MEDIUM VOLTAGE PRODUCT

# KEVA 36 G

## Indoor voltage sensor

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01 Resistive divider principle
—
02 IED and sensor

## Technical parametres

| Parameters for Application | Value |
|---|---|
| Rated primary voltage of application | up to 36 kV |

| Sensor Parameters | Value |
|---|---|
| Rated primary voltage, $U_{pn}$ | 33/√3 kV |
| Highest voltage for equipment, $U_m$ | 36 kV |
| Rated power frequency withstand voltage | 70 kV |
| Rated lightning impulse withstand voltage | 170 kV |
| Rated transformation ratio, $K_n$ for voltage measurement | 10 000 : 1 |
| Voltage accuracy class | 0.5/3P |
| Length of cable | 1.7 m<br>3.6 m |

### Sensor principles

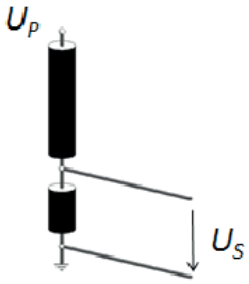
Electronic Instrument Transformers (Sensors) offer an alternative way of making the voltage measurement needed for the protection and monitoring of medium voltage power systems. Sensors based on alternative principles have been introduced as successors to conventional instrument transformers in order to significantly reduce size, increase safety, and to provide greater rating standardization and a wider functionality range. These advantages can be fully obtained in connection with modern digital protection 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 G sensors is based on the resistive divider principle. The output voltage is directly proportional to the input voltage:




$$U_s = \frac{R_2}{R_1 + R_2} U_p$$

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In all cases, a signal that represents the actual primary current waveform is easily obtained by integrating the transmitted output 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 (such as ABB's 615 series relays) 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).

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| Sensor type designation | | Adapter type | | |
|---|---|---|---|---|
| **Type** | **Primary ter.** | **Manufacturer** | **Type** | **Reference no.** |
| KEVA 36 G22 | M12 | NKT | End adapter 24kV / 1250 A | 26 129 72 |
| | | | Cross adapter 24kV / 1250A | 26 129 73 |
| | | | End adapter 24kV / 2500 A | 26 526 88 |
| | | | Cross adapter 24kV / 2500 A | 26 526 89 |
| | | | End adapter 36kV / 1250 A | 26 129 32 |
| | | | Cross adapter 36kV / 1250A | 26 129 33 |
| | | ABB | Socket adapter | GCE9016092R0102 |
| KEVA 36 G23 | M16 | NKT | End adapter 36kV / 2500 A | 26 129 88 |
| | | | Cross adapter 36kV / 2500A | 26 129 89 |

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03 Voltage sensor installed in MV gas insulated switchgear ZX 0.2 (voltage measurement on bus bar side).
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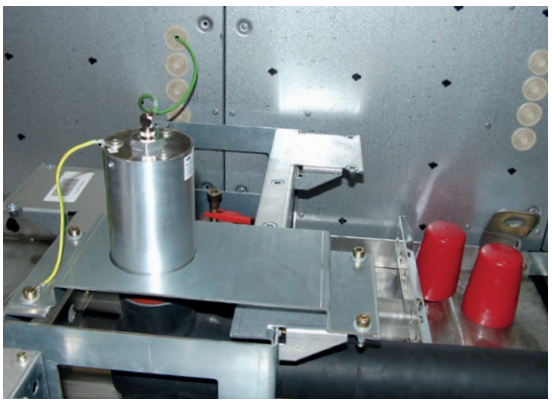
04 Combined accuracy class.

**Note: For use in alternative adapters, please contact ABB.**

**Sensor applications**
The voltage sensors type KEVA 36 G are intended for use in voltage measurement in gas insulated medium voltage switchgear. For voltage measurement on bus bar side the voltage sensors are designed as easy replacement of originally used insulating plugs in the adapters for screened bus bar systems. For voltage measurement on cable side the voltage sensors are designed as easy replacement of plug-in voltage transformers connected to the socket adapter. Due to the compact size and optimized design sensors can be used for retrofit purposes as well as in new installations.



