33CS
Accessory Enthalpy Switch/Receiver
Accessory Enthalpy Sensor

Installation Instructions

Part Numbers 33CSENTHSW and 33CSENTSEN

GENERAL

The accessory enthalpy switch/receiver (33CSENTHSW) senses temperature and humidity of the air surrounding the device and calculates the enthalpy when used without an enthalpy sensor. The relay is energized when enthalpy is high and deenergized when enthalpy is low (based on ASHRAE 90.1 criteria). If an accessory enthalpy sensor (33CSENTSEN) is attached to the return air sensor input, then differential enthalpy is calculated. The relay is energized when the enthalpy detected by the return air enthalpy sensor is less than the enthalpy at the enthalpy switch/receiver. The relay is deenergized when the enthalpy detected by the return air enthalpy sensor is greater than the enthalpy at the enthalpy switch/receiver (differential enthalpy control). See Fig. 1 and 2. This sensor is normally used with PremierLink™ or Centurion controls and may also be used with Energy$Recycler units or rooftop units with economizers.

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

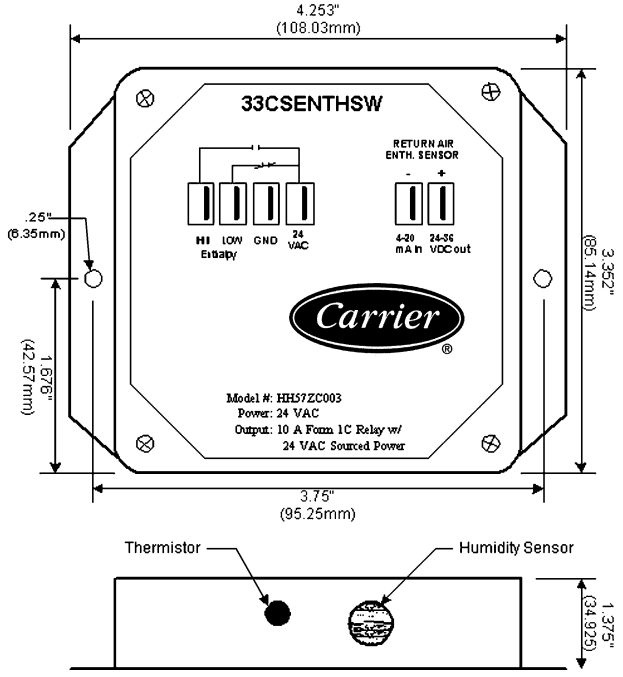


Fig. 1 — Enthalpy Switch/Receiver Dimensions (33CSENTHSW)

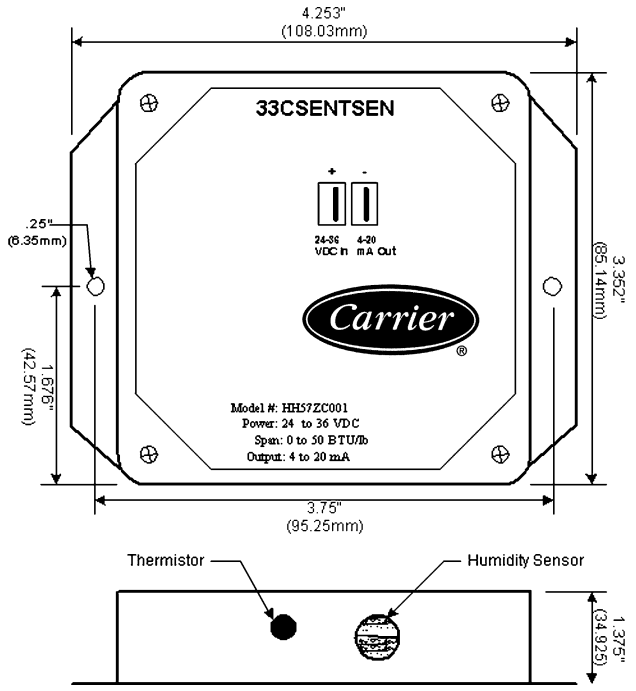


Fig. 2 — Enthalpy Sensor Dimensions (33CSENTSEN)

INSTALLATION

Outdoor Enthalpy Control (Fig. 3) — Outdoor enthalpy control requires only an enthalpy switch/receiver (33CSENTHSW). The enthalpy switch/receiver is mounted in the outdoor air inlet and calculates outdoor air enthalpy. The enthalpy switch/receiver energizes the relay output when the outdoor enthalpy is above 28 BTU/lb **OR** dry bulb temperature is above 75 F and is deenergized when the outdoor enthalpy is below 27 BTU/lb **AND** dry bulb temperature is below 74.5 F. The relay output is wired to the unit economizer which will open or close depending on the output of the switch.

