LENNOX

SERVICE AND APPLICATION NOTES

New Dehumidification and Humidification Modes
(iComfort Wi-Fi® Software Version 2.1 and Higher)

AFFECTED PRODUCT

iComfort Wi-Fi® (software version 2.1 and higher)

ISSUE

With the implementation of the iComfort Wi-Fi® software revision 2.1 (and higher), the parameter label that was displayed on the thermostat screen and the operating characteristics associated with the dehumidification and humidification modes have changed. The purpose of this bulletin is to provide information concerning these changes.

In addition to the flow charts in this document here are other thing to consider if having a dehumidification issue:

• Check the ARI S/T ratio ratings on the system installed. Ratings can be found at DAVENET.COM.
• Check for high humid outdoor air being introduced to the home.
• Check for air leaks in the duct system (attic or crawlspace air being drawn in to home).
• Check for indoor blower running when their is no call for cooling or after the cooling call has been satisfied.

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DEHUMIDIFICATION

1. **Dehumidification Modes — without Zoning (iComfort Wi-Fi® Software Version 2.02) — Communicating (XC17, XP17, XP17N, XC21, XP21 and XP21N)**

TABLE 1

Lennox Communicating Outdoor Units — iComfort Wi-Fi® Software Version 2.02 (XC17, XP17, XP17N , XC21, XP21 and XP21N)	
Original Parameter Label	**Resulting Operation**
Off	Off
Basic	Compressor in high speed with blower in low with call for AC
Precision	Compressor in high speed with blower in low speed with no call for AC but with dehumidification call.

2. **Dehumidification Modes — without Zoning (iComfort Wi-Fi® Software 2.1 and Later) — Communicating (XC17, XP17, XP17N, XC21, XP21 and XP21N)**

TABLE 2

Lennox Communicating Outdoor Units — iComfort Wi-Fi® Software Version 2.1 and Later (XC17, XP17, XP17N , XC21, XP21 and XP21N)	
New Parameter Label	**Resulting Operation**
Dry	Off
Moderate	Compressor in high speed with blower in low with call for AC
Humid	Compressor in high speed with blower in low speed with no call for AC but with dehumidification call.
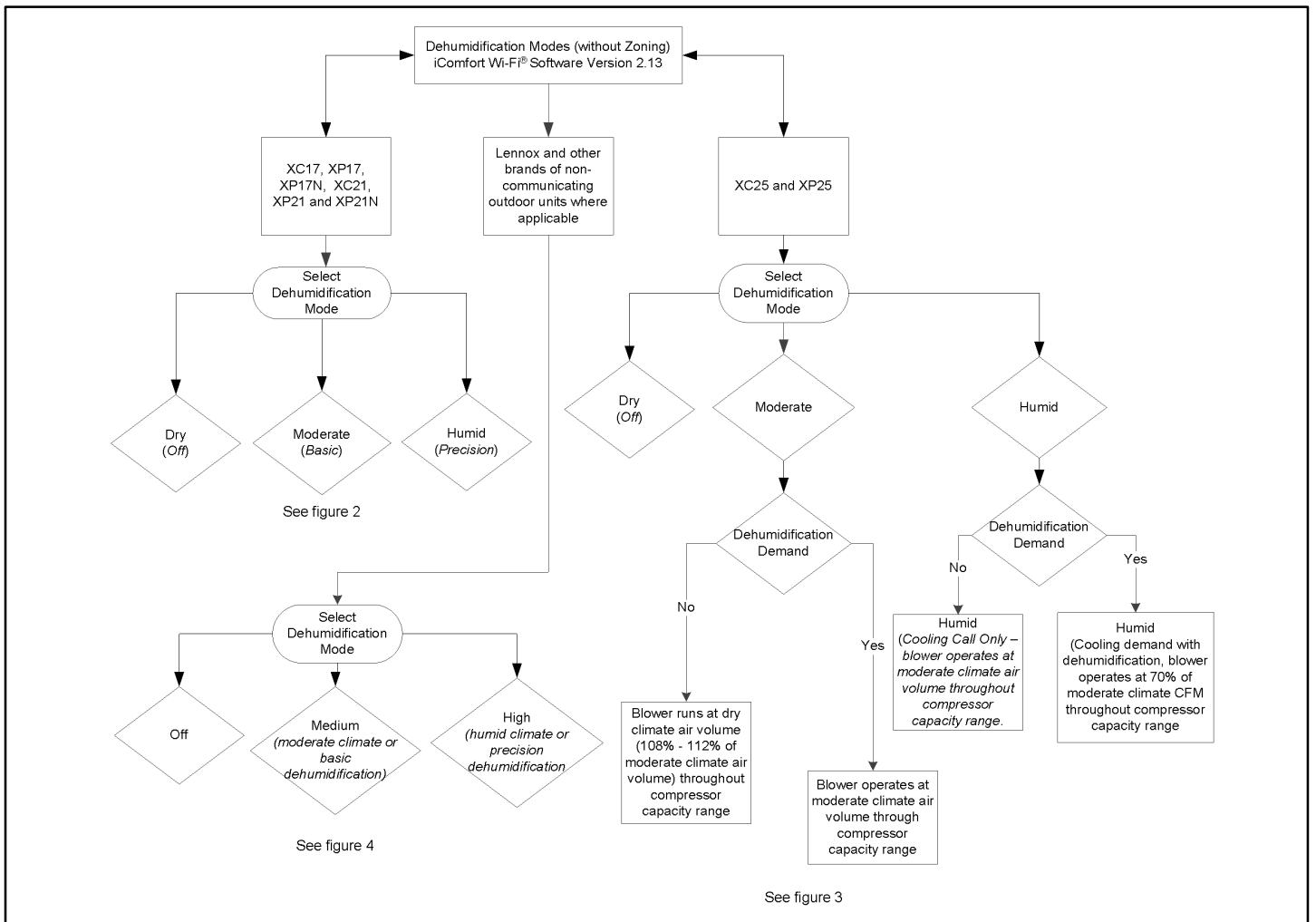
FIGURE 1. DEHUMIDIFICATION MODES WITHOUT ZONING

XC17, XP17, XP17N, XC21, XP21 and XP21N
(iComfort Wi-Fi® Software Version 2.13)

Select Dehumidification Mode

Dry
(*Off*)

Dehumidification is off and system is working normally.

