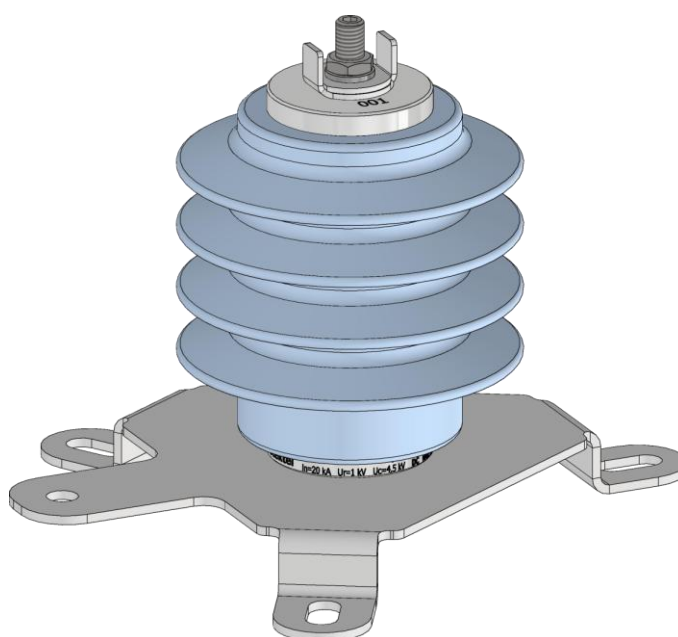


INSTALLATION AND OPERATING MANUAL FOR PROXAR-IVN DC TYPE SURGE ARRESTERS



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Instruction No PROXAR-IVN DC/IMIE/07/EN edition 01.2025

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1. GENERAL INFORMATION

Dear customer, thank you for choosing our product - the surge arrester type PROXAR-IVN DC. Please read the operating manual before starting the installation. The manufacturer assumes no responsibility for incorrect installation of the product.

This manual does not cover all contingencies relating to the installation and operation manual for the arresters. If problems arise that are not covered in this manual, please contact the manufacturer. The described type of surge arresters are designed to be installed by qualified personnel with the required practice in the field of safety devices of high and medium voltage. These guidelines are drafted for such personnel and are not a substitute for proper training and experience in the safe operation of this type of devices.

WARNING

Any work on the surge arresters should be carried out on disconnected and grounded device. Follow all the rules and principles of international and national safety and health at work.

2. DESCRIPTION OF THE PRODUCT

Surge arresters type PROXAR-IVN DC are single-phase devices, designed to work both outdoors and indoors. The role of surge arresters is protection against over voltage by bringing it to the ground and reducing it. This allows other devices connected to the network are safely protected from the effects of each type of overvoltage. Generally, arresters are constructed from a stack of variable resistance elements – i.e. zinc oxide (ZnO) resistors, placed in a durable mechanical structure made of an aramid composite terminated with electrodes and completely overmolded with an electrically insulating material, i.e. silicone. Surge arrester PROXAR-IVN DC can be supplied with the following equipment:

Surge arrester PROXAR-IVN DC can be supplied with the following equipment:

- Line terminal
 - Base
 - Insulating base
 - Ground terminal
- Optional equipment:
- Insulating bracket
 - Disconnecter

3. ELECTRICAL DETAILS

Arrester classification according to EN 50526-1: 2012

Line discharge class according to IEC 60099-4: 2009

System voltage (U_{DC})

Continuous operating voltage (U_{DC})

Nominal discharge current I_n 8/20 μs

High current impulse I_{hc} 4/10 μs

Long duration current impulse resistance

Long duration impulse current at operating duty test

Energy absorption capability, 2 impulses

Energy absorption capability in operating duty test

Short circuit rating

Service conditions:

- temperature
- altitude up to

Mechanical strength:

- SLL specified long-term load
- SSL specified short-term load
- torque
- tensile

Mechanical shock resistance and vibration:

- according to PN-EN 60068-2-6:2008
- according to PN-EN 60068-2-27:2009
- according to PN-EN 661373:2011

* structure of surge arrester is resistant on 50 kA short circuit current according to Report no 8060/NBR/10 IEL

**) for other values please contact the manufacturer

DC-B

4

0.6 - 3 kV

1.0 – 4.7 kV

20 kA

200 kA

1350 A

2000 μs

1000 A

2800 μs

1600 A

2800 μs

13.5 kJ/kV of U_c dc

10,5 kJ.kV of U_c dc

40 kA dc for 0.2s*

-40 °C do +60 °C**

1000 m**

1200 Nm

1800 Nm

650 Nm

20 kN

3 g 10 ÷ 500 Hz

30 g

category 1, class B

The nominal parameters are summarized in Table 1 below.

