TP–PRH–A, TP–NRH–A Performance™ Series Edge® Thermidistat™ Control

Carrier®

Turn to the Experts.℠

Installation Instructions

A07049

Programmable Control

A07048

Non–Programmable Control

Designed and Assembled in the USA.

NOTE: Read the entire instruction manual before starting the installation.

US patents: US7287709 B2, US20080147242 A1, USD582800 SI, US20060165149 A1, US6956463 B2.

TABLE OF CONTENTS

PAGE

SAFETY CONSIDERATIONS 2
INTRODUCTION 3
INSTALLATION CONSIDERATIONS 4
INSTALLATION 8
SYSTEM START−UP AND CHECKOUT 44
OPERATIONAL INFORMATION 55
TROUBLESHOOTING 59
WIRING DIAGRAMS 63
THERMIDISTAT CONTROL CONFIGURATION RECORD 84

SAFETY CONSIDERATIONS

Read and follow manufacturer instructions carefully. Follow all local electrical codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage Thermidistat Control.

Recognize safety information. This is the safety−alert symbol ⚠ . When you see this symbol on the equipment and in the instruction manual, be alert to the potential for personal injury.

Understand the signal words **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety−alert symbol. **DANGER** identifies the most serious hazards which will result in severe personal injury or death. **WARNING** signifies a hazard which could result in personal injury or death. **CAUTION** is used to identify unsafe practices which may result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

INTRODUCTION

Carrier's 7−day, 5/2−day, 1−day programmable and non−programmable Performance Series Thermidistat Control is a wall−mounted, low−voltage control which combines temperature and humidity control in either a single unit or a two−piece unit. In two−piece configuration, the relays are located near the equipment and a two−wire connection is used between the Display Module and the Equipment Control Module. Single−piece installation requires more wiring and results in a higher profile. The Edge® Thermidistat has no need for batteries to store user−configured settings in memory. During power loss its internal memory saves settings for unlimited time, and the clock continues to run for at least 24 hours. An extension of Carrier's proven line of thermostats; it provides separate setpoints for heating and cooling in addition to humidification and dehumidification.

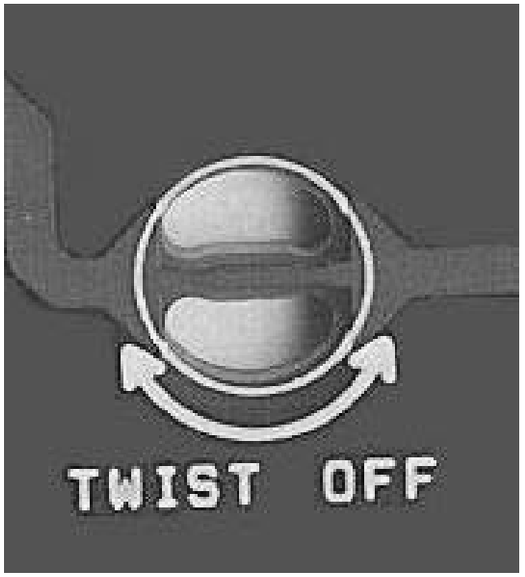
In the Edge Thermidistat Control programmable configuration, different heating and cooling setpoints and times are programmable for 4 periods per day or 2 periods per day. Programming can be done for 7 days per week, 5/2 days per week, or 1 day. The programmable Thermidistat Control can also be user configured as a non−programmable Thermidistat Control. When operating as non−programmable, the Edge Thermidistat Control will still have both temperature and humidity control.

The non−programmable Thermidistat Control features Touch 'N' Go™ settings for quick and easy temperature change without complicated programming schedules. The non−programmable Edge Thermidistat Control will still have both temperature and humidity control. And, its Touch 'N' Go technology enables the user to switch between three different user−configurable settings through intuitive buttons located just below the display.

INSTALLATION CONSIDERATIONS

Power

This control is powered by 24VAC only. It requires 24VAC (Rh and/or Rc and C terminals) of the low−voltage transformer to be connected to it for proper operation. It will not operate without these 2 connections. Rh and Rc are connected via PCB breakout jumper. See Fig. 1. For applications using two 24VAC transformers, one in the indoor unit and one in the outdoor unit, connect the common from each to the C terminal. Connect R from the indoor unit to the Rh terminal. Connect R from the outdoor unit to the Rc terminal. Then, break jumper on the circuit board. The W and HUM signals are taken from the Rh power and the G signal is taken from the Rc power. If Thermidistat Control has been installed in a two−transformer application that is later changed to a single−transformer installation, installer must install a field supplied jumper between Rc and Rh. Depending on the installation, up to 14 wires may be required. Installation as two−piece unit is recommended. Only 2 wires are required for connection between Display Module and Equipment Control Module. These two wires (V+ and Vg) do not provide ordinary 24VAC. They carry a combination of power and communications data that is unique to these products.



A07052

Fig. 1 – PCB Breakout Jumper

Models

There are programmable and non−programmable models for all applications. They can be configured for AC or HP, 1−or 2−speed compressor, and for Hybrid Heat™ installations, allowing it to be used in place of all Carrier thermostats. Programmable Thermidistat Controls may be configured as non−programmable if user desires.

Humidify Equipment and Connections

The humidify output connects directly to 24VAC operated humidifiers. An isolation relay may be required when using powered humidifiers. No other connection or interlock is required. Any of several installer−selectable operating modes are available.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

DO NOT connect furnace HUM terminal directly to Thermidistat Control HUM terminal. This will bypass furnace safety controls. See Low Voltage Wiring Diagrams and notes for proper connection.

Dehumidify Equipment and Connections

The dry contact output connects to the dehumidify input on variable−speed furnaces and fan coils. Additional dehumidification is done by controlling the compressor. A variety of operating modes are available. The dry contact must be configured for dehumidification in setup Option 19. See Wiring Diagrams for more information.

Outdoor Temperature Sensor (TSTATCCSEN01−B)

Outdoor air temperature sensor is included in the box with the Thermidistat Control. Optimum performance is obtained when an outdoor temperature sensor is used with the Thermidistat Control. Plan installation so that 2 wires can be run from Equipment Control Module to an outdoor location, preferably on the north side of the house or refer to Installation Instructions included with the outdoor temperature sensor for simplified connection. Sensor can be mounted to outdoor unit and existing control wires may be used for its connection. Details are provided in sensor instructions.

Remote Indoor Temperature Sensor

A remote temperature sensor may be used with the programmable model, where it is desirable to install the Thermidistat Control in a limited access location while measuring the temperature in the living space. The remote room sensor may be used as a stand alone or average with local sensor.

Two−Piece Thermidistat Control Configuration

The Performance Series Thermidistat Control can be installed in one of two configurations. The control may be installed as a single−piece Thermidistat Control or it may be split into two pieces and mounted in separate locations. As a single−piece unit, all required wiring must be brought to the Equipment Control Module for connection to the terminal strip. In two−piece configuration, the Display Module can be mounted in the living space while the Equipment Control Module may be mounted near the indoor furnace or fan coil. Connection from the Display Module to the Equipment Control Module requires only two wires. All other control wires are connected to the Equipment Control Module from the HVAC equipment. This configuration results in a slimmer display and locates the Equipment Control Module containing the switching relays away from the main living space where relay clicking will not be heard.

The model numbers on the Display Module and the Equipment Control Module (ECM) must match or unpredictable results may occur.

Two−wire pigtail replacement part number is TX−2WR05.

Wiring

Wire length should be no more than 250 ft (76 m). Use 22 AWG or larger for normal wiring applications. Continuous wire lengths over 100 ft (30.5 m) should use 20 AWG or larger.

INSTALLATION

Carton contains the following components. See Fig. 2 for TP−PRH−A or Fig. 3 for TP−NRH−A.

A07685

Fig. 2 − TP−PRH−A Carton Contents

1. Display Module
2. Stand−off for Equipment Control Module
3. Outside Air Temperature Sensor, screws and pigtail
4. Equipment Control Module

A07686

Fig. 3 – TP–NRH–A Carton Contents

1. Display Module
2. Stand–off for Equipment Control Module
3. Outside Air Temperature Sensor, screws and pigtail
4. Equipment Control Module

Thermidistat Control Location

Thermidistat Control should be mounted:

- Approximately 5 ft (1.5m) from floor.
- Close to or in a frequently used room, preferably on an inside partitioning wall.
- On a section of wall without pipes or duct work.

Thermidistat Control should NOT be mounted:

- Close to a window, on an outside wall, or next to a door leading to the outside.

- Exposed to direct light or heat from a lamp, sun, fireplace, or other temperature−radiating objects which could cause a false reading.
- Close to or in direct airflow from supply registers and return−air registers.
- In areas with poor air circulation, such as behind a door or in an alcove.

Installer should determine whether control will be installed as single−piece or two−piece. In single−piece configuration, as many as 14 wires may need to run to wall mounting location for connection to the control. In two−piece configuration, the Display Module and Equipment Control Module are connected by two wires.

Install Thermidistat Control

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing Thermidistat Control, turn off all power to equipment. There may be more than 1 power disconnect.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Improper wiring or installation may damage Thermidistat Control. Check to make sure wiring is correct before proceeding with installation or turning on power.

1. Turn off all power to equipment.
2. If an existing Thermidistat Control or thermostat is being replaced:
   a. Remove existing control from wall.
   b. Disconnect wires from existing thermostat, 1 at a time.
   c. As each wire is disconnected, record wire color and terminal marking.
   d. New or additional wires may be needed to accommodate added humidity outputs.
   e. Discard or recycle old control.

⚠ CAUTION

ENVIRONMENTAL HAZARD

Failure to follow this caution may result in environmental damage.

Mercury is a hazardous waste. Federal regulations require that Mercury be disposed of properly.

Two−Piece Installation

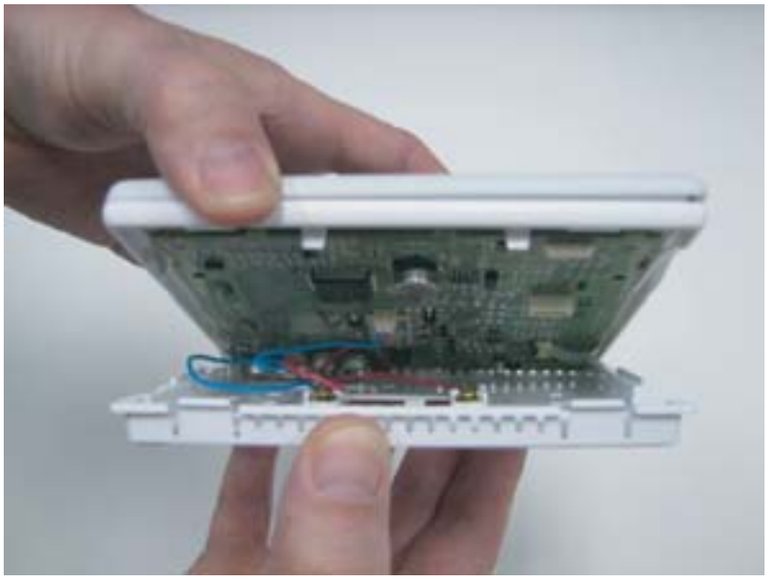
The following steps should be followed for the installation of the two−piece configuration.

NOTE: The 2−wire pigtail is not intended to support the weight of the Display Module. Do not hang the Display Module from the Equipment Control Module screw terminals.

1. Remove mounting plate from back of Display Module by pressing the two tabs on the bottom edge and pulling away. See Fig. 4 and 5.

A07225

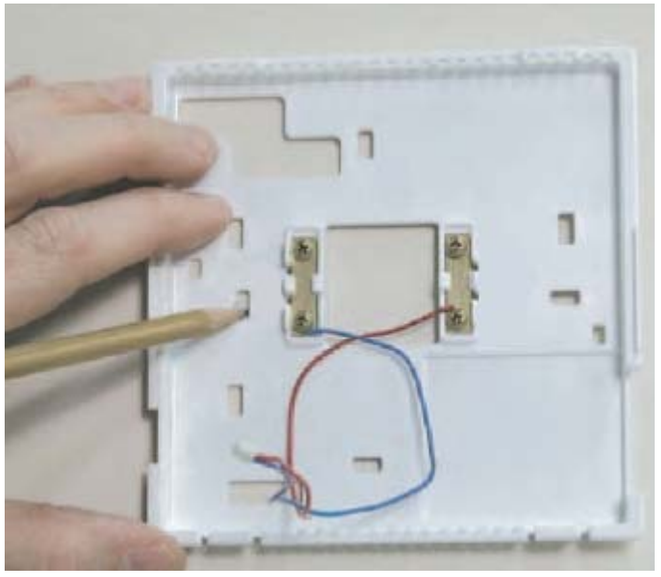
Fig. 4 – Press Tabs to Remove Backplate



A07226

Fig. 5 – Take Apart

2. Route wires through large hole in mounting base. Level mounting base against wall (for aesthetic value only—Display Module need not be leveled for proper operation) and mark wall through 4 mounting holes. To avoid unintended bending of wall plate plastic, use all 4 screws and anchors. See Fig. 6.

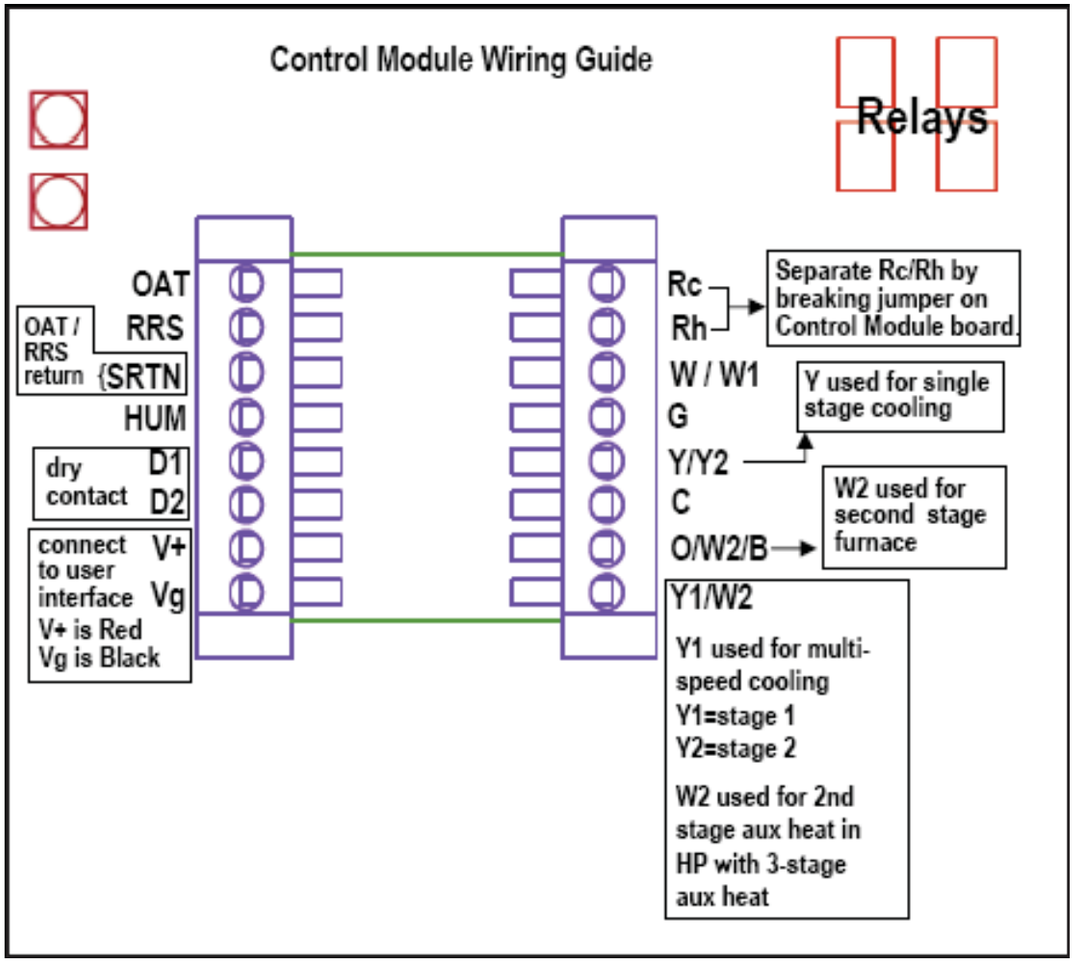


A07165

Fig. 6 – Backplate Mounting

3. Drill four 3/16–in. mounting holes in wall where marked. Thermidistat Control may be mounted to a standard junction box, if desired. Hole pattern on Thermidistat Control mounting base matches junction box mounting holes.
4. Secure rear plastic mounting base to wall with 4 screws and anchors provided. To avoid unintended bending of wall plate plastic, use all 4 screws and anchors. Make sure all wires extend through hole in mounting base.
5. Adjust length and routing of each wire to reach proper connector block and terminal on mounting base with 1/4–in. (6 mm) extra wire.

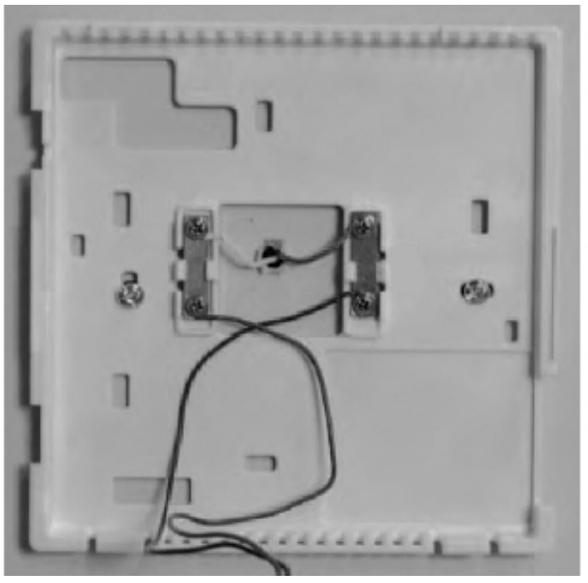
6. Match and connect equipment wires to proper terminals of each connector block, being careful not to over tighten the screws. Correct polarity must be observed when connecting the two wires from the Equipment Control Module to the Thermidistat Control mounting base. If wires are connected incorrectly, the Display Module will not operate. See Fig. 7, 8 and 9.



A08072

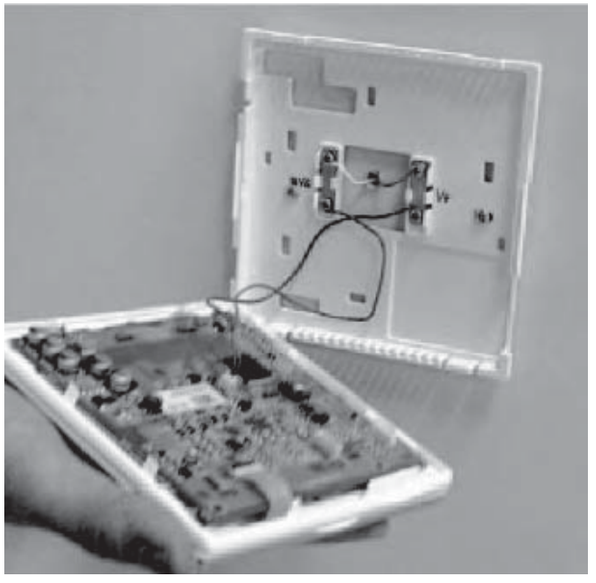
Fig. 7 – Control Module Wiring Guide

- Red is V+
- Black is Vg



A07166

Fig. 8 – Secure Wires to Terminal Strip



A07167

Fig. 9 – Connect Pigtail Wires to Display Module

NOTE: The 2–wire pigtail is not intended to support the weight of the Display Module. Do not hang the Display Module from the Equipment Control Module screw terminals.

