7SR10 Argus

Overcurrent and Earth Fault Relay

Energy Management

SIEMENS

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Overcurrent and Earth Fault Relay

Description

The 7SR10 overcurrent and earth fault relay is developed by using the latest generation of hardware technology and is available in multiple variants depending on power supply, Binary input/binary output configuration and data communication facility. 7SR10 is a member of Siemens Reyrolle® protection devices Argus product family.

The 7SR10 overcurrent and earth fault relay is housed in a 4U high, size 4 non draw-out case and these relays provide protection, monitoring, instrumentation, and metering with integrated input and output logic, data logging and fault reports. Communication access to the relay functionality is via a front USB port for local PC connection or rear electrical RS485 (optional) port for remote connection.

Function Overview

Protection

46BC	Broken Conductor, Load Unbalance
46 NPS	Negative Phase Sequence Overcurrent
49	Thermal Overload
50	Instantaneous Overcurrent Protection
50N/G	Instantaneous Earth Fault
51	Time Delayed Overcurrent Protection
51N/G	Time Delayed Derived/Measured Earth Fault Protection
51c	Current Protection: Cold Load
50BF	Circuit Breaker Fail
81HBL2	Inrush Restraint
50SEF	Instantaneous Sensitive Earth Fault
51SEF	Time Delayed Sensitive Earth Fault Protection

Supervision

74 T/CCS	Trip and Close Circuit Supervision
81 THD	Total Harmonic Distortion Supervision

Control

79	Auto Reclose
86	Lockout
	CB Control
CB	Trip/Close

Features

Cold Load Settings
Two 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
Dedicated circuit breaker open and close push buttons

Monitoring Functions

Primary/Secondary Current Phases and Earth
Positive Phase Sequence (PPS) Current
Negative Phase Sequence (NPS) Current
Zero Phase Sequence (ZPS) Current
Frequency
Binary Input/Output status
Trip circuit healthy/failure
Time and date
Starters
Fault records
Event records
Circuit breaker trip counters
I^2t summation for contact wear

Hardware

4 CT   3 Binary Inputs/3 Binary Outputs 10 LEDs
4 CT   6 Binary Inputs/6 Binary Outputs 10 LEDs

Data Storage and Communication

Front USB port + Rear RS485 port (optional)
Protocols - IEC60870-5-103, DNP3.0 or Modbus RTU
Event Records - User Configurable
Fault Records
Waveform Records
Measurands
Commands
Time Synchronism
Viewing and Changing Settings

Application

The 7SR10 overcurrent and earth fault relay is a numerical overcurrent protection relay intended for use in the 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.

A wide range of measured values can be viewed on the front LCD or remotely via the communication channel.

The integrated control feature allows the operation of a single circuit breaker and monitoring its trip and closed circuits.

7SR10 Functional Diagram
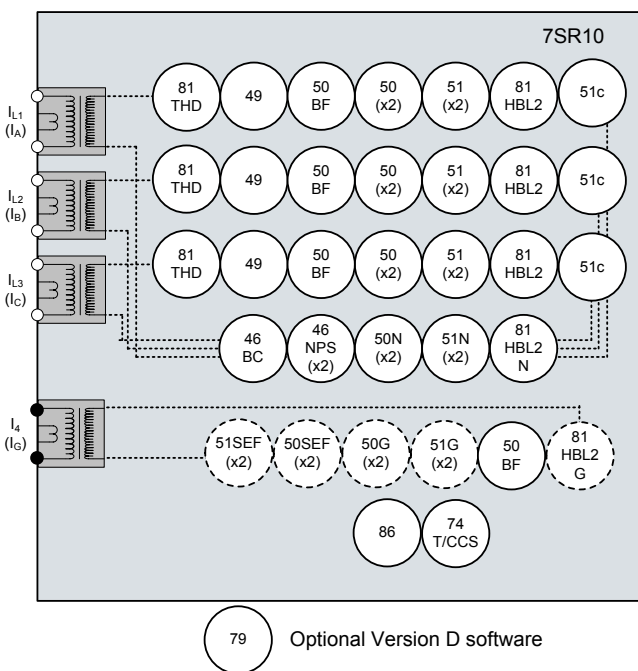
Fig 1. Four Pole Overcurrrent Relay

Description of Functionality

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, the element 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.

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.

51c Cold Load Protection

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 the grading with electromechanical protection.

50G/51G/50N/51N/50SEF 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 earth fault or sensitive earth fault (50G/51G/50SEF/51SEF).

The second mode derives the earth current internally from the 3 phase CT inputs to give earth fault (50N/51N).

