

MEDIUM VOLTAGE PRODUCT

AdvaSense™ Voltage Sensors

KEVA 24 B20; KEVA 24 B21

Instructions for installation, use and maintenance



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AdvaSense™ KEVA 24 B20 and KEVA 24 B21 voltage sensors

Instructions

These instructions for installation, use and maintenance are valid for KEVA 24 B20 and KEVA 24 B21 type voltage electronic transformers (sensors) operating in indoor conditions.

01 Example of rating plate (IEC 61869-11)


1. Operating Conditions

The sensor should be mounted in dry, indoor conditions without excess ingress of dust and corrosive gases. The sensor must 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°C and +40°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 sensor may also be used at higher altitudes when agreed upon with the manufacturer.

The AdvaSense™ voltage sensors are the effective solutions for voltage measuring needed for protection and monitoring in medium voltage power systems. The AdvaSense™ voltage sensors type KEVA 24 B20 and KEVA 24 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. The output circuit of the sensor shall be connected to secondary equipment (e.g. relay) specified by the manufacturer. The use of sensor for other purposes than those described above is forbidden.

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.

ABB		Voltage Sensor	
KEVA 24 B21		S/N 1VLT5419012345	
Upr: 22/√3 kV	Kr: 10000/1	cl: 0.5/3P	φ _{cor} : 0°
Fv: 1,9/8h	fr: 50/60 Hz	-5/55 °C	
CF _u 0.6666	φ _{o cor} : 0.8888°	E	
IEC 61869-11	24/50/125/0,82 kV	7.1 kg	
Made by ABB		21 Jun 2019	

01

KEVA 24 B21	Type code
S/N	Serial number
Upr	Rated primary voltage
Kr	Divider ratio
cl	Accuracy class
Tv	Rated voltage factor
Cfu	Correction factors used for voltage sensor. Correction factors are measured and calculated separately for each sensor. Amplitude correction factor is a number by which the output signal of the sensor shall be multiplied in order to have minimum amplitude error
φ _{o cor}	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 increased or decreased (depending on the sign) in order to have minimum phase error
fr	Rated frequency in Hz
17.5/38/95 kV	Insulation level
0.82 kV	Insulation requirement for secondary terminal - power frequency voltage withstand capacity
2 kg	Weight
E	Insulation class
IEC 61869-11	IEC – standard referred to
-5/40 °C	Ambient temperature
24 Oct 2018	Date of production

Tab. 1. Labels abbreviation definitions

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02 Example of rating plate (IEC 60044-7)

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03 Example of data stored in 2D Bar Code according to label parameters in picture 02 (IEC 60044-7). Same principle can be applied with label parameters in 01 (IEC 61869-11)

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04 Example of Amplitude and Phase error correction factors setting for current sensor into REF615 according to label parameters in picture 02 (IEC 60044-7). Same principle can be applied with label parameters in 01 (IEC 61869-11)

ABB		Voltage Sensor	
KEVA 24 B20		S/N 1VLT5413920000	
Upn: 22/√3 kV		Kn: 10000/1	
cl: 0.5/3P		cu: 1.9/8h	
fr: 50/60 Hz		Cfs.: aU: 0.9984	
pU: -0.0400°		IEC 60044-7	
24/50/125 kV		2.52 kg	
Made by ABB		E	
16 MAY 2014			

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02

POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DATA	K	E	V	A	2	4			B	2	0			S	/	N		1	V

20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
L	T	5	4	1	3	9	2	0	0	0				1	6		M	a	y		2

42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0	1	2			C	f	s	.	:		a	U	:		0	.	9	8	4		

