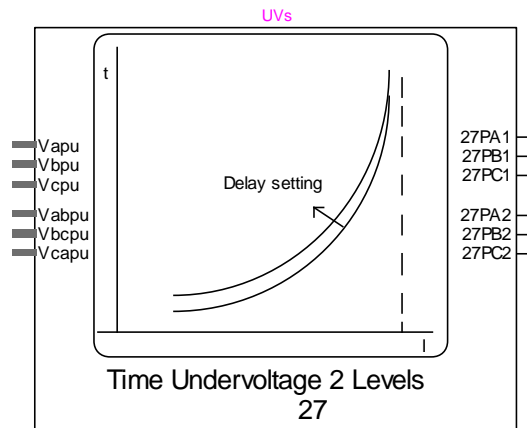


Protection: Under voltage functions



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1 Introduction

This function is based on the ANSI standard 27 – phase under voltage and the IEC standard PTUV. Two levels of settings are available for this function. The phase-to-phase or phase-to-ground voltage can be monitored for each level. Different types of curves (voltage-time) are available depending on the manufacturer selection.

2 Input data of Undervoltage tab

- Input:** Phase-to-phase or phase-to-ground. Choice of the voltage to be monitored.
- V_{pkp}:** Pickup voltage in pu. Once this value is reached, the timer starts. Does not apply for “Build your own” selection of Type of curve (see below).
- Type of curve:** Select the type of curve (see Section 2.1)
- Pickup delay or Time dial:** this input is related to the **Type of curve** selection:
 - Inverse curve: this input is the **Time Dial**
 - Definite time: this input is a **Pickup delay**
 - Build your own: this input is a coefficient multiplying the time-points
- Min voltage:** Minimum value of voltage for this element to become active.

2.1 Type of curve

Here is how the tripping time is calculated according to the **Type of curve** selection. For the definition of Tap see the **Pickup delay or Time dial** input explanations above.

- “Inverse” selection

$$\text{tripping time} = \frac{\text{Tap}}{1 - \frac{V_{pu}}{V_{pkp}}} \quad (1)$$

- “Definite time” selection:

$$\text{trippingtime} = \text{Tap} \quad (2)$$

- “Build your own” selection:
With this choice, the user specifies the number of points required to build the curve and enters the points of the voltages with the associated tripping times. Warning: no extrapolation is performed.

3 Flags available in the tripping function and the output bundle of the relay

- 27_PA_*i*: Undervoltage on phase A (level *i*)
- 27_PB_*i*: Undervoltage on phase B (level *i*)
- 27_PC_*i*: Undervoltage on phase C (level *i*)

4 Scopes

The following scopes are available in the subcircuit: *RelayName/Control/Console*

- 27_P_*i*: Under voltage detection of the 3 phases for the level *i*

5 Modifications

The protection functions are updated automatically. For example, for memory usage and computational speed considerations, if an entire element is disabled, the subcircuits associated to its functions are replaced by empty subcircuits with the same inputs and outputs. The outputs will be forced to zero or one. When enabled, the subcircuits can take different architectures considering the user choices. Some elements can be excluded if not enabled in the mask.

The updates are performed immediately after entering the parameters and clicking the OK button. The user should wait for the completion of tasks.

If the user wants to modify the subcircuit manually (for example, when adding new scopes), using in the GUI, and avoid the automatic updates of contents, the attribute DeviceVersion has to be set to “none” as shown below. To access to this attribute, right click on the desired device, then go to Attributes and select DeviceVersion (see Figure below).

To allow the automatic updates again, just remove the “none” string.

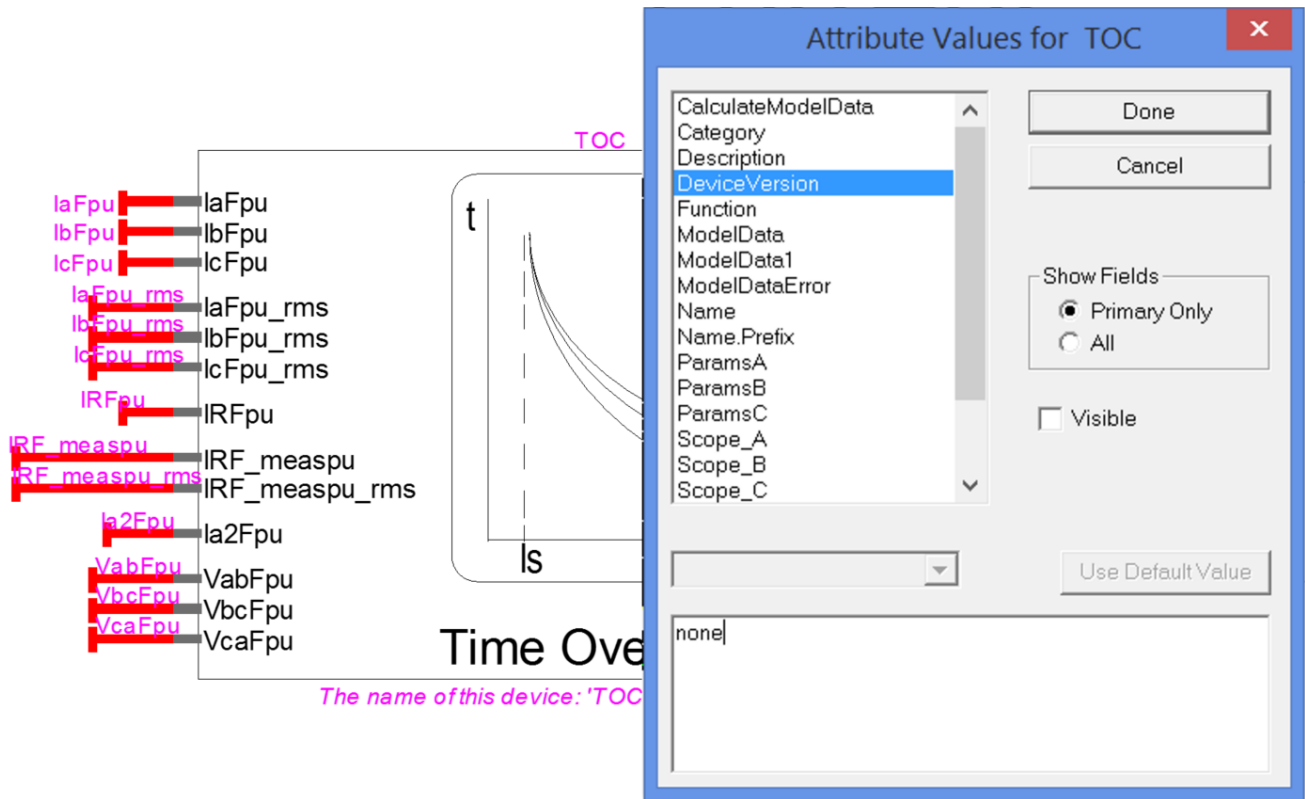


Figure 5-1 How to set the DeviceVersion attribute of the TOC element to allow modifications.

6 References:

- [1] D60 Line Distance Protection System, chapter 5.6 p5-159, UR Series Instruction Manual, DE Digital Energy, D60 Revision 7.1x