SIEMENS

CATALOG EDITION 2

Overcurrent Protection Device

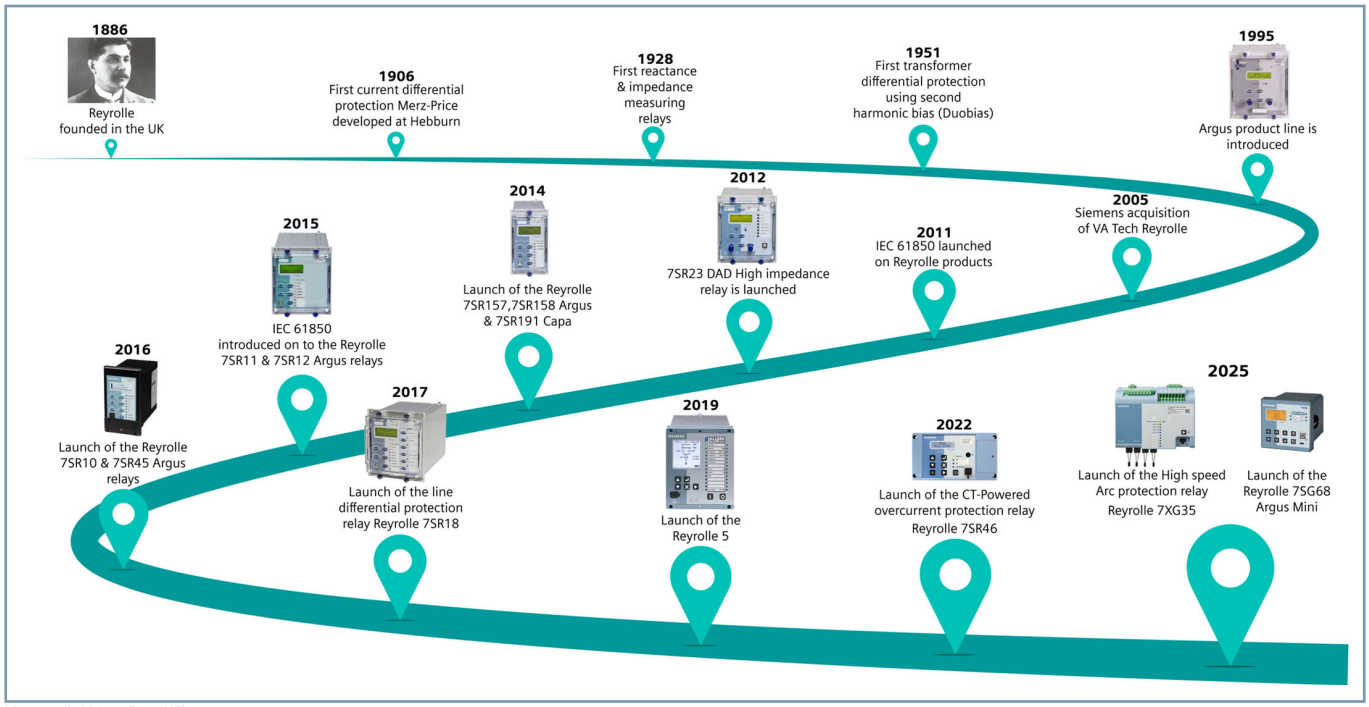
Reyrolle 7SG68

Protecting Grids With Confidence

Reyrolle 7SG68 Argus Mini Catalog Protection, Control, & Automation

Reyrolle 7SG68 - Catalog Edition 2

Reyrolle – Solutions for Distribution Grids



[dw_reyrolle history, 5, en_US]

Figure 1/1 History of Reyrolle

Reyrolle has been synonymous with electrical protection devices in the sectors of sub-transmission, distribution, and industrial applications for decades. Historically, Reyrolle relays were sold mainly in traditional markets but are now sold worldwide as part of the Siemens protection network.

Since its foundation, Reyrolle has been an innovation driver in product development – based on a strong focus on market, customer and technology. Worldwide established brand names such as "Solkor" and "Argus" demonstrate this. But there is more: A wide range of Reyrolle products has determined technological firsts in the market.

The comprehensive range of Reyrolle products provides the total protection requirements of distribution markets – ranging from overcurrent protection via transformer protection and voltage control to a full spectrum of auxiliary and trip relays. The portfolio includes many famous products such as "Argus", "Duobias", "Solkor", "Rho", etc.

To serve specific needs in industrial applications, a range of proven products such as "Argus overcurrent", "Solkor line differential" and "Rho motor protection devices" is offered.

Through successive generations, Reyrolle numerical products have been developed to increase value to system operators. This increase in value is the result of consistent development:

- Ease-of-use as a principle – our withdrawable product solutions allow flexible, easy operation through high user friendliness.
- One size fits all – the 4U housing height and the latest generation of numerical products features 1 A/5 A CT Input, and some models are provided with universal DC power supplies.
- Learn once, know all – the new product generation provides a similar look and feel as earlier products. If Reyrolle numerical devices have been previously used, there is a high consistency in both programming and interrogation.
- With Reydisp Manager and Reydisp Evolution, a free comprehensive software support toolkit for relay setting, fault interrogation and general system information is provided.

The 7SR5 is the latest generation of 7SR devices providing an updated user interface linking to the latest hardware platform and software implementation. The hardware platform offers a flexible solution relevant to changing power grids and load flows. The 7SR5 builds on the proven performance of the existing 7SR1 and 7SR2 products, the function implementation and user interface are instantly recognizable to users of previous generation products, but have also been updated and enhanced. The 7SG68 Argus mini follows this long tradition, to provide our base overcurrent devices benefitting from bluetooth technology for easy parameterization via a mobile application.

Description

The Reyrolle 7SG68 Argus Mini overcurrent and earth fault protection device includes a range of protection functions designed for applications including for high-voltage power distribution systems with different grounding methods and 400 V low-voltage power distribution systems. It also provides control, measurement, and monitoring functions.

The 4 current inputs supports 50/60 Hz and 1/5 A.

An option is available to order 3 voltage inputs on the device which can be connected to a voltage transformer for measuring high-voltage busbars, and can directly measure 400 V systems. The voltage is used for voltage protection and metering function.

In addition to the standard protection functions the device can be ordered to support arc flash protection function based on current jump and light criteria with a trip time of approximately 10 ms. Innovative ARC point sensor, three-stage adjustable sensitivity, can be used in parallel to expand the arc detection range or achieve redundant configuration. The pure optic ARC line sensor is easy to install and has high reliability. The arc protection function can automatically identify sensor abnormalities, issue alarms, and lock abnormal sensors.

A solution is also available for wireless temperature monitoring. This can monitor the temperature of the circuit breaker, busbars and cable joints in real time.

Users can choose a transparent plastic protective cover to prevent unauthorized personnel from modifying the settings. The buttons on the fascia allow operation and maintenance personnel to read real-time current values, trip log, and alarm information.

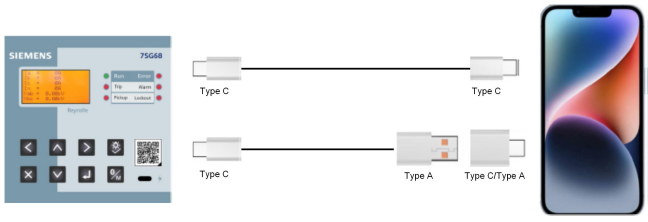
The device complies with Siemens green product design standards.

Inputs and outputs	Binary inputs – 8 + TCS input Binary outputs – 4 Arc flash line sensor inputs (AFD) – 0 or 1 Arc flash point sensor inputs (AFD) – 0 or 8 High speed binary outputs (HSBO) – 0 or 1 Current inputs – 4 Voltage inputs – 0 or 3
Communication	Front USB port, RS485 (IEC 60870-5-103 and Modbus), BLE (Bluetooth Low Energy for app configuration)
Housing	115 x 115 x 115 mm
Display	Backlit 128 x 64 LCD display

Benefits

- All inputs and outputs are user configurable
- The debounce time for each input can be independently set
- Integrated arc protection and wireless temperature measurement function
- Configure using a smartphone
- Front USB Type C port supports mobile phone power supply commissioning mode

- Fully maintenance free and training free design
- Lightweight and environmentally friendly design



Functions

Standard Functionality

- 46 Negative sequence overcurrent protection
- 46BC Broken conductor detection
- 50 Overcurrent – phase
- 50OL Overload current protection – phase
- 50BF Circuit-breaker failure protection – 3-pole
- 50N Earth fault – measured/calculated
- 50GI Intermittent earth fault
- 50HS High speed overcurrent – phase
- 50SOTF Switch onto fault
- 51 Time delayed overcurrent – phase
- 51CL Cold load overcurrent – phase
- 51N Time delayed earth fault – measured/calculated
- 52 Circuit-breaker control
- 59 Overvoltage protection – 3-phase
- 74TC Trip-circuit supervision
- 79 Automatic reclosing (3 shots)
- 81HB2 Inrush current detection block 50/51
- 86 Lockout

2.1

Additional Functionality

- 27 Undervoltage protection – 3 phase
- 49TS Temperature sensor supervision
- 50AFD Arc flash detection (point sensor)
- 50AFD Arc flash detection (line sensor)
- 59N Neutral voltage displacement

Measurement and Monitoring Functions

- Run measurement values U, I, P, Q, S, cosϕ, f---
- Energy metering kWh, kvarh
- Trip-circuit supervision
- Statistics of circuit breaker operation times
- Statistics of device operation days
- Temperature

