CPK-C-27

- capacitive level sensors
- for limit level sensing of liquid, bulk-solid and powder materials
- universal using (bulk solids, liquids, aggressive materials, petroleum products etc.)
- direct mounting into various containers, silos, vessels, tanks, filling inlets, reservoirs, etc.
- sensitivity and hysteresis fluently adjustable
- output types: NPN, PNP

CE

Capacitive level sensors **CPK-C-27** are designed for limit sensing of the level of liquid and bulk solids in tanks, sumps, tubes or, hoppers, silos, etc. The sensors are manufactured in several modifications of sensing electrodes (rod and rope). The electrodes can be given an insulating coating, a useful feature in case of adhesive, aggressive or conductive media sensing. Rod electrodes are also available in a version with reference tube for measuring fluids in tanks made from non-conductive material.

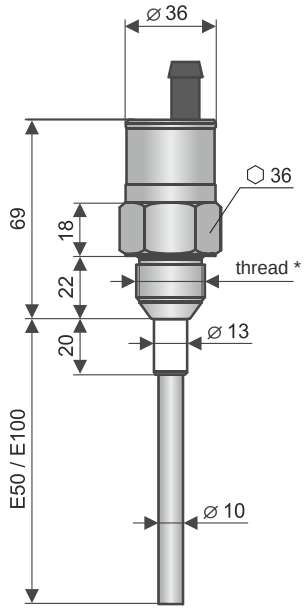
There are high temperature performance NT available and various types of process connection (metric and pipe thread, jointless connection Tri-clamp).

VARIANTS OF LEVEL SENSORS

CPK-C-27_–10	**Uncoated short bar electrode** for sensing non-adhesive bulk solids (sand, sugar) and non-conductive liquids (petroleum products, oils), horizontal mounting. Electrode length 50 mm or 100 mm.
CPK-C-27_–11	**Fully coated short bar electrode**, for sensing conductive liquids (water). Horizontal mounting into tanks and tubes. Electrode length 30 mm.
CPK-C-27_–20	**Semi-coated rod electrode** for sensing slightly adhesive bulk solids (cement, flour) and non-conductive liquids (plant oils), horizontal, slant or vertical mounting. Electrode length from 0.1 m to 1 m.
CPK-C-27_–21	**Fully coated rod electrode (FEP insulation)** for sensing conductive liquids (water solutions, water), adhesive and aggressive materials, horizontal or vertical mounting. Electrode length from 0.1 m to 1 m.
CPK-C-27_–22	**Fully coated rod electrode (PFA insulation) with enhanced resistance**, for sensing aggressive conductive liquids and materials. Horizontal or vertical mounting. Electrode length from 0.1 m ... 1 m.
CPK-C-27_–30	**Dismountable uncoated rod electrode** for sensing bulk solids and conductive or non-conductive liquids. Vertical or horizontal slant mounting. Electrode length 0.1 m ... 3 m.
CPK-C-27_–31	**Fully coated rod electrode**, for sensing aggressive conductive liquids (water, various chemicals). Vertical mounting. Electrode length from 0.1 m to 2 m.
CPK-C-27_–40	**Uncoated rope electrode and weight**, for general purpose use in deeper silos (bulk solids sensing – sand, gravel, cement) or sumps (sensing liquids). Vertical mounting. Electrode length from 1 m to 6 m.

