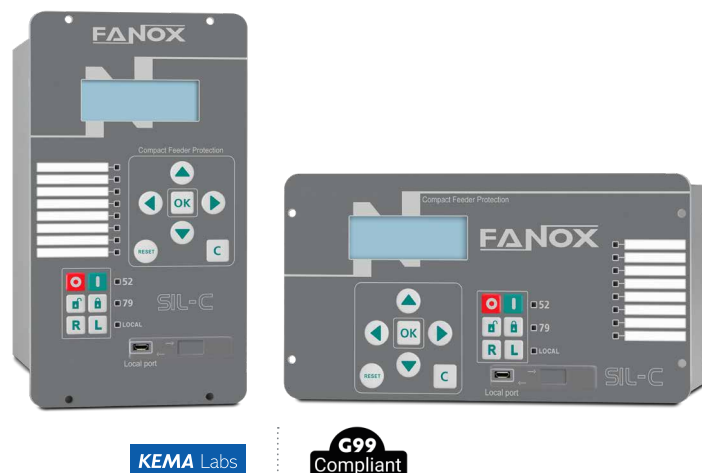


# SIL-C

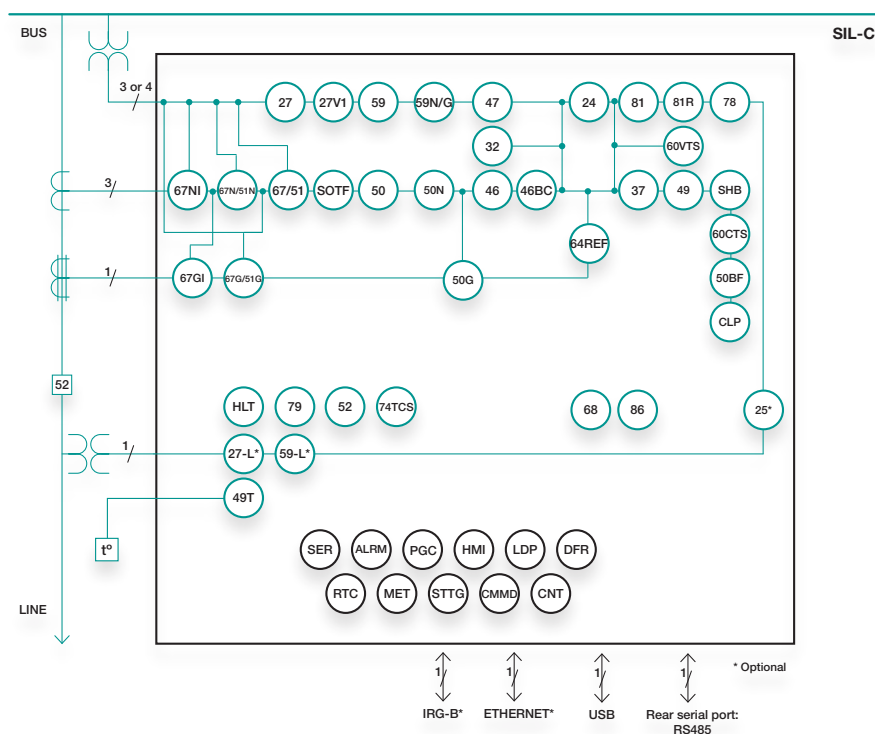
## Relé de protección de Línea, Alimentador y Generador

Protección para Distribución Primaria y Secundaria



- 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 y hasta 5 canales de tensión para transformadores de tensión (TT) convencionales.
- 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: Modbus RTU, DNP3.0 Serial o IEC60870-5-103 (seleccionable mediante ajustes generales).
  - » Puerto Ethernet trasero (RJ45 o FO-LC): Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 o IEC61850 (seleccionable por 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 programa 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 medio                        |
| 67N/51N | Sobrecorriente direccional* de tiempo inverso de neutro calculado |
| 67G/51G | Sobrecorriente direccional* de tiempo inverso de neutro medio     |
| 67NI    | Sobrecorriente direccional de neutro aislado calculado            |
| 67GI    | Sobrecorriente direccional de neutro aislado medido               |
| SOTF    | Cierre sobre falta                                                |
| 46      | Protección de intensidad para equilibrio de fases                 |
| 46BC    | Detección de conductor roto                                       |
| 64REF   | Diferencial de fallo a tierra limitado                            |
| 49      | Sobrecarga por imagen térmica                                     |
| 49T     | Disparo Externo                                                   |
| 37      | Subcorriente instantánea de fase                                  |
| SHB     | Bloqueo por segundo armónico                                      |
| 59      | Sobretensión instantánea de fase                                  |
| 59N/G   | Sobretensión instantánea de neutro calculado/medido               |
| 59L     | Sobretensión instantánea de línea                                 |
| 47      | Protección de tensión para secuencia de fases                     |
| 27      | Subtensión instantánea de fase                                    |

