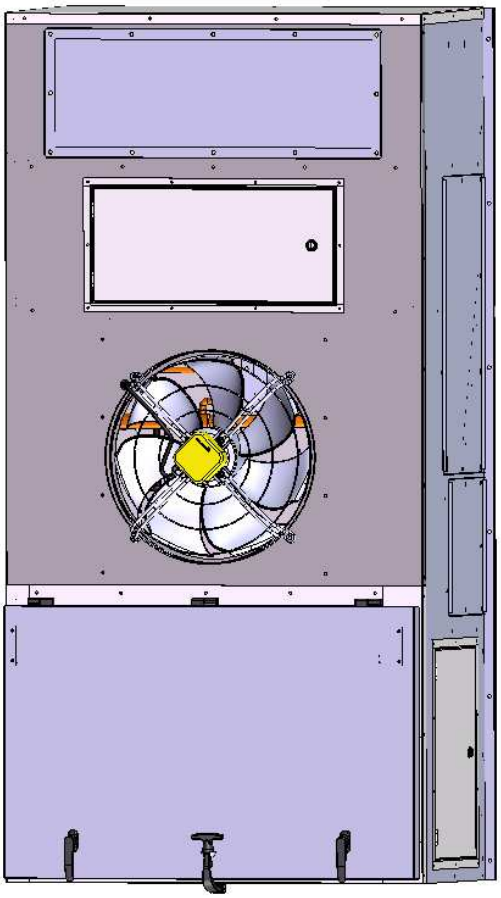
3605 BUFFALO RD
ROCHESTER, NY 14624

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

# T060WMBDA1SDA01



REV A
10-01-15

# TABLE OF CONTENTS

# System Specifications

**Capacity: 60,000 BTU/hr @ 80F db/67F wb return air, 95F ambient air temperature**

**Supply Airflow: 2000 CFM @ 0.5”**
**Heat Capacity: 9 kW**
**Condenser Airflow: 3000 CFM**
**Refrigerant: 17 LBS R407C**

POWER:

208 VAC 3 PHASE 60 HZ

| | | |
|---|---|---|
| 1-Compressor: | 5.74 kW | 20.7 FLA |
| 1-Evap. Blower: | 1.27 kW | 5.6 FLA |
| 1-Cond. Fan: | 1.1 kW | 3.3 FLA |
| 2-Heat Elements: | 4.5 kW | 21.7 FLA |

MAX OVERCURRENT PROTECTION (MOP): 60 AMPS
MINIMUM CIRCUIT AMPACITY (MCA): 55 AMPS
COOLING FLA: 40 AMPS
HEATING FLA: 50 AMPS
COMBINED FLA: 90 AMPS

# Sequence of Operations

- 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 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.
- 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. The fans are factory set to maintain 230 PSI
- 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)
- The unit controllers can 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 setpoint. 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.
- 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 3.6V, 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 | Suction temperature (optional) | | 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 (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

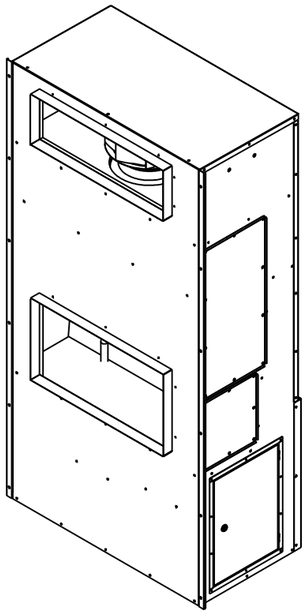
Second Unit Hot Gas EVD Address 4

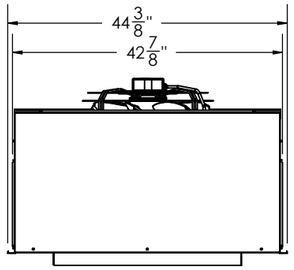
5/11/2010

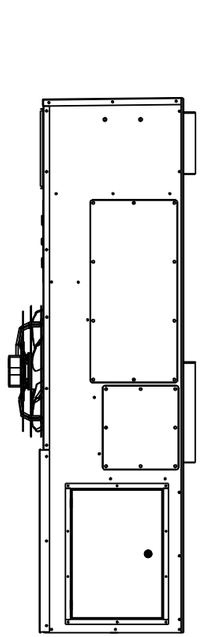
**5-Ton Wall Mount A/C Unit, NAS Model T060WM, with:**

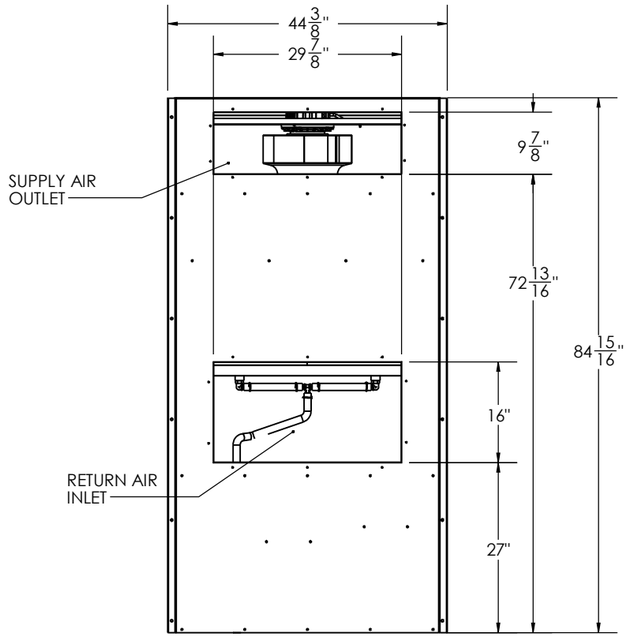
- 60,000 BTU / hour total cooling capacity at 95°F ambient
- Copeland digital scroll compressor that provides modulating cooling capacity
- Programmable Logic Controller (PLC)
- 208 VAC, three-phase, 60-Hz power
- Low ambient operation to -10°F
- High quality German-designed axial condenser fan & centrifugal evaporator blower
- Standard gloss white polyester powder coated exterior
- Hinged access doors with tool-access latches
- R-407C EPA-compliant refrigerant
- 9 kW Resistive Heat
- One (1) year parts warranty

