

How to measure residual voltage (V0) in Sepam series 20, 40, 60 and 80? Where to connect external VT?

First of all please be informed that there are two different ways to have V0 :

- By calculation of Vo (it is a must to have V1,V2 and V3) → 3V sum method in SFT2841
- By direct measurement or in another words open star, delta VT → External VT method in SFT2841

So then combining these two scenarios and considering the voltage input channel of each model in Sepam protection relay became important. By saying combining scenarios, we mean that customer may need to measure V1, V2 and V3 and at the same time may need to measure directly V0. So if the relay just has three input channels for voltage what would be the solution? That is exactly the case for Sepam series 20 and 60.

For all series by having V1, V2 and V3 voltage (Phase –to-Neutral voltage) it is possible to calculate V0. But there is some limitation for Sepam series 40 and 60 for having phase-to-neutral and V0 (measured method) at the same time, as they have got just 3 VT input channels.

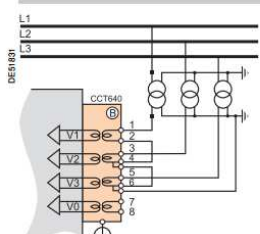
The purpose of this FAQ in below is to make it clearer all possibilities accordingly:

In Sepam series 20 (voltage models B20,B21,B22):

The connector CCT640 containing 4 transformers which provide impedance matching and isolation between the VTs and Sepam input circuits, is used as voltage channel in Sepam series 20.

Terminals B1 to B6 are intended for phase voltage measurement and B7 and B8 for residual voltage measurement (case shown, not connected if obtained by the sum of the 3 phase voltages).

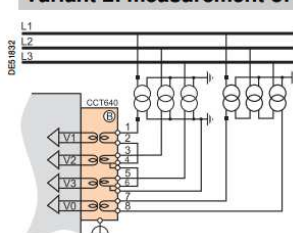
Variant 1: measurement of 3 phase-to-neutral voltages (standard connection)



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



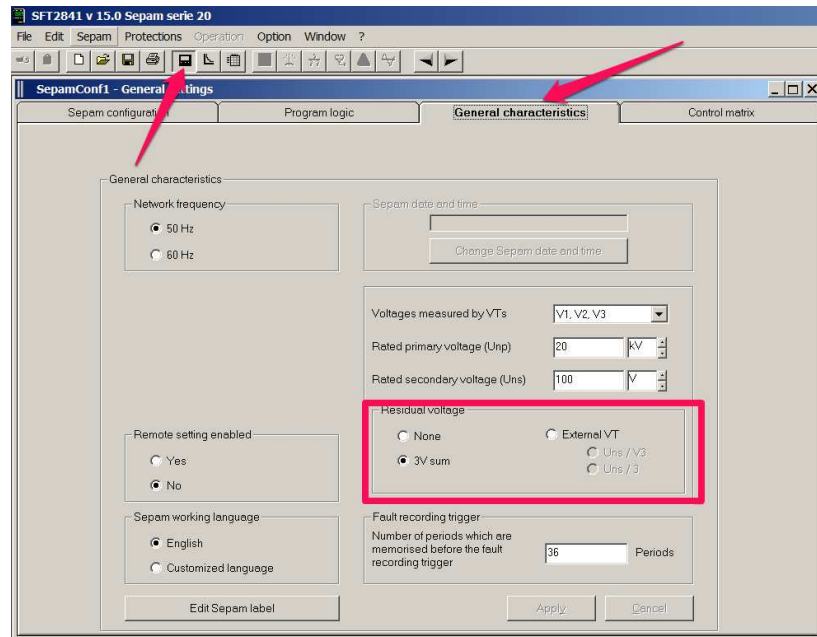
Parameters	
Voltages measured by VTs	V1, V2, V3
Residual voltage	External VT

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

In above diagram in variant 1 V0 is calculated, in variant 2 we directly measure V0 and all phase to phase voltages.

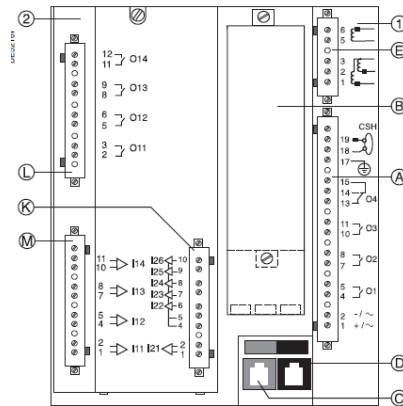
In order to choose the 3V sum/ External VT method in SFT2841, you should go through:

General setting>General Characteristics> Residual voltage:



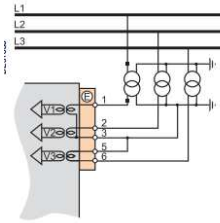
In Sepam series 40:

In Series 40 phase and residual voltage are connected to slot E. If it is needed to measure directly V0 it is a must to connect to measure 2 line voltage, and connect delta VT to terminal 5,6 of slot E.



of Sepam series 40.

