WaterFurnace®
Smarter from the Ground Up™

Specification Catalog

Geo-Ready® Split

Geothermal Comfort System

Table of Contents

5 Series

Geo-Ready® Split Geothermal Heat Pump

The First of its Kind

The Geo-Ready Heat Pump provides the perfect solution for homeowners who are ready to make the transition from Air Source to Geothermal systems.

Field Convertible

Seamless conversion from Air Source to Geothermal. A solution that provides the flexibility to install a High Efficiency Air Source Heat Pump and later convert to a Geothermal Heat Pump when ready.

Geo-Ready Split Exterior Installation

Refrigerant Monitoring

The Refrigerant Monitoring package constantly monitors the refrigerant pressures and temperatures within the system which is vital for maintaining efficient performance, system health and assisting with troubleshooting.

Hot Water Assist

With the compressor housed inside the Indoor unit, the Geo-Ready product comes with the added benefit of Hot Water Generation that allows significant Energy Savings over traditional Air Source Heat Pumps during the cooling season.

Active Charge Assist

This feature allows accurate charging in the field through the ACC app based on superheat and subcooling levels at various ambient conditions.

Air Source/Geo Mode

The Geo-Ready system has the capability to switch between Air Source and Geo Mode depending on field application.

On-Board Diagnostics

The Aurora Interface and Diagnostics (AID) Tool provides diagnostics, fault management, variable speed ECM setup, and system configuration capabilities.

Energy Monitoring

The Energy Monitoring Package allows measurement of the complete power usage of the system with the help of current transducers.

Compressor Housed Indoors

Serviceability is made more convenient due to the location of the compressor inside the indoor unit. This takes harsh weather conditions out of the equation for field servicing.

5 Series Interior Installation

With AHRI 210/240 Certification, the Geo-Ready Product delivers up to 16.00 SEER2 and 8.90 HSPF2. Innovative and unique, the Geo-Ready product provides the option to seamlessly convert to Geothermal when convenient. With a GLHP rating of 28 EER and 4.8 COP per AHRI 13256-1, this product delivers a level of comfort, efficiency and reliability that drives confidence. The Geo-Ready Split is available in three dual capacity sizes (3, 4 and 5 ton) with the latest generation of Copeland Scroll Two-Stage K7 Compressors.

These Geo-Ready Split units utilize ozone-safe R-410A refrigerant to meet the most stringent EPA requirements. ECM blowers are used to increase comfort, efficiency, and airflow flexibility. A new sophisticated Aurora™ Control system is modular and designed to grow with the application. The Aurora 'Base' Control (ABC) features a microprocessor control to sequence all components during operation for optimum performance. Plus, the ABC provides easy-to-use troubleshooting features with fault lights, on-board diagnostics, and a hand held Aurora Interface Diagnostic (AID) Tool. The Aurora 'Advanced' Control adds the Aurora Expansion Board (AXB) to further extend the capability of the system to include compressor current monitoring, advanced loop and hot water generator pump control, as well as service, performance, and energy monitoring sensor kit capability. Aurora Weblink (AWL) allows remote access to the thermostat via WiFi to the internet or smartphone as well as remote monitoring of the heat pump and receives lockout/fault info via text or e-mail. A swing-out control box provides serviceability. Unit configurations include vertical top, bottom, or rear discharge (left or right return) and horizontal units with left or right return a side or end discharge. Heavy-gauge metal cabinets are fully insulated and coated with an attractive and durable gray paint for long lasting protection. The cabinet's rounded front corners, blue wave styling element, and 5 Series nameplate add a touch of elegance to the unit. In Air Source configuration, the Geo-Ready Outdoor unit features a Variable Speed ECM Fan Motor with Swept Wing Fan Blades to maximize efficiency and airflow output. The Outdoor Fan Motor is operated by the Aurora Outdoor Board (AOB) and it also monitors the Outdoor Motor Current, pressures and temperatures. The AOB communicates vital temperature readings to the ABC for accurate Demand Defrost Operation during the Heating Season. Both the Indoor and Outdoor units utilize Electronic Expansion Valves (EEVs) for better refrigerant control and improved performance over regular Thermostatic Expansion Valve driven systems.

Unlike other air source heat pumps, our compressor is housed inside the Indoor unit, the Geo-Ready product comes with the added benefit of Hot Water Generation that allows significant Energy Savings over traditional Air Source Heat Pumps during the Cooling Season. This is a feature that enables the Geo-Ready product to outperform traditional Air Source Heat Pumps by leaps and bounds and provide better efficiency for a greener home. In addition, serviceability is made more convenient due to the location of the compressor inside the Indoor Unit. This takes harsh weather conditions out of the equation for field servicing.

Geo-Ready products are performance-certified to AHRI/ISO 13256-1 and AHRI 210/240 standards, ETL listed, ENERGY STAR® qualified, and tested in an ISO 17025 accredited testing lab.

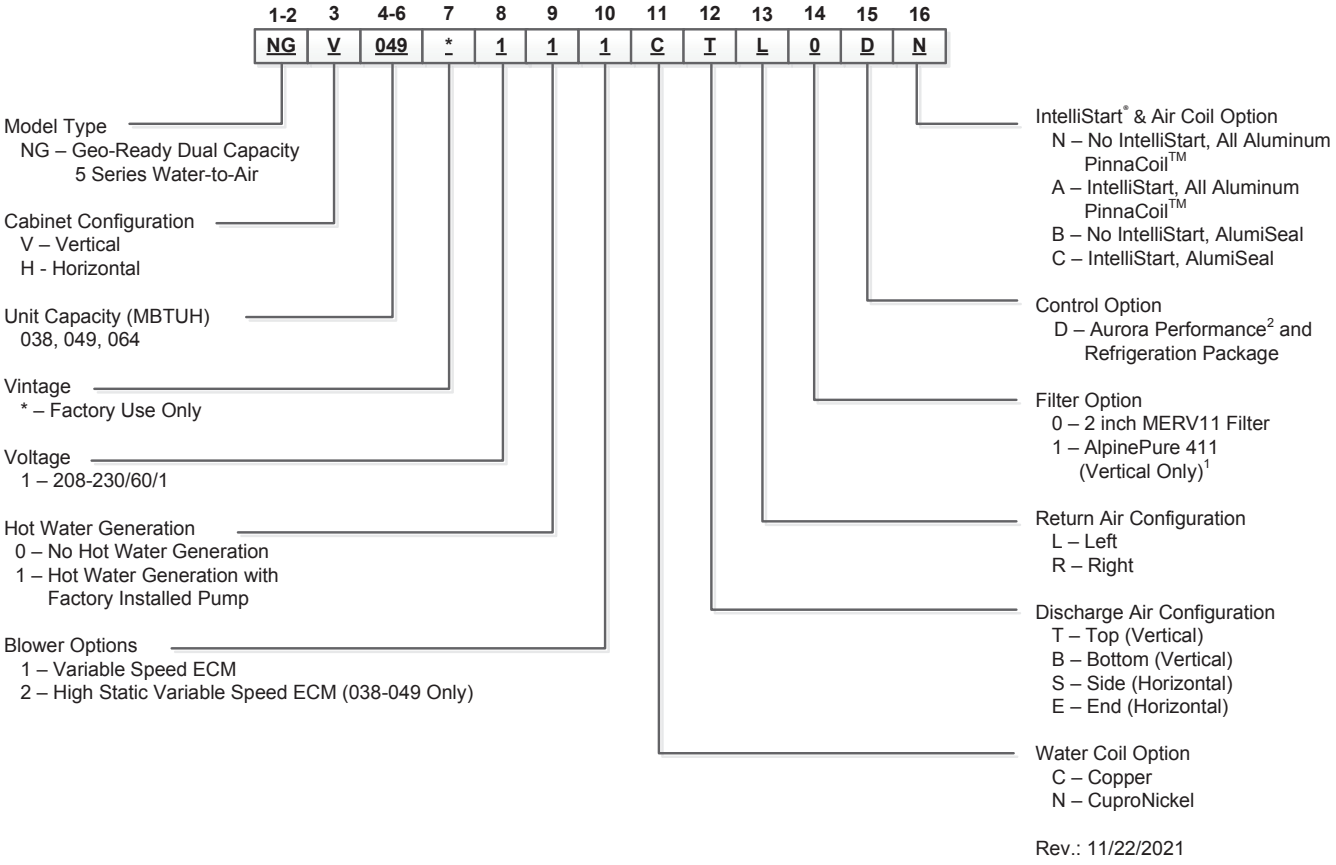
As a leader in the industry, WaterFurnace® is dedicated to innovation, quality, and customer satisfaction. In fact, every unit built is exposed to a wide range of quality control procedures throughout the assembly process and is then subjected to a rigorous battery of computerized run tests to certify that it meets or exceeds performance standards for efficiency and safety, and will perform flawlessly at startup. As further affirmation of our quality standards, each unit carries our exclusive Quality Assurance emblem, signed by the final test technician.

WaterFurnace® International's corporate headquarters ISO 9001:2015/ISO 14001:2015 and manufacturing facility is located in Fort Wayne, IN. A scenic three-acre pond located in front of the building serves as our geothermal heating and cooling source to comfort-condition our 110,000 square feet of manufacturing and office space. As a pioneer, and now a leader in the industry, the team of WaterFurnace® engineers, customer support staff, and skilled assembly technicians is dedicated to providing the finest comfort systems available.

By choosing or specifying WaterFurnace® 5 Series products, you can be assured that your customer is investing in the ultimate comfort system and peace of mind for many years to come.

Model Nomenclature

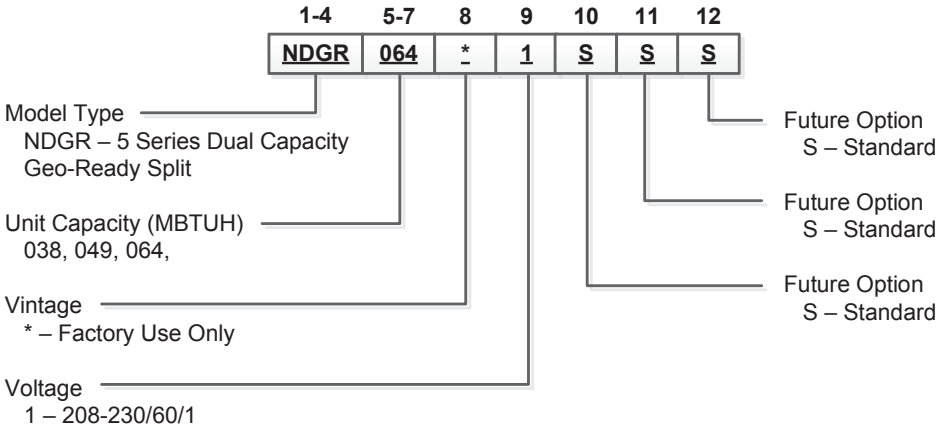
Indoor



Notes:
All Models include sound kits as std. equipment
[1] Available on vertical configurations only
[2] Performance demonstrated only when connected to ground source

Model Nomenclature cont.

Outdoor



Rev.: 3/28/22

AHRI Performance Ratings

ECM motor

AHRI/ASHRAE/ISO 13256-1

English (IP) Units

Model	Capacity Modulation	Flow Rate		Water Loop Heat Pump				Ground Water Heat Pump				Ground Loop Heat Pump			
				Cooling EWT 86°F		Heating EWT 68°F		Cooling EWT 59°F		Heating EWT 50°F		Cooling Brine Full Load 77°F Part Load 68°F		Heating Brine Full Load 32°F Part Load 41°F	
		gpm	cfm	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP	Capacity Btuh	EER Btuh/W	Capacity Btuh	COP
038	Full	9	1300	36,500	17.0	43,300	5.5	40,000	24.4	35,000	4.9	38,200	19.7	28,500	4.2
	Part	8	1150	26,500	19.0	31,300	6.4	29,900	32.1	24,900	5.1	29,500	28.0	22,900	4.8
049	Full	12	1600	49,100	17.2	59,000	5.5	54,100	24.5	47,200	4.6	50,800	19.3	38,200	4.0
	Part	11	1400	36,300	19.1	41,700	6.1	41,600	33.0	33,600	4.7	39,800	27.4	31,000	4.4
064	Full	16	1800	62,300	16.4	73,900	5.2	69,000	23.9	60,400	4.6	65,500	19.3	47,300	3.8
	Part	14	1500	45,800	18.1	53,200	5.9	53,000	30.7	43,500	4.8	50,500	26.5	35.700	4.3

Cooling capacities based upon 80.6°F DB, 66.2°F WB entering air temperature
Heating capacities based upon 68°F DB, 59°F WB entering air temperature
All ratings based upon 208V operation

11/22/22

AHRI 210/240 Performance Ratings (Air Source Mode)

AHRI 210/240

English (IP) Units

Indoor	Outdoor	Rated SCFM	*2023 Standard						2017 Standard					
			Cooling			Heating			Cooling			Heating		
			Capacity (95°F) Btuh	EER-2 (95°F)	SEER-2	Capacity (47°F) Btuh	Capacity (17°F) Btuh	HSPF-2 (Region IV)	Capacity (95°F) Btuh	EER (95°F)	SEER	Capacity (47°F) Btuh	Capacity (17°F) Btuh	HSPF (Region IV)
NGV/NGH038*1*(1,2)	NDGR038*1	1300	36,800	12.60	16.00	35,000	21,800	8.90	36,800	13.50	17.30	35,000	21,800	10.50
NGV/NGH049*1*(1,2)	NDGR049*1	1600	47,000	12.30	15.50	48,000	31,000	8.60	47,000	12.65	16.00	48,000	31,000	10.00
NGV/NGH064*1*1	NDGR064*1	1800	60,000	12.10	15.00	55,500	35,600	8.60	60,000	12.45	15.50	55,500	35,600	10.00

Cooling capacities based upon 80°F DB, 67°F WB entering air temperature
Heating capacities based upon 70°F DB, 60°F WB entering air temperature
All ratings based upon 230V operation
*New SEER-2, EER-2, HSPF-2 ratings (based on new 2023 M1 standard) equivalent to previous SEER, EER and HSPF ratings (based on 2017 M standard)

11/16/22

The new SEER-2, EER-2 and HSPF-2 ratings are based on the Appendix-M1 update to the 10CFR Subpart B of Part 430 of the Federal Code. M1 Ratings are effective January 1, 2023. All Heat Pumps manufactured on or after January 1, 2023 must comply to the new M1 standard. The degradation in efficiency numbers is a reflection of more stringent testing requirements meant to be more representative of real world application in terms of higher external static pressures experienced by Indoor Units. The minimum static pressure requirements for Indoor Airflow increased to 0.5 from 0.2 for units with Air Filters. And for units without Air Filters, the minimum requirement increased to 0.58 from 0.28. Bin hour distributions for HSPF calculations have changed to allow for more stringent testing conditions at lower temperatures. This is reflected in the significant efficiency degradation in Heating more so than Cooling. In addition, the minimum energy efficiency requirements have also increased by 7% compared to 2017. All Geo-Ready products comply with the 2023 standards based on AHRI Certification Test Results.

Minimum Efficiency Requirements for Air Source Heat Pumps

2017		2023			
SEER	HSPF	SEER	HSPF	SEER-2	HSPF-2
14	8.2	15	8.8	14.3	7.5

11/16/22

AHRI Performance Ratings cont.

Energy Star Compliance Table AHRI ISO 13256-1 (Geo Mode)

Model	Tier 3	
	Ground Water	Ground Loop
038	E	E
049	E	E
064	E	E

Notes for Blower Option 5/16/22

E - ECM

Energy Star Rating Criteria

In order for water-source heat pumps to be Energy Star rated they must meet or exceed the minimum efficiency requirements listed below. Tier 3 represents the current minimum efficiency water source heat pumps must have in order to be Energy Start rated.

Tier 3: 1/1/2012 – No Effective End Date Published

Water-to-Air	**EER**	**COP**
Ground Loop	17.1	3.6
Ground Water	21.1	4.1
Water-to-Water		
Ground Loop	16.1	3.1
Ground Water	20.1	3.5

GSHP Energy Star Rated Tier 3 Minimum Requirements

GWHP	21.1
GLHP	17.1
GWHP	4.1
GLHP	3.6

Energy Star Compliance Table AHRI 210/240 (Air Source Mode)

Indoor	Outdoor	Energy Star Compliant
NGV/NGH038*1*(1,2)	NDGR038*1	Yes
NGV/NGH049*1*(1,2)	NDGR049*1	Yes
NGV/NGH064*1*1	NDGR064*1	No

6/27/22

ASHP Energy Star Criteria for Certified Residential Heat Pumps

Product Type	SEER	EER	HSPF
HP Split Systems	≥ 16.0	≥ 12.5	≥ 9.2

6/1/22

Sound Performance Ratings (Air Source)

Model	Stage	Sound Rating (dBa)
038	Part Load	55
	Full Load	60
049	Part Load	55
	Full Load	63
064	Part Load	60
	Full Load	72

8/18/22

AHRI Performance Ratings cont.

Comparison of Test Conditions

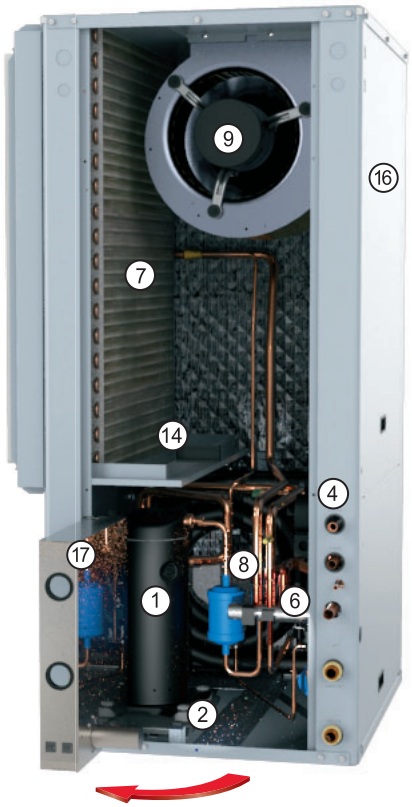
	ARI 320	ISO/AHRI 13256-1 WLHP	ARI 325	ISO/AHRI 13256-1 GWHP	ARI 330	ISO/AHRI 13256-1 GLHP
Cooling						
Entering Air - DB/WB °F	80/67	80.6/66.2	80/67	80.6/66.2	80/67	80.6/66.2
Entering Water - °F	85	86	50/70	59	77	77
Fluid Flow Rate	*	**	**	**	**	**
Heating						
Entering Air - DB/WB °F	70	68	70	68	70	68
Entering Water - °F	70	68	50/70	50	32	32
Fluid Flow Rate	*	**	**	**	**	**

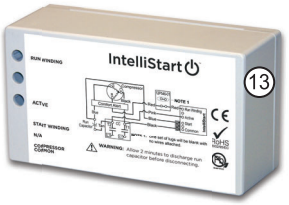
NOTES: * Flow rate is set by 10°F rise in standard cooling test
** Flow rate is specified by the manufacturer
Part load entering water conditions not shown
WLHP = Water Loop Heat Pump; GWHP = Ground Water Heat Pump; GLHP = Ground Loop Heat Pump

Conversions:

Airflow (lps) = cfm x 0.472;
ESP (Pascals) = ESP (in wg) x 249;
WaterFlow (lps) = gpm x 0.0631;
Press Drop (Pascals) = Press Drop (ft hd) x 2990

Geo-Ready Design Features





1. **COMPRESSOR:** The latest generation of Copeland Scroll K7 (Dual Capacity) compressors.
2. **DOUBLE ISOLATED COMPRESSOR:** Double isolated compressor mounting to reduce noise and vibration
3. **AURORA CONTROLS & AID TOOL:** Aurora 'Base' Control, Aurora 'Advanced' Control, and Aurora AID Tool
4. **OPTIONAL HOT WATER ASSIST:** Provides free hot water in cooling and very high efficiency hot water generation in heating mode
5. **COAXIAL HEAT EXCHANGER:** High efficiency copper (optional cupronickel) coax with our exclusive void-free and robotically applied ThermaShield insulation coating
6. **ELECTRONIC EXPANSION VALVE:** high efficiency electronic expansion valve provides the ultimate in accurate control for the highest efficiency at any condition.
7. **AIR COIL:** Large air coil is designed for maximum efficiency, moisture removal and provides superior protection from formicary corrosion.
8. **DISCHARGE MUFFLER:** Helps quiet compressor gas pulsations
9. **ECM BLOWER MOTOR:** High efficiency and ultra-flexible Variable Speed Constant CFM ECM blower motors
10. **FILTER RACK:** Filter rack holds 1 in. or 2 in. filters (field changeable) with exclusive snap on filter door
11. **FILTER:** High holding capacity 2 in. pleated MERV 11 filter is standard and 4 in. pleated MERV 11 Is optional
12. **SWIVEL LOOP CONNECTIONS:** Leak free swivel water connections provide a hand tight gasket connection that easily handles the temperature extremes of geothermal earth loops
13. **INTELLISTART®:** Single phase soft starter that reduces normal starting current by up to 60%.
14. **INSULATION:** Cleanable foil lined insulation to prevent mold growth; corrosion resistant composite drain pan
15. **CABINET FINISH:** Heavy gauge galvanized sheet metal cabinet has gray powder coat paint for long life
16. **ACCESS PANELS:** Lift out access panels for easier removal and servicing
17. **HINGED CONTROL BOX:** Hinged removable control box
18. **HOT WATER GENERATOR SWITCH & AID TOOL PORT:** Hot water generator switch for easy enabling/disabling of the hot water generator pump; AID Tool port provides quick AID Tool connection
19. **INDOOR SERVICE VALVES:** For field servicing including refrigerant evacuation and charging.
20. **LINE SET CONNECTIONS:** Field installed interconnecting tubing for connecting indoor section to outdoor section

Geo-Ready Design Features cont.

1. **CHARGE COMPENSATOR:** For maintaining optimum refrigerant charge levels in both heating and cooling modes.
2. **LINE SET CONNECTIONS:** Field installed interconnecting tubing for connecting outdoor section to indoor section.
3. **AIR COIL:** Large air coil is designed for maximum efficiency and provides superior protection from formicary corrosion.
4. **FAN:** Three wing swept wing fan blade for efficient airflow distribution across heat exchanger.
5. **FAN MOTOR:** Variable Speed ECM Fan Motor for Airflow Optimization and improved efficiency.
6. **FAN MOTOR MODULE:** Variable Speed ECM Motor Module for Outdoor Airflow control through PWM.
7. **SUCTION PRESSURE TRANSDUCER:** Measures Evaporator (Outdoor Coil) Suction Pressure in Heating Mode for Refrigerant Monitoring, EEV Superheat Control and System Health Diagnostics.
8. **SOLENOID VALVE:** For holding refrigerant pressure within the system during compressor off-cycles. This reduces the amount of work done by the compressor during instances where the system might short-cycle in the field and enables the system to reach steady-state capacity sooner during compressor ON cycles.
9. **EEV:** Electronic Expansion Valve for efficient refrigerant control in Heating Mode.
10. **OUTDOOR SERVICE VALVES:** For field servicing including refrigerant evacuation and charging.

Geo-Ready Design Features cont.

What's New?

- Convertible from Air Source to Geothermal Heat Pump and vice versa.
- Exceptional AHRI/ISO 13256-1 Ratings for traditional geothermal
  - 28 EER and 4.8 COP
- AHRI 210/240 Ratings for Air Source Heat Pumps
  - 17.30 SEER and 9.50 HSPF
- Latest technology compressors
  - Copeland UltraTech™ K7 Compressors in dual capacity units (sizes 038, 049, 064)
- Electronic Expansion Valves for improved efficiency and refrigerant control.
- Discharge line mufflers to help quiet compressor discharge gas pulsations.
- Variable Speed ECM blower motors for the highest in efficiency and airflow flexibility
- Communicating Digital Thermostats: The Aurora controls system features either monochromatic or color touch screen graphic display thermostats for user interface with the Geo-Ready Split system. These displays not only feature easy to use graphical interface but display alerts and faults in plain English.
- Aurora™ Communicating Control Features
  - *Traditional Safety Sensors:* HP, LP, condensate overflow, freeze detection loop, freeze detection air coil
  - *Communicating Modular Design:* Communicating modular design for flexibility and expandability
  - *Intelligent Hot Water Generator Control:* The Aurora Advanced control determines operation of hot water assist dependent upon system parameters to maximize overall system efficiency
  - *Loop pump linking:* For multiple units on one flow center with either variable speed, single, or dual capacity units (with Aurora Advanced Control); even works with our legacy controls
  - *Electric Heat Powered Blower and Controls:* Prevents the compressor from tripping out and disabling heat in the house
  - *Internet Ready:* With Aurora WebLink (AWL) device and Symphony Web Portal
- Advanced Service Features
  - Aurora Controls with the AID Tool provide advanced service diagnostics. With this device setup and configurations as well as real-time sensors fault and lockout history can be monitored and much more.
  - Aurora can be internet capable simply by adding the Aurora WebLink (AWL). This device will connect your Aurora system to web for remote monitoring and control. It also comes standard with an SD drive for storing operating and performance data. Providing 'black box' capability.
  - Complete air flow control throughout the unit's operating range
- Cabinet Design – Improved design of access panels, control box and filter rack
- Cabinet Configurations – Vertical left or right return, downflow left or right return; Horizontal left or right return with either end or side air discharge
- Monitoring Sensor Kits
  - *Energy Monitoring:* With this standard sensor kit, the Aurora Advanced Control will feature power monitoring of the compressor, blower, and electric heat; the information can be displayed on AID Tool, selected thermostats, or through AWL. In Air Source Mode, Outdoor Fan Motor power monitoring will also be available.
  - *Refrigerant Monitoring:* The Geo-Ready features refrigeration service sensors; now superheat, subcooling, refrigerant pressures, and various temperatures needed to diagnose unit problems are readily available at your finger tips in the AID Tool.
  - *Performance Monitoring (Geo Mode only):* efficiency performance (Geo Mode only) of the heat pump; With this sensor kit installation, the Aurora controls can measure actual capacity and efficiency performance of the heat pump; the information can be displayed on AID Tool or thru AWL
- Cupronickel heat exchanger
- High static blower available on some models

Air Source Control Features

- Demand Defrost
- Timed Defrost
- 6-Hour Defrost
- Air Source Mode
- Geo Mode
- Outdoor Coil Temperature Sensor
- Outdoor Ambient Temperature Sensor
- Discharge Line Temperature Sensor
- Discharge Air Temperature Sensor(for Charge Assist)
- Indoor/Outdoor EEV
- Indoor/Outdoor Solenoid Valve

Geo-Ready Design Features cont.

Application Flexibility

- (In Geo-Mode) Safe, efficient operation in a wide range of liquid temperatures (20°F to 120°F) and flow rates (as low as 1.5 gpm/ton in open loop applications when EWT >50°F)
- Safe, efficient operation in a wide range of Outdoor Ambient temperatures (-6°F to 125°F) in Air Source Mode
- Top or rear air discharge for upflow, or bottom discharge for counterflow installations in vertical units, side or end discharge for horizontal units
- True left or right return air locations—vertical units include filter rack/duct collar
- Variable-speed ECM blowers permit various duct applications with flexible airflow selection.
- Narrow cabinet for easy movement through doorways
- Internally trapped condensate piping on vertical units for neat, compact installation
- Optional field-installed auxiliary electric heater
- Corner-located electrical box for field wiring from two sides
- Circuit breaker protected loop pump power block for easy wiring
- Relay to control field-mounted accessories
- Field-selectable freeze detection setting for well or closed loop systems
- Loop pump linking feature allows multiple units to share one flow center (requires Aurora 'Advanced' Control option)
- Refrigerant Hand Valves for switching refrigerant flow for Air Source and Geo Mode. In Air Source Mode, the refrigerant hand valves isolate the coaxial heat exchanger from the active circuit

Operating Efficiencies

- AHRI/ISO 13256-1 rating for heating COPs, cooling EERs, and low water flow requirements
- AHRI 210/240 ratings for cooling SEER, and heating HSPF in Air Source Mode
- Optional hot water generator with internal pump generates hot water at considerable savings while improving overall system efficiency
- Expansion valve delivers optimum refrigerant flow over a wide range of conditions and provides bidirectional operation without troublesome check valves
- Efficient scroll compressors operate quietly
- Oversized coaxial tube water-to-refrigerant heat exchanger operates at low liquid pressure drops
- Convoluted copper water tube functions efficiently at low flow rates
- Oversized all-aluminum air coil with lanced fin or rifled copper tube/lanced aluminum fin air-to refrigerant heat exchanger provides high efficiencies at low-face velocity with patented 11 element fin design
- Variable Speed ECM motors provide quiet and efficient air movement with high static capability
- Utilizes the ozone-friendly R-410A refrigerant which produces higher efficiencies and warmer discharge air temperatures

Service Advantages

- Hinged/removable control box for added serviceability
- Removable panels: three for the compressor compartment and one (on horizontals) or two (on verticals) for the air handling compartment to provide quick access to all internal components with ductwork in place
- Easily accessible electronic expansion valve
- Brass, swivel-type water connections for quick connection union, and elimination of wrenches and sealants during installation; sweat type connections are on the hot water generator
- Insulated divider and separate air handling/compressor access panels permit service testing without air bypass
- Designed for front access in tight applications
- LED fault and status lights on the Aurora board with memory for easy diagnostics
- Aurora AID Tool provides enhanced service information via communication directly with the Aurora control including sensor inputs, fault history, and much more
- Detachable thermostat connection strip for wiring convenience
- Hot water pump shut-off switch for easy startup and service
- Control box and blower motors have quick-attach wiring plugs for easy removal
- Internal drop-out blower with permanently-lubricated ball bearing motor
- High- and low-pressure service ports in refrigerant circuit.
- Blower and transformer powered from auxiliary heat supply (when installed) to provide emergency heat with open compressor circuit breaker
- Refrigerant Hand Valves for isolating coaxial heat exchanger for easy transition from Geo to Air Source mode.
- Internal Service Valves on both the Indoor and Outdoor unit for easy pressure gauge installation and system charging.
- Access panels for easy access to the Outdoor unit.

Geo-Ready Design Features cont.

Product Quality

- Heavy-gauge steel cabinets are painted with durable powder coat paint for long lasting beauty and service
- Coaxial heat exchanger, refrigerant suction lines, hot water generator coil, and all water pipes are fully insulated to reduce condensation problems in low temperature operation
- Noise reduction features includes compressor discharge muffler, double isolation mounted compressors and soft starting blower motors; insulated compressor compartment; interior cabinet insulation using 1/2 in. coated glass fiber; all units include compressor blanket for quiet operation
- Safety features include high- and low-pressure refrigerant controls to protect the compressor, condensate overflow protection, freeze detection sensor to safeguard the coaxial heat exchanger and air coils, blower start detection, hot water high-limit hot water generator pump shutdown, compressor monitoring, and fault lockout enables emergency heat and prevents compressor operation until thermostat or circuit breaker is reset

Air Source Safety Features

- Low Pressure Switch Ignore - this is an Air Source Mode only Feature that is activated during low Ambient Heating Mode. The control shall ignore the LPS Input when the Outdoor Ambient Temperature is <= 17°F. The LPS Input is also ignored during Active Defrost and also 120 seconds following the termination of a Defrost Cycle. This feature ensures continued system operation at low ambient heating conditions.
- Low Discharge Gas Temperature - this is an Air Source Mode only Fault Code. This fault code is only active in Heating Mode. This fault is recognized at Outdoor Ambient temperature <= 17°F in Heating Mode and after fifteen minutes of accumulated compressor run time following the exit of a defrost cycle. The low discharge temperature fault could indicate a failed outdoor fan or other things such as the outdoor coil turning too cold during heating operation.
    - The lockout is intended to prevent refrigerant flooding back to the compressor. The discharge sensor must be well insulated and installed properly to prevent nuisance lockouts from occurring. This is a secondary safety feature at low ambient heating conditions to provide system protection when the LPS is ignored.
- High Discharge Gas Temperature - this is an Air Source Mode only Fault Code. This fault code is active in both Heating and Cooling Mode. This fault is recognized at discharge gas temperatures of 250°F and above. The control shall lockout after the third occurrence of this fault. A soft reset will clear the fault code counter for High Discharge Gas Temperature.
- OD Fan Motor/CT Fault - this is an Air Source Mode only Fault Code. This fault code is active in both Heating and Cooling Mode. If the AOB senses zero Amp draw by the OD Fan Motor for more than 15 seconds during Heating/Cooling operation, then the control shall log a Outdoor Fan Motor/CT Fault indicating a failed OD Fan Motor or Current Transducer. This fault does not shut down the system but is used for diagnosing a motor or current sensor that has failed.

Microprocessor Benefits

- Communicating monochromatic or color digital auto-changeover thermostat with 3-stage heating/2-stage cooling holds precise temperature and provides varying blower speed control
- Component sequencing delays for quiet startup, shutdown, and timed staging of auxiliary electric heat
- ECM blower speed control provides higher supply air temperature in heating, better dehumidification in cooling, and quiet operation at reduced airflows in all modes
- Hot water limit prevents scalding, and pump shuts down automatically when full unit capacity is needed for heating
- Communication capability for future expansions

Geo-Ready Design Features cont.

Options and Accessories

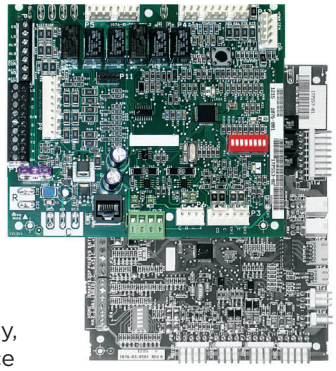
- Communicating Digital Thermostats
  - *Monochromatic Graphic Display Thermostats:* For user interface with the Aurora system; these displays not only feature easy to use graphical interface but display alerts and faults in plain English. When Energy Monitoring is added, instantaneous usage is displayed on the thermostat itself.
  - *Color Touch Screen Graphic Display Thermostats:* For user interface with the Aurora system; these displays not only feature easy to use graphical interface but display alerts and faults in plain English. When Energy Monitoring is added not only instantaneous usage is displayed but also weekly and annual consumptions are stored and graphed. Other features include full color implementation, user loaded background photos, and USB port for easy configuration and software updates.
- IntelliZone2 Zone System: The IntelliZone2 zoning system provides up to 6 zones (Variable Speed), 4 zones (Dual Capacity), or 2 zones (Single Speed) of individualized comfort via communication to the Aurora Control System. Requires AXB board.
- IntelliZone2 ● 24V is a non-communicating zoning system that uses a daughter board to translate communication to 24 VAC for the heat pump (no AXB). Maximum of 4 zones (Dual Capacity) or 2 zones (Single Speed).
- AID Tool: The Aurora Interface and Diagnostics (AID) Tool is a plug-in configuration and troubleshooting tool for the Aurora Control System.
- Aurora WebLink (AWL): The Aurora Control System can be made internet capable simply by adding the Aurora WebLink (AWL) device. The AWL will connect your Aurora system to the web for remote monitoring and control. It also comes standard with an SD disc for storing operating and performance data providing true 'black box' capability for troubleshooting.
- Aurora 'Advanced' Controls (see controls description)
- Optional cupronickel heat exchangers for open loop applications
- Optional hot water generator with internally mounted pump and water heater plumbing connector
- High static ECM blower motor for high static applications on all units from 038 to 064
- Electronic auto-changeover thermostat with 3-stage heating/2-stage cooling and indicator LEDs (non-communicating)
- 24 Volt 1 in. electronic air cleaner
- 90% efficient, cleanable electrostatic filters
- Closed loop flow center in several sizes
- Auxiliary electric heater
- Hose kits
- Additional accessory relay
- AlpinePure 2 in. MERV 13 filter
- AlpinePure 4 in. MERV 11 filter
- IntelliStart soft starter

Manufacturing Quality

- All units are computer run-tested, with conditioned source water, in all modes to ensure efficiency and reliability
- All refrigerant brazing is performed in a nitrogen atmosphere
- All units are deep evacuated to less than 150 microns prior to refrigerant charging
- All joints are helium leak-tested to ensure an annual leak rate of less than 1/4 ounce
- All major components bar coded; eliminating possibility of mismatched parts built into unit
- All assembly technicians thoroughly trained in proper quality procedures
- All units have model number and serial number embedded in control for local or remote retrieval
- WaterFurnace International, Inc. is an ISO 9001:2015 certified manufacturing facility
- WaterFurnace International, Inc. engineering labs are ISO 17025 accredited

The Aurora™ Control System

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 linking, intelligent hot water generator control, variable speed pump capability, and also allows for optional energy, refrigeration, and performance monitoring factory installed 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.

