



Reyrolle  
Protection  
Devices

## 7SR157 Argus

Check and System Synchronising Relay

Energy Management.

**SIEMENS**



# 7SR157 Argus

Check and System Synchronising Relays



Fig. 1 7SR157 Fascia

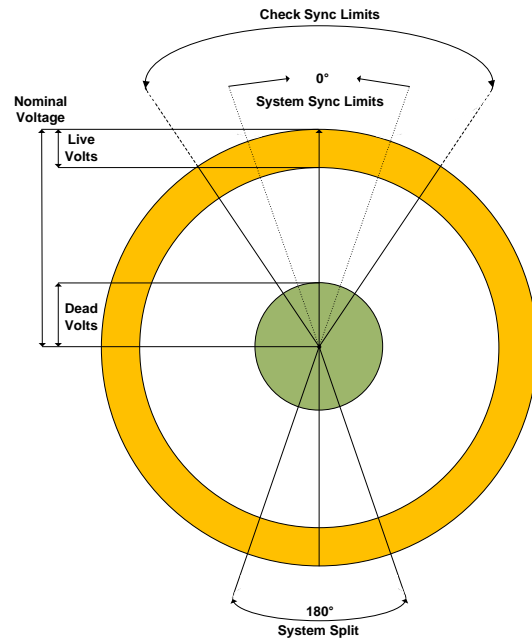
## Description

The 7SR157 Argus is a combined check and system synchronising relay which can carry out controlled closing of a circuit breaker using measurements of the line and bus voltages. The relay will prevent closure of the circuit breaker if the differences in phase angle, slip frequency or magnitude of the voltages fall outside prescribed limits.

If the parameters are within limits, the relay will issue an output which can be used to close the circuit breaker directly or in conjunction with an auto-reclose scheme.

Housed in a 4U high, size E4 or E6 (Optional IEC61850 model) case, the relay provides instrumentation and fault data 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 or rear electrical RS485 port for remote connection & optional IEC61850 communication through two rear Ethernet ports (Electrical or Optical).

## Function Overview



- Independent check, system synchronising and close on zero settings.
- Adjustable slip frequency, phase angle, voltage blocking and Differential voltage blocking.
- Split system detection.
- Configurable dead/live bus and dead/live line voltage settings, (2 State and 3 State).
- Synchronising bypass logic is provided to connect a dead line or bus to a live line or bus.
- For manual synchronising the relay includes a circuit breaker close guard feature, which is used to prevent the control switch being held closed during a synchronising operation.

### Monitoring

25	Undervoltage Detector Differential Voltage Detector Voltage Levels (Live and Dead status)
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### Control

25	Voltage Trim (Magnitude and Phase) System Split Detector Check Synchronising Check Synchronising Close Guard System Synchronising Close On Zero Synchronising System Split Lockout Synchronising Bypass
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### Supervision

74	Close Circuit Supervision
60	VT Fail Demand Metering

### Features

- Four Settings Groups
- Password Protection – 2 levels
- User Programmable Logic
- Self Monitoring

## User Interface

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

## Hardware

2 VT, 3 Binary Inputs, 5 Binary Outputs  
2 VT, 6 Binary Inputs, 8 Binary Outputs

## Data Storage and Communication

### Standard Communications Ports

Communication access to relay functionality is via a front USB port for local PC connection or rear electrical RS485 port for remote connection

### Additional Optional Communication Ports

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

### Standard Protocols

IEC60870-5-103, Modbus RTU, DNP3.0. 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

Up to 1000 event records  
User configurable fault record duration  
Waveform records  
Measurands  
Commands  
Time synchronism  
Viewing and changing settings

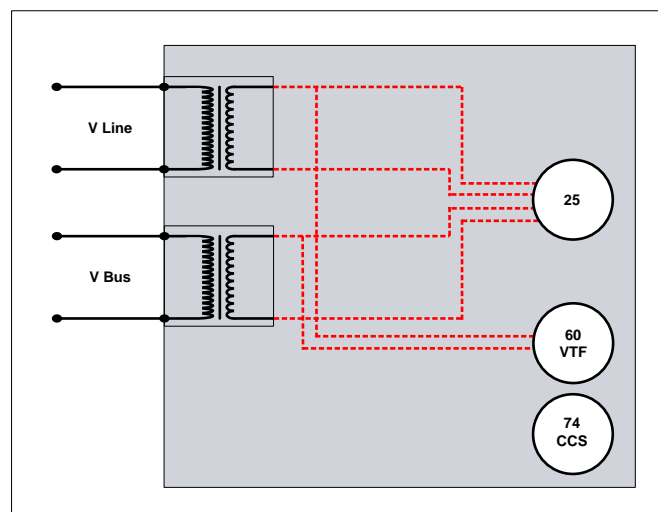
## Application

Check or system synchronising is required whenever two parts of a power system network, each containing generation, have to be connected or re-connected together. To avoid shock loading and possible damage to primary electrical plant the voltage, frequency and phase angle difference between the two systems should be within acceptable limits relative to one another.

