Technical Support
MUA Start-Up Report
Data & Analysis

GREENHECK
Building Value in Air.

Job Information

Job Name: _____

Unit Sales Order Number: _____

Unit Serial Number: _____

Technician Information

Startup Company: _____

Technician Name: _____

Startup Date: _____

This report consists of recorded data as observed by a Greenheck certified technician on the date indicated. The data is generated by a series of tests of the individual sub-systems within the air handler. The entire system (with all sub-systems functional) is tested to observe proper operation of the standard sequences within the completed air system of the occupied space. The air handler itself has been engineered to meet criteria specified by the owner but field conditions often vary from design specifications. During the course of this startup, the Greenheck certified technician will make needed minor adjustments to operating parameters to produce the desired operating characteristics. The testing of this unit is based upon completed installation of the unit. All associated ductwork is to be intact and completed. A completed Pre Startup Checklist is to be furnished by the installer prior to the unit startup.

REQUIRED TOOLS

- Voltmeter
- Screwdrivers (Phillips & flathead)
- Metric hex keys
- Manometer
- Amperage Meter
- Temperature probes
- Pressure gauges & barb fittings

Because field conditions may change after the startup testing of this unit, the recorded data points are subject to change.

As each sub-system is isolated and tested, critical data is observed and recorded. This data should be preserved as a benchmark, to be used by others for purposes of normal maintenance and for possible trouble-shooting of the system. Due to seasonal ambient conditions, it may not be possible to test full operational ranges of all subsystems.

All data is analyzed by the Greenheck certified technician and anomalies are recorded in the “Notes” portion of each sub-system. The analysis on the final page of this report indicates whether the system operates as intended and may make recommendations regarding potential areas of concern.

Table of Contents

MUA Exterior Inspection

Exterior Air Handler Inspection

Yes	No	N/A	
☐	☐	☐	Is there shipping damage present? If yes, please send pictures to technical support at tap@greenheck.com.
☐	☐	☐	Do all seams have caulking present?
☐	☐	☐	Do all access doors and handles open properly? Loosen set screw locking before turning handle.
☐	☐	☐	Are all hoods, louvers, and bird screens secure?
☐	☐	☐	Are all shipping covers removed (shipping wrap, duct covers)?
☐	☐	☐	Are unit clearances adequate for service and operation as stated in IOM?
☐	☐	☐	Is all ductwork connected and sealed properly?
☐	☐	☐	Are drain connections and traps present and fabricated in accordance with the IOM?
☐	☐	☐	Is freeze protection present on drains and traps?
☐	☐	☐	Are all hardware fasteners tightened?

MUA Interior Inspection

Yes	No	N/A	
☐	☐	☐	Is there shipping damage present?
☐	☐	☐	Do all seams have caulking present?
☐	☐	☐	Are the interior and drain(s) free of construction debris?
☐	☐	☐	Are all damper seals present?
☐	☐	☐	Are all hardware fasteners tightened?
☐	☐	☐	Do all blower wheels spin freely and smoothly when rotated by hand?
☐	☐	☐	Are all major component hardware tightened?
☐	☐	☐	Are all shipped loose items removed from interior?
☐	☐	☐	Are all air filters present? ☐ Outside Air ☐ Supply Air ☐ Return

Control Panel Documentation

*Perform the following inspections with the main disconnect OFF.

Yes	No	N/A	
☐	☐	☐	Is the touchscreen display and cable present?
☐	☐	☐	Are all control wiring connections secure? Perform wire tug test.
☐	☐	☐	Are all field-wired sensors landed (pressure, fire, smoke, temperature, touchscreen)?
☐	☐	☐	Is wiring schematic on cabinet door? If wiring diagram is not legible, email tap@greenheck.com.

Supply Power Inspection

☐ Inspect all electrical connections ☐ Phasing correct

Main Voltage		Rated Voltage
L1 - L2		
L2 - L3		
L1 - L3		

Note to owner: Although the motors and electronic devices in this unit can tolerate some variation in the actual supplied voltage relative to the rated voltage, these variations are always a concern. Variations in excess of **+/- 4%** may result in shortened component life, elevated operating temperatures and/or inconsistent performance. Whenever the supplied voltage varies from the rated voltage by more than this amount, preventive maintenance should be enhanced to include an aggressive inspection of VFDs and electric motors. It is recommended that if the supplied voltage varies by more than this amount, an electrical contractor be engaged to discover the problem and correct it.

