Thoreson-McCosh Inc

DRYER

A-B PLC CONTROLS

INSTRUCTION MANUAL

IB201204

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FORWARD

The information contained in this Instruction Manual is provided to you for the maintenance of your Thoreson-McCosh Inc.equipment.

Also included in this manual are operating instructions, a service parts list, and wiring diagrams. Please file this manual for future use.

For additional information, please contact:

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CUSTOMER RECORDS

Upon receipt of your Thoreson-McCosh Inc. equipment, it is very important that you complete the table below. The information will be needed to best serve you when you call the Thoreson-McCosh Inc. Service Department with questions or to order replacement parts. The information is located on the Serial Tag on the unit and inside the door of the control box.

Model Name _____

Serial No. _____

Wiring Diagram No. _____

Insert No. _____

Program No. _____

Layout No. _____

Table of Contents

SECTION 1: THORESON-MCCOSH INC. PRODUCT WARRANTY

Thoreson-McCosh warrants each product of its manufacture to be free from defects in material and workmanship for a period of 30 months (2-1\2) year from the date of delivery to the original purchaser. Thoreson-McCosh's obligation under this warranty is limited to repairing or replacing any part returned to the Thoreson-McCosh factory with transportation charges prepaid, and which, on examination by Thoreson-McCosh, shall disclose to Thoreson-McCosh's satisfaction to have been defective.

The purchaser must notify Thoreson-McCosh of such defects and promptly deliver the defective part(s) in accordance with Thoreson-McCosh's shipping instructions, delivery prepaid. Parts will be replaced F.O.B. Thoreson-McCosh factory, by Thoreson-McCosh, and will be invoiced to the purchaser with "credit on return of defective part", if the part is returned within fifteen (15) days after shipment of replacement part. Thoreson-McCosh is not liable for installation or cost to install the replacement part or removal of the defective part.

Thoreson-McCosh is not responsible for any failure of its product due to improper use, installation, or operation. Thoreson-McCosh shall not assume any expense or liability for repairs made to any Thoreson-McCosh unit or equipment outside Thoreson-McCosh's own factory unless specifically agreed to in writing by Thoreson-McCosh.

Equipment and accessories furnished by us, but manufactured by others, are guaranteed to the extent of the original manufacturer's guarantee to Thoreson-McCosh, if that guarantee exceeds one (1) year.

It is expressly understood that Thoreson-McCosh is not responsible for damage and/or injury caused to buildings, contents, products, or persons by reason of installation or use of any of our products. Thoreson-McCosh shall not be liable for loss, damage or expenses arising directly or indirectly from, or being consequential or incidental to, the use of its products or from any other cause.

The above warranty supersedes, and is in lieu of all other warranties expressed or implied; and no person, agent, representative or dealer is authorized to give any warranties on behalf of Thoreson-McCosh, not to assume for Thoreson-McCosh any other liability in connection with Thoreson-McCosh products.

SECTION 2: TD DRYER MECHANICAL METHOD OF OPERATION

SECTION 2.1: INTRODUCTION

Your Thoreson-McCosh dryer was thoroughly tested prior to shipment and checked to insure that its performance is up to specifications. Upon arrival in your plant, the unit should be carefully inspected for physical damage which might have occurred in transportation. Should any damage be observed, it should be reported to the carrier at the earliest possible time.
Dryers are held to the crate bottom with a Z bracket. The side panels must be removed before the Z brackets can be removed. Use a hi-low or a lift to raise the unit off of the crate bottom. We recommend that a person steady the unit while on the hi-low.

NOTE:
For the TD-150 and up, there are cross supports and some wood supports to secure the beds during shipping, these must be removed before power and air are connected to the unit. Failure to remove these items will damage the unit.

The dryer should be located as close as possible to the material drying hopper it will service. This will minimize thermal and air flow losses. The unit should be placed on any reasonable level area or platform. The unit should be connected to the power source indicated on the model nameplate. If the return air temperature will be above 165°F/ 74°C, than an After-Cooler should be installed into your unit.

This dryer is a triple desiccant bed unit which continuously removes moisture from the process air stream by absorption. While two of the beds are absorbing moisture from the process air, the third is being automatically recharged.

This unit is a re-circulating dryer, recycling the drying air from the material hopper through the desiccant beds. The regeneration air flow is completely independent of the process air flow. The only atmospheric air that enters the process system is a small quantity which may leak in via the material loading system, if present on the hopper. A process air filter and regeneration air filter are provided to prevent contaminates from reaching the desiccant material.

SECTION 2.2: TRIPLE BED METHOD OF OPERATION

The operation of the triple bed dryer is based on each of the three beds being indexed to one of three separate stations within the unit.

The first position is the regeneration station. Here, super-heated ambient air is blown through the bed to remove adsorbed moisture from the desiccant material. This moisture is exhausted to the atmosphere near the bottom of the dryer.

The second position is the cool down station. Here, a small percentage of return air from the hopper passes through the bed to gradually cool down the hot desiccant material. The heat captured by this air is used to heat the process air, thus minimizing process heater energy requirements. As the bed cools, it begins to contribute to the material drying process.

The third position is the process station. Here, the rest of the return air from the hopper passes through this desiccant bed. The dried, cooled, desiccant material is now permitted to adsorb any moisture removed from the plastic resin that is carried in with the return air, before it is heated and sent back to the drying hopper in a completely closed loop cycle.

Automatic indexing of the beds is performed by separating the manifolds upper and lower airflow from the desiccant beds with an electric lineal actuator motor. The beds are then rotated with a gear motor/chain drive assembly. A limit switch stops the beds at the next sequential station. The lineal actuator motor then clamps the manifold seals located on the upper and lower air flow manifolds against the beds for an airtight operation.

On standard units, the automatic bed indexing time cycle is controlled by the microprocessor, which is maximized to guarantee very dry process air, even while operating under extremely severe drying conditions.

In the optional dewpoint control mode, the dewpoint of the process air is continuously monitored. Automatic bed indexing will occur only when the dewpoint is approaching an unacceptable level.

The process air heating elements are located in a heater box which is mounted on the upper deck nearest the process and cool down ports. An indicating light on the HMI is provided to indicate when the process heater elements are activated.

The regeneration air heating elements are located in the heater box, on the upper deck, nearest to the process and cool down ports. The regeneration heaters and blower are timed to be on during the first portion of the bed index cycle, and off during the remainder of the cycle. Units with the optional **regeneration power saver** will turn the heaters and blower off early if the regeneration bed exhaust is sensed at 350°F/ 1773°C. An indicating light on the HMI is provided to indicate when the regeneration heater elements are on.

SECTION 2.3: QUICK START

NOTE: Please read this section, as it contains information not found elsewhere in the manual. Most steps will refer you to the correct section for reference.

1. Uncrate equipment (Section 2.1).
2. Clean drying hopper. All hoppers are shipped with a light coat of oil.
3. Connect power. (Section 2.4)
4. Connect water lines to after-cooler (optional equipment). Requires 3 to 4 gallons per minute, maximum 100 P.S.I., 80°F/ 27°C.
5. Connect compressed air to the units requiring compressed air. (TD-480 & up). 65 P.S.I. minimum, 120 P.S.I. maximum.
6. Check process blower rotation (Section 2.4).
7. Connect Air hoses. The smaller diameter red process hose connects from the dryer to the diffuser on the hopper. The black hose returns air from the connection near the top of the hopper back to the dryer unit.
8. Set process temperature setpoint (Section 4).
9. Visually inspect drying system (Section 9.1).
10. Fill hopper with material.
11. Begin drying, giving first batch of material sufficient residence time before beginning to use material (typically 3 to 4 hours). Check with the resin manufacturer.

SECTION 2.4: POWER CONNECTIONS

The power line terminals are identified as L1, L2, and L3. All heater and blower circuits are individually fused. It is highly recommended and required by many local codes, that a fusible disconnect of adequate capacity be installed by the user. The unit is ready to operate after connecting the power lines to their respective terminals and properly grounding the machine.

Blower motor rotation on three phase units must be checked when the unit is first started and after any reconnection of power to the unit. All dryers from the TD-12 up to the TD-360 include a Blower Rotation Alarm. This alarm will activate the alarm light and display a message on the HMI indicating that the dryer is phased incorrectly.

On larger dryers (TD-480 and above), the Blower Rotation Alarm is optional. If the alarm is not included on your dryer, you must check that the process blower is rotating in the right direction by removing the side panel and checking that the process blower motor is rotating clockwise.

To correct the blower rotation, reverse any two of the three incoming power leads to the disconnect or the main power terminal block. Do not swap the power leads at the blower itself.

CAUTION: The correct phase is extremely important. Incorrect phasing can damage the dryer.

SECTION 2.5: UNITS WITH COMPLETE DRYING HOPPER

Clean the inside of your hopper thoroughly to avoid contamination of plastics resin to be processed. Install the balanced flow air diffuser inside of the drying vessel with the mounting plate and bolts supplied. Your drying hopper is made in two sections for ease of cleaning and installation. To remove the barrel of the hopper, lift it out of its "seat" on the hopper cone. If you have purchased a machine-mounted hopper, install the hopper cone mounting plate to the feed throat of your molding machine, being sure that it is well secured. Refit the hopper barrel into its "seat" on the hopper cone, being sure that it is located and clamped properly with the stainless steel ring clamp provided.

NOTE: The T-bolt should have a light application of grease on the threads or the T-bolt will score and lock-up in the clamp.

SECTION 2.6: UNITS WITH HOPPER EXTENSIONS

Clean the inside of your extension thoroughly to avoid contamination of plastic resin. Install the balanced flow air diffuser with the mounting plate and bolts supplied.

Place the extension on your machine hopper, being sure that the extension is centrally located on the machine hopper and properly secured.

SECTION 3: HMI INSTRUCTIONS

SECTION 3.1: DISPLAYING THE PROGRAM # & CYCLE TIMES

When the dryer is first powered up, the START-UP screen will display for a few seconds. The screen will display the Program # and the Dryer Process & Regen Cycle times.

SECTION 3.2: HUMAN MACHINE INTERFACE

The Human Machine Interface or HMI, is a touch screen that enables the user to turn the unit Off and ON, and to monitor and modify the various set points associated with the unit.