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

MOUNTING — Mount the enthalpy switch/receiver in a location where the outdoor air can be sampled (such as the outdoor air intake). The enthalpy switch/receiver is not a NEMA 4 (National Electrical Manufacturers Association) enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x $^3/_4$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy switch/receiver.

WIRING — Carrier recommends the use of 18 to 22 AWG (American Wire Gage) twisted pair or shielded cable for all wiring. All connections must be made with $^1/_4$-in. female spade connectors.

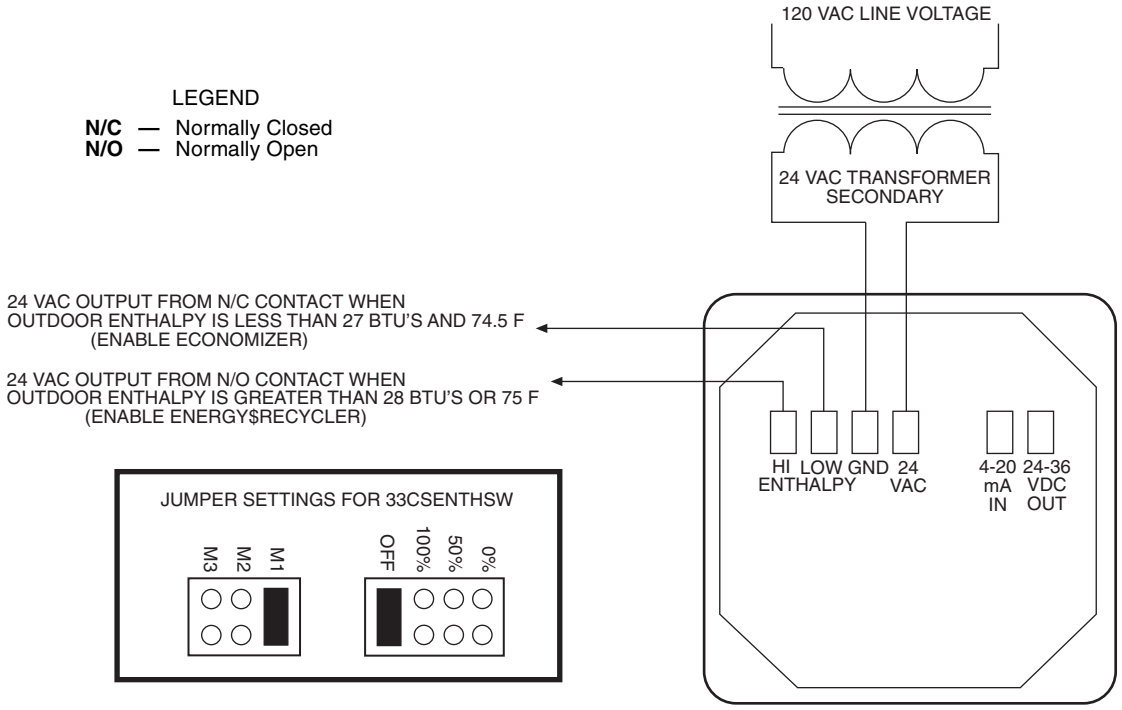


Fig. 3 — Outdoor Enthalpy Control Wiring

A field-supplied, 24-VAC transformer is required to power the enthalpy switch/receiver. Connect the GND and 24 VAC terminals on the enthalpy switch/receiver to the terminals on the transformer. On some applications, the power from the economizer harness can be used to power the enthalpy switch/receiver. To power the enthalpy switch/receiver from the economizer harness, connect power of the enthaply switch/receiver to the red and brown wires (1 and 4) on the economizer harness.

For connection to Energy$Recycler units, connect the HI Enthalpy terminal on the enthalpy switch/receiver to the HM terminal on the heat recovery unit to precondition incoming air. The LOW Enthalpy terminal is not used. See Fig. 4.

For connection to rooftop units with PremierLink™ control, connect the LOW Enthalpy terminal on the enthalpy switch/receiver to J4 — pin 2 of the PremierLink control on the HVAC unit. The switch can be powered through the PremierLink control board if desired. Wire the 24 VAC terminal on the enthalpy switch/receiver to J4 — pin 1 on the PremierLink control. Wire the GND terminal on the enthalpy switch/receiver to J1 — pin 2 on the PremierLink control. The HI Enthalpy terminal is not used. See Fig. 5.