64	65	66	67	68	69	70	71	72	73	74
p	U	:		-	0	.	0	4	0	0

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03

KEVA 24 B20	Type code
S/N	Serial number
Upn	Rated primary voltage
Kn	Divider ratio
cl	Accuracy class
ku	Rated voltage factor
Cfs.	Correction factors used for voltage sensor. Amplitude correction factor is a number by which the output of sensor must be multiplied in order to have minimum amplitude error. Phase error correction factor is a number by which the output of the sensor must be increased or decreased (depending on the sign) in order to have minimum phase error.
aU	Amplitude correction factor of a voltage sensor
pU	Phase error correction factor of a voltage sensor in degrees
fr	Rated frequency in Hz
24/50/125 kV	Insulation level
2.52 kg	Weight
E	Insulation class
IEC 60044-7	IEC – standard referred to
16 May 2014	Date of production

Tab. 2. Labels abbreviation definitions



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04

Group/Parameter Name	IED Value	PC Value	Unit	Min	Max
Voltage (3U,VT)					
Primary voltage		22,000	kV	0,100	440,000
Secondary voltage		100 V	V	60	210
VT connection		Wye			
Amplitude Corr A		0,9984		0,9000	1,1000
Amplitude Corr B		0,9984		0,9000	1,1000
Amplitude Corr C		0,9984		0,9000	1,1000
Division ratio		10000		1000	20000
Voltage input type		CVD sensor			
Angle Corr A		-0,0400	deg	-20,0000	20,0000
Angle Corr B		-0,0400	deg	-20,0000	20,0000
Angle Corr C		-0,0400	deg	-20,0000	20,0000

05 Sensor variants

06 Sensor mechanical installation

3. Instructions for Installation

Safety instruction

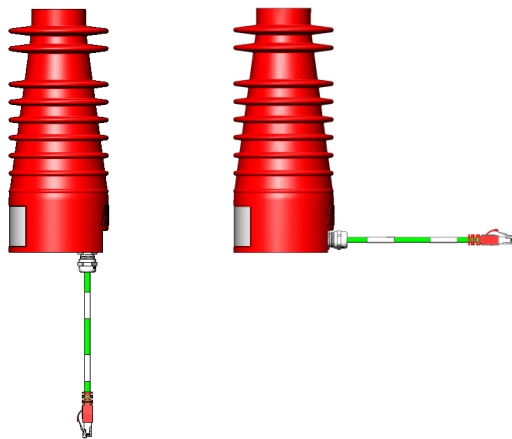
Always ground the sensor grounding terminal.

Installation conditions

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

Mechanical installation

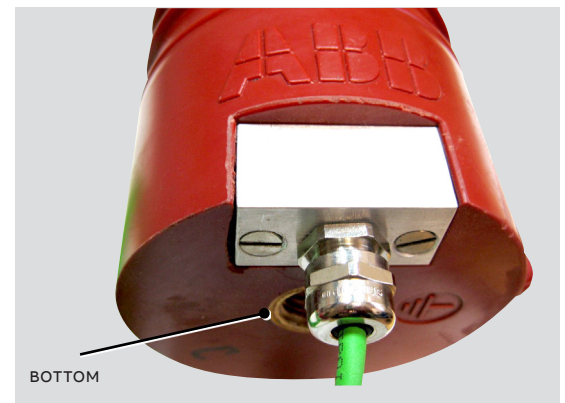
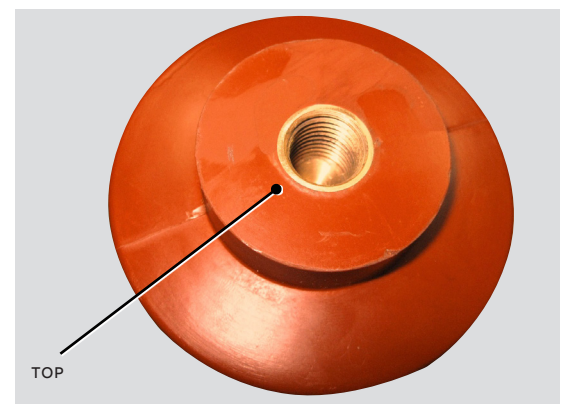
There are two possibilities of cable output position from the sensor terminal part, see Fig. 5. The position of the sensor cable from the sensor terminal part determines sensor variant.