|       |                                              |
|-------|----------------------------------------------|
| 27L   | Subtensión instantánea de línea              |
| 27V1  | Subtensión instantánea de secuencia positiva |
| 32    | Sobrepotencia direccional                    |
| 81O/U | Sub/Sobrefrecuencia                          |
| 81R   | Derivada de frecuencia (ROCOF)               |
| 78    | Salto de vector                              |
| 24    | Sobreflujo                                   |
| CLP   | Arranque en carga fría                       |
| 79    | Relé de reenganche c.a.                      |
| HLT   | Mantenimiento en línea energizada            |
| 52    | Monitorización del interruptor               |
| 25    | Sincronismo                                  |
| 50BF  | Fallo de apertura del interruptor            |
| 74TCS | Supervisión del circuito de disparo          |
| 60CTS | Supervisión TI de fase                       |
| 60VTS | Supervisión LPVT de fase                     |
| 86    | Bloqueo de disparo                           |
| 68    | Selectividad e interbloqueo (ZSI)            |
| PGC   | Lógica programable                           |

\*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).

### 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

|                                                                                                          |                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 50-1</b>                                                                                     | 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%                                                                                                                                                                             |
| <b>Function 50-2</b>                                                                                     | Deactivation level: 95%                                                                                                                                                                            |
|                                                                                                          | Temporized deactivation                                                                                                                                                                            |
|                                                                                                          | Timing accuracy: $\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                      |
|                                                                                                          |                                                                                                                                                                                                    |
| <b>Function 50N</b>                                                                                      | 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                                                                                                                                                                            |
|                                                                                                          | Timing accuracy: $\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                      |
| <b>Function 50G</b>                                                                                      | 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%                                                                                                                                                                             |
|                                                                                                          | Deactivation level: 95%                                                                                                                                                                            |
|                                                                                                          | Temporized deactivation                                                                                                                                                                            |
|                                                                                                          | Timing accuracy: $\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                      |
| <b>Function 67/51-1</b><br><b>Function 67/51-2</b><br><b>Function 67/51-3</b><br><b>Function 67/51-4</b> | 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)<br>If Curve type IEC: 0.01 to 1.00 (step 0.01)<br>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:<br>$\pm 30$ ms or $\pm 5\%$ (greater of both)                                                                                                   |
|                                                                                                          | Timing accuracy for defined time curve selection:<br>$\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                  |

|                                                        |                                                                                                                                                                                                    |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 67N/51N-1</b><br><b>Function 67N/51N-2</b> | 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)<br>If Curve type IEC: 0.01 to 1.00 (step 0.01)<br>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%                                                                                                                                                                     |
|                                                        | Voltage deactivation level: 95%                                                                                                                                                                    |
|                                                        | Temporized deactivation                                                                                                                                                                            |
|                                                        | Timing accuracy for IEC and IEEE curves selection:<br>$\pm 30$ ms or $\pm 5\%$ (greater of both)                                                                                                   |
|                                                        | Timing accuracy for defined time curve selection:<br>$\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                  |
| <b>Function 67G/51G-1</b><br><b>Function 67G/51G-2</b> | 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)<br>If Curve type IEC: 0.01 to 1.00 (step 0.01)<br>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:<br>$\pm 30$ ms or $\pm 5\%$ (greater of both)                                                                                                   |
|                                                        | Timing accuracy for defined time curve selection:<br>$\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                  |

## Características técnicas SIL-C

|                       |                                                                                                                                                                                                    |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 67NI</b>  | 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: $\pm 30$ ms or $\pm 5\%$ (greater of both)                                                                                                                                        |
| <b>Function 67GI</b>  | 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: $\pm 30$ ms or $\pm 5\%$ (greater of both)                                                                                                                                        |
| <b>Function 64REF</b> | 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: $\pm 35$ ms or $\pm 5\%$ (greater of both)                                                                                                                                        |
| <b>Function SOTF</b>  | 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: $\pm 35$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                      |
| <b>Function 49</b>    | Function enable: No/Alarm/Trip                                                                                                                                                                     |
|                       | Current tap: 0.100 to 2.400 In (step 0.001xIn)                                                                                                                                                     |
|                       | $\zeta$ heating: 3 to 600 min (step 1 min)                                                                                                                                                         |
|                       | $\zeta$ cooling: 1 to 6 x $\zeta$ 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.                                                                                                                                           |
| <b>Function SHB</b>   | 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%                                                                                                                                                                            |
| <b>Function CLP</b>   | 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)                                                                                                                                                  |
|                       | Open breaker activation 0.8% In and reset threshold: 1% In                                                                                                                                         |
| <b>Function 46</b>    | 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%                                                                                                                                                            |
|                       | Defined time, current activation level: 100%                                                                                                                                                       |
|                       | Defined time, current deactivation level: 95%                                                                                                                                                      |
| <b>Function 46BC</b>  | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                      |

