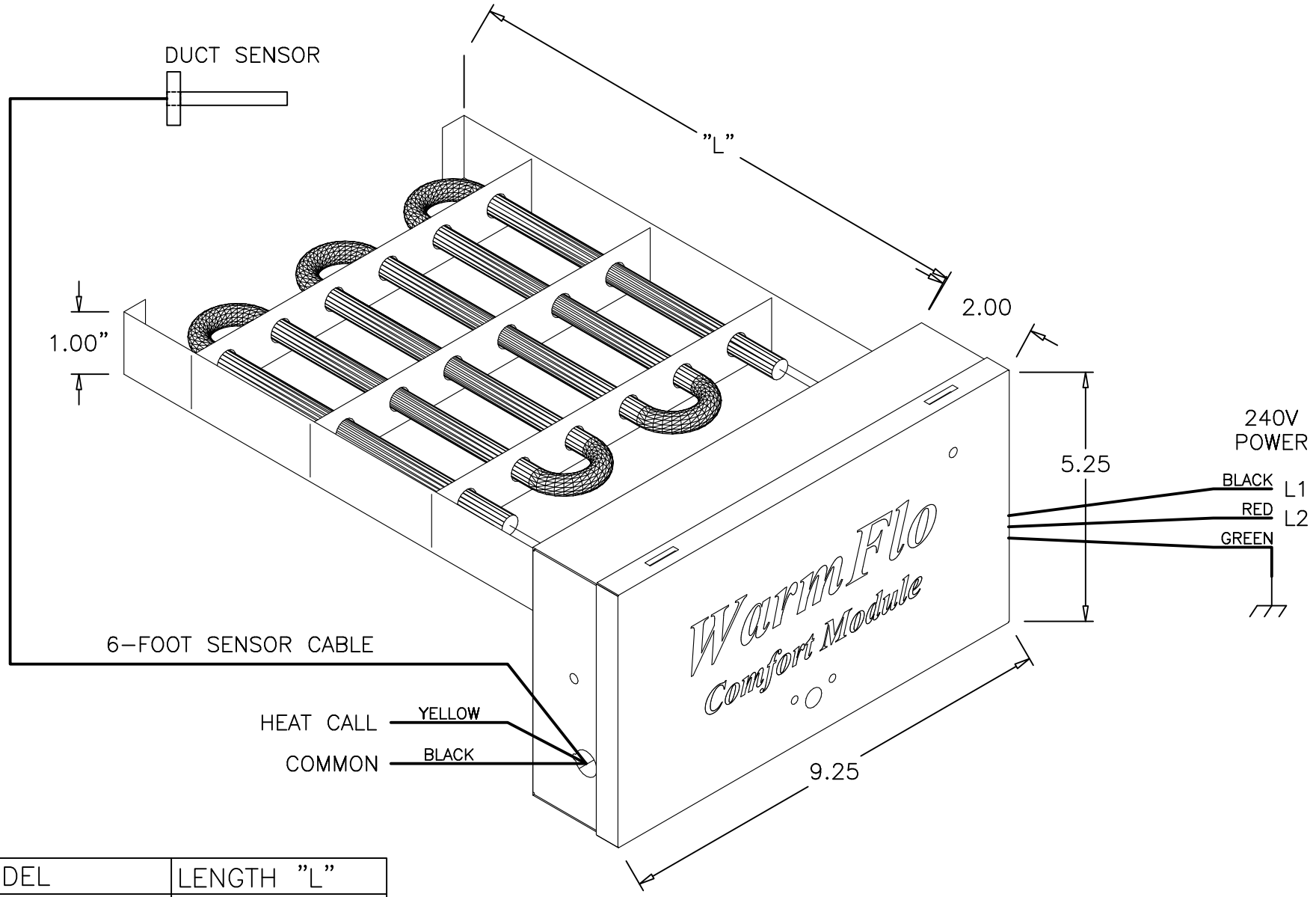
Arrange wiring so load control receiver interrupts the yellow or "Y" input. If the yellow wire is connected to the heat pump first stage Y function, the load control receiver is before this yellow wire connection and the outdoor unit yellow wire.

