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December 2013

## EH Series Desiccant Dryer

### Models 150-8000

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## Operator's Manual

- EN** Operator's Manual
- ES** Manual Del Operador
- FR** Manuel De L'opérateur
- PT** Manual do Operador



**Save These Instructions**

**IR** Ingersoll Rand®

# 1.0 CONTENTS

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## 2.0 INTRODUCTION

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The **Ingersoll Rand** Heatless Desiccant Dryers are designed to adsorb moisture from compressed air. The dryers are constructed with two towers, each containing desiccant beads, that alternate between online (drying) and offline (regenerating) modes, yielding a continuous stream of dry air at the dryer's outlet.

During normal operation, wet air passes through the on line tower and water vapor from the air is adsorbed (collected) on the desiccant beads. While air is being adsorbed in the online tower, the moisture on the desiccant in the offline tower is removed by a process called desorption (regeneration). In standard heat reactivated operation, after

an initial rapid depressurization, a portion of dried air from the on-line tower passes through a heater and over the desiccant bed and carries the moisture off the bed and out the dryer's exhaust. With the dryer's Bi-Mode feature, the dryers may also be operated in a Heatless mode, which uses more purge air but does not require use of the heater.

The continuous, alternating process of adsorption and desorption is controlled using a timer that switches the towers in a specific timed sequence. Very dry compressed air dew points are achieved through the continuous switching and operation of this dryer. **Ingersoll Rand** offers dryers to provide either -40°F or -100°F pressure dew point outlet air.

## 3.0 WARRANTY

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The Company warrants that the equipment manufactured by it and delivered hereunder will be free of defects in material and workmanship for a period of twelve months from the date of placing the Equipment in operation or eighteen months from the date of shipment from the factory, whichever shall first occur. The Purchaser shall be obligated to promptly report any failure to conform to this warranty, in writing to the Company in said period, whereupon the Company shall, at its option, correct such nonconformity, by suitable repair to such equipment or, furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated such Equipment in accordance with good industry practices and has complied with specific recommendations of the Company. Accessories or equipment furnished by the Company, but manufactured by others, shall carry whatever warranty the manufacturers have conveyed to the Company and which can be passed on to the Purchaser. The Company shall not be liable for any repairs, replacements, or adjustments to the Equipment or any costs of labour performed by the Purchaser or others without Company's prior written approval.

The effects of corrosion, erosion and normal wear and tear are specifically excluded. Performance warranties are limited to those specifically stated within the Company's proposal. Unless responsibility for meeting such performance

warranties are limited to specified tests, the Company's obligation shall be to correct in the manner and for the period of time provided above.

THE COMPANY MAKES NO OTHER WARRANTY OR REPRESENTATION OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HERBY DISCLAIMED.

Correction by the Company of non conformities whether patent or latent, in the manner and for the period of time provided above, shall constitute fulfilment of all liabilities of the Company for such non conformities whether based on contract, warranty negligence, indemnity, strict liability or otherwise with respect to or arising out of such Equipment.

The Purchaser shall not operate Equipment which is considered to be defective, without first notifying the Company in writing of its intention to do so. Any such use of Equipment will be at Purchaser's sole risk and liability.

Note that this is **Ingersoll Rand** standard warranty. Any warranty in force at the time of purchase of the equipment or negotiated as part of the purchase order may take precedence over this warranty.

## 4.0 HEATLESS DRYER NOMENCLATURE

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PREFIX	NOMINAL*	POWER / FLOW (m <sup>3</sup> /hr)	DEW POINT	NEMA/ MAWP	ELECTRICAL OPTION	ELECTRICAL OPTION	MECHANICAL OPTION	FILTERS
EH	150-8000	4 = 460-3-60 / -40 D= 460-3-60/ -100 6 = 575/3/60 / -40 F=575-3-60/ -100	H = NEMA 4 / 150 psig MAWP	0 = Standard F = EMS for Heatless Dryers	0 = Standard	0 = Standard	0 = Standard	A = Filters Attached L = Filters Loose

\* Nominal Flows indicated are for 100°F inlet temperature, 100°F ambient temperature and 100 psig compressed air pressure.

## 5.0 RECEIVING AND INSPECTION

### 5.1 INSPECTION

Upon receiving your **Ingersoll Rand** air dryer, please inspect the unit closely. Visually check the dryer to make certain that all air lines and electrical connections are securely fastened and were not damaged in transit. If rough handling has been detected, please note it on your delivery receipt, especially if the dryer will not be immediately uncrated. Obtaining the delivery person's signed agreement to any noted damage will facilitate any insurance claim.

### 5.2 UNPACKING AND HANDLING

Refer to labels on the dryer for the appropriate means for lifting or moving the dryer. When lifting the dryer, ensure that no stress is applied to the piping or valving. Refer to Section 10.2 for locating and mounting of dryer.

#### ⚠ WARNING

**Under no circumstances should any person attempt to lift heavy objects without proper lifting equipment (i.e., crane, hoist, slings or fork truck). Lifting any unit without proper lifting equipment, can cause serious injury.**

## 6.0 SAFETY AND OPERATION PRECAUTIONS

Because an air dryer is pressurized and contains rotating parts, the same precautions should be observed as with any piece of machinery of this type where carelessness in operation or maintenance could be hazardous to personnel. In addition to obvious safety rules that should be followed with this type of machinery, safety precautions as listed below must be observed:

1. Only qualified personnel shall be permitted to adjust, perform maintenance or repair this air dryer.
2. Read all instructions completely before operating unit.
3. Pull main electrical disconnect switch and disconnect any separate control lines, if used, before attempting to work or perform maintenance on the unit.
4. Do not attempt to service any part while machine is in an operational mode.
5. Do not attempt to remove any parts without first relieving the entire air system of pressure.
6. Do not operate the dryer at pressures in excess of its rating.
7. Do not operate the dryer without guards, shields and screen in place.
8. Inspect unit daily to observe and correct any unsafe operating conditions.

#### OSHA

#### Heading Descriptions

#### ⚠ WARNING

**"Warning" is used to indicate a hazardous situation which has some probability of death or severe injury. Warning should not be considered for property damage accidents unless personal injury risk is present.**

#### ⚠ ATTENTIC

**"Caution" is used to indicate a hazardous situation which may result in minor or moderate injury.**

#### ⚠ NOTICE

**"Notice" is used to indicate a statement of company policy as the message relates directly or indirectly to the safety of personnel or protection of property. Notice should not be associated directly with a hazard or hazardous situation and must not be used in place of "Danger," "Warning," or "Caution."**

#### ⚠ NOTICE

**The user of any air dryer manufactured by Ingersoll Rand, is hereby warned that failure to follow the above Safety and Operation Precautions may result in personal injury or equipment damage. However, Ingersoll Rand does not state as fact, nor does it mean to imply, that the preceding list of Safety and Operating Precautions is all inclusive, and further, that the observance of this list will prevent all personal injury or equipment damage.**



## 7.0 PRINCIPLES OF OPERATION

### 7.1 INTRODUCTION

As described in Section 1, water vapor is removed from compressed air by diverting air flow alternately between two towers filled with activated alumina desiccant. While one tower processes the compressed air stream adsorbing water vapor, the opposite tower regenerates by desorbing the water vapor and venting it to atmosphere.

The Microprocessor Controller provides the ability to select between heated or heatless regeneration. Both heated and heatless regeneration methods are described in the following sections.

#### ⚠ NOTICE

**The Microprocessor Controller must be in the OFF position prior to changing the mode (heated purge / heatless) of the dryer. After the change is made and the Microprocessor Control is subsequently turned ON, the dryer will be in the new mode of operation.**

### 7.2 DRYING CYCLE

Saturated compressed air enters the dryer and is diverted to the appropriate tower by the Inlet Flow Valves. (Refer to the Process and Instrumentation Diagram.) The Right Tower Flow Valve is actuated to a closed position to prevent air flow from entering the regenerating tower. Simultaneously, the Left Tower Flow Valve is actuated to an open position allowing air flow to the drying tower. During this time, the Left Tower Purge Valve is actuated to a closed position, preventing the compressed air from venting to atmosphere. As the compressed air flows through the desiccant material in the left tower at pressure, removal of water vapor from the air stream begins to occur through adsorption. In the adsorption process, the desiccant material draws water vapor out of the compressed air and "holds" it until the left tower drying cycle is complete. Compressed air flows out of the tower for delivery to the process use. The Outlet Flow Check Valves provide air flow diversion to the outlet air connection of the dryer.

### 7.3 REGENERATION CYCLE

Previously adsorbed moisture, removed from the process stream, gets stripped or desorbed from the desiccant material in the regeneration process. The first stage of regeneration is tower depressurization. After the Inlet Flow Valves are switched to divert air flow away from the regenerating tower, the appropriate Purge Valve will be opened and the tower will be depressurized. Through rapid depressurization, a significant portion of the previously adsorbed water vapor is stripped off of the desiccant material and exhausted to atmosphere.

#### ⚠ CAUTION

**Any time the dryer is switched between two operating modes, care must be taken to ensure the purge adjustment valve is adjusted correctly. Refer to the specification sheet in this manual for proper gauge setting.**

### 7.3.1 SETTING THE REGENERATION AIR FLOW

Proper setting of the purge flow is necessary to achieve proper dryer performance in the heatless and externally heated modes. Setting the purge flow too high will waste compressed air and if set too low, the dryer will not achieve dew point performance. The purge adjustment manifold consists of the purge adjustment valve, purge pressure gauge, and the purge orifice. The purge pressure gauge is located between the purge adjustment valve and purge orifice. Manually adjust the purge adjustment valve until the reading on purge pressure gauge matches the purge pressure setting listed on the tag attached to the gauge. Note that there are two purge gauge values, corresponding to each mode of operation.

### 7.3.2 HEATED PURGE REGENERATION

In the heat reactivated mode, the dryer uses 7.5% of dry compressed air expanded to atmospheric pressure. However, after air expansion through the Purge Orifice, the purge air is passed through the purge heater. This expanded, heated purge air is then passed through the regenerating tower and exhausted out to atmosphere. After a three minute delay, the heating process occurs for 2 hours and 57 minutes. During the heating process the electric heater is cycled on and off by **Ingersoll Rand**' temperature controller Solid State relay. This advanced controller precisely monitors purge air temperature and adjusts the heater temperature accordingly. This results in a regeneration air temperature that remains within 1.5 °F from the heater setpoint for the entire regeneration cycle, eliminating temperature swings associated with contactor-based heating system. Upon completion of the three-hour heating period, the electric heater turns off. The dry regeneration air continues to flow for 57 minutes in order to cool down the desiccant bed.

## 7.0 PRINCIPLES OF OPERATION

### 7.3.3 HEATLESS PRESSURE SWING REGENERATION

In the heatless mode, following depressurization, regeneration uses approximately 15% of the dry compressed air expanded to atmospheric pressure to complete the desorption process. As shown on the P & ID, the compressed air exits the drying tower and a portion of the air flows through the purge adjustment valve and the Purge Orifice. Once the air has passed through the Purge Orifice, it expands to atmospheric pressure and continues the regeneration process. Desorption occurs as the desiccant releases water vapor into the regeneration air and is exhausted through the Outlet Purge Valves.

### 7.4 TOWER REPRESSURIZATION

Upon completion of tower regeneration, and prior to changing the Inlet Flow Valve position to switch towers, the regenerated tower must be repressurized. Repressurization is accomplished by closing the appropriate purge valve. Closing the Purge Valve allows the regeneration air to pressurize the tower.

#### ⚠ NOTICE

**Failure to repressurize prior to tower switchover will result in shocking the desiccant material and cause premature desiccant dusting.**

#### 7.4.1 HEATED PURGE REPRESSURIZATION

Three minutes prior to tower switch-over, repressurization is accomplished by closing the appropriate Purge Valve. When the Purge Valve closes, the regeneration air begins to pressurize the tower. If the dryer is supplied with the optional repressurization piping, the Repressurization Valve opens, allowing some additional air from the outlet of the dryer to assist the purge air and to ensure adequate pressurization. During normal tower regeneration, the Repressurization Valve is held closed so that the only source of air for regeneration passes through the purge adjustment assembly.

#### 7.4.2 HEATLESS PRESSURE SWING REPRESSURIZATION

45 seconds prior to tower switch-over, repressurization is accomplished by closing the appropriate Purge Valve. When the Purge Valve closes, the regeneration air begins to pressurize the tower. If the dryer is supplied with the optional repressurization piping, the Repressurization Valve opens, allowing some additional air from the outlet of the dryer to assist the purge air and to ensure adequate pressurization. During normal tower regeneration, the Repressurization Valve is held closed so that the only source of air for regeneration passes through the purge adjustment assembly.

### 7.5 VALVES

Flow and Purge Valves are two-way valves that are switched using airoperated double-acting actuators. Each valve is actuated by a four-way solenoid valve as shown on the P & ID.

#### ⚠ NOTICE

**Actuated valves require 75 psi min. pressure for proper operation.**

The Inlet Flow Valves are connected as normally open valves. When the dryer is de-energized, the solenoid valves for the Inlet Flow Valves supply control air to the "open" port on the appropriate valve actuator.

Purge Valves are connected as normally closed valves. When the dryer is de-energized, the solenoid valves for the Purge Valves supply control air to the "closed" port on the appropriate valve actuator.

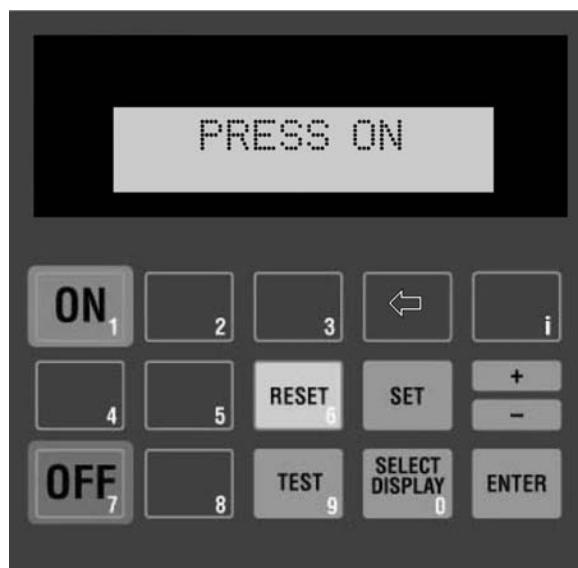
Outlet Check Valves, as well as Purge Check Valves are single-direction check valves that will allow flow in the direction shown on the P & ID, but not allow flow in the opposite direction.

### 7.6 CONTROLS

#### 7.6.1 MICROPROCESSOR CONTROL USER INTERFACE

The Microprocessor Control display provides the user with the operating parameters and their corresponding values. When power is supplied to the dryer, the Microprocessor Control will illuminate and default to the "Standby" mode, displaying the "Press ON" prompt.

The following illustration summarizes the keypad functions.



**FIGURE 1 - MICROPROCESSOR CONTROLLER**

## 7.0 PRINCIPLES OF OPERATION

### BUTTONS

- ON  
Initiates PLC program. Begins system monitoring and valve switching functions.
- OFF  
Stops PLC program. Stops valve switching functions. Initiates shutdown sequence. Opens Inlet Flow Valves. Closes Purge Valves.
- SELECT DISPLAY  
Allows the user to scroll through the available displays. The last display selected will remain displayed as the default display.
- + / -  
Allows user to modify set point values. Set point values cycle through a fixed range. Also allows entering negative numbers in Factory Modes.
- ⇡ or "blank" button  
Allows user to step backwards to the previous level of the menu.
- RESET  
Pressing once clears the local alarm indication and de-energizes the remote alarm contact for many alarm conditions. Should the alarm condition persist, the alarm will return after the alarm inhibit time has expired.
- SET  
Permits the adjustment of parameters in FACTORY MODES.
- ENTER  
Used to accept changed parameters and set point values.
- TEST  
Not used in Desiccant Dryer applications
- i  
Restricted Level access for factory use only.

### 7.6.2 STATUS PANEL USER INTERFACE

The status panel provides clear indication of dryer status via bright LED indicators. The following illustration summarizes the panel's features:

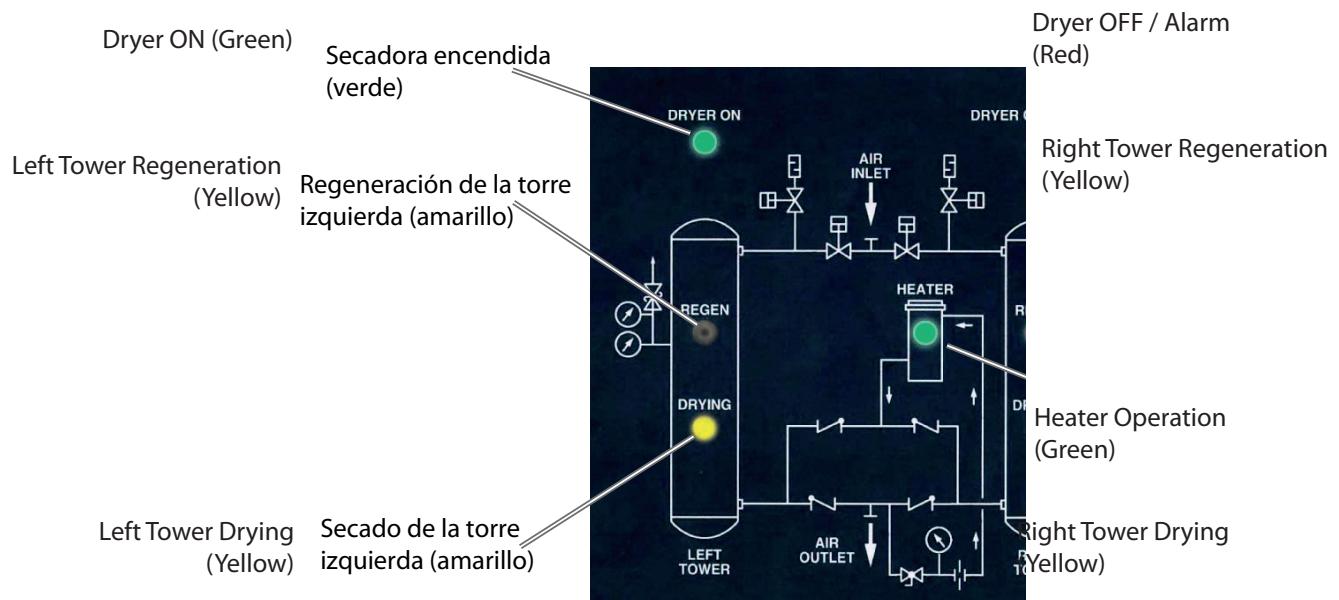


FIGURE 2 - STATUS PANEL

## 7.0 PRINCIPLES OF OPERATION

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NOTE: **Ingersoll Rand** solid state temperature controller modulates the heater repeatedly during the heating cycle. Pulsating of the heater LED will occur as a result and should be considered normal dryer operation.

### 7.6.3 MICROPROCESSOR CONTROL DISPLAY PARAMETERS

The Microprocessor Controller is capable of displaying a number of system parameters in the default CUSTOMER MODE. The following summarizes the parameters that can be accessed by depressing the SELECT DISPLAY button from the Microprocessor Controller. (Note that some displays are optional and may not appear on all models):

- Tower Status {LT DRY / RT REGEN or LT REGEN / RT DRY}: Provides visual confirmation of tower drying and regenerating status.
- Step Timer {ie STEP 4 TIME 120}: Information screen displaying the current step in the program and the time remaining for the displayed step.
- Dew Point Temperature (OPTIONAL) - {DEW POINT TEMP: XX}: When equipped with the Energy Management System (EMS) feature, provides accurate display of dryer outlet pressure dew point.
- Purge Status (OPTIONAL) - {PURGE / NO PURGE}: Indicates whether unit is currently consuming purging air. Requires EMS.
- Heater Status (HEATED PURGE MODE ONLY) - {On / OFF}: Indicates that the heater is being given a signal to heat the purge air.
- Heater Temperature (HEATED PURGE MODE ONLY) - {HEATER TEMP: XX}: Indicates the heater temperature set point.
- Alarms {ALARM LIST - PRESS ENTER}: Depressing <ENT> at this prompt permits viewing of current alarm status and alarm history, which includes the time and date of the alarm occurrence.
- Operating & Purge Times - {OPERATING TIMES - PRESS ENTER}: Depressing <ENT> at this prompt provides access to the operating and purge hours of operation.
- Operating Mode {OPERATING MODE: HEATLESS/ HEATED PURGE}: EH dryers are capable of operating in Heated Purge and Heatless Pressure Swing modes. This display indicates mode of operation for dryer.

Once the last screen is displayed, depressing the SELECT DISPLAY button will return the display to the top of the list.

### 7.7 TIMING SEQUENCE

All timing functions are performed by **Ingersoll Rand'** Microprocessor Controller, an advanced micro PLC designed exclusively for **Ingersoll Rand** dryers. The Microprocessor Controller is completely programmed at the factory and does not require any further adjustment. The standard timing cycle switches the Inlet Flow Valve, which alternates the drying tower. At the same time as the Inlet Flow Valve opens, the appropriate tower Purge Valve opens to begin the purge flow generation. Once the purge regeneration flow portion of the dryer cycle is complete, tower repressurization begins as previously described.

#### 7.7.1 HEATED PURGE TIMER CYCLE

In the externally heated operating mode, the Microprocessor Control controls an eight-hour cycle. The tower switch-over occurs every four hours. Ten seconds after switch-over occurs, the regenerating tower depressurizes for 50 seconds. After depressurization, heated regeneration begins and extends for 2 hours and 58 minutes. The heating supply is turned off and the purge air flow continues for the next 58 minutes. The purge air supply during this time is used to cool down the hot desiccant. After the cool down stage, a repressurization stage repressurizes the offline tower for 3 minutes.

#### 7.7.2 HEATLESS PRESSURE SWING TIMER CYCLE

In the heatless operating mode, the Microprocessor Control controls a ten-minute cycle. The tower switch-over occurs every five minutes. Ten seconds after tower switch-over occurs, the regenerating tower depressurizes and tower regeneration occurs for four minutes and 15 seconds. At that time, tower repressurization begins.

### 7.8 RESTART MODES

The Microprocessor Controller includes a Shutdown Sequence that is activated when the dryer OFF button is depressed. This feature positions the valves to their failsafe position and resets the program and is the recommended method of shutting down the dryer. When the dryer is subsequently energized, the dryer is ready to run at the start of the program. Should, however, power be cut to the dryer before the Shutdown Sequence has been initiated, as would be the case from a power failure, the dryer can be configured to restart in one of two restart modes. Note that when the dryer is shut down using the OFF button, the dryer will require user intervention to restart the dryer.

## 7.0 PRINCIPLES OF OPERATION

### 7.8.1 MANUAL MODE (ZERO)

Ingersoll Rand dryers are shipped from the factory in the Manual Mode. After power is re-supplied to the dryer, the user will be presented with the "PRESS ON" display. The valve switching and timing operations will only start once the ON button is depressed. In this configuration, to restart the dryer, the user must manually depress the ON button on the Microprocessor Control panel.

### 7.8.2 AUTO RESTART MODE (LAST)

In this mode, the dryer will re-start automatically once power is applied to the dryer. The Microprocessor Control will pick up where it left off in the program once power is applied.

## 7.9 OPERATING TIMES

In the CUSTOMER MODE, the Microprocessor Controller provides access to the operating hours of the dryer. The following describe the method to access and review the operating and purge hours for the dryer:



OPERATING TIMES  
PRESS ENTER

Depress the SELECT DISPLAY button until the OPERATING TIMES display appears.



BEGIN TIMES

Depressing the ENTER button enters the OPERATING TIMES menu.



OPERATING HOURS  
000000065

Depressing the SELECT DISPLAY button displays the cumulative operating hours of the dryer.



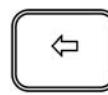
PURGE HOURS  
000000009

Depressing the SELECT DISPLAY button displays the cumulative hours the dryer has used purge air.



BEGIN TIMES

Depressing the ENTER button returns the display to the top of the OPERATING TIMES menu.



OPERATING TIMES  
PRESS ENTER

Depressing the button returns the controller to the CUSTOMER MODE

## 8.0 ALARMS AND INDICATORS

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### 8.1 MOISTURE INDICATOR (STANDARD)

The moisture indicator senses a sample of the control air which is taken from the dryer outlet. The indicator provides a gross indication of dew point deterioration at the outlet of the dryer. Under normal operating conditions, the indicator is blue. In the event of a dryer malfunction or prolonged dryer shut down, it will turn gray in the presence of moisture.

### 8.2 HEATER HIGH TEMPERATURE ALARM WITH INTERLOCK (STANDARD)

The Heater High Temperature Alarm monitors the internal temperature of the heater housing. Should a component failure occur or system conditions result in the heater temperature rising above the alarm set point, the dryer will alarm. During the alarm condition, the heater is prevented from operating, the Microprocessor Control halts the program at the point where the alarm occurred and displays the condition in the Microprocessor Control LCD display. The dryer will be unable to be reset until the temperature of the heater has fallen below the alarm point. To reinstate the dryer, depress the RESET button on the Microprocessor Controller AND manually reset the Heater High Temperature Safety in the electrical enclosure. Note that the alarm condition will return should proper corrective action not be taken.

### 8.3 HEATER FAILURE ALARM (STANDARD)

This feature produces an alarm should the heater fail to generate heat at the beginning of the heating cycle. During the initial ten minutes of the heating cycle, the Microprocessor Controller monitors the heater temperature. Should the heater temperature fail to rise to 150 °F within the ten minute period, the Heater Failure Alarm will be triggered. During this alarm condition, power to the heater is removed and the program is halted. Depressing the RESET button on the Microprocessor Controller will reinstate the program and provided the heater problem has been remedied, continue with normal operation.

### 8.4 FAILURE TO SHIFT ALARM (STANDARD)

**Ingersoll Rand** Failure To Shift Alarm monitors the dryer sequencing functions to insure proper dryer operation by sensing the pressure in each tower via tower pressure switches. Should one of the following conditions occur, the Microprocessor Controller will communicate the alarm condition. There are several types of switching failure modes that can be detected by the Failure To Shift Alarm feature. They are as follows:

### 8.4.1 FAILURE TO REPRESSURIZE

At the end of the repressurization stage of the dryer operation, both towers should be at line pressure. Should the pressure switches indicate that both towers are not at line pressure, the Failure to Shift Alarm will activate and the Microprocessor Control will stop the program at its current position in the program. The user must depress the RESET button followed by the ON button, at which time the Microprocessor Control will start at the beginning of the program.

### 8.4.2 FAILURE TO DEPRESSURIZE

At the end of the depressurization stage of the dryer operation, the regenerating tower should be at atmospheric pressure. Should the pressure switches indicate that this is not the case, the Failure to Shift Alarm will activate and the Microprocessor Control will stop the program at its current position in the program. The user must depress the RESET button followed by the ON button, at which time the Microprocessor Control will start at the beginning of the program.

### 8.5 HIGH DEW POINT ALARM (INCLUDED WITH EMS)

The purpose of the High Dew Point Alarm is to provide the operator an alarm indication should the equipment fail to supply air at its designed pressure dew point. The EMS dew point sensor communicates the pressure dew point reading to the Microprocessor Controller. Should the pressure dew point rise above the alarm set point, the Microprocessor Controller will display the alarm condition on the controller screen.

### 8.6 ENERGY MANAGEMENT SYSTEM (EMS) (OPTIONAL)

EMS is an energy savings feature that matches moisture loading and regeneration energy usage. Drying equipment is typically operated below full flow rating and/or below maximum water loading capacity of the desiccant bed. The EMS option includes a dew point transmitter that transmits the outlet pressure dew point to the Microprocessor Controller. The Microprocessor Controller displays the outlet pressure dew point in real-time. The EMS feature utilizes the data communicated from the dew point sensor and extends the normal timed switching sequence in proportion to the moisture loading on the dryer. When the EMS feature is turned off, all switching sequences occur as described in Section 7.3. When the EMS feature is activated, the drying sequence is governed by the outlet pressure dew point as

## 8.0 ALARMS AND INDICATORS

measured by the dew point sensor. When the sampled outlet dew point registers below the customer set point (-43°F default for -40°F dryers; -102°F on -100°F dryers), an immediate change in dryer operation will not be noticeable. The dryer will continue its normal regeneration process through tower re-pressurization. Once the tower is re-pressurized, both towers will be at line pressure but air will only flow through the tower indicated by the status panel. Tower switch over sequence is delayed until the dew point elevates above the EMS set point, at which point tower switch over will occur.

In addition to monitoring the outlet pressure dew point of the drying tower, the EMS feature monitors the temperature of the purge exhaust air on the regenerating tower. After a tower switch-over, and at the beginning of tower regeneration, the purge exhaust temperature will be relatively low (normally 90 to 110°F). The purge exhaust temperature will increase as desiccant regeneration progresses. As nearly all of the previously adsorbed moisture is driven off of the desiccant, the exhaust temperature will begin to rise. The timing for the temperature change will vary depending on moisture loading on the towers. When the purge exhaust temperature reaches 195°F, which indicates that the desiccant heating is complete, the Microprocessor Controller will remove power to the heater. Once the heater is turned off, the tower cool down process begins and continues for 57 minutes. Purge air will continue to exhaust and the exhaust air temperature will continue to rise (250°F is not uncommon) as it removes the heat from the regenerated desiccant material. As the cool down progresses, the exhaust temperature will begin to decrease. After cooling, the Purge Valves close and the optional Repressurization Valve (if equipped) opens. The off-line tower remains pressurized until the tower switchover sequence is initiated.

### 8.7 HIGH OUTLET TEMPERATURE (OPTIONAL)

This option provides continuous monitoring of the the dryer discharge air temperature via a thermostat that senses the outlet air temperature during dryer operation. Should a high outlet temperature condition exist, the alarm is displayed on the Microprocessor Controller to alert maintenance personnel of a malfunction. This alarm does not interrupt the dryer program. Depressing the RESET button will clear the alarm provided the alarm condition as been addressed. Note that the alarm will clear automatically once the high temperature condition is corrected.

### 8.8 ALARM LIST

The Microprocessor Controller stores the 20 most recent alarm conditions. These alarms are stored with the type of alarm as well as the date and time the alarm occurred. This list can greatly facilitate troubleshooting the dryer and provide an indication of dryer operation during unattended service. The following describe the method to access and review the alarms stored in the Microprocessor Controller:



ALARM LIST  
PRESS ENTER

Depress the SELECT DISPLAY button until the ALARM LIST display appears.



BEGIN ALARMS

Depressing the ENTER button enters the ALARM LIST menu.



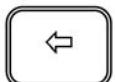
ALARM OFF

Depressing the SELECT DISPLAY button advances the menu to the current alarm status.

## 8.0 ALARMS AND INDICATORS



FAIL TO SHIFT  
TM 1635 DATE 1104



BEGIN ALARMS

Depressing the SELECT DISPLAY list displays the most recent of the alarms stored by the Microprocessor Control. Refer to the diagram at the end of this section for an explanation of the ALARM LIST Display.

Depressing the SELECT DISPLAY button will reveal the previous alarm condition(s), as well as the remaining available alarm placeholders for alarms. To EXIT the ALARM LIST, perform the following:

Depressing the ⇡ button returns the controller to the top of the ALARM LIST.



ALARM LIST  
PRESS ENTER

Depressing the ⇡ button again returns the controller to the CUSTOMER MODE.

Alarm Condition

HIGH DEW POINT  
TM 1635 DATE 1104

Time of Alarm  
(Military Time)

Date of Alarm (Date-Month) Example shows April 11

## 9.0 TECHNICIAN MODE

The Microprocessor Control provides a protected TECHNICIAN MODE to manipulate several parameters not accessible by the casual operator. Below is a list of parameters that can be accessed and manipulated by the technician in the TECHNICIAN MODE:

Parameter	Display	Set Point
OPERATION MODE	OPERATION MODE	HTLS, HEATED
ENERGY MANAGEMENT SYSTEM (OPTIONAL)	EMS	OFF , ON
ENERGY MANAGEMENT SYSTEM SETPOINT (OPTIONAL) *	EMS SET POINT	-76 - +68
PURGE TEMPERATURE	PURGE TEMP	OFF , ON
RESTART MODE	RESTART	LAST, ZERO
EXTENDED HEATING	EXTENDED HTG	OFF , ON
HIGH DEW POINT ALARM ACTIVATION (OPTIONAL)	HIGH DEW POINT	OFF , ON

\* NOTE: Setpoints indicated are adjustable ONLY when dryer is equipped with the Energy Management System option.

Setpoints are non-adjustable on dryers

### 9.1 ENTERING TECHNICIAN MODE

#### ⚠ WARNING

**TECHNICIAN MODE should only be entered by qualified service personnel. Altering the set points in TECHNICIAN MODE will have a significant effect on the operation of the dryer. Incorrect set points may damage dryer and cause potential serious injury.**

To enter the TECHNICIAN MODE, perform the following keystrokes:



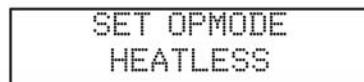
Pressing the "2" and "3" buttons simultaneously enters the TECHNICIAN MODE.



Depressing SELECT DISPLAY scrolls through the available parameters.

### 9.2 OPERATING MODE (BI-MODE)

As described in Section 7, Heat Reactivated Dryers can operate in a heated purge mode as well as a heatless pressure swing mode. To change the operation mode of the dryer, perform the following keystrokes:



Depress the SELECT DISPLAY button until the SET OPERATION MODE screen is displayed.



Depress the +/- button until the desired dew point is displayed. Pressing SELECT DISPLAY saves the current selection.

#### ⚠ NOTICE

**The Microprocessor Controller must be in the OFF position prior to changing the mode (heated purge / heatless) of the dryer. After the change is made and the Microprocessor Control is subsequently turned ON, the dryer will be in the new mode of operation.**

#### ⚠ CAUTION

**Any time the dryer is switched between two operating modes, care must be taken to ensure the purge adjustment valve is adjusted correctly. Refer to the specification sheet in this manual for proper gauge setting.**

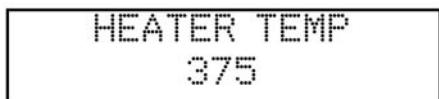
### 9.3 HEATER TEMPERATURE SETPOINT (HEATED PURGE MODE ONLY)

The Microprocessor Controller permits the user to adjust the temperature of the heater, thereby altering the regeneration temperature in the heated purge mode.

#### ⚠ WARNING

**The user is advised to only alter the regeneration temperature after being instructed to do so by Ingersoll Rand factory personnel. Improper or inappropriate manipulation of the heater temperature can result in degraded dryer performance, equipment damage and serious injury. Notify Ingersoll Rand Compressed Air Solutions prior to altering the heater temperature.**

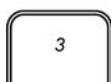
## 9.0 TECHNICIAN MODE



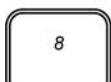
Depress the SELECT DISPLAY button until the HEATER TEMPERATURE SET POINT screen is displayed.



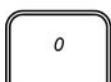
Pressing the SET button permits the value of the HEATER TEMPERATURE SETPOINT to be changed



Use the numbers on the keypad to enter the desired value for the HEATER TEMPERATURE setpoint.



Use the numbers on the keypad to enter the desired value for the HEATER TEMPERATURE setpoint.



Use the numbers on the keypad to enter the desired value for the HEATER TEMPERATURE setpoint.



Depressing ENTER saves the selected set point.

### 9.4 ENERGY MANAGEMENT SYSTEM (OPTIONAL)

The Energy Management System option includes a dew point sensor that transmits the outlet pressure dew point to the Microprocessor Controller. The Microprocessor Controller displays the outlet pressure dew point in real-time. This option package also includes Energy Management System, an energy savings feature that matches moisture loading and regeneration energy usage. Drying equipment is typically operated below full flow rating and/or below maximum water loading capacity of the desiccant bed. The Energy Management System feature utilizes the data communicated from the dew point sensor and extends the normal timed switching sequence in proportion to the

moisture loading on the dryer.

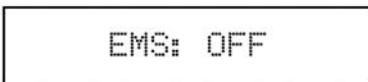
When the Energy Management System feature is turned off, all switching sequences occur as described in Section 7.3. When the Energy Management System feature is activated, the drying sequence is governed by the outlet pressure dew point as measured by the dew point sensor. When the sampled outlet dew point registers below the customer set point (-43°F default for -40°F dryers; -102°F on -100°F dryers), an immediate change in dryer operation will not be noticeable. The dryer will continue its normal regeneration process through tower re-pressurization. Once the tower is re-pressurized, both towers will be at line pressure but air will only flow through the tower indicated by the status panel. Tower switch over sequence is delayed until the dew point elevates above the Energy Management System setpoint, at which point tower switch over will occur.

#### ⚠ NOTICE

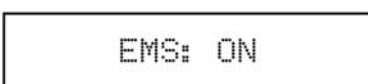
**The Microprocessor Controller must be in the OFF position prior to changing the mode (heated purge / heatless) of the dryer. After the change is made and the Microprocessor Control is subsequently turned ON, the dryer will be in the new mode of operation.**

#### 9.4.1 ENABLING / DISABLING ENERGY MANAGEMENT SYSTEM

The following illustrates the method of accessing and adjusting the Energy Management System feature:



Depress the SELECT DISPLAY button until the ENERGY MANAGEMENT SYSTEM screen is displayed.



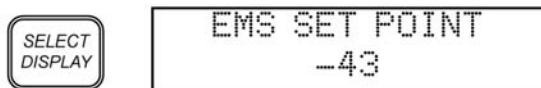
Depress the +/- button until the desired set point is displayed. Pressing SELECT DISPLAY saves the current selection.

## 9.0 TECHNICIAN MODE

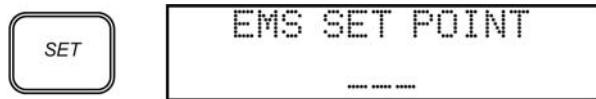
### 9.4.2 SETPOINT ADJUSTMENT

On dryers equipped with the optional Energy Management System the setpoint can be adjusted to match the dryers operation to the desired pressure dew point.

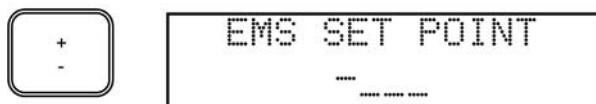
The following illustrates the method of adjusting the setpoint for the Energy Management System feature:



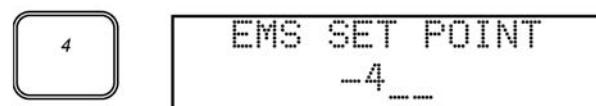
Depress the SELECT DISPLAY button until the EMS SET POINT screen is displayed.



Pressing the SET button permits the value of the EMS SETPOINT to be changed.



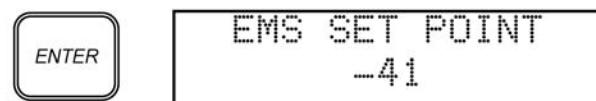
To enter a negative number, depress the +/- button. Otherwise, proceed to the next step.



Use the numbers on the keypad to enter the desired pressure dew point temperature for the EMS setpoint.



Use the numbers on the keypad to enter the desired pressure dew point temperature for the EMS setpoint.

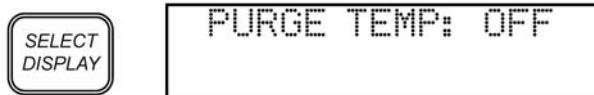


Depressing ENTER saves the selected set point.

### 9.5 PURGE TEMPERATURE (OPTIONAL, HEATED PURGE MODE)

On dryers equipped with EMS, the temperature of the purge exhaust is monitored and displayed on the Microprocessor Controller. After a tower switch-over, and at the beginning of tower regeneration, the purge exhaust temperature will be relatively low (normally 90 to 110°F). The purge exhaust temperature will increase as desiccant regeneration progresses. As nearly all of the previously adsorbed moisture is driven off of the desiccant, the exhaust temperature will begin to rise. The timing for the temperature change will vary depending on moisture loading on the towers. When the purge exhaust temperature reaches 195°F, which indicates that the desiccant heating is complete, the Microprocessor Controller will remove power to the heater. Once the heater is turned off, the tower cool down process begins and continues for 57 minutes. Purge air will continue to exhaust and the exhaust air temperature will continue to rise (250°F is not uncommon) as it removes the heat from the regenerated desiccant material. As the cool down progresses, the exhaust temperature will begin to decrease. After cooling, the Purge Valves close and the optional Repressurization Valve (if equipped) opens. The off-line tower remains pressurized until the tower switchover sequence is initiated. Activation of the Purge Temperature feature is via the Microprocessor Controller.

The following illustrates the method of accessing and activating the Purge Temperature feature:



Depress the SELECT DISPLAY button until the PURGE TEMP screen is displayed.



Depress the +/- button until the desired set point is displayed. Pressing SELECT DISPLAY saves the current selection.

### 9.6 RESTART MODE

**Ingersoll Rand** dryers can be configured to restart in one of two operating modes. As described in Section 7.8, the dryer may be configured for Manual operation (factory default) or Auto Restart, which permits the dryer to operate automatically once power is re-applied to the dryer after a power failure. The following illustrates the method of accessing and adjusting the different start modes for the dryer:

## 9.0 TECHNICIAN MODE



Depress the SELECT DISPLAY button until the START MODE screen is displayed.



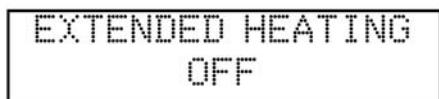
To change the start mode from its current selection to the alternate setting, depress the +/- button until the desired set point is displayed. Pressing SELECT DISPLAY saves the current selection.

### ⚠ NOTICE

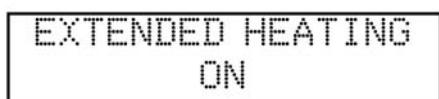
**The restart modes will only affect restarting should power be unexpectedly removed from the dryer. After proper shut down, the dryer will require the user to depress the ON button to initiate the operation of the dryer program.**

## 9.7 EXTENDED HEATING (OPTIONAL)

On dryers equipped with the Energy Management System option, the dryer may be operated in an extended heating mode. In this mode, the heating cycle is extended while the Energy Management System function prolongs the drying cycle. This feature is particularly useful when operating the dryer with new desiccant. As described earlier in this manual, new desiccant has the ability to adsorb more moisture than the dryer can desorb in a fixed regeneration cycle. With the Extended Heating operation, the Energy Management System feature can be used immediately without the need to age the desiccant. To enable the Extended Heating mode, perform the following keystrokes:



Depress the SELECT DISPLAY button until the EXTENDED HEATING screen is displayed.



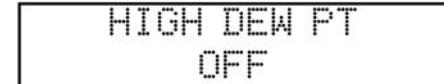
Depress the +/- button until the desired set point is displayed. Pressing SELECT DISPLAY saves the current selection.

## 9.8 HIGH DEW POINT ALARM (OPTIONAL)

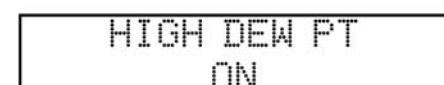
### 9.8.1 DESCRIPTION AND ACTIVATION

When the dryer is equipped with the optional Energy Management System feature, the dew point sensor transmits the dew point to the Microprocessor Control. Should the outlet pressure dew point exceed the customer specified set point, High Dew Point Alarm will activate.

The following illustrates the method of activating the High Dew Point Alarm feature:



Depress the SELECT DISPLAY button until the HIGH DEW POINT screen is displayed.

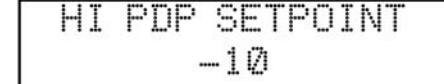


Depress the +/- button until the desired set point is displayed. Pressing SELECT DISPLAY saves the current selection.

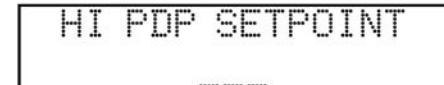
### 9.8.2 SETPOINT ADJUSTMENT

On dryers equipped with the optional Energy Management System, the High Dew Point Alarm setpoint can be adjusted as follows. Factory settings on -40°F dryers is -28°F.

The following illustrates the method of adjusting the setpoint for the High Dew Point Alarm feature:



Depress the SELECT DISPLAY button until the HIGH DEW POINT SET POINT screen is displayed.



Pressing the SET button permits the value of the HIGH DEW POINT ALARM SETPOINT to be changed

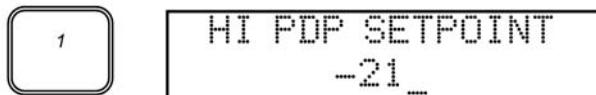


To enter a negative number, depress the +/- button. Otherwise, proceed to the next step.

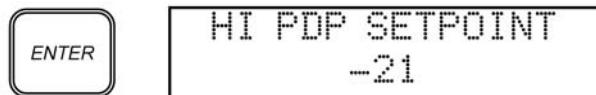
## 9.0 TECHNICIAN MODE



Use the numbers on the keypad to enter the desired pressure dew point temperature for the EMS setpoint.



Use the numbers on the keypad to enter the desired pressure dew point temperature for the HIGH DEW POINT ALARM setpoint.

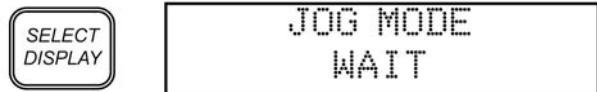


Depressing ENTER saves the selected set point.

### ⚠ NOTICE

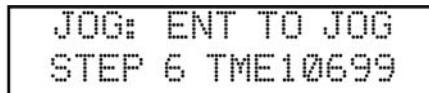
**The High Dew Point Alarm set point should not be greater than the Energy Management System set point. Failure to do so will result in an alarm indication. Ingersoll Rand recommends setting the High Dew Point Alarm at least 10°F wetter than the Energy Management System setpoints.**

The Microprocessor Controller will only permit the jog function during specific stages of the program. Should the program be at a stage where the program can not advance, the following will be displayed:

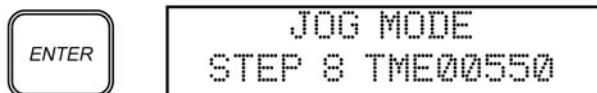


Depress the SELECT DISPLAY button until the JOG MODE display appears. The WAIT prompt will appear should the program not be able to advance at this stage.

Should the program be at a stage whereby the Microprocessor Control permits the jog feature, the following will be displayed:



Depress the SELECT DISPLAY button until the JOG MODE display appears. The PRESS ENTER prompt will appear, along with the current step and remaining time, should the program be able to advance at this stage.



Depressing the ENTER button advances the program to the next step. The display will indicate the next step has been initiated.

### ⚠ NOTICE

**The Program Jog advances steps #6, #8, #20 & #22, which are the longest program steps. The balance of the steps are not advanced in Program Jog Mode.**

### ⚠ NOTICE

**To exit the TECHNICIAN MODE, press the "+ / -" key to the initial "SET OPMODE" screen and depress the ⌂ button to return to the CUSTOMER MODE.**

## 9.9 PROGRAM JOG

All heated purge dryers come equipped with a Program Jog feature that is accessible via the Microprocessor Controller. This feature allows the dryer cycle to be accelerated for troubleshooting and routine inspection purposes. By accessing the Program Jog routine in the Microprocessor Control, the customer can advance the program to the next program step. Note that the program advance feature will not advance through all steps of the program.

### ⚠ WARNING

**When the Program Jog is initiated in the middle of the heating cycle, advancing the program without allowing normal tower cool down will result in an outlet air temperature that may exceed 300°F. As such, proper precautions must be taken to protect downstream equipment from high temperature exposure.**

### ⚠ NOTICE

**During the Program Jog routine, the display may show intermediate steps in the program that are not active in the current program set up. This should be considered normal operation.**

## 9.10 SHUTDOWN SEQUENCE

When the OFF button is pressed, SHUTDOWN SEQUENCE will be displayed for 30 seconds. During this time the offline tower will represurize. Both main flow valves will open and purged air will cool the heater element.

## 10.0 INSTALLATION AND INITIAL START-UP

### 10.1 EQUIPMENT APPLICATION GUIDELINES

**Ingersoll Rand** Regenerative air dryers are shipped complete with desiccant up to and including model EH2100. On larger units, the desiccant is packaged separately for ease in handling. Refer to Section 9.6 for desiccant fill procedures.

To achieve the best dryer performance, carefully check that the design and installation requirements outlined below are satisfied.

**Ingersoll Rand** dryers are available with an operating range from 75 - 150 PSIG. Air available for your usage will vary with operating pressure. The maximum design pressure of the standard Desiccant Dryers is 150 PSIG. For units that require higher operating pressures, consult your **Ingersoll Rand** representative.

Dryers are sized according to flow and pressure drop, not pipe size. The difference between the inlet and the outlet flow is the amount of purge air required. This air is exhausted to atmosphere and is not available for use downstream. Make certain air supply to dryer meets air demand plus purge air requirements.

#### ⚠ NOTICE

**The standard dryer is not rated for any gas other than air.**

#### ⚠ NOTICE

**Ingersoll Rand recommends that the mufflers be cleaned after initial start-up to remove any desiccant dust generated during shipment. After running dryer for initial 30 minute period, de-energize / depressurize dryer and remove mufflers. Disassemble and clean the removable insert inside the muffler core. Reinstall mufflers prior to operating dryer.**

### 10.2 LOCATING AND MOUNTING

The dryer must never be installed where air and/or ambient temperature exceeds 120°F or drops below +35°F. Locate dryer to avoid extremes of heat and cold from ambient or other conditions. Where applicable, dryer towers may be insulated to reduce heat loses. Avoid locating dryer outside or where it is exposed to the elements.

The dryer, or any air system component, must be located to avoid exposure to pulsation in the compressed air as well as possible surges due to fluctuating demand. In addition, care must be used to minimize exposure to vibration transmitted through mounting pads or piping.

Provide adequate space around the dryer for normal maintenance requirements and service.

If the dryer is shipped with the desiccant packaged separately, install the desiccant after locating and mounting.

Desiccant has been provided separately to minimize handling difficulty and placing unnecessary stress on the dryer assembly.

Bolt the dryer to the foundation using the bolt holes provided in the base frame. Anchor bolts should project a minimum of 3.5 inches above the foundation and allow proper nut and washer assembly.

### 10.3 PIPING

Pipe the compressed air lines to the inlet and outlet connections. Locate the pre-filters as close as possible to the dryer. Ensure the positioning allows for ease of servicing.

Note that the wet air inlet is at the dryer's lower manifold, while the dry air outlet is at the dryer's upper manifold. In situations where air supply is required 24 hours a day (it is undesirable to interrupt the airflow), a three valve by-pass system is recommended to bypass the dryer. To keep pressure drop at a minimum use the fewest elbows necessary.

To eliminate noise created by frequent tower release of purge exhaust, the dryer's exhaust may be piped to an outside or more remote location. This will also eliminate any possible problems caused by indoor accumulation of condensed moisture from the purge exhaust. If extending the exhaust pipe, install it horizontal or downward to avoid accumulation of condensate at low points. If the purge exhaust is required to run upward, install a valve at the low point. Keep this valve partially (50-75%) open to continually drain any liquid water. If extending the exhaust pipe farther than 15 feet, consult the factory for recommendations.

Once all piping has been connected all joints, including those on the dryer, should be soap bubble tested at line pressure to ensure no joints have been damaged in transit and site placement.

### 10.4 FILTRATION

It is important that a pre-filter and an post-filter be provided in your dryer installation. These are included with the dryer. They are mounted on models EH1500 and below.

#### ⚠ NOTICE

**All dryers must have proper filtration. Liquid water and oil must be removed before the air enters the dryer. Ensure separators, pre-filters and drains are in good working order. Failure to do so will void warranty.**

It is recommended that a mechanical separator be installed immediately preceding the pre-filter to remove the bulk liquid and entrained water.

## 10.0 INSTALLATION AND INITIAL START-UP

Coalescing pre-filters, located before the dryer, protect desiccant beds from contamination by oil, entrained water, pipe scale, etc., thereby, extending dryer desiccant life.

Locate pre-filters as close to dryer as possible. FAILURE TO PROVIDE AND MAINTAIN A HIGH EFFICIENCY COALESCING PRE-FILTER WILL VOID DRYER WARRANTY.

Post-filters, located after the dryer, help eliminate the possibility of desiccant dusting carrying over into the air system.

### ⚠ WARNING

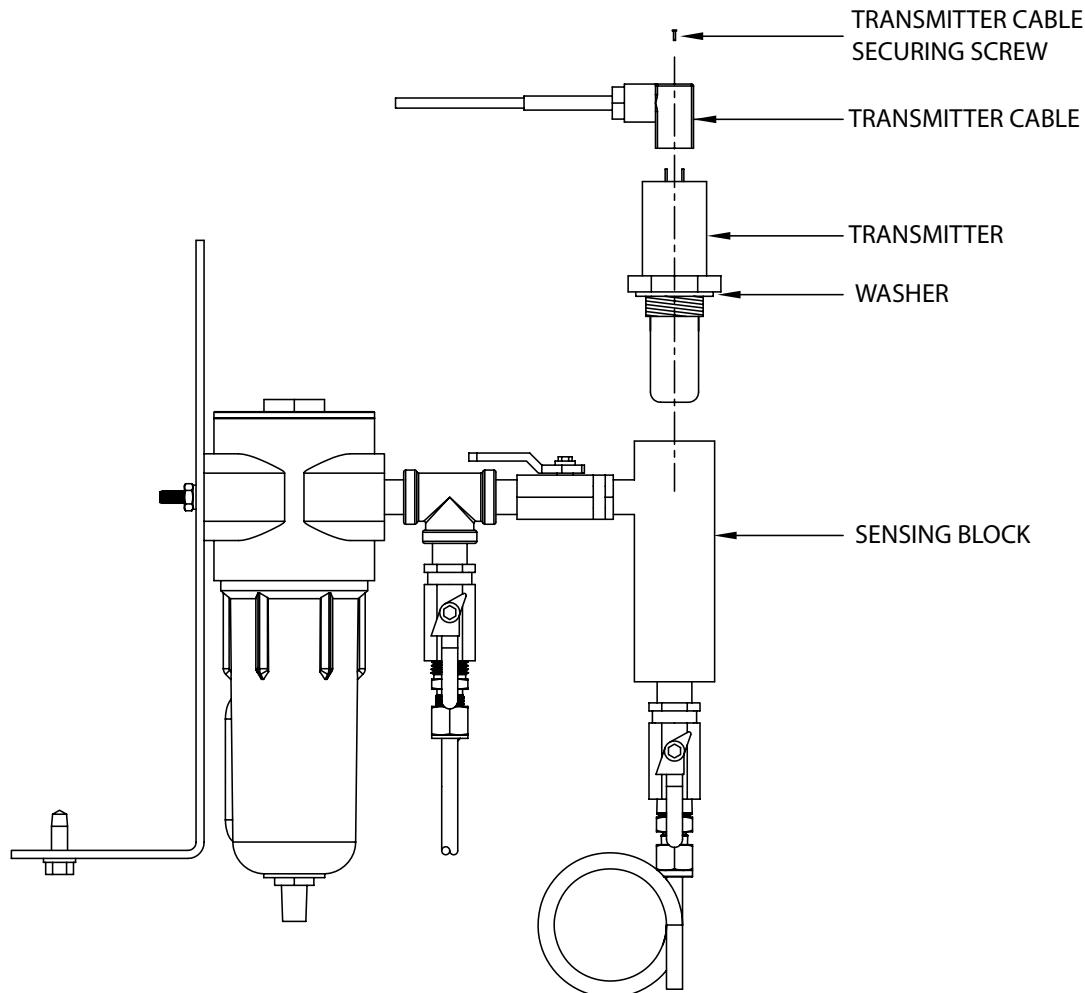
**High temperature filters must be used to prevent rupture possibility in the event dryer failure should occur. Consult your Ingersoll Rand representative for appropriate filter selection.**

### 10.5 DEW POINT TRANSMITTER INSTALLATION (OPTIONAL)

On dryers equipped with EMS, the dew point transmitter is shipped in a separate container within the electrical enclosure to protect the transmitter during shipment. Prior to using the EMS feature, the transmitter must be installed in the sensor block located on the side of or behind the electrical enclosure and the transmitter cable fastened to the sensor. Note that the transmitter should only be installed when the dryer is ready to be commissioned.

To install the Dew Point Transmitter:

- Remove Transmitter from original packaging.
- Verify that Washer is placed below Transmitter hex.
- Thread the Transmitter into the Sensor Block as shown.
- Attach the Transmitter Cable to the Transmitter. Be sure to fully engage the Transmitter Cable Securing Screw into the mating thread in the Transmitter.



EH DEW POINT SENSOR ASSY

## 10.0 INSTALLATION AND INITIAL START-UP

### 10.6 ELECTRICAL CONNECTION

Refer to wiring diagram for all electrical connections. Electrical connection must be hard piped with an external fused disconnect switch with proper overload protection.

Size field connection knock-out for the conduit fitting required by the NEC.

Service wires must be sized according to the minimum circuit ampacity shown on the dryer serial nameplate and the requirements of the NEC.

The power connections are marked L1, L2 and L3.

#### ⚠ CAUTION

**Dryer must be grounded with the full sized ground wire connected to an earth ground.**

### 10.7 START-UP

#### ⚠ NOTICE

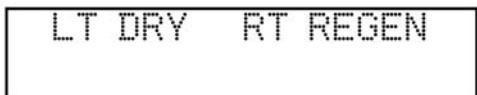
**Initial dryer start-up must be in the Heated Purge Mode**

- With dryer de-energized, slowly pressurize the dryer. When the dryer reaches full operating pressure, check the system for air leaks. Soap test all joints and fitting. To maintain desired dew point, any leaks detected must be repaired, especially those on the outlet side of the dryer.
- Turn on dryer disconnect switch to apply power to the dryer.

PRESS ON

Once power is applied to the dryer and after a brief initialization sequence, the PRESS ON prompt will be displayed.

- Verify all actuated valves are in their failsafe position.
- Using a voltmeter, check the power connections for the correct voltage shown on the dryer serial nameplate
- Close and secure all electrical panel covers.
- Ensure that the purge adjustment valve is in the open position.



- The sequence will initiate proper Inlet and Purge Valve positioning and tower depressurization.
- If the dryer has been in storage or off for an extended period of time, the Blue Moisture Indicator may be gray, the High Dew Point Alarm (if equipped) may be activated and the Dew Point Display (if equipped) may indicate a high dew point. Depending upon the duration of idle time, it may take anywhere from one to twelve hours for the alarm to deactivate, the BMI to return to its normal blue state and dew point to drop.
- For dryers equipped with EMS, refer to Section 9.4 regarding the use of this option.

#### ⚠ NOTICE

**-100° F dryers require flow through the dryer to lower the pressure dew point to design levels. Failure to permit air flow through the dryer (dead-heading) will result in elevated outlet dew points. Once air is permitted to flow through the dryer, the pressure dew point will gradually reduce to design levels.**

### 10.8 SHUT DOWN PROCEDURES

The following procedures must be followed to properly shut down the Heat Reactivated Dryer to avoid damage to the unit and preserve dryer performance. The dryer requires compressed air to actuate the valves. Removing the compressed air supply prior to shutting down the dryer will result in improper valve positioning. In addition, the dryer must complete a specific Shutdown Sequence prior to being turned off. Should power be removed from the dryer or air pressure removed from the dryer prior to the completion of the Shutdown Sequence, damage to the dryer may occur. Lastly, the inlet valves are configured to open on a loss of power and the purge valves configured to close (fail safe). Should a valve open to a depressurized tower, as would be the case if the dryer were stopped in mid-cycle, a rapid pressurization will occur.

#### ⚠ NOTICE

**Initial dryer start-up must be in the Heated Purge Mode**

#### ⚠ NOTICE

**On dryers equipped with EMS, merely leaving the unit in EMS without a compressed air supply is not advised, as it is likely that the system pressure will decay over time. Should this occur, the unit will go into a FTS alarm as well as risk misalignment of valves should switchover occur prior to reinstating the air compressor.**

Depress the ON button to initiate the dryer program. The Microprocessor Controller will display the first CUSTOMER MODE screen

## 10.0 INSTALLATION AND INITIAL START-UP

### ⚠ CAUTION

Dryer should not be shut down during the heating cycle. Doing so may cause the Heater High Temperature alarm to activate, which will require the user to manually reset the Heater High Temperature safety in the control enclosure. If the dryer must be shut down during the heating cycle, advance the program via the Program Jog function (see Section 9.9) to the end of the heating cycle prior to initiating the Shutdown Sequence.

For all Heat Reactivated Dryers **Ingersoll Rand** recommends that an isolation valve be installed at the dryer outlet. Upon restarting the dryer, it is likely that the pressure downstream of the dryer will have decayed. When starting the dryer without the valve (or with the valve in the fully open position), the high velocities of the air through the towers could damage the desiccant, as well as provide unprocessed air down stream.

### ⚠ NOTICE

Prior to removing power or compressed air from the dryer, depress the OFF button on the Microprocessor Control. This initiates the Shutdown Sequence, which closes the purge valves, repressurizes the off-line tower and opens the flow valves. **DO NOT REMOVE POWER OR COMPRESSED AIR FROM THE DRYER DURING THE SHUTDOWN SEQUENCE.**

Shut Down Procedure:

- Maintain a compressed air source to the dryer and a supply of power to the Microprocessor Controller.

OFF

SHUTDOWN  
SEQUENCE

Depress the OFF button to initiate the SHUTDOWN SEQUENCE.

- Permit the dryer to complete the full SHUTDOWN SEQUENCE (30 seconds).

PRESS ON

Once the PRESS ON Prompt is displayed, the dryer has completed the SHUTDOWN SEQUENCE. Power and air may be safely removed from the dryer.

- De-energize the dryer
- Shut down air compressor or bypass dryer
- Close Isolation Valves (if equipped)

Note: On the subsequent Start-up, the outlet isolation valve should be in the closed position. Slowly open the valve to build pressure downstream.

## 11.0 MAINTENANCE AND SYSTEM CHECK

### 11.1 SCHEDULED MAINTENANCE

#### DAILY MAINTENANCE FUNCTIONS:

- Check and record inlet pressure, temperature and flow. Verify that it is within specifications.
- Check tower pressure gauge readings within operating tolerance.
- Check tower pressure gauges for proper dryer cycling.
- Check that pre-filter condensate drains are functioning properly. Replace cartridges sooner if necessary as required by differential pressure indicator.
- Verify that pressure in purging tower is 5 PSIG or less.
- Verify that pre-filter and post-filter differential pressure is within operating limits. Replace cartridges sooner if necessary as required by differential pressure indicator.

#### MONTHLY MAINTENANCE FUNCTIONS:

- Check your operating conditions: inlet flow, inlet pressure, and inlet temperature.
- Check pre-filter(s) and post-filter(s) differential pressure and drains. Replace cartridges sooner if necessary as required by differential pressure indicator.
- Check dryer cycle and sequence of operations (i.e. drying, depressurizing, regenerating).

#### QUARTERLY MAINTENANCE FUNCTIONS:

- Replace pre-filter(s) and post-filter(s) cartridges. Replace cartridges sooner if necessary as required by differential pressure indicator.
- Check pilot air filter element and replace as needed.

#### SEMI-ANNUAL MAINTENANCE FUNCTIONS:

- Check outlet dew point.
- Check amp draw on heater.
- Replace pre-filter and post-filter elements and / or cartridges. Replace cartridges sooner if necessary as required by differential pressure indicator.

#### ANNUAL MAINTENANCE FUNCTIONS:

- Check desiccant and replace if necessary.
- Inspect and clean no-loss drain valves and check valves. Replace worn or damaged seats and parts as required.
- Test lights and switches, replace as necessary.
- Test electrical components, replace as necessary.

- Check and repair any air leaks, loose bolts, flanges and fittings.

#### EVERY TWO YEARS:

- Change check valves
- Change control no-loss drain valves
- Check and change temperature probes

#### EVERY THREE - TO - FIVE YEARS:

- Replace desiccant.

#### ⚠ NOTICE

Refer to Section 10.7 for the proper way to shut down the Heat Reactivated Dryer.

## 11.2 PRE-FILTERS AND POST-FILTERS

Pre-filter elements must be changed as often as required to prevent contamination of the regenerative dryer's desiccant bed.

Pre-filter drains must be checked daily. Failure to drain condensed liquid from the sump of the filter housing will result in carry over and damage to the desiccant material. HB post-filters are used to prevent desiccant dust particulate contamination from migrating downstream into plant processes. Elements should be changed as pressure drop increases to an undesirable level.

#### ⚠ NOTICE

Should the drying system be overloaded and/or malfunctioning causing high pressure drop, HB post-filters will prematurely plug. This problem can be avoided by frequent inspection and cleaning of elements.

#### ⚠ WARNING

Depressurize the system before disassembling filters. Failure to do so may result in injury or death.

Filter elements should be changed as indicated on the pressure differential gauge. Change carbon elements when hydrocarbons are first detected downstream or every six months, whichever comes first.

Certain filters contain multiple elements. When replacing filter elements, all elements should be replaced simultaneously. Mixing new and old elements can result in reduced air quality.

## 11.0 MAINTENANCE AND SYSTEM CHECK

### 11.2.1 THREADED FILTERS:



STEP 1 - Rotate filter bowl counter-clockwise to loosen bowl from filter head. If necessary, a spanner and/or strap wrench may be used. Remove bowl.

STEP 2 - Elements are removed by grasping element and pulling downward. Note that filter bowl need only be dropped approximately 2" to permit element to drop from head.

STEP 3 - Inspect element prior to installation. If necessary, lubricate orings on upper end cap to facilitate installation.

Inspect filter head o-ring. Lubricate, reseat or replace as required. If equipped with internal float drain, inspect drain operation. Repair or replace as required.

STEP 4 - Insert element into filter head and push into place.

Reinstall filter bowl. Alternately, the element may be placed within the center of the filter bowl with the o-rings facing upward. The element will seat itself in the filter head as the bowl is threaded into place.

STEP 5 - With replacement element installed, tighten filter bowl such that the flat of the filter bowl is in contact with the filter head.

STEP 6 - With filter bowl tightened, slowly pressurize filter. Avoid rapid introduction of compressed air to the filter.

### 11.2.2 FLANGED FILTERS:



STEP 1 - Using a 2" socket with an extension, carefully loosen element.



STEP 2 - Remove old element from filter housing.



STEP 3 - Install new element by carefully inserting element in top plate.



STEP 4 - Hand tighten element in place until element o-ring contacts top plate.



STEP 5 - Using a 2" socket with an extension, tighten element one half turn. DO NOT OVERTIGHTEN.



STEP 6 - Repeat procedure as required to replace all elements.

## 11.0 MAINTENANCE AND SYSTEM CHECK

### 11.3 MUFFLER CHANGEOUT PROCEDURE

- Turn control power off per shutdown procedures described in Section 9.7.

#### ⚠ WARNING

To avoid injury, depressurize dryer before performing any service.

- Once the dryer has been depressurized, replace the muffler.
- Follow normal start-up procedures as described in Section 9.

### 11.4 NO-LOSS DRAIN VALVES

Periodically clean all no-loss drain valves. Cleaning can be accomplished by removing the no-loss drain, removing the mufflers and removing the valve bodies from the manifold. Check and replace o-rings as necessary. If the no-loss drain valves fail to operate, check the following:

- Control Circuit - Verify that the no-loss drain is receiving electric current.
- Burned out no-loss drain coil.
- High/low voltage - Voltage should be +/- 10% of nameplate readings.
- No-loss drain valve leaking - Disassemble, clean and repack or replace.

### 11.5 PILOT OPERATED ACTUATOR

Should the actuator fail to rotate, disconnect the pilot lines to check if the actuator is receiving pilot pressure.

If the actuator is receiving pressure:

- Verify that control pressure is 75 psig min.
- Ensure the inlet valve is not plugged.  
Normally Closed (N.C.) Valves: For N.C. purge valves, the top port is plugged. Control air is supplied to the back port. If air vents out of the back port continuously when the solenoid is de-energized, it will exhaust through the top of the solenoid. If this condition is observed, the internal seals are leaking and must be replaced.

### 11.6 DESICCANT CHANGEOUT PROCEDURE

#### ⚠ WARNING

To avoid injury, depressurize dryer before performing any service.

#### ⚠ CAUTION

Be sure to wear respiratory protection during the draining and filling process to minimize inhalation of desiccant, as desiccant will produce dust during this procedure.

#### ⚠ NOTICE

Each dryer is shipped with a desiccant sample kit to allow the desiccant to be sent for analysis. This kit can be used to have the condition of the desiccant verified by laboratory analysis. Please follow the instructions found in the kit.

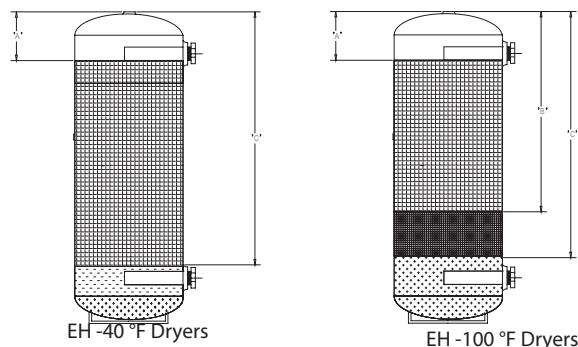
- Desiccant dryers are furnished with fill and drain ports on each desiccant tower. Remove the caps on both ports.
- To assist in getting the desiccant to flow from the tower, insert a small rod in to the drain port as necessary. This may be required as the desiccant is packed into the towers which may interfere with the desiccant flow from the towers.
- Retainer screens, located at the inlet and outlet piping connections of the tower, are removable on all models. It is suggested that these screens be removed and cleaned at the time of desiccant changeout. These screens can be accessed by disconnecting the upper and lower manifolds from the dryer towers.
- After cleaning the retainer screens, replace screens and reattach the outlet port plug.
- With the fill port plug removed, fill the dryer tower with the appropriate grade and size desiccant. The level and grade of the desiccant should be consistent with the Desiccant Fill Chart.

#### ⚠ CAUTION

Desiccant quantity, positioning and grades must match the corresponding values in the Desiccant Fill Chart. Failure to do so may result in poor dryer performance.

- Once the towers have been filled, replace the fill port plug on each tower.
- Any connections disturbed in the desiccant changeout process should be leak tested prior to re-commissioning the dryer.

## 11.0 MAINTENANCE AND SYSTEM CHECK



ACTIVATED ALUMINA 3/16"(4-8 mm)      ACTIVATED ALUMINA 3/16"(4-8 mm)

ACTIVATED ALUMINA 1/8"(2-5 mm)      ACTIVATED ALUMINA 1/8"(2-5 mm)

MOLECULAR SIEVE

EH MODEL	A (IN)	B (IN)	C (IN)
150	7.00	37.75	52.25
200	7.00	36.75	51.00
250	16.00	40.12	52.25
300	8.00	37.12	51.25
400	24.00	50.37	64.38
500	14.00	45.50	62.75
600	30.00	59.75	75.50
800	10.00	55.75	75.50
1000	19.50	52.50	69.50
1200	14.50	50.25	69.50
1500	28.00	63.00	78.50
1800	17.00	60.00	78.50
2100	10.00	60.00	78.50
3000	7.75	53.75	81.00
4000	9.00	47.50	74.50
5000	6.00	49.00	79.00
6000	9.00	54.00	74.25
8000	6.50	55.00	76.75

Tolerance = +/- .50"

### DESICCANT FILL CHART

EH MODEL	3/16" (4MM-8MM) AA ALL DRYERS (LB)	1/8" (2MM-5MM) AA -40 °F DRYERS (LB)	1/8" (2MM-5MM) AA -100 °F DRYERS (LB)	MS -100 °F DRYERS (LB)
150	52	184	125	59
200	78	266	180	86
250	100	298	199	100
300	111	359	242	117
400	160	444	293	151
500	178	570	383	187
600	86	922	670	252
800	86	1184	868	316
1000	142	1258	908	350
1200	142	1464	1062	402
1500	266	1934	1384	550
1800	266	2334	1684	650
2100	266	2662	1930	732
3000	600	3650	2588	1063
4000	750	4450	3150	1300
5000	900	6300	4500	1800
6000	1100	7550	5388	2163
8000	1400	10150	7263	2888

AA = ACTIVATED ALUMINA

NOTE: Qty. is per dryer

MS = MOLECULAR SIEVE

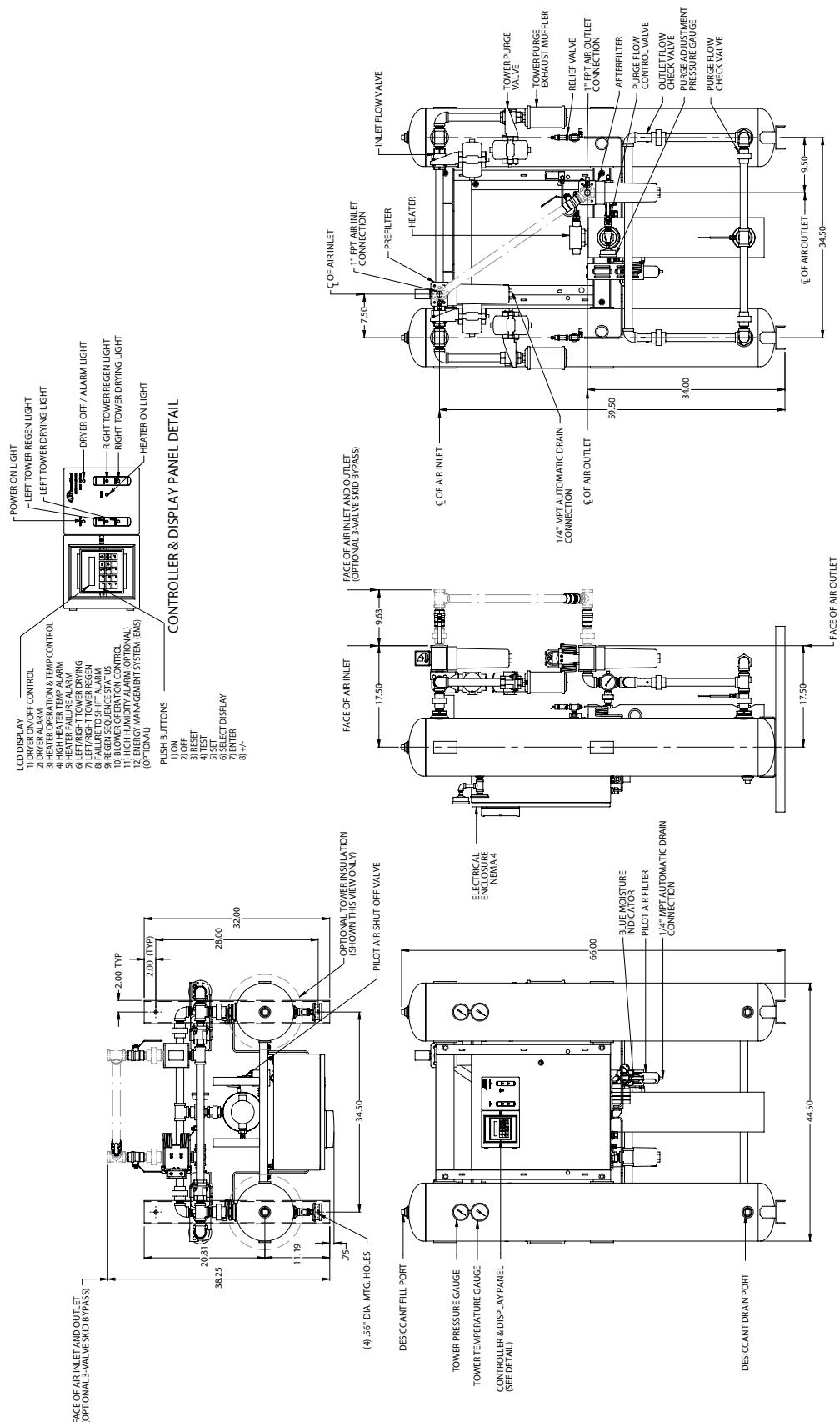
## 12.0 TROUBLESHOOTING

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Refer to maintenance descriptions in Section 11 as required for trouble shooting procedures.

<b>PROBLEM</b>	<b>PROBABLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
<b>Elevated dew point</b>	Insufficient purge rate	Check purge flow settings. Check purge piping for obstruction. Clean purge piping and muffler.
	Inlet air pressure below design condition.	Check pressure source.
	Flow rate higher than design condition.	Check flow rate and cause for increased demand.
	Inlet temperature above design condition	Check aftercooler, clean and service as necessary.
	Entrained water entering desiccant bed.	Check air/moisture separator and pre-filter. Replace dryer desiccant if necessary.
	Desiccant contaminated by oil.	Install suitable pre-filter. Replace dryer desiccant.
<b>Excessive pressure drop in dryer</b>	Excessive flow rate.	Check flow rate and cause for increased air demand.
	Inlet pressure below design condition.	Check pressure source.
<b>Excessive back pressure in regenerating tower (Above 5 PSIG).</b>	Air is leaking across valve.	Check inlet valve. Verify inlet valve is closed to purging tower (0 PSIG tower).
<b>Excessively high pressure at the purge gage (Blower and Heatless Modes)</b>	Improper calibration	Check gauge against tower gauges when in switching sequence. Replace gauge as required.
<b>Failure to Shift (Switching Failure)</b>	No input power	Check power input.
	Defective solenoid valve	Check no-loss drain valve.
	No pilot air / Low pilot air pressure	Check pilot air line. Check that control air line filter is clean. Check regulator setpoint.
	Defective pressure switch	Check switch. Open pressure: > 65 psig; close pressure: < 40 psig
<b>Failure to Shift (Dryer fails to pressurize.)</b>	Faulty purge valve	Check purge valve and its no-loss drain valve.
		Check that repressurization circuit is sending control signal.
<b>Failure to Shift (Dryer fails to depressurize.)</b>	Purge valve does not open. Purge valve stuck in closed position.	Check no-loss drain valve. Repair and replace if necessary.
<b>Heater High Temp. Alarm (Heater runs continuously)</b>	Contactor stuck closed.	Replace contactor.
	Defective thermocouple	Replace thermocouple.
	Defective temperature control	Replace temperature control.
<b>Heat High Temp. Alarm (Loss of flow across heater)</b>	Valve switching failure	Contact <b>Ingersoll Rand</b> Distributor / Factory

## **13.0 GENERAL ARRANGEMENT**

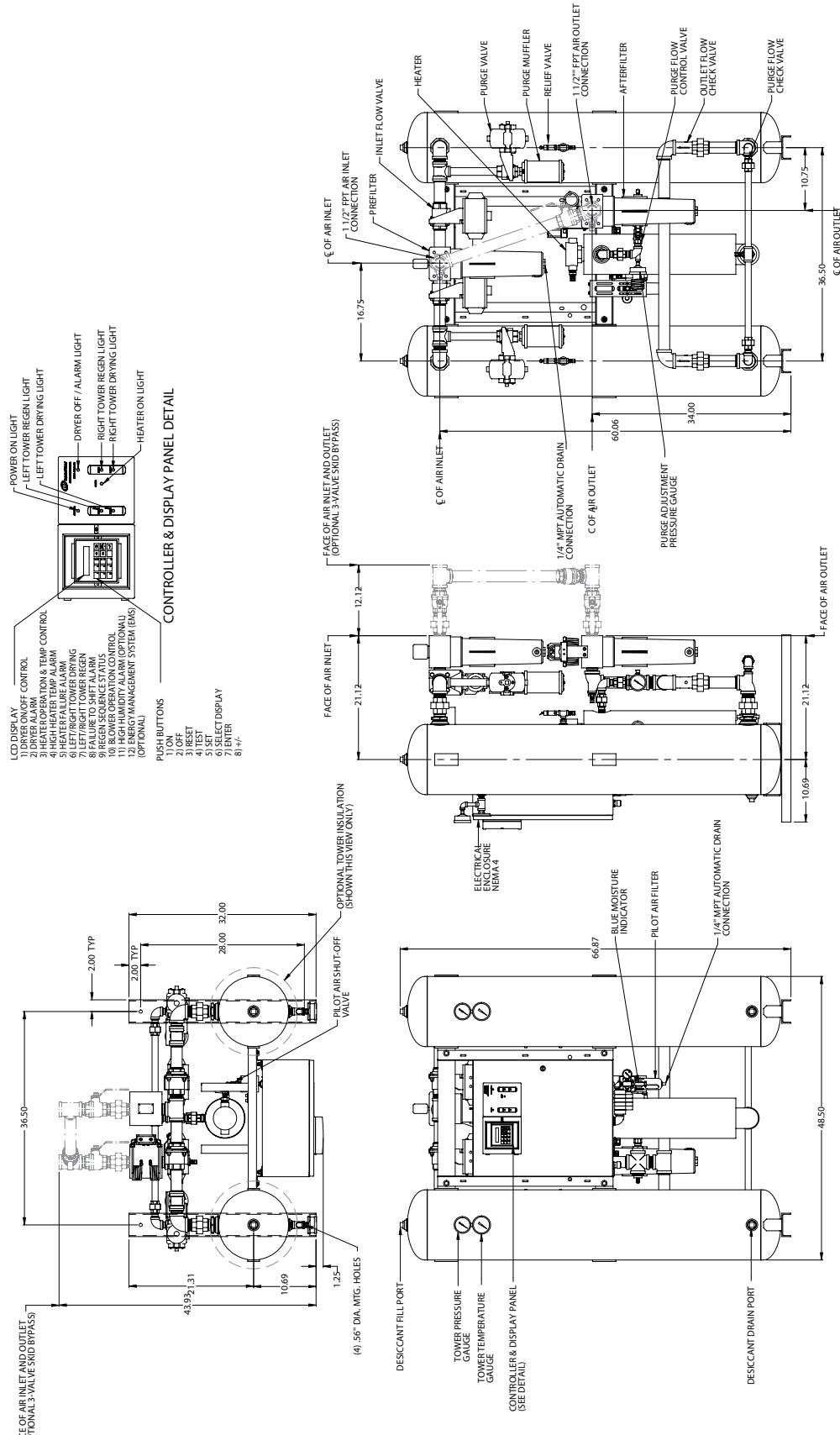


GENERAL ARRANGEMENT  
EH 150 580478

**NOTES:**

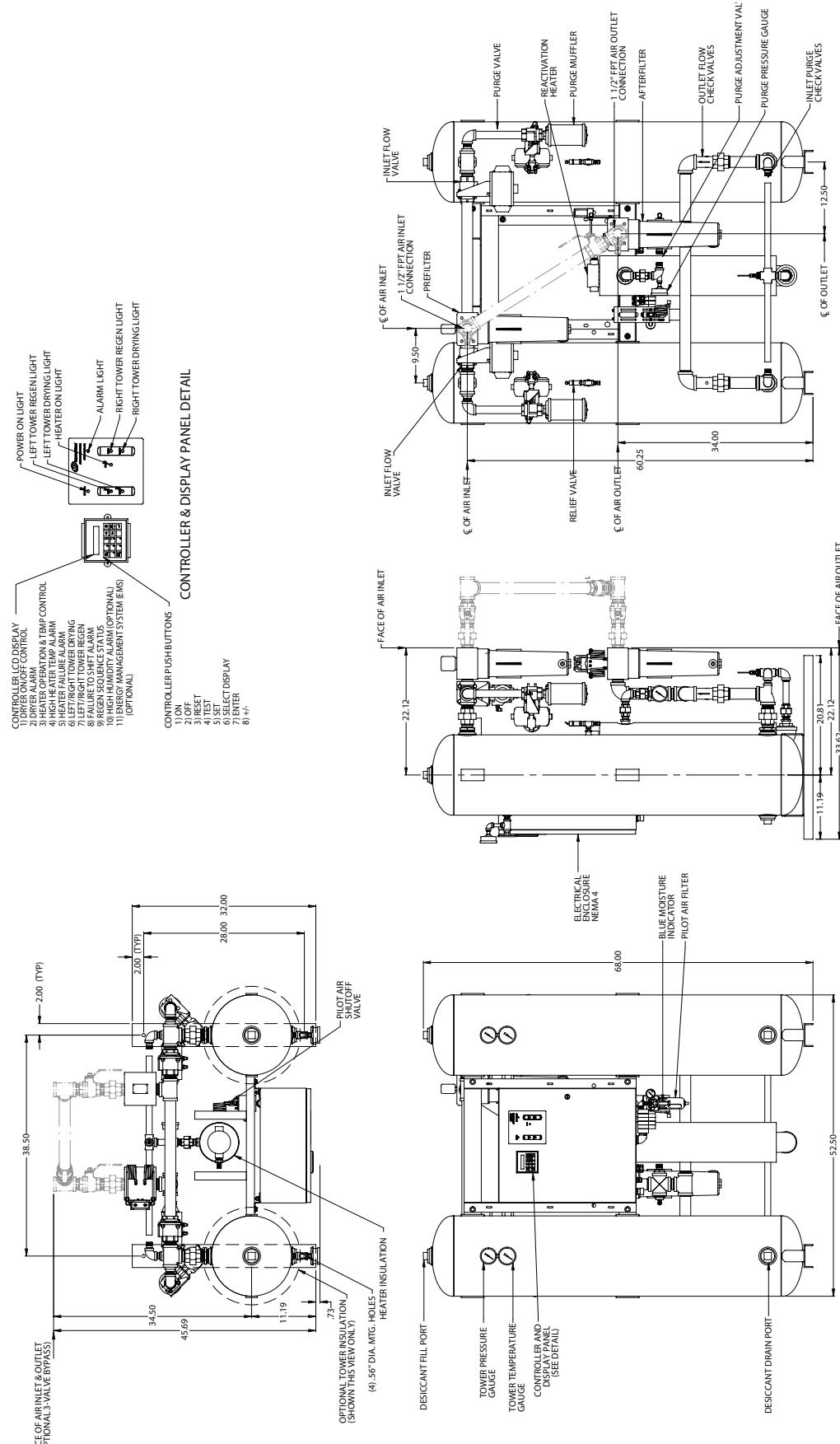
- 1) MAXIMUM WORKING PRESSURE - 150 P.S.I.
- 2) SAFETY RELIEF VALVE SETTING - 165 P.S.I.
- 3) PILOT AIR LINE NOT SHOWN FOR CLARITY.
- 4) ALL WIRING IS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODES/LATEST EDITION

## **13.0 GENERAL ARRANGEMENT**



GENERAL ARRANGEMENT  
EH200  
580479

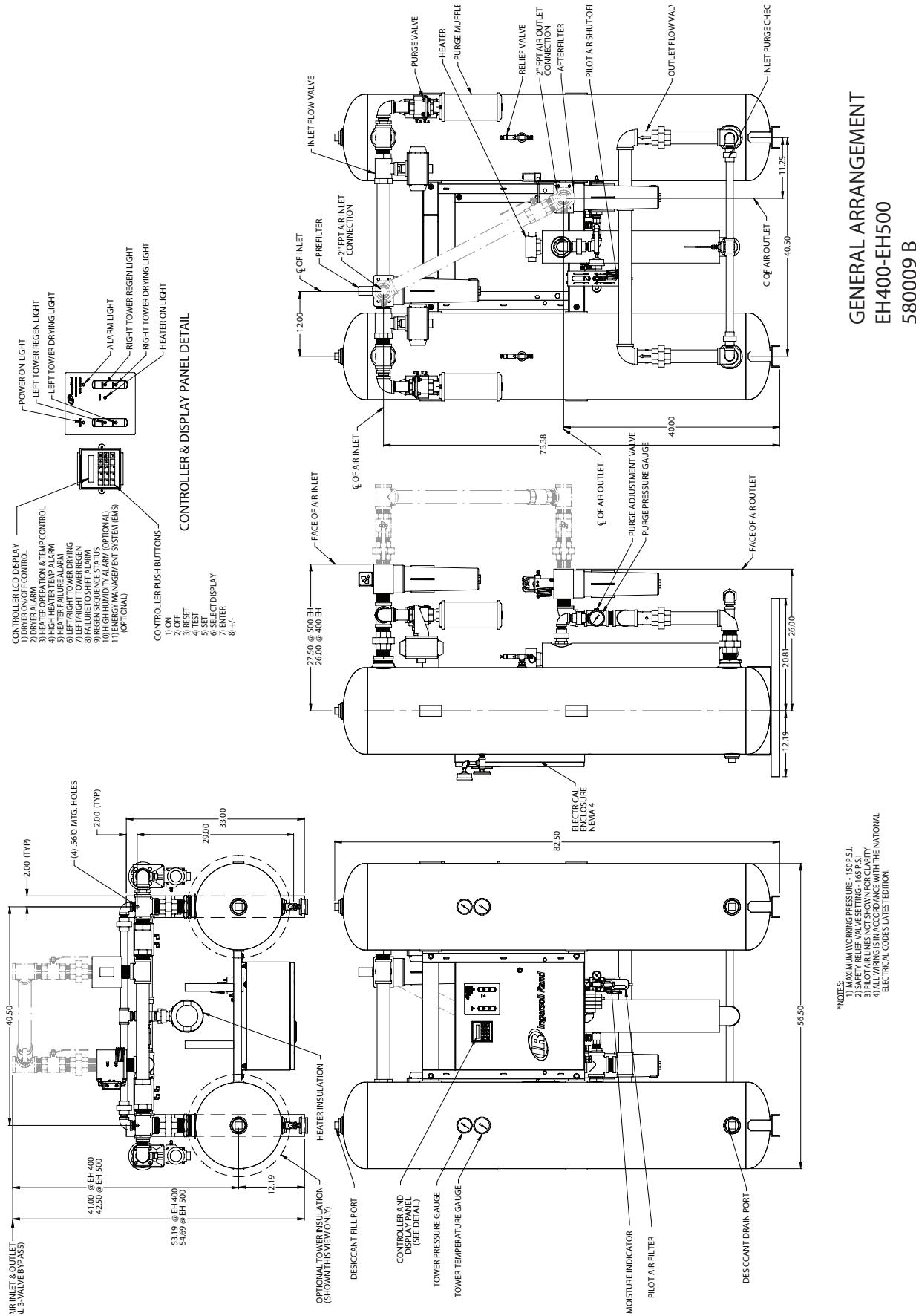
## 13.0 GENERAL ARRANGEMENT



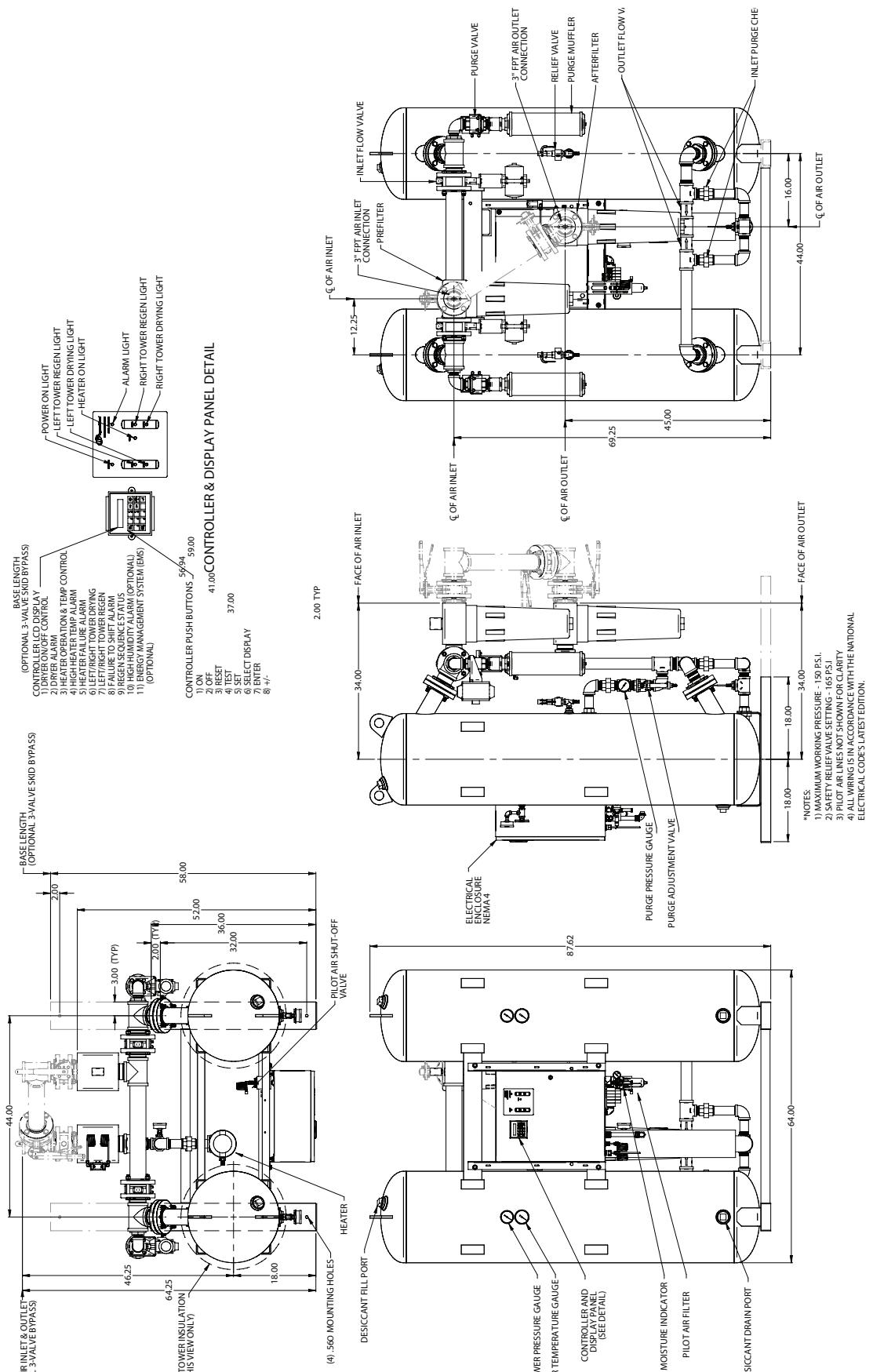
GENERAL ARRANGEMENT  
EH250-EH300  
580008-D

NOTES:  
1) MAXIMUM WORKING PRESSURE - 150 PSI.  
2) SAFETY RELIEF VALVE SETTING - 165 PSI.  
3) PILOT AIR LINES NOT SHOWN FOR CLARITY.  
4) ALL WIRING IS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODES LATEST EDITION.

## **13.0 GENERAL ARRANGEMENT**

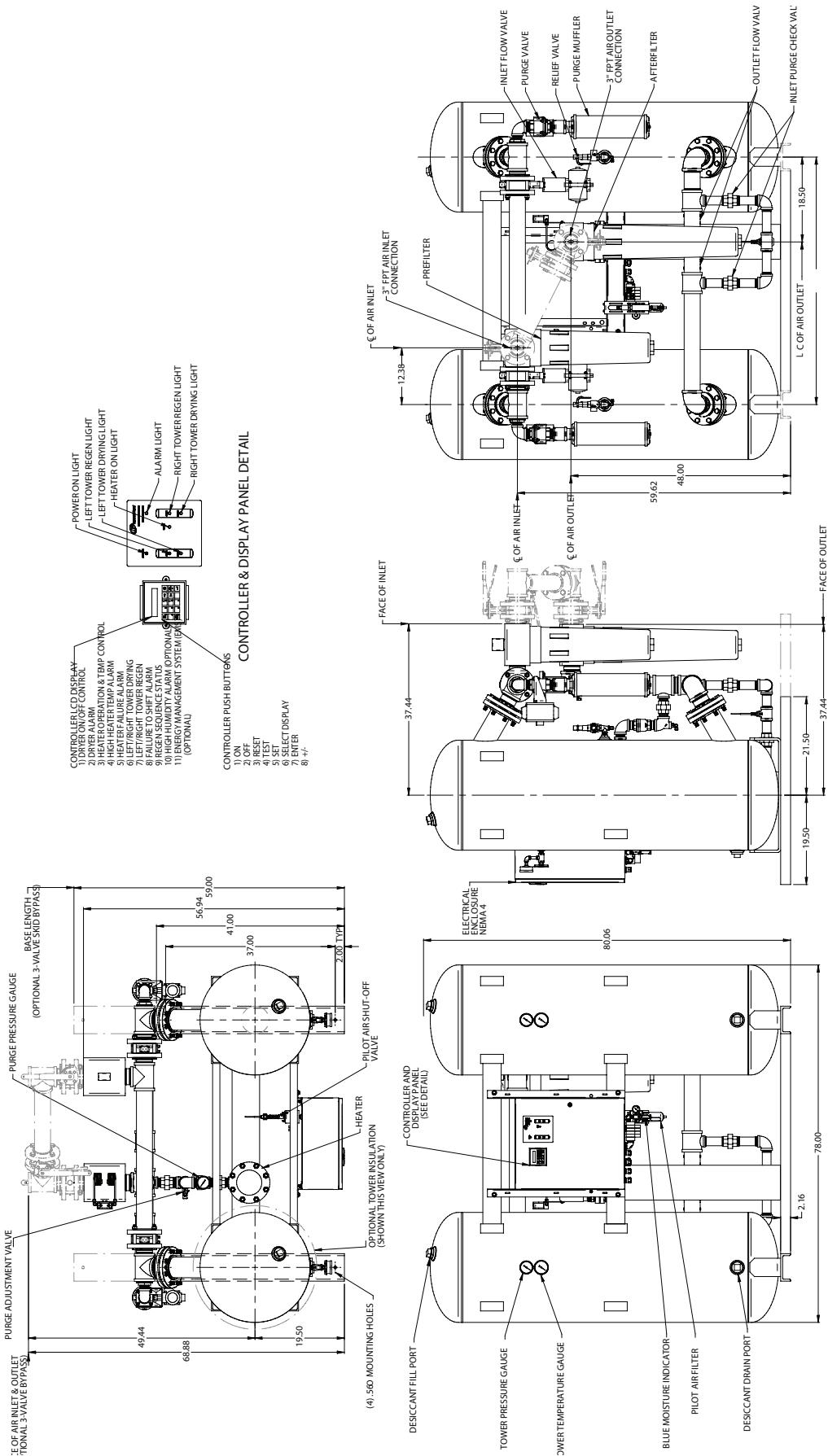


## **13.0 GENERAL ARRANGEMENT**

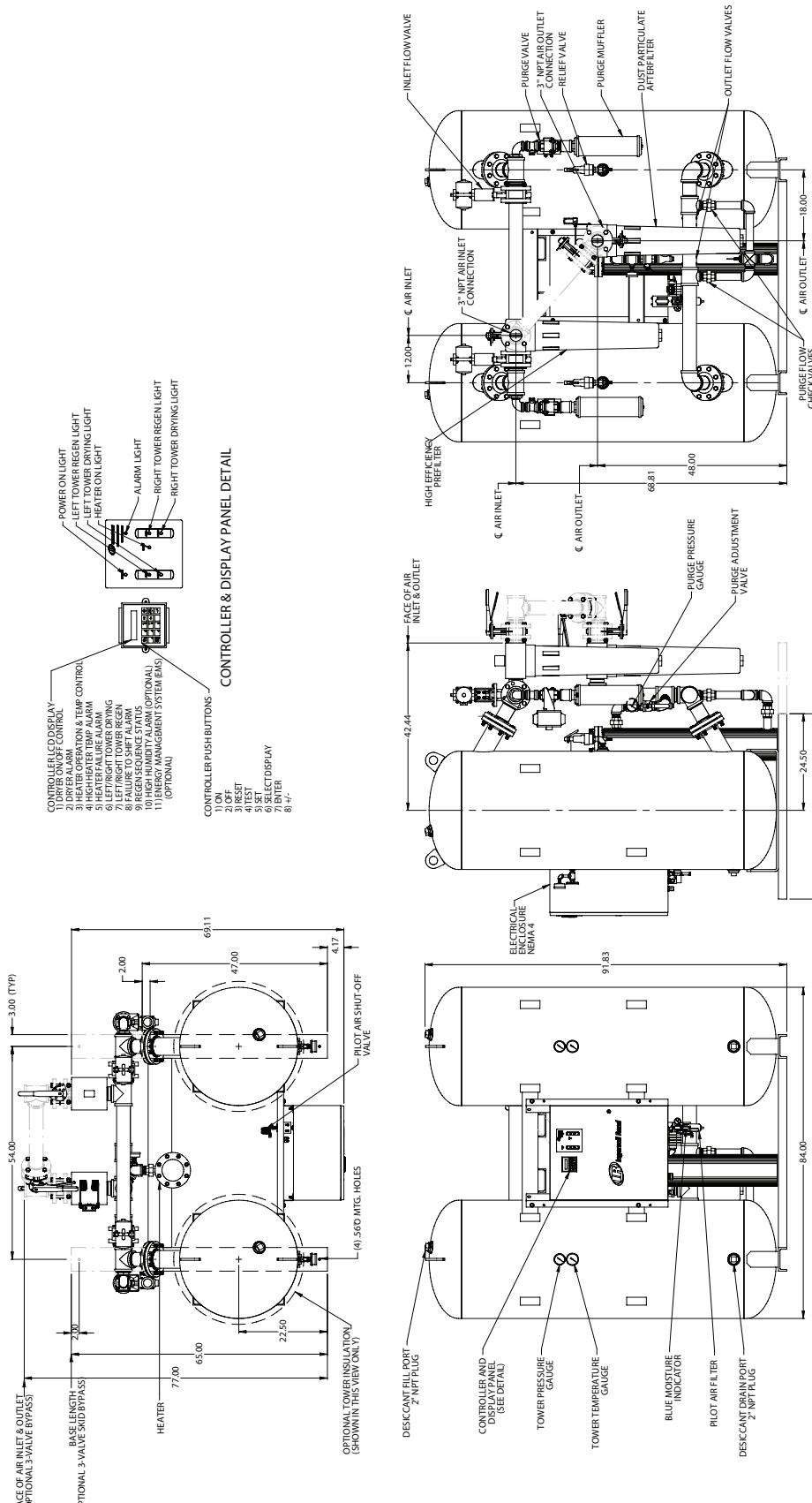


GENERAL ARRANGEMENT  
EH600-EH800  
580010 C

## 13.0 GENERAL ARRANGEMENT



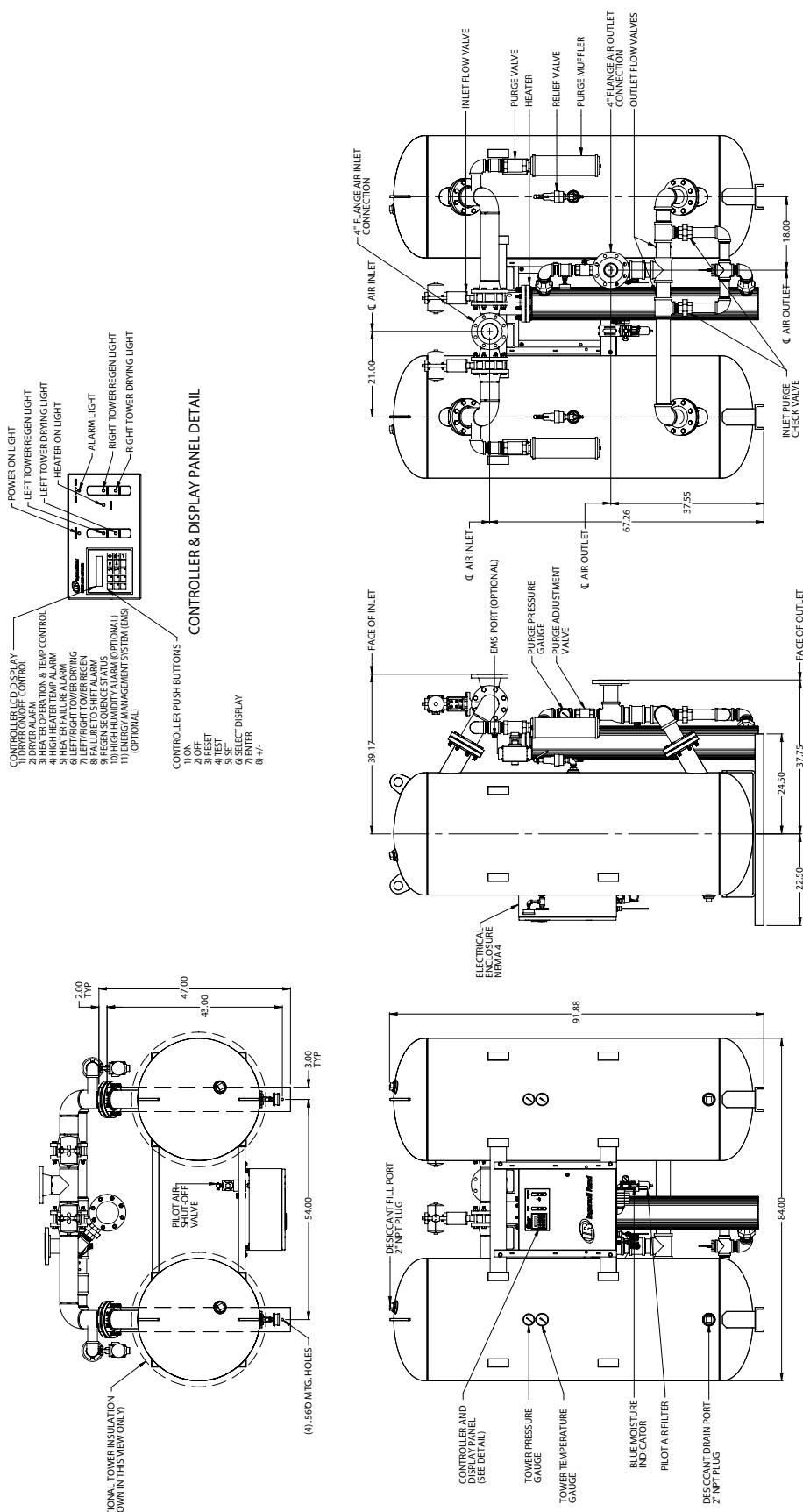
## 13.0 GENERAL ARRANGEMENT



NOTES:  
 1) MAXIMUM WORKING PRESSURE - 150 PSI  
 2) SAFETY RELIEF VALVE SETTING - 165 PSI  
 3) PIPES OF AIRLINES NOT SHOWN FOR CLARITY  
 4) ALL WIRING IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE'S LAST EDITION

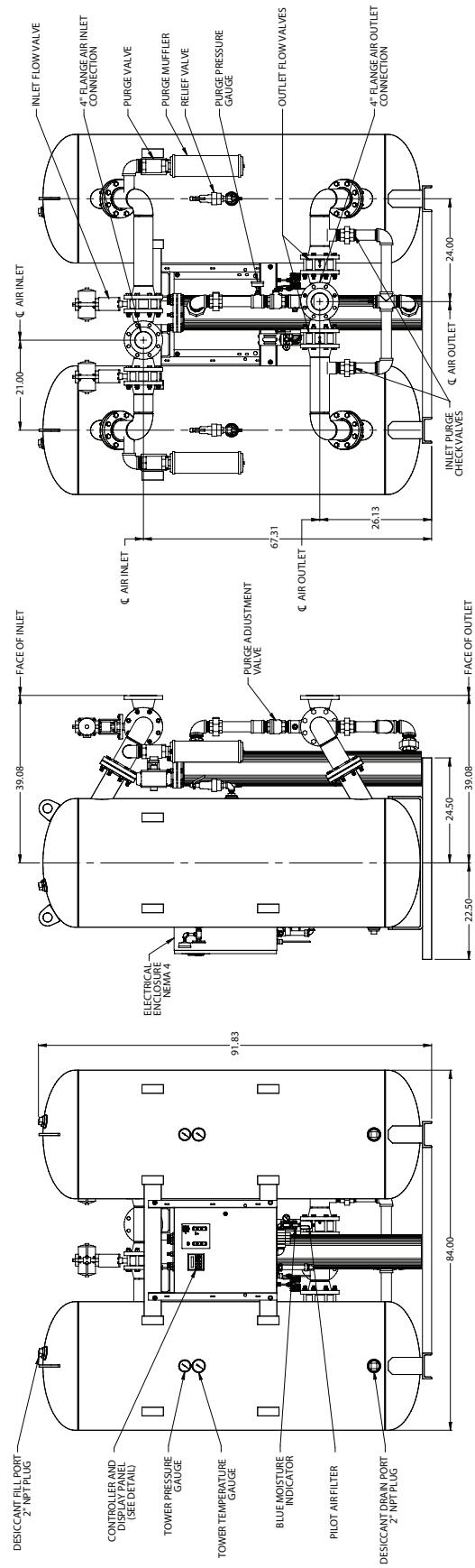
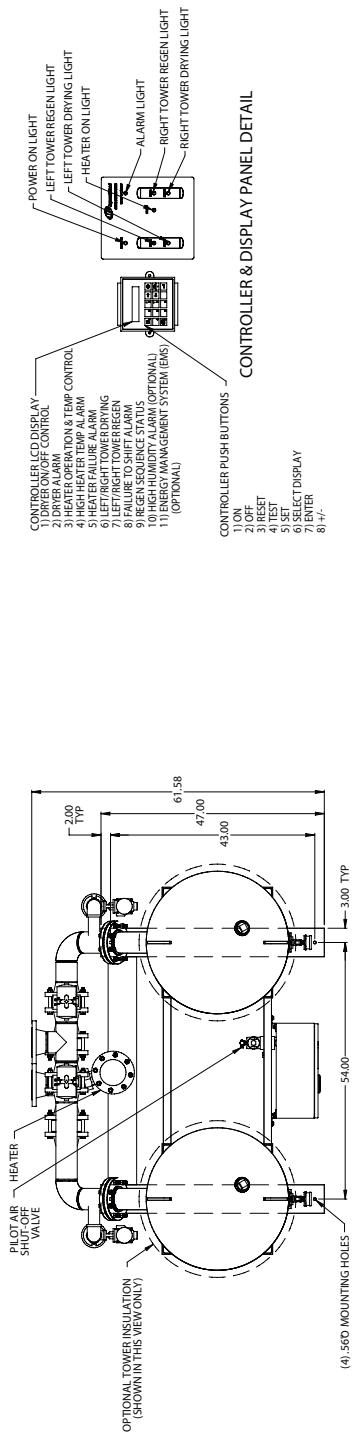
GENERAL ARRANGEMENT  
 EH1500  
 580012 A

## **13.0 GENERAL ARRANGEMENT**



GENERAL ARRANGEMENT  
EH1800  
580044 A

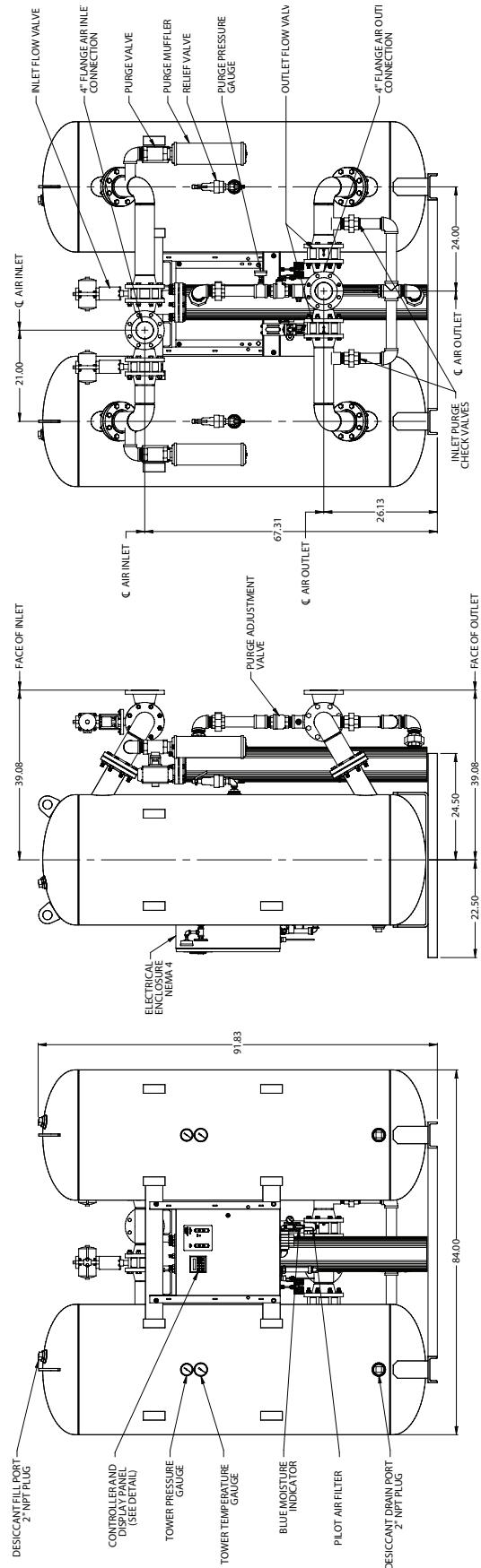
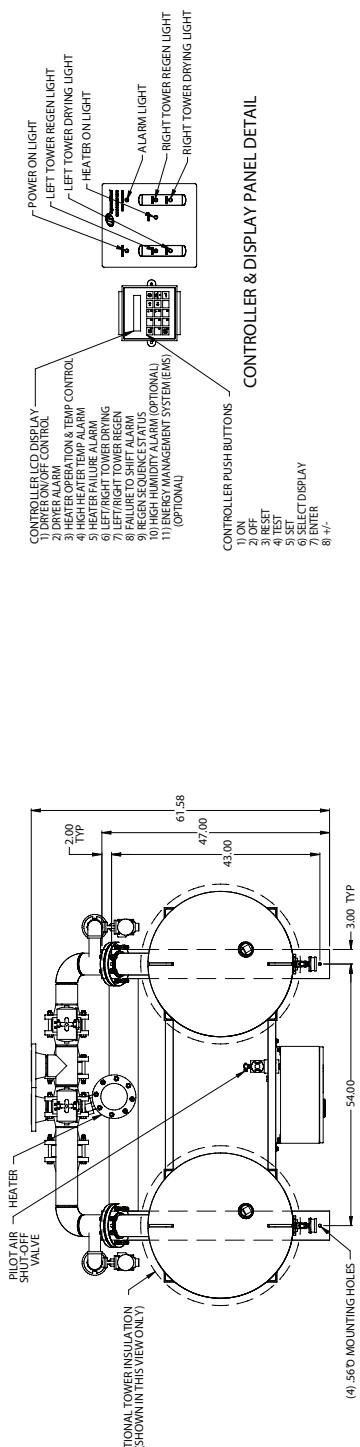
## 13.0 GENERAL ARRANGEMENT



\*NOTES:  
 1) MAXIMUM WORKING PRESSURE = 150 P.S.I.  
 2) SAFETY RELIEF VALVE SETTING = 65 P.S.I.  
 3) PILOT AIR LINES NOT SHOWN FOR CLARITY  
 4) ALL WIRING IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE'S LATEST EDITION.

GENERAL ARRANGEMENT  
EH2100  
580013 A

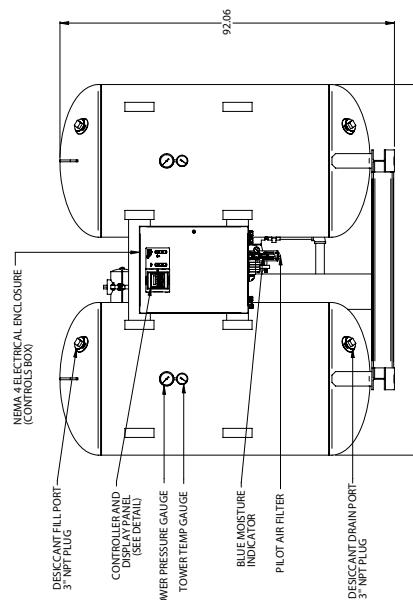
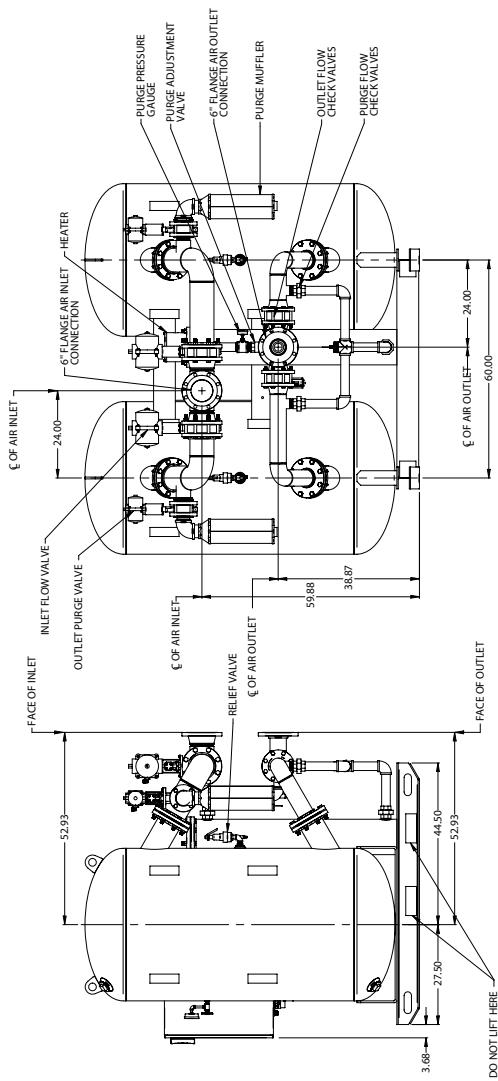
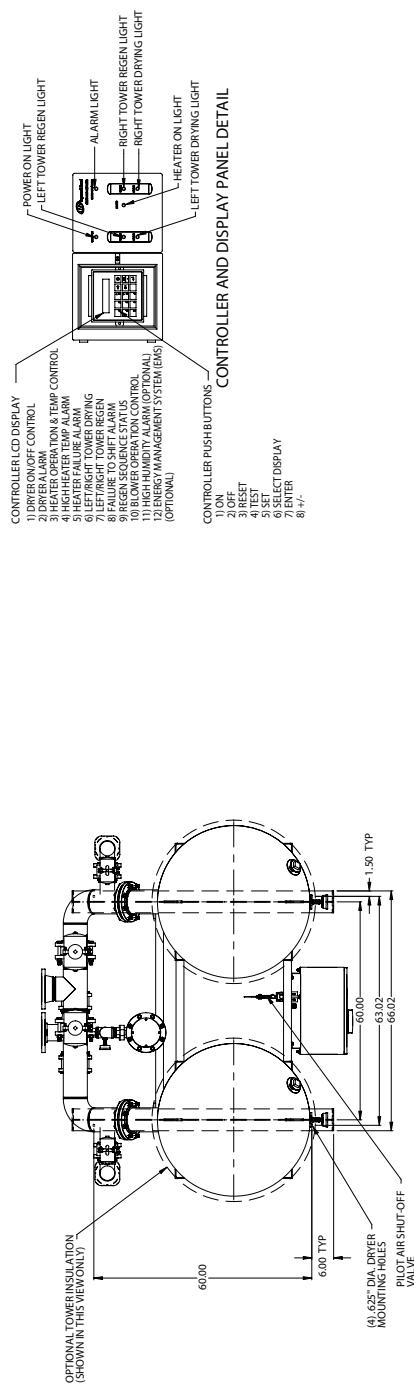
## 13.0 GENERAL ARRANGEMENT



\*NOTES  
 1) MAXIMUM OPERATING PRESSURE: 150 P.S.I.  
 2) SHUT OFF VALVE: 1/2" F.F.C. X 1/2" S.S.  
 3) PILOT AIR LINES NOT SHOWN FOR CLARITY  
 4) ALL WIRING IS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODES LATEST EDITION.

GENERAL ARRANGEMENT  
 EH3000  
 580024 C

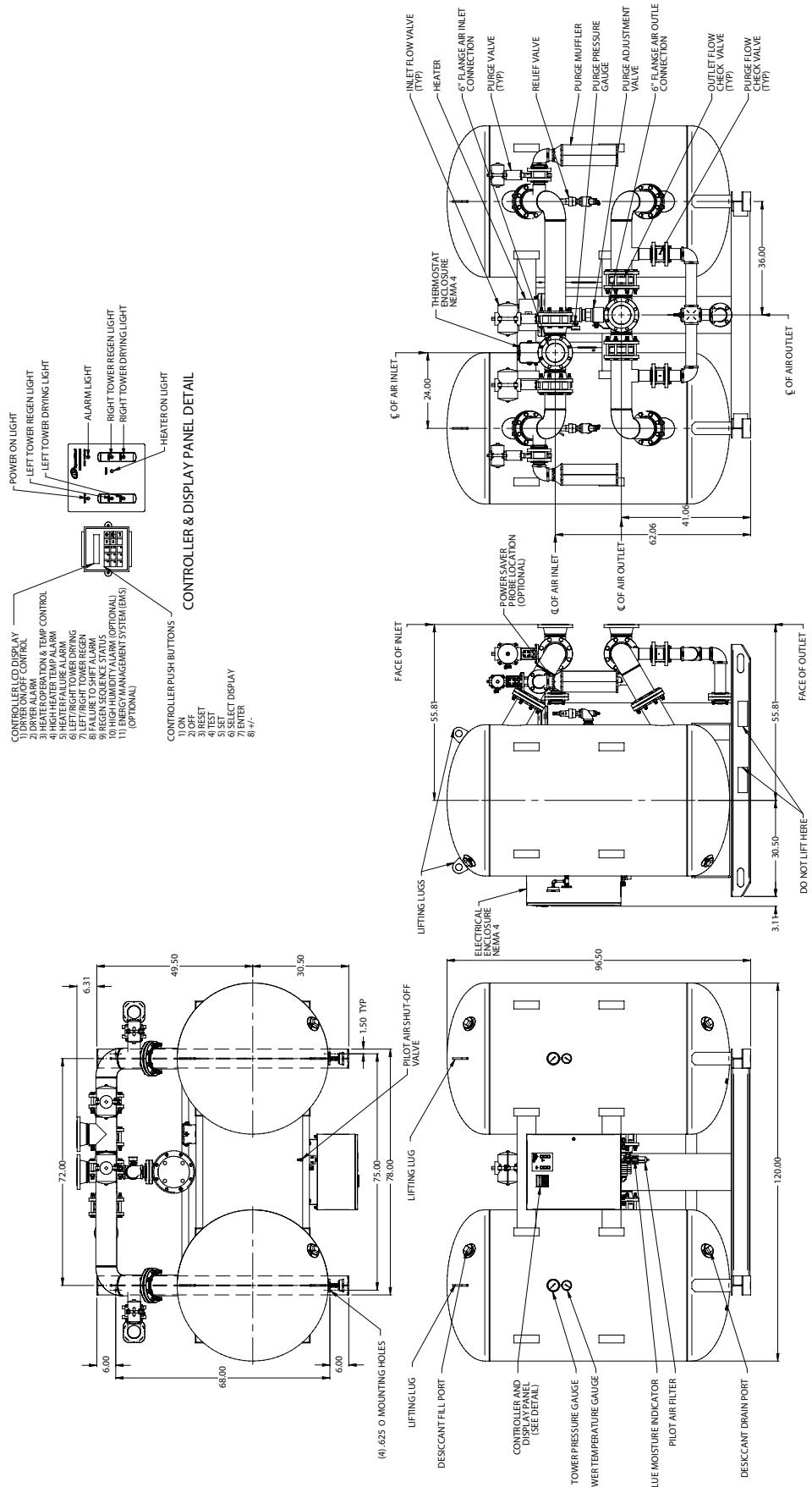
## 13.0 GENERAL ARRANGEMENT



\*NOTES:  
1) MAXIMUM WORKING PRESSURE - 150 P.S.I.  
2) SAFETY RELIEF VALVE SETTING - 165 P.S.I.  
3) PILOT AIR LINES NOT SHOWN FOR CLARITY  
4) REFER TO THE NATIONAL ELECTRICAL CODE'S LATEST EDITION

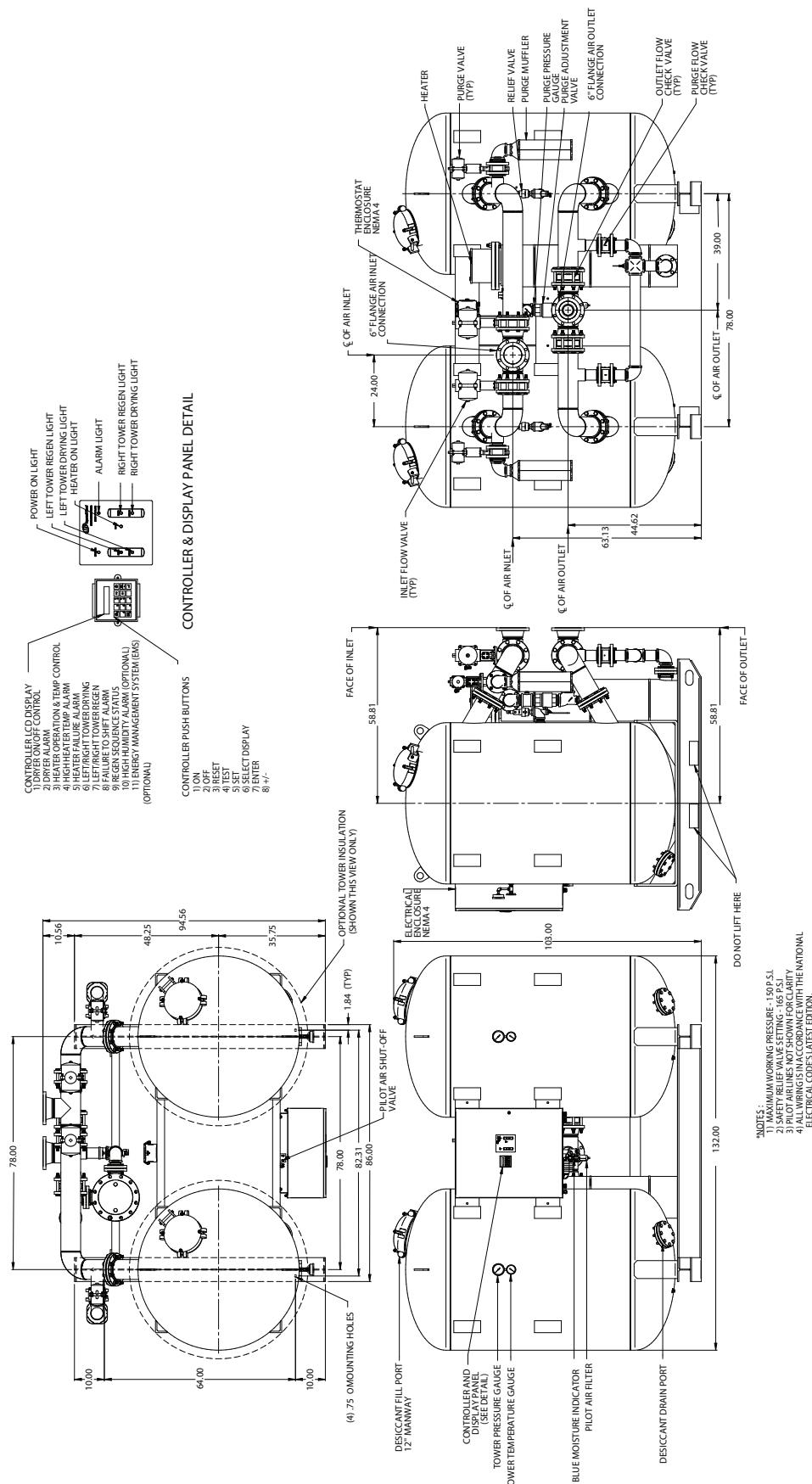
**GENERAL ARRANGEMENT**  
**EH4000**  
**580482**

