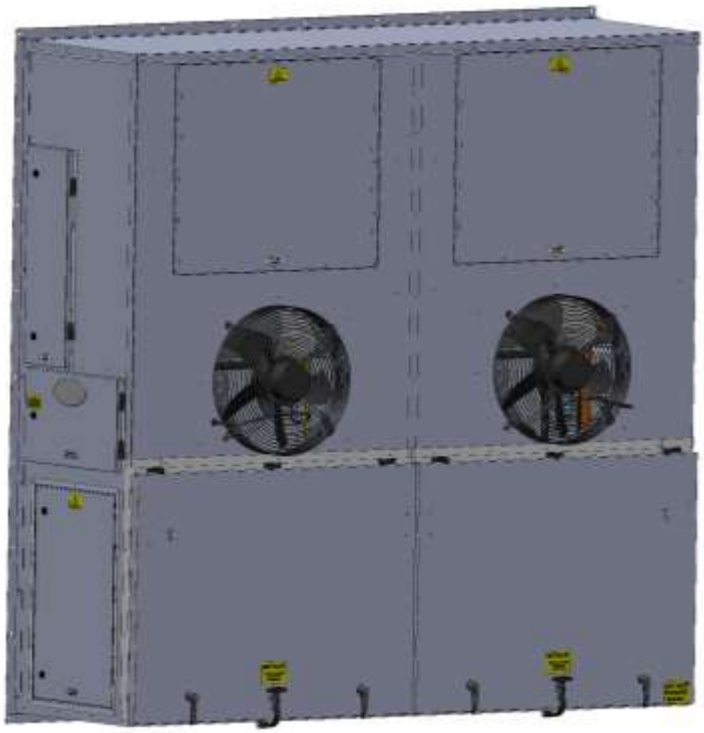
3605 BUFFALO RD
ROCHESTER, NY 14624

Phone: +1-585-594-5050
Fax: +1-585-594-8888
Toll Free: +1-888-723-9230 / 24 hrs.
On the web: www.northernairsystems.com

TVBC192WMBGA2DDA01

Serial# 0001-Present



REV A - 12/8/16

MODEL CODE	CAPACITY (x 1000 BTU/hr)			DESCRIPTIVE CHARACTERS		POWER	HEAT CAPACITY (kW)	REFRIGERANT	AC ZONES	CIRCUITS	Compressor	Differentiators		
T	1	2	0	W	M	C	D	A	2	D	H	A	0	1

SAMPLE MODEL CODES

T: TT- UNIVERSAL
X: EX - EXPLOSION PROOF
V: VFDH- OIL & GAS
C: Custom
D: Dual
F: Fan Coil Unit
TTD: Mobile Medical Phase 2
TTE: Mobile Medical Phase 1
E: Modified Explosion Proof
M: Modified Unit

DESCRIPTIONS

WM- WALL MOUNT
RM- ROOF MOUNT
FM- FRONT MOUNT
BM- BASE MOUNT
SP- SPLIT SYSTEM
CU- CONDENSING UNIT
CW- Chilled Water Fan Coil
DX- DX Fan Coil
CH- CHILLER
CB- COMBO
OC- OVER CAB
PU- Packaged Unit
SM-SKID MOUNT
MU-Mobile Unit
FC- Fan Coil Unit
CM- Cart Mount

VOLTAGE-PHASE-HZ

A: 480-3-60
B: 208-3-60
C: 230-1-60
D: 220-1-50
E: 220-3-50
F: 400-3-50
G: 575-3-60
X:480/400-3-60/50
H: 110-1-60
K: 400-3-60

Heat Capacity

N:	0 kW
A:	3 kW
B:	4.5 kW
C:	5 kW
D:	9 kW
E:	10 kW
F:	13.5 kW
G:	18 kW
H:	20 kW
I:	36 kW
K:	12 kW
L:	25 kW
M:	1.6 kW
P:	30kW
Q:	50kW
R:	40kW
S:	6 KW
T:	150,000 BTU Gas Heat
U:	80kW
V:	27kW

REFRIGERANT

N: NA
A: R-407C
B: R-134A
C: R-22
G: Glycol
H: R-404A
J: R-410A

CIRCUITS

S: SINGLE
D: DUAL
T: TRIPLE

TYPE

N: NA
S: STANDARD SCROLL
D: DIGITAL SCROLL
H: SEMI-HERMETIC (RECIPROCATING)
R: ROTARY
F: FULLY HERMETIC (RECIPROCATING)

Version

A
B
C

Configuration

0	0
0	1
0	2
0	3

TABLE OF CONTENTS

System Specifications-Per Side

Capacity Per Side:	96,000 BTU/hr @ 80F db/67F wb return air, 95F ambient air temperature (per side)
Supply Airflow:	2,800 CFM (Adjustable to accommodate system pressure drop) (per side)
Heat Capacity:	9 kW (per side)
Condenser Airflow:	4,500 CFM (per side)
Refrigerant:	R-407C 12.5 lbs (per side)

POWER:

208 VOLT	**3 PHASE**	**60 HERTZ**
1 - 0.75 kW	Cond Fan Motor	3.40 FLA
1 – 5.10 kW	Compressor	29.00 FLA
1 - 1.70 kW	Evap. Fan Motor	4.60 FLA
1- 4.50 kW	Electric Heaters	21.60 FLA ea.

MAX OVERCURRENT PROTECTION (MOP): 110 AMPS
MINIMUM CIRCUIT AMPACITY (MCA): 95 AMPS
COOLING FLA: 40 AMPS
HEATING FLA: 50 AMPS
DEHUM FLA: 80 AMPS

Sequence of Operations 3.8v

- System is turned on by the PGD display interface or selector switch
- System reads temperatures, humidity (optional) and system refrigerant pressures, as well as checks all alarm circuits for faults
- If an optional 2nd temperature sensor is installed and activated, the system will control to the average of the 2 temperature sensors.
- If unit is turned on and no faults are present, the evaporator fan contactor will be activated. The evaporator fan and condenser fans will run for 30 seconds as a purge cycle. The condenser fans will be deactivated; the evaporator fan will stay activated.
- If the Evap Fan Mode is set to ON, the evaporator will run all the time when the on/off switch is in the on position. When Evap Fan Mode is set to AUTO, the fan will shut off when there is no call for heating or cooling, then start up again when heating or cooling is required.
- (Optional) If the Power Up Mode Enable is set to YES, the unit mode and unit temperature setpoint will be reset to its selected settings when power is cycled to the unit. When set to NO, cycling power will no effect on unit mode or unit temperature settings.
- Digital Compressor: when the temperature rises 1° above setpoint the compressor starts and runs modulating to maintain suction pressure set point.(Optional)
- Based on cooling demand the system provides 0 – 10v output to digital compressor.
- Standard Compressor: when the temperature rises 1° above setpoint the compressor will be activated.
- The condenser fans speed up and down based on pressure using a 0 – 10 volt analog signal to the drive.
- Heating is activated when the temperature drops below set point by 1° and turns off when temperature is satisfied.(Can be configured through factory menu)
- If there is a need for heating, the system stops cooling by bringing compressor demand to 0% and shut off when in cycling mode (optional)
- (Optional) Multiple units can be linked and communicate via PLAN Network. The units are capable of 4 selectable operation modes: UNIT 1; UNIT 2; ALTERNATING; DUAL.
    - When in UNIT 1 mode, only Unit 1 will run
    - When in UNIT 2 mode, only Unit 2 will run
    - When in DUAL mode, both units will run simultaneously.
    - When in ALTERNATING mode, one unit is designated as the lead unit, the other is designated as the lag unit, only the lead unit will run. In the event of an alarm on the lead unit, the lag unit will be activated and run.
    - When the “Days Until Rotation” setpoint has been reached, the lead unit becomes the lag unit and vice versa. If Rotation Overlap is activated, both units will run for 2 minutes before the lead and lag units change. After 2 minutes the new lag unit will be deactivated and the new lead unit will continue to run.
    - When ALT/DUAL Enable is activated and the temperature has exceeded the ALT DUAL setpoint, the lag unit will be activated and both units will run until the temperature drops below the ALT DUAL set point. The lag unit will then be deactivated and they will resume normal operation.
- In system is equipped with optional dehumidification control and in the case of high humidity, the system will run cooling and heat at the same time to dehumidify and maintain temperature set points. (optional)
- When humidification is required, the system enables the humidifier contactor and sends a 0-10 volt signal to the CPY controller. (optional)
- In the event of an alarm, the system will display each one with a time and date stamp. This will be displayed until the problem is solved and alarm is reset by the control pad display.

WALL MOUNT 3.8V, PCO3 SMALL

		Analog Input	NTC Probe (max.5)	PT 1000 (max.2)	ON/OFF (max.2)	0-1V (max.3)	0-10V (max.3)	0-20 mA (max.3)	0-5V Ratiometric (max.3)	4-20 mA (max.3)	Digital Input	24 Vac/Vdc (max.8)	110/230 Vac (max.N/A)	Anolog Output	0-10 V (max.4)	Digital Output	Relay (max.8, 250Vac 8A res.)	Switching (max.1, 24Vac/dc 10W)
	Analog Inputs																	
AI-1	Low pressure sensor								X									
AI-2	High pressure sensor								X									
AI-3	Humidity Sensor or Air Pressure (CFM)					X												
AI-4	Room temperature		X															
AI-5	Room Temp 2 or Suction temperature		X															
		Total	2			1			2									
	Digital Inputs																	
DI-1	Phase monitor										X							
DI-2	Evaporator fan fault										X							
DI-3	Condenser fan fault										X							
DI-4	Low air flow switch or Generator status										X							
DI-5	Heater fault										X							
DI-6	Compressor 1 fault										X							
DI-7	Humidifier fault or Compressor #2 Fault (optional)										X							
DI-8	On/Off switch										X							
										Total	8							
	Analog Output																	
AO-1	Condenser fan VFD 0-10vdc													X				
AO-2	Evaporator fan VFD 0-10 vdc													X				
AO-3	Digital compressor demand													X				
AO-4	Humidifier demand													X				
													Total	4				
	Digital Outputs																	
DO-1	Heater #1 contactor															X		
DO-2	Heater #2 contactor (optional)															X		
DO-3	Heater #3 contactor (optional)															X		
DO-4	Evaporator fan contactor															X		
DO-5	Standard compressor#1 or Digital Tandem #2 compressor contactor (optional)															X		
DO-6	Remote Alarm Contact															X		
DO-7	Condenser fan VFD enable															X		
DO-8	Humidifier enable or Standard Tandem #2 compressor Contactor (optional)															X		
															Total	8		

