

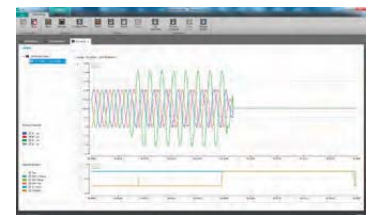
SIL-B

Feeder Protection Relay for Primary Distribution



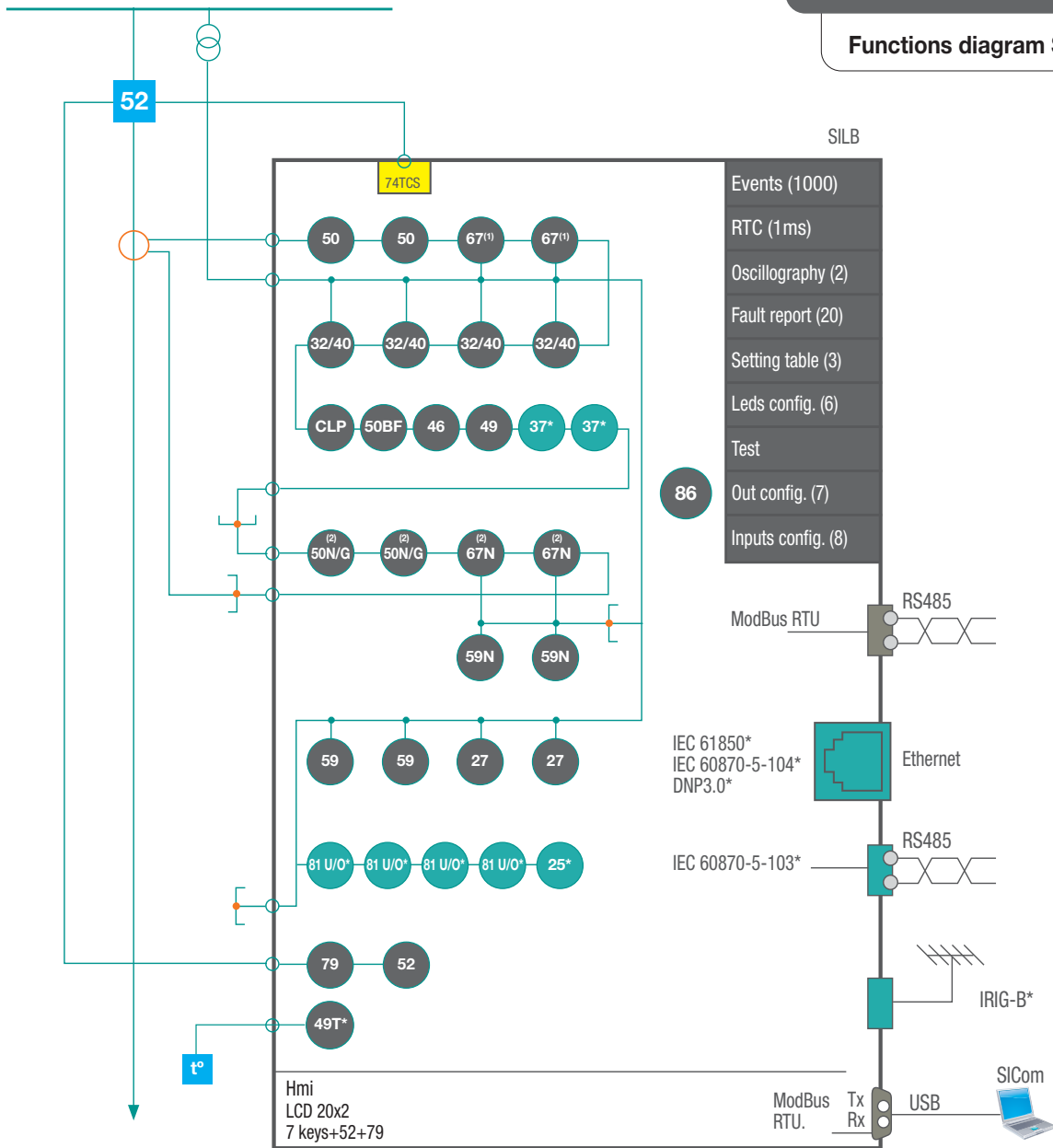
Main characteristics

- The SIL-B is a relay for primary distribution which is able to protect a feeder by means of current and voltage functions.
It is normally used with a circuit breaker as cutting element.
- SIL-B is used with auxiliary power supply 110-230 Vac/90-300 Vdc or 24-48 Vdc.
- Protection functions available in SIL-B are the following:
50 (2), 50N/G (2), 67 (2), 67N (2), 46, 59 (2), 59N (2), 27 (2), 32/40 (4), 79, 50BF, 52, 49, 86 Cold Load Pick-up, 49T, 74TCS.
Optionally: 81 U/O, 25, 37 and IRIG-B.
- 79 protection function (Recloser) allows up to 5 attempts of reclosing which can be programmed by the user.
- SIL-B has metallic box with high electromagnetic compatibility level (EMC) and wide range of operating temperature.
- Its reduced size makes the SIL-B relay easy to install and its light weight helps the customer to save costs in transport.
- Direct signalling/control both of the circuit breaker (52 function), both of the recloser (79 function).
- To allow the communication relays have a communication port on the front of the equipment.
- Two rear ports on the back for remote communication. Two communication protocols can be used simultaneously:
 - MODBUS RTU
 - IEC 60870-5-103, IEC 61850, DNP 3.0 or IEC 60870-5-104.
- SIL-B can show different measurements like:
 - Phase r.m.s. currents, neutral r.m.s. current, positive / negative sequence currents.
 - Phase r.m.s. voltages, residual neutral voltage r.m.s, voltage between phases and Busbar phase voltage.
 - Angle current of each phase respect to phase A voltage.
 - Cos Phi (power factor and each phase power factor).
 - Active power, reactive and apparent power (Total power and each phase power).
 - Line frequency and Busbar frequency.
 - Phase difference between phase B line voltage and busbar voltage.
- The SIL-B has 8 configurable inputs and 7 configurable outputs.
- 2 Oscillographic records, non-volatile RAM memory in order to store up to 1.000 events and 20 fault reports, without power supply thanks to its internal RTC (Real Time Clock).



