MEDIUM VOLTAGE PRODUCT

KEVA 17.5 B20; KEVA 17.5 B21
Voltage Sensors
Instructions for installation, use and maintenance
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Instructions for installation, use and maintenance for the KEVA 17.5 B20 and KEVA 17.5 B21 voltage sensors

These instructions for installation, use and maintenance are valid for KEVA 17.5 B20 and KEVA 17.5 B21 type voltage electronic transformers (sensors) operating in indoor conditions. The voltage sensors type KEVA 17.5 B20 and KEVA 17.5 B21 are intended for use in voltage measurement in air insulated medium voltage switchgear. The voltage sensors have been designed to be used as a post insulator but can be used as a stand-alone unit as well.

1. Operating conditions

The sensor should be mounted in dry, indoor conditions without excess ingress of dust and corrosive gases. The sensor shall be protected against unusually heavy deposits of dust or similar pollution, as well as against direct sunshine. The sensor is designed for standard ambient temperature between -5 and +40°C (storage and transportation temperature between -40 and +80°C). The altitude for mounting should be lower than 1000 m above sea level. The sensor may also be used at higher altitudes when agreed upon with the manufacturer.

2. Technical details

For sensor dimensions see separate dimension drawings. Rated values for each individual sensor are mentioned on the rating plate glued to the sensor. Values mentioned on the rating plate must not be exceeded.

### Tab. 1. Labels abbreviation definitions

<table>
<thead>
<tr>
<th>KEVA 17.5 B20</th>
<th>Type code</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/N</td>
<td>Serial number</td>
</tr>
<tr>
<td>Upn</td>
<td>Rated primary voltage</td>
</tr>
<tr>
<td>Kn</td>
<td>Divider ratio</td>
</tr>
<tr>
<td>cl</td>
<td>Accuracy class</td>
</tr>
<tr>
<td>ku</td>
<td>Rated voltage factor</td>
</tr>
<tr>
<td>Cfs.</td>
<td>Correction factors used for voltage sensor. Correction factors are measured and calculated separately for each sensor. Amplitude correction factor (aU) is a number by which the output signal of the sensor shall be multiplied in order to have minimum amplitude error. Phase error correction factor (pU) is a number by which the output signal of the sensor shall be increased or decreased (depending on the sign) in order to have minimum phase error.</td>
</tr>
<tr>
<td>aU</td>
<td>Amplitude correction factor of a voltage sensor</td>
</tr>
<tr>
<td>pU</td>
<td>Phase error correction factor of a voltage sensor in degrees</td>
</tr>
<tr>
<td>fr</td>
<td>Rated frequency in Hz</td>
</tr>
<tr>
<td>17.5/38/95 kV</td>
<td>Insulation level</td>
</tr>
<tr>
<td>1.96 kg</td>
<td>Weight</td>
</tr>
<tr>
<td>E</td>
<td>Insulation class</td>
</tr>
<tr>
<td>IEC 60044-7</td>
<td>IEC – standard referred to</td>
</tr>
<tr>
<td>30 Oct 2012</td>
<td>Date of production</td>
</tr>
</tbody>
</table>
3. Instructions for installation

**Safety instruction**
Always ground the sensor grounding terminal.

**Installation conditions**
The sensor should be installed in dry, indoor conditions. The temperature during the assembly shall be between 0 and +40°C. The sensor cable shall not be moved or bent if the temperature is below 0°C.

**Mechanical installation**
There are two possibilities of cable output position from the sensor terminal part, see Fig. 4. The position of the sensor cable from the sensor terminal part determines sensor variant.

Connection of the busbars to the primary terminal shall be done according to following instructions:
- Application voltage level up to 12 kV – non-insulated busbars allowed
- Application voltage level above 12 kV up to 17.5 kV – insulated busbars shall be used

**Secondary cable, secondary connections**
The secondary cable is a special shielded cable designed to give maximum EMI shielding. The secondary cable is inseparable part of each sensor and cannot be additionally extended, shortened, branched, modified, withdrawn or changed.
due to the guarantee of accuracy and performance of the sensor. The cable shall be connected directly (or via a connector adapter if needed) to Intelligent Electronic Device (e.g. protection relay). The electrical shielding of cable is connected to connector shielding and shall be earthed on IED side. The cable shall be fixed close to metal wall or inserted inside of metal cable tray far from power cables! The maximal bending radius for the cable is 7.5x cable diameter. The cable cannot to be moved if the temperature is below 0°C. If cable, connector or connector grommet is damaged please contact the manufacturer for instructions.

**Connection to the IED**

The sensor cable is terminated by shielded RJ-45 plug connector that shall be connected to the inputs of the IED.

A cable not connected to the IED can be left open or short-circuited without any harm for the sensor. Even during a primary short-circuit the voltage in the secondary circuit of the current sensor will be below 100 V. Nevertheless it is a good safety practice to earth cables not connected to the IED.

RJ-45 plug connector has 8 contacts and locking latch coupling. The sensor connector plug shall be inserted properly with the IED matting receptacle before completing the coupling with the bayonet lock. Take care and do not use excessive force to plug-in and plug-out these connectors.

The used RJ-45-type connectors (EIA/TIA 568A Standard) are screened and designed to guarantee low resistance shielding; they are particularly adapted to applications where electromagnetic compatibility (EMC) is important. The connectors are robust but it is necessary to be careful during their assembly – do not use force!

**Grounding terminal**

The sensor grounding terminal is located on the same side as the sensor secondary terminal part and shall be connected to the ground during the sensor operation.

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**Note:** It is recommended to use a cable tie to fasten long sensor cables approximately 10 cm from the RJ-45 socket. The sensor plug connector pin's assignment is shown on Fig. 7. (Front view).
4. Instructions for use

The voltage sensors are used:
- To convert large voltages in the primary circuit of the network to the appropriate signal for the secondary equipment (e.g. IEDs)
- To insulate primary and secondary circuits from each other
- To protect secondary equipments from harmful effects or large voltages during abnormal situations in the network

The use of a sensor for other purposes than those described above is forbidden.

Routine test report

The routine test report includes following tests:
- a) Verification of terminal marking
- b) Power-frequency withstand test on primary voltage terminal
- c) Partial discharge measurement
- d) Test for accuracy

Note: No power-frequency withstand test on secondary terminals (connector) of the voltage sensor is allowed.

Correction factors are measured separately for each sensor during routine testing and are marked on the rating plate. The use of correction factors is required condition in order to achieve the declared accuracy class.

5. Instructions for maintenance

Excessive dust or other kinds of pollution shall be brushed off the sensor. Polluted sensors can be cleaned with spirit, petrol or toluene. Otherwise, during normal use the sensors do not need any additional maintenance.

6. Transport and storage

The permissible transport and storage temperature for sensors is -40 and +80°C. During transport and storage the sensors shall be protected against direct sunshine. The sensors are delivered packed into wooden boxes or transport pallets.

7. Recommended procedure for disposal of the sensor

The sensor does not contain environmentally hazardous materials. For disposal of the product after it has been taken out of use, local regulations, if there are any, should be followed.