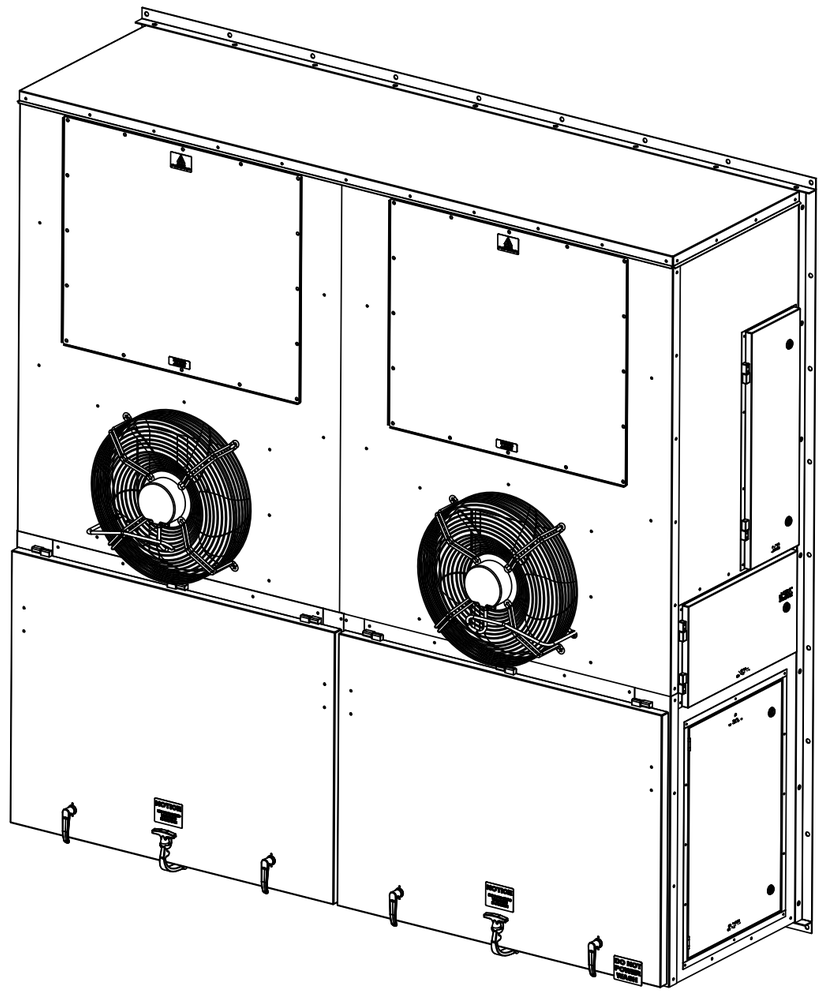
Pco Address 1
***When using lead lag option the second unit Pco address will be 2
First Unit Hot Gas EVD Address 3
Second Unit Hot Gas EVD Address 4

Room Temperature Sensor #2 added for average temerature control 3.7v 2/29/16
Heat and compressor limits during dehum / standard tandem option added 3.8V 6/9/16

REVISIONS			
REV.	DESCRIPTION	DATE	ECN
A	DRAWING RELEASE	11/5/14	

System Description:

- 96,000 BTU/hour total cooling capacity per zone
- 192,000 BTU/hour total cooling capacity per unit
- Copeland digital scroll compressor set that provides modulating cooling capacity
- Ambient operation from -30°F to 120°F
- 18 kW resistive heat capacity(9kW per zone)
- 208 VAC, Three-phase, 60-Hz power
- Programmable Logic Controller (PLC)
- High quality German-designed axial condenser fan & motorized impeller evaporator blower
- Two (2) remote programmable displays (Part # 20EPGD1)
- 1/4” structural aluminum frame with 0.04-0.80” aluminum sheet metal construction
- Standard gloss white polyester powder coat finish
- Hinged access doors with tool-access latches
- R-407C EPA-compliant refrigerant
- One (1) year parts only warranty



UNLESS OTHERWISE SPECIFIED:		NAME	DATE
	DRAWN BY	NRW	5/9/2016
	APPROVED BY	*NRW 5/9/2016*	

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/16"
BEND ± 4°
TWO PLACE DECIMAL ± 0.07"
THREE PLACE DECIMAL ± 0.063"

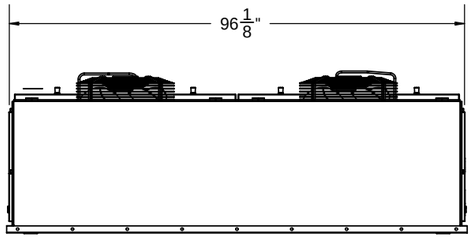
DO NOT SCALE DRAWING

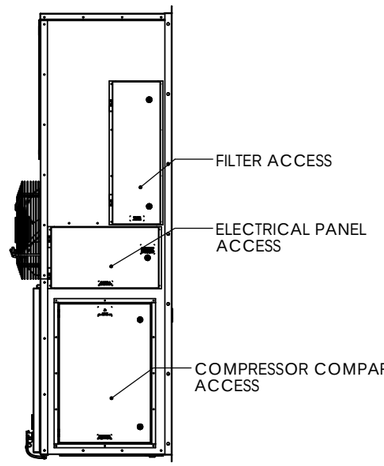
Northern-Air

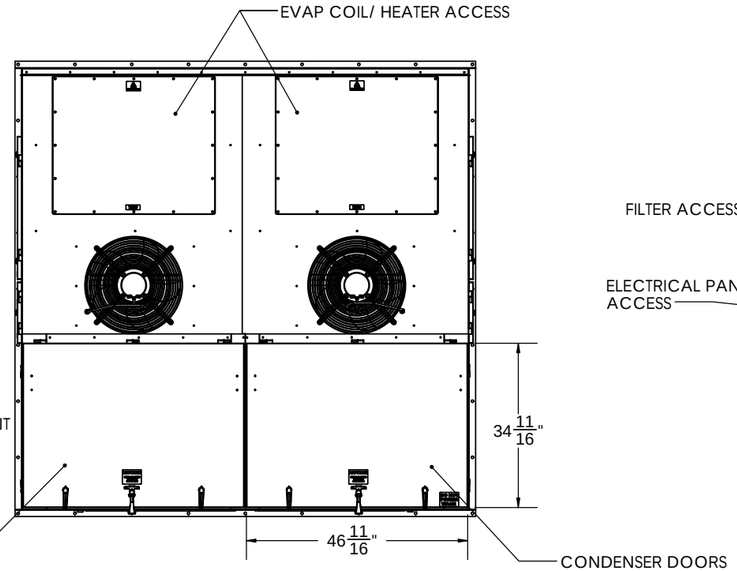
TITLE:
TVBC192WMBGA2DDA01

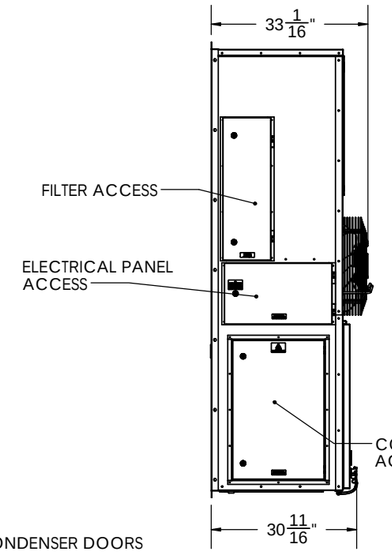
SIZE	DWG. NO.	
B	TVBC192WMBGA2DDA01	
SCALE: 1:32		SHEET 1 OF 2

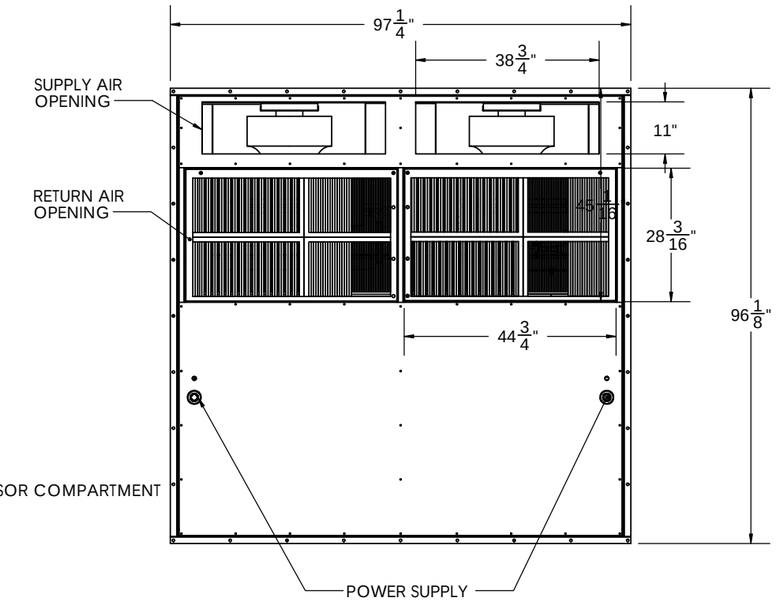
REVISIONS			
REV.	DESCRIPTION	DATE	ECN
A	DRAWING RELEASE	11/5/14	

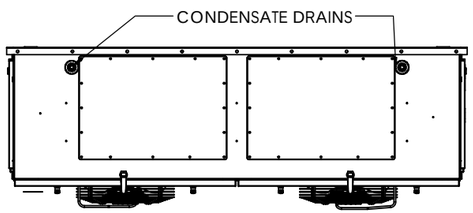












		NAME	DATE
UNLESS OTHERWISE SPECIFIED:	DRAWN BY	NRW	5/9/2016
	APPROVED BY	NRW 5/9/2016	

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/16"
BEND ± 4°
TWO PLACE DECIMAL ± 0.07"
THREE PLACE DECIMAL ± 0.063"

