INSTRUMENTS

IRIS POWER ENGINEERING

SurgAlert™

A cost-effective on-line portable instrument to measure voltage surges from switchgear and IFDs

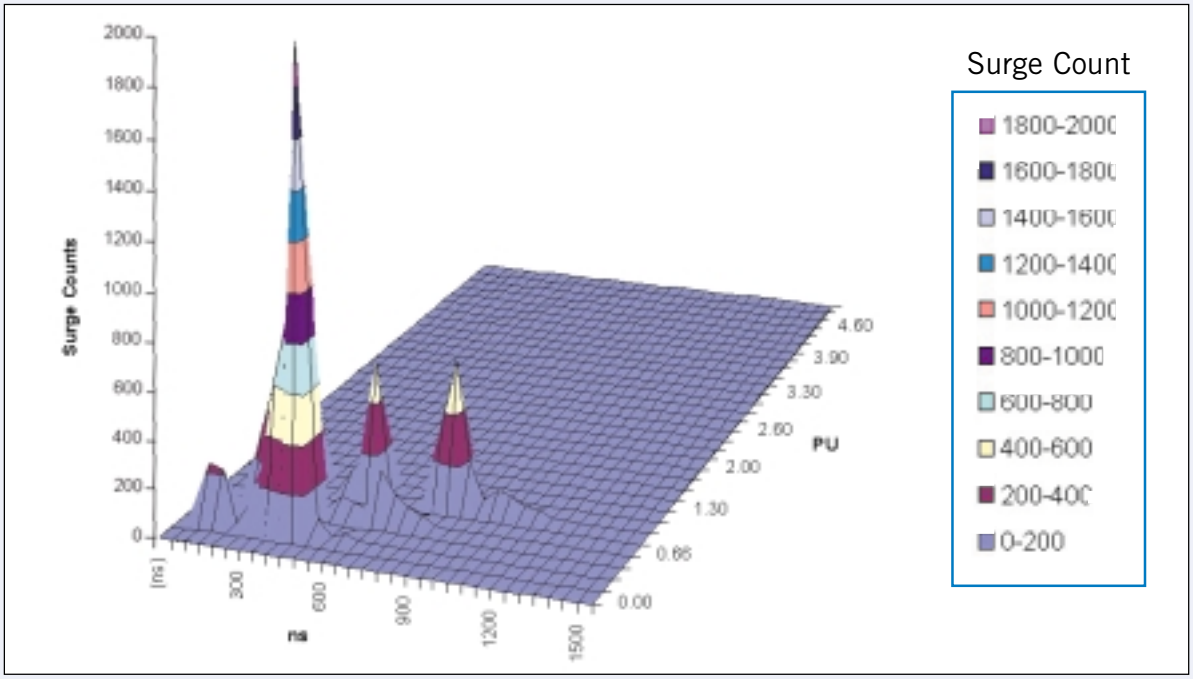
SurgAlert™ provides a state-of-the-art means to identify whether power surges pose a risk of failure to motor stators. Within a few minutes the portable ***SurgAlert***™ monitoring system measures the actual surge environment for any motor in question, during normal motor operation. ***SurgAlert***™ digitally records the risetime and magnitude of each surge, and stores this information in memory. The information is downloaded to a laptop computer producing a summary of the measured surges for display or printout. Motors experiencing surges of fast risetime and high magnitude are likely to fail.

SurgAlert™

***SurgAlert*™** is a sophisticated portable voltage sensor and instrument which accurately measures the magnitude, risetime (as fast as 50ns) and the number of voltage surges in motors rated from 440V to 16 kV.

The risk of failure of motors due to surges from IFDs (inverter-fed drives) and modern circuit breakers is increased if the surges are of greater voltage and/or a faster risetime. Surges can result in **gradual deterioration** and **eventual failure** of the turn insulation both in low voltage (less than 1000 V) and higher voltage motors.

Users of IFDs, especially if the IFDs are retrofitted to motors not originally intended for IFD application, need a means to assess how severe the voltage surges are in each specific situation.



***SurgAlert*™ results from a 600V PWM (pulse width modulated) IFD monitored at the motor for 1 second.**

The above data was collected over 1 second, and the magnitude and risetime of all surges during this interval were measured. The vertical scale of the graph is the number of surges recorded in the 1-second interval as a function of risetime and magnitude. The magnitude is scaled in terms of 'per unit' (pu), where 1 pu is the peak line to ground rated ac voltage.