- Red of the pigtail is V+
- Black of the pigtail is Vg

7. Push any excess wire into wall and against mounting base. Seal hole in wall to prevent air leaks. Leaks can affect operation and cause incorrect temperature and/or humidity measurement.
8. Make sure to attach 2–wire pigtail to Display Module mounting base. It is packed loose in the box from the factory. Then attach 2–wire pigtail to the back of the Display Module via 2 pin, keyed connector.
9. Reattach Display Module body to mounting base by first setting on at top of mounting base and then push bottom corners of Display Module to snap into place. See Fig. 10.

A07168

Fig. 10 – Attach Display to Backplate

10. Find suitable indoor mounting location for Equipment Control Module, either near or on equipment. See Fig. 11.

IMPORTANT NOTE: Equipment Control Module should not be mounted to duct work or below any other controls or equipment (i.e. humidistat, humidifier, etc.).

A07217

Fig. 11 – Equipment Control Module on Equipment

11. Route wires through rear of Equipment Control Module using either a clearance hole or supplied standoff. See Fig. 12.

A07227

Fig. 12 – Standoff

NOTE: Standoffs are provided as an aid when installing Equipment Control Module on inside equipment or a solid wall.

12. Match and connect equipment wires to proper terminals of each connector block being careful not to over tighten the screws. Correct polarity must be observed when connecting the two wires from the Equipment Control Module to the Thermidistat Control mounting base. If wires are connected incorrectly, the Display Module will not operate. See Fig. 7, 8 and 9.
13. Snap cover over top of Equipment Control Module. See Fig. 13.

A07218

Fig. 13 – Cover on Equipment Control Module

14. Turn on power to equipment. On power up, all display segments will light for 5 sec. For the next 5 sec a 2−digit code appears on large display which identifies Thermidistat Control configuration. Refer to Option 33.
    a. AC — 1−stage air conditioner with furnace or fan coil
    b. HP — 1−stage heat pump with fan coil
    c. A2 — 2−stage air conditioner with furnace or fan coil
    d. H2 — 2−stage heat pump with fan coil
    e. hh — Hybrid Heat system with 1−stage heat pump
    f. h2 — Hybrid Heat system with 2−stage heat pump
    g. H — heating only system
    h. C — cooling only system

Single−Piece Installation

The following steps should be followed for the installation of the single−piece configuration.

1. Remove cover from Equipment Control Module by pressing the two tabs on the bottom edge and pulling away. Route wires through large hole in Equipment Control Module. Level Equipment Control Module against wall (for aesthetic value only − Equipment Control Module need not be leveled for proper operation) and mark wall through 4 mounting holes.
2. Drill two 3/16−in. mounting holes in wall where marked. Thermidistat Control may be mounted to a standard junction box if desired. Hole pattern on Equipment Control Module matches junction box mounting holes.
3. Secure rear plastic Equipment Control Module to wall with 4 screws and anchors provided. To avoid unintended bending of wall plate plastic, use all 4 screws and anchors. Make sure all wires extend through hole in Equipment Control Module.
4. Adjust length and routing of each wire to reach proper connector block and terminal on Equipment Control Module with 1/4−in. (6 mm) extra length. See Fig. 14.

A07219

Fig. 14 – Equipment Control Module

5. Match and connect equipment wires to proper terminals of each connector block.
6. Push any excess wire into wall and against Equipment Control Module. Seal hole in wall to prevent air leaks. Leaks can affect operation and cause incorrect temperature and/or humidity measurement.
7. Attach 2–wire pigtail to Equipment Control Module terminal block (terminals V+ and Vg). Attach 2–wire pigtail to the back of the Display Module via 2 pin, keyed connector.
8. Reattach Display Module body to Equipment Control Module by first setting on at top and then push bottom corners to snap into place. See Fig. 15.

A07220

Fig. 15 – Reattach Display Module

9. Turn on power to equipment. On power up, all display segments will light for 5 sec. For the next 5 sec a 2−digit code appears on large display which identifies Thermidistat Control configuration. Refer to Option 33.
   a. AC — 1−stage air conditioner with furnace or fan coil
   b. HP — 1−stage heat pump with fan coil
   c. A2 — 2−stage air conditioner with furnace or fan coil
   d. H2 — 2−stage heat pump with fan coil
   e. hh — Hybrid Heat system with 1−stage heat pump
   f. h2 — Hybrid Heat system with 2−stage heat pump
   g. H — heating only system
   h. C — cooling only system

Set Thermidistat Control Configuration

Configuration options enable the installer to configure the Thermidistat Control for a particular installation. Most are not presented to the homeowner and therefore must be properly set by the installer. (Only those marked with an asterisk * below are available to the homeowner.) The homeowner configurations are described in the owner's manual. A special procedure allows entry into the configuration mode. Selections can be made while in configuration mode. Description of each selection and how to use the configuration mode follows.

CONFIGURATION OPTIONS – SUMMARY

Option 01 — Equipment Type

Option 02 — Clean Filter Timer Adjustment

Option 03* — Fahrenheit/Centigrade Selection

Option 04 — Fan (G) on with W/W1 Selection

Option 05 — Room Air Temperature Sensing (programmable models only)

Option 06 — Cooling Lockout Below 55°F/13°C Selection (only available if outdoor air sensor is present)

Option 07 — Zoning

Option 08 — Auxiliary Heat Lockout Temperature Setting (only available when heat pump is used and when outdoor air temperature sensor is present)

Option 09 — Heat Pump Lockout Temperature Balance Point (only available when outdoor air temperature sensor is present)

Option 10 — Reversing Valve

Option 11 — Adjustable Setpoint Deadband (not available on heat only and cool only systems)

Option 12 — Smart Recovery (programmable models only)

Option 13 — Room Temperature Offset Adjustment

Option 14 — Humidity Offset Adjustment

Option 15 — Enable Auto Mode

Option 16 — Cycles Per Hour

Option 17 — Time Between Stages

Option 18* — Backlight Configuration

Option 19 — Dry Contact

Option 20 — Outdoor Air Temperature Offset Adjustment

Option 21* — Keypad Lockout

Option 22 — High Cool Latch Temperature

Option 23 — High Heat Latch Temperature

Option 24* — Programmable/Non−Programmable (programmable models only)

Option 25* — Number of Programmable Periods per Day (programmable models only)

Option 26 — Minimum Cooling Setpoint

Option 27 — Maximum heating Setpoint

Option 28 — UV Light Reminder

Option 29 — Humidifier Pad Reminder

Option 30* — Programmable Fan (programmable models only)

Option 31* — Daylight Savings Time Configuration (programmable models only)

Option 32 — Furnace Heat Staging

Option 33 — Single or Two−Piece Installation

Option 34 — Hybrid Heat Furnace Latch

Option 40 — Fan Humidify

Option 41 — Variable Speed Blower

Option 42 — Variable Speed Super Dehumidification

Option 43 — Intelligent Heat Staging

Option 44 — Super Comfort Heat

Option 99 — Reset to Factory Defaults

TO ENTER CONFIGURATION MODE

Press and hold FAN button for approximately 10 sec. The Display Module is now in configuration mode. It will automatically exit this mode if no button is pressed for 3 minutes. Pressing the DONE button will exit configuration mode immediately.

WHILE IN CONFIGURATION MODE

The option number is displayed in the heat setpoint location and the configuration setting is displayed in the cool setpoint location. On the TP−PRH−A (programmable) model, a box will surround the option number. The mode button is used to move the box between the two displayed values. The soft keys below the listed values may also be used to move the box between selected values. The value inside the box is changed by using the UP/DOWN buttons. On the TP−NRH−A (non−programmable) model, one of the values will be flashing. The mode button is used to change which value is flashing or the Home and Sleep buttons may also be used to select which value to flash. The value that is

flashing is changed by using the UP/DOWN buttons. All changes made are saved at the time of selection and will be saved in the event of the 3 minute time−out or when installer exits from configuration menu.

Configuration Options —Selection

Option 01 — Equipment Type

Range: H2, A2, HP, AC, hh, h2, H, C

H2 — operates a two−speed heat pump with a fan coil

HP — operates a single−speed heat pump with a fan coil

A2 — operates a two−speed AC with a fan coil or furnace

AC — operates a single−speed AC with a fan coil or furnace

hh — operates a single−speed heat pump with a furnace

h2 — operates a two−speed heat pump with a furnace

H — operates a heat−only system. Furnace or fan coil only; no outdoor unit.

C — operates a cool only−system. Outdoor AC unit with an indoor fan coil with no strip heaters.

Default is H2.

Option 02 — Clean Filter Timer

Select hours of blower operation (heating, cooling, or fan) before CHECK FILTER icon is displayed. With OF selected, icon will never come on, disabling this feature. Time selection can range from 800 to 7200 hr by selecting numbers 1 through 9. (Time is 800 X number selected.) Default is 4 (3200 hr).

Recommended selections are disposable filter−800 to 2400 hr, media filter−2400 to 3200 hr, or electronic air cleaner−1600 to 2400 hr of blower operation. For higher efficiency filter, please consult filter's Installation Instruction for details.

Option 03 — Fahrenheit/Centigrade

Select between Fahrenheit (F) and Centigrade (C) operation. Factory default is Fahrenheit (F).

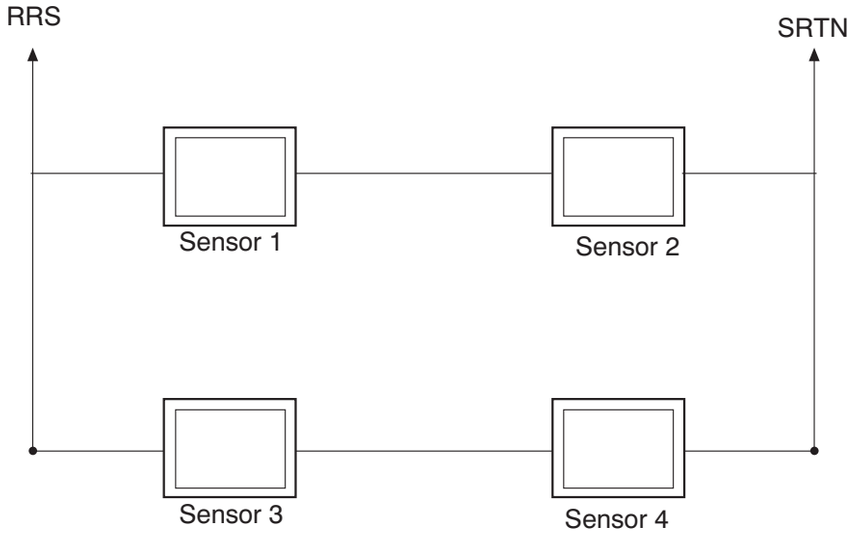
Option 04 — Fan (G) On With W/W1

This selection determines whether fan (G) output is to be On or OFF when any W/W1 (furnace or strip heat) output is On. Most furnaces and fan coils manage their own blowers and do not require separate G signal. For these applications, select OFF. Some auxiliary heaters require separate G signal to turn on blower. In this case, select On.

Default is OF (off).

Option 05 — Room Air Temperature Sensing (programmable models only)

The remote room sensor may be installed as a single sensor or multiple sensors may be installed for further averaging functionality. See Fig. 16



A09130

Fig. 16 – Remote Room Sensor – Parallel Wiring

This selection determines which sensor the control will use for measuring room air temperature. Room air temperature can be sensed in one of three ways; the local sensor (L) located on the Display Module, the remote room air sensor (r), or the average of local and remote sensors (Lr). Settings are L, r, Lr.

Default is L.

Option 06 — Cooling Lockout Below 55°F/13°C

This selection disables cooling when outdoor temperature is below 55°F/13°C. It requires an outdoor temperature sensor. Setting is not available if valid outdoor sensor is not connected. Set to OF (off) to allow cooling below 55°F/13°C. Set to On to prevent cooling below 55°F/13°C.

Factory default is OF (off).

Option 07 — Zoning

This selection should be set to On when the Thermidistat Control is to be used as part of a zoning system. It is assumed that the zoning equipment will take care of time guard and cycle timers. The minimum On time is still controlled by the Thermidistat Control.

Default is OF (off).

Option 08 — Auxiliary Heat Lockout Temperature

This selection is available on heat pump systems with a valid outdoor temperature sensor connected. Available settings are: Off, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55.

OF (off) – function is disabled. Auxiliary heat is allowed to operate whenever sufficient demand for heat is available.

5 to 55°F (–15 to 13°C) – Outdoor temperature above which the auxiliary heat is not allowed to operate (unless MODE is set to Emergency Heat). If room

temperature falls below 45°F (7°C), the auxiliary heat will be allowed to turn on and will continue to run until demand is satisfied.

Default is OF (off).

Option 09 — Heat Pump Lockout Temperature Balance Point (only available when heat pump is used and when outdoor air temperature sensor is present)

This selection is only available on Hybrid Heat systems. A Hybrid Heat system is selected via the Option 1 Equipment Type configuration. Configurations settings are: OF (off), 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55.

OF (off) — the heating cycle will always start with heat pump heating.

5 to 55°F (–15 to 13°C) — the outdoor temperature below which heat pump operation is not allowed.

When emergency heat mode is selected, only auxiliary heat will operate.

Default is OF (off).

Option 10 — Reversing Valve

This selection is only available on heat pump systems. “O” terminal can be configured to be energized in either heating mode or in cooling mode, depending on heat pump operation. “O” is used to describe a heat pump system that energizes its reversing valve in cooling. “B” is used to describe a heat pump system that energized its reversing valve in heating.

H — Reversing valve output (O/W2/B) is energized when HEAT mode is selected.

C — Reversing valve output (O/W2/B) is energized when COOL mode is selected.

Default is C.

Option 11 — Deadband Setting Between Heat & Cool

This option is not available on Heat Only and Cool Only systems. The selection allows the installer to choose how much differential exists between the heating and cooling setpoints. Allowable selections are 1 thru 6.

Default is 2.

Option 12 — Smart Recovery

Smart Recovery OF (off) means setpoints change precisely at setback recovery time. Thirty, 60, or 90 selects the number of minutes recovery starts before programmed recovery time. Recovery takes place smoothly during the selected recovery time, ending at the recovery time and temperature which is programmed. Not available with non−programmable Thermidistat Controls or when Thermidistat Control is configured as non−programmable.

Default is 90.

Option 13 — Room Air Temperature Offset Adjust

The number of degrees to be added to the displayed temperature to calibrate or deliberately miscalibrate the measured room temperature (−5 to +5°).

Default is 0.

Option 14 — Humidity Display Offset Adjust

The percentage to be added to the displayed humidity to calibrate or deliberately miscalibrate the measured room humidity (−9% to +9% RH).

Default is 0.

Option 15 — Enable Auto Mode

This selection is not available if the Thermidistat Control is configured as Heat Only or Cool Only in Option 1. This allows the homeowner to select auto changeover mode in addition to heat and cool. This allows the Thermidistat

Control to automatically change between heating mode and cooling mode when sufficient demand for heating or cooling exists.

On — Auto mode is available.

OF — Auto mode is not available.

Default is On.

Option 16 — Maximum Cycles Per Hour

This selection limits the number of cycles per hour that the Thermidistat Control allows the system to operate. Selections are 2, 4, 6.

2 — The heating and cooling outputs will be energized no more than 2 times per hour. When an output is energized, it will not be energized again for 30 minutes.

4 — The heating and cooling outputs will be energized no more than 4 times per hour. When an output is energized, it will not be energized again for 15 minutes.

6 — The heating and cooling outputs will be energized no more than 6 times per hour. When an output is energized, it will not be energized again for 10 minutes.

Default is 4.

Option 17 — Time Between Equipment Stages

This selection is only available for heat pump systems. This determines the minimum number of minutes of equipment operation on the highest compressor stage before allowing the transition to auxiliary heat. Available selections are 10, 15, 20, and 25. The time between stages of any individual piece of equipment, such as low speed and high speed compressor or fan coil stages, will be fixed at 10 minutes.

Default is 15.

Option 18 — Backlight Configuration

When OF (off), the backlight will be lit for 10 seconds after a button is pressed. After 10 seconds of no button presses, the backlight turns off. When On, the backlight will normally be on and dim in appearance. The backlight brightness becomes brighter when a button is pressed. After 10 seconds of no button presses, the backlight will return to the dimmer level until another button press occurs. The range of brightness is 1 through 5 with 5 being full brightness.

Default is 3.

Option 19 — Dry Contact Configuration (programmable models only)

There are 3 available selections, OF, 1 and 2.

OF — The dry contact is always de−energized.

1 — The dry contact will be energized for the specified number of minutes per hour. This selection is programmable by period. When this selection is changed from OF to 1, the period icons are shown and the minute segments of the clock display are shown. The triangle icon next to the WAKE period will be on and a value between 0 and 60 will be shown in the minutes display. See Operational Information and Wiring Diagrams for further explanation of dry contact configuration and use. To change the period or minutes, press the soft key below the period or minutes and then use the UP/DOWN buttons to change to the desired value.

2 — The dry contact will operate as a DH relay. This relay is reverse logic. When the humidity level is above the dehumidify setpoint, the dry contact D1−D2 will be opened. When the humidity level is below the dehumidify setpoint, D1−D2 will be closed. There is a +/− 2% hysteresis around the dehumidify setpoint to prevent rapid on/off cycling of the DH output. When configured for dehumidification, the Rc terminal must be connected to one of the dry contact terminals. This provides power to energize the dehumidify terminal on the

cooling equipment when the dry contact is closed. See Wiring Diagrams for more information.

Default is OF (off).

Option 19 — Dry Contact Configuration (non−programmable models only)

OF — The dry contact is always de−energized.

ON — The dry contact will operate as a DH relay. This relay is reverse logic. When the humidity level is above the dehumidify setpoint, the dry contact D1−D2 will be opened. When the humidity level is below the dehumidify setpoint, D1−D2 will be closed. There is a +/− 2% hysteresis around the dehumidify setpoint to prevent rapid on/off cycling of the DH output. When configured for dehumidification, the Rc terminal must be connected to one of the dry contact terminals. This provides power to energize the dehumidify terminal on the cooling equipment when the dry contact is closed. See Wiring Diagrams for more information.

Default is OF (off).

Option 20 — Outdoor Air Temperature Offset Adjustment

This selection allows the calibration, or deliberate miscalibration of the outdoor air temperature sensor reading. The selection ranges from −5 to +5°.

Default is 0.

Option 21 — Keypad Lockout (programmable models only)

This selection allows the installer to limit access to the keypad. Selections are OF (off), 1, 2, 3. These options are independent of Option 24, which allows the programmable model to be configured as a non−programmable thermostat.

OF (off) — The user has full access to the keypad.

1 — The user has access to change the setpoints, time of day and calendar.

2 — The user has access to change the setpoints only.

3 — The entire keypad is locked. When a button is pressed, the backlight will turn on but none of the operating parameters will be changed.

When the keypad lock selection is turned on, the padlock icon will be displayed. To unlock the keypad, press and hold the UP/DOWN buttons simultaneously for five seconds. When the keypad is unlocked, the padlock icon will turn off. The keypad will remain unlocked for two minutes after the last button press. After two minutes with no button presses, the keypad will lock again. The keypad will not lock in the software configuration mode or in the installer test mode.

Default is OF (off).

Option 21 — Keypad Lockout (non−programmable models only)

This selection allows the installer to limit access to the keypad. Selections are OF (off), 1, 2.

OF (off) — The user has full access to the keypad.

1 — The user has access to modify Home, Sleep, Away, and UP/DOWN setpoints.

2 — The entire keypad is locked. When a button is pressed, the backlight will turn on but none of the operating parameters will be changed.

When the keypad lock selection is turned on, the padlock icon will be displayed. To unlock the keypad, press and hold the UP/DOWN buttons simultaneously for five seconds. When the keypad is unlocked, the padlock icon will turn off. The keypad will remain unlocked for two minutes after the last button press. After two minutes with no button presses, the keypad will lock again. The keypad will not lock in the software configuration mode or in the installer test mode.

Default is OF (off).

Option 22 — High Cool Latch Temperature (only available if outdoor sensor is present)

An outdoor sensor is required for high cool latch feature.