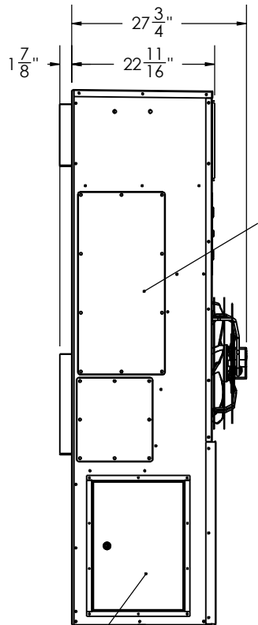
| REVISIONS | | | |
|---|---|---|---|
| REV. | DESCRIPTION | DATE | ECN |
| A | DRAWING RELEASE | 6/28/15 | |

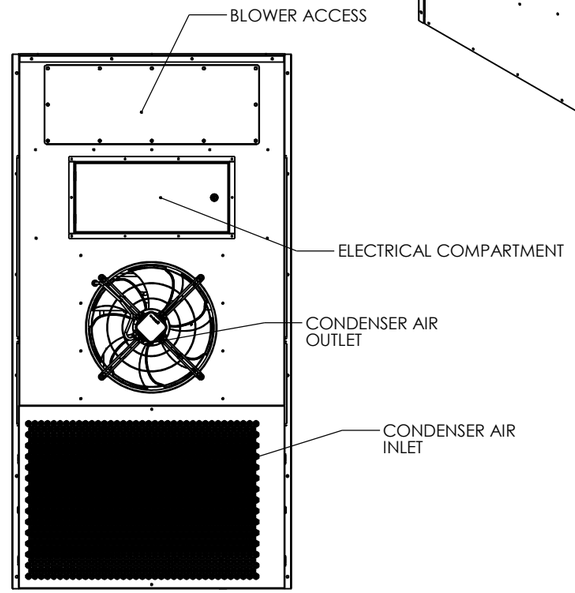







| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED: | | NAME | DATE |
| | DRAWN BY | WDR | 6/28/15 |
| | APPROVED BY | *WDR 6/28/2015* | |
| DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL ± 1/16"<br>BEND ± 4°<br>TWO PLACE DECIMAL ± 0.07"<br>THREE PLACE DECIMAL ± 0.063" | **PROPRIETARY AND CONFIDENTIAL**<br>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF NORTHERN AIR SYSTEMS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF NORTHERN AIR SYSTEMS IS PROHIBITED. | | |
| DO NOT SCALE DRAWING | | | |

Northern-Air

TITLE:
T060WMBDA1SDA01
5 TON C1D2 WALL MOUNT A/C UNIT

| SIZE | DWG. NO. | |
|---|---|---|
| B | T060WMBDA1SDA01 | |
| SCALE: 1:24 | | SHEET 1 OF 1 |

## REVISION HISTORY

| REV | DESCRIPTION | DATE | ECN# |
|---|---|---|---|
| A | INITIAL RELEASE | 6/28/15 | |
| B | DIRTY FILTER SWITCH / COND DOOR SWITCH | 10/31/16 | |

208 VAC 3PH.
60 HZ.
HEAT LOAD=45A
COOLING LOAD=40A
MCA=55A MOP=60A

L1 BLK
L2 RED
L3 BLU
GND

PDB1–L1 PDB1–L2 PDB1–L3

16 AWG BLK RED BLU

PM–1
3 4 5
1 8
+24VAC RED
21 RED
(SH. 2)

16 AWG BLK RED

TX–1
BLK ORG
RED 24 VAC RED
BUILT IN 6A CB
16 AWG RED BLK
+24VAC RED
–24VAC BLK
TO SH.2,3,4

14 AWG BLK RED BLU

CFD–1
20EESV112N02YX
L1 L2 L3
6.9A
T1 T2 T3
(SH. 4)
118 BLK
119 RED
120 BLU
CA–CF1
16 AWG
GRN/YEL
T1 T2 T3
CF–1
3.3A
1.1kW
OL
42 ORG
27 BRN
(SH 4)
(SH 2)

12 AWG BLK RED BLU 12 AWG BLK

CC–1
25A
L1 L2 L3 21
T1 T2 T3 22
(SH. 2)

DCC–1
T1 T2 T3
(SH. 3)
110 BLK
111 RED
112 BLU
YEL/GRN
120 BRN
ORG
CA–C1
12 AWG
T1 T2 T3
C–1
MCC=29A
RLA=20.7A
P=5.74kW
CH–1
70W
0.34A

BLK RED YEL/GRN
CA–EB1
16 AWG
KL1:1 L1
KL1:2 N
Din1 KL3:7
+20V KL3:12
Ain1U KL3:4
GND KL3:3
COM KL2:2
NC KL2:3
EB–1
P=1.27kW
RLA=5.6A
PE
(SH. 2)
CA–EB2
18 AWG
217 RED
–24VAC BLK
–24VAC BRN
211 ORG
(SH. 2)
(SH. 2)

10 AWG BLK RED BLU

(SH. 2)
+24VAC RED
HC–1
32A
L1 L2 L3 21
T1 T2 T3 22
(SH. 2)
122 RED
(SH. 2)