Table 1. **ELECTRICAL DATA**

TYPE PROXAR-IVN DC	Continuous operating voltage U _c (DC) kV	Residual voltage in kV pk at a specified impulse current								
		Wave 1/... μs (pk)		Wave 8/20 μs (pk)				Wave 30/60 μs (pk)		
		10kA	20kA	5kA	10kA	20kA	40kA	500A	1kA	2kA
1.0	1.0	2.65	2.97	2.30	2.42	2.60	2.87	1.99	2.03	2.10
1.5	1.5	4.12	4.57	3.53	3.74	4.01	4.39	3.06	3.15	3.24
2.0	2.0	5.37	5.95	4.63	4.90	5.28	5.80	3.98	4.06	4.23
2.5	2.5	6.77	7.51	5.81	6.14	6.59	7.22	5.03	5.18	5.33
3.0	3.0	8.06	8.92	6.95	7.38	7.91	8.65	5.99	6.12	6.37
4.2	4.2	11.10	12.10	9.40	10.00	10.90	12.00	8.10	8.40	8.70
4.5	4.5	12.01	13.09	10.17	10.82	11.80	12.98	8.76	9.08	9.41
4.7	4.7	12.52	13.64	10.60	11.28	12.30	13.53	9.13	9.47	9.81

Note: It is possible to make PROXAR-IVN DC surge arrester with a different range of continuous operating voltage.

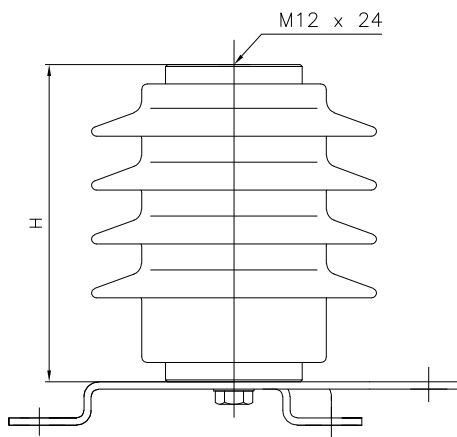


Fig.1

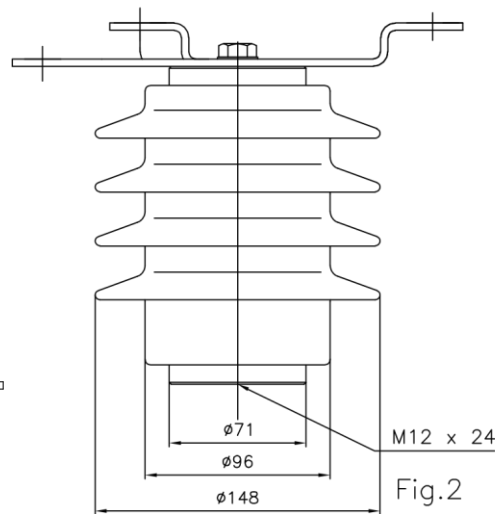


Fig.2

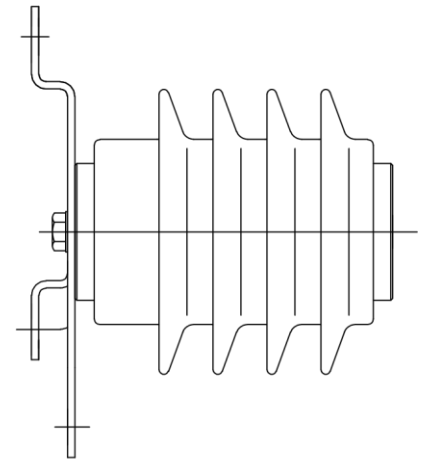


Fig.3

In the above figures show the installation of the surge arresters. Drawings No 1 presents vertical system of assembling. Drawings No 2 presents reverse system of assembling surge arrester. Drawings No 3 presents horizontal system of assembling. Below the figures are presenting different options line and earth accessories available for use in surge arrester type PROXAR-IVN DC.

For horizontal working configuration of surge arresters is this same option like for vertical working.

