MDB Series Dehumidifying Dryers
Operation and Installation Manual

50, 100, 150, 255 CMF (85, 170, 255, 380 M^3/hr)

Part Number: 882.xxxxx.00
Bulletin Number: DRY1-685
Effective: September 1, 2012

ACS Group

Write Down Your Serial Numbers Here For Future Reference:

_____ _____

_____ _____

_____ _____

We are committed to a continuing program of product improvement.
Specifications, appearance, and dimensions described in this manual are subject to change without notice.

DCN No. _____

Shipping Info

Unpacking and Inspection

You should inspect the large dehumidifying dryer for possible shipping damage.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

In the Event of Shipping Damage

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage.

Hold the damaged goods and packing material for the examining agent's inspection. Do not return any goods before the transportation company's inspection and authorization.

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

If the Shipment is Not Complete

Check the packing list as back-ordered items are noted on the packing list. You should have:

- ☑ Large Dehumidifying Dryer
- ☑ Bill of lading
- ☑ Packing list
- ☑ Operating and Installation packet
- ☑ Electrical schematic and panel layout drawings
- ☑ Component instruction manuals

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

If the Shipment is Not Correct

If the shipment is not what you ordered, **contact the shipping department immediately**. For immediate assistance, please contact the correct facility located in the technical assistance section of this manual. Have the order number and item number available. *Hold the items until you receive shipping instructions.*

Returns

Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

Credit Returns

Prior to the return of any material **authorization** must be given by **the manufacturer.** A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

ALL returned material purchased from **the manufacturer** returned is subject to 15% ($75.00 minimum) restocking charge.

ALL returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

No credit will be issued for material that is not within the manufacturer's warranty period and/or in new and unused condition, suitable for resale.

Warranty Returns

Prior to the return of any material, authorization must be given by **the manufacturer.** A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

All returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

After inspecting the material, a replacement or credit will be given, at **the manufacturer's** discretion. If the item is found to be defective in materials or workmanship, and it was manufactured by our company**,** purchased components are covered under their specific warranty terms.

Table of Contents

Chapter 1: Safety

1-1 How to Use This Manual

Use this manual as a guide and reference for installing, operating, and maintaining the mid-sized dehumidifying dryer. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity.

This manual covers only light corrective maintenance. No other maintenance should be undertaken without first contacting a service engineer.

The General Information section outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the mid-sized dehumidifying dryer. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the dryer. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Controls and Operations chapters include a description of electrical and mechanical controls, in addition to information for operating the dryer safely and efficiently.

The Maintenance chapter is intended to serve as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service. Preventive maintenance sections are included to ensure that the dehumidifying dryer provides excellent, long service.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The Appendix contains technical specifications, drawings, schematics, parts lists, and available options. A spare parts list with part numbers specific to your machine is provided with your shipping paperwork package. Refer to this section for a listing of spare parts for purchase. Have your serial number and model number ready when ordering.

Safety Symbols Used in this Manual

The following safety alert symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING indicates a potentially hazardous situation or practice that, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation or practice that, if not avoided, may result in minor or moderate injury or in property damage.

Dryer Safety Tags

Hazard Alert Symbol	Description/Explanation	Preventative Maintenance
	High Voltage Hazard. The electrical enclosure is supplied with 3-phase electrical power. Use caution when using or maintaining this product.	Every six months inspect all electrical connections for secure attachment. For further information see the Maintenance Chapter in this manual.
	Auto start Hazard. Equipment may start at any time. Lock out/tag out before servicing the machine.	Every month inspect all electrical connections for secure attachment and that all warning labels are in place. For further information see the Maintenance Chapter in this manual.
	Hot Surface Hazard. When the unit operates above 212F (100C) the surface of the unit may reach excessive temperatures. Use caution when using or maintaining this product.	Every month check heater elements for continuity using an ohmmeter. For further information see the Maintenance Chapter in this manual.

Mandatory Symbol	Description/Explanation
	Read Operators Manual. This equipment must be operated and maintained by properly trained personnel. The information contained within this manual must be read and understood prior to operating this equipment.
	Lock Out. This equipment is operated with 3-phase electrical power. Therefore, when performing any maintenance operations we recommend following the local standards for performing a lock-out/tag-out procedure.

1-2 Warnings and Precautions

Our equipment is designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes. This may include, but is not limited to OSHA, NEC, CSA, SPI, and any other local, national and international regulations.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices:

- ☑ **Read and follow these operation and installation instructions when installing, operating, and maintaining this equipment. If these instructions become damaged or unreadable, additional copies are available from the manufacturer.**

- ☑ Follow all **SAFETY CODES**.
- ☑ Wear **SAFETY GLASSES** and **WORK GLOVES**.
- ☑ Work only with approved tools and devices.
- ☑ Disconnect and/or lock out power before servicing or maintaining the equipment.
- ☑ Use care when **LOADING, UNLOADING, RIGGING**, or **MOVING** this equipment.

- ☑ Operate this equipment within design specifications.
- ☑ **OPEN, TAG**, and **LOCK ALL DISCONNECTS** before working on equipment. You should remove the fuses and carry them with you.
- ☑ Make sure the equipment and components are properly **GROUNDED** before you switch on power.
- ☑ When welding or brazing in or around this equipment, make sure **VENTILATION** is **ADEQUATE. PROTECT** adjacent materials from flame or sparks by shielding with sheet metal. An approved **FIRE EXTINGUISHER** should be nearby and ready for use if needed.
- ☑ Do not restore power until you remove all tools, test equipment, etc., and the equipment and related components are fully reassembled.
- ☑ Only **PROPERLY TRAINED** personnel familiar with the information in this manual should work on this equipment.

We have long recognized the importance of safety and have designed and manufactured our equipment with operator safety as a prime consideration. We expect you, as a user, to abide by the foregoing recommendations in order to make operator safety a reality.

1-3 Responsibility

These machines are constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.

All personnel engaged in the use of the machines should become familiar with their operation as described in this manual.

Proper operation of the machine promotes safety for the operator and all workers in its vicinity.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All warning and danger signs must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

General Responsibility

No matter who you are, safety is important. Owners, operators and maintenance personnel must realize that every day, safety is a vital part of their jobs.

If your main concern is loss of productivity, remember that production is always affected in a negative way following an accident. The following are some of the ways that accidents can affect your production:

- Loss of a skilled operator (temporarily or permanently)
- Breakdown of shop morale
- Costly damage to equipment
- Downtime

An effective safety program is responsible and economically sound.

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily equipment inspections in addition to regular maintenance checks. You will keep your equipment safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to equipment safety. This manual contains safety warnings throughout, specific to each function and point of operation.

Operator Responsibility

The operator's responsibility does not end with efficient production. The operator usually has the most daily contact with the equipment and intimately knows its capabilities and limitations.

Plant and personnel safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward machinery formed over a period of months or years. Your employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your equipment.

Learn and always use safe operation. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor.

- **NEVER** place your hands or any part of your body in any dangerous location.
- **NEVER** operate, service, or adjust the dryer without appropriate training and first reading and understanding this manual.

- **NEVER** try to pull material out of the dryer with your hands while it is running!
- Before you start the dehumidifying dryer, check the following:
    - Remove all tools from the dryer;
    - Be sure no objects (tools, nuts, bolts, clamps, bars) are laying in the area;
- If your dryer has been inoperative or unattended, check all settings before starting.
- At the beginning of your shift and after breaks, verify that the controls and other auxiliary equipment are functioning properly.
- Keep all safety guards in place and in good repair. **NEVER** attempt to bypass, modify, or remove safety guards. Such alteration is not only unsafe, but will void the warranty on your equipment.
- When changing control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Locking selector switches should only be adjusted by authorized personnel and the keys removed after setting.
- Report the following occurrences **IMMEDIATELY:**
    - unsafe operation or condition
    - unusual dryer action
    - leakage
    - improper maintenance
    - **NEVER** stand or sit where you could slip or stumble into the dehumidifying dryer while working on it.
- **DO NOT** wear loose clothing or jewelry, which can be caught while working on the dryer. In addition, cover or tie back long hair.
- Clean the dehumidifying dryer and surrounding area **DAILY**, and inspect the machine for loose, missing or broken parts.
- Shut off power to the dryer when it is not in use. Turn the switch to the **OFF** position, or unplug it from the power source.

Maintenance Responsibility

Proper maintenance is essential to safety. If you are a maintenance worker, you must make safety a priority to effectively repair and maintain equipment.

Before removing, adjusting, or replacing parts on a machine, remember to turn off all electric supplies and all accessory equipment at the machine, and disconnect and lockout electrical and pneumatic power. Attach warning tags to the disconnect switch and air shutoff valve.

⚠CAUTION

When you need to perform maintenance or repair work on a dehumidifying dryer above floor level, use a solid platform or a hydraulic elevator. If there is a permanently installed catwalk on your dryer, use it. The work platform should have secure footing and a place for tools and parts. **DO NOT** climb on the dehumidifying dryer, machines, or work from ladders.

If you need to repair a large component, use appropriate handling equipment. Before you use handling equipment (portable "A" frames, electric boom trucks, fork trucks, overhead cranes) be sure the load does not exceed the capacity of the handling equipment or cause it to become unstable.

Carefully test the condition of lifting cables, chains, ropes, slings, and hooks before using them to lift a load.

Be sure that all non-current carrying parts are correctly connected to earth ground with an electrical conductor that complies with current codes. Install in accordance with national and local codes.

When you have completed the repair or maintenance procedure, check your work and remove your tools, rigging, and handling equipment.

Do not restore power to the dehumidifying dryer until all persons are clear of the area. **DO NOT** start and run the dryer until you are sure all parts are functioning correctly.

BEFORE you turn the dehumidifying dryer over to the operator for production, verify all enclosure panels, guards and safety devices are in place and functioning properly.

Reporting a Safety Defect

If you believe that your equipment has a defect that could cause injury, you should immediately discontinue its use and inform the manufacturer.

The principle factors that can result in injury are failure to follow proper operating procedures (i.e. lockout/tagout), or failure to maintain a clean and safe working

Chapter 2: General Information

2-1 Models Covered in This Manual

This manual provides operation, installation, and maintenance instructions for 50, 100, 150 and 225 cfm Dehumidifying Dryers with DryPro control. Model numbers are listed on the serial tag. Make sure you know the model and serial number of your equipment before contacting the manufacturer for parts or service.

Our dehumidifying dryers are designed to generate heated, dehumidified air at carefully controlled temperatures for use in closed-loop plastic drying systems. Moisture removal from hygroscopic (moisture attracting) plastic pellets is an essential step in the manufacture of high-quality plastic products. Our dehumidifying dryers are used to generate very low dew point air heated to a controlled temperature for drying plastic pellets and regrind.

2-2 Necessary Documents

The documents listed below are necessary for the operation, installation, and maintenance of Cabinet Series dehumidifying dryers. You can obtain additional copies from the manufacturer. **Make sure that the appropriate personnel are familiar with these documents:**

- ☑ This manual.
- ☑ The schematic and assembly drawings included in the customer information packet.
- ☑ The Customer Parts List included in the information packet.
- ☑ Operation and installation manuals for any optional controls or auxiliary equipment in the drying system.

2-3 General Description

Moisture removal from hygroscopic (moisture attracting) plastic pellets is an essential step in the manufacture of high-quality plastic products.

Our Dehumidifying Dryers are used by the plastics industry to generate very low dewpoint air that is heated to a controlled temperature for drying plastic pellets and regrind.

The drying system consists of a dry air source and drying hoppers with process heating controls. The dry air source controls two primary sub-systems, the process air and the regeneration circuit. Each dryer has a left and a right desiccant bed so that one bed can regenerate while the other is in use.

The drying system can be configured for one drying hopper or for as many as 3 hoppers. The process air heater can be located on the dryer (single hopper only) or on each individual drying hopper. Heaters that are located on the drying hoppers have their own independent controls.

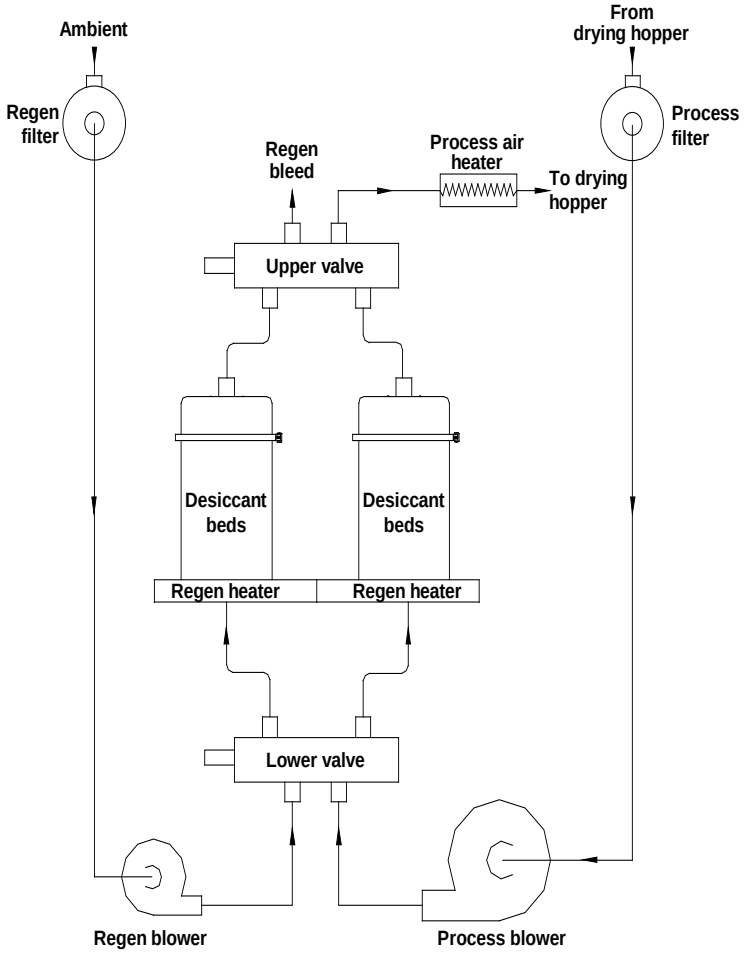
The Drying System

Dehumidifying dryers force hot, dry air through the resin in the drying hopper where the air picks up moisture from the material and is drawn back to the dryer.

In the dryer, a desiccant bed strips moisture from the air. The dryer then re-heats dried process air, and sends it back into the drying hopper to dry material again.

This system is a closed loop, because ambient (outside) air is never introduced into the process air. See Figure 1. Our dehumidifying dryers use the closed loop system, because the process air is typically much drier than ambient air, even after carrying moisture out of the plastic resin. Recycling process air maintains drying efficiency at a consistently high level. (see Figure 1).

Figure 1: Air Flow Diagram.



Specifying a Drying System

There were many variables considered in the selection of your drying system, including: type of materials, residence time, throughput of the extruder or injection molding machine, ambient air moisture and temperature, and the altitude at the processing site. Should your operating environment change, we can advise you on necessary equipment, process time and temperature modifications.

What is Desiccant?

