# SIA-B Standard CT's

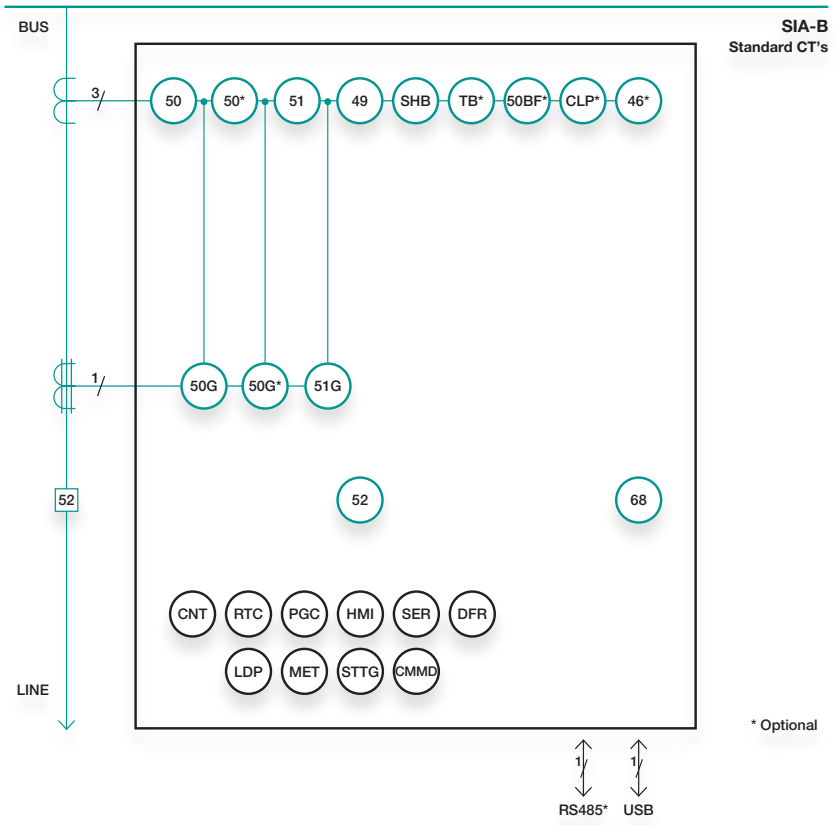
## OC&EF Dual & Self Powered Protection Relay




SELF-POWERED TECHNOLOGY

- The SIA-B 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 /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 be also supplied by a USB cable connected to the laptop, with the USB KITCOM adapter or 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: 75mA in three phase system /160 mA in single phase system.
- Test menu allows the trip circuit to be tested before the transformation centre is powered up.
- There are 4 configurable LEDs. When the relay is switched off, their previous states can be checked by powering the relay up (by self-powering the relay, through USB cable, auxiliary voltage or pressing 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 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 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 |
| **SHB** | Second Harmonic Blocking |
| **49T** | External trip |
| **46** | Phase balance current protection |
| **49** | Thermal overload |
| **CLP** | Cold Load Pickup |
| **52** | Breaker wear monitoring |
| **50BF** | Circuit Breaker Failure |
| **68** | Zone selection interlocking |
| **TB** | Trip block for switch disconnector |
| **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 |
| **CMMD** | Commands |

# Technical parameters SIA-B

| | |
|---|---|
| **Function 50-1**<br>**Function 50-2 (*)** | Function Enable: No/Yes/SHB |
| | Current Tap: 0.07 to 30.00 xIn (step 0.01 xIn) |
| | Time Delay: 0.02 to 300.00 s (step 0.01 s) |
| | Activation level: 100% |
| | Deactivation level: 95% |
| | Instantaneous deactivation |
| | Timing accuracy:<br>Without SHB permitted: ± 30 ms or ± 0.5% (greater of both).<br>With SHB permitted: ± 50 ms or ± 0.5% (greater of both). |
| **Function 50G-1**<br>**Function 50G-2 (*)** | Function Enable: No/Yes/SHB |
| | Current Tap: 0.05 to 15.00 xIn (step 0.01 xIn) |
| | Time Delay: 0.02 to 300.00 s (step 0.01s) |
| | Activation level: 100% |
| | Deactivation level: 95% |
| | Instantaneous deactivation |
| | Timing accuracy:<br>Without SHB permitted: ± 30 ms or ± 0.5% (greater of both).<br>With SHB permitted: ± 50 ms or ± 0.5% (greater of both). |
| **Function 51** | Function Enable: No/Yes/SHB |
| | Curve Type: IEC 60255-151 and IEEE curves.<br>IEC (Definite time, standard inverse, very inverse, extremely inverse, long 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): 0.01 to 1.50 (step 0.01) |
| | Current Tap: 0.07 to 30.00 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:<br>Without SHB permitted: ± 30 ms or ± 5% (greater of both).<br>With SHB permitted: ± 50 ms or ± 5% (greater of both).<br>Timing accuracy for defined time selection:<br>Without SHB permitted: ± 30 ms or ± 0.5% (greater of both).<br>With SHB permitted: ± 50 ms or ± 0.5% (greater of both). |

| | |
|---|---|
| **Function 51G** | Function Enable: No/Yes/SHB |
| | Curve Type: IEC 60255-151 and IEEE curves.<br>IEC (Definite time, standard inverse, very inverse, extremely inverse, long 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): 0.01 to 1.50 (step 0.01) |
| | Current Tap: 0.05 to 15.00 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 curves selection:<br>± 30 ms or ± 5% (greater of both)<br>Timing accuracy for defined time curve selection:<br>± 35 ms or ± 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: 0.07 to 30.00 xIn (step 0.01 xIn) |
| | Activation level: 100% |
| | Deactivation level: 95% |
| | Temporized deactivation |
| **Function 49T** | External trip through configurable inputs. Activated by short circuiting the terminals (without auxiliary voltage) |
| **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 x ζ 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 52** | 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) |
| | Open breaker activation and reset threshold: 0.6% In |
| **Function TB (*)** | Function Enable: No/Yes |
| | Tap: 1.50 to 30.00 xIn (step 0.01 xIn) |

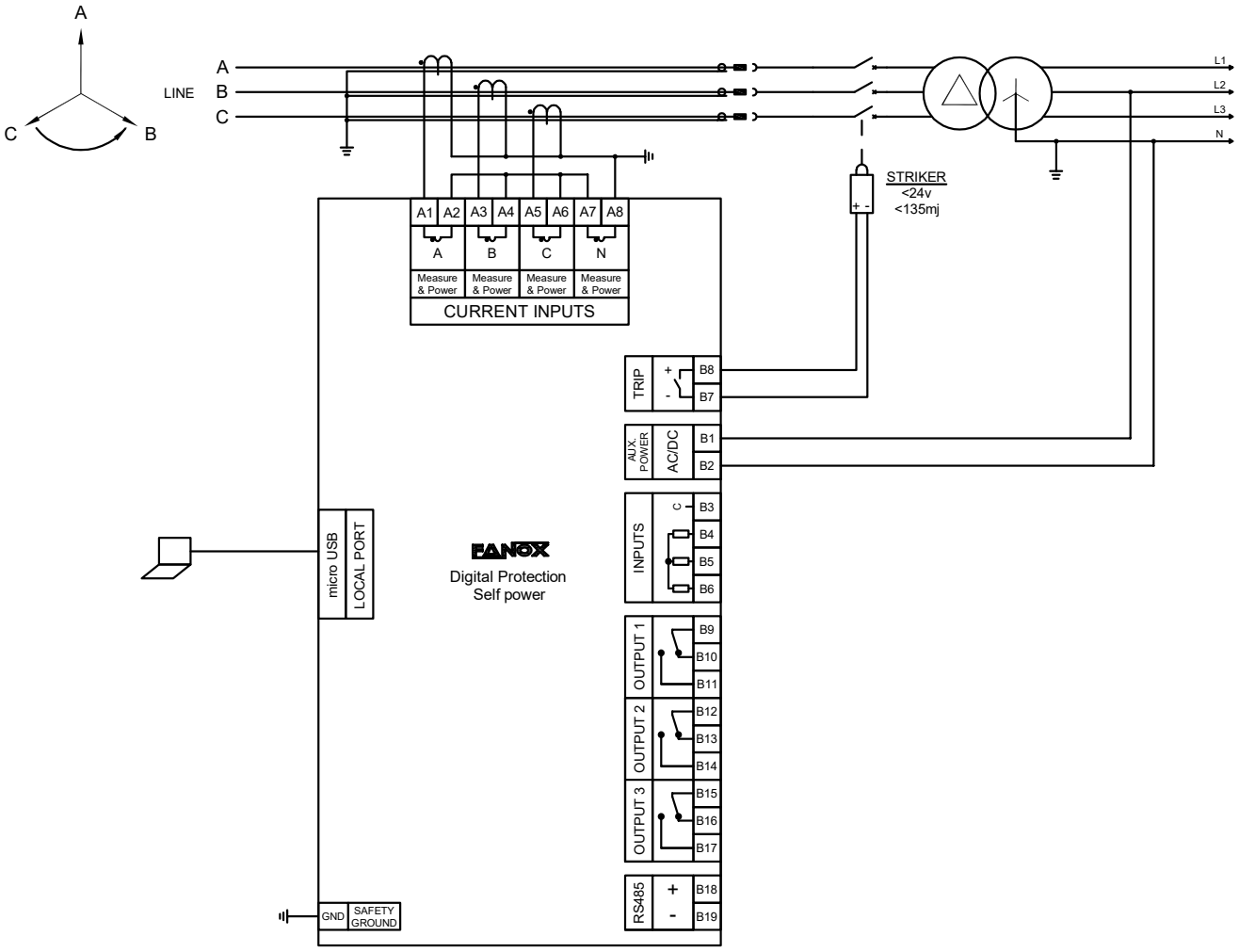
## Technical parameters SIA-B

| | |
|---|---|
| **Function 46 (*)** | Function enable: No/Yes/SHB |
| | Curve Type: IEC 60255-151 and IEEE curves.<br><br>IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).<br><br>Time delay: 0.02 to 300.00 s (step 0.01 s) |
| | Time Dial (TMS): 0.01 to 1.50 (step 0.01) |
| | Current tap: 0.07 to 10.00 xIn (step 0.01xIn) |
| | 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:<br><br>Without SHB permitted: ± 30 ms or ± 5% (greater of both).<br><br>With SHB permitted: ± 50 ms or ± 5% (greater of both).<br><br>Timing accuracy for defined time curve selection:<br><br>Without SHB permitted: ± 30 ms or ± 0.5% (greater of both).<br><br>With SHB permitted: ± 50 ms or ± 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 0.6% In and reset threshold: 0.8% In |
| **Function 50BF (*)** | Function Enable: No/Yes |
| | Time Delay: 0.02 to 1.00 s (step 0.01 s) |
| | Open breaker activation and reset threshold: 0.6% In |
| **Function 68** | Available through configurable inputs and outputs thanks to the programmable logic (PGC). |
| **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 |
| **Settings tables** | 4 settings groups |
| | Selectable by input or general setting. |
| **SER** | 1024 events |
| **Disturbance fault recording (DFR)** | 16 samples/cycle |
| | 4 analog channels and 32 digital channels |
| | 20 fault reports, 16 events in each.<br><br>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:<br>- Number of records: 168<br>- Recording mode circular<br>- 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):<br><br>250 Vac – 8 A<br><br>30 Vdc – 8 A<br><br>(*) 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** | 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. |
| | Phase measurement range: 0.07 to 30 times the nominal current<br><br>Neutral measurement range: 0.05 to 16 times the nominal current |
| **Communications** | Local port (micro USB): Modbus RTU |
| | RS485 rear port: Modbus RTU 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** | With USB KITCOM adapter or standard powerbank |
| | Commissioning internal battery |
| **Transformers** | Power supply and measurement with standard CTs /1 |
| **Environmental conditions** | Operating temperature: -40 to 70ºC |
| | Storage temperature: -40 to 80ºC |
| | Relative humidity: 95% |
| **Mechanical characteristics** | Metallic box |
| | Panel mounted |
| | Height x Width: 90 mm x 245 mm |
| | Depth: 139.4 mm |
| | Weight: 3 kg |
| | IP-54 panel mounted |
| (*) Optional depending on model | |

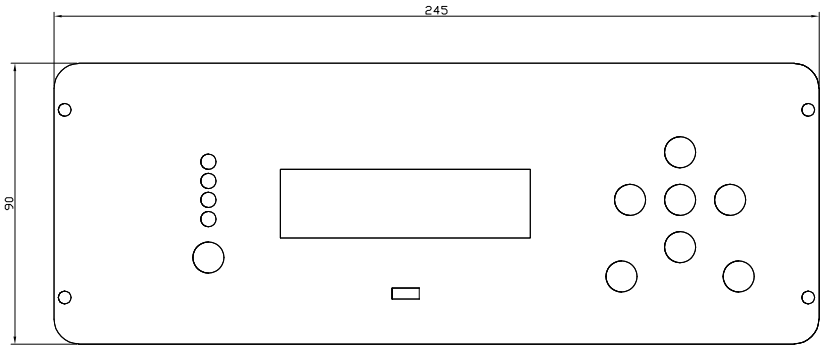
## Connections diagram SIA-B

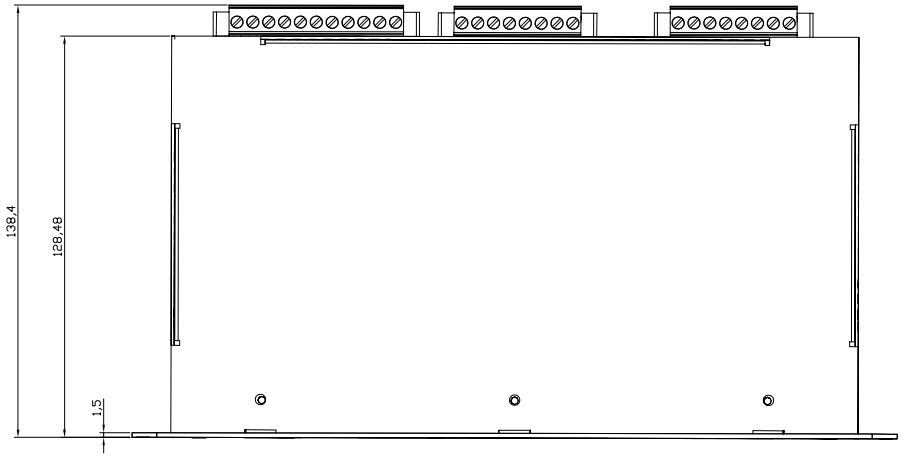
- 3 CT power supply-measurement
- Rigid neutral

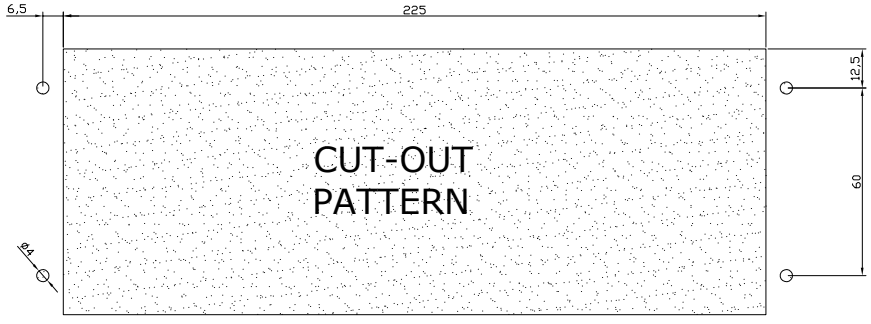



(*) Example of connections diagram

## Dimensions and cutout SIA-B



# Kema Standards SIA-B

| TEST | TEST STANDARD | LEVEL |
|---|---|---|
| 1. **DIELECTRIC TESTS** | | |
| 1.1. **Impulse voltage** | IEC60255-27<br>Clause 10.6.4.2 | 5 kV<br>1 kV |
| 1.2. **Dielectric voltage** | IEC60255-27<br>Clause 10.6.4.3 | 2 kV<br>0,5 kV |
| 1.3. **Insulation resistance** | IEC60255-27<br>Clause 10.6.4.4 | 500 VDC |
| 2. **ELECTROMAGNETIC COMPATIBILITY (EMC) tests** | | |
| 2.1. **EMISSION** | | |
| 2.1.1. **Radiated emission** | IEC 60255-26<br>CISPR11<br>CISPR22<br>table 1<br>table 6<br>table 7 | <br><br>class A<br>class A |
| 2.1.2. **Conducted emission** | IEC 60255-26<br>CISPR22<br>table 2<br>table 2/4 | class A |
| 2.2. **IMMUNITY** | | |
| 2.2.1. **Slow damped oscillatory wave (1 MHz)** | IEC 60255-26<br>(IEC 61000-4-18)<br>Clause 7.2.6 | 2,5 kV CM<br>1,0 kV DM<br>1 kV CM<br>0 kV DM |
| 2.2.2. **Electrostatic discharges** | IEC 60255-26<br>(IEC 61000-4-2)<br>Clause 7.2.3 | 6 kV cont.<br>8 kV air |
| 2.2.3. **Radiated radio frequency magnetic field** | IEC 60255-26<br>(IEC 61000-4-3)<br>Clause 7.2.4 | 80 - 1000 MHz<br>10 V/m<br>1,4 – 2,7 GHz<br>10 V/m<br>80, 160, 380,<br>450, 900,<br>1850, 2150<br>MHz<br>10 V/m |
| 2.2.4. **Fast transient/ burst** | IEC 60255-26<br>(IEC 61000-4-4)<br>Clause 7.2.5 | ☒ Zone A<br>4 kV CM<br>2 kV CM<br>☐ Zone B<br>2 kV CM<br>1 kV CM |
| 2.2.5. **Surge** | IEC 60255-26<br>(IEC 61000-4-5)<br>Clause 7.2.7 | ☒ Zone A<br>to 4 kV LE<br>to 2 kV LL<br>☐ Zone B<br>to 2 kV LE<br>to 1 kV LL |
| 2.2.6. **Conducted disturbance induced by RF fields** | IEC 60255-26<br>(IEC 61000-4-6)<br>Clause 7.2.8 | 0,15 - 80 MHz<br>10 V<br>27, 68 MHz<br>10 V |
| 2.2.7. **Power frequency voltage (50 Hz)** | IEC 60255-26<br>(IEC 61000-4-16)<br>Clause 7.2.9 | ☒ Zone A<br>150 V DM<br>300 V CM<br>☐ Zone B<br>100 V DM<br>300 V CM |
| 2.2.8. **Power frequency H- field (50 Hz)** | IEC 60255-26<br>(IEC 61000-4-8)<br>Clause 7.2.10 | 30 A/m cont.<br>300 A/m 1-3 s |
| 2.2.9. **D.C. Voltage dips** | IEC 60255-26<br>(IEC 61000-4-29)<br>Clause 7.2.11 | 100%; 10-1000 ms<br>60%; 200 ms<br>30%; 500 ms |
| 2.2.10. **A.C. voltage dips** | IEC 60255-26<br>(IEC 61000-4-11)<br>Clause 7.2.11 | 100%;<br>0,5 – 25 c.<br>60%; 10/12 c.<br>30%; 25/30 c. |
| 2.2.11. **D.C. voltage interruptions** | IEC 60255-26<br>(IEC 61000-4-29)<br>Clause 7.2.11 | 100%; 5s |
| 2.2.12. **A.C. voltage interruptions** | IEC 60255-26<br>(IEC 61000-4-11)<br>Clause 7.2.11 | 100%;<br>250/300 c |
| 2.2.13. **D.C. Ripple** | IEC 60255-26<br>(IEC 61000-4-17)<br>Clause 7.2.12 | 15% Ut_dc<br>100/120 Hz |
| 2.2.14. **D.C gradual shut-down/start-up** | IEC 60255-26<br>Clause 7.2.13 | Shut-down ramp 60 s<br>5 min off<br>Start-up ramp 60 s |
| 2.2.15. **Damped oscillatory magnetic field (100 kHz and 1 MHz)** | IEC 61000-4-10 | ☒ Zone A<br>100 A/m (peak)<br>☐ Zone B<br>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<br>(IEC 60255-21-1)<br>Clause 6.13.1 | class 1 |
| 3.2. **Vibration endurance** | IEC 60255-1<br>(IEC 60255-21-1)<br>Clause 6.13.1 | class 1 |
| 3.3. **Shock response** | IEC 60255-1<br>(IEC 60255-21-2)<br>Clause 6.13.2 | class 1 |
| 3.4. **Shock withstand** | IEC 60255-1<br>(IEC 60255-21-2)<br>Clause 6.13.2 | class 1 |

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|---|---|---|
| 3.5. **Bump** | IEC 60255-1<br>(IEC 60255-21-2)<br>Clause 6.13.2 | class 1 |
| 3.6. **Seismic (single axis sweep)** | IEC 60255-1<br>(IEC 60255-21-3)<br>Clause 6.13.3 | class 1 |
| 4. **CLIMATIC ENVAIRONMENTAL CONDITIONS** | | |
| 4.1. **Dry heat operational** | IEC 60255-1<br>(IEC 60068-2-2, test Bd)<br>Clause 6.12.3.1 | +70°C; 72h |
| 4.2. **Cold operational** | IEC 60255-1<br>(IEC 60068-2-1, test Ad)<br>Clause 6.12.3.2 | -40°C; 72h |
| 4.3. **Dry heat storage** | IEC 60255-1<br>(IEC 60068-2-2, test Bb)<br>Clause 6.12.3.3 | +80°C; 72h |
| 4.4. **Cold storage** | IEC 60255-1<br>(IEC 60068-2-1, test Ab)<br>Clause 6.12.3.4 | -40°C; 72h |
| 4.5. **Change of temperature** | IEC 60255-1<br>(IEC 60068-2-14, test Nb)<br>Clause 6.12.3.5 | -40°C; +70°C<br>3 hours<br>5 cycles |
| 4.6. **Damp heat, steady state** | IEC 60255-1<br>(IEC 60068-2-78, test Cab)<br>Clause 6.12.3.6 | +40°C; 93%<br>10 days |
| 4.7. **Damp heat, cyclic** | IEC 60255-1<br>(IEC 60068-2-30, test Db)<br>Clause 6.12.3.7 | +25°C; 40°C<br>97%; 93%<br>6 cycles |

KEMA Labs

# Selection & Ordering data SIA-B

## SIA-B Standard CT's

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

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

**Example of ordering code:**

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


Dual Powered OC & EF
OK
Battery
Local port
FANOX
Ready
Ground Trip
Phase Trip
CB SF6 Gas Low
RESET


Circuit Breaker