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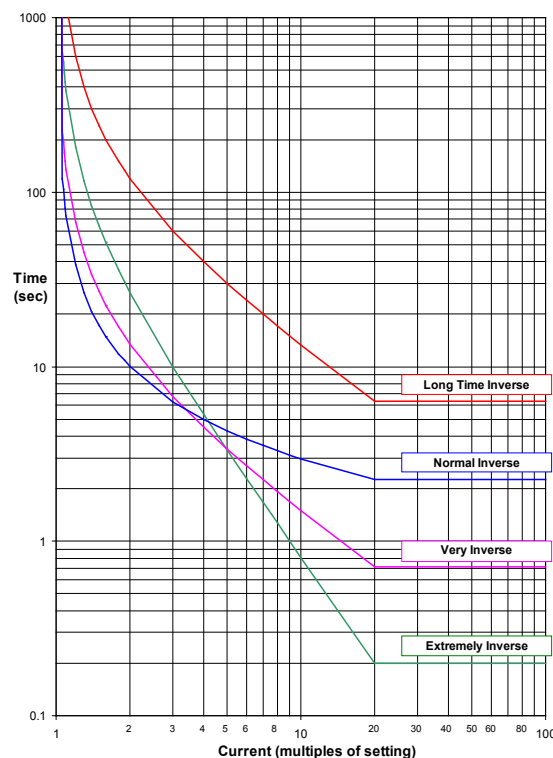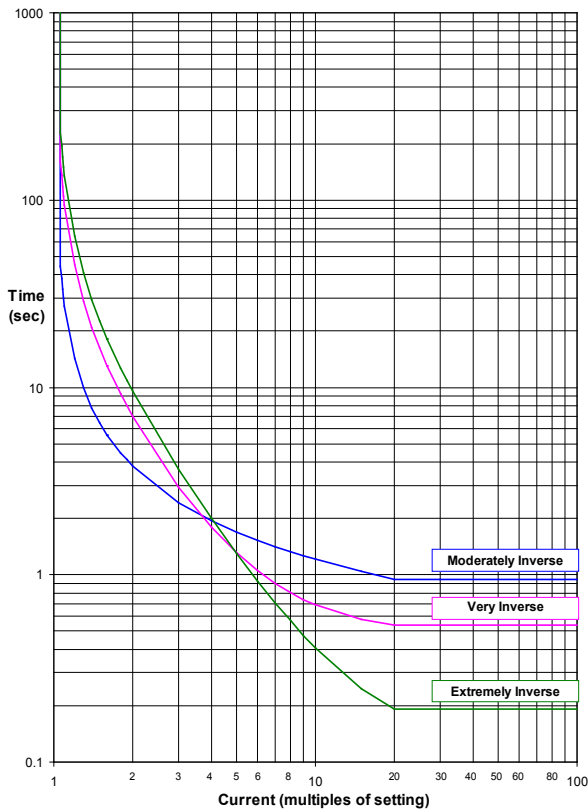

Fig 2. IEC Overcurrent Curves

Fig 3. ANSI Overcurrent Curves

(Graph axes: Time (sec) vs Current (multiples of setting); curves labelled Moderately Inverse, Very Inverse, Extremely Inverse)

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 the 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.

74T/CCS Trip and 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.

81THD Total Harmonic Distortion Supervision

Total harmonic distortion is the percentage of harmonics present in fundamental frequency current. THD calculates the 2nd to 15th harmonic currents presents inline current and displayed in the 'Harmonic Meter' window as a percentage of fundamental frequency current. Separate THD threshold setting and delay is available as a function.

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 I^2t 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. 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 control mode supports the CB Operation control function only.

CB Open/Close

The circuit breaker (CB) control function is used to manually open and close the CB when it is connected to the power system. Two dedicated push buttons are provided on the HMI to execute the CB manual close and open operations.

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.

Data Acquisition - Via Communication Interface

Sequence of Event Records

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

Fault Records

The last 15 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.

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 and post trigger data. A record can be triggered from protection function, binary input or via data communications. 15 records of 1 second duration are stored.

Demand Metering

A rolling record of demand over the last 24 h is stored. The demand is averaged over a user selectable period of time. A rolling record of such demand averages is stored and provides the demand history. A typical application is to record 15min averages for the last 7 days.

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.

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.
The data acquisition via communication interface can be done by Reydisp Evolution.

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 optionally available on the relay 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.
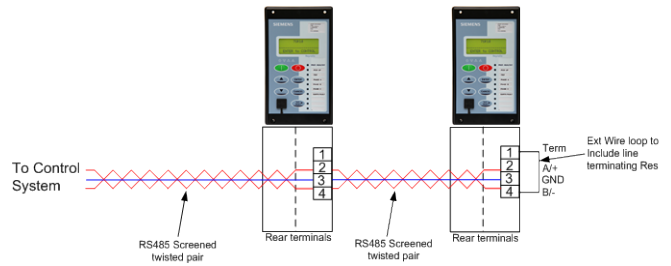

Fig 4. Typical RS485 connection

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

Construction

The relay is housed in a non draw-out case 4U high, size 4 case.

The rear connection comprises of user friendly pluggable type terminals for wire connections for BI, BO, Communication, and Power Supply.

The fascia cover can be ordered with one push button to allow the user to reset the fault indication without removing the cover.