Desiccant is a material that attracts and holds (absorbs) water from the air. The desiccant our dryers use is a synthetic crystalline metal aluminosilicate that is blended with a clay binder and formed into beads.

Absorbed water is driven from saturated desiccant by heating it to a high temperature (reducing the desiccant's capacity to hold water) and forcing air through it. This moisture removal process is called "regeneration".

The Process/Regeneration Cycle

Our dehumidifying dryers have two desiccant beds. While one bed is on-line in the process air loop, the other is off-line being regenerated.

When a desiccant bed is on-line, it absorbs moisture from the process air. In time, the bed becomes saturated with moisture and needs to be regenerated. The dryer automatically redirects the process airflow to the second bed and starts the regeneration cycle on the first bed.

During regeneration, the dryer heats air to over 500°F (260ºC) and forces it through the desiccant bed. Moisture driven off the bed bleeds to the atmosphere.

If you measure the temperature of the air bled to the atmosphere (bleed temperature), you should observe a rise after a period of time. This condition, *bed breakthrough* or bed break, indicates that the bed is dry. At bed breakthrough, the bleed air temperature peaks between 350°F (176ºC) and 400°F (204ºC). After bed breakthrough the desiccant is hot and needs to be cooled down to avoid a temperature spike when the beds are switched.

The Dew Point meter measures the dew point of the process air. A properly regenerated bed produces process air dew point of -40°F (-40ºC) or lower. This ultra-low humidity level is more than adequate to dry plastics to as little as .003% moisture, depending on the process, material, and ambient conditions.

Aftercoolers, Pre-Coolers, and Plasticizing Traps

These dehumidifying dryers force hot, dry air through the resin in the drying hopper, where the High temperature applications (250°F to 400°F / 121°C to 204°C) require aftercoolers to cool moist air returning to the dryer from the drying hopper. An aftercooler cools the return air by 100°F (38°C); this maintains dryer efficiency and condenses unwanted plasticizers from the air-stream. Heat Exchangers are also required (called pre-coolers) when processing materials that have low drying temperatures (typically 120 F to 150 F / 49 C to 66 C). Check your specific dryer model technical specifications for actual requirements. Some models have a minimum low end temperature range that will determine actual requirements.

NOTICE

Optional Plasticizer Trap:

- **Plasticizer traps should be used when resins are processed in the family of acetates, butyrates and/or propionates. They should also be used when any resin (when dried) is known to produce residue, contaminates or volatiles. This contaminate is trapped in the air stream and is carried back from the drying process as the air leaves the drying hopper.**

- **The plasticizer trap will condense the contaminate that is in the air stream and remove it before it enters the dryer unit. If this contaminant is not removed, it can foul the desiccant beds and damage mechanical components in the dryer and in the drying process**

- **Review your process and confirm with your resin supplier if this will be an issue. If it is, a Plasticizer trap must be used or it will void the warranty on the dryer.**

Closed Loop and Heat Recovery Option

After bed breakthrough (see Process/Regeneration Cycle) the desiccant is hot and needs to be cooled down to avoid a temperature spike when the beds are switched. Instead of using ambient air to cool down the desiccant, the closed loop option recirculates a portion of the dry air from the desiccant bed currently on-line for the process. This approach avoids introducing moisture from the ambient air normally used to cool down the desiccant, also referred to as “pre-loading”. This option may be required for high humidity environments.

The closed loop option may use an air to air or a water to air heat exchanger to cool the air before it passes through the desiccant. If a water to air heat exchanger is used then a water source is required (see section 3-5)

The heat recovery option utilizes an air to air heat exchanger to pull heat from the exhaust of the regeneration cycle that would otherwise have been wasted. The recovered heat is then used to pre-heat the air in the regeneration cycle before it reaches the regeneration heaters reducing the amount of energy required to heat the air which translates to higher efficiency and lower operating costs.

Process Heat Recovery Option

In high temperature applications the air returning from the drying hopper is at an elevated temperature that requires cooling before it returns to the dryer. The process heat recovery option uses an air to air heat exchanger to pull heat from the air returning from the drying hopper and then the recovered heat is used to pre-heat the process air before it reached the process heaters. This reduces the amount of energy required to heat the process air which increases efficiency and decreases operating costs. This option is deal for high temperature applications.

Modular Convey Options

The midsized dryer line are designed to easily add a full range of convey options all of which are controlled from the dryers touch screen. There are many variables to consider when adding a convey system including dry air convey, proportioning, hopper and machine convey, among others. For this reason consult sales who can advise you on necessary equipment.

Material Overdrying Protection

Material Overdrying Protection is an automatic system used to reduce the chance of over-drying, and possibly melting, the resin in the drying hopper. Material Overdrying Protection activates when the return temperature is above a set value, indicating that all the resin in the hopper is dry.

The control system monitors the return air temperature and automatically changes the process air setpoint to the **SET BACK SETPOINT** value when the return air temperature rises above the set back temperature. The process air setpoint returns to normal when the return air temperature falls below the **SETUP TEMPERATURE** value. The target values for changing the process air setpoint can be adjusted on the Mat Protect screen.

Recommended Temperature Settings

Drying Temperature (ºF)	160	180	200	220	240	260	280	300	320	340	360
Set Back Setpoint	130	145	160	175	190	210	225	240	170	260	290

Safety Devices and Interlocks

This section includes information on safety devices and procedures that are inherent to the large dehumidifying dryer. This manual is not intended to supersede or alter safety standards established by the user of this equipment. Instead, the material contained in this section is recommended to supplement these procedures in order to provide a safer working environment.

At the completion of this section, the operator and maintenance personnel will be able to do the following:

- Identify and locate specific safety devices.
- Understand the proper use of the safety devices provided.
- Describe the function of the safety device.

Safety Circuit Standards

Safety circuits used in industrial systems protect the operator and maintenance personnel from dangerous energy. They also provide a means of locking out or isolating the energy for servicing equipment.

Various agencies have contributed to the establishment of safety standards that apply to the design and manufacture of automated equipment. The Occupational Safety and Health Administration (OSHA) and the Joint Industrial council (JIC) are just a few of the organizations that have joined with the plastics industry to develop safety standards.

Every effort has been made to incorporate these standards into the design of the large dehumidifying dryer; however, it is the responsibility of the personnel operating and maintaining the equipment to familiarize themselves with the safety procedures and the proper use of any safety devices.

Fail Safe Operation

If a safety device or circuit should fail, the design must be such that the failure causes a “Safe” condition. As an example, a safety switch must be a normally open switch. The switch must be held closed with the device it is to protect. If the switch fails, it will go to the open condition, tripping out the safety circuit.

At no time should the safety device fail and allow the operation to continue. For example, if a safety switch is guarding a motor, and the safety switch fails, the motor should not be able to run.

Safety Device Lock-Outs

Some safety devices disconnect electrical energy from a circuit. The safety devices that are used on the large dehumidifying dryer are primarily concerned with electrical power disconnection and the disabling of moving parts that may need to be accessed during the normal operation of the machines.

Some of the safety devices utilize a manual activator. This is the method of initiating the safety lock out. This may be in the form of a plug, lever or a handle. Within this lockable handle, there may be a location for a padlock. Personnel servicing the equipment should place a padlock in the lockout handle.

In addition to the safety devices listed above, these dehumidifying dryers are equipped with a line cord plug. This allows the operator or maintenance personnel to unplug the system from its power source and tag it out. The plug can then be tagged with any number of approved electrical lockout tags available at most electrical supply stores.

Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning the dehumidifying dryer. Failure to do so may result in serious injury. No one but the person who installed the lockout may remove it.

2-4 Standard Features

Mechanical Features

- ☑ Rugged compact frame with sturdy 4" (10cm) casters
- ☑ Dual blower dryer with dual desiccant beds and electrically actuated valves
- ☑ 180ºF – 300ºF (150ºC) standard drying temperature range
- ☑ High regeneration temperature control safeties
- ☑ 13X desiccant (molecular sieve)
- ☑ Easy to access process, regeneration, and combustion air filters
- ☑ High pressure centrifugal blower
- ☑ Dew point +55º F to –90º F (13º C to -68º C)

Electrical Features

- ☑ Electrically-actuated air valves
- ☑ NFPA79, UL & CUL machinery electrical standards (Electric Dryers) includes:
  - NEMA 12 controls, components & enclosure
  - Non-fused electrical disconnect
  - Solid state relays for process heater control
  - Branch fusing
  - Lockable power disconnects
  - Color touch screen control
  - Password protection
  - Temperature display in C or F
  - Graphical temperature monitor
  - Data logging option available
  - Process & Regeneration PID temperature control with auto tune
  - Dewpoint extend

Material saver with temperature setback

Process recipes (200 max, over 50 pre-loaded)

- Drying temperature
- Residence time
- Regrind percent
- Density
- Setback temperature
- Throughput calculation

Alphanumeric hopper / process ID

Hour & KWH meters (total & resettable service)

Audible & visible alarm

7 day timer

Sequence shutdown

- ☑ Available supply voltages of 208, 230, 460, 575/3/60 and 220, 400/3/50

2-5 Options

Options can tailor your dehumidifying dryer system to meet the exact requirements of the drying task being performed.

- ☑ Aftercoolers for high and low temperature applications.
- ☑ Audible/visual critical alarm.
- ☑ Dirty Filter indicator for each individual blower.
- ☑ Modular hopper stands, hopper banks, and convey systems.
- ☑ Closed loop regeneration and heat recovery system
- ☑ Process air heat recovery system
- ☑ Insulated dryer hose

2-6 Dimensions and Specifications

Process Air Flow		Hose Connection Dia.		Output Temperature Range		Process Blower Power		Regen Blower Power		Dimensions						Approximate Shipping Weight	
										inches			cm				
cfm	*cmh*	*in.*	*mm*	*°F*	*°C*	*hp*	*kw*	*hp*	*kw*	*L*	*W*	*H*	*L*	*W*	*H*	*lbs.*	*Kg*
50	85	2.5	63	140-400	60-204	0.75	0.5	0.33	0.25	34	28	64.5	340	71	164	440	200
100	170	2.5	63	140-400	60-204	1.0	0.75	0.33	0.25	34	28	64.5	340	71	164	475	216
150	255	3	75	160-400	71-204	4.0	3.0	0.5	0.38	39	37	82	99	94	208	750	341
225	380	3	75	160-400	71-204	5.0	3.75	0.5	0.38	39	37	82	99	94	208	850	386

Dryer AMP Draw	**CFM**			
	50	**100**	**150**	**225**
Standard voltage Low & Ligh Heat	Full load Amps/Operating Amps			
208v/3/60Hz.	**26 / 0**	**42 / 0**	**73 / 0**	**97 / 0**
220v/3/50Hz.	**25 / 0**	**40 / 0**	**70 / 0**	**92 / 0**
230v/3/60Hz.	**24 / 0**	**38 / 0**	**66 / 0**	**88 / 0**
400v/3/50Hz.	**14 / 0**	**22 / 0**	**38 / 0**	**51 / 0**
460v/3/60Hz.	**12 / 0**	**19 / 0**	**33 / 0**	**44 / 0**
575v/3/60Hz.	**10 / 0**	**16 / 0**	**27 / 0**	**35 / 0**

2-7 Silo Dehumidification System

Airflow range – Mid- Size 50-225 cfm

NOTICE (In most cases, a 50 cfm dryer may not be adequate).

Metal silos are affected by the weather conditions surrounding them. They can become damp internally from sweat on their sidewalls caused by changes in humidity and temperature and this moisture can be transferred to the material stored in the silo. Silo dehumidifiers are not intended to dry the material stored inside the silo.

Silo dehumidifiers operate on the simple principle of providing a blanket of dry air in the space above the material to keep the material from picking up additional moisture while in storage. Silo dehumidifiers are usually installed in the base of a silo. One dehumidifier may serve more than one silo (if sized properly depending on the location and climate conditions).

The process heater is usually removed from the desiccant dryer (not required).

The process delivery air is driven to the top of the silo up the bulk material air delivery tube. There is usual an air feeder tap line with a shut off valve (special tube assembly kit) sold with the dryer to be installed in the truck fill line.

Never run the silo dehumidification system when you are filling material with the bulk truck fill line. Isolate the dryer line with shut off valve and turn the dryer off line.

Run a return line back to the dryer to close loop the dryer and complete the loop to the dryer.

This silo dehumidified air blanketing system will blanket the silo with dehumidified air under positive pressure. It will minimize moisture contamination of the resin.

The number of air exchanges and integrity of the blanket will depend on the size of the desiccant system, the blower pressure and silo dome seals.

Review the silo deck for leaks prior to installation and install a PRV dome lid to prevent air from leaking. Make sure the dome lid has pressure relief to allow for excess pressure build up.

Contact our factor application engineering for expert design and installation support.

Chapter 3: Installation

3-1 Positioning Your Dryer

The dehumidifying dryer system was designed to be wheeled into place. The entire assembly is mounted on a rugged, compact frame and is equipped with sturdy, 4” (10 cm) heavy-duty casters. It is important to leave room to access the dryer from the front, rear, and at least one side, for repair and regular maintenance.

⚠CAUTION ***Use caution and observe safety rules when placing your dryer!***

3-2 Making Electrical Connections

- ☑ Fulfill all national, state, and local safety and electrical code requirements.
- ☑ Connections should be made by a qualified electrician.
- ☑ Make sure all electrical connections are tight.
- ☑ Connect main power to the dryer at the disconnect or terminals in the upper right corner of the control enclosure.
- ☑ Install a fused disconnect with a lockout feature in the power main leading to the dryer.
- ☑ The power drop must include a ground wire.

⚠WARNING ***Proper grounding of the main power line is critical!***

3-3 Checking for Proper Blower Rotation

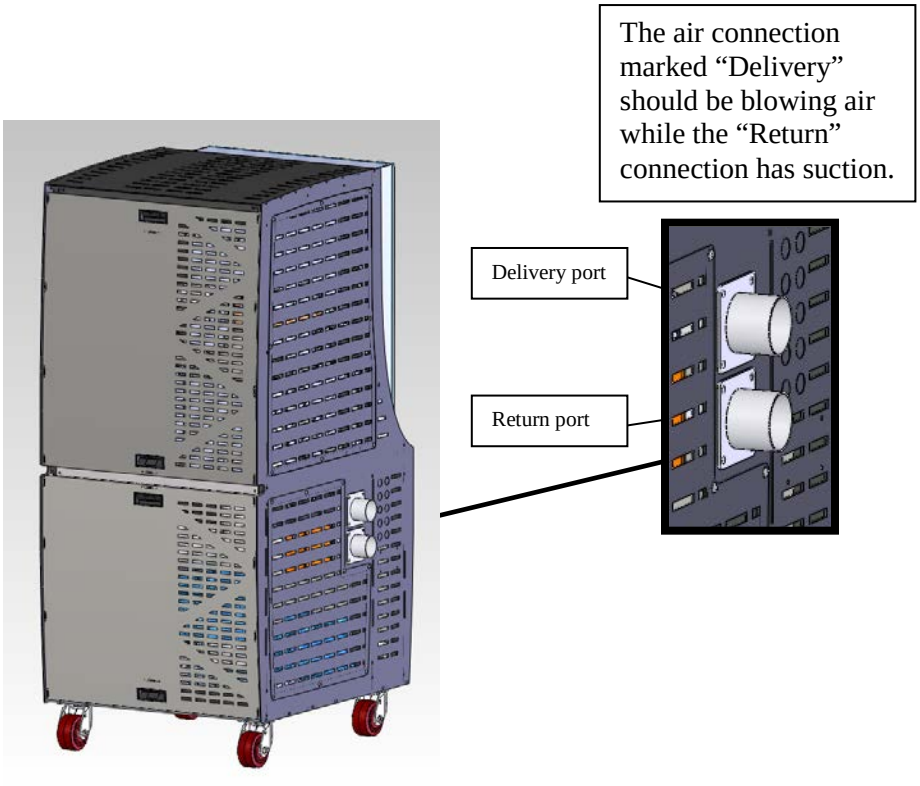
Three-Phase Models

The blower rotates properly when air flows from the delivery outlet and a vacuum is felt on the blower inlet.

