



Reyrolle
Protection
Devices

7SR11 and 7SR12 Argus

Overcurrent Relays

Energy Management

SIEMENS

7SR11 and 7SR12 Argus

Overcurrent Relays



Description

The 7SR11 & 7SR12 are overcurrent protection relays developed to enhance the Argus family of products by providing a familiar product using the latest generation of hardware technology.

The 7SR11 provides overcurrent and earth fault protection, the 7SR12 comes with additional voltage inputs providing directional protection. Both relays are available in single and four pole variants.

Housed in a 4U high, size E4 or E6 (Optional IEC61850 model) cases, these relays provide protection, monitoring, instrumentation and metering with integrated input and output logic, data logging & fault reports. Communication access to the relay functionality is via a front USB port for local PC connection, a rear electrical RS485 port for remote connection & optional IEC61850 communication through two rear Ethernet ports (Electrical or Optical).

Function Overview

Protection

| | |
|-----------|--|
| 37 | Undercurrent |
| 46BC | Broken Conductor / Load Unbalance |
| 46NPS | Negative Phase Sequence Overcurrent |
| 49 | Thermal Overload |
| 50 | Instantaneous Overcurrent |
| 50G/N/SEF | Instantaneous Earth Fault |
| 50AFD | Arc Flash Detection (6 zones) |
| 50BF | Circuit Breaker Fail |
| 51 | Time Delayed Overcurrent |
| 51G/N/SEF | Time Delayed Measured/Derived/Sensitive EF |
| 64H | High Impedance REF |
| 27/59 | Under/Over Voltage |
| 47 | Negative Phase Sequence Voltage |
| 51V | Voltage Controlled Overcurrent |
| 59N | Neutral Voltage Displacement |
| 67/50 | Directional Instantaneous Overcurrent |
| 67/50G/N | Directional Instantaneous Earth Fault |
| 67/51 | Directional Time Delayed Overcurrent |
| 67/51G/N | Directional Time Delayed Earth Fault |
| 32 | Directional Power |
| 32S | Directional Sensitive Power |
| 55 | Power Factor |
| 81HBL2 | Inrush Detector |
| 81 | Under/Over Frequency Line Check/Switch onto Fault |

Supervision

| | |
|---------|----------------------------------|
| 60CTS | CT Supervision |
| 74T/CCS | Trip & Close Circuit Supervision |
| 60VTS | VT Supervision |

Control

| | |
|----|-----------------------|
| 79 | Auto Reclose |
| 86 | Lockout CB Control |

Features

Cold Load Settings
Four Settings Groups
Password Protection – 2 levels
User Programmable Logic
Self Monitoring
Circuit Breaker Trip and Maintenance Counter
Trip Timers

User Interface

20 Character x 4 Line Backlit LCD
Menu Navigation Keys
9 User Programmable Tri-colour LEDs
User Language Configuration

Monitoring Functions

Primary/Secondary Current Phases and Earth Direction
Primary/Secondary Line and Phase Voltages
Apparent Power and Power Factor
Real and Reactive Power
W Hr & VAR Hr Forward and Reverse
Historical Demand Record
Positive Phase Sequence (PPS) Voltage & Current
Negative Phase Sequence (NPS) Voltage & Current
Zero Phase Sequence (ZPS) Voltage
Frequency
Direction
Binary Input/Output status
Trip circuit healthy/failure
Time and date
Starters
Fault records
Event records
Energy
Circuit breaker trip counters
I²t summation for contact wear

Hardware

| | | |
|------|-----------------|--|
| 1 CT | 3 Binary Inputs | 5 Binary Outputs |
| 4 CT | 3 Binary Inputs | 5 Binary Outputs |
| 4 CT | 6 Binary Inputs | 8 Binary Outputs |
| 4 CT | 4 Bin.In. | 8 Bin.Out. (segregated rear terminals) |
| 1 CT | 3 VT | 3 Binary Inputs |
| 4 CT | 3 VT | 3 Binary Inputs |
| 4 CT | 3 VT | 6 Binary Inputs |
| 4 CT | 3 VT | 4 Bin. In. |

Data Storage and Communication

Standard Communication Ports

Front USB port + Rear RS485 port

Additional Optional Communication Ports

2x Electrical RJ45 Ethernet ports
2x LC Fibre Optic Ethernet ports

Standard Protocols

IEC60870-5-103, DNP3.0 or Modbus RTU
User Selectable with programmable data points

Optional Protocols

IEC61850 (E6 Case)

Ethernet Redundancy Protocols:

Standard in all IEC61850 models:
PRP (Parallel Redundancy Protocol)
RSTP (Rapid Spanning Tree Protocol)
HSR (High-availability Seamless Redundancy)

Data

Event Records – User Configurable
Fault Records
Waveform Records
Measurands
Commands
Time Synchronism
Viewing and Changing Settings

Application

The Argus is a numerical overcurrent protection relay intended for use on distribution and industrial networks. It provides a highly comprehensive functional software package with a range of integral application functions aimed at reducing installation, wiring and engineering time. An extensive range of metered values can be viewed on the front LCD or at a remote point via the communication channel.

The integrated control feature allows operation of a single circuit breaker and monitoring of its trip and close circuits (except 7SR1102-1*A12-*AA0 models).

Function Matrix

| FUNCTION | FUNCTIONAL REQUIREMENT | | | | | | | | | |
|--------------------------|--|--------------------|--------------------|--------------------|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 7SR1101-1*A**.*AA0 | 7SR1101-3*A**.*AA0 | 7SR1102-1*A12-*AA0 | 7SR1102-1*A**.*[C/D]A0 | 7SR1102-3*A**.*AA0 | 7SR1204-2*A**.*AA0 | 7SR1204-4*A**.*AA0 | 7SR1205-2*A**.*AA0 | 7SR1205-4*A**.*AA0 |
| 27 | Undervoltage | | | | | | ■ | ■ | ■ | ■ |
| 32 | Directional Power | | | | | | | | ■ | ■ |
| 32S | Directional Sensitive Power | | | | | | | | | ■ |
| 37 | Undercurrent | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| 46BC | Broken Conductor / Load Unbalance | | | ■ | ■ | ■ | | | ■ | ■ |
| 46NPS | Negative Phase Sequence Overcurrent | | | | ■ | ■ | | | ■ | ■ |
| 47 | Negative Phase Sequence Voltage | | | | | | | | ■ | ■ |
| 49 | Thermal Overload | | | | ■ | ■ | | | ■ | ■ |
| 50 | Instantaneous Overcurrent | | | ■ | ■ | ■ | | | ■ | ■ |
| 50G | Measured Instantaneous Earth Fault | ■ | | ■ | ■ | | ■ | | ■ | |
| 50SEF | Measured Instantaneous Sensitive Earth Fault | | ■ | | | ■ | | ■ | | ■ |
| 50N | Derived Instantaneous Earth Fault | | | ■ | ■ | ■ | | | ■ | ■ |
| 50AFD | Arc Flash Detection | | | | ■ | ■ | | | ■ | ■ |
| 50BF | CB Failure | | | ■ | ■ | ■ | | | ■ | ■ |
| 51 | Time Delayed Overcurrent | | | ■ | ■ | ■ | | | ■ | ■ |
| 51G | Measured Time Delayed Earth Fault | ■ | | ■ | ■ | | ■ | | ■ | |
| 51SEF | Measured Time Delayed Sensitive Earth Fault | | ■ | | | ■ | | ■ | | ■ |
| 51N | Derived Time Delayed Earth Fault | | | ■ | ■ | ■ | | | ■ | ■ |
| 55 | Power Factor | | | | | | | | ■ | ■ |
| 59 | Overvoltage | | | | | | | ■ | ■ | ■ |
| 59N | Neutral Voltage Displacement | | | | | | | ■ | ■ | ■ |
| 64H | High Impedance Restricted Earth Fault | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 67 | Directional Overcurrent | | | | | | | | ■ | ■ |
| 67G | Directional Measured Earth Fault | | | | | | | ■ | | ■ |
| 67SEF | Directional Sensitive Earth Fault | | | | | | | ■ | | ■ |
| 67N | Directional Derived Earth Fault | | | | | | | | ■ | ■ |
| 81HBL | Inrush Detector | ■ | | | ■ | ■ | | ■ | ■ | ■ |
| 81 | Under/Over Frequency | | | | | | | ■ | ■ | ■ |
| CONTROL / MONITOR | | | | | | | | | | |
| 51c | Cold Load - Phase Only | | | | ■ | ■ | | | ■ | ■ |
| 60CTS | CT Supervision | | | ■ | ■ | ■ | | | ■ | ■ |
| 60VTS | VT Supervision | | | | | | | ■ | ■ | ■ |
| 74T/CCS | Trip & Close Circuit Supervision | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 79 | Autoreclose | | | | □ | □ | | | □ | □ |
| 86 | Lockout | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | Line Check/SOTF | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |

Key - ■ - Included as standard
□ - Ordering option

7SR11 Functional Diagrams

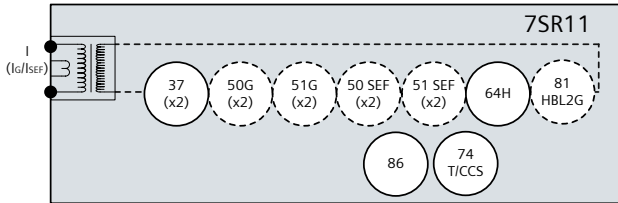


Fig 1. Single Pole Overcurrent Relay

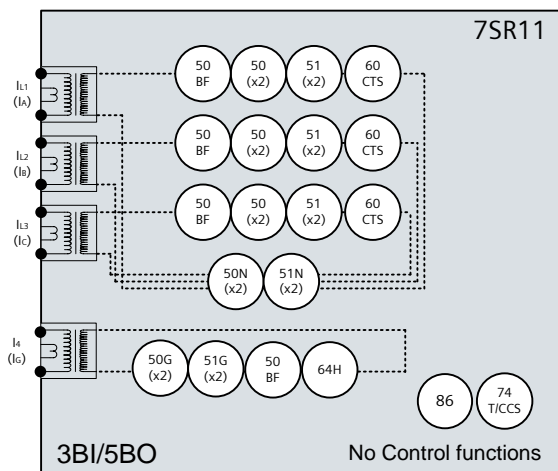


Fig 2. Four Pole Overcurrent Relay Version A software

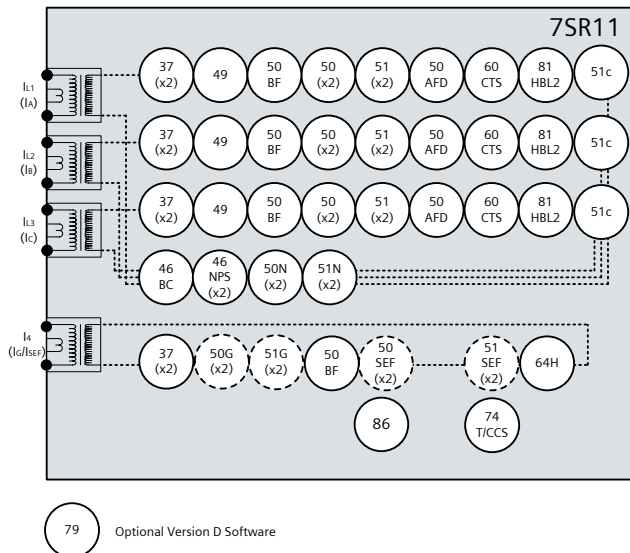


Fig 3 Four Pole Overcurrent Relay Version C Software

7SR12 Functional Diagrams

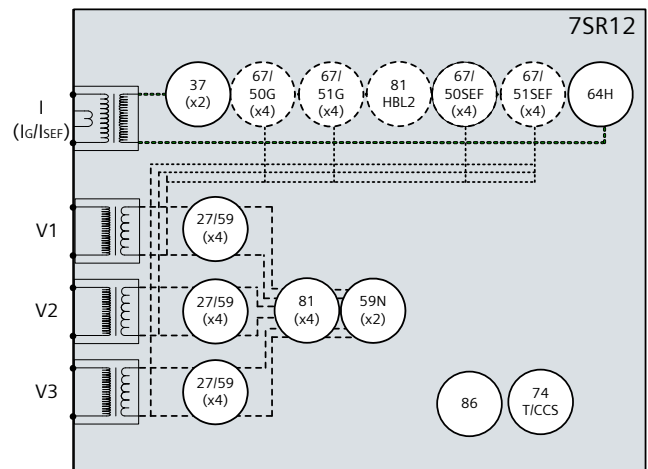


Fig 4. Single Pole Directional Relay

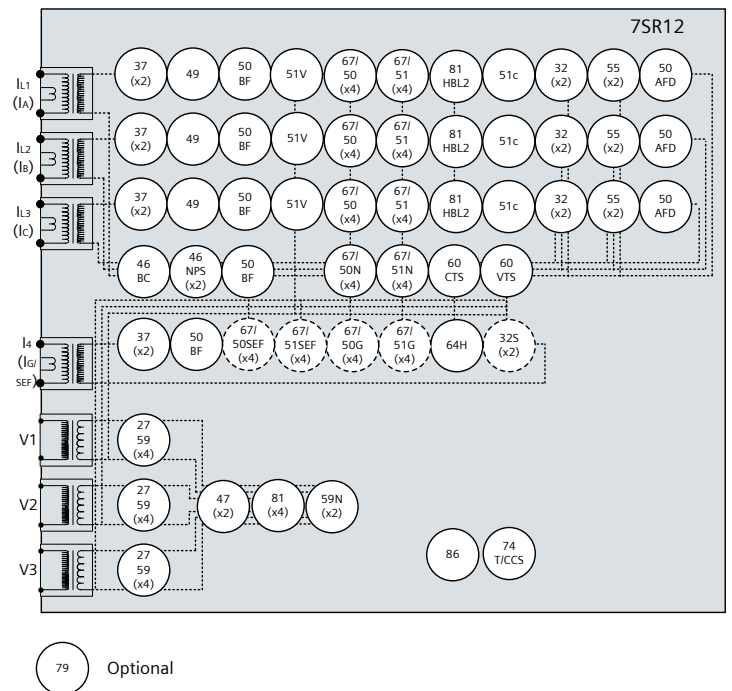


Fig 5. Four Pole Directional Overcurrent Relay

Notes

1. Items shown dotted are only available in some models; please refer to the Ordering Information Section.
2. The use of some functions are mutually exclusive

Description of Functionality

27/59 Under/Over Voltage

Each element has settings for pickup level, drop-off level and Definite Time Lag (DTL) delays. Operates if voltage exceeds setting for duration of delay.

32 Power

Each element has settings for pickup level, Definite Time Lag (DTL) delay and Direction. Each element can be set as Under or Over power, to operate from Apparent, Real or Reactive power and can be set for any phase or all three phases.

32S Sensitive Power

This is provided in 4 pole SEF relays and provides elements operated by single phase measured current in the I_{SEF} input. Each element has settings for pickup level, Definite Time Lag (DTL) delay and Direction. Each element can be set as Under or Over power, to operate from Apparent, Real or Reactive power.

37 Undercurrent

Each element has settings for pickup level and Definite Time Lag (DTL) delays. Operates if current falls below setting for duration of delay.

46BC Phase Unbalance/Broken Conductor

Element has settings for pickup level and DTL delay. With the circuit breaker closed, if the NPS:PPS current ratio is above setting this could be due to a broken conductor.

46NPS Negative Phase Sequence Overcurrent

Each element has user settings for pickup level and IDMTL or DTL delay, operates if NPS current exceeds setting and delay. NPS current elements can be used to detect unbalances on the system or remote earth faults when a delta-star transformer is in circuit.

47 Negative Phase Sequence Voltage

Each element has settings for pickup level and Definite Time Lag (DTL) delays. Operates if NPS voltage exceeds setting for duration of delay.

49 Thermal Overload

The thermal algorithm calculates the thermal states from the measured currents and can be applied to lines, cables and transformers. Alarm outputs are given for thermal overload and thermal capacity.

50BF Circuit Breaker Fail

The circuit breaker fail function may be triggered from an internal trip signal or from a binary input. Line currents and earth currents are monitored following a trip signal and an output is issued if any current is still detected, above setting, after a specified time interval. Alternatively, if the trip is from a mechanical protection the circuit breaker position can be used to determine a failure. A second time delay is available to enable another stage to be utilized if required. An input is also available to bypass the time delays when the circuit breaker is known to be faulty.

51c Cold Load Pickup

If a circuit breaker is closed onto a 'cold' load, i.e. one that has not been powered for a prolonged period, this can

impose a higher than normal load-current demand on the system which could exceed normal settings. These conditions can exist for an extended period and must not be interpreted as a fault. To allow optimum setting levels to be applied for normal operation, the cold load pickup feature will apply alternative current settings for a limited period. The feature resets when either the circuit breaker has been closed for a settable period, or if the current has reduced beneath a set level for a user set period.

50/51 Phase Fault

50 INST/DTL and 51 IDMTL/DTL elements provide overcurrent protection, each with independent settings for pickup current, time-multiplier (51) and time-delays. User can select IEC or ANSI time current characteristics. The IDMT stage has a user programmable reset characteristic, either DTL or shaped current ~ time reset characteristic, to improve grading with electromechanical protection.

50G/51G/50N/51N Earth Fault/Sensitive Earth Fault

Two earth fault measurement modes are available. One mode directly measures the earth current from an independent CT, or the residual connection of the 3 line CTs. This input can be ordered as either earth fault or sensitive earth fault (50G/51G).

The second mode derives the earth current internally from the 3 phase CT inputs to give earth fault (50N/51N). 50 INST/DTL and 51 IDMTL/DTL elements provide overcurrent protection, each with independent settings for pickup current, time-multiplier (51) and time-delays. User can select IEC or ANSI time current characteristics. The IDMT stage has a user programmable reset characteristic either DTL or shaped current ~ time reset characteristic to improve grading with electromechanical protection.

The directional SEF element is also suitable for use on compensated networks.

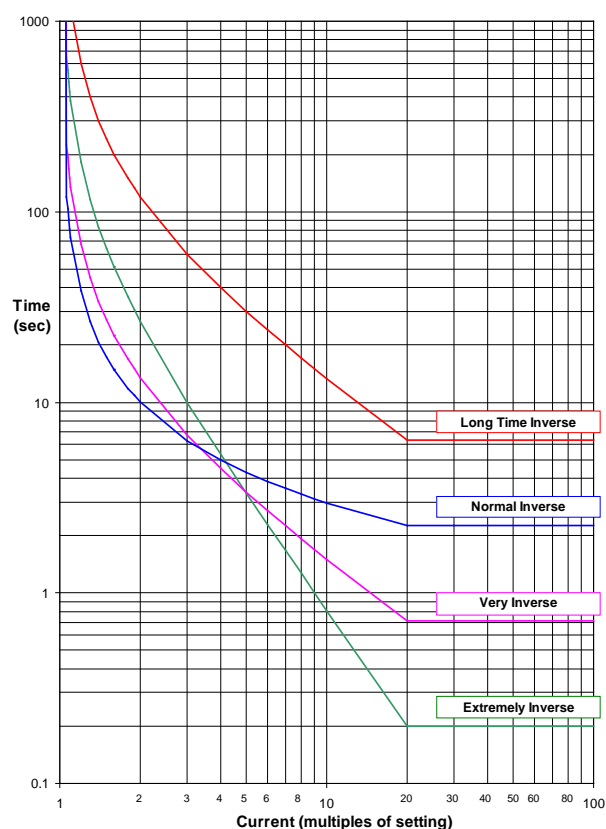


Fig 6. IEC Overcurrent Curves

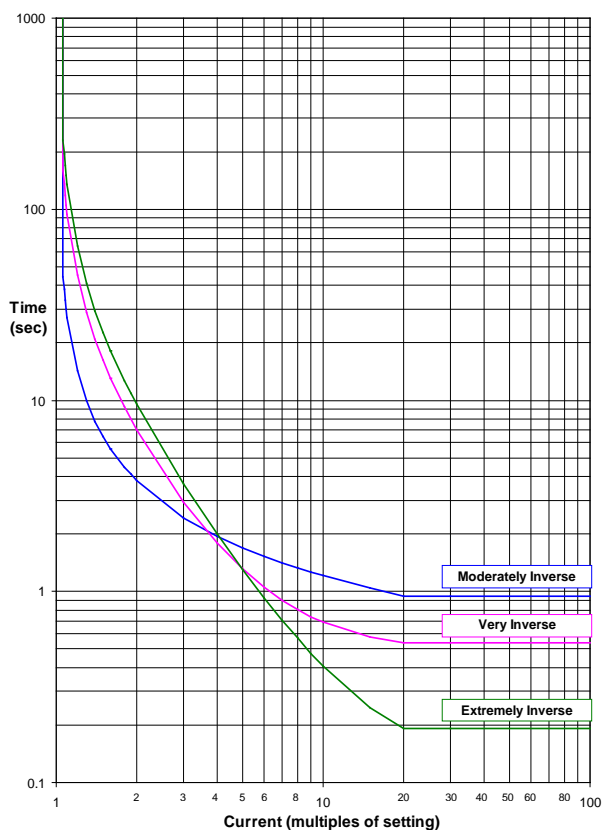


Fig 7. ANSI Overcurrent Curves

51V Voltage Controlled Overcurrent

Each phase shaped overcurrent element can be independently controlled by the level of measured input voltage. For applied voltages above setting the 51-n element operates in accordance with its current setting but for voltages below the setting a multiplier is applied to reduce the 51-n pickup current setting.

