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General Air Division

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GH HEATERLESS DRYER INSTRUCTION MANUAL

CONTENTS

SAFETY PRECAUTION:

Carefully read this instruction manual before attempting to operate this dryer.

1.0 DATA SHEET

Dryer Model No.

□ GH-10	□ GH-60	□ GH-200	□ GH-500
□ GH-15	□ GH-75	□ GH-250	□ GH-600
□ GH-25	□ GH-100	□ GH-300	□ GH-800
□ GH-40	□ GH-135	□ GH-400	□ GH-1000

Dryer Serial No. _____

Operating Conditions: Inlet Flow _____ SCFM @ _____ PSIG (_____°F)

Standard Features

- 150 PSIG Design Pressure
- NEMA 4 Electrical Controls
- 115 V/1 PH/50-60 Hz Voltage
- -40°F Pressure Dewpoint
- Enamel Paint – Medium Blue

Controller/Alarm Indicators

□ Control Display/Cycle Failure (STD.)
□ High Humidity
□ Cycle Demand
□ High Humidity & Cycle Demand

Notes

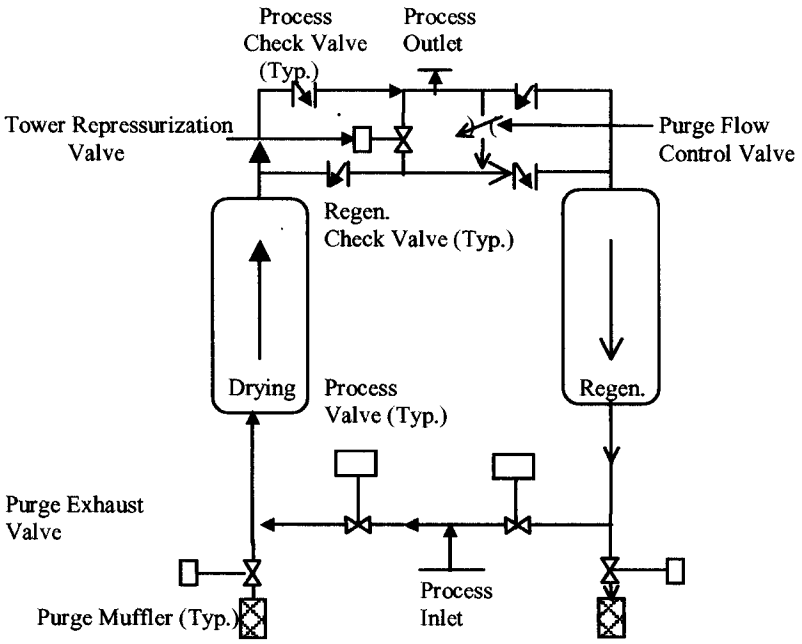
Filter Bypass

□ None
□ Filter(s) only
□ 3-valve

2.0 OPERATION

2.1 Basic Principle – Pressure swing dryers take advantage of the natural tendency of desiccant to establish equilibrium with its surroundings. During the drying cycle, the desiccant adsorbs moisture from the incoming saturated process stream. During the regeneration cycle, a small portion of the dry product is passed through the desiccant picking up and removing the adsorbed moisture.