Table 2. **TECHNICAL DATA FOR HOUSING**

Type	External insulation		Minimal distances	H	Creepage distance	Flash-over distance	Weight
PROXAR-IVN DC	DC voltage wet (60s)	1.2/50 μs dry	Distance between arrester and the nearest return path structure „a”				
kV	kV	kV	mm	mm	mm	mm	kg
1.0	29.5	75	100	165	318	165	2.3
1.5			100				2.5
2.0			100				2.7
2.5			100				3.0
3.0			100				3.2
4.2			100				3.5
4.5			100				3.6
4.7			100				3.6

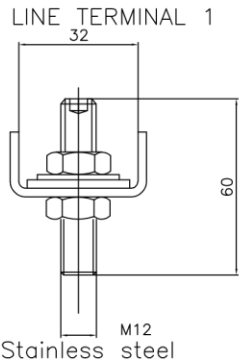
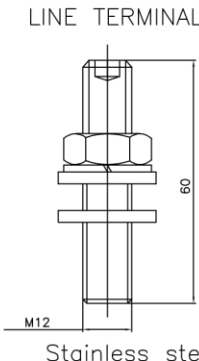
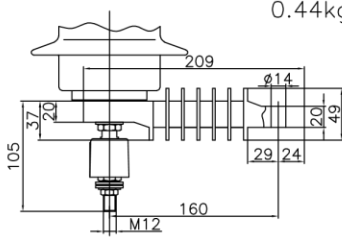
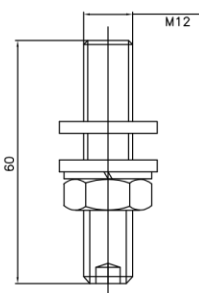
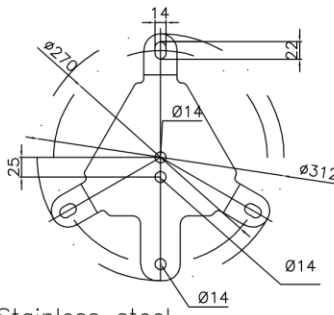
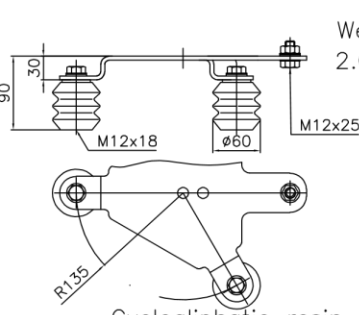
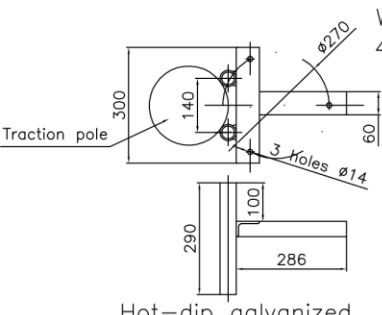
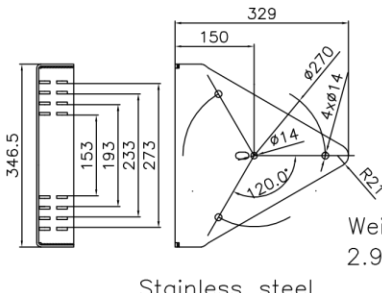
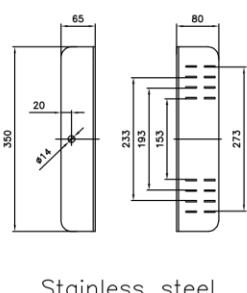
LINE ACCESSORIES	LINE TERMINAL 1  Weight: 0.23kg Stainless steel	LINE TERMINAL 6  Weight: 0.069kg Stainless steel	
EARTH ACCESSORIES	INSULATING BRACKET WITH DISCONNECTOR 1  Weight: 0.44kg Stainless steel	EARTH TERMINAL 6  Weight: 0.069kg Stainless steel	
	MOUNTING BASE 1  Weight: 1.18kg Stainless steel	INSULATING BASE 2  Weight: 2.06kg Cycloaliphatic resin	MOUNTING BASE 3 (for traction pole)  Weight: 4.54kg Hot-dip galvanized
	MOUNTING BASE 4 (for traction pole)  Weight: 2.97kg Stainless steel	MOUNTING BASE 5 (for traction pole)  Weight: 1.47kg Stainless steel	

Fig.4. Equipment for surge arresters type PROXAR-IVN DC

4. TRANSPORTATION, COLLECTION AND STORAGE

The surge arresters are supplied in strong, individual cardboard packages, which are packed in collective cartons or packed on pallets. The line, grounding and base or other accessories are packed separately.

