Cancels: II ZONEKIT-0-11   II ZONEKIT-0-12
                                                           12-99

TABLE OF CONTENTS

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

This symbol → indicates a change since the last issue.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes and wear safety glasses. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local and state building codes and Sheet Metal and Air Conditioning National Association (SMACNA) for special installation requirements.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit or in instructions and manuals, 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 hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

INSTALLATION CONSIDERATIONS

Before the actual installation of a zoning system can begin, decisions need to be made to determine the number and location of zones and sensors. This affects duct and damper selections. For assistance with these decisions, consult the Zoning Design Guide available from your distributor or branch.

This instruction covers the physical installation and start up of the Zone Perfect *Plus* -B system. Use this instruction to guide the actual installation process after all the air side decisions have been made.

1. Install User Interface and Remote Sensors in non-condensing areas with ambients between 32°F and 120°F. Install Dampers and Equipment Controller in non-condensing areas with ambients between 32°F and 158°F.

2. A TXV is required on the indoor coil when used with all residential split system equipment.

3. Use separate isolated transformer to supply power to Zone Perfect *Plus* -B system (40 va minimum, class 2, field supplied).

4. Proper equipment and duct sizing are important in a zoned system. Be sure to refer to the Zoning Design Guide for assistance in making these selections.

⚠ **CAUTION:** TXV on indoor coil is required with all residential split system equipment.

INTRODUCTION

The Zone Perfect *Plus* -B System allows air conditioning and heating equipment to control temperatures and humidity in up to 8 distinct spaces or Zones within a building. Each zone has independent temperature settings.

The comfort temperature settings can change automatically through the use of schedules. This allows Zone Perfect *Plus* -B to change temperature settings in zones to reflect occupancy or usage. For example, you can condition the bedrooms in a home from 5:00 PM through 7:00 AM or the kitchen from 3:00 PM through 6:00 PM. The Zone Perfect *Plus* -B System uses motorized air volume control dampers (also called zone dampers) to regulate flow of conditioned air into zones. In this manner Zone Perfect *Plus* -B can selectively heat or cool certain portions of a building depending upon space temperature requirements.

Each zone requires a motorized zone damper to control the air supplied to it and a zone sensor to sense zone temperature. There are 4 types of zone sensors available and they may be used in combination:

• User Interface — Each installation has only 1 User Interface. This is the command center for the entire system, and it will typically be located in Zone 1 to sense and control the

temperature in this zone. If desired, a Remote Sensor may be used to sense the Zone 1 temperature. This can give the installer some flexibility in locating the User Interface to another area.

- Remote Sensor — This is a temperature sensor only, having no additional user inputs.
- Smart Sensor — Any zone other than Zone 1 may use a Smart Sensor. It provides a display of zone temperature and means to adjust the desired temperature in that zone only. It also displays the outdoor temperature and indoor humidity.

Be sure to select the desired sensor type for each zone. Standard kits include only Remote Sensors. Other types must be purchased separately. Installation Instructions for Smart Sensors are included with them.

INSTALLATION

I. CHECK EQUIPMENT AND JOB SITE

A. Inspect Equipment

File claim with shipping company, prior to installation, if shipment is damaged or incomplete.

II. COMPONENT LOCATION AND WIRING CONSIDERATIONS

⚠ **WARNING:** To prevent personal injury or possible equipment damage disconnect power supply before routing wire.

All wiring must comply with national, local, and state codes.

A. Locating Equipment Controller

All wiring is run back to the Zone Perfect *Plus* -B Equipment Controller. Select a location near the furnace or fan coil where wiring from the User Interface, each Remote Sensor or Smart Sensor, each damper actuator, and the equipment itself can come together easily.

The Zone Perfect *Plus* -B System is approved for indoor use only and should never be installed with any of its components exposed to the elements. The Equipment Controller (and the zone dampers) may be installed in any area where the temperature remains between 32° and 158°F, and there is no condensation. The cover must be installed to prevent damage from other sources. Do not locate where it will be accessible to children. Avoid areas in which the sound of relays energizing on the Equipment Controller may be an annoyance. It may be mounted in either vertical or horizontal position. Remember that wiring access is likely the most important consideration.

⚠ **CAUTION:** To prevent possible damage to Equipment Controller, do not mount on plenum, duct work, or flush against furnace.

B. Locating User Interface

The User Interface is the command center for the Zone Perfect *Plus* -B system. It should be located where it is easily accessible and visible to home or business owner. It is also normally the Zone 1 sensor and as such needs to be located to properly measure the temperature in Zone 1. If these 2 requirements conflict, a separate Remote Sensor can be added for Zone 1. When Remote Sensor is connected to Zone 1 terminals (ZS1 and ZS1C) of Equipment Controller, the system **automatically** switches to using this sensor for Zone 1 and ignores the sensor within the User Interface. This arrangement allows User Interface to be located at any convenient place within the home or business, and only the Zone 1 Remote Sensor must be located in Zone 1.

NOTE: The User Interface also controls humidity functions. If the User Interface is not used to control Zone 1 temperature, it must still be located in a suitable area where humidity control will not be affected.

C. Locating Sensors

For proper operation, each sensor must accurately measure the temperature within its zone. Remember that zone sensors can be a combination of 4 different types as described in introduction.

For accurate temperature measurement, the following guidelines should be followed:

Sensor should be mounted:
- Approximately 5 ft (1.5m) from floor.
- Close to the center of its zone, preferably on an inside wall.
- On a section of wall without pipes or duct work.

Sensor should NOT be mounted:
- Close to a window, on an outside wall, or next to a door leading to the outside.
- Where it will be exposed to direct light and heat from a lamp, sun, fireplace, or other temperature-radiating object which may cause a false reading.
- Close to or in direct airflow from supply registers and return-air grilles.
- In areas with poor air circulation, such as behind a door or in an alcove.

The Remote Sensor terminals are not marked for polarity because polarity is not important.

D. Wiring Considerations

All wiring in the Zone Perfect *Plus* -B system may be unshielded. Ordinary thermostat wire is ideal. Use 22 gage or larger for normal wiring. Lengths over 100 ft should use 20 gage or larger wire. Remote Sensors require only 2 conductors, but it is recommended that at least 4 conductors be run. This will allow a Smart Sensor to replace the Remote Sensor with no wiring changes at a later date.

The User Interface requires 4 conductors, each damper actuator requires 3 conductors. The connection to equipment (furnace or fan coil) could require as many as 8 conductors for a multi-stage installation. The leaving air temperature (LAT), heat pump temperature (HPT)—*(used with heat pumps only)*, and outdoor air temperature (OAT) sensors require 2 conductors each. The OAT sensor may be able to be connected at the outdoor unit using existing wiring. Refer to Installation Instructions included with the OAT.

Cables with excess conductors are acceptable. Cut off or fold back and tape any unneeded conductors.

Plan the routing of wiring early to avoid possible problems later on.

Remember all wires converge at the Equipment Controller, so its location is important.

III. INSTALL COMPONENTS

A. Install Equipment Controller

The Equipment Controller is designed so that wires can enter it from behind, above, or below. Plan wire routing before mounting Controller.

1. Open doors or remove cover to access mounting holes (remove the 2 Zone system cover from the left side first).
2. Mount back plate to wall using screws and wall anchors provided.
3. Level back plate and tighten screws.

B. Install User Interface

1. Open User Interface rear door (mounting base) to expose mounting holes. Press back half of the right end inward and then pull front and back halves apart at the right end to open. The mounting base (the back half of the plastic) can be separated from the User Interface body by snapping the hinge apart.

a. Remove hinged cover by snapping apart its hinge.

b. Separate the main body from the mounting plate by snapping its hinge apart.

c. Mount base before wiring and attaching remaining parts.

2. Route User Interface wires through large hole in mounting base. Level mounting base against wall and mark wall through 2 mounting holes. Any thermostat cable of 4 or more conductors may be used. Shielded cable is not needed.

3. Drill two 3/16-in. holes in wall where marked.

4. Secure mounting base to wall with 2 screws and anchors provided, making sure all wires extend through hole in mounting base.

5. Adjust length and routing of each wire to reach proper terminal and connector block on mounting base with 1/4 in. of extra wire. Strip only 1/4 in. of insulation from each wire to prevent adjacent wires from shorting together when connected.

6. Match and connect 4 wires to proper terminals of the connector blocks. Recommended connection is RED to V+, WHITE to VG, BLUE or YELLOW to RS+, and GREEN to RS-.

> ⚠ **CAUTION:** Improper wiring or installation may damage the User Interface. Check to make sure wiring is correct before proceeding with installation or turning on unit.

7. Push any excess wire into wall and against mounting base. Seal hole in wall to prevent air leaks. Leaks can affect operation.

8. Snap hinge back together.

9. Close User Interface assembly making sure pins on back of circuit board align with sockets in connector.

C. Install Remote Sensors

1. Separate the sensor and mounting back plate (with provided screws and anchors). Squeeze the top and bottom of the cover together firmly by grasping the raised top and bottom ridges. This will release the cover.

2. Pull a 2-conductor wire through hole on right-hand side.

3. Recommended connection is BLACK to either terminal, WHITE to remaining terminal. Stranded or common bell wire may be used. Lengths up to 1000 ft will contribute no noticeable error.

4. Align sensor case with base plate then press firmly until cover snaps into place.

For installation of other sensor types, refer to Installation Instructions provided for them.

IV. INSTALL ZONE DAMPERS

Proper selection and sizing of dampers is very important for proper system operation. Be sure to consult the Zoning Design Manual for assistance in making these selections. Selection and sizing information is not provided in this installation instruction.

If duct work requires multiple dampers for a single zone, up to 5 dampers may be wired in parallel. A multi-damper enabler is not needed.

For retrofit applications, older type dampers with their original actuators may be used under the following conditions:

1. A single damper may be connected directly to a Zone Perfect *Plus* -B output.

2. If multiple dampers are needed for a single zone, a multi-damper enabler must be used.

Older type dampers having an extended shaft and driven by a crank arm may be fitted with the new DAMPACT actuators for quieter operation. Mounting is straightforward. Be sure to use 45° actuators (part No. DAMPACT45DEG) with round dampers and 90° actuators (part No. DAMPACT90DEG) with rectangular dampers. When new actuators are fitted to older dampers, multi damper enablers are not needed and up to 5 actuators can be connected in parallel to a single Zone Perfect *Plus* -B output.

Zone dampers may be installed in any position.

Install dampers so that actuator is visible for inspection and accessible in the event it would ever need to be serviced. The black mark on the end of damper shaft represents position of damper blade.

The 45 degree actuators on round ducts have their mechanical stops set at 45 degrees. DO NOT CHANGE THIS SETTING. Doing so will allow the actuator to close when it is trying to open. If an actuator is removed, it must be properly aligned when it is reinstalled. Do this by rotating the actuator and the blade to their closed positions and then tightening the actuator to the shaft. This assures alignment at the closed position. (Pressing the red blade release button inside the actuator connection box releases the motor and allows the actuator to be manually turned.)

> ⚠ **CAUTION:** When dampers are located in an unconditioned space, condensation is likely to occur in cooling. Regular and severe condensation will damage the actuator. To prevent condensation and losses, all dampers and ductwork in unconditioned space must be insulated or otherwise protected.

Whenever condensation might occur, it is recommended that plastic actuator covers (Part#DAMPACTXXCOV) be used over the actuator. These covers can help prevent condensation on actuators by locking out ambient humidity. Insulation may be applied over the cover to minimize heat transfer.

To install, place the cover over actuator and seal in place over the surrounding insulation with duct tape on all four sides. Sealing need not be perfect because there will be positive pressure inside the cover. Do not mount the dampers with their actuators hanging directly beneath the ductwork. It is best to mount the actuator facing in either the three or nine o'clock position.

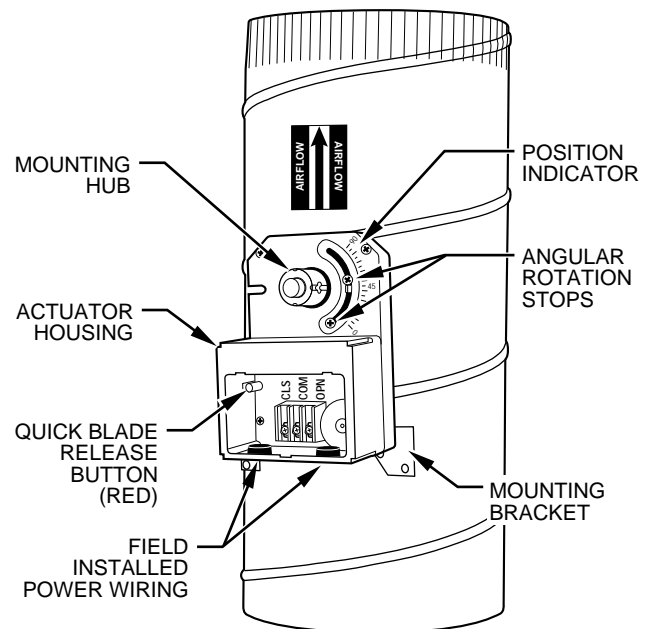For specific duct types, follow instructions below:

Fig. 1—Damper 24-vac Connections

A95096

A. Round Metal Duct Work

1. Crimp end of branch duct.

2. Slip end of zone damper over end of duct work. Use self-tapping sheet metal screw to secure. (See Fig. 2.)

3. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.

4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.)

Fig. 2—Insulated Round Metal Duct Work A95130
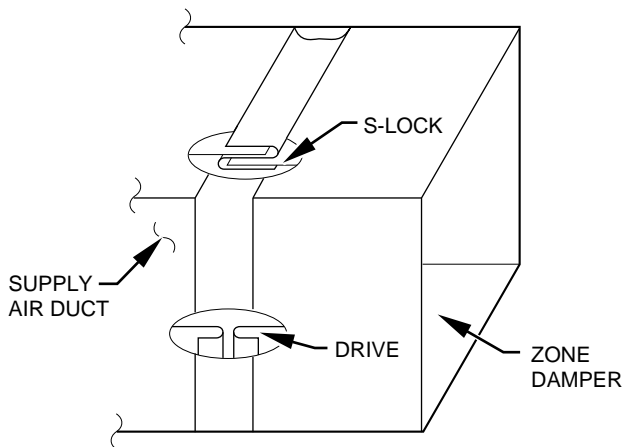
Fig. 3—Rectangular Metal Duct Work A92478

NOTE: All zone dampers and duct work must be properly supported according to local codes or SMACNA standards.

B. Rectangular Metal Duct Work

1. Make connections using S-lock and drives. (See Fig. 3.)

2. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.

3. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.) (See Fig. 4.)

C. Round Flexible Duct Work

1. Slip 1 end of flexible duct work over 1 end of zone damper. (See Fig. 5.)

2. Secure flexible duct to zone damper using SMACNA or other approved method.

3. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.

4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.) (See Fig. 6.)

NOTE: All zone dampers and duct work must be properly supported according to local codes or SMACNA standards.
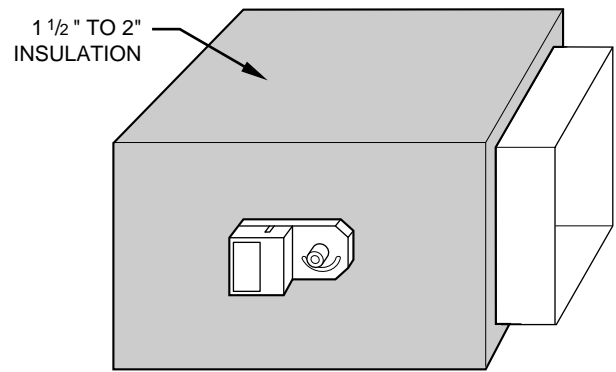
Fig. 4—Insulated Rectangular Metal Duct Work A95131
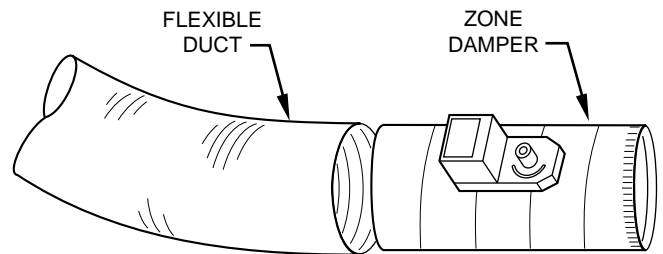
Fig 5—Round Flexible Duct Work A95132
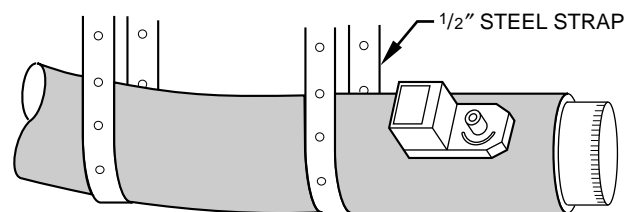
Fig. 6—Insulated Round Flexible Duct Work A95133
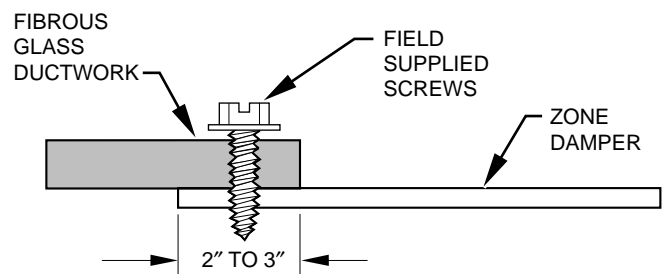
Fig. 7—Rectangular Fibrous Glass Duct Work A92480

D. Rectangular Fibrous Glass Duct Work

1. Insert 1 end of zone damper into 1 end of fibrous glass duct work approximately 2 to 3 in. (See Fig. 7.)

2. Screw field-supplied screws and tabs into zone damper.

3. Properly seal joint using duct tape, mastic, or other approved method. Do not allow mastic to come in contact with actuator.

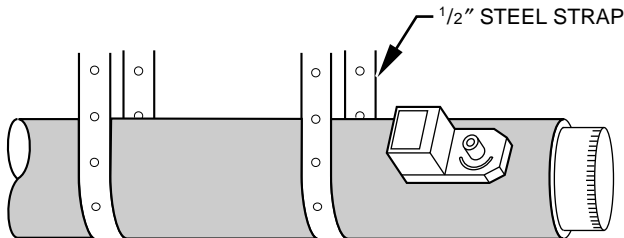4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.) (See Fig. 8.)

