

## HCT, HCL, HCS SERIES

Pressure-Swing Desiccant Type Compressed Air Dryers with AccuShift™ Switching Valves

FORM NO.: 7465156 REVISION: 03/2019

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.

MODELS			RATED FLOW	REFER AS MODELS
HCT SERIES	HCL SERIES	HCS SERIES		
HCT-40	HCL-40	HCS-40	40 SCFM	40
HCT-60	HCL-60	HCS-60	60 SCFM	60
HCT-90	HCL-90	HCS-90	90 SCFM	90
HCT-115	HCL-115	HCS-115	115 SCFM	115
HCT-165	HCL-165	HCS-165	165 SCFM	165
HCT-260	HCL-260	HCS-260	260 SCFM	260
HCT-370	HCL-370	HCS-370	370 SCFM	370
HCT-450	HCL-450	HCS-450	450 SCFM	450
HCT-590	HCL-590	HCS-590	590 SCFM	590
HCT-750	HCL-750	HCS-750	750 SCFM	750
HCT-930	HCL-930	HCS-930	930 SCFM	930
HCT-1130	HCL-1130	HCS-1130	1130 SCFM	1130
HCT-1350	HCL-1350	HCS-1350	1350 SCFM	1350
HCT-1550	HCL-1550	HCS-1550	1550 SCFM	1550
HCT-2100	HCL-2100	HCS-2100	2100 SCFM	2100
HCT-3000 NA	HCL-4100	HCS-3000	3000 SCFM	3000
NA	HCL-5400	HCS-4100	4100 SCFM	4100
		HCS-5400	5400 SCFM	5400



## Contents

1.0	GENERAL SAFETY INFORMATION.....	1
2.0	RECEIVING, MOVING, UNPACKING .....	1
3.0	DESCRIPTION .....	2
4.0	INSTALLATION.....	7
5.0	CONTROLLERS – GENERAL.....	15
6.0	HCT SERIES CONTROLLER.....	17
7.0	HCL SERIES CONTROLLER.....	20
8.0	HCS SERIES CONTROLLER .....	31
9.0	OPERATION.....	58
10.0	MAINTENANCE.....	73
11.0	TROUBLESHOOTING.....	75
12.0	REPLACEMENT PARTS .....	76
13.0	MAINTENANCE KITS.....	84
14.0	NOTES .....	85
	WARRANTY	

## 1.0 GENERAL SAFETY INFORMATION

### 1.1 Pressurized Devices

- This equipment is a pressure-containing device.
- Do not exceed maximum operating pressure as shown on the equipment serial number tag.
- Verify that equipment is fully de-pressurized before performing service or maintenance functions.

### 1.2 Electrical:

- This equipment requires electricity to operate.
- Install equipment in compliance with national and local electrical codes.
- Standard equipment is supplied with NEMA 4,4X electrical enclosures and is not intended for installation in hazardous environments.
- Disconnect power supply to equipment when performing any electrical service work.

### 1.3 Breathing Air:

- Air treated by this equipment may not be suitable for breathing without further purification.
- Refer to OSHA standard 1910.134 for the requirements for breathing quality air.

### 1.4 Noise:

**CAUTION:** Do not operate dryer without mufflers installed.

### 1.5 High Velocity Air:

**CAUTION:** Do not stand near mufflers during tower depressurization.

## 2.0 RECEIVING, MOVING, UNPACKING

### 2.1 Receiving:

- This shipment has been thoroughly checked, packed and inspected before leaving our plant.
- It was received in good condition by the carrier and was so acknowledged.
- Check for visible loss or damage. If this shipment shows evidence of loss or damage at time of delivery to you, insist that the carrier's agent make a notation of this loss or damage on the delivery receipt.

### 2.2 Moving:

**CAUTION:** Use lifting lugs or forklift. Do not lift equipment by piping.

### 2.3 Unpacking:

- Check for concealed loss or damage. When a shipment has been delivered to you in apparent good order, but concealed damage is found upon unpacking, notify the carrier immediately and insist that his agent inspect the shipment.
- Fifteen days from receipt of shipment is the maximum time limit for requesting such inspection.
- Concealed damage claims are not our responsibility as our terms are F.O.B. point of shipment.

## 3.0 DESCRIPTION

### 3.1 Dryer Function

- Dual tower regenerative desiccant dryers are an economical and reliable way to dry compressed air to dew points below the freezing point of water (dew points as low as -94°F (-70.0°C) [0.2 ppmV @ 100 psig, 6.9 barg] are possible) or reduce the moisture content of compressed air when used in critical process applications.
- These dryers continuously dry compressed air by using two identical towers, each containing a desiccant bed. While one tower is on-stream drying, the other tower is off-stream being regenerated (reactivated, i.e., dried out). The towers are alternated on- and off-stream so that dry desiccant is always in contact with the wet compressed air. In this way a continuous supply of dry air downstream of the dryer is possible.
- Desiccant dryers lower the dew point of compressed air by adsorbing the water vapor present in the compressed air onto the surface of the desiccant. Desiccant is a highly porous solid containing extensive surface area.
- Adsorption occurs until the partial pressure of the water vapor in the air and that on the surface of the desiccant come into equilibrium. As adsorption occurs, heat is released (referred to as the heat of adsorption) and is stored in the bed for use during regeneration.
- Desiccant is regenerated by driving off (desorbing) the water collected on its surface. Pressure-swing (also called heatless or heater-less because no outside heat is added) dryers regenerate by expanding a portion (approximately 14 -15% at 100 psig, 6.9 barg) of the dried air to atmospheric pressure. This “swing in pressure” causes the expanded air to become very dry (have a very low vapor pressure). This very dry air (called purge air) plus the stored heat of adsorption allows the moisture to desorb from the desiccant. The purge air then carries the desorbed water out of the dryer.

### 3.2 Automatic Purge Saving System

Featured with the HCS Series Controller, the Automatic Purge Saving System is designed to save energy (purge air) when pressure-swing dryers are operated at reduced loads.

The Purge Saving System operates by monitoring the changes in temperature within the desiccant beds. These changes in temperature are the result of heat (thermal energy) that is released when a bed is on-line drying (heat of adsorption), and the heat that is used when a bed is off-line being regenerated (heat of desorption). The magnitude of these changes in temperature is an indirect measure of the water vapor content in the air being dried. This information is used to determine the time a tower stays on line during the drying cycle.

### 3.3 Dew Point Transmitter (Optional)

This option monitors and displays outlet pressure dew points and provides an alarm signal if the dew point exceeds user-specified set point. Recommended calibration interval is 12 months. Contact the Service Department for details.

Operation - The dew point is measured at the dryer operating pressure and is displayed in the operation interface. If the dew point is outside of the temperature range, the display will indicate an over-range (high dew point) or under-range (low dew point condition). A defective sensor assembly or an electronics malfunction could also cause the transmitter to indicate under-range.

### 3.4 Description of Operation – Dryer

#### 3.4.1 Models 40 to 3000 w/ Shuttle Valve

(Refer to Fig. 3-1a.) Compressed air flows through inlet shuttle valve (3) to tower (4A) where the air is dried. After the air is dried it flows through outlet shuttle valve (5) and then to the dryer outlet. A portion of the dry air, the purge stream, branches off from the main air stream prior to the outlet. The purge stream flow rate is controlled by the adjustable purge rate valve (6) and the two purge orifices (7).

The purge flow, which has been throttled to near atmospheric pressure, is directed to tower (4B). As the purge flow passes over the desiccant in tower (4B), it removes the water vapor, which was deposited there while the tower was on-line drying. The purge air then passes through purge and repressurization valve (9B) (normally closed) and purge muffler (10B) to the atmosphere.

After regeneration, purge and repressurization valve (9B) (normally closed) closes allowing tower (4B) to repressurize slowly. Adequate repressurization time is allowed so that tower (4B) is fully repressurized before tower switchover. After a controlled time period, purge and repressurization valve (9A) (normally closed) then opens. This causes the inlet and outlet shuttle valves to shift, directing the air flow through tower (4B).

(Refer to Fig. 3-1b.) Tower (4B) is now drying the main air stream while tower (4A) is being regenerated by the purge air stream. The operation of the purge and repressurization (normally closed) valves is sequenced by the control system located in the electrical enclosure.

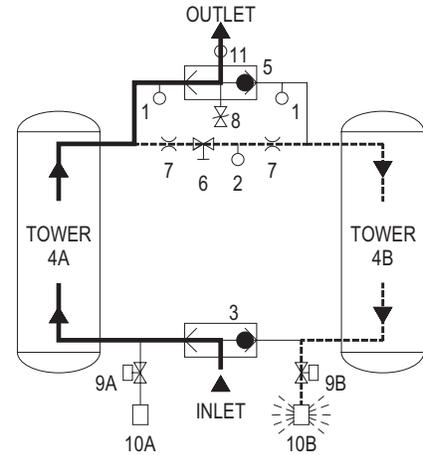


FIGURE 3-1a  
TOWER 4A DRYING  
TOWER 4B REGENERATING

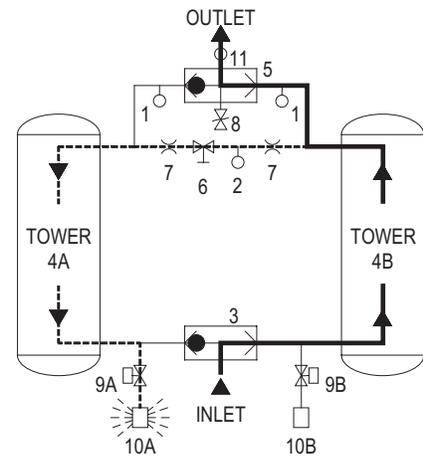


FIGURE 3-1b  
TOWER 4A REGENERATING  
TOWER 4B DRYING

- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Tower Pressure Gauges       | 8. Safety Valve                      |
| 2. Purge Pressure Gauge        | 9. Purge and Repressurization Valves |
| 3. Inlet Shuttle Valve         | 10. Purge Mufflers                   |
| 4. Desiccant Drying Towers     | 11. Moisture Indicator               |
| 5. Outlet Shuttle Valve        |                                      |
| 6. Adjustable Purge Rate Valve | A Left Tower Suffix                  |
| 7. Purge Orifices              | B Right Tower Suffix                 |

Process Stream —————  
Purge Stream - - - - -

### 3.4.2 Models 4100 to 5400 w/ Check Valves

(Refer to Fig. 3-2a.) Compressed air flows through inlet switching valve (3A) (normally open) to tower (4A) where the air is dried. After the air is dried it flows through outlet check valve (5A) and then to the dryer outlet. A portion of the dry air, the purge stream, branches off from the main air stream prior to the outlet. The purge stream flow rate is controlled by the adjustable purge rate valve (6) and the single purge orifice (7).

The purge flow, which has been throttled to near atmospheric pressure, is directed through purge check valve (5D) to tower (4B). As the purge flow passes over the desiccant in tower (4B), it removes the water vapor which was deposited while the tower was on-line drying. The purge air then passes through purge and repressurization valve (9B) (normally closed) and purge muffler (10B) to the atmosphere.

After regeneration, purge and repressurization valve (9B) (normally closed) closes allowing tower (4B) to re-pressurize slowly. Adequate repressurization time is allowed so that tower (4B) is fully re-pressurized before switchover. After a controlled time period, air inlet switching valve (3B) (normally open) opens and inlet-switching valve (3A) (normally open) closes, purge and repressurization valve (9A) (normally closed) then opens.

(Refer to Fig. 3-2b.) Tower (4B) is now drying the main air stream while tower (4A) is being regenerated by the purge air stream. The operation of the inlet switching (normally open) and purge and repressurization (normally closed) valves is sequenced by the control system located in the electrical enclosure.

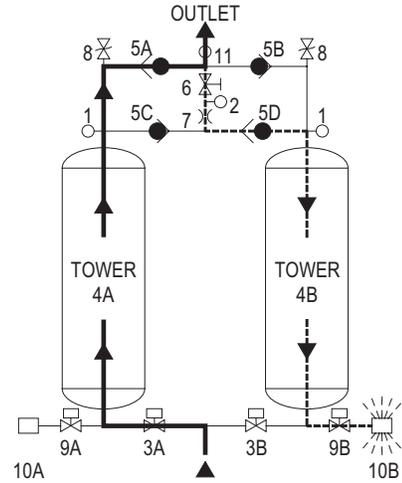


FIGURE 3-2a  
TOWER 4A DRYING  
TOWER 4B REGENERATING

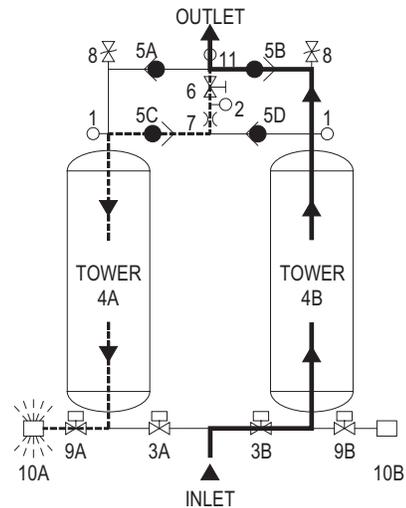


FIGURE 3-2b  
TOWER 4A REGENERATING  
TOWER 4B DRYING

- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Tower Pressure Gauges       | 8. Safety Valves                     |
| 2. Purge Pressure Gauge        | 9. Purge and Repressurization Valves |
| 3. Inlet Switching Valves      | 10. Purge Mufflers                   |
| 4. Desiccant Drying Towers     | 11. Moisture Indicator               |
| 5. Check Valves                | A & C Left Tower Suffixes            |
| 6. Adjustable Purge Rate Valve | B & D Right Tower Suffixes           |
| 7. Purge Orifice               |                                      |

Process Stream —————  
Purge Stream - - - - -

### 3.4.3 Models 40 to 450 (High Pressure Option)

(Refer to Fig. 3-3a.) Compressed air flows through inlet switching valve (3A) (normally open) to tower (4A) where the air is dried. After the air is dried it flows through shuttle valve (5) and then to the dryer outlet. A portion of the dry air, the purge stream, branches off from the main air stream prior to the outlet. The purge stream flow rate is controlled by the adjustable purge rate valve (6) and the two purge orifices (7).

The purge flow, which has been throttled to near atmospheric pressure, is directed to tower (4B). As the purge flow passes over the desiccant in tower (4B), it removes the water vapor which was deposited while the tower was on-line drying. The purge air then passes through purge and repressurization valve (9B) (normally closed) and purge muffler (10B) to the atmosphere.

After regeneration, purge and repressurization valve (9B) (normally closed) closes allowing tower (4B) to re-pressurize slowly. Adequate repressurization time is allowed so that tower (4B) is fully re-pressurized before switchover. After a controlled time period, air inlet switching valve (3B) (normally open) opens and inlet-switching valve (3A) (normally open) closes, purge and repressurization valve (9A) (normally closed) then opens.

(Refer to Fig. 3-3b.) Tower (4B) is now drying the main air stream while tower (4A) is being regenerated by the purge air stream. The operation of the inlet switching (normally open) and purge and repressurization (normally closed) valves is sequenced by the control system located in the electrical enclosure.

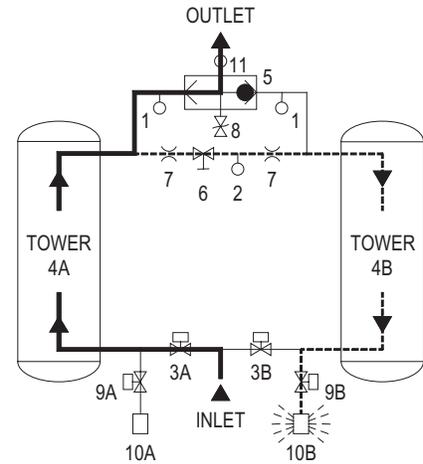


FIGURE 3-3a  
TOWER 4A DRYING  
TOWER 4B REGENERATING

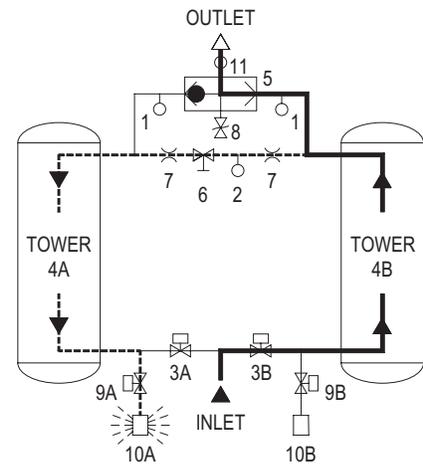


FIGURE 3-3b  
TOWER 4A REGENERATING  
TOWER 4B DRYING

- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Tower Pressure Gauges       | 8. Safety Valve                      |
| 2. Purge Pressure Gauge        | 9. Purge and Repressurization Valves |
| 3. Inlet Switching Valves      | 10. Purge Mufflers                   |
| 4. Desiccant Drying Towers     | 11. Moisture Indicator               |
| 5. Shuttle Valve               | A Left Tower Suffix                  |
| 6. Adjustable Purge Rate Valve | B Right Tower Suffix                 |
| 7. Purge Orifices              |                                      |

Process Stream —————  
Purge Stream - - - - -

### 3.5 Automatic Purge Saving System

(Refer to Figure 3-4a for Models 40 through 3000 and Figure 3-4b for Models 4100 through 5400.)

Assume tower A is on-line drying while tower B has just gone off-line to be regenerated. At the beginning of tower B's regeneration cycle a temperature measurement is made at position B1. After the tower has been regenerated, another measurement is made at B1. The drop in temperature sensed during regeneration is an indirect measure of the water vapor content of the inlet air. The Automatic Purge Saving System's microprocessor then uses this information to calculate an allowable temperature rise in the bed during the drying cycle.

When tower B goes back on-line, a temperature sensor (RTD) at position B2 measures the initial bed temperature at this point and then monitors the bed until the calculated temperature rise occurs. The temperature rise occurs as heat of adsorption is released during the drying process. The time for the temperature rise to occur depends on flow rate. At 100% flow the temperature rise takes 5 minutes, at 50% flow it takes 10 minutes.

**NOTE:** If after 30 minutes, the bed temperature has not risen to the calculated value, the dryer will automatically switch towers.

When the calculated temperature rise is reached, the towers switch with tower A now drying and tower B being regenerated. Tower B regenerates for 3.9 minutes, re-pressurizes, and remains idle until it is called upon for the next drying cycle.

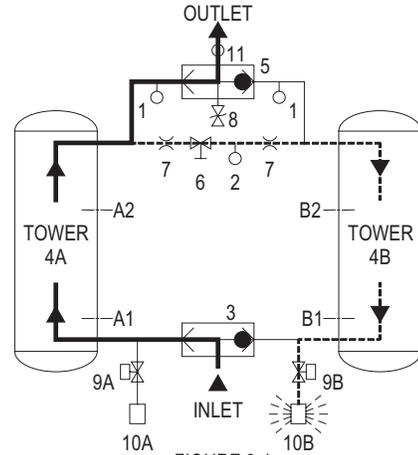


FIGURE 3-4a  
Models 40 through 3000  
**TOWER 4A DRYING**  
**TOWER 4B REGENERATING**

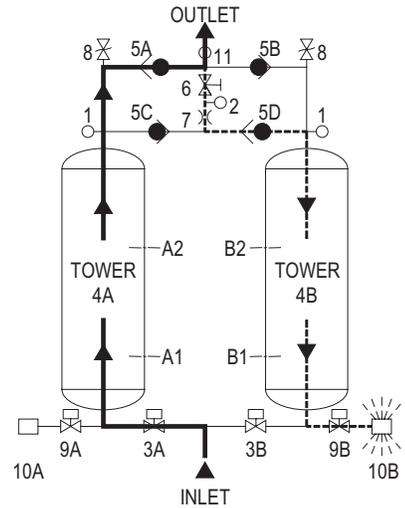


FIGURE 3-4b  
Models 4100 through 5400  
**TOWER 4A DRYING**  
**TOWER 4B REGENERATING**

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| 1. Tower Pressure Gauges             | 8. Safety Valve(s)                   |
| 2. Purge Pressure Gauge              | 9. Purge and Repressurization Valves |
| 3. Inlet Shuttle or Switching Valves | 10. Purge Muffers                    |
| 4. Desiccant Drying Towers           | 11. Moisture Indicator               |
| 5. Shuttle or Check Valve(s)         | A & C Left Tower Suffix(es)          |
| 6. Adjustable Purge Rate Valve       | B & D Right Tower Suffix(es)         |
| 7. Purge Orifice(s)                  |                                      |

**Process Stream** —————  
**Purge Stream** - - - - -

## 4.0 INSTALLATION

### 4.1 Location in the compressed air system

**NOTE:** The air compressor should be adequately sized to handle air system demands as well as purge loss. Failure to take this into account could result in overloading air compressors and/or insufficient air supply downstream. It is desirable to install the dryer where the compressed air is at the lowest possible temperature (downstream of aftercoolers) and the highest possible pressure (upstream of pressure reducing valves) without exceeding the maximum operating pressure of the equipment. (Refer to Figure 4-1)

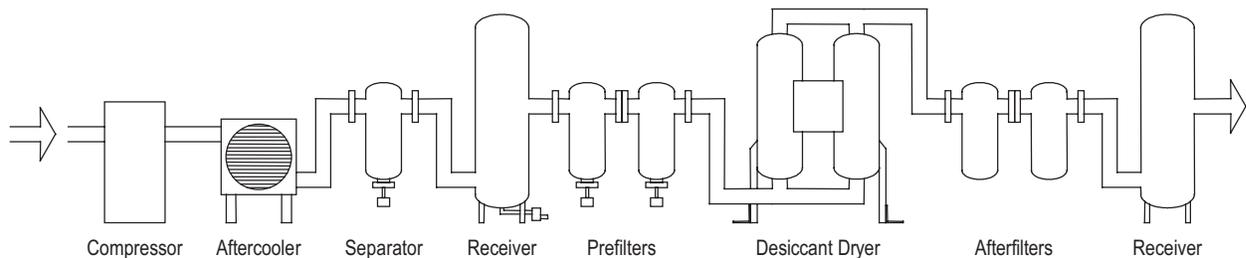


Figure 4-1

#### 4.1.1 Aftercooler/Separator –

Compressed air entering dryer must be cooled to a temperature of 140°F (60°C) or lower. Use of an aftercooler and condensate separator may be necessary to reduce inlet air temperature to an acceptable level.

**NOTE:** Installation of a refrigerated dryer ahead of a pressure-swing desiccant dryer does not increase desiccant dryer capacity or reduce purge flow requirements.

#### 4.1.2 Receiver(s) –

Air receivers dampen pulsations from the compressor discharge line and can eliminate some of the condensed moisture that is carried over from the aftercooler and separator. They also provide a reservoir of stored air for response to system demands in excess of compressor capacity. Size and location of receivers in the compressed air system need to be considered carefully. Flows must not exceed the adjusted maximum inlet capacity of the desiccant air dryer.

#### 4.1.3 Prefilter(s) –

Adequate filtration is required upstream of the dryer in order to protect the desiccant bed from contamination. The following filtration, equipped with automatic condensate drains, is recommended:

- First Prefilter - Particulate/Gross Liquid Removal - On heavily contaminated systems, a gross contaminant filter to remove solids and high inlet liquid concentrations should be used.
- Second Prefilter - Oil Aerosol Removal - On systems with lubricated compressors, an oil removal filter to remove oil aerosols and protect the desiccant beds from oil contamination is required.

#### 4.1.4 Heatless Pressure-Swing Desiccant Air Dryer

##### 4.1.5 Afterfilter(s) –

To ensure downstream air purity (prevent desiccant dust from traveling downstream) adequate filtration downstream of the dryer is required.

- First Afterfilter - Particulate Removal - Typically 1-micron filtration is specified although finer filtration is available.
- Second Afterfilter - Oil Vapor Adsorption - This filter is used to remove oil vapor and its subsequent taste and odor and to protect downstream components from solid particles 0.01 micron and larger.

**NOTE:** By-pass lines and isolation valves are recommended so that maintenance work can be performed without shutting off the air supply.

## 4.2 Physical Location

The dryer must be installed with suitable overhead protection as well as clearance to change desiccant. Sufficient clearance around the periphery of the dryer should be provided to allow maintenance personnel access to all areas for routine inspections and adjustments.

## 4.3 Minimum & Maximum Operating Conditions

The compressed air supply to the dryer inlet should be checked periodically to ensure that dryer design specifications are not exceeded. Normally the compressor installation includes intercoolers, aftercoolers, separators, receivers, or similar equipment, which adequately pretreat the compressed air supply in order to avoid excessively high air temperatures and liquid slugging of downstream equipment.

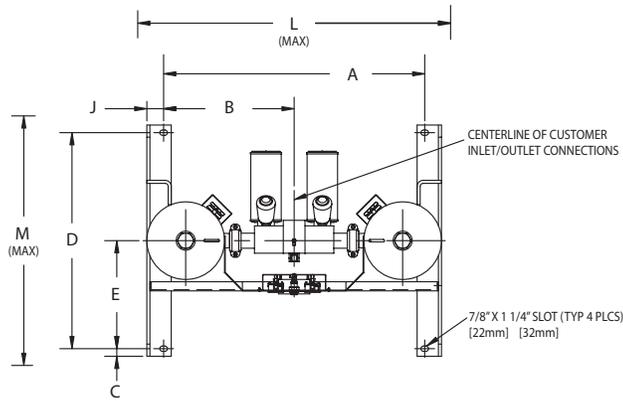
## 4.4 Maximum Operating Pressure (MOP):

- 150 psig (10.3 barg) is standard.
- 250 psig (17.2 barg) is optional.

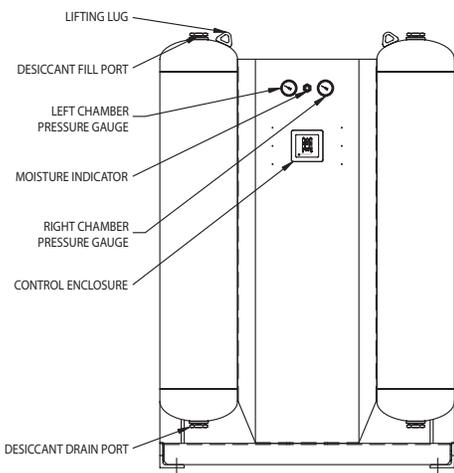
Refer to Dryer Serial Number Tag.

**WARNING – Do not operate the dryer at pressures above the maximum operating pressure shown on the serial number tag.**

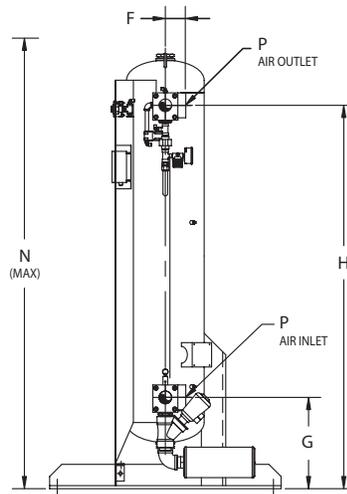
**NOTE:** Consult factory for applications requiring higher maximum operating pressures.



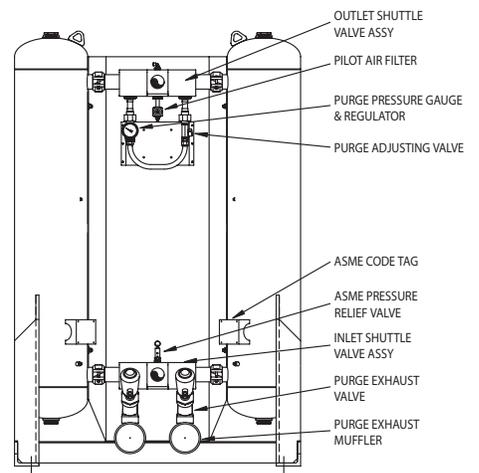
TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW  
RIGHT CHAMBER REMOVED FOR CLARITY



REAR VIEW

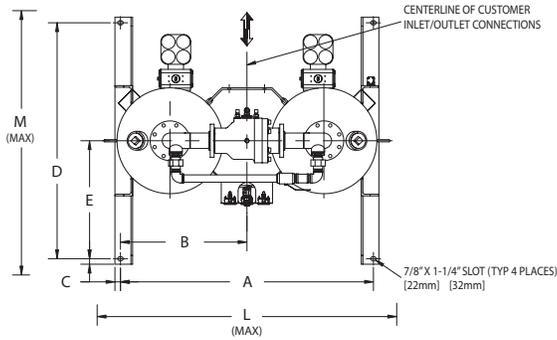
Figure 4-2  
40-450 SCFM General Arrangement  
(NOTE: Figure is representative of Standard Pressure Models 40 through 450.)  
(continued on next page)

DIMENSIONS IN INCHES								
MODEL	40	60	90	115	165	260	370	450
A	27.5/8	27.5/8	27.5/8	38.3/8	38.3/8	41.3/8	49.3/8	49.3/8
B	13.13/16	13.13/16	13.13/16	19.13/16	19.13/16	20.11/16	24.11/16	24.11/16
C	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4
D	29.1/2	29.1/2	29.1/2	35.1/2	35.1/2	35.1/2	35.1/2	35.1/2
E	14.3/4	14.3/4	14.3/4	17.3/4	17.3/4	17.3/4	17.3/4	17.3/4
F	2.13/16	2.13/16	2.13/16	2.13/16	2.13/16	3.1/4	3.1/4	3.1/4
G	14	14	14	15	15	15	16	16
H	39	54	71	45	45	63	53	61
J	1.3/4	1.3/4	1.3/4	1.3/4	1.3/4	2.3/4	2.3/4	2.3/4
L	35	35	37	50	50	51	58	58
M	35	35	35	41	41	41	42	42
N	49	64	81	57	57	75	65	73
P	1 NPT	2 NPT	2 NPT	2 NPT				
WT/LBS	365	445	575	685	685	1010	1215	1350
DIMENSIONS IN MILLIMETERS								
MODEL	40	60	90	115	165	260	370	450
A	702	702	702	975	975	1051	1254	1254
B	351	351	351	487	487	525	627	627
C	32	32	32	32	32	32	32	32
D	749	749	749	902	902	902	902	902
E	375	375	375	451	451	451	451	451
F	71	71	71	71	71	83	83	83
G	356	356	356	381	381	381	406	406
H	991	1372	1803	1143	1143	1600	1346	1549
J	44	44	44	44	44	70	70	70
L	889	889	948	1264	1264	1305	1470	1470
M	889	889	889	1041	1041	1041	1062	1062
N	1235	1616	2047	1437	1437	1894	1658	1861
P	1 NPT	2 NPT	2 NPT	2 NPT				
WT/KGS	166	202	261	311	311	458	551	612

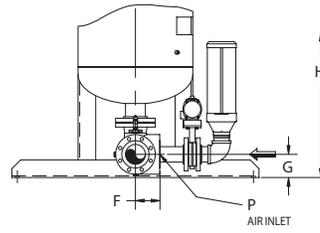
**NOTE:** Dimensions and weights are for reference only.

**NOTE:** For construction purposes, contact factory to request certified drawings for Standard Pressure Models, High Pressure Models, or Dryers with Mounted Filters.

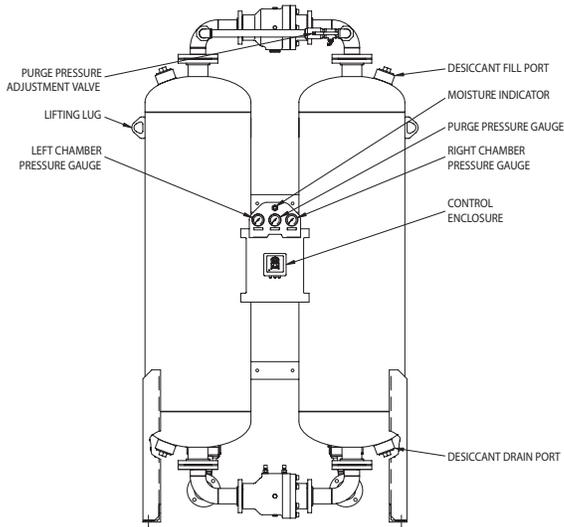
Figure 4-2  
 40-450 SCFM General Arrangement  
 (NOTE: Figure is representative of Standard Pressure Models 40 through 450.)  
 (continued from previous page)



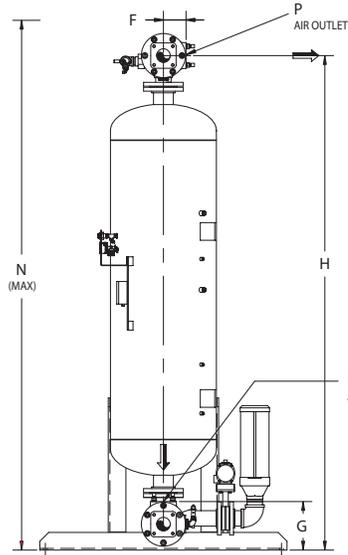
TOP VIEW



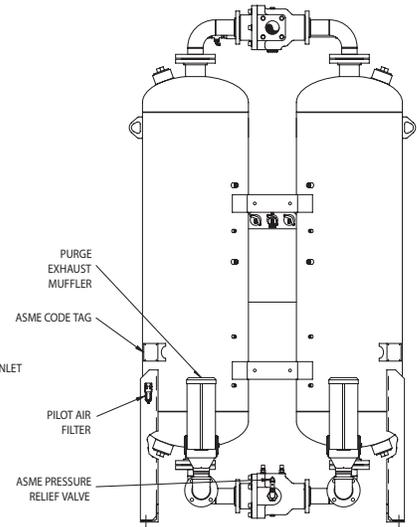
BOTTOM RIGHT SIDE VIEW  
(Models 1550, 2100 and 3000)  
RIGHT CHAMBER REMOVED FOR CLARITY



FRONT VIEW



RIGHT SIDE VIEW  
(Models 590 through 1350)  
RIGHT CHAMBER REMOVED FOR CLARITY



REAR VIEW

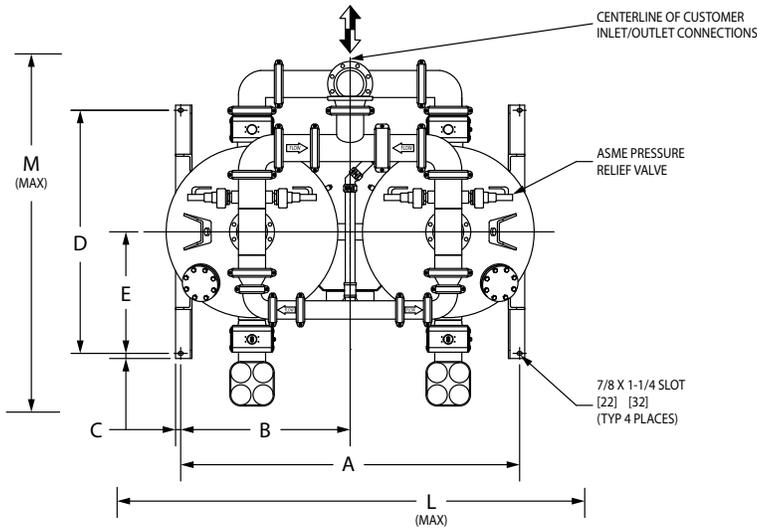
Figure 4-3  
590-3000 SCFM General Arrangement  
(NOTE: Figure is representative of Standard Pressure Models 590 through 3000.)  
(continued on next page)

DIMENSIONS IN INCHES								
MODEL	590	750	930	1130	1350	1550	2100	3000
A	46.3/4	47.9/16	52.11/16	56.7/16	57.5/16	63.1/8	69.13/16	73.3/8
B	23.3/8	23.13/16	26.5/16	28.1/4	28.11/16	31.9/16	34.7/8	36.11/16
C	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4	1.1/4
D	45.1/2	45.1/2	53.1/2	53.1/2	53.1/2	53.1/2	53.1/2	59.1/2
E	22.3/4	22.3/4	26.3/4	26.3/4	26.3/4	26.3/4	26.3/4	29.3/4
F	3.1/4	3.1/4	3.1/4	5.1/8	5.1/8	5.9/16	5.9/16	5.9/16
G	9.3/16	9.11/16	11.7/16	11	11	5.1/4	6.3/16	8.1/2
H	97.5/16	100.13/16	105.9/16	107.1/8	112.1/8	109.1/2	111.5/16	117.3/8
L	55	57	63	66	68	74	82	86
M	51	51	59	59	59	59	59	67
N	104	107	112	115	120	117	119	125
P	2 NPT	2 NPT	2 NPT	3 FLANGE	3 FLANGE	4 FLANGE	4 FLANGE	4 FLANGE
WT/LBS	1473	2134	2414	2875	3722	4167	4417	9010
DIMENSIONS IN MILLIMETERS								
MODEL	590	750	930	1130	1350	1550	2100	3000
A	1187	1208	1338	1434	1456	1604	1773	1864
B	594	604	669	717	728	802	886	932
C	32	32	32	32	32	32	32	32
D	1156	1156	1359	1359	1359	1359	1359	1511
E	578	578	679	679	679	679	679	756
F	83	83	83	130	130	141	141	141
G	234	247	291	279	279	133	157	216
H	2472	2561	2681	2721	2848	2781	2827	2981
L	1387	1438	1603	1673	1724	1876	2080	2172
M	1295	1295	1499	1499	1499	1499	1499	1693
N	2631	2720	2841	2924	3051	2980	3026	3180
P	2 NPT	2 NPT	2 NPT	3 FLANGE	3 FLANGE	4 FLANGE	4 FLANGE	4 FLANGE
WT/KGS	668	968	1095	1304	1688	1890	2004	4087

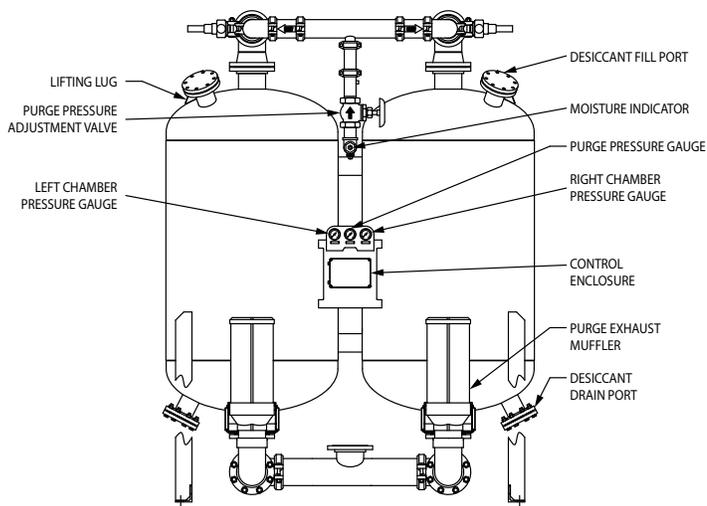
**NOTE:** Dimensions and weights are for reference only.

**NOTE:** For construction purposes, contact factory to request certified drawings for Standard Pressure Models, High Pressure Models, or Dryers with Mounted Filters.