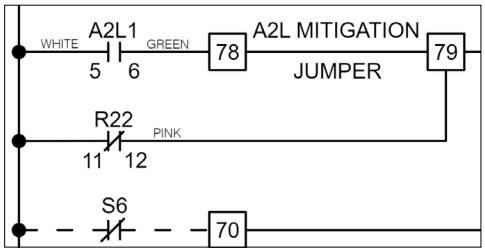
Yes	No	
☐	☐	Does line voltage match rated voltage?
☐	☐	Is the line voltage wired correctly into the main disconnect?
☐	☐	Does the supply voltage in this unit vary from the rated voltage by more than +/- 4%?

Refrigerant Leak Detection System

Unit equipped with refrigerant leak detection sensors. In the event of a leak in the air tunnel, the unit will move stagnant refrigerant from within the unit, duct, and space ensuring proper dilution. Alarm outputs available for monitoring and external action requirements which includes opening of zone dampers in the ductwork, disabling duct-mounted electric resistance heaters, and/or enabling mechanical ventilation if required. These outputs are available to the building management system or through hardwire mitigation system contacts in the unit control section. Verification of the mitigation system response must be performed at start-up by removing the A2L mitigation test jumper found in the control section of the unit. Additional testing may be required by local code. The refrigerant sensors installed in the appliance will initiate a safety sequence if a leak is detected. Maintain that the sensor is free of any dust or other contaminants. The alarm status is available in the form of an electronic signal from the appliance controller and a relay dry contact suitable for building safety sequences.

Building Fire Alarm Shutdown

Unit is equipped with a building fire alarm relay. The building fire alarm contacts or jumper wire (remove jumper if using fire alarm later, leave if no fire alarm will be used) need to land across terminal “R” and “70” before equipment operation is allowed. Please refer to local codes and AHJ (Authorities Having Jurisdiction) for your job requirements. See image on the right.



A2L Refrigerant Mitigation Sequence

Unit is equipped with A2L mitigation sequence. To test proper function of mitigation sequence, remove A2L test jumper from equipment terminal blocks 78/79. See image on the right.

Using Manual Overrides to Complete Startup

To enter manual override mode to test individual unit components, follow these steps:

1. Ctrl Variables
2. Advanced
3. Login
   (Enter password 1000 or 9998 and the controller will auto boot you back to the “Advanced Menu” after a couple of seconds)
4. Manual Overrides

Before overriding the unit to the On position (Figure 2) make sure ALL components not currently being tested are set to Manual Off.

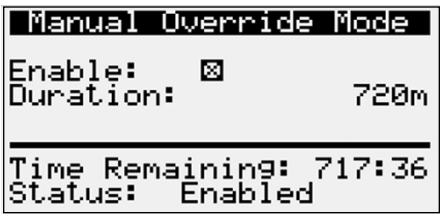


Figure 1 - Enable Manual Override Mode

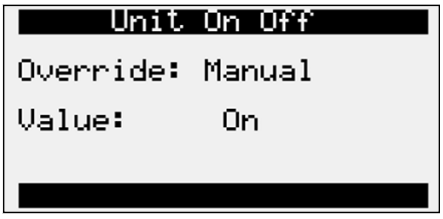


Figure 2 - Manually Override Unit On

Dampers and Actuators Functional Test

Open Smooth, Close Tight?	Match Control Command?	N/A	
☐	☐	☐	Outside Air?
☐	☐	☐	Recirculation Air?

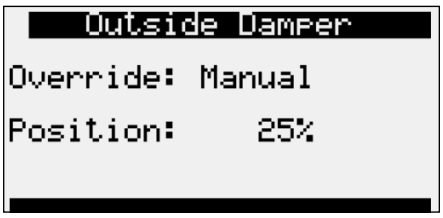


Figure 3 - Manually override damper to 25% as shown

Blowers and Blower Motors

Supply Air Blower and Motor

Fan 1	Fan 2	
☐	☐	Check all fasteners, set screws and locking collars.
☐	☐	Check bearing alignment and lubrication.
☐	☐	Check for correct rotation direction.
☐	☐	Overloads set to 100-115% of motor nameplate FLA.

