SIA-C

Dual & Self Powered OC&EF Protection Relays

ANSI CODE PROTECTIONS	
50	Instantaneous phase overcurrent
51	Inverse time phase overcurrent
50G	Instantaneous measured neutral overcurrent
51G	Inverse time measured neutral overcurrent
SHB	Second Harmonic Blocking
49T	External trip
46	Phase balance current protection
49	Thermal overload
CLP	Cold Load Pickup
46BC	Broken Conductor Detection
52	Breaker wear monitoring
79	AC Reclosing device
74CT	Phase CT supervision
74TCS	Trip voltage supervision
50BF	Circuit Breaker Failure
68	Zone selection interlocking
PGC	Programmable logic control

SIA-C

Overcurrent & Earth Fault Protection Relay

Secondary Distribution Protection, RMUs, MRMUs, and SF6 insulated Switchgears

• The SIA-C is an OC&EF protection relay with self powered and dual powered (self-powering + auxiliary power) options.

• The relay is self powered using the operating current through three /5 (5VA) or /1 (2.5VA) standard current transformers fitted on the lines. These transformers are also used to obtain current measurements. Besides, SIAC relay can be used with auxiliary power supply (24 Vdc, 230 Vac, 48 Vdc or 100-230 Vdc/ac). The relay can be occasionally supplied by an external battery portable kit (KITCOM).

• Internal Commissioning battery as optional. (Lithium battery: 20 years lifetime).

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

• Low start-up levels In self powered mode, 0.1 times of the nominal current in three phase system/0.2 times of the nominal current in single phase system

• Test menu allows the trip circuit to be tested before the transformation centre is powered up.

• Bistable magnetic indicators which indicate the trip cause, maintaining their position even though the relay loses the supply (flags).

• Self-diagnosis of the relay status (WATCHDOG) through the configurable LEDs and outputs.

• Low power consumption.

• To allow communication, relays are provided with a RS232 front port and with optional remote communication RS485 port (Modbus RTU or IEC60870-5-103 protocol, selectable by general settings) on the rear side.

KEMA Labs

• The SIA-C is provided with a trip output for low power coil (24 Vdc – 135 mJ) or for standard coil depending on model and, optionally, 1 external trip input, up to 2 configurable inputs and up to 3 configurable outputs.

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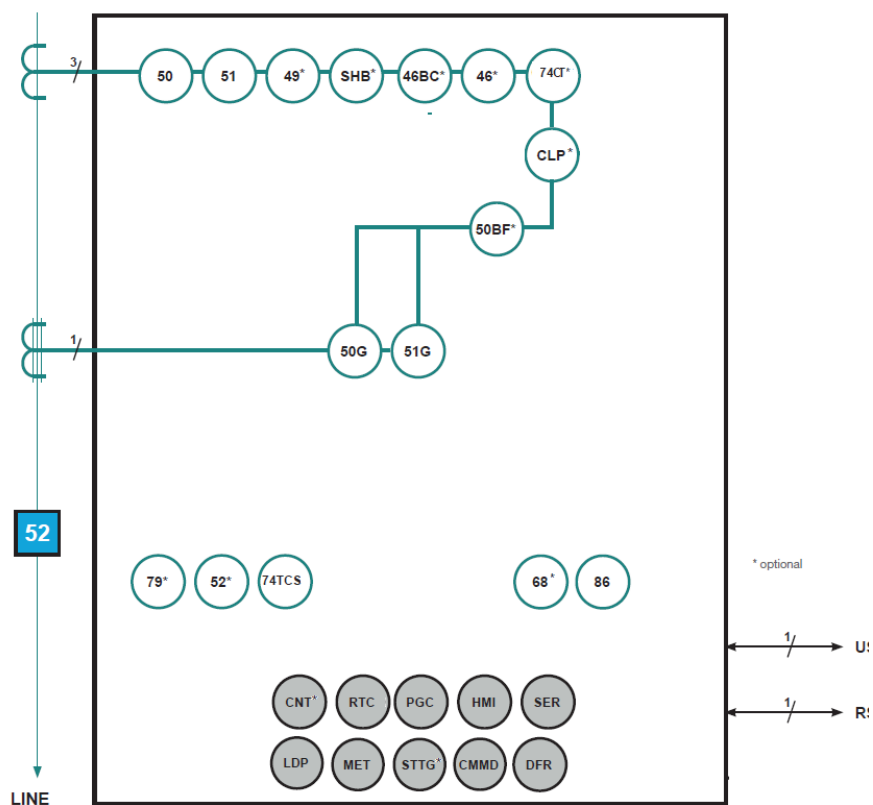
•The oscillography is downloaded by communications port. The SICom communications program allows the oscillography record to be downloaded and saved in COMTRADE format (IEEE C37.111-1991).

• The installation and subsequent maintenance of external batteries is eliminated. The operating costs of the centre are reduced.

• Different sizes of SIA-C relay available by model list to fulfil all the needs of our customers and make the installation easier.

Functions diagram SIA-C

ANSI CODE PROTECTIONS	
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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
CMMD	Commands

Technical parameters SIA-C

Function 50-1 / Function 50-2 (*)	
	Function Enable: Yes/No/SHB[(*)]
	Current Tap: 0.10 to 30.00 xIn (step 0.01 x In)
	Time Delay: 0.02 to 300.00 s (step 0.01 s)
	Activation level 100%
	Deactivation level 95%
	Instantaneous deactivation
	Timing accuracy: ± 20 ms or ± 0.5% (greater of both). Adaptation C With SHB permitted: ± 40 ms or ± 0.5% (greater of both).

Function 50G-1 / Function 50G-2 (*)	
	Function Enable: Yes/No/SHB[(*)]
	Current Tap: 0.10 to 30.00 xIn (step 0.01 x In)
	Time Delay: 0.02 to 300.00 s (step 0.01 s)
	Activation level 100%
	Deactivation level 95%
	Instantaneous deactivation
	Timing accuracy: ± 20 ms or ± 0.5% (greater of both). Adaptation C With SHB permitted: ± 40 ms or ± 0.5% (greater of both).

Function 51	
	Function Enable: Yes/No/SHB[(*)]
	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: 0.02 to 300.00 s (step 0.01 s)
	Time Dial (TMS): 0.02 to 1.25 (step 0.01)
	Current Tap: 0.10 to 7.00 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%
	Instantaneous deactivation
	Timing accuracy for IEC and IEEE curve selection: ± 30 ms or ± 5% (greater of both). Adaptation C With SHB permitted: ± 40 ms or ± 5% (greater of both).
	Timing accuracy for defined time selection: ± 30 ms or ± 0.5% (greater of both). Adaptation C with SHB permitted: ± 40 ms or ± 0.5% (greater of both).

Function 51G	
	Function Enable: Yes/No/SHB[(*)]
	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: 0.02 to 300.00 s (step 0.01 s)
	Time Dial (TMS): 0.02 to 1.25 (step 0.01)
	Current Tap: 0.10 to 7.00 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%
	Instantaneous deactivation
	Timing accuracy for IEC and IEEE curve selection: ± 30 ms or ± 5% (greater of both). Adaptation C With SHB permitted: ± 40 ms or ± 5% (greater of both).
	Timing accuracy for defined time selection: ± 30 ms or ± 0.5% (greater of both). Adaptation C with SHB permitted: ± 40 ms or ± 0.5% (greater of both).

Function SHB (*)	
	Function enable: No/Yes
	Current Tap: 10 to 50% (step 1%)
	Reset Time: 0.00 to 300.00 (step 0.01 s)
	Block Threshold: 0.10 to 30.00 xIn (step 0.01 xIn)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation

Function 49 (*)	
	Function enable: No/Yes
	Current tap: 0.10 to 2.40 In (step 0.01xIn)
	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 TB (*)	
	Function Enable: Yes/No
	Tap: 1.50 to 20.00 xIn (step 0.01 xIn)

Technical parameters SIA-C

Function 46 (*)	Function enable: No/Yes	**Function 79 (*)**	Function Enable: Yes/No
	Curve Type: IEC 60255-151 and IEEE curves.		Hold Enable: Yes/No/No Time
			Number of reclosings: 1 to 5
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse and IEEE (Moderately inverse, very inverse, extremely inverse.		Reclosing time 1, 2, 3, 4, 5: 0.02 to 300 s (step 0.01 s)
			Hold time: 0.02 to 300 s (step 0.01 s)
			Reset time: 0.02 to 300 s (step 0.01 s)
	Time delay: 0.02 to 300.00 s (step 0.01 s)		Safe time: 0.02 to 300 s (step 0.01 s)
	Time Dial (TMS): 0.02 to 1.25 (step 0.01)		Locking possibilities: pulse inputs, level inputs, commands.
	Current tap: 0.10 to 7.00 xIn (step 0.01xIn)	**Programmable logic control (PGC)**	OR4, OR4_LATCH, OR4_PULSES, OR4_TIMERUP, OR4_PULSE, NOR4, NOR4_TIMERUP, NOR4_PULSE, NOR4_PULSES, AND4, AND4_PULSES, AND4_TIMERUP, AND4_PULSE, AND4_LATCH, NAND4, NAND4_TIMERUP, NAND4_PULSE
	Curve, current activation level: 110%		
	Curve, current deactivation level: 100%		
	Defined time, current activation level: 100%		
	Defined time, current deactivation level: 95%		
	Instantaneous deactivation	**Settings tables**	Adaptation A and C: 3 settings groups
	Timing accuracy for IEC and IEEE curve selection: ± 30 ms or ± 5% (greater of both). Adaptation C With SHB permitted: ± 40 ms or ± 5% (greater of both). Timing accuracy for defined time selection: ± 20 ms or ± 0.5% (greater of both). Adaptation C With SHB permitted: ± 40 ms or ± 0.5% (greater of both).		Adaptation B: 4 settings groups
			Selectable by input or general setting.
		SER	1024 events
		Disturbance fault recording (DFR)	16 samples/cycle
			20 fault reports, 16 events in each.
			10 disturbance records in COMTRADE format (50 cycles each).
			COMTRADE IEEE C37.111-1991 - 4 analog channels and 32 digital channels
Function CLP (*)	Function Enable: Yes/No	**Load Data Profiling (LDP)**	Demand of power with the following characteristics:
	Settings groups: 1 to 4 (step 1)		- Number of records: 168
	No load Time: 0.02 to 300.00 s (step 0.01 s)		- Recording mode circular
	Cold load Time: 0.02 to 300.00 s (step 0.01 s)		- Sampling rate (interval): configurable through communications (1-60 min)
	CLP activation threshold: 60 mA	**Trip output**	For Striker: 24 Vdc-135 mJ
	CLP reset threshold: 80 mA		For coil (optionally with TCM adapter): 250 Vac – 8A 30 Vdc – 8A Resistive load (cos = 1)
Function 50BF (*)	Function Enable: Yes/No		
	Time Delay: 0.02 to 1.00 s (step 0.01 s)		
	Open circuit breaker activation threshold: 60 mA		
Function 74CT (*)	Function Enable: yes/no	**Outputs (*)**	Up to 3 configurable outputs (output 2, output 3 and output 4):
	Time Delay: 0.02 to 300 s (step 0.01 s)		220 Vdc – 1 A (30 W max)
	Timing accuracy: ±30 ms or ±0.5% (greater of both)		250 Vac – 1 A (62,5 VA max)
Function 74TCS (*)	Trip supervision through the control of the trip voltage level.	**Inputs (*)**	1 external trip input and 2 configurable inputs:
Function 68 (*)	Available through configurable inputs and outputs thanks to the programmable logic (PGC).		They are activated by short-circuiting the terminals without external supply
Function 52 (*)	Maximum number of openings: 1 to 10.000 (step 1)	**Current measurements**	RMS
	Maximum accumulated amperes: 0 to 100.000 (M(A²)) (step 1)		Fundamental values (DFT) (Only for adaptation C)
	Opening time: 0.02 to 30.00 s (step 0.01 s)		Sampling: 16 samples/cycle
	Closing time: 0.02 to 30.00 s (step 0.01 s)		±2% in a band of ± 20% the nominal current and ±4% or ± 5 mA in the rest of the band.
	Excessive repeated openings: 1 to 10.000 (step 1)	**Communications**	RS232 port: Modbus RTU
	Repetitive openings/Time: 1 to 300 min (step 1 min)		RS485 port: Modbus RTU (*)
			RS485 port: Modbus RTU or IEC 60870-5-103 (*)

Technical parameters SIA-C

Self powering from current	Three phase self-powering level: I > 0.1 xIn
Power supply (*)	230 Vac -20 % and +10%
	24 Vdc -20 % and +10%
	48 Vdc -20 % and +10%
Battery Supply	Externally, with adapter (Kitcom) DB9 port
	Internal commissioning battery (*)
Transformers	Power supply and measurement standard CTs /1 or /5
Environmental conditions	Operating temperature: -40 to 70ºC
	Storage temperature: -40 to 80ºC
	Relative humidity: 95%
Mechanical characteristics	Metallic box
	Panel mounted
	Height x Width: Compact Vertical model:177 x 155 (mm) Standard Vertical model: 177 x 189 (mm) Horizontal model: 177.8 x 290.3 (mm)
	Depth: Compact Vertical model:132.8 mm / 135 mm for the withdrawable model Standard Vertical model: 145.8 (mm) Horizontal model: 100.75 mm
	Weight: 3.5 kg
	IP-54 panel mounted
(*) Optional depending on model	

Connections diagram SIA-C

- 3 power supply-measurement CTs
- Solid neutral
- 2 inputs + 2 outputs
- RS485
- Trip by means of Striker
- External trip
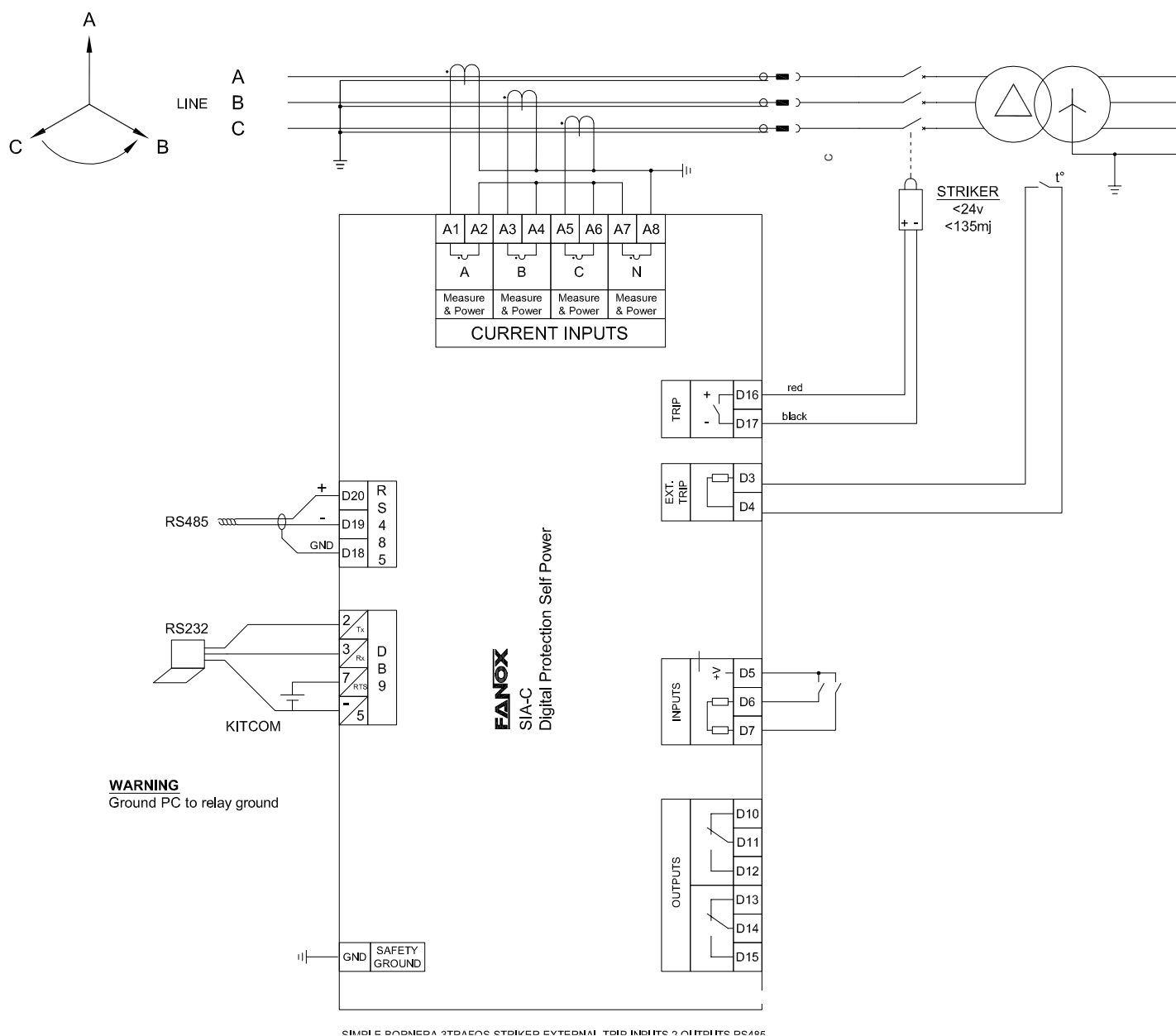
(*) Other connections available Depending on model.

