5 Series
500A11

Application and Service Guide

7 Series
700A11

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How it Works

The Aurora Control System - Base, Advanced, and Advanced VS

A new sophisticated Aurora Control system is modular and designed to grow with the application. The base Aurora Control features a microprocessor control to sequence all components during operation for optimum performance, and provides easy-to-use troubleshooting features with fault lights and on-board diagnostics and a hand held Aurora Interface Diagnostic (AID) Tool. The Advanced Aurora Control Adds the Aurora Expansion Board (AXB) to further extend the capability of the system to include compressor current monitoring, advanced loop and DHW pump control as well as service, performance and energy monitoring sensor kit capability.

Several documents detail the operation of individual components of the Aurora System:
• ABC Application Guide for early ABC Base Controls (software STD Ver 1.*)
• ABC Application Guide for later 5 Series and other Base Controls as well as 5 series Advanced (software STD Ver 2.*)
• ABC Application Guide for 7 Series Aurora Advanced VS Variable Speed (software VSPD Ver 2.*)
• AID Tool Application Guide
• AWL Application Guide

Aurora Base Control

The Aurora Base Control (ABC) System is a complete residential and commercial comfort system that brings all aspects of the HVAC system into one cohesive module network. The ABC features microprocessor control and HP, LP, Condensate & Freeze detection, over/under voltage faults along with communicating thermostat capability for complete fault detection text at the thermostat. Aurora uses the Modbus communication protocol to communicate between modules. Each module contains the logic to control all features that are connected to the module. The Aurora Base Control (ABC) has two Modbus channels. The first channel is configured as a master for connecting to devices such as a communicating thermostat, expansion board, or other slave devices. The second channel is configured as a slave for connecting the Aurora Interface Diagnostic Tool (AID Tool). The base control is only available on the 5 Series.

Aurora Advanced Control

The Aurora Advanced Control expands on the capability of the Aurora Base Control (ABC) System by adding the Aurora Expansion Board (AXB). The additional features include compressor current monitoring, loop pump slaving, intelligent HWA control, VS pump capability, and also allows optional energy, refrigeration and performance monitoring add-on sensor kits. The AXB also features a second field configurable accessory relay, and two home automation inputs that are AID configurable for different types of alarms from sump pumps to home security. The Smart Grid input is AID configurable with many options to react to Utility controlled relay operation for ON Peak optimization. The AXB also expands the communication capability for IntelliZone2 ready operation as well as other expansion with the ClimateTalk protocol. The advanced control is available on the 5 Series.

Aurora Advanced VS Control

The Advanced VS of the 7 Series adds special programming of the ABC for the variable speed 7 Series to the Advanced Control and adds variable speed compressor and electronic expansion valve capability.

Aurora Components

The Aurora Control functions around the concept of modularity:

• **Aurora Base Control (ABC)** This main board controls the basic functions of compressor blower motor, RV, thermostat and other basic component control.
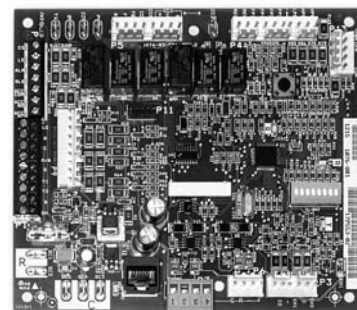
• **Aurora Interface and Diagnostics (AID) Tool** is a hand held tool that can be plugged into any ABC board for quick setup, configuration, diagnostic and troubleshooting capability.

• **Aurora Expansion Board (AXB)** is added to include compressor current monitoring, loop pump slaving, intelligent HWA control, VS pump capability, and also allows optional energy, refrigeration and performance monitoring add-on sensor kits

How it Works cont.

- **Aurora Weblink (AWL)** is a device that can be added on for 'black box capability to record all sensor and control events for forensic diagnosis onto an SD memory card and for wireless connection to the internet

- **Thermostats** – several communicating thermostat models are available for connection to the Aurora system with varying features. (Traditional Y1/Y2 stats can be used with many models but some features will be eliminated). The 7 Series requires a communicating thermostat.

- IntelliZone2 (IZ2) is added to the system but requires the AXB for a dedicated communication port specifically designed for the IZ2. IZ2 allows for up to 2 zones with single speed, 4 zones with dual capacity and 6 zones with variable speed compressors.

- Other communicating components
    - **Variable Speed Compressor Drive (VS Drive)** this drive communicates with the ABC for commands and returns status, sensor values and faults.
    - **Electronic Expansion Valve (EEV) Board** is a small board connected to the VS Drive which controls the EEV via pressure and temperature sensors and a stepper motor.
    - Expansion for other communicating components such as ECM blower motor and HRV/ERVs,

Aurora Communications

The Aurora Control functions around the concept of modularity and intercommunications between multiple boards. The communication is a 4 wire ModBus protocol. ModBus protocol is an open source protocol becoming more popular with equipment manufacturers for use in HVAC equipment. The Aurora has one slave 'bus' for the ABC, AXB, AWL, VS Drive, EEV, and thermostats.

The AID Tool only plugs into the ABC AID Tool master port (RJ style connector) and will not work at any other location.

The AXB has 3 other independent com ports for differing protocols; for IntelliZone2, ClimateTalk Components, and Communicating ECM fan motors. None of these ports comply with the ModBus protocol set up for the rest of the Aurora system and are for proprietary communications to external components.

The ModBus communication is accomplished within the cabinet using shielded and ground cabling. This shield is most important in 7 Series applications where the VS Drive component, by its very nature, emits electro-magnetic interference and can interfere with ModBus communications. Round ferrite 'donuts' can be observed at various locations to aid in 'cleaning' the communication lines.
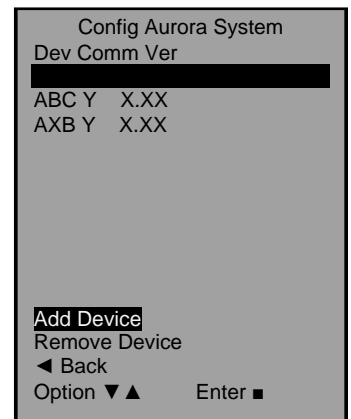
Each line is comprised of an R (+24VAC), C (common) and a '+' and '-' communication line. At times the 'R' and 'C' lines may not be connected or needed depending upon whether the connecting device needs powered. The terminals marked '+' and '-' should not be switched. Although damage may not occur to the boards directly, communication will not be possible.

The communication voltage and current are small, therefore 24 awg wire is adequate for these communication lines and although a shield is not required, it is recommended in high electro-magnetic interference (EMI) environments such as with a variable speed compressor drive. An extra Aurora communication 'expansion' connector is available for connecting future devices such as the AWL and other devices onto the main ABC ModBus line for future expansion.