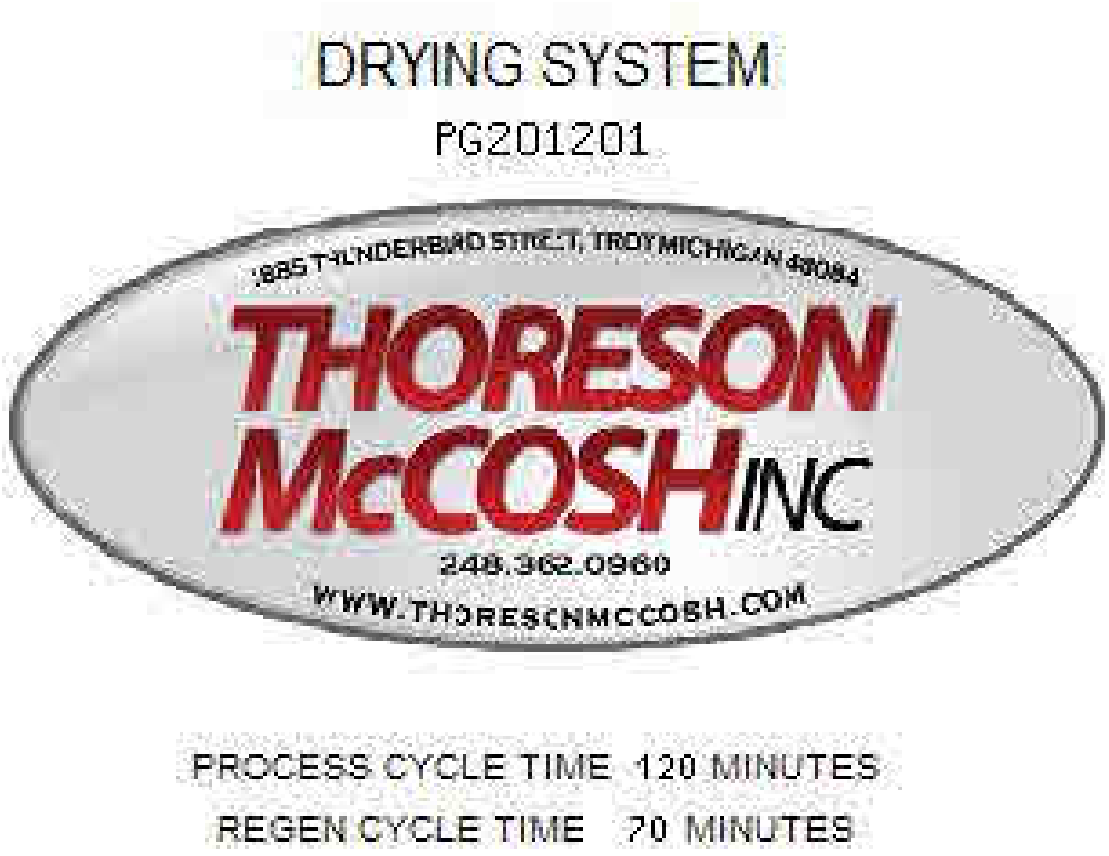


FIGURE 3.1: START-UP SCREEN

SECTION 3.3: MAIN MENU SCREEN

The MAIN MENU screen consists of 6 buttons.
The MODE select buttons are OFF, ON and AUTO
There are also 3 screen select buttons. SETUP, ALARMS and MONITOR

SECTION 3.4: MODE SELECT BUTTONS

AUTO	Puts the dryer into Auto Mode so the seven day timer can be utilized.
OFF	Turns the dryer OFF.
ON	Turns the dryer ON and goes to a ON monitor screen.

SECTION 3.5: SCREEN SELECT BUTTONS

SETUP	Displays the setup screens for the dryer and other options.
ALARMS	Displays the Alarm screen where faults can be acknowledged.
MONITOR	Displays a graphic monitoring screen.

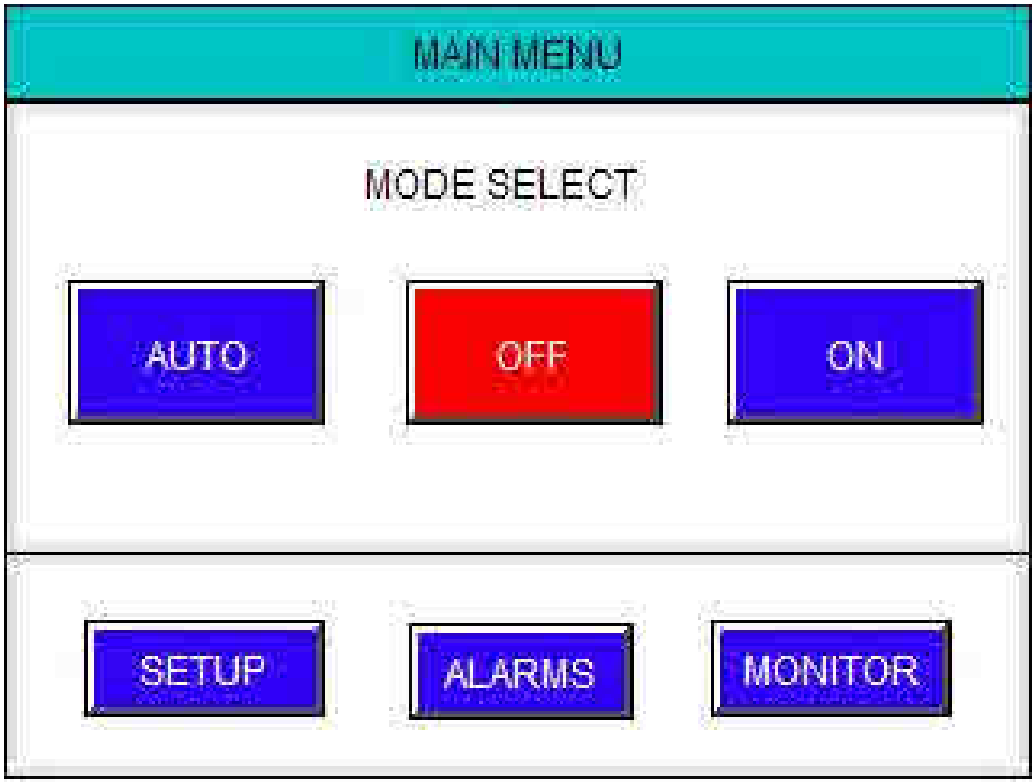


FIGURE 3.4: MAIN SCREEN

SECTION 3.6: ON MODE SCREEN

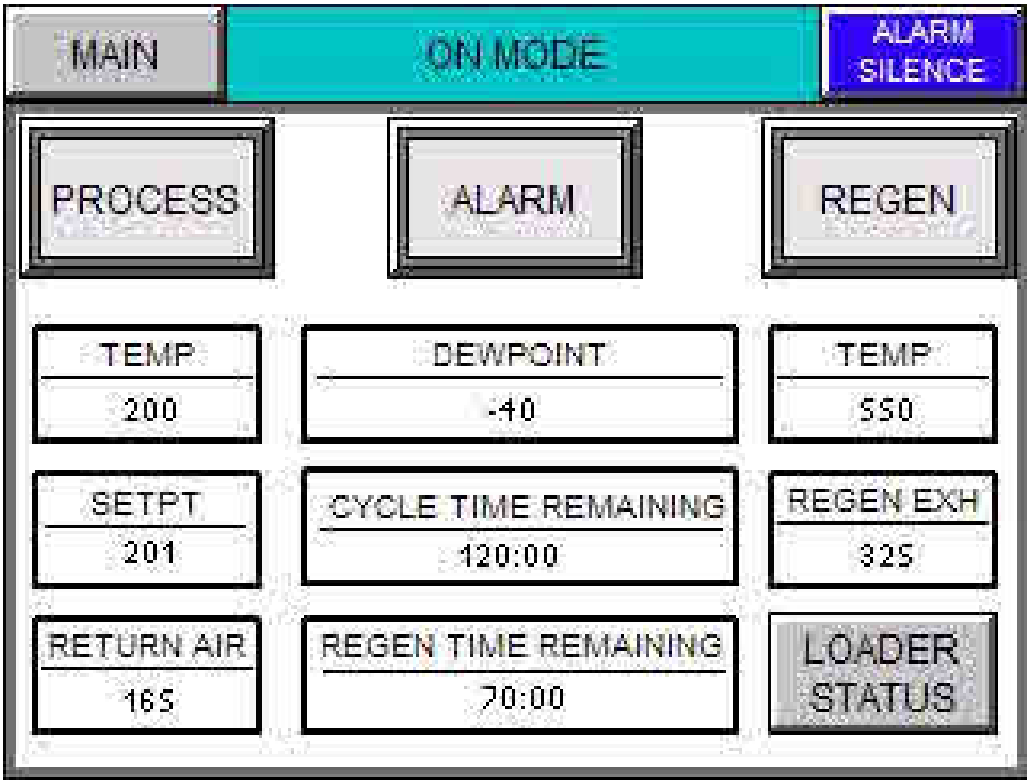


FIGURE 3.5: ON MODE SCREEN

The ON MODE screen has 3 indicator lights that show when the Process & Regen heaters are on, and if there is a alarm.
There are also 3 buttons.
The MAIN button in the top left corner will return to the MAIN MENU screen.
The ALARM SILENCE button will disable the alarm momentarily.
The LOADER STATUS button is only present if the loader option is selected. Pressing this button will take you to the loader status screen.
The remaining items display the process actual temperature and set point, the return air actual, Dew point, Cycle and Regen time remaining, The Regen actual temperature and the Regen Exhaust actual temperature.

Pressing the Process set point button will display the adjust temperature set point screen. This is a 10 digit display with the minimum and maximum settings for the Process Temperature.

Pressing the Dew point button will display the SETUP DRYER (page1) screen. Select the Dew point set points that you wish to edit.

