

Reyrolle  
Protection  
Devices

# 7SG118 Argus 8

Voltage & Frequency Relay

Answers for energy

**SIEMENS**

# 7SG118 Argus 8

Voltage and Frequency Relay

## Description

7SG118 Argus 8 voltage and frequency relays are numerical, multi-function devices that are designed to be applied for the protection of transmission, distribution and industrial systems.

The relay provides phase under and over voltage, neutral displacement overvoltage, negative sequence overvoltage and under and over-frequency protection elements.

These relays have extensive protection functions, which are supplemented by advanced metering, data storage and communications. Supervisory and self monitoring features give added confidence to the user as well as reduced maintenance and down time. A menu-based interface gives user-friendly access to relay settings, meters and operational data.

## Function Overview

- 2 or 3 voltage inputs
- Under/Over Voltage
- Negative phase sequence over voltage
- Neutral voltage displacement
- Under/Over Frequency
- Under voltage blocking
- Fibre optic or RS485 electrical communications port

## Data Storage and Communication

Serial communications conform to IEC60870-5-103 or Modbus RTU protocol. Up to 254 relays may be connected in a ring network and addressed individually.

A fibre-optic communications port is provided on the rear of the relay. It is optimised for 62.5/125µm glass fibre using ST® (BFOC/2.5) bayonet connectors. Optionally an RS485 electrical connector can be provided.

### Indication

LEDs for STARTER, TRIP and PROTECTION HEALTHY status.

LCD – Alpha-numeric display for settings, instruments and fault data.

### Sequence of event records

Up to 500 events are stored and time tagged to 1ms resolution. These are available via the communications.

### Fault records

The last 10 fault records are available from the fascia with time and date of trip, measured quantities and type of fault.

### Disturbance recorder

The waveform recorder may be triggered from a protection function or external input and has a configurable pre-fault trigger. Up to 5 fault waveforms may be stored.

AC voltage waveforms are stored together with the digital states of the status inputs and output relays.

### Reydisp Evolution

Reydisp Evolution is common to the entire range of Reyrolle numeric products. It provides the means for the user to apply settings, interrogate settings and retrieve events and disturbance waveforms from the Relay.

## Application

### Undervoltage and overvoltage

Four independent elements are supplied, each of which can be set to operate for under or over voltage conditions. Each has separate definite time delay elements. These can be used to protect generators against over-voltages, motors against loss of supply or applied as backup protection in the event of defective system regulating equipment.

### Negative sequence overvoltage

Two independent elements are supplied, each of which has a definite time delay element. These can be used to monitor the quality of the supply and protect plant against system unbalance.

### Neutral voltage displacement

Two independent elements are supplied, each of which has a definite time delay element. These can be used to detect earth faults in high impedance earthed or isolated systems. For this feature, the residual voltage can be measured directly from an open delta tertiary winding or (for 3-phase variants) calculated internally from the phase voltage inputs.

These elements include a third harmonic filter, which desensitises the elements to any superimposed third harmonic frequencies.

### Underfrequency and overfrequency

Four independent elements are supplied, each of which can be set to operate for under or over frequency. Each has separate definite time delay elements. These can be applied wherever frequency protection is required to maintain system stability e.g. in load shedding schemes. The accuracy and security of operation of the numeric algorithms enables the relay to be employed to detect any frequency abnormalities.

## Description of Functionality

Relay variants with two voltage inputs have a '2 Systems A/B' connection setting. This allows the voltage of two different systems each to be assigned two of the under/overvoltage elements.

This feature could be used as part of a local generation scheme with islanding capability, where one input is allocated to the local system, and the other to the grid.

Note that in this mode the frequency elements are disabled.

### Blocking operation

Each protection element can be blocked from operation by a user-defined status input signal. In addition, the voltage, frequency and NPS elements can be protected against maloperation during system de-energisation using the Voltage Blocking Threshold. Each frequency element may also be blocked by any combination of the voltage elements starting.

### Trip circuit supervision

The trip circuit connections can be monitored by a status input. This is linked to an alarm and may be configured to operate an output relay.

### Circuit breaker maintenance

A circuit breaker operations counter is provided. An operations count level can be set which, when reached, can be used as an input to a condition-based maintenance regime.

