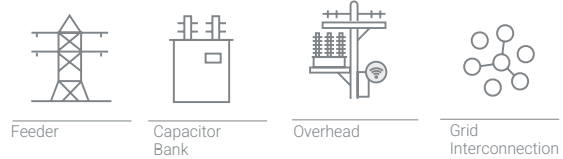


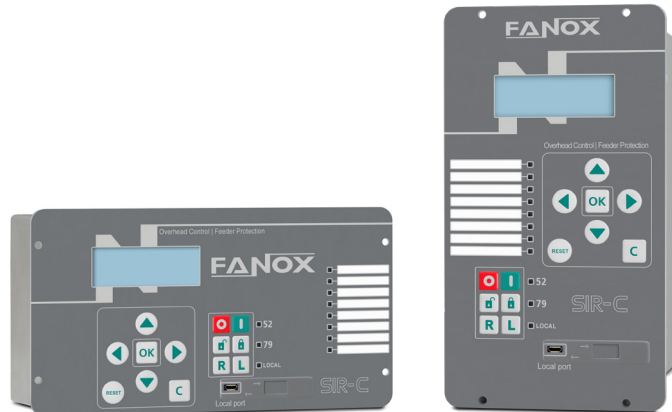
# SIR-C

## Control de Solución Aérea / RTU Relé de Protección de Alimentador Compacto

### Protección para Distribución Primaria y Secundaria



PM I V f CI Std. CTs /1/5 VI Voltage sensors



KEMA Labs

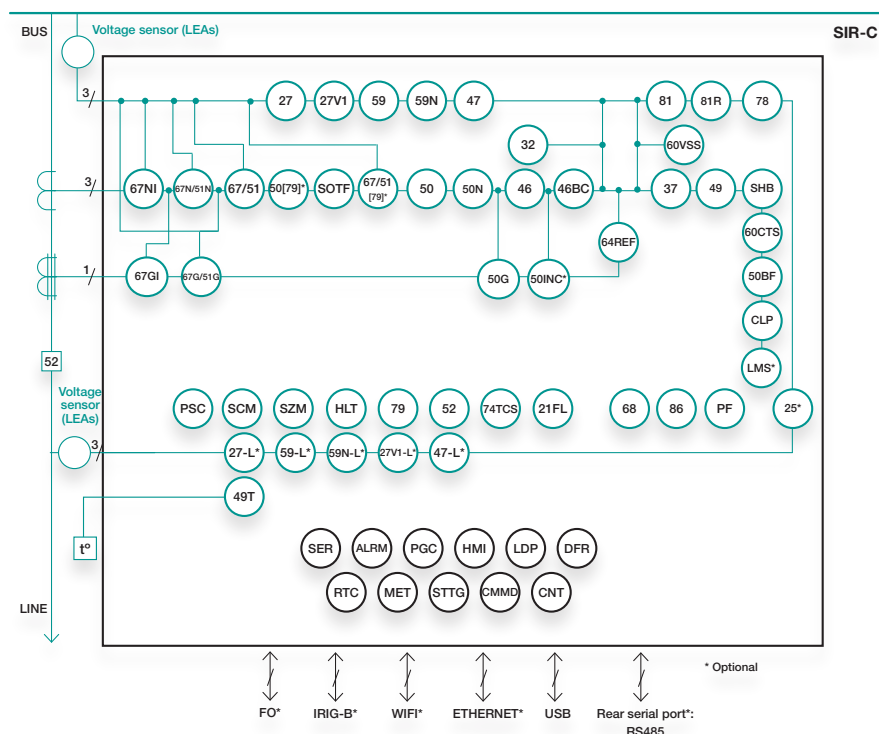
G99  
Compliant

- El SIR-C es un relé para control de reconectador y protección de alimentador que incorpora funciones de corriente, tensión y frecuencia para distribución primaria y secundaria con una fuente de alimentación auxiliar de 24-230 Vcc/ca.
- 4 canales de corriente para transformadores de corriente convencionales /1 y /5 y 6 canales de tensión para sensores de tensión capacitivos y resistivos de baja potencia (LEA).
- 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 SIR-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 del relé SIR-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 la comunicación, los relés están provistos de un puerto frontal micro-USB para comunicación local y diferentes opciones (puertos y

protocolos) para comunicación remota en su parte trasera:

- » Puerto serie trasero: Modbus RTU, DNP3.0 Serie o IEC60870-5-103 (seleccionable desde 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 SNMP + Servidor Web.
- Comunicación inalámbrica (Wi-Fi) y sincronización mediante IRIG-B (opcionales según el modelo).
- Panel de alarmas disponible.
- El SIR-C está provisto de (según el modelo):
  - » 8 entradas configurables y 7 salidas configurables.
  - » 11 entradas configurables y 5 salidas configurables.
- El SIR-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 SIR-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 para cada registro): 1 a 8 ciclos prefalta + 292 a 299 ciclos posfalta.
  - » 25 registros en formato dato y COMTRADE (60 ciclos para cada registro): 1 a 8 ciclos prefalta + 52 a 59 ciclos posfalta.
  - » 50 registros en formato dato y COMTRADE (30 ciclos para cada registro): 1 a 8 ciclos prefalta + 22 a 29 ciclos posfalta.
  - » 100 registros en formato dato y COMTRADE (15 ciclos para cada registro): 1 a 8 ciclos prefalta + 7 a 14 ciclos posfalta.
- 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 SIR-C



## PROTECCIONES CÓDIGOS ANSI

|               |                                                                                         |
|---------------|-----------------------------------------------------------------------------------------|
| 50            | Sobrecorriente instantánea de fase                                                      |
| 67/51         | Sobrecorriente direccional* de tiempo inverso de fase                                   |
| 50 [79] (*)   | Sobreintensidad de fase instantánea - Ajuste por ciclo de reconexión                    |
| 67/51[79] (*) | Sobreintensidad de fase direccional* de tiempo inverso - Ajuste por ciclo de reconexión |
| 50N           | Sobrecorriente instantánea de neutro calculado                                          |
| 50G           | Sobrecorriente instantánea de neutro medido                                             |
| 67N/51N       | Sobrecorriente direccional* de tiempo inverso de neutro calculado                       |
| 67G/51G       | Sobrecorriente direccional* de tiempo inverso de neutro medido                          |
| 67NI          | Sobrecorriente direccional de neutro 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                                                  |
| 50INC (*) (1) | Detección de faltas incipiente/ intermitente                                            |
| 49            | Sobrecarga por imagen térmica                                                           |
| 49T           | Disparo Externo                                                                         |
| 37            | Subcorriente instantánea de fase                                                        |
| SHB           | Bloqueo por segundo armónico                                                            |
| 59            | Sobretensión instantánea de fase (Barra)                                                |
| 59N           | Sobretensión instantánea de neutro calculado (Barra)                                    |
| 59-L          | Sobretensión instantánea de fase (Línea)                                                |
| 59N-L         | Sobretensión instantánea de neutro calculado (Línea)                                    |
| 47            | Protección de tensión para secuencia de fases (Barra)                                   |
| 47-L          | Protección de tensión para secuencia de fases (Línea)                                   |
| 27            | Subtensión instantánea de fase (Barra)                                                  |
| 27-L          | Subtensión instantánea de fase (Línea)                                                  |
| 27V1          | Subtensión instantánea de secuencia positiva (Barra)                                    |