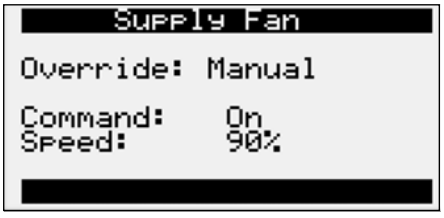
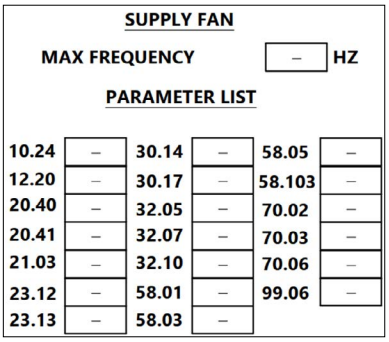


Figure 4 - Manually Overriding the Supply Fan on (Leave the damper overridden to its open position when testing fans, to avoid pressure issues).

Supply & Exhaust Fan Performance

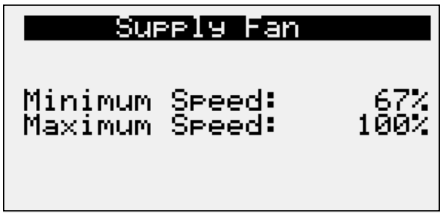
From main controller menu, scroll down to find ABB VFD 1 Status, record values. Scroll down if equipped with a second supply VFD or exhaust VFD to record those values.

	ABB VFD 1	ABB VFD 2	ABB VFD 3
Device			
Speed (RPM/HZ)			
Current			
Torque			
Bus			
Output			
KWH Count			



Fan Speed Adjustments

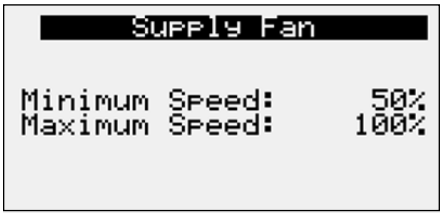
Locate parameter listing on the exterior of the unit. The values shown are factory modified parameters.



To reduce fan speed, navigate Carel as shown below.

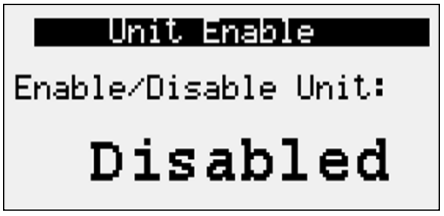
A minimum of 50% of air flow is required for proper heating/cooling performance. A minimum of 67% is required if unit is a DGX model.

Control Variables> Fan Control> Supply Fan



To increase fan speed above design, VFD adjustment will be required:

- 12.20 = Frequency at 10vdc input. Increase/decrease to match target frequency.
- 30.14 = Maximum Frequency. Increase/decrease to match target max frequency.
- 99.06 = Motor FLA. Adjust within service factor if needed.
- 96.07 = Save Settings. Change to a 1 to save. Will resort back to 0 once saved.



How to Navigate ABB ACH-180 VFD

Disable the MUA – Press target button and navigate to unit enable. Switch to disabled.

How to Navigate ABB ACH-180 VFD

1. Press “OK” on main screen.

2. Navigate to parameters (option 5) and press “OK”.

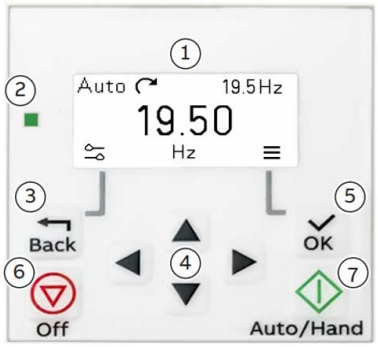
3. Option 1 (top left) is a complete parameter list. Option 2 (top right) is factory modified parameter list.

4. Navigate to parameter group to modify settings.

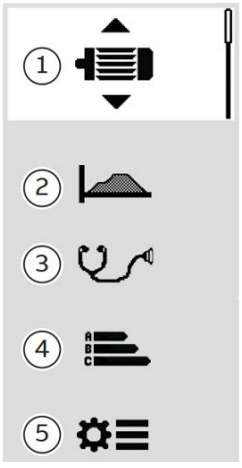
5. Once complete, navigate to parameter 96.07 and change to “1” to save changes.

