

**Damper Control Module for
 Comfort Sync™ Zoning
 System**

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**Installation Instructions for the Damper Control Module (DCM) (1.851399) used with
 Comfort Sync™ Zoning System**

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

Installation and service must be performed by a licensed professional HVAC installer (or equivalent) or service agency.

NOTE - See table 9 for a list of Comfort Sync™ variable speed indoor units.

Shipping and Packaging

- 1 - Damper control module with housing (1.851399)
- 1 - Discharge air temperature sensor (88K38)
- 1 - Screwdriver for use with In-Zone Sensors

Other Required Items Sold Separately

The following items are also required for the Comfort Sync™ Zoning System to operate:

1. Comfort Sync™ thermostat (catalog number 1.841197).
2. In-Zone Sensors (catalog number 1.851400) — are required for zones 2 through 4. Zone 1 is controlled and integrated into the Comfort Sync™ thermostat.
3. Zone damper transformer.
4. Zone dampers — recommended zone dampers are spring-open and power-close but you may also use power-open and spring-close, or power-open and power-close. Modulating dampers are not supported.
5. Optional freezestat (see table 2 on page 5 for available freezestats based on tubing sizes).
6. Fasteners to mount Damper Control Module.

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General

The damper control module is compatible with the Comfort Sync™ thermostat (1.841197):

- Comfort Sync™-enabled variable speed or variable capacity (modulating) indoor and two-stage or variable capacity (modulating) outdoor units.
- Comfort Sync™-enabled variable speed indoor unit and communicating or non-communicating (conventional) single-stage outdoor unit (two zones maximum supported).
- Comfort Sync™-enabled variable speed indoor unit and communicating or non-communicating (conventional) two-stage outdoor unit (four zones maximum supported).

ZONE DAMPER TRANSFORMER

The zone dampers are powered by a field-provided 24VAC transformer. zone dampers require 6 to 12VA each depending on zone damper used. The zone damper transformer must have an adequate VA rating to serve all components (see recommendations in table 1).

- The damper control module and three In-Zone Sensors require a total of 6VA to operate.

Table 1. Zone Damper Transformer Selection Chart

Catalog Number	Size	Description	VA LOAD =
10P17	40VA	120/208/240VAC, 24VAC	Damper VA x number of dampers + 6VA (damper control module + 3 In-Zone Sensors) = damper transformer VA requirement.
10P87	50VA		
12P61	75VA		
83P74	—	Electrical Box (4-in. square)	

TRANSFORMER PHASING

The indoor unit and zone damper transformers must be in-phase since both are connected to the damper control module. Follow the instructions below for phasing both transformers.

1. Connect the damper control module **INDOOR R** and **C** to the indoor unit **R** and **C**.
2. Connect the external 24VAC transformer to the damper control module **DMPR XFMR R** and **C** terminals.
3. Measure voltage between the damper control module **INDOOR R** and **DMPR XFMR R** terminals.
 - > In-phase voltage will be less than 10VAC.
 - > Out-of-phase voltage will be greater than 40VAC. If voltage is greater than 40VAC, swap external 24VAC transformer (**DMPR XFMR R** and **C**) wires.

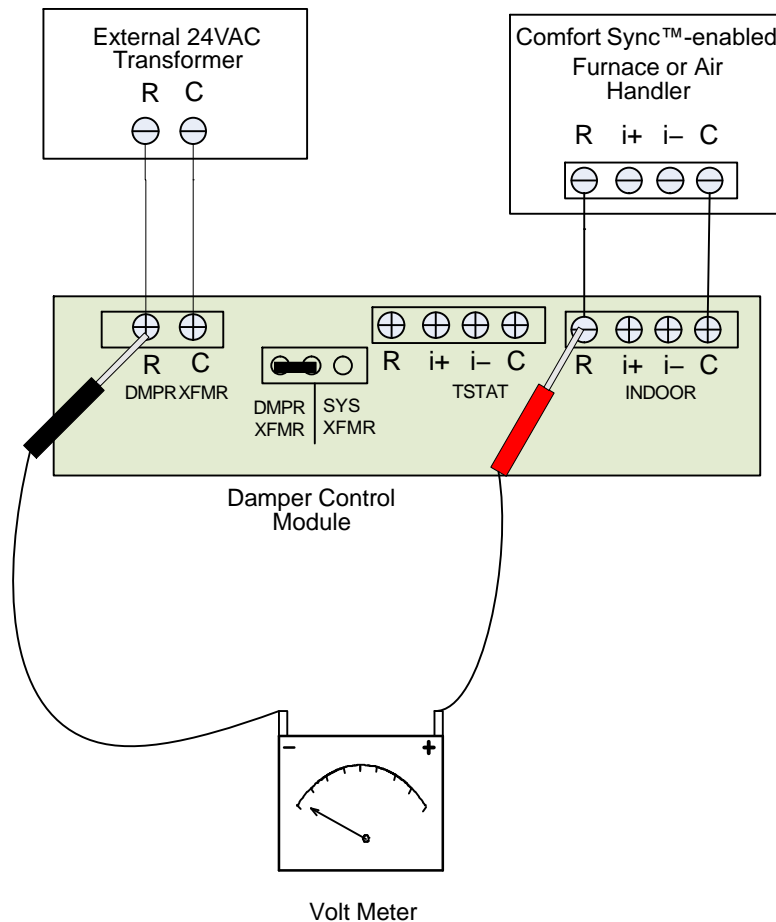


Figure 1. Confirming Correct Transformer Phasing (Polarity)

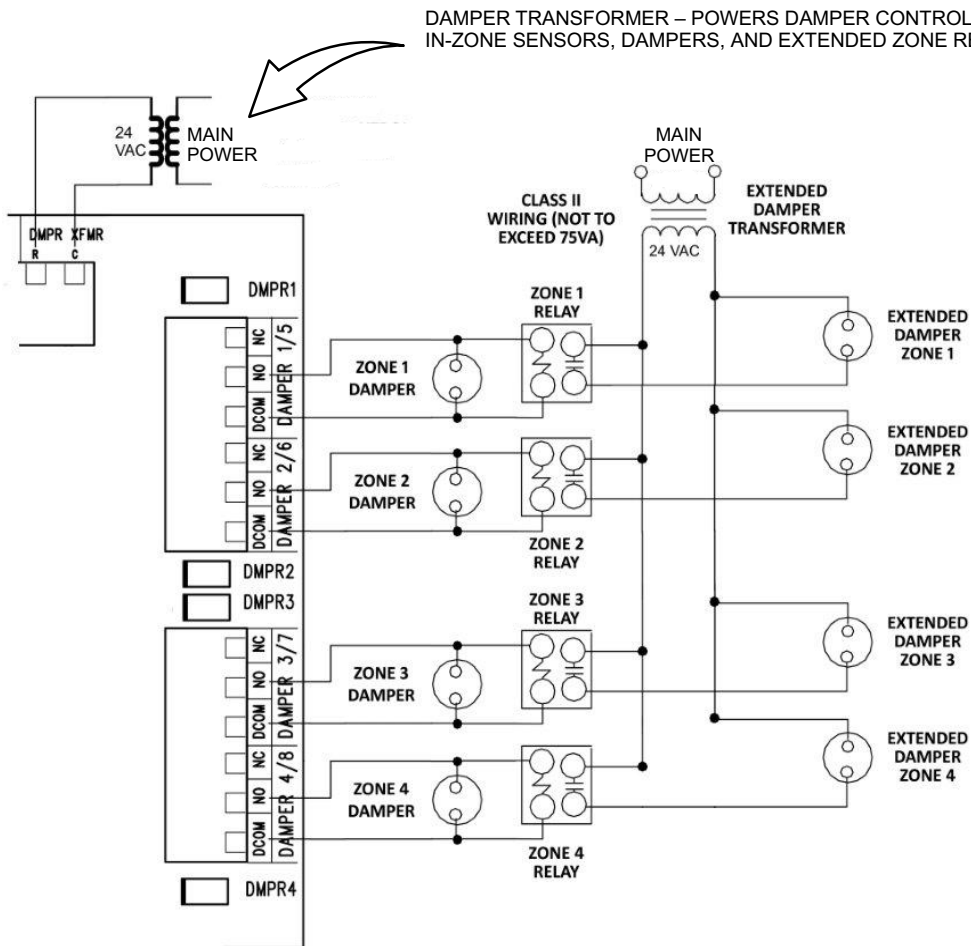
DAMPERS

See table 1 to determine the minimum damper transformer VA requirements based on the number of zones being installed. If extended zone dampers are used then see figure 2 for damper, transformer and zone relay wiring requirements.

Refer to the Comfort Sync™ Zoning System Product Specification for ordering dampers and other various components.

Once the damper control module has been installed and the system energized, the damper control module will automatically populate the thermostat commissioning screens. All zone CFM settings will be selected from commissioning screens for continuous blower and both heating / cooling blower operations. Testing CFMs for each or all zones may also be performed.

1. The extended damper transformer will only supply power to extended dampers and relay contacts.
2. The system transformer powers the relay coils (0.4VA each).
3. Combined load of damper transformer (see table 1) and add 0.4VA per zone relay to determine the minimum damper transformer VA requirements. Total VA requirements should not exceed 60VA.

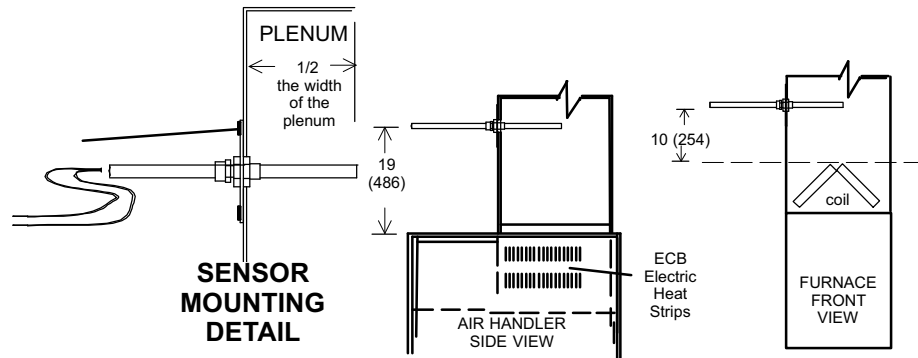


NOTE 1 - Connections illustrated here are for the recommended spring-open/power-close dampers. The connections would be different for other dampers.

NOTE 2 - Use catalog number 56L68 for zone relays 1 through 4.

Figure 2. Damper and Extended Damper Wiring Diagram

- When possible, position the sensor some distance away from the coil rather than in the immediate coil area. The Discharge Air Temperature Sensor should be located at least 19 inches above the air handler unit and 10 inches above cooling coil with a furnace. Locate the tip of the sensor 1/2 the depth of the plenum, and centered over the discharge airflow, side-to-side in the discharge plenum
- Fasten the sensor bracket to the plenum with two self-tapping sheet metal screws.
- Connect wires to DATS on damper control module, NOT on the Comfort Sync™ air handler or furnace controls.



NOTE - FOR UNITS WITH HUMIDITROL—Discharge air sensor temperature (DATS) MUST be located on the output side of the EDA (if used; see Humiditrol Zoning Accessory Installation 505,337M)

Figure 3. Discharge Air Temperature Sensor installation (Typical Upflow Furnace)

DISCHARGE AIR TEMPERATURE SENSOR (DATS)

The included discharge air temperature sensor (88K38) monitors the supply air. Figure 4 shows the discharge air temperature sensor. This electronic sensor's probe is inserted into the discharge air plenum (see figure 3 on page 4) to gather air temperature data for the zone control module.