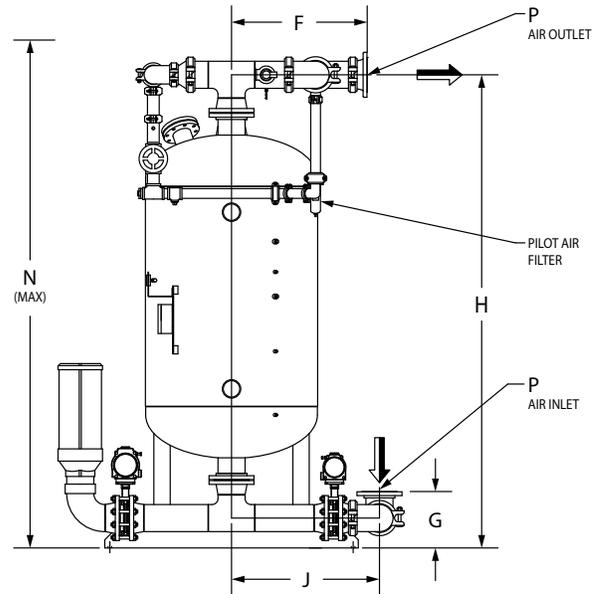
Figure 4-3  
590-3000 SCFM General Arrangement  
(NOTE: Figure is representative of Standard Pressure Models 590 through 3000.)  
(continued from previous page)



TOP VIEW



FRONT VIEW



SIDE VIEW  
(RIGHT CHAMBER REMOVED FOR CLARITY)

Figure 4-4  
4100-5400 SCFM General Arrangement  
(NOTE: Figure is representative of Standard Pressure Models 4100 through 5400.)  
(continued on next page)

DIMENSIONS IN INCHES		
MODEL	4100	5400
A	82.7/8	93.3/8
B	41.7/16	46.11/16
C	1.1/4	1.1/4
D	59.1/2	63.1/2
E	29.3/4	31.3/4
F	33.3/16	35.7/8
G	13.13/16	19.7/16
H	115.13/16	116.3/16
J	36.3/16	38.7/8
L	100	105
M	88	89
N	124	124
P	6 FLANGE	6 FLANGE
WT/LBS	9900	12000
DIMENSIONS IN MILLIMETERS		
MODEL	4100	5400
A	2106	2372
B	1053	1186
C	32	32
D	1511	1613
E	756	806
F	843	911
G	351	494
H	2942	2951
J	919	988
L	2537	2667
M	2227	2253
N	3158	3158
P	6 FLANGE	6 FLANGE
WT/KGS	4500	5445

**NOTE:** Dimensions and weights are for reference only.

**NOTE:** For construction purposes, contact factory to request certified drawings for Standard Pressure Models, High Pressure Models, or Dryers with Mounted Filters.

Figure 4-4  
 4100-5400 SCFM General Arrangement  
 (NOTE: Figure is representative of Standard Pressure Models 4100 through 5400.)  
 (continued from previous page)

## 4.5 Minimum Operating Pressures:

### 4.5.1 For 150 psig (10.3 barg) MOP models -

- 60 psig (4.1 barg) is the minimum operating pressure for dryers operated on ISO classes 1, 2, 3, and 4.

### 4.5.2 For 250 psig (17.2 barg) MOP models -

- 120 psig (8.3 barg) is the minimum operating pressure for dryers operated on ISO classes 1, 2, 3, and 4.

Refer to Dryer Serial Number Tag.

**WARNING – Do not operate the dryer at pressures below the minimum operating pressure shown on the serial number tag.**

**NOTE:** Consult factory for applications requiring lower minimum operating pressures.

## 4.6 Maximum Compressed Air Temperature at Dryer Inlet:

- 140°F (60°C) for all models.

## 4.7 Ambient Temperatures:

### 4.7.1 Minimum Ambient Temperature

- Standard units: 35°F (2°C)
- Units with optional low ambient package: -20°F (-29°C)

### 4.7.2 Maximum Ambient Temperature

- 120°F (49°C)

**NOTE:** If dryer is installed in ambients below 35°F (2°C), low ambient protection requiring heat tracing and insulation of the prefilter bowls, auto drains and/or sumps, and lower piping with inlet switching and purge/repressurization valves is necessary to prevent condensate from freezing. If installing heat tracing, observe electrical class code requirements for type of duty specified. Purge mufflers and their relief mechanisms must be kept clear from snow and ice buildup that could prevent proper discharge of compressed air.

## 4.8 Mounting

Install dryer on a level pad. Holes are provided in the dryer base members for floor anchors.

**NOTE:** Floor anchors must be used if area is subject to vibration.

## 4.9 Piping

Inlet and Outlet connections

Observe locations of inlet and outlet connections as shown in Figures 4-2, 4-3 or 4-4 and connect inlet and outlet piping as indicated.

**NOTE:** All piping must be supported so as not to bear on the dryers or filters.

## 4.10 Isolation Valves

If isolation or bypass valves are installed, care must be used to ensure that equipment is pressurized slowly. This is particularly true if isolation valves are placed before and after pre and afterfilters where rapid pressurization could cause excessive pressure drop across filter elements.

**NOTE:** When quarter-turn valves (e.g. ball or butterfly valves) are used for isolation of pressure components, care should be taken to open or close valves slowly.

## 4.11 Electrical Connections

Refer to the appropriate controller sections for detailed information on connections, ratings, and operation of the HCL Series or HCS Series Controllers.

**NOTE:** Refer to the dryer serial number tag for allowable voltages, frequency and power rating.

## 4.12 Provisions for Purge Exhaust

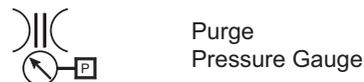
- Purge exhaust must be routed through the factory supplied mufflers or piped to a remote location.
- Purge mufflers - If shipped separately, install purge exhaust mufflers in the locations shown in Figures 4-2, 4-3 or 4-4.
- If purge exhaust is piped to a muffler located in a remote location, choose a combination of diameters, lengths, and turns that limits the additional pressure drop to 1 psid or less.

**WARNING – Do not operate dryer without installed mufflers. Exhausting compressed air directly to atmosphere will result in noise levels above OSHA permissible levels and rapidly expanding gas could potentially cause harm to persons or property.**

## 4.13 Initial Desiccant Charge

The dryer is shipped complete with desiccant and is ready to operate after piping and electrical connections are made and controller settings are established.

## 4.14 Icon Identification



## 5.0 CONTROLLERS – GENERAL

### 5.1 Overview

The solid-state dryer controller is located in a polycarbonate, NEMA Class 4/4X, IP66 rated electrical enclosure mounted to a center panel located between the two desiccant towers. Controls are available in three functional levels. The HCT Series Controller offers a fixed-time cycle that provides a dew point corresponding to ISO compressed air quality class 2. The HCL Series Controller offers four fixed-time cycles that provide dew points corresponding to ISO compressed air quality classes 1 through 4. The HCS Series Controller offers three fixed-time cycles that provide dew points corresponding to ISO compressed air quality classes 1 through 3. A key difference between the HCL Series Controller and the HCS Series Controller is the way in which they address

energy savings. When inlet flow is less than the adjusted rated capacity of the dryer, average purge air requirements are reduced. This reduction can translate to energy savings at the air compressor.

The HCL Series Controller offers 8 selectable fixed-cycle Energy (purge) Saver modes (0% to 70% in 10 % increments) to reduce purge time to match the load on the dryer.

The HCS Series Controller features the Automatic Purge Saving System (APSS) as described in Sections 3.2 and 3.4. When HCS Series Controllers are operated in demand rather than fixed cycle modes, the APSS automatically adjusts to dryer loading and extends drying time when possible. Average purge use is thus automatically reduced.

HCS Series Controllers also have optional dewpoint control capability.

A feature-by-feature comparison of each controller can be found in Table 5-1.

Desiccant Dryer Controllers		HCT Series Controller	HCL Series Controller Fixed Cycle Only	HCS Series Controller Fixed Cycle and APSS
Category	Feature			
General	AC Input Voltage: 100-240 VAC, 50-60 Hz (See NOTE 1)	•		
	AC Input Voltage: 85-264 VAC, 47-63 Hz (See NOTE 1)		•	
	AC Input Voltage: 90-277 VAC, 47-63 Hz (See NOTE 1)			•
	DC Input Voltage: 11.5-28 VDC (See NOTE 1)		•	•
	Auxiliary power terminals (See NOTE 2)		•	•
	Solenoid valve coil voltage	12 VDC	12 VDC	12 VDC
	NEMA 4/4X, IP 66 electrical enclosure rating	•	•	•
	Soft on/off switch with two power recovery modes (See NOTE 3)		•	•
	Tower status LEDs (amber=drying)	•		
	Tower status LEDs (green=drying, amber=regenerating)		•	•
	Process valve status LEDs (on=valve open, off=valve closed)		•	•
	Operating mode LEDs (see next category for number of modes)		•	
	Alarm LED (red)		•	•
	Voltage-free alarm contacts, 5A rating		•	•
	Alarm reset switch (mounted on front panel)		•	•
Service reminder LEDs (See NOTE 4)		•	•	
Vacuum fluorescent text display			•	
Operating Modes (See NOTE 5 and NOTE 7)	60-150 or 120-250 psig MOP (selectable via jumper on circuit board)		•	•
	ISO Class 1 (-94°F/-70°C PDP) - fixed cycle (4 minute)		•	•
	ISO Class 2 (-40°F/-40°C PDP) - fixed cycle (10 minute)	•	•	•
	ISO Class 3 (-4°F/-20°C PDP) - fixed cycle (16 minute)		•	•
	ISO Class 4 (+38°F/+3°C PDP) - fixed cycle (24 minute)		•	
	Fixed Cycle Energy (purge) Saver (See NOTE 6)		•	
	Manual Cycle (test mode)		•	•
	ISO Class 2 (-40°F/-40°C PDP) - demand cycle			•
	ISO Class 3 (-4°F/-20°C PDP) - demand cycle			•
	Dewpoint Mode			•
Digital I/O	Controlled shutdown and restart (upon user supplied contact closure)		•	•
	Tower pressure switches (2)		•	•
	High Inlet Temperature Switch			•
	Low Outlet Pressure Switch			•
	Dew Point Alarm			Optional
	Electric drain alarm (1 or 2 filters)			Optional
	Electric drain test (1 or 2 filters)			Optional
Analog I/O (12 bit accuracy)	RTD (5)			•
	4-20mA Dew point transmitter			Optional
Communication	RS232 communication port		•	
	Ethernet			•

Table 5-1  
Feature Comparison  
(continued on next page)

**NOTES:**

1. The **HCT Series Controller** will accept AC (Alternating Current) input power. The **HCL Series Controller** and **HCS Series Controller** will accept either AC (Alternating Current) or DC (Direct Current) input power.
2. **(HCL Series Controller & HCS Series Controller)** The auxiliary power terminals are in parallel with the input power terminals (i.e., there are two common terminals for each input power connection point, L, N, and PE. The auxiliary power terminals provide a connection point for another device that operates on the same voltage as the Desiccant Dryer Controller.
3. **(HCL Series Controller & HCS Series Controller)** The controller has two power recovery modes. For **HCL Series Controllers**, the selection is made using a jumper on the circuit board. For **HCS Series Controllers**, the selection is made using the switches on the front panel. In one mode, the controller remembers its state (on or off) prior to a power interruption and returns to that state when power is restored. In the other mode, the controller always returns to the off state when power is restored after an interruption.
4. **(HCL Series Controller & HCS Series Controller)** The service reminder LEDs indicate that it is time to perform preventive maintenance on the (a) filters and drains, (b) valves, or (c) desiccant. The user selects service intervals. For **HCL Series Controllers**, the selection is made using a jumper on the circuit board. For **HCS Series Controllers**, the selection is made using the switches on the front panel.
5. **(HCL Series Controller & HCS Series Controller)** For **HCL Series Controllers** and **HCS Series Controllers**, the operating mode (with exception of the MOP) is selected via switches on the front panel.
6. **(HCL Series Controllers)** The **HCL Series Controller** Energy (purge) Saver feature has eight settings, 0% to 70% in 10% increments. Energy Saver setting =  $100\% - (\text{percentage of adjusted allowable inlet flow})$ . (e.g. if the maximum adjusted allowable inlet flow to a dryer was 1000 SCFM, but the actual flow to the inlet was only 300 SCFM, then the Energy Saving setting would be  $100\% - ((300/1000) * 100\%) = 70\%$ . At 300 SCFM, only 30% of the dryer capacity is being utilized. Average purge requirements and the related energy needed to compress that purge air can be reduced by 70%.) The selection is made using a switch on the front panel.
7. PDP – Pressure Dew Point  
MOP – Maximum Operating Pressure

## 6.0 HCT SERIES CONTROLLER

This section provides connection, adjustment and operational information for the HCT Series – Fixed Cycle Controller. Similar information for the HCL Series – Fixed Cycle Controller and HCS Series Controller featuring the APSS, Automatic Purge Saving System, can be found in Sections 7 and 8 respectively.

### 6.1 Reference Figures

- Figure 6-1, Front Panel Overlay
- Figure 6-2, Point-to-Point Diagram

## 6.2 Connections

See Figure 6-2, Point-to-Point Diagram for the location and function of the various cable and cord connectors that are provided on the bottom of the HCT Series Controller enclosure.

### 6.2.1 Connections - Input Power

#### 6.2.1.1 VAC Input Power Connections

Single-phase, alternating current (AC) input power connection of 100-240VAC / 1 ph / 50-60 Hz. can be made at terminals mounted within the control enclosure. See reference figures for proper polarity.

Program Step	1	2	3	4	5	6	7	8
Left tower status	drying	drying	drying	drying	regen	regen	regen	regen
Right tower status	regen	regen	regen	regen	drying	drying	drying	drying
Left purge solenoid	off	off	off	off	off	off	on	off
Right purge solenoid	off	off	on	off	off	off	off	off
Left purge valve	closed	closed	closed	closed	closed	closed	open	closed
Right purge valve	closed	closed	open	closed	closed	closed	closed	closed

Table 6-1  
Cycle Sequence Steps – HCT Series Controller

<b>Dryer MOP</b>	<b>60- 150 psig (4.1 - 10.3 barg)</b>
<b>ISO Class</b>	<b>2</b>
<b>Dew Point</b>	<b>-40°C</b>
	<b>-40°F</b>
<b>Cycle Time (minutes)</b>	<b>10</b>
<b>Time</b>	<b>Time from start of cycle (minutes:seconds)</b>
<b>t0</b>	00:00
<b>t1</b>	00:02
<b>t2</b>	00:06
<b>t3</b>	04:12
<b>t4</b>	05:00
<b>t5</b>	05:02
<b>t6</b>	05:06
<b>t7</b>	09:12
<b>t8</b>	10:00
<b>Reference Data</b>	
<b>Purge time (min:sec)</b>	04:12
<b>Repress. time (min:sec)</b>	00:48

Table 6-2  
Fixed Cycle Timing – HCT Series Controller

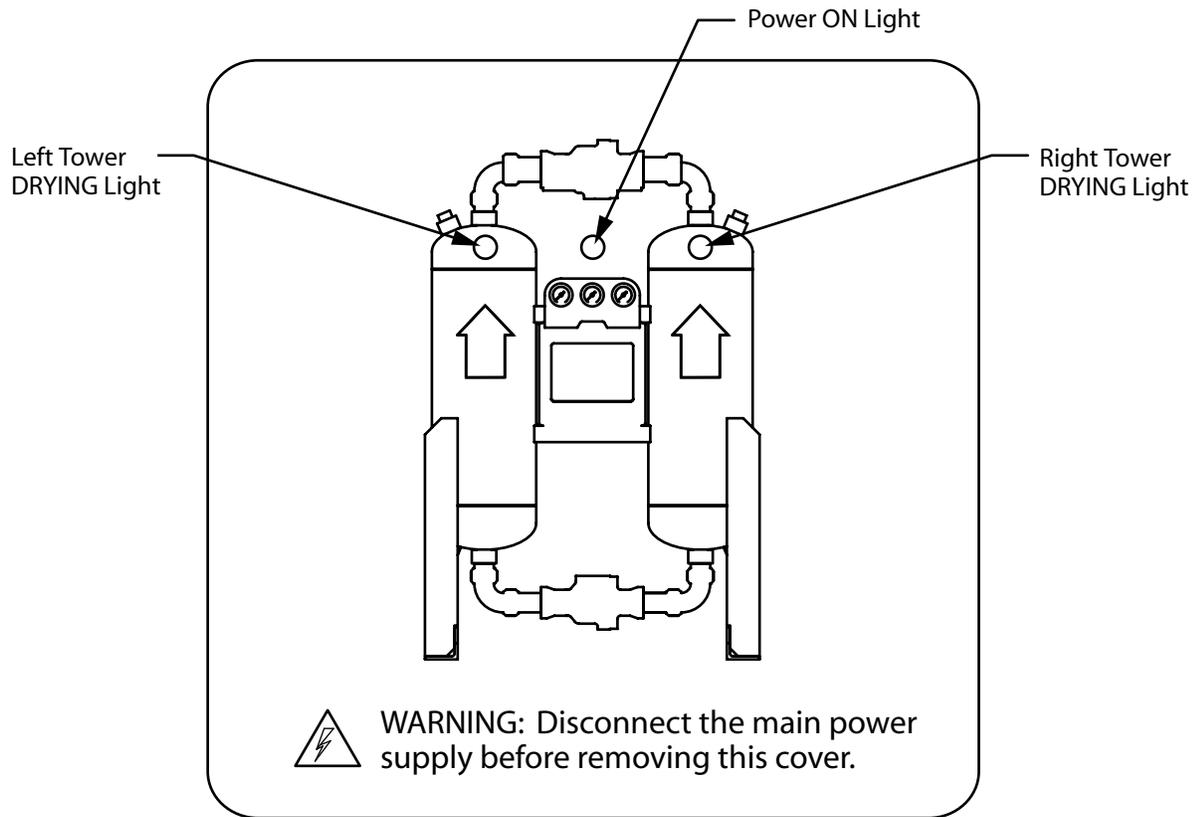


Figure 6-1  
Front Panel Overlay – HCT Series Controller  
(**NOTE:** Figure is representative of Models 40 through 3000.)

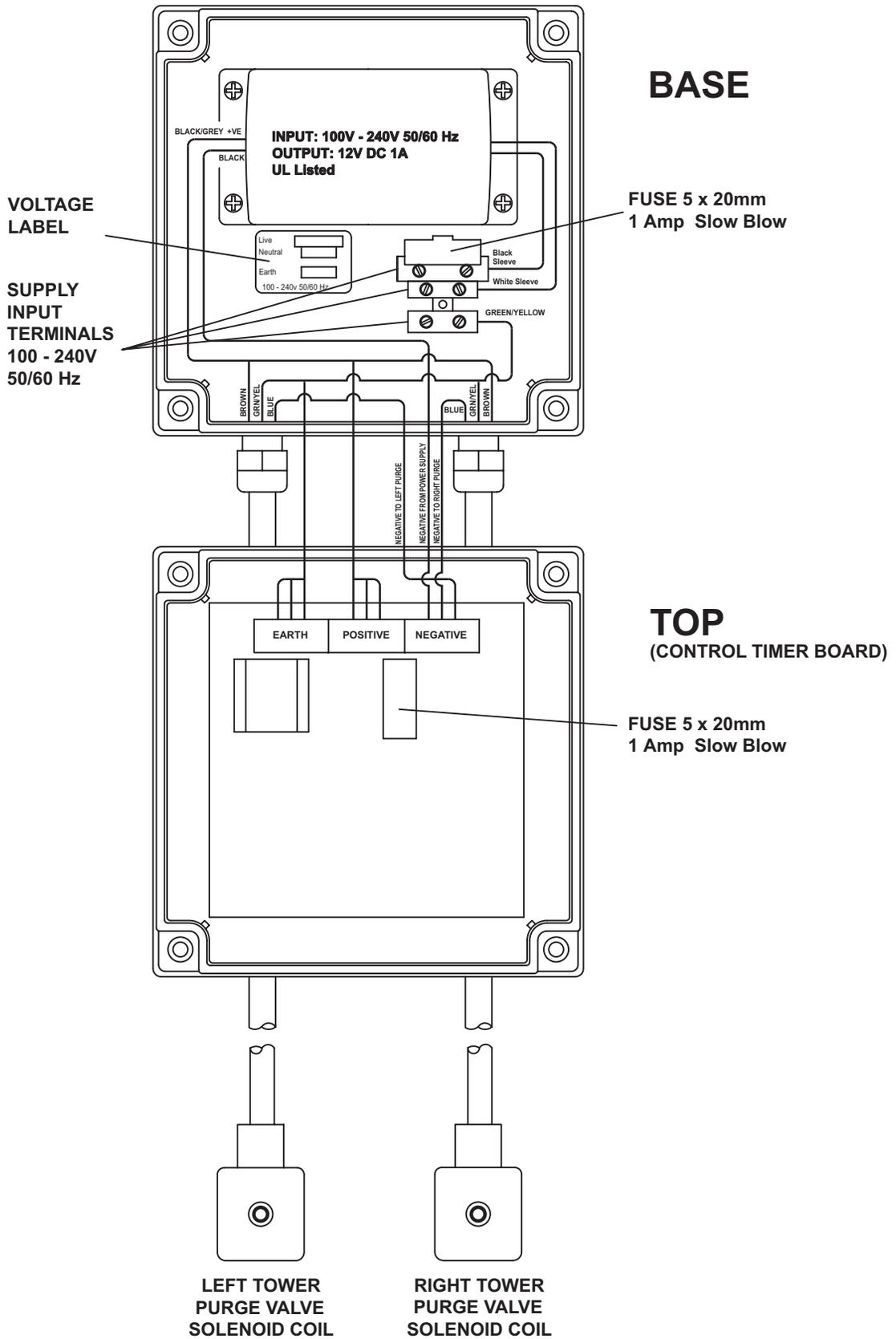


Figure 6-2  
Point-to-Point Connection Diagram – HCT Series Controller

## 7.0 HCL SERIES CONTROLLER

This section provides connection, adjustment and operational information for the HCL Series – Fixed Cycle Controller. Similar information for the HCS Series Controller featuring the APSS, Automatic Purge Saving System, can be found in Section 8.

### 7.1 Reference Figures

- Figure 7-1, Front Panel Overlay – HCL Series Controller
- Figure 7-2, Electrical Schematic – HCL Series Controller
- Figure 7-3, Point-to-Point Diagram – HCL Series Controller
- Figure 7-4, Panel Layouts – HCL Series Controller
- Figure 7-5, Enclosure Penetrations – HCL Series Controller

### 7.2 Connections

See Figure 7-5, Enclosure Penetrations for the location, size and function of the various cable and cord connectors that are provided on the bottom of the HCL Series Controller enclosure.

#### 7.2.1 Connections - Input Power

##### 7.2.1.1 VAC Input Power Connections

Single-phase, alternating current (AC) input power connections ranging from 85-264 VAC and 47 to 63 Hz. can be made at terminals TB5-20, -22, and -24. See reference figures for proper polarity. These terminals are connected to accessory output terminals TB5-21, -23, and -25 respectively. Accessory output terminals can be used to direct power at the same voltage and frequency to external devices.

**CAUTION:** Accessory output terminals are NOT controlled by the power on/off switch and are always energized when power is provided to terminals TB -20, -22, and -24.

##### 7.2.1.2 VDC Power Connections

- The control and display boards operate on low-voltage direct current. The controller is provided pre-wired with an AC to 12 VDC power supply board. For users with AC power as described in Section 7.2.1.1, their AC input is directed to the power supply board where it is conditioned and returned to the control board as 12 VDC at terminals TB4-18 and -19.
- For users with direct current (DC) input power ranging from 11.5 to 28 VDC, use of the AC to DC power supply board is not needed and their connections can be made at terminals TB4-18 and -19 by first removing the black and red leads coming from the power supply board. See reference figures for proper polarity.

#### 7.2.2 Connections – Common Alarm Contacts

Connections to voltage-free common alarm contacts with a maximum 5-amp rating can be made at terminals TB2-7 through -9.

- Terminal TB2-9 is the common contact connection.
- Terminal TB2-7 is the N.O. (normally open) contact connection.
- Terminal TB2-8 is the N.C. (normally closed) contact connection.
- The alarm relay coil is energized when power is supplied to the controller input terminals and there are no alarms.
- The coil is de-energized when power is removed or when an alarm condition exists.
- The common alarm is designed to activate on: a) either a dryer fault condition or a service reminder, or b) a dryer fault condition only. This is user selectable.
- For the common alarm to activate on either a dryer fault condition or a service reminder, the jumper at J2 is removed. This is the default configuration.

- To have the common alarm activate on a dryer fault condition only, the jumper at J2 is installed.
- Additional information on the common alarm relay logic appears in Table 7-1.

Power To Controller	Controller On or Off?	Alarm or Service Reminder	Alarm Relay Coil	Alarm N.O. Contact (TB2-7)	Alarm N.C. Contact (TB2-8)
No	N/A	N/A	De-Energized	Open	Closed
Yes	Off	N/A	Energized	Closed	Open
Yes	On	No	Energized	Closed	Open
Yes	On	Yes	De-Energized	Open	Closed

Table 7-1  
Common Alarm Relay Logic – HCL Series Controller

#### 7.2.3 Connections – Remote Start / Stop

Terminals TB1-1 and -2 are used to provide a 5 VDC output to a remote switch or volt free contacts that when closed will stop the dryer at the end of the current half cycle. The dryer will resume running at the beginning of the new half cycle when the remote switch or contacts are reopened. When dryer operation is in the remote stop state, all four tower drying (green) and regenerating (amber) LEDs flash simultaneously.

**NOTE:** Remote start / stop is disabled when the dryer is in the Manual cycle operation mode. When the dryer is in the remote stop state, the only front panel and remote selector switches (see Section 7.2.4) that remain enabled are the power on/off switches.

#### 7.2.4 Connections – Remote Switches

The controller door is equipped with four momentary-contact, push button switches. Pressing the appropriate icon printed on the display overlay actuates these switches. The display board containing the switches, display LEDs and the J2 terminal strip is mounted on the inside of the enclosure door. The terminal strip provides connection points for remotely mounted, NO (normally open), momentary-contact push buttons that provide the same function as the board mounted switches. The terminal – switch combinations are:

- Terminals J2-1 and -2 (remote switch to select ISO dew point class or manual cycle / test mode)
- Terminals J2-3 and -4 (remote switch to select % energy savings mode)
- Terminals J2-5 and -6 (remote power on / off switch)

**NOTE:** Care must be exercised in using this remote switch to stop a dryer. Closing this switch will affect the same response as a loss of power. Both purge-repressurization valves will close. On standard pressure models 4100 & 5400 and high pressure models 40 through 5400, both inlet-switching valves will open. A tower that is actively purging when the power on/off button is actuated will be subjected to a rapid repressurization that can lead to fluidization and subsequent abrasion of the desiccant bed. Ideally, dryers should only be powered off during those portions of the drying cycle when both desiccant towers are at full operating pressure. Use of the remote start/stop connections as described in Section 7.2.3 would be preferable in most cases.

- Terminals J2-7 and -8 (remote alarm reset and manual cycle increment switch)

#### 7.2.5 Connections – RS232

Refer to Figure 7-4, Panel Layouts – HCL Series Controller. RS232 connections can be made at the 3-pin connector labeled J5 and located at the upper left-hand corner of the control board. A cable for this connection can be purchased through your distributor.

### 7.3 Control Board Jumpers

Refer to Figure 7-3, Point to Point Connection Diagram – HCL Series Controller. In the upper left hand corner of the control board there are four two-pin jumpers labeled J1 through J4. The jumper is a removable bridge that is used to make or break continuity between the two pins that form a pair. When installed in the ON position, the jumper is placed on both pins of the pair and continuity between the pins is established. When installed in the OFF position, the jumper is removed or stored on a single pin and continuity is broken. Jumper functions are as follows:

#### 7.3.1 Jumper J1 – Maximum Operating Pressure

Jumper J1 is used to select the maximum operating pressure. Installed in the OFF position when operating at inlet pressures of 60 to 150 psig (4.1 to 10.3 barg). Installed in the ON position when operating at inlet pressures of 120 to 250 psig (8.3 to 17.2 barg). This setting will affect tower purge and repressurization times. (Refer to serial number tag.)

#### 7.3.2 Jumper J2 – Common Alarm.

Jumper J2 is installed in the OFF position to enable both dryer fault alarms and service alarms to activate the common alarm. This is the default configuration. Install jumper J2 in the ON position if the common alarm is to be activated by a dryer fault alarm only.

#### 7.3.3 Jumper J3 – Service Reminder Interval

Jumper J3 is used to select the service reminder interval. Installed in the OFF position when the Normal service reminder interval is desired. Installed in the ON position when the Severe service reminder interval is desired. Service items, check points and time intervals appear in Table 7-2.

##### 7.3.3.1 Filter Service

When the service interval for filters has expired the following LEDs will blink:

- Service LED (amber)
- Three filter LEDs (amber)

##### 7.3.3.2 Desiccant Service

When the service interval for desiccant has expired, the following LEDs will blink:

- Service LED (amber)
- Both tower regenerating LEDs (amber). The service function overrides the normal display of the tower regenerating LEDs.

##### 7.3.3.3 Valve Service

When the service interval for valves has expired, the following LEDs will blink:

- Service LED (amber)
- Valve LEDs (green) The service function overrides the normal display of the valve LEDs.

To extinguish the blinking LEDs and restart the timer for a new service interval, press the alarm reset button.

**NOTE:** Time continues to accumulate as long as power is supplied to the controller, whether the controller is switched on or off.

Use the following sequence to manually reset the accumulated service interval time for all timers.

- Pause for about 1 second at each instruction. If the sequence is executed too quickly it will not work.
- With the controller already on, press and hold the alarm reset button.
- Press and hold the on/off button.
- Release the on/off button.
- Release the alarm reset button. The service interval time is now reset; the maintenance LED flashes three times to acknowledge the action.

Service Item (Customer check points are listed for each item)	Normal Service Interval (J3 OFF)	Severe Service Interval (J3 ON)
<b>Filters</b> 1. Check prefilter Delta-P 2. Ensure prefilter drain is discharging 3. Check afterfilter Delta-P	4,000 Hours	2,000 Hours
<b>Desiccant</b> 1. Check moisture indicator 2. Check dryer outlet dew point 3. Inspect mufflers for excessive dusting	8,000 Hours	4,000 Hours
<b>Valves</b> 1. Ensure valves are cycling properly 2. Check for switching failure alarms 3. Inspect valves for leaks - adjust purge valve as needed	4,000 Hours	2,000 Hours

Table 7-2  
Jumper J3 – Service Reminder Intervals

#### 7.3.4 Jumper J4 – Power Recovery Mode

Jumper J4 is used to select the power recovery mode. When power to the controller is interrupted, the position of this jumper controls the recovery mode of the dryer when power is restored. Installed in the OFF position when automatic power recovery is not desired. Installed in the ON position when automatic power recovery is desired.

- Jumper J4 installed in the OFF position – Automatic power recovery is turned off. The controller returns to the off state when interrupted power to the controller is restored.
- Jumper J4 installed in the ON position – Automatic power recovery is turned on. The controller remembers its state (on or off) prior to a power interruption and returns to that state (at the beginning of the prior ISO operating cycle) when power is restored. If power is interrupted while the controller is in the Manual cycle mode, the controller will return to the prior ISO operating cycle and not the Manual cycle when power is restored.

## 7.4 Front Panel Overlay

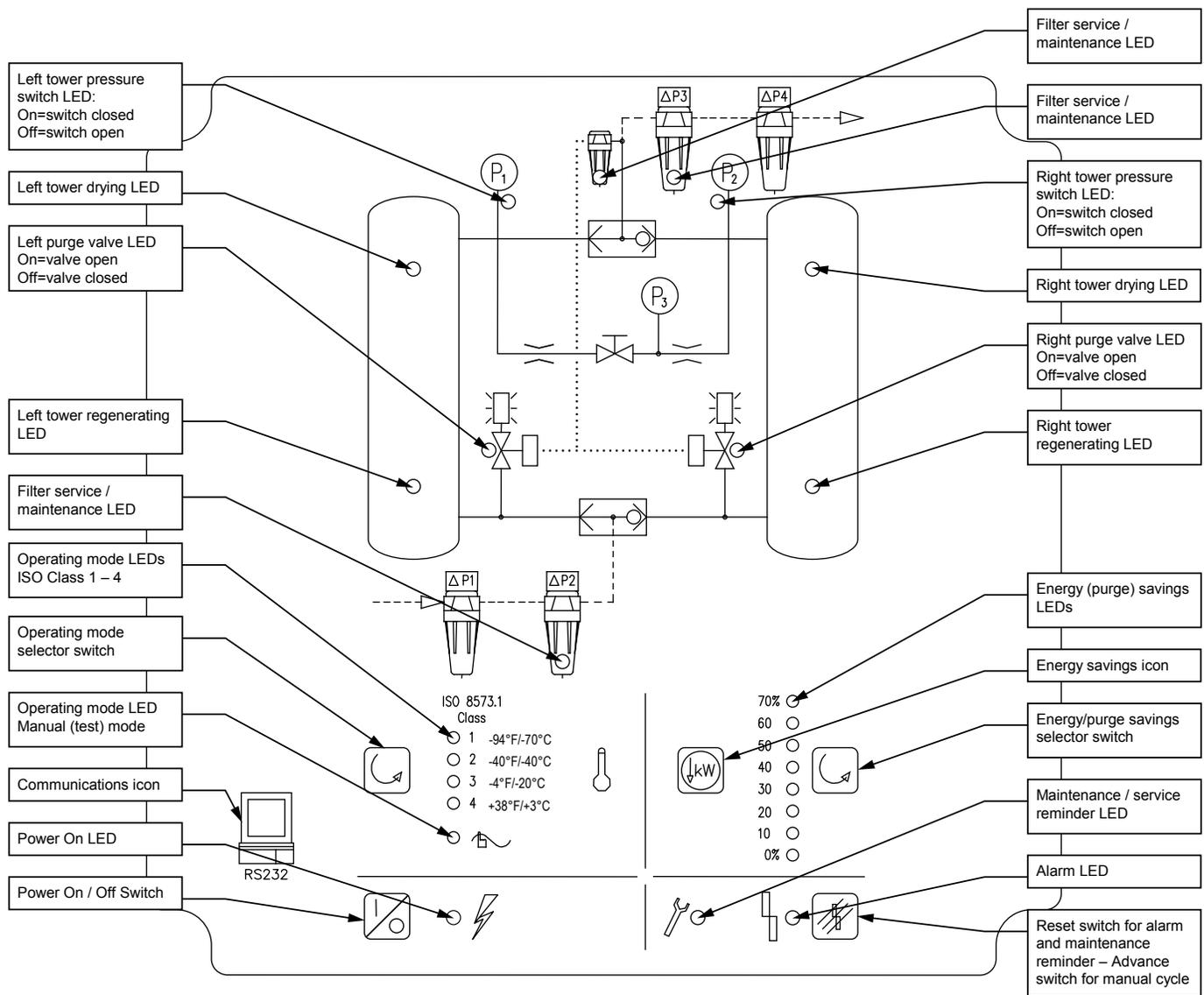


Figure 7-1

Front Panel Overlay – HCL Series Controller

(NOTE: Figure is representative of Standard Pressure Models 40 through 3000.)

(NOTE: Overlay for Standard Pressure Models 4100 & 5400 and High Pressure Models 590 through 5400 depicts a different inlet valve and outlet/purge circuit. Overlay for High Pressure Models 40 through 450 depicts a different inlet valve circuit.)

### 7.4.1 Front Panel LEDs

- Power on - green
- Alarm – red
- Service / maintenance reminder – amber
- Filters (pre, after, and pilot) service / maintenance reminders - amber
- Operating mode (ISO class / manual (test) mode) – green
- Energy (purge) savings % – green
- Purge / repressurization valve status (On = valve open; Off = valve closed) – green
- Left and right tower status (regenerating) - amber
- Left and right tower status (drying) - green
- Left and right tower pressure switch status (On = switch closed; Off = switch open) - green

### 7.4.2 Front Panel Switches

The front panel contains four momentary-contact push button switches. Refer to Figure 7-1, Front panel Overlay – HCL Series Controller for the appropriate icon associated with each switch. Pushing on the overlay icon actuates the switch. Switching can be affected remotely by wiring external push-buttons to the J2 terminals located on the rear of the display board. Refer to Section 7.2.4.

#### 7.4.2.1 Dryer On / Off Switch

This switch is used to turn the dryer on (run) or off (stop).

**CAUTION:** In the event of a loss of power, either intentional or unintentional, both purge-repressurization valves will close. On standard pressure models 4100 & 5400 and high pressure models 40 through 5400, both inlet-switching valves will open. A tower that is actively purging when the power off button is actuated will be subjected to a rapid repressurization that can lead to fluidization and subsequent abrasion of the desiccant bed. Ideally, dryers should be powered off at the end of any half cycle when both desiccant towers are at full operating pressure.

Power recovery after an external loss of power is affected by the position of control board jumper J4 (power recovery mode). Refer to Section 7.3.4 for additional information.

#### 7.4.2.2 Operating Mode Selector Switch

- Four fixed-time cycles provide varying degrees of dryness corresponding to ISO Classes 1, 2, 3, and 4.
- Manual cycle (test mode) is used for troubleshooting and startup.
- The operating mode can be changed at any time. Press the switch repeatedly until the desired mode's LED is blinking. The LED for the current mode remains illuminated until the end of the current half-cycle, at which time the new selection becomes active. At this time, the LED for the new selection switches from blinking to illuminated, and the LED for the previous selection is extinguished.
- To select Manual (test) cycle, press and hold the switch for approximately 2 seconds. The current ISO Class LED will remain illuminated and the Manual cycle mode LED will illuminate. When in the Manual cycle mode, the dryer can be advanced one step at a time using the reset/manual advance switch. Refer to section 7.4.2.4.
- **NOTE:** Button function is disabled when the remote start / stop feature has placed the dryer in the cycle interrupted (stop) mode. Refer to section 7.2.3.

### 7.4.2.3 Percent Energy / Purge Savings Selector Switch

- If dryer is operated at less than maximum flow capacity a reduction in purge air usage may be possible. Eight settings (0% to 70% in 10% increments) reduce the purge time to match the load on the dryer. Refer to the Operation Section to determine maximum inlet flow capacity at operating pressure. The Energy savings selection can be changed at any time. Press the switch repeatedly until the desired selection's LED is blinking. The LED for the current selection remains illuminated until the end of the current half-cycle, at which time the new selection becomes active. At this time, the LED for the new selection switches from blinking to illuminated, and the LED for the previous selection is extinguished.
- **Example:** If the maximum adjusted allowable inlet flow to a dryer was 1000 SCFM, but the actual flow to the inlet was only 300 SCFM, then the Energy Saving setting would be  $100\% - ((300/1000) * 100\%) = 70\%$ . At 300 SCFM, only 30% of the dryer capacity is being utilized. Average purge requirements and the related energy needed to compress that purge air can be reduced by 70%.
- **NOTE:** Button function is disabled when the remote start / stop feature has placed the dryer in the cycle interrupted (stop) mode. Refer to section 7.2.3.

#### 7.4.2.4 Reset / Manual Advance Switch

- This switch is normally used to reset an alarm or service reminder. When the Manual cycle (test) mode is selected, this switch is used to advance through the operating cycle one step at a time.

**NOTE:** Allow towers to fully repressurize before advancing to tower switchover.

### 7.4.3 Switching Failure Alarms

- When a tower does not de-pressurize, the Alarm LED, Pressure Switch LED, and Tower Regenerating LED will blink.
- When a tower does not re-pressurize, the Alarm LED, Pressure Switch LED, and Tower Drying LED will blink.
- To extinguish the blinking LEDs, correct the fault condition and press the alarm-reset button.
- Refer to Table 7-4.

## 7.5 Fixed Cycle Timing

Refer to Table 7-3 for the fixed cycle timing for the HCL Series Controller.

## 7.6 Event Sequence and Component Status

Refer to Table 7-4 for the event sequence and component status for the HCL Series Controller.

