SIL-A

Overcurrent and Earth Fault Relay for Primary and Secondary Distribution

Main characteristics

- The SIL-A is an overcurrent and earth fault protection relay for primary and secondary distribution with auxiliary power supply 24-220 Vdc/ 48-230 Vac). 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(2), 50N/G (2)(1), 50/51, 50/51N/G(1), 50BF, 46, 52, 79, 74TCS, COLD LOAD PICK-UP, 86, 49T and optionally 49, 74CT, 37, 46 BC, trip block for switch disconnector.
- Metallic box 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).
- Trip bus protection function is available through configurable inputs and outputs thanks to the programmable logic.
- To allow the communication, relays have a communication port on the front of the equipment and remote communication with different options:

  One rear port on the back with the following options respect to communication protocols:

  - RS 485 PORT: IEC60870-103 or Modbus RTU selectable by settings
  - RJ 45 PORT: IEC 61850, DNP 3.0 or IEC 60870-5-104 (depending on model).
- The SIL-A has configurable inputs and outputs: 6 inputs (74TCS through configurable inputs) - and 4 outputs
- SIL-A is fitted with the demand of current with the following characteristics:

  Number of records: 168

  Recording mode circular

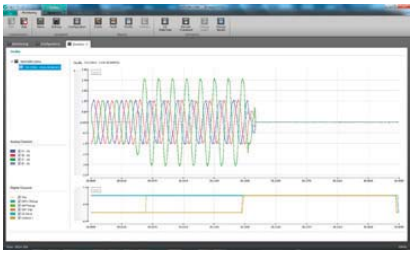
  Sampling rate (interval): configurable through communications: 1 – 60 min

SIL-A relays installed in Azadi Football Stadium's electrical substation.

(1) Note:

- LPCT model: neutral current is calculated so overcurrent protection functions are 50N(2) and 50/51N
- Compact model: neutral current is measured so overcurrent protection functions are 50N/G(2) and 50/51 N/G

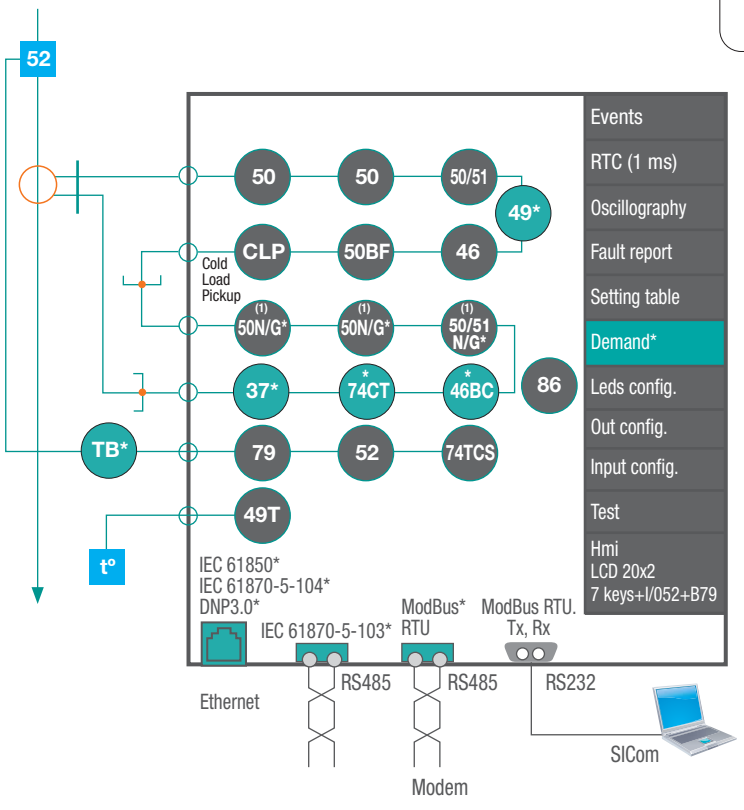
- 5 Oscillographic records, 20 fault reports and 200 events saved in non-volatile RAM memory with date / time even without power supply thanks to its internal RTC (Real Time Clock).