Where two systems have been previously interconnected, the frequencies of the two systems will drift apart slowly following circuit breaker tripping and the phase angle difference will increase. Here the slip rate will be small and the circuit breaker can be closed using check synchronising settings as the limiting parameters.

However, if the two systems become asynchronous so one system is an 'island' of generation then a high rate of slip may result causing the two systems to pass through anti-phase conditions. The relay will detect this system split condition, inhibit the check synchronising algorithms and apply system synchronising settings as limiting parameters. Typically in this mode the slip rate will be much higher and so there will be a narrower allowable phase angle difference before closing. In addition, closure of the circuit breaker will only be allowed under conditions of decreasing difference in phase angle.

## Functional Diagram



VLine, Vbus connection

## Description of Functionality

### 25 Line/Bus Undervolts

The undervoltage detector element can block a close output command if either the line or bus voltages are below the **25 Line UV / 25 Bus UV** setting value.

### 25 Voltage Diff

The Differential Voltage Detector Element can block a close output command if the scalar difference between the line and bus voltages is greater than the **25 Volt Differential** setting value.

### VT Level Mode

Option of 2 State or 3 State, to determine when a voltage is live or dead:

2 State – Line or Bus voltages are dead until they exceed the live threshold. The voltages are then live until they drop below the dead threshold.

3 State - The Line or Bus Voltages are only classed as live when above the live threshold. When the voltage falls below the live threshold, the live output is RESET but the Dead output does not SET until the voltage falls below the Dead threshold. This is an indeterminate state, where both Live and Dead outputs have the same value, both are RESET.

### 25 Voltage Trim

The relay incorporates a **Voltage Trim Magnitude** feature and a **Voltage Trim Angle** feature for both the line and bus voltages. This allows small adjustments to the input voltages and phase angles of the relay.

### 25 System Split Detector

The method used to detect a system split can be selected as either phase angle or slip frequency. When the selected condition is exceeded the **25 System Split** output is set; indicating the system is split. A drop-off delay timer **25 System Split Timer** is applied to the output, to suppress flickering.

### 25 Check Sync

Check Synchronising sets **25 InSyncCS** and **25 Check Sync Close** outputs when the Line and Bus voltages are healthy and synchronised. The phase angle tolerance for being synchronised is set by **25 Check Sync Angle** setting. The synchronised conditions must be held for a minimum time of **25 Check Sync Timer** setting. An optional setting **25 Check Sync Slip** may be applied to limit Slip Frequency.

There are two modes of operation, Auto and Manual.

**AUTO: 25 Check Sync Close** output is set when the Check synchronizing conditions are met.

**MANUAL: 25 Check Sync Close** output is set when Check synchronizing conditions are met and a manual close command is received, via **Start Check Sync** input.

### Close Guard

If manual closes are required to be carried out via an operator, the **Close Guard** feature can be enabled. This issues an alert message and a general alarm, intended to warn the operator about initiating a CB close before the relay issues a valid Check Sync Close signal. This prevents the operator from pre-empting the relays' decision.

### 25 System Synchronising

System Synchronising is triggered by a system split. After a split, System Sync will wait for Line and Bus phases to realign, before setting **25 InSyncSS** and **25 System Sync Close** outputs. The phase angle tolerance for being synchronised is set by **25 System Sync Angle** setting (for the System Sync outputs to be set the phase angle between the two voltages must be decreasing). The slip frequency must not be excessive, within **25 System Sync Slip** setting. The synchronised conditions must be held for a minimum time of **25 System Sync Timer** setting.

There are two modes of operation, Auto and Manual, there is also a lockout mode.

**AUTO: 25 System Sync Close** output is set when the Check synchronizing conditions are met.

**MANUAL: 25 System Sync Close** output is set when Check synchronizing conditions are met and a manual close command is received, via **Start Check Sync** input.

**LOCKOUT:** The **System Split Lockout** output is set when there is a **25 System Split** event.

### 25 Close On Zero

If the **25 Split Mode** is set to **COZ** and a **25 System Split** occurs, a Close On Zero operation will be activated. Close On Zero differs from System Sync, by attempting to issue a close output when phase angle is precisely zero. The phase angle, slip frequency and CB Close time delay are used to predict when zero phase angle will occur.

