

## Commercial Comfort Controller (543-0175-00) Installation Guide

### Contents

Mounting.....	1
Connections and Wiring .....	1
Wiring Considerations .....	1
Input Connections .....	2
Output Connections .....	3
Power Connection .....	3
Configuration .....	3
Applications .....	4
Heat Pump Unit (HPU) – 1 or 2 Compressors with Auxiliary and Emergency Heat.....	4
Roof Top Unit (RTU) – 1 or 2 Heat and 1 or 2 Cool ..	5
Maintenance .....	6
Accessories .....	6
Warranty .....	6
Important Notices .....	6

### MOUNTING

**For optimum temperature sensor performance, the controller must be mounted on an interior wall and away from heat sources, sunlight, windows, air vents, and air circulation obstructions (e.g., curtains, furniture).**

If replacing an existing thermostat, label wires as needed for reference when removing the existing thermostat.

1. Complete rough-in wiring at each location prior to thermostat installation. Cable insulation must meet local building codes.
2. Turn the hex screws in the bottom and top of the controller **CLOCKWISE** (only) until they clear the cover. (See **Figure 1.**) Pull the cover away from the backplate (mounting base).
3. Route the wiring through the backplate.
4. **With the embossed UP toward the ceiling**, fasten the backplate to a wall handy-box. The controllers mount directly on vertical 2 x 4 inch boxes, but they require an HMO-10000W wall mounting plate for horizontal or 4 x 4 boxes.
5. Make the appropriate connections to the terminal blocks. (See the Connections and Wiring section.)
6. Place the cover over the backplate **while being careful not to pinch or dislodge any wiring**. Back the hex screws (**counterclockwise**) out of the brackets until they engage the cover and hold it in place.

### ⚠ CAUTION

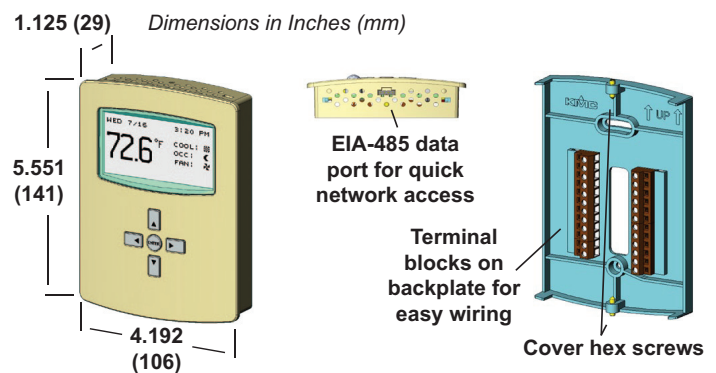
**To prevent mounting screw heads from touching the circuit board in the thermostat, use only the mounting screws supplied. Using screws other than the type supplied may damage the controller. Do not turn the screw in farther than necessary to remove the cover.**

NOTE: This document is for the 5-relay, 1-triac, and 3-analog-output 543-0175-00 controller used to control the Copeland Scroll Digital™ compressor. This document gives basic mounting, wiring, and setup information only. For specifications and additional accessory information, see the Data Sheet. For operation, configuration, troubleshooting, and other information, see the Operation Guide. For additional wiring, application, and programming information, see the Application Guide. For more detailed information on configuration, programming, and operation, please visit [EmersonClimate.com/DigitalRetrofitKit](http://EmersonClimate.com/DigitalRetrofitKit).

### CONNECTIONS AND WIRING

#### Wiring Considerations

- Because of the many connections (power, network, inputs, outputs, and their respective grounds or switched commons), be sure wiring is well planned before installation of conduit!
- Make sure that conduit for all wiring has adequate diameter for all necessary wiring. Using 1-inch conduit and junction boxes is recommended! Use external junction boxes above the ceiling or in another convenient location as needed to make connections that run to the junction box.



**Figure 1 – Dimensions and Connections**

- To prevent excessive voltage drop, use a conductor size that is adequate for the wiring length! Allow plenty of “cushion” to allow for transient peaks during startup.
- Using multiple conductor wires for all relevant inputs (e.g., 8 conductor) and outputs (e.g., 12 conductor) is recommended. Grounds for all the inputs can be combined on one wire.

**Input Connections**

Passive input devices require pull-up resistors in the circuit. For passive input devices (e.g., switch contacts and 10K ohm thermistors) on IN2 through IN4 and IN7 through IN9, set the pull-up switches on the back of the circuit board to the 10K position. For active voltage devices, set the switches to the 0–12 VDC position. (See Figures 2 and 3.)