## Características técnicas SIL-C

|                                              |                                                               |
|----------------------------------------------|---------------------------------------------------------------|
| <b>Function 37</b>                           | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 27-1</b><br><b>Function 27-2</b> | 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                                       |
| <b>Function 27L (*)</b>                      | 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                                       |
| <b>Function 27V1</b>                         | 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                                       |
| <b>Function 59-1</b><br><b>Function 59-2</b> | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |

|                                                                                              |                                                               |
|----------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| <b>Function 59L (*)</b>                                                                      | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 59N/G-1</b><br><b>Function 59N/G-2</b>                                           | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 47</b>                                                                           | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 32-1</b><br><b>Function 32-2</b><br><b>Function 32-3</b><br><b>Function 32-4</b> | 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: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |

## Características técnicas SIL-C

|                                              |                                                                                                                                                                                                                   |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 81-1</b>                         | 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)                                                                                                                                                                     |
| <b>Function 81-2</b>                         | Function blocked if phase B voltage is lower than 20 volts P-N (35 volts P-P)                                                                                                                                     |
| <b>Function 81-3</b>                         | Activation level: 100%                                                                                                                                                                                            |
| <b>Function 81-4</b>                         | 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. |
| <b>Function 81R-1</b>                        | 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)                                                                                                                                                                      |
|                                              | Reset time: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
| <b>Function 81R-2</b>                        | Function blocked if phase B voltage is lower than 20 volts P-N (35 volts P-P)                                                                                                                                     |
| <b>Function 81R-3</b>                        | Activation level: 100%                                                                                                                                                                                            |
| <b>Function 81R-4</b>                        | 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. |
| <b>Function 78</b>                           | 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                                                                                                                                                                                           |
|                                              | Measurement accuracy: $\pm 1^\circ$ or $\pm 10\%$ (greater of both)                                                                                                                                               |
| <b>Function 24-1</b><br><b>Function 24-2</b> | 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): 0.10 to 25.00 (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 0.001 s)                                                                                                                                                                     |
|                                              | Reset Time: 0.00 to 300.000 s (step 0.001 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:<br>$\pm 30$ ms or $\pm 5\%$ (greater of both)                                                                                                                               |
|                                              | Timing accuracy for defined time curve selection:<br>$\pm 30$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                 |
| <b>Function 25 (*)</b>                       | 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)                                                                                                                                                             |
| <b>Function 79</b>                           | Number of recloses: 0 to 4 (step 1)                                                                                                                                                                               |
|                                              | Reclose time 1, 2, 3, 4: 0.020 to 2000.000 s (step 0.001 s)                                                                                                                                                       |
|                                              | Hold Enable: No/Yes/No Time                                                                                                                                                                                       |
|                                              | Hold time: 0.000 to 2000.000 s (step 0.001 s)                                                                                                                                                                     |
|                                              | Reset time: 0.020 to 2000.000 s (step 0.01 s)                                                                                                                                                                     |
|                                              | Safe time: 0.020 to 2000.000 s (step 0.001 s)                                                                                                                                                                     |
| <b>Function 52</b>                           | Locking possibilities: pulse inputs, level inputs, commands.                                                                                                                                                      |
|                                              | 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 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)                                                                                                               |
|                                              | Using contacts: 52a or 52b and 52a and 52b                                                                                                                                                                        |
| <b>Function 74TCS</b>                        | Function enable: No/Yes                                                                                                                                                                                           |
|                                              | Time delay: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
|                                              | Continuity in circuits A and B through configurable inputs                                                                                                                                                        |
| <b>Function 60CTS</b>                        | Function enable: No/Yes                                                                                                                                                                                           |
|                                              | Time delay: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
|                                              | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                                     |
|                                              | Open breaker activation and reset threshold: 0.8% In                                                                                                                                                              |
|                                              | Detection of the loss of one phase CT                                                                                                                                                                             |
| <b>Function 60VTS</b>                        | Function enable: No/Yes                                                                                                                                                                                           |
|                                              | Time delay: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
|                                              | V1, V2 and VP Tap: 0.08 to 2.00 xUn (step 0.001xUn)                                                                                                                                                               |
|                                              | I1, I2 and 3I0 Tap: 0.010 to 20.000 xIn (step 0.001xIn)                                                                                                                                                           |
|                                              | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                                     |
| <b>Function 50BF</b>                         | 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                                                                                                                                                              |
| <b>Function 49T</b>                          | Available through configurable inputs thanks to the programmable logic                                                                                                                                            |



