Dehydrators are an integral part in maintaining optimal performance in a waveguide system. Fluctuations in temperature and wind speed can cause a difference between the pressure inside the system and the environment. When the pressure is lower in the waveguide, moist air can be pulled into the waveguide causing undesirable conditions such as corrosion and arcing. These conditions will result in increased VSWR or failure of the system to operate. A dehydrator will pump dry air into the waveguide system ensuring that the system will be held at a higher pressure than the environment.

The Etsiline Series of dehydrators was designed specifically for use in terrestrial microwave systems with volumes up to 625 liters. The Estiline Dehydrators operate using a system involving two separate desiccant chambers resulting in a completely automatic, maintenance-free and highly reliable unit. The design of the dehydrator also allows it to operate with a very low noise level, under 43 dB, with no vibration. The Estiline Dehydrators consume little power when compared to other models on the market, drawing as little as 5 watts in the stand-by mode. These features make the Etsiline Series the ideal choice for both remote sites and in-office use. Please contact Eupen customer service for more information.

STANDARD FEATURES

- 6-port manifold with 3/8" compression fit outlets
- Digital readout indicates the pressure in digital and analog forms as well as the operating time and process.
- In the event the pressure in the system rises above 2.3 psi, the high pressure relief valve will open to prevent damage to pressure sensitive components.
- Optical dew point indicator shows the relative humidity of the air being handled.
- The Signalization plug is used to connect to a remote location such as a control room.
ALARMS AND OPTIONS

Low Pressure Alarm
The Estiline series dehydrator comes standard with a low pressure alarm. The low pressure alarm will show in the display as “LOW PR”. It will activate when the pressure drops below 0.15 psig for at least 1 minute. The low pressure alarm will alert the user that the system is losing pressure faster than the dehydrator is able to replenish.

High Pressure Alarm
The high pressure alarm is available as an option for the Estiline series dehydrator. The high pressure alarm will show in the display as “HIGH PR”. The high pressure alarm will activate when the pressure exceeds 14.5 psig. A high pressure relief valve is standard on all units and will activate when the pressure exceeds 2.3 psig.

Excess Run Alarm
The excess run alarm is available as an option for the Estiline series dehydrator. The excess run alarm will show in the display as “PUMP AL”. The alarm is only activated during the “COOL1” or “COOL2” mode and will not function during the “HEATER1” or “HEATER2” regeneration period.

Humidity Alarm
The humidity alarm is available as an option for the Estiline series dehydrator. In the case that the relative humidity rises above 7%, the display will read “HIGH RH”. The alarm will deactivate when the humidity lowers to 4%.

RS-232 Communication Port
The RS-232 communication port is an available option for the Estiline series dehydrator. The RS-232 will allow the dehydrator to be monitored remotely via Windows HyperTerminal.

DEHYDRATOR OPERATING MODES
The dehydrators operate in three distinct separate modes; drying, standby and regeneration. During the drying mode, the unit is providing pressure and dry air to the waveguide system. This mode will typically draw up to 9 Watts of power for the Etsiline 32 and 52 and 13 Watts for the Etsiline 102. When the required pressure is reached in the system, the unit will enter the stand by mode. The unit will stay in the stand by mode until the pressure in the system drops to the minimum level. This mode consumes 5 Watts of power. The drying mode and standby mode will both read “COOL.1” or “COOL.2” in the display. The regeneration mode occurs after the pump has run a total of 3 hours during the drying mode, time spent in the standby mode is not counted. This phase will draw approximately 53 Watts of power for the Etsiline 32 and 52, and 59 Watts of power for the Etsiline 102. During the regeneration mode the display will read “HEATER.1” or “HEATER.2”.

