

SIL-C

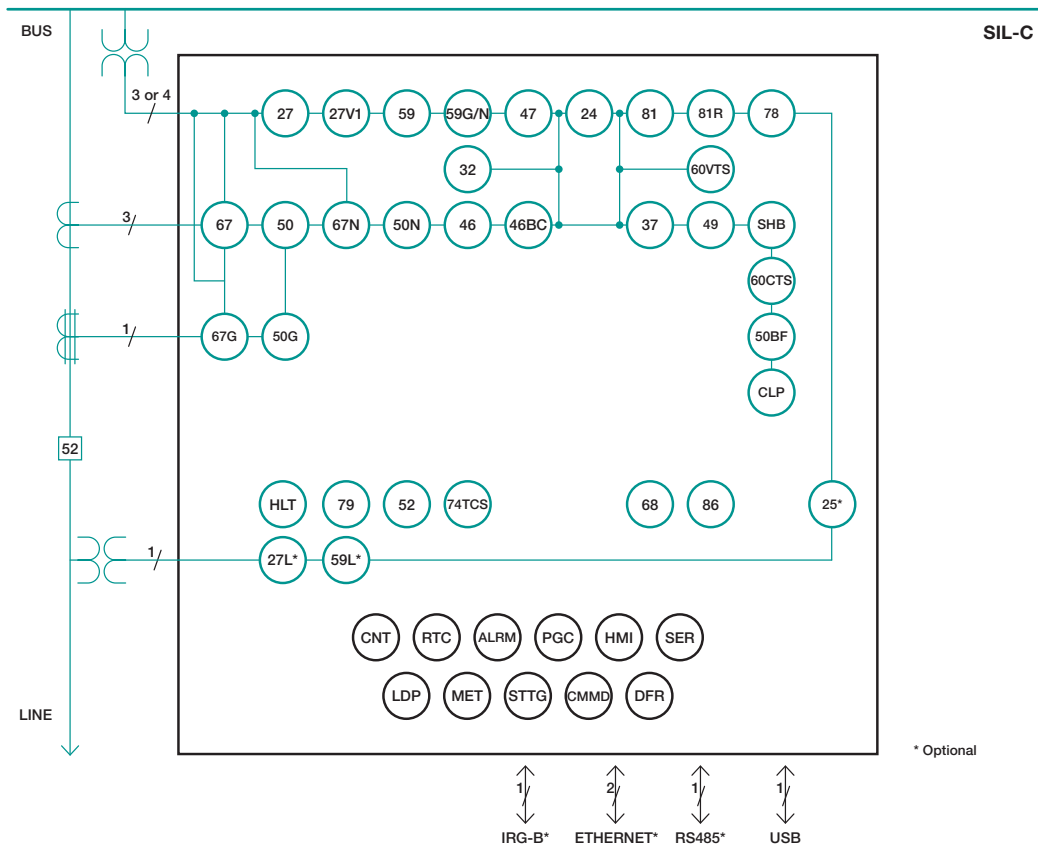
Line, Feeder & Generator Protection Relay

Primary & Secondary Distribution Protection



- The SIL-C is a feeder relay with current, voltage and frequency functions for primary and secondary distribution with auxiliary power supply of 24- 230 Vdc/ac.
- 4 current channels and up to 5 voltage channels with conventional VTs.
- Capability of measuring up to 1.000 volts when it is connected directly to the low voltage line.
- Metallic box with high electromagnetic compatibility level (EMC) and wide range of operating temperature.
- Protection of decoupling, load shedding and loss of main (islanding). Loss of Main (islanding) occurs when part of the public utility network loses connection with the rest of the system. If this situation is not detected, then the generator could remain connected, causing a safety hazard within the network. Automatic reconnection of the generator to the network may occur causing damage to the generator and the network. SIL-C protection relay detects this situation thanks to its voltage and frequency functions focused on the Rate of change of frequency (ROCOF) method.
- Signaling/control of the circuit breaker (52 function) and the recloser (79 function).
- Zone selection interlocking - ZSI (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 critical if the overcurrent protection function does not clear the fault until the adjusted time delay is finished. It is necessary, in those cases, to clear the fault quickly by means of SOTF function.
- To allow the communication, relays are provided with a local micro USB front port and with remote communication with different options (ports and protocols) on the rear side:
 - » Rear RS485 Port: IEC60870-5-103, Modbus RTU or DNP3.0 Serial.
 - » Rear RJ45 Port: Modbus TCP/IP, DNP3.0 TCP/IP or IEC60870-5-104 + Web Server + SNTP Protocol
- Synchronization through IRIG-B optional depending on model.
- The SIL-C is provided with 11 configurable inputs and 5 configurable outputs.
- The SIL-C is fitted with the demand of power (Load Data Profiling) with the following characteristics:
 - » Number of records: 2160.
 - » Recording mode circular.
 - » Sampling rate (interval): configurable through communications (1-60 min).
- Alarms panel is available.
- SIL-C is provided with non-volatile RAM memory in order to store up to 3072 events and disturbance fault recording (DFR), maintaining date & time thanks to its internal RTC (real Time Clock).
 - » 5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 postfault cycles.
 - » 25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles.
 - » 50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles.
 - » 100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.)
- 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).

