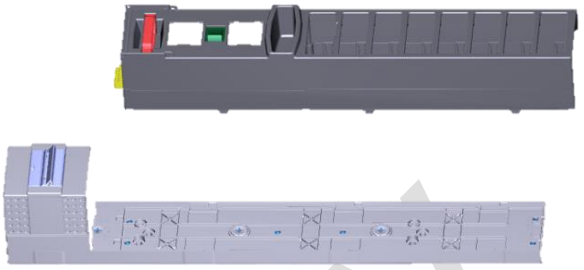
data sheet: SGIM – Smart Grid Interface Module

The Smart Grid Interface Module SGIM is a modular system to monitor electric and further physical sensor data in cabinets and cable distributions.

SGIM's mounting and design appear in line with industrial standards. Integration of the SGIM in a 185mm busbar system is handled in an accustomed way just as e.g. NH bars of fuse-switches. The installation takes place without getting in touch with busbars under current and without interrupting power lines. SGIM measures 100mm in width, which is the same size as the mentioned NH bar (size 1-3). In case of a mounting environment without normed bars all desired inputs are provided by several connecting plugs. The modular design of the SGIM offers high flexibility concerning number and definition of the measured values. The evaluated parameters are continuously live-streamed to the data server. As long as a performing data connection is secured, the system informs the user within a second, if a defined threshold is violated. The well-tried transfer protocol com.tom Kolibri minimizes the amount of data that is necessarily transferred. The protocol allows read-and-write requests. Alternatively, optional protocols may also be used: These are the normed master protocols IEC 60870-5-104 and IEC 61850.

SGIM is built up out of two main modules: the installation platform and the plug-in unit. The installation platform is mounted separately to provide the basis for the whole system. The plug-in unit comes with two 230V-outputs to power electric accessories or tools of the maintenance staff (e.g. a lamp). One of the two sockets can be switched, so that a lamp may remain in the cabinet for regular maintenance.



Modularity

Different modules provide the sensor functionality of the SGIM. Power supply and CPU form the obligatory base of the platform. All further functions are integrated on your demand. In this way sensor functionality is continuously accustomed to your latest needs. The high flexibility guarantees maximal security in investment and future building management.

CPU module

The CPU module is an obligatory, factory-provided element of the SGIM. It consolidates and processes the measured values and controls communication with the data server in line with the com.tom Kolibri protocol. The CPU module offers LAN and RS485 interfaces that connect to the internet as well as to external devices.

Sensor module for Rogowski coils

This module processes data that is measured by Rogowski coils. A flexible sensor ring is core part of these coils that can easily be attached to a power line to measure actual currents. A screw plug fixes the sensor on the power line without interrupting it. This way of measurement is suitable to currents of 100A to 2000A.

Sensor module for current transformers

The CT module connects to the current transformers (CTs) of the installation. A CT is built upon an inflexible ferrite ring. The desired power line is led through the ring sensor. CT sensors provide more exact measurement of marginal currents. The method is practicable for currents of 1A to 200A.

To minimize the work load during the installation the Rogowski coils and CT sensors of the SGIM are predefined to measure 3-phase power lines. The SGIM cable set for 3-phase measurement is plugged into the related sensor module and

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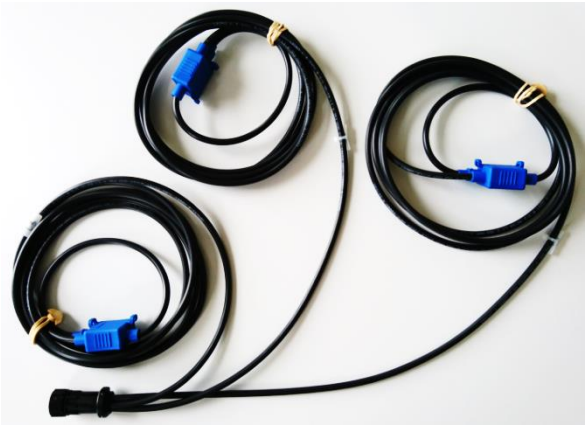


supports three Rogowski coils, resp. three current transformers. There are two inputs available for every sensor unit so that two cable sets may be attached, i.e. two power lines may be monitored in L1, L2, L3.

4-phase measurement is a special feature where the current of the neutral line is additionally monitored. The method allows detection of fault currents. In this case one input of the main module is used to connect to the L1, L2, L3 sensors and the second input connects to the one-phased sensor unit on the neutral line. A cable set dedicated to one-phase monitoring of neutral lines is available.

GSM module

This module sets communication between the SGIM and the data server via mobile networks. Whenever the SGIM is not connected to an internet router by a LAN cable, this module secures that SGIM and the desired data have online access. It provides bidirectional data transfer, remote configuration and software updates.

Fiber optic (FO) module

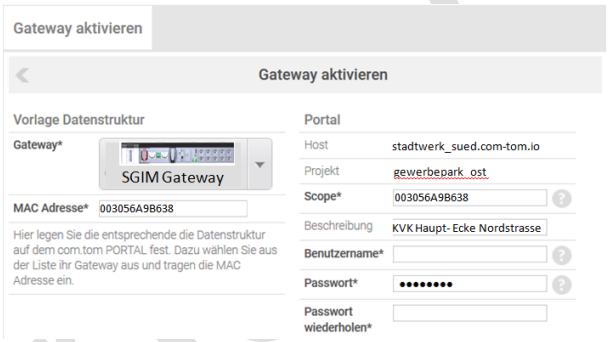
If an internet connection via fiber optic is available, the FO module will be at your hands. It supports the E2000 standard (Diamond).