This selection is only available when Option 1 is set to H2, A2, or h2 and when Option 7 (zoning) is set to OF (off). Configuration settings are OF (off), 80, 85, 90, 95, 100, 105, 110, On.

OF (off) — Cooling always starts in low stage (Y1) and stages up to high stage (Y1 and Y/Y2) when demand is sufficient and staging timer constraints have been satisfied.

80 to 110°F (27 to 43°C) — Outdoor temperature above which both first and second stages of the compressor are energized to satisfy all cooling demands. When a cycle starts under a high cool latch, it will finish the cooling cycle on high stage. If the cooling equipment is energized to satisfy a dehumidify demand only (no cooling demand), the latch will not be applied.

On — The Y1 and Y/Y2 outputs are simultaneously energized to satisfy all cooling demands.

Default is OF (off).

Option 23 — High Heat Latch Temperature (only available if outdoor sensor is present)

This selection is only available when Option 1 is set to H2, or h2 and Option 7 (zoning) is set to OF (off). Configuration settings are OF (off), 20, 25, 30, 35, 40, 45, 50, On.

OF (off) —Heating always starts in low stage (Y1) and stages up to high stage (Y1 and Y/Y2) when demand is sufficient and staging timer constraints have been satisfied.

20 to 50°F (−7 to 10°C) — Outdoor temperature below which both first and second stages of the compressor are energized to satisfy all heating demands. When a cycle starts under a high heat latch, it will finish the heating cycle on high stage.

On — The Y1 and Y/Y2 outputs are simultaneously energized to satisfy all heating demands.

Default is OF (off).

Option 24 — Programmable/Non−Programmable (programmable models only)

This selection allows the installer to configure the Thermidistat Control as either programmable or non−programmable. Selections are P, nP.

Default is P.

Option 25 — Number of Programmable Periods (programmable models only)

This selection allows the installer to configure the Thermidistat Control for two or four periods per day. Two periods is a common commercial application and four periods is more common for residential. This selection is not available if Option 24 has been set to nP to configure the Thermidistat Control for non−programmable operation.

2 — Periods DAY and SLEEP are available

4 — Periods WAKE, DAY, EVE, and SLEEP are available.

Default is 4.

Option 26 — Minimum Cooling Setpoint

This selection allows the installer to configure the minimum cooling setpoint that the user is allowed to set. The range is based on the value of the adjustable

deadband Option 11, such that the minimum of the range is 50°F/10°C plus the adjustable deadband and the maximum is 90°F/32°C.

Default is 52°F/11°C (based on the adjustable deadband default = 2).

Option 27 — Maximum Heating Setpoint

This selection allows the installer to configure the maximum heating setpoint. The range is based on the adjustable deadband value Option 11, such that the minimum of the range is 50°F/10°C and the maximum is 90°F/32°C minus the deadband.

Default is 88°F/31°C (based on the adjustable deadband default = 2).

Option 28 — UV Light Reminder

This selection allows the installer to select the number of months after which the UV Light icon will be displayed to indicate to the homeowner that it is time to call the dealer to have the UV Lights replaced. Selections available are OF (off), 6, 12, 18, 24, 30, 36, 42, 48.

OF (off) — The UV Light reminder is turned off and will never be displayed.

6–48 — The number of months after which the UV Light reminder will be displayed, “CHECK UV LIGHT”.

Default is OF (off).

Option 29 — Humidifier Pad Reminder

This selects the number of months after which the Humidifier Pad Reminder icon will be displayed. This is not based on run time.

OF (off) — The Humidifier Pad Reminder is disabled and will never be displayed.

1–24 — The number of months after which the Humidifier Pad Reminder icon will be displayed, “CHECK HUM PAD”.

Default is OF (off).

Option 30 — Programmable Fan (programmable models only)

This selection allows the homeowner to program the fan selection to “Auto” or “On” fan operation for each of the program schedule periods. This selection is only available on programmable Thermidistat Controls.

OF (off) — Programmable fan is disabled and the homeowner must manually select “Auto” or “On” for fan operation.

On — Programmable fan is enabled. The homeowner can program “Auto” or “On” fan operation along with the heat and cool setpoints for each programmed period. When the program schedule is running, the programmed heat setpoint, cool setpoint, and fan selection for that period will be used. If the homeowner “overrides” the programmed fan setting by pressing the fan button, the override selection will remain in effect until the next programmed period time.

Default is OF (off).

Option 31 — Daylight Savings Time Configuration (programmable models only)

This selection allows the installer to set the Thermidistat Control to automatically change by one hour on the specified day, month, and week specified.

OF (off) — Daylight Savings Time Function disabled.

1,2 On — The first time the UP/DOWN button is pressed, the value of this selection changes from OF (off) to 1. When 1 is displayed, the days of the week and clock digits will be turned on. The installer will set the start date (Spring) for Daylight Savings Time by setting the day of the week by selecting the appropriate triangle icon next to the days of the week, the month of the year will

be set in the clock hours location (range 1−12) and the week of the month will be set in the clock minutes location. The week of the month selections will be F, 2, 3, 4, and L for First, 2nd, 3rd, 4th, and Last. So for the first Sunday in April, the display would show SUN, 4, F. When 2 is displayed, the installer will then choose the end date for daylight savings time (Fall). To activate the function, the installer changes the “2” by pressing the up button and “On” is displayed. The setting shall be left “On” to enable the Daylight Savings Time function.

Default is On (on).

Option 32 — Furnace Heat Staging Control (available only when the Thermidistat Control is configured to operate AC or A2 equipment).

1 — Thermidistat Control controls W1 output only and furnace controls the turn on and turn off of higher stages of heat.

2 — Thermidistat Control will control the W1 and O/W2/B outputs.

Default is 1.

Option 33 — Single or Two−Piece Installation

This configuration allows the Thermidistat Control to compensate for the amount of heat generated by the Thermidistat Control electronics to allow more accurate sensing of the temperature sensor. The amount of heat compensation will be different between single installation and two−piece installation.

Range: 1P or 2P

1P — The installation is single piece.

2P — The installation is two separate pieces.

Default is 2P.

Option 34 – Hybrid Heat Furnace Latch

This selection allows a Hybrid Heat system to finish a heating cycle using the furnace.

On – Once the furnace is on, it will finish the heating cycle with the furnace. If a heat pump defrost occurs, the heating cycle will finish with the furnace.

OF – The system will stage from furnace back to heat pump if heating demand dictates, or 2 minutes after a defrost has ended.

Default is On.

Option 40 — Humidify Fan

This selection controls whether humidification can only be done when a heating demand is present. If the homeowner turns humidification OFF, this configuration operates as if the selection was set to OFF.

OF – The humidity output will only energize when there is a humidity demand and the heating equipment is energized.

On – The humidity output and the fan will energize anytime humidification is needed during heating mode regardless of the state of the heating equipment.

Factory default is OF (Off)

Option 41 — Variable Speed Blower

This selection allows the installer to select between a single speed or variable motor. In a system with a two speed compressor (A2, h2, H2), if a dehumidification demand exists and the compressor is energized for cool to dehumidify, cooling, or both, and the system has a PSC blower (Option 41 = OFF), then both Y/Y2 and Y1/W2 are energized.

Off – The system has a single speed (PSC) blower.

On – The system has a variable speed blower.

Factory default is OF (Off)

Option 42 — Variable Speed Super Dehumidification

This option will only be available if the Variable Speed Blower setup (Option 41) has been set to ON.

OF – The fan output (G) is energized when the compressor is on for cool to dehumidify functionality.

On – The fan output (G) is de–energized when the compressor is running for cool to dehumidify functionality. In this setup the fan will run at very low speed because a Y/Y2 or Y1/W2 is present but the G signal is not. The fan output (G) will be energized any time the compressor is energized in response to a cooling demand.

Factory default is OF (Off)

Option 43 — Intelligent Heat Staging

This function is only available if the equipment configuration is a single speed heat pump (Option 01 = HP).

Off – Electric heat will not be staged.

On –Three stages of electric heat will be staged.

This switch should be set to On if the HVAC equipment has two banks of strip heaters. When electric heat is required, the thermostat will energize the smallest bank first (W1 only), then the larger bank (turning the smaller bank off – Y1/W2 only), and then both banks together (both W1 and Y1/W2). When power is cycled to the thermostat, this unit configuration will be displayed as HS.

Factory defaults is OF (Off)

Option 44 — Super Comfort Heat

This option is only available on heat pump units HP (HP, H2, hh, and h2) when Option 41 (Variable Speed Blower) is set to On and the system has a valid OAT sensor.

OF (Off) – Comfort Heat is off

On – Comfort Heat feature is on.

If the outdoor air temperature is between 12 to 40°F (–11 to 4°C) and the compressor is running in heating, then the fan output is turned off. This will signal the variable speed blower to reduce the air speed. The fan output is turned off even if the user has the fan selection set to continuous fan. The fan output will be turned back on in this temperature range if the maximum capacity of auxiliary heat is on due to system demand (auxiliary heat on in response to a defrost signal shouldn't cause the fan to turn back on).

If the outdoor air temperature is below 12°F/–11°C and there is sufficient demand for the equipment to be on, then the fan output is turned back on and the W/W1 output is energized. In a two speed unit the Y/Y2 output should be energized in addition to the W/W1 output. This logic does not apply to a Hybrid Heat system. In the unlikely event that the installer has selected a heat pump lockout temperature (Option 09) of 5°F/–15°C in a Hybrid Heat system and the comfort heat feature is on, then the comfort heat feature will turn the W/W1 on and the compressors off when the outdoor air temperature drops below 12°F/–11°C instead of at the lower temperature of 5°F/–15°C.

NOTE: All temperature boundaries have a +/– 2° hysteresis

Factory default is OF (Off).

Option 99 — Reset to Factory Defaults

Use this capability to reset the Thermidistat Control to “out of the box” conditions. BEWARE! All configuration settings, program settings, clock, and calendar which have been manually entered will be lost!

When this option is selected, the configuration number (99), will appear on the left and 10 will appear on the right. To perform the reset, first use the MODE key to move the box from the 99 to the 10 (programmable model) or to flash the 10 (non−programmable model). Then press and hold the DOWN key. The 10 will start counting down toward zero. If the DOWN key is kept pressed until the count reaches zero, the reset will be performed. When the value reaches zero, the heat setpoint shall display −−. The cool setpoint shall display − and the room air temperature shall display Fd. When the factory defaults have been restored, the Thermidistat Control will act as if power was cycled and return to normal operation. If the DOWN key is released early, the number will return to 10 and the reset will not occur.

SYSTEM START−UP AND CHECKOUT

The Thermidistat Control is designed with a built−in installer test capability. It allows easy operation of equipment without delays or setpoint adjustments to force heating or cooling. To enable installer test mode, press and hold the fan button for 15 seconds. After 10 seconds, the Thermidistat Control will enter Configuration Mode. Continuing to hold the Fan button through 15 seconds will cause the Thermidistat Control to enter Installer Test Mode. Pressing the Mode button will change the system operating mode to test the heating and cooling equipment. Auto Mode is not available during Installer Test Mode. If no buttons are pressed for 15 minutes, the installer test mode will be terminated. Pressing DONE at any time will exit installer test mode.

Heat − The first stage of heating will be energized for three minutes, then the first and second stages (if a second stage exists) will turn on for an additional three minutes. During the first stage of heating, the HEAT ON icons will be displayed. During the second stage of heating (if one exists), the “2” next to the “On” will be displayed if the system has a two−stage compressor (A2, h2, or H2 unit types). The “auxiliary heat on” icon will be displayed if the second stage is electric heat (HP unit type). While the heating test is active, the humidify output can be toggled. On the programmable models, pressing the button below the humidify icon shall toggle the state of the humidify output. On the non−programmable models, pressing the features button shall toggle the state of the humidify output.

Installer test for cooling is the same as described for heating above. COOL ON will be displayed during cooling in Installer Test Mode. While the cooling test is active, the dehumidify icon shall be displayed if the dry contact has been configured as a DH output. On the programmable models, pressing the button below the dehumidify icon shall toggle the state of the dry contact output. On the

non−programmable models, pressing the features button shall toggle the state of the dry contact.

In a heat pump application, when the mode is set to “em heat” the auxiliary heat will turn on for 3 minutes. The clock display will count down from 180 to 0 during this test.

TO TEST FAN

Fan button switches FAN icon between AUTO and On. While On is displayed, G output will be energized, turning fan on. On some fan coils, fan continues to operate for 90 sec after G signal is removed.

Final Settings

Be sure to press DONE to exit installer setup mode. If the system is to be left in operation after installation is complete, use MODE button to select between HEAT, COOL, or AUTO to provide desired operation of heating, cooling, or auto.

On the programmable models, the default setpoints and programmed schedule conform to the Energy Star® requirements of the U.S. Department of Energy for both heating and cooling. These provide energy saving temperature settings. Refer to Table 1.

Table 1 – Energy Star Default Schedule

SCHEDULE	HEAT	COOL
Wake 6:00 AM	68°F/20°C	78°F/26°C
Day 8:00 AM	60°F/16°C	85°F/29°C
Evening 5:00 PM	68°F/20°C	78°F/26°C
Sleep 10:00 PM	60°F/16°C	82°F/28°C

If the programmed schedule is to be used, make sure the triangle icon next to the FOLLOW SCHEDULE icon is turned on. Pressing the Schedule button will cycle the triangle icon through the FOLLOW SCHEDULE, HOLD and VACATION selections.

If fixed temperatures are desired, use SCHEDULE button to turn on arrow icon next to HOLD. This will maintain setpoints, not allowing them to change with programmed schedule.

The FAN button may be used to select between AUTO (fan on only with equipment) and On (fan on continuously) fan modes. For further information on temperature selection and programming, refer to Homeowner's Guide.

Setting The Clock, Calendar, Daily Schedule, and Vacation Settings (programmable models only)

To set the clock, press the SET button once. The Clock will be displayed at the bottom center of the screen. Use the soft keys to move the box around the digits to be set and the UP/DOWN buttons to change the setting. Concurrent presses of the set button will cycle through the calendar, daily schedule, and vacation settings.

Calendar may be changed by using the soft keys to select the Month, Day, or Year. The UP/DOWN buttons are used to change the Month, Day, or Year setting when the box surrounds it. Day of the week (Mon–Sun) is determined by calendar settings and is not directly adjustable.

When changing daily schedule settings, the soft keys are used to set the days, period times, heating setpoints, and cooling setpoints. The UP/DOWN buttons are used to change the setting with the box around it. ALL PROGRAM PERIODS (WAKE, DAY, EVE, SLEEP) MUST OCCUR WITHIN THE SAME 24 HOUR PERIOD.

When changing Vacation settings, the soft keys are used to choose the selection to be adjusted and the UP/DOWN buttons are used to change the setting. Humidify setting may only be changed when heat mode is selected and Dehumidify setting may only be changed when cool mode is selected.

Humidity Control Features

The various humidity control features of the Thermidistat Control are explained below. They are grouped into 2 sections, humidification and dehumidification. Instructions on how to select each feature are given at the end of each section.

Humidification

The Thermidistat Control directly connects to a standard 24VAC humidifier to control humidification in the home. A humidify setpoint between 10 and 44% in 2% increments relative humidity is selected by the homeowner, or all humidification can be turned off. When humidity in home drops below setpoint, humidifier will be turned on to raise humidity level. Humidification can only occur while in heating mode. See Table 2 for reference.

Table 2 – Humidification Selections

SELECTION	FAN DISPLAY	HUMIDIFY SETPOINT DISPLAY
Normal Humidify	Blank	10—44
Auto Humidify	AUTO	1
Humidify Off	Blank	OF (Off)

1. Humidify
   In normal humidify, humidifier will be on if there is humidity demand and any heating equipment is on. This will include furnace, heat pump, or auxiliary heat.

2. Auto Humidify
   Thermidistat Control will automatically adjust the humidity setpoint according to the outdoor temperature. As the outdoor temperature decreases, the humidity setpoint also decreases. Settings ranging from 1 to 9, 1 being the lowest and 9 the highest, will be visible to the homeowner. See Fig. 17 for outdoor temperature/indoor humidity relationship in auto humidify mode.
3. Humidify Off
   The humidify function can be turned off completely. This does not require changing existing setpoints.

To Select Humidification (programmable)

Press the soft key below the humidify icon to bring up humidity select screen. Humidify options are only available when in Heating mode. When system is in AUTO mode, humidify options are available if the last system operation was a call for heat.

To Select Humidification (non−programmable)

Press the features button twice. The first press displays the outdoor air temperature and the second press displays the humidity value and humidify target.

Pressing the mode button shall cycle through the available humidification selections (Off, Humidify and Auto Humidify).

Additional Humidify Comments

The humidifier is actually turned on when humidity is 1% below setpoint and turned off when it reaches 1% above setpoint. This built−in hysteresis prevents humidify output from toggling on and off when humidity level is near setpoint.

Dehumidification

Dehumidification is done only during cooling. Depending on type of equipment used, compressor speed, blower speed, setpoint adjustment, and equipment cycling are modified to provide added dehumidification. A dehumidification setpoint (separate from humidification setpoint) is available to the homeowner. It can range from 46% to 66% relative humidity. When actual humidity is higher than setpoint, a dehumidification demand exists. The Thermidistat Control responds by activating the dry contact (when enabled in Option 19). It may also control the compressor and blower, depending on equipment type and dehumidify selection choice. The 3 available selections are described below. A mandatory 5 minute blower off delay will be enforced if there has been a call for dehumidification during a cooling call. The amount of extra dehumidification available is very dependent on the type of equipment in the home. Without a variable−speed blower, the system's ability to adjust dehumidification is very limited.

1. Normal Dehumidify Operation
   When normal dehumidify is selected, the compressor will not turn on without a cooling demand. If dehumidify demand exists while cooling, dry contact will also be active (24VAC removed). This output commands variable−speed blowers to reduce their airflow, which improves water removal from the cooled air.
2. Cool to Dehumidify
   The cool to dehumidify selection tells the system to operate the compressor, within limits, when there is a dehumidify demand even if there is no cooling demand. The limits are that the system may overcool up to 3°, but no more, while attempting to satisfy a dehumidify demand. Within this 3° range, there is an additional balance between overcooling and humidity satisfaction. When overcooling must occur, the dehumidify

setpoint is adjusted upward by 2% per degree of overcooling. For example, a cooling setpoint of 76°F/24°C and a dehumidify setpoint of 60% is equivalent to a cooling setpoint of 75°F/24°C and a dehumidify setpoint of 62%. This dehumidify setpoint change is internal to the Thermidistat Control and is not shown on the display.