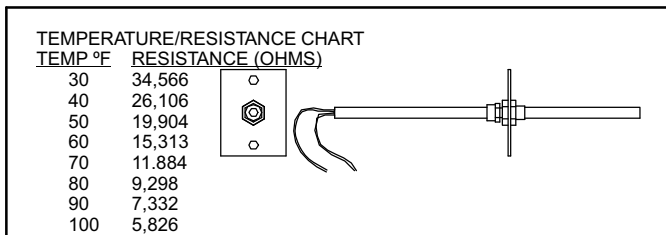


Figure 4. Discharge Air Temperature Sensor (DATS)

PRESSURE SWITCH (REQUIRED FOR HEAT PUMP APPLICATIONS)

NOTE - Outdoor unit (heat pump) will not operate if pressure switch is not installed)

A field-provided HFC-410A pressure switch (catalog number 27W13) is required for applications with a Comfort Sync™ heat pump. This switch acts as a guard in case of high head pressures during first- and second-stage heating. The switch opens at 550 psig (3965 kPa) and closes (resets) at 425 psig (3102 kPa).

NOTE - If a pressure switch is factory installed in the outdoor unit, do not remove the switch or switch wires.

The damper control module pressure switch may also be fastened directly to the vapor valve service port using a tee adaptor. This line becomes the discharge line in heat pump heating mode. Recommend using pressure switch valve tee adaptor (catalog number 87071). An alternate tee adaptor location is at the indoor TXV equalizing port on the indoor suction line.

Other conditions:

- Pressure switch status is used only for the heat pump heating and does not have any effect on non-zone demands.
- Heat pump will stop after the pressure switch status remains open for 60 seconds.

Staged Heat Pump Units

Should the pressure switch open during heat pump heating second stage operation:

- Comfort Sync™ thermostat will downstage the heat pump from second stage to first stage heating operation in order to bring the system pressure down to a point where the switch closes again.
- If the unit is already running in first stage when the pressure switch opens, the unit will shut off.
- If the switch closes within 60 seconds, then the Comfort Sync™ thermostat may send demand for second-stage HP if needed.
- If the switch does not close within 60 seconds, the Comfort Sync™ thermostat stops heat pump heating and satisfies the heating demand with backup heat (backup heat is either electric or gas) regardless of the

ambient temperature being above the high balance point.

The heat pump is used again on the next call provided the pressure switch has closed; otherwise backup heat is used on subsequent heating calls until the pressure switch closes.

FREEZESTAT (OPTIONAL)

This optional component is only required if there is a small zone with little airflow which is causing the indoor coil to freeze up. However, normal **return** air temperature should prevent this from occurring. The addition of the freezestat will provide for added protection.

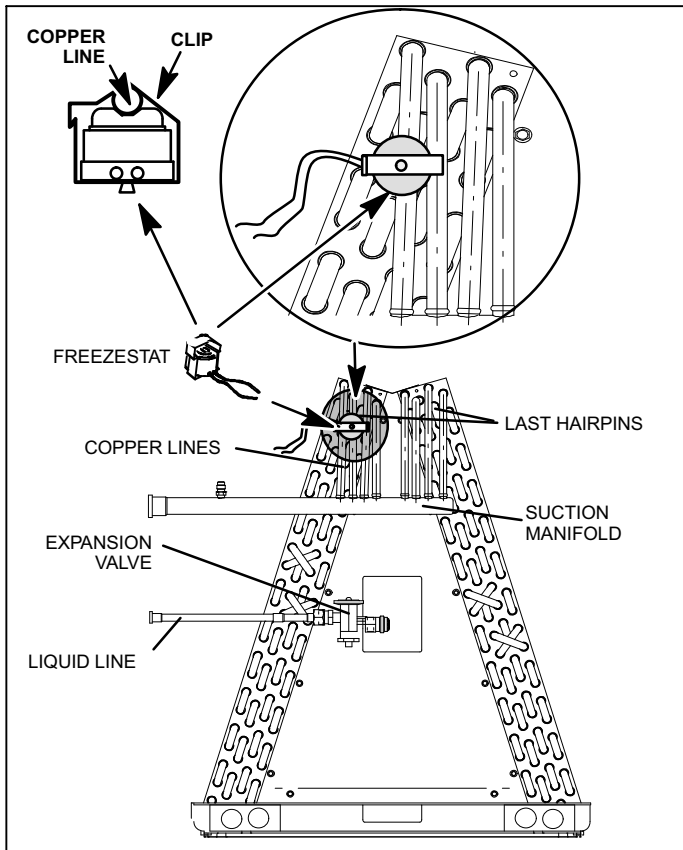


Figure 5. Typical Freezestat Installation (Indoor Coil)

NOTE - The damper control module comes from the factory with a insertion bridge installed on the freezestat terminals (see figure 7). Do not remove unless a freezestat is connected. Outdoor unit will not operate if insertion bridge is removed (missing) and no freezestat is installed.

The table below lists available freezestats for use with the damper control module.

Table 2. Available Freezestats

Catalog Number	Piping Size	Description
93G35	3/8"	Opens at 29°F, and closes at 58°F
50A93	5/8"	Opens at 36°F, and closes at 58°F

Suggested Freezestat Installation Method

The following is the recommended method for installation of the freezestat for connection to the damper control module.

1. A freezestat, sized per table 2 and ordered separately, can be installed. Install the freezestat on one of the copper lines between the last hairpins and the suction manifold (see figure 5) of the indoor coil.
2. The freezestat senses the line temperature and cycles the compressor off when the line temperature fails below its setpoint. The freezestat will open and close as listed in table 2.
3. Connect freezestat wires to the freezestat terminals on the damper control module after removing the factory installed bridge (see figure 7).

Installation and Setup

DAMPER CONTROL MODULE

Use the following procedure to install the damper control module. For information concerning connections see table 3 on page 8.

1. Remove the module cover.
2. Mount the damper control module near the indoor unit using field-provided fasteners.

NOTE - DO NOT mount damper control module to indoor unit or equipment that could induce vibration to the module. Mount module on flat surface away from indoor unit to minimize vibration. Securing module to a wall stud is desirable.

NOTE - By moving the jumper to system you can shift the VA load from the damper transformer to the system transformer if needed.

3. Use the default jumper setting for using an external 24VAC transformer (**DMPR XFMR**). Connect the external 24VAC transformer wires to terminals **DMPR XFMR R** and **C** (see figure 7).
4. Verify that the **ZONE ID** jumper is set to **Zone 1-4** only.

NOTE - In-Zone Sensors control zones 2, 3 and 4. The Comfort Sync™ thermostat will always control zone 1.

5. Connect wiring from Comfort Sync™ thermostat to RSBUS terminal **TSTAT R, I+, I-** and **C** (see figure 7).
6. Connect wiring from Comfort Sync™-enabled indoor unit to RSBUS terminals labelled **INDOOR, R, I+, I-** and **C** (see figure 7).
7. Connect In-Zone Sensors from zones 2, 3 and 4 as needed to terminals **PWR, D+, D-** and **C** (see figure 7).

NOTE - In-Zone Sensors are 12VDC devices that are powered by the damper control module.

8. Connect zone dampers to proper terminals. Dampers can be power-open / spring-close, power-close / spring-open, or power-open / power-close type. Connect to **NC** or **NO** and **DCOM**, depending on type of damper being employed. Power-closed / spring-open is the recommend damper and would be connected to **NO** and **DCOM**.
9. See table 3 for required and optional device connections to various terminals

10. **LEDs** — See table 4 for complete descriptions for various LED functions.

11. **Fuse** —The control has a 3 amp fuse.

12. **Error Codes**—The damper control module stores NO error codes; all codes are sent directly to thermostat. For a list of errors that are sent to the thermostat, see table 5 on page 9.