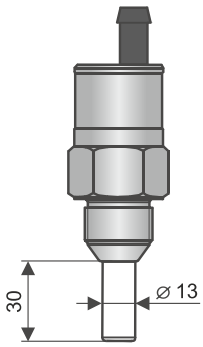
DIMENSION DRAWINGS

CPK-C-27_–10

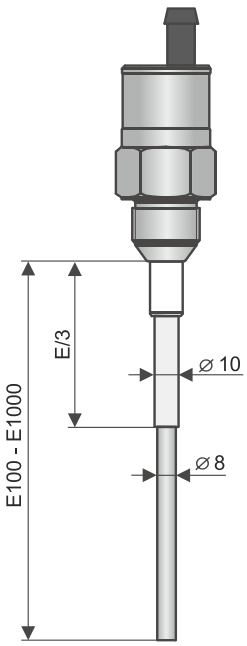


* Type of threads: G 3/4"
M27x2
M30x1,5

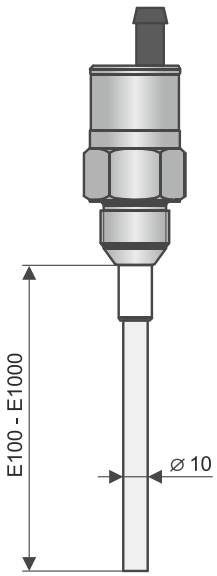
CPK-C-27_–11



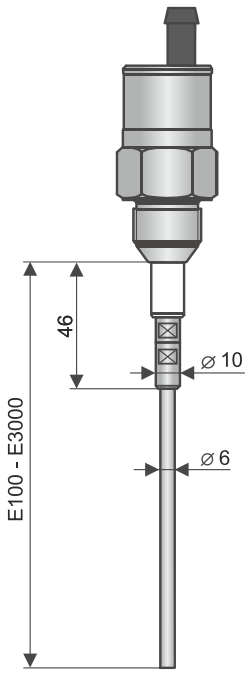
CPK-C-27_–20



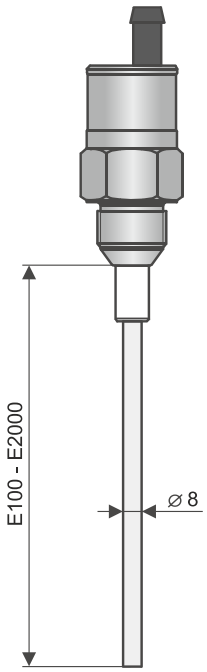
CPK-C-27_–21, 22



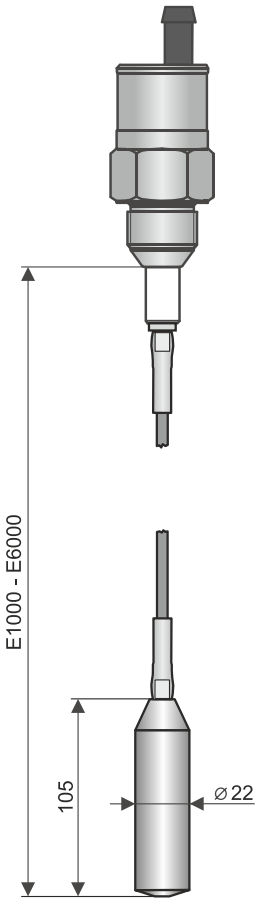
CPK-C-27_–30



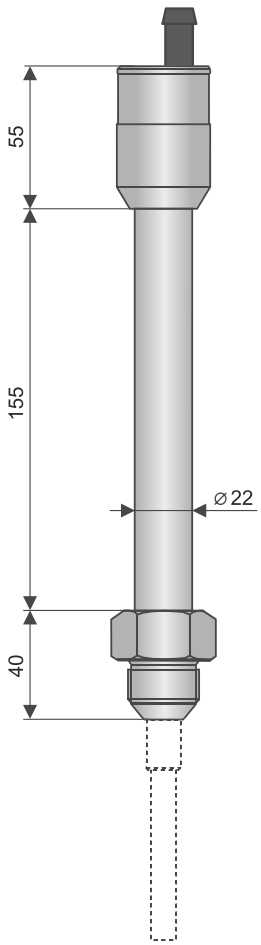
CPK-C-27_–31



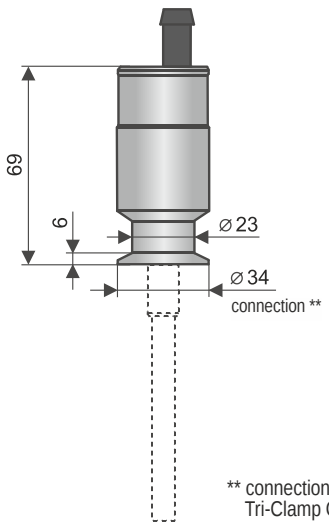
CPK-C-27_–40



High temperatures variants

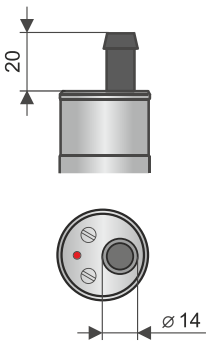


Tri-clamp

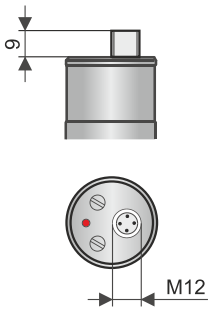


** connection:
Tri-Clamp CI34 (ø 34 mm)

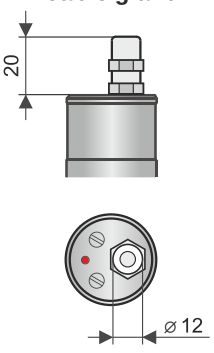
Variants "B" with cable outlets



Variants "C" with connector



Variants "D" with cable gland



Technical data

Supply voltage		7 ... 36 V DC
Current supply (state OFF / ON)		3 / 10 mA
Max. switching current (NPN, PNP)		200 mA
Residual voltage – ON state		max. 1,5 V
Delay of output signal due to electrode activation		0,2 s
Input resistance / Electric strength		1 MΩ / 1 kV AC
Coupling capacity / Electric strength		47 nF / 250 V AC
Protection class		IP 67
Cable (version with cable outlets)		PVC 3 x 0,5 mm^2 or 2 x 0,75 mm^2
Weight (excl. electrode, cable 2 m)	CPK-C-27N CPK-C-27NT	cca 0,4 kg cca 0,7 kg

Used materials

Part	Type	Standard material *
Housing	All type except Tri-Clamp Tri-Clamp	W. Nr. 1.4301 (AISI 304) W. Nr. 1.4404 (AISI 316 L)
Insulating bushing	All type	PTFE
Electrode	CPK-C-27_-10,11,20,21,22,30,31 CPK-C-27_-40	W. Nr. 1.4404 (AISI 316 L) W. Nr. 1.4401 (AISI 316)