In addition, the AXB monitors Suction Temperature and Pressure to support EEV Control in both Air Source and Geo Mode.

Aurora "Outdoor" Control (AOB)

This is an additional Control Board utilized in Air Source Mode. It is mounted inside the Control Box on the Outdoor Unit. In Air Source Mode, the AOB is connected to the ABC through a 4-wire Communication Cable. The AOB controls the Outdoor Fan Motor and also supports additional features including Outdoor Coil Temperature, Outdoor Ambient Temperature, Outdoor Discharge Air Temperature monitoring. It also monitors the Suction Temperature and Pressure on the Outdoor Unit for accurate EEV Control during Heating Operation. The DIV output on the AOB controls the outdoor Solenoid Valve, so that it opens and closes with the compressor ON and OFF cycle. Outdoor Fan Motor current is monitored by the AOB to provide information regarding the health of the OD Fan Motor or Current Transducer.

Aurora Control Features	Description	Aurora 'Advanced'
Microprocessor Compressor Control	Microprocessor control of compressor for timings with FP1, HP, LP, Condensate, assignable Acc relay	•
Advanced Microprocessor Features	Smart Grid, Home Automation Alarm Inputs, and Accessory2 Relay (HRV/ERV)	•
Advanced Hot Water Generator Control	Microprocessor and separate power relay for Hot Water Generator Pump with digital temperature monitoring and multiple HWG setpoint selection.	•
Advanced Speed Pump Control	Microprocessor and separate power relay for loop pump and inline circuit breakers and loop pump slaving.	•
Variable Speed Pump	Capable of setup, monitoring and controlling a variable speed flow center.	•
Compressor Monitoring	Control monitors compressor starts for high current, missing leg etc.	•
Smart Grid/Utility Input	Allows simple input to externally enable of occupied/unoccupied mode for basic utility time of use programs.	Dry Contact x1
Home Automation Alarm Input	Allows simple input to signal sump, security, or smoke/CO sensor alarms from other home automation or security systems. The two inputs can be field configured to a number of options and logic.	Dry Contactx2
HAN/Smart Grid Com (AWL and Portal) Kit	Allows direct communication of the Aurora to Smart Meters, Home Automation Network and Internet.	Standard
IntelliZone2® Compatibility	IntelliZone2 communicates Modbus to the heat pump via the AXB board.	Optional IntelliZone2

The Aurora Control System cont.

Service Device	Description	Aurora 'Advanced'
 **Aurora Interface and Diagnostics (AID) Tool**	Allows setup, monitoring and troubleshooting of any Aurora Control. **NOTE:** Although the ABC has basic compatibility with all Aurora, new product features may not be available on older AID Tools. To simplify the basic compatibility ensure the version of AID is at least the same or greater than the ABC software version.	For Service (Ver. 2.xx or greater)

Add On Control Feature Kits (field or factory installed)	Description	Aurora 'Advanced'
Energy Monitoring Kit	Monitors realtime power consumption of compressor, blower, aux heat and pump. Requires thermostat TPCM32UO3A, TPCM32UO4A, or TPCC32UO2. AXB required.	Standard
Refrigeration Monitoring Kit	Monitors realtime pressures, temperatures, superheat, and subcooling. AXB required.	Standard
Performance Monitoring Kit (N/A in ASHP mode)	Monitors air and water temperatures, and water flow rate and calculates heat of extraction/rejection. AXB required.	Standard
Data Logging (AWL) Kit	Allows data logging of up to 12 months. AXB required. Can also be temporarily installed.	Standard
HAN/Smart Grid Com (AWL and Portal) Kit	Allows direct communication of the Aurora to Smart Meters, HAN, and internet. AXB required.	Optional
AXB Kit for advanced hot water generator control, flow center linking, variable speed pump, IntelliZone2	Added to 5 Series for key features of advanced hot water generator control, advanced loop control/linking, IntelliZone2 communication, and variable speed pump control.	Standard

Add On Thermostats and Zoning	Description	Aurora Advanced
 **TPCM32U03A/04A - MonoChrome Communicating Thermostat**	Elite Stat with full English fault codes and alerts, communicating thermostat. Monochrome thermostat allows instantaneous energy measurement only. Compatible with AWL.	Optional
 **TPCC32U02 - Color Touchscreen Communicating Thermostat**	4.3 in. color touchscreen communicating thermostat with full English fault codes and alerts. Color thermostat allows instantaneous energy measurement and 13 month energy usage history. Compatible with AWL.	Optional
 **IntelliZone2® Zoning**	IntelliZone2® is a communicating zoning system that includes color main thermostat and up to 6 zones (with variable speed, 4 zones (with dual capacity), and 2 zones (with single speed). There are 3 thermostat options (MasterStat, SensorStat, ZoneStat). Compatible with AWL.	Optional (IntelliZone2 Preferred)

The Aurora Control System cont.

Control Features

Software ABC Geo-Ready (Air)

Variable Speed Indoor ECM Blower Motor Option

A Variable Speed ECM blower motor can be driven directly using the onboard PWM output. Four blower speeds are available based upon the G, Y1, Y2, and W input signals to the board. The blower speeds can be changed either by the ECM manual configurations mode method or by using the Aurora AID Tool directly. All four blower speeds can be set to the same speed if desired.

Other Control Features

- Random start at power up
- Anti-short cycle protection
- High and low pressure cutouts
- Loss of charge
- Water coil freeze detection
- Air coil freeze detection
- Over/under voltage protection
- Condensate overflow sensor
- Load shed
- Dehumidification (where applicable)
- Emergency shutdown
- Hot gas reheat operation (where applicable)
- Diagnostic LED
- Test mode push button switch
- Two auxiliary electric heat outputs
- Alarm output
- Accessory output with N.O. and N.C.
- Modbus communication (primary)
- Modbus communication (secondary)

Air Source Control Features:

- Demand Defrost
- Timed Defrost
- 6-Hour Defrost
- Air Source Mode
- Geo Mode
- Outdoor Coil Temperature Sensor
- Outdoor Ambient Temperature Sensor
- Discharge Line Temperature Sensor
- Discharge Air Temperature Sensor(for Charge Assist)
- Indoor/Outdoor EEV
- Indoor/Outdoor Solenoid Valve
- Charging/Recovery/Evacuation

Field Selectable Options via Hardware

DIP Switch (SW1) – Test/Configuration Button (See SW1 Operation Table)

Test Mode

The control is placed in the test mode by holding the push button switch SW1 for 2 - 5 seconds. In test mode most of the control timings will be shortened by a factor of sixteen (16). LED3 (green) will flash at 1 second on and 1 second off. Additionally, when entering test mode LED1 (red) will flash the last lockout one time. Test mode will automatically time out after 30 minutes. Test mode can be exited by pressing and holding the SW1 button for 2 to 5 seconds or by cycling the power. **NOTE:** Test mode will automatically be exited after 30 minutes.

Variable Speed Indoor ECM Configuration Mode

The control is placed in the ECM configuration mode by holding the pushbutton switch SW1 for 5 to 10 seconds, the high, low, and “G” ECM speeds can be selected by following the LED display lights. LED2 (yellow) will fast flash when entering the ECM configuration. When setting “G” speed LED3 (green) will be continuously lit, for low speed LED1 (red) will be continuously lit, and for high speed both LED3 (green) and LED1 (red) will be continuously lit. During the ECM configuration mode LED2 (yellow) will flash each of the 12 possible blower speeds 3 times. When the desired speed is flashed press SW1, LED2 will fast flash until SW1 is released. “G” speed has now been selected. Next select low speed, and high speed blower selections following the same process above. After third selection has been made, the control will exit the ECM configuration mode. Aux fan speed will remain at default or current setting and requires the AID Tool for adjustment.

The Aurora Control System cont.

Reset Configuration Mode

The control is placed in reset configuration mode by holding the push button switch SW1 for 50 to 60 seconds. This will reset all configuration settings and the EEPROM back to the factory default settings. LED3 (green) will turn off when entering reset configuration mode. Once LED3 (green) turns off, release SW1 and the control will reset.

DIP Switch (SW2)

SW2-1 FP1 Selection – Low water coil temperature limit setting for freeze detection. On = 30°F; Off = 15°F.
SW2-2 FP2 Selection – On = 30°F; Off = N/A
SW2-3 GEO/ASHP Mode - Used to switch between Air Source and Geo Mode depending on field application. On = ASHP (Air Source Mode); Off = GEO (Geo Mode).
SW2-4 and 2-5 Access Relay Operation (P2)

Access Relay Operation	SW2-4	SW2-5
Cycle with Blower	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
Cycle with Comm. T-stat Hum Cmd	OFF	ON

Cycle with Blower - The accessory relay will cycle with the blower output.

Cycle with Compressor - The accessory relay will cycle with the compressor output.

Water Valve Slow Opening - The accessory relay will cycle and delay both the blower and compressor output for 90 seconds.

SW2-6 CC Operation – selection of single or dual capacity compressor. On = Single Stage; Off = Dual Capacity
SW2-7 Lockout and Alarm Outputs (P2) – selection of a continuous or pulsed output for both the LO and ALM Outputs. On = Continuous; Off = Pulsed
SW2-8 *Future Use*

Alarm Jumper Clip Selection

From the factory, ALM is connected to 24 VAC via JW2. By cutting JW2, ALM becomes a dry contact connected to ALG.

Variable Speed Indoor ECM Configuration Mode

The blower speeds can be changed either by using the ECM manual configurations mode method or by using the Aurora AID Tool directly (see Instruction Guide: Aurora Interface and Diagnostics (AID) Tool topic).

Field Selectable Options via Software

(Selectable via the Aurora AID Tool)

Unit Size (Air Source Mode)

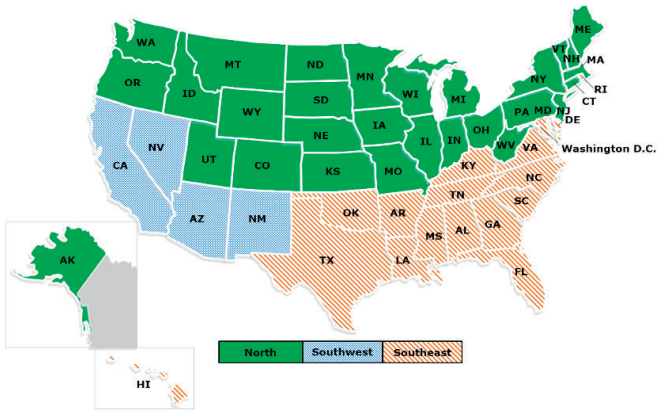
Full Load and Part Load Outdoor Fan speeds for each tonnage can be selected through the AID Tool. Correct Airflow for each system size will be set in the Factory before units are shipped.

Defrost Configuration

Mode - The AID Tool will have both **Timed and On-Demand Defrost options** available. By default, the system will be configured to run Demand Defrost (recommended). At any time, this can be changed to Timed Defrost by simply accessing the Defrost Configuration screen on the AID Tool. It is recommended to make any necessary changes to the Defrost Mode before Unit Startup.

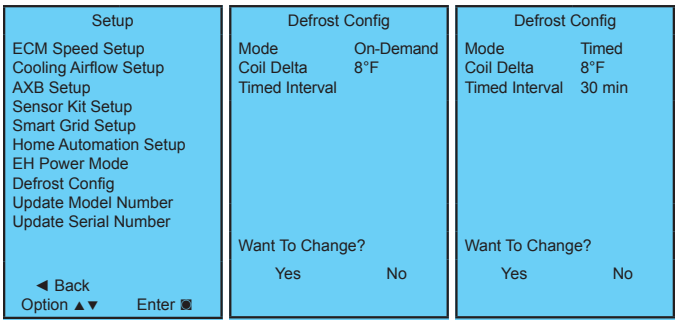
Coil Delta - The Coil Delta is a variable that is utilized to determine the amount of frost on the Outdoor Air Coil and enables accurate Defrost initiation. By default, this value is set to 4°F (recommended) . It can be configured between 4°F - 8°F (at 1°F increments) if needed.

USA Regions	Coil Delta Recommended Settings
Northern Region States	4˚F-7˚F
Southeastern Region States	6˚F-8˚F
Southwestern Region States	8˚F



Timed Interval - This is the interval at which Defrost is initiated in Timed Mode only. By default, this interval is set at 30 minutes, but can be configured to 60 and 90 minutes if needed. It is recommended to only configure this setting if the system requires to run Timed Defrost Mode.

For High Humidity Northern States such as Washington or Oregon, Timed Defrost Mode may be beneficial in keeping up with excessive frost build up on the outdoor coil and allowing efficient heating operation in cold weather.



The Aurora Control System cont.

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, 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 3 seconds. To reset lockout conditions with SW2-8 Off, thermostat inputs "Y1", "Y2", "W", and "DH" must be removed for at least 3 seconds. Lockout may also be reset by turning power off for at least 30 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 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 2 minutes. When the W input is removed, all of the emergency heat outputs will turn off, and the ECM blower will shift to "G" speed and PSC blower motor output will remain on.

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 hard-wired limit switch if an overpressure condition should occur.

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.

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

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.

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.

Freeze Detection (Indoor Air Coil) - uses 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.

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.

Air Source Safety Features

Low Pressure Switch Ignore - this is an Air Source Mode only Feature that is activated during low Ambient Heating Mode. The control shall ignore the LPS Input when the Outdoor Ambient Temperature is <= 17°F. The LPS Input is also ignored during Active Defrost and also 120 seconds following the termination of a Defrost Cycle. This feature ensures continued system operation at low ambient heating conditions.

Low Discharge Gas Temperature - this is an Air Source Mode only Fault Code. This fault code is only active in Heating Mode. This fault is recognized at Outdoor Ambient temperature <= 17°F in Heating Mode and after fifteen minutes of accumulated compressor run time following the exit of a defrost cycle. The low discharge temperature fault could indicate a failed outdoor fan or other things such as the outdoor coil turning too cold during heating operation. The lockout is intended to prevent refrigerant flooding back to the compressor. The discharge sensor must be well insulated and installed properly to prevent nuisance lockouts from occurring. This is a secondary safety feature at low ambient heating conditions to provide system protection when the LPS is ignored.

The Aurora Control System cont.

High Discharge Gas Temperature - this is an Air Source Mode only Fault Code. This fault code is active in both Heating and Cooling Mode. This fault is recognized at discharge gas temperatures of 250°F and above. The control shall lockout after the third occurrence of this fault. A soft reset will clear the fault code counter for High Discharge Gas Temperature.

Operation Description

Power Up - The unit will not operate until all the inputs and safety controls are checked for normal conditions. The unit has a 5 to 80 second random start delay at power up. Then the compressor has a 4 minute anti-short cycle delay after the random start delay.

Standby In standby mode, Y1, Y2, W, DH, and G are not active. Input O may be active. The blower and compressor will be off.

Heating Operation

Heating, 1st Stage (Y1) - The blower is started on "G" speed immediately and the compressor is energized 10 seconds after the Y1 input is received. The ECM blower motor is switched to low speed 15 seconds after the Y1 input.

Heating, 2nd Stage (Y1, Y2) - The compressor will be staged to full capacity 20 seconds after Y2 input is received. The ECM blower will shift to high speed 15 seconds after the Y2 input is received.

Heating, 3rd Stage (Y1, Y2, W) - The hot water pump is de-energized and the first stage of electric heat is energized 10 seconds after the W command is received. If the demand continues the second stage of electric heat will be energized after 5 minutes.

Emergency Heat (W) - The blower will be started on "G" speed, 10 seconds later the first stage of electric heat will be turned on. 5 seconds after the first stage of electric heat is energized the blower will shift to Aux speed. If the emergency heat demand is not satisfied after 2 minutes the second electric heat stage will be energized.

Blower (G) - The blower will start immediately upon receiving a thermostat G command. If there are no other commands from the thermostat the ECM will run on "G" speed until the G command is removed. Regardless of blower input (G) from the thermostat, the blower will remain on for 30 seconds at the end of each heating cycle.

Cooling Operation

In all cooling operations, the reversing valve directly tracks the O input. Thus, anytime the O input is present, the reversing valve will be energized.

Cooling, 1st Stage (Y1, O) - The blower is started on "G" speed immediately and the compressor is energized 10 seconds after the Y1 input is received. The ECM blower motor is switched to low speed 15 seconds after the Y1 input.

Cooling, 2nd Stage (Y1, Y2, O) - The compressor will be staged to full capacity 20 seconds after Y2 input is received. The ECM blower will shift to high speed 15 seconds after the Y2 input is received.

Blower (G) - The blower will start immediately upon receiving a thermostat G command. If there are no other commands from the thermostat the ECM will run on "G" speed until the G command is removed. Regardless of blower input (G) from the thermostat, the blower will remain on for 30 seconds at the end of each heating, cooling, and emergency heat cycle.

Dehumidification (Y1, O, DH or Y1, Y2, O, DH) - When a DH command is received from the thermostat during a compressor call for cooling the ECM blower speed will be reduced by 15% to increase dehumidification.

Emergency Shutdown - Four (4) seconds after a valid ES input, P2-7 is present, all control outputs will be turned off and remain off until the emergency shutdown input is no longer present. The first time that the compressor is started after the control exits the emergency shutdown mode, there will be an anti-short cycle delay followed by a random start delay. Input must be tied to common to activate.

Continuous Blower Operation - The blower output will be energized any time the control has a G input present, unless the control has an emergency shutdown input present. The blower output will be turned off when G input is removed.

Load Shed - The LS input disables all outputs with the exception of the blower output. When the LS input has been cleared, the anti-short cycle timer and random start timer will be initiated. Input must be tied to common to activate.

Defrost Operation (Air Source Mode)

The system utilizes an adaptive Defrost algorithm to sense frost accumulation on the Outdoor Air Coil and initiates defrost cycles accordingly to keep the coil frost free during the heating season. Defrost Operation is equivalent to cooling operation except that the outdoor fan motor is de-energized. Both Demand and Timed Defrost modes will be selectable through the AID Tool, whichever is applicable in the field. By Default, all units will be programmed to run Demand Defrost unless a need for switching to Timed Defrost arises.

Defrost Logic Basic Description

Defrost Monitoring - During normal Heating operation, the outdoor ambient and outdoor coil temperatures are measured for the Defrost Initiation trigger and stored.

Pre Defrost Rampdown (Stage-1) - Once Triggered, compressor is ramped down within 10s.

The Aurora Control System cont.

Pre Defrost Wait – System is shutdown for 10s to shift reversing valve prior to Defrost.

Defrost Cycle Time – Compressor started in cooling full capacity for a minimum of 3 minutes and a maximum of 12 minutes while monitoring outdoor coil temperature for termination logic.

Post Defrost Wait – System is shutdown for 10s to shift reversing valve prior to normal heating.

Clean Coil Calibration – After coil is cleaned, system operates in heating at Full Load for 1 minute to cool coil down and then coil temperature is measured four times 1 min apart to obtain an average clean coil temperature related to current ambient temperature for the next defrost cycle.

End of Cycle – Normal heating is resumed with little time delays. Correct compressor speed is communicated based on mode of operation prior to defrost initiation.

Demand Defrost Initiation

Sacrificial Defrost - In Heating Mode, the system will initiate a Sacrificial Defrost Cycle after the first 30 minutes of accumulated compressor run time if the measured Outdoor Coil Temperature remains at or below 35°F and the Outdoor Ambient Temperature remains at or below 50°F. This is because the system is considered un-calibrated for Defrost during every power cycle after the system starts up in Heating Mode.

Clean Coil Calibration - Once the Sacrificial Defrost has terminated, a clean coil temperature is established by averaging Outdoor Coil Temperature readings once a minute (for 4 minutes).

Defrost Trigger - The Defrost Trigger temperature is the temperature that is calculated right before the beginning of every Defrost Cycle in Demand Mode. For Sacrificial Defrost, the Defrost Trigger Temperature is assigned a default value of 35°F. The Defrost Trigger Temperature varies with changing Outdoor Ambient and Coil Temperature conditions and is also dependent upon stored Clean Coil Temperature readings and a specified Coil Delta Temperature (NOTE: The Coil Delta Temperature is configurable through the AID Tool Defrost Configuration Screen). Therefore, anytime after the compressor accumulated runtime reaches 30 minutes, if the Outdoor Coil Temperature is measured to be equal to or less than the Defrost Trigger Temperature, then a Defrost Cycle is initiated (provided the measured Outdoor Ambient Temperature is still less than or equal to 50°F).

NOTE: Look at Figure-xx Demand Defrost Example for how the cycle is initiated and terminated.

Timed Defrost Initiation

In Timed Defrost Mode, the system does not go through Clean Coil Calibration and is therefore unable to detect the amount of frost on the Outdoor Air Coil. It is only dependent upon a specified Outdoor Coil Temperature of 35°F and accumulated compressor run time of 30/60/90 minutes (NOTE: The timed intervals of 30/60/90 minutes are selectable through the AID Tool Defrost Configuration Screen). If the system is configured for 30 Minute Timed Defrost Mode, then during heating operation, if the accumulated compressor runtime reaches 30 minutes and the Outdoor Coil Temperature is measured to be less than or equal to 35°F, then a Defrost Cycle is initiated.

Defrost Initiation Sequence

Following is a step by step outline of the Defrost Initiation sequence:

Step-1 Begin ignoring Low Pressure Switch;
Ramp Compressor speed down to OFF (within 10s)

Step-2 Ramp the Outdoor Fan down to OFF (within 5s);
Ramp the Indoor Blower down to OFF (within 5s)

Step-3 Wait 5s

Step-4 Begin “Defrost Cycle Timer”; Ramp up Compressor to Full Speed; Energize Reversing Valve; Ramp Indoor Blower up to Full Speed; Turn ON Auxiliary Heat (EH-1)

Step-5 Wait 1 minute. Turn ON Auxiliary Heat (EH-2)

Step-6 Active Defrost Cycle

Defrost Termination Sequence

Defrost is terminated if any of the following conditions are satisfied:

1. If the Outdoor Coil Temperature is measured to be equal to or above the Defrost Terminate Coil Temperature (this has a maximum value of 50°F and a minimum value of 37°F).
2. After 12 minutes of operation in Defrost Mode.
3. If call for Heating is removed during an Active Defrost Cycle, defrost is terminated and the Defrost Cycle timer is paused. When the control receives another call for heating, the system shall continue the Defrost Cycle from the point where the Defrost Cycle timer was paused.

The control shall do the following to terminate a defrost cycle:

The Aurora Control System cont.

Step-7 Ramp down compressor to OFF; Wait 10s

Step-8 Turn OFF Auxiliary Heat (EH-1 & EH-2); Wait 5 seconds. De-energize Reversing Valve;

Step-9 Wait 5 seconds

Step-10 Ramp up compressor to Full Speed; Ramp up Outdoor Fan to Full Speed;

Step 11-14 Take 4 readings of the Coil Temp at one reading per minute (t1, t2, t3, t4)

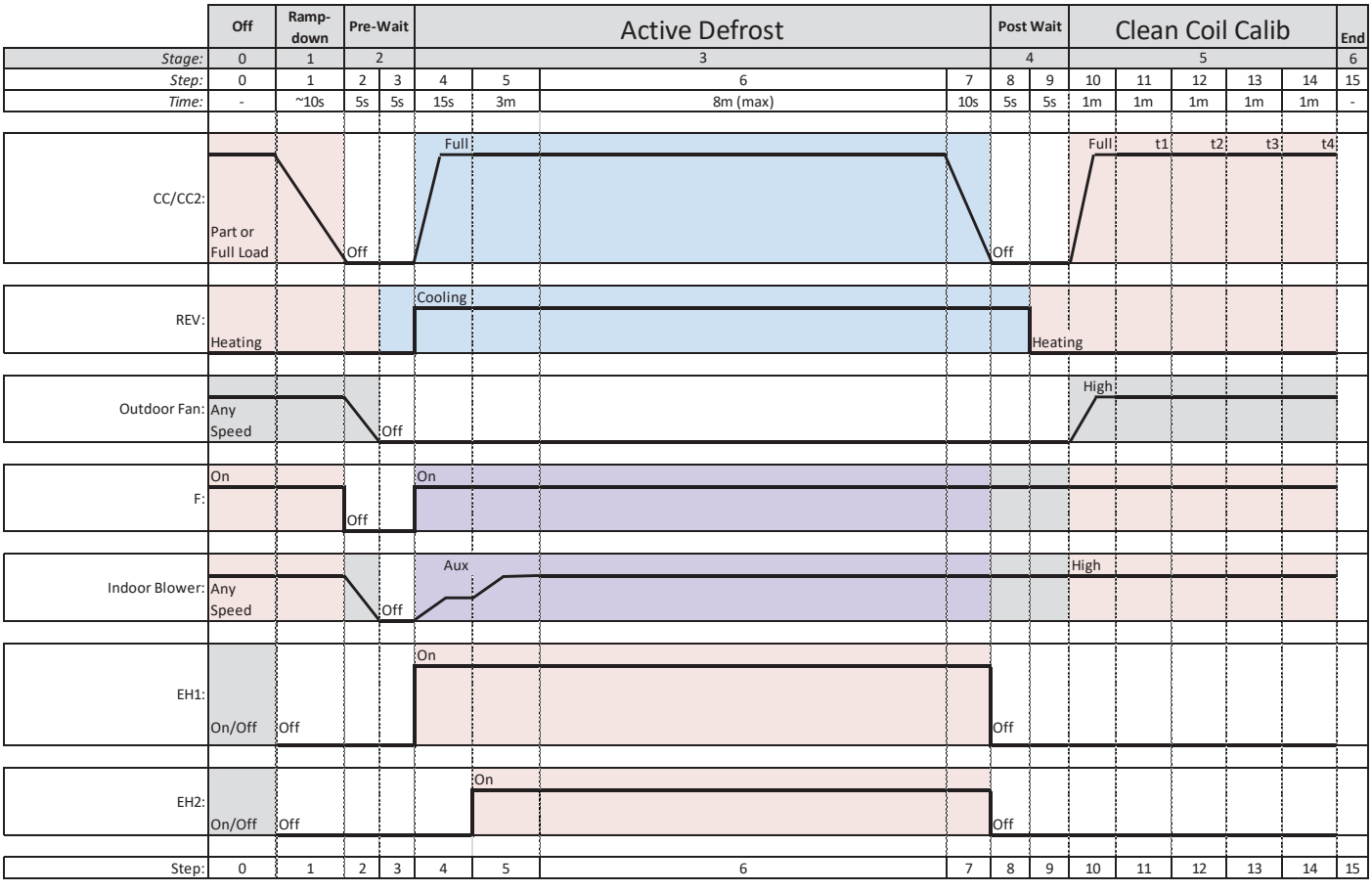
Step-15 Communicate proper speed of compressor after calibration is completed; Reset and restart accumulated compressor runtime. Ignore Low Pressure Switch (start 120s timer for LPS Ignore time)

6-Hour Defrost

Should 6 hours of "Accumulated Compressor Run Time" in Heating elapse without a Defrost Cycle AND the Outdoor Ambient Temperature is <= 50°F (for 1 continuous minute), a Defrost Cycle will be initiated immediately. This forced defrost shall be terminated after 6 minutes if the Outdoor Coil Temperature is greater than or equal to the Defrost Terminate Coil Temperature (NOTE: In Timed Mode, this value is specified at 50°F). The purpose of this 6-Hour Defrost is to allow oil return to the compressor at lower operating temperatures. The compressor shall run Full Stage during the Defrost Cycle. However, if the Outdoor Coil Temperature goes above the Defrost Terminate Coil Temperature, 3 minutes after the 6hr mark, then the system shall terminate Defrost normally per the Defrost Termination Logic. This event shall occur if the Outdoor Coil Temperature is greater than the Defrost Trigger Coil Temperature (NOTE: In Timed Mode, this value is specified at 35°F) for 6 hours of "Accumulated Compressor Run Time" in Heating.

NOTE: Look at Figure-18 Six Hour Defrost Example (Demand) and Figure-19 Six Hour Defrost Example (Timed) for how the cycle is initiated and terminated.

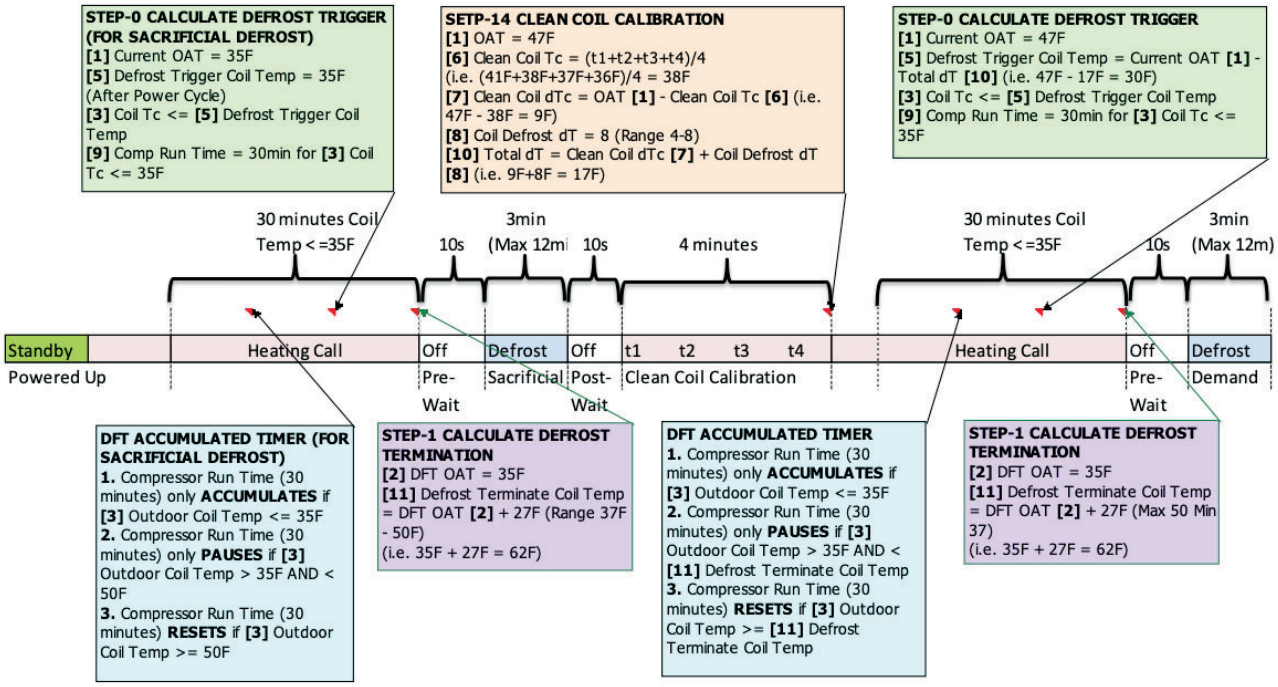
Dual Capacity Demand Defrost Logic



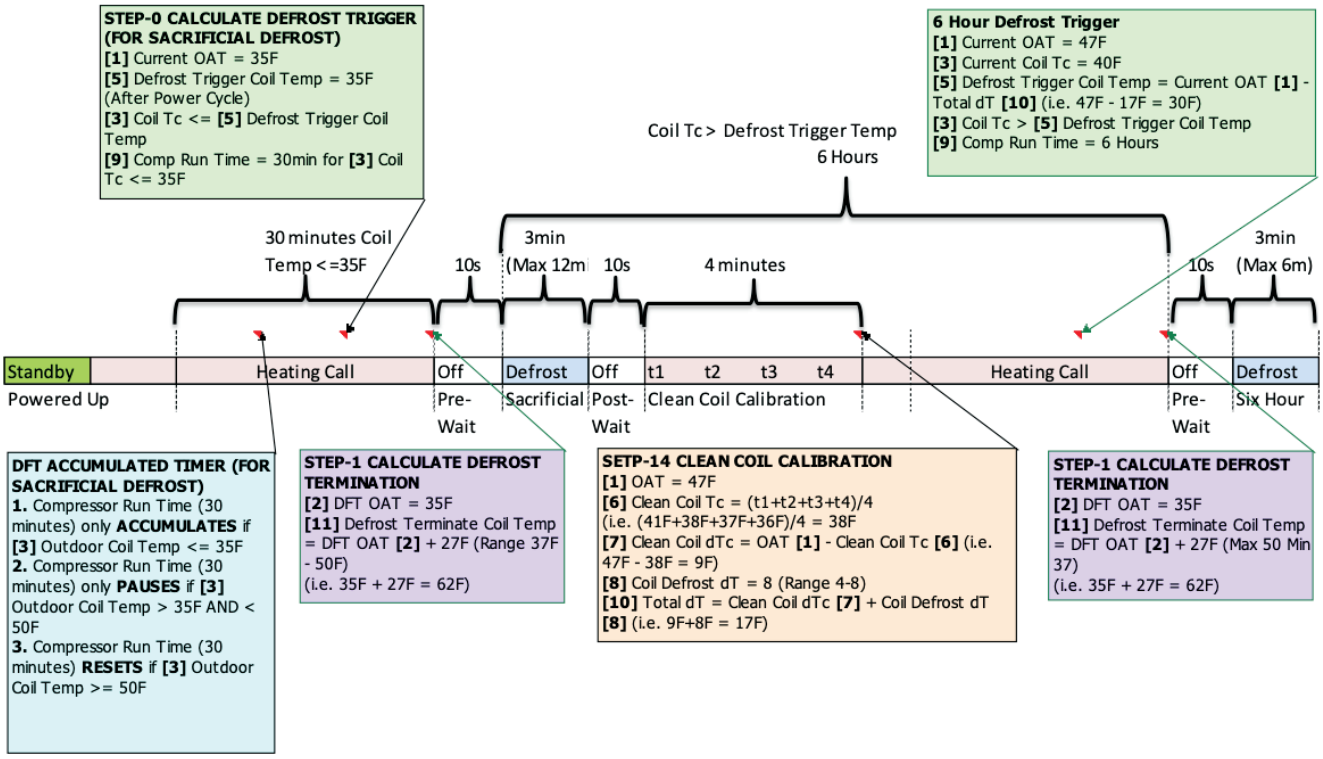
NOTE: For 6-Hr Defrost, Step-5 = 3 minutes and Step-6 = 3 minutes.

The Aurora Control System cont.

