


**MICROPROCESSOR
CONTROL
INSTRUCTION MANUAL**

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SECTION I SYSTEM OVERVIEW

1 FEATURES

The Dri-Air Industries Microprocessor Control is one of the most sophisticated and yet operator friendly controls on the market. Its development has spanned several years, incorporating changes and upgrades which outperform other manufacturer's systems. It is not a PLC control, but a dedicated microprocessor, with eight (8) thermocouple inputs to monitor and control the heart of the dryer. The many programmable features allow the dryer to operate more efficiently, as well as, provide greater flexibility to customize the operation of the system to best suit the user's needs.

Features and options available on the Dri-Air Microprocessor Control include the following:

- -40° F dew point monitor
- 7-day timer
- Heater fault detection
- Alarm package, including High and Low Temperature alarms
- Battery backup for time retention
- Password protection
- Auto restart on power interruption
- Communication capability via RS232 - Optional
- SPI Protocol with RS485 communication- Optional
- Temperature readout in degrees F or C
- Thermocouple break detection
- Stacked alarm features
- Diagnostic capability from panel
- Display of internal temperatures
- Multiple regeneration modes
- Watch dog timer for power failure memory protection
- Relay output for audible or visual alarm signal
- Programmable Closed Loop Loading Controls

Many of the options and features listed above are described in detail in subsequent sections in this manual.

2 OPERATING IMPROVEMENTS

This exclusive Microprocessor Control used in dryer systems manufactured by Dri-Air Industries enables the dryer to achieve numerous operating improvements over other typical PLC controlled systems.

A. Greater Energy Efficiency

The regeneration cycle in dryers can use a substantial amount of energy to remove the moisture from the desiccant. With time based systems, the regeneration heater is turned on for a preset time with little or no actual control of the regeneration cycle temperature. This wastes energy when the heater continues to run, even after the desiccant is regenerated.

The Dri-Air microprocessor controls this process by monitoring thermocouples located at the bottom and top of each desiccant bed. The lower thermocouple is used to monitor and control the actual regeneration temperature, while the upper thermocouple controls the cool down cycle by monitoring the temperature of the desiccant at the top of the bed.

Controlling the regeneration cycle results in lower energy consumption by heating the beds only long enough to remove the moisture.

B. Minimization of Temperature Spikes

Temperature spikes are the result of incomplete desiccant bed cooling, resulting from the internal heat from the desiccant beds being transferred to the hopper. With the Dri-Air microprocessor, the optimal temperature that the cooling cycle has to reach is calculated based on the actual process temperature. The beds do not switch until this temperature has been reached.

Additionally, an interim stage has been incorporated that preheats the idle

regeneration heater, getting it ready for use as a process heater. This reduces the temperature drop that occurs as the result of the time needed for the heater to come up to temperature.

C. Heater Fault Detection

This function has historically caused the most false alarms on competitive systems. Their systems require a specific amperage to be entered for the customer's given voltage. This can lead to false alarms because of variations and fluctuations in voltages at the user's locations (amperage variation is a function of the square of the voltage change).

In response to this, the Dri-Air microprocessor uses a unique current monitoring system. Upon initial start up after installation, the unit initiates a *learning mode*, where the amperages (at the actual operating voltage at the user's location) for each heater combination are stored into memory. These stored current readings are used to compare to subsequent heater current readings to detect heater failures. Once detected, the unit will shut down and run a self-diagnostic procedure to determine the faulty heater. An alarm, and the faulty heater position is displayed on the control panel.

D. Multiple Regeneration Modes

The microprocessor allows the following regeneration modes to be internally selected according to the customer's needs or application:

1. Thermal Control

This mode allows the unit to maintain the lowest and most consistent dew point, as the desiccant beds are switched immediately after the cooling cycle is completed. This assures that the newly regenerated desiccant bed is used, preventing any increase in the process air's dew point, and is therefore, more efficient in removing moisture from the process air.

2. Process Dew Point Control

In this mode, switching of the desiccant beds is done when the dew point of the process air reaches a preprogrammed level. Although this mode lowers the total number of regeneration cycles, the user will not see a significant drop in energy usage, as the desiccant has become completely saturated and therefore will require longer to regenerate. In addition, the process air's dew point will vary based on the level programmed into the control. The savings from this mode are not all that significant but may be of interest to some users.

3. Time Control

The unit can be set to operate on a time controlled basis. However, this circumvents the unique operating features of the microprocessor, and does not guarantee optimal drying conditions. We do not recommend this operation for extended periods, but include it as a backup mode of operation.

SECTION II

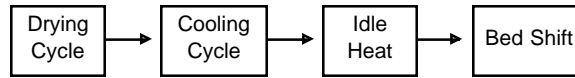
REGENERATION

CYCLE

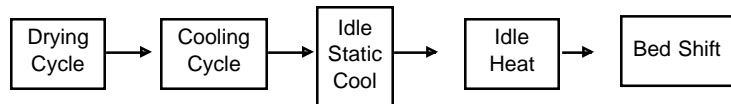
DESCRIPTION

The following schematics and descriptions detail the operating cycles associated with the three desiccant regeneration modes available on systems supplied by Dri-Air Industries.

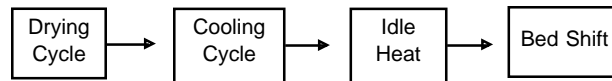
Thermal Regeneration Control



Dew Point Regeneration Control



Timed Regeneration Control



1. DESICCANT DRYING CYCLE

If the unit is programmed to operate in the *Thermal* or *Dew Point Control* modes, the microprocessor initiates the cycle by turning on the regeneration heater located at the bottom of the desiccant bed and controls the temperature to between 550 and 600° F. As the bed heats up, the temperature at the top approaches 250° F. The top of the bed will maintain this temperature while the moisture is being driven off. Once the moisture is driven off the temperature at the top of the bed will rise rapidly. If the unit is programmed to operate in the *Timed* regeneration mode, this cycle will simply run for the period of time entered into the controller.

2. COOLING CYCLE

With the unit operating in either the *Thermal* or *Dew Point Control* modes, the heating cycle terminates when the temperature at the top of the bed reaches 330° F. Once the cooling cycle initiates, the lower bed temperature will immediately begin to decline. However, the temperature at the top of the bed will continue to rise, until it approaches 600° F and then begin to decline. When the unit is operating in the *Timed* regeneration mode, this cycle will allow the desiccant to cool for a preprogrammed period of time without regard to temperature.

3. IDLE HEATING CYCLE

When the unit's regeneration cycle is programmed to operate on *Thermal Control*, the unit will allow the desiccant to cool until the top bed temperature reaches a differential of 75° F above the process air temperature, or the default minimum temperature of 280° F (which ever is greater). At this point, the unit initiates the Idle Heat Cycle, where the bed's regeneration heater will cycle *on* and *off* simultaneously with the process air heater for a one to two minute interval. This reduces the fall off in temperature of the process air resulting from the lag time required to heat the tubular element. After this 1-2 minute pre-heat, the beds shift and the opposite bed completes the regeneration cycle. If the unit is operating on *Timed Control*, the microprocessor will initiate the 1-2 minute "pre-heat" cycle upon completing the Cool Down time interval.