2.2 Flow Diagram –Typical Flow Diagram illustrated below.



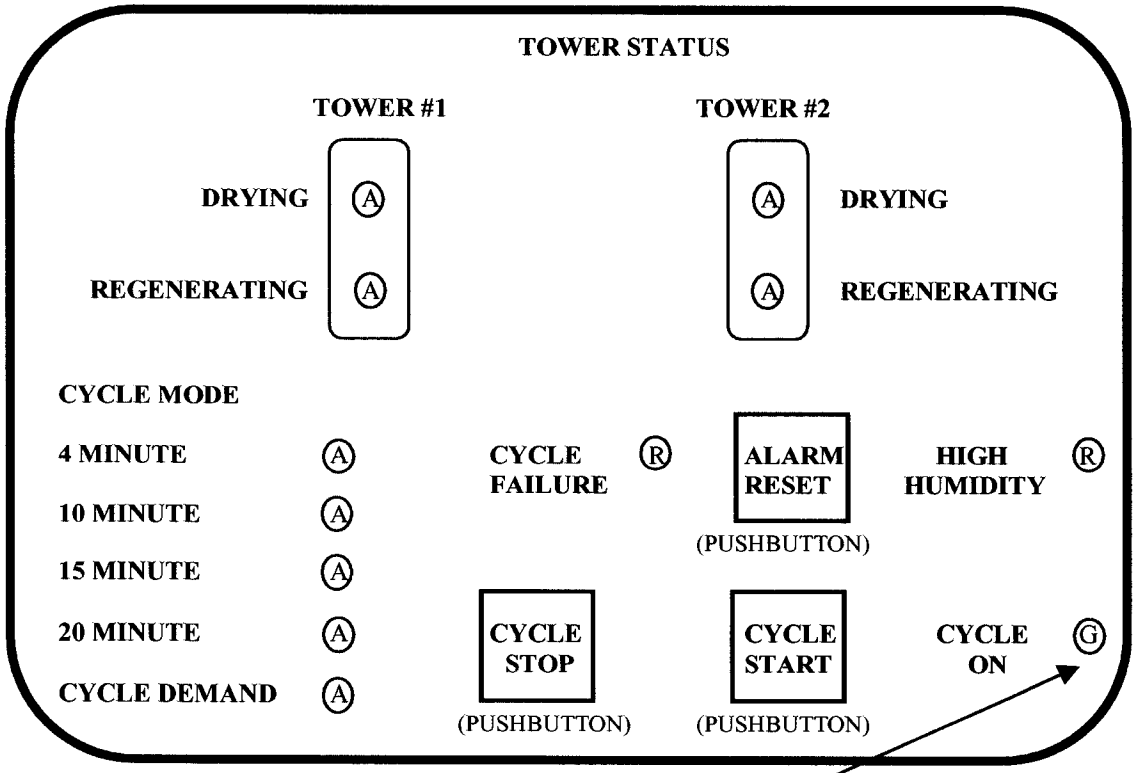
2.3 Flow Process

1. Saturated gas enters the dryer.
2. Saturated gas passes through the on-stream tower allowing desiccant to adsorb moisture.
3. Clean dry gas exits the dryer.
4. Small portion of clean, dry gas is drawn off through purge flow control valve.
5. Purge gas passes through the regenerating tower reactivating the desiccant.
6. Moisture laden gas vents to atmosphere through a purge muffler.
7. Towers repressurizes and switch over.

3.0 CONTROLS

3.1 External Electric Controls - Indicators and pushbuttons are illustrated and defined as follows:

- **Dryer Control Cycle Start/Stop Pushbuttons:** Controls dryer cycle operation.
- **Cycle On Indicator:** Indicates that dryer cycle is operating.
- **Tower Drying/Regenerating Indicators:** Indicate status of each vessel.
- **Cycle Failure Indicator:** Indicates failure mode of dryer controls/components.
- **High Humidity Indicator:** Indicates failure mode of dryer outlet dewpoint.
- **Alarm Reset Pushbutton:** Enables continuation of dryer cycle when failure is corrected.
- **Cycle Mode Indicators:** Indicate timed cycle function.



ENCLOSURE PANEL LAYOUT

TOWER STATUS LED LEGEND:

A: Amber
R: Red
G: Green

3.2 Controller

***** IMPORTANT *****

CAUTION: Must be used when servicing the controller circuitry.

The controller electronically directs the timing sequence for the control functions of the unit. The controller signals the pilot air solenoids which in turn causes tower reversal. Prior to tower switchover, the controller signals the purge exhaust valve to close and the tower repressurization valve to open in order to bring the regenerating tower to line pressure. Once the tower is repressurized, the controller signals the tower repressurization valve to close and the pilot air solenoid to switch towers. After switchover, the controller signals the purge exhaust valve to open allowing controlled tower depressurization.