50AFD Arc Flash Detector

The 7SR1 relays can be used with the 7XG31 ReyArc range of Arc Flash Detection devices. Arc fault protection is a technique employed for the fast clearance of arcing faults on busbars, within metal clad switchgear & associated cable boxes. The arc is detected using an optical sensor & the signal input to a protection device which also monitors the load current on the system. A trip signal can be achieved in less than 10 ms using arc detection only or within 20 ms when using overcurrent check.

55 Power Factor

Each element has settings for Under or Over Power Factor pickup level, Definite Time Lag (DTL) delay and Lead/Lag Direction. Each can also be set for any phase or all three phases operation.

59N Neutral Overvoltage

Neutral overvoltage can be used to detect earth faults in high impedance earthed or isolated systems. Operates if the neutral voltage exceeds setting for duration of delay.

60CTS CT Supervision

The relay has two methods of CT supervision.. The 7SR11 monitors each phase current input and operates if any one

or two inputs fall below the setting. The 7SR12 has the above method and an addition method that considers the presence of negative phase sequence current, without an equivalent level of negative phase sequence voltage, for a user set time as a CT failure. Both element types have user operate and delay settings.

60VTS VT Supervision

The VT supervision uses a combination of negative phase sequence voltage and negative phase sequence current to detect a VT fuse failure. This condition may be alarmed or used to inhibit voltage dependent functions. Element has user operate and delay settings.

64H Restricted Earth Fault

The measured earth fault input may be used in a 64H high impedance restricted earth fault scheme to provide sensitive high speed unit protection. A calculation is required to determine the values of the external series stabilising resistor and non-linear shunt resistor which can be ordered separately.

67/67N Directional Control

Phase, earth and sensitive earth fault elements can be directionalised. Each element can be user set to Forward, Reverse, or Non-directional.

Directional Phase Fault elements are polarised from quadrature voltage.

Derived earth fault elements can be user set to be polarised from residual voltage or negative phase sequence voltage. Measured earth fault elements are polarized from V_0 .

74T/CCS Trip & Close Circuit Supervision

The trip or close circuit(s) can be monitored via binary inputs. Trip circuit failure raises an HMI alarm and output(s).

81HBL2 Inrush Restraint

Where second harmonic current is detected (i.e. during transformer energisation) user selectable elements can be blocked and an alarm given.

81 Under/Overfrequency

Each element has settings for pickup level, drop-off level and Definite Time Lag (DTL) delays. Operates if frequency exceeds setting for duration of delay. Typically applied in load shedding schemes.

Standard Version – Plus 79 Auto-Reclose

A high proportion of faults on an overhead line network are transient and can be cleared quickly by high speed tripping followed by an automated circuit breaker reclose sequence.

The function provides independent phase fault and earth fault / sensitive earth fault sequences of up to 5 trip i.e. 4 reclose attempts before lockout. An auto-reclose sequence can be user set to be initiated from internal protection operation or via binary input from an external protection.

Programmable Logic

The user can map binary inputs, protection elements, LEDs and binary outputs together in a logical scheme. Up to 4 logic equations can be defined using standard logic functions e.g. Timers, AND/OR gates, Inverters and Counters to provide the user required functionality. Each logic equation output can be used for alarm & indication and/or tripping.

Virtual Inputs/Outputs

There are 8 virtual inputs/outputs to provide internal logical states to assist in the application of the functions. Each virtual I/O can be assigned in the same way as a physical I/O.

Circuit Breaker Maintenance

Two circuit breaker operations counters are provided to assist with maintenance scheduling. The maintenance counter records the overall number of operations and the delta counter records the number of operations since the last reset.

An I²t summation counter provides a measure of the contact wear indicating the total energy interrupted by the circuit breaker contacts.

Each counter has a user set target operations count which, when reached, can be mapped to raise alarms/ binary outputs. A CB Trip Time meter is also available, which measures the time between the trip or open command being issued and the auxiliary contacts changing state.

Control Mode

The relay has a control menu with access to commonly used command operations (except 7SR1102-1*A12-*AA0 models). Access to the control commands is restricted by a 4 character control function password. Each command requires a select then execute operation, if the execute operation is not performed within a time window the command is aborted. The following control functions are available:

- CB Operation
- Auto Reclose In/Out
- Auto Reclose Trip & Reclose
- Auto Reclose Trip & Lockout
- SEF In/Out
- Inst Prot In/Out
- Hot Line Working In/Out



Fig 8. Example of Control Function View

Data Acquisition - Via Communication Interface

Sequence of event records

Up to 1000 events are stored and time tagged to 1ms resolution.

Fault Records

The last 10 fault records are displayed on the relay fascia and are also available through the communication interface, with time and date of trip, measured quantities and type of fault. (5 records for 7SR1102-1*A12-*AA0 versions).

Waveform recorder

The waveform recorder stores analogue data for all poles and the states of protection functions, binary inputs, LEDs and binary outputs with user settable pre & post trigger data. A record can be triggered from protection function, binary input or via data communications. 10 records of 1 second duration are stored. (5 records for 7SR1102-1*A12-*AA0 versions).

Demand Metering

A record of demand is available. The demand minimum, maximum and average values for currents, frequency and if applicable, voltages and real, reactive and apparent power, over a user selectable period of time, is displayed and available via data communications. Typically this is set as a rolling value for the last 24 hours.

Real Time Clock

The time and date can be set and are maintained while the relay is de-energised by a back up storage capacitor. The time can be synchronized from a binary input pulse or the data communication channel.

Serial Communications

The relay offers a USB serial port as standard on the front of all units. All of the relays functions can be set on a PC using Reydisp Evolution via the USB port. The connection is made with a USB cable and operates with a 'plug and play' connection, so no pre-setting of the relay is required. The front port can be switched off or set to use either the DNP3.0, MODBUS-RTU, IEC60870-5-103 and ASCII protocols for testing purposes.

A rear RS485 electrical connection is available on all units for system interface connections. An internal terminating resistor is provided, which can be connected into the circuit by adding a wire loop between the relevant terminals.

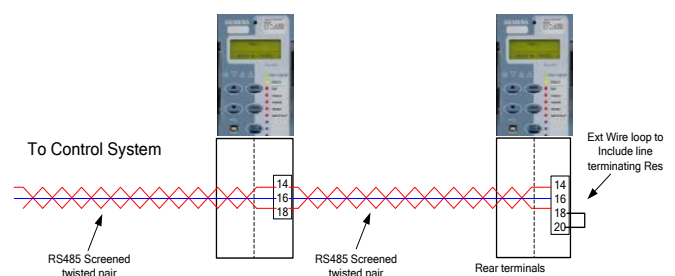


Fig 9. Typical RS485 connection

The rear RS485 can be user selected to be OFF, IEC60870-5-103, MODBUS RTU or DNP3.0 protocol.

IEC 61850

IEC61850 communication is available through an optional EN100 communication module. The EN100 Module can be ordered with either 2x Electrical RJ45 or 2x Fibre optic LC Ethernet ports.

Information on IEC61850 functionality can be found in the following 7SR11/12 documents:

Model Implementation Conformance Statement (MICS)

Protocol Implementation (PICS, PIXIT & TICS)

Reydisp Evolution

Reydisp Evolution is a Windows based software tool, providing the means for the user to apply settings, interrogate settings and retrieve events and disturbance waveforms from the device and is common to the entire range of Reyrolle protection relays.

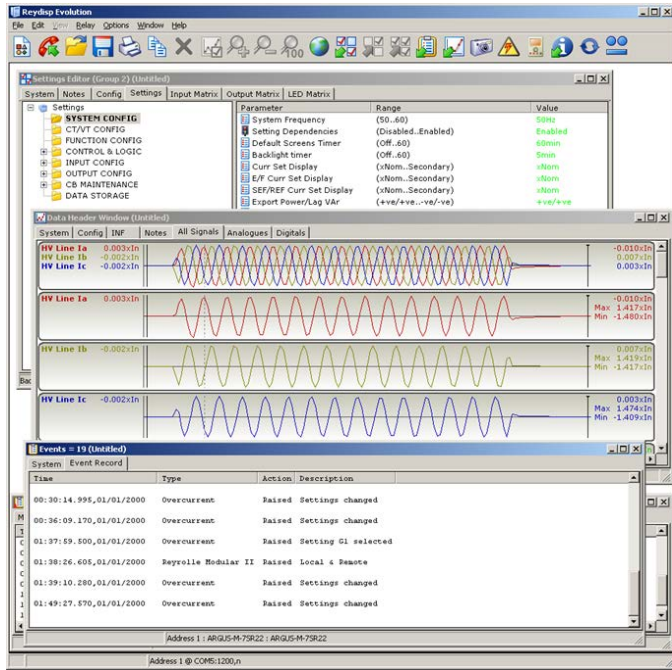


Fig 10. Typical Reydisp Evolution Screenshot

Language Editor

The Language editor software gives the user the ability to customize the text displayed in the relays, Menu structure and instrumentation views. The tool allows a language file to be created and transferred to the relay also containing Western European characters.

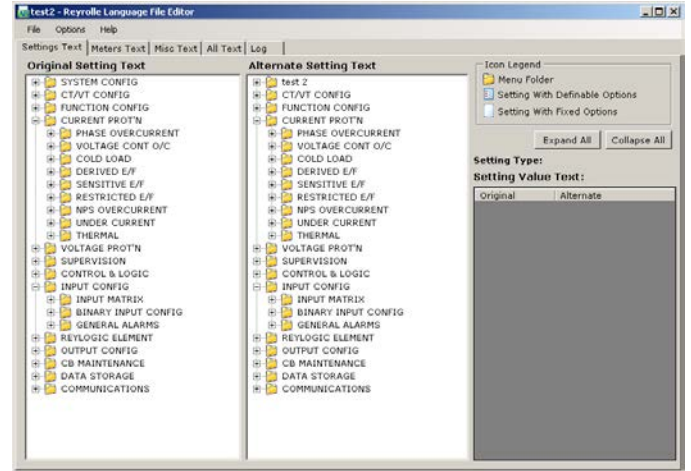


Fig 11. Typical Language Editor Screenshot

Communications Editor

To facilitate easier interfacing to a substation the relays default Protocol configuration may be modified using the communication editor software tool.

The communication editor is a PC based software package provided within the Reydisp software suite which allows modification of the IEC60870-5-103, DNP 3.0 and MODBUS Protocols.

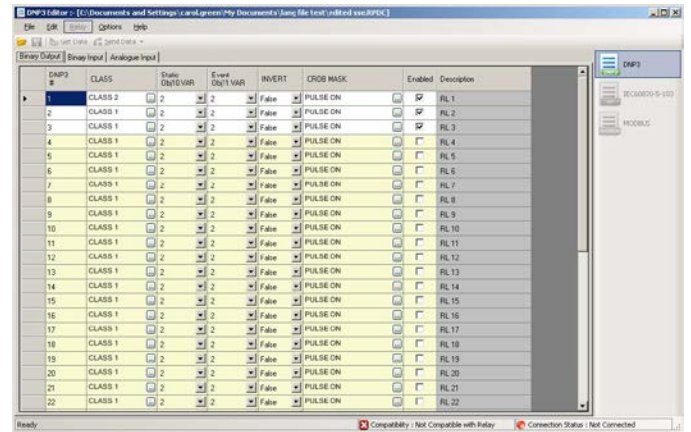


Fig 12. Typical Communications Editor Screenshot

Reydisp Manager

Reydisp Manager provides the functionality of Reydisp Evolution and also provides project management of multiple devices to allow engineering of IEC61850 projects. It also provides access to user logic within the devices via an easy to use graphical interface.