|             |                                                      |
|-------------|------------------------------------------------------|
| 27V1-L      | Subtensión instantánea de secuencia positiva (Línea) |
| 32          | Sobrepotencia direccional                            |
| 81O/U       | Sub/Sobrefrecuencia                                  |
| 81R         | Derivada de frecuencia (ROCOF)                       |
| 78          | Salto de vector                                      |
| CLP         | Arranque en carga fría                               |
| 79          | Relé de reenganche c.a.                              |
| SCM         | Modo de coordinación secuencial                      |
| SZM         | Modo seccionalizador                                 |
| 52          | Monitorización del interruptor                       |
| 25          | Sincronismo                                          |
| HLT         | Mantenimiento en línea energizada                    |
| 50BF        | Fallo de apertura del interruptor                    |
| 74TCS       | Supervisión del circuito de disparo                  |
| 60CTS       | Supervisión TI de fase                               |
| 60VSS       | Supervisión LPVT de fase                             |
| 21FL        | Localizador de fallos                                |
| LMS (*) (1) | Sistema de gestión de carga                          |
| PF (1)      | Flujo de potencia                                    |
| 86          | Bloqueo de disparo                                   |
| 68          | Selectividad e interbloqueo (ZSI)                    |
| PR (2)      | Rotación de fases                                    |
| PSC         | Control de la fuente de alimentación                 |

(\*) Opcional según el modelo

(1) Disponible a partir de la versión 01.22.00

(2) Disponible a partir de la versión 01.23.00

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.

Las funciones 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 neutra 1 (IN = 0,1A o 1A).

## FUNCIONES ADICIONALES

|      |                                 |
|------|---------------------------------|
| CNT  | Contadores                      |
| RTC  | Reloj en Tiempo Real            |
| ALRM | Panel de alarmas                |
| PGC  | Control Lógico Programable      |
| HMI  | Interfaz de usuario             |
| SER  | Grabación secuencial de eventos |

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

## CARACTERÍSTICAS TÉCNICAS SIR-C

|                                                                                                                      |                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 50-1</b><br><b>Function 50-2 (*)</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 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: IEC60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long-time inverse, short time inverse), IEEE (Moderately inverse, very inverse, extremely inverse), U, SMU and RC curves. |
|                                                                                                                      | User defined curves (curve 1, curve 2, curve 3, curve 4) <sup>(2)</sup>                                                                                                                                               |
|                                                                                                                      | For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)                                                                                                                                            |
|                                                                                                                      | Time dial (TMS): 0.05 to 25.00 (step 0.01)                                                                                                                                                                            |
|                                                                                                                      | If Curve type IEC: 0.01 to 1.00 (step 0.01)                                                                                                                                                                           |
|                                                                                                                      | If Curve type IEEE: 0.01 to 25.00 (step 0.01)                                                                                                                                                                         |
|                                                                                                                      | If Curve type U: 0.05 to 15.00 (step 0.01)                                                                                                                                                                            |
|                                                                                                                      | If Curve type RC: 0.10 to 2.00 (step 0.01)                                                                                                                                                                            |
|                                                                                                                      | Current tap: 0.010 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                      |
|                                                                                                                      | Directionality: No/Forward/Reverse                                                                                                                                                                                    |
|                                                                                                                      | Polarization voltage: 0.04 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%                                                                                                                                                                               |
|                                                                                                                      | Definite time, current activation level: 100%                                                                                                                                                                         |
|                                                                                                                      | Definite 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: IEC60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long-time inverse, short time inverse), IEEE (Moderately inverse, very inverse, extremely inverse), U, SMU and RC curves. |
|                                                        | User defined curves (curve 1, curve 2, curve 3, curve 4) <sup>(2)</sup>                                                                                                                                               |
|                                                        | 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)                                                                                                                                                                         |
|                                                        | If Curve type U: 0.05 to 15.00 (step 0.01)                                                                                                                                                                            |
|                                                        | If Curve type RC: 0.10 to 2.00 (step 0.01)                                                                                                                                                                            |
|                                                        | Current tap: 0.050 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                      |
|                                                        | Directionality: No/Forward/Reverse                                                                                                                                                                                    |
|                                                        | Polarization voltage: 0.04 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%                                                                                                                                                                               |
|                                                        | Definite time, current activation level: 100%                                                                                                                                                                         |
|                                                        | Definite 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 SIR-C

|                           |                                                                                                                                                                                                                        |                      |                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------|
| <b>Function 67G/51G-1</b> | Function enable: No/Alarm/Trip/SHB Trip                                                                                                                                                                                | <b>Function 67GI</b> | Function enable: No/Alarm/Trip/SHB Trip                                                  |
|                           | Curve Type: IEC60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long-time inverse, short time inverse), IEEE (Moderately inverse, very inverse, extremely inverse), U, SMU, and RC curves. |                      | Directionality: No/Forward/Reverse                                                       |
|                           | User defined curves (curve 1, curve 2, curve 3, curve 4) <sup>(2)</sup>                                                                                                                                                |                      | Low Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)                                     |
|                           | For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)                                                                                                                                             |                      | High Current Tap: 0.010 to 30.000 xIn (step 0.001xIn)                                    |
|                           | Time dial (TMS): 0.01 to 25.00 (step 0.01)                                                                                                                                                                             |                      | Low Voltage Tap: 0.04 to 2.00 xUn (step 0.01xUn)                                         |
|                           | If Curve type IEC: 0.01 to 1.00 (step 0.01)                                                                                                                                                                            |                      | High Voltage tap: 0.04 to 2.00 xUn (step 0.01xUn)                                        |
|                           | If Curve type IEEE: 0.01 to 25.00 (step 0.01)                                                                                                                                                                          |                      | Time delay: 0.000 to 300.000 s (step 0.001 s)                                            |
|                           | If Curve type U: 0.05 to 15.00 (step 0.01)                                                                                                                                                                             |                      | Operating angle: 0 to 359° (step 1°)                                                     |
|                           | If Curve type RC: 0.10 to 2.00 (step 0.01)                                                                                                                                                                             |                      | Halfcone angle: 10 to 170° (step 1°)                                                     |
|                           | Current tap: 0.010 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                       |                      | Activation level: 100%                                                                   |
| <b>Function 67G/51G-2</b> | Directionality: No/Forward/Reverse                                                                                                                                                                                     |                      | Deactivation level: 95%                                                                  |
|                           | Polarization voltage: 0.04 to 2.00 xUn (step 0.01xUn)                                                                                                                                                                  | <b>50[79] (*)</b>    | Temporized deactivation                                                                  |
|                           | Operating angle: 0 to 359° (step 1°)                                                                                                                                                                                   |                      | Timing accuracy: ± 30 ms or ± 5% (greater of both)                                       |
|                           | Halfcone angle: 10 to 170° (step 1°)                                                                                                                                                                                   |                      | Function enable: No/Alarm/Trip/SHB Trip                                                  |
|                           | Curve, current activation level: 110%                                                                                                                                                                                  |                      | Current tap: 0.010 to 30.000 xIn (step 0.001xIn)                                         |
|                           | Curve, current deactivation level: 100%                                                                                                                                                                                |                      | 5 independent tap settings for each reclose number (79-0, 79-1, 79-2, 79-3, 79-4)        |
|                           | Definite time, current activation level: 100%                                                                                                                                                                          |                      | Time delay: 0.000 to 300.000 s (step 0.001 s)                                            |
|                           | Definite time, current deactivation level: 95%                                                                                                                                                                         |                      | 5 independent time delay settings for each reclose number (79-0, 79-1, 79-2, 79-3, 79-4) |
|                           | Voltage activation level: 100%                                                                                                                                                                                         |                      | Activation level: 100%                                                                   |
|                           | Voltage deactivation level: 95%                                                                                                                                                                                        |                      | Deactivation level: 95%                                                                  |
|                           | Temporized deactivation                                                                                                                                                                                                |                      | Temporized deactivation                                                                  |
| <b>Function 67NI</b>      | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both)                                                                                                                                |                      | Timing accuracy: ± 35 ms or ± 0.5% (greater of both)                                     |
|                           | Timing accuracy for defined time curve selection:<br>± 35 ms or ± 0.5% (greater of both)                                                                                                                               |                      |                                                                                          |
|                           | 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: 0.04 to 2.00 xUn (step 0.01xUn)                                                                                                                                                                       |                      |                                                                                          |
|                           | High Voltage tap: 0.04 to 2.00 xUn (step 0.01xUn)                                                                                                                                                                      |                      |                                                                                          |
|                           | Time delay: 0.000 to 300.000 s (step 0.001 s)                                                                                                                                                                          |                      |                                                                                          |
|                           | Operating angle: 0 to 359° (step 1°)                                                                                                                                                                                   |                      |                                                                                          |
|                           | Halfcone angle: 10 to 170° (step 1°)                                                                                                                                                                                   |                      |                                                                                          |
|                           | Activation level: 100%                                                                                                                                                                                                 |                      |                                                                                          |
|                           | Deactivation level: 95%                                                                                                                                                                                                |                      |                                                                                          |
|                           | Temporized deactivation                                                                                                                                                                                                |                      |                                                                                          |
|                           | Timing accuracy: ± 30 ms or ± 5% (greater of both)                                                                                                                                                                     |                      |                                                                                          |