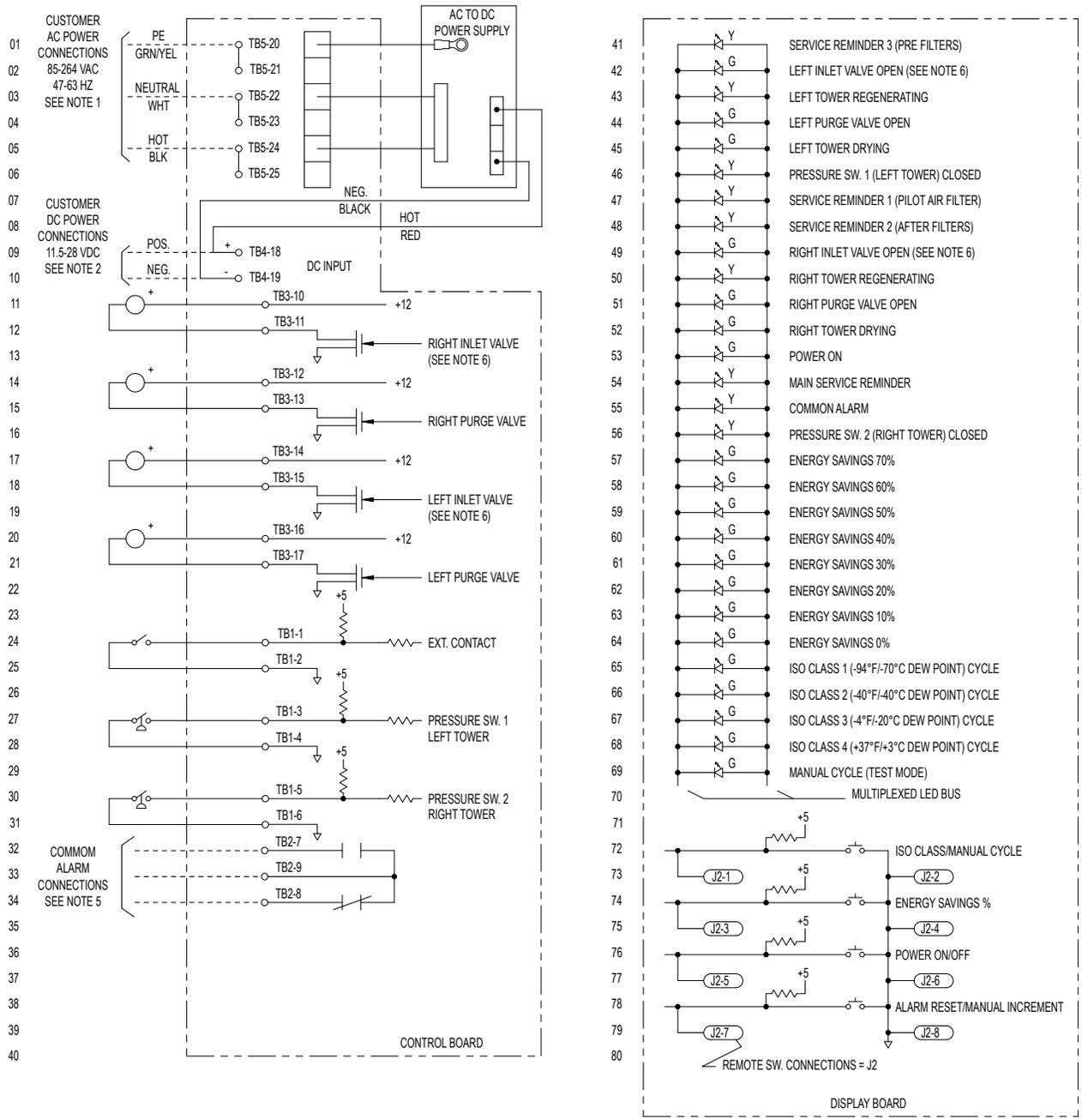
Dryer MOP		60 - 150 psig (4.1 - 10.3 barg)				120 - 250 psig (8.3 - 17.2 barg)			
ISO Class		1	2	3	4	1	2	3	4
Dew Point		-70°C	-40°C	-20°C	+3°C	-70°C	-40°C	-20°C	+3°C
		-94°F	-40°F	-4°F	+38°F	-94°F	-40°F	-4°F	+38°F
Cycle Time (minutes)		4	10	16	24	4	10	16	24
Time	Energy (Purge) Savings Settings	Time from start of cycle (minutes : seconds)				Time from start of cycle (minutes : seconds)			
t0	all	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
t1	all	00:02	00:02	00:02	00:02	00:02	00:02	00:02	00:02
t2	all	00:06	00:06	00:06	00:06	00:06	00:06	00:06	00:06
t3	70%	00:26	01:16	02:09	03:19	00:19	00:58	01:46	02:52
	60%	00:32	01:40	02:50	04:24	00:23	01:16	02:20	03:48
	50%	00:39	02:03	03:31	05:28	00:27	01:33	02:53	04:43
	40%	00:46	02:26	04:11	06:32	00:31	01:50	03:26	05:38
	30%	00:52	02:50	04:52	07:37	00:35	02:08	04:00	06:34
	20%	00:59	03:13	05:33	08:41	00:40	02:25	04:33	07:29
	10%	01:05	03:37	06:14	09:46	00:44	02:43	05:07	08:25
	0%	01:12	04:00	06:55	10:50	00:48	03:00	05:40	09:20
t4	all	02:00	05:00	08:00	12:00	02:00	05:00	08:00	12:00
t5	all	02:02	05:02	08:02	12:02	02:02	05:02	08:02	12:02
t6	all	02:06	05:06	08:06	12:06	02:06	05:06	08:06	12:06
t7	70%	02:26	06:16	10:09	15:19	02:19	05:58	09:46	14:52
	60%	02:32	06:40	10:50	16:24	02:23	06:16	10:20	15:48
	50%	02:39	07:03	11:31	17:28	02:27	06:33	10:53	16:43
	40%	02:46	07:26	12:11	18:32	02:31	06:50	11:26	17:38
	30%	02:52	07:50	12:52	19:37	02:35	07:08	12:00	18:34
	20%	02:59	08:13	13:33	20:41	02:40	07:25	12:33	19:29
	10%	03:05	08:37	14:14	21:46	02:44	07:43	13:07	20:25
	0%	03:12	09:00	14:55	22:50	02:48	08:00	13:40	21:20
t8	all	04:00	10:00	16:00	24:00	04:00	10:00	16:00	24:00
Reference Data									
Purge time (min:sec) at 0% Energy Savings settings [(t3-t2) or (t7-t6)]		01:06	03:54	06:49	10:44	00:42	02:54	05:34	09:14
Repressurization time (min:sec) at 0% Energy Savings settings [(t4-t3) or (t8-t7)]		00:48	01:00	01:05	01:10	01:12	02:00	02:20	02:40

Table 7-3  
Fixed Cycle Timing – HCL Series Controller

Process valve name (Process valve state w/ de-energized pilot solenoid valve)	Time (refer to Table 7-3)								
	t0	t1	t2	t3	t4	t5	t6	t7	t8
	Left Tower Drying Right Tower Regenerating Half Cycle				Right Tower Drying Left Tower Regenerating Half Cycle				
Left purge valve (normally closed)							Pilot Energized (open)		
Left inlet valve (normally open) (See NOTE 1)							Pilot Energized (closed)		
Right inlet valve (normally open) (See NOTE 1)		Pilot Energized (closed)							
Right purge valve (normally closed)			Pilot Energized (open)						
Normal status of pressure switches									
Left tower pressure switch	closed	closed	closed	closed	closed	closed	closed	closed for < 5 sec. then open	open at t7, closed before t8
Right tower pressure switch	closed	closed	closed for < 5 sec. then open	open at t3, closed before t4	closed	closed	closed	closed	closed
Pressure switch status that causes an alarm									
Left tower drying Low tower pressure <sup>a</sup>			open <sup>1</sup>	open <sup>1</sup>					
Left tower regenerating Fail to de-pressurize <sup>b</sup>							closed <sup>1</sup>		
Left tower regenerating Fail to re-pressurize <sup>c</sup>									open <sup>2</sup>
Right tower drying Low tower pressure <sup>d</sup>							open <sup>1</sup>		open <sup>1</sup>
Right tower regenerating Fail to de-pressurize <sup>e</sup>			closed <sup>1</sup>						
Right tower regenerating Fail to re-pressurize <sup>f</sup>				open <sup>2</sup>					
NOTE	Stop cycle on fault	Comments							
<b>1: Check for fault condition at 15, 25, 35,... seconds into half-cycle</b>	no	If the fault condition is clear for 2 cycles: the alarm LED stays on (without blinking); the tower and pressure switch LEDs stop blinking (return to normal operation). Once the fault condition is clear, pressing the reset button will clear the alarm LED (and the tower and pressure switch LEDs if they are still blinking).							
<b>2: Check for fault condition just before the end of the half-cycle</b>	yes	If the fault condition clears: resume cycling; the alarm LED stays on (without blinking); the pressure switch LED stops blinking (returns to normal operation). Once the fault condition is clear, pressing the reset button will clear the alarm LED.							
a: Blink the following LEDs: Alarm + P1 + Left tower drying									
b: Blink the following LEDs: Alarm + P1 + Left tower regenerating									
c: Blink the following LEDs: Alarm + P1									
d: Blink the following LEDs: Alarm + P2 + Right tower drying									
e: Blink the following LEDs: Alarm + P2 + Right tower regenerating									
f: Blink the following LEDs: Alarm + P2									

**NOTE 1:** Standard Pressure Models 4100 & 5400 ONLY. High Pressure Models 40 through 5400.

Table 7-4  
Event Sequence and Component Status – HCL Series Controller



**NOTES:**

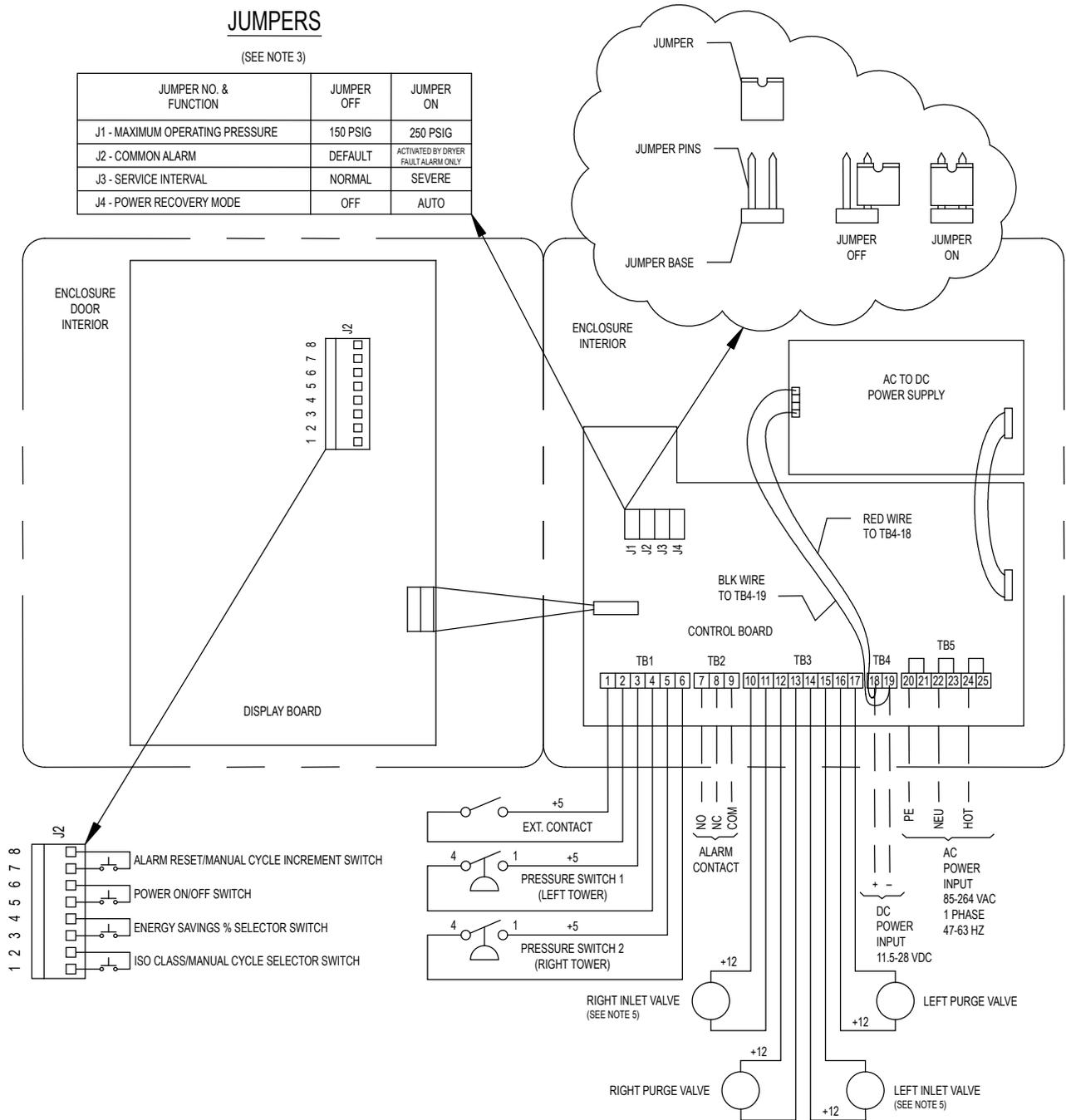
1. CUSTOMER POWER CONNECTIONS WHEN SUPPLY VOLTAGE IS AC (ALTERNATING CURRENT). TERMINALS TB5-21, TB5-23 AND TB5-25 CAN BE USED TO PROVIDE ACCESSORY POWER AT THE SAME VOLTAGE AND FREQUENCY. AC POWER IS DIRECTED TO POWER SUPPLY BOARD WHERE IT IS CONVERTED TO 12 VDC AND RETURNED TO THE CONTROL BOARD.
2. CUSTOMER POWER CONNECTIONS WHEN SUPPLY VOLTAGE IS DC (DIRECT CURRENT). RED AND BLACK WIRES FROM THE POWER SUPPLY BOARD SHOULD BE REMOVED AND THE CUSTOMER SHOULD MAKE THEIR POWER CONNECTIONS AT TERMINALS TB4-18 AND TB4-19.
3. VOLTAGE RATING OF VALVES IS 12 VDC.
4. VOLTAGE RATING OF SWITCHES IS 5 VDC.
5. WITH UNIT ON AND NO ALARMS, THERE SHOULD BE CONTINUITY BETWEEN TERMINALS TB2-7 AND TB2-9.
6. STANDARD PRESSURE MODELS 4100 & 5400 ONLY. HIGH PRESSURE MODELS 40 THROUGH 5400.

Figure 7-2  
Electrical Schematic – HCL Series Controller

# JUMPERS

(SEE NOTE 3)

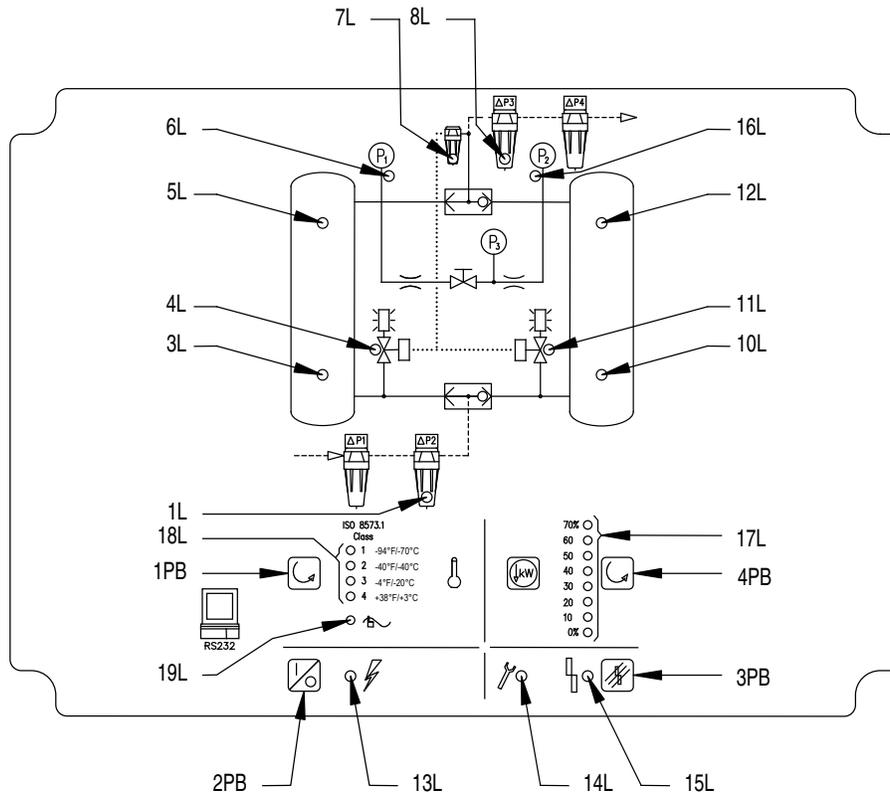
JUMPER NO. & FUNCTION	JUMPER OFF	JUMPER ON
J1 - MAXIMUM OPERATING PRESSURE	150 PSIG	250 PSIG
J2 - COMMON ALARM	DEFAULT	ACTIVATED BY DRYER FAULT ALARM ONLY
J3 - SERVICE INTERVAL	NORMAL	SEVERE
J4 - POWER RECOVERY MODE	OFF	AUTO



## NOTES:

- SEE FIGURE 7-5 FOR RECOMMENDED AWG CONDUCTOR SIZES.
- CUSTOMER SUPPLIED AC (ALTERNATING CURRENT) INPUT POWER CONNECTIONS SHOULD BE MADE AT TERMINALS TB5-21, TB5-23 AND TB5-25. FOR CUSTOMER SUPPLIED DC (DIRECT CURRENT) POWER, THE RED AND BLACK WIRES FROM THE POWER SUPPLY BOARD SHOULD BE REMOVED AND THE CUSTOMER POWER CONNECTIONS SHOULD BE MADE AT TERMINALS TB4-18 AND TB4-19..
- IN THE "JUMPER OFF" POSITION, THE JUMPER CAN BE COMPLETELY REMOVED OR STORED ON A SINGLE PIN. IN THE "JUMPER ON" POSITION, THE JUMPER IS INSTALLED ACROSS BOTH PINS TO PROVIDE CONTINUITY.
- WITH UNIT ON AND NO ALARMS, THERE SHOULD BE CONTINUITY BETWEEN TERMINALS TB2-7 AND TB2-9.
- STANDARD PRESSURE MODELS 4100 & 5400 ONLY. HIGH PRESSURE MODELS 40 THROUGH 5400.

Figure 7-3  
Point-to-Point Connection Diagram - HCL Series Controller



### ENCLOSURE DOOR EXTERIOR

#### LEGEND

CR	COMMON ALARM RELAY	12L	RIGHT TWR. DRYING (GREEN)	1PB	ISO CLAS/MANUAL CYCLE SELECTOR SWITCH
1L	SERVICE REMINDER 3 - PREFILTERS (AMBER)	13L	POWER ON LED (GREEN)	2PB	POWER ON/OFF SWITCH
3L	LEFT TOWER REGEN. (AMBER)	14L	MAIN SERVICE REMINDER (AMBER)	3PB	ALARM RESET/MANUAL CYCLE INCREMENT SWITCH
4L	LEFT PURGE VALVE OPEN (GREEN)	15L	COMMON ALARM (RED)	4PB	ENERGY SAVINGS % SELECTOR SWITCH
5L	LEFT TOWER DRYING (GREEN)	16L	PRESS. SWITCH 2 - R. TWR. CLOSED (GREEN)	RS232	SERIAL I/O CONNECTION
6L	PRESS. SWITCH 1 - L. TWR. CLOSED (GREEN)	17L	ENERGY SAVINGS % LEDS (GREEN)	PS	AC TO DC POWER SUPPLY
7L	SERVICE REMINDER 1 - PILOT AIR FILTER (AMBER)	18L	ISO CLASS (DEW POINT) CYCLE LEDS (GREEN)	J2	REMOTE SWITCH TERMINALS
8L	SERVICE REMINDER 2 - AFTERFILTERS (AMBER)	19L	MANUAL CYCLE (TEST MODE) LED (GREEN)	TB1	EXTERNAL CONTROL INPUT TERMINALS
10L	R. TWR REGEN. (AMBER)	CNTRLPCB	CONTROL BOARD	TB2	COMMON ALARM CONTACT TERMINALS
11L	RIGHT PURGE VALVE OPEN (GREEN)	DISPCB	DISPLAY BOARD	TB3	VALVE OUTPUT TERMINALS
		JMP	CONFIGURATION JUMPERS	TB4	DC POWER INPUT TERMINALS
				TB5	AC POWER INPUT TERMINALS

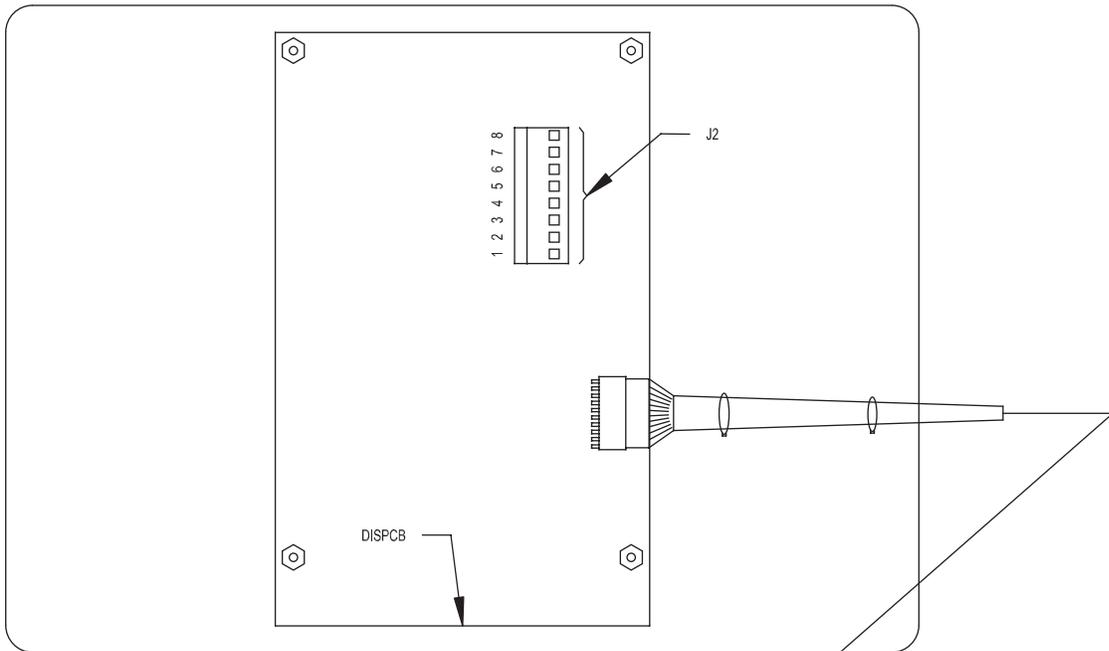
Figure 7-4

#### Panel Layouts – HCL Series Controller

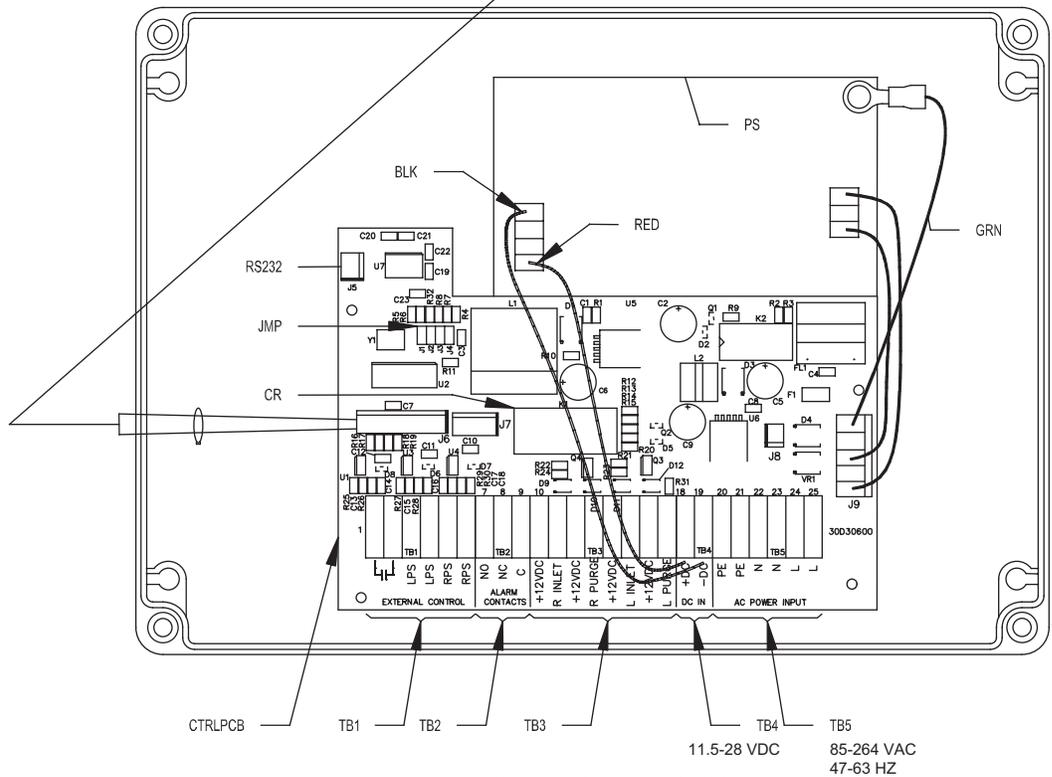
(NOTE: Figure is representative of Standard Pressure Models 40 through 3000.)

(NOTE: Overlay for Standard Pressure Models 4100 & 5400 and High Pressure Models 590 through 5400 depicts a different inlet valve and outlet/purge circuit. Overlay for High Pressure Models 40 through 450 depicts a different inlet valve circuit.)

(continued on next page)



**ENCLOSURE DOOR INTERIOR**

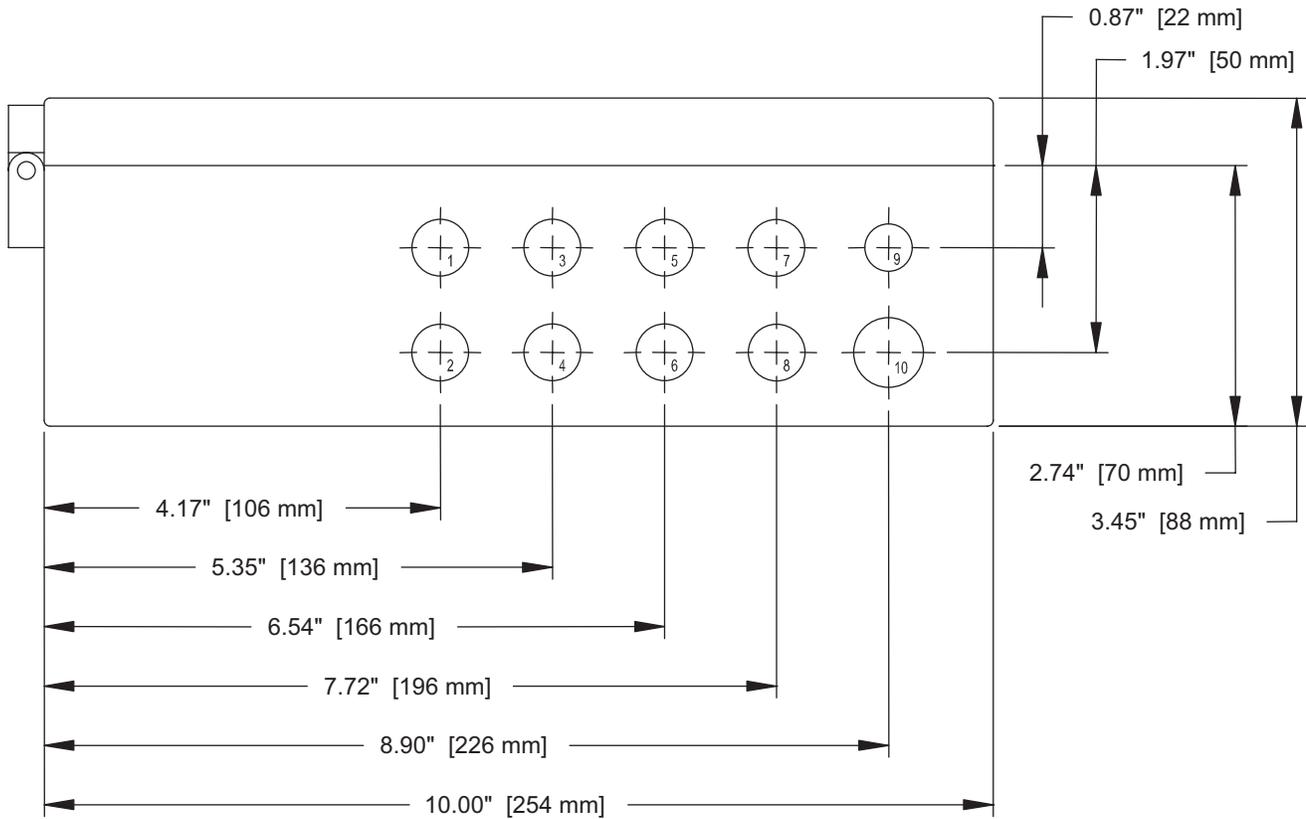


**ENCLOSURE INTERIOR**

Figure 7-4  
Panel Layouts - HCL Series Controller  
(continued from previous page)

LOCATION	FUNCTION		# OF CONDUCTORS	AWG SIZE	CABLE DIAMETER RANGE				CONNECTOR SIZE	ENCLOSURE HOLE DIA.	
					MIN. DIA.		MAX. DIA.			in.	mm
					in.	mm	in.	mm			
1	FACTORY CONNECTIONS STANDARD DEVICES	PRESSURE SWITCH - RIGHT TOWER	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
2		PRESSURE SWITCH - LEFT TOWER	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
3		SOLENOID - LEFT PURGE VALVE	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
4		SOLENOID - LEFT INLET VALVE*	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
5		SOLENOID - RIGHT PURGE VALVE	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
6		SOLENOID - RIGHT INLET VALVE*	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
7	USER CONNECTIONS	ALARM CONTACTS	2	16	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
8		REMOTE STOP / START	2	16	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
9		RS232	3	22	0.114	2.9	0.250	6.4	PG-7	0.492	12.5
10		INPUT POWER	3	14	0.230	5.8	0.395	10.0	PG-11	0.733	18.6

\* STANDARD PRESSURE MODELS 4100 & 5400 ONLY. HIGH PRESSURE MODELS 40 THROUGH 5400.



**BOTTOM VIEW - HINGE LEFT**

Figure 7-5  
Enclosure Penetrations - HCL Series Controller

## 8.0 HCS SERIES CONTROLLER

This section provides connection, adjustment and operational information for the HCS Series Controller featuring the APSS, Automatic Purge Saving System. Similar information can be found in Section 7 for the HCL Series Controller - Fixed Cycle Controller.

### 8.1 Reference Figures

- Figure 8-1, Front Panel Overlay – HCS Series Controller
- Figure 8-2, Dryer Status Menu – HCS Series Controller
- Figure 8-3, Alarm History Menu – HCS Series Controller
- Figure 8-4, Temperature Display Menu – HCS Series Controller
- Figure 8-5, Mode Menu – HCS Series Controller
- Figure 8-6, Configuration Menu – HCS Series Controller
  - Figure 8-6a, Language Menu
  - Figure 8-6b, Date & Time Menu
  - Figure 8-6c, Auto-Restart Menu
  - Figure 8-6d, Service Interval Menu
  - Figure 8-6e, Cycle Counter Menu
  - Figure 8-6f, Network Menu
  - Figure 8-6g, Inlet Air Temperature Set Point Menu
  - Figure 8-6h, Outlet Air Pressure Set Point Menu
  - Figure 8-6i, Outlet Dew Point Menu
- Figure 8-7, Alarm Screens – HCS Series Controller
- Figure 8-8, Manual Mode Screens – HCS Series Controller
- Figure 8-9, Electrical Schematic – HCS Series Controller
- Figure 8-10, Point-to-Point Diagram – HCS Series Controller
- Figure 8-11, Panel Layouts – HCS Series Controller
- Figure 8-12, Enclosure Penetrations – HCS Series Controller

### 8.2 Connections

See Figure 8-12, Enclosure Penetrations for the location, size and function of the various cable and cord connectors that are provided on the bottom of the HCS Series Controller enclosure.

#### 8.2.1 Connections - Input Power

##### 8.2.1.1 VAC Input Power Connections

Single-phase, alternating current (AC) input power connections ranging from 90–277 VAC and 47–63 Hz. can be made at terminals J68, J66, and J64. See reference figures for proper polarity. These terminals are connected to accessory output terminals J67, J65, and J63 respectively. Accessory output terminals can be used to direct power at the same voltage and frequency to external devices.

**CAUTION:** Accessory output terminals are NOT controlled by the power on/off switch and are always energized when power is provided to terminals J68, J66, and J64.

##### 8.2.1.2 VDC Power Connections

- The control and display boards operate on low-voltage direct current. The controller is provided pre-wired with an AC to 12 VDC power supply board. For users with AC power as described in Section 8.2.1.1, their AC input is directed to the power supply board where it is conditioned and returned to the control board as 12 VDC at terminals J61 and J62.
- For users with direct current (DC) input power ranging from 11.5 to 28 VDC, use of the AC to DC power supply board is not needed and their connections can be made at terminals J61 and J62 by first removing the black and red leads coming from the power supply board. See reference figures for proper polarity.

#### 8.2.2 Connections – Common Alarm Contacts

Connections to voltage-free common alarm contacts with a minimum 5-amp rating can be made at terminals J41 through J43.

- Terminal J43 is the common contact connection.
- Terminal J41 is the N.O. (normally open) contact connection.
- Terminal J42 is the N.C. (normally closed) contact connection.
- The alarm relay coil is energized when power is supplied to the controller input terminals and there are no alarms.
- The coil is de-energized when power is removed or when an alarm condition exists.
- The common alarm is designed to activate on: a) either a dryer fault condition or a service reminder, or b) a dryer fault condition only. This is user selectable.
- For the common alarm to activate on either a dryer fault condition or a service reminder, DIP Switch 6 is in the OFF position. This is the default configuration.
- To have the common alarm activate on a dryer fault condition only, DIP Switch 6 is in the ON position.
- Additional information on the common alarm relay logic appears in Table 8-1.

Power To Controller?	Controller On or Off?	Alarm or Service Reminder	Alarm Relay Coil	Alarm N.O. Contact (J41)	Alarm N.C. Contact (J42)
No	N/A	N/A	De-Energized	Open	Closed
Yes	Off	N/A	Energized	Closed	Open
Yes	On	No	Energized	Closed	Open
Yes	On	Yes	De-Energized	Open	Closed

Table 8-1  
Common Alarm Relay Logic – HCS Series Controller

#### 8.2.3 Connections – Remote Start / Stop

Terminals J19 and J20 are used to provide a 5 VDC output to a remote switch or volt free contacts that when closed will stop the dryer at the end of the current half cycle. The dryer will resume running at the beginning of the new half cycle when the remote switch or contacts are reopened. When dryer operation is in the remote stop state, all four tower drying (green) and regenerating (amber) LEDs flash simultaneously.

**NOTE:** Remote start / stop is disabled when the dryer is in the Manual cycle operation mode. When the dryer is in the remote stop state, the only front panel and remote selector switches (see Section 8.2.4) that remain enabled are the power on/off switches.

#### 8.2.4 Connections – Remote Switches

The controller door is equipped with four momentary-contact, push button switches. Pressing on the appropriate icon printed on the display overlay actuates these switches. The display board containing the switches, display LEDs, text display, and the RPB (J10) terminal strip is mounted on the inside of the enclosure door. The terminal strip provides connection points for remotely mounted, NO (normally open), momentary-contact push buttons that provide the same function as the board mounted switches. The terminal – switch combinations are:

- Terminals J10-1 and J10-2 (Remote “SELECT” switch)
- Terminals J10-3 and J10-4 (Remote “ENTER” switch)
- Terminals J10-5 and J10-6 (Remote Power On / Off Switch)
- Terminals J10-7 and J10-8 (Remote Alarm Reset Switch)

### 8.3 Control Board DIP Switches

Refer to Figure 8-10, Point to Point Connection Diagram – HCS Series Controller. On the left side of the CPU board there are eight DIP Switches labeled 1 through 8.

DIP Switch	Description	ON	OFF
1	Maximum Operating Pressure	17 BARG (250 PSIG)	10 BARG (150 PSIG)
2	Remote Start/Stop	Modbus	Digital input
3	Inlet Air Temperature Sensor	Enabled	Disabled
4	Outlet Air Pressure Sensor	Enabled	Disabled
5	Pressure Switches	Disabled	Enabled
6	Service Alarms	Disabled	Enabled
7	Outlet Dew Point Sensor	Enabled	Disabled
8	Reserved	N/A	N/A

Table 8-2  
DIP Switch Settings – HCS Series Controller

DIP Switch functions are as follows:

#### 8.3.1 DIP Switch 1 – Maximum Operating Pressure

- DIP Switch 1 is used to select the maximum operating pressure. Set DIP Switch 1 in the OFF position when operating at inlet pressures of 60 to 150 psig (4.1 to 10.3 barg). Set DIP Switch 1 in the ON position when operating at inlet pressures of 120 to 250 psig (8.3 to 17.2 barg).
- This setting will affect tower purge and repressurization times.

#### 8.3.2 DIP Switch 2 – Remote Start-Stop

- DIP Switch 2 is used to select the Remote Start-Stop source.
- DIP Switch 2 is set in the ON position for Remote Start-Stop operation through Modbus. It is set in the OFF position for Remote Start-Stop operation through Digital Inputs.

#### 8.3.3 DIP Switch 3 – Inlet Air Temperature Sensor

- DIP Switch 3 is set to the ON position when an Inlet Air Temperature Sensor is installed. DIP Switch 3 is set to the OFF position when an Inlet Air Temperature Sensor is not installed.

#### 8.3.4 DIP Switch 4 – Outlet Air Pressure Sensor

- DIP Switch 4 is set to the ON position when an Outlet Pressure Sensor is installed. DIP Switch 4 is set to the OFF position when an Outlet Pressure Sensor is not installed.

#### 8.3.5 DIP Switch 5 – Pressure Switches

- DIP Switch 5 is set in the OFF position to enable Switching Failure. This is the default configuration. DIP Switch 5 is set in the ON position if Switching Failure is disabled.

#### 8.3.6 DIP Switch 6 – Common Alarm.

- DIP Switch 6 is set in the OFF position to enable both dryer fault alarms and service alarms to activate the common alarm. This is the default configuration. DIP Switch 6 is set in the ON position if the common alarm is to be activated by a dryer fault alarm only.

#### 8.3.7 DIP Switch 7 – Outlet Dew Point Sensor

- DIP Switch 7 is set to the ON position when an Outlet Dew Point Transmitter is installed. DIP Switch 7 is set to the OFF position when an Outlet Dew Point Transmitter is not installed.

**NOTE:** Energy Management can co-exist with the Dew Point Transmitter option. Dryer control based on the Energy Management or Dew Point Control is selected on Screen 1 of the Set Up Mode.

If Dew Point Control is not selected then the dew point signal does not control the dryer cycle but still serves a monitoring and alarm function.