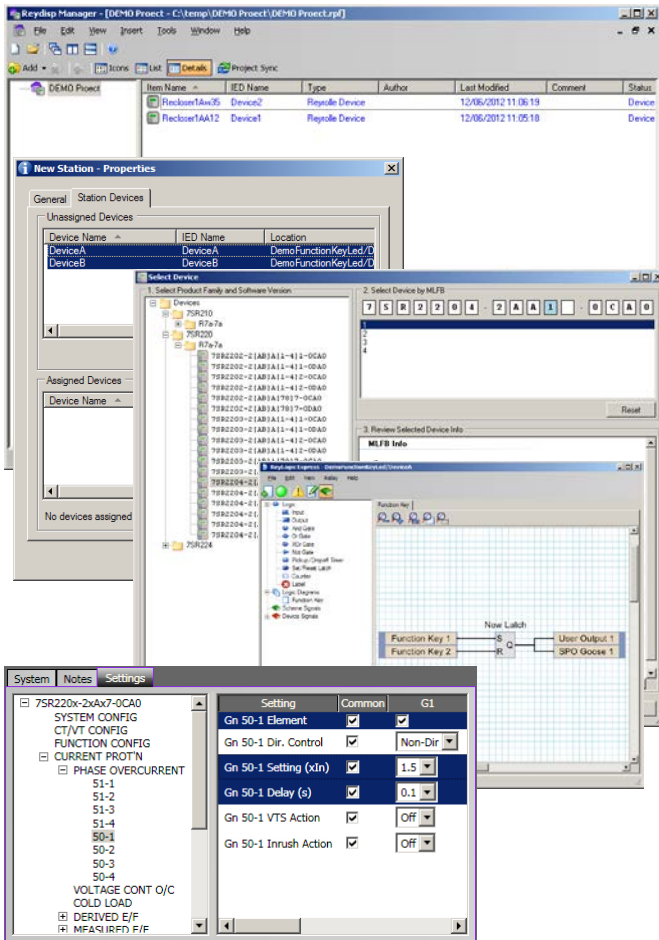


Fig 3. Typical Reydisp Manager screenshots

Construction

The relay is housed in a 4U high, size E4 or E6 (Optional IEC61850 model) case with a removable clear fascia cover. The fascia cover can be ordered with or without two push buttons to allow the user to view the settings and instruments without removing the cover.

Two handles are provided to allow the relay to be withdrawn from its case, contacts in the case ensure that the CT circuits and normally closed contacts remain short circuited when the relay is withdrawn.

The rear terminal blocks comprise M4 female terminals for ring crimp wire connections, to provide a secure and reliable termination.



Fig 13. Rear view of relay (E4 Case)



Fig 14. Rear view of relay with 2x LC Fibre Optic ports (E6 Case with IEC61850)



Fig 15. Front view of relay (E4 Case with push buttons)



Fig 16. Front view of relay (E6 Case with IEC61850)

User Interface

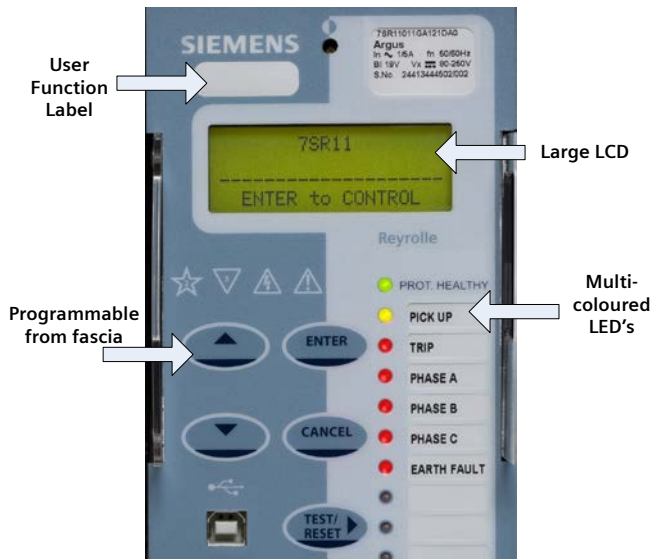


Fig 17. User Interface

The operator interface is designed to provide a user friendly method of controlling, viewing menus, entering settings and retrieving data from the relay. Five buttons are provided for navigation around the menu structure.

LCD

A 4 line by 20 character liquid crystal display with power save operation indicates the relay identifier, settings, instrumentation, fault data and control commands. Up to 6 user programmable general alarms can be configured to display your own indications on the LCD.

LEDs

A green steadily illuminated LED indicates the 'Protection Healthy' condition. 9 user programmable LEDs are available eliminating the need for expensive panel mounted pilot lights and associated wiring. Each LED is tri-color (red, green, yellow) allowing for clear indication of the associated function's state and has a label insert for identification.

Relay Information

The device is identified by the rating label on the fascia. The user can also give the device its own identity by editing the 'Relay Identifier' displayed on the LCD or space is provided to place a slip in label giving the relays function.

Technical Data

For full technical data refer to the Performance Specification Section of the Technical Manual.

Inputs and Outputs

Current Inputs

| | |
|---------------------------------------|---|
| Quantity | 3 x Phase & 1 x Earth or Sensitive Earth |
| Rated Current In | 1/5A |
| Measuring Range | 80 x In |
| Instrumentation $\geq 0.1 \times I_n$ | $\pm 1\% I_n$ |
| Frequency | 50/60Hz |
| Thermal Withstand: | |
| Continuous | 3 x In |
| 10 Minutes | 3.5 x In |
| 2 Minutes | 6 x In |
| 1 Second | 100A (1A) 350A (5A) |
| 1 Cycle | 700A (1A) 2500A (5A) |
| Burden @ In | $\leq 0.02VA$ (1A phase and Earth element) $\leq 0.2VA$ (5A phase and earth element) |

Voltage Inputs

| | |
|---------------------------------------|----------------|
| Nominal | 40...160 Vrms |
| Operating Range | 0... 200 Vrms |
| Instrumentation $\geq 0.8 \times V_n$ | $\pm 1\% V_n$ |
| Burden @ 110V | $\leq 0.06 VA$ |
| Overtoltage Withstand | 300 Vrms |

Auxiliary Supply

| | | |
|--|--|----------------------------|
| Rated DC Voltage | 24-250V DC Operating Range 19.2 to 275V | |
| Allowable superimposed ac component | 12% of DC voltage | |
| Rated AC Voltage | 100-230 VAC 50/60Hz Range 80 to 253 V rms AC 50/60Hz $\pm 5\%$ | |
| Power Consumption: | Min (DC) | 3.6W(6.1W with IEC61850) |
| | Max (DC) | 8.4W (11W with IEC61850) |
| | Min (AC) | 9VA (14.5VA with IEC61850) |
| | Max (AC) | 17VA (23VA with IEC61850) |
| Allowable breaks/dips in supply (collapse to zero) | DC | 50ms |
| | AC | 2.5/3 cycles @50/60Hz |

Binary Inputs

| | | |
|-------------------------------|---|---------------------|
| Number | 3,4 or 6 | |
| Operating Voltage | 19V dc | Range 17 to 320V dc |
| | 88V dc | Range 70 to 320V dc |
| Maximum current for operation | 1.5mA dc | |
| Pick Up Delay | User Selectable 0 to 14,400,000ms (up to 4 hours) | |
| Drop Off Delay | User Selectable 0 to 14,400,000ms (up to 4 hours) | |

Binary Outputs

| | | |
|--|--|---------------------|
| Number | 5 or 8 (3 change over contacts) | |
| Operating Voltage | Voltage Free | |
| Operating Mode | User selectable - Self or Hand/Electrical Reset or pulsed. | |
| Operating Time from Energizing Binary Input | <20ms | |
| Making Capacity: | | |
| Carry continuously | 5A ac or dc | |
| Make and carry (L/R ≤ 40 ms and V ≤ 300 V) | 20A ac or dc for 0.5s 30A ac or dc for 0.2s | |
| Breaking Capacity (≤ 5 A and ≤ 300 V): | | |
| AC Resistive | 1250 VA | |
| AC Inductive | 250 VA | at p.f. ≤ 0.4 |
| DC Resistive | 75 W | |
| DC Inductive | 30 W | at L/R ≤ 40 ms |
| | 50 W | at L/R ≤ 10 ms |

Unit Design

| | |
|-----------------------------------|---|
| Housing | E4 or E6(see dimension drawing) |
| Indication | 20 Character 4 line Display Relay Healthy LED 9 Tri Coloured User Programmable Self or Hand Reset LED's |
| With-drawable Element | Yes |
| User Interface | 5 Navigation Keys |
| Weight | Typical 3.1Kg |
| IP Rating installed with cover | IP 51 from front |
| IP Rating installed without cover | IP 20 from front |

Data Communication Interface

| | |
|--|---|
| Communication Port | Front USB Type B Rear RS485 2 wire electrical IEC61850 optional ports: 2x Electrical RJ45 Ethernet 2x LC Fibre Optic Ethernet |
| Protocols | IEC60870-5-103 MODBUS RTU (Serial) DNP3.0 O (Serial) IEC61850 - optional |
| Fibre Optic Ethernet Data Communication Interface (IEC 61850 Option) | |

EN100 Fibre Optic Data Communication Interface (IEC 61850 Option)

| | |
|---------------------|--|
| Physical | layer Fibre-optic |
| Connectors | Duplex LC 100BaseF in acc. With IEEE802.3 |
| Recommended fibre | 62.5/125 µm glass fibre with Duplex-LC connector |
| Transmission Speed | 100 Mbits/s |
| Optical Wavelength | 1300 nm |
| Bridgeable distance | 2 km |

EN100 Electrical Ethernet Data Communication Interface (IEC 61850 Option)

| | |
|--------------------------------------|--------------------------------------|
| Physical | Electrical |
| Connectors | RJ45 100BaseF in acc. With IEEE802.3 |
| Transmission Speed | 100 Mbits/s |
| Test Voltage (with regard to socket) | 500 VAC 50 Hz |
| Bridgeable distance | 20m |

Data Storage

| | |
|-----------------|---|
| Fault Record | 10 (5 for 7SR1102-1*A12-*AA0). |
| Waveform Record | 10 x 1sec 2 x 5sec 5 x 2sec 1 x 10sec (5x1sec, 2x2sec, 1x5sec for 7SR1102-1*A12-*AA0) Pre trigger 10...90% |
| Events | 1000 1ms Resolution |