## CARACTERÍSTICAS TÉCNICAS SIR-C

|                       |                                                                                                                                                                                                                        |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>51/67[79] (*)</b>  | Function enable: No/Alarm/Trip/SHB Trip                                                                                                                                                                                |
|                       | Curve Type: IEC60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long-time inverse, short time inverse), IEEE (Moderately inverse, very inverse, extremely inverse), U, SMU, and RC curves. |
|                       | User defined curves (curve 1, curve 2, curve 3, curve 4) <sup>(2)</sup>                                                                                                                                                |
|                       | 5 independent curve type settings for each reclose number (79-0, 79-1, 79-2, 79-3, 79-4)                                                                                                                               |
|                       | For IEC Definite time curve, time delay: 0.000 to 300.000 s (step 0.001 s)                                                                                                                                             |
|                       | 5 independent time delay settings for each reclose number (79-0, 79-1, 79-2, 79-3, 79-4)                                                                                                                               |
|                       | 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)                                                                                                                                                                          |
|                       | If Curve type U: 0.05 to 15.00 (step 0.01)                                                                                                                                                                             |
|                       | If Curve type RC: 0.10 to 2.00 (step 0.01)                                                                                                                                                                             |
|                       | 5 independent time dial settings for each reclose number (79-0, 79-1, 79-2, 79-3, 79-4)                                                                                                                                |
|                       | Current tap: 0.010 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                       |
|                       | 5 independent tap settings for each reclose number (79-0, 79-1, 79-2, 79-3, 79-4)                                                                                                                                      |
|                       | Directionality: No/Forward/Reverse                                                                                                                                                                                     |
|                       | Polarization voltage: 0.04 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%                                                                                                                                                                                |
|                       | Definite time, current activation level: 100%                                                                                                                                                                          |
|                       | Definite time, current deactivation level: 95%                                                                                                                                                                         |
|                       | Voltage activation level: 100%                                                                                                                                                                                         |
|                       | Voltage deactivation level: 95%                                                                                                                                                                                        |
|                       | Temporized deactivation                                                                                                                                                                                                |
|                       | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both)                                                                                                                                |
|                       | Timing accuracy for defined time curve selection:<br>± 35 ms or ± 0.5% (greater of both)                                                                                                                               |
| <b>Function 64REF</b> | Function enable: No/Alarm/Trip/ IN SHB Trip                                                                                                                                                                            |
|                       | Current tap: 0.050 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                       |
|                       | Time delay: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                          |
|                       | Neutral SHB Tap: 5 to 50% (step 1%)                                                                                                                                                                                    |
|                       | Activation level: 100%                                                                                                                                                                                                 |
|                       | Deactivation level: 90%                                                                                                                                                                                                |
|                       | Temporized deactivation                                                                                                                                                                                                |
|                       | Timing accuracy: ± 35 ms or ± 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: ± 35 ms or ± 0.5% (greater of both)                                                                                                                                                                   |

|                                          |                                                                                                                                                                                                                        |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 50INC (*) <sup>(1)</sup></b> | Function enable: No/Alarm/Trip                                                                                                                                                                                         |
|                                          | Phase Current Tap: 0.500 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                 |
|                                          | Pickup Peaks number: 1 to 10 (step 1)                                                                                                                                                                                  |
|                                          | Trip Peak number: 1 to 10 (step 1)                                                                                                                                                                                     |
| <b>Function 49</b>                       | Function enable: No/Alarm/Trip                                                                                                                                                                                         |
|                                          | Current tap: 0.100 to 2.400 In (step 0.001xIn)                                                                                                                                                                         |
|                                          | ζ heating: 3 to 600 min (step 1 min)                                                                                                                                                                                   |
|                                          | ζ cooling: 1 to 6 xζ heating (step 1)                                                                                                                                                                                  |
|                                          | Alarm: 20 to 99% (step 1%)                                                                                                                                                                                             |
|                                          | Trip level: 100%                                                                                                                                                                                                       |
|                                          | Deactivation level: 95% of alarm level                                                                                                                                                                                 |
|                                          | Timing accuracy: ± 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%                                                                                                                                                                                                 |
| <b>Function CLP</b>                      | Deactivation level: 95%                                                                                                                                                                                                |
|                                          | Temporized deactivation                                                                                                                                                                                                |
|                                          | Function enable: Yes/No                                                                                                                                                                                                |
|                                          | Settings group: 1 to 6 (step 1)                                                                                                                                                                                        |
|                                          | No load time: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                        |
| <b>Function 46</b>                       | Cold load time: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                      |
|                                          | Open breaker activation 0.8% In and reset threshold: 1% In                                                                                                                                                             |
|                                          | Function enable: No/Alarm/Trip/SHB Trip                                                                                                                                                                                |
|                                          | Curve Type: IEC60255-151 (Definite time, standard inverse, very inverse, extremely inverse, long-time inverse, short time inverse), IEEE (Moderately inverse, very inverse, extremely inverse), U, SMU, and RC curves. |
|                                          | User defined curves (curve 1, curve 2, curve 3, curve 4) <sup>(2)</sup>                                                                                                                                                |
|                                          | 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)                                                                                                                                                                          |
|                                          | If Curve type U: 0.05 to 15.00 (step 0.01)                                                                                                                                                                             |
|                                          | If Curve type RC: 0.10 to 2.00 (step 0.01)                                                                                                                                                                             |
|                                          | Current tap: 0.010 to 20.000 xIn (step 0.001xIn)                                                                                                                                                                       |
|                                          | Curve, current activation level: 110%                                                                                                                                                                                  |
|                                          | Curve, current deactivation level: 100%                                                                                                                                                                                |
|                                          | Definite time, current activation level: 100%                                                                                                                                                                          |
|                                          | Definite time, current deactivation level: 95%                                                                                                                                                                         |
|                                          | Temporized deactivation                                                                                                                                                                                                |
|                                          | Timing accuracy for IEC and IEEE curves selection:<br>± 30 ms or ± 5% (greater of both)                                                                                                                                |
|                                          | Timing accuracy for defined time curve selection:<br>± 35 ms or ± 0.5% (greater of both)                                                                                                                               |