Demand Defrost Example (Figure 18)

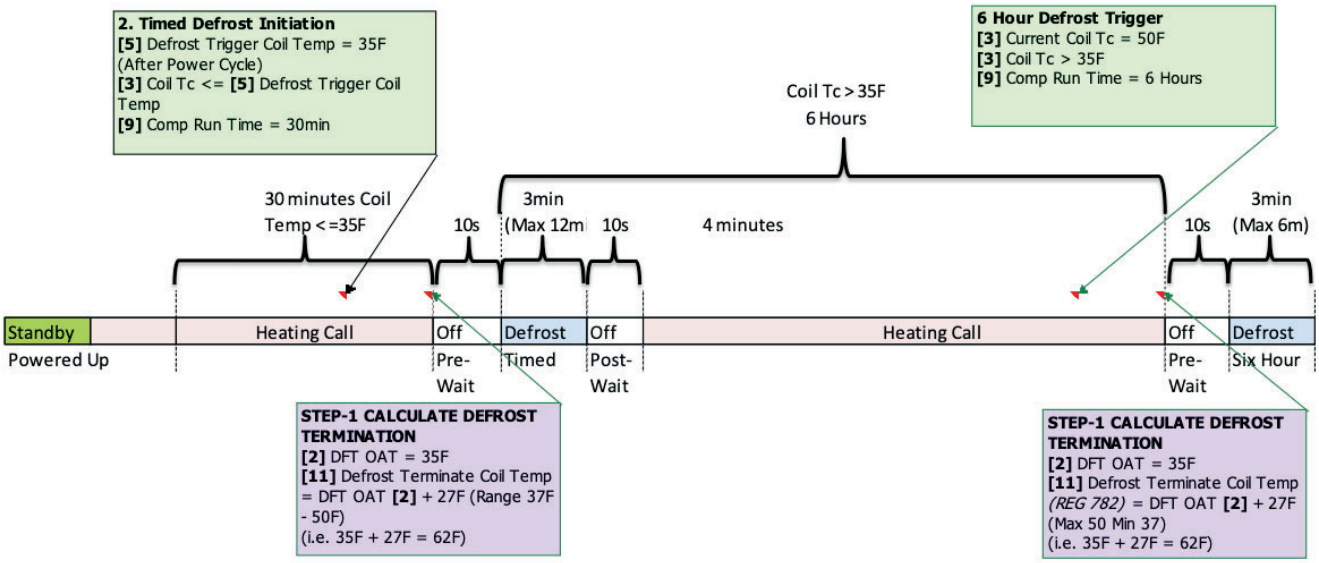


Six Hour Defrost Example (Demand) (Figure 19)



The Aurora Control System cont.

Six Hour Defrost Example (Timed)



The Aurora Control System cont.

Aurora 'Base' Control LED Displays

These three LEDs display the status, configuration, and fault codes for the control. These can also be read in plain English via the Aurora 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
(Future Use)	Flash Code 3
(Future Use)	Flash Code 4
Load Shed	Flash Code 5
ESD	Flash Code 6
(Future Use)	Flash Code 7

Configuration LED (LED2, Yellow)

Description of Operation	Configuration LED, Yellow
No Software Overwritten	Flashing ECM Setting
DIP Switch was Overwritten	Slow Flash
ECM Configuration Mode	Fast Flash

Fault LED (LED1, Red)

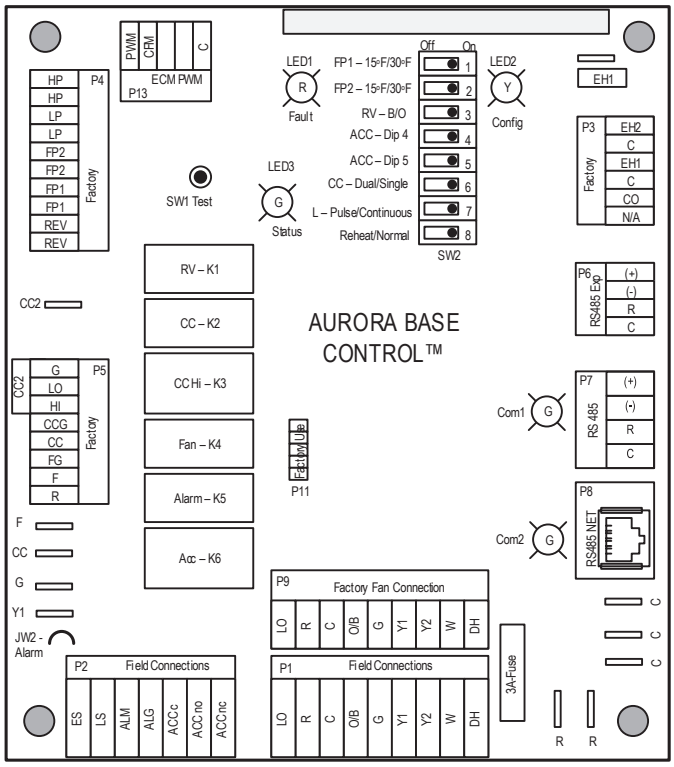
	Red Fault LED	LED Flash Code*	Lockout	Reset/ Remove
ABC Basic Faults	Normal - No Faults	OFF	–	
	Fault - Input	1	No	Auto
	Fault - High Pressure	2	Yes	Hard or Soft
	Fault - Low Pressure	3	Yes	Hard or Soft
	Fault - Freeze Detection FP2	4	Yes	Hard or Soft
	Fault - Freeze Detection FP1	5	Yes	Hard or Soft
	Fault - Condensate Overflow	7	Yes	Hard or Soft
	Fault - Over/Under Voltage	8	No	Auto
	Fault - FP1 Sensor Error	11	Yes	Hard or Soft
	Fault - CritComErr	19	NO	Auto

NOTE: All codes >11 use long flash for tens digit and short flash for the ones digit. 20, 30, 40, 50, etc. are skipped.

Aurora Interface and Diagnostics (AID) Tool

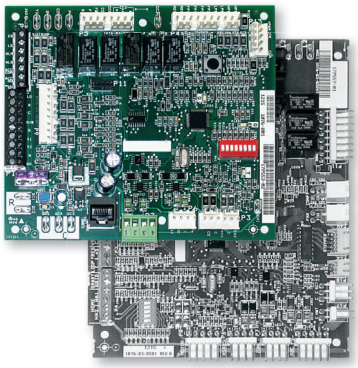
The Aurora Interface and Diagnostics (AID) Tool is a device that is a member of the Aurora network. The AID Tool is used to troubleshoot equipment which uses the Aurora control via Modbus RTU communication. The AID Tool provides diagnostics, fault management, variable speed ECM setup, and system configuration capabilities to the Aurora family of controls. An AID Tool is required, for ECM airflow settings and for setting the correct Unit Size in Air Source Mode. The AID Tool simply plugs into the exterior of the cabinet in the AID Tool port.

ABC Control Board Layout



The Aurora Control System cont.

Aurora 'Advanced' Control Features



The Aurora 'Advanced' Control system expands on the capability of the Aurora 'Base' Control (ABC) by adding the Aurora Expansion Board (AXB). All of the preceding features of the Aurora 'Base' Control are included. The following control description is of the additional features and capability of the Aurora advanced control.

It is highly recommended the installing/servicing contractor obtain an Aurora Interface and Diagnostic Tool (AID) and specialized training before attempting to install or service an Aurora 'Advanced' control system.

The additional AXB features include the following:

AXB DIP Switch

DIP 1 - ID: This is the AXB ModBus ID and should always read On.

DIP 2 & 3 - Future Use

DIP 4 & 5 - Accessory Relay2: A second, DIP configurable, accessory relay is provided that can be cycled with the compressor 1 or 2 , blower, or the Dehumidifier (DH) input. This is to complement the Accessory 1 Relay on the ABC board.

Position	DIP 4	DIP 5	Description
1	ON	ON	Cycles with Fan or ECM (or G)
2	OFF	ON	Cycles with CC1 first stage of compressor or compressor spd 1-6
3	ON	OFF	Cycles with CC2 second stage of compressor or compressor spd 7-12
4	OFF	OFF	Cycles with DH input from ABC board

Advanced Hot Water Generator Control (Domestic Hot Water Option)

The Advanced features an AID Tool selectable temperature limit and microprocessor control of the process. This will maximize hot water generation and prevent undesirable energy use. An alert will occur when the hot water input temperature is at or above setpoint (100°F - 140°F) for 30 continuous seconds (130°F is the default setting). This alert will appear as an E15 on the AID Tool and the hot water pump de-energizes. Hot water pump operations resume on the next compressor cycle or after 15 minutes of continuous compressor operation during the current thermostat demand cycle. Since compressor hot gas temperature is dependent on loop temperature in cooling mode, loop temperatures may be too low to allow proper heating of water. The control will monitor water and refrigerant temperatures to determine if conditions are satisfactory for heating water. LED1 (red LED) will flash code 15 when the DHW limit is reached and when conditions are not favorable for water heating. Error code 15 will also be displayed on the AID Tool in the fault screen. This flash code is a noncritical alert and does not necessarily indicate a problem.

Compressor Monitoring

The AXB includes two current transducers to monitor the compressor current and starting characteristics. Open circuits or welded contactor faults will be detected. A fault will produce an E10 code.

Indoor Solenoid Valve

The DIV output on the AXB controls the indoor Solenoid Valve, so that it opens and closes with the compressor ON and OFF cycle. The solenoid valve holds refrigerant pressure within the system during compressor off-cycles. This reduces the amount of work done by the compressor during instances where the system might short-cycle in the field and enables the system to reach steady-state capacity sooner during compressor ON cycles.

IntelliZone2 Zoning Compatibility (Optional IntelliZone2 Communicating Zoning)

A dedicated input to connect and communicate with the IntelliZone2 (IZ2) zoning system is provided on P7 on the AXB. The is a dedicated communication port using a proprietary ModBus protocol. An AXB is required. Consult the IntelliZone2 literature for more information.

Water Quality

It is the responsibility of the system designer and installing contractor to ensure that acceptable water quality is present and that all applicable codes have been met in these installations. Failure to adhere to the guidelines in the water quality table could result in loss of warranty. In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, a closed loop system is recommended. The heat exchanger coils in ground water systems may, over a period of time, lose heat exchange capabilities due to a buildup of mineral deposits inside. These can be cleaned, but only by a qualified service mechanic, as special solutions and pumping equipment are required. Hot water generator coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional flushing.

Units with cupronickel heat exchangers are recommended for open loop applications due to the increased resistance to build-up and corrosion, along with reduced wear caused by acid cleaning. Failure to adhere to the guidelines in the water quality table could result in the loss of warranty.

Water Treatment

Do not use untreated or improperly treated water. Equipment damage may occur. The use of improperly treated or untreated water in this equipment may result in scaling, erosion, corrosion, algae or slime. Purchase of a pre-mix antifreeze could significantly improve system reliability if the water quality is controlled and there are additives in the mixture to inhibit corrosion. There are many examples of such fluids on the market today such as Environol™ 1000 (pre-mix ethanol), and others. The services of a qualified water treatment specialist should be engaged to determine what treatment, if any, is required. The product warranty specifically excludes liability for corrosion, erosion or deterioration of equipment. The heat exchangers and water lines in the units are copper or cupronickel tube. There may be other materials in the buildings piping system that the designer may need to take into consideration when deciding the parameters of the water quality. If antifreeze or water treatment solution is to be used, the designer should confirm it does not have a detrimental effect on the materials in the system.

Contaminated Water

In applications where the water quality cannot be held to prescribed limits, the use of a secondary or intermediate heat exchanger is recommended to separate the unit from the contaminated water. The table above outlines the water quality guidelines for unit heat exchangers. If these conditions are exceeded, a secondary heat exchanger is required. Failure to supply a secondary heat exchanger where needed will result in a warranty exclusion for primary heat exchanger corrosion or failure.

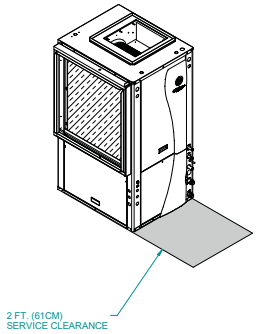
Material		Copper	90/10 Cupronickel	316 Stainless Steel
pH	**Acidity/Alkalinity**	7 - 9	7 - 9	7 - 9
Scaling	Calcium and Magnesium Carbonate	(Total Hardness) less than 350 ppm	(Total Hardness) less than 350 ppm	(Total Hardness) less than 350 ppm
Corrosion	Hydrogen Sulfide	Less than 0.5 ppm (rotten egg smell appears at 0.5 ppm)	10 - 50 ppm	Less than 1 ppm
	Sulfates	Less than 125 ppm	Less than 125 ppm	Less than 200 ppm
	Chlorine	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Chlorides	Less than 20 ppm	Less than 125 ppm	Less than 300 ppm
	Carbon Dioxide	Less than 50 ppm	10 - 50 ppm	10 - 50 ppm
	Ammonia	Less than 2 ppm	Less than 2 ppm	Less than 20 ppm
	Ammonia Chloride	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonia Nitrate	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonia Hydroxide	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Ammonia Sulfate	Less than 0.5 ppm	Less than 0.5 ppm	Less than 0.5 ppm
	Total Dissolved Solids (TDS)	Less than 1000 ppm	1000 - 1500 ppm	1000 - 1500 ppm
	LSI Index	+0.5 to -0.5	+0.5 to -0.5	+0.5 to -0.5
Iron Fouling (Biological Growth)	Iron, FE^{2}+ (Ferrous) Bacterial Iron Potential	< 0.2 ppm	< 0.2 ppm	< 0.2 ppm
	Iron Oxide	Less than 1 ppm, above this level deposition will occur	Less than 1 ppm, above this level deposition will occur	Less than 1 ppm, above this level deposition will occur
Erosion	Suspended Solids	Less than 10 ppm and filtered for max. of 600 micron size	Less than 10 ppm and filtered for max. of 600 micron size	Less than 10 ppm and filtered for max. of 600 micron size
	Threshold Velocity (Fresh Water)	< 6 ft/sec	< 6 ft/sec	< 6 ft/sec

NOTES: Grains = ppm divided by 17
mg/L is equivalent to ppm

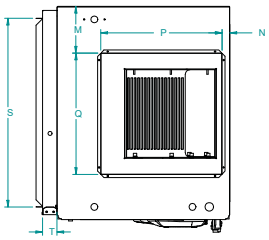
2/22/12

Vertical Dimensional Data

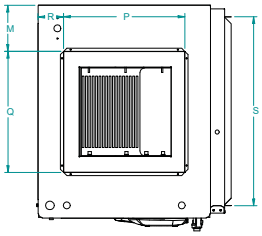
Top Air Discharge



TOP

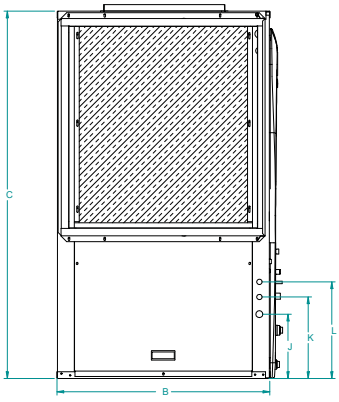


TOP

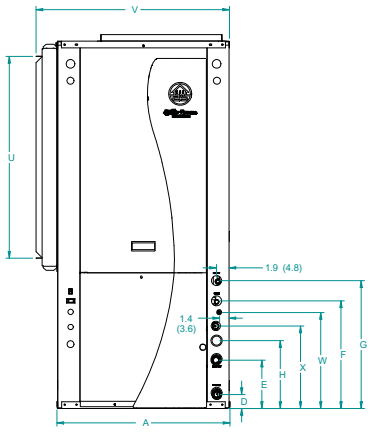


LEFT RETURN

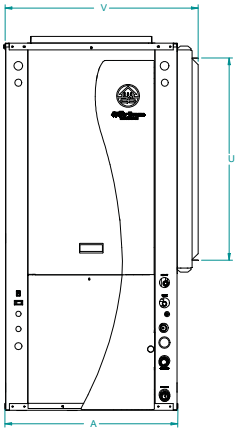
RIGHT RETURN



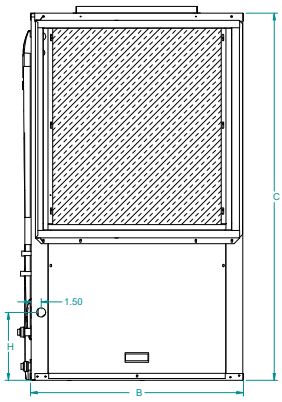
LEFT



FRONT



FRONT



RIGHT

Vertical Top Flow		Overal Cabinet			Water Connections							Electrical Connections			Discharge Connection					Return Connection				Refrigerant Connections (O.d.)		
		A	B	C	D	E	F	G	H	LOOP WATER FPT	HWG SWEAT (I.D.)	J	K	L	duct flanges installed ± .01"					using std deluxe filter rack (± 0.10 IN)						
		Width	Depth	Height	Loop In	Loop Out	HWG In	HWG Out	Conden-sate			3/4" K.O. Power Supply	1/2" K.O. Ext. Pump	1/2" K.O. Low Voltage	M	N	P Supply Width	Q Supply Depth	R	S Return Width	T Return Depth	U Return Height	V	W 3/8"	X 3/4"	X 7/8"
038	in.	25.7	31.6	50.4	2.3	7.2	16.0	19.0	9.8	1" Swivel	1/2" Female	9.5	12.1	14.3	6.9	1.1	18.0	18.0	3.8	28.0	2.2	30.0	28.6	14.2	12.2	N/A
	cm.	65.3	80.3	128.0	5.8	18.3	40.6	48.3	24.9			24.1	30.7	36.3	17.5	2.8	45.7	45.7	9.7	71.1	5.6	76.2	72.6	36.1	31.0	N/A
049	in.	25.7	31.6	54.5	2.3	7.2	16.0	19.0	10.6	1" Swivel	1/2" Female	9.5	12.1	14.3	6.9	1.1	18.0	18.0	3.8	28.0	2.2	30.0	28.6	14.2	N/A	12.2
	cm.	65.3	80.3	138.4	5.8	18.3	40.6	48.3	26.9			24.1	30.7	36.3	17.5	2.8	45.7	45.7	9.7	71.1	5.6	76.2	72.6	36.1	N/A	31.0
064	in.	25.7	31.6	58.4	2.3	7.2	16.0	19.0	10.6	1" Swivel	1/2" Female	9.5	12.1	14.3	6.9	1.1	18.0	18.0	3.8	28.0	2.2	34.0	28.6	14.2	N/A	12.2
	cm.	65.3	80.3	148.3	5.8	18.3	40.6	48.3	26.9			24.1	30.7	36.3	17.5	2.8	45.7	45.7	9.7	71.1	5.6	86.4	72.6	36.1	N/A	31.0

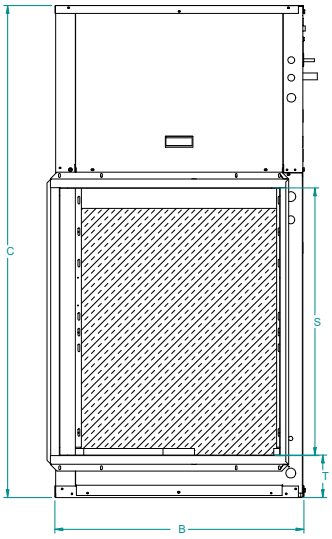
Condensate is 3/4" PVC female glue socket and is switchable from side to front
Unit shipped with deluxe 2" (field adjustable to 1") duct collar/filter rack extending from unit 3.25" and is suitable for duct connection.
Discharge flange is field installed and extends 1" [25.4mm] from cabinet
Decorative molding and/or water connections extend 1.2" [30.5mm] beyond front of cabinet.
Top panel has 1.375 and 1.125 knockouts for electrical connections

10/24/22

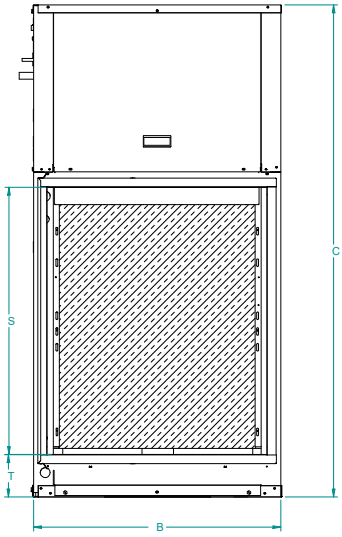
Vertical Dimensional Data cont.

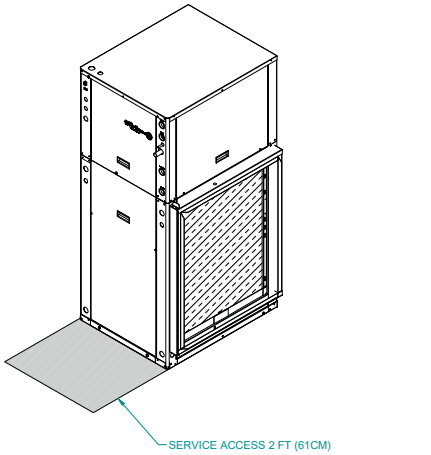
Bottom Air Discharge

LEFT RETURN

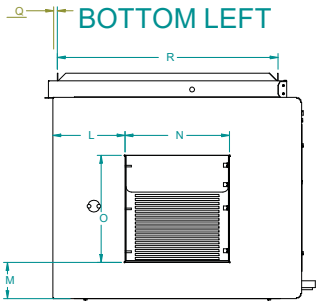


RIGHT RETURN



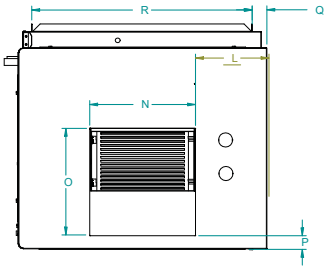


BOTTOM LEFT

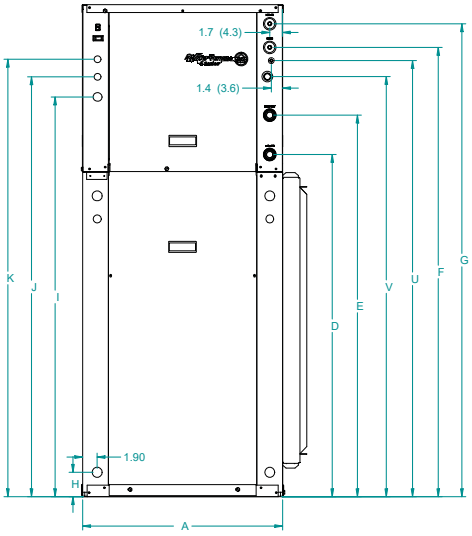


LEFT BOTTOM DISCHARGE
FLOOR FOOT PRINT

BOTTOM RIGHT



RIGHT BOTTOM DISCHARGE
FLOOR FOOT PRINT



FRONT

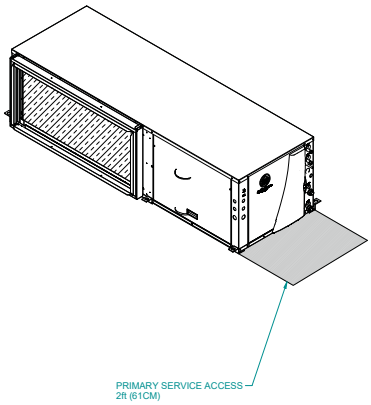
Bottomflow Models		Overall Cabinet			Water Connections							Electrical Knockouts			Discharge Connection					Return Connection					REFRIGERANT CONNECTIONS (O.D.)		
					1	2	3	4	5			I 3/4" cond	J 1/2" cond	K 1/2" cond	duct flange installed (±0.10 in)					using std deluxe filter rack (±0.10 in)							
		A	B	C	D	E	F	G	H						L	M	N	O	P	Q	R	S	T	U	V	W
		Width	Depth	Height	In	Out	HWG In	HWG Out	Conden-sate	Loop Water FPT	HWG Sweat (I.D.)	Power Supply	Ext Pump	Low Votage			Supply Width	Supply Depth			Return Depth	Return Height		3/8"	3/4"	7/8"
038	in.	25.5	31.5	62.5	43.4	48.4	57.0	60.0	3.1	1" Swivel	1/2" female	50.8	53.3	55.6	9.1	4.8	13.4	13.6	1.5	1.9	28.1	34.0	5.6	55.4	53.4	N/A
	cm.	64.8	80.0	158.8	110.2	122.9	144.8	152.4	7.9			129.0	135.4	141.2	23.1	12.2	34.0	34.5	3.8	4.8	71.4	86.4	14.2	140.7	135.6	N/A
049-064	in.	25.5	31.5	62.5	43.4	48.4	57.0	60.0	3.1	1" Swivel	1/2" female	50.8	53.3	55.6	9.1	4.8	13.4	13.6	1.5	1.9	28.1	34.0	5.6	55.4	N/A	53.4
	cm.	64.8	80.0	158.8	110.2	122.9	144.8	152.4	7.9			129.0	135.4	141.2	23.1	12.2	34.0	34.5	3.8	4.8	71.4	86.4	14.2	140.7	N/A	135.6

Condensate is 3/4" PVC female glue socket and is switchable from side to front
Vertical bottomflow unit shipped with deluxe 2" (field adjustable to 1") duct collar/filter rack extending from unit 3.25" and is suitable for duct connection.
Decorative molding and water connections extend 1.2" (30.5mm) beyond front of cabinet.

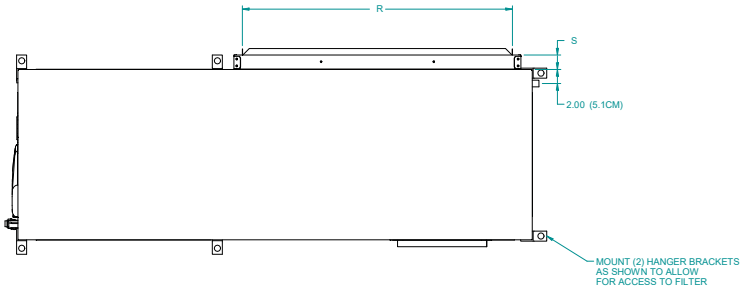
10/24/2022

Horizontal Dimensional Data

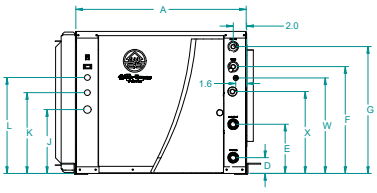
GEO-READY HORIZONTAL SUBMITTAL



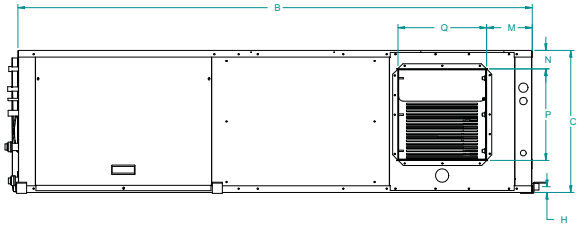
TOP VIEW



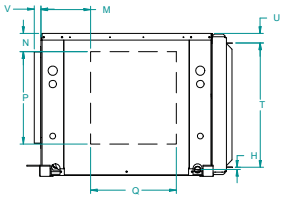
FRONT VIEW



SIDE DISCHARGE VIEW



END VIEW

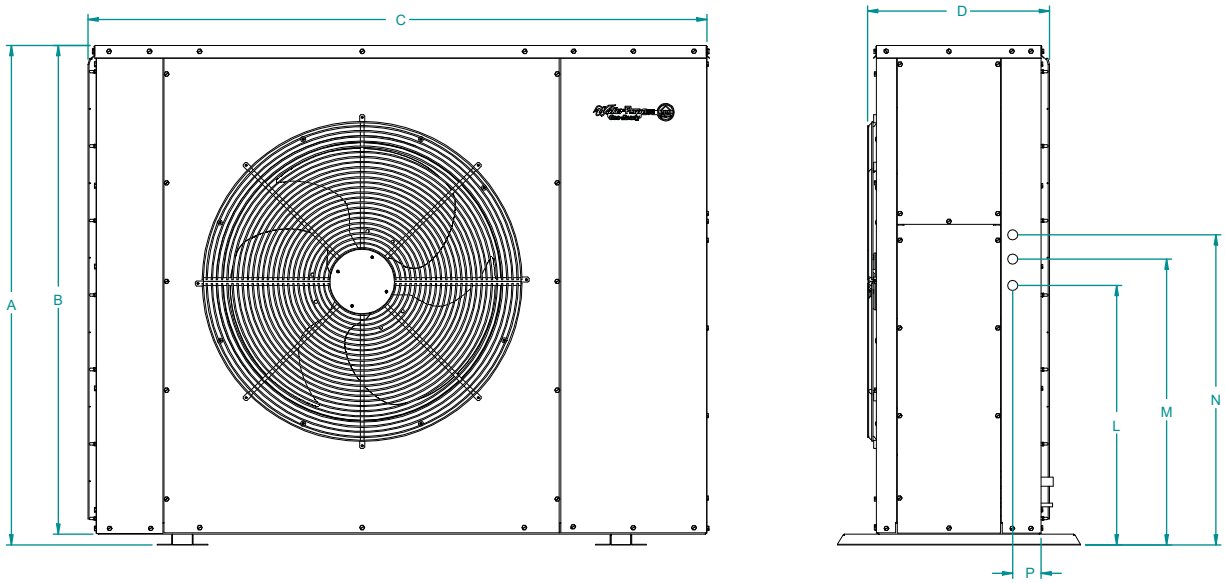


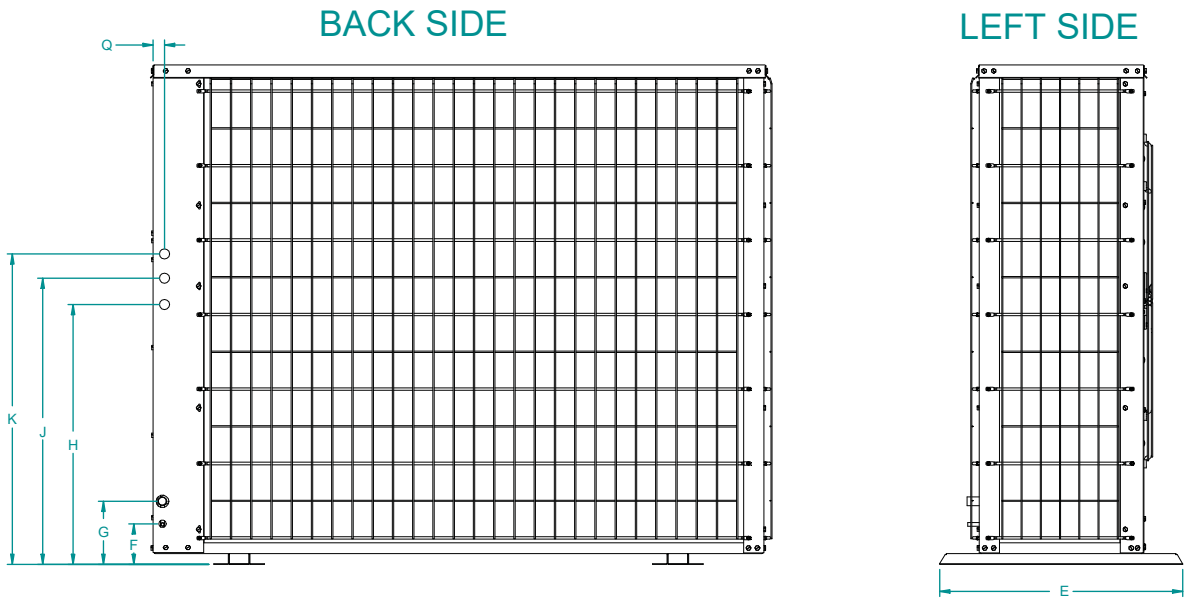
Horizontal Models		Overall Cabinet			Water Connections							Electrical Connections			Discharge Connection					Return Connection				Refrigerant Connections (O.d.)		
												J	K	L	duct flanges installed ± .01"					using std deluxe filter rack ± .01"						
		A	B	C	D	E	F	G	H	LOOP WATER FPT	HWG SWEAT (I.D.)	3/4" K.O.	1/2" K.O.	1/2" K.O.	M	N	P	Q	R	S	T	U	V	W	X	Y
		Width	Depth	Height	Loop In	Loop Out	HWG In	HWG Out	Conden-sate			Power Sup-ply	Ext. Pump	Low Voltage			Supply Width	Supply Depth		Return Width	Return Depth	Return Height		3/8"	3/4"	7/8"
038	in.	25.6	72.0	21.3	2.3	7.2	16.0	19.0	0.1	1"	1/2"	9.5	12.1	14.3	6.9	2.8	13.7	13.2	1.0	35.4	2.2	18.7	1.4	14.2	12.2	N/A
	cm.	65.0	182.9	54.1	5.8	18.3	40.6	48.3	0.2	Swivel	Female	24.1	30.7	36.3	17.5	7.1	34.8	33.5	2.5	89.9	5.6	47.5	3.6	36.1	31.0	N/A
049	in.	25.6	77.0	21.3	2.3	7.2	16.0	19.0	0.9	1"	1/2"	9.5	12.1	14.3	6.9	2.8	13.7	13.2	1.0	40.4	2.2	18.7	1.4	14.2	N/A	12.2
	cm.	65.0	195.6	54.1	5.8	18.3	40.6	48.3	2.3	Swivel	Female	24.1	30.7	36.3	17.5	7.1	34.8	33.5	2.5	102.6	5.6	47.5	3.6	36.1	N/A	31.0
064	in.	25.6	82.0	21.3	2.3	7.2	16.0	19.0	0.9	1"	1/2"	9.5	12.1	14.3	6.9	2.8	13.7	13.2	1.0	45.4	2.2	18.7	1.4	14.2	N/A	12.2
	cm.	65.0	208.3	54.1	5.8	18.3	40.6	48.3	2.3	Swivel	Female	24.1	30.7	36.3	17.5	7.1	34.8	33.5	2.5	115.3	5.6	47.5	3.6	36.1	N/A	31.0

Condensate is 3/4" PVC tube. 10/24/22
Unit shipped with deluxe 2" (field adjustable to 1") duct collar/filter rack extending from unit 3.25" and is suitable for duct connection.
Discharge flange is field installed and extends 1" [25.4mm] from cabinet
Decorative molding and/or water connections extend 1.2" [30.5mm] beyond front of cabinet.