Functions diagram SIL-C



ANSI CODE PROTECTIONS

50	Instantaneous phase overcurrent
67/51	Inverse Time Directional* Phase Overcurrent
50N	Instantaneous calculated neutral overcurrent
50G	Instantaneous measured neutral overcurrent
67N/51N	Inverse Time Directional* Calculated Neutral Overcurrent
67G/51G	Inverse Time Directional* Measured Neutral Overcurrent
67NI	Directional isolated calculated neutral overcurrent
67GI	Directional isolated measured neutral overcurrent
SOTF	Switch On To Fault
46	Phase balance current protection
46BC	Broken Conductor Detection
64REF	Restricted earth fault
37	Instantaneous phase undercurrent
49	Thermal overload
49T	External Trip
SHB	Second Harmonic Blocking
59	Instantaneous phase overvoltage
59N/G	Instantaneous Calculated/Measured neutral overvoltage
59L	Instantaneous Line overvoltage
47	Phase Balance voltage protection
27	Instantaneous Phase undervoltage

27L	Instantaneous Line undervoltage
27V1	Instantaneous Positive sequence undervoltage
32	Directional Overpower
81O/U	Under/Overfrequency
81R	Rate of change of Frequency (ROCOF)
78	Out of Step (Vector Shift)
24	Overfluxing
CLP	Cold Load pickup
79	AC Reclosing device
HLT	Hot Line Tag
52	Breaker Wear Monitoring
25	Synchro Check
50BF	Circuit Breaker Failure
74TCS	Trip Circuit Supervision
60CTS	Phase CT Supervision
60VTS	Phase VT Supervision
86	Trip Lockout
68	Zone Selection Interlocking (ZSI)
PGC	Programmable logic control

* ANSI 67, ANSI 67G and ANSI 67N can be converted into ANSI 51, ANSI 51G and ANSI 51N respectively by setting the "Directionality" parameter to NO.

ADDITIONAL FUNCTIONS

CNT	Counters
RTC	Real Time Clock
ALRM	Alarm panel
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 SIL-C

Function 50-1 Function 50-2	Function enable: No/Alarm/Trip/SHB Trip	Function 67N/51N-1 Function 67N/51N-2	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)		Curve Type: IEC 60255-151 and IEEE curves.
	Time delay: 0.000 to 300.000 s (step 0.001 s)		IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).
	Activation level: 100%		Time delay: 0.000 to 300.000 s (step 0.001 s)
	Deactivation level: 95%		Time dial (TMS): 0.05 to 25.00 (step 0.01)
	Temporized deactivation		If Curve type IEC: 0.05 to 1.00 (step 0.01)
Function 50N-1	Timing accuracy: $\pm 0.5\%$ or ± 35 ms (greater of both)	If Curve type IEEE: 0.10 to 25.00 (step 0.01)	Current tap: 0.050 to 20.000 xIn (step 0.001xIn)
	Function enable: No/Alarm/Trip/SHB Trip	Function 67N/51N-1 Function 67N/51N-2	Directionality: No/Forward/Reverse
	Current tap: 0.050 to 30.000 xIn (step 0.001xIn)		Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)		Operating angle: 0 to 359° (step 1°)
	Activation level: 100%		Halfcone angle: 10 to 170° (step 1°)
	Deactivation level: 95%		Curve, current activation level: 110%
Temporized deactivation	Curve, current deactivation level: 100%		
Function 50G-1	Timing accuracy: $\pm 0.5\%$ or ± 35 ms (greater of both)	Defined time, current activation level: 100%	Defined time, current deactivation level: 95%
	Function enable: No/Alarm/Trip/SHB Trip	Voltage activation level: 100%	Voltage deactivation level: 95%
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)	Temporized deactivation	Timing accuracy for IEC and IEEE curves selection:
	Time delay: 0.000 to 300.000 s (step 0.001 s)	± 30 ms or $\pm 5\%$ (greater of both)	Timing accuracy for defined time curve selection:
	Activation level: 100%		± 35 ms or $\pm 0.5\%$ (greater of both)
	Deactivation level: 95%		
Function 67/51-1 Function 67/51-2 Function 67/51-3 Function 67/51-4	Temporized deactivation		
	Timing accuracy: $\pm 0.5\%$ or ± 35 ms (greater of both)		
	Function enable: No/Alarm/Trip/SHB Trip		
	Curve Type: IEC 60255-151 and IEEE curves.		
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).		
	Time delay: 0.000 to 300.000 s (step 0.001 s)		
	Time dial (TMS): 0.05 to 25.00 (step 0.01)		
	If Curve type IEC: 0.05 to 1.00 (step 0.01)		
	If Curve type IEEE: 0.10 to 25.00 (step 0.01)		
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)		
	Directionality: No/Forward/Reverse		
	Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)		
	Operating angle: 0 to 359° (step 1°)		
	Halfcone angle: 10 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%			
Temporized deactivation			
Timing accuracy for IEC and IEEE curves selection:			
± 30 ms or $\pm 5\%$ (greater of both)			
Timing accuracy for defined time curve selection:			
± 35 ms or $\pm 0.5\%$ (greater of both)			