4. IDLE STATIC

When the regeneration cycle is programmed to operate on *Dew Point Control*, the bed is allowed to cool and remains static. The microprocessor will not control the temperature of the bed, or actuate the heaters, until the process dewpoint reaches the set point programmed into the control. Once the dew point level is reached, the system initiates the *Idle Heating Cycle*, whereby the bed's regeneration heater is cycled on and off simultaneously with the process heater as detailed above.

5. BED SWITCH

The microprocessor performs the Bed Switch by actuating the Zone Valve, diverting the process air flow through the newly regenerated desiccant bed, and then initiating the Regeneration Cycle for the opposite bed. When the unit is operating in *Thermal Control*, the beds are switched, based on preprogrammed set points for the temperature of the desiccant during the Cooling Cycle. The *Dew Point Control* mode actuates the bed switch when moisture levels in the process air reach the preset limits programmed into the microprocessor. In Timed Control mode, the microprocessor will initiate the bed switch upon completion of the preprogrammed time interval of the Cooling Cycle.

SECTION III SYSTEM FEATURES

1. CONTROL PANEL LAYOUT

A. TOUCH PAD BLOCKS

The control panel is separated into the touch pad blocks described below. For ease of entry, the touch pads are equipped with an audible beep and tactile click to indicate a button has been depressed. The touch pads indicate a successful entry by signaling with one beep, while two (2) beeps, indicates a button cannot be pushed in that sequence.



1. Temperature

This block allows the user to set the process air temperature by pressing the touch pad labeled SET. The high temperature alarm can be set using the ALARM touch pad and the upper right hand display can be toggled between SET POINT and DEW POINT using the TEMP/D.POINT touch pad.



2. Function

This block is used in conjunction with the TEMPERATURE, TIMER, and SETUP touch pads. The **UP** and **DOWN** arrows are used to increase or decrease the selected settings. (Pressing and holding the touch pad will allow the selected digit to rapidly increment/decrement.) The **LEFT** arrow is used to cursor through the setting displayed, causing the selected digit to flash.



3. Timer

This touch pad block is used to program the automatic start up and shut down sequence for the drier. The microprocessor will store up to seven days of pre-programmed operating cycles, and with the battery backup, will retain these in memory, even when power is disconnected. Please refer to Section IV, part 1.E, for the specific programming procedure. The operating day of the week and time (expressed in military format) are displayed in the upper left and right displays respectively, when the **TIME** touch pad is depressed. To reprogram this information, see Section IV, part 2.A on alarm and clock setting.



4. Programming Function Keys

The Programming Function touch pads are used to set the dryer's operating parameters, set points and control functions. The **SETUP** touch pad is used to access, scroll through and configure the parameters used to control the unit. The parameters and their settings are displayed in the upper left and right hand displays, respectively. These parameters are preset at the factory but may be modified to suit the user's requirements. Please refer to Section IV for specific procedures.

The **ENTER** touch pad is used in conjunction with SETUP, TEMPERATURE, and TIMER touch pads. As settings for each of the parameters are changed, the ENTER pad must be pressed to log the entry into the units memory.

The **CLEAR / EXIT** button returns the panel to the normal operating mode and resets the alarm enunciators to read clear.



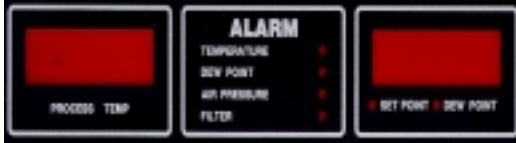
5. Start / Stop

These touch pads are used to manually start and stop the unit. They also will override the automatic Start/Stop function. The POWER enunciator lamp will light when power is turned on by using the main disconnect located on the dryer's electrical panel enclosure.

B. DISPLAYS

There are four display blocks on the panel. Each display will indicate or flash various parameters or status messages depending on the unit's current mode of operation.

1. Alarm-Process Temp-Set Point/Dew Point



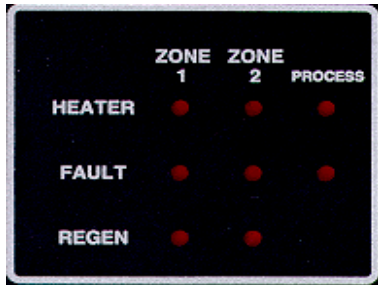
The **Alarm** block displays the type of alarm that has been detected with a flashing enunciator lamp and audible beep.

The **Process Temp** block displays the actual process air temperature when the panel is in the normal operating mode. If the unit detects an error or a failure, the display flashes the error message - *Err*. When programming the TIMER functions the block will display the day of the week currently being programmed along with a "b" or an "E" to signify the beginning or ending times respectively (ie: dA 1b or dA 1E). When checking or programming the SETUP functions, the block will display the number of the SETUP parameter recalled (ie. Su 01).

The **Set Point/Dew Point** block will display the process air temperature set point, or the actual dew point measured by the unit. This block can be toggled between these two displays by pressing the TEMP/D.POINT touch pad. When programming the TIMER, TEMPERATURE, and SETUP functions, the block will display the current setting for the parameter recalled.

2. Zone 1/Zone 2 Heater Status

The **Zone Heater Status** block indicates; which zone is currently in the regeneration cycle, which zone and process heater has actuated, and if a heater has been diagnosed as faulty.



2. ALARMS & FAULT DETECTION

Depending on the dryer model and options selected, the systems supplied by Dri-Air Industries are equipped with a variety of alarms and fault detection features.

Alarms are displayed on the panel in the upper middle display block labeled **ALARM**. Whenever an "alarm" condition exists, the enunciator lamp associated with that alarm will flash and an error message will also appear in the upper left and right hand displays. Please refer to the following section entitled **ALARMS** for a description of the alarm options available in our systems.

Faults are displayed on the panel in the middle left hand display block labeled **ZONE 1, ZONE 2**. When the microprocessor detects a "fault", the **FAULT** lamp associated with the heater will flash, an error message will appear in the upper left and right hand displays and the unit will shut down. Please refer to the following section entitled **HEATER FAULT DETECTION** for a description of this feature.

A. ALARMS

1. Temperature Alarm

Standard options include both High and Low Temperature Alarms. When the alarms actuate, they are factory programmed to execute a "machine shut down", display error messages and light the TEMPERATURE alarm light. Please refer to Appendix 1 for the factory default settings (The Low Temp Alarm is disabled at the factory.). If the user wishes to enable/disable the alarms or alter the alarm set points please refer to Section IV, part 1.D, entitled *Setting the High Temperature Alarm*. **CAUTION:** After a High Temp Alarm condition is detected, the High Temp Alarm functions are temporarily disabled to facilitate troubleshooting the cause for the alarm. The functions will remain disabled until the process air temperature comes below the alarm set point.

2. Dew Point Alarm

This alarm is standard on all microprocessor-controlled systems supplied by Dri-Air Industries. The alarm actuates whenever the process air dew point rises above the preset limit programmed into the microprocessor. The set point and functional parameters for this alarm are preset at the factory. Please refer to Appendix 1 for the factory default settings. If the user wishes to alter the alarm set point, please contact the factory for assistance. To enable/disable the alarm, please refer to Section IV, part 2.E, entitled *Activating High Temp/Dew Point Alarms & Temperature Setback*, for the procedure to program this alarm.

3. Air Pressure

This alarm is standard only on PD II Dual Hopper systems and dryers with a process air flow of 150 CFM or greater. The alarm actuates when the air pressure of the Zone Valve supply air falls below the preset limit on the pressure switch. The alarm is programmed to display the type of alarm, error message and shut the unit down. The system will not operate under this alarm condition.