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|----------------------------------------------|---------------------------------------------------------------|
| <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%                                       |
|                                              | Temporized deactivation                                       |
|                                              | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <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%                                      |
|                                              | 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: 0.04 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%                                      |
| <b>Function 27-L (*)</b>                     | Function enable: No/Alarm/Trip                                |
|                                              | Voltage tap: 0.04 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%                                      |
| <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%                                      |
| <b>Function 27V1-L (*)</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%                                      |

|                                                |                                                               |
|------------------------------------------------|---------------------------------------------------------------|
| <b>Function 59-1</b><br><b>Function 59-2</b>   | Function enable: No/Alarm/Trip                                |
|                                                | Voltage tap: 0.04 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%                                       |
|                                                | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 59-L (*)</b>                       | Function enable: No/Alarm/Trip                                |
|                                                | Voltage tap: 0.04 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%                                       |
|                                                | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 59N-1</b><br><b>Function 59N-2</b> | Function enable: No/Alarm/Trip                                |
|                                                | Voltage tap: 0.04 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%                                       |
|                                                | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 59N-L (*)</b>                      | Function enable: No/Alarm/Trip                                |
|                                                | Voltage tap: 0.04 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%                                       |
|                                                | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 47</b>                             | Function enable: No/Alarm/Trip                                |
|                                                | Voltage tap: 0.04 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%                                       |
|                                                | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |
| <b>Function 47-L (*)</b>                       | Function enable: No/Alarm/Trip                                |
|                                                | Voltage tap: 0.04 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%                                       |
|                                                | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both) |

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|                       |                                                                                                                                                                                                                   |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 32-1</b>  | Function enable: No/Alarm/Trip                                                                                                                                                                                    |
|                       | Activation level: 0.02 to 2.00 xSn (step 0.01xSn)                                                                                                                                                                 |
|                       | Operating angle: 0 to 359° (step 1°)                                                                                                                                                                              |
|                       |                                                                                                                                                                                                                   |
| <b>Function 32-2</b>  | Time delay: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
| <b>Function 32-3</b>  | Activation level: 100%                                                                                                                                                                                            |
| <b>Function 32-4</b>  | Deactivation level: 95%                                                                                                                                                                                           |
|                       | Instantaneous deactivation                                                                                                                                                                                        |
|                       | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both)                                                                                                                                                     |
| <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)                                                                                                                                                                     |
| <b>Function 81-2</b>  | Reset time: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
|                       | Function blocked if phase B voltage is lower than 6% of the LEA Vrms maximum value (Vrms is 2.8, 5.2, 8 or 16 Vrms depending on model)                                                                            |
| <b>Function 81-3</b>  | Activation level: 100%                                                                                                                                                                                            |
| <b>Function 81-4</b>  | Underfrequency reset level: activation level + 50mHz                                                                                                                                                              |
| <b>Function 81-5</b>  | Overfrequency reset level: activation level - 50 mHz                                                                                                                                                              |
| <b>Function 81-6</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 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)                                                                                                                                                                      |
| <b>Function 81R-2</b> | Reset time: 0.020 to 300.000 s (step 0.001 s)                                                                                                                                                                     |
|                       | Function blocked if phase B voltage is lower than 6% of the LEA Vrms maximum value (Vrms is 2.8, 5.2, 8 or 16 Vrms depending on model)                                                                            |
|                       | Activation level: 100%                                                                                                                                                                                            |
| <b>Function 78</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 6% of the LEA Vrms maximum value (Vrms is 2.8, 5.2, 8 or 16 Vrms depending on model)                                                                            |
| <b>Function 78</b>    | Temporized deactivation                                                                                                                                                                                           |
|                       | Measurement accuracy: $\pm 1^\circ$ or 10% (greater of both)                                                                                                                                                      |

|                        |                                                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Function 25 (*)</b> | Dead tap: 0.04 to 2.00 xUn (step 0.01xUn)                                                           |
|                        | Live tap: 0.04 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)                                            |
| <b>Function 79</b>     | Synchro check time: 0.020 to 300.000 s (step 0.001 s)                                               |
|                        | Number of recloses: 0 to 4 (step 1)                                                                 |
|                        | Reclose times 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 0.001 s)                                                      |
| <b>Function SCM</b>    | Safe time: 0.020 to 2000.000 s (step 0.001 s)                                                       |
|                        | Locking possibilities: pulse inputs, level inputs, commands.                                        |
| <b>Function SZM</b>    | Number of shots: 0 to 4 (step 1)                                                                    |
|                        | Reset time: 0.020 to 2000.000 s (step 0.001 s)                                                      |
|                        | Max open time: 0.020 to 2000.000 s (step 0.001 s)                                                   |
|                        | Max close time: 0.020 to 2000.000 s (step 0.001 s)                                                  |
|                        | Fault current: 0.010 to 20.000 s (step 0.001 xIn)                                                   |
|                        | Voltage supervision time: 0.000 to 300.000 s (step 0.001 s)                                         |
| <b>Function 52</b>     | Dead tap: 0.04 to 2.00 xUn (step 0.01 xUn)                                                          |
|                        | Maximum number of openings: 1 to 100,000 (step 1)                                                   |
|                        | Maximum accumulated amperes: 1 to 100,000 M(A2) (step 1)                                            |
|                        | Repetitive number of openings: 1 to 100,000 (step 1)                                                |
|                        | Time for repetitive number of openings: 1 to 300 min (step 1 min)                                   |
|                        | Maximum opening time: 0.020 to 300.000 s (step 0.001 s)                                             |
| <b>Function 74TCS</b>  | 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) |
| <b>Function 60CTS</b>  | Using contacts: 52a or 52b and 52a and 52b                                                          |
|                        | Function enable: No/Yes                                                                             |
|                        | Time delay: 0.020 to 300.000 s (step 0.001 s)                                                       |
| <b>Function 60CTS</b>  | Continuity in circuits A and B through configurable inputs                                          |
|                        | 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)                                       |
| <b>Function 60CTS</b>  | Open breaker activation and reset threshold: 0.8% In                                                |
|                        | Detection of the loss of one phase CT                                                               |

