TEMPERATURE-SENSING MAKEUP AIR SENSOR

Model: T-Sensor

The Field Controls T-Sensor Outdoor Temperature Damper Control is intended for use in conjunction with the HHSC+ Ventilation Control and FAD-model Fresh Air Dampers, for the purpose of preventing outdoor air from being brought into the home when outdoor weather conditions are extreme and undesirable for ventilation.

The T-Sensor and HHSC+ also have the capability of providing make-up air to the home on demand, when sensed by a variety of sensors, switches, and other equipment. The make-up air function may or may not override the T-Sensor ventilation – inhibiting function, depending on the wiring configuration chosen by the installer.

The T-Sensor mounts to the fresh air ventilation duct, between the FAD damper and the air intake hood or termination. The outdoor air temperature is sensed by an integral probe that penetrates into the duct. Ventilation may be prohibited when either:

- Outdoor air is too cold (Lo-Temp setting)
- Outdoor air is too hot (Hi-Temp setting)

The T-Sensor is powered with 24VAC by connection to the HHSC+ control, which is powered by connection to the HVAC 24V thermostat or system transformer. No secondary power transformer is normally required.

ITEMS INCLUDED IN KIT:

- **T-Sensor Control Unit**
- **Damper Cable with modular connectors, for connection to FAD damper**
- **Control Harness for connection to HHSC+ ventilation control, with modular connector**
- **Makeup Air Harness with modular connector**
- **Duct Gasket**
- **(2) Zip Ties for mounting T-Sensor to fresh air duct**
- **Installation and Operation Instructions**

Additional Hardware Required: wire and wire nuts for connection

READ THESE INSTRUCTIONS CAREFULLY AND COMPLETELY BEFORE PROCEEDING WITH THE INSTALLATION.

This device **MUST** be installed by a qualified agency in accordance with the manufacturer's installation instructions. The definition of a qualified agency is: any individual, firm, corporation or company which either in person or through a representative is engaged in, and is responsible for, the installation and operation of HVAC appliances, who is experienced in such work, familiar with all the precautions required, and has complied with all the requirements of the authority having jurisdiction.

Please retain these instructions after installation.

Installed By: _____ Phone: _____ Installation Date: _____

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INSTALLATION

Note: Disconnect power to the HHSC+ ventilation control before beginning the installation! The HHSC+ is typically powered by the HVAC system transformer; in this case, shut off power to the HVAC system and verify that there is no voltage on HHSC+ terminals R and C.

1. Mount the T-Sensor on the fresh air duct:
   a. Choose a location on the fresh air duct that is dry and protected from weather, preferably within two feet of the FAD damper location. The damper cable included in the kit is 2' long, but may be extended with field wiring of min. 22 gage low-voltage wire if necessary.
   b. Reinforce flex duct and/or insulation with duct tape applied around the hole, and cut a 1" round or square hole in the side or top of the duct. For especially thick insulation, it may be necessary to cut back insulation ¼" from the outline of the T-Sensor when installed (see Figure 3) and seal off with tape. DO NOT cover the sides or top of the T-Sensor with insulation or tape!
   c. Slide the two included Zip Ties through the slotted tabs on the base of the T-Sensor; SEE Figure 1.
   d. Place the square Duct Gasket over the probe on the T-Sensor; see Figure 2.
   e. Install the T-Sensor with the probe projecting into the duct, and secure to duct with the Zip Ties; see Figure 3. The T-Sensor probe may be oriented at any angle within the duct, but must protrude a minimum of ½".
   f. Ensure that the duct is adequately supporting the T-Sensor, and add a hanger or support tie if necessary.
   Note: DO NOT mount the T-Sensor underneath any horizontal part of the fresh air duct!
2. Connect Damper Cable (included):
   The Damper Cable has different 4-pin modular connectors on opposite ends that correspond to matching sockets on the T-Sensor and the FAD damper. Snap the corresponding connector into the T-Sensor socket marked "Damper" (see Figure 4), and the corresponding connector on the other end of the cable into the FAD damper socket. The Damper Cable may be extended if necessary, see Installation Step 1a. Make sure that the Damper Cable is adequately supported and is unlikely to be disturbed during further installation and maintenance.