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Function 67G/51G-1 Function 67G/51G-2	Function enable: No/Alarm/Trip/SHB Trip	Function 67GI	Function enable: No/Alarm/Trip/SHB Trip		
	Curve Type: IEC 60255-151 and IEEE curves. IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).		Directionality: No/Forward/Reverse		
	Time delay: 0.000 to 300.000 s (step 0.001 s)		Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)		
	Time dial (TMS): 0.05 to 25.00 (step 0.01) If Curve type IEC: 0.05 to 1.00 (step 0.01) If Curve type IEEE: 0.10 to 25.00 (step 0.01)		High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)		
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)		Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)		
	Directionality: No/Forward/Reverse		High Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)		
	Polarization voltage: 0.08 to 2.00 xUn (step 0.01xUn)		Time delay: 0.000 to 300.000 s (step 0.001 s)		
	Operating angle: 0 to 359° (step 1°)		Operating angle: 0 to 359° (step 1°)		
	Halfcone angle: 10 to 170° (step 1°)		Halfcone angle: 10 to 170° (step 1°)		
	Curve, current activation level: 110%		Curve, current activation level: 110%		
	Curve, current deactivation level: 100%		Curve, current deactivation level: 100%		
	Defined time, current activation level: 100%		Defined time, current activation level: 100%		
	Defined time, current deactivation level: 95%		Defined time, current deactivation level: 95%		
	Voltage activation level: 100%		Voltage activation level: 100%		
	Voltage deactivation level: 95%		Voltage deactivation level: 95%		
	Temporized deactivation		Temporized deactivation		
	Timing accuracy for IEC and IEEE curves selection: ± 30 ms or ± 5% (greater of both)		Function enable: No/Alarm/Trip/ SHB Trip	Function 64REF	Function enable: No/Alarm/Trip/ SHB Trip
	Timing accuracy for defined time curve selection: ± 35 ms or ± 0.5% (greater of both)		Current tap: 0.050 to 20.000 xIn (step 0.001xIn)		Current tap: 0.050 to 20.000 xIn (step 0.001xIn)
			Time delay: 0.020 to 300.000 s (step 0.001 s)		Time delay: 0.020 to 300.000 s (step 0.001 s)
			Neutral SHB Tap: 5 to 50% (step 1%)		Neutral SHB Tap: 5 to 50% (step 1%)
	Activation level: 100%	Activation level: 100%			
	Deactivation level: 95%	Deactivation level: 95%			
	Temporized deactivation	Temporized deactivation	Temporized deactivation		
	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)	Timing accuracy: ± 35 ms or ± 0.5% (greater of both)		
Function 67NI	Function enable: No/Alarm/Trip/SHB Trip	Function SOTF	Function enable: No/Alarm/Trip/SHB Trip		
	Directionality: No/Forward/Reverse		Current tap: 0.010 to 30.000 xIn (step 0.001xIn)		
	Low Current Tap: 0.050 to 30.000 xIn (step 0.001xIn)		Time delay: 0.000 to 295.000 s (step 0.001 s)		
	High Current Tap: 0.050 to 30.000 xIn (step 0.001xIn)		Safe Time: 0.000 to 300.000 s (step 0.001 s)		
	Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)		Activation level: 100%		
	High Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)		Deactivation level: 95%		
	Time delay: 0.000 to 300.000 s (step 0.001 s)		Reset time: 0.000 to 300.000 s (step 0.001 s)		
	Operating angle: 0 to 359° (step 1°)		Timing accuracy: ±0.5% or ±35 ms (greater of both)		
	Halfcone angle: 10 to 170° (step 1°)		Function enable: No/Alarm/Trip	Function 49	Function enable: No/Alarm/Trip
	Curve, current activation level: 110%		Current tap: 0.100 to 2.400 In (step 0.001xIn)		Current tap: 0.100 to 2.400 In (step 0.001xIn)
	Curve, current deactivation level: 100%		ζ heating: 3 to 600 min (step 1 min)		ζ heating: 3 to 600 min (step 1 min)
	Defined time, current activation level: 100%		ζ cooling: 1 to 6 xζ heating (step 1)		ζ cooling: 1 to 6 xζ heating (step 1)
	Defined time, current deactivation level: 95%		Alarm: 20 to 99% (step 1%)		Alarm: 20 to 99% (step 1%)
	Voltage activation level: 100%		Trip level: 100%		Trip level: 100%
Voltage deactivation level: 95%	Deactivation level: 95% of alarm level	Deactivation level: 95% of alarm level			
Temporized deactivation	Timing accuracy: ± 5% respect of theoretical value.	Timing accuracy: ± 5% respect of theoretical value.	Timing accuracy: ± 5% respect of theoretical value.		
	Function enable: No/Yes	Function SHB	Function enable: No/Yes		
	Current Tap: 5 to 50% (step 1%)		Current Tap: 5 to 50% (step 1%)		
	Reset Time: 0.000 to 300.000 (step 0.001 s)		Reset Time: 0.000 to 300.000 (step 0.001 s)		
	Block Threshold: 0.010 to 30.000xIn (step 0.001xIn)		Block Threshold: 0.010 to 30.000xIn (step 0.001xIn)		
	Activation level: 100%		Activation level: 100%		
	Deactivation level: 95%	Deactivation level: 95%	Deactivation level: 95%		
	Temporized deactivation	Temporized deactivation	Temporized deactivation		
	Function enable: Yes/No	Function CLP	Function enable: Yes/No		
	Settings group: 1 to 4 (step 1)		Settings group: 1 to 4 (step 1)		
	No load time: 0.020 to 300.000 s (step 0.001 s)		No load time: 0.020 to 300.000 s (step 0.001 s)		
	Cold load time: 0.020 to 300.000 s (step 0.001 s)	Cold load time: 0.020 to 300.000 s (step 0.001 s)	Cold load time: 0.020 to 300.000 s (step 0.001 s)		

