

# Grid Control Unit - Secure

## GCU-S

HIGH SECURITY CONTROL UNIT  
FOR POWER MANAGEMENT, SMART GRIDS,  
DISTRIBUTION NETWORK AUTOMATION,  
VPP / DIRECT MARKETING  
AND FACILITIES OR INFRASTRUCTURES  
WITH ALL-IP CONNECTIVITY

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### PRODUCT INFORMATION



## Features

The GCU-S control unit is a member of the IP-based product line, which is dedicated to secure energy supply. The device can be used independently or in combination with a meter system. With variants available for extended data acquisition and output, the GCU-S can also be used to form a secure, flexible and cost-effective remote control system. One of the main goals in this regard is to fill the gap in low- and medium-voltage distribution networks, most of which are not monitored or controlled.

The functionality of the GCU-S control unit extends from conventional remote control to grid management with secure IP communication in grids with distributed generation facilities.

The following features are typical:

- Two independent TLS-protected Ethernet IP interfaces for WAN and LAN connectivity
- Daisy-chained device operation
- Four bistable 1 A changeover relays for switching purposes
- Configurable relay control, grouping and interlocking
- Up to four 24 VDC digital inputs
- 230 VAC or 12–60 VDC supply voltage
- Dedicated profiles for flexibly configurable functionality, particularly for communication, operating or switching schedules and security functions
- Role-based access control
- EN 61850 (according to FNN-Specification) and EN 60870-5-104 as standard user protocols
- Firmware upgrade over IP interfaces with WELMEC-compliant partitioning of fixed and modifiable firmware
- Independent protocol allocation to Ethernet ports by firmware upgrade
- Optional: Longwave broadcast channel for direct control or redundant control channel

## Use

The scope of use of the GCU-S control unit meets or exceeds the FNN standard. It includes load and energy management, facility and infrastructure control, management of distributed generation facilities, and grid management tasks in low-voltage and medium-voltage distribution networks. In particular:

- Heating control
- Load and facility management
- Street lighting
- Management of renewable energy generation in LV and MV grids
- Process output and control
- Time-critical control in LV and MV grids
- VPPs and direct marketing
- Substation automation

Along with deployment as a system component, the GCU-S can be used as an independent IP terminal device or as an independent remote control receiver when connected to an active longwave antenna. In combination with the SGH-S secure gateway, the GCU-S acts as a CLS device meeting statutory requirements for controlling loads and distributed generation facilities. It is connected through the TLS-protected CLS interface to the gateway, which in turn establishes a secure connection to the relevant external party.

Continuous advancements in distributed power generation and the growing popularity of electric vehicles create new applications for this family of devices, such as smart control of distributed storage components and regulated charging of vehicles according to dynamic grid status. For these grid service tasks, such as imbalance detection or price-sensitive switching, the GCU-S provides distributed intelligence for the terminal devices.

The Ethernet IP interfaces can be operated independently of each other and thus used for different purposes, including connection to the gateway as a CLS interface, daisy-chain connection with other GCU-S units, connection to external devices or systems for grid quality monitoring or other purposes, and connection to an inverter. In combination with the gateway and other IP-capable devices, the GCU-S can be used in control systems for purposes such as cost analysis and allocation or efficiency management in building complexes.

## 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:

- Prioritised control
- Role-based authorisation and client capability
- Autonomous control
- Central control actions (group or stage switching, pulse function)
- Real-time clock with calendar; time synchronisation via NTP server
- Self-monitoring and self-test (system and operation logs, relay test)
- Floating inputs for status feedback or switching actions
- Power restoration and soft start
- Configuration through IP interfaces
- Emergency operation
- Relay monitoring, status information, logging of operationally relevant data
- Automatic commissioning

## Auxiliary functions

For wide-range flexible deployment, the device offers auxiliary functions for applications that are not covered by the smart meter system:

- Astronomical calendar
- Measurement data acquisition over IP interface
- Loadable control programs, for example for balanced load distribution over supply lines
- Longwave connection as an independent and/or redundant control channel
- Remote control receiver function



## TECHNICAL DATA

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

Supply voltage	AC line: 230 VAC
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Switch outputs	4x changeover 1 A, 250 V (floating contacts, bistable relay)
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Signal inputs	4x optoisolated 24 VDC digital inputs
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7x LED indicators	Operation, communication, relay
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Operation	Relay test buttons
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Ethernet port I	IEEE802, 10/100 Base-T
	10/100 Mbit/s
	e.g. CLS / Smart Meter Gateway

Ethernet port II	IEEE802, 10/100 Base-T
	10/100 Mbit/s
	e.g. daisy-chain, external IP device

WiFi	2.4GHz RF, IEEE 802.11b/g/n
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Protocols (fixed)	TCP/IPv4, IPv6, TLS
	DHCP, NTP, OpenVPN
	SOCKSv5

Protocols (configurable)	CLS: HKS3/4
	MQTT
	EN 61850/ EN 62351-8

Power consumption	<2,9 W (typical)
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Operating temperature range	-25 °C to +55 °C
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Storage/transport temperature range	-25 °C to +70 °C
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Relative humidity	Max. 95 %, non-condensing
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Case:	Top-hat rail mount, DIN 43857
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Dimensions	70 x 66 x 90 mm (4 MU)
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Protection class	II
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Protection rating	IP3x
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Material (recyclable)	Glass-fibre reinforced polycarbonate
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Fire characteristics	Flame resistant to IEC 62052-11
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Mechanical strength	MID M1
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EMC	MID E2
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Weight	approx. 250 g
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Relay terminals	4x insertion terminals Ø 0,6 - 2,5 mm
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Ethernet ports	2 x RJ45 jack
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Digital inputs	4x insertion terminals Ø 0,6 - 2,5 mm
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Longwave antenna	RJ12
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Real-time clock accuracy	5 ppm, < 0,5 s per 24 h
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Longwave interface	UART, 5 V
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Protocol	Versacom
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Transmission rate	200 bit/s
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## APPLICABLE PROVISIONS, STANDARDS AND TESTS

Test standards		Manufacturing certifications	
General requirements	EN 50470, Part 1	Quality management	ISO 9001
Specific requirements	WELMEC 7.2	Environmental management	ISO 14001
Applicable standards	EN 300 220-2 v.2.1.1/2 EN 55022/24 EN 61000 EN 60950 EN 301489-1/3	Conformity and certifications	
		FNN-Specification „Steuerbox“ v1.3 (partially)	

## TYPE DESIGNATION

<b>GCU-S-</b>								<b>Control Box „Grid Control Unit“</b>
	<b>A</b>							AC power connection 230 VAC
		<b>1</b>						with integrated WiFi module
		<b>2</b>						without WiFi module
			<b>0</b>					variant without safety module
			<b>1</b>					variant with safety module

All variants have four switching outputs, four digital inputs, two Ethernet interfaces and one serial interface included as standard.

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