Additional information to fault reports

Technical specifications SIL-A

Functions diagram SIL-A



(1) Note:

- LPCT model: neutral current is calculated so overcurrent protection functions are 50N(2) and 50/51N
- Compact model: neutral current is measured so overcurrent protection functions are 50N/G(2) and 50/51 N/G

*** optional**

50(2)	Function permission: Yes/No
	Operating range: 0.10 to 30 xIn (step 0.01)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Activation level 100%
	Deactivation level 95%
	Instantaneous deactivation
	Timing accuracy: ±30 ms or ±0.5% (greater of both)
50N/G(2) (1)	Function permission: Yes/No
	Operating range: 0.10 to 30 xIn (step 0.01)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Activation level 100%
	Deactivation level 95%
	Instantaneous deactivation
	Timing accuracy: ±30 ms or ±0.5% (greater of both)
50/51	Function permission: Yes/No
	Operating range: 0.10 to 7 xIn (step 0.01)
	Curves IEC 60255-151 and ANSI
	Operating time: IEC Inverse curve, IEC very inverse curve,IEC extremely inverse curve IEC long time inverse, ANSI Inverse curve, ANSI very inverse curve, ANSI extremely inverse curve.
	Defined time : 0.02 to 300 s (step 0.01 s)
	Dial: 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
	Timer accuracy: ±5% or ±30 ms (whichever is greater)
50/51N/G (1)	Function permission: Yes/No
	Operating range: 0.10 to 7 xIn (step 0.01)
	Curves IEC 60255-151 and ANSI
	Operating time: IEC Inverse curve, IEC very inverse curve,IEC extremely inverse curve IEC long time inverse, ANSI Inverse curve, ANSI very inverse curve, ANSI extremely inverse curve.
	Defined time : 0.02 to 300 s (step 0.01 s)
	Dial: 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
	Timer accuracy: ±5% or ±30 ms (whichever is greater)
46	Function permission: yes/no
	Operating range: 0.10 to 7.00 xIn (step 0.01)
	Curves IEC 60255-151 and ANSI
	Operating time: IEC Inverse curve, IEC very inverse curve,IEC extremely inverse curve IEC long time inverse, ANSI Inverse curve, ANSI very inverse curve, ANSI extremely inverse curve.
	Defined time : 0.02 to 300 s (step 0.01 s)
	Dial: 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
	Timer accuracy: ±5% or ±30 ms (whichever is greater)
Circuit breaker monitoring	Excessive number of openings: 1 to 10000 (step 1)
	Maximum accumulated amps: 0 to 100000 ($M(A^2)$) (step 1)
	Opening time: 0.02 to 30 s (step 0.01 s)
	Closing time: 0.02 to 30 s (step 0.01 s)
	Excessive repeated openings: 1 to 10000 (step 1)
	Time Excessive repeated openings: 1 to 300 min (step 1 min)

50BF	Function permission: Yes/No
	Opening fault time: 0.02 to 1.00 s (step 0.01 s)
	Open circuit breaker activation threshold: 8% In
	Open circuit breaker reset threshold: 10% In
	Function Pickup configurable: Equipment trip, activation of the opening fault input, circuit breaker open control activation.
79	Function Permission: yes/no
	Hold permission: yes/no
	Number of reclosings: 1 to 5
	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)
	Locking possibilities: pulse inputs, level inputs, commands.
	Replacement time: 0.02 to 300 s (step 0.01 s)
	Definitive opening time: 0.02 to 300 s (step 0.01 s)
74TCS	Function permission: Yes/No
	Operating time: 0.02 to 300 s (step 0.01 s)
	Trip continuity, in circuits A and B
	Configurable inputs
CLP	Permission: 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
PLC	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
86	Allows to latch (lock out) the contact trip due to programmable logic (PLC: LATCH).
49T	Available through configurable inputs thanks to the programmable logic
49 (*)	Function permission: Yes/No
	Operating range: 0.1 to 2.4 xIn (step 0.01)
	ζ heating: 3 to 600 min (step 1 min)
	ζ cooling: 1 to 6 ζ heating (step 1)
	Alarm: 20 to 99 % (step 1%)
	Trip level: 100%
	Deactivation level: 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.
74CT (*)	Function permission: Yes/No
	Operating time: 0.02 to 300 s (step 0.01 s)
	Timing accuracy: ±30 ms or ±0.5% (greater of both)

