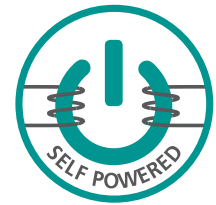


# SIA-C Standard CT's

Overcurrent & Earth Fault Protection  
Relay for Secondary Distribution

Reliable OC&EF Dual & Self Powered  
Protection Relay



| ANSI CODE PROTECTIONS |  |
|-----------------------|--|
| 50                    | Instantaneous phase overcurrent            |
| 50/51                 | Inverse time phase overcurrent             |
| 50G                   | Instantaneous measured neutral overcurrent |
| 50/51G                | Inverse time measured neutral overcurrent  |
| 46                    | Phase balance current protection           |
| 46BC                  | Broken Conductor detection                 |
| 49                    | Thermal image                              |
| CLP                   | Cold Load Pick-up                          |
| SHB                   | Second Harmonic Blocking                   |
| 50BF                  | Circuit Breaker opening failure            |
| 52                    | Circuit Breaker monitoring                 |
| 79                    | AC reclosing device                        |
| 74CT                  | Phase CT supervision                       |
| 74TCS                 | Trip voltage supervision                   |
| 49T                   | External Trip                              |
| 68                    | Zone selection interlocking                |
| PGC                   | Programmable logic control                 |

## Overcurrent & Earth Fault Protection Relay

Secondary Distribution Protection, RMU's, MRMU's and SF6 insulated switchgears

- The SIA-C is a overcurrent protection relay with self powered and dual powered (self + auxiliary) models.
- 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, SIA-C relay can be used with auxiliary power supply (24 Vdc, 230 Vac, 48 Vdc or 100-230 Vdc/ac). The relay can also be occasionally supplied by an external battery portable kit (KITCOM).
- **Internal commissioning battery** as optional. Lithium battery: 20 years lifetime.
- Front port connection (ModBus RTU protocol) for local communication. Remote communication through rear **RS485 (ModBus RTU or IEC 60870-5-103)** selectable by general setting).
- Specific test menu is provided and configurable inputs and outputs.
- High electromagnetic compatibility (EMC).
- **The installation and subsequent maintenance of batteries is eliminated. The operating costs of the centre are reduced.**
- In self powered mode, **the start-up of the relay from low energy levels**, 0.1 times of the nominal current in three phases, ensures capacity to trip.
- The line opening mechanism is activated either by means of a striker PRT, operated by the energy supplied by the relay itself, or by a coil using the TCM trip adapter in case it is necessary.
- There are **bistable magnetic indicators** which indicate the trip cause, maintaining their position even though the relay loses the supply (flags).
- Self diagnosis of the status (**Watchdog**) through leds and physical outputs.
- The SIA-C is fitted with the demand of current (**Load Data Profiling**) with the following characteristics:

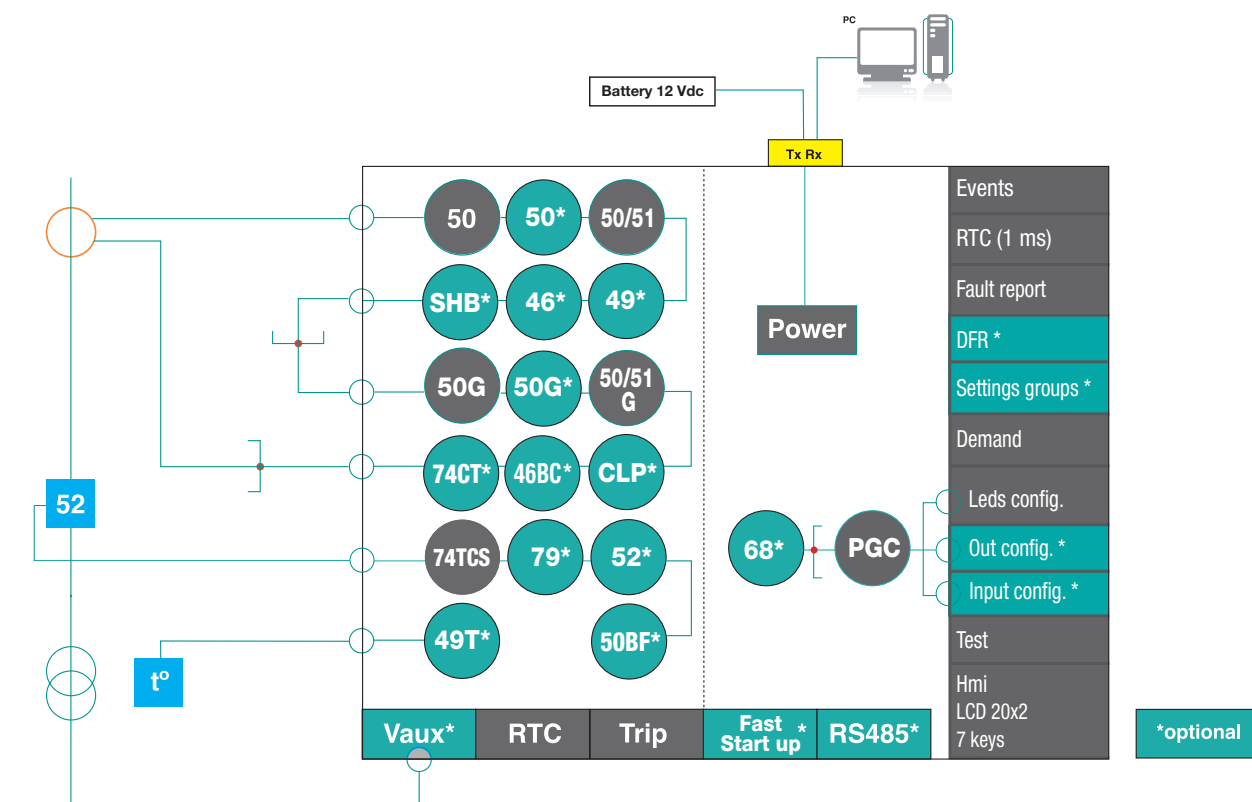
Number of records: 168

Recording mode: circular

Sampling rate (interval): configurable through communications: 1-60 min.

- Non-volatile RAM memory in order to store up to 1024 events and 20 fault report and, depending on model, disturbance fault recording (10 oscillographic records in **COMTRADE** format), maintaining date & time, thanks to its internal **RTC** (Real time clock) even without power supply.

## Functions diagram SIA-C



## Technical parameters SIA-C

|   |   |                           |   |
|---|---|---------------------------|---|
| <b>Function 50_1</b>  | Function Enable: yes/no/SHB   | <b>Function 50G_1</b>     | Function Enable: yes/no/SHB   |
|   | Current tap: 0.10 to 30 x In (step 0.01 x In)   |                           | Current tap: 0.10 to 30 x In (step 0.01 x In)   |
|   | Time delay: 0.02 to 300 s (step 0.01 s)   |                           | Time delay: 0.02 to 300 s (step 0.01 s)   |
|   | Activation level 100%   |                           | Activation level 100%   |
| <b>Function 50_2 (*)</b>                                      | Deactivation level 95%  | <b>Function 50G_2 (*)</b> | Deactivation level 95%  |
|   | Instantaneous deactivation  |                           | Instantaneous deactivation  |
| <b>Function 50/51</b>   | Timing accuracy:  | <b>Function 50/51G</b>    | Timing accuracy:  |
|   | - Without SHB permitted: ± 20 ms or ± 0.5% (greater of both).   |                           | - Without SHB permitted: ± 20 ms or ± 0.5% (greater of both).   |
|   | - With SHB permitted: ± 50 ms or ± 0.5% (greater of both).  |                           | - With SHB permitted: ± 50 ms or ± 0.5% (greater of both).  |
|   | Function Enable: yes/no/SHB   |                           | Function Enable: yes/no/SHB   |
|   | Current tap: 0.10 to 7 x In (step 0.01 x In)  |                           | Current tap: 0.10 to 7 x In (step 0.01 x In)  |
|   | Curves: IEC 60255-151 and IEEE  |                           | Curves: IEC 60255-151 and IEEE  |
|   | Curve type: IEC Inverse curve, IEC very inverse curve, IEC extremely inverse curve, IEC long time inverse, IEEE Inverse curve, IEEE very inverse curve, IEEE extremely inverse curve. |                           | Curve type: IEC Inverse curve, IEC very inverse curve, IEC extremely inverse curve, IEC long time inverse, IEEE Inverse curve, IEEE very inverse curve, IEEE extremely inverse curve. |
|   | Time delay: 0.02 to 300 s (step 0.01 s)   |                           | Time delay: 0.02 to 300 s (step 0.01 s)   |
|   | Time dial (TMS): 0.02 to 1.25 (step 0.01)   |                           | Time dial (TMS): 0.02 to 1.25 (step 0.01)   |
|   | Curve, activation level 110%  |                           | Curve, activation level 110%  |
|   | Curve, deactivation level 100%  |                           | Curve, deactivation level 100%  |
|   | Definite time, activation level 100%  |                           | Definite time, activation level 100%  |
| Definite time, deactivation level 95%                         | Definite time, deactivation level 95%   |                           |   |
| Instantaneous deactivation                                    | Instantaneous deactivation  |                           |   |
| Timing accuracy for IEC and IEEE curve selection:             | Timing accuracy for IEC and IEEE curve selection:   |                           |   |
| - Without SHB permitted: ± 30 ms or ± 5% (greater of both).   | - Without SHB permitted: ± 30 ms or ± 5% (greater of both).   |                           |   |
| - With SHB permitted: ± 50 ms or ± 5% (greater of both).      | - With SHB permitted: ± 50 ms or ± 5% (greater of both).  |                           |   |
| Timing accuracy for defined time selection:                   | Timing accuracy for defined time selection:   |                           |   |
| - Without SHB permitted: ± 20 ms or ± 0.5% (greater of both). | - Without SHB permitted: ± 20 ms or ± 0.5% (greater of both).   |                           |   |
| - With SHB permitted: ± 50 ms or ± 0.5% (greater of both).    | - With SHB permitted: ± 50 ms or ± 0.5% (greater of both).  |                           |   |

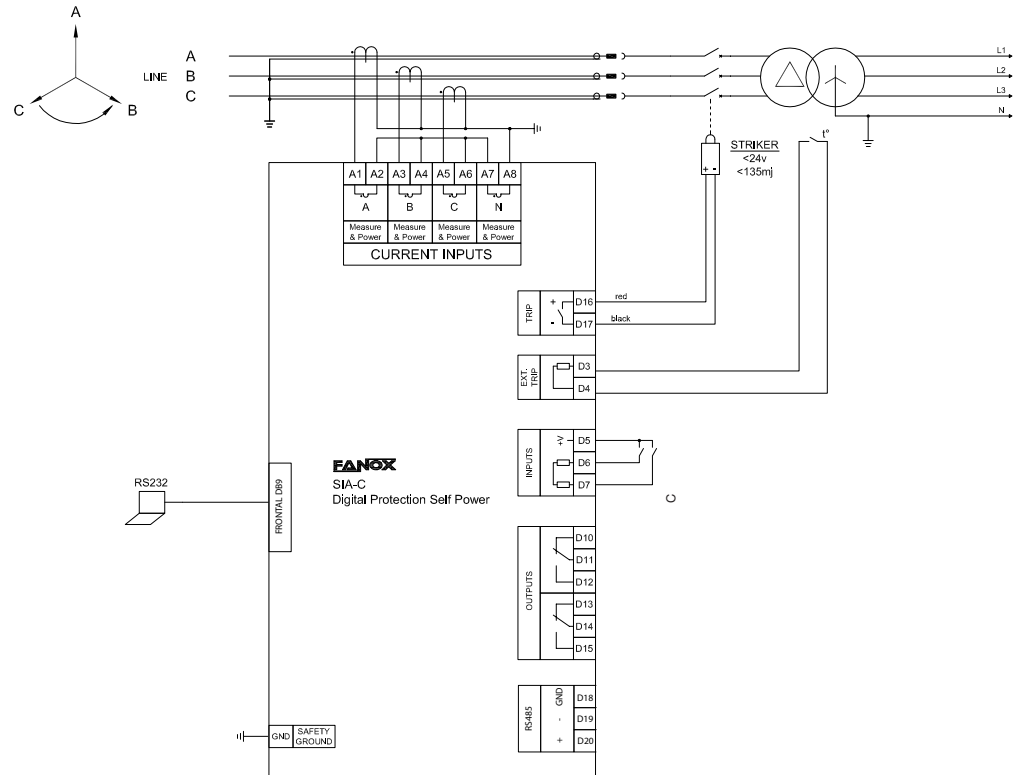
(\*) Optional depending on model

## Technical parameters SIA-C

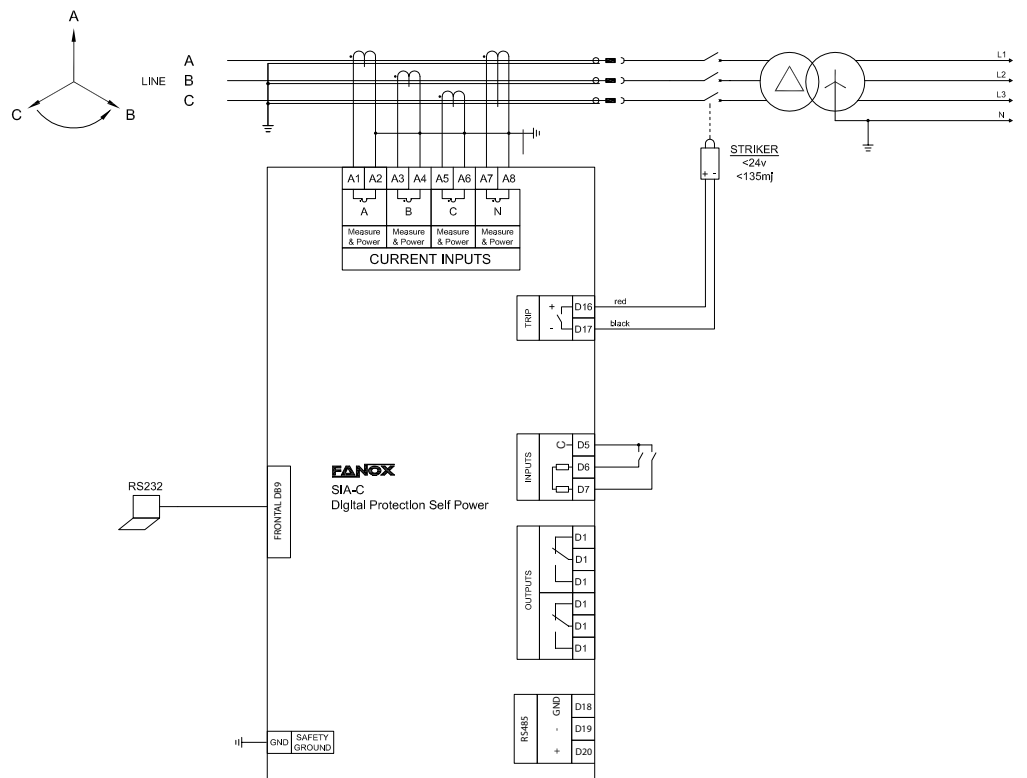
|  |   |   |   |  |
|--|---|---|---|--|
| <b>Function 46 (*)</b>   | Function Enable: yes/no/SHB   | <b>Programmable logic control (PGC)</b> | OR4, OR4_LATCH, OR4_PULSES, oR4_TIMERUP, OR4_PULSE, NOR4, AND4_LATCH, NOR4_TIMERUP, NOR4_PULSE, AND4, AND4_PULSES, AND4_TIMERUP, AND4_PULSE, NAND4, NAND4_TIMERUP, NAND4_PULSE, NOR4_PULSES   |  |
|  | Current tap: 0.10 to 7 x In (step 0.01 x In)  |   | <b>Settings groups (*)</b>  | Adaptation A and C:<br>- 3 settings groups<br>- Activated by inputs or by general settings.  |
|  | Curves: IEC 60255-151 and IEEE  |   |   | Adaptation B:<br>- 4 settings groups<br>- Activated by inputs or by general settings   |
|  | Curve Type: IEC Inverse curve, IEC very inverse curve, IEC extremely inverse curve, IEC long time inverse, IEEE Inverse curve, IEEE very inverse curve, IEEE extremely inverse curve. |   | <b>Disturbance Fault Recording (DFR)</b>  | 20 fault reports, 16 events in each  |
|  | Time delay: 0.02 to 300 s (step 0.01 s)   |   |   | 10 COMTRADE records of 50 cycles: 3 pre-fault and 47 post-fault cycles (*)   |
|  | Time dial (TMS): 0.02 to 1.25 (step 0.01)   |   | <b>Load Data Profiling (Current Demand)</b>   | Demand of current with the following characteristics:<br><ul style="list-style-type: none"><li>• Number of records: 168</li><li>• Recording mode circular</li><li>• Sampling rate (interval): configurable through communications: 1 – 60 min</li><li>• Record format:<ul style="list-style-type: none"><li>- Date/Time</li><li>- IMAX (in interval)</li><li>- IMAX (actual)</li><li>- IA</li><li>- IB</li><li>- IC</li><li>- IN</li></ul></li></ul> |
|  | Curve, activation level 110%  |   |   |  |
|  | Curve, deactivation level 100%  |   |   |  |
|  | Definite time, activation level 100%  |   |   |  |
|  | Definite time, deactivation level 95%   |   |   |  |
|  | Instantaneous deactivation  |   |   |  |
|  | Timing accuracy for IEC and IEEE curve selection:<br>- Without SHB permitted: ± 30 ms or ± 5% (greater of both).<br>- With SHB permitted: ± 50 ms or ± 5% (greater of both).          |   |   |  |
|  | Timing accuracy for defined time selection:<br>- Without SHB permitted: ± 20 ms or ± 0.5% (greater of both).<br>- With SHB permitted: ± 50 ms or ± 0.5% (greater of both).            |   |   |  |
|  | <b>Function 46BC (*)</b>  |   |   | Function Enable: yes/no  |
| Current tap: 15 to 100 % (step 1%)   |   |   |   |  |
| Time delay: 0.02 to 300 s (step 0.01 s)  |   |   |   |  |
| <b>Function 50BF (*)</b>   | Timing accuracy: ±30 ms or ±0.5% (greater of both)  | <b>Signaling outputs (*)</b>            |   | Up to 3 configurable outputs (output 2, output 3 and output 4):<br>220 Vdc – 1 A (30 W max)<br>250 Vac – 1 A (62,5 VA max)   |
|  | Function Enable: yes/no   |   |   |  |
|  | Time delay: 0.02 to 1.00 s (step 0.01 s)  |   |   |  |
|  | Open circuit breaker activation threshold: 8% In  |   |   |  |
| <b>Function 49 (*)</b>   | Open circuit breaker reset threshold: 10% In  | <b>Signaling inputs (*)</b>             | 2 configurable inputs:<br>They are activated by short-circuiting the terminals without external supply  |  |
|  | Configurable function start   |   |   |  |
|  | Function Enable: yes/no   | <b>Frequency</b>                        | 50/60 Hz  |  |
|  | Time delay: 0.02 to 2.4 x In (step 0.01)  |   |   |  |
|  | ζ heating: 3 to 600 min (step 1 min)  | <b>Current measurement</b>              | RMS<br>Sampling: 16 samples/cycle<br>Accuracy of ±2% on a band of ±20% over the nominal current and ±4% over the rest of the range.   |  |
|  | ζ cooling: 1 to 6 ζ heating (step 1)  |   |   |  |
|  | Alarm: 20 to 99 % (step 1%)   |   |   |  |
|  | Trip level: 100%  |   |   |  |
|  | Trip reset: 95% of alarm level  |   |   |  |
|  | Timing accuracy: ± 5% over the theoretical value  |   |   |  |
| Trip time curves are valid under 20 times the adjusted tap. With currents higher than 20 times the adjusted tap, trip time and thermal image value are truncated to 20 times the adjusted tap. |   |   |   |  |
| <b>Function SHB (*)</b>  | Function Enable: yes/no   |   | <b>Communication</b>  | RS232 port: Modbus RTU<br>RS485 port: Modbus RTU (*)<br>RS485 port: Modbus RTU or IEC 60870-5-103 (*)  |
|  | Current tap: 10 to 50% (step 1%)  |   |   |  |
|  | Reset time: 0.00 to 300 s (step 0.02 s)   |   |   |  |
| <b>Function CLP (*)</b>  | Block threshold: 0.1 to 30 x In (step 0.01 x In)  | <b>Auxiliary power supply (*)</b>       | 230 Vac ±20 %<br>24 Vdc ±10 %<br>48 Vdc ±10 %<br>100-230 Vdc/Vac ±15 %  |  |
|  | Function Enable: yes/no   |   |   |  |
|  | Settings group: 1 to 4 (step 1)   |   |   |  |
|  | No load time: 0.02 to 300 s (step 0.01 s)   |   |   |  |
|  | Cold load time: 0.02 to 300 s (step 0.01 s)   |   |   |  |
| <b>Function 74CT (*)</b>   | CLP activation threshold: 8% In   | <b>Battery supply</b>                   | Externally, with adapter (Kitcom) DB9 port<br>Internal commissioning battery (*)  |  |
|  | CLP reset threshold: 10% In   |   |   |  |
|  | Function Enable: yes/no   |   |   |  |
| <b>Function 74TCS</b>  | Time delay: 0.02 to 300 s (step 0.01 s)   | <b>Self-powering from current</b>       | Self powered with /5 or /1 standard CT:<br>I > 0.1xIn three phases<br>I > 0.2xIn single phase   |  |
|  | Timing accuracy: ±30 ms or ±0.5% (greater of both)  |   |   |  |
| <b>Function 49T (*)</b>  | Trip supervision through the control of the trip voltage level.   | <b>Environment</b>                      | Operating temperature: -40 to 70°C<br>Storage temperature: -40 to 80 °C<br>Humidity: 95%  |  |
| <b>Function 68 (*)</b>   | Charging time 10 s. It is activated by short-circuiting the terminals without external supply   |   |   |  |
| <b>Function 52 (*)</b>   | Available through configurable inputs and outputs thanks to programmable logic  | <b>Transformers</b>                     | Power supply and measurement CT /5 or /1  |  |
|  | Maximum number of openings: 1 to 10,000 (step 1)  |   |   |  |
|  | Maximum accumulated amps: 0 to 100,000 (M(A²)) (step 1)   |   |   |  |
|  | Maximum open time: 0.02 to 30 s (step 0.01 s)   |   |   |  |
|  | Maximum close time: 0.02 to 30 s (step 0.01 s)  |   |   |  |
|  | Repetitive open number: 1 to 10000 (step 1)   |   |   |  |
| <b>Function 79 (*)</b>   | Repetitive open time: 1 to 300 min (step 1 min)   | <b>Mechanical features</b>              | Metallic box<br>Panel Mounting<br>Height x Width:<br>Compact Vertical model: 177 x 155 (mm)<br>Standard Vertical model: 177 x 189 (mm)<br>Horizontal model: 177.8 x 290.3 (mm)<br>Depth:<br>Compact Vertical model: 132.8 mm / 135 mm for the withdrawable model<br>Standard Vertical model: 145.8 (mm)<br>Horizontal model: 100.75 mm<br>IP-54 |  |
|  | Function Enable: yes/no   |   |   |  |
|  | Hold enable: yes/no/no time   |   |   |  |
|  | Reclose number: 1 to 5  |   |   |  |
|  | Reclose 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)   |   |   |  |
|  | Safe time: 0.02 to 300 s (step 0.01 s)  |   |   |  |
|  | Locking possibilities: pulse inputs, level inputs, commands.  |   |   |  |
| <b>Weight</b>  | 3.5 Kg.   |   |   |  |

## Connections diagram SIA-C

- 3 Phases CTs
- 2 Inputs + 2 Outputs
- Striker
- RS485
- External trip



- 3 power supply-measurement CTs
- 1 neutral CT
- Striker

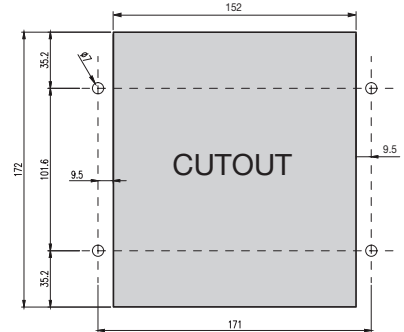
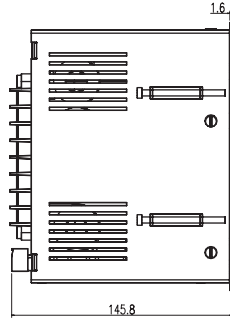
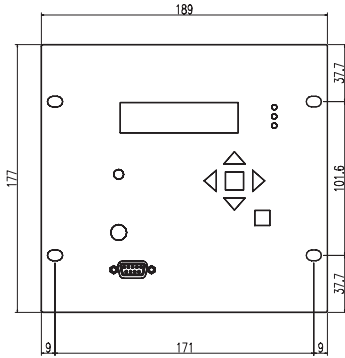


(\*) Example of connections diagram

# Dimensions and cutout SIA-C

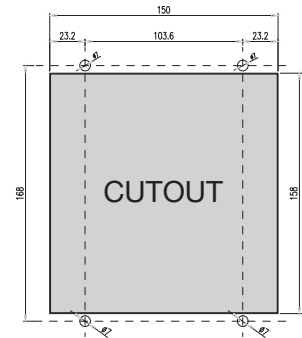
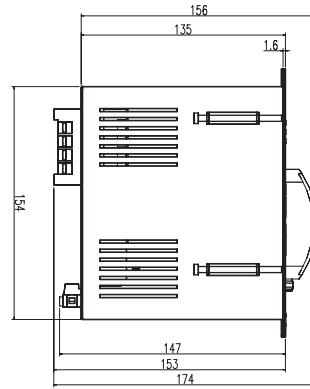
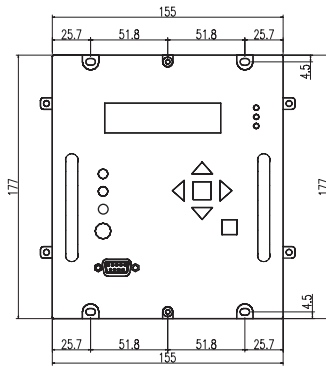
Vertical assembly

Mechanical assembly:  
D



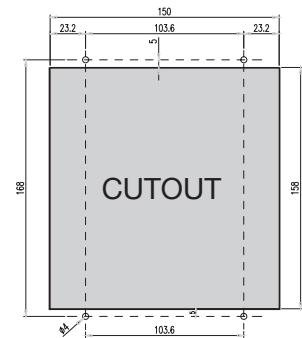
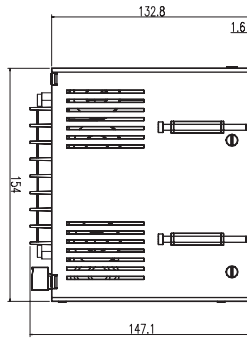
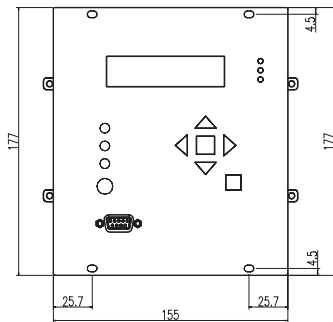
Withdrable Vertical assembly  
Compact size

Mechanical assembly:  
F



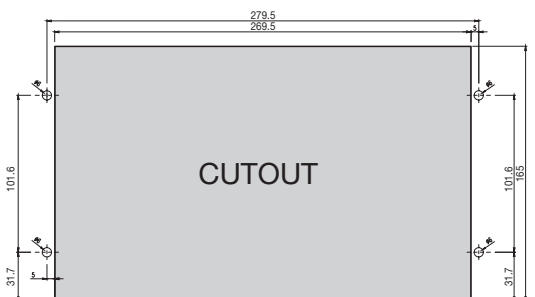
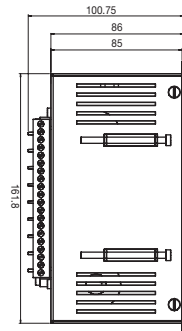
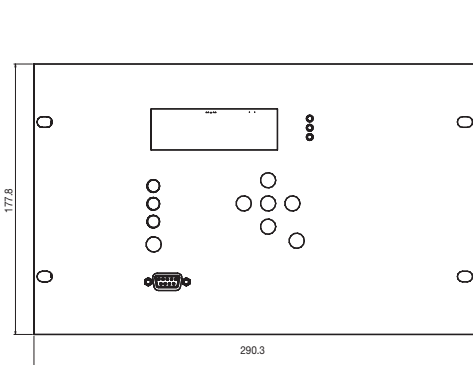
Vertical assembly  
Compact size

Mechanical assembly:  
E, G



Horizontal assembly

Mechanical assembly:  
B, C



## Selection & Ordering data SIA-C

| SIA-C    |  |  |  |  |  |  |  |  |  | Overcurrent & Earth Fault Protection Relay - Dual & Self Powered |  |  |  |  |  |  |  |  |  | PROTECTION FUNCTIONS  |
|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|
| 15       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 50_1 + 50/51 + 50G_1 + 50/51G +74TCS + PGC  |
| 15       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>PHASE MEASUREMENT</b><br>In = 1 A; (0,10 – 30,00 A)<br>In = 5 A; (0,50 – 150,00 A)   |
| 15A<br>B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <b>NEUTRAL MEASUREMENT</b><br>In = 1 A; (0,10 – 30,00 A)<br>In = 5 A; (0,50 – 150,00 A)<br>In = 0,1 A; (0,01 – 3,00 A)<br>In = 0,2 A; (0,02 – 6,00 A)   |
|          |  |  |  |  |  |  |  |  |  | 56   |  |  |  |  |  |  |  |  |  | <b>NET FREQUENCY</b><br>50 Hz<br>60 Hz  |
|          |  |  |  |  |  |  |  |  |  | 01345<br>A<br>B<br>D<br>E<br>F                                   |  |  |  |  |  |  |  |  |  | <b>POWER SUPPLY</b><br>Self powered<br>Self powered + 230 Vac (Dual)<br>Self powered + 24 Vdc (Dual)<br>Self powered + 48 Vdc (Dual)<br>Self powered + 100-230 Vac-dc (Dual)<br>Self powered + Commissioning battery<br>Self powered + 230 Vac (Dual) + Commissioning battery<br>Self powered + 24 Vdc (Dual) + Commissioning battery<br>Self powered + 48 Vdc (Dual) + Commissioning battery<br>Self powered +100-230 Vac-dc (Dual) + Commissioning battery  |
|          |  |  |  |  |  |  |  |  |  | 01234  |  |  |  |  |  |  |  |  |  | <b>ADDITIONAL FUNCTIONS</b><br>Striker<br>Striker and with external trip (49T)<br>Coil<br>Coil and with external trip (49T)<br>Striker and 230 Vac adapted external trip  |
|          |  |  |  |  |  |  |  |  |  | 012  |  |  |  |  |  |  |  |  |  | <b>COMMUNICATIONS</b><br>RS232 (Modbus RTU)<br>RS232 (Modbus RTU) + RS485 (Modbus RTU)<br>RS232 (Modbus RTU) + RS485 (Modbus RTU or IEC60870-5-103)   |
|          |  |  |  |  |  |  |  |  |  | 0123   |  |  |  |  |  |  |  |  |  | <b>INPUTS-OUTPUTS</b><br>Trip<br>Trip + 2 outputs<br>Trip + 2 outputs + 2 inputs<br>Trip + 3 outputs  |
|          |  |  |  |  |  |  |  |  |  | 12   |  |  |  |  |  |  |  |  |  | <b>MEMORY</b><br>Non-volatile RAM memory<br>Non-volatile RAM memory + Fast start-up   |
|          |  |  |  |  |  |  |  |  |  | A<br>B<br>C<br>D   |  |  |  |  |  |  |  |  |  | <b>LANGUAGE</b><br>English, Spanish and German<br>English, Spanish and Turkish<br>English, Spanish and French<br>English, Spanish and Russian   |
|          |  |  |  |  |  |  |  |  |  | B<br>C<br>D<br>E<br>F<br>G<br>H<br>I                             |  |  |  |  |  |  |  |  |  | <b>MECHANICS</b><br>Horizontal assembly with 1 magnetic Flag<br>Horizontal assembly with 3 magnetic Flags<br>Double rear terminals, Vertical assembly with 1 magnetic Flag<br>Vertical, Compact Size with 3 magnetic Flags<br>Vertical, Compact Size with 3 Flags, Backligh LCD, Withdrawable<br>Vertical Assembly, compact size with 1 magnetic indicator, Backligh LCD<br>Double rear terminals, Vertical assembly with 1 magnetic Flag with anticorrosive treatment<br>Vertical, Compact Size with 3 magnetic Flags with anticorrosive treatment |
|          |  |  |  |  |  |  |  |  |  | -<br>A<br>B<br>C   |  |  |  |  |  |  |  |  |  | <b>ADAPTATION</b><br>-<br>+ 50_2 + 50G_2 + 3 Settings group<br>+ CLP + 4 Settings groups<br>+ 50_2 + 50G_2 + 46 + 50BF+ 49 + 79 + 52 + 74CT + 46BC + SHB<br>+ 3 settings groups   |

Example of ordering code:

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

SIAC11500032AFA