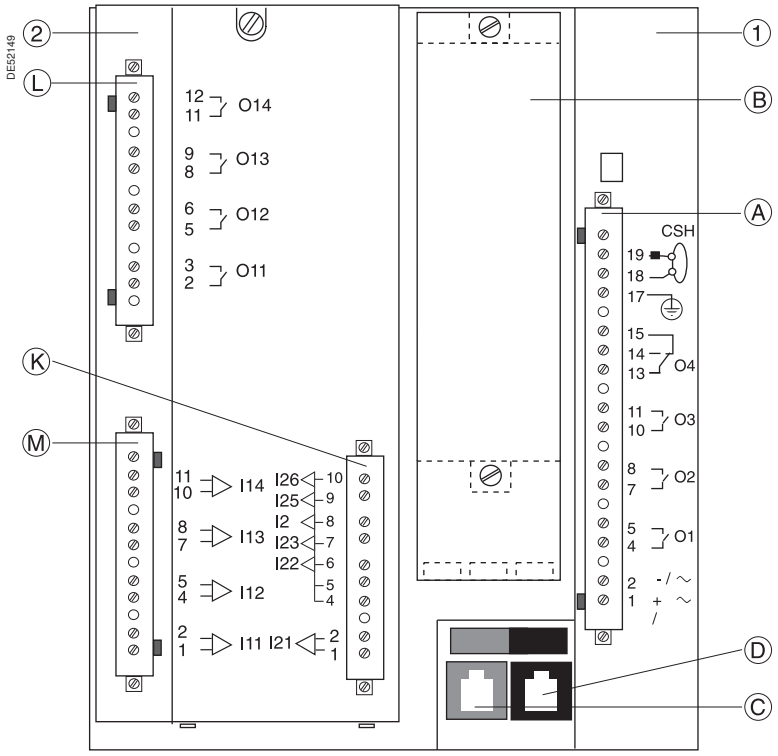
Base unit
Description

Sepam components

■ Base unit ①
□ Ⓐ base unit connector:
- power supply
- output relays
- CSH30, 120, 200 or ACE990 input.

Screw-type connector shown (CCA620), or ring lug connector (CCA622)
□ Ⓑ 1 A/5 A CT current input connector (CCA630 or CCA634) or LPCT current input connector (CCA670) or VT voltage input connector (CCT640)
□ Ⓒ communication module link connection (white)
□ Ⓓ remote inter-module link connection (black)
■ Optional input/output module ② (MES114)
□ Ⓛ Ⓜ MES114 module connectors
□ Ⓚ MES114 module connector.



Base unit
Connection

Connection of the base unit

The Sepam connections are made to the removable connectors located on the rear panel. All the connectors are screw-lockable.

CAUTION

LOSS OF PROTECTION OR RISK OF NUISANCE TRIPPING

If the Sepam is no longer supplied with power or is in fail-safe position, the protection functions are no longer active and all the Sepam output relays are dropped out. Check that this operating mode and the watchdog relay wiring are compatible with your installation.

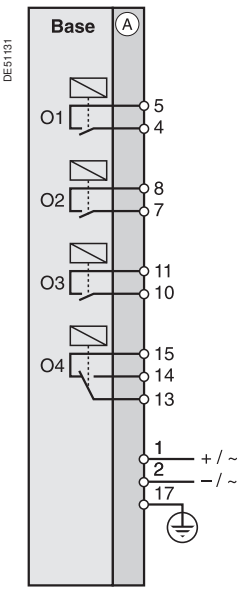
Failure to follow these instructions can result in equipment damage and unwanted shutdown of the electrical installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, ELECTRIC ARC OR BURNS

- Only qualified personnel should install this equipment. Such work should be performed only after reading this entire set of instructions.
- NEVER work alone.
- Turn off all power supplying this equipment before working on or inside it. Consider all sources of power, including the possibility of backfeeding.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Start by connecting the device to the protective earth and to the functional earth.
- Screw tight all terminals, even those not in use.

Failure to follow these instructions will result in death or serious injury.



Wiring of the CCA620 connector:

- Without fitting:
  - 1 wire with maximum cross-section of 0.2 to 2.5 mm^2 (AWG 24-12) or 2 wires with maximum cross-section of 0.2 to 1 mm^2 (AWG 24-18)
  - Stripped length: 8 to 10 mm (0.31 to 0.39 in)
- With fitting:
  - Recommended wiring with Schneider Electric fitting:
    - DZ5CE015D for 1 wire 1.5 mm^2 (AWG 16)
    - DZ5CE025D for 1 wire 2.5 mm^2 (AWG 12)
    - AZ5DE010D for 2 wires 1 mm^2 (AWG 18)
  - Tube length: 8.2 mm (0.32 in)
  - Stripped length: 8 mm (0.31 in).

