

SIL-G

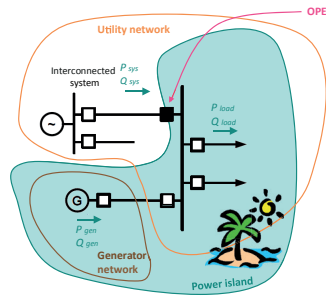
Feeder & Generator Protection Relay



Main characteristics



- The SIL-G is a relay for primary distribution which can protect a feeder by means of current and voltage functions. It is also provided with the main functions to protect a generator protecting decoupling, load shedding and loss of main (islanding). It is normally used with a circuit breaker as cutting element.
- SIL-G can work with auxiliary power supply 24-220 Vdc/48-230 Vac, 48-230 Vdc/ac, 24-48 Vdc or in self-powered mode through the VTs (depending on model).
- Capability of measuring up to 1.000 volts when it is connected directly to the low voltage line.
- Protects decoupling, load shedding and loss of main (islanding). Loss of Mains (islanding) occurs when part of the public utility network loses connection with the rest of the system. If this situation is not detected, then the generator could remain connected, causing a safety hazard within the network. Automatic reconnection of the generator to the network may occur causing damage to the generator and the network. SIL-G protection relay detects this situation thanks to its voltage and frequency functions focused on the Rate of change of frequency (ROCOF) method.
- Arc Flash detection (AFD) with 4 AFD inputs and 4 high-speed outputs available depending on model.
- 79 protection function (Recloser) allows up to 4 attempts of reclosing which can be programmed by the user.
- SIL-G has metallic box with high electromagnetic compatibility level (EMC) and wide range of operating temperature.
- Direct signaling/control of the circuit breaker (52 function), of the recloser (79 function) and the communications local/remote control.
- To allow the communication locally, relays have a front USB port. Depending on model, WiFi local communication is available.
- For remote communications several rear ports are available with the following protocols (depending on model):
 - Serial rear port RS485: Modbus RTU, DNP3.0 Serial or IEC 60870-5-103
 - Ethernet rear port RJ45: Modbus TCP/IP, DNP3.0 TCP/IP or IEC 61850
 - Fiber Optic: redundant communication (HSR – IEC 61850)
- Alarms panel is available.
- SIL-G can show different measurements like:
 - Phase currents, neutral (measured and calculated), maximum current, positive sequence current and negative sequence current.
 - Second harmonic current per phase
 - Phase to neutral, phase to phase voltages, neutral voltage (calculated and measured), maximum voltage, phase B line voltage (optional for the model with ANSI 25), positive sequence voltage and negative sequence voltage.
 - Current angle for each phase and neutral (referred to VA). Voltage angle per each phase and neutral (referred to V-A). Phase B Line voltage angle (optional for the model with ANSI 25).