Mechanical Tests

Vibration (Sinusoidal)

IEC 60255-27 & IEC 60255-21-1 Class I

| Type | Level | Variation |
|--------------------|--------|-----------|
| Vibration response | 0.5 gn | ≤ 5 % |
| Vibration response | 1.0 gn | ≤ 5 % |

Shock and Bump

IEC 60255-27 & IEC 60255-21-2 Class I

| Type | Level | Variation |
|-----------------|--------------|-----------|
| Shock response | 5 gn, 11 ms | ≤ 5 % |
| Shock withstand | 15 gn, 11 ms | ≤ 5 % |
| Bump test | 10 gn, 16 ms | ≤ 5 % |

Seismic

IEC 60255-27 & IEC 60255-21-3 Class I

| Type | Level | Variation |
|------------------|--|-----------|
| Seismic response | X-plane - 3.5mm displacement below crossover freq (8-9Hz) 1gn and above Y-plane - 1.5mm displacement below crossover freq (8-9Hz) 0.5gn above | ≤ 5 % |

Mechanical Classification

| | |
|------------|-----------------------------|
| Durability | >10 ⁶ operations |
|------------|-----------------------------|

Electrical Tests

Insulation

IEC 60255-27

| Type | Level |
|--------------------------------|-------------------------|
| Between any terminal and earth | 2.0 kV AC RMS for 1 min |
| Between independent circuits | 2.0 kV AC RMS for 1 min |
| Across normally open contacts | 1.5 kV AC RMS for 1 min |

Slow damped Oscillatory Wave (High Frequency Disturbance)

IEC 60255-26

| Type | Level | Variation |
|----------------------------|--------|-----------|
| Common (longitudinal) mode | 2.5 kV | ≤ 5 % |
| Series (transverse) mode | 1.0 kV | ≤ 5 % |

Electrostatic Discharge

IEC 60255-26

| Type | Level | Variation |
|---------------------|----------------------------------|-----------|
| Front Cover Fitted | Class IV, 15 kV Air Discharge | ≤ 5 % |
| Front Cover Removed | Class III, 8 kV Air Discharge | ≤ 5 % |

Fast Transients

IEC 60255-26)

| 5/50 ns 5 kHz repetitive | Level | Variation |
|---------------------------------|-------|-----------|
| Analog Inputs, Aux supply & I/O | 4kV | ≤ 5 % |
| RS485 port | 2kV | ≤ 5 % |

Surge Immunity

IEC 60255-26

| Type | Level | Variation |
|--------------------------------------|----------|--------------|
| Analog Inputs: Line to Earth | 4.0 kV | ≤ 10% |
| Case, Aux Power & I/O: Line to Earth | 2.0 kV | ≤ 10% |
| RS485 Comms port: Line to Earth | 1.0 kV | No Data Loss |
| Analog Inputs: Line to Line | 1.0 kV | ≤ 10% |
| Case, Aux Power & I/O: Line to Line | 1.0 kV * | ≤ 10% |

* Note 50ms DTL pick-up delay applied to binary inputs

Conducted Radio Frequency Interference Immunity

IEC 60255-26

| Type | Level | Variation |
|----------------|-------|-----------|
| 0.15 to 80 MHz | 10 V | ≤ 5 % |

Radiated Radio Frequency Emissions

IEC 60255-26

| Type | Limits at 10 m, Quasi-peak |
|------------------|----------------------------|
| 30 to 230 MHz | 40 dB(μV) |
| 230 to 10000 MHz | 47 dB(μV) |

Conducted Radio Frequency Emissions

| Type | Limits | |
|-----------------|------------|-----------|
| | Quasi-peak | Average |
| 0.15 to 0.5 MHz | 79 dB(μV) | 66 dB(μV) |
| 0.5 to 30 MHz | 73 dB(μV) | 60 dB(μV) |

Radiated Immunity

IEC 60255-26

| Type | Level |
|---------------------------------------|--------|
| 80 MHz to 1000 MHz Sweep | 10 V/m |
| 1.4GHz to 2.7GHz Sweep | 10V/m |
| 80,160,380,450,900,1850,2150 MHz Spot | 10V/m |

Climatic Tests

Temperature

IEC 60255-1 & IEC 60068-2-1/2

| | |
|-----------------|------------------|
| Operating Range | -10 °C to +55 °C |
| Storage range | -25 °C to +70 °C |

Humidity

IEC 60255-1 & IEC 60068-2-78

| | |
|------------------|---|
| Operational test | 56 days at 40 °C and 93 % relative humidity |
|------------------|---|

Cyclic Temperature and Humidity

IEC 60255-1 & IEC 60068-2-30

| | |
|------------------|---|
| Operational test | 25 °C to 55 °C (outdoor equipment) and 97/93 % relative humidity. 6 x 24h (12h+12h) cycles. |
|------------------|---|

Performance

27/59 Under/Over Voltage

| | |
|-------------------------------|---|
| Number of Elements | 4 Under or Over |
| Operate | Any phase or All phases |
| Voltage Guard | 1, 1.5...200V |
| Setting Range Vs | 5, 5.5...200V |
| Hysteresis Setting | 0.0.1...80% |
| Vs Operate Level | 100% Vs, ±1% or ±0.25V |
| Reset Level: | |
| Overvoltage | $= (100\% - \text{hyst}) \times V_{op}$, ±1% |
| Undervoltage | $= (100\% + \text{hyst}) \times V_{op}$, ±1% |
| Delay Setting td | 0.00, 0.01...20, 20.5...100, 101...1000, 1010...10000, 10100...14400s |
| Basic Operate Time : | |
| 0 to 1.1xVs | 73ms ±10ms |
| 0 to 2.0xVs | 63ms ±10ms |
| 1.1 to 0.5xVs | 58ms ±10ms |
| Operate time following delay. | Tbasic +td , ±1% or ±10ms |
| Inhibited by | Binary or Virtual Input VT Supervision Voltage Guard |

32 Power (7SR12)

| | |
|-------------------------------|---------------------------|
| Number of Elements | 2 Forward or Reverse |
| Operate | P, Q or S |
| U/C Guard | 0.05 to 1.0 x In |
| Setting Range Ss | 0.05 to 2.0 x Sn |
| Operate Level Sop | 100% Ss, ±5% or ±2% Sn |
| Reset Level: - | ≥95% Sop |
| Basic Operate Time: - | |
| 1.1 x Ss (over) | 60ms ± 10ms |
| 2.0 x Ss (over) | 45ms ± 10ms |
| 0.5 x Ss (under) | 30ms ± 10ms |
| Delay Setting td | 0 to 14400s |
| Operate time following delay. | tbasic +td , ±1% or ±10ms |
| Inhibited by | Undercurrent Guard, VTS |

32S Sensitive Power (7SR12 SEF)

| | |
|-------------------------------|---------------------------|
| Number of Elements | 2 Forward or Reverse |
| Operate | P, Q or S |
| U/C Guard | 0.005 to 1.0 x In |
| Setting Range Ss | 0.005 to 2.0 x Sn |
| Operate Level | 100% Ss ± 5% or ± 2% Sn |
| Reset Level: - | ≥95% Sop |
| Basic Operate Time: - | |
| 1.1 x Ss (over) | 60ms ± 10ms |
| 2.0 x Ss (over) | 45ms ± 10ms |
| 0.5 x Ss (under) | 30ms ± 10ms |
| Delay Setting td | 0 to 14400s |
| Operate time following delay. | tbasic +td ± 1% or ± 10ms |
| Inhibited by | Undercurrent Guard, VTS |

37 Undercurrent

| | |
|-------------------------------|---|
| Number of Elements | 2 Phase and 2 EF/SEF |
| Operate | Any phase or ALL |
| Setting Range Is | Phase and EF 0.05, 0.10...5.0 x In SEF 0.005, 0.010...5.0 x In |
| Operate Level | 100% Is, ±5% or ±1% x In |
| Current Guard | Phase 0.05, 0.1...5.0 x In |
| Delay Setting td | 0.00, 0.01...20, 20.5...100, 101...1000, 1010...10000, 10100...14400s |
| Basic Operate Time: | |
| 1.1 to 0.5xIn | 35ms ±10ms |
| Operate time following delay. | Tbasic +td , ±1% or ±10ms |
| Overshoot Time | < 40ms |
| Inhibited by | Binary or Virtual Input |

46 Negative Phase Sequence Overcurrent

| | |
|----------------------------------|---|
| Number of Elements | DT & IT |
| DT Setting Range Is | 0.05, 0.10...4.0 x In |
| DT Operate Level | 100% Is, ±5% or ±1% x In |
| DT Delay Setting td | 0.00, 0.01...20, 20.5...100, 101...1000, 1010...10000, 10100...14400s |
| DT Basic Operate Time | |
| 0 to 2 xIs | 40ms ±10ms |
| 0 to 5 xIs | 30ms ±10ms |
| DT Operate time following delay. | Tbasic +td , ±1% or ±10ms |
| IT Char Setting | IEC NI, VI, EI, LTI ANSI MI, VI, EI & DTL |
| IT Setting Range | 0.05..2.5 |
| Tm Time Multiplier | 0.025, 0.030...1.6, 1.7...5, 6...100 |
| Char Operate Level | 105% Is, ±4% or ±1% In |
| Overshoot Time | < 40ms |
| Inhibited by | Binary or Virtual Input |

47 Negative Phase Sequence

| | |
|-------------------------------|---|
| Number of Elements | 2 |
| Setting Range Vs | 1, 1.5...90V |
| Hysteresis Setting | 0, 0.1...80% |
| Operate Level | 100% Vs, ±2% or ±0.5V |
| Delay Setting td | 0.00, 0.01...20, 20.5...100, 101...1000, 1010...10000, 10100...14400s |
| Basic Operate Time | |
| 0V to 1.5xVs | 80ms ±20ms |
| 0V to 10xVs | 55ms ±20ms |
| Operate time following delay. | Tbasic +td , ±2% or ±20ms |
| Overshoot Time | < 40ms |
| Inhibited by | Binary or Virtual Input |

49 Thermal Overload

| | |
|-----------------------|---|
| Operate levels | Operate and Alarm |
| Setting Range Is | 0.10,0.11...3.0 x In |
| Operate Level | 100% Is, ±5% or ±1%xIn |
| Time Constant Setting | 1,1.5...1000min |
| Operate time | $t = \tau \times \ln \left\{ \frac{I^2 \cdot I_p^2}{I^2 \cdot (k \times I_B)^2} \right\}$ ±5% absolute or ±100ms where Ip = prior current |
| Alarm Level | Disabled, 50,51...100% |
| Inhibited by | Binary or Virtual Input |