The slip frequency must be less than the **25 COZ Slip Freq** but greater than the **25 Split Slip** setting to avoid reversion to Check Synchronising conditions.

### 25 Synchronising Bypass

**Sync Bypass** is triggered for switching operations, which involve connecting a dead line or bus to a live line or live bus. For these switching operations the synchronising conditions will not be met, the **Sync Bypass** setting is required to bypass the synchronising operations and allow the **Bypass Close** output.

### 74 Close Circuit Supervision

Monitors the open/closed status of up to 3 circuits. If circuit status is open for a minimum time of **74CCS-n-Delay** setting, **Close Circuit Fail** and **Close Circuit Fail n** events are raised.

### 60 VT Fail

When the circuit breaker is closed, both voltages should be either Live or Dead. If this is not true, a VT Fail output is set (**60VTS**, to indicate the Line VT has failed and **60VTF-Bus** to indicate the Bus VT has failed). A time delay setting (**60VTF – Line/Bus Delay**) suppresses spurious operations during transient switching conditions.

### 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.

## 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. The fault recorder is triggered by an input or custom logic scheme.

### 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 seconds of waveform storage are available, configurable as 10 records of 1 second duration, 5 of 2 seconds, 2 of 5 seconds or 1 record of 10 seconds duration.

### Demand Metering

The Demand Metering Calculates the maximum, minimum and mean values of Line and Bus voltages and displays it as instruments which can be read in the relay INSTRUMENTS MENU or via Reydisp.

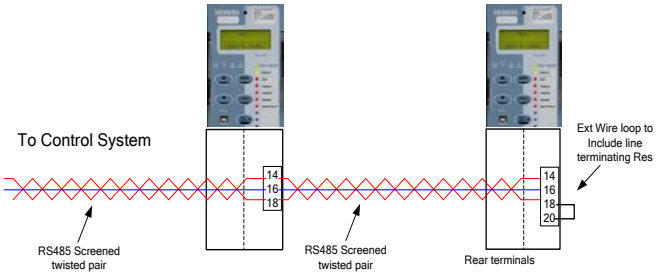
### Real Time Clock

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 or 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.



### Typical RS485 connection

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

## Ethernet Communications

### IEC 61850

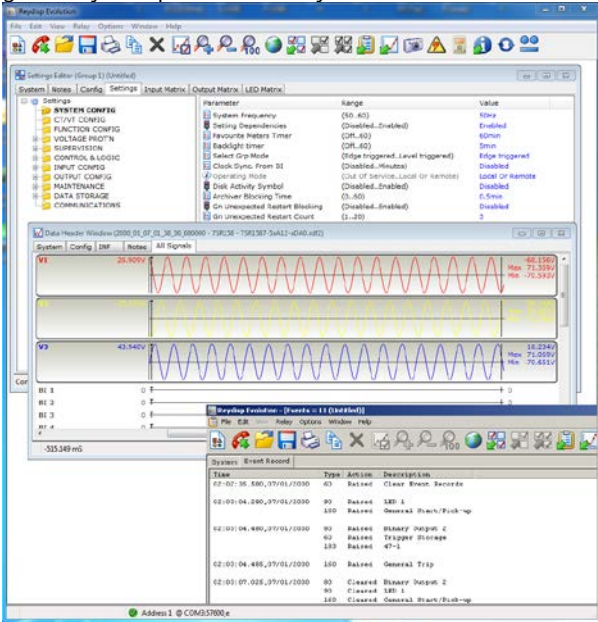
IEC61850 communication is available through an optional EN100 communication module. The EN100 Module can be ordered with either 2x Electrical RJ45 or 2x Fibre optic LC Ethernet ports.

Information on IEC61850 functionality can be found in the following 7SR157 documents:

- Model Implementation Conformance Statement (MICS)
- Protocol Implementation Conformance Statement (PICS)
- Protocol Implementation Extra Information for Testing (PIXIT)