038-064 MODEL		Q	P
Right Return End Discharge	in	2.8	4.6
	cm	7.1	11.8
Right Return Side Discharge	in	4.9	6.9
	cm	12.4	17.5
Left Return End Discharge	in	4.9	7.6
	cm	12.4	19.4
Left Return Side Discharge	in	2.8	6.9
	cm	7.1	17.5

Geo-Ready Dimensional Data



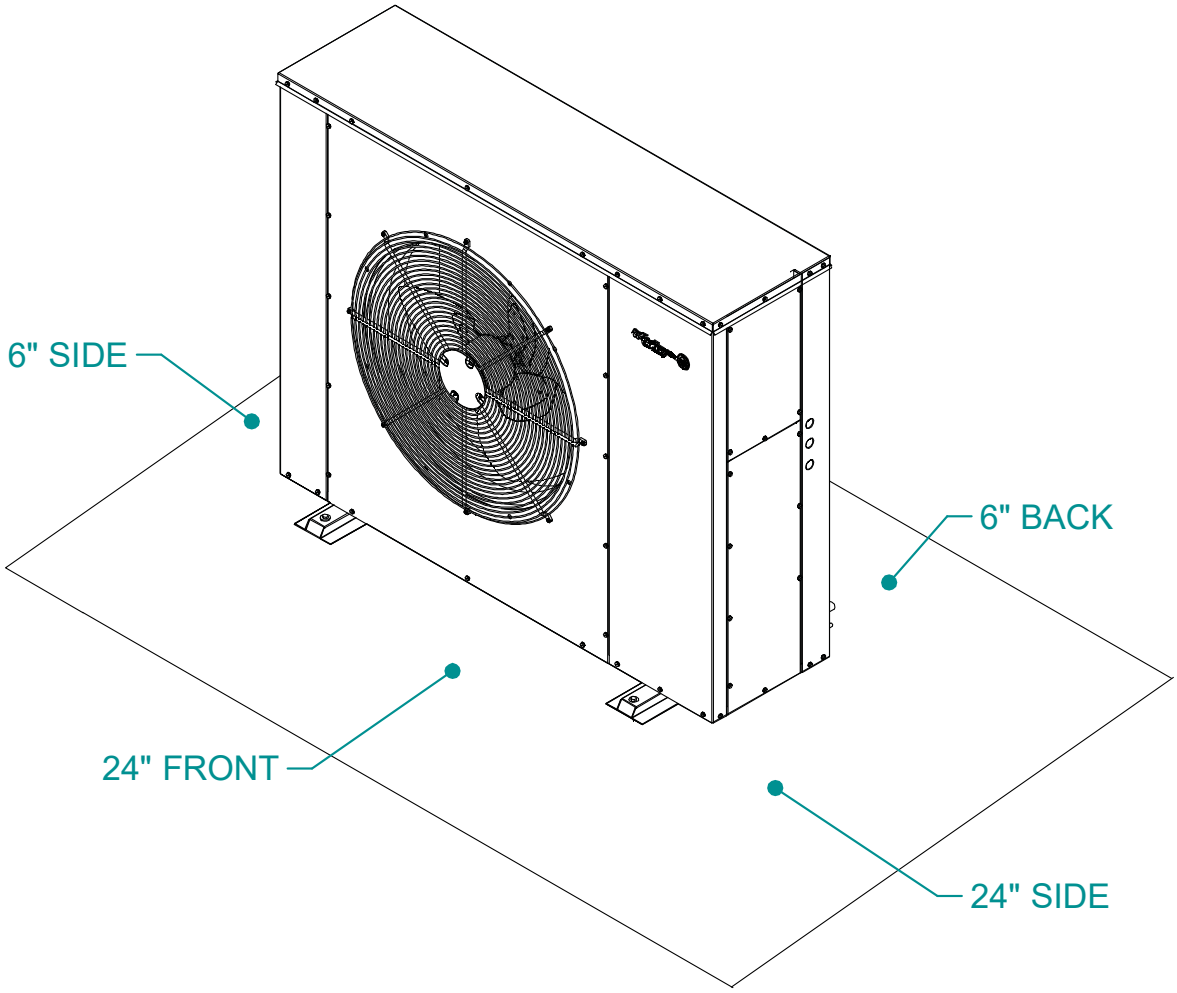


GEO-READY OUTDOOR UNIT

Models		Height	Height w/ Bracket	Width	Depth	Depth w/ Bracket	Service Valve Connections		KNOCK OUT	KNOCK OUT	KNOCK OUT	KNOCK OUT	KNOCK OUT	KNOCK OUT	KNOCK OUT	KNOCK OUT
							Liquid	Gas	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"	1 1/8"
		A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
038-064	in.	48.25	49.30	61.10	18.00	24.00	4.00	6.20	25.70	28.30	30.70	25.70	28.30	30.70	2.80	1.10
	cm.	122.50	125.20	155.50	45.70	61.00	10.20	15.75	65.30	71.90	78.00	65.30	71.90	78.00	7.10	2.80
049-064	in.	48.25	49.30	61.10	18.00	24.00	4.00	6.20	25.70	28.30	30.70	25.70	28.30	30.70	2.80	1.10
	cm.	122.50	125.20	155.50	45.70	61.00	10.20	15.75	65.30	71.90	78.00	65.30	71.90	78.00	7.10	2.80

10.24.2022

Geo-Ready Service Clearance



Physical Data

Model		038	049	064
Compressor (1 each)				
Indoor Factory Charge R410a, oz [kg] (Aluminum tube and fin air coil)	Vertical	76 [2.15]	93 [2.64]	86 [2.44]
Indoor Factory Charge R410a, oz [kg] (Aluminum tube and fin air coil)	Horizontal	70 [1.98]	91 [2.58]	100 [2.83]
ECM Blower Motor & Blower				
Blower Motor Type/Speeds	VS ECM			
Blower Motor- hp [W]	VS ECM	1/2 [373]	1/2 [373]	1 [746]
High Static Blower Motor - hp [W]	VS ECM	1 [746]	1 [746]	n/a
Blower Wheel Size (Dia x W), in. [mm]	VS ECM	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
High Static Blower Wheel Size - [Dia. x W], in. [mm]	VS ECM	11 x 10 [279 x 254]	11 x 10 [279 x 254]	n/a
Coax and Water Piping				
Water Connections Size - Swivel - in [mm]		1" [25.4]	1" [25.4]	1" [25.4]
HWG Connection Size - Female Sweat I.D. - in [mm]		1/2" [12.7]	1/2" [12.7]	1/2" [12.7]
Coax & Piping Water Volume - gal [l]		1.3 [4.9]	1.6 [6.1]	1.6 [6.1]
Indoor Vertical				
Air Coil Dimensions (H x W), in. [mm]		28 x 25 [711 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]
Air Coil Total Face Area, ft2 [m2]		4.9 [0.451]	5.6 [0.570]	6.3 [0.641]
Air Coil Tube Size, in [mm]		3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows		3	3	4
Filter Standard - 2" [51mm] Pleated MERV11 Throwaway, in [mm]		28 x 30 [712 x 762]	32 x 30 [813 x 762]	36 x 30 [914 x 762]
Weight - Operating, lb [kg]		358 [162]	408 [185]	453 [205]
Weight - Packaged, lb [kg]		378 [172]	428 [194]	473 [215]
Indoor Horizontal				
Air Coil Dimensions (H x W), in. [mm]		20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]
Air Coil Total Face Area, ft2 [m2]		4.9 [0.451]	5.6 [0.570]	6.3 [0.641]
Air Coil Tube Size, in [mm]		3/8 [9.5]	3/8 [9.5]	3/8 [9.5]
Air Coil Number of rows		3	3	4
Filter Standard - 2" [51mm] Pleated MERV11 Throwaway, in [mm]		1 - 20 x 37 [686 x 940]	1 - 20 x 20 [508 x 508] 1 - 20 x 22 [508 x 559]	1 - 20 x 25 [508 x 635] 1 - 20 x 22 [508 x 559]
Weight - Operating, lb [kg]		368 [167]	418 [190]	463 [210]
Weight - Packaged, lb [kg]		388 [176]	438 [199]	483 [219]
Outdoor				
Air Coil Dimensions (H x W), in. [mm]		48 x 64 [1219 x 1626]	48 x 64 [1219 x 1626]	48 x 64 [1219 x 1626]
Air Coil Total Face Area, ft2 [m2]		21 [1.951]	21 [1.951]	21 [1.951]
Air Coil Tube Size, in [mm]		5/16 [7.9]	5/16 [7.9]	5/16 [7.9]
Air Coil Number of rows		2	2	2
Weight - Operating, lb [kg]		215 [98]	215 [98]	215 [98]
Weight - Packaged, lb [kg]		235 [107]	235 [107]	235 [107]

11/17/2022

Auxiliary Heat Ratings

Model	KW		Stages	BTU/HR		Min CFM	5 Series Compatibility		Minimum Unit Size
	208V	230V		208V	230V		038	049 - 064	
EAL(H)10	7.2	9.6	2	24,600	32,700	1100	•	•	038
EAL(H)15	10.8	14.4	2	36,900	49,100	1250	•	•	049
EAL(H)20	14.4	19.2	2	49,200	65,500	1500		•	064

Order the "H" part number when installed on horizontal and vertical rear discharge units 5/16/2022

Air flow level for auxiliary heat (Aux) must be equal to or above the minimum CFM in this table

NOTE: Compressor is disabled below -5F to conserve compressor health as temperatures below -5F are beyond the compressor's operating envelope. The system shall run on Emergency Heat below -5F if demand for heating exists.

Auxiliary Heat Electrical Data

Model	Supply Circuit	Heater Amps		Min Circuit Amp		Fuse (USA)		Fuse (CAN)		CKT BRK	
		208 V	240 V	208 V	240 V	208 V	240 V	208 V	240 V	208 V	240 V
EAL(H)10	Single	34.7	40.0	53.3	60.0	60	60	60	60	60	60
EAL(H)15	Single	52.0	60.0	75.0	85.0	80	90	80	90	70	100
	L1/L2	34.7	40.0	53.3	60.0	60	60	60	60	60	60
	L3/L4	17.3	20.0	21.7	25.0	25	25	25	25	20	30
EAL(H)20	Single	69.3	80.0	96.7	110.0	100	110	100	110	100	100
	L1/L2	34.7	40.0	53.3	60.0	60	60	60	60	60	60
	L3/L4	34.7	40.0	43.3	50.0	45	50	45	50	40	50

All heaters rated single phase 60 cycle and include unit fan load 3/9/22

All fuses type "D" time delay (or HACR circuit breaker in USA)

Supply wire size to be determined by local codes

Electrical Data

Dual Capacity with ECM2.3 motor

Rated		Voltage Min/Max	Compressor				HWG Pump FLA	Ext Loop FLA	Blower Motor FLA	Total Unit FLA	Min Circ Amp	Max Fuse/ HACR
Model	Voltage		MCC	RLA	LRA	LRA**						
038	208-230/60/1	187/253	24.1	15.4	92.0	33.0	0.4	5.4	4.0	25.2	29.1	50
049	208-230/60/1	187/253	31.1	19.9	126.5	45.0	0.4	5.4	4.0	29.7	34.7	60
064	208-230/60/1	187/253	37.0	23.7	151.0	54.0	0.4	5.4	7.0	36.5	42.4	70

Rated Voltage of 208/230/60/1 11/17/2022
HACR circuit breaker in USA only
All fuses Class RK-5

Geo-Ready Split Outdoor Unit Electrical Table

Rated		Voltage Min/Max	Outdoor Motor FLA	Max Fuse/ HACR
Model	Voltage			
038	208-230	187/253	2.8	10
049	208-230	187/253	2.8	10
064	208-230	187/253	2.8	10

Rated Voltage of 208/230/60/1 5/16/2022
HACR circuit breaker in USA only
All fuses Class RK-5

Blower Performance Data

5 Series Dual Capacity ECM Blower Table

MODEL	MAX ESP	INDOOR AIR FLOW SPEED SETTINGS											
		1	2	3	4	5	6	7	8	9	10	11	12
038	0.50	650	750 G	850	1000	**1100 L**	**1200**	**1300 H**	**1400**	**1500**	1550 Aux		
049	0.50	650	800 G	900	1050	1150	**1250**	**1350 L**	**1450**	**1550 H**	1575 Aux		
064	0.75	800	950 G	1100	1300	**1500 L**	**1750**	**1950 H**	**2100**	**2300**	2325 Aux		

Factory settings are at recommended G-L-H-Aux speed settings 3/9/22
L-H settings MUST be located within boldface CFM range
"Aux" is factory setting for auxiliary heat and must be equal to or above the "H" setting as well as at least the minimum required for the auxiliary heat package
"G" may be located anywhere within the airflow table
CFM is controlled within ±5% up to the maximum ESP
Max ESP includes allowance for wet coil and standard filter

Blower Performance Data cont.

Setting Blower Speed - Variable Speed ECM

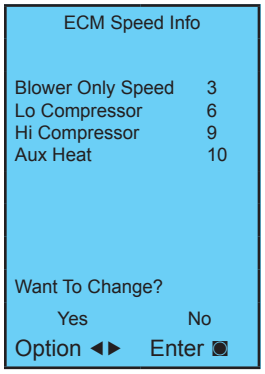
The ABC board's Yellow Config LED will flash the current ECM blower speed selections for "G", low, and high continuously with a short pause in between. The speeds can also be confirmed with the AID Tool under the Setup/ ECM Setup screen. The Aux will not be flashed but can be viewed in the AID Tool. The ECM blower motor speeds can be field adjusted with or without using an AID Tool.

ECM Setup without an AID Tool

The blower speeds for "G", Low (Y1), High (Y2), and Aux can be adjusted directly at the Aurora ABC board which utilizes the push button (SW1) on the ABC board. This procedure is outlined in the ECM Configuration Mode portion of the Aurora 'Base' Control System section. The Aux cannot be set manually without an AID Tool.

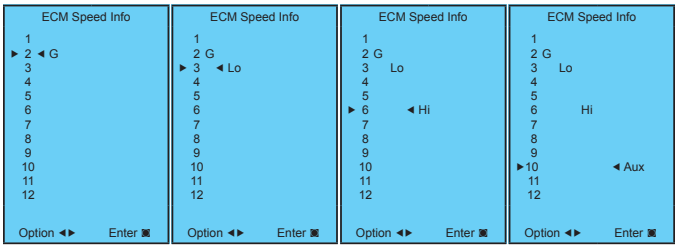
Outdoor and Indoor ECM Setup with an AID Tool

A much easier method utilizes the AID Tool to change the airflow using the procedure below. First navigate to the Setup screen and then select ECM Setup. This screen displays the current ECM settings. It allows the technician to enter the setup screens to change the ECM settings. Change the highlighted item using the ◄ and ► buttons and then press the ◙ button to select the item.



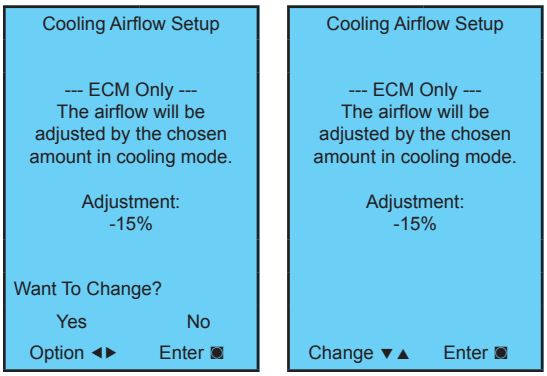
Selecting YES will enter ECM speed setup, while selecting NO will return to the previous screen.

ECM Speed Setup - These screens allow the technician to select the "G", low, high, and auxiliary heat blower speed for the ECM blower motor. Change the highlighted item using the ▲ and ▼ buttons. Press the ◙ button to select the speed.

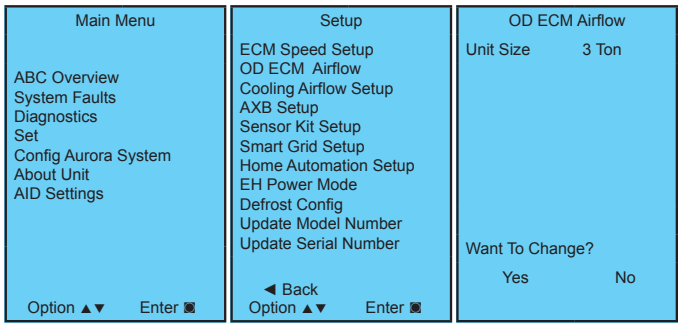


After the auxiliary heat speed setting is selected the AID Tool will automatically transfer back to the ECM Setup screen.

Cooling Airflow Setup - These screens allow the technician to select -15%, -10%, -5%, None or +5%. Change the adjustment percentage using the ▲ and ▼ buttons. Press the ◙ button to save the change.



Unit Size Setup - The following AID Tool screen allows the technician to select the correct Unit Size for the Geo-Ready System in Air Source Mode, so that the system delivers the correct amount of outdoor airflow. In order to access this screen, simply navigate to the "Setup" screen and select the "OD ECM Airflow" option. Then select the correct "Unit Size" for the system.



Reference Calculations

Heating Calculations:	Cooling Calculations:
$LWT = EWT - \frac{HE}{gpm \times 500}$	$LWT = EWT + \frac{HR}{gpm \times 500}$
$LAT = EAT + \frac{HC}{cfm \times 1.08}$	$LAT\ (DB) = EAT\ (DB) - \frac{SC}{cfm \times 1.08}$
	$LC = TC - SC$
$TH = HC + HW$	$S/T = \frac{SC}{TC}$

Legend and Notes

Abbreviations and Definitions

cfm = airflow, cubic feet/minute
EWT = entering water temperature, Fahrenheit
gpm = water flow in gallons/minute
WPD = water pressure drop, psi and feet of water
EAT = entering air temperature, Fahrenheit (dry bulb/wet bulb)
HC = air heating capacity, MBtu/h
TC = total cooling capacity, MBtu/h
SC = sensible cooling capacity, MBtu/h
kW = total power unit input, kilowatts
HR = total heat of rejection, MBtu/h
HE = total heat of extraction, MBtu/h
HWC = hot water generator capacity, MBtu/h
EER = Energy Efficient Ratio
= Btu output/Watt input
COP = Coefficient of Performance
= Btu output/Btu input
LWT = leaving water temperature, °F
LAT = leaving air temperature, °F
TH = total heating capacity, MBtu/h
LC = latent cooling capacity, MBtu/h
S/T = sensible to total cooling ratio

Notes to Performance Data Tables

The following notes apply to all performance data tables:

- Performance ratings are based on 80°F DB/67°F WB EAT for cooling and 70°F DB EAT for heating.
- Three flow rates are shown for each unit. The lowest flow rate shown is used for geothermal open loop/well water systems with a minimum of 50°F EWT. The middle flow rate shown is the minimum geothermal closed loop flow rate. The highest flow rate shown is optimum for geothermal closed loop systems and the suggested flow rate for boiler/tower applications.
- The hot water generator numbers are based on a flow rate of 0.4 gpm/ton of rated capacity with an EWT of 90°F.
- Entering water temperatures below 40°F assumes 15% antifreeze solution.
- For non-standard EAT conditions, apply the appropriate Correction Factor tables.
- Interpolation between EWT, gpm, and cfm data is permissible, extrapolation is not.

Operating Limits

Operating Limits	Cooling		Heating	
	(°F)	(°C)	(°F)	(°C)
Air Limits				
Min. Ambient Air	45	7.2	45	7.2
Rated Ambient Air	80	26.7	70	21.1
Max. Ambient Air	100	37.8	85	29.4
Min. Entering Air	50	10.0	40	4.4
Rated Entering Air db/wb	80.6/66.2	27/19	68	20.0
Max. Entering Air db/wb	110/83	43/28.3	80	26.7
Water Limits				
Min. Entering Water	30	-1.1	20	-6.7
Normal Entering Water	50-110	10-43.3	30-70	-1.1
Max. Entering Water	120	48.9	90	32.2

NOTE: Minimum/maximum limits are only for start-up conditions, and are meant for bringing the space up to occupancy temperature. Units are not designed to operate at the minimum/maximum conditions on a regular basis. The operating limits are dependent upon three primary factors: 1) water temperature, 2) return air temperature, and 3) ambient temperature. When any of the factors are at the minimum or maximum levels, the other two factors must be at the normal level for proper and reliable unit operation.

Outdoor Ambient Temperature Limits

Cooling Operation	Max DB	125°F
	Min DB	55°F
Heating Operation	Max DB	75°F
	Min DB	-5°F

6/1/22

Operation Logic Data Table

Operation Logic Table	Heating					Cooling			
	STG1	STG2	STG3	EMERG	Fan Only	STG1	STG2	Reheat	Fan Only
Compressor	On	On	On	Off	Off	On	On	On	Off
Reversing Valve	Off	Off	Off	Off	Off	On	On	On	On
Aux Heat	Off	Off	Staged	Staged	Off	Off	Off	Off	Off
Acc Relay	On	On	On	Off	Off	On	On	On	Off
Fan Relay (PSC)	On	On	On	On	On	On	On	On	On
Loop Pump	On	On	On	Off	Off	On	On	On	Off
Hot Water	On	On	Off	Off	Off	On	On	NA	Off
5-Speed ECM Speed	Med Low	Med High	High	High	Low	Med Low	Med High	High	Low
ECM Speed	Med	High	Aux	Aux	Low	Med	High	High	Low
T-Stat Signal	Y1	Y1,Y2	Y1,Y2,W	W	G	Y1,O	Y1,Y2,O	DH	G

5/11/12

Antifreeze Corrections

Catalog performance can be corrected for antifreeze use. Please use the following table and note the example given.

Antifreeze Type	Antifreeze % by wt	Heating	Cooling	Pressure Drop
EWT - °F [°C]		**30 [-1.1]**	**90 [32.2]**	**30 [-1.1]**
Water	0	1.000	1.000	1.000
Ethylene Glycol	10	0.973	0.991	1.075
	20	0.943	0.979	1.163
	30	0.917	0.965	1.225
	40	0.890	0.955	1.324
	50	0.865	0.943	1.419
Propylene Glycol	10	0.958	0.981	1.130
	20	0.913	0.969	1.270
	30	0.854	0.950	1.433
	40	0.813	0.937	1.614
	50	0.770	0.922	1.816
Ethanol	10	0.927	0.991	1.242
	20	0.887	0.972	1.343
	30	0.856	0.947	1.383
	40	0.815	0.930	1.523
	50	0.779	0.911	1.639
Methanol	10	0.957	0.986	1.127
	20	0.924	0.970	1.197
	30	0.895	0.951	1.235
	40	0.863	0.936	1.323
	50	0.833	0.920	1.399

WARNING: Gray area represents antifreeze concentrations greater than 35% by weight and should be avoided due to the extreme performance penalty they represent.

Antifreeze Correction Example

Antifreeze solution is Propylene Glycol 20% by weight. Determine the corrected heating and cooling performance at 30°F and 90°F respectively as well as pressure drop at 30°F for a 5 Series NS*022-ECM.

The corrected cooling capacity at 90°F would be: 22,400 MBtu/h x 0.969 = 21,706 MBtu/h

The corrected heating capacity at 30°F would be: 14,500 MBtu/h x 0.913 = 13,239 MBtu/h

The corrected pressure drop at 30°F and 6 gpm would be: 6.6 feet of head x 1.270 = 8.38 feet of head

Correction Factor Tables

Air Flow Corrections (Dual Capacity Part Load)

Airflow		Cooling				Heating		
cfm Per Ton of Clg	% of Nominal	Total Cap	Sens Cap	Power	Heat of Rej	Htg Cap	Power	Heat of Ext
240	60	0.922	0.778	0.956	0.924	0.943	1.239	0.879
275	69	0.944	0.830	0.962	0.944	0.958	1.161	0.914
300	75	0.957	0.866	0.968	0.958	0.968	1.115	0.937
325	81	0.970	0.900	0.974	0.970	0.977	1.075	0.956
350	88	0.982	0.933	0.981	0.980	0.985	1.042	0.972
375	94	0.991	0.968	0.991	0.991	0.993	1.018	0.988
400	**100**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
425	106	1.007	1.033	1.011	1.008	1.007	0.990	1.010
450	113	1.013	1.065	1.023	1.015	1.012	0.987	1.018
475	119	1.017	1.099	1.037	1.022	1.018	0.984	1.025
500	125	1.020	1.132	1.052	1.027	1.022	0.982	1.031
520	130	1.022	1.159	1.064	1.030	1.025	0.979	1.034

5/30/06

Air Flow Corrections (Dual Capacity Full Load and Single Speed)

Airflow		Cooling				Heating		
cfm Per Ton of Clg	% of Nominal	Total Cap	Sens Cap	Power	Heat of Rej	Htg Cap	Power	Heat of Ext
240	60	0.922	0.786	0.910	0.920	0.943	1.150	0.893
275	69	0.944	0.827	0.924	0.940	0.958	1.105	0.922
300	75	0.959	0.860	0.937	0.955	0.968	1.078	0.942
325	81	0.971	0.894	0.950	0.967	0.977	1.053	0.959
350	88	0.982	0.929	0.964	0.978	0.985	1.031	0.973
375	94	0.992	0.965	0.982	0.990	0.993	1.014	0.988
400	**100**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
425	106	1.007	1.034	1.020	1.010	1.007	0.990	1.011
450	113	1.012	1.065	1.042	1.018	1.013	0.983	1.020
475	119	1.017	1.093	1.066	1.026	1.018	0.980	1.028
500	125	1.019	1.117	1.092	1.033	1.023	0.978	1.034
520	130	1.020	1.132	1.113	1.038	1.026	0.975	1.038

5/30/06

Cooling Capacity Corrections

Entering Air WB °F	Total Clg Cap	Sensible Cooling Capacity Multipliers - Entering DB °F										Power Input	Heat of Rejec-tion
		60	65	70	75	80	80.6	85	90	95	100		
55	0.898	0.723	0.866	1.048	1.185	*	*	*	*	*	*	0.985	0.913
60	0.912		0.632	0.880	1.078	1.244	1.260	*	*	*	*	0.994	0.927
63	0.945			0.768	0.960	1.150	1.175	*	*	*	*	0.996	0.954
65	0.976			0.694	0.881	1.079	1.085	1.270	*	*	*	0.997	0.972
66.2	0.983			0.655	0.842	1.040	1.060	1.232	*	*	*	0.999	0.986
67	**1.000**			0.616	0.806	**1.000**	1.023	1.193	1.330	1.480	*	**1.000**	**1.000**
70	1.053				0.693	0.879	0.900	1.075	1.205	1.404	*	1.003	1.044
75	1.168					0.687	0.715	0.875	1.040	1.261	1.476	1.007	1.141

NOTE: * Sensible capacity equals total capacity at conditions shown.

3/28/12

Heating Capacity Corrections

Ent Air DB °F	Heating Corrections		
	Htg Cap	Power	Heat of Ext
45	1.062	0.739	1.158
50	1.050	0.790	1.130
55	1.037	0.842	1.096
60	1.025	0.893	1.064
65	1.012	0.945	1.030
68	1.005	0.976	1.012
70	**1.000**	**1.000**	**1.000**
75	0.987	1.048	0.970
80	0.975	1.099	0.930

11/10/09

Pressure Drop

Model	GPM	Pressure Drop (psi)				
		30°F	50°F	70°F	90°F	110°F
038 full load	5	1.3	1.2	1.1	0.8	0.7
	7	2.8	2.3	2.0	1.8	1.6
	9	4.6	3.7	3.3	3.0	2.6
	11	6.3	5.4	4.7	4.3	3.9
038 part load	4	0.9	0.8	0.6	0.5	0.4
	6	2.1	1.7	1.4	1.3	1.2
	8	3.6	3.1	2.5	2.3	1.8
	10	5.5	4.5	4.0	3.6	3.2
049 full load	6	1.5	1.4	1.2	1.1	1.0
	9	3.0	2.7	2.5	2.2	2.0
	12	4.9	4.3	3.9	3.7	3.6
	15	7.2	6.2	5.9	5.5	5.6
049 part load	5	1.1	1.1	1.0	0.9	0.7
	8	2.5	2.2	2.0	1.8	1.6
	11	4.2	3.7	3.4	3.1	3.0
	14	6.3	5.5	5.3	4.9	5.0
064 full load	8	2.5	2.2	2.0	1.8	1.6
	12	4.9	4.3	3.9	3.7	3.6
	16	7.9	7.0	6.7	6.3	6.5
	20	11.7	10.5	10.5	9.6	10.2
064 part load	6	1.5	1.4	1.2	1.1	1.0
	10	3.5	3.2	2.9	2.6	2.5
	14	6.3	5.5	5.3	4.9	5.0
	18	9.5	8.7	8.3	7.9	8.2

6/3/22

Geo Mode Performance Data

NG*026 - High Speed (900 cfm)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	4.0	1.4	3.2	Operation not recommended							Operation not recommended							
	6.0	2.9	6.6															
	8.0	4.8	11.1	700	16.5	1.42	11.6	91.8	3.40	2.1								
				900	17.0	1.46	12.0	87.5	3.41	2.0								
30	4.0	1.4	3.2	Operation not recommended							Operation not recommended							
	6.0	2.8	6.4	700	18.9	1.45	13.9	95.0	3.82	2.3	700	29.8	18.6	0.62	0.93	33.0	32.0	---
				900	19.4	1.50	14.3	90.0	3.81	2.1	900	30.3	20.3	0.67	0.98	33.6	30.8	---
	8.0	4.7	10.8	700	19.2	1.47	14.2	95.4	3.84	2.3	700	30.0	18.6	0.62	0.90	33.1	33.1	---
				900	19.8	1.51	14.7	90.4	3.85	2.2	900	30.7	20.3	0.66	0.95	33.9	32.3	---
40	4.0	1.3	3.1	Operation not recommended							Operation not recommended							
	6.0	2.7	6.2	700	21.5	1.50	16.4	98.5	4.21	2.5	700	30.1	19.1	0.63	1.02	33.6	29.4	-
				900	22.2	1.53	17.0	92.8	4.25	2.3	900	30.7	20.8	0.68	1.07	34.3	28.5	-
	8.0	4.5	10.4	700	22.0	1.51	16.8	99.1	4.25	2.6	700	30.3	19.1	0.63	0.99	33.7	30.5	-
				900	22.7	1.55	17.4	93.3	4.30	2.4	900	31.0	20.8	0.67	1.04	34.5	29.8	-
50	4.0	1.3	3.0	700	23.3	1.51	18.2	100.9	4.53	2.7	700	28.8	17.8	0.62	1.17	32.8	24.6	1.3
				900	24.0	1.53	18.8	94.7	4.60	2.5	900	30.3	19.7	0.65	1.23	34.5	24.6	1.4
	6.0	2.6	6.0	700	24.2	1.55	18.9	102.0	4.59	2.8	700	29.4	18.0	0.61	1.10	33.2	26.7	1.3
				900	25.0	1.57	19.6	95.7	4.67	2.6	900	31.0	20.0	0.64	1.16	34.9	26.8	1.4
	8.0	4.4	10.1	700	24.7	1.56	19.4	102.7	4.65	2.9	700	29.7	19.2	0.65	1.08	33.4	27.6	1.2
				900	25.5	1.58	20.1	96.2	4.73	2.7	900	31.3	21.3	0.68	1.13	35.2	27.7	1.3
60	4.0	1.2	2.9	700	26.0	1.58	20.6	104.4	4.82	3.1	700	28.5	17.9	0.63	1.28	32.9	22.3	1.6
				900	26.8	1.59	21.4	97.6	4.94	2.9	900	29.9	19.9	0.67	1.34	34.4	22.3	1.7
	6.0	2.5	5.8	700	27.2	1.63	21.6	105.9	4.90	3.2	700	29.2	18.1	0.62	1.22	33.3	24.0	1.5
				900	28.1	1.64	22.5	98.9	5.02	2.9	900	30.5	20.1	0.66	1.27	34.9	24.1	1.6
	8.0	4.2	9.8	700	27.8	1.64	22.2	106.8	4.96	3.3	700	29.4	19.1	0.65	1.19	33.5	24.8	1.4
				900	28.8	1.65	23.1	99.6	5.11	3.0	900	30.9	21.2	0.68	1.24	35.1	24.9	1.6
70	4.0	1.2	2.8	700	28.7	1.65	23.1	108.0	5.09	3.5	700	28.2	18.0	0.64	1.39	32.9	20.3	2.0
				900	29.7	1.65	24.0	100.5	5.27	3.2	900	29.4	20.1	0.68	1.44	34.3	20.4	2.1
	6.0	2.4	5.6	700	30.2	1.71	24.3	109.9	5.18	3.6	700	28.9	18.2	0.63	1.33	33.4	21.7	1.9
				900	31.2	1.71	25.3	102.1	5.35	3.3	900	30.1	20.2	0.67	1.38	34.8	21.9	2.0
	8.0	4.1	9.5	700	30.9	1.73	25.1	110.9	5.25	3.7	700	29.2	19.0	0.65	1.30	33.6	22.5	1.7
				900	32.0	1.72	26.1	102.9	5.45	3.4	900	30.5	21.0	0.69	1.35	35.1	22.6	1.9
80	4.0	1.2	2.7	700	31.2	1.75	25.3	111.3	5.23	3.9	700	27.0	17.8	0.66	1.54	32.2	17.5	2.5
				900	32.3	1.74	26.4	103.3	5.46	3.6	900	28.0	19.8	0.71	1.59	33.5	17.7	2.7
	6.0	2.4	5.4	700	33.0	1.82	26.8	113.7	5.32	4.0	700	27.7	18.0	0.65	1.49	32.8	18.6	2.3
				900	34.2	1.80	28.0	105.1	5.56	3.7	900	28.8	20.0	0.69	1.53	34.0	18.8	2.5
	8.0	4.0	9.2	700	34.0	1.84	27.7	115.0	5.41	4.1	700	28.0	18.5	0.66	1.46	33.0	19.2	2.2
				900	35.2	1.82	29.0	106.2	5.68	3.8	900	29.2	20.5	0.70	1.50	34.3	19.4	2.4
90	4.0	1.1	2.6	700	33.8	1.85	27.5	114.7	5.36	4.3	700	25.7	17.6	0.68	1.69	31.5	15.2	3.1
				900	35.0	1.82	28.8	106.0	5.63	4.0	900	26.7	19.5	0.73	1.73	32.6	15.4	3.3
	6.0	2.3	5.2	700	35.9	1.93	29.3	117.5	5.45	4.5	700	26.5	17.8	0.67	1.64	32.1	16.1	2.9
				900	37.2	1.90	30.7	108.2	5.74	4.1	900	27.5	19.8	0.72	1.68	33.2	16.3	3.2
	8.0	3.8	8.8	700	37.0	1.96	30.3	119.0	5.54	4.6	700	26.8	18.0	0.67	1.62	32.3	16.6	2.7
				900	38.3	1.91	31.8	109.4	5.88	4.3	900	27.8	19.9	0.72	1.65	33.4	16.8	3.0
100	4.0	1.1	2.5	Operation not recommended							Operation not recommended							
	6.0	2.2	5.1								700	24.9	17.3	0.69	1.85	31.2	13.5	3.6
											900	25.7	19.2	0.74	1.88	32.1	13.7	3.9
	8.0	3.7	8.5								700	25.2	17.2	0.68	1.82	31.4	13.9	3.3
											900	26.0	19.1	0.73	1.85	32.3	14.1	3.7
110	4.0	1.0	2.4								Operation not recommended							
	6.0	2.1	4.9								700	23.3	16.7	0.72	2.05	30.3	11.4	4.4
											900	24.0	18.6	0.78	2.07	31.0	11.6	4.7
	8.0	3.5	8.2								700	23.6	16.5	0.70	2.02	30.4	11.7	4.1
											900	24.2	18.2	0.75	2.04	31.2	11.9	4.5
120	4.0	1.0	2.3								Operation not recommended							
	6.0	2.0	4.7								700	21.6	16.1	0.74	2.28	29.4	9.5	5.3
											900	22.0	17.5	0.79	2.34	30.0	9.4	5.7
	8.0	3.4	7.9								700	21.8	16.1	0.74	2.21	29.4	9.9	4.9
											900	22.3	17.5	0.78	2.28	30.1	9.8	5.4

9/16/14

Geo Mode Performance Data cont.

NG*026 - Low Speed (700 cfm).