Upon receipt, check number and completeness arresters. Must be stored in a dry and ventilated place, free from corrosive agents. Please observe the instructions on the cartons. Cartons can be bunk on top of another to a maximum of 6 layers. Surge arresters delivered on pallets should not be stacked.

5. INSTALLATION

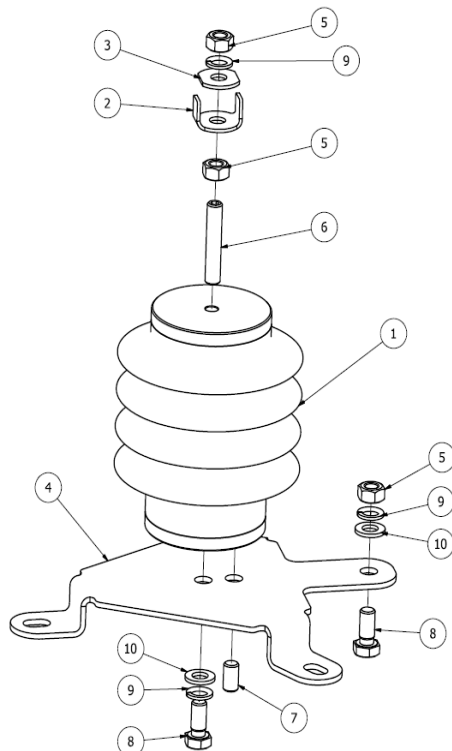


Fig. 5. Correctly mounting of surge arrester with line terminal

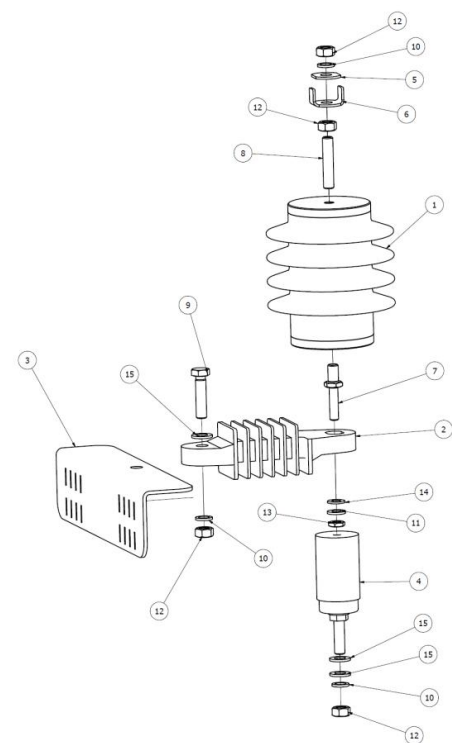


Fig. 6 Correctly mounting of surge arrester with disconnector

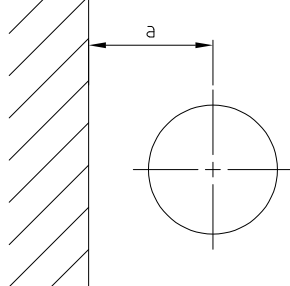


Fig. 7. Minimal mounting distances of surge arresters.

If damage was found during unloading or unpacking please do not hesitate to contact with the manufacturer.

Before final installation, check that the product is correct (type designation, Ur - rated voltage, Uc - continuous operating voltage, type of voltage system DC – direct current, In – nominal discharge current, etc.). If in doubt about the appropriate model, please consult with the manufacturer's technical department (+48 29 752 57 84).

The method of assembling and tightening torques of screw connections are shown in Figure "Figure mounting surge arresters type PROXAR-IVN DC", which is always attached to each batch of surge arresters. For screw connections used to be typical assembly tools in the form of keys and sockets using the torque wrench.