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Function 46	Function enable: No/Alarm/Trip/SHB Trip	Function 27V1	Function enable: No/Alarm/Trip		
	Curve Type: IEC 60255-151 and IEEE curves.		Voltage tap: 0.15 to 2.00 xUn (step 0.01xUn)		
	IEC (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse).		Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)		
	Time delay: 0.000 to 300.000 s (step 0.001 s)		Time delay: 0.060 to 300.000 s (step 0.001 s)		
	Time dial (TMS): 0.05 to 25.00 (step 0.01)		Reset time: 0.020 to 300.000 s (step 0.001 s)		
	If Curve type IEC: 0.05 to 1.00 (step 0.01)		Activation level: 100%		
	If Curve type IEEE: 0.10 to 25.00 (step 0.01)		Deactivation level: 105%		
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)		Temporized deactivation		
	Curve, current activation level: 110%		Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)		
	Curve, current deactivation level: 100%		Function 27L (*)	Function enable: No/Alarm/Trip	
	Defined time, current activation level: 100%			Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)	
	Defined time, current deactivation level: 95%			Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)	
	Temporized deactivation			Time delay: 0.060 to 300.000 s (step 0.001 s)	
	Timing accuracy for IEC and IEEE curves selection:			Reset time: 0.020 to 300.000 s (step 0.001 s)	
± 30 ms or $\pm 5\%$ (greater of both)	Activation level: 100%				
Timing accuracy for defined time curve selection:	Deactivation level: 105%				
± 35 ms or $\pm 0.5\%$ (greater of both)	Temporized deactivation				
Function 46BC	Function enable: No/Alarm/Trip	Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)		Function 59-1	Function enable: No/Alarm/Trip
	Tap: 15 to 100 % (step 1%)	Function 59-2			Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.030 to 300.000 s (step 0.001 s)				Time delay: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%				Reset time: 0.020 to 300.000 s (step 0.001 s)
	Deactivation level: 95%				Activation level: 100%
	Timing accuracy: 0.5% or 30 ms (greater of both)				Deactivation level: 95%
Function 37	Function enable: No/Alarm/Trip		Function 59N/G-1	Function 59N/G-2	Function enable: No/Alarm/Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)			
	Minimum level: 0.000 to 1.000 xIn (step 0.001xIn)	Time delay: 0.020 to 300.000 s (step 0.001 s)			
	Time delay: 0.060 to 300.000 s (step 0.001 s)	Reset time: 0.020 to 300.000 s (step 0.001 s)			
	Activation level: 100%	Activation level: 100%			
	Deactivation level: 105%	Deactivation level: 95%			
	Temporized deactivation	Temporized deactivation			
Timing accuracy: 0.5% or 30 ms (greater of both)	Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)				
Function 27-1 Function 27-2	Function enable: No/Alarm/Trip	Function 47	Function 59L (*)	Function enable: No/Alarm/Trip	
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)			Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)	
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)			Time delay: 0.020 to 300.000 s (step 0.001 s)	
	Time delay: 0.060 to 300.000 s (step 0.001 s)			Reset time: 0.020 to 300.000 s (step 0.001 s)	
	Reset time: 0.020 to 300.000 s (step 0.001 s)			Activation level: 100%	
	Activation level: 100%			Deactivation level: 95%	
	Deactivation level: 105%			Temporized deactivation	
	Temporized deactivation			Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)	
	Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)			Function enable: No/Alarm/Trip	
				Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)	
	Time delay: 0.020 to 300.000 s (step 0.001 s)				
	Reset time: 0.020 to 300.000 s (step 0.001 s)				
	Activation level: 100%				
	Deactivation level: 95%				
	Temporized deactivation				
	Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)				

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Function 32-1	Function enable: No/Alarm/Trip	Function 24-1	Function enable: No/Alarm/Trip
	Activation level: 0.08 to 2.00 xSn (step 0.01xSn)		Curve Type: Inverse A, Inverse B, Inverse C and Defined Time.
	Operating angle: 0 to 359° (step 1°)		Time delay: 0.020 to 300.000 s (step 0.001 s)
	Function 32-2		Time dial (TMS): 0.10 to 25.00 (step 0.01)
Time delay: 0.020 to 300.000 s (step 0.001 s)	Function 32-3	Activation level: 100%	Activation level: 0.50 to 2.00 xUn/Fn (step 0.01 xUn/Fn)
Function 32-3	Deactivation level: 95%	Function 32-4	Time delay: 0.020 to 300.000 s (step 0.001 s)
Instantaneous deactivation	Timing accuracy: $\pm 0.5\%$ or ± 30 ms (greater of both)	Function 24-2	Reset Time: 0.020 to 300.000 s (step 0.001 s)
Function 81-1	Function enable: No/Alarm/Trip	Curve, activation level: 110%	Curve, deactivation level: 100%
Function 81-2	Type: Underfrequency or overfrequency	Defined time, activation level: 100%	Defined time, deactivation level: 95%
Function 81-3	Activation level: 45.000 a 65.000 Hz (step 0.001 Hz)	Temporized deactivation	Timing accuracy for curves selection:
Function 81-4	Time delay: 0.020 a 300.000 s (step 0.001 s)	Reset time: 0.020 a 300.000 s (step 0.001 s)	± 30 ms or $\pm 5\%$ (greater of both)
Function blocked if phase B voltage is lower than 20 volts	Activation level: 100%	Overfrequency reset level: activation level + 50mHz	Timing accuracy for defined time curve selection:
Underfrequency reset level: activation level + 50mHz	Underfrequency reset level: activation level + 50mHz	Overfrequency reset level: activation level - 50 mHz	± 30 ms or $\pm 0.5\%$ (greater of both)
Overfrequency reset level: activation level - 50 mHz	Temporized deactivation	The frequency measurement is an average value of the frequency measured during 8 cycles. The accuracy of the Time Delay is the adjusted value plus the necessary time to achieve the measurement during 8 cycles.	Dead tap: 0.08 to 2.00 xUn (step 0.01xUn)
Temporized deactivation	The frequency measurement is an average value of the frequency measured during 8 cycles. The accuracy of the Time Delay is the adjusted value plus the necessary time to achieve the measurement during 8 cycles.	Function 25 (*)	Live tap: 0.08 to 2.00 xUn (step 0.01xUn)
Function 81R-1	Function enable: No/Alarm/Trip	Type: Increase/Decrease	Voltage supervision time: 0.060 to 300.000 s (step 0.001 s)
Function 81R-2	Activation level: 0.100 to 5.000 Hz/s (step 0.001 Hz/s)	Time delay: 0.060 to 40.000 s (step 0.001 s)	Voltage difference: 0.05 to 2.00 xUn (step 0.01xUn)
Function 81R-3	Time delay: 0.060 to 40.000 s (step 0.001 s)	Reset time: 0.020 to 300.000 s (step 0.001 s)	Phase difference: 2 to 90 ° (step 1°)
Function 81R-4	Function blocked if phase B voltage is lower than 20 volts	Activation level: 100%	Frequency difference: 0.060 to 10.000 Hz (step 0.001 Hz)
Temporized deactivation	The frequency measurement is an average value of the frequency measured during 8 cycles. The accuracy of the Time Delay is the adjusted value plus the necessary time to achieve the measurement during 8 cycles.	Temporized deactivation	Synchro check time: 0.020 to 300.000 s (step 0.001 s)
Function 78	Function enable: No/Alarm/Trip	Measurement accuracy: $\pm 1^\circ$ or 10% (greater of both)	Number of recloses: 0 to 4 (step 1)
Activation level: 1 to 25° (step 1°)	Reset time: 0.020 to 300.000 s (step 0.001 s)	Function blocked if phase B voltage is lower than 20 volts	Reclose time 1, 2, 3, 4: 0.020 to 2000.000 s (step 0.001 s)
Temporized deactivation	Measurement accuracy: $\pm 1^\circ$ or 10% (greater of both)	Function 79	Hold Enable: No/Yes/No Time
		Hold time: 0.000 to 2000.000 s (step 0.001 s)	Reset time: 0.000 to 2000.000 s (step 0.001 s)
		Safe time: 0.020 to 2000.000 s (step 0.001 s)	Locking possibilities: pulse inputs, level inputs, commands.
		Function 52	Maximum number of openings: 1 a 100,000 (step 1)
		Maximum accumulated amperes: 1 to 100,000 M(A2) (step 1)	Repetitive number of openings: 1 to 100,000 (step 1)
		Time for repetitive number of openings: 1 to 300 min (step 1 min)	Maximum opening time: 0.020 to 300.000 s (step 0.001 s)
		Maximum closing time: 0.020 to 300.000 s (step 0.001 s)	Maximum closing time: 0.020 to 300.000 s (step 0.001 s)
		Function 74TCS	Function enable: No/Yes
		Time delay: 0.020 to 300.000 s (step 0.001 s)	Continuity in circuits A and B