A small green LED is located next to each of the communication ports to aid in evaluating active communication at that specific port. This is true for each board. The blinking indicates transmission or receiving communication activity.

Aurora Compatibility

The Aurora control is a large roll out and inevitably will include phases of product launch. With these phases come software and component compatibility issues. Current software versions of each component can be viewed in the Aurora Config Screen shown. A compatibility chart is shown in the ABC/AXB Application and Troubleshooting guide.

```
     Config Aurora System
Dev Comm Ver


ABC Y   X.XX
AXB Y   X.XX




Add Device
Remove Device
◄ Back
Option ▼ ▲        Enter ■
```

How it Works cont.

Aurora Status Modes (ABC-Green LED)

The status (green) LED will show the current mode of the heat pump i.e. normal (heating, cooling or standby) or other modes such as load shed or emergency shutdown. The following table shows all of the modes and the associated flash codes followed by a description of each. The status mode can also be read directly from the AID Tool.

Status LED (LED3, Green)

Description of Operation	Fault LED, Green
Normal Mode	ON
Control is Non-functional	OFF
Test Mode	Slow Flash
Lockout Active	Fast Flash
Dehumidification Mode	Flash Code 2
Load Shed	Flash Code 5
Emergency Shutdown	Flash Code 6
On Peak Mode	Flash Code 7
Warning! VS Derated	Flash Code 8
Warning! VS SafeMode	Flash Code 9

Normal Operation - The system is operating without limitations.

Test Mode - The unit is in test mode and many of the timings are sped up to facilitate easier troubleshooting. Test mode is entered by holding the push button switch SW1 down for 3 sec. It can be exited the same way. This mode will only last for 20 minutes before it will be autoreset to prevent accidentally leaving it in test mode.

Lockout Mode - The system has encountered a severe exceptional condition and has stopped immediately. In some cases, the drive will attempt to restart the system after 2 minutes, in other case it goes to a trip lock condition immediately and it is necessary to cycle power to the drive and to perform a reset for restarting (see individual description of the possible alarms). See the Alarm Codes/Alarm Faults table that provides an overview over the particular information, expressed in a 32-bit structure.

Dehumidification - The unit is either in passive or active dehumidification mode.

Emergency Shutdown (ESD) - In ESD mode all blower, compressor and loop pump operation is shutdown to prevent circulation of smoke, refrigerant and/or water during an emergency.

Load Shed (LS) - In LS mode compressor and loop pump operation is shutdown to limit electrical loads during peak periods. The blower continues normal operation.

Derating - The system is operating, but out-of-range condensing, evaporating, drive current or supply voltage operating conditions is causing the drive to self limit the capacity output and bring the unit back into more normal operating parameters until a solution occurs to the adverse condition.

SafeMode - The system has encountered an undesirable operation condition that prevents automatic speed control, e.g. lost a sensor signal. To avoid damage to the system or components, the drive operates the compressor at a fixed speed of 2400 rpm awaiting the problem to be solved and eventually returning to normal operation. If the problem cannot be solved the drive stops and issues a fault (see lockout mode).

Aurora Safety Features

The following safety features are provided to protect the compressor, heat exchangers, wiring and other components from damage caused by operation outside of design conditions.

Fuse – a 3 amp automotive type plug-in fuse provides protection against short circuit or overload conditions.

Anti-Short Cycle Protection – 4 minute anti-short cycle protection for the compressor.

Random Start – 5 to 80 second random start upon power up.

Fault Retry – in the fault condition, the control will stage off the outputs and then "try again" to satisfy the thermostat Y input call. Once the thermostat input calls are satisfied, the control will continue on as if no fault occurred. If 3 consecutive faults occur without satisfying the thermostat Y input call, then the control will go to Lockout mode.

Lockout – when locked out, the blower will operate continuously in "G" speed setting, and PSC blower motor output will remain on. The Alarm output (ALM) and Lockout output (L) will be turned on. The fault type identification display LED1 (Red) shall flash the fault code. To reset lockout conditions with SW2-8 On, thermostat inputs "Y1", "Y2", and "W" must be removed for at least three (3) seconds. To reset lockout conditions with SW2-8 Off, thermostat inputs "Y1", "Y2", "W", and "DH" must be removed for at least three (3) seconds. Lockout may also be reset by turning power off for at least 5 seconds or by enabling the emergency shutdown input for at least 3 seconds.

Lockout With Emergency Heat - if the control is locked out in the heating mode, and a Y2 or W input is received, the control will operate in the emergency heat mode while the compressor is locked out. The first emergency heat output will be energized ten (10) seconds after the W input is received, and the blower will shift to high speed. If the control remains locked out, and the W input is present, additional stage of emergency heat will stage on after two (2) minutes. When the W input is removed, all of the emergency heat outputs will turn off, and the variable speed ECM blower will shift to low speed and PSC blower motor output will remain on.

Aurora Fault/Alarm Codes (ABC-Red LED)

Aurora now expands the Fault/Alarms in to several groups.
- Faults are system critical faults to the heat pump and will cause a Lockout. Some are retried 3 times before locking out while others lockout out immediately. Consult the table below for details.
- Alarms are designed solely to alert the customer and the dealer to alerts designed as an input only to the Aurora system. These alarms are not system critical.
- Errors are sensor/hardware errors that although may not be system critical, may need serviced for optimal features.
- *SafeMode* - The system is still operational during SafeMode however the compressor is restricted to 2400 rpm (speed 6).
- *Derating Mode* - The system is operating, but out-of-range condensing, evaporating, drive current or supply voltage operating conditions are causing the drive to self-limit the capacity output and bring the unit back into more normal operating parameters until a solution occurs to the adverse condition.

Summary Table of Faults, Alarm, and Errors

All lockouts and alarms are shown in the Status LED (LED1, Red) table with the associated codes visible on the thermostat, ABC Fault LED, and in text in the AID Tool.

Aurora Fault Codes (ABC-Red LED)

These fault codes generally will affect the operation of the heat pump and will cause a lockout.

E1, Fault Input - A Y1/Y2 style thermostat is providing a non-normal sequence of signals possibly caused by a bad thermostat wire or connection.

E2, High Pressure - Fault is recognized when the Normally Closed High Pressure Switch, P4-9/10 opens, no matter how momentarily. The High Pressure Switch is electrically in series with the Compressor Contactor and serves as a hardwired limit switch if an overpressure condition should occur.

E3, Low Pressure - Fault is recognized when the Normally Closed Low Pressure Switch, P4-7/8 is continuously open for 30 seconds. Closure of the LPS any time during the 30 second recognition time restarts the 30 second continuous open requirement. A continuously open LPS shall not be recognized during the 2 minute startup bypass time.

E3, Loss of Charge - Fault is recognized when the Normally Closed Low Pressure Switch, P4-7/8 is open prior to the compressor starting.