DO NOT SCALE DRAWING

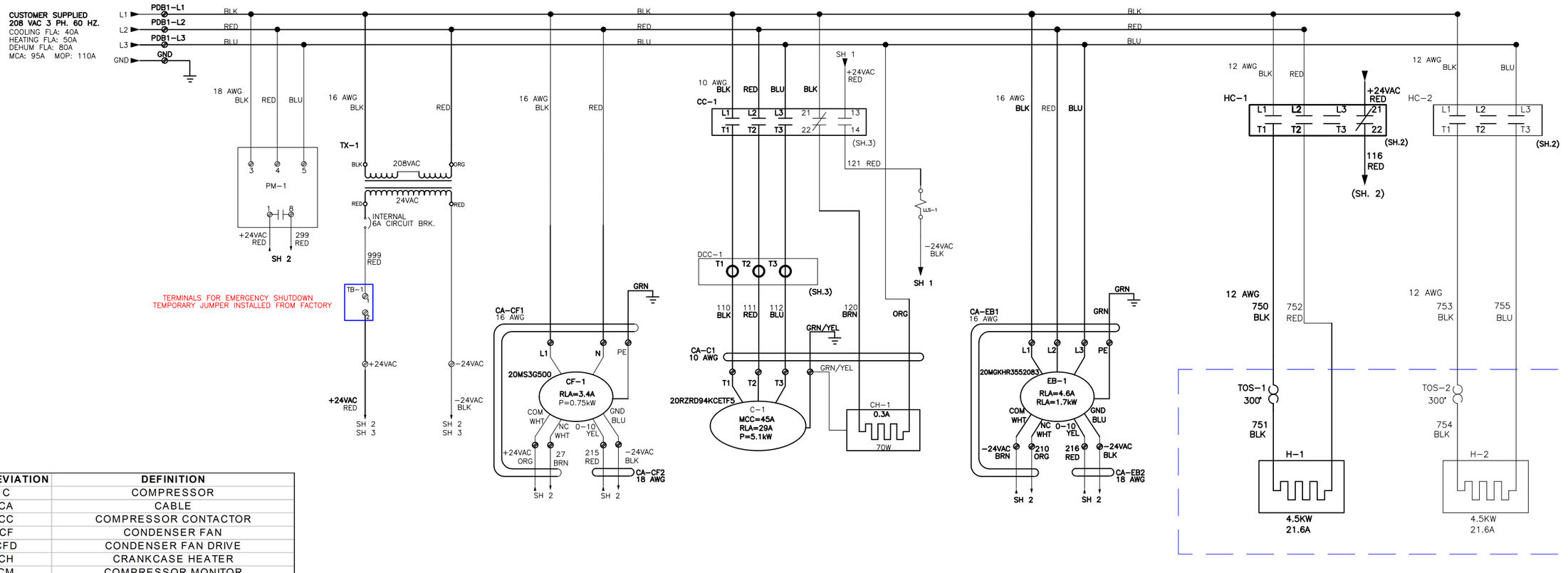
Northern-Air

TITLE:
TVBC192WMBGA2DDA01

SIZE	DWG. NO.	
B	TVBC192WMBGA2DDA01	
SCALE: 1:32		SHEET 2 OF 2

REVISION HISTORY

REV	DESCRIPTION	DATE	ECN#
A	INITIAL RELEASE	5/10/2016	



ABBREVIATION	DEFINITION
C	COMPRESSOR
CA	CABLE
CC	COMPRESSOR CONTACTOR
CF	CONDENSER FAN
CFD	CONDENSER FAN DRIVE
CH	CRANKCASE HEATER
CM	COMPRESSOR MONITOR
CON	CONNECTOR
DCC	DIGITAL COMPRESSOR CONTROLLER
DTT	DISCHARGE TUBE THERMISTER
EB	EVAPORATOR BLOWER
EBC	EVAPORATOR BLOWER CONTACTOR
EBD	EVAPORATOR BLOWER DRIVE
EVD	ELECTRONIC VALVE DRIVER
FS	FLOW SWITCH
H	HEATER
HC	HEATER CONTACTOR
HGS	HOT GAS SOLENOID
HPS	HIGH PRESSURE SWITCH
HPT	HIGH PRESSURE TRANSDUCER
HS	HUMIDITY SENSOR
LLS	LIQUID LINE SOLENOID
LPT	LOW PRESSURE TRANSDUCER
PC	PROGRAMMABLE CONTROLLER
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PM	PHASE MONITOR
PS	POWER SUPPLY
TS	TEMPERATURE SENSOR
TX	TRANSFORMER

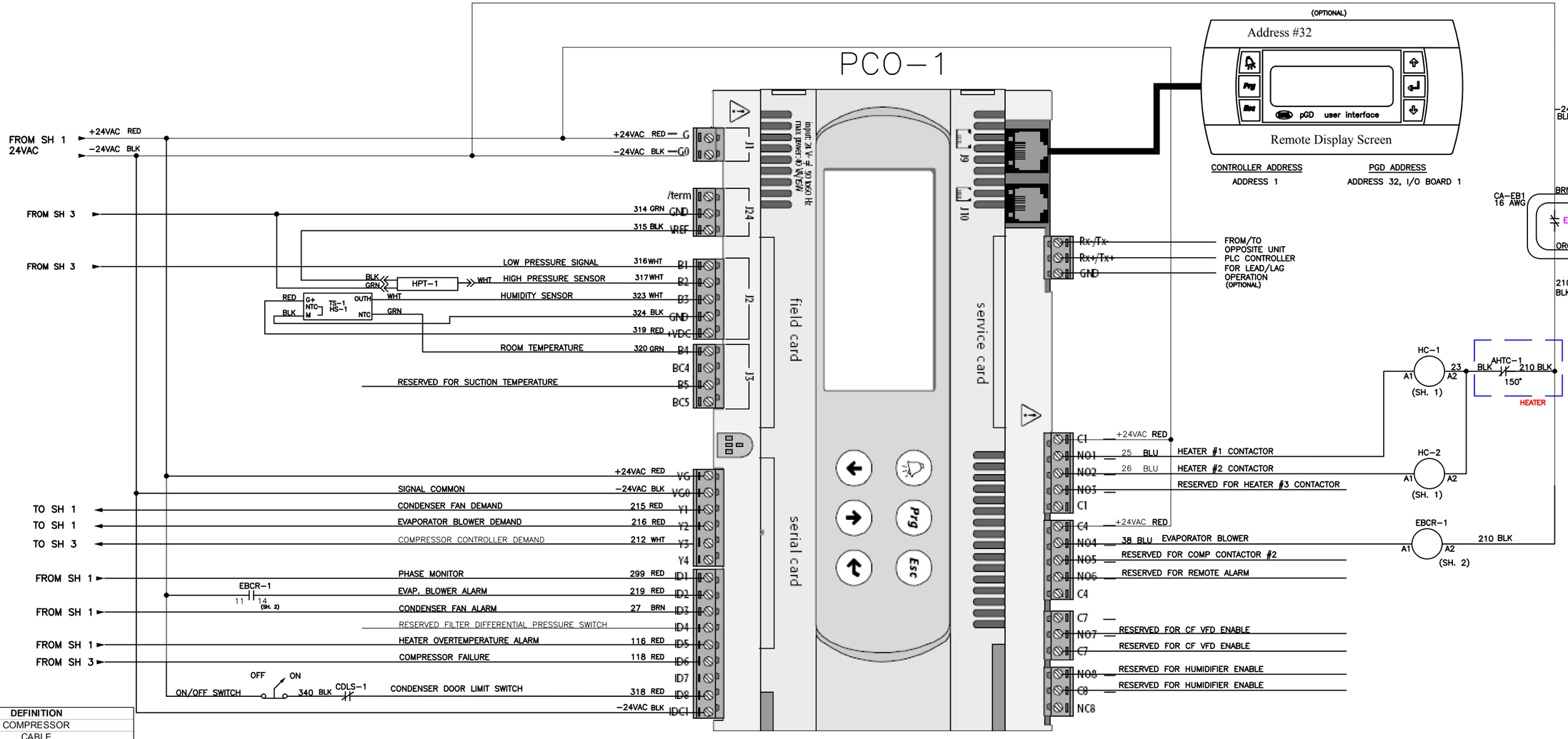
	NAME	DATE
DRAWN	TJF	5/10/16
ENG. APPR.	TJF	5/10/16

Northern-Air

TITLE: POWER DISTRIBUTION WIRING

SIZE	DWG. NO.	REV
B	TVBC192WMBGA2DDA01–10–00001	A

SCALE: NONE | WEIGHT: | SHEET 1 OF 3



ABBREVIATION	DEFINITION
C	COMPRESSOR
CA	CABLE
CC	COMPRESSOR CONTACTOR
CF	CONDENSER FAN
CFD	CONDENSER FAN DRIVE
CH	CRANKCASE HEATER
CM	COMPRESSOR MONITOR
CON	CONNECTOR
DCC	DIGITAL COMPRESSOR CONTROLLER
DTT	DISCHARGE TUBE THERMISTER
EB	EVAPORATOR BLOWER
EBC	EVAPORATOR BLOWER CONTACTOR
EBD	EVAPORATOR BLOWER DRIVE
EVD	ELECTRONIC VALVE DRIVER
FS	FLOW SWITCH
H	HEATER
HC	HEATER CONTACTOR
HGS	HOT GAS SOLENOID
HPS	HIGH PRESSURE SWITCH
HPT	HIGH PRESSURE TRANSDUCER
HS	HUMIDITY SENSOR
LLS	LIQUID LINE SOLENOID
LPT	LOW PRESSURE TRANSDUCER
PC	PROGRAMMABLE CONTROLLER
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PM	PHASE MONITOR
PS	POWER SUPPLY
TS	TEMPERATURE SENSOR
TX	TRANSFORMER