Electrode coating	CPK-C-27_– 11 CPK-C-27N– 20, 21, 31 CPK-C-27_– 22	PTFE FEP PFA
Weight	CPK-C-27_-40	W. Nr. 1.4301 (AISI 304)

** It is always necessary to verify the chemical compatibility of the material with the measured medium. You can also choose another type of material after agreement.*

Process connection

Type	Size	Marking
Pipe thread	G 3/4"	**G**
Metric thread	M27x2	**M27**
Metric thread	M30x1,5	**M30**
Jointless connection (Tri-Clamp) (DN 20)	ø 34 mm	**CI34**

Type of output

Output
NPN (NC; NO)
PNP (PC; PO)

Working areas (EN 60079-0, EN 60079-10-1(2))

CPK-C-27N	Basic performance for non-explosive atmospheres.
CPK-C-27NT	High-temperature basic performance for non-explosive atmospheres.

Temperature and pressure resistivity

variant	temperature tm	temperature tp	temperature ta	max. operating pressure for temperature tp				
				Up to 30°C	Up to 85°C	Up to 120°C	Up to 150°C	Up to 180°C
CPK-C-27N–10, 11	-40°C ... +100°C	-25°C ... +85°C	-20°C ... +80°C	3 MPa	2 MPa	–	–	–
CPK-C-27N–20, 30	-40°C ... +300°C	-25°C ... +85°C	-20°C ... +80°C	3 MPa	2 MPa	–	–	–
CPK-C-27N–21, 22, 31, 40	-40°C ... +200°C	-25°C ... +85°C	-20°C ... +80°C	3 MPa	2 MPa	–	–	–
CPK-C-27NT–10, 11, 21, 22, 31, 40	-40°C ... +200°C	-40°C ... +200°C	-20°C ... +80°C	3 MPa	2 MPa	0,5 MPa	0,3 MPa	0,1 MPa
CPK-C-27NT–20, 30	-40°C ... +300°C	-40°C ... +200°C	-20°C ... +80°C	3 MPa	2 MPa	0,5 MPa	0,3 MPa	0,1 MPa

Note: For the correct operation of the level meter, none of the here provided temperature ranges may be exceeded (tp, tm or ta).
1) The here-mentioned temperatures are visually explain in Fig.

