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# GIC-Sensor

Dynamic Ratings

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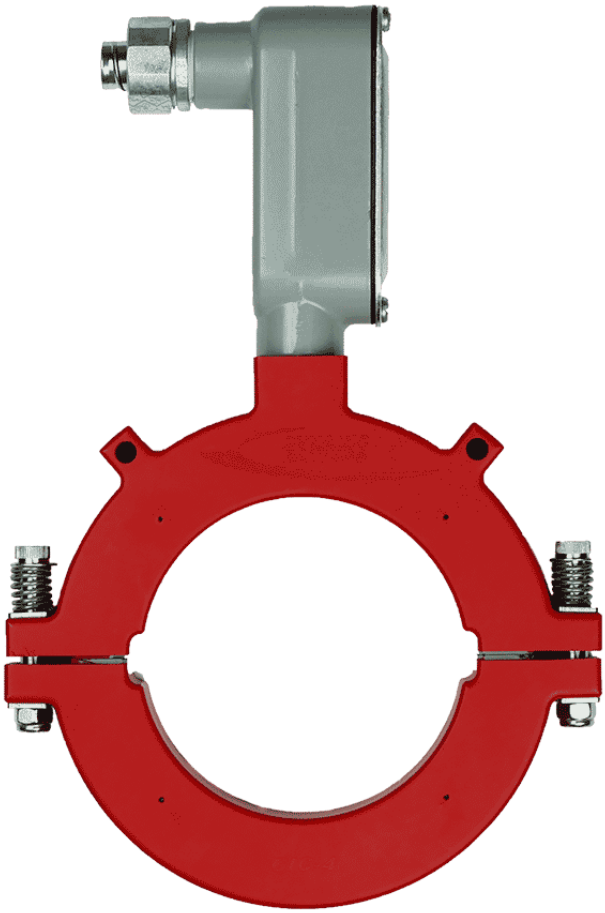

DYNAMIC RATINGS

# GIC

## Geomagnetic Induced Current Sensor

- Easy Installation
- Long Range Sensors
- Accurate Measurements

RESPONSIVE

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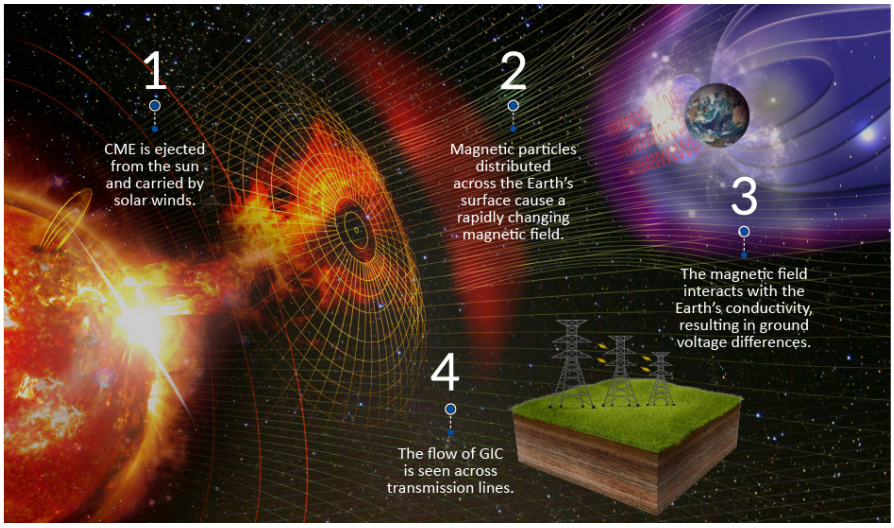
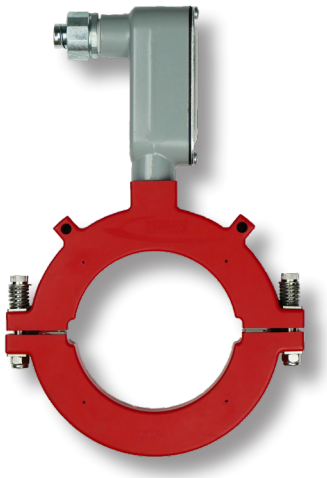
# Geomagnetic Disturbances Lead to GIC

Geomagnetic Disturbances (GMD) are random and can occur in both the southern and northern hemispheres. The probability of a GMD event is greatest at the peak of the solar cycle but GMD events can occur at any time. Industry studies have identified that locations with latitudes above 45-50 degrees may be more susceptible to GMD events. GMD can lead to geomagnetic induced currents (GIC) in the transformer neutral ground connection.




## The Effect of GIC on Transformers

The flow of GIC in transformers is the root cause of all GMD related power system problems. GIC can result in increased reactive power requirements and large harmonic currents during GMD events. There are many different kinds of system alarms that are reported as a result of GIC Events such as:



- Overvoltage alarms
- Voltage dip
- Frequency alarms
- Phase imbalance
- MVAR swings
- Capacitor banks tripping
- Generator voltage swings
- Unintended capacitor bank switching
- Harmonic imbalance alarms and trips
- Voltage controlled capacitor banks turning on and more

## Easy Installation

The GIC Sensor split core design allows for easy installation. The split core sensors allow the sensor to be installed on both new or existing transformer neutral ground connections without modification or the need to disconnect the ground. In most applications, the sensor can be installed while the transformer is energized. A dual sensing cabinet model features a stainless steel enclosure and two installed sensors, allowing for rapid field installation. Sensors are constructed of a UV-resistant material for direct installation around a conductor without the need for a separate enclosure.

