


FD Series User Manual

FD 14 - 60



© Nyle Systems LLC
FD 14 - 60 User Manual Version 2.1

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 **800-777-6953**



Benefits of a Nyle Systems FD System



Cost Effective

Our dryers cost significantly less than our competitors. This allows you to dry more for less!



User Friendly

All of our units come with intuitive touch screen controls and a flexible user interface.



Higher Quality Output

Our systems are capable of drying at lower temperatures, resulting in higher quality product.



Energy Efficient

Our systems utilize heat pumps, using up to 60% less energy than conventional drying.



Easy Installation

Installation process is simple and does not require ductwork or gas lines to be installed in your facility.



Tech Support

You get the straight answers you need from the professionals that design and build your systems.

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Introduction

General Information

Nyle Systems Food dehydrators offer commercial users an energy efficient and controllable means of dehydrating food in a temperature range of 80° to 160°F. Nyle food dehydrators work by gathering energy from moisture-laden air through a refrigeration cycle, depositing the extracted energy back into the circulating air to maintain the desired drying temperature. Through this cycle, water is removed from the product.

Nyle Systems FD 14 - 60 Food dehydrators consist of a dehumidification unit and airflow control components positioned within an insulated drying chamber. These units are built specifically for use in small to large sized commercial batch dehydrating applications where temperature and humidity during the drying process may be closely monitored and controlled.

About the Nyle Systems FD 14 - 60

The Nyle Systems FD 14 is rated to remove 14 pounds of water per hour at air conditions of approximately 115°F dry bulb temperature and 70% relative humidity. Under these conditions the FD 24 is rated to remove 24 pounds of water per hour and the FD 60 is rated to remove 60 pounds of water per hour. Actual water removal rates will depend largely on the ability of the food product to release moisture at the desired drying temperature. Nyle Systems encourages experimentation within the confines of the dehydrator operating characteristics to achieve the desired drying cycle time.

Safety Information

Installation and servicing of heat pump equipment can be hazardous due to system pressure and electrical components. Please note that only trained and qualified service personnel should perform installation, repairs, or service on Nyle Systems food dehydrators. When performing installation, repair, or service on the unit, observe precautions in the manual, tags, and labels attached to the unit. Follow all other safety precautions that may apply.

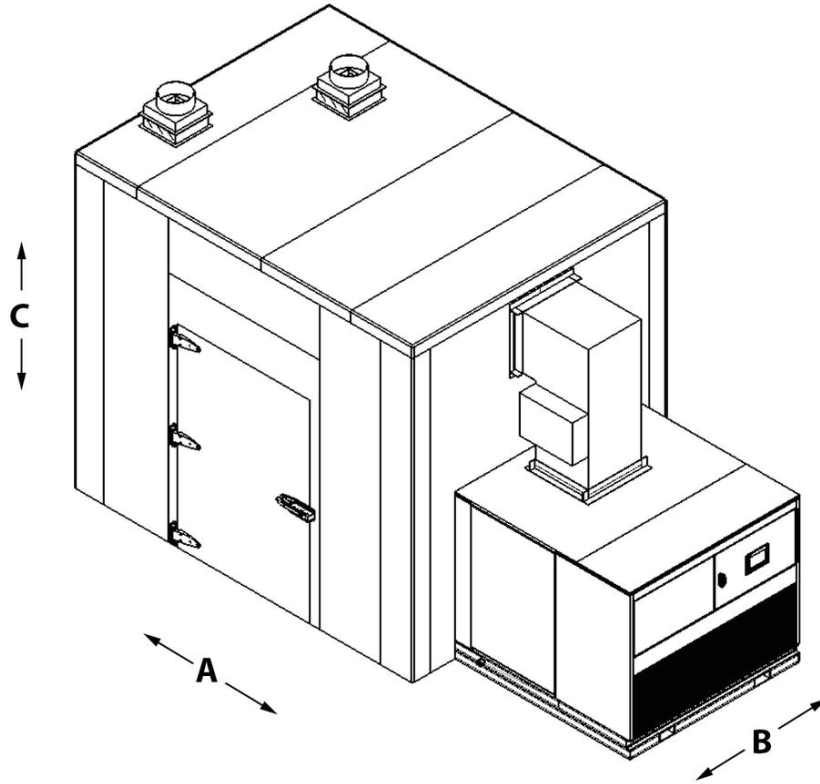
Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other hazardous conditions which may cause personal injury or property damage. Always consult a qualified installer, service agency, or your distributor for information or assistance.

- Do not stand or sit on the unit.
- Disconnect all power before removing the control panel.
- There is no need to remove the control panel unless there is a malfunction internally. Only a licensed technician is to remove the control panel.
- Disconnect all power before installing or servicing the Nyle Systems FD unit.
- Ensure the power receptacle is rated for the appropriate load.
- Ensure that the electrical supply has proper overload fuse or breaker protection rated for at least the appropriate amperage.
- Moving or lifting of Nyle Systems FD unit components should be done with team lifting or appropriate equipment to prevent back injuries or damage to components. Never lift or move the unit alone.

Follow all safety codes. Wear safety glasses and work gloves. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the National Electrical Code (NEC) for special installation requirements.

Model Information

Physical Dimensions

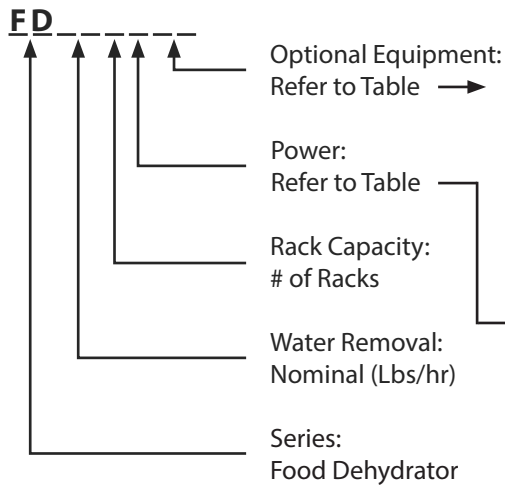


FD 60 Shown

Unit	Rack Capacity (# of Racks)	A (in)	B (in)	C (in)
FD 14	4	145	70	110
	6	169	70	110
	8	191	70	110
FD 24	8	191	70	110
	10	213	70	110
	12	237	70	110
FD 60	12	212	96	110
	15	234	96	110
	18	258	96	110
	21	280	96	110
	24	302	96	110

Nomenclature

Model Number System



Option	Notes	Designation
Venting	Alternative to external condensor	V
Floor	Adds 4" to dimension C	F

Voltage (V)	Phase (Φ)	Frequency (Hz)	FD 14	FD 24	FD 60	Designation
208-220/240	1	60	87	114	N/A	A
	3	60	45	70	151	F
480	3	60	23	34	70	C

Technical Specifications

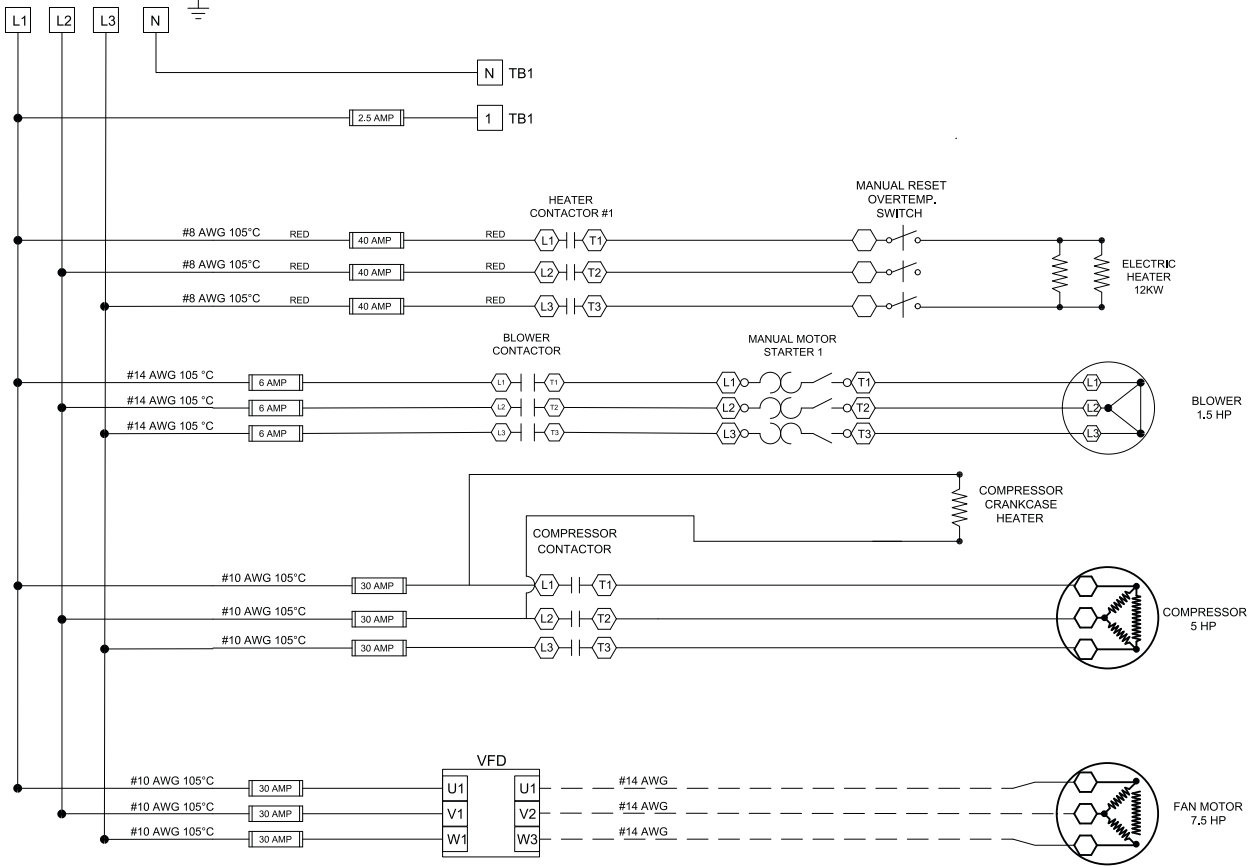
Model	FD Series
Compressor Type	Semi Hermetic
Refrigerant	R-416a

