SIL-A

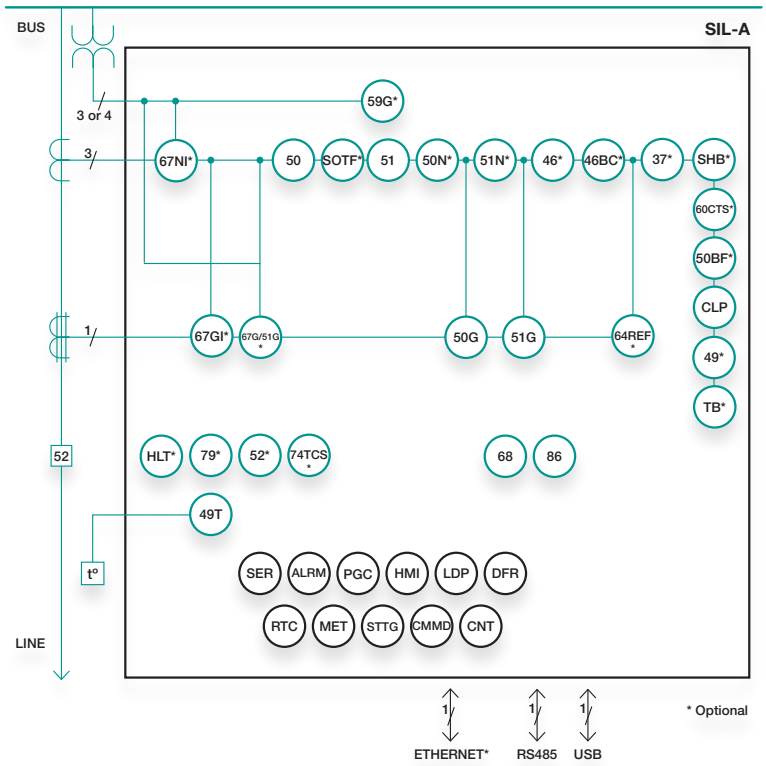
OC&EF Feeder Protection Relay

KEMA Labs

IEC 61850

- The SIL-A is a feeder relay with overcurrent and earth fault protections for primary and secondary distribution with auxiliary power supply 24-230 Vac/dc.
- 4 current channels and 1 voltage channel with conventional VTs depending on model.
- Metallic box with high electromagnetic compatibility level (EMC) and wide range of operating temperature.
- Signaling/control of the circuit breaker (52 function) and the recloser (79 function).
- 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 (selectable by general settings).
  - » Rear RJ45 Port: Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 (selectable by general settings) + SNTP Protocol + Web Server.
  - » Rear RJ45: IEC61850.
- The SIL-A is provided with (depending on model):
  - » 3 configurable inputs and 3 configurable outputs.
  - » 6 configurable inputs and 4 configurable outputs.
  - » 6 configurable inputs and 6 configurable outputs.
  - » 5 configurable inputs and 7 configurable outputs.
  - » 9 configurable inputs and 5 configurable outputs.
- SIL-A is fitted with the demand of current (Load Data Profiling) with the following characteristics:
  - » Number of records: 744.
  - » Recording mode circular.
  - » Sampling rate (interval): configurable through communications (1-60 min).
- SIL-A is provided with non-volatile RAM memory in order to store up to 2048 events and disturbance fault recording (DFR), maintaining date & time thanks to its internal RTC (Real Time Clock):
  - » 5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 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-A



ANSI CODE PROTECTIONS	
50	Instantaneous phase overcurrent
51	Inverse time phase overcurrent
50N	Instantaneous calculated neutral overcurrent
50G	Instantaneous measured neutral overcurrent
51N	Inverse time calculated neutral overcurrent
51G	Inverse time measured neutral overcurrent
67G/ 51G	Inverse Time Directional* Measured Neutral Overcurrent
67NI	Directional isolated calculated neutral overcurrent
67GI	Directional isolated measured neutral overcurrent
SOTF	Switch On To Fault
46	Phase balance current protection
46BC	Broken Conductor Detection
64REF	Restricted earth fault
37	Instantaneous phase undercurrent
49	Thermal overload
49T	External Trip
SHB	Second Harmonic Blocking

52	Breaker wear monitoring
50BF	Circuit Breaker Failure
74TCS	Trip circuit supervision
79	AC Reclosing device
HLT	Hot Line Tag
CLP	Cold Load Pickup
60CTS	Phase CT Supervision
59G	Instantaneous measured neutral overvoltage
86	Trip lockout
68	Zone selection interlocking (ZSI)
TB	Trip block for switch disconnector
PGC	Programmable logic control