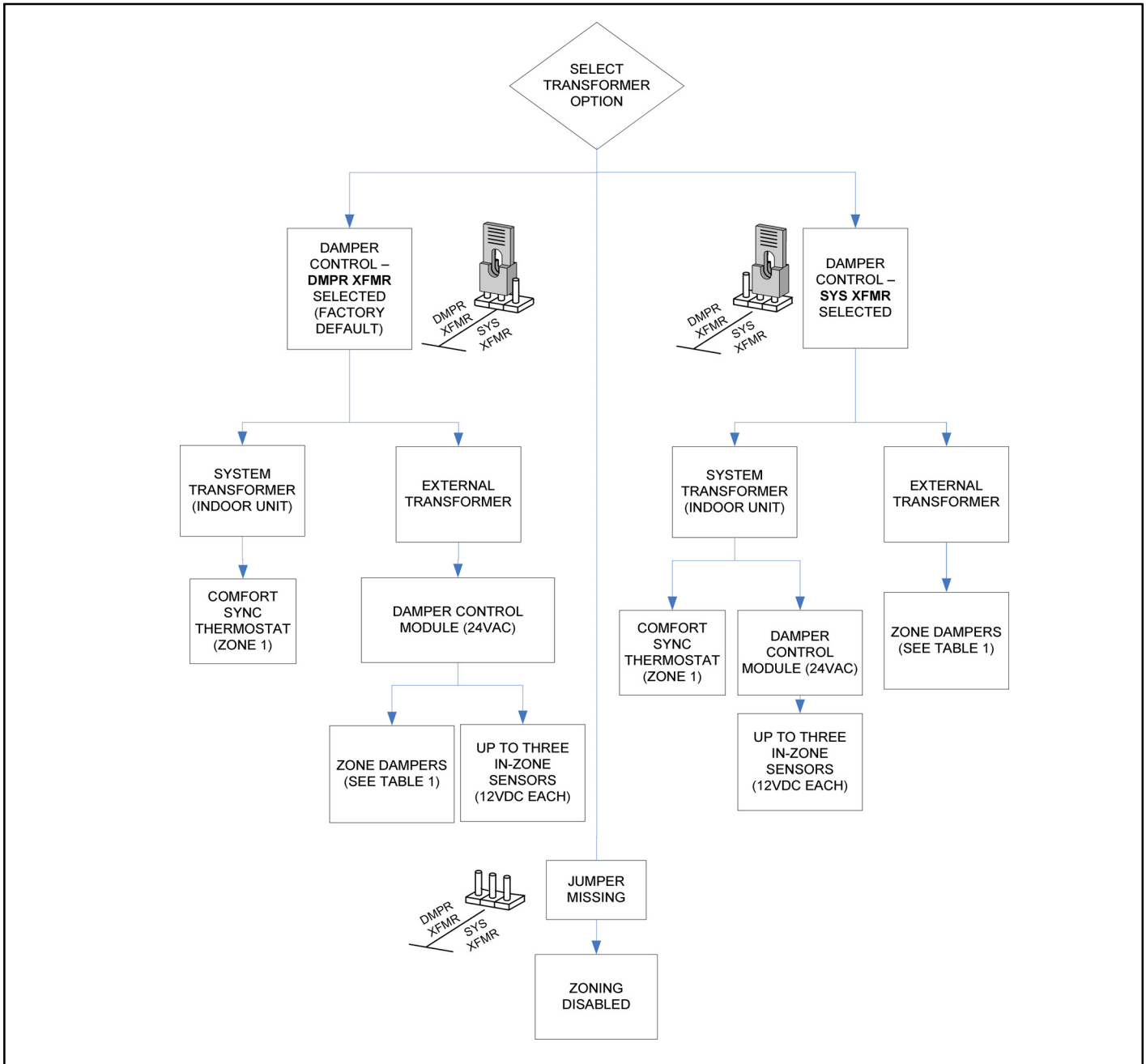


Figure 6. Transformer Configuration

Table 3. Connections, Insertion Bridge and Jumpers

Damper Control Label	Description	
TSTAT (Connection to Comfort Sync™ thermostat (thermostat controls Zone 1 operation))		
C	RSBus 24VAC common	
i+	RSBus data positive	
I-	RSBus data negative	
R	RSBus 24VAC power	
INDOOR (Connection to Comfort Sync™ -enabled furnace or air handler)		
C	RSBus 24VAC common	
i+	RSBus data positive	
I-	RSBus data negative	
R	RSBus 24VAC power	
DMPR XFMR / SYS XFMR		
DMPR XFMR	Use factory default position.	
	Connect zone damper 24VAC transformer wires to terminals DMPR R and XFMR C (see figure 7). Factory default is DMPR XFMR .	
G	SENSE	Connect the IAQ device requiring blower operation to the indoor unit control G terminal as illustrated in the wiring diagrams located in the Comfort Sync™ Thermostat Installer Guide. Place a wire jumper between the indoor unit G and damper control module G sense terminals. This will allow the damper control module to adjust the indoor blower CFM from continuous blower speed to the correct zone heating or cooling blower speed when any zone has a demand for heating or cooling.
	24VAC	24VAC power (NOT USED)
FREEZESTAT	SENSE	From the factory, an insertion bridge is installed between these two terminals. If a freezestat is to be used, remove insertion bridge and replace with connections to freezestat. See table 2 on page 5 for ordering freezestat. NOTE: If jumper is missing and no freezestat is installed the outdoor unit will not operate.
	24VAC	
PRESSURE S/W	SENSE	A HFC-410A pressure switch (catalog number 27W13) is required for applications with a Comfort Sync™ heat pump. This switch acts as a guard in case of high head pressures during first- and second-stage heating. The switch opens at 550 psig (3965 kPa) and closes (resets) at 425 psig (3102 kPa).
	24VAC	
DATS	SENSE	Terminals for the included discharge air temperature sensor (DATS). See figure 3 for installation requirements.
	24VAC	
ZONE 5, ZONE 2/6, ZONE 3/7 and ZONE 4/8 <i>(NOTE: ONLY ZONES 2, 3 and 4) are used.)</i>	PWR	In-Zone Sensor 12VDC power.
	D+	In-Zone Sensor data positive
	D-	In-Zone Sensor data negative
	C	In-Zone Sensor 12VDC common
DAMPER 1/5, DAMPER 2/6, DAMPER 3/7 and DAMPER 4/8	NC	Normally closed.
	NO	Normally opened.
	DCOM	Common
ZONE 1 - 4 / 5 - 8	The factory default for this jumper is 1-4. Do not set jumper to 5-8, which is not in use at this time.	

Table 4. LEDs

LED Indicator Label/Name	Color	Description
DMPR1, 2, 3, 4	Damper position LED. Illuminated when damper is power closed. LED will remain ON as long as the damper is power-closed.	
CNTRL	Red	Illuminated when system zoning is OFF.
STATUS	Green	This green LED should blink at 1Hz, 50% duty cycle as a "heartbeat" indicating that the device is operating normally. During device soft disable state, this LED will blink 3 seconds ON and 1 second OFF.
RSBUS COMM	Green	RSBus activity. Active communications with external device (Comfort Sync™-enabled external device).
IN-ZONE SENSORS COMM	Green	Active communication with In-Zone Sensors.
PS	Red	Illuminate when pressure switch is open (high pressure detected).

Table 5. Alarm/Fault Name

The following alarms are sent by the damper control module to the Comfort Sync™ thermostat. All alarms and faults are stored in the thermostat only.

Code	Priority	Alarm / Fault Name	Generating conditions
105	Moderate	The damper control module has lost communication with the rest of the system.	Equipment is unable to communicate. This may indicate the existence of other alarms/codes. In most cases errors are related to electrical noise. Make sure high voltage power is separated from RSBUS. Check for mis-wired and/or loose connections between the stat, indoor unit and outdoor unit. Check for a high voltage source of noise close to the system. Generally, this is a self-recoverable error. System is placed into non-zone mode when this condition occurs.
114	Moderate / Critical	There is a frequency/distortion problem with the power to the damper control module.	This alarm/code may indicate transformer overloading. Check the voltage and line power frequency. Check the generator operating frequency, if the system is running on back-up power. Correct voltage and frequency problems. System is placed into non-zone mode when this condition occurs. System resumes normal operation 5 seconds after fault recovered.
115	Moderate / Critical	The secondary 24VAC to the <i>damper control module</i> is lower than the required range of 18 to 30VAC.	24-Volt power low (range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. This alarm/code may require the installation of an additional or larger VA transformer. System is placed into non-zone mode when this condition occurs. System resumes normal operation 5 seconds after fault recovered.
124	Critical	The thermostat has lost communication with the <i>damper control module</i> for more than 3 minutes.	Thermostat has lost communication with the damper control module. Check the wiring connections, ohm wires and cycle power. The alarm stops all associated HVAC operations and waits for a heartbeat message from the unit that's not communicating. System is placed into non-zone mode when this condition occurs. The alarm/fault clears after communication is re-established.
125	Critical	There is a hardware problem with the <i>damper control module</i> .	There is a control hardware problem. Replace the control if the problem prevents operation and is persistent. System is placed into non-zone mode when this <i>damper control module</i> occurs. The alarm/fault is cleared 300 seconds after the fault recovers.
131	Critical	The damper control module control parameters are corrupted.	Reconfigure the system. Replace the control if zoning is not available.
132	Critical	The damper control module software is corrupted.	Recycle power. If failure re-occurs, replace the control. System reset is required to recover.
310	Moderate/ Critical	The damper control discharge air temperature sensor is either open, short-circuited or the temperature is out of sensor range. As a result the outdoor unit control will not perform any defrost tempering.	The damper control module detects open or shorted discharge sensor, or temperature that is out of discharge sensor range. Check the resistance of the discharge sensor and compare to temperature resistance chart - replace if needed. Reset by replacing the discharge sensor. This fault is detected by allowing the unit to run for 90 seconds before checking discharge sensor resistance. If the discharge sensor resistance is not within range after 90 seconds, the control will count one fault. After 5 faults, the control will lock out. Check for proper sensor reading and attachment to line. The alarm clears after a power reset.
530	Moderate / Critical	Low Damper 24VAC Voltage	<ul style="list-style-type: none"> • Damper Supply voltage is < 18VAC. • Maintain non-zone mode for 5 minutes after alarm clears.
532	Moderate	Zoning Pressure Switch Opened (high pressure)	Compressor pressure is above the specified limit. Compressor is turned off. Zoning will be restored once the zoning high pressure switch closes.
542	Moderate/ Critical	Zone 1 Temperature Sensor Problem	Invalid temperature reading, Open or short sensor detected. System is restored 30 seconds after fault is recovered.
543		Zone 2 Temperature Sensor Problem	
544		Zone 3 Temperature Sensor Problem	
545		Zone 4 Temperature Sensor Problem	

Comfort Sync™ Thermostat Installer Zoning Control A Settings

To Adjust Zoning Control A Parameters

Refer to the Comfort Sync™ Thermostat Installer's System Setup Guide to navigate to the system devices list. Use the

following procedure to configure available parameters for the damper control module primary parameters.

Use arrows (see figure 8) to select a device from the “system devices” list; then use the **about** button to view information about **communicating** devices (information about other devices is not available).

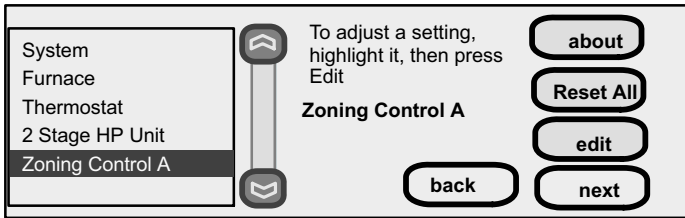


Figure 8. Select Zoning Control A

Use **back** to return to the previous screen or **next** to go on. A complete list of parameters, their defaults and setting ranges is listed in figure 9.

1. In the “system devices” screen, use the arrows (A) to highlight **Zoning Control** and press **edit** (B).
2. Touch one of the listed options (C) to select for example “Zone 2 Temp Reading Calibration”. Press edit (D) to continue.
3. Use up or down arrows (E) to change the value.
4. Press **save** (F). Change other red settings (if present) using a similar process.
5. List:normal
6. List:normal

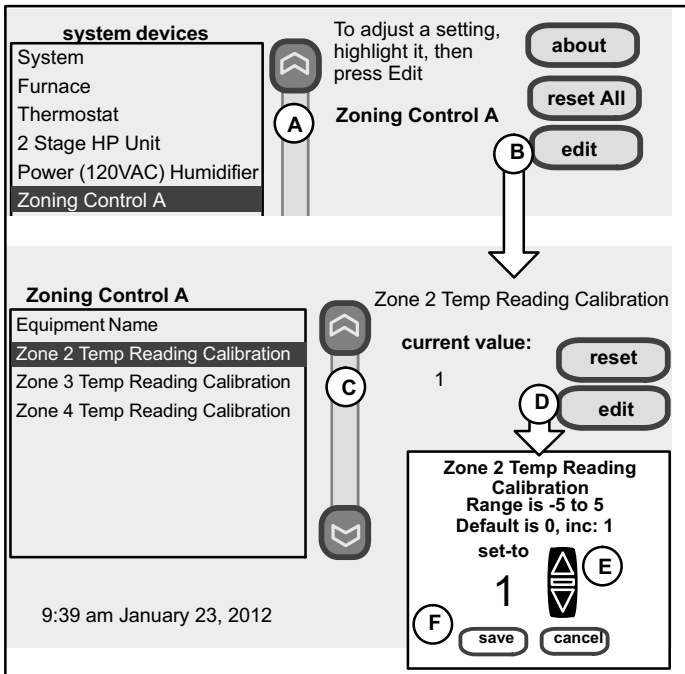


Figure 9. Adjusting Zoning Control A Parameters

After completing the settings press the **back** button to continue. On the “system devices” screen, continue by pressing the **next** button.

Table 6. Adjustable Zone Temp Reading Calibrations

Parameter Name	Default	Min.	Max.	Incr.	Parameter Description
Zone 2 through 4 Temp Reading Calibration	0°F	-5°F	5°F	1°F	Recalibrating the In-Zone Sensors temperature reading.

To Adjust System Parameters

Refer to the Comfort Sync™ Installer's System Setup Guide to navigate to the system devices list.

Use arrows (see figure 10) to select a device from the “system devices” list; then use the **about** button to view information about **communicating** devices (information about other devices is not available).

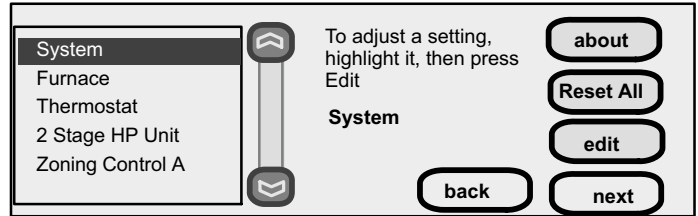


Figure 10. Select System

A complete list of defaults and ranges are listed in figure 9.

1. In the **system devices** screen, use the arrows (A) to highlight **System** and press **edit** (B).
2. Touch one of the options (C) to select for example **Zoning Target Supply Air Temp for Cooling**. Press **edit** (D) to continue.
3. Use up or down arrows (E) to change the value.
4. Press **save** (F). Change other red settings (if present) using a similar process.

After completing the settings press the **back** button to continue. On the **system devices** screen, continue by pressing the **next** button.