Figure 1

Figure 2

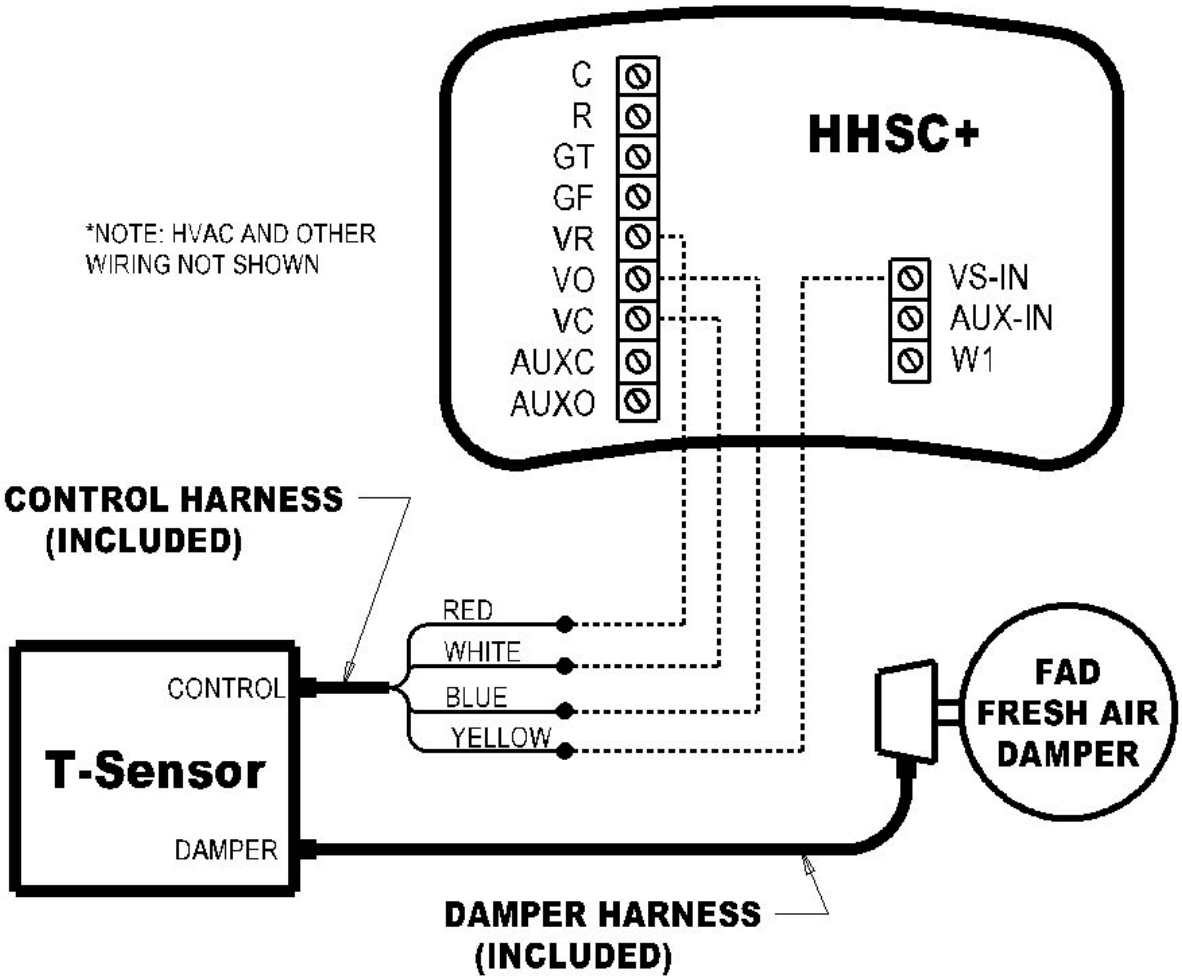
Figure 3

Figure 4

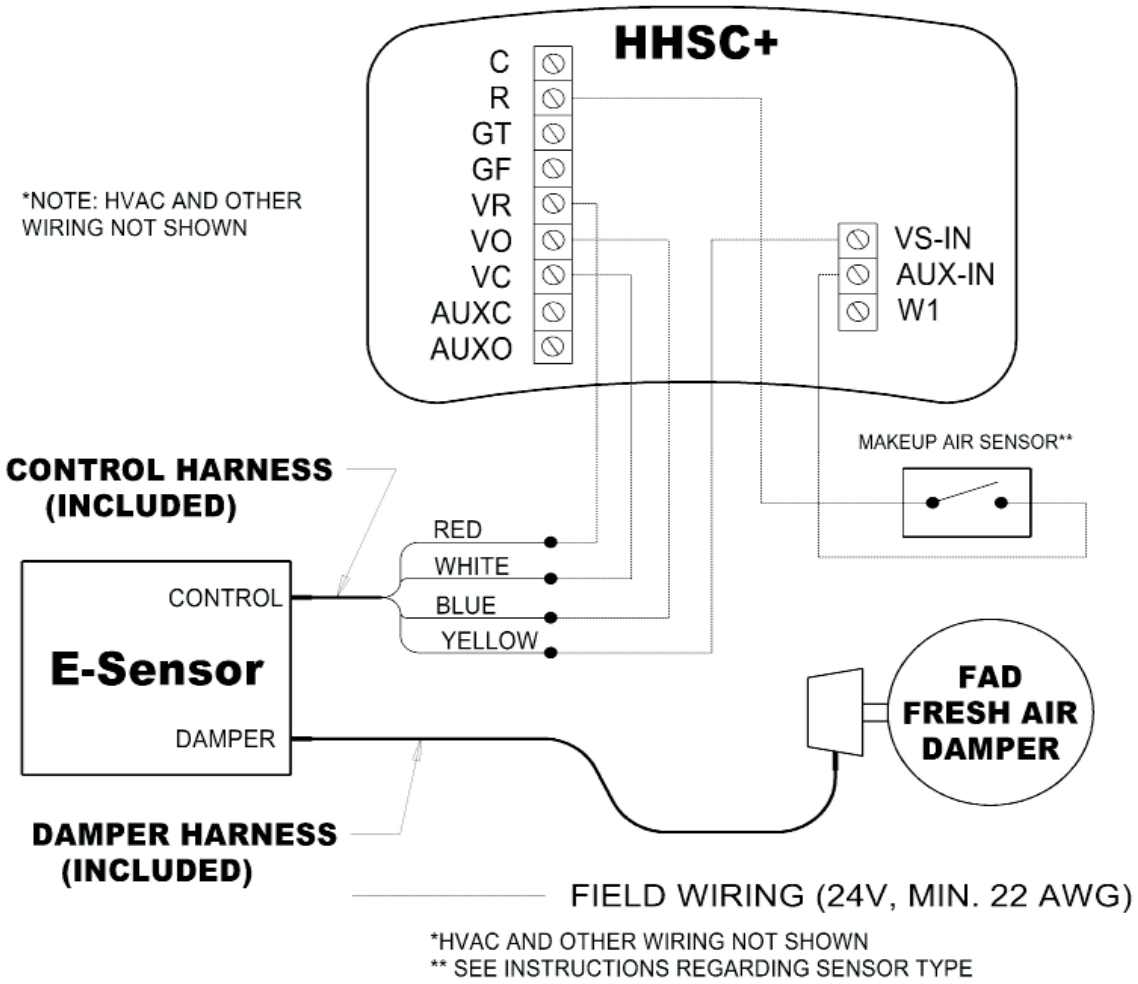
Sensing Device Connection(s)	System Operation Upon Sensing Makeup Air Demand	Application Notes
HHSC+ Control Only, Wiring Diagram B	HHSC+ sends fan-on over-ride command to HVAC circulation fan, sends command to open FAD damper.	If installed, the T-Sensor may prevent the FAD damper from opening, depending on settings and outdoor conditions. The HVAC fan would be commanded to run, regardless of outdoor conditions.
T-Sensor Only, Wiring Diagram C	The T-Sensor will command the FAD damper to open, regardless of outdoor conditions and status of HHSC+ and HVAC circulation fan.	The HVAC fan would not be commanded to run by Makeup Air demand. The HVAC heating/cooling system may or may not be active, depending on thermostat action.
HHSC+ Control AND T-Sensor, Wiring Diagram D	The HHSC+ sends fan-on override command to HVAC circulation fan, sends command to open FAD damper. The T-Sensor allows the FAD damper to open for makeup air regardless of outdoor conditions.	Make-up air will be actively forced into the house, regardless of outdoor conditions

3. Connect the Control Harness:
   Make sure the wiring from the HHSC+ to the included Control Harness is complete and correct. Snap the 4-pin modular connector on the Control Harness into the T-Sensor socket marked "Control" (see Figure 4). The installation is now complete.

