MEDIUM VOLTAGE PRODUCTS

KEVA C with 3.25V output
Indoor voltage sensors for Cellpack separable connectors
KEVA C WITH 3.25V OUTPUT
INDOOR VOLTAGE SENSORS FOR CELLPACK SEPARABLE CONNECTORS

Parameters for Application | Value
--- | ---
Rated primary voltage of application | up to 24 kV

Sensor Parameters | Value
--- | ---
Rated primary voltage, \( U_{pr} \) | 20/√3 kV, 15/√3 kV, 10/√3 kV
Highest voltage for equipment, \( U_m \) | 24 kV
Rated power frequency withstand voltage | 50 kV
Rated lightning impulse withstand voltage | 125 kV
Rated secondary voltage, \( U_s \) | 3.25/√3 kV
Voltage accuracy class | 0.5/3P
Length of cable | 2.2; 5 m

Sensor principles
Voltage sensors (low-power passive voltage transformers according to IEC 61869-11 standard) offer an alternative way of making the voltage measurement needed for the protection and monitoring of medium voltage power systems. Sensors based on alternative principles have been introduced as successors to conventional instrument transformers in order to significantly reduce size, increase safety, and to provide greater rating standardization and a wider functionality range. These well known principles can only be fully utilized in combination with versatile electronic relays.

Sensor characteristics
Construction of ABB’s voltage sensors is done without the use of a ferromagnetic core. This fact results in several important benefits for the user and the application.

The main benefit is that the behavior of the sensor is not influenced by non-linearity and width of hysteresis curve, which results in a highly accurate and linear response over a wide dynamic range of measured quantities. A linear and highly accurate sensor characteristic in the full operating range enables the combination of metering and protection classes in one device.

Voltage sensor
Voltage measurement in KEVA C sensors is based on the resistive divider principle. The output voltage is directly proportional to the input voltage:

\[
U_s = \frac{R_2}{R_1 + R_2} U_p
\]

In all cases, the transmitted output signal reproduces the actual waveform of the primary voltage signal.

Protection and control IEDs (Intelligent Electronic Devices)
Protection and control IEDs incorporate the functions of a traditional relay, as well as allow new additional functions. The information transmitted from the sensors to the IED is very accurate, providing the possibility of versatile relay functionality.

However, the IED must be able to operate with sufficient accuracy at a sensor’s low input signal level. Modern IEDs are designed for such sensor use.

Modern digital apparatuses (microprocessor based relays) allow protection and measurement functions to be combined. They fully support voltage sensing realized by the single sensor with double the accuracy class designation (e.g.: voltage sensing with combined accuracy class 0.5/3P).

Attention: Connected device shall fulfill requirements according IEC 61869-11 for nominal burden. Standard defines to have input impedance 2MΩ and 50pF. Other option to have 200 kΩ ±1% which cover other solution from some other suppliers. Impact of other devices with different input impedance can have influence on output of sensors and defined accuracy is not valid.
Differences between Sensors and Instrument Transformers

There are some noticeable differences between Sensors and conventional Instrument Transformers:

**Linearity**

Due to the absence of a ferromagnetic core the sensor has a linear response over a very wide primary voltage range.

Example of voltage measurement range for metering accuracy class 0.5 and protection accuracy class 3P:

The accuracy limits are described on the graph below.

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

Tab. 2. Sensor variants and use in cable connectors

**Note:** For use in alternative cable connectors please contact ABB.
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Secondary cables
The sensor is equipped with a cable for connection with the IED. The cable termination can be realized by the cable connector RJ45 (standard solution) or with ferrules. The sensor accuracy classes are verified up to the connector or ferrules, i.e. considering also its secondary cable. These cables are intended to be connected directly to the IED, and subsequently neither burden calculation nor secondary wiring is needed. Every sensor is therefore accuracy tested when equipped with its own cable and termination.

