Protection: Fault Identification Selection

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1   Introduction

This function selects the faulty phase and supervises the distance element accordingly.

2   Input data: FIDS data tab

- **Manufacturer**: choice of Manufacturer.
- **Enable FIDS**: Enable the supervisor (Fault Identification Selection). If disabled, the outputs of the function are set to 1.
- **Angle**: Characteristic angle of the supervisor. See Section 4. This is Generic option data.

3   Manufacturer data

3.1   SEL

This device contains the negative-sequence directional element. The logic is described in [1] in Section 2-5.

- $Z_{2Forward}$: Forward directional negative-sequence impedance threshold in ohms at the secondary of the CT/VT.
- $Z_{2Reverse}$: Reverse directional negative-sequence impedance threshold in ohms at the secondary of the CT/VT.
- **a2**: Positive-sequence restraint factor
- $3I_{2Fmin}$: Threshold of the negative-sequence overcurrent ($3I_2$) supervisor for the forward direction.
- $3I_{2Rmin}$: Threshold of the negative-sequence overcurrent supervisor ($3I_2$) for the reverse direction.
- $Z_{0Forward}$: Forward directional zero-sequence impedance threshold in ohms at the secondary of the CT/VT.
- $Z_{0Reverse}$: Reverse directional zero-sequence impedance threshold in ohms at the secondary of the CT/VT.
- **a0**: Positive-sequence restraint factor
- $3I_{0Fmin}$: Threshold of the zero-sequence overcurrent ($3I_0$) supervisor for the forward direction.
- $3I_{0Rmin}$: Threshold of the zero-sequence overcurrent ($3I_0$) supervisor for the reverse direction.
- **DIR MTA**: Angle setting of the directional characteristic (degrees)

3.2 Siemens

The logic of the Siemens FIDS is described in [2].

- ❑ **SystemStarpoint**: "Solid Earthed" or "Perterson-coil" or "Isolated".
- ❑ **3U0>Threshold**: Zero-sequence voltage threshold
- ❑ **3I0> Threshold**: Zero-sequence current threshold
- ❑ **3U>COMP/ISOL.**: see [2]
- ❑ **Uph-ph unbal.**: see [2]
- ❑ **3I0>/Iphmax**: see [2]
- ❑ **I-CTsat. Thres.**: see [2]

3.3 General Electric

This is the same as the Generic option.

4 Angle comparators

The following table summarizes the angle monitor by the FIDS and its output.

Table 4-1 Fault Identification selector

Phase	Phasor 1	Phasor 2	Limit angle settings
A	I_0	I_2	Angle<angle(I_0/I_2) Angle>-angle(I_0/I_2)
B	I_0	I_2	Angle<angle(I_0/I_2) -120degrees Angle>-angle(I_0/I_2)-120degrees
C	I_0	I_2	Angle<angle(I_0/I_2) +120degrees Angle>-angle(I_0/I_2) +120degrees

5 Scopes

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

- ❑ FIDS_AGorBCG for fault phase A-to-ground or phase B-to phase C–to ground
- ❑ FIDS_BGorCAG for fault phase B-to-ground or phase C-to phase A–to ground
- ❑ FIDS_CGorABG for fault phase C-to-ground or phase A-to phase B–to ground

6 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).

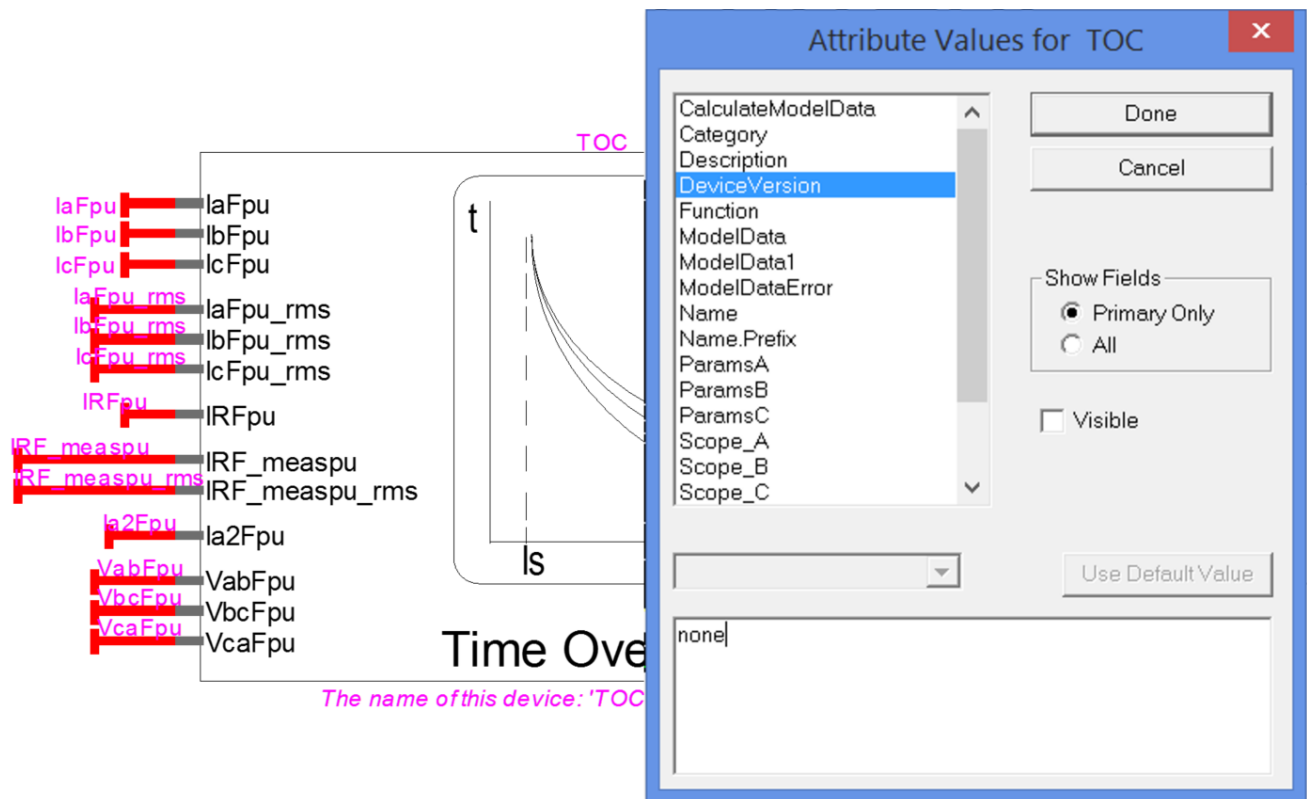To allow the automatic updates again, just remove the "none" string.

Figure 6-1 How to set the DeviceVersion attribute of an element to allow modifications.

7 References:

[1] SEL-321-5 Relay – Instruction Manual - Phase and Ground Distance Relay Directional Overcurrent Relay Fault Locator, 20130424, Schweitzer Engineering Laboratories, INC.

[2] SIPROTEC, Distance protection 7SA522, Manuel, Chapter 2.2.3.1 p99, V4.70