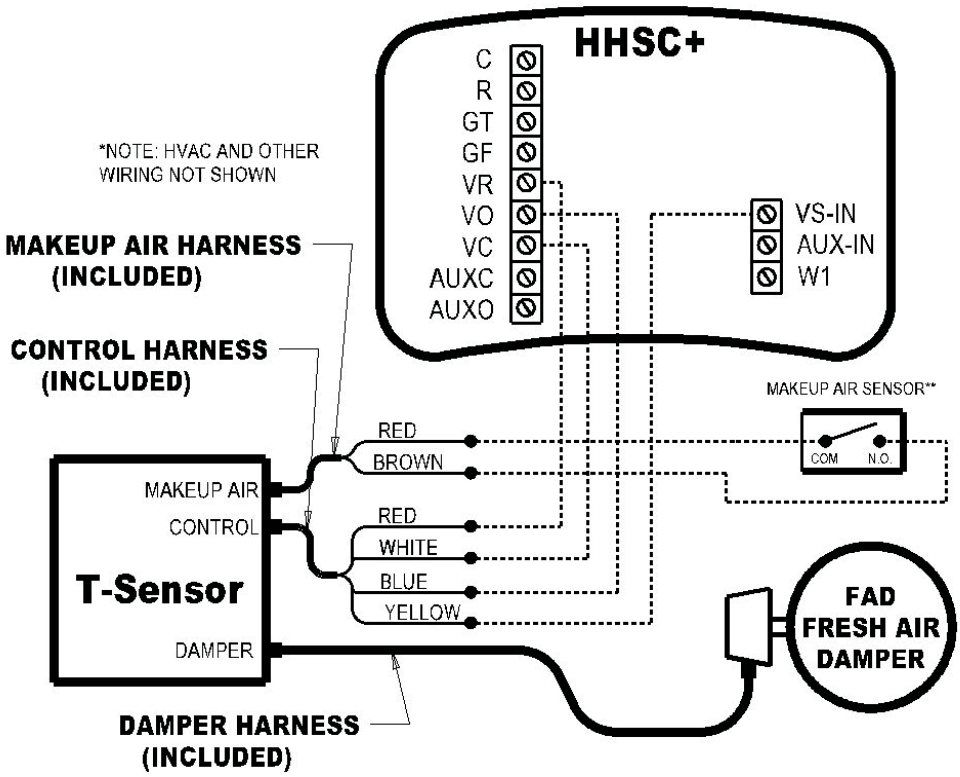
WIRING DIAGRAM A: NO MAKEUP AIR



WIRING DIAGRAM B



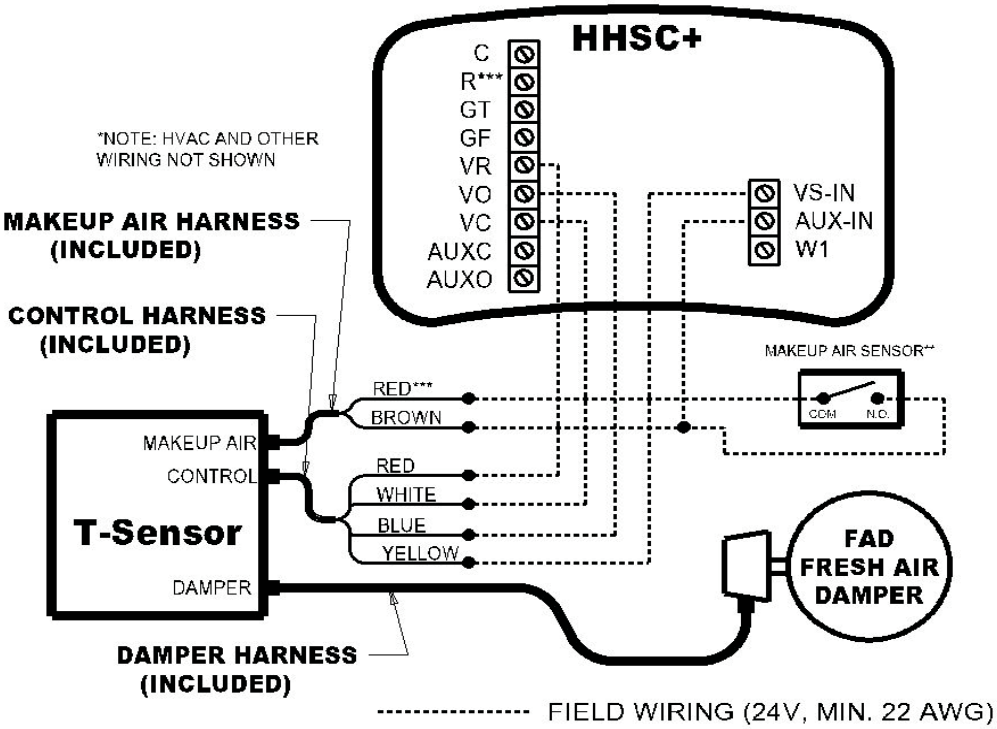
WIRING DIAGRAM C



---------- FIELD WIRING (24V, MIN. 22 AWG)

*HVAC AND OTHER WIRING NOT SHOWN
** SEE INSTRUCTIONS REGARDING SENSOR TYPE

WIRING DIAGRAM D



---------- FIELD WIRING (24V, MIN. 22 AWG)

*HVAC AND OTHER WIRING NOT SHOWN
** SEE INSTRUCTIONS REGARDING SENSOR TYPE
*** EITHER E-SENSOR RED WIRE OR HHSC+ TERMINAL "R" MAY BE CONNECTED TO MAKEUP AIR SENSOR COM TERMINAL

OPERATION

1. Adjust the Hi-Temp and Lo-Temp settings on the T-Sensor:
   Insert a small flat-blade screwdriver into the arrow-shaped slots in the tops of the blue adjustment knobs (see Figure 4) and rotate to the desired ventilation cut-off temperature settings:
   • If the sensed temperature in the duct is below the Lo-Temp setting, the T-Sensor will prevent the FAD damper from opening on a ventilation call from the HHSC+.
   • If the sensed temperature in the duct is above the Hi-Temp setting, the T-Sensor will prevent the FAD damper from opening on a ventilation call from the HHSC+.
   Note: The T-Sensor may or may not prevent the FAD damper from opening to allow makeup air, if this function is used, depending on the system configuration, see Makeup Air configuration table and corresponding wiring diagrams.
2. Restore power to the HHSC+ control:
   The T-Sensor will now be powered up and begin functioning; this will be indicated by a short sequence of flashing red/green indicator lights, after which normal operation will begin.
