

SG203 Advanced Conductor Mounted Fault Indicator

The most innovative Overhead Line Fault Indicator that delivers cutting-edge data acquisition, data logging, and alarm monitoring on high voltage, overhead line systems.

System Overview:

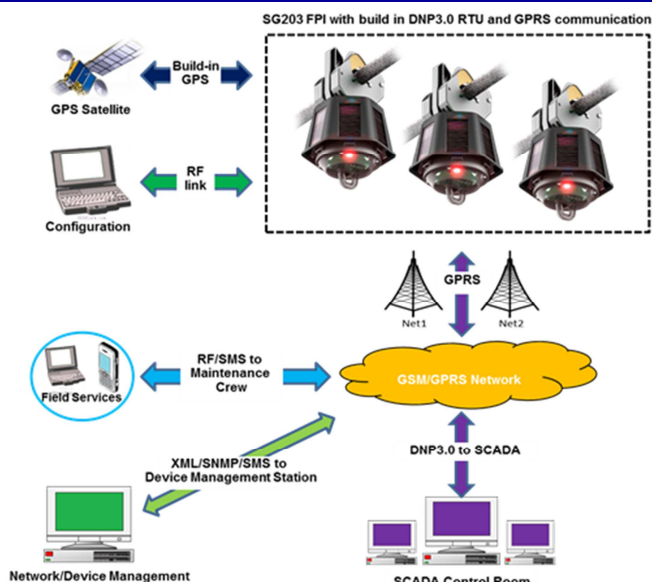
The unique cluster configuration of three line sensors with one sensor acting as the master with its integrated DNP3 RTU and GPRS/3G communication modem is a world first. The industry proven RTU integrated in the SG203 master, efficiently and seamlessly integrates into the existing SCADA and IT systems of the electrical utility. As a result it instantly optimises Outage and Fault Management that will decrease the Customer Minutes Lost (SAIDI).

At the same time, the enterprise Network and Device Management Software provides the electrical utility with the tools and data to further improve its asset management, power distribution and resource management, resulting in major cost savings, higher-performance and increased efficiency.

This turnkey solution is designed for African conditions and network topology with local technical support up to design level. It complies with international IEEE specifications for Fault Path Indicators and is approved by the local regulatory authority.



- ✓ **Advanced current/voltage/temperature sensors and fault detection algorithms**
- ✓ **Measure from 1A to 1600A and up to 132kV on three-phase networks**
- ✓ **Waveform capture and load profile logging**
- ✓ **Integrated DNP3 RTU with GPRS/3G and two CHIP SIM's for network reliability**
- ✓ **Built-in GPS**
- ✓ **360° solar panel array and long life battery**
- ✓ **Ultra-bright high intensity LED's**
- ✓ **IEEE, DNP3 and IEC certified**



- ✓ **Management Software for device monitoring and maintenance with local support**
- ✓ **Scheduled upload of load profiles and fault waveforms**
- ✓ **Powerful reporting and analysis capability for asset optimisation**
- ✓ **Remote application and settings update**
- ✓ **Network and communication management tools for reliable operation and reporting**
- ✓ **Turnkey solution designed for African conditions and network topology**
- ✓ **Lowest total cost of ownership with GPRS data package and support software**
- ✓ **ICASA and Mobile Network approved**



Design Features:

The SG203 is a fault Indicator cluster of 3 conductor mounted sensors. One sensor acts as the master with an integrated DNP3 RTU and GPRS/3G modem. It is completely self-powered with a uniquely designed 360° solar panel array and rechargeable long life batteries. The solar panel design ensures that the SG203 always collects maximum solar radiation charge irrespective of the mounting orientation, latitude where it is installed and the change in season. It will operate for a minimum of 10 years and has been designed to operate for 20 years.

The dual clamp mechanism mounts security onto a wide range of conductor sizes. Installation is quick and easy with a standard utility link stick of up to 12 meters. The LED status indicator panel on each sensor provides visual feedback to the installer of the GSM signal strength; DNP3 link to SCADA; sensor radio network and the line voltage and current. Configuration is via the local serial port, short range 2.4GHz radio link or remotely over GPRS/3G.

State of the art instrumentation sensors produces accurate line voltage and current as well as conductor temperature information. Line voltage is measured through a capacitive line to earth voltage sensor allowing for a measurement range of more than 132KV. A specially design high voltage Rokowski coil current sensor provides an accurate ultra-wide measurement range from 1A to 1600A. Fault currents of >25KA can be detected. The conductor temperature and load profile is measured and logged for line-load monitoring and optimisation of the distribution network.

Fault waveforms and load profiles are captured with a 1ms resolution. Advanced data analysis and algorithms for fault detection and the prevention of false triggers results in superior accuracy and effectiveness so that the utility can despatch line crew knowing that they can trust the fault alarms and location.