05

The sensor is designed to be fixed to the base plate using the screw M16 * (recommended tightening torque is 110 Nm without lubrication and 90 Nm with lubrication). The mounting position for the sensor is given by the cable bushing which is located at the bottom of the sensor (KEVA 24 B20) or at the side of the sensor (KEVA 24 B21), see BOTTOM designation in Fig. 6. Thus, the correct sensor orientation, cable direction and rating plate position are ensured. Primary connection is made on the sensor top side using the screw M12 * (recommended tightening torque is 45 Nm without lubrication and 36 Nm with lubrication), see TOP designation in Fig. 6.

***Note:** Strength class of the screws at least 8.8



06

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07 Connector RJ45 (IEC 60044-8)

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08 Connector RJ45 (IEC 61869-11)

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09 KEVA 24 B20 and KEVA 24 B21 sensors plug connector pin's assignment

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10 The sensor grounding terminal

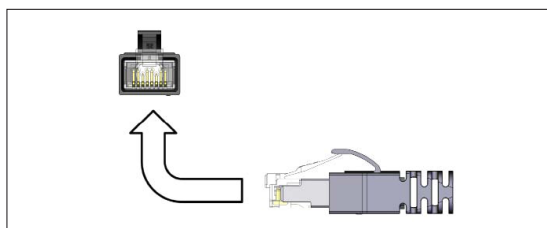
Secondary cable, secondary connections

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.

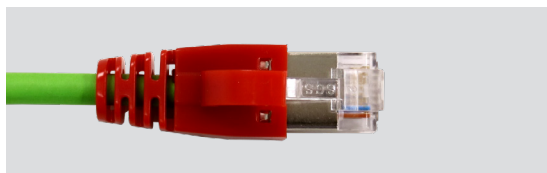
The cable shall be connected directly (or via a connector adapter if needed) to Intelligent Electronic Device (e.g. protection relay). The electrical shielding of cable is connected to connector shielding and shall be earthed on IED side. The cable shall be fixed close to metal wall or inserted inside 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 RJ45 plug connector that shall be connected to the inputs of the IED.

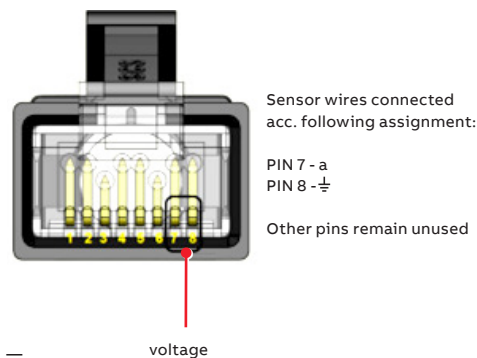


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08

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. 8. (Front view).



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09

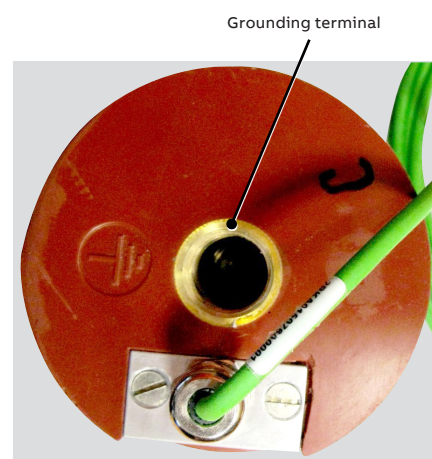
A cable not connected to the IED can be left open or short-circuited without any harm for the sensor. Nevertheless it is a good safety practice to earth cables not connected to the IED.

RJ45 plug connector has 8 contacts and locking latch coupling. The sensor connector plug shall be inserted properly with the IED mating receptacle before completing the coupling with the bayonet lock. Take care and do not use excessive force to plugin 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 terminal part and shall be connected to the ground during the sensor operation, see Fig. 9.



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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 equipment 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.

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 from -40 to +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.