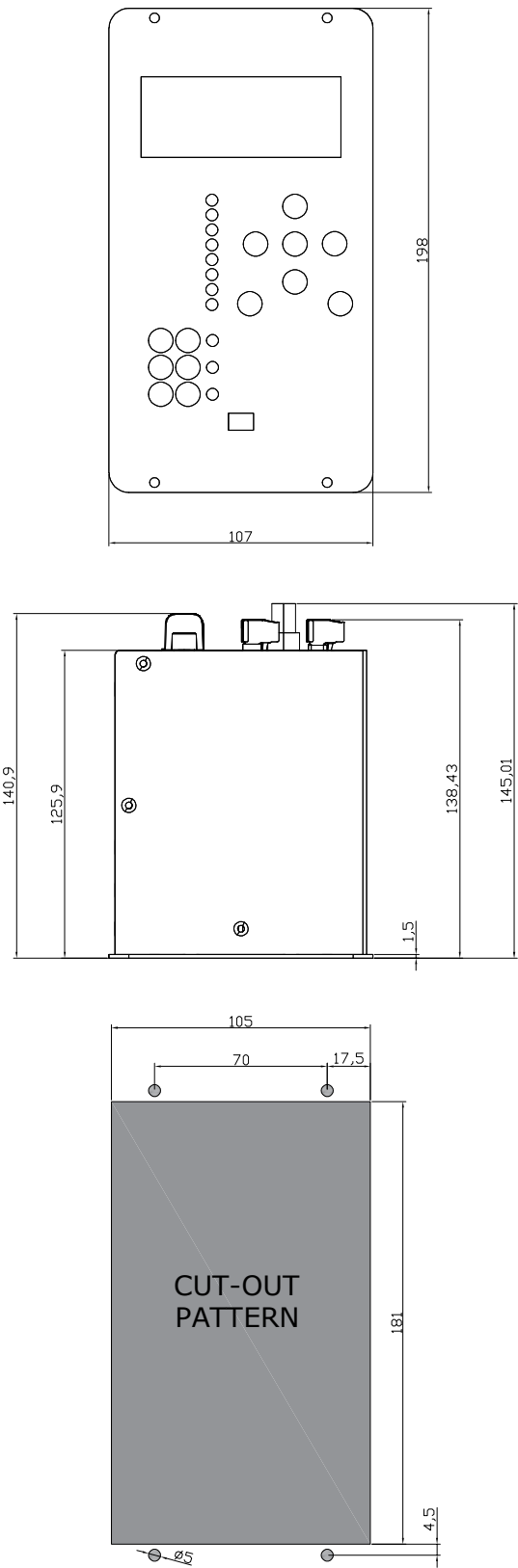
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|                               |                                                                        |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------|------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Function 60VSS</b>         | Function enable: No/Yes                                                | <b>Power Flow <sup>(1)</sup></b>              | Function enable: No/Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                               | Time delay: 0.020 to 300.000 s (step 0.001 s)                          |                                               | Settings Group: 1-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                               | V1, V2 and VP Tap: 0.04 to 2.00 xUn (step 0.001xUn)                    |                                               | Interval Time: 0.02 to 300 s (step 0.001)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | I1, I2 and 3I0 Tap: 0.010 to 20.000 xIn (step 0.001xIn)                |                                               | Power Flow Direction: ABC to RST or RST to ABC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Function 50BF</b>          | Timing accuracy: $\pm 30$ ms or $\pm 0.5\%$ (greater of both)          | <b>Function 86</b>                            | It allows to latch (lockout) the contact trip due to programmable logic (PGC: RSFF or SRFF).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                               | Function enable: No/Yes                                                | <b>Function 68</b>                            | Available through configurable inputs and outputs thanks to the programmable logic (PGC).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | Time delay: 0.020 to 1.000 s (step 0.001 s)                            | <b>Function Phase Rotation <sup>(2)</sup></b> | Available by selecting "phase rotation" and "CT polarity" settings in general settings menu.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Function 21FL</b>          | Open breaker activation and reset threshold: 0.8% In                   | <b>Programmable logic control (PGC)</b>       | OR, OR_1PULSE, OR_PULSES, OR_BLINKING, OR_TIMER UP, OR_TIMER DOWN<br>NOR, NOR_1PULSE, NOR_PULSES, NOR_BLINKING, NOR_TIMER UP, NOR_TIMER DOWN<br>AND, AND_1PULSE, AND_PULSES, AND_BLINKING, AND_TIMER UP, AND_TIMER DOWN<br>NAND, NAND_1PULSE, NAND_PULSES, NAND_BLINKING, NAND_TIMER UP, NAND_TIMER DOWN<br>XOR, OR_1PULSE, XOR_PULSES, XOR_BLINKING, XOR_TIMER UP, XOR_TIMER DOWN<br>SRFF, SRFF_1PULSE, SRFF_PULSES, SRFF_BLINKING, SRFF_TIMER UP, SRFF_TIMER DOWN and NON-VOLATILE FF.<br>RSFF, RSFF_1PULSE, RSFF_PULSES, RSFF_BLINKING, RSFF_TIMER UP, RSFF_TIMER DOWN and NON-VOLATILE FF.<br>R_EDGE, R_EDGE_1PULSE<br>F_EDGE, F_EDGE_1PULSE |
|                               | Function enable: No/Yes                                                |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Line length 0.1 to 100.0 km (step 01 km)                               |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Z1 line magnitude: 0.001 to 5.000 (step 0.001 $\Omega$ /km)            |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Z1 line angle: 1 to 90° (step 1°)                                      |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>LMS (*) <sup>(1)</sup></b> | Z0 line magnitude: 0.001 to 5.000 (step 0.001 $\Omega$ /km)            | <b>Settings groups</b>                        | 6 settings groups                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                               | Z0 line angle: 1 to 90° (step 1°)                                      |                                               | Selectable by input, communications, user commands or general setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                               | Function enable: No/Yes                                                |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak Mode: Alarm/Trip                                               | <b>SER</b>                                    | 3072 events                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                               | Peak mode: Alarm/Trip                                                  | <b>Disturbance Fault Recording (DFR)</b>      | 32 samples/cycle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                               | Peak period starting month: January to December                        |                                               | 10 analog channels and 96 configurable digital channels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                               | Peak period starting day: 1 to 31 (step 1)                             |                                               | Configurable DFR start                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                               | Peak period ending month: January to December                          |                                               | Configurable number of records depending on the size:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                               | Peak period ending day: 1 to 31 (step 1)                               |                                               | 5 records in data and COMTRADE format (300 cycles each record): 1 to 8 pre-fault cycles + 292 to 299 postfault cycles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                               | Peak period starting hour: 0 to 23 (step 1 hour)                       |                                               | 25 records in data and COMTRADE format (60 cycles each record): 1 to 8 pre-fault cycles + 52 to 59 postfault cycles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                               | Peak period starting minute: 0 to 59 (step 1 minute)                   |                                               | 50 records in data and COMTRADE format (30 cycles each record): 1 to 8 pre-fault cycles + 22 to 29 postfault cycles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                               | Peak period ending hour: 0 to 23 (step 1 hour)                         |                                               | 100 records in data and COMTRADE format (15 cycles each record): 1 to 8 pre-fault cycles + 7 to 14 postfault cycles.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                               | Peak period ending minute: 0 to 59 (step 1 minute)                     |                                               | COMTRADE IEEE C37.111-1991                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                               | Peak period starting day of week: Monday to Sunday                     |                                               | Up to 100 fault reports (data format) with 29 events each one                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                               | Peak period ending day of week: Monday to Sunday                       | <b>Load Data Profiling (LDP)</b>              | Demand of power with the following characteristics:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                               | Reset Time: 0 to 18000 s (step 1 s)                                    |                                               | - Number of records: 2160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | Peak period Tap: 0.010 to 30.000 xIn (step 0.001xIn)                   |                                               | - Circular recording mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                               | Peak trip Time 1: 0 to 18000 s (step 1 s)                              |                                               | - Sampling rate (interval): configurable through communications (1-60 min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                               | Peak trip Time 2: 0 to 18000 s (step 1 s)                              |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak trip Time 3: 0 to 18000 s (step 1 s)                              |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak trip Time 4+: 0 to 18000 s (step 1 s)                             |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak Number of recloses: 0 to 247 (Step 1)                             |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak Interval Time 1: 0 to 18000 s (Step 1 s)                          |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak Interval Time 2: 0 to 18000 s (Step 1 s)                          |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak Interval Time 3: 0 to 18000 s (Step 1 s)                          |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak Interval Time 4+: 0 to 18000 s (Step 1 s)                         |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak period Tap: 0.010 to 30.000 xIn (step 0.001xIn)                |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak trip Time 1: 0 to 18000 s (step 1 s)                           |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak trip Time 2: 0 to 18000 s (step 1 s)                           |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak trip Time 3: 0 to 18000 s (step 1 s)                           |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | Peak trip Time 4+: 0 to 18000 s (step 1 s)                             |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak Number of recloses: 0 to 247 (Step 1)                          |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak Interval Time 1: 0 to 18000 s (Step 1 s)                       |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak Interval Time 2: 0 to 18000 s (Step 1 s)                       |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak Interval Time 3: 0 to 18000 s (Step 1 s)                       |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | No Peak Interval Time 4+: 0 to 18000 s (Step 1 s)                      |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Power supply control</b>   | Function enable: No/Yes                                                |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | V supply alarm 1: 19 to 220 Vdc (step 1 V)                             |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                               | V supply alarm 2: 19 to 220 Vdc (step 1 V)                             |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Function 49T</b>           | Available through configurable inputs thanks to the programmable logic |                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



