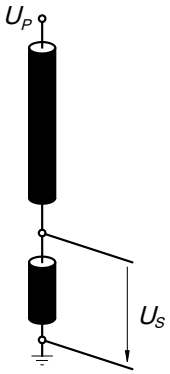
MEDIUM VOLTAGE PRODUCTS

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_{sr}	3.25/√3 V
Voltage accuracy class	0.5/3P
Length of cable	2.2; 5 m



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

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

— 01 Resistive divider principle

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:

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.

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02 KEVA C application

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03 Combined accuracy class

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Sensor variants

Sensor type designation	Metal coated (conductive surface)	Picture
KEVA 24 C10 KEVA 24 C25	✖	
KEVA 24 C10c KEVA 24 C25c	✔	

Tab. 1. Sensor design variants (with and without conductive surface)

Sensor type designation	Cable connector		
	Manufacturer	Type	Connecting screw for sensor
KEVA 24 C10 **KEVA 24 C10c**	Cellpack	CTS-S 630A 24kV	M16
KEVA 24 C25 **KEVA 24 C25c**	Cellpack	CTS 630A 24kV CTKS 630A 24kV CTKSA 630A 24kV	M16

Tab. 2. Sensor variants and use in cable connectors

Note: For use in alternative cable connectors please contact ABB.

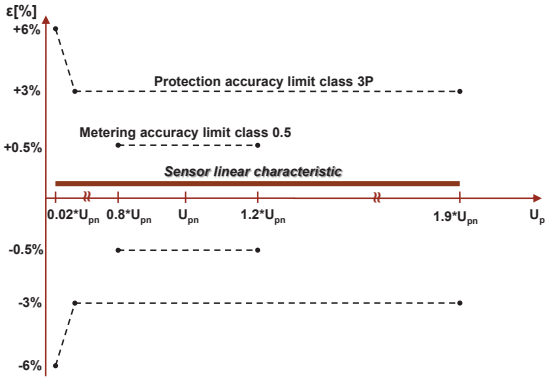
Differences between Sensors and Instrument Transformers

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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04 Example of a sensor label (IEC 61869-11). In case of rated burned 2 MΩ, 50pF, this value will not be given on rating plate.

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05 Connector RJ45

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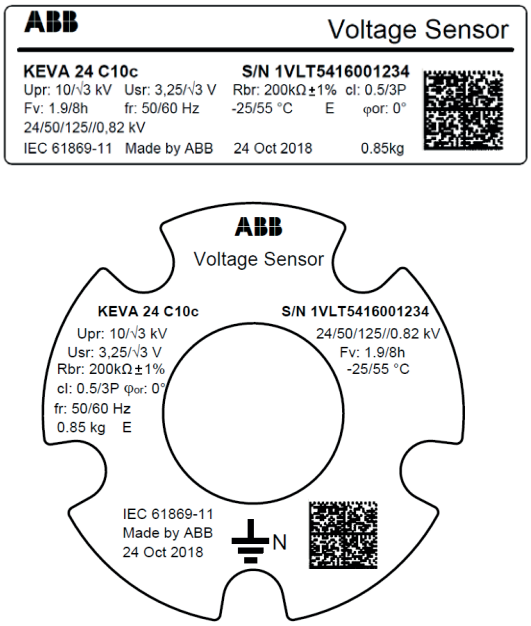
06 Ferrules



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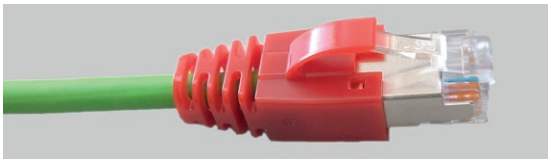
Secondary cables

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.



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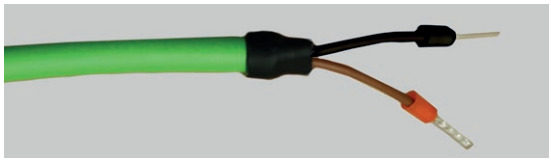

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Connector adapters

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.