B. FAULTS

1. Heater Fault Detection

Heater Fault Detection is standard on all microprocessor controlled systems supplied by Dri-Air Industries. A heater fault is detected when the total operating current used by the dryer's heating system deviates from the initial current usage readings stored into the microprocessor's memory. When a fault is detected, the microprocessor begins a diagnostic routine to determine which heater has failed. Once the microprocessor has isolated the faulty heater, the appropriate alarm and error message will be displayed, and the unit is shut down. The factory readings preprogrammed into the Heater Current Usage Matrix can be altered at the user's location. CAUTION: This should only be attempted if the unit is experiencing a high number of fault alarms and the system's hardware has been checked for electrical continuity, or the user is moving the unit to a location where the voltage deviation will be significantly different from the present location. Please refer to Section IV, part 2.D, entitled *Programming Heater Fault Detection* for the procedure to reset these readings.

3. OTHER OPERATIONAL FEATURES

A. AUTOMATIC TEMPERATURE SETBACK

This is an optional feature that requires additional hardware and programming to be installed prior to shipment of the system to the user. This option allows the microprocessor to automatically lower the process air temperature to prevent over-drying of the material in the hopper. The installation of a thermocouple that monitors the temperature of the air at the outlet of the hopper allows the microprocessor to automatically "set back" the temperature of the process air when the outlet air reaches a preset limit. In addition, the microprocessor will automatically deactivate this function if the "trigger temperature" is not reached in 120 minutes, or sensing when material has been added to the hopper or delivered to the Loader. All of these functional parameters are preprogrammed at the factory but can be altered to better suit the user's needs. Refer to Section IV, parts 2.C & 2.E, entitled *Programming Auto-Temp Setback* for the procedure to reset these parameters.

B. CLOSED LOOP LOADER CONTROLS

This feature is an optional system, that when installed, uses the same filtered and dried air used in the drying process to load the Material Receiver(s). This eliminates the possibility of contaminating the dried material from the use of unprocessed air to move material through the unit. When this option is in-

stalled, the microprocessor actuates the material loading process by monitoring the inputs of proximity switches installed on the Receiver. The microprocessor uses preprogrammed time delays and a default protocol to control the loading, clean-out and hopper fill operations. The operational settings are preprogrammed at the factory, but can be altered at the user's location. Refer to Section IV, part 2.K for the procedure to program this option.

C. RS232 COMMUNICATION CAPABILITY & SPI PROTOCOL W/ RS485

These features are optional communication devices and software that allow the system to be remotely operated and monitored. They require factory installation of additional hardware and factory activation of the preprogrammed SPI protocol. The RS485 communication device is only available with SPI protocol.

D. PASSWORD PROTECTION

This feature is standard on all systems supplied by Dri-Air Industries. It allows the user to protect the preprogrammed operational settings and parameters from inadvertent changes or intentional tampering. It does not hinder the operator from making routine changes to the basic operational parameters such as, Process Air temperature, High Temp Alarm and the 7-Day Timer. When enabled, the PASSWORD PROTECTION will not allow access to the SETUP parameters numbered Su07 and higher. Refer to Section IV, part 2.G, entitled *Programming Password Protection* for the procedure to implement this feature.

E. PDII OPERATION

This feature is only available on PDII dryers and is preset at the factory. The PDII dryer is capable of operating with different drying temperature settings for each hopper. To accomplish this, the PDII dryer controls the process temperature with a separate digital controller for each hopper, eliminating the need to enter the process temperature via the Control Panel Touch Pad. This feature disables the capability of entering the process temperature set point via the Control Panel Touch Pad.

F. INHIBIT RESTART AFTER HIGH TEMP ALARM SHUTDOWN

To assist the operator when trouble-shooting after a High Temperature Alarm shutdown, the dryer is factory programmed so it can be immediately restarted, even if the process air temperature is still above the alarm set point. If the operator does not take appropriate precautions, material in the hopper may be over heated, as the dryer will continue to operate without the High Temp Alarm functions. To prevent this from happening, the operator can inhibit the dryer restart capability by altering the factory default setting in Su08. Please note section IV, part 2.H entitled *ACCESSING Su 08 PARAMETERS*.

SECTION IV **DRYER STARTUP &** **PROGRAMMING**

1. DRYER STARTUP

A. MAIN POWER

To power up the drier, locate the Main Power Disconnect on the upper right hand corner of the panel enclosure door, and rotate the knob clockwise. The unit will initiate a self-diagnostic routine, where the displays flash a series of dashes, and takes several seconds to complete. Once the diagnostic cycle is complete, the upper left and right hand displays will read *dri Air*. The dryer is now ready to be started. **CAUTION:** Before proceeding with the next operation, you must ensure that after wiring the unit for installation, that the process air blower is rotating in the proper direction. Please consult the installation section in the dryer operating manual.

B. DRYER START

The dryer operating cycle can then be manually started by pressing the **START** touch pad located in the POWER block. The unit is now ready to begin programming the Process Air Temperature, High temperature Alarm and Seven Day Timer settings (if desired) into the microprocessor's memory. Once the unit is programmed to operate in Auto-Start mode, this step will not be required, unless the power has been disconnected or interrupted.

C. SETTING THE PROCESS AIR TEMPERATURE

The Process Air Temperature setting programmed into the microprocessor at the factory may not be the temperature that the user requires. If this is the case, the temperature will have to be altered to accommodate the users needs. In addition, the user may also need to reset the temperature when drying different resins/compounds in subsequent production runs. Detailed below is the procedure to program the Process Air Temperature.

1. Press the **SET** touch pad located in the TEMPERATURE touch pad block. The current temperature setting will appear in the upper right hand display. The far right hand digit of the set point displayed will flash.
2. To change the setting, use the **UP/DOWN ARROW** touch pads located in the FUNCTION touch pad block. (Depressing and holding the touch pads will cause the digits to rapidly increment/decrement)
3. Using the **LEFT ARROW** touch pad located in the FUNCTION touch pad block, cursor to the next digit requiring a change and repeat the above step.
4. Once the desired temperature setting is displayed, press the **ENTER** touch pad to store the setting into memory.

D. SETTING THE HIGH TEMPERATURE ALARM

The High Temperature Alarm point is set at the factory, and is described in a later section in this manual. If the user wishes to alter this setting, please follow the procedure outlined below.

NOTE: *This alarm point, like the Low Temp Alarm, is a differential from the process air temperature set point. The factory default setting of 50 means, that when the process air temperature deviates greater than 50° above the process air temperature set point, the alarm will trigger. When the process air temperature is changed, the dryer must reach the new set point to rearm the alarm points in order to avoid unnecessary alarms.*

1. Press the **ALARM** touch pad located in the TEMPERATURE touch pad block. The current alarm point will appear in the upper right hand display. The far right hand digit of the set point will flash.
2. To change the setting, use the **UP/DOWN ARROW** touch pads located in the FUNCTION touch pad block. (Depressing and holding the pad down will cause the digit to rapidly increment/decrement.)

3. Using the **LEFT ARROW** touch pad located in the FUNCTION touch pad block, cursor to the next digit requiring a change and repeat the above step.
4. Once the desired alarm point is obtained, press the **ENTER** touch pad to store the setting into memory.