For connection to rooftop units without PremierLink control and an EconoMi$er2, remove the existing dry bulb sensor and 820-ohm resistor. Connect the tan wire from the S_O + terminal on the EconoMi$er2 controller to the Low Enthalpy terminal on the enthalpy switch/receiver. Connect the violet wire from the S_O terminal on the EconoMi$er2 controller to the 24VAC terminal on the enthalpy switch/receiver. Connect the TR1 terminal on the EconoMi$er2 controller to the GND terminal on the enthalpy switch/receiver. The HI Enthalpy terminal is not used. See Fig. 6.

The Return Air Enthalpy Sensor terminals are not used.

JUMPER SETTINGS — There are two jumpers. One jumper determines the mode of the enthalpy switch/receiver. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy switch/receiver and then remove the cover. The factory settings for the jumpers are M1 and OFF.

The mode jumper should be set to M1 for outdoor enthalpy control. The factory test jumper should remain on OFF or the enthalpy switch/receiver will not calculate enthalpy.

Differential Enthalpy Control (Fig. 7) — Differential enthalpy control requires both an enthalpy switch/receiver (33CSENTHSW) and an enthalpy sensor (33CSENTSEN). The enthalpy switch/receiver is mounted in the outdoor air inlet and calculates outdoor air enthalpy. The enthalpy sensor is mounted in the return airstream and calculates the enthalpy of the indoor air.

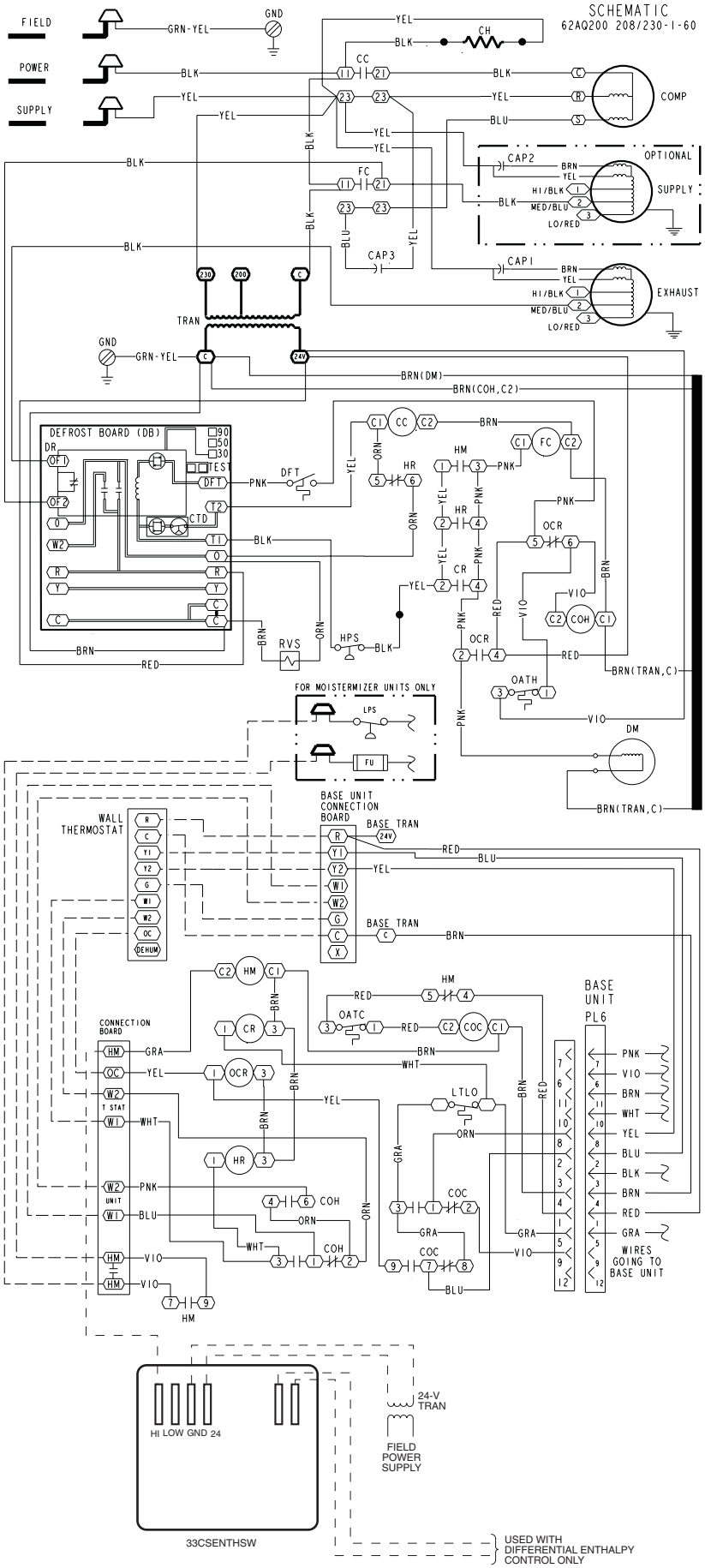
The enthalpy switch/receiver energizes the HI Enthalpy relay output when the outdoor enthalpy is greater than the indoor enthalpy. The LOW Enthalpy terminal is energized when the outdoor enthalpy is lower than the indoor enthalpy. The relay output is wired to the unit economizer which will open or close depending on the output of the switch.

