WF-DFSLT – Dual Fuel Kit

Trane/American Standard – ComfortLink[™] System and/or Roomstat 900 Controller

Installation & Operating Instructions

Reference WarmFlo Select – plenum heater product EM-WU(WD)***D*-SLT Series

This model or controller is the same as the above without electric heat element plenum heater. This model relates to the heat pump only.

This controller only model is identified - WF-DFSLT

- The control board itself is the same as the plenum heater model
- But must use chip code version 17.4*
- The SLT I/F relay box installed within the heat pump is also identical

Communicating Room Thermostat Only

 Designed and configured as a system with the manufacturer's heat pump, gas furnace, and matching roomstat

Specific Systems

- This WF-DFSLT interface can only be used with the following hardware combinations:
 - System 900 Controller
 - Heat Pump 16i (configured with 900 roomstat)
 - Heat Pump 19i and 20i

Application

- Since this is a controller only without WarmFlo electric elements, the OT sensor is also not required
- Warm air setting is required which can be used as a heat pump switchover function
 - If the ST sensor is below the warm air dial switch temperature setting "30" minutes after thermostat call, this controller establishes a standby mode (SB) and terminates heat pump and uses gas to finish out the cycle.
 - The end of the SB call from the SLT is detected when the ST sensor rises above 95° F. Once ST is above 95° F, EL mode returns and the thermostat will finish heat call in gas mode.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICE TECHNICIAN.

Drawings: EH715, XX017



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Drawings Included:	EH715
	XX017

Introduction

This manual assumes the installer is already familiar with WarmFlo Select –SLT Series relating to the applicable Trane/American Standard product. Thus this manual is quite brief and basically covers installation only

As a controller only this is provided for installations where the electric elements are not desired, but all of the interface control features provided by this product are desirable.

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. Visit our web site at electromn.com for upcoming service schools.

WARNING

ALL ELECTRICAL WIRING MUST BE IN ACCORDANCE WITH NATIONAL ELECTRIC CODE AND LOCAL ELECTRIC CODES, ORDINANCES, AND REGULATIONS.

WARNING

OBSERVE ELECTRIC POLARITY AND WIRING COLORS. FAILURE TO OBSERVE COULD CAUSE ELECTRIC SHOCK AND/OR DAMAGE TO THE EQUIPMENT.

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 installations, and conditions which may bypass or compromise the built-in safety features and controls.

2. This installation manual and WarmFlo Select products relate only to the addition of the SLT interface to the furnace ducting system external to the gas or oil force air furnace. The owner/installer assumes all responsibility and/or liability associated with any needed installation of the gas/oil furnace, fuel system, flue, chimney, etc. Any instructions or comments made within this manual (or factory phone assistance) relating to the gas/oil furnace are provided as comments of assistance and "helps" only.

ACAUTION

This unit shall not be operated (either heating section or blower) until the interior of the structure is completed and cleaned. This also means all duct work must be complete with filter, etc. Both manufacturers' warranties are void if this unit is operated during structure construction.

CAUTION

Hazards or unsafe practices could result in property damage, product damage, severe personal injury and/or death.

Remember, safety is the installer's responsibility and the installer must know this product well enough to instruct the end user on its safe use.

Safety is a matter of common sense - - a matter of thinking before acting. Professional installers have training and experienced practices for handling electrical, sheet metal, and material handling processes. Use them.

Electrical Hookup

Remote Sensor

The outdoor sensor (OT) is not required. This OT terminal block screw will be left empty.

Duct Sensor (ST) – locate approximately 6" to 8" above the A-coil, at either side. If there is not adequate plenum distance, pick the largest distribution duct and install towards the top of the horizontal duct. Evaluate air distribution and locate in the maximum warm air stream.

The key is getting this sensor in the maximum warm air stream, the air coming through the A-coil fins will all be on the edge of the plenum.

Note: The black tip inside of the white tube is the sensor itself. It must be positioned slightly sticking out of the white tube. The only purpose of the white tube is physical protection, once it is installed it is okay to push out the sensor $\frac{1}{4}$ " to $\frac{1}{2}$ " to make it more sensitive and faster responding to the warm air stream.