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

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

Technical parameters SIL-A

Function 50-1 **Function 50-2 (*)**	Function enable: No/Alarm/Trip/SHB Trip(1)
	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%
	Temporized deactivation
	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)
Function SOTF (*)	Function enable: No/Alarm/Trip/ SHB Trip(1)
	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: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)
Function 50N-1 (*) **Function 50N-2 (*)**	Function enable: No/Alarm/Trip/ SHB Trip(1)
	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%
	Temporized deactivation
	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)
Function 50G-1 **Function 50G-2 (*)**	Function enable: No/Alarm/Trip/ SHB Trip(1)
	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%
	Temporized deactivation
	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)
Function 51-1 **Function 51-2 (*)**	Function enable: No/Alarm/Trip/ SHB Trip(1)
	Curve Type: IEC 60255-151 and IEEE curves.
	Curve type: IEC Standard Inverse, IEC Very Inverse, IEC Extremely Inverse, IEC Long Time Inverse, IEC Short Time Inverse, IEEE Moderately Inverse, IEEE Very Inverse, IEEE Extremely, Defined Time.
	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 0.001 xIn)
	Curve, activation level: 110%
	Curve, deactivation level: 100%
	Defined time, activation level: 100%
	Defined time, deactivation level: 95%
	Temporized 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 51N-1 (*) **Function 51N-2 (*)**	Function enable: No/Alarm/Trip/ SHB Trip(1)
	Curve Type: IEC 60255-151 and IEEE curves.
	Curve type: IEC Standard Inverse, IEC Very Inverse, IEC Extremely Inverse, IEC Long Time Inverse, IEC Short Time Inverse, IEEE Moderately Inverse, IEEE Very Inverse, IEEE Extremely, Defined Time. 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: 0.050 to 20.000 xIn (step 0.001 xIn)
	Curve, activation level: 110%
	Curve, deactivation level: 100%
	Defined time, activation level: 100%
	Defined time, deactivation level: 95%
	Temporized 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 51G-1 **Function 51G-2 (*)**	Function enable: No/Alarm/Trip/ SHB Trip(1)
	Curve Type: IEC 60255-151 and IEEE curves.
	Curve type: IEC Standard Inverse, IEC Very Inverse, IEC Extremely Inverse, IEC Long Time Inverse, IEC Short Time Inverse, IEEE Moderately Inverse, IEEE Very Inverse, IEEE Extremely, Defined Time. 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 0.001 xIn)
	Curve, activation level: 110%
	Curve, deactivation level: 100%
	Defined time, activation level: 100%
	Defined time, deactivation level: 95%
	Temporized 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-A

Function 67G/51G-1 (*) **Function 67G/51G-2 (*)**	Function enable: No/Alarm/Trip/SHB Trip[1]
	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%
	Temporized 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 67NI (*)	Function enable: No/Alarm/Trip/ SHB Trip[1]
	Directionality: No/Forward/Reverse
	Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)
	High Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	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%
	Temporized deactivation
	Timing accuracy for defined time curve selection: ± 30 ms or ± 0.5% (greater of both)

Function 67GI (*)	Function enable: No/Alarm/Trip/ SHB Trip[1]
	Directionality: No/Forward/Reverse
	Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)
	High Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	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%
	Temporized deactivation
	Timing accuracy for defined time curve selection: ± 30 ms or ± 0.5% (greater of both)
Function 64REF (*)	Function enable: No/Alarm/Trip/ IN SHB Trip
	Current tap: 0.050 to 20.000 xIn (step 0.001xIn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Block Threshold: 5 to 50% (step 1%)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 30 ms or ± 0.5% (greater of both)
Function 49 (*)	Function enable: No/Alarm/Trip
	Current tap: 0.100 to 2.400 In (step 0.001 xIn)
	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 49T	Available through configurable inputs thanks to the programmable logic
Function SHB (*)	Function enable: No/Yes
	Current Tap: 5 to 50% (step 1%)
	Reset Time: 0.000 to 300.000 (step 0.001 s)
	Block Threshold: 0.010 to 30.000xIn (step 0.001 xIn)
	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)
	Open breaker activation 0.8% In and reset threshold: 1% In