Web based Device Management Software

Waveform capture and load profile logging

All configuration parameters, status indications, diagnostic information, load profiles and fault waveforms can be accessed on demand via GPRS/3G or scheduled for automatic upload to the Device Management Software System. Configurable alarms and preventative maintenance notifications reduce maintenance costs and improve reliability. The remote over the air (OTA) application update function, combined with powerful processing capability, makes the SG203 Fault Indicator future proof, ensuring that the product functionality can grow with the utility's needs as it accelerates towards the Smart Grid.

Two CHIP SIM's on the GPRS/3G modem with advanced network failover algorithms ensures exceptional communication reliability. The exact location of the Fault Indicator is available through the integrated GPS. To reduce costs and complexity for the utility, a 5 year cellular plan and GPRS/3G private network bundle is available. All functions from network design, operation, monitoring and management to SIM activation, administration, fraud prevention and data costs are included as a service.

When you combine all of these benefits, the SG203 Fault Indicator solution offers the lowest total cost of ownership in the market today.



SG203 Advanced Conductor Mounted Fault Indicator Technical Specifications

Item	Description
Interfaces	
Communication and Security	GSM/GPRS/3G with two SIM's for Network redundancy & CHIP SIM for theft prevention. Multiple security levels and firewall preventing unauthorized access. Individual SIM PIN algorithm per RTU Local 2.4GHz RF radio link between sensors. IEEE 802.15.4. 20-30m range Local configuration serial port
Protocol	DNP3 to SCADA and XML, SMS to Device Management Software Application
Local Fault Indication	12 ultra-bright high intensity flashing LEDs. Visibility >50m day ; >500m night ; 360 degrees visibility
Local Status Indication	GSM signal strength, RF link status, DNP3 link status, battery, line voltage, line current 1 x Tri-color (Red/Yellow/Green), 1 x Red, 1 x Amber, 1 x Blue
Sensors and data logger	
Voltage sensor	Detection and measurement range: 1kV to 132kV L-L / 50Hz
Current sensor (Rokowski Coil)	Measurement range: 1A – 1.6kA (Accuracy +/- 5% or +/- 1A) Fault range: up to 25kA
Temperature sensor	Line temperature measurement range: -40 to 130 °C (Accuracy +/-2.5 °C) Device temperature measurement range: -40 to 85 °C (Accuracy +/-1 °C)
Trigger principle	Proprietary algorithms adaptive to the line current and voltage signature Voltage Loss/Return detection Current inrush restraint Directional measurement with false trigger prevention on capacitive discharge current
Fault data waveform capture	Time stamped Voltage and Current pre- and post- event values 1ms sample rate with 120ms window. Up to 10 Events. Uploaded to Device Management Station post event.
On-demand waveform capture	Time stamped, Voltage and Current values, 1ms sample rate with 200ms window.
Load Profile record	Average RMS load current and line temperature values 15 Minute interval, 10 Day buffer Scheduled upload of load profile to Device Management Station
Power and Mechanical	
Power source	360° solar panel array, MPPT charger and 6Ah LiFePO4 Battery. 15 year life. External Charging supported
Power storage capacity	10 days operational capacity with zero sunlight
Conductor clamp mechanism	Two spring loaded secure conductor clamps Mounting and de-mounting with standard link stick
Conductor size	5mm – 32mm diameter
Weight	960g (dependent on configuration)
Dimensions	Height: 260mm, Depth: 160mm, Width: 145mm
Housing	UV stabilized Acrylonitrile Styrene Acrylate (ASA) used in the automotive industry, glass filled nylon and Polycarbonate certified for the specified operating environment.
Environmental	
Temperature ranges	Operating: - 25°C to +65°C, Storage: - 40°C to +85°C
Humidity range	0 % to 95 % non-condensing
Certification	
Protocol	DNP3.0 certified stack tested to Subset Level 2
EMC	ETSI EN 301 489-1 : EMC and Radio spectrum Matters (ERM) EN 55022/SANS 222/CISPR22 : Radiated Emission SANS/IEC 61000-4-2 : Electrostatic discharge immunity SANS/IEC 61000-4-3 : Radiated immunity SANS/IEC 61000-4-4 : Electrical Fast Transient / Burst SANS/IEC 61000-4-6 : Immunity to conducted disturbances SANS/IEC 61000-4-8 : Power Frequency Electric Field Immunity SANS/IEC 61000-4-9 : Pulse magnetic field immunity test
Functionality	IEEE Std 495-2007 Faulted Circuit Indicators
Environmental	IP54 to SANS/IEC 60529, Operating Temperature to IEEE 495-2007
Regulatory	ICASA, MTN, Vodacom, Vodafone
Quality System	ISO9001:2008 Design and production facility