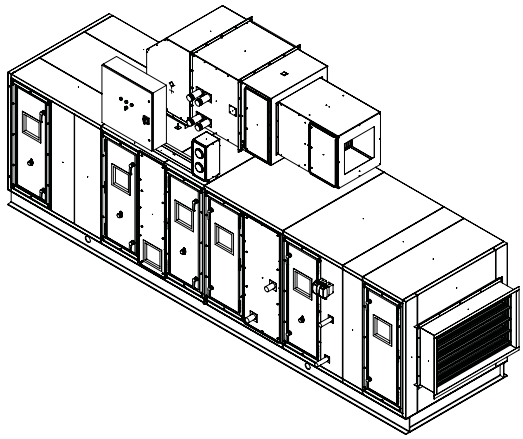
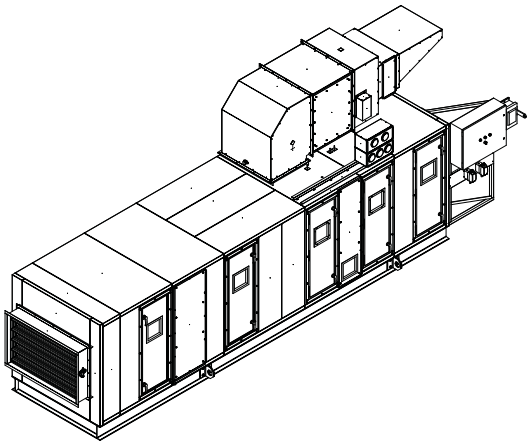
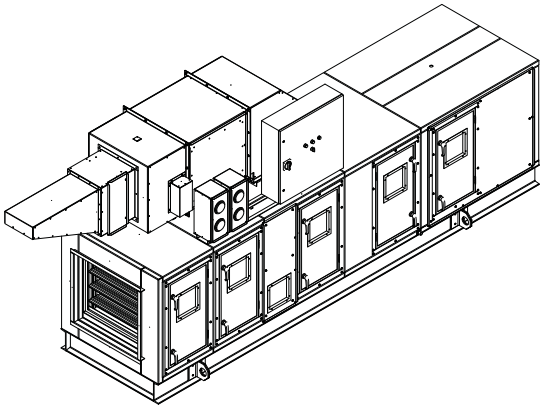
DryHandler Plus

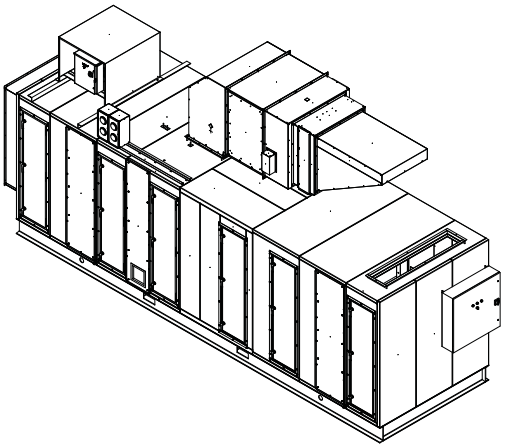
DHP Series 6000

Installation, Operation and Maintenance Manual









Desiccant
Dehumidification
System

STULZ®

MODEL NOMENCLATURE

DESICAiR Product Identification Number Example

DHP – 2750 – 107 – G – L – S

DHP= ***DryHandler Plus***

Nominal Process Airflow

750 CFM
1150 CFM
1500 CFM
2250 CFM
2750 CFM
3000 CFM
3750 CFM
4250 CFM
5500 CFM
6000 CFM
7250 CFM
7500 CFM
9000 CFM
10,000 CFM
11,250 CFM
12,000 CFM
15,000 CFM

Rotor Diameter

055 cm
077 cm
107 cm
122 cm
152 cm
173 cm

Reactivation Type

S =Steam
G =Gas
E =Electric

Cabinet Configuration

L=Left Hand
R =Right Hand

Cabinet Construction

S =Single Wall
D =Double Wall

Notice

Stulz Air Technology Systems, Inc.
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USA

Table of Contents

Appendices

List of Figures

List of Tables

1.0 GENERAL INFORMATION

1.1 About this Manual

This manual provides installation, operation, and maintenance information for the STULZ DryHandler® Plus (DHP) modular dehumidification system. The DHP system has many options, most of which are covered in this manual. The set of options included in your system are reflected in the engineering drawings provided in the Technical Data Package shipped with your system. They are also described in the order sheets and other submittal package documents for your system. You can use these documents to index into the sections of this document containing information relevant to your system.

1.2 Introduction

The DHP Series dehumidification system is designed and manufactured by Stulz Air Technology Systems, Inc. (STULZ) utilizing the latest, state-of-the-art control technology. Recognized as a world leader, STULZ provides dehumidification systems manufactured with the highest quality craftsmanship and finest materials available. The unit will provide years of trouble-free service if it is installed, operated and maintained in accordance with this manual. Damage to the unit from improper installation, operation or maintenance is not covered by the warranty.

Study the instructions contained in this manual. They must be followed to avoid difficulties. Spare parts are available from STULZ to ensure continuous operation. Using substitute parts or bypassing electrical or refrigeration components in order to continue operation is not recommended and will void the warranty.

1.2.1 Technical Data Package

This manual is part of the Technical Data Package provided with your unit. The Technical Data Package typically includes drawings, Technical Data Sheets, a Flow Diagram, a Test Report and component part manufacturer's manuals containing additional information about significant components. The Technical Data Package may also contain related STULZ manuals (for example, the *E^2 Series Microprocessor Controller for Desicair Dehumidification Systems IOM* manual). These documents should be stored in a safe place on or near the unit for reference.

A "Warranty Registration and Start-up Checklist" is also included in the Technical Data Package. This form must be completed during installation and returned to STULZ Product Support to activate your warranty.

1.2.2 Unit Nameplate

The Unit Nameplate, located in or near the main electrical enclosure (see Figure 12 for an example), is a quick source for useful information about your system, such as the unit model number, serial number and specific STULZ job number. This data will be required if you need to contact STULZ for assistance, warranty information, or spare parts. The Unit Nameplate also includes the process and reactivation airflow targets, along with their corresponding rotor pressure drops. Refer to Section 4.4.1 for more Unit Nameplate details.

1.3 Safety Summary

Read and understand all instructions in this manual relating to the specific function you are to perform, prior to starting the task.

Carefully read and understand all notes, cautions and warnings contained in this manual that pertain to the task you are to perform.

Carefully read and understand all WARNING and/or CAUTION plates located on the unit.

Never operate the unit with any cover, screen, or panel removed unless the instructions specifically instruct you to do so. When required to operate the unit with a cover, screen, or panel removed, do so with extreme caution.

1.4 Warnings and Cautions

The following is a condensed list of the WARNINGS and CAUTIONS included in this manual. All personnel who operate, service or maintain the dehumidifier should read and understand these WARNINGS and CAUTIONS. WARNINGS indicate a threat to personnel safety. CAUTIONS indicate a threat of equipment damage.

Prior to using any chemicals, cleansers, or solvents, refer to the manufacturer's Safety Data Sheets (SDS) for proper handling and usage of such materials.

WARNING

HIGH VOLTAGE IS USED IN THIS EQUIPMENT. FAILING TO OBSERVE SAFETY PRECAUTIONS MAY RESULT IN DEATH OR INJURY.

WARNING
DO NOT CONTACT HIGH AC VOLTAGE CONNECTIONS WHEN INSTALLING OR OPERATING THIS EQUIPMENT. WHENEVER THE NATURE OF THE OPERATION PERMITS, KEEP ONE HAND AWAY FROM THE EQUIPMENT TO REDUCE THE HAZARD OF CURRENT FLOWING THROUGH VITAL ORGANS OF THE BODY.

WARNING
NEVER WORK ON ELECTRICAL EQUIPMENT UNLESS THERE IS SOMEONE NEARBY FAMILIAR WITH THE OPERATION AND HAZARDS OF THE EQUIPMENT WHO IS COMPETENT TO ADMINISTER FIRST AID. WHEN OPERATORS AID THE TECHNICIAN, THE TECHNICIAN MUST WARN THEM ABOUT DANGEROUS AREAS.

WARNING
WHEN POSSIBLE, DISCONNECT MAIN POWER BEFORE PERFORMING ANY MAINTENANCE TO THE ELECTRICAL SYSTEM. DEADLY VOLTAGES ARE USED IN THE UNIT. SWITCHING THE CONTROL PANEL MODE SELECTOR TO "OFF" DOES NOT DISCONNECT POWER TO COMPONENTS OF THE UNIT.

WARNING
MULTIPLE POWER SOURCES MAY BE USED IN THE UNIT. ENSURE POWER IS DISCONNECTED FROM ALL SOURCES BEFORE SERVICING POWERED COMPONENTS.

WARNING
DO NOT ALLOW THE UNIT TO SWING WHILE SUSPENDED FROM A LIFTING DEVICE. FAILURE TO OBSERVE THIS WARNING MAY RESULT IN INJURY TO PERSONNEL AND DAMAGE TO THE EQUIPMENT.

WARNING
DO NOT ALLOW ANYONE UNDER THE EQUIPMENT WHILE IT IS SUSPENDED FROM A LIFTING DEVICE.

WARNING
DO NOT TOUCH HOT COMPONENTS. THE DESIGN REACTIVATION TEMPERATURE RANGE IS 250 °F TO 300 °F. COMPONENTS OF THE REACTIVATION SYSTEM MAY BE EXTREMELY HOT DURING OPERATION. BE ABSOLUTELY CERTAIN THAT THE UNIT AND/OR REACTIVATION COMPONENTS ARE COOL BEFORE ATTEMPTING TO WORK ON ANY COMPONENTS.

WARNING
UNLESS SPECIFICALLY INSTRUCTED, DO NOT OPERATE THE EQUIPMENT WITHOUT ALL GRILLES, GUARDS, LOUVERS AND COVERS IN PLACE AND TIGHTLY SECURED. WHEN INSTRUCTED TO OPERATE WITHOUT ALL GRILLES, GUARDS, LOUVERS, AND COVERS IN PLACE, DO SO WITH CARE.

WARNING
DUE TO AUTOMATIC RESETTING OF INTERNAL OVERLOAD DEVICES, BLOWER MOTORS MAY START UNEXPECTEDLY WHEN THE UNIT IS RUNNING.

WARNING
REFRIGERANT MAY BE USED WITH THIS EQUIPMENT. DEATH OR SERIOUS INJURY MAY RESULT IF PERSONNEL FAIL TO OBSERVE PROPER SAFETY PRECAUTIONS. GREAT CARE MUST BE EXERCISED TO PREVENT CONTACT WITH LIQUID REFRIGERANT, OR WITH REFRIGERANT GAS DISCHARGED UNDER PRESSURE. THE EXTREMELY LOW TEMPERATURE RESULTING FROM THE RAPID EXPANSION OF LIQUID REFRIGERANT, OR REFRIGERANT GAS RELEASED UNDER PRESSURE, CAN CAUSE SUDDEN AND IRREVERSIBLE TISSUE DAMAGE THROUGH FREEZING. AS A MINIMUM, ALL PERSONNEL MUST WEAR THERMAL PROTECTIVE GLOVES AND A FACE SHIELD OR GOGGLES WHEN REFRIGERANT CONTACT WITH THE SKIN OR EYES IS POSSIBLE.

WARNING
APPLYING EXCESSIVE HEAT TO ANY COMPONENT IN A CHARGED REFRIGERANT SYSTEM CAN CAUSE EXTREME PRESSURE

THAT MAY RESULT IN A RUPTURE OR EXPLOSION. EXPOSING REFRIGERANT TO AN OPEN FLAME OR A VERY HOT SURFACE MAY GENERATE PHOSGENE GAS, A HIGHLY POISONOUS AND CORROSIVE GAS, AS WELL AS HYDROCHLORIC AND HYDROFLUORIC ACID.

WARNING
REFRIGERANT IS A COLORLESS, ODORLESS, NONTOXIC GAS AND IN A WELL-VENTILATED AREA IT DISPERSES RAPIDLY. HOWEVER, IT IS HEAVIER THAN AIR AND IN AN UNVENTILATED AREA IT PRESENTS DANGER AS A SUFFOCANT.

CAUTION Compressed air used for cleaning purposes should not exceed 30 psi (2.1 kg/cm^2). Do not direct compressed air against the skin. Use goggles or a full face shield for personal protection.

CAUTION Ensure that the dehumidifier power is properly phased. Improper phasing can cause severe damage to the equipment.

CAUTION Air intake and discharge openings must be completely free of obstructions. Ensure all access panels are installed and all doors securely latched.

CAUTION Do not use steam to clean coils.

CAUTION Do not operate the unit without air filters. It is better to operate the unit with dirty filters than no filters. Operating the unit without filters may void the warranty.

1.5 Theory of Operation

The DHP series is designed to dehumidify a space to a level below that attainable with a refrigeration-based dehumidification system. Moisture is removed from the air by being passed through a desiccant wheel (called the "rotor") that is impregnated with a dry desiccant. Process air (the air being dehumidified) is filtered, dehumidified and supplied to a conditioned space at a lower relative humidity and a slightly higher dry bulb temperature than its inlet condition.

Simultaneously, a second airstream (reactivation air) is filtered and heated by a reactivation heater system, then passed through a separate segment of the rotor. This heated reactivation air removes the previously adsorbed moisture from the desiccant rotor and exhausts it to an area other than that being conditioned. During operation, the desiccant rotor rotates through the process and reactivation airstreams of the dehumidifier at a constant speed. The two airstreams are separated by face and peripheral seals and by internal fluting in the desiccant rotor. Process and reactivation airstreams are counter-flow to maximize the efficiency of the adsorption process and to help prevent the rotor's flutes from fouling.

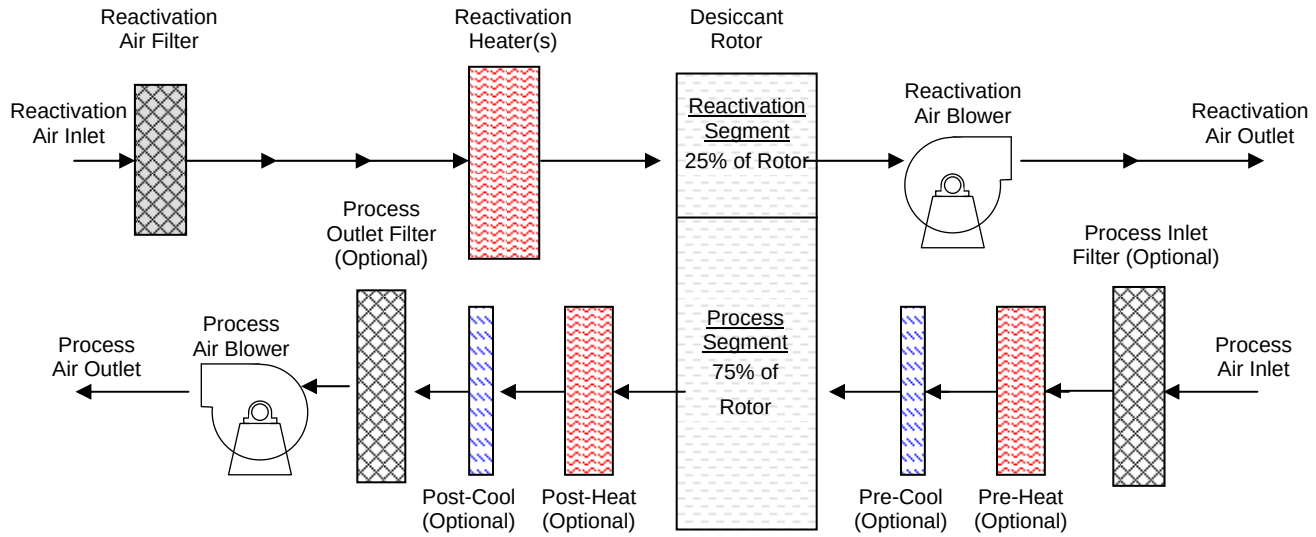


Figure 1. General Theory of Operation Diagram

The reactivation heater is sized to raise the temperature of the reactivation air entering the desiccant rotor approximately 190ºF above ambient (dependent upon moisture adsorbed from the process air and reactivation airflows). The energy from the heated reactivation air is used to desorb the moisture. Reactivation discharge air temperature will vary and can be as high as 150ºF and moist. Controls are included in the unit to vary reactivation heat based upon the amount of moisture adsorbed from the process airstream.

The main dehumidifier components include the reactivation heater system (electric, steam or gas-fired), desiccant rotor, rotor seals, rotor drive gearmotor, blowers/motors, air filters, electrical controls, electrical contacts and indicator lights.

Optional pre-cooling may be used to cool and remove moisture from process air before it enters the desiccant rotor, improving drying performance.

Optional post-cooling may be used to cool process air after it passes through the rotor, removing heat added during desiccation.

Optional pre-heating may be used to prevent a chilled water coil from freezing or to heat outside air on units with make-up (outside) air requirements.

1.5.1 Capacity Control

There are four basic dehumidification control methods used in DHP systems; 1) D-Stat, 2) H-Trac, 3) Dew-Trac and 4) C-Trol II**.** The way your unit operates depends upon the features purchased with the unit. See the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* manual for detailed control sequences.

Control Method	Description
D-Stat	On/Off control based on the relative humidity limit.
H-Trac	Proportional control to maintain a relative humidity setpoint.
Dew-Trac	Proportional control to maintain a dewpoint temperature setpoint.
C-Trol II	Control to prevent condensation from forming on cold surfaces.

1.6 Design

The heart of all DHP systems is a rotary desiccant dehumidification system. DHP systems may integrate additional air conditioning and/or air control features to increase capabilities. The DHP series offers the most popular features available for dehumidification systems. These features are typically pre-designed as add-on modules which can be selected to meet your particular application. Refer to the Installation and Electrical drawing(s) provided with the unit to determine which features are included in your system. The various modules are integrated on a common mounting skid. Using this modular approach, STULZ can rapidly incorporate proven designs and custom features to efficiently manufacture units for quick delivery.

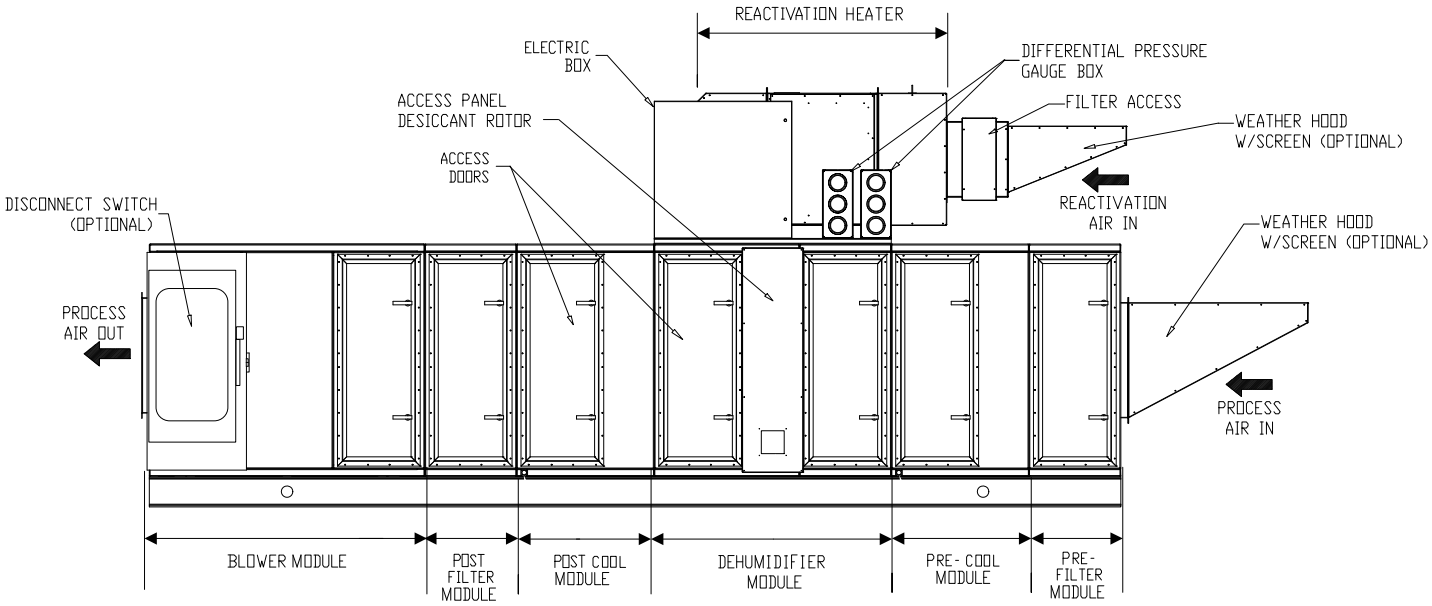


Figure 2. Generic DHP Module Layout

Figure 2 shows a general layout of a typical DHP system. Your unit may vary, so refer to the Installation drawing provided in your Technical Data Package for the modules that make up your unit. The Installation drawing also shows the location of major parts/features and the dimensions and weight of the unit.

1.6.1 Design Features

A typical DHP Series system has these features:

- Rugged, welded all-aluminum cabinet
- Insulated cabinet panels
- Digital control with user-friendly interface
- Continuous or automatic operation
- Inert, stable silica gel desiccant
- Non-toxic, non-corrosive desiccant
- Capable of withstanding 100% RH without adverse effect
- Counter-flow process and reactivation air patterns
- Process and reactivation air filters
- Easy access to internal components

1.6.2 Cabinet Construction

The cabinet modules are composed of double-wall insulated panels that have 2 inches of sound/thermal insulation sandwiched between aluminum inner and outer skins. The outer skins are isolated from the inner skin using rubber gasket material. Cabinet modules are welded together, and then bolted to a steel channel mounting base (skid) with rubber gasket between them. The skid and all exterior cabinet surfaces are coated with a durable weather-resistant paint to protect against corrosion.

Hinged access doors with positive latching handles are provided for easy maintenance / service access to all major components. The access doors are fully gasketed to prevent moisture infiltration.

Operator controls are conveniently located inside an electric box and are accessible from the front of the unit. A display/keyboard for the system controller (described in section 3.4.1) is typically located inside the electric box but may be shipped separately for remote mounting.

For the location of major components, refer to the Installation drawing provided in the Technical Data Package.

1.6.3 Air Inlets and Outlets

The unit will be equipped with inlet/outlet features as required. Available inlet/outlet options are detailed in this section.

1.6.3.1 Flanged Duct Connections

Flanged connections for ductwork are typically provided at all air inlets and outlets. Refer to the installation drawing provided with your unit for the size and location of all flanged inlets and outlets (excluding weather hoods or louvers).

1.6.3.2 Weather Hoods/Louvers

Weather hoods/louvers are used on outdoor units to prevent rain or snow from entering the unit. Screens are provided to prevent birds or other small animals from entering or nesting in the inlets or outlets.

Weather hoods are typically provided for reactivation air (inlet and outlet). Louvers or weather hoods may also be provided at the process (return) air inlet and the make-up (outside) air inlet, where applicable. Weather hoods/louvers are not an option for the process air outlet because it's always ducted into the space being conditioned.

1.6.3.3 Process Make-up and Return Air Inlets

The unit may include an outside (make-up) air inlet and a return air inlet for the process airstream. A certain amount of outside air is allowed to mix with process (return) air before it passes through the desiccant rotor. The combined process air is then dried for delivery to the conditioned space. Process airflows need to be set specifically for the unit. See the Airflow diagram, included in the Technical Data Package provided with the unit, for the target process make-up and return air volumes.

1.6.4 Air Control Dampers

Air control dampers are used to adjust airflows for optimal unit performance. Dampers are typically located at the inlets. The dampers may be actuated manually, by means of slide/lock control handles, or automatically by motorized actuators.

Depending on the unit configuration and/or features purchased with the unit, various dampers may be installed in the unit as delivered. Other dampers may need to be supplied by others. A process outlet damper is not typically supplied by STULZ, but an adjustable damper may be required to achieve the correct process airflow. Target process and reactivation airflows are provided on the Unit Nameplate. See Section 4.4.2, Rotor Pressure Drop Indication, for more information on airflow adjustment.

1.6.4.1 Reactivation Outlet Damper

As standard, a damper is supplied at the reactivation air outlet. The damper is manually actuated by means of a slide/lock control handle located near the reactivation blower outlet.

1.6.4.2 Reactivation Inlet Damper

Steam reactivated units include a motorized damper installed at the reactivation air inlet. Refer to Section 1.7.3.1 for more details about the reactivation inlet damper.

1.6.4.3 Process Make-up & Return Air Dampers

When outside (make-up) air is added into the process airstream, a set of dampers may be installed at the make-up and return air inlets. These dampers are typically manually actuated by means of slide/lock control handles.

1.6.5 Process Fan/Blower

The process fan/blower is located inside the unit. The fan and associated motor are mounted on vibration isolation springs. Depending on the unit configuration and/or the features purchased with the unit, the process blower may be belt- or direct-driven.

1.6.5.1 Belt Driven Process Fan/Blower

A V-belt drive system (belts and pulleys) ties the motor shaft to the fan shaft in belt-drive applications. If a Variable Frequency Drive (VFD) is also incorporated, the pulleys are fixed and motor/fan speed/airflow can be adjusted via the VFD. Otherwise, a variable pitch pulley is typically installed on the motor, allowing fan speed adjustment by changing the ratio between the pulleys. Adjusting fan speed is a more energy efficient way to set process airflow, at least as compared to using a process outlet damper.

1.6.5.2 Direct Driven Process Fan/Blower

The motor and fan (impeller/wheel) are directly coupled in direct-drive applications. Therefore, fan speed corresponds directly to motor speed and is fixed unless a VFD is incorporated to allow motor speed to be varied. A process outlet damper may be required to adjust airflow if there is no other means to adjust motor/fan speed.

1.7 Reactivation Heat

Three basic reactivation heater types are available in DHP units: Electric, Steam and Direct-Fired Gas. In all cases, heater output is modulated by the system controller based on reactivation heater temperature and reactivation air discharge temperature, as measured at the reactivation blower outlet. The controller tries to maintain reactivation discharge air temperature at a fixed setpoint as high as 140 °F, while maintaining the temperature of the reactivation air entering the rotor at a fixed setpoint as high as 290 °F.

Refer to the Unit Nameplate for reactivation heater type and capacity.

The general operation of each reactivation type is described below. Refer to the *E² Series Microprocessor Controller for* Desicair *Dehumidification Systems IOM Manual*, included in the Technical Data Package, for more detailed reactivation heater control information.

1.7.1 Electric Reactivation

Systems equipped with Electric Reactivation have electric resistance heating elements mounted in the reactivation airstream. Depending on required heater capacity, reactivation heat may be divided into multiple stages. The system controller modulates the first heater stage via a Silicon Controlled Rectifier (SCR). Subsequent heater stages are turned on/off by the system controller, while the first stage continues to modulate, ensuring smooth temperature control as stages are pulled in or dropped out. Refer to the Unit Nameplate for reactivation heater kilowatts (kW).

1.7.2 Steam Reactivation

Systems equipped with Steam Reactivation have steam coil(s) mounted in the reactivation airstream. Steam must be provided at a constant pressure (saturated, not superheated steam). Steam specialties, including piping, traps, strainers, and valves, must be supplied by others. Refer to the Unit Nameplate for steam pressure and condensate removal requirements. See section 2.7.2 for more details

The system controller modulates heat by varying the airflow through the steam coil(s). Increasing airflow through the steam coil(s) increases heat output, providing more drying capability when needed. Reactivation airflow is modulated via a Variable Frequency Drive on the reactivation blower motor.

1.7.3 Reactivation Blower VFD

Reactivation blower speed is used to vary reactivation airflow, and thus modulate reactivation heat, on steam reactivated units. Reactivation blower speed is controlled by a Variable Frequency Drive (VFD) responding to a control signal from the E² system controller. If the moisture load is high, the VFD's output increases the blower's speed to provide additional heat. The VFD may be located in the main electrical (control) enclosure, a separate electrical enclosure or inside the cabinet itself. The VFD is programmable and has been pre-set by the factory for optimal unit performance. Should adjustment be needed, refer to the VFD source manufacturer's instruction manual.

1.7.3.1 Reactivation Inlet Damper

Steam reactivated units include a motorized damper installed at the reactivation air inlet. The damper automatically opens when reactivation is active (when there is demand for reactivation and the desiccant rotor drive motor energizes). The damper closes when reactivation cycles off, the unit is turned off or power is lost (spring return damper actuator).

1.7.4 Direct-Fired Gas Reactivation

If equipped with direct-fired gas reactivation, a burner is mounted in the reactivation airstream. The burner ignition sequence is controlled by a flame safety relay device. Reactivation heat output is modulated by a gas valve corresponding to an analog output signal from the system controller. Refer to the Unit Nameplate for gas type, minimum required gas pressure and required gas heating capacity. Gas piping details can be found on the Gas Flow drawing. Also refer to the Electrical drawing for more information.

1.8 Air Treatment

1.8.1 Air Filtration

Disposable cartridge style air filters are standard for process inlet and reactivation inlet air. Process outlet and separate make-up air filters are also available as an option. Refer to the Installation drawing for filter access locations. Note: Operating the unit with dirty filters may reduce unit performance and/or damage the desiccant rotor.

! CAUTION Do not operate the unit without filters. It's better to operate the unit with dirty filters than no filters. Operating the unit without filters may void the warranty.

1.8.2 Chilled Water (CW) Pre/Post-Cooling

Chilled Water (CW) cooling coil(s) may be mounted in the process airstream before and/or after the desiccant rotor (see Figure 1). A stainless steel condensate drain pan is provided for each set of coils, including drain ports for directing condensate out of the cabinet. The chilled water source, pump, piping, etc. must be supplied by others.

1.8.2.1 CW Cooling Control

A proportional control signal is provided by the E² Series system controller to modulate chilled water flow via a proportional chilled water control valve. The valve must be field installed in the CW return line. The valve is typically supplied by others but may be purchased from STULZ and shipped loose for field installation. Refer to the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* included in the Technical Data Package for more detailed CW cooling control information.

1.8.2.2 Chilled Water Piping

Chilled water supply and return connections are provided at the rear of the cabinet. Refer to the Installation drawing for the type, size and location of the CW supply, CW return and condensate drain connections. See Section 2.7.4 for more details on chilled water piping.

1.8.3 Direct Expansion (DX) Pre/Post-Cooling

Direct Expansion (DX) refrigerant cooling (evaporator) coil(s) may be mounted in the process airstream before and/or after the desiccant rotor (see Figure 1). Multiple evaporator coils may be included and a single evaporator coil may have two independent circuits. Multiple circuits allow better temperature and/or humidity control. A stainless steel condensate drain pan is provided for each set of coils, including drain ports for directing condensate out of the cabinet. Refer to the Refrigeration and Electrical drawings provided in the Technical Data Package supplied with your unit for details about the cooling circuits.

1.8.3.1 DX Cooling Control

The E² Series system controller calculates a proportional output based on cooling demand. The output is divided into the number of available cooling stages and the cooling stages are pulled in as needed. Refer to the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* included in the Technical Data Package for more detailed DX cooling control information.

1.8.3.2 Refrigerant Piping

Evaporator coil suction and liquid (refrigerant distributor) connections for each cooling circuit are located inside the unit. Refrigerant is used to transfer the heat from each evaporator coil circuit to a Remote Condensing Unit (RCU). RCU(s), piping and all necessary refrigeration components (i.e. thermal expansion valve and drier/strainer) must be supplied and installed by others. See Section 2.7.5 for more details concerning refrigerant piping.

1.8.4 Remote Condensing Unit (RCU)

A Remote Condensing Unit is required to reject the heat (to ambient) picked up by the evaporator coil. RCUs may be purchased from STULZ or supplied by

others. Wiring between the RCU(s) and DHP electric box must be performed during installation. The system controller stages the cooling circuits as needed. Refer to section 2.7.6 for more information on RCUs. Also, refer to the RCU manufacturer's operation manual for more information.

1.8.5 Process Blower VFD (optional)

A Variable Frequency Drive (VFD) may have been installed to control the process blower motor and thereby vary process airflow. The VFD responds to an analog control signal from the E² system controller.

The customer may provide an analog reference signal to the system controller via a BMS interface to control the signal transmitted to the process blower VFD.

1.8.6 Process Blower Piezometer (optional)

A piezometer ring airflow measurement system may be provided in the process blower inlet. It is pre-connected to a differential pressure controller (transducer) with a digital display which is located in the process blower compartment. The installer may interconnect the differential pressure controller to a BMS for monitoring airflow through the blower. Refer to the differential pressure controller manufacturer's instruction manual for operating instructions.

2.0 INSTALLATION

This section describes how to receive, assemble and install the DHP unit. These instructions apply only to the DHP Series.

2.1 Receipt of Unit

2.1.1 Uncrating and Inspection

Upon receiving the unit, carefully remove any shipping covers and immediately inspect the unit for damage which may have occurred during shipment. Open all doors to inspect the unit interior as well. If any shipping damage is found, report it to the carrier immediately. Any obvious damage incurred during shipping must be noted on the freight carrier's delivery forms before signing for the equipment. Freight claims must be submitted through the freight carrier. Generally, all equipment ships "F.O.B. Factory." STULZ can assist in the claim filing process with the freight company.

Check the equipment against the packing list to see if the shipment is complete. Report all discrepancies to the appropriate authority.

2.2 Rigging

The DHP unit may be shipped in multiple sections which need to be bolted together on site. It is important to thoroughly review the Installation and Electrical drawings provided with your unit for details on how the sections should be fitted together and to familiarize yourself with the unit prior to beginning the assembly. Individual hardware bags (nuts and bolts) are provided and are labeled for the section on which they are to be used.

When moving any part/section of the unit, ensure it remains level at all times. The skid provides rigidity and protects the unit from damage during installation. Always use a suitable device, such as a crane with an overhead lifting sling, and lift from the skid rails, as shown on the Installation drawing provided with your unit.

If an overhead lifting device is utilized, use one with the appropriate capacity to ensure that it can safely handle the weight of the unit. Consult the lifting equipment operating manual before attempting to lift the unit and make sure the rated working capacity of the lifting equipment is never exceeded. The estimated unit weight is provided on the Installation drawing and on the shipping documentation. Utilize spreader bars that exceed the cabinet width (see Figure 3) in order to avoid crushing the sides of the cabinet and/or damage components mounted to the sides.

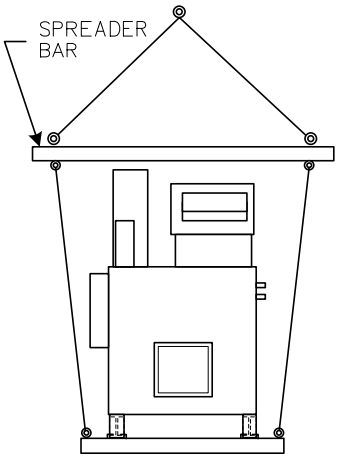


Figure 3. End View with Spreader Bar

To facilitate lifting/placing the unit, lifting holes or removable lifting lugs are provided at multiple points on the unit skid.

WARNING

DO NOT ALLOW THE UNIT TO SWING WHILE SUSPENDED FROM A LIFTING DEVICE. FAILURE TO OBSERVE THIS WARNING MAY RESULT IN DEATH, INJURY OR DAMAGE TO THE EQUIPMENT.

2.3 Location and Clearances

Allow unrestricted access on all sides of the dehumidifier to perform routine maintenance and inspection. Recommended minimum clearance at the front of the unit is the full depth of the unit plus room for necessary equipment (forklift, lifting device, etc.). To judge the clearance requirements, consider that all the components are housed inside the DHP dehumidifier cabinet. The desiccant rotor is typically the largest component requiring removal. Blower assemblies also require sufficient clearance for removal.

Position the unit in the desired location. Make sure the mounting surface is level and capable of supporting the weight of the equipment. Secure the unit to the mounting surface. Mounting holes may be drilled into the base of the unit for anchoring. The following general requirements should also be considered:

1. The power source should be located as near as possible to the installed location of the equipment.
2. The power source wiring should include a disconnect switch with branch circuit protection however, provisions should be made to ensure

that power is not accidentally disconnected during normal operation and that the disconnect switch is not used to turn off the unit for normal shut-down.

3. If possible, avoid locations where the air intakes will be laden with dust, dirt, soot, smoke, or other debris.
4. Do not operate the unit in or near flammable or corrosive environments or allow flammable or corrosive air into the unit.
5. Refer to the Installation drawing and Electrical drawing for electrical and piping connections.

! CAUTION Reactivation discharge air can be very warm and humid. Keep items that may be damaged by excessive heat and humidity away from the reactivation air outlet.

2.4 Cabinet Assembly

If the main cabinet was split for shipment, the sections need to be reassembled on site; bolted together as shown on the installation drawing included in the Technical Data Package. Prior to bolting the individually skidded cabinet sections together, apply silicone sealant to both mating surfaces to ensure an adequate seal. Once the fasteners that join the sections together are installed and tightened, seal the section seams with the excess silicone sealant that squeezes out. Apply additional silicone sealant as necessary to completely seal the seam and then wipe away the excess.

2.4.1 Reactivation Module Assembly

If the reactivation heater module was shipped separately, it will need to be mounted on top of the main cabinet. Prior to placing the reactivation heater section on top of the cabinet, apply the silicone sealant provided to form a seal between the mating surfaces. Apply the sealant to both surfaces to ensure an adequate seal. Carefully lift the reactivation section and place it on top of the unit, aligning the holes in the bottom of the section with the holes in the mating flange on the top of the cabinet. Once the fasteners that join the sections together are installed and tightened, seal the section seams with the excess silicone that squeezes out and then wipe away the excess. Apply additional silicone sealant as necessary to completely cover the seam.

2.4.2 Reactivation Blower Assembly

If the reactivation blower assembly was removed for shipping, it needs to be mounted to the opening in the rear of the cabinet, as shown on the installation drawing. Apply silicone sealant to both mating surface flanges to form a seal then lift the blower assembly into the tray in the cabinet opening and fasten it with the two stainless steel threaded rods (see Figure 4) provided. Align the holes in the tray with the holes in the blower assembly base and insert the threaded rods all the way through the tray from the top so they protrude through the holes in the bottom. Secure the threaded rods with the nuts and washers provided.

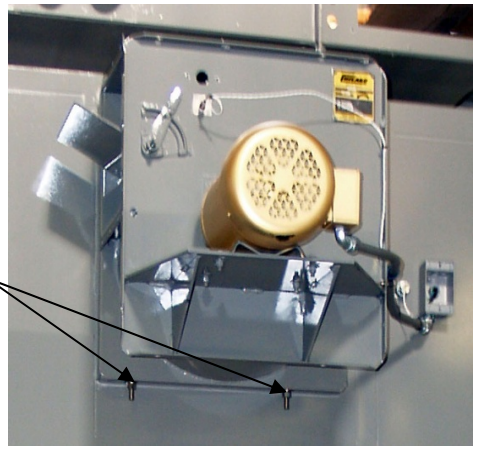


Figure 4. Reactivation Blower Assembly

2.5 Process Blower

The process blower is mounted on vibration isolator springs, as shown in Figure 5. After the unit is installed, remove the temporary “shipping tie-down” bolts and blocking from each side of the process blower assembly where it attaches to the lower frame. This allows the blower to float freely on the springs.

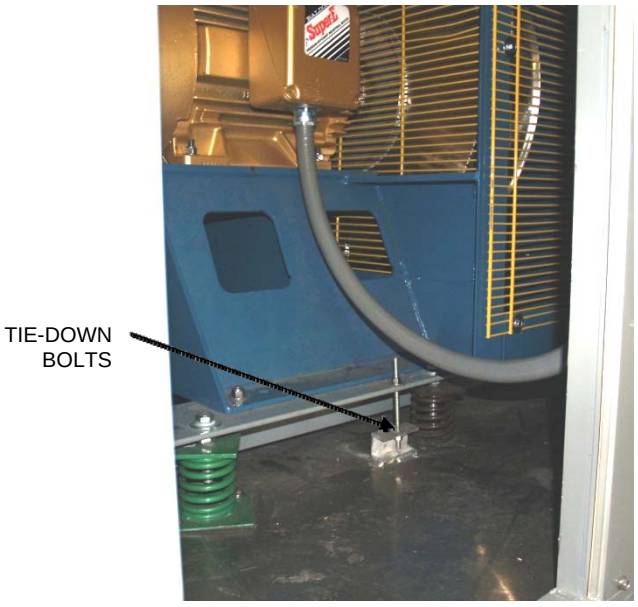


Figure 5. Blower Tie-Down Bolts

Inspect the flexible blower connection for damage.

2.6 Ductwork

When installing a unit outside the conditioned space, the process outlet must be ducted to the conditioned space to prevent humid air from entering the process airstream. All ducting must be airtight or the dehumidification system will not perform to maximum capacity. Even small leaks can have a dramatic effect on system performance. Ducting should be sized for the appropriate air volumes and pressure drops, as specified on the Unit Nameplate. Refer to the Installation drawing provided with the unit for duct connection locations.

Ensure all inlets and outlets are free of obstructions and filters are clean.

A manually-adjustable damper is provided at the reactivation air outlet to allow reactivation airflow adjustment. Process airflow adjustment is typically accomplished via an adjustable sheave (on belt driven blowers) or a VFD (on direct driven blowers). Otherwise, a flow regulation device, such as an outlet damper, may also be required to fine-tune process airflow. After all ductwork is installed, it is the responsibility of the installer/owner to set the appropriate process and reactivation airflows. See Section 3.2, Step 2 for more information concerning correct airflow settings. If the air volumes are not set correctly, unit performance may be affected.

2.7 Utility Connections

WARNING

HIGH VOLTAGE IS USED IN THIS EQUIPMENT. FAILURE TO OBSERVE SAFETY PRECAUTIONS MAY RESULT IN DEATH OR INJURY.

2.7.1 Electric Power

Examine the Unit Nameplate and ensure the main power matches the rated operating voltage, frequency and phase of the unit. The supply voltage measured at the unit must be within ±10% of the voltage specified on the Unit Nameplate. The nameplate also provides the Full Load Amps (FLA), the current that the unit will draw under full design load, the Minimum Circuit Ampacity (MCA, used for wire sizing), and the Maximum Fuse Size (MFS) allowed for circuit protection. The Unit Nameplate is generally located on the outside of the cabinet, in close proximity to the electrical box.

NOTE: Branch circuit protection is required by National Electrical Codes.

NOTE: It is important to utilize branch circuit protection that is correctly rated to protect the system per the Unit Nameplate Maximum Fuse Size (MFS).

The unit is provided with terminals for all required field-wiring connections. Refer to the Electrical drawing supplied with the unit for all power and control field-wiring connections. It is important to identify the options that were purchased with the unit in order to confirm which field connections are required.

NOTE: The unit is electrically wired to ground in the electric box. Prior to unit operation, an adequate ground wire must be connected to the ground lug in the electric box. Refer to the Electrical drawing.

1. Refer to the Electrical drawing for the main power connections.
2. Connect main power to the unit disconnect switch per the Electrical drawing. The wire gauge must be selected according to the distance and the circuit ampacity. See the Unit Nameplate for Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS).
3. Connect wiring for field mounted control/ monitoring devices (i.e. Temperature/Humidity Transmitter, Remote Start/Stop, Emergency Stop contacts, etc.) to the control terminal block in the dehumidifier electric box.
4. Where applicable, connect the Building Management System (BMS) to the network interface card on the system controller. Refer to the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* included in the Technical Data Package.

NOTE: All wiring to be sized per the latest edition of the National Electrical Code (NEC) and local codes, as required.

2.7.2 Steam Piping

If applicable, connect all steam supply and condensate return lines to a stable source of saturated steam. Connection location and sizes are shown on the installation drawing. Supply and condensate lines should be sized for the expected condensate load. Target steam pressure(s) and

expected condensate load(s) are shown on the Unit Nameplate. Each coil should be individually equipped with a customer-provided steam trap and all other steam specialties, such as vacuum breakers, strainers, etc., as required.

2.7.3 Gas Piping

If applicable, have your local gas company connect a gas supply line, making sure it is adequately sized for the minimum pressure and required BTU/hr specified on the Unit Nameplate. If not specified on the Unit Nameplate, minimum required inlet gas pressure is typically 10 to 14 inches water column. Do not exceed 14 inches water column (1/2 psig) gas inlet pressure. Refer to the Gas Flow drawing included in the Technical Data Package for more details.

! CAUTION Do not interchange natural and propane gas on any gas-fired unit. Only use the type of gas specified on the Unit Nameplate.

2.7.4 Chilled Water Piping

Generally, fluid coil inlets and outlets use threaded pipe stubs that protrude from the rear of the unit. When making threaded connections, Teflon tape thread sealant is recommended to minimize internal fouling of the piping. Refer to the Installation drawing provided with your unit for chilled water supply and return connection locations.

The required pipe size may not be the same size as the coil connection. Size the supply and return piping in accordance with good engineering practice. Piping should be sized to match the system pressure drop and pump capacity, if applicable, and may require reducing fittings to match the connections on the coil(s) and/or the chilled water source.

The use of a short length of high-pressure hose with a swivel fitting will prevent the transmission of vibrations and may simplify the connections. Piping supports to reduce vibration transmission are highly recommended.

Customer-furnished supply and return isolation valves must be installed for each coil in the unit. As an option, supply and return valves may be factory installed or shipped loose by STULZ for field installation. The return valve can serve two purposes: Flow rate adjustment and system isolation. Do not use supply valves for flow adjustment.

In situations where scaling could be heavy, or where biological growth will be present, a closed loop system is recommended. Untreated water in the unit cooling coils may cause, over a period of time, a loss of heat exchange capacity due to a mineral deposit build-up inside the coil. Only a qualified service mechanic should clean dirty coils.

NOTE: A 60-mesh strainer is recommended to be installed in the supply pipe before each fluid coil.

Observe the following precautions when installing and filling the chilled water loop:

- Clean the piping system before operating the system.
- Bleed all air from the piping system.

2.7.5 Refrigerant Piping

Liquid (refrigerant distributor) and suction connections to the DX cooling (evaporator) coils are located inside the cooling modules on the evaporator coils. Drill holes in the rear of the DHP cabinet to pipe between the evaporator coil and a Remote Condensing Unit (RCU). After refrigerant lines are installed, seal the holes to prevent air infiltration.

A thermostatic expansion valve (TXV) must be installed on each refrigerant circuit. The TXV controls the flow of refrigerant entering the cooling coil and maintains superheat of the refrigerant vapor at the outlet of the evaporator coil. By controlling superheat, the TXV maximizes the use of the evaporator coil's surface area while preventing liquid refrigerant from returning to the compressor. Refer to the compressor manufacturer's recommended superheat values.

A hot gas bypass system may be needed for freeze protection of the evaporator coil. The hot gas bypass system includes a discharge bypass valve that allows some hot gas from the compressor discharge to bypass the condenser coil when suction pressure drops below the saturated pressure equivalent of 32 °F, thus helping maintain the evaporator coil temperature above the freezing point of water.

STULZ recommends that oil traps be included in the risers. Refrigerant lines must be sloped to ensure proper oil return to the compressor (see Figure 6). An inverted trap is recommended on remote condenser units to prevent oil from flowing back to the lowest point in the system. Also, consult the RCU manufacturer's installation instructions for more specific recommendations regarding refrigerant line traps and line sizing.

Interconnecting refrigerant lines must be sized according to total equivalent length and cooling capacity (refrigerant mass flow). Follow ASHRAE

piping guidelines and good engineering practice for all refrigerant piping.

Use only Type "L" or "K" refrigerant grade copper for all refrigerant lines.

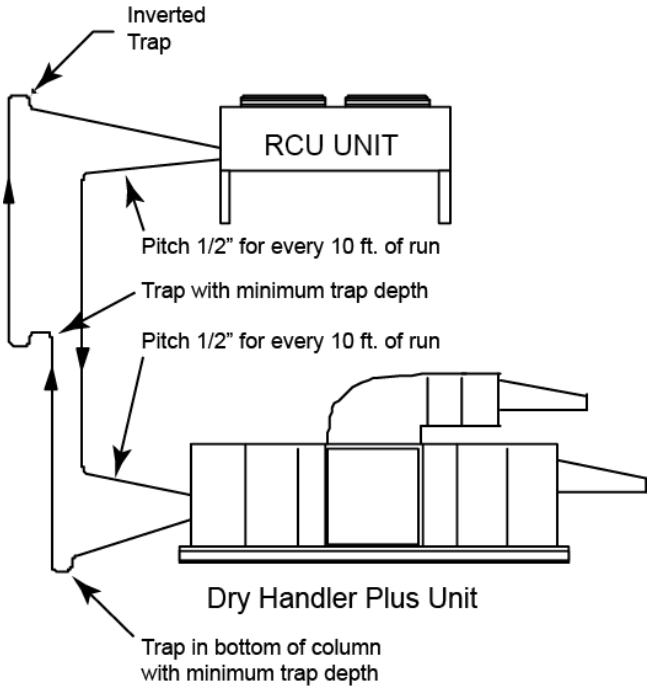


Figure 6. Typical RCU Piping

2.7.6 Remote Condensing Unit (RCU)

STULZ recommends installing the RCU in a secure location where the condenser cannot be tampered with and where the disconnect switch cannot be inadvertently turned off. Locate the RCU where the fans are not likely to draw dirt and debris into the heat exchanger fins. There should be enough clearance around all sides to ensure adequate airflow to the condenser coil(s). Secure the unit so that the system will not move during operation or under high winds. The mounting site must be capable of supporting the weight of the RCU with its operating charge. Refer to the RCU manufacturer's documentation for complete installation guidelines.

2.7.6.1 RCU Wiring

Systems to be equipped with an RCU require field wiring between the DHP system electric box and the remote condenser. The installer must provide main power wiring to the main power distribution block located within the RCU control box. The installer must also wire control conductors from the terminal block in the DHP electrical enclosure to the terminal board within the remote condenser control box. The number of conductors required between the two systems varies based upon the number of cooling stages and options provided. Refer to the drawings provided by STULZ and the RCU manufacturer for complete wiring instructions.

2.7.7 Condensate Drains

Cooling coils are provided with stainless steel condensate drain pans equipped with 1" MPT condensate drain stubs. The drain stubs exit from the unit at the base of the cabinet, typically front and rear.

For post-cooling coils, the drains are needed during start up only to remove condensation that may form from the initial humidity load before dehumidification ramps up. During normal operation the drains must be capped.

For pre-cooling coils, connect drain lines to each of the drain stubs. The pre-cooling drains should be operational at all times and condensate P-traps are required (to be provided by others). The height of the trap must be at least 2" and must exceed the total static pressure of the system to ensure proper water drainage from the drain pan. The drain lines should be located so they will not be exposed to freezing temperatures. It's important to direct the condensation away from the unit and away from equipment that may be damaged by water. Refer to the Installation drawing for the location of drain connections.

2.8 Installing a Control Sensor/Transmitter

A terminal block is provided for the connection of a temperature / humidity control sensor (humidistat or temperature/RH transmitter). Refer to the Electrical drawing for the wiring connections. If customer mounted, interconnecting field wiring should be installed in accordance with NFPA 70 of the National Electrical Code (N.E.C.).

Wire the control sensor per the Electrical drawing provided with the unit. Wall-mounted control devices should typically be mounted 4-5 feet up from the floor in the conditioned space (see Figure 7).

Locate the sensor according to the application. To control the conditions in a space, a wall-mount sensor may be installed in the space to be conditioned or a duct-mount sensor may be installed in the return air inlet duct (if process air is recirculated). To control the air supplying a process, a duct-mount sensor may be installed in the supply duct near the process.

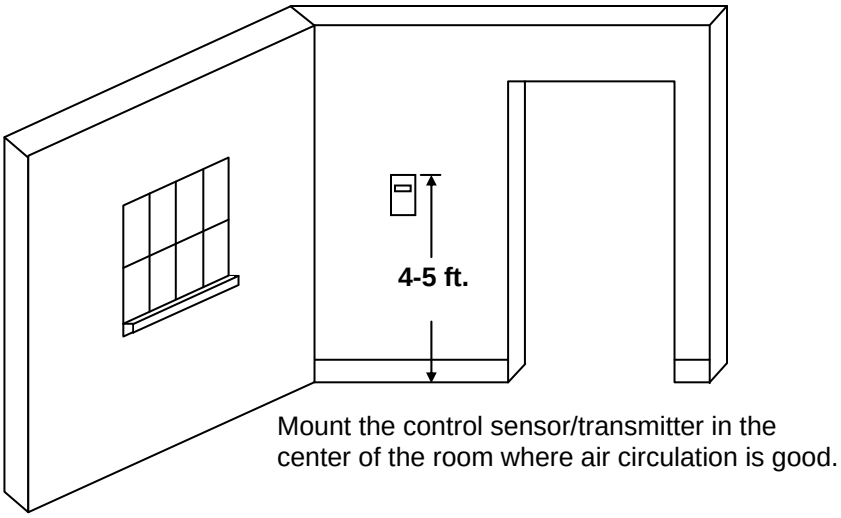


Figure 7. Locating a Wall Mounted Control Sensor/Transmitter

3.0 OPERATION

The following information provides an overview of the operating procedures and sequences. Before operating the unit, follow the steps below to ensure all electrical and utility connections are correct and the unit is ready to operate.

NOTE: A Warranty Registration and Start-Up checklist is provided in the Technical Data Package supplied with your unit. It must be completed during installation / start up and sent to STULZ Product Support to activate your warranty. It will also assist if service or troubleshooting support is ever needed.

During basic unit operation, process air will enter the unit cool and humid and leave the unit warm and dry. Optional post-cooling may be used to cool the process air leaving the unit. Reactivation air will leave the desiccant rotor very warm and more humid than it was before entering the rotor.

3.1 Installation Checks

Using the Warranty Registration and Start-up Checklist forms, record the steps taken during installation. Recommended tools for performing the pre-operation checkout include a voltage meter, digital amp meter, temperature probe, flashlight and a set of screwdrivers (Phillips and flat head).

1. Verify that main power is correct per the Unit Nameplate.

   WARNING

   ONLY SUPPLY POWER RATED FOR THIS UNIT PER THE NAMEPLATE. INCORRECT POWER MAY RESULT IN DEATH OR INJURY TO PERSONNEL OR DAMAGE TO THE UNIT.

2. Check all electrical connections for tightness.
3. Check wiring to any remote sensors/transmitters, start/stop contacts, etc. Refer to the enclosed Electrical drawing for specific wiring connections.
4. Ensure no loose parts or spare parts (such as extra filters, etc.) are located inside the unit or electric box.
5. Ensure all access panels are in place and sealed. Ensure all doors are closed and tightly latched. Small air leaks can significantly reduce unit performance.
6. If applicable, verify the correct gas pressure or steam pressure per the Unit Nameplate. For gas units, ensure all lines are purged of air.
7. If applicable, ensure all chilled water lines are purged of air.
8. Check all piping and pipe connections for any signs of leaks.
9. Verify that all motors (process, reactivation, and rotor drive motor) rotate in the direction indicated by the arrow labels on or near the motors.

3.2 Start Up

1. Apply main power to the unit and turn the 3-position mode selector switch to “On” (or “Local”).
2. After all ductwork is installed, sealed and complete, process and reactivation airflows need to be adjusted to meet design conditions. Airflows correspond to rotor pressure drop values, which are displayed on differential pressure gauges mounted on the front of the unit (see Section 4.4.2). Design airflows and corresponding rotor pressure drops can be found on the Unit Nameplate. Set airflows while the unit is still cold, preferably when it is first turned on. Reactivation airflow is set using a manually adjustable damper located at the reactivation air outlet.

   Process airflow adjustment depends on unit configuration. Typically it’s accomplished via a variable pitch pulley on a belt-drive blower but it could be via a VFD on the process blower motor, air control damper(s) or a combination of those methods. Refer to Sections1.6.4 and 1.6.5 for more information about process air control features. If make-up (outside) air is mixed with return air, refer to the Flow Diagram provided in the Technical Data Package for design airflows.

   Afterward, if the differential pressure gauges show readings that are significantly lower than the initial settings, the filters may need to be replaced or there may be something obstructing airflow.

   NOTE: On steam reactivation units, the desiccant rotor pressure drop must be set with the motorized, reactivation inlet control damper fully open. Ensure that the steam supply is turned back on after pressure drop adjustments are complete.

3. Ensure the amp draws of each component do not exceed 10% above the rated Full Load Amps

(FLA) shown on the Unit Nameplate. Amp draws lower than Nameplate FLA are normal and acceptable.

4. Ensure proper operation of the heater controls, gas train or reactivation dampers. Refer to Section 1.7 for an overview of the various reactivation types. Refer to the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* included in the Technical Data Package for details concerning reactivation heater operation.
5. Verify the operation of all switches and safeties.
6. Individual status/fault lights are equipped with "press-to-test" capability. Use this feature to test bulb operation. If a bulb does not illuminate when pressed, it may be burned out or the electrical connections may be faulty.
7. Adjust the humidity setpoint to the desired setting with the system controller.
8. Insert a temperature probe into the test ports to verify the reactivation air temperature entering the rotor is approximately 190 °F above ambient at full heater output.
9. After the rotor is reactivated and reactivation temperatures are stable, verify the grain depression across the system (in the process airstream) is correct per the Technical Data Sheet provided in the Technical Data Package.

3.3 Control Panel

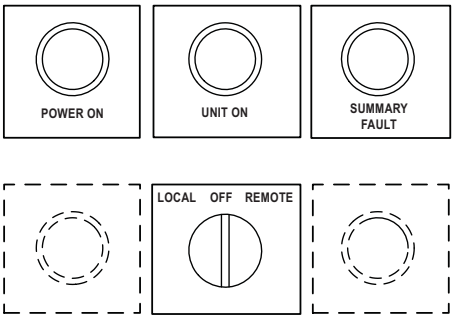


Figure 8. Control Panel

3.3.1 Mode Selector Switch

The unit is equipped with a three-position mode selector switch (Local/Off/Remote) located on the front of the control panel (see Figure 8).

Mode	Status of Unit
LOCAL	Unit runs continuously; green "Unit On" indicator light is illuminated.
OFF	Unit is off, power is still live if the main disconnect is ON; white "Power On" indicator light is illuminated.
REMOTE	Unit operates in response to a Remote Start/Stop signal; green "Unit On" light illuminates when the unit is running.

3.3.2 Power Disconnect Switch

The unit may be equipped with a "through-door" power disconnect switch located on the main electric box, or a knife-style power disconnect switch, typically located beside the main electric box. The Power On light should illuminate white when the switch handle is in the ON position. The switch handle may be used to disconnect power during maintenance or service. The handle is equipped with a lock-out feature to prevent unauthorized switch actuation during periods of service or operation.

3.3.3 Control Panel Lights

The unit is equipped with visual indicator lights to notify the operator of the current status of the unit. The green Unit On and the optional red status indicator lights are equipped with "press-to-test" capability. This should be used to test operation of the lamp element. If a light does not illuminate when pressed, it may be burned out or the electrical connections may be faulty. Certain status indicator lights may operate in sequence with optional customer interface indicators. For specific information regarding troubleshooting fault lights, refer to Troubleshooting, in Section 7.0 of this manual and to the Electrical drawing provided with the unit.

The light icon next to the light name in the following text contains the light's color: **W** for white, **G** for green and **R** for red.

Power On

This illuminates white indicating that main power is supplied to the unit.

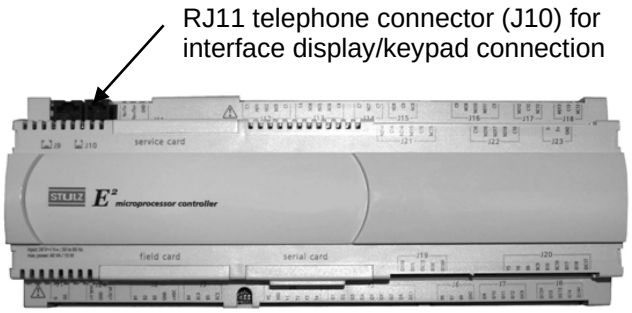
Unit On

This illuminates green when main power is supplied to the unit and the unit is running.

Summary Fault - This illuminates red when the controller logs a critical alarm that is tied to the Summary Fault. The controller display will indicate

the actual alarm. Refer to the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* for a list of the alarms tied to the Summary Fault.

3.4 System Controller



The controller I/O module is located in the main electric box. The controller is furnished with factory configured software designed to maintain space or process discharge air conditions (temperature and/or humidity).

3.4.1 Display/Keypad

A display/keypad is provided for interaction with the system controller. It may be located in the main electric enclosure, in a separate "window" box mounted on the unit or shipped loose for field installation.

Press the alarm (🔔) key on the keypad to call up alarm screen messages. After the alarm condition is corrected, press the alarm key again to reset the controller and resume normal operation.

3.5 Initial Start Up for Gas Fired Units

3.5.1 Gas Train Ignition Sequence

There are several important parts to an industrial gas unit. The gas train that supplies gas to the burner includes one or two pilot solenoid valves, two main gas solenoid valves, main gas and pilot gas regulators, a main gas control valve with actuator and several hand valves. The burner assembly consists of a spark ignitor, a flame rod (to detect a flame) and the burner. Inside the electric box is a Burner Control Relay Module (see Figure 9). Refer to the Gas Flow drawing included in the Technical Data Package for a gas train schematic that shows the component designators referenced in this document. See Figure 11 for a photo of a typical gas train that calls out the major components.

Refer to the Burner Control Relay Module manufacturer's documentation (provided separately) for a detailed ignition sequence and troubleshooting information.

The Burner Control Relay Module (also called "Flame Safety Relay") initiates the ignition sequence with a pre-purge cycle. Following the pre-purge cycle, the Pilot Solenoid Valve (V20) opens and the ignition transformer is energized. If a pilot flame is sensed by the Flame Rod (F20), the Main Gas Solenoid Valves (V21 & V22) are energized and the system controller modulates the Main Gas Valve (V23 via actuator AT20) accordingly.

3.5.2 Flame Safety Interlocks

The unit is equipped with a Reactivation Air Proving Switch and High/Low Gas Pressure Switch (S20), wired in series as a safety input into the Burner Control Relay Module. If gas supply pressure is not within the limits of the high/low gas pressure switch or reactivation airflow is too low to satisfy the reactivation air proving switch, an "air/gas fault" locks out the Burner Control Relay Module.

Failure to establish a pilot flame during pre-ignition causes the pilot solenoid valve to de-energize and stop electric ignition.

Flame failure during operation de-energizes the main gas valves and the Burner Control Relay Module automatically goes into a new purge / ignition sequence.

Power interruption to the Burner Control Relay Module de-energizes the main gas and pilot solenoid valves. Once power is restored, the complete purge and ignition sequence is initiated.

A fault is logged in the system controller and the Summary Fault light illuminates. The Burner Control Relay remains locked out until the fault is cleared in the system controller and the Burner Control Relay Module is manually reset.

Note: The safety lockout requires a manual reset. See Figure 9 for the location of the reset button.

3.5.3 Burner System Start Up

For initial system start up:

NOTE: The gas burner is set up and adjusted when the unit is tested prior to leaving the factory. Variations in gas pressure and heat capacity may require field adjustments to reestablish proper burner operation.

CAUTION Do not interchange natural and propane gas. Use the type of gas specified on the Unit Nameplate.

1. Ensure the gas supply line is purged of all air up to the main gas connection on the unit. Several ignition trials/resets may be required to purge the pilot and main gas lines.
2. Inspect the flame to ensure the burner produces an even, blue flame along its entire length at minimum and maximum output.
3. If the burner won't ignite after several trials or if the flame isn't evenly distributed, see Section 3.5.4 for burner setup/adjustment instructions.

3.5.4 Burner System Set Up and Adjustment

If the gas burner won't ignite or the flame is uneven or yellow, the burner may need to be readjusted. Before making adjustments, review Section 3.5.1 for a full understanding of the ignition sequence.

WARNING

CONNECTING AND SERVICING GAS COMPONENTS PRESENTS AN EXPLOSION HAZARD. INITIAL BURNER START UP AND ADJUSTMENT MUST BE PERFORMED BY QUALIFIED TECHNICIANS TRAINED TO WORK WITH COMBUSTION SYSTEMS.

1. Prior to supplying main gas to the dehumidifier, gas pressure must be checked to ensure it doesn't exceed the maximum inlet pressure shown on the Unit Nameplate.
2. Check that all dampers are properly positioned and locked into the operating position.
3. Start the unit with all hand operated gas valves closed. Check for proper motor rotation and impeller direction. Ensure the gas burner differential pressure gauge reads between 0.7 and 1.1" w.c.
4. Turn the unit off before proceeding to step 5.

CAUTION Do not bypass any control panel timers which typically control sequential operation.

5. To light and adjust the gas pilot: Open the Main Gas Supply Shut-off Valve and open the Pilot Gas Shut-off Valve (see Figure 11). Start the unit and ensure the PILOT Sequence Status LED on the Burner Control Relay Module illuminates (see Figure 9). Observe the pilot flame through the burner viewing window.
6. If ignition doesn't occur the first time, it may be necessary to reset the Burner Control Relay Module. Several ignition trials/resets may be required to purge the gas line up to the pilot.

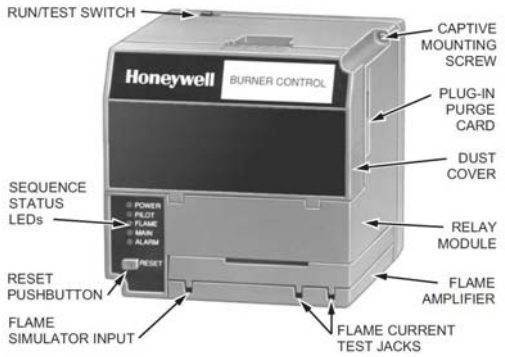


Figure 9. Burner Control Relay Module

7. Refine the pilot setting for a hard blue flame by adjusting the gas flow through the Pilot Gas Adjustment Needle Valve and/or Pilot Gas Regulator.
8. Prepare to light the main burner flame. Using the system controller, manually adjust the Gas Modulating Control Valve to the minimum position by varying the analog output signal. Refer to the *E² Series Microprocessor Controller for Desicair Dehumidification Systems IOM* for information on adjusting the output signal.
9. With the Gas Modulating Control Valve at "minimum," light the main burner by gradually opening the Main Burner Gas Shut-off valve. Adjust the Main Gas Regulator to provide the desired outlet pressure. A good minimum fire should provide a uniform blue flame across the entire burner, which is contained within the zipper flame channel (see Figure 10).
10. Close the Main Gas Balancing Valve. Using the system controller, manually adjust the output signal to the Gas Modulating Control Valve to the maximum output position. Open the Main Gas Balancing Valve gradually and adjust it to limit

the gas flow so the reactivation air temperature doesn't exceed the design temperature. Adjust the Main Gas Regulator and the Upper and Lower Profile plates as required to obtain an even blue flame.

11. After the reactivation heater temperature approaches equilibrium, manually adjust the Main Gas Balancing Valve to limit the minimum burner output to achieve a reactivation air temperature rise of approximately 180 °F above the reactivation inlet air temperature.
12. Any thin spots or gaps indicate uneven air velocity over the burner and must be corrected by re-adjusting the burner profile plates to provide an even air flow across the top and bottom of the burner. Re-adjust the Upper and Lower profile plates together with the reactivation outlet damper to achieve the correct burner and reactivation differential pressures (in. w.c.) as indicated on the Unit Nameplate. Burner and reactivation static pressures are displayed on the unit's differential pressure gauges.
13. Shut off the unit then start it again. The burner should light quickly after the pre-purge time delay.

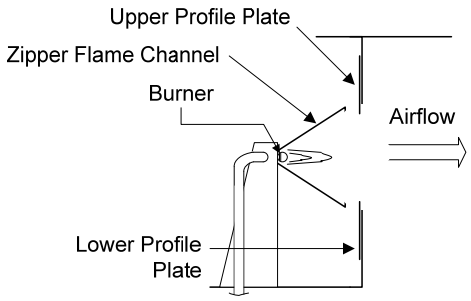


Figure 10. Burner Assembly

14. Tighten the set screw on the Main Gas Balancing Valve to lock its position. Cycle the unit on & off several times and verify the burner ignites each time. Return control of the Modulating Gas Control Valve to automatic operation.

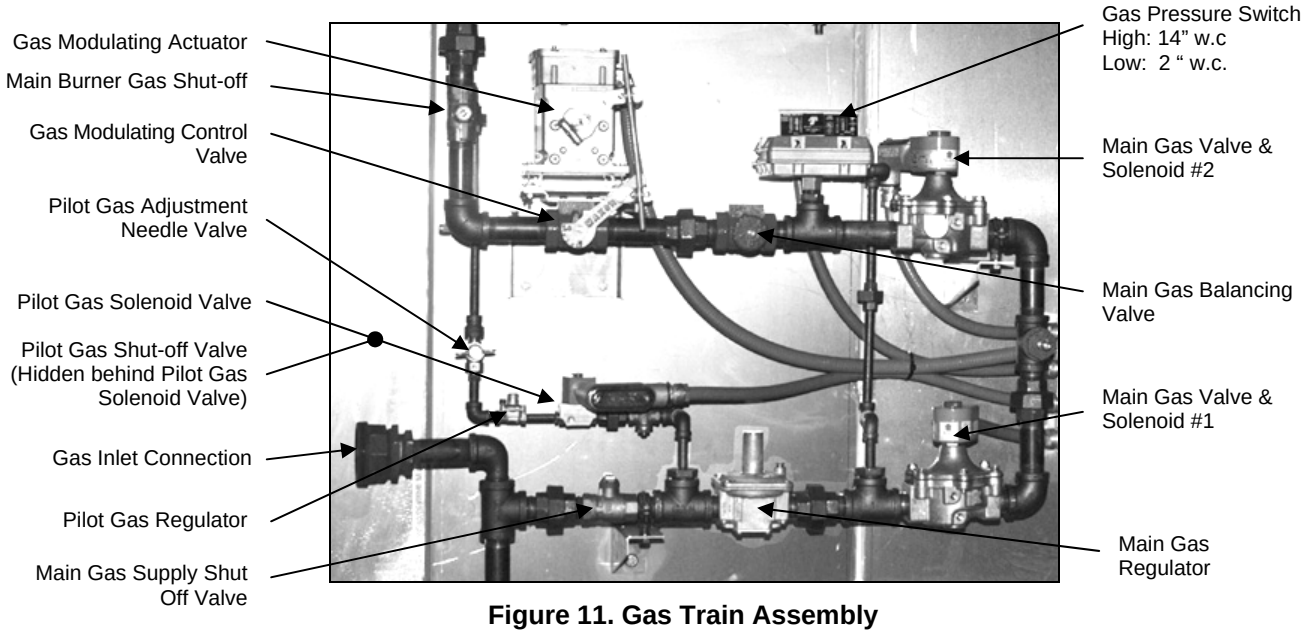


Figure 11. Gas Train Assembly

4.0 FEATURES

The DHP series offers the most popular features available for dehumidification systems. Refer to the Installation and Electrical drawing(s) provided with the unit to determine which features are included. The features described in this section are available for DHP series dehumidifiers.

4.1 System Controller

The unit is equipped with an E^2 Series programmable logic microprocessor controller. The controller is furnished with software that is factory configured for the specific application. See Section 3.4 for basic information on how to use the system controller.

4.2 Service Lights and Utility Receptacle (Optional)

The unit may be equipped with interior cabinet service lights and/or a duplex GFCI utility receptacle for 120 Volt service. The utility circuit is provided with a power disconnect switch. An On/Off switch for the service lights is typically located beneath the electric box, as is a utility outlet receptacle. Refer to the Installation drawing supplied in the Technical Data Package for the location of the utility receptacle and light switch and see the Electrical drawing for wiring details.

WARNING

THE 120 VAC UTILITY CIRCUIT IS ENERGIZED WHEN THE MAIN DISCONNECT IS IN THE OFF POSITION. A SEPARATE DISCONNECT IS PROVIDED FOR THE UTILITY CIRCUIT.

4.3 Control Box Heater (Optional)

This unit may be equipped with an enclosure heater to prevent damage to or malfunction of the system controller if the unit is installed in cold ambient temperatures. When the interior of the control box drops below a pre-determined temperature, (approximately 40 °F) the heater energizes. When the control enclosure temperature rises above approximately 68 °F, the heater de-energizes.

4.4 Monitoring Unit Performance

4.4.1 Unit Nameplate

The Unit Nameplate, which is located on or near the main electric box, is a quick source for information about the unit. The Unit Nameplate provides electrical characteristics (main power voltage, unit amp draw and individual motor amp draw), reactivation heater characteristics (type and capacity) and the design process and reactivation airflows. A sample Unit Nameplate is shown in Figure 12.

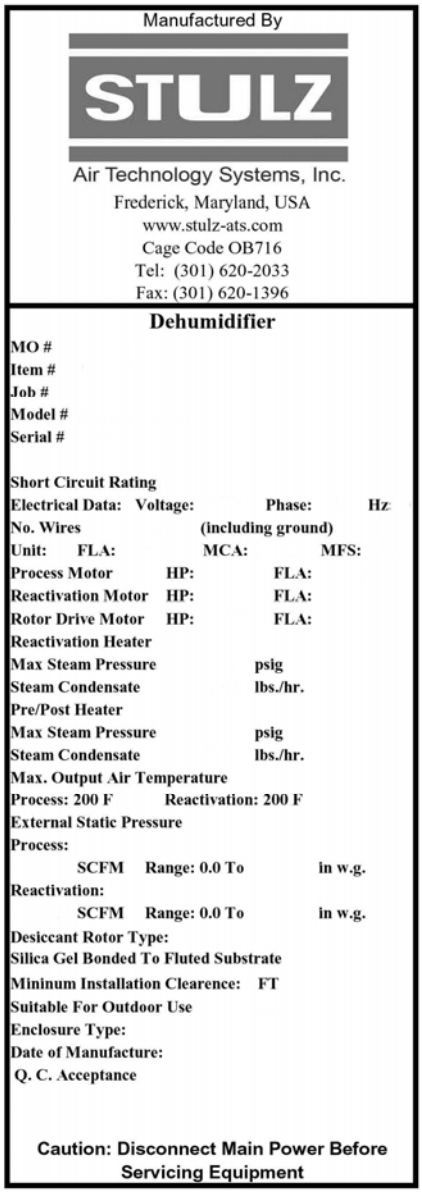


Figure 12. Sample Unit Nameplate

The Unit Nameplate also provides the model number, serial number and specific STULZ job number for the unit. This information will be required if it is necessary to contact STULZ for additional information, warranty information, or spare parts.

4.4.2 Rotor Pressure Drop Indication

Two differential pressure gauges, mounted in a box on top or on the front of the unit, indicate pressure drop of the process and reactivation airstreams across

the desiccant rotor. Rotor pressure drop roughly correlates to airflow so the gauges can be used to set process and reactivation airflow. In order to maintain optimum performance, process and reactivation airflows should be set close to the rotor pressure drops indicated on the Unit Nameplate. Refer to Section 3.2 for details on setting process and reactivation airflows.

Set the rotor pressure drops while the unit is cold (that is, when the reactivation and process air temperature is as close to 70 °F as reasonable). The values indicated on the gauges change as the airstreams heat up so variation from Unit Nameplate values is typical and does not necessarily indicate a problem. If the value indicated on a gauge is significantly lower than the Nameplate value, airflow may be reduced and air filters may need to be replaced.

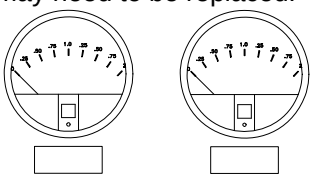


Figure 13. Differential Pressure Gauges

The differential pressure gauges indicate pressure drop in inches water column (in. w.c.).

4.4.3 Filter Pressure Gauges

The unit may be provided with optional, differential pressure gauges for selected filters. These differential pressure gauges may be used to monitor the condition of the filters. See section 4.6.2.2, “Dirty Filter Indication (Optional)” for more information.

4.4.4 Gas Burner Pressure Drop Indication

If gas is used for reactivation, a separate differential pressure gauge is supplied for monitoring the pressure drop across the burner. For optimal performance, the burner gauge reading should be between 0.7 and 1.1” w.c. The burner pressure drop is pre-set at the factory and should not require adjustment.

4.4.5 Test Ports

Test ports are conveniently located at strategic points in both the process and reactivation airstreams. These test ports are equipped with 1” NPT threaded stubs which are capped off during normal operation. The test ports allow insertion of probes to measure temperature or humidity inside the unit while it’s operating.

4.4.6 Alarm Indication

Optional alarm indicator lights may be provided on the front of the unit. As programmed into the system controller, specified alarm conditions may be assigned to operate an alarm indicator light and/or alarm dry contact. See Section 3.3.3 for more details about indicator lights.

Note: Refer to the Electrical drawing provided with your unit to determine which alarm indicators are furnished. The Electrical drawing also provides wiring details and the power rating(s) for any optional alarm contacts.

4.5 Overheat Reset Switch

Gas and electric reactivated units include a push button switch to reset the unit if a “High Reactivation Temperature” shut-down has occurred.

The cause of the overheat condition must be determined prior to resetting the unit. For example, check the condition of air filters and check system airflows, as indicated by rotor pressure drops.

4.6 Auxiliary Control Terminals

This unit is equipped with terminals for customer use. The terminals are utilized for monitoring and/or control purposes. Unless noted otherwise, these interface terminals are located inside the main electrical control enclosure.

Some customer-provided auxiliary devices must be sized appropriately for the power characteristics of the circuit. Refer to the Electrical drawing supplied with the unit for specifics on the contact ratings, control signals and for wiring details.

4.6.1 Process Blower Interlock

This normally open contact closes when the process blower is operating. It can be used to indicate unit operating status or to start and stop auxiliary equipment such as a booster fan or condensing unit.

4.6.2 Summary Fault Contact

Dry alarm contacts are provided for remote monitoring of alarm conditions. As programmed into the system controller, certain alarm conditions are selected to operate the Summary Fault indicators. The same conditions that cause the Summary Fault Contact to actuate also illuminate the Summary Fault Light. The system controller alarm display screens may then be

used to determine the specific nature of the fault condition.

The Summary Fault Contact terminals may be wired to operate as “Normally Open” or “Normally Closed.”

Note: Refer to the Electrical drawing provided with your unit for wiring details and the power rating of the Summary Fault contact.

4.6.2.1 Reactivation Air Proving

A Reactivation Air Proving Switch is provided as a safety feature on Electric and Gas reactivated units. The reactivation heater is interlocked by the switch. The switch contacts close when reactivation airflow is sufficient. The contacts open upon loss of reactivation airflow, de-energizing the reactivation heater. When the airflow problem is corrected and the alarm is reset, the heater automatically resumes normal operation.

4.6.2.2 Dirty Filter Indication (Optional)

An optional “dirty filter” gauge and switch may be assigned to any of the filter banks. The switch contacts actuate when the differential pressure across the filter bank exceeds the setting of the switch. The system controller may be programmed to provide a Summary Alarm indication when this occurs. The differential pressure gauge indicates the pressure drop across the filter bank. The recommended change-out values for the various filter banks are:

30% Pleated ..... 1.0” w.c.

High Efficiency Pleated
w/ 30% Pre-Filter ..... 1.5” w.c.

When a filter gauge exceeds the value listed above, the filter(s) should be replaced. Operating the unit with dirty filters may reduce unit performance and/or damage the rotor. See the unit Electrical drawing to determine whether the switch contacts are provided as Normally Open (N.O.) or Normally Closed (N.C.).

4.6.2.3 Process Air Proving (Optional)

A Process Air Proving Switch may be provided. The switch contacts close when there is sufficient process airflow. The contacts open upon loss of process airflow.

4.6.2.4 Rotor Rotation Detection (Optional)

A Rotor Rotation Switch may be mounted near the desiccant rotor. The switch contacts close momentarily each time the desiccant rotor completes a revolution. A fault occurs when the switch has not closed within a specified period of time, indicating the rotor did not complete a revolution. The system controller is programmed to provide Summary Fault indication when this occurs.

4.6.3 Control Sensor/Transmitter

Terminals may be provided in the main electrical enclosure for field connection of a temperature-humidity sensor/transmitter (See the Electrical drawing for your unit for the location of the terminals). This sensor measures air temperature and humidity (RH or dew point) of the process supply air or conditioned space, which is typically used by the system controller to manage reactivation heat. See Section 5.0 for a detailed description of how the controller utilizes the sensor to manage operation of your unit.

The sensor/transmitter may be mounted at the process outlet or shipped loose for field installation in the space to be conditioned. Refer to the manufacturer’s instructions provided with the control sensor and to Section 2.8 of this manual for installation guidelines. Refer to the Electrical drawing for wiring details.

4.6.4 Emergency Stop

Your unit includes a terminal block that normally has a jumper installed where an “Emergency Stop” control relay can be connected (refer to the Electrical drawing for your unit for the location of the jumper). This jumper may be removed and the customer may connect a remotely-located, “Emergency Stop” control relay. In an emergency, the relay circuit may be opened to disconnect control power from the dehumidifier to stop operation.

NOTE: The emergency stop only disconnects control power from the unit. Main power is still present in the unit when the emergency stop is utilized.

4.6.5 Fire/Smoke Detection

Your unit includes a terminal block that normally has a jumper installed where a fire/smoke detector can be connected (refer to the Electrical drawing for your unit for the location of the jumper). This jumper may be removed and the customer may connect a fire/smoke detector for the system controller to monitor. Upon receiving a fire/smoke alarm signal, the controller will shut down the unit and activate the Summary Fault (indicator light and contact).

4.6.6 Remote Start/Stop

Your unit includes a terminal block that normally has a jumper installed where a remotely-located Start/Stop control device can be connected and used to start and stop the unit when the Mode Selector Switch is set to “Remote.” See the Electrical drawing for your unit for the location of the jumper and see Section 3.3.1 and Figure 8 for information about the Mode Selector Switch.

5.0 SYSTEM CONTROL

5.1 Dehumidification Control

There are two basic humidity control methods used in DHP systems: 1) On/Off (D-Stat) or 2) Proportional (H-Trac or Dew-Trac). (C-Trol II is a condensation control method.)

The way in which the unit operates depends upon which features were purchased for the unit. Refer to your order sheets for specific details on the configuration of the unit.

5.1.1 D-Stat

What it Does:

This control method cycles the dehumidifier on and off to maintain a relative humidity setting.

Requires:

A wall-mounted humidistat (optionally provided by STULZ) or a customer supplied humidity control device with a dry contact.

How it Works:

With the mode selector switch set to “Local” (or “On”), the dehumidifier runs continuously. With the mode selector switch set to “Remote” (or “Auto”), the dehumidifier responds to a control signal from a humidistat or customer supplied humidity control device which cycles the dehumidifier on and off to maintain the relative humidity setting.

5.1.2 D-Stat II

How it Works:

This control method functions similar to D-Stat, except the process blower runs continuously. The reactivation heater and blower cycle on and off in response to a humidistat or customer-supplied humidity control device with a dry contact.

NOTE: D-Stat and D-Stat II will not work without a humidistat or a customer supplied dry contact control signal.

5.1.3 H-Trac

What it Does:

This control method regulates the reactivation heater to provide constant process discharge or space relative humidity.

Requires:

An RH sensor/transmitter located in the conditioned space or mounted at the process discharge.

How it Works:

The controller determines how much reactivation energy is required to maintain the relative humidity setpoint. The dehumidifier runs continuously as the controller modulates reactivation heater output in response to load changes. In the “Remote” (or “Auto”) mode, the dehumidifier responds to a customer-supplied start/stop signal.

5.1.4 Dew-Trac

What it Does:

This control method regulates the reactivation heater to provide constant process discharge or space dewpoint temperature (a measure of absolute humidity).

Requires:

A dewpoint transmitter located in the conditioned space or mounted at the process discharge.

How it Works:

The controller determines how much reactivation energy is required to maintain the dewpoint setpoint. The dehumidifier runs continuously as the controller modulates reactivation heater output in response to load changes. In the “Remote” (or “Auto”) mode, the dehumidifier responds to a customer-supplied start/stop signal.

5.1.5 C-Trol II

What it Does:

This control method regulates reactivation heat by maintaining the ambient dewpoint temperature below a cold surface temperature in order to prevent condensation from forming on cold surfaces.

How it Works:

The controller determines the amount of reactivation energy required to maintain dewpoint temperature. The controller compares the cold surface temperature to the ambient dewpoint temperature and develops a control output. The dehumidifier runs continuously and the controller continuously adjusts reactivation heat in response to load changes. The dehumidifier maintains the space dewpoint at 5 °F (adjustable) less than the cold surface temperature.

In the “Remote” (or “Auto”) mode, the process blower runs continuously and the dehumidifier responds to a customer-supplied start/stop signal.

5.1.6 Proportional Reactivation Controls (H-Trac or Dew-Trac)

If the system is configured for H-Trac or Dew-Trac reactivation control, the unit proportionally controls humidity. When the Humidity PI loop output exceeds 0%, the reactivation heater and reactivation blower turn on. The controller calculates PI loop outputs for humidity, reactivation discharge air temperature and reactivation heater temperature (see Figure 14).

As each of these PI loop outputs modulate, the controller selects the lower PI loop output and uses that output to control the reactivation heater. Note: This methodology prevents overheating of the desiccant, which would result in diminished drying performance. Once the Humidity PI loop output drops to 0% for the "Reactivation Idle" time, the Energy Savings Feature shuts off reactivation but the process blower continues to operate, ensuring accurate humidity measurement and control, even when dehumidification isn't required.

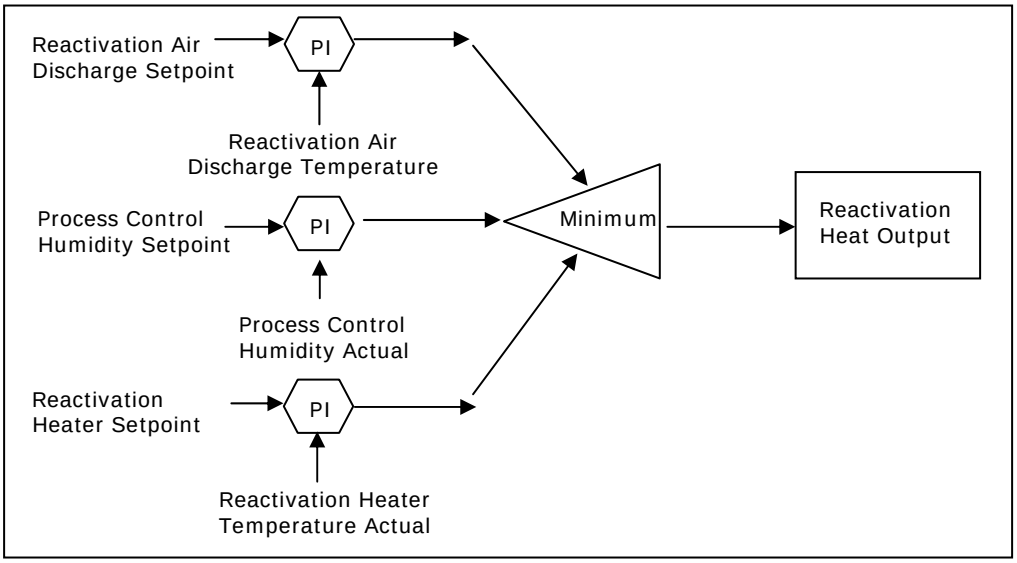


Figure 14. Proportional (Trac) Control Diagram

6.0 MAINTENANCE

6.1 Preventive Maintenance

Minimal periodic Preventive Maintenance Checks and Services (PMCS) are recommended to ensure optimal performance of the dehumidification system. Routine maintenance can correct deficiencies before they cause serious damage to the equipment and help ensure the unit is ready for operation at all times.

A schedule for preventive maintenance inspection and service should be established immediately after installation of the unit. The system should record all problems, defects, and deficiencies noted by operators and discovered during maintenance inspections, together with the corrective actions taken. Use copies of the Periodic General Maintenance Checklist in Appendix A to record maintenance inspections. For assistance, contact STULZ Product Support.

WARNING

UNIT CONTAINS DEADLY VOLTAGES. USE ONLY QUALIFIED ELECTRICIANS TO PERFORM ELECTRICAL MAINTENANCE.

WARNING

DISCONNECT ALL POWER BEFORE PERFORMING ANY SERVICE OR MAINTENANCE. TURNING THE "LOCAL/OFF/REMOTE" UNIT SELECTOR SWITCH TO THE "OFF" POSITION DOES NOT DISCONNECT POWER.

6.1.1 General

The following lists the preventive maintenance checks and services that should be performed quarterly or at otherwise established intervals. When operating under extreme or unusual conditions, such as a very dusty or sandy environment, it may be necessary to reduce maintenance intervals. The schedule below assumes your system operates continuously.

1. Check all electrical connections to ensure they are tight and not shorted to ground.
2. Ensure all control panel lights are functional and not burned out. (Use the "Press to Test" feature.)
3. Ensure all bolts, motor mounts, brackets, etc., are secure. Look for loose or missing parts.
4. Ensure all bearing shaft set screws are tight, if applicable.
5. Verify that any shaft key, pulley, and bearing lockdowns are tight.
6. Thoroughly clean the unit inside and out, making sure to remove any dust from fan blades and any accumulation on air inlets and outlets.

6.1.1.1 Filters

Remove, clean, and/or replace air filters to ensure proper airflow through the unit. If your environment is exceptionally dusty or sandy, this may be required on a more frequent basis.

6.1.1.2 Seals

Ensure that desiccant rotor seals are not worn and peripheral seals contact rotor flanges.

6.1.1.3 Belts

Check blower belts (if applicable) for signs of abnormal wear. Examine for tightness and general condition. Check the rotor drive belt for signs of abnormal wear.

6.1.1.4 Coils

Remove accumulated dust and dirt buildup on coils (if applicable). Use a soft brush or vacuum sweeper to remove dirt from face areas. Inspect the area around the coil(s) for leaks.

WARNING

DO NOT USE STEAM TO CLEAN A COIL. DO NOT USE STEAM, OPEN FLAME, HEAT GUN OR ANY OTHER HIGH-TEMPERATURE HEAT SOURCE TO THAW AN ICED COIL. THAW AN ICED COIL BY USING A LAMP BULB (75 WATT MAXIMUM), OPERATING UNIT IN HIGH HEAT MODE, WITH A HAIR DRIER, ELECTRIC FAN OR BY LEAVING THE UNIT SHUT DOWN UNTIL ICE MELTS.

6.1.1.5 CW Cooling

Bleed any air from the glycol or chilled water system. Check glycol solution inhibitors and concentration. Flush and restore as necessary.

6.1.1.6 Condensate Drains

Pour approximately one quart of clean water into the condensate drain pan and watch for it to flow through the drain line in the bottom of the unit. If water does not drain, check the pan and hoses for blockages. Clean the pan and hoses as needed. Ensure the condensate trap is filled with water.

6.1.1.7 DX Refrigeration

Check the refrigerant charge. If low on charge, check for refrigerant leaks. If necessary, recover refrigerant, repair leak and recharge system per the instructions given in the RCU manual.

6.1.1.8 Remote Condensing Unit(s)

Do not allow debris to accumulate in or around the RCU openings that will inhibit airflow. Check the refrigerant lines for signs of leakage.

6.2 Rotor Drive Maintenance

A drive belt and speed-reducing gearmotor are used to rotate the desiccant rotor. The rotating speed is relatively slow and is measured in RPH (revolutions per hour), not RPM (revolutions per minute).

6.2.1 Rotor Drive Motor

The gearmotor bearings are pre-lubricated and do not require re-lubrication. Periodically inspect the area around the gearmotor for accumulated dirt. Remove dirt by vacuuming.

! CAUTION Dirt accumulation can cause motor heating and can be a fire hazard.

Also, measure gearmotor current during unit operation and compare it against the Full Load Amps (FLA) value on the Unit Nameplate. Check for unusual noises or vibration, overheating, worn or loose couplings and loose mounting bolts.

6.2.2 Rotor Drive Belt

A drive belt rides on a series of cleats that are pop riveted to the rotor's circumference. Periodically check the drive belt and cleats for cracks, crazing and abnormal wear. Also, ensure there is good mating between the drive belt and all cleats. Too much tension in the drive belt can reduce belt life so ensure there is some slack by adjusting, as necessary, the tensioner located near the gearmotor.

6.3 Blower Motor Maintenance

6.3.1 General Inspection

Inspect the blower motors at regular intervals (approximately every 550 hours of operation or every 3 months). Keep the motors clean and make sure the ventilation openings are clear. The steps listed below should be performed at each inspection.

WARNING
DISCONNECT ALL POWER BEFORE SERVICING UNIT. TURNING THE "LOCAL/OFF/REMOTE" UNIT SELECTOR SWITCH TO THE "OFF" POSITION DOES NOT DISCONNECT POWER.

1. Ensure the exterior of the motors (including the area inside any motor fan guards) are free of dirt, lint, oil, water, etc. because they can accumulate and block motor ventilation. If a motor is not properly ventilated, overheating can occur and cause early motor failure.
2. Use a "Megger" periodically to verify the integrity of the winding insulation is maintained and record the readings. If there is a significant drop in insulation resistance, immediately investigate.
3. Ensure all electrical connections are tight.

6.3.2 Lubrication and Bearings

NOTE: Some motors are provided permanently lubricated and will not require service for the lifetime of the equipment.

(For motors with grease fittings only)

The lubricating ability of grease depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. This lubricating ability can be lost over time.

For motors that require periodic service, the following recommended lubrication interval and procedure should be followed:

1. A high grade ball or roller bearing grease should be used. Several recommended greases for standard service conditions are Shell Dolium R (factory installed), Texaco Polystar, Amoco Rykon Premium #2 or Chevron SRI#2.
2. Lubrication should be performed at the recommended intervals shown in the following table. These recommended intervals are based on average use. See the nameplate on the motor for frame size and rated speed.

Table 1. Blower Motor Lubrication Intervals

NEMA/(IEC) Frame Size	Rated Speed - RPM	
	3600	1800
Up to 210 incl. (132)	5500 Hrs.	12000 Hrs.
Over 210 to 280 incl. (180)	3600 Hrs.	9500 Hrs.
Over 280	2200 Hrs	7400 Hrs.

Table 2. Service Conditions

Severity of Service	Ambient Temperature Maximum	Atmospheric Contamination	Type of Bearing
Standard	40°C	Clean, Little Corrosion	Deep Groove Ball Bearing
Severe	50°C	Moderate dirt, Corrosion	Ball Thrust, Roller
Extreme	>50°C* or Class H Insulation	Severe dirt, Abrasive dust, Corrosion	All Bearings
Low Temperature	<-30°C**		

*Special high temperature grease is recommended (Dow Corning DC44 or Darmex 707).
**Special low temperature grease is recommended (Aeroshell 7).
} **(Not applicable to units using food grade grease.)**

Table 3. Lubrication Interval Multiplier

Severity of Service	Multiplier
Standard	1.0
Severe	0.5
Extreme	0.1

Table 4. Bearing Sizes and Types

Frame Size NEMA (IEC)	Bearing Description (These are the "Large" bearings (shaft End) in each frame size)					
	Bearing	OD mm	Width mm	Weight of Grease to add oz (grams)	Volume of grease to be added	
					in^3	teaspoon
Up to 210 incl. (132)	6307	80	21	0.30 (8.4)	0.6	2.0
Over 210 to 280 incl. (180)	6311	120	29	0.61 (17.4)	1.2	3.9
Over 280	6313	140	33	0.81 (23.1)	1.5	5.2

6.3.2.1 Sample Lubrication Determination

Assume NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43°C and an atmosphere that is moderately corrosive.

Table 1 lists 9500 hours for standard conditions.

- Table 2 classifies severity of service as "Severe."
- Table 3 lists a multiplier of 0.5 for severe conditions.
- Table 4 shows 1.2 in^3 or 3.9 teaspoons of grease to be added.

6.3.2.2 Lubrication Procedure

Ensure the grease you are adding is compatible with the grease already in the motor. Consult the factory or the motor manufacturer if you are using grease other than the recommended type.

! CAUTION To avoid damage to motor bearings, keep grease free of dirt. If you have an extremely dirty environment, contact the factory or the motor manufacturer for additional information.

1. Clean the grease fitting.
2. If the motor has grease outlet plug remove it.
3. If the motor is stopped, slowly add the recommended amount of grease. If the motor is to be greased while running, add a slightly greater quantity of grease.
4. Add grease slowly until new grease appears at shaft hole in the endplate or purge outlet plug.
5. Re-install grease outlet plug if removed.

6.3.3 Extended Lubrication Lines (Optional)

The process blower and motor may be equipped with lubrication lines extending to grease fittings mounted on the rear (exterior) of the cabinet.

NOTE: Some grease is pressed out of the bearings during installation to ensure there are no air pockets in the lines or bearings.

7.0 TROUBLESHOOTING

In the event a problem is encountered, the control panel indicator lights and system controller, which provide alarm indication, may be used to diagnose the cause. Often the remedy is simply determined by viewing the alarm notification (e.g., "Dirty Filter Process Air" means change the process air filter). The following guidelines are included to assist you with troubleshooting. If the problem can't be resolved using the guidelines below, contact STULZ Product Support for assistance (see Section 9.0).

For information about specific alarms, refer to the *E^2 Series Microprocessor Controller for Desicair Dehumidification Systems IOM*.

Problem: Unit Does Not Run

If the dehumidifier is controlled by a remote device such as a remote start/stop request, check this device before you check the dehumidifier itself.

In REMOTE mode:

1. Check remote start/stop contact or controller.
2. If this check-out does not solve the problem, then set the mode selector switch to the "Local" position. If the unit operates, the problem is related to the remote start/stop request.

In LOCAL mode:

1. Check power supply for correct voltage and phase.
2. Check wiring connections. Refer to the unit Electrical drawing.
3. Check circuit breakers and reset if necessary.
4. Check the motor thermal overloads or circuit controllers. If an overload or motor controller tripped, the amp draw exceeded the design condition. Check that the filters are clean and unclogged, that the damper is in the proper position, and that no other obstructions exist.

Problem: Control is Erratic

1. Wiring improperly connected or broken.
2. Wires shorted. Check all wire connections to ensure they are tight and that no shorts are present. Also check the wiring point-to-point terminations against the electrical diagram.
3. Adjust the control parameters. (See the *E^2 Series Microprocessor Controller for Desicair Dehumidification Systems IOM.*)

Problem: Red "Summary Fault" Lamp Illuminated

1. Use the system controller to identify the alarm.
2. Diagnose and correct the cause of alarm condition.
3. Reset if necessary.
4. Check all wire connections to ensure they are tight and that no shorts are present.

Problem: High Reactivation Temperature

1. Ensure the reactivation air volume is sufficient in accordance with the Unit Nameplate. Adjust the air damper position if necessary.
2. Ensure the filters are clean and unclogged.
3. Ensure the rotor flutes are not dirty (clogged).
4. Ensure the duct work is not damaged or obstructed.

Problem: Low Reactivation Temperature (steam units only)

1. Ensure the supply of steam is sufficient in accordance with the Unit Nameplate.
2. Ensure the steam supply and return valves are opened.

Problem: Process Blower Does Not Turn, but "UNIT ON" Lamp is ON (systems with VFD only)

1. Ensure the process blower VFD disconnect switch is turned to the "On" position.
2. Check the VFD to ensure there is an output signal to the blower motor.
   a. Ensure the current rating on the VFD matches the motor data plate FLA for the rated voltage.
3. Check the motor thermal overload for the process blower and the circuit breaker in the process blower VFD enclosure.
   a. Reset if necessary.
   b. Identify and correct the cause of the overload condition.

   In this case, amp draw of the motor exceeded the design condition. With main power off, ensure the blower turns freely. Also, ensure all wire connections are tight and no shorts are present.

Problem: Reactivation Blower Does Not Turn, but "UNIT ON" Lamp is ON

1. Check controller to ensure output signal.

2. Check the VFD to ensure output signal (steam reactivated units only).
3. Check the motor starter protector for the reactivation blower.
   a. Reset if necessary.
   b. Identify and correct cause of overload condition.

   In this case, amp draw of the motor exceeded the design condition. With main power off, ensure the blower turns freely. Also, ensure all wire connections are tight and no shorts are present.

   Ensure the overload current setting on the motor starter protector for the reactivation blower matches the motor data plate FLA for the rated voltage. Adjust the motor starter protector if necessary.

Problem: Desiccant Rotor Does Not Turn

1. Check the rotor drive motor starter. The rotor drive starter is interlocked for the rotor drive to operate only when the reactivation blower motor is on.
2. Check the VFD to ensure there is an output signal to the blower (steam reactivated units only).
3. Check that the belt and tensioner are properly positioned.
4. Realign the belt or reset the tensioner.
5. Check the power supply to the rotor drive motor.
   a. Ensure all wiring terminations are tight and no shorts are present.
   b. Check the primary and secondary fuses.
6. Check the seals for wear. If the surface is worn through, then increased drag will occur. This may cause increased power draw or too much torque for the rotor drive motor.

Problem: Dehumidifier Performance is Reduced

This condition could indicate a problem with the dehumidifier or a change in moisture loads within the space being conditioned. See the Technical Data Sheets provided for your unit to verify the performance conditions are as stated.

It is important that the power supply voltage and phase be correct and that the airflow rates be adjusted to the correct values.

1. To check the dehumidifier performance, take dry bulb and wet bulb temperature measurements upstream and downstream of the desiccant rotor in the process airstream. Convert the readings to dry bulb temperature and grains per pound. Compare the results to those indicated by the Technical Data Sheet. If the results are comparable, the problem is not with the unit. In this case, analysis of the entire system of duct work and space, including any changes in moisture loads (occupancy, etc.), is required.
2. Ensure the fans are rotating in the correct direction. If they are reversed, turn the unit off, allow for the cool down cycle, then disconnect main power and switch any two of the three power supply leads at the power distribution block located inside the electrical enclosure.
3. The desiccant itself is designed for a ten (10) year life with little degradation over time (<10% over 10 years). Improperly filtered air or oil-contaminated air can affect the capacity of the desiccant. If this is the case, then performance may be restored by washing the desiccant rotor as described in Section 8.2 of this manual.
4. Check the rotor seals. Ensure the seals are intact and that the edge seal makes contact with the rotor perimeter to prevent air from leaking.
5. Check for air leakage. Inspect the exterior of the system cabinet, the door seals and duct connections to ensure there are no air leaks. Open the access doors and inspect the interior of the cabinet for signs of possible leaks in the plenums and transition ducts.

Problem: Heating Performance Reduced

1. Check for correct steam supply pressure and temperature. Check for leaks.

Problem: Burner Faults Continuously
(Gas Fired Reactivation Only)

1. Check the manual valves in the gas line.
2. Purge all air out of the gas line supplying the dehumidifier.
3. Reset the burner control relay module, which is located in the main electrical enclosure.

Problem: “Check Air/Gas” Fault Lamp Illuminated
(Gas Fired Reactivation Only)

This indicates either an improper burner pressure drop setting or a high/low gas pressure condition. Ensure the burner pressure drop is approximately 1.0” by adjusting the burner profile plates both above and below the gas burner, if necessary. Refer to Figure 10, Burner Assembly. The profile plates should be adjusted so that an even airflow distribution is

maintained across both the upper and lower sections of the burner. Ensure that the inlet gas pressure is between 2" and 14" w.c. If gas inlet pressure is within the limits, both switch contacts will be closed (this can be checked through the small view windows on the gas pressure switch located on the gas train. Ensure that the burner air proving switch is adjusted correctly[1] (the switch is located behind the burner pressure differential gauge). This switch may need to be adjusted depending on altitude.

Problem: Pre or Post Cool Stages Not Starting

1. Check the controller to ensure output signal.
2. Ensure "minimum off" time has expired. (applies to units with DX cooling only.)

Problem: Cooling Performance is Reduced

1. Check for and clear any obstructions in the Process airstream.
2. Check the air filters and replace as needed.
3. Check the coil fins for dirt build-up and clean if necessary.

WARNING
DO NOT USE STEAM TO CLEAN COIL

4. Check for clogged chilled water strainers as applicable.

If the result of following the above troubleshooting steps doesn't solve the problem, contact STULZ Product Support (see Section 9.0).

Problem: Compressor Does Not Run

Check for:

1. Defective contactor:
   a. Check for overload.
   b. Repair or replace.
2. Head pressure too high:
   a. Check condenser air inlet and discharge for obstruction.
   b. Reset high pressure switch.
   c. Check condenser motor contactors.
3. Complete loss of refrigerant charge:
   a. Repair leak.
   b. Recharge system.
4. Defective compressor:
   a. Check for lack of oil.
   b. Check for piston seizure, if applicable.
   c. Check for broken reed valve jamming piston, if applicable.
   d. Replace compressor.
5. Defective compressor motor:
   a. Replace compressor.

WARNING
BEFORE PERFORMING BRAZING OR DEBRAZING OPERATIONS BE SURE THE REFRIGERATION SYSTEM IS FULLY DISCHARGED AND PURGED AND THAT DRY NITROGEN IS FLOWING THROUGH THE SYSTEM AT THE RATE OF NOT LESS THAN 1-2 CFM (0.028-0.057 M3/MINUTE).

Problem: Noisy Compressor

Check for:

1. Expansion valve stuck in open position:
   a. Ensure feeler bulb is tight.
   b. Check superheat.
   c. Adjust or replace valve.
2. Broken compressor valve:
   a. Replace compressor.
3. Worn or failed compressor bearings:
   a. Replace compressor.
4. Liquid floodback - check superheat.

Problem: System Short of Capacity

Check for:

1. Flash gas in liquid refrigerant line:
   a. Repair leak.
   b. Recharge system.
2. Expansion valve stuck in the closed position:
   a. Ensure feeler bulb is tight.
   b. Check superheat.
   c. Adjust or replace valve.

Problem: Head Pressure Too High

Check for:

1. Low condenser air flow:
   a. Open air passages.
   b. Clean coil.
   c. Check condenser fan(s).

[1] Air Switches are typically set to trip at 2/3rd of the measured pressure drop (example: if the pressure drop setting is 1.5", then the switch should be set to open at 1.0")

2. Air or other non-condensable gas in system:
   a. Reclaim system.
   b. Recharge system.
   c. Install new drier/strainer.
3. Overcharge of refrigerant:
   a. Reclaim excess refrigerant from unit.
4. Condenser fan not on:
   a. Verify setting at 180 psig.
   b. Ensure the overload is closed.

Problem: Head Pressure Too Low

Check for:

1. Loss of refrigerant:
   a. Repair leak.
   b. Recharge system.
2. Broken or faulty compressor valves:
   a. Replace compressor.

