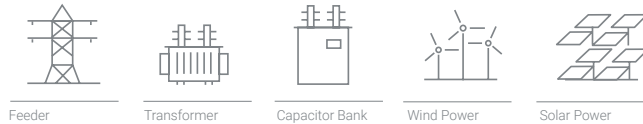


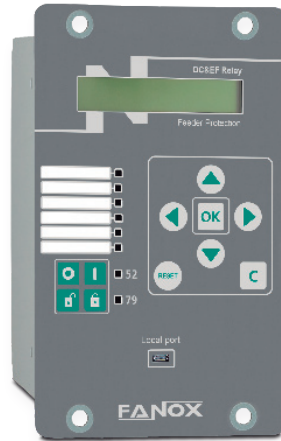
SIL-A

OC&EF
FEEDER PROTECTION
RELAY

Primary & Secondary Distribution Protection



PM I CI Std. CTs /1/5 VI Conv. VTs (neutral)

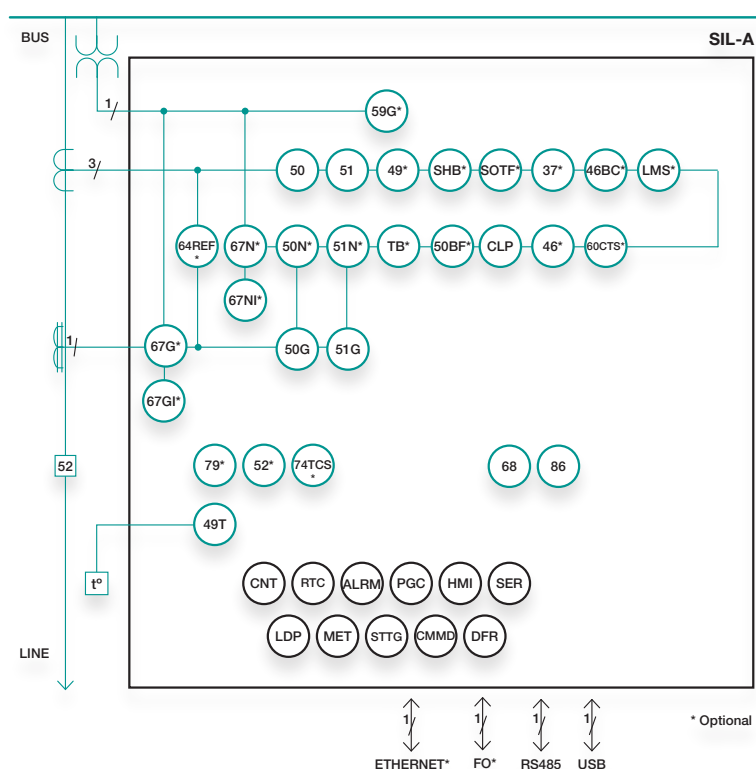


- The SIL-A is a feeder relay that includes overcurrent and earth fault protections for primary and secondary distribution fitted with an auxiliary power supply of 24-230 Vac/dc.
- 4 current channels for conventional /1 and /5 current transformers and an optional 1 voltage channel for conventional VTs.
- Metal housing with a high electromagnetic compatibility level (EMC) and a wide range of operating temperature.
- Signaling and control of the circuit breaker (52 function) and the recloser (79 function).
- The front part of the SIL-A relays is provided with a navigation keypad made of 7 keys (including the RESET key), 4 programmable hot keys that are configured by default: two (2) keys to open and close the CB, and two (2) keys to block and unblock the recloser with their associated two (2) configurable control LEDs. Besides, there are six (6) programmable alarm LEDs.
- 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 the 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 Serial Port: IEC60870-5-103, Modbus RTU or DNP3.0 Serial (selectable by general settings).
 - » Rear Ethernet Port (RJ45): Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 or IEC61850 (selectable by general settings) + SNTP Protocol + Web Server.
 - » Rear FO-LC Port: Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-

5-104 or IEC61850 (selectable by general settings) + SNTP Protocol + Web Server.