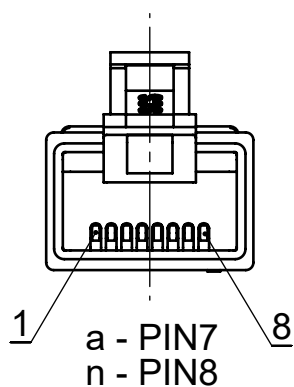
7. Recommended Procedure for Disposal of the Sensor

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.

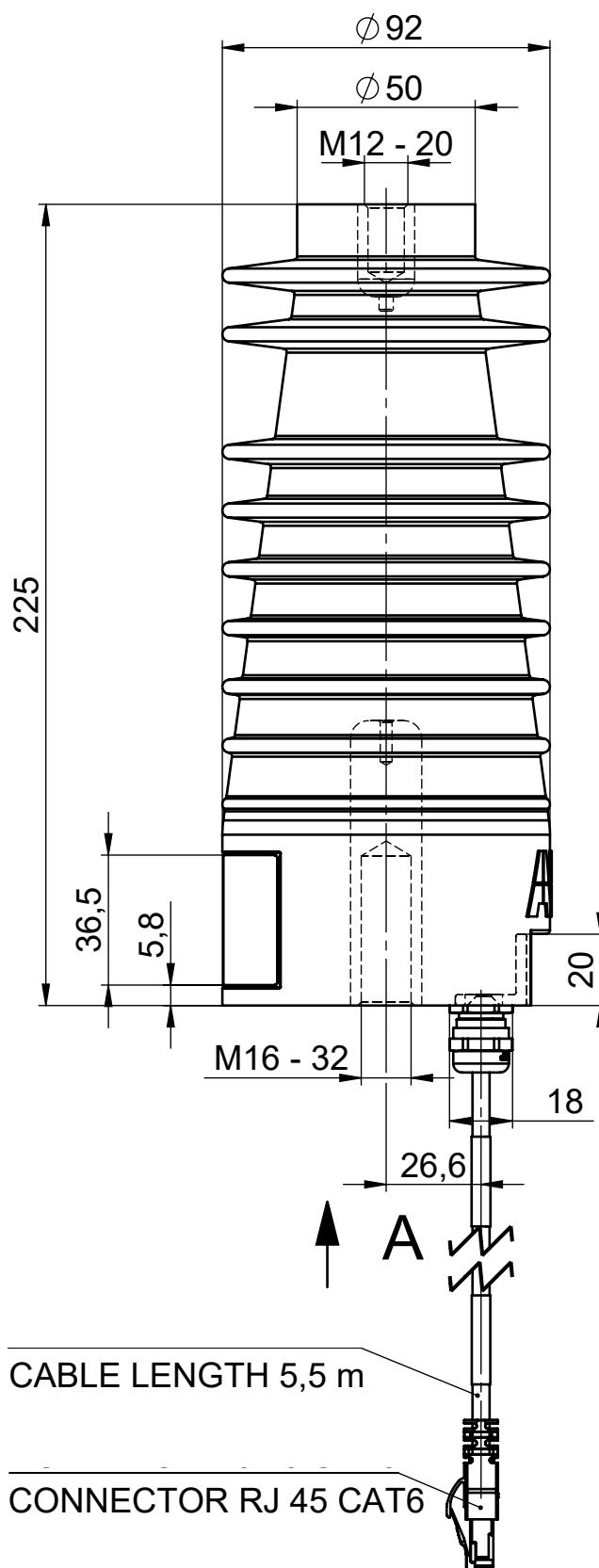
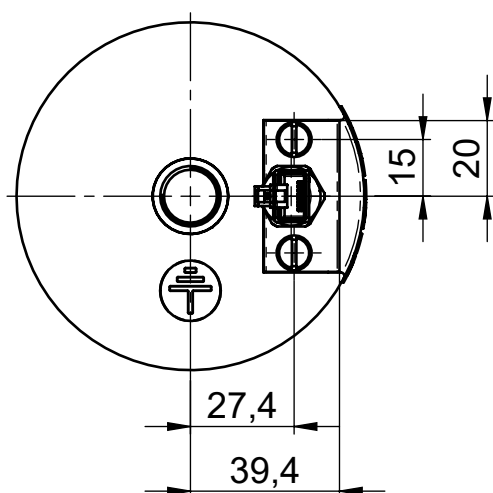
Dimensional Drawings