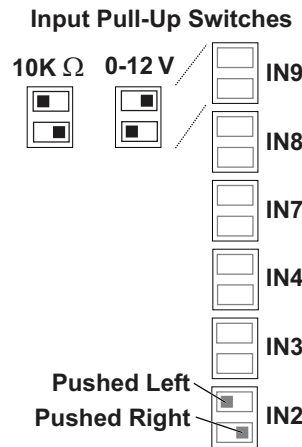
NOTE: The INPUT switch pairs must NOT have both switches set to the left or both set to the right – if one of the pair’s switches is set to the left, for example, the other must be set to the right (or vice versa). ALL the input pull-up resistor switch pairs must be fully latched in either 10K Ohm or 0–12 VDC positions even if a switch pair has no input connected! A single incorrect switch position may cause errors in multiple inputs.

NOTE: Type II or III 10K ohm thermistors can be selected by changing the menu setting in Advanced > Inputs > Input # > Sensor (see the Configuration section). If a remote space temperature sensor is connected to AI7, space temperature can be configured for onboard, remote, averaging of the two, the lowest reading, or the highest reading.

NOTE: To use a 4–20 current loop input or map analog inputs as binary values, see the Application Guide.

NOTE: Inputs do not support 1K ohm RTDs.

NOTE: For more information on wiring specific applications, see the Applications section. (These applications are the packaged programs selectable from the Advanced > Application menu.)



NOTE:  
Except for IN8, external inputs are configurable for 10K ohm Type II or Type III thermistors in the Advanced > Inputs menu. IN8 should be in the 10K ohm position for the 87K ohm DTS thermistor.

Figure 2 – Pull-Up Switch Resistor Positions

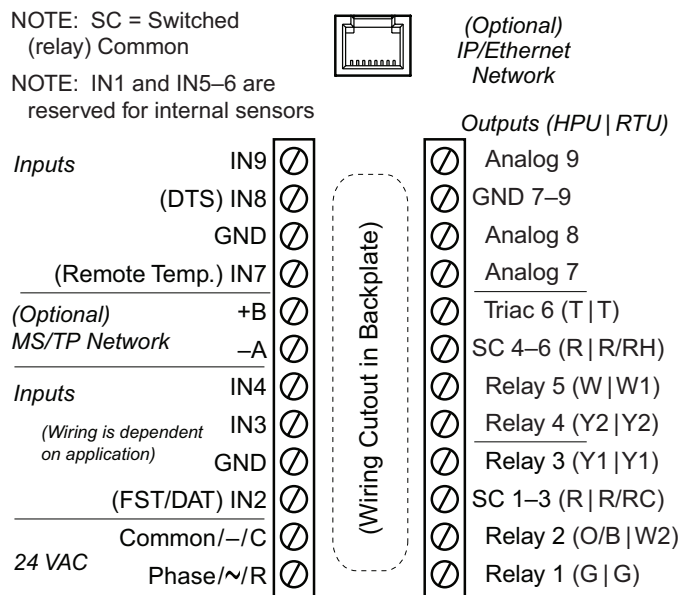


Figure 3 – Terminals and Connections

NOTE: Although typical terminal code letters are shown in this document, check the schematics of your unit for wiring details!

### Output Connections

Connect the device under control between the desired output terminal and the related **SC (Switched Common for relays) or GND (Ground for analog outputs)** terminal. (See **Figure 3**). For the bank of three relays (or two relays and a triac), there is one Switched (relay) Common connection (in place of the GND terminal used with analog outputs). (See **Figure 4**.)

Relays 1–5 are **NO, SPST (Form “A”)**.

**Do not attach a device that draws current exceeding the controllers’s output capacity:**

- Maximum output current for individual ANALOG outputs (7–9) is 20 mA @ 12 VDC (each).
- Max. output current is 1 A for the TRIAC (output 6), which is always only connected to the Copeland compressor solenoid.
- Max. output current is 1 A for individual RELAYS @ 24 VAC/VDC or a total of 1.5 A per bank of 3 relays (outputs 1–3) or bank of 2 relays and 1 triac (outputs 4–6).