- Alarms panel is available.
- The SIL-A is provided with (depending on the 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 (LDP - Load Data Profiling) with the following characteristics:
 - » Number of records: 744.
 - » Circular recording mode.
 - » 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 the disturbance fault recording (DFR), maintaining date & time thanks to its internal RTC (Real Time Clock). The configurable options are:
 - » 5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 post-fault cycles.
 - » 25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 post-fault cycles.
 - » 50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 post-fault cycles.
 - » 100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 post-fault cycles.
- Each oscillographic record contains 4 analogue channels and up to 96 configurable digital channels. The oscillography is downloaded by a 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
59G	Instantaneous measured neutral overvoltage
CLP	Cold Load Pickup
79	AC Reclosing device
52	Breaker wear monitoring
HLT	Hot Line Tag
50BF	Circuit Breaker Failure
74TCS	Trip Circuit Supervision
60CTS	Phase CT Supervision
86	Trip lockout
68	Zone Selection Interlocking (ZSI)
TB	Trip block for switch disconnector
LMS	Load Management System
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
Function SOTF (*)	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
	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%
Function 50N-1 (*) Function 50N-2 (*)	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
	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)
Function 50G-1 Function 50G-2 (*)	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
	Function enable: No/Alarm/Trip/ SHB Trip ⁽¹⁾
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
Function 51-1 Function 51-2 (*)	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 $\pm 0.5\%$ (greater of both)
	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: 0.01 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 $\pm 5\%$ (greater of both).
	Timing accuracy for defined time curve selection: ± 35 ms or $\pm 0.5\%$ (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: 0.01 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%
Function 51G-1 Function 51G-2 (*)	Temporized deactivation
	Timing accuracy for IEC and IEEE curves selection: ± 30 ms or $\pm 5\%$ (greater of both).
	Timing accuracy for defined time curve selection: ± 35 ms or $\pm 0.5\%$ (greater of both)
	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: 0.01 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 $\pm 5\%$ (greater of both).
	Timing accuracy for defined time curve selection: ± 35 ms or $\pm 0.5\%$ (greater of both)

TECHNICAL PARAMETERS SIL-A

Function 67G/51G-1 (*) Function 67G/51G-2 (*)	Function enable: No/Alarm/Trip/SHB Trip ⁽¹⁾	Function 67GI (*)	Function enable: No/Alarm/Trip/ SHB Trip ⁽¹⁾		
	Curve Type: IEC 60255-151 and IEEE curves.		Directionality: No/Forward/Reverse		
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).		Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)		
	Time delay: 0.000 to 300.000 s (step 0.001 s)		High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)		
	Time dial (TMS): 0.05 to 25.00 (step 0.01)		Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)		
	If Curve type IEC: 0.01 to 1.00 (step 0.01)		High Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)		
	If Curve type IEEE: 0.10 to 25.00 (step 0.01)		Time delay: 0.000 to 300.000 s (step 0.001 s)		
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)		Operating angle: 0 to 359° (step 1°)		
	Directionality: No/Forward/Reverse		Halfcone angle: 10 to 170° (step 1°)		
	Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)		Curve, current activation level: 110%		
	Operating angle: 0 to 359° (step 1°)		Curve, current deactivation level: 100%		
	Halfcone angle: 10 to 170° (step 1°)		Defined time, current activation level: 100%		
	Curve, current activation level: 110%		Defined time, current deactivation level: 95%		
	Curve, current deactivation level: 100%		Voltage activation level: 100%		
	Defined time, current activation level: 100%		Voltage deactivation level: 95%		
	Defined time, current deactivation level: 95%		Temporized deactivation		
	Voltage activation level: 100%		Timing accuracy for defined time curve selection: ± 30 ms or ± 0.5% (greater of both)		
	Voltage deactivation level: 95%				
	Temporized deactivation				
Function 67NI (*)	Function enable: No/Alarm/Trip/ SHB Trip ⁽¹⁾	Function 64REF (*)	Function enable: No/Alarm/Trip/ IN SHB Trip		
	Directionality: No/Forward/Reverse		Current tap: 0.050 to 20.000 xIn (step 0.001xIn)		
	Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)		Time delay: 0.020 to 300.000 s (step 0.001 s)		
	High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)		Block Threshold: 5 to 50% (step 1%)		
	Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)		Activation level: 100%		
	High Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)		Deactivation level: 95%		
	Time delay: 0.000 to 300.000 s (step 0.001 s)		Temporized deactivation		
	Operating angle: 0 to 359° (step 1°)		Timing accuracy: ± 30 ms or ± 0.5% (greater of both)		
	Halfcone angle: 10 to 170° (step 1°)				
	Curve, current activation level: 110%		Function 49 (*)	Function enable: No/Alarm/Trip	
	Curve, current deactivation level: 100%			Current tap: 0.100 to 2.400 In (step 0.001 xIn)	
	Defined time, current activation level: 100%			ζ heating: 3 to 600 min (step 1 min)	
	Defined time, current deactivation level: 95%			ζ cooling: 1 to 6 xζ heating (step 1)	
	Voltage activation level: 100%			Alarm: 20 to 99% (step 1%)	
	Voltage deactivation level: 95%			Trip level: 100%	
	Temporized deactivation			Deactivation level: 95% of alarm level	
	Timing accuracy for defined time curve selection: ± 30 ms or ± 0.5% (greater of both)			Timing accuracy: ± 5% respect of theoretical value.	
				Function 49T	Available through configurable inputs thanks to the programmable logic
					Function SHB (*)
	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: 0.01 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: 0.02 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 to 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 a 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 (*)	Open breaker activation and reset threshold: 0.8% In
	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
Function 60CTS (*)	Continuity in coils A and B
	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
Function 50BF (*)	Detection of the loss of one phase CT
	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)