SECTION 4: SETUP DRYER SCREENS

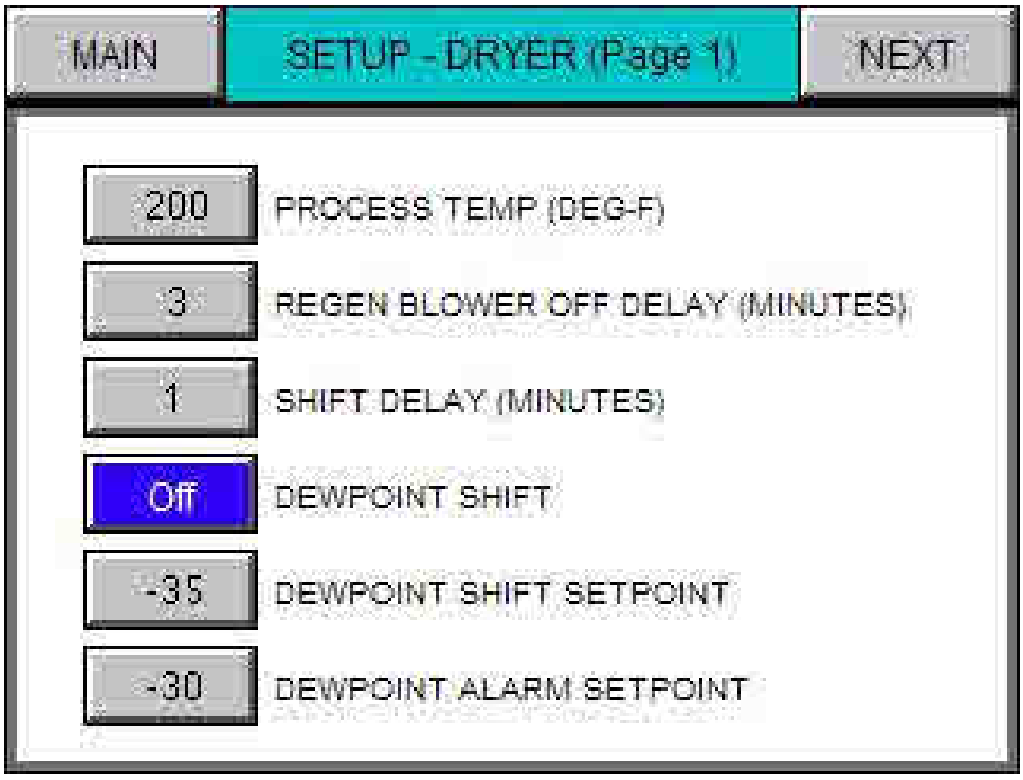


FIGURE 4.1: SETUP DRYER (PAGE 1) SCREEN

SECTION 4.1: SETUP-DRYER (PAGE 1)

There are 2 pages to setup the dryer. Page one has:
Process set point: Select this button to edit the Process set point from 60°F to 400°F.

Regen Blower Off Delay: This set point keeps the Regen blower running for a period of time after the Regen heater cycle is done, purging the heat from the heater box and the bed.

Shift Delay: This set point is a adjustable amount of time to delay the bed shift cycle to purge the heat from the process heater box and any pre-heaters connected to the dryer.

Dew point Shift: This button toggles the Dew point shift option OFF or ON.

Dew Point Shift Set point: All Thoreson-McCosh material dryers have been designed to operate at a -40° dew point. The dew point shift option keeps the desiccant beds from shifting until it's the Dew point shift set point is reached. Taking the dryer unit off the time line schedule and allowing the desiccant bed to continue to absorb moisture until it reaches the dew point shift set point. The dryer will incur fewer regeneration cycles. Fewer regeneration cycles means a huge reduction of standard operating cost. (NOTE: Minimum time is the standard cycle time preset at the factory). That is, the beds do not shift until the

dew point of the process stream reaches the set point value after the cycle timer has timed out.

NOTE: Since the Dew point sensor in many cases will read–40 when the sensor goes bad, If the Dew point Shift option is turned on, the unit will only delay the shift for two additional cycle times and then the unit will force a desiccant bed index.

Dew point Alarm Set point: This is the value that you want a alarm to come on to tell the operator, there is a High Dew Point.

Pressing the Main button on the top left will return you to the Main screen. Pressing the Next button will display the Setup Dryer (page 2) screen.

SECTION 4.2: SETUP DRYER (PAGE 2)

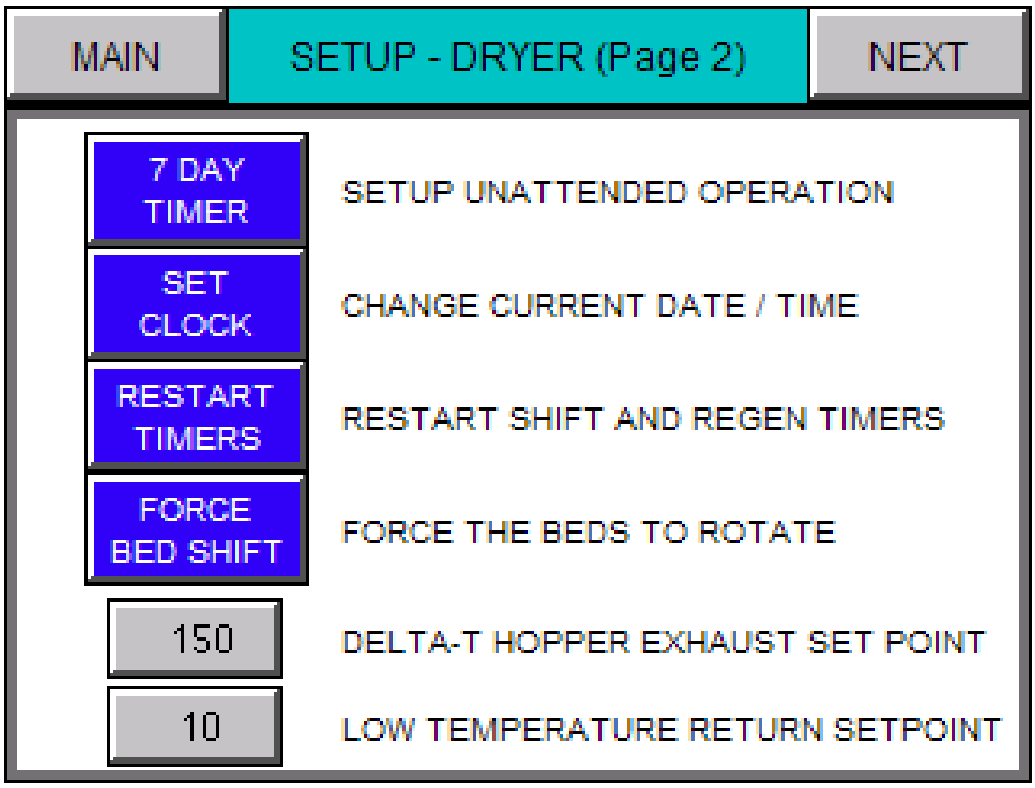


FIGURE 4.2: SETUP DRYER (PAGE 1) SCREEN

7 Day Timer: The dryer can be run unattended in the AUTO Mode. This is where the times and temperatures can be edited for the unattended use of the dryer.

Set Clock: This button displays a screen to adjust the Real Time Clock in the PLC.

Restart Timers: This button is for diagnostics only. It resets all the internal timers in the program to zero. Button must be held for 5 seconds to reset timers.

Force bed shift: This button is for diagnostics and maintenance only. Pressing this button will force the beds to shift or Index to the next position.

NOTE: SHIFTING THE BEDS SHOULD NOT BE DONE UNLESS IT IS NECESSARY AS IT WILL CAUSE IMPROPER DRYING, AND MAY CAUSE A SEVERE TEMPERATURE SPIKE.

SECTION 4.3: DELTA-T OPTION

Delta-T Option: The Delta-T function determines the material has achieved an acceptable dry level based on the idea that when the hopper air return temperature approaches the hopper air inlet temperature, the material is dry. Obviously, due to losses of energy in a drying environment, the air inlet and outlet will never be the same, but at some point, the difference is small enough to indicate that the material can be considered dry. At this point, the process air flow heaters will turn off. The process blower will continue to cycle keeping positive dry air pressure in the drying hopper. This will prevent the material from being over dried and also keep it from being saturated with moisture. This also saves energy.
The **Process Set point** should be set to the drying temperature recommended by the material manufacturer or supplier. The **Hop Exhaust Set point** is determined by drying the material for the manufactures suggested residence time. (typically 3 to 4 hours). Note the **Hopper Exhaust Temperature** at the end of the residence time and set the **Hopper Exhaust Set point** at this temperature. If the **Hopper Exhaust Temperature** falls below the **Low Temperature Return Setpoint**, the Process heaters will come back on.

Delta-T example:
Resin Manufacture suggested drying temperature. **225°F (107°C)**
Hopper Exhaust temperature after 3 hours: **195°F (91°C)**
Low Temperature Return:

Small hopper	**11-15°**
Med hopper	**8-10°**
Large hopper	**5-7°**

Process Set point..... 225°F (107°C)
Hopper Exhaust Set point ..... 195°F (91°C)
Low Temp Return Set point..... 9° (medium hopper)

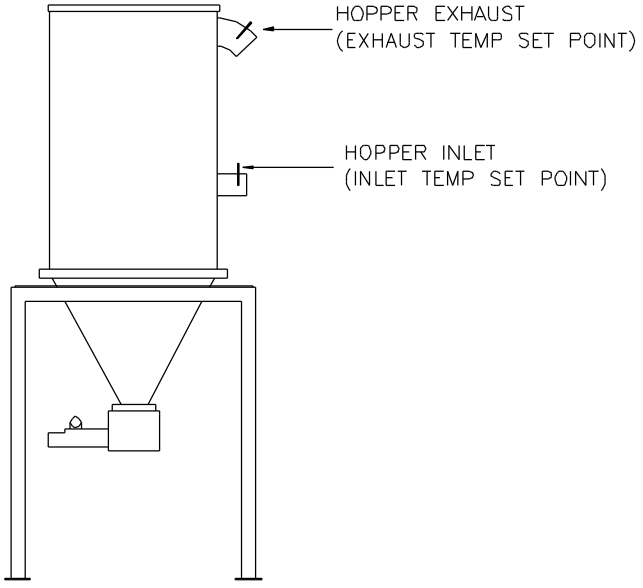


FIGURE 4.3: DELTA-T HOPPER PROBE CONFIGURATION

SECTION 5: REAL TIME CLOCK

SECTION 5.1: SETTING THE CURRENT TIME AND DATE

Pressing the SET CLOCK button, will display the CLOCK SETUP screen. Use the buttons to adjust the time and date. Then press the SET button to enter the new values into the PLC real time clock. Press the setup button to return to the dryer setup screen. All values displayed will be updated when the SET button is pushed. So make sure all values are proper before pushing the SET button.