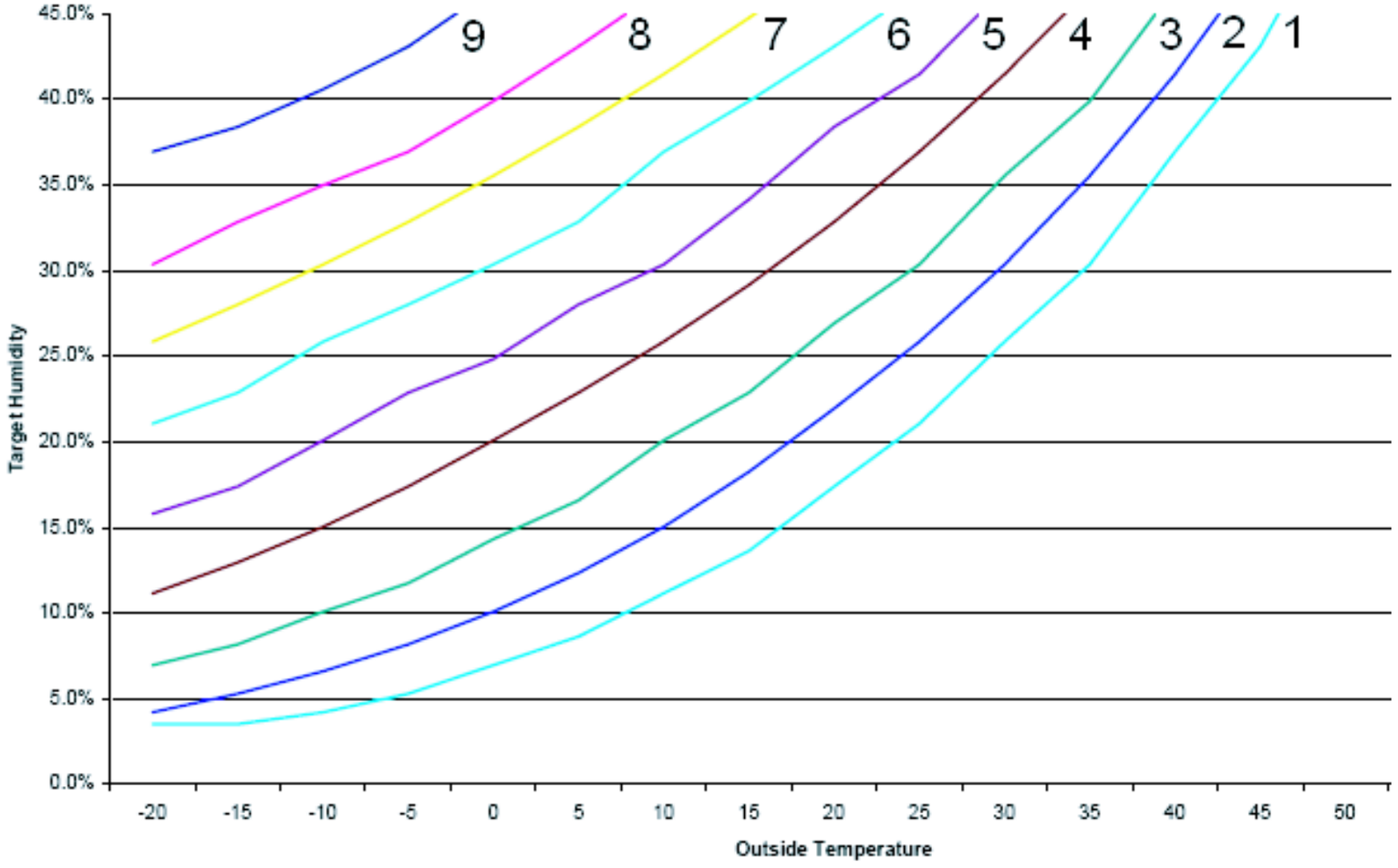


Fig. 17 – Auto Humidity

3. Dehumidify Off
   Dehumidification can be turned off completely. This can be done without changing existing setpoints.

To Select Dehumidification (programmable – between NORMAL, COOL TO, and OFF)

Press the soft key below the dehumidify icon button to bring up dehumidify selections. Dehumidify options are only available when in Cooling mode. When system is in AUTO mode, dehumidify options are available if the last system operation was a call for cooling.

To Select Dehumidification (non–programmable – between NORMAL, COOL TO, and OFF)

Press the features button three times. The first press displays the outdoor air temperature, the second press displays the humidify options and the third press will display the current dehumidify selections.

The mode button is used to cycle through the dehumidify selections.

Additional Dehumidify Comments

Dehumidification can be enhanced (with some efficiency loss) by turning blower off immediately at the end of each cooling cycle (eliminating normal 90 sec blower off delay). Where maximum humidity removal is desired, this should be done. Fan coils have the capability of removing this off delay. On FK or FV Fan Coils, set delay tap to 0/0. On standard fan coils, a jumper can be cut to disable off delay. Refer to fan coil Installation Instructions for details. If FAN is set for continuous operation (fan On icon displayed), G output is turned off for 5 minutes at the end of each cooling cycle as long as dehumidify demand exists.

Like humidify, dehumidify actions are initiated when humidity is 1% above setpoint and are terminated when humidity drops to 1% below setpoint. This prevents unnecessary toggling of dehumidify actions when humidity is near setpoint.

Dehumidify Output and Equipment Connections

When there is a dehumidify demand, dry contact is activated, meaning that a 24VAC signal is removed from the DHUM or DH output terminal. In other words, dehumidify output logic is reversed – output is turned On when no dehumidify demand exists and is turned OFF when demand exists.

Carrier FK and FV series variable−speed fan coils, all variable−speed furnaces, and select single and multi−stage furnaces with the dehumidify connection have dehumidify inputs which connect directly to Thermidistat Control dry contact. Refer to the furnace literature for dehumidification options.

The FK and FV series fan coils have a terminal marked DH which should be connected to the Thermidistat Control dry contact output. Jumper J1 on fan coil MUST be removed. It is located behind the DH terminal. Additionally blower delay tap on fan coil should be set to 0/0 (no On delay and no OFF delay) when using cool to dehumidify. With this selection, the blower stops when G signal is removed, preventing re−evaporation of water from the coil which would occur during the normal 90 sec blower off delay. See fan coil installation instructions for more information.

The furnace dehumidify input acts differently depending on which style of variable speed, select single−stage or multi−stage furnace control you have.

Vacation (programmable models only)

A vacation selection is available specifically for times where the home will not be occupied for an extended period. Vacation mode has an automatic hold, meaning that setpoints are not affected by the programmed schedule. Vacation mode is active for a specified period of time. While in vacation mode, the system provides temperature and humidity protection for the home in the selected mode, but not comfort. When vacation mode is active, an arrow will be displayed beside “VACATION” in the upper left corner of the display.

Vacation Setpoints

A special set of temperature and humidity setpoints exist which are active in vacation mode. They are adjustable by the homeowner, are exclusively for vacation mode, and are remembered from one vacation selection to the next. See Table 3 for default values.

Table 3 – Vacation Setpoints Default Values

MODE	AUTO
Fan	Auto
Heat Setpoint	55°F/13°C
Cool Setpoint	85°F/29°C
Humidify Setpoint	20°F/–7°C
Dehumidify Setpoint	60°F/16°C

Vacation Humidification

Normal humidify is available using vacation setpoints. Auto humidification is available, adjusting its setpoint with outdoor temperature the same as when occupied. Vacation humidification can be turned off independently of occupied humidification. While setting the Vacation setpoints, the Vacation humidify setpoint is accessible by pressing the soft key below the humidify icon when the box is around the heating setpoint.

Vacation Dehumidification

Normal Dehumidify, Cool to Dehumidify, and Dehumidify OFF are all available in vacation mode, and selection of one of these can be different from that of occupied. Vacation dehumidification selection and setpoints are remembered the next time vacation is used. While setting Vacation setpoints, the Vacation

dehumidify setpoint is accessible by pressing the soft key below the dehumidify icon when the box is around the cooling setpoint.

OPERATIONAL INFORMATION

Timers

Five–Minute Compressor Timeguard

This timer prevents compressor from starting unless it has been off for at least 5 minutes. It can be overridden for 1 cycle by simultaneously pressing FAN and UP buttons.

Cycle Timer

Based on the selection of 2, 4, or 6 cycles per hour, this timer is set to 30, 15, or 10 minutes. This much time must elapse from the start of one cycle before another cycle can start. It serves to impose the cycles per hour limits. It can be defeated for one cycle by simultaneously pressing the FAN and UP buttons.

Ten–Minute Staging Timer

In multistage heating or cooling, this timer prevents any higher stage from turning on until preceding stage has been on for 10 minutes. When staging between compressor and electric heat or between compressor and furnace heat, the time is configurable. The timer is configurable via Option 17. This timer is overridden if temperature error is greater than 5° (usually due to a large change in desired temperature) and equipment stages up in 60 second intervals.

The ten–minute staging timer does not require the thermostat to change to a higher stage after 10 minutes. If the system is able to meet the demand (maintain setpoint) it may not change stages after the 10 minute timer has expired. If there is sufficient demand for a higher stage at the end of 10 minutes or at any time after the 10 minute timer has expired, the thermostat will energize the next higher stage.

Defrost

When defrost occurs in a Hybrid Heat system, the furnace will operate during the defrost cycle. At the end of the defrost cycle, the furnace and heat pump will be de−energized while the fan is energized for 2 minutes allowing the heat exchanger to cool down. If Option 34, Hybrid Heat Furnace Latch is set to Off, at the end of the 2 minute time, the heat pump will be re−energized if a call for heat still exists. If Option 34 is set to On (default), the furnace will remain on until the end of the heating cycle.

Defrost detection is not available if the installer has configured the O/W2/B output to function as a B output. During heat pump heating, a defrost signal shall be considered valid if the compressor output is energized and the defrost signal has been active for less than 15 consecutive minutes. Any defrost signal present for longer than 15 minutes shall be considered invalid.

Heat pump/fan coil and Hybrid Heat systems shall use this input to:

- Detect that defrost is in progress and energize the auxiliary heat to provide homeowner comfort during the defrost cycle
- Allow a defrost cycle to run to completion regardless of the system demand

Three−Minute Minimum on Time

In normal operation, when a stage turns on, it will not turn off for a minimum of 3 minutes. In Hybrid Heat systems, the minimum on time for the furnace is 5 minutes. If the setpoint is changed, this timer is canceled, allowing the equipment to turn off immediately when the demand is removed. The 3 minute minimum on timer applies to all stages of heating and cooling, except Hybrid Heat. A stage will run for a minimum of 3 minutes before the thermostat will be allowed to stage to a lower stage.

Heat/Cool Setpoints (Desired Temperature)

A minimum difference of 1° and maximum of 6° is enforced between heating and cooling desired temperatures. This is done by allowing 1 setting to “push” the other, to maintain this difference. This difference is adjustable via Configuration Option 11.

Equipment On Indicators

When cooling equipment is on, a COOL ON icon is displayed. While cooling equipment operation is delayed by the time guard or cycle timer, COOL ON will flash. The same is true for HEAT ON icon.

During second stage compressor operation a “2” will be displayed with the HEAT ON or COOL ON icon. This is displayed when the Thermidistat Control is configured as H2, A2, or h2.

When the W is energized in a heat pump or Hybrid Heat system, the “auxiliary heat on” icon will be displayed.

Humidify and Dehumidify Indicators

When the Display Module door is closed, the humidify icon will be displayed when humidification is active and the dehumidify icon will be displayed when dehumidification is active.

Auto Changeover

When auto changeover mode is selected, a change from heat to cool (or vice versa) will not occur until an opposite mode demand has existed for 20 minutes. If setpoint is changed, 20−minute requirement is deleted.

Emergency Heat Mode

When Thermidistat Control is configured as a heat pump and emergency heat is selected, all Y signals are locked out, and W becomes energized upon a call for heat.

Programmable Fan (programmable models only)

The fan output can be programmed based on period of the day. When programming for each day and period the fan can be set to On or AUTO. If the fan button is pressed to change from On to Auto or vice versa when programmable fan has been enabled, the manual change will only remain in effect until the next program period, when the programmable fan setting will be changed per the scheduled setting.

Dry Contact

On the programmable models, the dry contact that can be used for control of an auxiliary device. The dry contact may be configured to be closed for a specific number of minutes per hour for each period of the program schedule. This can be used to operate a ventilator, damper, system blower, or other auxiliary device. There are two terminals, D1 and D2.

On both the programmable and non−programmable models, when configured as a dehumidify output, it will operate cooling equipment capable of dehumidify function. When configured for dehumidification, the Rc terminal must be connected to one of the dry contact terminals. The other dry contact terminal is connected to the dehumidify terminal on the furnace or fan coil. This provides power to energize the dehumidify terminal on the cooling equipment when the dry contact is closed.

If it is desired to operate a ventilator or other device, the D1 and D2 terminals can be connected directly to the equipment. This will provide a closed contact for the specified number of minutes per hour. See Option 19.

If timed control of the system blower is required, the dry contact can be used for this function. The G terminal can be connected to one of the dry contact terminals with the other terminal being connected to Rc and/or Rh for timed control of the fan. Note that this is not the same as programmable fan Option 30.

See Wiring Diagrams for more information.

Relays

This thermostat uses latching relays. When the thermostat loses power, the relays will remain in their last position until power is restored and all relays are reset to their correct position. Out of the box, the outputs may appear to be On when the thermostat is not powered. This is normal. Output states should only be checked when the thermostat is powered.

Temperature Offset After Power Cycle

To compensate for internal heat build−up from the electronics in the thermostat, the thermostat will add an offset to the actual temperature that it measures. If the thermostat power is cycled quickly, one can witness an immediate increase in the actual temperature displayed due to this added offset. The thermostat display will return to the actual room temperature after several minutes of operation.

TROUBLESHOOTING

If the display module doesn't power up after power is applied, check the Rc/Rh and C terminals for 24VAC. If 24VAC is present, check the voltage between Vg and V+. This voltage will be approximately 12–20VDC. If voltage is present, check the polarity to make sure it is wired correctly. The display will not power up if polarity is reversed.

If dashes appear for Option 01 in config and during reboot, the problem could be the red pigtail being wired to Rc or Rh and the black pigtail being wired to C. If so, remove the two–wire pigtail and connect to the V+ and Vg terminals.

Error Codes

"**––**" – If Thermidistat Control cannot properly read room temperature, display will indicate "––" and all outputs (except fan, if on) will turn off. In the case where the installer has selected to average the local sensor and the remote room sensor, the Thermidistat Control display will alternate between "––" for the failed sensor and the temperature sensed by the working sensor every 10 seconds. The control will operate from the temperature sensed by the working sensor.

E1 – If the Display Module and the Equipment Control Module cannot communicate via two–wire connection, an E1 will be displayed.

E2 – There is no E2 error message.

E3 – If Thermidistat Control cannot properly read outdoor temperature, and it is needed for proper operation, display will indicate "––" in the outdoor temperature location. If Option 06, 08, 09, 22, 23 or 44 is not set to OFF, display will indicate "––" in the outdoor temperature location.

E4 – If Thermidistat Control's internal memory fails, E4 will be displayed. Replace Thermidistat Control.

E5 – If Thermidistat Control cannot properly read humidity, E5 will be displayed. Replace Thermidistat Control. If both Humidify and Dehumidify have been set to OF, the humidity value will be shown as "––" when viewed from the humidity menu, but no E5 will be shown in the display.

Table 4 can be used as a troubleshooting tool for determining which outputs will be active for a particular configuration and each operating mode.

When replacing a failed component such as an equipment control module or a display module, the installer should replace both parts as a matched set. It is very easy to accidentally mix an A/C or HP display with a PRH equipment control module. When this happens, some functions appear in the setup while others do not. This can be very confusing to troubleshoot. Verify that both parts have the same model and serial number when troubleshooting the thermostat.

Table 4 – Equipment Configuration Outputs

EQUIP CONFIG OPTION 01	HARDWARE CONFIG	COOL STG 1	COOL STG 2	HEAT STG 1	HEAT STG 2	HEAT STG 3	HEAT STG 4	EM HEAT STG 1	EM HEAT STG 2
SS AC	AC	Y/Y2	–	W/W1	–	–	–	–	–
SS AC	HP RH	Y/Y2	–	W/W1	W/W1 O/W2/B (if Opt32 = 2)	–	–	–	–
SS HP RVS = O	HP	Y/Y2, O/W2/B	–	Y/Y2	Y/Y2, W/W1	–	–	W/W1	W/W1 Y1/W2
SS HP RVS = B	HP	Y/Y2	–	Y/Y2, O/W2/B	Y/Y2, W/W1, O/W2/B	Y/Y2 W/W1/ Y1/W2	–	W/W1	W/W1 Y1/W2
SS HP RVS = O Opt43 = On	RH	Y/Y2, O/W2/B	–	Y/Y2	Y/Y2, W/W1	Y/Y2 Y1/W2	Y/Y2 W/W1 Y1/W2	W/W1	W/W1 Y1/W2
SS HP RVS = B Opt43 = On	RH	Y/Y2	–	Y/Y2, O/W2/B	Y/Y2, W/W1, O/W2/B	Y/Y2, Y1/W2, O/W2/B	Y/Y2, Y1/W2, W/W1 O/W2/B	W/W1	W/W1 Y1/W2
2SPD AC	RH	Y1/W2	Y/Y2, Y1W2	W/W1	W/W1 O/W2/B	–	–	–	–
2SPD HP RVS = O	RH	Y1/W2 O/W2/B	Y1/W2 Y/Y2 O/W2/B	Y1/W2	Y1/W2 Y/Y2	Y1/W2 Y/Y2 W/W1	–	W/W1	–

Table 4 – Equipment Configuration Outputs (cont.)

EQUIP CONFIG OPTION 01	HARDWARE CONFIG	COOL STG 1	COOL STG 2	HEAT STG 1	HEAT STG 2	HEAT STG 3	HEAT STG 4	EM HEAT STG 1	EM HEAT STG 2
2SPD HP RVS = B	RH	Y1/W2	Y1/W2 Y/Y2	Y1/W2 O/W2/B	Y1/W2 Y/Y2 O/W2/B	Y1/W2 Y/Y2 O/W2/B W/1	–	W/W1	–
SS Hybrid Heat RVS = O	RH	Y/Y2, O/W2/B	–	Y/Y2	W/W1	W/W1 Y1/W2	–	W/W1	W/W1 Y1/W2
SS Hybrid Heat RVS = B	RH	Y/Y2	–	Y/Y2 O/W2/B	W/W1	–	–	W/W1	–
2S Hybrid Heat RVS = O	RH	Y1/W2 O/W2/B	Y1/W2 Y/Y2 O/W2/B	Y1/W2	Y1/W2 Y/Y2	W/W1	–	W/W1	–
2S Hybrid Heat RVS = B	RH	Y1/W2	Y1/W2 Y/Y2	Y1/W2 O/W2/B	Y1/W2 Y/Y2 O/W2/B	W/W1	–	W/W1	–
Heat Only Unit	AC HP RH	–	–	W/W1	If HP or 2S board AND Opt32 = 2	–	–	–	–
Cool Only Unit	RH	Y1/W2	Y1/W2 Y/Y2	–	–	–	–	–	–
Cool Only Unit	AC HP	Y/Y2	–	–	–	–	–	–	–

