



net-line FW-5-GATE-450

including 450 MHz module



Secure communication for critical operator infrastructures

The requirements made of network operators in regard to security and reliability of their communication network are growing continually. The requirement in particular is to integrate an ever increasing number of nodes into the system, and control them, so that reliable network management and high levels of grid stability can be guaranteed. Communication using the 450 MHz mobile network represents the right solution for these challenges - with the new net-line FW-5-GATE-450 telecontrol unit from SAE. The product combines powerful telecontrol technology with a 450 MHz module. As with all FW-5 telecontrol units, the FW-5-GATE-450 can also be expanded with various input and outputs modules (I/O) and interface modules in the DIN rail enclosure. IT security is also paramount in this SAE solution.

Typical applications for the FW-5-GATE-450

- Substation and bay station controllers in secondary unit substations and medium voltage switching stations
- Controllers for distribution network automation and feed-in management in accordance with the Renewable Energy Law
- Monitoring and control device for utilities and industry
- Data acquisition and communication system in transport and infrastructure applications

FW-5-GATE-450 overview

Compact bay station controller with 450 MHz CDMA radio module in a micro housing for DIN rail installation.

2 independent Ethernet LAN 10/100 BaseTx, 2 RS-485 field and meter interfaces, RS-232/V.24. for integration of communication drivers to IEC 61850, DNP3, IEC 60870-5-101/-104, -103 protection device coupling, Modbus, DSfG. Meter connection IEC 62056-21, SML or S0 pulse. PLC programming to IEC 61131-3 optional.

System with end-to-end VPN tunnel (IPsec/OpenVPN). Configuration via LAN, USB or memory stick. 24 V DC supply. Expansion with up to 12 I/O modules.

450 MHz communication: Benefits & opportunities

The 450 MHz frequency band is a globally active mobile radio spectrum with excellent building penetration down into basements, and an especially high range of up to 50 kilometres. The network enables operators of critical infrastructures to communicate via an independent platform that is not used by the wider public. This offers considerable benefits for providers:

- Significantly higher availability, as the communication paths cannot be negatively influenced by other users (for instance at major events)
- Self-contained buffering of the radio cell to ensure communication capabilities even in the event of a blackouts
- Encryptions and secure login scenarios enhance the security level

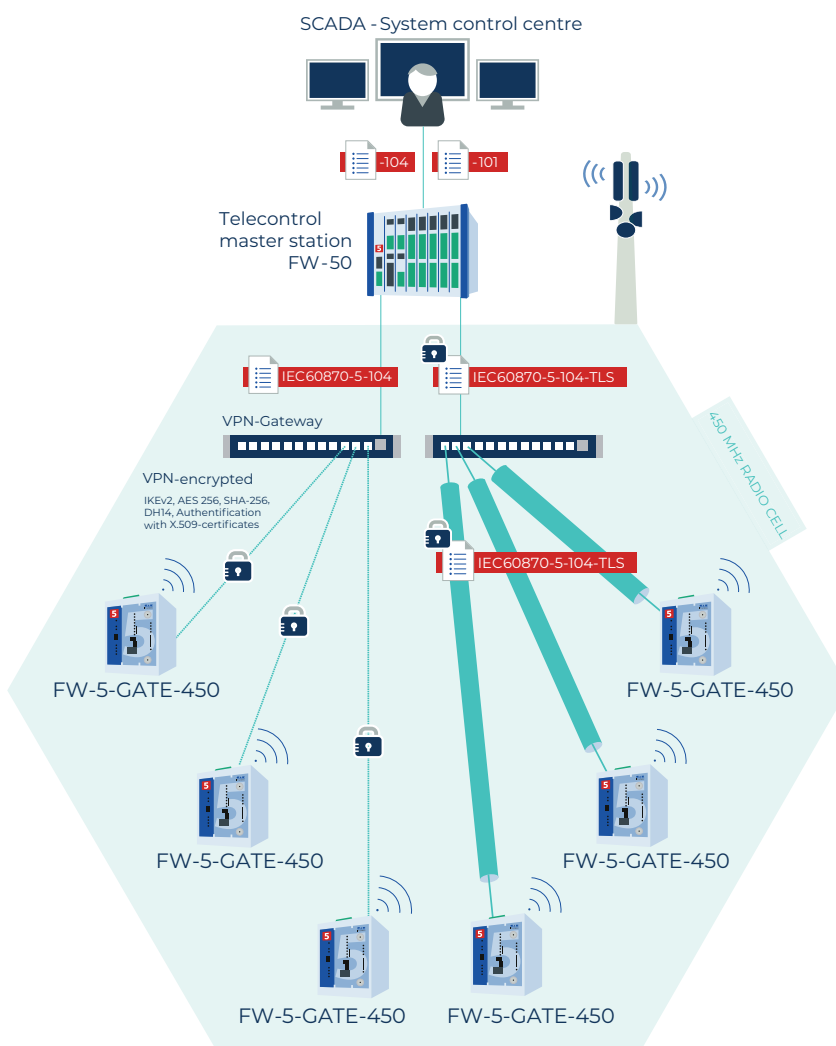
- The network is optimal for transmitting smaller data packets, e.g. control commands
- A high number of stations can be connected
- Free choice of transmission protocol thanks to PPP-linking
- Further services can also be used in parallel