1 1/2″ TO 2″
INSULATION
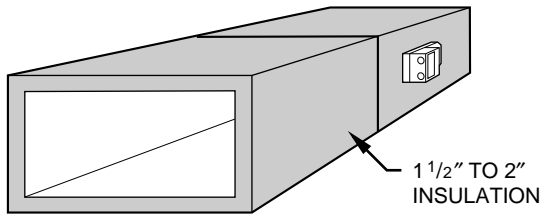
A95134

**Fig. 8—Insulated Rectangular Fibrous Glass
Duct Work**

V.   INSTALL BAROMETRIC BYPASS DAMPER

NOTE: The barometric bypass damper is a critical part of Zone Perfect *Plus* -B System for controlling noise at minimum airflow. A barometric bypass should be installed unless the duct work and indoor unit have been sized for use without a bypass.

The bypass should be installed according to local codes and SMACNA standards. Be sure bypass is properly supported.

For proper installation, refer to Installation Instructions packaged with barometric bypass.

⚠ **CAUTION:** Failure to properly install Leaving Air Temperature Sensor can cause permanent damage to the HVAC equipment.

VI.   INSTALL LEAVING AIR TEMPERATURE (LAT) SENSOR

Locate LAT sensor in main supply trunk after heating and cooling coil and before bypass damper and first branch. The LAT sensor is radiant shielded to prevent heat from affecting correct air temperature.

1. Drill a 1/4-in. hole at location in supply trunk where sensor will be installed.

2. Insert sensor in hole and use as a template to mark the 2 mounting holes.

3. Drill two 1/16-in. holes to accept No. 6 screws through pre-drilled holes in duct temperature sensor back plate.

4. Use 2 No. 6 sheet metal screws to mount duct temperature sensor to unit.

5. Connect sensor to 2-conductor wire using provided wire nuts. (See Fig. 9, 10, or 11 for connection to Equipment Controller.)

VII.   INSTALL HEAT PUMP TEMPERATURE (HPT) SENSOR

The HPT sensor is required in all heat pump/fan coil installations. It is not used in dual fuel(heat pump/furnace installation). It measures the temperature of the air leaving the indoor coil. The sensor is to be installed downstream of the indoor coil but before the electric heaters. It can be installed through the wall of the fan coil or may be located entirely inside the fan coil near the blower inlet. Anchor firmly in place with cable ties so that it cannot interfere with the blower wheel. (See Fig. 9, 10, or 11 for connection to Equipment Controller.)

VIII.   FINAL WIRING

Bring all Equipment Controller wires together at Equipment Controller. Make all connections as indicated on Fig. 9 (for 2-zone installations), Fig. 10 (for up to 4-zone installations), or Fig. 11 (for up to 8-zone installations).

Figures 15 through 42 show the connection between the Equipment Controller and the HVAC equipment. Select proper diagram for your equipment and connect accordingly. This connection will require as few as 4 or as many as 7 conductors. See Table 6 to identify the correct wiring figure.

NOTE: Table 6 and wiring diagrams appear in sequence near the end of this document.

NOTE: It is good practice to mark each wire as the final connection is made. This will preserve its identity if it is ever disconnected.

When installing a 24-vac humidifier, connect it directly to the HUM terminal on Equipment Controller, and C terminal of indoor equipment. Do not use an external humidistat. All necessary control is provided by Zone Perfect *Plus* -B.

⚠ **WARNING: DO NOT** connect furnace HUM terminal directly to Equipment Controller HUM terminal. This will bypass furnace safety controls. See Low Voltage Wiring Diagrams and notes for proper connection.

When using an FK or FV series fan coil, connect DHUM (dehumidify) output directly to DH terminal of fan coil. This output may also drive a relay (connected with other side to C) which can be connected to reduce fan speed in other types of blowers. The relay will be <u>energized</u> when humidity is normal and will de-energize when humidity is high, calling for reduced fan speed.

An LAT sensor must be connected in all systems. Both LAT and HPT sensors must be connected in heat pump/fan coil systems.

WIRING CONSIDERATIONS

Zone Perfect *Plus* -B treats all furnaces as if they were 2-stage. For single stage equipment, connect to W1. The same holds true for auxiliary heat in fan coils. (Refer to Fig. 15-42.)

With any 2-stage furnace, configure the furnace so that low heat is controlled by W1 and high heat is controlled by W1 and W2 together. This means the internal algorithm is to be disabled. See furnace instructions.

Some variable speed furnaces have a "zoning" setting. If such a setting exists, it should be turned on. It forces the furnace to adjust its airflow more frequently to accommodate the effects of damper movement. See furnace instructions.

All 2-speed air conditioners and heat pumps need to be configured so that Y1 controls low speed and Y1 and Y2 together control high speed in both heating and cooling. This is usually done by selecting the "zoning" position of the stage 2 latch pot. See 2-speed equipment instructions.

In 2-speed dual fuel applications (2-speed heat pump and furnace), do <u>not</u> set the furnace interface jumper on the heat pump to ON, even though its instructions say to do so. The necessary interlocking to keep both the heat pump and furnace from operating at the same time is done by Zone Perfect *Plus* -B.

Bryant's Perfect Heat system is now supported by Comfort Zone II, with all the features of the Thermidistat™ Control. When used with compatible variable-speed furnaces and fan coils, controlled dehumidification in cooling and warm heat pump heating are provided.

IX.   UNDERSTANDING SEQUENCE OF OPERATION

A.   Temperature Set Points

The Zone Perfect *Plus* -B System uses 2 temperature set points for each zone, the higher for cooling and the lower for heating. A minimum difference of 2°F. is normally enforced between heating and cooling set points, although this value may be adjusted by the installer. Each set point may be manually adjusted or controlled by a programmed time schedule established by the home or business owner.

B.   Heating and Cooling Comfort Set Points

If space temperature is between heating and cooling set points for the zone, then the zone is said to be "satisfied" with respect to temperatures. When a zone is satisfied, no heating or cooling is
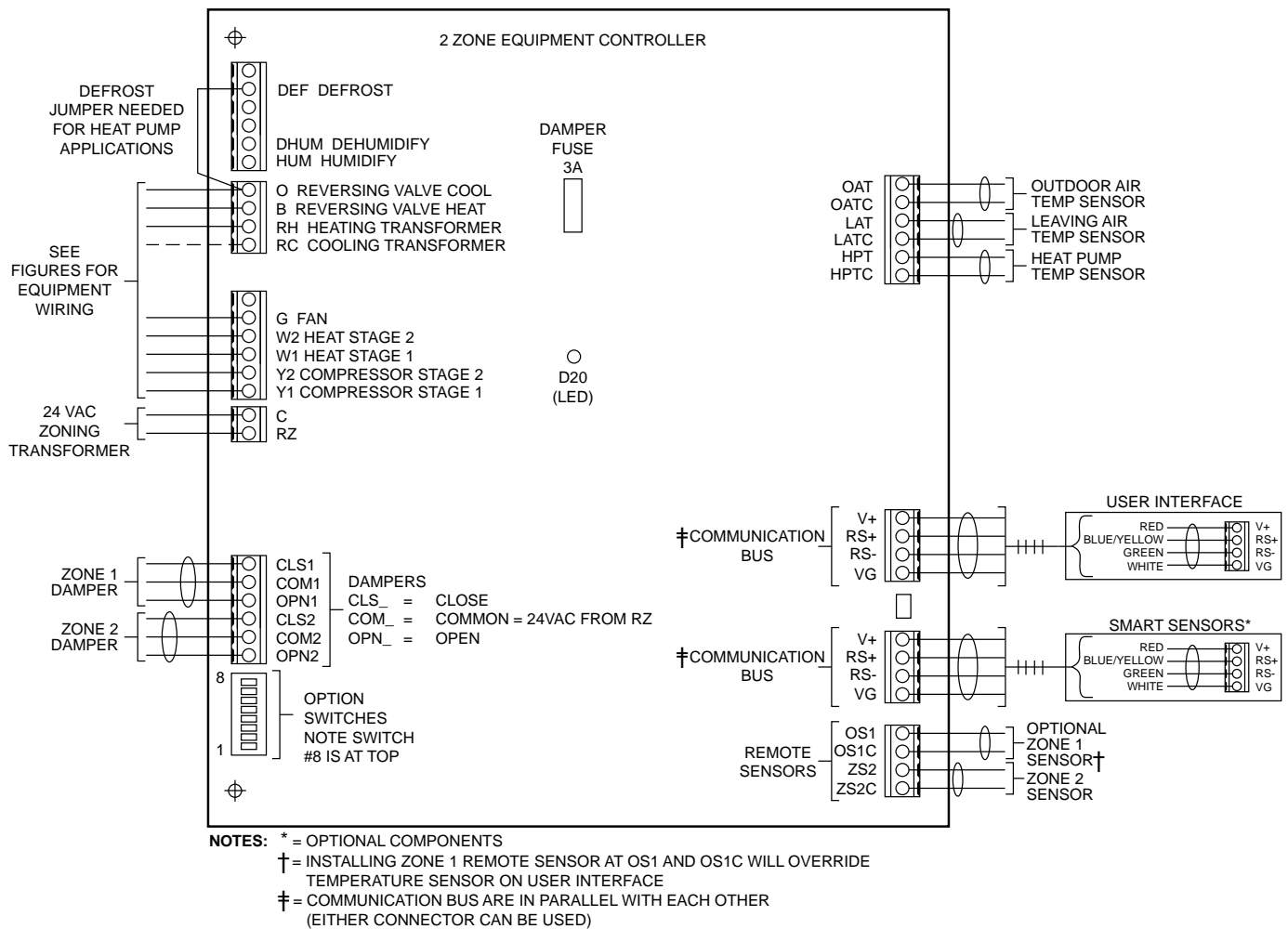
Fig. 9—2-Zone System Wiring Diagram

required. When all zones are satisfied, there is no demand and the equipment is turned off. For example, if cooling set point is 76°F and heating set point is 72°F, then a space temperature of 73°F is assumed to be satisfactory and no heating or cooling of the zone is required.

If space temperature in a zone falls below heating set point, then that zone needs to have heat added to zone which will raise space temperature back to heating set point. For example, if heating set point is 72°F and space temperature is 70°F, then space temperature must be raised 2°F in order for zone to be satisfied. In this case, temperature "heating demand" for zone is 2°F. (72° minus 70°F.)

Otherwise, if space temperature in a zone rises above cooling set point, then that zone needs to have heat removed from zone which will lower space temperature back to cooling set point. For example, if cooling set point is 76°F and space temperature is 77°F, space temperature must be lowered 1°F in order for zone to be satisfied. In this case, "cooling demand" for zone is 1°F. (77° minus 76°F.)

C. Out Feature

A new feature called OUT can be selected via the OUT button. When this selection is made, the system is being told that the selected zone is unoccupied. It will normally supply no conditioning to an OUT zone. If zone temperature exceeds 85°F or goes below 60°F, conditioning will be supplied to maintain the zone within these limits.

OUT zones are also used to provide dehumidification when cooling is not needed. During 'cool to dehumidify' all OUT zones are fully open.

The system will also use OUT zones to relieve the equipment under overload conditions. If the total demand from all zones is such that airflow is insufficient (or bypassing is excessive) this condition will be sensed by the LAT or HPT temperature sensors. When these temperatures begin to approach their limits, Zone Perfect *Plus* -B will first begin to open dampers in the OUT zones to relieve overload condition. The system will also monitor temperatures in the OUT zones and never allow them to become cooler than the coolest zone (in cooling) or warmer than the warmest zone (in heating). This prevents over conditioning of OUT zones while still using them to relieve an overload condition.

Zones can be set to OUT at any time or OUT can be programmed like any other temperature. The home or business owner can then program OUT for times that the zone is not likely to be occupied. When OUT is selected, both heating and cooling set points are replaced by "--."

D. Sequence Of Events For Normal Heating Or Cooling Cycle

Given comfort set points and space temperature for zones within system, Zone Perfect *Plus* -B will determine if active heating or cooling is required. If so, Zone Perfect *Plus* -B will perform the following:

1. Fully open 1 or more dampers and position others so that all zones will be conditioned back to their set points at the same time.

2. Turn on equipment.

3. While equipment is on, continually make small adjustments in damper positions so that all zones converge on their set points at the same time.

DEFROST JUMPER NEEDED FOR HEAT PUMP APPLICATIONS

4 ZONE EQUIPMENT CONTROLLER

DEF DEFROST

DHUM DEHUMIDIFY
HUM HUMIDIFY

DAMPER FUSE 3A

SEE FIGURES FOR EQUIPMENT WIRING

O REVERSING VALVE COOL
B REVERSING VALVE HEAT
RH HEATING TRANSFORMER
RC COOLING TRANSFORMER

G FAN
W2 HEAT STAGE 2
W1 HEAT STAGE 1
Y2 COMPRESSOR STAGE 2
Y1 COMPRESSOR STAGE 1

24 VAC ZONING TRANSFORMER

C
RZ

D20 (LED)

ZONE 1 DAMPER
CLS1
COM1
OPN1

ZONE 2 DAMPER
CLS2
COM2
OPN2

ZONE 3 DAMPER
CLS3
COM3
OPN3

ZONE 4 DAMPER
CLS4
COM4
OPN4

DAMPERS
CLS_ = CLOSE
COM_ = COMMON = 24VAC FROM RZ
OPN_ = OPEN

OAT
OATC
LAT
LATC
HPT
HPTC

OUTDOOR AIR TEMP SENSOR
LEAVING AIR TEMP SENSOR
HEAT PUMP TEMP SENSOR

‡ COMMUNICATION BUS
V+
RS+
RS-
VG

USER INTERFACE
RED
BLUE/YELLOW
GREEN
WHITE
V+
RS+
RS-
VG

‡ COMMUNICATION BUS
V+
RS+
RS-
VG

SMART SENSORS*
RED
BLUE/YELLOW
GREEN
WHITE
V+
RS+
RS-
VG

REMOTE SENSORS
OS1
OS1C
ZS2
ZS2C
ZS3
ZS3C
ZS4
ZS4C

OPTIONAL ZONE 1 SENSOR †
ZONE 2 SENSOR
ZONE 3 SENSOR
ZONE 4 SENSOR

8
OPTION SWITCHES NOTE SWITCH #8 IS AT TOP
1

NOTES: * = OPTIONAL COMPONENTS
† = INSTALLING ZONE 1 REMOTE SENSOR AT OS1 AND OS1C WILL OVERRIDE TEMPERATURE SENSOR ON USER INTERFACE
‡ = COMMUNICATION BUS ARE IN PARALLEL WITH EACH OTHER (EITHER CONNECTOR CAN BE USED)

A98086

Fig. 10—4-Zone System Wiring Diagram

4. Turn off equipment when all zones reach their set points.

5. Leave dampers at their final positions while equipment is off.

6. If equipment does not run for 1 hour, it will fully open all dampers.

7. If any zone is more than 1½°F overconditioned, its damper will be fully closed.

8. If any zone is more than 2°F. underconditioned (calling), its damper will be fully open.

This is the basic sequence of operation for the Zone Perfect *Plus* -B System. The actual control of dampers, HVAC equipment, and system fan will change with the configuration of system. Depending upon configuration, Zone Perfect *Plus* -B can control heat pumps, furnaces, and dual fuel applications.

E. Control Strategy for Heating / Cooling Stages

The Zone Perfect *Plus* -B System will attempt to minimize use of additional stages of heating or cooling equipment.

Zone Perfect *Plus* -B controls multi-stage equipment in response to the level of demand and the number of zones with demand. In general, it tries to satisfy demand with a minimum number of stages. In heat pump systems, where auxiliary heat is usually expensive, a small extra demand is required to bring on auxiliary heat. This acts to prevent the unnecessary use of auxiliary heat. In addition, when an outdoor sensor is attached, the system can be set to lock out auxiliary heat for outdoor temperatures above an installer selectable value. This will be covered under System Configuration.

SYSTEM CONFIGURATION

Zone Perfect *Plus* -B must be configured to match the type of equipment connected to it. In addition, there are several choices of configuration based on how the user wants the system to operate. Configuration is done in 2 parts. First is the setting of 8 DIP switches on the Equipment Controller. The second is a group of software selections made via User Interface. Follow the sequence below for easy setup.

Configuration of the Equipment Controller is done first with the power off. Then power is applied and the User Interface is configured with power on.

