Application Notes

Subject: Power Line Monitoring using WindSonic, WindObserver, WindMaster & MaxiMet

Reference AN0010 v2

Introduction

Overhead power lines are the backbone of the supply of any country with electrical energy needs, especially with growing populations and expanding manufacturing industries. Steadily rising power demand and the quick extension of renewable energy sources quickly lead to bottle necks in the transfer network. However, the construction of new routes is expensive and is often affected by refusal and opposition in the population and so any existing power line network needs to be efficient.

Requirement

The capacity of overhead lines is limited by several factors including the maximum operating temperature of the cables. The temperature is also dependent on the strength of the current flowing through the cable and any cooling provided by wind and weather. When calculating the maximum current in the cables a conservative model may well be used for the climate and security reserves, however, as power lines are affected by weather conditions along with the load that is put through them, especially in high industrial areas or highly dense housing areas, and especially during cold weather conditions it can cause them to sag / break and thus affect the efficiency.

Parameters Monitored

Many conditions are monitored and feed directly into monitoring systems to enable the efficient use of the power lines as an increase in temperature can massive reduce the efficiency of the cable and also to make sure that safety is observed as sagging power lines can get caught on objects or eventually snap, which then causes a dangerous situation. A benefit of monitoring during storm events is that it can allow for maintenance teams to be deployed in advance of any possible storm damage.

Temperature is a critical parameter to monitor as this directly affects the performance of the cable and any increase in temperature above the maximum requirements can massively reduce the power load that can be applied. Temperature can affect the load by up to 50%.

Wind speed is monitored in areas where power lines may become an issue and this is for a couple of reasons. Wind loading when the power lines are under a large electrical load could cause the lines to move around too much, which in turn could cause them to snap, thus causing not only a dangerous situation but a possible black-out condition. However, wind does have an advantage that it can also provide cooling to the cables when they are under load and starting to heat-up.

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Solar radiation is also often taken into account alongside power lines as this helps the operator understand all the conditions that the cable is being subjected to that may increase the available load.

Installations

Gill wind sensors are often used to monitor power line condition and are normally placed on the pylon/structure.

WindSonic, WindObserverII and MaxiMet have been used around the world including Australia, Northern Ireland, Uruguay and South Korea.

Due to the height, the vertical component of the wind speed is also important and so the WindMaster has been extensively used in countries including Switzerland.









Interfaces

WindSonic, WindObserver and WindMaster cover the basic requirements of measuring wind whereas MaxiMet and MetPak provide simple, compact systems that are able to measure all of these parameters in one instrument and provide a single output string to the operators controls system either via MODBUS or even using MetStream to send the data from often remote installations.

Why Gill?

All Gill ultrasonic wind sensors have the added benefit providing instantaneous wind data from compact, robust and virtually maintenance free package and the MaxiMet / MetPak offer the end user compact packages to monitor further parameters with only a single datastring to log.

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