The CT terminals are suitable for ring type lug connection to provide a secure and reliable termination.
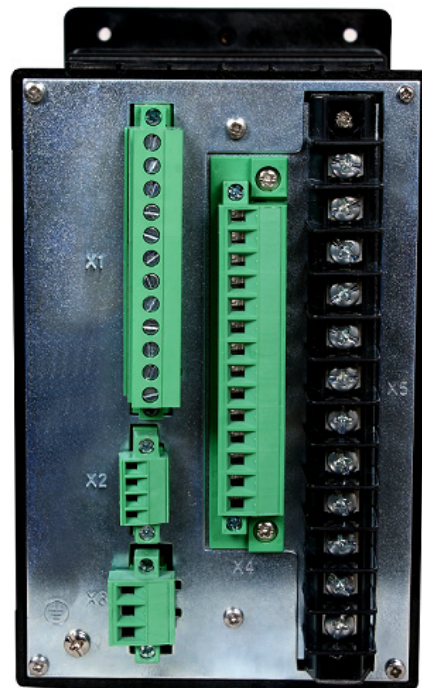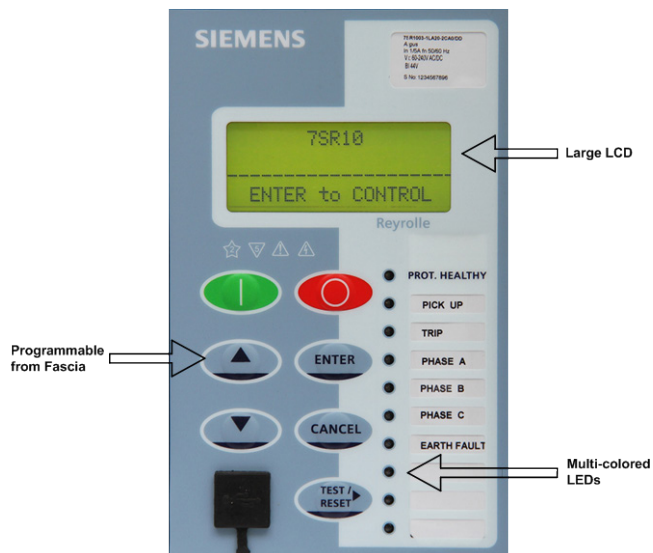
User Interface

Fig 5. 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.

Two dedicated push buttons are provided on the HMI to execute the CB manual close and open operations.

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 users 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 for identification.

Relay Information

The device is identified by the rating label on the front fascia. The user can also give the device its own identity by editing the 'Relay Identifier' displayed on the LCD.

Indication of Conformity

C E This product complies with the directive of the Council of the European Communities on harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC Council Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low Voltage Directive 2006/95/EC).
This conformity has been proved by tests performed according to the Council Directive in accordance with the generic standard IEC/EN 60255-26 (for EMC directive) and with the standards IEC/EN 60255-27 (for Low Voltage Directive) by Siemens AG.

Technical Data

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

Technical Data Overview

Product Family (Auxiliary powered)	Non Directional, Overcurrent and Earth Fault Protection Relay
Case and LEDs	Non Draw-out Polycarbonate case (Size4 standard, Non Draw-out design), 10 LEDs
Measuring Inputs (Current)	1 A/5 A, 50 Hz/60 Hz
Auxiliary Voltage	60 V - 240 V AC/DC
	24 V - 60 V DC
Communication	Default front communication port Back port: RS485 (optional – IEC 60870-5-103 or Modbus RTU or DNP 3.0)
Protection Functions	50, 50G/N, 51, 51G/N, 50BF, 50SEF, 51SEF, 49, 46BC, 46NPS
Supervision and control functions	74 T/CCS, 86, 81HBL2 – (inrush restraint), 51c, 81THD, 79 AR
Binary Input and Binary Output	3 BI or 6 BI 3 BO or 6 BO, (2 changeover contact) Threshold voltage - 88 VAC/DC or 44 V AC/DC available with 60 V - 240 V AC/DC power supply version - 19 V DC with 24 V - 60 V DC power supply version
Overvoltage	Category III
Pollution Degree	2

Mechanical Specifications

Design	Flush mounting, Non Draw-out Polycarbonate moulded case
Enclosure	IP 54 (front panel) IP 20 Protection for terminals (rear side) Depth is 199 mm
Weight	1.6 kgs (appx)

Terminal Blocks

Current Inputs	12 position, M4 Screw-type Barrier Terminal block suitable for 2.5 mm^2/4 mm^2 cable
Auxiliary Supply	3 position, M3 screw-type plug-in terminals suitable for 2.5 mm^2 cable
Rear Communication Port	4 position, M2 screw-type plug-in terminals suitable for 1.5 mm^2 cable
Front Communication Port	USB, Type B
Binary Input	6 or 12 position, M3 screw-type plug-in terminals suitable for 2.5 mm^2 cable
Binary Output	8 or 14 position, M3 screw-type plug-in terminals suitable for 2.5 mm^2 cable