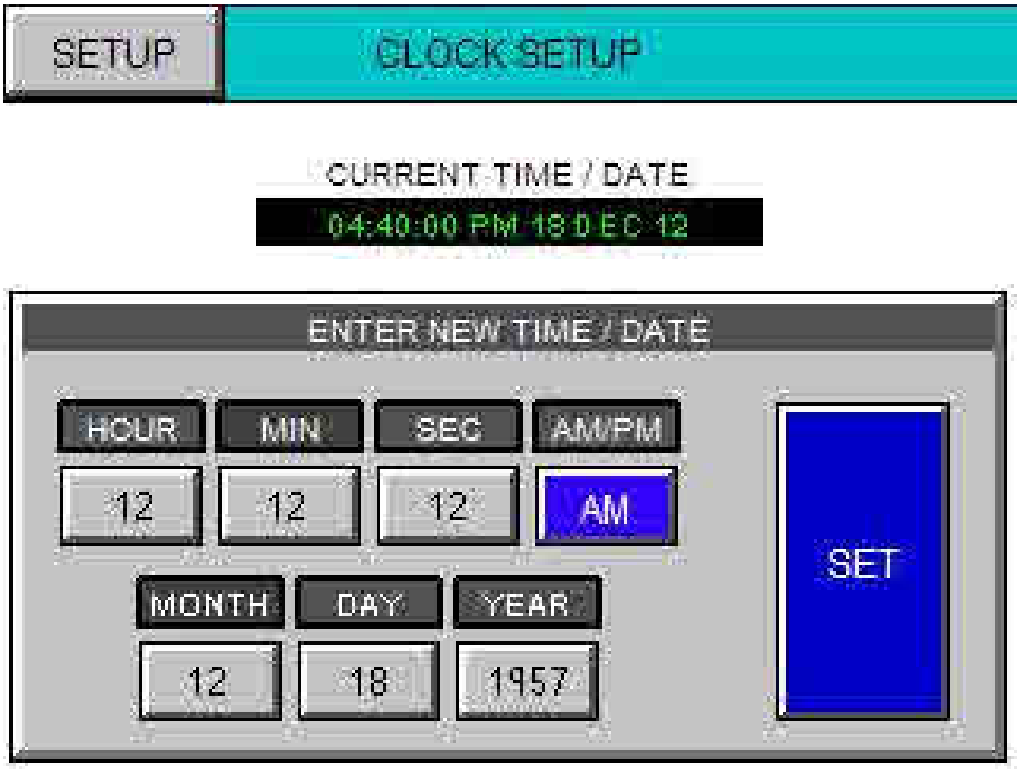


FIGURE 5.1: CLOCK SETUP SCREEN

SECTION 5.2: SEVEN DAY TIMER

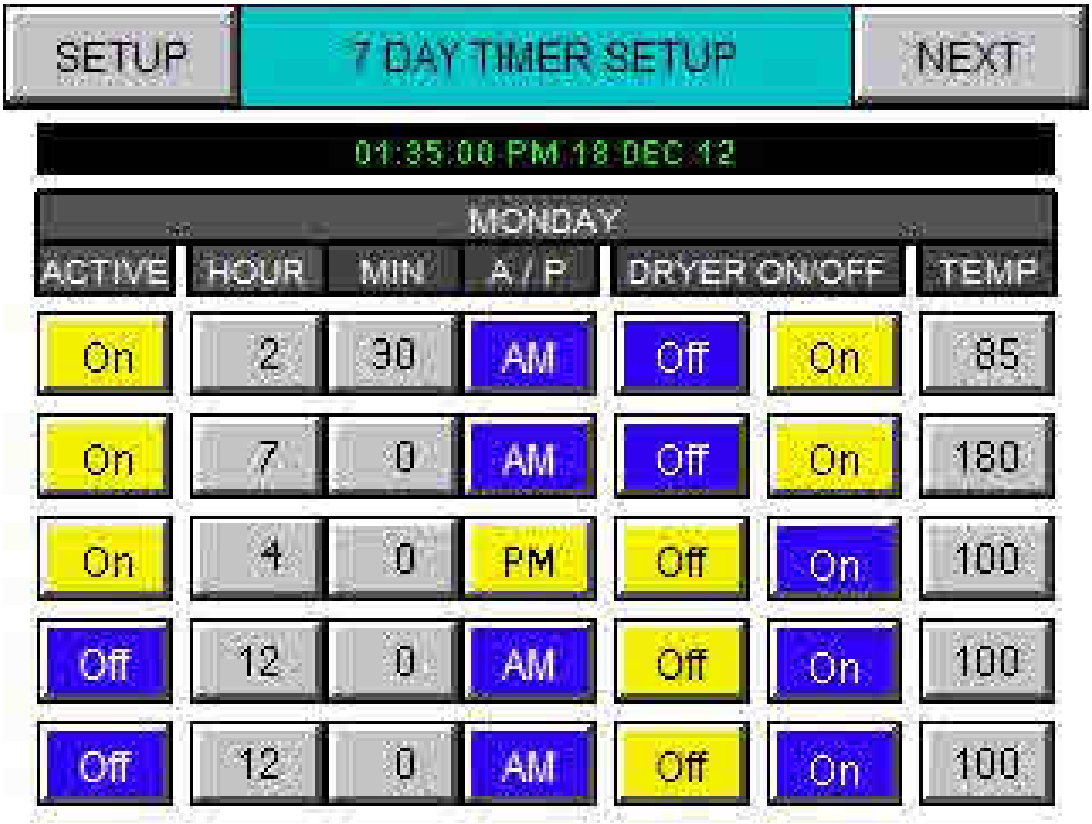


FIGURE 5.2: SEVEN DAY TIMER SCREEN

Pressing the 7 DAY TIMER button will display the 7 DAY TIMER SETUP screen, starting with Sunday. There is one screen for each day of the week. Pressing the NEXT button will display the next day. The dryer can be turned OFF or ON, five times in a 24 hour period. The Process temperature can also be adjusted. To enable a change, select the ACTIVE line to ON. Input time. Select AM or PM. Select if you are turning the dryer OFF or ON. Select the Process temperature that is needed.

For instance, the dryer can be turned on at two thirty AM with a Process temperature set point of 85°F, so the resin is drying, but will not melt. Then at seven AM, the process temperature can be set to the normal drying temperature of 180°F. Then turn the dryer OFF at four PM.

There must be a DRYER OFF at the end of the day, or else the dryer will keep running until it finds the next ACTIVE OFF.

SECTION 6: GRAPHICAL MONITOR SCREEN

SECTION 6.1: USING THE GRAPHICAL MONITORING SCREEN

The Graphical Monitor screen has many of the same components as the ON MODE screen. It just displays it graphically. Pressing the DEW POINT CHART buttonwill display the DEW POINT GRAPH screen.
Press the ALARMS button to display the ALARM screen.
Press the MAIN button to return to the MAIN screen.
Press the process heater box, and it will display the process temperature edit screen.
Press the Dew Point display, and it will display the Setup Dryer screen.
The Process and Regen heater boxes will turn red when the heaters are on.

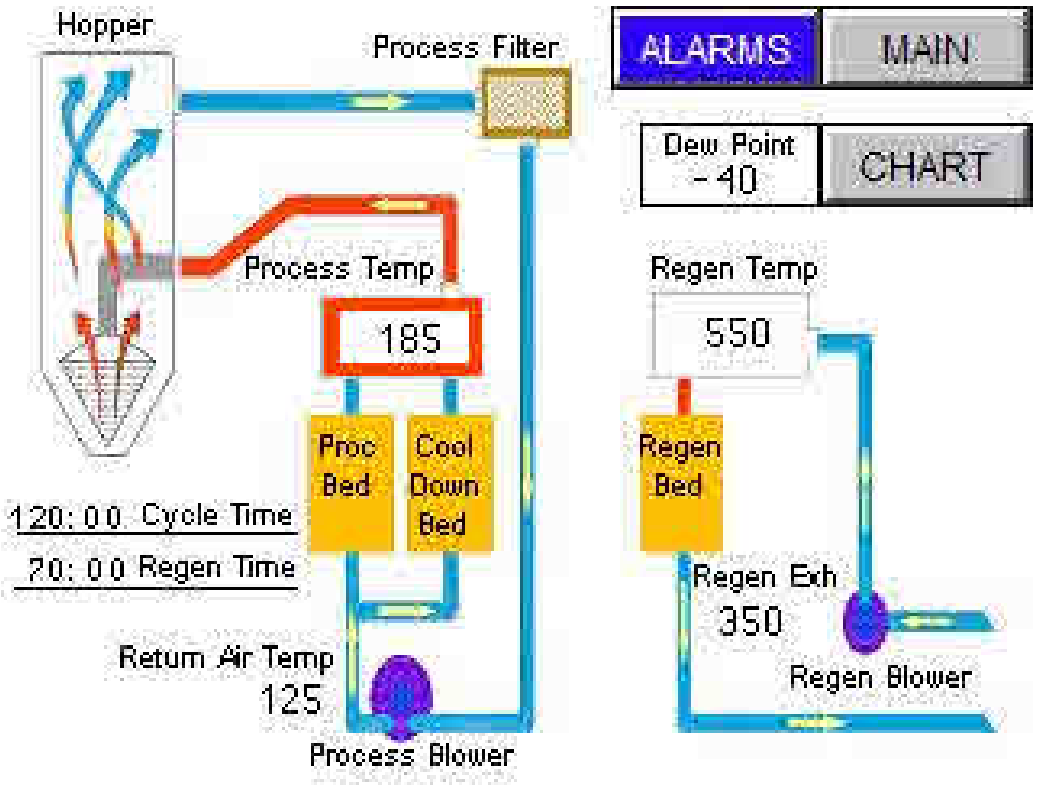


FIGURE 6.1: GRAPHICAL MONITOR SCREEN

SECTION 6.2: DEW POINT GRAPH

Pressing the CHART button will display the DEW POINT GRAPH screen.
This screen displays the last 8 hours of Dew point in a graph format. Press the forward or backward buttons to display a 50 minute sample of the graph.
Press the MAIN button to return to the MAIN screen, or the back button to return to the graphical monitor screen.