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Function 60CTS	Function enable: No/Yes	Load Data Profiling (LDP)	Demand of power with the following characteristics:
	Time delay: 0.020 to 300.000 s (step 0.001 s)		- Number of records: 2160
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)		- Recording mode circular
	Open breaker activation and reset threshold: 0.8% In		- Sampling rate (interval): configurable through communications (1-60 min)
Function 60VTS	Detection of the loss of one phase CT	Inputs	11 configurable inputs
	Function enable: No/Yes		The voltage of the inputs is the same as the auxiliary power supply
	Time delay: 0.020 to 300.000 s (step 0.001 s)	Outputs	5 configurable outputs
	V1, V2 and VP Tap: 0.08 to 2.00 xUn (step 0.001xUn)		Output 1: NO-NC; the rest of the outputs: NO. 250 V AC – 8 A; 30 V DC – 8 A
Function 50BF	I1, I2 and 3I0 Tap: 0.010 to 20.000 xIn (step 0.001xIn)	Frequency	50/60Hz
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)		Burden
Function enable: No/Yes	<0.001 VA (1 A) & <0.025 VA (5 A)		
Time delay: 0.020 to 1.000 s (step 0.001 s)	Burden of voltage inputs:		
Open breaker activation and reset threshold: 0.8% In	< 70 mVA		
Function 49T	Available through configurable inputs thanks to the programmable logic	Current measurements	Burden of power supply unit:
	Function 86		It allows to latch (lock out) the contact trip due to programmable logic (PGC: RSFF).
Function 68		Available through configurable inputs and outputs thanks to the programmable logic (PGC).	Voltage measurements
	Programmable logic control (PGC)	OR, OR_1PULSE, OR_PULSES, OR_BLINKING, OR_TIMER UP, OR_TIMER DOWN	
NOR, NOR_1PULSE, NOR_PULSES, NOR_BLINKING, NOR_TIMER UP, NOR_TIMER DOWN		Fundamental values (DFT)	
AND, AND_1PULSE, AND_PULSES, AND_BLINKING, AND_TIMER UP, AND_TIMER DOWN		Sampling: 32 samples/cycle	
NAND, NAND_1PULSE, NAND_PULSES, NAND_BLINKING, NAND_TIMER UP, NAND_TIMER DOWN		2% precision in a band covering $\pm 20\%$ of nominal current and $\pm 4\%$ in the rest of the range	
XOR, OR_1PULSE, XOR_PULSES, XOR_BLINKING, XOR_TIMER UP, XOR_TIMER DOWN		Saturation limit: 30 times rated current	
SRFF, SRFF_1PULSE, SRFF_PULSES, SRFF_BLINKING, SRFF_TIMER UP, SRFF_TIMER DOWN		Phase voltage (VA, VB, VC), Line Voltage (VL)*, phase-phase voltage (UAB, UBC, UCA), neutral voltage (VR, 3V0), positive sequence (V1) and negative sequence (V2), Maximum voltage (VMAX) and V/f.	
RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN			Fundamental values (DFT)
R_EDGE, R_EDGE_1PULSE		Sampling: 32 samples/cycle	
F_EDGE, F_EDGE_1PULSE		1% precision in a band covering $\pm 20\%$ of nominal voltage and 4% in the rest of the range	
Settings tables		4 settings groups	- With VTs: 3-250 V
	Selectable by input or general setting.	- Direct connection: Up to 1000 V	
SER	3072 events	Angle measurements	Current Angles: IA, IB, IC, IN and 3I0.
	32 samples/cycle		Voltage Angles: VA, VB, VC, VR, VL*, 3V0, UAB, UBC and UCA.
Disturbance fault recording (DFR)	Fault start configurable	Power measurements	Power factor: Cos PHI-A, Cos-PHI-B and Total Cos-PHI
	Configurable number of records depending on the size:		Accuracy: $\pm 2\%$
	5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 postfault cycles.		Total and per phase active power
	25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles.	Total and per phase reactive power	
	50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles.	Total and per phase apparent power	
	100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.)	2% accuracy in rated values with power factor between 1 and 0.7 (phase shift from 0 to $\pm 45^\circ$).	
COMTRADE IEEE C37.111-1991 - 9 analog channels and 96 digital channels	Energy measurement	Positive and negative active energy	
		Positive and negative reactive energy	