Wiring of the CCA622 connector:

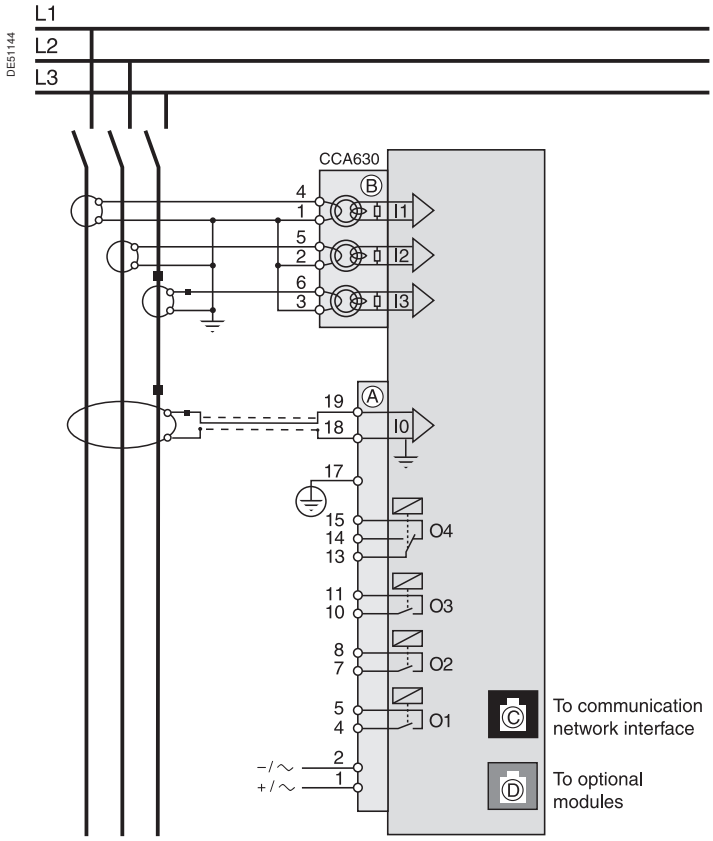
- Ring lug connectors 6.35 mm (1/4 in)
- Wire with maximum cross-section of 0.2 to 2.5 mm^2 (AWG 24-12)
- Stripped length: 6 mm (0.236 in)
- Use an appropriate tool to crimp the lugs onto the wires
- 2 ring or spade lugs maximum per terminal
- Tightening torque: 0.7 to 1 N•m (6 to 9 lb-in).

Characteristics of the 4 base unit relay outputs O1, O2, O3, O4

- O1 and O2 are 2 control outputs, used by the breaking device control function for:
  - O1: breaking device tripping
  - O2: breaking device closing inhibition
- O3 is a non assigned control output.
- O4 is a non assigned indication output. It can be assigned to the watchdog function.

Base unit
Connection of current inputs

Types S20/S23/S24/T20/T23/T24/M20

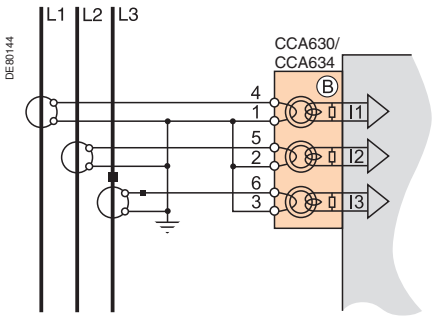


Connection to 1 A/5 A current sensors

Connector	Type	Ref.	Cable
A	Screw-type	CCA620	■ 1 wire 0.2 to 2.5 mm² (AWG 24-12) ■ 2 wires 0.2 to 1 mm² (AWG 24-18)
	Ring lug 6.35 mm (1/4 in)	CCA622	■ Cross-section: 0.2 to 2.5 mm² (AWG 24-12) ■ Stripped length: 6 mm (0.236 in) ■ Tightening torque: 0.7 to 1 N.m (6 to 9 lb-in)
B	Ring lug 4 mm (0.16 in)	CCA630/ CCA634	■ Cross-section: 1.5 to 6 mm² (AWG 16-10) ■ Stripped length: 6 mm (0.236 in) ■ Tightening torque: 1.2 N.m (11 lb-in)
C	RJ45		CCA612
D	RJ45		■ CCA770: L = 0.6 m (2 ft) ■ CCA772: L = 2 m (6.6 ft) ■ CCA774: L = 4 m (13 ft)

