HIGH VOLT

HV TEST AND MEASURING SYSTEMS FACTORY AND ON SITE

MODULAR TEST SYSTEM FOR TESTING OF SUPER-LONG CABLES

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As a result of the changing ways in which society is consuming energy, the demand for ever longer cables is also increasing. The challenge is to manufacture and test cables that have such great lengths, and conventional systems can often reach their limits. The new testing system from HIGHVOLT is capable of testing extremely long cables with equipment that not only weighs less, but also takes up less space. The solution is modular and free of partial discharge, as is required for cable testing. The first testing system of this type was installed and taken into operation in Greece in the autumn of 2018.

A new reactor design is available for the testing of long DC and AC cables.

The new series of reactors has the following technical data:

Main parameters	Nominal inductance H	Nominal voltage kV	Nominal current A	Nominal frequency Hz
DE 126000/200-151	17.55	200	151	12
DE 120000/225-122	24.5	225	122	
DE 126000/260-116	29.73	260	116	

The rated frequency was chosen as 12 Hz, so that the cables could still be tested under deviating or larger cable capacitances, albeit with reduced voltage. At 10 Hz, cables can still be measured that are longer by 44 %, but the available testing voltage is 20 % lower.

Up to 16 reactors can be connected in parallel or partially in series. With the specially developed reactor DE 126000/200-151, cable lengths of several 100 km can be tested with a test voltage of up to 400 kV at 12 Hz, of course subject to the specific cable capacitance. With a test voltage of just 260 kV (16 reactors in parallel) it is possible to test lengths far in excess of 350 km in a single piece.

A significant advantage here is that around four times the performance of a conventional reactor can be achieved with just a doubling of the weight to 50 t per unit. The necessary feeding power is reduced significantly depending on the cable lengths under testing. Among other things, this was achieved by using air gap-separated iron cores and a closed magnetic circuit similar to the principle of previous reactors. The surroundings are not influenced by the magnetic field generated by the coils.

Within this component size it is possible to individually adapt the output voltage of the reactor within certain limits, which naturally also changes both the inductance and the current. One project (Fig. 1) was implemented with an output voltage of 225 kV per reactor.

"The new XXL reactors are four times as powerful, but only twice the size of the existing reactors."

Günther Siebert

With the new reactors, the concept of the modular layout of such testing systems is continued.

This modular testing system based on the new reactors can be adapted to the conditions and requirements of all manufacturers and operators of very long AC and DC cables and is variable. It can be used particularly in the factory, but also in the field, as it is not necessary to dismantle different add-on parts for transport. The restrictions for AC testing of DC power cables for large manufacturing lengths and high voltages as described in CIGRE TB 496, Working Group B1.32 C do not apply. With the extended capabilities for AC testing, the quality requirements for DC cables can be better met. It is also easier to test long AC cables in accordance with CIGRE TB 490, Working Group B1.27.

Fig.1: Four new reactors DE 120000/225-122 (right) combined with 8 conventional reactors, resulting in an installed total test power of 700 MVA – the most powerful testing system in the world to date.