Technical parameters SIL-A

Function 46 (*)	Function enable: No/Alarm/Trip/SHB Trip (1)
	Curve Type: IEC 60255-151 and IEEE curves.
	Curve type: IEC Standard Inverse, IEC Very Inverse, IEC Extremely Inverse, IEC Long Time Inverse, IEC Short Time Inverse, IEEE Moderately Inverse, IEEE Very Inverse, IEEE Extremely, Defined Time. 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 0.001 xIn)
	Curve, activation level: 110%
	Curve, deactivation level: 100%
	Defined time, activation level: 100%
	Defined time, deactivation level: 95%
	Temporized 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
	Current Tap: 15 to 100 % (step 1%)
	Time delay: 0.030 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ±30 ms or ±0.5% (greater of both)
Function 37 (*)	Function enable: No/Alarm/Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001 xIn)
	Minimum Level: 0.000 to 1.000 xIn (step 0.001 xIn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 105%
	Temporized deactivation
	Timing accuracy: ±30 ms or ±0.5% (greater of both)
Function 59G-1 (*) **Function 59G-2 (*)**	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.045 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 101%
	Deactivation level: 99%
	Temporized deactivation
	Timing accuracy: ±0.5% or ±30 ms (greater of both)
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 M(A2))
	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)
	Open breaker activation and reset threshold: 0.8% In
Function 74TCS (*)	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Continuity in coils A and B
Function 60CTS (*)	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Open breaker activation and reset threshold: 0.8% In
	Detection of the loss of one phase CT
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 TRIP BLOCK (*)	Function enable: No/Yes
	Current Tap: 1.500 to 30.000 xIn (step 0.001 xIn)
Function 86	It allows to latch (lock out) the contact trip due to programmable logic (PGC: RSFF or SRFF).
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, SRFF_NON VOLATIL RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_ BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN, RSFF_NON VOLATIL R_EDGE, R_EDGE_1PULSE F_EDGE, F_EDGE_1PULSE
Settings Groups	4 settings groups
	Selectable by input, communications, user commands or general setting.
Sequential Events Recording (SER)	2048 events

Technical parameters SIL-A

Disturbance fault recording (DFR)	32 samples/cycle
	Fault start configurable
	4 analog channels and 96 configurable digital channels
	5 COMTRADE records (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 postfault cycles 25 COMTRADE records (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles. 50 COMTRADE records (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles. 100 COMTRADE records (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.
	COMTRADE IEEE C37.111-1991 - 4 analog channels and 96 digital channels
	Up to 100 fault reports (data format) with 29 events each one
Load Data Profiling (LDP)	Demand of current with the following characteristics: - Number of records: 744 - Recording mode circular - Sampling rate (interval): configurable through communications (1-60 min) - Record format: Date/Time IMAX (in interval) Imax (at the moment of the record) IA IB IC IN
Inputs (*)	Depending on model: - 3 configurable inputs - 5 configurable inputs - 6 configurable inputs - 9 configurable inputs The voltage of the inputs is the same as the auxiliary power supply
Outputs (*)	Depending on Model: - 3 configurable outputs - 4 configurable outputs - 5 configurable outputs - 6 configurable outputs - 7 configurable outputs 250 V AC – 8 A / 30 V DC – 8 A
	Output 1 (NC + NO) Output 2, Output 3, Output 4(*), Output 5(*) and Output 6(*): NO Model with 5 or 7 outputs (*): All the outputs NO
Frequency	50/60Hz