Moderate
(*Basic*)

- When there is simultaneous call for cooling and dehumidification the indoor unit will lower the blower air volume to 70% of the cooling air volume (70% is default Dehumidification Airflow % - adjustable 60% to 80%)
- Single-stage outdoor units will operate at normal speed.
- Two-stage outdoor unit will run in high speed.
- The system will not overcool the space.
- When the cooling set point is satisfied the system will shut off even if there is still a dehumidification call.

Humid
(*Precision*)

- The thermostat must be in cooling mode in order to run Humid (Precision) mode.
- There must have been a previous cooling call prior to the dehumidification demand.
- In Humid (Precision) mode there is no need for a call for cooling to run dehumidification.
- When there is a dehumidification call the system will bring the system on with the indoor blower running on low speed the indoor blower will operate at the dehumidification air volume (default is 70% of the cooling speed - adjustable 60-80%)
- Single-stage outdoor units will run normally until dehumidification demand is satisfied or has over-cooled by 2ºF.
- Two-stage outdoor units will operate at high speed and the indoor blower will operate at the dehumidification air volume (default is 70% of the cooling speed - adjustable 60-80%).
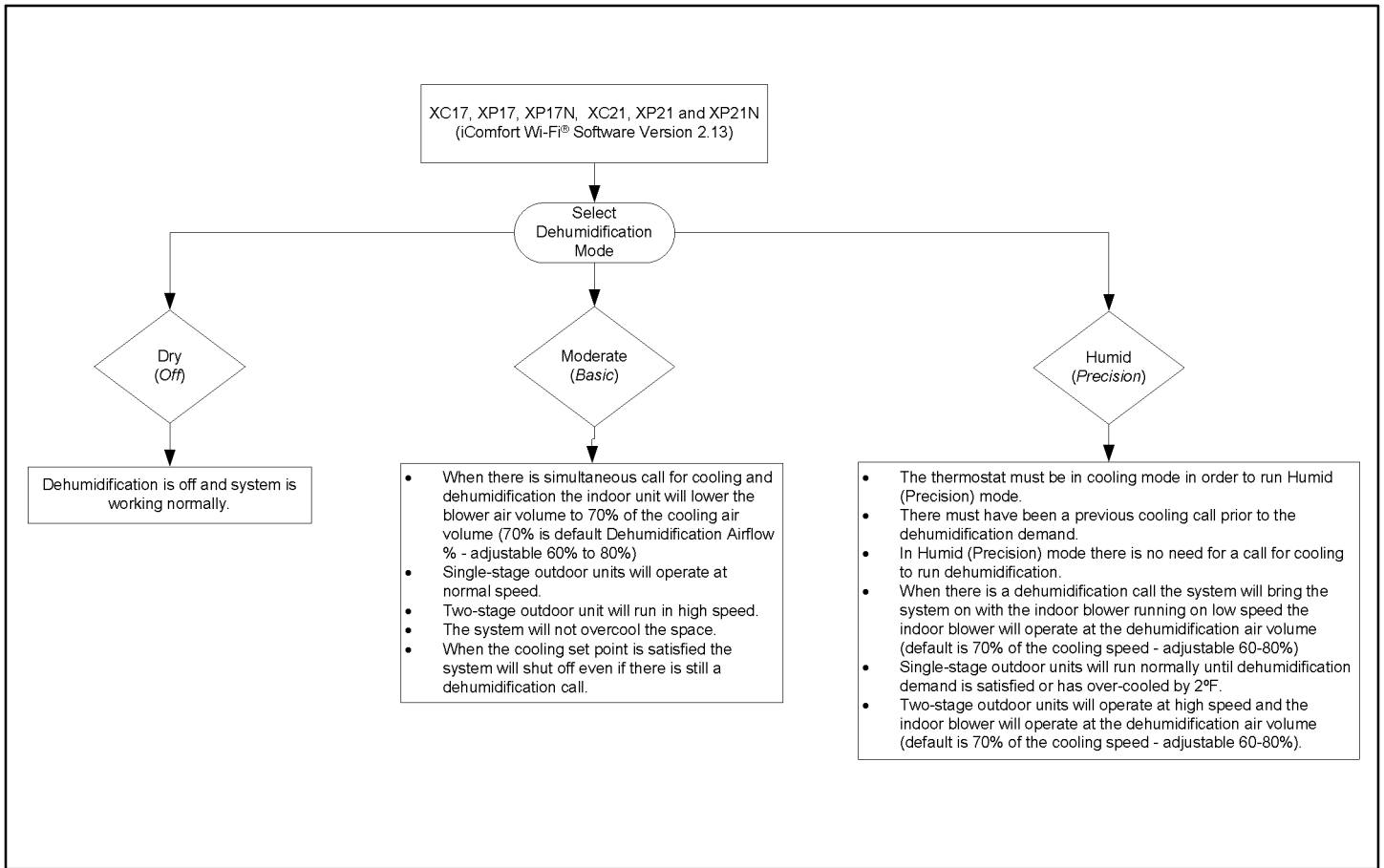
FIGURE 2. XC17, XP17, XP17N, XC21, XP21 AND XP21N DEHUMIDIFICATION MODES WITHOUT ZONING