TECHNICAL PARAMETERS SIL-A

Function LMS (*)	Function enable: No/Yes	Programmable logic control (PGC)	OR, OR_1PULSE, OR_PULSES, OR_BLINKING, OR_TIMER UP, OR_TIMER DOWN
	No Peak Mode: Alarm/Trip		NOR, NOR_1PULSE, NOR_PULSES, NOR_BLINKING, NOR_TIMER UP, NOR_TIMER DOWN
	Peak mode: Alarm/Trip		AND, AND_1PULSE, AND_PULSES, AND_BLINKING, AND_TIMER UP, AND_TIMER DOWN
	Peak period starting month: January to December		NAND, NAND_1PULSE, NAND_PULSES, NAND_BLINKING, NAND_TIMER UP, NAND_TIMER DOWN
	Peak period starting day: 1 to 31 (step 1)		XOR, OR_1PULSE, XOR_PULSES, XOR_BLINKING, XOR_TIMER UP, XOR_TIMER DOWN
	Peak period ending month: January to December		SRFF, SRFF_1PULSE, SRFF_PULSES, SRFF_BLINKING, SRFF_TIMER UP, SRFF_TIMER DOWN, SRFF_NON VOLATIL
	Peak period ending day: 1 to 31 (step 1)		RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN, RSFF_NON VOLATIL
	Peak period starting hour: 0 to 23 (step 1 hour)		R_EDGE, R_EDGE_1PULSE
	Peak period starting minute: 0 to 59 (step 1 minute)		F_EDGE, F_EDGE_1PULSE
	Peak period ending hour: 0 to 23 (step 1 hour)	Settings Groups	4 settings groups
	Peak period ending minute: 0 to 59 (step 1 minute)		Selectable by input, communications, user commands or general setting.
	Peak period starting day of week: Monday to Sunday	Sequential Events Recording (SER)	2048 events
	Peak period ending day of week: Monday to Sunday		32 samples/cycle
	Reset Time: 0 to 18000 s (step 1 s)	Disturbance fault recording (DFR)	Fault start configurable
	Peak period Tap: 0.010 to 30.000 xIn (step 0.001xIn)		4 analog channels and 96 configurable digital channels
	Peak trip Time 1: 0 to 18000 s (step 1 s)		5 COMTRADE records (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 postfault cycles
	Peak trip Time 2: 0 to 18000 s (step 1 s)		25 COMTRADE records (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles.
	Peak trip Time 3: 0 to 18000 s (step 1 s)		50 COMTRADE records (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles.
	Peak trip Time 4+: 0 to 18000 s (step 1 s)		100 COMTRADE records (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.
	Peak Number of recloses: 0 to 247 (Step 1)		COMTRADE IEEE C37.111-1991 - 4 analog channels and 96 digital channels
	Peak Interval Time 1: 0 to 18000 s (Step 1 s)		Up to 100 fault reports (data format) with 29 events each one
	Peak Interval Time 2: 0 to 18000 s (Step 1 s)	Load Data Profiling (LDP)	Demand of current with the following characteristics:
	Peak Interval Time 3: 0 to 18000 s (Step 1 s)		- Number of records: 744
	Peak Interval Time 4+: 0 to 18000 s (Step 1 s)		- Recording mode circular
	No Peak period Tap: 0.010 to 30.000 xIn (step 0.001xIn)		- Sampling rate (interval): configurable through communications (1-60 min)
	No Peak trip Time 1: 0 to 18000 s (step 1 s)		- Record format:
	No Peak trip Time 2: 0 to 18000 s (step 1 s)		Date/Time
	No Peak trip Time 3: 0 to 18000 s (step 1 s)		IMAX (in interval)
	Peak trip Time 4+: 0 to 18000 s (step 1 s)		Imax (at the moment of the record)
	No Peak Number of recloses: 0 to 247 (Step 1)		IA
	No Peak Interval Time 1: 0 to 18000 s (Step 1 s)		IB
	No Peak Interval Time 2: 0 to 18000 s (Step 1 s)		IC
	No Peak Interval Time 3: 0 to 18000 s (Step 1 s)		IN
	No Peak Interval Time 4+: 0 to 18000 s (Step 1 s)		
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).		