Applications

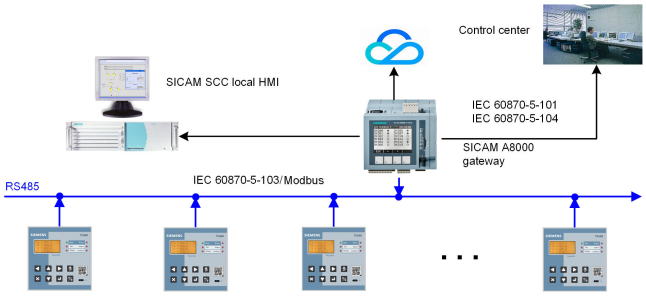
- Overcurrent and earth fault protection for medium voltage substations
- Backup protection for other main protection devices e.g. on lines, transformers, generators, motors, and busbars
- Arc flash protection
- Temperature monitoring

Data Security

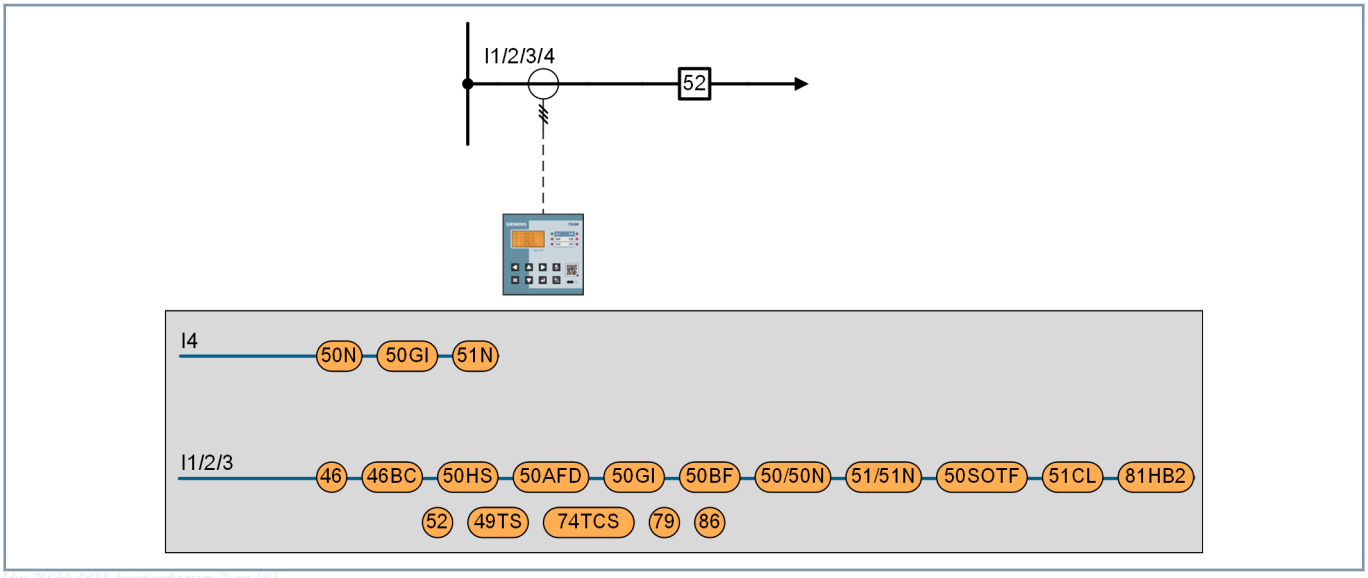
- Firmware digital signature
- Password hash password
- Security log

Communication

- IEC 60870-5-103, Modbus RTU, BLE

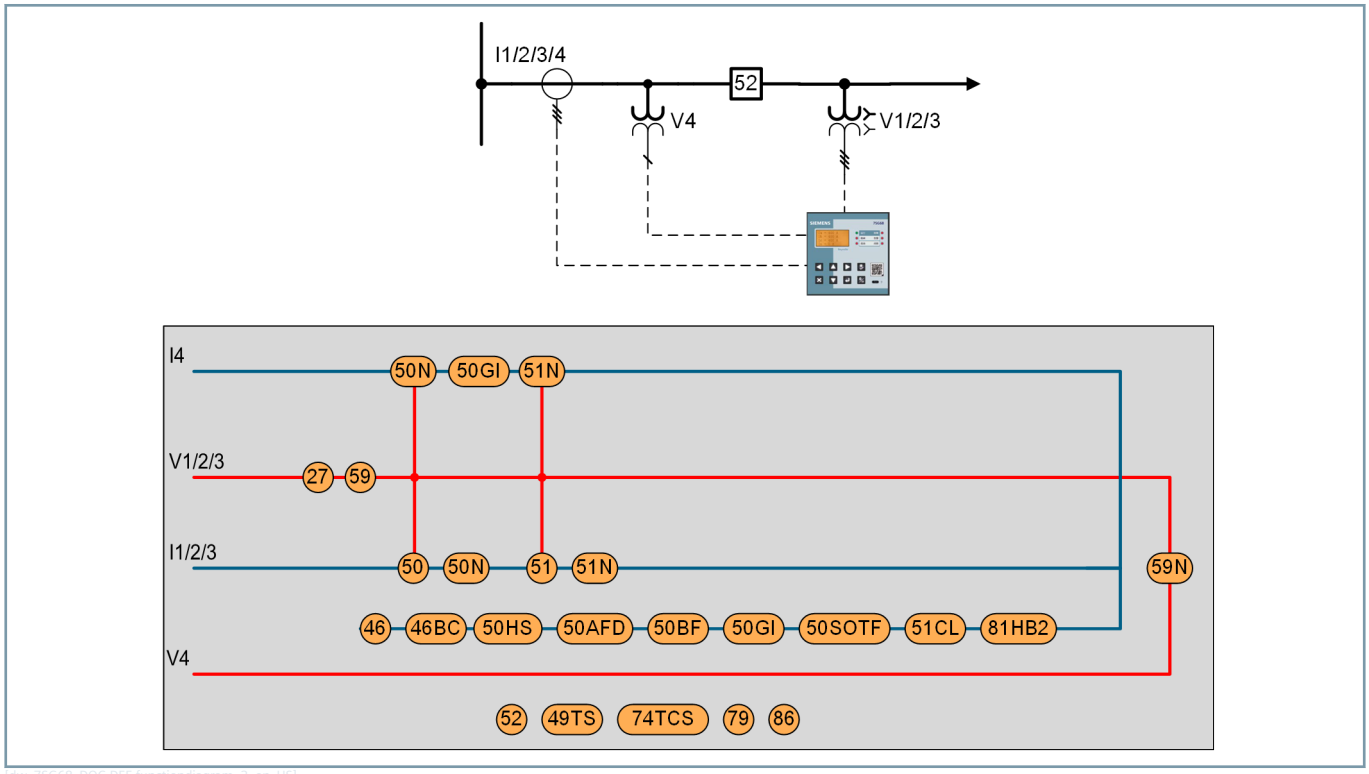


Application Templates



[dw_7SG68_OCEF_functiondiagram, 2, en_US]

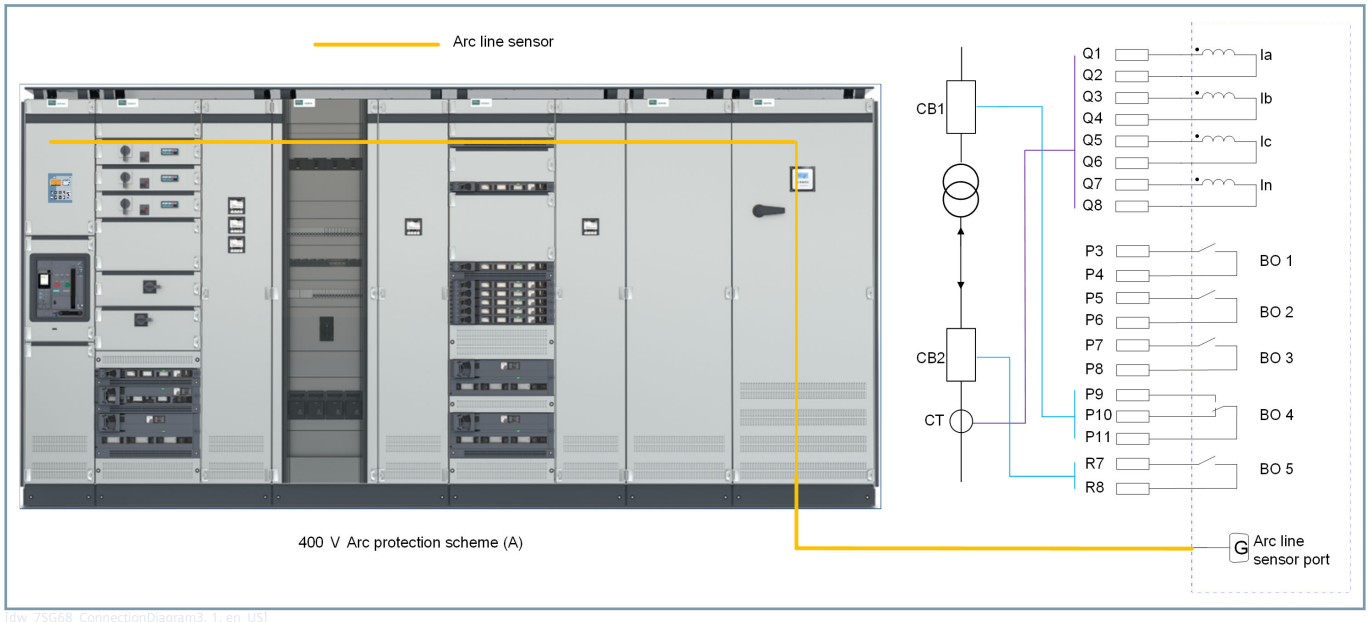
Figure 2.1/1 Function Diagram: Reyrolle 7SG68 Basic Device



[dw_7SG68_DOC-DEF functiondiagram, 2, en_US]