Base unit
Other phase current input connection schemes

Variant 1: phase current measurements by 3 x 1 A or 5 A CTs (standard connection)



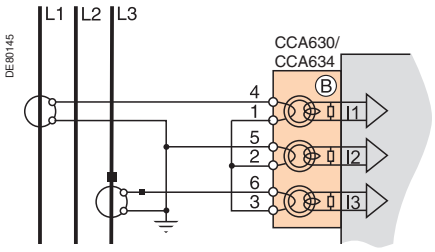
Description
Connection of 3 x 1 A or 5 A sensors to the CCA630 or CCA634 connector.

The measurement of the 3 phase currents allows the calculation of residual current.

Parameters

Sensor type	5 A CT or 1 A CT
Number of CTs	I1, I2, I3
Rated current (In)	1 A to 6250 A

Variant 2: phase current measurement by 2 x 1 A or 5 A CTs



Description
Connection of 2 x 1 A or 5 A sensors to the CCA630 or CCA634 connector.

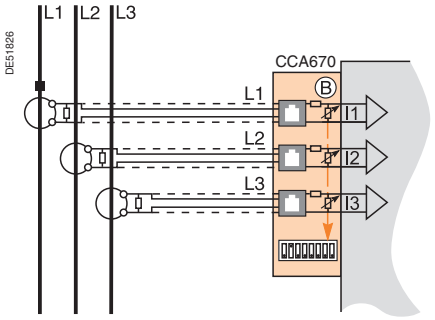
The measurement of phase currents 1 and 3 is sufficient to ensure all the phase current-based protection functions.
The phase current I2 is only assessed for metering functions, assuming that I0 = 0.

This arrangement does not allow the calculation of residual current.

Parameters

Sensor type	5 A CT or 1 A CT
Number of CTs	I1, I3
Rated current (In)	1 A to 6250 A

Variant 3: phase current measurement by 3 LPCT type sensors



Description
Connection of 3 Low Power Current Transducer (LPCT) type sensors to the CCA670 connector. The connection of only one or two LPCT sensors is not allowed and causes Sepam to go into fail-safe position.

The measurement of the 3 phase currents allows the calculation of residual current.

Parameters

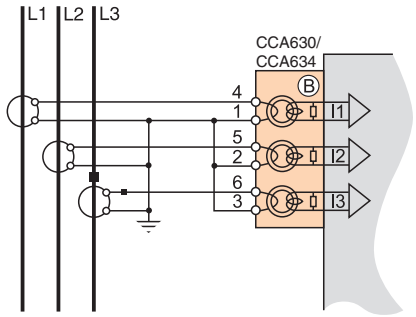
Sensor type	LPCT
Number of CTs	I1, I2, I3
Rated current (In)	25, 50, 100, 125, 133, 200, 250, 320, 400, 500, 630, 666, 1000, 1600, 2000 or 3150 A

Note: *Parameter In must be set 2 twice:*

- *Software parameter setting using the advanced UMI or the SFT2841 software tool*
- *Hardware parameter setting using microswitches on the CCA670 connector*

Base unit
Other residual current input connection schemes

Variant 1: residual current calculation by sum of 3 phase currents

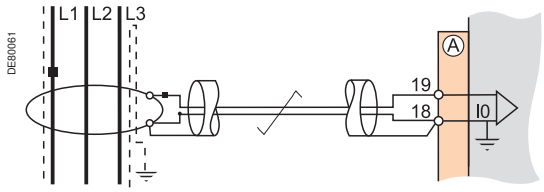


Description
Residual current is calculated by the vector sum of the 3 phase currents I1, I2 and I3, measured by 3 x 1 A or 5 A CTs or by 3 LPCT type sensors.
See current input connection diagrams.