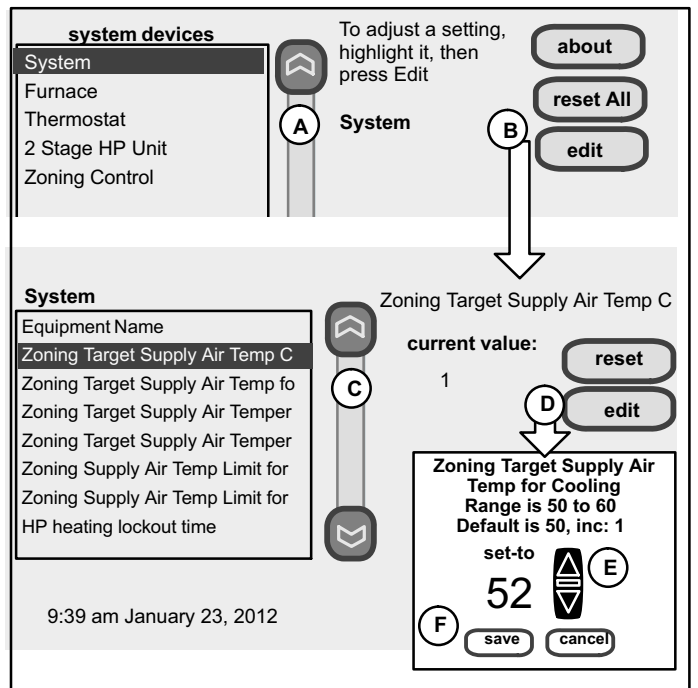


Figure 11. Adjusting System Parameters for Zoning

Table 7. Adjustable System Parameters for Comfort Sync™ Zoning System)

Parameter Name:	Default	Min.	Max.	Incr.	Dependency	Parameter Description
Zoning Gas heating DAT Cool down Target	100°F	80°F	110°F	1°F	Damper control module, Furnace	At the end of a gas heat cycle, the Heat Blower Off-Delay may not be long enough to completely cool the heat exchanger. This may result in a primary limit trip then, or at the beginning of the next heat demand. This parameter allows the blower to run after a gas heat call ends until the discharge air temperature sensor (DATS) cools to the temperature set in the parameter. If the temperature is set too low this will cause the temperature in the room to overshoot.
Zoning Anticipated Discharge Air Temperature Adjustment	60 secs	0 secs	120 secs	10 secs	Damper control module, DATS	This parameter setting compensates for a rapid change of the discharge air temperature due to fast changing conditions. It examines the change in the discharge air temperature for the previous 2 minutes and extrapolates or looks forward by the number of seconds set in the parameter and uses this as the DATS value for staging. This parameter setting helps prevent limit trips/frozen coils from occurring.
Zoning Target Supply Air Temp for Cooling	50°F	50°F	60°F	1°F	Damper control module	In cooling mode, this setting sets the target discharge air temperature.
Zoning Target Supply Air Temp for Gas/Electric Heating	100°F	100°F	130°F	5°F	Damper control module, Furnace or air handler electric heat section	In heating mode, this setting sets the target discharge air temperature.
Zoning Target Supply Air Temp for HP Heating	90°F	85°F	110°F	1°F	Damper control module, heat pump	In heat pump heating mode, this setting sets the target discharge air temperature.
Zoning Supply Air Temp Limit for Cooling	40°F	35°F	45°F	2°F	Damper control module and compressor cooling operation	In cooling mode, this setting sets the discharge air temperature low limit. Below this temperature, the cooling is turned off.
Zoning Supply Air Temp Limit for Gas/Electric Heating	140°F	140°F	160°F	5°F	Damper control module, Furnace or air handler electric heat section	In heating mode, this setting sets the discharge air temperature high limit. Above this temperature the heating is turned off.
Zone 1 First Stage Differential	1.0°F	0.5°F	3.0°F	0.5°F	Damper control module	Differential is the temperature difference between when first stage will cycle ON and cycle OFF. (Example: Zone 1 thermostat is set at 70°F with a 1.0°F differential. Cooling Demand - Cooling will cycle ON when the room temperature reaches 70.5°F and cycle OFF when the room temperature is 69.5°F.)
Zone 2 First Stage Differential	1.0°F	0.5°F	3.0°F	0.5°F		
Zone 3 First Stage Differential	1.0°F	0.5°F	3.0°F	0.5°F		
Zone 4 First Stage Differential	1.0°F	0.5°F	3.0°F	0.5°F		

Table 8. Adjustable System Parameters for Comfort Sync™ Zoning System (Configuration Dependent)

Parameter Name:	Default	Min.	Max.	Incr.	Dependency	Parameter Description
Zone 1 Continuous Blower CFM	Dependent on hardware configuration	Minimum and maximum CFM will be dependent on system component configurations. These parameter values are automatically adjusted to the specific hardware configuration. (see table 9 on page 12 for minimum CFMs for specific indoor units.		5 CFM	Damper control module	Zones requesting the fan on are only allowed while no other zone demand is present. The thermostat will sum all the zone continuous blower CFM requirements and send the command only after positioning the dampers and waiting for the damper close delay period to expire. Continuous blower demands are the lowest priority demands, all other conditioning demands will override the continuous blower demand.
Zone 2 Continuous Blower CFM						
Zone 3 Continuous Blower CFM						
Zone 4 Continuous Blower CFM						
Zone 1 Cooling CFM						Target cooling CFM for a specific zone.
Zone 2 Cooling CFM						
Zone 3 Cooling CFM						
Zone 4 Cooling CFM						
Zone 1 Heating CFM						Target heating CFM for a specific zone.
Zone 2 Heating CFM						
Zone 3 Heating CFM						
Zone 4 Heating CFM						

MINIMUM CFM FOR COMFORT SYNC™ ZONING SYSTEM WITH VARIABLE SPEED BLOWER MOTORS

The table 9 list minimum indoor unit CFMs for use with the damper control module.

Table 9. Minimum CFM

Unit Model Number	CFM (minimum)	Unit Model Number	CFM (minimum)
A80US2V070A12	250	A96DS2V045B12S	250
A80US2V090B12	250	A96DS2V070B16S	380
A80US2V090B16	380	A96DS2V090C20S	450
A80US2V090C20	450	A96DS2V110C20S	450
A80US2V110C20	450	A97USMV070B12S	250
A80US2V135D20	450	A97USMV090C12S	250
A80US2V070A12L	250	A97USMV090C16S	250
A80US2V090B16L	380	A97USMV090C20S	450
A80US2V110C20L	450	A97USMV110C20S	450
A80DS2V070A12	250	A97USMV135D20S	450
A80DS2V090B16	380	A97DSMV070B12S	250
A80US2V110C20L	450	A97DSMV090C16S	380
A96US2V045B12S	250	A97DSMV090C20S	450
A96US2V070B12S	250	A97DSMV110C20S	450
A96US2V090C12S	250	BCS2M24	250
A96US2V090C16S	380	BCS2M36	380
A96US2V090C20S	450	BCS2M42	450
A96US2V110C16S	380	BCS2M48	450
A96US2V110C20S	450	BCS2M60	450
A96US2V135D20S	450		

To Edit and Test Airflow per Zone

Use the following procedure to edit and begin test procedure airflow per each zone. The three values listed in figure 12 were set in the previous section. However, adjustments can be made on the **Edit and Test Air Flow per Zone** screen also.

NOTE - If the total CFM from calling zones is less than the minimum CFM that the unit will deliver (see table 9), the minimum CFM will be delivered, not the desired CFM.

System Devices > System Parameter Names	Edit and Test Airflow Screen Parameter Names
Zones 1 - 4 Continuous Blower CFM	Blower Circulation Airflow
Zones 1 - 4 Cooling CFM	Cooling Airflow
Zones 1 - 4 Heating CFM	Heating Airflow

1. Select the desired radio button option - **Blower Circulation Airflow, Cooling Airflow or Heating Airflow (A)**.
2. Adjust airflow for a specific zone by pressing on the desired zone (**B**). Total maximum airflow for all zones in this example is a combined 1250 CFM. Minimum CFM per zone is **50** and maximum is **1250**.
3. Adjust airflow by using the up or down arrow to change the CFM (**C**).
4. Press **start (D)** to begin operation for that specific zone.
5. Repeat procedure to configure all applicable zones.
6. Press **save (E)**.

After setting zoning CFMs the **next** button will appear and let you proceed to the system testing screen.

Refer to the Comfort Sync™ Thermostat Installer's System Setup Guide to proceed with system tests.

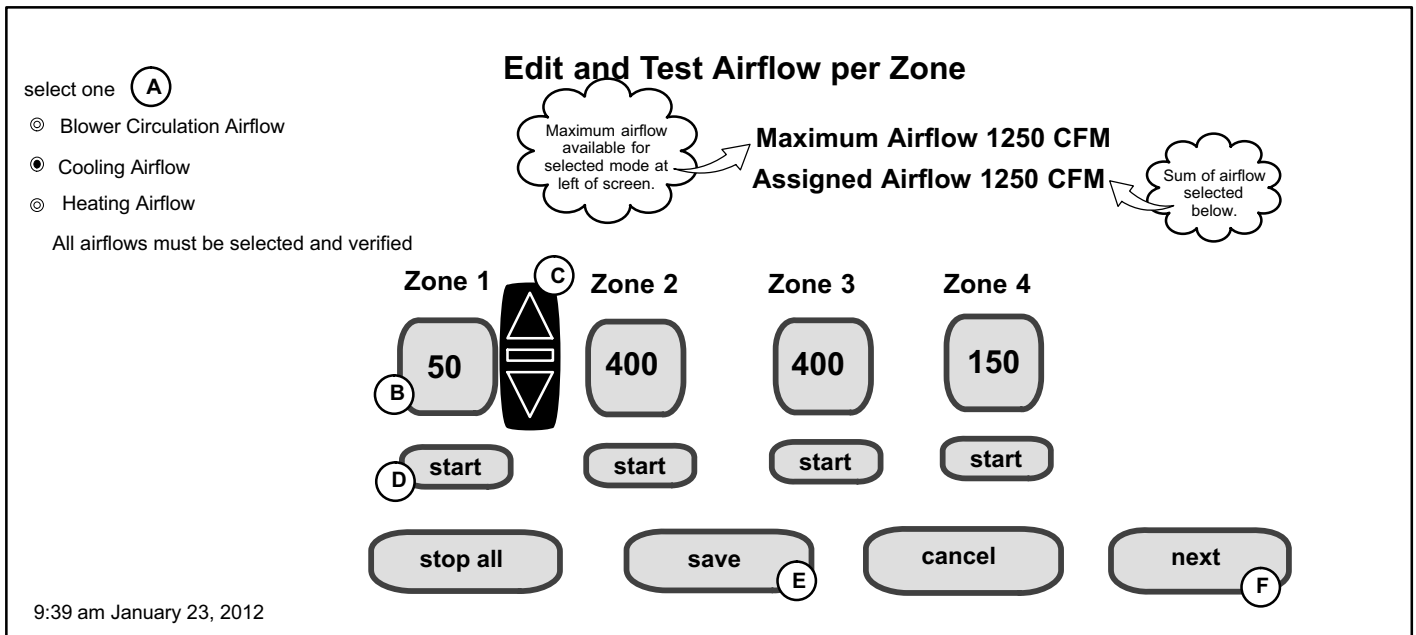


Figure 12. Editing Zone CFMs

RECORDING AIRFLOW INFORMATION

Use the following table to record each zone's airflow value:

Table 10. Recording Airflow Values

Parameter	Zone 1	Zone 2	Zone 3	Zone 4
Continuous Circulation Airflow				
Cooling Airflow				
Heating Airflow				

Sequence of Operation

When power is first applied, the green Status LED will flash, indicating that the damper control control is functioning normally. When the control is first powered on, there is a 5 minute minimum time delay during which only the fan output will respond.

HEATING / COOLING CHANGEOVER

The following is an example of how the system operates during a heating / cooling changeover.