Model	Water Removal (lb/hr)	Temperature (F)	Rack Capacity (# of Racks)	Drying Area (sqft)	Interior Finish	Exterior Finish
FD 14	14	80 - 160	4,6,8	260 - 520	Stainless Steel	Galvalume Steel
FD 24	24	80 - 160	8,10,12	520 - 780	Stainless Steel	Galvalume Steel
FD 60	60	80 - 160	12,15,18,21,24	780 - 1560	Stainless Steel	Galvalume Steel

Electrical Diagrams

CUSTOMER SUPPLIED
DISCONNECT

POWER SUPPLY
230/3/60

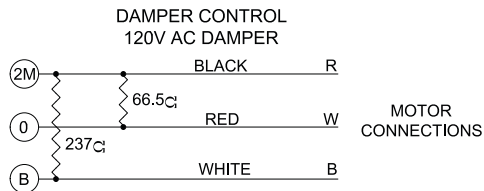
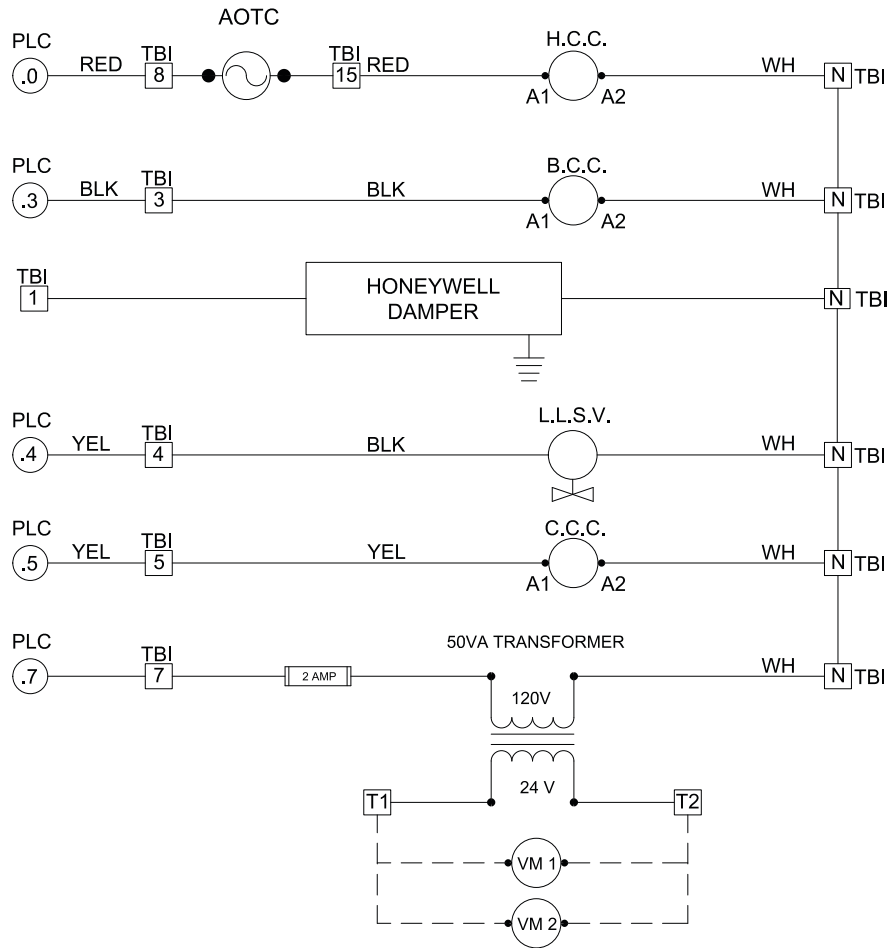



LEGEND:

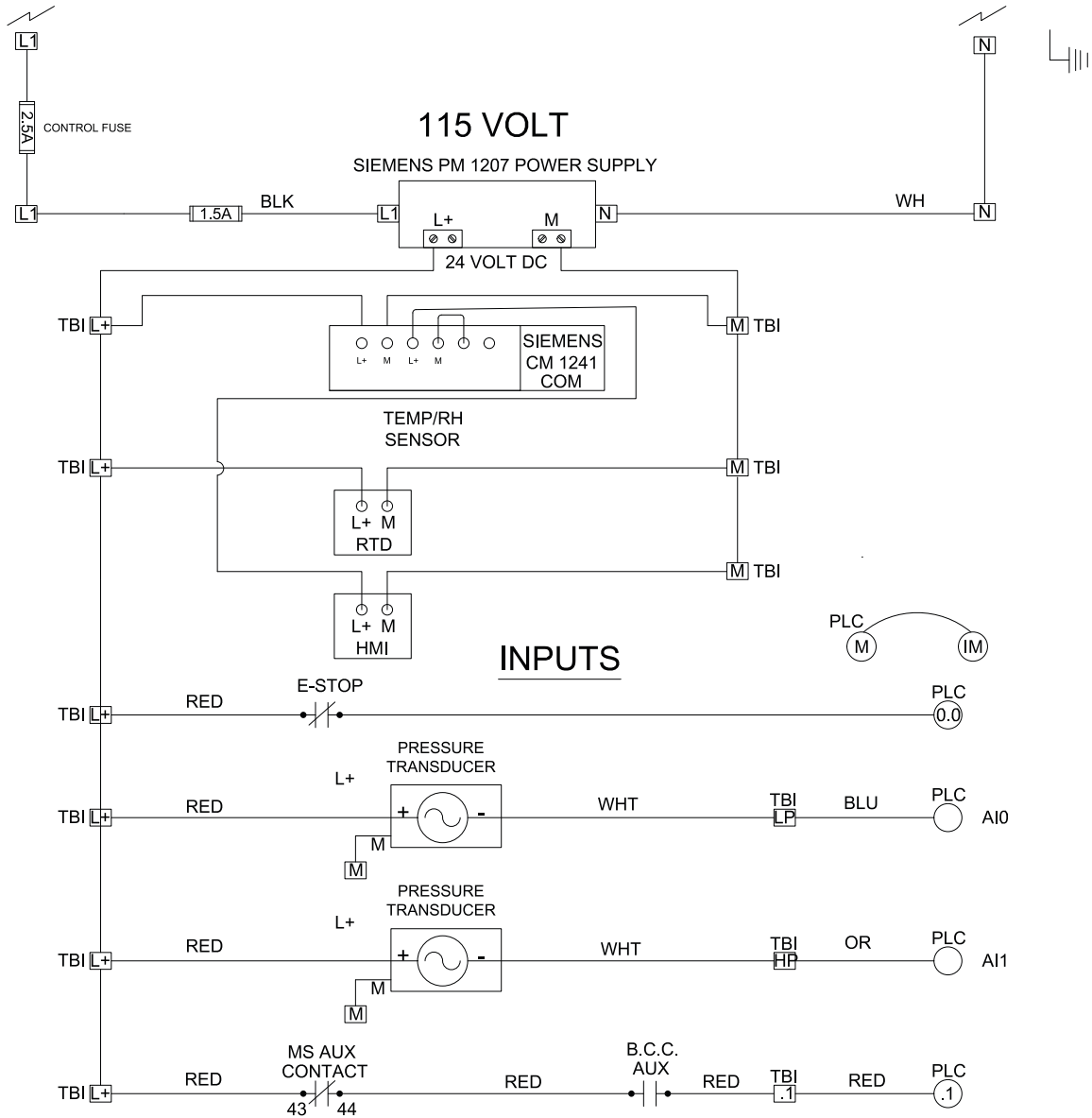
- TBI- TERMINAL BLOCK #1
- BCC- BLOWER CONTACT COIL
- LLSV- LIQUID LINE SOLENOID VALVE
- CCC- COMPRESSOR CONTACTOR COIL
- C. AUX. C- COMPRESSOR AUX CONTACTS
- HCC- HEAT CONTACTOR COIL
- EXT FCC- EXT. CONDENSOR FAN CONTACTOR COIL


 <small>12 Stevens Road Brewer, Maine 04412 Tel: 1-207-686-4333 Int: 1-207-777-6953 Fax: 1-207-686-1101 Email: info@nyle.com</small>	TITLE POWER WIRING 1-1	
	CUSTOMER FD24	
DRAWN BY AS	DWG FILE NAME FD24-8-F-V	REV 1.1
CHECKED	SCALE NTS	SHEET 1 OF 3

