

# SIL-G

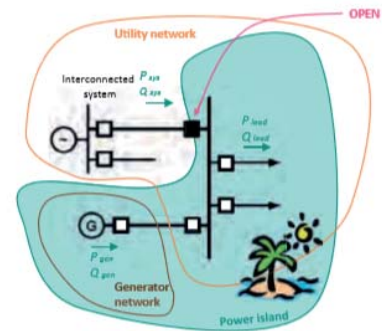
## Feeder and Generator Protection Relay



### 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 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.

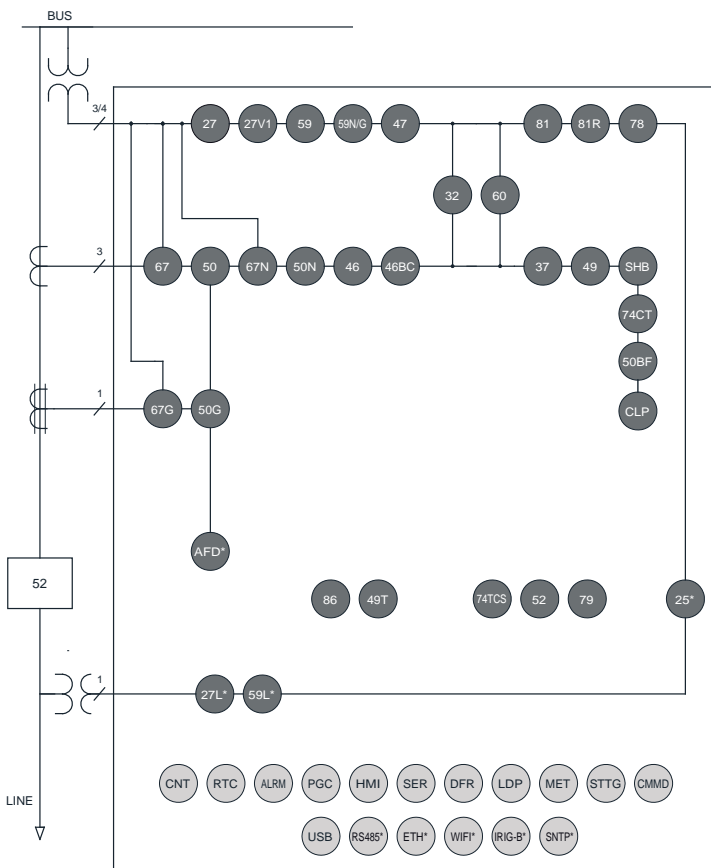


- Protection functions: 50 (2), 67/51/50 (4), 50N (1), 50G (1), 67N (2), 67G (2), 46, 46BC, 49, 37, 59 (2), 59N/G (2), 59L, 47, 27(2), 27V1, 27L, 32 (4), 81O/U (4), 81R (4), 78, CLP, SHB, 50BF, 79, 52, 86, 49T, 74CT, 60, 74TCS. Optionally 25, 27L and 59L.
- Arc Flash detection (AFD) with 4 AFD inputs 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).
  - 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.
- 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	Programmable Logic Control
HMI	Human machine Interface
SER	Sequential Event recording
DFR	Disturbance Fault Recorder
LDP	Load Data Profiling
MET	Metering
STTG	Settings Groups
CMMD	Commands
USB	USB local port
RS485	RS485 serial port
ETH	Ethernet communication
WIFI	WIFI Communication
IRIG-B	IRIG-B synchronization
SNTP	Synchronization through SNTP

