

Smart Grid Hub - Secure

SGH-S

HIGH SECURITY COMMUNICATION GATEWAY
FOR SMART MEASURING SYSTEMS
AND NETWORK MANAGEMENT
WITH ALL-IP CONNECTIVITY VIA ETHERNET,
MOBILE TELECOMMUNICATION AND WIDEBAND PLC

PRODUCT INFORMATION



Features

The SGH-S high-security communication gateway with statutory certification in accordance with Common Criteria is the core component of the IP-based product line, which is dedicated to secure energy supply. In combination with the basic meter it forms a smart measuring system. The entire device is designed to be intrinsically safe. The security requirements for level EAL4+ are legally specified in the specific protection profile. They apply end-to-end to development, production, installation, and all operational processes during the entire life cycle.

As a communication gateway, the SGH-S fulfils tasks related to calibration statutes, such as tariffing, processing and provision of billing data, in strict compliance with privacy protection regulations. As a multi-function device, the SGH-S also connects consumer and generator systems at the terminal points of the supply network to the applications and services of various parties. In this way the SGH-S plays a significant role in comprehensive networking of the terminal points of distributed energy supply.

The following features are typical for this high-security device:

- An integrated security module with statutory certification provides cryptographic protection to ensure extremely secure communication
- Independent TLS-protected Ethernet IP port for WAN connectivity
- Independent TLS-protected Ethernet IP port for HAN/CLS connectivity
- Integrated Ethernet switch
- Physical separation of HAN and CLS interfaces by the Ethernet switch
- Integrated SOCKS5 server for transparent connection of control devices to the CLS channel
- Integrated web server for data provision to end users over the HAN interface
- TLS-protected RS 485/HDLC bus interface for meter connection
- 230 VAC supply voltage
- Profile-based client administration
- Management of TLS certificates for all connected devices or nodes
- Mutual authentication of all TLS connections

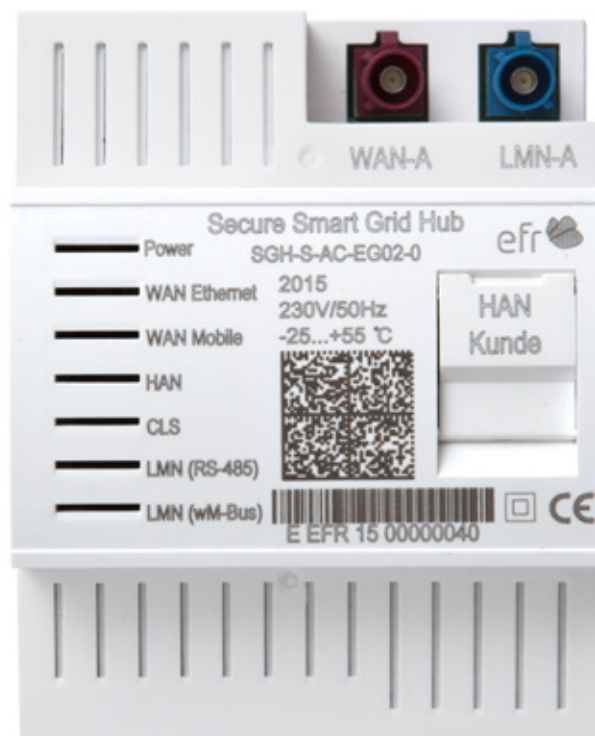
- Profile-based configuration for communication, node authorisation and processes by the authorised administrator (GWA)
- Diverse evaluation and use cases (TAFs) for processing and provision of data and measurement values
- Dedicated logs for calibration data, system data and end user data
- Secure firmware upgrade over WAN channel with WELMEC-compliant partitioning of fixed and modifiable parts
- Integrated mobile telecommunication connectivity for WAN
- Versions with transparent IP connectivity via integrated broadband powerline modem for WAN
- Support for prioritized data traffic
- Support for quality of service (QoS), monitoring and generic device management

Use

In combination with the SGM-D system-ready basic meter, the SGH-S secure communication gateway forms the legally prescribed smart measuring system for customer installations with annual consumption greater than 6,000 kWh and installations with feed-in into the public power grid as described by the German Renewable Energy Resources Act (EEG). In future, customers with load management, heating control and EEG feed-in will use a control unit as an additional component which must be connected to the control centre via the gateway using the CLS interface designated for this purpose.

As components of the secure IP product line, the SGH-S gateway and the corresponding GCU-S control unit can be integrated into the basic meter. Together they form the basis for customer management, efficient energy utilization, and automation in modern distribution networks (smart grids).

Other application areas include building automation and resource management in commercial and industrial facilities, where the SGH-S can be used as a universal secure communication node or router.