## Características técnicas SIL-C

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 86</b>                       | It allows to latch (lockout) the contact trip due to programmable logic (PGC: RSFF or SRFF).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Function 68</b>                       | Available through configurable inputs and outputs thanks to the programmable logic (PGC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Programmable logic control (PGC)</b>  | <p>OR, OR_1PULSE, OR_PULSES, OR_BLINKING, OR_TIMER UP, OR_TIMER DOWN</p> <p>NOR, NOR_1PULSE, NOR_PULSES, NOR_BLINKING, NOR_TIMER UP, NOR_TIMER DOWN</p> <p>AND, AND_1PULSE, AND_PULSES, AND_BLINKING, AND_TIMER UP, AND_TIMER DOWN</p> <p>NAND, NAND_1PULSE, NAND_PULSES, NAND_BLINKING, NAND_TIMER UP, NAND_TIMER DOWN</p> <p>XOR, OR_1PULSE, XOR_PULSES, XOR_BLINKING, XOR_TIMER UP, XOR_TIMER DOWN</p> <p>SRFF, SRFF_1PULSE, SRFF_PULSES, SRFF_BLINKING, SRFF_TIMER UP, SRFF_TIMER DOWN, SRFF_NON VOLATIL</p> <p>RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN, RSFF_NON VOLATIL</p> <p>R_EDGE, R_EDGE_1PULSE</p> <p>F_EDGE, F_EDGE_1PULSE</p>                                                                                                                                   |
| <b>Settings tables</b>                   | <p>4 settings groups</p> <p>Selectable by input, communications, user commands or general setting.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>SER</b>                               | 3072 events                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Disturbance fault recording (DFR)</b> | <p>32 samples/cycle</p> <p>10 analog channels and 96 configurable digital channels</p> <p>Configurable DFR start</p> <p>Configurable number of records depending on the size:</p> <p>5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 postfault cycles.</p> <p>25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles.</p> <p>50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles.</p> <p>100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.)</p> <p>COMTRADE IEEE C37.111-1991</p> <p>Up to 100 fault reports (data format) with maximum 29 events each one</p> |
| <b>Load Data Profiling (LDP)</b>         | <p>Demand of power with the following characteristics:</p> <ul style="list-style-type: none"> <li>- Number of records: 2160</li> <li>- Circular recording mode circular</li> <li>- Sampling rate (interval): configurable through communications (1-60 min)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Inputs (*)</b>                        | <p>Depending on Model:</p> <ul style="list-style-type: none"> <li>- 8 configurable inputs</li> <li>- 11 configurable inputs</li> </ul> <p>The voltage of the inputs is the same as the auxiliary power supply</p> <p>Burden: 24 Vdc: &lt;20 mW<br/>230 Vdc: &lt;200 mW<br/>24 Vac: &lt;50 mW<br/>230 Vac: &lt;500 mW</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Outputs (*)</b>           | <p>Depending on Model:</p> <ul style="list-style-type: none"> <li>- 5 configurable outputs</li> <li>- 7 configurable outputs</li> </ul> <p>250 V AC – 8 A; 30 V DC – 8 A</p> <p>Contact current short duration: 30A – 200ms</p> <p>Output 1: NO-NC; the rest of the outputs: NO</p> <p>Model with 7 outputs: Output 1 NC; the rest of the outputs: NO</p>                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Frequency</b>             | 50/60Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Energizing Quantities</b> | <p>Burden of current inputs:</p> <p>&lt;0.015 VA (1 A) &amp; &lt;0.375 VA (5 A)</p> <p>Burden of voltage inputs:</p> <p>&lt; 70 mVA</p> <p>Burden of power supply unit:</p> <p>24-230 Vdc/Vac: &lt; 12 VA</p> <p>Burden for binary inputs:</p> <p>24 Vdc: &lt;20 mW<br/>230 Vdc: &lt;200 mW<br/>24 Vac: &lt;50 mW<br/>230 Vac: &lt; 500 mW</p>                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Current measurements</b>  | <p>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).</p> <p>Fundamental values (DFT)</p> <p>Sampling: 32 samples/cycle</p> <p>Phase and Neutral (1 A or 5 A): ±2% precision in a band covering ±20% of nominal current and ±4% or ±5 mA in the rest of the range</p> <p>Neutral (0.1 A): ±2% precision in a band covering ±20% of nominal current and ±4% or ±0.5 mA in the rest of the range</p> <p>Current measurement range: From 0.01 to 30 times the nominal current</p>                                                                      |
| <b>Voltage measurements</b>  | <p>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.</p> <p>Fundamental values (DFT)</p> <p>Sampling: 32 samples/cycle</p> <p>Measured voltage: 1% precision in a band covering ±20% of nominal voltage and 4% in the rest of the range (ambient temperature)</p> <p>Calculated voltage: 2% precision in a band covering ±20% of nominal voltage and 4% in the rest of the range (ambient temperature)</p> <ul style="list-style-type: none"> <li>- With VTs: 3-250 V measured voltage (6-250 V calculated voltage)</li> <li>- Direct connection: From 12 to 1000 V</li> </ul> |
| <b>Angle measurements</b>    | <p>Current Angles: IA, IB, IC, IN and 3I0.</p> <p>Voltage Angles: VA, VB, VC, VR, VL*, 3V0, UAB, UBC and UCA.</p> <p>Power factor: Cos PHI-A, Cos-PHI-B and Total Cos-PHI-C</p> <p>Accuracy: ±2°</p> <p>Angle measurement range: From 0 to 359°</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Características técnicas SIL-C