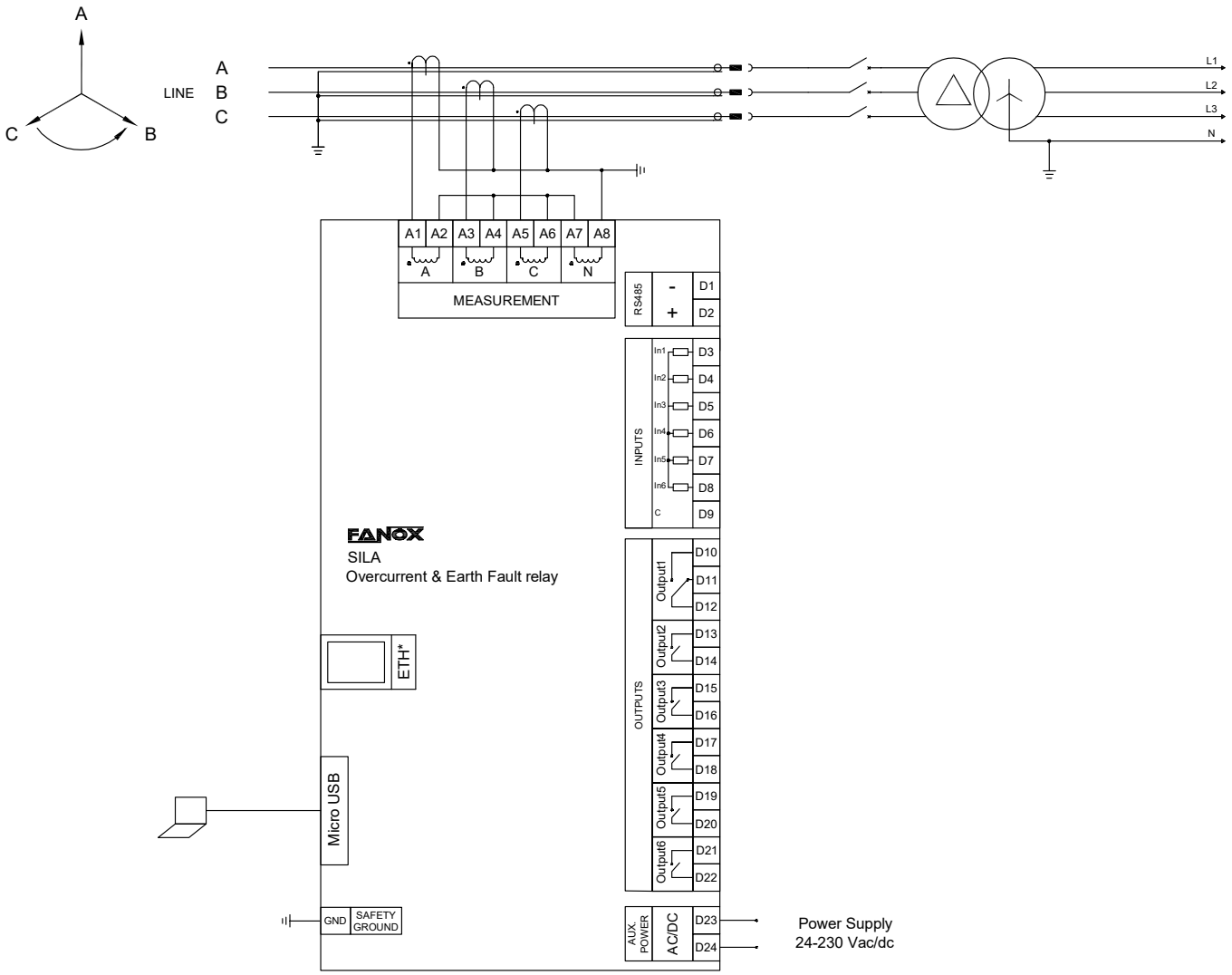
Burden	Burden of current inputs: <0.1 mVA (1 A) & <0.5 mVA (5 A) Burden of voltage input (*): <70 mVA Burden of power supply unit: 24 Vdc (quiescent): < 4 W 24 Vdc (50% Load): < 7 W 230 Vdc (quiescent): < 5 W 230 Vdc (50% Load): < 6 W 24 Vac (quiescent): < 8 VA 24 Vac (50% Load): < 17 VA 230 Vac (quiescent): < 13 VA 230 Vac (50% Load): < 17 VA Burden for binary inputs: 24 Vdc: <20 mW 230 Vdc: <200 mW 24 Vac: <50 mW 230 Vac: < 500 mW
Measurements	Phase current (I-A, I-B, I-C), neutral (3I0* and IN), neutral voltage (V-R*), positive sequence (I-1*), negative sequence (I-2*), I-2/I-1*, phase second harmonic current (IA-2H, IB-2H, IC-2H and I-N2H)*, maximum current (Imax), Total Harmonic Distortion (THD-A, THD-B and THD-C), thermal image (TI*) and neutral angle (Ang 3I0-IN and Ang 3I0-VR, Ang IN-VR)*
	Fundamental values (DFT)
	Sampling: 32 samples/cycle
	Current: ±2% precision in a band covering ±20% of nominal current and ±4% or ± 5 mA in the rest of the range Voltage: 1% precision in a band covering ±20% of nominal voltage and 4% in the rest of the range (*) Angle: ± 1º
	Current measurement range: From 0.01 to 30 times the nominal current Voltage (phase to phase) measurement range with conventional VTs: From 3 to 250 V Angle measurement range: From 0 to 359º
Communications	Local port (micro USB): Modbus RTU
	Remote port RS485: IEC60870-5-103, Modbus RTU or DNP3.0 Serial (selectable by general settings).
	Remote port RJ45 (10/100 Base-Tx): DNP3.0 TCP/IP, Modbus TCP/IP (selectable by general settings) + SNTP Protocol + Web Server (*)
	RJ45 Port (10/100 Base-Tx): IEC61850 (*)
Power supply	24-230 Vac/dc (24-220 Vdc (±20%) / 100-230 Vac (±15%))
Environmental conditions	Operating temperature: -40 to 70ºC
	Storage temperature: -40 to 80 ºC
	Relative humidity: 95%
Transformers	Measurement 3 or 4 CT /5 or /1 (depending on model)
Mechanical characteristics	Metallic box
	Panel mounted
	Height x Width: 177 x 107 (mm)
	Depth: 122.1 mm
	IP-54