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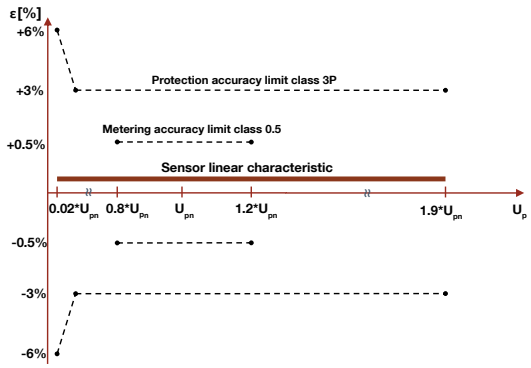
**Differences between Sensors and Instrument Transformers**
There are some noticeable differences between Sensors and conventional Instrument Transformers:

**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.

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**Rated parameters**
Because the sensors are highly linear within a very wide range of voltages, the same single sensor can be used for the various rated voltages associated with each specific application up to the specified maximum voltage for equipment. There is no need to specify other parameters such as burden etc. since they are standard over the defined range. To achieve the correct function of the protection and control IED, the selected rated voltage as well as the rated transformation ratio, must be properly set into the IED.

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05 Example of a sensor label
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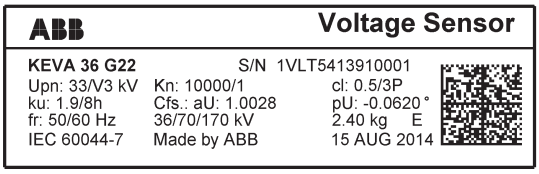
06 Connector RJ-45

**Correction factors**
The amplitude and phase error of a voltage sensor is, in practice, constant and independent of the primary voltage. Due to this fact it is an inherent and constant property of each sensor and it is not considered as unpredictable and influenced error. Hence, it can be easily corrected in the IED by using appropriate correction factors, stated separately for every sensor.

Values of the correction factors for the amplitude and phase error of a voltage sensor are mentioned on the sensor label (for more information please refer to Instructions for installation, use and maintenance) and should be uploaded without any modification into the IED before the sensors are put into operation (please check available correction in the IED manual). To achieve required accuracy classes it is recommended to use both correction factors (Cfs): amplitude correction factor (aU) and phase error correction factor (pU) of a voltage sensor.

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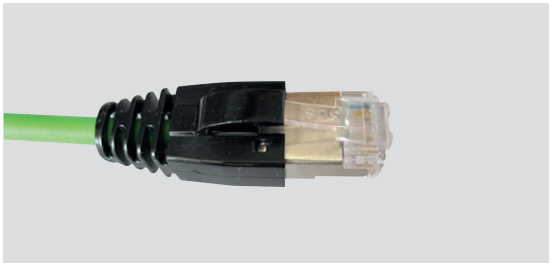
**Secondary cables**
The sensor is equipped with a cable for connection with the IED. The cable connector is type RJ-45. The sensor accuracy classes are verified up to the connector, i.e. considering also its secondary cable. These cables are intended to be connected directly to the IED, and subsequently neither burden calculation nor secondary wiring is needed. Every sensor is therefore accuracy tested when equipped with its own cable and connector.



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**Standards**
Voltage sensors: IEC 60044-7 (1999-12)
Instrument transformers – Part 7: Electronic voltage transformers

**Highest voltage for equipment and test voltages**

- Highest voltage for equipment, $U_m$: 36 kV
- Rated power frequency test voltage: 70 kV
- Rated lightning impulse test voltage: 170 kV

**Voltage sensor, rated values**

- Rated primary voltage, $U_{pn}$ 33/√3 kV
- Rated frequency, $f_r$ 50/60 Hz
- Accuracy class 0.5/3P
- Rated burden, $R_{br}$ 10 MΩ
- Rated transformation ratio, $K_n$ 10 000:1
- Rated voltage factor, $k_u$ 1.9 /8h

**Temperature category**

- Operation: -5°C/+40°C
- Transport and storage: - 40°C/+80°C

**Cable**

- Length: 1.7 m; 3.6 m (KEVA 36 G22 only)
- Connector: RJ-45 (CAT-6)
- Grounding wire length: 0.5 m

