



DESIGNED & ENGINEERED IN TÜRKİYE

INDUSTRIAL TELEPROTECTION UNIT

SMG50

**The protection command,
at the far end within 10 ms.**

A new-generation industrial teleprotection unit for 154 kV / 400 kV power transmission lines and substation protection signaling. Relay commands are taken on 8 isolated inputs, carried redundantly over up to 3 links (RS232 / fiber / E1) and reproduced at the far end on 8 relay outputs. IEC 60834-1 performance, full compliance with the TEİAŞ-MYD/2024-062.0 specification.

2–10 ms

END-TO-END
TRANSFER

8 + 8

ISOLATED INPUTS
· RELAY OUTPUTS

3 links

RS232 · FIBER · E1

2× PSU

–48 V DC · HOT-
SWAP



SMG50 front panel · 8 input / 8 output LEDs, touch status display, service ports, link indicators



01

CORPORATE

Protection Communication for Power Transmission Is Our Business

Simgenet Mühendislik is a Turkish engineering company delivering industrial networking and critical-infrastructure communication systems. Our team has built SDH/PDH, FSK modem, power-line carrier, IP/MPLS and GNSS timing infrastructures in transmission and distribution facilities for years; with the SMG50 we brought the transport of protection-relay commands into **a device of our own design**.

2000

FOUNDED

500+

PROJECTS DELIVERED

30+

COUNTRIES SERVED

100+

PRODUCTS

■ Why our own teleprotection unit

- Substation protection signaling needs a team that knows every clause of the national specification; the SMG50 was designed around the clauses of **TEİAŞ-MYD/2024-062.0**
- Hardware, embedded software and web interface are **entirely in house**; field feedback goes straight into the product
- Compliance matrix, FAT/SAT procedures and relay verification documents ship with the product
- From one source: fiber/E1 transport, GNSS time source, switching and acceptance testing

■ Who it is for

- Distance and differential protection schemes on 154 kV / 400 kV transmission lines
- Permissive / direct trip and blocking command transfer between substations
- Generation and transmission facilities, line operators, critical-infrastructure operators
- Projects that must run over existing SDH/PDH, fiber and OPGW infrastructure

One device, one responsible party. The SMG50 is not a "box" but a link in the protection chain: transfer time, dependability and security from the relay contact to the relay coil at the far end are defined by **IEC 60834-1**; Simgenet takes end-to-end responsibility for the communication link of that chain.

Our Mission

To deliver innovative, reliable and sustainable technology solutions for industrial networking and critical-infrastructure communication, safeguarding our customers' business continuity.

Our Vision

To become Türkiye's most trusted and innovative network-infrastructure technology partner and a globally recognized brand.



02

PRODUCT

The Device That Carries the Relay's Command to the Far End

When a fault occurs on a transmission line, the protection relays at both ends send each other "trip", "permit trip" or "block" commands. Whether that command reaches the far end **within milliseconds, without false triggering and without being lost** determines the safety of the line and the substation. The SMG50 takes these commands on isolated inputs, carries them over the communication link and reproduces them as relay contacts at the far end.

■ Input

- 8 independent, isolated digital command inputs
- Directly on 110 V DC (75–140 V) and 220 V DC (150–280 V) systems
- Signals under 2 ms are not accepted: interference and noise rejection
- Command rejection voltage: < 66 V (110 V) · < 132 V (220 V)

■ Transfer

- RS232, optical fiber (SM, OPGW-compatible) and E1 (ITU-T G.703)
- Up to 3 simultaneous, redundant links depending on model
- 2–10 ms end to end: detection + processing + transmission + output
- Stable, repeatable distribution, measured with < 2 ms resolution

■ Output

- 8 independent relay digital command outputs
- MOV overvoltage protection, all outputs isolated
- 110 V DC 1 A / 220 V DC 0.5 A continuous (rated +20 %)
- Separate changeover-contact communication and system alarm relays

Key Capabilities

■ IEC 60834-1 performance

The three criteria of teleprotection communication — transfer time, dependability (no command is lost) and security (no false command is produced) — are the design targets; they are verified in relay load and cycle tests and in the FAT/SAT procedures.