When the system is satisfying a call from zone 1 for heating and receives a call for cooling from zone 2, the following will occur:

- Then system will continue to fulfill the demand from zone 1 until satisfied, or a maximum time of 20 minutes has occurred.
- If after 20 minutes the system is still operating based on satisfying the heating demand from zone 1, the system will terminate that demand.
- The system will then shut system down for five (5) minutes. This will allow for system temperatures and operating pressures to stabilize.
- After a five 5 minute delay the system will begin operations to satisfied the cooling demand from zone 2.

The system will continue to operate in this matter each time it receives a zone call that is opposite of the current mode of operation (heating or cooling).

DAMPER OPERATION

Cooling Operation - Conventional Heat/Cool and Heat Pump Systems

When a In-Zone Sensor makes a demand for cooling, the zone damper opens and the cooling equipment begins operating.

Cooling demand is terminated when:

1. All zone demands for cooling are terminated.
2. The demand has exceeded the heat/cool changeover time limit (20-minutes) while a heat demand exists.

When cooling demand is terminated, a 5 minute minimum off time delay is initiated.

Second stage cooling is energized when the discharge air temperature is 7°F higher than the set point of the cooling staging temperature settings.

Heating Operation - Conventional Heat/Cool and Heat Pump Systems

When a In-Zone Sensor makes a demand for heating, the zone damper opens and heating equipment begins operating. Heating demand is terminated when:

1. All zone demands for heating are terminated.

2. The demand has exceeded the heat/cool changeover time limit (20-minutes) while a cooling demand exists.

When heating demand is terminated, a 5-minute minimum off time delay is initiated.

Second-stage heating is energized if the discharge air temperature is lower than the set point of the heating staging temperature set point.

DUAL-FUEL OPERATION

NOTE - Only Comfort Sync™ -enabled communicating heat pump outdoor units may be used with a dual-fuel system.

When both a gas furnace and a heat pump are present on the system, the thermostat uses the balance points to determine which source to use for heating.

When the outdoor temperature is above the low balance point, the heat pump is always attempted first before using the gas furnace.

In order to use the gas furnace as a primary heating source (not defrost tempering) when the outdoor temperature is between the high and low balance points, the following conditions must occur:

- Heat pump must be used for a minimum of 30 minutes.
- Temperature in the zone not increase by more than 0.5°F
- Heat pump has not gone into defrost in the 30 minute period

If any single-zone satisfies the specified conditions, the heat pump will stop and the gas furnace is used to satisfy all heat calls for the next duration of the parameter heat pump lockout time. After the heat pump lock out has expired, the heat pump is again used as the primary heat source on the next call after the equipment has stopped.

Emergency Heat Operation - Heat Pump Systems

When the Comfort Sync™ emergency heat is enabled the unit will satisfy all heating demand with either gas or electric backup heat. When the Emergency Heat setting is OFF, the heat pump is used to satisfy heating demands.

Whole Home Dehumidification Operation

Humiditrol Whole Home Dehumidification System can be used with the Comfort Sync™ Zoned System. Humiditrol can be installed through the Comfort Sync™ thermostat under **System Devices > Add or Remove Non-communicating equipment?**, select **Yes**. From the **non-communicating device list**, select **Dehumidifier**. Press **edit**, and select **Humiditrol** to enable. The default setting is **max over cool**.