TECHNICAL PARAMETERS SIL-A

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 Burden: 24 Vdc: <20 mW 230 Vdc: <200 mW 24 Vac: <50 mW 230 Vac: < 500 mW
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 Contact current short duration: 30A – 200ms 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: <0.015 VA (1 A) & <0.375 VA (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 230 Vac (quiescent): < 13 VA 230 Vac (50% Load): < 17 VA Burden for binary inputs: 24 Vdc: <20 mW 230 Vdc: <200 mW 230 Vac: < 500 mW
Current measurements	Phase current (I-A, I-B, I-C), neutral (3I0* and IN), 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*) 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 Current measurement range: From 0.01 to 30 times the nominal current

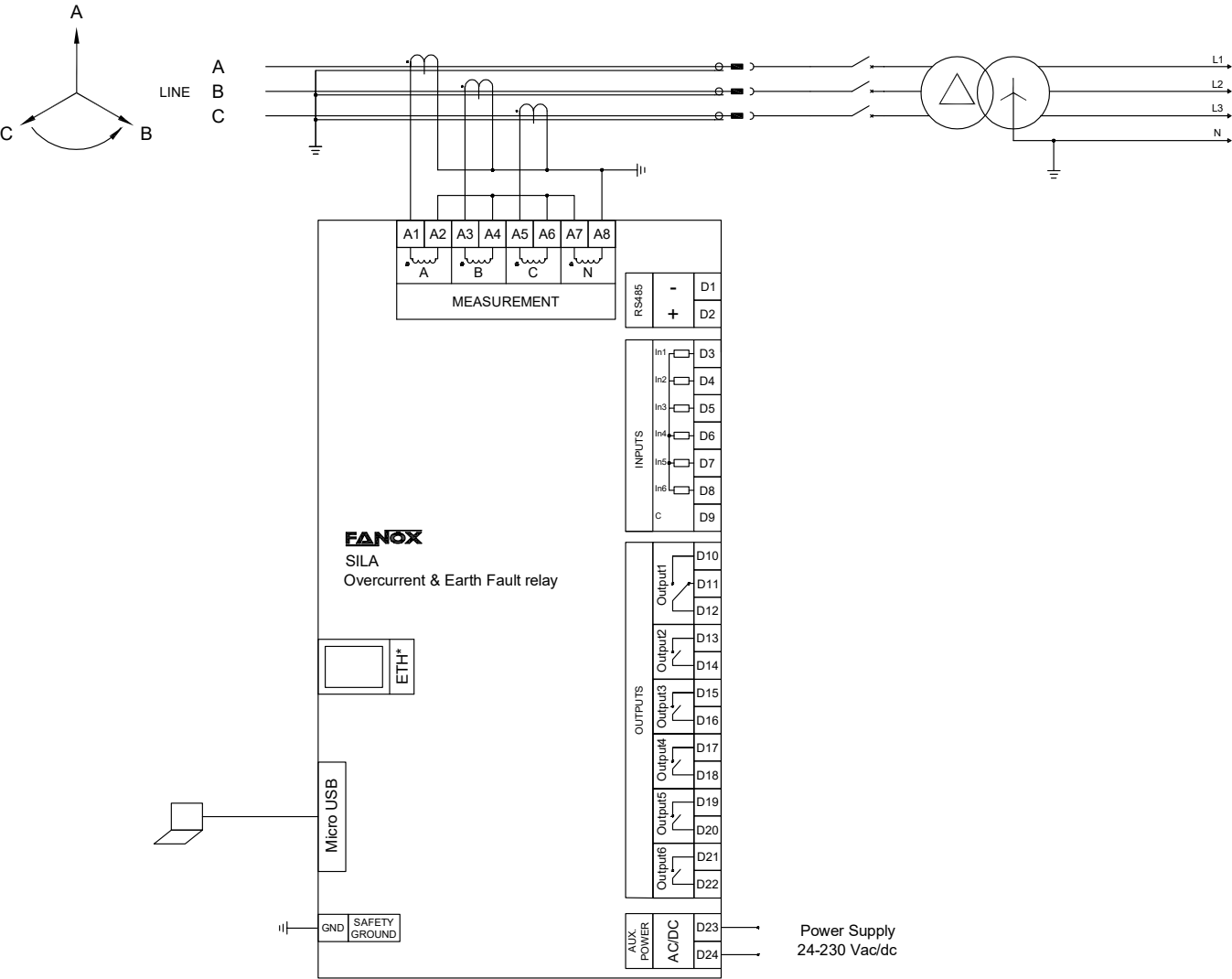
Voltage measurements	Neutral voltage (V-R) Fundamental values DFT Sampling: 32 samples/cycle Measured voltage: 1% precision in a band covering ±20% of nominal voltage and 4% in the rest of the range (*) Voltage (phase to phase) measurement range with conventional VTs (Un setting: 100-130 V P-P): From 3 to 250 V
Angle measurements	Angle between calculated and measured neutral current (Ang 3I0-IN*), angle between calculated neutral current and measured neutral voltage (ang 3I0-VR) and Angle between measured neutral current and measured neutral voltage (Ang IN-VR) Accuracy: ± 2 degrees Angle measurement range: From 0 to 359°
Communications	Local port (micro-USB): Modbus RTU Rear Serial Port (RS485): Modbus RTU, IEC60870-5-103, or DNP3.0 Serial (selectable by general settings) (*). Rear Ethernet Port (RJ45 (10/100 Base-Tx) or FO-LC(10/100 Base-Fx)): Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 or IEC61850 (selectable by general settings) + SNTP Protocol + Web Server (*)
Power supply	24-230 Vac/dc (24-220 Vdc (±20%) / 100-230 Vac (±15%)) Burden: 24 Vdc (quiescent): < 4 W 24 Vdc (50% Load): < 7 W 230 Vdc (quiescent): < 5 W 230 Vdc (50% Load): < 6 W 230 Vac (quiescent): < 13 VA 230 Vac (50% Load): < 17 VA
Environmental conditions	Operating temperature: -40 to 70°C Storage temperature: -40 to 80 °C 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 The required screws to fix the relay should be M4