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

- IEC 61869-11 (2017-12) Instrument transformers - Part 11: Additional requirements for low-power passive voltage transformers.
- 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

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 V
- Rated voltage factor, Fv: 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

Secondary cables with RJ 45 connection

Sensor type designation	Supported type of cable connector	Ratio	Burden	Secondary cable length	
				2.2 m	5 m
KEVA 24 C10	CTS-S 630A 24kV	20/√3 kV	2 MΩ/50 pF	1VL5400090V1101	1VL5400090V1103
			200 kΩ/350 pF	1VL5400091V1101	1VL5400091V1103
		15/√3 kV	2 MΩ/50 pF	1VL5400092V1101	1VL5400092V1103
			200 kΩ/350 pF	1VL5400093V1101	1VL5400093V1103
		10/√3 kV	2 MΩ/50 pF	1VL5400094V1101	1VL5400094V1103
			200 kΩ/350 pF	1VL5400095V1101	1VL5400095V1103
KEVA 24 C10c		20/√3 kV	2 MΩ/50 pF	1VL5400090V1201	1VL5400090V1203
			200 kΩ/350 pF	1VL5400091V1201	1VL5400091V1203
		15/√3 kV	2 MΩ/50 pF	1VL5400092V1201	1VL5400092V1203
			200 kΩ/350 pF	1VL5400093V1201	1VL5400093V1203
		10/√3 kV	2 MΩ/50 pF	1VL5400094V1201	1VL5400094V1203
			200 kΩ/350 pF	1VL5400095V1201	1VL5400095V1203
KEVA 24 C25	CTS 630A 24kV CTKS 630A 24kV CTKSA 630A 24kV	20/√3 kV	2 MΩ/50 pF	1VL5400120V1101	1VL5400120V1103
			200 kΩ/350 pF	1VL5400121V1101	1VL5400121V1103
		15/√3 kV	2 MΩ/50 pF	1VL5400122V1101	1VL5400122V1103
			200 kΩ/350 pF	1VL5400123V1101	1VL5400123V1103
		10/√3 kV	2 MΩ/50 pF	1VL5400124V1101	1VL5400124V1103
			200 kΩ/350 pF	1VL5400125V1101	1VL5400125V1103
KEVA 24 C25c		20/√3 kV	2 MΩ/50 pF	1VL5400120V1201	1VL5400120V1203
			200 kΩ/350 pF	1VL5400121V1201	1VL5400121V1203
		15/√3 kV	2 MΩ/50 pF	1VL5400122V1201	1VL5400122V1203
			200 kΩ/350 pF	1VL5400123V1201	1VL5400123V1203
		10/√3 kV	2 MΩ/50 pF	1VL5400124V1201	1VL5400124V1203
			200 kΩ/350 pF	1VL5400125V1201	1VL5400125V1203

Tab. 3. Secondary cables with RJ 45 connection - Ordering numbers by sensor type, standard and cable length