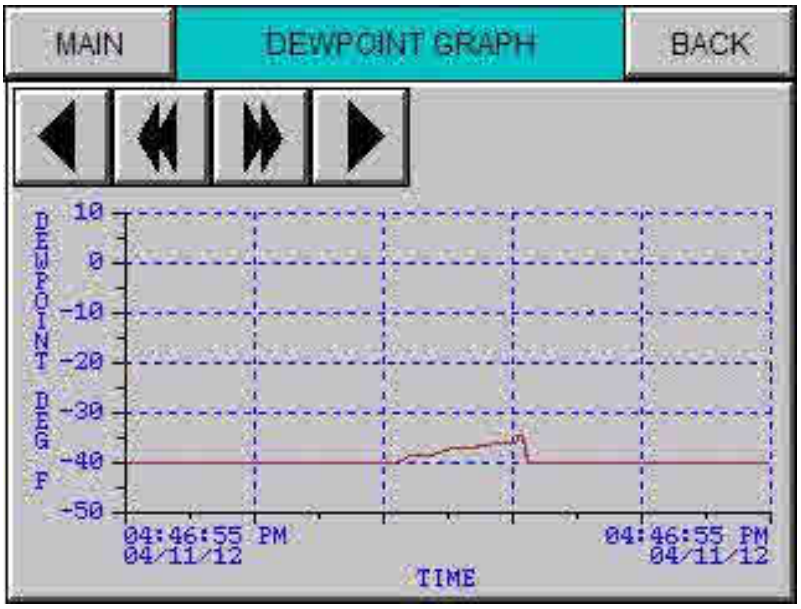


FIGURE 6.2: DEW POINT GRAPH SCREEN

SECTION 7: ALARM SCREEN

SECTION 7.1: READING THE ALARM SCREEN

When a Fault or Alarm happens, The Alarm screen will display. If there are no faults, the screen will display “NO ALARMS”. If there is a fault. You most press the FAULT ACK button to acknowledge the fault, otherwise, it will continue to come back.
Press the MAIN button to return to the MAIN screen.

FIGURE 7.1: ALARM SCREEN

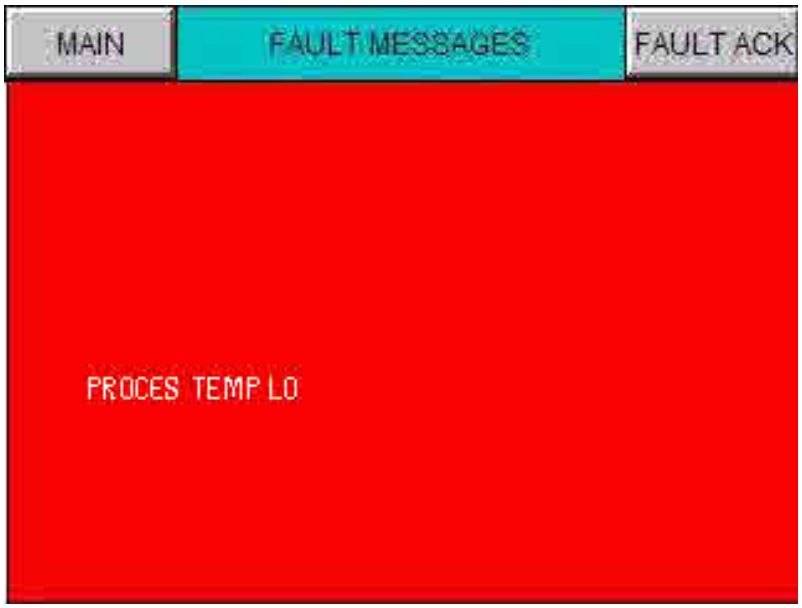


FIGURE 7.2: ALARM SCREEN

SECTION 8: PRELIMINARY TD DRYER CHECKS

SECTION 8.1: VISUALLY CHECK DRYING SYSTEM

Check dryer hoses and hopper. Be sure that delivery and return hoses are in good condition routed with a minimum of length and sharp bends. Hopper lid should be in place and well sealed. If a hopper loader is used, it should be mounted so that drying air leakage is minimized.

SECTION 8.2: CHECK DRYING HOPPER INLET TEMPERATURE

At the hopper air inlet, the drying temperature should match the recommended temperature specified by the material supplier. In general, as hot as possible without allowing thermal degradation or discoloration of the material being processed If the hopper inlet temperature is lower than the dryer discharge, the dryer temperature setpoint should be increased to compensate for the temperature drop in the process air flow hose.

SECTION 8.3: CHECK THE HOPPER TEMPERATURE DISTRIBUTION

Let dryer run for 3 - 4 hours. Air/material temperature in the hopper should be uniform around the hopper at any level, and hot (within 15°F/ 9°C of inlet temperature) up to 80% of the full hopper height when material is being added at the designed drying rate. Under static drying conditions (no new material added to hopper) the discharge temperature should approach inlet temperature after approximately 4-5 hours of operation. Should these checks show that the heat is not progressing upward through the hopper, the dryer should be checked for low airflow.

SECTION 8.4: CHECK DRYER RETURN AIR TEMPERATURE

After 4 hours of residence time, check the return air temperature. If the return air temperature exceeds 165°F / 74°C, than your unit should be equipped with some kind of After-Cooler. This will protect the process blower and allow the desiccant to work at optimum efficiency.

SECTION 8.5: CHECK DISCHARGE DEW POINT OF DRYER

For standard dryers, it should be approximately -40°F/ -40°C or lower. Should the dew point run higher than specified, check dryer.

SECTION 8.6: SOLID STATE RELAYS & MASTER HEATER CONTACTOR

The Solid State Relay, or SSR, is the accepted way to replace the Mercury contactors. Since SSRs normally close when they malfunction, a Master Heater Contactor, or MHC, is installed ahead of the SSR. The MHC is controlled by a safety thermostat, that opens when the heater temperature has exceeded the maximum controlled temperature. The Process is 425°F (218°C), and the Regen is 575°F (302°C). To keep the cost of controls down, on 3 phase heater banks, the center leg of power is not interrupted by the SSR, so the MHC is also open when the dryer is in the OFF position, this disables all three power legs

SECTION 8.7: PRECOOLER & WATER SAVER VALVE

When drying a resin below 170°F (77°C), a pre-cooler will need to be installed on the dryer. A water saver valve can also be installed to control the water flow. This valve is temperature controlled and turns the water flow down when not in use.

SECTION 9 MAINTENANCE

SECTION 9.1: FILTERS

The process and regeneration filters should be checked weekly and cleaned with compressed air or replaced if necessary.
Remember to check the filter gasket and fix or replace as needed.

SECTION 9.2: LUBRICATION

The regeneration blower motor bearings may be lubricated every 6 months to extend blower life. A couple drops of S.A.E. 20 motor oil at each of the two motor bearings is recommended.

SECTION 9.3: MOLECULAR SIEVE TEST

When it is suspected that the molecular sieve needs replacement, there is a simple test that can be performed. A positive test does not ensure that the molecular sieve is in good condition. If there is a large percentage of broken pellets or dust, contamination from foreign matter, or most of the pellets are discolored, the desiccant should be replaced. New desiccant is light tan in color.

To test the desiccant's effectiveness, a sample should be regenerated in an oven at 600°F/ 316°C for about two hours. At the end of that period, place the desiccant into an air tight jar and allow it to cool down to room temperature for a minimum of 12 hours. Pour 30ml of water into a small glass. Determine and record the temperature of the water using a mercury thermometer. Into a similar dry glass, pour a quantity of desiccant that is 10% greater by volume than the water (33ml). Dry the thermometer and place it into the glass containing molecular sieve. With one quick motion, pour the water into the glass of desiccant. Observe the increase in temperature of the mixture while stirring with the thermometer and record the peak temperature. This will occur in about 20 to 30 seconds. Subtract the water temperature from peak temperature observed. If the temperature difference is 40°F/ 4°C or greater, the sieve is in satisfactory condition.

SECTION 9.4: DESICCANT BED RECHARGING PROCEDURE

FOR TD-12 THROUGH TD-360

Read instructions completely before attempting to remove the beds.

1. Remove the Fuses or turn OFF the circuit breakers for the process and regen heaters.
2. Remove side panels.
3. Power up the dryer and turn the dryer ON.
4. From the Main Menu screen, press the SETUP button.
5. Press the NEXT button to display the SETUP-DRYER (Page 2) screen.
6. Press the FORCE BED SHIFT button.
7. After the Manifold has pulled down, disconnect the power from the unit. DO NOT turn the dryer OFF with the controls. The manifold will go back up.
8. Loosen the band clamps that hold the bed tight up against the turret plates, and remove the bed from the unit. Secure the clamps so they don't catch on any thing in the unit.
9. Apply power and repeat items 6, 7 & 8 until all the beds have been removed.

Note: On some units, The bed turret assembly can be manually rotated if care is taken to rotate them slowly, and always in a left to right direction.

Inspect the center cavity at the top of the bed for any quantity of beads, which may indicate a damaged inner perforate screen.

Inspect the bottom part of the bed for the presence of any loose beads, which may indicate a damaged outer screen. If when the beds are refilled and there is evidence of bead leakage, the bed must be repaired or replaced.

To replace the desiccant:

a) Remove the bed bead plate to gain access to the desiccant.
b) Dump the desiccant beads out and vacuum the remaining beads out.
c) Fill the beds with new desiccant - use only 4a type 8 x 12 size (0.080" diameter) desiccant beads. Fill beds as full as possible. Rock or vibrate the beds to promote settling of the beads. Add more desiccant to fill the beds and pack tight without breaking beads.
d) Apply high temperature sealant (G.E. silicone RTV-106n sealant is recommended) and secure bed bead plates to beds.
e) Reverse the bed removal procedure to replace the beds. Lift the beds into the dryer with bed bead plates up and positioned outward from the shaft. Make sure that the bolts for the band clamps are not strait out from the shaft. (The bolts can catch on frame parts and stall the rotate motor)
f) Secure the beds tight against the turret plate with the band clamps.
g) Start the dryer and let it operate for a few bed shift cycles while inspecting for leaks at the upper and lower bed seals.
h) Shut off dryer and install side panels.
i) After approximately 1-2 weeks of dryer operation check the bead level and add more desiccant if needed.

FOR TD-480 THROUGH TD-2000

Read instructions completely before attempting to remove the beds.

1. Remove the Fuses or turn OFF the circuit breakers for the process and regen heaters.
2. Remove side panels.
3. Power up the dryer and turn the dryer ON.
4. From the Main Menu screen, press the SETUP button.
5. Press the NEXT button to display the SETUP-DRYER (Page 2) screen.
6. Press the FORCE BED SHIFT button.
7. When the manifolds have pulled away from the beds, remove the 4CR (bed shift relay) from its socket. Place a 1" block inside of the upper and lower air cylinders. (2 if a single piston air cylinder). Remove the compressed air from the unit and make sure that the bed seals are far enough away from the beds to be able to slide the beds out of the turret plate. Remove power from the dryer.
8. Loosen the rotate motor bracket and remove the rotate chain. If the is not enough adjustment to remove the chain, use the master link to break the chain.
9. Using a HI-LO, place the forks on both sides of the manifold tube over the process blower. Lift the forks till just touching the beds. (DO NOT LIFT THE BED) Remove the bolts that hold the band clamps together and remove the bed by backing the HI-LO out of the unit.
10. Rotate the beds from left to right by hand so the next bed is in the same position as the first bed removed.
11. Repeat instructions 9 and 10 for the rest of the beds the bed from the unit. Secure the clamps so they don't catch on any thing in the unit.