KEVA 24 B20

RJ 45 CAT6 DETAIL:

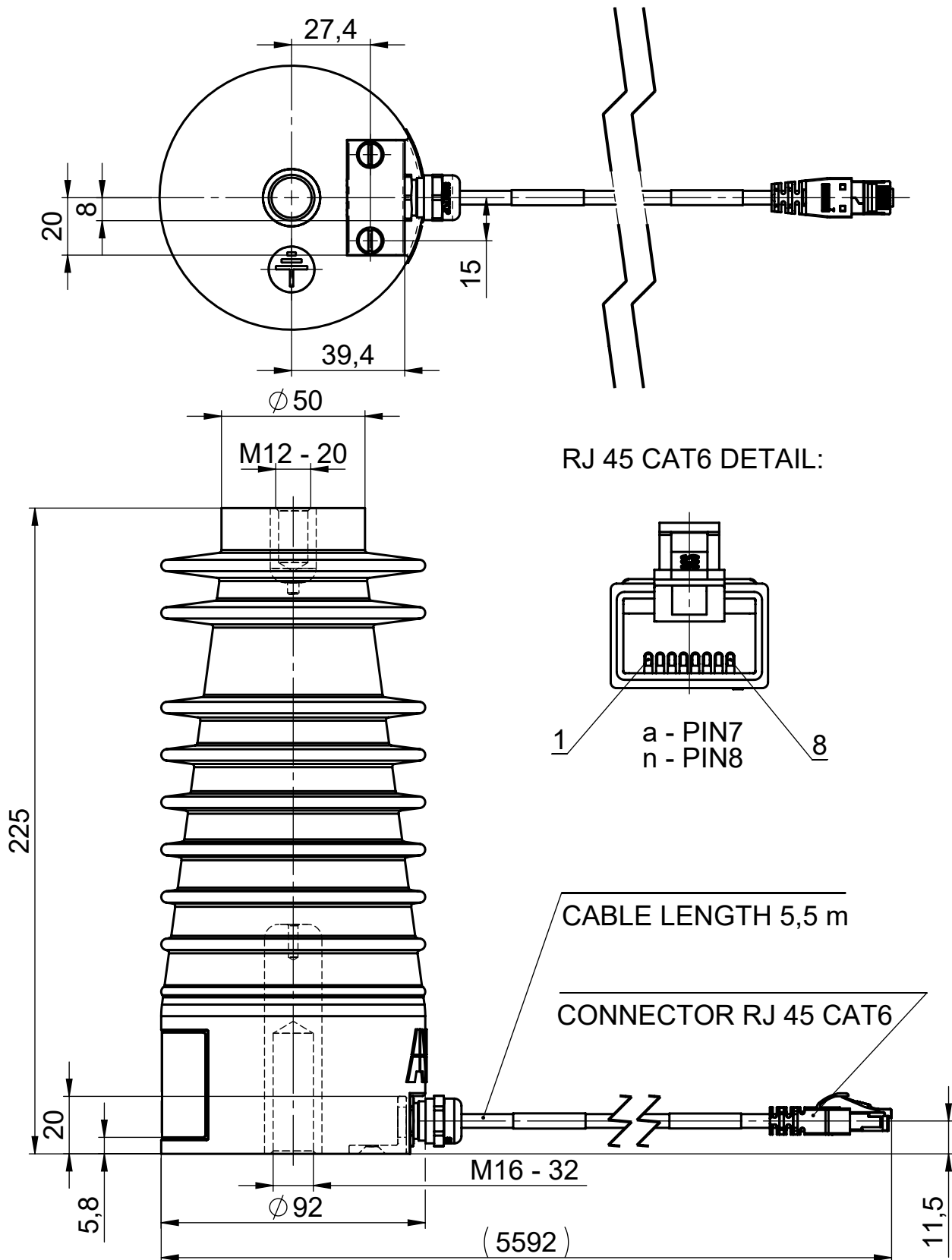


A 1 : 2



Dimensional Drawings

KEVA 24 B20



Appendix 1. Harsh environment installation

Despite the voltage sensors KEVA 24 B2x are intended to be used at their rated characteristic under normal service conditions defined by IEC 60044-7 and IEC 61869-11 (IEC 61869-1) standards, the voltage sensors might be used also in the indoor Switchgear and Controlgear panels under more severe conditions where the normal indoor service conditions could be affected by higher level of water condensation and dust pollution, generally called as harsh environment.

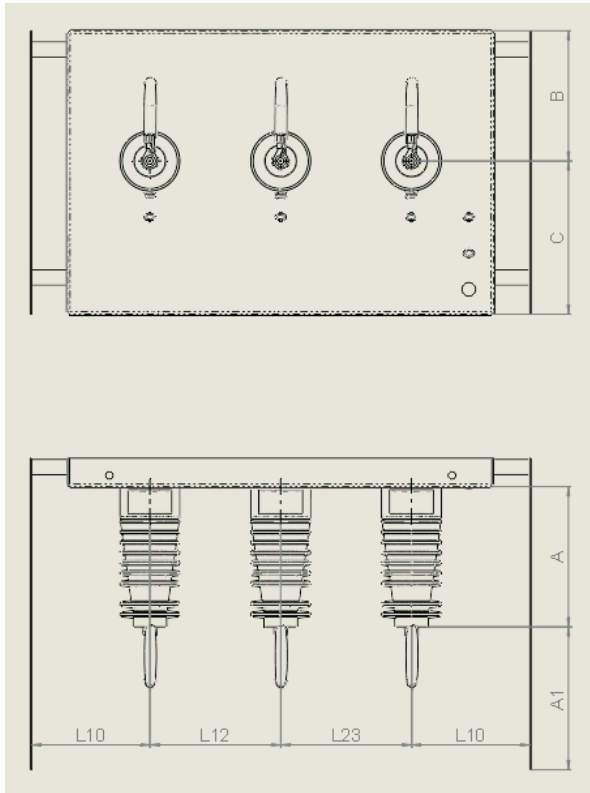
The basic normative reference to prove this installation is IEC 62271-304:2008, where are defined all environmental aspects above the standards IEC 60044-7 and IEC 61869-11 (IEC 61869-1) which refer to the normal service conditions for indoor applications.

The service conditions for the installation in harsh environment are considered as Degree of severity 2, which means the level of combinations marked as „ClPh“ or „ChPl“ or „ChPh“, where:

- Cl is non-frequent condensation (not more than twice a month),
- Ch is frequent condensation (more than twice a month),