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



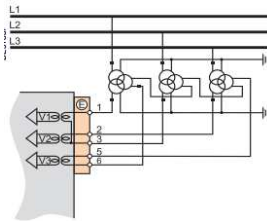
Parameters

Voltages measured by VTs	V1, V2, V3
Residual voltage	None

Functions available

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

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



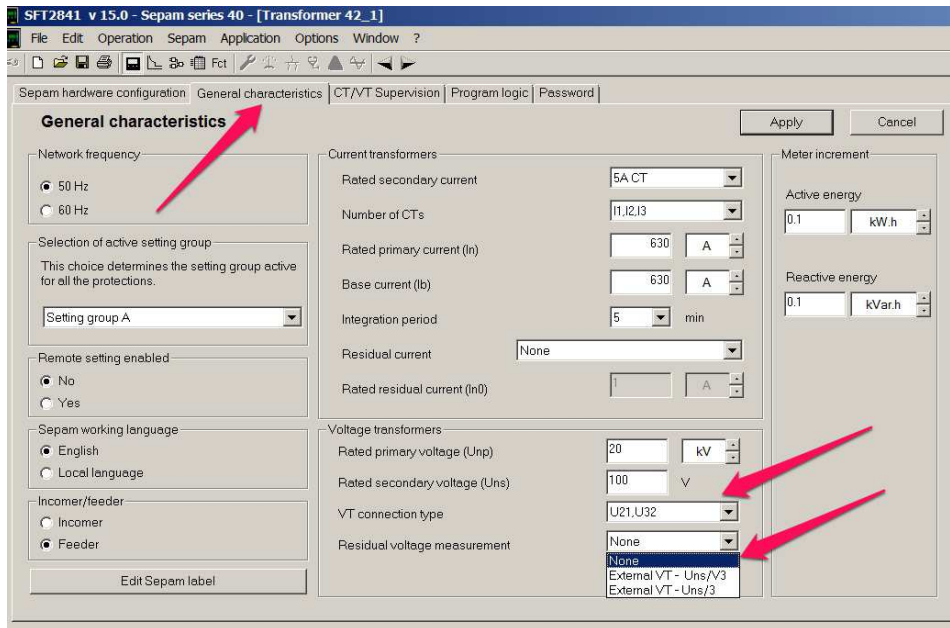
Parameters

Voltages measured by VTs	U21, U32
Residual voltage	External VT

Functions available

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

In above diagram in variant 1 V0 is calculated, in variant 2 we directly measure V0 but U21 and U32.

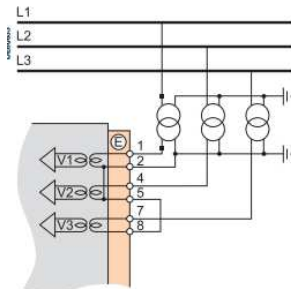


It is clear in screen shot above from SFT2841 Sepam 40 , that for V0 direct measurement through delta voltage it is mandatory to connect U21,U32 to calculate V1,V2,V3 and make free one more input to connect open delta VT to the relay to measure V0. In order to choose the 3V sum/ External VT method in SFT2841, you should go through Sepam parameters>General characteristics> voltage transforms> residual voltage measurement.

In Sepam series 60:

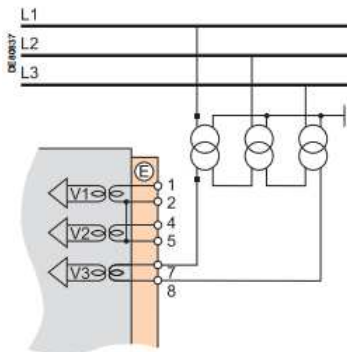
In Series 60 phase and residual voltage are connected to slot E. Same as Sepam series 40 if we want to connect external (delta VT) to directly measure V0, so it is mandatory to just use U21,U32 configuration.