3. Dehumidification Modes — without Zoning (iComfort Wi-Fi® Software 2.1 and later) — Communicating (XC25 and XP25)

TABLE 3

Lennox Communicating Outdoor Units — iComfort Wi-Fi® Software Version 2.1 and later (XC25 and XP25)	
Parameter Label	**Resulting Operation**
Dry	• Higher blower speed all cooling calls. • Higher blower CFM at all cooling calls and capacities (108 - 112% of moderate air volume. • Compressor operation runs at demand BTU and does not increase to 100%.
Moderate	Moderate climate air volume (see table 6). High Normal Cooling Airflow Settings.
Humid = moderate climate indoor air volume	Cooling call only.
Humid = 70% of moderate climate air volume	Cooling calls with dehumidification.
See expanded performance rating available on DAVENET.COM under Partner Resources/Sales Tools/ACCA).	
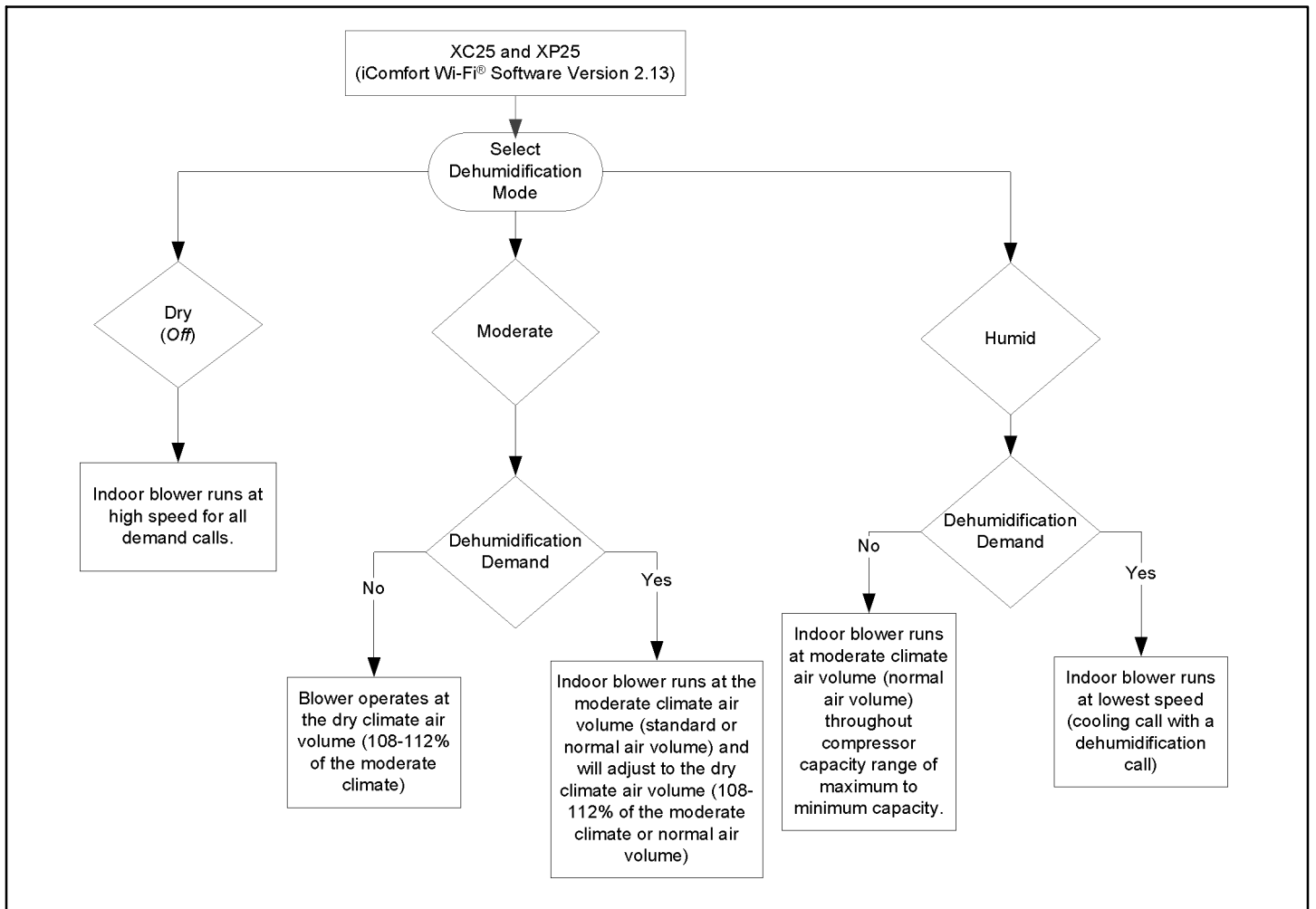
FIGURE 3. XC25 AND XP25 DEHUMIDIFICATION MODES WITHOUT ZONING

