MEDIUM VOLTAGE PRODUCTS

KEVA 24 Cxx(c) Indoor voltage sensors for CELLPACK
Instructions for installation, use and maintenance
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Instructions for installation, use and maintenance for the KEVA 24 Cxx(c) indoor voltage sensors

These instructions for installation, use and maintenance are valid for KEVA 24 Cxx(c) types voltage sensors (Electronic voltage transformers according to IEC 60044-7 and low-power passive voltage transformers according to IEC 61869-11 standards) operating in indoor conditions. The voltage sensors type KEVA 24 Cxx(c) are intended for use in voltage measurement in gas insulated medium voltage switchgear. The voltage sensors are designed as easy replacement of originally used insulating plugs in the CELLPACK separable cable connectors. Due to their compact size and optimized design sensors can be used for retrofit purposes as well as in new installations. The housing of sensors is made from plastic; the internal parts are shielded and earthed.

### 1. Operating conditions

The sensors should be mounted in dry, indoor conditions without excess ingress of dust and corrosive gases. The sensors shall be protected against unusually heavy deposits of dust or similar pollution, as well as against direct sunshine.

The sensors are designed for standard ambient temperature between -25°C and +80°C (storage and transportation temperature between -40°C and +80°C). The altitude for mounting should be lower than 1000 m above sea level. The sensors may also be used at higher altitudes when agreed upon with the manufacturer.

### 2. Technical details

For sensor dimensions see dimension drawings at the end of these instructions. Interface of KEVA 24 C10(c) sensor (dimensions of sensor cone) is compatible with CENELEC EN 50180 & 50181 type C and adjusted to the connection bolt of Cellpack connector. Interface of sensors KEVA 24 C25(c) is given by manufacturer, please refer to the sensor drawings below. 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.

### Table 1. Sensor variants and use in cable connectors

<table>
<thead>
<tr>
<th>Sensor type designation</th>
<th>Manufacturer</th>
<th>Type</th>
<th>Connecting screw for sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEVA 24 C10</td>
<td>Cellpack</td>
<td>CTS-S 630A 24kV</td>
<td>M16</td>
</tr>
<tr>
<td>KEVA 24 C10c</td>
<td>Cellpack</td>
<td>CTS 630A 24kV</td>
<td>M16</td>
</tr>
<tr>
<td>KEVA 24 C25</td>
<td>Cellpack</td>
<td>CTKS 630A 24kV</td>
<td>M16</td>
</tr>
<tr>
<td>KEVA 24 C25c</td>
<td>Cellpack</td>
<td>CTKSA 630A 24kV</td>
<td>M16</td>
</tr>
</tbody>
</table>

**Note:** For use in alternative cable connectors please contact ABB.
### Tab. 2. Labels abbreviation definitions

<table>
<thead>
<tr>
<th>KEVA 24 C10 Type code (KEVA 24 C10/C25/C10c/C25c)</th>
<th>KEVA 24 C10c Type code (KEVA 24 C10/C25/C10c/C25c)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S/N</strong></td>
<td>Serial number 1VLT5416001234</td>
</tr>
<tr>
<td><strong>Upn</strong></td>
<td>Rated primary voltage</td>
</tr>
<tr>
<td><strong>Kn</strong></td>
<td>Divider ratio</td>
</tr>
<tr>
<td><strong>cl</strong></td>
<td>Accuracy class</td>
</tr>
<tr>
<td><strong>ku</strong></td>
<td>Rated voltage factor</td>
</tr>
<tr>
<td><strong>Cfu</strong></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><strong>ϕ</strong></td>
<td>Correction factors used for voltage sensor. Correction factors are measured and calculated separately for each sensor. Phase error correction factor is a number by which the output signal of the sensor shall be multiplied in order to have minimum amplitude error.</td>
</tr>
<tr>
<td><strong>fr</strong></td>
<td>Rated frequency in Hz</td>
</tr>
<tr>
<td>24/50/125 kV</td>
<td>Insulation level</td>
</tr>
<tr>
<td>0.82 kV</td>
<td>Insulation requirement for secondary terminal - power frequency voltage withstand capacity</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>Insulation class</td>
</tr>
<tr>
<td>IEC 60044-7</td>
<td>IEC – standard referred to</td>
</tr>
<tr>
<td>12 Feb 2016</td>
<td>Date of production</td>
</tr>
<tr>
<td>24 Oct 2018</td>
<td>Date of production</td>
</tr>
</tbody>
</table>
03 Example of data stored in 2D Bar Code