## Technical Data

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

## Inputs and Outputs

### Voltage Inputs

AC Voltage	Frequency
63.5/110V	50 / 60Hz

Burden	≤ 0.2VA
Continuous Withstand	250V

### DC Auxiliary supply

Rated DC Voltage	Operating Range V dc
24/30/48V	18 to 60V
110/220V	88 to 280V

Operate State	Burden
Quiescent (Typical)	3 W
Maximum	10 W

Allowable superimposed ac component	≤ 12% of dc voltage
Allowable breaks/dips in supply (collapse to zero from nominal voltage)	≤ 20 ms

### DC status input

Nominal voltage	Operating range
30V	18 - 37.5 V D C
48V	37.5 - 60 V D C
110V	87.5 - 137.5 V D C
220V	175 - 280 V D C

Attribute	Value
Min. DC Current for Operation: 30/48V 110/220V	10mA <5mA
Reset/Operate voltage ratio	≥ 90 %
Typical response time	5 ms
Typical response time when programmed to energise an output relay contact	< 15 ms
Recommended Minimum pulse duration	40ms with setting of 20ms PU delay for a.c. rejection

The 30V and 48V inputs meet the requirements of the ESI48-4 ES1 standard. However, the 110V or 220V inputs will operate with a DC current of less than 10mA. If 110V or 220V inputs compliant with ESI48-4 ES1 are required, a 48 volt status input can be supplied with external dropper resistors as follows:

Nominal Voltage	Resistor Value	Wattage
110V	2k7 ± 5%	2.5 W
220 V	8k2 ± 5%	6.0 W

Each status input has associated timers which can be programmed to give time delayed pick-up and time delayed drop-off. The pick-up delays have default settings of 20ms, thus providing rejection and immunity to an AC input signal. Status inputs will not respond to the following:-

- 250V RMS 50/60Hz applied for two seconds through a 0.1µF capacitor.
- Discharge of a 10µF capacitor charged to maximum DC auxiliary supply voltage.

### Output relays

Carry continuously	5A ac or dc
Make and carry (L/R ≤ 40 ms and V ≤ 300V)	20A ac or dc for 0.5s 30A ac or dc for 0.2s
Breaking Capacity (≤ 5 A and ≤ 300 V): AC Resistive AC Inductive DC Resistive DC Inductive	1250 VA 250 VA at p.f. ≥ 0.4 75 W 30 W at L/R ≤ 40ms 50 W at L/R ≤ 10ms
Minimum number of operations	10 <sup>6</sup> at maximum load
Minimum recommended load	0.5 W minimum of 10mA or 5V

## Mechanical

### Vibration (Sinusoidal)

IEC 60255-21-1 Class I

Vibration response	0.5gn	≤ 5% variation	0.5gn
Vibration endurance	1.0gn		1.0gn

### Shock and Bump

IEC 60255-21-2 Class I

Shock response	5gn, 11ms	≤ 5% variation	5gn, 11ms
Shock withstand	15gn, 11ms		15gn, 11ms
10 gn, Bump test	10gn, 16ms		10gn, 16ms

### Seismic

IEC 60255-21-3 Class I

Seismic Response	1gn	≤ 5% variation
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## Electrical Tests

### Insulation IEC 255-5

IEC 255-5 rms levels for 1 minute

Between all terminals and earth for 1 minute	2.0 kV rms
Between independent circuits for 1 minute	2.0 kV rms
Across normally open contacts for 1 minute	1.0 kV rms

### High frequency disturbance

IEC 60255-22-1 class III

2.5kV longitudinal mode	< 3% deviation
1.0kV transverse mode	

### Electrostatic Discharge

IEC 60255-22-2 class III

8kV, Contact discharge	≤ 5% variation
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### Fast transient

IEC 255-22-4 class IV

4kV, 5/50ns, 2.5 kHz, repetitive	≤ 3% variation
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### Conducted RFI

IEC 60255-22-6 class IV

10 V, 0.15 to 80 MHz	≤ 5% variation
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### Conducted Limits

IEC 60255-25

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

### Radiated Limits

IEC 60255-25

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

### Radio frequency interference

IEC 60 255-22-3

10 V/m, 80 to 1000 MHz	≤ 5% variation
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## Environmental

### Temperature

IEC 68-2-1/2

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

### Humidity

IEC 68-2-3

Operational test	56 days at 40°C and 95% RH
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## Performance

