

SIA-B Standard CT's

OC&EF
DUAL & SELF POWERED
PROTECTION RELAY

Secondary Distribution Protection

RMUS, MRMS, AND SF6 INSULATED SWITCHGEARS



Transformer



Wind Power



Solar Power

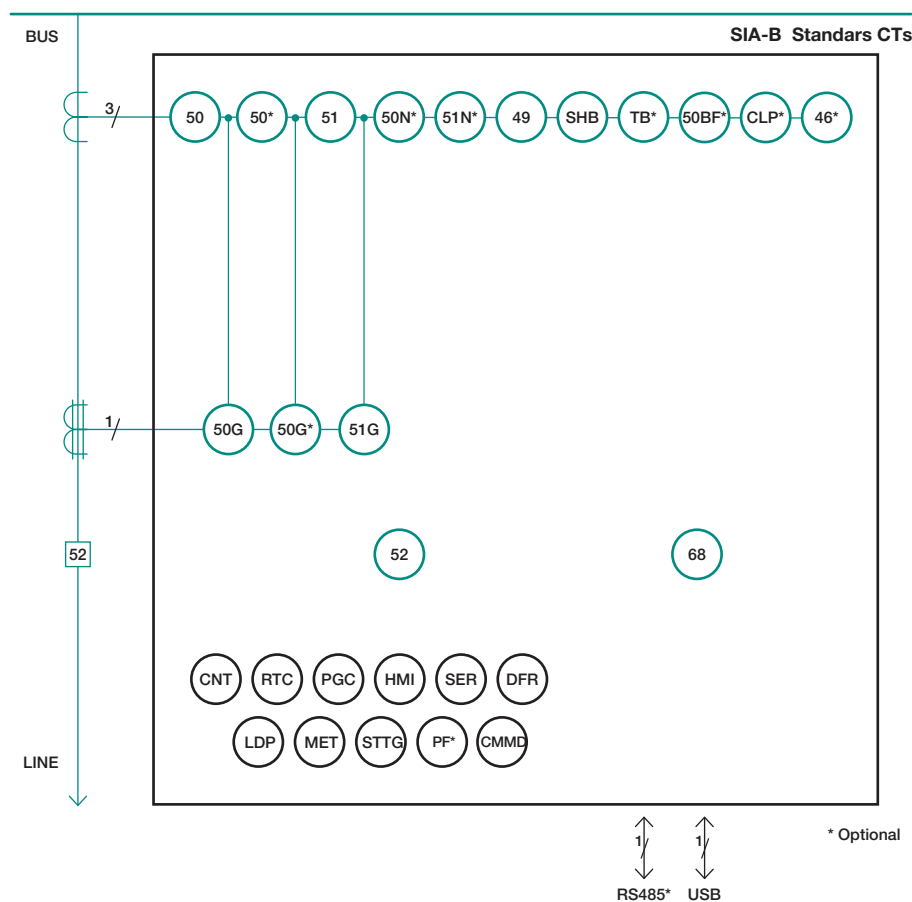
PM I SP 0.075 xIn CI Std. CTs /1



- The SIA-B is an OC&EF protection relay with self-powered and dual-powered (self-powering + auxiliary power) options.
- Measurements: Phases currents, measured and calculated neutral current and power factor calculation based on set voltage reference.
- The relay is self-powered using the operating current through three /1 (<2VA) standard current transformers fitted on the lines. These transformers are also used to obtain current measurements. Besides, SIA-B can be used with auxiliary power supply (24-230Vac/dc). The relay can also be supplied by a USB cable connected to the laptop or with a standard power bank.
- Internal commissioning battery included as optional (Lithium battery: 20 years lifetime).
- Metallic box with high electromagnetic compatibility level (EMC) and wide range of operating temperature.
- Really low start-up levels in self-powered mode: 75 mA in a three-phase system /160 mA in a single-phase system.
- Test menu allows the trip circuit to be tested before the transformation centre is powered up.
- Phases and neutral current measurements plus power factor calculation based on adjusted voltage reference.
- There are 4 configurable LEDs. When the relay is switched off, its previous states can be checked by powering the relay up (by self-powering the relay through a USB cable, auxiliary voltage, or pressing the commissioning battery).
- Self-diagnosis of the relay status (WATCHDOG) through the configurable LEDs and outputs.
- Low power consumption.