Checkout and Calibration

There is no field calibration or adjustments.

Total element turn on can be accomplished by jumpering system "R" (24 volts) to "W" internal terminal. In essence, this bypasses the temperature modulation function and causes the element to be full on.

However, see previous section "Summer or Cooling Disable".

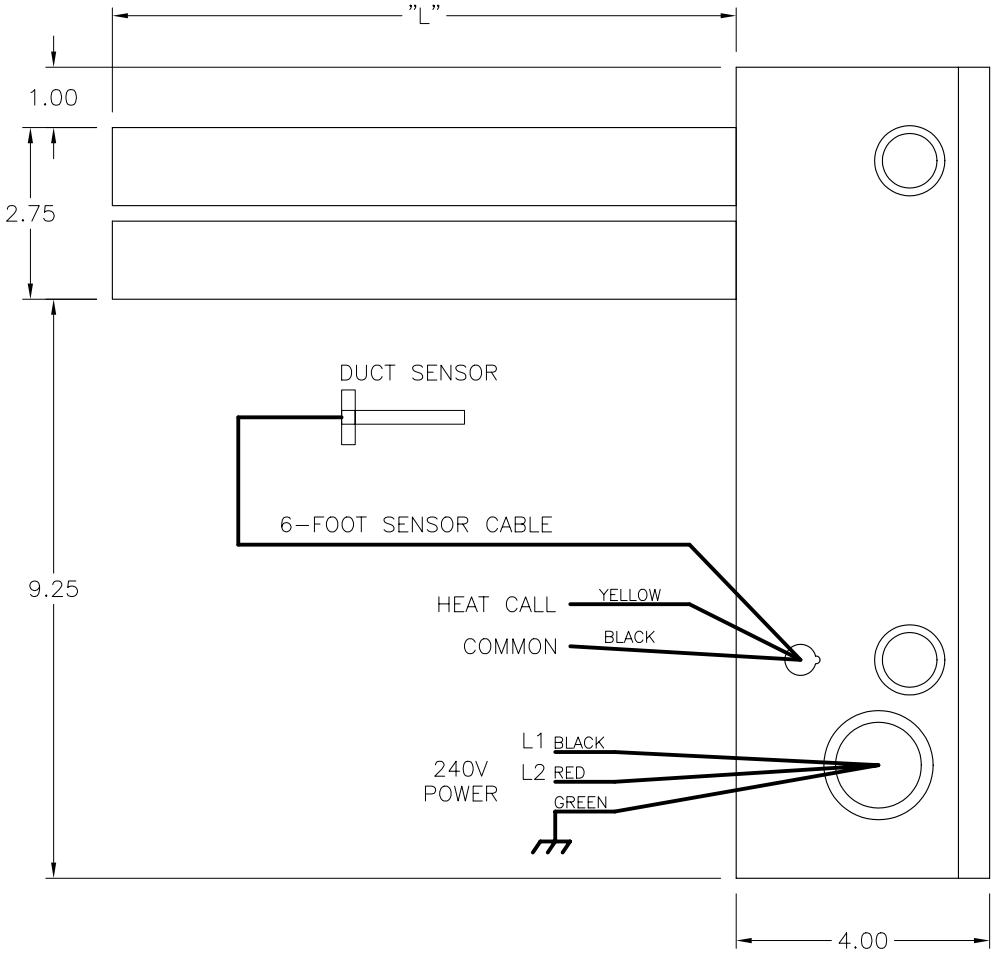


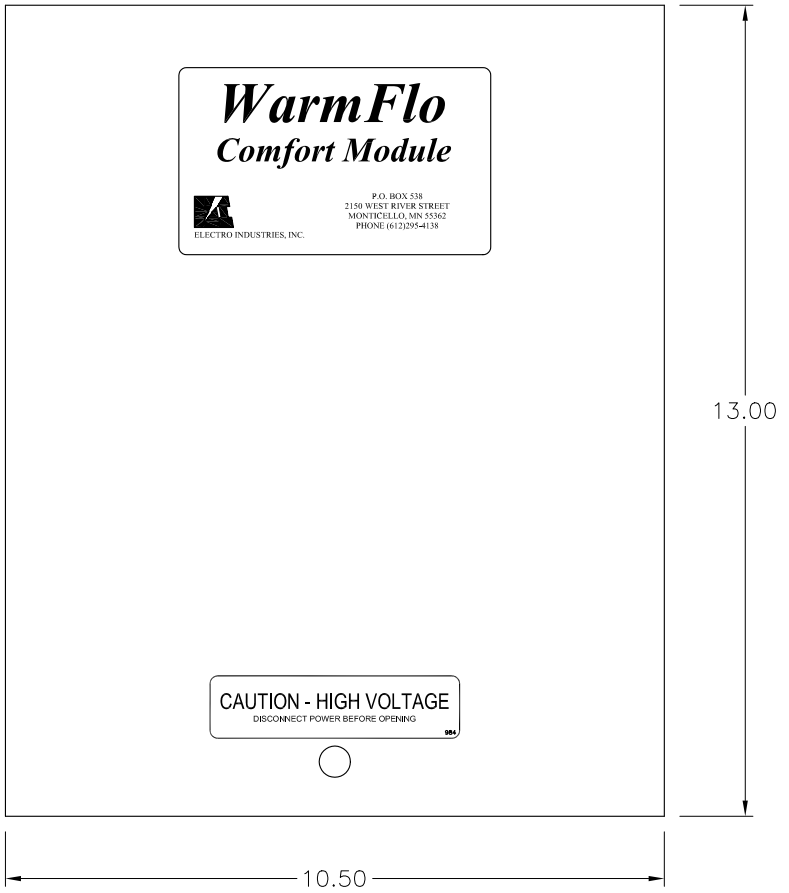
MODEL	LENGTH "L"
EM-WC0515H	10.00"
EM-WC0515L	16.00"

Rev.B 03-20-09: Removed EM-WC0313H From Table.
Rev.A 01-31-00.

DESCRIPTION	ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362	SHEET	SCALE	PART/MODEL NUMBER
WF-CM OUTLINE		1/1	NTS	EM-WC0*1**
	DRAWN: JAD / CHECKED / APPROVED	DATE: 03-20-09	REV/STATUS: B	DOCUMENT NUMBER: HH313

NOTE: THIS DRAWING IS INVALID UNLESS CHECKED AND APPROVED

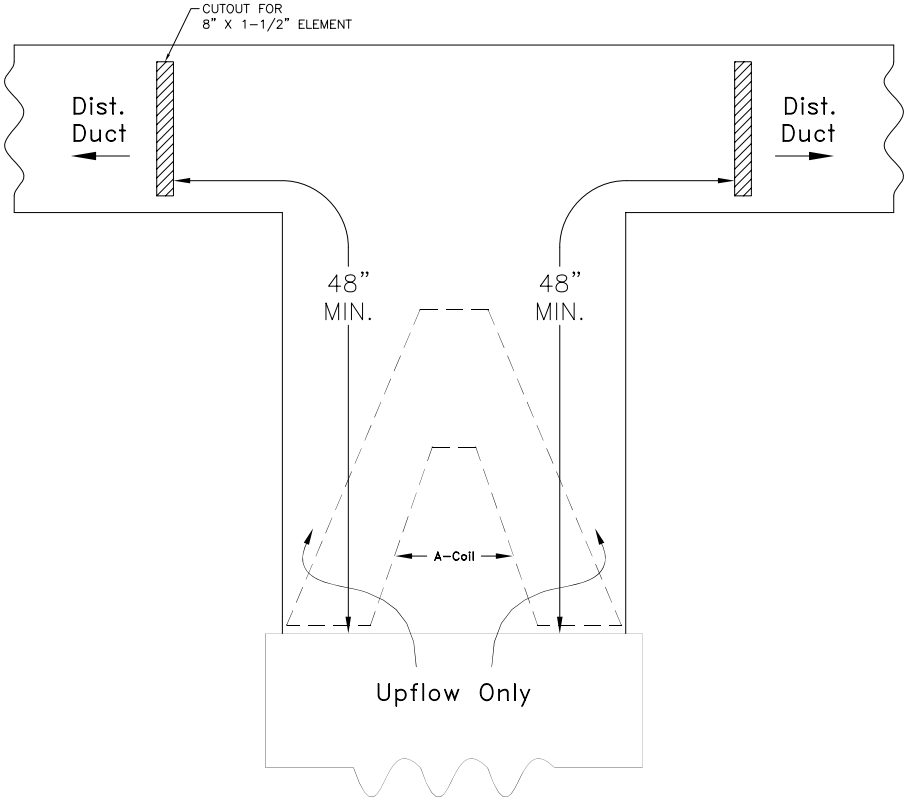


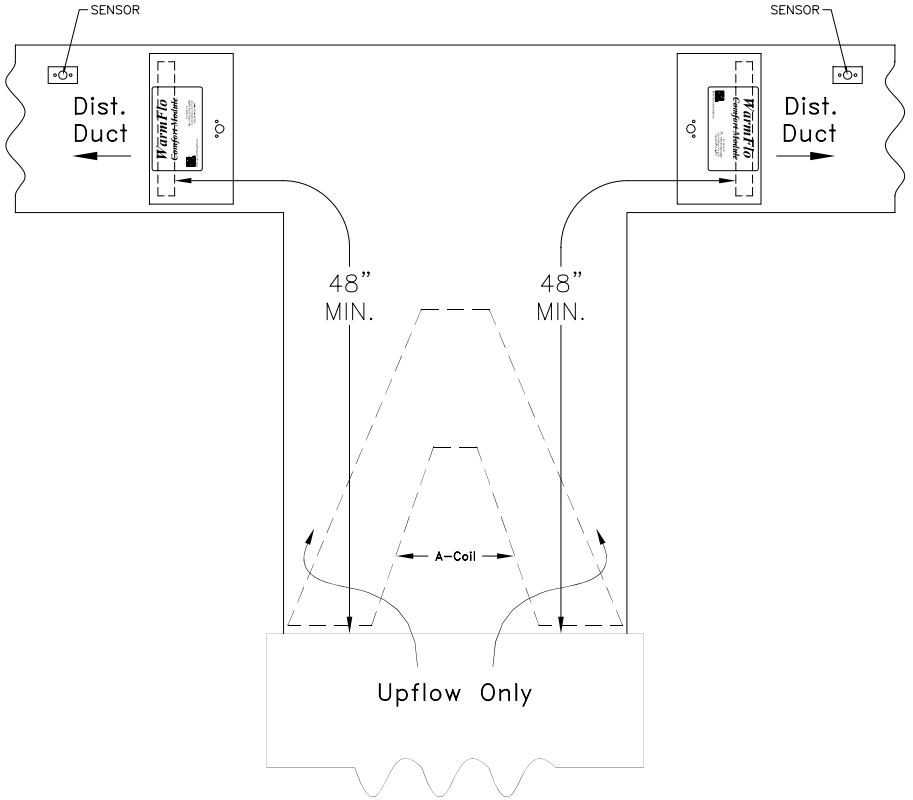


MODEL	LENGTH "L"
EM-WC1025H	10.00"
EM-WC1025L	16.00"

ELECTRO INDUSTRIES, INC. MONTICELLO, MN 55362			DESCRIPTION: WF-CM OUTLINE	
DRAWN: MEF	REFERENCE DOCUMENT: --			
CHECKED	VIEW/DRAWING TYPE: HOOKUP		SCALE: NTS	PART/ASSY/MODEL NUMBER: EM-WC1025*
APPROVED	DRAWING STATUS: RELEASED	DOCUMENT DATE: 02-01-00	SHEET: 1/1	DOCUMENT NUMBER: HH315