(*) Optional depending on model

[1] Only for models with SHB function

Connections diagram SIL-A

3 Standard current transformers

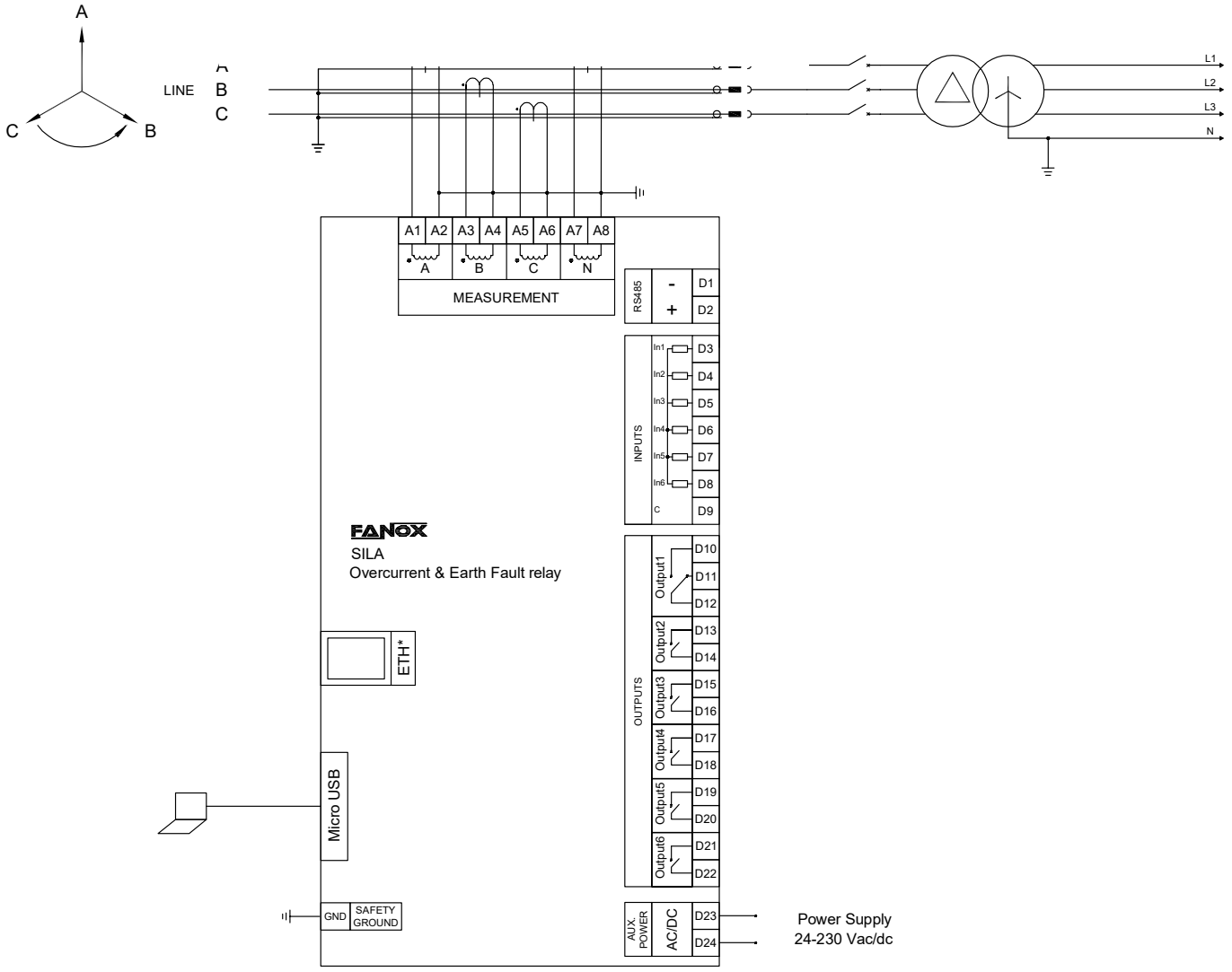


(*) Example of connections diagram

(*) Other inputs and outputs available depending on model

Connections diagram SIL-A

4 Standard current transformers

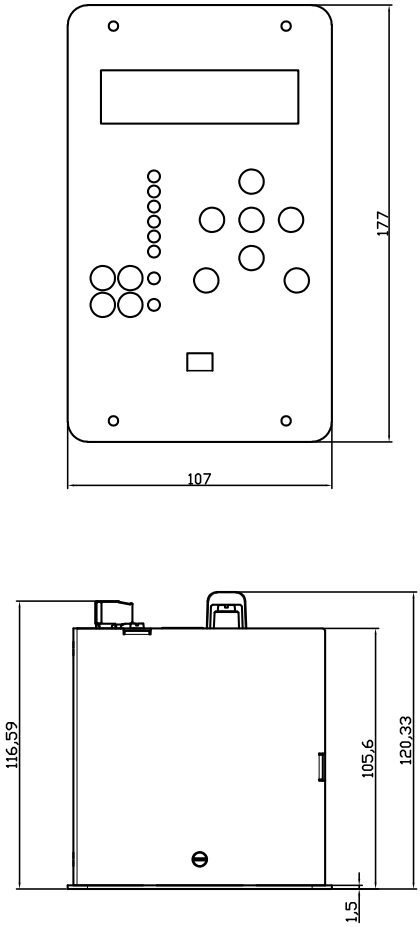


(*) Example of connections diagram

(*) Other inputs and outputs available depending on model

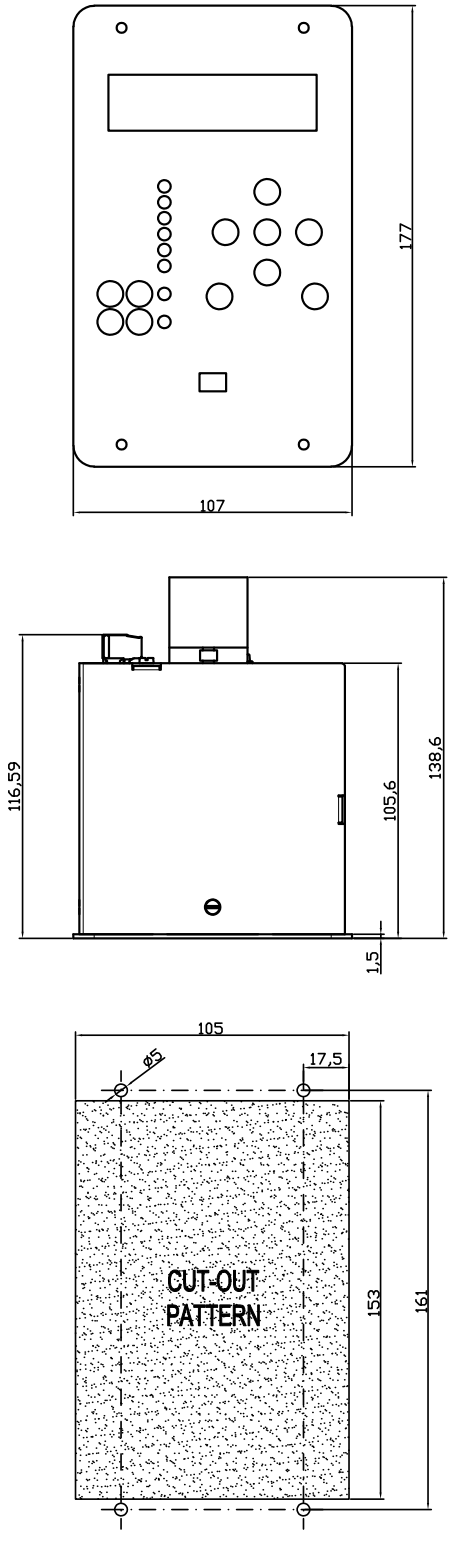
Dimensions and cutout SIL-A

Mechanical assembly with **FIXED current terminals**



Dimensions and cutout SIL-A

Mechanical assembly with **SHORT-CIRCUITABLE current terminals**



Kema Standards Type Tests SIL-A

TEST	TEST STANDARD	LEVEL
1. **PRODUCT SAFETY REQUIREMENTS**		
1.1. **Clearance and creepage**	IEC60255-27 Clause 10.6.3	see standard
1.2.1. Accessible parts test	IEC60255-27 Clause 10.6.2.5	IP2X
1.2.2. IP rating	IEC 60255-1, Clause 6.3 IEC60255-27 Clause 10.6.2.6	IP54 (front)
1.3. **Impulse voltage**	IEC60255-27 Clause 10.6.4.2	5 kV 1 kV
1.4. **Dielectric voltage**	IEC60255-27 Clause 10.6.4.3	2 kV 0,5 kV
1.5. **Insulation resistance**	IEC60255-27 Clause 10.6.4.4	500 VDC