|                                   |                                                                                                                                                                                           |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power measurements</b>         | 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 $\pm 45^\circ$ ).                                                                                  |
| <b>Energy measurement</b>         | Positive and negative active energy                                                                                                                                                       |
|                                   | Positive and negative reactive energy                                                                                                                                                     |
| <b>Frequency measurements</b>     | Busbar Frequency, Line Frequency, df/dt                                                                                                                                                   |
|                                   | Minimum voltage: 20V P-N (35 P-P)                                                                                                                                                         |
|                                   | Accuracy: $\pm 0.005$ Hz                                                                                                                                                                  |
|                                   | Frequency measurement range: From 45 to 65 Hz                                                                                                                                             |
| <b>Communications</b>             | Local port (micro-USB): Modbus RTU                                                                                                                                                        |
|                                   | Wireless communication (Wi-Fi) (*)                                                                                                                                                        |
|                                   | Rear Serial Port (RS485): Modbus RTU, DNP3.0 and IEC60870-5-103 (selectable by general settings) (*)                                                                                      |
|                                   | Rear Ethernet Port (RJ45 or FO-LC) (10/100 Base-Tx): Modbus TCP/IP, DNP3.0 TCP/IP, IEC60870-5-104 or IEC61850 (selectable by general settings) + SNTP Protocol + Web Server + IIRIG-B (*) |
| <b>Power supply</b>               | 24-230 Vac/dc (24-220 Vdc ( $\pm 20\%$ ) / 100-230 Vac ( $\pm 15\%$ ))                                                                                                                    |
|                                   | Burden: 24-230 Vdc/Vac: < 20 VA                                                                                                                                                           |
| <b>Environmental conditions</b>   | Operating temperature: -40 to 70°C                                                                                                                                                        |
|                                   | Storage temperature: -40 to 80°C                                                                                                                                                          |
|                                   | Relative humidity: 95%                                                                                                                                                                    |
| <b>Mechanical characteristics</b> | 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                                                                                                                                         |