Parameters

Residual current	Rated residual current	Measuring range
Sum of 3 Is	In0 = In, CT primary current	0.1 to 40 In0

Variant 2: residual current measurement by CSH120 or CSH200 core balance CT (standard connection)

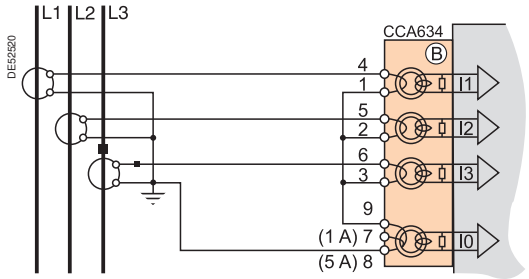


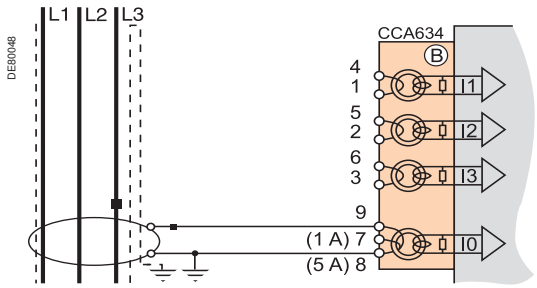
Description
Arrangement recommended for the protection of isolated or compensated neutral systems, in which very low fault currents need to be detected.

Parameters

Residual current	Rated residual current	Measuring range
2 A rating CSH	In0 = 2 A	0.2 to 40 A
20 A rating CSH	In0 = 20 A	2 to 400 A

Variant 3: residual current measurement by 1 A or 5 A CTs and CCA634





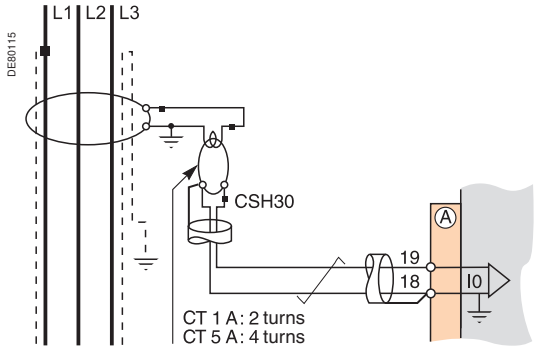
Description
Residual current measurement by 1 A or 5 A CTs.
- Terminal 7: 1 A CT
- Terminal 8: 5 A CT

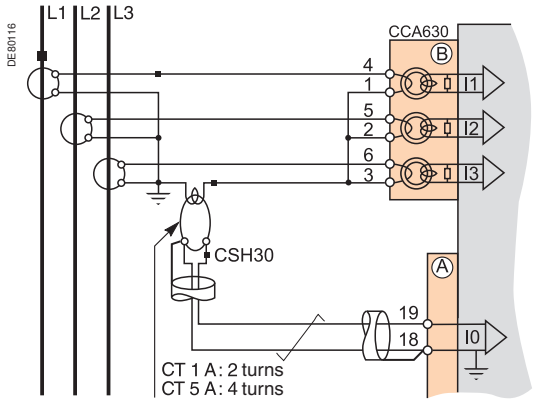
Parameters

Residual current	Rated residual current	Measuring range
1 A CT	In0 = In, CT primary current	0.1 to 20 In0
5 A CT	In0 = In, CT primary current	0.1 to 20 In0

Base unit
Other residual current input connection schemes

Variant 4: residual current measurement by 1 A or 5 A CTs and CSH30 interposing ring CT





Description

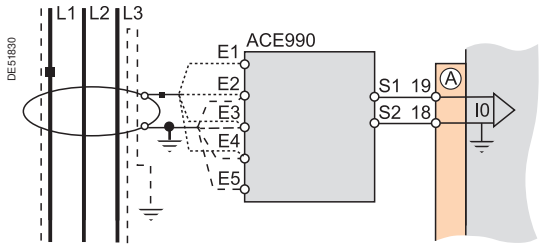
The CSH30 interposing ring CT is used to connect 1 A or 5 A CTs to Sepam to measure residual current:

- Connection of CSH30 interposing ring CT to 1 A CT: make 2 turns through CSH primary
- Connection of CSH30 interposing ring CT to 5 A CT: make 4 turns through CSH primary.

Parameters

Residual current	Rated residual current	Measuring range
1 A CT	In0 = In, CT primary current	0.1 to 20 In0
5 A CT	In0 = In, CT primary current	0.1 to 20 In0

Variant 5: residual current measurement by core balance CT with ratio of 1/n (n between 50 and 1500)



Description

The ACE990 is used as an interface between an MV core balance CT with a ratio of 1/n (50 < n < 1500) and the Sepam residual current input.
This arrangement allows the continued use of existing core balance CTs on the installation.