E. Setting the 7-Day Timer

The 7-day timer allows the user to preprogram up to seven start/stop cycles into the unit. When programming, the selected day appears in the upper left hand display on the panel, and is designated by dA 1 through dA 7, with dA 1 being Sunday. The "b" or "E" which follows the day indicates that the corresponding time appearing in the upper right hand display is a beginning (start-up) or ending (shutdown) time. Time is always displayed in military format, with 0000 being 12:00 AM, 1200 being noon, 1700 being 5:00PM and so on. Any setting above 2359 will be recorded as 2359. To program the 7-Day Timer, follow the procedure outlined below.

1. Prior to programming the 7-Day Timer, check the Day and Time already programmed into the unit, by depressing the **TIME** touch pad located in the TIMER touch pad block. This will display the day of the week in the upper left display and the time (Eastern Std. Time) in the upper right display that was programmed at the factory. If for any reason the time does not correspond to the user's time, the day and time will have to be reprogrammed prior to initiating the 7-Day Timer program. Please refer to *Setting the Week Day and Clock* in Section IV, part 2.A.
2. To initiate programming of the 7-Day Timer, depress the **DAY** touch pad in the TIMER touch pad block. dA 1b will appear in the upper left hand display, while a time (or - - - -, if no time has previously been entered) will appear in the upper right hand display.
3. To change the time, use the **UP/DOWN ARROW** touch pads located in the FUNCTION touch pad block. (Depressing and holding the pad down will cause the digit to rapidly increment/decrement)
4. Using the **LEFT ARROW** touch pad located in the FUNCTION touch pad block, cursor to the next digit requiring change, and repeat the above step.
5. Once the desired time is displayed, press the **ENTER** touch pad to store the time into memory.
6. To program the "shutdown" time for the day, press the **BEGIN/END** touch pad located in the TIMER touch pad block. This will change the suffix for dA 1 from "b" to "E", signifying that the shutdown time is ready for programming. Repeat steps 3 through 5.
7. To program any other days of the week, press the **DAY** touch pad located in the TIMER touch pad block, and repeat steps 3 through 6.

CAUTION: When disabling the Auto Run function in the 7-Day Timer, the "beginning time" and "end time" for each day of the period, must be reprogrammed to the "off" setting. The beginning and end times are "off" when four dashes [- - - -] appear in the upper right hand display for each day's corresponding start/stop time. To reset the timer to "off", use the **LEFT ARROW** touch pad, located in the FUNCTION touch pad block, to cursor over to the last digit on the left of the start/stop time appearing in the upper right hand display. Using the **UP ARROW** touch pad, located in the FUNCTION touch pad block, increment the digit to a number greater than 2 (A flashing dash will appear.). Press the **ENTER** touch pad and all the digits in the time display will change to dashes. Proceed to the day's "end" time and repeat the above procedure. Remember, setting the beginning and end times to 0000 is actually programming a time into memory (0000 is 12:00 midnight in "military" time).

2. PROGRAMMING DRYER FEATURES & OPTIONS

The basic operating functions and parameters can be accessed and programmed from the dryer Startup menu detailed above. However, many of the critical operating parameters and optional features can only be programmed using the **SETUP** functions. Although each dryer system microprocessor supplied by Dri-Air Industries is configured at the factory, certain parameters may require changing, to better suit the user's application. Detailed in the following sections are the procedures required to reprogram these additional functions.

A. SETTING THE WEEK DAY AND CLOCK

1. Setting the Week Day

To set the day of the week, press the **SETUP** touch pad until Su02 appears in the upper left display. In the upper right display, a number between 1 and 7 will be flashing. Using the **UP/DOWN ARROW** touch pads in the FUNCTION block, reset the flashing number to the number that corresponds to current day of the week. Press **ENTER**, and the new setting will be stored. The Factory Default settings use the number 1 to correspond to Sunday, 2 for Monday, and so on. The user may use any sequence they wish.

2. Setting the Hour of the Day

To set the hour of the day, press the **SETUP** touch pad until Su03 appears in the upper left display. A number between 0 and 23 will appear in the upper right display, with the first digit to the right flashing. Using the **UP/DOWN ARROW** touch pads in the FUNCTION block, reset the flashing digit to the desired hour and proceed to the next digit by pressing the **LEFT ARROW** touch pad, and repeat the same procedure. When the correct hour of the day (military format) is displayed, press the **ENTER** touch pad to initialize the new time.

3. Setting the Minutes of the Hour

To set the minutes of the hour, press the **SETUP** touch pad until Su04 appears in the upper left display. A number between 0 and 59 will appear in upper right display, with the first digit to the right flashing. Using the **UP/DOWN ARROW** touch pads in the FUNCTION block, reset the digit to desired minute and proceed to the next digit by pressing the **LEFT ARROW** touch pad, and repeat the same procedure. When the correct minutes of the hour are displayed, press the **ENTER** touch pad to initialize the correct time.

NOTE: To ensure that you have correctly input the time, press the **TIME** touch pad located in the TIMER touch pad block. After installation, periodically check the clock time to ensure that proper time is being kept. If there is a significant deviation from the original settings, call the factory.

B. SETTING THE LOW TEMPERATURE ALARM

To reset the Low Temp Alarm, press the **SETUP** touch pad until Su01 appears in the upper left display. A number between 0 and 100 will appear in the right hand display, with the extreme right hand digit flashing. Using the **UP/DOWN ARROW** touch pads in the FUNCTION touch pad block, change the digit to the desired setting. Using the **LEFT ARROW** touch pad, proceed to the next digit, and repeat the same procedure. When the desired alarm point is displayed, press the **ENTER** touch pad to store the differential into memory.

NOTE: *This alarm point, like the High Temp Alarm, is a differential from the process air temperature set point. The factory default setting of 50° means, that when the process air temperature deviates greater than 50° below the process air temperature set point, the alarm will trigger. To avoid unnecessary alarms, if the process air temperature is changed, the dryer must reach the new set point to rearm the alarm points.*

C. SETTING THE TEMPERATURE SETBACK DELTA

If the dryer is equipped with this option, the factory will preset this differential to 30°. Should the user determine that this setting is inadequate, it can be altered, by pressing the **SETUP** touch pad until Su00 appears in the upper left display. The current setting will appear in the upper right display, with the extreme right hand digit flashing. Using the Up/Down Arrow touch pads, located in the FUNCTION touch pad block, change the digit to the desired setting and press the **LEFT ARROW** touch pad and repeat the procedure. When the desired set point is displayed, press the **ENTER** touch pad to store the differential into memory.

NOTE: *The Setback Delta is expressed as the number of degrees the process air temperature will be "offset" when the Setback function is activated. The factory default setting of 30, will automatically lower the process air temperature 30° below the current process air temperature set point. The Setback Delta can be set within the range of 0 to 100°.*

D. PROGRAMMING HEATER FAULT DETECTION

CAUTION: Prior to initiating this program and its associated diagnostic routine, the user must ensure that all the heater circuits are functioning properly. This program stores current usage readings, regardless of the circuit's integrity. Any faulty readings obtained from malfunctioning circuits will be stored into the microprocessor's control matrix as "normal", thus defeating the program's heater failure detection capability

To initiate this program, turn on the main power and allow the system to perform its startup routine. Press **START**, then press the **SETUP** touch pad until Su06 appears in the upper left display. Using the **UP/DOWN ARROW** touch pads located in the FUNCTION touch pad block, set the upper right display to read 1010. Press **ENTER**, and the unit will then check each of the 32 heater combinations at the actual voltage you are running, and store the values into the microprocessor's control matrix. The unit will then re-initialize and display *dri - Air* in the upper displays. To restart the dryer, press the **STOP** touch pad and then the **START** touch pad.