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

MOUNTING — Mount the enthalpy switch/receiver in a location where the outdoor air can be sampled (such as the outdoor air intake). The enthalpy switch/receiver is not a NEMA 4 enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain, snow, or direct sunlight. Use two field-supplied no. 8 x $^3/_4$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy switch/receiver.

Mount the enthalpy sensor in a location where the indoor air can be sampled (such as the return air duct). The enthalpy sensor is not a NEMA 4 enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x $^3/_4$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy sensor.

WIRING — Carrier recommends the use of 18 to 22 AWG twisted pair or shielded cable for all wiring. All connections must be made with $^1/_4$-in. female spade connectors.



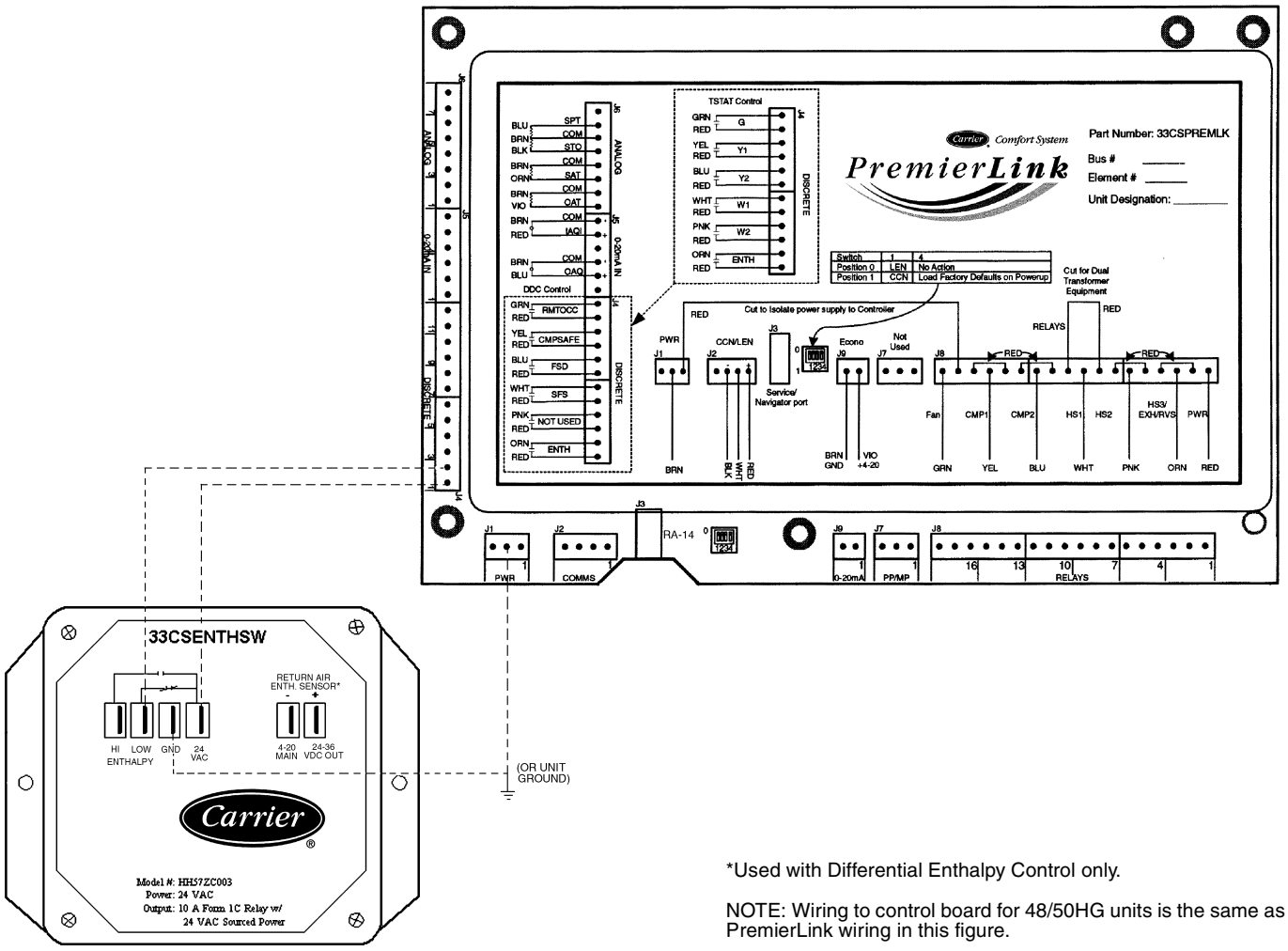
LEGEND

C	— Contactor
CAP	— Capacitor
CC	— Compressor Contactor
CH	— Crankcase Heater
COC	— Cool Changeover Relay
COH	— Heat Changeover Relay
COMP	— Compressor Motor
CR	— Cooling Relay
CTD	— Compressor Time Delay
DB	— Defrost Board
DFT	— Defrost Thermostat
DM	— Damper Motor
DR	— Defrost Relay
FC	— Fan Contactor
FU	— Fuse
GND	— Ground
HM	— Humidity Relay
HPS	— High-Pressure Switch
HR	— Heating Relay
LTLO	— Low Temp Cooling Lockout
LPS	— Low-Pressure Switch
OCR	— Occupied Relay
OATC	— Outdoor-Air Thermostat (Cool)
OATH	— Outdoor-Air Thermostat (Heat)
RVS	— Reversing Valve Solenoid
TRAN	— Transformer

Field Splice
Terminal (Marked)
Terminal (Unmarked)
Splice
Splice (Marked)
Factory Wiring
Field Control Wiring
Field Power Wiring
Accessory or Optional Wiring
To indicate common potential only. Not to represent wiring.

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with 90° C wire or its equivalent.
2. Use copper conductors only.
3. TRAN is wired for 230-v unit. If unit is to be run with 208-v power supply, disconnect black wire from 230-v terminal and connect to 208-v terminal.

Fig. 4 — Typical Wiring Schematic, 62AQ Unit with Enthalpy Sensor



