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FM DRYERS

FEATURES:

The FM series dryers are the traditional dryer and hopper where the dryer is on the floor positioned next to the molding machine and the hopper is mounted on top of the molding machine. They are ideal where floor space is limited and material changes are infrequent. The FM dryer series utilize the HP4-X four bed design that provides a constant supply of dry air to the material hopper.

A FM can also be used with a hopper bank to provide hot, dry air to a hopper bank where the air will then be heated up by each hopper's booster heater.

HP4-X 4 Bed Design

While one bed is removing moisture from the process air the other is regenerating by heating the desiccant to a high temperature. Once the regenerated bed cools down, the Zone Valve switches the airflow, and the newly regenerated bed is used to desiccate the process air stream. The saturated bed is now regenerated in the same manner, completing the regeneration cycle

The airflow design of the HP4-X dryers makes the regeneration cycle more efficient because we utilize a small amount of the desiccated process air rather than ambient air to regenerate the desiccant bed. This reduces the impact of the high moisture content of the ambient air, which would contaminate the desiccant bed, and allows the dryer to attain a lower dew point. Please see the Air Flow Schematic on Page 4.

Dryer process operating temperatures are 140 degrees F (minimum) to 325 degrees F (maximum) with an accuracy of +/- 3 degrees. When the drying temperature is 275 degrees F or higher, it is necessary to install a water-cooled heat exchanger on the return hose of the dryer to ensure maximum dryer efficiency. If you do not have a heat exchanger and will be operating 275 degrees F or higher, please contact the factory for heat exchanger pricing.

Hopper Design

Dri-Air's "all stainless" hopper design utilizes a stainless-steel inner shell surrounded by a stainless-steel jacketed insulation layer. The easily removable stainless steel spreader cone

promotes proper material flow to ensure that the material is dried efficiently and no dried material is left at the hopper bottom that needs to be fed out prior to operating. You must ensure that your hopper is adequately sized for your usage rate and is kept filled, to ensure that you have sufficient time to dry the material.

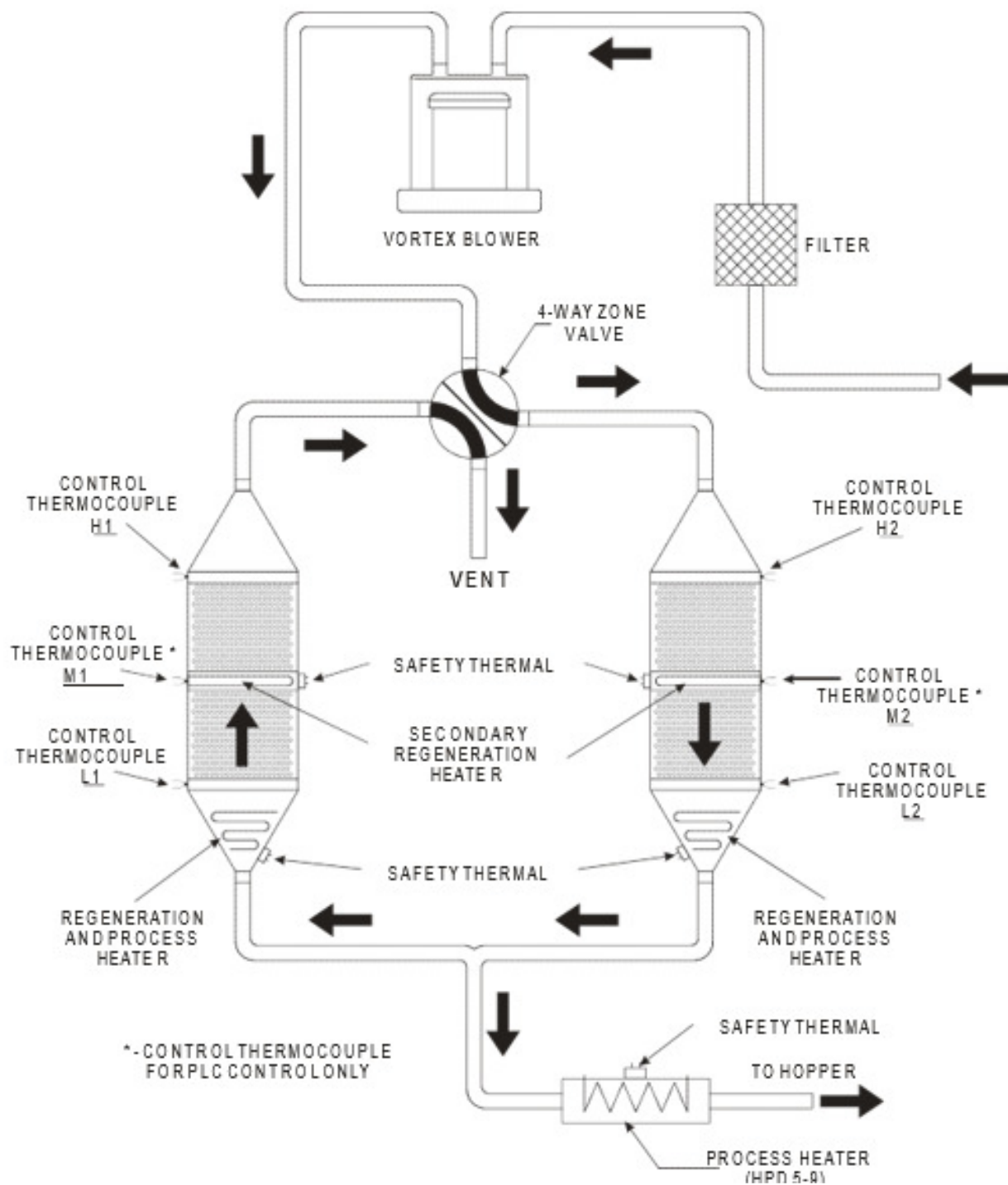
STC Smart Touch Controls

The FM series are supplied with the Smart Touch Control (STC).