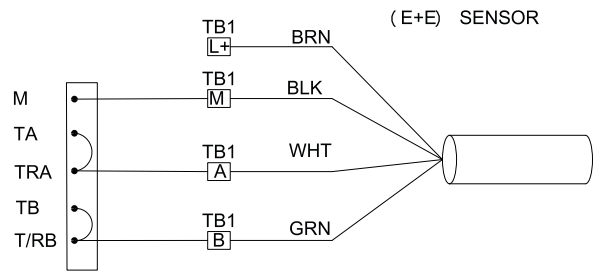
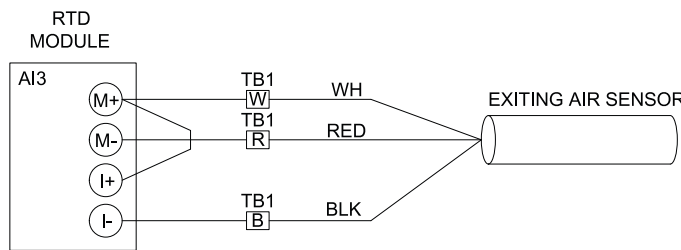
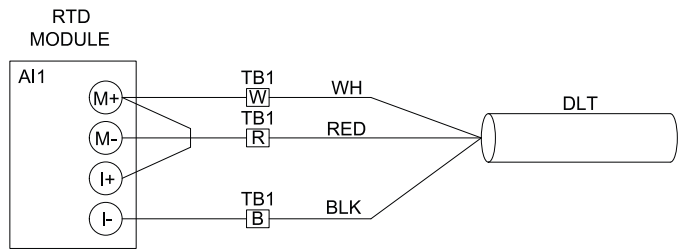
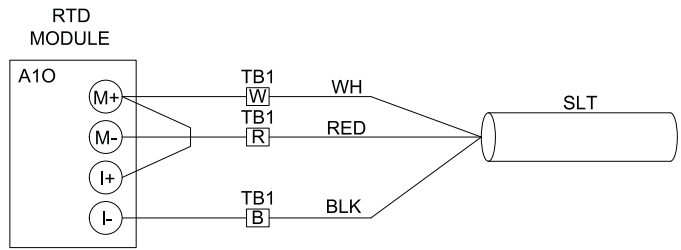
OUTPUTS 115 VOLT




 <small>12 Shuman Road Brewer, MA 01824 Tel: 978-689-4122 Ext: 400/775-6953 Fax: 978-689-1151 Email: info@nye.com</small>	TITLE OUTPUTS	
	CUSTOMER FD24	
DRAWN BY AS	DWG FILE NAME FD24-8-F-V	REV 1.1
CHECKED	SCALE NTS	SHEET 2 OF 3

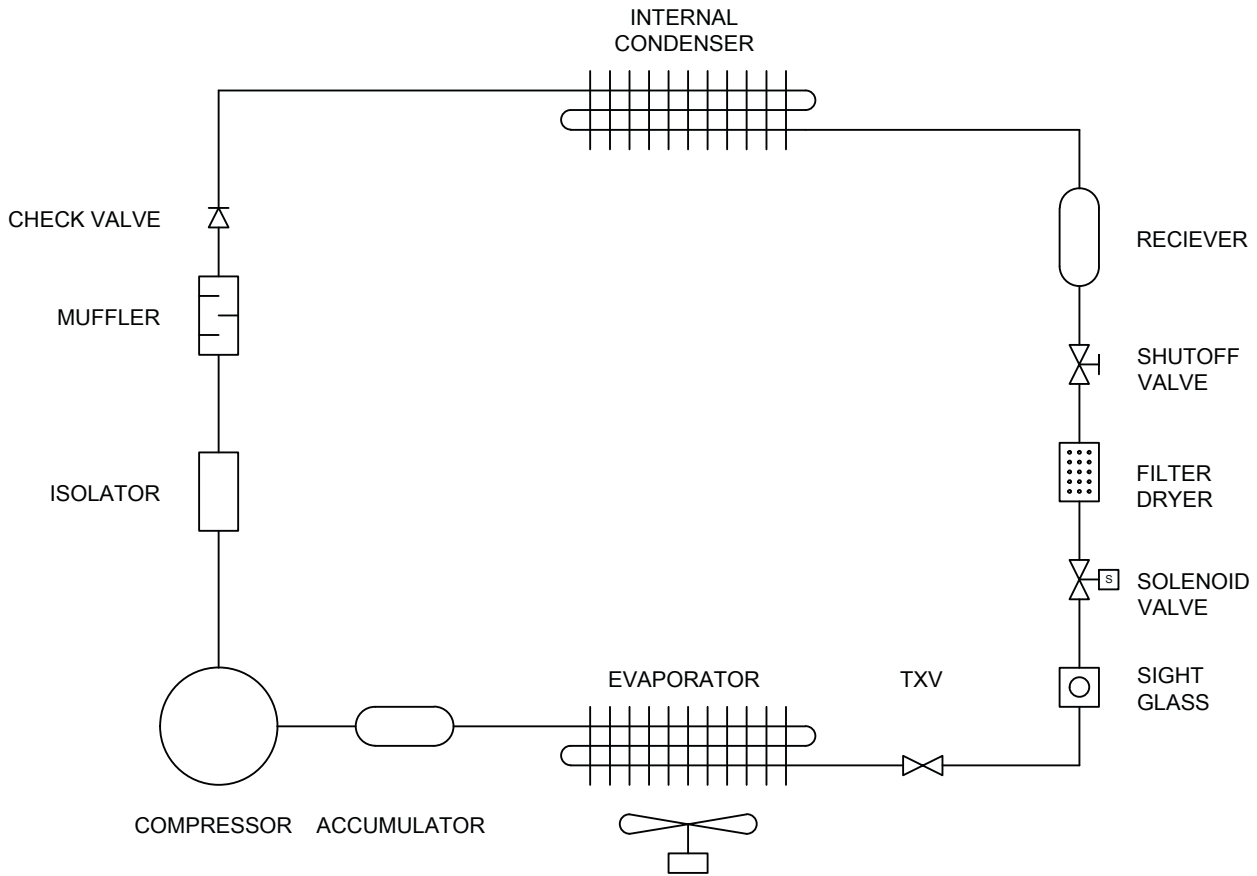



 <small>12 Shivers Road Brewer, Maine 04412 Tel: 1-207-989-4336 Int: 1-800-777-6953 Fax: 1-207-695-1101 Email: info@ny/e.com</small>	TITLE CONTROL WIRING 1-1	
	CUSTOMER FD24	
DRAWN BY	DWG FILE NAME FD24-8-F-V	REV 1.1
CHECKED AS	SCALE NTS	SHEET 3 OF 3



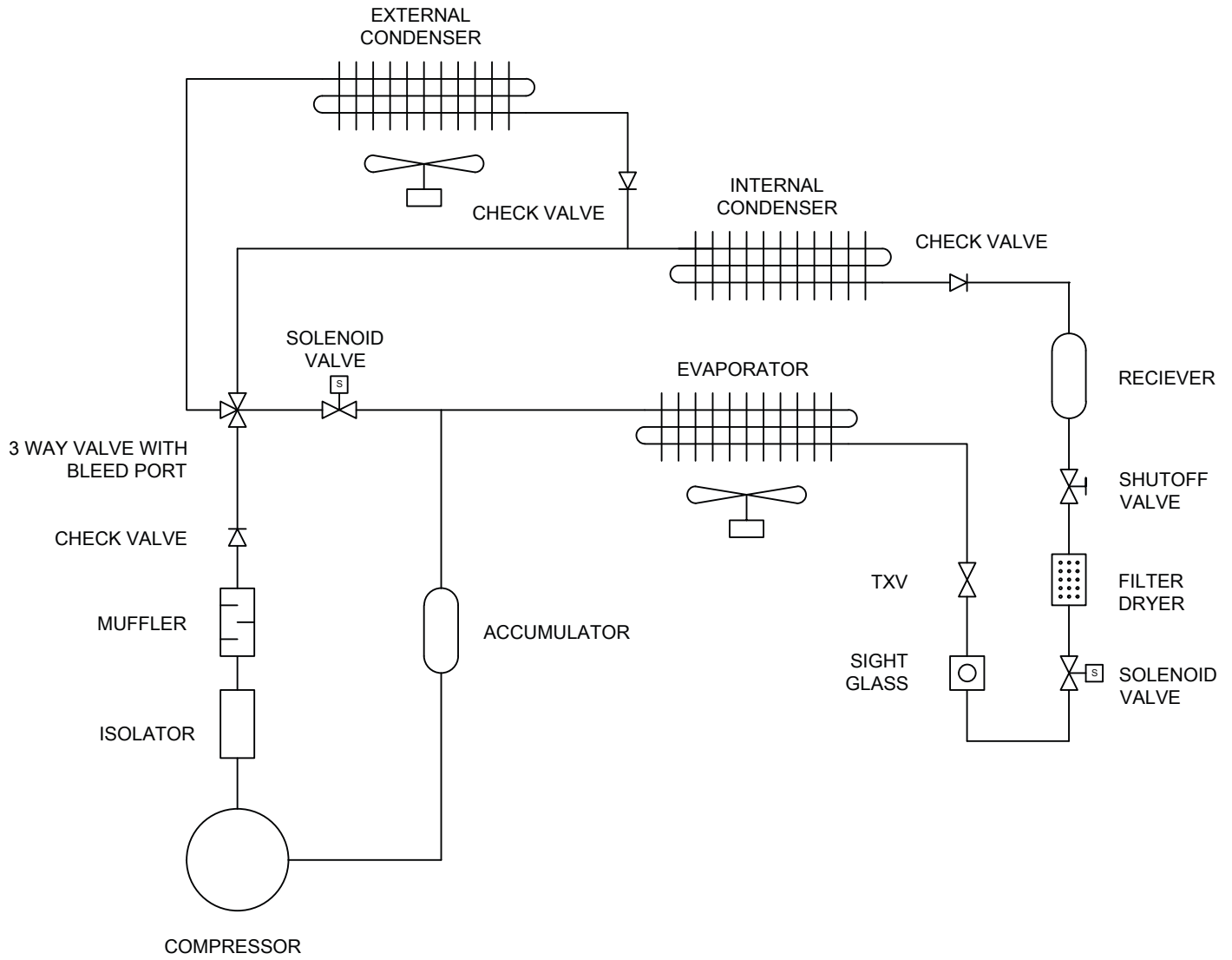
 <small>12 Stevens Road Bremer, Maine 04912 Tel: 1-207-886-4125 Int: 1480-777-6953 Fax: 1-207-889-1101 Email: info@nye.com</small>	TITLE CONTROL WIRING 1-2	
	CUSTOMER FD24	
DRAWN BY AS	DWG FILE NAME FD24-8-F-V	REV 1.1
CHECKED	SCALE NTS	SHEET 4 OF 4