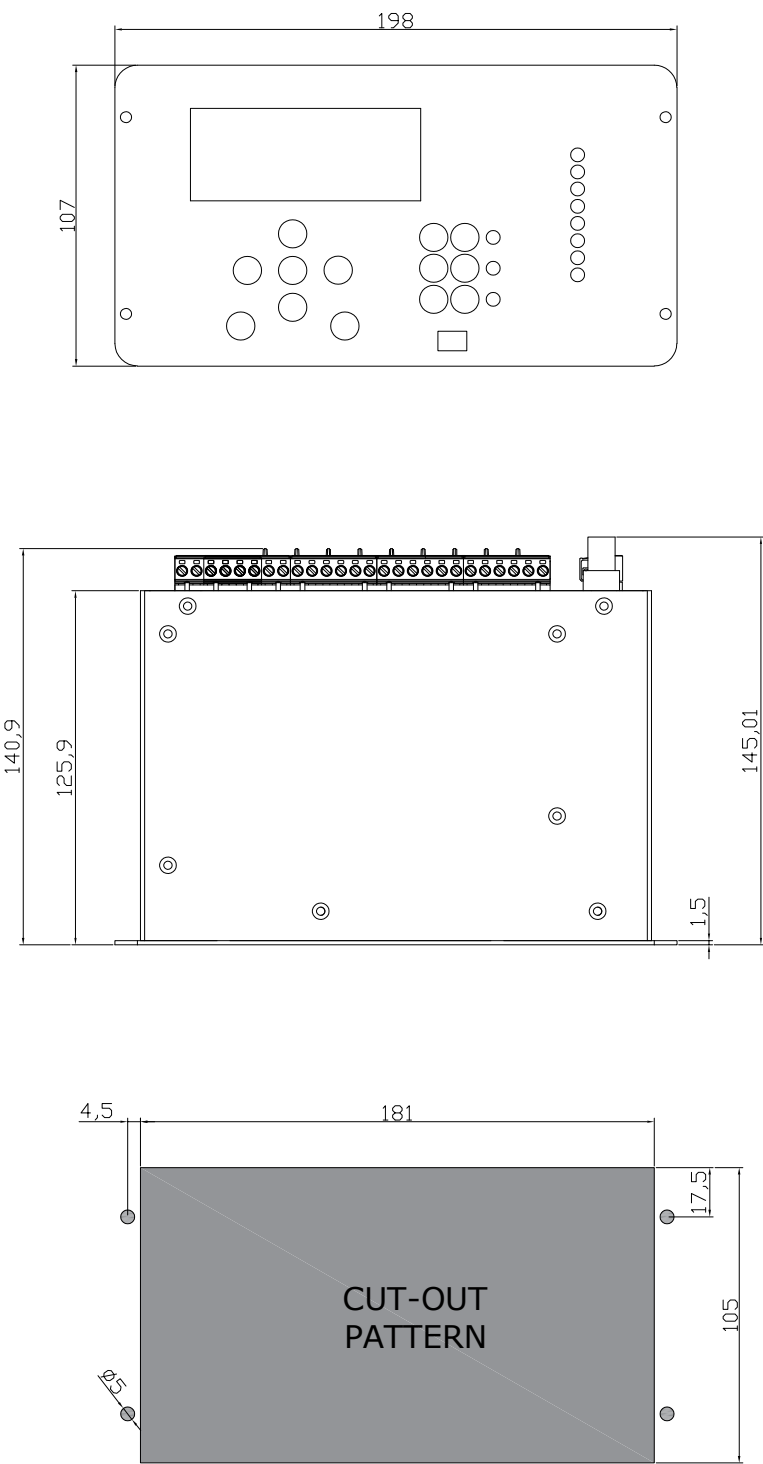
(\*) Optional depending on model

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)



Dimensiones y corte de chapa SIL-C



## Dimensiones y corte de chapa SIL-C

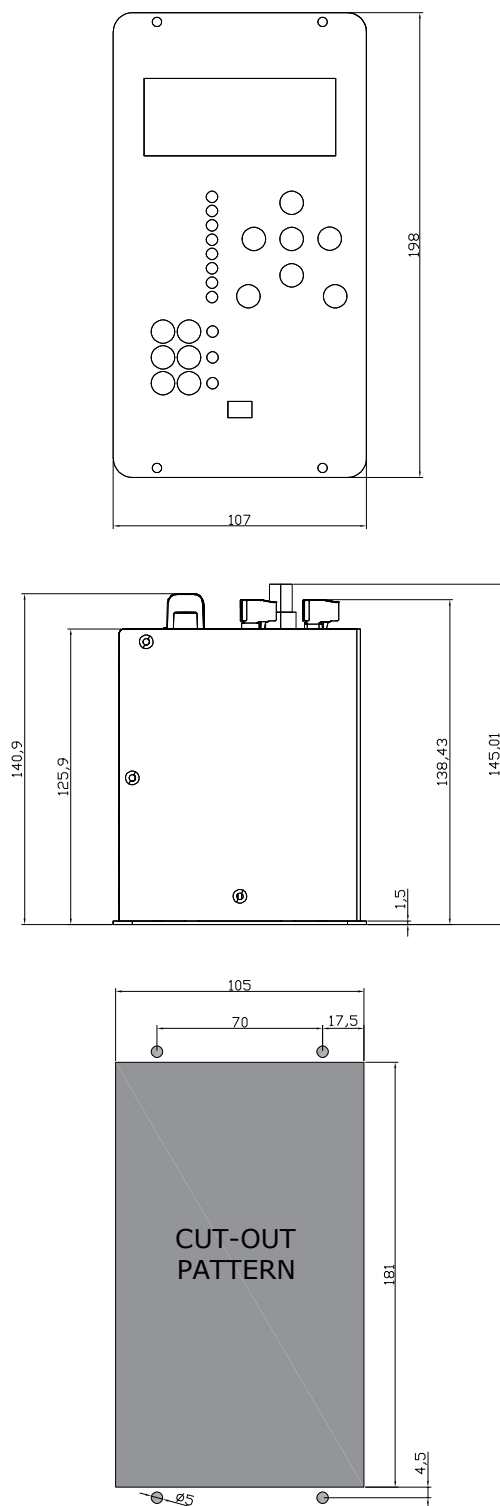
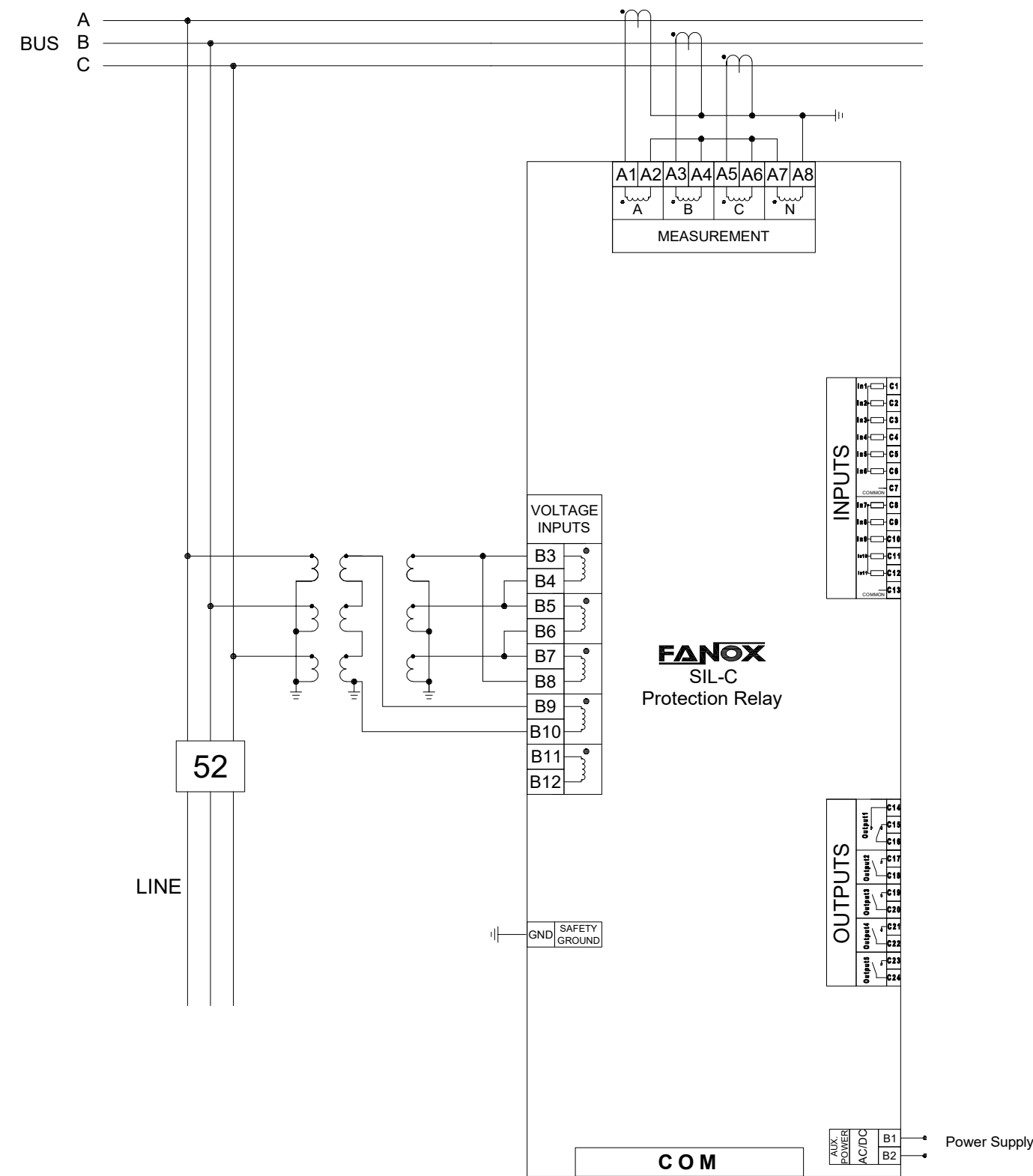