NOTE: A DIP switch module is oriented with switch 1 at the bottom and switch 8 at the top. Refer to Fig. 12 for switch orientation and labels.
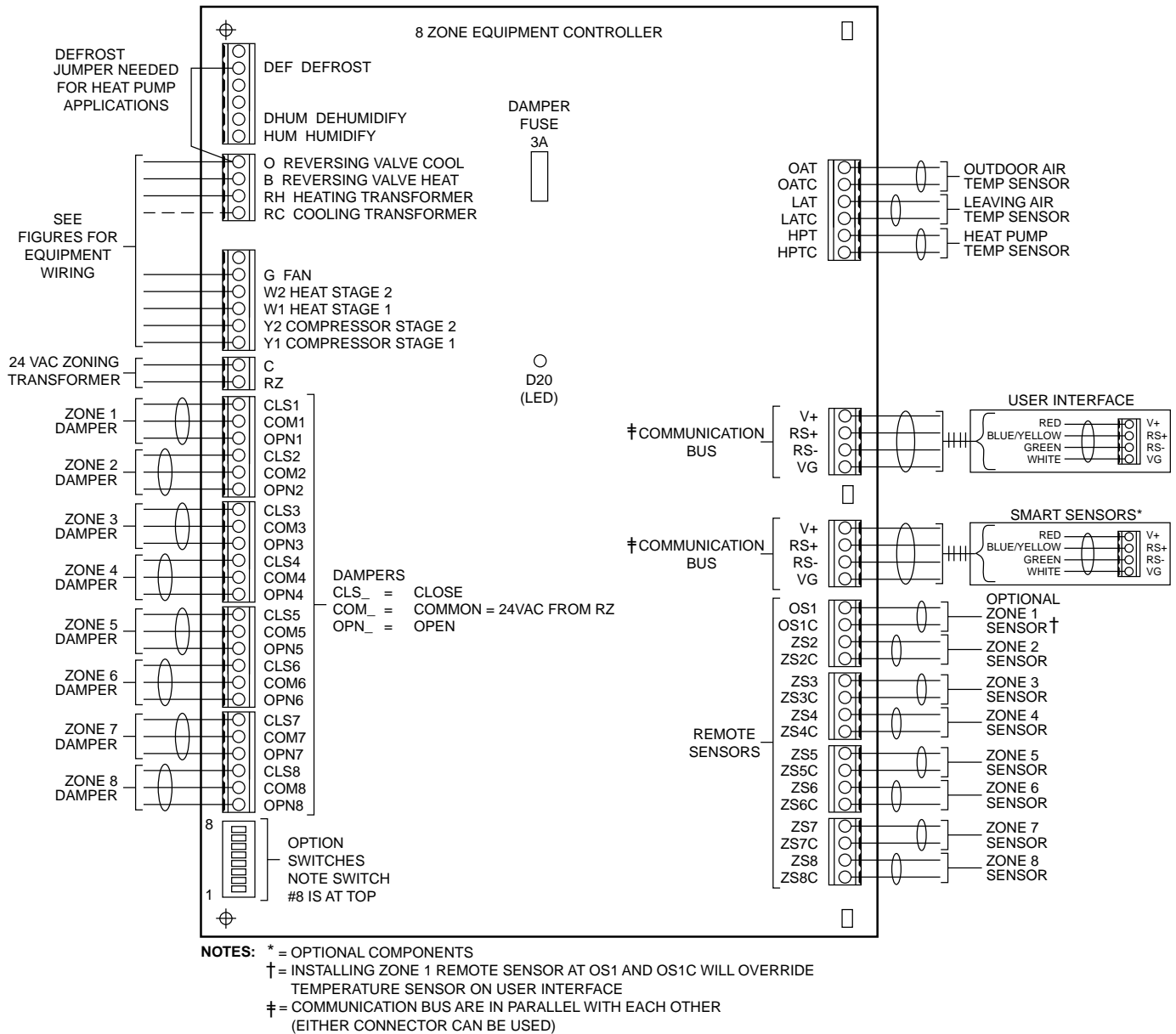
—7—

Fig. 11—8-Zone System Wiring Diagram

A98087

I. EQUIPMENT CONTROLLER CONFIGURATION

Located near bottom of Equipment Controller circuit board, there is an 8 section DIP switch. The use of each switch is described below. Using a pen or pencil, set each switch to its proper state. ON is to the left and is the factory setting. OFF is to the right. Fig. 12 is a pictorial drawing of this selector switch.

Switch 1—Selects AC or HP.

ON—Selects AC.

OFF—Selects HP.

Switch 2—Selects single- or 2-speed compressor.

ON—Selects single speed.

OFF—Selects 2 speed.

Switch 3—Selects 3-stage electric heat. Equipment must include FK or FV series fan coil with single-speed heat pump and properly selected 3-stage electric heater.

ON—Normal 1- or 2-stage electric heat.

OFF—Special 3-stage electric heat.

Switch 4—Selects Smart Recovery in both heating and cooling. The system starts adjusting temperature 1-1/2-hours earlier than selected recovery time so it will arrive at new temperature at selected time.

ON—Smart recovery.

OFF—Normal recovery.

Switch 5—Zone system address selection. When 2 zoning systems are connected together, the second system should be set to OFF.

ON—Normal single system (address = 01).

OFF—Address selection for second zoning system.

Switch 6—Select installer test mode to assist in checking out the system. See Starting System.

ON—Selects normal operation.

OFF—Selects installer test mode.

Switch 7—Enables or prevents cooling when outdoor temperature is below the value selected by software Configuration Option 6. To limit low temperature cooling, first set this switch to OFF and then select 55, 50, or 45 degrees farenheit with Configuration Option 6. Requires outdoor air temperature sensor.

ON—Cooling enabled at all temperatures.

OFF—Low temperature cooling disabled.

Switch 8—Dual fuel selection for systems with heat pump and furnace.

ON—Selects normal system.

OFF—Selects dual fuel system.

—8—

NORM	☐	8	DUAL FUEL
NORM	☐	7	DISABLE LOW TEMP COOLING
NORM	☐	6	INSTALLER TEST MODE
NORM	☐	5	ADDRESS 11
SMART RECOVERY	☐	4	NORM
NORM	☐	3	3 STG HEAT
1 SPD	☐	2	2 SPD
AC	☐	1	HP

ON (CLOSED)   OFF (OPEN)   **NOTE:** Switch factory default is closed.
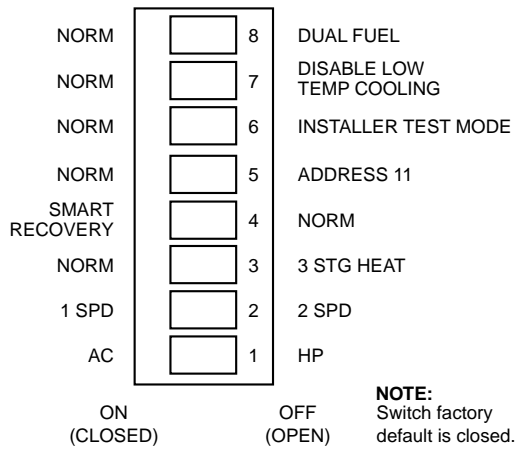
Fig. 12—DIP Switch Settings

A98183

→ **CAUTION:** All dual fuel installations **must** be equipped with a high pressure switch to turn off the compressor under a high indoor coil pressure situation.
The high pressure switch protects compressor and indoor coil from overpressure which would occur if a failure or wiring error resulted in the heat pump and furnace operating at the same time.
Also, an outdoor temperature sensor must always be included in dual fuel installations. If not, an E3 error message will appear. See Error Messages in the Trouble-shooting section.

II. USER INTERFACE CONFIGURATION

The User Interface is configured via a group of selections made through the keypad in a special configuration mode. Before the equipment is operated, the system must be properly configured. **Make sure this step is not left out.**

Before turning power on to the zoning system, disable the system equipment itself by either turning off its main power or by temporarily disconnecting its 24-vac power at the RC and RH terminals of the Equipment Controller. This will allow the zoning system only to operate. Go through the following steps with the equipment power off.

By this time 8 DIP switches on the Equipment Controller should be properly set.

Turn on power to the zoning system by applying power to its 24-vac transformer. When power is first applied to Zone Perfect *Plus* -B the Equipment Controller immediately begins positioning all dampers to fully open by running each damper motor in the open direction for 15 sec. This is done in succession, 2 zones at a time, starting with Zone 1. The time required will be 15 sec for each pair of zones. Remember that the system automatically determines the number of zones by detecting the presence of zone sensors.

At power up the User Interface displays all segments for a few sec. This is followed by the selected system type for an additional few sec. The system type shows as follows:

1. AC—1-Speed Air Conditioner
2. HP—1-Speed Heat Pump
3. A2—2-Speed Air Conditioner
4. H2—2-Speed Heat Pump
5. HS—1 or 2-Speed Heat Pump with 3-Stage Auxiliary Heat
6. dF—Dual Fuel with 1-Speed Heat Pump

7. d2—Dual Fuel with 2-Speed Heat Pump

Power-on check of the User Interface itself can be done by separating the User Interface from its backplate and then reconnecting it by attaching the 2 parts. This will allow observation of the User Interface at power up.

Several installer select options are set using the User Interface keypad.

These configuration options, like DIP switch settings, are intended to be selected at installation and are normally not modified by home or business owner. These options are not discussed in the Owner's Guide and therefore must be made as part of the installation. A special procedure allows entry into configuration mode. Zone Perfect *Plus* -B will automatically exit this mode if no button is pressed for 3 minutes. While in the configuration mode, configuration choices can be made. In addition, LAT and HPT temperatures as well as all damper positions can be viewed. A brief description of each is given below, followed by instructions on how to make the selection.

Not all option numbers are used in this product. Options will only appear on the User Interface if they are used in the particular application, i.e., auxiliary heat lockout temperatures will appear with heat pump selections, but not with AC/furnace selections. Option numbers between 1 and 29 are common to all wall mounted controls. Option numbers 30 and above are unique to zoning systems.

A. To Enter the Configuration Mode:

Press and hold FAN button for approximately 10 sec until room temperature and set point displays change to 2 numbers. You are now in the configuration mode.

CONFIGURATION OPTIONS:

Option 2—Clean filter timer

Option 3—Fahrenheit or Celsius

Option 4—Fan (G) ON with W

Option 5—Variable speed ICM motor

Option 6—Low ambient cooling lockout temperature

Option 7—Variable speed superdehumidification

Option 8—Auxiliary heat lockout Temperature

Option 11—Dual fuel crossover temperature

Option 12—Defrost heat selection

Option 13—Zone temperature offset adjustment

Option 14—Heat/cool dead band adjustment

Option 15—Enable AUTO mode

Option 16—Enable Perfect Heat *Plus* mode

Option 18—Humidity offset adjustment

Option 19—Outdoor air temperature offset adjustment

Option 20—Enable programmable fan

Option 30—Display damper positions

Option 31—Display HPT temperature reading

Option 32—Display LAT temperature reading

Option 33—Select LAT shutdown temperature

Option 34—User Interface address

Option 35—Disable zoning

Option 36—Select HPT or LAT sensor to monitor cooling

Option 37—Ignore LAT/HPT safeties

Option 38—Select auto changeover time
(1,9,10,17,21-29 are not applicable)

NOTE: If END button is pressed or if no button is pressed for 3 minutes, Zone Perfect *Plus* -B will exit configuration mode and return to normal operation. To re-enter configuration mode, FAN button must be pressed and held for 10 sec again.

While in configuration mode, the large display shows the selection which has been made and the smaller display (COOL set point display) shows current option number. One of these will be flashing.

The up and down buttons are used both to move between available options and to make selection for each option. When option number (small display) is flashing, the up and down buttons adjust it, moving between available option numbers. After desired option number has been selected, press SET TIME/TEMP button. The large display will now flash, indicating that the up and down buttons now control available choices within that option. Each press of the SET TIME/TEMP button switches between available option (small display) and available selections within each option (large display).

Available options and available selections for each are described below.

OPTION 2—CLEAN FILTER TIMER

Select hours of blower operation (heating, cooling, or fan) before CLEAN FILTER icon is displayed. With OFF selected, icon will never come on, disabling this feature. Time selection can be from 400 to 3600 hours by selecting numbers 1 through 9. (Time is 400X number selected.) Factory default is 2 (800 hours). Recommended selections are: disposable filter—400 to 800 hours, media filter—1200 to 1600 hours, or electronic air cleaner—1600 to 2400 hours of blower operation.

AVAILABLE SELECTIONS:

Use UP and DOWN buttons to alternate between OF (off) and 1 to 9 in steps of 1.

OPTION 3—FAHRENHEIT OR CELSIUS

Select between Fahrenheit or Celsius operation. Factory default is Fahrenheit.

AVAILABLE SELECTIONS:

Use UP or DOWN buttons to alternate between F or C.

OPTION 4—FAN (G) ON WITH W

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

AVAILABLE SELECTIONS:

Use UP or DOWN buttons to alternate between OF (off) and ON.

OPTION 5—VARIABLE SPEED (ICM) BLOWER

If the furnace or fan coil contains a variable speed ICM blower, set this option ON. For normal (PSC) blowers, set to OF (off). This selection enables the system to use Perfect Heat features available only with the ICM blower. Factory default is OF (off).

AVAILABLE SELECTIONS:

Use UP or DOWN buttons to alternate between OF (off) and ON.

OPTION 6—COOLING LOCKOUT TEMPERATURE

This option allows selection of the outdoor temperature below which cooling is not allowed. DIP switch 7 still enables or disables this function, but this option allows setting its temperature. If DIP switch 7 is ON (cooling is enabled at all outdoor temperatures), Option 6 will display OF and cannot be changed. If DIP switch 7 is OFF (cooling can be disabled below a selected temperature), Option 6 will allow the selection of 45, 50 or 55 degrees F. For all residential equipment, select 55 degrees. For light commercial equipment, select minimum outdoor cooling temperature from equipment instructions. Factory default is 55.

AVAILABLE SELECTIONS:

Use the UP and DOWN buttons to move between 45, 50 and 55.

OPTION 7—VARIABLE SPEED SUPER DEHUMIDIFICATION

This function only operates with selected Perfect Heat compatible furnaces and fan coils. Refer to furnace or fan coil instructions. Option 5 must be set to ON for this option to appear. When there is a '*cool to dehumidify*' demand (a dehumidification demand but no cooling demand), the blower CFM is reduced to a minimum to obtain maximum dehumidification. While a '*cool to dehumidify*' demand exists, the equipment is cycled ON for 10 min. and then OFF for 10 min. The reduced blower CFM is produced by a Y signal without a G signal. ON enables this function. Factory default is OF.

AVAILABLE SELECTIONS:

Use UP or DOWN buttons to alternate between OF (off) and ON.

OPTION 8—AUXILIARY HEAT LOCKOUT TEMPERATURE SELECTION

This option is available only with heat pump and dual fuel systems. In heat pump systems, auxiliary heat is prevented from coming on while outdoor temperature is above the selected value. In dual fuel systems, the furnace is prevented from operating while outdoor temperature is above the selected value. This temperature must be set higher or equal to that of option 11. (See option 11 below.) Outdoor temperatures of 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, or 55°F or OF (off) may be selected. If OF (off) is selected, outdoor temperature does not affect system operation. Factory default is OF (off).

AVAILABLE SELECTIONS:

Use UP and DOWN buttons to move between 5 and 55 or OF (off) in steps of 5.

OPTION 11—DUAL FUEL CROSSOVER TEMPERATURE SELECTION

This option is only available with dual fuel systems. While outdoor temperature is below the selected value, only the furnace is used for heating. This option must be set lower than or equal to that of option 8. (See option 8 above.) If the temperature selections of option 8 and 11 are set to the same value, a dual fuel system will use the heat pump only above this temperature and the furnace only below this temperature. If the selections are different, the range between the 2 selections will use the heat pump as the first stage and the furnace as the second stage. Once the furnace comes on, it will remain on until the demand is satisfied. The following cycle will start with the heat pump. Outdoor temperatures of 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, or 55°F or OF (off) may be selected. If OF (off) is selected, outdoor temperature does not affect system operation. Factory default is OF (off).

AVAILABLE SELECTIONS:

Use UP and DOWN buttons to move between 5 and 55 or OF (off) in steps of 5.

OPTION 12—DEFROST HEAT SELECTION

A new feature that allows heat pump defrost cycles to always run to completion and includes a software selectable amount of aux heat during defrost. The equipment controller now senses 24vac on

the O line (which it did not put there) during a defrost. In response to this, it maintains the Y signal as long as the O signal exists, assuring defrost runs to completion. It now can also turn on W1 and/or W2 during defrost to control the amount of defrost heat. Option 12 makes this selection. Select O for no heat, 1 for W1 on, 2 for W1 and W2 on, and 3 for W2 only on. This last selection is only available if 3-stage heat is selected by turning DIP switch 3 off. When 1, 2 or 3 are selected, no wire should be connected between the W terminals of the heat pump and the indoor unit. Factory default is 0.

AVAILABLE SELECTIONS:
Use UP and DOWN buttons to move between 0, 1, 2, or 3.

OPTION 13—ZONE TEMPERATURE OFFSET ADJUSTMENT

Each zone temperature reading can be independently offset by up to plus or minus 5 degrees F. While Option 13 is selected, the NEXT ZONE button moves between zones and the UP and DOWN buttons select an offset value between -5 and +5 degrees F in 1 degree F steps. The offset number is added to the actual zone temperature to produce the offset zone temperature, which is displayed and used by the system. Factory default value is 0.

AVAILABLE SELECTIONS:
Use UP and DOWN buttons to move between -5 and 5 in steps of 1.

OPTION 14—HEAT/COOL DEADBAND ADJUSTMENT

The minimum allowable difference between the heat and cool set points can be selected to any value between 0 and 6 degrees F. The factory default value is 2. Higher numbers provide less precise temperature control but save energy. Lower numbers provide comfort with more energy use. If the deadband is set to less than 2, the mode is set to auto changeover, and the auto changeover timer is small (see Option #38), continuous alternating heat and cool cycles may occur. This wastes energy, but may be desired to reduce humidity. When used with the 'COOL TO DEHUMIDIFY' selection, effective cooling with reheat can occur.

AVAILABLE SELECTIONS:
Use UP and DOWN buttons to move between 0 and 6 in steps of 1.

OPTION 15—ENABLE AUTO MODE

In some applications, auto changeover from heat to cool may not be desired. Option 15 selects ON or OF (off) for auto changeover. When OF, the AUTO mode icon never appears, disabling the AUTO mode. Factory default is ON.

AVAILABLE SELECTIONS:
Use UP or DOWN buttons to alternate between OF (off) and ON.

OPTION 16—ENABLE PERFECT HEAT *PLUS* MODE

The Perfect Heat operation is the same as that for the Thermidistat. This selection is only available if heat pump (DIP switch 1) and variable speed blower (Option 5) selections are already made. While heat pump is heating, the blower speed is reduced (by removal of the G signal) for outdoor temperatures between 12 and 40 degrees F., providing warmer leaving air temperatures. For heat pumps with electric aux heat and outdoor temperatures below 12 degrees F., any heat call is accompanied by a W1 signal, bringing on the first stage of aux heat to again increase leaving air temperature. Factory default is OF (off).

AVAILABLE SELECTIONS:
Use UP or DOWN buttons to alternate between OF (off) and ON.

OPTION 18—HUMIDITY OFFSET ADJUSTMENT

Like the zone temperature offset, the humidity reading can be offset by plus or minus 10% in 1% steps. This offset adjusts the humidity sensor output and therefore affects both humidify and dehumidify performance. Factory default is 0.

AVAILABLE SELECTIONS:
Use UP and DOWN buttons to move between -10 and 10 in steps of 1.

OPTION 19—OUTDOOR TEMPERATURE OFFSET ADJUSTMENT

Use this option to offset the outdoor temperature reading within a range of plus or minus 5 degrees F. Factory default is 0.

AVAILABLE SELECTIONS:
Use up and down buttons to move between -5 and 5 in steps of 1.

OPTION 20—ENABLE PROGRAMMABLE FAN

This option allows the blower to operate continuously (fan = ON) during the day and automatically (fan = AUTO) at night. When enabled, if the fan mode is set to ON, it will operate in AUTO during the Zone 1 SLEEP period. Factory default is OF (off).

