GREENHECK
Building Value in Air.

Energy Recovery and Make-Up Air Start-Up Report

Please complete and save this guide. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Start-up date: _____

Job name:	_____	GFC sales order no.:	_____
Rep office name:	_____	Start-up company:	_____
Rep contact name:	_____	Start-up performed by:	_____
Rep phone no.:	_____	Start-up contact phone:	_____
Unit model no.:	_____	Unit serial no.:	_____
Heat pump model no.:	_____	Energy wheel serial no.:	_____
Compressor 1 model no.:	_____	Compressor 2 model no.:	_____
Compressor 1 serial no.:	_____	Compressor 2 serial no.:	_____

☐ Heating

- ☐ None
- ☐ Hot water coil
- ☐ Water-source heat pump
- ☐ Electric Pre-heat
- ☐ Electric Post-heat
- ☐ Indirect Gas-Fired
- ☐ Direct Gas-Fired

☐ Cooling

- ☐ None
- ☐ Chilled water coil
- ☐ Water-source heat pump
- ☐ Packaged DX
- ☐ Split DX
- ☐ Indirect Evap Cooling
- ☐ Indirect/Direct Evap Cooling
- ☐ Direct Evap Cooling

SPECIAL TOOLS REQUIRED

- Voltage Meter (with wire probes)
- Amperage Meter
- Pressure Gauges – (refrigerant)
- Tachometer
- Thermometer
- U-tube manometer or equivalent

Start-Up Checklist

The following is a comprehensive check list for possible components on your unit.

☐ Exterior, look for damage to housing, doors, handles, fittings, etc.

☐ Interior, look for damage to fans, exchanger, flue, media, coils, cells, etc.

☐ Remove all foreign material from unit.

☐ Check that all ducts, dampers and registers are set.

☐ Check that all openings and penetrations are sealed.

☐ Check fan rotation.

☐ Rotate each fan wheel by hand to ensure it spins freely.

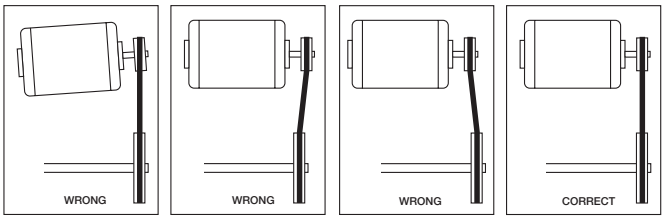
☐ Tighten all fasteners.

☐ Tighten all set screws and lock collars for each: fans, bearings, motors, dampers and accessories.

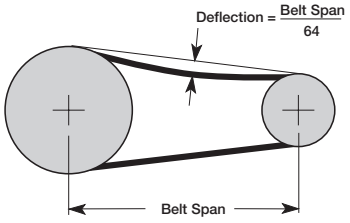
☐ Replace any dirty pleated filters and clean any aluminum mesh filters.

☐ Verify that non-motorized dampers open and close properly.

☐ Check the fan belt drives for proper alignment and tension.



Proper alignment of motor and drive shaft.



Proper fan belt tension.

☐ Verify proper drain trap installation, if applicable.

☐ Inspect all coils within the unit. Fins may get damaged in transit or during construction. Carefully straighten fins with a fin comb.

☐ Check for any loose electrical connections.

☐ Check circuit breaker disconnect mechanisms/ mechanical interlocks work properly.

☐ Disconnect and lock-out all power switches.

☐ Verify control wire gauge.

☐ Ensure all system components are adjusted to proper settings (temperature, amperage).

☐ Verify diameter seal settings on the energy recovery wheel.

PDX Only

☐ Check condensing fans for any damage or misalignment. Spin the blades and make sure they don't contact any parts and are free-turning without any resistance.

☐ Look over the refrigerant piping system. Inspect for oil at all tubing connections. Oil typically highlights a leak in the system.

☐ This unit contains a crankcase heater for each compressor which needs power supplied to it 24 hours prior to start-up. If start-up is scheduled in 24 hours, unlock the disconnect power and energize unit.

☐ After power has been applied for 24 hours, verify that all crankcase heaters are heating properly. Either check the amp draw on each heater or touch the compressor near the top to verify that the heater is warming the compressor. Do not touch the crankcase heater, it will cause burns.