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	3.0	0.8	1.9	Operation not recommended							Operation not recommended							
	5.0	2.0	4.7															
	7.0	3.7	8.7	500	11.9	1.06	8.3	92.0	3.28	1.8								
				700	12.4	1.09	8.7	86.4	3.33	1.6								
30	3.0	0.8	1.8	Operation not recommended							Operation not recommended							
	5.0	2.0	4.5	500	13.1	1.06	9.5	94.3	3.61	1.8	500	22.5	14.1	0.63	0.52	24.3	43.3	-
				700	13.7	1.09	9.9	88.1	3.66	1.6	700	22.9	15.4	0.67	0.55	24.8	41.8	-
	7.0	3.6	8.4	500	13.9	1.09	10.2	95.8	3.75	1.8	500	22.6	14.1	0.62	0.50	24.4	44.9	-
				700	14.5	1.12	10.7	89.2	3.80	1.6	700	23.2	15.4	0.66	0.53	25.0	43.8	-
40	3.0	0.8	1.8	Operation not recommended							Operation not recommended							
	5.0	1.9	4.4	500	15.3	1.06	11.7	98.3	4.21	1.8	500	23.3	14.7	0.63	0.58	25.3	40.1	-
				700	15.8	1.08	12.1	90.9	4.28	1.7	700	23.7	16.0	0.67	0.61	25.8	38.9	-
	7.0	3.5	8.2	500	16.1	1.09	12.4	99.8	4.33	1.9	500	23.5	14.7	0.62	0.56	25.4	41.6	-
				700	16.7	1.11	12.9	92.0	4.40	1.7	700	24.0	16.0	0.67	0.59	26.0	40.7	-
50	3.0	0.7	1.7	500	16.8	1.06	13.2	101.2	4.65	1.9	500	23.5	14.5	0.62	0.66	25.8	35.6	0.7
				700	17.4	1.08	13.7	93.0	4.73	1.7	700	24.2	16.1	0.67	0.67	26.5	35.9	0.8
	5.0	1.8	4.3	500	17.4	1.06	13.8	102.3	4.81	1.9	500	23.7	14.6	0.62	0.64	25.9	36.9	0.7
				700	18.0	1.08	14.3	93.8	4.90	1.8	700	24.4	16.2	0.66	0.66	26.6	37.2	0.7
	7.0	3.4	7.9	500	18.3	1.09	14.6	103.8	4.92	2.0	500	24.1	15.0	0.62	0.64	26.3	37.8	0.6
				700	18.8	1.10	15.0	94.9	5.01	1.8	700	24.8	16.6	0.67	0.65	27.0	38.2	0.7
60	3.0	0.7	1.7	500	19.4	1.08	15.7	105.9	5.28	2.1	500	23.1	14.5	0.63	0.75	25.7	30.7	1.0
				700	19.9	1.09	16.2	96.3	5.37	1.9	700	23.7	16.0	0.68	0.77	26.4	31.0	1.0
	5.0	1.8	4.1	500	20.2	1.08	16.5	107.4	5.50	2.1	500	23.3	14.6	0.63	0.73	25.8	31.8	0.9
				700	20.7	1.08	17.0	97.3	5.60	2.0	700	24.0	16.1	0.67	0.75	26.5	32.1	1.0
	7.0	3.3	7.6	500	20.9	1.10	17.1	108.7	5.56	2.2	500	23.7	15.0	0.63	0.73	26.2	32.6	0.8
				700	21.4	1.11	17.6	98.2	5.66	2.0	700	24.4	16.6	0.68	0.74	26.9	32.9	0.9
70	3.0	0.7	1.6	500	21.9	1.09	18.2	110.6	5.88	2.3	500	22.7	14.5	0.64	0.84	25.6	26.9	1.3
				700	22.4	1.09	18.6	99.6	5.99	2.1	700	23.3	16.0	0.69	0.86	26.2	27.1	1.4
	5.0	1.7	4.0	500	22.9	1.09	19.2	112.4	6.16	2.4	500	22.9	14.5	0.64	0.82	25.7	27.8	1.3
				700	23.3	1.09	19.6	100.8	6.28	2.2	700	23.5	16.1	0.68	0.84	26.4	28.1	1.4
	7.0	3.2	7.4	500	23.5	1.11	19.7	113.5	6.19	2.4	500	23.3	14.9	0.64	0.81	26.0	28.6	1.2
				700	23.9	1.11	20.1	101.6	6.31	2.2	700	23.9	16.5	0.69	0.83	26.7	28.8	1.3
80	3.0	0.7	1.6	500	24.4	1.12	20.5	115.1	6.35	2.6	500	21.1	13.8	0.65	0.97	24.4	21.8	1.8
				700	24.7	1.12	20.9	102.7	6.47	2.4	700	21.7	15.3	0.70	0.99	25.1	21.9	1.9
	5.0	1.7	3.9	500	25.5	1.12	21.7	117.3	6.70	2.6	500	21.3	13.9	0.65	0.95	24.5	22.5	1.7
				700	25.8	1.11	22.0	104.2	6.83	2.4	700	21.9	15.4	0.70	0.96	25.2	22.7	1.9
	7.0	3.1	7.1	500	25.9	1.14	22.0	117.9	6.65	2.7	500	21.6	14.2	0.66	0.94	24.8	23.1	1.6
				700	26.2	1.13	22.3	104.6	6.78	2.5	700	22.3	15.8	0.71	0.96	25.5	23.3	1.8
90	3.0	0.7	1.5	500	26.8	1.16	22.8	119.6	6.79	2.9	500	19.5	13.1	0.67	1.10	23.3	17.8	2.4
				700	27.0	1.14	23.1	105.7	6.93	2.7	700	20.1	14.5	0.72	1.12	23.9	18.0	2.6
	5.0	1.6	3.7	500	28.1	1.15	24.2	122.1	7.20	3.0	500	19.7	13.2	0.67	1.07	23.4	18.4	2.3
				700	28.3	1.13	24.5	107.5	7.35	2.8	700	20.3	14.6	0.72	1.09	24.0	18.6	2.5
	7.0	3.0	6.9	500	28.3	1.17	24.3	122.4	7.09	3.1	500	20.0	13.6	0.68	1.06	23.7	18.9	2.1
				700	28.4	1.15	24.5	107.6	7.24	2.8	700	20.6	15.0	0.73	1.08	24.3	19.1	2.4
100	3.0	0.6	1.5	Operation not recommended							Operation not recommended							
	5.0	1.6	3.6								500	18.2	12.6	0.69	1.23	22.4	14.9	3.0
											700	18.7	14.0	0.75	1.25	23.0	15.0	3.2
	7.0	2.9	6.6								500	18.5	13.0	0.70	1.22	22.7	15.2	2.8
											700	19.1	14.4	0.75	1.24	23.3	15.4	3.1
110	3.0	0.6	1.4								Operation not recommended							
	5.0	1.5	3.4								500	16.8	12.1	0.72	1.39	21.5	12.1	3.8
											700	17.2	13.4	0.78	1.41	22.0	12.2	4.1
	7.0	2.8	6.4								500	17.0	12.4	0.73	1.37	21.7	12.4	3.5
											700	17.5	13.7	0.78	1.40	22.3	12.5	3.9
120	3.0	0.6	1.3								Operation not recommended							
	5.0	1.4	3.3								500	16.2	12.4	0.77	1.59	21.6	10.2	4.7
											700	16.5	13.5	0.82	1.63	22.1	10.1	5.1
	7.0	2.7	6.1								500	16.4	12.4	0.76	1.54	21.6	10.6	4.3
											700	16.7	13.5	0.81	1.59	22.1	10.5	4.8

9/16/14

Geo Mode Performance Data cont.

NG*038 - High Speed (1250 CFM Heatling)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MB-tu/h	Power kW	HE MB-tu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mb-tu/h	SC Mb-tu/h	S/T Ratio	Power kW	HR Mb-tu/h	EER	HWC Mbtu/h
20	5.0	1.3	3.0	Operation not recommended							Operation not recommended							
	7.0	2.3	5.2															
	9.0	3.5	8.1	1050	25.2	2.21	17.7	92.2	3.34	2.9								
				1250	26.0	2.28	18.2	89.3	3.34	2.6								
30	5.0	1.2	2.9	Operation not recommended							Operation not recommended							
	7.0	2.2	5.1	1050	28.8	2.24	21.1	95.4	3.77	3.1	1050	39.3	25.2	0.64	1.43	44.2	27.4	-
				1250	29.6	2.31	21.7	91.9	3.76	2.8	1250	40.0	27.5	0.69	1.51	45.1	26.5	-
	9.0	3.4	7.9	1050	29.2	2.26	21.5	95.8	3.79	3.2	1050	39.5	25.2	0.64	1.39	44.3	28.4	-
				1250	30.2	2.33	22.3	92.4	3.80	2.9	1250	40.5	27.5	0.68	1.46	45.5	27.7	-
40	5.0	1.2	2.8	Operation not recommended							Operation not recommended							
	7.0	2.1	4.9	1050	32.7	2.32	24.8	98.8	4.12	3.4	1050	40.6	26.4	0.65	1.60	46.0	25.4	-
				1250	33.7	2.37	25.6	95.0	4.16	3.1	1250	41.3	28.8	0.70	1.67	47.0	24.7	-
	9.0	3.3	7.6	1050	33.3	2.35	25.3	99.4	4.16	3.5	1050	40.9	26.4	0.65	1.55	46.2	26.4	-
				1250	34.4	2.40	26.2	95.5	4.21	3.2	1250	41.8	28.8	0.69	1.62	47.3	25.8	-
50	5.0	1.2	2.7	1050	35.3	2.36	27.3	101.1	4.39	3.7	1050	39.7	25.1	0.63	1.84	46.0	21.5	1.9
				1250	36.4	2.39	28.2	96.9	4.46	3.4	1250	41.8	27.9	0.67	1.94	48.4	21.5	2.0
	7.0	2.1	4.8	1050	36.6	2.41	28.4	102.3	4.45	3.8	1050	40.5	25.4	0.63	1.74	46.5	23.3	1.8
				1250	37.8	2.44	29.4	98.0	4.53	3.5	1250	42.6	28.2	0.66	1.82	48.8	23.4	1.9
	9.0	3.2	7.4	1050	37.4	2.43	29.1	103.0	4.51	3.9	1050	40.9	27.1	0.66	1.69	46.7	24.1	1.7
				1250	38.6	2.47	30.2	98.6	4.59	3.6	1250	43.1	30.1	0.70	1.78	49.2	24.2	1.8
60	5.0	1.1	2.6	1050	38.7	2.47	30.3	104.1	4.60	4.2	1050	39.4	25.8	0.66	2.00	46.2	19.7	2.3
				1250	40.0	2.48	31.5	99.6	4.72	3.8	1250	41.3	28.7	0.70	2.09	48.4	19.8	2.4
	7.0	2.0	4.6	1050	40.5	2.54	31.8	105.7	4.68	4.3	1050	40.4	26.1	0.65	1.90	46.8	21.3	2.2
				1250	41.8	2.55	33.1	100.9	4.80	4.0	1250	42.3	29.0	0.69	1.98	49.0	21.4	2.3
	9.0	3.1	7.2	1050	41.4	2.56	32.7	106.5	4.74	4.4	1050	40.7	27.5	0.68	1.85	47.1	22.0	2.0
				1250	42.8	2.57	34.0	101.7	4.88	4.1	1250	42.8	30.6	0.71	1.94	49.4	22.1	2.2
70	5.0	1.1	2.5	1050	42.1	2.57	33.4	107.2	4.80	4.7	1050	39.2	26.6	0.68	2.15	46.5	18.2	2.9
				1250	43.6	2.57	34.8	102.3	4.96	4.3	1250	40.9	29.6	0.72	2.23	48.5	18.3	3.0
	7.0	1.9	4.5	1050	44.3	2.66	35.2	109.1	4.88	4.8	1050	40.2	26.9	0.67	2.06	47.2	19.5	2.7
				1250	45.8	2.66	36.7	103.9	5.04	4.4	1250	41.9	29.8	0.71	2.13	49.2	19.7	2.9
	9.0	3.0	6.9	1050	45.5	2.69	36.3	110.1	4.95	5.0	1050	40.6	28.0	0.69	2.01	47.4	20.2	2.5
				1250	47.0	2.68	37.9	104.8	5.14	4.6	1250	42.4	31.0	0.73	2.09	49.5	20.3	2.8
80	5.0	1.1	2.5	1050	45.4	2.72	36.2	110.1	4.89	5.2	1050	37.5	26.1	0.70	2.34	45.4	16.0	3.6
				1250	47.0	2.70	37.8	104.8	5.10	4.8	1250	39.0	29.0	0.74	2.41	47.2	16.1	3.8
	7.0	1.9	4.3	1050	48.1	2.83	38.4	112.4	4.98	5.4	1050	38.5	26.4	0.69	2.26	46.2	17.0	3.3
				1250	49.7	2.80	40.1	106.8	5.20	5.0	1250	40.0	29.2	0.73	2.33	48.0	17.2	3.6
	9.0	2.9	6.7	1050	49.5	2.87	39.7	113.6	5.05	5.6	1050	38.9	27.0	0.69	2.21	46.4	17.6	3.1
				1250	51.2	2.83	41.5	107.9	5.31	5.1	1250	40.5	30.0	0.74	2.28	48.3	17.8	3.4
90	5.0	1.0	2.4	1050	48.8	2.87	39.0	113.0	4.97	5.9	1050	35.8	25.5	0.71	2.53	44.4	14.1	4.4
				1250	50.5	2.83	40.8	107.4	5.23	5.4	1250	37.0	28.4	0.77	2.59	45.9	14.3	4.7
	7.0	1.8	4.2	1050	51.8	3.00	41.6	115.7	5.06	6.0	1050	36.8	25.9	0.70	2.46	45.2	15.0	4.1
				1250	53.7	2.95	43.6	109.8	5.33	5.6	1250	38.2	28.7	0.75	2.52	46.8	15.1	4.5
	9.0	2.8	6.5	1050	53.5	3.05	43.1	117.1	5.14	6.2	1050	37.2	26.1	0.70	2.42	45.5	15.4	3.9
				1250	55.3	2.97	45.2	111.0	5.46	5.8	1250	38.6	28.9	0.75	2.47	47.0	15.6	4.3
100	5.0	1.0	2.3	Operation not recommended							Operation not recommended							
	7.0	1.7	4.0								1050	34.6	25.0	0.72	2.73	43.9	12.7	5.1
											1250	35.7	27.7	0.78	2.77	45.2	12.9	5.5
	9.0	2.7	6.2								1050	35.0	24.9	0.71	2.68	44.1	13.1	4.8
											1250	36.1	27.6	0.76	2.72	45.4	13.3	5.3
110	5.0	1.0	2.2								Operation not recommended							
	7.0	1.7	3.9								1050	32.4	24.1	0.74	2.99	42.6	10.8	6.2
											1250	33.3	26.7	0.80	3.01	43.5	11.0	6.8
	9.0	2.6	6.0								1050	32.7	23.7	0.73	2.94	42.7	11.1	5.8
											1250	33.6	26.2	0.78	2.97	43.7	11.3	6.4
120	5.0	0.9	2.1								Operation not recommended							
	7.0	1.6	3.7								1050	30.6	23.3	0.76	3.31	41.9	9.2	7.5
											1250	31.1	25.3	0.81	3.39	42.7	9.2	8.1
	9.0	2.5	5.8								1050	30.8	23.3	0.76	3.20	41.8	9.6	7.0
											1250	31.5	25.3	0.80	3.30	42.8	9.5	7.7

9/16/14

Geo Mode Performance Data cont.

NG*038 - Low Speed (1050 CFM Heating)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	4.0	0.9	2.1	Operation not recommended							Operation not recommended							
	6.0	1.7	4.0															
	8.0	2.9	6.7	900	17.6	1.63	12.1	88.1	3.17	2.5								
				1050	18.4	1.67	12.7	86.2	3.22	2.3								
30	4.0	0.9	2.0	Operation not recommended							Operation not recommended							
	6.0	1.7	3.9	900	19.2	1.58	13.8	89.8	3.57	2.4	900	29.5	19.1	0.65	0.74	32.0	40.1	---
				1050	20.0	1.62	14.5	87.7	3.62	2.2	1050	30.0	20.9	0.70	0.78	32.6	38.7	---
	8.0	2.8	6.5	900	20.5	1.62	14.9	91.0	3.71	2.5	900	29.7	19.1	0.64	0.71	32.1	41.5	---
				1050	21.3	1.66	15.6	88.8	3.76	2.3	1050	30.4	20.9	0.69	0.75	33.0	40.5	---
40	4.0	0.8	1.9	Operation not recommended							Operation not recommended							
	6.0	1.6	3.8	900	22.5	1.60	17.0	93.1	4.11	2.5	900	30.8	20.6	0.67	0.81	33.5	37.8	-
				1050	23.3	1.63	17.7	90.5	4.17	2.3	1050	31.3	22.5	0.72	0.85	34.3	36.8	-
	8.0	2.7	6.3	900	23.7	1.64	18.1	94.4	4.23	2.6	900	31.0	20.6	0.66	0.79	33.7	39.3	-
				1050	24.5	1.67	18.8	91.6	4.29	2.4	1050	31.7	22.5	0.71	0.83	34.5	38.4	-
50	4.0	0.8	1.9	900	24.8	1.63	19.3	95.5	4.47	2.6	900	31.3	21.1	0.67	0.91	34.4	34.2	1.0
				1050	25.6	1.65	20.0	92.6	4.55	2.4	1050	32.2	23.4	0.73	0.93	35.4	34.5	1.1
	6.0	1.6	3.7	900	25.7	1.63	20.1	96.4	4.62	2.7	900	31.6	21.2	0.67	0.89	34.6	35.5	0.9
				1050	26.5	1.65	20.8	93.3	4.70	2.5	1050	32.5	23.5	0.72	0.91	35.6	35.8	1.0
	8.0	2.6	6.1	900	26.9	1.67	21.2	97.7	4.73	2.8	900	32.1	21.8	0.68	0.88	35.1	36.4	0.9
				1050	27.7	1.69	21.9	94.4	4.81	2.5	1050	33.0	24.1	0.73	0.90	36.1	36.7	1.0
60	4.0	0.8	1.8	900	28.1	1.67	22.4	98.9	4.94	2.9	900	30.5	20.8	0.68	1.04	34.0	29.4	1.3
				1050	28.8	1.68	23.1	95.4	5.03	2.6	1050	31.3	23.1	0.74	1.06	35.0	29.7	1.4
	6.0	1.5	3.6	900	29.3	1.67	23.6	100.1	5.15	3.0	900	30.8	21.0	0.68	1.01	34.2	30.5	1.3
				1050	29.9	1.68	24.2	96.4	5.24	2.7	1050	31.6	23.2	0.73	1.03	35.1	30.7	1.4
	8.0	2.5	5.9	900	30.3	1.70	24.5	101.2	5.21	3.0	900	31.3	21.5	0.69	1.00	34.7	31.3	1.2
				1050	31.0	1.71	25.1	97.3	5.30	2.8	1050	32.2	23.8	0.74	1.02	35.6	31.5	1.3
70	4.0	0.8	1.8	900	31.4	1.71	25.6	102.3	5.39	3.2	900	29.7	20.6	0.69	1.16	33.6	25.6	1.9
				1050	32.0	1.71	26.2	98.3	5.49	2.9	1050	30.5	22.8	0.75	1.18	34.5	25.8	2.0
	6.0	1.5	3.5	900	32.8	1.70	27.0	103.7	5.64	3.3	900	30.0	20.7	0.69	1.13	33.8	26.6	1.7
				1050	33.4	1.70	27.6	99.4	5.75	3.0	1050	30.8	22.9	0.74	1.15	34.7	26.8	1.9
	8.0	2.5	5.7	900	33.6	1.74	27.7	104.6	5.67	3.4	900	30.5	21.2	0.70	1.12	34.3	27.2	1.6
				1050	34.2	1.74	28.3	100.2	5.78	3.1	1050	31.3	23.5	0.75	1.14	35.2	27.5	1.8
80	4.0	0.7	1.7	900	35.0	1.77	29.0	106.0	5.80	3.6	900	28.1	19.8	0.70	1.33	32.6	21.1	2.5
				1050	35.5	1.76	29.5	101.3	5.91	3.3	1050	28.9	21.9	0.76	1.36	33.5	21.3	2.7
	6.0	1.4	3.3	900	36.7	1.76	30.7	107.7	6.12	3.7	900	28.3	19.9	0.70	1.30	32.8	21.9	2.4
				1050	37.1	1.74	31.1	102.7	6.24	3.4	1050	29.1	22.0	0.76	1.32	33.6	22.0	2.6
	8.0	2.4	5.5	900	37.2	1.79	31.1	108.3	6.08	3.8	900	28.8	20.4	0.71	1.29	33.2	22.4	2.2
				1050	37.6	1.78	31.5	103.1	6.20	3.5	1050	29.6	22.6	0.76	1.31	34.1	22.6	2.5
90	4.0	0.7	1.6	900	38.6	1.83	32.3	109.7	6.19	4.0	900	26.5	18.9	0.71	1.50	31.6	17.6	3.4
				1050	38.9	1.81	32.7	104.3	6.31	3.7	1050	27.2	20.9	0.77	1.53	32.4	17.7	3.6
	6.0	1.4	3.2	900	40.5	1.81	34.4	111.7	6.56	4.2	900	26.7	19.0	0.71	1.46	31.7	18.2	3.2
				1050	40.8	1.79	34.7	106.0	6.70	3.8	1050	27.4	21.1	0.77	1.49	32.5	18.4	3.4
	8.0	2.3	5.3	900	40.7	1.85	34.4	111.9	6.46	4.3	900	27.1	19.5	0.72	1.45	32.1	18.7	2.9
				1050	40.9	1.82	34.7	106.1	6.59	4.0	1050	27.9	21.6	0.77	1.48	32.9	18.9	3.3
100	4.0	0.7	1.6	Operation not recommended							Operation not recommended							
	6.0	1.3	3.1								900	24.9	18.6	0.75	1.68	30.6	14.8	4.1
											1050	25.6	20.6	0.80	1.72	31.4	14.9	4.5
	8.0	2.2	5.1								900	25.3	19.1	0.75	1.67	31.0	15.2	3.8
											1050	26.0	21.1	0.81	1.70	31.8	15.3	4.2
110	4.0	0.7	1.5								Operation not recommended							
	6.0	1.3	3.0								900	23.1	18.1	0.79	1.90	29.6	12.1	5.2
											1050	23.7	20.1	0.85	1.94	30.3	12.2	5.7
	8.0	2.1	4.9								900	23.4	18.6	0.79	1.88	29.9	12.4	4.8
											1050	24.1	20.6	0.85	1.92	30.7	12.6	5.4
120	4.0	0.6	1.5								Operation not recommended							
	6.0	1.2	2.9								900	22.2	18.8	0.85	2.18	29.7	10.2	6.5
											1050	22.6	20.4	0.90	2.24	30.3	10.1	7.0
	8.0	2.0	4.7								900	22.4	18.8	0.84	2.11	29.6	10.6	6.0
											1050	22.9	20.4	0.89	2.18	30.3	10.5	6.7

9/16/14

Geo Mode Performance Data cont.

NG*049 - High Speed (1550 CFM Heating)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	6.0	1.3	3.0	Operation not recommended							Operation not recommended							
	9.0	2.5	5.7															
	12.0	4.0	9.2	1350	32.6	2.94	22.6	92.4	3.25	5.3								
				1550	33.8	2.98	23.6	90.2	3.32	4.8								
30	6.0	1.2	2.9	Operation not recommended							Operation not recommended							
	9.0	2.4	5.5	1350	36.2	2.99	26.0	94.8	3.55	5.6	1350	51.5	28.2	0.55	1.80	57.6	28.6	---
				1550	37.3	3.01	27.0	92.3	3.63	5.2	1550	52.3	30.8	0.59	1.89	58.8	27.6	---
	12.0	3.9	8.9	1350	37.1	3.01	26.8	95.4	3.61	5.6	1350	51.7	28.2	0.54	1.74	57.7	29.7	---
				1550	38.4	3.05	28.0	92.9	3.69	5.3	1550	53.0	30.8	0.58	1.83	59.2	29.0	---
40	6.0	1.2	2.8	Operation not recommended							Operation not recommended							
	9.0	2.3	5.3	1350	40.9	3.11	30.3	98.0	3.86	6.2	1350	52.9	29.7	0.56	2.01	59.8	26.3	-
				1550	42.3	3.11	31.7	95.3	3.99	5.7	1550	53.9	32.5	0.60	2.11	61.1	25.6	-
	12.0	3.7	8.7	1350	42.2	3.13	31.5	98.9	3.96	6.4	1350	53.3	29.7	0.56	1.95	60.0	27.3	-
				1550	43.7	3.15	32.9	96.1	4.07	5.8	1550	54.5	32.5	0.60	2.04	61.5	26.7	-
50	6.0	1.2	2.7	1350	42.3	3.12	31.7	99.0	3.98	6.7	1350	52.9	28.8	0.54	2.63	61.8	20.1	3.0
				1550	43.7	3.12	33.0	96.1	4.10	6.2	1550	54.5	34.0	0.62	2.74	63.9	19.9	3.2
	9.0	2.2	5.2	1350	45.6	3.22	34.6	101.3	4.15	6.9	1350	54.0	28.9	0.54	2.27	61.8	23.8	2.8
				1550	47.3	3.20	36.4	98.3	4.34	6.4	1550	55.7	34.1	0.61	2.38	63.8	23.4	3.0
	12.0	3.6	8.4	1350	47.3	3.24	36.3	102.5	4.28	7.2	1350	54.4	28.9	0.53	2.14	61.7	25.4	2.6
				1550	48.9	3.24	37.8	99.2	4.42	6.5	1550	56.0	34.1	0.61	2.25	63.7	24.9	2.9
60	6.0	1.1	2.6	1350	46.3	3.26	35.2	101.8	4.16	7.6	1350	52.5	29.1	0.55	2.78	62.0	18.9	3.7
				1550	48.0	3.24	36.9	98.7	4.34	7.0	1550	54.1	34.3	0.63	2.90	64.0	18.7	3.9
	9.0	2.2	5.0	1350	50.1	3.34	38.7	104.4	4.40	7.8	1350	53.4	29.3	0.55	2.47	61.8	21.6	3.4
				1550	52.1	3.30	40.8	101.1	4.62	7.2	1550	55.0	34.5	0.63	2.58	63.8	21.3	3.7
	12.0	3.5	8.1	1350	52.2	3.37	40.7	105.8	4.54	8.0	1350	54.0	29.4	0.55	2.34	61.9	23.0	3.2
				1550	54.1	3.33	42.7	102.3	4.76	7.4	1550	55.6	34.6	0.62	2.45	63.9	22.7	3.5
70	6.0	1.1	2.5	1350	50.4	3.40	38.8	104.5	4.34	8.5	1350	52.1	29.4	0.56	2.94	62.1	17.7	4.6
				1550	52.3	3.36	40.9	101.3	4.56	7.9	1550	53.7	34.6	0.64	3.07	64.2	17.5	4.9
	9.0	2.1	4.9	1350	54.7	3.46	42.9	107.5	4.63	8.8	1350	52.6	29.7	0.56	2.66	61.7	19.8	4.3
				1550	56.8	3.40	45.2	103.9	4.90	8.1	1550	54.3	34.9	0.64	2.78	63.8	19.5	4.6
	12.0	3.4	7.9	1350	57.2	3.50	45.2	109.2	4.79	9.0	1350	53.6	29.9	0.56	2.54	62.2	21.1	4.0
				1550	59.3	3.42	47.6	105.4	5.08	8.3	1550	55.2	35.1	0.64	2.64	64.2	20.9	4.4
80	6.0	1.1	2.5	1350	54.3	3.56	42.2	107.2	4.47	9.6	1350	49.7	28.5	0.57	3.11	60.3	16.0	5.8
				1550	56.4	3.50	44.5	103.7	4.73	8.8	1550	51.3	33.5	0.65	3.25	62.3	15.8	6.2
	9.0	2.0	4.7	1350	59.0	3.60	46.7	110.5	4.80	9.8	1350	50.0	28.8	0.58	2.89	59.8	17.3	5.4
				1550	61.4	3.51	49.4	106.7	5.13	9.1	1550	51.4	33.9	0.66	3.01	61.7	17.1	5.9
	12.0	3.3	7.6	1350	62.0	3.64	49.6	112.5	4.99	10.1	1350	51.1	29.1	0.57	2.77	60.5	18.5	5.0
				1550	64.5	3.54	52.4	108.5	5.34	9.4	1550	52.7	34.2	0.65	2.88	62.5	18.3	5.6
90	6.0	1.0	2.4	1350	58.2	3.72	45.6	109.9	4.59	10.7	1350	47.3	27.6	0.58	3.30	58.5	14.3	7.3
				1550	60.5	3.63	48.1	106.1	4.88	9.9	1550	48.8	32.4	0.66	3.43	60.5	14.2	7.7
	9.0	2.0	4.5	1350	63.3	3.74	50.6	113.4	4.97	11.1	1350	47.3	27.9	0.59	3.13	57.9	15.1	6.8
				1550	65.9	3.61	53.6	109.4	5.35	10.2	1550	48.6	32.9	0.68	3.24	59.6	15.0	7.4
	12.0	3.2	7.3	1350	66.8	3.78	53.9	115.8	5.18	11.4	1350	48.6	28.2	0.58	2.99	58.8	16.2	6.3
				1550	69.6	3.66	57.1	111.6	5.58	10.6	1550	50.1	33.2	0.66	3.13	60.8	16.0	7.0
100	6.0	1.0	2.3	Operation not recommended							Operation not recommended							
	9.0	1.9	4.4								1350	44.3	27.1	0.61	3.49	56.2	12.7	8.4
											1550	45.6	31.9	0.70	3.62	58.0	12.6	9.2
	12.0	3.1	7.1								1350	45.9	27.5	0.60	3.36	57.4	13.7	7.8
											1550	47.3	32.3	0.68	3.51	59.2	13.5	8.7
110	6.0	1.0	2.2								Operation not recommended							
	9.0	1.8	4.2								1350	41.2	26.3	0.64	3.85	54.4	10.7	10.3
											1550	42.6	30.9	0.73	4.01	56.3	10.6	11.2
	12.0	2.9	6.8								1350	43.2	26.8	0.62	3.73	55.9	11.6	9.6
											1550	44.4	31.4	0.71	3.89	57.7	11.4	10.7
120	6.0	0.9	2.1								Operation not recommended							
	9.0	1.7	4.0								1350	40.1	27.7	0.69	4.35	54.9	9.2	12.5
											1550	40.8	30.1	0.74	4.46	56.0	9.1	13.5
	12.0	2.8	6.5								1350	40.4	27.7	0.69	4.21	54.8	9.6	11.6
											1550	41.3	30.1	0.73	4.34	56.1	9.5	12.9

9/16/14

Geo Mode Performance Data cont.

NG*049 - low speed (1350 CFM Heating)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	5.0	0.9	2.2	Operation not recommended							Operation not recommended							
	8.0	2.0	4.6															
	11.0	3.4	7.8	1150	23.5	2.20	15.9	88.9	3.12	4.2								
				1350	24.3	2.24	16.7	86.7	3.19	3.8								
30	5.0	0.9	2.1	Operation not recommended							Operation not recommended							
	8.0	1.9	4.4	1150	26.5	2.20	19.0	91.3	3.52	4.3	1150	37.5	21.5	0.57	1.10	41.2	34.1	---
				1350	27.3	2.22	19.7	88.7	3.61	3.9	1350	38.1	23.5	0.62	1.16	42.0	32.9	---
	11.0	3.3	7.6	1150	27.1	2.22	19.6	91.8	3.59	4.4	1150	37.7	21.5	0.57	1.07	41.3	35.3	---
				1350	28.1	2.25	20.4	89.3	3.66	4.0	1350	38.6	23.5	0.61	1.12	42.4	34.5	---
40	5.0	0.9	2.0	Operation not recommended							Operation not recommended							
	8.0	1.9	4.3	1150	29.9	2.23	22.3	94.1	3.93	4.5	1150	39.5	23.4	0.59	1.21	43.6	32.6	-
				1350	31.0	2.23	23.3	91.2	4.06	4.2	1350	40.2	25.6	0.64	1.27	44.6	31.7	-
	11.0	3.2	7.4	1150	30.9	2.25	23.2	94.9	4.03	4.7	1150	39.8	23.4	0.59	1.18	43.8	33.8	-
				1350	32.0	2.26	24.2	91.9	4.14	4.2	1350	40.7	25.6	0.63	1.23	44.9	33.1	-
50	5.0	0.9	2.0	1150	31.0	2.19	23.5	94.9	4.14	4.8	1150	40.4	23.3	0.58	1.56	45.7	25.9	1.6
				1350	32.0	2.19	24.5	91.9	4.27	4.4	1350	41.7	27.5	0.66	1.63	47.2	25.6	1.7
	8.0	1.8	4.2	1150	33.4	2.26	25.7	96.9	4.32	4.9	1150	41.3	23.5	0.57	1.35	45.9	30.5	1.5
				1350	34.7	2.25	27.0	93.8	4.51	4.5	1350	42.5	27.6	0.65	1.42	47.4	30.0	1.6
	11.0	3.1	7.2	1150	34.7	2.28	26.9	97.9	4.46	5.1	1150	41.5	23.5	0.56	1.27	45.9	32.6	1.4
				1350	35.8	2.28	28.0	94.6	4.60	4.6	1350	42.8	27.6	0.65	1.34	47.4	31.9	1.5
60	5.0	0.8	1.9	1150	33.7	2.23	26.1	97.1	4.42	5.2	1150	39.5	23.3	0.59	1.69	45.3	23.4	2.3
				1350	34.9	2.22	27.3	93.9	4.61	4.8	1350	40.7	27.5	0.67	1.76	46.8	23.1	2.4
	8.0	1.8	4.0	1150	36.5	2.29	28.6	99.3	4.67	5.4	1150	40.2	23.5	0.59	1.50	45.3	26.8	2.1
				1350	37.9	2.26	30.2	96.0	4.91	5.0	1350	41.4	27.7	0.67	1.57	46.7	26.4	2.3
	11.0	3.0	6.9	1150	38.0	2.31	30.1	100.6	4.83	5.5	1150	40.6	23.6	0.58	1.42	45.5	28.6	1.9
				1350	39.4	2.28	31.6	97.0	5.06	5.1	1350	41.9	27.7	0.66	1.49	46.9	28.2	2.2
70	5.0	0.8	1.8	1150	36.4	2.27	28.7	99.3	4.71	5.8	1150	38.6	23.3	0.60	1.81	44.8	21.3	3.2
				1350	37.9	2.24	30.2	96.0	4.95	5.4	1350	39.8	27.4	0.69	1.90	46.3	21.0	3.4
	8.0	1.7	3.9	1150	39.5	2.31	31.7	101.8	5.02	6.0	1150	39.0	23.6	0.60	1.64	44.6	23.8	3.0
				1350	41.1	2.27	33.4	98.2	5.31	5.5	1350	40.2	27.7	0.69	1.72	46.1	23.5	3.2
	11.0	2.9	6.7	1150	41.3	2.33	33.4	103.3	5.19	6.1	1150	39.7	23.7	0.60	1.57	45.0	25.3	2.8
				1350	42.9	2.28	35.1	99.4	5.51	5.7	1350	40.9	27.8	0.68	1.63	46.5	25.1	3.1
80	5.0	0.8	1.8	1150	39.3	2.31	31.4	101.6	4.99	6.5	1150	37.5	22.3	0.60	2.01	44.3	18.6	4.4
				1350	40.8	2.27	33.1	98.0	5.27	6.0	1350	38.7	26.2	0.68	2.10	45.8	18.4	4.6
	8.0	1.6	3.8	1150	42.6	2.33	34.7	104.3	5.36	6.7	1150	37.7	22.5	0.60	1.87	44.1	20.1	4.1
				1350	44.4	2.27	36.6	100.4	5.72	6.1	1350	38.8	26.5	0.68	1.95	45.4	19.9	4.4
	11.0	2.8	6.5	1150	44.8	2.36	36.8	106.1	5.57	6.9	1150	38.5	22.7	0.59	1.79	44.6	21.5	3.8
				1350	46.6	2.29	38.8	102.0	5.95	6.3	1350	39.7	26.7	0.67	1.87	46.1	21.3	4.2
90	5.0	0.7	1.7	1150	42.1	2.35	34.1	103.9	5.26	7.2	1150	36.3	21.3	0.59	2.21	43.9	16.4	5.9
				1350	43.7	2.30	35.9	100.0	5.58	6.7	1350	37.5	25.0	0.67	2.30	45.3	16.3	6.2
	8.0	1.6	3.6	1150	45.8	2.36	37.7	106.8	5.68	7.4	1150	36.3	21.5	0.59	2.10	43.5	17.3	5.5
				1350	47.6	2.28	39.9	102.7	6.12	6.9	1350	37.3	25.4	0.68	2.18	44.8	17.2	5.9
	11.0	2.7	6.2	1150	48.3	2.38	40.1	108.9	5.93	7.7	1150	37.3	21.8	0.58	2.01	44.2	18.6	5.1
				1350	50.3	2.31	42.4	104.5	6.39	7.1	1350	38.5	25.6	0.66	2.10	45.7	18.3	5.6
100	5.0	0.7	1.7	Operation not recommended							Operation not recommended							
	8.0	1.5	3.5								1150	35.2	22.5	0.64	2.42	43.5	14.6	7.1
											1350	36.3	26.5	0.73	2.51	44.9	14.4	7.7
	11.0	2.6	6.0								1150	36.5	22.8	0.63	2.33	44.5	15.7	6.6
											1350	37.6	26.8	0.71	2.43	45.9	15.5	7.3
110	5.0	0.7	1.6								Operation not recommended							
	8.0	1.5	3.4								1150	31.6	21.2	0.67	2.69	40.8	11.7	9.0
											1350	32.6	24.9	0.76	2.80	42.2	11.6	9.8
	11.0	2.5	5.8								1150	33.1	21.6	0.65	2.61	42.0	12.7	8.4
											1350	34.0	25.3	0.74	2.72	43.3	12.5	9.3
120	5.0	0.7	1.5								Operation not recommended							
	8.0	1.4	3.3								1150	29.1	20.6	0.71	3.01	39.4	9.7	11.2
											1350	30.1	24.2	0.80	3.14	40.8	9.6	12.1
	11.0	2.4	5.6								1150	30.8	21.0	0.68	2.92	40.8	10.6	10.4
											1350	31.6	24.7	0.78	3.06	42.0	10.3	11.5

9/16/14

Geo Mode Performance Data cont.