■ Self-supervision

Communication-link failure and power-supply / time-synchronization failure are signalled on separate alarm relays that connect directly to SCADA or the local panel.

■ Dual redundant power

Two independent, galvanically isolated, active/active –48 V DC power supplies. Sliding hot-swap design: a PSU is replaced while the unit runs and the line is never left unprotected.

■ Time-stamped event log

Primary / secondary time server via SNTP; at least 2,000 time-stamped events in non-volatile memory, retained through power loss. Events are exported to a PC for post-fault analysis.



03

COMMUNICATION

Three Media, Redundancy up to Three Links

The communication infrastructure between substations differs in every project: sometimes direct OPGW fiber, sometimes an E1 channel over an SDH/PDH multiplexer, sometimes an existing modem line. The SMG50 offers all three media **in the same chassis**; depending on the model configuration one, two or three links run simultaneously and the command is carried on every link.

■ Optical fiber

- Single-mode fiber, OPGW-compatible
- Direct substation-to-substation connection; immune to electrical noise
- Link status LED on the front panel (FIBER)

■ E1 (ITU-T G.703)

- 2 Mbit/s digital transmission interface
- Transport over existing SDH/PDH multiplexers and telecom infrastructure
- Link status LED on the front panel (E1)

■ RS232

- Serial communication port; modem and serial-channel infrastructures
- Carrier of the basic single-link configuration
- Link status LED on the front panel (RS232)

Configurations

CONFIGURATION	RS232	OPTICAL FIBER	E1 (G.703)	SIMULTANEOUS LINKS
SMG50 · RS232	•	—	—	1
SMG50 · RS232 + Fiber	•	•	—	2
SMG50 · RS232 + E1	•	—	•	2
SMG50 · RS232 + Fiber + E1	•	•	•	3

■ End-to-end layout

- **End A:** protection-relay contact → SMG50 input (DI 1–8)
- **Transport:** fiber / E1 / RS232 — over all selected links
- **End B:** SMG50 output (DO 1–8) → protection relay at the far end
- Communication and system alarm relays at both ends connect to SCADA

■ Redundancy principle

- If one link drops, the command continues over the remaining links
- On link failure the communication alarm relay operates and a time-stamped event is logged
- On the power side two PSUs run active/active; losing one raises a system alarm without interrupting service

Fits your infrastructure. Designed from one source together with Simgenet's SDH/PDH multiplexer, DWDM/EDFA, FSK modem and IP/MPLS solutions: the teleprotection channel, the transport infrastructure and the time source are deployed in one project and accepted together.



04

INPUT / OUTPUT

No False Command, No Dropped Command

Neither error is acceptable in a teleprotection unit: mistaking interference for a command, or losing a genuine one. The SMG50 input stage evaluates the relay contact against **both a voltage threshold and a time threshold**; the output stage guarantees continuous and repeated operation of the relay contacts under field load.

Digital input stage

- 8 independent, mutually isolated command inputs
- 110 V DC system: 75–140 V DC operating · < 66 V DC rejection
- 220 V DC system: 150–280 V DC operating · < 132 V DC rejection
- Command acceptance time > 2 ms**: shorter pulses are not interpreted as commands
- Input LEDs latch — an incoming command stays on the panel until reset

Digital output stage

- 8 independent relay command outputs; all outputs isolated
- MOV overvoltage protection
- 110 V DC — 1 A / 220 V DC — 0.5 A continuous (rated voltage +20 %)
- Make/break: ≥ 0.3 A, ≥ 200 ms
- Output LEDs latch; the LED test button checks every indicator