Comments:

Motor Information

☐ **Supply Fan**		☐ **N/A**	Fan RPM:		Airflow design/actual:
☐ VFD	Make:	Model:	☐ Motor starter		
Motor manufacturer:			Frame:		SF:
Motor CAT/ Model:					PF:
Motor HP:	Voltage:	RPM:	FLA:		Max Current:
☐ Belt tension:			Correct rotation? ☐ Yes		
Motor fuses:		Motor AMPS:	L1:	L2:	L3:

Comments:

☐ **Exhaust Fan**		☐ **N/A**	Fan RPM:		Airflow design/actual:
☐ VFD	Make:	Model:	Motor starter		
Motor manufacturer:			Frame:		SF:
Motor CAT/ Model:					PF:
Motor HP:	Voltage:	RPM:	FLA:		Max Current:
☐ Belt tension:			Correct rotation? ☐ Yes		
Motor fuses:		Motor AMPS:	L1:	L2:	L3:

Comments:

☐ **Energy Recovery Wheel**		☐ **N/A**			
☐ VFD	Make:	Model:	☐ Motor starter		
Motor manufacturer:			Frame:		SF:
Motor CAT/ Model:					PF:
Motor HP:	Voltage:	RPM:	FLA:		Max Current:
☐ Belt tension:	☐ Adjust air seals:		Correct rotation? ☐ Yes		
Motor fuses:		Motor AMPS:	L1:	L2:	L3:

Comments:

PDX Cooling

☐ N/A

NOTE

Refrigeration System Start-Up Checklist must be performed by a Qualified Refrigeration Technician.

If a digital scroll compressor is installed in the unit, make certain that all current readings are taken when compressors are running under load. See the **Digital Scroll Compressors** section in the unit IOM.

WARNING

All motor(s) / compressor(s) have been checked for rotation. If blower rotation is incorrect, wiring must be changed at the disconnect to ensure all motor(s) / compressor(s) are corrected.

Operation of scroll compressor(s) in this unit are directional and will be damaged if run in the wrong direction.

Outdoor Air Temp. _____°F

Outdoor Air Wet Bulb _____°F

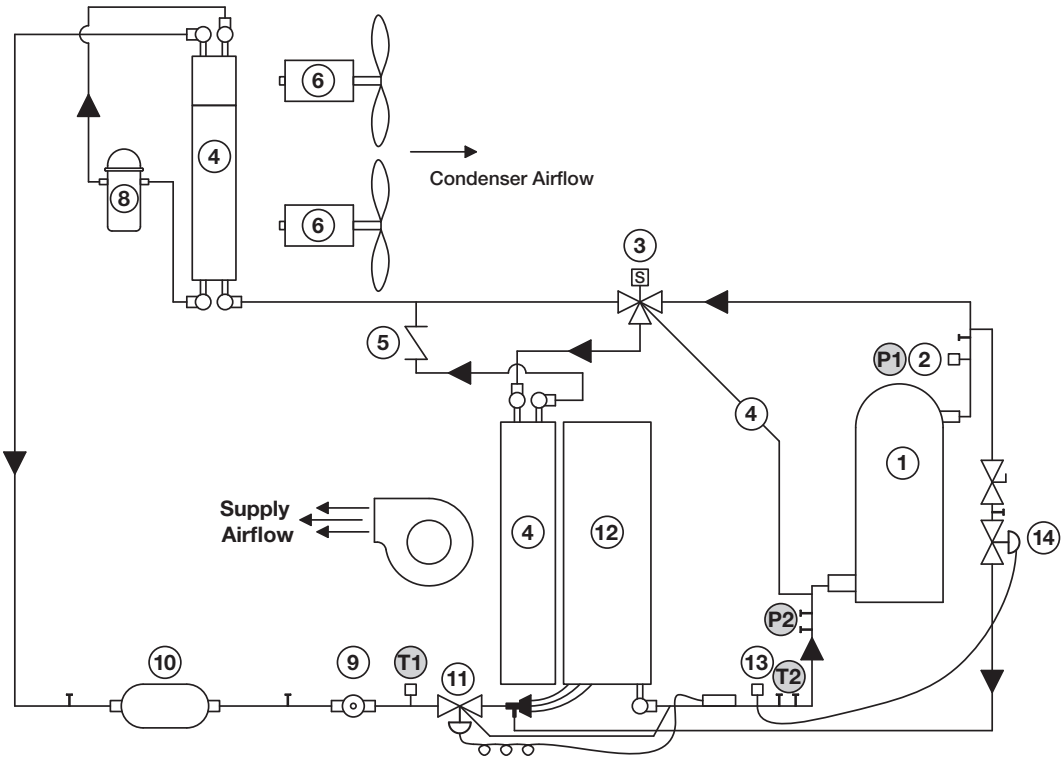
Condensing Fan 1	Condensing Fan 2	Condensing Fan 3 (If applicable)
L1 _____ Amps	L1 _____ Amps	L1 _____ Amps
L2 _____ Amps	L2 _____ Amps	L2 _____ Amps
L3 _____ Amps	L3 _____ Amps	L3 _____ Amps
Compressor 1 Hot gas reheat valve closed	**Compressor 1** Hot gas reheat valve open **(If applicable)**	**Compressor 2 (If applicable)**
L1 _____ Amps	L1 _____ Amps	L1 _____ Amps
L2 _____ Amps	L2 _____ Amps	L2 _____ Amps
L3 _____ Amps	L3 _____ Amps	L3 _____ Amps
Crankcase heater _____ Amps	Crankcase heater _____ Amps	Crankcase heater _____ Amps