E4, Freeze Detection-Air Coil - Air Coil Freeze Detection will use the FP2 input to protect against ice formation on the air coil. The FP2 input will operate exactly like FP1 except that the set point is 30 degrees and is not field adjustable.

E5, Freeze Detection-Coax - Set points shall be either 30°F or 15°F. When the thermistor temperature drops below the selected set point, the control shall begin counting down the 30 seconds delay. If the thermistor value rises above the selected set point, then the count should reset. The resistance value must remain below the selected set point for the entire length of the appropriate delay to be recognized as a fault. This fault will be ignored for the initial 2 minutes of the compressor run time.

E7, Condensate Overflow - Fault is recognized when the impedance between this line and 24 VAC common or chassis ground drops below 100K ohms for 30 seconds continuously.

E8, Over/Under Voltage Shutdown - An over/under voltage condition exists when the control voltage is outside the range of 18 VAC to 30 VAC. If the over/under voltage shutdown lasts for 15 minutes, the lockout and alarm relay will be energized. Over/under voltage shutdown is self-resetting in that if the voltage comes back within range of 18 VAC to 30 VAC for at least 0.5 seconds, then normal operation is restored.

E10, Compressor Monitoring - Fault is recognized when the compressor has an open circuit, potential welded contactor.

E11, FP1 and FP2 Sensor Error - Fault is recognized when the impedance between this line and 24 VAC common or chassis.

E14, Critical AXB Sensor Error - Fault is recognized when a sensor faults that is critical to heat pump operation. These sensors would include the HW Temperature limit sensor.

E15, Alarm Hot Water - Fault is recognized when the hot water temperature sensor is either over the configured limit or the Aurora has determined the current conditions should disengage the hot water generation capability limit.

E16, Variable Speed Pump - Fault is recognized when the variable speed pump returns a fault code from its PWM feedback signal.

E19, Critical Communication Error - A critical communication error has occurred with a board that previously had been configured but now is not available for communication. Since this is critical to unit operation, the heat pump will be locked out with this fault displayed on the ABC board and the thermostat. The AID Tool should be used to view the configuration window and ascertain the status of all appropriate board communication. The fault displayed will be removed when the problem has been resolved or the unit is soft or hard reset.

E51, Drive Fault - Discharge Temperature - Invalid The reading of the discharge temperature sensor (Sd) is not within the specified sensor range of -60 to +200°C (-76 to +392°F). Possible causes are faulty wiring or a defect sensor. The system will go to safe mode speed and return to normal operation, when the problem has been resolved.

Aurora Fault/Alarm Codes (ABC-Red LED) cont.

E52, Drive Fault - Suction Pressure Invalid - The reading of the suction pressure transmitter is not within the specified sensor range of 0 to 16bar (0 to 232psi). Possible causes are faulty wiring or a defective transmitter. The system will go to safe mode speed and return to normal operation, when the problem has been resolved.

E53, Drive Fault - Condenser Pressure - Invalid - The reading of the condenser pressure transmitter is not within the specified sensor range of 0 to 50bar (0 to 725psi). Possible causes are faulty wiring or a defective transmitter. The system will go to safe mode speed and return to normal operation, when the problem has been resolved.

E54, Drive Fault - Low Supply Voltage - The supply voltage has dropped below 175V and the drive has stopped the compressor. When the supply voltage has recovered to at least 190V, the drive will resume operation possibly with derating of the output power. This fault does not require soft or hard reset.

E56, Drive Fault - Over Current - The drive has encountered an over current event and has stopped operation. An over current can be triggered by a number of different events, such as motor phase loss, locked rotor, short circuit or ordinary overload condition. The drive will stop the compressor and will attempt 5 times to auto restart the system after waiting 2 minutes. If more than 5 events occur within 1 hour then the drive will go into a trip lock condition and it becomes necessary to cycle power to the drive and to perform a reset to restart the system. In case of an earth fault, the drive goes immediately into a trip lock condition and will not attempt to restart the system.

E57, Drive Fault - Over Voltage - The drive has encountered an over voltage event (more than 253V) and has stopped operation. An over voltage condition can happen due to a mains failure. The drive will attempt to auto-restart the system after 2 minutes. This fault does not require soft or hard reset.

E58, Drive Fault - Over Temperature - The drive has encountered an over temperature condition and has stopped operation (trip lock). An over temperature occurs when the temperature measured inside the drive has reached a critical level (>115°C / 239°F). Possible causes are insufficient cooling due to a defective cooling fan, blocked air circulation or extreme high ambient temperature. To restart the system, it is necessary to cycle power to the drive and to perform a reset.

E59, Drive Fault - Internal Error - The drive has encountered an internal error, e.g. missing communication between the microprocessors. The drive goes immediately into a trip lock condition. To restart the system, it is necessary to cycle power to the drive and to perform a reset, however it is likely that the drive will not recover from this condition.

E61, EEV Fault - Loss of Charge (LOC) - The EEV sensors have determined that the unit has experienced a severe loss of charge and will be locked out.

Aurora Error Codes

NOTE: The system is operating normally, but a sensor or communication issue is preventing full features of the system. Since these can be deemed non-critical to system operation, such as internet access boards etc., they may simply cause errors/alerts that signal the user to the situation but may not effect normal operation.

E13, Non Critical AXB Sensor Error - Fault is recognized when a sensor faults that is not critical to heat pump operation. These sensors would include the performance, energy monitoring and refrigeration sensors.

E18, Error Non-Critical Communication Error - A non-critical communication error has occurred such as communication to the internet access board. Since this is not critical to unit operation, the heat pump will continue operating normally with this error displayed on the ABC board and the thermostat. The AID Tool should be used to view the configuration window and ascertain the status of all appropriate board communication. The Error displayed will be removed when the problem has been resolved.

E55, Drive Fault - Out of Envelope - The automatic derating functions were unable to bring the operating point back into the compressor envelope. After operating outside the envelope for more than 90 seconds (low suction pressure 60 sec.), the system stops and issues an alarm. The drive will attempt to auto-restart the system after 2 minutes. Note that some E55 faults can be generated by low loop temperatures in cooling frequently which is experienced in the spring time. These will not result in a full lockout. The Aurora will alter compressor speed to avoid the E55 condition but these events will still be visible in the E55 history.

Aurora Derating Codes

NOTE: the system is operating, but out-of-range condensing, evaporating, drive current or supply voltage operating conditions is causing the drive to self-limit the capacity output and bring the unit back into more normal operating parameters until a solution occurs to the adverse condition. It is possible for some situations to progress from Derating to SafeMode to finally locking out due to a fault.

E41, Derating Drive - High Drive Temperature -The temperature measured in the drive's power electronics has reached a critical level and the drive cannot maintain full capacity output. Therefore the drive slows the compressor down until the temperature is no longer critical. When temperatures have normalized the drive will attempt to return to normal operation.