4. Dehumidification Modes — without Zoning (iComfort Wi-Fi® Software 2.1 and later) — Non-Communicating

TABLE 4

Lennox and Other Brands of Non-Communicating Outdoor Units where Applicable		
iComfort Wi-Fi® Software Version 2.02	**iComfort Wi-Fi® 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	• Dehumidification only with call for cooling and runs dehumidification air volume (70% of the cooling at volume default. • If two-stage unit, then will upstage to second-stage compressor.
Precision	High	• Runs with or without a demand for cooling with a 2ºF over cool • Runs low blower speed.
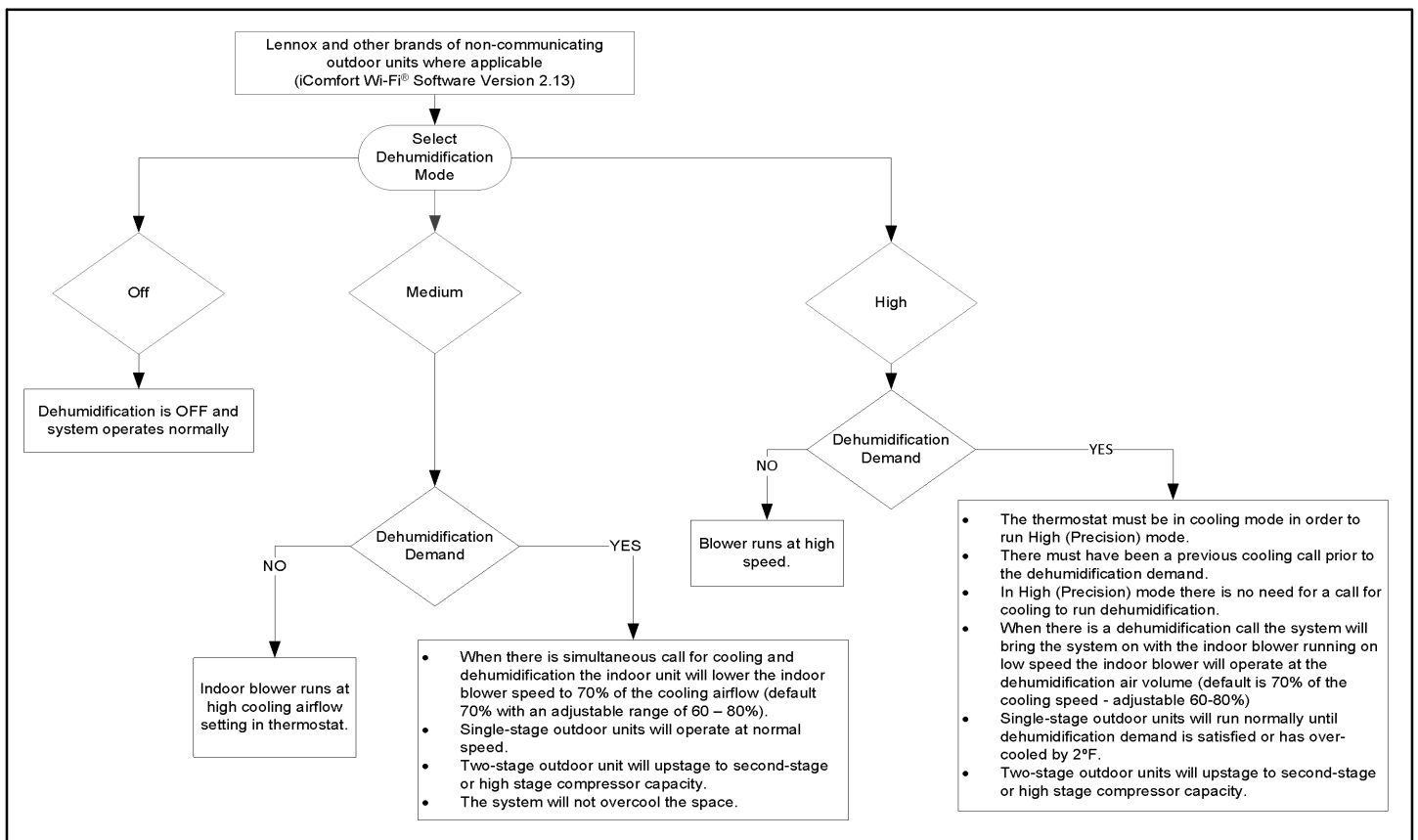
FIGURE 4. DEHUMIDIFICATION MODES WITHOUT ZONING (OTHER EQUIPMENT — NON-COMMUNICATING)

5. Dehumidification — with Zoning (iComfort Wi-Fi® Software Version 2.1 and Later) - Communicating

TABLE 5

Lennox Communicating Outdoor Units Only		
iComfort Wi-Fi® Software Version 2.02	iComfort Wi-Fi® Software Version 2.1 and later (Auxillary and Humiditrol® Dehumidification)	iComfort Wi-Fi® Software Version 2.1 and later (Lennox Communicating Outdoor Units configured for moderate or humid mode)
Not available	Dry = Off	
Not available	**Moderate and Humid = On** (There is no difference between moderate and humid mode settings for dehumidific-ation. Auxiliary or Humiditrol® will work if no other demands for heating or cooling are active for any zone.)	• Moderate and humid dehumidification 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.

FIGURE 5. DEHUMIDIFICATION MODES WITH ZONING

6. Indoor Air Volume Relationship with Climate IQ™ (iComfort Wi-Fi® Software 2.13 and later) — Communicating (XC25 and XP25)

TABLE 6

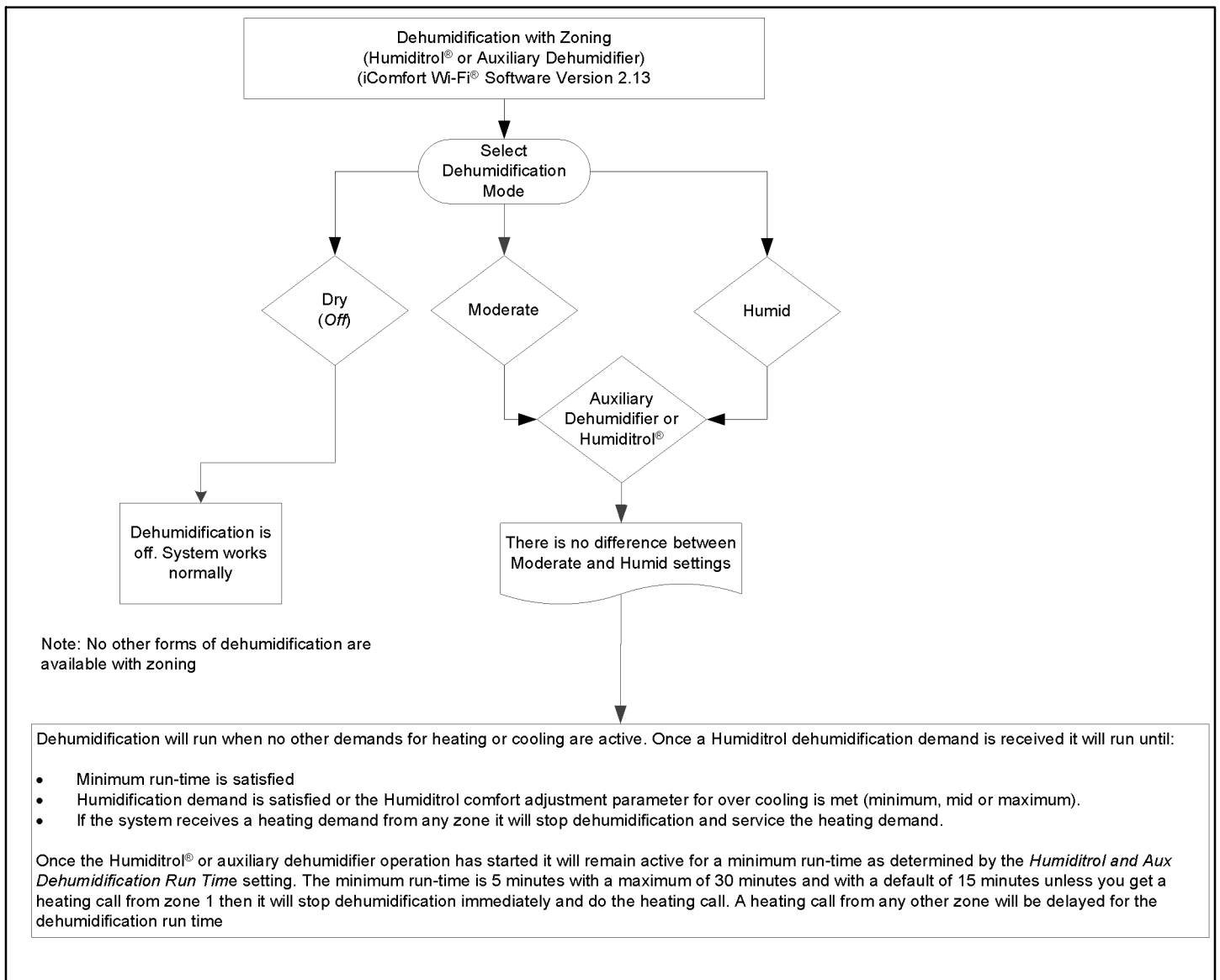| Indoor Air Volume Relationship at Climate IQ™ Settings (XC25 and XP25)			
Unit Models	Moderate Climate Indoor Air Volume at 100% Compressor Capacity (Factory Default)	Humid Climate Indoor Air Volume at 100% Compressor Capacity	Dry Climate Indoor Air Volume at 100% Compressor Capacity
XC25-024, XP25-024	850 CFM	70% of Moderate Climate CFM	108% - 112% of Moderate Climate CFM
XC25-036, XP25-036	1250 CFM		
XC25-048, XP25-048	1600 CFM		
XC25-060, XP25-060	1800 CFM		
NOTE: Indoor air volume tracks compressor capacity throughout compressor operating range of maximum to minimum capacity.			