### 8.3.8 DIP Switch 8 – Unused.

## 8.4 Front Panel Overlay

Refer to Figure 8-1, Front Panel Overlay – HCS Series Controller for information regarding the location and function of the LEDs, switches, and text display.

### 8.4.1 Front Panel LEDs

- Power on – green (constant when controller is switched on; flashing when controller is energized but switched off.)
- Alarm – red
- Service/maintenance reminder – amber
- Filters (pre, after, and pilot) service/maintenance reminders - amber
- Purge / repressurization valve status (On = valve open; Off = valve closed) – green
- Left and right tower status (regenerating) - amber
- Left and right tower status (drying) - green
- Left and right tower pressure switch status (On = switch closed; Off = switch open) – green

### 8.4.2 Front Panel Switches

The front panel contains four momentary-contact push button switches. Refer to Figure 8-1, Front Panel Overlay – HCS Series Controller for the appropriate icon associated with each switch. Pushing on the overlay icon actuates the switch. Switching can be affected remotely by wiring external push-buttons to the RPB (J10) terminals located on the rear of the display board. Refer to Section 8.2.4.

#### 8.4.2.1 Dryer On / Off Switch

This switch is used to turn the dryer on (run) or off (stop).

**CAUTION:** In the event of a loss of power, either intentional or unintentional, both purge-repressurization valves will close. On standard pressure models 4100 & 5400 and high pressure models 40 through 5400, both inlet-switching valves will open. Ideally, dryers should be powered off at the end of any half cycle when both desiccant towers are at full operating pressure.

Power recovery after an external loss of power is affected by the programming of the auto restart mode (Configuration Menu). Refer to Section 8.11 for additional information.

#### 8.4.2.2 SELECT Switch

This button is located to the left of the text display window. Refer to Section 8.6 for additional information.

#### 8.4.2.3 ENTER Switch

This button is located to the right of the text display window. Refer to Section 8.6 for additional information.

#### 8.4.2.4 Alarm Reset Switch

This switch is normally used to reset an alarm or service reminder. Refer to Section 8.8 for additional information.

## 8.5 Event Sequence and Component Status

Refer to Tables 8-3 and 8-4 for the event sequence, timing and component status for the HCS Series Controller.

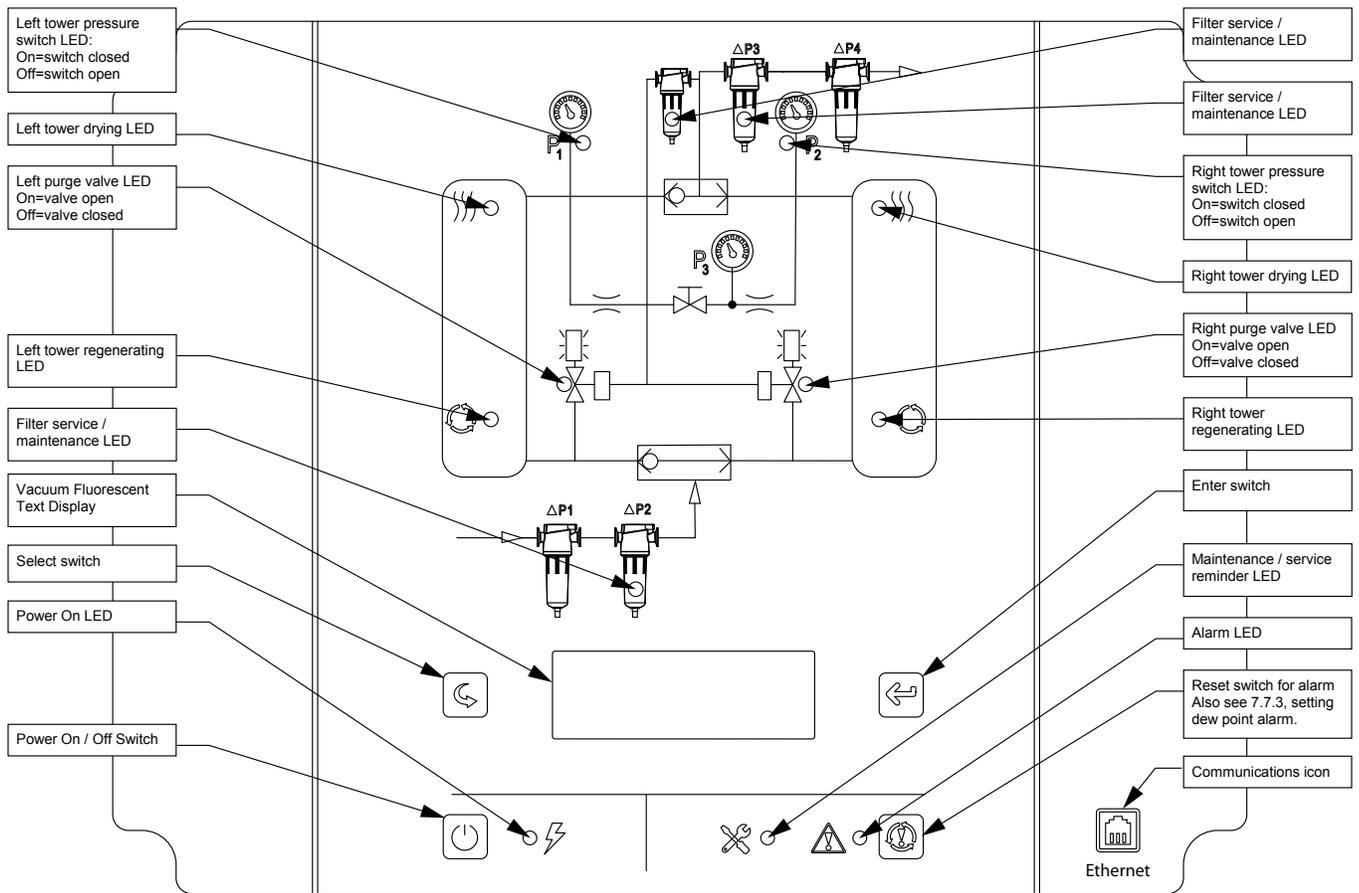


Figure 8-1  
 Front Panel Overlay – HCS Series Controller  
 (NOTE: Figure is representative of Standard Pressure Models 40 through 3000.)  
 (NOTE: Overlay for Standard Pressure Models 4100 & 5400 and High Pressure Models 590 through 5400 depicts a different inlet valve and outlet/purge circuit. Overlay for High Pressure Models 40 through 450 depicts a different inlet valve circuit.)

## 8.6 Front Panel Operation

1. There are five menus for the HCS Series Controller.
  - A. Dryer Status Menu
  - B. Alarm History Menu
  - C. Temperature Display Menu
  - D. Mode Menu
  - E. Configuration Menu
2. Each menu is described in the following pages.

## 8.7 Dryer Status Menu (Figure 8-2)

1. The dryer status menu is the first menu that becomes active when the user presses the power button.
2. The dryer status menu comprises several screens which can be cycled through when the operator presses the select button.
3. The screens are displayed in the sequence they are listed in below:
  - A. Dryer State Screen – Shows the state of the dryer and indicates which step each tower is in.
  - B. Dryer Mode Screen – Shows the ISO class selection and operating mode selection.
  - C. Energy Savings – Shows energy savings only when energy savings operating mode is selected.
  - D. Filter Service Timer – Shows time remaining until filter service is recommended.
    - i. Press and hold alarm reset button for 3 seconds to reset service timer.
  - E. Valve Service Timer – Shows time remaining until valve service is recommended.
    - i. Press and hold alarm reset button for 3 seconds to reset service timer.
  - F. Desiccant Service Timer – Shows time remaining until desiccant service is recommended.
    - i. Press and hold alarm reset button for 3 seconds to reset service timer.
  - G. Alarm Status – Shows any active alarms.
  - H. Alarm History – Press enter to access the alarm history menu.
  - I. Temperature Data – Press enter to access the temperature display menu.

## 8.8 Alarm History Menu (Figure 8-3)

1. Press the enter button on the alarm history screen in the dryer status menu to enter the alarm history menu.
2. The alarm history menu shows the alarm # in the first-in-first-out queue, the timestamp of when the alarm occurred, and the alarm message text.
3. Press the select button to cycle thru the alarm history messages.
4. Press the alarm reset button to acknowledge all unacknowledged alarms.
5. Press and hold the alarm reset button for 3 seconds to reset the alarm history.
6. Press the enter button to return to the dryer status menu.

## 8.9 Temperature Display Menu (Figure 8-4)

1. Press the enter button on the temperature display screen in the dryer status menu to enter the temperature display menu
2. Press the select button to cycle thru the temperature readings
3. Press the enter button to return to the dryer status menu.

## 8.10 Mode Menu (Figure 8-5)

1. Press and hold the enter button for 3 seconds to enter the mode menu.
2. The following options are available in the mode menu:
  - A. ISO Dew point selection.
    - i. ISO Class 1: -70°C / -94°F
    - ii. ISO Class 2: -40°C / -40°F
    - iii. ISO Class 3: -20°C / -4°F
  - B. Dryer cycle type selection
    - i. Manual Cycle
    - ii. Fixed Cycle
    - iii. Demand Cycle
    - iv. Dew Point Cycle
  - C. Drain test
    - i. No
    - ii. Yes
3. Press the select button to cycle thru selections for the current mode menu item.
4. Press the enter button to apply the setting and move to the next mode menu item.
5. Pressing enter on the last mode menu item will return to the dryer status menu.

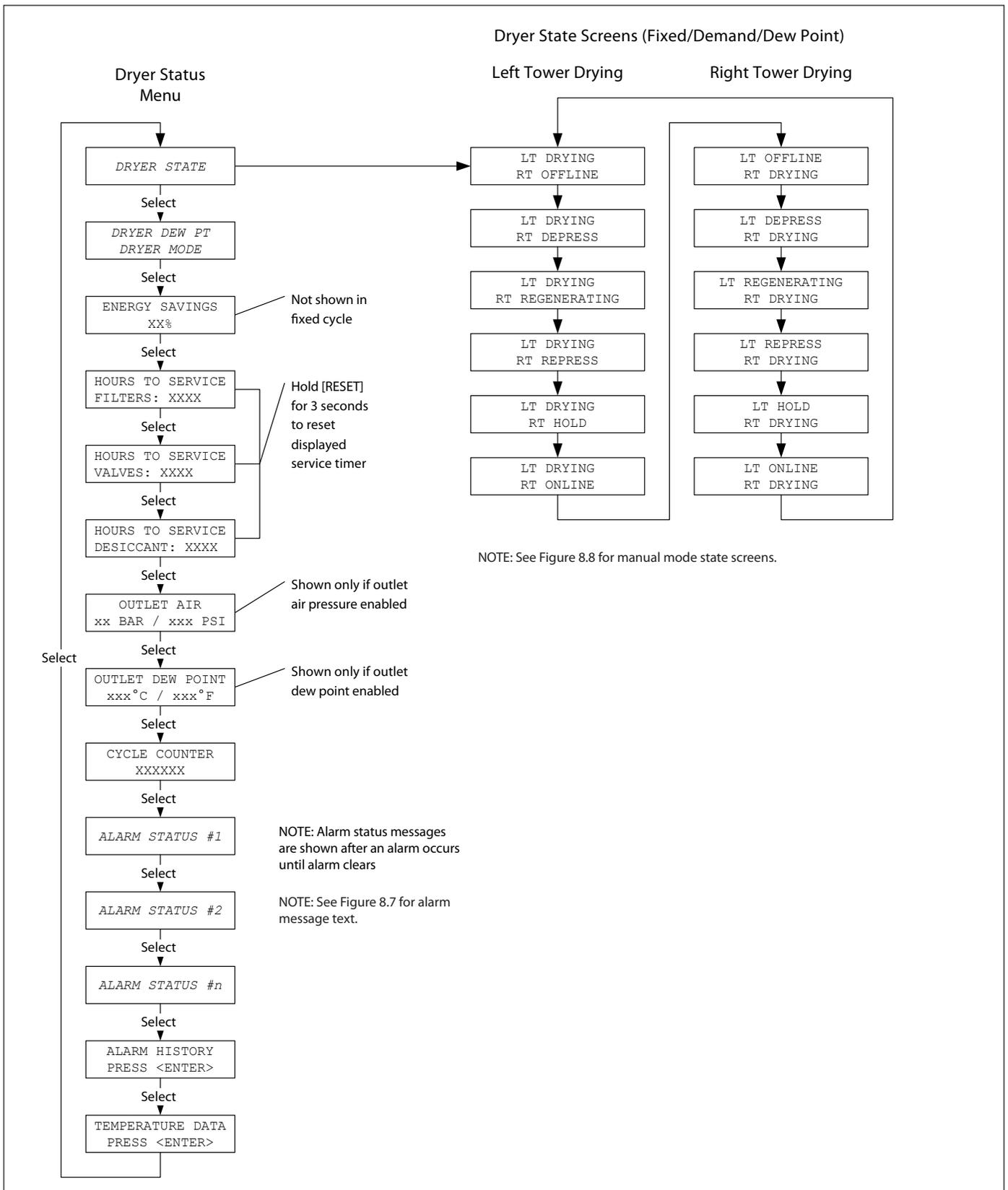


Figure 8-2  
Dryer Status Menu – HCS Series Controller

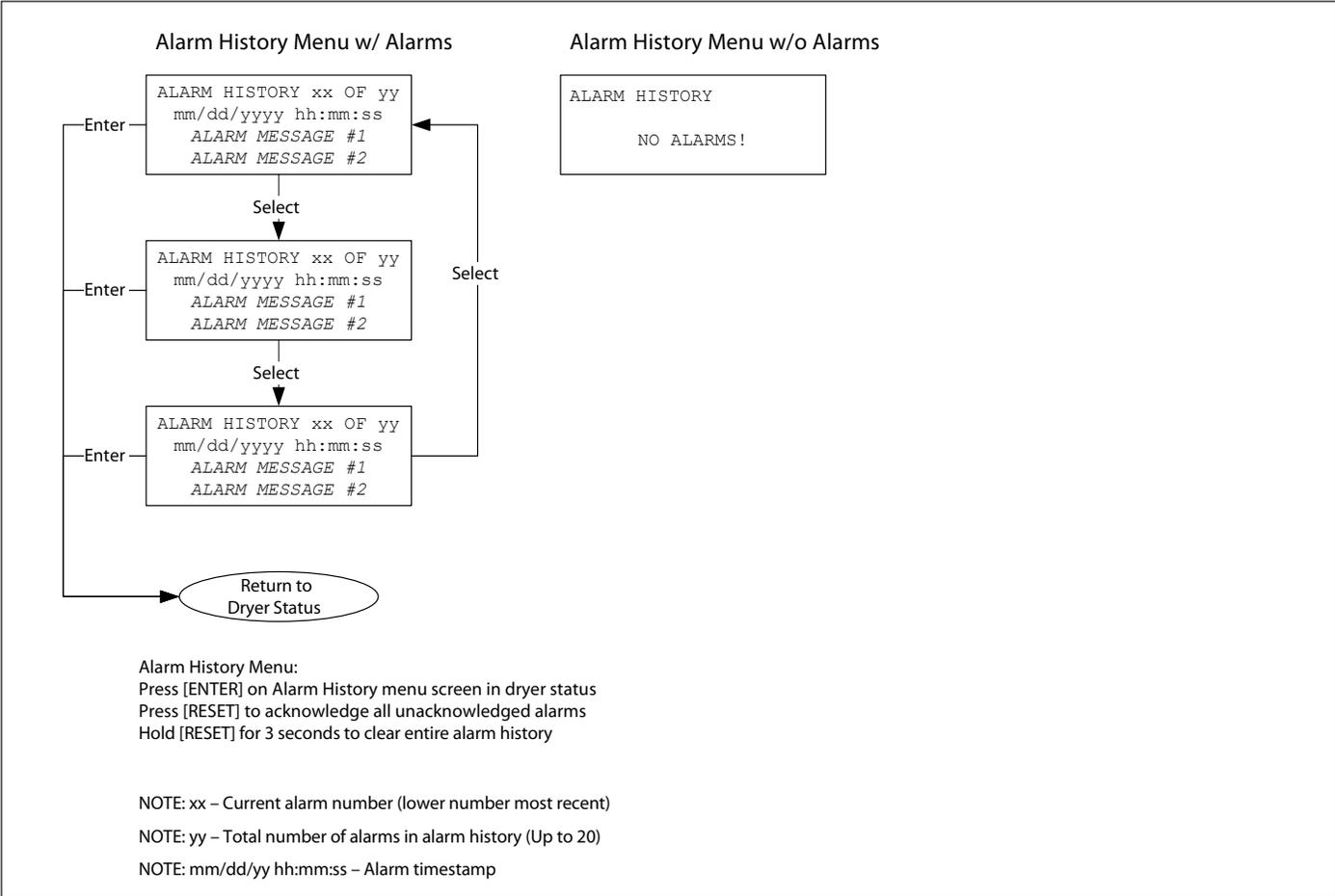


Figure 8-3  
 Alarm History Menu – HCS Series Controller

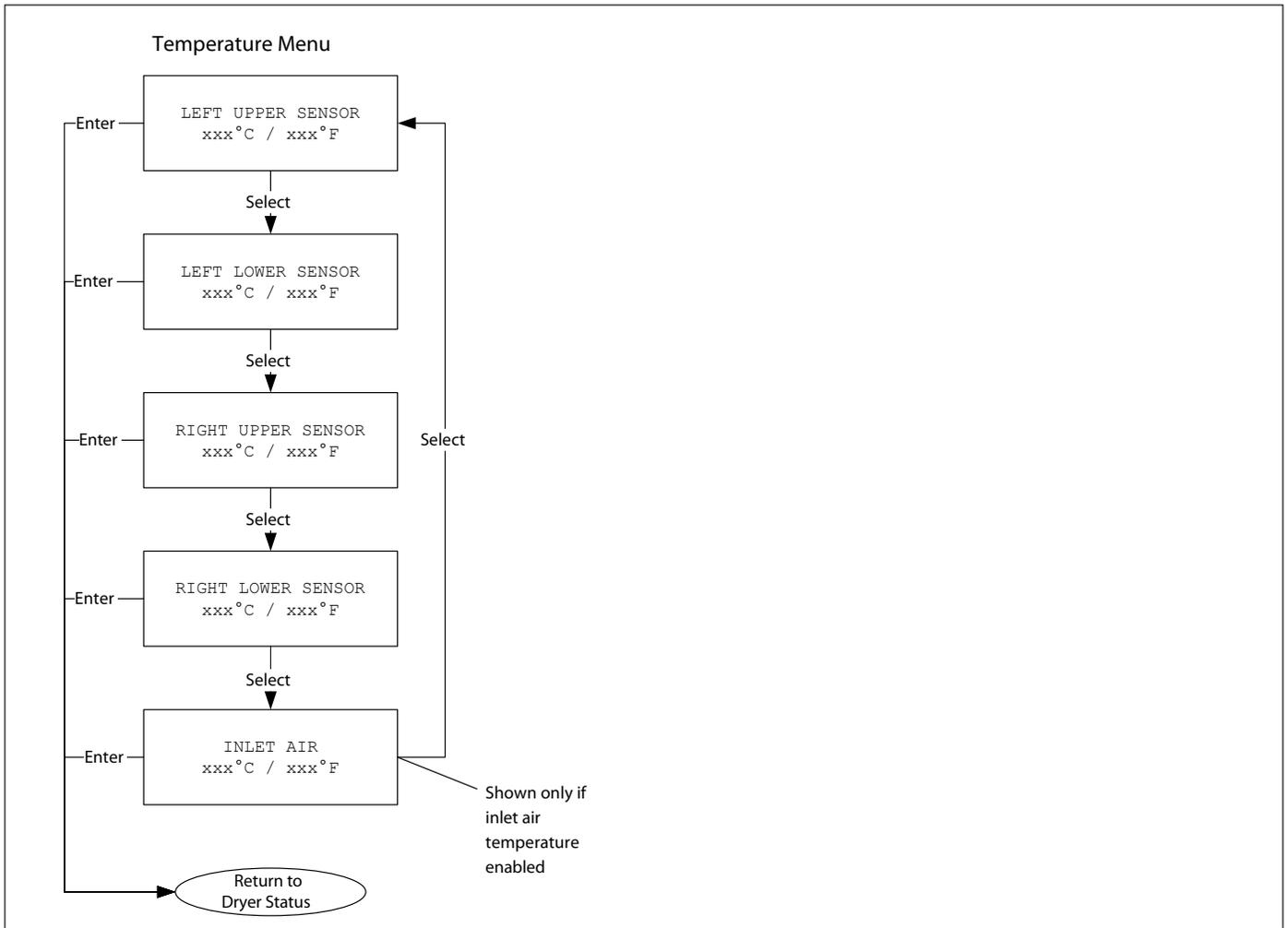


Figure 8-4  
Temperature Menu – HCS Series Controller

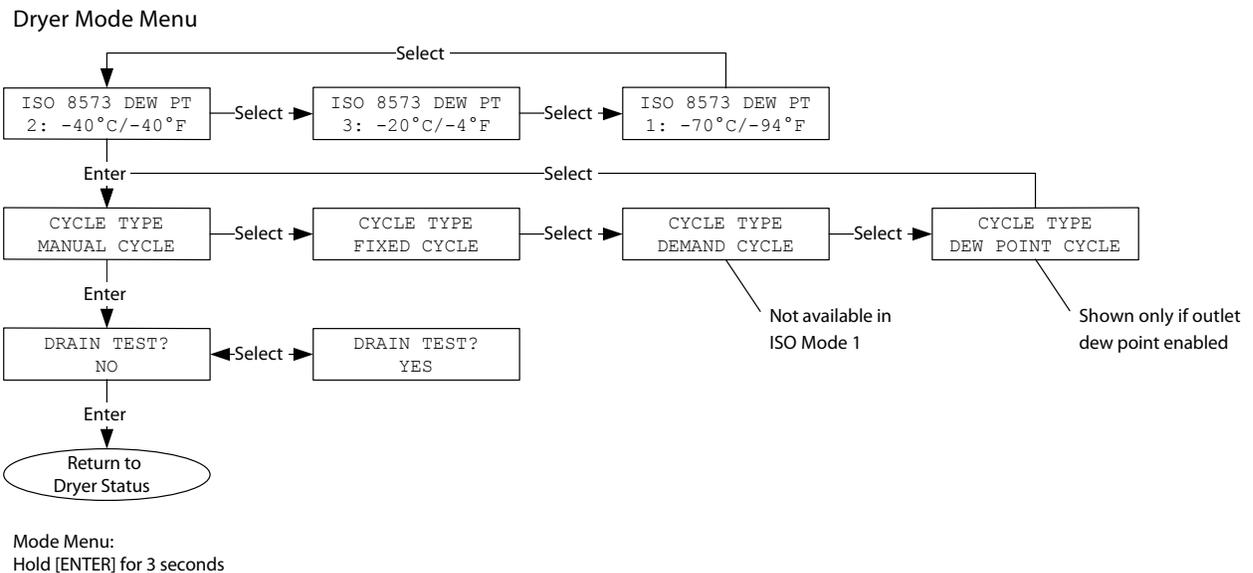
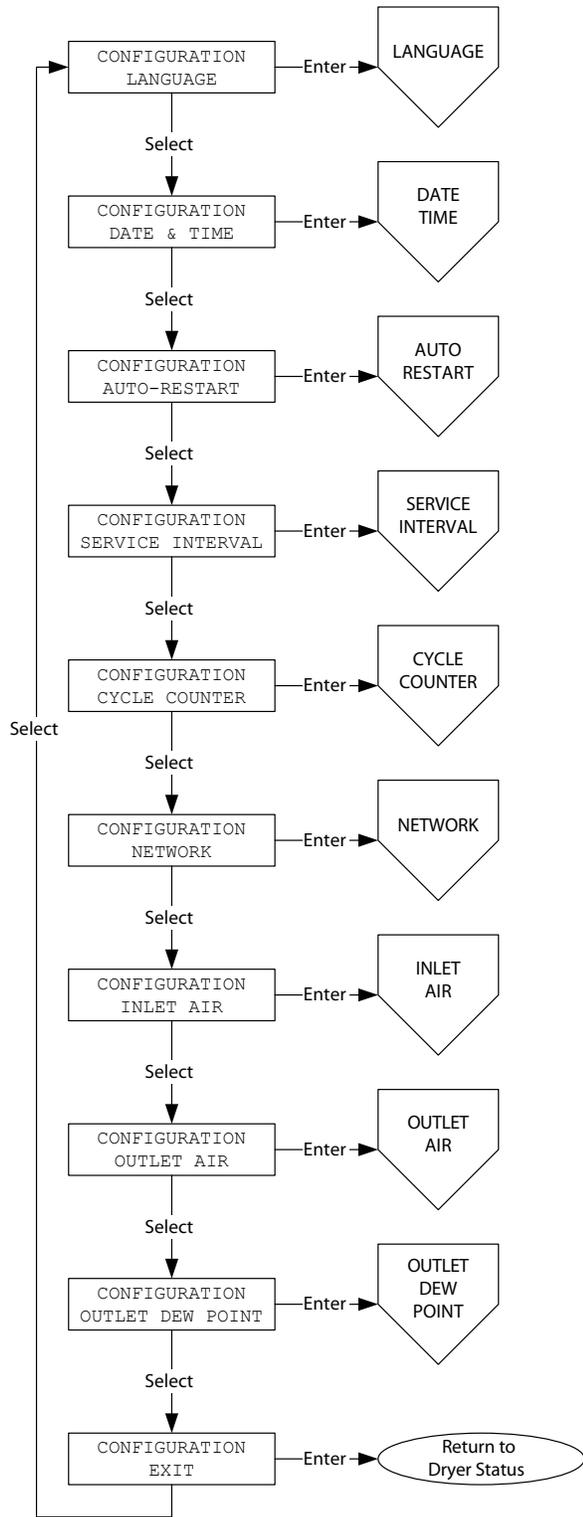


Figure 8-5  
Mode Menu – HCS Series Controller

## 8.11 Configuration Menu (Figure 8-6)

1. Press and hold the enter button and select button for 3 seconds to enter the configuration menu.
2. The following options are available in the configuration menu:
  - A. Language
    - i. Press select to change the language selection.
    - ii. Available languages are: English, Spanish, French, German, Portuguese, Italian, Polish, Danish, Dutch, Norwegian, Finnish, Swedish, and Czech.
    - iii. Press enter to apply the new selection and return to the configuration menu.
  - B. Date/Time
    - i. Press select to change the decade.
    - ii. Press enter to apply the new selection and move to the year field.
    - iii. Press select to change the year.
    - iv. Press enter to apply the new selection and move to the month field.
    - v. Press select to change the month.
    - vi. Press enter to apply the new selection and move to the day field.
    - vii. Press select to change the day.
    - viii. Press enter to apply the new selection and move to the hours field.
    - ix. Press select to change the hours.
    - x. Press enter to apply the new selection and move to the ten minutes field.
    - xi. Press select to change the ten minutes.
    - xii. Press enter to apply the new selection and move to the minutes field.
    - xiii. Press select to change the minutes.
    - xiv. Press enter to apply the new date & time and return to the configuration menu.
  - C. Auto-Restart
    - i. Press select to toggle between auto-restart enabled or disabled.
    - ii. Press enter to apply the new selection and return to the configuration menu.
  - D. Service Interval
    - i. Press select to cycle thru service interval sub-menu options.
    - ii. Press enter to enter a service interval sub-menu.
      1. Filters
        - a. Press select to change the hours.
        - b. Press enter to apply the hours and move to the tens field.
        - c. Press select to change the tens field.
        - d. Press enter to apply the tens and move to the hundreds field.
        - e. Press select to change the hundreds field.
        - f. Press enter to apply the hundreds field and move to the thousands field.
        - g. Press select to change the thousands field.
        - h. Press enter to apply the new selection and return to the service interval menu.
      2. Valves
        - a. Press select to change the hours.
        - b. Press enter to apply the hours and move to the tens field.
        - c. Press select to change the tens field.
        - d. Press enter to apply the tens and move to the hundreds field.
  3. Desiccant
    - a. Press select to change the hours.
    - b. Press enter to apply the hours and move to the tens field.
    - c. Press select to change the tens field.
    - d. Press enter to apply the tens and move to the hundreds field.
    - e. Press select to change the hundreds field.
    - f. Press enter to apply the hundreds field and move to the thousands field.
    - g. Press select to change the thousands field.
    - h. Press enter to apply the new selection and return to the service interval menu.
  4. Exit
    - a. Press enter to return to the configuration menu.
  - E. Cycle Counter
    - i. Press select to toggle between resetting and not resetting the cycle counter.
    - ii. Press enter to apply the new selection and return to the configuration menu.