50 (67) Instantaneous & DTL OC&EF (Directional)

| | |
|--|--|
| Operation – 7SR12 only | Non directional, Forward or reverse |
| Elements | Phase, Derived Earth, Measured Earth & SEF |
| Number of Elements 2 x 7SR11 4 x 7SR12 | 2/4 x OC 2/4 x Derived EF 'N' 2/4 x Measured EF 'G' where fitted 2/4 x SEF where fitted |
| Setting Range Is | 0.05,0.06...50 x In SEF 0.005...5 x In |
| Time Delay | 0.00...14400s |
| Operate Level Iop | 100% Is, ±5% or ±1%xIn |
| Reset level | ≥ 95 % Iop |
| Operate time: 50 50N | 0 to 2xIs – 35ms, ±10ms, 0 to 5xIs – 25ms, ±10ms 0 to 2xIs – 40ms, ±10ms, 0 to 5xIs – 30ms, ±10ms |
| Operate time following delay | Tbasic +td , ±1% or ±10ms |
| Inhibited by | Binary or Virtual Input Inrush detector VT Supervision |

51(67) Time Delayed OC&EF (Directional)

| | |
|--|---|
| Operation – 7SR12 only | Non directional, Forward or reverse |
| Elements | Phase, Derived Earth, Measured Earth & SEF |
| Number of Elements 2 x 7SR11 4 x 7SR12 | 2/4 x OC 2/4 x Derived EF 'N' 2/4 x Measured EF 'G' 2/4 x SEF where fitted |
| Characteristic | IEC NI,VI,EI,LTl ANSI MI,VI,EI & DTL |
| Setting Range Is | 0.05,0.06...2.5 x In SEF 0.005...0.5 x In |
| Time Multiplier | 0.025,0.030...1.6,1.7...5,6...100 |
| Time Delay | 0,0.01... 20s |
| Operate Level | 105% Is, ±4% or ±1%xIn |
| Minimum Operate time IEC | $t_{op} = \frac{K}{\left[\frac{I}{I_s}\right]^a - 1} \times Tm$ |
| ANSI | $t_{op} = \left[\frac{A}{\left[\frac{I}{I_s}\right]^b - 1} + B \right] \times Tm$ |
| | ± 5 % absolute or ± 30 ms |

| | |
|----------------|--|
| Follower Delay | 0 - 20s |
| Reset | ANSI decaying, 0 – 60s |
| Inhibited by | Binary or Virtual Input Inrush detector VT Supervision |

51V Voltage Controlled Overcurrent

| | |
|---------------|------------------------|
| Setting Range | 5,5.5...200V |
| Operate Level | 100% Vs, ±5% or ±1%xVn |
| Multiplier | 0.25.0.3...1 x 51Is |
| Inhibited by | VT Supervision |

50AFD Arc Flash Detector

| | |
|-------------------|--|
| Number of Zones | 6, segregated outputs with and without current supervision. |
| Setting Range Is | 1,2...10 x In |
| Operate Level Iop | 100% Is, ±5% or ±1%xIn |
| Reset level | ≥ 95 % Iop |
| Operate time: | 50AFD Overcurrent <16ms AFD Zone Operate Time <25ms |

50BF Circuit Breaker Fail

| | |
|------------------------------|--|
| Operation | Current check - Phase and Measured Earth with independent settings Mechanical Trip CB Faulty Monitor |
| Setting Range Is | 0.05,0.055...2.0 x In |
| 2 Stage Time Delays | Timer 1 20...60000ms Timer 2 20...60000ms |
| Operate Level | 100% Is, ±5% or ±1%xIn |
| Disengaging time | < 20ms |
| Operate time following delay | Tcbf ±1% or ±2ms |
| Triggered by | Any function mapped as trip contact. |
| Inhibited by | Binary/Virtual Input |
| Timer By pass | Yes, 50BF CB Faulty Input |

55 Power factor (7SR12)

| | |
|------------------------------|-------------------------------|
| Number of Elements | 2 |
| Operation | Under or Over, Lead or Lag |
| U/C Guard | 0.05 to 1.0 |
| Setting Range PFs | 0.05 to 0.99 |
| Time Delays | 0 to 14400s |
| Operate Level | ± 0.05 |
| Basic Operate time | ≤ 70ms |
| Operate time following delay | tbasic +td ± 1% or ± 10ms |
| Inhibited by | Undercurrent Guard, VTS |

59N Neutral Voltage Displacement

| | |
|----------------------------------|---------------------------------------|
| Number of Elements | DT & IT |
| DT Setting Range Is | 1...100V |
| DT Operate Level | 100% Vs, $\pm 2\%$ or $\pm 0.5V$ |
| DT Delay Setting td | 0 ...14400s |
| DT Basic Operate Time | |
| 0V to 1.5 x Vs | 76ms ± 20 ms |
| 0V to 10 x Vs | 63ms ± 20 ms |
| DT Operate time following delay. | Tbasic +td , $\pm 1\%$ or ± 20 ms |
| IT Char Setting | IDMTL & DTL |
| IT Setting Range | 1...100V |
| Tm Time | 0.1...140 |
| Multiplier(IDMT) | |
| Delay (DTL) | 0...20s |
| Reset | ANSI Decaying, 0...60s |
| Char Operate Level | 105% Vs, $\pm 2\%$ or $\pm 0.5V$ |
| Inhibited by | Binary or Virtual Input |

60 Supervision

| | |
|----|---|
| CT | 7SR11 Current 7SR12 Current or Vnps & Inps |
| VT | nps/zps |

64H Restricted Earth Fault

| | | |
|--------------------|--|---|
| Setting Range | SEF input | 0.005, 0.006 ... 0.100, 0.105 ... 0.950 xIn |
| | EF input | 0.05, 0.055... 0.95 xIn |
| Operate Level | 100% Is, $\pm 5\%$ or $\pm 1\% \times In$ | |
| Time Delay | 0.00... 14400s | |
| Basic Operate Time | 0 to 2 xIs 45ms ± 10 ms 0 to 5 xIs 35ms ± 10 ms | |
| Inhibited by | Binary or Virtual Input | |

74T/CC Trip/Close Circuit Supervision

| | |
|---------------------------------|------------------------|
| Number of supervisable circuits | 3 x Trip and 3 x Close |
| Number of BI's Required | 1 or 2 per function |

79 AutoReclose

| | |
|----------------------|----------------------------|
| Operating Mode | Phase, Earth, SEF External |
| Number of Reclosures | 4 |
| Number of Trips | 5 |
| Dead Time | 0...14400 |
| Reclaim Time | 0...600 |
| Lockout Reset | CB, Timer & BI |

81 Under/Over Frequency

| | |
|---------------------|----------------------|
| Number of Elements | 4 Under or Over |
| Under Voltage Guard | Yes/No |
| Setting Range Hz | 43,43.01...68Hz |
| Hysteresis Setting | 0, 0.1... 2% |
| Operate Level | 100% Fs ± 10 mHz |
| Operate Time | Typical <150ms |
| Vs Operate Delay | 0...14400s |

Control Functions

| | |
|------------|------------------------------|
| CB | Open/Close |
| Inst Prot | IN/OUT |
| EF | IN/OUT |
| SEF | IN/OUT |
| Hot Line | IN/OUT |
| Relay Mode | Local/Remote/Local or Remote |
| Reset | LED's & O/P's |

Not available in 7SR1102-1*A12-*AAO

CB Maintenance

| | |
|------------------------|----------------------------|
| Trip Counter | Total & Delta 0...10000 |
| Counts to AR Block | 0...10000 |
| Frequent Operations | 0...10000 |
| I ² t Alarm | 10...100000 |

Case Dimensions

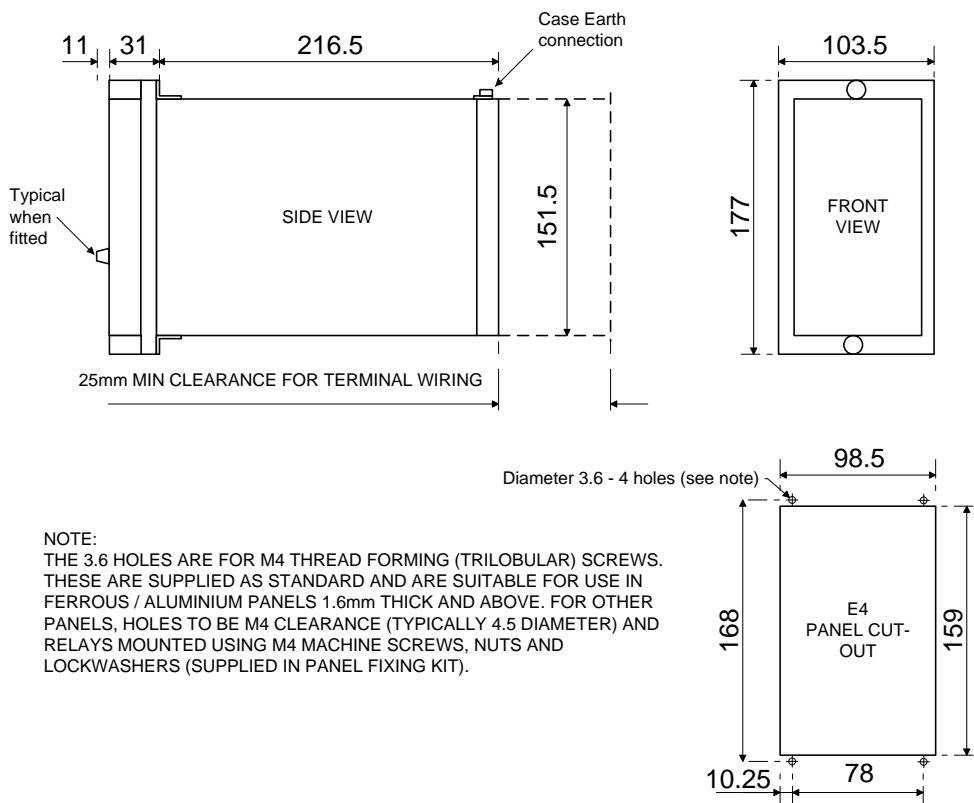
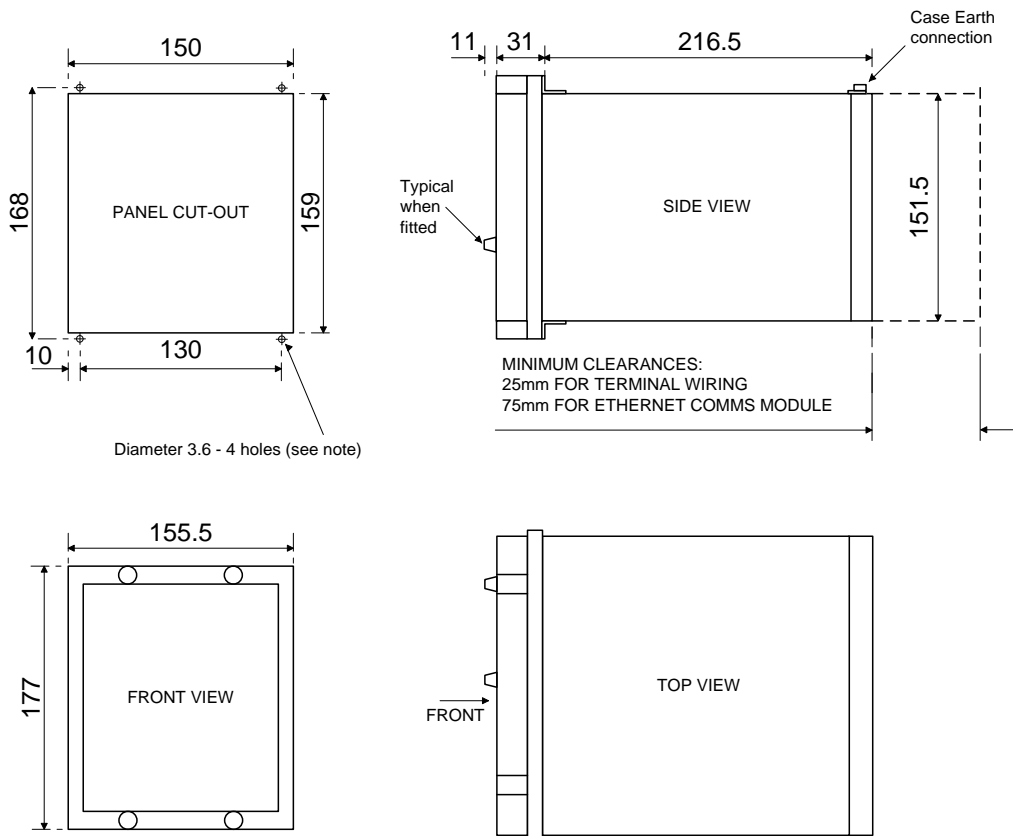