OTHER AVAILABLE SELECTIONS:
Still using UP or DOWN buttons to alternate between OF (off) and ON.

Options 30, 31, and 32 allow direct viewing of the temperatures of the HPT and LAT sensors and the positions of all zone dampers. They are useful for setup and troubleshooting. When these options are selected, the temperatures or positions appear on the large display. All other system operation is unchanged. When Option 30 is selected, use the NEXT ZONE button on the User Interface to move between zones. Closed position is 0. Fully open is 15. Temperature above 100°F are shown as the amount above 100.

OPTION 30—DISPLAY DAMPER POSITIONS

Previously, Options 21 through 28 were used to view Zone 1 through Zone 8 damper positions. Now, Option 30 is selected for all damper positions and the NEXT ZONE button is used to move between the zones. This saves option numbers and makes scanning damper positions easier.

OPTION 31—DISPLAY HPT TEMPERATURE READING
OPTION 32—DISPLAY LAT TEMPERATURE READING
OPTION 33—SELECT LAT SHUTDOWN TEMPERATURE

This option selects maximum allowable LAT in furnace and fan coil auxiliary heat installations. Equipment will be turned off if its LAT exceeds selected value. Values are 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, or 75 corresponding to temperatures of 115° to 175°F. As LAT nears selected limit, actions are taken by the system to try to reduce the LAT. These include staging down multi-stage equipment and limited conditioning of OUT zones.

When the LAT temperature approaches its limit, OUT zone dampers progressively open, allowing more airflow into the duct system. The temperatures of the OUT zones are also monitored. As any OUT zone approaches the temperature of the most conditioned zone, its damper closes again, preventing the OUT zone from being over conditioned. If OUT zones are not available and LAT temperature cannot be maintained at a safe value, the system will shut down the equipment when the LAT temperature reaches its limit. If the equipment is shut down by a LAT or HPT limit trip, the small '*equipment on*' triangle on the display will be flashing to indicate this condition. Continuousfan is energized druing a LAT/HPT Limit Trip. This is true for both heating and cooling. As with earlier Zone Perfect *Plus* -B Systems, temperature set here was temperature where actions were **started**. Shutdown temperature was 20°F higher than selected temperature. Therefore a setting of 155°F on Zone Perfect *Plus* -B is equivalent to 175°F on Zone Perfect *Plus* -B.

Heat pump temperature limit for shut down is fixed at 115°F and cooling LAT temperature limit for shut down is fixed at 40°F (down from Zone Perfect *Plus* -B which was 45°F.)

Fan coils vary greatly in their LAT (leaving air temperature) because of variations in the size of their heaters and their air flow. This makes proper selection of LAT limits difficult. A value of 50 (150 °F limit) should be adequate. After the system is in operation, LAT can be monitored via User Interface (configuration option 31 or 32) to check actual operating temperature. For furnaces select a value of 75°F plus the rated maximum temperature rise from the furnace nameplate. Factory default is 50 (or 150°F).

AVAILABLE SELECTIONS:

1. Use UP and DOWN buttons to move between 15 and 75 in steps of 5.

OPTION 34—USER INTERFACE ADDRESS

When 2 Zone Perfect *Plus* -B Systems are connected together on the same bus, each must have a different address. Address 01 is used for single systems. Address 11 is selected for second User Interface when present. Factory default is 01.

AVAILABLE SELECTIONS:

1. Use UP or Down buttons to alternate between 01 and 11.

OPTION 35—DISABLE ZONING

When this option is selected, all dampers go fully open and zone 1 sensor (normally User Interface itself) becomes the sensor for the entire home or business. In effect, the zoning system disappears and is replaced by a single thermostat. In this mode, the ZONE X where X is the zone number is not displayed. Factory default is OF (off), zoning enabled. This option is used to check out the system equipment. The User Interface acts as normal thermostat.

AVAILABLE SELECTIONS:

1. Use UP or DOWN buttons to alternate between OF (off) and ON.

OPTION 36—SELECT HPT OR LAT SENSOR TO MONITOR COOLING

Previously, the LAT sensor, located in the leaving air path, was always used to monitor cooling leaving air temperature. There are some applications where the HPT sensor, located just downstream of the coil, is better suited to measure the cooling leaving air temperature. This option allows the installer to make this selection.

AVAILABLE SELECTIONS:

1. Use UP or DOWN buttons to alternate between LA (use LAT sensor) and HP (use HPT sensor).

OPTION 37—LAT/HPT SAFETIES

⚠ **CAUTION:** Leaving this selection ON can cause permanent damage to HVAC equipment
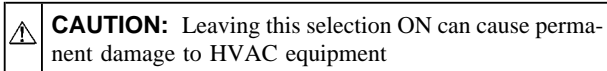
This option, when ON, tells the system to ignore the LAT and HPT temperature information. It should **only** be used for troubleshooting and to allow temporary operation with a failed or missing sensor until the sensor can be replaced. Factory default is OF (off).

AVAILABLE SELECTIONS:

1. Use UP or DOWN buttons to alternate between OF (off) and ON.

NOTE: ON is for temporary use only.

OPTIONS 38—SELECT AUTO CHANGEOVER TIME

This option selects a 5 to 30 minute time delay between heat and cool while in auto changeover mode. System must have no demand in current mode for selected time before changeover between heating and cooling is allowed. Factory default is 30 minutes.

AVAILABLE SELECTIONS:

1. Use UP and DOWN buttons to move between 5 and 30 in steps of 5.

SYSTEM STARTUP AND CHECKOUT

Zone Perfect *Plus* -B is designed with built-in checkout capability for both the equipment and the zoning system. Use the sequence below for trouble free setup. When it is time to start up system for the first time, you may want to check out the zoning system first and the equipment second or to reverse the process, checking equipment first and zoning system second. Either way is acceptable.

The following sequence checks out zoning system first. If you wish to check equipment first, proceed to Step 4 below. Then, after equipment is operating properly, return to Steps 1, 2, and 3 to check out zoning system.

I.   ENABLE INSTALLER SETUP MODE

Select installer setup mode at the Equipment Controller by moving DIP switch No. 6 to the OFF position. (See Fig. 12.) This may be done with power on or off. **This mode is indicated by InSt appearing in the User Interface clock display.** In this mode several special features are available to assist in the setup/checkout process:

a. When a zone is selected with the NEXT ZONE button, its damper opens fully and all other dampers close.

b. The selected zone's temperature appears on the large display.

c. The FAN button turns the blower ON or OFF.

d. The MODE button operates HEAT, COOL, or EHEAT for 2 minutes and then returns automatically to OFF. **No demand from the zones is needed to bring on the equipment in installer setup mode.**

II.   CHECK DAMPER AND SENSOR OPERATION

At the User Interface, set the mode to OFF using the MODE Button to make sure cooling or heating outputs are not turned on. Use the FAN button to turn on the blower by selecting ON (not AUTO) under the fan icon. This will start the blower (if its supply power is on). Use the NEXT ZONE button to select ZONE 1 above the large display. This will open Zone 1 fully and close all other zones. It will take the system 15 sec for each zone to complete this process.

You may now physically observe the dampers to verify their positions are correct (and check for air blowing out all Zone 1 registers only). The large display reads the temperature in Zone 1. Use this opportunity to verify the Zone 1 sensor is properly connected and is located in Zone 1 by breathing on the Zone 1 sensor and observing the temperature change. Remember, the Zone 1 sensor is normally inside the User Interface but a remote sensor may be used.

Use the NEXT ZONE button to select Zone 2 and repeat the above process. Continue through all zones. When finished, you will have verified that all the dampers and zone sensors are properly connected and working.

III.   QUICK CHECK OF EQUIPMENT OPERATION

Either this or the next step (Step 4) may be used for initial startup. This check runs equipment for only 2 minutes on each stage and is adequate to see that each stage comes on properly. For temperature rise, charge levels, etc. use the longer check, or disable zoning feature.

Be sure installer setup is still selected (Equipment Controller DIP switch No. 6 is OFF).

At User Interface, select HEAT mode. The first stage of heat will come on immediately (no temperature demand is needed). For a heat pump, this will be Y1 and G. For an air conditioning system, this will be W1. The first stage will remain on for 2 minutes. Then the second stage of heat will come on for 2 minutes. This will be Y1, Y2, and G for a heat pump, or W1 and W2 for an air conditioning system. At the end of 4 minutes, equipment will turn off and mode will automatically return to OFF. If mode is set to OFF at any time during 4 minutes, equipment will turn off immediately. Note that single stage system (heat or cool) will remain on for full 4 minutes because there will be no connection to Y2 or W2.

The same applies to COOL. When selected, cooling will come on immediately with no need for temperature demand. First stage will

be Y1, G (and O if a heat pump) and will run for 2 minutes. Then Y1, Y2, G (and O if a heat pump) will come on for next 2 minutes. At the end of 4 minutes equipment will turn off and mode will return to OFF.

In a heat pump system, EHEAT may also be selected at User Interface. This will turn on W1 only for first 2 minutes and then W1 and W2 for the second 2 minutes. The compressor will not run. As above, equipment may be turned off at any time during the 4 minutes by setting mode to OFF.

For all operation in this installer setup mode, no demand is needed, no compressor timeguard exists, and no temperatures are monitored. This means there is no protection for equipment, and this is the reason that operation is limited to 4 minutes.

When leaving this step, be sure to return installer setup switch (Equipment Controller DIP switch No. 6) to ON position. This will enable normal operation.

When any output is turned on, a red LED on the Equipment Controller board adjacent to the output's connection terminal is also turned on. This can be used at any time to monitor the state of the Equipment Controller outputs, even if the equipment is not yet connected or powered. Remember, the DEHUM output is a reverse logic relay. This means its LED will be ON while there is no dehumidify demand. See dehumidification section.

IV. LONGER CHECK OF EQUIPMENT OPERATION

When more detailed tests need to be made on equipment, the 2 or 4 minute run time provided in Step 3 may not be adequate. By selecting disable zoning mode (turn Option No.35 to ON under User Interface configuration), system operates like a standard thermostat system. All dampers go fully open, and the zone which is displayed on User Interface provides set points. This zone's temperature is the only controlled temperature. Equipment will operate as if it were being controlled by a single thermostat in the displayed zone. Use this option to check out equipment as you would with a normal thermostat. When finished, be sure to return to the configuration mode and turn Option No.35 OFF to enable normal zoning operation.

FINAL INSTALLATION SETTINGS
HUMIDIFICATION DESCRIPTION

If a humidifier is included in the system, Zone Perfect *Plus* -B can directly control it. If a conventional humidity control exists, it should be removed and the zoning system used in its place. Zone Perfect *Plus* -B provides superior convenience and features. When installing a 24-vac humidifier, connect it directly to the HUM terminal on the Equipment Controller and C terminal of indoor equipment.

⚠ **WARNING: DO NOT** connect furnace HUM terminal directly to Equipment Controller HUM terminal. This will bypass furnace safety controls. See Low Voltage Wiring Diagrams and notes for proper connection.

A humidity sensor is built into the User Interface to monitor and control relative humidity. The HUM output will control any humidifier with a 24-vac input. A humidify set point can be set to any value between 10 percent and 45 percent or can be turned off. When the humidity drops 2 percent below the set point, the HUM output is activated to turn on a humidifier. When the humidity rises 2 percent above the set point, the HUM output will turn off.

When an outdoor air temperature sensor is attached, an automatic humidity level adjustment can be selected. This selection provides a 1 percent reduction in the humidity set point for every 2 degrees reduction in outdoor temperature. The set point can be changed at any time, and it will then automatically adjust itself up and down with changes in outdoor temperature. In no case will the set point go above 45 percent or below 10 percent. This feature is to prevent sweating of windows in very cold weather while allowing higher humidity levels in warmer weather.

Another selection involves the interlocking of the HUM output to heating or fan operation. The HUM output can be set to come on only when there is a humidity demand and any heat output is on (heat pump, furnace, or auxiliary heat). A second setting allows the HUM output and the blower to turn on when there is humidity demand. This selection allows humidification with the fan when there is a no heat call. In no case will the HUM output be on without either heat or fan.

It may be advisable to configure the humidity control as part of the installation process. Following is a brief description of the humidify setup process. It is also covered in the Owner's Manual.

There are 5 selections for humidification in the heating mode:

1. Normal Humidify
2. Fan Humidify
3. Auto Humidify
4. Auto and Fan Humidify
5. OFF

HUMIDIFICATION SETUP

To make a humidification selection or change the humidity (hu) set point, a 2-button keypad press is required. Press SET TIME/TEMP and FAN buttons simultaneously (indicated on keypad by the RH symbol) to enter humidity mode. Either hu (humidify) or dh (dehumidify) will appear in the clock display. Use the SET TIME/TEMP button to select hu. The actual humidity now appears in the large display, the humidify set point appears in the heat set point display, and the small triangle icon below the set point is turned on when the humidify output is active. The UP and DOWN buttons now adjust the humidify set point and the MODE button scrolls through the 5 available humidification modes. These are described below. Table 1 shows the display indication for each of the 5 humidification modes.

1. Normal Humidify Mode—This is the factory default. In Normal Humidify, the humidifier will be on only if there is a humidify demand and any heating equipment is on. This will include furnace, heat pump, or auxiliary heat. In heat pump applications, this is an improvement over using an external humidistat, which only supplies humidity when auxiliary heat is on.

2. Fan Humidify Mode—This configuration allows a humidity demand to turn on the fan and the humidifier together, even if there is no heat demand. It is particularly useful when a furnace is oversized, resulting in short heating cycles. It allows the humidifier to run longer, supplying more humidity to the home. Note that fan hours will increase, using more electricity. Also, the humidifier delivers less moisture to cooler air than it does to heated air.

3. Auto Humidify—This feature is designed to eliminate the problem of sweating windows in very cold weather. When selected, the set point is reduced by 1 percent for every drop of 2°F. in outdoor temperatures between 50°F. and 0°F. The set point may be changed at any time. It will continue to track outdoor temperature from the new set point and the current outdoor temperature. The adjusted set point range is still limited between 10% and 45% relative humidity. To use this feature, the outdoor temperature sensor **MUST** be attached. If not, an E3 error message will be displayed.

4. Auto and Fan Humidify—The two choices of Auto Humidify nd Fan Humidify are combined in this selection.

5. Humidify Off—The humidify function can be turned off completely. This does not require changing existing set points.

To exit humidity setup mode, press END button, or if no buttons are pressed for 3 minutes, the User Interface will save and exit this mode, returning to normal operation.

—13—

TABLE 1—DISPLAYS OF AVAILABLE HUMIDIFY MODES

SELECTION	MODE DISPLAY	FAN DISPLAY	HUMIDIFY DISPLAY
Normal Humidity	Blank	Blank	HSP Value
Fan Humidity	Blank	Fan	HSP Value
Auto Humidity	Auto	Blank	HSP Value
Auto and Fan	Auto	Fan	HSP Value
Humidify Off	Blank	Blank	OF

HSP = Humidity Set Point

OF = Off

DEHUMIDIFICATION DESCRIPTION

Zone Perfect *Plus* -B contains a rich set of capabilities for the enhancement and control of dehumidification, particularly when used with a variable speed (ICM) blower. Depending on the type of equipment used, compressor speed, blower speed, set point adjustment, and equipment cycling are modified to provide added dehumidification.

A dehumidification set point(separate from the humidification set point) can be set to a value between 50 percent and 90 percent humidity or can be turned off. When the humidity rises above this set point by 2 percent, the dehumidify output is turned off. When the humidity falls to 2 percent below this set point, the dehumidify output turns on, supplying 24vac at its output. This output can be used to control any 24-vac device which decreases humidity when its control signal is removed.

When a variable speed blower with a dehumidify input is used with the system, the dehumidify output can be connected to its dehumidify input. This connection provides reduced cooling air flow while dehumidification is needed yielding better moisture removal from cooling air.

If the system has a 2-speed compressor (as selected by Equipment Controller DIP switch No. 2) and a PSC blower (as selected by User Interface Option No. 5), a dehumidify demand will make compressor operate at high speed only for any cooling demand. High speed provides better water removal than low speed when a 2-speed compressor is used with PSC blower.

Another selection provides humidity control by operating the cooling system when cooling is not required. If the humidity rises above the dehumidification set point, a special dehumidification routine is executed. As long as zone temperatures are not more than 3°F below their cooling set points, a dehumidify demand will turn on the cooling equipment but will limit its ON time to no more than 10 minutes at a time.

Finally, OUT zones are used to their maximum capability. When a zone is set to OUT it can be used to help remove humidity by cooling it as much as possible. When there is a dehumidify demand and a zone set to OUT, its damper is fully opened, and it can be cooled down to as low as 70°F. If it reaches 70°F its damper will close.

When all zones are set to OUT the house is in vacation mode. The cooling equipment will come on either to maintain the house below 85°F or to maintain the dehumidify set point by cooling the house down to as low as 70°F. This is a valuable feature for unoccupied homes in hot and damp climates.

DEHUMIDIFICATION SETUP

IMPORTANT: It may be advisable to configure the dehumidify control as part of the system installation process. Following is a brief description of the dehumidify setup process. It is also covered more thoroughly in the Owner's Manual.

There are 4 selections for dehumidification in the cooling mode:

1. Normal Dehumidify
2. Cool to Dehumidify
3. Vacation Dehumidify
4. OFF

To make a dehumidification selection or change the dehumidify (dh) set point, a 2-button keypad press is required. Press SET TIME/TEMP and FAN buttons simultaneously (indicated on keypad by the RH symbol) to enter humidity mode. Either hu (humidify) or dh (dehumidify) will appear on the clock display. Use the SET TIME/TEMP button to select dh (dehumidify). The actual humidity now appears in the large display, the dehumidify set point appears in the cool set point display, and the small triangle icon below the set point is turned on when the dehumidify output is active. The UP and DOWN buttons now adjust the dehumidify set point. The MODE button scrolls through the available dehumidification modes. These are described below. Table 2 shows the display indication for each of the dehumidification modes below. Note special instructions for the Vacation Dehumidify mode.

1. Dehumidify Off—This is used to disable dehumidification. It is indicated on the display by OF in the dehumidify set point location.