Relay Endurance and Load Tests

TEST	CONDITION	CRITERION
Continuous carry — 110 V DC	Rated voltage +20 %, 1 A, 1 min continuous	3 repetitions, contact and coil stable
Continuous carry — 220 V DC	Rated voltage +20 %, 0.5 A, 1 min continuous	3 repetitions, contact and coil stable
Make / break	Rated voltage +20 %, ≥ 0.3 A, minimum 200 ms	No contact welding or arc damage
Repeated make / break	100 / 1,000 / 5,200 command cycles	Stable operation in every cycle, transfer-time band maintained
Command transfer time	DI detection → link → DO contact	2–10 ms, measured with < 2 ms resolution, repeatable distribution

Real field load. Tests are performed with the trip-coil current and above-rated voltage the relay will see in the substation; at acceptance the same criteria are repeated in front of the customer under the FAT/SAT procedure and delivered as the relay verification document.



05

MONITORING AND MANAGEMENT

From the Panel, the Display and the Web



Front panel: everything at a glance

Left block: 8 input / 8 output latching LEDs; centre: touch status display (Status · Events · Settings · About), navigation keys and LED TEST; right: Ethernet and USB service ports with CPU, POWER-1, POWER-2, TIME, RS232, FIBER and E1 status LEDs.

■ LEDs and display

- Power (each PSU), communication (each link), time synchronization, CPU
- Input / output LEDs latch; cleared with the reset button
- Time / date, system status and event log on the display; at least 3 control buttons

■ Time and event log

- SNTP: primary and secondary time server; synchronization-loss alarm
- ≥ 2,000 time-stamped events; retained through power loss
- FIFO: when memory is full the oldest record gives way to the newest

■ Service port and web

- Web interface via the Ethernet service port: device status, links, alarms
- Event log exported to a PC; post-fault analysis
- USB service port: on-site maintenance and software update

Alarm Outputs

ALARM	TRIGGERING CONDITION	OUTPUT
Communication alarm	Failure / loss of one of the communication links	Changeover (NO/NC) contact alarm relay
System alarm	Power-supply failure (PSU-1 / PSU-2) or time-synchronization loss	Changeover (NO/NC) contact alarm relay
Self-supervision	Internal health check; SYSTEM OK / fault indication on the display	Display + LED + event log

Commissioning in Four Steps

1 · Mounting

19" rack, rear earthing, dual
–48 V DC feed

2 · Links

Fiber / E1 / RS232
connection, pairing with the
far end

3 · I/O

Relay contacts to DI 1–8,
trip coils to DO 1–8, alarm
relays

4 · Time and acceptance

SNTP servers, command
transfer-time measurement,
FAT/SAT



06

RUGGEDNESS AND COMPLIANCE

Designed for the Substation Environment

A high-voltage substation means electrostatic discharge, switching transients, strong magnetic fields and a wide temperature range. The SMG50 is a metal-cased unit that has passed the IEC 61000 series EMC tests and the IEC 60068 environmental tests, with IEC 60255-27 dielectric strength applied.

TEST	STANDARD	LEVEL
Electrostatic discharge (ESD)	IEC 61000-4-2	8 kV contact / 15 kV air
Radiated RF immunity	IEC 61000-4-3	10 V/m
Fast transient (EFT/Burst)	IEC 61000-4-4	Level 3
Surge	IEC 61000-4-5	2 kV
Conducted RF immunity	IEC 61000-4-6	10 V
Power-frequency magnetic field	IEC 61000-4-8	30 A/m
Damped oscillatory wave	IEC 61000-4-18	2.5 kV
Emission	IEC 61000-6-4 / EN 55032	Industrial limits
Cold	IEC 60068-2-1	-20 °C / 2 h
Dry heat	IEC 60068-2-2	+60 °C / 2 h
Dielectric strength	IEC 60255-27	0.5 kV / 2 kV — 1 min

■ Specification compliance

- Full compliance with every clause of the **TEİAŞ-MYD/2024-062.0** technical specification
- Performance standard **IEC 60834-1** (teleprotection communication systems)
- Shipped with the product: compliance matrix, FAT/SAT test procedures, relay verification documents, TR/EN user manual

■ Applications

- 154 kV / 400 kV power transmission lines
- Substation protection signaling
- Power generation and transmission facilities
- Critical-infrastructure protection communication

With the Simgenet ecosystem. Simgenet GNSS Server as the SNTP time source, SDH/PDH and fiber solutions for transport, SMG-SW series switches for the substation LAN; command transfer time and link redundancy are accepted with a Simgenet SVP test platform report.



07

SPECIFICATIONS

SMG50

FEATURE	VALUE
Product type	Industrial Teleprotection Unit — protection signaling communication device
Reference specification / standard	TEİAŞ-MYD/2024-062.0 · IEC 60834-1
Form factor	19" rack, panel-compatible metal enclosure; external earthing point on the rear
Digital inputs (DI)	8 independent, isolated command inputs · 110 V DC: 75–140 V (reject < 66 V) · 220 V DC: 150–280 V (reject < 132 V) · command acceptance > 2 ms
Digital outputs (DO)	8 independent relay command outputs · MOV overvoltage protection · all inputs/outputs mutually isolated
Relay load conditions	Continuous: rated +20 %, 110 V DC 1 A / 220 V DC 0.5 A, 1 min × 3 · make/break: ≥ 0.3 A, ≥ 200 ms · repeated: 100 / 1,000 / 5,200 commands
Command transfer time	2–10 ms end to end (detection + processing + transmission + output) · measured with < 2 ms resolution · stable, repeatable distribution
Communication interfaces	RS232 serial · SM optical fiber (OPGW-compatible) · E1 ITU-T G.703 · up to 3 simultaneous links depending on model
Configurations	RS232 (1 link) · RS232 + Fiber (2) · RS232 + E1 (2) · RS232 + Fiber + E1 (3)
Front panel	Power / communication / time / input / output LEDs · latching I/O LEDs with reset button · LED test · touch display (time, status, events) · ≥ 3 control buttons
Time synchronization	SNTP, primary + secondary server · alarm on synchronization loss
Event log	≥ 2,000 time-stamped events · retained through power loss · FIFO · export to PC
Alarm outputs	Communication alarm (link failure) and system alarm (power / time sync) — separate changeover-contact relays · self-supervision
Service and management	Ethernet service port — status monitoring and event export via web interface · USB service port
Power supply	–48 V DC (–42 ... –68 V DC) · 2× independent, galvanically isolated, active/active redundant PSUs · sliding hot-swap, replaceable in operation
Operating temperature	–20 to +60 °C
EMC	IEC 61000-4-2 (8/15 kV) · -4-3 (10 V/m) · -4-4 (Level 3) · -4-5 (2 kV) · -4-6 (10 V) · -4-8 (30 A/m) · -4-18 (2.5 kV) · emission IEC 61000-6-4 / EN 55032
Environmental / safety	IEC 60068-2-1 (–20 °C, 2 h) · IEC 60068-2-2 (+60 °C, 2 h) · IEC 60255-27 dielectric 0.5 / 2 kV, 1 min
Delivery documents	Compliance matrix · FAT/SAT test procedures · relay verification documents · user manual (TR/EN)
Applications	154 kV / 400 kV transmission lines · substation protection signaling · generation and transmission facilities · critical infrastructure



Why Simgenet Teleprotection Unit SMG50

Full specification compliance

The clauses of TEİAŞ-MYD/2024-062.0 are design inputs; IEC 60834-1 performance is documented with the compliance matrix and FAT/SAT.

Under 10 ms, every time

2–10 ms end-to-end transfer; 2 ms interference rejection; relay load and 5,200-cycle tests.

Uninterrupted

Redundant communication over up to 3 links, active/active dual PSU, hot-swap; every fault on its own alarm relay.

Entirely ours

Hardware, embedded software and interface at Simgenet; GNSS time, transport infrastructure and SVP acceptance from one source.

GET IN TOUCH

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Product Brochure · SMG-UB-TPU-EN · Rev. 2 · © 2026

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