04 Example of Ampli-

tude and Phase error 
correction factors set-

ing for voltage sensor 
into REF615 according 
to label parameters in 
picture 01a and 01b (IEC 
60044-7). Same princi-
ple can be applied with 
label parameters in 02a 
and 02b (IEC 61869-11).

<table>
<thead>
<tr>
<th>POSITION</th>
<th>20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA</td>
<td>1 V L T 5 4 1 6 0 0 1 2 3 4 1 2</td>
</tr>
<tr>
<td>POSITION</td>
<td>39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57</td>
</tr>
<tr>
<td>DATA</td>
<td>F E B 2 0 1 6 C f s : a U :</td>
</tr>
<tr>
<td>POSITION</td>
<td>58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75</td>
</tr>
<tr>
<td>DATA</td>
<td>0 9 9 8 4 p U : - 0 . 0 4 0 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REF615 - Parameter Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group / Parameter Name</td>
</tr>
<tr>
<td>Voltage (U/VF)</td>
</tr>
<tr>
<td>Primary voltage</td>
</tr>
<tr>
<td>Secondary voltage</td>
</tr>
<tr>
<td>VT connection</td>
</tr>
<tr>
<td>Amplitude Cor A</td>
</tr>
<tr>
<td>Amplitude Cor B</td>
</tr>
<tr>
<td>Amplitude Cor C</td>
</tr>
<tr>
<td>Division ratio</td>
</tr>
<tr>
<td>Voltage input type</td>
</tr>
<tr>
<td>Angle Cor A</td>
</tr>
<tr>
<td>Angle Cor B</td>
</tr>
<tr>
<td>Angle Cor C</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**
The sensors can be mounted into the multiple types of cable connectors according to the used type according Tab. 1. The mounting position for voltage sensor is shown in Fig. 5. The sensor is screwed into the cable connectors. Proper mounting is ensured by the tightening hex nut of size 24 mm which is part of the grounding cover (recommended tightening torque shall be used). See page 7 and 8.

Before mounting of sensor remove dust from the surface of sensor using a cleaning tissue. Then the lubricant and filling agent GM1 must be used on the contact surface between the sensor and the cable connector, use a glove (see Fig. 6). The lubricant and filling agent GM1 enable an easy installation (see Fig. 6) and in combination with tongue of mounting aid to avoid the formation of air bubbles and contributes in making interfaces easy to install (see Fig. 6).
Mechanical installation KEVA 24 C10 and KEVA 24 C10c

The KEVA 24 C10(c) sensors are designed to be fixed to the cable connector using the screw M16 which is a part of the cable connectors, see Fig. 7 – picture 4.

**Attention:** Be careful when unpacking and handling to avoid damages to the sensor. Damages that occur during unpacking or poor handling will not be covered by the warranty.

Mechanical installation according to the next steps, see Fig. 7:

0 step the state before of installation process, see picture 0
1 step remove the conductive protection cap, see picture 1
2 step remove the insulating plug, see picture 2
3 step clean the inside surface of the connector by Cellpack cleaning tissue, consistently must be checked that on the surface of inside cone are not the metal burrs, see picture 3
4 step check the tightening of the screw M16, the tightening hex nut of size 22 mm, recommended tightening torque 50 Nm shall be used, see picture 4, in order to achieve the correct applied torque ensure that there is no lubricant on the threaded parts

5 step lightly lubricate the lubricant and filling agent GM1 on the inside connector surface (where there is contact between the sensor and the cable connector) by glove, first consistently must be checked that on the surface of inside cone are not any metal burrs, see picture 4
6 step screw the KEVA 24 C10(c) sensor, the tightening hex nut of size 24 mm, recommended tightening torque 30 Nm shall be used, in order to achieve the correct applied torque ensure that there is no lubricant on the threaded parts.