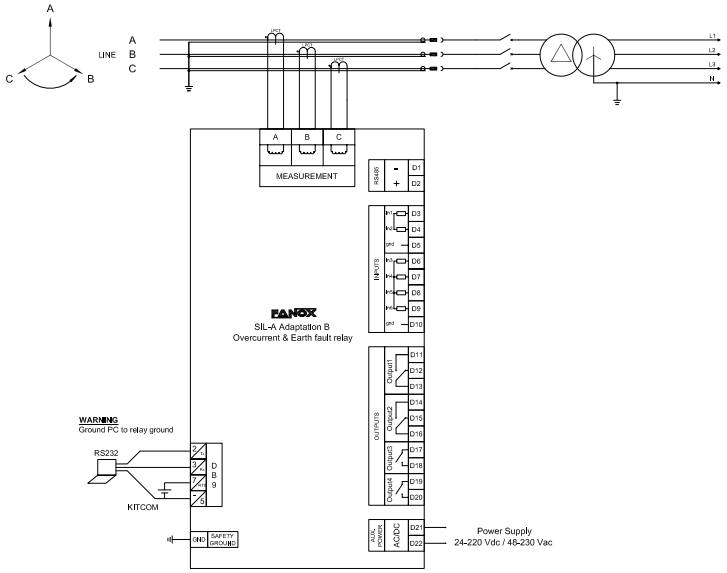
37 (*)	Function permission : yes/no
	Operating range: 0.10 to 30 xIn (step 0.01)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Activation level: 100%
	Deactivation level: 105%
	Instantaneous reset
	Timing accuracy: ±30 ms or ±0.5% (greater of both)
46BC (*)	Function permission : yes/no
	Current tap: 15 to 100 %(step 1%)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Timing accuracy: ±30 ms or ±0.5% (greater of both)
Trip block (*)	Blocking: Yes/No
	Blocking limit: 1.5 to 20 x In (step 0.01)
68	Available through configurable inputs and outputs thanks to programmable logic
Settings tables	4 settings tables
	Activated by inputs or by general settings.
RTC	Capacitor charge time: 10 minutes
	Operation with no auxiliary voltage: 72 hours
Oscillography	16 samples/cycle
	Fault init configurable
	5 records of 100 cycles: 3 prefault and 97 postfault cycles
	COMTRADE IEEE C37.111-1991
	4 analog channels y 48 digital channels
Fault reports	20 fault reports with 24 events each one
Demand of current	Demand of current with the following characteristics: • Number of records: 168 • Recording mode circular • Sampling rate (interval): configurable through communications: 1 – 60 min • Record format: Date/Time IMAX (in interval) IMAX (actual) IA IB IC IN
Configurable inputs	Same voltage as the auxiliary power supply 6 configurable inputs
Configurable outputs	250 Vac – 8 A 30 Vdc – 5 A
	4 configurable outputs • Output 1 and output 2: NC + NO • Output 2 and output 4: NO
Frequency	50/60 Hz selectable by general settings
Current measurement	Phase current (IA, IB, IC), neutral (IN), positive sequence (I1), negative sequence(I2), maximum current (Imax) and thermal image (TI)
	Real RMS
	Sampling: 16 samples/cycle
	±2% Accuracy over a band of ±20% over the nominal current and 4% over the rest of the range
	Saturation limit: 30 times rated current