Parameters

Residual current	Rated residual current	Measuring range
ACE990 - range 1 (0.00578 ⩽ k ⩽ 0.04)	In0 = Ik.n(1)	0.1 to 20 In0
ACE990 - range 2 (0.0578 ⩽ k ⩽ 0.26316)	In0 = Ik.n(1)	0.1 to 20 In0

(1) *n = number of core balance CT turns*
k = factor to be determined according to ACE990 wiring and setting range used by Sepam

Base unit
Connection of low voltage residual current inputs

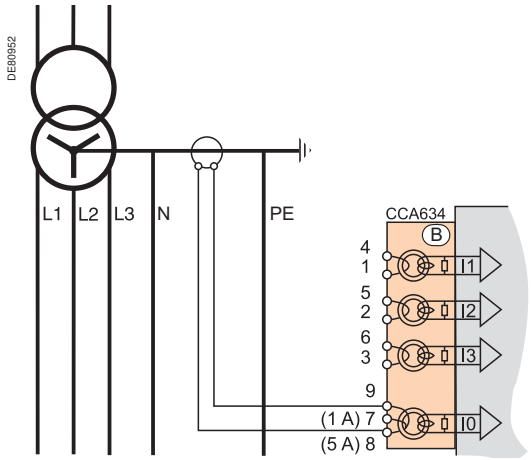
Variant 1: residual current measurement by CTs on the neutral earthing link (with or without CSH30 interposing ring CT)

Description

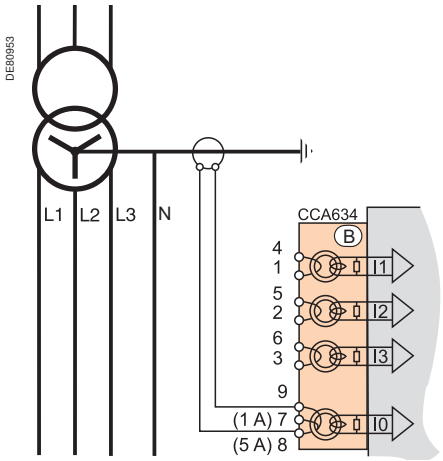
Residual current is measured with a 1 A or 5 A CT on the neutral point.

Parameters

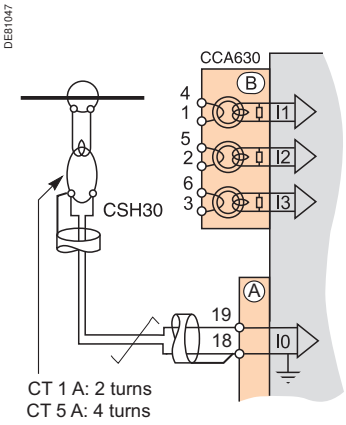
Residual current	Rated residual current	Measuring range
1 A CT	In0 = neutral point CT In	0.1 to 20 In0
5 A CT	In0 = neutral point CT In	0.1 to 20 In0



Connection on TN-S network.



Connection on TT network.



Connection with CSH30.

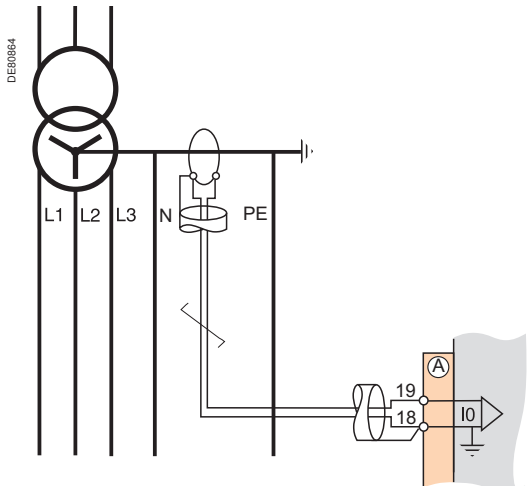
Variant 2: residual current measurement by CSH120 or CSH200 core balance CT on the neutral earthing link