Additional information to fault reports

Technical specifications SIL-B
Functions diagram SIL-B



*optional

* available trough configuration

67⁽¹⁾ 67 → 50/51

67⁽²⁾ 67N → 50/51 N/G

Technical specifications

Technical parameters SIL-B

50_1 50_2	Function permission: yes/no
	Operating range: 0.10 to 30 xIn (step 0.01)
	Operating time: 0.02 to 300.00 s (step 0.01 s)
	Activation level: 100%
	Deactivation level: 95%
50N/G_1 50N/G_2	Instantaneous deactivation
	Timing accuracy: 30 ms
	Function permission: yes/no
	Operating range: 0.10 to 30 xIn (step 0.01)
	Operating time: 0.02 to 300.00 s (step 0.01 s)
67_1 67_2	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: 30 ms
	Function permission: yes/no
	Operating range I: 0.10 to 7 xIn (step 0.01)
	Operating range V: 4 to 170V (step 1 V)
	IEC 60255-151 and IEEE curves
	Operating time: Inverse curve, very inverse curve, extremely inverse curve.
	Defined time: 0.02 to 300 s (step 0.01 s)
	Dial: 0.05 to 2.20 (step 0.01)
	Directionality: yes/no
	Operating angle: 0 to 359° (step 1°)
	Half cone angle: 0 to 170° (step 1°)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
	Defined time, current activation level: 100%
Defined time, current deactivation level: 95%	
Voltage activation level: 100%	
Voltage deactivation level: 95%	
Instantaneous deactivation	
Timing accuracy: 5% or 30 ms (whichever is higher)	
46	Function permission: yes/no
	Operating range: 0.10 to 1 xIn (step 0.01)
	IEC 60255-151 and IEEE curves
	Operating time: Inverse curve, very inverse curve, extremely inverse curve.
	Defined time: 0.02 to 300 s (step 0.01 s)
	Dial: 0.05 to 2.20 (step 0.01)
	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: 5% or 30 ms (whichever is higher)	
49	Function permission: yes/no
	Tap: 0.10 a 2.40 Inominal (step 0.01)
	ζ heating: 3 to 600 minutes (step 1 min)
	ζ cooling: 1 a 6 times ζ heating (step 1)
	Alarm level: 20 to 99% (step 1%)
	Trip level: 100%
	Deactivation level: 95% of alarm level
	Timing accuracy: ± 5% respect of 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.
37_1 (*) 37_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: 105%
	Instantaneous reset
Timing accuracy: 30 ms	