- To allow communication, relays are provided with a local micro USB front port and with optional remote communication RS485 port (Modbus RTU, IEC60870-5-103 or DNP3.0 protocol, selectable by general settings) on the rear side.
- The SIA-B is provided with a trip output for low power coil (24 Vdc – 135 mJ), 3 configurable inputs, and 3 configurable outputs.
- The SIA-B is fitted with the demand of current (Load Data Profiling) with the following characteristics:
 - » Number of records: 168
 - » Recording mode circular
 - » Sampling rate (interval): configurable through communications 1-60 min
- The SIA-B is provided with non-volatile RAM memory in order to store up to 1.024 events and disturbance fault recording (DFR-20 fault reports and 10 oscillographic records in COMTRADE format), maintaining date & time thanks to its internal RTC (Real Time Clock) even without power supply.
- Each oscillographic record contains 4 analogue channels and up to 32 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).
- The installation and subsequent maintenance of external batteries is eliminated. The operating costs of the centre are reduced.
- Its compact size makes SIA-B easy to install and its light weight helps the customer to save costs in transport.

FUNCTIONS DIAGRAM SIA-B



ANSI CODE PROTECTIONS

50	Instantaneous phase overcurrent
51	Inverse time phase overcurrent
50G	Instantaneous measured neutral overcurrent
51G	Inverse time measured neutral overcurrent
50N	Instantaneous calculated neutral overcurrent
51N	Inverse time calculated neutral overcurrent
SHB	Second Harmonic Blocking
49T	External trip
46	Phase balance current protection
49	Thermal overload
CLP	Cold Load Pickup
52	Breaker wear monitoring
74TVS	Trip voltage supervision
50BF	Circuit Breaker Failure
68	Zone selection interlocking
TB	Trip block for switch disconnecter
PGC	Programmable logic control

ADDITIONAL FUNCTIONS

CNT	Counters
RTC	Real Time Clock
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
PF	Power Factor calculation
CMMD	Commands

TECHNICAL PARAMETERS SIA-B

Function 50-1 Function 50-2 (*)	Function Enable: No/Alarm/Trip/S HB
	Current Tap: 0.05 to 30.00 xIn (step 0.01 xIn)
	Time Delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	According to the "phase reset time" general setting
Function 50G-1 Function 50G-2 (*)	Timing accuracy: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).
	Function Enable: No/Alarm/Trip/S HB
	Current Tap: 0.002 to 10.000 xIn (step 0.001 xIn)
	Time Delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
Function 50N (*)	According the "phase reset time" general setting
	Timing accuracy: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).
	Function Enable: No/Alarm/Trip/S HB
	Current Tap: 0.05 to 30.00 xIn (step 0.01 xIn)
	Time Delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
Function 50N (*)	Deactivation level: 95%
	According to the "phase reset time" general setting
	Timing accuracy: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).

Function 51	Function Enable: No/Alarm/Trip/S HB
	Curve Type: IEC 60255-151 and IEEE curves.
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)), user defined curves (curve 1, curve 2, curve 3, curve 4) (*)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time Dial (TMS): 0.01 to 2.00 (step 0.01)
	Current Tap: 0.05 to 20.00 xIn (step 0.01 xIn)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	According the "phase reset time" general setting
	Timing accuracy for IEC and IEEE curve selection: Without SHB permitted: ± 30 ms or $\pm 5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 5\%$ (greater of both).
Function 51G	Timing accuracy for defined time selection: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).
	Function Enable: No/Alarm/Trip/S HB
	Curve Type: IEC 60255-151 and IEEE curves.
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)), user defined curves (curve 1, curve 2, curve 3, curve 4) (*)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time Dial (TMS): 0.01 to 2.00 (step 0.01)
	Current Tap: 0.002 to 10.000 xIn (step 0.001 xIn)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	According the "phase reset time" general setting
	Timing accuracy for IEC and IEEE curve selection: Without SHB permitted: ± 30 ms or $\pm 5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 5\%$ (greater of both).
	Timing accuracy for defined time selection: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).