\* Optional

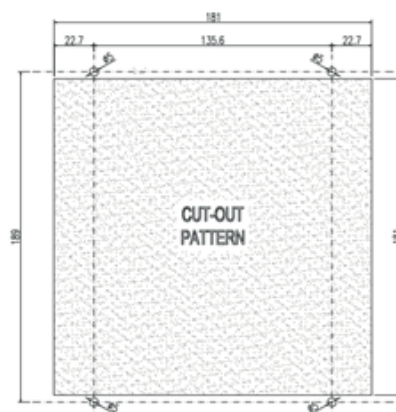
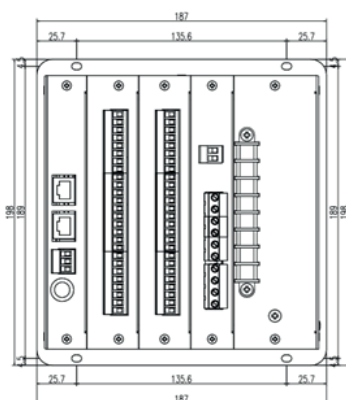
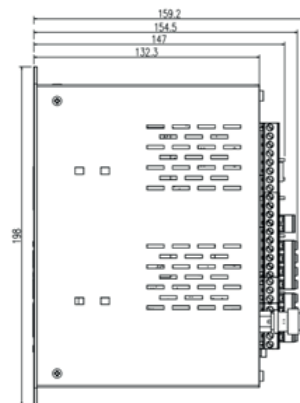
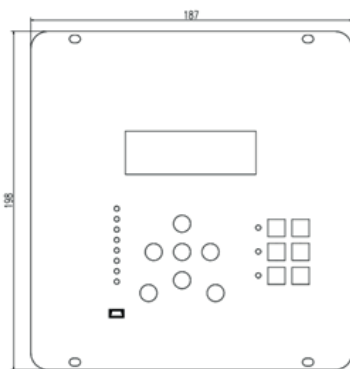
## Technical specifications

### Technical parameters SIL-G

Configuration depending on the number and type of voltage transformers: phase-ground, phase-phase ...	√	32 Directional Power	4
Connection without VTs (directly to low power line)	√ (Measurement up to 1000 volts)	81U/O Under/Over frequency	4
50 Phase instantaneous overcurrent	2	81R Rate of change of frequency (ROCOF)	4
50N Neutral instantaneous overcurrent	2	78 Vector shift (Out of step)	1
50G Ground instantaneous overcurrent	2	CLP Cold Load Pick-up	1
67 Inverse time directional phase overcurrent	4	SHB Second harmonic blocking	1
67N Inverse time directional neutral overcurrent	2	50BF Breaker failure monitoring	1
67G Inverse time directional ground overcurrent	2	79 Recloser	Up to 4 attempts
46 Negative sequence over current / Phase balance current	1	52 Breaker wear monitoring	1
46BC Broken conductor detection	1	86 Trip output lockout with PLC	√
49 Thermal image	1	49T External trip	√
37 Phase instantaneous undercurrent	1	74CT CT Circuit Supervision	1
59 Phase instantaneous overvoltage	2	60 Voltage Circuit supervision	1
59N/G Neutral instantaneous overvoltage (measured/calculated)	2	74TCS Trip circuit supervision	1
59L Instantaneous line phase B overvoltage	Optional	47 Negative sequence over voltage / Phase balance voltage	1
27 Phase instantaneous undervoltage	2	25 Synchronism	Optional
27L Instantaneous line phase B undervoltage	Optional	Counters	√
27V1 Positive sequence undervoltage	1	Commands	√
SER Sequential events recording	2048 events	Settings groups	4
DFR Disturbance fault recorder	Up to 100 records (data and oscillography)	Inputs	Depending on model: 8 configurable inputs 16 configurable inputs 8 configurable inputs + 4 AFD Inputs

<b>Load Data profiling</b>	2160 records	<b>Outputs</b>	Depending on model: 7 configurable inputs 11 configurable inputs 7 configurable inputs + 4 High-Speed Outputs
<b>Alarms Panel</b>	32 alarms	<b>Signaling</b>	11 LEDs: 8 configurable LEDs + 3 non-configurable LEDs (52 status, 79 status and communication status)
<b>Local communication</b>	Front micro-USB WIFI (optional)	<b>HMI</b>	LCD 20x4 + 13 keys
<b>Remote communications</b>	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	<b>Auxiliary supply</b>	Depending on model:  24-220 Vdc/48-230 Vac Self-powered through the VTs

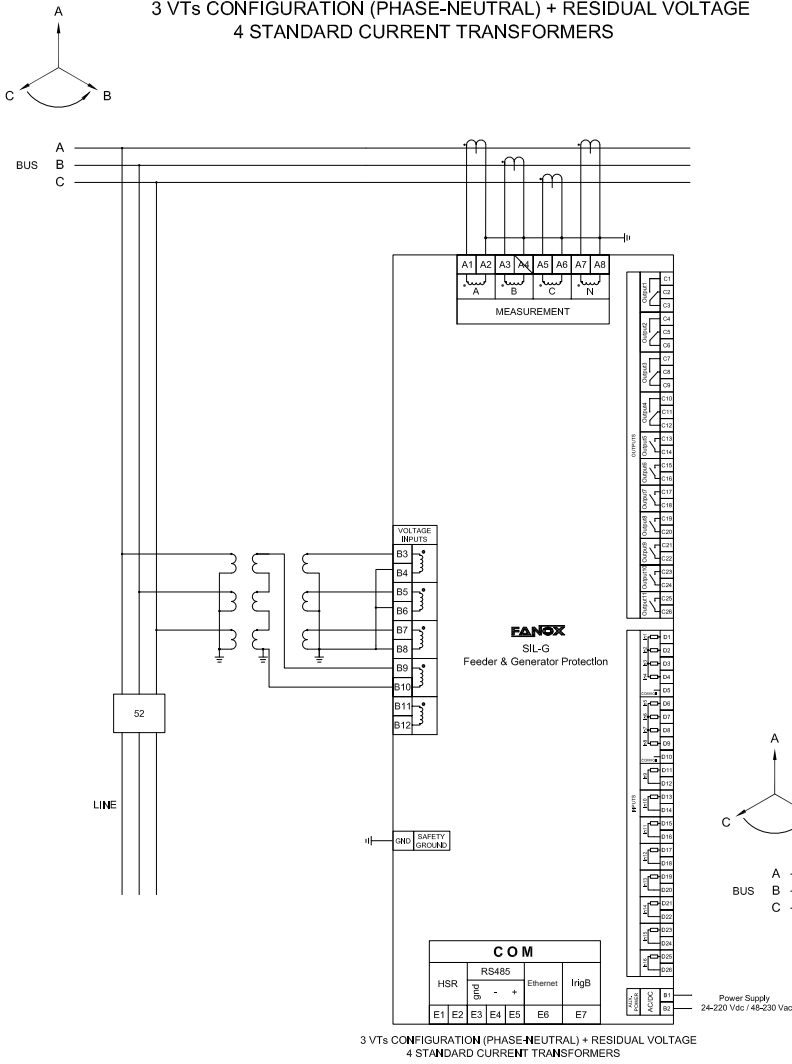
### Dimensions and cutout pattern SIL-G



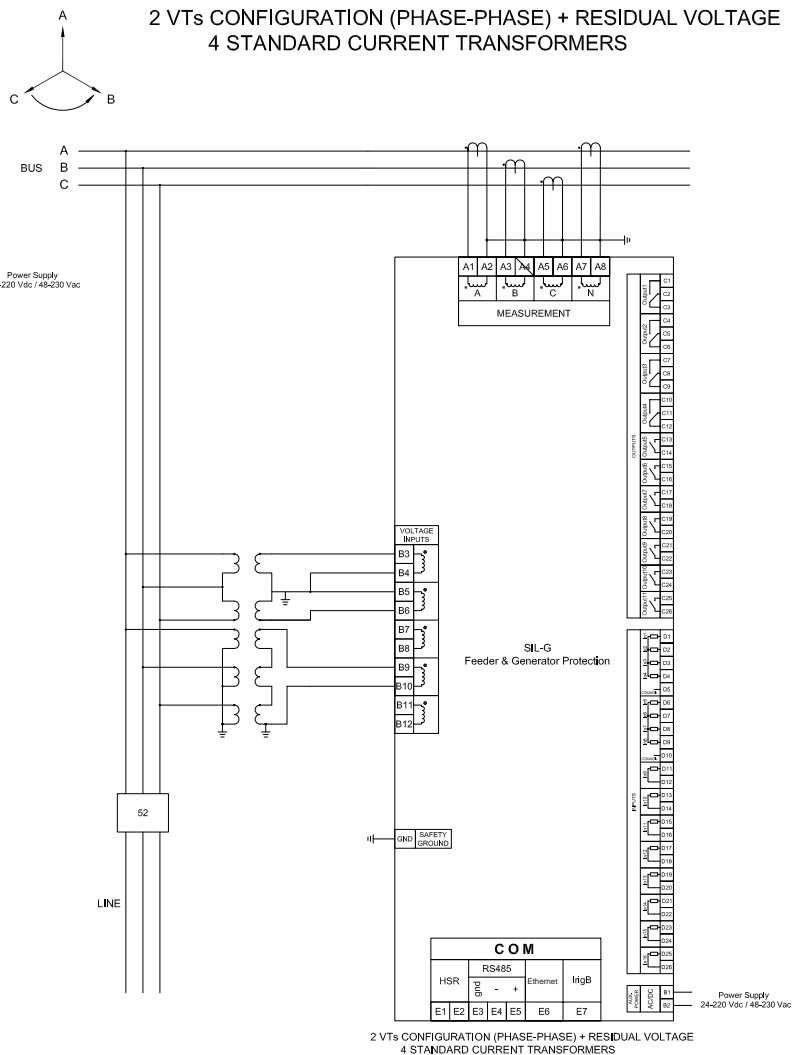
# Technical specifications

## Connections diagram SIL-G

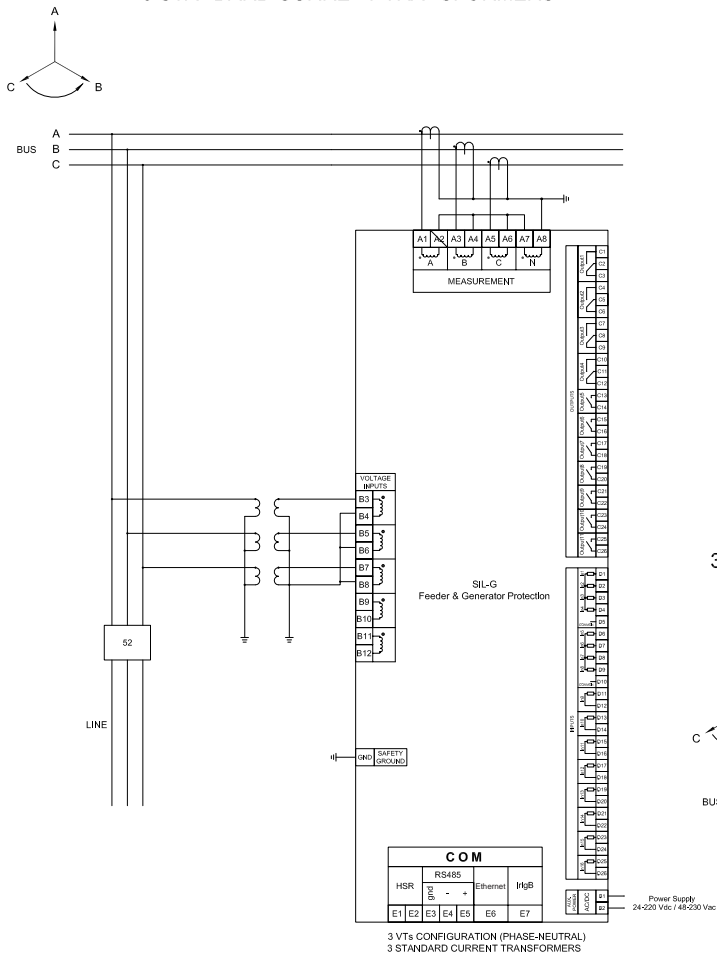
3 VTs CONFIGURATION (PHASE-NEUTRAL) + RESIDUAL VOLTAGE  
4 STANDARD CURRENT TRANSFORMERS



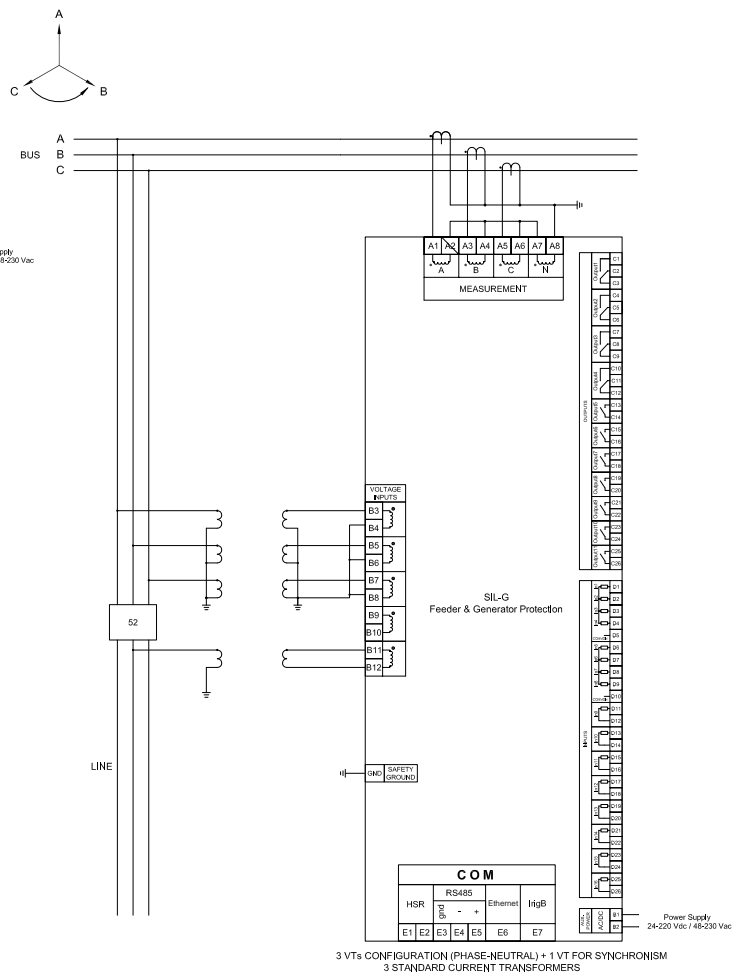
2 VTs CONFIGURATION (PHASE-PHASE) + RESIDUAL VOLTAGE  
4 STANDARD CURRENT TRANSFORMERS



### 3 VTs CONFIGURATION (PHASE-NEUTRAL) 3 STANDARD CURRENT TRANSFORMERS



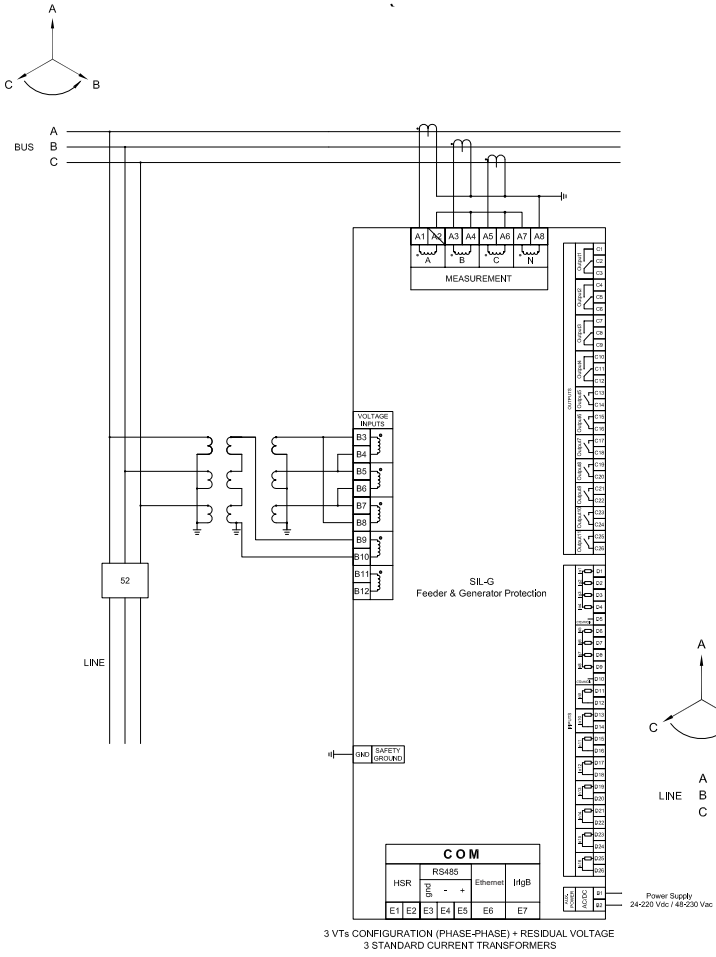
### 3 VTs CONFIGURATION (PHASE-NEUTRAL) + 1 VT FOR SYNCHRONISM 3 STANDARD CURRENT TRANSFORMERS



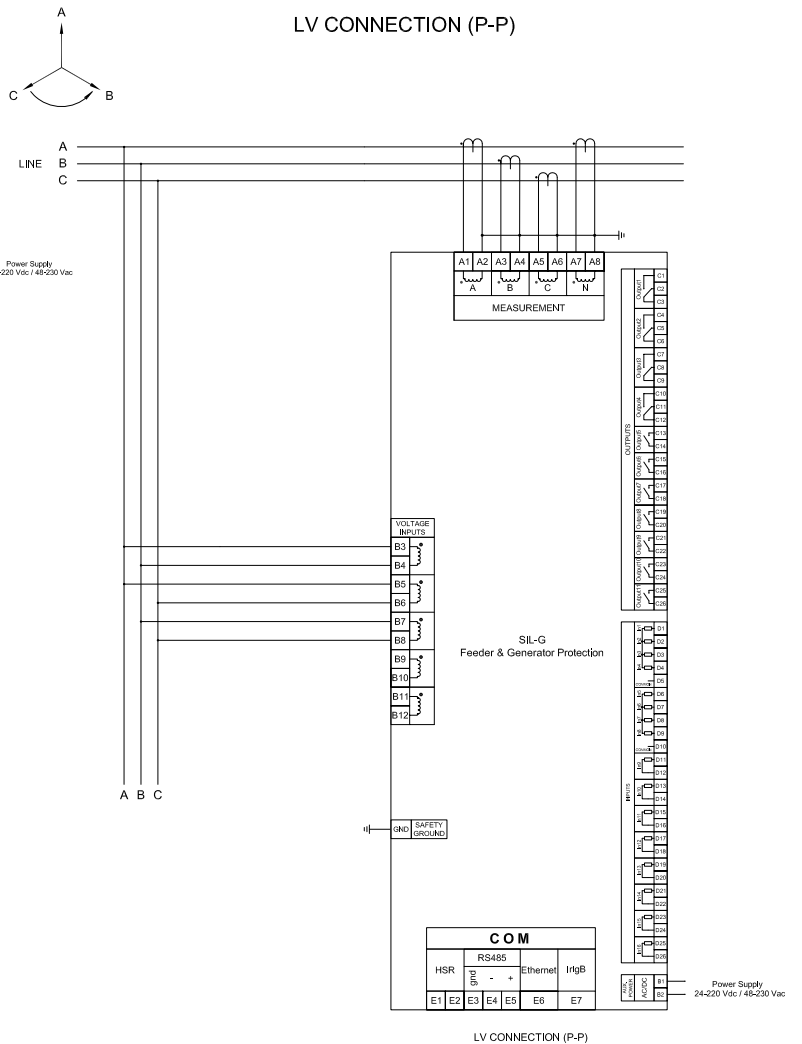
# Technical specifications

## Connections diagram SIL-G

3 VTs CONFIGURATION (PHASE-PHASE) + RESIDUAL VOLTAGE  
3 STANDARD CURRENT TRANSFORMERS



LV CONNECTION (P-P)



\* Other connetions available

## Selection & Ordering data SIL-G

SILG											<b>PROTECTION FUNCTIONS</b>	
												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
	0											<b>PHASE CURRENT MEASUREMENT</b> Standard: Up to 30xIn, Adjustable In to 1 A or 5 A
		0 1										<b>NEUTRAL CURRENT MEASUREMENT</b> Standard: Up to 30xIn, Adjustable In to 1 A or 5 A Sensitive: Up to 30xIn, Adjustable In to 0.1 A or 0.5 A
			0									<b>VOLTAGE MEASUREMENT</b> Standard: Up to 300 V or 1000 V depending on auxiliary voltage
				C D								<b>POWER SUPPLY</b> 24-220 Vdc / 48-230 Vac Self-powered through Voltage Transformers
					0 1							<b>ADDITIONAL FUNCTIONS</b> - +25 + 27L + 59L
						A B C D E F O P Q R S T						<b>COMMUNICATIONS</b> 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					<b>INPUTS AND OUTPUTS</b> 8 Inputs + 7 Outputs 16 Inputs + 11 Outputs 8 Inputs + 7 Outputs + 4 AFD Inputs + 4 High-Speed Outputs
								4				<b>MECHANICS</b> Vertical Assembly
									A B D E			<b>LANGUAGES</b> English, Spanish and German English, Spanish and Turkish English, Spanish and Russian English, Turkish and Russian
										A		<b>ADAPTATION</b> Second generation