Control panel

By default, ACH180 has an integrated control panel. You can also use an external control panel. For more information, refer to ACS-AP-I, -S, -W and ACH-AP-H, -W Assistant control panel's user's manual (3AUA0000085685 [English]).



1. Display. Shows the **Home** view as default.
2. Status LED. Green and red colors indicate the state and potential problems.
3. **Back** key. Opens the **Options** view.
4. Arrow keys for menu navigation and setting values.
5. **OK** key. Opens the **Menu** in the **Home** view.
6. **Off** key. Stops the drive and switches to the Off mode.
7. **Auto/Hand** key. Opens a selection screen view that allows the user to select between Auto and Hand modes.

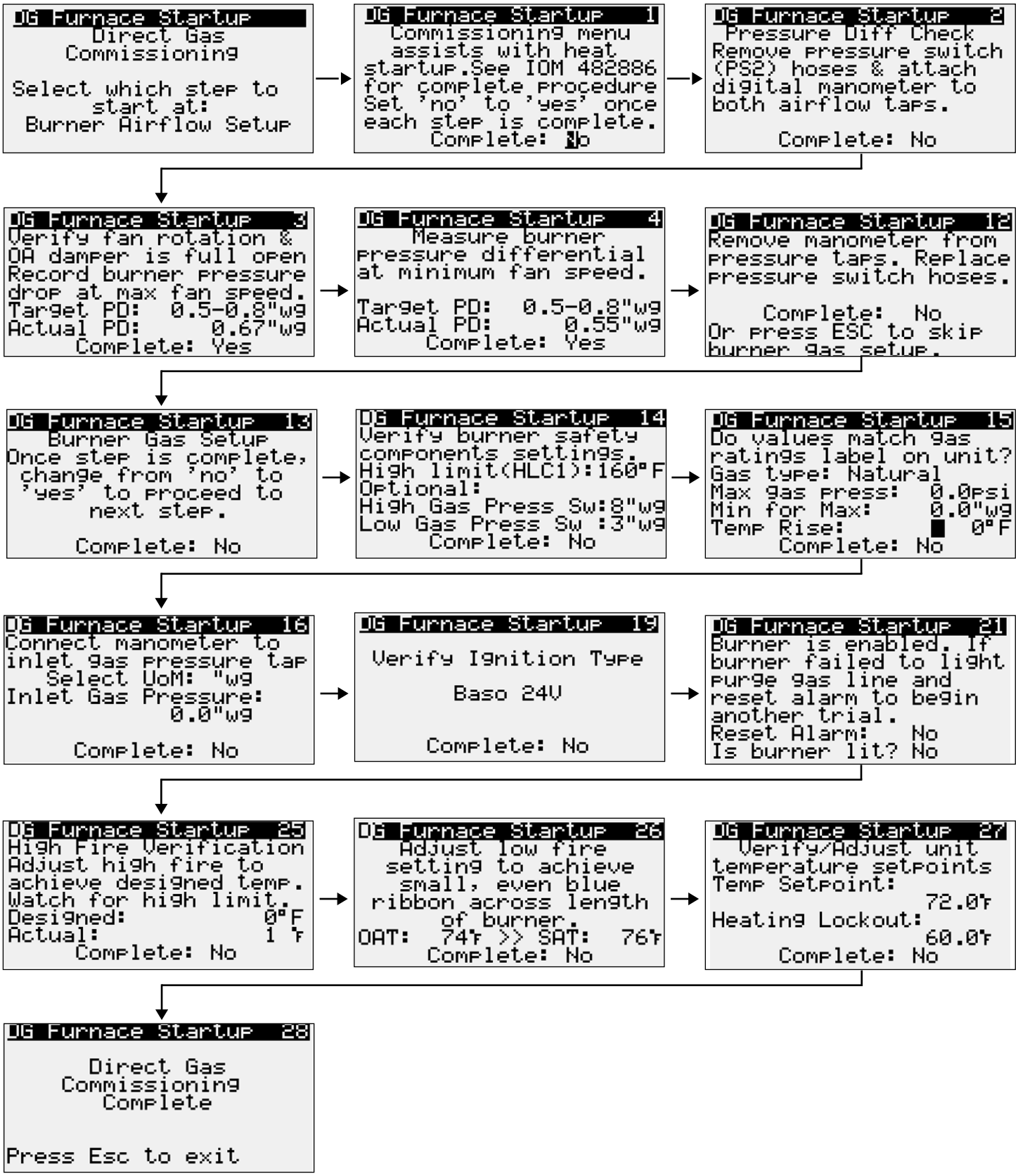


1. Motor data - motor parameters
2. Motor control - motor settings
3. Diagnostics - faults, warnings, fault log and connection status
4. Energy efficiency
5. Parameters