In this case, the fastest risetime surges (about 100ns) fortunately have a magnitude of only 0.3 pu. The highest magnitude surges (1pu) have a risetime longer than 800 ns. Surges creating pulses in the upper left portion of the graph pose the greatest risk. Experience indicates that a conventional motor experiencing a high percentage of surges with risetimes shorter than 100 ns and surges higher than about 2pu, has significant risk of stator winding problems. Precautions should be taken.

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Why Use *SurgAlert*™ ?

Invertor fed drives (IFDs) and modern circuit breakers can create frequent and often severe voltage surges. ***SurgAlert***™ helps eliminate premature stator winding failure by allowing the user to **quickly assess** which motors are at risk.

SurgAlert™ assesses the effectiveness of corrective measures necessary to reduce surge severity:

- ☐ change cable length and/or grounding
- ☐ replace cable with a higher surge impedance cable (thicker insulation), or a cable with a more lossy dielectric (e.g. butyl rubber or oil-paper)
- ☐ install a low pass filter between the IFD and the motor to lengthen the risetime of surges

The ***SurgAlert***™ monitoring system does not require the services of an expert, but can be used by plant staff to easily measure the actual surges which strike each particular motor. Plant staff can objectively determine which motors are most likely to fail from the effect of surges.

How *SurgAlert*™ Works

A wideband sensor is temporarily installed on the motor terminals. It detects the surge voltages and reduces them to a safe level for the electronic instrument. The instrument contains specialized high speed analog to digital converters which record the risetime and magnitude of **every** surge. Over a period of time, the number of surges are stored. Basic data can be displayed on an LCD. A table of number of surges versus risetime and surge magnitude can be directly printed out via an RS232 port. Alternatively, the measured data can be downloaded to a computer as a CSV file, readable in Excel™ and other spreadsheets.

Using *SurgAlert*™

The ***SurgAlert***™ sensor is connected to one motor terminal (or sometimes the IFD terminal) during a brief shutdown. The sensor is connected to the instrument and the motor is returned to service. The motor is required to run at full speed for a few minutes and the surge data is downloaded. It can also be useful to determine the surges at reduced load. Once the data has been downloaded, the ***SurgAlert***™ system can be disconnected.

SurgAlert™ is most beneficial in situations where:

- ☐ The surge environment of many motors needs to be measured
- ☐ More than one motor requires monitoring
- ☐ Motors have a history of stator winding failures
- ☐ Motors are being retrofitted with IFDs or vacuum breakers
- ☐ Motors experience frequent start-ups or shutdowns

The *SurgAlert*™ system includes:

- ☐ A portable electronic instrument with transit case
- ☐ Resistive sensor for motors rated up to 1 kV measurements
- ☐ Capacitive sensors (80pF) for use on motors rated greater than 1 kV (optional)
- ☐ Software
- ☐ Operating Manual

SPECIFICATIONS

Surge Measurement

- ☐ Surge magnitude resolution: 32 voltage levels
- ☐ Magnitude range: 0.18 pu to 5.48 pu
- ☐ Surge risetime resolution: 32 time ranges
- ☐ Risetime range: 50 ns to 1500 ns
- ☐ Maximum measurable surge count of 500,000 per second
- ☐ Measurement intervals:
    - User intervals from 1s, 2s, up to 65,535s
    - Or continuous intervals

Portable Light-Weight Industrial Enclosure

- ☐ Metal enclosure with locking carrying handle
- ☐ Weight: 7 kg (15 lbs.)
- ☐ Size: 12.5 cm (5") x 35 cm (13") x 30 cm (12")
- ☐ All connections are made on front panel
- ☐ Transit case
- ☐ Permanent grounding cable with clip and cable holder

Wide Bandwidth Voltage Sensors

- ☐ Wide bandwidth sensors: 6 Hz to 8 MHz
- ☐ Resistive sensor for motors rated up to 1 kV measurements
- ☐ Capacitive sensors (80 pF) for use on motors:
    - rated 1 kV to 6.9 kV (optional)
    - rated 7 kV to 16 kV (optional)

Operating Environment

- ☐ Temperature Range: 0°C to +35°C
- ☐ Humidity: 15% to 90% non-condensing
- ☐ Operating Supply Voltage: 85 Vac to 260 Vac, auto-sensing
- ☐ Power Consumption: 13 Watts

Other Unique Features

- ☐ Features a 4 line x 20 character LCD
- ☐ Sealed, tactile feedback membrane switches
- ☐ RS232 interface port for data collection controlled via PC or printer
- ☐ PC download software included
- ☐ Self diagnosis status indicator

To identify our sales and technical support office nearest you, contact...

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