TECHNICAL PARAMETERS SIA-B

Function 51N (*)	Function Enable: No/Alarm/Trip/SHB
	Curve Type: IEC 60255-151 and IEEE curves.
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)), user defined curves (curve 1, curve 2, curve 3, curve 4) (*)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time Dial (TMS): 0.01 to 2.00 (step 0.01)
	Current Tap: 0.05 to 20.00 xIn (step 0.01 xIn)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	According the "phase reset time" general setting
	Timing accuracy for IEC and IEEE curve selection: Without SHB permitted: ± 30 ms or $\pm 5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 5\%$ (greater of both).
	Timing accuracy for defined time selection: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).
Function SHB	Function enable: No/Yes
	Current Tap: 5 to 50% (step 1%)
	Reset Time: 0.00 to 300.00 (step 0.01 s)
	Block Threshold: 0.05 to 30.00 xIn (step 0.01 xIn)
	Activation level: 100%
	Deactivation level: 95%
Function 49T	External trip through configurable inputs. Activated by short circuiting the terminals (without auxiliary voltage)
Function 49	Function enable: No/Alarm/Trip
	Current tap: 0.10 to 2.40 In (step 0.01 xIn)
	ζ heating: 3 to 600 min (step 1 min)
	ζ cooling: 1 to 6 x ζ heating (step 1)
	Alarm: 20 to 99% (step 1%)
	Trip level: 100%
	Deactivation level: 95% of alarm level
Function 52	Timing accuracy: $\pm 5\%$ respect of theoretical value.
	Maximum number of openings: 1 to 10.000 (step 1)
	Maximum accumulated amperes: 0 to 100.000 (M(A ²)) (step 1)
	Opening time: 0.02 to 30.00 s (step 0.01 s)
	Closing time: 0.02 to 30.00 s (step 0.01 s)
	Excessive repeated openings: 1 to 10.000 (step 1)
	Repetitive openings/Time: 1 to 300 min (step 1 min)
Function 52	Open breaker activation and reset threshold: 2% In
Function TB (*)	Function Enable: No/Yes
	Tap: 1.50 to 30.00 xIn (step 0.01 xIn)
Function 46 (*)	Function enable: No/Alarm/Trip/SHB
	Curve Type: IEC 60255-151 and IEEE curves.
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)), user defined curves (curve 1, curve 2, curve 3, curve 4) (*)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Time Dial (TMS): 0.01 to 2.00 (step 0.01)
	Current tap: 0.05 to 20.00 xIn (step 0.01 xIn)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
	Defined time, current deactivation level: 95%
	According the "phase reset time" general setting
	Timing accuracy for IEC and IEEE curve selection: Without SHB permitted: ± 30 ms or $\pm 5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 5\%$ (greater of both).
	Timing accuracy for defined time curve selection: Without SHB permitted: ± 30 ms or $\pm 0.5\%$ (greater of both). With SHB permitted: ± 50 ms or $\pm 0.5\%$ (greater of both).
Function CLP (*)	Function Enable: No/Yes
	Settings groups: 1 to 4 (step 1)
	No load Time: 0.02 to 300.00 s (step 0.01 s)
	Cold load Time: 0.02 to 300.00 s (step 0.01 s)
	Open breaker activation activation 1.5% In and reset threshold: 2% In
Function 50BF (*)	Function Enable: No/Yes
	Time Delay: 0.020 to 1.000 s (step 0.001 s)
Power Factor calculation (*)	Open breaker activation 1.5% In and reset threshold: 2% In
	Voltage reference module: 11 to 36 kV (step 0.1 kV)
Function 68	I-V reference angle: 0 to 359° (step 1°)
	Available through configurable inputs and outputs thanks to the programmable logic (PGC).
Programmable logic control (PGC)	OR4, OR4_PULSE, OR4_PULSES, OR4_TIMERUP, OR4_TIMERDOWN, NOR4, NOR4_PULSE, NOR4_PULSES, NOR4_TIMERUP, NOR4_TIMERDOWN, AND4, AND4_PULSE, AND4_PULSES, AND4_TIMERUP, AND4_TIMERDOWN, NAND4, NAND4_PULSE, NAND4_TIMERUP, NAND4_TIMERDOWN, XOR2, RSFF, NON-VOLATILE RSFF, SRFF, NON-VOLATILE RSFF.
Settings tables	4 settings groups
	Selectable by input or general setting.
SER	1024 events

TECHNICAL PARAMETERS SIA-B

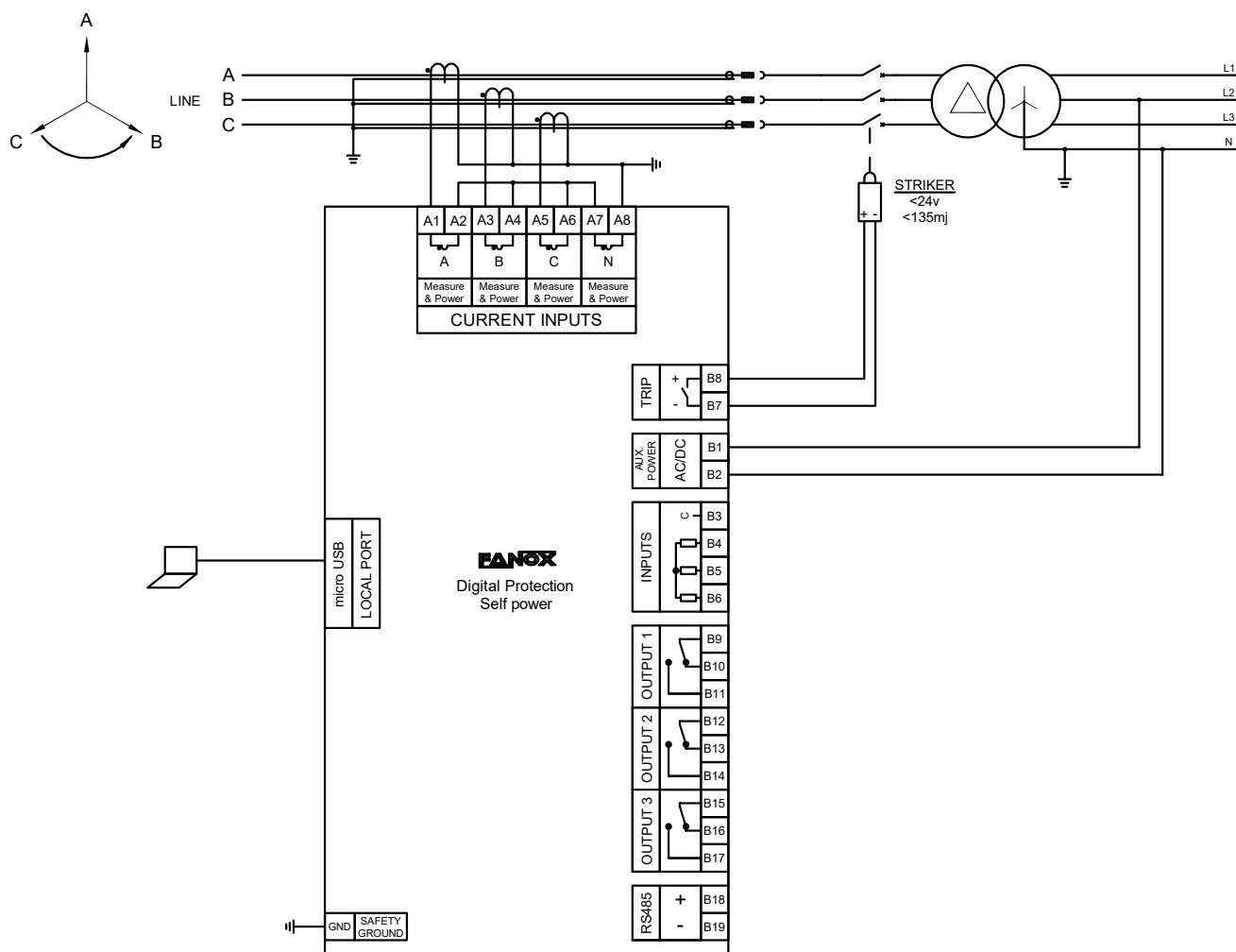
Disturbance fault recording (DFR)	16 samples/cycle
	4 analog channels and 32 digital channels
	20 fault reports, 16 events in each. 10 disturbance records in COMTRADE format (50 cycles each).
	COMTRADE IEEE C37.111-1991
Load Data Profiling (LDP)	Demand of current with the following characteristics: - Number of records: 168 - Recording mode circular - Sampling rate (interval): configurable through communications (1-60 min)
Trip output	24 Vdc; 135 mJ (activation of the striker or low powered coil)
Outputs	3 configurable outputs (output 1, output 2 and output 3): 250 Vac – 8 A 30 Vdc – 8 A (*) For the model with UL certification, the maximum current is 4 A
Inputs	3 inputs: they are activated by short-circuiting the terminals without external supply.
Current measurements	Phase current (I-A, I-B, I-C), neutral (3I0* and IN), positive sequence (I-1*), negative sequence (I-2*), phase second harmonic current (IA-2H, IB-2H, IC-2H), maximum current (Imax), thermal image (TI), trip voltage and calculated power factor (PF-A, PF-B, PF-C) **Power factor is calculated from voltage reference settings.
	Fundamental values (DFT)
	Sampling: 16 samples/cycle
	±2% in a band of ± 20% the nominal current and ±4% or ± 5 mA in the rest of the band. In case the current is between 0.002 to 0.0125 times the nominal current the accuracy will be 0.5mA.
	Phase measurement range: 0.02 to 30 times the nominal current
	Neutral measurement range: 0.002 to 16 times the nominal current
Communications	Local port (micro USB): Modbus RTU RS485 rear port: Modbus RTU, IEC60870-5-103 or DNP3.0 Serial (*)
Self powering from current	Three phase self-powering level: I > 75 mA
Power supply (*)	24-230 Vac/Vdc (-20/+10%)
Battery Supply	Commissioning internal battery
Transformers	Power supply and measurement with standard CTs /1
Environmental conditions	Operating temperature: -40 to 70°C
	Storage temperature: -40 to 80°C
	Relative humidity: 95%

Mechanical characteristics	Metallic box
	Panel mounted
	Height x Width x Depth
	SIABxxxxxx2(6)xx: 90 mm x 245 mm x 139.4 mm
	SIABxxxxxx7xx: 90 mm x 245 mm x 149.56 mm
	SIABxxxxxx8xx: 90 mm x 245 mm x 144.38 mm
	Weight: 3 kg
	IP-54 panel mounted

(*) Optional depending on model

CONNECTIONS DIAGRAM SIA-B

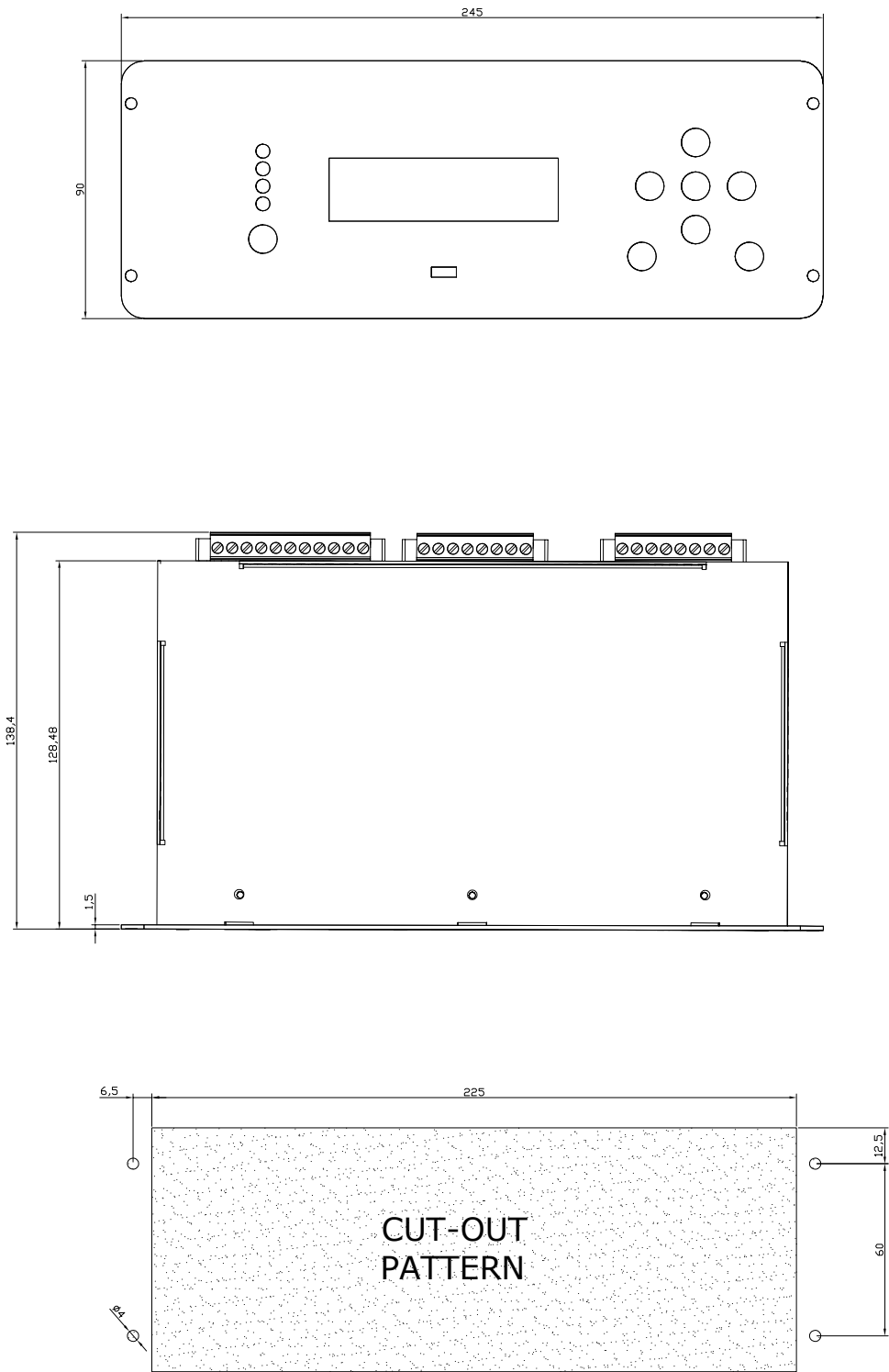
- 3 CT power supply-measurement
- Rigid neutral



(*) Example of connections diagram

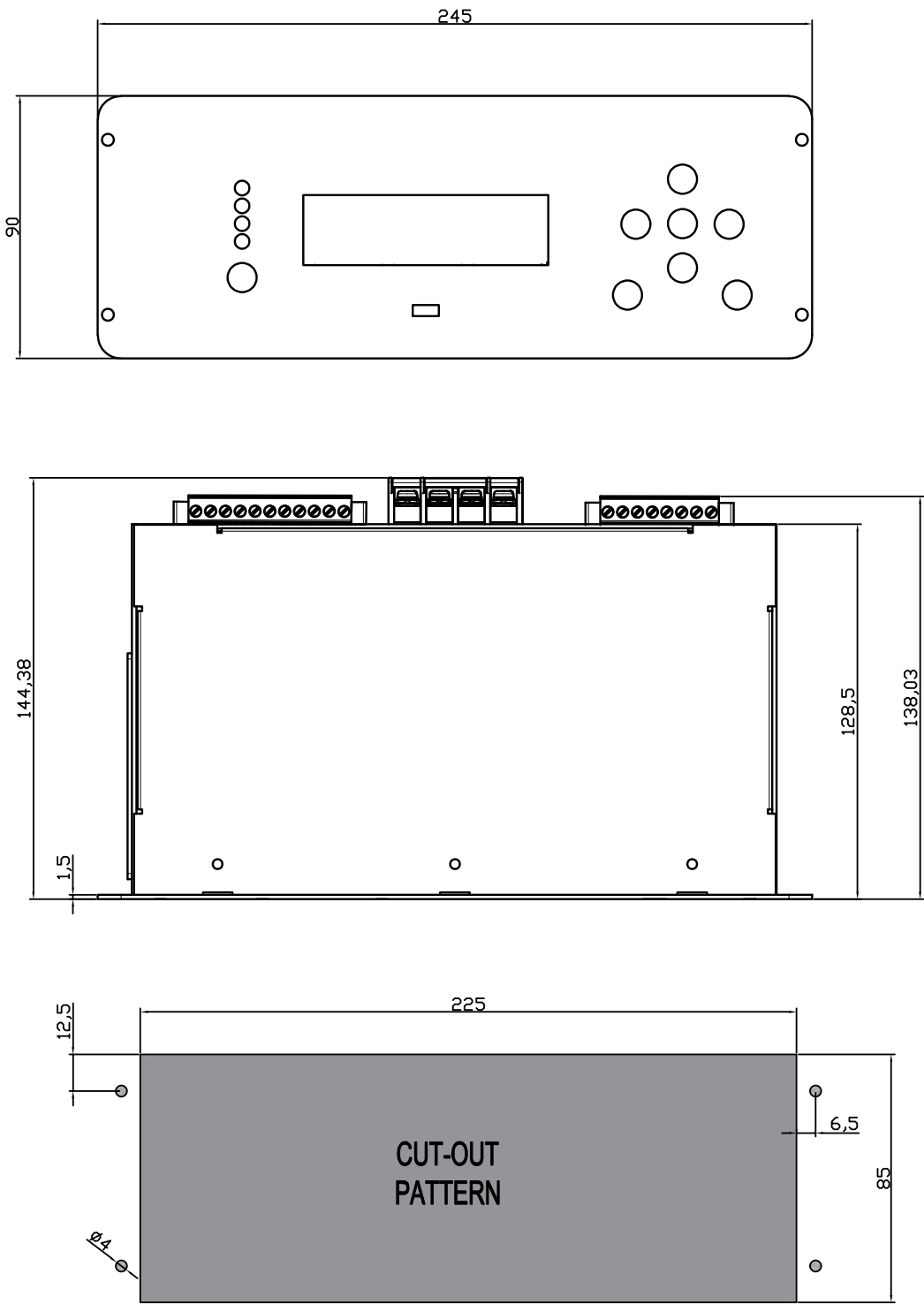
DIMENSIONS AND CUTOUT SIA-B

- Mechanical 2,6 and 7



DIMENSIONS AND CUTOUT SIA-B

- Mechanical 8
Extended Horizontal Assembly with barrier block with ring lug current terminals



KEMA STANDARDS SIA-B

TEST	TEST STANDARD	LEVEL
1. DIELECTRIC TESTS		
1.1. Impulse voltage	IEC60255-27 Clause 10.6.4.2	5 kV 1 kV
1.2. Dielectric voltage	IEC60255-27 Clause 10.6.4.3	2 kV 0,5 kV
1.3. Insulation resistance	IEC60255-27 Clause 10.6.4.4	500 VDC
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	6 kV cont. 8 kV air
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 (50 Hz)	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 (50 Hz)	IEC 60255-26 (IEC 61000-4-8) Clause 7.2.10	30 A/m cont. 300 A/m 1-3 s
2.2.9. D.C. Voltage dips	IEC 60255-26 (IEC 61000-4-29) Clause 7.2.11	100%; 10-1000 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%; 5s
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% Ut_dc 100/120 Hz
2.2.14. D.C gradual shut-down/start-up	IEC 60255-26 Clause 7.2.13	Shut-down ramp 60 s 5 min off Start-up ramp 60 s
2.2.15. Damped oscillatory magnetic field (100 kHz and 1 MHz)	IEC 61000-4-10	☒ Zone A 100 A/m (peak) ☐ Zone B 30 A/m (peak)
2.2.16. Pulse magnetic field	IEC 61000-4-9	1000 A/m
3. MECHANICAL ENVIRONMENTAL CONDITIONS		
3.1. Vibration response	IEC 60255-1 (IEC 60255-21-1) Clause 6.13.1	class 1
3.2. Vibration endurance	IEC 60255-1 (IEC 60255-21-1) Clause 6.13.1	class 1
3.3. Shock response	IEC 60255-1 (IEC 60255-21-2) Clause 6.13.2	class 1
3.4. Shock withstand	IEC 60255-1 (IEC 60255-21-2) Clause 6.13.2	class 1