NOTE: *If the unit trips alarms or shuts down when heaters have not failed, the input voltage to the unit may be the source. In some user locations, voltage may vary beyond the factory set tolerance for this program. If this is believed to be the source, the factory set point can be altered by accessing Su24, and increasing the allowable percentage deviation. This can be increased safely to 60 percent.*

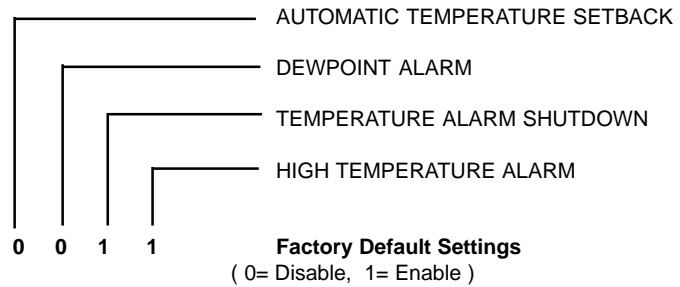
In the rare circumstance that this program malfunctions, and the user cannot operate the dryer, this program can be disabled. This should only be done while the user waits for the unit to be serviced. Please refer to SECTION IV, part I, entitled Accessing Su09 Parameters, for the procedure to disable the fault detection program.

E. ACTIVATING HIGH TEMP/DEW POINT ALARMS & TEMPERATURE SETBACK

The High Temperature and Dew Point alarms, as well as the Auto Setback function can be activated or deactivated individually. Each is preset at the factory as detailed below. To alter the current enable/disable settings of any of these functions, press the **SETUP** touch pad until Su05 appears in the upper left display. A four digit number will appear in the upper right display. (The number will be a combination of 0,s and 1's. A 0 indicates that the function associated with that digit is disabled, while a 1, indicates it is enabled. If the unit has not been altered from the factory settings, this number should read 0011.) To alter the current settings, use the **UP/DOWN ARROWS** located in the FUNCTION touch pad block to enable or disable the associated function, and the **LEFT ARROW** touch pad to move to any other function that requires changing. Press the **ENTER** touch pad to activate the new settings. Detailed

below are the functions associated with the digits and their current settings.

The factory default settings associated with Su05 are shown below, ordered from left to right as they appear in the upper right display.



F. MONITORING INTERNAL OPERATING PARAMETERS

Upon initial installation or when trouble shooting, it may be necessary to access and record the internal operating parameters programmed into the microprocessor. To access these parameters, follow the procedures detailed below.

1. Accessing Internal Operating Temperatures

To allow the operator or service technician to view the internal operating temperatures, press the **SETUP** touch pad until Su06 appears in the upper left display, and four zeros appear in the upper right display. Using the **UP/DOWN** and **LEFT ARROW** touch pads located in the FUNCTION touch pad block, reset the upper right display to 0 0 0 1, and press the **ENTER** touch pad to begin displaying the temperatures. A zero (0) will appear in the upper left display and the corresponding parameter will appear in the upper right display. To continue, press the **ENTER** touch pad until all the parameters have been displayed. Listed below, are the display numbers and the associated temperature displayed.

<u>Display No.</u>	<u>Parameter</u>
0	Ambient Temp.
1	Zone 1–Bottom Temp.
2	Zone 1-Top Temp.
3	Spare or Hopper Return Temp.*
4	Zone 2-Bottom Temp.
5	Zone 2-Top Temp.
6	Spare

* When Automatic Temperature Set-back option is installed.

2. Accessing Regeneration Parameters

To allow the operator or service technician to view the unit's Regeneration variables, press the **SETUP** touch pad until Su06 appears in the upper left display, and four zeros appear in the upper right display. Using the **UP/DOWN** and **LEFT ARROW** touch pads located in the FUNCTION touch pad block, reset the upper right display to 0 0 1 0, and press the **ENTER** touch pad to begin displaying the variables. A zero (0) will appear in the upper left display and the corresponding parameter will appear in the upper right display. To continue, press the **ENTER** touch pad until all the parameters have been displayed. Listed below, are the display numbers and the associated regeneration variable displayed.

- 1 = Zone 1 in Drying Cycle
- 2 = Zone 1 in Cooling Cycle
- 3 = Zone 1 in Idle Static Cycle
- 4 = Zone 1 in Idle Heat Cycle
- 5 = Zone 2 in Drying Cycle
- 6 = Zone 2 in Cooling Cycle
- 7 = Zone 2 in Idle Static Cycle
- 8 = Zone 2 in Idle Heat Cycle

Display no. 0. This number displays the status of the current zone in Regeneration Mode by the code numbers detailed to the left.

Display no. 1 This number displays the time (in minutes) that the applicable Zone has been in regeneration.

Display no. 2 This number displays the temperature at which

the heating cycle terminates and the cooling cycle begins.

Display no. 3

This number displays the temperature at which the desiccant bed will shift from regeneration mode to process mode.

G. PROGRAMMING PASSWORD PROTECTION

If the user wishes to protect the programming and settings accessed in SETUP functions Su08 through Su28, the unit can be programmed to accept a password that will restrict access to these parameters. To program a password, press the **SETUP** touch pad until *id1* appears in the upper left display. The default factory setting 0000 will appear in the upper right display. Press the **ENTER** touch pad, and Su07 will appear in the upper left display. Zeros will appear in the upper right display. Using the Up/Down and Left Arrows located in the FUNCTION touch pad block, change the zeros to any four digit code, and press **ENTER** to store it into memory. **RECORD THIS NUMBER IMMEDIATELY.**

To access the parameters Su07 to Su28 in the future, this code must now be entered at the id1 Prompt, by using the **UP/DOWN** and **LEFT ARROW** touch pads located in the FUNCTION touch pad block, and pressing **ENTER** when the code appears in the upper right display.

To alter this code, access Su07 by entering the current password and change the code that appears in the upper left display by the procedure mentioned above.

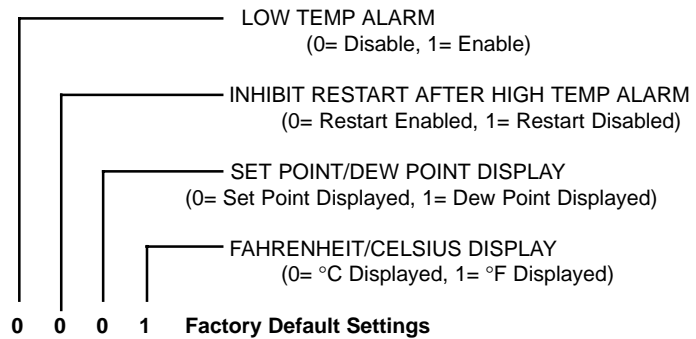
NOTE: *If the password is lost, you must contact the factory to reset the unit's access code to the default settings (0 0 0 0), to allow the user access to the parameters Su07 through Su28. Dri-Air strongly recommends that only the settings from Su07 through Su12 be altered without consulting the factory. If no password protection is desired to access the parameters above Su07, simply leave the unit in the factory default setting and press the **ENTER** touch pad when the id1 Prompt is displayed.*

H. ACCESSING Su08 PARAMETERS

The following parameters are accessed by this code:

- Low Temp Alarm Enable
- Inhibit Restart After High Temp Alarm
- Set Point/Dew Point Display Default
- Fahrenheit/Celsius Temp. Display Default

To access these parameters, enter the proper access code at the *id1 Prompt*, and press the **ENTER** touch pad. Press the **SETUP** touch pad until Su08 appears in the upper left display. The factory default settings for each parameter will appear in the upper right display. To alter the current settings, use the **UP/DOWN** and **LEFT ARROW** touch pads, located in the FUNCTION touch pad block. Detailed below are the factory default settings for these parameters.

