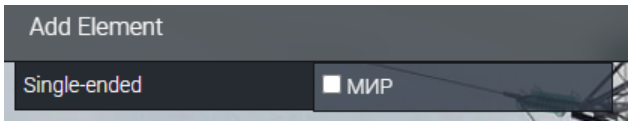
RelayHelper
You can just see

FAULT LOCATION

Protection → **Fault location**



We also just began to add modules to this page. Now it has one module for single ended fault location based on USSR ИМФ-3 Р and МИР1 devices.

A line can be configured with an unlimited number of parts. It may include tap transformers (they need to be added only in the case of a solidly grounded neutral). The algorithm supports mutual coupling between lines; based on our experience, we have added the ability to calculate the influence of two parallel lines for single phase to ground faults.

Procedure:

- Merge files from parallel lines and calculate their zero-sequence currents;
- Add the fault location module;
- Configure the line parameters;
- Link analog channels from the event file to the fault location calculator. Link phase currents and phase voltages from the faulted line; from parallel lines, link zero-sequence currents;
- Select the correct fault type in the calculator (for two-phase-to-ground faults, use phase-to-phase loops);
- Place the blue cursor at a point 3–4 cycles after the beginning of the fault. The result is shown in the calculator and protection window.
- Save file with RelayHelper settings for future use.

The calculator includes a switch for phase-current inversion in the case of incorrect CT orientation. Zero-sequence currents from parallel lines also have inversion switches, and their influence can be disabled.

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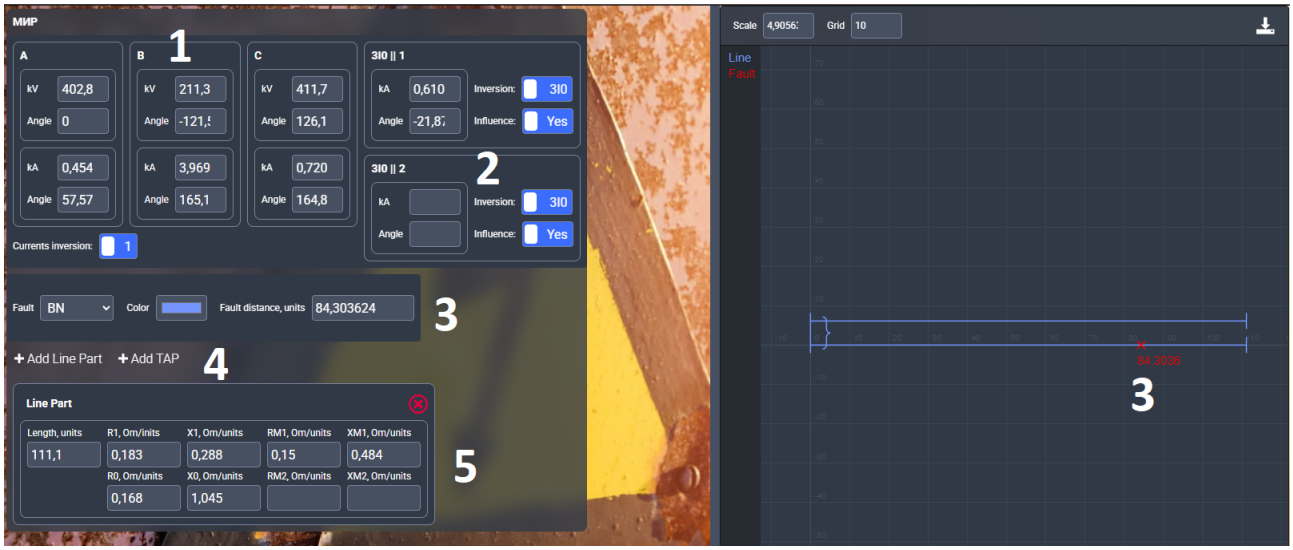
Example below shows fault location calculation on 750 kV transmission line with mutual coupling between two lines.



1 Voltages and currents from faulted line.

2 Zero sequence currents from parallel lines.

3 Distance to the fault. Displayed in the same units as specified in the Line Part module.

4 Buttons with different elements for the line configuration.

5 Line part module with impedance.

Distance to fault in case of three phase short circuit is calculated as follows:

$$L=\frac{Re\left\{\frac{(U_A-U_B)}{I_C}\right\}}{Re\left\{\frac{(I_A-I_B)\times Z_1}{I_c}\right\}}$$

In case of phase-phase short circuits (with ground and without):

$$L=\frac{Re\left\{\frac{U_{ph1}-U_{ph2}}{I_2}\right\}}{Re\left\{\frac{(I_{ph1}-I_{ph2})\times Z_1}{I_2}\right\}}$$

Distance to fault in case of single phase to ground short circuit without mutual coupling:

$$L=\frac{Im\left\{\frac{U_{ph}}{I_0}\right\}}{Im\left\{\frac{(I_{ph}+kI_0)\times Z_1}{I_0}\right\}}$$