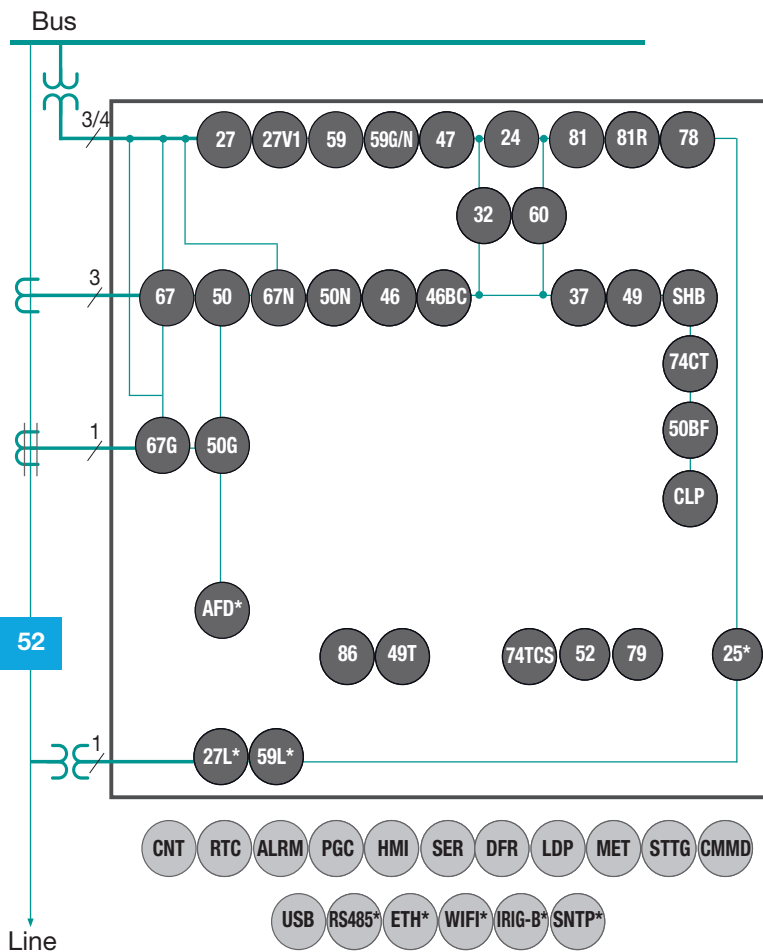
PROTECTIONS

50	Phase instantaneous overcurrent
50N	Neutral instantaneous overcurrent
50G	Ground instantaneous overcurrent
67	Inverse time directional phase overcurrent
67N	Inverse time directional neutral overcurrent
67G	Inverse time directional ground overcurrent
46	Phase balance current
46BC	Broken conductor detection
49	Thermal image
37	Phase instantaneous overcurrent
59	Instantaneous phase overvoltage
59N/G	Instantaneous neutral overvoltage (measured/calculated)
59L	Instantaneous line phase L overvoltage
27	Instantaneous phase undervoltage
27L	Instantaneous line phase L undervoltage
27V1	Positive sequence undervoltage
47	Phase balance voltage
32	Directional Power
81U/O	Under/Over frequency
81R	Rate of change of frequency (ROCOF)
78	Vector shift (Out of step)
CLP	Cold Load Pick-up
SHB	Second harmonic blocking
50BF	Breaker failure monitoring
79	Recloser
52	Breaker wear monitoring
86	Trip output lockout with PLC
49T	External trip
74CT	CT Supervision
60	Voltage Circuit supervision
74TCS	Trip circuit supervision
25	Synchro check
24	Overflux
AFD	Arc Flash detection

- Active, reactive and apparent powers (3- phase and per phase)
- Thermal image
- Line frequency and busbar frequency
- Rate of change of frequency
- The SIL-G is provided with (depending on model):
 - 8 configurable inputs and 7 configurable outputs.
 - 16 configurable inputs and 11 configurable outputs.
 - 8 configurable inputs, 7 configurable outputs, 4 AFD inputs and 4 High-Speed outputs.
- Up to 100 oscillographic records and fault reports (1500 cycles in total considering the number of cycles configurable to 15, 30 or 60 cycles), load data profiling with up to 2160 records and 2048 events can be recorded in non-volatile RAM memory maintaining the date and time thanks to its internal RTC (Real Time Clock).
- Synchronization through IRIG-B and SNTP optional depending on model.

Technical specifications SIL-G

Functions diagram SIL-G



CNT	Counters
RTC	Real time Clock
ALRM	Alarm panel
PGC	Programable Logic Control
HMI	Human machine Interface
SER	Sequential Event recording
DFR	Disturbance Fault Recorder
LDP	Load Data Profiling
MET	Metering
CMMD	Setting Groups
USB	USB local port
RS485*	RS485 serial port
ETH*	Ethernet communication
WIFI*	WIFI Communication
IRIG-B*	IRIG-B synchronization
SNTP*	Synchronization through SNTP

* optional

Technical specifications

Technical parameters SIL-G

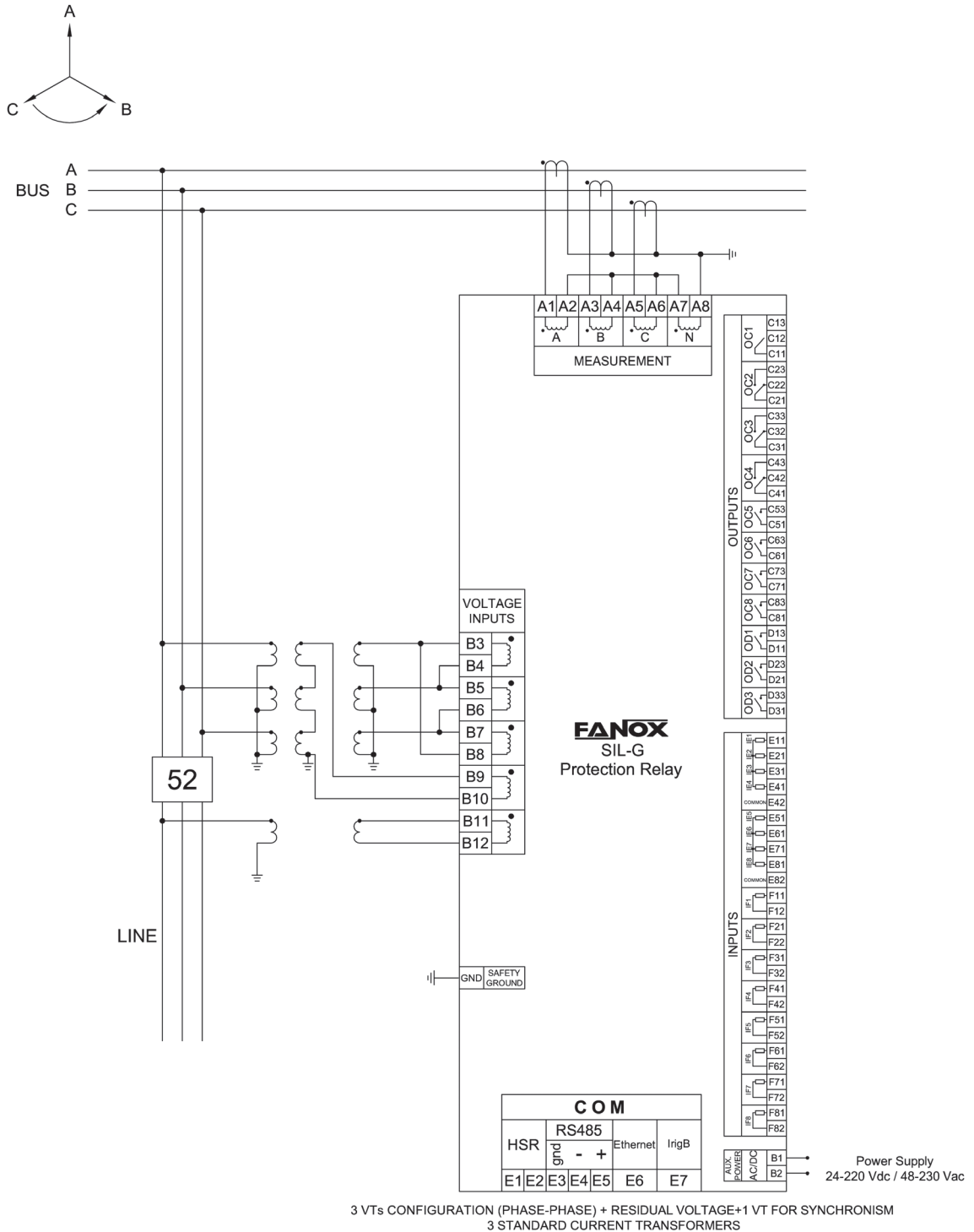
Configuration depending on the number and type of voltage transformers: phase-ground, phase-phase ...	√	27V1 Positive sequence undervoltage	1
Connection without VTs (directly to low power line)	√ (Measurement up to 1000 volts)	SER Sequential events recording	2048 events
50 Phase instantaneous overcurrent	2	DFR Disturbance fault recorder	Up to 100 records (data and oscillography)
50N Neutral instantaneous overcurrent	2	32 Directional Power	4
50G Ground instantaneous overcurrent	2	81U/O Under/Over frequency	4
67 Inverse time directional phase overcurrent	4	81R Rate of change of frequency (ROCOF)	4
67N Inverse time directional neutral overcurrent	2	78 Vector shift (Out of step)	1
67G Inverse time directional ground overcurrent	2	CLP Cold Load Pick-up	1
46 Negative sequence over current / Phase balance current	1	SHB Second harmonic blocking	1
46BC Broken conductor detection	1	50BF Breaker failure monitoring	1
49 Thermal image	1	79 Recloser	Up to 4 attempts
37 Phase instantaneous undercurrent	1	52 Breaker wear monitoring	1
59 Phase instantaneous overvoltage	2	86 Trip output lockout with PLC	√
59N/G Neutral instantaneous overvoltage (measured/ calculated)	2	49T External trip	√
59L Instantaneous line overvoltage	Optional	74CT CT Circuit Supervision	1
27 Phase instantaneous undervoltage	2	60 Voltage Circuit supervision	1
27L Instantaneous line undervoltage	Optional	74TCS Trip circuit supervision	1

47 Negative sequence over voltage / Phase balance voltage	1
24 Overflux	2
25 Synchronism	Optional
Counters	√
Commands	√
Settings groups	4
Inputs	Depending on model: 8 configurable inputs 16 configurable inputs 8 configurable inputs + 4 AFD Inputs
Load Data profiling	2160 records
Alarms Panel	32 alarms
Local communication	Front micro-USB WIFI (optional)

Remote communications	Depending on model: IRIG-B and SNTP synchronization Rear Ports: Ethernet (RJ45) Serial (RS485), Fiber optic Protocols: Modbus RTU DNP3.0 Serial IEC 60870-5-103 Modbus TCP/IP DNP3.0 TCP/IP IEC 61850 Redundant protocol: HSR- IEC 61850
Outputs	Depending on model: 7 configurable outputs 11 configurable outputs 7 configurable outputs + 4 High-Speed Outputs
Signaling	11 LEDs: 8 configurable LEDs + 3 non-configurable LEDs (52 status, 79 status and communication status)
HMI	LCD 20x4 + 13 keys
Auxiliary supply	Depending on model: 24-220 Vdc/48-230 Vac Self-powered through the VTs

Technical specifications
Connections diagram SIL-G

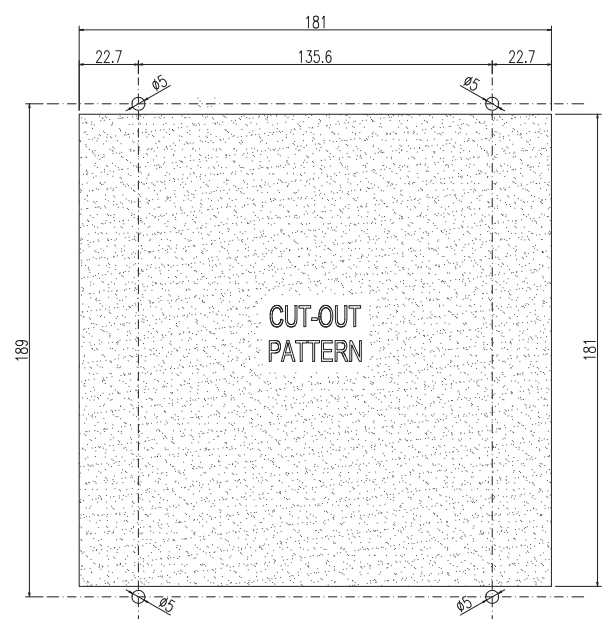
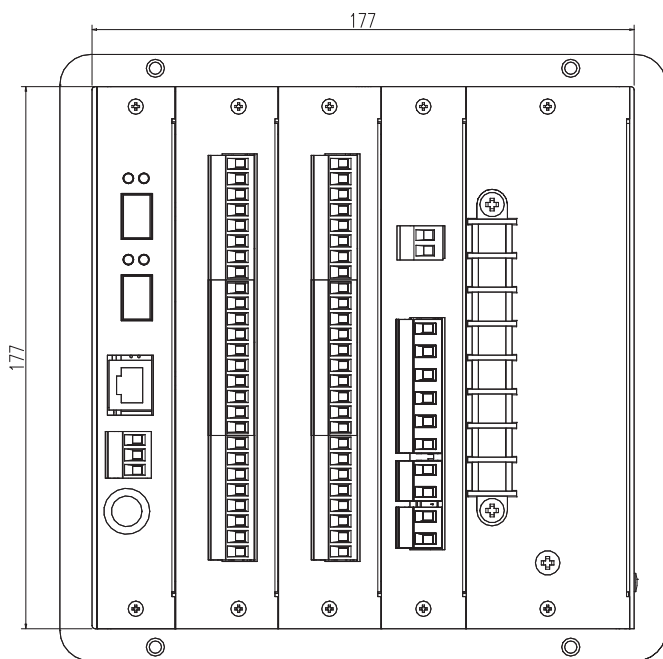
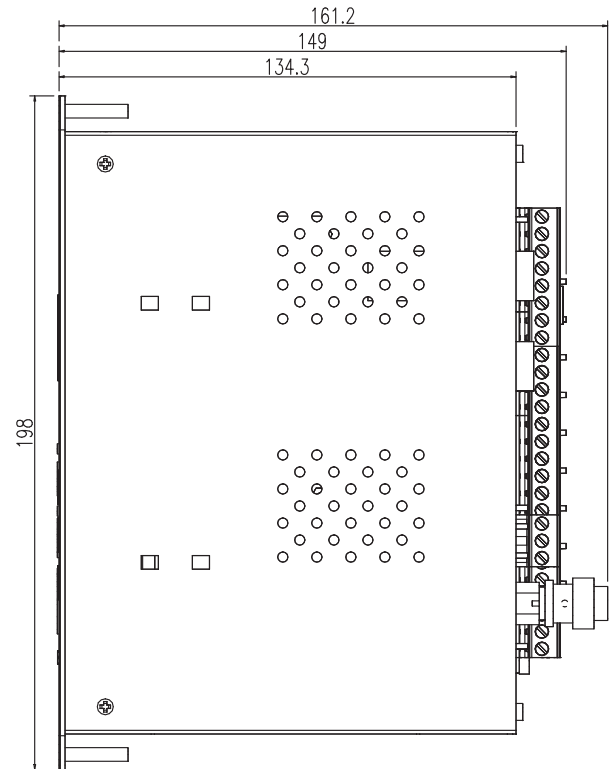
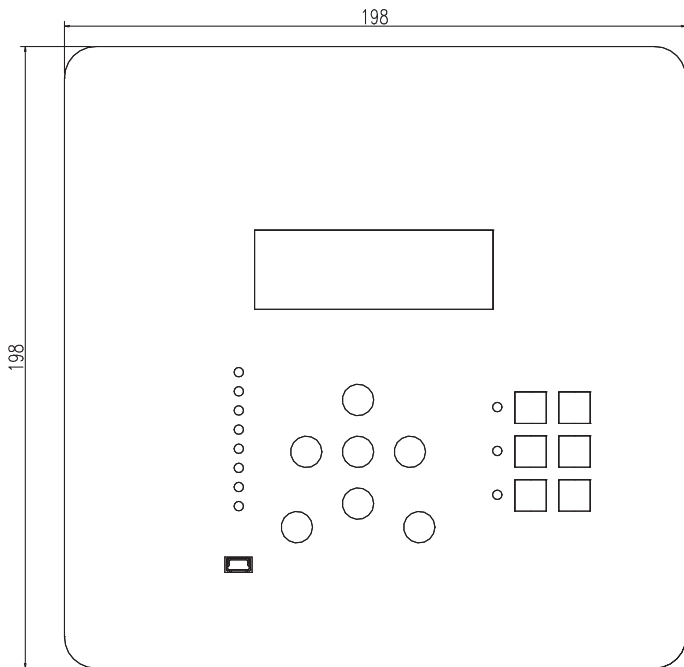
- 3 VT Phase-neutral + Vr
- 1 VT for synchronism
- 3 CTs



(*) Example of connections diagram

Technical specifications

Dimensions and cutout pattern SIL-G



Selection & Ordering data SIL-G

SIL-G Feeder & Generator Protection Relay											PROTECTION FUNCTIONS
0											50 (2) + 67/51/50 (4) + 50N (1) + 50G (1) + 67N (2) + 67G (2) + 46 + 46BC + 49 + 37 + 59 (2) + 59N/G (2) + 47 + 27(2) + 27V1 + 32 (4) + 81O/U (4) + 81R (4) + 78 + CLP + SHB + 50BF + 79 + 52 + 86 + 49T + 74CT + 60 + 74TCS + 24 (2)
0											PHASE CURRENT MEASUREMENT Adjustable In to 1 A or 5 A
0											NEUTRAL CURRENT MEASUREMENT Adjustable In to 1 A or 5 A
0											VOLTAGE MEASUREMENT Up to 1000 V or 250 V (with VTs)
A B C D											POWER SUPPLY 24-48 Vdc 48-230 Vdc/ac 24-220 Vdc / 48-230 Vac Self-powered through Voltage Transformers
0 1											ADDITIONAL FUNCTIONS - +25 + 27L + 59L
A B C D E F O P Q R S T											COMMUNICATIONS A: RS485: Modbus RTU, IEC60870-5-103 or DNP 3.0 Serial B: RS485: Modbus RTU or IEC60870-5-103 + Ethernet - RJ45: Modbus TCP and DNP 3.0 TCP + IRIG-B C: Ethernet - RJ45: IEC 61850 D: Ethernet - RJ45: IEC 61850 + Ethernet - RJ45: Modbus TCP and DNP 3.0 TCP + IRIG-B E: HSR – FO – LC: IEC 61850 F: HSR – FO – LC: IEC 61850 + + Ethernet - RJ45: Modbus TCP and DNP 3.0 TCP + IRIG-B O: WiFi + RS485: Modbus RTU, IEC60870-5-103 or DNP 3.0 Serial P: WiFi + RS485: Modbus RTU or IEC60870-5-103 + Ethernet - RJ45: Modbus TCP and DNP 3.0 TCP + IRIG-B Q: WiFi + Ethernet - RJ45: IEC 61850 R: WiFi + Ethernet - RJ45: IEC 61850 + Ethernet - RJ45: Modbus TCP and DNP 3.0 TCP + IRIG-B S: WiFi + HSR – FO – LC: IEC 61850 T: WiFi + HSR – FO – LC: IEC 61850 + + Ethernet - RJ45: Modbus TCP and DNP 3.0 TCP + IRIG-B
0 7 A											INPUTS-OUTPUTS 8 Inputs + 7 Outputs 16 Inputs + 11 Outputs 8 Inputs + 7 Outputs + 4 AFD Inputs + 4 High-Speed Outputs
4											MECHANICS Vertical Assembly
A B											LANGUAGES English, Spanish, French and German English, Spanish, Turkish and Russian
B											ADAPTATION Second generation

Example of ordering code:

SIL G	0	0	0	A	0	A	0	4	A	B	S I L G 000A04AB
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