In summary, network operators, providers and public utilities are able to handle demanding communication and automation applications over the 450 MHz frequency.

Implementation of the FW-5-GATE-450

Mounting on DIN rails and the particularly compact design mean the device can be wired directly in the cabinet and be used when space is at a premium. The parameters for network access and authentication are specified and preconfigured in the system. A SIM card is not necessary. For secure data connection to the power system control, the connection is based upon Triple-A (Authentication Authorization Accounting) and PPP authentication. There are two options for this:

- Connection over an encrypted VPN tunnel
- Communication via encrypted TLS protocols over a GRE tunnel (perspectively)



net-line FW-5-GATE-450 hardware

The FW-5-GATE-450 is based on the series5e CPU generation. Thanks to a processor speed of 1200 MIPS, it has enough in reserve - also with respect to future challenges. The high performance level has a particularly positive impact on network communication via IEC 61850 and process point handling to IEC 60870-5-10x standards. The main system comprises:

- 2 Ethernet LAN TCP/IP connections
- 2 RS-485 field interfaces
- Meter connection IEC 62056-21
- RS-232/V.24 interface
- 450 MHz CDMA module

450 MHz CDMA module

With its dual antenna, the radio module provides a flexible and highly available link to control and energy management systems. On CDMA radio level, it supports the EVDO Rev. A/B protocols. The downlink and uplink speeds of the module and network are optimal for transmitting switching commands

and facilitate trouble-free communication.

net-line FW-5-GATE-450 software

The setIT configuration software permits speedy startup and high levels of compatibility. Thanks to full configuration of all components of the FW-5-GATE-450 in setIT, there is no need to integrate or adapt an external modem, which can be time-consuming at times. In addition, all available information from the mobile radio module must be used in the diagnostics functions of setIT.

The optional Soft PLC codeIT offers additional flexibility and permits implementation of PLC programs to IEC 61131-3.



Secure communication to German Association of Energy and Water Industries (BDEW) whitepaper

Like all series5e telecontrol technology devices, the FW-5-GATE-450 also features a high level of IT security, and is more than capable of facing up to the complex security and practical requirements of today and tomorrow.

- Secure encryption and hash algorithms, e.g. for encrypting project files with AES-256
- User profile with individual role based access control (RBAC)
- VPN tunnel from the station (end-to-end encryption with IPsec IKEv1/IKEv2 or OpenVPN protocol)
- Secure file transfer with FTPS (File Transfer Protocol over SSL), e.g. for station updating
- Secure web communication with HTTPS (HyperText Transfer Protocol Secure)
- Accesses and services such as USB port, USB Ethernet and web server can be disabled
- Integrated firewall (whitelist concept)
- Syslog for central logging of operational messages and processes

Overview of expansion modules

The configuration of the net-line FW-5-GATE-450 can be tailored as required and expanded with up to 12 expansion modules. With the TBUS-T and TBUS-R accessories, the expansion modules can also be placed remotely from the base system. For higher power supply requirements, above the capacities of the basic unit, the power supply module PWR-1 can be added. All modules have the dimensions of 22.5 × 105 × 115 mm (W×H×D).

Signals and commands

8DI	8 signals
8DO	8 commands
8DI2AI	8 signals, 2 measurands

Measured values and setpoints

4AI	4 measurands
2AO	2 set points
4AO	4 set points

Other accessories

PWR-1	Power booster for larger capacities
PS-60	Power supply, 20 to 72 V DC
TBUS-T	T-Bus extension, transmitter
TBUS-R	T-Bus extension, receiver

Command termination

DSO-1	6 commands, 6 check-back signals
DSO-2	4 commands, 2 check-back signals

Modules for special tasks

4DI4DO	4 signals, 4 commands
RES-1	4 S0 pulse inputs, 2 measurands, 4 commands
VPP-1*	6 signals, 2 measurands, 5 commands, 2 set points
PM-1	Power measurement terminal
PM-2	Power measurement terminal
ISO-1*	Leakage detection
PIT-1*	Sensor module

Communication

PDPS-1	Profibus-DP slave
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* From setIT Version 6

