

UHF/VHF CONVERTER

LDA-5/U



The standard version of the Differential Lemke Probe LDP-5 is designed for wide-band PD detection. For this it is equipped with a wide-band input amplifier having an upper limited frequency of 50 MHz. This lies in the "very high frequency (VHF)" range. With respect to on-site testing of cable accessories, however, an extension up to the "ultra high frequency (UHF)" range, i.e. above 300 MHz, offers additional advantages. For this the UHF/VHF Converter LDA-5/U has been developed, which can be adopted to the Differential Lemke Probe LDP-5, and which works in combination with the UHF Sensor LDA-5/U1.

Application Guidelines

As mentioned previous, the extended version of the Differential Lemke Probe LDP-5 for PD detection in the UHF-range needs both units, the UHF/VHF Converter LDA-5/U and the UHF Sensor LDA-5/U1. Those components are especially designed for on-site PD diagnosis tests on power cable accessories under life condition. As well known, the conventional measurement of partial discharges (PD) according to the relevant IEC standard 60270 bases on the evaluation of the PD quantity "apparent charge". The for this purpose applied measuring principle uses the so-called quasi-integration of the detected PD pulses. That means, the origin PD pulses, characterized by significant time parameters down to the nano-second range, are extremely stretched up to several microseconds or longer. This is usually done by limitation the measuring frequency range, where the upper measuring frequency should be limited below a critical value of 0.5 MHz, in order to ensure the required quasi-integration.

The previous mentioned pulse stretching in the time domain is accompanied by a strong reduction of the pulse magnitude, if compared to those of the origin PD pulse. This is because the characteristic signal-time-area will not be changed by the quasi-integration. Consequently, the signal-to-noise ratio is also extremely reduced due to the reduction of the resulting PD pulse magnitude. Hence it seems evident, that this disadvantage can only be avoided, if the origin PD pulses are not longer stretched by a quasi-integration, but detected up to an extremely high measuring frequency range.

Fundamental studies dealing with the investigation of origin PD pulse shapes, using advanced ultra-wide-band measuring techniques up to the GHz range, showed that characteristic rise times shorter than one nano-second may appear. This is equivalent to a characteristic frequency spectrum up to the UHF range. Hence it seems obvious, to substitute the quasi-integration of the PD pulses by the UHF measuring technique with respect to an effective improvement of the signal-to-noise ratio.

In this respect it seems evident, that under those condition the standardized PD quantity "apparent charge" can not longer be evaluated, because no quasi-integration is conducted. From a practical point of view, however, a PD detection equipment should also be accepted, which is not able to measure the "apparent charge" in a correct way but which offers many advantages for the recognition of dangerous PDs on-site under extremely noisy conditions in the measuring surroundings. Besides the increased signal-to-noise ratio another important benefit exist for the UHF-measuring technique. It results from the fact, that the shielding effect of metallic enclosures is strong reduced at ultra high frequencies. This offers a chance for PD recognition in power cable joints, if covered by a metallic sheet but not fully electromagnetically shielded.

Test procedure

The UHF Sensor LDA-5/U1 works like an electromagnetical field sensor. In principle the PD test in the UHF range can be conducted similar to the procedure, recommended for the Differential Lemke Probe LDP-5 in connection with the conventional L-sensor. In this context it has to be underlined, that the test results are mainly influenced by the constellation between the LDA-5/U1 and the test object. The highest sensitivity is obtained, if the magnetic flux of the PD current pulses crosses the UHF Sensor LDA-5/U1 orthogonal to its active measuring area.

Delivery volume

The delivery volume of the standard option of the LDA-5/U includes the following components:

- UHF/VHF Converter LDA-5/U
- UHF Sensor LDA-5/U1
- UHF Calibrating Loop LDA-5/U2
- BNC Measuring cable, length 1 m
- BNC Adaptor S/S
- Adjustable rubber band
- Users manual
- Carry case