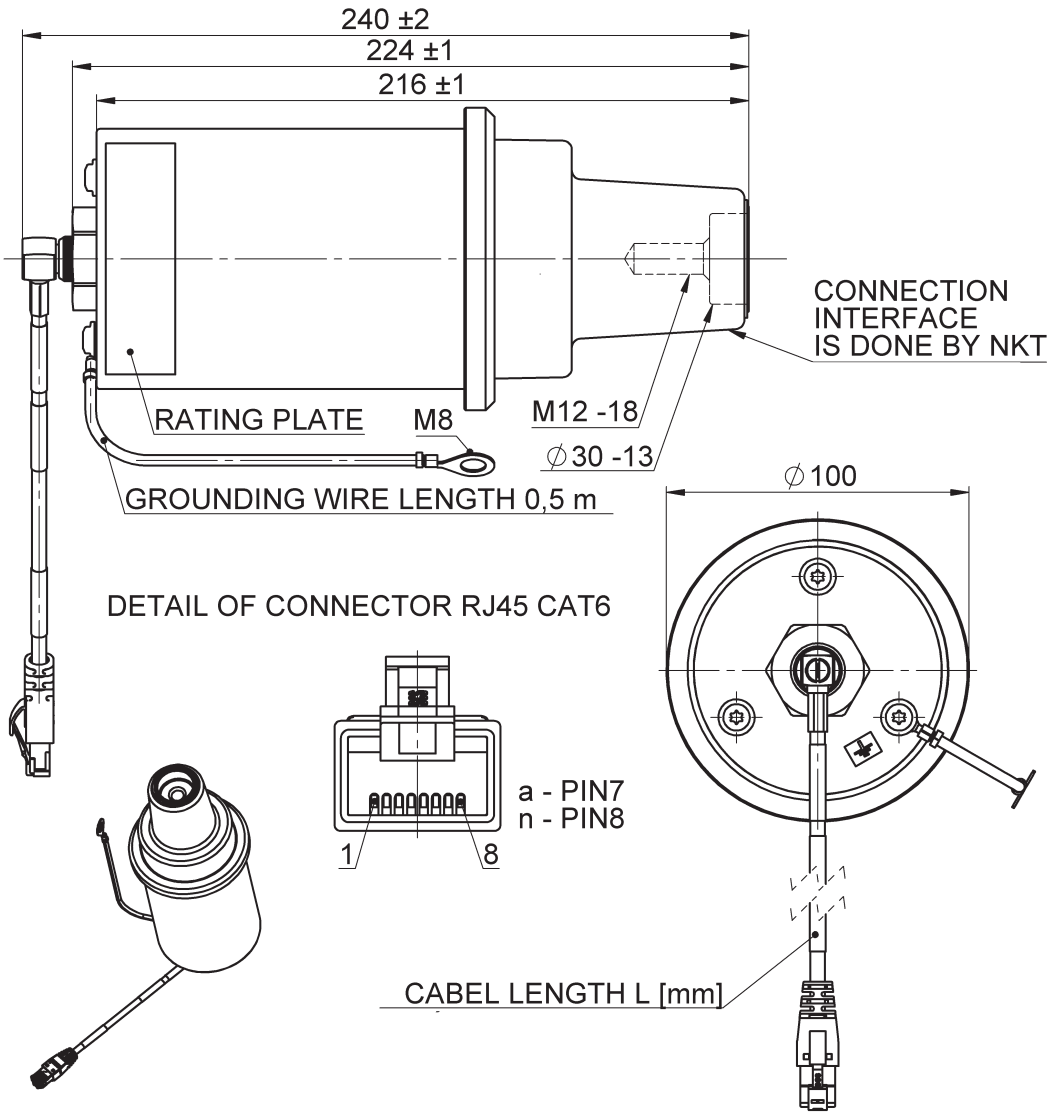
**Ordering data**

- KEVA 36 G22, cable length 1.7m 1VL5400074V0101
- KEVA 36 G22, cable length 3.6m 1VL5400074V0103
- KEVA 36 G23, cable length 1.7m 1VL5400075V0101

# Dimensional Drawings

## KEVA 36 G22

Dimensions and weight
Outline drawing number: 2RKA018390
Weight: 2.4 kg




| CONFIGURATION | SENSOR TYPE | CABLE LENGTH L [mm] |
|---|---|---|
| A0011 | KEVA 36 G22 | 1700 |
| A0031 | KEVA 36 G22 | 3600 |