Inputs and Outputs

Current Inputs

Quantity	3 x Phase & 1 x Earth
Rated Current In	1 A/5 A
Measuring Range	80*In 8*In (SEF)
Instrumentation	±1% (Typical) ($\geq$ 0.1xIn to 3xIn) ± 3% (> 3xIn to 80xIn)
Frequency	50 Hz (Range: 47 Hz to 52 Hz) 60 Hz (Range: 57 Hz to 62 Hz)
Thermal Withstand: Continuous 10 seconds 1 Second	4 x In 30 x In 100 A (1 A) 350 A (5 A)
Burden @ In	$\leq$ 0.3 VA per phase and earth for both 1 A and 5 A

Auxiliary Supply

Rated Voltage	60 V - 240 V AC/DC, Tolerance -20% to +10%
Allowable super imposed AC component	15% of DC voltage
Typical power consumption (DC) Typical power consumption (AC)	< 7 W <7 VA 0.5 PF
Max Interruption time (Collapse to Zero)	$\leq$100 ms (110 V DC) $\leq$ 1000 ms (230 V AC)

Auxiliary Supply

Rated Voltage	24 V - 60 V DC Tolerance -20% to +10%
Allowable super imposed AC component	15% of DC voltage
Typical Power consumption (DC)	< 7 W
Max Interruption time (Collapse to Zero)	20 ms (24 V DC)

Binary Inputs

Number	3 or 6	
Operating Voltage*	19 V DC	Range 24 V - 66 V DC
	44 V AC/DC	Range 44 V - 265 V
	Range	DC 44 V - 265 V DC AC 36 V - 265 V AC
	88 V AC/DC	Range 88 V - 265 V
	Range	DC 88 V - 265 V DC AC 68 V - 265 V AC
Maximum AC/DC current for operation	3.5 mA	
Pick Up Delay	User selectable 0 to 14,400,000 ms (up to 4 hours)	
Drop Off Delay	User selectable 0 to 14,400,000 ms (up to 4 hours)	

*Refer to ordering information for more details.

For more details about binary inputs, refer to Technical Manual.

Binary Outputs

Number	3 or 6 (2 change over contacts)
Operating Voltage	Voltage Free
Operating Mode	User selectable - Self or Hand/Electrical Reset or pulsed
Operating Time from energizing Binary Input	<20 ms
Making Capacity: Carry continuously Make and carry (L/R $\leq$ 40 ms and V $\leq$ 300 V)	5 A AC or DC 20 A AC or DC for 0.5 s 30 A AC or DC for 0.5 s
Breaking Capacity ($\leq$ 5 A and $\leq$ 300 V): AC Resistive AC Inductive DC Resistive DC Inductive	1250 VA 250 VA at p.f. $\leq$ 0.4 75 W 30 W at L/R $\leq$ 40 ms 50 W at L/R $\leq$ 10 ms
Disengaging time	< 20 ms

Rear Communication Port

Quantity	1 No. (Optional)
Electrical connection	RS485, 2 wire electrical
Protocol Support	MODBUS RTU, IEC 60870-5-103, DNP 3.0
Rate	Data Transfer rate: 2400 - 38400 bps

Front Communication Port

Quantity	1 No.
Electrical connection	USB, Type B

Data Storage

Fault Record	15
Waveform Record	15 Rec x 1 Sec 7 Rec x 2 Sec 3 Rec x 5 Sec 1 Rec x 15 Sec Pre trigger 10...90%
Events	1000 events (1 ms Resolution)

Mechanical Tests

Test	Standard
Vibration	IEC 60255-21-1 Response and Endurance, Class I
Shock and Bump	IEC 60255-21-2 Shock response and withstand Class I Bump, Class I
Degree of Protection	IEC 60529 IP 54 front IP 20 back
Seismic	IEC 60255-21-3, Class I
Contact	IEC 60255-1 (Ref: Std IEC 61810-1)
Electrical Endurance Test	IEC 60255-1 (Ref: Std IEC 61810-1) (10000 operations at 250 V, 5 A)

Electrical Tests

Test	Standard
Insulation Resistance	IEC 60255-27# 500 V DC, >100M Ohms
Impulse Voltage Withstand	IEC 60255-27# 5 kV, 5 +ve, -ve pulses
Hi Voltage (Dielectric) Voltage	IEC 60255-27# 2 kV@1 min (Between any terminal and earth, independent circuits) 1 kV AC RMS for 1 min (across normally open contacts)
High Frequency Disturbance	IEC 60255-26 2.5 kV (CM), 1.0 kV (DM) 1 MHz, 100 kHz
Electrostatic Discharge	IEC 60255-26 8 kV air discharge
Electrical Fast Transient or Burst *	IEC 60255-26, Zone A 4 kV, 5 kHz
Surge Immunity *	IEC 60255-26, Zone A 4 kV (CM), 2 kV (DM) 1.2/50 µs
Radiated Immunity	IEC 60255-26 80 MHz to 1.0 GHz and 1.4 GHz to 2.7 GHz Both frequency at 10 V/m
Conducted Radio Frequency Interference	IEC 60255-26 150 kHz to 80 MHz, Class III
Power Frequency Magnetic Field	IEC 60255-26 30 A/m applied 1 min, 300 A/m applied for 3 s
Conducted Emissions	IEC 60255-26 CISPR 22, Class A
Radiated Emissions	IEC 60255-26 CISPR 11, Class A
Thermal Withstand Continuous 1 s Burden	IEC 60255-27 4 x In 100 A (1 A) 350 A (5 A) IEC 60255-1 ≤0.3 VA per phase and earth for both 1 A and 5 A
Functional	IEC 60255-3