Secondary cables with ferrules connection

Sensor type designation	Supported type of cable connector	Ratio	Burden	Secondary cable length	
				2.2 m	5 m
KEVA 24 C10	CTS-S 630A 24kV	20/√3 kV	2 MΩ/50 pF	1VL5400090V1107	1VL5400090V1105
			200 kΩ/350 pF	1VL5400091V1107	1VL5400091V1105
		15/√3 kV	2 MΩ/50 pF	1VL5400092V1107	1VL5400092V1105
			200 kΩ/350 pF	1VL5400093V1107	1VL5400093V1105
		10/√3 kV	2 MΩ/50 pF	1VL5400094V1107	1VL5400094V1105
			200 kΩ/350 pF	1VL5400095V1107	1VL5400095V1105
KEVA 24 C10c		20/√3 kV	2 MΩ/50 pF	1VL5400090V1207	1VL5400090V1205
			200 kΩ/350 pF	1VL5400091V1207	1VL5400091V1205
		15/√3 kV	2 MΩ/50 pF	1VL5400092V1207	1VL5400092V1205
			200 kΩ/350 pF	1VL5400093V1207	1VL5400093V1205
		10/√3 kV	2 MΩ/50 pF	1VL5400094V1207	1VL5400094V1205
			200 kΩ/350 pF	1VL5400095V1207	1VL5400095V1205
KEVA 24 C25	CTS 630A 24kV CTKS 630A 24kV CTKSA 630A 24kV	20/√3 kV	2 MΩ/50 pF	1VL5400120V1107	1VL5400120V1105
			200 kΩ/350 pF	1VL5400121V1107	1VL5400121V1105
		15/√3 kV	2 MΩ/50 pF	1VL5400122V1107	1VL5400122V1105
			200 kΩ/350 pF	1VL5400123V1107	1VL5400123V1105
		10/√3 kV	2 MΩ/50 pF	1VL5400124V1107	1VL5400124V1105
			200 kΩ/350 pF	1VL5400125V1107	1VL5400125V1105
KEVA 24 C25c		20/√3 kV	2 MΩ/50 pF	1VL5400120V1207	1VL5400120V1205
			200 kΩ/350 pF	1VL5400121V1207	1VL5400121V1205
		15/√3 kV	2 MΩ/50 pF	1VL5400122V1207	1VL5400122V1205
			200 kΩ/350 pF	1VL5400123V1207	1VL5400123V1205
		10/√3 kV	2 MΩ/50 pF	1VL5400124V1207	1VL5400124V1205
			200 kΩ/350 pF	1VL5400125V1207	1VL5400125V1205

Tab. 4. Secondary cables with ferrules connection - Ordering numbers by sensor type, standard and cable length

KEVA C WITH 3.25V OUTPUT

INDOOR VOLTAGE SENSORS FOR CELLPACK SEPARABLE CONNECTORS

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08 CTS 630 A 24 kV
+ CTKS 630 A 24 kV
+ KEVA 24 C25(c)

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

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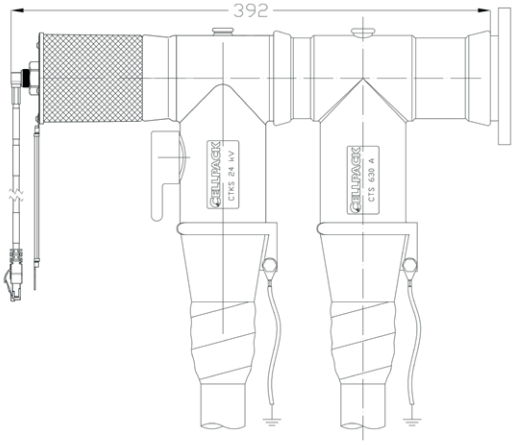
10 CTS-S 630 A 24 kV
+ KEVA 24 C10(c)



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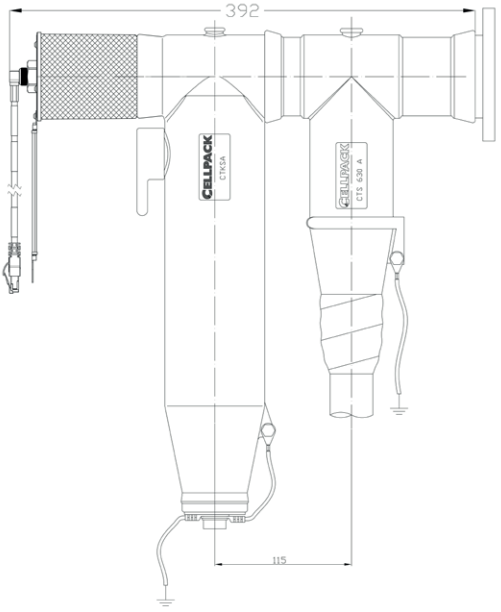

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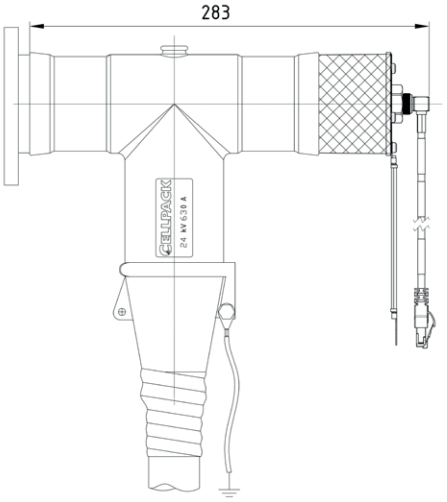