*Used with Differential Enthalpy Control only.

NOTE: Wiring to control board for 48/50HG units is the same as PremierLink wiring in this figure.

Fig. 5 — Typical Wiring Schematic — Carrier Rooftop Unit with PremierLink™ Controls

A field-supplied, 24-VAC transformer is required to power the enthalpy switch/receiver. Connect the GND and 24 VAC terminals on the enthalpy switch/receiver to the terminals on the transformer. On some applications, the power from the economizer harness can be used to power the enthalpy switch/receiver. To power the enthalpy switch/receiver from the economizer harness, connect power of the enthaply switch/receiver to the red and brown wires (1 and 4) on the economizer harness.

For connection to Energy$Recycler units, connect the HI Enthalpy terminal on the enthalpy switch/receiver to the HM terminal on the heat recovery unit to precondition incoming air. The LOW Enthalpy terminal is not used. See Fig. 4.

For connection to rooftop units with PremierLink control, connect the LOW Enthalpy terminal on the enthalpy switch/receiver to J4 — pin 2 of the PremierLink control on the HVAC unit. The switch can be powered through the PremierLink control board if desired. Wire the 24VAC terminal on the enthalpy switch/receiver to J4 — pin 1 on the PremierLink control. Wire the GND terminal on the enthalpy switch/receiver to J1 — pin 2 on the PremierLink control. The HI Enthalpy terminal is not used. See Fig. 5.

For connection to rooftop units without PremierLink control and an EconoMi$er2, remove the existing dry bulb sensor and 820-ohm resistor. Connect the tan wire from the S_O + terminal on the EconoMi$er2 controller to the 24VAC terminal on the enthalpy switch/receiver. Connect the violet wire from the S_O terminal on the EconoMi$er2 controller to the LOW Enthalpy terminal on the enthalpy switch/receiver. Connect the TR1 terminal on the EconoMi$er2 controller to the GND terminal on the enthalpy switch/receiver. The HI Enthalpy terminal is not used. See Fig. 6.