Insulation requirements for secondary terminals according to IEC 61869-11
- Power frequency voltage withstand capability: 0.82 kV
- Impulse voltage withstand capability: 1.5 kV 1.2/50 μs

Voltage sensor, rated values
- Rated primary voltage, \( U_{pr} \): 20/√3 kV, 15/√3 kV, 10/√3 kV
- Rated frequency, \( f_r \): 50/60 Hz
- Accuracy class: 0.5/3P
- Rated burden, \( R_{br} \):
  - IEC 61869-11 2 MΩ/50 pF or 200 kΩ/350 pF
- Rated secondary voltage, \( U_{sr} \): 3.25/√3 kV
- Rated voltage factor, \( F_v \): 1.9/8h

Temperature category
- Operation: -25°C/+55°C
- Transport and storage: -40°C/+80°C

Cable
- Length: 2.2; 5 m
- Connector: RJ45 (CAT-6) ferrules
- Grounding wire length: 0.5 m

The use of connector or coupling adapters has no influence on the current and/or voltage signal and accuracy of the sensor with the cable.

For more information about connector adapters and coupling adapter refer to Doc. No. 1VLC000710 - Sensor accessories.

Standards
- HD 629.1 S2 (02/2006) + A1 (09/2008) Table 10, test requirements.

Highest voltage for equipment and test voltages
- Highest voltage for equipment, \( U_{m} \): 24 kV
- Rated power frequency test voltage: 50 kV
- Rated lightning impulse test voltage: 125 kV

Connector adapters
To provide connectivity between a sensor with a RJ45 cable connector and IEDs with Twin-BNC connectors a group of adapters were designed. To provide connectivity between current and voltage sensors with RJ45 cable connectors and IEDs with RJ45 connector the coupling adapter was designed.
### Secondary cables with RJ 45 connection

<table>
<thead>
<tr>
<th>Sensor type designation</th>
<th>Supported type of cable connector</th>
<th>Ratio</th>
<th>Burden</th>
<th>Secondary cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEVA 24 C10</td>
<td></td>
<td>20/√3 kV</td>
<td>2 MΩ/50 pF</td>
<td>1VL5400090V1101</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200 kΩ/350 pF</td>
<td>1VL5400090V1103</td>
</tr>
<tr>
<td></td>
<td>CTS-S 630A 24kV</td>
<td>15/√3 kV</td>
<td>2 MΩ/50 pF</td>
<td>1VL5400092V1101</td>
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<td>1VL5400092V1103</td>
</tr>
<tr>
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<td>KEVA 24 C10c</td>
<td>10/√3 kV</td>
<td>2 MΩ/50 pF</td>
<td>1VL5400094V1101</td>
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<td></td>
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<td>1VL5400094V1103</td>
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<td>1VL5400120V1101</td>
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<td>1VL5400090V1105</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>200 kΩ/350 pF</td>
<td>1VL5400090V1106</td>
</tr>
<tr>
<td></td>
<td>CTS-S 630A 24kV</td>
<td>15/√3 kV</td>
<td>2 MΩ/50 pF</td>
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<td>KEVA 24 C10c</td>
<td>10/√3 kV</td>
<td>2 MΩ/50 pF</td>
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08 CTS 630 A 24 kV
+ CTKS 630 A 24 kV
+ KEVA 24 C25(c)

09 CTS 630 A 24 kV
+ CTKSA 630 A 24 kV
+ KEVA 24 C25(c)

10 CTS-S 630 A 24 kV
+ KEVA 24 C10(c)
Dimensional Drawings

KEVA 24 C10(c)

Outline drawing numbers:
2RKA015654A0001 (KEVA 24 C10)
2RKA015654A0002 (KEVA 24 C10c)

Weight: 0.85 kg
KEVA 24 C25(c)

Outline drawing numbers: 2RKA019522
Weight: 0.85 kg

Variant with the ferrules:

- RED FERRULE
- WHITE FERRULE

1 - PIN 7
8 - PIN 8

CONNECTOR RJ45 CAT6