750 BLK
751 RED
752 BLU

TOS–1
300°
753 RED
10 AWG
TOS–2
300°
14 AWG GRN
754 BLU
H–1
4.5 KW
21.7A
H–2
4.5 KW
21.7A
HEATER

| | NAME | DATE |
|---|---|---|
| DRAWN | WDR | 6/28/15 |
| APPROVED | TJF | 10/31/16 |

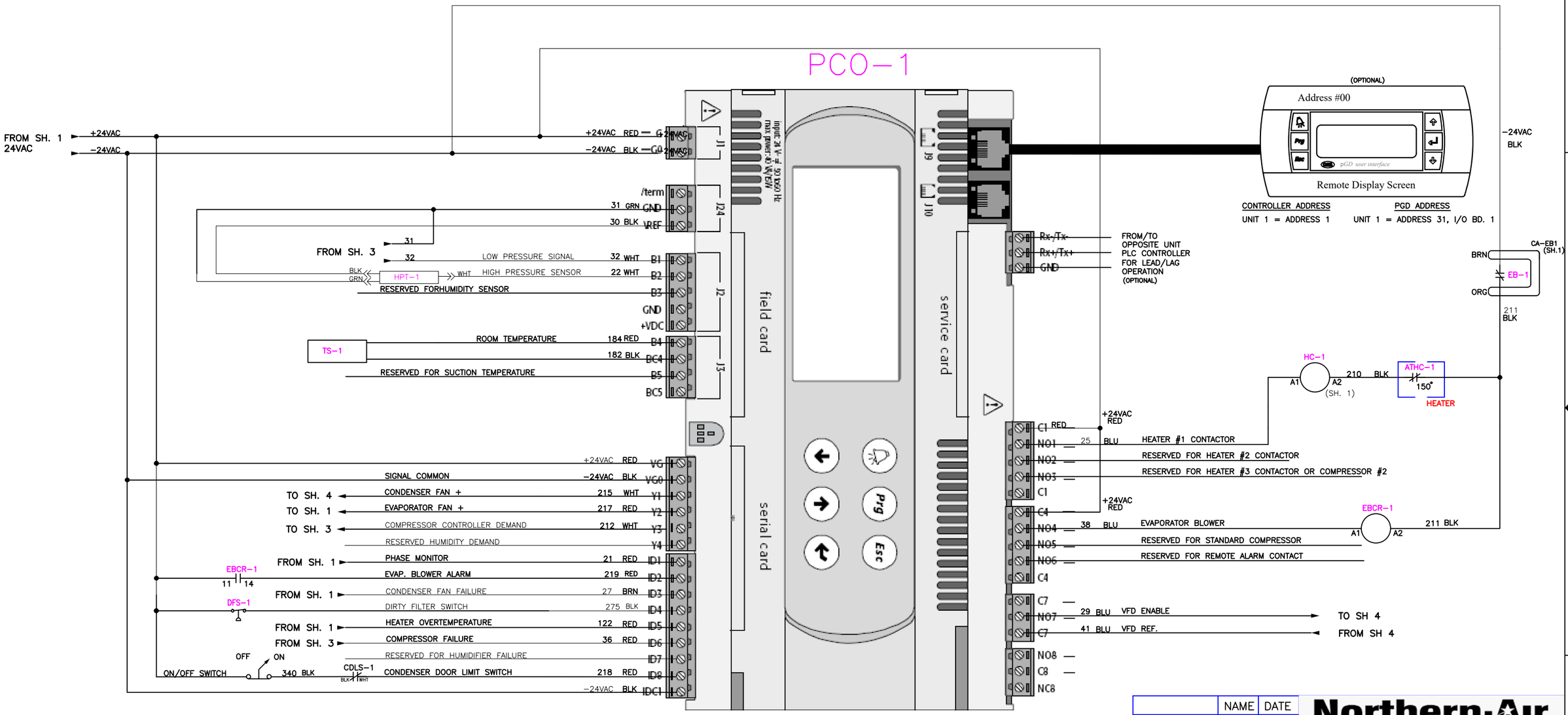


Northern-Air

TITLE:
# POWER DISTRIBUTION

| SIZE | DWG. NO. | REV |
|---|---|---|
| B | T060WMBDA1SDA01–10–00001 | B |

SCALE: NONE | WEIGHT: | SHEET 1 OF 4




| | NAME | DATE |
|---|---|---|
| DRAWN | WDR | 6/28/15 |
| APPROVED | TJF | 10/31/16 |

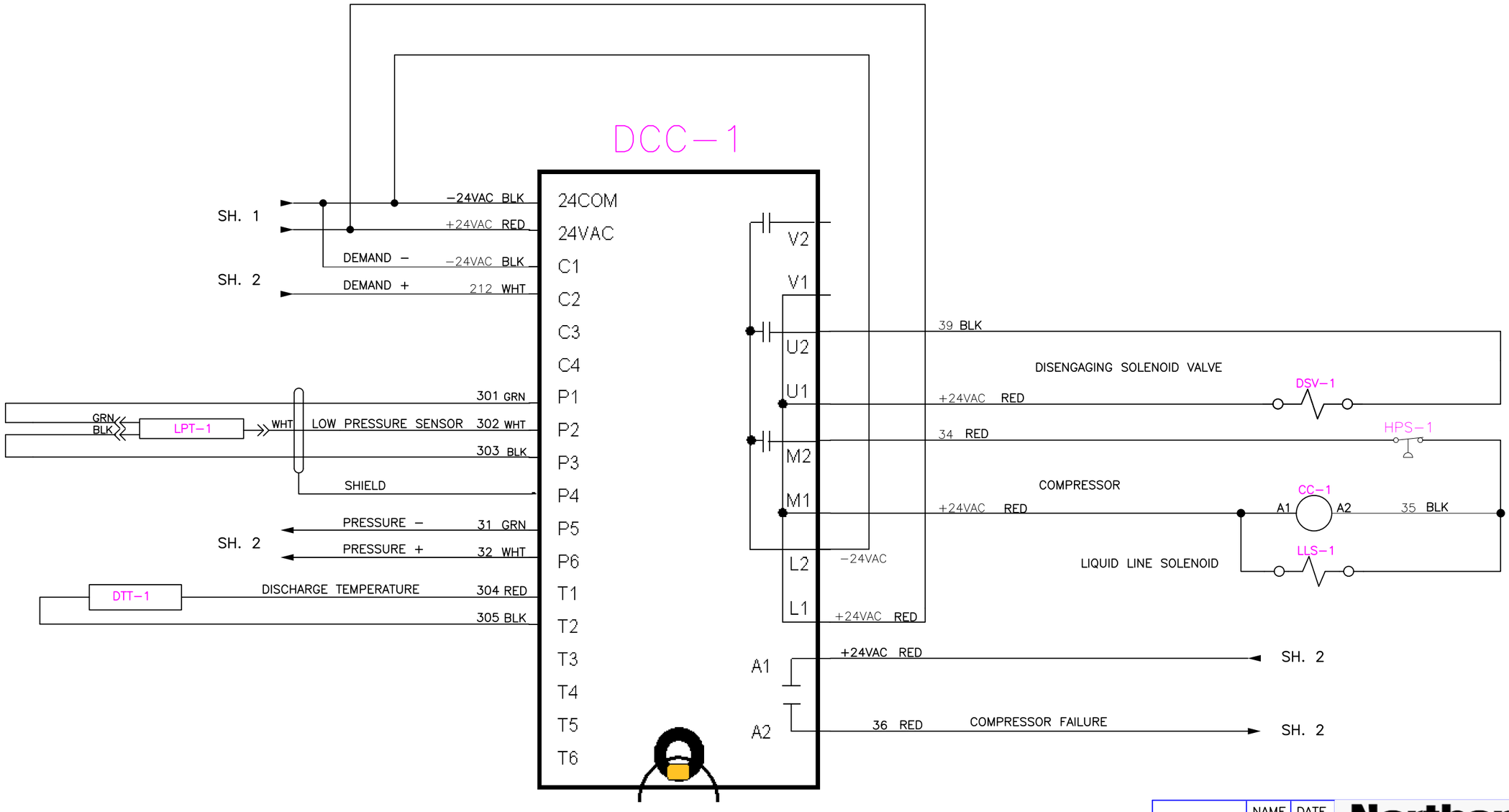


Northern-Air

TITLE:
# PLC CONTROL WIRING

| SIZE | DWG. NO. | REV |
|---|---|---|
| B | T060WMBDA1SDA01–10–00001 | B |

SCALE: NONE | WEIGHT: | SHEET 2 OF 4




(SH 1)

| | NAME | DATE |
|---|---|---|
| DRAWN | WDR | 6/28/15 |
| APPROVED | TJF | 10/31/16 |



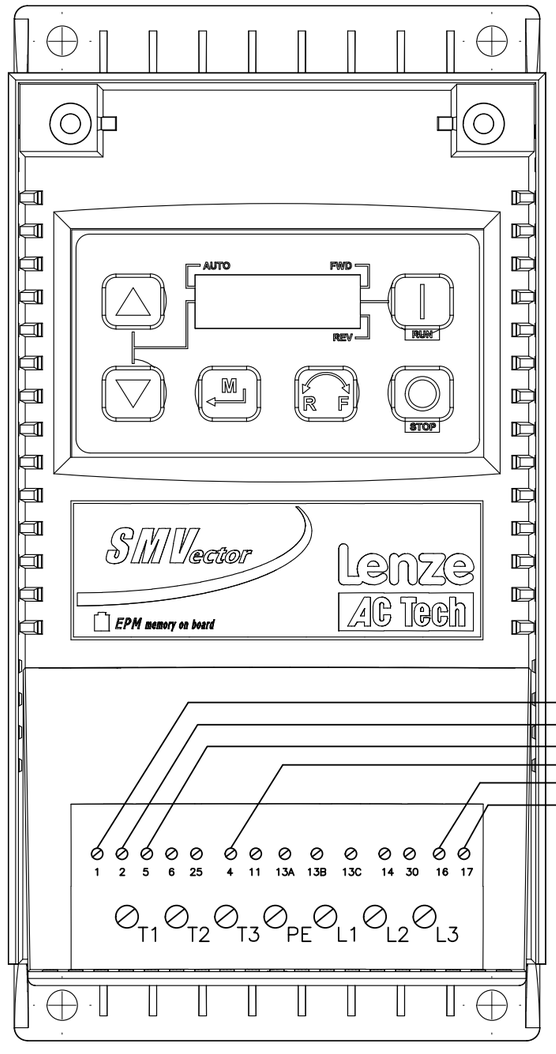
Northern-Air

TITLE:
COMPRESSOR CONTROL WIRING

| SIZE | DWG. NO. | REV |
|---|---|---|
| B | T060WMBDA1SDA01–10–00001 | B |

SCALE: NONE | WEIGHT: | SHEET 3 OF 4

# CFD–1




| | | | |
|---|---|---|---|
| 29 | BLU | ENABLE | SH. 2 |
| –24VAC | BLK | (–SIG.) | SH. 2 |
| 215 | WHT | (+SIG) | SH. 2 |
| 41 | BLU | DIG. INPUT REF. | SH. 2 |
| +24VAC | RED | + 24VAC | SH. 2 |
| 42 | ORG | FAULT | SH. 1 |

(SH 1)

| | NAME | DATE |
|---|---|---|
| DRAWN | WDR | 6/28/15 |
| APPROVED | TJF | 10/31/16 |



Northern-Air

TITLE: VFD CONTROL WIRING

| SIZE | DWG. NO. | REV |
|---|---|---|
| B | T060WMBDA1SDA01–10–00001 | B |

SCALE: NONE | WEIGHT: | SHEET 4 OF 4

# 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 contaminated recovery tanks.
Systems using blended refrigerants that have had refrigerant leaks we recommend replacing with virgin refrigerant. 407C **is** a blended refrigerant.