E42, Derating Drive - High Discharge Temperature - The compressor discharge temperature (Sd) has reached a critical high value. To decrease the discharge temperature, the drive has slowed down the compressor. When the temperature has normalized the drive will attempt to return to normal operation.

Aurora Fault/Alarm Codes (ABC-Red LED) cont.

E43, Derating Drive - Low Suction Pressure - The suction pressure (P0) has reached a critical low value. To make the suction pressure recover, the drive has slowed down the compressor. When the pressure has normalized the drive will attempt to return to normal operation.

E44, Derating Drive - Low Condenser Pressure - The condenser pressure (Pc) has reached a critical low value. To increase the condenser pressure, the drive has slowed down the condenser fan speed. When the pressure has normalized the drive will attempt to return to normal operation. This function is only available in AC mode and system configurations with condenser fan.

E45, Derating Drive - High Condenser Pressure - The condenser pressure (Pc) has reached a critical high value. To decrease the condenser pressure, the drive has slowed down the compressor. When the pressure has normalized the drive will attempt to return to normal operation.

E46, Derating Drive - Output Power Limit - The supply voltage has dropped below 208V or an extreme operating condition, e.g. high condensing pressure has activated the derating function limiting the output power of the drive. The drive will return to normal operation when the supply voltage has recovered or operating conditions have normalized.

Aurora SafeMode Codes

NOTE: The system is still operational during safemode, however the compressor is restricted to 2400 rpm (speed 6). It is possible for some situations to progress from Derating to SafeMode to finally locking out due to a fault.

E47, SafeMode Drive - EEV Indoor Failure - The communication with the indoor EEV controller has been interrupted and the EEV controller has switched to independent mode to maintain the requested superheating. The system will go to safe mode speed and return to normal operation when communication has been re-established.

E48, SafeMode Drive - EEV Outdoor Failure - The communication with the outdoor EEV controller has been interrupted and the EEV controller has switched to independent mode to maintain the requested superheating. The system will go to safe mode speed and return to normal operation when communication has been re-established. Not used in GSHP.

E49, SafeMode Drive - Ambient Temperature Invalid - The reading of the ambient temperature sensor (Samb) is not within the specified sensor range of -60 to +100°C (-76 to +212°F). Possible causes are faulty wiring or a defective sensor. The system will go to safe mode speed and return to normal operation, when the problem has been resolved.

E72, SafeMode EEV - Suction Temperature Invalid - The reading of the suction temperature sensor is not within the specified sensor range of -60 to +200°C (-76 to +392°F). The EEV will be positioned at 50% and the compressor

will be operated at 2400 rpm in SafeMode until rectified. Possible causes are faulty wiring or a defective sensor. The system will go to safe mode speed and return to normal operation, when the problem has been resolved.

E73, SafeMode EEV – Leaving Air Temperature (LAT) Invalid - The reading of the leaving air temperature sensor is not within the specified sensor range of -60 to +200°C (-76 to +392°F). Normal operation will continue with an Error 73 display on the thermostat to notify the user of the issue. Possible causes are faulty wiring or a defective sensor. The Error displayed will be removed when the problem has been resolved.

E74, SafeMode EEV - Maximum Operating Pressure (MOP) - The reading of the suction pressure is above the recommended limit. If this condition persists more than 90 seconds, the Drive will revert to a Fault – Out of Envelope Code 35. The system will continue to operate in SafeMode at 2400 rpm until the situation is resolved or the drive has fault on an out of envelope condition.

Aurora Alarm Codes

These alarms are planned to alert the homeowner and the service personnel but will NOT effect system operation and are for information only. These would be available on the thermostat, AID Tool and the internet access for remote monitoring capability.

E21, Loop Pressure Alarm - Fault is recognized when the loop pressure sensor is installed and the loop pressure falls below the setpoint. (future use)

E23 and E24, Home Automation 1 and 2 Inputs - The Home automation inputs are simple 24VAC inputs that will trigger an AID Tool and thermostat alert for the homeowner. These would require optional sensors and or equipment for connection to the AXB board. With two inputs, two different sensors can be selected. The selected text will then be displayed on the AID Tool and com thermostats. These events will NOT alter functionality or operation of the heat pump/accessories and is for homeowner/service notification only. With a closed dry contact signal, this input will cause an alarm E23 or E24 to indicate on the stat or flash on ABC. The AID Tool will allow configuration of these two inputs independently between the following selections:
  • *No Action*
  • *Home Automation Fault [no lockout, info only]* - Output from home automation system
  • *Security Alarm [no lockout info, only]* - Output from home security
  • *Sump Alarm Fault [no lockout info, only]* - Switch output from sump sensor
  • *Smoke/CO Alarm Fault [no lockout info, only]* - Switch output from Smoke/CO sensor
  • *Dirty Filter Alarm [no lockout info, only]* - Output from dirty filter sensor

Aurora Fault/Alarm Codes (ABC-Red LED) cont.

Status LED (LED1, Red)