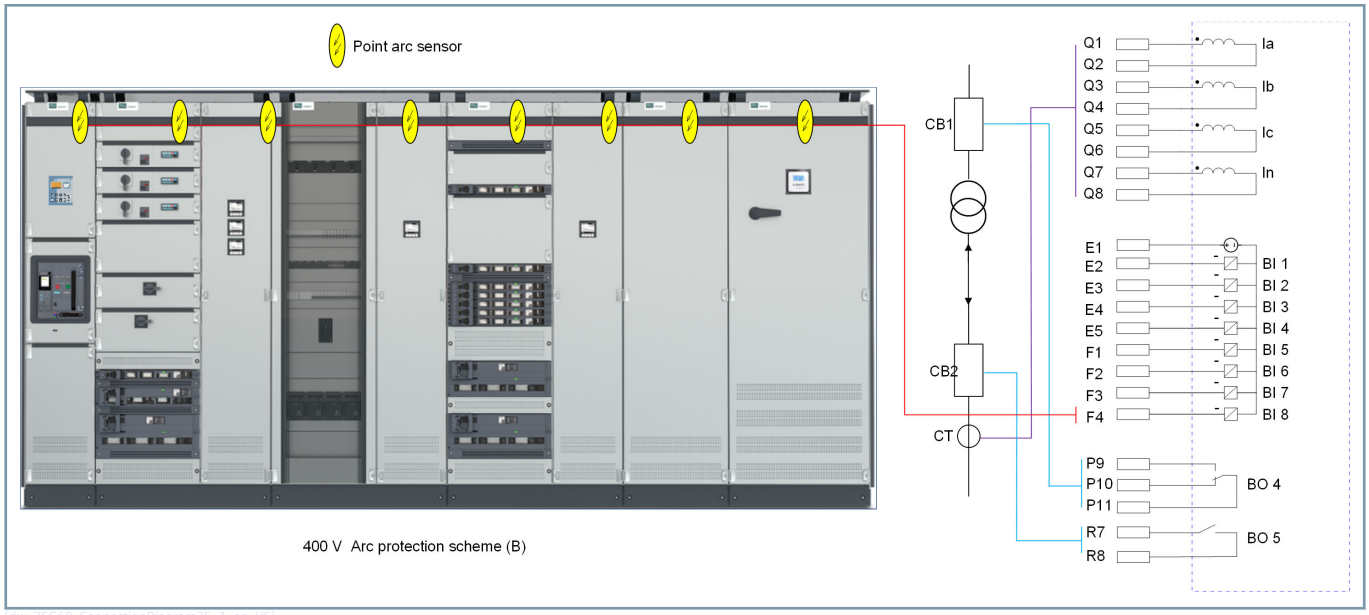
Figure 2.1/2 Function Diagram: Reyrolle 7SG68 with Additional VT Inputs

Arc flash protection is supported with an option for a single optical line sensor which can be placed along the switchgear for a single zone application as shown in *Figure 2.1/1* or with up to 8 electronic ARC zones with multiple point sensors per zone with electrical connections which can be located in the required locations as shown in *Figure 2.1/2*.



[dw_7SG68_ConnectionDiagram3, 1, en_US]

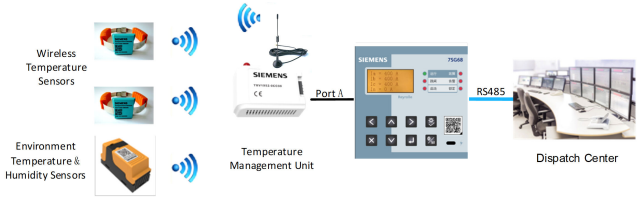
Figure 2.1/3 400 V Arc Protection Scheme (A)



[dw_7SG68_ConnectionDiagram25, 1, en_US]

Figure 2.1/4 400 V Arc Protection Scheme (B)

An ordering option is also provided to allow connection to 60 wireless temperature sensors and 2 temperature and humidity sensors, to monitor the real-time temperature of the busbar, upper and lower contact arms, and cable connections. By setting an over temperature threshold, an alarm signal can be issued. The temperature value is transmitted to the SCADA system through a communication protocol and can also be read on the device's LCD screen.



The user friendly HMI provides an LCD screen in multi-language that can be switched online, and allows users to modify the protection parameters setting from the intuitive menu structure using the 6 navigation keys. LED warning lights and indications are also provided on the fascia.

Functions, Application Templates

ANSI	Functions (MLFB Code Position 14)	A	B	C	J	K
27	Undervoltage protection – 3-phase	–	■	–	■	■
46	Negative sequence overcurrent protection	■	■	■	■	■
46BC	Broken conductor detection	■	■	■	■	■
49TS	Temperature sensor supervision	–	–	■	■	■
50	Overcurrent – phase	■	■	■	■	■
50OL	Overload current protection – phase	■	■	■	■	■
50AFD	Arc flash detection (point sensor)	–	–	–	■	■
50AFD	Arc flash detection (line sensor)	–	–	–	–	■
50BF	Circuit-breaker failure protection – 3-pole	■	■	■	■	■
50N	Earth fault – measured /calculated	■	■	■	■	■
50GI	Intermittent earth fault	■	■	■	■	■
50HS	High speed overcurrent – phase	■	■	■	■	■
50SOTF	Switch onto fault	■	■	■	■	■
51	Time-delayed overcurrent – phase	■	■	■	■	■
51CL	Cold load overcurrent – phase	■	■	■	■	■
51N	Time-delayed earth fault – measured/calculated	■	■	■	■	■
52	Circuit-breaker control	■	■	■	■	■
59	Overvoltage protection – 3-phase	–	■	–	■	■
59N	Neutral voltage displacement	–	■	–	■	■
74TC	Trip-circuit supervision	■	■	■	■	■
79	Automatic reclosing (3 shots)	■	■	■	■	■
81HB2	Inrush current detection block 50/51	■	■	■	■	■
86	Lockout	■	■	■	■	■
	Measured values	■	■	■	■	■
	Switching-statistic counters	■	■	■	■	■
	External trip initiation	■	■	■	■	■
	Control	■	■	■	■	■
	Fault recording of analog and binary signals	■	■	■	■	■
	System log 200	■	■	■	■	■
	Trip log 20	■	■	■	■	■
	Fault record 5	■	■	■	■	■
	Event log 500	■	■	■	■	■
	Security log 2048	■	■	■	■	■
	Monitoring and supervision	■	■	■	■	■
	Setting groups 4	■	■	■	■	■
	Changeover of setting group	■	■	■	■	■
	Binary inputs (max)	8	8	8	8	8
	Binary outputs (max) incl. healthy contact	4	4	4	4	4
	Arc flash line sensor inputs (AFD)	0	0	0	0	1
	Arc flash point sensor inputs (AFD)	0	0	0	8	8
	High speed binary outputs (HSBO)	0	0	0	1	1
	Current inputs	4	4	4	4	4
	Voltage inputs	0	3	0	3	3
	Size	115 x 115 x 115 mm				
	LCD	128 x 64 2"				
	Push buttons	8				
	LEDs	6				
	Power supply unit rated voltages	DC 24 to 220 V AC 24 to 220 V				
	Front protective cover	Order option				
	User selectable languages: English, Spanish, Turkish, Chinese	■	■	■	■	■

2.1

ANSI	Functions (MLFB Code Position 14)	A	B	C	J	K
	IEC 60870-5-103	■	■	■	■	■
	Modbus RTU	■	■	■	■	■
	Time synchronization: Modbus RTU, IEC 60870-5-103	■	■	■	■	■
	Security FW signature, security hash password	■	■	■	■	■

Table 2.1/1 Reyrolle 7SG68 – Functions and Application Templates

NOTE

■ – Included in standard ordering code

Standard Variants

Standard Variants for Reyrolle 7SG68		
7SG6855-6AB11-0AA0	8 BI, 4 BO, 4 I	
	Housing width 115 x 115 x 115 mm 8 binary inputs 4 binary outputs (1 changeover, 3 make) 4 current transformer inputs Communication: 1 RS485 1 trip-circuit supervision interface	
7SG6855-6AB11-0BA0	8 BI, 4 BO, 4 I, 3 V	
	Housing width 115 x 115 x 115 mm 8 binary inputs 4 binary outputs (1 changeover, 3 make) 4 current transformer inputs 3 voltage transformer inputs Communication: 1 RS485 1 trip-circuit supervision interface	
7SG6855-6AB11-0CA0	8 BI, 4 BO, 4 I, 1 wireless temperature receiver port	
	Housing width 115 x 115 x 115 mm 8 binary inputs 4 binary outputs (1 changeover, 3 make) 4 current transformer inputs 1 wireless temperature receiver port Communication: 1 RS485 1 trip-circuit supervision interface	
7SG6855-6AB11-0JA0	8 BI, 4 BO, 4 I, 3 V, 1 HSBO,1 wireless temperature receiver port	
	Housing width 115 x 115 x 115 mm 8 binary inputs 4 binary outputs (1 changeover, 3 make) 4 current transformer inputs 3 voltage transformer inputs 1 high speed binary output for ARC 1 wireless temperature receiver port Communication: 1 RS485 1 trip-circuit supervision interface	

7SG6855-6AB11-0KA0	8 BI, 4 BO, 4 I, 3 V, 1 AFD, 1 HSBO, 1 wireless temperature receiver port	
	Housing width 115 x 115 x 115 mm 8 binary inputs 4 binary outputs (1 changeover, 3 make) 4 current transformer inputs 3 voltage transformer inputs 1 ARC line sensor interface 1 high speed binary output for ARC 1 wireless temperature receiver port Communication: 1 RS485 1 trip-circuit supervision interface	

Table 2.1/2 Standard Variants for Reyrolle 7SG68

The technical data of the devices can be found in the user manual.