2. Normal Dehumidify Mode—this is the factory default. When normal dehumidify is selected, the compressor will not turn on without a cooling demand. if a dehumidify demand exists while cooling, the dehumidify output will be active (24vac removed from DHUM terminal of Equipment Controller). A variable speed blower will respond by reducing its airflow by 20%. If the fan is set for continuous operation (fan mode = ON) the fan will turn off for 5 minutes at the end of each cooling cycle to allow condensate draining and prevent re-evaporation. For this to work properly, the blower off delay of the equipment itself must be defeated. In this mode, the dehumidify set point appears and can be set to any value between 50 and 90% relative humidity.

3. Cool to Dehumidify Mode—This mode tells the system to operate the compressor, with limits, when there is a dehumidify demand and there is no cooling demand. The limits are that the system may overcool zones by up to 3° F., while attempting to satisfy a dehumidify demand. Within this 3°F. range, there is an additional balance between overcooling and humidity satisfaction. When overcooling must occur, the dehumidify set point is adjusted upward by 2% for each degree of zone overcooling. For example, a cooling set point of 76°F. and a dehumidify set point of 62% is equivalent to a cooling set point of 75° F. and a humidity set point of 64%. This balancing of temperature and dehumidification demand results in smoother operation of the equipment at the set points. Adjustment of the dehumidify set point as described above is internal to the system and does not show on the display.

   During cool to dehumidify demand, the compressor runs a maximum of 10 minutes ON followed by 10 minutes OFF. As in normal dehumidify, a continuous fan is turned off for 5 minutes at the end of each cooling cycle. Again, to utilize this feature, the equipment blower off delay must be defeated.

   If any of the zones are set to OUT, their dampers will fully open while the compressor is running and a cool to dehumidify demand exists. While the compressor is off or if their temperature goes below 70°F., their dampers close.

4. Vacation Dehumidify Mode—this is an extension of Cool to Dehumidify Mode. This mode is initiated when cool to dehumidify is selected AND all zones are set to OUT. All zones are conditioned to keep them below 85°F. If the humidity rises above the dehumidify set point, cooling can occur to satisfy the dehumidify demand until zones reach 70°. This selection is ideal for unoccupied homes in high humidity climates. This mode can be selected — when cool to dehumidify is selected — by pressing HOLD, OUT , and ALL ZONE in that order. Alternatively, each zone can be set to HOLD and OUT, but this requires more button presses. Remember, in vacation mode there are no temperature set points, but a dehumidify set point must be selected. Suggested values are 60 to 70 percent.

To exit the humidity setup mode, press HOLD/END button once. If no button is pressed for 3 minutes, Zone Perfect *Plus* -B will automatically save any new settings and then return back to normal operation.

TABLE 2—DISPLAYS OF AVAILABLE DEHUMIDIFY MODES

SELECTION	MODE DISPLAY	DEHUMIDIFY SET POINT
Dehumidify Off	Blank	OF
Normal Dehumidify	Blank	Dehum Set Point
Cool to Dehumidify	COOL	Dehum Set Point

ADDITIONAL DEHUMIDIFICATION COMMENTS

Variable Speed Superdehumidification is selected by configuration Option 7. It can only be implemented with Perfect Heat pump compatible systems because it require a variable speed indoor unit with superdehumidify capability. During a cool-to-dehumidify call, it provides maximum dehumidification by reducing airflow to its lowest possible value. The actual command from Zone Perfect *Plus* to the indoor unit is a Y signal without a G signal in addition to a dehumidify signal. All other characteristics of cool-to-dehumidify are unchanged.

Dehumidify actions are initiated when humidity rises to 2% above set point and are terminated when humidity drops to 2% below set point. This prevents unnecessary toggling of dehumidify actions when humidity is near the set point.

With any dehumidify selection, if the system has 2-speed compressor (DIP switch 2 is ON) and does not have a variable speed blower (configuration option 5 is set to OFF), all cooling will be done at high speed while a dehumidify demand exists. This is because the combination of a 2-speed compressor without a variable speed blower generally has poor humidity removal on low speed.

DEHUMIDIFY OUTPUT AND EQUIPMENT CONNECTIONS

When there is a dehumidify demand, dehumidify output is activated, which means that a 24vac signal is removed from the DHUM 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. This logic reversal has come about from historical use of a standard humidistat to do dehumidification. The humidistat contacts open on high humidity, thus removing a 24vac signal to initiate dehumidification. Equipment has been designed to operate in this manner, so Zone Perfect *Plus* -B must now accommodate the existing equipment.

FK and FV Series Variable-Speed Fan Coils, all 333BAV and 333JAV 80% Variable-Speed Furnaces, and 355MAV 90% Variable-Speed Furnaces with the DE connection have dehumidify inputs which connect directly to Zone Perfect *Plus* -B DHUM output. They are compatible with the reverse logic output and will reduce their cooling CFM by approximately 20% when a dehumidify demand is present.

The FK and FV Series Fan Coils have a terminal marked DH which should be connected to the Zone Perfect *Plus* -B DHUM output. Jumper J1 on the 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 Table 6 and Fig. 39 through 42.

On 333BAV and 333JAV furnaces, a green wire marked DHUM is connected to a spade lug which is connected to the G input terminal. Unplug spade lug, cut off spade receptacle from wire end, and splice a wire between green DEHUM wire and Zone Perfect *Plus* -B DHUM terminal. See Table 6 and Fig. 23 through 26.

Bryant 355MAV furnaces also have a DEHUM input. The DEHUM input acts differently depending on which style of variable-speed furnace control you have. The older style variable-

speed furnace control DOES NOT have a DE connection while the newer style variable-speed furnace control has a DE connection. Both of these variable-speed furnace controls function the same except the DEHUM logic is reversed.

On the older style variable-speed furnace controls, a field-supplied relay is required between the equipment controller and the furnace. The relay coil is connected between DHUM output on the equipment controller and COM terminal on the furnace control. Its normally closed contact is connected between R and DEHUM terminals on the furnace control, where the DEHUM terminal is a spade lug located next to the transformer secondary connections. See Table 6 and Fig. 27 through 30. When a dehumidify demand exists, relay is de-energized, and normally closed contacts supply 24vac to the furnace DEHUM terminal. As a result the furnace control reduces the blower airflow by 15%.

On newer style variable-speed furnace controls, a field-supplied relay IS NOT required. The DHUM output on the equipment controller is instead connected directly to the DEHUM terminal on the furnace control, where the DEHUM terminal is a spade lug located next to the transformer secondary connections. In addition, the DE jumper located next to the DEHUM terminal must be removed to enable the DEHUM input. See Table 6 and Fig. 31 through 34. When a dehumidify demand exists, the furnace control reduces the blower airflow by 21%.

OPERATIONAL INFORMATION

FIVE-MINUTE COMPRESSOR TIMEGUARD

This timer prevents the compressor from starting unless it has been off for at least 5 minutes. It can be defeated for 1 cycle by simultaneously pressing the FAN mode button and the UP button. It is not active in the installer setup mode.

FIFTEEN-MINUTE CYCLE TIMER

This timer prevents the start of the next cycle until at least 15 minutes after the start of the present cycle. Its job is to assure that equipment is not cycled more than 4 times per hour (or 1 cycle every 15 minutes). It is defeated for 1 cycle when the set point is manually changed to provide fast response to set point change. It can also be defeated for 1 cycle by simultaneously pressing the FAN mode and UP buttons.

STAGING TIMER

In multistage heating or cooling this timer prevents any higher stage from coming on until the previous stage has been on for 10 minutes. The timer is extended to 15 minutes for heat pump auxiliary heat and dual fuel furnace operation.

MINIMUM ON TIME

When a cooling or heating stage is turned on, it will remain on for at least 3 minutes. These timers are canceled when set points are changed.

HEAT/COOL SET POINT DIFFERENCE

The deadband between heating and cooling set points is selected by configuration Option 14. This deadband is maintained by allowing one set point to 'push' the other to maintain the required minimum difference. This is true in programming of schedules and adjustment of set points in operation.

AUTO CHANGEOVER

When the auto changeover mode is selected, a change from heat to cool or cool to heat cannot occur until a demand exists in the new mode and no demand has appeared in the old mode for the amount of time selected by configuration Option 38. Note that this means that for changeover to occur, the old mode must be and remain satisfied for the selected changeover time. Use the 30 minute setting for installations which should change modes only twice per day. The 5 minute setting will allow simultaneous heating and cooling demands to be serviced.

TABLE 3—OUTPUTS VS. STAGES

SYSTEM TYPE	COOL 2	COOL 1	HEAT 1	HEAT 2	HEAT 3	HEAT 4	HEAT 5
1-Speed AC	N/A	Y1	W1	W1,W2	N/A	N/A	N/A
2-Speed AC	Y1,Y2	Y1	W1	W1,W2	N/A	N/A	N/A
1-Speed HP	N/A	Y1,O	Y1	Y1,W1	Y1,W1,W2	N/A	N/A
with 3-Stage Heat	N/A	Y1,O	Y1	Y1,W1	Y1,W2	Y1,W1,W2	N/A
2-Speed HP	Y1,Y2,O	Y1,O	Y1	Y1,Y2	Y1,Y2,W1	Y1,Y2,W1,W2	N/A
with 3-Stage Heat	Y1,Y2,O	Y1,O	Y1	Y1,Y2	Y1,Y2,W1	Y1,Y2,W2	Y1,Y2,W1,W2
1-Speed Dual Fuel	N/A	Y1,O	Y1	W1	W1,W2	N/A	N/A
2-Speed Dual Fuel	Y1,Y2,O	Y1,O	Y1	Y1,Y2	W1	W1,W2	N/A

EMERGENCY HEAT MODE

When system is configured for a heat pump and EHEAT mode is selected, Y outputs are disabled and W outputs only are used for heat.

POWER-ON CHECK

When power is first applied to the system the large display indicates the equipment type selected by DIP switches as follows:

1. AC—1-Speed Air Conditioner

2. HP—1-Speed Heat Pump

3. A2—2-Speed Air Conditioner

4. H2—2-Speed Heat Pump

5. HS—1 or 2-Speed Heat Pump with 3-Stage Auxiliary Heat

6. dF—Dual Fuel with 1-Speed Heat Pump

7. d2—Dual Fuel with 2-Speed Heat Pump [15]

OTHER MESSAGES

Small Arrow—A small arrow is located to the left of HEAT and COOL icons which are located under the two set point displays. These indicate when cooling or heating equipment is actually operating. When arrows flash, equipment is waiting to come on but is being held off by compressor timeguard, cycle timer, or because LAT or HPT has exceeded its limits and temporarily turned equipment off. When the humidity screen is displayed, these same arrows show the state of the humidify and dehumidify outputs.

MULTIPLE SENSORS IN A SINGLE ZONE

In applications where a zone is large or contains several rooms, it may be desirable to have several sensors which are connected to read their average temperature. This may be done using 4 or 9 (or 16 or 25) sensors connected in series/parallel.

INITIAL POWER-ON PERFORMANCE

When power is applied to system all dampers are fully opened. As operation progresses, the system "learns" optimum damper positions needed to maintain set points in all zones. This learning process may require up to 2 hours of operation. Allow the system time to complete its learning.

OVERSHOOT CONTROL

If for any reason a zone is over-conditioned by more than 1.5 degrees and the equipment is still operating, that zone's damper will fully close until the over-conditioning is less than 1.5 degrees.

UNDERSHOOT CONTROL

If, for any reason, a zone is underconditioned,by more than 2°F., that zone's damper will be fully opened until the underconditioning is less than 2°F.

TEMPERATURE BALANCING

Under heavy load conditions when the HVAC system does not have sufficient capacity to maintain all set points, the system does not automatically open all dampers fully. It continues to control dampers to keep temperature error in each zone the same as all others.

VENTILATOR MODE

An automatic ventilation mode is provided by keeping all dampers at their final position while equipment is off. If the fan is left ON, more air is supplied to zones which required most conditioning. Those which required none will have their dampers closed. If 1 hour passes and there is no call for conditioning, all dampers open fully. In addition, if the mode selection is set to OFF and the fan selection is set to ON, all dampers will immediately open.

OUTPUTS VS. STAGES

Table 3 lists the active outputs for each stage of each possible system configuration. G is not shown.

For 1-stage furnaces and auxiliary heat connect to W1 and leave W2 open.

For single speed compressors, connect to Y1 and leave Y2 open.

SMART SENSOR OPERATION

NOTE: Refer to Smart Sensor Installation and Start-Up Instructions for proper installation and set-up procedure.

The Smart Sensor can control the setting of zone temperature, OUT, HOLD, or OFF. It can also display outdoor temperature and indoor humidity.
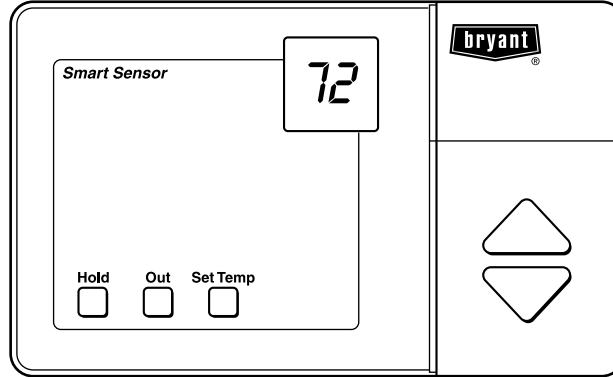

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A. Changing Set Point

1. The current temperature in that zone will be displayed in the LCD.

2. Press UP or DOWN button once to display set point for that zone. The LCD will display the current mode of operation, either heat or cool.

3. Press UP or DOWN button again as needed until new set point is shown.

4. Press SET TEMP button to change temperature between COOL set point and HEAT set point.
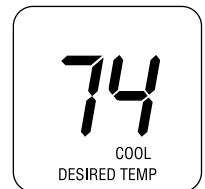
5. Pressing HOLD button will hold set point setting indefinitely. Pressing HOLD button again removes HOLD function.
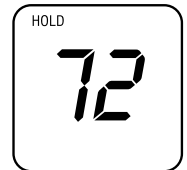
6. Pressing OUT button will program zone as being unoccupied. Pressing OUT button again changes zone to occupied. When a zone is set to OUT, desired temperature will be displayed as dashes when UP and DOWN buttons are pressed.
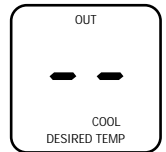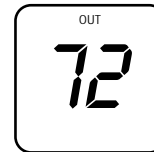
B. Viewing Outdoor Temperature and Indoor Humidity

1. Pressing both UP and DOWN buttons simultaneously will display outdoor temperature, if this feature is included, and indoor humidity. Outdoor temperature will be displayed first for 5 sec, followed by humidity for 5 sec. Smart Sensor will then return to normal. The humidity value will be humidity level as measured at user interface.

NOTE: If All Zone feature has been enabled from user interface, you will not be able to override settings at Smart Sensor location. The desired temperature will be displayed as dashes when UP and DOWN buttons are pressed. You must first remove All Zone function by pressing ALL ZONE button on user interface.
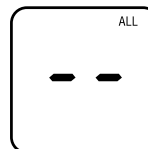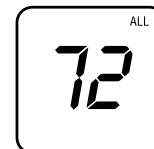
Smart Sensor display with ALL ZONE enabled

A Smart Sensor does not remove or transfer features from User Interface. It only provides a location within zone where access is provided to some of User Interface features. Any input that can be provided at Smart Sensor can also be provided at User Interface.

QUICK START

The quick start procedure outlined below will allow you to use your zoning system before you learn all the details of system operation. This setup may be done by the installer. For the best comfort and energy-saving results, we recommend that you read through the Owner's Guide and set up the system to match the end-user's schedule and comfort requirements.

To begin, locate the User Interface and follow the steps outlined below: (See Fig. 14.)

Set current day and time:

1. Press NEXT DAY button until current day of the week is shown.

2. Press SET TIME/TEMP button until the TIME icon flashes.

3. Press UP or DOWN buttons until the desired time is shown, making sure that the AM or PM time is correct.

4. Press HOLD/END key to exit.

Select system Mode:

1. Press MODE button to select HEAT or COOL.

2. Press HOLD/END button to turn on HOLD icon.

3. Press UP or DOWN button until the desired temperature is displayed.

4. Press ALL ZONE button to turn on ALL ZONE icon if this desired temperature is needed for every zone. With ALL ZONE selected, all zones are controlled to a single set point, providing even temperatures in all zones. Otherwise press NEXT ZONE button, and repeat HOLD function in selecting the desired temperature for each zone.

QUICK PROGRAMMING OF COMFORT SCHEDULES

The following is a brief overview of how to access and program schedules in your new zoning system. We highly recommend that you read and follow the programming information provided in the Owner's Guide for detail step-by-step instructions.

Before proceeding, set the correct Time and Day at the User Interface (see above Quick Start).

However, if you followed the above Quick Start procedure in selecting the system mode, you will need to reverse the ALL ZONE and/or HOLD functions before proceeding. Simply press ALL ZONE and/or HOLD button to remove these icons from the display. (See Fig. 14.) Make sure HOLD is removed from each zone.

During the programming process, you will have access to 4 program time periods, e.g., WAKE, DAY, EVE, and SLEEP. You will be able to select program start times and the heat/cool set points for each time period and zone. Use the Keypad to enter and move around inside the program. Use the temperature UP and DOWN buttons to adjust the start times and to raise and lower set points. When inside the program, the blinking icon indicates that a setting may now be changed.

1. Decide on a program schedule that you desire. Table 4 is an example of what already exists in the User Interface as the Energy Star recommended settings.