WIRING DIAGRAMS

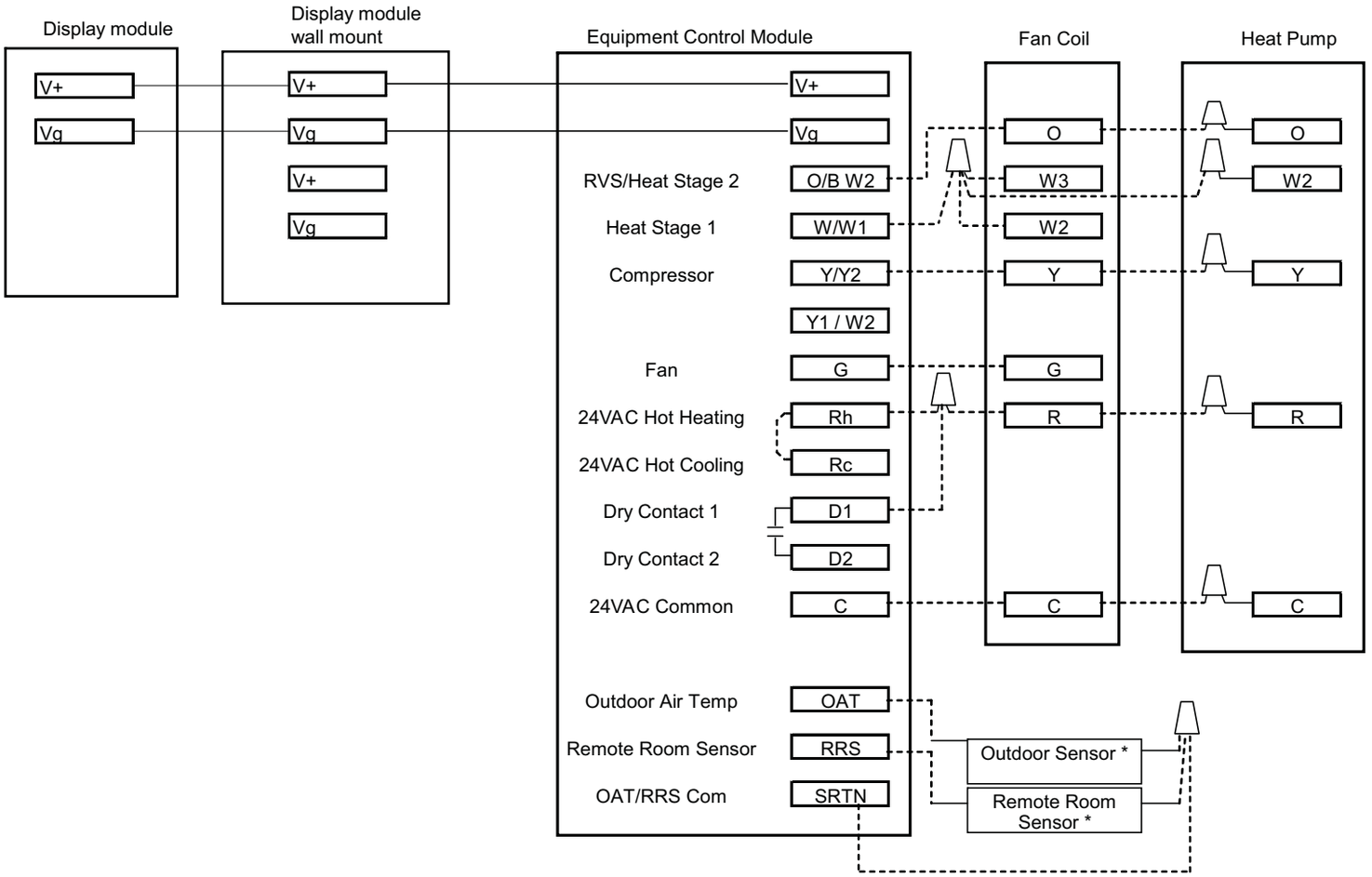


Fig. 18 – Display to Equipment Control Module Connection

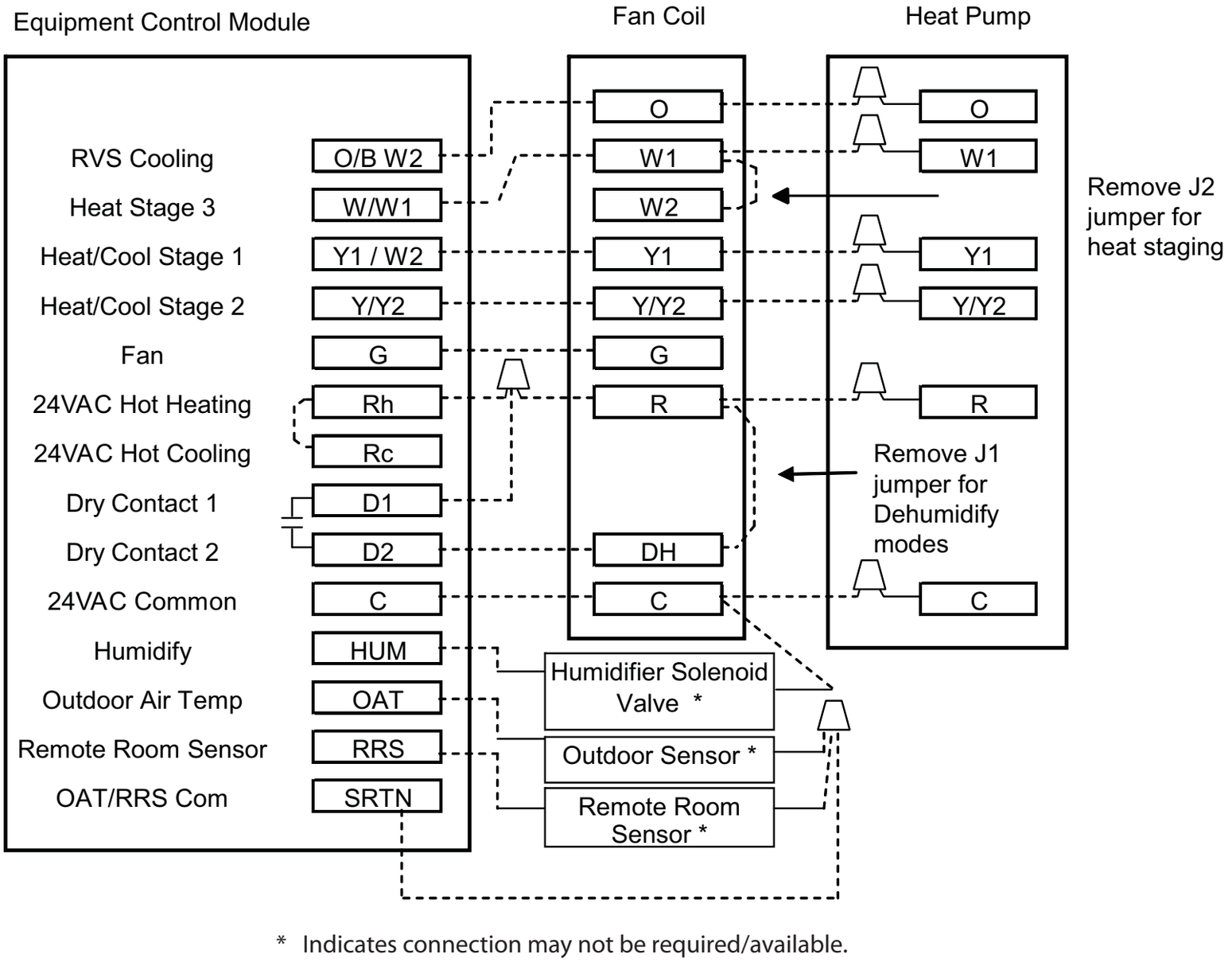
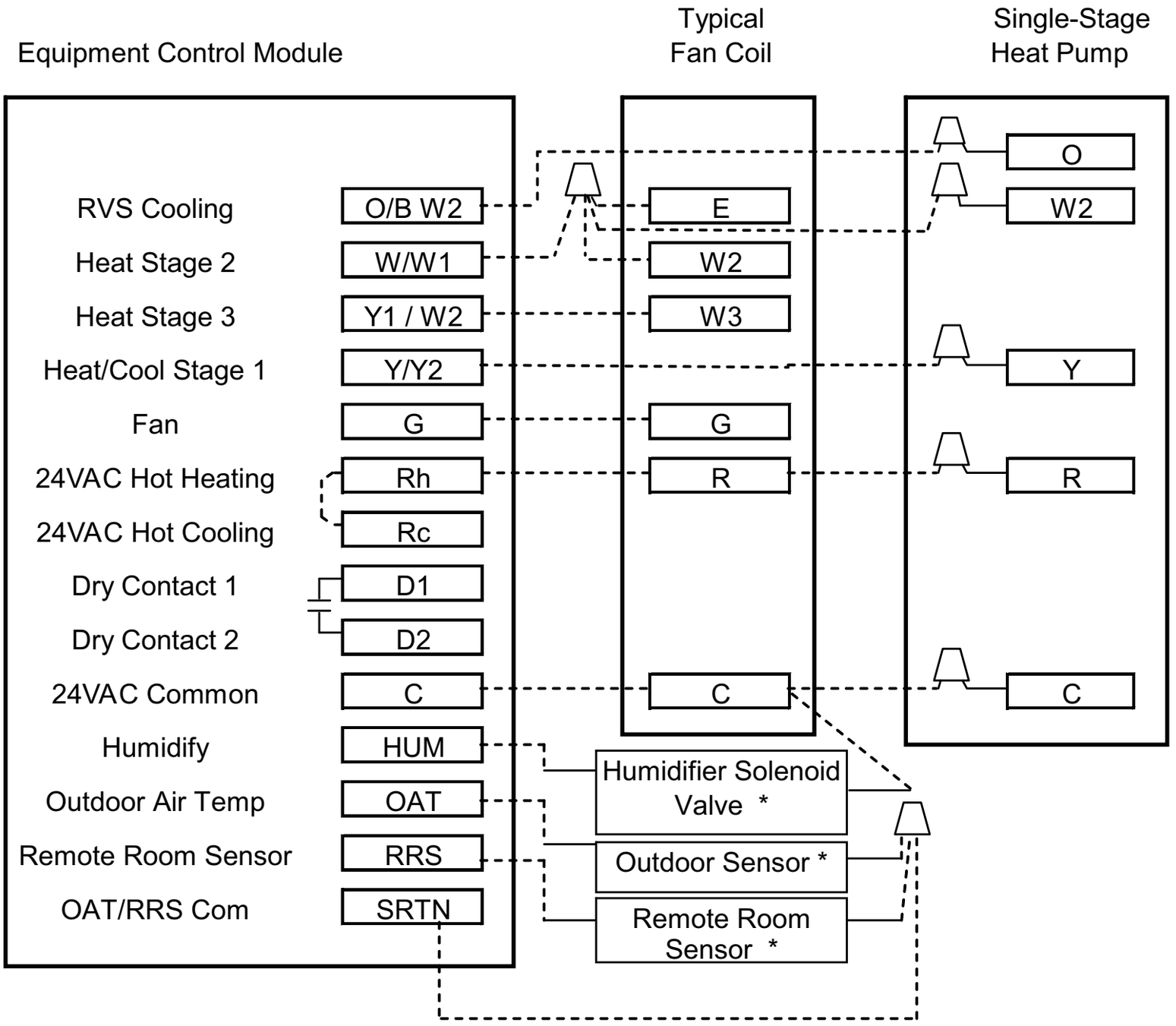


Fig. 19 – FV/FK Fan Coil with 2–Stage Heat Pump



* Indicates connection may not be required/available.

A09165

Fig. 20 – Typical Fan Coil with Heat Pump

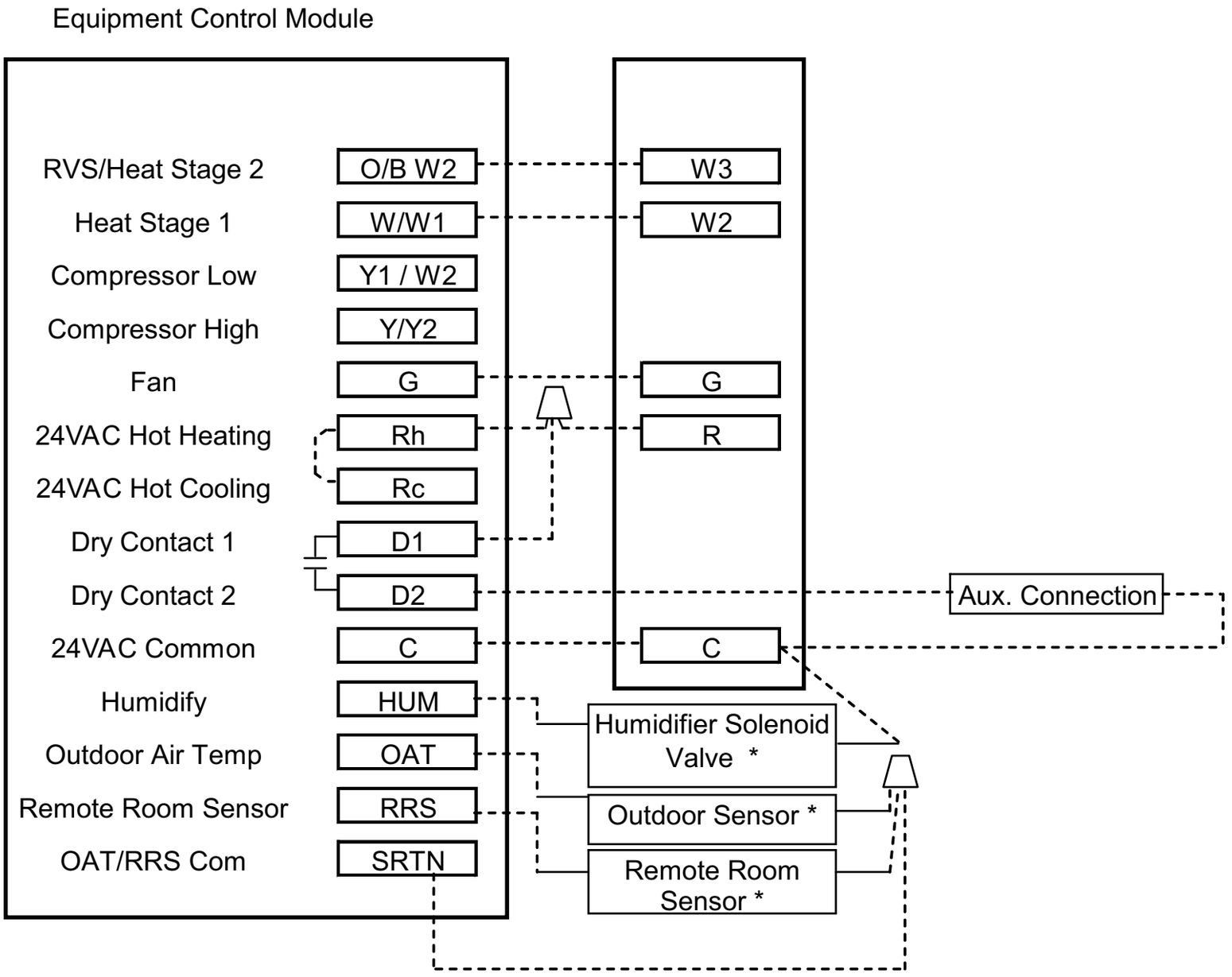


Fig. 21 – Fan Coil Shown w/Aux. Connection #1 (Heat Pump/Air Conditioner removed for clarity.)

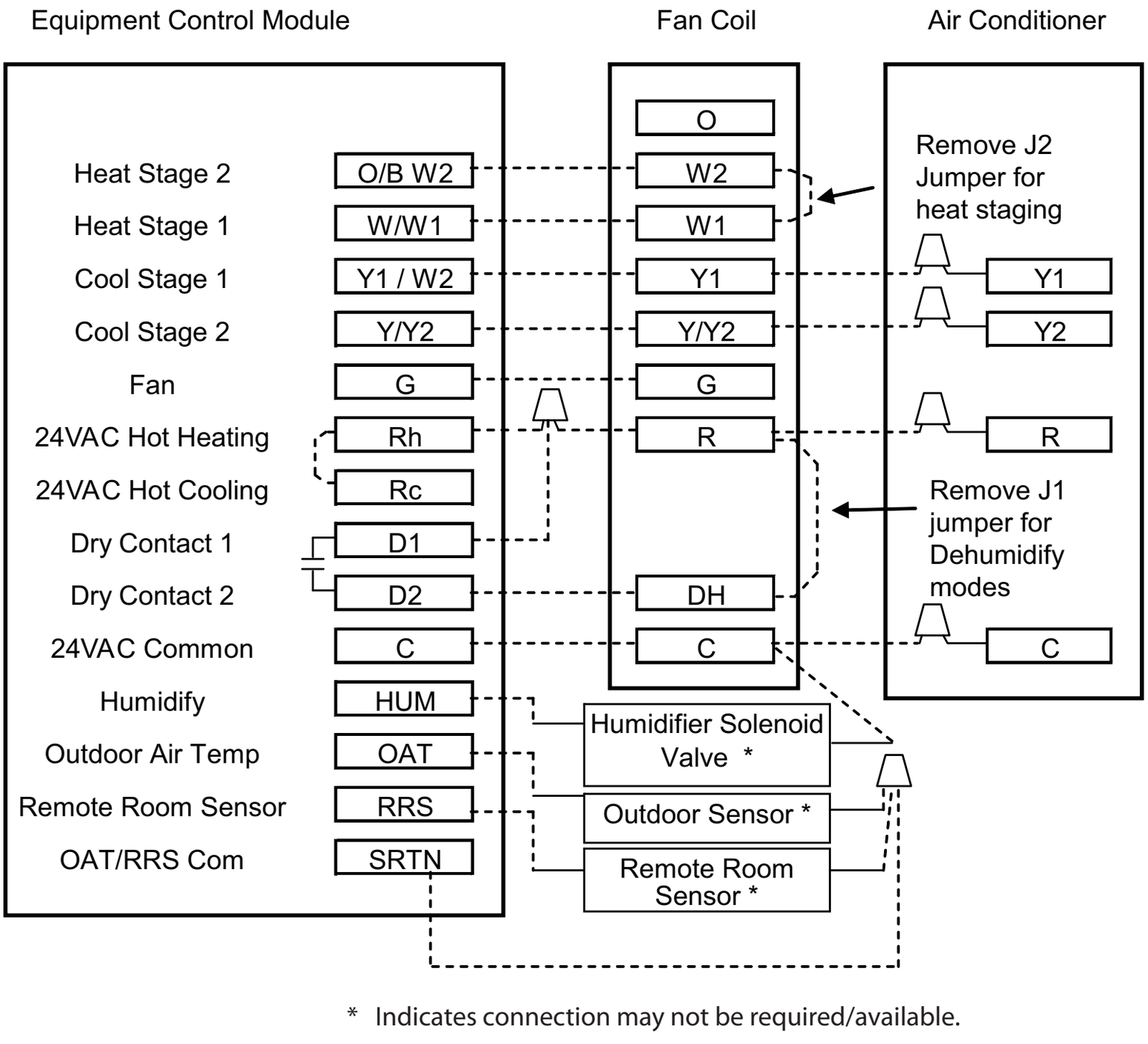
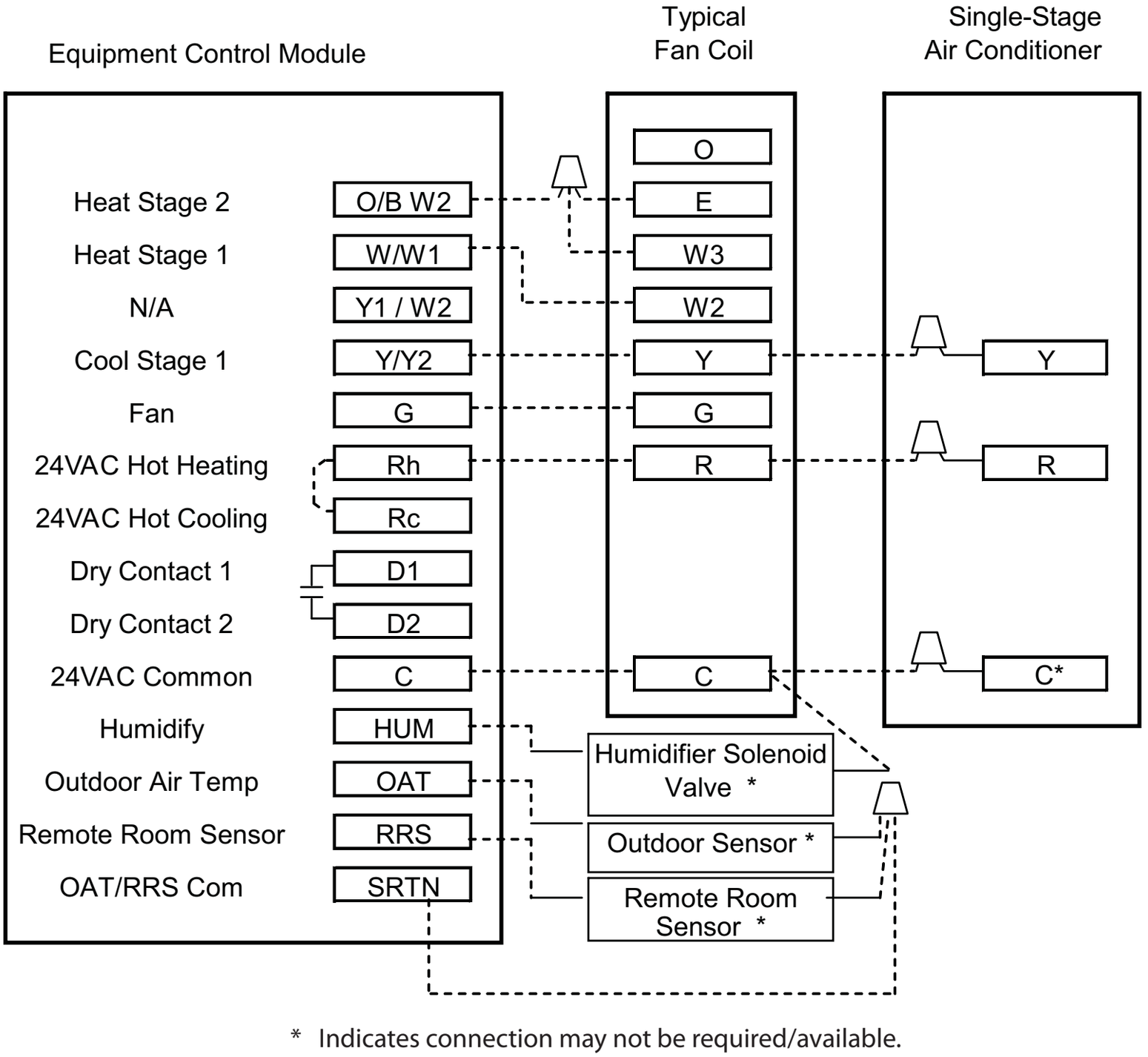


Fig. 22 – FV/FK Fan Coil w/2–Stage Air Conditioner



* Indicates connection may not be required/available.