Maximum Allowable Temperature	IEC 60255-6 Max. temperature limit +100 ^{0} C
Limiting Dynamic Value	10 ms 700 A (1 A) 2500 A (5 A)
Gradual shutdown/Start-up test	IEC 60255-26 Shut down/start up ramp 60 s Power off 5 min

* NOTE: 45 ms DTL pick-up delay applied to binary inputs

NOTE: All aspect of IEC 60255-5 have been covered under IEC 60255-27

Climatic Environmental Tests

Temperature
IEC 60068-2-1/IEC 60068-2-2

Operating Temperature	-10^{0}C to + 60^{0}C
Storage Range	- 25^{0}C to + 70^{0}C

Humidity
IEC 60068-2-30/IEC 60068-2-78

Damp heat test, Cyclic	6 days at 40^{0}C and 93% relative humidity
Damp heat test, Steady State	4 days at 95% RH, +40^{0}C
Maximum Altitude of Operation	Upto 2000 m

Product Safety Test

IEC/EN 60255-27

Type Test	Parameters	Values
Clearances and Creepage Distances	Clearances and creepage distances between external circuits mutual and to the enclosure	≥ 4 mm
Protective Bonding Resistance	Test voltage: < 12V AC/DC	
	Test duration: 1 min	
	Bonding resistance	< 0.1 Ohm
Protective Bonding Continuity	Accessible conductive parts should be bonded with the protective conductor terminal	Low current continuity test
Flammability of Insulating Materials, Components and Fire enclosures	Structure Part	Standard for insulating material of flammability class
	Terminals	Class UL 94 V-0
	Terminal Mounting	Class UL 94 V-0
	Wiring (CT)	(N)2GFAF (VDE)

Type Test	Parameters	Values
	Components mounting	Class UL 94 V-0
	Enclosure	Class UL 94 V-0
	PCB	Class UL 94 V-0
	LCD	Class UL 94 V-0
Single Fault Condition	Assessment of: • Insulation between circuits and parts • Compliance with requirements for protection against the spread of fire • Overloads • Intermittently rated resistors • Compliance with requirements for mechanical protection	The equipment shall not present a risk of electric shock or fire after a single-fault test.

IEC/EN 61010-1

Test Description	Applicable Clause No.
Marking and Documentation	5
Protection against electric shock	6
Protection against mechanical hazard	7
Resistance to mechanical stresses (shock and impact)	8
Protection against the spread of fire	9
Equipment temperature limits and resistance to heat	10
Protection against liberated gases and substances, explosion and implosion	13
Components and sub assemblies	14
HAZARDS resulting from application	16
Risk Assessment	17

Performance

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%xIn
DT Delay Setting td	0.00, 0.01...20, 20.5...100,101...1000, 1010...10000, 10100... 14400 s
DT Basic Operate Time 0 to 2x Is 0 to 5x Is	 40 ms ±10 ms 30 ms ±10 ms
DT Operate time	Tbasic +td , ±1% or ±10 ms

following delay	
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	< 40 ms
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...1000 min
Operate time	$$t = \tau \times In\left\{ \frac{I^2 \cdot I_p^2}{I^2 \cdot (k \times I_B)^2} \right\}$$ ±5% absolute or ±100 ms where Ip = prior current
Alarm Level	Disabled, 50,51...100%
Inhibited by	Binary or Virtual Input

50 Instantaneous & DTL OC&EF

Operation	Non directional
Elements	Phase, Derived Earth, Measured Earth, Sensitive Earth fault
Setting Range Is (50/50N/50G)	0.05,0.06...50 x In
Setting Range Is (50SEF)	0.005.... 5 x In
Time Delay	0.00...14400 s
Operate Level Iop	100% Is, ±5% or ±1%xIn
Reset level	≥ 95 % Iop
Reset level (50SEF)	>= 95 % Iop or Iop - 0.1% In
Operate time: 50, 50G,50SEF 50N	 0 to 2x Is – 35 ms, ±10 ms, 0 to 5x Is – 25 ms, ±10 ms 0 to 2x Is – 40 ms, ±10 ms, 0 to 5x Is – 30 ms, ±10 ms
Operate time following delay	Tbasic +td , ±1% or ±10 ms
Inhibited by	Binary or Virtual Input Inrush detector

81HBL2 Inrush Detector

I Setting (Ratio of 2nd Harmonic current to fundamental component current)	0.10, 0.11... 0.5
t basic Element basic operate time	Will pick-up before operation of any protection element due to magnetic inrush
Reset Time	Will operate until drop-off of any protection element due to magnetic inrush