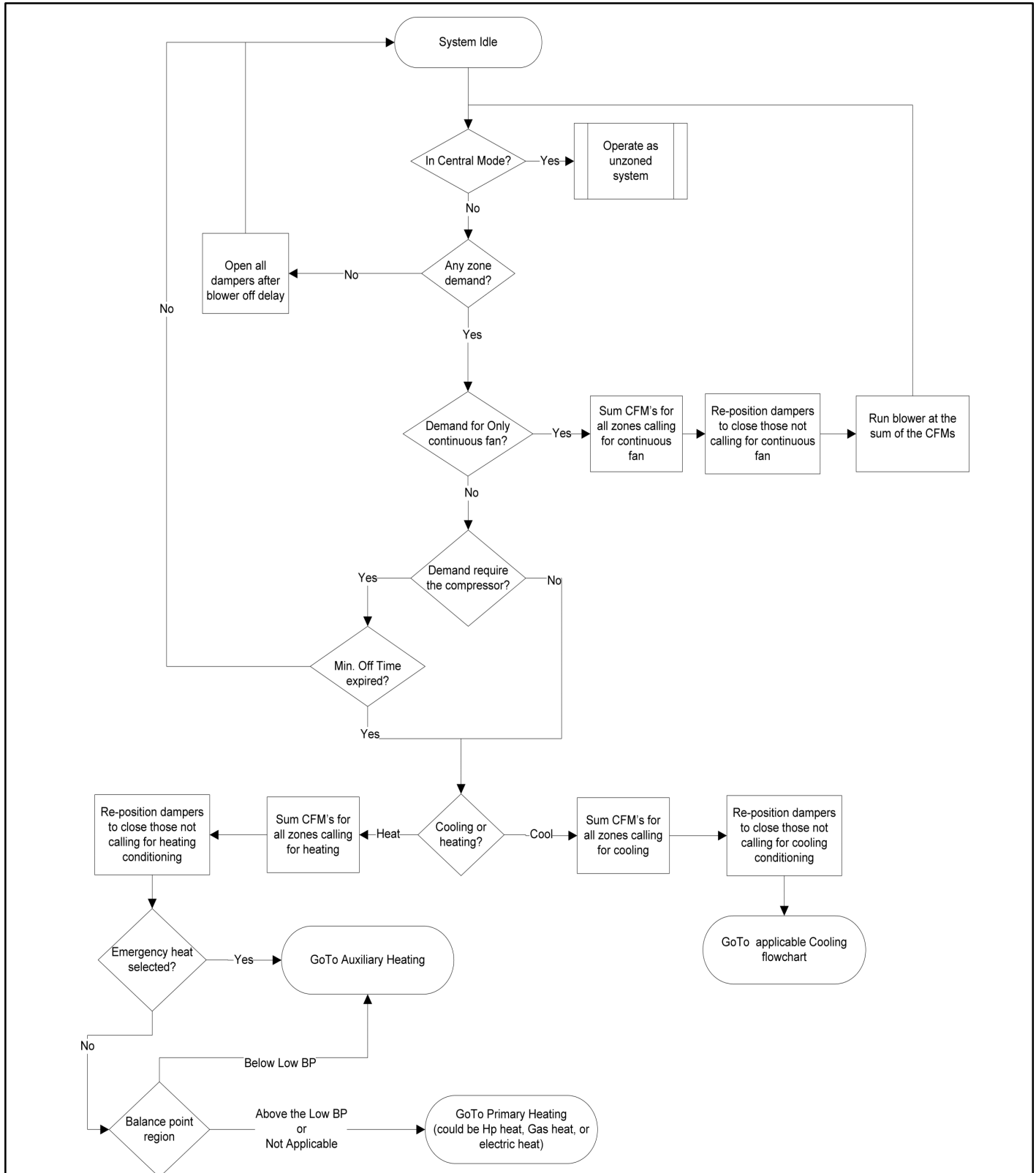


Figure 13. System Idle

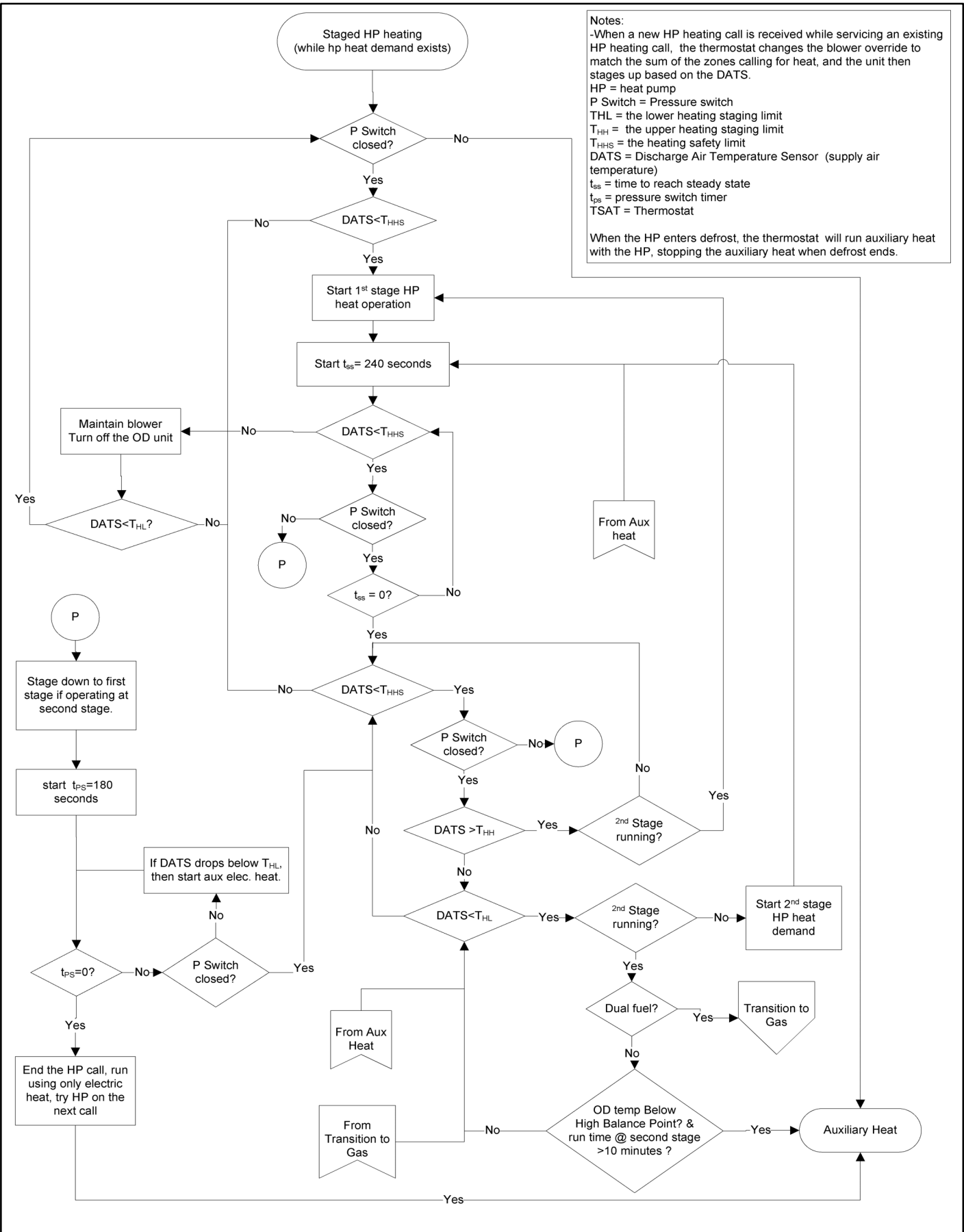


Figure 14. Staged Heat Pump Heating

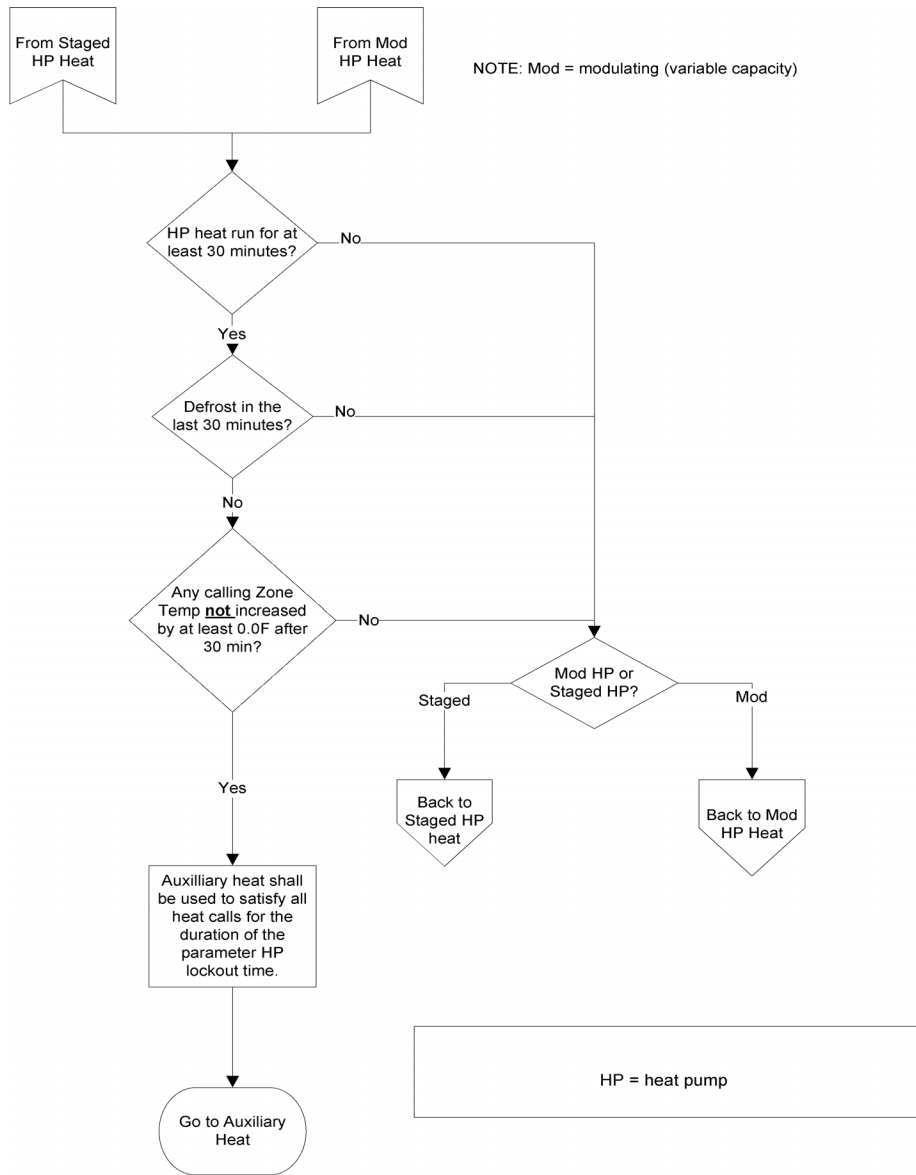


Figure 16. Transition to Gas

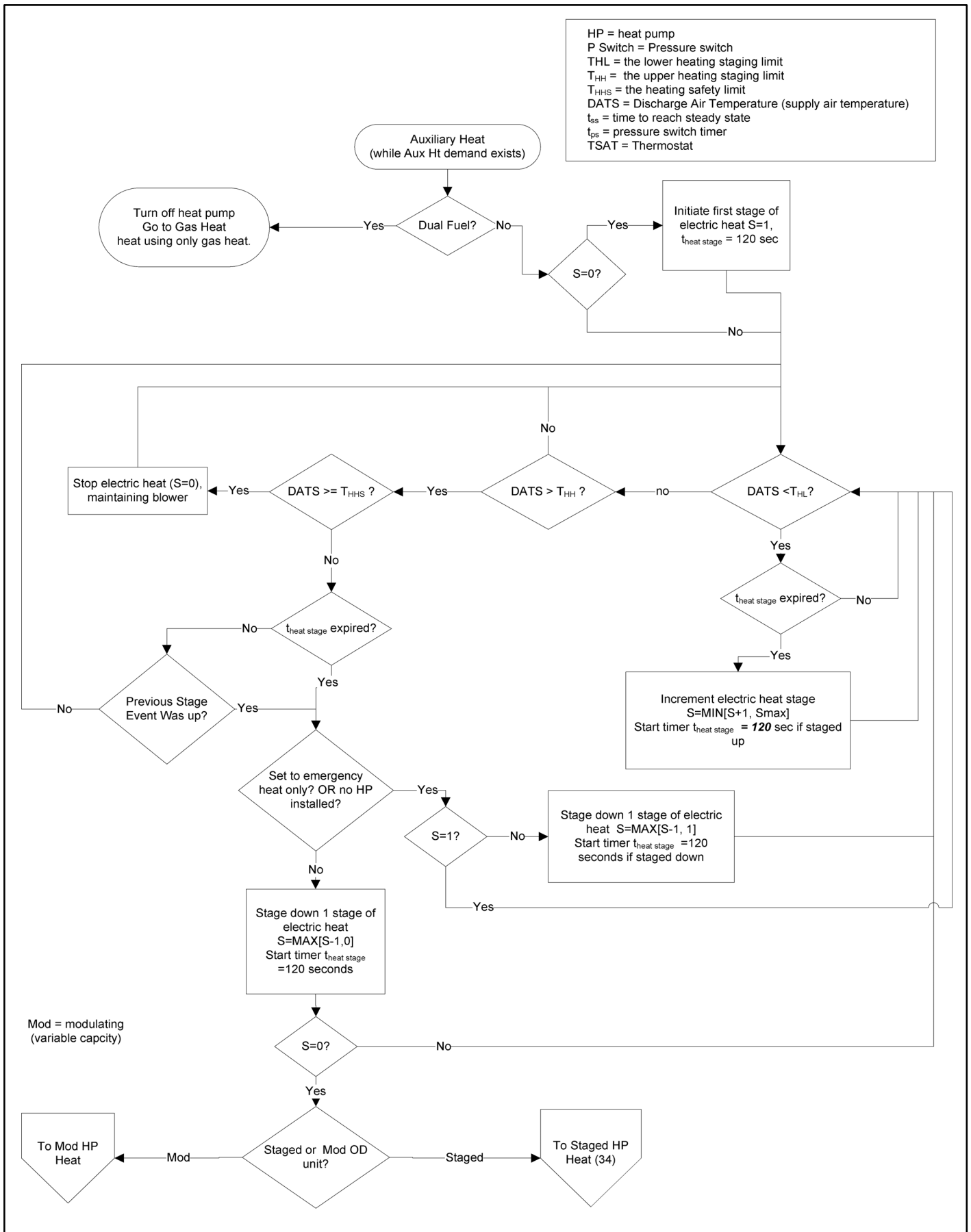
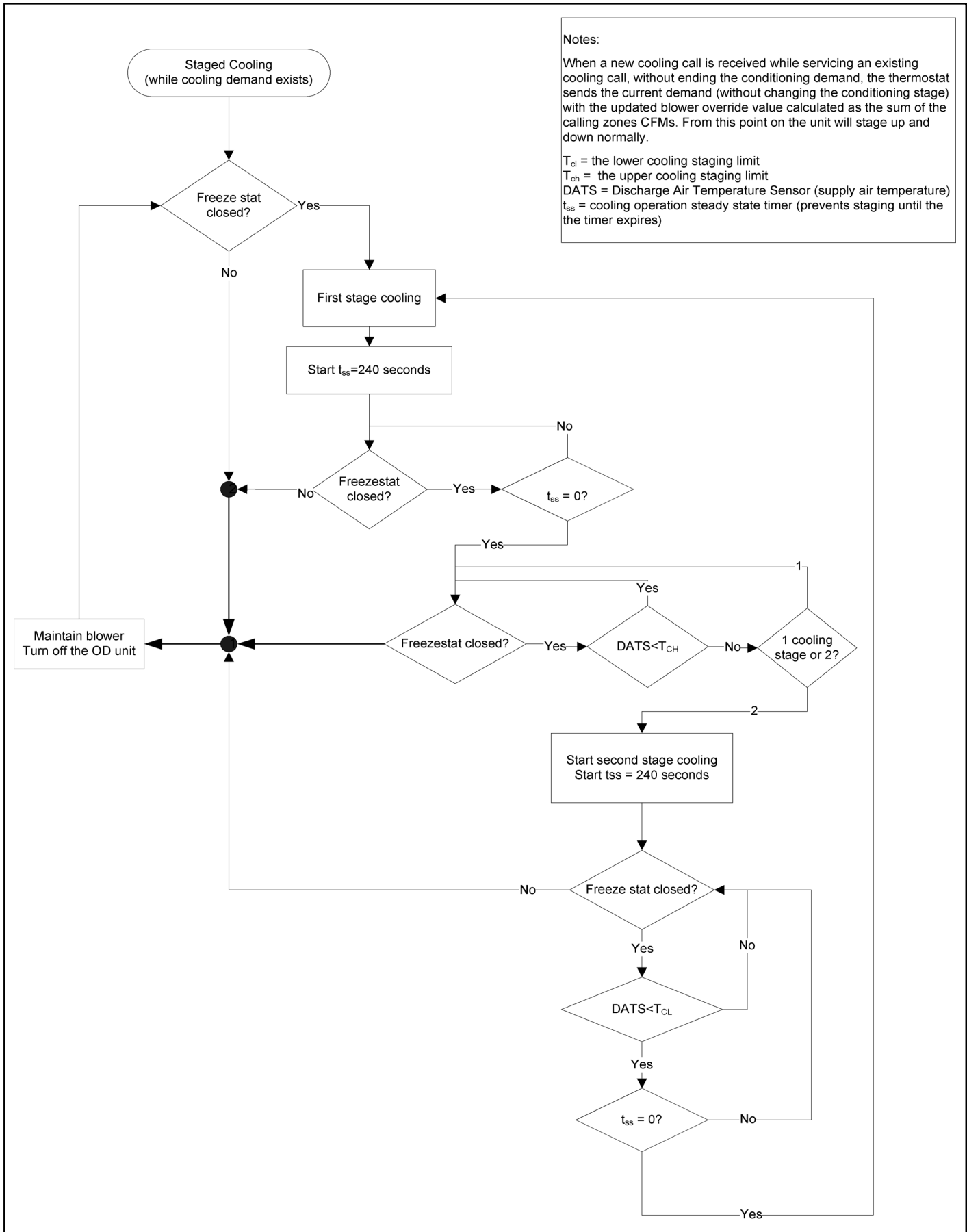


Figure 17. Auxiliary Heat



Notes:

When a new cooling call is received while servicing an existing cooling call, without ending the conditioning demand, the thermostat sends the current demand (without changing the conditioning stage) with the updated blower override value calculated as the sum of the calling zones CFMs. From this point on the unit will stage up and down normally.