Problem: Suction Pressure Too Low

Check for:

1. Expansion valve stuck in the open position:
   a. Repair or replace valve.
2. Hot gas regulator pressure setting too low:
   a. Adjust or replace.
3. Broken suction valve in compressor:
   a. Replace compressor.
4. Low charge, flash gas in liquid line:
   a. Repair leak.
   b. Recharge unit.
5. Clogged drier/strainer:
   a. Replace drier/strainer.
6. Obstructed expansion valve. Replace valve.

Problem: Cooling Coil Ices

1. Temperature setting too low.
2. Low airflow.
3. Expansion valve stuck open.
4. Hot gas regulator pressure setting too low.

Problem: Chilled Water Valve Fails to Open or Close

1. Check for control signal to chilled water valve.
2. Check operation of valve actuator.

8.0 REPAIR PROCEDURES

8.1 General

Under normal operating conditions and with the proper preventive maintenance, the unit should provide excellent service for many years. If necessary, the unit should be returned to the manufacturer or a suitably qualified depot for major overhaul and refurbishment. All work must be performed by qualified refrigeration and electrical technicians and should include replacement of rotor, seals, compressors, motors, starters, contactors, bearings and other accessories as necessary.

8.2 Rotor Washing Instructions

Over time, dirt accumulations may form on the surface of the desiccant rotor, blocking the openings of the flutes. The rotor may require periodic cleaning to maintain peak performance. Accumulated dirt can be removed from the surface of the rotor using a vacuum cleaner. Heavier accumulations may be removed by washing the rotor with clean water. If the desiccant rotor is continuously exposed to air containing oil laden vapors, it may be necessary to wash the rotor with a solution of water mixed with a light, non-alkaline detergent.

The following procedure describes the steps required to wash the desiccant rotor. At least two people are required to efficiently and safely clean the rotor. Required materials include:

- Plastic sheeting to protect internal electrical components
- Dry vacuum
- Wet vacuum
- Wood block
- Hand-held spraying device (found at most hardware stores)
- Water/solution supply

8.2.1 Preparation

Operate the unit with the reactivation blower “On”, the reactivation heater “Off”, and the process blower “Off” for two hours or until the entering and leaving reactivation air temperature is the same. Pre-cooling of the airstream is not necessary.

8.2.2 Unit Shut Down

1. Disconnect the power (turning the “Local/Off/Remote” mode selector switch to “Off” does not disconnect the power).
2. Remove the rotor service panels to allow access to the unit and the cassette.
3. Slide the drive belt off the tensioner and drive-belt pulley, freeing it from the drive system.
4. Carefully cover the drive motor with plastic to prevent the water/solution from coming in contact with the drive motor.

8.2.3 Cleaning

1. Note the initial starting point. Using an industrial dry vacuum with a clean, soft brush attachment, draw air through the rotor flutes into the vacuum. Vacuum the entire surface of the rotor. With one person operating the vacuum, the other person slowly rotates the rotor by pulling on the drive belt.
2. Dry vacuum for at least one full revolution of the rotor. Repeat this process for the other side of the rotor (if possible).
3. After dry vacuuming, stabilize the rotor by placing a wood block under the rotor near the drive motor to prevent rotation during washing.
4. Open the drain holes in the floor of the cabinet to allow the cleaning water/solution to flow out. **NOTE:** Ensure that a means of collecting the cleaning solution for proper disposal is provided.
5. With the water/solution in the spraying device, flush the rotor through the lower half section (see Figure 15). If using a solution, rinse the rotor with water after flushing it with the solution.

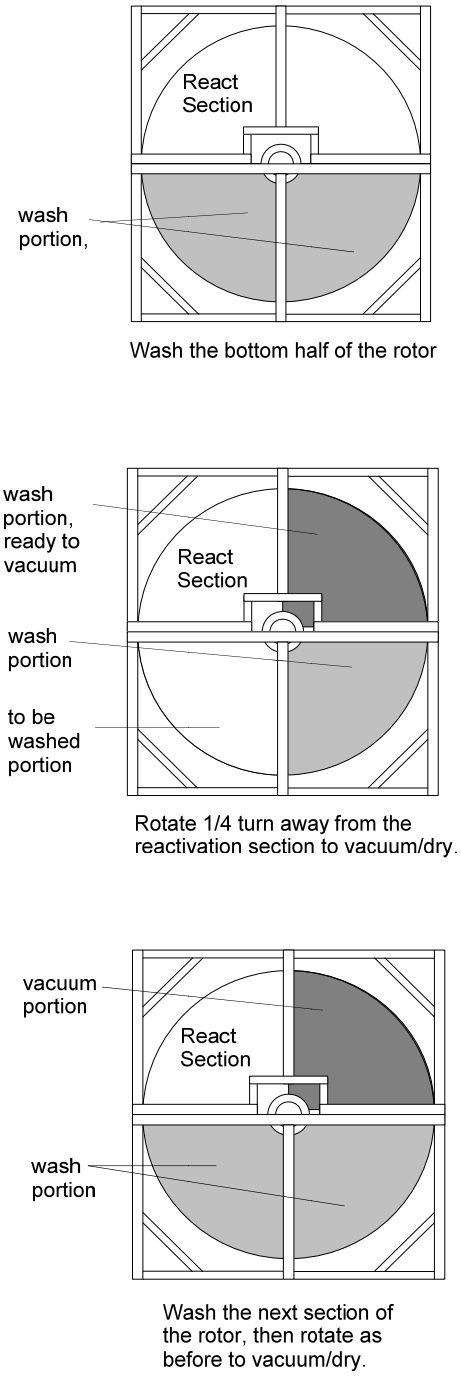


Figure 15. Rotor Washing

6. Remove the wood block and rotate the wet part of the rotor 1/4 turn *away* from the reactivation section of the cassette. Replace the wood block under the rotor.
7. Continue washing/rinsing the next section of the rotor. At the same time, wet vac the rotor at the upper section of the cassette. Then dry vac the same portion of the rotor. After dry vacuuming, remove the wood block and rotate the rotor in the same direction 1/4 turn. Begin washing, rinsing and vacuuming as before.
8. Continue this operation until the entire rotor has been washed, rinsed, and vacuumed.
9. When finished, use the wet/dry vac to remove any water from around the hub, spokes, and flange areas. Spin/rotate the rotor to check for balance. An unbalanced rotor may indicate the need for more wet/dry vacuuming. Repeat the drying operations as necessary.
10. Drain, wet vac, and dry mop the bottom of the cabinet on both the upstream and downstream side of the rotor/cassette.
11. Remove the wood block and plastic sheeting and make sure the rotor turns freely and there is no moisture around the base of the drive motor.
12. Align and reinstall the rotor drive belt and tensioner. Replace all service panels (making sure all tools/supplies are removed from the unit first). Reconnect the power.
13. Operate the unit with the reactivation blower On, the reactivation heater Off and the process blower Off for 60 minutes, then resume normal unit operation.
14. After 6 hours, check the performance of the unit. If the process air output is excessively humid (greater than 10% of original performance), turn the process blower Off and run the reactivation heater and blower for another 2 hours to “reactivate” the desiccant. If conditions still do not return to normal, consult the factory.

8.3 Rotor Repair

Minor repairs, such as rotor cracks, can be performed by service technicians when required. These instructions are for small cracks in the desiccant rotor surface. For large cracks or for information on replacing the rotor, contact STULZ’ Product Support at (240) 529-1399. Materials needed include:

- Masking tape
- Small piece of stiff cardboard with flat edge
- Tube of 100% Silicone caulk
- Caulking gun

1. Turn the unit Off and disconnect main power. Remove the service panels from the unit.
2. Remove the belt from the rotor drive pulley so you can turn the rotor freely. Position the rotor so you have unobstructed access to the cracked portion of the rotor.

3. Apply masking tape to the face of the rotor on the right and left sides of the crack. Allow for about two “corrugations” on each side of the crack.
4. Apply 100% silicone sealant to the crack, keeping the angled cut of the silicone tube parallel and very close to the surface of the rotor to ensure good penetration. Allow the silicon seal to extend ½” beyond the edge of the crack. For best results, apply the silicone in an upward motion to push the silicone into the crack.

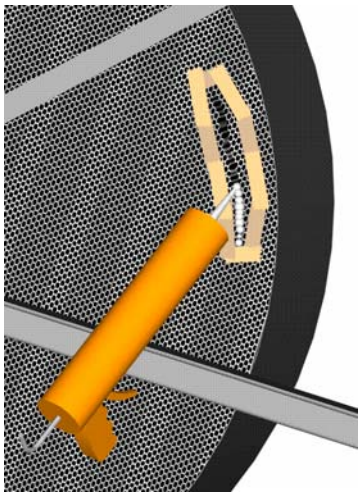


Figure 16. Rotor Crack Repair

5. After applying the silicone, take the piece of cardboard, and at a 45° angle, drag the cardboard over the bead to press the silicone into the crack and make the surface of the silicone smooth and flush with the face of the rotor. This will further enhance the penetration of the silicone and will ensure that the silicone does not protrude above the surface of the rotor.
6. Immediately after pressing the silicone into the crack with the cardboard, remove the masking tape. This must be done before the silicone starts to cure or “skin over.”
7. Allow the silicone 24 hours to fully cure prior to running the unit. Should any questions or problems arise, contact STULZ Product Support.

8.4 Cooling System Field Repairs

From time to time it may be necessary to perform field repairs on the cooling system. If field repairs are necessary, the procedures in this section apply.

NOTE: Repairs to refrigeration systems must be performed by a journeyman refrigeration mechanic or air conditioning technician.

8.4.1 CW Cooling Repairs (CW systems only)

If the Chilled Water system isn’t cooling or if cooling is reduced, check for leaks in the system. Check for clogged water lines. If filters are installed in the CW lines, check the condition of the filters. Clean or replace the filters if necessary.

8.4.1.1 Leaks

A leak in a chilled water cooling system will usually form a puddle of fluid beneath the unit that can be easily seen. Visually trace the leak up from the puddle to the area on the unit where fluid may be seen dripping.

8.4.1.2 Leak Repair

When a leak is detected, properly reclaim the remaining CW coolant before attempting repairs. Adjacent piping must be thoroughly cleaned by removing all paint, dirt and oily film. Use a wire brush, sandcloth or sandpaper and wipe the area with clean, dry cloths. Protect nearby parts from heat damage by wrapping with water-soaked cloths.

For copper-to-copper (piping) repairs use SILFOS Alloy. No flux is required with Silfos Alloy. Silver solder (Stay Silv #45) and flux should be used on copper-to-brass or copper-to-steel repairs.

When repairs are completed, remove all traces of flux. After any repair, check for leaks prior to recharging the system.

IMPORTANT: Do not attempt to make any adjustments without the proper tools.

8.4.2 DX Refrigerant Leaks (DX systems only)

WARNING

IN ITS NATURAL STATE, REFRIGERANT IS A COLORLESS ODORLESS VAPOR WITH NO TOXIC CHARACTERISTICS. REFRIGERANT IS HEAVIER THAN AIR AND IN A WELL-VENTILATED AREA WILL DISPERSE RAPIDLY. HOWEVER, IN AN UNVENTILATED AREA IT PRESENTS DANGER OF SUFFOCATION.

Several methods can be used to detect a leak in a DX refrigeration system. The most modern and easiest method is to use an electronic leak detector. Follow the manufacturer's directions and any leak can be quickly located.

A second method is to use soap bubbles. Apply a solution of soapy water with a brush or sponge to the joints and connections in the refrigeration lines. A leak in the lines will cause bubbles to form.

8.4.2.1 Leak Repair

If a leak is detected, properly reclaim the remaining DX refrigerant before attempting repairs. When replacing refrigeration components, adjacent piping must be thoroughly cleaned by removing all paint, dirt and oily film. Use wire brush, sandcloth or sandpaper and wipe the area with clean, dry cloths.

When brazing copper-to-copper connections (piping liquid line or suction line), use a phosphorus copper brazing alloy with 15% silver. General purpose silver brazing alloy with 45% silver is to be used for copper-to-brass or copper-to steel.

Wrap wet rags around the pipes between the areas to be soldered and any nearby refrigeration components to keep excessive heat from traveling through the pipe and causing damage.

When repairs are completed, remove all traces of flux. After any repair, check for leaks prior to recharging the system.

WARNING

SERIOUS INJURY MAY RESULT IF PERSONNEL FAIL TO OBSERVE PROPER SAFETY PRECAUTIONS. DO NOT CONTACT LIQUID REFRIGERANT OR REFRIGERANT GAS DISCHARGED UNDER PRESSURE. THE EXTREMELY LOW TEMPERATURE RESULTING FROM THE RAPID EXPANSION OF LIQUID REFRIGERANT, OR REFRIGERANT GAS RELEASED UNDER PRESSURE, CAN CAUSE SUDDEN AND IRREVERSIBLE TISSUE DAMAGE THROUGH FREEZING. WEAR THERMAL PROTECTIVE GLOVES AND FACE SHIELD OR GOGGLES WHEN WORKING IN ANY SITUATION WHERE REFRIGERANT CONTACT WITH THE SKIN OR EYES IS POSSIBLE.

9.0 STULZ PRODUCT SUPPORT

STULZ provides its customers with Product Support which not only provides technical support and parts but the following additional services, as requested:

- Performance Evaluations
- Start-up Assistance
- Training

9.1 Technical Support

The STULZ Technical Support Department is dedicated to the prompt reply and solution to any problem encountered with a unit. Should a problem develop that cannot be resolved using this manual, you may contact (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. If a problem occurs after business hours, provide your name and telephone number. One of our service technicians will return your call.

When calling to obtain support, it is important to have the following information readily available, (information is found on the Unit Nameplate):

- Unit Serial Number (12345678)
- Unit Model Number (DHP-XXXX-XX-X)
- STULZ Sales Order Number (123456-12)
- Description of Problem

9.2 Obtaining Warranty Parts

Warranty inquiries should be made through the Technical Support Department at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. A service technician at STULZ will assist in troubleshooting the system over the telephone with a field service technician to determine the defect of the part. If it is determined that the part may be defective, a replacement part will be sent via UPS ground. If the customer requests warranty part(s) be sent by any method other than UPS ground, the customer is responsible for the shipping charges. If you do not have established credit with STULZ, you must give a freight carrier account number.

A written (or faxed) purchase order is required on warranty parts and must be received prior to 12:00 p.m. for same day shipment. The purchase order must contain the following items:

- Purchase Order Number
- Date of Order
- STULZ Stated Part Price
- Customer Billing Address
- Shipping Address
- Customer's Telephone and Fax Numbers
- Contact Name
- Unit Model No., Serial No. and STULZ Item No.

The customer is responsible for the shipping cost incurred for returning the defective part(s) back to STULZ. Return of defective part(s) must be within 30 days, at which time an evaluation of the part(s) is conducted and if the part is found to have a manufacturing defect a credit will be issued.

When returning defective part(s), complete the Return Material Authorization Tag and the address label provided with the replacement part.

9.3 Obtaining Spare/Replacement Parts

It is recommended to have selected spare parts on hand to help ensure minimal system down time. Spare and replacement part requests should be made through Product Support by fax (301) 620-2606, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com). Quotes are given for specified listed parts for a specific unit.

STULZ accepts Visa and MasterCard. STULZ may extend credit to its customers; a credit application must be prepared and approved (this process could take one week).

A 25% minimum restocking charge will be applied on returned stocked parts that were sold as spare/replacement parts. If the returned part is not a stocked item, a 50% restocking charge may be applied. Additionally a Return Material Authorization Number is required when returning parts. To receive credit for returned repair/replacement parts, the parts must be returned to STULZ within 30 days of the purchase date. Spare part sales over 30 days old will be considered final and the parts will remain the sole property of the ordering party.

Appendix A
Forms

DESICAiR PRODUCT DIVISION

Appendix A- Forms

Checklist for Completed Installation

- ☐ 1 Proper clearances for service access have been maintained around equipment.
- ☐ 2 Equipment is level and mounting fasteners (if applicable) are tight.
- ☐ 3 Foreign materials removed from inside and around equipment installed (shipping materials, blower lockdown bolts construction materials, tools, etc.).
- ☐ 4 Blowers rotate freely without unusual noise.
- ☐ 5 Filter(s) installed (if required).
- ☐ 6 Duct work installed and sealed against leaks
- ☐ 7 Air dampers installed in ductwork (if required).
- ☐ 8 Incoming line voltage matches equipment nominal nameplate rating ± tolerances.
- ☐ 9 Main power wiring connections to the equipment, including earth ground, have been properly installed according to applicable codes.
- ☐ 10 Customer supplied main power branch circuit protection device/ fuses have proper ratings for equipment installed.
- ☐ 11 All control wiring completed according to applicable codes to wall mounted control panel, temperature/RH sensor transmitter, etc. (as applicable).
- ☐ 12 Control Sensors (+/-) polarity wired correctly.
- ☐ 13 All control wiring completed to terminal positions for customer control and monitoring lines.
- ☐ 14 All wiring connections are tight.
- ☐ 15 Steam piping, control valves, etc. installed (if required).
- ☐ 16 All field-installed piping leak tested.
- ☐ 17 Gas inlet supply pressure matches nominal nameplate rating (if required).

