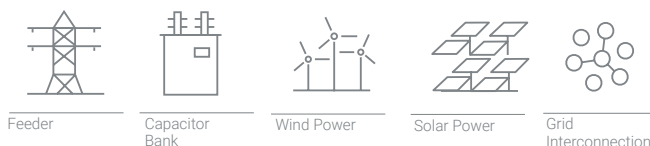


SIL-C

Relé de Protección
ALIMENTADOR Y GENERADOR
Compacto

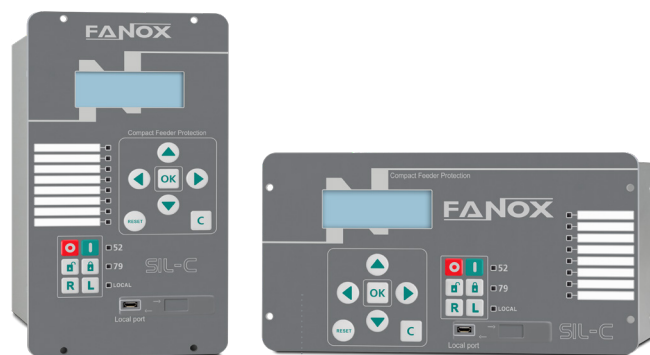
PROTECCIÓN DE DISTRIBUCIÓN SECUNDARIA



PM I V f

CI Std. CTs /1/5

VI Conv. VTs

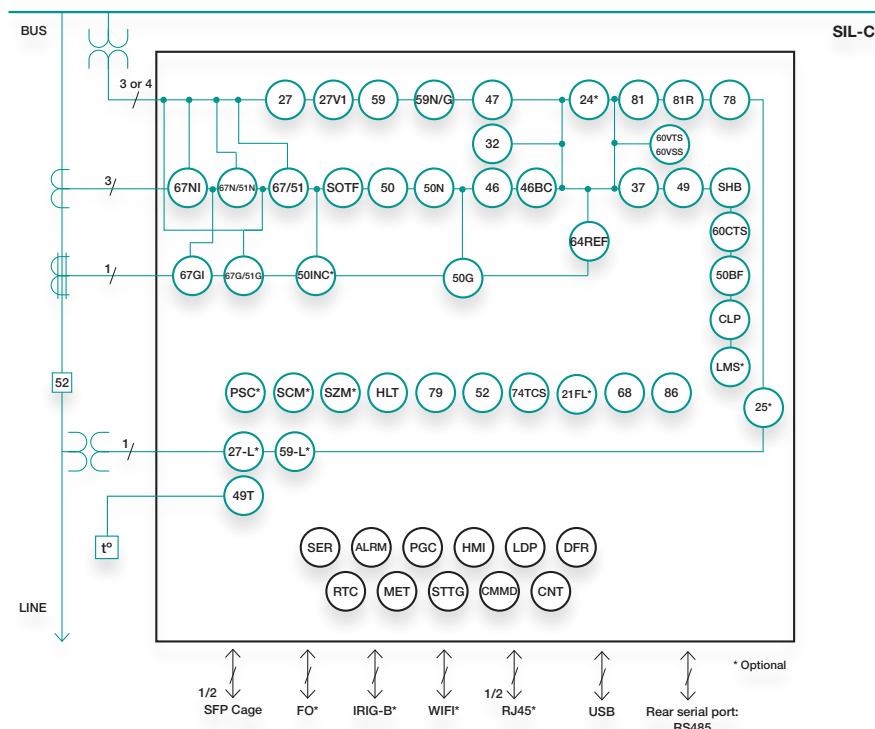


KEMA Labs

G99
Compliant

- El SIL-C es un relé de protección de alimentador que incorpora funciones de corriente, tensión y frecuencia para distribución primaria y secundaria con una fuente de alimentación auxiliar de 24-230 Vcc/ca.
- 4 canales de corriente para transformadores de corriente convencionales /1 y /5 y 5 canales de tensión para transformadores de tensión convencionales o 6 canales de tensión para sensores de tensión capacitivos y resistivos de baja potencia (LEA), según el modelo.
- Capacidad para medir hasta 1.000 voltios cuando se conecta directamente a la línea de baja tensión.
- Caja metálica con alta compatibilidad electromagnética (EMC) y amplio rango de temperatura de operación.
- Protege contra desacoplamientos, desconexión de cargas y desacople de la red, también llamado islanding. El islanding se produce cuando parte de la red de servicios públicos se desconecta del resto del sistema. Si la situación no se detecta, el generador puede permanecer conectado, causando problemas de seguridad en la red. Además, puede darse la reconexión automática del generador a la red causando daños en el generador y en la propia red. El relé de protección SIL-C, detecta esta situación gracias a sus funciones de tensión y frecuencia basadas en el método de la derivada de frecuencia (ROCOF – Rate Of Change Of Frequency).
- Señalización y control del interruptor (función 52) y del reconectador (función 79).
- La parte frontal de los relés SIL-C está provista de un teclado de navegación compuesto por 7 teclas (incluyendo la tecla RESET), 6 teclas de acceso rápido programables que por defecto vienen configuradas: dos (2) teclas para abrir y cerrar el CB, dos (2) teclas para bloquear y desbloquear el reenganchador y dos (2) teclas para poner el relé en modo local o remoto con sus tres (3) LEDs de control configurables asociados. Además, ocho (8) LEDs de alarma programables.
- Si el interruptor se cierra de manera manual, puede producirse un cierre sobre falta. Esta condición de falta es crítica si las funciones de sobrecorriente no despejan la falta hasta que transcurra el tiempo de disparo ajustado. Es necesario, en esos casos, despejar la falta rápidamente a través de la función SOFT (Switch On To Fault).
- Para permitir las comunicaciones, los relés SIL-C están provistos de un puerto micro-USB local en la parte delantera y de opciones de comunicación remota (puertos y protocolos) en la parte trasera:
 - » Puerto serie trasero (RS485): Modbus RTU, DNP3.0 Serial o IEC60870-5-103 (seleccionable mediante ajustes generales).
 - » Puerto Ethernet trasero (RJ45, FO-LC, SFP Cage o SFP Cage HSR/PRP): Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 o IEC61850 (seleccionable desde ajustes generales) + Protocolo SNTP + Servidor Web
 - » HSR/PRP (RJ45 o SFP Cage): Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 o IEC61850 (seleccionable desde ajustes generales) + Protocolo SNTP + Servidor Web
- La comunicación inalámbrica (Wi-Fi) y la sincronización mediante IRIG-B son opcionales (según el modelo).
- Dispone de un panel de alarma.
- El SIL-C está provisto de (según el modelo):
 - » 8 entradas configurables y 7 salidas configurables.
 - » 11 entradas configurables y 5 salidas configurables.
- El SIL-C está equipado con demanda de potencia (datos de carga por perfiles) con las siguientes características:
 - » Número de registros: 2160
 - » Modo de registro circular
 - » Frecuencia de muestreo (intervalo): configurable por comunicaciones (1-60 min).
- El SIL-C cuenta con memoria RAM no volátil para registrar hasta 3072 eventos y oscilografías, manteniendo la fecha y hora gracias a su reloj interno en tiempo real (RTC - Real Time Clock).
 - » 5 registros en formato dato y COMTRADE (300 ciclos por registro): 1 a 8 ciclos de prefalta + 292 a 299 ciclos de postfalta.
 - » 25 registros en formato dato y COMTRADE (60 ciclos por registro): 1 a 8 ciclos de prefalta + 52 a 59 ciclos de postfalta.
 - » 50 registros en formato dato y COMTRADE (30 ciclos por registro): 1 a 8 ciclos de prefalta + 22 a 29 ciclos de postfalta.
 - » 100 registros en formato dato y COMTRADE (15 ciclos por registro): 1 a 8 ciclos de prefalta + 7 a 14 ciclos de postfalta.
- Cada registro oscilográfico contiene 10 canales analógicos y hasta 96 canales digitales configurables. El registro oscilográfico es descargable por medio de un puerto de comunicaciones. El software de comunicaciones SiCom permite descargar y guardar el registro oscilográfico en formato COMTRADE (IEEE C37.111-1991).