	Red Fault LED	LED Flash Code*	Lockout	Reset/ Remove	Fault Condition Summary	ABC Green Status LED	ABC Red Fault LED	AID Tool Display and History	IntelliZone2 and Thermostat Display
	Normal - No Faults	Off	-			Normal			
ABC & AXB Basic Faults	Fault-Input	1	No	Auto	Tstat input error. Autoreset upon condition removal.	Normal	Code 1		
	Fault-High Pressure	2	Yes	Hard or Soft	HP switch has tripped (>600 psi)	Lockout	Code 2	Lockout - E2 High Press	Lockout - E2 High Press
	Fault-Low Pressure	3	Yes	Hard or Soft	Low Pressure Switch has tripped (<40 psi for 30 continous sec.)	Lockout	Code 3	Lockout - E3 Low Press	Lockout - E3 Low Press
	Fault-Freeze Detection FP2	4	Yes	Hard or Soft	Freeze protection sensor has tripped (<15 or 30 degF for 30 continuous sec.)	Lockout	Code 4	Lockout - E4 Freeze Detection FP2	Lockout - E4 Freeze Detection FP2
	Fault-Freeze Detection FP1	5	Yes	Hard or Soft	Freeze protection sensor has tripped (<15 or 30 degF for 30 continuous sec.)	Lockout	Code 5	Lockout - E5 Freeze Detection FP1	Lockout - E5 Freeze Detection FP1
	Fault-Condensate Overflow	7	Yes	Hard or Soft	Condensate switch has shown continuity for 30 continuous sec.	Lockout	Code 7	Lockout - E7 Condensate	Lockout - E7 Condensate
	Fault-Over/Under Voltage	8	No	Auto	Instantaneous Voltage is out of range. **Controls shut down until resolved.	Lockout	Code 8	Lockout - E8 Over/Under voltage	Lockout - E8 Over/Under voltage
	Fault-Compressor Monitor	10	Yes	Hard or Soft	Open Crkt, Run, Start or welded cont	Lockout	Code 10	Lockout - E10 Compress Monitor	Lockout - E10 Compress Monitor
	Fault-FP1 & 2 Snsr Error	11	Yes	Hard or Soft	If FP1 or 2 Sensor Error	Lockout	Code 11	Lockout - E11 FP1/FP2 Sensor Error	Lockout - E11 FP1/FP2 Sensor Error
Miscellaneous	Non-CriticAXBSnsrErr	13	No	Auto	Any Other Sensor Error	Normal	Code 13	Alert - E13 Non-Critical AXB Sensor Error	Alert - E13 Non-Critical AXB Sensor Error
	CriticAXBSnsrErr	14	Yes	Hard or Soft	Sensor Err for EEV or HW	Lockout	Code 14	Lockout - E14 Critical AXB Sensor Error	Lockout - E14 Critical AXB Sensor Error
	Alarm-HotWtr	15	No	Auto	HW over limit or logic lockout. HW pump deactivated.	Normal	Code 15	Alert - E15 Hot Water Temp Limit	No Display
	Fault-VarSpdPump	16	No	Auto	Alert is read from PWM feedback.	Normal	Code 16	Alert - E16 Var Spd Pump Err	Alert - E16 Var Spd Pump Err
	Non-CritComErr	18	No	Auto	Any non-critical com error	Normal	Code 18	Alert - E18 Non-Critical Communication Error	Alert - E18 Non-Critical Communication Error
	Fault-CritComErr	19	No	Auto	Any critical com error. Auto reset upon condition removal	Normal	Code 19	Alert - E19 Critical Communication Error	Alert - E19 Critical Communication Error
	Alarm - Low Loop Pressure	21	No	Auto	Loop pressure is below 3 psi for more than 3 minutes	Normal	Code 21	Alert - E51 Low Loop Pressure	No Display
	Alarm - Home Automation 1	23	No	Auto	Closed contact input is present on Dig 2 input - Text is configurable	Normal	Code 23	Alert - E23 Selected choice	Alert - E23 Selected choice
	Alarm - Home Automation 2	24	No	Auto	Closed contact input is present on Dig 3 input - Text is configurable	Normal	Code 24	Alert - E24 Selected Choice	Alert - E24 Selected Choice
Danfoss VS Drive	Derate-DriveTemp	41	No	Auto	Drive Temp has reached critical High Temp	Derated	Code 41	Warning! Derated - E41 DriveTemp	Warning! Derated - E41 DriveTemp
	Derate-HiDisTemp	42	No	Auto	Compressor Discharge isexceeded limit for 90 continuous sec..	Derated	Code 42	Warning! Derated - E42 HiDisTemp	Warning! Derated - E42 HiDisTemp
	Derate-LoSucPres	43	No	Auto	Suction Pressure is critically low	Derated	Code 43	Warning! Derated - E43 LoSucPres	Warning! Derated - E43 LoSucPres
	Derate-LoConPres	44	No	Auto	Condensing pressure is critically low	Derated	Code 44	Warning! Derated - E44 LoConPress	Warning! Derated - E44 LoConPress
	Derate-HiConPres	45	No	Auto	Condensing pressure is critically high	Derated	Code 45	Warning! Derated - E45 HiConPress	Warning! Derated - E45 HiConPress
	Derate-OutPwrLmt	46	No	Auto	Supply Voltage is <208V or Max Pwr is reached due to high pressure	Derated	Code 46	Warning! Derated - E46 OutPwrLmt	Warning! Derated - E46 OutPwrLmt
	SafeMd-EEVIndCom	47	No	Auto	Com with EEV is interrupted EEV has gone independent mode	SafeMode	Code 47	Warning! SafeMode - E47 EEVIndCom	Warning! SafeMode - E47 EEVIndCom
	SafeMd-EEVOutCom	48	No	Auto	Com with EEV is interrupted EEV has gone independent mode	SafeMode	Code 48	Warning! SafeMode - E48EEVOutCom	Warning! SafeMode - E48EEVOutCom
	SafeMd-AmbTmpSnr	49	No	Auto	Ambient Temperature (Tamb) is <-76 or > 212 F and out of range or invalid	SafeMode	Code 49	Warning! SafeMode - E49	Warning! SafeMode - E49
	Fault-DisTmpSnr	51	Yes	Hard or Soft	Discharge Sensor (Sd) is > 280 F or invalid (-76 to 392 F)	Lockout	Code 51	Lockout! - E51 DisTmpSnr	Lockout! - E51 DisTmpSnr
	Fault-SucPrsSnr	52	Yes	Hard or Soft	Suction Pressure (PO) is invalid (0 to 232 psi)	Lockout	Code 52	Lockout! - E52 SucPrsSnr	Lockout! - E52 SucPrsSnr
	Fault-ConPrsSnr	53	10x then Yes	Hard or Soft	Low condensing pressure (PD) or invalid (0 to 870 psi) Retry 10x.	Norm then Lockout	Code 53	Lockout! - E53 ConPrsSnr	Lockout! - E53 ConPrsSnr
	Fault-LowSupVolt	54	Yes	Hard or Soft	Supply Voltage is <175 V (190V to reset) or powered off/on too quickly (<30 sec.).	Lockout	Code 54	Lockout! - E54 LowSupVolt	Lockout! - E54 LowSupVolt
	Fault-OutEnvelop	55	10x then Yes	Hard or Soft	Comp Operating out of envelope (PO) more than 90 sec. Retry 10x.	Norm then Lockout	Code 55	Lockout! - E55 OutEnvelop	No Display
	Fault-OverCurrnt	56	Yes	Hard or Soft	Over current tripped by phase loss, earth fault, short circuit, low water flow, low air flow, or major drive fault.	Lockout	Code 56	Lockout! - E56 OverCurrnt	Lockout! - E56 OverCurrnt
	Fault-Over/UnderVolt	57	Yes	Hard or Soft	DC Link Voltage to compressor is >253V or at minimum Volt.	Lockout	Code 57	Lockout! - E57 Over/Under Volt	Lockout! - E57 Over/Under Volt
	Fault-HiDrivTemp	58	Yes	Hard or Soft	Drive Temp has reached critical High Temp >239 F	Lockout	Code 58	Lockout! - E58HiDrivTemp	Lockout! - E58HiDrivTemp
	Fault-DrvIntErr MOC/AOC	59	Yes	Hard or Soft	The MOC has encountered an internal fault or an internal error. Probably fatal.	Lockout	Code 59	Lockout! - E59 DrvIntErr	Lockout! - E59 DrvIntErr
	Fault-MultSafeMd	61	Yes	Hard or Soft	More than one SafeMode condition is present requiring lockout.	Lockout	Code 61	Lockout! - E61 MultSafeMd	Lockout! - E61 MultSafeMd
Ind/Pkg Danfoss EEV2	Fault-LossofCharge	71	Yes	Hard or Soft	High superheat and high EEV opening % for a long time will trigger a loss of charge fault	Lockout	Code 71	Lockout! - E71 LossCharge	Lockout! - E71 LossCharge
	SafeMd-SucTmpSnr	72	No	Auto	Suction Temperature Sensor is invalid (-76 to 392 F)	SafeMode	Code 72	Warning! SafeMode - E72 SucTmpSnr	Warning! SafeMode - E72 SucTmpSnr
	SafeMd-LATSensor	73	No	Auto	Leaving Air Temperature Sensor is invalid (-76 to 392 F)	Normal	Code 73	Alert - E73 LAT Sensor	No Display
	SafeMd-MaxOpPres	74	No	Auto	Suction pressure has exceeded that maximum operating level for 90 sec.	SafeMode	Code 74	Warning! SafeMode - E74 MaxOpPress	Warning! SafeMode - E74 MaxOpPress