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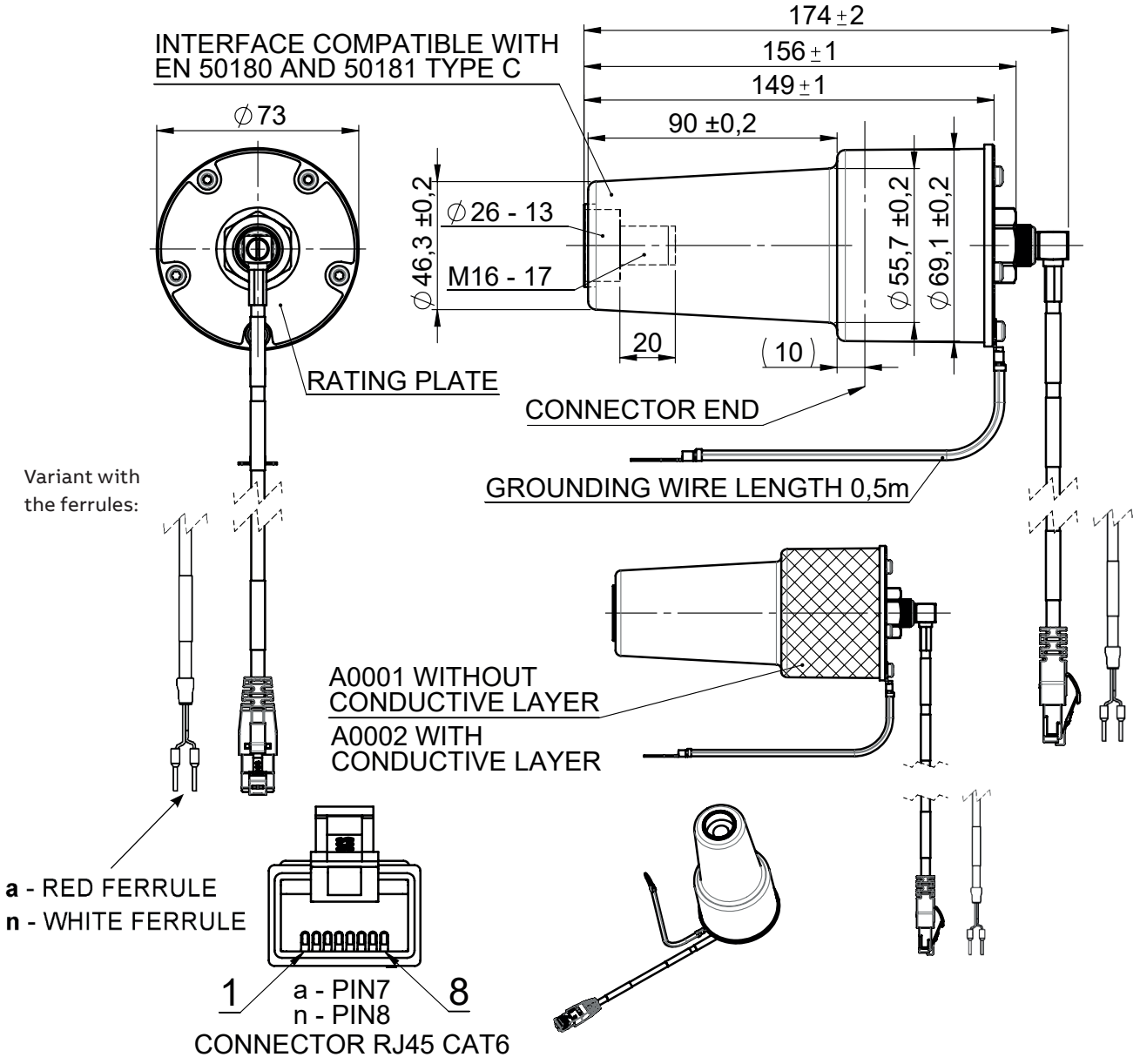
Dimensional Drawings