**Reference locations on next page.*

	Cooling	HP Heating	Cooling	Cooling	HP Heating
A. Discharge Pressure (psi) *P1					
B. Discharge Pressure Converted to Temperature (°F)					
C. Liquid Line Temperature (°F) *T1					
D. Subcooling (°F) (B-C) *Should be between 12° and 17°F*					
E. Suction Line Pressure (psi) *P2					
F. Suction Line Temperature (°F) *T2					
G. Suction Pressure Converted to Temperature (°F)					
H. Superheat (°F) (F-G) *Should be between 8° and 12°F*					
Water In (°F) *T3					
Water Out (°F) *T4					
Hot Gas Bypass Operational *(Not present on digital scroll compressors)*	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No
Suction Pressure Set Point					
Compressor Sight Glass (if present)					
Oil Level					
Oil Foaming	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

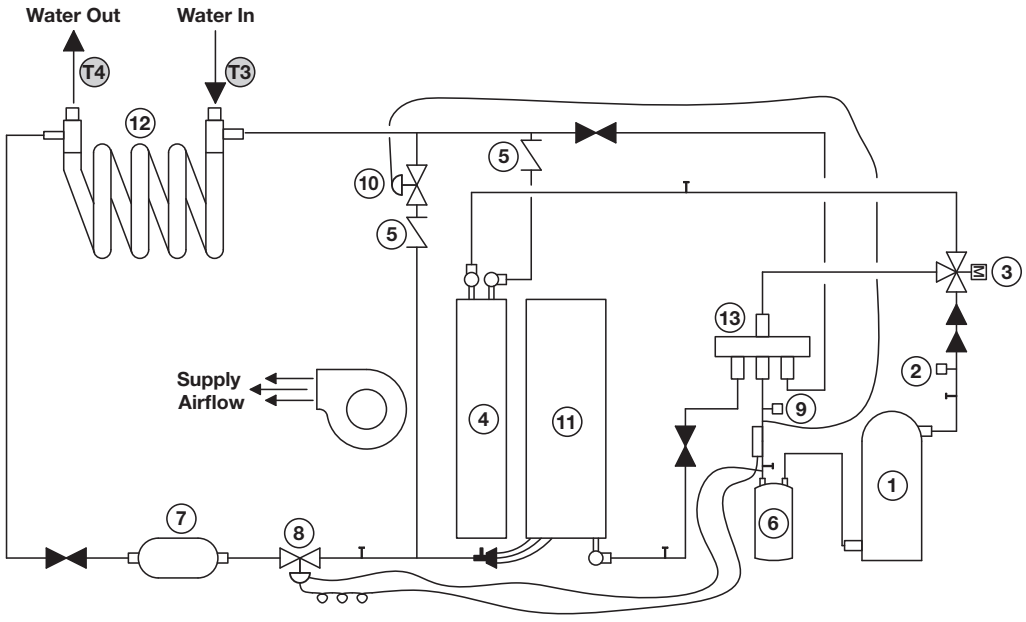
Comments:

Packaged DX Cooling with Digital Scroll Compressor



1. Compressor
2. High Limit Pressure Switch
3. Hot Gas Reheat Valve (optional)
4. Hot Gas Reheat Coil
5. Hot Gas Reheat Check Valve
6. Condenser Fans
7. Condensing Coil
8. Liquid Receiver (optional)
9. Sight Glass
10. Liquid Line Filter Drier
11. Thermostatic Expansion Valve (TXV)
12. Evaporative Coil
13. Low Limit Pressure Switch