**Attention:** During assembling, ventilate the air with a tongue EH from the applicator AH. Moistening the tongue slightly with GM1 before using (see picture 5). When the cone of sensor is 2 mm from the connector body, pull gently the tongue then tighten and use the cleaning tissue to remove remaining lubricant and filling agent GM1.

7 step connect the grounding wire by a screw M8 which is at the frame, see picture 6
8 step connect the secondary cable of sensor KEVA 24 C10(c) to the BNC connector (check that secondary cable with the same ID number as mentioned on the sensor label is connected), see picture 7
Mechanical installation KEVA 24 C25 and KEVA 24 C25c

The KEVA 24 C25(c) sensors are designed to be fixed to the Cellpack cable connectors using the screw M16 which is a part of the cable connectors, see Fig. 8 – picture 4.

**Attention:** Be careful when unpacking and handling to avoid damages to the sensor. Damages that occur during unpacking or poor handling will not be covered by the warranty.

Mechanical installation according to the next steps, see Fig. 8:

- **0 step** the state before of installation process, see picture 0
- **1 step** remove the conductive protection cap, see picture 1
- **2 step** remove the insulating plug, see picture 2
- **3 step** clean the inside surface of the connector by Cellpack cleaning tissue, consistently must be checked that on the surface of inside cone are not the metal burrs, see picture 3
- **4 step** check the tightening of the screw M16, the tightening hex nut of size 22 mm, recommended tightening torque 50 Nm shall be used, see picture 4, in order to achieve the correct applied torque ensure that there is no lubricant on the threaded parts
- **5 step** lightly lubricate the lubricant and filling agent GM1 on the inside connector surface (where there is contact between the sensor and the cable connector), use glove, first consistently must be checked that on the surface of inside cone are not any metal burrs, see picture 4
- **6 step** screw the KEVA 25 C25(c) sensor, the tightening hex nut of size 24 mm, recommended tightening torque 30 Nm shall be used, in order to achieve the correct applied torque ensure that there is no lubricant on the threaded parts
- **7 step** connect the grounding wire by a screw M8 which is at the frame, see picture 6
- **8 step** connect the secondary cable of sensor KEVA 25 C25(c) to the BNC connector (check that secondary cable with the same ID number as mentioned on the sensor label is connected), see picture 7

**Attention:** During assembling, ventilate the air with a tongue EH from the applicator AH. Moistening the tongue slightly with GM1 before using (see picture 5). When the cone of sensor is 2 mm from the connector body, pull gently the tongue then tighten and use the cleaning tissue to remove remaining lubricant and filling agent GM1.
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 - for more information about connector adapters and coupling adapter refer to Doc. No. 1VLC000710 - Sensor Accessories.) 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 minimal bending radius for the secondary cable is 35 mm. 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 RJ45 plug connector that shall be connected to the inputs of the IED.

Note: It is recommended to use a cable tie to fasten long sensor cables approximately 10 cm from the RJ45 socket.

The sensor plug connector pin’s assignment is shown on Fig. 10. (Front view).

A cable not connected to the IED can be left open or short-circuited without any harm for the sensor. Nevertheless it is a good safety practice to earth cables not connected to the IED.

RJ45 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 RJ45-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 cable and shall be connected to the ground during the sensor operation. To ground the sensor the grounding wire (length 0.5 m) with the cable eye M8 is used.

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 must be brushed off the sensor. Polluted sensors can be cleaned with spirit or petrol. 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°C...+80°C. During transport and storage the sensors shall be protected against direct sunshine. The sensors are delivered packed into paper boxes or transport pallets. The conical surface must be protected against damage.

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.

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.
KEVA 24 C10 and KEVA 24 C10c

Dimensional Drawings

INTERFACE COMPATIBLE WITH EN 50180 AND 50181 TYPE C

GROUNDING WIRE LENGTH 0.5m

CONNECTOR END

A0001 WITHOUT CONDUCTIVE LAYER
A0002 WITH CONDUCTIVE LAYER

CONNECTOR RJ45 CAT6
KEVA 24 C25 and KEVA 24 C25c