7. Humiditrol® Mode Selected — Climate IQ™ (with Zoning) — XC25 / XP25

XC25 / XP25 with zoning and in Humiditrol mode & Climate IQ™ set for Humid

Set Humiditrol mode to minimum overcool and Climate IQ™ set for desired RH%

WARNING: Humiditrol® mode is in reference to dehumidification control or sequence of operation only, the XC25 and XP25 models are not compatible with the EDA Humiditrol® condenser reheat coil.

Call for Cooling

NO

Indoor Blower operates at CFM set per zone setting and Compressor demand BTU — YES

Call for Dehumidification — YES

NO

Call for dehumidification while a zone is calling for heat or cooling

System must wait for all zone calls to satisfy — Yes

System is off and will wait for cooling or dehumidification call — No

- Cooling call must be complete then system blower runs at 70% of maximum cooling speed.
- Compressor runs at 100% capacity.
- Outdoor fan running at minimum speed.
May overcool by two degrees to achieve humidification set point.

- Indoor blower runs at 70% of maximum cooling speed.
- Compressor runs at 100% capacity.
- Outdoor fan runs at minimum speed for unit size .
System may overcool by two degrees to achieve humidification set point.

Note: Humiditrol® operation outdoor temperature is below 95°F Indoor temperature is above 65°F. Last condition is two degrees above heating set point.

- **MAX** adj. - Indoor temp > 2°F above heating set point
- **MID** adj. - Indoor temp > $\frac{\text{HEAT setpoint + COOL setpoint}}{2}$
- **MIN** adj. - Indoor temp > 2°F below cooling set point

A cooling call from any zone and a heating call from zones 2-4 will be ignored until the minimum dehumidification run time is complete. Default is 15 minutes adjustable from 5 to 30 minutes. A heating call from zone 1 will stop dehumidification immediately and starts a 5 minute delay for heating mode. Once heating call is satisfied if there is still call for dehumidification system will go back into dehumidification mode.