Parameters

1. Complete parameter list - groups menu with complete parameters and parameter levels
2. Modified parameter list
3. Parameter restore - resets the drive to the factory default parameters

Direct Gas Burner Startup Steps



Direct Fired-Gas Furnace Startup

☐ I have read and followed the vendor-specific operation manual.

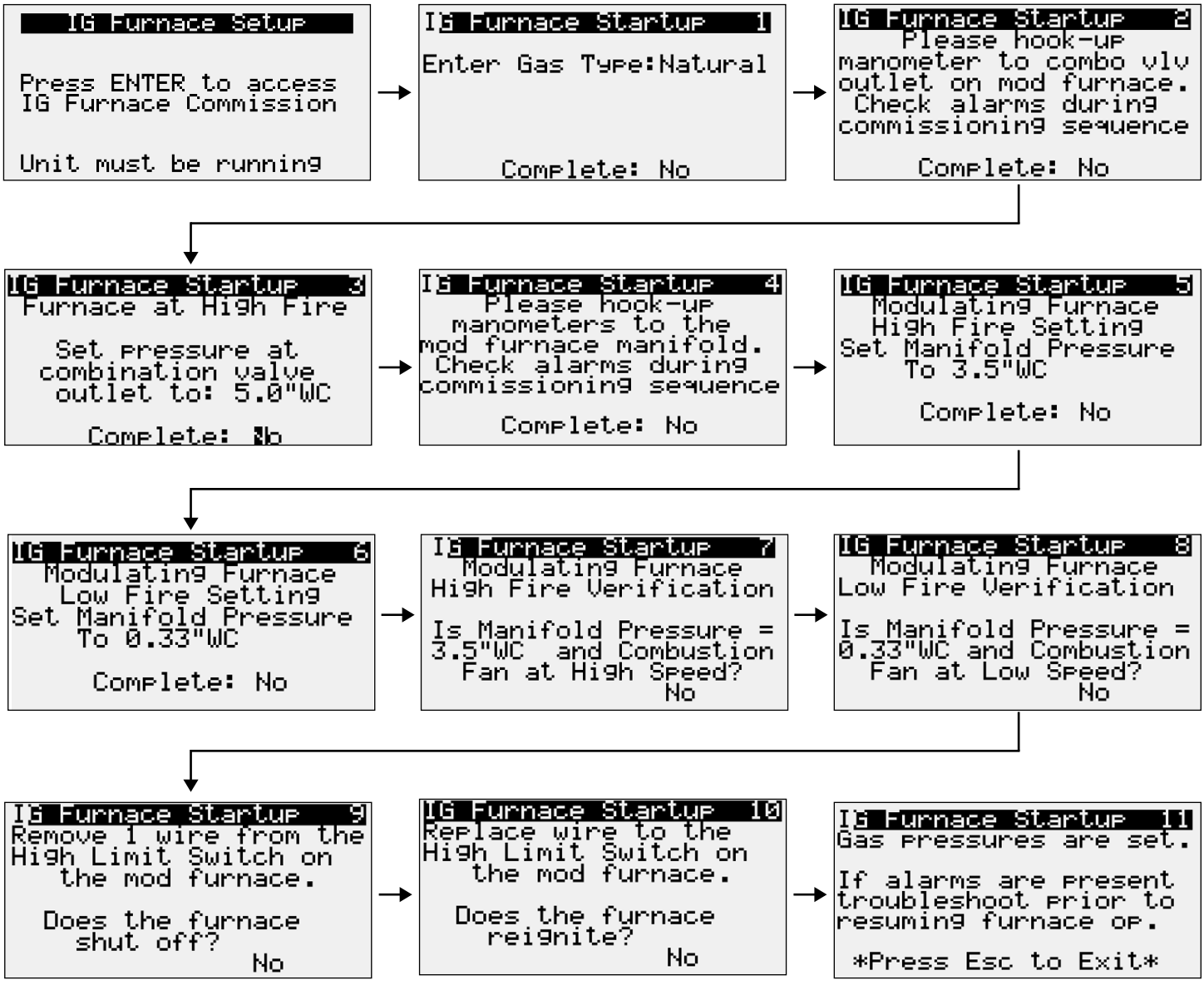
	Furnace #1
Fuel Type	
Manufacturer	
Model #	
Serial #	