46BC Broken Conductor

46BC setting, NPS to PPS ratio	20, 21...100%
t_f Delay setting	0.03,04,20.0,20.1,100, 101,1000,1010.....14400 s
I_{Curr} Operate level	100 % I_{set} ± 5 %
Reset level	90 % I_{curr} ± 5 %
t_{basic} Basic operate time	1x In to 0 A 40 ms
Operate time	t_f + t_{basic} , ± 1 % or ± 20 ms

51 Time Delayed OC&EF

Operation	Non directional
Elements	Phase, Derived Earth, Measured Earth, Sensitive Earth fault
Characteristic	IEC-NI, -VI, -EI, -LTI; ANSI-MI, -VI, -EI; DTL
Setting Range Is (51/51G)	0.05,0.06...4 x In
Setting Range Is (51SEF)	0.005,...0.5 x In
Time Multiplier	0.01, 0.015....1.6, 1.7,....5, 6...100
Time Delay	0,0.01... 20 s
Operate Level	105% Is, ±4% or ±1%x In
Minimum Operate time IEC ANSI	$$t_{op} = \frac{K}{\left[\frac{I}{Is}\right]^{\alpha}-1} \times Tm$$ $$t_{op} = \left[\frac{A}{\left[\frac{I}{Is}\right]^{P}-1}+B\right] \times Tm$$ ± 5% absolute or ± 40ms for TMS setting (0.01 to 0.245) ± 5% absolute or ± 30ms for TMS setting (0.25 to 100)
Follower Delay	0 s - 20 s
Reset	ANSI decaying, 0 s - 60 s
Inhibited by	Binary or Virtual Input Inrush detector

50 BF 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...60000 ms Timer 2 20...60000 ms
Operate Level	100% Is, ±5% or ±1%x In
Disengaging time	< 20 ms
Operate time following delay	Tcbf ±1% or ±20 ms
Triggered by	Any function mapped as trip contact
Inhibited by	Binary/Virtual Input
Timer By pass	Yes, 50BF CB Faulty Input

74 T/CCS 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

NOTE: Use the correct threshold voltages for BI when using TCS with 2 BI.

Control Functions

CB	Trip/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 (Test/Reset key)

CB Maintenance

Trip Counter	Total & Delta 0...10000
I^2t Alarm	10...100000

81THD Supervision

I_{thd} Setting	5, 6,.....100%
t_d Delay setting	0.02, 0.03...20.00, 20.10... 100, 101... 1000, 1010... 10000, 10100... 14400 s

79 AutoReclose

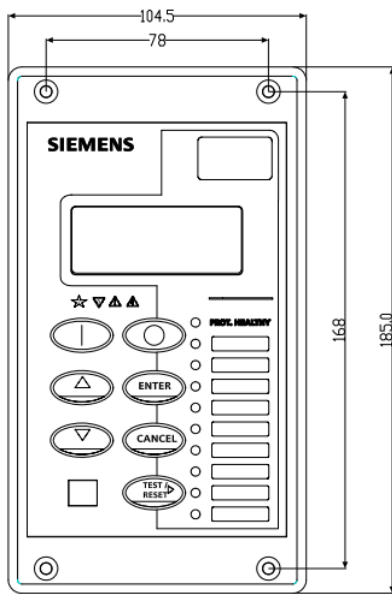|	
Operating Mode	Phase, Earth, SEF External
Number of Reclose	1..4
Number of Trips to Lockout	1..5
Dead Time	0...14400
Reclaim Timer	0...600
Lockout Reset	CB, Timer & BI

Case Dimensions

Fig 6. Front View
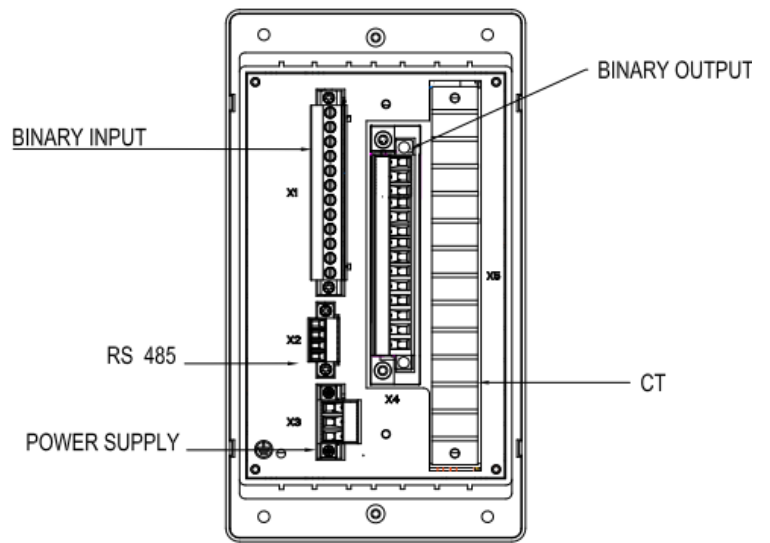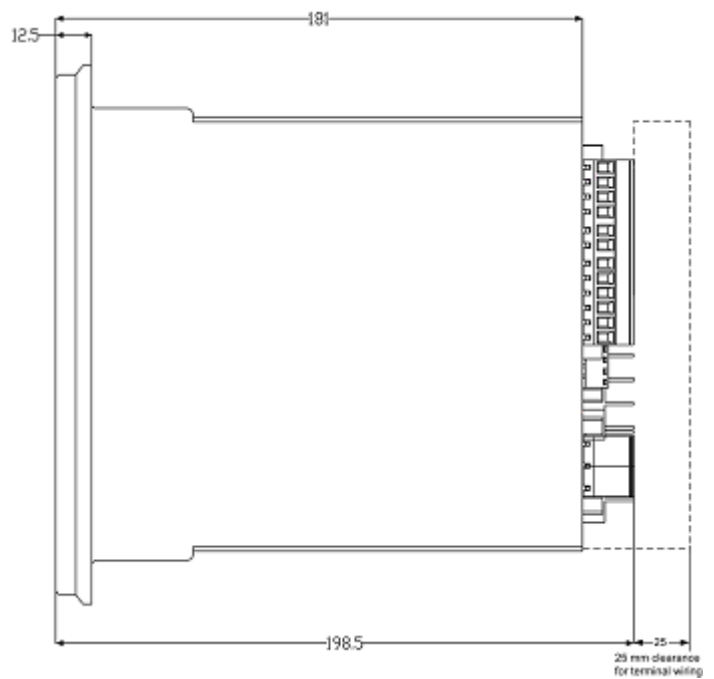