Inspect the center cavity at the top of the bed for any quantity of beads,which may indicate a damaged inner perforate screen.
Inspect the bottom part of the bed for the presence of any loose beads, which may indicate a damaged outer screen. If when the beds are refilled and there is evidence of bead leakage, the bed must be repaired or replaced.

To replace the desiccant:

a) Remove the bed bead plate to gain access to the desiccant.
b) Dump the desiccant beads out and vacuum the remaining beads out.
c) Fill the beds with new desiccant - use 4a type 8 x 12 size (0.080" diameter) desiccant beads only. Fill beds as full as possible. Rock the beds to promote settling of the beads. Add more desiccants to fill the beds and pack tight without breaking beads.
d) Apply high temperature sealant (G.E. silicone RTV-106n sealant is recommended) and secure bed bead plates to beds.
e) Lift the beds into the dryer with bed bead plates up and positioned outward from the shaft.
f) Reverse the bed removal procedure to replace the beds. Make sure that the bolts for the band clamps are not strait out from the shaft. (The bolts can catch on frame

parts and stall the rotate motor) and the lid clamp pads on the top of the bed don't touch the turret plate alignment bushings.

g) Start the dryer and inspect for leaks at the upper and lower bed seals. Force a shift to check the seals on all beds in all positions.

SECTION 9.5: DEWPOINT SENSOR REPLACEMENT

The dewpoint sensor should be replaced once a year or when contaminated.

Note: Never attempt to measure the resistance of the sensor. This will damage the sensor.

To replace the sensor:

1. Remove power from the unit.
2. Locate the sensor manifold assembly. This is a manifold (block) with wires coming from the socket to the dewpoint board.
3. Remove socket.
4. Unscrew retaining nut.
5. Remove sensor and insert from manifold.
6. Remove the insert from the sensor. Place the insert onto the new sensor.
7. Reverse steps 1-5.

SECTION 9.6: DISPOSAL OF MERCURY CONTACTORS

When a mercury contactor needs to be replaced, care must be taken to properly dispose of the defective unit. Remove the contactor and place it in a plastic baggy and seal the bag. Then place the unit or units in a sealable 5 gallon steel drum. If the unit is under Thoreson-McCosh's factory warranty, ship to Thoreson-McCosh for warranty replacement credit. If the unit is no longer under warranty, please contact:

Bethlehem Apparatus
P.O. Box 890
Front St.
Hellertown. PA 18055
Ph: (215) 838-7034

SECTION 9.7: MAINTENANCE SCHEDULE

TO BE USED IN CONJUNCTION WITH DRYER INSTRUCTION MANUAL

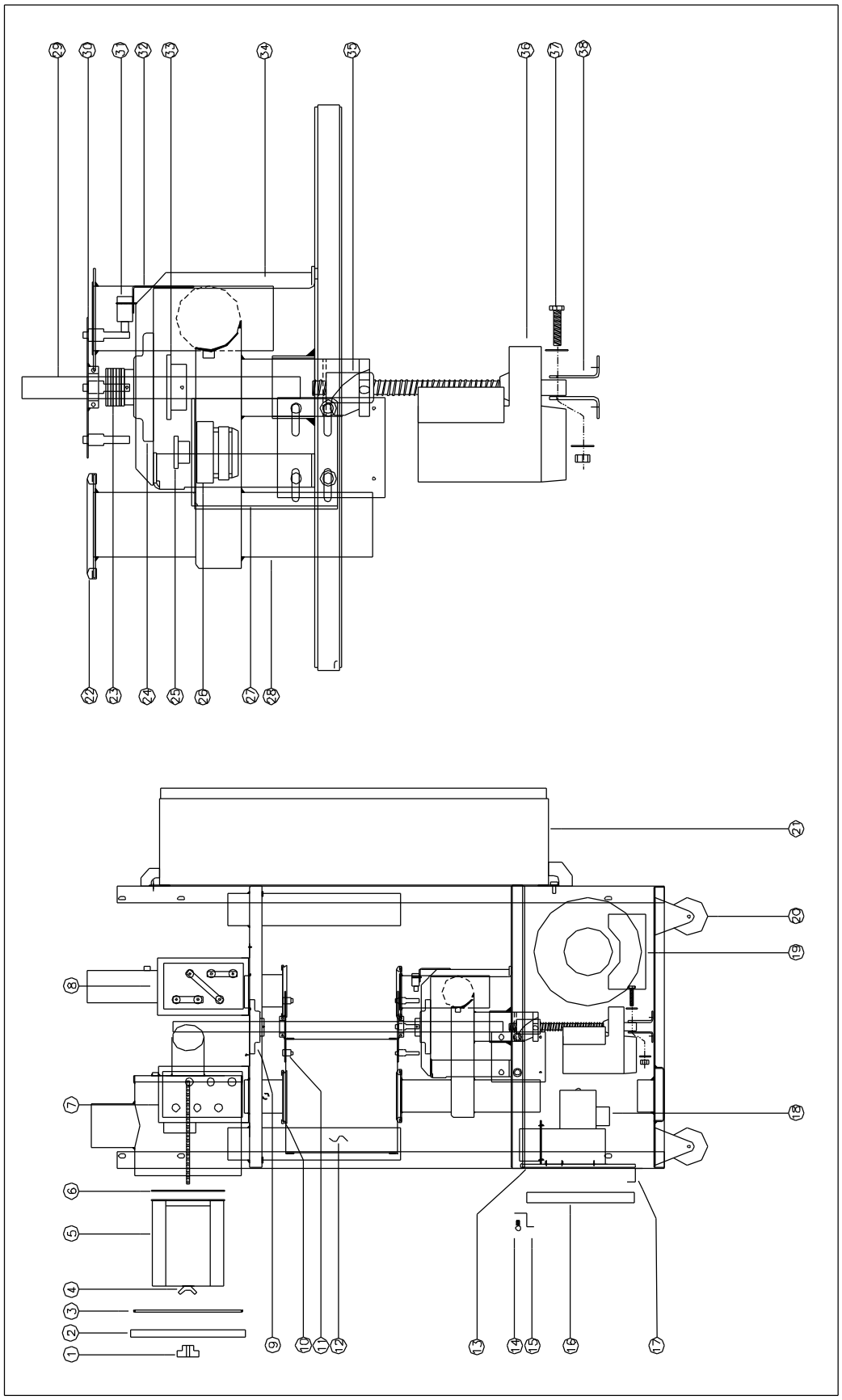
DRYER#: DATE:
SPECIAL INSTRUCTIONS:
WEEKLY
CHECK AND CLEAN OR REPLACE FILTERS
CHECK FOR UNUSUAL NOISE
CHECK PROCESS DEWPOINT (MAX.=-40°F)
CHECK SYSTEM FOR AIR LEAKS (HOSES, HOPPER)
SEMI-ANNUALLY
OIL REGENERATION BLOWER MOTOR BEARINGS
CHECK BED INDEXING
CHECK LIGHTS
CHECK CONTACTS
CHECK AMP DRAW OF HEATERS AND BLOWER MOTORS
(SEE WIRING DIAGRAM , INSERT AND INDIVIDUAL MOTORS NAME PLATE)
ANNUALLY
REPLACE DEW POINT SENSOR
TEST MOLECULAR SIEVE
GREASE SHAFT BEARINGS AT TOP AND BOTTOM OF BEDS
(SUGGESTED GREASE: DOW CORNING #41 EXTREME HIGH TEMP. BEARING GREASE OR EQUIVALENT

SECTION 10: ALARM MESSAGE CHART

ALARMS	MESSAGE
Index Switch timed out, beds fail to index	BEDS NOT INDEXED
Process Temperature too high (30 degrees above set point for 3 minutes)	TEMP TOO HIGH
Process Temperature too low (20 degrees below set point for 3 minutes)	TEMP TOO LOW
Return air temp exceeds 165°F / 74°C. Consult the factory	RETURN AIR TEMP HIGH
TD-12 through TD-360 only Push up motor failed to actuate the rotate motor	PUSH UP MOTOR FAILURE
(TD-480 through TD-2000 only.) Air cylinder failed to de-activate the air cylinder reed switch	AIR CYLINDER FAILURE
Thermistor temperature probe failed. The failed probe's temperature will now read 999°F	PROBE FAILED
Process filter dirty	FILTER DIRTY
Regen heater failure	HEATER FAULT
Incorrect phasing of three phase high power	WRONG PHASE
Process Dewpoint exceeds the alarm setpoint	HIGH DEW POINT
Process Blower Overload tripped	HIGH AMPS
(TD-480 through TD-2000 only) Regen Blower Overload tripped	HIGH AMPS
(TD-480 through TD-2000 only) Compressed air pressure has fallen below 65 P.S.I. (unit will shut down)	LOW AIR PRESSURE
Heater safety thermostat open (Heaters will be disabled)	MASTER HTR CONT OPEN

TD DRYERS COMMON SPARE PARTS LIST

MODEL	MANIFOLD UPPER SEAL	MANIFOLD LOWER SEAL	PROCESS FILTER	REGEN FILTER	DEW POINT SENSOR	MANIFOLD SEPARATION DEVICE	BED INDEX MOTOR
TD-6	413987 (3PCS)	413987 (3PCS)	404663	404663	------	413989	409650
TD-12	413987 (3PCS)	413987 (3PCS)	410086	404663	411335	410213	409650
TD-24	413987 (3PCS)	413987 (3PCS)	410086	404663	411335	410213	409650
TD-40	413860 (3PCS)	413861 (3PCS)	409951	404654	411335	410213	409650
TD-60	413860 (3PCS)	413861 (3PCS)	409951	404654	411335	410213	409650
TD-90	413860 (3PCS)	413861 (3PCS)	409951	404654	411335	410213	409650
TD-120	413860 (3PCS)	413861 (3PCS)	409951	404654	411335	410213	409650
TD-150	413985 (3PCS)	413986 (3PCS)	410598	404648	411335	410213	410713
TD-180	413985 (3PCS)	413986 (3PCS)	410598	404648	411335	410213	410713
TD-240	413985 (3PCS)	413986 (3PCS)	410598	404648	411335	410213	410713
TD-360	413985 (3PCS)	413986 (3PCS)	410598	404648	411335	410213	410713
TD-480	411204 (3PCS)	411204 (3PCS)	404658	409951	411335	Call Factory	410713
TD-600	411204 (3PCS)	411204 (3PCS)	404658	409951	411335	Call Factory	410713
TD-800	411204 (3PCS)	411204 (3PCS)	404658	409951	411335	Call Factory	410713
TD-1000	410865 (3PCS)	410865 (3PCS)	404658 (2PCS)	409951	411335	Call Factory	413663
TD-1500	410865 (3PCS)	410865 (3PCS)	404658 (2PCS)	404656	411335	Call Factory	413663
TD-2000	411792 (3PCS)	411792 (3PCS)	404658 (3PCS)	404656	411335	Call Factory	413663