EVAPORATOR COIL
EC-1
20RTT72A2M

NOZZLE
GR-4 (ALREADY IN COIL)

THERMOSTATIC EXPANSION VALVE
TXV-1
20RBBIVE5

LIQUID LINE SOLENOID
LLS-1
20RTT72A6

Access Valve

EB-1

BULB

SUCTION LIQUID LINE HEAT EXCHANGER
SLLHX-1
20RHXR150

SIGHT GLASS
SG-1
20S43102

DSV-1
Disengaging Valve
20R998007300

HPT-1
HIGH PRESSURE TRANSDUCER

CONDENSER COIL
CC-1
20RTT72A1

ORD VALVE
ORD-1
20S46901

LPT-1
LOW PRESSURE TRANSDUCER

Access Valve

CC-1

CF-1

HEAD PRESSURE CONTROL VALVE
ORI-1
20S45601

FUSIBLE PLUG

FILTER DRIER
FD-1
20SC164S

HPS-1
HIGH PRESSURE CUT OUT SWITCH
20E100DA2 (475)

OUT

COMPRESSOR
20RZRD614803

REFRIGERANT RECEIVER
R-1
20RL516C

UNIT: T060WM VER A
T060WMA00-12-00001

| | |
|---|---|
| PREPARED BY: | WDR |
| DATE: | 2/2/15 |

## 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: 585-594-9933
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"**

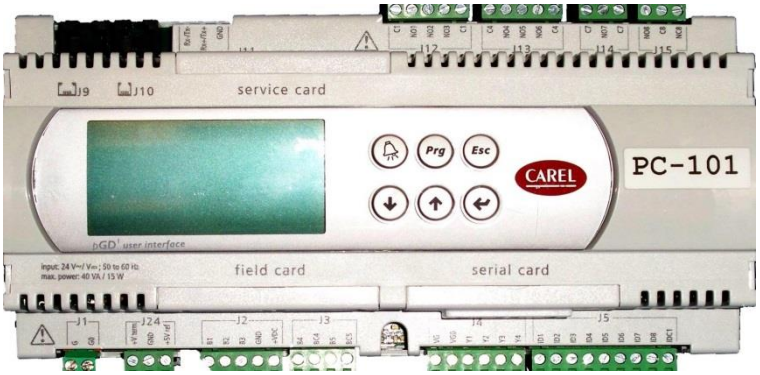
### TO VIEW CURRENT STATUS

- **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

| MENU | DISPLAY | OPTIONS | DESCRIPTION |
|---|---|---|---|
| SYSTEM STATUS | | | |
| | SYSTEM | U1,U2,BOTH | Displays what units are on or off |
| | 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 |
| | 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) |
| | HEAT STAGE | X | Displays current heating stage |
| | 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) |
| | 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 by switch | Displays the position of the unit ON/OFF switch |
| | ROTATION LEAD | Unit 1 or Unit 2 | Displays which unit is the current lead unit |
| UNIT ON/OFF | | | |
| SYSTEM ON/OFF | STATUS | ON / OFF by switch | Displays position of unit ON/OFF switch |
| | STARTUP DELAY: | X SECONDS | Allows fans to run for X amount of time before starting the compressor |
| | UNIT ADDRESS | X | Displays the units Plan communication address |
| | 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 units are on or off |
| 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 | | | |
| | 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 |
| | LEAD/LAG ENABLE | ON/OFF | Allows the units lead/ lag option to be activated or deactivated. |
| | 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. |

| | | | |
|---|---|---|---|
| | DAY ROTATION<br><br>DAYS TIL ROTATION | YES/NO<br><br>X DAYS | Allows the enabling or disabling of the lead and lag units to swap<br>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 |
| | LEAD/LAG OVERLAP | X SECONDS | The amount of time in seconds that both units will run simultaneously when the lead and lag units swap. |
| | DEMAND SD TIMER | X MINUTES | Compressor will shut down after having zero demand for this amount of time |
| | 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 |
| | 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 |
| | 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.<br>DO NOT CHANGE |
| | CHANGE FACTORY PASSWORD | XXXX | Allows change of factory level password.<br>DO NOT CHANGE |
| FACTORY MENU / I/O CONFIGURATION | | | |
| | TH TUNE CONFIGURATION | MULTIPLE | TH TUNE set up. Factory Set. DO NOT CHANGE. |
| | 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 and calibration |
| | SUCTION TEMP | MULTIPLE | Suction temp sensor set up & calibration (optional) |
| | 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 |
| | HEATER FAILURE | MULTIPLE | Heater failure input set up |
| | COMPRESSOR OVERLOAD | MULTIPLE | Compressor 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 |
| | ON/OFF SWITCH | MULTIPLE | ON/OFF switch input set up |
| | REMOTE PANEL OPR | MULTIPLE | Remote panel operations input set up |
| | GENERATOR STATUS | MULTIPLE | Generator input set up (optional) |
| FACTORY MENU / MANUAL CONTROL | | | |
| | COND VFD | AUTO/HAND % | Allows manual operation of the condenser fan VFD |
| | EVAP COND 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 |
| | HI TEMPERATURE | X DEG F | Degrees above set point when hi room temp alarm is activated |
| | LO TEMPERATURE | X DEG F | Degrees below set point when low 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 |
| | 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 |
| 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 | 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 an 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

| 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 | 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. |
| 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 FAULT<br>DIGITAL COMPRESSOR ONLY<br>(OPTION) | 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, If compressor starts then look for dirty condenser coils or lack of air flow through condenser coil. If switch was not tripped check the compressor body for excessively high temperature, if compressor is truly overheated 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. Count the red flashing light on the digital compressor controller and refer to this manual for the compressor controller fault codes and explanations. |
| pLAN FAILURE<br>PCO #1 OFFLINE<br>PCO #2 OFFLINE<br>(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<br>HIGH PRESSURE SENSOR FAIL<br>HUMIDITY SENSOR FAIL (optional)<br>ROOM TEMPERATURE SENSOR FAIL<br>SUCTION TEMPERATURE SENSOR FAIL<br>(OPTIONAL) | The PLC has lost the input signal from the sensor. Check for broken wires, loose connections or terminations. Replace sensor as needed. |