# Reydisp Evolution

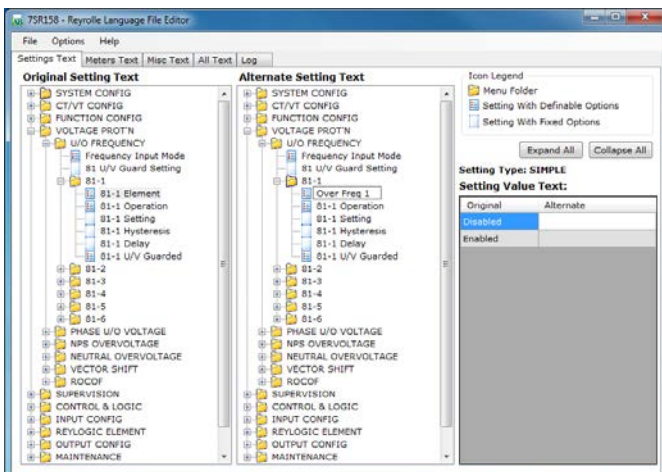
Reydisp Evolution is a Windows based software tool, providing the means for the user to apply settings, interrogate settings and retrieve events and disturbance waveforms from the device and is common to the entire range of Reyrolle protection relays.



Typical Reydisp Evolution Screenshot

## Language Editor

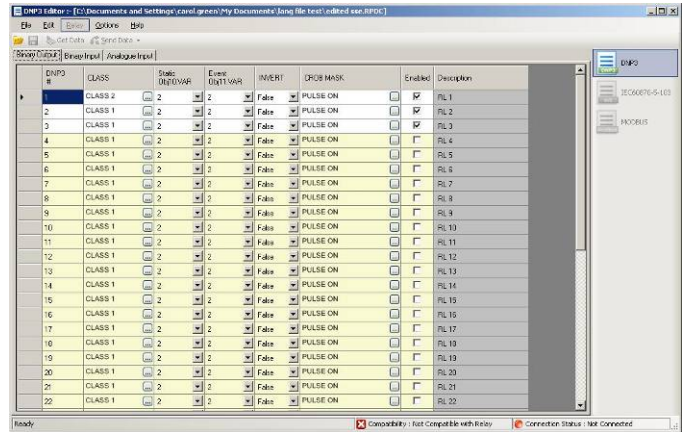
The Language editor software gives the user the ability to customize the text displayed in the relays, Menu structure and instrumentation views. The tool allows a language file to be created and transferred to the relay also containing Western European characters.



Typical Language Editor Screenshot

## Communications Editor

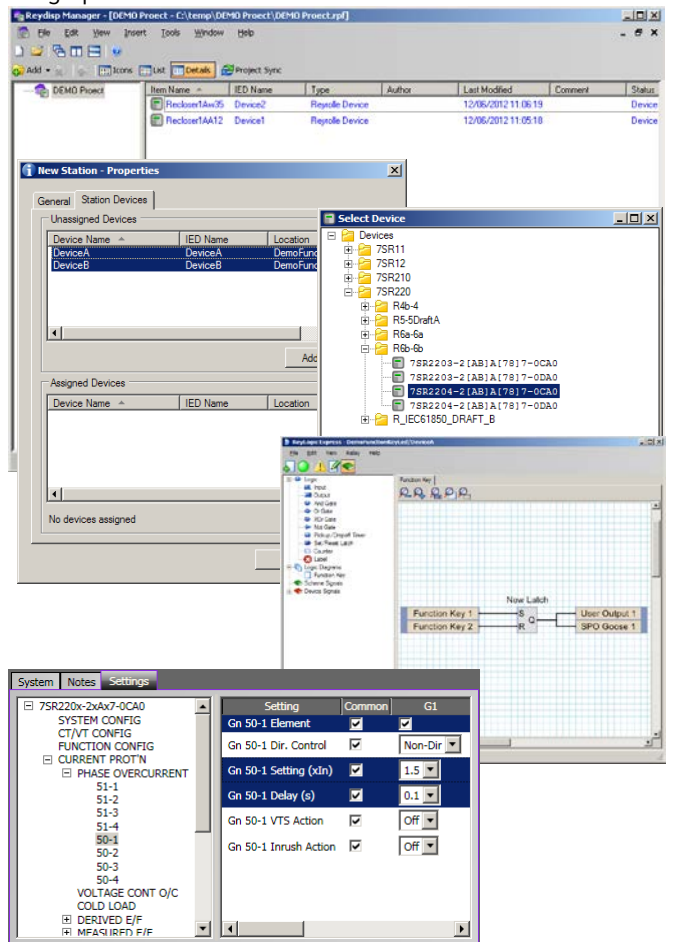
To facilitate easier interfacing to a substation the relays default Protocol configuration may be modified using the communication editor software tool. The communication editor is a PC based software package provided within the Reydisp software suite which allows modification of the IEC60870-5-103, DNP 3.0 and MODBUS Protocols.



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.