### General Accuracy

Reference Conditions	
General	IEC 60255-3
Auxiliary supply	Nominal
Frequency	50Hz or 60Hz
Ambient temperature	20 °C

### Accuracy Influencing Factors

Temperature		
-10 °C to +55 °C		≤ 5 % variation
Frequency		
47 Hz to 52 Hz	Level:	≤ 1 % variation
57 Hz to 62 Hz	Operating time:	≤ 1 % variation

### Phase Under/Over Voltage protection (27/59)

No. of elements	4
Level	
Setting Vs	5.0 to 200.0 V step 0.5 V
Hysteresis	1 to 90 % step 1 %
Accuracy	Operate: setting ± 1% or ± 0.25 V U/V reset: (operate + hysteresis) O/V reset: (operate - hysteresis)

Operating Time		
Under-Voltage	1.1x to 0.9x Vs:	≤ 65 ms
	Reset	0 V to 1.1x Vs: ≤ 75 ms 0 V to 2.0x Vs: ≤ 65 ms
Over-Voltage	0 V to 1.1x Vs:	≤ 55 ms
	0 V to 2.0xVs:	≤ 45ms
Reset	1.1x to 0.9x Vs:	≤ 50 ms
Delay (additional to operating time)		
Setting	0.00 to 600 sec	
Accuracy	± 1 % or ± 30 ms	

### Negative Sequence Over Voltage protection (47)

No. of elements	2
Level	
Setting Vs	1.0 to 100.0 V step 0.5 V
Hysteresis	1 to 90 % step 1 %
Accuracy	Operate: setting ± 1% or ± 0.5 V Reset: ≥ 95% of operate value (for Vs > 3.5 V)

Operating Time		
Operate	0 V to 1.1xVs	≤ 85 ms
	0 V to 2.0xVs	≤ 85 ms
Reset	1.1x to 0.9x Vs:	≤ 80 ms
	1.1xVs to 0 Vs:	≤ 70 ms

Delay (additional to operating time)	
Setting	0.00 to 600 sec
Accuracy	± 1 % or ± 30 ms

### Neutral Over Voltage protection (59N)

No. of elements	2
Level	
Setting Vs	1.0 to 100.0 V step 0.5 V
Accuracy	Operate: setting ± 1% or ± 0.5 V Reset: ≥ 95% of operate value (for Vs > 7.5 V)

Operating Time		
Operate	0 V to 1.1x Vs	≤ 85 ms
	0 V to 2.0x Vs	≤ 85 ms
Reset	1.1x to 0.9x Vs	≤ 80 ms
	1.1xVs to 0 V:	≤ 70 ms

Delay (additional to operating time)	
Setting	0.00 to 600 sec
Accuracy	± 1 % or ± 30 ms

### Under/Over Frequency protection (81U/O)

No. of elements	4
Level	
Setting	47.00 to 62.00 Hz step 0.01 Hz
Accuracy	Operate: setting ± 10mHz U/F reset: ≤ operate + 20 mHz O/F reset: ≤ operate - 20 mHz

Operating Time		
for ROCOF between 0.1 - 10 Hz/s	typically:	< 140 ms
	maximum:	175 ms *
Delay (additional to operating time)		
Setting	0.00 to 600 sec	
Accuracy	± 1 % or ± 30 ms	

\* 7SG118n-nW 300-series meets NGC specification for an underfrequency operating time of 150ms maximum