NG*064 - High Speed (1800 CFM Heating)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	8.0	1.8	4.2	Operation not recommended							Operation not recommended							
	12.0	3.8	8.8															
	16.0	6.5	15.1	1500	39.7	3.44	28.0	94.5	3.39	6.2								
				1800	40.7	3.60	28.4	90.9	3.31	5.6								
30	8.0	1.8	4.1	Operation not recommended							Operation not recommended							
	12.0	3.7	8.6	1500	45.8	3.46	34.1	98.3	3.89	6.5	1500	64.3	41.0	0.64	2.29	72.1	28.1	---
				1800	47.1	3.68	34.6	94.2	3.75	6.0	1800	65.3	44.8	0.69	2.41	73.5	27.1	---
	16.0	6.4	14.7	1500	46.5	3.54	34.4	98.7	3.84	6.7	1500	64.6	41.0	0.63	2.22	72.2	29.1	---
				1800	47.6	3.71	34.9	94.5	3.76	6.1	1800	66.2	44.8	0.68	2.33	74.1	28.4	---
40	8.0	1.7	4.0	Operation not recommended							Operation not recommended							
	12.0	3.6	8.3	1500	52.7	3.68	40.1	102.5	4.19	7.2	1500	66.8	41.9	0.63	2.66	75.9	25.1	---
				1800	53.9	3.84	40.8	97.7	4.11	6.6	1800	68.1	45.8	0.67	2.79	77.6	24.4	---
	16.0	6.2	14.2	1500	53.5	3.75	40.7	103.0	4.18	7.4	1500	67.4	41.9	0.62	2.58	76.2	26.1	---
				1800	54.7	3.88	41.5	98.1	4.13	6.7	1800	68.9	45.8	0.66	2.70	78.1	25.5	---
50	8.0	1.7	3.8	1500	56.3	3.84	43.2	104.7	4.30	7.8	1500	68.7	42.2	0.61	3.00	78.9	22.9	4.0
				1800	57.4	3.95	44.0	99.6	4.26	7.2	1800	70.1	45.9	0.65	3.19	81.0	22.0	4.2
	12.0	3.5	8.1	1500	59.5	3.91	46.2	106.7	4.46	8.0	1500	69.4	42.6	0.61	2.94	79.4	23.6	3.7
				1800	60.7	4.01	47.0	101.2	4.44	7.4	1800	70.8	46.4	0.65	3.12	81.5	22.7	4.0
	16.0	6.0	13.8	1500	60.5	3.95	47.0	107.3	4.48	8.2	1500	70.1	43.1	0.61	2.89	80.0	24.3	3.4
				1800	61.8	4.05	48.0	101.8	4.47	7.5	1800	71.5	46.8	0.65	3.07	82.0	23.3	3.8
60	8.0	1.6	3.7	1500	63.1	4.12	49.1	109.0	4.49	8.7	1500	68.2	42.2	0.62	3.30	79.5	20.7	4.8
				1800	64.5	4.18	50.2	103.2	4.52	8.0	1800	70.0	45.9	0.66	3.51	81.9	19.9	5.1
	12.0	3.4	7.8	1500	66.0	4.18	51.7	110.7	4.62	9.0	1500	68.9	42.6	0.62	3.23	79.9	21.3	4.5
				1800	67.4	4.24	53.0	104.7	4.66	8.3	1800	70.7	46.3	0.66	3.43	82.4	20.6	4.9
	16.0	5.8	13.4	1500	67.4	4.23	53.0	111.6	4.67	9.2	1500	69.6	43.1	0.62	3.18	80.4	21.9	4.2
				1800	69.0	4.28	54.3	105.5	4.72	8.5	1800	71.4	46.8	0.66	3.38	82.9	21.1	4.6
70	8.0	1.6	3.6	1500	69.9	4.39	55.0	113.2	4.66	9.8	1500	67.7	42.2	0.62	3.60	80.0	18.8	6.1
				1800	71.5	4.42	56.4	106.8	4.74	9.0	1800	69.8	45.9	0.66	3.83	82.9	18.2	6.4
	12.0	3.3	7.5	1500	72.5	4.46	57.3	114.8	4.77	10.1	1500	68.4	42.6	0.62	3.53	80.4	19.4	5.7
				1800	74.2	4.47	58.9	108.1	4.86	9.3	1800	70.6	46.3	0.66	3.75	83.4	18.8	6.1
	16.0	5.6	12.9	1500	74.4	4.51	59.0	115.9	4.83	10.4	1500	69.0	43.0	0.62	3.46	80.9	19.9	5.3
				1800	76.1	4.51	60.7	109.1	4.95	9.6	1800	71.2	46.8	0.66	3.69	83.8	19.3	5.8
80	8.0	1.5	3.5	1500	76.9	4.70	60.9	117.5	4.80	11.0	1500	63.2	40.8	0.65	3.89	76.5	16.3	7.7
				1800	78.7	4.67	62.7	110.5	4.94	10.2	1800	65.5	44.3	0.68	4.14	79.7	15.8	8.1
	12.0	3.2	7.3	1500	78.7	4.76	62.5	118.6	4.85	11.3	1500	63.9	41.1	0.64	3.81	76.9	16.8	7.1
				1800	80.6	4.71	64.6	111.5	5.02	10.5	1800	66.2	44.7	0.68	4.06	80.0	16.3	7.7
	16.0	5.4	12.5	1500	81.1	4.81	64.7	120.1	4.94	11.7	1500	64.5	41.6	0.65	3.75	77.3	17.2	6.6
				1800	83.2	4.76	66.9	112.8	5.13	10.8	1800	66.9	45.2	0.68	3.99	80.5	16.8	7.4
90	8.0	1.4	3.3	1500	83.9	5.00	66.8	121.8	4.92	12.4	1500	58.7	39.3	0.67	4.18	72.9	14.0	9.6
				1800	85.9	4.93	69.1	114.2	5.11	11.4	1800	61.3	42.7	0.70	4.45	76.5	13.8	10.2
	12.0	3.0	7.0	1500	85.0	5.05	67.7	122.5	4.93	12.7	1500	59.3	39.6	0.67	4.10	73.3	14.5	9.0
				1800	87.1	4.95	70.2	114.8	5.16	11.8	1800	61.8	43.1	0.70	4.36	76.7	14.2	9.7
	16.0	5.2	12.0	1500	87.9	5.12	70.4	124.3	5.03	13.1	1500	59.9	40.1	0.67	4.03	73.7	14.9	8.3
				1800	90.2	5.00	73.1	116.4	5.29	12.2	1800	62.5	43.5	0.70	4.29	77.2	14.6	9.2
100	8.0	1.4	3.2	Operation not recommended							Operation not recommended							
	12.0	2.9	6.8								1500	55.2	37.5	0.68	4.47	70.4	12.3	11.1
											1800	57.8	40.7	0.70	4.77	74.0	12.1	12.1
	16.0	5.0	11.6								1500	55.7	37.9	0.68	4.39	70.7	12.7	10.3
											1800	58.4	41.2	0.71	4.69	74.3	12.5	11.5
110	8.0	1.3	3.1								Operation not recommended							
	12.0	2.8	6.5								1500	51.0	35.3	0.69	4.84	67.5	10.5	13.6
											1800	53.7	38.3	0.71	5.17	71.4	10.4	14.8
	16.0	4.8	11.2								1500	51.5	35.7	0.69	4.76	67.7	10.8	12.7
											1800	54.2	38.8	0.72	5.08	71.5	10.7	14.1
120	8.0	1.3	3.0								Operation not recommended							
	12.0	2.7	6.3								1500	51.4	36.4	0.71	5.62	70.6	9.2	16.5
											1800	52.4	39.5	0.75	5.76	72.0	9.1	17.9
	16.0	4.6	10.7								1500	51.9	36.4	0.70	5.44	70.4	9.5	15.3
											1800	53.0	39.5	0.75	5.61	72.1	9.4	17.0

9/16/14

Geo Mode Performance Data cont.

NG*064 - Low Speed (1500 CFM Heating)

EWT °F	Flow Rate GPM	WPD		HEATING - EAT 70°F							COOLING - EAT 80/67 °F							
		PSI	FT/HD	Airflow CFM	HC MBtu/h	Power kW	HE MBtu/h	LAT °F	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	HR Mbtu/h	EER	HWC Mbtu/h
20	6.0	1.0	2.4	Operation not recommended							Operation not recommended							
	10.0	2.7	6.2															
	14.0	5.1	11.8	1250	28.6	2.73	19.3	91.2	3.07	4.9								
				1500	29.6	2.77	20.1	88.3	3.13	4.5								
30	6.0	1.0	2.3	Operation not recommended							Operation not recommended							
	10.0	2.6	6.0	1250	31.9	2.70	22.7	93.6	3.46	5.0	1250	50.0	30.0	0.60	1.38	54.7	36.3	-
				1500	33.1	2.74	23.7	90.4	3.54	4.6	1500	50.8	32.8	0.65	1.45	55.8	35.0	-
	14.0	5.0	11.5	1250	33.1	2.70	23.8	94.5	3.58	5.1	1250	50.3	30.0	0.60	1.34	54.8	37.6	-
				1500	34.2	2.74	24.9	91.1	3.66	4.7	1500	51.5	32.8	0.64	1.40	56.3	36.7	-
40	6.0	1.0	2.3	Operation not recommended							Operation not recommended							
	10.0	2.5	5.9	1250	37.4	2.79	27.9	97.7	3.92	5.3	1250	51.5	30.7	0.60	1.54	56.8	33.5	-
				1500	38.4	2.80	28.9	93.7	4.02	4.9	1500	52.5	33.6	0.64	1.61	58.0	32.5	-
	14.0	4.8	11.1	1250	38.6	2.80	29.1	98.6	4.04	5.5	1250	51.9	30.7	0.59	1.49	57.0	34.8	-
				1500	39.7	2.81	30.1	94.5	4.14	5.0	1500	53.1	33.6	0.63	1.56	58.4	34.0	-
50	6.0	0.9	2.2	1250	42.2	2.83	32.5	101.2	4.37	5.6	1250	52.8	30.0	0.57	1.74	58.7	30.4	2.0
				1500	43.3	2.83	33.7	96.7	4.49	5.2	1500	54.3	34.0	0.63	1.83	60.6	29.7	2.1
	10.0	2.5	5.7	1250	42.8	2.88	33.0	101.7	4.36	5.7	1250	52.9	30.2	0.57	1.67	58.7	31.7	1.9
				1500	43.8	2.86	34.0	97.0	4.48	5.3	1500	54.5	34.3	0.63	1.75	60.5	31.1	2.0
	14.0	4.7	10.8	1250	44.1	2.90	34.2	102.7	4.46	5.9	1250	53.1	30.2	0.57	1.64	58.7	32.3	1.7
				1500	45.1	2.88	35.3	97.8	4.59	5.4	1500	54.6	34.3	0.63	1.72	60.5	31.8	1.9
60	6.0	0.9	2.1	1250	46.6	2.91	36.7	104.5	4.70	6.1	1250	51.4	29.8	0.58	1.96	58.1	26.2	2.8
				1500	47.6	2.89	37.8	99.4	4.84	5.7	1500	53.0	33.7	0.64	2.06	60.0	25.8	3.0
	10.0	2.4	5.5	1250	48.1	2.96	38.0	105.6	4.76	6.3	1250	51.6	30.1	0.58	1.90	58.1	27.2	2.6
				1500	48.9	2.92	38.9	100.2	4.90	5.8	1500	53.2	34.0	0.64	1.99	60.0	26.8	2.9
	14.0	4.5	10.4	1250	49.2	2.99	39.0	106.5	4.83	6.5	1250	51.9	30.2	0.58	1.86	58.2	27.9	2.5
				1500	50.0	2.95	40.0	100.9	4.98	6.0	1500	53.4	34.1	0.64	1.95	60.1	27.4	2.7
70	6.0	0.9	2.0	1250	51.1	2.99	40.9	107.9	5.01	6.8	1250	50.0	29.7	0.59	2.19	57.5	22.9	4.0
				1500	52.0	2.94	42.0	102.1	5.18	6.3	1500	51.6	33.3	0.64	2.28	59.4	22.6	4.2
	10.0	2.3	5.3	1250	53.3	3.04	42.9	109.5	5.13	7.0	1250	50.3	29.9	0.59	2.13	57.6	23.7	3.7
				1500	53.9	2.98	43.7	103.3	5.31	6.5	1500	51.9	33.7	0.65	2.22	59.5	23.4	4.0
	14.0	4.4	10.1	1250	54.3	3.08	43.8	110.2	5.17	7.2	1250	50.7	30.1	0.59	2.08	57.8	24.3	3.5
				1500	54.9	3.01	44.6	103.9	5.35	6.6	1500	52.2	33.8	0.65	2.17	59.6	24.0	3.9
80	6.0	0.9	2.0	1250	55.4	3.09	44.9	111.0	5.26	7.6	1250	47.2	28.5	0.60	2.49	55.7	18.9	5.5
				1500	55.9	3.02	45.6	104.5	5.43	7.0	1500	48.6	31.8	0.65	2.58	57.4	18.9	5.9
	10.0	2.2	5.1	1250	58.5	3.14	47.8	113.4	5.47	7.8	1250	47.6	28.7	0.60	2.43	55.9	19.6	5.2
				1500	58.8	3.04	48.4	106.3	5.66	7.2	1500	49.0	32.2	0.66	2.52	57.6	19.4	5.6
	14.0	4.2	9.8	1250	59.2	3.18	48.4	113.9	5.46	8.0	1250	47.9	28.9	0.60	2.39	56.0	20.0	4.8
				1500	59.5	3.09	48.9	106.7	5.65	7.4	1500	49.4	32.4	0.65	2.48	57.8	19.9	5.3
90	6.0	0.8	1.9	1250	59.7	3.18	48.9	114.2	5.51	8.5	1250	44.3	27.2	0.61	2.80	53.8	15.8	7.4
				1500	59.8	3.09	49.3	106.9	5.67	7.8	1500	45.6	30.2	0.66	2.88	55.4	15.9	7.8
	10.0	2.1	5.0	1250	63.7	3.23	52.7	117.2	5.79	8.7	1250	44.8	27.5	0.61	2.73	54.1	16.4	6.9
				1500	63.7	3.11	53.1	109.3	6.01	8.1	1500	46.1	30.6	0.66	2.83	55.8	16.3	7.5
	14.0	4.1	9.4	1250	64.1	3.28	53.0	117.5	5.74	9.0	1250	45.1	27.8	0.62	2.70	54.3	16.7	6.4
				1500	64.0	3.16	53.2	109.5	5.94	8.3	1500	46.6	30.9	0.66	2.78	56.1	16.8	7.1
100	6.0	0.8	1.8	Operation not recommended							Operation not recommended							
	10.0	2.1	4.8								1250	41.7	26.8	0.64	3.13	52.4	13.3	9.0
											1500	43.0	29.6	0.69	3.22	54.0	13.4	9.7
	14.0	3.9	9.1								1250	42.2	27.1	0.64	3.09	52.7	13.6	8.3
											1500	43.5	30.0	0.69	3.17	54.3	13.7	9.2
110	6.0	0.8	1.8								Operation not recommended							
	10.0	2.0	4.6								1250	38.7	26.0	0.67	3.53	50.7	10.9	11.3
											1500	39.9	28.6	0.72	3.60	52.2	11.1	12.3
	14.0	3.8	8.7								1250	39.2	26.4	0.67	3.48	51.1	11.3	10.5
											1500	40.4	29.0	0.72	3.55	52.5	11.4	11.7
120	6.0	0.7	1.7								Operation not recommended							
	10.0	1.9	4.4								1250	36.7	26.7	0.73	4.01	50.4	9.2	14.0
											1500	37.4	29.0	0.78	4.11	51.4	9.1	15.2
	14.0	3.6	8.4								1250	37.0	26.7	0.72	3.88	50.2	9.5	13.0
											1500	37.8	29.0	0.77	4.00	51.4	9.5	14.5

9/16/14

Air Source Mode Performance Data

NG*038 - High Speed (1250 CFM Heating and Cooling) - 1 of 2

OD DB Temp °F	ID Temp °F		HEATING					COOLING						
	DB	WB	Airflow CFM	HC MBtu/h	Power kW	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	EER	HWC Mbtu/h
5	60	55	1050	16.20	1.83	2.62	2.92	Operation not recommended						
			1250	15.61	1.89	2.45	2.79							
	70	60	1050	16.56	2.03	2.43	3.83							
			1250	16.36	2.07	2.34	3.76							
	75	62	1050	16.74	2.14	2.33	4.29							
			1250	16.74	2.17	2.29	4.24							
	80	57	1050	18.79	2.32	2.74	4.40							
			1250	18.60	2.36	2.65	4.32							
	80	62	1050	17.86	2.28	2.49	4.57							
			1250	17.86	2.31	2.45	4.52							
	80	67	1050	16.92	2.24	2.24	4.74							
			1250	17.12	2.26	2.24	4.73							
	80	72	1050	15.98	2.20	1.99	4.91							
			1250	16.38	2.21	2.03	4.93							
15	60	55	1050	19.51	1.93	2.96	2.93	Operation not recommended						
			1250	20.13	1.95	3.01	2.79							
	70	60	1050	20.20	2.15	2.77	3.81							
			1250	20.37	2.17	2.76	3.80							
	75	62	1050	20.55	2.26	2.67	4.25							
			1250	20.49	2.28	2.64	4.30							
	80	57	1050	22.94	2.45	3.12	4.38							
			1250	23.10	2.47	3.12	4.37							
	80	62	1050	21.92	2.41	2.85	4.54							
			1250	21.86	2.43	2.82	4.58							
	80	67	1050	20.89	2.37	2.57	4.70							
			1250	20.62	2.39	2.52	4.80							
	80	72	1050	19.87	2.32	2.30	4.86							
			1250	19.37	2.34	2.22	5.01							
25	60	55	1050	22.82	2.02	3.30	2.93	Operation not recommended						
			1250	24.65	2.02	3.57	2.80							
	70	60	1050	23.84	2.26	3.10	3.79							
			1250	24.38	2.27	3.18	3.83							
	75	62	1050	24.35	2.37	3.01	4.22							
			1250	24.25	2.39	2.99	4.35							
	80	57	1050	27.09	2.57	3.50	4.35							
			1250	27.61	2.58	3.58	4.41							
	80	62	1050	25.98	2.53	3.21	4.50							
			1250	25.86	2.55	3.19	4.64							
	80	67	1050	24.86	2.49	2.91	4.65							
			1250	24.11	2.51	2.80	4.87							
	80	72	1050	23.75	2.45	2.61	4.80							
			1250	22.37	2.48	2.41	5.10							
35	60	55	1050	27.33	2.10	3.80	3.06	Operation not recommended						
			1250	29.37	2.07	4.16	2.81							
	70	60	1050	28.01	2.36	3.50	4.01							
			1250	28.84	2.34	3.66	3.92							
	75	62	1050	28.35	2.49	3.34	4.49							
			1250	28.57	2.48	3.40	4.47							
	80	57	1050	31.79	2.70	3.94	4.61							
			1250	32.65	2.68	4.11	4.52							
	80	62	1050	30.24	2.66	3.57	4.79							
			1250	30.47	2.65	3.63	4.77							
	80	67	1050	28.68	2.63	3.19	4.97							
			1250	28.30	2.62	3.15	5.03							
	80	72	1050	27.13	2.59	2.82	5.15							
			1250	26.13	2.60	2.67	5.29							
45	60	55	1050	33.04	2.16	4.48	3.30	Operation not recommended						
			1250	34.31	2.10	4.79	2.82							
	70	60	1050	33.27	2.47	4.01	4.38							
			1250	33.74	2.41	4.18	4.05							
	75	62	1050	33.39	2.62	3.77	4.92							
			1250	33.46	2.56	3.88	4.67							
	80	57	1050	37.73	2.82	4.51	5.04							
			1250	38.20	2.75	4.70	4.67							
	80	62	1050	35.62	2.79	4.02	5.25							
			1250	35.69	2.73	4.14	4.98							
	80	67	1050	33.51	2.77	3.53	5.46							
			1250	33.17	2.71	3.58	5.28							
	80	72	1050	31.40	2.75	3.05	5.67							
			1250	30.66	2.70	3.02	5.59							
55	60	55	1050	37.88	2.20	5.04	3.50							
			1250	38.84	2.15	5.30	3.03							
	70	60	1050	37.63	2.50	4.47	4.74	1050	43.14	18.34	0.67	1.68	25.65	1.45
			1250	38.34	2.44	4.67	4.33	1250	44.02	19.67	0.71	1.78	24.77	1.52
	75	62	1050	37.51	2.65	4.19	5.36	1050	38.68	28.63	0.74	1.66	23.24	1.40
			1250	38.09	2.59	4.36	4.98	1250	39.95	31.14	0.78	1.74	22.98	1.41
	80	57	1050	42.63	2.86	5.03	5.45	1050	34.22	38.93	0.81	1.65	20.84	1.36
			1250	43.42	2.79	5.25	4.99	1250	35.87	42.61	0.85	1.70	21.19	1.30
	80	62	1050	40.01	2.83	4.47	5.72	1050	38.11	33.76	0.89	1.66	22.91	1.47
			1250	40.63	2.76	4.65	5.31	1250	39.61	36.63	0.92	1.73	22.94	1.49
	80	67	1050	37.38	2.81	3.90	5.98	1050	42.00	28.59	0.70	1.68	24.97	1.57
			1250	37.84	2.74	4.05	5.62	1250	43.36	30.65	0.72	1.75	24.68	1.67
	80	72	1050	34.76	2.78	3.34	6.24	1050	45.89	23.43	0.51	1.70	27.04	1.68
			1250	35.06	2.71	3.44	5.94	1250	47.11	24.67	0.52	1.78	26.42	1.86

7/13/2022

Air Source Mode Performance Data cont.

NG*038 - High Speed (1250 CFM Heating and Cooling) - 2 of 2

OD DB Temp °F	ID Temp °F		HEATING					COOLING						
	DB	WB	Airflow CFM	HC MBtu/h	Power kW	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	EER	HWC Mbtu/h
65	60	55	1050	42.71	2.24	5.61	3.69							
			1250	43.36	2.19	5.81	3.23							
	70	60	1050	41.98	2.54	4.94	5.09	1050	41.33	17.64	0.68	1.89	22.77	2.52
			1250	42.94	2.48	5.16	4.60	1250	42.24	18.97	0.72	1.98	22.12	2.55
	75	62	1050	41.62	2.69	4.60	5.80	1050	37.15	27.92	0.75	1.87	20.69	2.45
			1250	42.73	2.62	4.84	5.28	1250	38.36	30.39	0.79	1.95	20.50	2.46
	80	57	1050	47.53	2.90	5.55	5.87	1050	32.98	38.21	0.83	1.85	18.60	2.37
			1250	48.64	2.83	5.81	5.30	1250	34.49	41.80	0.87	1.91	18.88	2.37
	80	62	1050	44.40	2.87	4.91	6.18	1050	36.74	33.05	0.90	1.87	20.45	2.50
			1250	45.58	2.80	5.16	5.64	1250	38.14	35.87	0.94	1.94	20.48	2.55
	80	67	1050	41.26	2.84	4.27	6.50	1050	40.50	27.88	0.71	1.89	22.30	2.63
			1250	42.51	2.77	4.52	5.97	1250	41.80	29.95	0.74	1.96	22.09	2.73
	80	72	1050	38.12	2.81	3.63	6.81	1050	44.26	22.72	0.51	1.91	24.16	2.76
			1250	39.45	2.73	3.87	6.30	1250	45.46	24.02	0.53	1.99	23.69	2.90
75	60	55	Operation not recommended											
	70	60						1050	39.53	16.94	0.69	2.11	19.90	3.60
								1250	40.45	18.27	0.73	2.19	19.46	3.58
	75	62						1050	35.63	27.21	0.77	2.08	18.13	3.49
								1250	36.78	29.63	0.81	2.16	18.02	3.51
	80	57						1050	31.73	37.49	0.84	2.06	16.35	3.39
								1250	33.11	41.00	0.88	2.12	16.57	3.43
	80	62						1050	35.37	32.33	0.92	2.08	17.99	3.54
								1250	36.68	35.12	0.96	2.15	18.03	3.60
	80	67						1050	39.00	27.17	0.72	2.10	19.63	3.70
								1250	40.25	29.24	0.75	2.17	19.49	3.78
	80	72						1050	42.64	22.01	0.52	2.12	21.28	3.85
								1250	43.82	23.37	0.53	2.20	20.95	3.95
85	60	55	Operation not recommended											
	70	60						1050	37.73	16.24	0.70	2.32	17.03	4.67
								1250	38.67	17.57	0.74	2.40	16.81	4.61
	75	62						1050	34.10	26.50	0.78	2.29	15.57	4.54
								1250	35.20	28.88	0.82	2.37	15.54	4.55
	80	57						1050	30.48	36.77	0.86	2.27	14.10	4.40
								1250	31.73	40.19	0.90	2.33	14.26	4.50
	80	62						1050	33.99	31.62	0.93	2.29	15.53	4.58
								1250	35.21	34.37	0.98	2.36	15.58	4.66
	80	67						1050	37.51	26.46	0.73	2.31	16.96	4.76
								1250	38.69	28.54	0.76	2.38	16.90	4.83
	80	72						1050	41.02	21.31	0.52	2.33	18.40	4.93
								1250	42.18	22.72	0.54	2.41	18.22	4.99
95	60	55	Operation not recommended											
	70	60						1050	35.92	15.54	0.71	2.54	14.16	5.75
								1250	36.88	16.87	0.76	2.60	14.15	5.64
	75	62						1050	32.58	25.79	0.79	2.50	13.01	5.58
								1250	33.61	28.13	0.84	2.58	13.05	5.60
	80	57						1050	29.23	36.05	0.87	2.47	11.86	5.42
								1250	30.35	39.39	0.92	2.55	11.96	5.56
	80	62						1050	32.62	30.90	0.95	2.49	13.08	5.62
								1250	33.74	33.61	0.99	2.57	13.13	5.72
	80	67						1050	36.01	25.75	0.74	2.52	14.30	5.82
								1250	37.14	27.84	0.77	2.59	14.31	5.88
	80	72						1050	39.40	20.60	0.52	2.54	15.51	6.01
								1250	40.54	22.06	0.54	2.62	15.49	6.03
105	60	55	Operation not recommended											
	70	60						1050	33.15	15.40	0.76	2.83	12.14	7.26
								1250	33.56	16.93	0.83	2.86	12.00	7.08
	75	62						1050	30.43	25.15	0.83	2.82	11.20	7.18
								1250	31.35	27.46	0.88	2.89	11.25	7.22
	80	57						1050	27.71	34.91	0.90	2.81	10.26	7.11
								1250	29.14	37.99	0.94	2.92	10.49	7.35
	80	62						1050	30.57	29.75	0.98	2.81	11.27	7.24
								1250	31.81	31.70	0.99	2.89	11.40	7.38
	80	67						1050	33.43	24.60	0.76	2.82	12.29	7.38
								1250	34.48	25.42	0.77	2.86	12.30	7.42
	80	72						1050	36.30	26.25	0.78	2.90	12.31	7.46
								1250	37.14	20.11	0.55	2.87	13.26	7.52
115	60	55	Operation not recommended											
	70	60						1050	30.38	15.26	0.81	3.12	10.11	8.78
								1250	30.23	18.62	0.89	3.19	9.87	8.61
	75	62						1050	28.28	24.51	0.87	3.13	9.39	8.79
								1250	29.08	26.78	0.93	3.20	9.44	8.83
	80	57						1050	26.18	33.77	0.94	3.14	8.67	8.79
								1250	27.93	34.94	0.96	3.21	9.01	9.05
	80	62						1050	28.52	28.61	0.94	3.13	9.47	8.86
								1250	29.87	29.80	0.96	3.21	9.66	9.05
	80	67						1050	30.86	23.45	0.78	3.12	10.28	8.93
								1250	31.81	24.65	0.79	3.20	10.31	9.05
	80	72						1050	33.20	18.29	0.55	3.11	11.08	9.01
								1250	33.75	19.51	0.58	3.20	10.96	9.04
125	60	55	Operation not recommended											
	70	60						1050	27.61	15.12	0.85	3.42	8.09	10.30
								1250	26.91	19.50	0.96	3.48	7.73	10.09
	75	62						1050	26.13	23.87	0.91	3.45	7.58	10.39
								1250	26.82	26.11	0.97	3.51	7.63	10.44
	80	57						1050	24.66	32.63	0.98	3.48	7.07	10.48
								1250	26.72	32.72	0.99	3.54	7.53	10.80
	80	62						1050	26.47	27.46	0.98	3.45	7.67	10.49
								1250	27.94	27.89	0.99	3.53	7.92	10.71
	80	67						1050	28.29	22.29	0.80	3.42	8.27	10.49
								1250	29.15	23.06	0.80	3.51	8.31	10.63
	80	72						1050	30.11	17.13	0.57	3.40	8.86	10.50
								1250	30.36	18.23	0.60	3.49	8.70	10.55

7/13/2022

Air Source Mode Performance Data cont.

NG*049 - High Speed (1550 CFM Heating and Cooling) - 1 of 2

OD DB Temp °F	ID Temp °F		HEATING					COOLING						
	DB	WB	Airflow CFM	HC MBtu/h	Power kW	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	EER	HWC Mbtu/h
5	60	55	1350	24.51	2.64	2.74	1.40	Operation not recommended						
			1550	24.23	2.65	2.70	3.85							
	70	60	1350	24.81	2.85	2.58	4.10							
			1550	23.38	2.99	2.35	5.40							
	75	62	1350	24.97	2.95	2.50	5.45							
			1550	22.96	3.16	2.17	6.17							
	80	57	1350	28.14	3.24	2.91	4.83							
			1550	26.44	3.41	2.64	6.22							
	80	62	1350	26.63	3.15	2.67	5.81							
			1550	24.49	3.37	2.32	6.58							
	80	67	1350	25.12	3.05	2.42	6.80							
			1550	22.54	3.33	2.00	6.94							
	80	72	1350	23.61	2.96	2.18	7.79							
			1550	20.58	3.29	1.68	7.31							
15	60	55	1350	28.62	2.79	2.99	2.84	Operation not recommended						
			1550	28.29	2.80	2.95	4.23							
	70	60	1350	28.69	3.06	2.76	4.73							
			1550	27.58	3.14	2.60	5.43							
	75	62	1350	28.73	3.20	2.64	5.67							
			1550	27.22	3.31	2.43	6.04							
	80	57	1350	32.52	3.49	3.11	5.49							
			1550	31.20	3.58	2.93	6.24							
	80	62	1350	30.64	3.41	2.81	6.05							
			1550	29.03	3.53	2.59	6.44							
	80	67	1350	28.76	3.34	2.52	6.62							
			1550	26.86	3.48	2.26	6.64							
	80	72	1350	26.88	3.26	2.22	7.19							
			1550	24.69	3.43	1.92	6.84							
25	60	55	1350	32.74	2.94	3.25	4.27	Operation not recommended						
			1550	32.35	2.95	3.20	4.61							
	70	60	1350	32.57	3.28	2.93	5.36							
			1550	31.77	3.29	2.86	5.47							
	75	62	1350	32.49	3.45	2.77	5.90							
			1550	31.48	3.45	2.69	5.90							
	80	57	1350	36.90	3.74	3.30	6.14							
			1550	35.97	3.75	3.22	6.26							
	80	62	1350	34.65	3.68	2.96	6.29							
			1550	33.58	3.69	2.87	6.29							
	80	67	1350	32.40	3.62	2.61	6.44							
			1550	31.19	3.62	2.51	6.33							
	80	72	1350	30.16	3.57	2.27	6.59							
			1550	28.80	3.56	2.16	6.37							
35	60	55	1350	38.13	3.02	3.70	4.93	Operation not recommended						
			1550	37.92	2.97	3.76	4.66							
	70	60	1350	37.79	3.38	3.32	5.88							
			1550	37.55	3.34	3.35	5.68							
	75	62	1350	37.63	3.56	3.13	6.36							
			1550	37.37	3.52	3.15	6.19							
	80	57	1350	42.81	3.85	3.73	6.73							
			1550	42.53	3.80	3.77	6.50							
	80	62	1350	40.13	3.80	3.33	6.78							
			1550	39.86	3.75	3.36	6.60							
	80	67	1350	37.46	3.74	2.94	6.84							
			1550	37.18	3.70	2.94	6.70							
	80	72	1350	34.78	3.68	2.54	6.89							
			1550	34.51	3.65	2.52	6.79							
45	60	55	1350	44.81	3.03	4.34	4.79	Operation not recommended						
			1550	44.99	2.85	4.64	4.39							
	70	60	1350	44.77	3.40	3.90	6.51							
			1550	44.91	3.28	4.08	6.06							
	75	62	1350	44.75	3.59	3.69	7.37							
			1550	44.87	3.50	3.81	6.89							
	80	57	1350	50.74	3.88	4.40	7.50							
			1550	50.90	3.75	4.59	6.98							
	80	62	1350	47.74	3.83	3.93	7.87							
			1550	47.87	3.74	4.06	7.35							
	80	67	1350	44.73	3.78	3.47	8.23							
			1550	44.83	3.72	3.53	7.73							
	80	72	1350	41.73	3.73	3.01	8.60							
			1550	41.80	3.70	3.00	8.10							
55	60	55	1350	52.16	3.10	4.92	5.04							
			1550	53.05	3.02	5.14	4.48							
	70	60	1350	51.63	3.52	4.36	6.93	1350	56.13	23.36	0.65	2.39	23.49	2.83
			1550	51.73	3.35	4.57	6.38	1550	56.85	24.52	0.67	2.49	22.86	3.21
	75	62	1350	51.37	3.73	4.08	7.88	1350	51.41	36.79	0.72	2.35	21.92	2.37
			1550	51.06	3.52	4.29	7.32	1550	53.20	39.28	0.74	2.45	21.75	2.47
	80	57	1350	58.48	4.02	4.90	7.99	1350	46.69	50.21	0.79	2.30	20.35	1.90
			1550	58.53	3.82	5.15	7.35	1550	49.55	54.05	0.81	2.40	20.64	1.73
	80	62	1350	54.79	3.98	4.35	8.41	1350	50.29	42.99	0.85	2.35	21.42	2.45
			1550	54.47	3.75	4.58	7.81	1550	52.11	45.93	0.88	2.44	21.35	2.46
	80	67	1350	51.11	3.94	3.80	8.83	1350	53.89	35.77	0.68	2.39	22.49	3.00
			1550	50.40	3.68	4.01	8.27	1550	54.67	37.80	0.70	2.48	22.06	3.19
	80	72	1350	47.42	3.90	3.25	9.25	1350	57.50	28.55	0.50	2.44	23.56	3.55
			1550	46.33	3.62	3.44	8.73	1550	57.22	29.68	0.52	2.51	22.77	3.93

8/16/2022

Air Source Mode Performance Data cont.

