



SWITCHBOARD CONDENSATION

1. DEFINITION

Condensation

Condensation forms when water molecules in relatively warm air come into contact with a cold surface. As the molecules cool down, they begin to move about more slowly and draw closer together. If they are cooled down enough, they begin to stick together -- they no longer have the energy to overcome their natural attraction for one another.



Damage caused by condensation

As more and more molecules stick together, visible droplets of liquid water form on the surface. This moisture is a major cause of switchgear failure as the resistance between electrical components breaks down and can cause a “Dead Short” between power circuits. PCB’s are especially susceptible when there is a coating of dust on the circuit board and the moisture causes a low resistance track between high voltage components.

Dew Point Temperature

Dew Point Temperature is defined as the temperature to which the air would have to cool (at constant pressure and constant water vapor content) in order to reach saturation.

2. SITE CONDITIONS

Condensation will form within a switchboard when there are 2 natural phenomena:

- Humid air
- Switchboard surface temperature, lower than the dew point.
- Poor ventilation within the pump house.

This combination of climatic conditions general only occurs in the tropical or temperate climates.



The best way to avoid surface condensation is to keep the component parts within a switchboard at a higher temperature than any known Dew Point temperature. This is typically done with an “Anti-condensation heater” with a thermostat set to the required temperature.

With standard Techsys Corporation products the VFD is a source of both heat and air movement so the requirement to maintain a sufficiently high internal temperature is not generally a problem. However with applications that may be shut down for periods or not operate for periods it is essential to consider surface condensation or the risk of short circuiting on power up is possible.

3. DESIGNING FOR CONDENSATION

The main design requirement is to keep the surface temperature above the dew point temperature. This temperature can be determined by calling the local meteorological service or using the industry standard of 10 degC. as the minimum internal temperature.

The selection of an anti condensation heater is determined by the amount of temperature that a switchboard with naturally dissipate when there is a temperature difference between the internal part of the switchboard and the environment.

The following table can be used for most applications with Techsys Corporation switchboards however please refer to your local Techsys Corporation dealer to confirm specific site requirements.

Code	Power	Switchboard Dimensions HxWxD	Anti condensation heater size - watts
Great White			
GW1	0-11kW	800x600X300	60
GW2	15-22kW	1000X800X300	120
GW3	30-37kW	1200X1000X300	120
GW4	45-75kW	1600X1000X400	350
GW5	90-110kW	1600X1200X400	350
DOLPHIN			
DOL1	0-11kW	900X1200X400	120
DOL2	15-37kW	1800x1200X400	350
DOL3	45kW	2100X1200X500	350
DOL4	55-110kW	2200x2300X500	700
MARLIN			
MA1	0-7.5kW	800x600X300	60
MA2	11-15kW	1200x1000X400	350
MA3	18.5-37kW	1500X1200X400	350
MA4	45kW	2000X1500X400	350
MA5	55-75kW 2Pump	2000X1500X400	350
MA6	55-75kW 3Pump	2000x2000X400	700
MA7	55-75kW 4Pump	2200x2300X500	700
MA6	90-110kW 2&3Pump	2000x2000X400	700
MA7	90-110kW 4Pump	2200x2300X500	700

4. PROCEDURE FOR STARTING TECHSYS CORPORATION SYSTEMS AFTER LONG PERIODS IN CONDENSATION RISK CLIMATES

After extended periods of shutdown of Techsys Corporation pumpstations it is advisable to attempt to dry out any potential condensation. To do this, follow the procedure listed below.





- Be sure that the main switch is turned off and open the switchboard door. Visually check the gear tray for moisture build up by running finger over an open space. If there is moisture present then the switchboard needs to be dried out with an **EXTERNAL HEAT SOURCE**. Do not apply power to the system until all signs of moisture have been expelled by use of a heating fan or equivalent.
- If there is only modest signs of moisture switch off all circuit breakers to the unit. Turn on the anti condensation heater and the cooling fan. Apply power to the system via the main switch and leave for 1-2 days. After this period the unit should have evaporated any moisture within the switchboard. Before powering the rest of the system carry out a visual check

and check for continuity between all of the incoming phases and earth. If any of these tests return a resistance of under 1000 ohms there is a potential moisture problem.

5. INSTALLATION OF ANTI-CONDENSATION HEATERS

All Anti condensation heaters should be positioned to provide the most even heating of the enclosure without being able to burn any other components. The best position is on the floor of the enclosure at the mid point.

A thermostat is provided to set the temperature at which the heater should start to function. This temperature should be set to approximately 5 degrees above the dew point temperature. To determine this temperature, call the local Meteorological Bureau or go to www.wunderground.com on the Internet and select your country and location.

Darwin, Australia Forecast		12.4° S 130.9° E MapBlast	
Metric English Both		Updated: 09:30 PM ACST on September 07, 1999	
Updated: 07:30 AM ACST on September 09, 1999			
Observed at Darwin, Australia			
Temperature	73° F / 23° C		
HeatIndex	69° F / 21° C		
Humidity	94%		
Dewpoint	72° F / 22° C		
Wind	North at 1 mph / 1.6 km/h		
Pressure	29.94 in / 1014 hPa		
Conditions	Unknown		
			Today High: 84° F / 29° C Clear
			Tonight Low: 75° F / 24° C Clear
			Thursday High: 84° F / 29° C Clear
			Thursday Night Low: 75° F / 24° C Partly Cloudy

In this example the thermostat temperature would be set to 27degC to try and avoid any possibility of condensation.