NOTES: *All codes >11 use long flash for tens digit and short flash for the ones digit. 20, 30, 40, 50 etc. are skipped!
Alert' is a noncritical sensor or function that has failed. Normal operation of the heat pump is maintained but service is desired at some point.

Variable Capacity Technology Description

The Variable Speed Compressor

The 7 Series employs a variable speed compressor that operates from 900 rpm to 4200 rpm. This represents roughly a 20% capacity to 100 % capacity variation. The required air and water flow is roughly proportional at any given speed (rpm) and is similar to existing product in that approximately 2.25 -3 gpm per ton water flow (1.5 gpm per ton open loop) and 300-400 cfm per ton airflow are required for operation at any given speed. A variable speed flow center and ECM blower motor are provided to smoothly ramp up water and air flow to satisfy the unit at all operational speeds and provide highest energy savings especially when operating at the lower compressor capacities a significant amount of the year.

A unique requirement of the variable speed compressor is that traditional thermostats (Y1/Y2 style) cannot provide the detailed percentage demand to operate the compressor throughout its wide operating speed range. Therefore a proportional communicating thermostat is required so that a wide range of operating speeds can be transmitted allowing the compressor capacity of the unit to better match the load of the application. In the Aurora system the room temperature and setpoint are transmitted from the communicating thermostat to the Aurora ABC and using proprietary algorithms a 'demand call' is calculated and transmitted to bring on the compressor at a percent of capacity 25% to 100%.

We have chosen to operate the variable speed compressor at 12 discrete speeds with speed 1 correlating to 900 rpm and speed 12 to 4200 rpm and other speeds between every 300 rpm. Although the compressor will still ramp up and down between the speeds we have chosen to operate at the 12 fixed speeds so as to simplify field troubleshooting, standardize heat pump performance charts and mitigate unusual noise and vibration issues. The table below will show the relative capacity at each speed using the NVV(H)048 as example:

Speed	RPM	Hz	RPM %	Clg Cap (NV048 shown)	Clg Cap %	Htg Cap (NV048 shown)	Htg Cap %	CFM
12	4200	70	100.0%	54.5	127%	49.81	100%	1800
11	3900	65	92.9%	51.0	118%	45.54	93%	1686
10	3600	60	85.7%	46.7	109%	41.27	86%	1543
9	3300	55	78.6%	44.4	100%	36.99	79%	1467
8	3000	50	71.4%	43.1	91%	33.01	71%	1425
7	2700	45	64.3%	38.7	82%	29.01	64%	1279
6	2400	40	57.1%	34.9	73%	25.36	57%	1153
5	2100	35	50.0%	31.1	64%	21.77	50%	1027
4	1800	30	42.9%	25.9	55%	17.87	43%	854
3	1500	25	35.7%	20.3	45%	13.83	36%	670
2	1200	20	28.6%	15.2	36%	9.75	29%	501
1	900	15	21.4%	10.4	27%	5.42	21%	342

= Cooling Operation
= SuperBoost Cooling
= Heating Operation

NOTE: SuperBoost mode is selectable at the thermostat and allows speeds 10-12 cooling operation for a 24-hr period.

The variable speed compressor will operate on the low compressor speeds for a significant amount of the year, therefore it is recommended to elevate lower speed airflows to improve ductwork distribution (See Airflow). Low design airflow (25%) can result in poor distribution. When operating at the lower speeds, the VS drive will periodically (every 30 min.) ramp up to speed 6 for 60 sec. Upon power up the first compressor call will also engage this oil circulation mode of speed 6 prior to moving to the desired compressor speed. The difference between desired compressor speed and actual compressor speed can be observed in the AID Tool. This is to ensure good oil circulation and lubrication of the compressor.

The VS compressor utilizes 'envelope control' to maintain performance within operational limits and improve reliability. To accomplish this, pressure sensors for discharge and suction pressure as well as hot gas temperature sensing are used to monitor the conditions in which the compressor operates. The envelope does vary based upon operating speed (rpm). When operating out of these limits the control will attempt to improve the situation by moderating the compressor speed for a larger envelope. This mode is called 'Derating' and is observed on the Aurora control as an 'E' code. The control will automatically try to resolve the situation. If the situation progresses, a fault and lockout will be generated by the control.

In general, lower rpm's do not have as high a condensing temperature capability as higher rpm's. Therefore the control will limit high condensing pressure (generally high loop temperatures in cooling mode).

NOTE: These limitations should not affect the operation of the compressor within normal catalog stated operating range for heating with 20-70 °F entering water temperature and cooling with 50-110 °F entering water temperature.

The Variable Speed Drive

The VS Drive has two circuit board components that appear in the Aurora Config Screen. The AOC is the VS Drive application control that monitors the refrigerant pressures and temperatures and maintains operation within the specified operating envelope. The AOC also issues most of the faults. The MOC control board is the power section of the drive and performs the power functions of the compressor. The MOC also monitors the voltage and temperatures of the drive operation. A variable speed 'muffin' fan is also part of the drive. The drive is limited to 125 °F ambient temperature. For this reason the 7 Series is not recommended for

Variable Capacity Technology Description cont.

attic installations without special precautions to limit high temperature ambient conditions. The compressor compartment temperature is also monitored by the Aurora. This 'compressor ambient' temperature is available on the AID Tool.

The AOC monitors the temperature of the drive components and will increase or decrease the speed of the "muffin" fan based upon the temperature. This fan speed % is available in the AID Tool to help in troubleshooting its operation. Airflow needs to be maintained in the compressor compartment. The drive fan pulls air thru the corner post and should discharge out the lower right side access panel louvers. The corner post air intake features a filter than may need cleaning occasionally.