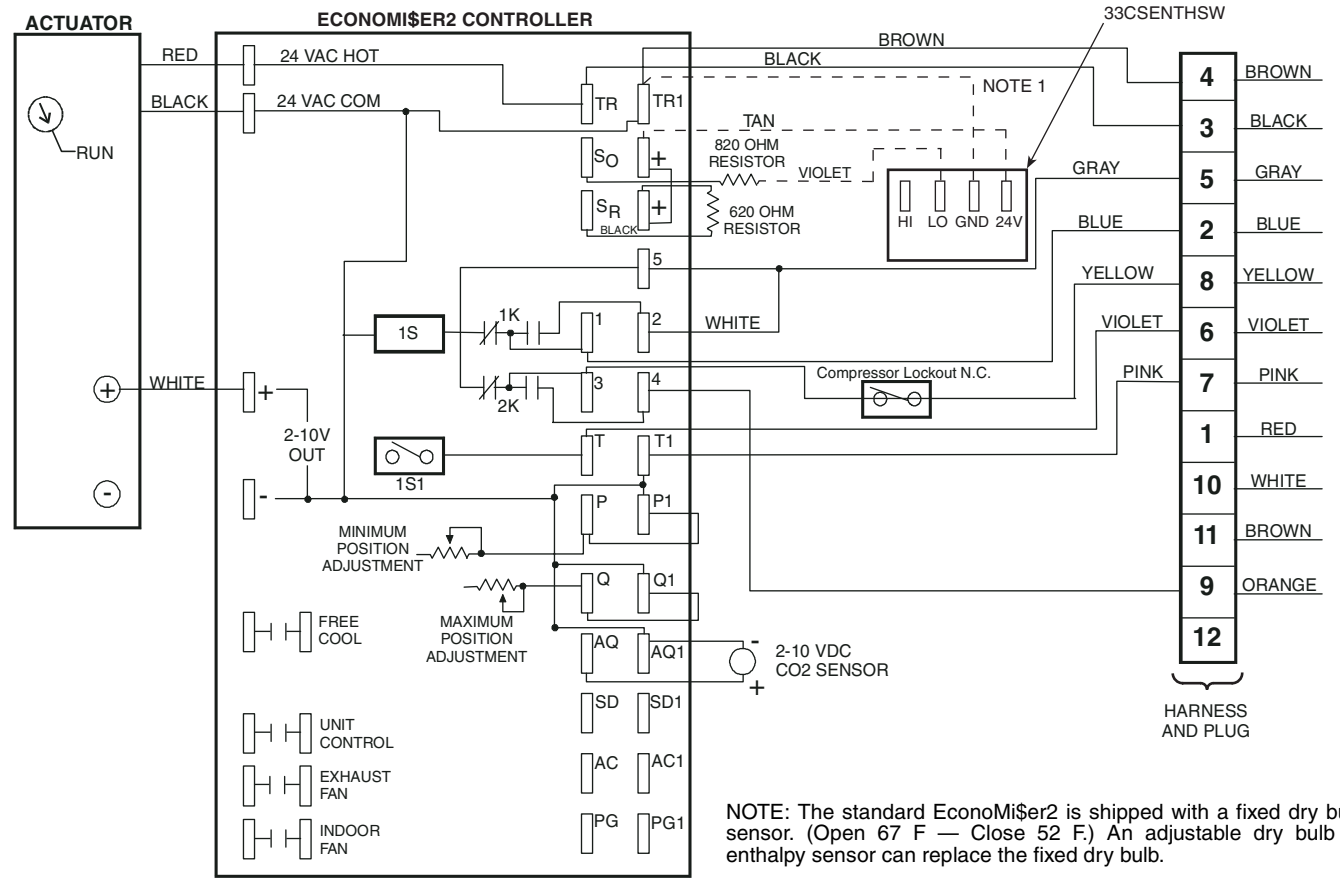
Connect the 4-20 mA In terminal on the enthalpy switch/receiver to the 4-20 mA Out terminal on the return air enthalpy sensor. Connect the 24-36 VDC Out terminal on the enthalpy switch/receiver to the 24-36 VDC In terminal on the return air enthalpy sensor. See Fig. 7.

ENTHALPY SWITCH/RECEIVER JUMPER SETTINGS — There are two jumpers. One jumper determines the mode of the enthalpy switch/receiver. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy switch/receiver and then remove the cover. The factory settings for the jumpers are M1 and OFF.