The new STC (Smart Touch Control) was introduced for optimum operation of the dryer and is as user friendly as possible. The easy-to-see, menu driven HMI allows access to all operating parameters and enables the operator to navigate through all settings and data. All data and fault conditions are shown on the display in a format that is easy to understand and stored for retention and reports

As with earlier designs, the STC is driven by thermocouples strategically located in the towers, hoses to the hoppers, and other locations to properly control the operation of the dryer. Other inputs monitor the performance of the dryer for safe and efficient operation.

Please refer to the STC controls section following the dryer operation.

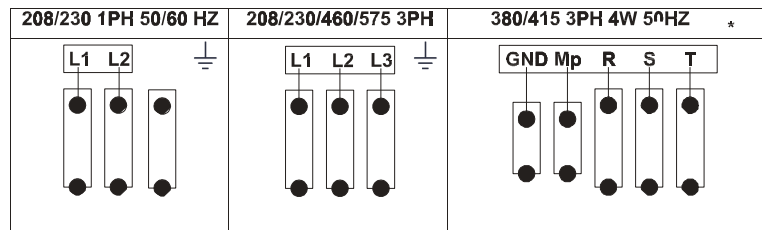


INSTALLATION PROCEDURE

Electrical Connection:

Open electrical access door on the front of the machine by turning the disconnect off and turning the lower clamping screw 1/2 turn counterclockwise. Locate the disconnect by following the operating handle down to the electrical panel.

Insert the incoming power cable or conduit through the hole provided on the side of the machine. Wire incoming power to the top of the disconnect as shown in the diagrams below.



« **use approved wire and fastening means** »

3 PHASE DRYER INSTALLATION CHECK FOR CORRECT MOTOR ROTATION BEFORE RUNNING DRYER

To check motor rotation.....

Leave the electrical cabinet door open so the blower can be observed. Turn on the power to the dryer and press the **ON/ START** touch pad and then immediately press the **OFF/STOP** touch pad. Observe the cooling fan on the top of the blower motor and verify the fan is turning clockwise. If the motor is not turning clockwise, switch any two adjacent supply wires.

Compressed Air Connection:

Compressed air is only required for dryers which have the closed loop loader as part of the system. For those units:

CONNECT COMPRESSED AIR TO INLET ON TOP OF THE CLOSED LOOP LOADER FILTER CANISTER. The closed loop system includes a regulator that is set to the proper pressure and an automatic drain water separator. Maximum incoming pressure not to exceed 145 psi (1.0 mpa).

The unit is now ready for operation.

QUICK START-UP GUIDE

Operating this unit is very simple. Once the dryer is connected to the facility power supply, the unit can be started by turning the disconnect handle located in the upper right-hand corner of

the electrical panel enclosure to the ON position and pressing the START button on the HMI. To shut the dryer off, simply push the STOP button on the HMI.

For a more detailed explanation, please refer to the STC control section later in this manual.

DRYER OPERATION TROUBLE SHOOTING

The SmartTouch Controls were designed for quick diagnosis of problems. The following steps should be done before proceeding with other diagnostic steps. Alarm codes that occur on the STC controls are further detailed in the controls section of this manual.

Check the Power Circuit:

1. Incoming fuses or circuit breaker
2. Check secondary fuses or circuit breakers.
3. Is power supplied to the unit?
4. Check heater continuity using a volt ohmmeter.

Compressed Air:

For those models that require compressed air.

5. Is compressed air connected with at least 60 PSI
6. Check water separator and drain if necessary
7. Pressure gage should read 60 PSI

Air Flow Circuit:

8. Ensure zone valve position is correct. Remove the hoses from the top of the desiccant towers and compare the airflow to that in the provided airflow diagram in this manual.
9. Make sure that all hoses are connected, not crushed, and free from obstructions.
10. Inspect filter and make sure cover is tight and the filter is clean and in good condition.

Control Circuit:

11. Using the PLC motherboard indicator lights as a guide for the dryer regeneration cycle, check that all inputs/outputs are proper for the part of the regeneration cycle that the machine is in.
12. Monitor the PLC output lights to ensure the corresponding LED on the power solid state relay is illuminated and there is an output voltage to the heater.

Operating Conditions:

13. Check the process temperature. It should not be set below 140° F (60° C) because the unit will go into high temp alarm.

If the temp exceeds the set point check the following:

1. Remove the hose from the top of the hopper to check air flow. There should be air flow out of the hopper with a suction on the hose. If there is little or no flow, check the inlet hose.
2. Inspect the filter to make sure that it is clean and not affecting the air flow.
3. Check to see if one of the solid-state relays has failed on. Using an ammeter or voltmeter on the output to the heater, see if there is power when the LED is not lit which will indicate a failed relay.
4. Check the valve position.

The Dri-Air valve is designed to provide very little flow restriction and no leakage. It incorporates high temperature spool for years of trouble-free service. The electrical controls are built into the end of the valve for long lasting performance.