Technical parameters SIL-C

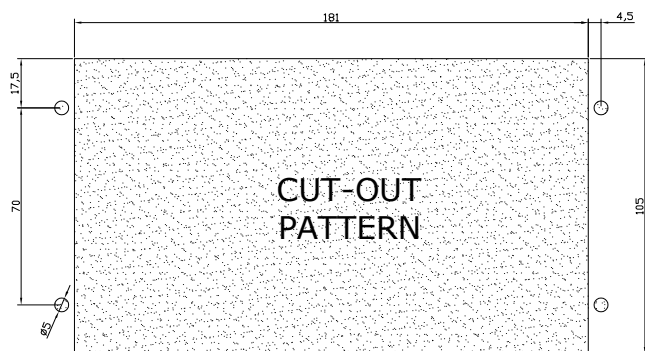
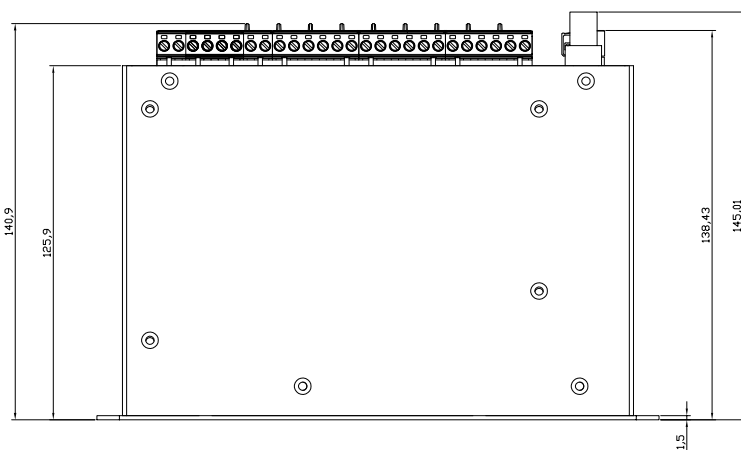
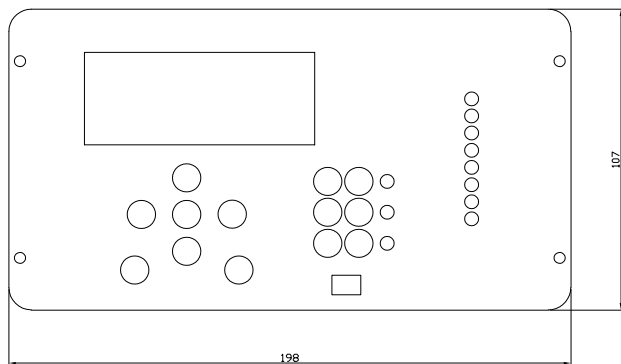
Frequency measurements	Busbar Frequency, Line Frequency, df/dt
	Minimum voltage: 20V
	Accuracy: ± 0.01 Hz
Communications	Local port (micro USB): Modbus RTU
	Remote port RS485: Modbus RTU, DNP3.0 or IEC60870-5-103 Remote port RJ45: DNP3.0 TCP/IP, IEC60870-5-104 or Modbus TCP/IP + Web Server + SNTP Protocol + IRIG-B (*)
Power supply	24-230 Vdc / Vac (Tolerance: -20%/+10%)
Environmental conditions	Operating temperature: -40 to 70°C
	Storage temperature: -40 to 80°C
	Relative humidity: 95%
Mechanical characteristics	Metallic box
	Panel mounted
	Horizontal assembly: HxWxD: 198x107x145.01 (mm)
	Vertical assembly: HxWxD: 107x198x145.01 (mm)
	IP-54

(*) Optional depending on model

NOTE: ANSI 67, ANSI 67G and ANSI 67N can be converted into ANSI 51, ANSI51G and ANSI 51N respectively by setting the "Directionality" parameter to NO.