### Dryer Configuration Menu



Configuration Menu:  
Hold [SELECT] & [ENTER] for 3 seconds

Figure 8-6  
Configuration Menu – HCS Series Controller

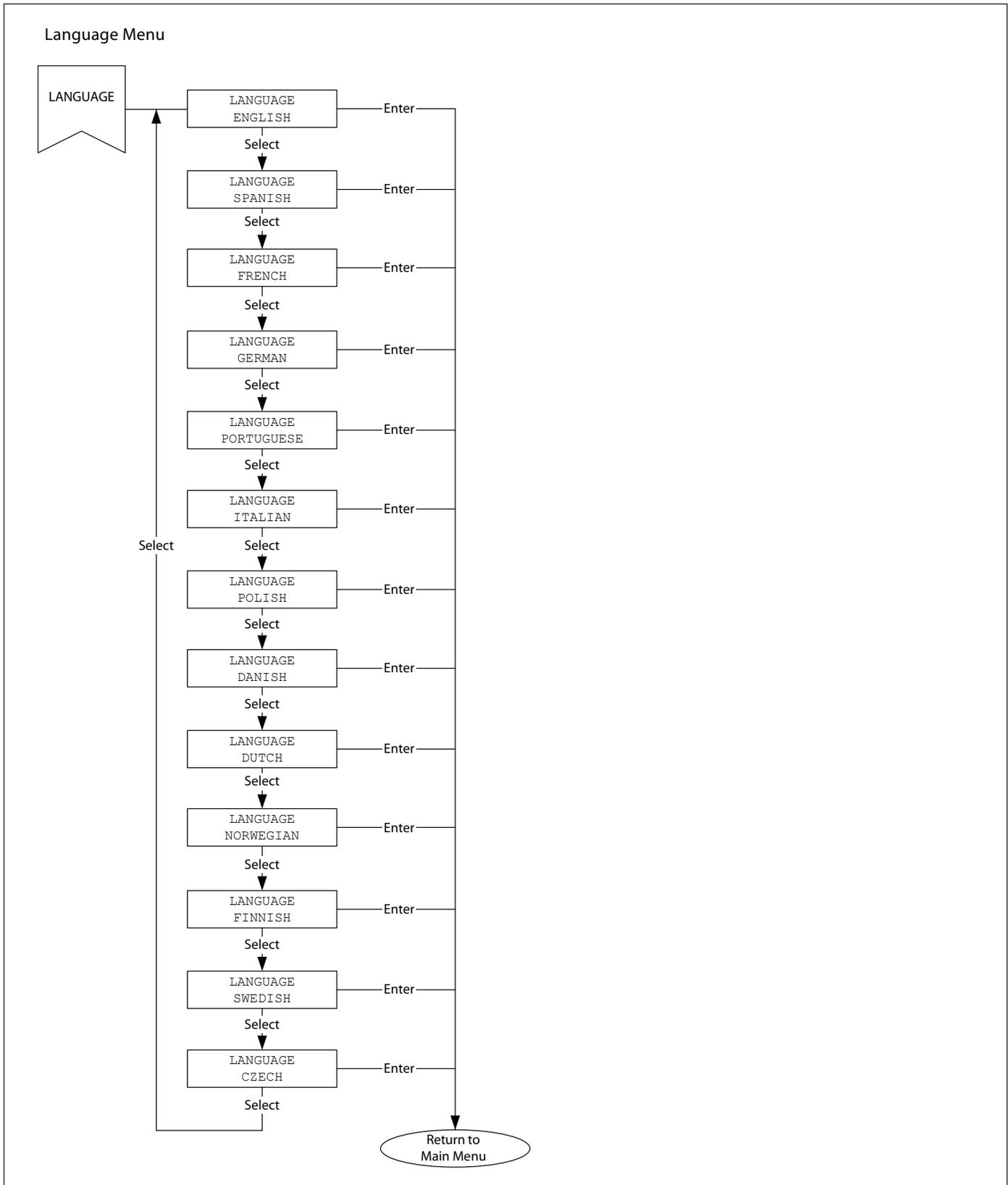


Figure 8-6a  
Language Menu – HCS Series Controller

Date & Time Menu

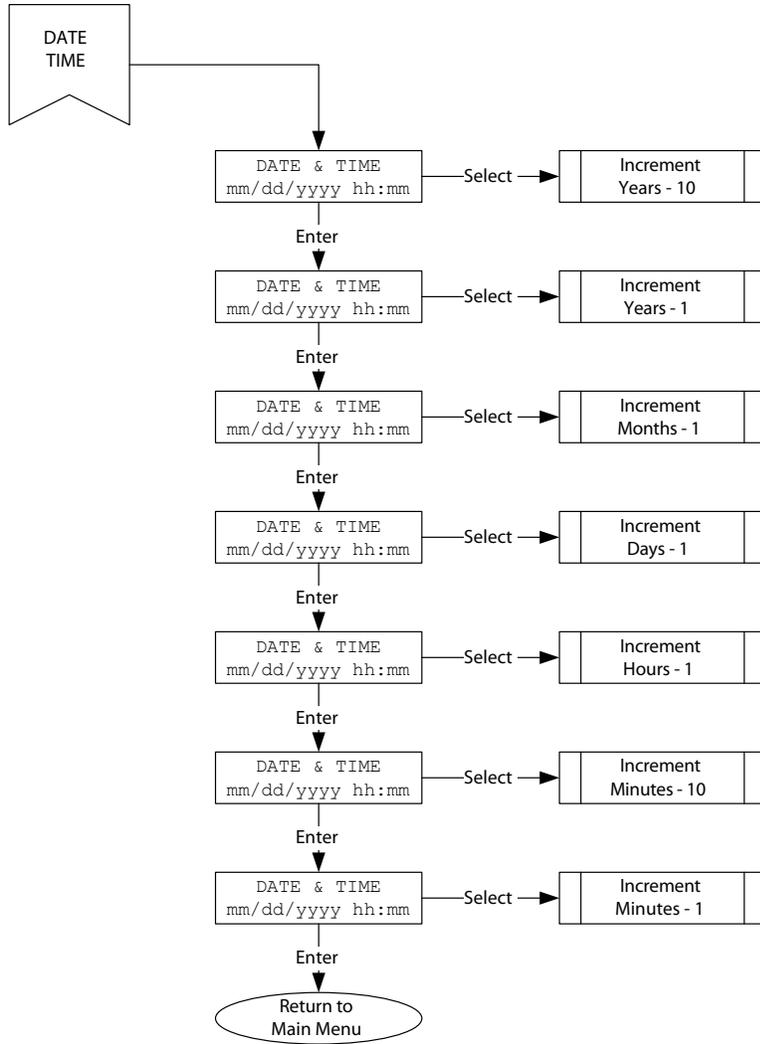


Figure 8-6b  
Date & Time Menu – HCS Series Controller

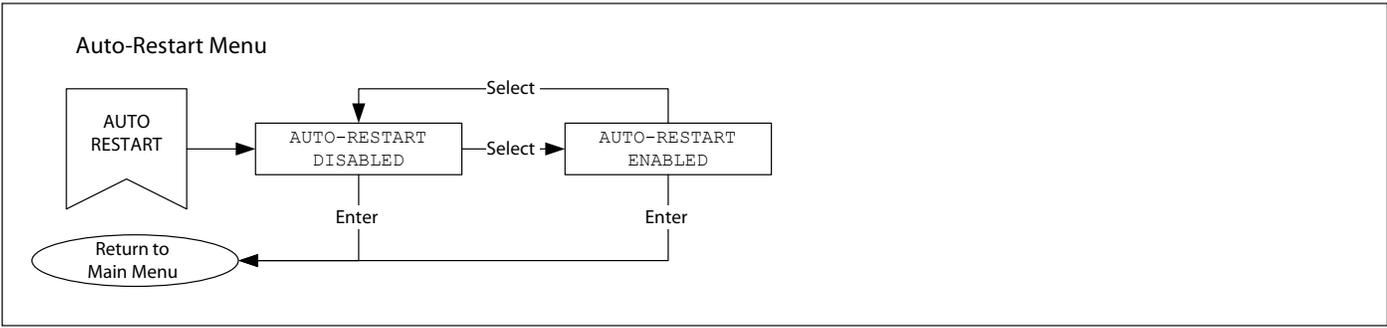


Figure 8-6c  
Auto-Restart Menu – HCS Series Controller

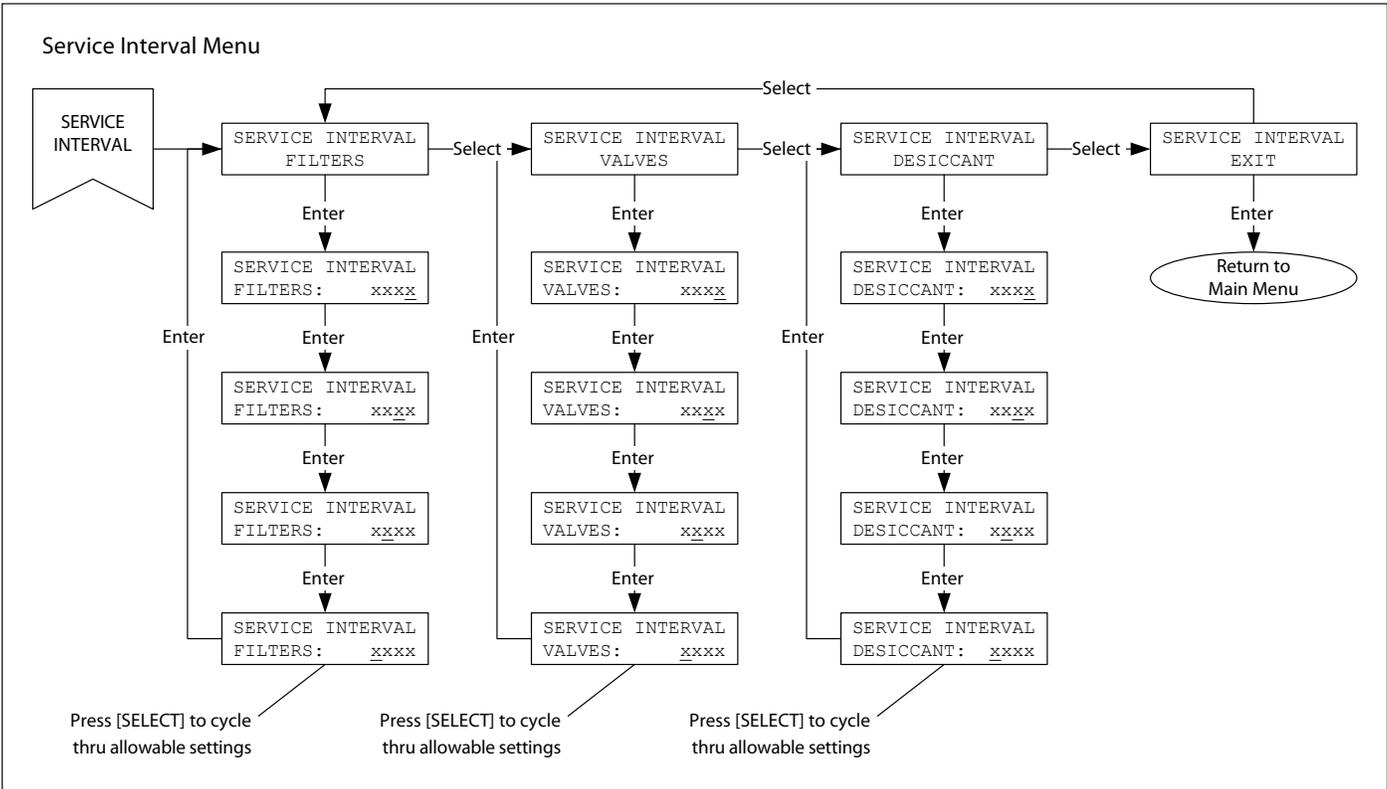


Figure 8-6d  
Service Interval Menu – HCS Series Controller

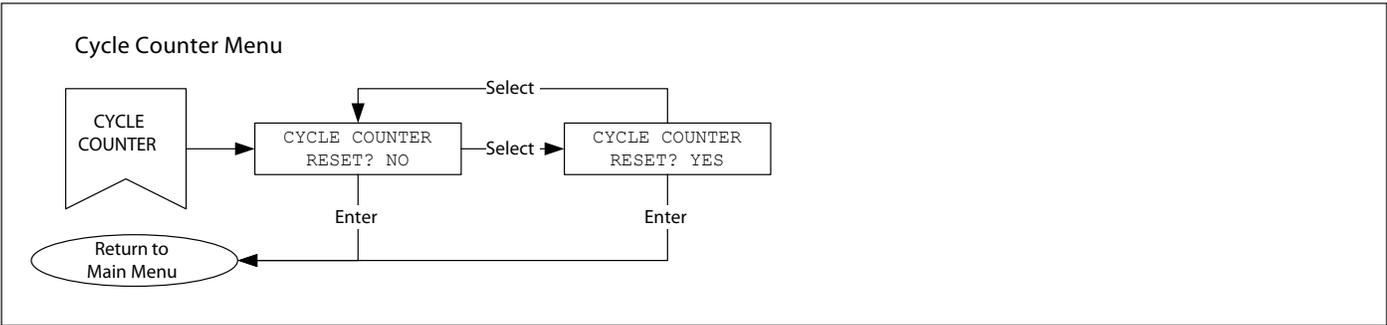


Figure 8-6e  
Cycle Counter Menu – HCS Series Controller



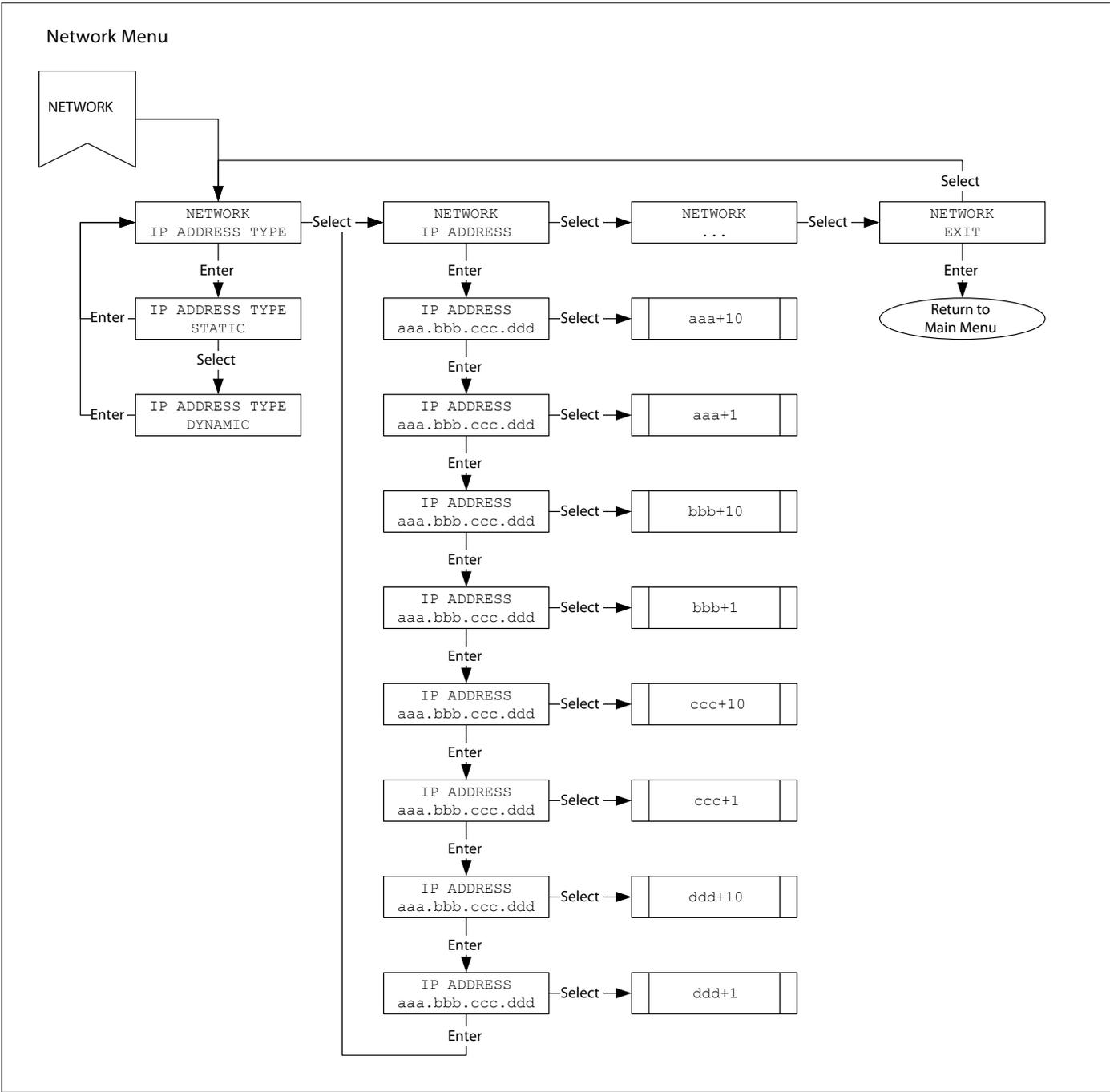


Figure 8-6f  
Network Menu – HCS Series Controller

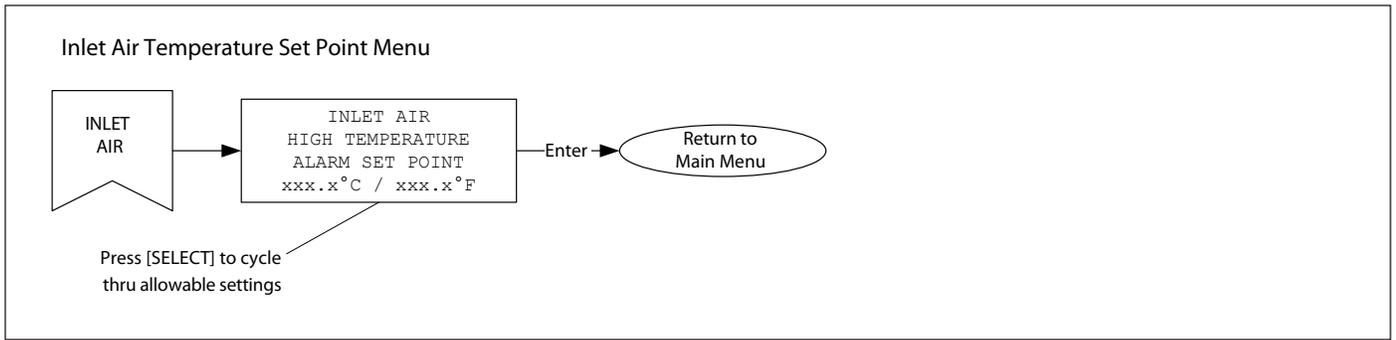


Figure 8-6g  
Inlet Air Temperature Set Point Menu – HCS Series Controller

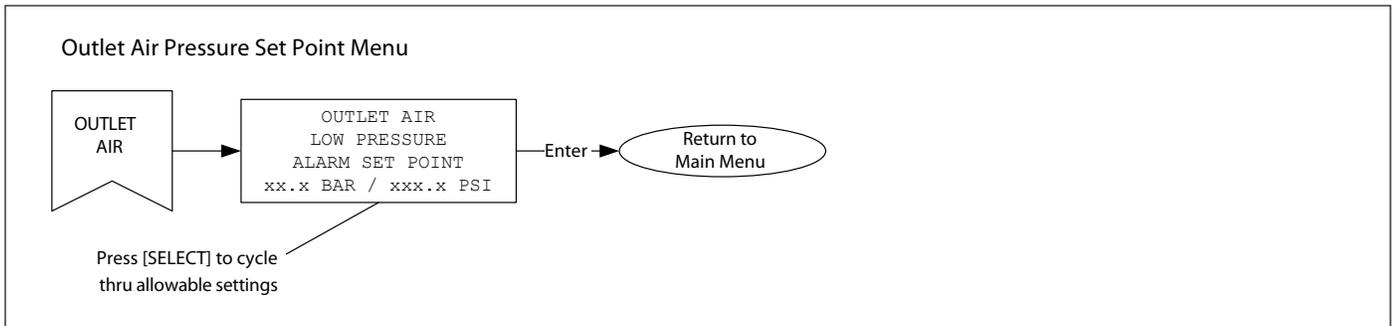


Figure 8-6h  
Outlet Air Pressure Set Point Menu – HCS Series Controller

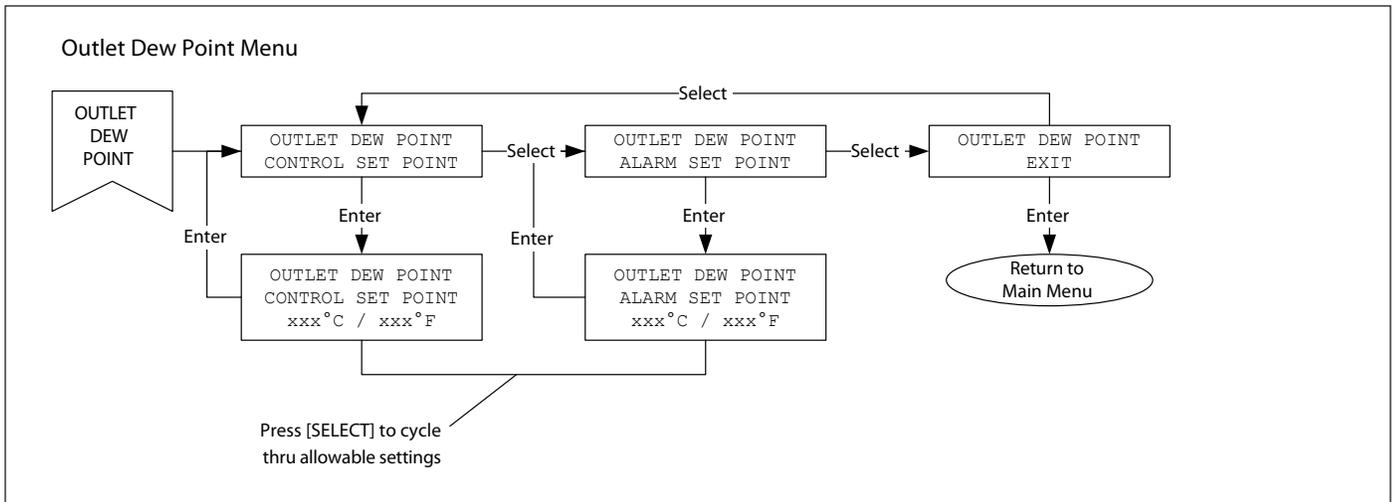


Figure 8-6i  
Outlet Dew Point Menu – HCS Series Controller

- G. Inlet Air
  - i. Shown only if inlet air temperature sensor is enabled.
  - ii. Press select to cycle thru high inlet air temperature set points.
    - Lower Limit: 10°C / 50°F
    - Upper Limit: 60°C / 140°F
    - Increment: 5°C / 9°F
    - Factory Default: 35°C / 95°F
  - iii. Press enter to apply the new selection and return to the configuration menu.
- H. Outlet Air
  - i. Shown only if outlet air pressure sensor is enabled.
  - ii. Press select to cycle thru low outlet air pressure set points.
    - Lower Limit: 3 BAR / 45 PSI
    - Upper Limit: 20 BAR / 290 PSI
    - Increment: 1 BAR / 15 PSI
    - Factory Default: 5 BAR / 75 PSI
  - iii. Press enter to apply the new selection and return to the configuration menu.
- I. Exit
  - i. Press enter to return to the dryer status menu.
- 8. Drain 1/Drain 2
  - a. Alarm occurs if drain switch opens.
- 9. High Inlet Air Temperature
  - a. Alarm is only checked if inlet air temperature sensor is enabled.
  - b. Alarm occurs if inlet air temperature is greater than high inlet air temperature set point.
- 10. Low Outlet Air Pressure
  - a. Alarm is only checked if outlet air pressure sensor is enabled.
  - b. Alarm occurs if outlet air pressure is less than low outlet air pressure set point.
- 11. Filter Service Reminder
  - a. Alarm occurs if filter service timer exceeds filter service interval.
- 12. Valve Service Reminder
  - a. Alarm occurs if valve service timer exceeds valve service interval.
- 13. Desiccant Service Reminder
  - a. Alarm occurs if desiccant service timer exceeds desiccant service interval.

## 8.12 Alarm Conditions

When a new alarm becomes active each active alarm is shown as a new screen in the dryer status menu and the red alarm LED begins to blink. When an alarm clears the alarm message is no longer shown in the dryer status menu, but remains in the alarm history menu. If when the alarm clears it is the last active alarm the alarm LED goes from blinking to on solid. The alarm LED can be cleared by pressing the alarm reset button.

1. Left/Right Drying Low Pressure.
  - a. Alarm is only checked if pressure switches are enabled.
  - b. Alarm occurs when the drying tower pressure switch is open.
2. Left/Right De-Pressurizing High Pressure.
  - a. Alarm is only checked if pressure switches are enabled.
  - b. Alarm occurs if the regenerating tower has completed de-press, but the pressure switch is closed.
3. Left/Right Re-Pressurizing Low Pressure.
  - a. Alarm is only checked if pressure switches are enabled.
  - b. Alarm occurs if the regenerating tower has completed repress, but the pressure switch is open.
  - c. Alarm prevents cycle from continuing.
4. Left/Right Upper/Lower Sensor Under-Range
  - a. Alarm is only checked if dryer is operating in demand mode.
  - b. Alarm occurs if the temperature sensor drops below 4°C / 39°F.
5. Left/Right Upper/Lower Sensor Over-Range
  - a. Alarm is only checked if dryer is operating in demand mode.
  - b. Alarm occurs if the temperature sensor rises above 66°C / 150°F.
6. Dew point Sensor Under-Range
  - a. Alarm is only checked if outlet dew point sensor is enabled.
  - b. Alarm occurs if dew point sensor < -102°C / -152°F.
7. High Outlet Air Dew Point
  - a. Alarm is only checked if outlet dew point sensor is enabled.
  - b. Alarm occurs if dew point reading is greater than dew point alarm set point.

## 8.13 Manual Mode

Manual mode is activated when the user exits the mode menu with manual mode selected. Manual mode can be used as a troubleshooting tool to determine if the solenoids and temperature probes are operating properly.

When operating the dryer in manual mode:

- Manual mode is shown on the display.
- The current step number is shown on the display.
- One of the temperature probe readings is shown on the display.
- Press the select button to advance the dryer from the current step to the next step.
- Press the enter button when prompted to return the dryer to a normal operating mode.

### Pressure Alarms

Left Tower

ALARM!  
LEFT DRYING  
LOW PRESSURE

ALARM!  
LEFT REGENERATING  
HIGH PRESSURE

ALARM!  
LEFT REGENERATING  
LOW PRESSURE

Right Tower

ALARM!  
RIGHT DRYING  
LOW PRESSURE

ALARM!  
RIGHT REGENERATING  
HIGH PRESSURE

ALARM!  
RIGHT REGENERATING  
LOW PRESSURE

### Temperature Alarms

Left Tower

ALARM!  
LEFT UPPER SENSOR  
UNDER-RANGE

ALARM!  
LEFT UPPER SENSOR  
OVER-RANGE

ALARM!  
LEFT LOWER SENSOR  
UNDER-RANGE

ALARM!  
LEFT LOWER SENSOR  
OVER-RANGE

Right Tower

ALARM!  
RIGHT UPPER SENSOR  
UNDER-RANGE

ALARM!  
RIGHT UPPER SENSOR  
OVER-RANGE

ALARM!  
RIGHT LOWER SENSOR  
UNDER-RANGE

ALARM!  
RIGHT LOWER SENSOR  
OVER-RANGE

#### Alarm LED:

Blinking – Controller has at least one active alarm condition

On – Controller has at least one unacknowledged alarm

Off – Controller has no active alarms

ALARM!  
INLET AIR  
HIGH TEMPERATURE

### Dew Point Alarms

Left Tower

ALARM!  
LEFT DRYING  
HIGH OUTLET DEW POINT

Right Tower

ALARM!  
RIGHT DRYING  
OUTLET DEW POINT

ALARM!  
OUTLET DEW POINT  
UNDER-RANGE

### Service Messages

ALARM!  
SERVICE REMINDER  
FILTERS

ALARM!  
SERVICE REMINDER  
DESICCANT

ALARM!  
SERVICE REMINDER  
VALVES

### Drain Alarms

ALARM!  
DRAIN #1

ALARM!  
DRAIN #2

### Pressure Alarms

ALARM!  
OUTLET AIR  
LOW PRESSURE

#### Service LED:

Blinking – Controller has at least one active service reminder

Off – Controller has no active service reminders

Figure 8-7  
Alarm Screens – HCS Series Controller

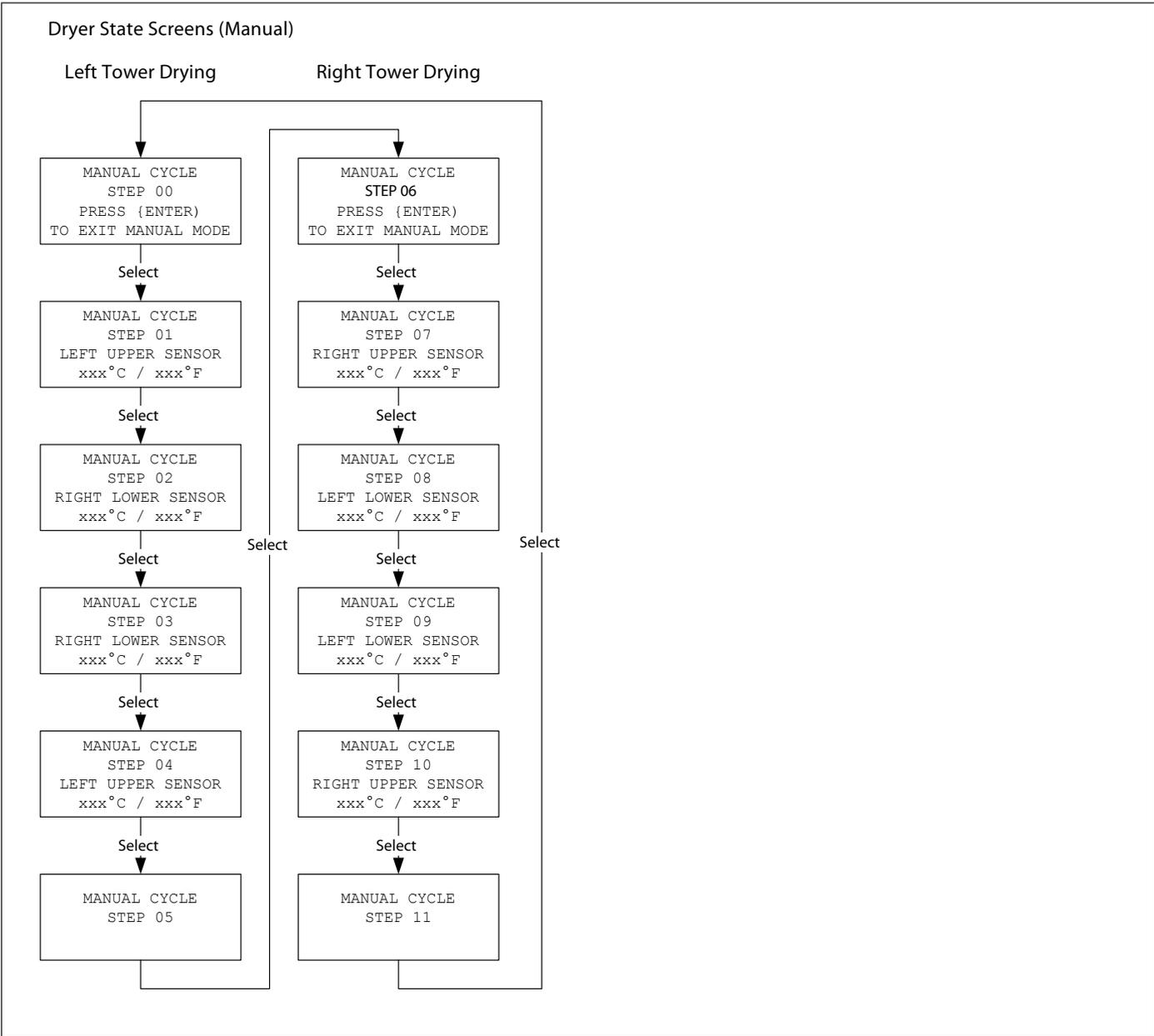


Figure 8-8  
Manual Mode Screens – HCS Series Controller

ID	State Description	Solenoid Valve (0=De-energized 1=Energized)			
		Left Inlet	Left Purge	Right Inlet	Right Purge
0	Right Offline	0 (Open)	0 (Closed)	1 (Closed)	0 (Closed)
1	Right De-pressurize	0 (Open)	0 (Closed)	1 (Closed)	1 (Open)
2	Right Regenerating	0 (Open)	0 (Closed)	1 (Closed)	1 (Open)
3	Right Re-pressurize	0 (Open)	0 (Closed)	1 (Closed)	0 (Closed)
4	Right Hold	0 (Open)	0 (Closed)	1 (Closed)	0 (Closed)
5	Right Online	0 (Open)	0 (Closed)	0 (Open)	0 (Closed)
6	Left Offline	1 (Closed)	0 (Closed)	0 (Open)	0 (Closed)
7	Left De-pressurize	1 (Closed)	1 (Open)	0 (Open)	0 (Closed)
8	Left Regenerating	1 (Closed)	1 (Open)	0 (Open)	0 (Closed)
9	Left Re-pressurize	1 (Closed)	0 (Closed)	0 (Open)	0 (Closed)
10	Left Hold	1 (Closed)	0 (Closed)	0 (Open)	0 (Closed)
11	Left Online	0 (Open)	0 (Closed)	0 (Open)	0 (Closed)
12	Right Shut-down	0 (Open)	0 (Closed)	1 (Closed)	0 (Closed)
13	Left Shut-down	1 (Closed)	0 (Closed)	0 (Open)	0 (Closed)
14	Dryer Offline	0 (Open)	0 (Closed)	0 (Open)	0 (Closed)

Table 8-3  
Cycle Sequence Steps – HCS Series Controller

Pressure	150 PSIG					
Mode	Fixed Cycle			Demand Cycle	Dew Point Cycle	
ISO Class	1	2	3	ANY	< -40°C	≥ -40°C
Set Point	State Times (minutes : seconds)					
Inlet Open Time	00:02	00:02	00:02	00:02	00:02	00:02
Inlet Close Time	00:04	00:04	00:04	00:04	00:04	00:04
De-pressurization Time	00:15	00:15	00:15	00:15	00:15	00:15
Regeneration Time	00:51	03:39	06:34	03:39	00:51	03:39
Re-pressurization Time	00:48	01:00	01:05	01:00	00:48	01:00
Maximum Drying Time	02:00	05:00	08:00	30:00	30:00	30:00
Pressure	250 PSIG					
Mode	Fixed Cycle			Demand Cycle	Dew Point Cycle	
ISO Class	1	2	3	ANY	< -40°C	≥ -40°C
Set Point	State Times (minutes : seconds)					
Inlet Open Time	00:02	00:02	00:02	00:02	00:02	00:02
Inlet Close Time	00:04	00:04	00:04	00:04	00:04	00:04
De-pressurization Time	00:15	00:15	00:15	00:15	00:15	00:15
Regeneration Time	00:27	02:39	05:19	02:39	00:27	02:39
Re-pressurization Time	01:12	02:00	02:20	02:00	01:12	02:00
Maximum Drying Time	02:00	05:00	08:00	30:00	30:00	30:00

Table 8-4  
Fixed Cycle Timing – HCS Series Controller

**NOTE:** When operated in the Demand Mode, drying times can extend to a maximum of 30 minutes each.

- Purge times in the Demand Mode, regardless of the ISO Class selection, will always be equal to the purge times of the ISO Class 2 (10 min.) Fixed Cycle (3:54 for 150 psig MOP and 2:54 for 250 psig MOP).
- Purge times in the Dewpoint Mode, regardless of the ISO Class selection, will be equal to the purge times of the ISO Class 1 (4 min.) Fixed Cycle for dew points <-40°C, or will be equal to the purge times of the ISO Class 2 (10 min.) Fixed Cycle for dew points ≥ -40°C.

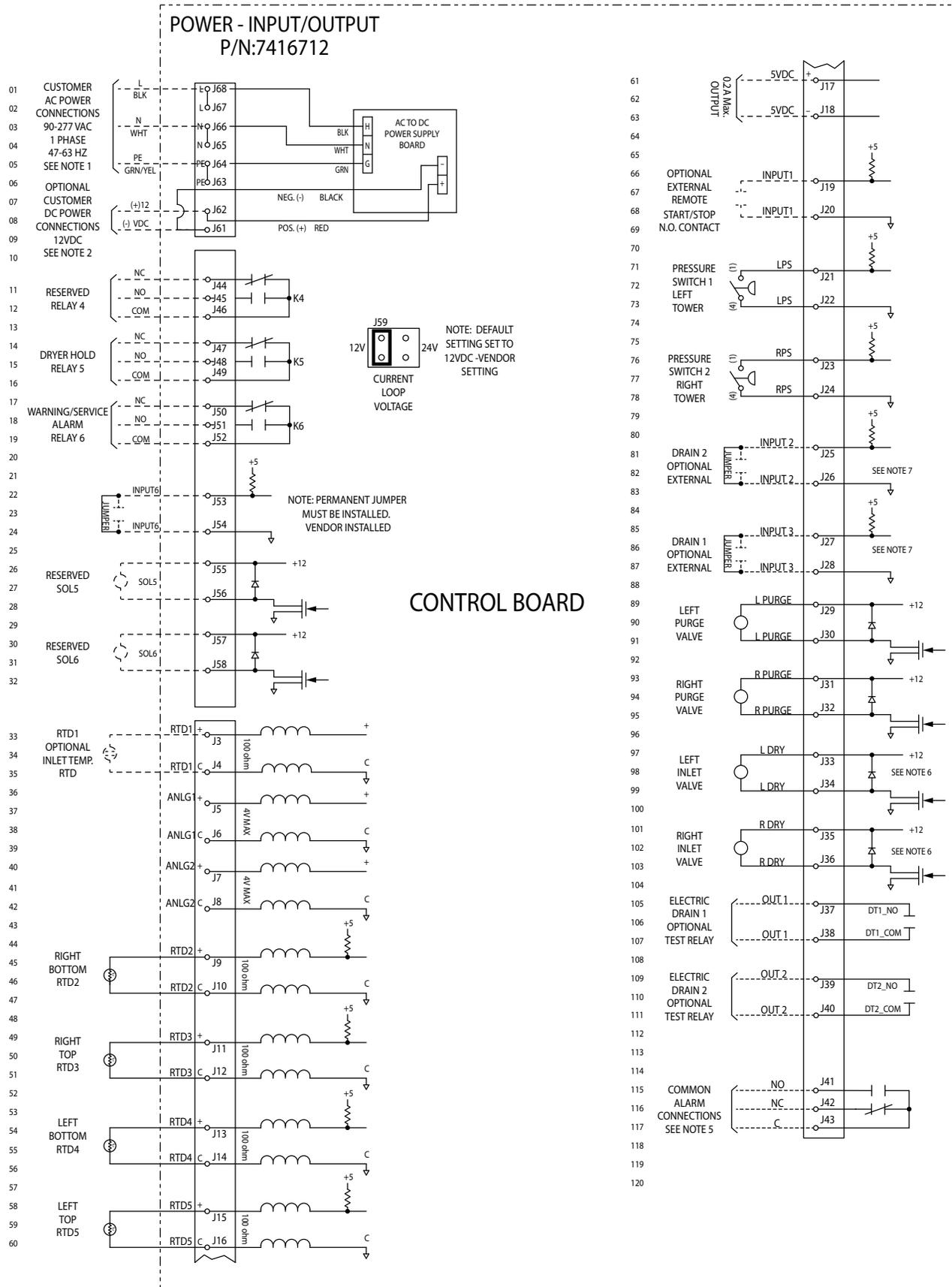
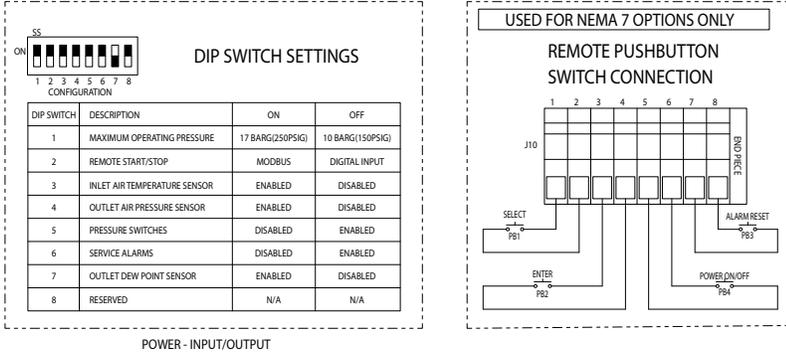


Figure 8-9a  
Electrical Schematic – HCS Series Controller  
(continued on next page)

CPU BOARD  
P/N: 7416711

CPU BOARD



**NOTES:**

1. CUSTOMER POWER CONNECTIONS WHEN SUPPLY VOLTAGE IS AC (ALTERNATING CURRENT). TERMINALS J63, J65 AND J67 CAN BE USED TO PROVIDE ACCESSORY POWER AT THE SAME VOLTAGE AND FREQUENCY. AC POWER IS DIRECTED TO THE POWER SUPPLY BOARD WHERE IT IS CONVERTED TO 12 VDC AND RETURNED TO THE CONTROL BOARD.
2. CUSTOMER POWER CONNECTIONS WHEN SUPPLY VOLTAGE IS DC (DIRECT CURRENT). RED AND BLACK WIRES FROM THE POWER SUPPLY BOARD SHOULD BE REMOVED AND THE CUSTOMER SHOULD MAKE THEIR POWER CONNECTIONS AT TERMINALS J61 AND J62.
3. VOLTAGE RATING OF VALVES IS 12 VDC.
4. VOLTAGE RATING OF SWITCHES IS 5 VDC.
5. WITH UNIT ON AND NO ALARMS, THERE SHOULD BE CONTINUITY BETWEEN TERMINALS J41 AND J43. CONTACTS ARE RATED AT 5 AMPS.
6. SOLENOIDS UTILIZED ON STANDARD PRESSURE MODELS 4100 THRU 5400 AND HIGH PRESSURE APPLICATIONS.
7. IF DRAIN VALVE 1 IS NOT EQUIPPED, JUMPER J27-J28. IF DRAIN VALVE 2 IS NOT EQUIPPED, JUMPER J25-J26. REMOVE JUMPERS AS REQUIRED.
8. SERVICE ALARMS CONSIST OF THE FOLLOWING: FILTERS, VALVES, & DESICCANT. THESE ALARMS DO NOT IMPEDE THE OPERATION OF THE DRYER. THEY ONLY TURN ON THE SERVICE LED AND DE-ENERGIZE THE COMMON ALARM RELAY.

Figure 8-9b  
Electrical Schematic – HCS Series Controller  
(continued from previous page)

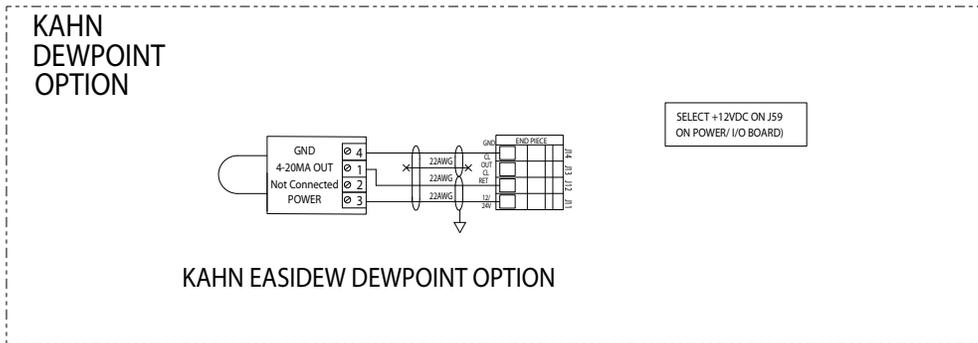
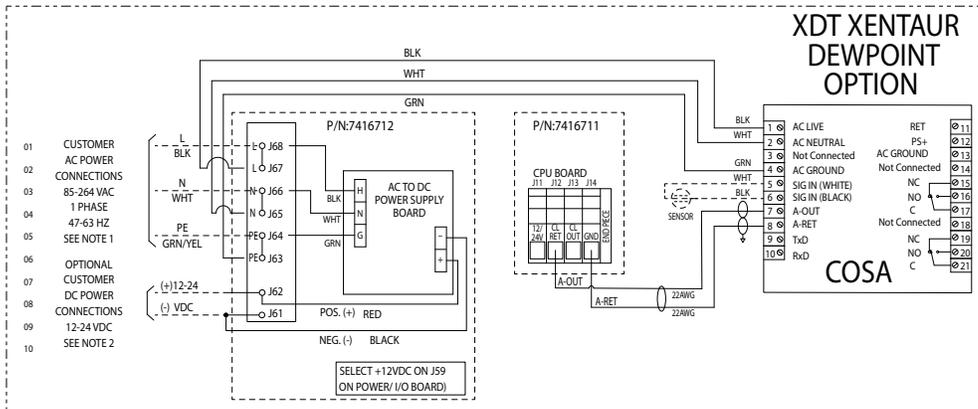


Figure 8-9c  
Electrical Schematic – Dewpointer Wiring Options for HCS Series Controller

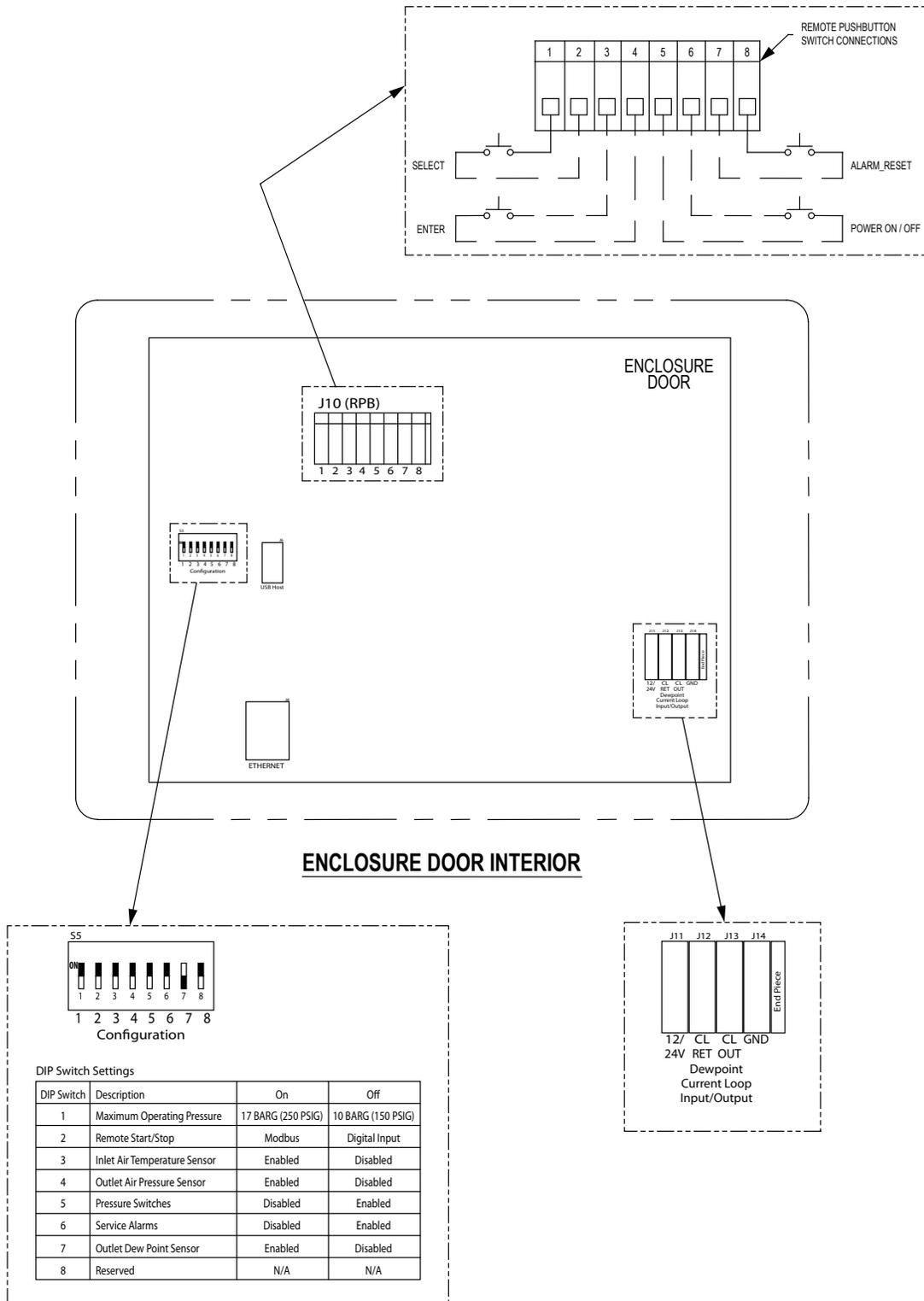
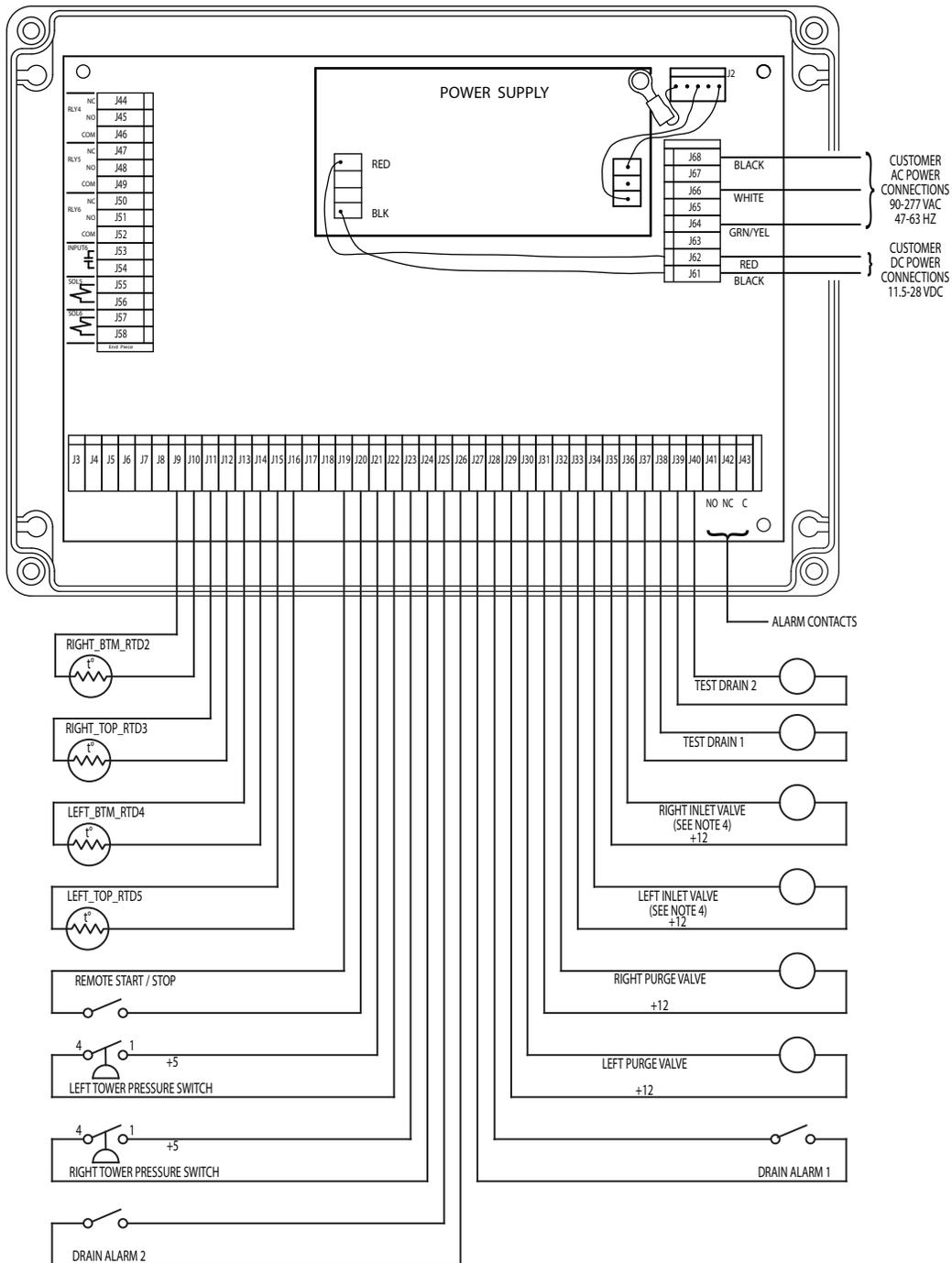


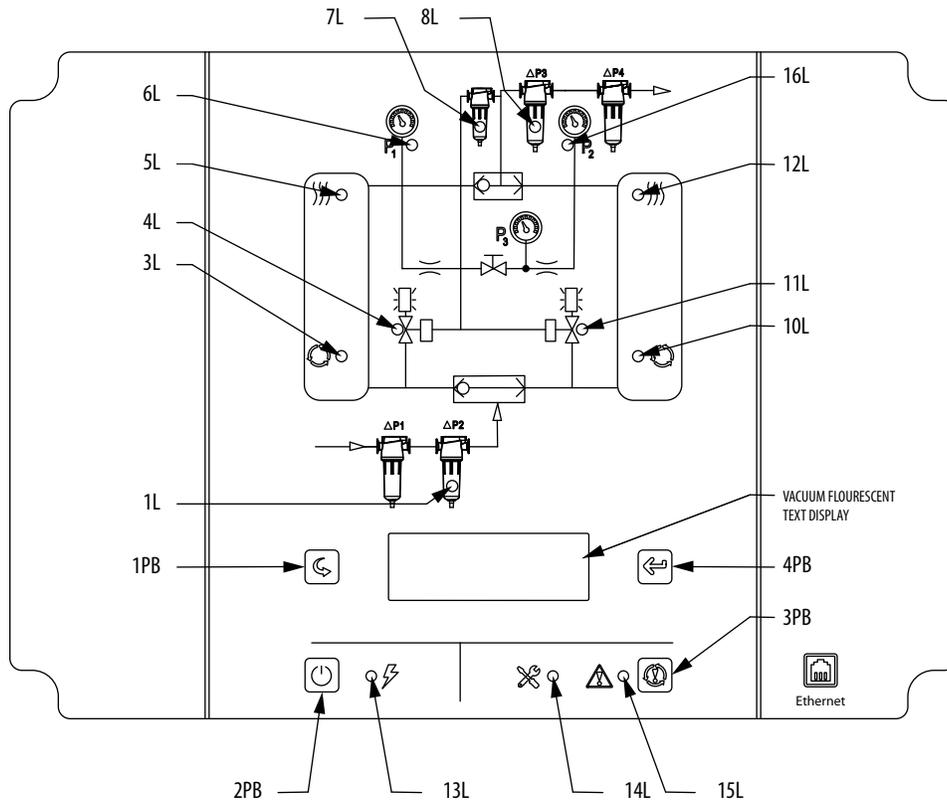
Figure 8-10a  
Point-to-Point Diagram – HCS Series Controller  
(continued on next page)



**NOTES:**

1. SEE FIGURE 8-5 FOR RECOMMENDED AWG CONDUCTOR SIZES..
2. CUSTOMER SUPPLIED AC (ALTERNATING CURRENT) INPUT POWER CONNECTIONS SHOULD BE MADE AT TERMINALS J64, J66, AND J68. FOR CUSTOMER SUPPLIED DC (DIRECT CURRENT) POWER, THE RED AND BLACK WIRES FROM THE POWER SUPPLY BOARD SHOULD BE REMOVED AND THE CUSTOMER POWER CONNECTIONS SHOULD BE MADE AT TERMINALS J61 AND J62.
3. WITH UNIT ON AND **NO ALARMS**, THERE SHOULD BE CONTINUITY BETWEEN TERMINALS J41 AND J43. CONTACTS ARE RATED AT 5 AMPS.
4. STANDARD PRESSURE MODELS 4100 & 5400 ONLY. HIGH PRESSURE MODELS 40 THROUGH 5400.