**CAUTION**

*Do not mistakenly connect 24 VAC to an analog output ground. This is not the same as a relay’s switched common. See the backplate’s terminal label for the correct terminal.*

**CAUTION**

*For optional networking connections and configuration, see the Operation Guide. To avoid damage from ground loops and other communication issues in networked controllers, correct phasing on MS/TP network and power connections on ANY and ALL of the existing and future networked controllers is critically important.*

**CAUTION**

*Relays are for Class-2 voltages (24 VAC) only. Do not connect line voltage to the relays!*

### Power Connection

The controller requires an external, 24 volt, AC power source. Use a Class-2 transformer to supply power. Connect the transformer’s **neutral** lead to the 24 VAC **Common/~C** terminal and the AC **phase** lead to the 24 VAC **Phase/~R** terminal. (See **Figure 3**.) Power is applied to the controller when the transformer is powered.

Powering only one controller/thermostat from each transformer is recommended. If installing a controller in a system with other controllers/thermostats powered from a single transformer, however, phasing must be correct and the total power drawn from the transformer must not exceed its rating.

### CONFIGURATION

To configure the controller, navigate the menus and change settings by pressing a combination of buttons. Press the **Right** (Menu) button and then the:

- **Enter** button to select and/or exit value editing.
- **Up/Down** button to move among entries (up/ down lines).
- **Left/Right** button to move among value fields (left/ right spaces).
- **Left** button to return to the Home screen.

NOTE: Applications on the next pages are the packaged programs selectable from the Advanced > Application menu.

NOTE: The default application setting is RTU 1H/1C. Be sure sure the application and all options under Additional Setup are configured according to the needs of the particular installation. See Page 5.

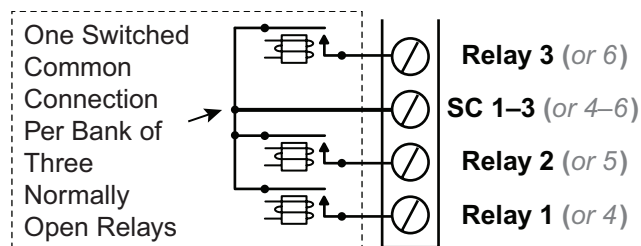


Figure 4 – Switched (Relay) Common and Relays

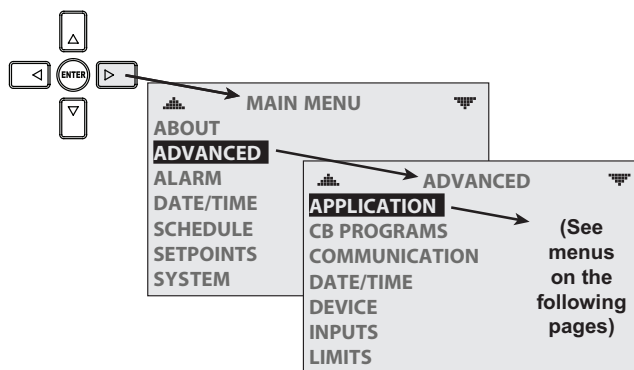
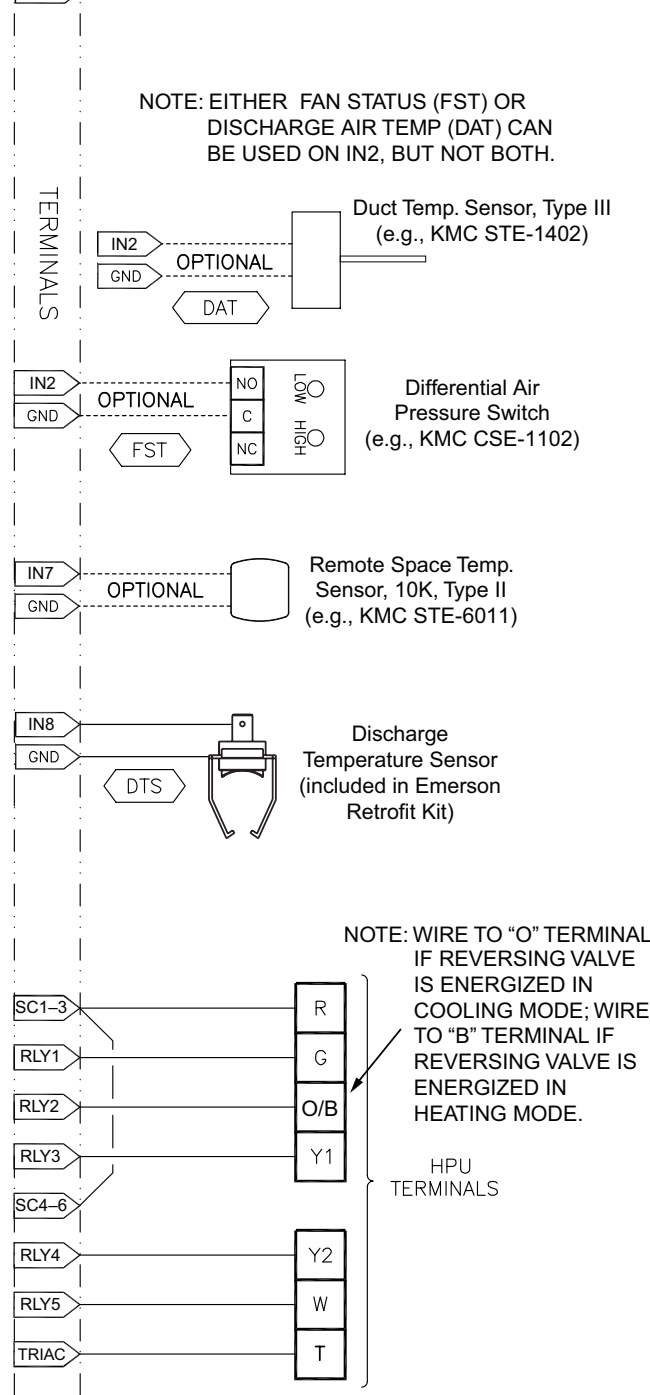
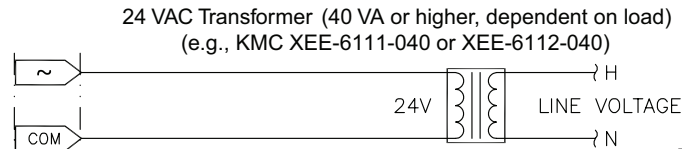