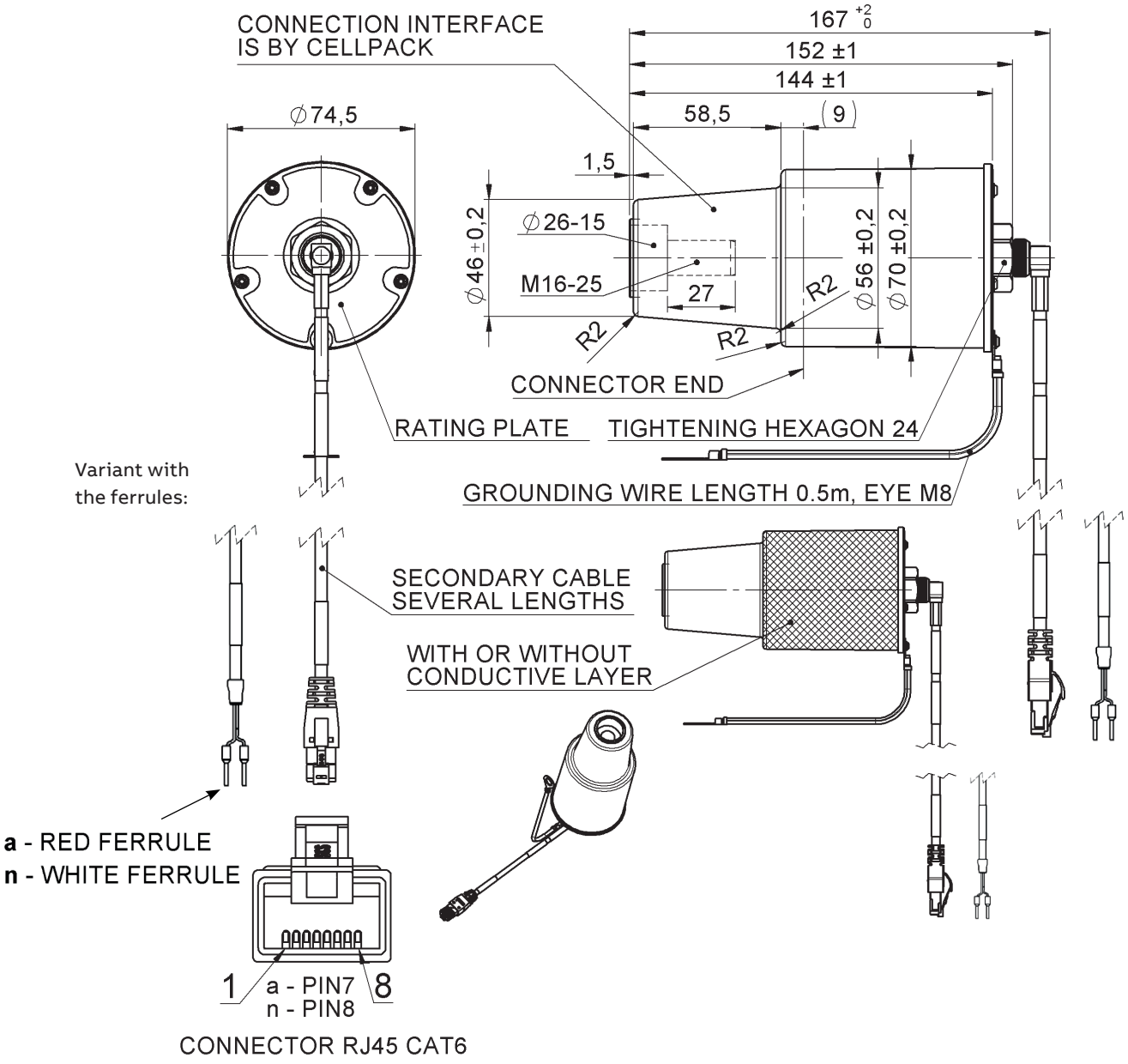
KEVA 24 C10(c)

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



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