KEMA STANDARDS SIA-B

3.5. Bump	IEC 60255-1 (IEC 60255-21-2) Clause 6.13.2	class 1
3.6. Seismic (single axis sweep)	IEC 60255-1 (IEC 60255-21-3) Clause 6.13.3	class 1
4. CLIMATIC ENVIRONMENTAL CONDITIONS		
4.1. Dry heat operational	IEC 60255-1 (IEC 60068-2-2, test Bd) Clause 6.12.3.1	+70°C; 72h
4.2. Cold operational	IEC 60255-1 (IEC 60068-2-1, test Ad) Clause 6.12.3.2	-40°C; 72h
4.3. Dry heat storage	IEC 60255-1 (IEC 60068-2-2, test Bb) Clause 6.12.3.3	+80°C; 72h
4.4. Cold storage	IEC 60255-1 (IEC 60068-2-1, test Ab) Clause 6.12.3.4	-40°C; 72h
4.5. 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
4.6. Damp heat, steady state	IEC 60255-1 (IEC 60068-2-78, test Cab) Clause 6.12.3.6	+40°C; 93% 10 days
4.7. 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



SELECTION & ORDERING DATA SIA-B

SIA-B Standard CT's

Overcurrent & Earth Fault Protection Relay – Dual & Self-powered

1										PHASE CURRENT MEASUREMENT 1 A
	1									NEUTRAL CURRENT MEASUREMENT 1 A
		0								NET FREQUENCY Defined by General Settings
			A F							POWER SUPPLY Self-powered + Commissioning battery Self-powered + 24-230 Vac/dc (Dual) + Commissioning battery
				C D						ADDITIONAL FUNCTIONS + 49 + SHB + 4 Settings groups + LDP + DFR + 52 + 49 + SHB + 4 Settings groups + LDP + DFR + 52 + 46 + Trip Block + 50_2 + 50G_2 + CLP + 50BF
					0 2 3					COMMUNICATIONS 0: USB (Modbus RTU) 2: USB (Modbus RTU) + RS485 (Modbus RTU or DNP3.0 Serial) 3: USB (Modbus RTU) + RS485 (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial)
						3				INPUTS AND OUTPUTS 4 LEDs + Trip (Striker) + 3 Outputs + 3 Inputs
							2 6 7 8			MECHANICAL ASSEMBLY 2: Extended Horizontal Assembly 6: Extended Horizontal Assembly with anticorrosive treatment 7: Extended Horizontal Assembly with red LED for IRF and with barrier block with ring lug current terminals 8: Extended Horizontal Assembly with barrier block with ring lug current terminals
								A B C D F		LANGUAGE English, Spanish and German English, Spanish and Turkish English, Spanish and French English, Spanish and Russian English, French and Dutch
									C D E U	ADAPTATION C: 50_1 + 51 + 50G_1 + 51G + PGC D: 50_1 + 51 + 50G_1 + 51G + 50N + 51N + PGC + PF calculation + E User defined curves E: 50_1 + 51 + 50G_1 + 51G + PGC + User defined curves U: 50_1 + 51 + 50G_1 + 51G + 50N + 51N + PGC + PF calculation + User defined curves + UL certification

Example of ordering code:

1	1	0	F	C	0	3	2	A	C	SIAB110FC032AC
SIA-B										