Usage of SRT Current Sensors with AC Output

Installation

Connections

Sensors with solder pins should be connected with the usual electronic techniques - rosin core solder and an iron at 700 degrees F. Excessive heat can damage the sensor. If the run is longer than a few feet, shielded wire should be considered.

Sensors manufactured with captive wires in the form of twisted pair without shielding have no special considerations.

Larger sensors (with extended data runs) manufactured with twisted shielded pair have the shield connected to the ferrous core of the sensor. Experimentation may be required to determine if the shield should be grounded, left unconnected, or tied through an impedance to ground.

Voltmeter

High turns count makes high voltage but also makes for high sensor impedance. A high resistance voltmeter is required for precision measurement. Factory measurements are made with a 1 MΩ load in parallel with 60 pF in addition to a selected load resistor, also in parallel.

Loading

Sensors are not internally loaded. If a load is used it's better to put it at the voltmeter end of the cable to minimize ambient noise.

Sensed Wire

The position of the sensing coil is usually at the same edge of the sensor as the terminals, the flat side for D-shaped sensors. Maximum sensitivity is achieved by placing the sensed wire as close to the sensing coil as possible.

For best stability the sensed wire should be attached as closely as possible to the sensing coil so that it cannot move. A plastic spot tie is appropriate.

The sensed wire can be insulated or not, but grounded shielding will interfere with the measurement.

The strands of "zip cord" must be separated with only one wire passing through the sensing hole to avoid cancellation by the return current.

Adding Turns

If multiple primary turns are used they should be wrapped around the sensor so as to surround the internal sensing coil.

Phase

SRT sensors are wound with phase in mind. Please refer to the drawing of your sensor available at <http://www.srt-inc.com/pdfs/Case_Collection.pdf> for information about polarity of the output terminals or wires.

Calibration

Factory procedure

All sensors shipped are 100% tested for open circuit voltage output at customers current & frequency but are not calibrated unless customer has provided sufficient information about proposed installation and use.

Special calibration

SRT will calibrate using a sample of customer's wire and will provide a selected load resistor for the more expensive sensors.

SRT will calibrate sensors for use with multiple turns if specified by the customer.

SRT can provide calibration as a function of frequency up to 60 kHz. Results are available in the form of amplitude and phase shift or delay.

Theory

Sensor Patented

SRT sensors are covered by a US Patent which is available at: <http://www.uspto.gov/>, search by number for 5,418,514

Mag-Gap

The sensors differ from typical current transformers in that they have a magnetic gap.

Mag-Gap technology limits voltage spikes due to magnetic saturation.

Mag-Gap technology allows for a very high secondary turns count and associated high output voltage.

Differentiation

Differentiation of input is characteristic of any unloaded transformer. For small signals this simply turns a sine into a cosine but for larger excitation magnetic non linearity will introduce harmonics which eventually become sharp positive and negative pulses at the zero crossings of the exciting current. Loading of the transformer allows secondary current which produces a reverse magnetic field which in turn limits the harmonics. SRT sensors with their magnetic gaps exhibit smaller harmonic voltages than tightly coupled toroids.

Monotonic

Other sensors can saturate and produce less than full scale with very high excitation. The output of SRT sensors will always increase with increasing excitation.

Flux Level

Peak magnetic flux is well below saturation in SRT sensors.

Magnetic Leakage

Mag-Gap technology exhibits some magnetic leakage which makes the calibration somewhat sensitive to the placement of the sensed wire in the sensing hole and also gives the sensor the ability to see external alternating magnetic fields. This sensitivity is sometimes unwanted and can complicate a measurement of a small current in close proximity to a conductor carrying a much higher current. Reasonable attention to placement of the sensor is usually an adequate solution.