Typical Reydisp Manager screenshots

## Construction

The relay is housed in a 4U high size E4 case with a removable clear plastic fascia cover. The plastic 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 plastic handles are provided to allow the relay to be withdrawn from its case.

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

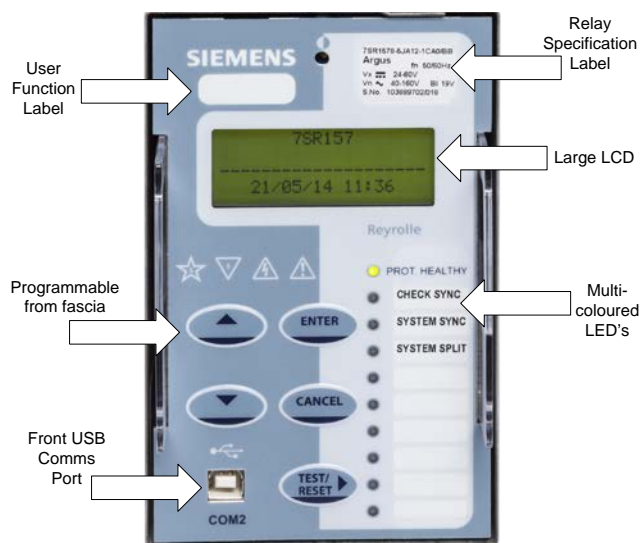


Rear view of Standard E4 relay



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

## User Interface



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

### 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	110/125/220/250V Range 64 to 300V 24/48/60V Range 18 to 72V	
Allowable superimposed ac component	12% of DC voltage	
Rated AC Voltage	115 VAC 50/60Hz Range 92 to 138 V rms AC 50/60Hz $\pm 5\%$	
Power Consumption:	E4 Min (DC)	3.9W
	E4 Max (DC)	8W
	E4 Min (AC)	9VA 0.5PF
	E4 Max (AC)	16VA 0.5PF
	E6 Min (DC)	6.4W
	E6 Max (DC)	10.5W
Allowable breaks/dips in supply (collapse to zero)	E6 Min (AC)	14.5VA 0.5PF
	E6 Max (AC)	21.5VA 0.5PF
	DC	50ms
	AC	2.5/3 cycles @50/60Hz

### Binary Inputs

Number	6 or 3	
Operating Voltage	19V dc	DC Range 17 to 320V dc AC Range 92 to 138 V <sub>RMS</sub> AC
	88V dc	Range 70 to 320V dc
Maximum dc current for operation	1.5mA	
Maximum peak ac current for operation	1.5mA	
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)	

For AC operation the BI pick-up delay should be set to 0ms and the drop-off delay to 20ms.

### Binary Outputs

Number	8 (2 change over contacts) 5 (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	<20ms
Making Capacity: Carry continuously Make and carry (L/R $\leq 40$ ms and $V \leq 300$ V)	5A ac or dc 20A ac or dc for 0.5s 30A ac or dc for 0.2s
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

## Unit Design

Housing	E4 (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 3.2kg E4 case, 4.15 kg E6 case. Additional Transport packaging: add 0.4kg
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 100BaseT 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
Waveform Record	10 x 1sec 2 x 5sec 5 x 2sec 1 x 10sec Pre trigger 10...90%
Events	1000 1ms Resolution

## Mechanical Tests

### Vibration (Sinusoidal)

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 60255-21-2 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 60255-21-3 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 <sup>6</sup> operations
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## Electrical Tests

### Insulation

IEC 60255-5

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	1.0 kV AC RMS for 1 min

### High Frequency Disturbance

IEC 60255-22-1 Class III

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

### Electrostatic Discharge

IEC 60255-22-2 Class IV

Type	Level	Variation
Contact discharge	8.0 kV	≤ 5 %

### Fast Transients

IEC 60255-22-4 Class A (2002)

Type	Level	Variation
5/50 ns 2.5 kHz repetitive	4kV	≤ 5 %

## Surge Immunity

### IEC 60255-22-5

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

### IEC 60255-22-6

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

## Radiated Radio Frequency

### IEC 60255-25

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

## Conducted Radio Frequency

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 60255-22-3 Class III

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 60068-2-1/2

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

### Humidity

#### IEC 60068-2-78

Operational test	56 days at 40 °C and 93 % relative humidity
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## Performance

### 25 Check Synchronising

Line Nom Voltage	40-160 V
Bus Nom Voltage	40-160 V
System Frequency	50/60 Hz
25 Check Sync Angle	0 – 90 °
25 Check Sync Slip	0 – 2Hz
25 Check Sync Timer	0-100 s
25 Split Slip	0 – 2Hz
25 System Split Timer	0 – 60 s