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

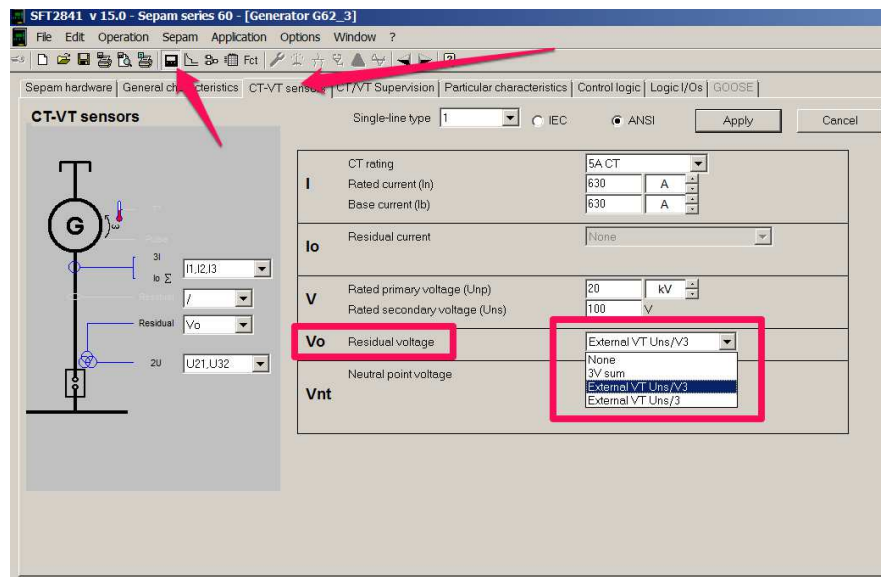


Measurement of the 3 phase-to-neutral voltages allows the calculation of residual voltage, V_0 .

Variant 5: measurement of residual voltage V0



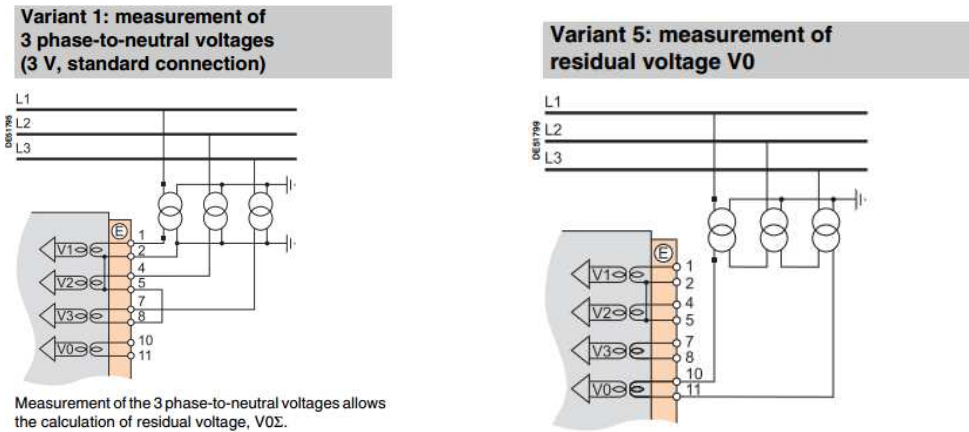
Same as Sepam 40 , if we need to measure V0, we can just connect to set of phase-to-phase VT then can jusy measure directly U21 and U32.



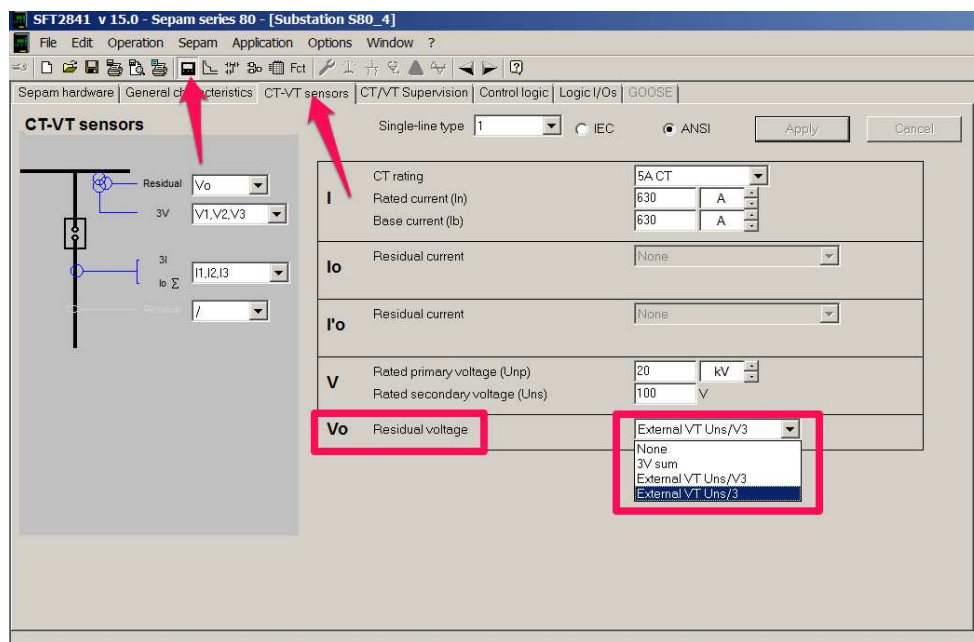
In order to choose the 3V sum/ External VT method in SFT2841, you should go through Sepam setting> CT-VT sensors> V0 residual voltage.

In Sepam series 80:

As it is clear here on Series 80 both phase and residual voltage could be connected to slot E at the same time. It means we have got V1,V2,V3 and V0 at the same time. So for external Vt connection



As Sepam series 80 has 4 VT input channel, then we have possibility the measure V1, V2, V3 and V0 at the same time.



In order to choose the 3V sum/ External VT method in SFT2841, you should go through Sepam setting> CT-VT sensors> V0 residual voltage.