Refrigeration Diagram - No External Condenser



 <small>12 Stevens Road Brewer, Maine 04412 Tel: 1-207-989-4335 Int: 1-800-777-6953 Fax: 1-207-989-1101 Email: info@nyle.com</small>	TITLE FD Piping Diagram - No External Condenser	
	CUSTOMER N/A	
DRAWN BY	DWG FILE NAME FD Piping Diagram - No External Condenser	REV 1
CHECKED	SCALE NTS	SHEET 1 OF 1

Refrigeration Diagram - With External Condenser



 <small>12 Stevens Road Brewer, Maine 04412 Tel: 1-207-989-4335 Int'l: 1-800-777-6953 Fax: 1-207-989-1101 Email: info@nyle.com</small>	TITLE FD Piping Diagram - With External Condenser	
	CUSTOMER N/A	
DRAWN BY	DWG FILE NAME FD Piping Diagram - With External Condenser	REV 1
CHECKED	SCALE NTS	SHEET 1 OF 1

Preinstallation

IMPORTANT: Please read this entire manual before installation. Be sure to follow all installation steps. Failure to conform to these instructions may decrease food dehydrator performance and could cause severe injury or death. Only qualified, licensed persons should install the equipment and electrical supply. Installation must conform to all applicable local, state, and federal codes.

Receiving and Storage

When receiving shipment at the jobsite, carefully inspect the shipment against the bill of lading. Please make sure that all units have been received as ordered. Inspect each unit's shipping crate/packaging and inspect each unit for damage. If there is a problem, notify the shipping company to make proper notation of any shortages or damage on all copies of the freight bill.

NOTE: It is the responsibility of the purchaser to file all necessary claims with the shipping company.

If the equipment is not needed for immediate installation upon arrival at the jobsite, it should be left in its shipping carton(s) and stored in a clean, dry area of the building. Heat pump units must be stored in an upright position at all times. Do not remove any equipment from its shipping carton(s) until it is needed for installation.

Unit Location

1. Units are for indoor use only.
2. Provide sufficient space for water and electrical connections.
3. Allow enough space for service personnel to perform maintenance.
4. Allow enough space around chamber footprint for chamber construction.
5. If shifting partially assembled chamber walls into a building corner or against a building wall, allow a minimum of 2" clearance between the drying chamber and existing building walls to allow air circulation.
6. Allow enough space for free movement of air to and from the external condenser fan.

Installation

Chamber Installation

Follow the chamber manufacturer instructions for installation of the pre-fabricated insulated drying chamber. These instructions will have been included with the chamber shipment, or will be attached with this manual.

All seams and gaps should be closed either by NSF approved gaskets or NSF approved silicone caulking. Unit must be sealed to floor using NSF certified gaskets or NSF certified silicone caulking.

Particular attention should be given to caulking joints between insulated panels during installation. This will prevent moisture migration into panel joints.

Internal Components Installation

IMPORTANT: Always wear gloves when handling sheet metal internal components.

1. Install the dehumidification unit. The external condenser housing should slide through the chamber opening located on the right hand side of the chamber when viewed from the front. Roll the unit snugly against the chamber wall and lock the wheels.
2. Install the supply plenum elbow. The elbow fits over the fixed supply plenum of the dehumidification unit and attaches with fasteners on either side.
3. Install the baffle frame. The aluminum baffle frame should be placed in the left side of the chamber with the vertical supports closer to the left wall of the chamber.
4. Install the slanted baffle onto the baffle frame. The slanted baffle will sit over the top back horizontal support and rest on the slanted aluminum portion of the baffle frame. DO NOT install wing bolts through pre-drilled holes at this time.

5. Install the perforated baffle onto the baffle frame. The perforated baffle will sit over the top front horizontal support and rest on the slanted baffle. Install 2 wing bolts at the bottom of the baffle at this time.

6. Install the false ceiling. The ceiling will ne to be carried into the chamber diagonally, with the cutout for the supply plenum fitting through the door to the lower right hand side. Once inside, slide the ceiling all the way to the frame side of the chamber, and lift the cutout end up until the ceiling is nearly level. Slide the ceiling toward the dehumidification unit until the ceiling makes contact with the chamber wall. Install 4 wing bolts: 2 on the baffle frame side and 2 into the chamber walls on the dehumidifation unit side.

Connecting Wiring

All electrical work should be performed by a licensed professional, and should adhere to all local and state codes.

The wiring panel is located beside the door which sits on the D.H. unit. Follow the name plate information located on the unit for proper voltage, phase, amps, breaker sizing, and wire sizing. Locate a fused disconnect as close as possible to the heat pump.

NOTE: Check to make sure that fans are rotating in the correct direction. If fans are running backwards on a unit requiring 3-phase power, switch 2 legs of the incoming power at the distribution block.

System Usage

Before Start Up

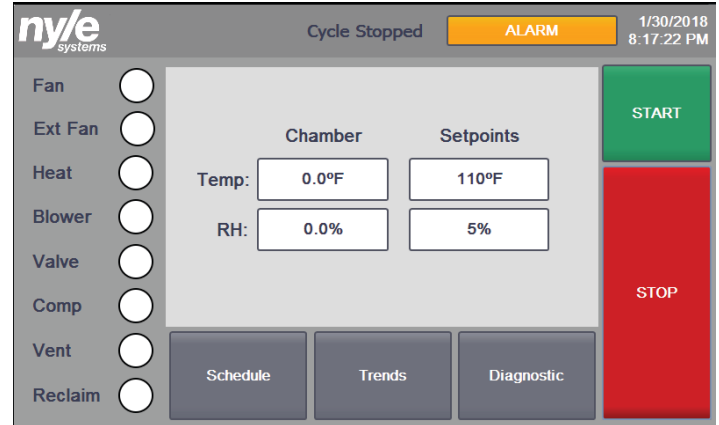
Verify the following:

- Voltage is correct and matches nameplate.
- Temperature/RH sensor is mounted near air intake of the D.H. unit.
- Service panels are in place.
- Emergency stop is deactivated (twist counterclockwise until the button pops out).

Quick Start Guide

1. When the dehumidification unit is energized, the touch screen will undergo a boot process until the Home screen is displayed.

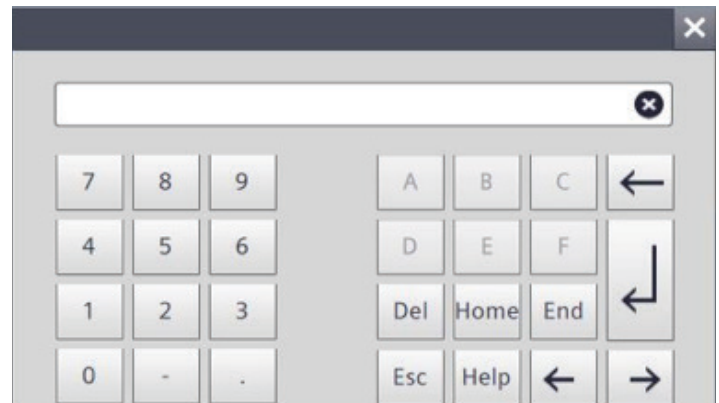
Home Screen:



Chamber temperature and relative humidity will be displayed, along with current user set points for desired chamber temperature and relative humidity.

2. To change set points, touch the box representing the parameter you desire to change. A number pad will appear. Enter the desired set point, and press the return button. The value entered should now be displayed in the appropriate set point box.

Number Pad:

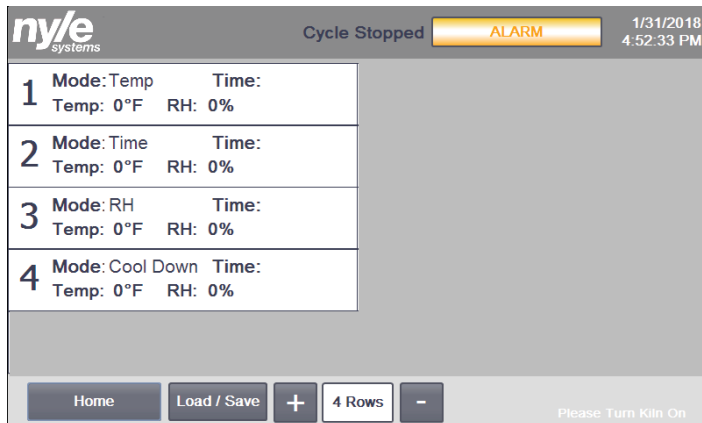


Before starting your cycle, change the cool down set point on the load & save screen to the temperature you desire the chamber to cool down to after reaching the relative humidity setpoint and before shutting down.