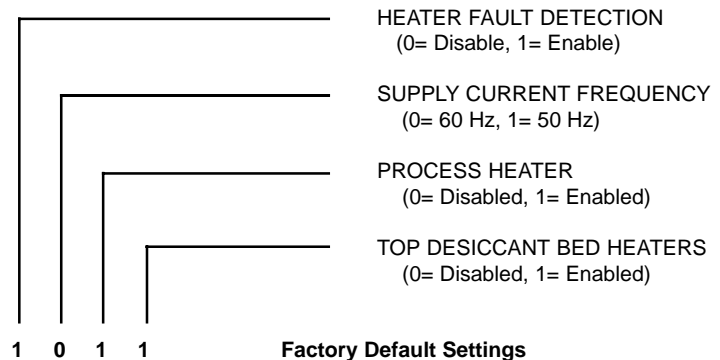


I. ACCESSING Su09 PARAMETERS

The following parameters are accessed by this code:

- Heater Fault Detection Disable
- Supply Current Frequency
- Process Heater Enable
- Top Desiccant Bed Heaters Enable (HP Models only)

To access these parameters, enter the proper access code at the *id1 Prompt*, and press the **ENTER** touch pad. Press the **SETUP** touch pad until Su09 appears in the upper left display. The factory default settings for each parameter will appear in the upper right display. To alter the current settings, use the **UP/DOWN** and **LEFT ARROW** touch pads, located in the FUNCTION touch pad block. Detailed below are the factory default settings for these parameters.

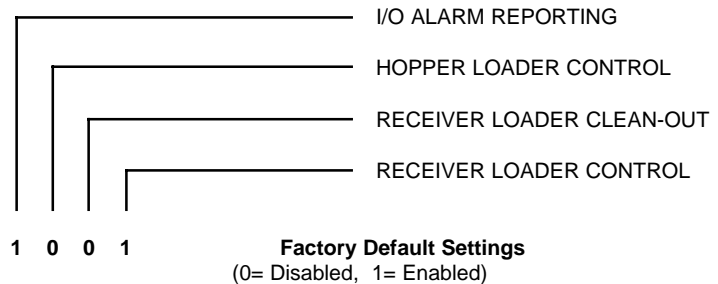


J. ACCESSING Su10 PARAMETERS

The following parameters are accessed by this code:

- Input/Output Alarm Reporting for RS232 & RS485
- Hopper Loader Control Enable
- Loader Clean-out Enable
- Loader Control Enable

To access these parameters, enter the proper access code at the *id1 Prompt*, and press the **ENTER** touch pad. Press the **SETUP** touch pad until Su10 appears in the upper left display. The factory default settings for each parameter will appear in the upper right display. To alter the current settings, use the **UP/DOWN** and **LEFT ARROW** touch pads, located in the FUNCTION touch pad block. Detailed below are the factory default settings for these parameters.



K. PROGRAMMING CLOSED LOOP LOADER CONTROLS

When the Closed Loop Loader Option is installed on the unit, the operating parameters are preset at the factory. If the user wishes to alter the settings associated with the Receiver or Hopper loading cycles, please follow the procedures detailed below.

1. Setting Receiver Loader Clean-out Time-SU11 (When option installed)

The Receiver Loader Clean-out Cycle is intended to clear the feed lines of material, by running the blower for a set duration after the Receiver proximity switch signals the end of the feed cycle. The duration (in seconds) of the Clean-out Cycle can be reset by entering the appropriate entry code at the *id1 Prompt*, and pressing the **SETUP** touch pad until Su11 appears in the upper left display. The current setting will appear in the upper right display. Using the **UP/DOWN** and **LEFT ARROW** touch pads located in the function touch pad block, reset the seconds to the desired duration (1 to 120 seconds). Press **ENTER** to store the new setting.

2. Setting Hopper Loader Fill Time Su12 (When option installed)

The Hopper Loader Fill Time sets the duration (in seconds) that the blower runs in order to feed material into the Hopper Loader when the Hopper proximity switch calls for material. The current fill time can be reset by entering the appropriate entry code at the *id1 Prompt*, and pressing the **SETUP** touch pad until Su12 appears in the upper left display. The current setting will appear in the upper right display. Using the **UP/DOWN** and **LEFT ARROW** touch pads located in the function touch pad block, reset the seconds to the desired duration (1 to 120 seconds). Press **ENTER** to store the new setting. After the Hopper Loader is filled, there is a 12 second delay before the system will reinitiate the Hopper Loader sequence.

CAUTION: The remaining setup codes that are accessible (listed in Appendix 1) **must not** be changed without consulting the factory.

APPENDIX 1

Factory Default Settings

1. Operating Parameters

<u>Parameter</u>	<u>Set Point</u>	<u>Unit</u>	<u>Description</u>
Alarm	50	deg.F	High Temp. Alarm
Su00	30	deg.F	Auto Temp. Set Back Delta
Su01	50	deg.F	Low Temp. Alarm
Su11	15	sec.	Receiver Loader Clean-out Time
Su12	15	sec.	Hopper Loader Fill Time
Su63	-31	deg.F	Dew Point Alarm Temp.

2. Regeneration Cycle Settings

<u>Parameter</u>	<u>Set Point</u>	<u>Unit</u>	<u>Description</u>
Su13	1	deg. F	Regeneration algorithm type
Su14	-22	deg. F	Dewpoint switch trip-point temp.
Su15	30	mins.	Zone heating (drying) time
Su16	30	mins.	Zone cooling time
Su17	1	mins.	Zone idle time
Su18	600	deg. F	Regeneration drying temp.
Su19	330	deg. F	Heating (drying) trip-point temp.
Su20	280	deg. F	Cooling trip-point temperature
Su21	75	deg. F	Cooling trip-point delta
Su22	70	percent	Top Heater ON duration
Su23	160	deg. F	Process (booster) heater turn on temp
Su24	25	percent	Allowable heater amperage deviation

3. Temperature setback variable settings (Please contact factory for access to these setup codes.)

<u>Parameter</u>	<u>Set Point</u>	<u>Unit</u>	<u>Description</u>
Su59	120	min.	Setback inhibit time
Su60	30	min.	Setback receiver idle time
Su61	75	deg. F	Setback activation delta temperature
Su62	100	deg. F	Setback restoration temperature

APPENDIX 2

Alarm/Error Codes

The alarm/error codes listed below will appear in the upper right display of the control panel, and are displayed to assist in the servicing of the unit. They result when the system's diagnostic and monitoring functions detect a component failure or a condition that exceeds a preset operating limit. They may be cleared from the display after the unit is repaired, by pressing the CLEAR/EXIT touch pad. Please refer to Appendix 3 for more troubleshooting assistance.