DO NOT PUT FINGERS INTO VALVE WITH POWER ON

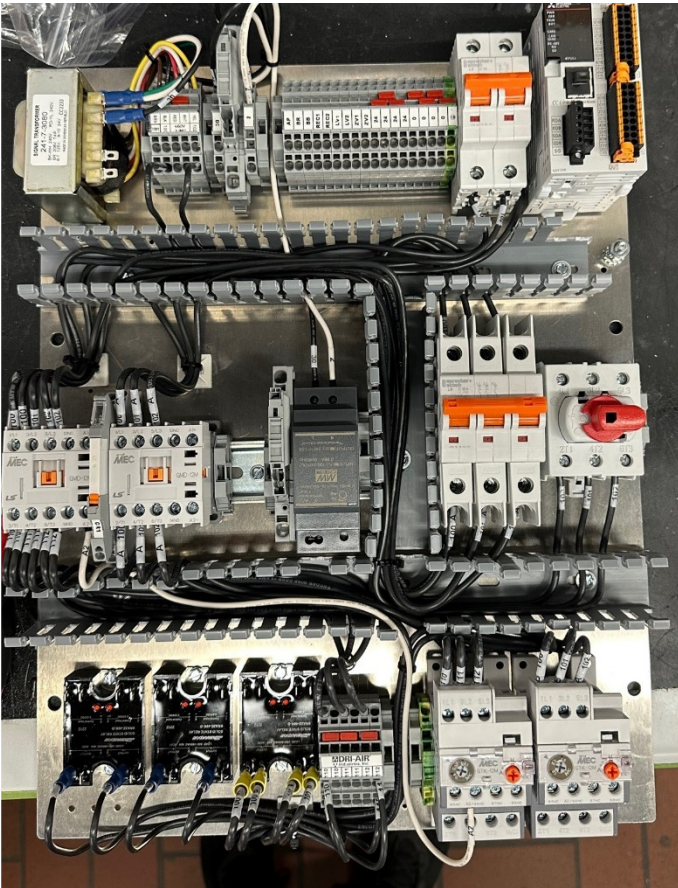
Check all electrical connections to make sure they are tight.
Contact factory with the serial number of the dryer for a replacement valve.

PART LIST



Description	Part #	Amount
Valve Zone STC 24V Assembly Smart touch	89167	1
Blower 50CFM-----→	87780	1
Blower 75-100CFM-----→	84868	
Sensor RH STC Control for 84936 RH Board Assembly	85374	1
Gasket 9" for 50-100 towers	82795	6
Filter Element 50-100 CFM for	81331	1
Thermocouple 1/8" x 6" Female Type J	82174	8
Switch Pressure Ultra Low 1.5" for STC Blower Rotation	86155	1
Thermocouple 1/8" x 3" Female Type J	87361	1

Voltage	<u>208V</u>	<u>230V</u>	<u>400V</u>	<u>480V</u>	<u>575V</u>
Cone	81351	81351	81766	81366	81432
HP/Middle	82364	82364	83934	82493	85098
Process	82343	82343	84204	82319	84065

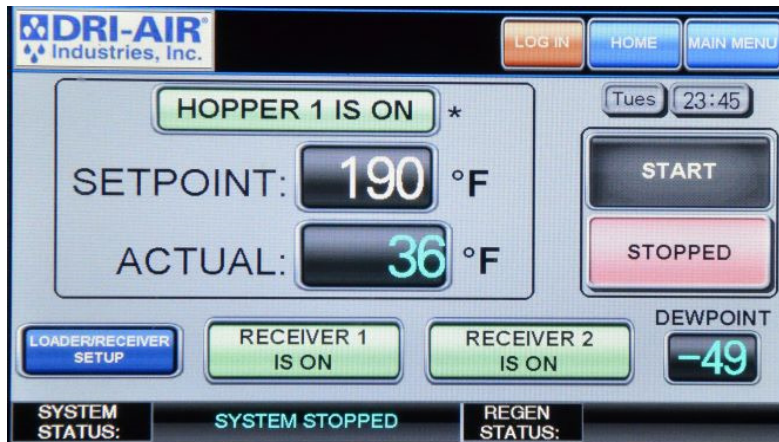


Description	Part #	Amount
Contactor 12A 600V 4P 24VDC LS	85355	1
Overload .4-1 Overload .4-.63 Amp-----→ Overload .63-1 Amp-----→	One of: 85358 85359	1
Relay SS 40A 480V 2P 15-32 VDC	85364	2
Switch Disconnect 40A (Handle, Shaft, Switch)	85365	1
Relay 1P DT 24VDC 6A card wago	89384	1
STC HMI	85089	1
STC PLC	85090	1
Mother Board STC Rev3A STC/HMI	89030	1
Power Supply 24VDC 30W STC	89259	1
Transformer	85959	1

SMART TOUCH CONTROLS GUIDE

MAIN OPERATING SCREEN:

The operating screen displays all of the dryer performance information in an easy-to-read format visible from a long distance. The large STOP/START button is incorporated into the screen rather than being located remotely.



All common operator inputs are located on this main screen including starting and stopping the dryer, closed loop loader control and temperature changes. The asterisk (next to the setpoint) indicates the setback function is turned on. The setpoint temperature numbers change to red when the dryer is in setback.

To change the process temperature, press the SETPOINT number to display the input screen. Select the new temperature setting and press ENT.



SYSTEM SETUP SCREEN:



To enter the setup screen, first tap the main menu button in the top right of the touch screen, then select the “SETUP” button.

All of the parameters of the dryer are accessed through this screen that is very explanatory.

To access the area of interest, simply press the associated button.

System, Alarms, and Factory settings buttons are only accessible through password protected Log In.

7 DAY TIMER:



The 7-Day Timer allows the user to set one start and one stop time per day.

Before setting the times into the schedule, check to verify the actual time matches the time set into the dryer as shown in the upper left-hand corner.

If the time is incorrect, press the hours, minutes, or seconds display and make the correction from the keypad that will be displayed.

To enter a start or stop time, press the time box on the day selected and a keypad will be displayed to make the entry desired. Note that 99 in the hour field turns off the time for that setting. All times are displayed in military time where the day is 24 hours. For 8:00 AM set 0800 and for 4:00 PM set 1600, settable 00:00 to 23:59. Then press Disabled button to Enable. You may also disable any day independently with the disabled button.