NG*049 - High Speed (1550 CFM Heating and Cooling) - 2 of 2

OD DB Temp °F	ID Temp °F		HEATING					COOLING						
	DB	WB	Airflow CFM	HC MBtu/h	Power kW	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	EER	HWC Mbtu/h
65	60	55	1350	59.51	3.18	5.50	5.29							
			1550	61.11	3.19	5.64	4.57							
	70	60	1350	58.49	3.64	4.81	7.36	1350	53.56	23.03	0.66	2.65	20.96	4.02
			1550	58.54	3.42	5.06	6.69	1550	54.49	23.95	0.68	2.75	20.48	4.31
	75	62	1350	57.98	3.87	4.47	8.39	1350	49.26	35.78	0.73	2.61	19.58	3.66
			1550	57.25	3.53	4.78	7.75	1550	50.92	38.05	0.75	2.71	19.46	3.76
	80	57	1350	66.22	4.15	5.41	8.47	1350	44.96	48.53	0.80	2.57	18.21	3.30
			1550	66.17	3.89	5.70	7.73	1550	47.35	52.14	0.82	2.67	18.43	3.20
	80	62	1350	61.85	4.12	4.77	8.95	1350	48.41	41.77	0.86	2.61	19.19	3.74
			1550	61.07	3.77	5.10	8.27	1550	49.98	44.56	0.89	2.71	19.12	3.78
	80	67	1350	57.48	4.10	4.13	9.42	1350	51.85	35.01	0.69	2.66	20.18	4.19
			1550	55.97	3.65	4.49	8.81	1550	52.61	36.98	0.71	2.75	19.81	4.37
	80	72	1350	53.10	4.07	3.49	9.90	1350	55.29	28.24	0.51	2.70	21.16	4.64
			1550	50.86	3.53	3.89	9.36	1550	55.24	29.40	0.53	2.78	20.50	4.95
75	60	55	Operation not recommended											
	70	60						1350	50.99	22.70	0.67	2.91	18.42	5.21
								1550	52.13	23.37	0.69	3.02	18.11	5.41
	75	62						1350	47.11	34.78	0.74	2.88	17.24	4.95
								1550	48.64	36.81	0.76	2.97	17.17	5.04
	80	57						1350	43.24	46.86	0.81	2.84	16.07	4.69
								1550	45.15	50.24	0.83	2.93	16.23	4.68
	80	62						1350	46.52	40.55	0.87	2.88	16.97	5.04
								1550	47.85	43.20	0.90	2.97	16.90	5.11
	80	67						1350	49.80	34.25	0.70	2.92	17.87	5.38
								1550	50.55	36.16	0.73	3.01	17.57	5.54
	80	72						1350	53.09	27.94	0.53	2.96	18.76	5.72
								1550	53.25	29.13	0.55	3.05	18.23	5.97
85	60	55	Operation not recommended											
	70	60						1350	48.41	22.37	0.69	3.17	15.88	6.40
								1550	49.77	22.80	0.69	3.28	15.73	6.51
	75	62						1350	44.96	33.78	0.75	3.14	14.91	6.24
								1550	46.36	35.57	0.77	3.24	14.88	6.33
	80	57						1350	41.51	45.18	0.82	3.11	13.93	6.09
								1550	42.96	48.33	0.84	3.19	14.02	6.15
	80	62						1350	44.64	39.33	0.88	3.15	14.74	6.33
								1550	45.72	41.84	0.92	3.24	14.67	6.43
	80	67						1350	47.76	33.48	0.71	3.19	15.55	6.57
								1550	48.49	35.34	0.74	3.28	15.32	6.71
	80	72						1350	50.88	27.64	0.55	3.22	16.36	6.81
								1550	51.26	28.85	0.56	3.32	15.97	6.99
95	60	55	Operation not recommended											
	70	60						1350	45.84	22.04	0.70	3.43	13.34	7.58
								1550	47.41	22.23	0.70	3.55	13.35	7.61
	75	62						1350	42.81	32.77	0.77	3.41	12.57	7.53
								1550	44.09	34.33	0.78	3.50	12.58	7.62
	80	57						1350	39.79	43.50	0.83	3.38	11.79	7.48
								1550	40.76	46.43	0.85	3.46	11.82	7.63
	80	62						1350	42.75	38.11	0.89	3.42	12.52	7.62
								1550	43.59	40.48	0.93	3.50	12.45	7.76
	80	67						1350	45.71	32.72	0.73	3.45	13.24	7.76
								1550	46.43	34.52	0.75	3.55	13.07	7.89
	80	72						1350	48.67	27.34	0.56	3.49	13.96	7.89
								1550	49.27	28.57	0.58	3.60	13.70	8.01
105	60	55	Operation not recommended											
	70	60						1350	43.52	21.06	0.72	3.85	11.65	9.05
								1550	44.42	20.64	0.73	3.91	11.66	9.47
	75	62						1350	40.28	31.42	0.78	3.82	10.91	9.40
								1550	41.30	33.04	0.80	3.91	10.91	9.48
	80	57						1350	37.04	41.78	0.85	3.78	10.16	9.75
								1550	38.18	45.44	0.88	3.92	10.16	9.50
	80	62						1350	40.02	36.46	0.91	3.82	10.83	9.78
								1550	40.89	38.72	0.95	3.92	10.79	9.66
	80	67						1350	43.00	31.14	0.74	3.87	11.49	9.81
								1550	43.61	32.01	0.75	3.92	11.42	9.81
	80	72						1350	45.98	32.88	0.77	3.97	11.35	9.80
								1550	46.33	26.43	0.57	3.97	12.03	9.90
115	60	55	Operation not recommended											
	70	60						1350	41.20	20.08	0.73	4.28	9.96	10.52
								1550	41.42	20.79	0.76	4.36	9.82	11.31
	75	62						1350	37.75	30.07	0.80	4.23	9.25	11.27
								1550	38.51	31.74	0.83	4.32	9.23	11.35
	80	57						1350	34.30	40.06	0.87	4.18	8.53	12.02
								1550	35.59	42.70	0.90	4.28	8.65	11.39
	80	62						1350	37.30	34.81	0.94	4.23	9.14	11.94
								1550	38.19	36.97	0.97	4.33	9.13	11.55
	80	67						1350	40.30	29.55	0.75	4.29	9.74	11.86
								1550	40.79	31.24	0.78	4.39	9.62	11.72
	80	72						1350	43.29	24.30	0.56	4.34	10.34	11.79
								1550	43.39	25.51	0.59	4.44	10.11	11.89
125	60	55	Operation not recommended											
	70	60						1350	38.87	19.09	0.74	4.70	8.27	11.98
								1550	38.42	20.07	0.78	4.77	8.05	13.16
	75	62						1350	35.22	28.72	0.82	4.64	7.59	13.13
								1550	35.72	30.45	0.85	4.73	7.56	13.21
	80	57						1350	31.56	38.35	0.89	4.58	6.91	14.29
								1550	33.01	40.83	0.92	4.68	7.06	13.26
	80	62						1350	34.57	33.16	0.96	4.64	7.45	14.10
								1550	35.49	35.22	0.99	4.75	7.48	13.45
	80	67						1350	37.59	27.97	0.76	4.70	7.98	13.92
								1550	37.97	29.60	0.79	4.81	7.89	13.64
	80	72						1350	40.60	22.78	0.56	4.76	8.52	13.74
								1550	40.44	23.99	0.59	4.87	8.31	13.83

8/16/2022

Air Source Mode Performance Data cont.

NG*064 - High Speed (1800 CFM Heating and Cooling) - 1 of 2

OD DB Temp °F	ID Temp °F		HEATING					COOLING						
	DB	WB	Airflow CFM	HC MBtu/h	Power kW	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	EER	HWC Mbtu/h
5	60	55	1500	24.37	2.98	2.43	4.74	Operation not recommended						
			1800	25.17	3.09	2.42	4.19							
	70	60	1500	25.31	3.38	2.24	5.60							
			1800	25.07	3.24	2.29	5.60							
	75	62	1500	25.78	3.57	2.15	6.03							
			1800	25.03	3.32	2.23	6.31							
	80	57	1500	28.74	3.85	2.53	6.40							
			1800	28.41	3.69	2.59	6.44							
	80	62	1500	27.49	3.81	2.29	6.43							
			1800	26.70	3.54	2.38	6.73							
	80	67	1500	26.24	3.77	2.05	6.46							
			1800	24.98	3.40	2.17	7.01							
	80	72	1500	25.00	3.73	1.81	6.49							
			1800	23.27	3.26	1.95	7.29							
15	60	55	1500	31.42	3.26	2.80	4.96	Operation not recommended						
			1800	31.51	3.31	2.77	4.50							
	70	60	1500	30.98	3.56	2.56	6.05							
			1800	30.45	3.54	2.52	5.90							
	75	62	1500	30.76	3.71	2.43	6.60							
			1800	29.93	3.66	2.40	6.60							
	80	57	1500	35.08	4.06	2.88	6.93							
			1800	34.44	4.03	2.84	6.78							
	80	62	1500	32.81	3.96	2.59	7.04							
			1800	31.92	3.90	2.56	7.04							
	80	67	1500	30.53	3.87	2.31	7.15							
			1800	29.40	3.77	2.28	7.31							
	80	72	1500	28.26	3.77	2.02	7.25							
			1800	26.88	3.64	1.99	7.57							
25	60	55	1500	38.47	3.53	3.17	5.19	Operation not recommended						
			1800	37.85	3.54	3.11	4.81							
	70	60	1500	36.65	3.75	2.87	6.51							
			1800	35.84	3.84	2.75	6.20							
	75	62	1500	35.74	3.85	2.72	7.17							
			1800	34.83	3.99	2.57	6.90							
	80	57	1500	41.41	4.26	3.23	7.47							
			1800	40.48	4.37	3.09	7.13							
	80	62	1500	38.12	4.11	2.90	7.65							
			1800	37.15	4.26	2.74	7.36							
	80	67	1500	34.82	3.96	2.57	7.83							
			1800	33.82	4.14	2.39	7.60							
	80	72	1500	31.53	3.81	2.24	8.01							
			1800	30.49	4.02	2.03	7.84							
35	60	55	1500	45.92	3.69	3.65	5.41	Operation not recommended						
			1800	45.79	3.67	3.65	4.96							
	70	60	1500	43.97	4.02	3.23	6.77							
			1800	43.62	4.05	3.19	6.42							
	75	62	1500	42.99	4.18	3.02	7.46							
			1800	42.54	4.24	2.95	7.15							
	80	57	1500	49.70	4.57	3.63	7.77							
			1800	49.29	4.62	3.58	7.37							
	80	62	1500	45.86	4.46	3.22	7.96							
			1800	45.38	4.53	3.15	7.63							
	80	67	1500	42.02	4.34	2.81	8.14							
			1800	41.46	4.43	2.72	7.88							
	80	72	1500	38.18	4.23	2.40	8.33							
			1800	37.54	4.34	2.30	8.13							
45	60	55	1500	53.77	3.72	4.23	5.62	Operation not recommended						
			1800	55.32	3.71	4.37	4.96							
	70	60	1500	53.79	4.23	3.77	7.24							
			1800	53.82	4.18	3.83	6.55							
	75	62	1500	53.80	4.49	3.54	8.05							
			1800	53.07	4.41	3.56	7.35							
	80	57	1500	60.96	4.83	4.24	8.31							
			1800	60.89	4.77	4.30	7.53							
	80	62	1500	57.38	4.79	3.78	8.59							
			1800	56.60	4.71	3.80	7.83							
	80	67	1500	53.81	4.75	3.31	8.86							
			1800	52.31	4.65	3.29	8.14							
	80	72	1500	50.23	4.70	2.84	9.13							
			1800	48.03	4.59	2.78	8.45							
55	60	55	1500	62.74	3.99	4.60	5.95							
			1800	63.49	3.89	4.78	5.17							
	70	60	1500	62.35	4.54	4.08	7.63	1500	64.83	28.40	0.66	3.32	19.53	4.58
			1800	62.63	4.38	4.25	6.81	1800	64.50	27.59	0.69	3.58	17.96	4.92
	75	62	1500	62.15	4.81	3.82	8.47	1500	64.65	46.12	0.71	3.25	19.90	3.59
			1800	62.20	4.62	3.98	7.63	1800	65.28	49.26	0.75	3.45	18.91	4.43
	80	57	1500	70.64	5.18	4.59	8.76	1500	64.47	63.84	0.77	3.18	20.27	2.61
			1800	70.93	4.99	4.78	7.83	1800	66.05	70.94	0.82	3.32	19.87	3.95
	80	62	1500	66.30	5.13	4.08	9.03	1500	65.56	54.37	0.83	3.20	20.47	3.43
			1800	66.35	4.93	4.25	8.14	1800	66.35	59.23	0.89	3.35	19.81	4.37
	80	67	1500	61.96	5.09	3.56	9.31	1500	66.65	44.91	0.68	3.22	20.68	4.26
			1800	61.77	4.86	3.72	8.46	1800	66.66	47.52	0.71	3.37	19.76	4.79
	80	72	1500	57.62	5.04	3.05	9.58	1500	67.74	35.45	0.52	3.24	20.88	5.09
			1800	57.20	4.80	3.18	8.77	1800	66.96	35.81	0.53	3.40	19.70	5.21

7/13/2022

Air Source Mode Performance Data cont.

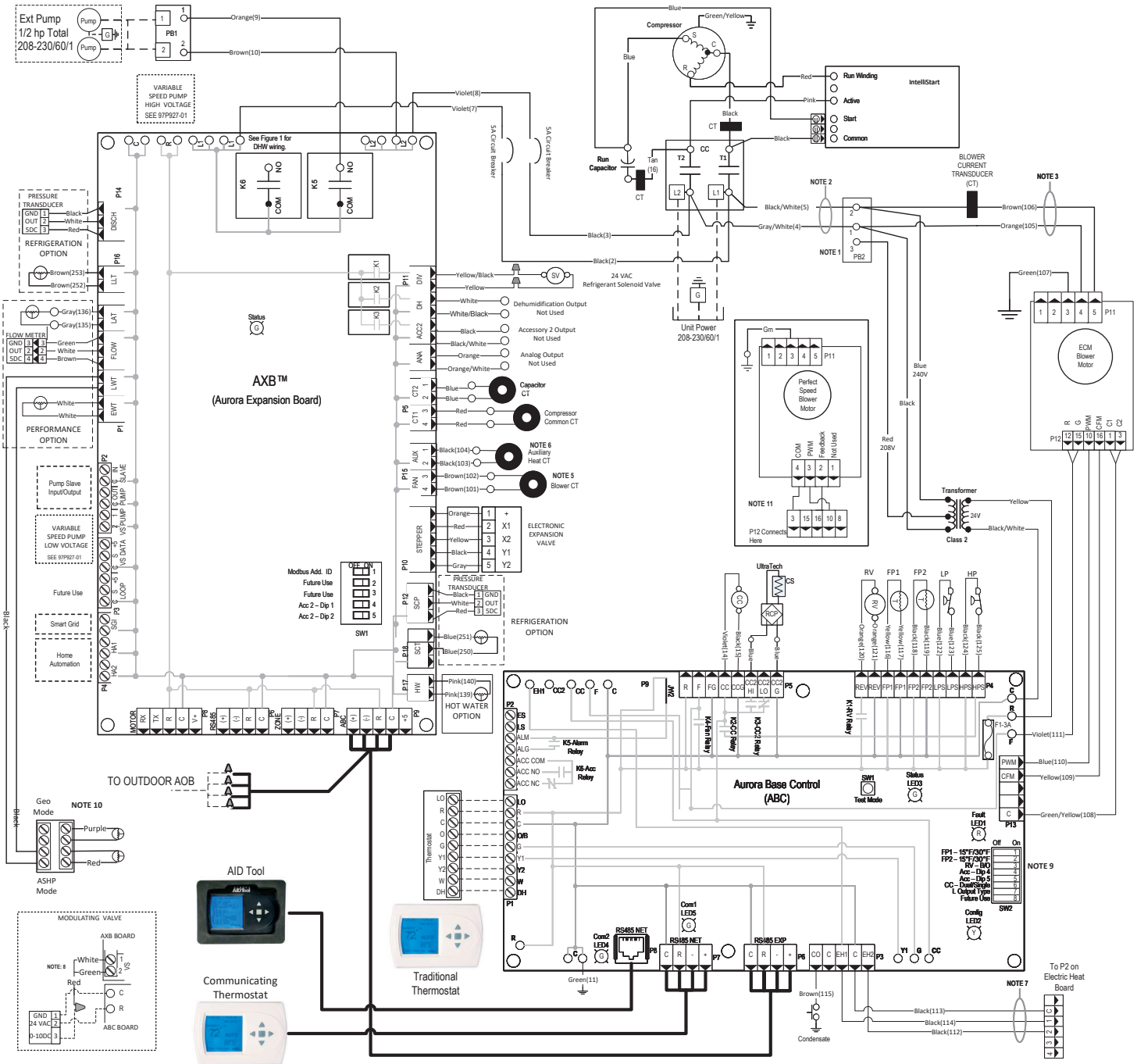
NG*064 - High Speed (1800 CFM Heating and Cooling) - 2 of 2

OD DB Temp °F	ID Temp °F		HEATING					COOLING						
	DB	WB	Airflow CFM	HC MBtu/h	Power kW	COP	HWC Mbtu/h	Airflow CFM	TC Mbtu/h	SC Mbtu/h	S/T Ratio	Power kW	EER	HWC Mbtu/h
65	60	55	1500	71.70	4.26	4.96	6.28							
			1800	71.67	4.07	5.19	5.38							
	70	60	1500	70.91	4.84	4.39	8.02	1500	63.22	27.72	0.66	3.66	17.75	5.82
			1800	71.45	4.57	4.66	7.07	1800	64.24	26.99	0.69	3.89	16.74	6.11
	75	62	1500	70.51	5.13	4.11	8.89	1500	62.20	45.01	0.72	3.59	17.90	4.99
			1800	71.34	4.83	4.40	7.92	1800	63.04	48.23	0.77	3.78	17.13	5.64
	80	57	1500	80.31	5.53	4.94	9.20	1500	61.18	62.30	0.79	3.52	18.05	4.17
			1800	80.96	5.22	5.25	8.13	1800	61.83	69.48	0.84	3.67	17.52	5.18
	80	62	1500	75.21	5.48	4.38	9.48	1500	62.98	53.35	0.85	3.55	18.36	4.85
			1800	76.10	5.15	4.69	8.45	1800	63.55	58.17	0.92	3.71	17.74	5.58
	80	67	1500	70.11	5.43	3.82	9.76	1500	64.77	44.40	0.69	3.58	18.67	5.53
			1800	71.23	5.08	4.14	8.77	1800	65.28	46.86	0.72	3.75	17.95	5.97
	80	72	1500	65.02	5.38	3.26	10.03	1500	66.56	35.45	0.53	3.62	18.99	6.21
			1800	66.37	5.01	3.58	9.09	1800	67.00	35.55	0.53	3.79	18.17	6.37
75	60	55	Operation not recommended											
	70	60						1500	61.61	27.03	0.67	4.01	15.96	7.07
								1800	63.97	26.38	0.69	4.21	15.52	7.30
	75	62						1500	59.76	43.89	0.74	3.93	15.89	6.40
								1800	60.79	47.20	0.78	4.11	15.35	6.86
	80	57						1500	57.90	60.76	0.80	3.85	15.83	5.73
								1800	57.61	68.01	0.86	4.02	15.18	6.41
	80	62						1500	60.39	52.33	0.87	3.90	16.25	6.26
								1800	60.76	57.11	0.94	4.07	15.67	6.78
	80	67						1500	62.88	43.89	0.71	3.94	16.67	6.80
								1800	63.90	46.20	0.74	4.12	16.15	7.15
	80	72						1500	65.37	35.46	0.54	3.99	17.10	7.33
								1800	67.04	35.30	0.53	4.17	16.63	7.52
85	60	55	Operation not recommended											
	70	60						1500	60.00	26.34	0.68	4.36	14.18	8.32
								1800	63.70	25.78	0.70	4.53	14.30	8.49
	75	62						1500	57.31	42.78	0.75	4.27	13.89	7.80
								1800	58.55	46.17	0.79	4.45	13.57	8.07
	80	57						1500	54.61	59.22	0.82	4.18	13.61	7.29
								1800	53.40	66.55	0.88	4.36	12.84	7.65
	80	62						1500	57.80	51.30	0.89	4.24	14.14	7.67
								1800	57.96	56.04	0.97	4.43	13.59	7.99
	80	67						1500	60.99	43.38	0.72	4.30	14.67	8.06
								1800	62.52	45.54	0.75	4.49	14.35	8.33
	80	72						1500	64.18	35.46	0.55	4.36	15.20	8.45
								1800	67.08	35.04	0.52	4.56	15.10	8.67
95	60	55	Operation not recommended											
	70	60						1500	58.39	25.65	0.68	4.71	12.39	9.57
								1800	63.44	25.18	0.70	4.84	13.08	9.68
	75	62						1500	54.86	41.67	0.76	4.61	11.89	9.21
								1800	56.31	45.13	0.80	4.78	11.79	9.28
	80	57						1500	51.32	57.69	0.84	4.52	11.39	8.85
								1800	49.18	65.08	0.90	4.71	10.50	8.88
	80	62						1500	55.21	50.28	0.91	4.59	12.03	9.09
								1800	55.16	54.98	0.97	4.79	11.52	9.19
	80	67						1500	59.10	42.87	0.74	4.66	12.67	9.33
								1800	61.14	44.88	0.76	4.87	12.54	9.50
	80	72						1500	62.99	35.46	0.56	4.73	13.31	9.57
								1800	67.12	34.79	0.52	4.95	13.56	9.82
105	60	55	Operation not recommended											
	70	60						1500	54.80	25.95	0.72	5.24	10.78	11.27
								1800	58.64	23.83	0.74	5.33	11.27	11.33
	75	62						1500	51.76	40.18	0.78	5.18	10.34	11.03
								1800	53.13	43.75	0.83	5.35	10.26	11.10
	80	57						1500	48.73	54.41	0.84	5.11	9.90	10.78
								1800	47.61	63.67	0.91	5.36	9.26	10.88
	80	62						1500	52.47	47.33	0.90	5.18	10.48	11.00
								1800	52.62	52.68	0.98	5.35	10.12	11.09
	80	67						1500	56.21	40.24	0.73	5.25	11.07	11.22
								1800	57.63	41.69	0.75	5.34	10.99	11.30
	80	72						1500	59.96	43.15	0.77	5.44	10.92	11.38
								1800	62.64	33.38	0.55	5.42	11.68	11.56
115	60	55	Operation not recommended											
	70	60						1500	51.21	26.25	0.75	5.77	9.16	12.98
								1800	53.85	25.39	0.77	6.01	9.31	13.13
	75	62						1500	48.67	38.70	0.80	5.74	8.79	12.84
								1800	49.95	42.37	0.85	5.92	8.73	12.92
	80	57						1500	46.13	51.14	0.84	5.71	8.41	12.71
								1800	46.05	59.35	0.93	5.82	8.16	12.71
	80	62						1500	49.73	44.38	0.89	5.77	8.93	12.91
								1800	50.08	50.38	0.99	5.92	8.73	12.99
	80	67						1500	53.33	37.61	0.72	5.83	9.46	13.12
								1800	54.12	41.41	0.78	6.01	9.30	13.26
	80	72						1500	56.92	30.85	0.54	5.89	9.99	13.32
								1800	58.16	32.44	0.56	6.11	9.87	13.54
125	60	55	Operation not recommended											
	70	60						1500	47.62	26.55	0.78	6.30	7.55	14.68
								1800	49.06	25.49	0.81	6.60	7.43	14.86
	75	62						1500	45.58	37.21	0.82	6.30	7.23	14.66
								1800	46.77	40.99	0.88	6.49	7.21	14.74
	80	57						1500	43.53	47.87	0.85	6.31	6.92	14.64
								1800	44.48	56.49	0.94	6.38	6.99	14.63
	80	62						1500	46.98	41.43	0.88	6.36	7.39	14.83
								1800	47.55	48.09	0.99	6.48	7.34	14.89
	80	67						1500	50.44	34.98	0.71	6.41	7.86	15.01
								1800	50.61	39.68	0.80	6.58	7.68	15.14
	80	72						1500	53.89	28.54	0.53	6.47	8.33	15.20
								1800	53.68	31.27	0.58	6.69	8.03	15.40

7/13/2022

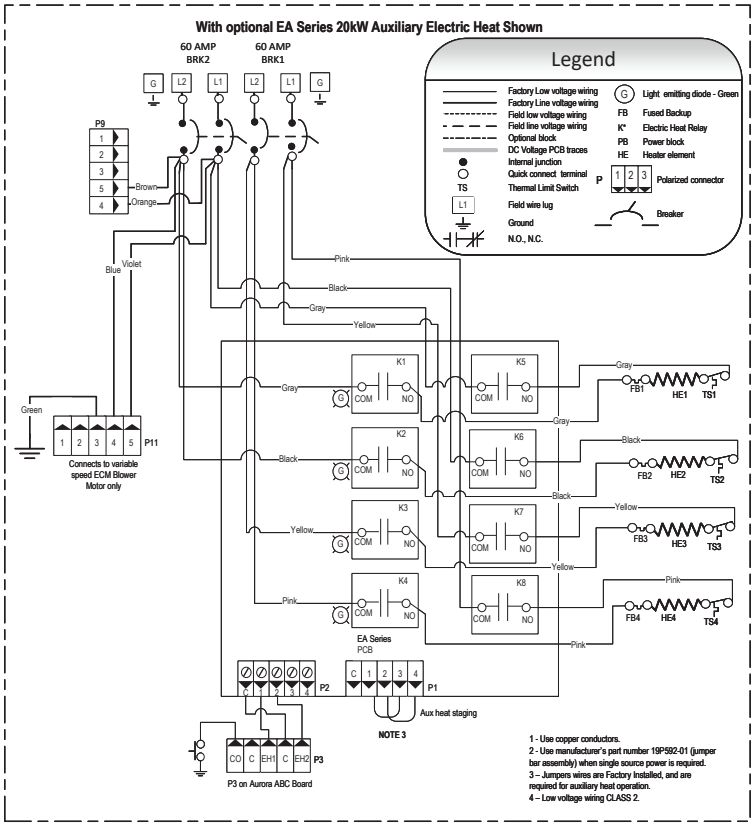
Wiring Schematics

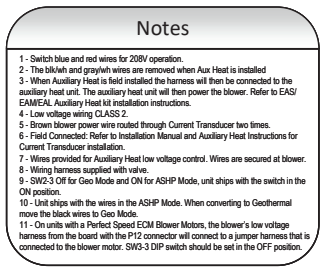
Aurora Advanced with ECM and IntelliStart

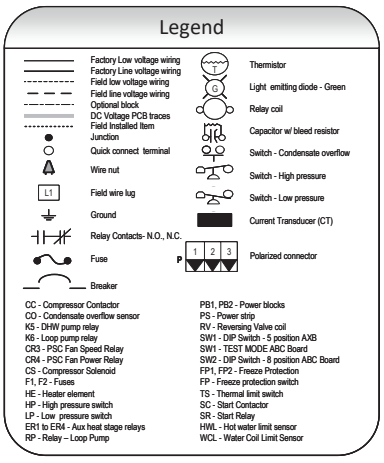


Wiring Schematics cont.

Aurora Advanced with ECM and IntelliStart cont.

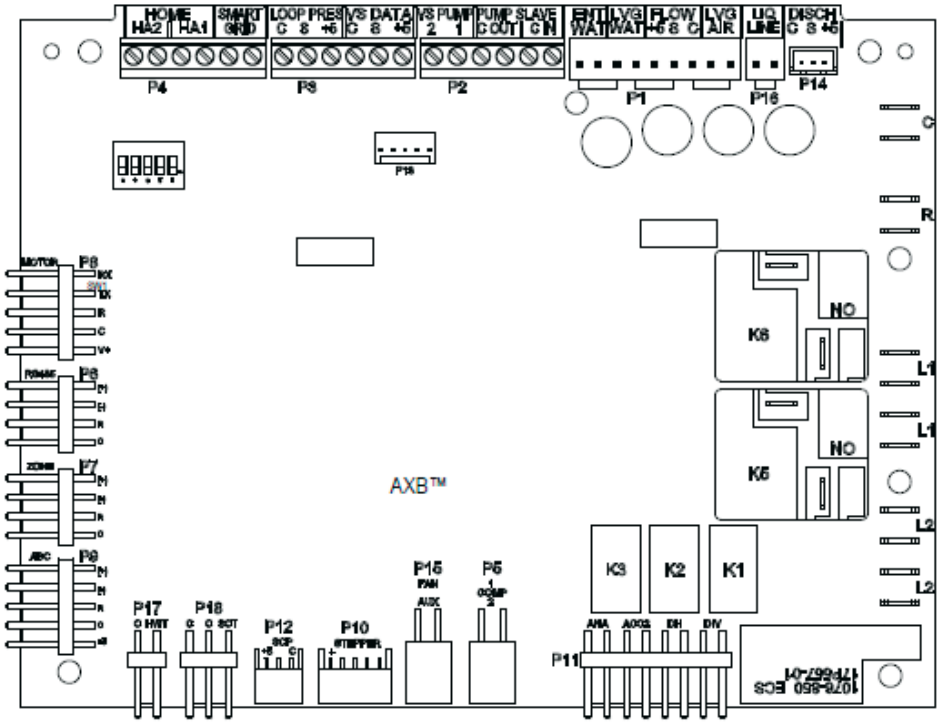






Wiring Schematics cont.

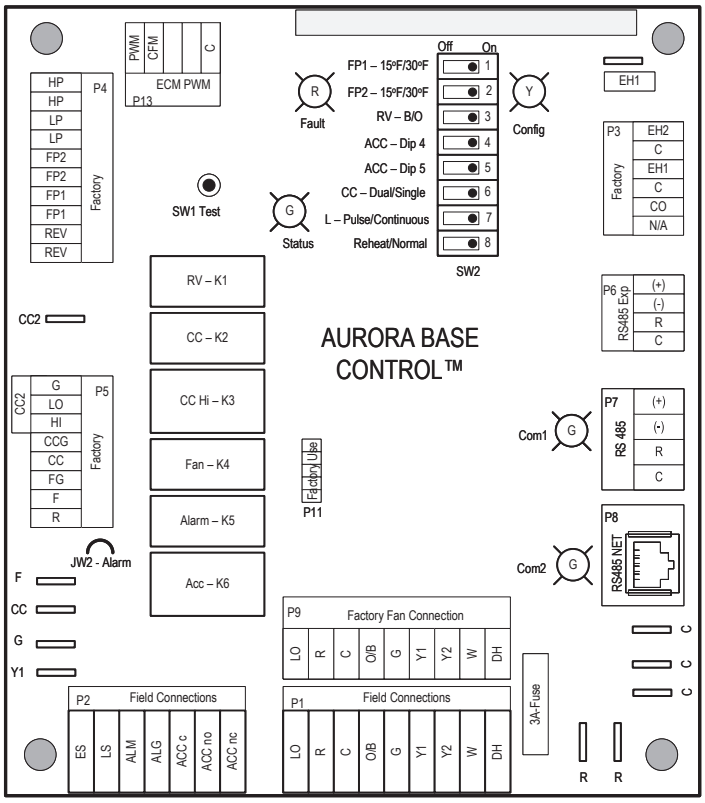
Aurora Advanced with ECM and IntelliStart cont.

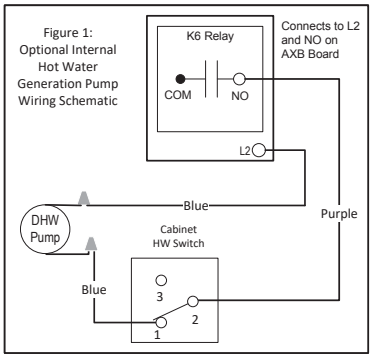


Aurora LED Flash Codes			
Slow Flash	1 second on and 1 second off		
Fast Flash	100 milliseconds on and 100 milliseconds off		
Flash Code	100 milliseconds on and 400 milliseconds off with a 2 second pause before repeating		
Fault LED (LED 1, Red)		**Random Start Delay (Alternating Colors)**	
Normal Mode	OFF	Status LED (LED1, Green)	Fast Flash
Input Fault Lockout	Flash Code 1	Configuration LED (LED 2, Yellow)	Fast Flash
High Pressure Lockout	Flash Code 2	Fault LED (LED 3, Red)	Fast Flash
Low Pressure Lockout	Flash Code 3	**Configuration LED (LED 2, Yellow)**	
Freeze Detection - FP2	Flash Code 4	No Software Overide	OFF
Freeze Detection - FP1	Flash Code 5	DIP Switch Overide	Slow Flash
Loss of Charge	Flash Code 6	**Status LED (LED 3, Green)**	
Condensate Overflow Lockout	Flash Code 7	Normal Mode	ON
Over/Under Voltage Shutdown	Flash Code 8	Control is Non - Functional	OFF
Future Use	Flash Code 9	Test Mode	Slow Flash
Compressor Monitoring	Flash Code 10	Lockout Active	Fast Flash
Fault- FP1 Sensor Error	Flash Code 11	Dehumidification Mode	Flash Code 2
Future Use	Flash Code 12	Future Use	Flash Code 3
Non-Critical AXB Sensor Error	Flash Code 13	Future Use	Flash Code 4
Critical AXB Sensor Error	Flash Code 14	Load Shed	Flash Code 5
Alarm - Hot Water	Flash Code 15	ESD	Flash Code 6
Fault Variable Speed Pump	Flash Code 16	Future Use	Flash Code 7
Future Use	Flash Code 17	**Fault LED (LED 1, Red) Cont.**	
Non-Critical Communication Error	Flash Code 18	Alarm - Home Automation 1	Flash Code 23
Fault - Critical Communication Error	Flash Code 19	Alarm - Home Automation 2	Flash Code 24
Alarm - Low Loop Pressure	Flash Code 21	Fault - EEV Error	Flash Code 25
Fault - Communication ECM Fan Motor Error	Flash Code 22	Outdoor Coil Temperature Sensor Failure	Flash Code 35
		Low Discharge Line Temperature	Flash Code 36
		High Discharge Line Temperature	Flash Code 42
		Outdoor Ambient Temperature Sensor Failure	Flash Code 49
		Discharge Temperature Sensor Failure	Flash Code 51
		Suction Pressure (EEV-1/EEV-2)	Flash Code 52
		Suction Temperature Sensor Failure (EEV-1/EEV-2)	Flash Code 72

Wiring Schematics cont.