	NAME	DATE
DRAWN	TJF	5/10/16
ENG. APPR.	TJF	5/10/16

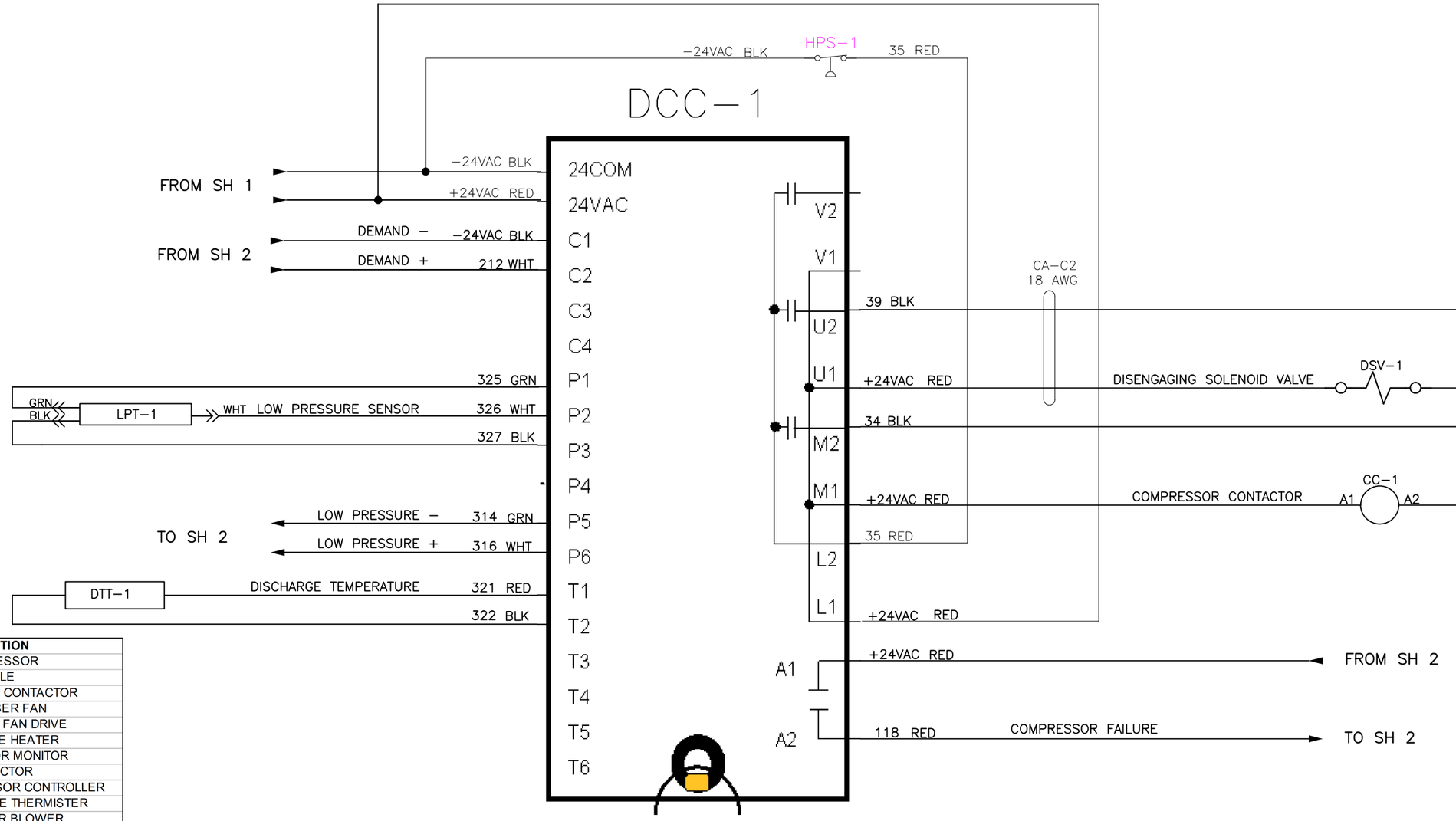
Northern-Air

TITLE:

PLC WIRING

SIZE	DWG. NO.	REV
B	TVBC192WMBGA2DDA01–10–00001	A

SCALE: NONE | WEIGHT: | SHEET 2 OF 3



(SH.1)

ABBREVIATION	DEFINITION
C	COMPRESSOR
CA	CABLE
CC	COMPRESSOR CONTACTOR
CF	CONDENSER FAN
CFD	CONDENSER FAN DRIVE
CH	CRANKCASE HEATER
CM	COMPRESSOR MONITOR
CON	CONNECTOR
DCC	DIGITAL COMPRESSOR CONTROLLER
DTT	DISCHARGE TUBE THERMISTER
EB	EVAPORATOR BLOWER
EBC	EVAPORATOR BLOWER CONTACTOR
EBD	EVAPORATOR BLOWER DRIVE
EVD	ELECTRONIC VALVE DRIVER
FS	FLOW SWITCH
H	HEATER
HC	HEATER CONTACTOR
HGS	HOT GAS SOLENOID
HPS	HIGH PRESSURE SWITCH
HPT	HIGH PRESSURE TRANSDUCER
HS	HUMIDITY SENSOR
LLS	LIQUID LINE SOLENOID
LPT	LOW PRESSURE TRANSDUCER
PC	PROGRAMMABLE CONTROLLER
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PM	PHASE MONITOR
PS	POWER SUPPLY
TS	TEMPERATURE SENSOR
TX	TRANSFORMER

	NAME	DATE
DRAWN	TJF	5/10/16
ENG. APPR.	TJF	5/10/16

Northern-Air

TITLE: DIGITAL COMPRESSOR CONTROLLER WIRING

SIZE	DWG. NO.	REV
B	TVBC192WMBGA2DDA01-10-00001	A

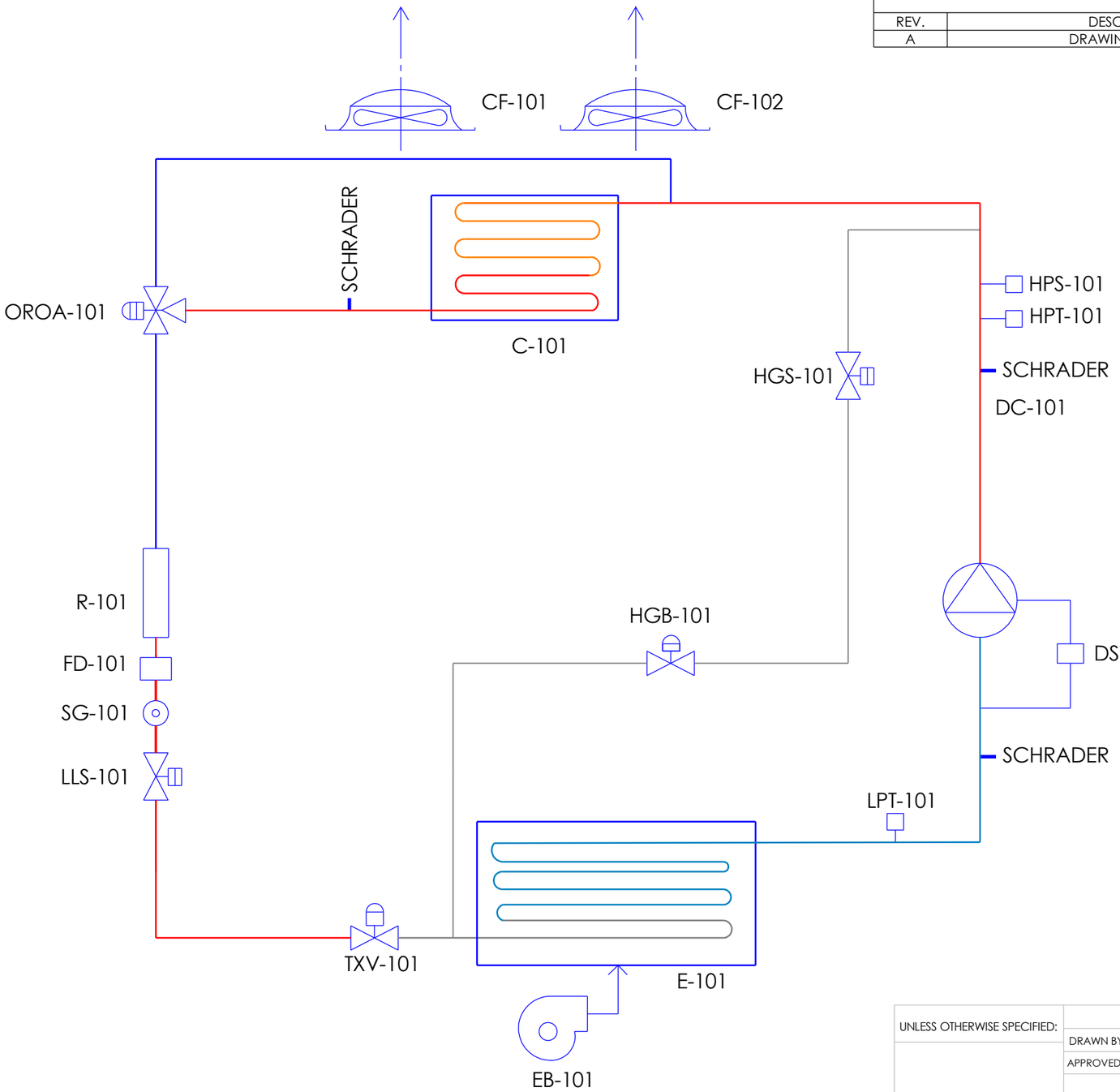
SCALE: NONE | WEIGHT: | SHEET 3 OF 3

CHARGING INFORMATION

Proper Refrigerant charge is critical for proper operation of unit across varying ambient conditions. System may operate with clear sight glass in warmer temperatures then charge may be insufficient once ambient temperatures drop.
Service Personnel should be familiar with head pressure control valves and their operation.
Consequently the only accurate method is to remove all refrigerant and weigh in charge to system name plate specifications.
If removing refrigerant to weigh use only clean non contaminating recovery tanks.
Systems using blended refrigerants and had refrigerant leaks we recommend replacing with all new refrigerant.
407C is a blended refrigerant.

General Table	
IDENTIFIER	**DESCRIPTION**
DC	DIGITAL COMPRESSOR SET
C	CONDENSER COIL
CF	CONDENSER FAN
R	RECEIVER
FD	FILTER DRYER
SG	SIGHT GLASS
HGB	HOT GAS BYPASS VALVE
HGBS	HOT GAS BYPASS SOLENOID
TXV	THERMOSTATIC EXPANSION VALVE
E	EVAPORATOR COIL
EB	EVAPORATOR BLOWER
LLS	Liquid Line Solenoid
LPT	LOW PRESSURE TRANSDUCER
HPT	HIGH PRESSURE TRANSDUCER
HPS	HIGH PRESSURE SWITCH
DSV	DISENGAGING SOLENOID VALVE
OROA	HEAD PRESSURE CONTROL VALVE

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	DRAWING RELEASE	11/4/14	



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/16"
BEND ± 4°
TWO PLACE DECIMAL ± 0.07"
THREE PLACE DECIMAL ± 0.063"

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN BY	KAH	11/4/14
APPROVED BY	*KAH 11/5/2014*	

Northern-Air

TITLE:
REFRIGERATION SCHEMATIC

SIZE	DWG. NO.	
B	TVBC240_288WM-12-00001	
SCALE: 1:1		SHEET 1 OF 1

DIGITAL SCROLL INFORMATION

Flash Code Troubleshooting

While each ALERT code is active, the alarm relay contacts (A1 and A2) are closed. The ALERT code will remain active and the alarm relay contacts closed until the reset conditions have been met or 24 VAC power has been cycled off and on. All Flash Codes except Code 6 and 8 result in the compressor contactor, unloader solenoid and vapor injection being deenergized.

All LEDs flashing at the same rate indicates 24VAC supply is too low for operation. All LEDs on solid at the same time indicates Digital Compressor Controller failure.