Diagrama de conexiones SIL-C

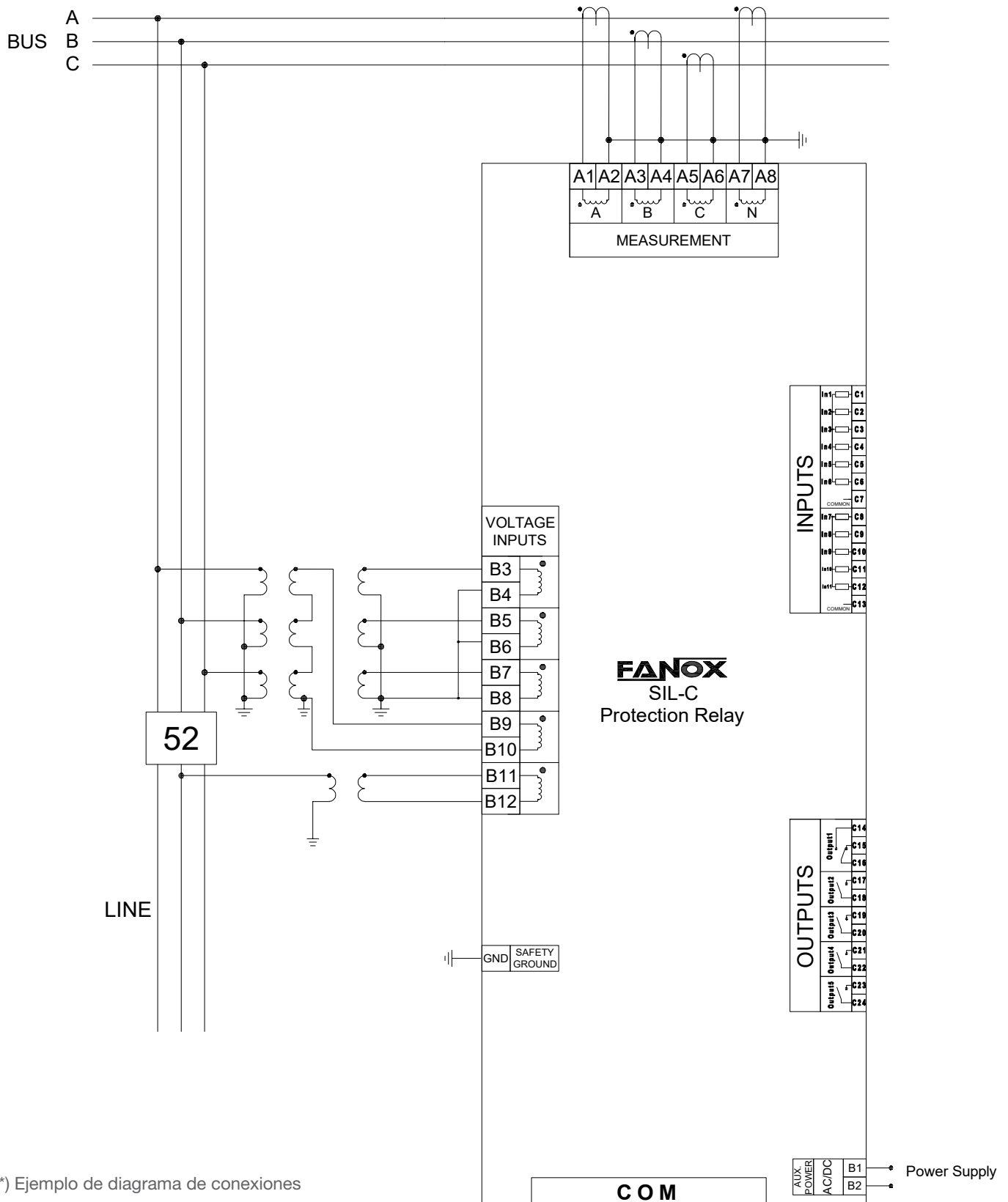
Fase-Fase + voltaje residual, 3 transformadores de corriente