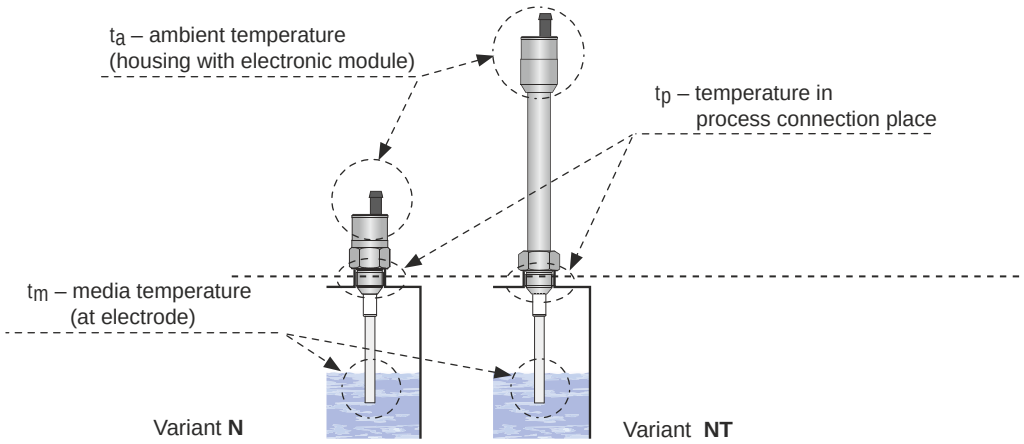


Illustration of areas for temperature measurement

ELECTRICAL CONNECTION

Sensor with NPN or PNP output is allowed to lead only by resistive or inductive lead. Positive supply voltage (+U) is connected to the brown conductor BN (1), negative (0 V) to the blue conductor BU (3) and the leads (only NPN or PNP type of output) to the black conductor BK (4). The capacity loads and low resistance loads (bulb) is evaluated by the sensor as short circuit.

For “B” and “D” variants with the fixed cable, the individual colour cores of the connecting cable are connected to the respective terminals of the related equipment (supply unit) see Fig. 1 to 2.

For “C” variant with the connector, the cable can be supplied with the sensor (length 2 or 5 m), fitted with the pressed connector socket or dismountable connector socket without the cable (see accessories), the connector is not part of the sensor. In this case the cable is connected to the inside pins of the socket according to Fig. 3.

The sensor with related equipment is interconnected by a suitable three-core cable. If using a dismountable connector socket, the outside diameter of the cable is a maximum of 6 mm.

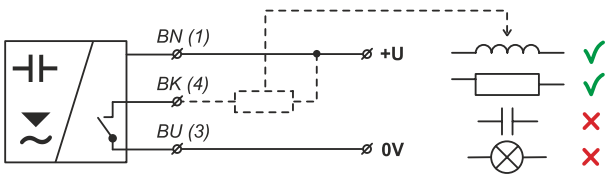


Fig. 1: NPN output type sensor connection

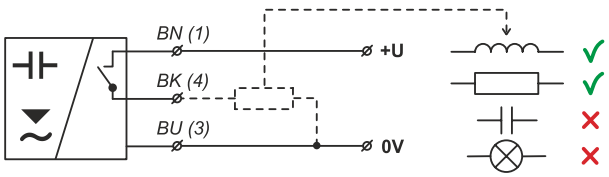


Fig. 2: PNP output type sensor connection

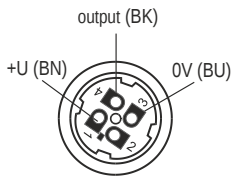


Fig. 3: Inside of the connector socket

Legend:

(1,...) – numbers of terminals inside the connector socket
BK – Black
BN – Brown
BU – Blue

RANGE OF APPLICATION AND INSTALLATION OF INDIVIDUAL VARIANTS

CPK-C-27_–10
Produced in two versions: with 50 mm or 100 mm electrode. The shorter version (E50) is suitable for clean non-conductive liquids level sensing (oils, diesel, petrol, etc.). The longer version (E100) is designed for non-adhesive bulk solids or non-adhesive powder materials (plastic granulates, sand, sugar, grains, detergents, etc.) and other slightly impure, non-conductive liquids (lubricants, plant oils). The sensor is specified to be mounted directly into a vessel or storage tank wall (best by horizontal position) by means of welding flanges or stainless steel fixing nuts. In case of level sensing of low-permittivity media in non-metal storage tanks, we recommend mounting the sensor on an auxiliary metal-plate electrode with min. area of 200 cm^2.

CPK-C-27_–11
Specified for level sensing of conductive liquids (water and water solutions). It can be used to identify the boundary between fluids with di ering permittivity (e.g. water – oil). The sensor is mounted directly into the side wall of the vessel or in a pipe (horizontal position) by means of a standard steel or stainless steel welding flange.