T_{cl} = the lower cooling staging limit
 T_{ch} = the upper cooling staging limit
 DATS = Discharge Air Temperature Sensor (supply air temperature)
 t_{ss} = cooling operation steady state timer (prevents staging until the timer expires)

Figure 18. Staged Cooling

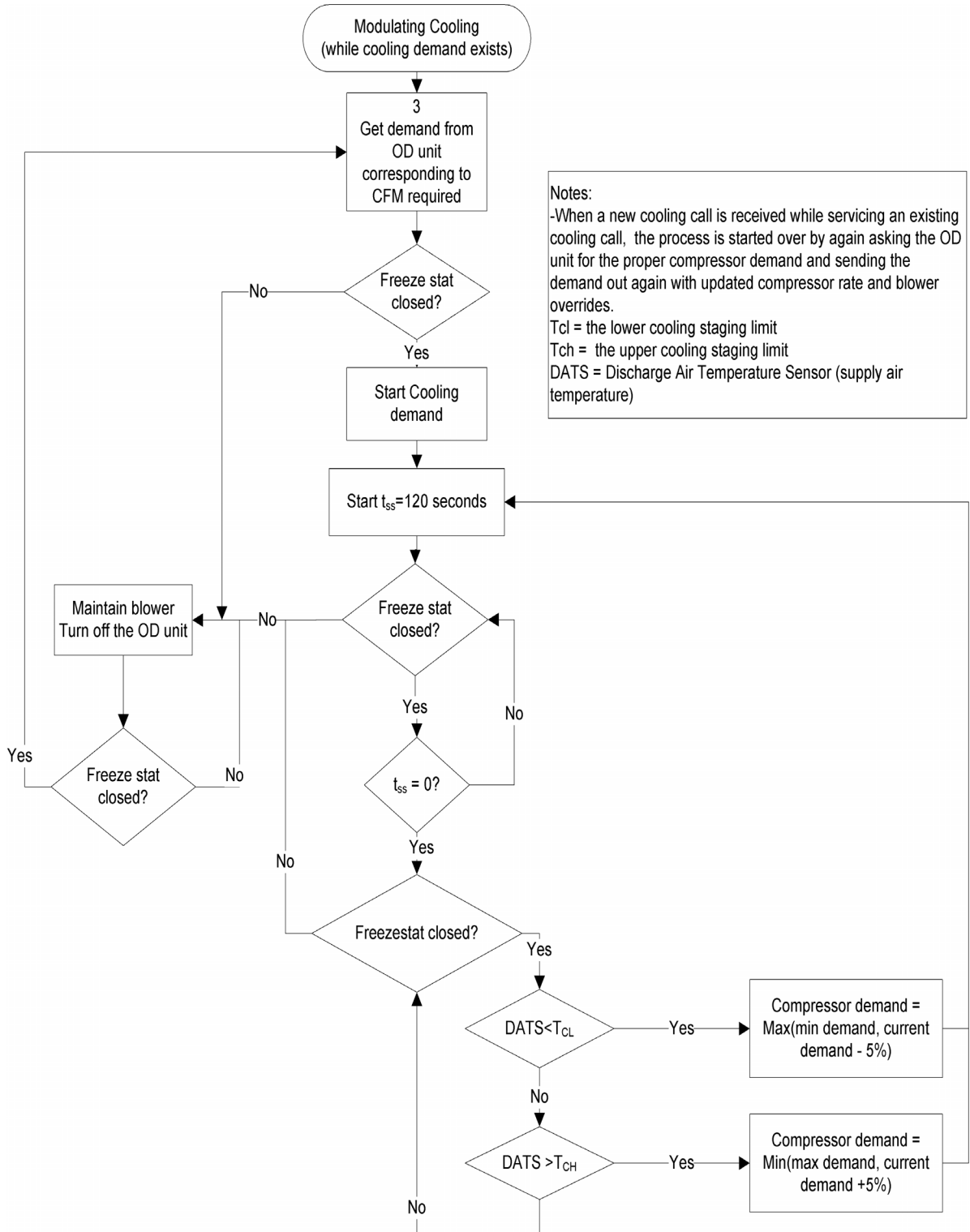


Figure 19. Modulating (Variable Capacity) Cooling

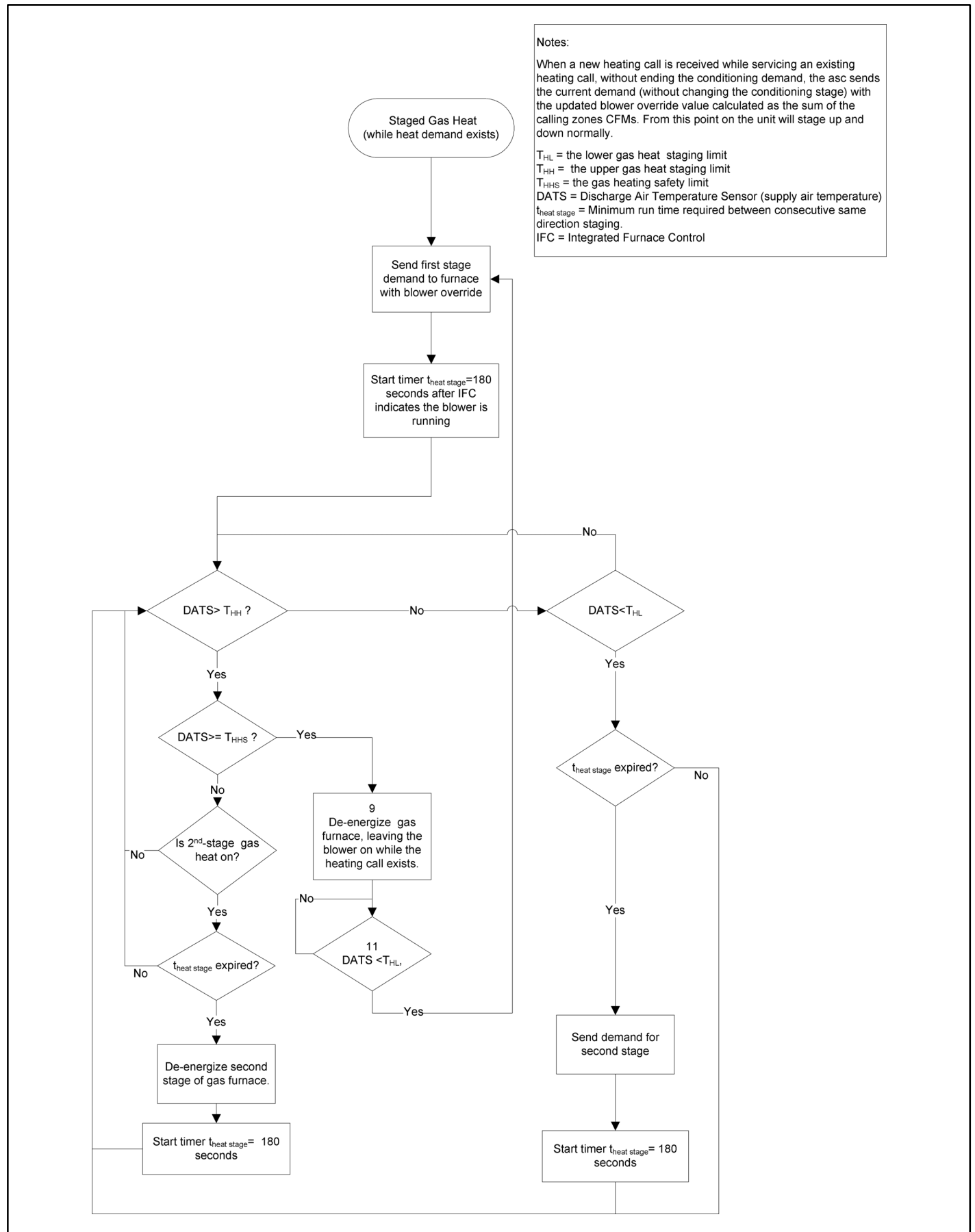
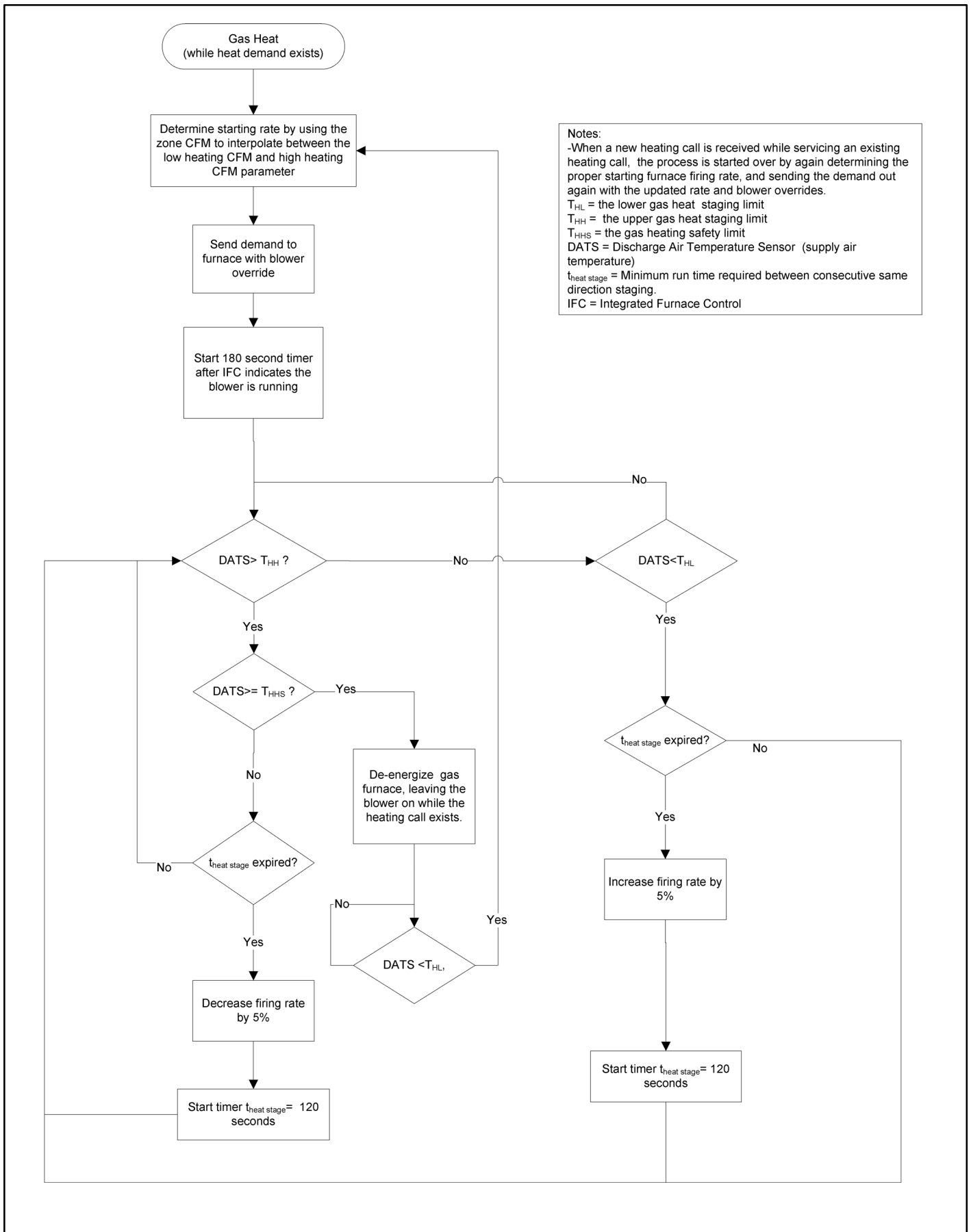


Figure 20. Staged Gas Heat



Notes:
 -When a new heating call is received while servicing an existing heating call, the process is started over by again determining the proper starting furnace firing rate, and sending the demand out again with the updated rate and blower overrides.
 T_{HL} = the lower gas heat staging limit
 T_{HH} = the upper gas heat staging limit
 T_{HHS} = the gas heating safety limit
 DATS = Discharge Air Temperature Sensor (supply air temperature)
 $t_{heat\ stage}$ = Minimum run time required between consecutive same direction staging.
 IFC = Integrated Furnace Control

Figure 21. Modulating (Variable Capacity) Gas Heat

Comfort Sync™ Thermostat User Zoning Control Settings

When a zone control system has been installed and enabled by the installer, the homeowner has the option to control temperature or set away mode for each enabled zone. Touch the **zone location** button as shown below to display the **AVAILABLE ZONES** screen.

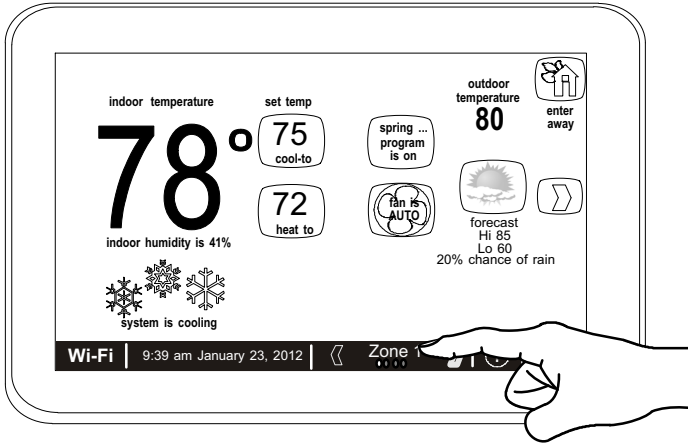


Figure 22 shows the AVAILABLE ZONES screen. This screen displays the current temperature, as well as the heating / cooling settings for each zone.