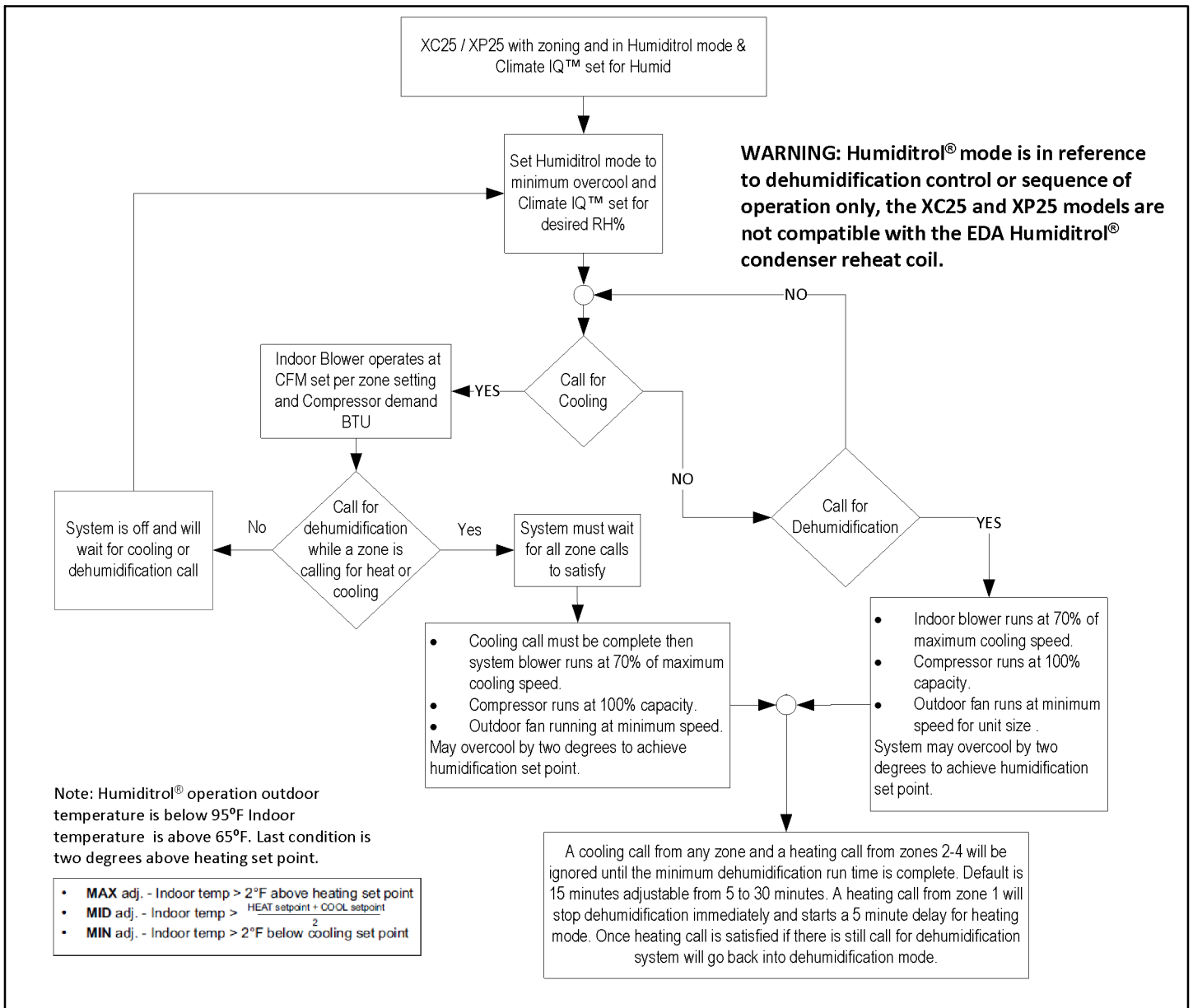**FIGURE 6. XC25 / XP25 WITH HUMIDITROL® MODE SELECTED (WITH ZONING)**

8. Humiditrol® Mode Selected — Climate IQ™ (without Zoning) — XC25 / XP25

XC25 / XP25 without zoning and in Humiditrol mode & Climate IQ™ set for Humid

Set Humiditrol mode to minimum overcool and Climate IQ™ set for desired RH%

NO

Call for Cooling

YES → Indoor Blower operates at CFM from Compressor's BTU demand

NO → Call for Dehumidification

When cooling demand is satisfied system will turn off and will wait for another cooling or dehumidification call

NO ← Call for Dehumidification → **YES** → System must wait for cooling call to satisfy then changes to dehumidification mode

YES (Call for Dehumidification)
- Indoor blower runs at 70% of maximum cooling speed.
- Compressor runs at 100% capacity
- Outdoor fan runs at minimum speed for unit size.

System may overcool by two degrees to achieve humidification set point

- Cooling call must be complete then system blower runs at 70% of maximum cooling speed
- Compressor runs at 100% capacity
- Outdoor fan running at minimum speed

System may overcool by two degrees to achieve humidification set point. Additional overcooling is not normally recommended.

A cooling call will switch compressor and blower CFM to the demand compressor BTU output demand.
When cooling demand is satisfied and there is still a dehumidification demand present, the system will switch back into dehumidification mode operation.

Note: Humiditrol® operation
Outdoor temperature is below 95°F
Indoor temp is above 65°F. Last condition is two degrees above heating set point.

- **MAX** adj. - Indoor temp > 2°F above heating set point
- **MID** adj. - Indoor temp > $\frac{\text{HEAT setpoint + COOL setpoint}}{2}$
- **MIN** adj. - Indoor temp > 2°F below cooling set point

Other dehumidification settings that maybe used
- Change Cycle Rate/Hour from 3 to 2
- Change PI Steady State to Less Aggressive
- Change PI Step Change to Less Aggressive
- Adjust Minimum airflow cooling to minimum setting for unit
- Make sure dehumidification adder is set to 0

If system has zoning
- Zoning target Supply Air Temperature setting for Cooling 40°F
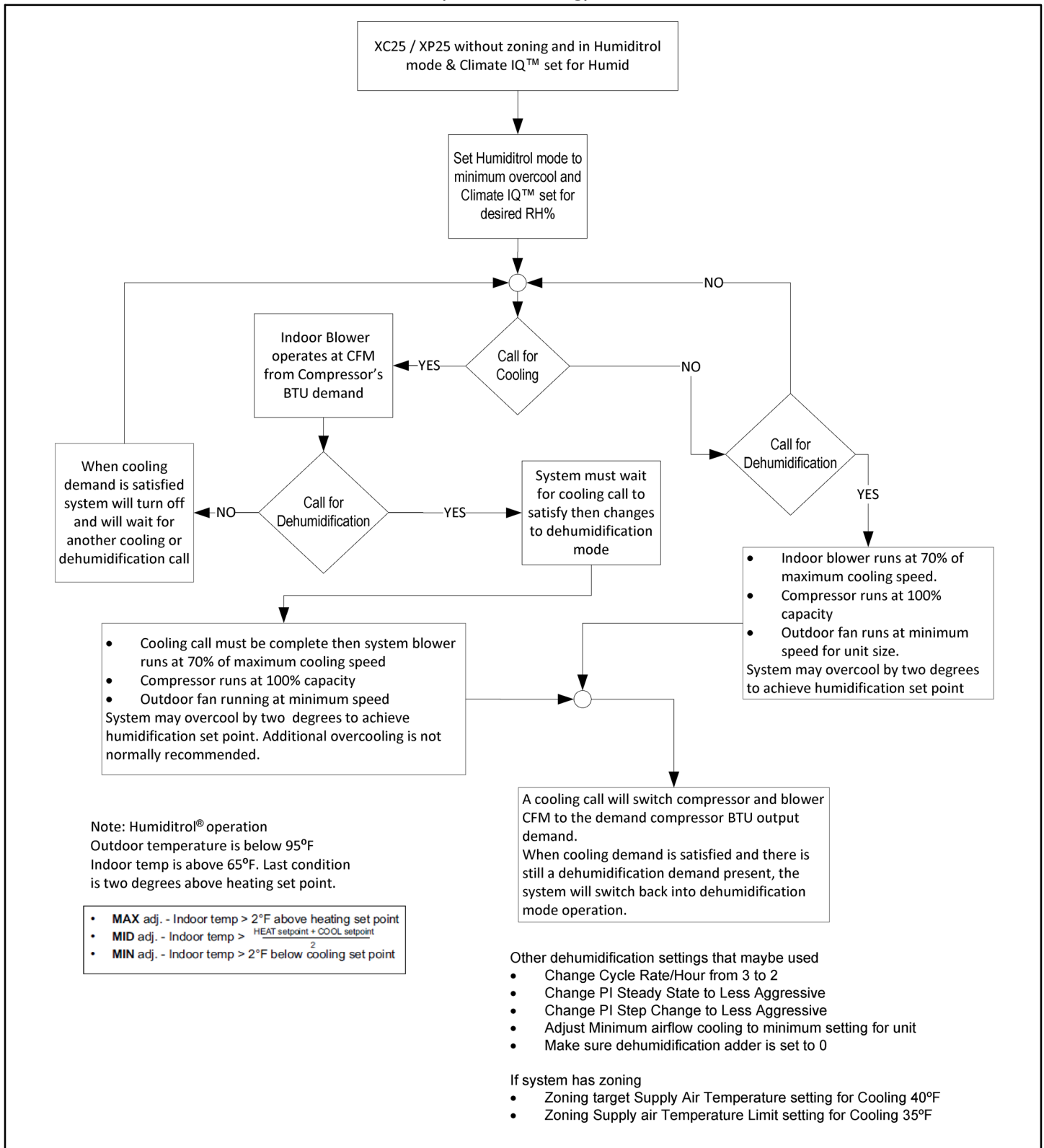- Zoning Supply air Temperature Limit setting for Cooling 35°F