Figure 8-10b  
Point-to-Point Diagram – HCS Series Controller  
(continued from previous page)



**ENCLOSURE DOOR EXTERIOR**

**LEGEND**

- |  |  |                                      |
|--|--|--------------------------------------|
| 1L SERVICE REMINDER 3 - PRE FILTERS (AMBER)      | 16L PRESSURE SWITCH 2 (RIGHT TOWER) CLOSED (GREEN) | ICSP PICPROG. CONNECTOR              |
| 3L LEFT TOWER REGENERATING (AMBER)               | 1PB SELECT SWITCH                                  | ENET ETHERNET CONNECTOR              |
| 4L LEFT PURGE VALVE OPEN (GREEN)                 | 2PB POWER ON/OFF SWITCH                            | J2 POWER SUPPLY INPUT CONNECTOR      |
| 5L LEFT TOWER DRYING (GREEN)                     | 3PB ALARM RESET SWITCH                             | PS AC TO DC POWER SUPPLY             |
| 6L PRESSURE SWITCH 1 (LEFT TOWER) CLOSED (GREEN) | 4PB ENTER SWITCH                                   | RPB REMOTE SWITCH TERMINALS          |
| 7L SERVICE REMINDER 1 - PILOT AIR FILTER (AMBER) | CNTRLCB CONTROL BOARD                              | RTB REAL-TIME CLOCK BATTERY          |
| 8L SERVICE REMINDER 2 - AFTER FILTERS (AMBER)    | CR ALARM CONTROL RELAY                             | ANALOG INPUT TERMINALS (J3 – J16)    |
| 10L RIGHT TOWER REGENERATING (AMBER)             | DISPPCB DISPLAY BOARD                              | SWITCH INPUT TERMINALS (J19 – J28)   |
| 11L RIGHT PURGE VALVE OPEN (GREEN)               | OB1 OPTION BOARD #1                                | VALVE OUTPUT TERMINALS (J29 – J36)   |
| 12L RIGHT TOWER DRYING (GREEN)                   | OB2 OPTION BOARD #2                                | CONTACT OUTPUT TERMINALS (J37 – J43) |
| 13L POWER ON INDICATOR (GREEN)                   | DIPSW DIP SWITCHES                                 | DC POWER INPUT TERMINALS (J61 & J62) |
| 14L MAIN SERVICE REMINDER (AMBER)                | USB USB HOST CONNECTOR                             | AC POWER INPUT TERMINALS (J63 – J68) |
| 15L COMMON ALARM (RED)                           |  |                                      |

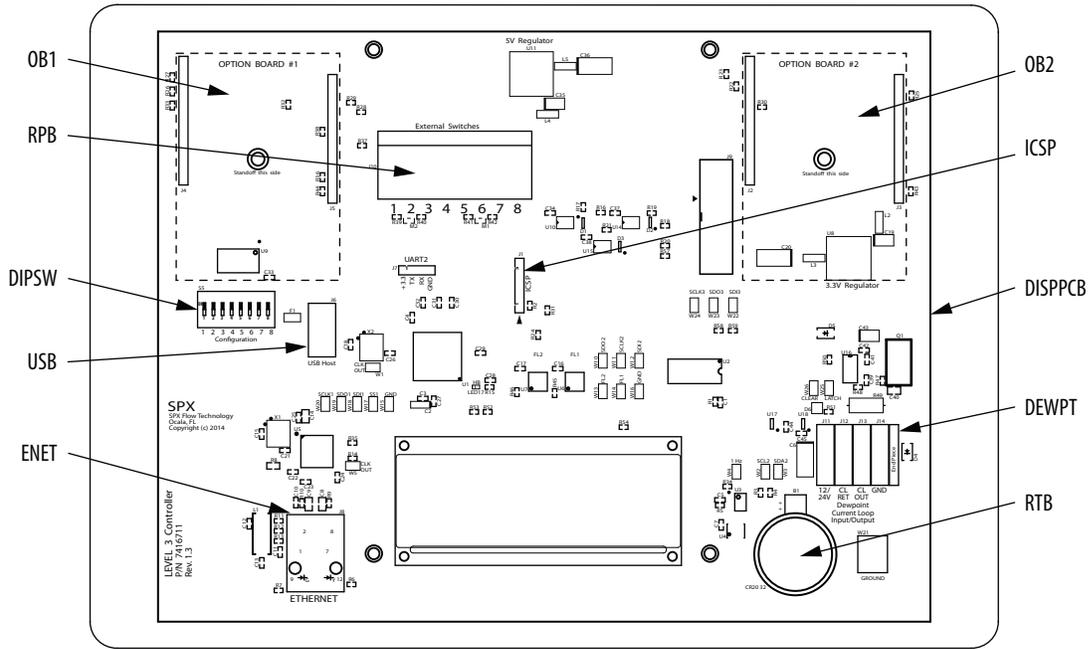
Figure 8-11a

Panel Layout – HCS Series Controller

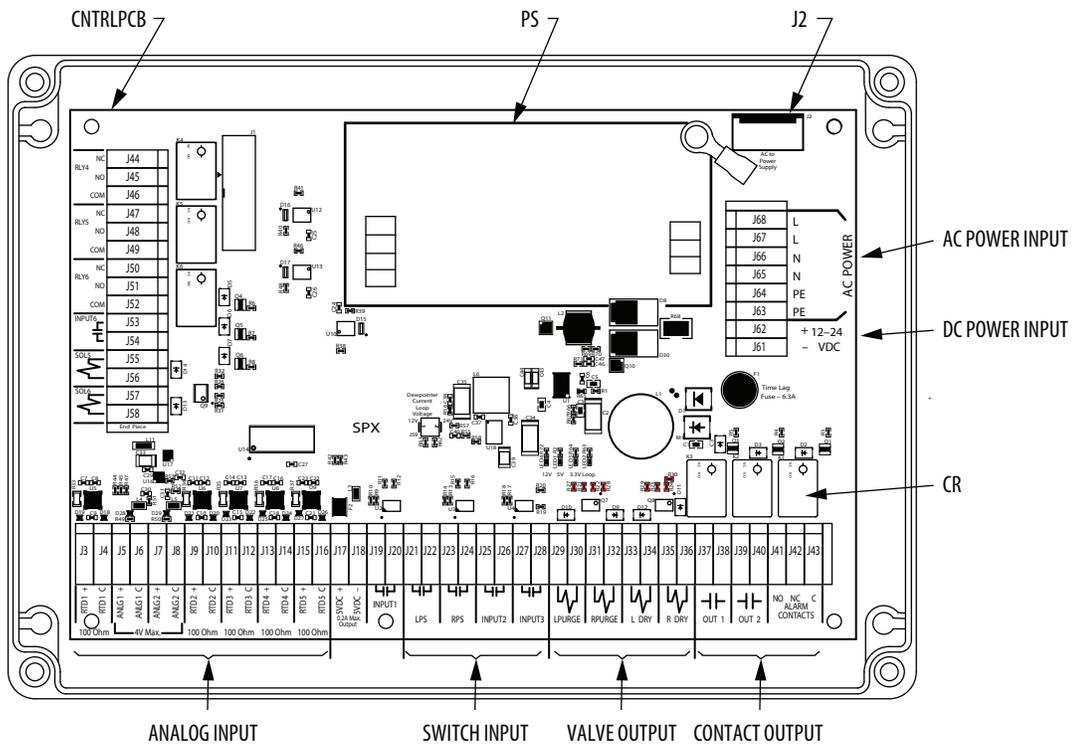
(NOTE: Figure is representative of Standard Pressure Models 40 through 3000.)

(NOTE: Overlay for Standard Pressure Models 4100 & 5400 and High Pressure Models 590 through 5400 depicts a different inlet valve and outlet/purge circuit. Overlay for High Pressure Models 40 through 450 depicts a different inlet valve circuit.)

(continued on next page)



**ENCLOSURE DOOR INTERIOR**



**ENCLOSURE INTERIOR**

Figure 8-11b  
Panel Layout – HCS Series Controller  
(continued from previous page)

LOCATION	FUNCTION	# OF CONDUCTORS	AWG SIZE	CABLE DIAMETER RANGE				CONNECTOR SIZE	ENCLOSURE HOLE DIA.	
				MIN. DIA.		MAX. DIA.			in.	mm
				in.	mm	in.	mm			
1	HUMIDITY-DEW POINT SENSOR	2	22	0.230	5.8	0.395	10.0	PG-11	0.733	18.6
	DRAIN 1 (POWER & TEST)	4								
	DRAIN 1 (ALARM)	2								
	DRAIN 2 (POWER & TEST)	4								
	DRAIN 2 (ALARM)	2								
2	ANALOG INPUT 1	2	22	0.230	5.8	0.395	10.0	PG-11	0.733	18.6
	ANALOG INPUT 2	2								
	ANALOG INPUT 3	2								
3	RTD 1 LEFT TOWER - UPPER	2	22	0.114	2.9	0.250	6.4	PG-7	0.492	12.5
4	RTD 2 RIGHT TOWER - UPPER	2	22	0.114	2.9	0.250	6.4	PG-7	0.492	12.5
5	RTD 3 LEFT TOWER - LOWER	2	22	0.114	2.9	0.250	6.4	PG-7	0.492	12.5
6	RTD 4 RIGHT TOWER - LOWER	2	22	0.114	2.9	0.250	6.4	PG-7	0.492	12.5
7	PRESSURE SWITCH - RIGHT TOWER	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
8	PRESSURE SWITCH - LEFT TOWER	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
9	SOLENOID - LEFT PURGE VALVE	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
10	SOLENOID - LEFT INLET VALVE*	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
11	SOLENOID - RIGHT PURGE VALVE	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
12	SOLENOID - RIGHT INLET VALVE*	2	18	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
13	ALARM CONTACTS	2	16	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
14	REMOTE STOP / START	2	16	0.181	4.6	0.312	7.9	PG-9	0.599	15.2
15	RESERVED	3	22	0.114	2.9	0.250	6.4	PG-7	0.492	12.5
16	INPUT POWER	3	14	0.230	5.8	0.395	10.0	PG-11	0.733	18.6

\* STANDARD PRESSURE MODELS 4100 & 5400 ONLY. HIGH PRESSURE MODELS 40 THROUGH 5400.

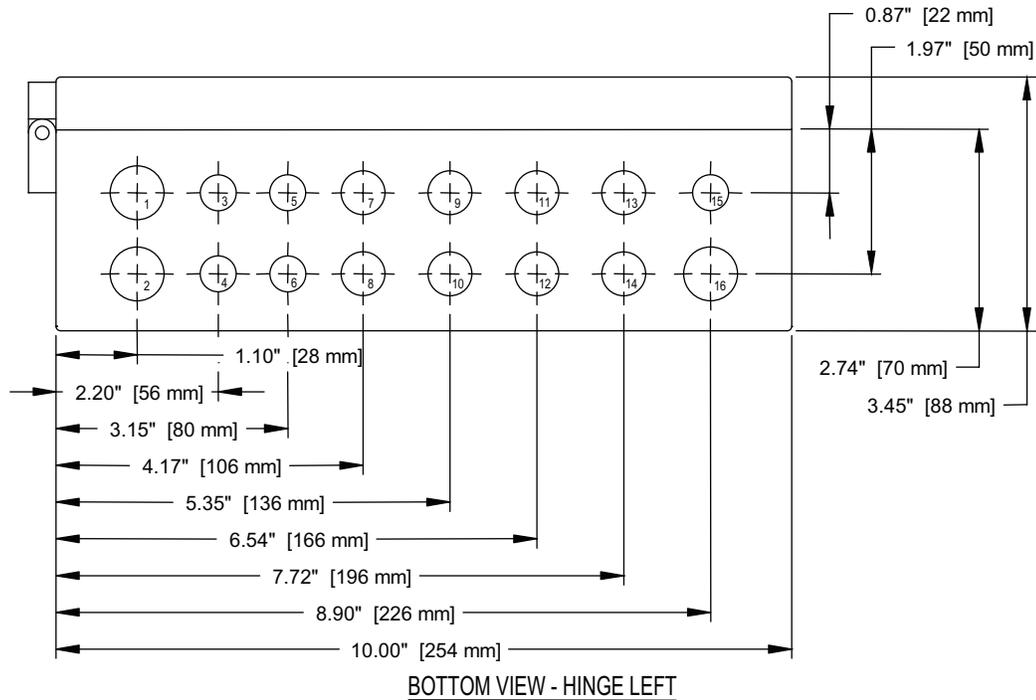


Figure 8-12  
Enclosure Penetrations – HCS Series Controller

## 9.0 OPERATION

### 9.1 Start-up

#### 9.1.1 Controller Settings (HCL Series or HCS Series Controllers)

- Set or verify settings on the HCL Series or HCS Series Controller. General information regarding both controllers can be found in Section 5. Detailed operational points are presented in Sections 7 and 8.

**WARNING – Enclosure may have live electric parts. De-energize dryer before opening enclosure.**

- If a Cycle or Energy (purge) Savings % change is made while the dryer is operating, the change will occur at the end of the current half-cycle. If it is necessary to begin a new selection immediately, shut the unit off and then back on.

**NOTE:** A tower that is actively purging when the power on/off button is actuated will be subjected to a rapid repressurization that can lead to fluidization and subsequent abrasion of the desiccant bed. Ideally, dryers should only be powered off during those portions of the drying cycle when both desiccant towers are at full operating pressure.

- If switching to a cycle mode producing a lower dew point (e.g. 0°F to -40°F [-17.8°C to -40°C]) while the dryer is operating, one or two days of operation may be needed before the new dew point is achieved.

#### 9.1.2 Initial Pressurization

- SLOWLY pressurize dryer to full line pressure. (If the dryer was installed with inlet and outlet isolation valves, the inlet isolation valve should be slowly opened while the outlet isolation valve remains closed.)
- During initial start-up, check the entire system for leaks. If necessary, de-pressurize the dryer and correct any leaks.

#### 9.1.3 Energizing the Dryer

- (HCT Series Controller) Energize the dryer using the disconnect fuse located next to the customer connections in the bottom of the control box.
- (HCL Series or HCS Series Controller) Energize the dryer using the power switch located on the control panel.
- **NOTE:** The switching failure alarm may be activated if the unit is energized before it is pressurized. To deactivate alarm, allow dryer to cycle to next step and press the reset button.

#### 9.1.4 Adjusting the Purge Rate

Determine the following:

- Maximum operating pressure (MOP) of dryer from the dryer serial number tag.
- Air pressure at inlet to dryer.
- ISO Class cycle setting (Class 1, 2, 3, or 4).

**NOTE:** For units with the HCS Series Controller and the Automatic Purge Saving System in the demand cycle mode use the ISO Class 2 (10 min.) purge pressure settings only.

- Energy (purge) Savings % setting. This setting is applicable to the HCL Series Controller only.

#### 9.1.4.1 Purge Rate Pressure – Models 40 to 3000

- Refer to Table 9-4 for the proper purge rate pressure setting corresponding to the conditions listed in Section 9.1.4.

**NOTE:** For units with the HCS Series Controller and the Automatic Purge Saving System in the demand cycle mode use the ISO Class 2 (10 min.) purge pressure settings only.

- Adjust purge rate valve until purge pressure gauge indicates the required pressure. The purge pressure adjustment valve on Models 40 through 3000 is a quarter-turn ball valve located in the smaller bypass line of the upper piping of the dryer. Refer to Figures 4-2 or 4-3 for location. Models 40 through 3000 use a double orifice purge circuit. Equally sized orifices are located at either end of the bypass line. The purge pressure adjustment valve, and a pressure tap for the purge pressure gauge are piped between the two orifices. Looking at the front of the dryer, when the left tower is drying and the right tower is purging, purge air flows from left to right through the first orifice, then the purge pressure adjustment valve, past the pressure tap for the purge pressure gauge, through the second and final orifice and into the offline tower. The pressure in the purge circuit just before the final orifice controls the purge flow rate. Because the purge pressure tap lies between the purge pressure adjustment valve and the orifice closest to the right hand tower, the purge pressure can only be correctly read and adjusted when the purge flow is from left to right. This only occurs when the right hand tower is actively purging. **IMPORTANT:** Purge pressure adjustment must be made while the RIGHT HAND TOWER AS SEEN FROM THE FRONT OF THE UNIT is regenerating and the right hand tower is actively purging (the purge valve associated with the right tower is open and air is exhausting from its muffler). Due to the symmetry of the design, identical orifices at opposite ends and the bi-directional flow characteristics of the purge pressure adjustment ball valve, purge flow will be similar when towers switch and the purge flow is from the drying tower on the right towards the regenerating tower on the left. Purge pressure as indicated by the purge pressure gauge should be disregarded during this half of the operating cycle.
- The purge pressure adjustment valve should never be fully closed. Proper purge flow is required to regenerate and re-pressurize the offline tower. Should the tower fail to re-pressurize, a switching failure alarm will be initiated, and the cycle will be stopped before tower switch over.
- After the purge pressure has been correctly set, the handle of the purge pressure adjustment valve may be removed and stored to prevent tampering with the setting.

#### 9.1.4.2 Purge Rate Pressure – Models 4100 to 5400

- Refer to Table 9-4 for the proper purge rate pressure setting corresponding to the conditions listed in Section 9.1.4.

**NOTE:** For units with the HCS Series Controller and the Automatic Purge Saving System in the demand cycle mode use the ISO Class 2 (10 min.) purge pressure settings only.

- Adjust purge rate valve until purge pressure gauge indicates the required pressure. The purge pressure adjustment valve on Models 4100 through 5400 is a globe valve located in the smaller by-pass line of the upper piping in the front of the dryer. Refer to Figure 4-4. **IMPORTANT:** Adjustment must be made while either tower is purging (air exhausting from muffler).
- The purge pressure adjustment valve should never be fully closed. Proper purge flow is required to regenerate and re-pressurize the offline tower. Should the tower fail to re-pressurize, a switching failure alarm will be initiated, and the cycle will be stopped before tower switch over.

- After the purge pressure has been correctly set, the handle of the purge pressure adjustment valve may be removed and stored to prevent tampering with the setting.

Insufficient purge air will eventually result in saturation of the desiccant beds and wet air downstream. Verify that maximum operating pressure mode, cycle time, energy (purge) savings percent selection, and purge pressure are correctly set.

### 9.1.5 Bringing the Dryer Online

Establish a normal flow through the dryer. Slowly open the outlet isolation valve if present. Close any dryer by-pass valves.

**NOTE:** When dew points below -40°F (-40°C) are required, the dryer must be run with an inlet flow rate of less than 50% of maximum until the desired dew point is attained. Depending on the initial dryness of the desiccant, this can take as long as 2 to 3 days. This stabilization period is required on initial startup, after the dryer has been shutdown for extended periods of time, or after dryer maintenance (desiccant change, etc.) has been performed.

### 9.1.6 Readjusting the Purge Rate

With the inlet pressure to the dryer at its minimum level, readjust the purge pressure per the instructions in Section 9.1.4.

**NOTE:** Adjustment must be made while the appropriate tower is purging (air exhausting from muffler).

## 9.2 Operational Check Points

### 9.2.1 Power to unit

Check periodically that there is power to the unit (indicating lights illuminated).

### 9.2.2 Moisture Indicator

Every four hours check moisture indicator. Indicator should be green. The color change moisture indicator indicates the outlet relative humidity of the desiccant dryer.

Green indicates a R.H. below 3% and yellow indicates a R.H. above 3%. Table 9-5 cross references outlet pressure dew points to moisture indicator changes from green to yellow at various inlet temperatures.

**NOTE:** During start-up the indicator may be yellow, however, it should begin to change to green within four hours.

### 9.2.3 Purge Pressure Setting

Every four hours check the purge pressure gauge for the proper setting and adjust as required. Adjustment should be made when the inlet pressure to the dryer is at its minimum level.

**NOTE:** Adjustment must be made while the appropriate tower is purging (air exhausting from muffler).

### 9.2.4 Alarms

Periodically check for flashing red alarm LED.

#### 9.2.4.1 Alarms – HCL Series Controller

Alarm light will flash if either tower fails to pressurize or de-pressurize to the required levels at the proper time. Refer to Section 7.4.3 and Table 7-4.

**NOTE:** Alarm will activate if dryer is energized without being pressurized. If this occurs, allow dryer to cycle to next step and press reset button. Alarm light will continue to illuminate even if fault clears. To clear alarm, press reset button.

If the tower being regenerated fails to re-pressurize, the dryer will not switch towers. The switching failure alarm will be activated and the dryer will remain in this mode until the tower re-pressurizes.

### 9.2.5 Tower Status LEDs

Illuminated LEDs indicate which tower is on-line drying or off-line regenerating.

### 9.2.6 Tower Pressure Gauges

Periodically check tower pressure gauges to verify that the pressure gauge of the online tower reads line pressure and the pressure gauge of the offline tower reads below 2 psig (0.14 barg).

**NOTE:** Read the offline tower pressure gauge when the tower is purging (air exhausting from muffler).

### 9.2.7 Check Mufflers For Back Pressure

Excessive back pressure may result due to the accumulation of desiccant fines (dust) in the muffler cartridges. This sometimes occurs after start-up due to dusting of the desiccant during tower filling and dryer transport. If the tower pressure gauge of the off-stream tower rises above 5 psig (3.5 barg), the muffler elements should be replaced.

**IMPORTANT:** Replace muffler cores provided with unit after 5 complete cycles following the completion of the Start-Up Procedures.

### 9.2.8 Process Valves

Determine if air control valves are operating and sequencing correctly. Refer to Section 3.3 for a general description of operating sequence. Refer to Tables 7-3 and 7-4 for time sequences for HCL Series Controllers. Refer to Tables 8-3 and 8-4 for time sequences for HCS Series Controllers.

#### 9.2.8.1 Valves – Models 40 through 3000

- Inlet/Outlet switching valves are non-lubricated shuttle valves. Pressure differences between the online and offline desiccant towers cause the shuttle valve to shift.
- High Pressure Models 40 through 450 ONLY. Inlet switching valves are normally open, pneumatically piston-actuated, Y-angle poppet valves. A yellow indicator can be seen through a clear window at the top of the actuator when the valve is in the open position.
- High Pressure Models 590 through 3000 ONLY. Inlet switching valves are resilient seated butterfly valves with double acting pneumatic rack and pinion actuators. An indicator located on the top of the actuator output shaft points to direction of flow. Pilot air is directed to actuator ports to open both inlet valves upon loss of power.
- Purge/repressurization valves are normally closed, pneumatically piston-actuated, Y-angle poppet valves. A yellow indicator can be seen through a clear window at the top of the actuator housing when the valve is in the open position.
- High Pressure Models 590 through 3000 ONLY. Purge/repressurization valves are resilient seated butterfly valves with spring return, fail closed, pneumatic rack and pinion actuators. An indicator located on the top of the actuator output shaft points to direction of flow. Pilot air is directed to actuator ports to close both purge/repressurization valves upon loss of power.
- 12 volt DC, normally-closed, 3-way pilot solenoid valves are wired to the controller and are used to direct pilot air to the actuators of the purge/repressurization valves.
- Purge pressure and subsequent flow is adjusted by means of a quarter-turn ball valve located in the bypass line of the upper piping.
- Models 40 through 3000 are equipped with a single safety relief valve that has been sized at a minimum to provide overpressure protection due to a fire for both desiccant towers.

### 9.2.8.2 Valves – Models 4100 through 5400

- Inlet switching valves are resilient seated butterfly valves with double acting pneumatic rack and pinion actuators. A yellow arrow indicator located on the top of the actuator output shaft points to valve position indicator icons. Pilot air is directed to actuator ports to open both inlet valves upon loss of power.
- Purge/repressurization valves are resilient seated butterfly valves with spring return, fail closed, pneumatic rack and pinion actuators. A yellow arrow indicator located on the top of the actuator output shaft points to valve position indicator icons. Pilot air is directed to actuator ports to close both purge/repressurization valves upon loss of power.
- 12 volt DC, single solenoid, 4-way pilot valves are wired to the controller and are used to direct pilot air to the actuators of the inlet switching and purge/repressurization valves.
- Two mainline outlet and two smaller purge line check valves are installed in the upper piping to control the flow of outlet and purge air. Check valve sticking will result in excessive air discharge through a muffler. Excessive air discharge through the muffler can be associated with a leaking outlet check valve on the same side or a purge check valve of the opposite side tower.
- Purge pressure and subsequent flow is adjusted by means of a throttling globe valve located in the bypass line of the upper piping.
- Models 4100 through 5400 are equipped with multiple safety relief valves that have been sized to provide overpressure protection for capacities equal to or greater than the adjusted capacity of the dryer at its maximum operating pressure.
- The tower pressure gauge of the online tower should read line pressure. Air should not be leaking from the purge-repressurization valve of the on-line tower.
- The tower pressure gauge of the offline tower should read below 2 psig (0.14 barg) while that tower is purging. If excessive air is exhausting during the purge cycle, the inlet-switching valve on the same side may have failed to close or a check valve may be sticking.

## 9.3 Operating Sequence

### 9.3.1 Operating Sequence – HCT Series Controller

The operating sequence for dryers equipped with HCT Series Controllers appears in Tables 6-1 and 6-2.

### 9.3.2 Operating Sequence – HCL Series Controller

The operating sequence for dryers equipped with HCL Series Controllers appears in Tables 7-3 and 7-4.

### 9.3.3 Operating Sequence – HCS Series Controller

The operating sequence for dryers equipped with HCS Series Controllers appears in Tables 8-3 and 8-4.

## 9.4 Dryer Shut Down

- If the dryer installation is equipped with dryer bypass and inlet and outlet isolation valves, the bypass valve should be opened and the inlet and outlet isolation valves closed.
- De-pressurize the dryer by allowing the controller to run through tower change cycles until pressure gauges on both towers read zero. Manual test mode may be used to speed up this process.

**NOTE:** Below 60 psig (4.1 barg) purge/repressurization valves may not open. Opening the manual drain on the pilot air filter or any mounted pre or afterfilters may bleed off remaining pressure.

- Turn dryer off using on-off switch (indicating LEDs extinguished).

## 9.5 Loss of Power

Control valves are designed so that upon loss of power the air dryer is capable of drying air until the desiccant exposed to the airflow is saturated.

## 9.6 Operating Parameters

Verify that dryer is operating within the following design parameters:

### 9.6.1 Maximum Operating Pressure (MOP):

- 150 psig (10.3 barg) is standard.
- 250 psig (17.2 barg) is optional.

Refer to Dryer Serial Number Tag.

**WARNING – Do not operate the dryer at pressures above the maximum operating pressure shown on the serial number tag.**

**NOTE:** Consult factory for applications requiring higher maximum operating pressures.

### 9.6.2 Minimum Operating Pressures:

#### 9.6.2.1 For 150 psig (10.3 barg) MOP models -

- 60 psig (4.1 barg) is the minimum operating pressure for dryers operated on a 4,10,16, or 24-minute cycle.

#### 9.6.2.2 For 250 psig (17.2 barg) MOP models -

- 120 psig (8.3 barg) is the minimum operating pressure for dryers operated on a 4,10,16, or 24-minute cycle.

Refer to Dryer Serial Number Tag.

**WARNING – Do not operate the dryer at pressures below the minimum operating pressure shown on the serial number tag.**

**NOTE:** Consult factory for applications requiring lower minimum operating pressures.

### 9.6.3 Maximum Compressed Air Temperature at Dryer Inlet:

- 140°F (60°C) for all models.

### 9.6.4 Ambient Temperatures:

#### 9.6.4.1 Minimum Ambient Temperature:

- Standard units: 35°F (2°C)
- Units with optional low ambient package: -20°F (-29°C)

#### 9.6.4.2 Maximum Ambient Temperature:

- 120°F (49°C)

**NOTE:** If dryer is installed in ambients below 35°F (2°C), low ambient protection requiring heat tracing and insulation of the prefilter bowls, auto drains and/or sumps, and lower piping with inlet switching and purge/repressurization valves is necessary to prevent condensate from freezing. If installing heat tracing, observe electrical class code requirements for type of duty specified. Purge mufflers and their relief mechanisms must be kept clear from snow and ice buildup that could prevent proper discharge of compressed air.

## 9.7 Maximum Inlet Flow Capacity

- Refer to Table 9-1 for maximum inlet flow at rated conditions of 100 psig (6.9 barg) and 100°F (38°C).
- At other conditions, multiply inlet flow from Table 9-1 by the multipliers from Tables 9-2 and 9-3 that correspond to the pressure and temperature at the inlet to the dryer.

## 9.8 Purge and Outlet Flows

### 9.8.1 Maximum Purge Flow

- Maximum Purge Flow is the amount of purge air flowing through the off-stream tower when the purge/repressurization valve is open. After the purge/repressurization valve closes, the purge flow will gradually decrease as the off-stream tower re-pressurizes to line pressure.
- For maximum purge flow multiply the Inlet Flow At Rated Conditions from Table 9-1 by Maximum Purge Flow Factor from Table 9-6 that corresponds to the dryer MOP, Cycle Time Setting, and air pressure at inlet to dryer.

**NOTE:** For HCS Series Controller equipped dryers supplied with the Automatic Purge Saving System operating in the Demand Cycle Mode, use ISO Class 2 (10 minutes) as the cycle time.

### 9.8.2 Average Purge Flow

- For dryers with HCL Series or HCS Series Controllers operating in the fixed cycle mode, the Average Purge Flow is the actual amount of flow used during the entire purge/repressurization cycle. It includes the maximum purge flow for a portion of the purge/repressurization time and the volume of air used for repressurization, averaged over the cycle time.
- For average purge flow multiply the Inlet Flow At Rated Conditions from Table 9-1 by Average Purge/Repressurization Flow Factor from Table 9-7 that corresponds to the dryer MOP, Cycle Time Setting, Energy (purge) Savings % setting, and air pressure at inlet to dryer.

### 9.8.3 Minimum Outlet Air Flow

- Determine minimum outlet flow available from dryer by subtracting Maximum Purge Flow found above from inlet flow to the dryer.

### 9.8.4 Average Outlet Air Flow

- For dryers with HCL Series or HCS Series Controllers operating in the fixed cycle mode, the average outlet flow available from dryer can be determined by subtracting the Average Maximum Purge Flow found above from the inlet flow to the dryer.

## 9.9 EXAMPLE

- Find the maximum inlet flow, maximum purge flow, and minimum outlet flow for a 60 SCFM unit with a MOP of 150 psig operated with 120 psig and 100°F inlet conditions on a 10 minute cycle. Dryer will operate with an inlet airflow of 46 SCFM.
- Step 1: Find Maximum Inlet Flow at 120 psig by multiplying Maximum Inlet Flow at Rated Conditions from Table 9-1 by Inlet Pressure Correction Factor for 120 psig from Table 9-2 and Inlet Temperature from Table 9-3:  
$$60 \times 1.08 \times 1.00 = 64.8 \text{ SCFM.}$$
- Step 2: Find Maximum Purge Flow by multiplying Maximum Inlet Flow at Rated Conditions from Table 9-1 by Maximum Purge Flow Factor from Table 9-6:  
$$60 \times 0.162 = 9.7 \text{ SCFM.}$$
- Step 3: Find Minimum Outlet Flow available by subtracting Maximum Purge Flow (Step 2) from actual inlet flow:  
$$46 - 9.7 = 36.3 \text{ SCFM.}$$

MODEL	40	60	90	115	165	260	370	450	590	750	930	1130	1350	1550	2100	3000	4100	5400
SCFM	40	60	90	115	165	260	370	450	590	750	930	1130	1350	1550	2100	3000	4100	5400
m <sup>3</sup> /hr	68	102	153	195	280	442	629	765	1002	1274	1580	1920	2294	2633	3568	5097	6966	9175

Table 9-1 Maximum Inlet Flow at Rated Conditions

INLET PRESSURE	psig	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250
	barg	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.3	11.0	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.5	17.2
MULTIPLIER		0.65	0.74	0.83	0.91	1.00	1.04	1.08	1.12	1.16	1.20	1.23	1.27	1.30	1.34	1.37	1.40	1.43	1.46	1.49	1.52

Table 9-2 Inlet Pressure Correction Factors

INLET TEMPERATURE	°F	100 and below	105	110	115	120	125	130	135	140
	°C	38 and below	41	43	46	49	52	54	57	60
MULTIPLIER		1.00	0.98	0.96	0.93	0.89	0.85	0.81	0.76	0.70

Table 9-3 Inlet Temperature Correction Factor

DRYER MOP			150 psig (10.3 barg)							250 psig (17.2 barg)													
INLET PRESSURE			psig	60-100	110	120	130	140	150	120	130	140	150	160	170	180	190	200	210	220	230	240	250
			barg	4.1-6.9	7.6	8.3	9.0	9.7	10.3	8.3	9.0	9.7	10.3	11.0	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.5	17.2
CYCLE	ISO CL.1	4 min.	psig	35	33	31	29	28	27	83	80	76	74	71	69	66	64	63	61	59	58	56	55
			barg	2.4	2.3	2.1	2.0	1.9	1.9	5.7	5.5	5.2	5.1	4.9	4.8	4.6	4.4	4.3	4.2	4.1	4.0	3.9	3.8
	ISO CL.2	10 min.	psig	20	19	18	17	16	15	44	42	40	39	37	36	35	33	32	31	31	30	29	28
			barg	1.4	1.3	1.2	1.2	1.1	1.0	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.1	2.0	1.9	
	ISO CL.3	16 min.	psig	18	17	16	15	14	13	35	33	32	30	29	28	27	26	25	25	24	23	23	22
			barg	1.2	1.2	1.1	1.0	1.0	0.9	2.4	2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.5
	ISO CL.4	24 min.	psig	16	15	15	14	13	13	30	29	28	26	25	24	24	23	22	21	21	20	20	19
			barg	1.1	1.0	1.0	1.0	0.9	0.9	2.1	2.0	1.9	1.8	1.8	1.7	1.7	1.6	1.5	1.4	1.4	1.4	1.4	1.3

Table 9-4 Purge Pressure (**NOTE:** For units with the HCS Series Controller operating in the Demand Cycle Mode, use the ISO Class 2 (10 min.) purge pressure settings only, regardless of ISO Class operating mode.)