1.6. **Protective bonding**	IEC60255-27 Clause 10.6.4.5	≤ 0,1 Ω
1.7. **Flammability (visual inspection)** • **Housing** • **Cover** • **Terminals** • **Push buttons** • **Display** • **PCB boards** • **(Input) transformers** • **Opto couplers** • **Output relays** • **Wires**	IEC60255-27 Clause 10.6.5.2	 • 70/80 °C • 70/80 °C • V-2 • 55/70 °C • 55/70 °C • V-2 • V-1 • V-1 • V-1 • V-1
1.8. **Single fault condition** • **Power supply circuit**	IEC60255-27 Clause 10.6.5.5	no fire risk
1.9. **Thermal short-time test** • **Overcurrent CT, cont.** • **Overcurrent CT, 1s**	IEC60255-27 Clause 10.6.5.3	 • 4xIn • 100xIn
1.10. **High Leakage current**	IEC60255-27 Clause: 5.1.8	see Standard
2. **ELECTROMAGNETIC COMPATIBILITY (EMC) tests**		
2.1. EMISSION		
2.1.1. Radiated emission	IEC 60255-26 CISPR11 CISPR22 table 1 table 6 table 7	class A class A
2.1.2. Conducted emission	IEC 60255-26 CISPR22 table 2 table 2/4	class A
2.2. IMMUNITY		
2.2.1. Slow damped oscillatory wave (1 MHz)	IEC 60255-26 (IEC 61000-4-18) Clause 7.2.6	2,5 kV CM 1,0 kV DM 1 kV CM 0 kV DM
2.2.2. Electrostatic discharges	IEC 60255-26 (IEC 61000-4-2) Clause 7.2.3	8 kV cont. 15 kV air