Technical details: net-line FW-5-GATE-450

Design	Substation/bay control, telecontrol and automation system in plastic housing, expandable with I/O and communication modules for DIN rail mounting
Communication	450 MHz CDMA module 2 Ethernet LAN TCP/IP, 10/100BaseTx, auto-MDIX, auto-negotiation 1 RS-485 interface, galvanically isolated 1 RS-485 counter interface or CL/S0 interface, galvanically isolated 1 RS-232/V.24 interface
Inputs/outputs	Up to 12 expansion modules for operation of single-/double-point, transformer tap and alarm signals, measurands, metered values, single, double and transformer tap commands, temperature sensor for ambient temperature, -25 °C to 100 °C, measuring error ±3°C max.
Protocols	IEC 61850 · IED and protective equipment coupling IEC 60870-5-101 · telecontrol technology, station control technology IEC 60870-5-103 · protective device coupling IEC 60870-5-104 · TCP/IP coupling to control centre DNP3 server · serial/IP IEC 62056-21 · meter connection (IEC 1107) SML smart meter connection via Ethernet DSfG · Digital interface for gas metering units Modbus RTU/TCP · master/slave, Profibus-DP slave, MPI/3964R/RK512 · field bus SNMPv3 · Network management NTP/SNTP/DCF clock synchronisation VPN-Tunnel · IPsec (IKEv1/IKEv2), OpenVPN Syslog-ng Server LDAP- and RADIUS-Server
PLC programming	IEC 61131-3 compatible via codeIT, 128 kb program memory
CPU series 5e	RISC processor Cortex-A8, 1200MIPS@800 MHz, FPU, Watchdog, real-time clock, 1 GB RAM (512 MB SDRAM, 512 MB SLC Flash)
Memory extension	1 GB microSD card (up to 8 GB in perspective)
Real time clock	Errors max. ±10 ppm in operation, maintenance-free buffer ±20 ppm 60 days @25°C, daylight saving time changeover, leap year correction
Status displays	Process status of the PLC, LED in front panel for system, communication, VPN and mobile status, diagnostics via integrated web server, optional: visIT plant visualisation
Service interface	Ethernet LAN 10/100BaseTx, auto-MDIX, USB 2.0 device 480 Mbit/s, USB 2.0 host 480 Mbit/s (configuration/archive synchronisation via stick)
Fault signal output	To be configured to relay output, configurable sys-LED
Power supply	24 bis 60 V DC (-15% + 20%), no galvanic isolation With additional expansion module PS-60: 24 V DC to 60 V DC (-15%/+20%), insulation 1500 V
Dielectric strength	5kV surge supply & process I/O to PE, according to class VW3 2.5 kV surge, supply to RS-232, USB
Standards	EMC: IEC 61000-6-2, IEC 61000-6-3, Device class B ETSI EN 301 489-1, 52, Radio: ETSI EN 301 526, ETSI 301 908-1 Security: DIN EN 60950-1, EN 62311, Insulation: IEC 60870-2-1, IEC 60255-5
Housing	Polyamide V0, IP20, weight 310 g Dimensions: 68×105×115 mm (W×H×D), Expansion modules: 22.5×105×115 mm (W×H×D)
Installation	DIN top-hat rail, DIN-EN 60715 TH35
Terminals	MSTB removable screw-type or spring terminal Combicon, 0,2 to 2,5 mm²
Ambient conditions	-25° to +70°C, ø24h max. +55° C, max. 3000 m above sea level, humidity < 95%, without condensation

Product variants

FW-5-GATE-450 cl

2 Ethernet / LAN interfaces,
1 RS-485 field interface,
1 CL/S0 meter pulse interface,
1 RS-232/V.24 interface,
450 MHz CDMA radio module

FW-5-GATE

2 Ethernet / LAN interfaces,
2 RS-485 field & meter connections,
1 RS-232/V.24 interface

FW-5-GATE cl

2 Ethernet / LAN interfaces,
1 RS-485 field interface,
1 CL/S0 meter pulse interface,
1 RS-232/V.24 interface

FW-5-GATE-4G

2 Ethernet / LAN interfaces,
2 RS-485 field & meter connections,
1 RS-232/V.24 interface,
4G/LTE mobile router

FW-5-GATE-4G cl

2 LAN interfaces,
1 RS-485 field interface,
1 CL/S0 meter pulse interface,
1 RS-232/V.24 interface,
4G/LTE mobile router

* From setIT Version 6



SAE IT-systems GmbH & Co. KG
Im Gewerbegebiet Pesch 14
50767 Cologne, Germany
Tel.: +49(0)221/59 808-0
Fax: +49(0)221/59 808-60
info@sae-it.de
www.sae-it.com