27 Undervoltage protection – 3-phase

2 stages element has settings for voltage pickup, and definite time lag (DTL) operate delay, with the criterion being low voltage on one phase-phase voltage or low voltage on all three phase-phase voltage, and at the same time, you can choose whether to be locked by the circuit breaker position. Operation occurs where the voltage falls below setting for the duration of the DTL setting.

46 Negative-sequence overcurrent protection

NPS current elements can be used to detect unbalances on the system or remote earth faults when a delta-star transformer is in circuit.

2 elements, one DTL and one IDMT, with user settings for pickup level and delays, will operate if NPS current exceeds setting and delay.

46BC Broken conductor detection

Elements are used to detect transformer OLTC mechanism failures or broken phase conductors.

Each phase unbalance element has settings for pickup level and DTL delay – operating where 1 or 2 of the measured currents fall below the pick-up setting for a time exceeding the DTL setting.

49TS Temperature sensor supervision

The device can connect to 60 wireless temperature sensors and monitor the real-time temperature of the busbar, upper and lower contact arms, and cable connections. By setting an over temperature threshold, an alarm signal can be issued. The temperature value is transmitted to the SCADA system through a communication protocol and can also be read on the device's LCD screen.

50 Overcurrent – phase

The 3 phase currents are measured to provide instantaneous overcurrent protection.

Settings for pickup current operation are available for each independent time (50) element.

An operate time delay can also be applied.

50OL Overload current protection – phase

50AFD Arc flash detection

Arc detection is employed for the fast clearance of arcing faults on busbars, within metal clad switchgear and associated cable boxes.

The device supports electric ARC point sensors and 1 optic ARC line sensor (P1X series arc sensors). Based on current jump and light criteria, the trip time is approximately 10 ms.

50BF Circuit-breaker failure protection – 3-pole

Where a CB fails to open and current continues to flow then an alternative means of interrupting the current flow must be implemented. A CB fail output can be used to re-trip the CB or to trip adjacent CBs.

The circuit-breaker fail function can be initiated from an internal trip signal or from a binary input. Currents are monitored following trip initiation and outputs issued if any current is still flowing after elapse of a user selectable time delay.

50N Earth fault – measured/calculated

Earth current is directly measured from an independent CT or the residual connection of the 3 line CTs. Settings for pickup current operation are available for each independent time element.

50GI Intermittent earth fault

For identification of intermittent, self clearing earth faults by counting fault occurrences and integration of fault current pulse duration for use on compensated networks and cable systems.

50HS High speed overcurrent – phase

High speed overcurrent element for faster clearance of high current faults.

50SOTF Switch onto fault

SOTF functionality provides high speed tripping if a fault is still present on the feeder after the reclosure of the circuit-breaker (Close-on-to-Fault) or if earthing clamps are left connected after maintenance.

51 Time-delayed overcurrent – phase

The 3 phase currents are measured to provide time delayed overcurrent protection.

Settings for time delayed operation are available for each dependent time (51) element.

Dependent time elements (51) also have selectable IEC/ANSI operate and reset characteristics.

Minimum operating time and additional Follower DTL can also be configured for increased flexibility.

51CL Cold load overcurrent – phase

If a circuit-breaker is closed onto load that has not been powered for a prolonged period a higher than normal load-current can flow until the load stabilizes. To allow optimum setting levels to be applied during this period the cold load pickup feature applies alternative overcurrent settings for a limited time.

The overcurrent function reverts to normal in-service settings when either the circuit-breaker has been closed for a defined period, or the current has fallen below a set level for a defined period.

This function is achieved by automatically switching the Setting group.

51N Time-delayed earth fault – measured/calculated

Earth current is measured from an independent CT or the residual connection of the 3 line CTs, or calculated from the sum of the 3 phase CT inputs.

Settings for time-delayed operation are available for each dependent time element.

Dependent time elements also have selectable IEC/ANSI operate and reset characteristics.

59 Overvoltage protection – 3 phase

Each element has settings for voltage pickup, drop-off (hysteresis) and definite time lag (DTL) operate delay. Operation occurs where the voltage exceeds setting for the duration of the DTL setting.

59N Neutral voltage displacement

2 DTL elements, have user settings for pickup level and delays. These will operate if the neutral voltage exceeds the setting for duration of delay. Neutral overvoltage can be used to detect earth faults in high-impedance earthed or isolated systems.

74TC Trip-circuit supervision

The trip-circuit supervision can be monitored via independent interface. Trip-circuit failure raises an HMI alarm and output.

79 Automatic reclosing (3 shots)

Flexible, independent automatic reclosing sequences for phase and earth fault protection operations are provided. Up to 4 trips + 3 reclose operations can be attempted. Automatic reclosing sequences can be user set to any configuration of ***Instantaneous*** or ***Delayed*** protection trips or ***Blocke AR***, with independent reclose (Dead) times. Instantaneous/Delayed elements are user defined from the dependent and independent time elements available.

Zone sequence coordination to harmonize the automatic reclosure function of this device with that of another device that forms part of the same power system. It is a complementary function to the automatic reclosure program and allows, for example, to perform group reclosing operations in radial systems.

81HB2 Inrush current detection block 50/51

A high content of second harmonic current is an indication of transformer energization inrush current. Harmonic detectors are provided for feeder.

Where the measured second harmonic level is above the setting operation of the overcurrent protection is blocked by 81HB2.

86 Lockout

Output relays can be configured to self reset, pulsed or hand reset operation.

Output relays can be used to directly trip the circuit-breaker. The operate 'break' duty of output relays is limited so the circuit-breaker trip coil must be open circuited by a suitably rated contact, typically a circuit-breaker auxiliary switch.

Trip Log

The last 20 trip logs are displayed on the HMI, with time and date of trip, measured quantities and type of fault.

Waveform Records

The waveform recorder stores analogue data for all inputs and protection function states.

A waveform record can be triggered from a protection function pickup.

The latest 5 dynamic variable length fault recordings waveform can be stored. The ratio of pre-fault to post-fault storage is fixed 2 cycle.

Event Records

Up to 500 events are stored and time tagged to 1ms resolution.

Events can be displayed on the relay fascia.

Real-Time Clock

The time and date can be set and are maintained while the relay is de-energized by a back up storage capacitor. The time can be synchronized from data communication port using a selected protocol using Modbus or IEC103.

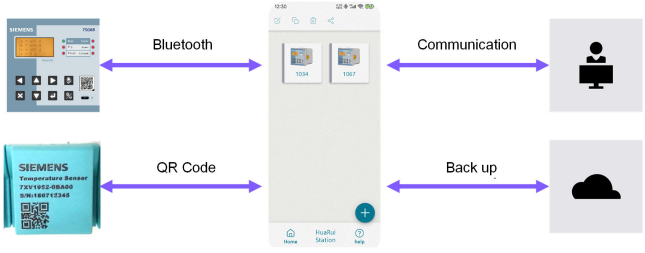
Security Log

The device produces a log of events related to the access control of the device. These events are categorized as either warnings or alarms and provide information about the time and date, access point and a description of the action.

Configuration Application

The "Protection Relay Manager" app, a configuration software based on Android and iOS smartphones, provides users with friendly and comprehensive configuration methods and a convenient fault diagnosis interface. Users can easily configure parameters on site, read fault records and trip logs, and analyze the causes of power system faults.

The mobile app supports device firmware upgrades and configuration cloud backup functions, combined with social app software, our after-sales service engineers can provide timely on-site guidance



Scanning the QR code on the front of the device can directly read the device's test report, samples, user manual, and download the configuration app.

Press the Bluetooth button and scan the QR code using the configuration app to complete Bluetooth pairing and connection.

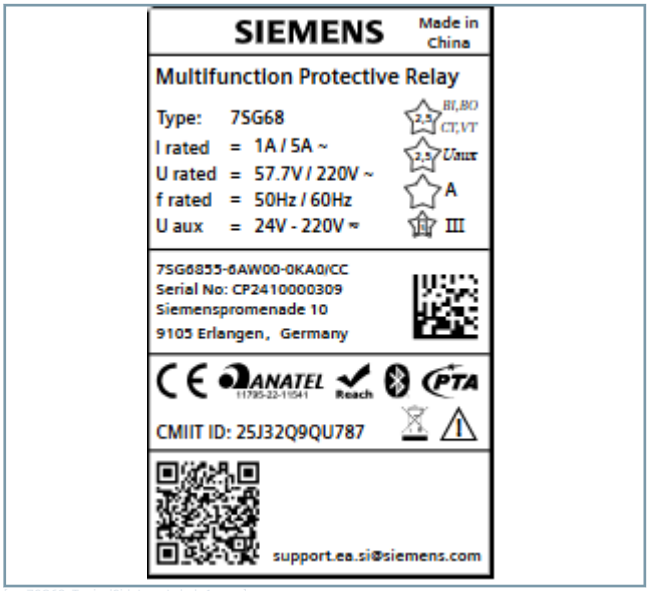
Hardware Construction

The product platform includes the following:

- Backlit 128x64 LCD with text display capabilities
- 8 x menu navigation buttons
- 6 LEDs
- Multi-language support capability

	QR code that can be scanned using a QR code reader application. This allows the device serial number to be quickly identified.
	AC 2.5 kV insulation test of reset coil, trip coil, and output contacts
	5 kV impulse voltage test (type test) in compliance with Class III
	Electrical Hazard
	European CE marking
	Refer to device documentation
	Waste Electrical and Electronic Equipment Directive (WEEE)
	Electrostatic Sensitive Devices warning

The device terminal labels display the MLFB code, serial number, relay description, terminal contact details, and safety symbols.