Fig 7. Rear View
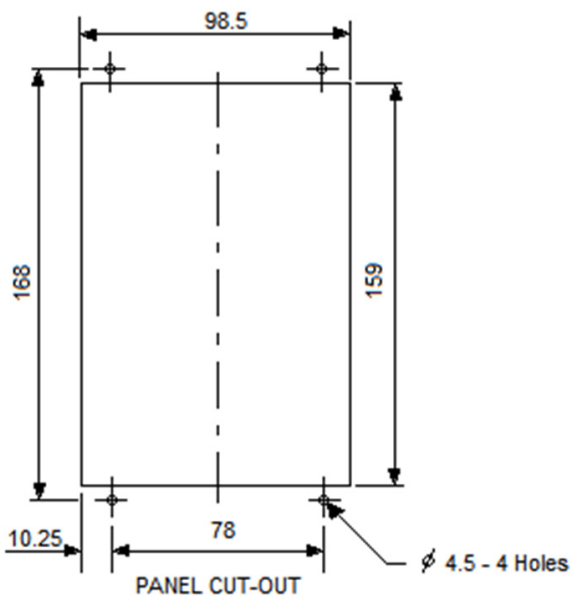
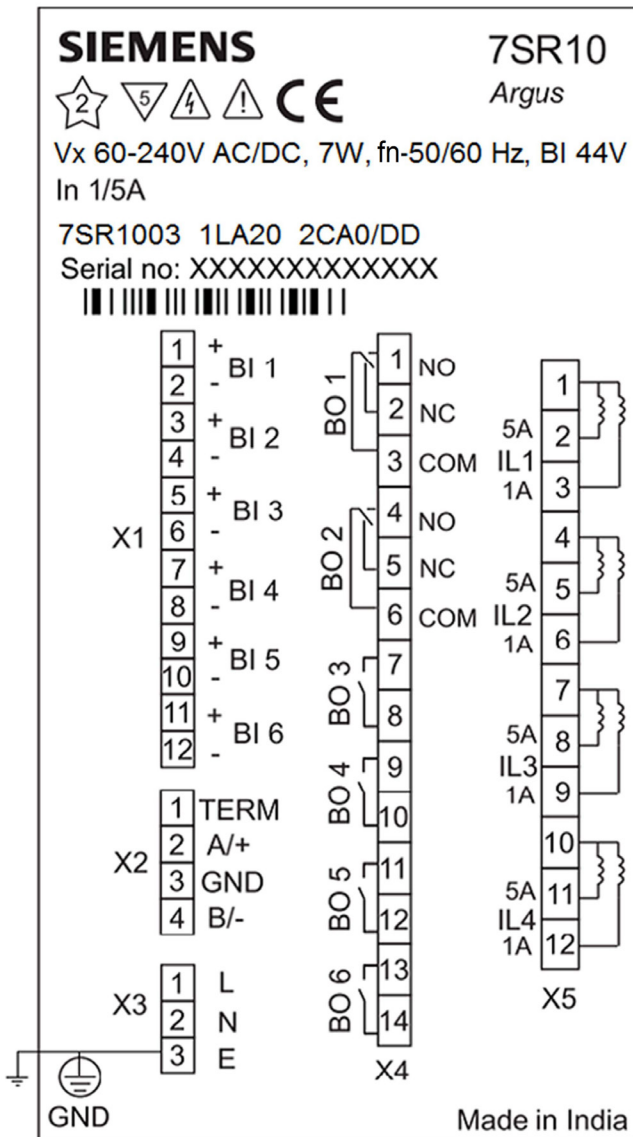Fig 8. Panel cut-out view