DIAGRAMA DE FUNCIONES SIL-C



PROTECCIONES CÓDIGOS ANSI

50	Sobrecorriente instantánea de fase
67/51	Sobrecorriente direccional* de tiempo inverso de fase
50N	Sobrecorriente instantánea de neutro calculado
50G	Sobrecorriente instantánea de neutro medido
67N/51N	Sobrecorriente direccional* de tiempo inverso de neutro calculado
67G/51G	Sobrecorriente direccional* de tiempo inverso de neutro medido
67NI	Sobrecorriente direccional de neutro medido
67GI	Sobrecorriente direccional de neutro calculado
50INC ³	Detección de faltas incipiente/ intermitente
SOTF	Cierre sobre falta
46	Protección de intensidad para equilibrio de fases
46BC	Detección de conductor roto
64REF	Diferencial de fallo a tierra restringido
37	Subtensión de fase instantánea
49	Sobrecarga por imagen térmica
49T	Disparo Externo
SHB	Bloqueo por segundo armónico
59	Sobretensión instantánea de fase (Barra)
59N/G	Sobretensión instantánea de neutro calculado/medido (Barra)
59L	Sobretensión instantánea de línea (Línea)
47	Protección de tensión para secuencia de fases (Barra)
27	Subtensión instantánea de fase (Barra)
27L	Subtensión instantánea de línea (Línea)
27V1	Subtensión instantánea de secuencia positiva (Barra)
32	Sobrepotencia direccional
81O/U ²	Sub/Sobrefrecuencia
81R ²	Derivada de frecuencia (ROCOF)
78	Salto de vector

24 ¹	Sobreexcitación
CLP	Arranque en carga fría
79	Relé de reenganche c.a.
52	Monitorización del interruptor
25	Sincronismo
SCM ²	Modo de coordinación de secuencias
SZM ²	Modo de seccionador
HLT	Mantenimiento en línea energizada
50BF	Fallo de apertura del interruptor
74TCS	Supervisión del circuito de disparo
60CTS	Supervisión TI de fase
60VTS	Supervisión en Fase VT
60VSS ²	Supervisión en Fase LPVT
21FL ³	Localización de faltas
86	Bloqueo de disparo
68	Selectividad e interbloqueo (ZSI)
PSC ²	Control de suministro eléctrico
PGC	Lógica programable
LMS ¹	Sistema de gestión de carga

*Las funciones ANSI 67, ANSI 67G y ANSI 67N pueden convertirse en ANSI 51, ANSI 51G y ANSI 51N respectivamente si el parámetro "DIRECCIONALIDAD" se ajusta a NO.

ANSI 50G, ANSI 67G y ANSI 67GI se convertirán en ANSI 50GS, ANSI 67GS y ANSI 67GSI en el modelo con dígito de medida de corriente de neutro 1 (IN = 0,1A o 1A).

⁽¹⁾ Disponible en modelos con TT convencionales (50G no disponible para sensores de tensión)

⁽²⁾ Solo para los modelos con sensores de tensión (dígitos 1, 2, 3, 4 de «medidas de tensión»). Disponible a partir de la versión de firmware 1.21.00

⁽³⁾ Disponible a partir de la versión de firmware 1.21.00 para modelos con sensores de tensión y a partir de la versión 3.00.00 para modelos con TT convencionales.

FUNCIONES ADICIONALES

CNT	Contadores
RTC	Reloj en Tiempo Real
ALRM	Panel de Alarma
PGC	Control Lógico Programable
HMI	Interfaz de usuario
SER	Registro secuencial de eventos

DFR	Oscilografía
LDP	Demanda de potencia
MET	Medida
STTG	Grupos de ajustes
CMMD	Comandos

CARACTERÍSTICAS TÉCNICAS SIL-C

Function 50-1	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
Function 50-2	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
Function 50N	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.050 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
Function 50G	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 300.000 s (step 0.001 s)
	Activation level: 100%
Function 67/51-1	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)
Function 67/51-2	For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.01 to 25.00 (step 0.01)
	If Curve type IEC: 0.01 to 1.00 (step 0.01)
	If Curve type IEEE: 0.01 to 25.00 (step 0.01)
	Current tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Directionality: No/Forward/Reverse
Function 67/51-3	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%
Function 67/51-4	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)

Function 67N/51N-1 Function 67N/51N-2	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)
	For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.01 to 25.00 (step 0.01)
	If Curve type IEC: 0.01 to 1.00 (step 0.01)
	If Curve type IEEE: 0.01 to 25.00 (step 0.01)
	Current tap: 0.050 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%
Function 67G/51G-1 Function 67G/51G-2	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)
	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)
	For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.01 to 25.00 (step 0.01)
	If Curve type IEC: 0.01 to 1.00 (step 0.01)
	If Curve type IEEE: 0.01 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)