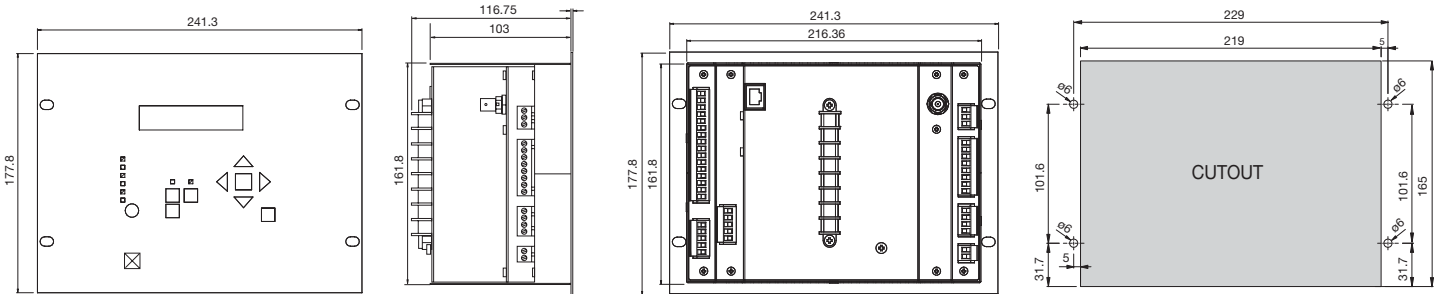
59_1 59_2	Function permission: yes/no
	Operating range: 4 to 170V (step 1 V)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Reset time: 0.2 to 1200.0 s (step 0.1 s)
	Activation level: 100%
59N_1 59N_2	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: 30 ms
	Function permission: yes/no
	Operating range: 4 to 170V (step 1 V)
27_1 27_2	Operating time: 0.02 to 300 s (step 0.01 s)
	Reset time: 0.2 to 1200.0 s (step 0.1 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
32_1 32_2 32_3 32_4	Timing accuracy: 30 ms
	Function permission: yes/no
	Operating range: 4 to 170V (step 1 V)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Reset time: 0.2 to 1200.0 s (step 0.1 s)
81_1 (*) 81_2 (*) 81_3 (*) 81_4 (*)	Activation level: 100%
	Deactivation level: 105%
	Temporized deactivation
	Timing accuracy: 30 ms
	Function permission: yes/no
Circuit breaker monitoring	Operating range: 1 to 10000 VA (step 1 VA) – secondary values
	Operating angle: 0 to 359° (step 1°)
	Operating time: 0.02 to 300 s (step 0.01 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Function permission: yes/no
	Type: Underfrequency or overfrequency
	Operating range: 45.00 a 65.00 Hz (step 0.01 Hz)
	Operating time: 0.06 a 300 s (step 0.01 s)
Reset time: 0.2 a 1200.0 s (step 0.1 s)	
Block function if phase b voltage is lower than 30 volts	
Activation level: 100%	
Underfrequency reset level: activation level + 50mHz	
Overfrequency reset level: activation level – 50 mHz	
Temporized deactivation	
Timing accuracy: 30 ms	
50BF	Breaker state: start, open, closed, error, opening time, opening error, closure time, closure error
	52a input and/or 52b input
	Opening and closure commands
	Maximum number of openings alarm: 1 a 10000
	Total amps alarm: 0 to 100000 M(A²)
79	Excess repeated openings: 1 a 10000
	Repeated openings excess time: 1 to 300 min
	Function permission : yes/no
	Opening failure time: 0.02 to 1.00 s (step 0.01 s)
	Open breaker activation threshold: 8% In
50BF	Open breaker reset time: 10% In
	Function start: Device trip, opening failure input activation, breaker opening command activation
	Function permission : yes/no
	Wait permission: yes/no
	Number of reclosings: 1 to 5
	Reclosure times 1, 2, 3, 4, 5 : 0.02 to 300.00 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 300.00 s (step 0.01 s)	
Definitive opening time: 0.02 to 300 s (step 0.01 s)	