Whenever power is cycled off and on, the current Flash Code and all internal counters are reset.

Flash Code 1 – Reserved for future use

Flash Code 2 – High Discharge Temperature

The discharge temperature thermistor has measured a temperature above 268°F (130°C) or the thermistor is short circuited (jumpered out)
The Digital Compressor Controller will deenergize the compressor contactor, unloader solenoid and vapor injection solenoid. The alarm relay contacts will close.
The compressor will be allowed to restart after a 30 minute delay and after the thermistor temperature is below 250°F (120°C). The Flash Code and alarm relay contacts will be reset after the compressor has run for 60 uninterrupted minutes without any other alerts.
If five high discharge temperature ALERTs have occurred within four hours, the Digital Compressor Controller will lock out the compressor. The lockout can only be reset by cycling the 24VAC power off and on.

Flash Code 3 – Compressor Protector Trip

The demand signal from the system controller is greater than 1.44VDC and there is no compressor current detected. This could be due to the compressor's internal overload protector being open, fuse or breaker open, power disconnected to compressor contactor, compressor power wiring not run through Digital Compressor Controller current transformer port or a compressor contactor failure.
The Digital Compressor Controller will deenergize the compressor contactor, unloader solenoid and vapor injection solenoid. The alarm relay contacts will close.
The Digital Compressor Controller will wait for the two minute anti-short cycle timer to time out and if the system controller demand signal is still greater than 1.44VDC, energize the compressor contactor again. If compressor current is detected on the restart, the ALERT code and alarm relay output will reset. The Digital Compressor Controller will attempt to restart compressor as long as the system controller demand is above 1.44VDC there is no lockout feature for this ALERT.

Flash Code 4 – Locked Rotor

A locked rotor condition in the compressor is sensed by the Digital Compressor Controller on four consecutive start ups.
The Digital Compressor Controller will deenergize the compressor contactor, unloader solenoid and vapor injection solenoid. The alarm relay contacts will close.
This code results in a lockout and can only be reset by cycling the 24VAC power off and on.

Flash Code 5 – Demand Signal Loss

The demand signal input has dropped below 0.5VDC. The demand input signal wire may be disconnected or the system controller providing the signal may not be powered.
The Digital Compressor Controller will deenergize the compressor contactor, unloader solenoid and vapor injection solenoid. The alarm relay contacts will close.
Once the system controller demand signal input has risen above 0.5VDC, the ALERT code, and alarm relay output will reset. If the demand signal is above 1.44VDC and the anti-short cycle timer has timed out, the compressor will restart.

Flash Code 6 - Discharge Thermistor Fault
The Digital Compressor Controller is not receiving a signal from the discharge temperature thermistor. The thermistor may be missing, disconnected or a wire is broken. The alarm relay contacts will close and the Digital Compressor Controller will not increase the capacity of the compressor beyond 50% loading.
This ALERT code and alarm relay output are reset by reconnecting the thermistor.

Flash Code 7 - Unloader Solenoid Fault
Reserved for future use

Flash Code 8 - Compressor Contactor Fault
Compressor current is detected when the system controller demand signal is below 1.44VDC. The compressor contactor may have welded contacts or the contacts may be mechanically jammed. The compressor will continue to run in this condition since the Digital Compressor Controller cannot open the compressor contactor.
The Digital Compressor Controller will energize the compressor contactor and vapor injection solenoid. The alarm relay contacts will close. The unloader solenoid will remain energized causing the compressor to run unloaded as long as the system controller demand signal is less than 1.44VDC. If the system controller demand is greater than 1.44VDC, the unloader solenoid will deenergize causing the compressor to run loaded.
The ALERT code and alarm relay output are reset when current is no longer detected while system controller demand signal is below 1.44VDC.

Flash Code 9 - Low 24VAC Supply
Supply voltage to the Digital Compressor Controller has dropped below 18.5VAC.
The Digital Compressor Controller will deenergize the compressor contactor, unloader solenoid and vapor injection solenoid. The alarm relay contacts may close if the voltage is high enough for the alarm relay to pull in.
The ALERT code and alarm relay output are reset when the supply voltage to the Digital Compressor Controller rises above 19.5VAC.

Testing the Installed Digital Compressor Controller
Once installed, the Digital Compressor Controller can be tested to verify it is working properly. In each test, 24VAC must be supplied to 24VAC and 24COM. For the output test, 24VAC must be supplied to L1 and L2.

Input Tests
Thermistor Input – disconnect the discharge temperature sensor wires from terminals T1 and T2. If functioning normally, the Digital Compressor Controller should display a Code 6 unless a previous ALERT code was present.
Demand Input – disconnect the System Controller Demand signal wires from C1 and C2. If functioning normally, the Digital Compressor Controller should display a Code 5 unless a previous ALERT code was present.

Output Tests
Contactor Output – while the Digital Compressor Controller is powered off (no supply voltage to 24VAC and 24COM), disconnect the System Controller Demand signal wire from C1 and C2. Add a jumper wire from P3 to C2 and a second jumper wire from P1 to C1. Reapply power to 24VAC and 24COM. If functioning normally, a voltmeter should read the same voltage across M1 and M2 as is measured across L1 and L2, unless an ALERT code is present.
Unloader Output – while Digital Compressor Controller is modulating the unloader solenoid, a voltmeter should read the same voltage across U1 and U2 as is measured across L1 and L2 whenever the yellow “Unloader “LED is lit.

3605 Buffalo Rd.
Rochester, NY 14624
Phone: 585-594-5050
Fax: 585-594-8888
www.northernairsystems.com

QUICK REFERENCE GUIDE

CAREL CONTROLLER: PCO 3 Small- Program 3.4v and up.

MAIN MENU

- **Main Screen – Displays current room temperature, setpoint and system status**
- **System Status Screens – Displays current room temperature, pressure, humidity, demands and outputs**
- **On/Off unit – Enable and disable system, change unit and system modes, and displays lead unit**
- **Set Points – Ability to change temperature, humidity and dehumidification set points.**
- **Run Times – Displays run hours of all components.**
- **Min/Max reading – Displays min and max temperature, pressure and humidity in last 24 hours.**
- **Factory menu – Factory set and factory authorized changes only**
- **Network status – Display status of devices on the network.**
- **Alarm history – Shows all past alarms with time and date**

CHANGE SET POINTS

- **Press ↑ or ↓ to change the setpoint to desired temperature**

VIEW SYSTEM STATUS SCREENS

- **Press the "Prg" to view status screens**
- **Press ↑ or ↓ to scroll through status screens**

CHANGE MODE

- **Press ↵**
- **Press ↑ or ↓ twice. When curser is flashing on "Unit Mode" press ↑ or ↓ to select desired mode.**
- **Press ↵ to return to the "Main Screen"**

VIEW ALARM HISTORY

- **Press "Prg" twice to view status screens**
- **Press the ↓ to highlight "Alarm History"**
- **Press the ↵**
- **Press ↓ to view past alarms**
- **Press Esc" twice to exit alarm history and return to the "Main Screen"**

TO VIEW CURRENT STATUS

- **Press "Prg"**
- **Press ↑ or ↓ to view**

TO VIEW CURRENT ALARMS

- **Press 🔔**
- **Press ↓to view**
- **Press ↵ when prompted to clear current alarms**

*** AT ANY TIME THE ESC KEY TO GET BACK TO THE MAIN SCREENS ***

PLC MENUS AND DISPLAYS – 3.8V

MENU	DISPLAY	OPTIONS	DESCRIPTION
SYSTEM STATUS			
	TEMPERATURE	X DEG F	Displays current room temperature
	HIGH PRESSURE	X PSI	Displays current high pressure
	LOW PRESSURE	X PSI	Displays current low pressure
	HUMIDITY	X %	Displays current relative humidity (optional)
	HEAT DEMAND	X %	Displays current heating demand
	HEAT STAGE	X	Displays current heating stage
	COOL DEMAND	X %	Displays current compressor demand
	COND FAN DEMAND	X %	Displays current condenser fan demand
	EVAP FAN SPEED	X %	Displays current evaporator fan speed
	HUMIDITY DEMAND	X %	Displays current humidification demand (optional)
	UNIT NUMBER	1 or 2	Displays which unit the controller is addressed to be
	UNIT MODE	Multiple	Displays the current mode of operation
	STATUS	ON / OFF	Displays the position of the unit ON/OFF switch
	SYSTEM MODE	U1,U2,BOTH,ALT	Displays what units are on or off
	ROTATION LEAD	Unit 1 or Unit 2	Displays which unit is the current lead unit
	TEMP SETPOINT	X DEG F	Displays current room temperature set point
	HUM SETPOINT	X %	Displays current room humidification set point (optional)
	DEHUM SETPOINT	X %	Displays current room dehumidification set point (optional)
	ROTATION LEAD	Unit 1 or Unit 2	Displays which unit is the current lead unit (optional)
UNIT ON/OFF			
	UNIT MODE	Multiple	Allows selection of unit mode of operation
	SYSTEM MODE	Multiple	Allows the selection of the system mode between UNIT 1, UNIT 2, BOTH, or ALTERNATE
	STATUS	Multiple	Displays what unit or units are ON or OFF.
	STARTUP DELAY:	X SECONDS	Allows fans to run for X amount of time before starting the compressor
	SHUT DOWN DELAY	X SECONDS	Allows fans to run for X amount of time before shutting down after the unit is turned OFF
	UNIT ADDRESS	X	Displays the units Plan communication address
SETPOINTS			
PSWD: 9999	TEMPERATURE	X DEG F	Controls temperature setpoint
	HUM SETPOINT:	X %	Controls humidification setpoint (optional)
	DEHUM SETPOINT:	X %	Controls dehumidification setpoint (optional)
	DEHUM STOP BAND	X DEG F	Number of degrees above or below setpoint dehumidification starts and stops(optional)
FACTORY MENU / CONFIGURATION			
PSWD: 9230	COND VFD SETP	X PSI	Controls the high pressure at which the condenser fan is set to maintain
	COND VFD EN	X PSI	High pressure set point used to enable the condenser fan VFD
	COND VFD START	X %	Percentage at which condenser fan will run during purge cycle on start up
	ENABLE HEAT	YES / NO	Allows the heat to be enabled or disabled
	EVAP FAN MODE	ON / AUTO	When set to ON, evaporator blower will run all the time the system switch is in the ON position. When set to AUTO, the evaporator blower will shut off when there is no cooling or heat demand