Standard functions

The functionality of the device can be flexibly configured by firmware upgrades and partitioning of the firmware into a fixed portion and a runtime-modifiable portion. The following functions are available as standard:

- Role-based authorisation and client capability
- Real-time clock, time synchronization via NTP server, time stamp
- Self-monitoring and self-test (system and operation logs)
- Diverse tariffing and billing modes approved with regard to PTB-A50.8 calibration regulations, including time-variable and load-variable tariffs and meter reading operations for external tariffing
- Billing data for multiple categories
- Acquisition, processing and provision of network services parameters, threshold-dependent measurement data and events
- Power restoration and emergency operation function
- Provision of historical end-user data via web server
- Manipulation detection and protection
- Configuration over IP interface
- Plug-in installation and automatic commissioning

Optional functions

The flexible upgrade capability allows the device to be equipped with specific functions for versatile deployment as highly secure communication hub in a variety of market segments, for example for network management. The following functions are examples of deployment in network management:

- Monitoring of communication channels
- Loadable IP protocols (IEC 60870-5-104, Modbus, etc.)

TECHNICAL DATA

Application area: Distribution networks	Low voltage 400 V
	Medium voltage 20 kV

Supply voltage	230 VAC
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7x LED indicators	Operation, communication channels
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Ethernet port I	IEEE802, 10/100 Base-T
	10/100 Mbit/s
	WAN

WAN protocols	TCP/IPv4, IPv6, TLS
	UDP, DHCP, NTP
	HTTP, RESTful Web Services, CMS
	XML/ IEC 62056-6-1/2

Ethernet port II	IEEE802, 10/100 Base-T
	10/100 Mbit/s
	HAN/CLS

HAN/CLS protocols	TCP/IPv4, IPv6, TLS
	UDP, DHCP, NTP
HAN protocols	HTTP, WEB server
CLS protocols	SOCKS5 TLS proxy
	EN 61850/ EN 62351-8

RS-485 bus port	LMN, meter connection
Protocols	HDLC, TLS, SML
	IEC 62056-6-1/2
Transmission rate	921,6 kbit/s

M-bus (wireless)	LMN, meter connection
Frequency band	868-870 MHz, max. 14 dBm
Channels	12, max. 100 kbit/s
Protocols	EN 13757-3/4, AFL

Mobile	LTE CAT1 (WAN)
Frequency band	4G: 800, 1800, 2600 MHz 2G: 900, 1800 MHz
Transmission	50 Mbit Uplink 100 Mbit Downlink

Mobile	CDMA (WAN)
Frequency band	450 MHz, EV DO
Transmission	50 Mbit uplink 100 Mbit downlink

Broadband PLC	WAN
Frequency band	1 - 30 MHz

Power consumption	Voltage path < 1,5 W Current path < 0,05 VA
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Operating temperature range	-25°C to +70°C
Storage/transport temperature range	-40°C to +85°C
Relative humidity	Max. 95 %, non-condensing

Case:	Top-hat rail mount, DIN 43857
Dimensions	70 x 66 x 90 mm (4 MU)
Protection class	II
Protection rating	IP3x
Material (recyclable)	Glass-fibre reinforced polycarbonate
Fire characteristics	Flame resistant per IEC 62052-11

Mechanical strength	MID M1
EMC	MID E2

Weight	approx. 200 g
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Ethernet ports	2 x RJ45 jack
Ethernet switch	HAN/CLS
Cellular antenna connection	FAKRA D socket, Bordeaux, 50 Ω
M-Bus antenna connector	FAKRA C socket, Blue 50 Ω
Mini SIM card	1,8 V and 3 V
	Plug-in / hard-soldered

Real-time clock accuracy	5 ppm, < 0,5 s per 24 h
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APPLICABLE PROVISIONS, STANDARDS AND TESTS

Statutory requirements		Manufacturing certifications	
General provisions	Common Criteria	Quality management	ISO 9001
Protection profile	BSI-CC-PP-0073/77	Environmental management	ISO 14001
Technical guidelines	BSI-TR-03109 BSI-TR-03116-3 BSI-TR-03109-4	Approvals, conformity, certificates	

Test standards		Type test	PTB A50.8
General requirements	EN 50470, Part 1	Type test certificate	TBD
Specific requirements	WELMEC 7.2	Conformity tests / certificates	MID Annex D
Applicable standards	EN 300 220-2 v.2.1.1/2 EN 55022/24 EN 61000 EN 60950 EN 301489-1/3		BSI PP (TBD)
			BSI TR (TBD)

TYPE DESIGNATION

SGH-S-						Secure Gateway "Smart Grid Hub Secure"
	AC					AC power connection 230 VAC
	DC					DC power connector 12-60 VDC
		E				Ethernet WAN enabled
		O				Ethernet WAN disabled
			00			No mobile telecommunication connection
			L0			Mobile CAT1 LTE 800/1800/2600 MHz, 2G 800/1800
			CD			CDMA 450 MHz EVDO
			BP			Broadband PLC (>1 MHz)
				0		Ethernet switch disabled
				1		Ethernet switch for WAN-WAN
				2		Ethernet switch for HAN-CLS
					0	α version
					1	1. Generation G1 with CC certification
					2	2. Generation G2 with CC and BSI-TR certification

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