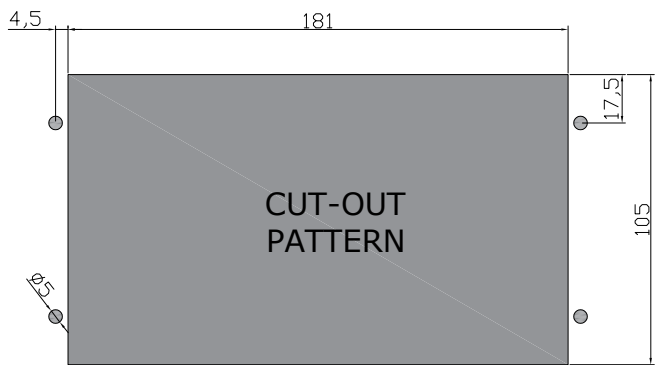
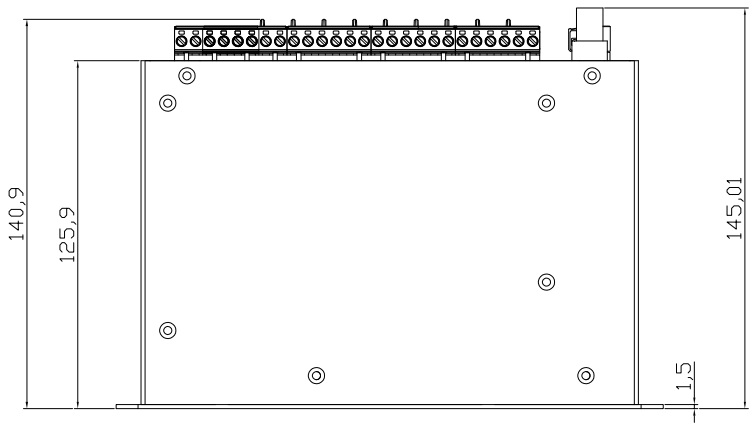
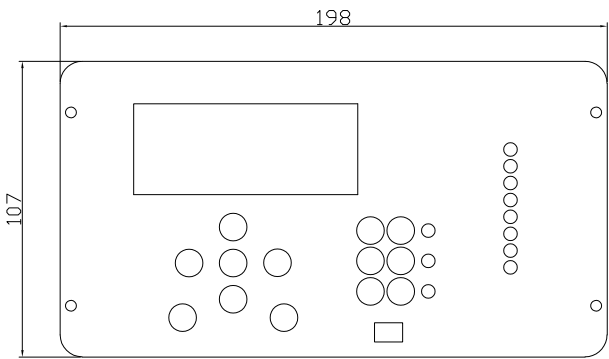
DIMENSIONES Y CORTE DE CHAPA SIR-C