Water-Source Heat Pump with Standard Scroll Compressor



1. Compressor
2. High Limit Pressure Switch
3. Hot Gas Reheat Valve (optional)
4. Hot Gas Reheat Coil
5. Hot Gas Reheat Check Valve
6. Liquid Receiver (optional)
7. Liquid Line Filter Drier
8. Thermostatic Expansion Valve (TXV)
9. Low Limit Pressure Switch
10. Hot Gas Bypass Valve (optional)
11. Airside Coil
12. Coaxial Refrigerant-to-Water Heat Exchanger
13. Reversing Valves

Evaporative Cooling ☐ N/A

Direct	Indirect	For units with ship loose evap section, complete wiring per unit wiring diagram.
☐	☐	Connect overflow line (run bleed line into overflow)
☐	☐	Install trap
☐	☐	Connect drain line
☐	☐	Connect water supply line
☐	☐	For units with auto drain & fill with freeze protection
☐	☐	Install, wire and provide power to components
☐	☐	Confirm temperature and timer settings
☐	☐	Pump filter is clean and installed properly
☐	☐	Saturate media per IOM
☐	☐	Adjust bleed-off rate per IOM
☐	☐	Check for water carryover
☐	☐	Connect “call for cooling” signal
☐	☐	Remove jumper wire

Comments:

Electric Heater 1 ☐ Pre ☐ Post ☐ N/A

Model:		Serial #:	
☐ Staged Control		☐ Modulating Control	
Voltage:		# of elements:	
Fuses:		Total KW:	
Total AMPS:	L1:	L2:	L3:
Heater Control:	☐ BAS	☐ Signal type:	☐ Internal controller:

Comments:

Electric Heat ☐ Pre ☐ Post ☐ N/A

Model:		Serial #:	
☐ Staged Control		☐ Modulating Control	
Voltage:		# of elements:	
Fuses:		Total KW:	
Total AMPS:	L1:	L2:	L3:
Heater Control:	☐ BAS	☐ Signal type:	☐ Internal controller:

Comments:

Gas Pressure Chart

Direct Gas				
	Max. Inlet Gas Pressure (natural gas or propane)	Min. Gas Pressure (natural gas)	Min. Gas Pressure (propane)	
< 800 MBH	0.5 psi (14 in. wg)	7-12 in. wg (output dependant)	3 in. wg	
> 800 MBH	5 psi	0.5 psi (14 in. wg)	3 in. wg	
Indirect Gas				
	High Fire	Low Fire (staged control)	Low Fire (2:1 modulating)	Low Fire (4:1 modulating)
Natural Gas	3.5 in. wg	0.875 in. wg	0.875 in. wg	0.333 in. wg
Propane	10 in. wg	2.5 in. wg	2.5 in. wg	1 in. wg

Direct Gas-Fired Heating ☐ N/A

☐ Gas regulator installed:	Regulator: NG LP	Supply pressure: in. wg
☐ High & low pressure switches installed:	High setting: in. wg. *Typical 8 in. wg*	Low setting: in. wg *Typical 3 in. wg (Natural Gas)*
☐ Burner differential pressure:	in. wg	*Between 0.625 and 0.675 in. wg*
☐ Set low fire time delay:	*Between 75% of it's max. setting.* *Should provide at least 10 sec. of low fire while lighting.*	
☐ Set max. firing rate:	☐ *Disconnect the wire connected to terminal #4 (Maxitrol 14)* ☐ *Disconnect the wire connected to terminal #2 & #4 (Maxitrol 44)* ☐ *Jumper terminals T1 & T2 (Maxitrol SC-25)*	
	☐ *Adjust regulator to achieve design ΔT*	Design ΔT: °F
☐ Set min. firing rate:	☐ *Disconnect one of the wires running to the modulating valve*	
	☐ *Adjust minimum firing rate to provide continuous flame that covers both the flame rod and the entire burner*	
	Increase = CCW *Decrease = CW*	
☐ Flame signal:	*Honeywell = 1.25 VDC* *BASO = 1.0 AMP*	Signal:
☐ Discharge air temp setting:		DAT Set point: °F

Comments:

Indirect Gas-Fired Heating ☐ N/A

☐ Furnace 1	☐ 1 Stage ☐ 2 Stage ☐ 8 Stage ☐ 2:1 Mod ☐ 4:1 Mod			
☐ Gas regulator installed:	Regulator: NG LP		Supply pressure:	in. wg
☐ Set unit to high fire:	*Reference PVF/PVG IOM*			
☐ Adjust high fire gas pressure:			Pressure:	in. wg
☐ Set unit to low fire:	*Reference PVF/PVG IOM*			
☐ Adjust low fire gas pressure:	*Reference PVF/PVG IOM*		Pressure:	in. wg
☐ Adjust discharge air temp:	*Reference PVF/PVG IOM*		DAT Set point:	ºF
☐ Adjust SOT temp: *If equipped with external control*	*If equipped - DDC set point* *Default 60-100ºF*		SOT Set point:	ºF
☐ Adjust inlet air set point:	*Default 65ºF*		IA Set point:	ºF
☐ Burner Control:	☐ BAS	☐ Internal	☐ Other:	

Comments:

☐ N/A

☐ Furnace 2 Optional	☐ 1 Stage ☐ 2 Stage ☐ 8 Stage ☐ 2:1 Mod ☐ 4:1 Mod			
☐ Gas regulator installed:	Regulator: NG LP		Supply pressure:	in. wg
☐ Set unit to high fire:	*Reference PVF/PVG IOM*			
☐ Adjust high fire gas pressure:	*Reference PVF/PVG IOM*		Pressure:	in. wg
☐ Set unit to low fire:	*Reference PVF/PVG IOM*			
☐ Adjust low fire gas pressure:			Pressure:	in. wg
☐ Adjust discharge air temp:	*Reference PVF/PVG IOM*		DAT Set point:	ºF
☐ Adjust SOT temp: *If equipped with external control*	*If equipped - DDC set point* *Default 60-100ºF*		SOT Set point:	ºF
☐ Adjust inlet air set point:	*Default 65ºF*		IA Set point:	ºF
☐ Burner Control:	☐ BAS	☐ Internal	☐ Other:	

Comments:

☐ N/A

☐ Furnace 3 Optional	☐ 1 Stage ☐ 2 Stage ☐ 8 Stage ☐ 2:1 Mod ☐ 4:1 Mod			
☐ Gas regulator installed:	Regulator: NG LP		Supply pressure:	in. wg
☐ Set unit to high fire:	*Reference PVF/PVG IOM*			
☐ Adjust high fire gas pressure:	*Reference PVF/PVG IOM*		Pressure:	in. wg
☐ Set unit to low fire:	*Reference PVF/PVG IOM*			
☐ Adjust low fire gas pressure:			Pressure:	in. wg
☐ Adjust discharge air temp:	*Reference PVF/PVG IOM*		DAT Set point:	ºF
☐ Adjust SOT temp: *If equipped with external control*	*If equipped - DDC set point* *Default 60-100ºF*		SOT Set point:	ºF
☐ Adjust inlet air set point:	*Default 65ºF*		IA Set point:	ºF
☐ Burner Control:	☐ BAS	☐ Internal	☐ Other:	

Comments:

Energy Recovery Optional Accessories Checklist

Frost Control Application / Operation:

			Setting	Factory Default
Yes	No	Frost Control set point		5ºF
		Differential		2ºF
		Timer		Refer to IOM
Yes	No	Frost Control Modulating		Refer to IOM

Economizer Application / Operation:

Yes	No	Economizer (temperature)		
		Set point		65ºF
		Offset		20ºF
		Differential		2ºF
Yes	No	Economizer (enthalpy)		
		Set point		B
Yes	No	Economizer (modulating)		Refer to IOM

Optional Accessories:

			Operational		
Yes	No	Wheel Rotation Sensor (⅛ in. from wheel)	Yes	No	N/A
Yes	No	OA Dirty Filter Sensor	Yes	No	N/A
Yes	No	EA Dirty Filter Sensor	Yes	No	N/A
Yes	No	CO_2 Sensor	Yes	No	N/A
Yes	No	Service Outlet	Yes	No	N/A
Yes	No	Vapor Tight Lights	Yes	No	N/A
Yes	No	Remote Control Panel	Yes	No	N/A

Damper Section:

			Operational		
Yes	No	Outdoor Air Damper	Yes	No	N/A
Yes	No	Exhaust Air Damper	Yes	No	N/A
Yes	No	Night Setback Damper	Yes	No	N/A
Yes	No	Recirculation Damper	Yes	No	N/A

Indirect Gas Furnace:

Yes	No	Refer to PVF/PVG Installation, Operation and Maintenance for start-up information.

Outdoor Air Monitoring:

Yes	No	Field calibrated.

Comments: