FANOX


# SIL-A

## O/C & E/F Line Protection Relay

**Overcurrent & Earth Fault Protection Relay**

**Primary & Secondary Distribution**

5
Five year guarantee

fanox.com

# SIL-A

## Overcurrent & Earth Fault Protection Relay for Primary & Secondary Distribution

### Line Protection Relay

| PROTECTIONS | |
|---|---|
| 50 | Instantaneous phase overcurrent |
| 50N | Calculated instantaneous neutral overcurrent |
| 50/51 | Inverse time phase overcurrent |
| 50/51N | Calculated inverse time neutral overcurrent |
| 50G | Measured instantaneous neutral overcurrent |
| 50/51G | Measured inverse time neutral overcurrent |
| SOTF | Switch on to fault |
| 49 | Thermal image |
| 46 | Negative sequence inverse time overcurrent |
| 46BC | Broken conductor detection |
| 37 | Instantaneous phase undercurrent |
| 74TCS | Trip circuit supervision |
| 50BF | Breaker failure |
| SHB | Second hamonic blocking |
| 52 | Breaker wear monitoring |
| 79 | AC reclosing device |
| 74CT | CT circuit supervision |
| CLP | Cold load pickup |
| 86 | Trip Latch |
| 49T | External trip |
| 68 | Zone selection interlocking |
| TB | Trip block |
| PGC | Programmable logic control |

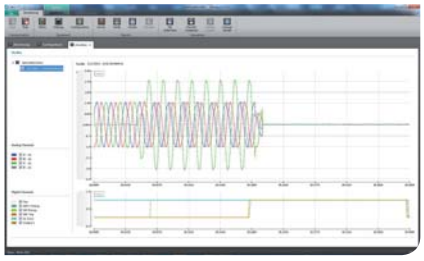
## Main characteristics

- The SIL-A is an overcurrent and earth fault protection relay for primary and secondary distribution with auxiliary power supply 24-230 Vac/dc. The current measurement is obtained either by standard current transformers /1 or /5, or by special Low Power Current Transformers (LPCT).
- Many protection functions: 50_1, 50/51_1, 52, 46, 79, 74TCS, CLP, 86, 49T, 68, 50BF and optionally 50_2, 50/51_2, 50N/G_1(1), 50N/G_2, 50/51N/G(1), 50N_1, 50N_2, 50G_1, 50G_2, 50/51N_1, 50/51N_2, 50/51G_1, 50/51G_2, SOTF, 49, 74CT, 37, 46BC, TB and SHB.
- Metallic blox with high electromagnetic compatibility level (EMC) and wide range of operating temperature.
- Direct signalling/control both of the circuit breaker (52 function), both of the recloser (79 function).
- Zone selection interlocking (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 really critical if the overcurrent protection function does not clear the fault until the adjusted time delay is finished. It is necessary, in that cases, clear the fault quickly by means of SOTF function.
- To allow the communication, relays have a communication port on the front (RS232 or USB, selectable by model) of the equipment and remote communication with different options (ports and protocols) on the back:
  - RS485 Port: IEC60870-5-103, Modbus RTU or DNP3.0 Serial, selectable by model/settings.
  - RJ45 Ethernet Port: IEC61850, Modbus TCP/IP, DNP3.0 TCP/IP or IEC60870-5-104 (IEC60870-5-104 only for adaptation “B”), selectable by model/setings.

- The SIL-A has configurable and dedicated inputs and outputs, depending on adaptation:
  - Adaptation “B”: 6 configurable Digital Inputs and 4 configurable Digital Outputs.
  - Adaptation “C”: 4 configurable Digital Inputs, 2 dedicated Digital Inputs and 4 configurable Digital Outputs.
  - Adaptacion “D”: 6 configurable Digital Inputs and 6 configurable Digital Outputs.
- SIL-A 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).

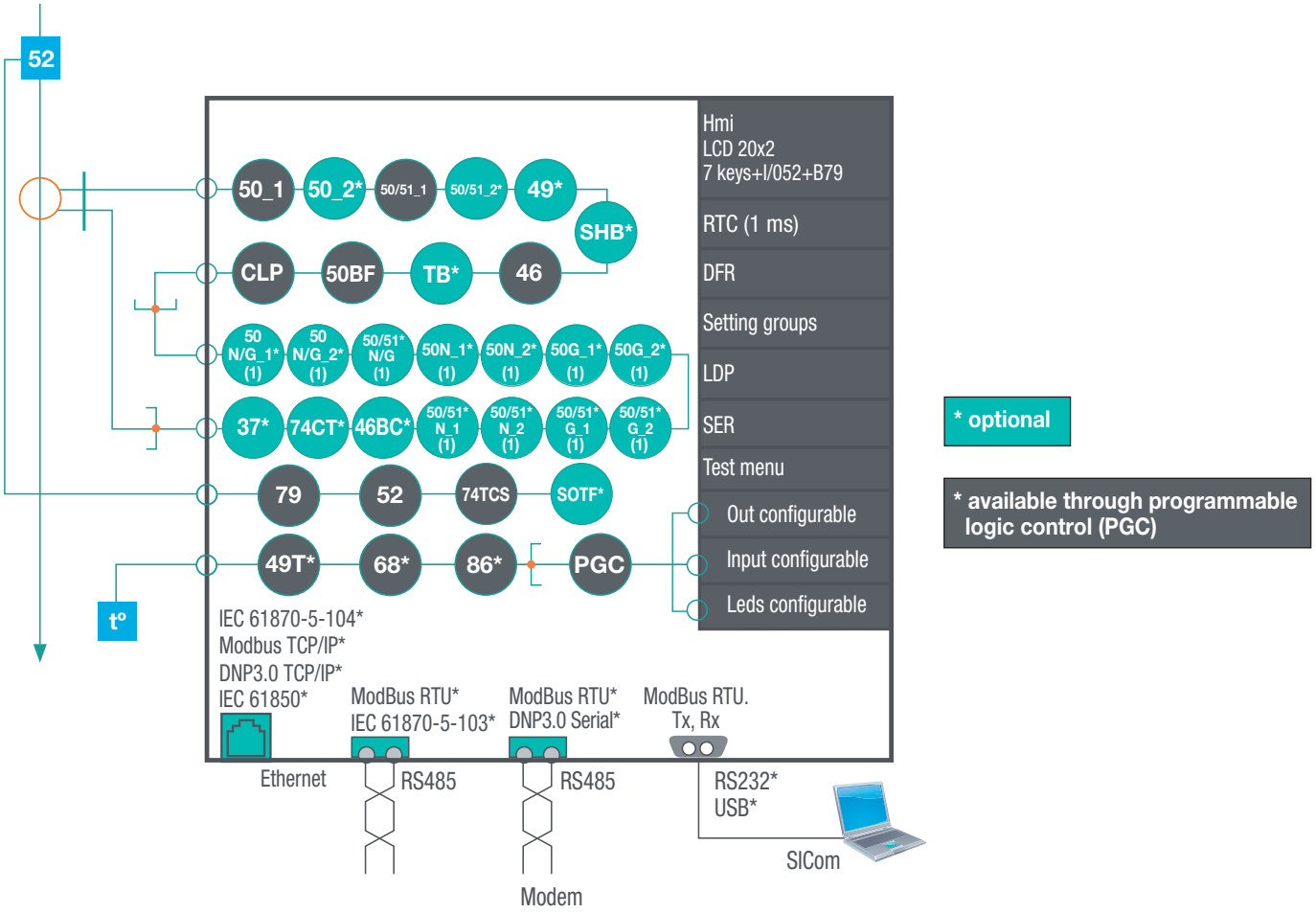
(1) Note:
- LPCT model: neutral current is calculated so overcurent protection functions are 50N(2) and 50/51N.
- Standard /1 or /5 models:
  - Adaptation “B” and “C”, neutral current is measured so overcurrent protections are 50N/G(2) and 50/51N/G.
  - Adaptation “D”, neutral will be measured, 50N(2) and 50/51N(2), and calculated, 50G(2) and 50/51G(2).

- Adaptation “B” and “C” is provided with non-volatile RAM memory in order to store up to 200 events, disturbance fault recording (DFR - 20 fault reports and 5 oscillographic records in COMTRADE format), maintaining date & time thanks to its internal RTC (real Time Clock).
- Adaptation “D” is provided with non-volatile RAM memory in order to store up to 2048 events, disturbance fault recording (DFR - 25 fault reports and 25 oscillographic records in COMTRADE format), maintaining date & time thanks to its internal RTC (real Time Clock).
- 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).



*Additional information to fault reports.*

## Functions diagram SIL-A




(1) Note:
- LPCT model: neutral current is calculated so overcurent protection functions are 50N(2) and 50/51N.
- Standard /1 or /5 models:
  - Adaptation “B” and “C”, neutral current is measured so overcurrent protections are 50N/G(2) and 50/51N/G.
  - Adaptation “D”, neutral will be measured, 50N(2) and 50/51N(2), and calculated, 50G(2) and 50/51G(2).

# Technical parameters SIL-A

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| **Function 50_1**<br><br>**Function 50_2 (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No/SHB<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “B”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “D”: 0.05 to 30 xIn (step 0.01 xIn) |
| | Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.00 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Activation level 100% |
| | Deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 0.5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 0.5% |
| **Function 50N/G_1 (*)**<br><br>**Function 50N/G_2 (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No/SHB |
| | Current tap:<br>- Adaptation “B”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.05 to 30 xIn (step 0.01 xIn) |
| | Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.00 to 300 s (step 0.01 s) |
| | Activation level 100% |
| | Deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 0.5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 0.5% |
| **Function 50N_1 (*)**<br><br>**Function 50N_2 (*)** | Function enable:<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “D”: 0.05 to 30 xIn (step 0.01 xIn) |
| | Time delay:<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Activation level 100% |
| | Deactivation level 95% |
| | Timing accuracy:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 0.5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 0.5% |
| **Function 50G_1 (*)**<br><br>**Function 50G_2 (*)** | Function enable:<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “D”: 0.01 to 30 xIn (step 0.01 xIn) |
| | Time delay:<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Activation level 100% |
| | Deactivation level 95% |
| | Timing accuracy:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 0.5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 0.5% |
| **Function 50/51_1**<br><br>**Function 50/51_2 (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No/SHB<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “B”: 0.10 to 7 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.10 to 7 xIn (step 0.01 xIn)<br>- Adaptation “D”: 0.05 to 20 xIn (step 0.01 xIn) |
| | 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, Defined Time:<br><br>Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.00 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Time dial (TMS):<br>- Adaptation “B”: 0.02 to 2.20 (step 0.01)<br>- Adaptation “C”: 0.02 to 2.20 (step 0.01)<br>- Adaptation “D”:<br>· If Curve type IEC: 0.05 to 1 (step 0.01)<br>· If Curve type IEEE: 0.1 to 25 (step 0.01) |
| | Curve, activation level 110% |
| | Curve, deactivation level 100% |
| | Defined time, activation level 100% |
| | Defined time, deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both).<br><br>Timing accuracy for defined time curve selection:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 5% |
| **Function 50/51N/G (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No/SHB |
| | Current tap:<br>- Adaptation “B”: 0.10 to 7 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.05 to 7 xIn (step 0.01 xIn) |
| | 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, Defined Time:<br><br>Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.00 to 300 s (step 0.01 s) |
| | Time dial (TMS):<br>- Adaptation “B”: 0.02 to 2.20 (step 0.01)<br>- Adaptation “C”: 0.02 to 2.20 (step 0.01) |
| | Curve, activation level 110% |
| | Curve, deactivation level 100% |
| | Defined time, activation level 100% |
| | Defined time, deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both).<br><br>Timing accuracy for defined time curve selection:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 5% |
| **Function 50/51N_1 (*)**<br><br>**Function 50/51N_2 (*)** | Function enable:<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “D”: 0.05 to 20 xIn (step 0.01 xIn) |
| | 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, Defined Time:<br><br>Time delay:<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |

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| | Time dial (TMS):<br>- Adaptation “D”:<br>· If Curve type IEC: 0.05 to 1 (step 0.01)<br>· If Curve type IEEE: 0.1 to 25 (step 0.01) |
| | Curve, activation level 110% |
| | Curve, deactivation level 100% |
| | Defined time, activation level 100% |
| | Defined time, deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both).<br><br>Timing accuracy for defined time curve selection:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 5% |
| **Function 50/51G_1 (*)**<br><br>**Function 50/51G_2 (*)** | Function enable:<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “D”: 0.01 to 20 xIn (step 0.01 xIn) |
| | 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, Defined Time:<br><br>Time delay:<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Time dial (TMS):<br>- Adaptation “D”:<br>· If Curve type IEC: 0.05 to 1 (step 0.01)<br>· If Curve type IEEE: 0.1 to 25 (step 0.01) |
| | Curve, activation level 110% |
| | Curve, deactivation level 100% |
| | Defined time, activation level 100% |
| | Defined time, deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both).<br><br>Timing accuracy for defined time curve selection:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 5% |
| **Function 49 (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: No/Alarm/Trip |
| | Tap: 0.10 to 2.40 xIn (step 0.01xIn) |
| | ζ heating: 3 to 600 minutes (step 1 min) |
| | ζ cooling: 1 to 6 x ζ heating (step 1) |
| | Alarm level: 20 to 99% (step 1 %) |
| | Trip level: 100% |
| | Trip reset: 95% of alarm level |
| | Trip time 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. |
| **Function SHB (*)** | Function enable: Yes/No |
| | Current tap: 5% to 50% (step 1%) |
| | Reset time: 0.00 to 300 s (step 0.01 s) |
| | Block threshold: 0.10 to 30.00 xIn (step 0.01 xIn) |

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| **Function 52** | Maximum number of openings: 1 to 10000 (step 1) |
| | Max. accumulated amps: 0 to 100000 (M(A²)) (step 1) |
| | Maximum opening time 0.02 to 30 s (step 0.01 s) |
| | Maximum closing time 0.02 to 30 s (step 0.01 s) |
| | Maximum number of repetitive openings: 1 to 10000 (step 1) |
| | Time of repetitive openings: 1 to 300 min (step 1 min) |
| | Open circuit breaker activation threshold: 8% In |
| | Open circuit breaker reset threshold: 10% In |
| **Function CLP** | 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) |
| | CLP activation threshold: 8% In |
| | CLP reset threshold: 10% In |
| **Function 46** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No/SHB<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “B”: 0.10 to 7 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.10 to 7 xIn (step 0.01 xIn)<br>- Adaptation “D”: 0.05 to 20 xIn (step 0.01 xIn) |
| | 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, Defined Time:<br><br>Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.00 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Time dial (TMS):<br>- Adaptation “B”: 0.02 to 2.20 (step 0.01)<br>- Adaptation “C”: 0.02 to 2.20 (step 0.01)<br>- Adaptation “D”:<br>· If Curve type IEC: 0.05 to 1 (step 0.01)<br>· If Curve type IEEE: 0.1 to 25 (step 0.01) |
| | Curve, activation level 110% |
| | Curve, deactivation level 100% |
| | Defined time, activation level 100% |
| | Defined time, deactivation level 95% |
| | Instantaneous deactivation |
| | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both).<br><br>Timing accuracy for defined time curve selection:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 5% |
| **Function 49T** | Available through configurable inputs thanks to the programmable logic (PGC). |
| **Function TB (*)** | Function enable: Yes/No |
| | Current tap: 1.5 to 20 xIn (step 0.01) |
| **Function 50BF** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: No/Alarm/Trip |
| | Time delay: 0.02 to 1.00 s (step 0.01 s) |
| | Open circuit breaker activation threshold: 8% In |
| | Open circuit breaker reset threshold: 10% In |
| | Configurable function pickup |

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| **Function 79** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: --- |
| | Hold enable: Yes/No/No time |
| | Number of reclosings:<br>- Adaptation “B”: 1 to 5<br>- Adaptation “C”: 1 to 5<br>- Adaptation “D”: 0 to 4 |
| | Reclosing time:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.02 to 2000 s (step 0.01 s) |
| | Hold time:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.02 to 2000 s (step 0.01 s) |
| | Reset time:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.02 to 2000 s (step 0.01 s) |
| | Safe time:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.02 to 2000 s (step 0.01 s) |
| | Locking possibilities: pulse inputs, level inputs, commands. |
| **Function 74TCS** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: No/Alarm/Trip |
| | Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Continuity in circuits A and B |
| | Inputs:<br>- Adaptation “B”: Configurable digital inputs<br>- Adaptation “C”: Dedicated digital inputs<br>- Adaptation “D”: Configurable digital inputs |
| **Function SOTF (*)** | Function enable:<br>- Adaptation “D”: No/Alarm/Trip/SHB Trip |
| | Current tap:<br>- Adaptation “D”: 0.05 to 30 xIn (step 0.01 xIn) |
| | Time delay:<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Activation time:<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| **Function 74CT (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: No/Alarm/Trip |
| | Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Timing accuracy: ± 30 ms or ± 0.5% (greater of both). |
| **Function 68** | Available through configurable inputs thanks to the programmable logic (PGC). |
| **Function 86** | Available through configurable inputs thanks to the programmable logic (PGC). |

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| **Function 37 (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: No/Alarm/Trip |
| | Current tap:<br>- Adaptation “B”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “D”: 0.05 to 30 xIn (step 0.01 xIn) |
| | Time delay:<br>- Adaptation “B”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “C”: 0.02 to 300 s (step 0.01 s)<br>- Adaptation “D”: 0.00 to 300 s (step 0.01 s) |
| | Dead tap:<br>- Adaptation “B”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “C”: 0.10 to 30 xIn (step 0.01 xIn)<br>- Adaptation “D”: 0.05 to 30 xIn (step 0.01 xIn) |
| | Activation level: 100% |
| | Deactivation level: 105% |
| | Instantaneous reset |
| | Timing accuracy:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 0.5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 0.5% |
| **Function 46BC (*)** | Function enable:<br>- Adaptation “B”: Yes/No<br>- Adaptation “C”: Yes/No<br>- Adaptation “D”: No/Alarm/Trip |
| | Current tap:<br>- Adaptation “B”: 15 to 300 xIn (step 0.01 xIn)<br>- Adaptation “C”: 15 to 300 xIn (step 0.01 xIn)<br>- Adaptation “D”: 15 to 100% (step 1%)<br>Current tap: 15 to 300 xIn (step 0.01 xIn) |
| | Time delay: 0.00 ot 300 s (step 0.01 s) |
| | Timing accuracy:<br>- If Time delay 0.00 to 0.02 s: ± 50 ms or ± 0.5%<br>- If Time delay 0.02 to 300 s: ± 30 ms or ± 0.5% |
| **PGC** | Adaptation “B”:<br>- OR4, OR4_LATCH, OR4_PULSES, OR4_TIMERUP, OR4_PULSE, NOR4, NOR4_LATCH, NOR4_TIMERUP, NOR4_PULSE, AND4, AND4_PULSES, AND4_TIMERUP, AND4_PULSE, NAND4, NAND4_TIMERUP, NAND4_PULSE.<br>Adaptation “C”:<br>- OR4, OR4_LATCH, OR4_PULSES, OR4_TIMERUP, OR4_PULSE, NOR4, NOR4_LATCH, NOR4_TIMERUP, NOR4_PULSE, AND4, AND4_PULSES, AND4_TIMERUP, AND4_PULSE, NAND4, NAND4_TIMERUP, NAND4_PULSE.<br>Adaptation “D”:<br>- Logical gates: OR4, NOR4, AND4, NAND4, SR_FLIP_FLOP, RS_FLIP_FLOP, XOR2, GREATER OR EQUAL, LESS OR EQUAL, BETWEEN TWO CONSTANTS, GREATER OR EQUAL CONSTANT, LESS OR EQUAL CONSTANT, GREATER xTIMES, LESS xTIMES.<br>- Gates operations: PULSE, TIMER_UP, PULSES, BLINK. |
| **Settings group** | 4 settings groups |
| | Activated by inputs or by general settings |
| **Frequency** | 50/60 Hz selectable by general settings |
| **Events** | Adaptation “B”:<br>- 200 events.<br>Adaptation “C”:<br>- 200 events.<br>Adaptation “D”:<br>- 2048 events |

# Technical parameters SIL-A

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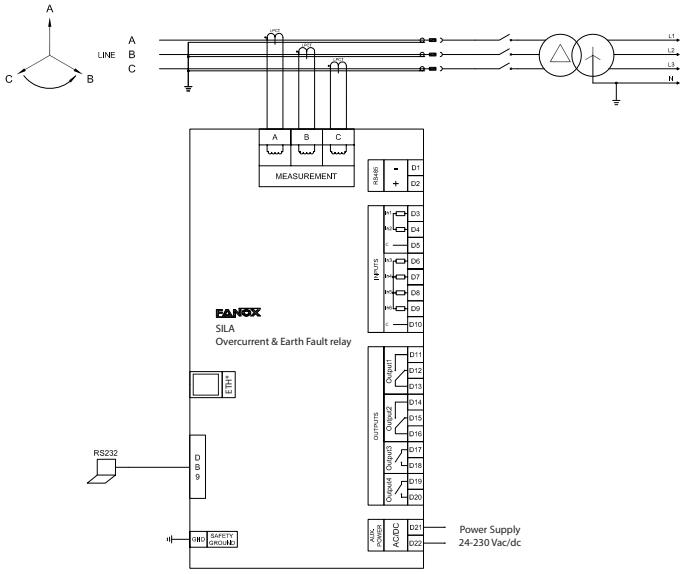
| **Disturbance Fault Recording (DFR)** | Adaptation “B”:<br>- 16 samples/cycle<br>- Fault start configurable<br>- 20 fault reports with 24 events each one<br>- 5 COMTRADE rec. (100 cycles): 3 pre. + 97 postfault cycles<br>- COMTRADE IEEE C37.111-1991<br>- 4 analog channels and 48 digital channels<br><br>Adaptation “C”:<br>- 16 samples/cycle<br>- Fault start configurable<br>- 20 fault reports with 24 events each one<br>- 5 COMTRADE rec. (100 cycles): 3 pre. + 97 postfault cycles<br>- COMTRADE IEEE C37.111-1991<br>- 4 analog channels and 36 digital channels<br><br>Adaptation “D”:<br>- 32 samples/cycle<br>- Fault start configurable<br>- 25 fault reports with 24 events each one<br>- 25 COMTRADE rec. (60 cycles): 1 to 8 pre. + 52 to 59 postfault cycles<br>- COMTRADE IEEE C37.111-1991<br>- 4 analog channels and 73 digital channels |
| **Load Data Profiling (LDP)** | Demand of current with the following characteristics:<br>- Number of records: 2160<br>- Recording mode circular<br>- Sampling rate (interval): configurable through communications (1-60 min)<br>- Record format:<br>· Date/Time<br>· IMAX (in interval)<br>· Imax (actual)<br>· IA<br>· IB<br>· IC<br>· IN |
| **Inputs** | Same voltage as the auxiliary power supply:<br>- Adaptation “B”: 6 configurable DI<br>- Adaptation “C”: 4 configurable DI + 2 dedicated DI<br>- Adaptation “D”: 6 configurable DI |
| **Outputs** | 250 Vac – 8 A<br>30 Vdc – 5 A |
| | Adaptation “B”:<br>- 4 configurable outputs<br>- Output 1 and Output 2: NC-NO<br>- Output 3 and Output 4: NO<br>Adaptation “C”:<br>- 4 configurable outputs<br>- Output 1 and Output 2: NC-NO<br>- Output 3 and Output 4: NO<br>Adaptation “D”:<br>- 6 configurable outputs<br>- Output 1: NC-NO<br>- Output 2, 3, 4, 5 and 6: NO |