3. With your temperature and relative humidity entered, you can start your dehydrator by pressing the “Start” button on the right hand side of the screen. To stop your cycle at any time, press the “Stop” button on the right hand side of the screen. In case of emergency, press the E-stop button below the touch screen.

During a drying cycle, the dehumidification unit will run until the relative humidity set point is reached. At this time the unit will enter a cool down mode prior to shutting down.

Schedule Screen:



4. The schedule screen allows the user to manage dryer scheduling. Further details concerning schedule operation are included in the schedule management portion of the manual on page 16.

Home Screen - Schedule:

When the schedule is active, current schedule step information is displayed on the Home Screen.

“Step”: Indicates the type of step mode selected for the particular step number.

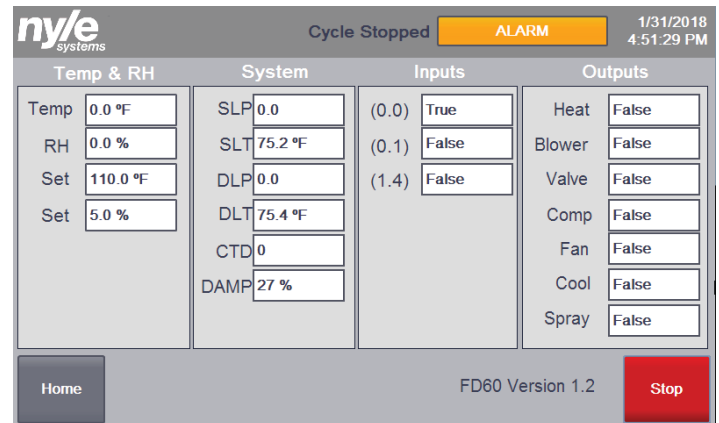
“Time”: Indicates the run time in minutes selected for a “Time” step mode.

“Temp”: Indicates the temperature setpoint selected for each step number.

“RH”: Indicates the relative humidity setpoint selected for an “RH” step mode.

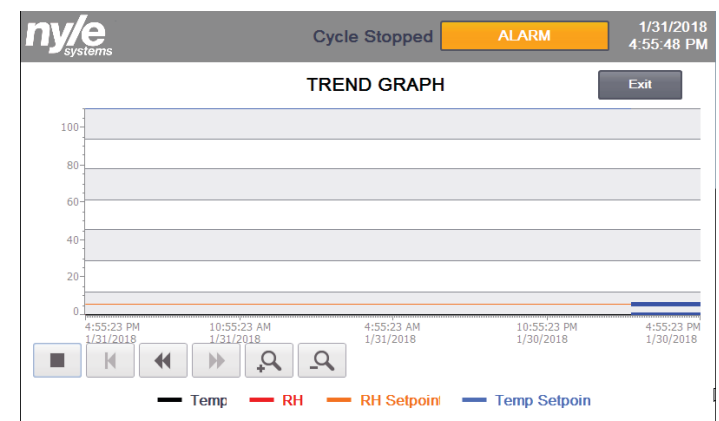
5. The diagnostic screen is accessed by pressing the “Diagnostic” button on the Home screen. The diagnostic screen provides refrigeration system operation information for troubleshooting purposes by a qualified service technician. You may be asked to access this screen during a troubleshooting call with a Nyle technician.

Diagnostic Screen:



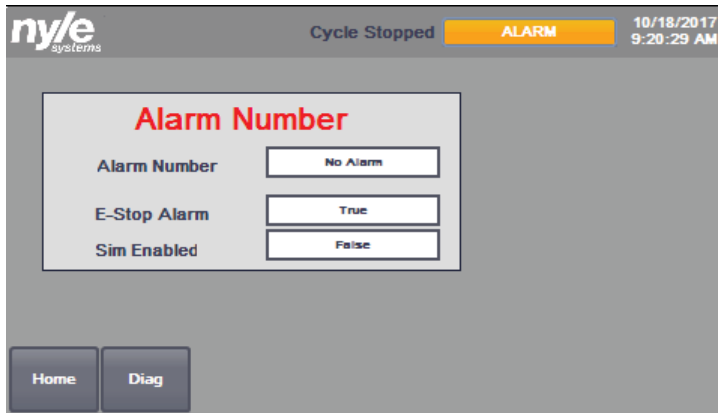
6. The trends screen records data every one minute. This unit records temperature, temperature set point, relative humidity and relative humidity set point. The toolbar stop button freezes the graph on screen but it will still record during this time. The rewind button moves the trend graph backward. The fast forward button moves the trend graph forward. The zoom buttons increase or decrease the time range shown on the graph.

Trends Screen:



7. If there is an issue with the unit, an alarm indicator will pop up on the top right column of the home screen. You can select this to view the alarm screen.

Alarm Screen:



The chart below will provide information on each alarm and steps to take if one is shown.

0 - OK	N/A
1 - Estop	Estop is pressed in
2 - Blower Fault	Blower motor starter tripped. Reset switch in panel. Upon multiple trips contact Nyle.
3 - Heat Safety	Overheat safety. Check wiring. Ensure the blower is working. Contact Nyle if issue continues.

Schedule Management

Schedule Operation

Before starting your cycle, change the cool down set point on the schedule load/save screen to the temperature you desire the chamber to cool down to after reaching the relative humidity setpoint and before shutting down.

In order to operate a drying schedule, use the schedule management features included with the controls package. From the home screen, tap the schedule button along the bottom of the screen. Up to 10 schedule steps may be programmed into the schedule by using the "+" and "-" buttons on the bottom of the schedule screen.

Schedule flexibility is provided primarily by allowing the user to select from 4 "step modes," including Time, Temp, RH, and Cool Down. Each of the step modes uses different criteria to determine when to advance to the following step within the schedule. Each step mode operates as follows:

Time step mode: A time step allows the user to input a set amount of time in minutes that the step should run for before advancing to the following step. Setpoints available for user input during a time step include Temp, Exhaust, Blower and RH.

NOTE: Do not adjust the time setpoint of a currently active time step. Doing so will cause the current time step to reset or advance to the next step.

Temp step mode: A temperature step allows the user to input a temperature value that the dryer should warm up to before advancing to the following step. Setpoints available for user input during a temp step include Temp, Exhaust, Blower and RH.

RH step mode: A relative humidity step allows the user to input a relative humidity value that the dryer should dry down to before advancing to the following step. Setpoints available for user input during an RH step include Temp, RH, Exhaust, and Blower.

Validation Step mode: A validation step allows the user to maintain a temp and RH for a specified period of time. This step is used to help achieve specific guidelines for certain food products. During this step all vents will remain closed and compressor will remain off, allowing temperature and RH to climb. When both Temp and RH setpoints are satisfied the timer will begin. Once the specified time is up, the schedule will advance to the next step.

Cool Down step mode: A cool down step allows the user to end a cycle by venting heat from the dryer with no heater input. A cool down mode ends the cycle when chamber temperature is measured to be equal to the setpoint user specified in the schedule load/save screen.

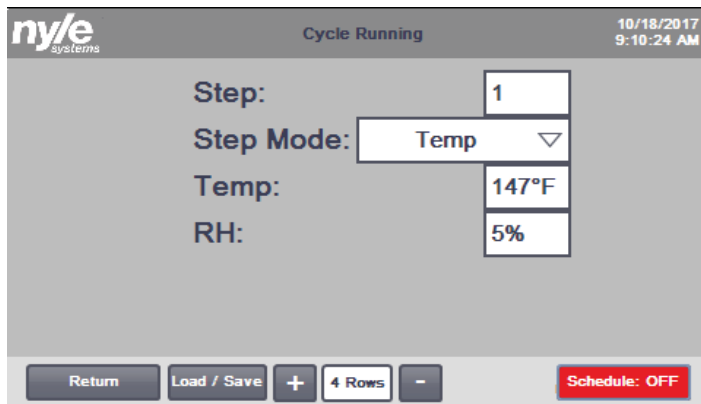
Note that for all of the step modes except for time, the schedule will advance based upon a selected dryer parameter other than time. Therefore, experimentation will be necessary to understand

the amount of time a particular schedule will take to run to completion. Factors affecting the run time of a particular schedule include product type, product load size, and ambient air conditions.

To enter and run a new schedule, conduct the following steps:

1. From the home screen, tap the schedule button along the bottom of the screen.
2. Using the "+" and "-" buttons along the bottom of the screen, adjust the number of steps desired for the schedule.
3. For the first step, tap the step to enter the step edit screen. Then select the step mode you desire.

Step Edit Screen:



4. Depending upon the step mode selected, continue down the screen until each selectable parameter has been entered for the step. Hit return to navigate back to the schedule menu or change the step input box to any of the other 10 steps to modify them without leaving that screen.

5. Repeat steps 3 and 4 for each step.

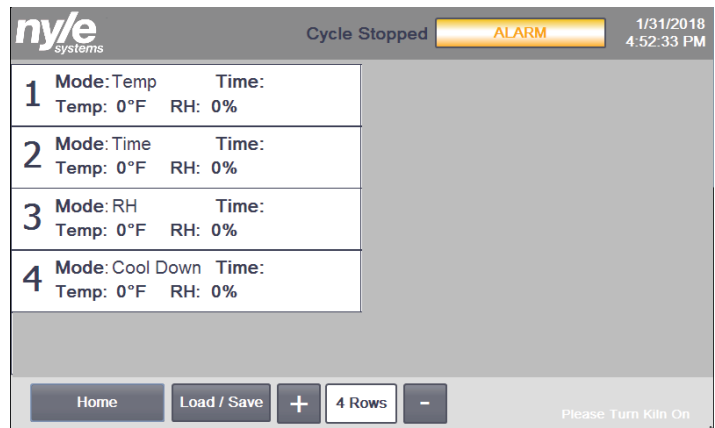
6. Return to the home screen.