A09168

Fig. 23 – Typical Fan Coil with Air Conditioner

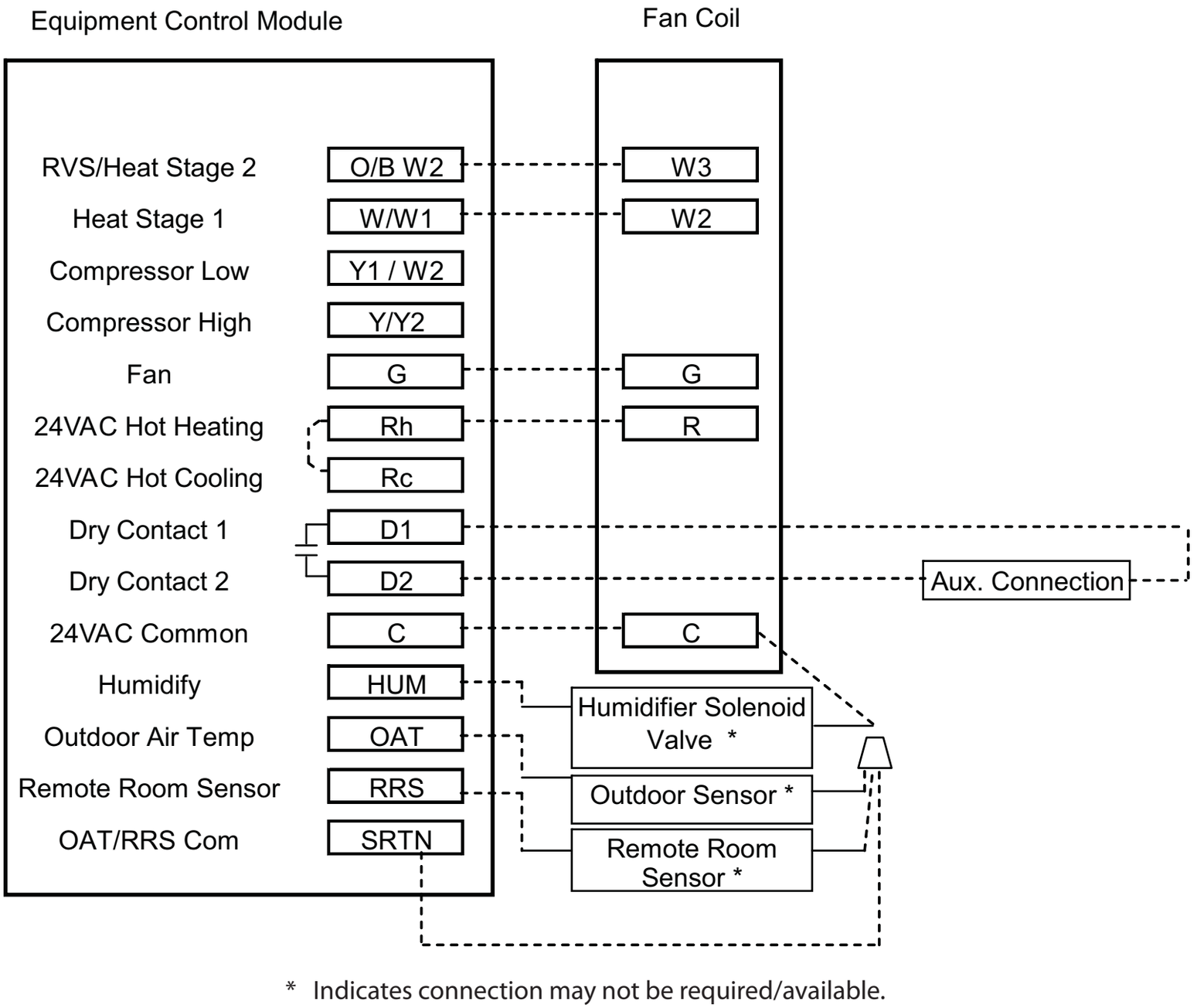


Fig. 24 – Fan Coil Shown with Aux. Connection #2 (Heat Pump/Air Conditioner removed for clarity.)

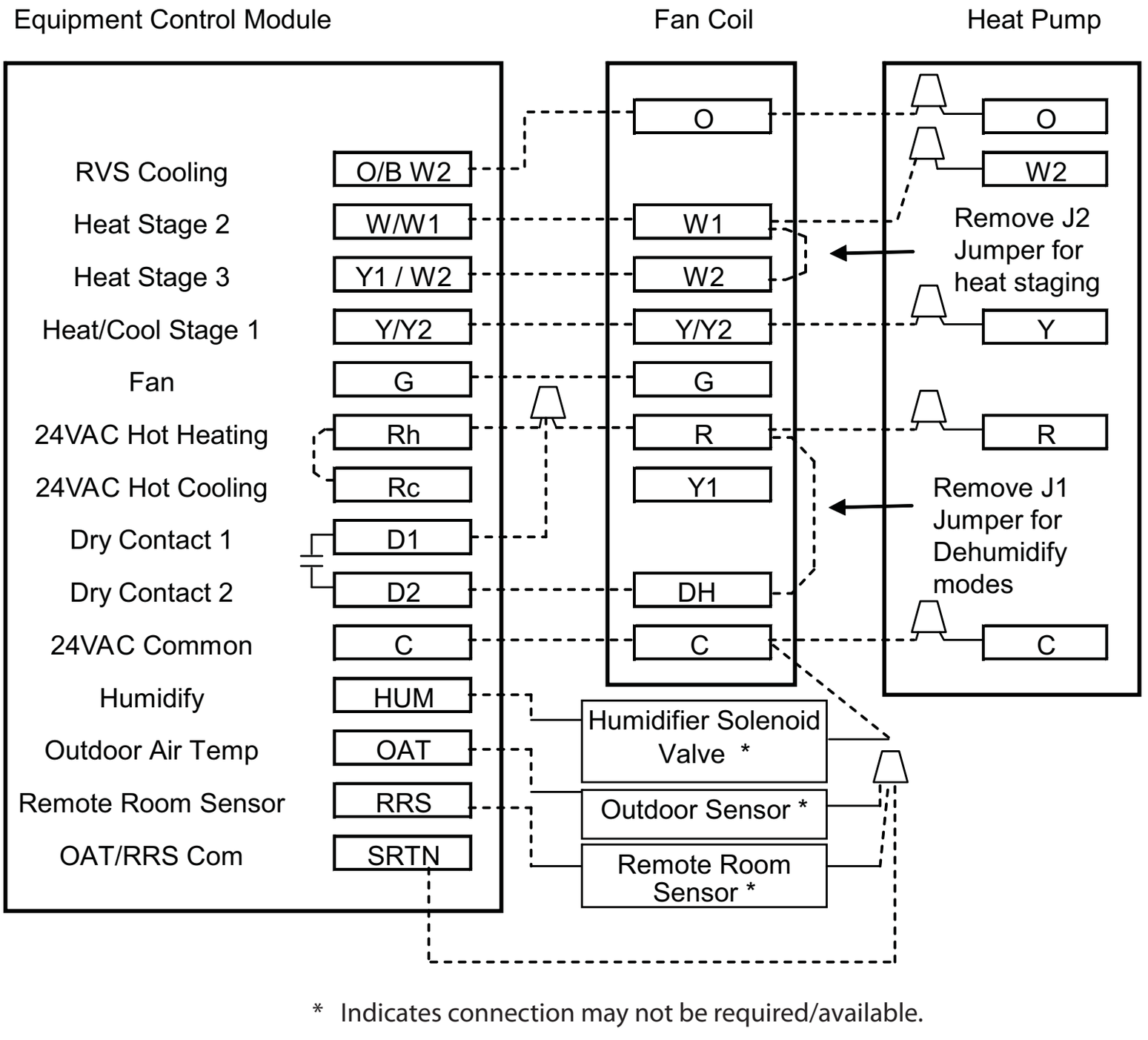
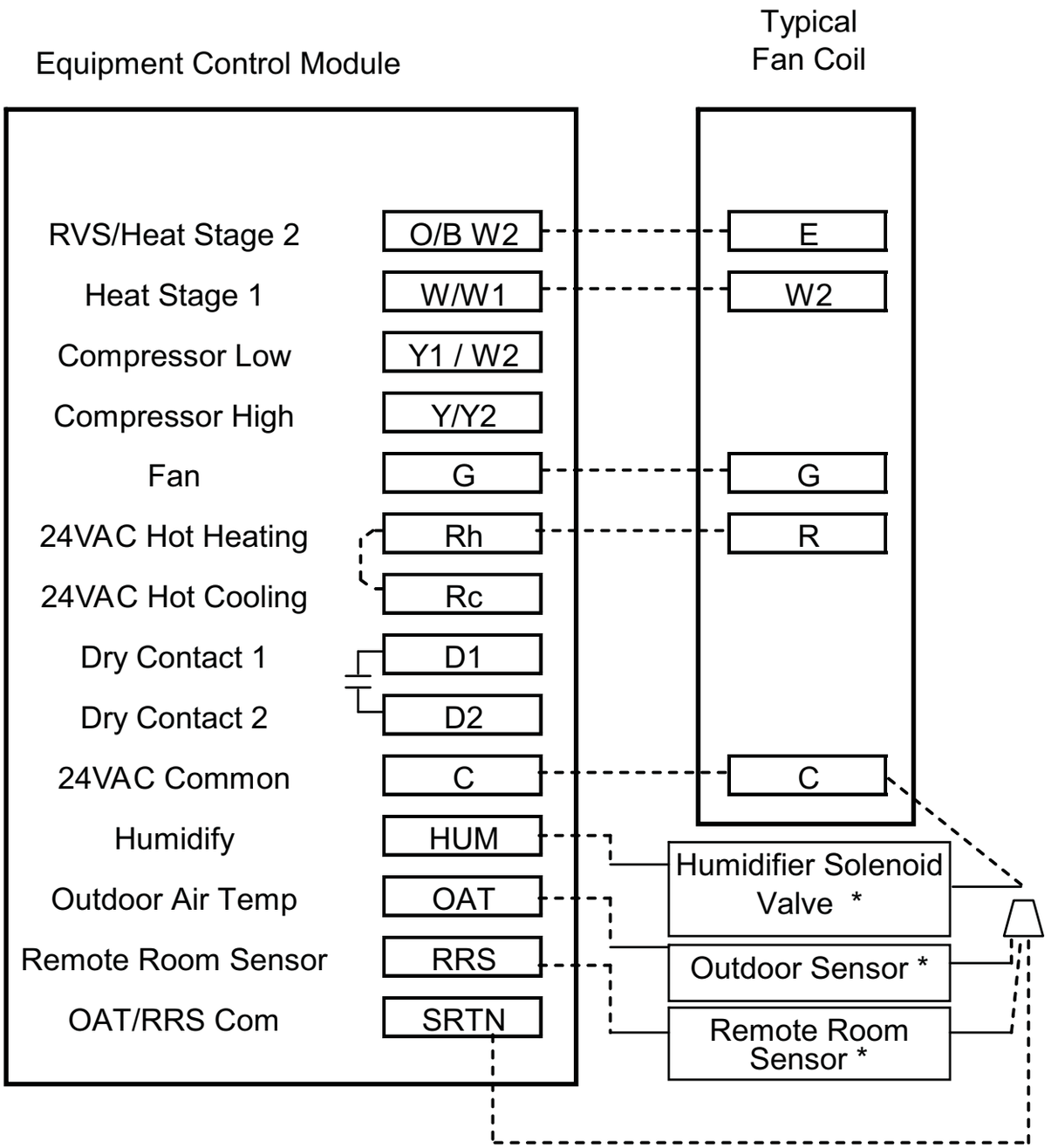


Fig. 25 – FV/FK Fan Coil with 1–Stage Heat Pump



* Indicates connection may not be required/available.