SYM.	AM'T	DESCRIPTION
20	4	CASTERS, 2 SWIVEL, 2 RIDGID
19	1	PROCESS BLOWER
18	1	REGEN BLOWER
17	1	LOWER REGEN FILTER BRACKET
16	1	REGEN FILTER BRACKET
15	1	UPPER REGEN FILTER BRACKET
14	1	THUMB SCREW
13	1	REGEN FILTER GASKET
12	3	DESICCANT BED
11	1	UPPER TURRET PLATE
10	3	UPPER BED SEAL
9	1	UPPER BEARING
8	1	PROCESS HEATER BOX
7	1	REGEN HEATER BOX
6	1	PROCESS FILTER GASKET
5	1	PROCESS FILTER
4	1	WING NUT WITH FLAT WASHER
3	1	PROCESS FILTER COVER GASKET
2	1	PROCESS FILTER COVER
1	1	KNOB

SYM.	AM'T	DESCRIPTION
40	X	---
39	X	---
38	2	PUSH-UP MOTOR BRACKETS
37	1	SHOULDER BOLT, LOCK-NUT, 2 WASHERS
36	1	PUSH-UP MOTOR
35	1	PUSH-UP MOTOR NUT
34	1	LOWER BEARING SUPPORT ASSEMBLY
33	1	SHAFT GEAR
32	1	BED INDEX LIMIT SWITCH BRACKET
31	1	BED INDEX LIMIT SWITCH
30	1	LOWER TURRET PLATE
29	1	BED SHAFT
28	1	MANIFOLD
27	1	ROTATE MOTOR BRACKET
26	1	ROTATE MOTOR
25	1	ROTATE MOTOR GEAR
24	1	LOWER BEARING
23	X	SHIMMS, AM'T VARIES TO MAINTAIN MAX 3/8" GAP
22	3	LOWER BED SEAL
21	1	ELECTRICAL CONTROL ENCLOSURE

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

MERCURY

MSDS NUMBER: M1599 --- *EFFECTIVE DATE: 07/09/2001*

1. PRODUCT IDENTIFICATION

Synonyms: Quicksilver; hydrargyrum; Liquid Silver
CAS No.: 7439-97-6
Molecular Weight: 200.59
Chemical Formula: Hg
Product Codes:
J.T. Baker: 2564, 2567, 2569, 2572
Mallinckrodt: 1278, 1280, 1288

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No	Percent	Hazardous
Mercury	7439-97-6	90 - 100%	Yes

3. HAZARDS IDENTIFICATION

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Mercury vapor is highly toxic via this route. Causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath, headache, muscle weakness, anorexia, gastrointestinal disturbance, ringing in the ear, liver changes, fever, bronchitis and pneumonitis. Can be absorbed through inhalation with symptoms similar to ingestion.
Ingestion:
May cause burning of the mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure. Gastrointenstinal uptake of mercury is less than 5% but its ability to penetrate tissues presents some hazard. Initial symptoms may be thirst, possible abdominal discomfort.
Skin Contact:
Causes irritaton and burns to skin. Symptoms include redness and pain. May cause skin allergy and sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.
Eye Contact:
Causes irritation and burns to eyes. Symptoms include redness, pain, blurred vision; may cause serious and permanent eye damage.
Chronic Exposure:
Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. A suspected reproductive hazard; may damage the developing fetus and decrease fertility in males and females.
Aggravation of Pre-existing Conditions:
Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

4. FIRST AID MEASURES

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. FIRE FIGHTING MEASURES

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Do not allow water runoff to enter sewers or waterways.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Undergoes hazardous reactions in the presence of heat and sparks or ignition. Smoke may contain toxic mercury or mercuric oxide. Smoke may contain toxic mercury or mercuric oxide.

6. ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from vapor. Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate misting. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Do not flush to sewer. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker CINNASORB(R) and RESISORB(R) are recommended for spills of this product.

7. HANDLING AND STORAGE

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Do not use or store on porous work surfaces (wood, unsealed concrete, etc.). Follow strict hygiene practices.

Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne Exposure Limits:
- OSHA Acceptable Ceiling Concentration:
mercury and mercury compounds: 0.1 mg/m3 (TWA), skin
- ACGIH Threshold Limit Value (TLV):
inorganic and metallic mercury, as Hg: 0.025 mg/m3 (TWA) skin, A4 Not classifiable as a human carcinogen.
- ACGIH Biological Exposure Indices:
total inorganic mercury in urine (preshift): 35 ug/g creatinine;
total inorganic mercury in blood (end of shift): 15 ug/l.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with a mercury vapor or chlorine gas cartridge may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with a mercury vapor or chlorine gas cartridge may be worn up to 50 times the exposure limit, or the maximum use concentraiton specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:
Silver-white, heavy, mobile, liquid metal.

Odor:
Odorless.

Solubility:

Insoluble in water.
Density:
13.55
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
356.7C (675F)
Melting Point:
-38.87C (-38F)
Vapor Density (Air=1):
7.0
Vapor Pressure (mm Hg):
0.0018 @ 25C (77F)
Evaporation Rate (BuAc=1):
4

10. STABILITY AND REACTIVITY

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
At high temperatures, vaporizes to form extremely toxic fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acetylenes, ammonia, ethylene oxide, chlorine dioxide, azides, metal oxides, methyl silane, lithium, rubidium, oxygen, strong oxidants, metal carbonyls.
Conditions to Avoid:
Heat, flames, ignition sources, metal surfaces and incompatibles.

11. TOXICOLOGICAL INFORMATION

Toxicological Data:
Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
All forms of mercury can cross the placenta to the fetus, but mostof what is known has been learned from experimental animals. See Chronic Health Hazards.
Carcinogenicity:
EPA / IRIS classification: Group D1 - Not classifiable as a human carcinogen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category

Mercury (7439-97-6)	No	No	3

12. ECOLOGICAL INFORMATION

Environmental Fate:
This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. This material is expected to significantly bioaccumulate.
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l.

13. DISPOSAL CONSIDERATIONS

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. TRANSPORT INFORMATION

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 2.5KG

International (Water, I.M.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 2.5KG

International (Air, I.C.A.O.)

Proper Shipping Name: MERCURY
Hazard Class: 8
UN/NA: UN2809
Packing Group: III
Information reported for product/size: 2.5KG

15. REGULATORY INFORMATION

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Mercury (7439-97-6)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Mercury (7439-97-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\---------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Mercury (7439-97-6)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\---------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Mercury (7439-97-6)	1	U151	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2Z
Poison Schedule: S7
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. OTHER INFORMATION

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE FATAL IF SWALLOWED OR INHALED. HARMFUL IF ABSORBED THROUGH SKIN. AFFECTS THE KIDNEYS AND CENTRAL NERVOUS SYSTEM. MAY CAUSE ALLERGIC SKIN REACTION.
Label Precautions:
Do not get in eyes, on skin, or on clothing.

Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No changes.

Disclaimer:

****

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: **Molsiv Adsorbents 4A 8x12**

Product Use: Adsorbent

UOP LLC
25 E. Algonquin Road
Des Plaines, IL 60017-5017
USA
Tel: +1-847-391-3189
Fax: +1-847-391-2953

UOP M.S. S.p.A.
Viale Milanofiori
Strada 1 - Palazzo E1
20090 Assago Mi, Italy
Tel : +39-02-892241
Fax : +39-02-57500145

Emergency Assistance - 24 hour Emergency Telephone Numbers:

USA (UOP LLC) :	+ 1-847-391-2123
USA (CHEMTREC) :	+ 1-800-424-9300
Canada (CANUTEC) :	+ 1-613-996-6666
Outside USA (CHEMTREC) :	+ 1-703-527-3887

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT & CAS No	% WEIGHT	ACGIH TLV-TWA	OSHA PEL-TWA	UNITS
Silicon oxide (synthetic) 7631-86-9	< 50	10(I) 3(R)	15(TD) 5(R)	mg/m^3
Sodium oxide 1313-59-3	< 30	N.E.	N.E.	N.A.
Aluminum oxide (non-fibrous) 1344-28-1	< 30	10	15(TD) 5(R)	mg/m^3
Magnesium oxide 1309-48-4	< 5	10 as Fu	15 as Fu (Total Particulate)	mg/m^3
Quartz 14808-60-7	< 3	0.05 (R)	TD: $30/(\%SiO_2+2)$ RD: $10/(\%SiO_2+2)$	mg/m^3

Note: The OSHA Permissible Exposure Limits (PEL) are determined from the percentage of quartz from airborne samples.

Abbreviations:

N.A. - Not Applicable	RD - Respirable Dust	Fu - Fume	IS - Insoluble
N.E. - None Established	TD - Total Dust	I - Inhalable	
SC - Soluble Compounds	FuD - Fume and Dust	R - Respirable	

3. HAZARDS IDENTIFICATION

Emergency Overview

In the fresh unused state, this product is not flammable. When first wetted, the product can heat up to the boiling point of water. Flood with water to cool material. Repeated and prolonged inhalation of crystalline silica in the form of quartz from occupational sources may cause cancer.

Form: Beads
Color: Tan

Potential Health Effects:

Primary Routes of Exposure: Contact with skin and eyes. Exposure may also occur via inhalation or ingestion if product dust is generated.

Skin Contact: May cause skin irritation. The product gets hot as it first adsorbs water.

Eye Contact: Dust and /or product may cause eye discomfort and/or irritation seen as tearing and reddening.

Ingestion: The product gets hot as it first adsorbs water. Burns to moist body tissues can result if contact is prolonged.

Inhalation: Exposure to dust particles generated from this material may cause irritation of the respiratory tract. Repeated and prolonged inhalation of crystalline silica in the form of quartz from occupational sources may cause cancer.

Target Organ: Prolonged or repeated inhalation may cause lung injury/cancer.