In addition, the controller monitors for cycle failure via a pressure switch for each tower. If any valve fails to switch (thus allowing the wrong tower to remain on line), the cycle failure indicator lights. If the depressurization valve fails to open (thus not allowing the regenerating tower to depressurize/purge), the cycle failure indicator lights. The indicator will remain lit until the cycle failure reset button is pushed.

Important: The controller timing sequence and output signals continue to function even though the cycle failure indicator is lit.

Terminal Layout: The terminal strip connections on the controller are as follow:

Terminal No.	Function
G	Supply power to controller
L1	
L2	
3	Powers Tower #1 On-stream and Cycle Demand solenoid valves
4	
5	Powers Tower #2 On-stream and Cycle Demand solenoid valves.
6	
7	Powers Tower #1 purge exhaust solenoid valve.
8	
9	Powers Tower #2 purge exhaust solenoid valve.
10	
11	Powers repressurization solenoid valve.
12	
13	Powers Tower #1 pressure switch
14	
15	Powers Tower #2 pressure switch
16	
17	Remote contact for common alarm
18	
19	

ON BOARD SWITCH DESCRIPTIONS

SWITCH 1: Disables the Cycle Failure alarm. OFF = DISABLED; ON = ENABLED

SWITCH 2: Disables the Cycle Demand/Energy Saver. OFF = DISABLED; ON = ENABLED

SWITCHES 3 and 4: Selects the Cycle Timing Mode as shown in the table below.

CYCLE MODE	SWITCH 3	SWITCH 4
20 MINUTE	OFF	OFF
15 MINUTE	OFF	ON
10 MINUTE	ON	OFF
4 MINUTE	ON	ON

3.3 Sequence of Operation Chart (Cycle Timing)

Tower #1		**Depress/Regen**	**Repress**	**On Stream**			
Tower #2	**On Stream**				**Depress/Regen**	**Repress**	
4 min Cycle Mode	0 min 5 sec	1 min* 0 sec	1 min 30 sec	2 min 2 min 5 sec	3 min* 0 sec	3 min 30 sec	4 min
10 min Cycle Mode	0 min 5 sec	1 min* 0 sec	4 min 30 sec	5 min 5 min 5 sec	6 min* 0 sec	9 min 30 sec	10 min
15 min Cycle Mode	0 min 5 sec	1 min* 0 sec	4 min 30 sec	7 min 7 min 30 sec 35 sec	8 min 30 sec	12 min 0 sec	15 min
20 min Cycle Mode	0 min 5 sec	1 min* 0 sec	4 min 30 sec	10 min 10 min 5 sec	11 min 0 sec	14 min 30 sec	20 min

- *As applicable to the cycle failure alarm indicator, the controller monitors the pressure switches for both towers (PS-1: Tower #1, PS-2: Tower #2) at the time span/interval indicated.*

4.0 DRYER FEATURES

Non-lubricated Switching Valves –Utilize non-lubricated valves with integral actuators controlled by solenoids. Valve contains seals which can be replaced without disconnecting piping.

Removable Stainless Steel Screens– Retain desiccant and disperse air flow to prevent channeling.

Separate Drain & Fill Ports – Permit desiccant removal/replacement without disconnecting piping.

Solid State Controller – Controls transfer valves and solenoids.

Soft Seated Check Valves – Provide reliable long-term operation.

Pilot Air Filter – Protects pneumatic devices.

Pressure Gauges – Indicate individual tower pressure.

Pressure Relief Valves – Protect dryer system from over-pressurization.

Purge Muffler – Reduces noise level output from the dryer.

Adjustable Purge – Utilizes a regulating device to monitor purge flow rate.

NEMA 4 Electricals – Used in locations where standard service conditions exist.

Activated Alumina Desiccant – Removes moisture from compressed, saturated air.