RENAMING ZONES

Touch the zone number of the zone you wish to rename. An on-screen keyboard will appear to allow you to rename a specific zone. Touch the **save** button when you are through.

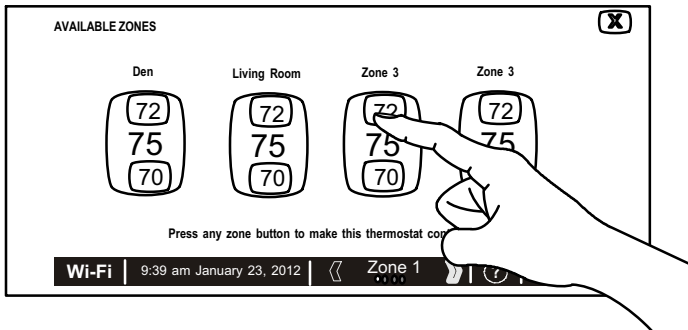


Figure 23. Adjusting Temperature

ADJUSTING ZONE TEMPERATURES

Touch the current temperature reading of any zone that you wish to adjust. This will trigger the appearance of the temperature adjustment screen. Make desired adjustments for the particular zone as outlined beginning on page 14.

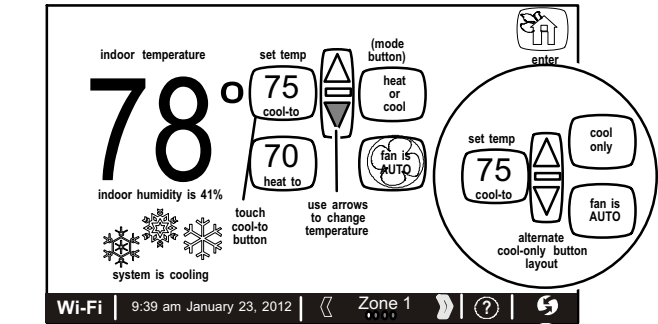


Figure 24. Selecting System Mode

USING UNIQUE INDIVIDUAL ZONE PROGRAMMING TEMPERATURES

If you wish to use preset temperature programming for individual zones then use the following procedure:

1. Give each active zone a unique name as exemplified in **RENAMING ZONES** (*kitchen, living, bedroom, etc.*).
2. From the Home Screen, select the **System Mode** button.

Figure 22. Home Screen - Selecting Available Zones Screen

Figure 24. Selecting System Mode

3. Touch programs and the touch edit programs.

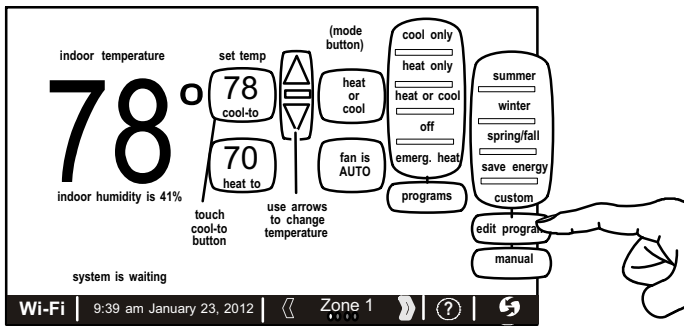


Figure 25. Turning on the Program

4. From the **EDIT PROGRAMS** screen, press and hold each program list under the **select programs** column and rename that program to match the zone names used in step 1 using the on-screen keyboard. Repeat this step for each active zone in the system.

NOTE: In a four zone system, only four unique programs can be used.

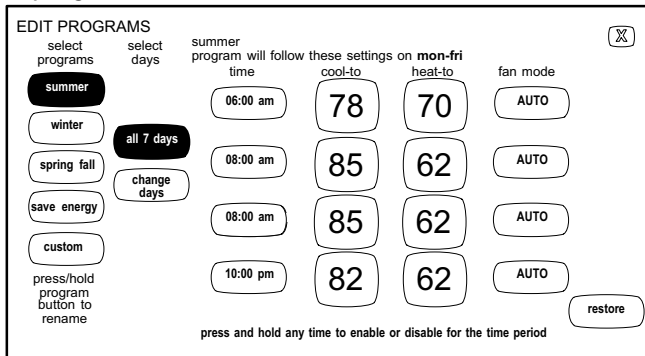


Figure 26. EDIT PROGRAMS Screen

5. Adjust individual program **time** and **cool-to**, **heat-to** and **fan mode** as desired. When done, touch the **save** button.

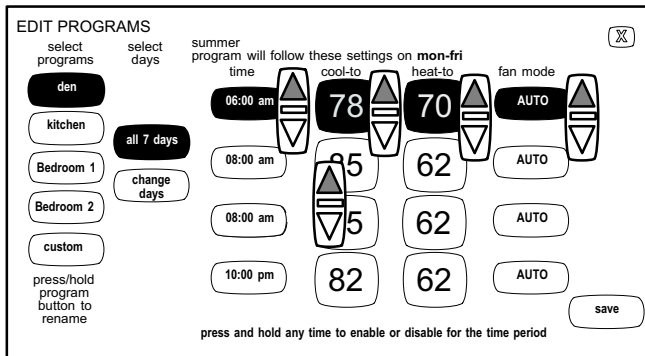


Figure 27. Adjusting PROGRAM Settings

6. From the Home Screen, select the desire zone, and then touch the System mode. *Example: If the zone selected in called Den, then select program Den.*

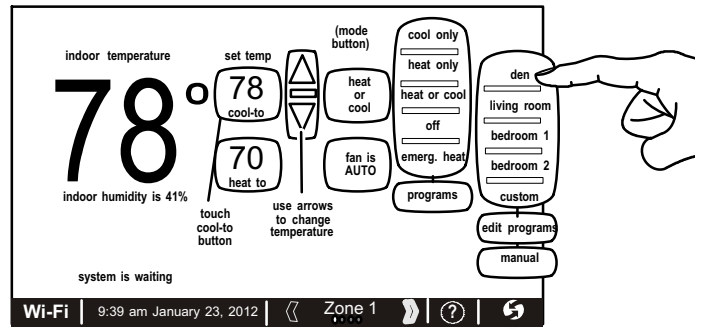


Figure 28. Selecting System Mode

SETTING AWAY MODE PER ZONE

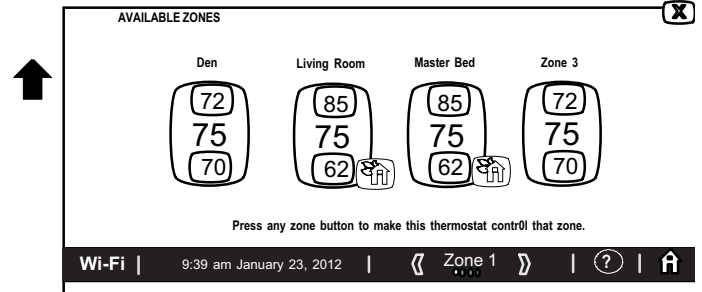


Figure 29. Home Screen - Selecting Away Mode for Individual Zones

The Zone 1 thermostat becomes the system master thermostat. If the Zone 1 thermostat is set for Away Mode (on the Home Screen), the away mode is enabled for the whole system (all zones) until canceled.

If zones 2, 3, or 4 are set for Away Mode on the Home Screen, the Away Mode icon appears at the lower-right of each zone button on the AVAILABLE ZONES screen.

ADJUSTING AWAY MODE TEMPERATURE OR CANCEL AWAY MODE PER ZONE

To adjust the Away Mode zone temperature setting or to cancel Away Mode for a specific zone, enter the Home Screen, select the desired zone and touch the **Cancel Away** icon located in the upper right-hand corner of the screen.

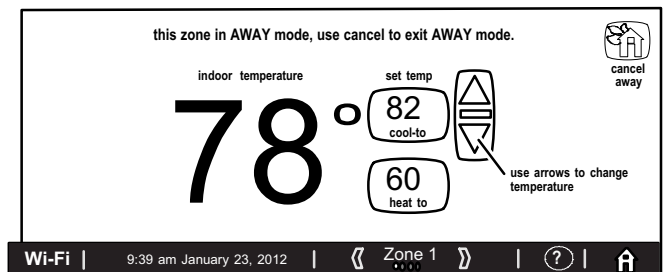


Figure 30. Adjusting Temperature or Canceling Away Mode with Program Running (Away Mode)

HOW TO DISABLE ZONING

From the Home screen, select the right arrow to proceed to the **FEATURES** screen. Select **zone settings** and then select **zoning is ON**. This will toggle zoning to OFF. Once disabled, zoning information disappears from the status bar along the bottom of the home screen. When zoning has been disabled, the master thermostat controls the entire system in single comfort mode.

NOTE - When Zoning is disabled, the In-Zone Sensors are also disabled; however, each of the In-Zone Sensors continues to display the current temperature for that zone. The Comfort Sync™ logo is also displayed to indicate that zoning is off.

Humidification and Dehumidification

HUMIDIFICATION - WITH ZONING

Humidification with zoning is handled based on the zone 1 demand using the indoor units 24VAC H terminal.

1. **Basic Mode** operates as follows:
 - > Zone 1 (Comfort Sync™ thermostat) humidity sensor controls all zone humidification.
 - > Zoning humidification can only be activated during a heating demand.

- > Humidification for all zones is determined by the **Humidification Setpoint** setting (Comfort Sync™).
- > Once **Humidification Setpoint** is satisfied then humidification is terminated even if heating demand is present.

2. **Precision Mode** operates as follows:

- > Zone 1 (Comfort Sync™ thermostat) humidity sensor controls all zone humidification.
- > Zoning humidification can be activated without a heating demand. However If there is a call for heating during humidification, then humidification will continue to operate until the **Humidification Setpoint** is satisfied.
- > Humidification for all zones is determined by the **Humidification Setpoint** setting (Comfort Sync™).
- > Once **Humidification Setpoint** is satisfied then humidification only is terminated even if heating demand is present.

DEHUMIDIFICATION MODES - WITH ZONING

See tables 11 and 12 to determine zoning and dehumidification information based on the Comfort Sync™ thermostat software version.

Table 11. Comfort Sync™ Outdoor Units Only

	Comfort Sync™ Software Version 2.1 and later (Auxillary and Humiditrol® Dehumidification)	Comfort Sync™ Software Version 2.1 and later (if compressor operation is altered or not). (Lennox Communicating Outdoor Units configured for moderate or humid mode)
	Dry = Off	
Zoning system - Dehumidification by EDA Accessory Control	Moderate and Humid = On (There is no difference between moderate and humid mode setting. Auxiliary or Humiditrol® will work if no other calls for heating or cooling are active for any zone.)	Moderate and humid modes will only be allowed when zoning is set to OFF . System must be <u>manually</u> set to zoning off mode from the thermostat home screen. When the zoning function is set to OFF, the system will operate as if no zoning equipment is connected.

Table 12. Comfort Sync™ and Other Brands of Non-Communicating Outdoor Units

Comfort Sync™ Software Version 2.02 (if compressor operation is altered or not).	Comfort Sync™ Software Version 2.1 and later (if compressor operation is altered or not).	
Original Parameter Label	New Parameter Label	Resulting Operation
Off	Off	Off
Basic	Medium	Standard blower speed
Precision	High	Low blower speed