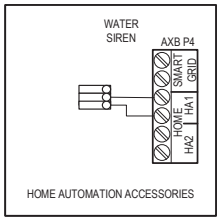
Aurora Advanced with ECM and IntelliStart cont.

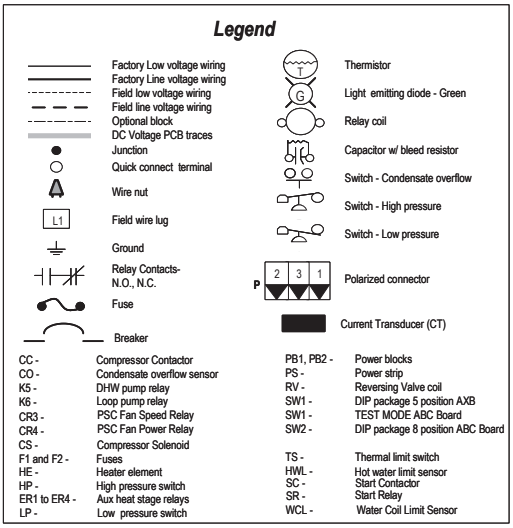




AXB Accessory 2 DIP Settings		
SW1-4	**SW1-5**	**DESCRIPTION**
ON	ON	Cycles with Blower
OFF	ON	Cycles with CC first stage compressor or compressor spd 1-12
ON	OFF	Cycles with CC2 second stage of compressor or comp spd 7-12
OFF	OFF	Cycles with DH from ABC board

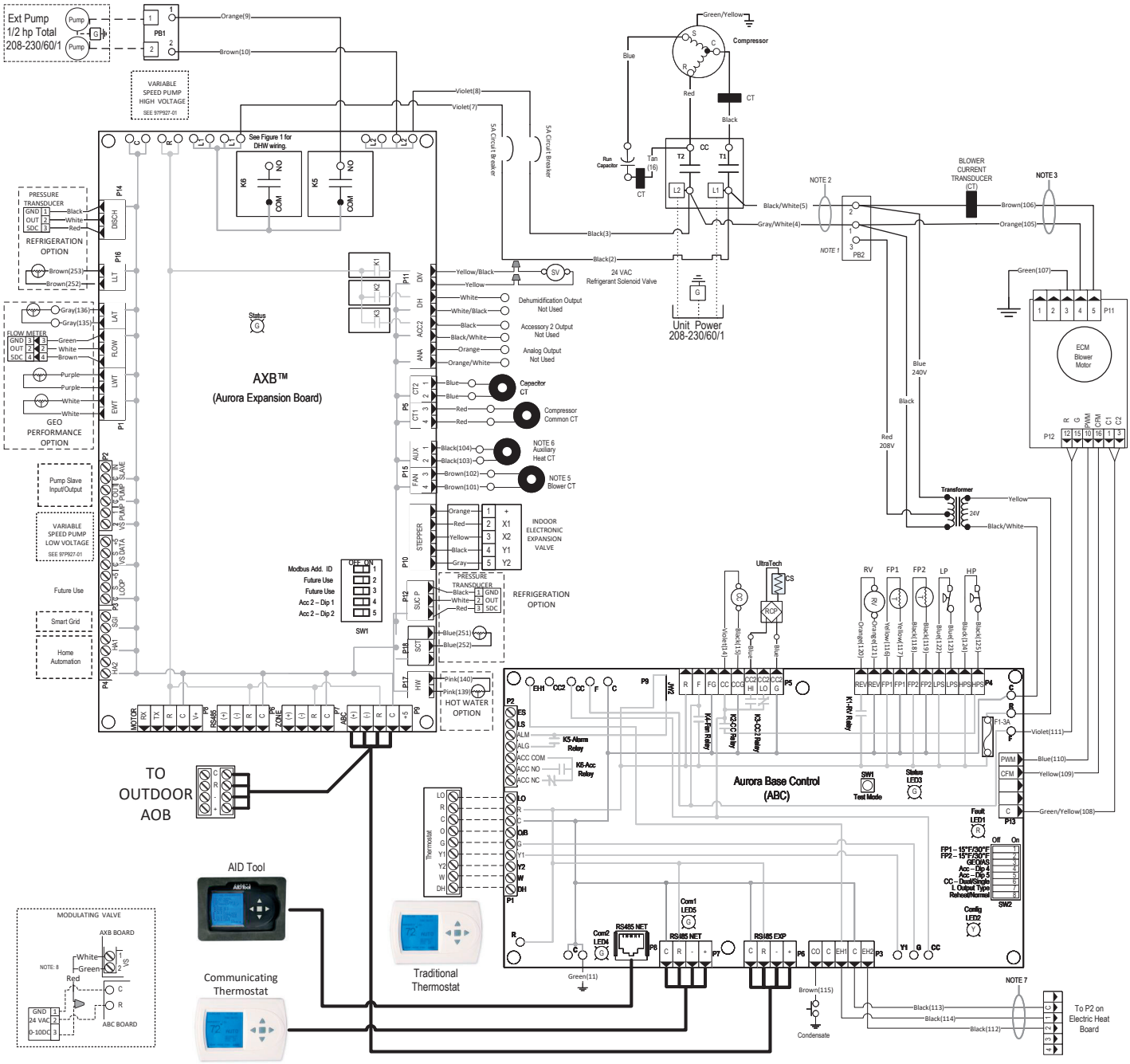
ABC SW2 Accessory Relay		
DESCRIPTION	**SW2-4**	**SW2-5**
Cycle with Blower	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
Cycle with Comm. T-stat Hum Cmd	OFF	ON





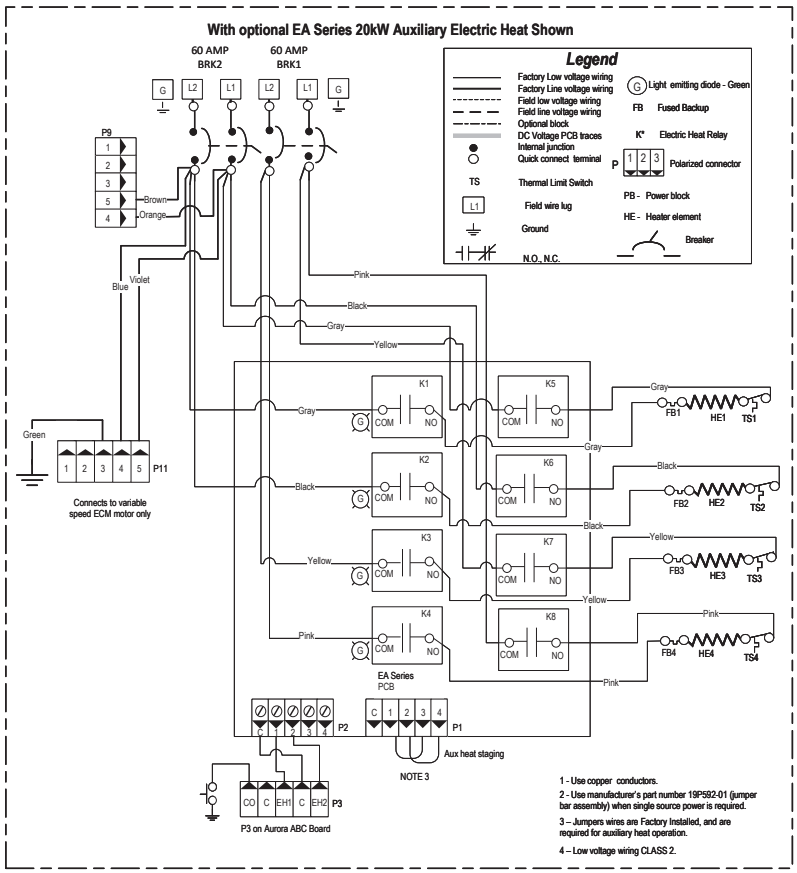
Wiring Schematics cont.

Aurora Advanced with ECM



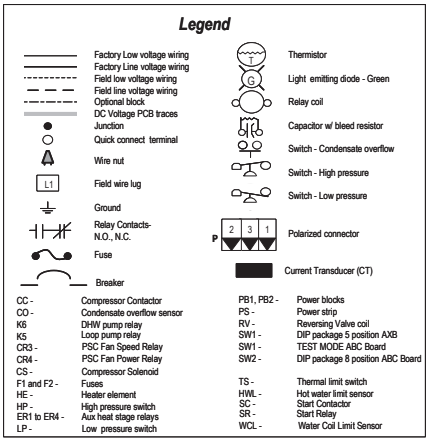
Wiring Schematics cont.

Aurora Advanced with ECM cont.



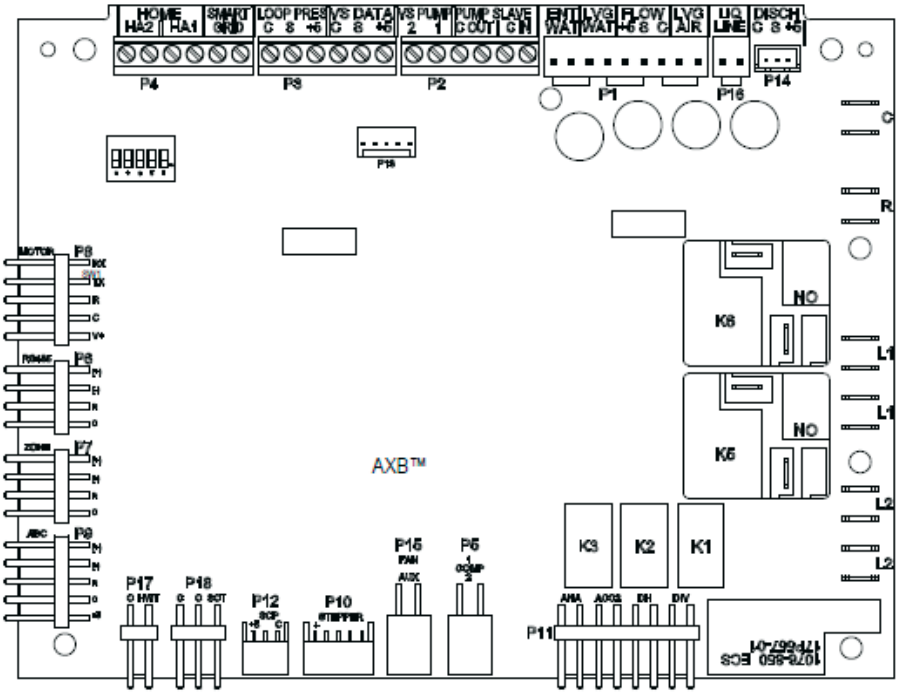
Notes

1 - Switch blue and red wires for 208V operation.
2 - The blk/wh and gray/wh wires are removed when Aux Heat is installed
3 – When Auxiliary Heat is field installed the harness will then be connected to the auxiliary heat unit. The auxiliary heat unit will then power the blower. Refer to EAS/EAM/EAL Auxiliary Heat kit installation instructions.
4 – Low voltage wiring CLASS 2.
5 – Brown blower power wire routed through Current Transducer two times.
6 – Field Connected: Refer to Installation Manual and Auxiliary Heat Instructions for Current Transducer installation.
7 - Wires provided for Auxiliary Heat low voltage control. Wires are secured at blower.
8 - Wiring harness supplied with valve.



Wiring Schematics cont.

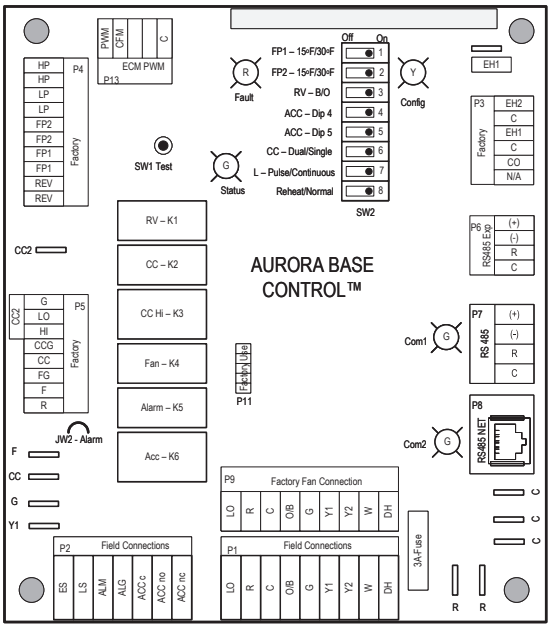
Aurora Advanced with ECM cont.

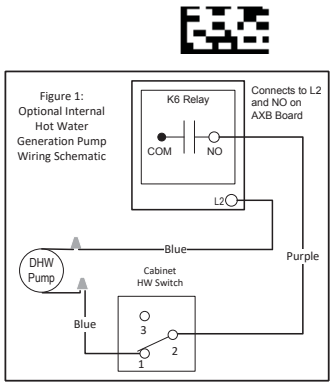


Aurora LED Flash Codes			
Slow Flash	1 second on and 1 second off		
Fast Flash	100 milliseconds on and 100 milliseconds off		
Flash Code	100 milliseconds on and 400 milliseconds off with a 2 second pause before repeating		
Fault LED (LED 1, Red)		**Random Start Delay (Alternating Colors)**	
Normal Mode	OFF	Status LED (LED1, Green)	Fast Flash
Input Fault Lockout	Flash Code 1	Configuration LED (LED 2, Yellow)	Fast Flash
High Pressure Lockout	Flash Code 2	Fault LED (LED 3, Red)	Fast Flash
Low Pressure Lockout	Flash Code 3	**Configuration LED (LED 2, Yellow)**	
Freeze Detection - FP2	Flash Code 4	No Software Overide	OFF
Freeze Detection - FP1	Flash Code 5	DIP Switch Overide	Slow Flash
Reserved	Flash Code 6	**Status LED (LED 3, Green)**	
Condensate Overflow Lockout	Flash Code 7	Normal Mode	ON
Over/Under Voltage Shutdown	Flash Code 8	Control is Non - Functional	OFF
Future Use	Flash Code 9	Test Mode	Slow Flash
Compressor Monitoring	Flash Code 10	Lockout Active	Fast Flash
Fault- FP1 Sensor Error	Flash Code 11	Dehumidification Mode	Flash Code 2
Future Use	Flash Code 12	Future Use	Flash Code 3
Non-Critical AXB Sensor Error	Flash Code 13	Future Use	Flash Code 4
Critical AXB Sensor Error	Flash Code 14	Load Shed	Flash Code 5
Alarm - Hot Water	Flash Code 15	ESD	Flash Code 6
Fault Variable Speed Pump	Flash Code 16	Future Use	Flash Code 7
Future Use	Flash Code 17	**Fault LED (LED 1, Red) Cont.**	
Non-Critical Communication Error	Flash Code 18	Alarm - Home Automation 1	Flash Code 23
Fault - Critical Communication Error	Flash Code 19	Alarm - Home Automation 2	Flash Code 24
Alarm - Low Loop Pressure	Flash Code 21	Fault - EEV Error	Flash Code 25
Fault - Communication ECM Fan Motor Error	Flash Code 22		

Wiring Schematics cont.

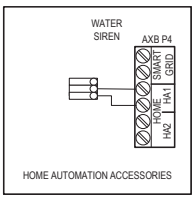
Aurora Advanced with ECM cont.

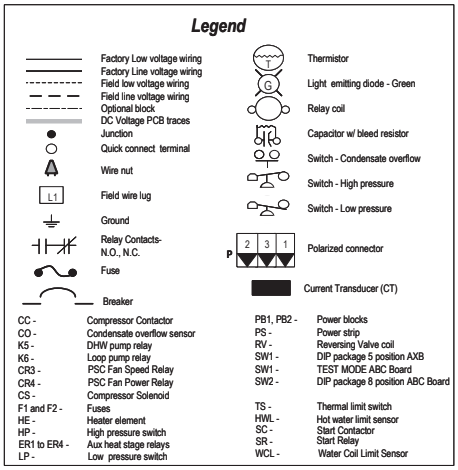




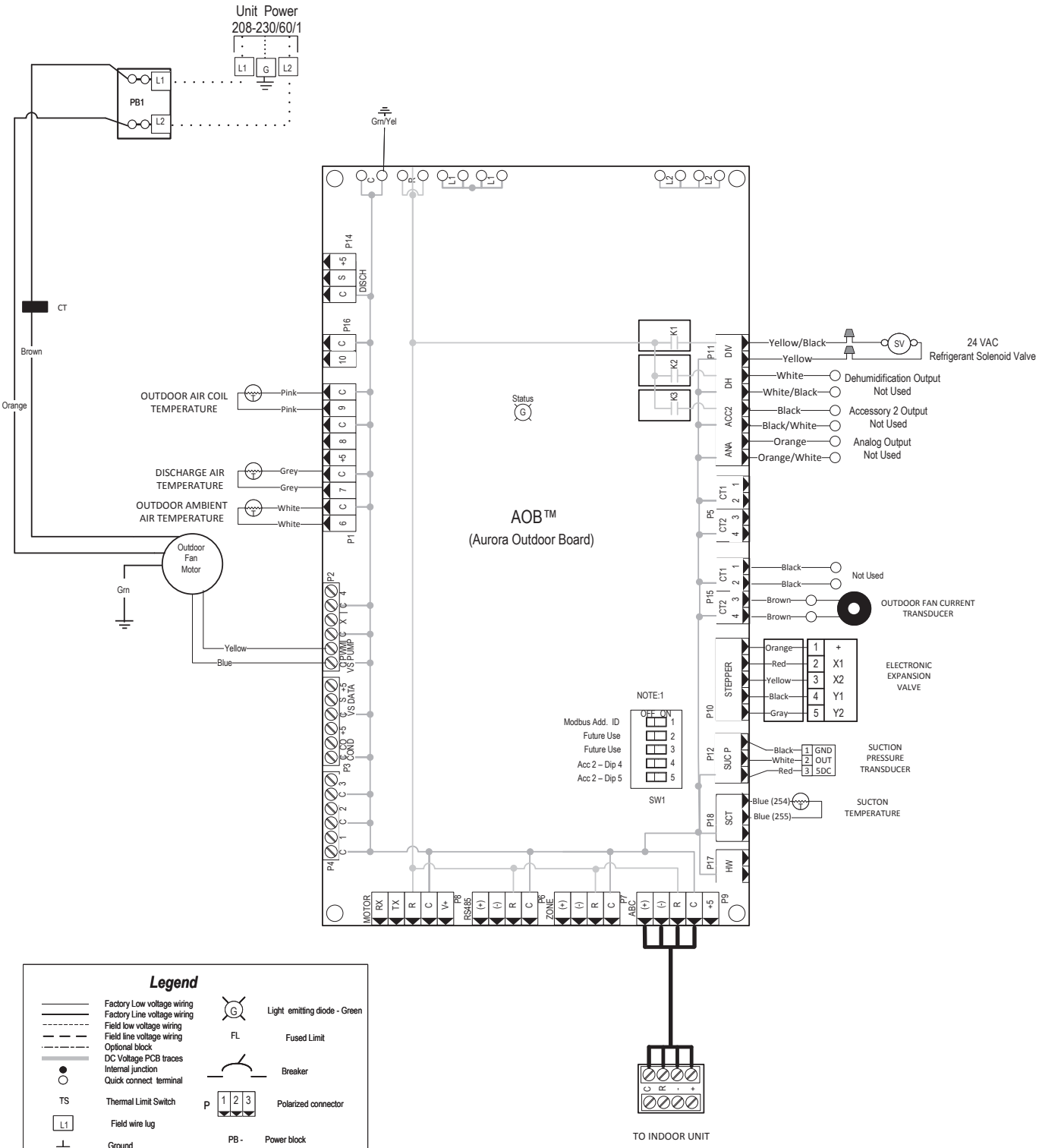
AXB Accessory 2 DIP Settings		
SW1-4	**SW1-5**	**DESCRIPTION**
ON	ON	Cycles with Blower
OFF	ON	Cycles with CC first stage compressor or compressor spd 1-12
ON	OFF	Cycles with CC2 second stage of compressor or comp spd 7-12
OFF	OFF	Cycles with DH from ABC board

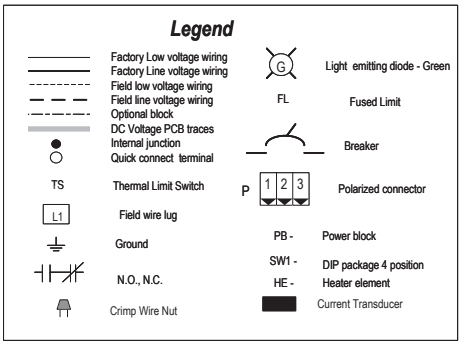
ABC SW2 Accessory Relay		
DESCRIPTION	**SW2-4**	**SW2-5**
Cycle with Blower	ON	ON
Cycle with Compressor	OFF	OFF
Water Valve Slow Opening	ON	OFF
Cycle with Comm. T-stat Hum Cmd	OFF	ON





Wiring Schematics





Notes:

1) SW1-5 must be in the off position

Engineering Guide Specifications

General

Furnish and install WaterFurnace Water/Air Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow. The reverse cycle heating/cooling units shall be either suspended type with horizontal air inlet and discharge or floor mounted type with horizontal air inlet and vertical upflow, downflow, or rear air discharge. Units shall be AHRI/ISO 13256-1 (for GLHP/WSHP) and AHRI 210/240 (for ASHP) certified and listed by a nationally recognized safety-testing laboratory or agency, such as ETL Testing Laboratory. Each unit shall be computer run-tested at the factory with conditioned water and operation verified to catalog data. Each unit shall be mounted on a pallet and shipped in a corrugated box or stretch-wrapped. The units shall be designed to operate with entering liquid temperature between 20°F and 120°F [-6.7°C and 48.9°C] for Geo Mode, and with entering air temperature between -6°F and 125°F [-21°C and 51.7°C] for Air Source Mode..

Casing and Cabinet

The cabinet shall be fabricated from heavy-gauge galvanized steel and finished with corrosion-resistant powder coating. The interior shall be insulated with 1/2-inch thick, multi-density, cleanable aluminum foil coated glass fiber with edges sealed or tucked under flanges to prevent the introduction of glass fibers into the discharge air. Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. Unit insulation must meet these stringent requirements or unit(s) will not be accepted.

One (horizontal) to two (vertical) blower and three compressor compartment access panels shall be 'lift-out' removable with supply and return ductwork in place. The front access panel shall be lift-out to provide easy access to the electrical/compressor section. The control box shall be hinged and removable to allow easy access to the compressor. The internal component layout shall provide for service access from the front side for restricted installations.

A duct collar shall be provided on the supply air opening. Standard size 2 in. [5.1 cm] MERV 11 pleated filters shall be provided with each unit. Vertical units shall have a return air filter rack/duct collar; the horizontal units shall have a filter bracket each field convertible from 2 in. [5.1 cm] to 1 in. [2.5 cm]. The upflow vertical (038-064) units shall have a removable insulated divider panel between the air handling section and the compressor section to minimize the transmission of compressor noise and to permit operational service testing without air bypass. Vertical units shall be supplied with left or right horizontal air inlet and top or bottom (038-064), air discharge. Horizontal units shall be supplied with left or right air inlet and side or end air discharge.

The compressor shall be double isolation mounted using selected durometer grommets to provide vibration free compressor mounting.

The indoor drain pan shall be of plastic construction to inhibit corrosion and bacterial growth. Drain outlet shall be located on pan as to allow complete and unobstructed drainage of condensate. The unit as standard will be supplied with solid-state electronic condensate overflow protection. Mechanical float switches WILL NOT be accepted. Vertical units shall be furnished with a PVC slip condensate drain connection and an internal factory installed condensate trap.

Refrigerant Circuit

All units shall contain a sealed refrigerant circuit including a hermetic motor-compressor, discharge line muffler (038-064), electronic expansion valve, finned tube air-to-refrigerant heat exchanger, reversing valve, coaxial tube water-to-refrigerant heat exchanger, optional hot water generator coil (038-064) solenoid valves, and service ports.

Compressors shall be high-efficiency dual capacity scroll type designed for heat pump duty and mounted on vibration isolators. Compressor motors shall be single-phase PSC with overload protection. The indoor finned tube air-to-refrigerant heat exchanger will be aluminum tube/fin or copper tube/aluminum fin and shall be sized for low-face velocity and constructed of lanced aluminum fins bonded to performance enhanced tubes in a staggered pattern not less than three rows deep for superior performance. The aluminum tube and fin air-to-refrigerant heat exchanger has as optional to be double electro-coated with AlumiSeal. Models 038-064 shall include discharge mufflers to help quiet compressor discharge gas pulsations. Refrigerant to air heat exchangers shall utilize enhanced tube construction rated to withstand 650psig (4482 kPa) refrigerant working pressure.

Engineering Guide Specifications cont.

The coaxial water-to-refrigerant heat exchanger shall be designed for low water pressure drop and constructed of a convoluted copper (cupronickel option) inner tube and a steel outer tube. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 600 psig (4135 kPa) working refrigerant pressure and 450 psig (3101 kPa) working water pressure. The electronic expansion valve shall provide proper superheat over the entire liquid temperature range with minimal "hunting." The valve shall operate bidirectionally without the use of check valves.

All units shall have the source coaxial tube refrigerant-to-water heat exchanger and the optional hot water generator coil shall be coated with ThermaShield. Refrigerant suction lines shall be insulated to prevent condensation at low liquid temperatures.

Outdoor Unit (Air Source Only)

The Outdoor Unit shall consist of a Copper Tube and Aluminum Fin Air Coil, a variable speed ECM Outdoor Fan Motor Assembly, an AOB (Aurora Outdoor Board), EEV, Solenoid Valve, Suction Pressure Transducer, Suction Temperature, Outdoor Coil Temperature, Outdoor Ambient Temperature, Discharge Air Temperature Sensors. The cabinet and corner posts shall be fabricated from heavy-gauge galvanized steel and finished with corrosion-resistant powder coating. Coil guards shall be installed to protect the Outdoor Air Coil from damage. The Outdoor Fan Motor Assembly shall consist of a Fan Guard for mounting the motor and Venturi Ring for proper airflow distribution across the coil. All components shall meet the UL-1995 Safety Standard.

Blower Motor and Assembly

The blower shall be a direct drive centrifugal type with a dynamically balanced wheel. The housing and wheel shall be designed for quiet low outlet velocity operation. The blower housing shall be removable from the unit without disconnecting the supply air ductwork for servicing of the blower motor. The blower motor shall be a variable-speed ECM type. The Variable Speed ECM blower motor shall be soft starting, shall maintain constant cfm over its operating static range, and shall provide 12 cfm settings. The blower motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermostatic overload protection. Variable Speed ECM motors shall be long-life ball bearing type.

Electrical

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer, 24 volt activated, 2 pole compressor contactor, circuit breakers for protecting loop pumps, terminal block for thermostat wiring, and solid-state controller for complete unit operation. Electromechanical operation WILL NOT be accepted. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 volt and provide heating or cooling as required by the remote thermostat/sensor. An Aurora, a microprocessor-based controller, interfaces with a multi-stage electronic thermostat to monitor and control unit operation shall be provided. The control shall provide operational sequencing, blower speed control, blower failure, high and low pressure switch monitoring, freeze detection, hot water limit thermistor sensing, condensate overflow sensing, auxiliary heat staging, lockout mode control, hot water and loop pump control, LED status and fault indicators, fault memory, field selectable options, and accessory output. The Lockout signal output shall have a pulsed option so that DDC systems can read specific lockout conditions from the control.

The Aurora Advanced Control shall also feature an Energy Monitoring Package that will provide real time total power consumption, compressor monitoring, On Peak input signal for utility controlled demand programs, intelligent hot water generation with user adjustable temperature limit, loop pump linking for multiple units driving a common flow center and up to two optional home automation inputs to drive dedicated alarms for sump pump, security system, and smoke/CO_2 or dirty air filter sensors. Optional Refrigerant and Performance Monitoring (N/A air source mode) kits to provide real time data including refrigerant superheat and subcooling, as well as heat of extraction/rejection capacity data. The capability for communicating to advanced IntelliZone2 zoning packages with up to 6 zones (Variable Speed), 4 zones (Dual Capacity), or 2 zones (Single Speed) shall also be provided with complete fault and information display on the zoning MasterStat.

A detachable terminal block with screw terminals will be provided for field control wiring. All units shall have knockouts for entrance of low and line voltage wiring. The blower motor and control box shall be harness plug wired for easy removal.

An optional Aurora Interface Diagnostic (AID) Tool shall communicate with the Aurora control allowing quick and easy access to setup, monitoring, and troubleshooting of any Aurora control. The device shall include the features of ECM airflow setup, fault description and history, manual operation capability, sensor readings, timings, and other diagnostic tools.

Engineering Guide Specifications cont.

Optional IntelliStart® (compressor Soft Starter) shall be factory installed for use in applications that require low starting amps, reduced compressor start-up noise, off-grid, and improved start-up behavior. IntelliStart shall reduce normal starting current by up to 60%.

Piping

Supply and return water connections shall be 1 in. [25.4 mm] FPT brass swivel fittings, which provide a union and eliminate the need for pipe wrenches and sealants when making field connections. The optional hot water generator shall have sweat type connections. All water piping shall be insulated to prevent condensation at low liquid temperatures, on the vertical units, the condensate connection shall be a 3/4 in. [19.1 mm] PVC socket with internally-trapped hose that can be routed to front or side locations.

Hanger Kit

(field-installed horizontal units only)

The hanger kit shall consist of galvanized steel brackets, bolts, lock washers, and isolators and shall be designed to fasten to the unit bottom panel for suspension from 3/8-inch threaded rods. Unit sizes 038-064 shall include six brackets.

Options and Accessories

Cupronickel Heat Exchanger

An optional cupronickel water-to-refrigerant heat exchanger shall be provided.

Hot Water Generator

An optional ThermaShield coated heat reclaiming hot water generator coil of vented double-wall copper construction suitable for potable water shall be provided. The coil and hot water circulating pump shall be factory mounted inside the unit with integral electronic high limit temperature monitoring and external on/off switch.

Thermostat (field-installed)

A multi-stage auto-changeover electronic digital thermostat shall be provided. The thermostat shall offer three heating and two cooling stages with precise temperature control. An OFF-HEAT-AUTO-COOL-EMERG system switch, OFF-AUTO blower switch, and indicating LEDs shall be provided. The thermostat shall display in °F or °C. The thermostat shall be either a communicating type or a traditional 24 VAC type.

Communicating Thermostat (field-installed)

A communicating auto-changeover electronic digital thermostat shall be provided. The thermostat shall offer variable speed heating and cooling staging with precise temperature control. An OFF-HEAT-AUTO-COOL-EMERG system switch, OFF-AUTO blower switch, and indicating display shall be provided. The thermostat shall display in °F or °C. The thermostat shall provide real time energy consumption data of the unit.

Communicating Color Touchscreen Thermostat (field-installed)

A color touchscreen communicating auto-changeover electronic digital thermostat shall be provided. The thermostat shall offer variable speed heating and cooling staging with precise temperature control. An OFF-HEAT-AUTO-COOL-EMERG system switch, OFF-AUTO blower switch, and indicating display shall be provided. The thermostat shall display in °F or °C. The thermostat shall provide real time and historical energy consumption data of the unit.

Electronic Air Cleaner (field-installed)

A 1 in. [25 mm] electronic air cleaner, cleanable 97% efficiency at 0.3 microns and larger, shall be provided in lieu of the standard throwaway filter. The initial pressure drop across the filter shall not exceed 0.2 in. w.g. at 300 fpm force velocity.

Electrostatic Air Cleaner (field-installed)

A 1 in. [25 mm] electrostatic air cleaner, cleanable 90% efficiency, shall be provided in lieu of the standard throwaway filter. The initial pressure drop across the filter shall not exceed 0.15 in. w.g. at 300 fpm force velocity.

AlpinePure 411–Rack 4 in. Pleated Filter Accessory

A 4 in. [102 mm] thick MERV 11 filter and filter rack shall be provided in lieu of the standard filter and rack.

Engineering Guide Specifications cont.

AlpinePure MERV 13 Filter

A 2 in. [50 mm] thick MERV 13 filter shall be provided in lieu of the standard filter and fits the factory filter rack. The filter maintains MERV 13 rating in full ASHRAE 52.2 independent testing as required for LEED® certification. Helps fulfill a full credit under the LEED rating system.

AlpinePure Drain Pan Treatment

Provides dependable, sustained time-release protection from slime build-up and foul smelling odors in the drain pan. Also adds a light, pleasant scent to the air.

Earth Loop Flow Center (field-installed)

A self-contained module shall provide all liquid flow, fill and connection requirements for ground source closed loop systems up to 20 gpm. The pumps shall be wired to a power block located in the nearest unit. The heat pump units shall contain low voltage pump linking control so that two units may share one flow center.

Auxiliary Heater (field-installed)

An electric resistance heater shall provide supplemental and/or emergency heating capability. Vertical units shall have the control panel and resistance heater coil assembly mounted internally. For horizontal units, the control panel shall be mounted internally while the resistance heater coil assembly shall be mounted externally. A low voltage plug shall be provided in each unit for quick auxiliary heat connection. The heater shall operate in sequenced stages as controlled by the unit's microprocessor. The heater shall feed line voltage power to the unit blower and transformer to provide emergency heat capability in the event of an open compressor circuit breaker.

Symphony/Aurora Weblink

Symphony is a Wi-Fi enabled smart comfort system for your geothermal heat pump that is unsurpassed in its ease of use, feature set and capability. Symphony marries the sophisticated Aurora controls of your WaterFurnace Geo-Ready System with a web enabled Aurora Weblink Router giving you access to your comfort heat pump from practically anywhere. Symphony is cloud-based and includes your whole system and isn't limited to just the thermostat as in other 'smart thermostat' systems. Symphony web-portal provides control over every aspect of your geothermal heat pump including:

- View your system's operation from anywhere. Great for vacation or second homes.
- Dashboard for quick review of operation, alerts and energy use (if installed).
- Smart Device capability
- Modify your zone temperature setpoints and programs remotely
- IntelliZone2 zoning system compatible to access up to 6 zone thermostats with variable speed, 4 zones with dual capacity, and 2 zones with single speed geothermal heat pumps.
- Observe and track WaterFurnace energy use for the last 13 months (if installed).
- Receive equipment alerts and service reminders (as well as your dealer) via email and texts
- Monitor earth loop and air temperature of your geothermal heat pump directly (if installed).
- Utilize a 'wireless' thermostat system with no visible thermostats using a smart device. By mounting a communicating thermostat in a closet with external mud-in sensor located in the living space, a smart device can be used as a wireless thermostat for the ultimate in flexibility (TPCC32U01, TPCM32U03A, TPCM32U04A, or MasterStat only)

External Sump Alarm Sensors for Aurora Controls

The sensor (field supplied) can be added to any Aurora Advanced Control System (including both ABC and AXB) to monitor a sump pump. The sensor can be connected to the Aurora Home Automation inputs (HA-1 or HA-2) of the AXB board. These will each display an E23 and E24 code respectively when the alarm is active and when Symphony/AWL is installed will also produce text/e-mail notifications.

- This sensor provides a relay closure that can be used to trip a fault when moisture is present. This can be used as a primary sump alarm or simply a wet basement or signal a blown washing machine hose.

Revision Guide

Pages:	Description:	Date:	By:
All	Document Creation	24 Feb 2023	JM
All	Geo-Ready™ updated to Geo-Ready®	18 July 2024	SW

Smarter from the Ground Up™

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PROUD MEMBER

SC2510EW 07/24