   The Hi- and Lo-Temp settings have an LED light that will glow red or green, depending on conditions and settings. A green LED indicates that the sensed air temperature does not exceed the setting, and ventilation will be allowed by that particular setting. Both setting indicators must be green for the FAD damper to open on a ventilation call by the HHSC+. If either of the setting LEDs is red; ventilation will not be allowed unless there is a makeup air demand and the system is configured appropriately.
   If a makeup air sensor or switch is calling for makeup air by closing the electrical circuit from red to brown on the corresponding Makeup Air Harness wires; the MAKEUP AIR indicator LED will glow red. The LED will not glow if this does not occur.

TROUBLESHOOTING

- If the LED indicator lights do not light up at all: check for nominal 24 volts AC on the red and white wires of the Control Harness. Power is fed to the T-Sensor by proper connection to the HHSC+; if the HHSC+ display is blank, check for 24 volts AC by probing the R and C terminals on the HHSC+
- If the FAD damper opens but fails to close, check the Service/Auto switch on the side of the FAD motor cover. The switch should be in the auto position.

SPECIFICATIONS

Ambient Operating Conditions: -38° to 180°F, 98% RH
Sensor Probe Operating Conditions: -40° to 180°F, 100% RH
Voltage: 20-32 VAC
Wattage: <1W
Max Damper Current: 1A

REPLACEMENT PARTS

- Damper Cable
- Control Harness
- Makeup Air Harness

For Field Controls warranty information, please visit www.fieldcontrols.com

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