Fig 9. Side View

Fig 10. Terminal/Wiring Diagram View (Extended Version)
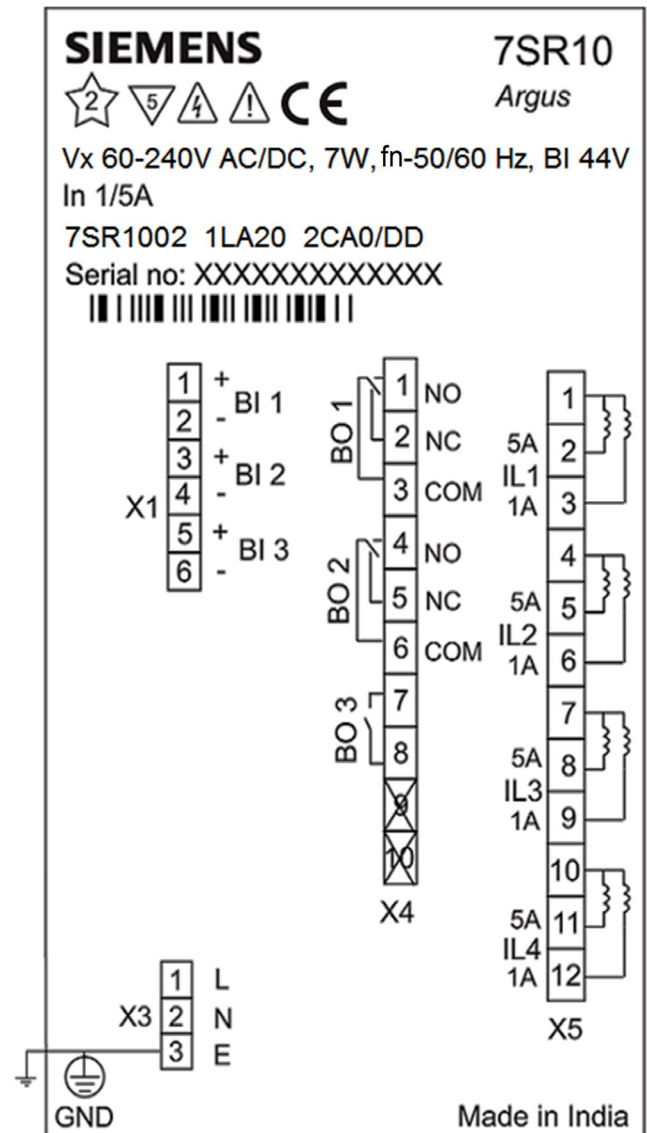
Fig 11. Terminal/Wiring Diagram View (Basic Version)

Ordering Information

Product Description	Variants		Order No.

7SR10 Argus   7 S R 1 0 0 ☐ - ☐ ☐ ☐ ☐ 0 - ☐ ☐ A 0

Nondirectional O/C Relay (Argus)

Case, I/O and Fascia
Size 4 Moulded case, 4 CT, 3 Binary Inputs/3 Binary Outputs, 10 LEDs   **2**   **1**   **1**
Size 4 Moulded case, 4CT, 6 Binary Inputs/6 Binary Outputs, 10 LEDs   **3**

Measuring input
1/5 A, 50/60Hz [1]   **2/3**   **1**
1/5 A, 50/60Hz with SEF input [2]   **3**   **2**

Auxiliary voltage
AC/DC 60-240V, Binary input threshold 44 V AC/VDC   **L**
AC/DC 60-240V, Binary input threshold 88 V AC/VDC   **K**
DC 24-60 V, Binary input threshold 19 VDC   **J**

Protective Cover
Standard version – No Cover   **A**
Plastic Cover with 1 Push Button for Test/Reset   **B**

Communication
Front Port : USB   **2**   **1**
Front Port : USB and Rear Port : RS-485 supporting IEC 60870-5-103 or Modbus RTU **3**   **2**
or DNP 3.0

Front Fascia
Standard Version – with Breaker Control Push Buttons   **2**

Protection Function Packages
Standard version - included in all models   **C**
46BC	Broken Conductor/Load Unbalance
46NPS	Negative Phase Sequence Overcurrent
49	Thermal overload
50	Instantaneous Phase Fault Overcurrent
50BF	Circuit Breaker fail
50G/N	Instantaneous Earth Fault
50SEF [2][4]	Instantaneous Sensitive Earth Fault Overcurrent
51	Timed Delayed Phase Fault Overcurrent
51 G/N	Timed Delayed Earth Fault
51SEF [2][4]	Time Delayed Sensitive Earth Fault
74T/CCS	Trip/Close Circuit Supervision
81HBL2 [3]	2nd Harmonic block/Inrush restraint
86	Hand Reset Contacts
51C	Cold Load Pickup
	Programmable Logic
81THD	Total Harmonic Distortion Supervision

Standard version – plus
79   Autoreclose   **D**

Additional Functionality
No Additional Functionality   **A**

[1] 4CT is configured as 3PF + EF
[2] 4CT is configured as 3PF + SEF
[3] Not available on SEF input
[4] Only with position 7 = 3

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