Connections diagram SIA-C

- 3 power supply-measurement CTs
- 1 neutral CT
- 2 inputs + 2 outputs
- RS485
- Trip by means of Striker
- External trip
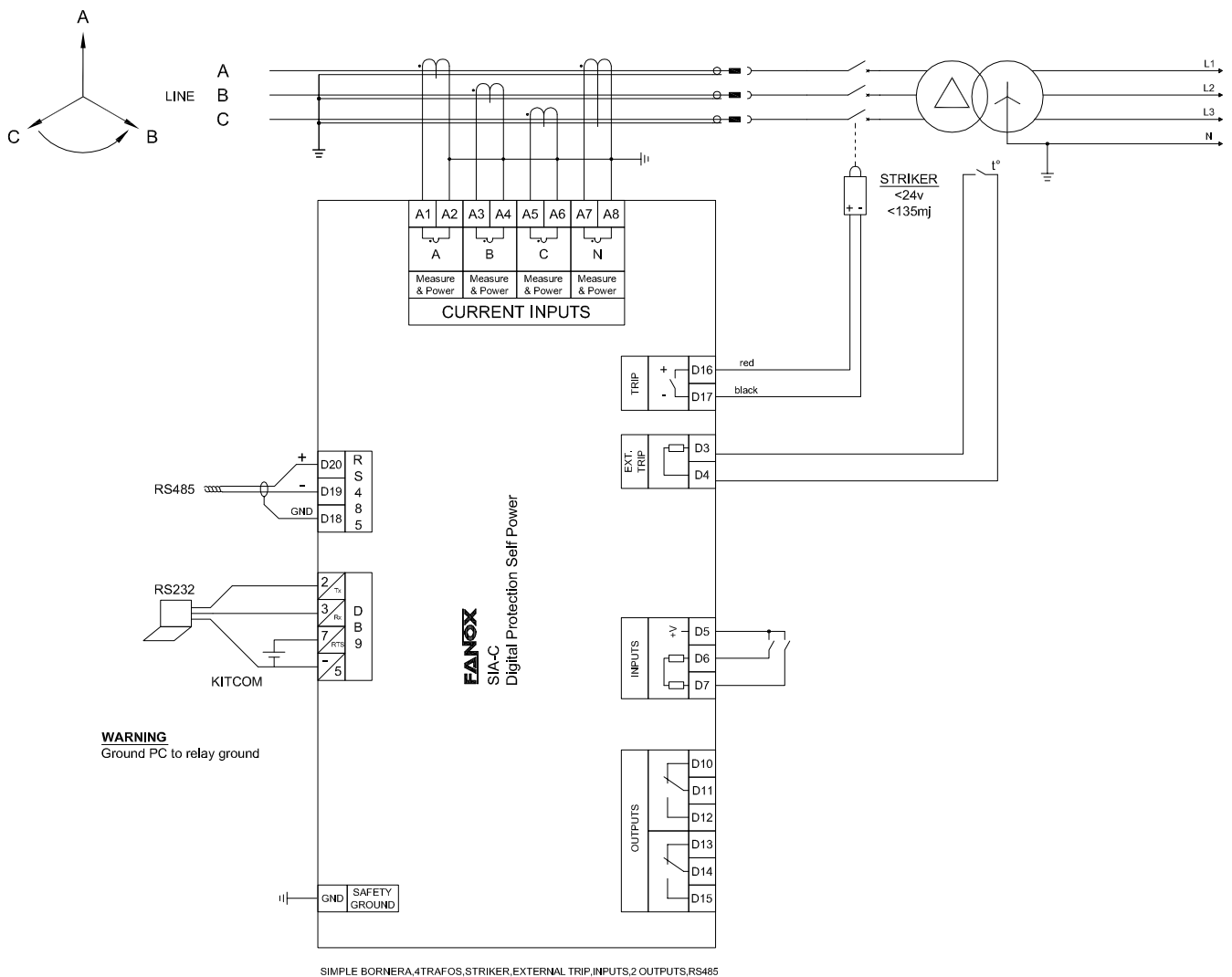
(*) Other connections available Depending on model.

Dimensions and cutout SIA-C

Vertical assembly

Mechanical assembly: D
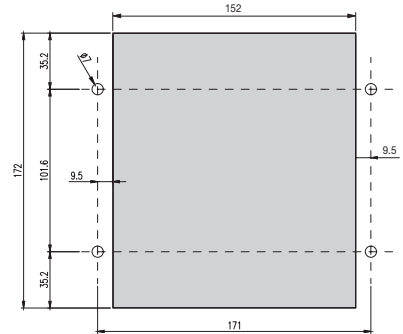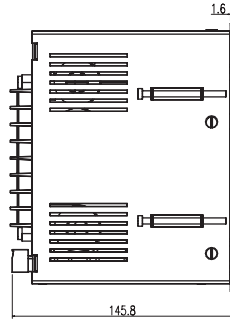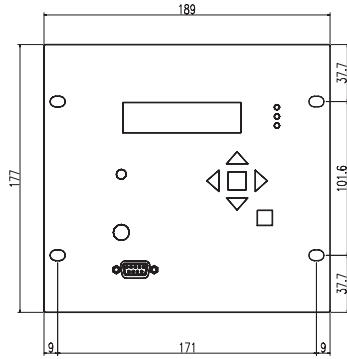
Withwadrable Vertical assembly Compact size

Mechanical assembly: F
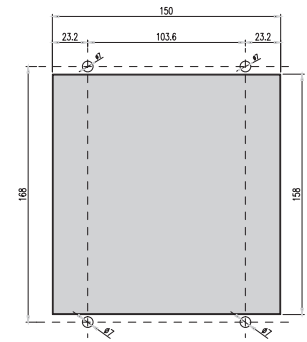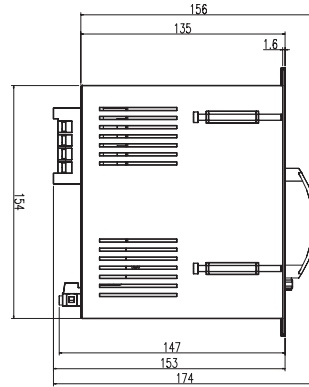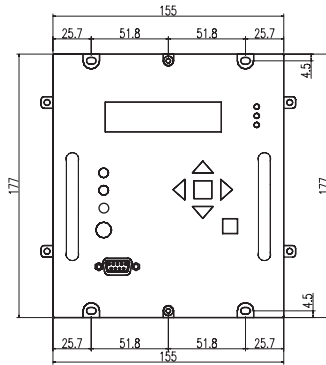
Vertical assembly Compact size

Mechanical assembly: E, G
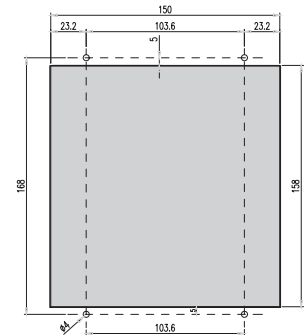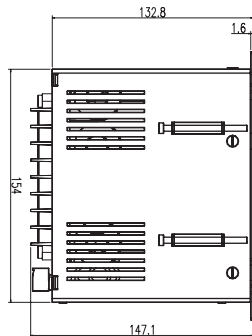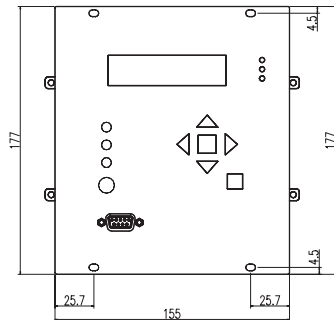
Horizontal assembly

Mechanical assembly: B, C
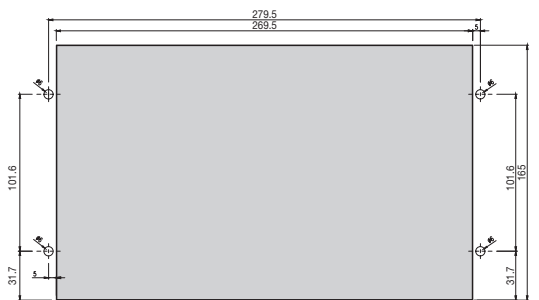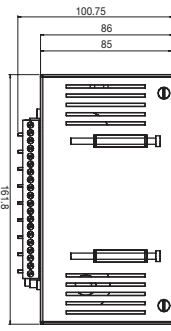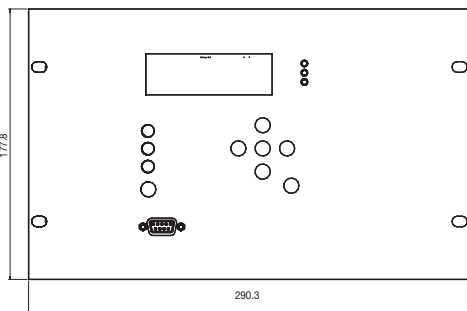
Selection & Ordering data SIA-C

Safely protected

SIA-C	Overcurrent & Earth Fault Protection Relay – Dual & Self Powered											

PHASE CURRENT MEASUREMENT
- 1 — In= 1 A
- 5 — In= 5 A

NEUTRAL CURRENT MEASUREMENT
- 1 — In= 1 A
- 5 — In= 5 A
- A — In= 0,1 A
- B — In= 0,2 A

NET FREQUENCY
- 5 — 50 Hz
- 6 — 60 Hz

POWER SUPPLY
- 0 — Self powered
- 1 — Self powered + 230 Vac (Dual)
- 3 — Self powered + 24 Vdc (Dual)
- 4 — Self powered + 48 Vdc (Dual)
- 5 — Self powered + 100/230 Vac/dc (Dual)
- A — Self powered + Commissioning battery
- B — Self powered + 230 Vac (Dual) + Commissioning battery
- D — Self powered + 24 Vdc (Dual) + Commissioning battery
- E — Self powered + 48 Vdc (Dual) + Commissioning battery
- F — Self powered + 100/230 Vac/dc (Dual) + Commissioning battery

ADDITIONAL FUNCTIONS
- 0 — Striker
- 1 — Striker with external trip (49T)
- 2 — Coil
- 3 — Coil with external trip (49T)
- 4 — Striker with external trip adapted at 230 Vac

COMMUNICATIONS
- 0 — RS232 (Modbus RTU)
- 1 — RS232 (Modbus RTU) + RS485 (Modbus RTU)
- 2 — RS232 (Modbus RTU) + RS485 (Modbus RTU or IEC60870-5-103) ("Only for Adaptation C")

INPUTS AND OUTPUTS
- 0 — Trip
- 1 — Trip + 2 outputs
- 2 — Trip + 2 outputs + 2 inputs
- 3 — Trip + 3 outputs

MEMORY
- 1 — Non-volatile RAM memory
- 2 — Non-volatile RAM memory + Fast start-up

LANGUAGE
- A — English, Spanish and German
- B — English, Spanish and Turkish
- C — English, Spanish and French
- D — English, Spanish and Russian

MECHANICS
- B: Horizontal assembly with 1 magnetic Flag
- C: Horizontal assembly with 3 magnetic Flags
- D: Double rear terminals, Vertical assembly with 1 magnetic Flag
- E: Vertical, Compact Size with 3 magnetic Flags
- F: Vertical, Compact Size with 3 Flags, Backlight LCD, Withdrawable
- G: Vertical Assembly, compact size with 1 magnetic indicator, Backlight LCD
- H: Double rear terminals, Vertical assembly with 1 magnetic Flag with anticorrosive treatment
- I: Vertical, Compact Size with 3 magnetic Flags with anticorrosive treatment
- J: Vertical, Compact Size with 3 magnetic Flags, Backlight LCD. SBEF application

ADAPTATION
- - — 50_1 + 51 + 50G_1 + 51G +74TCS + PGC
- A — + 50_2 + 50G_2 + 3 Settings group
- B — + CLP + 4 Settings groups
- C — + 50_2 + 50G_2 + 46 + 50BF+ 49 + 79 + 52 + 74CT + 46BC + SHB + 3 settings groups

Example of ordering code:

SIA-C	1	1	5	0	0	0	3	2	A	F	A	SIA C 1 1 5 0 0 0 3 2 A F A

FANOX

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