Component Operational Checks

Yes	No	
☐	☐	All gas piping has been checked for leaks
☐	☐	Airflow proving switch at High & Low Speed
☐	☐	High temperature limit

	Manifold 1
Unit Inlet Gas Pressure	
Pilot Gas Pressure	
Burner Differential Pressure)	
Inlet Air Temperature Setting	
High Limit Setting – HLC1	

Indirect Gas Startup Steps



Indirect Fired-Gas Furnace Startup

☐ I have read and followed the vendor-specific operation manual.

Component Operational Checks

Yes	No	
☐	☐	All gas piping has been checked for leaks
☐	☐	Airflow proving switch at High & Low Speed
☐	☐	High temperature limit

	Manifold 1	Manifold 2	Manifold 3
Gas pressure at Inlet (burners off)			
Gas Pressure at Burner Manifold (high fire)			
Gas Pressure at Burner Manifold (low fire)			

Gas Set Point Guidelines
(all gas pressure readings must be taken from the gas manifold)

Natural Gas
High fire manifold 3.5 in. WC
Low fire (modulating) .33 in. WC

Propane
High fire manifold 10.0 in. WC
Low fire (modulating) ..875 in. WC

Modulating Control Signal
Low fire = 0 VDC
High fire = 10 VCD

Cooling Setup

1

INSTALL P-TRAP KIT

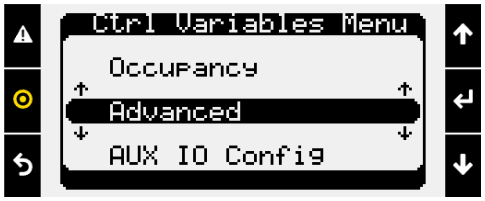
Install the P-trap kit that was shipped loose with the unit, following the provided installation instructions.

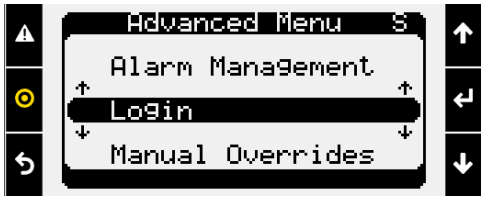
2

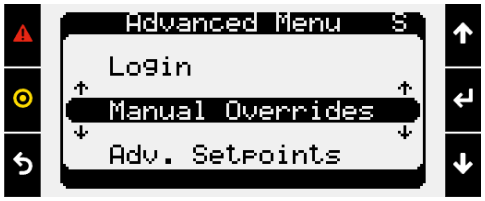
CONNECT GAUGE

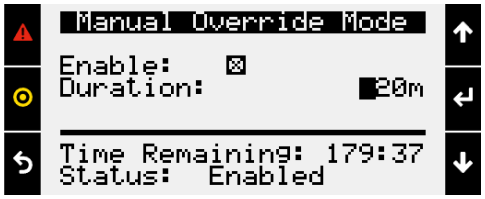
Connect a gauge set to the service ports identified by the red A2L warning labels.