The mode jumper should be set to M2 for differential enthalpy control. The factory test jumper should remain on OFF or the enthalpy switch/receiver will not calculate enthalpy.

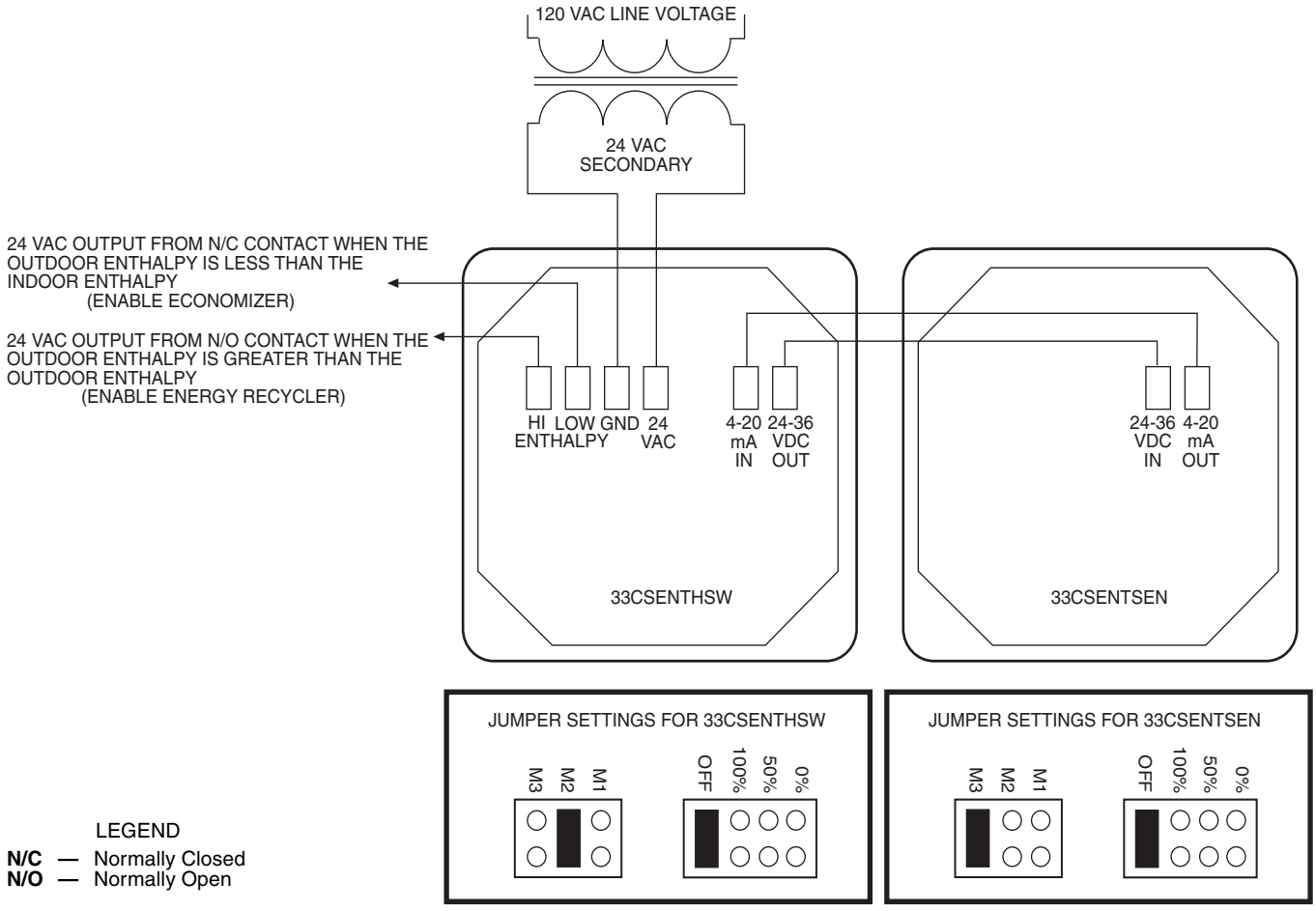
ENTHALPY SENSOR JUMPER SETTINGS — There are two jumpers. One jumper determines the mode of the enthalpy sensor. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy sensor and then remove the cover. The factory settings for the jumpers are M3 and OFF.

The mode jumper should be set to M3 for 4 to 20 mA output. The factory test jumper should remain on OFF or the enthalpy sensor will not calculate enthalpy.



NOTE: The standard EconoMi$er2 is shipped with a fixed dry bulb sensor. (Open 67 F — Close 52 F.) An adjustable dry bulb or enthalpy sensor can replace the fixed dry bulb.