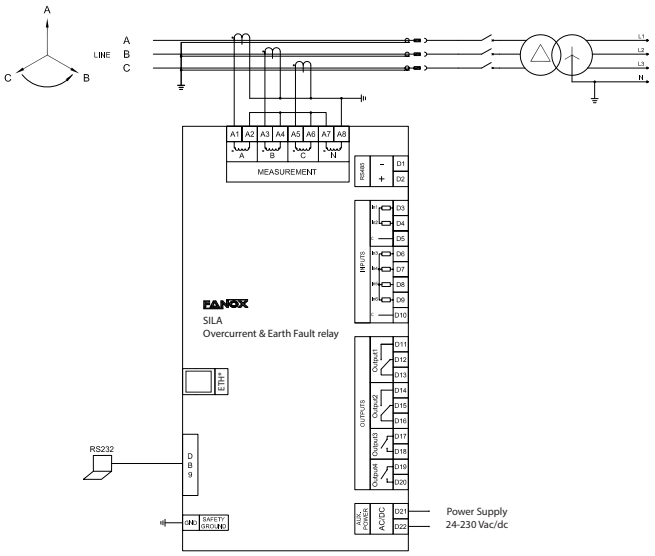
| | |
|---|---|
| **Current measurement** | Adaptation “B”:<br>- Phase current (IA, IB, IC), neutral (IN), positive sequence (I1), negative sequence(I2), maximum current (Imax) and thermal image (TI)<br>Adaptation “C”:<br>- Phase current (IA, IB, IC), neutral (IN), positive sequence (I1), negative sequence(I2), phase second harmonic current (IA-2H, IB-2H and IC-2H), maximum current (Imax) and thermal image (TI)<br>Adaptation “D”:<br>- Phase current (IA, IB, IC), neutral (3I0 and IN), positive sequence (I1), negative sequence(I2), phase second harmonic current (IA-2H, IB-2H and IC-2H), maximum current (Imax) and thermal image (TI) |
| | Fundamental values (DFT) |
| | Sampling:<br>- Adaptation “B”: 16 samples/cycle<br>- Adaptation “C”: 16 samples/cycle<br>- Adaptation “D”: 32 samples/cycle |
| | Measurement accuracy:<br>- Adaptation “B”: ±2% accuracy over a band of ±20% over the nominal current and 4% over the rest of the range<br>- Adaptation “C”: ±2% Accuracy over a band of ±20% over the nominal current and 4% or ±5 mA (greater of both) over the rest of the range<br>- Adaptation “D”: ±2% Accuracy over a band of ±20% over the nominal current and 4% or ±5 mA (greater of both) over the rest of the range |
| | Saturation limit: 30 times rated current |
| **Communications** | LOCAL COMMUNICATION:<br>- Adaptation “B”: 1 local port RS232: Modbus RTU<br>- Adaptation “C”: 1 local port RS232: Modbus RTU<br>- Adaptation “D”: 1 local port microUSB: Modbus RTU |
| | REMOTE COMMUNICATION:<br>1 remote port with the following options<br>- 1 Remote port RS485: ModBus RTU, IEC 60870-5-103 or DNP3.0 Serial, by model/settings.<br>- 1 Remote port RJ45: IEC 61850, DNP3.0 TCP/IP, Modbus TCP/IP or IEC 60870-5-104, by model/settings. (IEC 60870-5-104 only for adaptation “B”) |
| **Power supply** | 24-230 Vac/dc -20% +10% |
| **Environmental conditions** | Operating temperature:<br>- Adaptation “B”: -10 to 70ºC<br>- Adaptation “C”: -10 to 70ºC<br>- Adaptation “D”: -40 to 70ºC |
| | Storage temperature:<br>- Adaptation “B”: -20 to 80ºC<br>- Adaptation “C”: -20 to 80ºC<br>- Adaptation “D”: -40 to 80ºC |
| | Relative humidity: 95% |
| **Transformers** | Measurement 3 or 4 CT /1 or /5 |
| | Measurement 3 LPCT (current transformers with voltage output. (only for adaptation “B”) |
| **Mechanical characteristics** | Metallic box |
| | Panel mounted |
| | Height x Width: 177 x 107 mm |
| | Depth: 122.1 mm |
| | IP-54 on panel |
| | Weight: 1,5 kg |