### Voltage Blocking Element

Level	
Setting	1.0 to 100.0 V step 1 V

## Case Dimensions

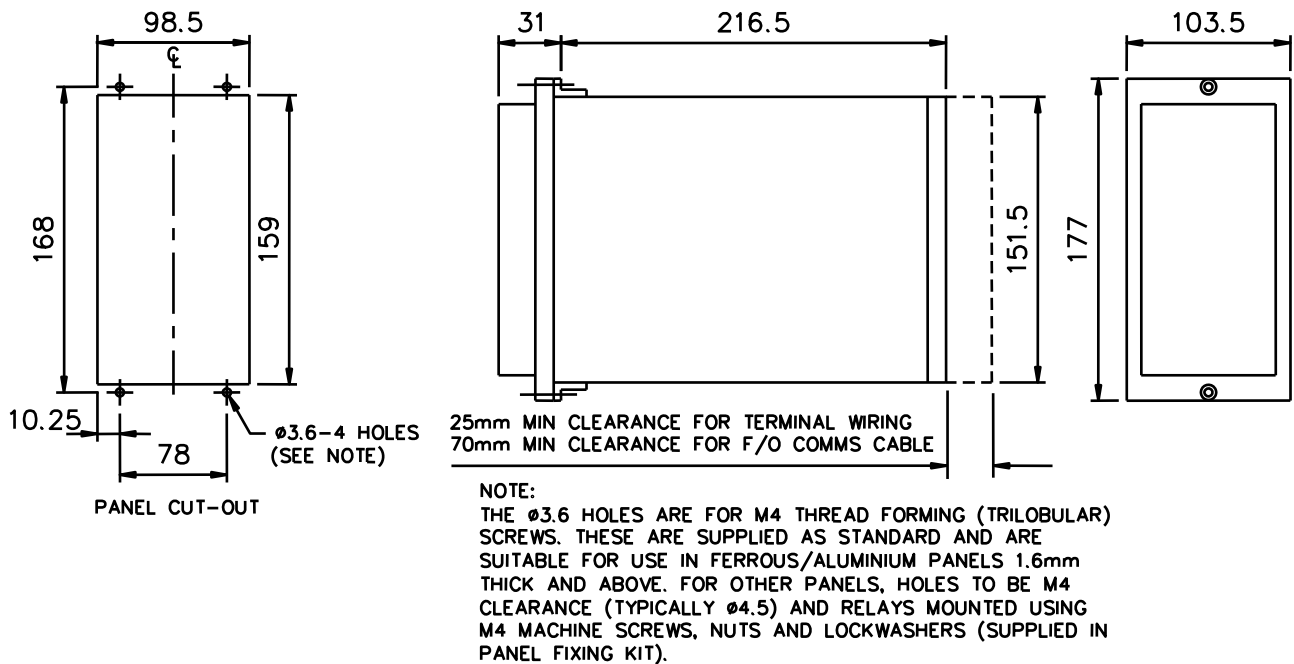


Fig 1. E4 Case Dimensions

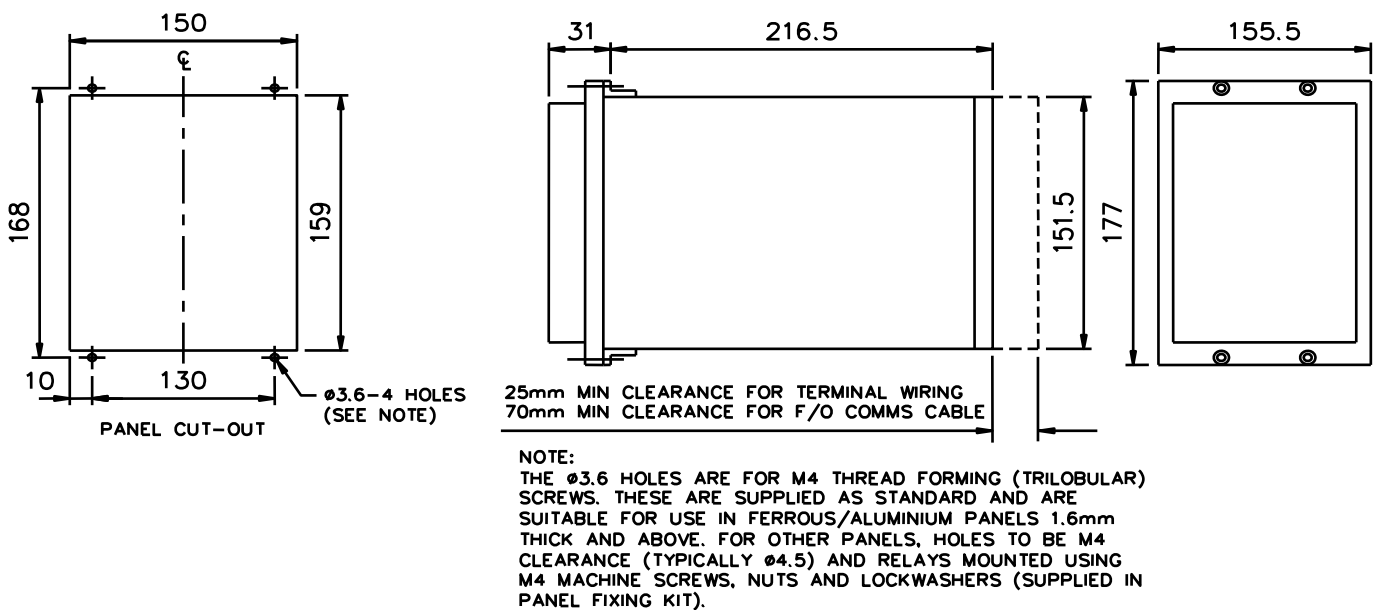