Safe Mode

The system has encountered an unsafe operation condition that prevents automatic speed control, e.g. lost a sensor signal. To avoid damage to the system, the drive is running the compressor at a fixed speed of 2400 rpm awaiting the problem to be solved and eventually returning to normal operation. If the problem cannot be solved the drive stops and issues an alarm (see fault/alarm table).

Electronic Expansion Valve (EEV)

An electronic expansion valve (EEV) is used to provide proper refrigerant control throughout the wide operating range of the unit. The EEV is driven by a separate EEV control board that appears in the Aurora Configuration Screen as EEV2 (an additional EEV1 is possible in other system configurations such as an air source heat pump). To operate the EEV, superheat is measured by the Aurora Control. Suction pressure is measured by the VS drive and communicated to the Aurora. Then the Suction Temperature is measured. With these two values superheat can be calculated. An algorithm controls the opening of the valve based upon several factors with the most important being the superheat measurement. The valve operates between full open and full closed with 470 steps during operation. The power head of the EEV is replaceable. The superheat setpoint is programmed around 7-10 °F. Both superheat and EEV % open (0 steps = 0% to 470 steps = 100%) is displayed by the AID Tool.
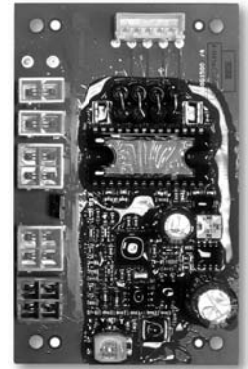
Sensors

7 Series Standard Sensors

The 7 Series has several sensors for operation and monitoring. Many of these are critical for the heat pump operation. These include refrigerant pressure and temperature sensors.

Refrigerant Pressure Sensors (Transducer) – These sensors are connected to the VS Drive and transmit the refrigerant pressure in a 0-5V control signal to the Aurora Control. These suction and discharge pressure sensors are different pressure ranges and calibration and are NOT interchangeable with each other or those meant for the AXB. Saturated temperature conversion is calculated within the Aurora.

Refrigerant Temperature Sensors – These sensors are connected to the VS drive and transmit the refrigerant, water and air temperature to the Aurora Control. These are 1kOhm PTC thermistors that measure refrigerant suction and discharge, entering water, leaving air and compressor ambient air temperatures. These temperature sensors are NOT interchangeable with the AXB sensors. FP1, FP2, hot water limit, heating liquid line, entering water temperature, and leaving water temperature (with optional Performance Package) are 10 kOhm PTC thermistors. These thermistors connect to the AXB and are not interchangeable with the VS drive sensors.

5 Series Optional Sensors

The 5 Series has several sensors for monitoring. These sensors are NOT critical to operation and are for informational purposes only. These include refrigerant pressure and temperature.

Refrigerant Pressure Sensors (Transducer) – These sensors are connected to the AXB and transmit the refrigerant pressure in 0-5V control signal to the Aurora Control. The suction and discharge sensor are different pressure ranges and calibration and are NOT interchangeable. Saturated temperature conversion is calculated in Aurora. These sensors are NOT interchangeable with the VS drive sensors.

Refrigerant Temperature Sensors – These sensors are connected to the AXB and transmit the refrigerant, water and air temperature to the Aurora Control. These are 10 kOhm PTC thermistors that measure FP1, FP2, heating liquid line, entering water, leaving water, and hot water limit temperatures These sensors are NOT interchangeable with the VS drive sensors.

7 Series Thermostats

The 7 Series requires a communicating thermostat of either TPCM32U04 or TPCC32U01 models. Communicating stats are required due to the requirement for more detailed demand capability than traditional Y1/Y2 stats can provide. In anticipation of potential thermostat communication error on models TPCM32U04, the 'W' signal can be connected as a fail-safe emergency heat signal to bring on emergency heat.

Color Touchscreen Communicating with Humidity Control TPCC32U01
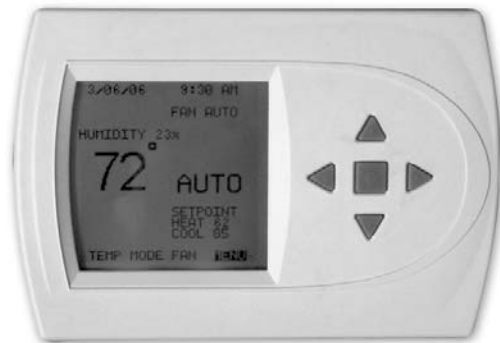
Elite Communicating Thermostat with Humidity Control - TPCM32U04

Variable Speed Airflow (7 Series Only)

The Airflow is set using the AID Tool. We have used the 12 available blower speed design similar to our 12 pin DIP switch on the Premier2 board to help clarify airflow selection. No matter the heating airflow intermediate speeds, the Aurora rounds and operates on the nearest of the 12 blower speeds. This means some airflows can be assigned the same blower speed when high and low settings are separated by less than 5 (i.e. low on spd 3 and high on spd 8).

The continuous blower and auxiliary (electric heat) settings are independent of the compressor speeds and can be set individually. Continuous blower can now be set at any of the 12 blower speeds. Auxiliary is required to be within the range specified for the electric heat package installed and is greater than or equal to the high blower speed.

Heating Airflow

The compressor airflow speeds are set by assigning the lowest airflow for compressor speeds 1/2 and the highest value for compressor speeds 11/12. Then 4 other airflow levels for the intermediate compressors speeds are interpolated in between these to low and high limits. This provides a very flexible airflow capability not only allowing for variation up and down collectively but also allowing higher airflow at lower speeds and lower airflow at higher speeds if desired. It is important to note that with this flexibility, some of the intermediate airflows can be 'compressed' until many compressor speeds have the same effective airflow. As always there are limits to the flexibility and low and high need to be within the ranges published in the blower tables.

Cooling Airflow

Cooling airflow is established first by the heating airflow setting above then a simple % reduction is applied based upon the AID Tool selection. The screen below in the AID Tool shows the options. Heating airflow less 15% for cooling is the default setting. Note that in cooling mode, the blower speed is shown on the AID Tool PRIOR to the default 15% reduction similar to the Premier and Envision Series.

NOTE: It has been found that operating a duct system designed around 1600 cfm at appropriate airflows for 25% (compressor speed 1) results in very low airflow velocities in the duct system and can hinder proper air distribution. Therefore WaterFurnace recommends a higher airflow at low compressor capacities (400-600 cfm/ton) to help improve the ductwork air distribution at lower compressor speeds. It will result in lower leaving air temperatures, however at such low airflows it cannot practically be felt at the register or cause discomfort to the homeowner.