Unit comes standard with a universal mounting kit that will allow it to be mounted in an ETSI-rack, a 19” rack or to a wall, table or floor.
OPERATION

The Etsiline Series Dehydrator operates on a 12-hour cycle subdivided into three components, drying, regenerating and cooling. During the drying phase, air is pulled through the absorber by the compressor. The water vapor is absorbed by the desiccant and the air flows through a solenoid, pump and through another solenoid to the waveguide system. When the pressure in the waveguide systems reaches the required level, the pressure controller will turn the pump off and the unit will go into standby mode. The unit will continue to monitor the pressure in the system. When the pressure drops below an acceptable level the low pressure alarm activates and the pump will run until the pressure is raised to the required level. The drying phase will continue for a total of 3 hours (time spent in the standby mode is not counted).

After the compressor runs a total of three hours the unit will enter the regeneration phase. During the regeneration phase, a small portion of dried air will be branched from the compressor outlet line and led to the regenerating absorber. This purge air flows through the regenerating absorber which is heated by a heater. During this phase the compressor will run continuously for three hours regardless of the pressure in the waveguide system. Upon completion of the regeneration phase the dehydrator will enter the cooling phase and the compressor will be controlled by the system pressure. After three hours in the cooling phase the absorber will be ready for drying.

The drying, regeneration and cooling processes are monitored and stored in the dehydrator's memory which is controlled by the compressor. The time for the dehydrator to complete one cycle can vary. If main power is lost or the unit is switched off, the unit will start in the same place it was when power is returned.

VOLUME CAPACITY

There are three Etsiline models available to choose from depending on the system requirements. For systems up to 225 liters the Etsiline 32 would be ideal. The Etsiline 52 and Etsiline 102 were designed for systems up to 375 liters and 625 liters respectively. The volume each dehydrator can support was based on two separate assumptions. The first is that the dehydrator would have to support the total system volume with the addition of an anticipated leak rate of 2% per hour. The unit would also have to maintain pressure during a temperature drop of 6 degrees in a 10 minute period.

To calculate the anticipated leakage of the system the following information is needed:

\[(P_{AM})\] Ambient Pressure
\[(P_1)\] Pressure at Start
\[(V_1)\] System Volume
\[(P_2)\] Pressure after 30 Minutes

The equation is as follows:

\[
\left[\frac{(P_1 - P_2) \times V_1}{P_{AM}}\right]^{0.5} = \text{LPHL (Liters leaked per hour)}
\]
To calculate the drop in pressure due to temperature change, the following information is needed:

- \((T_1)\) Ambient Temperature
- \((T_2)\) Temperature decrease of 6 degrees C in 10 minutes
- \((V_i)\) System Volume
- \((P_i)\) Pressure at start
- \((P_{AM})\) Ambient pressure

The equation is as follows:

\[
\frac{(T_1 - T_2) \times V_i}{T_1} \times \left(\frac{P_i}{P_{AM}}\right) = \text{LPHL} \quad \text{(Liters per hour needed to maintain pressure during temperature drop)}
\]

The total liters needed to maintain pressure to compensate for leaks in the system and pressure drops due to temperature changes would be the sum of the two values calculated above.

Liters per hour needed to maintain pressure = (LPHL) + (LPHT)

Taking these conditions into account and using an ambient pressure and temperature of 1000 mbars and 27 degrees Celsius respectively, the total lengths in feet each unit can support are summarized in the chart below.

<table>
<thead>
<tr>
<th>Waveguide Size</th>
<th>Etsiline 102</th>
<th>Etsiline 52</th>
<th>Etsiline 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU63</td>
<td>2400 feet</td>
<td>1440 feet</td>
<td>870 feet</td>
</tr>
<tr>
<td>EU77</td>
<td>3470 feet</td>
<td>2080 feet</td>
<td>1250 feet</td>
</tr>
<tr>
<td>EU90</td>
<td>6250 feet</td>
<td>3750 feet</td>
<td>2250 feet</td>
</tr>
<tr>
<td>EU127</td>
<td>7810 feet</td>
<td>4690 feet</td>
<td>2810 feet</td>
</tr>
</tbody>
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