FIGURE 7. XC25 / XP25 WITH HUMIDITROL® MODE SELECTED (WITHOUT ZONING)

HUMIDIFICATION

1. Humidification Modes — without Zoning (iComfort Wi-Fi® Software Version 2.1 and later)

TABLE 7

Modes	With A Heating Call	Without A Heating Call
Basic	• Thermostat is in heating mode with a demand for heating and humidification. • Once humidification setpoint is satisfied then humidification is terminated.	No humidification
Basic Dew Point	• Thermostat is in heating mode with a demand for both heating and humidification. • Dew point control requires an outdoor temperature sensor which is factory installed in an iComfort® outdoor unit or may be installed separately. • Humidification setpoint is based on outdoor temperature and user-defined dew point adjustment. Once Humidification setpoint is satisfied then humidification is terminated.	No humidification
Precision	• Thermostat is in heating mode with a demand for both heating and a humidification. • Once humidification setpoint is satisfied then humidification is terminated.	• Thermostat is in heating mode without a demand for heating. • There is a demand for humidification when blower and humidifier are on. • Once humidification setpoint is satisfied then humidification is terminated.
Precision Dew Point	• Thermostat is in heating mode with a demand for both heating and humidification. • Dew point control requires an outdoor temperature sensor which is factory installed in an iComfort® outdoor unit or may be installed separately. • Humidification setpoint is based on outdoor temperature and user-defined dew point adjustment. Once humidification setpoint is satisfied then humidification is terminated.	• Thermostat is in heating mode with no demand for heating. • There is a demand for humidification when blower and humidifier are on. • Outdoor temperature is available either by outdoor sensor or Internet. • Humidification setpoint is based on outdoor temperature and user-defined dew point adjustment. **RH set point - OAT/2 + 25 RH DP adjustment** • Once humidification setpoint is satisfied then humidification is terminated.

2. Humidification — with Zoning (iComfort Wi-Fi® Software Version 2.1 and 2.11)

TABLE 8

Mode	With Heating Call	Without Heating Call
Precision Mode (Only)	No Humidification	• Humidification is not allowed unless system is in zoning off mode and has been setup as Precision mode and has a demand for humidification. • If system gets a demand for either heating or cooling from any other zone then humidification is immediately turned off. • Once humidification setpoint is satisfied then humidification and blower is terminated.

3. Humidification Mode — with Zoning (iComfort Wi-Fi® Software Version 2.12)

TABLE 9

With Heating Call	Without Heating Call
Humidification is only available with zoning in Heat Only mode. No other heating or program modes will allow humidification in 2.12 software.	• Thermostat is in heating mode without a demand for heating. • There is a demand for humidification call. • Humidification is allowed with zoning turned on or off. Blower and humidifier are turned on. • If system receives a demand for either heating or cooling from any other zone, then humidification is immediately turned off. • Once humidification setpoint is satisfied then humidification is terminated.

4. Humidification Modes — with Zoning (iComfort Wi-Fi® Software Version 2.13) - Communicating (XC17, XP17, XP17N, XC21, XP21, XP21N, XC25 and XP25)

TABLE 10

Modes	With Heating Call	Without Heating Call
Basic	• Thermostat is in heating mode with a demand for both heating and humidification (humidification is controlled by iComfort® thermostat in zone 1). • A heating call from any zone and a humidification call from the iComfort® thermostat in zone 1 will activate humidification.	No Humidification
Basic Dew Point	• Thermostat is in heating mode with a demand for both heating and humidification (humidification is controlled by iComfort® thermostat in zone 1). • Outdoor temperature is available by either outdoor sensor or Internet. Requires outdoor sensor. Outdoor sensor provided in iComfort® outdoor unit or provided by separate outdoor sensor. • Humidification setpoint is based on outdoor temperature and user-defined dew point adjustment. • A heating demand from any zone and a humidification demand from the iComfort® thermostat in zone 1 will activate humidification. • Blower will operate at the requested zone air volume.	No Humidification
Precision	• Thermostat is in heating mode with a demand for both heating and a humidification (humidification is controlled by iComfort® thermostat in zone 1). • A heating call from any zone and a humidification demand by the iComfort® thermostat in zone 1 will activate humidification. • Once humidification setpoint is satisfied then humidification is terminated even if heating demand is present. • Blower will operate at the requested zone air volume.	• Thermostat is in heating mode with no demand for heating • Blower will operate the humidification air volume and all zone dampers will be open to deliver humidified air. • A demand is present for humidification from the iComfort® thermostat in zone 1 • Once humidification setpoint is satisfied then humidification is terminated.
Precision Dew Point	• Thermostat is in heating mode with a demand for both heating and humidification (humidification is controlled by iComfort® thermostat in zone 1). • Outdoor temperature is available by either outdoor sensor or Internet. Requires outdoor sensor. Outdoor sensor provided in iComfort® outdoor unit or provided by separate outdoor sensor. • Humidification setpoint is based on outdoor temperature and user-defined dew point adjustment. Once humidification setpoint is satisfied then humidification is terminated even if heating demand is present.	• Thermostat is in heating mode with no demand for heating. • No active demand for humidification from the iComfort® thermostat in zone 1 • Outdoor temperature is available by either outdoor sensor or Internet. Requires outdoor sensor. Outdoor sensor provided in iComfort® outdoor unit or provided by separate outdoor sensor. • Humidification setpoint is based on outdoor temperature and user-defined dew point adjustment. Blower and humidifier are turned on. • Once humidification setpoint is satisfied then humidification is terminated • Blower will operate the humidification air volume and all zone dampers will be open to deliver humidified air.