### 25 Check Sync Angle Difference

Operate angle	$\theta_{diff}, \pm 1^\circ$
Reset angle	$\theta_{op}, \pm 1^\circ$
Repeatability	$\pm 1^\circ$

### 25 Check Sync Slip Frequency

Operate frequency	$f_{slip}, \pm 10 \text{ mHz}$
Reset frequency	$f_{op}, - 10 \text{ mHz}$
Repeatability	$\pm 10 \text{ mHz}$

### 25 Split Angle Detector

Operate angle	$\theta_{diff}, \pm 1^\circ$
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### 25 Split Slip Frequency Detector

Operate frequency	$f_{slip}, \pm 10 \text{ mHz}$
Reset frequency	$f_{op}, - 10 \text{ mHz}$
Repeatability	$\pm 10 \text{ mHz}$

### 25 Check Sync Timer

Accuracy	$\pm 1\% \text{ or } \pm 20\text{ms}$	
Repeatability	$\pm 1\% \text{ or } \pm 20\text{ms}$	
Variation	-10 °C to +55 °C	$\leq 5\%$
	$f_{nom} \pm 5\%$	$\leq 5\%$

### 25 System Synchronising

Line Nom Voltage	40-160 V
Bus Nom Voltage	40-160 V
System Frequency	50/60 Hz
25 System Sync Angle	0 – 90 °
25 COZ Slip Freq	0 – 2Hz
25 System Sync Slip	0 – 2Hz
25 System Sync Timer	0-100 s
25 SS Close Pulse	0-60 s

### 25 System Sync Angle Difference

Operate angle	$\theta_{diff}, \pm 1^\circ$
Reset angle	$\theta_{op}, \pm 1^\circ$
Repeatability	$\pm 1^\circ$

### 25 System Sync Slip Frequency

Operate frequency	$f_{slip}, \pm 10 \text{ mHz}$
Reset frequency	$f_{op}, - 10 \text{ mHz}$
Repeatability	$\pm 10 \text{ mHz}$

### 25 Close on Zero Slip Frequency

Operate frequency	$f_{slip}, \pm 10 \text{ mHz}$
Reset frequency	$f_{op}, - 10 \text{ mHz}$
Repeatability	$\pm 10 \text{ mHz}$

### 25 System Sync Timer

Accuracy	$\pm 1\% \text{ or } \pm 20\text{ms}$	
Repeatability	$\pm 1\% \text{ or } \pm 20\text{ms}$	
Variation	-10 °C to +55 °C	$\leq 5\%$
	$f_{nom} \pm 5\%$	$\leq 5\%$

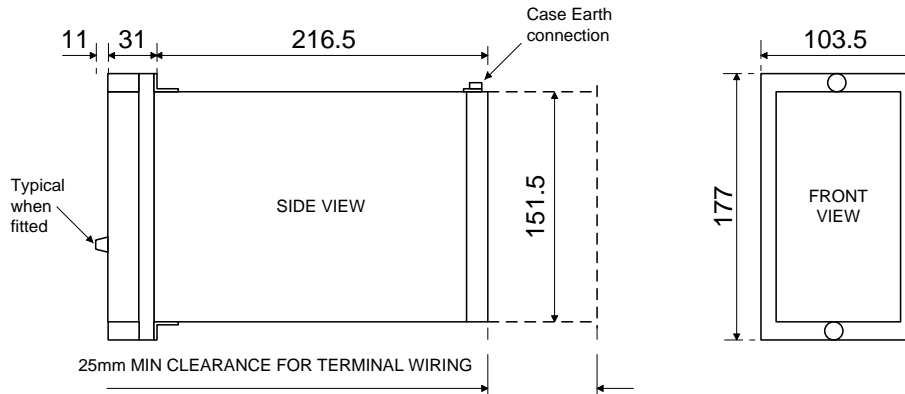
### 74 CCS Close Circuit Supervision Operate and Reset Time

Element basic operate time	25ms	
Operate time following delay	$t_{basic} + t_d, \pm 1\% \text{ or } \pm 20\text{ms}$	
Repeatability	$\pm 1\% \text{ or } \pm 20\text{ms}$	
Variation	-10 °C to +55 °C	$\leq 5\%$
	$f_{nom} \pm 5\%$	$\leq 5\%$