## VFD Troubleshooting and Diagnostics

| Status / Warning | | Cause | Remedy |
|---|---|---|---|
| br | DC-Injection brake active | DC-Injection brake activated<br>• Activation of digital input (P121…P124=18)<br>• Automatically (P110=2,4...6)<br>• Automatically (P111=1,3) | Deactivate DC-Injection brake<br>• Deactivate digital input<br>• Automatically after P175 time expired |
| bF | Drive ID Warning | The drive ID(P502) stored on the EPM does not match the drive model | • Verify motor data (P302…P306) and perform Auto Calibration<br>• Set drive mode (P300) to 0 or 1<br>• Reset the drive (P199 to 3 or 4) and reprogram |
| CAL | Motor Auto-Calibration Active | Refer to P300, P399 | Motor Auto-Calibration is being performed |
| cE | An EPM that contains valid data from a previous software version has been installed | An attempt was made to change parameter setting | Parameter settings can only be changed after the EPM data is converted to the current version (P199=5) |
| CL | Current Limit Reached | Motor Overload | • Increase P171<br>• Verify drive/motor are proper size for application |
| dEC | Decel Override | The drive has stopped decelerating to avoid tripping into HF fault, due to excessive motor regen (2 sec max) | If drive trips into HF fault:<br>• Increase P105, P126<br>• Install Dynamic Braking Option |
| Err | Error | Invalid data was entered, or invalid command was attempted | |
| FCL | Fast Current Limit | Overload | Verify drive/motor are proper size for application |
| FSE | Flying Restart Attempt After Fault | P110= 5,6 | |
| GE | OEM Settings Operation Warning | An attempt was made to change parameter settings while drive is operating in OEM settings mode | In OEM Settings mode (P199=1), making changes to parameters is not permitted |
| GF | OEM Defaults Data Warning | An attempt was made to use, or reset to, the OEM default setting (P199=1 or 2) using an EPM without valid OEM data | Install an EPM containing valid OEM defaults data |
| LC | Fault Lockout | The drive has attempted 5 restarts after a fault; all attempts were unsuccessful | • Drive requires manual reset<br>• Check fault history (P500) and correct fault condition |
| Pdec | PID Deceleration Status | PID setpoint has finished its ramp but the drive is still decelerating to a stop | |
| PI d | PID Deceleration Status | Drive has been put into PID mode | Refer to P200 |
| SLP | Sleep Mode Active | Refer to P240…P242 | |
| SP | Start Pending | The drive has tripped into a fault | To disable auto- restart, set |

| | | | |
|---|---|---|---|
| | | and will automatically restart | P110=0…2 |
| SPd | PID mode disabled | Drive has been taken out of PID mode. Refer to P200 | |
| StoP | Output frequency = 0Hz (outputs U,V,W inhibited) | Stop has been commanded from the keypad, terminal strip or network | Apply start command (start control source depends on P100) |

**Drive Configuration Messages**

When the mode button is pressed and held, the drive's display will show a 4 digit code that indicates how the drive is configured. If the drive is in the STOP state when this is done, the display will also indicate which control source commanded the drive to STOP. The two displays will alternate every second.

| Configuration Display | | | |
|---|---|---|---|
| Format= x.y.zz | X = Control Source:<br>L= Local Keypad<br>t= Terminal Strip<br>r= Remote Keypad<br>n= Network | Y= Mode:<br>S= Speed Mode<br>P= PID Mode<br>t= Torque Mode<br>C= Sequencer Mode | ZZ= Reference:<br>CP= Keypad↑↓<br>EU= 0-10 vdc (TB-5)<br>E 1= 4-20mA (TB-25)<br>JG= Jog<br>nt= Network<br>OP= MOP<br>P1___P7= Preset 1….7<br>P I___16= Sequencer Segment |
| | Example:<br>L_S_CP= Local Keypad Start control, Speed mode, Keypad speed reference<br>t_P-EU= Terminal Strip Start control, PID mode, 0-10vdc setpoint reference<br>t_C_12= Terminal Strip Start control, Sequencer Operation(Speed mode), Seg# 12<br>n_t_P2= Network Start control, Vector Torque mode, Preset Torque #2 reference<br>n_5_03= Network Start control, Speed mode, Speed reference from sequencer segment #03 | | |
| Stop Source Display | | | |
| Format= x_StP | L_StP= Stop Command came from Local Keypad<br>t_StP= Stop command came from Terminal Strip<br>r_StP= Stop command came from Remote Keypad<br>n_StP= Stop command came from Network | | |

**Fault Messages:**

The messages below show how they will appear on the display when the drive trips. When looking at the fault history(P500), the f_ will not appear in the fault message.

| Fault | | Cause | Remedy(*) |
|---|---|---|---|
| F_AF | High Temperature Fault | Drive is too hot inside | • Reduce drive load<br>• Improve cooling |
| F_AL | Assertion Level Fault | • Assertion level switch is changed during operation<br>• P120 is changed during operation | • Make sure the assertion level switch and P120 are both set for the type of the input devices being used, prior to setting P100 or 121…P124. |
| F_bF | Personality Fault | Drive Hardware | • Cycle power<br>• Power down and install EPM with valid data |
| F_CF | Control Fault | An EPM has been installed that is either blank or corrupted | |

| | | | |
|---|---|---|---|
| F_cF | Incompatible EPM Fault | An EPM has been installed that contains data from an incompatible parameter version | • Reset the drive back to defaults (P199=3,4) then re-program<br>• If problem persist, contact factory support |

(*) The drive can only be restarted if the error message has been reset.