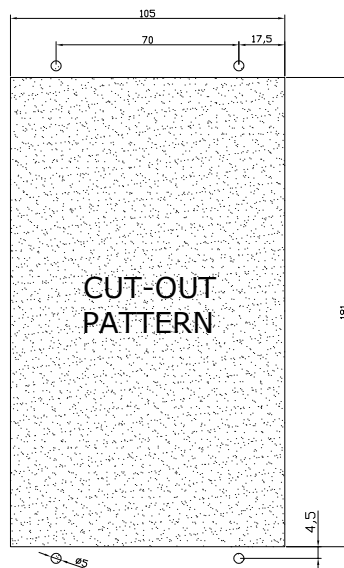
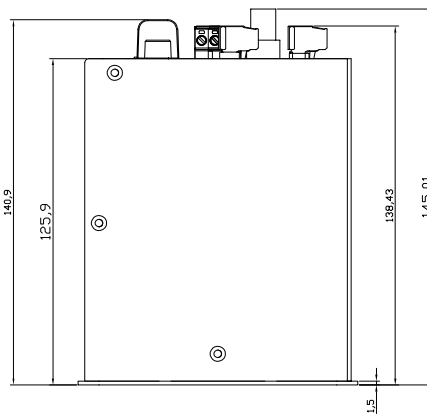
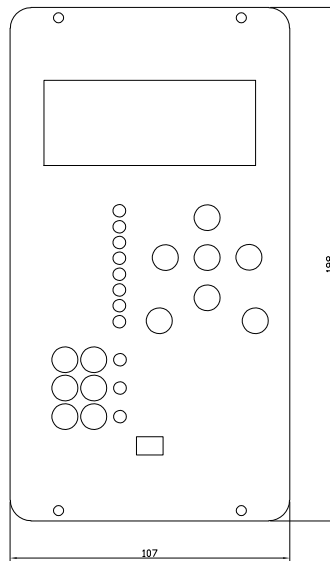
Dimensions and cutout SIL-C