Montaje vertical



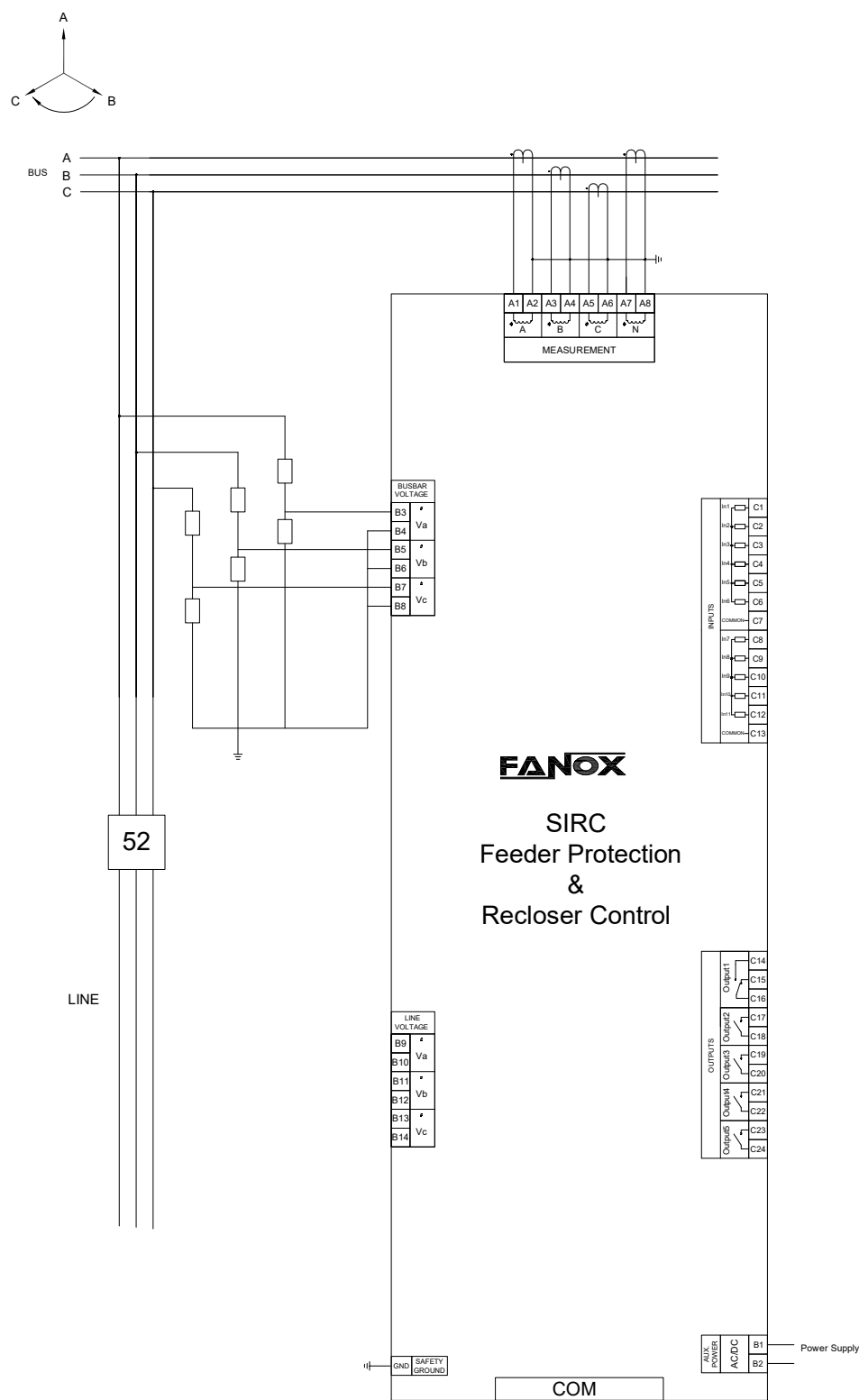
# DIMENSIONES Y CORTE DE CHAPA SIR-C

Montaje horizontal



DIAGRAMAS DE CONEXIONES SIR-C

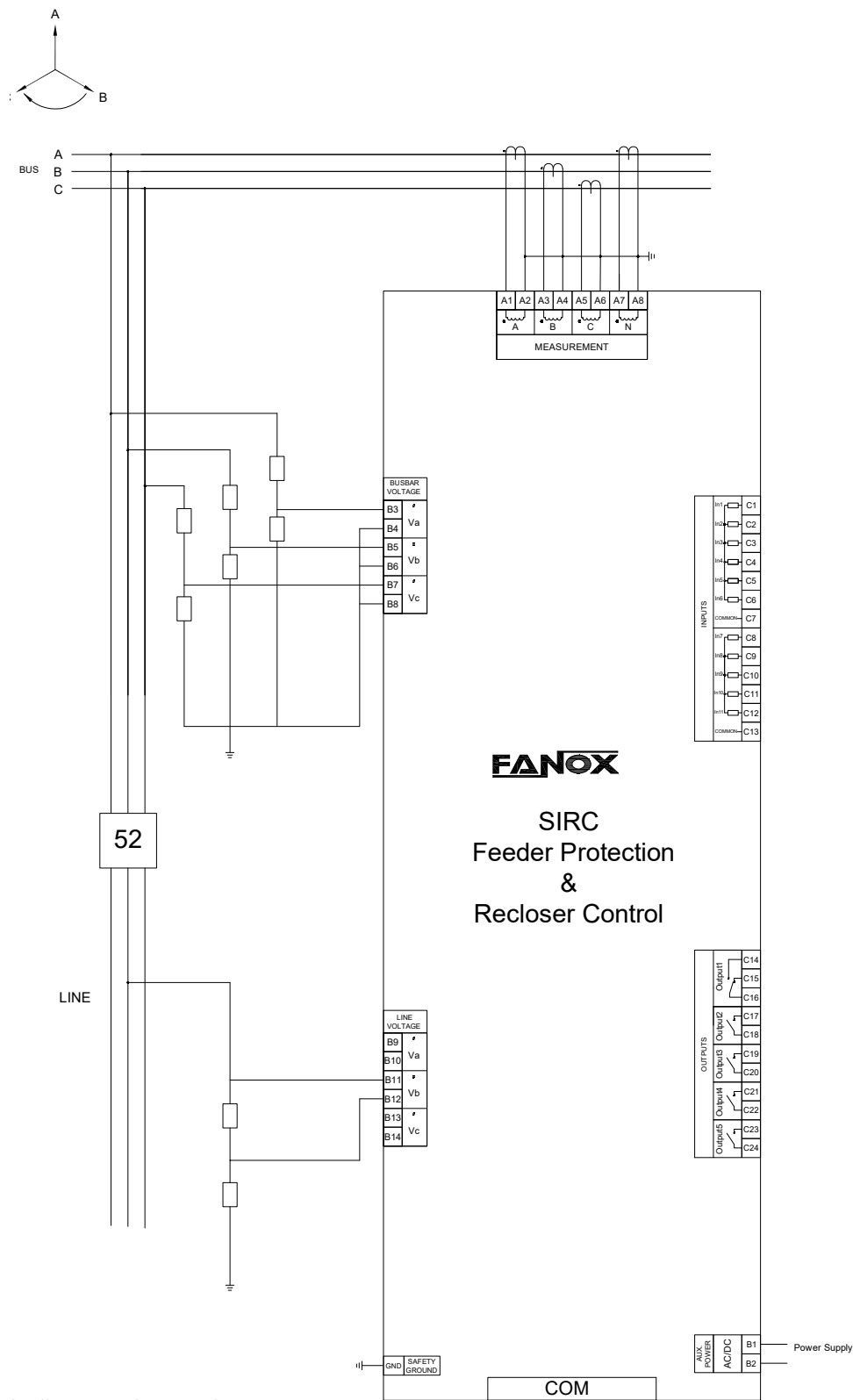
3 sensores resistivos + 4 transformadores de corriente



(\*) Ejemplo de diagrama de conexiones

# DIAGRAMAS DE CONEXIONES SIR-C

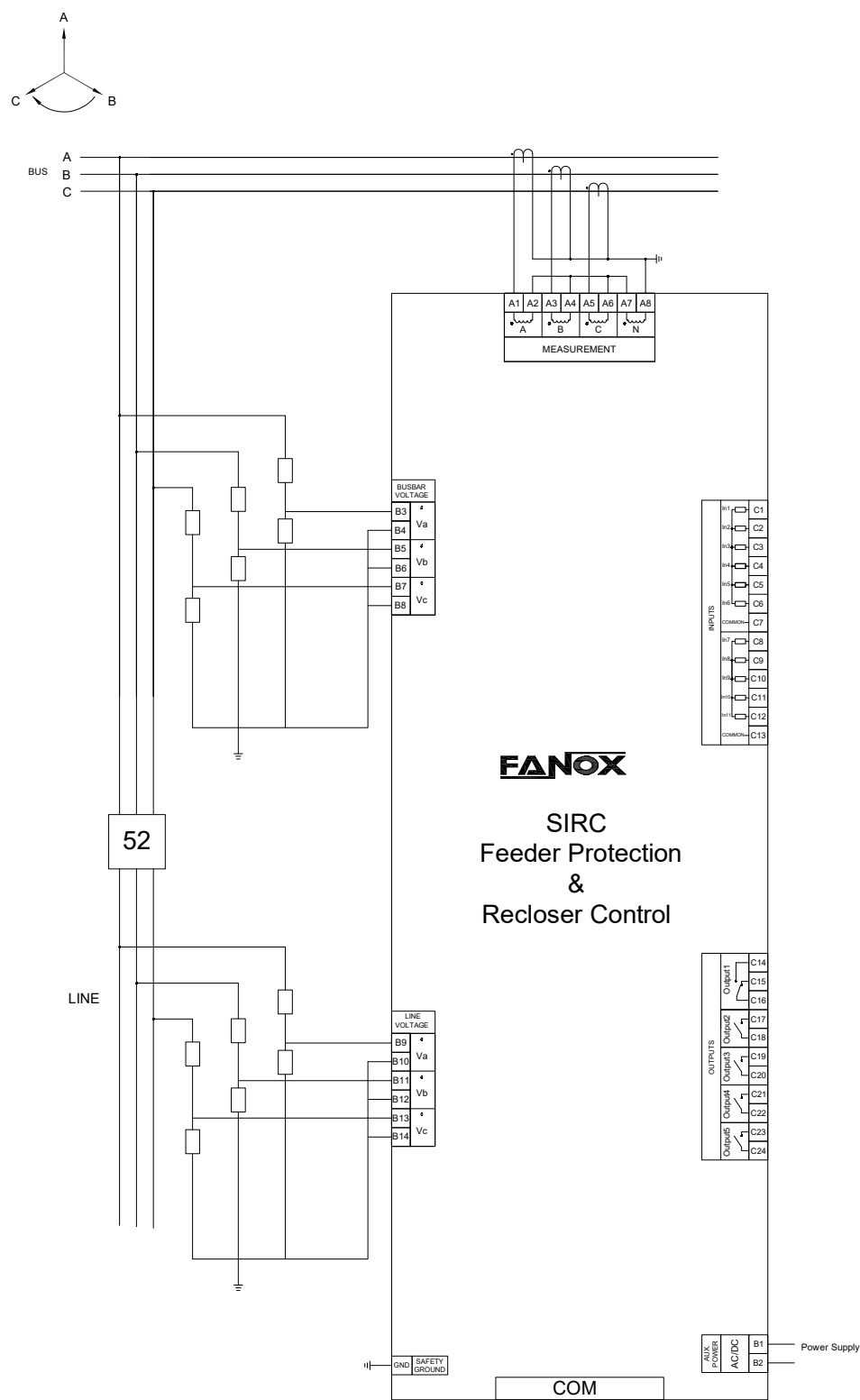
4 sensores resistivos + 4 transformadores de corriente