A09171

Fig. 26 – Typical Fan Coil Heating Only

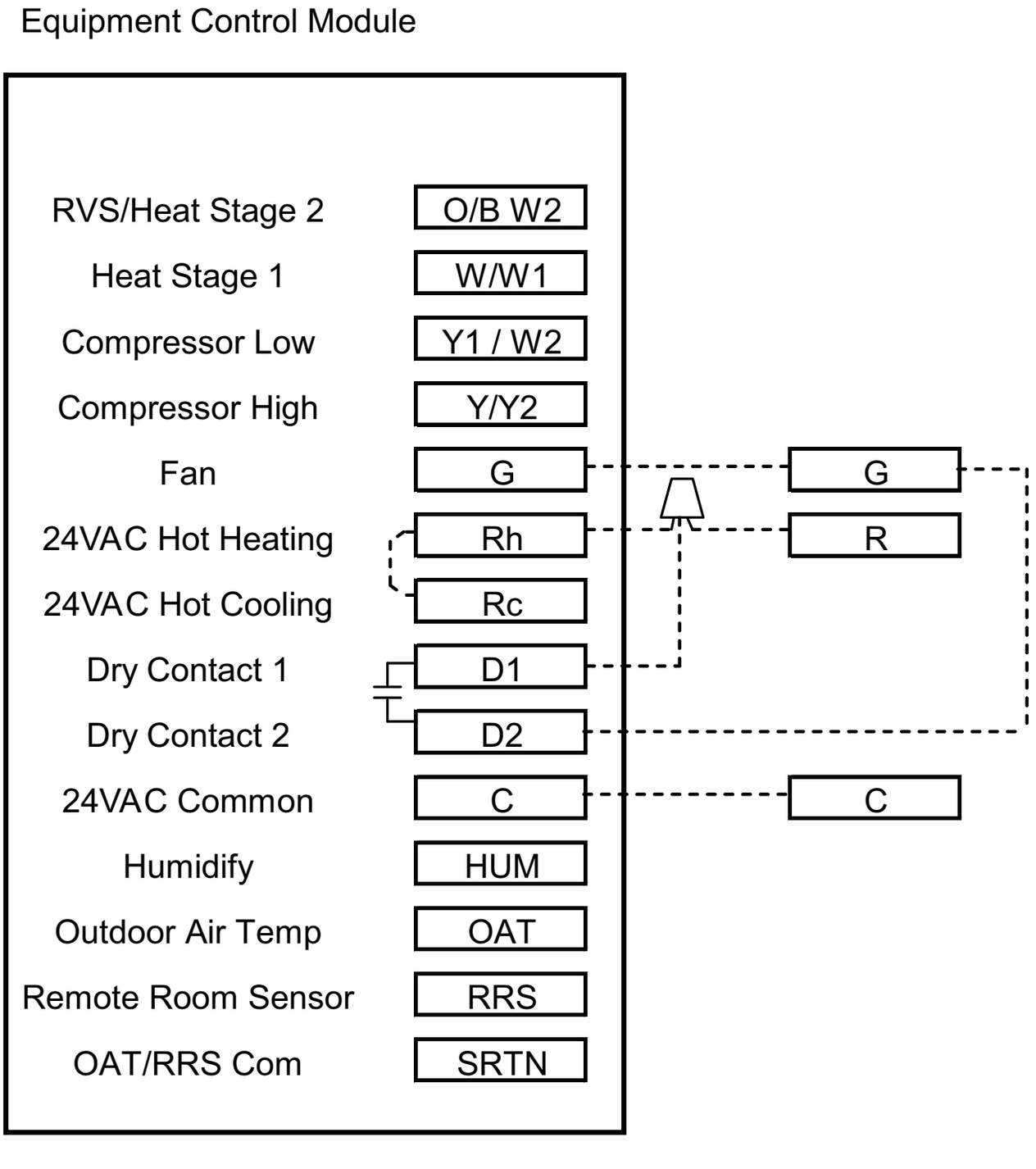


Fig. 27 – Thermidistat Control w/Dry Contact Control for Fan Run Time

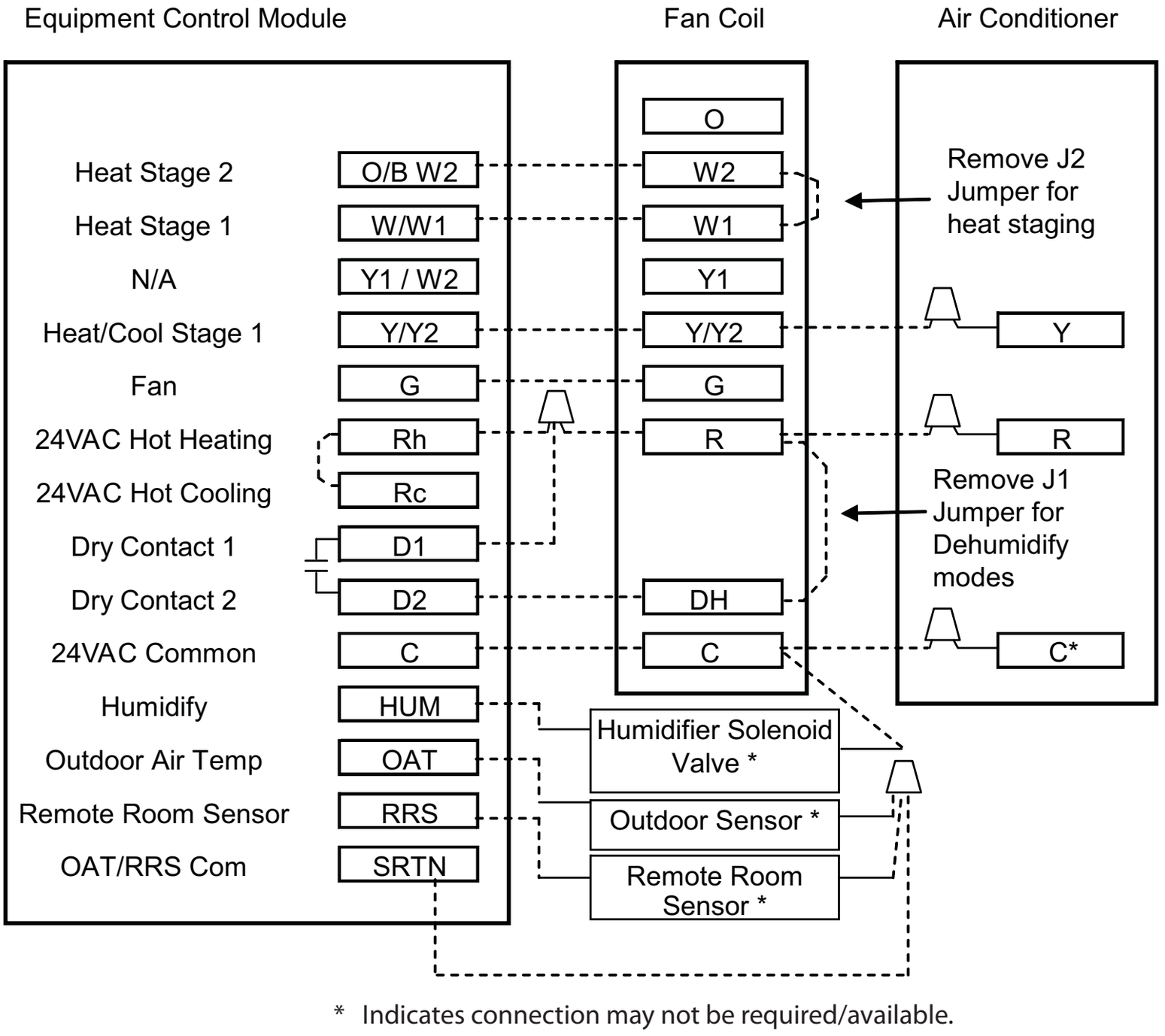


Fig. 28 – FV/FK Fan Coil with 1–Stage Air Conditioner

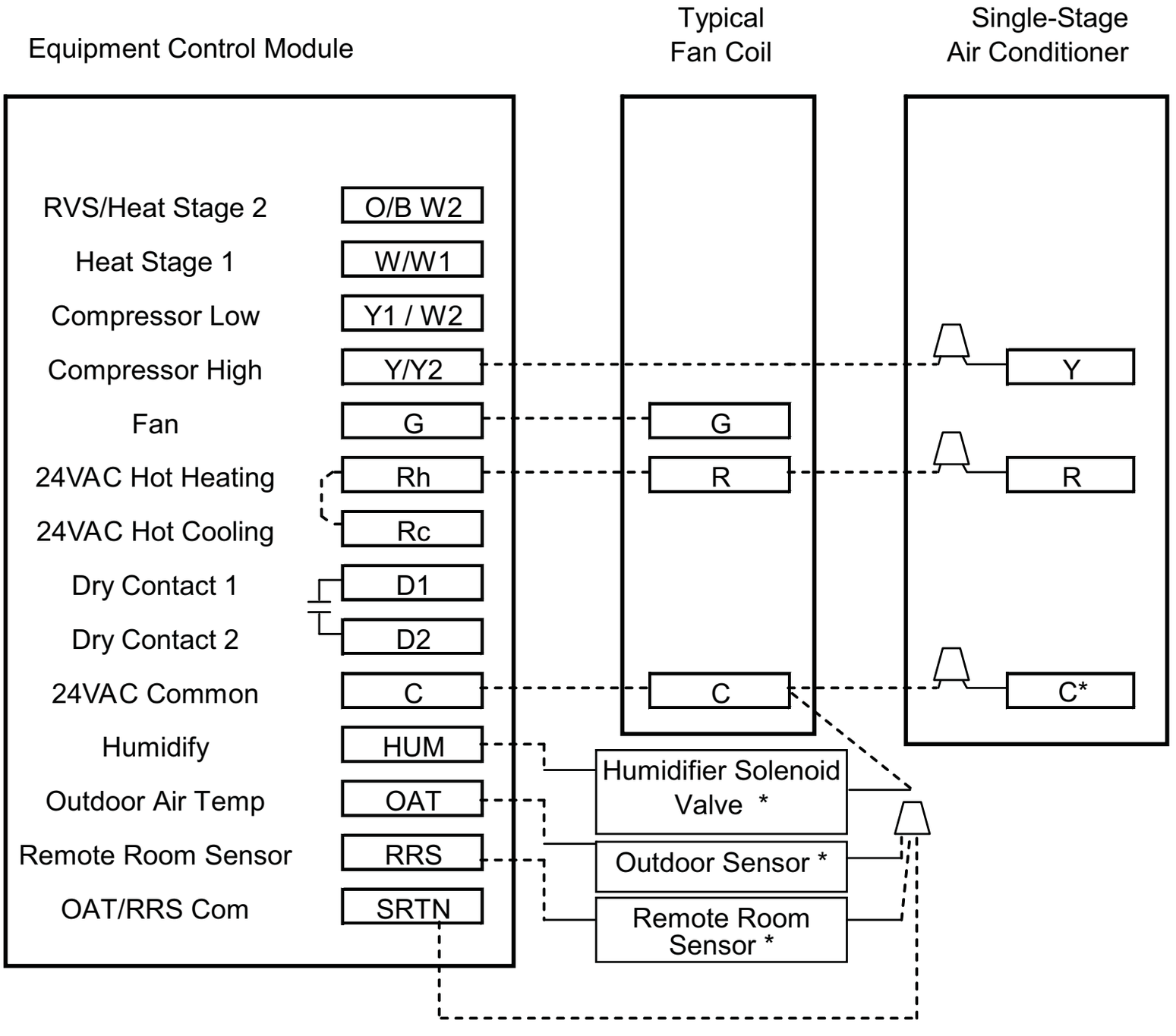
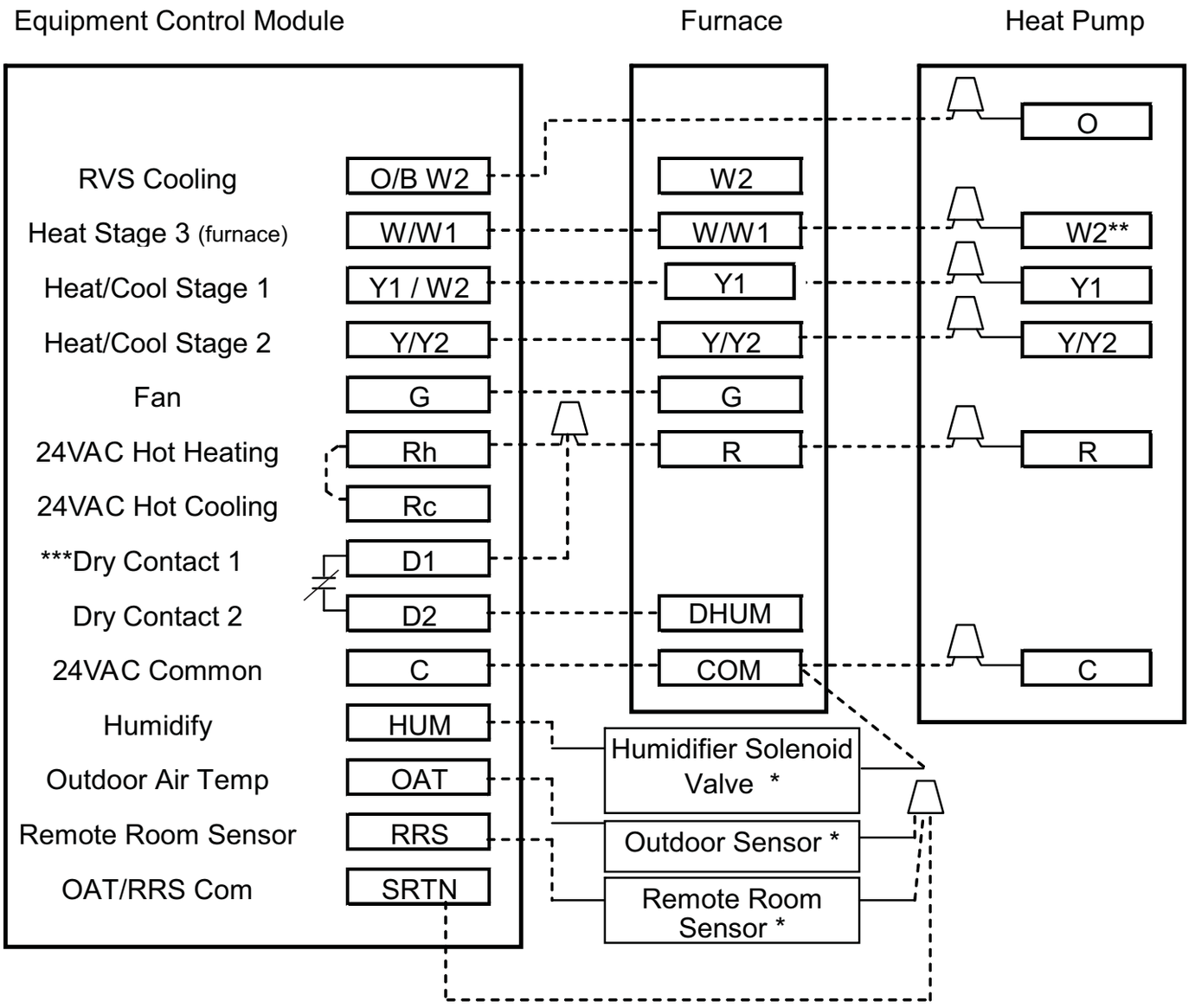


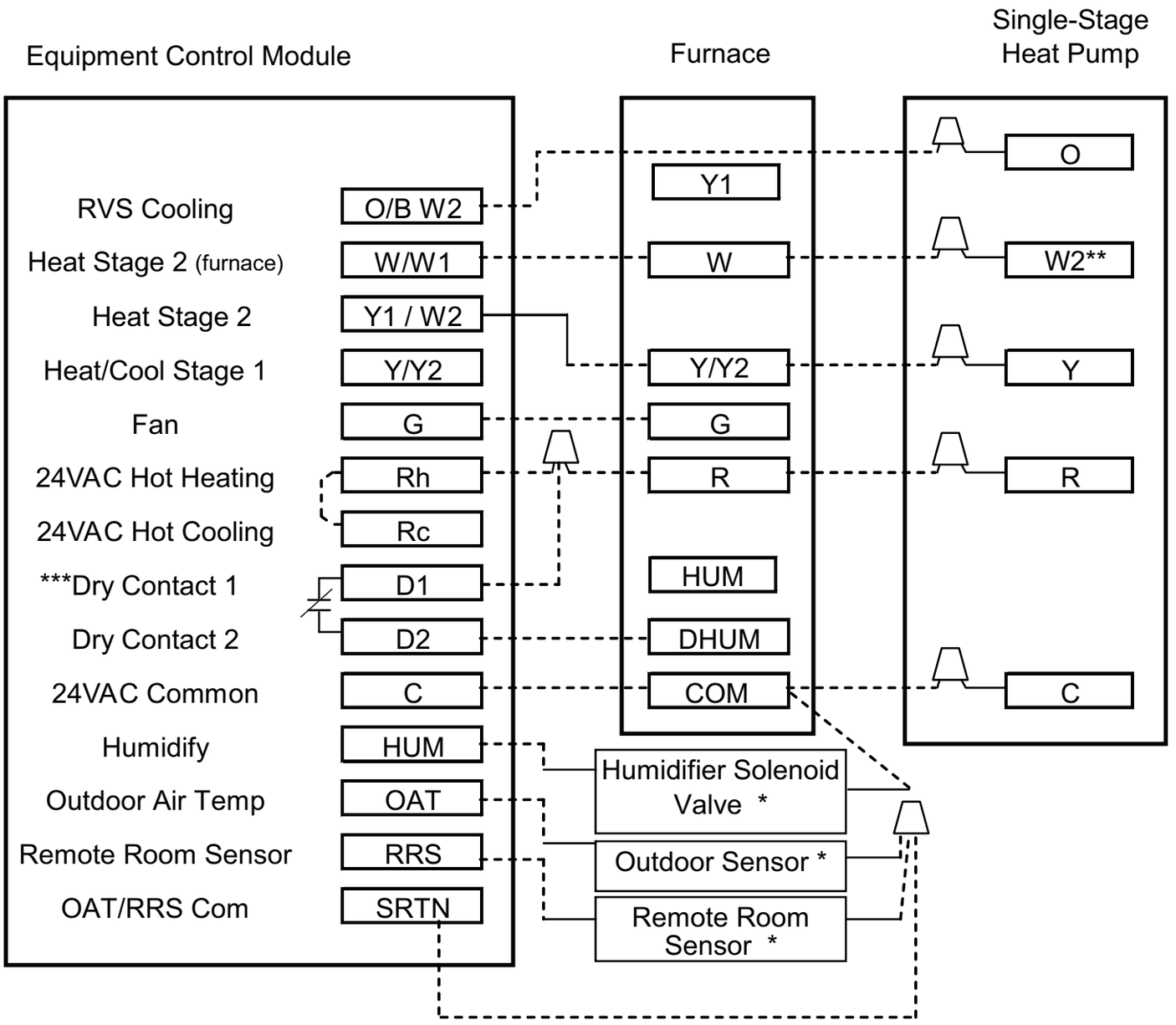
Fig. 29 – Typical Fan Coil Cooling Only



* Indicates connection may not be required/available.
** Some heat pumps may designate W1.
***Option 19 set to 2.

A09121

Fig. 30 – Variable Speed, Multi–Stage, Stage Modulating and Single–Stage Furnace with 2–Stage Heat Pump



* Indicates connection may not be required/available.
** Some heat pumps may designate W1.
***Option 19 set to 2.

A09122

Fig. 31 – Single–Stage Furnace with Heat Pump (Hybrid Heat)

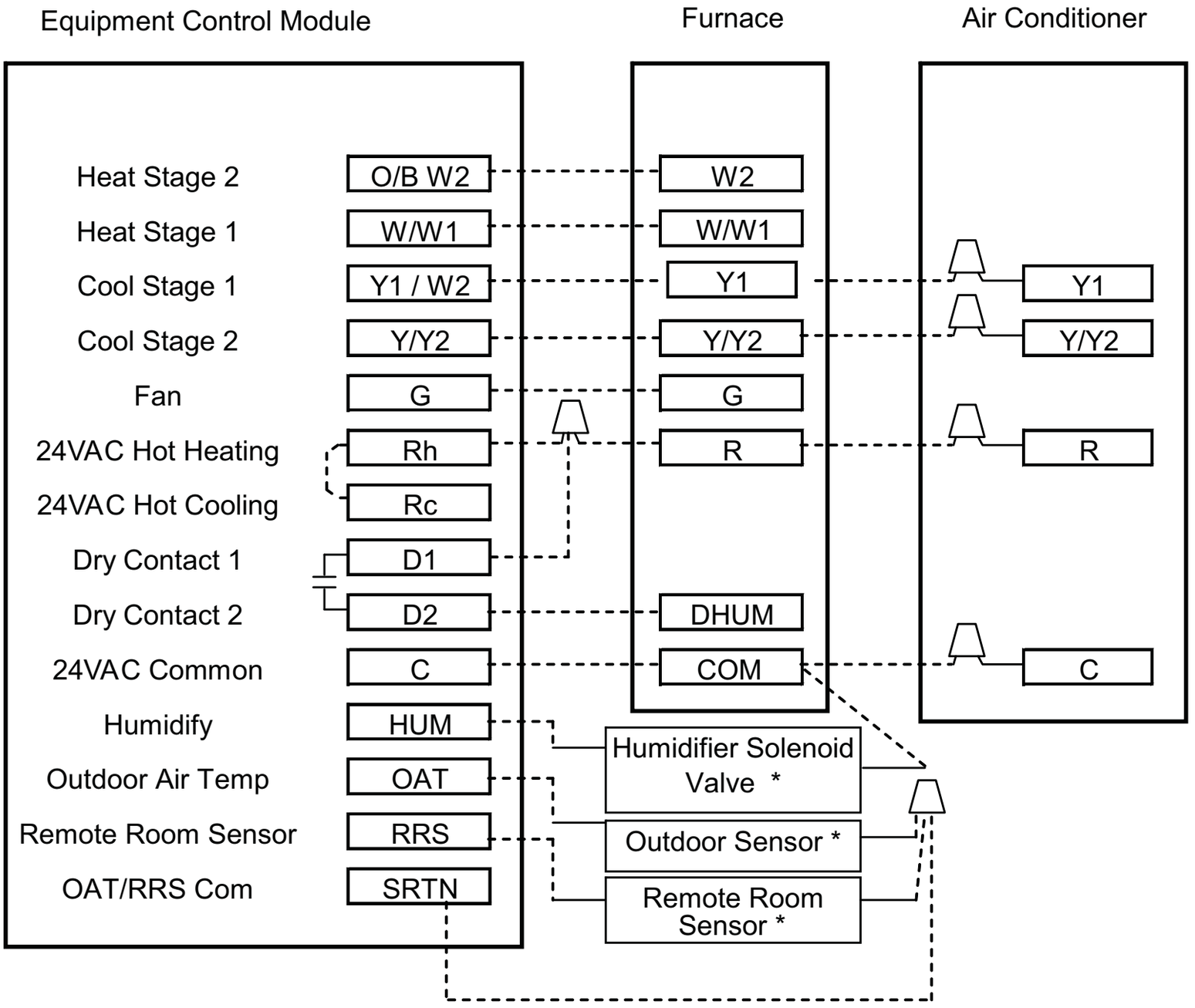
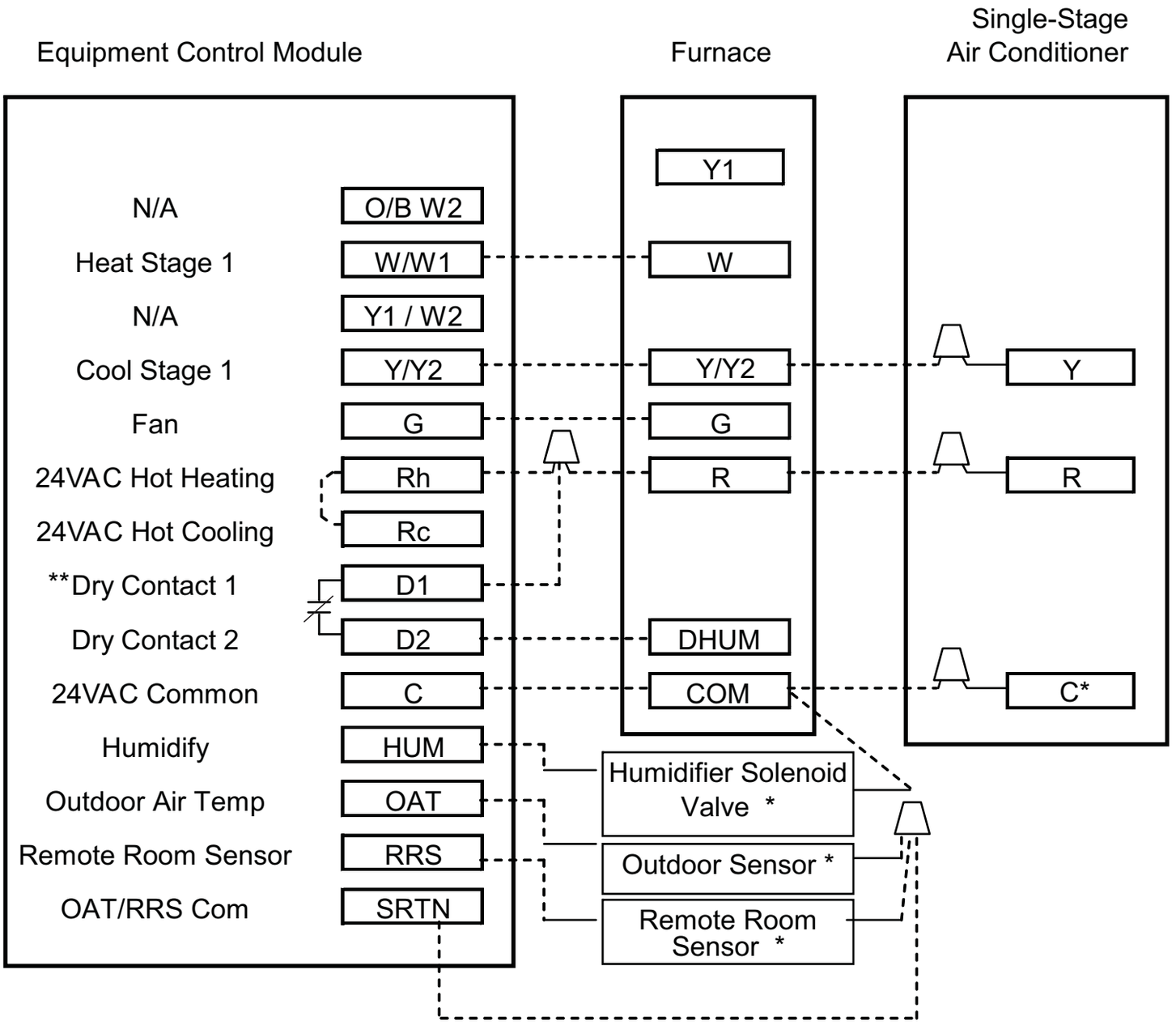