2. To begin programming, press PROGRAM button.

3. Press NEXT ZONE button until ZONE 1 appears on the LCD display.

4. Press NEXT DAY button until Monday (Mo) is displayed.

5. Press NEXT PERIOD button until the WAKE period is displayed.

6. Press SET TIME/TEMP button until the TIME icon is flashing.

7. Start programming ZONE 1 beginning with the WAKE start time. Press the UP or DOWN button until the desired starting time is displayed, make sure that the AM is correct.
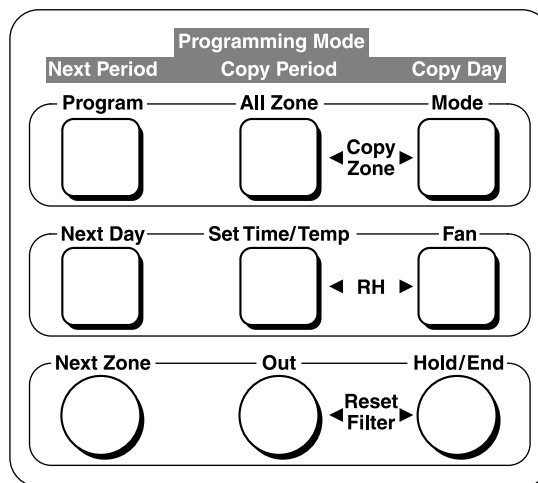

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Fig. 14—Zone Perfect Plus**-B Keypad**

TABLE 4—USER INTERFACE SETTINGS

	TIME	COOL	HEAT
WAKE	6:00 AM	78	68
DAY	8:00 AM	85	60
EVE	5:00 PM	78	68
SLEEP	10:00 PM	82	60

8. Press SET TIME/TEMP button until the HEAT icon is flashing. Press UP or DOWN button until the desired heating temperature for that period is displayed.

9. If that zone is going to be unoccupied, press OUT button. For more information regarding the Out feature, read the following section pertaining to Hold, Off, Out, and All Zone.

10. Press SET TIME/TEMP button until the COOL icon is flashing. Press UP or DOWN button until the desired cooling temperature for that period is displayed. You have now programmed the time and desired heating and cooling temperatures for Monday, ZONE 1, in the WAKE time period.

11. Press NEXT PERIOD button to change from WAKE to the DAY period. Repeat steps 6 through 11 for programming the time and desired heating and cooling temperatures for Monday, ZONE 1, in the DAY time period. Use NEXT PERIOD button again to select EVE and SLEEP, and repeat procedure.

12. After Monday ZONE 1 is completely programmed, you may select NEXT DAY and advance to Tuesday. You can now press COPY DAY button and copy the program schedule from Monday into Tuesday. This can be repeated as needed for each remaining day in the week. However, if copying the previous day is not desired, you may individually program each day using the NEXT DAY button and repeating steps 6 through 12. Press HOLD/END button to exit programming mode.

You may also use the button pair marked COPY ZONE (COPY PERIOD and COPY DAY buttons simultaneously) to copy a full week from 1 zone to the next. First use NEXT ZONE to select the new zone, and then press COPY ZONE pair to copy the entire week from the original zone into the new zone.

NOTE: Other ways to program comfort schedules with their function keys can be found in the Owner's Manual.

HOLD, OFF, OUT, AND ALL ZONE

The following will provide detailed information regarding HOLD, OFF, OUT, and ALL ZONE functions: (See Fig. 14.)

A. Hold Function

<u>At the User Interface or Smart Sensor(s):</u>

Pressing HOLD button activates and deactivates HOLD function for a single zone.

When HOLD function is active, HOLD icon is displayed, and the current set points will be used until the user cancels the HOLD function. The HOLD function prevents the set points from changing according to the program schedule. Cancelling the HOLD function changes the set points to whatever is in the program schedule for that period of the day.

B. OFF Function

<u>At the User Interface:</u>

Scrolling the heat set point past its lower limit (40°F), or the cool set point past its upper limit (90°F) activates the OFF function for a single zone. When a zone is set to OFF, the set points are displayed as "OF" and the damper is closed. No conditioning will be provided to that zone.

To cancel OFF, press UP button to change the heat set point, or DOWN button to change the cool set point.

When a zone is set to OFF, the HOLD icon will turn on indicating that OFF is a permanent override. The HOLD icon cannot be turned off by pressing the HOLD button. However, if HOLD was turned on prior to turning OFF that zone, then HOLD status will remain after OFF is cancelled.

The ALL ZONE function cannot be activated from a zone that is set to OFF.

All zones **cannot** be set to OFF. If end-user attempts to do this, the User Interface software will prevent the last zone from going to OFF.

<u>At the Smart Sensor(s):</u>

Same as above; scrolling the heat set point past its lower limit (40°F), or the cool set point past its upper limit (90°F) activates the OFF function for a single zone. When a zone is set to OFF, the set points are displayed as "OF" and the damper is closed. No conditioning will be provided to that zone.

C. OUT Function

<u>At the User Interface:</u>

Pressing OUT button activates and deactivates OUT function for a single zone. When OUT function is active, OUT icon is displayed. This function programs the zone as being unoccupied.

When OUT function is active, the zone has no set points. The zone temperature will be kept within the 60-85°F range and if necessary, the zone will be used as a "dump" zone to relieve LAT problems or to assist with dehumidification. The set points are displayed as "--", and pressing UP and DOWN buttons will have no effect.

To cancel OUT function, press OUT button and OUT icon will turn off. Pressing OUT button is a temporary override that will be cancelled at the next programmed schedule time unless the HOLD function is also active.

The OUT function is also a programmable option. You can program the OUT function in the program schedules.

If a zone is set to OFF, the OUT button will have no effect. OFF must be cancelled before OUT can become active.

<u>At the Smart Sensor(s):</u>

Same as the above; pressing OUT button will program the zone as being unoccupied. Pressing OUT button again changes the zone to occupied. When a zone is set to OUT, the desired temperature will be displayed as "--" when UP and DOWN buttons are pushed.

D. ALL ZONE

<u>At the User Interface:</u>

Pressing ALL ZONE button activates and deactivates ALL ZONE function. When ALL ZONE function is active, ALL icon is displayed.

This function allows the entire house to be controlled to the set points and program schedule of a single zone.

The zone that is displayed when ALL ZONE button is pressed is the controlling zone. Its set points will be displayed normally. If the NEXT ZONE button is pressed while ALL ZONE is active, the room temperature for each zone will be displayed, but the set points for the non-controlling zones will be displayed as "--".

This function is not available if the zoning has been turned off through software configuration.

This function is not available if the controlling zone is set to OFF.

<u>At the Smart Sensor(s):</u>

The ALL ZONE function cannot be changed from the Smart Sensor, but if the function is active, and the Smart Sensor is in a zone other than the controlling zone, the set point display will show "--".

If the Smart Sensor is in the controlling zone, then it cannot be scrolled to OFF.

TROUBLESHOOTING

A. Error Messages

Several error messages are provided. They appear on the large display and alternate with the normal room temperature data at a 2 sec rate. These are:

1. E1—COMMUNICATION FAILURE. An E1 will be displayed if the User Interface cannot communicate with the Equipment Controller. Check and make sure V+, Vg, RS+, and RS- are wired correctly between the User Interface and Equipment Controller. This error message may sometimes take up to 30 seconds before it is displayed. After the problem has been fixed, cycle power to insure that all errors have cleared.

2. E2—LAT or HPT SENSOR FAILURE. An E2 will be displayed if the temperature sensor is open, or if it is reading below -40°F or above 230°F. This error can be temporarily overridden for troubleshooting purposes only by turning on configuration option No. 37 in the User Interface. This will ignore the LAT/HPT sensors while you replace the sensors and/or investigate the problem. **Disabling this feature should only be temporary.** Failure to properly install the LAT/HPT sensors can cause permanent damage to the HVAC equipment, as well as lose other features that the zoning system can provide, e.g., OUT zone, etc.

3. E3—OUTDOOR AIR TEMPERATURE SENSOR FAILURE. An E3 will be displayed if the outdoor air temperature sensor is open, or if it is reading below -40°F or above 180°F. This error will also occur if the following features are active and the Equipment Controller cannot detect the outdoor air temperature sensor:

   (1.) <u>Auxiliary Heat Lockout</u> (System is configured as a heat pump and configuration Option No. 8 is active).

   (2.) <u>Dual Fuel Setup</u> (DIP switch No. 8 OFF. System is configured as a heat pump with dual fuel).

   (3.) <u>Cooling Lockout Below 55°F</u> (DIP switch No. 7 OFF. System is configured to disable cooling when outdoor temperature is below value selected by configuration Option 6).

   (4.) <u>Automatic Humidify Feature</u> (User Interface is setup for auto-humidify in heating mode).

(5.) Perfect Heat Feature (System is configured with Perfect Heat configuration Option 16 ON).

4. E4—NONVOLATILE MEMORY FAILURE. An E4 will be displayed if the configuration and program schedules cannot be read. This is usually the result of a microprocessor failure. If cycling power does not reset this error, the User Interface must be replaced.

5. E5—HUMIDITY SENSOR FAILURE. If the humidity sensor has failed, an E5 error message will be displayed.

6. E6—DEFROST LOCKED. An E6 will be displayed if the defrost cycle is in process longer than 10 minutes. The mode will automatically change to the EHEAT mode. Cycling power will reset error, however, outdoor unit should be checked to determine if defrost is operating properly.

7. FF—DAMPER FUSE BLOWN. An FF will be displayed if the fuse is open or missing. Remove plastic cover on Equipment Controller to locate and replace fuse.

8. "--" (2 dashes)—TEMPERATURE SENSOR FAILURE. Two dashes "--" will be displayed if a zone temperature sensor has failed or is out of range. The User Interface and Remote Room Sensors are considered failed if the temperature reading is outside the -40°F to 140°F range. A Smart Sensor is considered failed if the temperature is outside the 32°F to 140°F range. See Table 5 to determine the temperature/ohm relationship for a Remote Sensor. Do not confuse dashes in the display ("--") for a zone that is set to OUT or ALL ZONE.

OTHER HELPFUL HINTS

Read and understand "System Startup and Checkout" to review Installer Test Setup Mode and check the equipment operation. This is a good place to start in evaluating any problems associated with the zoning system or the system equipment.

TEMPERATURE/OHM RELATIONSHIP

Table 5 shows a temperature/ohm relationship to help aid in troubleshooting the Zone Perfect *Plus* -B System. This table will evaluate the Remote Sensor, LAT, and HPT sensor operation. Use a digital multimeter to perform the following:

To verify if a sensor is good, disconnect both leads from I/O board and measure resistance through the sensor. Match ohm reading to the table and compare temperature reading on table to ambient temperature surrounding sensor (accuracy should be within a few percent).

e.g. If 10.72k ohms are measured, this equals approximately 74°F. To verify if equipment controller is functioning normally, reattach sensor to equipment controller and set meter to 5vdc. Measure voltage across terminal connections with sensor attached. A typical voltage of approximately 2.5vdc will indicate equipment controller is functioning correctly.

TABLE 5—TEMPERATURE/OHM RELATIONSHIP

TEMP F°	OHMS
30	34,480
32	32,630
34	30,760
36	29,220
38	27,470
40	26,020
42	24,680
44	23,320
46	22,070
48	20,910
50	19,830
52	18,820
54	17,870
56	16,920
58	16,160
60	15,260
62	14,530
64	13,790
66	13,090
68	12,480
70	11,860
72	11,270
74	10,750
76	10,250
78	9,750
80	9,300
82	8,840
84	8,432
86	8,042
88	7,668
90	7,310
92	6,993
94	6,661
96	6,368
98	6,085
100	5,811
102	5,571
104	5,313
106	5,088
108	4,869
110	4,660
112	4,450
114	4,268
116	4,019
118	3,918
120	3,750

TABLE 6—WIRING DIAGRAM REFERENCE CHART

EQUIPMENT SELECTION	1-SPEED AC	2-SPEED AC	1-SPEED HP	2-SPEED HP
1-Stage Furnace	Fig. 15	Fig. 16	Fig. 17	Fig. 18
2-Stage Furnace	Fig. 19	Fig. 20	Fig. 21	Fig. 22
Variable-Speed Non-Condensing Furnace	Fig. 23	Fig. 24	Fig. 25	Fig. 26
Variable-Speed 2-Stage Condensing Furnace Variable-W/O DE Connection	Fig. 27	Fig. 28	Fig. 29	Fig. 30
Variable-Speed 2-Stage Condensing Furnace with DE Connection	31	32	33	34
Typical Fan Coil	Fig. 35	Fig. 36	Fig. 37	Fig. 38
FK4C Fan Coil	Fig. 39	Fig. 40	Fig. 41	Fig. 42
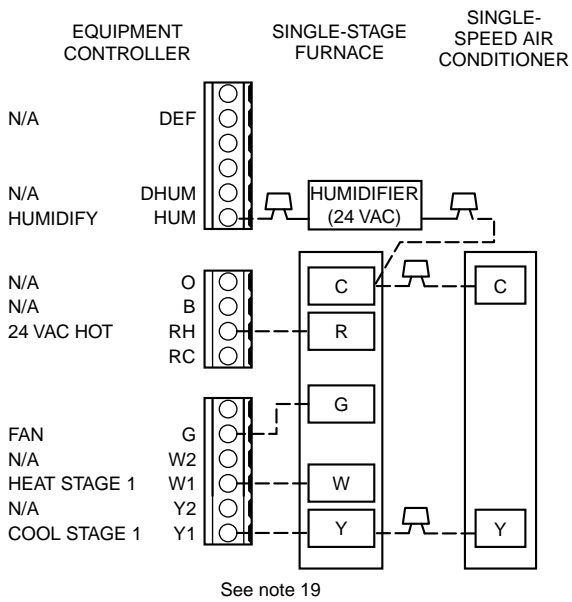
**Fig. 15—1-Stage Furnace with
1-Speed Air Conditioner**

See note 19

A98089
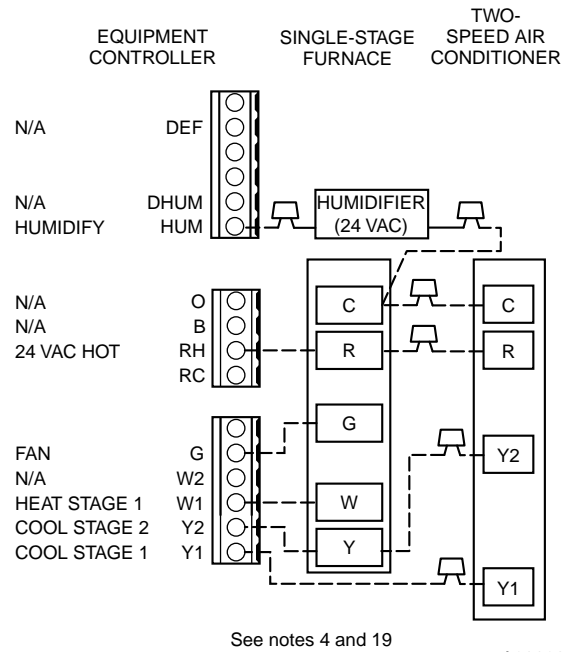
**Fig. 16—1-Stage Furnace with
2-Speed Air Conditioner**

See notes 4 and 19
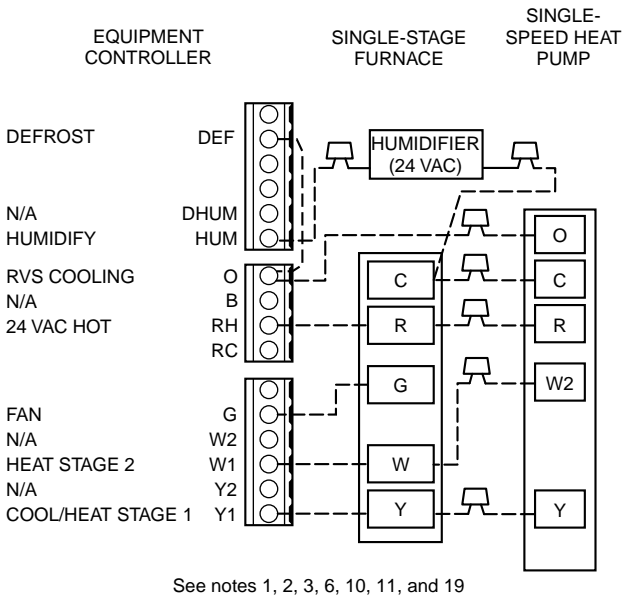
A98090

**Fig. 17—Single-Stage Furnace
with 1-Speed Heat Pump (Dual Fuel)**

See notes 1, 2, 3, 6, 10, 11, and 19

A98091

**Fig. 18—1-Stage Furnace with
2-Speed Heat Pump (Dual Fuel)**

See notes 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, and 19

A98092

Fig. 19

EQUIPMENT CONTROLLER		TWO-STAGE FURNACE	SINGLE-SPEED AIR CONDITIONER

N/A — DEF

N/A — DHUM
HUMIDIFY — HUM — HUMIDIFIER (24 VAC)

N/A — O
N/A — B
24 VAC HOT — RH
RC

C — C
R
G

FAN — G
HEAT STAGE 2 — W2 — W2
HEAT STAGE 1 — W1 — W/W1
N/A — Y2
COOL STAGE 1 — Y1 — Y/Y2 — Y

See notes 12 and 19

A98093

**Fig. 19—2-Stage Furnace
with 1-Speed Air Conditioner**

Fig. 20

EQUIPMENT CONTROLLER		TWO-STAGE FURNACE	TWO-SPEED AIR CONDITIONER

N/A — DEF

N/A — DHUM
HUMIDIFY — HUM — HUMIDIFIER (24 VAC)

N/A — O
N/A — B
24 VAC HOT — RH
RC

C — C
R — R
G

FAN — G
HEAT STAGE 2 — W2 — W2 — Y2
HEAT STAGE 1 — W1 — W/W1
COOL STAGE 2 — Y2
COOL STAGE 1 — Y1 — Y/Y2 — Y1

See notes 4, 12, and 19

A98094

**Fig. 20—2-Stage Furnace
with 2-Speed Air Conditioner**

Fig. 21

EQUIPMENT CONTROLLER		TWO-STAGE FURNACE	SINGLE-SPEED HEAT PUMP

DEFROST — DEF

HUMIDIFIER (24 VAC)

N/A — DHUM
HUMIDIFY — HUM — O

RVS COOLING — O — C — C
N/A — B
24 VAC HOT — RH — R — R
RC — G — W2

FAN — G — W2
HEAT STAGE 3 — W2
HEAT STAGE 2 — W1 — W/W1
N/A — Y2
COOL/HEAT STAGE 1 — Y1 — Y/Y2 — Y

See notes 1, 2, 3, 6, 10, 11, 12, and 19

A98095

**Fig. 21—2-Stage Furnace
with 1-Single Speed Heat Pump (Dual Fuel)**

Fig. 22

EQUIPMENT CONTROLLER		TWO-STAGE FURNACE	TWO-SPEED HEAT PUMP

DEFROST — DEF

HUMIDIFIER (24 VAC)