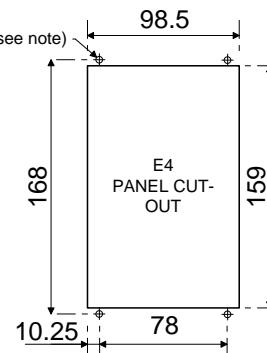
### 60 VTF VT Failure Operate and Reset Time

Element basic operate time	63 ms, $\pm 10\text{ms}$	
Operate time following delay	$t_{basic} + t_d, \pm 1\% \text{ or } \pm 20\text{ms}$	
Repeatability	$\pm 1\% \text{ or } \pm 20\text{ms}$	
Variation	-10 °C to +55 °C	$\leq 5\%$
	$f_{nom} \pm 5\%$	$\leq 5\%$

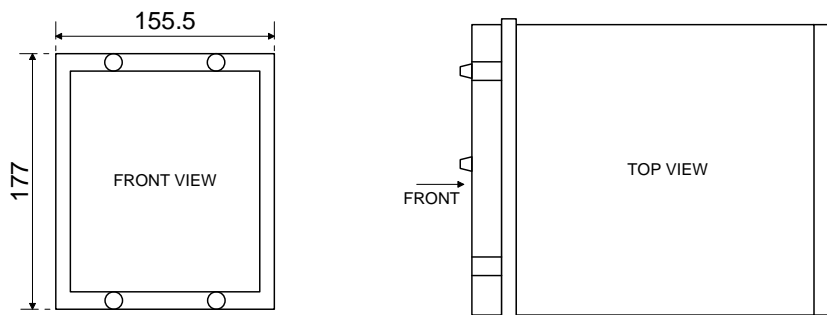
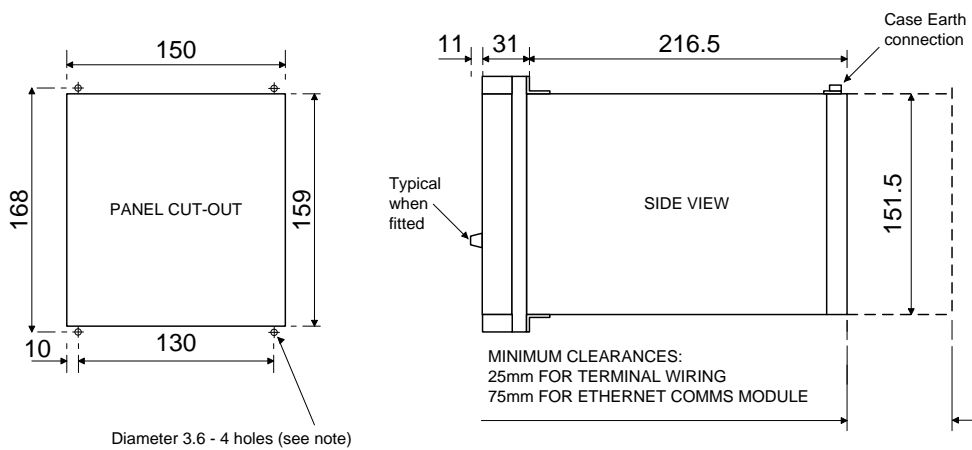
# Case Dimensions



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).