	LEAD/LAG ENABLE	ON/OFF	Allows the units lead/ lag option to be activated or deactivated.
	DAY ROTATION	YES/NO	Allows the enabling or disabling of the lead and lag units to swap
	DAYS TILL ROTATION	X DAYS	The number of days at which the lead and lag units swap.
	LEAD/LAG OVERLAP	YES/NO	Allows the enabling of lead/lag unit overlap
	TIME	X SECONDS	The amount of time in seconds that both units will run simultaneously when the lead and lag units swap.
	ALT DUAL ENABLE	ON/OFF	Allows the ALT/DUAL enable option to be activated or deactivated
	ALT DUAL SETPOINT	X DEG F	The degrees above setpoint that will allow both units to run to maintain setpoint.
	COMPRESSOR TYPE	Single, Standard,or Digital Tandem	Allows to select different compressor options.
	MIN COMP RUN V	X VOLTS	Output voltage to compressor controller at 0% demand while running(digital compressor only)
	MAX COMP RUN V	X VOLTS	Output voltage to compressor controller at 100% demand while running(digital compressor only)
	COMP OFF VOLT	X VOLTS	Output voltage to compressor controller while compressor is not running
	POWER UP MODE EN	YES / NO	Used to enable and disable the Power Up Mode. When enabled, the unit will set the unit mode and set point when power is cycled. When disabled the current settings will remain the same when power is cycled.
	UNIT MODE	AUTO, FAN, OFF, HEAT, COOL	The mode the unit will default to when the power is cycled
	UNIT TEMP	X.X° F	The setpoint the unit will default to when the power is cycled
	COMP MIN OFF	X MINUTES	Minimum amount of time in minutes that the compressor cannot be off
	COMP TYPE	CYCLYING/ CONTINOUS	Allows the compressors to be set for cycling or continuous run. DO NOT CHANGE
	DEMAND SD TIME	X MINUTES	The amount of time in minutes the compressor demand is at 0% before the compressor will be deactivated.
	LP SETPOINT	X PSI	Low pressure set point the compressor is modulating to maintain during cooling operation(digital compressor only)
	COOL ON SETP	X DEG F	Degrees above set point when cooling is activated
	DIG TANDEM COMP	NO	Not used. For use with Tandem compressors
	EVAP VFD SPEED	X %	For use on systems with EC evaporator fans or evaporator fan VFD. DO NOT CHANGE
	PURGE & PRESS UNIT	YES/NO	Allows purge and pressurization unit option to be enabled or disabled. DO NOT CHANGE
	TEMP SENSOR CONFIG	SENSOR 1; SENSOR 2; SENSOR 1 & SENSOR 2 AVERAGED	Used to set the unit to read temperature using a single temperature sensor or 2 temperature sensors averaged together. **NOTE:** Temperature Sensor #2 must be enabled in I/O Configuration menu under Factory Menu for averaged temperature reading.
	SENSOR #1	X.X° F	Shows the temperature sensor #1 is currently reading
	SENSOR #2	X.X° F	Shows the temperature sensor #2 is currently reading
	SENSORS AVERAGED	X.X° F	Shows the average temperature reading of sensor #1

			and sensor #2
	DISPLAYED TEMP	X.X° F	Shows the temperature that is being displayed on the System Status screen
	COND VFD TUNING	MULTIPLE	PI control loop settings for condenser fan, DO NOT CHANGE
	COOLING TUNING	MULTIPLE	PI control loop settings for compressor, DO NOT CHANGE
	HEAT TUNING	MULTIPLE	PI control loop settings for heating, DO NOT CHANGE
	HUMIDIFIER TUNING	MULTIPLE	PI control loop settings for humidification, DO NOT CHANGE
	CLOCK	TIME/DATE	Allows user to set the time and date
	TEMPERATURE UNITS	°F / °C	Allows change of temperature unit of measure
	PRESSURE UNITS	PSI	Displays the pressure unit of measure
	CHANGE PASSWORD SERVICE	XXXX	Allows change of service level password. DO NOT CHANGE
	CHANGE FACTORY PASSWORD	XXXX	Allows change of factory level password. DO NOT CHANGE
SET FIELDBUS	ADDRESS	X	Fieldbus Communications Address
	PROTOCOL	X	Fieldbus Communications Protocol
	BAUD RATE	X	Fieldbus Communications Baud Rate
SET BMS	ADDRESS	X	BMS Communications Address
	PROTOCOL	X	BMS Communications Protocol
	BAUD RATE	X	BMS Communications Baud Rate
FACTORY MENU / I/O CONFIGURATION			
	LOW PRESSURE	MULTIPLE	Low pressure sensor set up & calibration
	HIGH PRESSURE	MULTIPLE	High pressure sensor set up & calibration
	HUMIDITY	MULTIPLE	Humidity sensor set up & calibration (optional)
	SUPPLY AIR PRESSURE	MULTIPLE	Supply air pressure sensor set up. DO NOT CHANGE(option)
	TEMPERATURE	MULTIPLE	Temperature sensor set up & calibration
	SUCTION TEMP	MULTIPLE	Suction temp sensor set up & calibration (optional)
	TEMPERATURE SENSOR 2	MULTIPLE	Temperature sensor set up & calibration (optional) **NOTE:** This sensor must be enabled for the sensor averaging feature to work
	PHASE MONITOR	MULTIPLE	Phase monitor input set up
	EVAP FAN FAILURE	MULTIPLE	Evap fan failure input set up
	COND FAN FAILURE	MULTIPLE	Condenser fan fault input set up
	AIR FLOW SWITCH	MULTIPLE	Optional airflow switch can be used to indicate dirty filters
	GENERATOR STATUS	MULTIPLE	Generator input set up (optional)
	HEATER FAILURE	MULTIPLE	Heater failure input set up
	COMPRESSOR OVERLOAD	MULTIPLE	Compressor #1 fault input set up
	HUMIDIFIER FAILURE	MULTIPLE	Humidifier fault input set up (optional) If humidifier CP4 board faults, this alarm will be activated. See troubleshooting guide in humidifier section in this manual
	COMP 2 OVERLOAD	MULTIPLE	Compressor #2 fault input set up (optional)
	ON/OFF SWITCH	MULTIPLE	ON/OFF switch input set up
	REMOTE PANEL OPR	MULTIPLE	Remote panel operations input set up
FACTORY MENU / MANUAL CONTROL			
	COND VFD	AUTO/HAND %	Allows manual operation of the condenser fan VFD
	EVAP VFD	AUTO/HAND %	Only used on systems equipped with evaporator fan

			VFD. Allow manual control of evaporator fan VFD
	MOD COMP	AUTO/HAND %	Allows manual operation of the modulating compressor
	HUMDIFIER	AUTO/HAND %	Allows manual operation of the modulating humidifier
	HEATER 1	AUTO/HAND ON/OFF	Allows manual operation of the stage 1 heater contactor (optional)
	HEATER 2	AUTO/HAND ON/OFF	Allows manual operation of the stage 2 heater contactor (optional)
	HEATER 3	AUTO/HAND ON/OFF	Allows manual operation of the stage 3 heater contactor (optional)
	EVAP FAN	AUTO/HAND ON/OFF	Allows manual operation of the evaporator fan contactor
	COND EN	AUTO/HAND ON/OFF	Allows manual operation of the condenser fan VFD enable
	HUMID EN	AUTO/HAND ON/OFF	Allows manual operation of the humidifier enable
	COMP2	AUTO/HAND ON/OFF	Allows manual control of compressor#2 only used on systems equipped with 2 compressors
	ALARM	AUTO/HAND ON/OFF	Allows manual control of remote alarm output. Used to test light bulb and/or siren
FACTORY MENU / ALARM SET POINTS			
	TEMP AL DELAY	X MINUTES	Delay on start up only before hi or lo temp alarm is allowed
	LO TEMPERATURE	X DEG F	Degrees below set point when low room temp alarm is activated
	HI TEMPERATURE	X DEG F	Degrees above set point when hi room temp alarm is activated
	LOW AIR FLOW	X CFM	The CFM setpoint at which the Low Air Flow alarm is activated
	LOW AIR FLOW DEL	X SECONDS	Delay before the low air flow alarm is activated
	LO PR SHUTDOWN	X PSI	Low pressure alarm set point that compressor will shutdown
	LO FREQUENT PR	X PSI	Frequent low pressure alarm set point no comp shutdown
	LO PR TIMEOUT	X MINUTES	Delay before alarming on frequent low pressure alarm
	LO PRESSURE SHUTDOWN	X MINUTES	Delayed low pressure alarm for low ambient start-up
	HI PR SHUTDOWN	X PSI	High pressure alarm set point that compressor will shutdown
	HI FREQUENT PR	X PSI	Frequent high pressure alarm set point no comp shutdown
	HI PR TIMEOUT	X MINUTES	Delay before alarming on frequent high pressure alarm
	PLAN ALARM DLY	X SECONDS	The amount of time in seconds the PLAN network is off line before alarm is activated
	HIGH HUMIDITY	X %	Relative humidity at which high humidity alarm is activated
	LOW HUMIDITY	X %	Relative humidity at which low humidity alarm is activated
	DISABLE BUZZER	YES/NO	Allows the enabling and disabling of the remote display alarm buzzer(option)
FACTORY MENU / HUMIDIFY/DEHUM			
	HUMIDIFIER ENABLE	ON/OFF	Activates humidification control option
	DEHUM ENABLE	ON/OFF	Activates dehumidification control option
	DEHUM BAND	X %	Controls RH% at which dehum is activated and deactivated
	DEHUM HEAT STAGES	1-3	Allows 1, 2 or 3 stages of heat to activate while in Dehum.