EXISTING HP DUAL FUEL
ADDING 10KW

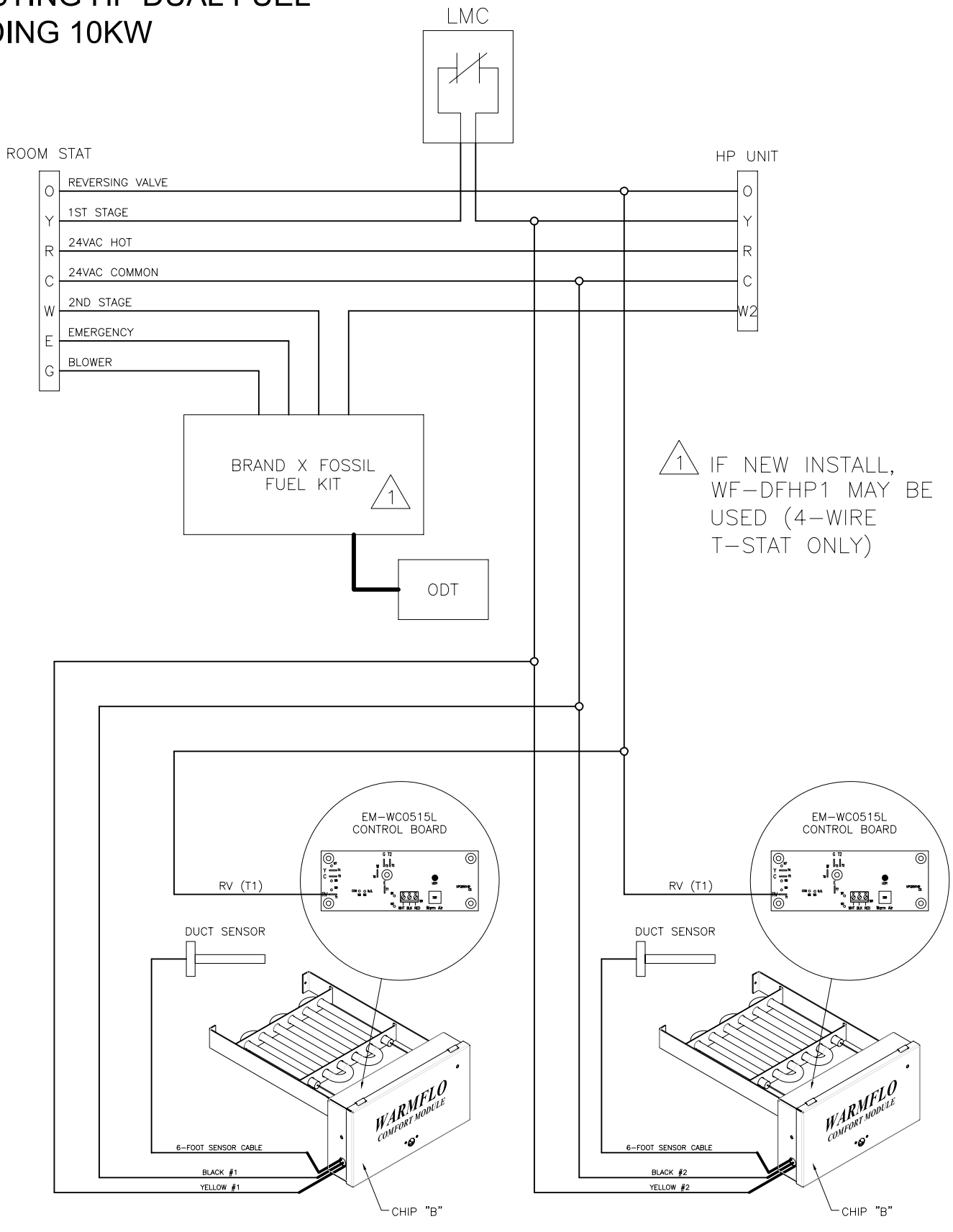




REFERENCE
MODEL SERIES:

EM-WC0515*

EXISTING HP DUAL FUEL ADDING 10KW



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.

ELECTRO INDUSTRIES, INC.
2150 West River Street, PO Box 538, Monticello, MN 55362
763.295.4138 • 800.922.4138 • fax 763.295.4434
sales@electromn.com • www.electromn.com

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.