DVS3 APPLICATION NOTE
IMPEDANCES FOR DISTANCE PROTECTION

1. Introduction

The DVS3 and a current source may be used to generate impedances for testing distance relays. In this situation, the current is set as the phase reference, and the magnitude and phase angle of the voltage is calculated to give the desired impedance.

To generate an impedance, you must know the impedance that you wish to generate and either the voltage or current at which you wish to do so.

2. Connections

Connect the output from the DVS3 to the voltage coil of the relay and the current source to the current coil of the relay. The T&R link connection is then made between the units to provide the phase lock reference for the DVS3.
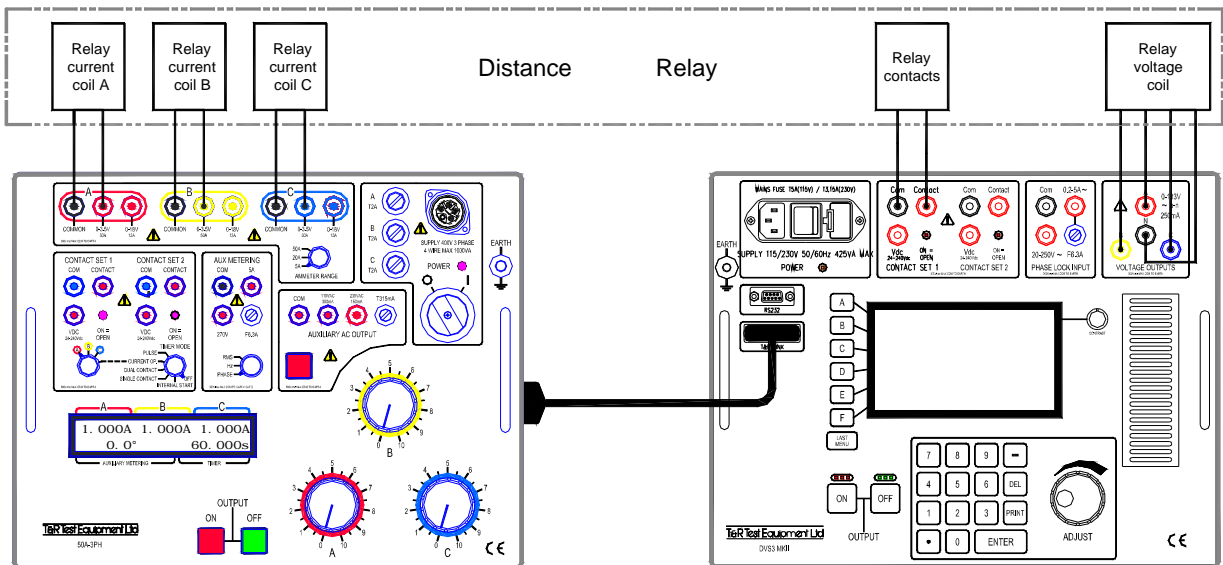

Figure 1 - Connections

3. Generating an Impedance with a Known Current

The current injected from the current source phase A is always the zero degrees reference when connected as in figure 1. It is therefore necessary to calculate the voltage phasor required to generate the desired impedance.

If the current is 1A, and the impedance to be generated is $100\angle$-30Ω (100Ω at –30°) the required voltage may be calculated using Ohm's law.

> V=IZ
>
> V=1A x 100Ω
>
> V=100V

The phase angle of the voltage will be the same as the phase angle of the impedance – 30° in this case.

When testing a relay, it may be necessary to take into account the system CT and VT ratios when determining voltages, currents, and impedances.

4. Generating an Impedance with a Known Voltage

The current injected from the current source phase A is always the zero degrees reference when connected as in figure 1. If the voltage is known, the phase angle and magnitude of the current may be calculated. In this case, the phase angle is still adjusted by changing the voltage phase angle.

If the voltage is 120V, and the impedance to be generated is $100\angle$-30Ω (100Ω at –30°) the required current may be calculated using Ohm's law.

> I=V/Z
>
> I=120V / 100Ω
>
> I=1.2A

The phase angle of the voltage will be the same as the phase angle of the impedance.

When testing a relay, it may be necessary to take into account the system CT and VT ratios when determining voltages, currents, and impedances.