Heating Airflow Selection (Variable Speed)

		From IZ2 Air Level %	Blwr Speed	Cont Blwr	Low Comp	Hi Comp	Aux Heat
			1				
			2				
Comp Speeds 1 & 2	Low Selection	25%	3		--->		
Comp Speeds 3 & 4		40%	4				
Comp Speeds 5 & 6		55%	5				
Comp Speeds 7 & 8		70%	6				
Comp Speeds 9 & 10		85%	7				
Comp Speeds 11 & 12	High Selection	100%	8	--->		--->	
			9				
			10				
			11				--->
			12				

Cooling Airflow Selection (Variable Speed)

		From IZ2 Air Level %	Actual Blower Speed*
Comp Speeds 1 & 2	Low Selection	25%	Blower Spd 3 - 15%
Comp Speeds 3 & 4		40%	Blower Spd 4 - 15%
Comp Speeds 5 & 6		55%	Blower Spd 5 - 15%
Comp Speeds 7 & 8		70%	Blower Spd 6 - 15%
Comp Speeds 9 &10	Cooling Max	85%	Blower Spd 7 - 15%
Comp Speeds 11 & 12	SuperBoost Only	100%	Blower Spd 8 - 15%

AID Reported Blower Speed	Cont Blower	Low Comp	Hi Comp	Aux Heat
1				
2				
3		--->		
4				
5				
6				
7				
8	--->		--->	
9				
10				
11				--->
12				

NOTE: * Denotes default cooling airflow setting of 15% less than heating mode airflow.

SuperBoost Cooling (7 Series Only)

Occasionally there can be a requirement for a short term 'boost' of cooling capacity during a large party etc. The user can then select 'SuperBoost' mode on the thermostat which will allow the 7 Series to ramp up an extra 30% of cooling capacity if needed. This extra SuperBoost will only be available for a 24 hr. period and then the unit will revert to normal operation. The short term boost does not affect ground loop sizing since it is limited in operation. Note that Superboost mode doesn't immediately operate the compressor at speeds 10-12, but merely ALLOWS the unit to ramp up to these higher speeds if necessary. Water and airflow will automatically be adjusted as setup. See Cooling airflow and waterflow.

NOTE: If allowed to operate for long periods, the SuperBoost mode would affect loop temperature adversely since all loop sizing is performed with the maximum normal cooling capacity of speed 9. Therefore, SuperBoost mode is limited to a short 24 hr. time period.

Waterflow

The 7 Series variable speed unit will operate by nature around 2.5 times longer annually than a single or dual capacity system. The flow curve laws show that for each 25% reduction in water flow we can halve the power requirement of the pump. Therefore it becomes advantageous to reduce the water flow pumping watts and water usage especially in lower flowrate demands.

Closed Loop Systems

WaterFurnace recommends an FCV1-GL, FCV2-GL, FCV1-GLNP, or FCV2-GLNP, (variable speed flow centers) for this purpose. The WaterFlow is set using the AID Tool. Using the AXB setup screen, the minimum water flow can be set for compressor speed 1 and the maximum can be set for compressor speed 12. By simply dialing in the water flow percentage and measuring the resulting water flow (either by pressure gauge or AID Tool if flow meter is installed), the installer can set the boundaries of the water flow and the Aurora will automatically vary the flow within these limits for each intermediate compressor speed.

The VS pumps in the FCV1 and 2 are VS pumps and are powered all of the time. The FCV2 second pump is powered by the AXB's loop pump relay. A variable PWM signal is provided by the Aurora to communicate speeds to the VS pump. The VS pump also has a feedback circuit to the Aurora for some fault conditions. This FCV feedback will be reported as an E16 fault in the Aurora system. These can be under/over voltage or rotor locked. The FCV1 will

have slightly less head capability than a traditional FC2 and will result in roughly 1 gpm less flow in the 9-15 gpm range with typical loop designs (consult pressure drop charts or software). For this reason a second UP26-99 pump is added to the FCV2. This second pump will be powered by the traditional loop pump relay from the loop power block any time there is a compressor call. The variable speed pump can then be setup for 0% flow at minimum and a logical maximum to give a wide range of waterflows. This is especially useful with multiple units on one flow center. Loop pump slaving will operate both pumps (VS pump at 100%) any time the slave unit calls. When the primary unit calls the UP26-99 will operate and VS will be varied according to the minimum and maximum settings.

NOTES: 1) Waterflow should be set at recommended maximum waterflow to ensure adequate waterflow during superboost cooling and high heating speeds. 2) Should this driving pwm signal disappear, the pump is programmed to operate at 100% until the communication issue is resolved.

Open Loop Systems

A modulating waterflow valve is also available and can be connected to the VS Pump connections of the AXB. The valve will be opened roughly the percentage shown in the AID Tool. Low Flow should be set up to the recommended minimum water flow. High flow should be setup for the recommended maximum water flow. This modulating valve can be used on both variable speed and dual capacity units.

Dehumidification

Passive Dehumidification (5 Series only)

In passive dehumidification mode, the VS unit airflow is reduced by 15% from the heating airflow setting. If cooling airflow is set to +5, -5 or -10% of heating airflow it will automatically be set to -15% of heating airflow whenever the dehumidification call is present in the communicating stat or from the thermostat input DH on the ABC board. If the airflow for cooling is already set to -15% no airflow change will be noticed from normal cooling. Dehumidification mode will be shown on the ABC and the communicating thermostats.

Active Dehumidification (7 Series only)

Active dehumidification will only activate during cooling operation and is based upon the humidity setpoint of the thermostat being at least 5% below the actual relative humidity and being within the temperature parameters described here. The green status LED will flash code 2 when active. The unit can operate a maximum of 2°F below the cooling setpoint. The compressor will ramp up and airflow will begin at a low level. Airflow is then reduced periodically until air coil temperature setpoint is reached. If coil temperature continues to drop, the airflow is increased until air coil setpoint is maintained. After 20 minutes of operation in the Active Dehumidification mode, normal cooling operation will resume for 5 minutes. This cycle continues until the dehumidification setpoint is reached, room temperature is more than 2°F below cooling setpoint, or more than 1°F above cooling setpoint (normal cooling takes over). In IntelliZone2 systems, the main zone will remain open during active dehumidification.

NOTE: Active dehumidification will generally operate with a latent capacity of 60% and sensible of 40% during high humidity conditions.

Notes

Revision Guide

Pages:	Description:	Date:	By:
16	Added Non-Pressurized Flow Centers to Waterflow Section	31 May 2013	DS
All	Minor Formatting Corrections	23 Oct 2012	DS
All	Added Revision Guide	23 Oct 2012	DS

Product: **5 Series 500A11 & 7 Series 700A11**

Type: Geothermal Heat Pump

Size: 1-6 Ton Single Speed

             2-6 Ton Dual Capacity

             3-5 Ton Variable Speed

Document: Application Guide

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