METHODS OF INSTRUMENT TRANSFORMER TESTING ARE CHANGING

By Christian Brenncke

In an environment where distribution and transmission networks are belonging to the same party, instrument transformers come more and more into the focus of testing.

As a vital part of the metering and billing system they have to be economical but reliable in operation. To meet these requirements, manufacturers have started to broaden their product range.

TYPES ARE CONTINUOUSLY INCREASING

Historically there were only conventional instrument transformers but at present there is a growing number of electronic instrument transformers in use. But in the future digital instrument transformers will become even more important. So what are the characteristics of the different types of instrument transformers?

The conventional instrument transformer is an inductive transformer. The basic characteristics of its components determine its limits. Taking into consideration the maximal flux density and lack of linearity in the excitation curve of the iron core, these characteristics will restrict the size and the weight of the transformers and also the range of applications.

Electronic instrument transformers are more lightweight and also easier to produce as they require less material. An example for an electronic current transformer is the Rogowski coil and for an electronic voltage transformer a resistive or capacitive divider. The idea of these types of instrument transformers is not new, but was not practical for a long time, as accurate and inexpensive electronic components were not available for the mass market. Now they are. And at the same time information technology is developing and spreading into more areas. So a new type of instrument transformer is emerging – the non-conventional instrument transformer that has a digital output. It has all the advantages of the electronic technology but with even more features. With non-conventional instrument transformers, it is possible to route the signals over a very long distance – a distance that is not possible with analogue signals. And for more comfort in handling it is possible to collect signals in a so-called merging unit, which can be read out via remote access.

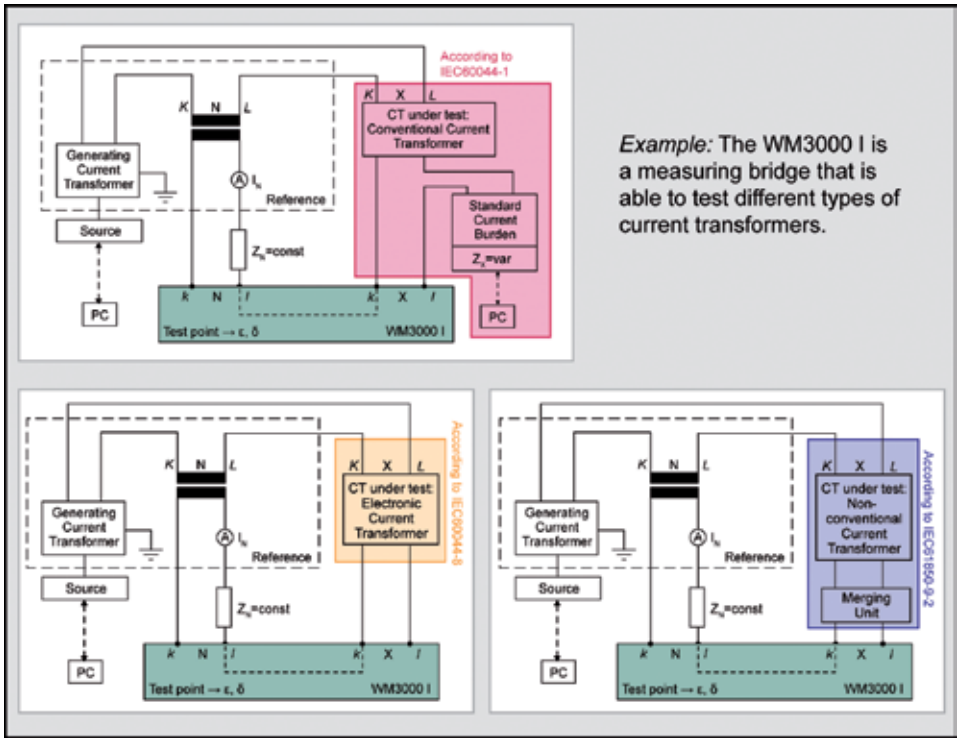
ACCURACY IS MORE SIGNIFICANT

Accuracy has always been significant. But now, with the liberalisation of the energy market, it is getting even more essential. There is no longer a single relationship between one supplier and one customer. Instead, the network is divided into the hands of several parties that produce, transmit, consume and those who cover more than one aspect. All parties involved have to balance their accounts with someone and certainly each of them has a vital interest to protect their revenue. Nobody wants to make huge losses arising in their part of the net. So what will be the logical consequence?

Each party is looking for an accuracy to rely on. The suppliers are most likely going to buy instrument transformers that have a testing certificate according to IEC standards. And in addition to this, they will test the devices before installation and also some time during operation on a sampling basis. The manufacturers have to provide accurate instrument transformers to meet such demand. The requirement to test all measuring transformers before bringing them into the market is not only desired by their customers but also for their own quality management.

TESTING GETS MORE COSTLY

The current situation is characterised as follows: Each company that has to test instrument transformers is faced with an increasing number of different types. And each type requires different test equipment. For example, have a closer look at three types of current transformers. The conventional current transformer steps down a high current into a low current which will be connected to the current input of a measuring bridge (IEC60044-1). On the other hand, the electronic current transformer steps down a high current into a low voltage. Such



WM3000-I instrument transformer test system.

low voltage requires different low voltage input of the measuring bridge or additional converters (IEC60044-8). And lastly, the non-conventional current transformer that steps down a high current into a digital signal requires a digital interface and testing in accordance to IEC61850-9-2.

So for each type of testing one has to buy and install different equipment. This will not only require more space but also more investment. And not only that, for each transformer type one has to switch between the different test systems which takes more testing time.

ONE TEST SYSTEM FOR ALL TYPES

We have seen that there is an increasing number of different instrument transformer types. This is a trend that will continue rather than stop. So what is needed in the future is the possibility to cut down the amount of money and time spent due to this diversity. What could be more desirable than to have one test system that is capable to test all types of instrument transformers – one test system that would be able to handle all different types of inputs coming from the transformers under test?

ZERA has developed such an instrument transformer test system, the new WM3000U for voltage transformer, and WM3000I for current transformer. As usual, for a measuring bridge it compares the signals coming from the transformer under test with a reference signal from a standard. But as is clear the graphic, the largest benefit of the new instrument transformer test system is to test conventional, electronic and digital instrument transformers as well. One no longer needs separate devices to fulfill testing according to IEC60044-1/2, IEC60044-7/8 and IEC61850-9-2.

The test results are displayed as ratios and phase displacements directly on the screen, which is designed for easy operation of the test system. The WM3000 comes with a touch screen that is a direct interface to the operator.

The following tests are possible in cooperation with additional testing equipment. All tests are for current transformers, and tests 2 and 4 are also for voltage transformers.

1. Interturn insulation test
2. Polarity check, which takes place during the accuracy test
3. Demagnetisation, done before the accuracy test, with the current being increased e.g. up to 5 % (type table) during the CTs are secondary open, and afterwards regulated slowly down to zero
4. Accuracy test, carried out with load points for CT: 120 – 100 – 20 – 5 – 1 % I_N and for PTs 80 – 100 – 120 % U_N with the corresponding burdens
5. Instrument security factor test (FS), which is measured according to IEC60044-1 chap. 11.6
6. Knee point voltage test, which will be measured according to IEC60044-1 chap. 2.3.12. MI

ABOUT THE AUTHOR:
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ABOUT THE COMPANY:
ZERA has nearly 90 years experience in providing equipment for generation, measuring, testing and calibration of electric variables worldwide. The product range covers portable meter test systems, stationary meter test systems and instrument transformer test systems. Typical customers are located in the field of electricity supply and instrument transformer manufacturing.

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