	DEHUM COMPRESSORS	1-2	Allows 1 or 2 compressors to run when Dehum is activated.
FACTORY MENU / HEAT SETUP			
	HEAT STAGE DELAY	X MIN	Delay time between stages of heat activation
	HEATING OFFSET	X DEG F	Degrees below set point when heating is activated
	STAGING	X %	Controls the demand for heat at which each stage is activated and deactivated.
FACTORY MENU / VALVE SETUP			
	ENABLE HOT GAS EVD	NO	Allows the enabling of electronic hot gas bypass valve controls. Not used DO NOT CHANGE
	ENABLE SPRHT EVD	NO	Allows the enabling of electronic pressure regulating valve controls. Not used DO NOT CHANGE
RUN TIMES			
	HEATER 1	X HRS	Displays current total hours of operation (optional)
	HEATER 2	X HRS	Displays current total hours of operation (optional)
	HEATER 3	X HRS	Displays current total hours of operation (optional)
	EVAPORATOR FAN	X HRS	Displays current total hours of operation
	COND FAN EN	X HRS	Displays current total hours of operation
	HUMIDIFIER EN	X HRS	Displays current total hours of operation (optional)
	COMPRESSOR 1	X DEG F	Displays current total hours of operation
MIN/MAX READINGS			
	HIGH PR	X PSI	Displays min and max readings over past 24 hours of operation
	LOW PR	X PSI	Displays min and max readings over past 24 hours of operation
	HUMIDITY	X %	Displays min and max readings over past 24 hours of operation (optional)
	TEMP	X DEG F	Displays min and max readings over past 24 hours of operation
NETWORK STATUS			
	NETWORK STATUS	NONE	Displays current network status and component address
ALARM HISTORY			
	ALARMS	ALARMS	Displays all past alarms with time and date stamp. Also the power supplied from generator or shore during the fault (optional)

SYSTEM ALARMS & TROUBLESHOOTING - 3.8v

DISPLAY	DESCRIPTION & TROUBLESHOOTING TIPS
FREQUENT LOW PRESSURE	Low pressure is nearing the low pressure shutdown setpoint: check for accurate pressure sensor reading, dirty evaporator coil or air filters. Make sure liquid line solenoid is open and liquid line filter drier is not plugged. Check for proper refrigerant charge & leak check.
LOW PRESSURE SHUTDOWN	Low pressure has reached the low pressure shutdown setpoint and has shut down the compressor: check for accurate pressure sensor reading, dirty evaporator coil or air filters. Make sure liquid line solenoid is open and liquid line filter drier is not plugged. Check for proper refrigerant charge & leak check.
FREQUENT HIGH PRESSURE	High pressure is nearing the high pressure shutdown setpoint: check for accurate pressure sensor reading, dirty condenser coil or lack of air flow through the condensing coil.
HIGH PRESSURE SHUTDOWN STRIKE 1 HIGH PRESSURE SHUTDOWN STRIKE 2 HIGH PRESSURE SHUTDOWN LOCKOUT	High pressure has reached the high pressure shutdown setpoint and has shut down the compressor: check for accurate pressure sensor reading, dirty condenser coil or lack of air flow through the condensing coil. The compressor will try to restart after 2 minutes, after the 3rd consecutive High Pressure Shut Down, it will be locked out and will need to be reset manually on the PLC or the PGD display.
LOW HUMIDITY	(Optional) The relative humidity level is below the alarm set point, check the humidifier, humidifier water supply tank and pump for proper operation. Also check for accurate humidity reading.
HIGH HUMIDITY	(Optional) The relative humidity level is above the alarm set point, check for accurate humidity reading, if dehumidification is needed ensure that the dehumidification option is activated in the factory menu.
LOW TEMPERATURE	The room temperature is below the low temperature alarm set point, check heater operation.
HIGH TEMPERATURE	The room temperature is above the high temperature alarm set point, check air conditioning operation.
EVAPORATOR FAN FAULT	The evaporator fan has possibly overheated: If fan contactor is pulled in and running check the fan contactor for defective auxiliary contacts. If the fan contactor is not pulled in check all wiring connections to the fan contactor and fan motor. Check fan for high motor temperature and or seized bearings replace fan if necessary.
CONDENSER FAN FAULT	The condenser fan has possibly overheated: Check all wiring connections to the fan VFD and/or fan motor. Check fan for high motor temperature and or seized bearings replace fan if necessary.
PHASE MONITOR FAULT	Phase protection monitor has faulted: Check for 3 phase line voltage to be within the setting on the phase monitor & adjust phase monitor if required. If 3 phase line voltage is within the setting, check wiring connections to phase monitor from the PCO controller, replace monitor if necessary.

HEATER FAULT	The electric heaters have possibly overheated: If heat contactor is pulled in and running check the heat contactors for defective auxiliary contacts. If the heat contactors are not pulled in check all wiring connections to the heat contactors and heat elements. Check the auto reset high limit switch for closure, if open and plenum is below 145 degrees replace the automatic high limit switch. Also ensure the one shot high voltage cut out switches are closed.
HUMIDIFIER FAULT	(Optional) The humidifier CPY board has faulted: count the red flashing light on the CPY board for a code, look in this manual for the humidifier fault codes and explanations.
COMPRESSOR 1 FAULT (OPTIONAL)	The digital compressor controller has faulted or the manual reset high pressure switch has tripped: Push the high pressure switch reset button located on the compressor discharge line or on the liquid line leaving the condenser coil, If compressor starts then look for dirty condenser coils or lack of air flow through condenser coil. If switch was not tripped check the digital compressor controller (DCC) for a fault code. Count the red flashing light on the DCC and refer to this manual for the DCC fault codes and explanations. Check the compressor body for excessively high temperature, if compressor is truly overheated let it cool and then restart to check refrigerant charge for 10 degree sub cooling and proper 12 degree superheat, adjust charge accordingly and leak check. If compressor is not hot check wiring to the compressor and the compressor controller.
pLAN FAILURE PCO #1 OFFLINE PCO #2 OFFLINE (OPTION)	The PLAN communication network between controllers has been interrupted. Check for loose connections at terminal J11 on both PCO controllers. Check the cable running between the controllers for damage or broken wires. If all connections are ok check controller addresses as follows: cycle power to controllers, on power up press and hold the ↑ and 🔔 simultaneously**.** Once the controller boots up it will display the controller address. Be sure one of the unit's controller address is set to address 1 and the other unit's controller address is set to address 2. If addresses are correct and there are no broken communication wires, replace controller as needed.
LOW PRESSURE SENSOR FAIL HIGH PRESSURE SENSOR FAIL HUMIDITY SENSOR FAIL (OPTIONAL) TEMPERATURE SENSOR 1 FAILURE TEMPURATURE SENSOR 2 FAILURE (OPTIONAL) SUCTION TEMPERATURE SENSOR FAIL (OPTIONAL)	The PLC has lost the input signal from the sensor. Check for broken wires, loose connections or terminations. Replace sensor as needed.

NORTHERN AIR SYSTEMS		+1-888-723-9230
ELECTRICAL PARTS LIST		
DESCRIPTION:	**PART NUMBER:**	**QTY- PER SIDE**
Controller, PCO3 Small	20EPCO3000ES0	1
PCO3 Connector Kit	20EPC03CONOSO	1
Transformer	20E694M2A	1
Compressor Controller-DCC	20ETT72A10	1
Phase Monitor	20EICM408	1
Solenoid, Unloader, Compressor	20E998006003	1
Contactor, 24vac, 32 amp, Compressor	20ED32B7	1
Contactor, 24vac, 18 amp, Heaters	20G56201	2
Crank Case Heater, Compressor	20R918004701	1
Solenoid, Liquid Line	20SMKC2	2
Relay, Alarm, 24vac	20E700HTLT2U24	1
ON/OFF Selector Switch	20G56901	1
ON/OFF Selector Switch Base	20G57001	1
Roller Door Switch	20E7988K500	1
High Pressure Switch, Manual Reset- 475psi	20E100DA2	1
Pressure Sensor	20C12101	2
Pressure Sensor Cables	20C13601	2
Temp/Hum Sensor, Wall Mount- NTC	20C12001	1
Remote Display, Wall Mount- PGD1	20EPGD1	1
Evaporator Blower Assembly, EC	20MGKHR3552083	1
Condenser Fan Assembly, EC	20MS3G500	1
Condenser door roller limit switch	20E65985K12	1
MISCELLANEOUS		
Air Filter 14X20X2	20M6C515	2
Air Filter 14X25X2	20M6C516	2
Slotted Cam Latch	20M12265A53	5
Latch Handles	20M9231522	2
Door Strap, 10”	20M1685A42	1
HEATER PARTS		
Heating Element, 208V, 4.5 KW	20E45KW208	2
300° One Shot High Temp.	20EL300F	2
150° Auto Reset High Temp.	20ETT72A3	1

NORTHERN AIR SYSTEMS		+1-888-723-9230
REFRIGERATION PARTS LIST		
DESCRIPTION:	**PART NUMBER:**	**QTY- PER SIDE**
Compressor, Digital	20RZRD612301	1
Isolators, Compressor	20M527011600	1 PKG
Unloader Solenoid Tubing Kit Assembly	20R998007300	1
Vibration Eliminator, 1 3/8”	20R20201	1
Liquid Receiver	20R3392	1
Sight Glass, 5/8"	20S45101	1
Solenoid, Liquid Line	20RME10S250	1
Check Valve, 5/8”	20RA17937	1
Drier, Liquid, Sweat	20RC415S	1
Suction Liquid Line Heat Exchanger	20RHXR150	1
Thermostatic Expansion Valve	20RERVE8-GA	1
Head Pressure Control Valve	20S46501	1
Coil, Evaporator, Left	20RTT240ECL	1
Coil, Evaporator, Right	20RTT240ECR	1
Coil, Condenser, Left	20RTT288CCL	1
Coil. Condenser, Right	20RTT288CCR	1
Refrigerant, 407C	20R407C	12.5 lbs

Northern-Air Systems	Date	
	Unit Model No.	
	Unit Serial No.	

A/C UNIT START UP PROCEDURE

NOTE: "Side 1" is on the right when facing the condenser side of the unit.
"Side 2" is on the left when facing the condenser side of the unit.

Side 1	Side 2	
_____	_____	Mount and seal the system water-tight to the building or trailer.
_____	_____	Connect the approved supply and return duct systems to the unit.
_____	_____	Where desired, mount and connect the air temperature sensor and remote display. *Sensor placement is crucial to proper operation.*
_____	_____	Connect the condensate drain piping to the system if required.
_____	_____	Connect high voltage power leads to the unit's line voltage breaker. Connect ground wire to ground lug mounted on electrical panel.
_____	_____	Check for loose wiring on all high voltage connections including: phase monitor, distribution block and contactors, by tightening each screw terminal as well as inspecting the wire terminations themselves.
_____	_____	Be sure all screw terminals and plug connections on the PCO controller are tight and secure
_____	_____	Inspect all mounting hardware for tightness on all fan motors, compressors, top skin, doors and all metal skins and covers.
_____	_____	Inspect all copper piping for proper mounting and strapping. Make sure there are no places where friction or rubbing can occur
_____	_____	Check access ports to be sure all caps are present. Look for any signs of oil which could indicate a refrigerant leak or damage in shipping
_____	_____	Inspect refrigerant piping insulation to ensure a good adhesion.