→ **Fig. 6 — Typical Wiring Schematic — Carrier Rooftop Unit with EconoMi$er2**



LEGEND
N/C — Normally Closed
N/O — Normally Open

Fig. 7 — Differential Enthalpy Control Wiring

Two-Wire, 4 to 20 mA Loop Powered Enthalpy Transmitter (Fig. 8) — Two-wire, 4 to 20 mA loop powered enthalpy transmitter control requires an enthalpy sensor (33CSENTSEN). The enthalpy sensor is mounted where required and calculates the enthalpy of the surrounding air. A 4 to 20 mA signal based on the enthalpy is transmitted from the enthalpy sensor to a user-determined device. The 4 mA output is equivalent to 0 BTU/lb. The 20 mA output is equivalent to 50 BTU/lb. The formula for calculating enthalpy from the 4 to 20 mA output is as follows:

(mA Output – 4 mA) / 0.32 mA per BTU = Enthalpy

NOTE: The enthalpy calculation is done using an average altitude of 1000 ft above sea level.

MOUNTING — Mount the enthalpy sensor in a location where the air can be sampled. The enthalpy sensor is not a NEMA 4 enclosure and should be mounted in a location that is not exposed to outdoor elements such as rain or snow. Use two field-supplied no. 8 x $^{3}/_{4}$-in. TEK screws. Insert the screws through the holes in the sides of the enthalpy sensor.

WIRING — Carrier recommends the use of 18 to 22 AWG twisted pair or shielded cable for all wiring. All connections must be made with $^{1}/_{4}$-in. female spade connectors.

A supply voltage of 24 to 36 VDC is required to power the enthalpy sensor. Connect the 24 to 36 VDC In terminal on the enthalpy sensor to the supply voltage.

Connect the 4 to 20 mA Out terminal on the enthalpy sensor to the 4 to 20 mA input on the user-determined device.

See Fig. 8 for a wiring diagram.

ENTHALPY SENSOR JUMPER SETTINGS — There are two jumpers. One jumper determines the mode of the enthalpy sensor. The other jumper is not used. To access the jumpers, remove the 4 screws holding the cover on the enthalpy sensor and then remove the cover. The factory settings for the jumpers are M3 and OFF.

The mode jumper should be set to M3 for 4 to 20 mA output. The factory test jumper should remain on OFF or the enthalpy sensor will not calculate enthalpy.

NOTE: If the mode jumper is removed so that no jumper is on M1, M2, or M3, then the sensor will output 4 to 20 mA relative to 0-100% RH as a 3% relative humidity sensor.

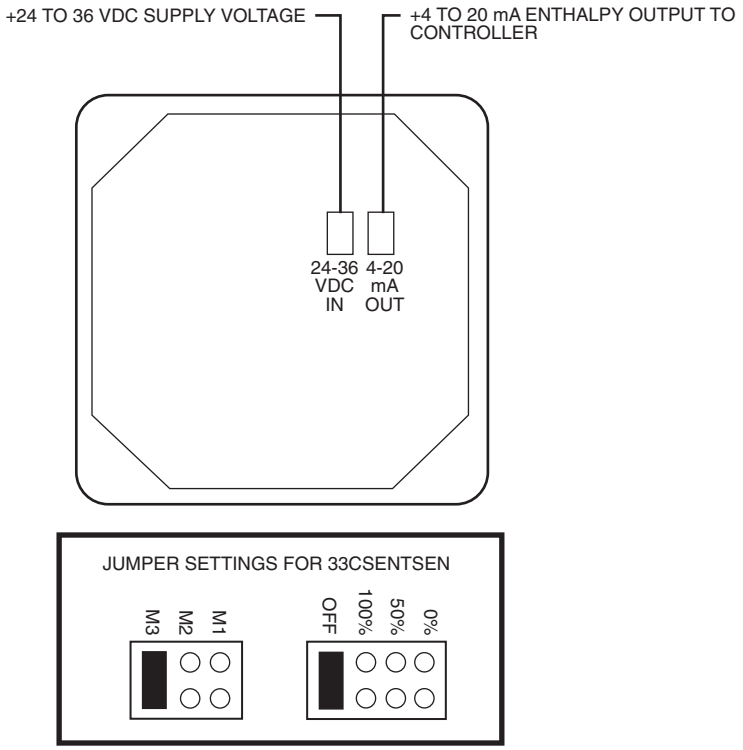


Fig. 8 — Enthalpy Transmitter Wiring