Figure 5 – Configuration Screens

**APPLICATIONS**

**Heat Pump Unit (HPU) – 1 or 2 Compressors with Auxiliary and Emergency Heat**



Input Terminals	HPU Input Connections
IN9	
IN8	Discharge Temperature Sensor (DTS)
IN7	Optional Remote Temperature Sensor*
IN4	
IN3	
GND	Ground
IN2	Optional FST or DAT*

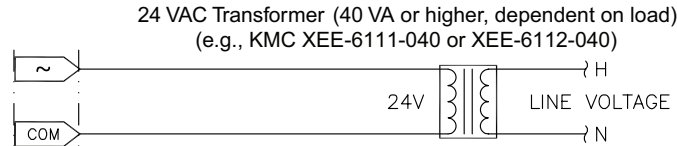
\*Fan Status (FST), Discharge Air Temperature (DAT), and remote temp. sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

Output Terminals	Typical Terminal Codes	HPU Output Connections
Analog 9		
GND		Ground (for analog output terminals 7-9)
Analog 8		
Analog 7		
Triac (6)	T	Compressor 1 Solenoid Valve
SC 4-6	R	24 VAC (for relay/triac terminals 4-6)
Relay 5	W	Emergency Heat (Optional)
Relay 4	Y2	Compressor 2 (Optional)
Relay 3	Y1	Compressor 1
SC 1-3	R	24 VAC (for relay terminals 1-3)
Relay 2	O/B	Reversing Valve (see O/B Note in schematic)
Relay 1	G	Fan

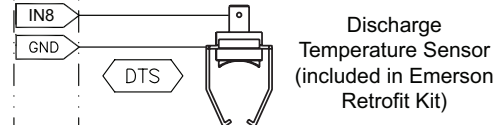
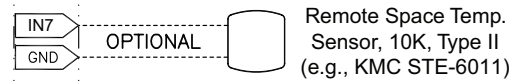
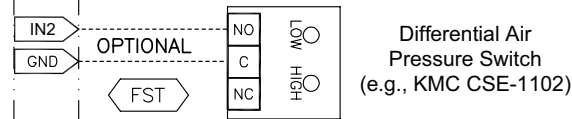
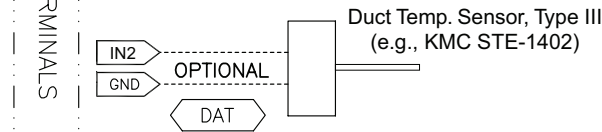
APPLICATION DEGREES SCALE: °F  
APP: HEAT PUMP  
OPT: 1 STAGE  
ADDITIONAL SETUP