CARACTERÍSTICAS TÉCNICAS SIL-C

Function 67NI	Function enable: No/Alarm/Trip/SHB Trip
	Directionality: No/Forward/Reverse
	Low Current Tap: 0.050 to 30.000 xIn (step 0.001xIn)
	High Current Tap: 0.050 to 30.000 xIn (step 0.001xIn)
	Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)
	High Voltage tap: 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°)
	Halfcone angle: 10 to 170° (step 1°)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 5\%$ (greater of both)
Function 67GI	Function enable: No/Alarm/Trip/SHB Trip
	Directionality: No/Forward/Reverse
	Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Low Voltage Tap: 0.08 to 2.00 xUn (step 0.01xUn)
	High Voltage tap: 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°)
	Halfcone angle: 10 to 170° (step 1°)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 5\%$ (greater of both)
Function 50INC (*)	Function enable: No/Alarm/Trip
	Phase Current Tap: 0.500 to 20.000 xIn (step 0.001xIn)
	Pickup Peaks number; 1 to 10 (step 1)
	Trip Peak number: 1 to 10 (step 1)
Function 64REF	Function enable: No/Alarm/Trip/ SHB Trip
	Current tap: 0.050 to 20.000 xIn (step 0.001xIn)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Neutral SHB Tap: 5 to 50% (step 1%)
	Activation level: 100%
	Deactivation level: 90%
	Temporized deactivation
	Timing accuracy: ± 35 ms or $\pm 5\%$ (greater of both)
Function SOTF	Function enable: No/Alarm/Trip/SHB Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Time delay: 0.000 to 295.000 s (step 0.001 s)
	Safe Time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Temporized deactivation
	Timing accuracy: ± 35 ms or $\pm 0.5\%$ (greater of both)
Function 49	Function enable: No/Alarm/Trip
	Current tap: 0.100 to 2.400 In (step 0.001xIn)
	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: $\pm 5\%$ respect of theoretical value.
Function SHB	Function enable: No/Yes
	Current Tap: 5 to 50% (step 1%)
	Reset Time: 0.000 to 300.000 (step 0.001 s)
	Block Threshold: 0.010 to 30.000xIn (step 0.001xIn)
	Activation level: 100%
	Deactivation level: 95%
Function CLP	Temporized deactivation
	Function enable: Yes/No
	Settings group: 1 to 4 (step 1)
	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)
Function 46	Open breaker activation 0.8% In and reset threshold: 1% In
	Function enable: No/Alarm/Trip/SHB Trip
	Curve Type: IEC 60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long time inverse, short time inverse) and IEEE (Moderately inverse, very inverse, extremely inverse)
	For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.01 to 25.00 (step 0.01)
	If Curve type IEC: 0.01 to 1.00 (step 0.01)
	If Curve type IEEE: 0.01 to 25.00 (step 0.01)
	Current tap: 0.050 to 20.000 xIn (step 0.001xIn)
	Curve, current activation level: 110%
	Curve, current deactivation level: 100%
Function 46BC	Defined time, current activation level: 100%
	Defined time, current 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)
	Function enable: No/Alarm/Trip/
	Tap: 15 to 100 % (step 1%)
	Time delay: 0.030 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)

CARACTERÍSTICAS TÉCNICAS SIL-C

Function 37	Function enable: No/Alarm/Trip
	Current tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Minimum level: 0.000 to 1.000 xIn (step 0.001xIn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 105%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 27-1³ Function 27-2³	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 99%
	Deactivation level: 101%
	Temporized deactivation
Function 27L (*)³	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)
	Time delay: 0.060 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 99%
	Deactivation level: 101%
	Temporized deactivation
Function 27V1	Function enable: No/Alarm/Trip
	Voltage tap: 0.15 to 2.00 xUn (step 0.01xUn)
	Minimum level: 0.00 to 1.00 xUn (step 0.01xUn)
	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: 99%
	Deactivation level: 101%
	Temporized deactivation
Function 59-1³ Function 59-2³	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.045 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 101%
	Deactivation level: 99%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)

Function 59L (*)³	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.045 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 101%
	Deactivation level: 99%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 59N/G¹⁻¹³ Function 59N/G¹⁻²³	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.045 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 101%
	Deactivation level: 99%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 47³	Function enable: No/Alarm/Trip
	Voltage tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Time delay: 0.045 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 101%
	Deactivation level: 99%
	Temporized deactivation
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 32-1 Function 32-2 Function 32-3 Function 32-4	Function enable: No/Alarm/Trip
	Activation level: 0.02 to 2.00 xSn (step 0.01xSn)
	Operating angle: 0 to 359° (step 1°)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Activation level: 100%
	Deactivation level: 95%
	Instantaneous deactivation
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 81-1 Function 81-2 Function 81-3 Function 81-4 Function 81-5² Function 81-6²	Function enable: No/Alarm/Trip
	Type: Underfrequency or Overfrequency
	Activation level: 45.000 to 65.000 Hz (step 0.001 Hz)
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Reset time: 0.020 to 300.000 s (step 0.001 s)
	Function blocked if phase B voltage is lower than 20 volts P-N (35 volts P-P)
	Activation level: 100%
	Underfrequency reset level: activation level + 50mHz 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.