7. Tap the start button. The dryer will start up based upon the values displayed on the home screen.

8. Return to the schedule screen.

9. Tap the "Schedule: OFF" button in the lower right corner of the schedule screen to activate the schedule. It should then read "Schedule: ON." The dryer should now begin with step 1 of the entered schedule.

Schedule Screen:



Schedule Monitoring

While a schedule is running, the schedule screen will provide indication of which step is being run, and whether or not a transition is being considered. While a particular step is active, the step number will be highlighted green. When the condition has been met for enough time to filter out sensor flutter, the next step will be highlighted green and dryer equipment will follow the entered conditions for the highlighted step.

As long as an SD card is inserted into the appropriate slot in the back of the control screen (accessed by opening the control panel door), schedules may be saved to or loaded from the SD card from the control schedule load/save screen.

To load or save a schedule, conduct the following steps:

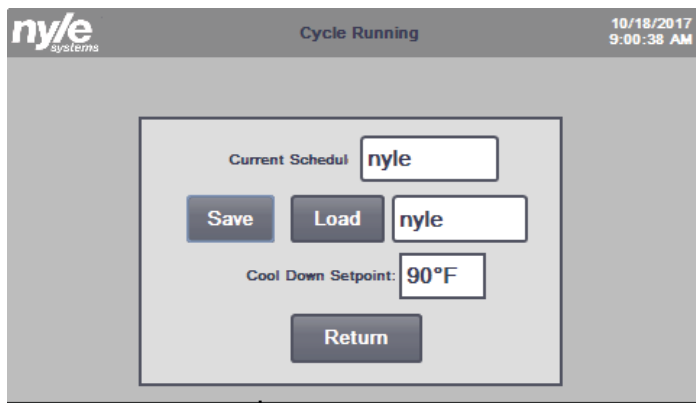
1. From the schedule screen, tap the load/save button to enter the load/save dialog. If a saved schedule is loaded, the "Current Schedule" window will display the name of a previously saved schedule. Otherwise, the "Current Schedule" window will be empty.

2. Tap the load/save value entry window, and enter a name in the value entry screen. Tap the return or enter button.

3. Tap the load or save buttons to either load the entered schedule or save the entered schedule to the selected number slot.

4. Tap the "Return" button to return to the schedule screen.

Load Save Screen:



Remote Monitoring

With customer provided IP addresses, Ethernet connection to the dryer PLC and installation of a VNC client on a customer provided device (PC or smart phone), remote monitoring and control are possible. When prompted by the VNC client, enter the following:

IP Address: 192.168.1.61

Password: 100

The HMI screen should appear as it does at the local control box. Using the mouse pointer, buttons may be pressed and values adjusted from this display.

Drying Theory

Dehumidification drying should be understood as a two-step process: dry, moving air absorbs water from a moist product, and a refrigeration system removes water from this air as it is passed over a cold surface. This cycle repeats until the moisture in the product reaches equilibrium with the moisture content of the air. A number of factors affect each step of this drying process, ultimately affecting the drying time achieved by your Nyle dehydrator.

In order for moisture to be removed from the air within your chamber, moisture first needs to be removed from your moist product. This process is affected by air temperature, air velocity, and product characteristics. Generally speaking, higher temperature and air velocity will result in shorter drying cycles. Product characteristics vary widely and

include characteristics inherent to the raw product itself as well as those caused by any processing that takes place prior to beginning the drying process. For example, thinner, more porous products usually dry more quickly than thicker, dense products.

Once moisture is removed from your product and absorbed by air within the chamber, the dehumidification system can remove this moisture and drain it away. The moisture removal capacity of the dehumidification system is most affected by the desired drying temperature. Drying temperatures warmer or cooler than the rated condition (115°F) will tend to change capacity.

To control your drying process, you will choose a drying temperature and relative humidity “target.” The relative humidity target represents the air moisture content at which you wish your product to be in equilibrium with when it is finished. The point at which this equilibrium occurs is known as the “Equilibrium Moisture Content” (EMC), and varies by product and drying temperature. Although published data is available for many products, your results may vary based upon raw product inconsistencies, ambient atmospheric conditions, and proprietary product processing. Some experimentation will be necessary to achieve your desired results.

Data Logging

As long as an SD card is inserted into the appropriate slot in the back of the control screen (accessed by opening the control panel door), operational data may be logged. Data logging functionality is active when:

1. An SD card is present AND
2. A cycle is active.

No further user action is necessary to activate data logging as long as the above conditions are met. Data is logged at a frequency of 1 measurement per minute.

Data is logged to a folder named “NyleDataLogs” on the inserted SD card. If a new SD card is inserted, the folder will be automatically created by the software.

In order to retrieve or otherwise manage data, **do not remove the SD card from the HMI slot.** Data

management may be accomplished from a computer web browser using the following steps:

1. Enter the IP address of your dryer PLC into the web browser address bar. The dryer IP address is: 192.168.1.61
2. Click on the "ENTER" button at the top left of the page.
3. Sign in with the following information:
 - a. Name: Administrator
 - b. Password: 100
4. Press Enter on your keyboard or click on the "Log in" button at the bottom right of the log in context box to enter the PLC management screen.
5. On the left side of the page, locate and select the following: File Browser > SD Card > Nyle Data Logs.
6. You should see data logs collected during previous cycles and named: "Nyle_[schedulingname]"
7. Use the file operations to the right of the file name to download, download and clear, or delete data logs from the SD card.

Maintenance

General Maintenance for FD-Series

The FD-Series is designed for continuous duty, with little maintenance. However, when a problem does arise prompt repair will ensure long life for the machine.

Suggested Maintenance Schedule

Weekly:

1. Check air filters
2. Visual inspection of unit & chamber
3. Inspect Evaporator and Condensor for debris

Monthly

Visual Inspection

1. Blower Assembly - No broken fins
2. Blower Belts
3. Electrical Panel Interior
4. Inspect Electrical Heater Terminals
5. Interior Damper Assembly

Every Four Months

1. Grease Blower Assembly
2. Grease Circulating Fan Assembly
3. Grease Blower Motor
4. Clean Drain Lines and Pan

Yearly

1. Lubricate Exhaust Dampers and Linkages*
2. Lubricant Evaporator Dampers and Linkages*

*Lubricate with NSF compliant lubricant, details on following pages for maintenance.

Unit/Chamber Inspection

Inspect unit and Chamber for signs of leaks. Yellow tinted streaking will appear near leaks on both the chamber and unit. Troublesome areas are typically the seams between chamber panels, near vents, plug fan, and unit/duct cutouts in chamber. If streaking is present, use NSF compliant 100% RTV silicone rated at 160F+ to seal these areas. Remove old silicone before applying a new bead. Keeping the unit sealed tight will ensure your drying cycle is as efficient as possible.

Air Inlet Filter Maintenance

The air filters are provided to keep the air inside the DH unit as clean as possible. Dirt build-up on the coils will lead to poor heat transfer with loss of water removal efficiency. In extreme cases, the coil will completely clog. The supplied filter is washable and should be replaced when light can no longer shine through it after cleaning.

Damper assembly inspection

The interior damper assembly consists of the metal blades located just behind the blue filter media in the unit. The damper assembly should consist of 3 sections of blades, two sections on the ends and one in front of the evaporator. The sections on the ends should be approx. 180° apart from the ones in front of the evaporator. This allows us to regulate flow over the evaporator as necessary. Be sure all linkages are tight and work together without binding. The nylon bearings supporting the damper assembly are also a point of wear and should be inspected during this time. Both of these components can be greased using any NSF compliant Grease.

FD Series Coil Cleaning Recommendations

Note: These recommendations apply to all Nyle Systems DH-based drying units and may be considered a part of standard maintenance procedures for trouble free operation of the system.

Your Nyle Systems FD drying system relies on a refrigeration system to accomplish efficient drying of your product. As part of each refrigeration system, refrigerant-to-air heat exchangers (“coils”) are used to complete the refrigeration cycle. Over time, refrigeration coils may become dirty as air is pulled through them, resulting in lower dehumidification performance and reduced operating efficiency. Your Nyle Systems FD drying system includes two to six coils which should be inspected and cleaned periodically to maintain optimum performance and efficiency.

The coil most prone to soiling is the evaporator coil. The Evaporator Coil must operate below dew point temperature of the chamber conditions to allow process condensate to form on it. Process Condensate is generated from the moisture removed from your product. This process condensate drips down into the drain pan where it is piped away. Because this coil becomes wet during a drying process, it tends to gather particulates traveling in the air stream, which build up over time.