CPK-C-27_–20
Designed for limit level detection of bulk solids with low specific weight and permittivity (cement, hydrated lime, flour), and for materials expected to have changing properties (fly ash, sawdust, feed mixtures, etc.). It is possible to use it for sensing non-conductive liquids containing a small amount of water (up to 2%) or other impurities (plant oils, liquid propane, etc.). The sensor is mounted directly into the wall of a vessel or storage tank using steel welding flanges or fixing nuts horizontally, slanted from the side or vertically. It is recommended to mount a sensor with an electrode longer than 300 mm only in the vertical position. Hollow spaces should be minimized between the electrode and the wall where the sensed material can accumulate (see application notes). In non-metal storage tanks, we recommend mounting the sensor on an auxiliary metal-plate electrode with min. area of 400 cm^2.

CPK-C-27_–21, 22
Specified for conductive liquids level sensing (water, water solutions, mud, etc.). It reacts to partial or full immersion of the electrode (depending on the adjusted sensitivity). The lower the sensitivity, the higher the sensor's resistance to contaminants and clinging remnants of material. The sensor with electrode length of up to 200mm can be desensitized to complete water immersion, so it can be operated in the horizontal position. The sensor can be operated in the vertical position with any length up to 1m. The sensor is mounted directly into the wall of the tank in horizontal or vertical position by applying a steel or stainless steel welding flange. For variant "22", the material PFA is used to insulate the electrode.

CPK-C-27_–30
Designed for sensing conductive and non-conductive liquids and bulk solids. It is not recommended to install the sensor into closed vessels (storage tanks) where intensive water vapour condensation occurs. The sensor reacts to electrically conductive liquids just by touch of the end of electrode. To react to a non-conductive liquid (bulk solid), it is necessary to have 5 ÷ 20% immersion of the electrode according to the sensor's adjusted sensitivity and permittivity of the sensed material. The sensor is mounted directly into a tank, hopper or sump in slant or vertical position by means of welding flange or stainless steel fixing nut. In non-metal storage tanks, we recommend mounting the sensor on an auxiliary metal-plate electrode with min. area of 500 cm^2.

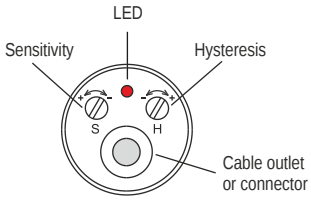
CPK-C-27_–31
Designed for limit level detection of conductive liquids (water and solutions of various chemicals). It is possible to place the sensor electrode into closed vessels (storage tanks), open canals and sumps. The sensor reacts to the conductive fluid level after 2 ÷ 20% immersion of the electrode based on the sensor's set sensitivity. The sensor is mounted vertically directly into a vessel, tank or open (concrete, plastic) sumps by means of welding flanges or fixing nuts. When installing the sensor into open sumps, it is necessary to secure conductive connection of the sensor housing with the sensed liquid. It is possible to use a metal structure, armouring or another auxiliary electrode. If you must sense an aggressive medium in a closed plastic container, contact the manufacturer.

CPK-C-27_–40
For sensing conductive and non-conductive liquids and bulk solids at greater depths (sewerage sumps, shafts, wells, cement storage tanks, sand, gravel, etc.). It is not appropriate to place the sensor electrode into closed containers (storage tanks) where intensive condensation of water vapour occurs. The sensor reacts to electrically conductive liquids just by touch of the end of electrode. To react to non-conductive liquid or bulk solid, a 5 ÷ 20% immersion into the material is necessary based on the sensitivity set on the sensor and the permittivity of the sensed material. The sensor is mounted vertically directly into the wall of a storage tank or sump. For open (concrete) sumps, it can be mounted on an auxiliary metal structure conductively connected with the sensed material. For mounting, you can use supplied welding flanges or fixing nuts.