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Function 81R-1	Function enable: No/Alarm/Trip
	Type: Increase/Decrease
	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)
Function 81R-2	Reset time: 0.020 to 300.000 s (step 0.001 s)
Function 81R-3¹	Function blocked if phase B voltage is lower than 20 volts P-N (35 volts P-P)
Function 81R-4¹	Activation level: 100%
	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 78	Function enable: No/Alarm/Trip
	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 P-N (35 volts P-P)
	Temporized deactivation
Function 24-1¹ Function 24-2¹	Measurement accuracy: $\pm 1^\circ$ or $\pm 10\%$ (greater of both)
	Function enable: No/Alarm/Trip
	Curve Type: Inverse A, Inverse B, Inverse C, and Defined Time.
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Time dial (TMS): 0.05 to 300.00 (step 0.01)
	Activation level: 0.50 to 2.00 xUn/Fn (step 0.01 xUn/Fn)
	Time delay: 0.020 to 300.000 s (step 0.01 s)
	Reset Time: 0.000 to 300.000 s (step 0.01 s)
	Curve, activation level: 110%
	Curve, deactivation level: 100%
	Defined time, activation level: 100%
	Defined time, deactivation level: 95%
	Temporized deactivation
	Timing accuracy for curves selection: ± 30 ms or $\pm 5\%$ (greater of both)
	Timing accuracy for defined time curve selection: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 25 (*)	Dead tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Live tap: 0.08 to 2.00 xUn (step 0.01xUn)
	Voltage supervision time: 0.060 to 300.000 s (step 0.001 s)
	Voltage difference: 0.05 to 2.00 xUn (step 0.01xUn)
	Phase difference: 2 to 90 ° (step 1°)
	Frequency difference: 0.060 to 10.000 Hz (step 0.001 Hz)
	Synchro check time: 0.020 to 300.000 s (step 0.001 s)
Function 79	Number of recloses: 0 to 4 (step 1)
	Reclose time 1, 2, 3, 4: 0.020 to 2000.000 s (step 0.01 s)
	Hold Enable: No/Yes/No Time
	Hold time: 0.02 to 2000.000 s (step 0.01 s)
	Reset time: 0.02 to 2000.000 s (step 0.01 s)
	Safe time: 0.020 to 2000.000 s (step 0.01 s)
Function SCM²	Locking possibilities: pulse inputs, level inputs, commands.
	Number of shots: 0 to 4 (step 1)
Function SZM²	Reset time: 0.020 to 2000.000 s (step 0.001 s)
	Number of shots: 0 to 4 (step 1)
	Reset time: 0.020 to 2000.000 s (step 0.001 s)
	Max open time: 0.020 to 2000.000 s (step 0.001 s)
	Max close time: 0.020 to 2000.000 s (step 0.001 s)
	Fault current: 0.010 to 20.000 s (step 0.001 xIn)
Function 52	Voltage supervision time: 0.000 to 300.000 s (step 0.001 s)
	Dead tap: 0.04 to 2.00 xUn (step 0.01 xUn)
	Maximum number of openings: 1 to 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 a 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)
	Circuit breaker status monitoring:
	Current measurements: Open breaker activation and reset threshold: 0.8% In (Without using contacts)
Function 74TCS	Using contacts: 52a or 52b and 52a and 52b
	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
Function 60CTS	Continuity in coils A and B through configurable inputs
	Function enable: No/Yes
	Time delay: 0.020 to 300.000 s (step 0.001 s)
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)
Function 60VTS	Open breaker activation and reset threshold: 0.8% In
	Detection of the loss of one phase CT
	Function enable: No/Yes
Function 60VSS²	Time delay: 0.020 to 300.000 s (step 0.001 s)
	V1, V2 and VP Tap: 0.08 to 2.00 xUn (step 0.01xUn)
	I1, I2 and 3I0 Tap: 0.010 to 20.000 xIn (step 0.001xIn)
	Timing accuracy: ± 30 ms or $\pm 0.5\%$ (greater of both)

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Function 50BF	Function enable: No/Yes
	Time delay: 0.020 to 1.000 s (step 0.001 s)
	Open breaker activation and reset threshold: 0.8% In
	From fw version 3.01.00 onwards:
	Phase Current Tap: 0.008 to 30 xIn (step 0.001xIn)
	Neutral Current Tap: 0.008 to 30 xIn (step 0.001xIn)
	Time Delay: 0.020 to 1.000 s (step 0.001 s)
Function 21FL (*)	Back Period: 0.020 to 1.000 s (step 0.001 s)
	50BF Start PGC
	Function enable: No/Yes
	Line length 0.1 to 100.0 km (step 01 km)
	Z1 line magnitude: 0.001 to 5.000 (step 0.001 Ω/km)
	Z1 line angle: 0 to 90° (step 1°)
LMS (*)	Z0 line magnitude: 0.001 to 5.000 (step 0.001 Ω/km)
	Z0 line angle: 0 to 90° (step 1°)
	Function enable: No/Yes
	No Peak Mode: Alarm/Trip
	Peak mode: Alarm/Trip
	Peak period starting month: January to December
	Peak period starting day: 1 to 31 (step 1)
	Peak period ending month: January to December
	Peak period ending day: 1 to 31 (step 1)
	Peak period starting hour: 0 to 23 (step 1 hour)
	Peak period starting minute: 0 to 59 (step 1 minute)
	Peak period ending hour: 0 to 23 (step 1 hour)
	Peak period ending minute: 0 to 59 (step 1 minute)
	Peak period starting day of week: Monday to Sunday
	Peak period ending day of week: Monday to Sunday
	Reset Time: 0 to 18000 s (step 1 s)
	Peak period Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	Peak trip Time 1: 0 to 18000 s (step 1 s)
	Peak trip Time 2: 0 to 18000 s (step 1 s)
	Peak trip Time 3: 0 to 18000 s (step 1 s)
	Peak trip Time 4+: 0 to 18000 s (step 1 s)
	Peak Number of recloses: 0 to 247 (Step 1)
	Peak Interval Time 1: 0 to 18000 s (Step 1 s)
	Peak Interval Time 2: 0 to 18000 s (Step 1 s)
	Peak Interval Time 3: 0 to 18000 s (Step 1 s)
	Peak Interval Time 4+: 0 to 18000 s (Step 1 s)
	No Peak period Tap: 0.010 to 30.000 xIn (step 0.001xIn)
	No Peak trip Time 1: 0 to 18000 s (step 1 s)
	No Peak trip Time 2: 0 to 18000 s (step 1 s)
	No Peak trip Time 3: 0 to 18000 s (step 1 s)
	Peak trip Time 4+: 0 to 18000 s (step 1 s)
	No Peak Number of recloses: 0 to 247 (Step 1)
	No Peak Interval Time 1: 0 to 18000 s (Step 1 s)
	No Peak Interval Time 2: 0 to 18000 s (Step 1 s)
	No Peak Interval Time 3: 0 to 18000 s (Step 1 s)
	No Peak Interval Time 4+: 0 to 18000 s (Step 1 s)