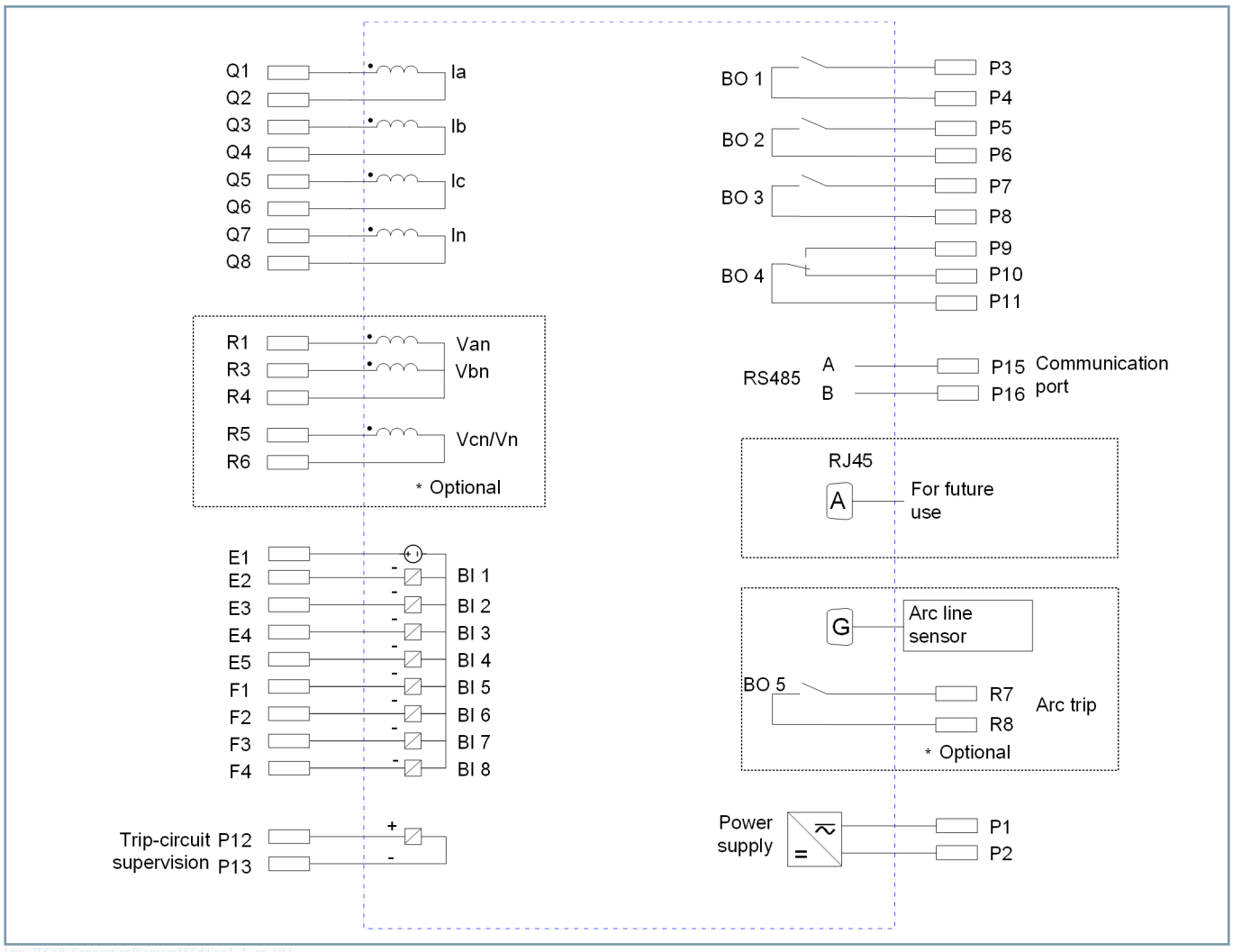


[sc_7SG68_TypicalSideLogoLabel, 1, --_--]

Figure 3.3/1 Example Logo Label

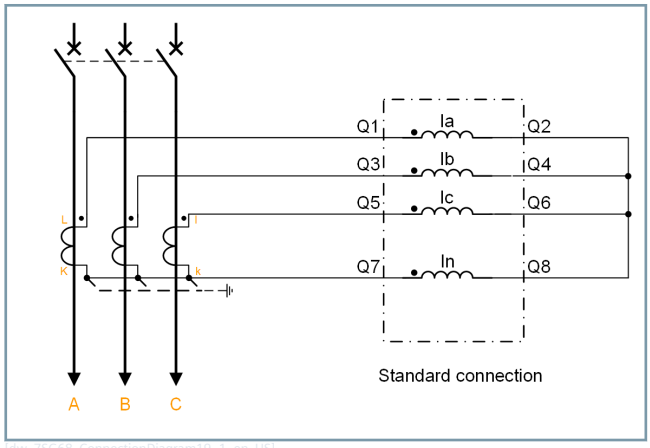
[sc_7SG68_Rear, 1, --_--]

Figure 3.3/2 Rear View: Arrangement of Terminals and Modules



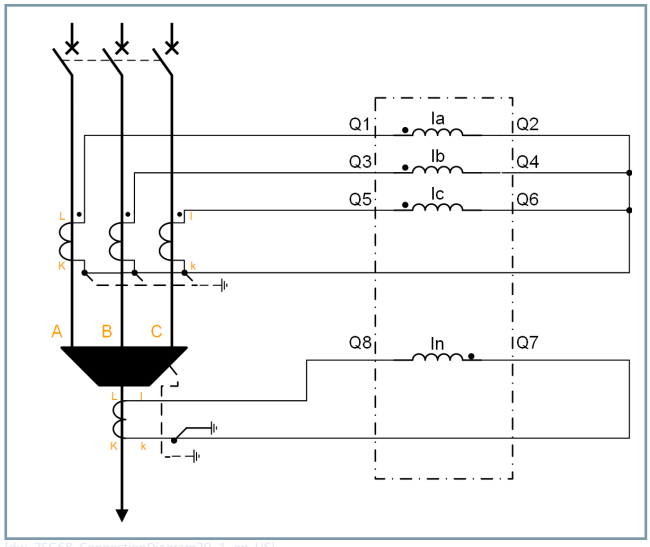
[dw_7SG68_ConnectionDiagram15Edition1, 1, en_US]

Figure 3.3/3 Terminal Connection Diagram



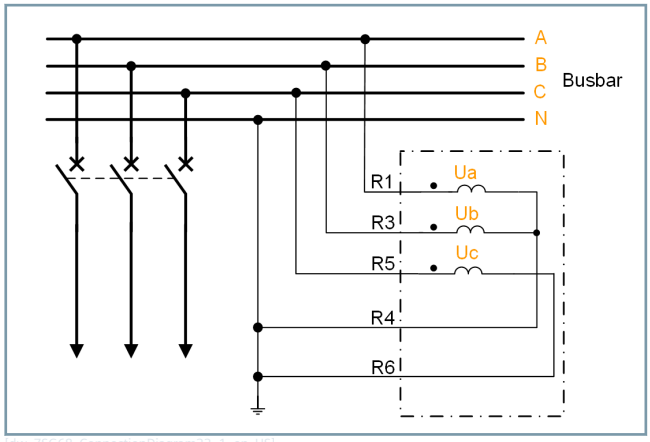
[dw_7SG68_ConnectionDiagram19, 1, en_US]

Figure 4.1/1 Standard CT Connection



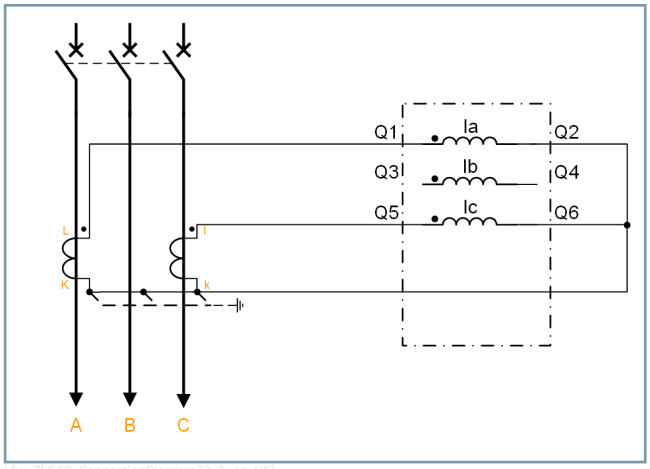
[dw_7SG68_ConnectionDiagram20, 1, en_US]

Figure 4.1/2 Current Connections to 3 Current Transformers, Ground Current from Additional Summation CT



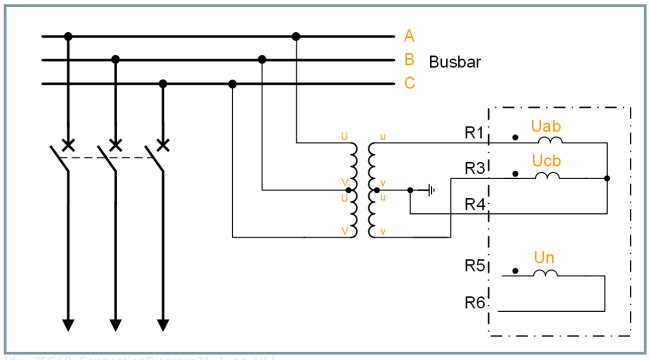
[dw_7SG68_ConnectionDiagram22, 1, en_US]