## 13.0 GENERAL ARRANGEMENT

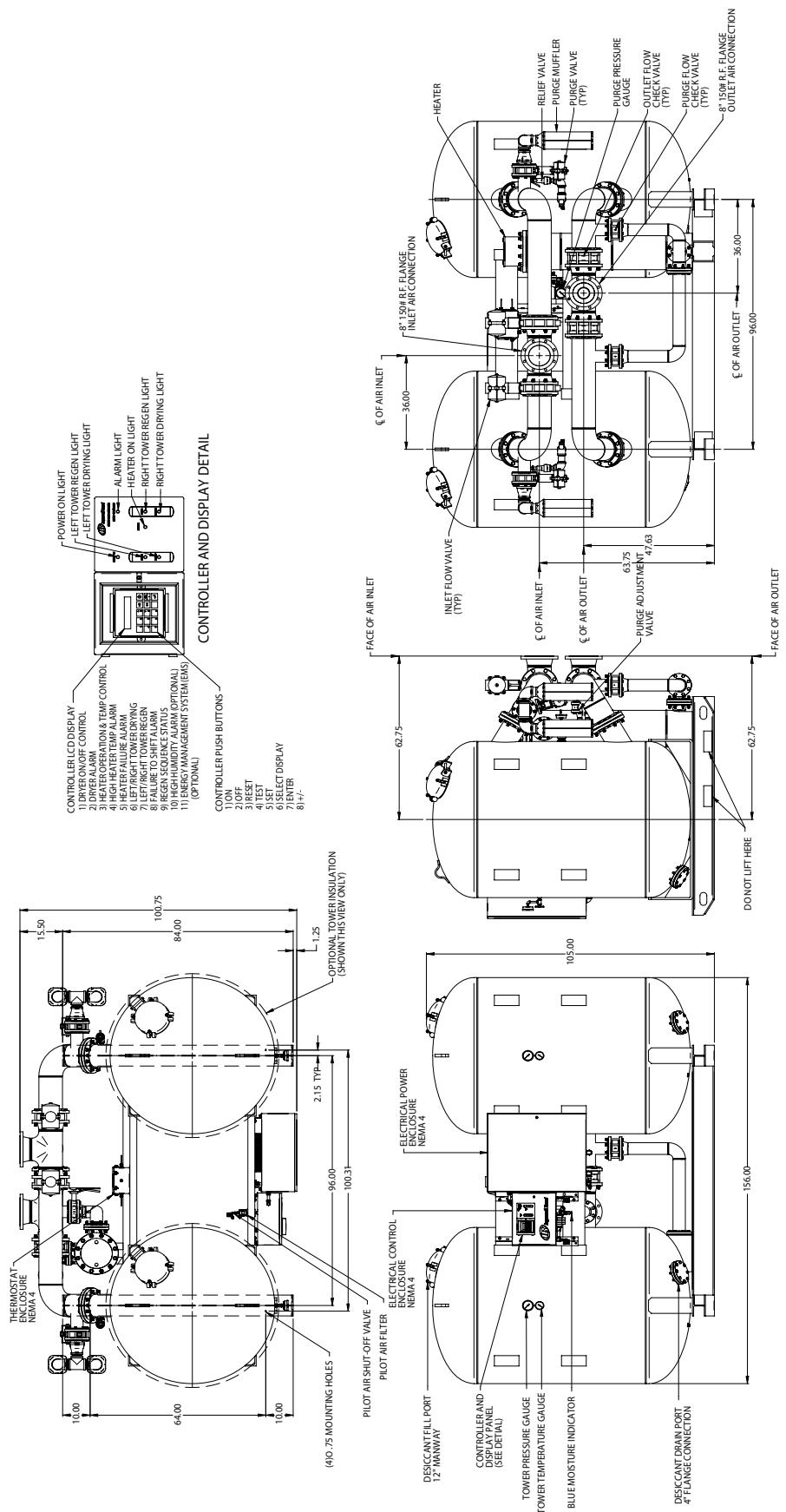


GENERAL ARRANGEMENT  
EH5000  
580158-C

## 13.0 GENERAL ARRANGEMENT

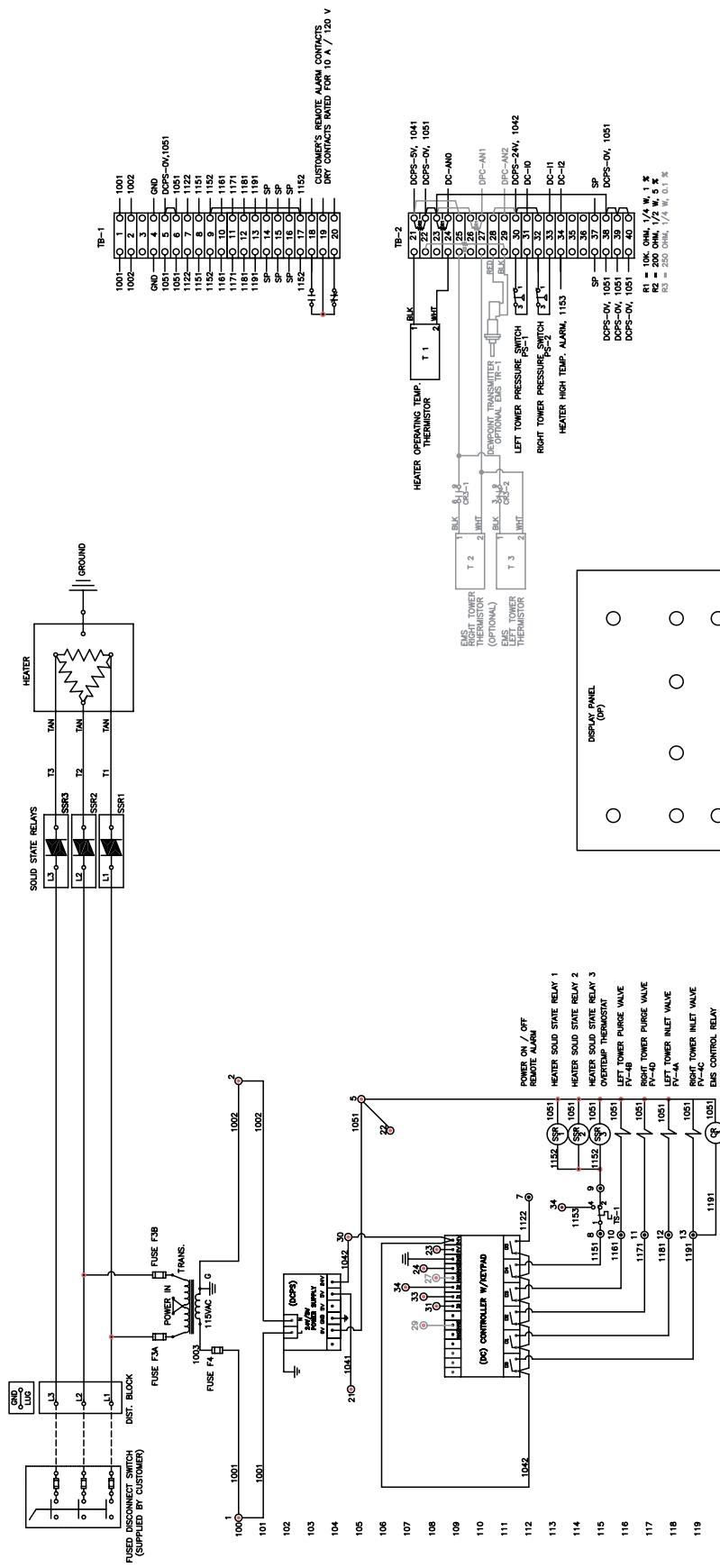


## **13.0 GENERAL ARRANGEMENT**

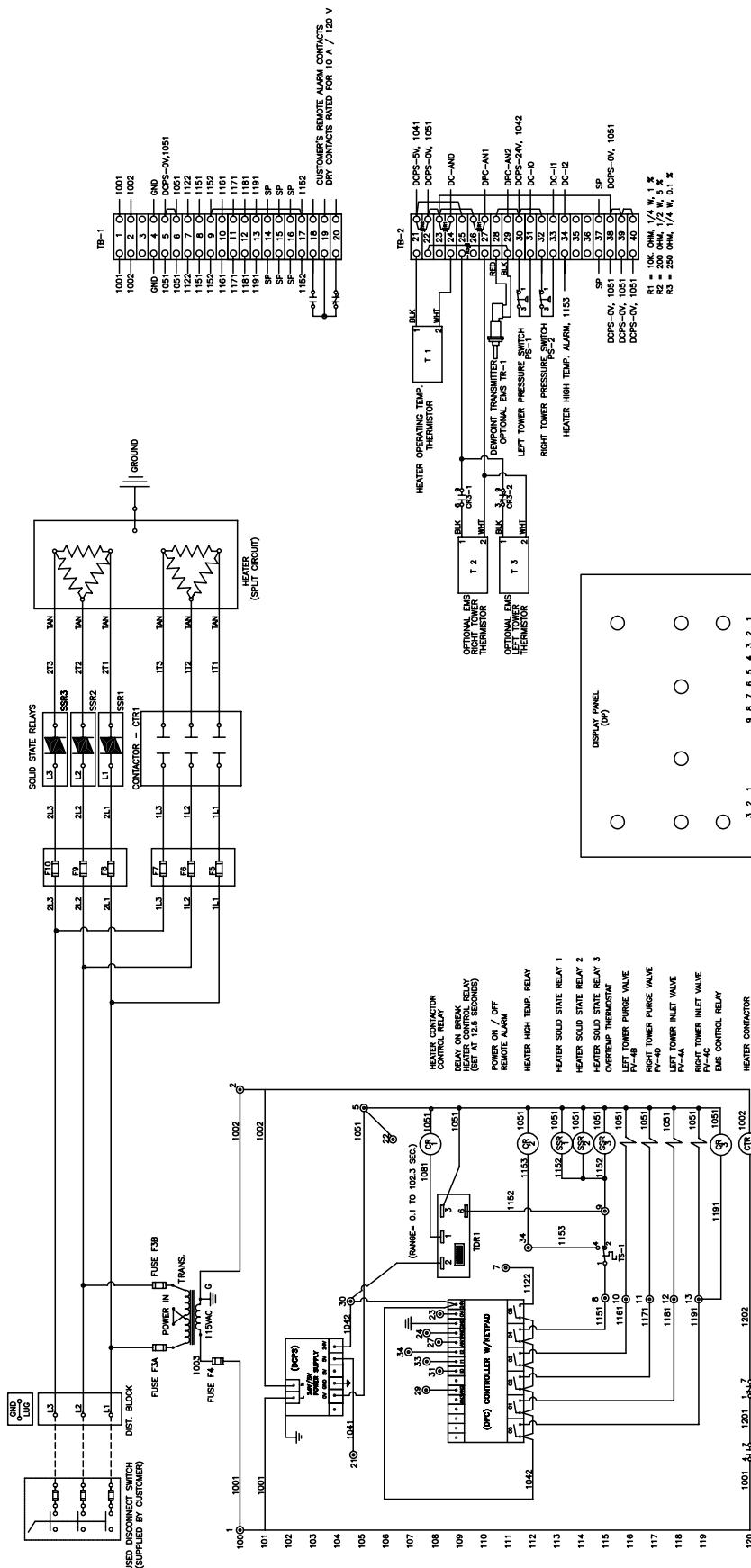


GENERAL ARRANGEMENT  
EH8000  
580461

## 14.0 WIRING DIAGRAM

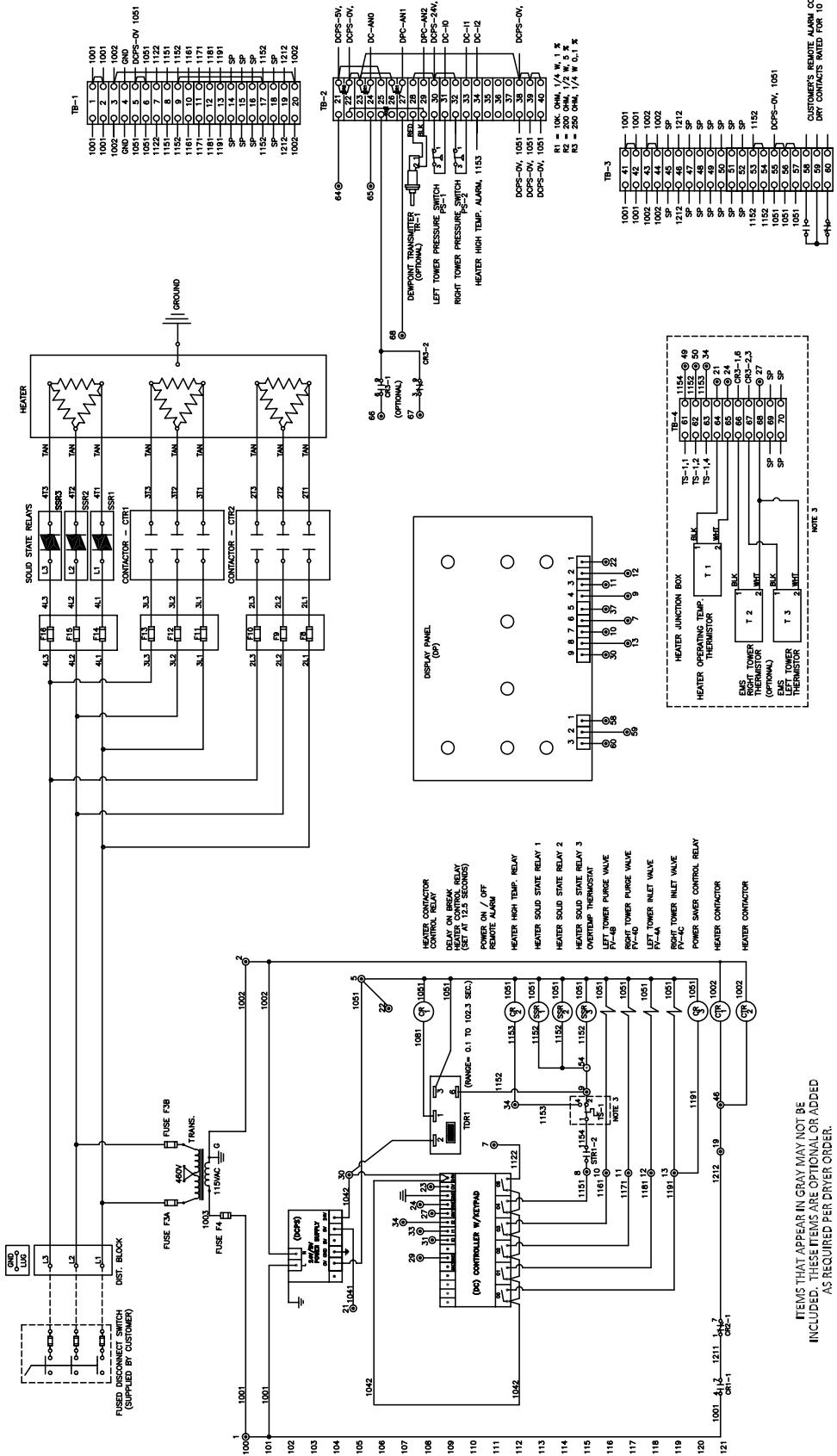


## 14.0 WIRING DIAGRAM



WIRING DIAGRAM  
EH1800-EH4000  
TM-580120-A

## **14.0 WIRING DIAGRAM**

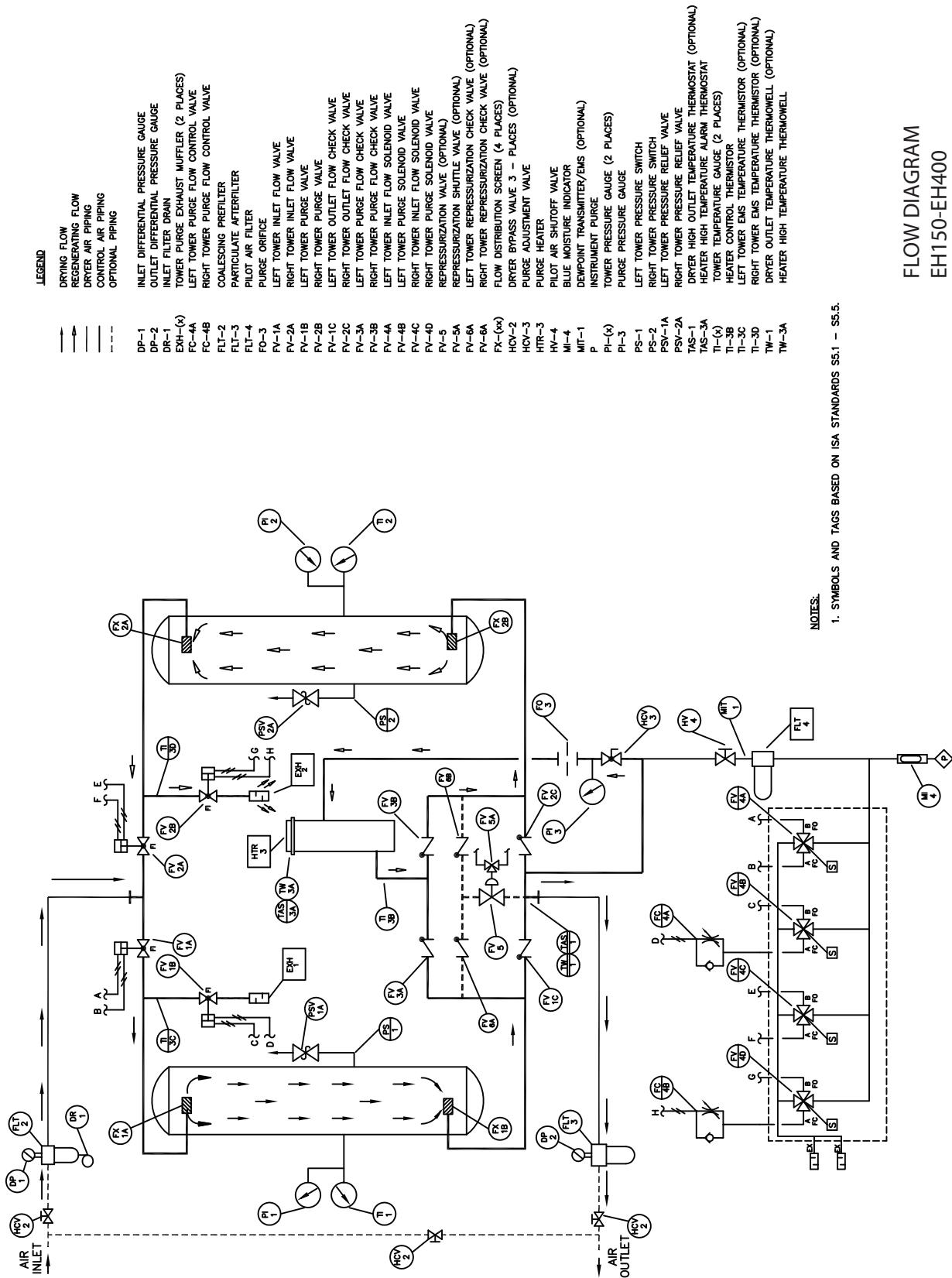


**ITEMS THAT APPEAR IN GRAY MAY NOT BE INCLUDED. THESE ITEMS ARE OPTIONAL OR ADDITIONAL AS REQUIRED PER DRYER ORDER.**

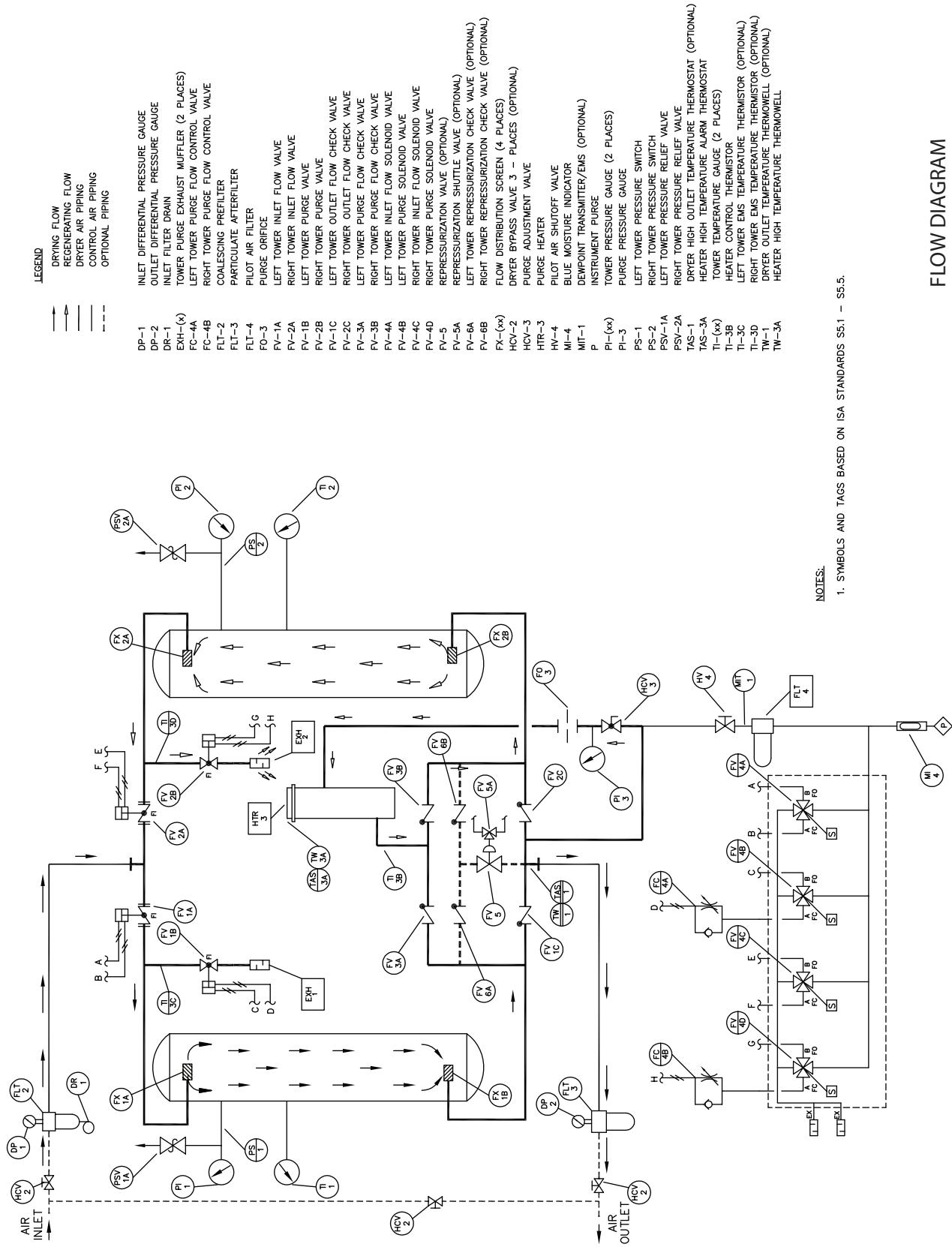
**Notes:**

WIBING DIAGRAM

## 15.0 FLOW DIAGRAM



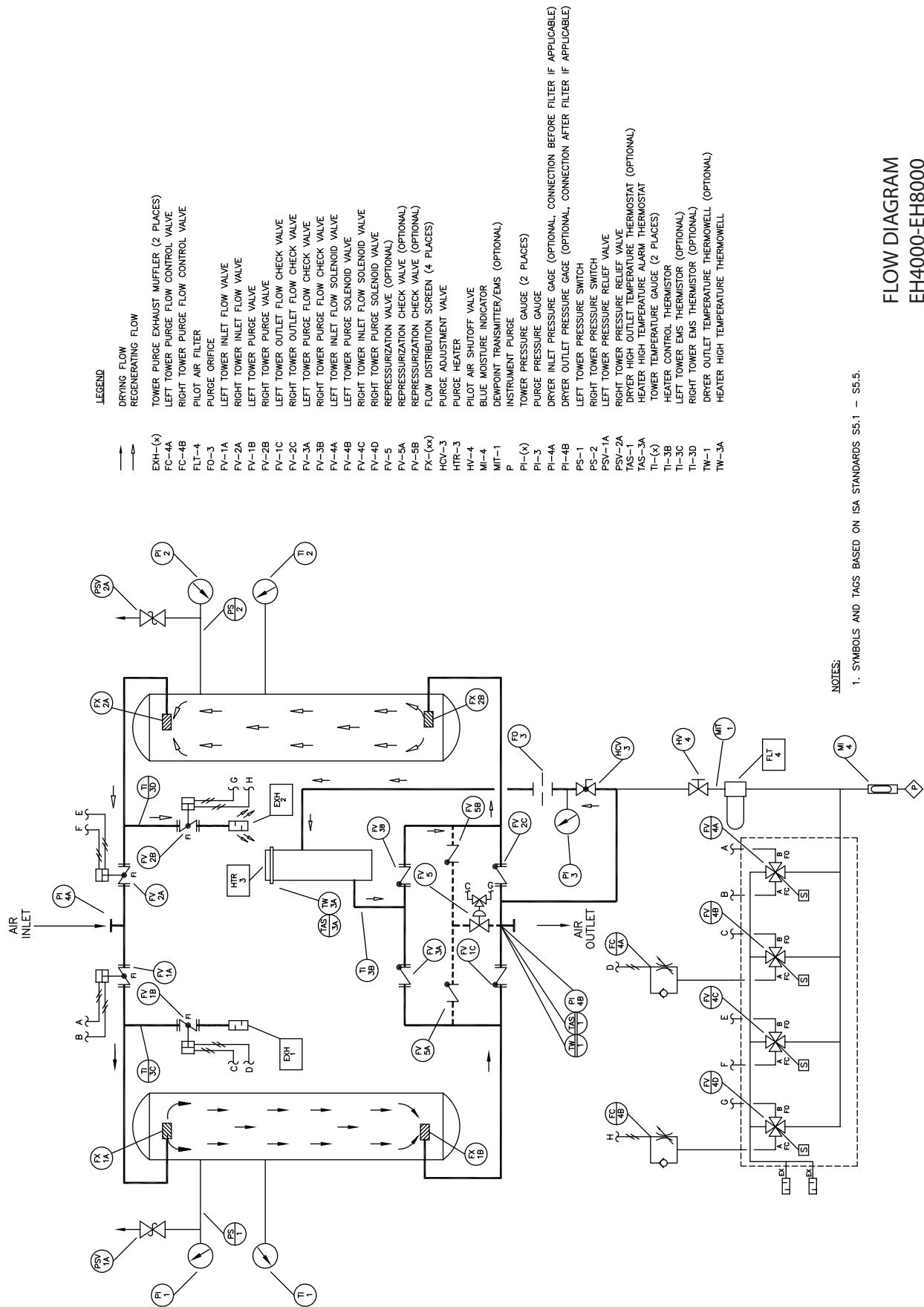
## **15.0 FLOW DIAGRAM**



NOTES:

FLOW DIAGRAM  
EH500-EH3000  
580042-D

## 15.0 FLOW DIAGRAM



## 16.0 REPLACEMENT PARTS

DESCRIPTION	EH150	EH200	EH250	EH300	EH400	QTY/	SPARES
	4H000A	4H000A	4H000A	4H000A	4H000A	UNIT	1 2 3
BLUE MOISTURE INDICATOR	705001-SP	705001-SP	705001-SP	705001-SP	705001-SP	1	
DESICCANT, 2-5mm GRADE D	NOTE 1	NOTE 1					
DESICCANT, 4-8mm GRADE D	NOTE 1	NOTE 1					
DESICCANT, MOLECULAR SIEVE	NOTE 1	NOTE 1					
DISPLAY BOARD, PANEL	633653	633653	633653	633653	633653	1	
DRYER CONTROLLER TYPE 4 WITH DESICCANT PROGRAM ( Dryer model and serial number must be provided with order to ensure proper configuration ).	800030	800030	800030	800030	800030	1	1 1 1
ELEMENT, POST-FILTER	23568942	38446290	38446290	38446290	38336365	1	1 1 1
ELEMENT, PRE-FILTER	23568926	23254758	23254758	38446308	38446316	1	1 1 1
FUSE, CONTROL PRIMARY, 0.5A 600V	699808	699808	699808	699808	699808	2	2 2 2
FUSE, CONTROL SECONDARY, 2A 250V	698396	698396	698396	698396	698396		
GAUGE, PURGE, 1 1/2" 0-160 PSI	633644	633644	633644	633644	633644	1	1
GAUGE, FILTER, DELTA-P DUAL FACE	633353	633353	633353	633353	633353	1	1
GAUGE, PRESSURE PURGE, 0-300 PSI	634278	634278	634278	634278	634278		
GAUGE, PRESSURE TOWER 0-300 PSI	631789	631789	631789	631789	631789	3	3
GAUGE, TEMPERATURE, TOWER	631787	631787	631787	631787	631787	2	2
HEATER	633625	632560	632560	632560	632037		
MUFFLER, PURGE	680454	680454	680454	680454	680711	2	2 2 2
MUFFLER, CONTROL AIR,	630524	630524	630524	630524	630524	1	1 1 1
OVERLAY, CONTROLLER	634087	634087	634087	634087	634087	1	
POWER SUPPLY, 5V/24VDC	633665-SP	633665-SP	633665-SP	633665-SP	633665-SP	1	1 1 1
PROBE, TEMPERATURE	633609	633609	633609	633609	633609	1	1 1 1
REGULATOR, CONTROL AIR	633607	633607	633607	633607	633607	1	
RELAY, SOLID STATE, HEATER CONTROL	634766	634766	634766	634766	634766	3	
RESISTOR, THERMISTOR, 10K OHM	683964	683964	683964	683964	683964	1	
RESISTOR, 5V LOAD, 200 OHM	683968	683968	683968	683968	683968	1	
RETAINER, DESICCANT SCREEN (UPPER MANIFOLD)	705604-SP	705180-SP	705180-SP	705180-SP	7255195-SP	4	
RETAINER, DESICCANT SCREEN (LOWER MANIFOLD)	705604-SP	705180-SP	705180-SP	705180-SP	7255195-SP	4	
SWITCH, LOW PRESSURE, FAIL TO SHIFT	600924	600924	600924	600924	600924	2	
THERMOSTAT, HEATER HITEMP SFTY	633601	633601	633601	633601	633601	1	
TRANSFORMER, CONTROL, 0.15KVA	600191	600191	600191	600191	600191	1	
TRANSMITTER, DEWPOINT (EMS OPTION)	633856	633856	633856	633856	633856	1	1 1 1
VALVE, PURGE ADJUSTMENT, HAND OP.	680029	680429	680429	680429	680430	1	
VALVE, INLET AIR OP.	632199	632200	632200	632200	632201	2	
VALVE, PURGE AIR OP.	632199	632199	632199	632199	632200	2	
VALVE, BALL, CONTROL AIR, 1/4"	681621	681621	681621	681621	681621	1	
VALVE, PURGE CHECK	633714	633731	633731	633731	633714	2	
VALVE, OUTLET FLOW CHECK	632790	632791	632791	632791	632792	2	
VALVE, SAFETY/RELIEF	630730	630730	630730	630730	630730	2	
VALVE, CONTROL AIR SOLENOID 4 WAY	633604	633604	633604	633604	633604	4	

NOTE 1: Refer to the Desiccant Fill Chart in the Maintenance section.

Spare. Quantities under this heading reflect the number of each item which we recommend be kept on hand for maintenance or repair.

The appropriate quantity for your application will depend on how critical interruptions in service are to your operation.

**Class    Quantity    Suggested for**

- |   |         |   |
|---|---------|---|
| 1 | Minimum | Domestic service where interruptions in service are acceptable.                         |
| 2 | Average | Domestic service where some interruptions in service are acceptable.                    |
| 3 | Maximum | Export service or for domestic service where interruptions in service are unacceptable. |

## 16.0 REPLACEMENT PARTS

DESCRIPTION	EH500	EH600	EH800	EH1000	EH1200	QTY/ UNIT	SPARES		
	4H000A	4H000A	4H000A	4H000A	4H000A		1	2	3
BLUE MOISTURE INDICATOR	705001-SP	705001-SP	705001-SP	705001-SP	705001-SP	1			
DESICCANT, 2-5mm GRADE D	NOTE 1	NOTE 1	NOTE 1	NOTE 1	NOTE 1	NOTE 1			
DESICCANT, 4-8mm GRADE D	NOTE 1	NOTE 1	NOTE 1	NOTE 1	NOTE 1	NOTE 1			
DESICCANT, MOLECULAR SIEVE	NOTE 1	NOTE 1	NOTE 1	NOTE 1	NOTE 1	NOTE 1			
DISPLAY BOARD, PANEL	633653	633653	633653	633653	633653	1	1	1	1
DRYER CONTROLLER TYPE 4 WITH DESICCANT PROGRAM ( Dryer model and serial number must be provided with order to ensure proper configuration ).	800030	800030	800030	800030	800030	1	1	1	1
ELEMENT, CONTROL FILTER	38446522	38446522	38446522	38446522	38446522	1	1	1	1
ELEMENT, POST-FILTER	38336365	38336373	38336373	38336373	38336381	1	1	1	1
ELEMENT, PRE-FILTER	38446316	38446324	38446324	38446324	38446332	1	1	1	1
FUSE, CONTROL PRIMARY, 0.5A 600V	699808	699808	699808	699808	699808	2	2	2	2
FUSE, CONTROL SECONDARY, 2A 250V	698396	698396	698396	698396	698396				
GAUGE, PURGE, 1 1/2" 0-160 PSI	633644	633644	633644	633644	633644	1			
GAUGE, FILTER, DELTA-P DUAL FACE	633353	633353	633353	633353	633353	1			
GAUGE, PRESSURE PURGE, 0-300 PSI	634278	634278	634278	634278	634278				
GAUGE, PRESSURE TOWER 0-300 PSI	631789	631789	631789	631789	631789	3			
GAUGE, TEMPERATURE, TOWER	631787	631787	631787	631787	631787	2			
HEATER	632037	632356	633689	633689	632044	1			
MUFFLER, PURGE	680455	680455	680455	680455	680455	2	2	2	2
MUFFLER, CONTROL AIR	630524	630524	630524	630524	630524	1	1	1	1
OVERLAY, CONTROLLER	634087	634087	634087	634087	634087	1			
POWER SUPPLY, 5V/24VDC	633665-SP	633665-SP	633665-SP	633665-SP	633665-SP	1	1	1	1
PROBE, TEMPERATURE	633609	633609	633609	633609	633609	1	1	1	1
REGULATOR, CONTROL AIR	633607	633607	633607	633607	633607	1			
RELAY, SOLID STATE, HEATER CONTROL	634766	634766	634766	634766	634766	3			
RESISTOR, THERMISTOR, 10K OHM	683964	683964	683964	683964	683964	1			
RESISTOR, 5V LOAD, 200 OHM	683968	683968	683968	683968	683968	1			
RETAINER, DESICCANT SCREEN (UPPER MANIFOLD)	725197-SP	725139-SP	725139-SP	725140-SP	725140-SP	4			
RETAINER, DESICCANT SCREEN (LOWER MANIFOLD)	7255195-SP	725139-SP	725139-SP	725140-SP	725140-SP	4			
SWITCH, LOW PRESSURE, FAIL TO SHIFT	600924	600924	600924	600924	600924	2			
THERMOSTAT, HEATER HITEMP SFTY	633601	633601	633601	633601	633601	1			
TRANSFORMER, CONTROL, 0.15KVA	600191	600191	600191	600191	600191	1			
TRANSMITTER, DEWPOINT (EMS OPTION)	633856	633856	633856	633856	633856	1	1	1	1
VALVE, PURGE ADJUSTMENT, HAND OP.	680430	680712	680712	632053	632053	1			
VALVE, INLET AIR OP.	632170	632170	632170	632170	632170	2			
VALVE, PURGE AIR OP.	632200	632200	632200	632200	632200	2			
VALVE, BALL, CONTROL AIR, 1/4"	681621	681621	681621	681621	681621	1			
VALVE, CHECK PURGE	633714	633708	633708	633708	633708	2			
VALVE, CHECK OUTLET FLOW	632792	632792	632794	632794	632794	2			
VALVE, SAFETY/RELIEF	630730	680896	680896	680896	680896	2			
VALVE, CONTROL AIR SOLENOID 4 WAY	633604	633604	633604	633604	633604	4			

NOTE 1: Refer to the Desiccant Fill Chart in the Maintenance section.

Spare. Quantities under this heading reflect the number of each item which we recommend be kept on hand for maintenance or repair.

The appropriate quantity for your application will depend on how critical interruptions in service are to your operation.

Class	Quantity	Suggested for
1	Minimum	Domestic service where interruptions in service are acceptable.
2	Average	Domestic service where some interruptions in service are acceptable.
3	Maximum	Export service or for domestic service where interruptions in service are unacceptable.

## 16.0 REPLACEMENT PARTS

DESCRIPTION	EH1500	EH1800	EH2100	EH3000	EH4000	QTY/ UNIT	SPARES		
	4H000A	4H000L	4H000L	4H000L	4H000L		1	2	3
BLUE MOISTURE INDICATOR	705001-SP	705001-SP	705001-SP	705001-SP	705001-SP	1			
CONTACTOR, HEATER	-	698343	698343	698343	698343	1			
DESICCANT, 2-5mm GRADE D	NOTE 1								
DESICCANT, 4-8mm GRADE D	NOTE 1								
DESICCANT, MOLECULAR SIEVE	NOTE 1								
DISPLAY BOARD, PANEL	633653	633653	633653	633653	633653	1			
DRYER CONTROLLER TYPE 4 WITH DESICCANT PROGRAM ( Dryer model and serial number must be provided with order to ensure proper configuration ).	800030	800030	800030	800030	800030	1	1	1	1
ELEMENT, CONTROL FILTER	38446522	38446522	38446522	38446522	38446522	1	1	1	1
ELEMENT, POST-FILTER	38336381	38336399	38336399	38336399	38336399	1/3/4 /5/7	1/3/4 /5/7	1/3/4 /5/7	1/3/4 /5/7
ELEMENT, PRE-FILTER	38446340	38446357	38446357	38446357	38446357	1/3/4 /5/7	1/3/4 /5/7	1/3/4 /5/7	1/3/4 /5/7
FUSE, CONTROL PRIMARY, 0.5 A 600V	699808	699808	699808	699808	699808	2	2	2	2
FUSE, CONTROL SECONDARY, 2A 250V	698396	698396	698396	698396	698396	1	1	1	1
GAUGE, PURGE, 1 1/2" 0-160 PSI	633644	633644	633644	633644	633644	1			
GAUGE, FILTER DELTA-P DUAL FACE	633353	633353	633353	633353	633353	2			
GAUGE, PRESSURE PURGE, 0-300 PSI	634278	634278	634278	634278	634278	1			
GAUGE, PRESSURE TOWER 0-300 PSI	631789	631789	631789	631789	631789	2			
GAUGE, TEMPERATURE, TOWER	631787	631787	631787	631787	631787	2			
HEATER	632044	632362	632362	632362	632362	633663	1		
MUFFLER, CONTROL AIR, 1/4"	630524	630524	630524	630524	630524	1	1	1	1
MUFFLER, PURGE	680455	680455	680455	680455	680455	633766	2	2	2
OVERLAY	634087	634087	634087	634087	634087	634087	1		
POWER SUPPLY, 5V/24VDC	633665-SP	633665-SP	633665-SP	633665-SP	633665-SP	1			
PROBE, TEMPERATURE	633609	633609	633609	633609	633609	633609	1		
REGULATOR, CONTROL AIR	633607	633607	633607	633607	633607	633607	1		
RELAY, SOLID STATE, HEATER CONTROL	634765	634764	634764	634764	634764	634764	3		
RESISTOR, THERMISTOR, 10K OHM	683964	683964	683964	683964	683964	683964	1		
RESISTOR, 5V LOAD, 200 OHM	683968	683968	683968	683968	683968	683968	1		
RETAINER, DESICCANT SCREEN ASSEMBLY	725269-SP	725269-SP	725269-SP	725151-SP	725270-SP	4			
SWITCH, LOW PRESSURE, FAIL TO SHIFT	600924	600924	600924	600924	600924	2			
THERMOSTAT, HEATER HITEMP SAFETY	633601	633601	633601	633601	633601	1			
TRANSFORMER, CONTROL, 0.15KVA	600191	600191	600191	600191	600191	1			
TRANSMITTER, DEWPOINT (EMS OPTION)	633856	633856	633856	633856	633856	1	1	1	1
VALVE, PURGE ADJUSTMENT, HAND OP.	632053	632053	632053	680466	680466	1			
VALVE, INLET AIR OP.	632170	632171	632171	632171	632172	2			
VALVE, PURGE AIR OP.	632200	632201	632201	632201	632170	2			
VALVE, BALL, CONTROL AIR, 1/4"	681621	681621	681621	681621	681621	1			
VALVE, CHECK PURGE	633708	633713	633713	633713	633713	2			
VALVE, CHECK OUTLET FLOW	632794	632794	633364	633364	633364	2			
VALVE, SAFETY/RELIEF	AD1415	AD1415	AD1415	AD1415	AD1415	2			
VALVE, CONTROL AIR SOLENOID 4 WAY	633604	633604	633604	633604	633604	4			

NOTE 1: Refer to the Desiccant Fill Chart in the Maintenance section.

**Spare.** Quantities under this heading reflect the number of each item which we recommend be kept on hand for maintenance or repair.

The appropriate quantity for your application will depend on how critical interruptions in service are to your operation.

Class	Quantity	Suggested for
-------	----------	---------------

- |   |         |   |
|---|---------|---|
| 1 | Minimum | Domestic service where interruptions in service are acceptable.                         |
| 2 | Average | Domestic service where some interruptions in service are acceptable.                    |
| 3 | Maximum | Export service or for domestic service where interruptions in service are unacceptable. |

## 16.0 REPLACEMENT PARTS

DESCRIPTION	EH5000	EH6000	EH8000	QTY/	SPARES		
	4H000L	4H000L	4H000L	UNIT	1	2	3
BLUE MOISTURE INDICATOR	705001-SP	705001-SP	705001-SP	1			
CONTACTOR, HEATER	633663	633663	633663	2			
DESIICCANT, 2-5mm GRADE D	NOTE 1	NOTE 1	NOTE 1	NOTE 1			
DESIICCANT, 4-8mm GRADE D	NOTE 1	NOTE 1	NOTE 1	NOTE 1			
DESIICCANT, MOLECULAR SIEVE	NOTE 1	NOTE 1	NOTE 1	NOTE 1			
DISPLAY BOARD, PANEL	633653	633653	633653	1			
DRYER CONTROLLER TYPE 4 WITH DESICCANT PROGRAM ( Dryer model and serial number must be provided with order to ensure proper configuration ).	800030	800030	800030	1	1	1	1
ELEMENT, CONTROL FILTER	38446522	38446522	38446522	1			
ELEMENT, POST-FILTER	38336399	38336399	38336399	10/10 /2015	10/10 /2015	10/10 /2015	10/10 /2015
ELEMENT, PRE-FILTER	38446357	38446357	38446357	10/10 /2015	10/10 /2015	10/10 /2015	10/10 /2015
FUSE, CONTROL PRIMARY, 0.5 A 600V	699808	699808	699808	2	2	2	4
FUSE, CONTROL SECONDARY, 2A 250V	698396	698396	698396	1	1	1	1
GAUGE, PURGE, 1 1/2" 0-160 PSI	633644	633644	633644	1			
GAUGE, FILTER DELTA-P DUAL FACE	633353	633353	633353	2			
GAUGE, PRESSURE PURGE, 0-300 PSI	634278	634278	634278	1			
GAUGE, PRESSURE TOWER 0-300 PSI	631824	631824	631824	2			
GAUGE, TEMPERATURE, TOWER	631787	631787	631787	2			
HEATER	633791	633695	632918	1			
MUFFLER, CONTROL AIR, 1/4"	630524	630524	630524	1	1	1	1
MUFFLER, PURGE	633766	633766	633766	2	2	2	2
OVERLAY	634087	634087	634087				
POWER SUPPLY, 5V/24VDC	633665-SP	633665-SP	633665-SP	1	1	1	1
PROBE, TEMPERATURE	633609	633609	633609	1	1	1	1
REGULATOR, CONTROL AIR	633607	633607	633607	1			
RELAY, SOLID STATE, HEATER CONTROL	634764	634764	634764	3			
RESISTOR, THERMISTOR, 10K OHM	683964	683964	683964	1			
RESISTOR, 5V LOAD, 200 OHM	683968	683968	683968	1			
RETAINER, DESICCANT SCREEN ASSEMBLY	725291-SP	725292-SP	725292-SP	4			
SWITCH, LOW PRESSURE, FAIL TO SHIFT	600924	600924	600924	2			
THERMOSTAT, HEATER HITEMP SAFETY	633601	633601	633601	1			
TRANSFORMER, CONTROL, 0.15KVA	600191	600191	600191	1			
TRANSMITTER, DEWPOINT (EMS OPTION)	633856	633856	633856	1			
VALVE, PURGE ADJUSTMENT, HAND OP.	699817	699817	632171	1			
VALVE, INLET AIR OP.	632172	632172	632917	2			
VALVE, PURGE AIR OP.	632170	632170	681571	2			
VALVE, BALL, CONTROL AIR, 1/4"	681621	681621	681621	1			
VALVE, CHECK PURGE	633723	633723	633767	2			
VALVE, CHECK OUTLET FLOW	633365	633365	631951	2			
VALVE, SAFETY/RELIEF	AD1420	AD1420	AD1420	2			
VALVE, CONTROL AIR SOLENOID 4 WAY	633604	633604	633604	1			

## 16.0 REPLACEMENT PARTS

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### VALVE REBUILD KITS

DESCRIPTION	VALVE W/ACT	VALVE ONLY	VALVE REPAIR KIT	ACTUATOR	ACTUATOR KIT
VAL ACT BALL 1"	632199	633835	632893	631940	633836
VAL ACT BALL 1 1/2"	632200	632676	632684	632985	632686
VAL ACT BALL 2"	632201	632852	633554	632985	632686
VAL BTFLY 3"W/ACTUATOR	632170	633831	632685	632985	632686
VAL BTFLY 4"W/ACTUATOR	632171	633832	683385	633497	633496
VAL BTFLY 6"W/ACTUATOR	632172	633833	633834	633578	633579
VAL BTFLY 8"W/ACTUATOR	632917	633828	633827	633826	633825

## 17.0 ENGINEERING SPECIFICATIONS

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MODEL	Flow -40 Dewpoint SCFM	Heater KW)	MCA (amps)	MOP (amps)	Purge SCFM	Air In & Out Connection	Shipping Weight lbs (kg)
EH150	150	2	3.5	5	10.5	1	758(344)
EH200	200	3	5.1	6	14	1 1/2	913(414)
EH250	250	3	5.1	6	17.5	1 1/2	1119(508)
EH300	300	3	5.1	6	21	1 1/2	1191(540)
EH400	400	4.5	7.5	8	28	2	1539(698)
EH500	500	4.5	7.5	8	35	2	1707(774)
EH600	600	6	9.8	10	42	3	2369(1075)
EH800	800	9	11.6	12	56	3	2681(1216)
EH1000	1000	9	11.6	12	70	3	3043(1380)
EH1200	1200	12	15.4	17.5	84	3	3285(1490)
EH1500	1500	15	23.9	25	105	3	4480(2032)
EH1800	1800	18	28.6	30	126	4	4956(2248)
EH2100	2100	18	28.6	30	147	4	5350(2427)
EH3000	3000	30	47.5	50	210	4	7750(3515)
EH4000	4000	36	54.4	60	280	6	10950(4967)
EH5000	5000	50	78.7	80	350	6	13248(6009)
EH6000	6000	60	90.5	100	420	6	15696(7120)
EH8000	8000	75	113.1	120	560	8	17910(8125)

Note: All above dryers rated at 150 psig, 120 ° F max. inlet temperature. Capacity basis 100 psig, 100 ° F inlet.

### A NOTICE

Specification information above accurate at time of publication. Refer to equipment serial label for actual specifications for units.



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