FACTORY SETTINGS:

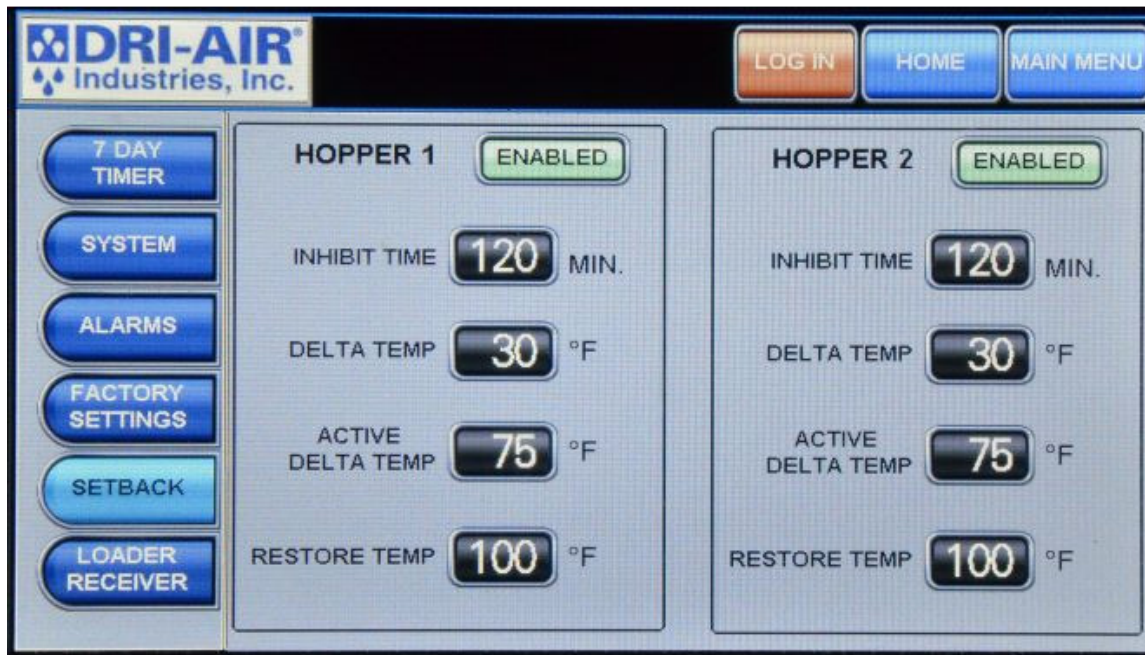
Factory settings allow DRI-AIR personnel to make changes to the basic operating parameters where necessary. This screen is password protected and only trained personnel have access.

Some pages in the setup screen are locked, and can only be accessed through factory settings; this includes the "SYSTEM" page, the "ALARM" page, and the "FACTORY SETTINGS" page. Note that this alarm page is separate from the alarms page in the diagnostic menu.

In addition, switching between Fahrenheit and Celsius can only be done under factory settings.



SETBACK (OPTION)



Temperature setback allows the dryer to automatically lower the process temperature after a period of time to keep from over drying the material. Here you can enable or disable the setback as well as setting setback parameters. The factory set parameters will work for most setback applications.

Parameter changes require a login and password. **Password = 1285**

An asterisk (*) will be displayed next to the “Hopper Is On” window on the Home Screen when setback is turned on. The new setpoint temperature will change to red when the setback activates.

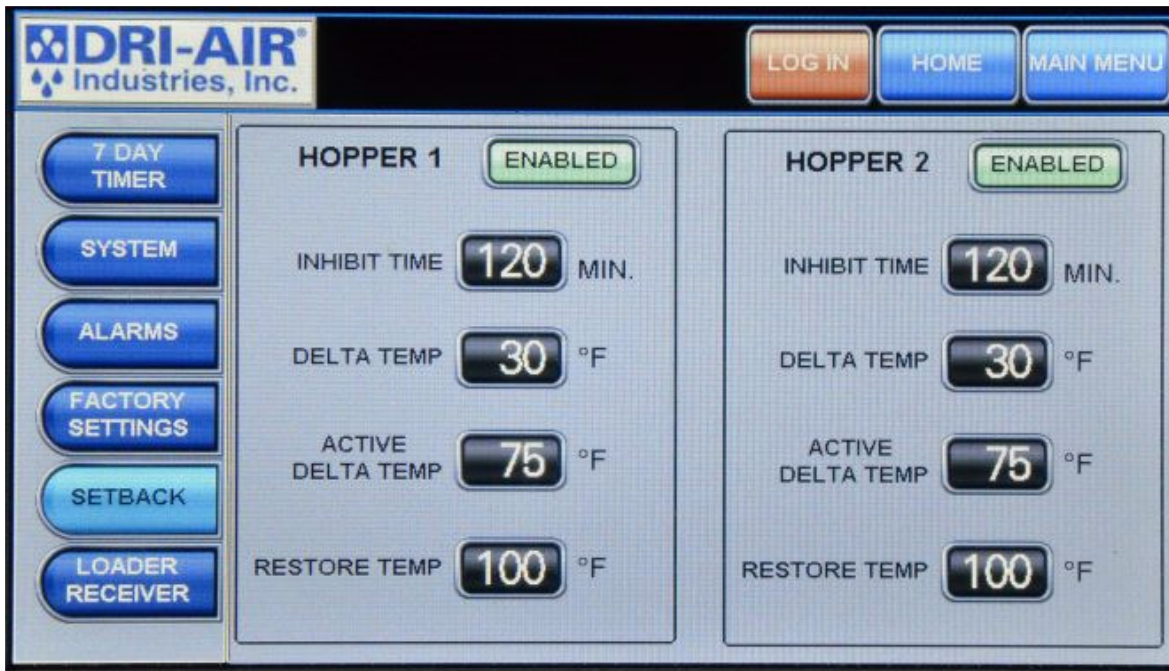
Inhibit Time = Time in minutes that the process temperature will maintain original setpoint before going into setback. (Settable 10-480 minutes)

Delta Temp = The amount the temperature will setback from setpoint (settable 0-999°F)

Warning: Delta temp cannot be set higher than the High Temp Alarm delta temperature.

Active Delta Temp = The difference between the setpoint temperature and the setback thermocouple temperature. The setback thermocouple temperature must be equal or less than the setpoint temperature minus the Active Delta Temp before the setback will activate. (Settable 0-999°F)

Restore Temp = The temperature that the setback thermocouple must drop down to or below for it to come out setback and revert to the original setpoint. (Settable 0-999°F)



Factory default settings will work fine for most temperature setback applications.

LOADER RECEIVER (OPTION)

DRI-AIR Industries, Inc.				LOG IN	HOME	MAIN MENU
7 DAY TIMER	RECEIVER 1	ENABLED	FILL TIME	10 SEC.	DROP TIME	0 SEC.
			RECEIVER 1 CLEAN-OUT	DISABLED	CLEAN TIME	5 SEC.
	RECEIVER 2	ENABLED	FILL TIME	10 SEC.	DROP TIME	0 SEC.
			RECEIVER 2 CLEAN-OUT	DISABLED	CLEAN TIME	0 SEC.
	BLOW-BACK	ENABLED	LOADER1 CYCLES BEFORE ALARM	5	LOADER2 CYCLES BEFORE ALARM	0
	BLOW-BACK PULSES	3				
SYSTEM			PULSE LENGTH	1 SEC.		
	ALARMS					
FACTORY SETTINGS						
SETBACK						
LOADER RECEIVER						

For those dryers with the closed-loop loader option to load the dried material to the press, this screen is used to configure the loading cycle.

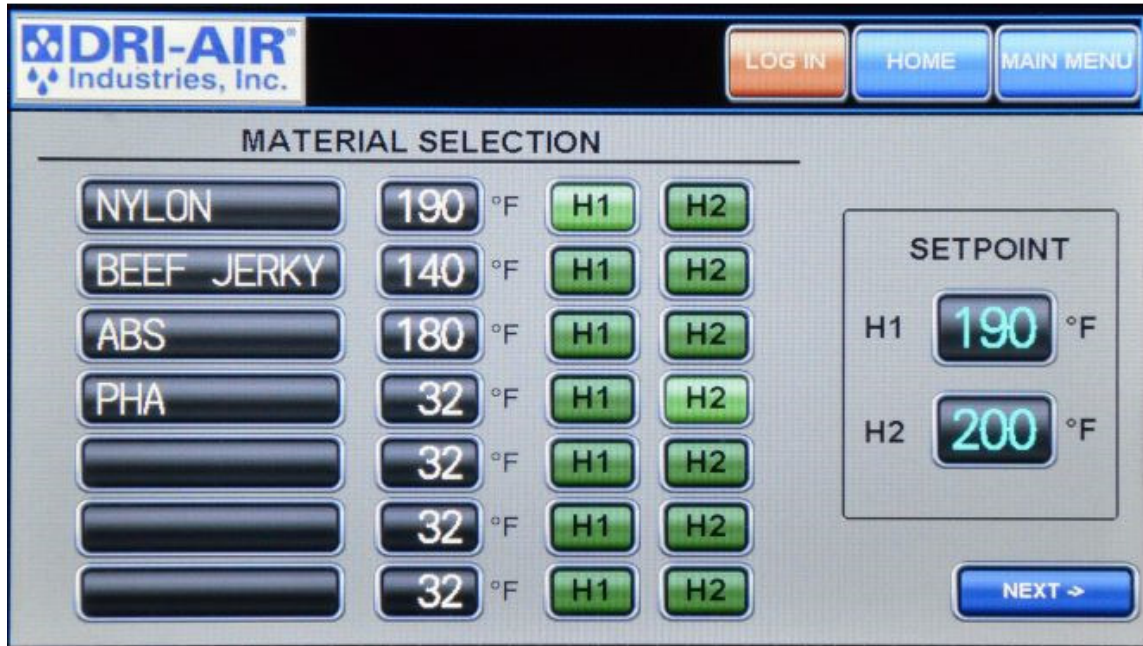
The **FILL TIME** is the time in seconds the loader sends material to the receiver and is normally in the range of 5 to 10 seconds.

The **DROP TIME** allows the material in the receiver to empty into the sight glass and inhibits the loader from trying to load again.

The **LOADER ALARM CYCLES** initiates an alarm if material has not been sent to the receiver in the set number of tries.

All adjustments are made by pressing on the selected time box which brings up a keypad to make the change.

RECIPE MENU:



*PDII Pictured

The process temperature can also be set using the **RECIPE MENU** screen. From the **MAIN OPERATING SCREEN**, press the **MAIN MENU**, then press the **RECIPE** button to access this screen.

To change the name of the recipe or any other designation you prefer and the temperature, press the section to change and a screen will appear to make the changes. The **NEXT MENU** button is the second page for this selection.

Press the **H1** button next to the desired material and the temperature setpoint of that material will be activated. **H2** represented only in PDII models.

DIAGNOSTICS SCREEN:



To enter the diagnostics screen, first tap the main menu button in the top right of the touch screen, and then select the “DIAGNOSTICS” button.

All diagnostic information about the dryer is in this screen, this includes temperature data, alarms, and event logs.

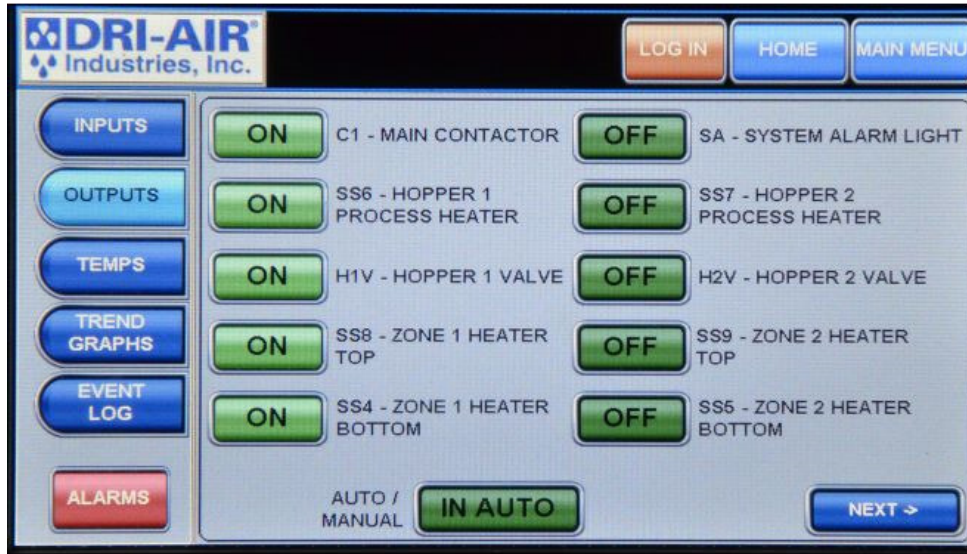
To access the area of interest, simply press the associated button.

INPUTS:



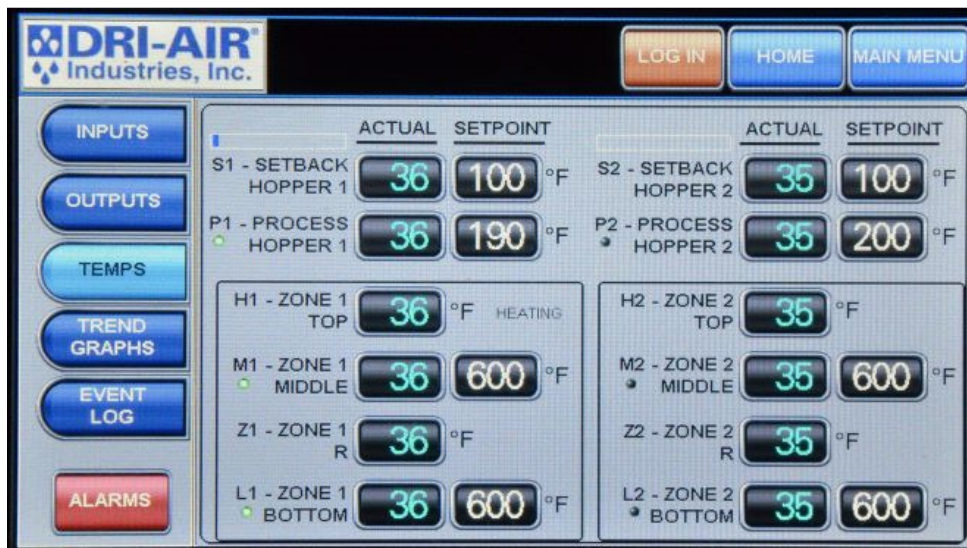
The inputs screen displays different sources of inputs, in this screen you can independently tell whether or not an input is on or off, as well as switching between auto and manual mode. This screen also displays an Hour Meter (Not resettable) and a Preventive Maintenance (PM) Meter (Which is resettable).

OUTPUTS:



The outputs screen displays different sources of outputs, in this screen you can independently tell which output sources are on or off. You can also switch from Auto to Manual mode to test output operation.

TEMPS:



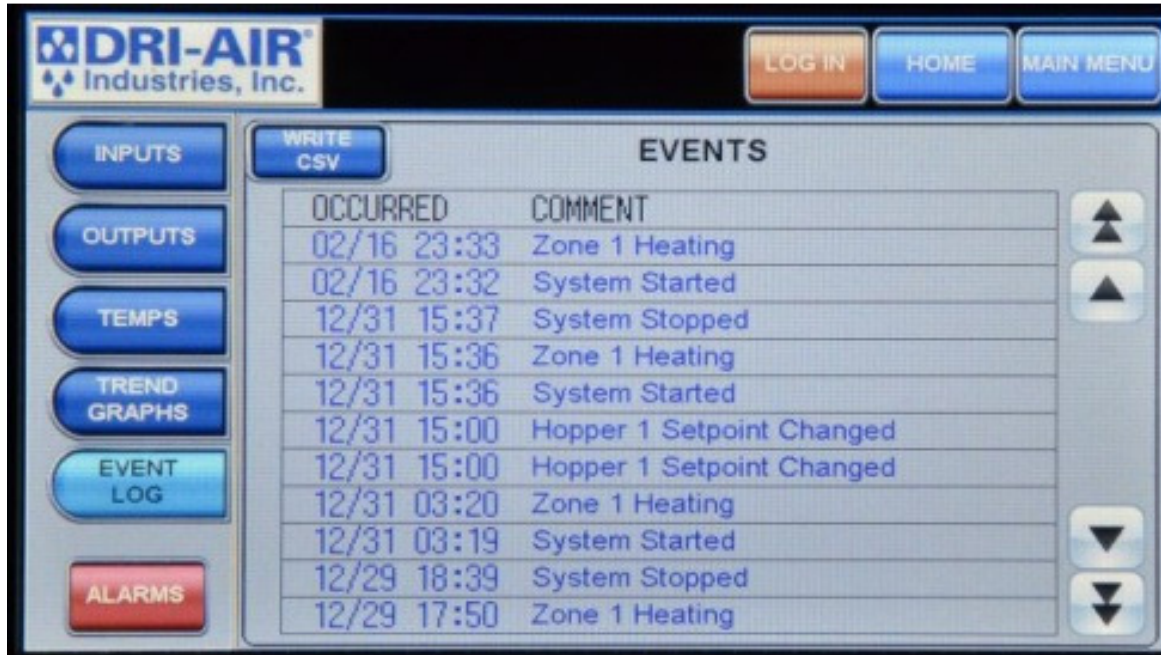
The temps screen is used to display all of the thermocouple temperatures to trouble shoot a problem. The current status of the regeneration cycle is displayed in the lower right of the display. We will use this screen while assisting in determining where to look to solve a problem. Heater outputs are also displayed by a small LED to the left of each heater's temperature readout.

TREND GRAPHS:



To read the temperature data in a trend graph, select the "Trend Graphs" button to get data on the dryer's temperature and dew points over a period of time. To record data, press write csv, to check older data use the "<< PAGE" and "PAGE>>" buttons, to check different data sheets use the "NEXT >" button to navigate. The Live Data button will refresh the data on the right to what the readings are at that moment. Write CSV will write a CSV file to an SD card; this is how you can send a file to Dri-Air Industries. Note: the Write CSV button will only write a CSV file for the data on the current screen, if you want other tracked data to be written to an SD card you will need to press the Write CSV file on those screens as well.

EVENT LOG:



All alarms and events are stored to assist in trouble shooting a problem. They are stored in sequence with the latest one first followed by past alarms and events. To make access easier, you can select the day's events using the arrow keys on the right. All events over 7 days are cleared out with a first in, first out sequence. Alarms and events are stored in two different menus, looking at the picture above, the bottom most red button is the alarm page and the button directly above it is the event log page. Write CSV will write a CSV file to an SD card; this is how you can send a file to Dri-Air Industries. Note: the Write CSV button will only write a CSV file for the data on the current screen, if you want other tracked data to be written to an SD card you will need to press the Write CSV file on those screens as well.

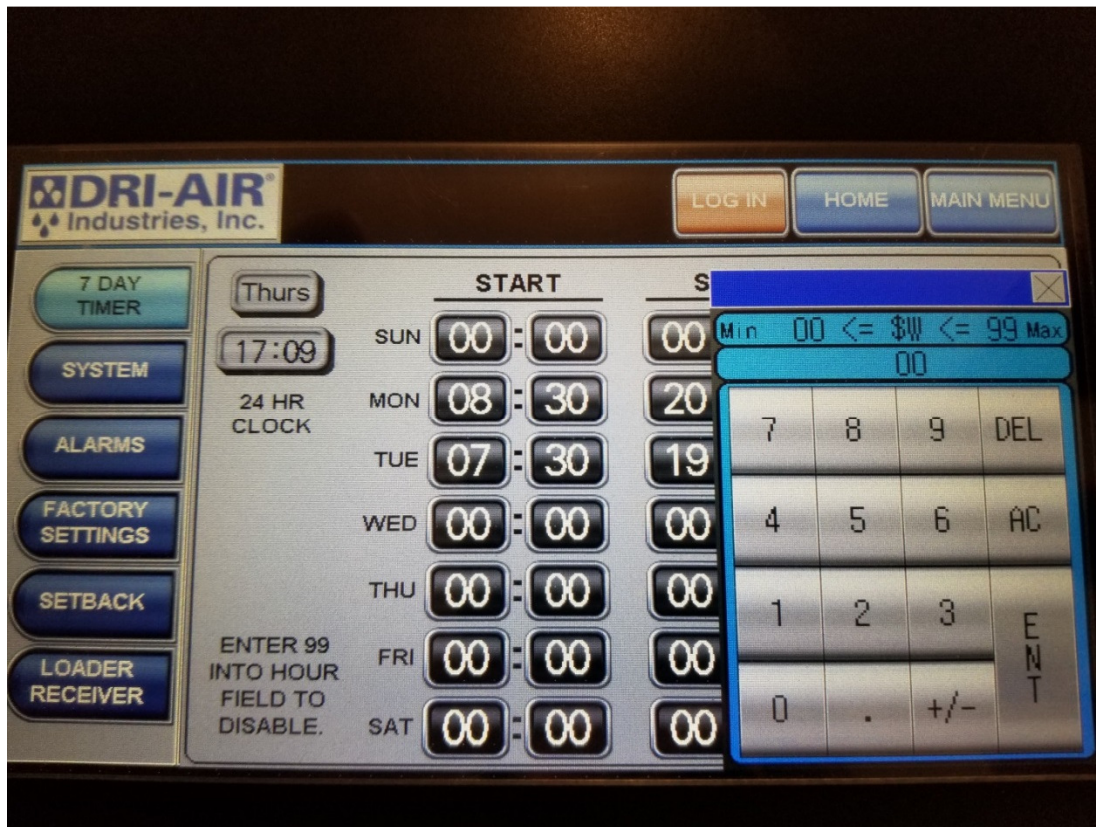
ALARMS:



OCCURRED	COMMENT
10/30 22:40	COMMUNICATIONS ERROR
10/29 19:57	COMMUNICATIONS ERROR
09/20 15:58	M2 OVER TEMP
09/20 15:58	L2 OVER TEMP
09/20 15:58	M1 OVER TEMP
09/20 15:58	L1 OVER TEMP

The Alarms page can be accessed by first hitting the “Main Menu” button, then hitting the “Diagnostics,” and finally selecting the red “ALARMS” button in the bottom left of the screen. This page displays all of the alarms set off by the machine, including the cause of the alarm and the time/date it occurred. Write CSV will write a CSV file to an SD card; this is how you can send a file to Dri-Air Industries. Note: the Write CSV button will only write a CSV file for the data on the current screen, if you want other tracked data to be written to an SD card you will need to press the Write CSV file on those screens as well.

DIGITAL KEYPAD SCREEN:



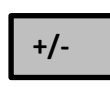
This keypad is used to enter all temperatures, times, and digital information. Press the desired numbers and then ENT to make the change.



Close



Clear entry



Unused

ALPHA-NUMERIC KEYPAD:

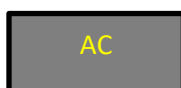


To enter a new recipe or other designation, press the center description area and the keypad as shown will appear. Type the new entry using the keypad and press enter.

To enter the temperature, press the associated temperature display to access the entry keypad.



Close out of keyboard



Clear entry



Space bar



Delete



Enter

TROUBLESHOOTING:

Below is a list of the possible error codes that might appear if an error occurs in a dryer.

Fault_Overload_Alarm

-Blower overload has tripped, Check incoming power and fuses

Fault_L1_Zone1_Bottom_TC_Backwrd

-Bottom left thermocouple on desiccant bed, Check thermocouple plug connection (white wire +, Red wire -)

Fault_L1_Zone1_Bottom_TC_Broken

-Bottom left thermocouple broken, Check thermocouple and thermocouple plug connections

Fault_Z1_Zone1_R_TC_Backwrd

-Second thermocouple up on bottom left, Check thermocouple plug connection (white wire +, Red wire -)

Fault_Z1_Zone1_R_TC_Broken

-Second thermocouple up on bottom left, Check thermocouple and thermocouple plug connections

Fault_M1_Zone1_Middle_TC_Backwrd

-Third thermocouple up on bottom left, Check thermocouple plug connection (white wire +, Red wire -)

Fault_M1_Zone1_Middle_TC_Broken

- Third thermocouple up on bottom left, Check thermocouple and thermocouple plug connections

Fault_H1_Zone1_Top_TC_Backwrd

-Top thermocouple on left, Check thermocouple plug connection (white wire +, Red wire -)

Fault_H1_Zone1_Top_TC_Broken

- Top thermocouple on left, Check thermocouple and thermocouple plug connections

Fault_P1_Process_Hopper1_TC_Backwrd

-Hopper 1 air inlet thermocouple, Check thermocouple plug connection (white wire +, Red wire -)

Fault_P1_Process_Hopper1_TC_Broken

- Hopper 1 air inlet thermocouple, Check thermocouple and thermocouple plug connections

Fault_S1_Setback_Hopper1_TC_Backwrd

-Hopper 1 return air thermocouple, Check thermocouple plug connection (white wire +, Red wire -)

Fault_S1_Setback_Hopper1_TC_Broken

- Hopper 1 return air thermocouple, Check thermocouple and thermocouple plug connections

Fault_L2_Zone2_Bottom_TC_Backwrd

-Bottom right thermocouple on desiccant bed, Check thermocouple plug connection (white wire +, Red wire -)

Fault_L2_Zone2_Bottom_TC_Broken

- Bottom right thermocouple on desiccant bed, Check thermocouple and thermocouple plug connections

Fault_Z2_Zone2_R_TC_Backwrd

-Second thermocouple up on bottom right, Check thermocouple plug connection (white wire +, Red wire -)

Fault_Z2_Zone2_R_TC_Broken

- Second thermocouple up on bottom right, Check thermocouple and thermocouple plug connections

Fault_M2_Zone2_Middle_TC_Backwrd

-Third thermocouple up on right desiccant bed, Check thermocouple plug connection (white wire +, Red wire -)

Fault_M2_Zone2_Middle_TC_Broken

- Third thermocouple up on right desiccant bed, Check thermocouple and thermocouple plug connections

Fault_H2_Zone2_Top_TC_Backwrd

-Top thermocouple on right, Check thermocouple plug connection (white wire +, Red wire -)

Fault_H2_Zone2_Top_TC_Broken

-Top thermocouple on right, Check thermocouple and thermocouple plug connections

Fault_P2_Process_Hopper2_TC_Backwrd

-Hopper 2 air inlet thermocouple wiring backwards, Check thermocouple plug connection (white wire +, Red wire -)

Fault_P2_Process_Hopper2_TC_Broken

-Hopper 2 air inlet thermocouple broken, Check thermocouple and thermocouple plug connections

Fault_S2_Setback_Hopper2_TC_Backwrd

-Hopper 2 return air thermocouple wiring backwards, Check thermocouple plug connection (white wire +, Red wire -)

Fault_S2_Setback_Hopper2_TC_Broken

-Hopper 2 return air thermocouple broken, Check thermocouple and thermocouple plug connections

Fault_Z1_Bottom_Loop_Break

-Bottom left heater in desiccant bed not coming up to regeneration temperature, Check heater and solid-state relay

Fault_Z2_Bottom_Loop_Break

- Bottom right heater in desiccant bed not coming up to regeneration temperature, Check heater and solid-state relay

Fault_Z1_Middle_Loop_Break

- Middle left heater in desiccant bed not coming up to regeneration temperature, Check heater and solid-state relay

Fault_Z2_Middle_Loop_Break

- Middle right heater in desiccant bed not coming up to regeneration temperature, Check heater and solid-state relay

Fault_P1_Over_Temp

-Hopper 1 air inlet temperature alarm, Check solid state relay and zone value position

Fault_P2_Over_Temp

- Hopper 2 air inlet temperature alarm, Check solid state relay and zone value position

Fault_Hopper1_Loop_Break

-Hopper 1 air inlet not coming up to set point, Check thermocouple position, Check process heater element and solid-state relay

Fault_Hopper2_Loop_Break

- Hopper 2 air inlet not coming up to set point, Check thermocouple position, Check process heater element and solid-state relay

Fault_Blower_Rotation

-Check if blower is running, Check blower rotation, Check blower pressure switch

Fault_Compressed_Air

-Check compressed air connection, Check compressed air pressure switch

Fault_System_Comm_Error

-RS 485 Cable break

Alarm_Clogged_Filter

-Return air filter is clogged, clean or replace air filter

Alarm_Receiver1_Cycle_Alarm

-Receiver 1 did not satisfy proximity switch in load cycles set, Check alarm load cycles, Check proximity switch calibration

Alarm_Receiver2_Cycle_Alarm

- Receiver 2 did not satisfy proximity switch in load cycles set, Check alarm load cycles, Check proximity switch calibration

Alarm_Hopper1_Low_Material

-Material level in hopper 1 below proximity sensor, Check material levels, Check proximity switch calibration

Alarm_Hopper2_Low_Material

- Material level in hopper 2 below proximity sensor, Check material levels, Check proximity switch calibration

Alarm_High_Dew_Point_Level

-Dew point exceeded set alarm level, Check dryer filter, Check desiccant for contamination

Fault_L1_Over_Temp

-Zone 1 bottom thermocouple exceeded 850°F, Check thermocouple and plug connection, Check zone 1 bottom heater relay

Fault_M1_Over_Temp

- Zone 1 middle thermocouple exceeded 850°F, Check thermocouple and plug connection, Check zone 1 top heater relay

Fault_L2_Over_Temp

- Zone 2 bottom thermocouple exceeded 850°F, Check thermocouple and plug connection, Check zone 2 bottom heater relay

Fault_M2_Over_Temp

- Zone 2 middle thermocouple exceeded 850°F, Check thermocouple and plug connection, Check zone 1 top heater relay