SETTINGS

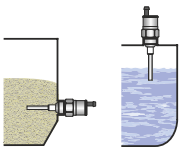
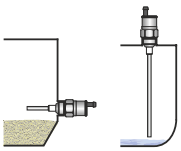
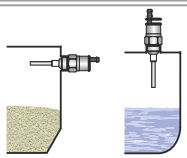
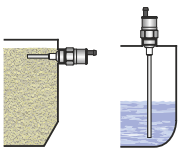
The sensor is factory adjusted for basic sensitivity. The sensitivity is set by trimmer located under the left cover screw on the rear side. Clockwise turning makes the sensitivity lower, reverse direction turning makes the sensitivity higher. The hysteresis is set by trimmer located under the right cover screw. Clockwise turning makes the hysteresis higher, reverse direction turning makes it lower. The lower the hysteresis is, the higher sensitivity is possible to obtain, but the resistance against various disturbances get worse.

For detailed information please read at the instructions manual.



Top view of level sensor

FUNCTION AND STATUS INDICATION

	Level state	Type of output	Output state	LED
Minimum level sensing		CPK-C-27N_–_ _– _ –**NO**–_ CPK-C-27N_–_ _– _ –**PO**–_	CLOSED	(Shine)
		CPK-C-27N_–_ _– _ –**NO**–_ CPK-C-27N_–_ _– _ –**PO**–_	OPEN	(Dark)
Maximum level sensing		CPK-C-27N_–_ _– _ –**NC**–_ CPK-C-27N_–_ _– _ –**PC**–_	CLOSED	(Shine)
		CPK-C-27N_–_ _– _ –**NC**–_ CPK-C-27N_–_ _– _ –**PC**–_	OPEN	(Dark)

ORDER CODE

CPK-C-27 □□ – □□ – □ – □□ – □ – **E** □□ – **K** □

performance:
N : normal
NT : high temperature

type and performance of electrode:
10 : short bar, uncoated, lengths 50 or 100 mm
11 : short bar, fully coated, fixed length 30 mm
20 : rod, partly coated, lengths 0.1 ... 1 m
21 : rod, coated (FEP), length 0.1 ... 1 m
22 : rod, coated (PFA), length 0.1 ... 1 m
30 : rod, dismountable uncoated, length 0,1 ... 3 m
31 : rod, coated (FEP), length 0,1 ... 2 m
40 : rope with weight, uncoated, length 1 ... 6 m

connection method:
B : cable outlet (+ cable length)
C : connector (socket not included with sensor, recommended type - see accessories.)
D : cable gland (+ cable length)

type of output:
N : NPN (open collector)
P : PNP (open collector

output state at non activated electrode:
O : open
C : closed

process connection:
G : pipe thread G 3/4"
M27 : metric thread M 27x2
M30 : metric thread M 30x1,5
CI34 : Tri-clamp (ø 34 mm)

electrode length in [mm]

cable length in [m]

CORRECT SPECIFICATION EXAMPLES

CPK-C-27N–10–B–NO–M27–E100–K5

(**N**) Normal performance; (**10**) Uncoated bar electrode; (**B**) Cable outlet with 5 m length cable; (**NO**) Output type NPN with open state at non-activated electrode; (**M27**) Metric thread M27x2 process connection; (**E100**) Electrode length 100 mm

CPK-C-27NT–21–C–PC–G–E580

(**NT**) High temperature performance; (**21**) Fully coated rod electrode (FEP); (**C**) Connector; (**PC**) Output type NPN with closed state at non-activated electrode; (**G**) Pipe thread G3/4" process connection; (**E580**) Electrode length 580 mm

ACCESSORIES

standard - included in the level sensor price

- 1 pcs. seal (asbestos free) *
- 1 pcs. screwdriver for adjustment (each 5 pcs.)

optional – for a surcharge

- Extra cables (over the standard length 2 m)
- Connector socket (type ELWIKA or ELKA)
- Normal steel welding flange ON –27x2
- Stainless steel welding flange NN–G3/4“
- Stainless steel fixing nut UM–27x2
- Other seals (PTFE, Al, etc.)
- Auxiliary plate electrode PDE-27

SAFETY, PROTECTIONS AND COMPATIBILITY

The level sensor is equipped with protection against electric shock on the electrode, reverse polarity, output current overload, short circuit and against current overload on output.
Protection against dangerous contact is provided by low safety voltage according to EN 33 2000- 4- 41. Electromagnetic compatibility is provided by conformity with standards EN 55022 / B, EN 61326-1, EN 61000-4-2 to -6.

A declaration of conformity was issued for this device in the wording of Act No. 90/2016 Coll., as amended. Supplied electrical equipment matches the requirements of valid European directives for safety and electromagnetic compatibility.