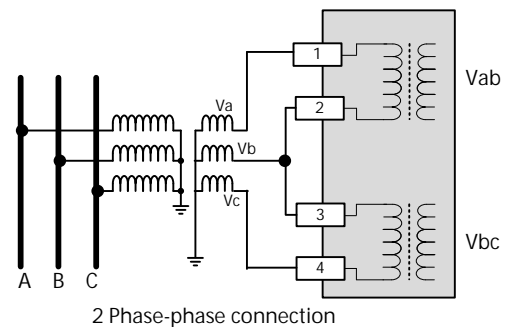
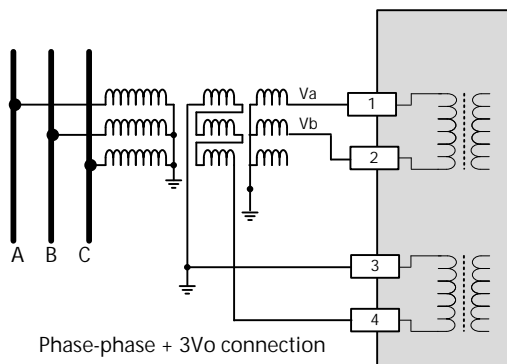
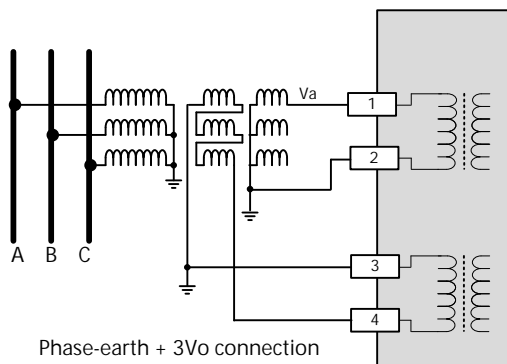
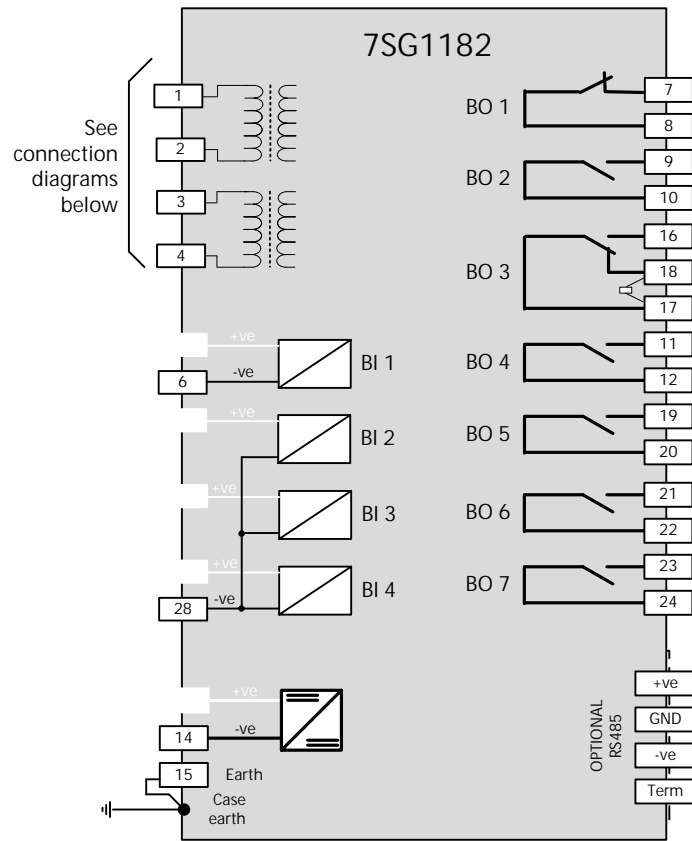