Power supply control²	Function enable: No/Yes
	V supply alarm 1: 19 to 220 Vdc (step 1 V)
	V supply alarm 2: 19 to 220 Vdc (step 1 V)
Function 49T	Available through configurable inputs thanks to the programmable logic
Function 86	It allows latching (lockout) the contact trip due to programmable logic (PGC: RSFF or SRFF).
Function 68	Available through configurable inputs and outputs thanks to the programmable logic (PGC).
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
	AND, AND_1PULSE, AND_PULSES, AND_BLINKING, AND_TIMER UP, AND_TIMER DOWN
	NAND, NAND_1PULSE, NAND_PULSES, NAND_BLINKING, NAND_TIMER UP, NAND_TIMER DOWN
	XOR, OR_1PULSE, XOR_PULSES, XOR_BLINKING, XOR_TIMER UP, XOR_TIMER DOWN
Settings tables	SRFF, SRFF_1PULSE, SRFF_PULSES, SRFF_BLINKING, SRFF_TIMER UP, SRFF_TIMER DOWN and NON-VOLATILE FF
	RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN and NON-VOLATILE FF
	R_EDGE, R_EDGE_1PULSE F_EDGE, F_EDGE_1PULSE
SER	4 settings groups
	6 settings groups ²
Disturbance fault recording (DFR)	Selectable by input, communications, user commands or general setting.
	3072 events
	32 samples/cycle
	10 analog channels and 96 configurable digital channels
	Configurable DFR start
	The configurable number of records depending on the size:
	5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 post-fault cycles.
	25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 post-fault cycles.
	50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 post-fault cycles.
	100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 post-fault cycles.)
Load Data Profiling (LDP)	COMTRADE IEEE C37.111-1991
	Up to 100 fault reports (data format) with a maximum 29 events, each one
	Demand of power with the following characteristics:
	- Number of records: 2160
	- Circular recording mode
	- Sampling rate (interval): configurable through communications (1-60 min)

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Inputs (*)	Depending on Model: - 8 configurable inputs - 11 configurable inputs The voltage of the inputs is the same as the auxiliary power supply Burden: 24 Vdc: <20 mW 230 Vdc: <200 mW 24 Vac: <50 mW 230 Vac: <500 mW	Voltage measurements	Phase voltage (V-A, V-B, V-C), line voltage (VL)*, phase-phase voltage (UAB, UBC, UCA), neutral voltage (VR, 3-V0), positive sequence voltage (V-1) and negative sequence voltage (V-2), maximum voltage (VMAX) and V/f.
			Fundamental values (DFT)
Outputs (*)	Depending on Model: - 5 configurable outputs - 7 configurable outputs 250 V AC – 8 A; 30 V DC – 8 A Contact current short duration: 30A – 200ms		Sampling: 32 samples/cycle
	Output 1: NO-NC; the rest of the outputs: NO Model with 7 outputs: Output 1 NC; the rest of the outputs: NO		Conventional VTs: Measured voltage: 1% precision in a band covering $\pm 20\%$ of nominal voltage and 4% in the rest of the range (ambient temperature) Calculated voltage: 2% precision in a band covering $\pm 20\%$ of nominal voltage and 4% in the rest of the range (ambient temperature) Range: With VTs: 3-250 V measured voltage (6-250 V calculated voltage). Direct connection: From 12 to 1000 V
Frequency	50/60Hz		Voltage sensors (LEAs): 1% precision in a band covering $\pm 20\%$ of nominal voltage and 4% in the rest of the range. Voltage sensors: LEA of 2.8Vrms or LEA of 16Vrms. Range: Measured voltage: From (0.01282 x LEA Maximum voltage x Ratio) to 2.4xUn. Calculated voltage: From (0.013 x LEA Maximum voltage x Ratio) to 2.4xUn.
Energizing Quantities	Burden of current inputs: <0.015 VA (1 A) & <0.375 VA (5 A) Burden of voltage inputs: < 70 mVA Burden of power supply unit: 24-230 Vdc/Vac: < 12 VA Burden for binary inputs: 24 Vdc: <20 mW 230 Vdc: <200 mW 24 Vac: <50 mW 230 Vac: < 500 mW		Current Angles: IA, IB, IC, IN and 3I0. Voltage Angles: VA, VB, VC, VR, VL*, 3V0, UAB, UBC and UCA. Power factor: Cos PHI-A, Cos-PHI-B, and Total Cos-PHI-C Accuracy: $\pm 2^\circ$ Angle measurement range: From 0 to 359°
Current measurements	Phase currents (IA, IB, IC), neutral (IN, 3I0), positive sequence (I1) and negative sequence (I2), I2/I1, maximum current (Imax), thermal image (TI), second harmonic (IA2H, IB2H IC2H), current total harmonic distortion (THD-A, THD-B, and THD-C).		Total and per-phase active power Total and per-phase reactive power Total and per phase apparent power 2% accuracy in rated values with power factor between 1 and 0.7 (phase shift from 0 to $\pm 45^\circ$).
	Fundamental values (DFT)		Positive and negative active energy Positive and negative reactive energy
	Sampling: 32 samples/cycle		Busbar Frequency, Line Frequency, df/dt, V/Hz Minimum required voltage: 20V P-N (35 P-P) Accuracy: ± 0.005 Hz Frequency measurement range: From 45 to 65 Hz
	Phase and Neutral (1 A or 5 A): $\pm 2\%$ precision in a band covering $\pm 20\%$ of nominal current and $\pm 4\%$ or ± 5 mA in the rest of the range Neutral (0.1 A): $\pm 2\%$ precision in a band covering $\pm 20\%$ of nominal current and $\pm 4\%$ or ± 0.5 mA in the rest of the range Current measurement range: From 0.01 to 30 times the nominal current		

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Communications	Local port (micro-USB): Modbus RTU
	Wireless communication (Wi-Fi) (*)
	Rear Serial Port (RS485) (*)
	IRIG-B (*)
	Remote Ethernet Port (*): RJ45 (10/100 Base-Tx) FO-LC(10/100 Base-Fx) SFP Cage HSR/PRP SFP Cages
	Protocols : WiFi: Modbus RTU RS485 : Modbus RTU, DNP3.0 and IEC60870-5-103 (selectable by general settings) RJ45, FO-LC or SFP Cage: Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 or IEC61850 (selectable by general settings) + SNTP Protocol HSR/PRP Cages: IEC61850
Power supply	24-230 Vac/dc (24-220 Vdc ($\pm 20\%$) / 100-230 Vac ($\pm 15\%$)) Burden: 24-230 Vdc/Vac: < 20 VA
Environmental conditions	Operating temperature: -40 to 70°C
	Storage temperature: -40 to 80°C
	Relative humidity: 95%
Mechanical characteristics	Metallic box
	Panel mounted
	Vertical assembly: HxWxD: 198x107x145.01 (mm)
	Horizontal assembly: HxWxD: 107x198x145.01 (mm)
	IP-54
	The required screws to fix the relay should be M4

(*) 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.

NOTE: ANSI 50G, ANSI 67G and ANSI 67GI will be converted into ANSI 50GS, ANSI 67GS and ANSI 67GSI in the model with neutral current measurement digit 1 (IN = 0.1A or 1A)

¹Available in models with conventional VTs (50G not available for voltage sensors).