(\*) Ejemplo de diagrama de conexiones

# DIAGRAMA DE CONEXIONES SIR-C

6 sensores resistivos + 3 transformadores de corriente



(\*) Ejemplo de diagrama de conexiones

## SELECCIÓN Y CÓDIGOS DE PEDIDO SIR-C

### SIR-C

#### Control de reenganchador y protección de alimentador

|   |        |                  |   |                                 |                                                                              |        |                  |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|--------|------------------|---|---------------------------------|------------------------------------------------------------------------------|--------|------------------|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 or 0,1 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|   |        | 1<br>2<br>3<br>4 |   |                                 |                                                                              |        |                  |  |  |  | MEDIDA DE TENSIÓN<br>LEA de 8 Vrms máximo, 1 MOhm<br>LEA de 5.2 Vrms máximo, 2 MOhms<br>LEA de 16 Vrms máximo, 2 MOhms<br>LEA de 2.8 Vrms máximo, 20 MOhms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|   |        |                  | C |                                 |                                                                              |        |                  |  |  |  | ALIMENTACIÓN<br>24-220 Vcc / 100-230Vca                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|   |        |                  |   | 0<br>1<br>2<br>3<br>4<br>5<br>6 |                                                                              |        |                  |  |  |  | FUNCIONES ADICIONALES<br>+ (1) 50 + (3) 67/51<br>+ (1) 50 + (3) 67/51 + LMS<br>+ (1) 50 + (3) 67/51 + 25 + 27-L + 59-L + 47-L + 27V1-L + 59N-L<br>+ 50[79] + 67[79]<br>+ 50[79] + 67[79] + 25 + 27-L + 59-L + 47-L + 27V1-L + 59N-L<br>+ (1) 50 + (3) 67/51 + 50INC (21FL) <sup>3</sup><br>+ (1) 50 + (3) 67/51 + 50INC (21FL) <sup>3</sup> + LMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|   |        |                  |   |                                 | A<br>B<br>2<br>E<br>F<br>G<br>3<br>J<br>M<br>N<br>O<br>P<br>Q<br>R<br>U<br>V |        |                  |  |  |  | COMUNICACIONES<br><br>A: 1xUSB + 1xRS485<br><br>B: 1xUSB + 1xRS485 + 1xRJ45 + IRIG-B<br><br>2: 1xUSB + 1xRS485 + 1xRJ45 + HSR/PRP RJ45 + IRIG-B<br><br>E: 1xUSB + 1xRS485 + 1xRJ45 + HSR/PRP SFP Cage + IRIG-B<br><br>F: 1xUSB + 1xRS485/RS232* + 1xRJ45 + IRIG-B (*)<br><br>G: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + IRIG-B<br><br>3: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + HSR/PRP RJ45 + IRIG-B<br><br>J: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + HSR/PRP SFP Cage + IRIG-B<br><br>M: 1xUSB + 1xRS485 + 2xRJ45 + IRIG-B<br><br>N: 1xUSB + WiFi + 1xRS485 + 2xRJ45 + IRIG-B<br><br>O: 1xUSB + 1xRS485 + 1xRJ45 + IRIG-B<br><br>P: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + IRIG-B<br><br>Q: 1xUSB + 1xRS485 + 1xFO-LC + IRIG-B<br><br>R: 1xUSB + WiFi + 1xRS485 + 1xFO-LC + IRIG-B<br><br>U: 1xUSB + 1xRS485 + 1xRJ45 + 1xSFP Cage + IRIG-B<br><br>V: 1xUSB + WiFi + 1xRS485 + 1xRJ45 + 1xSFP Cage + IRIG-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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## SELECCIÓN Y CÓDIGOS DE PEDIDO SIR-C

|  |  |  |  |  |  |  |  |  |             |   |  |                                                                                                                                                                                                                                                                                                                                                                                                 |
|--|--|--|--|--|--|--|--|--|-------------|---|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  |  |  |  |  |  |  |  | A<br>E<br>F |   |  | <b>IDIOMA</b><br>Inglés, Español, Alemán y Francés<br>Inglés, Español, Turco y Ruso<br>Inglés, Español, Alemán y Portugues                                                                                                                                                                                                                                                                      |
|  |  |  |  |  |  |  |  |  |             | B |  | <b>REVISIÓN</b><br>Funciones por defecto: (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 + 47 + (4) 32 + (6) 81U/O + (2) 81R + 78 + 79 + 74TCS + 60CTS + 60VSS + 50BF + SHB + CLP + 52 + 86 + SCM+ SZM + HLT+ 21FL <sup>3</sup> + Power Supply Control + Power Flow + Rotación de fases |

## Ejemplo de código de pedido:

|       |   |   |   |   |   |   |   |   |   |                           |
|-------|---|---|---|---|---|---|---|---|---|---------------------------|
| 0     | 0 | 2 | C | 0 | A | 0 | C | A | B | SIR C 0 0 2 C 0 A 0 C A B |
| SIR-C |   |   |   |   |   |   |   |   |   |                           |

| PUERTOS  | PROTOCOLOS                                                                                           |                                                                                                                                       |
|----------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| USB      | Modbus RTU                                                                                           |                                                                                                                                       |
| WiFi     | Modbus TCP                                                                                           |                                                                                                                                       |
| RS485    | Modbus RTU, IEC60870-5-103 o DNP3.0 Serial                                                           |                                                                                                                                       |
| FO-LC    | Modbus TCP, DNP3.0 TCP, IEC60870-5-104 o IEC61850 + Protocolo SNTP                                   |                                                                                                                                       |
| SFP Cage | Modbus TCP, DNP3.0 TCP, IEC60870-5-104 or IEC61850 + Protocolo SNTP                                  |                                                                                                                                       |
| RJ45     | Dígitos de comunicaciones B y G<br><br>RJ45: Modbus TCP, DNP3.0 TCP o IEC60870-5-104 + SNTP Protocol | Dígitos de comunicaciones 2, E, 3, J, M, N, O, P, U, V<br><br>RJ45: Modbus TCP, DNP3.0 TCP, IEC60870-5-104 o IEC61850, Protocolo SNTP |

No todas las combinaciones son posibles. Consulte con Fanox el modelo seleccionado.

## NOTAS:

- » Las funciones ANSI 67, ANSI 67G y ANSI 67N pueden convertirse en ANSI 51, ANSI 51G y ANSI 51N respectivamente si el parámetro "Direccionalidad" se ajusta en NO.
- » Las funciones 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).
- » <sup>3</sup> Disponible a partir de la versión de firmware 1.21.00
- » Para los dígitos de comunicaciones E, J, U y V, los transceptores SFP serán instalados por el usuario y deberán cumplir las siguientes especificaciones:
  - Alimentación: 3.3 V.
  - Velocidad: 100BASE-FX, Fast Ethernet.
  - El módulo SFP debe ser compatible con SerDes.