(\*) 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<br>1 A o 5 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                               | 0<br>1 |   |   |        |                                 |        |                  |             | MEDIDA DE CORRIENTE DE NEUTRO<br>1 A o 5 A<br>1 A o 0,1 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                               |        | 0 |   |        |                                 |        |                  |             | MEDIDA DE TENSIÓN<br>Hasta 1.000 V (conexión directa) o 250 V (con TTs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                               |        |   | C |        |                                 |        |                  |             | ALIMENTACIÓN<br>24-230 Vcc/ca                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                               |        |   |   | 0<br>1 |                                 |        |                  |             | FUNCIONES ADICIONALES<br>-<br>+25 + 27-L + 59-L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                               |        |   |   |        | A<br>B<br>G<br>O<br>P<br>Q<br>R |        |                  |             | COMUNICACIONES<br>A: USB (Modbus RTU) + Puerto Serie Trasero (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie)<br>B: USB (Modbus RTU) + Puerto Serie Trasero (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie) + RJ45 (Modbus TCP o DNP3.0 TCP o IEC60870-5-104) + Servidor web + SNTP Protocolo + IIRIG-B<br>G: USB (Modbus RTU) + WiFi + Puerto Serie Trasero (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie) + Puerto Ethernet trasero RJ45 (Modbus TCP, DNP3.0 TCP o IEC60870-5-104) + Servidor web + Protocolo SNTP + IIRIG-B<br>O: USB (Modbus RTU) + Puerto Serie Trasero (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie) + Puerto Ethernet trasero RJ45 (Modbus TCP, DNP3 TCP, IEC 60870-5-104 o IEC61850) + Servidor web + SNTP Protocolo + IIRIG-B<br>P: USB (Modbus RTU) + WiFi + Puerto Serie Trasero (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie) + Puerto Ethernet trasero RJ45 (Modbus TCP, DNP3 TCP, IEC 60870-5-104 o IEC61850) + Servidor web + SNTP Protocolo + IIRIG-B<br>Q: USB (Modbus RTU) + Puerto Serie Trasero: (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie) + Puerto Ethernet trasero FO-LC (Modbus TCP, DNP3 TCP, IEC 60870-5-104 o IEC61850) + Servidor web + SNTP Protocolo + IIRIG-B<br>R: USB (Modbus RTU) + WiFi + Puerto serie trasero (Modbus RTU, IEC60870-5-103 o DNP3.0 Serie) + Puerto Ethernet trasero (FO-LC)(Modbus TCP, DNP3 TCP, IEC 60870-5-104 o IEC61850) + Servidor Web + Protocolo SNTP + IIRIG-B |
|                                               |        |   |   |        |                                 | 0<br>1 |                  |             | ENTRADAS Y SALIDAS<br>8 Entradas + 7 Salidas<br>11 Entradas + 5 Salidas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                               |        |   |   |        |                                 |        | C<br>D<br>E<br>F |             | MECÁNICA<br>Montaje Vertical<br>Montaje Horizontal<br>Montaje Vertical con Tratamiento Anticorrosivo<br>Montaje Horizontal con Tratamiento Anticorrosivo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                               |        |   |   |        |                                 |        |                  | A<br>E<br>F | IDIOMA<br>Inglés, Español, Alemán y Francés<br>Inglés, Español, Turco y Ruso<br>Inglés, Español, Alemán y Portugués                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                               |        |   |   |        |                                 |        |                  | B           | REVISIÓN<br>(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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

Ejemplo de código de pedido:

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

(\*) NOTA: 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).