IO module

This module controls and enacts switching processes. It offers eight input and two output channels. If the circuit of an incoming port is closed to ground, the related input channel is set to “ON”. On the other hand, an input left open refers to the switch position “OFF”. This functionality allows e.g. the implementation of a simple door contact switch. The two output channels appear as relay contacts free of potential, so that e.g. controlling a power relay is possible. An automized algorithm defined within the SGIM CPU may be used to provide switch impulses. Alternatively the operator uses the com.tom Kolibri protocol 104 or the IEC61850 protocol.

Data visualization

As soon as the installation platform, the sensor modules and the cable sets are mounted and connected, SGIM is activated on the data server.



After activation is completed SGIM automatically starts to transfer parameter values to the data server. Due to the preinstalled SCADA compatibility of the com.tom gateway all values are immediately accessible on a PC or mobile device as your tablet or smartphone. The Login requires user name and password. The user selects the desired parameters for the local installation and configures their visualization. Thresholds for the installation are defined. In case of abnormal parameter values the SCADA system releases alerts that appear as SMS or Email on the user’s screen.

The SGIM and the com.tom server communicate alongside a secure IoT connection. It supports writing operations as soon as a safe data connection is established. Due to the read-write-exchange the user is able to control switching impulses in the transformer station as well as analogue steering processes.

Apart of the monitoring functionality SGIM also provides all prerequisites to manage the local installation from its control room, the cabinet or the cable distribution itself.

Connectivity for analysts

SGIM offers 3-phase current gripping as optional feature for e.g. mobile net analysts. Fully isolated 4mm sockets are used for gripping. A LSFI ballast provides secure switching.

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Advantages of the SGIM solution

- DIN normed mounting in 185mm busbar systems, in cabinets or on a mounting wall
- industrially standardized and adapted solution for various markets
- non-invasive installation without interruption of lines under current
- quick and easy installation
- 3-phase monitoring of up to 10 low voltage lines
  - current, voltage, net frequency, phase angle
  - active, reactive, apparent power
- current meter (no accounting approval)
- monitoring of cabinet temperature and humidity
- riskless current gripping for mobile net analysts (optional)
- online access via LAN, LWL, UMTS
- direct availability of the sensor data on the server
- flexible and modular system integrity
- integrative base platform to add several sensor units
- integrative base platform to add universal IOs
- protection of investment due to modularity and ability to retrofit the system

Electric specification

Power supply

power input: (100...240V)	1x 230V (L1) 50Hz, **CAT IV**
power dissipation:	<25VA

Sensor specification

Voltage

method	L – N, **CAT IV**
resolution	0.01 V
statistic features	mean, minimum, maximum
sensor range	1.5 x U_{nom}
min. averaging time	60 s
accuracy	<0.5 %

Current

resolution	0.01 A
CT range primary	250, 400, 630 A
CT range secondary	1 A
sensor range	CT1.7 x I_{nom}
RC range primary	630 A
RC output signal	22.5 mV / kA
sensor range	RC 10kA
statistic features	mean, minimum, maximum
min. averaging time	60 s
accuracy	<0.5 % + RC
accuracy (with original SGIM RC)	<1.0 %

Net frequency

resolution	0.01 Hz
statistic features	mean, minimum, maximum
min. averaging time	60 s
power	active, reactive, apparent power
statistic features	mean, minimum, maximum
min. averaging time	60 s 900 s (reactive/ apparent power)

Energy (electric work)

reactive, active and apparent power:	consumption/ supply
statistic features	mean, minimum, maximum
min. averaging time	900 s

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Power quality

THD voltage, THD current	
statistic features	mean, minimum, maximum
min. averaging time	900 s

Additional specifications

Power supply for external devices:

voltage	+12V
max. current	0.45 A

Sensor for temperature and humidity

sensor range	-40 - +125 °C
accuracy	±0.2 °C
sensor range	0 – 100 %RH
accuracy	±2 %

IO module [1]

2 x relay contact (G5SB)	
contact voltage	250VAC CAT II
max. contact current	3A
8 x digital input	
UHmax	+12V
UHmin	+5V9
ULmax	+3V9
Imax	5 mA
debounce time	10ms

[1] only if optional modules are installed

Norms and standards

SGIM conformity to EU regulation:

- EMC (Electromagnetic Compatibility) Regulation 2014/30/EU (4kV/8kV)
- Low Voltage Regulation 2014/35/EU
- Radio Equipment Directive (RED) 2014/53/EU
- Restriction of Hazardous Substances (RoHS 2) Directive 2011/65/EU

Measurement and monitoring according to EN 61557-12

- active power (P) and active energy (E)
- reactive power (S) and reactive energy (E)
- apparent power (Q) and apparent energy (E)
- net frequency (f)
- effective value (RMS) of line current (I) and neutral line current (measured and calculated)
- effective value (RMS) of voltage (U)

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