Figure 4.1/3 400 VT Direct Connection – 3 Phase, 4 Wire



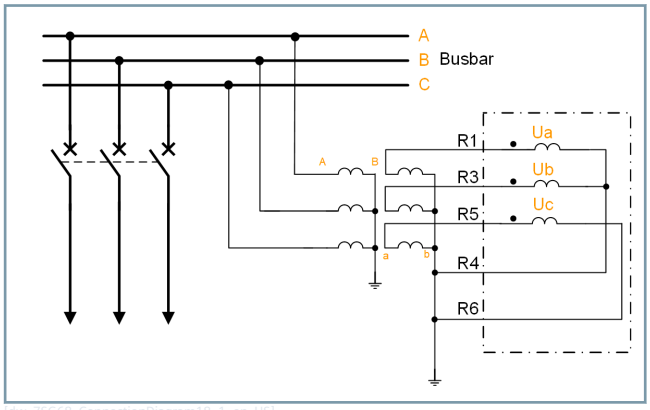
[dw_7SG68_ConnectionDiagram23, 1, en_US]

Figure 4.1/4 Current Connections to 2 Current Transformers, only for Ungrounded or Compensated Networks



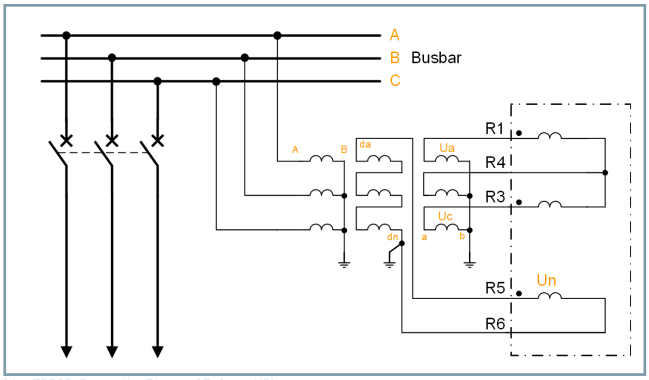
[dw_7SG68_ConnectionDiagram21, 1, en_US]

Figure 4.1/5 V-V Connection for Isolated Neutral



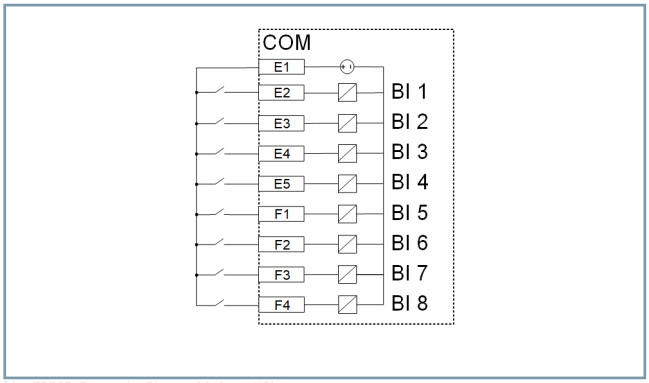
[dw_7SG68_ConnectionDiagram18, 1, en_US]

Figure 4.1/6 Voltage Connections to 3 Voltage Transformers (Phase-to-Ground Voltages)



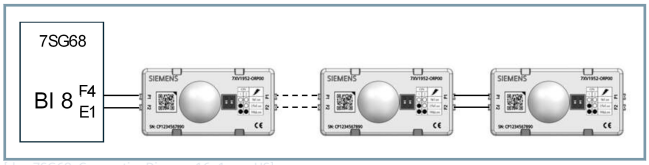
[dw_7SG68_ConnectionDiagram17, 1, en_US]

Figure 4.1/7 Voltage Connections to 2 Voltage Transformers (Phase-to-Phase Voltages) and Open Delta VT



[dw_7SG68_ConnectionDiagram14, 1, en_US]

Figure 4.1/8 Binary Input Wiring Method

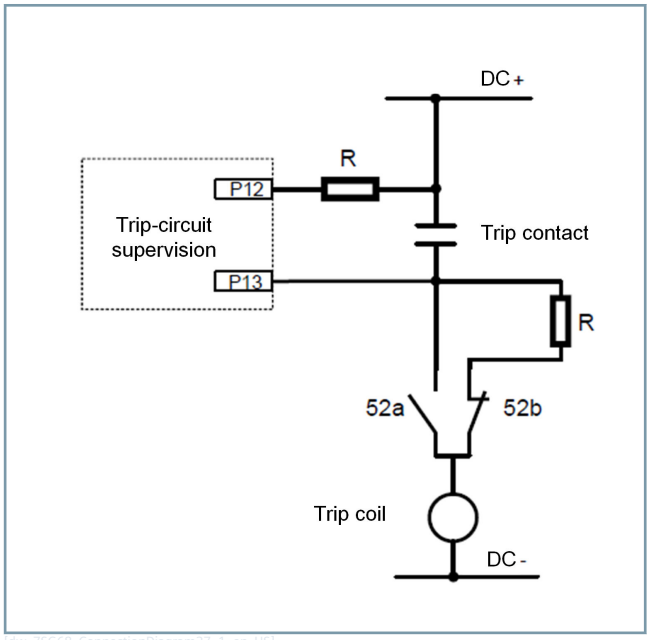


[dw_7SG68_ConnectionDiagram16, 1, en_US]

Figure 4.1/9 ARC Point Sensor Wiring Method

NOTE

A maximum of 10 arc point sensors can be used in parallel.



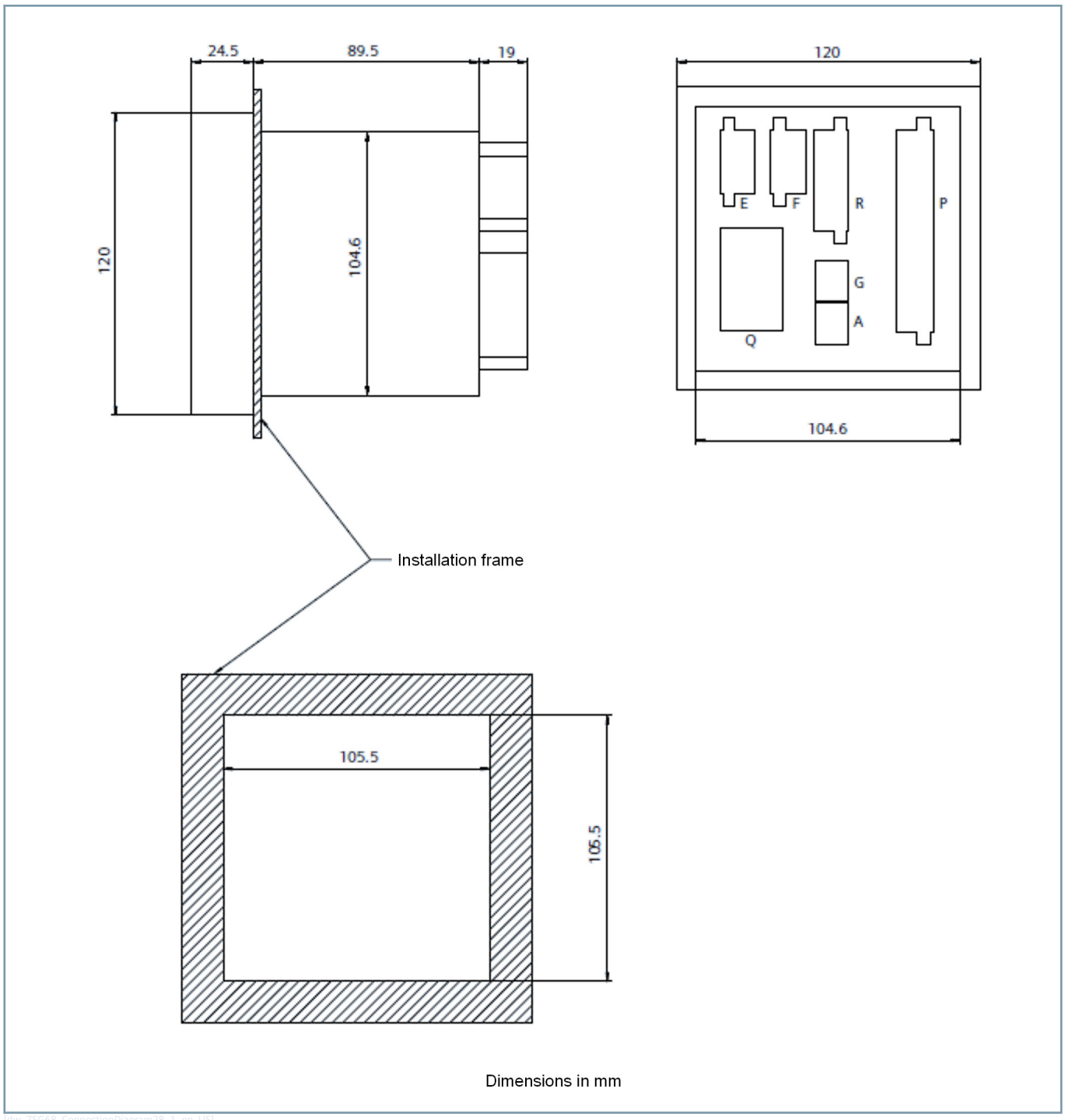
[dw_7SG68_ConnectionDiagram27, 1, en_US]

Figure 4.1/10 Trip Circuit Supervision Application Diagram

Resistor R				
Voltage DC	24 V	48 V	110 V	220 V
Resistance value (KΩ)	1	4.7	15	15 + 15
Resistor power (W)	2	2	3	3
Accuracy	10 %	10 %	10 %	10 %
Resistor type	Wirewound or cement resistor			

DIP Switch Position	1	○	●	●
	2	○	○	●
Safe environment illumination (kLux)		2	10	20
Operation threshold (kLux)		5	25	50

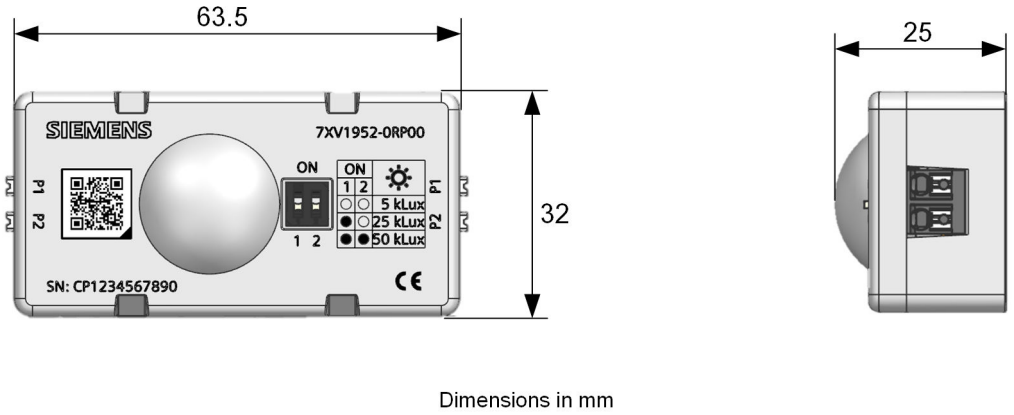
Table 4.1/1 ARC Point Sensor Sensitivity



[dw_7SG68_ConnectionDiagram28, 1, en_US]

Figure 4.2/1 Dimensions and Panel Drilling Details

Dimension drawings



[dw_7SG68_PointSensorDimensions, 1, en_US]

Figure 4.2/2 Point Sensor Dimensions

Inputs and Outputs

Current Inputs

(IEC 60255-1, IEC 60255-27)

Rated current I_{rated}		1 A/5 A
Measuring range		@ 1 A 0.5 % or 10 mA @ 5 A 0.5 % or 50 mA
Nominal frequency f_{rated}		50 Hz/60 Hz
Thermal withstand	Continuous	4.0 · I_{rated}
	1 Second	100 · I_{rated}
Burden @ I_{rated}	I_{rated} = 1 A	< 0.1 VA
	I_{rated} = 5 A	< 0.3 VA

Voltage Inputs

(IEC 60255-1, IEC 60255-27)

Rated voltage		AC 57.7 V to AC 220 V
Measuring range		AC 1 V to AC 270 V
Accuracy		@ AC 100 V 0.5 %
Thermal withstand RMS	Continuous	AC 300 V
Burden @ 100 V		< 0.2 VA

Auxiliary Supply

(IEC 60255-1, IEC 60255-26, IEC 60255-27)

Rated voltage		AC/DC 24 to 220 V (50 Hz/60 Hz)
Allowable superimposed AC component value		15 % U_{AUX}
Input power	Quiescent burden	About 3 W
	Maximum burden	About 5 W
DC power supply voltage dips		70 ms when U ≥ DC 110 V 100 ms when U ≥ DC 220 V 6 s after running the device for 3 min

Binary Inputs

(IEC 60255-1, IEC 60255-26)

Quantity	8
Operate voltage	Internal power supply, dry contact input
Current consumption	< 5 mA
Pickup/dropoff delay	< 3 ms
SOE resolution	1 ms

Binary Outputs

(IEC 60255-1)

Quantity		3 normal open 1 normal open/close
Switching capability	Make	1000 W/VA
	Break (resistive)	40 W
	Break (L/R ≤ 40 ms)	30 W
Switching voltage		AC/DC 250 V
Admissible current per contact (continuous)		5 A
Admissible current per contact (close and hold)		30 A, 0.5 s (NO contact)
Contact operate time		7 ms

Communication Interface

Rear system interface	1 RS485 port
Protocol	IEC 60870-5-103, Modbus
Test voltage	AC 500 V, 50 Hz
Bridgeable distance	1 km
Transmission speed	Min 4,800 Bd, Max 38,400 Bd Default 9,600 Bd

Mechanical Tests

Vibration – Sinusoidal

(IEC 60255-21, IEC 60068)

During Operation	
Vibration	Sinusoidal
IEC 60255-21-1, level II	10 Hz to 60 Hz, 0.075 mm
IEC 60068-2-6	60 Hz to 150 Hz, 1 g

During Transportation	
Vibration	Sinusoidal
IEC 60255-21-1, level II IEC 60068-2-6	10 to 150 Hz, 2 g

During Operation	
Shock	Half-sinusoid
IEC 60255-21-2, level I IEC 60068-2-27	5 g, 11 ms

During Transportation	
Shock	Half-sinusoid
IEC 60255-21-2, level I IEC 60068-2-27	15 g, 11 ms

During Transportation	
Bump	Half-sinusoid
IEC 60255-21-2, level I IEC 60068-2-29	10 g, 16 ms

Technical data

IP Ratings

(IEC 60259)

Type	Level
Weight	940 g
Front	IP 54
Side	IP 30
Top/bottom	IP 40
Rear	IP 20

Product Safety and EMC

Product standards	IEC 60255
Environmental level	Zone A
Pollution level	2
Protection class	III

Insulation – Dielectric Withstand

(IEC 60255-27)

Type	Level
Input/output port	AC 2.5 kV RMS, 50 Hz, for 1 min
Aux power, CT, BI, BO, VT	
Communication interface	AC 500 V RMS, 50 Hz, for 1 min

Impulse Voltage Withstand Test

(IEC 60255-27)

Type	Level
Aux power, BI, BO, CT, VT	5 kV, 1.2/50 µs
Communication	1.5 kV, 1.2/50 µs

Slow Damped Oscillatory Wave Test

(IEC 60255-26, IEC 61000-4-18)

Type	Level
Aux power, BI, BO, CT, VT	Diff. mode 1 kV, common mode 2. 5 kV, level 3
Communication	Common mode 1 kV, level 3

Radiated Radio Frequency Electromagnetic Field

(IEC 60255-26, IEC 61000-4-3)

10 V/m, 80 MHz to 6G MHz

Fast Transients Test

(IEC 60255-26, IEC 61000-4-4)

Type	Level
Aux power, BI, BO, CT, VT	4 kV, 5 kHz, 100 kHz, level 4
Communication	4 kV, 5 kHz, 100 kHz, level 4

Electrostatic Discharge Test

(IEC 60255-26, IEC 61000-4-2)

8 kV contact discharge, 15 kV air discharge, level 4

Surge Test

(IEC 60255-26, IEC 61000-4-5)

Type	Level
Voltage	1.2/50 µs
Current	8/20 µs
Source impedance	2 Ω, level 4
Aux power	Line to earth: 4 kV, 10 Ω, 9 µF Line to line: 2 kV, 0 Ω, 18 µF
BI, BO, CT, VT	Line to earth: 4 kV, 40 Ω, 0.5 µF Line to line: 2 kV, 40 Ω, 0.5 µF
Communication	Line to earth: 4 kV

Conducted Disturbance Induced by Radio-Frequency Fields Test

(IEC 60255-26, IEC 61000-4-6)

Type	Level
Aux power, BI, BO, CT, VT	10 V, 150 kHz to 80 MHz 80 % AM (1 kHz), 150 Ω

Power Frequency

(IEC 60255-26, IEC 61000-4-16)

Type	Level
BI	Differential mode: 150 V Common mode: 300 V, 60 s

Power Frequency Magnetic Field Immunity Test

(IEC 60255-26, IEC 61000-4-8)

Type	Level
Acceptance criteria A	100 A/m Continuous: level 5
Acceptance criteria B	1000 A/m 1 to 3 s, 50/60 Hz, level 5

Damped Oscillatory Magnetic Field Immunity Test

(IEC 61000-4-10)

0.1 MHz, 1 MHz, 30 A/m, level 4

Impulse Magnetic Field Immunity Test

(IEC 61000-4-9)

8/20 µs TR/TH, 300 A/m, level 4

Radiated Emission Test

(IEC 60255-26)

Type		Level
Below 1 GHz	30 MHz to 230 MHz	40 dB (µV/m) quasi-peak at 10 m 50 dB (µV/m) quasi-peak at 3 m
	230 MHz to 1000 MHz	47 dB (µV/m) quasi-peak at 10 m 57 dB (µV/m) quasi-peak at 3 m
Above 1 GHz	1 GHz to 3 GHz	56 dB (µV/m) average at 3 m 76 dB (µV/m) peak at 3 m
	3 GHz to 6GHz	60 dB (µV/m) average at 3 m 80 dB (µV/m) peak at 3 m

Conducted Emission Test

(IEC 60255-26)

Type	Level
0.15 MHz to 0.50 MHz	79 dB (µV) quasi-peak 66 dB (µV) average
0.50 MHz to 30 MHz	73 dB (µV) quasi-peak 60 dB (µV) average

Climatic Tests

Temperature

(IEC 60255-1)

Type		Level
Operating range		-25 °C to +70 °C
Storage range		-40 °C to +70 °C
Damp heat steady state test	Test temperature	+40 °C, humidity 93%
	Test for 10 days, insulation resistance	> 10 MΩ
	Dielectric	> 75 % normal value
Cyclic temperature with humidity test	Upper temperature cycle	+55 °C, humidity 93%
	Lower temperature	+25 °C, humidity 97%
	24 h	(12 h + 12 h) 6 cycles
Allow normal operating humidity range		The average allowable humidity is per year ≤ 75 %
		Not exceeding 56 days within one year humidity 93 %
		Condensation must be avoided

Performance

27/59 Voltage Protection

59-2 element	Enabled/Disabled
59-2 setting	90 to 460 V
59-2 delay	0 to 100 s
59-1 element	Enabled/Disabled
59-1 setting	90 to 460 V
59-1 delay	0 to 100 s
59-1 action	Alarm/Trip
27-2 Element	Enabled/Disabled
27-2 Setting	10 to 350 V
27-2 Delay	0 to 100 s
27-1 Element	Enabled/Disabled
27-1 Setting	10 to 350 V
27-1 Delay	0 to 100 s
27-1 Action	Alarm/Trip
CB position check	Enabled/Disabled
27-phase criteria	Any/All
Characteristic – Operate time	1.2 · setting value
Characteristic – Dropout time	30 ms
Characteristic – 59 Dropout ratio	0.95
Characteristic – 27 Dropout ratio	1.05
Characteristic – Pickup tolerance	2.5 % of setting value, or 1 V
Characteristic – Delay time tolerance	1 % or 10 ms

46 Negative-sequence overcurrent protection

DT element	Enabled/Disabled
DT setting	0.05 to 5 A (1 A) 0.25 to 25 A (5 A)
DT delay	0.06 to 60 s
IT element	Enabled/Disabled
IT setting	0.05 to 20 A (1 A) 0.25 to 100 A (5 A)
IT time multiplier	0.05 to 20 s
IT reset	Disk emulation/Instantaneous
Curve	IEC normal, IEC very, IEC extremely, IEC long, ANSI inverse, ANSI short, ANSI long, ANSI moderately, ANSI very, ANSI extremely, ANSI definite, User defined

46BC Broken conductor detection

Element		Disabled/Alarm/Trip
Ratio I_2/I_1		20 to 100 %
Delay		0.05 to 600 s
Characteristic	Operate time	1.2 · setting value
	Dropout ratio	30 ms
Pickup tolerances		1 % setting value
Delay time tolerances		1 % or 10 ms

50/51/50N/51N Overcurrent Protection

50/51 Overcurrent	Enabled/Disabled
50N/51N Overcurrent	Enabled/Disabled
50/50N-3 Element	Enabled/Disabled
50/50N-3 Setting	0.05 to 20 A (1 A) 0.25 to 100 A (5A)
50/50N-3 Delay	0 to 100 s
50/50N-2 Element	Enabled/Disabled

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50/50N-2 Setting		0.05 to 20 A (1 A) 0.25 to 100 A (5A)
50/50N-2 Delay		0 to 100 s
50/50N-1 Element		Enabled/Disabled
50/50N-1 Setting		0.05 to 20 A (1 A) 0.25 to 100 A (5A)
50/50N-1 Delay		0 to 100 s
50/50N-1 Inrush restraint		Enabled/Disabled
51/51N Element		Enabled/Disabled
51/51N Setting		0.05 to 20 A (1 A) 0.25 to 100 A (5A)
51/51N Time multiplier		0.05 to 20 s
51/51N Reset		Disk emaulation/Instantaneous
Curve		IEC normal, IEC very, IEC extremely, IEC long, ANSI inverse, ANSI short, ANSI long, ANSI moderately, ANSI very, ANSI extremely, ANSI definite, User defined
Overcurrent protection characteristic	Operate time	1.2 · setting value, typical 30 ms
	Dropout time	20 ms
	Dropout ratio	Approx. 0.95 for ($I/I_{rated} \geq 0.2$) or 0.01 I_{rated} ($I/I_{rated} < 0.2$)
	Pickup tolerances	2.5 % of setting value, or 10 mA for (I_{rated} = 1 A), or 50 mA for (I_{rated} = 5 A)
	Delay time tolerances	1 %, 10 ms
	Transient overreach	5 %
	50/50N with inrush restrain	15 % 2nd harmonic starting value, cross lock 500 ms, release current 7.5 · I_{rated}
Inverse time overcurrent protection characteristic	Pickup threshold	Approx. 1.10 Ip
	Reset threshold	Approx. 1.05 Ip for $Ip/I_{rated} \geq 0.2$ Approx. 1.01 I_{rated} for $Ip/I_{rated} < 0.2$
	Pickup threshold	2 % of setting value or 10 mA for I_{rated} = 1 A or 50 mA for I_{rated} = 5 A
	Delay time tolerance	5 % of reference (calculated) value + 2.5 % current tolereance, or 50 ms for $1.2 \leq I/Ip \leq 20$

50AFD Arc flash detection

Arc protection	Enabled/Disabled
Arc protection criteria	Light only/Light&current jump
Arc protection config	Pickup only/Trip
Arc line sensor	Enabled/Disabled
Arc backup delay	0.08 to 0.50 s
Arc jump current threshold	0.1 to 1 I/I_{rated}
Line sensor connect	Ring fiber/Acyclic fiber

50BF Circuit-breaker failure protection – 3-pole

Check breaker contacts	Enabled/Disabled
Current start mode	Phase/Zero/Negative current
Trip T1	0.06 to 60 s
Trip T2	0.06 to 60 s
Phase setting	0.05 to 20 A (1 A) 0.25 to 100 A (5 A)
I0/I2 setting	0.05 to 20 A (1 A) 0.25 to 100 A (5 A)

Characteristic	Operate time	1.2 · setting value
	Dropout time	20 ms
	Dropout ratio	0.95 for ($I/I_{rated} \geq 0.2$) or 0.01 I_{rated} ($I/I_{rated} < 0.2$)
	Pickup tolerance	2.5 % of setting value, or 10 mA for (I_{rated} = 1 A), or 50 mA for (I_{rated} = 5 A)
	Delay time tolerance	1 % or 10 ms
	Transient overreach	5 %

50GI Intermittent earth fault

Intermittent earth fault	Enabled/Disabled
Pickup value	0.05 to 20 A (1 A) 0.25 to 100 A (5 A)
Detection extension time	0 to 10 s
Sum of detection time	0 to 100 s
Reset time	1 to 3600 s
No. of det. for start	2 to 10

50HS High speed overcurrent – phase

Element		Enabled/Disabled
Setting		0.05 to 20 A (1 A) 0.25 to 100 A (5 A)
Delay		0 to 0.1 s
Characteristic	Operate time	1.2 · setting value
	Dropout time	20 ms
	Dropout ratio	0.95 for ($I/I_{rated} \geq 0.2$)
	Pickup tolerance	2.5 % of setting value, or 10 mA for (I_{rated} = 1 A), or 50 mA for (I_{rated} = 5 A)
	Time delay tolerance	1 % or 10 ms
	Transient overreach	5 %

50SOTF Switch Onto Fault

50SOTF Element	Enabled/Disabled
50SOTF Setting	0.05 to 20 A (1 A) 0.25 to 100 A (5 A)
50SOTF Delay	0 to 10 s
50NSOTF Element	Enabled/Disabled
50NSOTF Setting	0.05 to 20 A (1 A) 0.25 to 100 A (5 A)
50NSOTF Delay	0 to 10 s
Manual close valid time	0 to 100 s
Manual close criteria time	0 to 100 s

Characteristic	Operate time	1.2 · setting value
	Dropout time	20 ms
	Dropout ratio	0.95 for ($I/I_{rated} \geq 0.2$)
	Pickup tolerance	2.5 % of setting value, or 10 mA for (I_{rated} = 1 A), or 50 mA for (I_{rated} = 5 A)
	Time delay tolerance	1 % or 10 ms
	Transient overreach	5 %

59N Neutral voltage displacement

59N-2 element		Enabled/Disabled
59N-2 setting		1 to 150 V
59N-2 delay		0 to 60 s
59N-1 element		Enabled/Disabled
59N-1 setting		1 to 150 V
59N-1 delay		0 to 60 s
59N-1 action		Alarm/Trip
Characteristic	Operate time	1.2 · setting value
	Dropout time	30 ms
	59 Dropout ratio	0.95
	27 Dropout ratio	1.05
	Pickup tolerance	2.5 % of setting value, or 1 V
	Delay time tolerance	1 % or 10 ms

79 Automatic reclosing

Operating mode	Phase, earth
Number of reclosures	0 to 3
Dead time	0.01 to 320 s
Reclaim time	0.5 to 320 s

Ordering Information – Reyrolle 7SG68 Overcurrent Protection Relay

Product Description	Order No.																	
	1	2	3	4	5	6	7		8	9	10	11	12		13	14	15	16
Reyrolle 7SG68 Overcurrent Protection Relay	7	S	G	6	8	5	5	-	6	a	a	n	n	-	0	a	A	0
Power supply: 24~220 V DC/AC AC current range: 1/5 A 4 CT, 8 BI, 4 BO (with life contact) 1 RS485 port										|	|	|	|	-		|		
										|	|	|	|	-		|		
Terminal										*9*	|	|	|	-		|		
Spring terminal										A	|	|	|	-		|		
Screw terminal										B	|	|	|	-		|		
											|	|	|	-		|		
Language											*10*	|	|	-		|		
English											B	|	|	-		|		
Spanish											E	|	|	-		|		
Turkish											L	|	|	-		|		
Chinese											W	|	|	-		|		
												|	|	-		|		
Front Cover												*11*	|	-		|		
Without												0	|	-		|		
With												1	|	-		|		
													|	-		|		
Work Environment													*12*	-		|		
Standard													0	-		|		
Wet environment (with full coating)													1	-		|		
																|		
Extended Functions																*14*		
Without																A		
3 VT																B		
Wireless temperature online monitoring																C		
3 VT + Arc point sensor + wireless temperature online monitoring																J		
3 VT + Arc point sensor + arc line sensor + wireless temperature online monitoring																K		

Ordering Information – Reyrolle 7SG68 Overcurrent Protection Relay Accessories

Description	Ordering Code
Wireless temperature sensor	7XV1952-0BB00
Wireless temperature and humidity sensor	7XV1952-0DB00
Temperature management unit (should order with High-gain antenna)	7XV1952-0CC00
High-gain antenna	7XV1952-0EA00
Arc point sensor (DC 24 to 48 V)	7XV1952-0RP00
Arc point sensor (DC 110 to 220 V)	7XV1952-0RP01
Transparent plastic cover	7XV1988-0MB00
Cover seal (4 pcs)	7XV1988-0MC00

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