ADDITIONAL SETUP  
**AUX HEAT**  
DAMPER  
FAN  
OPTIMUM START SENSORS  
SETBACK LOCKOUT VALVE

Roof Top Unit (RTU) – 1 or 2 Heat and 1 or 2 Cool



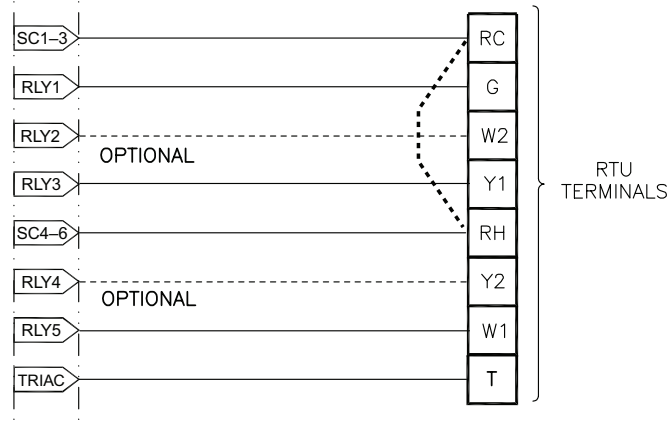
NOTE: EITHER FAN STATUS (FST) OR DISCHARGE AIR TEMP (DAT) CAN BE USED ON IN2, BUT NOT BOTH.



THE **SAME** TRANSFORMER SHOULD BE USED ON THE SC TERMINALS. IF SEPARATE TRANSFORMERS ARE USED, THEY **MUST** BE PROPERLY PHASED.

IF **BOTH** RC AND RH TERMINALS ARE PRESENT: JUMPER RC AND RH TO ENSURE PROPER PHASING. WIRE RC TO SC 1-3 AND RH TO SC 4-6.

IF ONLY ONE "R" TERMINAL IS PRESENT: WIRE BOTH SC 1-3 AND SC 4-6 TO R.



Input Terminals	RTU Input Connections
IN9	
IN8	Discharge Temperature Sensor (DTS)
IN7	Optional Remote Temperature Sensor*
IN4	
IN3	
GND	Ground
IN2	Optional FST or DAT*

\*Fan Status (FST), Discharge Air Temperature (DAT), and remote temp. sensors are optional inputs. Set pull-up resistor switch positions appropriately (see the Input Connections section).

Output Terminals	Typical Terminal Codes	RTU Output Connections (1 or 2 H and 1 or 2 C)
Analog 9		
GND		Ground (for analog output terminals 7-9)
Analog 8		
Analog 7		
Triac (6)	T	Compressor 1 Solenoid Valve
SC 4-6	RH/R	24 VAC (for relay/triac terminals 4-6)
Relay 5	W1	Heat 1
Relay 4	Y2	Cool 2 (Optional)
Relay 3	Y1	Cool 1 (w/ optional economizer)
SC 1-3	RC/R	24 VAC (for relay terminals 1-3)
Relay 2	W2	Heat 2 (Optional)
Relay 1	G	Fan

APPLICATION DEGREES SCALE: °F  
APP: ROOF TOP  
OPT: 1H /1C  
ADDITIONAL SETUP

ADDITIONAL SETUP  
DAMPER  
FAN  
OPTIMUM START SENSORS  
SETBACK LOCKOUT

**MAINTENANCE**

Remove dust as necessary from the holes in the top and bottom. Clean the display with a soft, damp cloth and mild soap.

**ACCESSORIES**

- CSE-1102      Differential air pressure switch
- HMO-10000W    Horizontal or 4 x 4 handy box wall mounting mounting plate, in white
- SP-001        Flat blade and hex end screwdriver for cover hex screws
- STE-1402      Duct temperature sensor, 10K, Type III
- STE-6011      Space temperature sensor, 10K, Type II
- XEE-6111-040   Transformer, 120-to-24 VAC, 40 VA, single-hub
- XEE-6112-040   Transformer, 120-to-24 VAC, 40 VA, dual-hub

For information on ordering accessories, please visit [EmersonClimate.com/DigitalRetrofitKit](http://EmersonClimate.com/DigitalRetrofitKit).

**WARRANTY**

Emerson Climate Technologies, Inc. warrants its controller to be free from defects in materials and workmanship under normal use for a period of one year from the date of purchase or twenty months from manufacture, whichever comes first. During this period, Emerson will replace any defective controller without charge.

For more information visit [www.EmersonClimate.com](http://www.EmersonClimate.com) or contact Emerson Climate Technologies, Inc. at 1-888-EMR-9950.

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