3





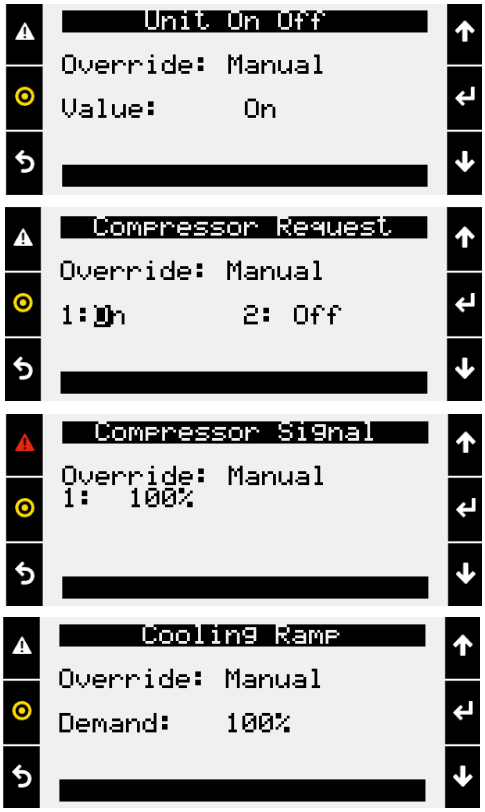




ENABLE COOLING

To enable cooling, access the Overrides menu in the controller and locate the Cooling Override setting. Override only one compressor at a time. The outdoor ambient temperature must be 65°F (18°C) or higher. If the temperature is below 65°F, accurate readings may not be obtained, and the cooling system may require recommissioning at a later date.

Cooling Setup



4 STABILIZE THE REFRIGERATING SYSTEM

Leave the system at the factory refrigerant charge and allow the compressor to operate for 10–15 minutes before recording subcooling and superheat values. For units equipped with a hot gas bypass system, close the hot gas bypass ball valve and allow the system to run for 10–15 minutes before taking measurements.

5 VERIFY AND ADJUST SUBCOOLING

Verify that subcooling is between 6°F and 8°F. If subcooling is above this range, remove refrigerant. If subcooling is below this range, add refrigerant as needed. Any change to the refrigerant charge must be documented by updating the charge label located inside the compressor control cabinet.

Note: This unit utilizes a micro channel condenser coil. Excessive refrigerant charge resulting in subcooling above 15°F may cause nuisance high-pressure trips.

6 VERIFY AND ADJUST SUPERHEAT

Verify that superheat is between 8°F and 14°F. If adjustment is required, use a hex key to adjust the TXV spring adjustment screw. Turn the screw clockwise to increase superheat and counterclockwise to decrease superheat.

7 COMPLETE COOLING STARTUP

Once subcooling and superheat are within the specified ranges, cooling startup is complete. If the hot gas bypass ball valve was closed during startup, reopen the valve before returning the unit to normal operation.

This completes startup procedure for cooling.

Refrigeration Troubleshooting

Pressures and Temperatures for new packaged DGX units

- Liquid Line- Measured at the Sight Glass. Values are operating range
  - Pressure 300 to 400 psi
  - Temperature 90-120 degrees
- Suction Line – Measured at the Compressor Inlet. Values are operating range
  - Pressure 60 to 140 psi
  - Temperature 34 to 60 degrees
- Discharge line temps 120-180 degrees
- Link to Sub Cool and Super Heat Calculator
  - Sub cool Calculator | HVAC Refrigerant Tools

Tips for units tripping high pressure on start up

- Adjusting the TXV
  - TXV can become stuck. Open TXV fully by rotating fully clockwise. This can help the TXV reset.
  - Adjust back clockwise until proper sub cool/super heat is achieved.
- Inspect equalizer line between TXV and suction line.
  - Look for kinks, breaks or bad joints.
- Inspect sensing bulbs and lines running to them
- Remove a few ounces of refrigerant from the system
  - 2 to 4 ounces.
- Last Resort would be to advise pulling charge, and purging system.
  - Possible non-compressible items in the system (water, foreign objects.)
  - Charge with nitrogen, purge and vacuum 3 times.
  - Install fresh refrigerant to the system.

Evap Cooling Startup Checklist

Auto Drain & Filling Evaporative Piping

IMPORTANT: The supply line should be of adequate size and pressure to resupply and amount of water lost due to bleed-off and evaporation. The drain line should be the same size or larger than the supply.

CAUTION: All solenoids valves and traps must be installed below the roof to protect the supply water line from freezing. If they cannot be installed below the roof, an alternative method must be used to protect the lines from freezing.

IMPORTANT: The supply solenoid (Valve A) is NOT the same as the drain solenoids (Valve B and Valve C). Make sure to use the proper solenoid for each location. Check your local code requirements for proper installation of this type of system.