INLET TEMPERATURE	°F	35	40	50	60	70	80	90	100	110	120
	°C	2	4	10	16	21	27	32	38	43	49
OUTLET P.D.P.	°F	-34	-28	-22	-16	-10	-4	3	9	15	21
	°C	-37	-33	-30	-27	-23	-20	-16	-13	-9	-6

Table 9-5 Outlet Pressure Dew points at Moisture Indicator Color Change

DRYER MOP			150 psig (10.3 barg)							250 psig (17.2 barg)													
INLET PRESSURE			psig	60-100	110	120	130	140	150	120	130	140	150	160	170	180	190	200	210	220	230	240	250
			barg	4.1-6.9	7.6	8.3	9.0	9.7	10.3	8.3	9.0	9.7	10.3	11.0	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.5	17.2
CYCLE	ISO CL.1	4 min.	0.249	0.239	0.230	0.222	0.214	0.208	0.361	0.348	0.337	0.326	0.317	0.308	0.300	0.293	0.286	0.279	0.273	0.268	0.262	0.257	
	ISO CL.2	10 min.	0.175	0.168	0.162	0.156	0.151	0.146	0.218	0.210	0.203	0.197	0.191	0.186	0.181	0.177	0.172	0.169	0.165	0.162	0.158	0.155	
	ISO CL.3	16 min.	0.161	0.154	0.148	0.143	0.138	0.134	0.182	0.175	0.169	0.164	0.159	0.155	0.151	0.147	0.144	0.141	0.138	0.135	0.132	0.129	
	ISO CL.4	24 min.	0.153	0.147	0.141	0.136	0.132	0.128	0.164	0.158	0.153	0.148	0.144	0.140	0.137	0.133	0.130	0.127	0.124	0.122	0.119	0.117	

Table 9-6 Maximum Purge Flow Factor

DRYER MOP		150 psig (10.3 barg)										
INLET PRESSURE (psig)		60	70	80	90	100	110	120	130	140	150	
INLET PRESSURE (barg)		4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7	10.3	
ISO CLASS 1 4 MIN. CYCLE -94°F / -70°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.147	0.149	0.151	0.153	0.155	0.151	0.148	0.145	0.143	0.141
		10%	0.134	0.136	0.137	0.139	0.141	0.138	0.135	0.133	0.131	0.129
		20%	0.120	0.122	0.124	0.125	0.127	0.124	0.122	0.120	0.119	0.118
		30%	0.106	0.108	0.110	0.112	0.114	0.111	0.110	0.108	0.107	0.106
		40%	0.093	0.095	0.096	0.098	0.100	0.098	0.097	0.096	0.095	0.095
		50%	0.079	0.081	0.083	0.084	0.086	0.085	0.084	0.084	0.084	0.084
		60%	0.065	0.067	0.069	0.071	0.072	0.072	0.072	0.072	0.072	0.072
ISO CLASS 2 10 MIN. CYCLE -40°F / -20°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.141	0.142	0.143	0.144	0.139	0.135	0.131	0.128	0.125	
		10%	0.127	0.128	0.129	0.130	0.130	0.126	0.122	0.119	0.116	0.113
		20%	0.114	0.114	0.115	0.116	0.117	0.113	0.110	0.107	0.104	0.102
		30%	0.100	0.101	0.101	0.102	0.103	0.100	0.097	0.095	0.092	0.091
		40%	0.086	0.087	0.088	0.088	0.089	0.087	0.084	0.082	0.081	0.079
		50%	0.073	0.073	0.074	0.075	0.076	0.073	0.072	0.070	0.069	0.068
		60%	0.059	0.060	0.060	0.061	0.062	0.060	0.059	0.058	0.057	0.056
ISO CLASS 3 16 MIN. CYCLE -4°F / -20°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.140	0.140	0.140	0.141	0.141	0.136	0.132	0.128	0.124	0.121
		10%	0.126	0.126	0.127	0.127	0.128	0.123	0.119	0.115	0.112	0.109
		20%	0.112	0.113	0.113	0.113	0.114	0.110	0.106	0.103	0.100	0.098
		30%	0.098	0.099	0.099	0.100	0.100	0.097	0.094	0.091	0.089	0.087
		40%	0.085	0.085	0.086	0.086	0.087	0.084	0.081	0.079	0.077	0.075
		50%	0.071	0.072	0.072	0.072	0.073	0.071	0.068	0.067	0.065	0.064
		60%	0.057	0.058	0.058	0.059	0.059	0.057	0.056	0.054	0.053	0.052
ISO CLASS 4 24 MIN. CYCLE +38°F / +3°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.139	0.139	0.139	0.140	0.140	0.135	0.130	0.126	0.122	0.119
		10%	0.125	0.125	0.126	0.126	0.126	0.121	0.117	0.114	0.110	0.107
		20%	0.111	0.112	0.112	0.112	0.112	0.108	0.105	0.101	0.098	0.096
		30%	0.098	0.098	0.098	0.098	0.099	0.095	0.092	0.089	0.087	0.084
		40%	0.084	0.084	0.084	0.085	0.085	0.082	0.079	0.077	0.075	0.073
		50%	0.070	0.071	0.071	0.071	0.071	0.069	0.067	0.065	0.063	0.062
		60%	0.057	0.057	0.057	0.057	0.058	0.056	0.054	0.053	0.051	0.050
70%	0.043	0.043	0.043	0.044	0.044	0.043	0.041	0.040	0.039	0.039		

DRYER MOP		250 psig (17.2 barg)														
INLET PRESSURE (psig)		120	130	140	150	160	170	180	190	200	210	220	230	240	250	
INLET PRESSURE (barg)		8.3	9.0	9.7	10.3	11.0	11.7	12.4	13.1	13.8	14.5	15.2	15.9	16.5	17.2	
ISO CLASS 1 4 MIN. CYCLE -94°F / -70°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.148	0.145	0.143	0.141	0.139	0.138	0.137	0.136	0.135	0.135	0.135	0.134	0.134	0.134
		10%	0.135	0.133	0.131	0.129	0.128	0.127	0.126	0.126	0.125	0.125	0.125	0.125	0.125	0.125
		20%	0.122	0.120	0.119	0.118	0.117	0.116	0.116	0.116	0.115	0.115	0.115	0.115	0.116	0.116
		30%	0.110	0.108	0.107	0.106	0.106	0.106	0.105	0.105	0.105	0.106	0.106	0.106	0.107	0.107
		40%	0.097	0.096	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.096	0.096	0.097	0.098	0.098
		50%	0.084	0.084	0.084	0.084	0.084	0.084	0.084	0.085	0.085	0.086	0.087	0.088	0.088	0.089
		60%	0.072	0.072	0.072	0.072	0.073	0.073	0.074	0.075	0.075	0.076	0.077	0.078	0.079	0.080
ISO CLASS 2 10 MIN. CYCLE -40°F / -20°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.135	0.131	0.128	0.125	0.122	0.120	0.118	0.116	0.114	0.113	0.111	0.110	0.109	0.108
		10%	0.122	0.119	0.116	0.113	0.111	0.109	0.107	0.106	0.104	0.103	0.102	0.101	0.100	0.099
		20%	0.110	0.107	0.104	0.102	0.100	0.098	0.097	0.095	0.094	0.093	0.092	0.091	0.090	0.090
		30%	0.097	0.095	0.092	0.091	0.089	0.088	0.086	0.085	0.084	0.083	0.083	0.082	0.081	0.081
		40%	0.084	0.082	0.081	0.079	0.078	0.077	0.076	0.075	0.074	0.074	0.073	0.072	0.072	0.072
		50%	0.072	0.070	0.069	0.068	0.067	0.066	0.065	0.065	0.064	0.064	0.063	0.063	0.063	0.063
		60%	0.059	0.058	0.057	0.056	0.056	0.055	0.055	0.054	0.054	0.054	0.054	0.054	0.054	0.054
ISO CLASS 3 16 MIN. CYCLE -4°F / -20°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.132	0.128	0.124	0.121	0.118	0.115	0.113	0.111	0.109	0.107	0.105	0.104	0.102	0.101
		10%	0.119	0.115	0.112	0.109	0.107	0.105	0.103	0.101	0.099	0.097	0.096	0.095	0.093	0.092
		20%	0.106	0.103	0.100	0.098	0.096	0.094	0.092	0.090	0.089	0.088	0.086	0.085	0.084	0.083
		30%	0.094	0.091	0.089	0.087	0.085	0.083	0.081	0.080	0.079	0.078	0.077	0.076	0.075	0.074
		40%	0.081	0.079	0.077	0.075	0.074	0.072	0.071	0.070	0.069	0.068	0.067	0.066	0.066	0.065
		50%	0.068	0.067	0.065	0.064	0.063	0.061	0.060	0.060	0.059	0.058	0.058	0.057	0.057	0.056
		60%	0.056	0.054	0.053	0.052	0.051	0.051	0.050	0.049	0.049	0.048	0.048	0.048	0.048	0.047
ISO CLASS 4 24 MIN. CYCLE +38°F / +3°C PRESSURE DEWPOINT	ENERGY (PURGE) SAVINGS SETTING	0%	0.130	0.126	0.122	0.119	0.116	0.113	0.110	0.108	0.106	0.104	0.102	0.100	0.099	0.097
		10%	0.117	0.114	0.110	0.107	0.105	0.102	0.100	0.098	0.096	0.094	0.093	0.091	0.090	0.088
		20%	0.105	0.101	0.098	0.096	0.093	0.091	0.089	0.088	0.086	0.084	0.083	0.082	0.081	0.079
		30%	0.092	0.089	0.087	0.084	0.082	0.081	0.079	0.077	0.076	0.075	0.073	0.072	0.071	0.070
		40%	0.079	0.077	0.075	0.073	0.071	0.070	0.068	0.067	0.066	0.065	0.064	0.063	0.062	0.061
		50%	0.067	0.065	0.063	0.062	0.060	0.059	0.058	0.057	0.056	0.055	0.054	0.054	0.053	0.052
		60%	0.054	0.053	0.051	0.050	0.049	0.048	0.047	0.047	0.046	0.045	0.045	0.044	0.044	0.043
70%	0.041	0.040	0.039	0.039	0.038	0.037	0.037	0.036	0.036	0.036	0.035	0.035	0.035	0.034		

Table 9-7 Average Purge / Repressurization Flow Factors ( 150 and 250 psig MOPs)

## 9.10 Using the USB Host Feature (J6) (HCS Series Controller)

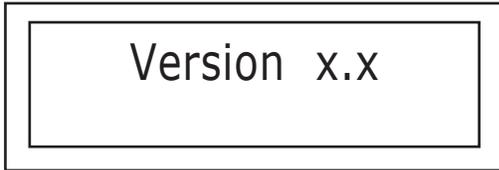
The HCS Series Controller is equipped with a USB Host port located at J6 on the control board which allows for the connection of a USB flash drive. The USB flash drive can be used for data logging, event history, and installing software updates.

### 9.10.1 USB Data Logging

When a USB flash drive is installed in the controller and USB data logging is enabled it will begin to automatically record key dryer operating parameters: timestamp, dryer state, drying timer, state timer, filter service timer, valve service timer, desiccant service timer, cycle count, and tower temperatures.

Timestamp	Units Drying Timer (min)	State Transitions	Filter Service Timer (hours)	Valve Service Timer (hours)	Desiccant Service Timer (hours)	Cycle Count	RT Lower (°C)	RT Upper (°C)	T1 Upper (°C)	
1/27/2014 12:00:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:00:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:00:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:00:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:00:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:00:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:01:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:01:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:01:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:01:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:01:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:01:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:02:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:02:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:02:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:02:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:02:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:02:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:03:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:03:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:03:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:03:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:03:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:03:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:04:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:04:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:04:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:04:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:04:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:04:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:05:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:05:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:05:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:05:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:05:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:05:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:06:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:06:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:06:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:06:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:06:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:06:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:07:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:07:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:07:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:07:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:07:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:07:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:08:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:08:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:08:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:08:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:08:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:08:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:09:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:09:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:09:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:09:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:09:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:09:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:10:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:10:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:10:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:10:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:10:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:10:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:11:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:11:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:11:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:11:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:11:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:11:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:12:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:12:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:12:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:12:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:12:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:12:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:13:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:13:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:13:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:13:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:13:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:13:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:14:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:14:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:14:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:14:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:14:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:14:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:15:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:15:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:15:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:15:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:15:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:15:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:16:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:16:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:16:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:16:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:16:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:16:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:17:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:17:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:17:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:17:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:17:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:17:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:18:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:18:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:18:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:18:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:18:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:18:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:19:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:19:10	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:19:20	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:19:30	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:19:40	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:19:50	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:20:00	0	0	0	0	0	0	30	30.0	60.5	90.1
1/27/2014 12:20:10	0	0	0	0	0	0	30			

With the dryer controller powered off, install the USB flash drive in the USB host port on the HCS Series Controller. Then while holding the enter button on the front panel apply power to the controller. Once the cursor shows up in the top left corner of the text display you can release the enter button. The controller will reboot when the update is complete. On startup the current firmware version will be shown on the text display.



## 9.11 Using the Ethernet Feature (J8) (HCS Series Controller)

The HCS Series Controller is equipped with an Ethernet port located at J8 on the CPU board which allows the customer to connect the dryer to a local area network. The customer can then monitor the dryer status and performance via Web Interface or ModbusTCP.

### 9.11.1 Web Interface

After assigning an IP address to the dryer the IP address can be entered into the address bar of any web browser to connect to the web interface. The first page displayed is the home screen. Displayed on this page are the tower states, elapsed state times, remaining state times, tower pressures, tower temperatures, energy savings, and alarm message (if there is an active alarm). The navigation bar at the bottom of this page can be used to view a flow diagram, alarm history, event history, and settings.

**NOTE:** The default IP Address is 192.168.1.2.

#### 9.11.1.1 Home Screen

	Left Tower	Right Tower
Tower State:	DRYER OFF-LINE	DRYER OFF-LINE
Time Elapsed:	0:00:00	0:00:00
Time Remaining:	0:00:00	0:02:00
Tower Pressure:	1	1
Upper Temperature:	23.28°C / 73.90°F	24.29°C / 75.72°F
Lower Temperature:	23.63°C / 74.53°F	25.26°C / 77.47°F
Dewpoint Disabled:		
Energy Savings:		
Alarm:		

Copyright © 2017 SPXFLOW, Inc.  
Version: 1.8 Build Date: [Nov 20 2017 08:59:28]

The flow diagram page shows the following information tower states, elapsed state times, remaining state times, tower pressures, and alarm message (if there is an active alarm) overlaid on top of an image which shows the state of the valves and flow of the air thru the system in the current dryer step.

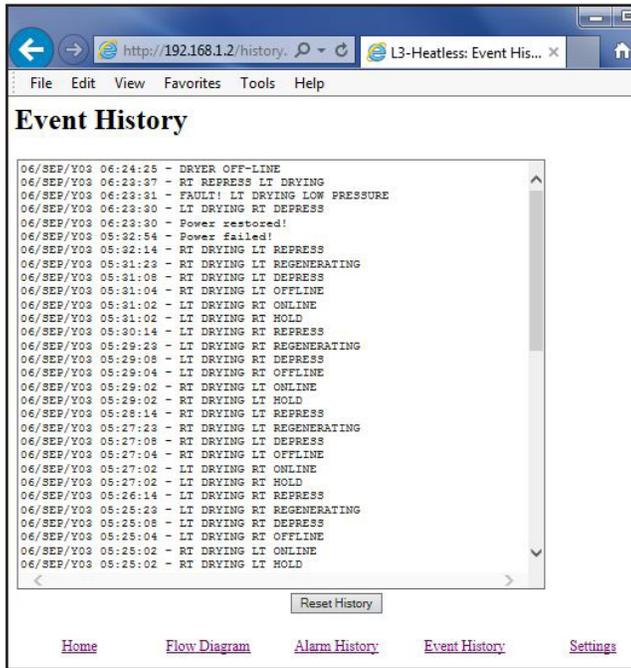
### 9.11.1.2 Flow Diagram

The alarm history page shows the last 20 time-stamped alarms that have occurred on the dryer.

### 9.11.1.3 Alarm History

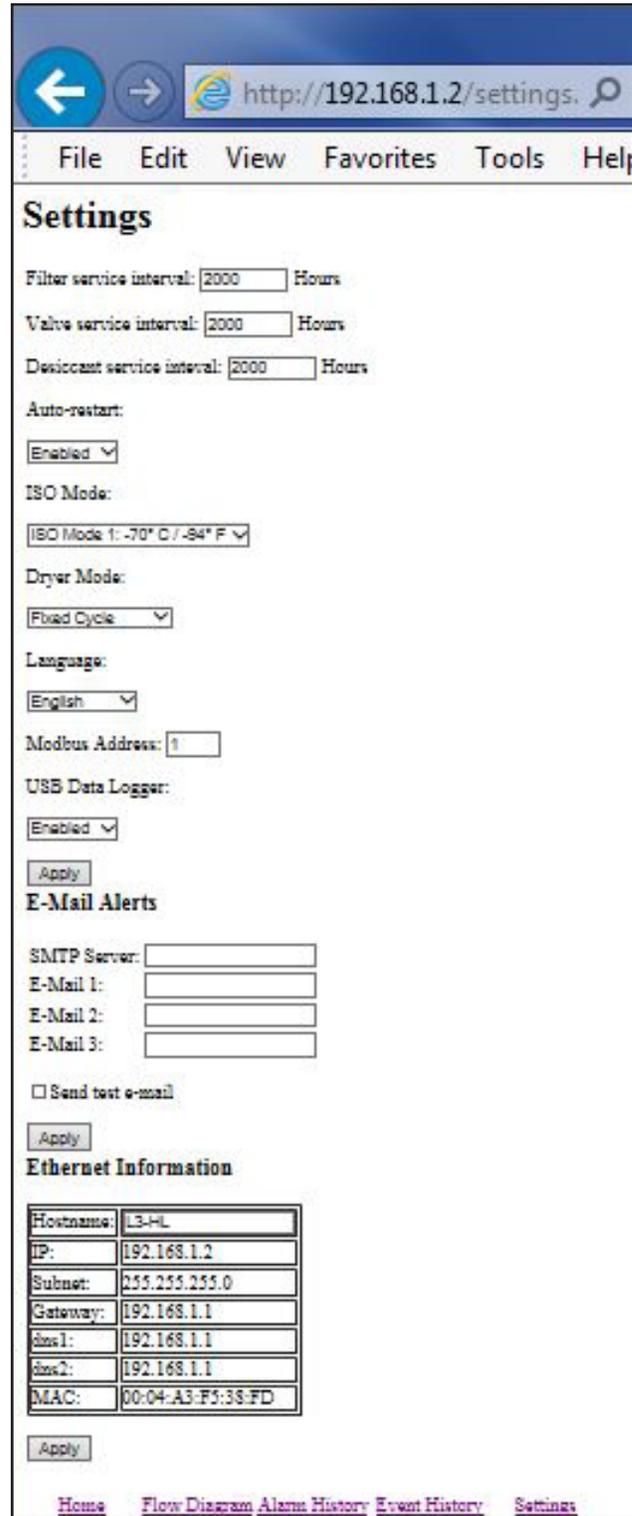
The event history page shows the last 64 time-stamped events that have occurred on the dryer. These events include power failure/recovery, dryer state changes, and alarms.

### 9.11.1.4 Event History



The dryer settings screen allows the customer to view/edit various dryer set points and setup E-mail alerts that will send an e-mail to up to 3 different e-mail addresses whenever an alarm or warning occurs on the dryer.

### 9.11.1.5 Settings



### 9.11.2 Modbus TCP

The Modbus TCP connection allows you to continuously monitor the dryer from a DCS system which implements a Modbus TCP master. The dryer controller implements a ModbusTCP server on port 502. The following Modbus register table provides a list of data that is available.

## Modbus Registers

Page 1 of 2

Holding Register		Name	R/W	Units	Description
Reference	Address				
40001	0x0000	DRYER_STATE	RO	State ID	Dryer state identifier
40002	0x0001	ALARM_STATUS	RO	Flag Bits	Alarm flag bits
40003	0x0002	WARNING_STATUS	RO	Flag Bits	Warning flag bits
40004	0x0003	SERVICE_STATUS	RO	Flag Bits	Service message flag bits
40005	0x0004	FILTER_TIMER	RO	Hours	Filter service timer
40006	0x0005	VALVE_TIMER	RO	Hours	Valve service timer
40007	0x0006	DESICCANT_TIMER	RO	Hours	Desiccant service timer
40008	0x0007	DRYING_TIMER_SEC	RO	Seconds	Drying timer in seconds (Max: 18 Hours)
40009	0x0008	DRYING_TIMER_MIN	RO	Minutes	Drying timer in minutes (Max: 45 Days)
40010	0x0009	STATE_TIMER_SEC	RO	Seconds	State timer in seconds (Max: 18 Hours)
40011	0x000A	STATE_TIMER_MIN	RO	Minutes	State timer in minutes (Max: 45 Days)
40012	0x000B	CYCLE_COUNTER	RO	100x Cycles	Hundreds of cycles
40013	0x000C	LT_PRESSURE	RO	Boolean	Left tower pressurized
40014	0x000D	RT_PRESSURE	RO	Boolean	Right tower pressurized
40015	0x000E	SAVINGS	RO	Percentage	Energy savings (%)
40016	0x000F				
40017	0x0010	DRYER_MODE	R/W	Mode_ID	Dryer mode
40018	0x0011	ISO_MODE	R/W	ISO_Mode_ID	ISO Mode
40019	0x0012	UI_LANGUAGE	R/W	Language_ID	User interface language
40020	0x0013	AUTO_RESTART	R/W	Boolean	Auto-restart (0=Disabled, 1=Enabled)
40021	0x0014	FILTER_INTERVAL	R/W	Hours	Filter service interval
40022	0x0015	VALVE_INTERVAL	R/W	Hours	Valve service interval
40023	0x0016	DESICCANT_INTERVAL	R/W	Hours	Desiccant service interval
40024	0x0017	DIP_SW	RO	Flag Bits	DIP Switch indicators
40025	0x0018	LOG_ENABLE	R/W	Boolean	USB Data Logging Enabled (0=Disabled, 1=Enabled)
40026	0x0019	HI_INLET_TEMP_SP	R/W	0.01°C	High inlet air temperature set point
40027	0x001A	LO_OUTLET_PRESS_SP	R/W	0.01 BAR	Low outlet air pressure set point
40028	0x001B	DEWPOINT_CTRL	R/W	0.01°C	Dew point control set point
40029	0x001C	DEWPOINT_ALRM	R/W	0.01°C	Dew point alarm set point
40030	0x001D	MODBUS_ADDRESS	R/W	Integer	Modbus address
40031	0x001E	REMOTE_STOP	R/W	Boolean	Remote stop (0=Run, 1=Stop)
40032	0x001F				
40033	0x0020	INPUT_STATUS	RO	Flag Bits	Digital input status
40034	0x0021	OUTPUT_STATUS	RO	Flag Bits	Digital output status
40035	0x0022	ANALOG_IN[0]	RO	Integer	Analog Input [0]
40036	0x0023	ANALOG_IN[1]	RO	Integer	Analog Input[1]
40037	0x0024	ANALOG_IN[2]	RO	Integer	Analog Input[2]
40038	0x0025	ANALOG_IN[3]	RO	Integer	Analog Input[3]
40039	0x0026	ANALOG_OUT[0]	RO	Integer	Analog Output[0]
40040	0x0027	RTD[0]	RO	0.01°C	RTD[0] Temperature
40041	0x0028	RTD[1]	RO	0.01°C	RTD[1] Temperature
40042	0x0029	RTD[2]	RO	0.01°C	RTD[2] Temperature
40043	0x002A	RTD[3]	RO	0.01°C	RTD[3] Temperature
40044	0x002B	RTD[4]	RO	0.01°C	RTD[4] Temperature
40045	0x002C	OUTLET_DEW_POINT	RO	0.01°C	Outlet air dew point temperature
40046	0x002D	OUTLET_AIR_PRESSURE	RO	0.01 BAR	Outlet air pressure
40047	0x002E				
40048	0x002F				

## Modbus Registers

Page 2 of 2

Holding Register		Name	R/W	Units	Description
Reference	Address				
40049	0x0030	ALARM_PHRASE[0]	RO	Phrase	Index of alarm phrase[0]
40050	0x0031	ALARM_PHRASE[1]	RO	Phrase	Index of alarm phrase[1]
40051	0x0032	LT_STATE_PHRASE[0]	RO	Phrase	Index of state phrase[0]
40052	0x0033	RT_STATE_PHRASE[1]	RO	Phrase	Index of state phrase[1]
40053	0x0034	LT_HR_ELAPSED	RO	Integer	Left tower hours elapsed
40054	0x0035	LT_MIN_ELAPSED	RO	Integer	Left tower minutes elapsed
40055	0x0036	LT_SEC_ELAPSED	RO	Integer	Left tower seconds elapsed
40056	0x0037	RT_HR_ELAPSED	RO	Integer	Right tower hours elapsed
40057	0x0038	RT_MIN_ELAPSED	RO	Integer	Right tower minutes elapsed
40058	0x0039	RT_SEC_ELAPSED	RO	Integer	Right tower seconds elapsed
40059	0x003A	LT_HR_REMAINING	RO	Integer	Left tower hours remaining
40060	0x003B	LT_MIN_REMAINING	RO	Integer	Left tower minutes remaining
40061	0x003C	LT_SEC_REMAINING	RO	Integer	Left tower seconds remaining
40062	0x003D	RT_HR_REMAINING	RO	Integer	Right tower hours remaining
40063	0x003E	RT_MIN_REMAINING	RO	Integer	Right tower minutes remaining
40064	0x003F	RT_SEC_REMAINING	RO	Integer	Right tower seconds remaining
40065	0x0040	INITIAL_DRY_TEMP	RO	0.01°C	Initial Drying Temperature
40066	0x0041	INITIAL_REGEN_TEMP	RO	0.01°C	Initial Regeneration Temperature
40067	0x0042	FINAL_REGEN_TEMP	RO	0.01°C	Final Regenerating Temperature
40068	0x0043	LEFT_DELTA	RO	0.01°C	Left temperature change
40069	0x0044	RIGHT_DELTA	RO	0.01°C	Right temperature change
40070	0x0045	DEMAND_STATE	RO	Integer	Demand cycle state
40071	0x0046	DRYER_ID[0-1]	R/W	Character	First 2 characters of dryer identifier
40072	0x0047	DRYER_ID[2-3]	R/W	Character	Next 2 characters of dryer identifier
40073	0x0048	DRYER_ID[4-5]	R/W	Character	Next 2 characters of dryer identifier
40074	0x0049	DRYER_ID[6-7]	R/W	Character	Next 2 characters of dryer identifier
40075	0x004A	DRYER_ID[8-9]	R/W	Character	Last 2 characters of dryer identifier
40076	0x004B				
40077	0x004C				
40078	0x004D				
40079	0x004E				
40080	0x004F				
40081	0x0050	INLET_OPEN	RO	Seconds	Inlet open time
40082	0x0051	INLET_CLOSE	RO	Seconds	Inlet close time
40083	0x0052	DEPRESS	RO	Seconds	Depressurization time
40084	0x0053	REGEN	RO	Seconds	Regenerating time
40085	0x0054	REPRESS	RO	Seconds	Repressurization time
40086	0x0055	MAX_DRY	RO	Seconds	Maximum drying time
40087	0x0056	FIXED DRYING TIME	RO	Seconds	Fixed drying time
40088	0x0057				
40089	0x0058				
40090	0x0059				
40091	0x005A				
40092	0x005B				
40093	0x005C				
40094	0x005D				
40095	0x005E				
40096	0x005F				

## Modbus Register Details

Page 1 of 4

Dryer Status		
Register	40001	Description
Decimal	Hex	Description
0	0x0000	Left Drying, Right Offline
1	0x0001	Left Drying, Right Depressurizing
2	0x0002	Left Drying, Right Regenerating
3	0x0003	Left Drying, Right Repressurizing
4	0x0004	Left Drying, Right Hold
5	0x0005	Left Drying, Right Online
6	0x0006	Right Drying, Left Offline
7	0x0007	Right Drying, Left Depressurizing
8	0x0008	Right Drying, Left Regenerating
9	0x0009	Right Drying, Left Repressurizing
10	0x000A	Right Drying, Left Hold
11	0x000B	Right Drying, Left Online
12	0x000C	Dryer Offline

Dryer Alarm Flags		
Register	40002	Description
Bit	Mask	Description
0	0x0001	Left Drying Low Pressure
1	0x0002	Right Drying Low Pressure
2	0x0004	Left Regenerating High Pressure
3	0x0008	Right Regenerating High Pressure
4	0x0010	Left Regenerating Low Pressure
5	0x0020	Right Regenerating Low Pressure
6	0x0040	Left Upper Sensor Under Range
7	0x0080	Right Upper Sensor Under Range
8	0x0100	Left Upper Sensor Over Range
9	0x0200	Right Upper Sensor Over Range
10	0x0400	Left Lower Sensor Under Range
11	0x0800	Right Lower Sensor Under Range
12	0x1000	Left Lower Sensor Over Range
13	0x2000	Right Lower Sensor Over Range
14	0x4000	Reserved
15	0x8000	Reserved

Dryer Warning Flags		
Register	40003	Description
Bit	Mask	Description
0	0x0001	Dewpoint Sensor Under-Range
1	0x0002	Left Drying High Outlet Dew Point
2	0x0004	Right Drying High Outlet Dew Point
3	0x0008	Drain #1 Warning
4	0x0010	Drain #2 Warning
5	0x0020	High Inlet Air Temperature
6	0x0040	Low Outlet Air Pressure
7	0x0080	Reserved

## Modbus Register Details

Page 2 of 4

Dryer Service Flags		
Register	40004	
Decimal	Mask	Description
0	0x0001	Service Dryer Filters
1	0x0002	Service Dryer Valves
2	0x0004	Service Dryer Desiccant
3	0x0008	Reserved
4	0x0010	Reserved
5	0x0020	Reserved
6	0x0040	Reserved
7	0x0080	Reserved

Dryer Mode		
Register	40017	
Decimal	Hex	Description
0	0x0000	Manual Cycle Mode
1	0x0001	Fixed Cycle Mode
2	0x0002	Demand Cycle Mode
3	0x0003	Dew Point Cycle Mode
4	0x0004	Reserved
5	0x0005	Reserved
6	0x0006	Reserved
7	0x0007	Reserved

ISO Mode		
Register	40018	
Decimal	Hex	Description
0	0x0000	ISO Mode 1 (-70°C / -94°F)
1	0x0001	ISO Mode 2 (-40°C / -40°F)
2	0x0002	ISO Mode 3 (-20°C / -4°F)
3	0x0003	Reserved
4	0x0004	Reserved
5	0x0005	Reserved
6	0x0006	Reserved
7	0x0007	Reserved

## Modbus Register Details

Page 3 of 4

UI Language		
Register	40021	
Decimal	Hex	Description
0	0x0000	English
1	0x0001	Spanish
2	0x0002	French
3	0x0003	German
4	0x0004	Portuguese
5	0x0005	Italian
6	0x0006	Polish
7	0x0007	Danish
8	0x0008	Dutch
9	0x0009	Norwegian
10	0x000A	Finnish
11	0x000B	Swedish
12	0x000C	Czech
13	0x000D	Reserved
14	0x000E	Reserved
15	0x000F	Reserved

DIP Switches		
Register	40024	
Bit	Mask	Description
0	0x0001	Line Pressure (1=Low Pressure, 0=High Pressure)
1	0x0002	Remote Start/Stop (1=Digital input, 0=Modbus)
2	0x0004	Inlet Air Temperature (1=Disabled, 0=Enabled)
3	0x0008	Outlet Air Pressure (1=Disabled, 0=Enabled)
4	0x0010	Pressure Switches (1=Enabled, 0=Disabled)
5	0x0020	Service Alarms (1=Enabled, 0=Disabled)
6	0x0040	Dew Point Sensor (1=Disabled, 0=Enabled)
7	0x0080	Reserved

## Modbus Register Details

Page 4 of 4

Input Status		
Register	40033	
Bit	Mask	Description
0	0x0001	Input #4
1	0x0002	Input #3
2	0x0004	Input #2
3	0x0008	Right tower pressure switch
4	0x0010	Left tower pressure switch
5	0x0020	Input #1
6	0x0040	Reserved
7	0x0080	Reserved
8	0x0100	Reserved
9	0x0200	Reserved
10	0x0400	Reserved
11	0x0800	Reserved
12	0x1000	Reserved
13	0x2000	Reserved
14	0x4000	Reserved
15	0x8000	Reserved

Output Status		
Register	40034	
Bit	Mask	Description
0	0x0001	Relay #1
1	0x0002	Relay #2
2	0x0004	Relay #3
3	0x0008	Relay #4
4	0x0010	Relay #5
5	0x0020	Relay #6
6	0x0040	Reserved
7	0x0080	Reserved
8	0x0100	Solenoid #1
9	0x0200	Solenoid #2
10	0x0400	Solenoid #3
11	0x0800	Solenoid #4
12	0x1000	Solenoid #5
13	0x2000	Solenoid #6
14	0x4000	Reserved
15	0x8000	Reserved

## 10.0 MAINTENANCE

**WARNING – The heatless desiccant dryer is a pressure-containing device. De-pressurize before servicing. (See Section 3.3)**

**NOTE:** HCL Series and HCS Series Controllers are equipped with Service Reminder functions for filters, desiccant and valves.

### 10.1 Desiccant Replacement

**NOTE:** The use of the correct replacement desiccant is necessary for proper dryer operation. Never use hygroscopic salts of the type commonly used in “deliquescent” type dryers.

#### 10.1.1 Frequency Of Desiccant Replacement

Desiccant should be replaced whenever the required dew point cannot be maintained while the dryer is being operated within its design conditions and there are no mechanical malfunctions. Refer to Section 11.0 for troubleshooting hints.

**NOTE:** Desiccant life is determined by the quality of the inlet air. Proper filtering of the inlet air will extend the life of the desiccant. Typically desiccant life is 3 to 5 years.

#### 10.1.2 Procedure for Desiccant Charge Replacement

- De-pressurize and de-energize the dryer.
- Remove the fill and drain plugs from desiccant tower and drain the spent desiccant. Place a container at the base of the vessel to collect the desiccant. If necessary tap the sides of the vessels with a rubber mallet to loosen desiccant.

**NOTE:** Use extreme care when inserting rods or other tools through the desiccant fill or drain ports to loosen packed desiccant. Internal flow diffusers at the ends of the desiccant beds can be damaged or punctured by sharp instruments. These diffusers are necessary to distribute the airflow and keep the desiccant beads within the tower. Desiccant beads in exhaust mufflers, afterfilters, or the piping connected to the desiccant towers may indicate a perforation of a diffuser.

- Amount of desiccant required for complete change.

MODEL SIZE	DESICCANT REQUIRED (Quantity per Tower)	
	lbs.	(kgs)
40	26	(11.8)
60	40	(18.1)
90	55	(24.9)
115	105	(47.6)
165	105	(47.6)
260	159	(72.1)
370	229	(103.9)
450	271	(122.9)
590	355	(161.0)
750	455	(206.4)
930	590	(267.6)
1130	710	(322.0)
1350	923	(418.7)
1550	1032	(468.1)
2100	1260	(571.5)
3000	1867	(846.9)
4100	2699	(1224.2)
5400	3600	(1632.9)

- Replace the drain plug using Teflon tape or another pipe thread sealant suitable for compressed air service.
- Fill the desiccant tower with the required quantity of dry desiccant. Do not tamp or otherwise pack the desiccant.

- Replace the fill plug using Teflon tape or another pipe thread sealant suitable for compressed air service.
- Repeat this procedure for the other tower.

### 10.1.3 Insuring Desiccant Dryness

Replacement desiccant is shipped in airtight containers. Keep the covers on these containers tightly closed until use to avoid moisture contamination. If desiccant is exposed to air it can be heated in an oven at 400°F (204°C) for four hours before use. Alternatively, if the dryer is not refilled with dry desiccant, it may be necessary to operate the unit with an inlet flow rate of less than 50% of maximum rated inlet capacity until the desiccant has regenerated fully.

### 10.2 Purge Mufflers

- Purge mufflers should be checked regularly, changed annually. Muffler disseminator elements become clogged with desiccant dust over time, creating back pressure and restricted purge flow.
- Refer to Section 9.2.7.

### 10.3 Valves

- Process and pilot valves should be checked frequently for leaks and proper operation.
- Purge pressure adjustment valve should be checked frequently for proper adjustment.
- Refer to section 9.2.8.

### 10.4 Pilot Air Filter Element Replacement

#### 10.4.1 Frequency of replacement

The pilot air filter contains a filter element that should be changed yearly. Replacement may be required sooner if pressure drop across cartridge prevents valves from actuating properly. Pilot air pressure should be in the range of 60-120 psig (4.1-8.3 barg) and is controlled by a pressure regulator that has been set and sealed at 120 psig (8.3 barg).

**WARNING – The pilot air filter housing is a pressure-containing device, de-pressurize before servicing. Slowly open manual drain valve on bottom of filter bowl by turning clockwise to verify that the housing is de-pressurized before removing bowl.**

#### 10.4.2 Procedure for element replacement

##### 10.4.2.1 Models 40 through 3000

- Isolate dryer from air supply
- De-pressurize dryer by running dryer and allowing system pressure to purge to atmosphere. Loss of pilot pressure will eventually prevent purge/repressurization valves from opening. Remaining pressure can be vented to atmosphere through the manual vent on the pilot air filter. The system must be fully de-pressurized before removing the bowl.
- Remove the filter bowl by turning counterclockwise and then pulling straight down.
- Clean the filter bowl.
- Replace the element. Reassemble in reverse order.

#### 10.4.2.2 Models 4100 through 5400

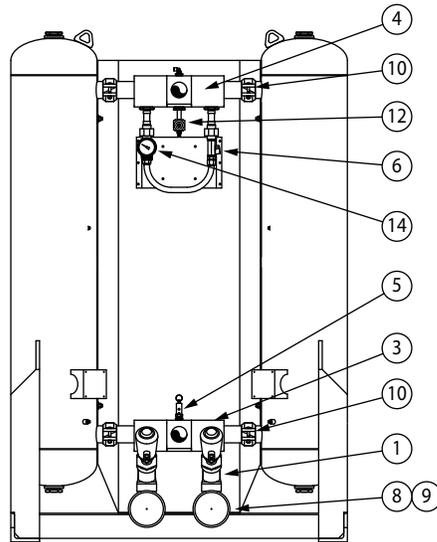
- Isolate dryer from air supply
- De-pressurize dryer by running dryer and allowing system pressure to purge to atmosphere. Loss of pilot pressure will eventually prevent purge/repressurization valves from opening. Remaining pressure can be vented to atmosphere through the manual drain on the pilot air filter. The system must be fully de-pressurized before removing the bowl.
- Remove the filter bowl by pushing up, turning counterclockwise and then pulling straight down.
- Clean the filter bowl.
- Replace the element – Pull off the old element and discard. Make certain O-ring inside top of replacement element is lubricated and in place and then push element onto filter head.
- Clean and lubricate O-ring at top of bowl and reassemble in reverse order.