Utility Load Control

Bottom 2-screw terminal block marked blue and blu/wht. Remove the jumper and extend the two wires to the utility furnished control device. For electric energy operation (off-peak) the two blue wires represent contact closure as shipped. **Do not apply external voltage or external power to the blue wires**, they are simply looking for a closed contact during off-peak.

- The maximum "AC noise" on the blue wire is 5 volts, peak to peak. The blue/white wire is actually common and if grounding is proper as suggested in the next paragraph, this should dampen any effect. But it is always good practice to run these wires separate from any current carrying line voltage Romex or other conductors.
- One load control wire pair handles both winter and summer interrupt. Please attach enclosed tag to the power company or utility end of the provided two wires.
- If load control reverse logic is required, consult factory for interposing relay or a "closed to interrupt" contact can be connected to SB SW to COM (see page 11).
- If load management interrupt does not apply, simply leave the blue wires jumpered.

Grounding

Caution – 24 volts common grounding – the installer must determine whether the furnace fan center COM screw terminal has a good ground bond (not simply furnace skin). If the fan center COM is not adequately grounded, use the pigtail green wire (WarmFlo board, upper, C tab) for a ground bond to the power source ground. The upper right circuit board mounting screw is a static ground protection point.

Room Thermostat – Heat Pump – Gas Furnace

Route and connect the communicating three wires between the manufacturer's components as specified in the manufacturer's installation instructions. This unit has additional hookup connections after you have completed the basic 3-wire hookup.

WarmFlo Select add-on control connections – in this specific model series all interface and control is at the outdoor unit. **There are no** SLT connections involved with the room thermostat or the gas furnace. Route an 8-wire t-stat cable (7 used) between the SLT interface unit (control board left center) and the lower corner (refrigerant line entrance area) of the outdoor unit. This will be the SLT I/F relay box (5642) location. This SLT I/F has a terminal block which closely matches the TB3 terminal block on the SLT control board.

The next section will outline the mounting suggestions for this added SLT I/F, but at this time terminate the 7 wires at the SLT control board, TB3.

Terminate the connecting cable as shown, wire colors will be based upon the cable used, write in for future troubleshooting. Also see EH715 drawing.

WF TB3	Function	SLT I/F	Wire Color
1 R	24 VAC power, hot	1 R	
2 W	Compressor on	2 W-ON	
3 C	Common/ground	3 C	
4 INT	INT (summer, K7)	4 INT	
5 X	EXT ODT, -17° output	5 X	
6 RV	Reversing valve, cool	6 RV	
Pigtail wire blk/wht	ODU special power control	7 reset	

Mounting SLT I/F relay box – three HP outdoor unit access panels will need to be removed – the corner control box, the corner bottom wiring shield/panel (just above refrigerant lines), and the front louvered panel accessing the reversing valve.

See Photo A, this identifies the compartment under the corner control box and seems to be the best location for SLT I/F relay box. Prepare for mounting by drilling screw holes, etc. All the pigtail wires will need to be fed through the vertical panel, then looped back through the same vertical panel into the main control upper section. Photo B shows the mounting completed.

Suggestion is to terminate the 7 wires (8-wire stat cable) coming from the SLT control board before actually screwing down the SLT I/F. The above chart and drawing EH715 show these terminal block to terminal block connections.

After completing the connections at the SLT I/F board terminal block and the routing of the cable as suggested in the next paragraph, install the plastic cover over the SLT I/F relay box.





Internal wiring connections – the pigtail wires from the SLT I/F are terminated at various connection points in the outdoor unit corner control box. At several wiring points an existing wire is actually removed and two wires from the SLT I/F are run in series between the component tab and the wire removed. Use electrical tape over any exposed terminals. The remarks column provides this additional step information.

SLT I/F Wire	ODU Component Tab	ODU Wire	Remarks	Photo
Red	Fuse tab		Remove red wire from fuse load side	С
Red/black		Red	Series wires, connection	С
Blue	Transformer common (blue junction)	Blue	Add the piggyback connector to existing blue piggyback junction	D
Orange	Reversing valve, coil junction	Orange	Add the piggyback connector to existing orange junction	Е
Yellow*	HI contactor coil		Remove yellow with orange tracer from coil tab	F
Yellow/green*		Yellow with orange tracer	Series wire connection	F
White	LO contactor coil		Remove yellow with black tracer from coil tab	G
White/black		Yellow with black tracer	Series wire connection	G
Brown	EXT ODU TB		Top center unit outdoor board	Н
Brown	EXT ODT TB		2-screw TB (no polarity)	Н

*16i only has one contactor, do not use these yellow and yellow/green wires, tape and stow.