Description

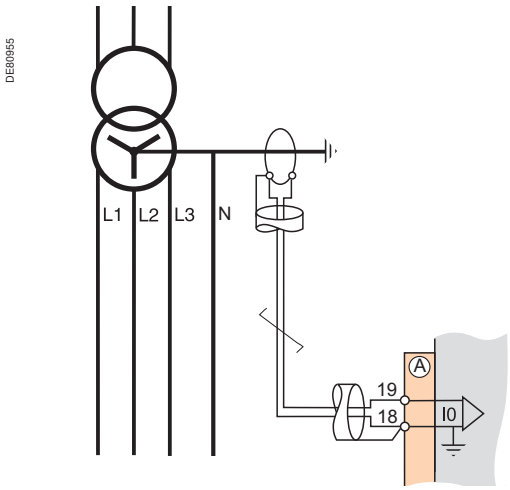
Residual current is measured with a core balance CT on the neutral point. Core balance CTs are recommended for measuring very low fault currents provided that the earth fault current remains below 2 kA. Above this value it is advisable to use the standard variant 1.

Parameters

Residual current	Rated residual current	Measuring range
2 A rating CSH	In0 = 2 A	0.1 to 20 In0
20 A rating CSH	In0 = 20 A	0.1 to 20 In0



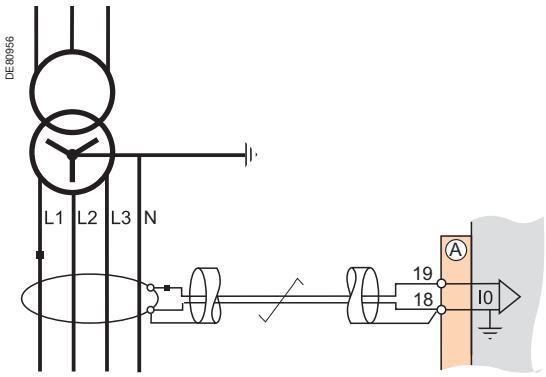
Connection on TN-S network.



Connection on TT network.

Base unit
Connection of low voltage residual current inputs

Variant 3: residual current measurement by sum of 3 phase currents and neutral current measurement by CSH120 or CSH200 core balance CT



Connection on TN-S and TT networks.

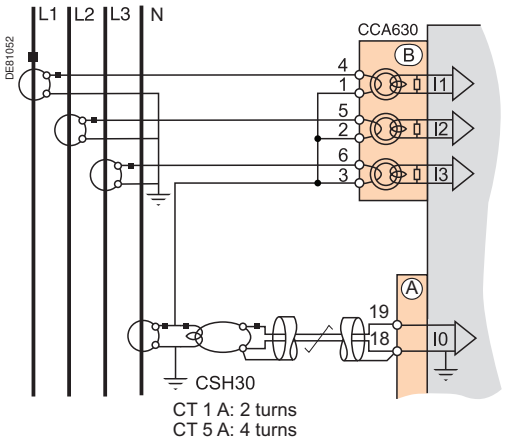
Description

Measurement by core balance CT is recommended for measuring very low fault currents.

Parameters

Residual current	Rated residual current	Measuring range
2 A rating CSH	In0 = 2 A	0.1 to 40 A
20 A rating CSH	In0 = 20 A	0.2 to 400 A

Variant 4: residual current measurement by sum of 3 phase currents and neutral current measurement by 1 A or 5 A CTs and CSH30 interposing ring CT



Connection on TN-S and TT networks.

Description

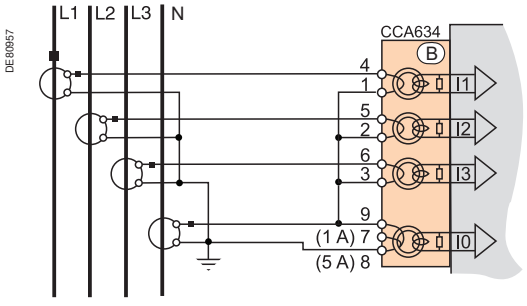
The phase and neutral CTs should have the same primary and secondary currents. The CSH30 interposing ring CT is used to connect 1 A or 5 A CTs to Sepam to measure residual current:

- Connection of CSH30 interposing ring CT to 1 A CT: make 2 turns through CSH primary
- Connection of CSH30 interposing ring CT to 5 A CT: make 4 turns through CSH primary.

Parameters

Residual current	Rated residual current	Measuring range
1 A CT	In0 = phase CT primary current In	0.1 to 20 In0
5 A CT	In0 = phase CT primary current In	0.1 to 20 In0

Variant 5: residual current measurement by sum of 3 phase currents and neutral current measurement by 1 A or 5 A CTs and CCA634 connector



Connection on TN-S and TT networks.