<u>ALARM CODE</u>	<u>REMEDY</u>
<u>Err 001-004</u> Err 001 = NVRAM failure alarm Err 002 = Real time clock set failure alarm Err 003 = Real time clock test failure alarm Err 004 = NVRAM initialization write failure alarm	Contact factory for board replacement Set time, (See SECTION IV, part 2.A) Contact factory for board replacement Contact factory for board replacement
<u>Err 101-105</u> Err 101 = Loss of air pressure alarm Err 103 = High process temperature alarm Err 104 = Dew point alarm Err 105 = Low process temperature alarm	Check air pressure. Turn on hopper. See Appendix 3-ERROR 101 Check thermocouple location. See Appendix 3-ERROR 103 Check hoses & cover for leaks. Ensure Zones are shifting. See Appendix 3-ERROR 104 Check air flow to hopper. See Appendix 3-ERROR 105
<u>Err 151-157</u> Err 151 = Zone 1 bottom thermocouple failure Err 152 = Zone 1 top thermocouple failure Err 153 = Auxiliary temperature thermocouple failure Err 154 = Zone 2 bottom thermocouple failure Err 155 = Zone 2 top thermocouple failure Err 156 = Spare thermocouple failure	Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157. Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157. Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157. Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157. Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157. Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157. Replace board.

<p>Err 151-157 Cont'd Err 157 = Process temperature thermocouple failure</p>	<p>Check thermocouple connections. Check thermocouple electrical continuity (<i>Short</i> =good, <i>Open</i> =bad). Check top left orange connector on microprocessor board for tightness, loose wires. See Appendix 3-ERROR 151-157.</p>
<p>Err 200-202 Err 200 = Process over-temperature alarm Err 201 = Zone 1 regeneration over-temp alarm Err 202 = Zone 2 regeneration over-temp alarm</p>	<p>Check blower rotation, air flow, filter, and hopper. See Appendix 3-ERROR 200 Check blower rotation, air flow, filter, and hopper. See Appendix 3-ERROR 201-202 Check blower rotation, air flow, filter, and hopper. See Appendix 3-ERROR 201-202</p>
<p>Err 211-215 Err 211 = Process heater shorted alarm Err 212 = Zone 1 bottom heater shorted alarm Err 213 = Zone 2 bottom heater shorted alarm Err 214 = Zone 1 top heater shorted alarm Err 215 = Zone 2 top heater shorted alarm</p>	<p>Check for shorts across output of solid state relays or heater element inputs. Check for shorts across output of solid state relays or heater element inputs. Check for shorts across output of solid state relays or heater element inputs. Check for shorts across output of solid state relays or heater element inputs. Check for shorts across output of solid state relays or heater element inputs.</p>
<p>Err 221-225 Err 221 = Process heater open circuit alarm Err 222 = Zone 1 bottom heater open circuit alarm Err 223 = Zone 2 bottom heater open circuit alarm Err 224 = Zone 1 top heater open circuit alarm Err 225 = Zone 2 top heater open circuit alarm</p>	<p>Check heater fuse. Check heater electrical continuity, loose wires, open solid state relay or snap disc switch on cone. See Appendix 3-ERROR 221-225 Check heater fuse. Check heater electrical continuity, loose wires, open solid state relay or snap disc switch on cone. See Appendix 3-ERROR 221-225 Check heater fuse. Check heater electrical continuity, loose wires, open solid state relay or snap disc switch on cone. See Appendix 3-ERROR 221-225 Check heater fuse. Check heater electrical continuity, loose wires, open solid state relay or snap disc switch on cone. See Appendix 3-ERROR 221-225 Check heater fuse. Check heater electrical continuity, loose wires, open solid state relay or snap disc switch on cone. See Appendix 3-ERROR 221-225</p>
<p>Err 231-235 Err 231 = Process heater high current alarm Err 232 = Zone 1 bottom heater high current alarm</p>	<p>Correct heater installed? Check solid state relay for failure in closed position. See Appendix 3-ERROR 231-235. Correct heater installed? Check solid state relay for failure in closed position. See Appendix 3-ERROR 231-235.</p>

Err 231-235 Cont'd	
Err 233 = Zone 2 bottom heater high current alarm	Correct heater installed? Check solid state relay for failure in closed position. See Appendix 3-ERROR 231-235.
Err 234 = Zone 1 top heater high current alarm	Correct heater installed? Check solid state relay for failure in closed position. See Appendix 3-ERROR 231-235.
Err 235 = Zone 2 top heater high current alarm	Correct heater installed? Check solid state relay for failure in closed position. See Appendix 3-ERROR 231-235.

Err 241-245	
Err 241 = Process heater low current alarm	Check heater fuses & heater electrical continuity. Check incoming voltage. See Appendix 3-ERROR 241-245.
Err 242 = Zone 1 bottom heater low current alarm	Check heater fuses & heater electrical continuity. Check incoming voltage. See Appendix 3-ERROR 241-245.
Err 243 = Zone 2 bottom heater low current alarm	Check heater fuses & heater electrical continuity. Check incoming voltage. See Appendix 3-ERROR 241-245.
Err 244 = Zone 1 top heater low current alarm	Check heater fuses & heater electrical continuity. Check incoming voltage. See Appendix 3-ERROR 241-245.
Err 245 = Zone 2 top heater low current alarm	Check heater fuses & heater electrical continuity. Check incoming voltage. See Appendix 3-ERROR 241-245.

APPENDIX 3

MICROPROCESSOR TROUBLESHOOTING

The items discussed in this appendix are intended to assist the user in diagnosing problems that may occur while operating the dryer. If the steps detailed in this section do not restore the unit to operation, please contact the factory, so that a service representative can assist you.

In many situations, the alarm/error code displayed is "stacked" over previously recorded alarm/error codes that resulted from the initial system failure causing the unit to shut down. The microprocessor will record and save each alarm encountered prior to the unit shutting down. It may be possible that the alarm/error code displayed is not the primary cause for the unit's shutdown. As the alarm conditions are repaired, they can be cleared by pressing the EXIT/CLEAR touch pad.

ERROR 101 - Air Pressure Alarm

This error is displayed when the unit detects a drop in incoming air pressure, or may also signify a temperature shut down or that both hoppers are "OFF" on APDII/APDIII systems.

Things to check:

1. Incoming air pressure must be 50 PSI or higher for models that require compressed air. **To Fix:** Restore air pressure and clear alarm.

Things to check if Dryer is PDII / PDIII:

If the dryer is a **PDII / PDIII**, the Temperature Alarm Light on panel enclosure will actuate in conjunction with this alarm to indicate that the unit has shut down on a Temperature Alarm.

Things to check:

- a. Ensure that at least one of the hoppers is available for drying. **To Fix:** Turn on the individual hopper power switch located on the control panel housing.
- b. If the error is due to a Temperature Alarm, one of the hoppers may have exceeded its set point, or was not able to obtain it's set point within a time span set in the controller.
- c. Ensure the microprocessor Process Air Temperature Set Point is set at 32° F, as the microprocessor does not control the hopper temperature on these systems. **To Fix:** Reset set point to 32° F and disable the temperature alarm (Set in Su05).
- d. Determine type of alarm (High or Low Temp.) by the following procedure:
 1. Reset the unit by clearing the Air Pressure alarm on the microprocessor control panel, and pressing the Machine Reset button on the panel enclosure. Press the **START** touch pad on the Microprocessor Control Panel and observe the unit to determine the operational temperatures at which the unit shuts down. The type of alarm displayed on the heater temperature controller just prior to shutdown will indicate the nature of the alarm, which will determine how you proceed. (See below)

If the LBA alarm light is lit, the most likely cause is that the actual temperature never reached the set point. Check fuses, solid state relays and heater elements. Check the dryer's internal air flow; by checking the Blower rotation, or filter or hose blockages, and proper Zone Valve operation (Refer to subsequent

troubleshooting procedure for dryer internal air flow check).