25 (*)	Closure permission LLLB, LLDB, DLLB, DLDB: yes/no
	Live line/bar voltage level: 30 to 170 V (step 0.1 V)
	Dead line/bar voltage level: 4 to 170 V (step 0.1 V)
	Voltage supervision temporisation: 0.02 to 300 s (step 0.01 s)
	Line-bar voltage difference: 4 to 170 V (step 0.1 V)
	Line-bar phase difference: 0 to 359° (step 1 °)
	Line-bar frequency difference : 0.02 to 0.50 Hz (step 0.01 Hz)
	Syncho temporization: 0.02 to 300 s (step 0.01 s)
	Phase B line voltage and busbar voltage: - Modules and phases using DFT - Frequency using hardware circuit with the passing through zero detection.
Permission signal minimum time 150 ms	
74TCS	Function permission: yes/no
	Operating time: 0.02 to 300 s (step 0.01 s)
	Command voltage presence: -40%
	Trip continuity, in circuit a and b.
CLP	Function permission: yes/no
	50_1 multiplier range: 1 to 5
	50_2 multiplier range: 1 to 5
	67_1 multiplier range: 1 to 5
	67_2 multiplier range: 1 to 5
	50N/G_1 multiplier range: 1 to 5
	50N/G_2 multiplier range: 1 to 5
	67N_1 multiplier range: 1 to 5
	67N_2 multiplier range: 1 to 5
	Time to pass to CLP: 1 a 18000 s (step 1 s)
	CLP duration time: 1 a 18000 s (step 1 s)
CLP activation threshold: 8% In	
CLP deactivation threshold: 10% In	
Programmable logic control (PLC)	OR16, OR16_LATCH, NOR16, NOR16_LATCH
86	Allows to latch (lock out) the contact trip due to programmable logic (PLC: OR_LATCH).
Settings tables	1 general settings table
	3 protection criteria tables
	Selectable by input or general setting.
RTC	Condenser charge time: 10 minutes
	Functioning without auxiliary voltage: 72 hours
Oscillography	16 samples/cycle
	Oscillo starting configuration
	2 records: 10 cycles pre-fault and 128 post-fault
	COMTRADE IEEE C37.111-1991
	8 analogue channels and 120 digital channels
Fault report	20 fault reports with 80 events in each
Configurable inputs	8 Configurable inputs The voltage of the inputs is the same as the auxiliary power supply
Configurable outputs	Configurable outputs 250 V AC – 8 A 30 V DC – 5 A
	Output 1 and output 2: Commuted (NC + NO) Others: NO
Frequency	50/60Hz
Current measurement	Phase currents (IA,IB,IC), neutral (IN), positive sequence (I1) and negative sequence (I2)
	Real RMS
	Sampling: 16 samples/cycle
	2% precision in a band covering ±20% of nominal current and ±4% in the rest of the range
	Saturation limit: 30 times rated current