Horizontal assembly



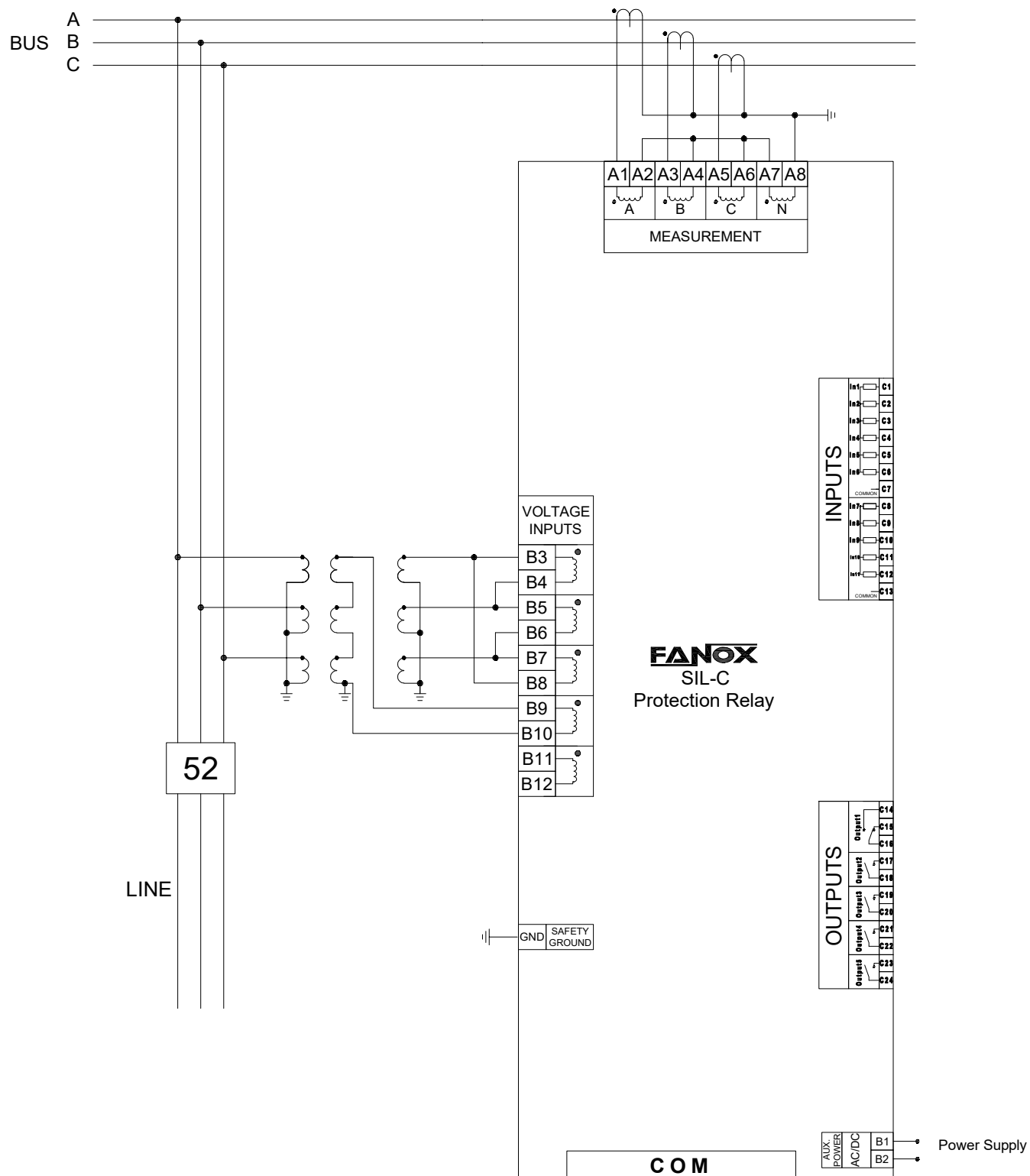
Dimensions and cutout SIL-C

Vertical assembly



Connections diagram SIL-C

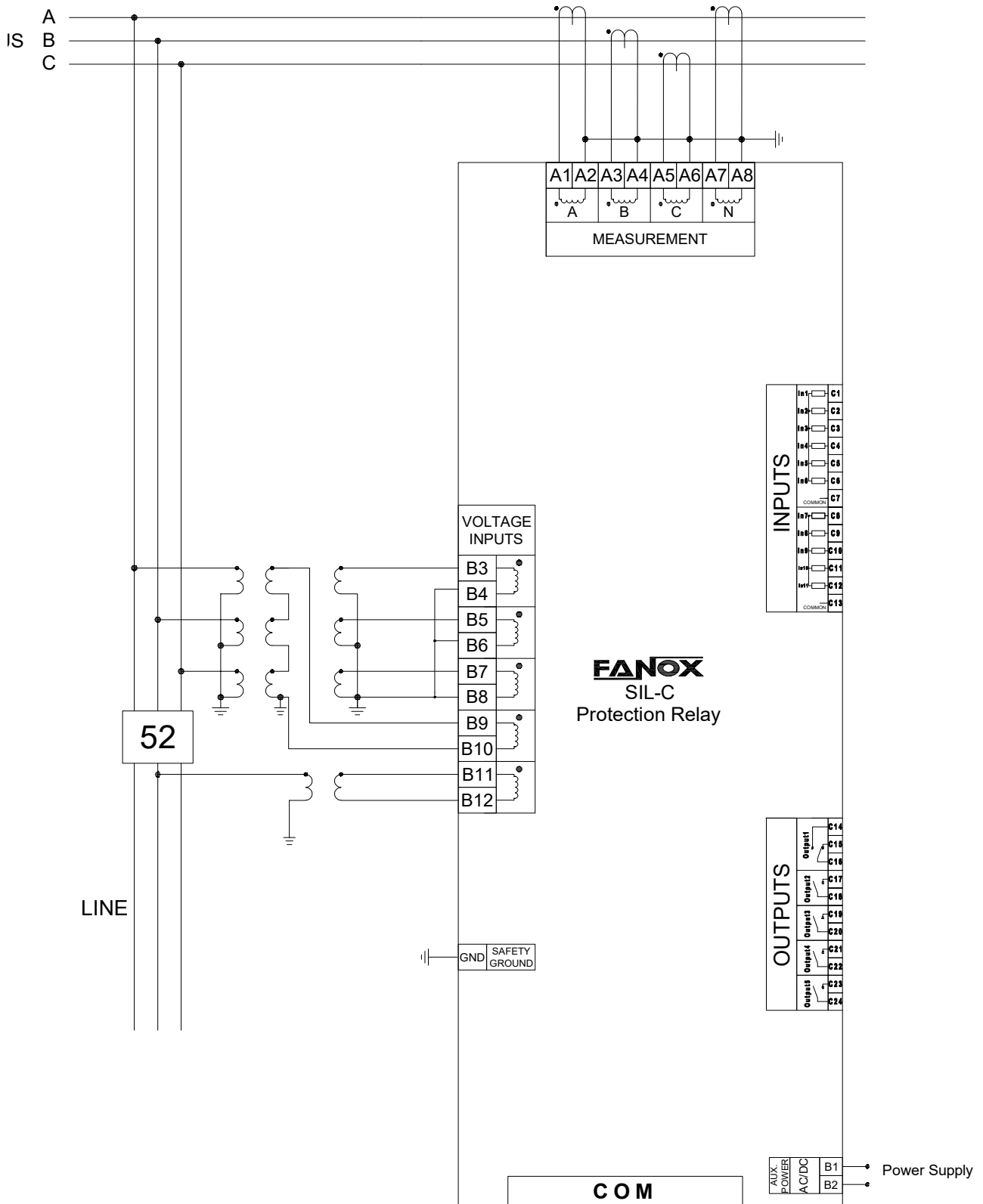
Phase-phase + residual voltage, 3 current transformers



(*) Example of connections diagram

Connections diagram SIL-C

3 VTs (Phase-neutral) + residual voltage + 1 VT for synchronism , 4 current transformers



(*) Example of connections diagram

Selection & Ordering data SIL-C

SIL-C

Feeder & Generator Protection Relay										
0										PHASE CURRENT MEASUREMENT 1 A or 5 A
	0									NEUTRAL CURRENT MEASUREMENT 1 A or 5 A
		0								VOLTAGE MEASUREMENT Up to 1000 V (direct connection) or 250 V (with VTs)
			C							POWER SUPPLY 24-230 Vac/dc
				0 1						ADDITIONAL FUNCTIONS - +25 + 27-L + 59-L
					A B					COMMUNICATIONS A: USB (Modbus RTU) + RS485 (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) B: USB (Modbus RTU) + RS485 (Modbus RTU, IEC60870-5-103 or DNP3.0 Serial) + RJ45 (Modbus TCP or DNP3.0 TCP or IEC60870-5-104)) + Web Server + SNTP Protocol + IRIG-B
						1				INPUTS AND OUTPUTS 11 Inputs + 5 Outputs
							C D E F			MECHANICAL ASSEMBLY Vertical Assembly Horizontal Assembly Vertical Assembly with anticorrosive treatment Horizontal Assembly with anticorrosive treatment
								A E F		LANGUAGE English, Spanish, German and French English, Spanish, Turkish and Russian English, Spanish, German and Portuguese
									B	ADAPTATION (2) 50 + SOTF + 50G + 50N + (4) 67/51 + (2) 67G/51G + (2) 67N/51N + 67GI + 67NI + 64REF + 46 + 46BC + 49 + 49T + 37 + (2) 27+ 27V1 + (2) 59 + (2) 59N/G + 47 + (4) 32 + (4) 81U/O + (4) 81R + 78 + (2) 24 + 79 + 74TCS + 60CTS + 60VTS + 50BF + SHB + CLP + 52 + 86 + HLT

Example of ordering code:

0	0	0	C	0	A	1	C	A	B	SIL C 0 0 0 C 0 A 1 C A B
SIL-C										