Tower Repressurization – Ensures full repressurization prior to tower switchover.

Pilot Air Fittings and Tubing – Components designed for standard conditions.

Tower Status Lights – Indicate individual tower status.

Cycle Failure Indicator – Utilizes pressure switches to monitor dryer operation.

Filter Bypass Piping (Optional) – Valved or non-valved system consisting of a coalescing filter to protect the desiccant from oil contamination and a particulate filter to protect downstream components from desiccant dust fines. Valving provides ease of service without interruption of process.

High Humidity Alarm (Optional) – The High Humidity alarm uses a lithium chloride sensor to measure the moisture content of the outlet gas from the dryer. Flow across the sensor must be maintained for proper operation.

Cycle Demand/Energy Saver (Optional) – The Cycle Demand/Energy Saver option optimizes energy usage during periods of low inlet moisture content. A process sample is continuously taken from the On Stream tower and is monitored by a lithium chloride sensor. The sensor sends a signal to the Cycle Demand/Energy Saver Board which overrides the timing of the Dryer Controller if the set point has not been reached at the end of the normal On Stream cycle. The tower remains On Stream while the regenerated tower is on standby. When the set point is reached, the towers switch. Flow across the sensor must be maintained for proper operation.

5.0 INSTALLATION

The dryer is completely piped, desiccant filled and ready for installation. Inlet and outlet ports are tagged for identification and plugged to prevent moisture pick-up during transit.

- Mount it vertically, level and free from any transmitted vibrations
- Allow adequate clearance around the dryer for maintenance and service
- Install the dryer downstream from the aftercooler on rotary type compressor systems or downstream from the receiver tank on piston type compressor systems*
- Install a coalescing prefilter and a particulate afterfilter if not supplied
- Tighten all pipe and tube connections which may have loosened in transit
- Install bypass piping and valves to allow service without interruption of process flow
- Connect electrical i/a/w dryer nameplate and applicable national/local codes
- Make sure inlet gas is within design conditions
- Connect process piping to the proper ports.

Note: Dryer warranty may be void if filters are not properly installed and maintained.

Caution: Dryer piping is self-supporting and must not be used to support additional piping or equipment.

***Installation Note:** Dryers equipped without a purge flow meter must be installed downstream of a receiver tank if the compressor cycles are on and off.

6.0 INITIAL START-UP

Step Number	Action
1	**Note: Prior to initial start-up, review this manual in its entirety.** Switch the main power disconnect to the "OFF" position. Isolate power to dryer controls.
2	Connect outlet valving/piping. Close the outlet valve.
3	Connect inlet valving/piping. Partially open the inlet valve and allow both towers to equalize to line pressure. Completely open the inlet valve once towers are fully pressurized.
4	Switch the main power disconnect to the "ON" position.
5	Push Cycle Start Pushbutton. **Result:** One tower depressurizes and purges while the other tower remains at line pressure. The purge exhaust valve closes after completion of the on-stream cycle, thereby allowing the tower to repressurize to line pressure. The process valve switches and the opposite tower depressurizes and purges.
6	Observe unit cycling and operation. Check flow indicator for proper adjustment. Reference the Troubleshooting Guide for operation problems.
7	Permit the unit to cycle (with the outlet valve closed) for a minimum of 24 hours (-40°F PDP) or 48 hours (-100°F PDP) to dry and condition the desiccant beds.
8	Slowly open the outlet valve placing the dryer in service.