Fig. 32 – Variable Speed, Step Modulating, Multi–Stage and Single–Stage Furnace with Two–Stage Air Conditioner

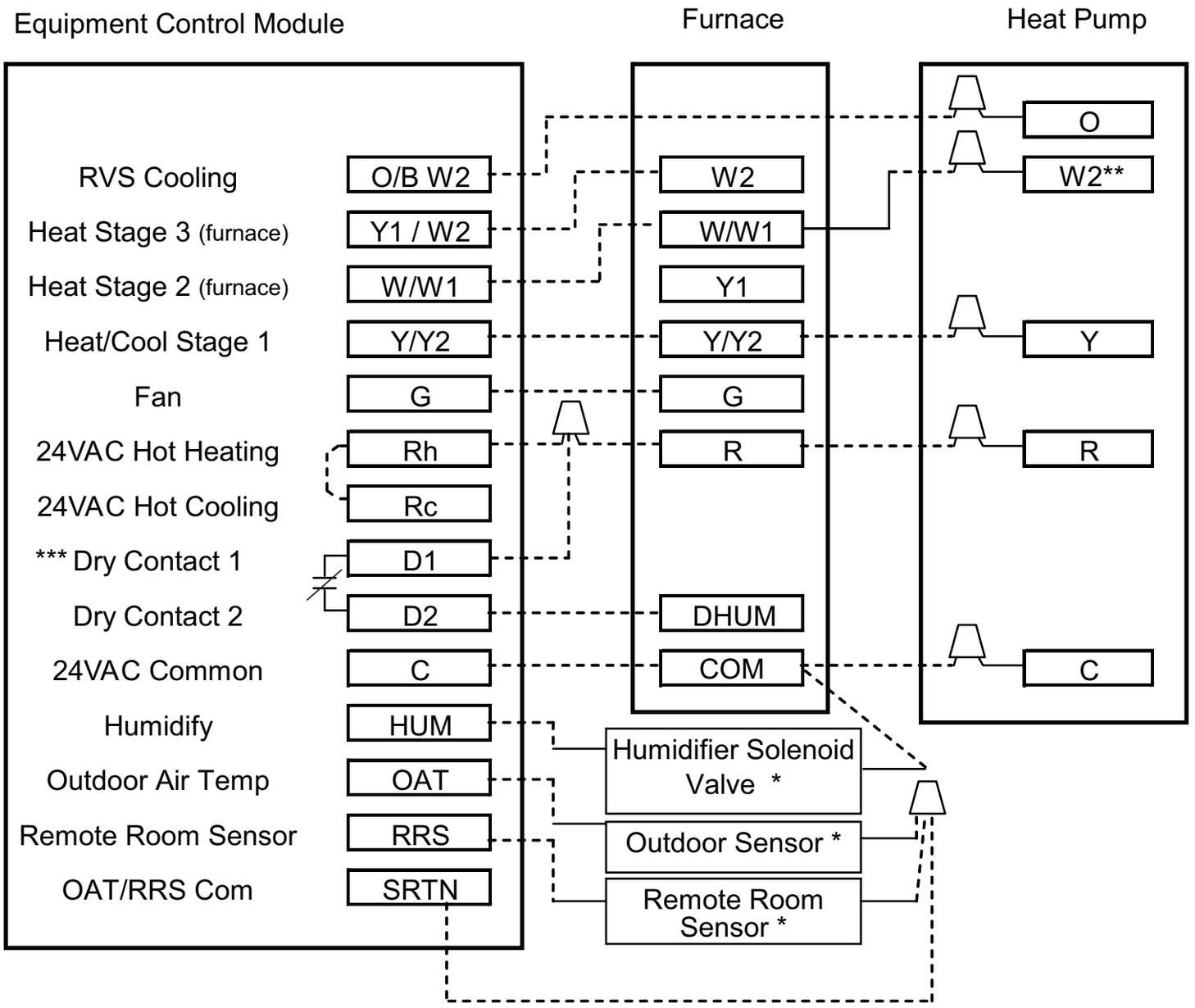


* Indicates connection may not be required/available.

** Option 19 set to 2.

A09124

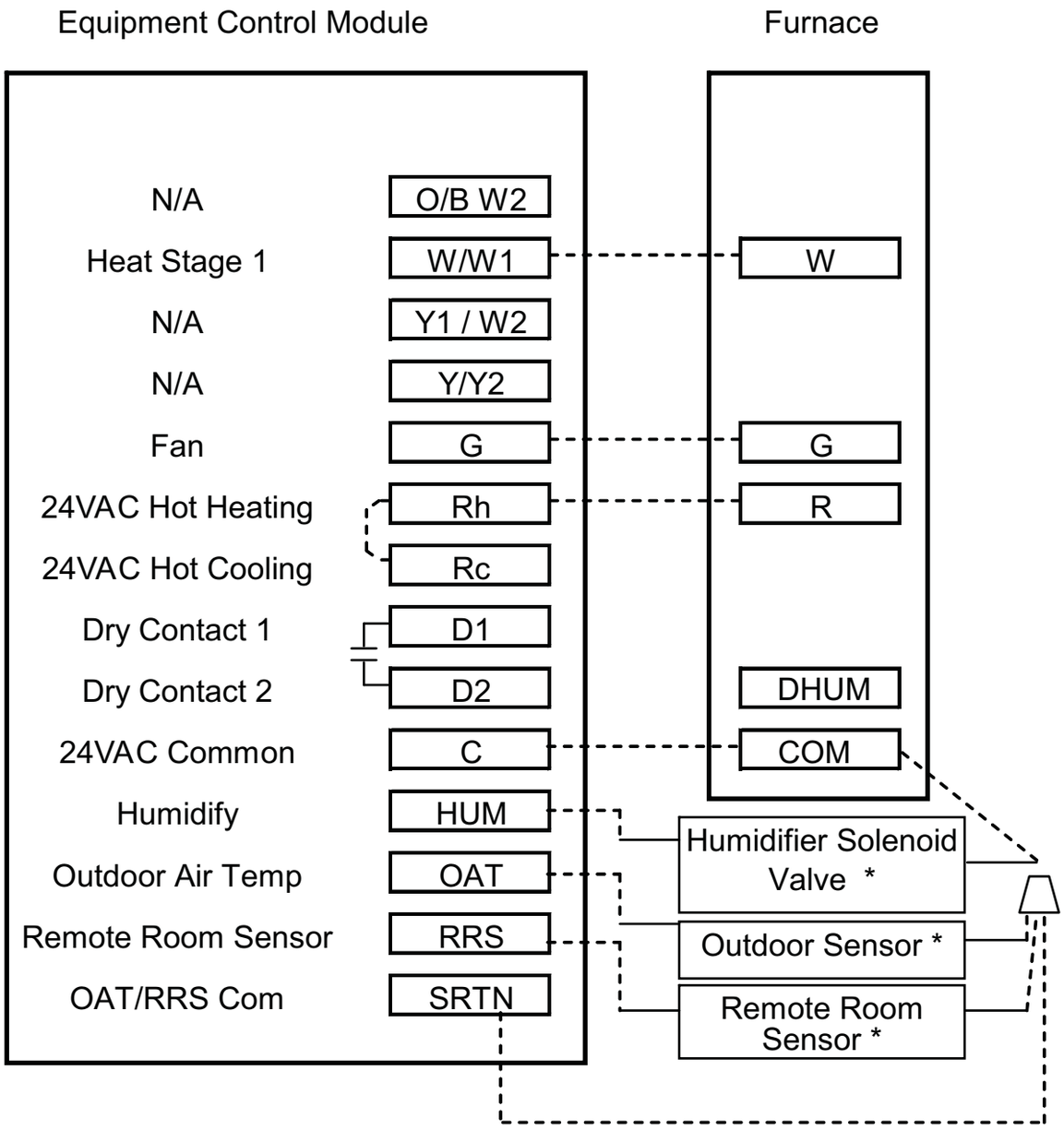
Fig. 33 – Single–Stage Furnace with Single–Speed Air Conditioner



* Indicates connection may not be required/available.
** Some heat pumps may designate W1.
***Option 19 set to 2.

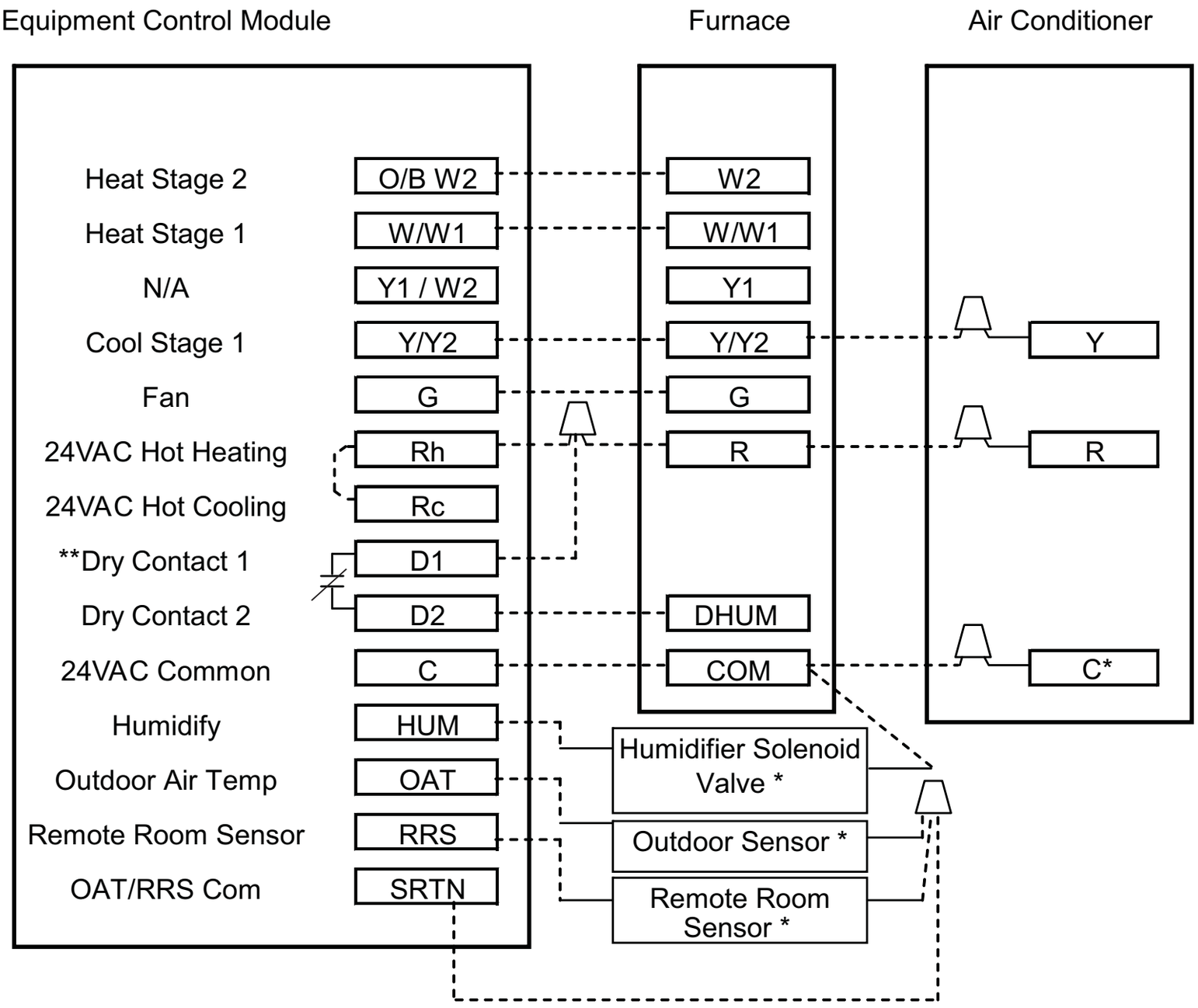
A09125

Fig. 34 – Variable Speed, Multi–Stage and Step Modulating Furnace with Single–Stage Heat Pump



A09126

Fig. 35 – Single–Stage Furnace Heating Only

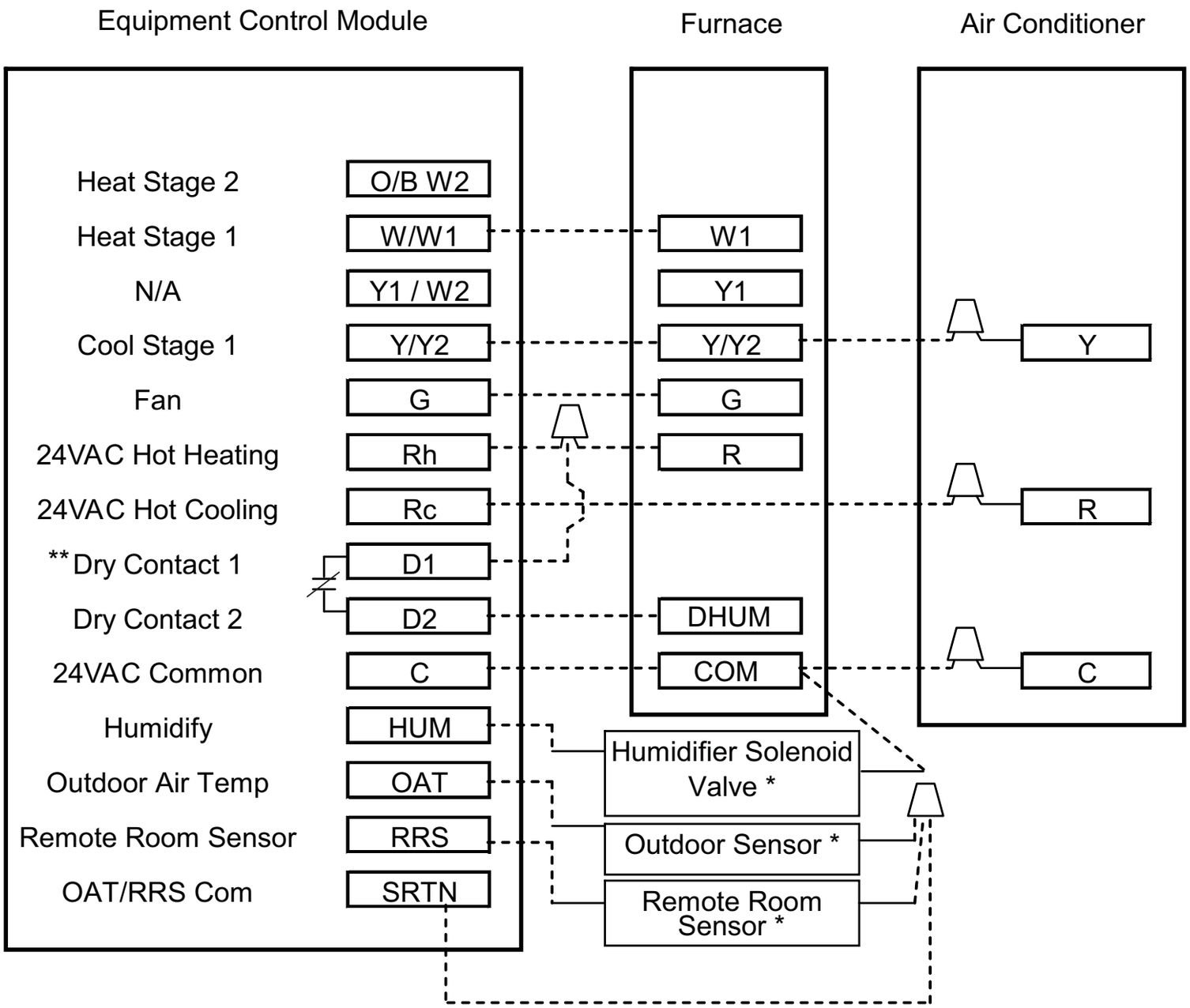


* Indicates connection may not be required/available.

** Option 19 set to 2.

A09127

Fig. 36 – Variable Speed, Multi–Stage, Step Modulating and Single–Stage Furnace with Single–Stage Air Conditioner



* Indicates connection may not be required/available.

** Option 19 set to 2.

A09152

Fig. 37 – Single–stage Furnace with Air Conditioner and Split Power

THERMIDISTAT CONTROL CONFIGURATION RECORD

Installer _____ Model Number _____ Date _____

A. Hardware Configuration

_____ Seal Hole In Wall

B. Mode Settings

_____ Mode (Off, Heat, Cool, Auto, Em Heat)

_____ Heating Setpoint Value

_____ Cooling Setpoint Value

_____ Fan (Auto or On)

C. Home, Away, Sleep Settings

	Heat	Cool
Home	____	____
Away	____	____
Sleep	____	____

D. Schedule (For Programmable Thermidistat Controls)

	Period 1			Period 2			Period 3			Period 4		
	Time	Heat	Cool	Time	Heat	Cool	Time	Heat	Cool	Time	Heat	Cool
All Days	____	____	____	____	____	____	____	____	____	____	____	____
Weekdays	____	____	____	____	____	____	____	____	____	____	____	____
Weekend	____	____	____	____	____	____	____	____	____	____	____	____

E Configuration Options

Option 01	_____	Equipment Type
Option 02	_____	Clean Filter Timer Adjustment
Option 03*	_____	Fahrenheit/Centigrade Selection
Option 04	_____	Fan (G) on with W/W1 Selection
Option 05	_____	Room Air Temperature Sensing (programmable models only)
Option 06	_____	Cooling Lockout Below 55°F/13°C Selection (only available if outdoor air sensor is present)
Option 07	_____	Zoning
Option 08	_____	Auxiliary Heat Lockout Temperature Setting (only available when heat pump is used and when outdoor air temperature sensor is present)
Option 09	_____	Heat Pump Lockout Temperature
Option 10	_____	Reversing Valve
Option 11	_____	Adjustable Setpoint Deadband (not available on Heat Only and Cool Only systems)
Option 12	_____	Smart Recovery (programmable models only)
Option 13	_____	Room Air Temperature Offset Adjustment
Option 14	_____	Humidity Offset Adjustment
Option 15	_____	Enable Auto Mode
Option 16	_____	Cycles Per Hour
Option 17	_____	Time Between Stages
Option 18*	_____	Backlight Configuration

E Configuration Options (cont)

Option 19	_____	Dry Contact (programmable models only)
Option 20	_____	Outdoor Air Temperature Offset Adjustment
Option 21*	_____	Keypad Lockout
Option 22	_____	High Cool Latch Temperature
Option 23	_____	High Heat Latch Temperature
Option 24*	_____	Programmable/Non-Programmable (programmable models only)
Option 25*	_____	Number of Programmable Periods Per Day (programmable models only)
Option 26	_____	Minimum Cooling Setpoint
Option 27	_____	Maximum Heating Setpoint
Option 28	_____	UV Light Reminder
Option 29	_____	Humidifier Pad Reminder
Option 30*	_____	Programmable Fan (programmable models only)
Option 31*	_____	Daylight Savings Time Configuration (programmable models only)
Option 32	_____	Furnace Heat Staging
Option 33	_____	Single or Two-Piece Installation
Option 34	_____	Hybrid Heat Furnace Latch

E Configuration Options (cont)

Option 40	_____	Fan Humidity
Option 41	_____	Variable Speed Blower
Option 42	_____	Variable Speed Super Dehumidification
Option 43	_____	Intelligent Heat Staging
Option 44	_____	Super Comfort Heat
Option 99	_____	Reset to Factory Defaults

* Options with an asterisk can also be set/changed by the homeowner.

TP-PRH-4SI

Copyright 2009 Carrier Corp. • 7310 W. Morris St. • Indianapolis, IN 46231
Printed in U.S.A. Edition Date: 04/09

Catalog No: TP—PRH—4SI

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

Replaces: TP—PRH—3SI