Carcinogenicity Classification:

International Agency for Research on Cancer (IARC):
Silicon oxide (synthetic) - Unclassifiable as to carcinogenicity in humans (Group 3).
Inhaled crystalline silica in the form of quartz from occupational sources is carcinogenic to humans (Group 1).

U.S. National Toxicology Program (NTP):
Quartz - Known human carcinogen.

U.S. Occupational Safety and Health Administration (OSHA):
Quartz - Known Carcinogen.

American Conference of Governmental Industrial Hygienists (ACGIH):
Aluminum oxide - Not Classifiable as a Human Carcinogen (A4).
Quartz - Suspected Human Carcinogen (A2)

4. FIRST AID MEASURES

4.1 Eye contact: Flush immediately with plenty of water for at least 15 minutes. If eye irritation persists, consult a physician.

4.2 Skin contact: Wash off with soap and plenty of water. If skin irritation persists, call a physician.

4.3 After inhalation: Remove the victim into fresh air. If symptoms persist, call a physician.

4.4 After ingestion: Immediately give large volume of water to drink. If symptoms persist, call a physician.

4.5 Notes to physician: This product is a desiccant and generates heat as it adsorbs water. The used product can contain material of a hazardous nature. Identify that material and treat symptomatically.

5. FIRE FIGHTING MEASURES

5.1 Suitable extinguishing media: Non-combustible. Use extinguishing media for surrounding fire.

5.2 Unsuitable extinguishing media: N.A.

5.3 Fire and explosion hazards: The product itself does not burn. The used product can retain material of a hazardous nature.
Identify that material and inform the fire fighters.

5.4 Special protective equipment: In the case of respirable dust and/or fumes, use self-contained breathing apparatus and dust impervious protective suit.

5.5 Flash Point: N.A.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal protection: See 8.2

6.2 Environmental precautions: No special environmental precautions required.

6.3 Clean-up: Sweep, shovel or vacuum spilled product into appropriate containers (do not use a vacuum if material has contacted a hydrocarbon material). Pick-up and arrange disposal without creating dust. Never use spilled product. Spilled product should be disposed of in accordance with all applicable government regulations.

7. HANDLING AND STORAGE

7.1 Handling: Handle and open container with care. Avoid formation of dust particles. Avoid contact with skin and eyes. Provide an electrical ground connection during loading and transfer operations to avoid static discharge in an explosive atmosphere and to prevent persons handling the product from receiving static shocks. A copy of UOP's booklet, "Precautions and Safe Practices for Handling Molecular Sieves in Process Units", M-100C, can be obtained from your UOP representative at no cost.

7.2 Storage: Store in original container. Keep in a dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Engineering measures: Ensure adequate ventilation, especially in confined areas.

8.2 Personal protection equipment: Handle in accordance with good industrial hygiene and safety practice.

Eye protection: Safety glasses or goggles.

Hand protection: Protective gloves.

Skin and body protection: Work uniform and gloves to prevent prolonged contact.

Respiratory protection: In case of insufficient ventilation wear suitable respiratory equipment. Breathing apparatus with filter: NIOSH classification N-100 or if oil/liquid aerosols are present P-100 (42 CFR 84).

9. PHYSICAL AND CHEMICAL PROPERTIES

These data do not represent technical or sales specifications.

9.1 Form:	Beads
9.2 Color:	Tan
9.3 Odor:	None
9.4 pH:	8 - 11 (AS)
9.5 Boiling point/range:	N.A.
9.6 Melting point/range:	N.A.
9.7 Flash point:	N.A.
9.8 Autoignition temperature:	N.A.
9.9 Bulk density:	N.D.
9.10 Explosion limits:	N.A.
9.11 Vapor pressure:	N.A.
9.12 Relative density/Specific Gravity:	N.A.
9.13 Vapor density:	N.A.
9.14 Viscosity:	N.A.
9.15 Water solubility:	N.D.
9.16 Solubility:	N.D.

Abbreviations:

AS	- Aqueous slurry
N.D.	- Not Determined
N.A.	- Not Applicable

10. STABILITY

10.1 Stability: Stable.

10.2 Hazardous decomposition products: No decomposition if used as directed. Hydrocarbons and other materials that contact the product during normal use can be retained on the product. It is reasonable to expect that decomposition products will come from these retained materials of use.

10.3 Conditions/Materials to avoid: Sudden contact with high concentrations of chemicals having high heats of adsorption such as olefins, HCl, etc. When first wetted, the product can heat up to the boiling point of water. Flood with water to cool material.

11. TOXICOLOGICAL INFORMATION

11.1 Acute toxicity:

LD50/oral/rat =	> 32 000 mg/kg *
LD50/dermal/rabbit =	> 2 000 mg/kg *
LC50/inhalation/rat =	No data available.

11.2 Chronic toxicity: **Classification of Ingredients**

EC Carcinogenic:	Not listed.
EC Mutagenic:	Not listed.
EC Toxic for Reproduction:	Not listed.
Carcinogenicity (ACGIH):	A4 (Aluminum oxide) A2 (Quartz)
IARC classification:	Group 3 (Silicon oxide - synthetic) Group 1 (Quartz)

11.3 Routes of exposure: Exposure may occur via inhalation, contact with skin and eyes.

11.4 Irritation:

Skin (rabbit):	Not classified as a skin irritant in animal testing. *
Eye (rabbit):	Moderate eye irritation. *

11.5 Additional product information:
* The toxicological data has been taken from products of similar composition.

11.6 Additional component information:
No data available.

12. ECOLOGICAL INFORMATION

12.1 Mobility: No data available.

12.2 Biodegradation: No data available.

12.3 Bioaccumulation: No data available.

12.4 Aquatic toxicity: No data available.

12.5 Further Information: No information available.

13. DISPOSAL CONSIDERATIONS

13.1 Provisions relating to waste: EPA - Resource Conservation and Recovery Act (RCRA) Hazardous and Solid Waste Management Regulations.

13.2 Disposal information: This product (in its fresh unused state) is not listed by generic name or trademark name in the U.S. EPA's RCRA regulations and does not possess any of the four identifying characteristics of hazardous waste (ignitability, corrosivity, reactivity or toxicity). Materials of a hazardous nature that contact the product during normal use may be retained on this product. The user of the product must identify the hazards associated with the retained material in order to assess the waste disposal options.

14. TRANSPORT INFORMATION

14.1 Proper shipping name: **Not applicable.**

14.2 UN-No.: N.A.
Packing group: N.A.

14.3 U.S. DOT **Not regulated.**
DOT Shipping name: N.A.
Hazard classification N.A.

14.4 IMO: **Not regulated.**
EmS: N.A.
MFAG: N.A.
Marine pollutant: No

14.5 ICAO - IATA: **Not regulated.**
Instruction "passenger": N.A.
Instruction "cargo": N.A.

14.6 Further Information:
Not classified as hazardous or dangerous in the meaning of transport regulations.

15. REGULATORY INFORMATION

UNITED STATES

Toxic Substances Control Act (TSCA):
All the ingredients of this mixture are registered on the TSCA Chemical Substance Inventory.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) Reportable Quantity:
The following component(s) of this product is/are subject to release reporting under 40 CFR 302 when release exceeds the
Reportable Quantity (RQ):
-- None --

SARA Title III (Superfund Amendments and Reauthorization Act of 1986):
Section 302 (Extremely Hazardous Substances):
The following component(s) of this product is/are subject to the emergency planning provisions of 40 CFR 355 when there are
amounts equal to or greater than the Threshold Planning Quantity (TPQ):
-- None --

Section 313 (Toxic Chemicals):
The following component(s) have been specified as Toxic Chemicals under SARA Section 313 and may be subject to the
Toxic Release Inventory (TRI) reporting requirements under 40 CFR 372:
-- None –

The following components are listed in U.S. State Regulations:

State Reg Reference:	**Component(s)**
California - Proposition 65:	Silica, crystalline
Massachusetts Right-To-Know:	Aluminum oxide Quartz
New Jersey Right-To-Know:	Silica, amorphous Aluminum oxide Magnesium oxide Silica, quartz
Pennsylvania Right-To-Know:	Silica Aluminum oxide Magnesium oxide Quartz

Note: Other U.S. State Regulations may exist, check your local sources if available or contact the UOP Product Stewardship Manager (see Section 16).

Canada

Canadian Hazardous Products Act:
This product is classified as a material causing other toxic effects, carcinogenicity- Class D, Division 2, Subdivision A, under regulations pursuant to the Federal Hazardous Products Act (e.g. WHMIS)

Canadian Environmental Protection Act:
All the ingredients of this mixture are notified to CEPA and on the DSL (Domestic Substances List).

European Union (EU)

European Inventory of Existing Commercial Chemical Substances:
All components of this product are included in EINECS/ELINCS.

Council of European Communities Directive on Classification, Packaging and Labelling of Dangerous Substances/Preparation (67/548/EEC & 88/379/EEC):
No Dangerous Goods Label Required.

16. OTHER INFORMATION

Summary of changes: Sections 3, 11, 15 (US)
Supersedes: August 2000
Prepared by: UOP Health, Safety & Environmental Department

HMIS™ - Hazardous Material Information System:
HMIS™ Ratings: 0-minimal hazard, 1- slight hazard, 2- moderate hazard, 3- serious hazard, 4- severe hazard.

HEALTH : 1* - * MAY CAUSE CANCER

FLAMMABILITY : 0
REACTIVITY : 1

For additional information concerning this product, contact the following:

FOR HEALTH, SAFETY AND ENVIRONMENTAL INFORMATION,FOR TECHNICAL OR

please contact:

Product Stewardship Manager
UOP LLC
25 E. Algonquin Road
Des Plaines, IL 60017-5017
USA
Tel: +1-847- 391-3189
Fax: +1-847-391-2953

Product Safety Steward Europe
UOP N.V.
Noorderlaan 147
B-2030 Antwerpen
Belgium
Tel: +32-3-5409-971
Fax: +32-3-5417-806

purchasing information, please contact:

Adsorbent Sales
UOP - Molsiv Dept.
13105 Northwest Freeway
Suite 600
Houston, TX 77040 USA
Tel: +1-713-744-2811
Fax: +1-713-744-2802

PRODUCT EMERGENCIES

If you have a product-related emergency, resulting in an incident such as a spill or release of product or human exposure and need assistance from UOP, please contact the following number :

24-Hour EMERGENCY NUMBER (UOP LLC) : + 1 - 847 - 391 – 2123

Thoreson-McCosh Inc

NOTES: