SIL-G

Line, Feeder & Generator Protection Relay

ANSI CODE PROTECTIONS	
50	Instantaneous phase overcurrent
67/51	Inverse Time Directional* Phase Overcurrent
50N	Instantaneous calculated neutral overcurrent
50G	Instantaneous measured neutral overcurrent
67N/51N	Inverse Time Directional* Calculated Neutral Overcurrent
67G/51G	Inverse Time Directional* Measured Neutral Overcurrent
SOTF	Switch On To Fault
46	Phase balance current protection
46BC	Broken Conductor Detection
37	Instantaneous phase undercurrent
49	Thermal overload
SHB	Second Harmonic Blocking
59	Instantaneous phase overvoltage
59N/G	Instantaneous Calculated/ Measured neutral overvoltage
59L	Instantaneous Line overvoltage
47	Phase Balance voltage protection
27	Instantaneous Phase undervoltage
27L	Instantaneous Line undervoltage
27V1	Instantaneous Positive sequence undervoltage
32	Directional Overpower
81O/U	Under/Overfrequency
81R	Rate of change of Frequency (ROCOF)
78	Out of Step (Vector Shift)
24	Overfluxing
CLP	Cold Load pickup
79	AC Reclosing device
52	Breaker Wear Monitoring
25	Synchro Check
50BF	Circuit Breaker Failure
74TCS	Trip Circuit Supervision
60CTS	Phase CT Supervision
60VTS	Phase VT Supervision
AFD	Arc Flash detection
86	Trip Lockout
68	Zone selection interlocking
PGC	Programmable logic control

* ANSI 67, ANSI 67G and ANSI 67N can be converted into ANSI 51, ANSI 51G and ANSI 51N respectively by setting the “Directionality” parameter to NO.

WIFI

IEC

ARC FLASH

IEC 61850

Feeder & Generator Protection Relay

Protection for Primary and Secondary Distribution

• The SIL-G is a feeder relay with current, voltage and frequency functions for primary and secondary distribution with auxiliary power supply of 24-230 Vdc/ac, 48-230 Vdc/ac or 24-48 Vdc(depending on model).

• Capability of measuring up to 1.000 volts when it is connected directly to the low voltage line.

• Metallic box with high electromagnetic compatibility level (EMC) and wide range of operating temperature.

• Protection of decoupling, load shedding and loss of main (islanding). Loss of Main (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.

• Signalling/control of the circuit breaker (52 function) and the recloser (79 function).

• Arc Flash detection (AFD) with 4 AFD inputs and 4 high-speed outputs available depending on model. This functionality, along with the possibility of having WIFI communication, allows the users to set and configure the relay through Fanox free software and to operate the relay without being present in the installation prioritizing the security.

• Zone selection interlocking - ZSI (68 function) is available through configurable inputs and outputs thanks to the programmable logic (PGC).

• In case a CB is manually closed, a switch on to an existing fault may occur. This fault condition is critical if the overcurrent protection function does not clear the fault until the adjusted time delay is finished. It is necessary, in those cases, to clear the fault quickly by means of SOTF function.

• To allow the communication, relays are provided with a local micro USB front port and with remote communication with different options (ports and protocols) on the rear side:

- Rear RS485 Port: IEC60870-5-103, Modbus RTU or DNP3.0 Serial.
- Rear RJ45 Port: Modbus TCP/IP, DNP3.0 TCP/IP or IEC61850 + Web Server.
- Rear FO-LC: IEC61850 and Redundancy (PRP or HSR).

• Synchronization through IRIG-B optional depending on model.

• The SIL-G is provided with (depending on model):

- 8 configurable inputs and 7 configurable outputs.
- 24 configurable inputs and 7 configurable outputs.
- 8 configurable inputs and 18 configurable outputs.
- 16 configurable inputs and 11 configurable outputs.
- 8 configurable inputs, 7 configurable outputs, 4 AFD inputs and 4 High-Speed outputs.

• SIL-G is fitted with the demand of power (Load Data Profiling) with the following characteristics:

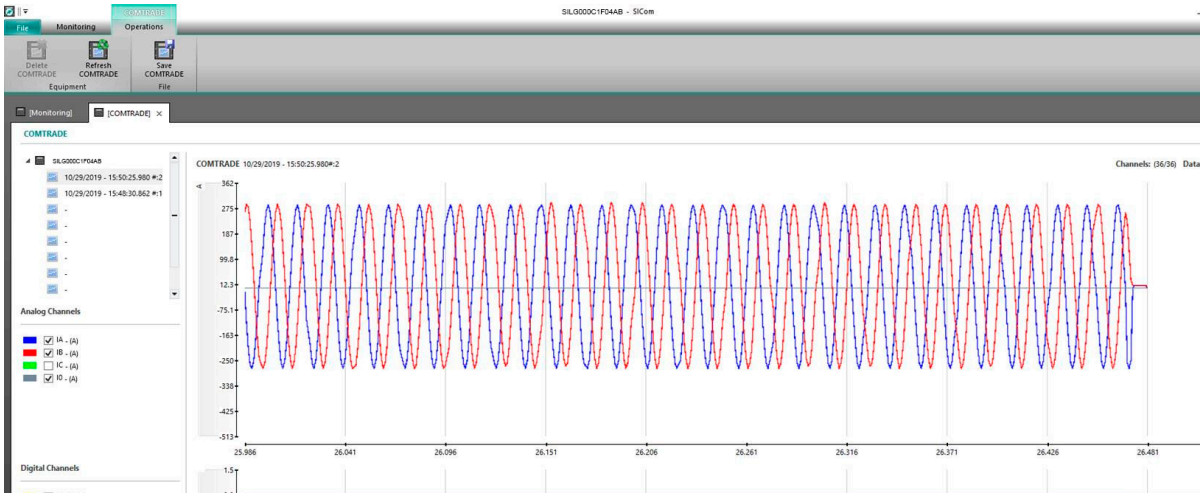
- Number of records: 2160.
- Recording mode circular.
- Sampling rate (interval): configurable through communications (1-60 min).

• Alarms panel is available.

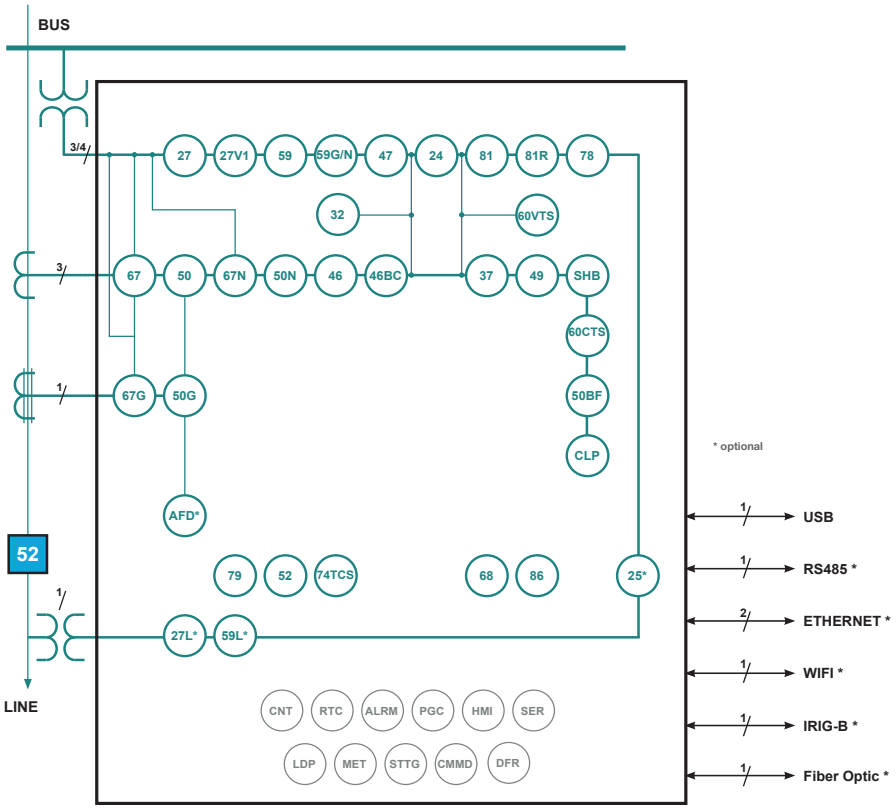
• SIL-G is provided with non-volatile RAM memory in order to store up to 3072 events and disturbance fault recording (DFR), maintaining date & time thanks to its internal RTC (real Time Clock).

- 5 records in data and COMTRADE format (260 cycles each record): 1 to 8 pre-fault cycles + 252 to 259 postfault cycles.
- 25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles.
- 50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles.
- 100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.)

•The oscillography is downloaded by communications port. The SICom communications program allows the oscillography record to be downloaded and saved in COMTRADE format (IEEE C37.111-1991).



Functions diagram SIL-G



ADDITIONAL FUNCTIONS	
CNT	Counters
RTC	Real Time Clock
ALRM	Alarm panel
PGC	Programmable Logic Control
HMI	Human Machine Interface
SER	Sequential Event Recording
DFR	Disturbance Fault Recording
LDP	Load Data Profiling
MET	Metering
STTG	Settings Groups
CMMD	Commands

ANSI CODE PROTECTIONS	
50	Instantaneous phase overcurrent
67/51	Inverse Time Directional* Phase Overcurrent
50N	Instantaneous calculated neutral overcurrent
50G	Instantaneous measured neutral overcurrent
67N/51N	Inverse Time Directional* Calculated Neutral Overcurrent
67G/51G	Inverse Time Directional* Measured Neutral Overcurrent
SOTF	Switch On To Fault
46	Phase balance current protection
46BC	Broken Conductor Detection
37	Instantaneous phase undercurrent
49	Thermal overload
SHB	Second Harmonic Blocking
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32	Directional Overpower
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60VTS	Phase VT Supervision
AFD	Arc Flash detection
86	Trip Lockout
68	Zone selection interlocking
PGC	Programmable logic control

* ANSI 67, ANSI 67G and ANSI 67N can be converted into ANSI 51, ANSI 51G and ANSI 51N respectively by setting the “Directionality” parameter to NO.

Technical parameters SIL-G

Function 50-1 **Function 50-2**	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: ±0.5% or ±35 ms (greater of both)
Function 50N-1	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.050 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: ±0.5% or ±35 ms (greater of both)
Function 50G-1	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: ±0.5% or ±35 ms (greater of both)
Function 67/51-1 **Function 67/51-2** **Function 67/51-3** **Function 67/51-4**	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 and IEEE curves. IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.05 to 25.00 (step 0.01) If Curve type IEC: 0.05 to 1.00 (step 0.01) If Curve type IEEE: 0.10 to 25.00 (step 0.01)
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Directionality: No/Forward/Reverse
	Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)
	Operating angle: 0 to 359º (step 1º)
	Halfcone angle: 10 to 170º (step 1º)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	Voltage activation level: 100%
	Voltage deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy for IEC and IEEE curves selection: ± 30 ms or ± 5% (greater of both) Timing accuracy for defined time curve selection: ± 35 ms or ± 0.5% (greater of both)

Function 67N/51N-1 **Function 67N/51N-2**	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 and IEEE curves. IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.05 to 25.00 (step 0.01) If Curve type IEC: 0.05 to 1.00 (step 0.01) If Curve type IEEE: 0.10 to 25.00 (step 0.01)
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Directionality: No/Forward/Reverse
	Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)
	Operating angle: 0 to 359º (step 1º)
	Halfcone angle: 10 to 170º (step 1º)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	Voltage activation level: 100%
	Voltage deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy for IEC and IEEE curves selection: ± 30 ms or ± 5% (greater of both) Timing accuracy for defined time curve selection: ± 35 ms or ± 0.5% (greater of both)

Technical parameters SIL-G

Function 67G/51G-1 **Function 67G/51G-2**	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 and IEEE curves. IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse). Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.05 to 25.00 (step 0.01) If Curve type IEC: 0.05 to 1.00 (step 0.01) If Curve type IEEE: 0.10 to 25.00 (step 0.01)
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Directionality: No/Forward/Reverse
	Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)
	Operating angle: 0 to 359º (step 1º)
	Halfcone angle: 10 to 170º (step 1º)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	Voltage activation level: 100%
	Voltage deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy for IEC and IEEE curves selection: ± 30 ms or ± 5% (greater of both) Timing accuracy for defined time curve selection: ± 35 ms or ± 0.5% (greater of both)
Function SOTF	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 295.000 s (step 0.001 s)
	Safe Time: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: ±0.5% or ±35 ms (greater of both)
Function 49	Function enable: No/Alarm/Trip
	Current tap: 0.100 to 2.400 In (step 0.001xIn)
	ζ heating: 3 to 600 min (step 1 min)
	ζ cooling: 1 to 6 xζ heating (step 1)
	Alarm: 20 to 99% (step 1%)
	Trip level: 100%
	Deactivation level: 95% of alarm level
	Timing accuracy: ± 5% respect of theorical value.
Function SHB	Function enable: No/Yes
	Current Tap: 5- 50% (step 1%)
	Reset Time: 0.000 to 300.000 (step 0.001 s)
	Block Threshold: 0.010 to 30.000xIn (step 0.001xIn)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation

Function CLP	Function enable: Yes/No
	Settings group: 1 to 4 (step 1)
	No load time: 0.020 to 300.000 s (step 0.001 s)
	Cold load time: 0.020 to 300.000 s (step 0.001 s)
Function 46	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 and IEEE curves. IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse). Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.05 to 25.00 (step 0.01) If Curve type IEC: 0.05 to 1.00 (step 0.01) If Curve type IEEE: 0.10 to 25.00 (step 0.01)
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy for IEC and IEEE curves selection: ± 30 ms or ± 5% (greater of both) Timing accuracy for defined time curve selection: ± 35 ms or ± 0.5% (greater of both)
Function 46BC	Function enable: No/Alarm/Trip/
	Tap: 15 to 100 % (step 1%)
	Time delay: 0.030 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Timing accuracy: 0.5% or 30 ms (greater of both)
Function 37	Function enable: No/Alarm/Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Minimum level: 0.000 to 1.000 xIn (step 0.001xIn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 105%
	Instantaneous reset
	Timing accuracy: 0.5% or 30 ms (greater of both)
Function 27-1 **Function 27-2**	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 105%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)

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Function 27V1	Function enable: No/Alarm/Trip
	Voltage tap: 0.15 to 2.00 xUn (step 0.01xUn)
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 105%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
Function 27L (*)	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 105%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
Function 59-1 **Function 59-2**	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
Function 59N/G-1 **Function 59N/G-2**	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
Function 47	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)

Function 59L (*)	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
Function 32-1 **Function 32-2** **Function 32-3** **Function 32-4**	Function enable: No/Alarm/Trip
	Activation level: 0.08 to 2.00 xSn (step 0.01xSn)
	Operating angle: 0 to 359º (step 1º)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
Function 81-1 **Function 81-2** **Function 81-3** **Function 81-4**	Function enable: No/Alarm/Trip
	Type: Underfrequency or overfrequency
	Activation level: 45.000 a 65.000 Hz (step 0.001 Hz)
	Time delay: 0.020 a 300.000 s (step 0.001 s)
	Reset time: 0.020 a 300.000 s (step 0.001 s)
	Function blocked if phase B voltage is lower than 20 volts
	Activation level: 100%
	Underfrequency reset level: activation level + 50mHz Overfrequency reset level: activation level - 50 mHz
	Temporized deactivation
	The frequency measurement is an average value of the frequency measured during 8 cycles. The accuracy of the Time Delay is the adjusted value plus the necessary time to achieve the measurement during 8 cycles.
Function 81R-1 **Function 81R-2** **Function 81R-3** **Function 81R-4**	Function enable: No/Alarm/Trip
	Type: Increase/Decrease
	Activation level: 0.100 to 5.000 Hz/s (step 0.001 Hz/s)
	Time delay: 0.060 to 40.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Function blocked if phase B voltage is lower than 20 volts
	Activation level: 100%
	Temporized deactivation
	The frequency measurement is an average value of the frequency measured during 8 cycles. The accuracy of the Time Delay is the adjusted value plus the necessary time to achieve the measurement during 8 cycles.

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Function 78	Function enable: No/Alarm/Trip
	Activation level: 1 to 25º (step 1º)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Function blocked if phase B voltage is lower than 20 volts
	Temporized deactivation
	Measurement accuracy: ±1º or 10% (greater of both)
Function 24-1 **Function 24-2**	Function enable: No/Alarm/Trip
	Curve Type: Inverse A, Inverse B, Inverse C and Defined Time. Time delay: 0.020 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.10 to 25.00 (step 0.01)
	Activation level: 0.50 to 2.00 xUn/Fn (step 0.01 xUn/Fn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Reset Time: 0.020 to 300.000 s (step 0.001 s)
	Curve, activation level: 110%
	Curve, deactivation level: 100%
	Defined time, activation level: 100%
	Defined time, deactivation level: 95%
	Temporized deactivation
	Timing accuracy for curves selection: ± 30 ms or ± 5% (greater of both) Timing accuracy for defined time curve selection: ± 30 ms or ± 0.5% (greater of both)
Function 25 (*)	Dead tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Live tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Voltage supervision time: 0.060 to 300.000 s (step 0.001 s)
	Voltage difference: 0.05 to 2.00 xUn (step 0.01xUn)
	Phase difference: 2 to 90 º (step 1º)
	Frequency difference: 0.060 to 10.000 Hz (step 0.001 Hz)
	Synchro check time: 0.020 to 300.000 s (step 0.001 s)
Function 79	Number of recloses: 0 to 4 (step 1)
	Reclose time 1, 2, 3, 4: 0.020 to 2000.000 s (step 0.001 s)
	Hold Enable: No/Yes/No Time
	Hold time: 0.000 to 2000.000 s (step 0.001 s)
	Reset time: 0.000 to 2000.000 s (step 0.001 s)
	Safe time: 0.020 to 2000.000 s (step 0.001 s)
	Locking possibilities: pulse inputs, level inputs, commands.
Function 52	Maximum number of openings: 1 a 100,000 (step 1)
	Maximum accumulated amperes: 1 to 100,000 M(A2) (step 1)
	Repetitive number of openings: 1 to 100,000 (step 1)
	Time for repetitive number of openings: 1 to 300 min (step 1 min)
	Maximum opening time: 0.020 to 300.000 s (step 0.001 s)
	Maximum closing time: 0.020 to 300.000 s (step 0.001 s)

Function 74TCS	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Continuity in circuits A and B
Function 60CTS	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Timing accuracy: ± 30 ms or ± 0.5% (greater of both)
	Open breaker activation and reset threshold: 0.8% In
	Detection of the loss of one phase CT
Function 60VTS	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	V1, V2 and VP Tap: 0.08 to 2.00 xUn (step 0.001xUn)
	I1, I2 and 3I0 Tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Timing accuracy: ± 30 ms or ± 0.5% (greater of both)
Function 50BF	Function enable: No/Yes
	Time delay: 0.020 to 1.000 s (step 0.001 s)
	Open breaker activation and reset threshold: 0.8% In
Function AFD (*)	Function enable: No/Alarm/Trip
	Current tap:1 to 20xIn (step 1xIn)
	Time delay: 1 to 4 samples (step 1 sample)
Function 86	It allows to latch (lock out) the contact trip due to programmable logic (PGC: RSFF).
Function 68	Available through configurable inputs and outputs thanks to the programmable logic (PGC).
Programmable logic control (PGC)	OR, OR_1PULSE, OR_PULSES, OR_BLINKING, OR_TIMER UP, OR_TIMER DOWN
	NOR, NOR_1PULSE, NOR_PULSES, NOR_ BLINKING, NOR_TIMER UP, NOR_TIMER DOWN
	AND, AND_1PULSE, AND_PULSES, AND_ BLINKING, AND_TIMER UP, AND_TIMER DOWN
	NAND, NAND_1PULSE, NAND_PULSES, NAND_ BLINKING, NAND_TIMER UP, NAND_TIMER DOWN
	XOR, OR_1PULSE, XOR_PULSES, XOR_BLINKING, XOR_TIMER UP, XOR_TIMER DOWN
	SRFF, SRFF_1PULSE, SRFF_PULSES, SRFF_ BLINKING, SRFF_TIMER UP, SRFF_TIMER DOWN
	RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_ BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN
	R_EDGE, R_EDGE_1PULSE
	F_EDGE, F_EDGE_1PULSE
Settings tables	4 settings groups
	Selectable by input or general setting.
SER	3072 events

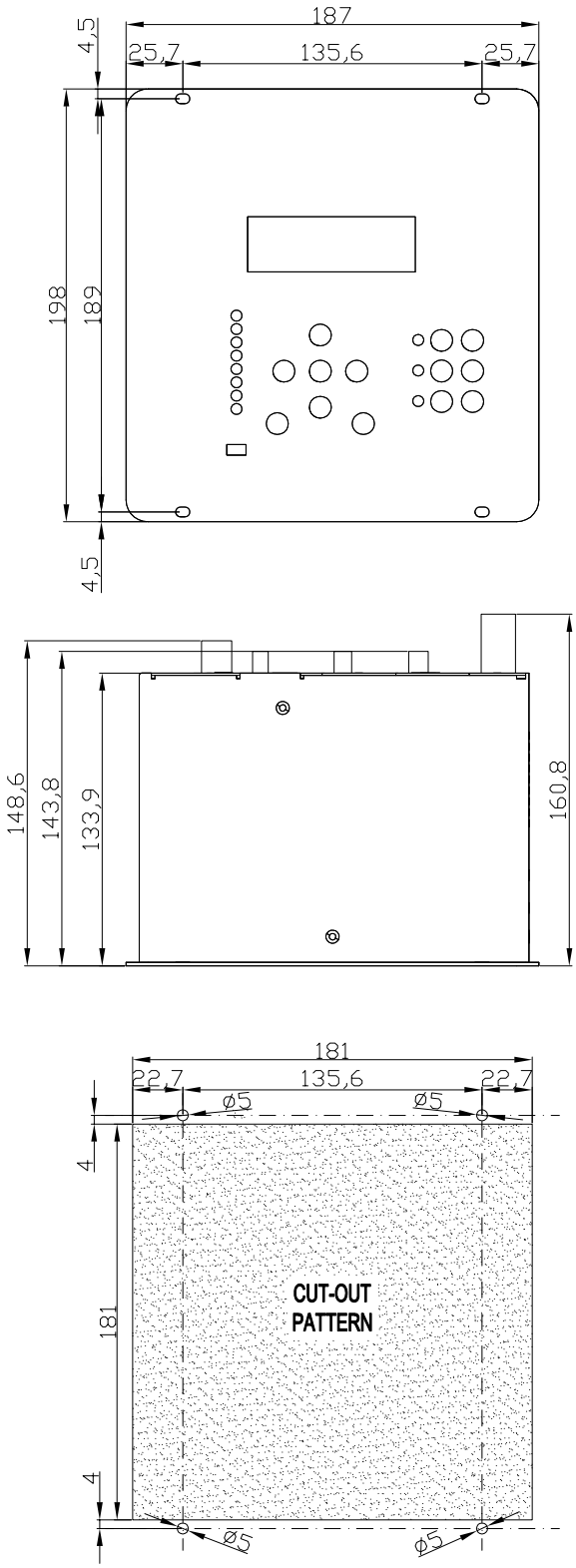
Disturbance fault recording (DFR)	32 samples/cycle
	Fault start configurable
	Configurable number of records depending on the size: 5 records in data and COMTRADE format (260 cycles each record): 1 to 8 pre-fault cycles + 252 to 259 postfault cycles. 25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles. 50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles. 100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.)
	COMTRADE IEEE C37.111-1991 - 9 analog channels and 96 digital channels
Load Data Profiling (LDP)	Demand of power with the following characteristics: - Number of records: 2160 - Recording mode circular - Sampling rate (interval): configurable through communications (1-60 min)
Inputs (*)	Depending on Model: - 8 configurable inputs - 24 configurable inputs - 8 configurable inputs + 4 AFD inputs - 16 configurable inputs The voltage of the inputs is the same as the auxiliary power supply
Outputs (*)	Depending on Model: - 7 configurable outputs - 18 configurable outputs - 7 configurable outputs + 4 High-Speed Outputs - 11 configurable outputs Model with 7 outputs: 250 V AC – 8 A; 30 V DC – 8 A Model with 11 outputs: 9 outputs→ 250 V AC – 8 A; 30 V DC – 8 A + 2 outputs→250 V AC – 16 A; 30 V DC – 16 A Model with 18 outputs: 16 outputs→ 250 V AC – 8 A; 30 V DC – 8 A + 2 outputs→ 250 V AC – 16 A; 30 V DC – 16 A
Frequency	50/60Hz
Burden	Burden of current inputs: <0.001 VA (1 A) & <0.025 VA (5 A) Burden of voltage inputs: < 70 mVA Burden of power supply unit: 24-48 Vdc/48-230 Vac/dc: < 10 VA 24-230 Vdc/Vac: < 20 VA

Current measurements	Phase currents (IA, IB, IC), neutral (IN, 3I0), positive sequence (I1) and negative sequence (I2) I2/I1 Maximum current (Imax), thermal Image (TI), Second harmonic (IA2H, IB2H IC2H)
	Fundamental values (DFT)
	Sampling: 32 samples/cycle
	2% precision in a band covering ±20% of nominal current and ±4% in the rest of the range
	Saturation limit: 30 times rated current
Voltage measurements	Phase voltage (VA, VB, VC), Line Voltage (VL)*, phase-phase voltage (UAB, UBC, UCA), neutral voltage (VR, 3V0), positive sequence (V1) and negative sequence (V2), Maximum voltage (VMAX) and V/f.
	Fundamental values (DFT)
	Sampling: 32 samples/cycle
	1% precision in a band covering ±20% of nominal voltage and 4% in the rest of the range
	- With VTs: 3-250 V - Direct connection: Up to 1000 V
Angle measurements	Current Angles: IA, IB, IC, IN and 3I0. Voltage Angles: VA, VB, VC, VR, VL*, 3V0, UAB, UBC and UCA.
	Accuracy: ±2º
Power measurements	Total and per phase active power
	Total and per phase reactive power
	Total and per phase apparent power
	2% accuracy in rated values with power factor between 1 and 0.7 (phase shift from 0 to ±45º).
Energy measurement	Positive and negative active energy
	Positive and negative reactive energy
Frequency measurements	Busbar Frequency, Line Frequency, df/dt
	Minimum voltage: 20V
	Accuracy: ±0.01 Hz
Communications	Local port (micro USB): Modbus RTU
	Remote port RS485: Modbus RTU, DNP3.0 and IEC60870-5-103 (*)
	Remote port RJ45: IEC 61850, DNP3.0 TCP/IP, Modbus TCP/IP + Web Server (*)
	Fiber Optic: IEC 61850 with redundancy (HSR or PRP) (*)
Power supply (*)	24-48 Vdc (Tolerance: -20/+10%)
	48-230 Vac/dc (Tolerance: -20/+10%)
	24-230 Vdc / Vac (Tolerance: -20/+10%)
Environmental conditions	Operating temperature: -40 to 70ºC
	Storage temperature: -40 to 80ºC
	Relative humidity: 95%
Mechanical characteristics	Metallic box
	Panel mounted
	Height x Width: 198x 187 (mm)
	Depth: 160.8 mm
	IP-54

(*) Optional depending on model

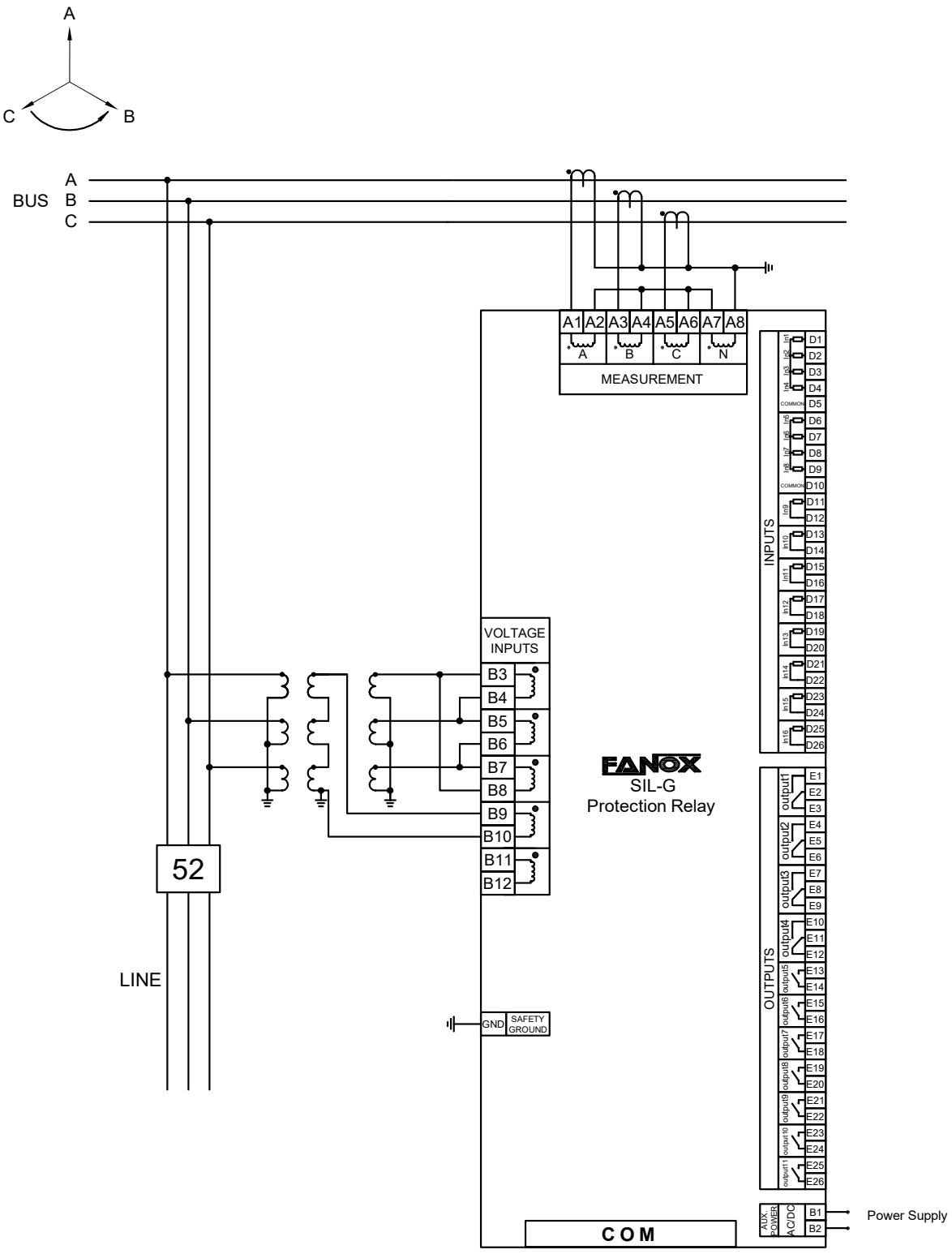
NOTE: ANSI 67, ANSI 67G and ANSI 67N can be converted into ANSI 51, ANSI51G and ANSI 51N respectively by setting the “Directionality” parameter to NO.

Dimensions and cutout SIL-G



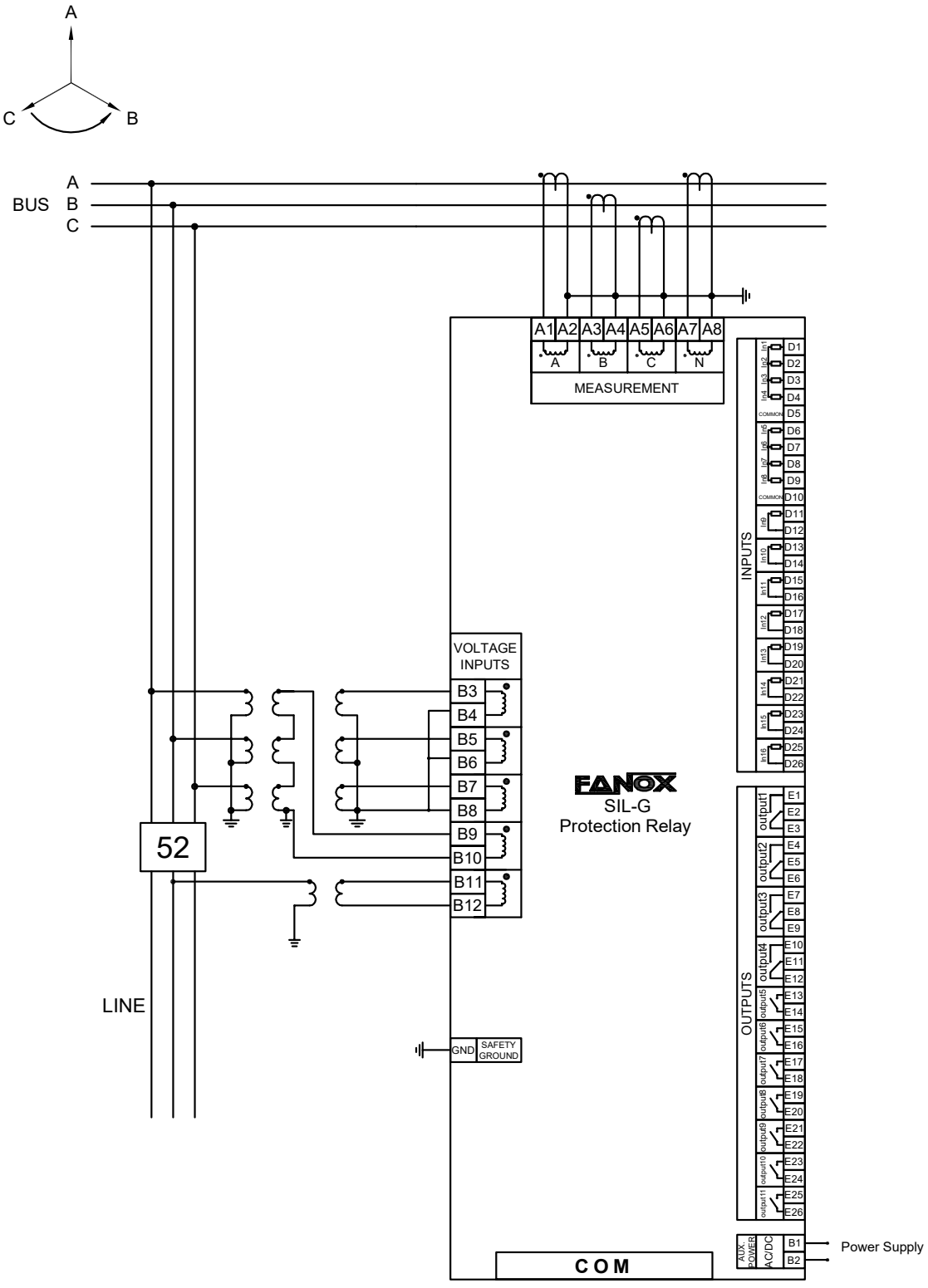
Connections diagram SIL-G

Phase-phase + residual voltage, 3 current transformers



Connections diagram SIL-G

3 VTs (Phase-neutral) + residual voltage + 1 VT for synchonism , 4 current transformers



Selection & Ordering data SIL-G

SIL-G	Feeder & Generator Protection Relay										
	0										**PHASE CURRENT MEASUREMENT** 1 A or 5 A
		0									**NEUTRAL CURRENT MEASUREMENT** 1 A or 5 A
			0								**VOLTAGE MEASUREMENT** Up to 1000 V (direct connection) or 250 V (with VTs)
				A B C							**POWER SUPPLY** 24-48 Vdc 48-230 Vac/dc 24-230 Vac/dc (Only for communication models: A, B, F and G)
					0 1						**ADDITIONAL FUNCTIONS** - +25 + 27-L + 59-L
						A B C D E F G H I J K L					**COMMUNICATIONS** A: USB (Modbus RTU) + RS485: (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) B: USB (Modbus RTU) + RS485 (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B C: USB (Modbus RTU) + RJ45 (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B D: USB (Modbus RTU) + HSR – FO (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B E: USB (Modbus RTU) + PRP – FO (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B F: USB (Modbus RTU) + WiFi + RS485 (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) G: USB (Modbus RTU) + WiFi + RS485 (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B H: USB (Modbus RTU) + WiFi + RJ45 (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B I: USB (Modbus RTU) + WiFi + HSR – FO (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B J: USB (Modbus RTU) + WiFi + PRP – FO (IEC61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B K: USB (Modbus RTU) + FO-LC (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + Web Server + IRIG-B L: USB (Modbus RTU) + WiFi + FO-LC (IEC 61850) + RJ45 (Modbus TCP or DNP3.0 TCP) + IRIG-B
							0 5 6 7 A				**INPUTS AND OUTPUTS** 8 Inputs + 7 Outputs 24 Inputs + 7 Outputs 8 Inputs + 18 Outputs 16 Inputs + 11 Outputs 8 Inputs + 7 Outputs + 4 AFD Inputs + 4 High-speed Outputs
								4 5			**MECHANICAL ASSEMBLY** Vertical Assembly Vertical Assembly with tropicalization
									A E		**LANGUAGE** English, Spanish, German and French English, Spanish, Turkish and Russian
										B	**ADAPTATION** Second generation. Default functions: (2) 50 + SOTF + 50G + 50N + (4) 67/51 + (2) 67G/51G + (2) 67N/51N + 46 + 46BC + 49 + 37 +(2) 27+ 27V1 + (2) 59 + (2) 59N/G + 47 + (4) 32 + (4) 81U/O + (4) 81R + 78 + (2) 24 + 79 + 74TCS + 60CTS + 60VTS + 50BF + SHB + CLP + 52 + 86

Example of ordering code:

SIL-G	0	0	0	C	1	F	0	4	A	B	*SIL G 0 0 0 C 1 F 04 A B*

(*) ANSI 67, ANSI 67G and ANSI 67N can be converted into ANSI 51, ANSI 51G and ANSI 51N respectively by setting the “Directionality” parameter to NO.