7.0 OPERATING MAINTENANCE

Daily	Observe unit's cyclic function. Monitor alarms and if indicated, consult the Troubleshooting Guide.
Weekly	Check condition of coalescing filter element(s). If pressure drop is 10 PSID or greater, replace the element(s). **Note:** Since oil coats the desiccant and cannot be driven off by regeneration, proper maintenance of coalescing filter is essential for dryer performance.
	Check condition of particulate filter element(s). If pressure drop is 10 PSID or greater, replace the element(s). **Note:** Excessive desiccant dust in the particulate filter element(s), other than after initial start-up, indicates overloading or malfunction.
	Observe back pressure on purging/regenerating tower. Back pressure of 5 PSIG or greater indicates purge muffler clogging or purge exhaust valve malfunction.
	Check purge flow indicator for proper setting.
Semi-Annually	Check dryer outlet dewpoint.
	Inspect pilot air filter; clean, replace if necessary.
	Inspect depressurization muffler; clean, replace if necessary.
Annually	Inspect all valves and pressure switches; clean, replace if necessary.
	Inspect desiccant; discoloration, contaminant and/or steady declining performance are indications that desiccant replacement is needed. When replacing desiccant, remove and clean vessel screens.

8.0 FACTORY SERVICE

Dryer problems will be indicated by either dryer malfunction light(s) or by poor outlet performance. Be familiar with the dryer features and serial number prior to using the Troubleshooting Instructions.

When Factory Technical or Field Service is required, please contact:

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9.0 TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
Poor dewpoint or moisture downstream of unit	1. Overloaded inlet conditions.	1. Correct conditions (i.e. pressure, flow, temp.) to within design limits.
	2. Purge flow control valve misadjusted or plugged.	2. Clean and/or reset flow indicator in accordance with charts.
	3. Purge exhaust valve inoperative.	3. Check control outputs and valves. Clean or repair.
	4. Purge muffler clogged.	4. Clean or replace.
	5. Check valve inoperative.	5. Locate and clean, repair or replace.
	6. Excessive water.	6. Check upstream separator, prefilter and drains.
	7. Desiccant contamination.	7. Replace desiccant and filter element (s).
Cycle malfunction	1. 4-way valve improperly positioned.	1. Check for proper operation of valve actuator, pilot air line leak, inoperative pilot air solenoid, or plugged pilot air filter.
	2. Purge flow control valve misadjusted or plugged.	2. Clean and/or reset flow indicator in accordance with charts.
	3. Purge exhaust valve inoperative.	3. Check control outputs and valves. Clean or repair.
	4. Tower repress. valve inoperative.	4. Check control outputs and valves. Clean or repair.
	5. Check valve inoperative.	5. Locate and clean, repair or replace.
Excessive desiccant dust downstream of unit	1. Overloaded inlet conditions.	1. Correct conditions (i.e. pressure, flow, temperature) to within design limits.
	2. Purge flow control valve misadjusted or plugged.	2. Clean and/or reset flow indicator in accordance with charts.
	3. Purge exhaust valve inoperative.	3. Check control outputs and solenoid valves. Clean or repair.
	4. Purge muffler clogged.	4. Clean or replace.
	5. Check valve inoperative.	5. Locate and clean, repair or replace.
No flow or reduced flow thru unit	1. 4-way valve improperly positioned.	1. Check for proper operation of valve actuator, pilot air line leak, inoperative pilot air solenoid, or plugged pilot air filter. Clean, repair or replace.
	2. Plugged afterfilter.	2. Replace filter element(s).
	3. Check valve inoperative.	3. Locate and clean, repair or replace.
	4. Overloaded inlet conditions.	4. Correct conditions (i.e. pressure, flow temp) to within design limits.
No purge flow or reduced purge flow	1. Purge muffler clogged.	1. Clean or replace.
	2. Purge flow control valve misadjusted or plugged.	2. Clean and/or reset flow indicator in accordance with charts.
	3. Purge exhaust valve inoperative.	3. Check control outputs and valves. Clean or repair.
Excessive pressure drop across unit	1. Overloaded inlet conditions.	1. Correct conditions (i.e. pressure, flow, temperature) to within design limits.
	2. 4-way valve improperly positioned.	2. Check for proper operation of valve actuator, pilot air line leak, inoperative pilot air solenoid, or plugged pilot air filter. Clean, repair or replace.
	3. Check valve inoperative.	3. Locate and clean, repair or replace.
	4. Plugged afterfilter.	4. Replace filter element(s).