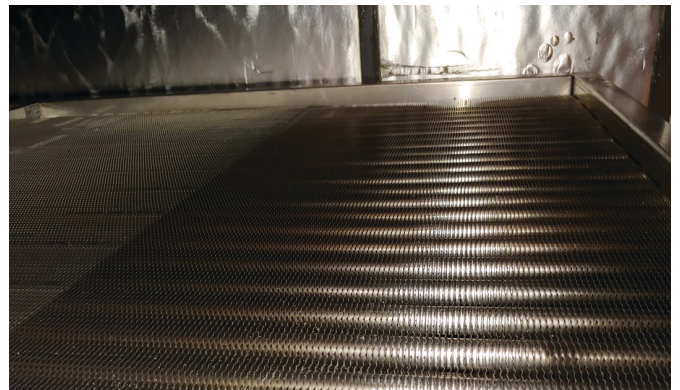
Coil cleaning procedure:

1. Ensure that the DH unit is shut down. Follow proper lock out tag out procedure.
2. Remove service panels allowing access to the coil to be cleaned.
3. Inspect the coil for damage or debris. Remove dry debris by either gently blowing compressed air through the coil fins or by vacuuming the coil fans. If using compressed air, blow through the coil from the back towards the front, or opposite the direction of airflow.

Danger: Coil fins are sharp and represent a cut hazard to bare hands. Wear proper PPE before conducting coil cleaning.

Warning: Coil fins are fragile and require gentle treatment to prevent bending and subsequent reduction in performance.

4. Use an FDA approved coil cleaning chemical to remove built up material on the coil fins. **Follow all manufacturer directions included with the cleaner.** Depending upon the chemical chosen, gently rinsing the coil after applying the cleaning chemical may or may not be necessary. Repeat cleaning if necessary.
5. Rinse the condensate drain pan and drain line to prevent clogging.
6. Reinstall service panels prior to using the system again.



Blower System Maintenance



This system should be serviced every 4-6 months.

The system should be checked for:

1. Worn blower shaft bearings.
2. Loose, tight, or worn belts.
3. Loose drive and driven sheaves.
4. Loose bearing and motor mount bolts.

The blower shaft bearings require 2 pumps of high quality NSF compliant grease.

It is very important that the belt tension is correct. If too tight, reduce bearing and belt life will result. If too loose, belt life will be shortened due to slippage. The ideal situation would be for the belts to be as loose as possible without squealing.

Correct tension is: 1/2" deflection at mid span with a force of 5 to 8 pounds.

Belt tension should be checked after the first few days of high temperature (140° F +) operation due to initial belt stretch.

Always change belts in pairs because a new belt will always do more work than a stretch used belt, ruining the new belt.

Belts should never bottom in the groove of the sheave. This is a sign of over tightening. Belts get their grip from the sides. If it bottoms, this grip goes away, and no amount of tightening will return the grip.

Never stretch the belt over the pulleys, as this will break the inner cords. Always reduce the center distance when replacing belts motor base moves to reduce center distance. Install belt on the smaller pulley first.

Electrical Panel Inspection

Before opening any electrical panel be sure electrical disconnect is in the off position follow your specific company's lockout procedures. With disconnect off electrical panel can be opened. Visually check all components in here for signs of burns/shorts. If any wire connections inside the panel appear black or brown don't turn the power back on until a licensed electrician has observed the area of concern. Check heater electrical boxes using the same method. The disconnect should remain off when checking heater electrical boxes as well.

Lubricating Motors

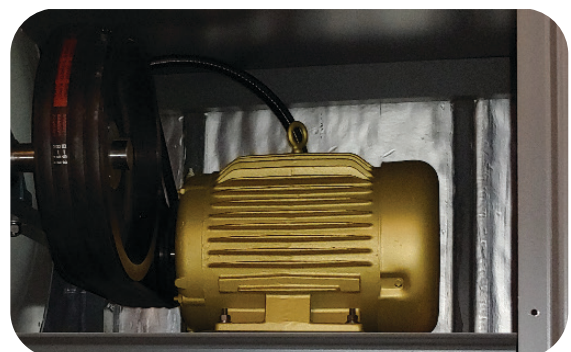
- On motors equipped with a grease fitting, clean tip of fitting and apply grease gun. Remove excess grease from fitting when done.
 - Use 1 to 2 full strokes on motors on FD 10-60
 - Use 2 to 3 strokes on FD 145-350
 - Use 3 to 4 strokes on FD 450-675

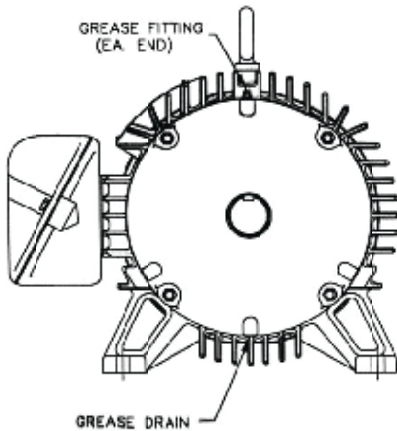
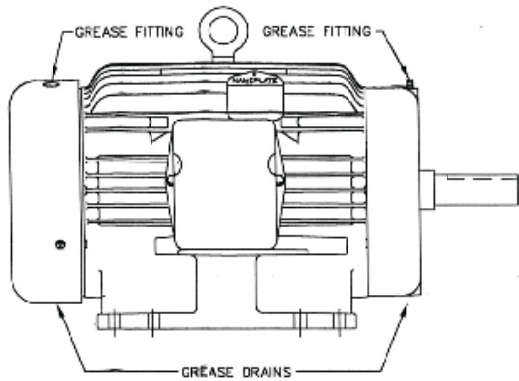
- On motors having drain plugs, remove grease drain plug and operate motor for 20 minutes before replacing drain plug.
- On motors equipped with slotted head grease screw, remove screw and apply grease tube to hold.
- Insert 2 to 3 inch length of grease string into each hole on motors in NEMA 215 frame and smaller.
- Insert 3 to 5 inch length on larger motors.
- On motors having grease drain plugs, remove plug and operate motor for 20 minutes before replacing drain plug.

CAUTION: Keep grease clean. Lubricate motors at standstill. Remove and replace drain plugs at standstill. Do not mix petroleum grease and silicone grease in motor bearings.

Lubrication Schedule		
Service and Conditions	HP Range	Suggested Schedule
Minimal Use 5,000 Hrs or less	1/8 to 7 1/2	5 years
	10 - 40	3 years
	50 - 150	1 year
Seasonal Use 6 months or less	All	At the start of every season
Continuous Use Normal conditions	1/8 to 7 1/2	1 year
	10 - 40	1 year
	50 - 150	9 months
Continuous Use Harsh conditions	1/8 - 40	6 months
	50 - 150	3 months

Fan Motor Lubrication Points





run the unit at extreme limits, as the product will degrade severely. With this danger factor and the factor of time involved of heating the chamber, Nyle insists that these machines have weighed in charge. The amount is as follows:

FD-Series

FD14 - 10lbs. R-416 (FR-12)

FD24 - 12lbs. R-416 (FR-12)

FD60 - 25lbs. R-416 (FR-12)

FD145 - 60lbs. R-416 (FR-12)

FD175 - 60lbs. R-416 (FR-12)

FD225 - 75lbs. R-416 (FR-12)

FD290 - 120lbs. R-416 (FR-12)

FD350 - 120lbs. R-416 (FR-12)

FD450 - 150lbs. R-416 (FR-12)

FD675 - 202lbs. R-416 (FR-12)

*Low temperature application $\leq 80^{\circ}$ F may use R407c
Canada & California applications may use R134a

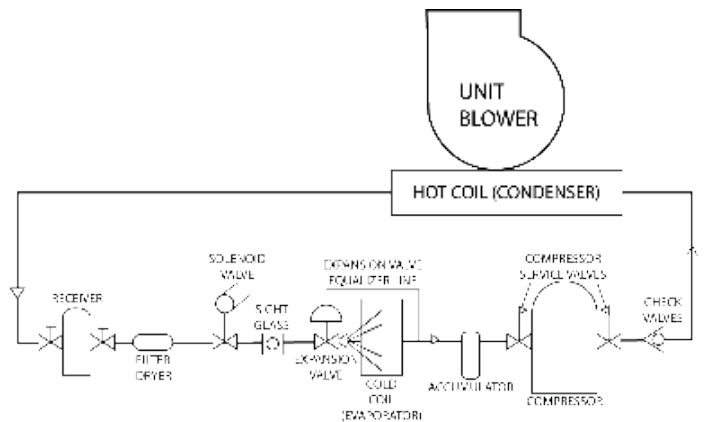
Call nyle if your technician lacks the recommended refrigerant. We can recommend alternatives.

Refrigerant System Information

The refrigeration system is a closed loop system with its own lubrication oil supply. Nyle uses only the best trade practices when assembling these systems. The system should give years of trouble free service. However, if the system is not removing the right amount of water, or if **a problem should arise from rough shipping or a refrigeration leak, the system should only be worked on by a qualified refrigeration mechanic.**

Warning: Refrigeration professionals should use caution, these refrigeration conditions are uncommon.

These systems operate over a very wide temperature and humidity range. The pressures will be relatively high when compared to air conditioners and heat pumps. For these reasons, you cannot charge by the sight glass, the sight glass will eventually clear at certain conditions but it is unlikely that those conditions will exist when servicing. If the chamber is loaded, it will be very dangerous to



Refrigerant Charging Procedure

WARNING: This procedure is extremely dangerous and should only be performed by a certified HVAC Technician. Failure to comply could result in significant property damage, serious injury and even death.

The proper refrigerant charge is essential for efficient use of the NYLE System. The charging procedure outlined below will result in optimum performance.

Because the load and operating conditions vary in this unit, normal procedures followed in the refrigeration and air conditioning industry cannot be used for charging the system.

At the extremes of high and low temperature, the following criteria must be met:

1. At high temperatures (160° F, 32% RH) adequate sub cooling must be present in the suction gas to cool the motor windings.
2. At high temperatures, the discharge gas pressure must not exceed 330-360 PSIG.
3. At High temperatures, the actual discharge gas temperature must not exceed 260° F.
4. At low temperatures, prevent excessive liquid flood back.