² Available only in models with voltage sensors. 81-5 available for models with VTs too from fw version 3.01.00 onwards.

³ Voltage setting from 0.04 instead of 0.08 for models with voltage sensors.

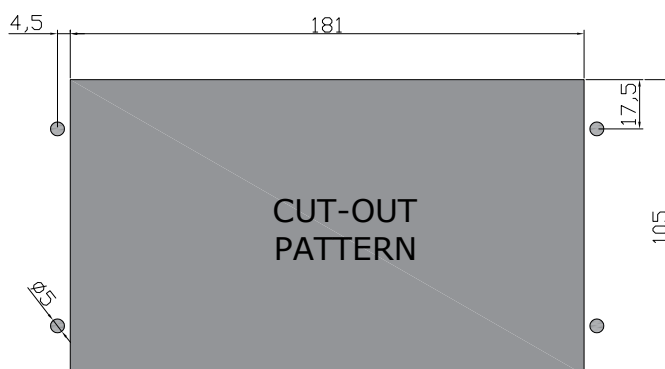
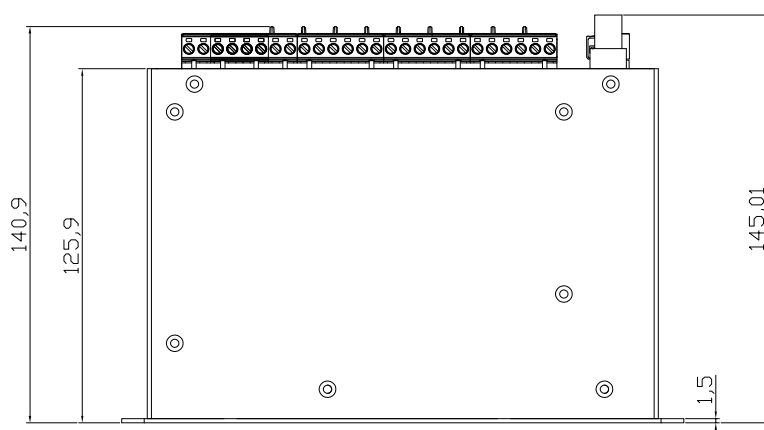
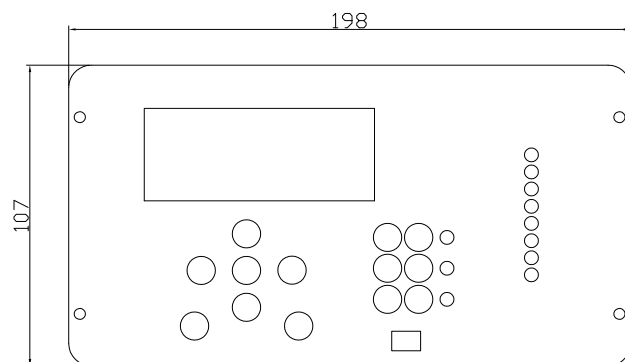
For communication digits E, J, U and V SFP transceivers will be installed by the user, and the following specifications must be complied:

Supply: 3.3v.

Speed: 100BASE-FX, Fast Ethernet.

The SFP module must support SerDeS

DIMENSIONES Y CORTE DE CHAPA SIL-C



DIMENSIONES Y CORTE DE CHAPA SIL-C

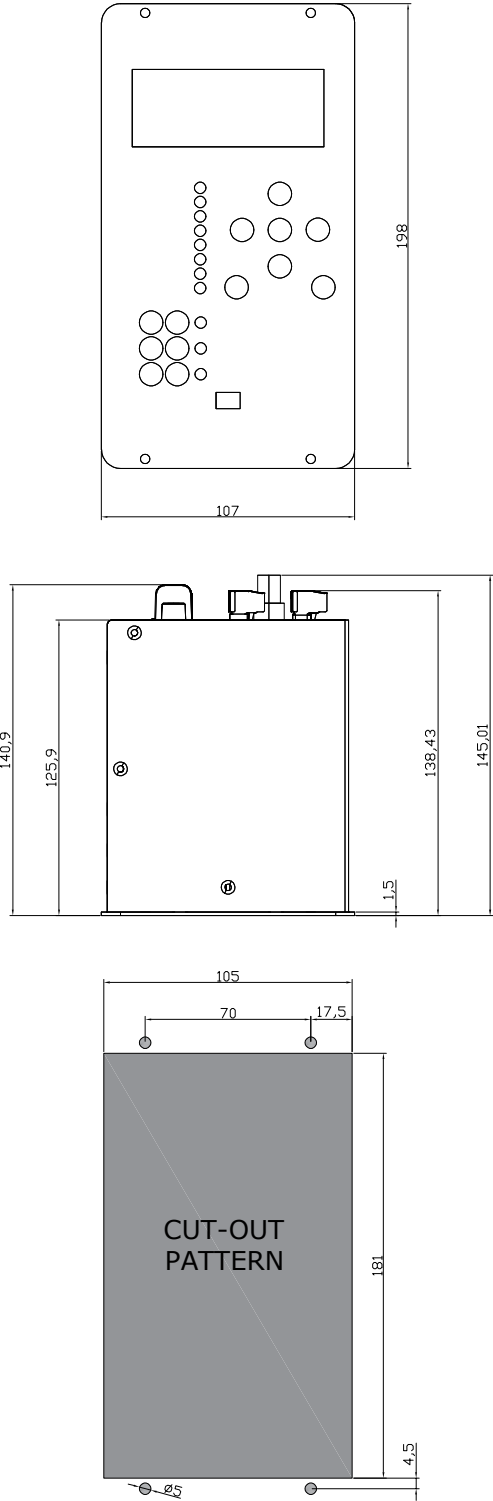
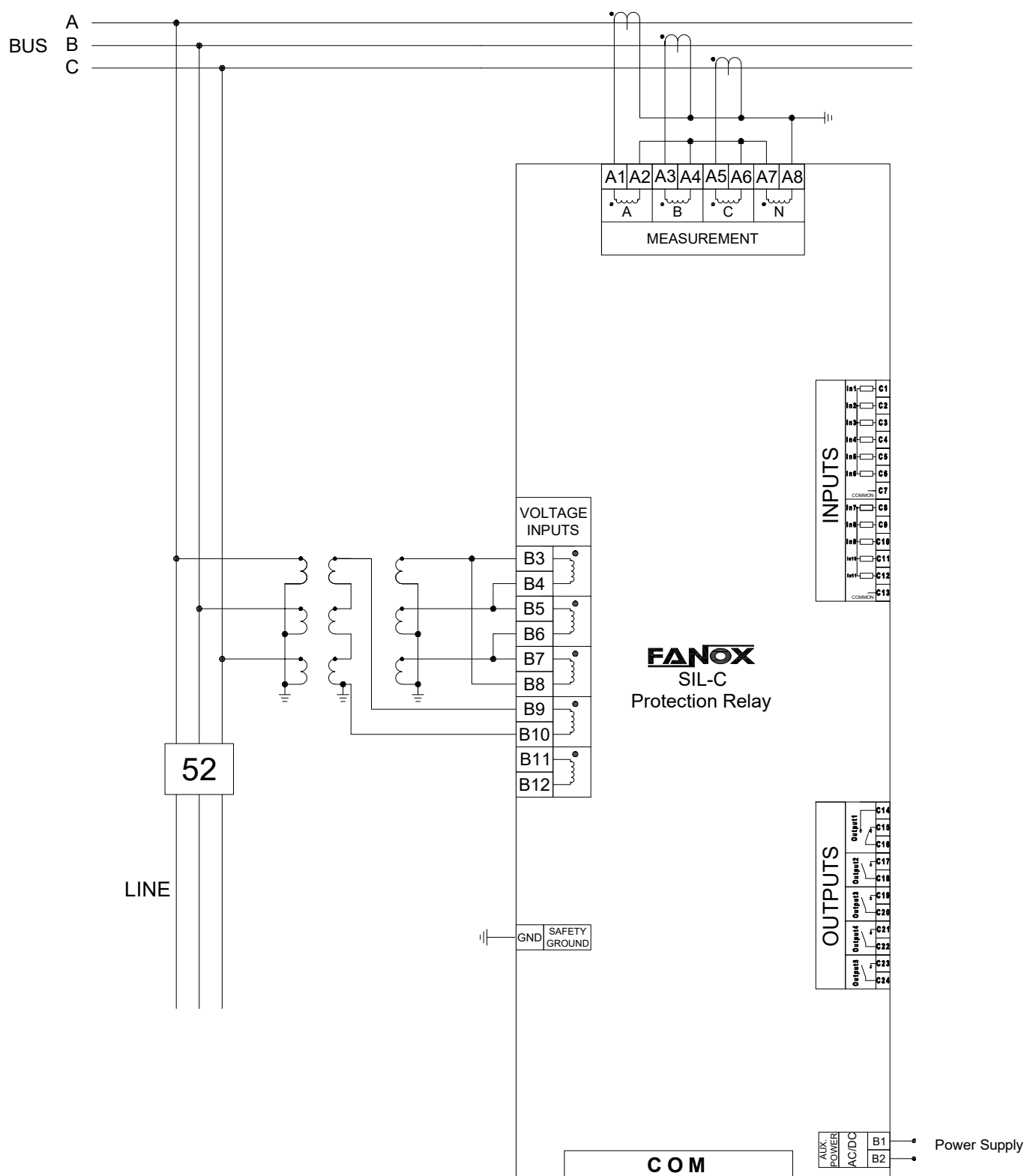