DHUM
HUMIDIFY — HUM — O

RVS COOLING — O — C — C
N/A — B
24 VAC HOT — RH — R — R
RC — G — W2

FAN — G — W2 — Y2
HEAT STAGE 4 — W2
HEAT STAGE 3 — W1 — W/W1 — W3
COOL/HEAT STAGE 2 — Y2
COOL/HEAT STAGE 1 — Y1 — Y/Y2 — Y1

See notes 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, and 19
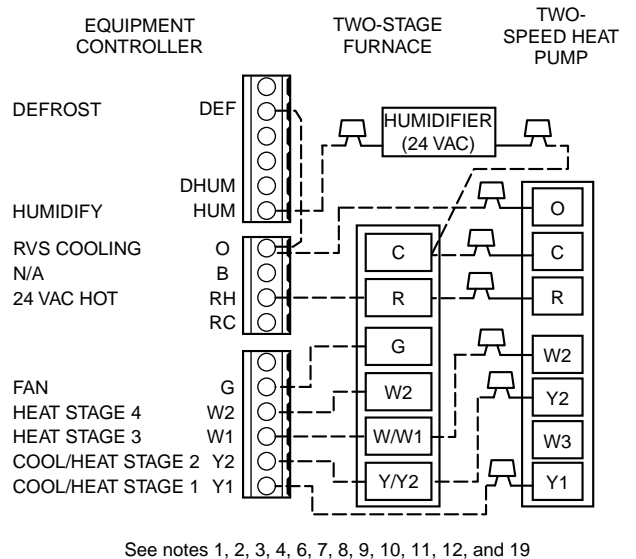
A98096

**Fig. 22—2-Stage Furnace
with 2-Speed Heat Pump (Dual Fuel)**

**Fig. 23—Variable-Speed Non-Condensing Furnace
with 1-Speed Air Conditioner**
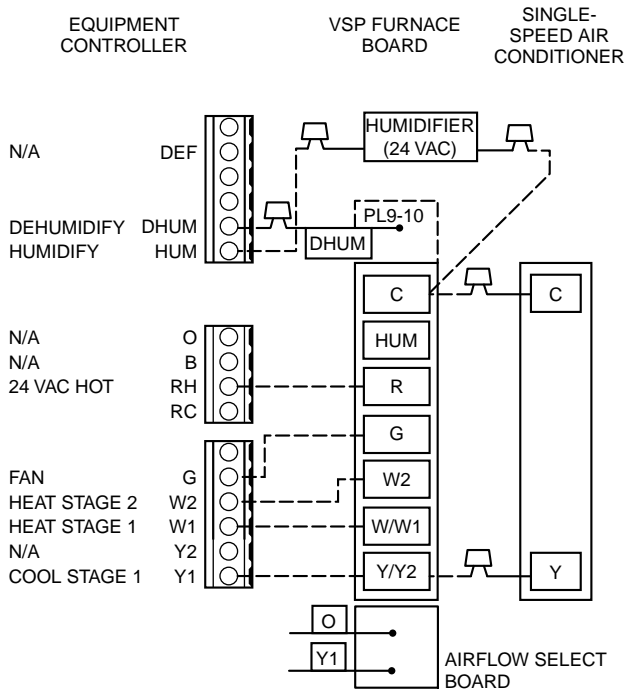
See notes 12, 15, 16, and 19

A98097

**Fig. 24—Variable-Speed Non-Condensing Furnace
with 2-Speed Air Conditioner**
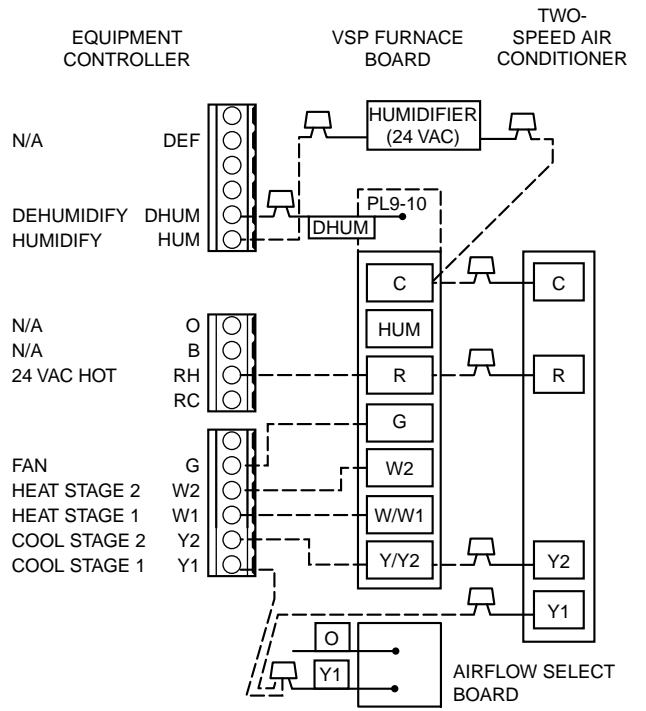
See notes 4, 12, 15, 16, and 19

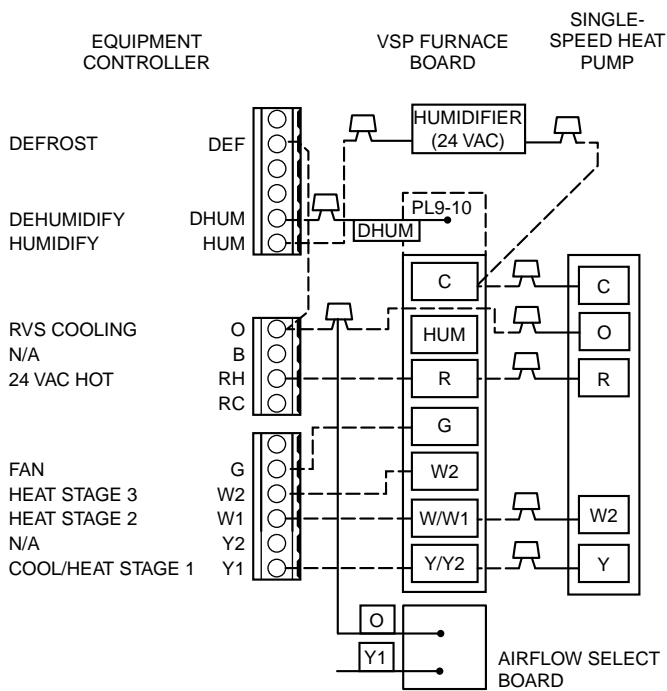A98098

**Fig. 25—Variable-Speed Non-Condensing Furnace
with 1-Speed Heat Pump (Dual Fuel)**

See notes 1, 2, 3, 6, 10, 11, 12, 15, 16, and 19

A98099

**Fig. 26—Variable-Speed Non-Condensing Furnace
with 2-Speed Heat Pump (Dual Fuel)**
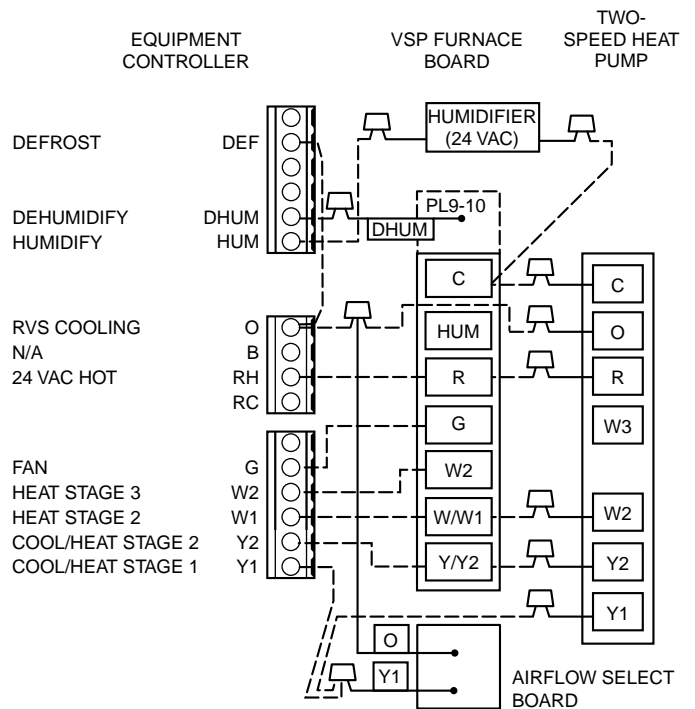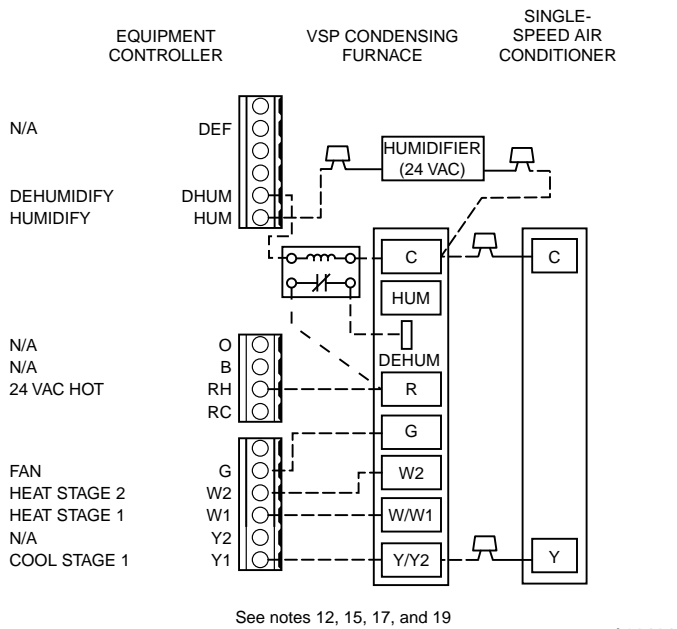
See notes 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, 16, and 19

A98100

See notes 12, 15, 17, and 19

A98101

**Fig. 27—Variable-Speed 2-Stage Condensing Furnace —
W/O DE Connection -
with 1-Speed Air Conditioner**

See notes 4, 12, 15, 17, and 19

A98102

**Fig. 28—Variable-Speed 2-Stage Condensing Furnace —
W/O DE Connection -
with 2-Speed Air Conditioner**

See notes 1, 2, 3, 6, 10, 11, 12, 15, 17, and 19

A98103

**Fig. 29—Variable-Speed 2-Stage Condensing Furnace —
W/O DE Connection -
with 1-Speed Heat Pump (Dual Fuel)**

See notes 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, 17, and 19

A98104

**Fig. 30—Variable-Speed 2-Stage Condensing Furnace —
W/O DE Connection -
with 2-Speed Heat Pump (Dual Fuel)**

—24—

EQUIPMENT CONTROLLER   VSP CONDENSING FURNACE   SINGLE-SPEED AIR CONDITIONER

N/A — DEF

HUMIDIFIER (24 VAC)

DEHUMIDIFY — DHUM
HUMIDIFY — HUM

C | C
HUM
DEHUM
DE
N/A — O
N/A — B
24 VAC HOT — RH — R
RC
G
FAN — G — W2
HEAT STAGE 2 — W2
HEAT STAGE 1 — W1 — W/W1
N/A — Y2
COOL STAGE 1 — Y1 — Y/Y2 — Y

See notes 12, 15, 18, and 19
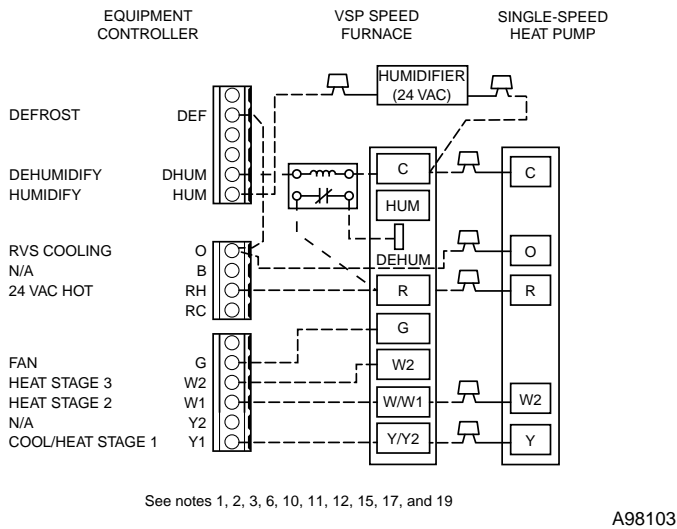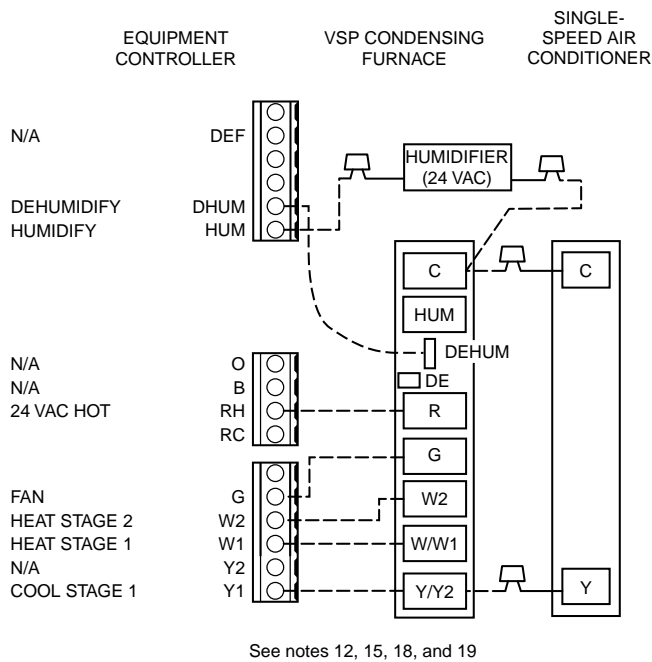
A99372

Fig. 31—Variable-Speed 2-Stage Condensing Furnace — With DE Connection — With 1-Speed Air Conditioner

EQUIPMENT CONTROLLER   VSP CONDENSING FURNACE   TWO-SPEED AIR CONDITIONER

N/A — DEF

HUMIDIFIER (24 VAC)

DEHUMIDIFY — DHUM
HUMIDIFY — HUM

C | C
HUM
DEHUM
DE
N/A — O
N/A — B
24 VAC HOT — RH — R — R
RC
G
FAN — G — W2
HEAT STAGE 2 — W2
HEAT STAGE 1 — W1 — W/W1 — Y2
COOL STAGE 2 — Y2
COOL STAGE 1 — Y1 — Y/Y2 — Y1

See notes 4, 12, 15, 18, and 19
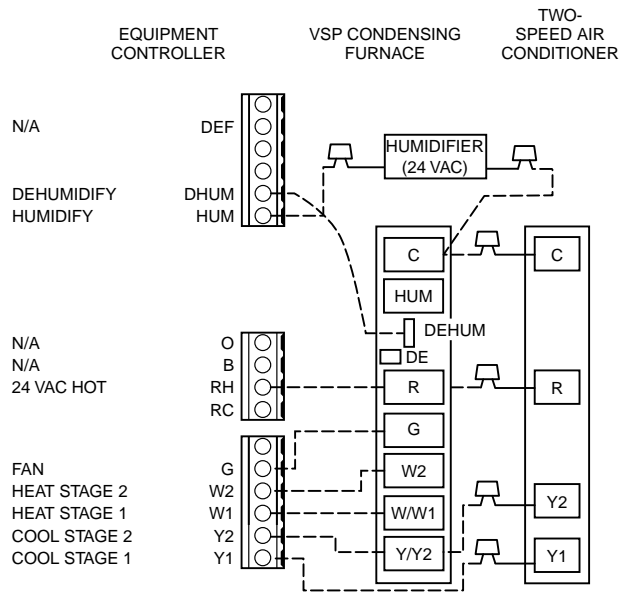
A99373

Fig. 32—Variable Speed 2-Stage Condensing Furnace — With DE Connection — With 2-Speed Air Conditioner

EQUIPMENT CONTROLLER   VSP SPEED FURNACE   SINGLE-SPEED HEAT PUMP

DEFROST — DEF

HUMIDIFIER (24 VAC)

DEHUMIDIFY — DHUM
HUMIDIFY — HUM

C | C
HUM
DEHUM
DE
RVS COOLING — O — O
N/A — B
24 VAC HOT — RH — R — R
RC
G
FAN — G — W2
HEAT STAGE 3 — W2
HEAT STAGE 2 — W1 — W/W1 — W2
N/A — Y2
COOL/HEAT STAGE 1 — Y1 — Y/Y2 — Y

See notes 1, 2, 3, 6, 10, 11, 12, 15, 18, and 19
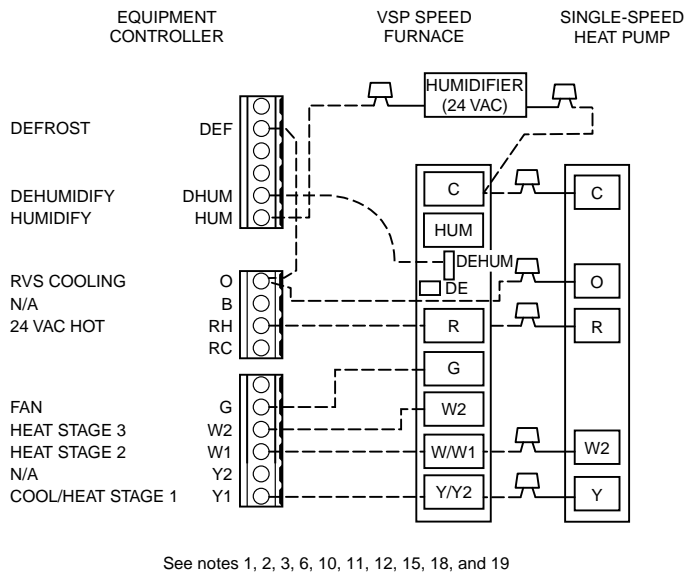
A99374

Fig. 33—Variable-Speed 2-Stage Condensing Furnace — With DE Connection — With 1-Speed Heat Pump (Dual Fuel)

EQUIPMENT CONTROLLER   VSP SPEED FURNACE   TWO-SPEED HEAT PUMP

DEFROST — DEF

HUMIDIFIER (24 VAC)