Voltage measurement	Phase voltage (VA,VB,VC), phase-phase voltage (VAB,VBC,VCA), neutral voltage (VN), bus voltage (VBB)
	The neutral voltage is calculated internally from the phase voltages.
	Real RMS
	Sampling: 16 samples/cycle
	2% precision in a band covering ±20% of nominal current and 4% in the rest of the range
	Measure: 4 to 185V
Angle accuracy	±2°
Power measurement	Total and per phase active power
	Total and per phase reactive power
	Total and per phase apparent power
	Total and per phase power factor
	2% accuracy in rated values with power factor between 1 and 0.7 (phase shift from 0 to ±45°).
Energy measurement	Positive and negative active energy
	Positive and negative reactive energy
Frequency measurement	Starting from phase B line voltage, passing through zero detection to line frequency Starting from phase B busbar voltage, passing through zero detection to busbar frequency.
	Minimum voltage: 30V
	Accuracy: ±0.01 Hz
Communications	Local port (USB): Modbus RTU
	Remote port RS485: Modbus RTU
	Remote port RS485: IEC 60870-5-103 (*)
	Remote port RJ45: IEC 61850, DNP3.0 or IEC60870-5-104 (*)
Power supply (*)	90 V DC – 300V DC / 110 V AC – 230 V AC ±20%
	24V DC - 48 V DC ±10%
Environmental conditions	Operating temperature: -10 to 70°C
	Storage temperature: -20 to 80 °C
	Relative humidity: 95%
Mechanical characteristics	Metal case
	Panel mounting
	Height x Width: 177.8 x 241.3 mm
	Depth: 116.75 mm
	IP-54

(*) Optional depending on model

Dimensions and cutout pattern SIL-B



Selection & Ordering data SIL-B

SIL-B	Feeder Protection Relay for Primary Distribution							PROTECTION FUNCTIONS
	1 5							50(2) + 50N/G(2) + 67(2) + 67N(2) + 59(2) + 59N(2) + 27(2) + 32(4) + 52 + 50BF + 46 + 79 + 74TCS + Cold Load Pick-up + 49 + 86 + 49T
		1 5						PHASE MEASUREMENT In = 1 A; (0,10 – 30,00 A) In = 5 A; (0,50 – 150,00 A)
			5 6					NEUTRAL MEASUREMENT In = 1 A; (0,10 – 30,00 A) In = 5 A; (0,50 – 150,00 A)
				A B				NET FREQUENCY 50 Hz 60 Hz
					0 1 2			POWER SUPPLY 24-48 Vdc 90-300 Vdc / 110-230 Vac
						0 3 4 5 6		ADDITIONAL FUNCTIONS - + 81U/O(4) + 25 + 37(2) + 81U/O(4) + 25 + 37(2) + IRIG-B
							0	COMMUNICATIONS USB (Modbus RTU) + RS485 (Modbus RTU) + RS485 (IEC 60870-5-103) USB (Modbus RTU) + RS485 (Modbus RTU) + RJ45 (IEC 61850) USB (Modbus RTU) + RS485 (Modbus RTU) + RJ45 (DNP3.0 TCP/IP) USB (Modbus RTU) + RS485 (Modbus RTU) + RJ45 (IEC 60870-5-104) USB (Modbus RTU) + RS485 (Modbus RTU) + FOC-LC (IEC 61850 HSR)
							0	INPUTS-OUTPUTS 8 Inputs and 7 Outputs
							1	MECHANICS Horizontal assembly
							A B D	LANGUAGE English, Spanish, French and German English, Spanish, French and Turkish English, Spanish, French and Russian
							A	ADAPTATION -

Example of ordering code:

SILB	1	1	6	B	0	0	0	1	B	A	<i>SILB116B0001BA</i>
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