Description

The phase and neutral CTs should have the same primary and secondary currents. Residual current measurement by 1 A or 5 A CTs.

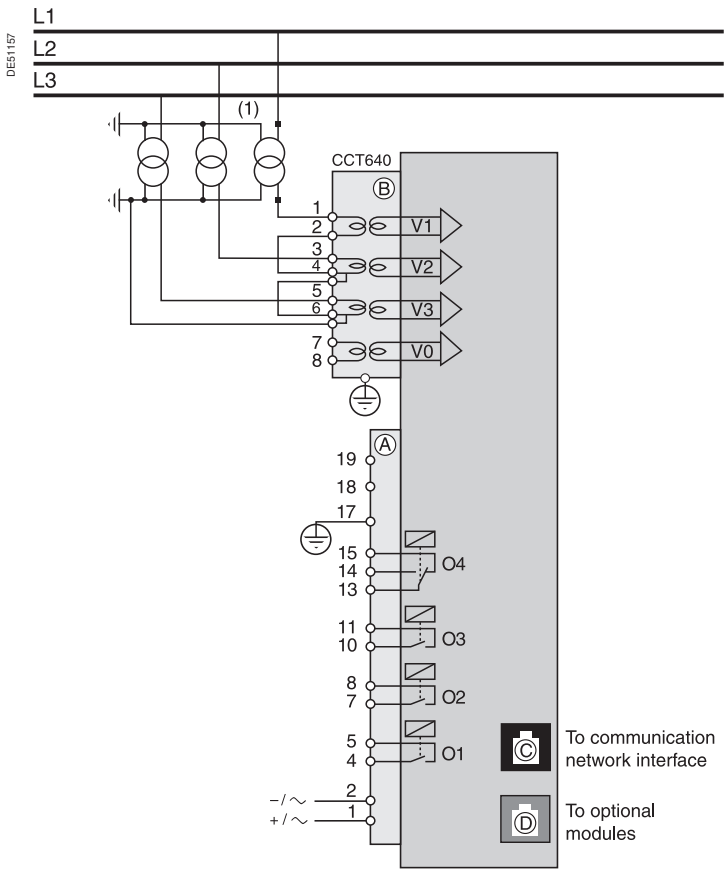
- Terminal 7: 1 A CT
- Terminal 8: 5 A CT

Parameters

Residual current	Rated residual current	Measuring range
1 A CT	In0 = phase CT primary current In	0.1 to 20 In0
5 A CT	In0 = phase CT primary current In	0.1 to 20 In0

Base unit
Connections of input voltage

B21/B22 types

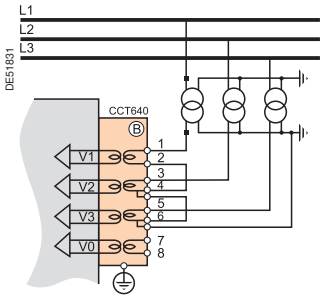


Connector	Type	Reference	Cable
A	Screw-type	CCA620	■ 1 wire 0.2 to 2.5 mm² (AWG 24-12) ■ 2 wires 0.2 to 1 mm² (AWG 24-18)
	Ring lug 6.35 mm (1/4 in)	CCA622	■ Cross-section: 0.2 to 2.5 mm² (AWG 24-12) ■ Stripped length: 6 mm (0.236 in) ■ Tightening torque: 0.7 to 1 N.m (6 to 9 lb-in)
B	Screw-type	CCT640	■ 1 wire 0.2 to 2.5 mm² (AWG 24-12) ■ 2 wires 0.2 to 1 mm² (AWG 24-18)
C	RJ45		CCA612
D	RJ45		■ CCA770: L = 0.6 m (2 ft) ■ CCA772: L = 2 m (6.6 ft) ■ CCA774: L = 4 m (13 ft)

Base unit
Other voltage input connection schemes

The phase and residual voltage transformer secondary circuits are connected to the CCT640 connector (item Ⓑ) on Sepam series 20 type B units. The CCT640 connector contains 4 transformers which perform isolation and impedance matching of the VTs and Sepam input circuits.