⚠CAUTION ***In three-phase models, incorrect phasing of power leads can cause backward rotation of blower motors and CONTAMINATION OF THE DESICCANT! Always check blower rotation before putting material in the drying hopper!***

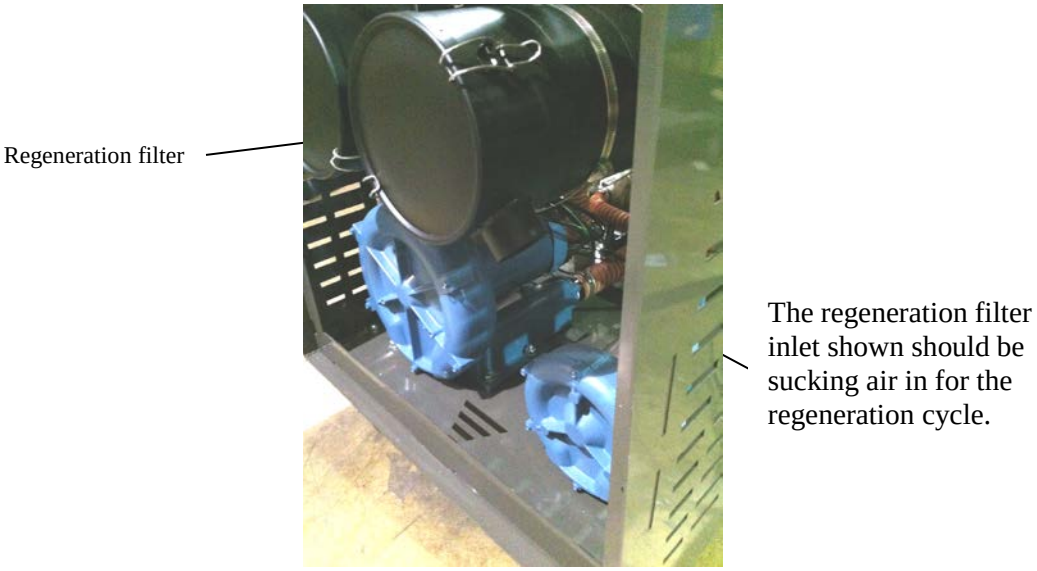
If the three-phase blower rotates improperly, reverse any two wires at the fused disconnect outside the dryer or at the disconnect/terminal in the control enclosure. This assures that the blower rotates in the proper direction.

Process Blower



Note: The return port is hosed to the process filter inlet.

Regeneration Blower



3-4 Process Air Connections Between the Dryer and Drying Hopper

- ☑ Remove the cap plugs from the inlet, discharge and bleed tubes before operation.
- ☑ Use high-temperature flexible dryer hose to connect the dryer to the drying hopper.
- ☑ Keep the delivery hose as short as possible to minimize heat loss. Insulated dryer hose is available for maximum energy savings.
- ☑ Do not shorten the return hose.
- ☑ Make sure the hoses are not kinked.
- ☑ Drying hopper air inlet and outlet locations vary from one drying hopper model to another, but always connect the hoses so the dry process air from the dryer enters the bottom of the drying hopper and flows out the top to return to the dryer inlet.

3-5 Connecting Cooling Water to the Optional Aftercooler/Precooler and Closed Loop Regeneration

High temperature applications (250°F to 400°F / 121°C to 204°C) require aftercoolers to cool moist air returning to the dryer from the drying hopper. An aftercooler cools the return air by 100°F (38°C); this maintains dryer efficiency and condenses unwanted plasticizers from the air-stream. Heat Exchangers are also required (called pre-coolers) when processing materials that have extremely low drying temperatures (typically 120 F to 150 F / 49 C to 66 C). Check your specific dryer model technical specifications for actual requirements. Some models have a minimum low end temperature range that will determine actual requirements.

Installing Water Lines

- Use the ½" (about 13 mm) brass pipe nipples for water line connections. Inlet and outlet line positions do not matter.
- Make sure you grip the nipple tightly when attaching a fitting. Doing so prevents damage to the soft copper coils. You should make connections with flexible hose to allow removing the coil assembly for cleaning.
- The aftercooler is designed to utilize either tower or city water as warm as 85ºF (29ºC). Recommended flow rate is one to three (1 to 3) gallons per minute (4 to 11 liters per minute).

NOTICE **OPTIONAL PLASTICIZER TRAP –**

- **Plasticizer traps should be used when resins are processed in the family of acetates, butyrates and/or propionates. They should also be used when any resin (when dried) is known to produce residue, contaminates or volatiles. This contaminate is trapped in the air stream and is carried back from the drying process as the air leaves the drying hopper.**
- **The plasticizer trap will condense the contaminate that is in the air stream and remove it before it enters the dryer unit. If this contaminant is not removed, it can foul the desiccant beds and damage mechanical components in the dryer and in the drying process**
- **Review your process and confirm with your resin supplier if this will be an issue. If it is, a Plasticizer trap must be used or it will void the warranty on the dryer.**

3-6 Drying Hopper

Removing the Rust Inhibitor

Rust preventative has been applied to internal unfinished surfaces. **Remove rust inhibitor *before*** using the drying hopper.

Using a non-water based degreasing agent, clean all inside surfaces of the drying hopper. Allow components to dry **thoroughly**.

Inspect the inside of the drying hopper for loose connections, foreign objects, or a blocked diffuser.

Air Trap Considerations

The air trap assembly in the top of the drying hopper prevents ambient air from contaminating the material being dried.

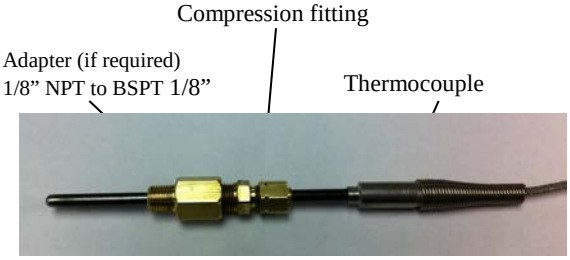
- ☑ Keep the material level at the mid point of the air trap for maximum efficiency.
- ☑ Use a hopper loader or vacuum conveying system to maintain the proper material level.

3-7 Positioning Your Dryer

For the dryer work function properly it is critical to place the process air thermocouples on the drying hopper inlet and outlet. These devices accurately monitor the air temperature entering and leaving the drying hopper, the value of which is used by the control to maintain the process temperature set point. Compression fittings are required to hold the thermocouple in place so that the tip is approximately in the center of the tube as shown.

The locations of the inlet and return will vary on different drying hoppers.

This photo demonstrates the proper location of the thermocouple inside the air inlet and return tubes.



Chapter 4: Controls

4-1 Controller Descriptions

The DryPro dryer control system is designed to control all ACS cabinet, medium and large dryers. These dryers have separate Process and regeneration blowers and up to four desiccant beds.

The DryPro control system includes the following features:

- Customer configurable drying hopper identification.
- Enhanced diagnostics for quick troubleshooting.
- Support for up to 3 drying hoppers.
- Support for Compact Flash memory cards.
  - Save & restore dryer configurations easily.
  - Save and recall material process recipes.
  - Automatic Program upgrades with.
  - Optional data logging.
- Ethernet monitoring.

The dryer is available in two basic configurations—local I/O and remote I/O.

- Local I/O where the Process heater controls are integral to the dry air source.
  - Used for single drying hopper configurations.
  - All controls are mounted on the dryer.
- Remote I/O, for Central drying applications, where the Process heaters are separate from the dry air source.
  - Used on systems with from 2 or 3 drying hoppers.
  - Drying hopper I/O is connected to the dryer controls using high speed communications.

4-2 Operating the Dryer

To operate the dryer, access the Dryer Status screen and press the “Start” button.

The main air valves will find home position.

- If the left bed finished regeneration then the right bed will be placed into regeneration and the left bed will be placed into Process.
- If the left bed did not finish regeneration then the left bed will be placed into regeneration and the right bed will be placed into Process.

The Process blower(s) will start.[1]

- When air flow is verified, all *enabled* drying hoppers heaters will begin heating the process supply air to their respective set points.
- There is an adjustable time delay between the Process blowers starting and the drying hoppers Process supply air heaters starting to allow the Process supply air header to come up to operating pressure.

[1] The Process and regeneration systems start operation in parallel and run independently.

The drying hoppers can be started in a staggered manner where the control waits an adjustable time between starting each drying hopper.

ACS recommends that the customer execute an auto-tune cycle on the regeneration beds and drying hoppers when the dryer is placed into service for the first time.

The regeneration blower starts.[2]

- When air flow is verified, the bed in regeneration is brought to the pre-set regeneration temperature.
- The bed remains at the regeneration temperature until either a pre-set time has expired or the beds outlet air temperature rises above the "Bed Break" target value at which point the regeneration heaters are turned off and the bed is allowed to cool for either a pre-set time period or until the bed outlet temperature reaches the "Cool Down" target value. If the closed loop regeneration option was purchased, then the closed loop valve will place the cooling bed into closed loop cooling, as opposed to ambient cooling, when the bed outlet temperature reaches the "Closed Loop" target value.

A customer adjustable option allows the beds to switch either when the regeneration cycle completes ("Switch on Time") or if the dew point rises above a pre-set limit ("Switch on Dew Point"). The "Switch on Dew Point" option will also cause the beds to switch if a side has been on-line for an adjustable amount of time.

ACS recommends that the customer execute an auto-tune cycle on the regeneration beds and drying hoppers when the dryer is placed into service for the first time.

The pattern continues until the dryer is shut down by pressing the "Stop" button on the Dryer Status screen or the auto start feature reaches a preprogrammed stop event time. However it is stopped, the DryPro control puts the dryer into a sequenced shutdown.

- The drying hoppers process supply air heaters shut down and then the Process air blower(s) shutdown after an adjustable delay and below an adjustable temperature.
- Any running regeneration cycle is allowed to finish and then the regeneration blower is shutdown.
- The dryer can be re-started by pressing the "Restart" button on the Dryer Status screen.

The Process and regeneration systems run in parallel and independently of each other with the following exceptions.

[2] The Process and regeneration systems start operation in parallel and run independently.

4-3 DryPro Data Entry

Values and text are changed using on-screen keypads. The screen will display either a numeric or alphanumeric keypad, depending on the type of data entry.

The appropriate keypad appears when a changeable value is pressed.

Minimum & maximum values are indicated for each numeric value. Values outside of these limits are rejected.

Passwords. All functions except starting and stopping the dryer require a password. Operator and supervisor access require the entry of a valid user name and the associated passwords. Valid user names are:

Oper1

Oper2

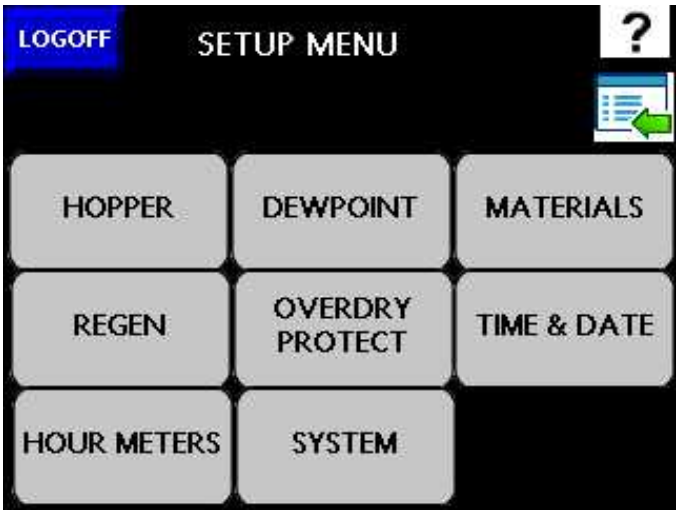
Super1

Super2

Oper1 & Super1 passwords can be changed. Passwords are provided in a separate document.

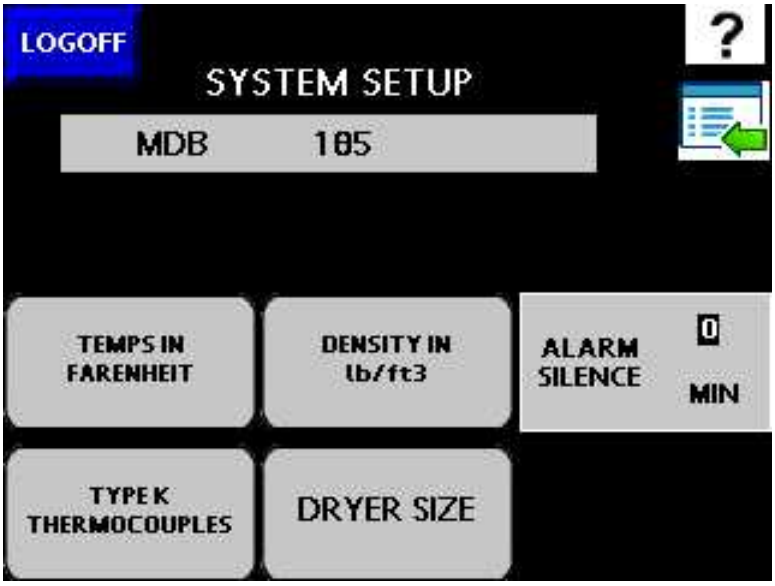
4-4 Single Hopper Dryer Setup

The customer can fine-tune the dryer by changing values and turning options on or off. All setup screens are accessed from the setup menu:



Access to setup functions require supervisor password.

System Setup.



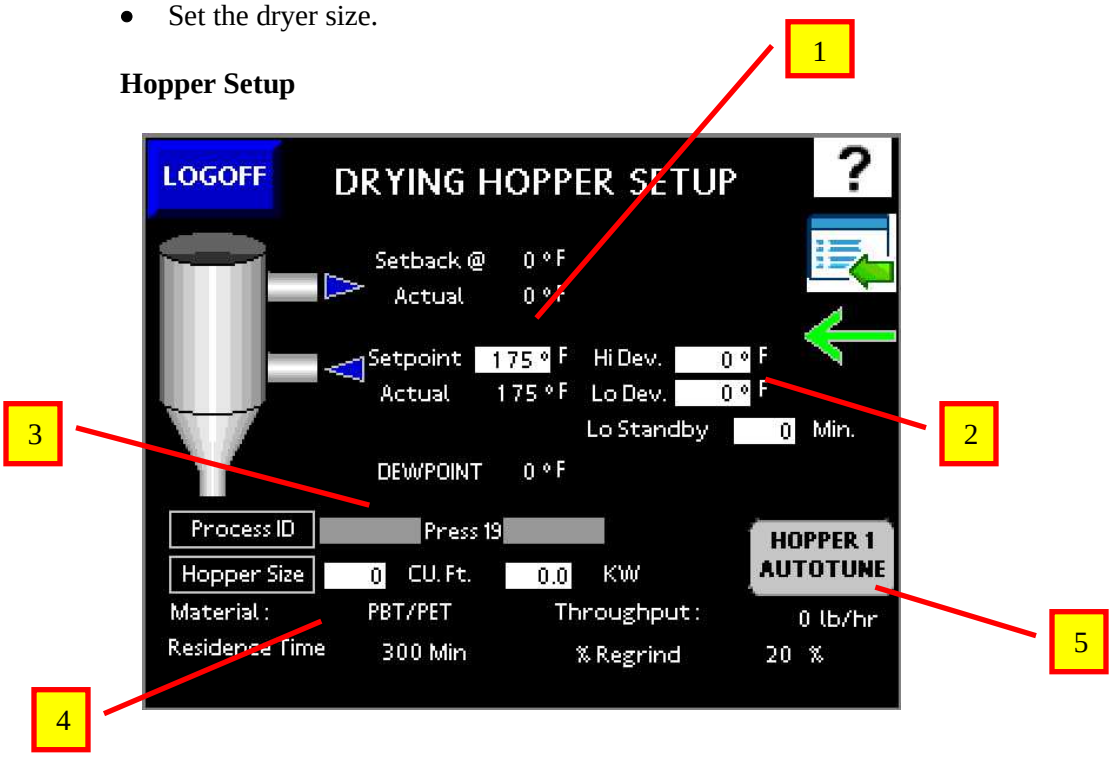
Use the "System Setup" display to

- Select whether temperatures are displayed in Fahrenheit or Celsius.
- Select metric or standard measure for volume & density.
- Set the alarm silence duration

The following are set at the factory and should only be accessed to commission a new display when the configuration can not be restored from compact flash.

- Select the appropriate thermocouple type.
- Set the dryer size.

Hopper Setup



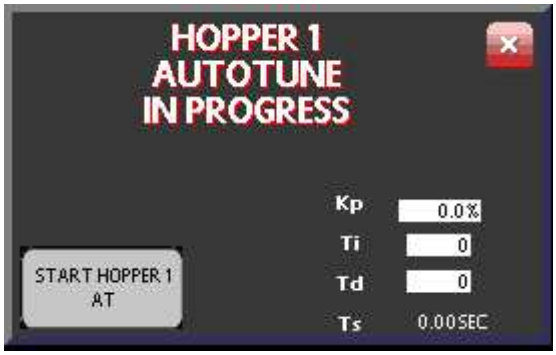
Use the Hopper Setup screen to:

1. Set the normal process temperature setpoint. The material saver setpoints are set on the Overdry Protect Setup screen.
2. Set the deviation limits for process temperature alarms. Also set the standby time to allow the drying temperature to rise to the set value at system startup.
3. Set the process ID for the hopper. This can be a press ID, product name, or any other value that makes sense. Also, the hopper volume and heater KW are set. These values are used in throughput and KWH calculations.
4. Press the material name to call up the Material Select screen described below. Selecting a new material / recipe when the system is idle will automatically change the drying temperature, setback temperature, residence time, and density. If the dryer process is running, selecting a new material has no effect on current settings.
5. Press the Autotune button to call up the Process Autotune screen described below.

Material Select Screen

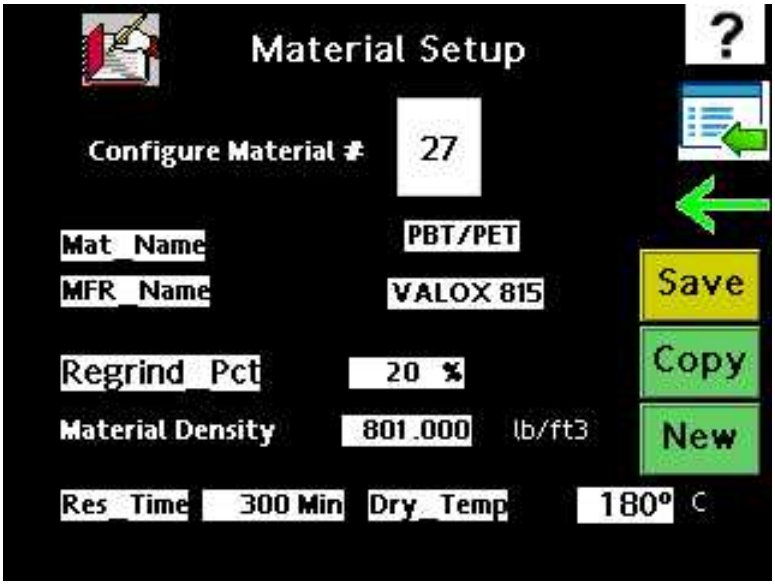
Use the Material Select screen to recall the material / recipe to use. Pressing the “Load” button will make the highlighted recipe current and return to the Hopper Setup screen. Pressing the “Setup” button will call up the Material Setup screen described below.

Process Autotune Screen

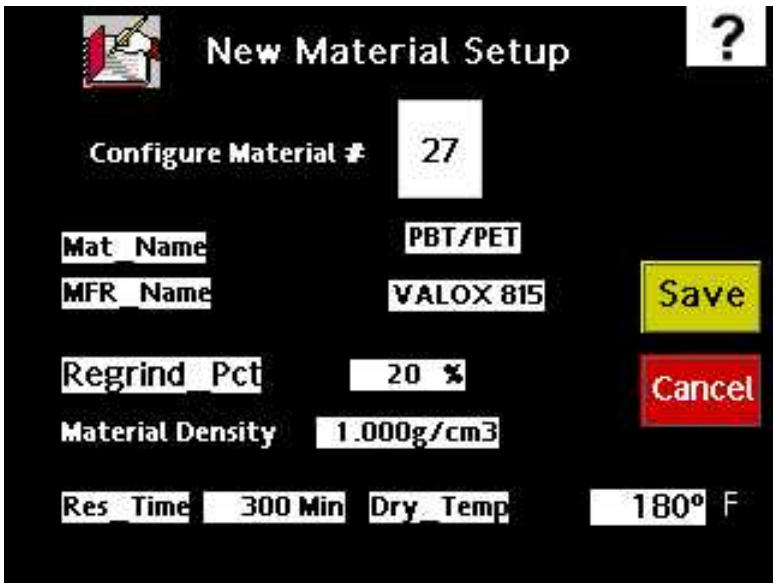


Use the Process Autotune screen to start or stop autotune for the process heater. Also, values can be manually entered, although this is generally discouraged. Autotune should be performed on initial startup after installation, and any time a process change occurs that affects air flow through the hopper. The values will change after a successful autotune. When autotune is in progress, the banner message is displayed on this screen and "AT" indicators are displayed on status screens.

Material Setup Screen

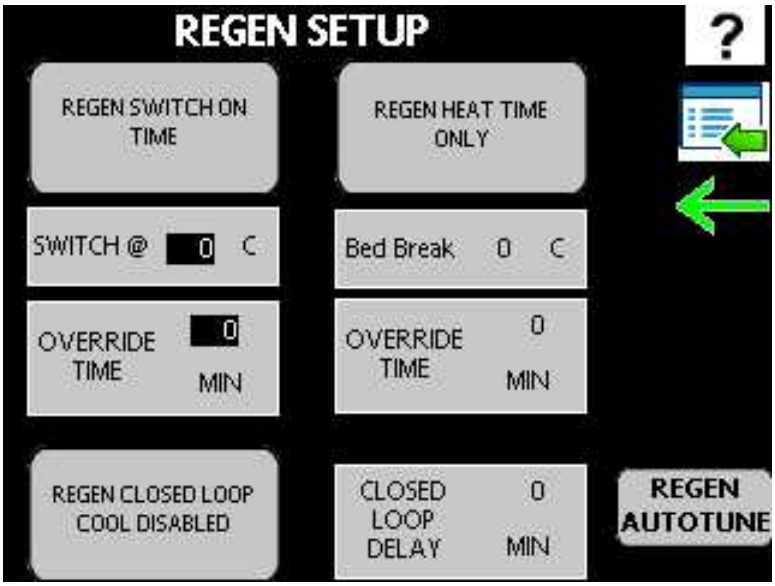


Use the material setup screen to make changes to the current material (recipe). Changing the regrind percent will recalculate density, although density can also be manually entered. Press the "Save" button to make changes permanent, otherwise changes will be lost when a new recipe is selected or the dryer power is shut off. Press the "Copy" button to create a new recipe using the current recipe as a template. Press the "New" button to create a new blank recipe. Pressing the "New" or "Copy" button calls up the New Material Setup screen:



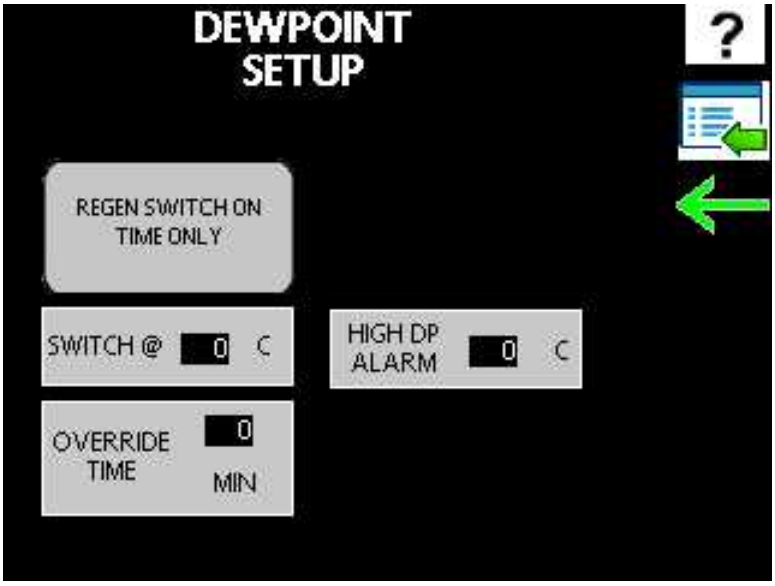
Use this screen for entering data for new recipes. Pressing the “Save” button will write the new recipe to Compact Flash and return to the Material Setup screen. Pressing “Cancel” will return to the Material Setup screen without making a new recipe.

Regen Setup screen



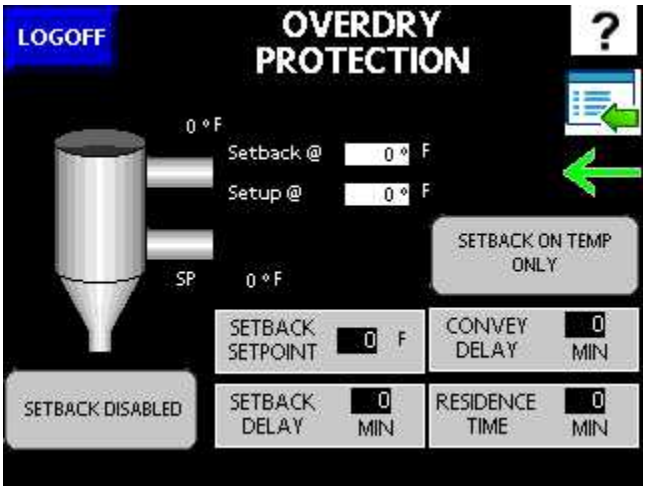
Use this screen to control the regen process. Bed switch on dewpoint can be set up here as well as on the Dewpoint Setup screen. Regen heat time can be based on time only or on bed break with an override time. The closed loop cooling option can also be enabled, although this requires that the closed loop components are installed on the dryer.

Dewpoint Setup screen



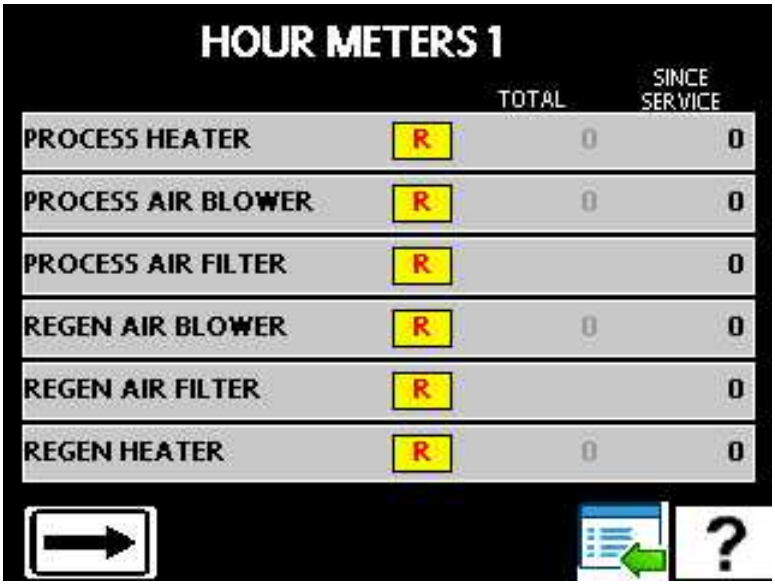
Use this screen to set up switch on dewpoint parameters, as well as the high dewpoint alarm value.

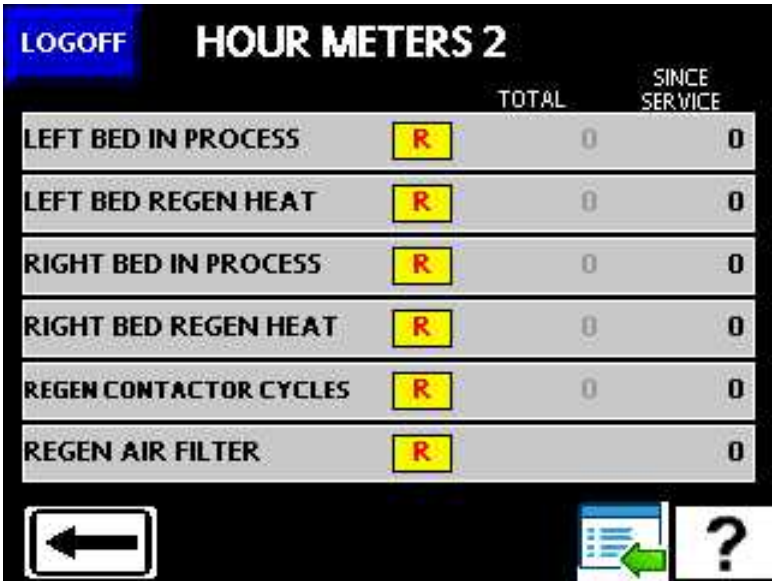
Overdry Protect Setup screen



Use this screen to configure overdry protection for your material. Setback setpoint is the secondary drying temperature to use. Setback @ is the hopper exit temperature that will cause the secondary setpoint to be activated. Setback Delay is how long the exit temperature must be above the Setback @ setting before setback is activated. Setup @ is the hopper exit temperature that will cause the drying temperature to be returned to the normal setpoint. Additionally, material setback can be activated based on convey activity from the hopper. If selected, a lack of convey activity for the set by Convey Delay will trigger setback, but only after residence time has been satisfied.

Hour Meters Setup screens

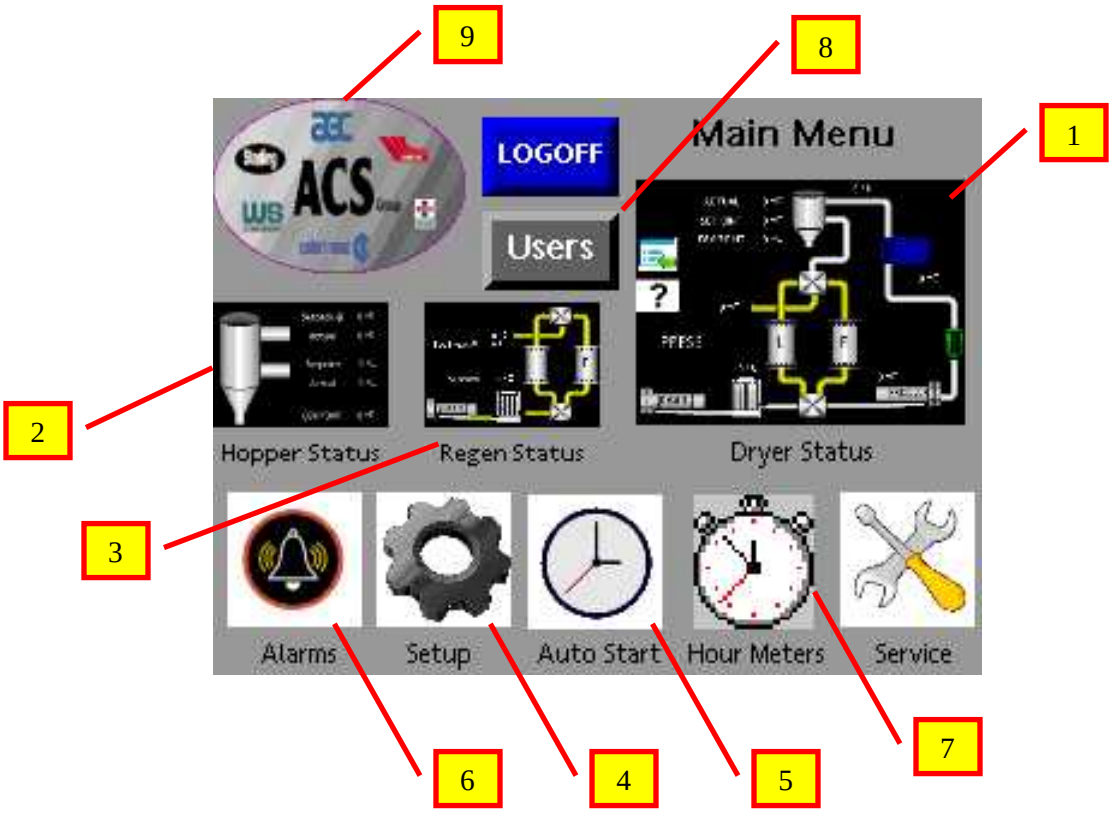




Use these screens to view and / or reset the various hour meters associated with the dryer. To reset a meter, press the “R” button for 3 seconds. Note that only the “Since Service” values are resettable. Additionally, hour meters can be viewed via the Main Menu screen, but not reset.

4-5 Single Hopper Dryer Operation

Main Menu screen



The Main Menu is the main navigational screen for the DryPro control system.

No password is required to access :

1) Dryer Status
3) Regen Status
6) Alarms
7) Hour Meters
9) Splash screen

Operator or above password is required for 2) Hopper status.

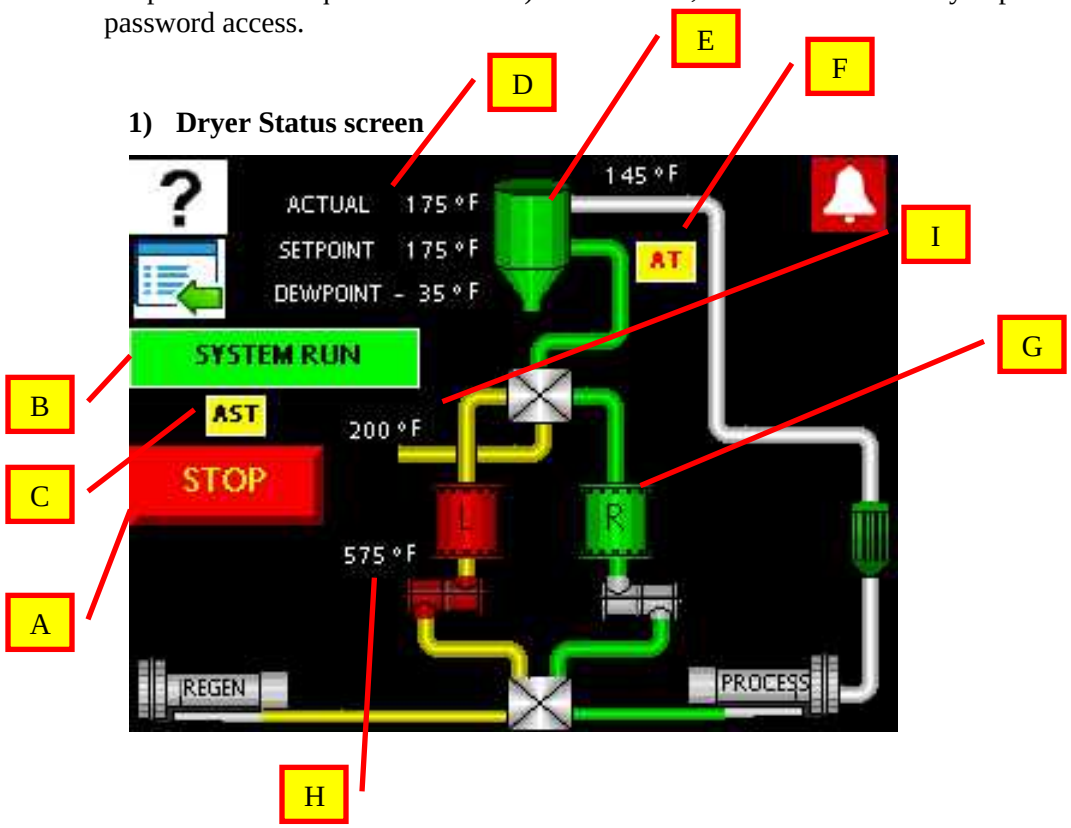
Supervisor or above password is required for:

4) Setup Menu
5) Auto Start Timers

Service password access is required for Service screens (ACS qualified personnel only).

No password is required to access 8) Users screen, however functionality depends on current password access.

1) Dryer Status screen



A) Dryer Start / Stop / Restart button

B) Dryer Status message

C) Auto Start Timer Active indicator.

D) Process temperature, setpoint, dewpoint, and exit temperature.

E) Hopper Status indicator / Button. Hopper color indicates status. Touching hopper graphic calls up Hopper Status screen.

F) Auto Tune / Setback Active indicators. Displayed only when auto tune ("AT") is in progress or setback ("SB") is active.

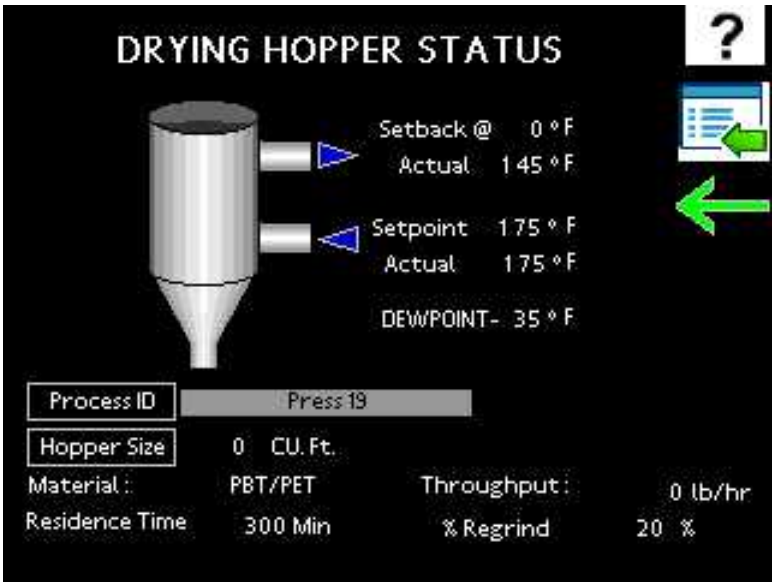
G) Regen Status Indicators / Button. Regen bed and heater icons indicate status. Touching any graphic of the regen system (heaters, beds, blower) calls up the Regen Status screen.

H) Regen Heater Temperature. This appears adjacent to the bed currently in the regeration cycle. Each Regen heater also may indicate “AT” when autotune is in progress for a regen heater.

I) Regen Exit Temperature.

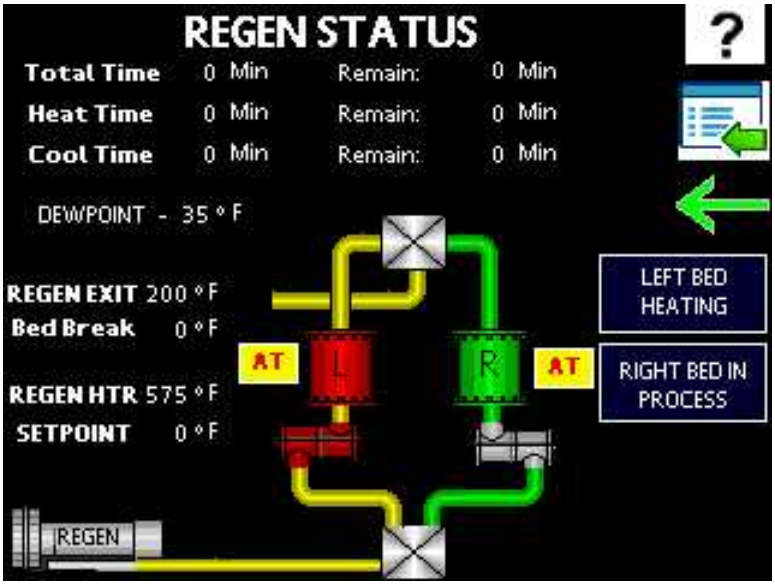
NOTICE Touching any current temperature value will display the associated graphical trend screen.

2) Hopper Status screen



This screen displays the current values for the drying hopper as well as allowing for changing the drying temperature. Operator or above password access is required. As with the Dryer Status screen, touching any current temperature value will display the associated graphical trend screen.

3) Regen Status screen

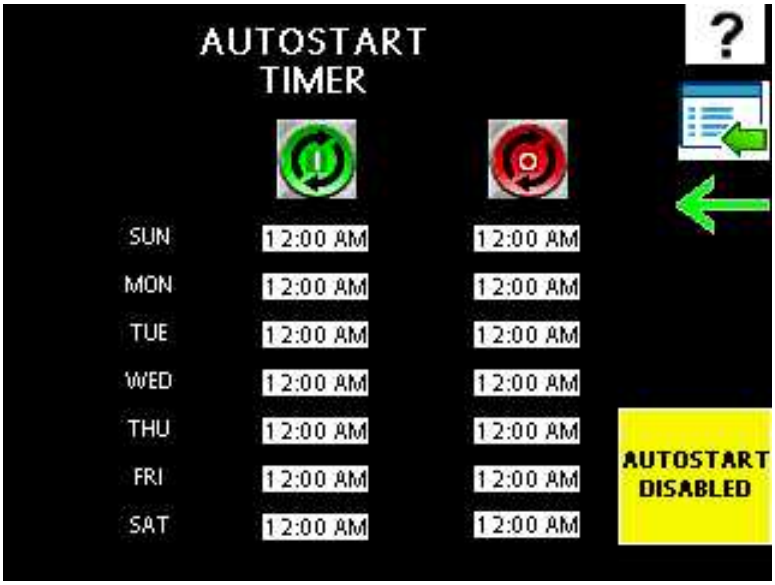


This screen displays all current status values for the regen subsystem. As with the Dryer Status screen, touching any current temperature value will display the associated graphical trend screen.

4) Setup Menu screen

See section 4-4.

5) Auto Start Timer screen

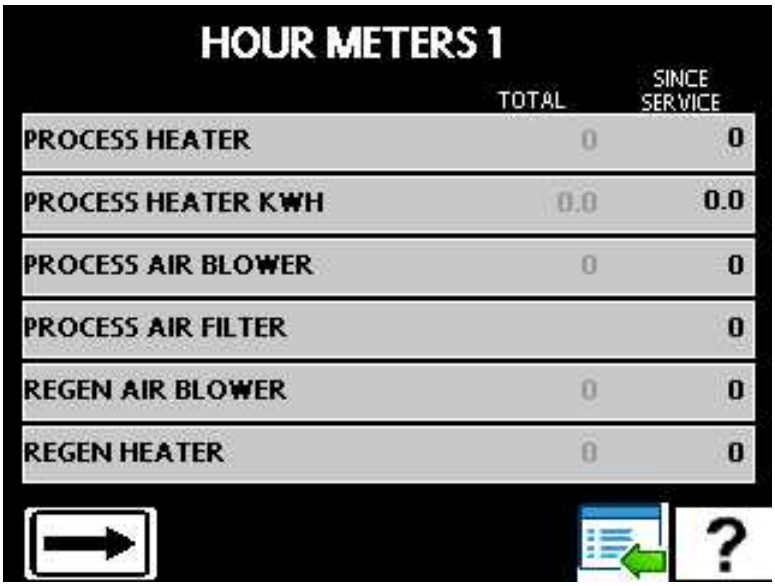


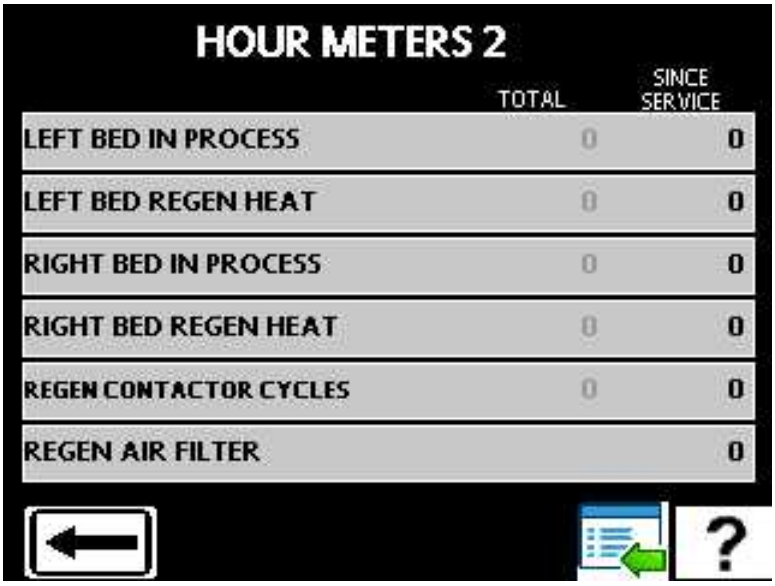
This screen is used to control the auto start functionality of the dryer. AutoStart must be enabled for entered times to take effect. A value of 12:00 AM is considered a non-value and has no effect. This screen requires supervisor password access.

6) Alarm History screen.

This screen displays a list of alarms that have occurred with descriptions and time stamps.

7) Hour Meter Display screens





These screens are used to view current hour meter and KWH meter values. Note that meters can only be reset via the Setup menu Hour Meter screens (see section 4-4).

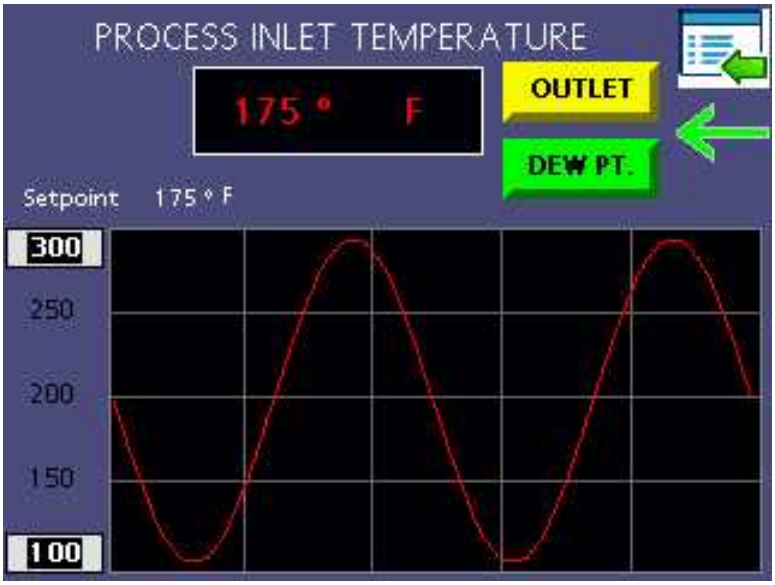
8) Users screen

This screen is used to change passwords for User1 or Super1. That user must be logged on to be able to change the password. User2 & Super2 passwords cannot be changed.

1) Splash screen

This screen is used to view the current PLC and HMI software versions.

Graphical Trend screens.



These screens are used to graphically track all dryer temperatures:

Process inlet (shown above)

Process exit

Regen heater

Regen exit

Dew point

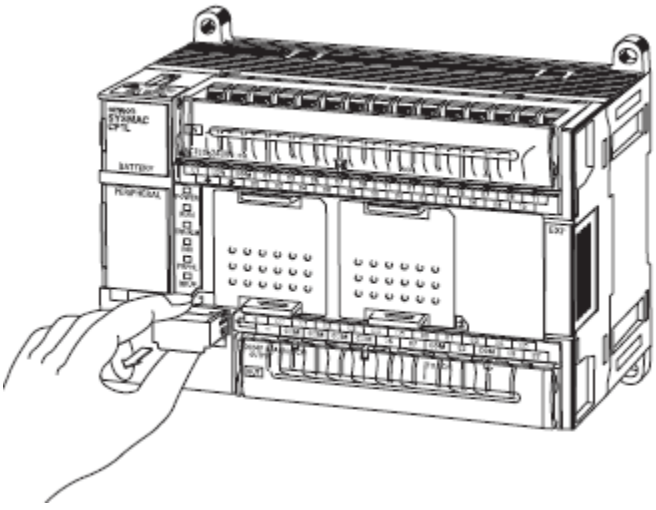
4-6 Program Upgrade Procedures

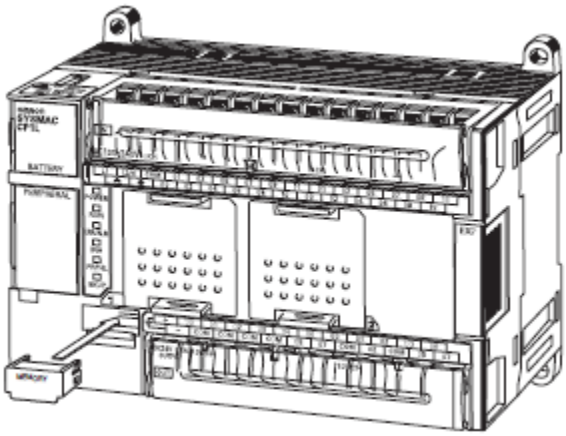
The DryPro PLC and touch screen use either a EEPROM module or compact flash memory card for program upgrades. Occasionally, a program upgrade will become available from ACS for the DryPro PLC, touch screen or both. Follow the instructions in this document to upgrade the specific component.

PLC Program Upgrade

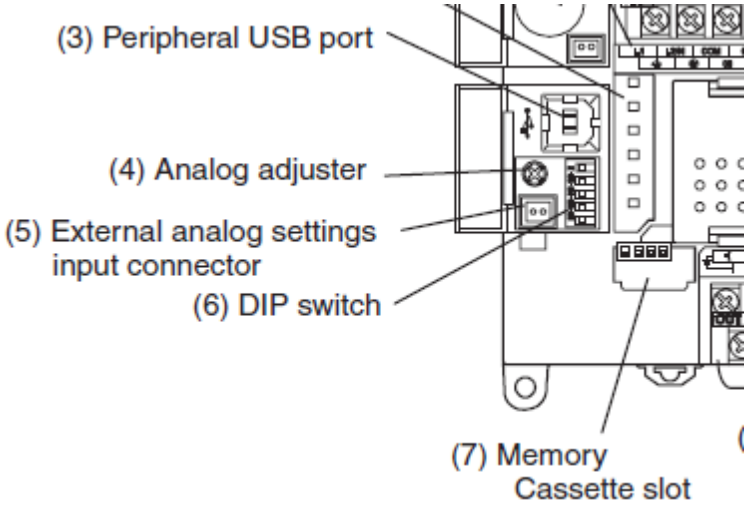
Dry-Pro PLC field upgrade instructions

- Record current dryer settings.
- Turn off power.
- Remove memory cassette cover.
- Insert Memory cassette.





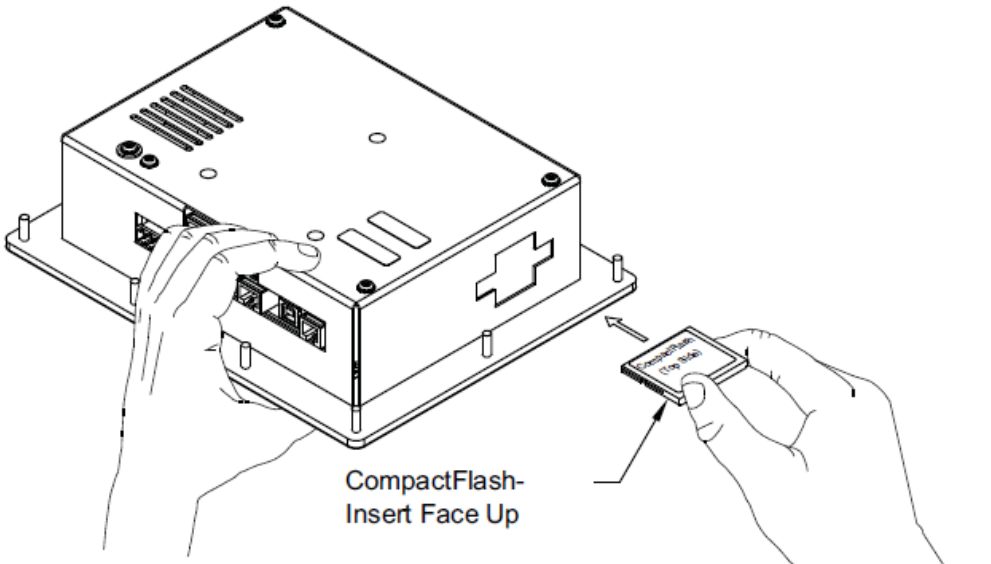
- Turn dip switch 2 on (slide to right side).



- Turn on Power.
- Wait for “Backup” indicator to turn off.
- Turn off power.
- Remove memory cassette.
- Replace cover.
- Turn off dip switch 2.
- Resume normal operation.
- Restore settings that have changed.
- Return upgrade kit to ACS for credit.
- Power up the dryer, inspect and verify the new version number(s)
- Start the dryer as required.

Dry-Pro HMI field upgrade instructions

- Turn off power.
- Remove existing compact flash – note orientation.
- Retain existing compact flash for re-installation.
- Insert upgrade compact flash.
- Turn on power.
- HMI will transfer upgrade database from compact flash.
- HMI will return to normal operation.
- Turn off power.
- Remove upgrade compact flash.
- Re-install existing compact flash.
- HMI is ready for normal operation.
- Return field upgrade kit to ACS for credit



Note: Do not remove or insert the CompactFlash card while power is applied. Refer to "Front Panel LEDs."

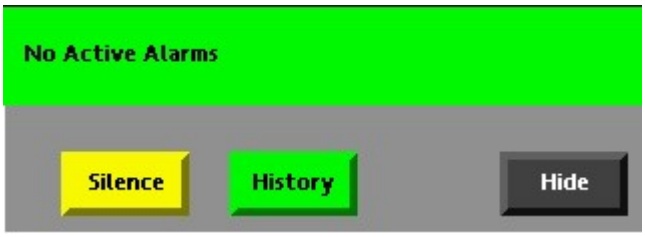
Dryer & Drying Hopper Faults

Faults fall into two broad categories.

- Critical Faults – Shuts down equipment.
- Non-Critical Faults – Does not shut down equipment.

Critical faults are assigned to conditions that could cause damage to either the dryer components or the material in the drying hopper while non-critical faults are assigned to conditions that would allow an undesirable or inefficient Process condition to exist.

Because the Process and regeneration systems of the dryer operate independently, it is possible that a condition exists in the regeneration system that prevents it from operating while the Process system continues to operate without error.



When a fault condition occurs, the screen displays an “Alarm Banner” showing the time, date and a brief description of the alarm. Optionally, the control will sound a klaxon and turn on an alarm lamp. The alarm banner, klaxon and lamp do not distinguish between critical and non-critical alarms. The klaxon can be silenced and the alarm lamp turned off by pressing the “Push to Silence” button on either the alarm banner or alarm history display. However, depending on the customer’s setup, the klaxon and lamp may repeat after a pre-set time if the alarm condition still exists.

If a dryer critical fault occurs then either a “Process Fault Push to Reset” or a “Regen Fault Push to Reset” button appears on the overview displays. Press the button to restart the failed system once the nature of the alarm is understood and corrected.

If a drying hopper critical fault occurs then disable and re-enable the drying hopper once the fault has been corrected.

Alarms generally take the following forms:

- If something should be “ON” and it’s “OFF” or vice versa.
  - Blower Motor Overloads should always be “ON”.
  - Heater isolation contactors should be “ON” when the heaters are in use and OFF otherwise.
- If a value is less than a pre-set limit.
  - Process supply air temperature low deviation alarm.
- If a value is greater than a pre-set limit.
  - Dryer high dew point alarm.

Alarm List

The following list describes all the alarms the control can detect. In general, those described as faults are critical and will shut down the process, regen, or both subsystems. Alarms and alerts are non-critical

Closed Loop Valve Position Alarm
Dewpoint Senser Error Alarm
High Dewpoint Alarm
Main Air Valve Position Fault
Process Air Blower Safety Fault
Process Air Dirty Filter Alert
Process Heater Temp Safety Fault
Process Heat High Temp Safety Fault
Process Heat High Deviation Fault
Process Inlet Sensor Error Fault
Process Outlet Sensor Error Alert
Process Low Deviation Alarm
Right Regen Heater Temp Safety Fault
Right Regen Heat High Deviation Fault
Right Regen Heat Low Deviation Fault
Left Regen Heater Temp Safety Fault
Left Regen Heat High Deviation Fault
Left Regen Heat Low Deviation Fault
Left Regen Heat Sensor Error Fault
Regen Air Blower Safety Fault

Regen Air Blower Safety Fault
Regen Air Dirty Filter Alert
Regen Exhaust Sensor Error Alert

Temperature Alarms

The control checks for high low and fail to change (loop break) alarm conditions on the regeneration inlet temperature and the drying hopper process supply air temperature. It also checks for high temperature on the dryer exit and the pre-cooler (or after-cooler) if the option is installed.

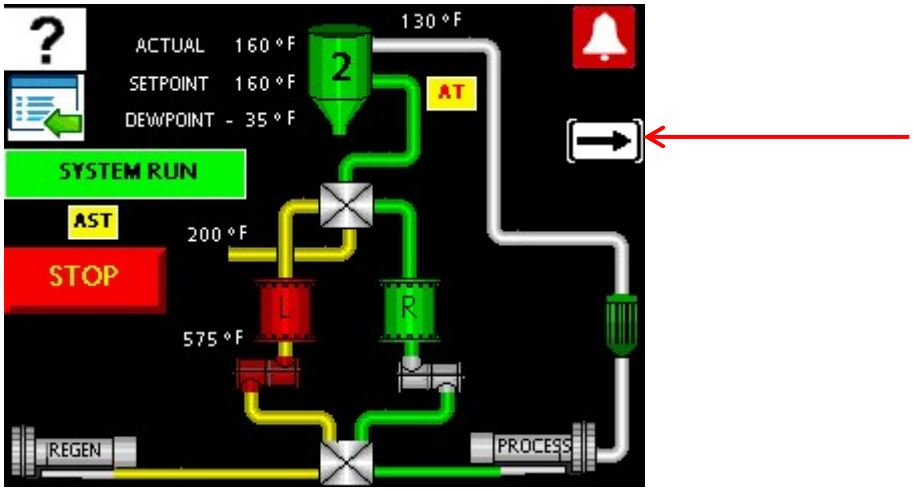
A high temperature alarm is generated when the actual temperature rises above a pre-set limit, or when the difference between the actual temperature and a controlling set point (if one exists) is greater than a calculated limit. High temperature alarms are always treated as critical alarms.

A low temperature alarm is generated when the actual temperature falls below a pre-set limit, or when the difference between the actual temperature and a controlling set point (if one exists) is less than a calculated limit. Low temperature alarms are always treated as non-critical alarms.

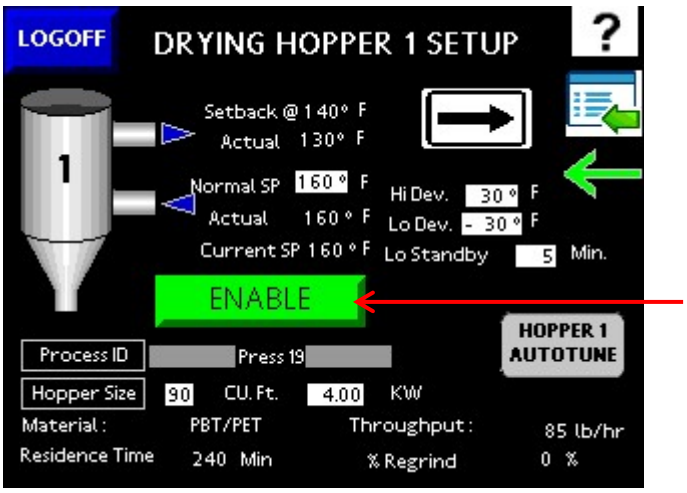
A loop break alarm is generated when a controlled temperature fails to rise by X degrees every Y seconds while its heaters are consuming power. The setting values associated with loop break alarms are automatically calculated following the completion of an auto-tune. Loop break alarms are always treated as critical alarms.

4-7 Multi-Hopper Dryer Control Operation

The DryPro Control for a dryer with more than one hopper is very similar to the standard single hopper version. However, there a few differences that need to be noted.



You will notice the addition of the black and white arrow on several setup screens. This allows for a convenient transition from one hopper or dryer setup screen to the next. The single hopper control did not require this arrow.



The other key difference is the addition of the new pushbutton on the Drying Hopper screens. For example, the green “Enable” icon on this screen is new. There may be other text that is shown in the box. Pressing the box will perform a specific function depending on the text shown:

1	ENABLE	(Dryer is off and hopper is currently disabled)
2	DISABLE	(Dryer is off and hopper is currently enabled)
3	START	(Dryer is on and hopper is currently off)
4	STOP	(Dryer is on and hopper is currently running)

Chapter 5: Operation

5-1 Pre-Startup Checks

1. Verify that the drying hopper is clean of rust-prohibitive oil or any foreign objects.
2. Verify that process and return hose connections are tight.
3. If your dryer has a water-cooled aftercooler/Precooler or closed loop cooler, make sure that sufficient cooling water flows properly through the coil and that you have bled any trapped air from the system. Make sure that the aftercooler/Precooler or closed loop cooler has the proper supply water temperature.
4. Check all companion equipment, such as the sight glass loader and drying hopper loader; verify that all convey tubing is in place and the loading system is ready for operation.
5. Verify that all electrical connection are **tight** and the unit is properly grounded.
6. With main power on, turn the dryer on until the process blower starts, verify blower rotation. (see section 3-3)

⚠CAUTION

Clean the rust-preventing oil from inside the drying hopper.
Failure to clean the hopper fouls the desiccant and voids your warranty!

5-2 Startup

1. Turn on (energize) the disconnect switch in your power drop.
2. Turn the system **ON/OFF** switch to **ON** to energize the display panel.
3. Close the slidegate at the bottom of the drying hopper.
4. On three-phase models, make sure that the blowers turn in the right direction.
5. Fill the drying hopper with material.
6. Turn the **DRYER ON/SEQUENCE SHUTDOWN** switch to **ON** to start the dryer.
7. The process blower will start.
8. Set the process set point on the temperature controller to the recommend drying temperature provided by the resin manufacturer. Press and hold the Auto-Tune key on the process temperature controller for two (2) seconds to initiate the auto-tune function.
9. After the proper pre-drying time for the initial hopper fill has elapsed, fully open the drying hopper slide gate.

NOTICE

To allow proper residence time during continuous processing, maintain the material level in the hopper at the midpoint of the air trap assembly.

5-3 Shutdown

1. Turn off the conveying system supplying the drying hopper.
2. When processing is complete, close the hopper slide gate and shut down any in-line companion equipment, such as the aftercooler.
3. Turn the **dryer ON/OFF** selector switch to the **SEQUENCE SHUTDOWN** position. The sequence shutdown operation turns off process heaters and keeps the process blower on for twenty minutes to cool down the process. The regeneration cycle of the off-line bed completes the cycle before the dryer shuts down completely.
4. To override the sequence shutdown turn the system **ON/OFF** switch to **OFF**.
5. To completely shut off the unit after sequence shutdown has completed, turn the system **ON/OFF** switch to **OFF**.
6. If needed, empty the drying hopper.
7. For maintenance or a long term shutdown, open (de-energize) the electrical disconnects at the dryer and at the power drop.

Chapter 6: Operation

6-1 Work Rules

The installation, operation, and maintenance of this equipment is to be conducted in accordance with all applicable work and safety codes for the installation location. This may include, but is not limited to, OSHA, NEC, CSA, and any other local, national, and international regulations.

In addition, you must observe the following specific work rules:

- ☑ Keep these operating instructions on hand and follow them when installing, operating, or maintaining your dryer.
- ☑ If these instructions become damaged or unreadable, you can obtain additional copies from the manufacturer.
- ☑ Only qualified personnel familiar with this equipment should work on or with this unit.
- ☑ Work only with approved tools and devices.

Disconnect power before servicing your dryer. If the disconnect switch you installed has a lockout, lock it in the **OFF** position before you perform any maintenance or service.

6-2 Servicing Process Air Filters

⚠CAUTION

Operating the dryer without the process air filter installed voids your warranty! Filter cleaning is an important part of your dryer maintenance program.

Our dehumidifying dryers have a single cartridge canister-type filter in the process and conveying air loop. The process filter is mounted above the process blower on the rear of the dryer. The conveying filters are located under the drying hopper next to the conveying blowers. These filters protect the blowers from plastic fines drawn in from the drying hopper. Regular filter cleaning is essential to keep your dryer operating at peak efficiency.

You can wash or blow out the filters, but remember, you reduce dirt holding capacity with each washing. The risk of dirt reaching the clean side of the filter during cleaning, plus possible filter damage from high pressure washing or blowing, makes washing a gamble.

You can carefully clean or wash the filter when airflow becomes restricted. Do **not** wash filters more than six (6) times or use them for more than a year, whichever comes first.

Use a detergent that won't damage filter media. Such a detergent permits easy removal of dirt particles through flushing and rinsing. An effective detergent removes the fine particles from the pores of the filter media.

The filter manufacturer recommends FM 1400 washing compound. It is formulated specifically for air filter element cleaning. It is non-sudsing and works in hot or cold water. FM 1400 contains biodegradable synthetic detergents and is non-phosphate, non-NTA. For more information, contact Filter Service Corporation, 2603 A West Main, Farmington, NM, 1-505-326-1127.

Recommendations for Cleaning and Replacing Filters

- Turn off and/or lock out electrical power to the dryer.
- Remove the threaded fastener securing the filter access cover, and then remove the cover.
- Remove the nut on the center retaining rod to remove the filter cartridge.

Vacuuming

Try vacuum-cleaning a soiled filter first. Vacuuming removes most large particles and surface contaminants, and may suffice for the first time you clean a filter. Use a commercial-duty (recommended) or household vacuum cleaner. Vacuum the filter from the air intake (dirty) side only.

Cleaning with Compressed Air

Blow clean, dry compressed air up and down the pleats, blowing out the filter from the clean side. Remove loose dirt from the filter with compressed air or a water hose. Compressed air should be less than 100 psi (689.5 kPa/6.89 bars). Use a $^{1}/_{8}$”
(3 mm) dia. nozzle at least 2” (5 cm) away from the filter. Don’t shoot the air in a crisscross motion against the grain of the pleats—you may damage it.

Washing

As a last resort, wash the filter. However, do so only if the pressure drop is too high from fine dirt embedded in the filter, or if oily mist is present near the intake air location. Soak in a solution of FM 1400 or comparable detergent and warm water from five to ten minutes, then gently agitate for several minutes.

Rinse thoroughly with clean water to remove all detergent.

⚠CAUTION ***Let the filter dry completely before returning it to service! A damp filter can contaminate the closed loop system of the dryer.***

Do not use a light bulb to dry the filter. You should get satisfactory filtration after second or third washings; however, dirt-holding capacity of the filter **decreases** after each washing.

After each cleaning:

- Inspect the filter element. Briefly hold a light bulb behind the element and look for any fatigued paper or residual dirt. Inspect for holes and tears by looking though the filter toward a bright light. Check for damaged gaskets or dented metal parts. Do not re-use a damaged filter!
- Inspect the end plates. Any damage here can allow air to bypass the filter.
- Look for rust on the end plates and metal core. Rust particles can flake off and contaminate the dryer and resin.
- Check the gasket for damage. A damaged gasket allows contaminants into the process. Replace as needed.
- Allow the filter to dry before re-using. Circulate warm air at less than 160ºF (71ºC). Do not use a light bulb to dry the filter

Preventative Maintenance Checklist

Dehumidifying Dryer Systems

System model #	Serial #

Every week	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By	Date/ By
Inspect all filters for wear, replace/clean if dirty or worn.													

Every month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lock out electrical power and inspect electrical wiring for integrity.												
Lock out electrical power and check heater elements for continuity using an ohmmeter.												
Check dew point and temperature tracking with an external dew point monitor and pyrometer.												
Visually inspect the shifting of the airflow valve during one cycle.												

Every year	Next scheduled inspection	Actual inspection Date/By	Next scheduled inspection	Actual inspection Date/By
Inspect desiccant. Replace if brown or broken.				

Every two years	Scheduled replacement date	Actual replacement Date/Work done by	Scheduled replacement date	Actual replacement Date/Work done by
Replace desiccant.				

- ***Photocopy this page for your maintenance records –***

6-3 Servicing the Dew Point Monitor

The accuracy of the dew point monitor on dehumidifying dryer systems depends on proper operation of the dew point sensor and the control board. The dew point sensor is in the process air stream and is therefore susceptible to contamination.

Dew point sensor life depends on:

Air temperature and flow passing over the sensor.

The amount of fines (dust) in the process air.

The amount of plasticizer vapor in the process air.

The dryer operator should monitor the initial dew point sensor readings and establish a periodic replacement schedule as needed.

⚠CAUTION

Do not attempt to check the continuity or resistance of the dew point sensor. The sensor will be destroyed!

6-4 Symptoms of Worn Desiccant

The moisture absorption capacity of the desiccant used in your dehumidifying dryer degrades after an indefinite period of time. Useful life depends on variables such as material moisture content, plasticizer vapors in the return air, and number of regeneration cycles.

Your dehumidifying dryer may need new desiccant if it exhibits any of the following symptoms:

- Plastic material is not being dried sufficiently (high scrap/reject rate).
- Air temperature at the top of the regenerating desiccant bed rapidly climbs to 350°F (177ºC) or more shortly after the start of regeneration, even though a saturated bed has just started heating.
- The process air dew point measured with a portable dew point monitor is higher than -10°F (-23ºC) throughout the process drying cycle.
- Smoke or dust blows out of the process air outlet.
- Noticeable amounts of desiccant in the beds is a medium-brown color or darker.

If you notice any of these signs, replace the desiccant in the desiccant beds. Desiccant replacement kits are available from the manufacturer's parts department. If you want, a service technician can repack desiccant beds at your site.

⚠WARNING

Desiccant material causes eye irritation! Breathing may be harmful and may cause skin irritation!

- ***Do not get in eyes.***
- ***Avoid prolonged contact with skin.***
- ***Use with adequate ventilation.***
- ***Wash thoroughly after handling.***

First Aid:

In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. If irritation persists, see a physician.

6-5 Replacing Worn Desiccant

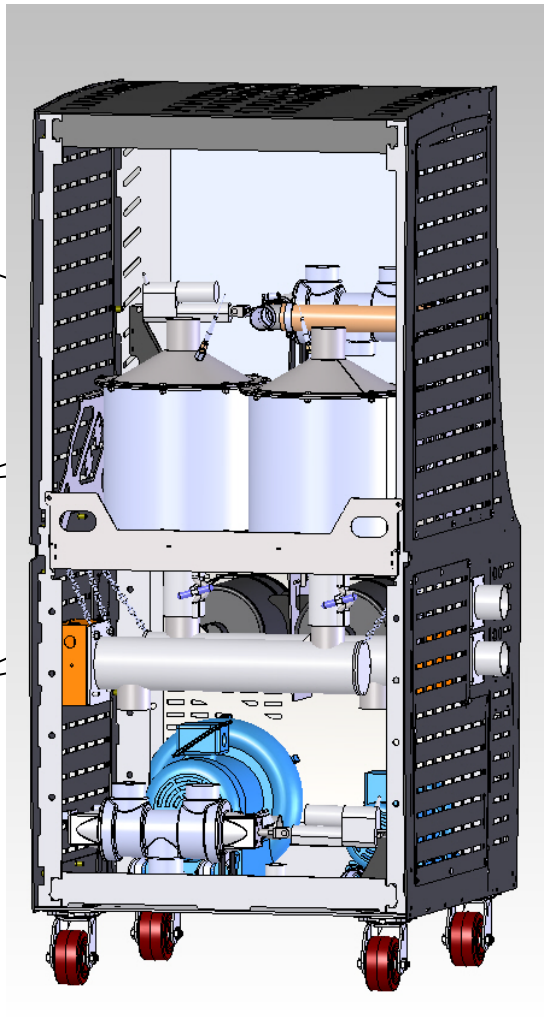
⚠CAUTION ***Make sure desiccant beds are sufficiently cool before replacing worn desiccant.***

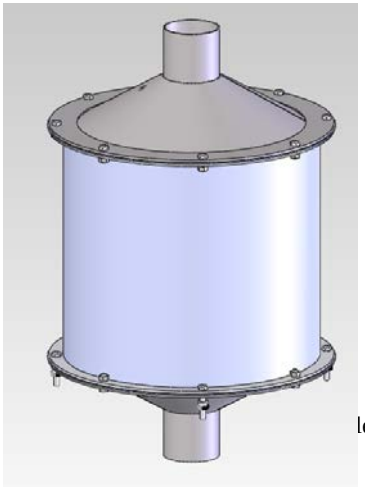
1. Disconnect the electrical supply.
2. Remove the rear panels to expose the desiccant beds.
3. Access the desiccant cans in one of the following ways:
    - **Remove the entire bed** from the frame.
    - Remove the hoses located at the top of the beds.
    - Remove the thermocouple and fittings. Make a note of the correct location for each.
    - loosen the 4 knurled nuts below the desiccant can.
    - Loosen the couplers below the desiccant can by turning the “T” handle.
    - twist the desiccant can clockwise and lift to remove.
    - **Remove only the top** cover then remove the screen inside by removing the single nut at the center of the can.
4. Replace the desiccant in one of the following ways:
    - **Replace the entire desiccant can** with a pre-packed desiccant can assembly available from parts and service.(see “Contact Information”, Can Assembly Part # 892.04505.00) Drop in the new cans, tighten the knurled nuts, and replace the thermocouple and fittings.
    - **Vacuum out the desiccant** from the can and proceed to step 5.

NOTICE **The desiccant levels for each unit are etched inside the cans for reference.**

Make sure the bed interiors are clean.

⚠CAUTION ***You should properly dispose of any discarded desiccant. Consult local disposal regulations for more information.***





led Nut

Can Assembly Part # 892.04505.00

The pre-packed can assembly is available from parts and service. See "Contact Information"

Before re-packing the beds, determine the proper amount of desiccant for the dryer being serviced. See Figure 7 on the following page for more information. Desiccant can assemblies pre-packed from the manufacturer are available and simply drop into the frame. Pre measures desiccant kits are also available from the manufacturer.