DIAGRAMA DE CONEXIONES SIL-C

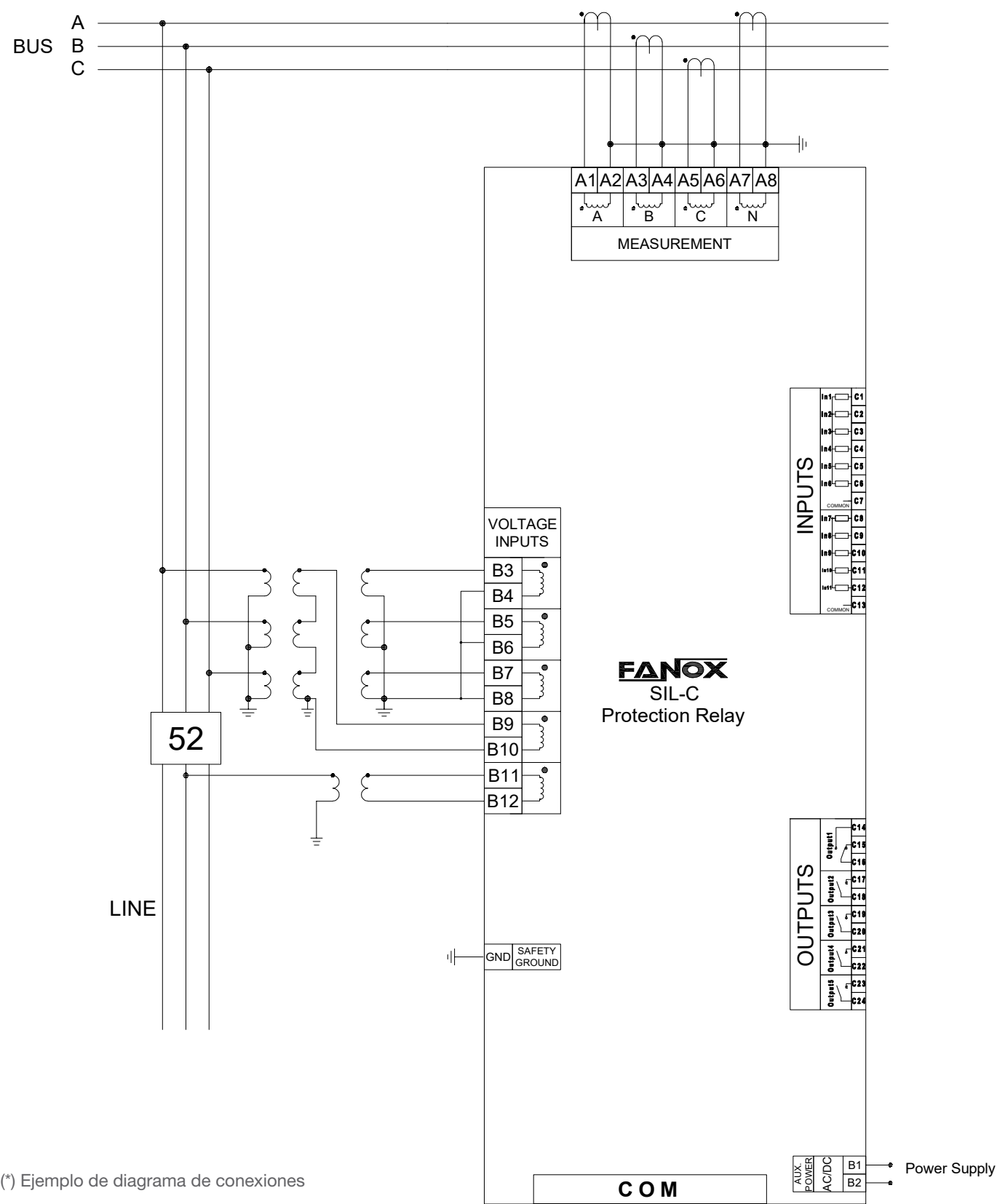
Fase-Fase + voltaje residual, 3 transformadores de corriente