Evaporative Cooling:
Microprocessor will enable the evaporative cooling when the outside air is above the cooling lockout setpoint (80°F). The valves will be energized opening the supply valve and closing the drain and supply line drain valves for an adjustable delay prior to the pump being enabled. The auto drain flush sequence can be used to drain the sump after an adjustable amount of run-time to bring fresh water into the evaporative cooler.

Auto Drain & Fill Valves
(when provided by manufacturer)

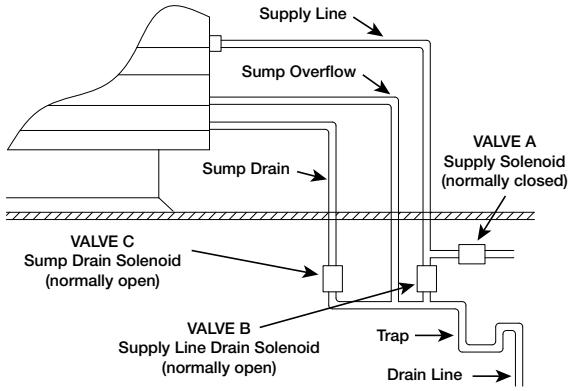
Assm. No.	Mfg. Part No.	ASCO Part No.	Solenoid Type	De-Energized Position	Diameter	Qty.
852178	461262	8210G2	Supply	Closed	1/2 inch (13 mm)	1
	461263	8262G262	Supply Line Drain	Open	1/4 inch (6 mm)	1
	461264	8210G35	Sump Drain	Open	3/4 inch (19.mm)	1

Part numbers subject to change.

Installing the Water Supply and Drain Line.

1. Install the Water Supply Line.
Supply line opening requirements vary by unit size and arrangement and are field-supplied.

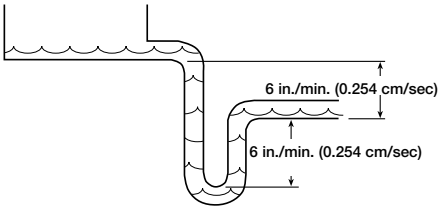
Connect the water supply line to the float valve through the supply line opening in the evaporative cooling unit. Install the 1/2 in. normally closed solenoid (Valve A) in the supply line. Install the 1/4 in. normally open solenoid (Valve B) between the supply line and the drain line. Refer to Evaporative Cooling with Auto Drain & Fill drawing.



Evap Cooling with Auto Drain and Fill

2. Install the Drain Line
Connect an unobstructed drain line to the sump drain overflow connection. Install the 3/4 in. normally open solenoid (Valve C) between the sump drain connection and the drain line.

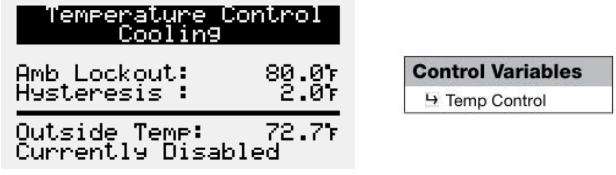
A trap should be used to prevent sewer gas from being drawn into the unit.



3. Check/Adjust Water Level
Check the water level in the sump tank. The water level should be above the pump intake and below the overflow. Adjust the float as needed to achieve the proper water level.

Refer to the Temp Control Menu, lower the heating lockout if necessary.

The default temperature is 80°



Electric Heater Startup

Figure 5 - Electric Heat Override Page. Set override to manual and set to 100% to complete startup.

Note: To ensure proper operation, leave dampers open and fans running when testing cooling heating components.

☐ I have read and followed the vendor-specific operation manual.

Heater Model: _____

Heater Serial #: _____

Electrical Inspection

Yes	No	N/A	
☐	☐	☐	Are all fuses present and free of defects?
☐	☐	☐	Are all connections at contactors and heating elements tightened?

Operational Inspection

Yes	No	N/A	
☐	☐	☐	Is there sufficient airflow through heater (per design temperature rise from manufacturer's nameplate)?
☐	☐	☐	Are combustible particles or flammable vapors present in the air tunnel?
☐	☐	☐	Is the air temperature at the outlet of heater less than 120°F?

Summary / Analysis of System

☐ **Complete Report** ☐ **Incomplete Report**

By checking a box above, you acknowledge that the startup report is either fully complete or will require completion at a later date.

SUBMIT FORM

If unable to submit through link above please manually send copy of report to tap@greenheck.com

R1 July 2026