# Connections Diagram SIL-A

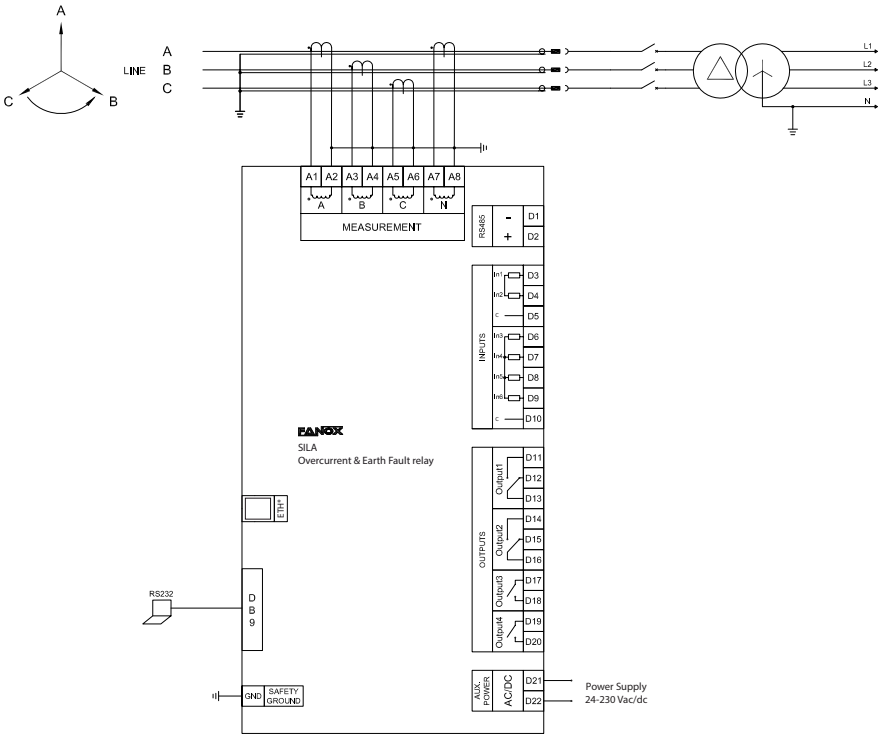
Adaptation "B" and adaptation "C":




• 3 LPCT Transformers



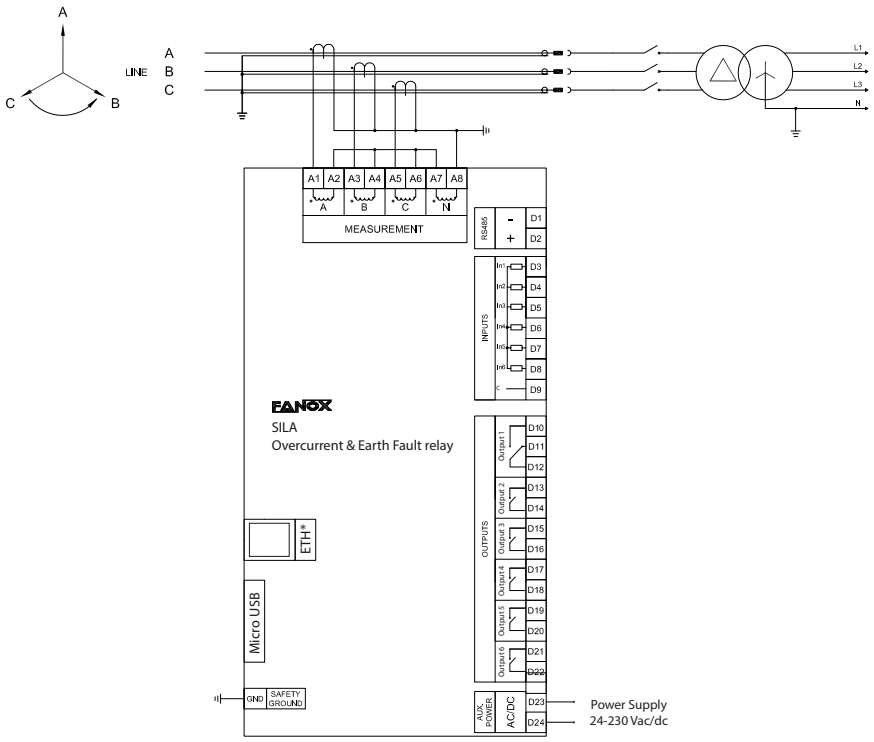

• 3 Standard Current Transformers

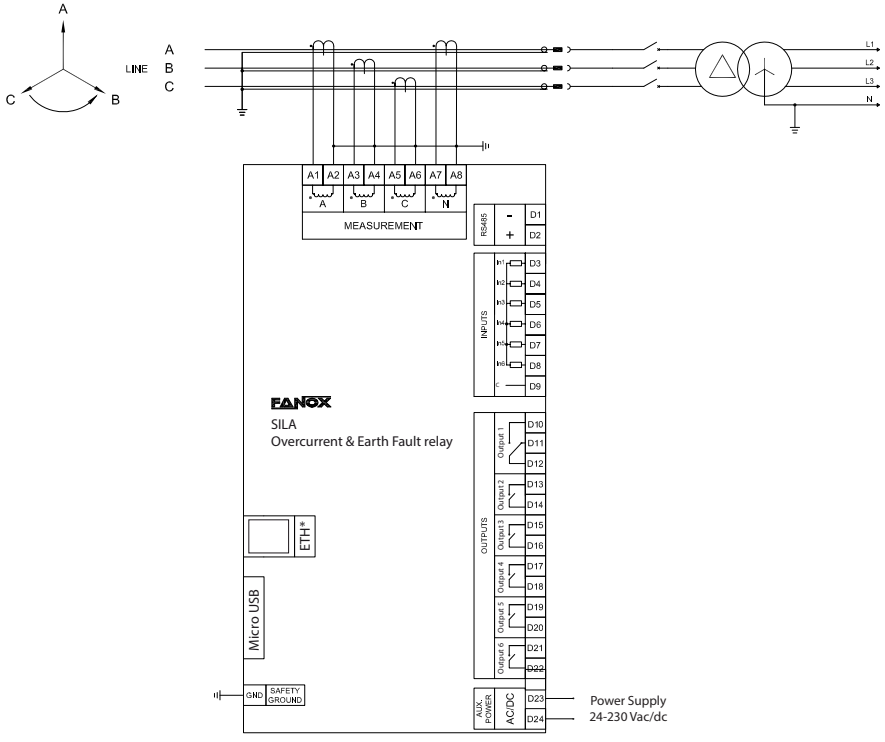

• 4 Standard Current Transformers

# Connections Diagram SIL-A

Adaptation "D":