**TROUBLESHOOTING AND DIAGNOSTICS-(Drive can only be restarted if the error message has been reset)**

| Fault | | Cause | Remedy(*) |
|---|---|---|---|
| F_dbf | Dynamic Breaking Fault | Dynamic braking resistors are overheating | • Increase active decal time (P105,P126,P127)<br>• Check mains voltage and P107 |
| F_EF | External Fault | • P121…P124=21 and that digital inputhas been opened<br>• P121….P124=22 and that digital input is closed | • Correct the external fault condition<br>• Make sure digital input is set properly for NC or NO circuit |
| F_F1 | EPM Fault | EPM is missing or defective | Power down and replace EPM |
| F_F2 thru F_F12 | Internal Faults | | Contact Factory Technical Support |
| F_Fnr | Control Configuration Fault | The drive is setup for REMOTE KEYPAD control(P100=2 or 5) but is not setup to communicate with a remote keypad | Set P400= 1; or P600= 1 |
| | | The drive is setup for NETWORK ONLY control(P100=3) but is not setup for network communications. | Set P400 or P600 to a valid network communications protocol selection |
| F_FoL | Loss of 4-20mA signal fault | 4-20 mA signal (at TB-25) is below 2 mA(P163= 1) | Check signal and/or signal wiring |
| F_GF | OEM Defaults data fault | Drive is powered up with P199= 1 and OEM settings in the EPM are not valid | Install an EPM containing valid OEM Defaults data or change P199 to 0 |
| F_HF | High DC Bus Voltage Fault | Mains too low | Check main voltage and P107 |
| | | Decel time is too short, or too much regen from motor | Increase active decel time(P105,P126, P127)or install dynamic braking option |
| F_LF | Low DC Bus Voltage Fault | Main Voltage Too Low | Check Main Voltage |
| F_IL | Digital Input Configuration Fault (P121…P124) | More than one digital input set up for the same function | Each setting can only be used once (except settings 0 and 3 |
| | | Only one digital input configured for MOP function (Up, Down) | One input must be set to MOP Up; another must be set to MOP Down |
| | | PID mode is entered with setpoint reference and feedback source set to the same analog signal | Change PID setpoint reference (P121… P124) or feedback source(P201) |
| | | One of the digital inputs (P121…P124) is set to 10 and another is set to 11…14 | Reconfigure digital inputs |
| | | One of the digital inputs | Reconfigure digital inputs |

| | | | |
|---|---|---|---|
| | | (P121…P124) is set to 11 or 12 and another is set to 13 or 14 | |
| | | PID enabled in Vector Torque mode (200= 1 or 2 and P300= 5) | PID cannot be used in Vector Torque mode |
| F_JF | Remote Keypad Fault | Remote Keypad disconnected | Check remote keypad connections |
| F_ntF | No Motor ID Fault | An attempt was made to start the drive in Vector or enhanced V/Hz mode prior to performing the Motor Auto- Calibration | See P300-P399 for Drive Mode setup and calibration |
| F_nF 1 thru F_nF 9 | Network Faults | Refer to the module documentation for causes and remedies | Check module connections |
| F_DF | Output Fault: Transistor Fault | Output short circuit | Check motor and/or motor cable |
| | | Acceleration time too short | Increase P104, P125 |
| | | Severe Motor Overload, due to:<br>• Mechanical Problem<br>• Drive/motor too small for application | • Check machine/system<br>• Verify drive/motor are proper size for application |
| | | Boost values too high | Decrease P168,P169 |
| | | Excessive capacitive charging current of the motor cable | • Use shorter motor cables with lower charging current<br>• Use low capacitance motor cables<br>• Install reactor between motor and drive |
| | | Failed Output Transistor | Contact factory technical support` |
| F_OF I | Output Fault: Ground Fault | Grounded Motor Phase | Check motor and cable |
| | | Excessive capacitive charging current of the motor cable | Use shorter motor cables with lower charging current |
| F_PF | Motor Overload Fault | Excessive motor load for too long | •Verify proper setting of P108<br>•Verify drive and motor are proper size for application |
| F_rF | Flying Restart Fault | Controller was unable to synchronize with the motor during restart attempt (P110=5 or 6) | Check motor/load |
| F_SF | Single Phase Fault | A main phase has been lost | Check main voltage |
| F_UF | Start Fault | Start command was present when power was applied(P110=0 or 2) | • Must wait at least 2 seconds after power-up to apply Start command<br>• Consider alternate starting method (P110) |

(*) The drive can only be restarted if the error message has been reset.

| NORTHERN AIR SYSTEMS | +1-888-723-9230 | |
|---|---|---|
| **ELECTRICAL PARTS LIST** | | |
| **DESCRIPTION:** | **PART NUMBER:** | **QTY-** |
| Controller, PCO3 Small | 20EPCO3000ES0 | 1 |
| Controller, Connector Kit | 20EPCO3CON0S0 | 1 |
| Transformer | 20E694M2A | 1 |
| Phase Monitor | 20EICM408 | 1 |
| Relay, 24v | 20E700HLT2U24 | 1 |
| Variable Frequency Drive | 20EESV112N02YX | 1 |
| Compressor Controller-DCC | 20ETT72A10 | 1 |
| Solenoid, Unloader, Compressor | 20R923005800 | 1 |
| Contactor, 24vac, 25 amp | 20G55801 | 1 |
| Contactor, 24vac, 32 amp | 20ED32B7 | 1 |
| Crank Case Heater, Compressor | 20E918-0043-00 | 1 |
| Solenoid Coil, Liquid Line | 20S45201 | 1 |
| ON/OFF Selector Switch | 20G56901 | 1 |
| ON/OFF Selector Switch Base | 20G57001 | 1 |
| High Pressure Switch, 475psi | 20E100DA2 | 1 |
| Pressure Sensor | 20C12101 | 2 |
| Pressure Sensor Cables | 20C13601 | 2 |
| Temperature Sensor, Wall Mount- NTC | 20C11901 | 1 |
| Remote Display, Wall Mount- PGD1 | 20EPGD1 | 1 |
| Evaporator Blower Assembly | 20MR3G310 | 1 |
| Condenser Fan Assembly | 20M156754 | 1 |
| Condenser Door Switch | 20E65985K12 | 1 |
| **HEATER PARTS LIST** | | **QTY-** |
| Heater Element | 20E45KW208 | 2 |
| High Temperature Cutout, 300°, One Shot | 20EL300F | 2 |
| High Temperature Cutout, 150°, Auto Reset | 20ETT72A3 | 1 |