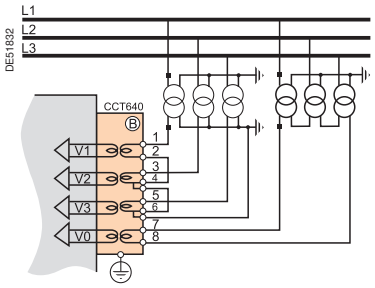
Variant 1: measurement of 3 phase-to-neutral voltages (standard connection)



Parameters	
Voltages measured by VTs	V1, V2, V3
Residual voltage	Sum of 3Vs

Functions available	
Voltages measured	V1, V2, V3
Values calculated	U21, U32, U13, V0, Vd, f
Measurements available	All
Protection functions available (according to type of Sepam)	All

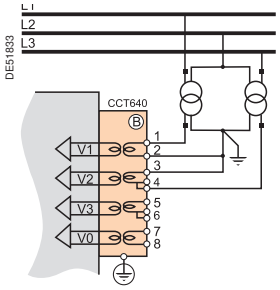
Variant 2: measurement of 3 phase-to-neutral voltages and residual voltage



Parameters	
Voltages measured by VTs	V1, V2, V3
Residual voltage	External VT

Functions available	
Voltages measured	V1, V2, V3, V0
Values calculated	U21, U32, U13, Vd, f
Measurements available	All
Protection functions available (according to type of Sepam)	All

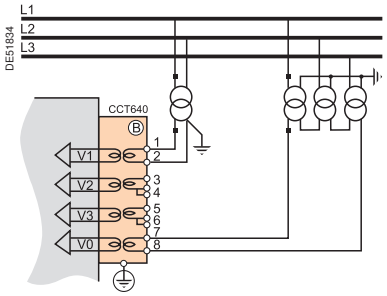
Variant 3: measurement of 2 phase-to-phase voltages



Parameters	
Voltages measured by VTs	U21, U32
Residual voltage	None

Functions available	
Voltages measured	V1, V2, V3
Values calculated	U13, Vd, f
Measurements available	U21, U32, U13, Vd, f
Protection functions available (according to type of Sepam)	All except 59N, 27S

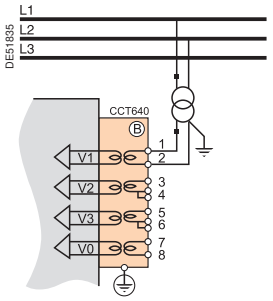
Variant 4: measurement of 1 phase-to-phase voltage and residual voltage



Parameters	
Voltages measured by VTs	U21
Residual voltage	External VT

Functions available	
Voltages measured	U21, V0
Values calculated	f
Measurements available	U21, V0, f
Protection functions available (according to type of Sepam)	All except 47, 27D, 27S

Variant 5: measurement of 1 phase-to-phase voltage

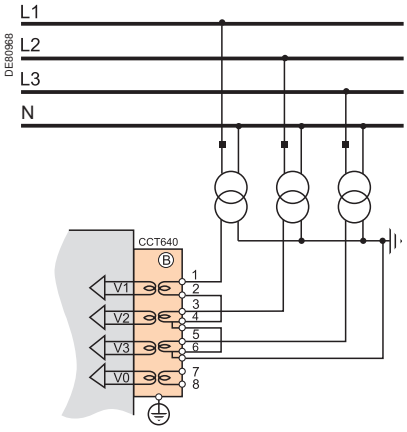


Parameters	
Voltages measured by VTs	U21
Residual voltage	None

Functions available	
Voltages measured	U21
Values calculated	f
Measurements available	U21, f
Protection functions available (according to type of Sepam)	All except 47, 27D, 59N, 27S

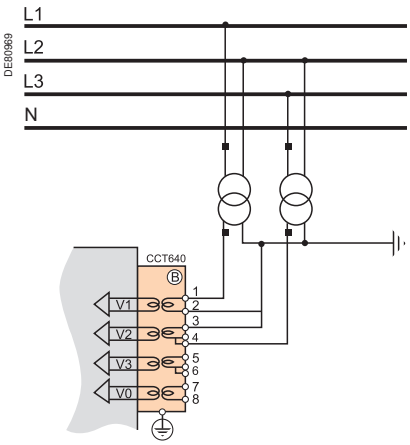
Base unit
Connection of low voltage phase voltage inputs

Variant 1: TN-S and TN-C networks



When a ground fault occurs on a TN-S or TN-C network, the neutral potential is not affected: the neutral can act as a reference for the VTs.

Variant 2: TT and IT networks



When a ground fault occurs on a TT or IT network, the neutral potential is affected: the neutral cannot act as a reference for the VTs, phase-to-phase voltages must be used on both phases.