Communications	LOCAL COMMUNICATION 1 Local port RS232: ModBus RTU
	REMOTE COMMUNICATION (*) 1 remote port with the following options : • 1 Remote port RS485: ModBus RTU, IEC 60870-5-103 or DNP3.0 Serial (by general settings) • 1 Remote port RJ45: IEC 61850, DNP3.0 TCP/IP, Modbus TCP/IP or IEC 60870-5-104 (depending on model)
Auxiliary power	24-220 Vdc /48-230 Vac ±20%
Environmental conditions	Operating temperature : -10 to 70ºC
	Storage temperature: -20 to 80ºC
	Relative humidity: 95%
Transformers	Measurement 3 or 4 CT /5 or /1
	Measurement 3 LPCT (current transformers with voltage output)
Mechanical Characteristics	Metallic box
	Panel mounted.
	Height x Width: 177 x 107 mm
	Depth: 122.1 mm
	IP-54 on pannel

(*) Optional depending on the model

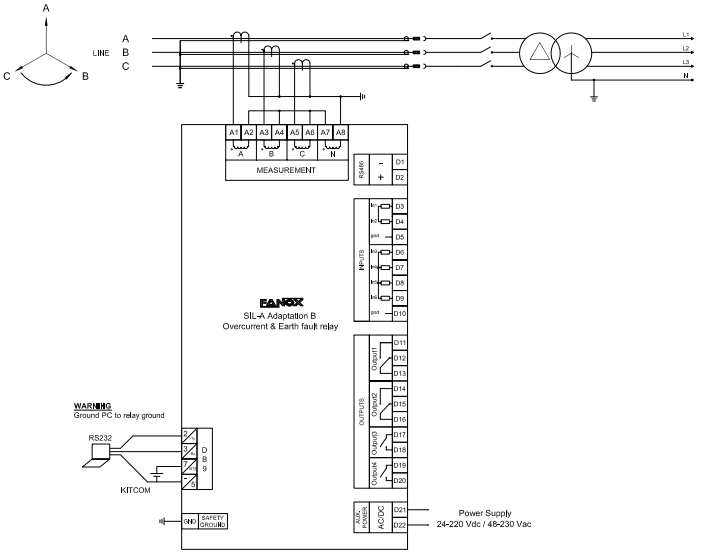
(1) LPCT model→50N/G, 50/51N: calculated neutral; Standard model→50N/G, 50/51N/G: measured neutral