Nyle suggests that the refrigerant charge be adjusted **at maximum** operating conditions (160° F, 32% RH). **Do not** allow the system to exceed the maximum temperature limits. **Do not** run the compressor when chamber temperatures are below 70° F unless unit is low temp

These conditions should be simulated if the chamber is empty by operating the heaters and humidifier. If the chamber is loaded, it may not be possible to accurately adjust the charge until maximum conditions are reached at the end of the cycle. If an approximate charge is put in the system, it is imperative the refrigeration technician return when conditions are at the extreme. If the conditions are simulated in an empty chamber, it will be necessary to closely watch both temperature and relative humidity because the dehumidification system will have a dramatic effect on both readings when the chamber is empty.

Install service gauges on the suction and discharge line valves, and thermometers on the suction and discharge lines as close to the compressor as possible. If you have reversing fans, be sure the fans are in the "Forward" mode, the belts are tight on the blower,

the blower is turning in the proper rotation, the filters are clean and check the damper operation (this is essential and instructions are given elsewhere in this manual). Be sure the air flows are all normal and note the temperature and relative humidity.

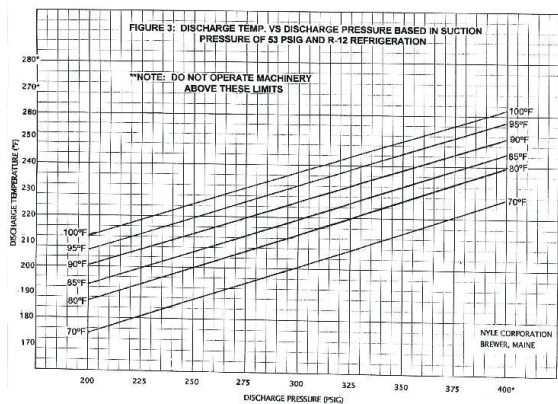
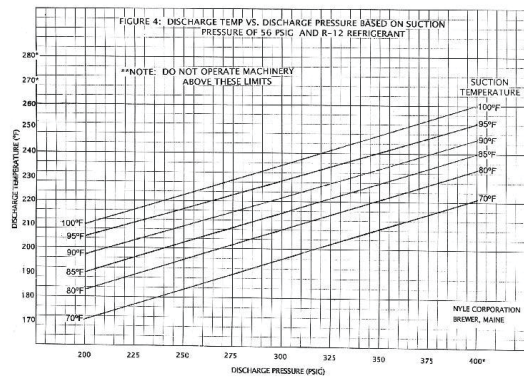
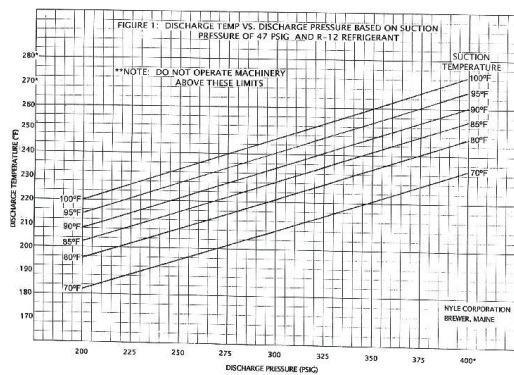
A sight glass is installed in the liquid line. **Do not charge to a clear sight glass.** The sight glass is provided as a reference and moisture indicator only. There are only limited periods when the sight glass will clear.

Add refrigerant while monitoring suctions and discharge pressure. When the actual suction line temperature drops to 80° F.-90° F, stop charging and observe pressure readings. Also note the damper position. At 32% RH they should be nearly closed or modulating from closed to slightly open. If they remain fully closed and the discharge pressure allows, add refrigerant to lower suction line temperature until they begin to modulate slightly.

At maximum operating temperature (160° F, 32% RH) the following approximate readings will be noted.

Suction Pressure	50-60 PSIG
Discharge Pressure	330-360 PSIG Do not exceed 375° F.
Suction Temperature	75°F - 95°F Do not exceed 100°F
Discharge Temperature	204°-255° Do not exceed 265°F
Evaporator Damper	Modulating from closed to slightly open

The attached graphs are helpful in checking performance. It may be difficult to exactly match the lines on the graph but this provides a good check on performance. To use these graphs, select the one for the suction pressure closest to the pressure being read. Compare the actual discharge gas temperature on the chart with the temperature being read on the operating system. If the discharge gas temperature is substantially higher (12° F. - 15° F.) then the chart indicates, steps must be taken to reduce the discharge temperature.



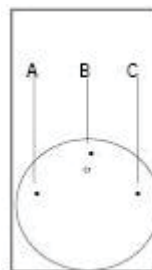
3. A mechanical failure in the compressor, broken reed valves, bearings, etc.
4. An electrical problem with the compressor motor, such as low voltage, unbalanced voltage, loose electrical connections, motor insulation failure etc.

An increase in suction gas temperature is usually related to improper refrigerant charge, improper damper operation, air flow problems or occasionally a malfunction in the compressor or expansion valve.

Unbalanced 3 Phase Supply Voltage

A very slight voltage unbalanced will cause a major unbalance in amperage draw. Operating a motor where these conditions exist will shorten equipment life and waste energy as the end result is dramatic increase in winding temperature. The following example will show how to calculate your unbalance. To assess the % unbalance you must find your maximum standard deviation. This number represents how much your voltage is deviating from the average voltage.

First measure the voltage for A-B, B-C & A-C as shown in the figure to the left.



Example: AB = 200
BC = 205
AC = 216

Then find the average voltage.

Example: $200 + 205 + 215 = 621$
 $621 / 3 = \underline{207}$

Find the difference between the average voltage and the measured voltages for AB, BC and AC. This is called the standard deviation. The highest number is your maximum deviation.

Note: Always put the larger number first.

Example: AB = $207 - 200 = 7$
BC = $207 - 205 = 2$
AC = $216 - 207 = \underline{9}$

The following can affect actual discharge temperature:

1. Excessive suction gas temperature: Check the operation of the damper system. Be sure relative humidity is below 32%, check the refrigerant charge.
2. Excessive discharge pressure, check air flow over the condenser, check blower operation (direction and belt tightness), filters, obstructions, check the refrigerant charge. Be sure the set temperature is under 160° F.

This voltage unbalance is accompanied by a motor temperature rise. A 10% unbalanced is equivalent to a 200% rise in temperature. Phase unbalances (which some might consider to be minimal but are quite serious) greatly shorten motor life and can cause catastrophic failure at any time.

Never operate a motor where a phase unbalanced in supply voltage is greater than 2%. If this is happening consider it a serious electrical issue and contact your local electric utility company immediately.

Replacement Procedures

When contacting Nyle for service or replacement parts, refer to the model number and serial number of the unit as included on the data sticker attached to the unit. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

Troubleshooting

Compressor Will Not Run

1. The breaker may be open or the circuit breaker is tripped. Check electrical circuits and motor windings for shorts or grounds. Investigate for possible overloading. Replace fuse or reset circuit breakers after fault is corrected.
2. Emergency stop may be depressed. Ensure that E-stop is deactivated.
3. Supply voltage may be too low. Check voltage with a volt meter.
4. Control system may be faulty. Check control for correct wiring of temperature/relative humidity sensor and check the control transformer for proper voltage.
5. Wires may be loose or broken. Replace or tighten.
6. The low pressure switch may have tripped due to one or more of the following:

- 1) Compressor suction line clogged
- 2) Low refrigerant

7. The high pressure switch may have tripped due to one or more of the following:

- 1) Compressor discharge line clogged
- 2) Air flow in D.H. unit reduced due to blockage
- 3) Air flow in D.H. unit reduced due to blower malfunction.

Unit Operation is Noisy

1. Check compressor for loosened mounting bolts. Make sure compressor is floating free on its isolator mounts. Check for tubing contact with the compressor or other surfaces.
2. Check screws on all panels.
3. Check for chattering or humming in the contractor or relays due to low voltage or a defective holding coil. Replace the component.
4. Check for abnormally high discharge pressures. 350 psi + (see page 30)
6. Check for any loose panels or parts that may be in contact with each other, vibrations from the compressor may cause them to chatter against one another.
7. Check for vibration related to the blower. Debris in the blower wheel may cause an unbalanced condition.

Insufficient Heating

1. Check for restriction in air flow.
2. Check for leaks at the intake and exhaust duct and damper openings.
3. Check auxiliary electric heater for appropriate current draw. (displayed on heater cover)
4. Consult with a qualified electrician concerning the heating circuit.

Limited Warranty

The equipment supplied by Nyle is warranted to be free from defects in workmanship and materials for a period of one year from the date of the original installation or 15 months from the date of delivery, whichever comes first. In the event of component failure, a new or remanufactured part will be supplied by Nyle providing the defective part is first returned to Nyle for inspection. The replacement part assumes the unused portion of the warranty. The warranty does not include labor or other costs incurred for diagnosis, repairing or removing, installing or shipping the defective or replacement parts.

Nyle makes no warranty as to the fitness of the equipment for a particular use and shall not be liable for any direct, indirect or consequential damages in conjunction with this contract and/or the use of its equipment. Buyer agrees to indemnify and save harmless Nyle from any claims or demands against Nyle for injuries or damages to third parties resulting from buyer's use or ownership of the equipment.

No other warranties, expressed or implied, will be honored unless in writing by an officer of Nyle Systems.