Northern-Air Systems

A/C UNIT START UP PROCEDURE

Continued

Side 1	Side 2	
_____	_____	Make sure there is no continuity from L1, L2 or L3 to ground.
_____	_____	Make sure the system switch in the panel is turned off.
_____	_____	Turn on the main line voltage breaker in the electrical panel. (Optional)
_____	_____	Power up high voltage to unit.
_____	_____	Check to make sure the controller powers up.
_____	_____	Check compressor crankcase heaters for operation.
_____	_____	Check the controller display for an accurate temperature reading against your temperature meter and adjust as needed in “Factory Menu” under “I/O Configuration”. (Password is 9230)
_____	_____	Check for any alarms and troubleshoot as needed.
_____	_____	Check the remote display for operation.
_____	_____	Make sure the condenser door panels are open, all other doors and panel covers are closed and air ducts are finished and diffusers open.
_____	_____	Turn systems switch to on
_____	_____	Adjust the temperature set point under “Setpoints” menu on the controller (Password is 9999). Raise the temperature set point above currently displayed temp to call for heat. When heating starts take an amp draw reading on the heater contactors to ensure heat is functioning. Let the heat run full out for five minutes. Refer to name plate label on the inside of electrical door for amp draw ratings. **NOTE: If two stage heat, take amp reading on both stages.**
_____	_____	Lower the set point below currently displayed temperature and cooling will start. Compressor #1 will run and modulate as needed to maintain a 65 psi low pressure. When compressor #1 runs at 100% demand and cannot maintain the low pressure at set point then compressor #2 will start. Compressor #1 will then modulate again to maintain the low pressure set point. The condenser fans will run as needed to maintain the high pressure at approximately 230 psi. When the #1 compressor is at 0% demand for five minutes the #2 compressor will shut down and compressor #1 will then modulate to maintain the low pressure on its own.

Northern-Air Systems

A/C UNIT START UP PROCEDURE

Continued

Side 1	Side 2	
_____	_____	The evaporator fan is adjustable in speed from the controller, if more or less air is desired. The supply duct system should be properly balanced by a qualified technician; this is important for proper operation and for even temperature control. Set the evaporator blower to desired speed in “CONFIGURATION” under “FACTORY MENU” (password 9230). Set speed as high as possible, to acceptable airflow and noise level.
_____	_____	Calibrate pressure gauges and connect them to the suction and discharge lines, check to make sure the display is reading pressures accurately. Calibrate in the “factory menu” under “I/O configuration” as needed to correct minor differences.
_____	_____	Disconnect the gauges from the suction and discharge.
_____	_____	Verify all pressure port caps and service valve caps are seated and tight, including receiver service valve.
_____	_____	Take amp draws of each component listed below and compare to the name plate ratings on the electrical door or panel cover. Actual readings shall be less than FLA on the name plate.

****NOTE: Mark N/A on the lines of the listed component that does not apply to the unit.**

NAMEPLATE RATING		SIDE 1	SIDE 2
_____	Compressor 1	_____	_____
_____	Compressor 2	_____	_____
_____	Evaporator Fan 1	_____	_____
_____	Evaporator Fan 2	_____	_____
_____	Condenser Fan 1	_____	_____
_____	Condenser Fan 2	_____	_____
_____	Condenser Fan 3	_____	_____

A/C UNIT START UP PROCEDURE

Concluded

_____Heater 1	_____	_____
_____Heater 2	_____	_____
_____Heater 3	_____	_____
_____Humidifier	_____	_____

Side 1	**Side 2**	
_____	_____	Adjust the set point back to 72°F or as desired.
_____	_____	Let the unit continue to run and periodically check for any alarms on the display.
_____	_____	Make sure all doors and panel covers are secure.
_____	_____	Northern Air Systems recommends replacing the air filters prior to system release to the end user.
_____	_____	Turn unit off from the ON/OFF switch or let it run based on customer needs.

System commissioning is complete.

Date Completed: _____

Name: _____
(print name)

Signature: _____

Thank you for choosing a Northern Air Systems custom air conditioning unit.
To contact us: 3605 Buffalo Road, Rochester, NY 14624, 888-723-9230
www.northernairtech.com

Northern-Air Systems	Date	
	Unit Model No.	
	Trailer/Rig #	
	Unit Serial No.	

A/C PM Service Checklist

This form is to be filled out and signed by the person performing the preventive maintenance service procedure.

_____ Check for loose wiring on all high voltage breakers, variable frequency drives, overload starters and contactors by tightening each screw terminal and inspecting the wire terminations.

_____ Inspect and tighten all wiring compressors.

_____ Inspect all low voltage wiring connections to the low voltage terminal block, control boards and controllers. Check by pulling on each individual wire ensuring that all connections are secure.

_____ Inspect all mounting hardware for tightness on all fan motors, compressors, chiller pump, doors, all metal skins and covers.

_____ Inspect refrigerant piping for any signs of leaks and repair as necessary.

_____ Inspect the humidifier (if equipped) for any signs of water leakage.

_____ Inspect the humidifier canister for excessive debris and sediment build up. Canister must be replaced at least once a year. If Canister fills more than ¾ full of water before producing steam and/or is impossible to see into, then replace the canister.(If equipped- humidifier option only)

_____ Make sure all seams are caulked and sealed tight on the exterior portion of the A/C unit.

_____ Inspect condenser mounting hardware, bump stops, Isolators, fan blades, motor brackets and fan guards.

_____ Inspect refrigerant pipe insulation and repair as necessary.

_____ Inspect all isolators: make sure they are not twisted, or deteriorated.

_____ Clean both A/C coils with coil wash solution as necessary.

Northern-Air Systems

A/C PM Service Checklist Cont.

_____ Inspect both A/C coils for damaged or bent fins and repair as necessary.

_____ Replace the air filters in the A/C unit. Use only high grade pleated filters.

_____ Check all sensors for accurate readings, including the pressure sensors. Calibrate sensors as needed.

_____ Check for any alarms and troubleshoot as needed.

_____ Check hot gas valve setting should open below 60PSI and close above 60 PSI using low pressure reading on controller (unit PSI key). Do this by adjusting the screw on the head of the valve located above the compressors, clockwise to rise and counterclockwise to lower the pressure setting.

Company: _____

Print Name: _____

Signature: _____

Date: _____

PCO3 SENSOR CALIBRATION INSTRUCTIONS-3.8v

1-Press PRG key 2 times to access main menu

2-Arrow down to “factory menu”

3-Press enter 2 times (↵)

4-Enter password 9230. Use the arrow up & down buttons then enter key(↵) after setting each digit.

5-Press enter key (↵) when password 9230 is displayed.

6-Arrow down to “I/O Configuration”

7-Press enter key (↵)

8-Arrow down to the sensor screen that needs calibrating (ex. Temperature)

9-Press enter key (↵) to move cursor to the Offset setting

10-Arrow up or down to set cal. offset +/- degrees as needed

11-Press enter (↵)

12-The temperature Value is displayed below Offset.

13- Press esc twice to get back to main temperature screens.

Installation Instructions

To prevent warranty voiding installation and start up is to be performed by factory approved and trained personnel. These instructions are reference only.

- **CONDENSATE DRAIN CONNECTIONS:**

Connect all condensate drains with a minimum of ¾" line size and a 4" trap on each.

- **MAIN ELECTRICAL CONNECTIONS:**

Supply proper power using unit nameplate in electrical compartment conforming to local codes and ordinances. Install cover after connections are made.

- **INSTALL TEMP SENSORS:**

Mount and wire temperature sensors in proper location based on system design
wiring diagram to show wire terminations.

- **MOUNTING TEMP/HUMIDITY SENSOR (When equipped)**

Connect temp/humidity sensor for room to designated 18/4 conductor cable off the front of A/C unit. Electrical diagram in this manual will show connections. Mount sensor in proper location based on system design.

- **CALIBRATE ALL SENSORS FOR HUMIDITY AND TEMPERATURE**

- **TEST AND RUN HEATING SYSTEM (When equipped)**

- **CHECK FLOW RATES AND CIRCUIT SETTER OPERATION (When equipped) Chillers Only**

MAINTENANCE GUIDELINES

General

Restricted airflow through the evaporator & condenser coils will reduce the operating efficiency of the unit and can result in high temperatures and loss of cooling or heating. Clean all coils of debris that will inhibit air flow. This can be done with compressed air or an environmentally safe commercial coil cleaner. Thoroughly rinse the coil to remove any cleaner residue. Check for bent or damaged fins and repair as necessary. In winter, do not permit snow to accumulate around the sides or underneath the condenser coil. Snow or ice accumulations on the fan blades will cause them to be out of balance.

Condenser Fans

Inspect the motor & fan assembly to ensure bearings are free and motor is secure within its mount.

Evaporator Fan Section

Check air filters after initial run period and monthly thereafter, replacing as necessary.
Replace with the same size, and type filters as originally furnished. Periodic checks of the blower package include: motor mounts, fan bearings and wheels.

Refrigerant Piping

Visually inspect all refrigerant lines for signs of oil leaks, an indicator of a refrigerant leak. Check the refrigerant charge at the system sight glass. A bubbling sight glass does not always mean low charge. Use good troubleshooting methods to determine a leak location or possible restrictions leading to this condition. Check all piping for vibration isolation and support as necessary.

Electrical

Check and record all running amperage of all fan motors, heaters and compressors. Also look for signs of heat and loose connections. Make sure line voltage is switched off while tightening wires.

3605 Buffalo Road
Rochester, NY 14624

RIGGING INSTRUCTIONS

To prevent possible damage to the system, Please use the Factory supplied lifting jig and/or qualified personnel to field install.
Contact factory for further instructions.
585-594-5050

****

Attention Service Personnel
Please Read!

WARRANTY AUTHORIZATION

You must contact the Northern Air Systems service department prior to beginning any repair or part replacement. The Service department will assign an authorization number (VOC) and determine warranty status.

Failure to receive authorization will void warranty and may delay repairs.

CONTACT: Northern Air Systems Service Department

24 Hour Emergency Technical Support: +888-723-9230

We recommend you purchase replacement parts through Northern Air Systems. If you intend to purchase replacement parts from a third party supplier you must receive authorization (VOC#) from the factory **prior** to purchasing. Northern Air Systems will not reimburse the cost of any part purchased without authorization.

Only use exact replacement O.E.M. parts

You may also contact our service department via e-mail: service@northernairtech.com
Please note: Sending an e-mail *does not* validate the warranty. You must receive authorization VOC # from the service department in order for the warranty to be valid.

Before working on this system you should be familiar with the products in this system.

It is imperative that you understand the charging procedure for head pressure control valves for proper winter and summer operation.

The electrical control system has special characteristics and factory support should be utilized.

****