(*) Optional, depending on the model

¹ Only for models with SHB function

CONNECTIONS DIAGRAM SIL-A

3 Standard current transformers

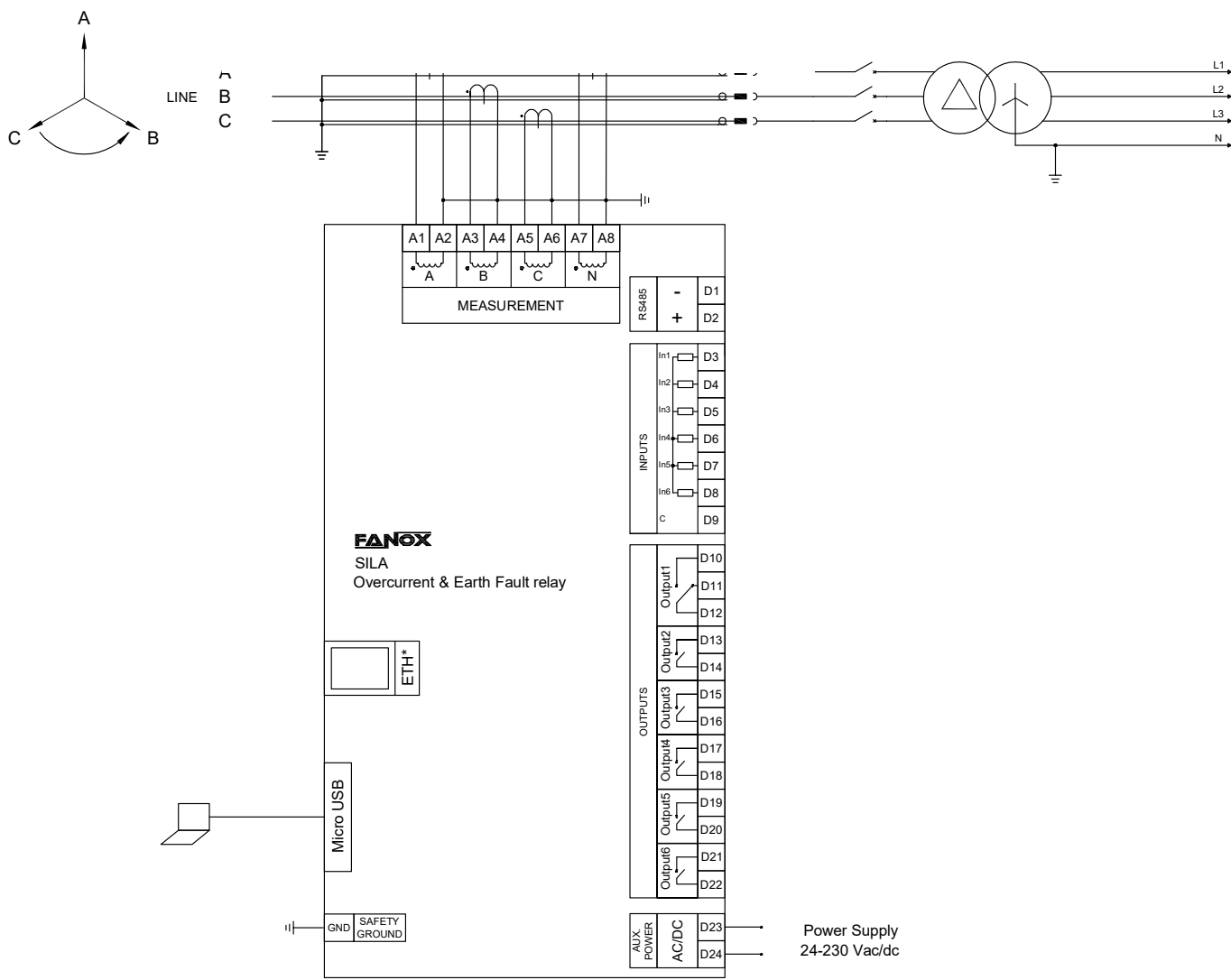


(*) Example of connections diagram

(*) Other inputs and outputs available depending on model

CONNECTIONS DIAGRAM SIL-A

4 Standard current transformers

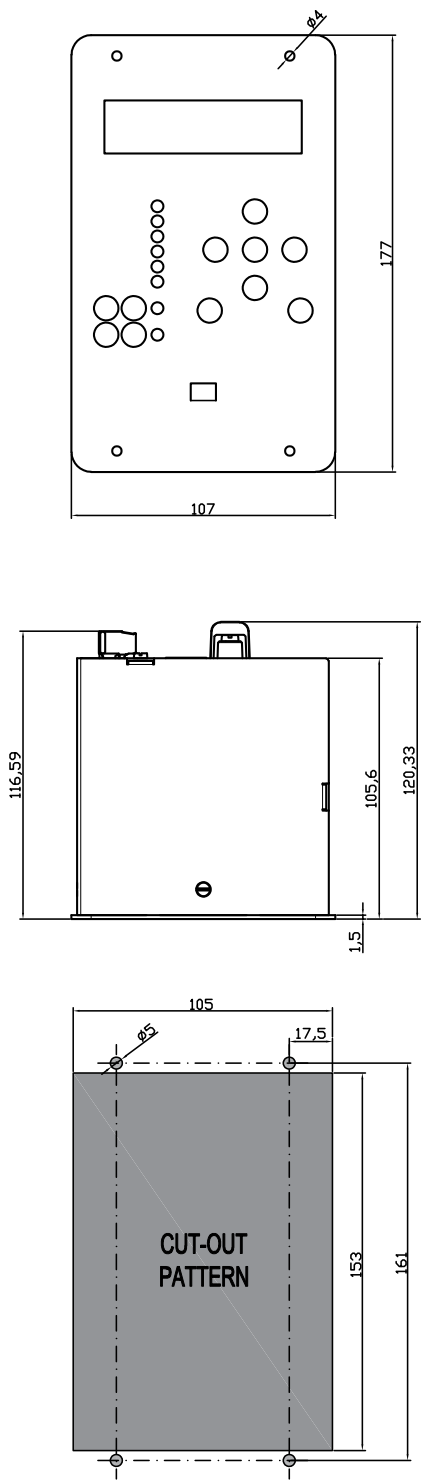


(*) Example of connections diagram

(*) Other inputs and outputs available depending on model

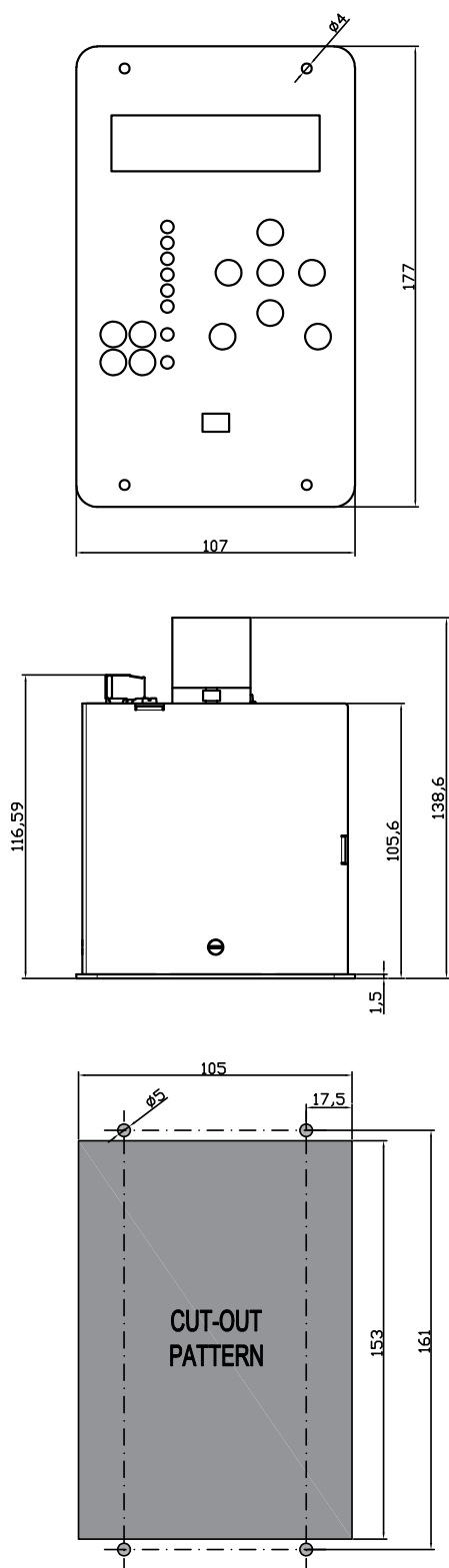
DIMENSIONS AND CUTOUT SIL-A

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
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	• 4xI _n • 100xI _n
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 ENVIRONMENTAL 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	-

TEST	TEST STANDARD	LEVEL