| NORTHERN AIR SYSTEMS | +1-888-723-9230 | |
|---|---|---|
| **REFRIGERATION PARTS LIST** | | |
| **DESCRIPTION:** | **PART NUMBER:** | **QTY-** |
| Compressor, Digital | 20RZRD612083 | 1 |
| Unloader Solenoid Tubing Kit Assembly | 20R998007300 | 1 |
| Liquid Receiver | 20RL516C | 1 |
| Sight Glass, 1/2" | 20S43102 | 1 |
| Solenoid, Liquid Line | 20RTT72A6 | 1 |
| Drier, Liquid, Sweat | 20SC164S | 1 |
| Suction Liquid Line Heat Exchanger | 20RHXR150 | 1 |
| Thermostatic Expansion Valve | 20RBBIVE5 | 1 |
| Head Pressure Control Valve | 20S45601 | 1 |
| Pressure Differential Valve | 20S46901 | 1 |
| Coil, Evaporator | 20RTT72A2M | 1 |
| Coil, Condenser | 20RTT72A1 | 1 |
| Refrigerant, 407C | 20R407C | 17 lbs |
| Filters, Pleated, Air- 18x20x1 | 20M5W974 | 2 |
| Slotted Cam Latch | 20M12265A53 | 3 |

# 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.**

- **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 SENSOR:**

Mount and wire temperature sensor 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 ACCURATE READINGS**

Temperature, Pressure and Optional Humidity sensors

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

| Northern-Air Systems | Unit Model No. | |
|---|---|---|
| | Job Number | |
| | Unit Serial No. | |

# START UP PROCESS CONTROL FORM

**Initials**

_____ Check for loose wiring on all high voltage VFD's, phase monitor, distribution block and contactors by tightening each screw terminal and inspecting the wire terminations.

_____ Check all low voltage wiring connections on low voltage terminal block. Check by pulling on each individual wire ensuring that all orange terminal tabs are secured in the locked position. Be sure all screw terminals on PCO controller and compressor controller are tight.

_____ Inspect both A/C coils for damaged or bent fins. Use coil comb to repair as needed.

_____ Inspect or connect the condensate drain hose to the system.

_____ Verify the high voltage distribution block cover has been installed.

_____ Make sure there is no continuity from L1, L2 or L3 to ground. (note: secondary of transformer is grounded and can show L1 or L3 grounded)

_____ Power up high voltage to unit.

_____ Check to make sure all items power up properly.

_____ Check crankcase heater for operation.

_____ Manually push evaporator fan contactor in to check fan motor rotation.

_____ Check room temperature sensor for an accurate reading against a digital temperature meter and adjust as needed in "I/O configuration" under "factory menu". (Password is 9230)

_____ Check for any alarms and troubleshoot as needed.

_____ (Optional) Connect PGD display to the unit and verify operation.

_____ Raise room temperature set point 10 degrees above current room temperature. When heating starts take an amp reading on the heater contactors load side to ensure heater is functioning. Let heat run full out for five minutes.

**NOTE: If two stage heat, take amp reading on both stages.**

_____ Lower the set point 5 degrees below current house temp. Cooling will start.

_____ Check for proper compressor & condenser fan operation and rotation.

_____ 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.

Compressor _____ amps

Evaporator fan_____ amps

Condenser fan _____ amps

Heater Element 1_____ amps

Heater Element 2_____ amps

_____ Let the unit continue to run while periodically checking for any alarms, troubleshoot if needed.

_____ Set the set point back to 70 degrees or customer desired set point.

_____ Turn unit off from the ON/OFF switch or let it run based on customer needs.

_____ Make sure all doors and panel covers are secure.

_____ Install new return air filters as needed.

_____ Startup is now complete.

Date Completed: _____

Name: _____

# 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. Also check all roto-lock connections for tightness on compressors.

**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.

| Northern-Air Systems | Date | |
|---|---|---|
| | Unit Model No. | |
| | Trailer No. | |
| | 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, 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.

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

_____ Inspect condenser mounting hardware, 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.

_____ 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.

**Company:** _____

**Print Name:** _____

**Signature:** _____

**Date:** _____

# PCO3 SENSOR CALIBRATION INSTRUCTIONS

1-Press PRG key until you see the menu list
2-Arrow down to “factory menu”
3-Press enter 2 times (left pointing arrow key)
4-Arrow down and set password 9230
5-Press enter
6-Arrow down to “I/O setup”
7- Press enter
8-Arrow down to the sensor screen that needs calibrating (ex. Temperature)
9-Press enter to move cursor to the cal offset setting(calibration offset)
10-Arrow up or down to set cal. offset +/- degrees as needed
11-Press enter
12-The actual temperature reading is on the bottom of the screen.
13- Press esc twice to get back to main temperature screens

# RIGGING INSTRUCTIONS

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

## Attention Service Personnel
## Please Read!

**Report all service calls to factory +1-585-594-5050**
**24 Hour Emergency Technical Support +888-723-9230**

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. Only use exact replacement O.E.M. parts. The electrical control system has special characteristics and factory support should be utilized. Failure to call will void warranty and might delay repairs.