Fig 2. E6 Case Dimensions

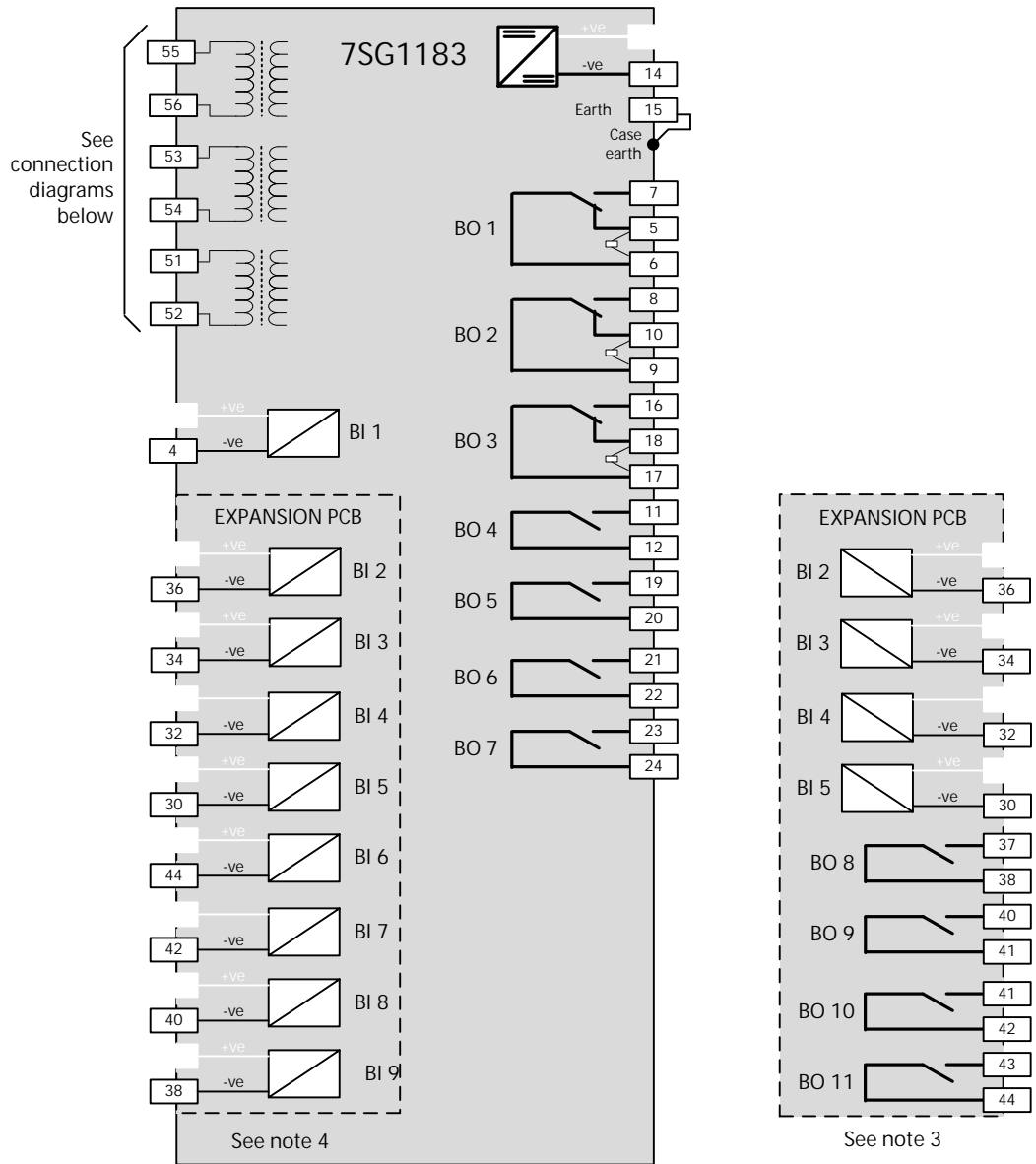
# Connection Diagram



Note  
For the phase-phase and phase-earth connections, any phasing may be used

Fig 3. Connection Diagram for 7SG1182 Relay

# Connection Diagram



Note  
For the phase-phase and phase-earth connections, any phasing may be used

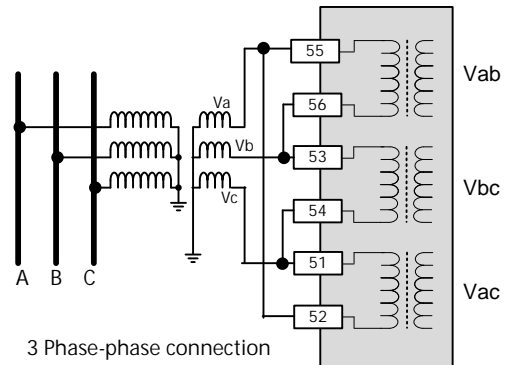
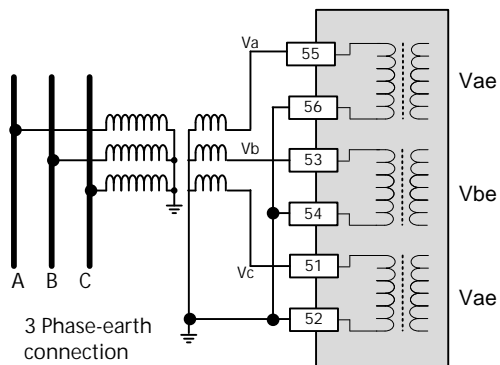


Fig 4. Connection Diagram for 7SG1183 Relay

# Ordering Information – 7SG1182

Product description	Variants	Order No.
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Voltage/frequency relay

Number of elements  
Two pole relay

Auxiliary supply /binary input voltage  
24/30/48 V DC auxiliary, 30 V binary input  
110/220 V DC auxiliary, 30 V binary input  
24/30/48 V DC auxiliary, 48 V binary input  
110/220 V DC auxiliary, 48 V binary input 1)  
110/220 V DC auxiliary, 110 V low burden binary input  
110/220 V DC auxiliary, 220 V low burden binary input

Type of relay  
100 series: Voltage measuring relay providing under & overvoltage, negative sequence overvoltage and neutral voltage displacement  