(*) Ejemplo de diagrama de conexiones

DIAGRAMA DE CONEXIONES SIL-C

3 VTs (Fase-neutro) + voltaje residual + 1 VT para sincronismo , 4 transformadores de corriente



(*) Ejemplo de diagrama de conexiones

SELECCIÓN Y CÓDIGOS DE PEDIDO SIL-C

SIL-C

Relé de Protección de Alimentador y Generador

0										MEDIDA DE CORRIENTE DE FASE 1 A ó 5 A
	0 1									MEDIDA DE CORRIENTE DE NEUTRO 1 A ó 5 A 1 A ó 0,1 A
		0 1 2 3 4								MEDIDA DE TENSIÓN Hasta 1000 V (conexión directa) o 250 V (con TTs) 8 Vrms LEA máximo, 1 MOhm 5.2 Vrms LEA máximo, 2 MOhm 16 Vrms LEA máximo, 2 MOhm 2.8 Vrms LEA máximo, 20 MOhm
			A							ALIMENTACIÓN 24-220 Vcc / 100-230 Vca
				0 1 2 3 4						FUNCIONES ADICIONALES - +25 + 27-L + 59-L + LMS ¹ + 21FL ³ + 50INC ³ + 21FL ³ + 50INC ³ + LMS
					A B 2 E G 3 J M N O P Q R U V					COMUNICACIONES A: 1xUSB + 1xRS485 B: 1xUSB + 1xRS485 + 1xRJ45 + IRIG-B 2: 1xUSB + 1xRS485 + 1xRJ45 + HSR/PRP RJ45 + IRIG-B E: 1xUSB + 1xRS485 + 1xRJ45 + Carcasa SFP HSR/PRP + IRIG-B G: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + IRIG-B 3: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + HSR/PRP RJ45 + IRIG-B J: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + Carcasa SFP HSR/PRP + IRIG-B M: 1xUSB + 1xRS485 + 2xRJ45 + IRIG-B N: 1xUSB + WiFi + 1xRS485 + 2xRJ45 + IRIG-B O: 1xUSB + 1xRS485 + 1xRJ45 + IRIG-B P: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + IRIG-B Q: 1xUSB + 1xRS485 + 1xFO-LC+ IRIG-B R: 1xUSB + WiFi + 1xRS485 + 1xFO-LC + IRIG-B U: 1xUSB + 1xRS485 + 1xRJ45 + 1x Carcasa SFP + IRIG-B V: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + 1x Carcasa SFP + IRIG-B
						0 1				ENTRADAS Y SALIDAS 8 Entradas + 7 Salidas 11 Entradas + 5 Salidas
							C D E F			MECÁNICA DE MONTAJE Montaje vertical Montaje horizontal Montaje vertical con tratamiento anticorrosivo Montaje horizontal con tratamiento anticorrosivo
								A E F		IDIOMA Inglés, Español, Alemán y Francés Inglés, Español, Turco y Ruso Inglés, Español, Alemán y Portugués
									B	REVISIÓN (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 ¹ + 47 + (4) 32 + (4) 81U/O ₂ + (6) 81U/O ² + (4) 81R ₂ + 78 + (2)24 ¹ + 79 + 74TCS + 60CTS + 60VTS/VSS ² + 50BF + SHB + CLP + 52 + 86 + SCM ² + SZM ² + HLT + Control de alimentación ² .

Ejemplo de código de pedido:

0	0	0	C	0	A	1	C	A	B	SILC000C0A1CAB
SIL-C										

SELECCIÓN Y CÓDIGOS DE PEDIDO SIL-C

PUERTOS	PROTOCOLOS	
USB	Modbus RTU	
WiFi	Modbus TCP	
RS485	Modbus RTU, IEC60870-5-103 o DNP3.0 Serial	
FO-LC	Modbus TCP o DNP3.0 TCP, IEC60870-5-104 o IEC61850 + Protocolo SNTP	
Carcasa SFP	Modbus TCP, DNP3.0 TCP, IEC60870-5-104 o IEC61850, Protocolo SNTP	
Carcasas SFP HSR/PRP RJ45 HSR/PRP	IEC61850	
RJ45	Comunicaciones dígitos B y G RJ45: Modbus TCP, DNP3.0 TCP o IEC60870-5-104 + Protocolo SNTP	Comunicaciones dígitos 2, E, 3, J, M, N, O, P, U y V: RJ45: Modbus TCP o DNP3.0 TCP, IEC60870-5-104 o IEC61850, Protocolo SNTP

No todas las combinaciones son posibles. Por favor consulte el modelo seleccionado con Fanox.

NOTAS:

- » Las funciones ANSI 67, ANSI 67G y ANSI 67N pueden convertirse en ANSI 51, ANSI 51G y ANSI 51N respectivamente si el parámetro "DIRECCIONALIDAD" se ajusta a NO.
- » ANSI 50G, ANSI 67G y ANSI 67GI se convertirán en ANSI 50GS, ANSI 67GS y ANSI 67GSI en el modelo con dígito de medida de corriente de neutro 1 (IN = 0,1A o 1A).
- ⁽¹⁾ Disponible en modelos con TT convencionales (50G no disponible para sensores de tensión).
- ⁽²⁾ Solo para los modelos con sensores de tensión (dígitos 1, 2, 3, 4 de «medidas de tensión»). Disponible a partir de la versión FW 1.21.00.
- ⁽³⁾ Disponible a partir de la versión FW 1.21.00 para modelos con sensores de tensión y a partir de la 3.00.00 para modelos con TC convencionales.
- » Para dígitos de comunicación E, J, U, and V, el usuario instalará transceptores de fibra, que deberán cumplir las siguientes especificaciones:
 - Alimentación: 3,3 V.
 - Velocidad: 100BASE-FX, Fast Ethernet.
 - El módulo SFP debe ser compatible con SerDes.