Fig 18. E4 Case Dimensions



NOTE:
THE 3.6 HOLES ARE FOR M4 THREAD FORMING (TRILOBULAR) SCREWS. THESE ARE SUPPLIED AS STANDARD AND ARE SUITABLE FOR USE IN FERROUS / ALUMINIUM PANELS 1.6mm THICK AND ABOVE. FOR OTHER PANELS, HOLES TO BE M4 CLEARANCE (TYPICALLY 4.5 DIAMETER) AND RELAYS MOUNTED USING M4 MACHINE SCREWS, NUTS AND LOCKWASHERS (SUPPLIED IN PANEL FIXING KIT).

Fig 19. E6 Case Dimensions

7SR11 Connection Diagram

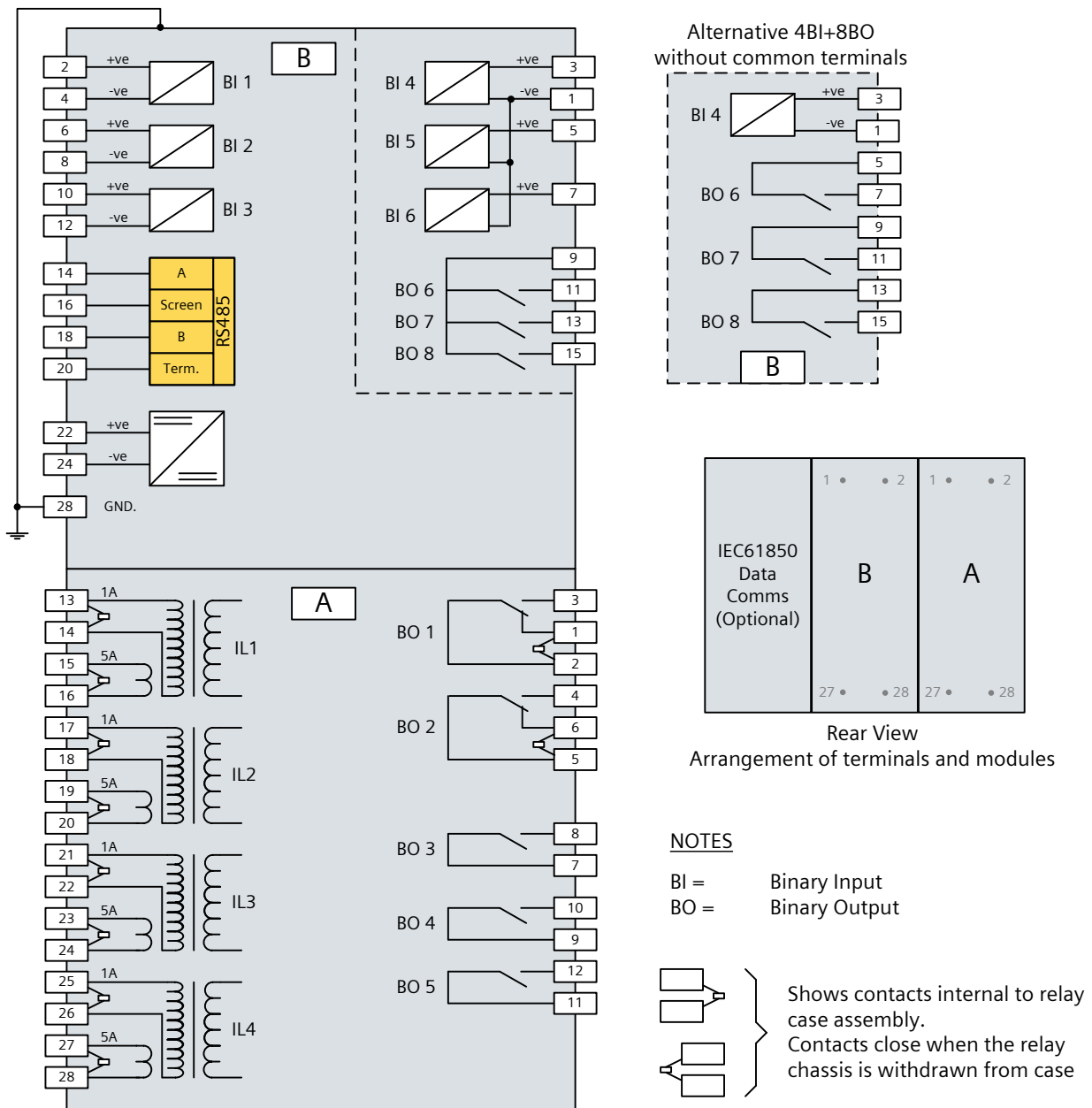


Fig20. Diagram showing 7SR11 relay with 4 CT inputs, up to 6 binary inputs and 8 binary outputs.

7SR12 Connection Diagram

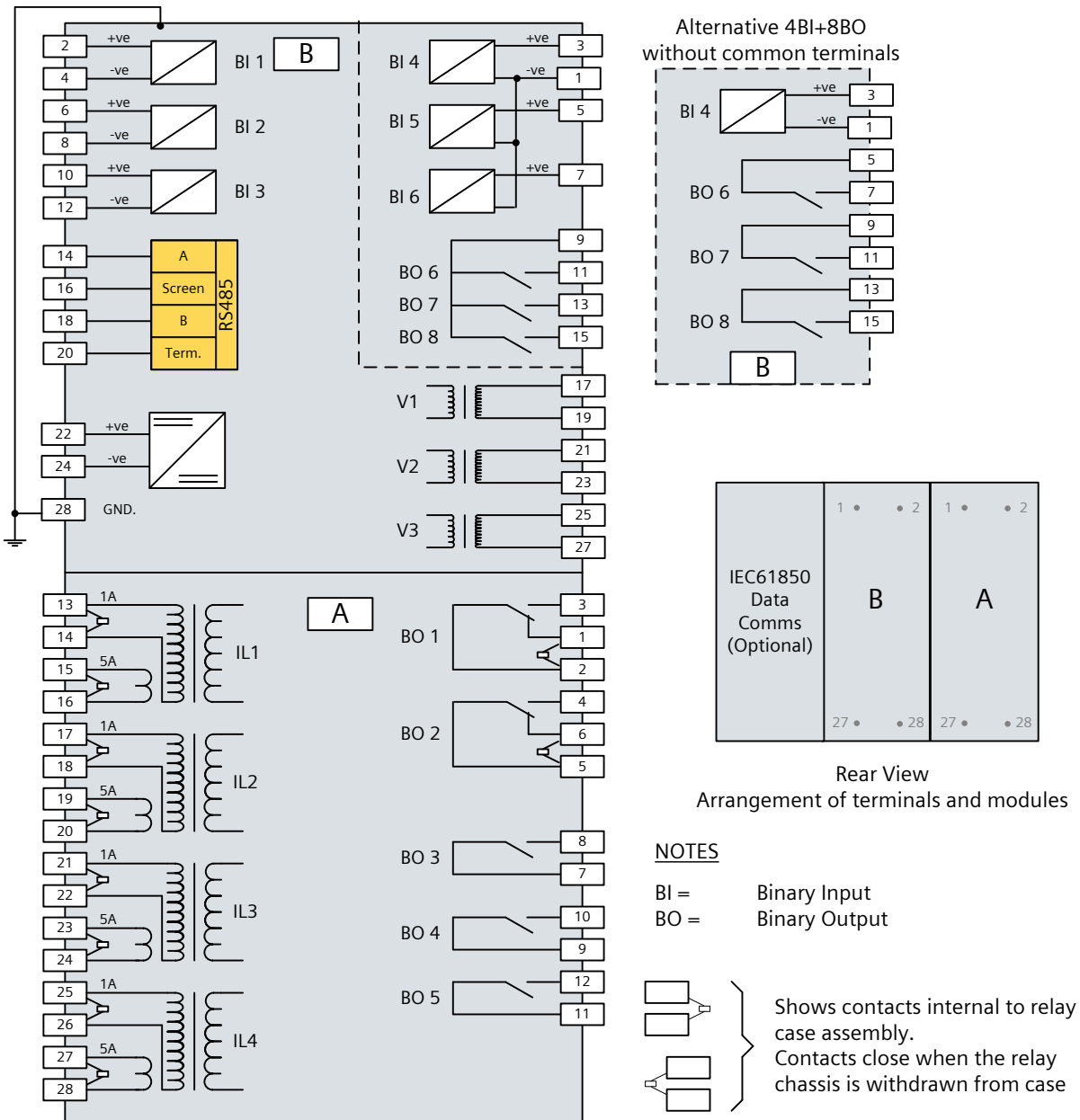


Fig21. Diagram showing 7SR12 relay with 4 CT inputs, 3 VT inputs, up to 6 binary inputs and 8 binary outputs.

Ordering Information – 7SR11 Argus Non-Directional Overcurrent

Product description Variants

Order No.