## Long Range Sensors

GIC Sensors are offered in three sensing ranges where the ranges of the sensors can be easily adjusted. Model L is designed for small GIC events or for transformers that may saturate at very low levels of GIC. Model H is designed for measurement of moderate GIC events, and Model 5 provides the industry's largest range of GIC sensing to include once in a hundred year events.

## Accurate Measurements

The selected sensor core ensures measurement accuracy of +/- 2% of full scale across the wide range of temperatures commonly found in a substation. The sensor output has noise immunity because it is designed to provide maximum accuracy despite the high magnetic field environments that exist in the substation environment.

## Standards Relating to Geomagnetic Induced Current

In the US, standards have been put in place to increase awareness of geomagnetic disturbance events such as FERC order 830 and NERC standard TPL-007. GIC is also being studied by industry organizations such as CIGRE and IEEE C57.163-2015, Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances.

# GIC Sensor

The substation hardened GIC Sensor provides a means to sense, measure and communicate DC ground currents in harsh utility environments. The GIC Sensor is offered in split and dual sensing cabinet packaging specifically designed for the measurement of Geomagnetic Induced Currents (GIC) in the transformer neutral ground connection. The Hall Effect sensor is embedded in a core. It is a specialty designed device for GIC applications. Care should be taken to center the sensor around the conductor for best accuracy.

## Features & Benefits

- Each sensor includes a type LB conduit body and 1/2” NPT fitting for access to the conduit system for inspection, wire pulling and maintenance.
- Senses DC and near DC signals and quasi-DC up to 3Hz.
- The system has a built-in 4th order, low pass filter tuned to 3Hz which ensures that the output provides the desired signal with no interference from higher frequencies.
- Hall affect sensor provides excellent response time and is linear over the entire operating range.
- Bracket design allows for centering the sensor around the conductor and provides conduit support for 4-20mA output.

## Product Specifications

| | |
|---|---|
| **Sensing Ranges*:** | -45 to 45A DC<br>-360 to 360A DC<br>-500 to 500A DC |
| **Output Signal:** | Two wire; 4-20mA |
| **Power Source:** | 24V Loop Powered (12 to 36 V) |
| **Full Scale Accuracy:** | +/- 1% at (0° C to 50° C / 32° F to 122° F)<br>+/- 2% at (-40° C to 85° C / -40° F to 185° F) |
| **Response Time:** | 0.22 seconds (to 90% of a step change in GIC) |
| **Materials Rating:** | UV Resistant |
| **Weight:** | 1.4 (kg) / 3.0 (lbs.) |

*Sensing Ranges are approximate. Please refer to the factory calibration test report that is sent with the sensor.

## How to Order GIC Sensors

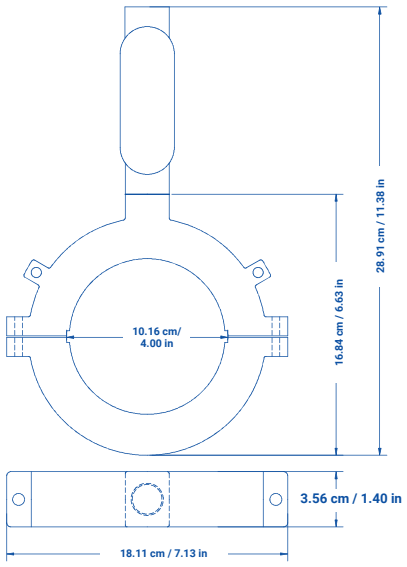
| Part Number | Sensing Range (*Nominal*) | Packaging | Description |
|---|---|---|---|
| **GIC-4-S-L** | -45 to 45A DC | Split Core | One GIC Sensor with a 4th order low pass filter, including a type LB, conduit body with 1/2” NPT type fitting. |
| **GIC-4-S-H** | -360 to 360A DC | Split Core | |
| **GIC-4-S-5** | -500 to 500A DC | Split Core | One GIC Sensor with a 4th order low pass filter, including a type LB, conduit body with 1/2” NPT type fitting. This model includes factory installed core gap range adjustors. |

## How to Order Dual Sensing Cabinets

| Part Number | Sensing Range (*Nominal*) | Description |
|---|---|---|
| **GICX2** | -45 to 45A DC and<br>-360 to 360A DC | Two GIC Sensors. Sensing Range by part number is shown on the left. Each sensor has a 4th order low pass filter. Both sensors are packaged in a 51cm x 51cm x 25cm / 20in x 20in x 10in. Stainless Steel Enclosure |

## How to Order Bracket Mounting Kit

| Part Number | | Description |
|---|---|---|
| **Bracket Kit** | - | Kit includes and bottom brackets as well as mounting hardware. |

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