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, 5, 6 and 7)
	0 1									NEUTRAL CURRENT MEASUREMENT 1 A or 5 A 1 A (For short-circuitable terminals: Mechanics options 3, 5, 6 and 7)
		0								NET FREQUENCY Defined by General Settings
			C							POWER SUPPLY 24-230 Vdc / 100-230Vac
				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 H J					COMMUNICATIONS E: USB (Modbus RTU) + Rear Serial Port (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) F: USB (Modbus RTU) + Rear Serial Port (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + Rear Ethernet Port (RJ45) (Modbus TCP, DNP3 TCP or IEC 60870-5-104) + Web Server + SNTP protocol H: USB (Modbus RTU) + Rear Serial Port (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + Rear Ethernet Port (RJ45) (Modbus TCP, DNP3 TCP, IEC 60870-5-104 or IEC61850) + Web Server + SNTP protocol J: USB (Modbus RTU) + Rear Serial Port (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + Rear FO-LC Port (Modbus TCP, DNP3 TCP, IEC 60870-5-104 or IEC61850) + Web Server + SNTP protocol
						0 1 2 3 4 5				INPUTS AND OUTPUTS 3 Inputs + 3 Outputs 6 Inputs + 4 Outputs 6 Inputs + 6 Outputs 5 Inputs + 7 Outputs 9 Inputs + 5 Outputs 5 Inputs + 6 Outputs
							2 3 4 5 6 7 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 6: Vertical Withdrawable Assembly and short-circuitable current terminals 7: Vertical Withdrawable 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 C: Default functions: 50 + 50G + 51 + 51G + CLP + 46 + 52 + 79 + 74TCS + 86 + 49T 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

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.