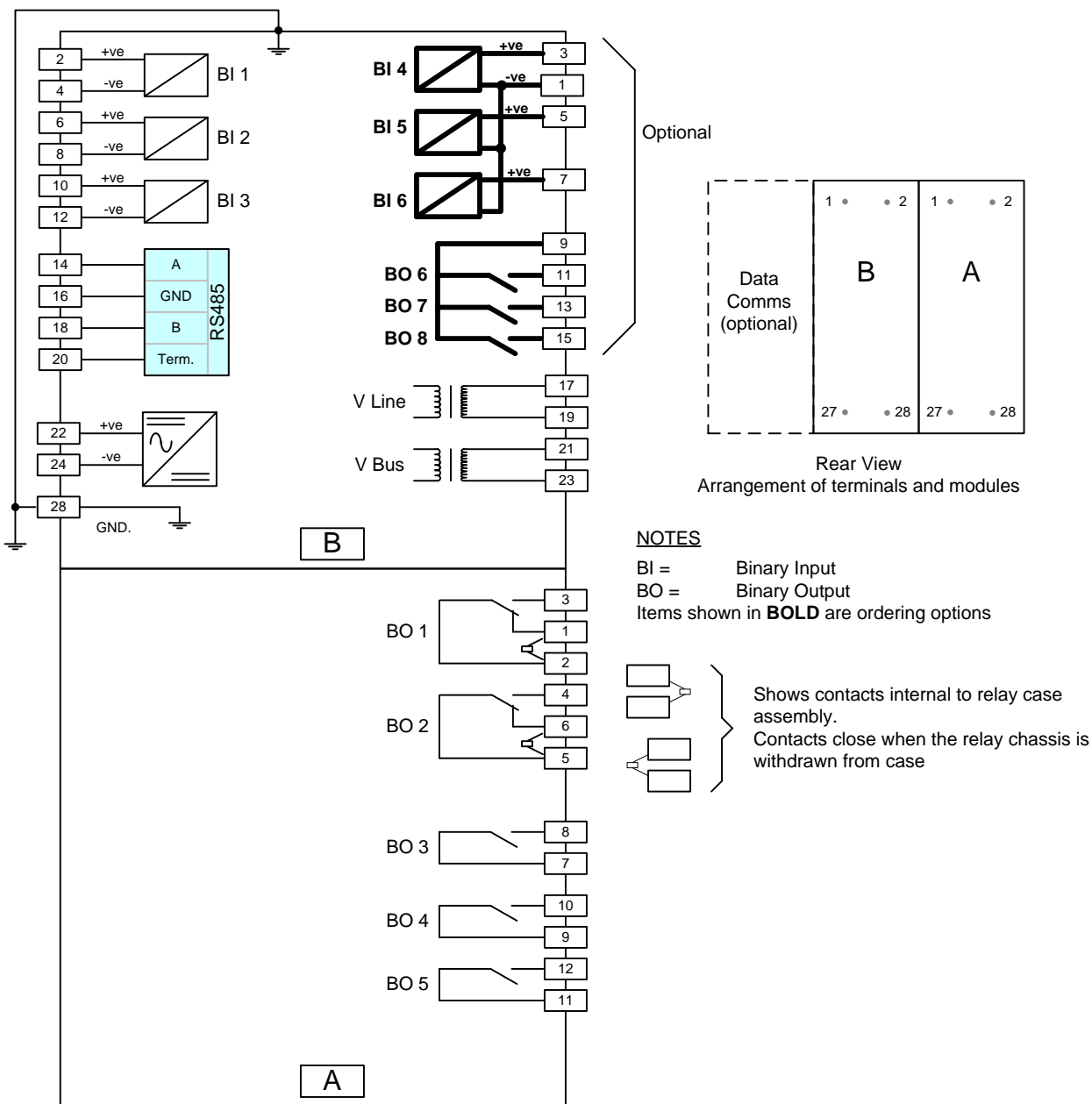
E4 Case overall dimensions and panel drilling details (all dimensions are in mm)



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).

E6 Case overall dimensions and panel drilling details (all dimensions are in mm)

# Connection Diagram



Connection Diagram

# Ordering Information

Product description	Variants	Order No.
<b>Voltage Relay (Argus)</b>		<b>7 S R 1 5 7 □ - 5 □ A □ □ - □ C A 0</b>
<u>Protection Product</u> Voltage		↑ 5
<u>Relay Type</u> Check Synchronising		↑ 7
<u>Case, I/O and Fascia</u> 2 VT, 3 Binary Inputs / 5 Binary Outputs, 10 LEDs 2 VT, 6 Binary Inputs / 8 Binary Outputs, 10 LEDs		↑ 7 8
<u>Measuring Input</u> 40/160V, 50/60Hz		↑ 5
<u>Auxiliary voltage</u> 80 to 250 VDC / 115 VAC, binary input threshold 19 V DC 80 to 250 V DC, binary input threshold 88 V DC 24 to 60 V DC, binary input threshold 19 V DC		↑ G H J
<u>Spare</u>		↑ A
<u>Communication Interface</u> Standard version – included in all models, USB front port, RS485 rear port (E4 case) <sup>1)</sup> Standard version - plus additional rear electrical Ethernet RJ45 (x2) (E6 Case) <sup>1)</sup> Standard version - plus additional rear optical Ethernet duplex (x2) (E6 Case) <sup>1)</sup>		↑ 1 2 7 7 8 7
<u>Protocol</u> IEC 60870-5-103, Modbus RTU and DNP3 (user selectable setting) IEC 60870-5-103, Modbus RTU, DNP3 and IEC 61850. (user selectable settings)		↑ 2 7
<u>Front Cover</u> Standard Version – No Push Buttons Push Buttons – Down and right arrows		↑ 1 2
<u>Protection Function Packages</u> Standard version 25 Check Synchronising		↑ C
<u>Additional Functionality</u> No additional functionality		↑ A
Spare		↑ 0

1) E4 case is standard, E6 case is required if IEC61850 option fitted

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