5. Carefully place half of the large bead in the bottom of the beds, in an even layer, on the bottom screen. Place the small bead on top of it, in an even layer. Carefully place an even layer of the remaining large beads over the small beads.
6. Install the top screen, making sure that the edge is in contact with the sides of the bed all the way around. Install the washers and nuts and tighten down. Gently tap the around the sides of the desiccant canister with a rubber mallet to settle the desiccant. As settling occurs, re-tighten the nuts. Repeat the tapping and tightening process until little additional settling occurs.
7. Install the covers and gaskets on the beds, making sure they are tight and sealed. Replace desiccant bed gasket if necessary.
8. Re-connect any hoses that were disconnected.

9. Re-install the rear and side shrouds. Re-connect the compressed air supply and electrical power.

Figure 7:

Required Desiccant Amounts per Bed; Type 4X Desiccant (2 beds per unit)

Dryer CFM	Large bead (Type 4X)			Small bead (Type 4X)			Total per bed	
	Part no.	lbs.	Kg	Part no.	lbs.	Kg	lbs.	Kg
50	W00000892	1.5	0.68	W00000893	10.5	4.75	12	5.44
100		3.0	1.362		21.0	9.534	24.0	10.896
150		9.0	4.086		30.0	13.620	39.0	17.706
225		9.0	4.086		30.0	13.620	39.0	17.706

Type 13X Desiccant

Dryer CFM	Large bead (Type 13X)			Small bead (Type 13X)			Total per bed	
	Part no.	lbs.	Kg	Part no.	lbs.	Kg	lbs.	Kg
50	W00018050	1.5	0.68	W00018051	10.5	4.75	12	5.44
100		3.0	1.362		21.0	9.534	24.0	10.896
150		9.0	4.086		30.0	13.620	39.0	17.706
225		9.0	4.086		30.0	13.620	39.0	17.706

6-6 Replacing the Process Heater

Our dehumidifying dryers use Calrod-type heater elements mounted in a heater tube located in the top rear of the cabinet. The wattage of the heater varies with model, voltage, temperature range, etc., but the replacement procedure is the same.

If the process heater is mounted to the hopper, contact the manufacturer for the appropriate replacement procedure.

Disconnect and lock out power before you replace heater elements!

Use the following procedure to replace the process heater:

1. Remove the bolts securing the process heater access cover.
2. Sketch the heater wiring configuration so you can properly re-wire the heater.
3. Remove the wires to the heater plate assembly being removed or replaced.
4. Remove the bolts securing the heater plate assembly, and slide out the assembly.
5. Remove the heater from the mounting plate by removing the large brass nuts and washers.

6. Re-install the heater and heater plate assemblies in reverse order. Install new heater gaskets and securely tighten all fasteners.

⚠CAUTION **Heater loops should not touch each other. "Hot Spots" lead to premature heater failure!**

7. Reinstall the wires based on the sketch you made earlier.
8. Secure the heater access cover.

6-7 Replacing the Regeneration Heater

The dehumidifying dryers use heater elements located below each desiccant bed.

⚠WARNING ***Disconnect and lock out power before you replace heater elements!***

1. Remove the cover plate secured by bolts.
2. Sketch the heater wiring configuration so you can properly re-assemble the heaters.
3. Remove the wiring for the heater being removed or replaced.
4. Remove the bolts securing each heater mounting plate. Slide out the heater.
5. Re-install the new heaters in reverse order. Install new heater gaskets and securely tighten all fasteners.

⚠CAUTION ***Heater loops should not touch each other. "Hot Spots" lead to premature heater failure!***

6. Re-install the wiring based on the sketch you made earlier.
7. Secure the heater access cover.

Chapter 7: Troubleshooting

Problem	*Possible cause*	Corrective action
Little or no air coming from the process delivery tube.	Dirty filter.	Clean or replace filter.
	Desiccant beds are contaminated by material or plasticizer leaking into the system.	Replace desiccant.
	Blower overload has tripped.	Fix the problem and reset the overload.
	Blower fins filled with dust or contaminants.	Remove blower side plate, clean baffles, replace.
Suction in delivery tube, pressure from the return tube.	Phase is reversed on power drop coming into the dryer.	**Stop the dryer.** If the dryer was connected to the drying hopper, check to see if the desiccant and process air heater has been contaminated with resin. If so, replace the desiccant and remove any resin carry-over. Otherwise, change the phase of two legs of the three-phase power drop.
Loss or reduction of process air temperature.	Process heaters are faulty.	Check for open heaters. Replace if required.
	Solid-state temperature controller faulty.	Replace.
	Process temperature was adjusted in error by plant personnel.	Make sure that plant personnel are aware of the proper temperature set point. A sign posted next to the controller is helpful.
Loss or reduction in drying capacity.	Process heaters are faulty.	Replace.
	Desiccant beds are contaminated.	Replace desiccant.
	Material being dried differs from material specified at the time of purchase.	Drying systems are designed for the material which was originally specified. Different materials may need a longer residence time or different drying temperature.
	Break in flex hose to/from drying hopper.	Inspect for air leaks; replace if necessary.

Problem	Possible cause	Corrective action
Loss or reduction in drying capacity. (Cont'd.)	Airflow valve sticking or failing to shift.	Check for proper operation of valve actuators. Repair or replace if necessary.
	Blower fins filled with dust or contaminants.	Remove blower side plate, clean baffles, replace. Replace filter elements.
PLC Regeneration Bed LED indicators both off.	Insufficient power to PLC (Power LED is off).	Check power supply and power wiring to PLC.
	Faulty PLC (PLC Power light is on, Run light is off, and/or Error light is on).	Replace PLC.
PLC Regeneration Heater Left/Right output indicators both off.	Regenerating bed cool down.	None.
	Blower Input indicator is off.	Verify that blower contactor is on. Check input wiring to PLC.
	Process air in high-temperature condition.	None.
	Insufficient power to PLC (Power light is off).	Check power supply and power wiring to PLC.
	Faulty PLC (PLC Power light is on, Run light is off, and/or Error light is on).	Replace PLC.
Material in drying hopper cakes, or meltdown occurs.	Process temperature set too high due to operator error.	Check resin manufacturer's data sheet for proper drying temperature. Make sure plant personnel are aware of the correct process temperature set point.
	High temperature alarm not set properly.	Reset high temperature alarm.
	Process set point is out of acceptable range.	Restore temperature controller to factory pre-sets.
	Function set for degrees Celsius (ºC), set point at degrees Fahrenheit (ºF).	Verify correct Celsius or Fahrenheit settings.
Poor dew point performance.	Burned out regeneration heater.	Repair or replace.
	Contaminated or worn out desiccant.	Replace.
	Leaking process air hoses.	Repair or replace.
	Dryer operates beyond its capacity.	Check dryer and drying hopper sizing.
	Bad dew point sensor.	Replace.
	Fouled dew point sensor manifold.	Clear obstruction. Air should flow freely through sensor.

Problem	Possible cause	Corrective action
Nothing displays when the controller is turned on.	The internal mechanism is not inserted properly into the housing.	Properly insert the internal mechanism into the housing.
	The power supply is not connected to its terminals properly.	Properly connect the power supply to the power supply terminals.
	No power is supplied, or the supplied power is not within the specified range.	Supply a voltage of 85 to 125 VAC to the power supply terminals of the controller.
	Disconnect switch or Control Power switch not set to **ON**. Control Power fuse blown.	Check control power fuse for continuity. Turn disconnect switch and control power switch **ON**.
Process value is abnormal or not obtained.	Input polarity on thermo-couple is wrong or connection is wrong.	Properly wire the terminals.
	No compensating lead wires used for extension of the thermocouple.	Use proper compensating lead wires and terminals.
	Thermocouple and controller are connected by wires other than proper lead wires.	Use a dedicated thermo-couple connector. If a connector is a metal different from the thermocouple and controller, a temperature error may result.
	Sensor is broken or short-circuited.	Replace with a good sensor.
	The controller is influenced by noise or other induction.	Separate input wires as far as possible from the origin of the noise.
	Celsius temperatures used instead of Fahrenheit or vice versa.	Setup mode level 2 display d-U. S-V display shows setting.

Determining Temperature Controller Errors or Sensor Errors

Using a Thermocouple

If the controller displays a temperature that is close to room temperature (70ºF/21ºC) when you short-circuit controller input terminals, the controller is normal and the sensor is probably broken, short-circuited, or incorrectly wired.

Using a Platinum Resistance Thermometer

If the controller displays a temperature of about 0.0°C (32ºF) when you insert a 100-ohm resistor between terminals **A** and **–B** of the controller, and you short-circuit controller terminals **+B** and **–B**, the controller is normal and the sensor is probably broken, short-circuited, or incorrectly wired.

Chapter 8: Appendix

8-1 Technical Assistance

Parts and Service Department

The ACS Customer Service Group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. ACS welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

For immediate assistance, please contact:

- North, Central and South America, 8am – 5pm CST +1 (800) 483-3919 for drying, conveying, heating and cooling and automation. For size reduction: +1 (800) 229-2919.
  North America, emergencies after 5pm CST (847) 439-5855
  North America email: acsuscanadacustserv@corpemail.com

- Mexico, Central & South America
  Email: acslatinamericacustserv@corpemail.com

- Europe, Middle East & Africa +48 22 390 9720
  Email: acseuropecustserv@corpemail.com

- India +91 21 35329112
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Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations.

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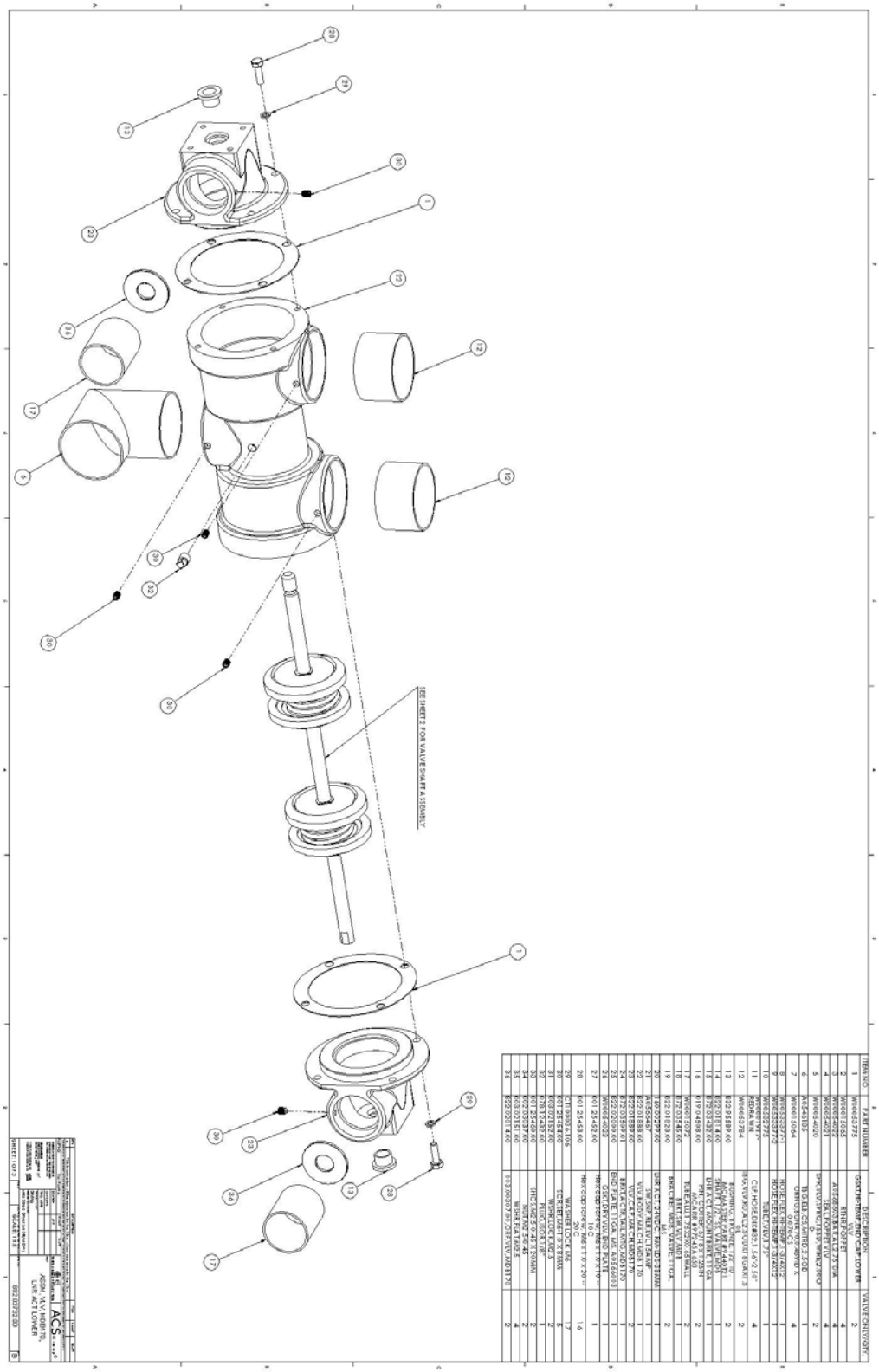
The following design information is provided for your reference:

1. No modifications are allowed to this equipment that could alter the CE compliance
2. Ambient temperature: 0 degrees Celsius – Maximum (104 degrees Fahrenheit)
3. Humidity range: 50% relative humidity
4. Altitude: Sea level
5. Environment: Clean and non-explosive
6. Radiation: None
7. Vibration: Minimal, i.e. machine mounting
8. Allowable voltage fluctuation: +/- 10%
9. Allowable frequency fluctuation: Continuous +/- 1%
   Intermittent +/- 2%
10. Nominal supply voltage: 460/3/60 (Verify on serial number tag)
11. Earth ground type: TN (system has one point directly earthed through a protective conductor)
12. Power supply should include a ground connection.
13. Over-current protection is supplied in the dryer, but additional protection should be supplied by the user.
14. The door-mounted disconnect serves as the electrical disconnect device.
15. Dryer is not equipped with local lighting.
16. Functional identification
17. Dryer is equipped with a CE mark
18. Dryer is supplied with an operating manual in the language of the destination country.
19. Cable support may be required for power cord, depending on final installation.
20. No one is required to be in the interior of the electrical enclosure during the normal operation of the unit. Only skilled electricians should be inside the enclosure for maintenance.
21. Doors can be opened with a screwdriver, but no keys are required.
22. Two-hand control is not required or provided.
23. All dryers should be moved around and set in a place with a lift truck or equivalent.
24. There are no frequent repetitive cycles that require manual control—repetitive functions are automatic while the dryer is operating.
25. An inspection report detailing the functional test is included with the dryer.
26. The machine is not equipped with cableless controls.
27. Color-coded (harmonized) power cord is sufficient for proper installation.

8-3 Parts Diagrams

Valve Assemblies – MDB 85 & 170



Notes