If the ALM alarm light is lit, the unit shut down as a result of a high temperature condition. Check the solid state relay for the Process Air Heater, to make sure it has not failed in the on (closed) position. Check the dryer internal air flow as mentioned above.

To check internal electrical components when the dryer has shut down on High Temp. Alarm, you may need to press the High Temperature Override button to prevent the dryer from shutting down.

ERROR 103 - High Process Temperature Alarm

Not applicable for PDII/PDIII units. This error is displayed when the actual process air temperature exceeds set point alarm limit. (Factory set at 50° above set point)

Things to check:

1. Rotation of blower (must be clockwise). **To Fix:** Reconnect main power leads (3 Phase) in proper sequence.
2. Ensure solid-state relays for Process or Regeneration heaters have not failed in the on (closed) position. **To Fix:** Replace relay.
3. Filter for blockages. **To Fix:** Clean or replace filter.
4. Zone position of valve by observing which Position Light is lit on valve.
5. Dryer internal airflow, by removing hoses from top of desiccant towers. If unit is in Zone 1 regeneration, all air should exit from right hand hose. If unit is in Zone 2 regeneration, all air should exit from left-hand hose. If air exits both hoses, or from neither hose, the Zone Valve is stuck. **To Fix:** Call factory.
6. Flap Valve on the hopper loader is closing properly. Leaks at this point will pull hot air into the hopper.

ERROR 104 - Dewpoint Alarm

This error is displayed when the dew point rises above the alarm set point (Factory set at -22° F), settable at Su14.

Things to check:

1. Make sure the hopper top is not entirely sealed. Due to the nature of the regeneration process, makeup air is made up from the top of the hopper.
2. Are there any large leaks? Inspect to ensure that Hopper cover is replaced and closed, the Return Air Filter cover is securely fastened, and the air hoses have maintained integrity.
3. Ensure that unit is switching zones in a timely manner. If the dew point remains at +25° F, determine if the unit switched zones. If the dryer takes longer to regenerate than indicated below, or is not switching from zone to zone, please call the service department at the factory.

Approximate regeneration time of units vary:

ARID-X 25/35 - 1 hour per zone
ARID-X 18 - 1-1/2 hours per zone
ARID-X 50/75/100 - 2 hours per zone
ARID-X 150/200/300 - 2-1/2 hours per zone

4. If zones are shifting check the following:
 - a. Check and clean Return Air Filter and return air port in hopper.

- b. Check internal air flows of dryer.
- c. If a portable dew point meter is available, check the outlet from the dryer to insure that the reading is correct and the sensor is functioning.
- d. Check sensor for proper operation

ERROR 105 - Low Process Temperature Alarm

Not applicable for APDII / APDIII units. The Process Air Low Temperature Alarm is disabled at the factory. If the alarm is enabled, this error will be displayed when the actual process air temperature deviates below the alarm set point (settable in Su01).

Things to check:

1. *Ensure fuses are intact. Note: power boards have "Blown Fuse Lights". **To Fix:** Reset or replace fuse.
 2. Filter for blockage. **To Fix:** Clean or replace filter.
 3. Rotation of blower (must be clockwise). **To Fix:** Reconnect incoming power leads (3 Phase) in proper sequence.
 4. *If any of the solid-state relays for Process or Regeneration heaters have failed in the off (open) position. **To Fix:** Replace relay.
 5. Check heaters for electrical continuity or broken wires.
 6. Dryer internal air flow, by removing hoses from top of desiccant towers. If unit is in Zone 1 regeneration, all air should exit from right hand hose. If unit is in Zone 2 regeneration, all air should exit from left hand hose. If air exits both hoses, Zone Valve is stuck. **To Fix:** Call factory.
- * These failures would initiate this error message only if the Heater Fault Detection function has been disabled (Su09) or improperly calibrated (Su06).

ERROR 151 - 157 - Thermocouple Failure Alarm

ERROR 201 – 202 – Zone 1 / 2 Regeneration Over Temp Alarm

Errors 151 through 157 will be displayed when one of the seven (7) thermocouples has failed or if an over-temp condition is encountered by a regeneration heater thermocouple.

Things to Check:

1. Check thermocouple wires for loose connections, breaks or possible disconnect.
2. Ensure that the Process Air thermocouple is attached and positioned in the center of the air stream.

Due to operator changes or alterations made to the position of the bottom desiccant bed thermocouple, a "High Temperature" condition will result in the desiccant bed. The microprocessor will read this condition as a Zone 1-2 Regeneration Over-temp Alarm. To check, turn on the dryer, and check the internal temperatures at Su06 0001. Regeneration temperatures may be too high due to the change in thermocouple positioning., Record the temperatures, and call the factory for possible alterations or changing of setup values.

Due to an obstruction/interruption of the internal airflow, an over-temp condition may result.

Things to check

1. Check dryer's internal air flow
2. Check and clean filter, hoses and hopper.

ERROR 200 - Process Over Temperature Alarm

The process over temperature alarm occurs when the process temperature has runaway. This alarm will usually be displayed with the Err 157 indicating a broken process thermocouple or a runaway process temperature. Please do the following:

1. Check process thermocouple
2. Check solid state relay
3. Check blower rotation

ERROR 221 - 225 Heater Open Circuit Alarm

The heater open circuit alarm occurs when the microprocessor is detecting that a heater is not functioning. By comparing the stored amperage readings, the dryer will determine and display which heater/s may not be powering.

Things to check:

1. Check heater fuses
2. Check solid state relays to ensure that they have not failed in the open (off) position.
3. Check heater element for "electrical continuity".
4. Check heater wires.

When the dryer experiences a shut down due to the triggering of an Over-heat Safety Switch, the microprocessor will display this as a Heater Open Circuit Alarm. The most likely cause, is an air flow restriction or a blower failure allowing the heater element to overheat, tripping the over-temp safety thermostat.

Things to Check:

1. Determine if main contactor has dropped out by, observing if the blower will not operate while the microprocessor still runs (until it goes into alarm). Check the thermostat of the zone in regeneration. Call the factory.
2. Check dryer's internal air flow.
3. Check dryer's internal temperatures in Su06 0001
4. Check filter for blockage.

ERROR 231 - 235 - High Heater Current Alarm
ERROR 241 - 245 - Low Heater Current Alarm

The high/low heater current alarms may occur upon initial startup when the dryer is newly installed, or has been moved to a new location. Since different locations may have varying voltages, which will result in different heater amperages, the unit will detect the differences and shut down displaying Err 231-235 or Err 241-245. If this happens, please do the following:

1. Has the unit gone through heater calibration Su06 - 1010?
2. Has the unit moved facilities where incoming voltage may have changed or slightly higher for Err 231-235 or slightly lower for Err 241-245?
3. Change heater detection bounds to slightly desensitize. Settable in Su24.