• 3 LPCT Transformers

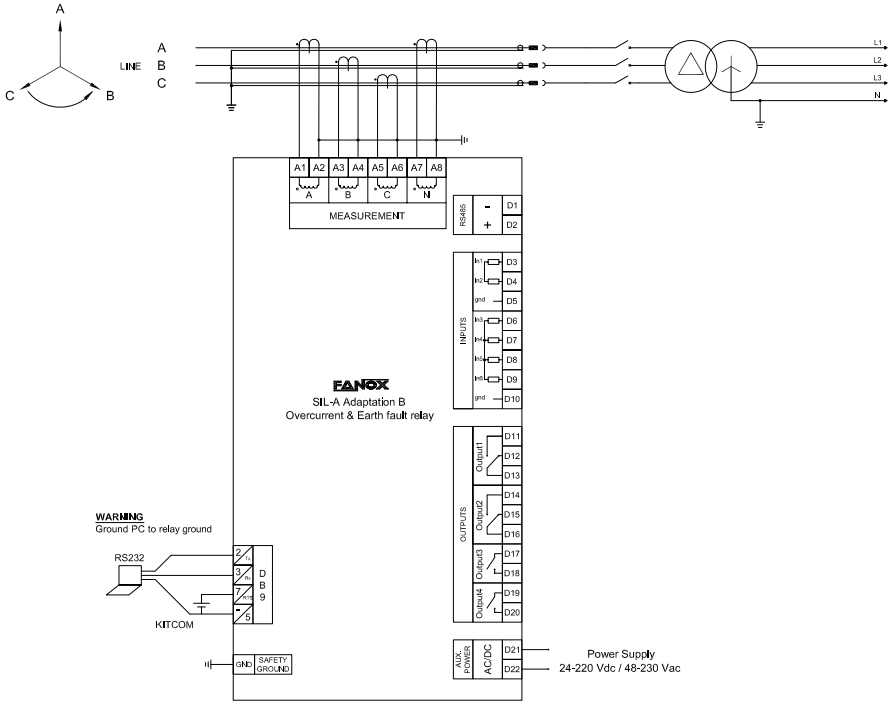


LPCT

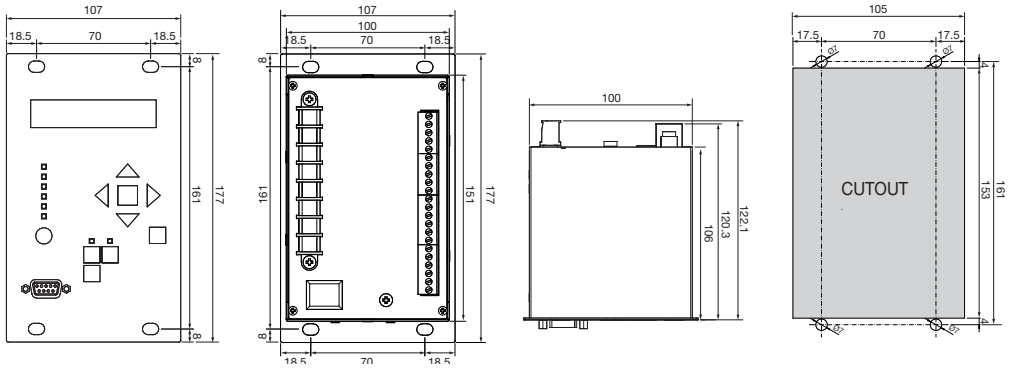
• 3 Standard Current Transformers



• 4 Standard Current Transformers



Connections diagram SIL-A



Selection & Ordering data SIL-A

SIL-A	Overcurrent & Earth Fault Protection Relay for Primary & Secondary										
											PROTECTION FUNCTIONS (2) 50 + 50/51 + (2) 50N/G(1) + 50/51 N/G(1) + 52 + 50BF + 46 + 79 + 74TCS + CLP + 86 + 49T
	X **0** **S**										**PHASE MEASUREMENT** LPCT In (Primary) = 50 – 800A. Standard In= 1A or 5A; (0.1 – 30A) / (0.5 – 150A) Sensitive In= ½ A or 5/2 A; (0.05–15A) / (0.25–75A)
		X **0** **S**									**NEUTRAL MEASUREMENT** LPCT: Neutral Internally Calculated. Standard In= 1A / 5A; (0.1–30A) / (0.5–150A) Sensitive In=1/10 A or 5/10 A; (0.01–3A) / (0.05–15A)
			0								**NET FREQUENCY** Defined by Setting
				C							**POWER SUPPLY** 24-220 Vdc/48-230Vac
					0 **2**						**ADDITIONAL FUNCTIONS** - + 49 + 74CT + 37 + 46BC + Trip Block
						A **B** **D** **7** **8**					**REAR COMMUNICATIONS** RS232 (Modbus RTU) + RS485 (Modbus RTU or IEC 60870-5-103) RS232 (Modbus RTU) + RJ45 (IEC 61850) RS232 (Modbus RTU) + RJ45 (IEC 60870-5-104) RS232 (Modbus RTU) + RS485 (Modbus RTU or DNP3.0 serial) RS232 (Modbus RTU) + RJ45 (Modbus TCP/IP or DNP3.0 TCP/IP)
							1				**INPUTS-OUTPUTS** 6 Inputs + 4 Outputs
								2			**MECHANICS** Vertical assembly
									A **B** **C** **E**		**LANGUAGE** English, Spanish and German English, Spanish and Turkish English, Spanish and French English, Turkish and Russian
										B	**ADAPTATION** -

Example of ordering code:

SIL A	0	0	0	C	2	A	1	2	B	B	*SILA 0 0 0 C 2 A 1 2 B B*