TEST	TEST STANDARD	LEVEL
2.2.3. Radiated radio frequency magnetic field	IEC 60255-26 (IEC 61000-4-3) Clause 7.2.4	80 - 1000 MHz 10 V/m 1,4 – 2,7 GHz 10 V/m 80, 160, 380, 450, 900, 1850, 2150 MHz 10 V/m
2.2.4. Fast transient/burst	IEC 60255-26 (IEC 61000-4-4) Clause 7.2.5	☒ Zone A 4 kV CM 2 kV CM ☐ Zone B 2 kV CM 1 kV CM
2.2.5. Surge	IEC 60255-26 (IEC 61000-4-5) Clause 7.2.7	☒ Zone A to 4 kV LE to 2 kV LL ☐ Zone B to 2 kV LE to 1 kV LL
2.2.6. Conducted disturbance induced by RF fields	IEC 60255-26 (IEC 61000-4-6) Clause 7.2.8	0,15 - 80 MHz 10 V 27, 68 MHz 10 V
2.2.7. Power frequency voltage	IEC 60255-26 (IEC 61000-4-16) Clause 7.2.9	☒ Zone A 150 V DM 300 V CM ☐ Zone B 100 V DM 300 V CM
2.2.8. Power frequency H-field	IEC 60255-26 (IEC 61000-4-8) Clause 7.2.10	100 A/m cont. 1000 A/m 1-3 s
2.2.9 D.C. voltage dips	IEC 60255-26 (IEC 61000-4-29) Clause 7.2.11	100%; 5, 10, 20, 50, 100 and 200 ms 60%; 200 ms 30%; 500 ms
2.2.10. A.C. voltage dips	IEC 60255-26 (IEC 61000-4-11) Clause 7.2.11	100%; 0,5 – 25 c. 60%; 10/12 c. 30%; 25/30 c.
2.2.11. D.C. voltage interruptions	IEC 60255-26 (IEC 61000-4-29) Clause 7.2.11	100%; 5 s
2.2.12. A.C. voltage interruptions	IEC 60255-26 (IEC 61000-4-11) Clause 7.2.11	100%; 250/300 c
2.2.13. D.C. ripple	IEC 60255-26 (IEC 61000-4-17) Clause 7.2.12	15% Ur_dc 100/120 Hz
2.2.14. D.C. gradual shut-down / start-up	IEC 60255-26 Clause 7.2.13	Shut d. ramp 60 s 5 min off St up ramp 60s
2.2.15. Damped oscillatory magnetic field (100 kHz and 1 MHz)	IEC 61000-4-10	100 A/m (peak)

Kema Standards Type Tests SIL-A

TEST	TEST STANDARD	LEVEL
2.2.16. Pulse magnetic field	IEC 61000-4-9	1000 A/m
2.2.17. Slow damped oscillatory wave (100 kHz)	IEC61000-4-18	2.5 kV CM 1.0 kV DM
2.2.18. Main frequency voltage	IEC61000-4-16	50 Hz 30 V; Cont. 300 V; 1 s
2.2.19. Reversal of DC power supply	IEC60255-27 Clause: 10.6.6	1 minute
3. **CLIMATIC ENVAIRONMENTAL CONDITIONS**		
3.1. Dry heat operational	IEC 60255-1 (IEC 60068-2-2, test Bd) Clause 6.12.3.1	+70°C; 96h
3.2. Cold operational	IEC 60255-1 (IEC 60068-2-1, test Ad) Clause 6.12.3.2	-40°C; 96h
3.3. Dry heat storage	IEC 60255-1 (IEC 60068-2-2, test Bb) Clause 6.12.3.3	+80°C; 96h
3.4. Cold storage	IEC 60255-1 (IEC 60068-2-1, test Ab) Clause 6.12.3.4	-40°C; 96h
3.5. Change of temperature	IEC 60255-1 (IEC 60068-2-14, test Nb) Clause 6.12.3.5	-40°C; +70°C 3 hours; 5 cycles
3.6. Damp heat, steady state	IEC 60255-1 (IEC 60068-2-78, test Cab) Clause 6.12.3.6	+40°C; 93% 10 days
3.7. Damp heat, cyclic	IEC 60255-1 (IEC 60068-2-30, test Db) Clause 6.12.3.7	+25°C; 40°C 97%; 93% 6 cycles
4. **MECHANICAL ENVIRONMENTAL CONDITIONS**		
4.1. Vibration response	IEC 60255-1 (IEC 60255-21-1) Clause 6.13.1	class 1
4.2. Vibration endurance	IEC 60255-1 (IEC 60255-21-1) Clause 6.13.1	class 1
4.3 Shock response	IEC 60255-1 (IEC 60255-21-2) Clause 6.13.2	class 1 class 2
4.4. Shock withstand	IEC 60255-1 (IEC 60255-21-2) Clause 6.13.2	class 1 class 2
4.5 Bump	IEC 60255-1 (IEC 60255-21-2) Clause 6.13.2	class 1
4.6 Seismic (single axis sweep)	IEC 60255-1 (IEC 60255-21-3) Clause 6.13.3	class 1 class 2
5. **ENERGIZING QUANTITIES**		
1.1 **Burden current transformers**	IEC60255-1 Clause: 10.6.2	-
5.2 Burden A.C. power supply (quiescent, maximum load, inrush current, power-up duration)	IEC60255-1 Clause: 10.6.3	-
5.3 Burden D.C. power supply (quiescent, maximum load, inrush current, power-up duration)	IEC60255-1 Clause: 10.6.4	-
5.4 Burden for binary input	IEC60255-1 Clause: 10.6.5	-
6. **CONTACT PERFORMANCE**		
6.1 Mechanical endurance	IEC60255-1 Clause: 6.11	-
6.2 Limiting making capacity	IEC60255-1 Clause: 6.11	-
6.3 Short time contact current	IEC60255-1 Clause: 6.11	-
6.4 Continuous contact current	IEC60255-1 Clause: 6.11	-
6.5 Limiting breaking capacity	IEC60255-1 Clause: 6.11	-