Name_____ Date_____

Company_____

DESICAiR PRODUCT DIVISION

Telephone: (301) 620-2033
Facsimile: (301) 620-1396

Periodic General Maintenance Checks and Services Checklist

Date: _____ Prepared By: _____

Model Number: _____ Serial Number: _____

Item Number: _____

Monthly

Filters

- ☐ Cleanliness
- ☐ No Obstructions

Rotor

- ☐ Check Condition of Rotor Face
- ☐ Check Condition of Seals

Reactivation Heater

- ☐ Inspect Flame (Gas Units)
- ☐ Inspect For Leaks (Steam Units)

Miscellaneous

- ☐ Check and Tighten Loose Fasteners
- ☐ Check Condition of Belts
- ☐ Check Pressure Drop Readings on Gauges
- ☐ Check Steam Lines for Air (bleed as required)
- ☐ Status Indicator Lights “Press to Test” Feature Operates Properly (Should Illuminate When Pressed)

Quarter-Annually

- ☐ Tighten Electrical Connections
- ☐ Check Contacts on Contactors for Pitting
- ☐ Clean Unit as Necessary
- ☐ Check Motor Amps Per Unit Name Plate
- ☐ Check Motors, Lubricate Per Maintenance Schedule
- ☐ Check Gas/Steam Pressure Per Unit Name Plate
- ☐ Clean Strainers as Necessary (Steam Units)
- ☐ Clean Coils as Necessary

Annually

- ☐ Conduct a Complete Check of All Services Listed Above and Clean Unit’s Interior
- ☐ Inspect Wiring For Fraying, Discoloration
- ☐ Inspect Piping System for Leaks and Corrosion (If Applicable)

Notes:_____

_____

_____

Signature:_____

*** If factory assistance is required for any reason, provide the model number, serial number and SATS item number found on the unit nameplate. This will speed the process and insure accuracy of information. ***

STULZ®

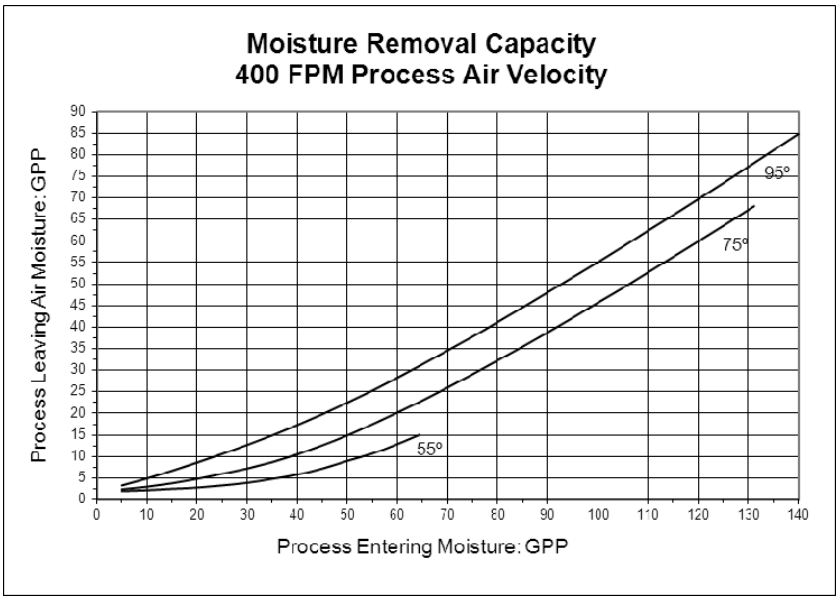
Appendix B
Unit Performance Curves

Note: Unit Performance Curves are provided for reference only. Data is based on reactivation entering air conditions at 95ºF/130 GPP. Refer to the Technical Data Sheet provided with the unit for specific unit performance data.

Performance for 400FPM Rotor Face Velocity

Grains Per Pound (GPP)

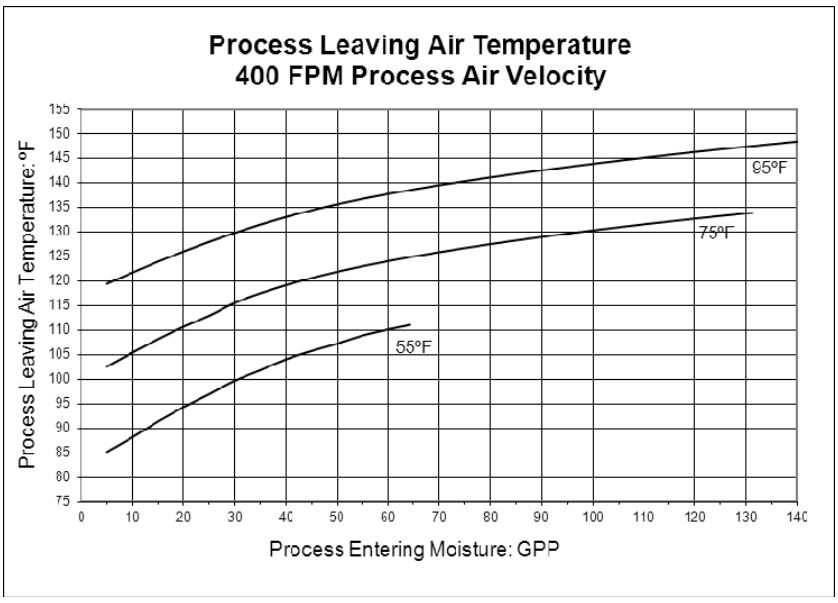
1. Enter the Performance Chart from the X-axis at the entering process air moisture in grains per pound (GPP).
2. Move vertically in a straight line to intersect the curve closest to the entering air temperature. Interpolate as required.
3. Move horizontally to the left and intersect the Y-axis. This point represents the leaving process air moisture from the dehumidifier in GPP



NOTE: Process air outlet temperatures as shown are maximum values at standard full rated heater output. The actual process outlet air temperature will be lower when the heater output is below full rated output. This condition will occur during heater modulation cycles due to partial loading of the dehumidifier.

Leaving Temperature

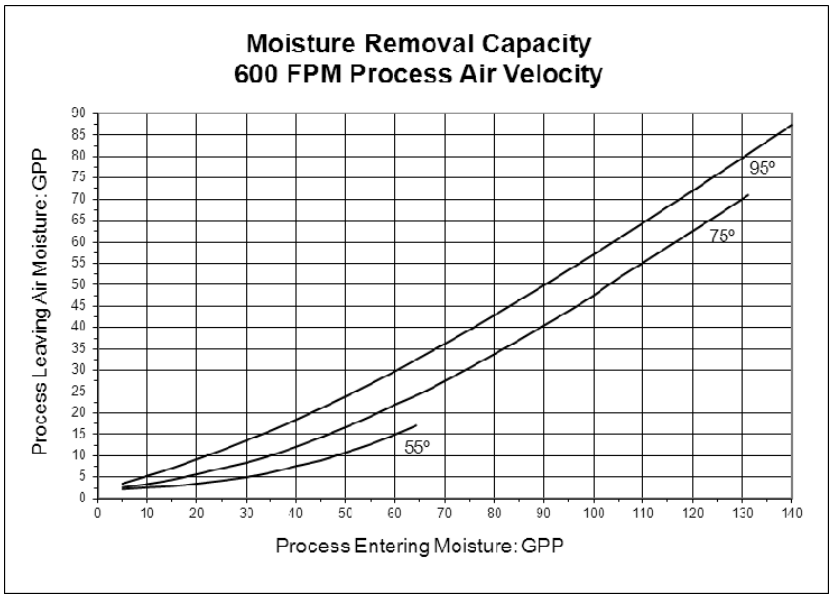
1. Enter the Performance Chart from the X-axis at the entering process air moisture in grains per pound (GPP).
2. Move vertically in a straight line to intersect the curve closest to the entering air temperature. Interpolate as required.
3. Move horizontally to the left and intersect the Y-axis. This point represents the leaving process air moisture from the dehumidifier in °F.



Performance for 600 FPM Rotor Face Velocity

Grains Per Pound (GPP)

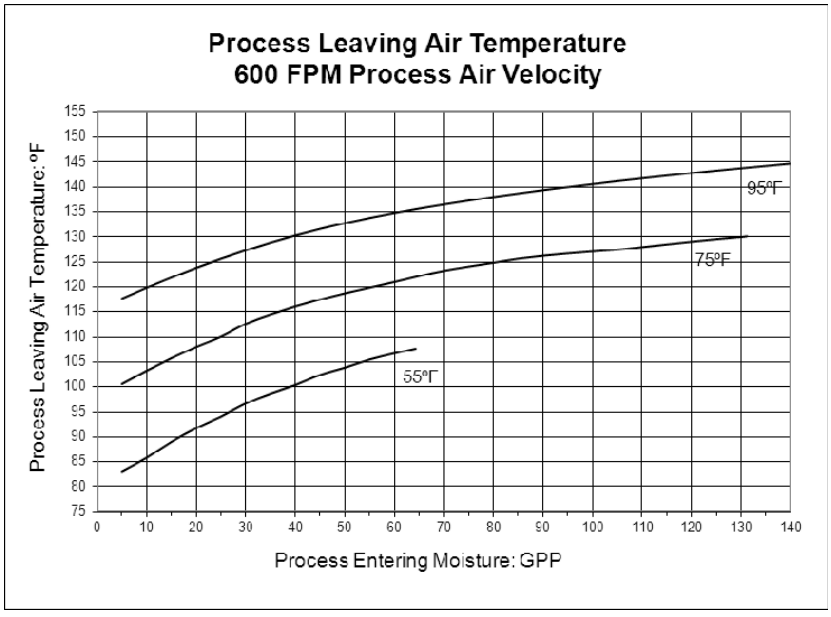
1. Enter the Performance Chart from the X-axis at the entering process air moisture in grains per pound (GPP).
2. Move vertically in a straight line to intersect the curve closest to the entering air temperature. Interpolate as required.
3. Move horizontally to the left and intersect the Y-axis. This point represents the leaving process air moisture from the dehumidifier in GPP.



NOTE: Process air outlet temperatures as shown are maximum values at standard full rated heater output. The actual process outlet air temperature will be lower when the heater output is below full rated output. This condition will occur during heater modulation cycles due to partial loading of the dehumidifier.

Leaving Temperature

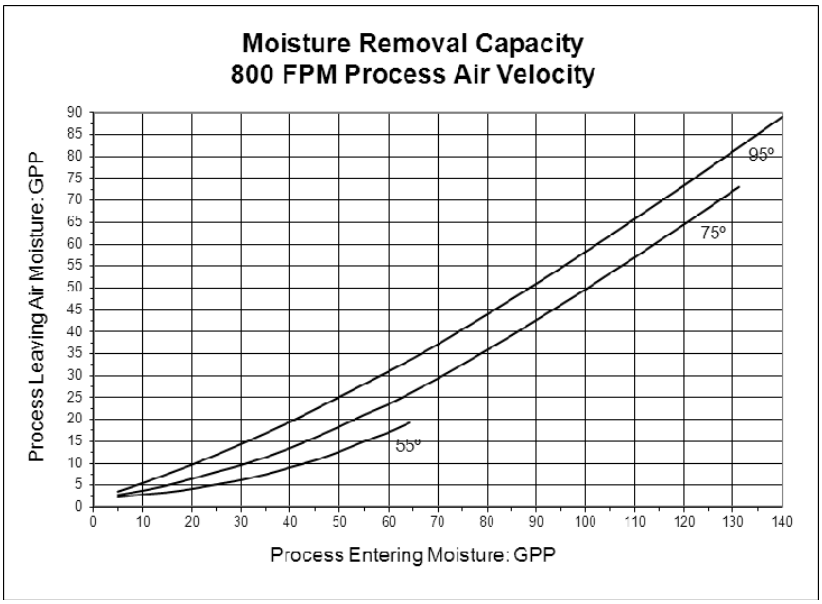
1. Enter the Performance Chart from the X-axis at the entering process air moisture in grains per pound (GPP).
2. Move vertically in a straight line to intersect the curve closest to the entering air temperature. Interpolate as required.
3. Move horizontally to the left and intersect the Y-axis. This point represents the leaving process air moisture from the dehumidifier in °F.



Performance for 800 FPM Rotor Face Velocity

Grains Per Pound (GPP)

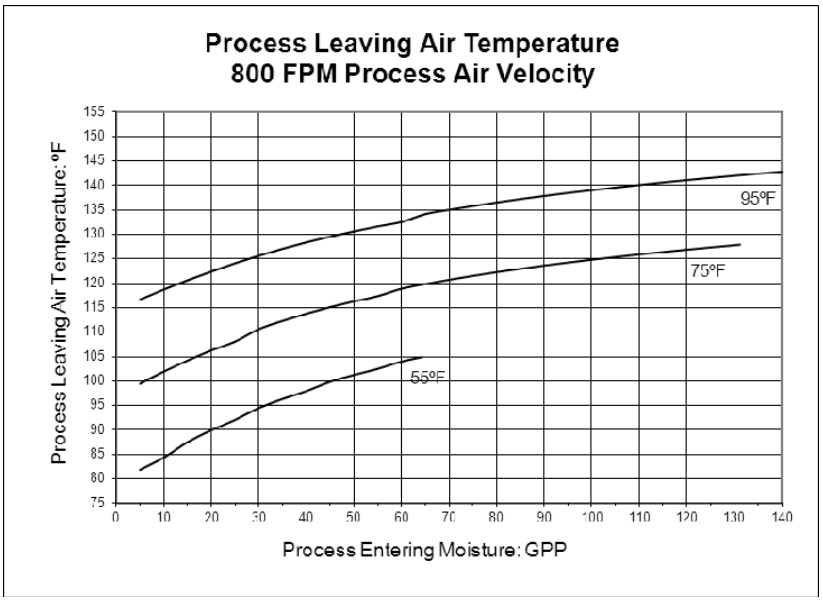
1. Enter the Performance Chart from the X-axis at the entering process air moisture in grains per pound (GPP).
2. Move vertically in a straight line to intersect the curve closest to the entering air temperature. Interpolate as required.
3. Move horizontally to the left and intersect the Y-axis. This point represents the leaving process air moisture from the dehumidifier in GPP



NOTE: Process air outlet temperatures as shown are maximum values at standard full rated heater output. The actual process outlet air temperature will be lower when the heater output is below full rated output. This condition will occur during heater modulation cycles due to partial loading of the dehumidifier.

Leaving Temperature

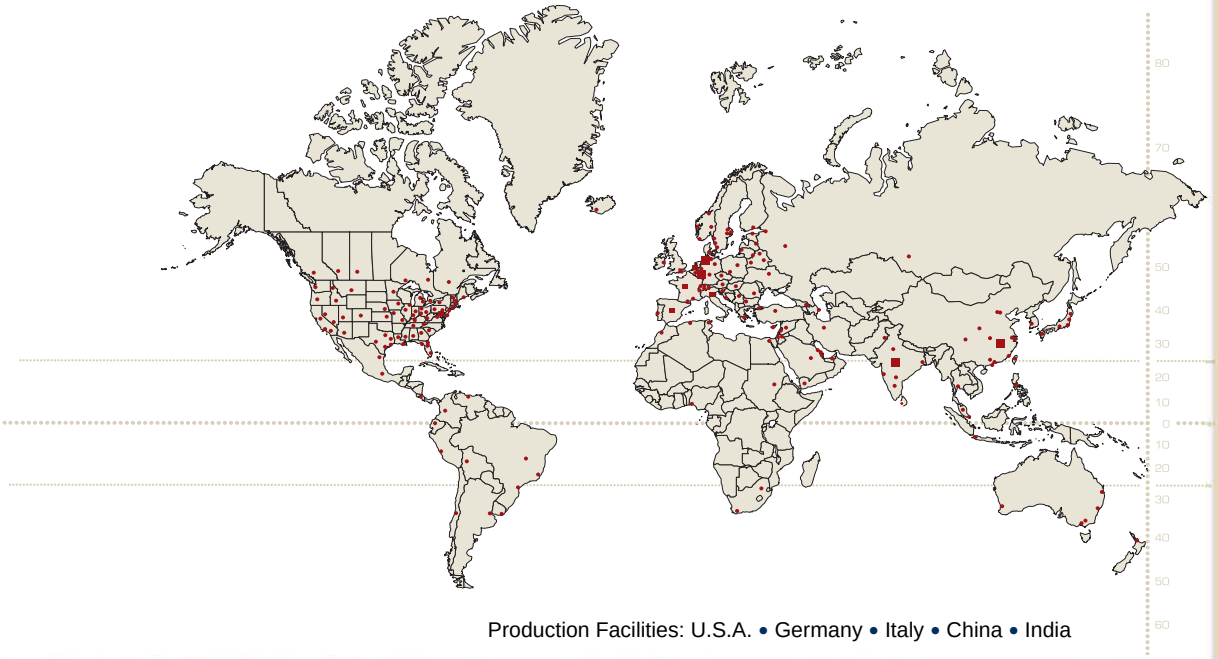
1. Enter the Performance Chart from the X-axis at the entering process air moisture in grains per pound (GPP).
2. Move vertically in a straight line to intersect the curve closest to the entering air temperature. Interpolate as required.
3. Move horizontally to the left and intersect the Y-axis. This point represents the leaving process air moisture from the dehumidifier in °F.



Appendix C
Glossary

APPENDIX C - GLOSSARY

Absorb	Penetration of vapor molecules into the molecular structure of another substance.
Adsorb	Attraction of vapor molecules to the surface of another substance
BTU/Hr	British Thermal Units per hour
C-TROL	Modulates reactivation heat to prevent condensation on cold surfaces
CFM	Cubic feet per minute
D-STAT™	Cycles dehumidifier on and off to maintain relative humidity
Desorb	Removal of absorbed or adsorbed vapor molecules
Dew Point	Temperature at which air is saturated with water vapor
DEW-TRAC™	Modulates reactivation heat to maintain dew point temperature
Dry Bulb	Temperature of air as measured by a thermometer
°F	Degrees Fahrenheit
FLA	Full load amperage
FOB	Free on board
GPP	Grains per pound
H-TRAC™	Modulates reactivation heat to maintain relative humidity
HP	Horse power
Hz	Hertz (frequency)
In. w.c.	Inches of water column
In. w.g.	Inches of water gauge
KVA	Kilovolt-Amp (one thousand Volt-amps)
KW	Kilowatt (One thousand Watts)
LRA	Locked rotor amps
MFS	Maximum fuse size
MCA	Minimum circuit ampacity
NEC	National electric code
PH	Phase
PSI	Pounds per square Inch
PSIG	Pounds per square inch gauge
RH	Relative humidity
SDS	Safety data sheet
VAC	Voltage, alternating current
VFD	Variable frequency drive
w.c.	Water column
Wet Bulb	Temperature of air as sensed by thermometer with a water saturated wick over the bulb.



Production Facilities: U.S.A. • Germany • Italy • China • India

Our mission is to be the premier provider of energy efficient temperature and humidity control solutions for mission critical applications.

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