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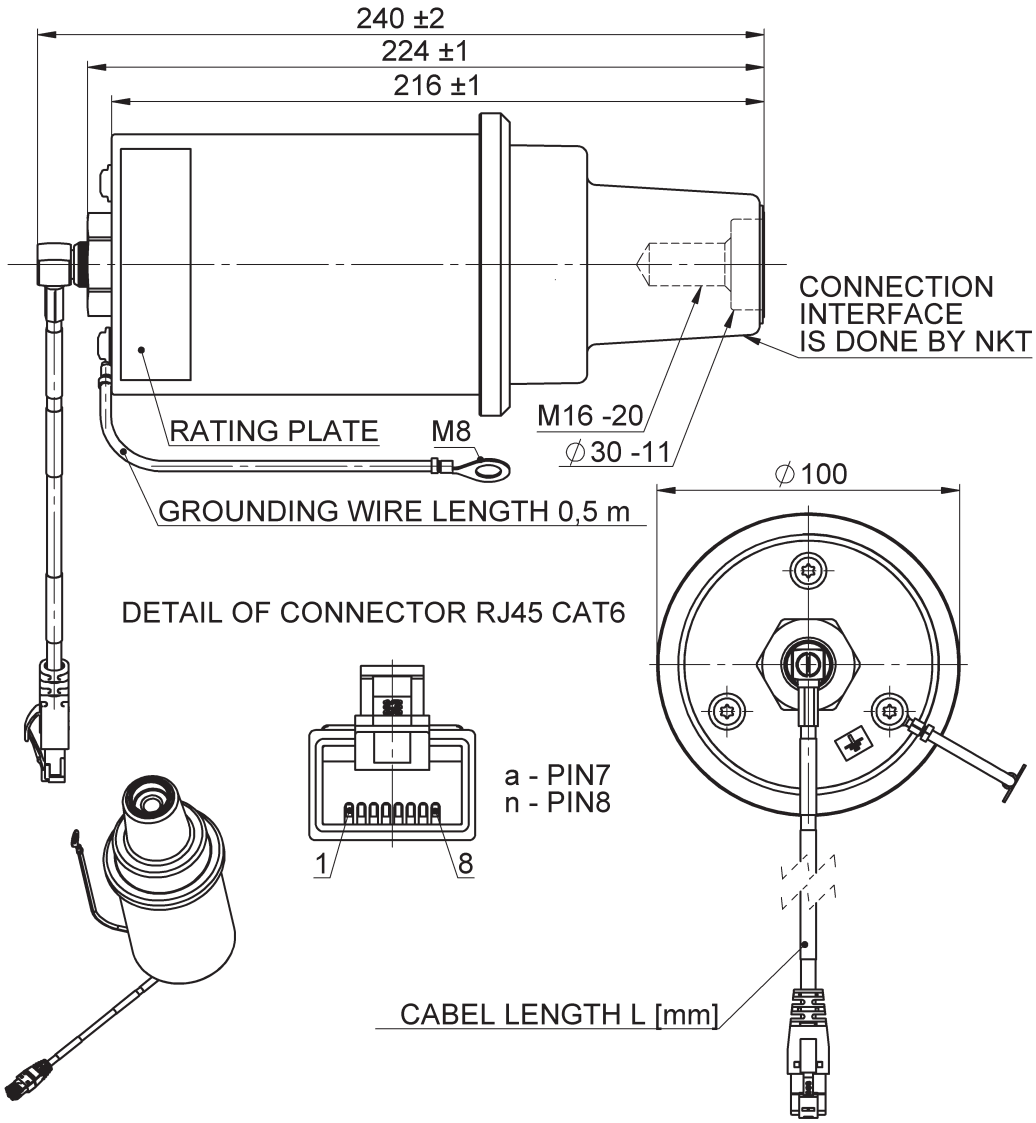
## KEVA 36 G23

Dimensions and weight

Outline drawing number: 2RKA018390

Weight: 2.4 kg




| CONFIGURATION | SENSOR TYPE | CABLE LENGTH L [mm] |
|---|---|---|
| A0012 | KEVA 36 G23 | 1700 |

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