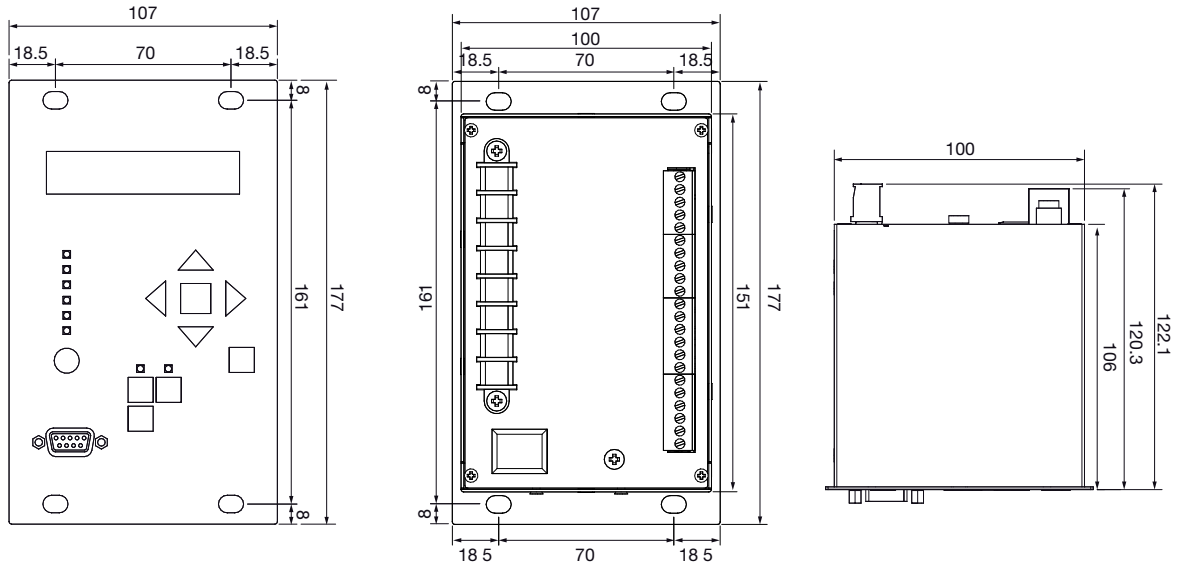

• 3 Standard Current Transformers



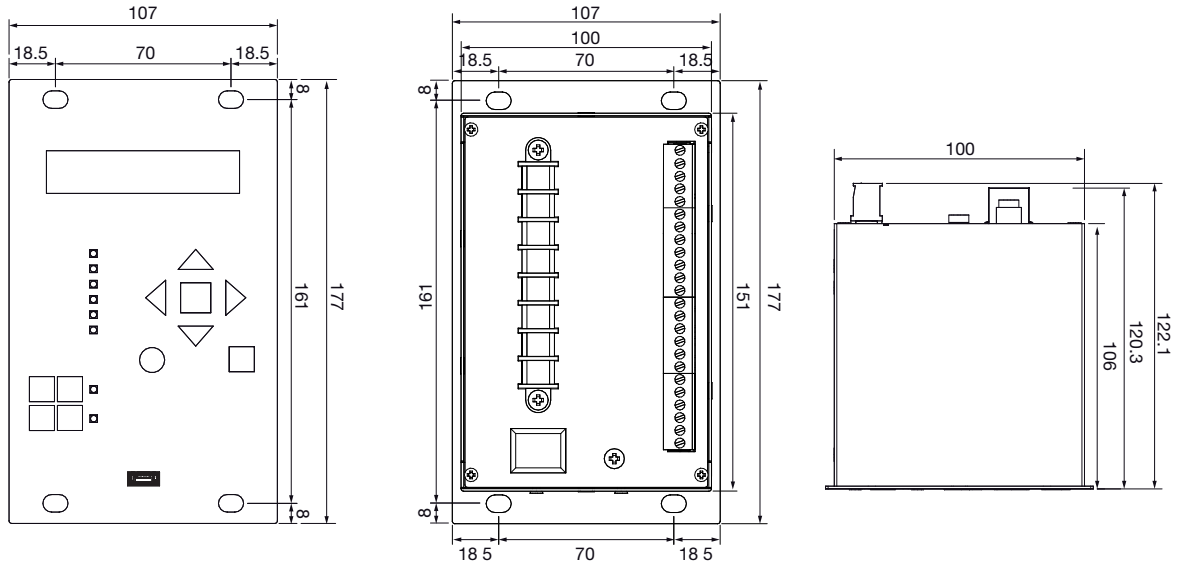

• 4 Standard Current Transformers

# Dimensions and cutout SIL-A

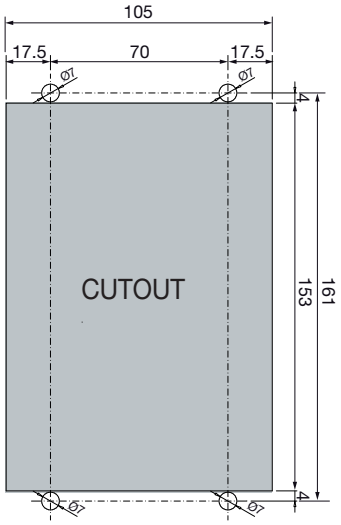
Adaptation "B" and adaptation "C":