200 series: Voltage measuring relay providing under & overvoltage, under & over frequency, negative sequence overvoltage and neutral voltage displacement  
300 series: Voltage measuring relay providing under & overvoltage, Under & over frequency with improved operating time, negative sequence overvoltage and neutral voltage displacement

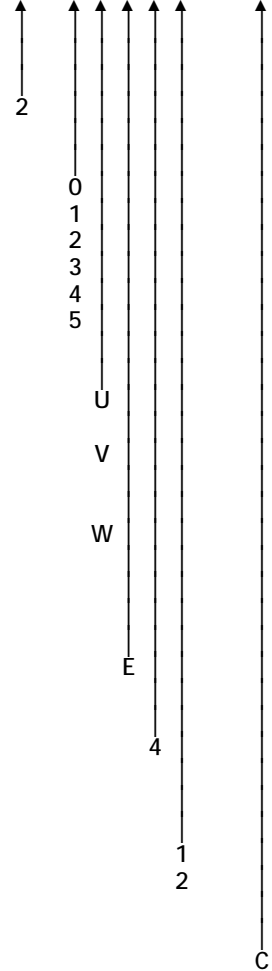
Nominal voltage inputs  
63/110 V AC

I/O range  
4 Binary Inputs / 7 Binary Outputs (incl. 1 changeover and 1 normally closed)

Communication interface  
Fibre optic (ST-connector) / IEC 60870-5-103 or Modbus RTU  
RS485 interface / IEC 60870-5-103 or Modbus RTU

Housing size  
Case size E4 (4U high)

7 S G 1 1 8 □ - □ □ □ □ □ - 0 □ A 0



1) High burden 110V & 220V binary inputs compliant with ESI48-4 ESI 1 available via external dropper resistors with 48V binary input version  
for 5 binary inputs and 110 V application, order resistor box VCE:2512H10065 in addition  
for 5 binary inputs and 220 V application, order resistor box VCE:2512H10067 in addition  
Refer to website for application note about ESI48-4 compliance

2) An additional unit is required for use with capacitor cones, order 7XG2100-1AA00-0AA0