- Pl is light pollution (ambient air NOT significantly polluted by dust, smoke, gases, salt),
- Ph is heavy pollution which exceed any from Pl (does not include area with conductive dust tor smoke).

The three-phase installations of KEVA 24 B2x voltage sensors meet the requirements of the Design class 2, what was reliably validated by Level 2 ageing tests according to IEC62271-304:2008 standard.

The highly recommended three-phase installation of KEVA 24 B2x for harsh environment:



L10 (mm)	190	Phase-to-ground
L12 (mm)	210	Phase-to-phase
L23 (mm)	210	Phase-to-phase
A (mm)	225	Phase-to-ground
A1 (mm)	230	Phase-to-ground
B (mm)	210	Phase-to-ground
C (mm)	210	Phase-to-ground

Screw on terminal A:

ISO4762-M12x20-8.8 hot-dip zinc coating or A4 stainless steel

Cable on terminal A:

Single core high voltage stranded tinned copper conductor with silicone rubber insulation, 25 mm², rated voltage 7,2 kV/50 Hz, test voltage 10 kV/50 Hz

The sensors installation could be provided either in the vertical or horizontal positioning.

Note: For installation in other configurations in harsh environment than described above please contact ABB.

For more technical details please refer to the IEC 62271-304:2008 standard



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