Photo C

Photo D



Photo E

Photo F





Photo G



Photo H



Additional Hookup or Special System Equipment Concerns

Remotely Located Standby Override Switch

On the bottom of the SLT control board is an "SB SW" tab. Using an external switch between this "SB SW" tab and a common tab provides the same function as the front override switch. Whichever switch is in the up or override position takes priority. In other words, they **both** need to be in the down position during **cooling**.

Note: All override switches (front panel and any options) must be in normal or electric position during cooling.

Load Control, Other Products or Hardware

If there is a need to "pass on" the utility load control receiver function to other heating equipment, radiant floor boiler, peak interrupter, etc; there is an isolated contact on this control board. Locate tabs COM/EL/SB. In the electric mode there is an isolated contact between COM and EL. This contact is for low voltage only, 1-amp maximum.

Note: There may be a 1 or 2 minute delay between this relay contact action and the actual load control receiver. This delay coincides with various blower purge functions.

Note: This contact also follows front panel standby switch.

Field Setup or Programming

Trane 900 Controller – there are only two special setups required for this combination system. However, for proper operation, efficiency, and comfort it is **important** that these two setups be taken care of.

- ISU 0346 upstage suggest either disabled or 75 minutes
- ISU 0350 set to 5° F

Important

This special model has its own programming chip. The unit as received should include version 17.40 and up. If this is not the case there will be improper functioning of the SLT I/F relays.

Warm Air Sensing Control – this is active only with temperatures **above switchover** and if the duct sensor is connected and installed.

See the next section, explaining the operation.

0 = 90	4 = 98	Factory set on #3.
1 = 92	5 = 100	
2 = 94	6 = 102	
3 = 96	7 = 104	

If the installer/user desires not to use the supply temperature sensing switchover to standby function, simply set the warm air dial switch to #0.

Heat Pump Operation/Supply Temperature/Switchover Delay Time

As stated on the cover and in the later sequence section, the heat pump run time before checking or sampling the minimum warm air (ST sensor) setting is factory default set at 30 minutes. There is a method of field changing the 30 minutes. This dial switch is purposely inconvenient. The front decal for this specific controller model has an adhesive applied decal to cover the normal temperature/efficiency dial. This dial switch can now be used to change this delay time. The field installer must remove this "paste over" decal to make the change and replace the cover decal.

0 = 5	4 = 30	Factory set on #4.
1 = 10	5 = 40	
2 = 15	6 = 50	
3 = 20	7 = 60	

WarmFlo Select/ComfortLinkTM II System Combination – Sequence

Standby (**SB**) – this is controlled or activated by either of the four (can be monitored or determined by the front panel amber mode LED).

- Utility load control receiver/LMC/blue and blue white wire loop. This is activated in either heat or cool mode, summer or winter, only one LMC contact is needed. The WF controller determines heat/cool and does the proper standby function.
- WF front panel standby switch
- SB SW tab switch contact to COM.
- Heat pump did not bring the temperature up to warm air dial setting.

During SB the ODU compressor contactor coils are interrupted.

- Option – this SB function only interrupts the compressors, the ODU fan will continue during call for cool. Within the I/F SLT box there are two tabs – T4 and T5. This is an isolated relay contact which could be used to interrupt any other "unwanted" electrical circuit during cooling SB.

Special feature, this controller – at the roomstat heat call and heat pump main contactor turn-on, this controller begins sampling the ST sensor, rolling average for one minute. At turn-on it also begins a "30" minute delay timer. At the end of this delay timer, if the ST average temperature is **not** greater than the

warm air dial switch set point, standby (SB) is initiated and the room thermostat now is controlling the gas furnace. The ST sensor now expects a temperature build up greater than 95° F. Once above 95° F and the controller conditions itself back to electric mode waiting for the next on signal from the heat pump compressor contactor. This standby is initiated by either of the first three methods above, the heat pump is interrupted and the thermostat heat call will go directly to gas furnace. If the system is in cooling, standby (SB) is potentially active and can be initiated from any of the above three. Cooling "SB" is interrupting the compressor, no gas furnace possibility.