Humidification with iHarmony® Zoning System
(iComfort Wi-Fi® Software Version 2.13)

XC17, XP17, XP17N, XC21, XP21, XP21N, XC25 and XP25

Select
Humidification Mode

Basic

Basic Dew Point
(required outdoor temperature sensor or Internet)

Precision Humidification

Precision Dew point
(required outdoor temperature sensor or Internet)

- Basic and Basic Dew Point Humidification is controlled by Zone 1 iComfort® thermostat humidification set point.
- A demand for heat from any zone
- A demand for humidification by Zone 1 iComfort® thermostat.
- The system will activate the humidification terminal in the indoor unit to provide humidification.
- When the heating call is satisfied the system will shut down even if there is still a call for humidification.
- Blower operates at the requested zone air volume.

- Precision and Precision Dew Point Humidification is controlled by Zone 1 iComfort® thermostat humidification set point.
- The system must be in the heating mode but will not need a heating call to activate the H terminal on the iComfort® control.
- When there is a humidification call the system will activate the humidification terminal of the indoor unit to provide humidification until the set point is satisfied or there is a cooling call from another zone. Blower and humidifier are turned on.
- A heating call from any zone will not stop humidification until humidification set point is reached.
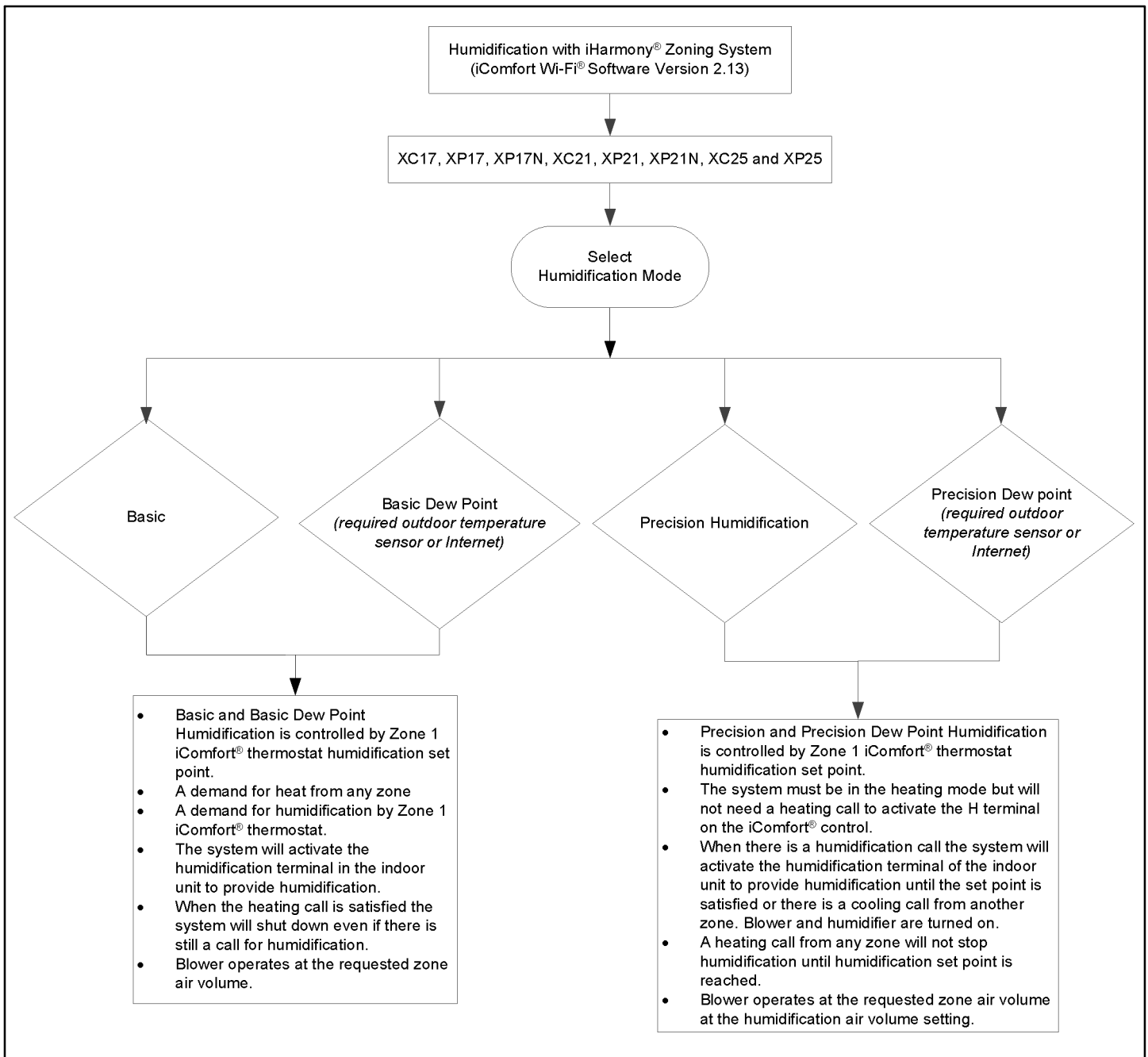- Blower operates at the requested zone air volume at the humidification air volume setting.

FIGURE 8. HUMIDIFICATION — WITH ZONING (iComfort Wi-Fi® Software Version 2.13)