DEHUMIDIFY — DHUM
HUMIDIFY — HUM

C | C
HUM
DEHUM
DE
RVS COOLING — O — O
N/A — B
24 VAC HOT — RH — R — R
RC — W3
G
FAN — G — W2
HEAT STAGE 4 — W2 — W2
HEAT STAGE 3 — W1 — W/W1 — Y2
COOL/HEAT STAGE 2 — Y2
COOL/HEAT STAGE 1 — Y1 — Y/Y2 — Y1

See notes 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, 18, and 19
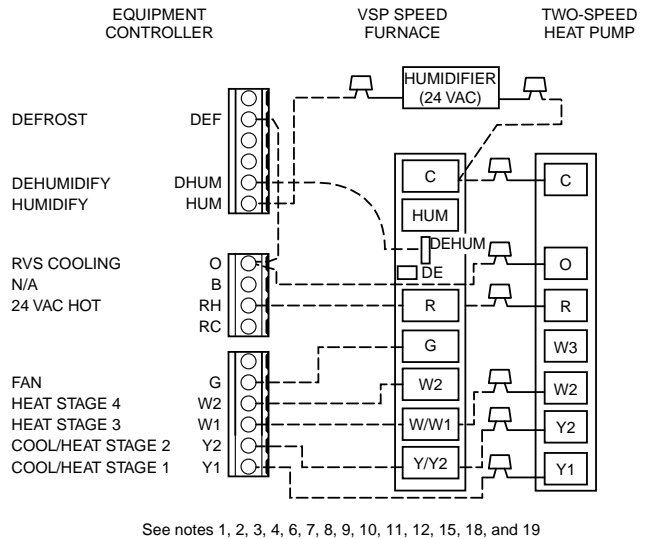
A99375

Fig. 34—Variable-Speed 2-Stage Condensing Furnace — With DE Connection — With 2-Speed Heat Pump (Dual Fuel)
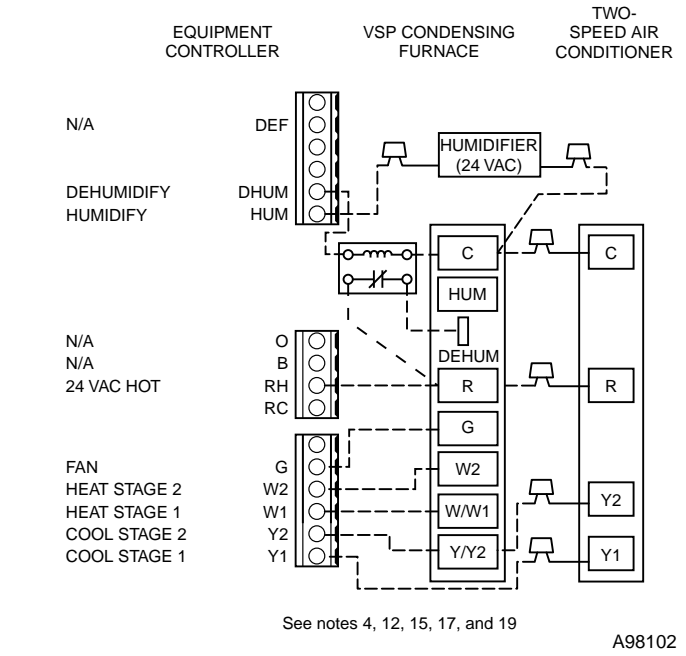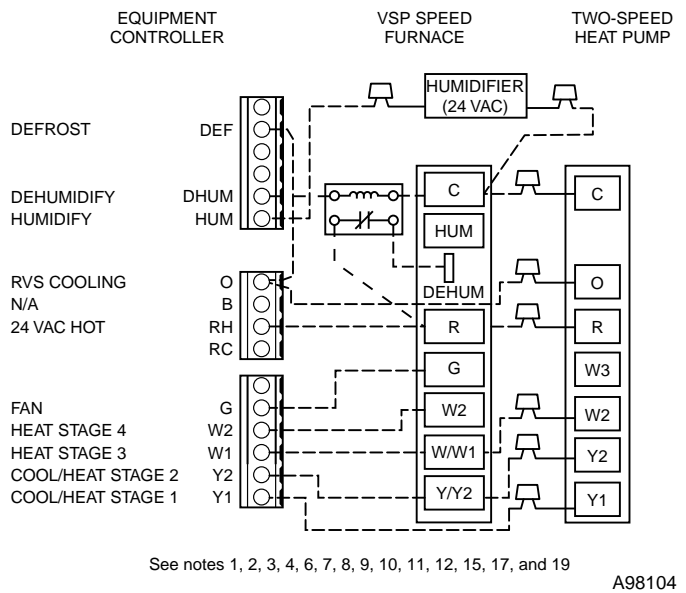
Fig. 35—Typical Fan Coil with 1-Speed Air Conditioner
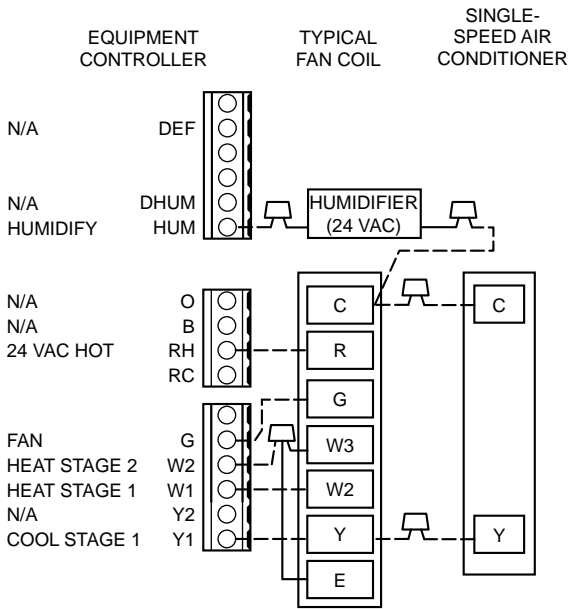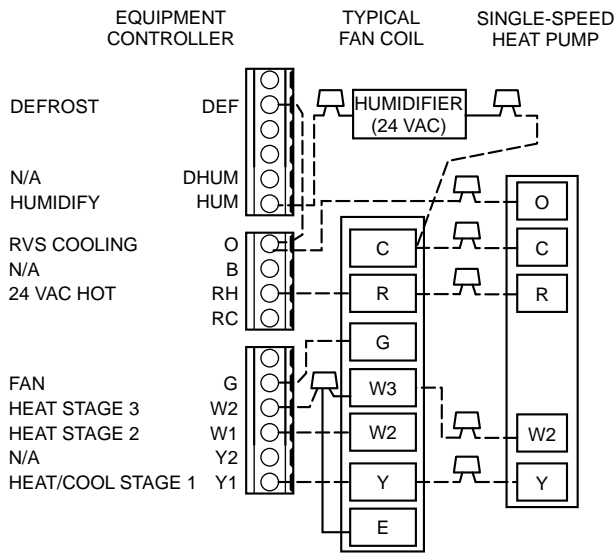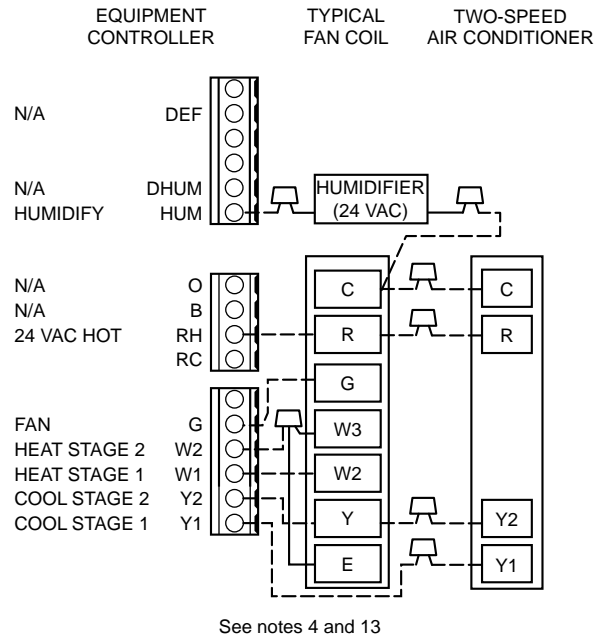
A98105

Fig. 36—Typical Fan Coil with 2-Speed Air Conditioner

A98106

Fig. 37—Typical Fan Coil with 1-Speed Heat Pump
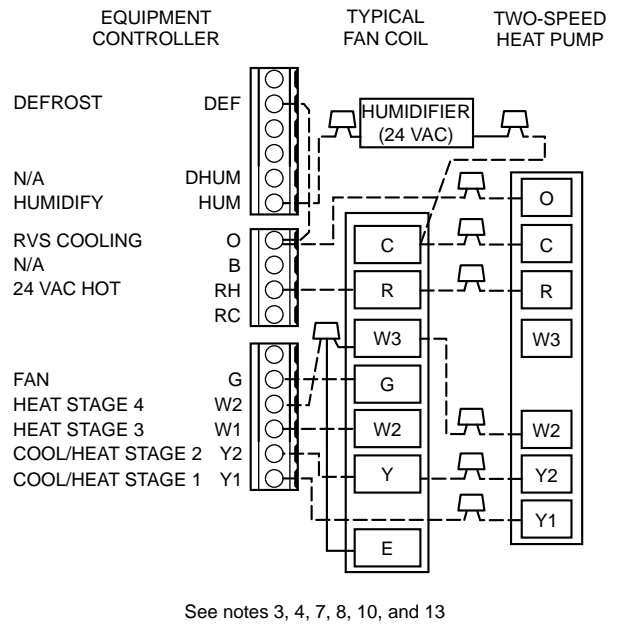
A98107

Fig. 38—Typical Fan Coil with 2-Speed Heat Pump

A98108

—26—

Fig. 39

EQUIPMENT CONTROLLER | FK AND FV SERIES FAN COIL | SINGLE-SPEED AIR CONDITIONER

Equipment Controller		Fan Coil	AC
N/A	DEF		
		HUMIDIFIER (24 VAC)	
DEHUMIDIFY	DHUM		
HUMIDIFY	HUM	O	
N/A	O	C	C
N/A	B	R	
24 VAC HOT	R1H	DH	
	R1C		
		REMOVE J1 JUMPER	
FAN	G	G	
HEAT STAGE 2	W2	W2	REMOVE J2 JUMPER FOR HEAT STAGING
HEAT STAGE 1	W1	W1	
N/A	Y2	Y/Y2	Y
COOL STAGE 1	Y1	Y1	

See notes 13, 14, and 15

A99367
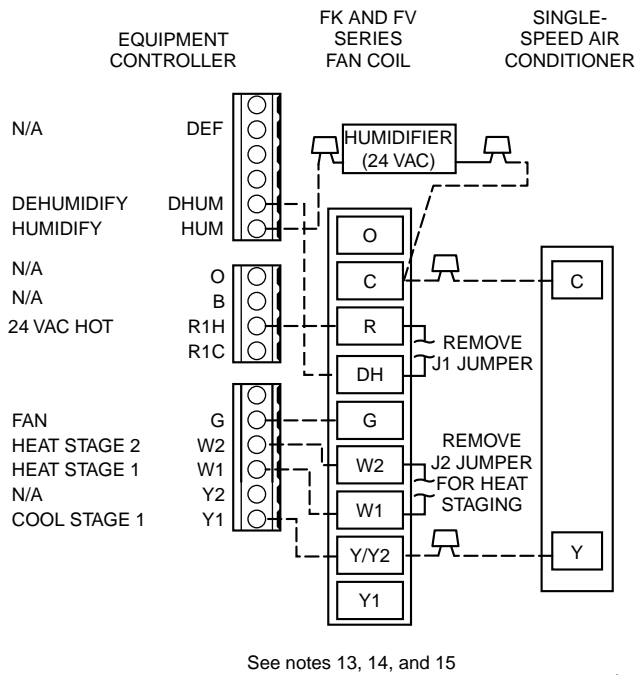
**Fig. 39—FK and FV Fan Coil
with 1-Speed Air Conditioner**

Fig. 40

EQUIPMENT CONTROLLER | FK AND FV SERIES FAN COIL | TWO-SPEED AIR CONDITIONER

Equipment Controller		Fan Coil	AC
N/A	DEF		
		HUMIDIFIER (24 VAC)	
DEHUMIDIFY	DHUM		
HUMIDIFY	HUM	O	
N/A	O	C	C
N/A	B	R	R
24 VAC HOT	R1H	DH	
	R1C		
		REMOVE J1 JUMPER	
FAN	G	G	
HEAT STAGE 2	W2	W2	REMOVE J2 JUMPER FOR HEAT STAGING
HEAT STAGE 1	W1	W1	
COOL STAGE 2	Y2	Y/Y2	Y2
COOL STAGE 1	Y1	Y1	Y1

See notes 4, 13, 14, and 15

A99368

**Fig. 40—FK and FV Fan Coil
with 2-Speed Air Conditioner**

Fig. 41

EQUIPMENT CONTROLLER | FK AND FV SERIES FAN COIL | SINGLE-SPEED HEAT PUMP

Equipment Controller		Fan Coil	Heat Pump
DEFROST	DEF		
		HUMIDIFIER (24 VAC)	
DEHUMIDIFY	DHUM	O	O
HUMIDIFY	HUM	C	C
RVS COOLING	O	R	R
N/A	B	DH	
24 VAC HOT	R1H		
	R1C	REMOVE J1 JUMPER	
FAN	G	G	
HEAT STAGE 3	W2	W1	REMOVE J2 JUMPER FOR HEAT STAGING
HEAT STAGE 2	W1	W2	W2
N/A	Y2	Y/Y2	Y
HEAT/COOL STAGE1	Y1	Y1	

See notes 3, 5, 10, 13, 14, and 15

A99369

**Fig. 41—FK and FV Fan Coil
with 1-Speed Heat Pump**

Fig. 42

EQUIPMENT CONTROLLER | FK AND FV SERIES FAN COIL | TWO-SPEED HEAT PUMP

Equipment Controller		Fan Coil	Heat Pump
DEFROST	DEF		
		HUMIDIFIER (24 VAC)	
DEHUMIDIFY	DHUM	O	O
HUMIDIFY	HUM	C	C
RVS COOLING	O	R	R
N/A	B	DH	
24 VAC HOT	R1H		
	R1C	REMOVE J1 JUMPER	
FAN	G	G	
HEAT STAGE 4	W2	W1	REMOVE J2 JUMPER FOR HEAT STAGING
HEAT STAGE 3	W1	W2	W2
HEAT/COOL STAGE 2	Y2	Y/Y2	Y2
HEAT/COOL STAGE 1	Y1	Y1	Y1

See notes 3, 4, 7, 8, 10, 13, 14, and 15
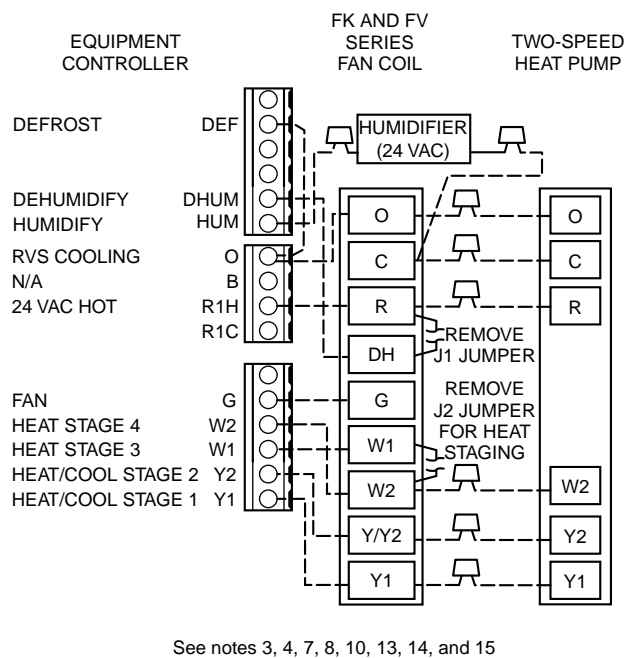
A99370

**Fig. 42—FK and FV Fan Coil
with 2-Speed Heat Pump**

WIRING DIAGRAM NOTES

1. Heat pump <u>must</u> have a high pressure switch for dual fuel applications.

2. Outdoor Air Sensor must be attached for all dual fuel applications.

3. Dip switch setting No. 1 must be OFF (open) for heat pump operation.

4. Dip switch setting No. 2 must be OFF (open) for 2-speed compressor operation.

5. Dip switch setting No. 3 must be OFF (open) for 3-stage heat operation.

6. Dip switch setting No. 8 must be OFF (open) for dual fuel operation.

7. Refer to outdoor equipment Installation Instructions for proper setup.

8. Select "ZONE" position on 2-speed heat pump control board.

9. Do not select "dual fuel" option on 2-speed heat pump control board. The zoning system will control this function.

10. Jumper wire must be installed between DEF and O terminal at Equipment Controller for proper defrost operation.

11. Configuration Option No. 11 (at User Interface) must be activated to select dual fuel crossover temperature. Configuration Option No. 8 is optional in selecting an auxiliary heat lockout temperature.

12. It is recommended to let the zoning system control furnace staging. Refer to indoor unit Installation Instructions for proper setup.

13. Refer to Fan Coil Installation Instructions for features and additional wiring information.

14. To activate dehumidify function on FK or FV, remove J1 jumper at fan coil control board.

15. Configuration Option No. 5 (at User Interface) should be activated to indicate variable-speed (ICM) blower motor.

16. To activate dehumidify feature on variable-speed 80% non-condensing furnace, disconnect green (DHUM) wire from G on furnace control board and connect to dehumidify terminal on Equipment Controller.

17. To activate dehumidify feature on older style variable-speed condensing furnaces (i.e., 355MAV) that do not have a DE connection, a pilot duty 24vac relay must be used.

18. Remove DE jumper to enable DEHUM input on furnace control board.

19. No connection should be made to the furnace HUM terminal.

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization   • Maintenance
- Installation Overview   • Operating Sequence

A large selection of product, theory, and skills programs is available, using popular video-based formats and materials. All include video and/or slides, plus companion book.

Classroom Service Training plus "hands-on" the products in our labs can mean increased confidence that really pays dividends in faster troubleshooting, fewer callbacks. Course descriptions and schedules are in our catalog.

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