Heat/cool – this is determined by the heat pump reversing valve orange wire. High or 24VAC = cooling. \rightarrow Reversing valve/TB3-7/RV/TB3-6/RV/orange wire connection

Cooling – except for load control or standby (SB) function, WF is locked out. Heat pump and furnace blower/air handler do their normal designed cooling functions, WF is basically out of the circuit.

→ Cooling interrupt/TB3-4/INT/TB1-4/INT/K1 and K4 NO (WF board K7 reverse logic opens) compressor contactor coils and provides option T4 and T5 tabs.

Standby (SB):

- **RESET** causes an interrupt of the heat pump 24-volt transformer source thus forcing a heat pump ODU internal reset (10 seconds).
 - \rightarrow Reset/T5/blk/wht/TB1-7/reset/K3 NC opens red wire
- X activates a special condition within the heat pump logic board where it forces the logic board to set itself to -17° outdoor temperature. With a -17° F switchover temperature the heat pump logic terminates the contactors and all the thermostat control goes to the gas furnace.
 → X/TB3-5/X/TB1-5/X/K2 NO activates -17° F switchover

Furnace blower speeds, etc. – the furnace blower and all gas furnace functions are handled by ComfortLink II, there is no connection with WF board. ComfortLink II appears to have adequate blower purge functions to protect or take care of any WarmFlo element concerns.

WarmFlo control power – the WarmFlo Select board receives its 24-volt source from the outdoor unit transformer. This is via TB3-1 (R) and TB3-3 (COM).

Operation Indicators

Front Panel LED's

- **PWR ON** indicates good fuse and 24-volt power source from the furnace terminal block.
- **Mode** this LED provides two sets of information:
 - o Off, standby mode (SB)
 - On, electric heat mode
 - Pulsing, cooling mode

Override Switch – the front panel slide switch (very similar to standard DFC) is a direct hardware disabling of any electric mode functions. The room thermostat heat call wire or function is directly controlling the fossil fuel or gas furnace. This function can also be on a remote switch, see previous statement for "SBSW" tab.

WARNING

THIS FRONT PANEL MANUAL OVERRIDE SWITCH IS A HARDWARE DIRECT TO GAS FURNACE FUNCTION. THUS THERE ARE NO BLOWER PURGE CYCLES. IF THE ELECTRIC ELEMENTS ARE ON AND HOT WHEN SWITCHING TO OVERRIDE AND IMMEDIATELY ALLOWING THE GAS FURNACE, OVERHEAT ON THE ELECTRIC ELEMENTS AND POTENTIAL ELECTRO-MATE MANUAL RESET IS POSSIBLE. THIS FRONT PANEL OVERRIDE SWITCH SHOULD ONLY BE ACTIVATED WHEN THERE IS NOT A ROOMSTAT HEAT CALL.

Note: This switch must be in the normal position during cooling.

Sensor Monitor Indicators – in addition to using WarmFlo Analyzer or WarmFlo PC software to readout the temperature sensors, there is a built-in go/no-go type monitor visible on the green PWR ON second from the top LED.

- If there is detection of miswired or totally inoperative sensor, this LED has a blinking or pulse mode. By checking the pulsing pattern, the appropriate sensor can be identified.
- ST sensor two, 100 ms blinks every second

Handheld Analyzer/Laptop Software

This test tool and/or software is available for temperature offset, field altering the program chip parameters and setup, and general assistance for troubleshooting. However, for this special version 17.30 software the factory or setup defaults, read out and controlled are different.

Setup Defaults

MU TIME -00	OT FUNC – DT CAL
SB RESET – DISABLE	ODT SW – HP ODT
SOT-S TIME – 00	OT SPD A – 30
SOT-E TIME – 00	OT SPD B – 20
STG 1 OT DIS – 55	ST SPD A – 95
STG 2 OT DIS – 38	ST SPD B - 105
STG 3 OT DIS – 36	
STG 4 OT DIS – 34	





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:

- 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:

- 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.
- 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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