KEMA Labs

Selection & Ordering data SIL-A

SIL-A

Overcurrent & Earth Fault Protection Relay for Primary & Secondary Distribution

0 1										PHASE CURRENT MEASUREMENT 1 A or 5 A 1 A (For short-circuitable terminals: Mechanics options 3 and 5)
	0 1									NEUTRAL CURRENT MEASUREMENT 1 A or 5 A 1 A (For short-circuitable terminals: Mechanics options 3 and 5)
		0								NET FREQUENCY Defined by General Settings
			C							POWER SUPPLY 24-230 Vac/dc
				0 2 4 5 6 8 9						ADDITIONAL FUNCTIONS 0: - 2: + 49 + 60CTS + 37 + 46BC + Trip Block (Only for adaptation “B”) 4: + SHB + 49 + 46BC (Only for adaptation “C”) 5: + 52 + 50BF + Trip Block (Only for adaptation “A”) 6: + 60CTS + 37 + 46BC + Trip block (Only for Adaptation “D”) 8: + 60CTS + 37 + 46BC + Trip block + (2) 59G + (2) 67G/51G + 67GI + 67NI (Only for Adaptation “D”) 9: + 60CTS + 37 + 46BC + Trip block + LMS (Only for Adaptation “D”)
					E F G					COMMUNICATIONS E: USB (Modbus RTU) + RS485: (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) F: USB (Modbus RTU) + RS485: (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + RJ45 (Modbus TCP, DNP3 TCP or IEC 60870-5-104) + Web Server + SNTP protocol G: USB (Modbus RTU) + RS485: (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + RJ45 (IEC61850) + SNTP Protocol
						0 1 2 3 4				INPUTS AND OUTPUTS 3 Inputs + 3 Outputs 6 Inputs + 4 Outputs 6 Inputs + 6 Outputs 5 Inputs + 7 Outputs 9 Inputs + 5 Outputs
							2 3 4 5 R T			MECHANICAL ASSEMBLY 2: Vertical Assembly 3: Vertical Assembly and short-circuitable current terminals 4: Vertical Assembly with anticorrosive treatment 5: Vertical Assembly with anticorrosive treatment and short-circuitable current terminals R: Vertical Assembly + UL certification T: Vertical Assembly with anticorrosive treatment + UL certification
								A E F		LANGUAGE English, Spanish, German and French English, Spanish, Turkish and Russian English, Spanish, German and Portuguese
									A B C D	ADAPTATION A: Default Functions: 50 + 50G + 51 + 51G + CLP + SHB + 49 + 86 + 49T B: Default functions: (2) 50 + (2) 50G + 51 + 51G + CLP + SHB + 46 + 52 + 50BF + 79 + 74TCS + 86 + 49T + HLT C: Default functions: 50 + 50G + 51 + 51G + CLP + 46 + 52 + 79 + 74TCS + 86 + 49T + HLT D: Default functions: (2) 50 + (2) 50N +(2) 50G + (2) 51 + (2) 51N + (2) 51G + SOTF + 64REF + CLP + SHB + 49 + 46 + 52 + 50BF + 79 + 74TCS + 86 + 49T + HLT

Example of ordering code:

0	0	0	C	6	F	2	2	A	D	SIL A 0 0 0 C 6 F 2 2 A D
SIL-A										

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


FANOX