Nondirectional O/C Relay (Argus)

Overcurrent and earth fault
Protection relay

Protection Product

Overcurrent – Non Directional

Housing I/O and Fascia

1 CT, 3 Binary Inputs / 5 Binary Outputs, 10 LEDs
4 CT, 3 Binary Inputs / 5 Binary Outputs, 10 LEDs
4 CT, 6 Binary Inputs / 8 Binary Outputs, 10 LEDs
4 CT, 4 Binary Inputs / 8 Binary Outputs, 10 LEDs ⁷⁾

Measuring Input

1/5 A, 50/60Hz¹⁾
1/5 A, 50/60Hz with SEF Input ²⁾

Auxiliary voltage

PSU Rated: 24-250V DC / 100-230V AC. BI threshold 19V DC (Rated: 24-250V DC)
PSU Rated: 24-250V DC / 100-230V AC. BI threshold 88V DC (Rated: 110-250V DC)

Communication Interface

Standard version – included in all models, USB front port, RS485 rear port (E4 Case)
Standard version – plus additional rear electrical Ethernet RJ45 (x2), E6 Case ⁶⁾
Standard version – plus additional rear optical Ethernet duplex (x2), E6 Case ⁶⁾

Protocol

IEC 60870-5-103 Modbus RTU and DNP3 (user selectable)
IEC 60870-5-103 Modbus RTU, DNP3 and IEC 61850 (user selectable settings) ⁶⁾

Relay Cover

Standard Version – No Push Buttons
Push Buttons – Down and Right Arrows

Protection Function Packages

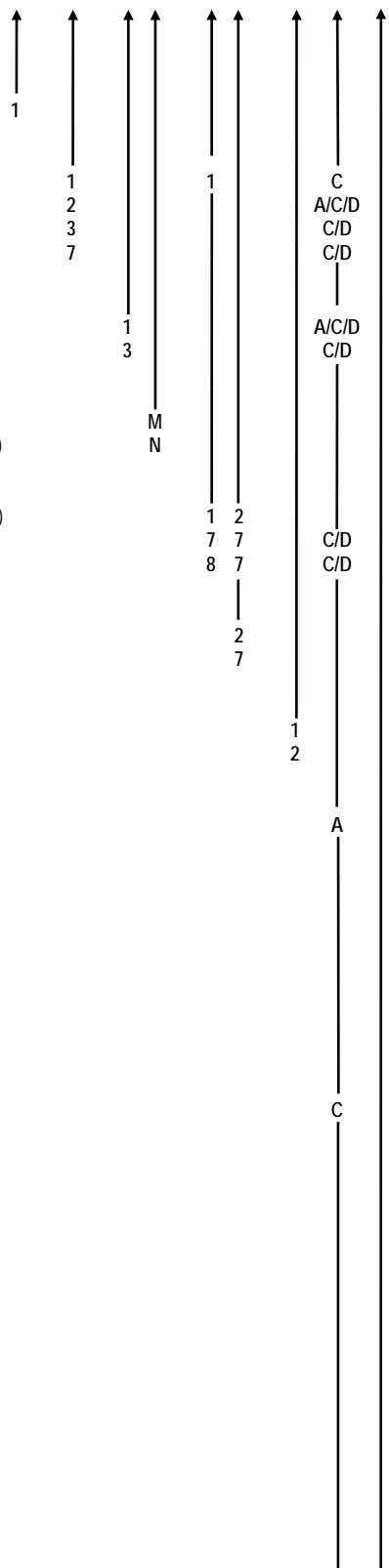
Basic version ⁵⁾

46BC³⁾ Broken conductor/load unbalance
50³⁾ Instantaneous phase fault overcurrent
50BF³⁾ Circuit breaker fail
50G/50N Instantaneous earth fault
51³⁾ Time delayed phase fault overcurrent
51G/51N Time delayed earth fault
60CTS³⁾ CT Supervision
64H High impedance REF
74T&C Trip & Close circuit supervision
86 Hand reset contacts

Standard version

37 Undercurrent
46BC³⁾ Broken conductor/load unbalance
46NPS³⁾ Negative phase sequence overcurrent
49³⁾ Thermal overload
50³⁾ Instantaneous phase fault overcurrent
50AFD Arc Flash Detection
50BF³⁾ Circuit breaker fail
50G/50N Instantaneous earth fault
50SEF²⁾ Instantaneous sensitive earth fault
51³⁾ Time delayed phase fault overcurrent
51G/51N Time delayed earth fault
51SEF²⁾ Time delayed sensitive earth fault
60CT³⁾ CT Supervision
64H High Impedance REF
74T/CC Trip and Close circuit supervision
81HBL²⁾ 2nd harmonic block/inrush restraint
51C³⁾ Cold load pickup
86 Hand reset contacts
Programmable logic

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
7 S R 1 1 0 □ - □ □ A □ □ - □ □ A 0



(continued on next page)

Ordering Information – 7SR11 Argus Non-Directional Overcurrent

| Product description | Variants | Order No. |
|---|---|--|
| <p>Nondirectional O/C Relay (Argus)</p> <p>continued from previous page</p> <p>Standard version – plus 79 Autoreclose</p> <p><u>Additional Functionality</u></p> <p>No Additional Functionality</p> | <p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16</p> <p>7 S R 1 1 0 <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> A <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> A 0</p> | <p style="margin-top: 150px;">↑</p> <p style="margin-top: 10px;">D</p> <hr style="width: 10px; border: 0.5px solid black; margin: 0 auto;"/> <p style="margin-top: 10px;">↑</p> <p style="margin-top: 10px;">A</p> |

- 1) 4CT is configured as 3PF + EF
- 2) 4CT is configured as 3PF + SEF/REF.
- 3) Functions only available in 4CT relay
- 4) Not available on SEF input
- 5) Protection function package ordering option A is only available on hardware variant 7SR1102-1XA12-XAA0-4CT 3BI 5B0
- 6) E4 case is standard, E6 case is required if IEC61850 model ordered
- 7) 4 Binary Input variant provides segregated Binary Outputs without a common terminal

Ordering Information – 7SR12 Argus Directional Overcurrent

Product description Variants Order No.

Directional O/C Relay (Argus)

Directional overcurrent and earth fault protection relay

Protection Product

Overcurrent – Directional

Housing I/O and Fascia

- 1 CT, 3 VT, 3 Binary Inputs / 5 Binary Outputs, 10 LEDs
- 4 CT, 3 VT, 3 Binary Inputs / 5 Binary Outputs, 10 LEDs
- 4 CT, 3 VT, 6 Binary Inputs / 8 Binary Outputs, 10 LEDs
- 4 CT, 3 VT, 4 Binary Inputs / 8 Binary Outputs, 10 LEDs ⁶⁾

Measuring Input

- 1/5 A, 40 to 160 V, 50/60Hz¹⁾
- 1/5 A, 40 to 160 V, 50/60Hz with SEF Input²⁾

Auxiliary voltage

- PSU Rated: 24-250V DC / 100-230V AC. BI threshold 19V DC (Rated: 24-250V DC)
- PSU Rated: 24-250V DC / 100-230V AC. BI threshold 88V DC (Rated: 110-250V DC)

Communication Interface

- Standard version – included in all models, USB front port, RS485 rear port (E4 Case)
- Standard version – plus additional rear electrical Ethernet RJ45 (x2), E6 Case ⁵⁾
- Standard version – plus additional rear optical Ethernet duplex (x2), E6 Case ⁵⁾

Protocol

- IEC 60870-5-103, Modbus RTU and DNP3 (user selectable)
- IEC 60870-5-103 Modbus RTU, DNP3 and IEC 61850 (user selectable settings) ⁵⁾

Relay Cover

- Standard Version – No Push Buttons
- Push Buttons – Down and Right Arrows

Protection Function Packages

- Standard version – Included in all models
- 27/59 Under/overvoltage
- 32³⁾ Power
- 32S⁷⁾ Sensitive Power
- 37 Undercurrent
- 46BC³⁾ Broken conductor/load unbalance
- 46NPS³⁾ Negative phase sequence overcurrent
- 47 Negative phase sequence voltage
- 49³⁾ Thermal overload
- 50AFD Arc Flash Detection
- 50BF³⁾ Circuit breaker fail
- 51V³⁾ Voltage controlled overcurrent
- 55³⁾ Power Factor
- 59N Neutral voltage displacement
- 60CTS³⁾ CT supervision
- 60VTS³⁾ VT supervision
- 64H High Impedance REF
- 67/50 Directional instantaneous phase fault overcurrent
- 67/50G 67/50N Directional instantaneous earth fault
- 67/50SEF²⁾ Instantaneous sensitive earth fault
- 67/51 Directional time delayed phase fault overcurrent
- 67/51G 67/51N Directional time delayed earth fault
- 67/51/SEF²⁾ Time delayed sensitive earth fault
- 81HBL²⁾ 2nd harmonic block/inrush restraint
- 74T/CC Trip & Close circuit supervision
- 51C³⁾ Cold load pickup
- 81U/0 Under/Over Frequency
- 86 Hand reset contacts
- Programmable logic

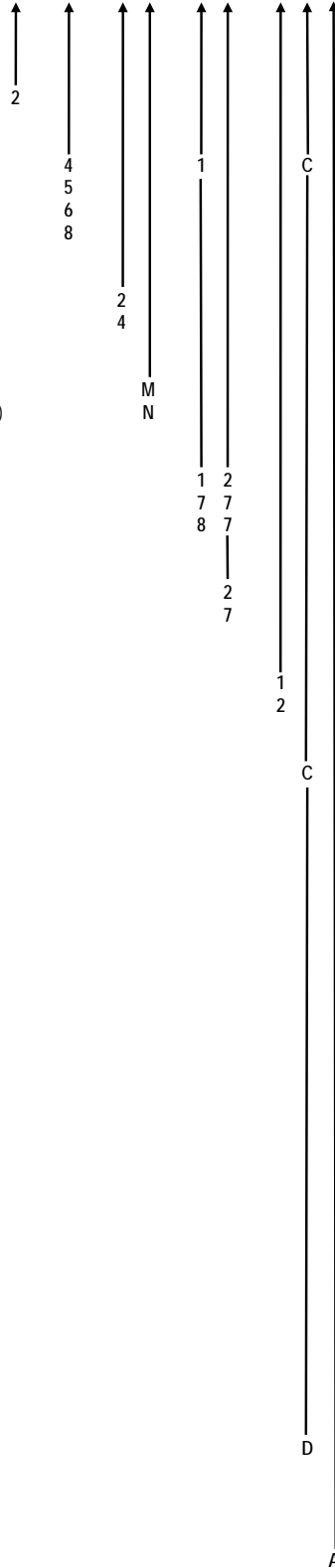
Standard version – plus

- 79 Autoreclose

Additional Functionality

No Additional Functionality

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
7 S R 1 2 0 □ - □ □ A □ □ - □ □ A 0



1) 4CT is configured as 3PF + EF
 2) 4CT is configured as 3PF + SEF/REF
 3) Functions only available in 4CT relay
 4) Not available on SEF input
 5) E4 case is standard, E6 case is required if IEC61850 model ordered
 6) 4 Binary Input variant provides segregated Binary Outputs without a common terminal
 7) Functions only available in 4CT SEF relay

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EMEA-C10028-00-76GB

Feb 2020

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