## 11.0 TROUBLESHOOTING

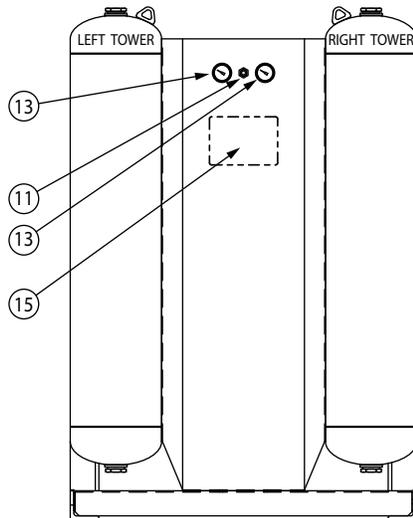
SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
<b>11.1 Indicator lights not illuminated</b>	No power to unit.	Check voltage at terminal board.
	Off/On switch turned off.	Turn on.
	Blown fuse.	Replace fuse.
	Off/on switch or board malfunction.	Replace board.
<b>11.2 Moisture indicator turns yellow (elevated outlet dew point)</b>	Design conditions exceeded.	Refer to Sections 4 & 9 to determine if dryer is being outside of design limitations.
	Spent desiccant (useful service life has ended).	Replace desiccant.
	Contaminated desiccant (e.g. with oil)	Take corrective action. Refer to Section 4.1 to determine proper prefiltration before changing desiccant.
	Saturated desiccant (saturated with water)	Refer to 11.3 for corrective action. Operation at reduced flow may reactivate desiccant beds until desired outlet dew point is achieved.
<b>11.3 Premature saturation of desiccant</b>	Insufficient purge flow - Purge pressure too low	Refer to Section 9 to determine correct Purge Pressure Indicator setting.
	Incomplete tower depressurization (tower pressure greater than 2 psig) - clogged mufflers	Replace muffler inserts.
	Incomplete tower depressurization - Purge/repressurization valve fails to open	Verify voltage to pilot solenoid valve. Check pilot air pressure (60-120 psig required). Verify proper actuator operation.
	Insufficient purge time - Incorrect controller settings	Refer to Section 7 or 8 to determine correct controller cycle settings.
<b>11.4 Tower fails to repressurize to line pressure</b>	Insufficient purge time - Faulty controller	Refer to Section 7 or 8 to verify proper time sequence. Replace controller board as required.
	Purge/repressurization valve fails to close (air loss from mufflers during tower repressurization portion of cycle)	Verify removal of voltage to pilot solenoid valve. Verify proper actuator operation. This is a spring-assisted, normally closed valve. Check valve for obstruction or seat damage.
<b>11.5 Excessive purge is discharged during purge cycle</b>	Insufficient purge flow - Purge pressure too low	Refer to Section 9 to determine correct Purge Pressure Indicator setting . Purge Pressure Adjustment Valve should never be completely closed.
	Excessive purge flow - Purge pressure too high	Refer to Section 9 to determine correct Purge Pressure Indicator setting .
	Inlet switching valve fails to close.	Verify voltage to pilot solenoid valve. Check pilot air pressure (60-120 psig required.) Verify proper actuator operation. Check valve for obstruction or seat damage.
<b>11.6 Excessive desiccant dust downstream</b>	(Models 40 through 3000) Shuttle Valve; or (Models 4100 through 5400) same tower Outlet Check or opposite tower Purge Check Valves fail to close	Repair or replace valve(s) as needed.
	Fluidization of desiccant bed - design conditions for maximum rated flow exceeded	Refer to Section 4 or 9 to determine if dryer is being operated outside of design limitations.
	Fluidization of desiccant bed - Rapid repressurization of offstream tower due to: Faulty timer Insufficient purge flow - purge pressure too low	Refer to Section 7 or 8 to verify proper time sequence. Refer to Section 9 to determine correct Purge Pressure Indicator setting .
<b>11.7 Switching Failure Alarm (HCL Series &amp; HCS Series Controllers only)</b>	Faulty pressure switches or control board	Replace components
	Offstream tower did not de-pressurize in time and/or below 10 psig	Check mufflers, check or shuttle valve(s), inlet switching and purge/repressurization valves, purge pressure adjustment, and controller settings.
	Offstream tower did not re-pressurize in time and/or above 10 psig	Check air supply to dryer, purge/repressurization valve, purge pressure adjustment, and controller settings.
<b>11.8 Real time clock data resets back to year 2000 when power is removed. (HCS Series Controller only)</b>	Bad battery (located on CPU board).	Replace battery. Refer to Section 8 to reset Date/Time parameters.  Replacement battery type: CR2032

## 12.0 REPLACEMENT PARTS

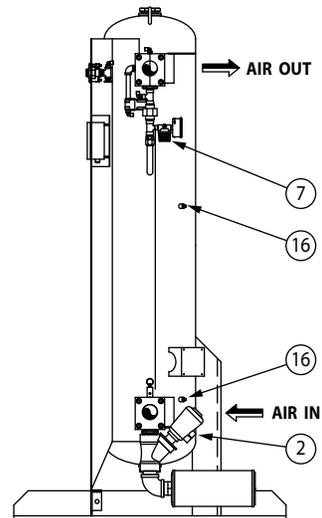
Models 40 through 450



REAR VIEW



FRONT VIEW



RIGHT SIDE VIEW  
RIGHT CHAMBER REMOVED FOR CLARITY

**Models 40 through 450**

MODEL							
40	60	90	115	165	260	370	450

**REPLACEMENT PARTS**

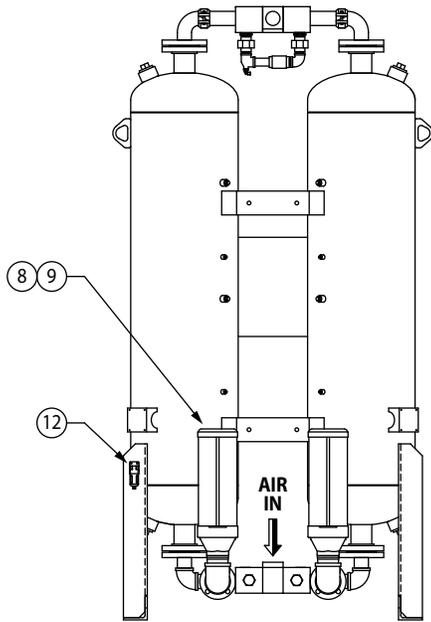
ID#	DESCRIPTION	40	60	90	115	165	260	370	450	SAFETY STOCK	DRYER QTY.
1	Purge/Repressurization Valve Assembly	7438612	7438613	7438613	7438614	7438614	7438616	7438616	7438616	1	2
2	Pilot Valve (with coil) 12 VDC	3203652	3203652	3203652	3203652	3203652	3203652	3203652	3203652	1	2
2	Pilot Valve for N7	3151158	3151158	3151158	3151158	3151158	3151158	3151158	3151158	1	2
3	Inlet Shuttle Valve	3206222	3206222	3206222	3206222	3206222	3206223	3206223	3206223	1	1
4	Outlet Shuttle Valve	3206222	3206222	3206222	3206222	3206222	3206223	3206223	3206223		1
5	Pressure Relief Valve (SP - 150#)	3214457	3214457	3214457	3214457	3214457	3214457	3214457	3214457		1
	Pressure Relief Valve (SP - 150#) (SST)	3214436	3214436	3214436	3214436	3214436	3214436	3214516	3214516		1
*	Pressure Relief Valve (HP - 250#)	3214433	3214433	3214433	3214433	3214433	3214433	3214433	3214433		1
	Pressure Relief Valve (HP - 250#) (SST)	3251902	3251902	3251902	3251902	3251902	3251902	3251902	3251902		1
6	Adjustable Purge Rate Valve	4009893	4009893	4009893	4009893	4009893	4009894	4009895	4009895		1
7	Purge Gauge Pressure Regulator (SP - 150#)	3204277	3204277	3204277	3204277	3204277	3204277	3204277	3204277		1
	Purge Gauge Pressure Regulator (HP - 250#)	3204278	3204278	3204278	3204278	3204278	3204278	3204278	3204278		1
8	Purge Muffler	3133635	3071392	3071392	3090655	3090655	3130773	3130773	3130773		2
9	Muffler Insert	3075949	3107791	3107791	3126761	3126761	3121200	3121200	3121200	2	2
10	Strainer	3216134	3216134	3216134	3216134	3216134	3216135	3216135	3216135		4
*	Purge Orifice	3086704	3055958	3060376	3109995	3161996	3162102	1268393	3161907		2
11	Moisture Indicator	4003167	4003167	4003167	4003167	4003167	4003167	4003167	4003167		1
12	Pilot Air Filter Replacement Cartridge (SP - 150#)	3158592	3158592	3158592	3158592	3158592	3158592	3158592	3158592	1	1
	Pilot Air Filter Replacement Cartridge (SP - 250#)	3158592	3158592	3158592	3158592	3158592	3158592	3158592	3158592		1
13	Tower Pressure Gauge (HCT) (SP - 150#)	7417542	7417542	7417542	7417542	7417542	7417542	7417542	7417542	1	2
	Tower Pressure Gauge (HCT) (SP - 150#) (SST)	7450562	7450562	7450562	7450562	7450562	7450562	7450562	7450562		2
*	Tower Pressure Gauge (HCL / HCS) (SP - 150#)	7417542	7417542	7417542	7417542	7417542	7417542	7417542	7417542	1	4
	Tower Pressure Gauge (HCL / HCS) (SP - 150#) (SST)	7450562	7450562	7450562	7450562	7450562	7450562	7450562	7450562		4
*	Tower Pressure Gauge (HCL / HCS) (HP - 250#)	7450553	7450553	7450553	7450553	7450553	7450553	7450553	7450553		4
	Tower Pressure Gauge (HCL / HCS) (HP - 250#) (SST)	7450562	7450562	7450562	7450562	7450562	7450562	7450562	7450562		4
14	Purge Gauge (SP - 150#)	7450554	7450554	7450554	7450554	7450554	7450554	7450554	7450554		1
	Purge Gauge (SP - 150#) (SST)	7450568	7450568	7450568	7450568	7450568	7450568	7450568	7450568		1
	Purge Gauge (HP - 250#)	7450555	7450555	7450555	7450555	7450555	7450555	7450555	7450555		1
	Purge Gauge (HP - 250#) (SST)	7450567	7450567	7450567	7450567	7450567	7450567	7450567	7450567		1
*	Pressure Switch	4006380	4006380	4006380	4006380	4006380	4006380	4006380	4006380	1	2
15	HCT Controller	3161779	3161779	3161779	3161779	3161779	3161779	3161779	3161779		1
15	HCL Controller	3204518	3204518	3204518	3204518	3204518	3204518	3204518	3204518		1
15	HCS Controller	7419130	7419130	7419130	7419130	7419130	7419130	7419130	7419130		1
16	RTD (HCS Controller)	3253902	3253902	3253902	3253902	3253902	3253902	3253902	3253902	1	4
	Desiccant Evaluation Kit	7452585	7452585	7452585	7452585	7452585	7452585	7452585	7452585		

**NOTES:**

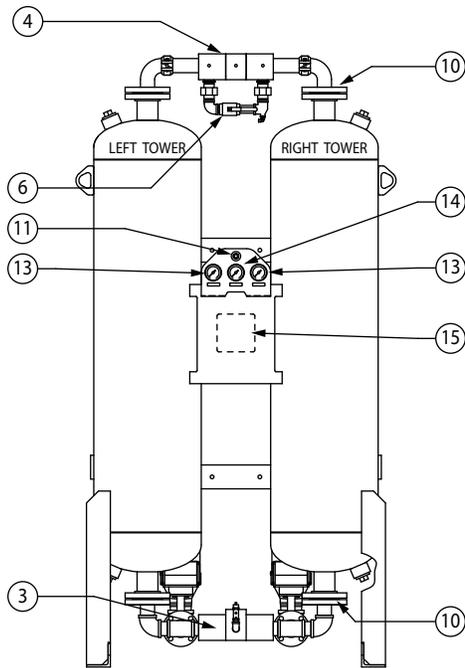
1. Parts and Maintenance Kits are for standard builds only. Please contact the factory with your dryer serial number for assistance on identifying spare parts and maintenance kits for your specific unit.
2. All quantities for one dryer.
3. ID# correspond to P&ID legend (\* Not pictured in diagrams.)

Phone: +1 724 745 1555  
 Email: [ft.dehydration.order.entry@spxflow.com](mailto:ft.dehydration.order.entry@spxflow.com)  
 Web: [www.spxflow.com/deltech](http://www.spxflow.com/deltech)

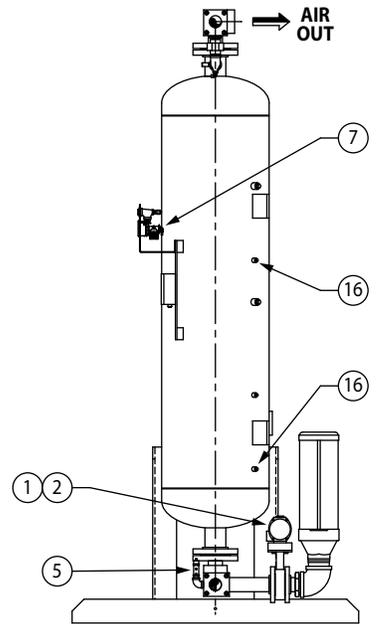
Models 590 through 930



REAR VIEW



FRONT VIEW



SIDE VIEW  
(RIGHT CHAMBER REMOVED FOR CLARITY)

Phone: +1 724 745 1555  
 Email: ft.dehydration.order.entry@spxflow.com  
 Web: www.spxflow.com/deltech

## Models 590 through 930

MODEL		
590	750	930

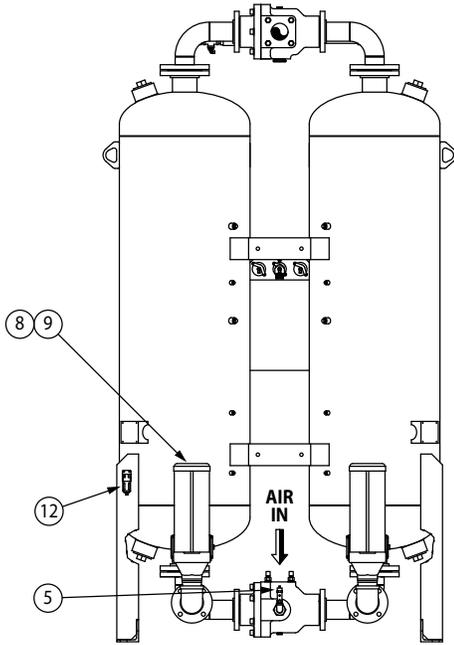
REPLACEMENT PARTS				SAFETY STOCK	DRYER QTY.	
ID#	DESCRIPTION	590	750	930		
1	Purge/Repressurization Valve Assembly	3152701	7449166	7448903	1	2
2	Pilot Valve for NEMA 4, 4X (Valve only)	N/A	4009880	4009880	1	2
2	Pilot Valve for NEMA 4, 4X (Coil only)	N/A	4009810	4009810	1	2
2	Pilot Valve for NEMA 4, 4X (Valve with coil)	3203652	N/A	N/A	1	2
3	Inlet Shuttle Valve	3206223	3206223	3206223		1
4	Outlet Shuttle Valve	3206223	3206223	3206223		1
5	Pressure Relief Valve (SP - 150#)	7400684	7400684	7400684		1
	Pressure Relief Valve (SP - 150#) (SST)	3214516	3214516	3214516		1
	Pressure Relief Valve (HP - 250#)	1262617	1262617	1262617		1
	Pressure Relief Valve (HP - 250#) (SST)	CF	CF	CF		1
6	Adjustable Purge Rate Valve	7401510	7401510	1197250		1
7	Purge Gauge Pressure Regulator (SP - 150#)	3204277	3204277	3204277		1
	Purge Gauge Pressure Regulator (HP - 250#)	3203296	3203296	3203296		1
8	Purge Muffler	3072056	3126355	3126355		2
9	Muffler Insert	3094580	3097672	3097672	See NOTE #1	
10	Strainer	3155578	3155578	3155579		4
*	Purge Orifice	3152946	3163469	3163522		2
11	Moisture Indicator	4003167	4003167	4003167		1
12	Pilot Air Filter Replacement Cartridge (SP - 150#)	3158592	3158592	3158592	1	1
	Pilot Air Filter Replacement Cartridge (HP - 250#)	3158592	3158592	3158592		1
13	Tower Pressure Gauge (HCT) (SP - 150#)	7417542	7417542	7417542	1	2
	Tower Pressure Gauge (HCT) (SP - 150#) (SST)	7450562	7450562	7450562		2
	Tower Pressure Gauge (HCL / HCS) (SP - 150#)	7450553	7450553	7450553		4
	Tower Pressure Gauge (HCL / HCS) (SP - 150#) (SST)	7450562	7450562	7450562		4
	Tower Pressure Gauge (HCL / HCS) (HP - 250#)	7450553	7450553	7450553		4
	Tower Pressure Gauge (HCL / HCS) (HP - 250#) (SST)	7450562	7450562	7450562		4
14	Purge Gauge (SP - 150#)	7450554	7450554	7450554		1
	Purge Gauge (SP - 150#) (SST)	7450568	7450568	7450568		1
	Purge Gauge (HP - 250#)	7450555	7450555	7450555		1
	Purge Gauge (HP - 250#) (SST)	7450567	7450567	7450567		1
*	Pressure Switch	4006380	4006380	4006380	1	2
15	HCT Controller	3161779	3161779	3161779		1
15	HCL Controller	3204518	3204518	3204518		1
15	HCS Controller	7419130	7419130	7419130		1
16	RTD (HCS Controller)	3253902	3253902	3253902	1	4
	Desiccant Evaluation Kit	7452585	7452585	7452585		

**NOTES:**

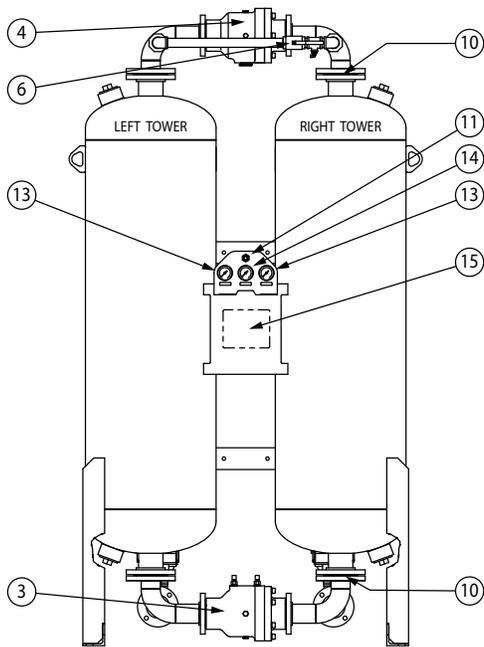
- Model 590 has a quantity of two (2) muffler inserts per dryer unit.  
Models 750 and 930 have a quantity of eight (8) muffler inserts per dryer unit.
- Parts and Maintenance Kits are for standard builds only. Please contact the factory with your dryer serial number for assistance on identifying spare parts and maintenance kits for your specific unit.
- All quantities for one dryer.
- ID# correspond to P&ID legend (\* Not pictured in diagrams.)
- N/A - Not Applicable to this Model Size
- CF - Consult Factory

Phone: +1 724 745 1555  
 Email: [ft.dehydration.order.entry@spxflow.com](mailto:ft.dehydration.order.entry@spxflow.com)  
 Web: [www.spxflow.com/deltech](http://www.spxflow.com/deltech)

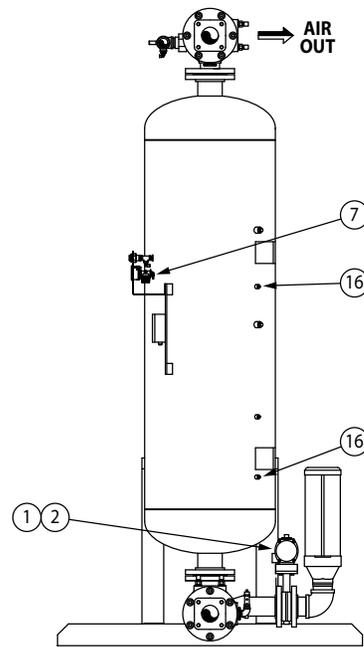
Models 1130 through 3000



REAR VIEW



FRONT VIEW



RIGHT SIDE VIEW  
RIGHT CHAMBER REMOVED FOR CLARITY

Phone: +1 724 745 1555  
 Email: [ft.dehydration.order.entry@spxflow.com](mailto:ft.dehydration.order.entry@spxflow.com)  
 Web: [www.spxflow.com/deltech](http://www.spxflow.com/deltech)

**Models 1130 through 3000**

MODEL				
1130	1350	1550	2100	3000

**REPLACEMENT PARTS**

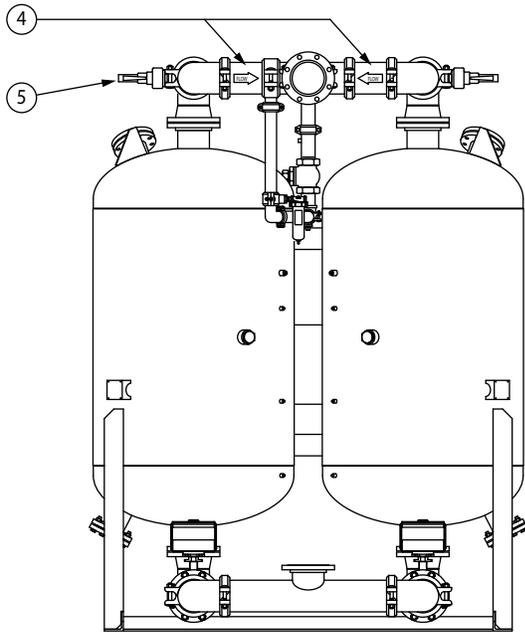
ID#	DESCRIPTION					SAFETY STOCK	DRYER QTY.
1	Purge/Repressurization Valve Assembly	7448894	7448894	7448894	7448895	3151607	2
2	Pilot Valve for NEMA 4, 4X (valve only)	4009880	4009880	4009880	4009880	4009880	2
2	Pilot Valve for NEMA 4, 4X (coil only)	4009810	4009810	4009810	4009810	4009810	2
3	Inlet Shuttle Valve	3163014	3163014	3163013	3163013	3163013	1
4	Outlet Shuttle Valve	3163014	3163014	3163013	3163013	3163013	1
5	Pressure Relief Valve (SP - 150#)	7400684	7400684	7400684	3100938	3100938	1
	Pressure Relief Valve (SP - 150#) (SST)	CF	CF	CF	CF	CF	1
	Pressure Relief Valve (HP - 250#)	CF	CF	CF	CF	CF	1
	Pressure Relief Valve (HP - 250#) (SST)	CF	CF	CF	CF	CF	1
6	Adjustable Purge Rate Valve	1197250	1197250	1196182	1196182	1182391	1
7	Purge Gauge Pressure Regulator (SP - 150#)	3204277	3204277	3204277	3204277	3204277	1
	Purge Gauge Pressure Regulator (HP - 250#)	3203296	3203296	3203296	3203296	CF	1
8	Purge Muffler	3126355	3126355	3126355	4005564	3137925	2
9	Muffler Insert	3097672	3097672	3097672	4005551	3138218	8
10	Strainer	3155579	3155579	3155579	3155579	3155580	4
*	Purge Orifice	3163540	3163546	3163561	3163575	3147693	2
11	Moisture Indicator	4003167	4003167	4003167	4003167	4003167	1
12	Pilot Air Filter Replacement Cartridge (SP - 150#)	3158592	3158592	3158592	3158592	3158592	1
	Pilot Air Filter Replacement Cartridge (HP - 250#)	3158592	3158592	3158592	3158592	3158592	1
13	Tower Pressure Gauge (HCT) (SP - 150#)	7417542	7417542	7417542	7417542	7417542	2
	Tower Pressure Gauge (HCT) (SP - 150#) (SST)	7450562	7450562	7450562	7450562	7450562	2
	Tower Pressure Gauge (HCL / HCS) (SP - 150#)	7417542	7417542	7417542	7417542	7417542	4
	Tower Pressure Gauge (HCL / HCS) (SP - 150#) (SST)	7450562	7450562	7450562	7450562	7450562	4
	Tower Pressure Gauge (HCL / HCS) (HP - 250#)	7450553	7450553	7450553	7450553	7450553	4
	Tower Pressure Gauge (HCL / HCS) (HP - 250#) (SST)	7450562	7450562	7450562	7450562	7450562	4
14	Purge Gauge (SP - 150#)	7450552	7450552	7450552	7450552	7450552	1
	Purge Gauge (SP - 150#) (SST)	7450568	7450568	7450568	7450568	7450568	1
	Purge Gauge (HP - 250#)	7450555	7450555	7450555	7450555	7450555	1
	Purge Gauge (HP - 250#) (SST)	7450567	7450567	7450567	7450567	7450567	1
*	Pressure Switch	4006380	4006380	4006380	4006380	4006380	2
15	HCT Controller	3161779	3161779	3161779	3161779	3161779	1
15	HCL Controller	3204518	3204518	3204518	3204518	3204518	1
15	HCS Controller	7419130	7419130	7419130	7419130	7419130	1
16	RTD (HCS Controller)	3253902	3253902	3253902	3253902	3253902	4
	Desiccant Evaluation Kit	7452585	7452585	7452585	7452585	7452585	1

**NOTES:**

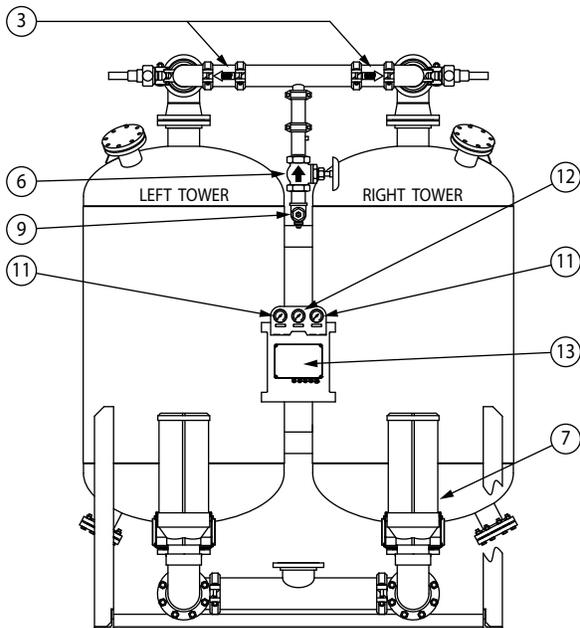
1. Parts and Maintenance Kits are for standard builds only. Please contact the factory with your dryer serial number for assistance on identifying spare parts and maintenance kits for your specific unit.
2. All quantities for one dryer.
3. ID# correspond to P&ID legend (\* Not pictured in diagrams.)
4. CF - Consult Factory

Phone: +1 724 745 1555  
 Email: [ft.dehydration.order.entry@spxflow.com](mailto:ft.dehydration.order.entry@spxflow.com)  
 Web: [www.spxflow.com/deltech](http://www.spxflow.com/deltech)

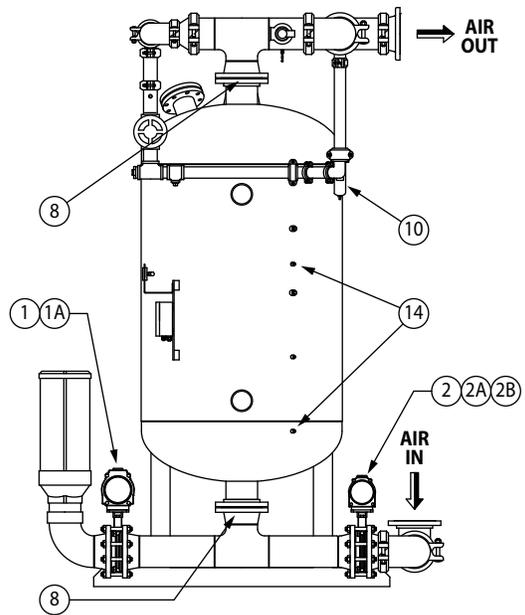
Models 4100 through 5400



REAR VIEW



FRONT VIEW



SIDE VIEW  
(RIGHT CHAMBER REMOVED FOR CLARITY)

Phone: +1 724 745 1555  
 Email: ft.dehydration.order.entry@spxflow.com  
 Web: www.spxflow.com/deltech

**Models 4100 through 5400**

MODEL	
4100	5400

**REPLACEMENT PARTS**

ID#	DESCRIPTION			SAFETY STOCK	DRYER QTY.
1	Purge/Repressurization Valve Assembly	7448901	7448901	1	2
1A	Purge Pilot Solenoid Valve for NEMA 4, 4X	4009878	4009878	1	2
2	Inlet Switching Valve Assembly	7448900	7448900	1	2
2A	Switching Pilot Solenoid Valve for NEMA 4, 4X (valve only)	4009880	4009880	1	2
2B	Switching Pilot Solenoid Valve for NEMA 4, 4X (coil only)	4009810	4009810	1	2
3	Purge Air Check Valve	4009987	4009987	1	2
4	Outlet Air Check Valve	4009988	4009988	1	2
5	Pressure Relief Valve (SP - 150#)	4010073	4010074		1
	Pressure Relief Valve (SP - 150#) (SST)	CF	CF		1
	Pressure Relief Valve (HP - 250#)	CF	CF		1
	Pressure Relief Valve (HP - 250#) (SST)	CF	CF		1
6	Adjustable Purge Rate Valve	7402959	7402959		1
*	Pilot Air Pressure Regulator	4010029	4010029		1
*	Purge Gauge Pressure Regulator (SP - 150#)	3204277	3204277		1
	Purge Gauge Pressure Regulator (HP - 250#)	CF	CF		1
7	Purge Muffler	3137925	3137925		2
*	Muffler Insert	3138218	3138218	8	8
8	Strainer	3155580	3155580		4
*	Purge Orifice (60-150PSIG MOP)	4012485	4013600		1
9	Moisture Indicator	4003167	4003167		1
10	Pilot Air Filter Replacement Cartridge (SP - 150#)	3158592	3158592	1	1
	Pilot Air Filter Replacement Cartridge (HP - 250#)	CF	CF		1
11	Tower Pressure Gauge (HCL / HCS) (SP - 150#)	4011096	4011096	1	2
	Tower Pressure Gauge (HCL / HCS) (SP - 150#) (SST)	4011107	4011107		2
	Tower Pressure Gauge (HCL / HCS) (HP - 250#)	CF	CF		2
	Tower Pressure Gauge (HCL / HCS) (HP - 250#) (SST)	CF	CF		2
12	Purge Gauge (SP - 150#)	3249310	3249310		1
	Purge Gauge (SP - 150#) (SST)	4011105	4011105		1
	Purge Gauge (HP - 250#)	CF	CF		1
	Purge Gauge (HP - 250#) (SST)	CF	CF		1
*	Pressure Switch	4006380	4006380	1	2
13	HCL Controller	3208951	3208951		1
13	HCS Controller	7419130	7419130		1
14	RTD (HCS Controller)	3253902	3253902	1	4
	Desiccant Evaluation Kit	7452585	7452585		

NOTES:

1. Parts and Maintenance Kits are for standard builds only. Please contact the factory with your dryer serial number for assistance on identifying spare parts and maintenance kits for your specific unit.
2. All quantities for one dryer.
3. ID# correspond to P&ID legend (\* Not pictured in diagrams.)
4. CF - Consult Factory

Phone: +1 724 745 1555  
 Email: ft.dehydration.order.entry@spxflow.com  
 Web: www.spxflow.com/deltech

## 13.0 MAINTENANCE KITS

### MAINTENANCE KITS - 300 SERIES FILTRATION

		MODEL							
		40	60	90	115	165	260	370	450
Year 2 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain	300DK2-00	300DK2-02	300DK2-04	300DK2-06	300DK2-06	300DK2-08	300DK2-10	300DK2-12
Year 3 Maintenance Kit	All the contents of the 2 Year Kit, Moisture Indicator, Pilot Air Filter Cartridge, Pressure Switches, Valve Repair Kits	300DK3-00	300DK3-02	300DK3-04	300DK3-06	300DK3-06	300DK3-08	300DK3-10	300DK3-12
Year 4 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain, Desiccant Evaluation Kit	300DK4-00	300DK4-02	300DK4-04	300DK4-06	300DK4-06	300DK4-08	300DK4-10	300DK4-12
Year 5 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain, Desiccant Kit	300DK5-00	300DK5-02	300DK5-04	300DK5-06	300DK5-06	300DK5-08	300DK5-10	300DK5-12

### MAINTENANCE KITS - 300 SERIES FILTRATION

		MODEL				
		590	750	930	1130	1350
Year 2 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain	300DK2-14	300DK2-16	300DK2-18	300DK2-20	300DK2-22
Year 3 Maintenance Kit	All the contents of the 2 Year Kit, Moisture Indicator, Pilot Air Filter Cartridge, Pressure Switches, Valve Repair Kits	300DK3-14	300DK3-16	300DK3-18	300DK3-20	300DK3-22
Year 4 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain, Desiccant Evaluation Kit	300DK4-14	300DK4-16	300DK4-18	300DK4-20	300DK4-22
Year 5 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain, Desiccant Kit	300DK5-14	300DK5-16	300DK5-18	300DK5-20	300DK5-22

### MAINTENANCE KITS - DF SERIES FILTRATION

		MODEL				
		1550	2100	3000	4100	5400
Year 2 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain	DDK2-24	DDK2-26	DDK2-28	DDK2-30	DDK2-32
Year 3 Maintenance Kit	All the contents of the 2 Year Kit, Moisture Indicator, Pilot Air Filter Cartridge, Pressure Switches, Valve Repair Kits	DDK3-24	DDK3-26	DDK3-28	DDK3-30	DDK3-32
Year 4 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain, Desiccant Evaluation Kit	DDK4-24	DDK4-26	DDK4-28	DDK4-30	DDK4-32
Year 5 Maintenance Kit	Elements, O-Rings, Muffler Cores, Drain, Desiccant Kit	DDK5-24	DDK5-26	DDK5-28	DDK5-30	DDK5-32

Phone: +1 724 745 1555  
 Email: [ft.dehydration.order.entry@spxflo.com](mailto:ft.dehydration.order.entry@spxflo.com)  
 Web: [www.spxflo.com/deltech](http://www.spxflo.com/deltech)

## 14.0 NOTES

Information from the dryer serial number tag can be recorded in the following table. This information may be necessary when communicating with Service representatives.

Serial Number Tag Fields	Allowable Values from Serial Number Tag	Actual Values at Installation
Model Number:		
Serial Number:		
Service Code:		
Rated Capacity:		
Maximum Operating Temperature:		
Desiccant Type:		
VAC (AC Voltage):		
AC Phase:		
AC Frequency:		
AC Wattage:		
AC Holding Current:		
VDC (DC Voltage)		
DC Wattage:		
DC Holding Current:		
ETO DCF- Code (If Listed, Btm RH Corner)		
EC- Code (If Listed, Btm RH Corner)		

Additional information that may be useful when dealing with Service:

Location of installation (address and phone number): \_\_\_\_\_

Distributor purchased from: \_\_\_\_\_

Repair Parts List Number and Revision: \_\_\_\_\_

Indoors or outdoors installation: \_\_\_\_\_

Ambient temperature range: \_\_\_\_\_

Prefilters: \_\_\_\_\_

Drains: \_\_\_\_\_

Delta-P devices: \_\_\_\_\_

Afterfilters: \_\_\_\_\_

Delta-P devices: \_\_\_\_\_

Blocking or Isolation Valves: \_\_\_\_\_

ISO Class Operating Mode: \_\_\_\_\_

Fixed or Demand Cycle Mode (HCS Series Controller only): \_\_\_\_\_

Outlet pressure dew point reading: \_\_\_\_\_

Additional accessories or special features: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## **WARRANTY**

The manufacturer warrants the product it manufactures, when properly installed, operated, applied, and maintained in accordance with procedures and recommendations outlined in manufacturer's instruction manuals, will be free from defects in material or workmanship for a period as specified below, provided such defect is discovered and brought to the manufacturer's attention within the aforesaid warranty period.

The manufacturer will repair or replace any product or part determined to be defective by the manufacturer within the warranty period, provided such defect occurred in normal service and not as a result of misuse, abuse, neglect or accident. Normal maintenance items requiring routine replacement are not warranted. The warranty covers parts and labor for the warranty period unless otherwise specified. Repair or replacement shall be made at the factory or the installation site, at the sole discretion of the manufacturer. Although not required for warranty consideration, it is recommended that the manufacture be contacted prior to doing any warranty related service work. This action will provide guidance and instruction on the repair often times authorization to perform the work. NOTE: The manufacture reserves the right to repair, replace in the case of warranty approval or reject the warranty claim once submitted.

Unauthorized service and use of unauthorized or pirated parts voids the warranty and any resulting charges or subsequent claim will not be paid. Products repaired or replaced under warranty shall be warranted for the unexpired portion of the warranty applying to the original product.

The foregoing is the exclusive remedy of any buyer of the manufacturer's product. The maximum damages liability of the manufacturer is the original purchase price of the product or part.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR STATUTORY, AND IS EXPRESSLY IN LIEU OF THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. THE MANUFACTURER SHALL NOT BE LIABLE FOR LOSS OR DAMAGE BY REASON OF STRICT LIABILITY IN TORT OR ITS NEGLIGENCE IN WHATEVER MANNER INCLUDING DESIGN, MANUFACTURE OR INSPECTION OF THE EQUIPMENT OR ITS FAILURE TO DISCOVER, REPORT, REPAIR, OR MODIFY LATENT DEFECTS INHERENT THEREIN. THE MANUFACTURER, HIS REPRESENTATIVE OR DISTRIBUTOR SHALL NOT BE LIABLE FOR LOSS OF USE OF THE PRODUCT OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS, EXPENSES, OR DAMAGES INCURRED BY THE BUYER, WHETHER ARISING FROM BREACH OF WARRANTY, NEGLIGENCE OR STRICT LIABILITY IN TORT.

Please note that the manufacturer's warranty for this product is intended to cover manufacturing defects and therefore does not cover consumable components (desiccants, filter elements, soft goods, standard maintenance kit wear items, etc.) or components that require periodic user adjustment (expansion valve, hot gas bypass valve or cooling water regulating valve) or calibration (dew point elements/sensors, gauge calibration, etc.)

### **Warranty Period**

One (1) year parts and labor from the date of shipment from the manufacturer or the manufacturer's authorized distributor (not to exceed eighteen (18) months from the date of shipment from the factory, whichever occurs first).

An extended warranty of up to 5 years from the date of purchase may be available for your dryer. Please contact your local distributor for more details of the requirements for activation of warranty extension.

**AUTHORIZATION FROM THE SERVICE DEPARTMENT IS NECESSARY BEFORE MATERIAL IS RETURNED TO THE FACTORY OR IN-WARRANTY REPAIRS ARE MADE.**

**SERVICE DEPARTMENT : (724) 746-1100**

# HCT, HCL, HCS SERIES

Pressure-Swing Desiccant Type  
Compressed Air Dryers  
with AccuShift™ Switching Valves

# SPXFLOW®

**SPX FLOW**

4647 S.W. 40th Avenue

Ocala, Florida 34474-5788 U.S.A.

P: (724) 745-1555

E: [deltech.americas@spxflow.com](mailto:deltech.americas@spxflow.com)

[www.spxflow.com/deltech](http://www.spxflow.com/deltech)

Improvements and research are continuous at SPX FLOW, Inc.

Specifications may change without notice.

ISSUED 03/2019 Form No.: 7465156 Revision: A

COPYRIGHT ©2019 SPX FLOW, Inc.