



Control your power

with

SMART GRID UNIT
SGU

SGU

In a Smart Grid Network you need to know if the network is OK, the amount of power and where the power is flowing. The SGU unit is designed to provide this information in an easy way on a real time basis.

The SGU can monitor up to 6 x 3 phases. The shown version will measure Voltage, Current, Active and Reactive Power and the Direction of power in each of the 18 cables. Additionally frequency and the temperature in the central unit is monitored.

For safety reasons, in order to avoid electrical hazards, the communication between the sensors and the main unit are carried out using optic fibres that can easily be cut to desired length. This optical real time communication is patented, and as the communication is digital and with automatic gain control, the optical link is uncritical and calibration procedures are not necessary.

The measured and calculated values are transmitted to a central computer for further evaluation in the Smart Grid Network. Communication modes can be RS485, Ethernet or GSM/GPRS network. Other types of communication can be implemented on request.

Advantages of the SGU

- **Class 1,0 measurement of RMS Voltage, RMS Current, Frequency and Temperature. Calculates $\cos\phi$ and signed Active and Reactive Power.**
- **Modbus via GPRS, RS485 or Modbus TCP via Ethernet**
- **Forced data read-out intervals can be set from from 1 sec to 24 hour or alarm only.**
- **Fast and easy installation without the need of special tools, even on “live” systems.**
- **No need for regular calibration.**
- **Reliable communication via RS485, Ethernet or standard GSM/GPRS network.**

Measurement Principle

Sensors

The sensors are powered by the current in the cables they are attached to. No external power supply is needed. The sensor coil deliver a small energy, enough to activate the low power electronics in the sensor. At current rates 0,5 - 2,5A, the sensor will send lightpulses with a slow rate, just to report that the fuse, wire, optical connection etc. are ok - no fuses blown. From 2,5A and up to 500A, the sensors will send light pulses with a frequency range up to 800 kHz, ensuring a “real-time” measurement for accurate RMS and power calculations.

Central unit

A set of processors in the central unit are converting the pulses from the sensors to actual current values that are sampled at a frequency of 5KHz. The measured and calculated data can - in the Modbus mode - be requested or sent at predefined intervals down to 1 sec. either via RS485, Ethernet or the normal GSM/GPRS net to a central computer with a SCADA system, or to a database for further evaluation in the Smart Grid Network.

Individual alarm levels can be defined for each input enabling the system to send a message if a certain level is exceeded.

The function and the set points in the various processors in the central unit can all be modified by sending a message with the relevant information, or they can even be completely re-programmed over the network connection.



Central unit
seen from the back

Installation

Central unit

The central unit is mounted directly on the current rails in a distribution panel or on a suitable frame on a wall. The fixation is done from the front by 3 embedded HEX screws that will fit the threads in the bus bar. By fastening the screws, the power for the unit is enabled automatically. Just an insulated 5 mm HEX key is needed for this installation

Sensors.

The metal part of the sensor is placed around the cable, and plugged into the sensor body, where it is locked without the use of tools.

Connection between the sensor and the central unit is established with an optical wire, cut to appropriate length, and easily inserted in both sensor and central unit.



Sensor ready for installation

Sensor - assembled

Specifications

Sensor:



Cable Size	Max. Ø34 mm, Max. 150 mm ² Cu (Round), or Max. 240 mm ² Al (Triangular)
Cable Voltage	Independant of voltage. Limited only by the insulation of the optical fibre
Current (measured)	1 - 2,5A: Sensor/Cable alive 2,5A - 500A: RMS Value (Measuring range Max. 800A)
Power Consumption	25µW - 2,5W
Body dimension	60 x 51 x 34mm (HxWxD)

Central Unit:



Channels	1 - 18 (6 x 3)
Supply Voltage	3 x 400V
Voltage (measured)	Supply voltage RMS. Resolution 0,1V
Current (measured)	1 - 500A RMS. Resolution 0,1A
Frequency (measured)	Resolution: 0,01Hz
Cosp	-1 to +1
Power (calculated)	0 - 999,9kW Active and Reactive power
Power Quality	Optional
I/O	Optional, 4xDI, 2xDO
Power Consumption	6W
Temperature	-25°C - +70°C
Dimension	575 x 49 x 130mm (HxWxD)
IP Class	40
Safety standard	EN 50178 CAT IV, 424V, Pollution degree 2, EN60950-1

Communication

Ethernet or GSM/GPRS communication module. Modbus via RS485 or Modbus TCP via Ethernet
Support IEC 60870-5-104. Planned support for IEC60850, Q2, 2014.
Update time from 1 sec.

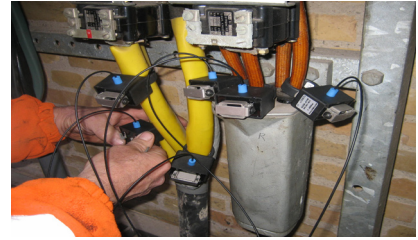
Actual installations



SGU installed
in a standard steel cabinet



Wall mounting

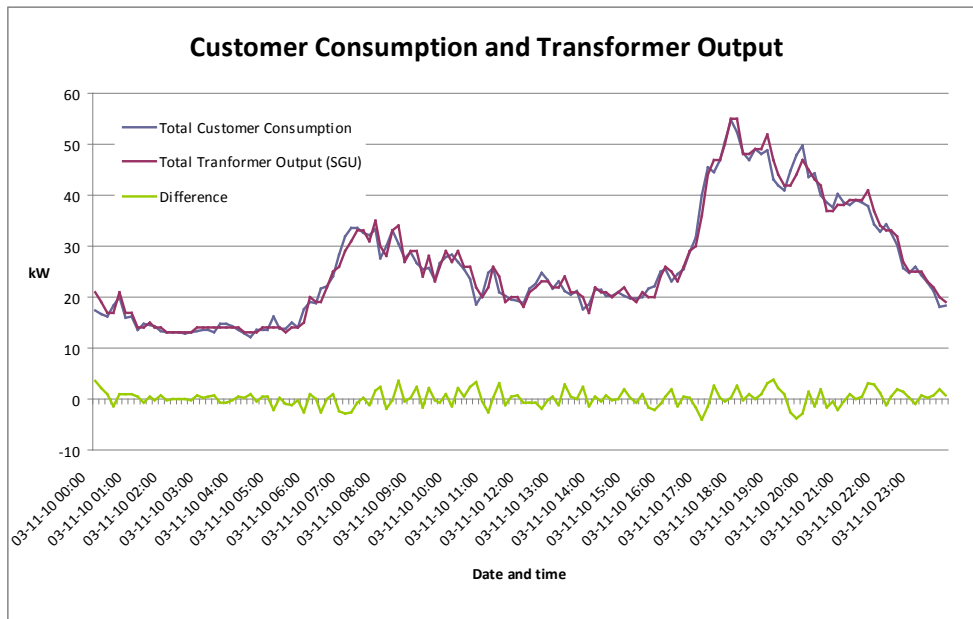


Mounting of sensors

Actual measurements in a transformer station in a residential area

The figure below shows a comparison of measurements of the total transformer output measured with the SGU unit and the total consumption of the users, measured with digital power meters in the individual homes.

The curves show the high accuracy of the SGU. The difference between the values are mainly due to the fact that the time base of the two measurements are not synchronized.



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