Adaptation "D":




Cutout for all adaptations:



# Selection & Ordering data SIL-A

| SIL-A | | | | | | | | | | ADAPTATION "B" | ADAPTATION "C" | ADAPTATION "D" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | **PROTECTION FUNCTIONS** | | |
| | | | | | | | | | | (2)50 + 50/51 + (2)50N/G(1) + 50/51N/G(1) + 52 + 50BF + 46 + 79 + 74TCS + CLP + 86 + 49T | (2)50 + 50/51 + (2)50N/G(1) + 50/51N/G(1) + 52 + 50BF + 46 + 79 + 74TCS + CLP + 86 + 49T | (2)50 + (2)50N + (2)50G + (2)50/51 + SOTF + (2)50/51N + (2)50/51G + 52 + 46 + 50BF + 79 + 74TCS + CLP + 86 + 49T + 49 + SHB |
| **X<br>0<br>S** | | | | | | | | | | **PHASE MEASUREMENT** | | |
| | | | | | | | | | | LPCT (Primary In = 50 – 800 A).<br>Standard: 1 A or 5 A.<br>Sensitive 0.5 A or 2.5 A. | n/a<br>Standard: 1 A or 5 A.<br>n/a | n/a<br>Standard: 1 A or 5 A.<br>n/a |
| | **X<br>0<br>S** | | | | | | | | | **NEUTRAL MEASUREMENT** | | |
| | | | | | | | | | | LPCT (Neutral internally calculated).<br>Standard: 1 A or 5 A.<br>Sensitive 0.5 A or 2.5 A. | n/a<br>Standard: 1 A or 5 A.<br>n/a | n/a<br>Standard: 1 A or 5 A.<br>n/a |
| | | **0** | | | | | | | | **NET FREQUENCY** | | |
| | | | | | | | | | | Defined by general settings. | Defined by general settings. | Defined by general settings. |
| | | | **C** | | | | | | | **POWER SUPPLY** | | |
| | | | | | | | | | | 24-230 Vac/dc | 24-230 Vac/dc | 24-230 Vac/dc |
| | | | | **0<br>2<br>4<br>5** | | | | | | **ADDITIONAL FUNCTIONS** | | |
| | | | | | | | | | | -<br>+ 49 + 74CT + 37 + 46BC + Trip Block<br>n/a<br>n/a | -<br>+ 49 + 46BC + SHB<br>n/a<br>n/a | -<br>n/a<br>n/a<br>+ 74CT + 37 + 46BC |
| | | | | | **A<br>B<br>D<br>7<br>8<br>O<br>P<br>Q** | | | | | **COMMUNICATIONS** | | |
| | | | | | | | | | | RS232 (Modbus RTU)<br>+ RS485 (Modbus RTU or IEC60870-5-103)<br>RS232 (Modbus RTU)<br>+ RJ45 (IEC 61850)<br>RS232 (Modbus RTU)<br>+ RJ45 (IEC 60870-5-104)<br>RS232 (Modbus RTU)<br>+ RS485 (Modbus RTU or DNP3.0 serial)<br>RS232 (Modbus RTU)<br>+ RJ45 (Modbus TCP/IP or DNP3.0 TCP/IP)<br>n/a<br>n/a<br>n/a | n/a<br>n/a<br>n/a<br>RS232 (Modbus RTU)<br>+ RS485 (Modbus RTU or DNP3.0 serial)<br>RS232 (Modbus RTU)<br>+ RJ45 (Modbus TCP/IP or DNP3.0 TCP/IP)<br>n/a<br>n/a<br>n/a | n/a<br>n/a<br>n/a<br>n/a<br>n/a<br>USB (Modbus RTU) + RS485 (Modbus RTU, DNP3.0 or IEC 60870-5-103)<br>USB (Modbus RTU) + RS485 (Modbus RTU, DNP3.0 or IEC 60870-5-103) + ETH-RJ45 (Modbus TCP or DNP3.0 TCP)<br>USB (Modbus RTU) + RS485 (Modbus RTU, DNP3.0 or IEC 60870-5-103) + ETH-RJ45 (Modbus TCP, DNP3.0 TCP or IEC61850) |
| | | | | | | **1<br>2** | | | | **INPUTS AND OUTPUTS** | | |
| | | | | | | | | | | 6 Inputs + 4 Outputs.<br>n/a | 6 Inputs + 4 Outputs.<br>n/a | n/a<br>6 Inputs + 6 Outputs. |
| | | | | | | | **2** | | | **MECHANICS** | | |
| | | | | | | | | | | Vertical assembly | Vertical assembly | Vertical assembly |
| | | | | | | | | **A<br>B<br>C<br>E** | | **LANGUAGES** | | |
| | | | | | | | | | | English, Spanish and German<br>English, Spanish and Turkish<br>English, Spanish and French<br>English, Turkish and Russian | English, Spanish and German<br>English, Spanish and Turkish<br>English, Spanish and French<br>English, Turkish and Russian | English, Spanish and German<br>English, Spanish and Turkish<br>English, Spanish and French<br>English, Turkish and Russian |
| | | | | | | | | | **B<br>C<br>D** | **ADAPTATION** | | |
| | | | | | | | | | | -<br>n/a<br>n/a | n/a<br>Without 50_2, 50N/G_2 and 50BF (74TCS with dedicated inputs).<br>n/a | n/a<br>n/a<br>3rd generation |

n/a: No available for selected adaptation

Example of ordering code:

| SIL-A | 0 | 0 | 0 | C | 0 | O | 2 | 2 | A | D | *SIL-A 0 0 0 C 0 O 2 2 A D* |
|---|---|---|---|---|---|---|---|---|---|---|---|

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