The installation method and tightening torques of screw connections are shown in the drawings "Correct installation of a surge arrester with a line terminal" and "Correct installation of a surge arrester with a disconnector". Figure No. 5 shows an example of installation of a surge arrester equipped with a mounting base and a line terminal. When installing the line terminal, first tighten the press screw item 6 (using a 6 mm Allen key) to a torque of 25 Nm, and then install elements items 2, 3, 5, 9. The tightening torque of the nuts item 5 (19 mm key size) of the line terminal is 50 Nm. Start the installation of the mounting base by screwing the M12 press screw item 7 into the lower electrode of the arrester (using a 6 mm Allen key) to a torque of 30 Nm, and then tighten the mounting base using the M12x25 screw, item 8 (use a 19 mm socket wrench) - tightening torque 50 Nm, previously using washers, items 9 and 10. If the surge arrester is additionally equipped with an insulating base, 3 insulators should be mounted to the mounting base using 3 pcs. M12x20 screws and washers (use a 19 mm socket wrench) - tightening torque 50 Nm. Figure no. 6 shows an example of mounting a surge arrester equipped with a disconnector. First, screw the M12 pressure screw into the upper hole with a torque of 25 Nm, item 8. Mount items 5; 6; 10; 12. Tighten the nut item 12 in this assembly with a torque of 50 Nm. (Carry out the nut assembly operation after connecting the wire from the surge arrester to the protective object). Then screw the screw item 7 into the lower hole of the electrode with a torque of 25 Nm. Then mount the surge arrester on the insulating bracket item 2, then slide the washer item 14 and 11 on to the M12 screw and tighten the nut item 13 with a torque of 30 Nm. Screw the disconnector item 4 to the protruding M12 screw with a torque of 20 Nm. In the lower part of the disconnector there is a screw with an M12 thread, on this screw we attach the washer item 15, the flexible cable with an eyelet connecting the disconnector to the return path structure, the washer item 15 and 10 and tighten it with the nut item 12 with a torque of 20 Nm. On the device assembled in this way, after mounting the mounting base item 3 on the pole structure (for example using the MTMN-G402 mounting tape), it is possible to finally mount the surge arrester with the insulating bracket on the base item 3. To mount the insulating bracket item 2 on the base item 3, the M12 screw item 9 with the washer item 15; 10 and the nut item 12 were used - tighten to a torque of 30 Nm. For the arrester with the disconnector mounted in this way, connect the flexible cable connecting the disconnector to the return path structure. Table 2 shows the recommended minimum distances that should be maintained when mounting the arresters (see Fig. 7). These are the minimum distances between the axes of the surge arresters and between the nearest return path structure.

Attention:

Disconnector with return path structure connect with the line which could fly away after activation the disconnector and made permanent break between the damaged surge arrester and return path structure connected with the above-mentioned connection. It is recommended that the line is ending with ring tip.

The maximum bending moment for the insulating bracket is 50 Nm.

6. ELECTRICAL CONNECTIONS

It is recommended to install arresters as close as possible in relation to the protected equipment, moreover, observe the rules for the shortest possible cable connections and return path connectors for better protection of surge arresters. Connections not need be insulated unless the infrastructure requires the use of insulation. See Table 2, where they are given the minimum distance surge arrester from the return path structure.

First of all, make sure to perform a reliable return path connection and then connect the surge arrester to the line. It is required that all installation works were carried out in a non-voltage protected system. The minimum section of the line conductor should be: Cu – 95 mm²; Al – 150 mm².

According to earth accessories (please see fig. 4), do not connect the surge arrester disconnector by metal banding tape, this connection should be made by flexible connection such as copper cable, which allows you to reject the disconnector terminal during its trip.

The PROXAR-IVN DC surge arrester is a "symmetrical" device. Accordingly, it is possible to swap the "+" and "-" poles on the terminals without affecting the quality and reliability of the surge arrester.

In the case when the arrester is installed under tension, must be strictly followed safety guidelines for this type of work.

NOTE: Improper installation will void the warranty on the product.

7. DISASSEMBLY

When dismantling the arrester, make sure that the voltage supplied to the arrester terminal has been effectively disconnected. The line terminal must be disconnected from the line cable first. It is required that all dismantling work is performed in a voltage-free state of the protected system. During dismantling, the same safety rules as when installing the arrester must be observed.

8. OPERATION

Surge arresters type PROXAR-IVN DC does not require any particular maintenance. Sufficient periodic inspection, under the inspection of other devices operating in the installation of arresters.

PROXAR surge arresters do not require cleaning of the external surface of the insulating housing during the entire period of operation. The insulating surface may appear dirty, but this does not affect the operation of the surge arrester. However, if the surge arrester were to be washed, then in addition to the usual precautions, the following should be taken into account:

- due to the soft structure of silicone insulation, do not use high-pressure water, which may damage the surface of the insulator
- use "soft" clean water without added detergents

9. IDENTIFICATION OF THE RATING PLATE

The nameplate is shown below in Figure 8. The description of the nominal data of the surge arrester is made by microprinting on the lower electrode:

1. Year of production
2. Serial number
3. The manufacturer's name
4. Product name
5. Basic rated parameters
6. Rated voltage U_r and the continuous operating voltage U_c in [kV]

A – nominal voltage for example 4.5

B – continuous operating voltage for example 4.5

C – intended for DC system **DC**

Top electrode

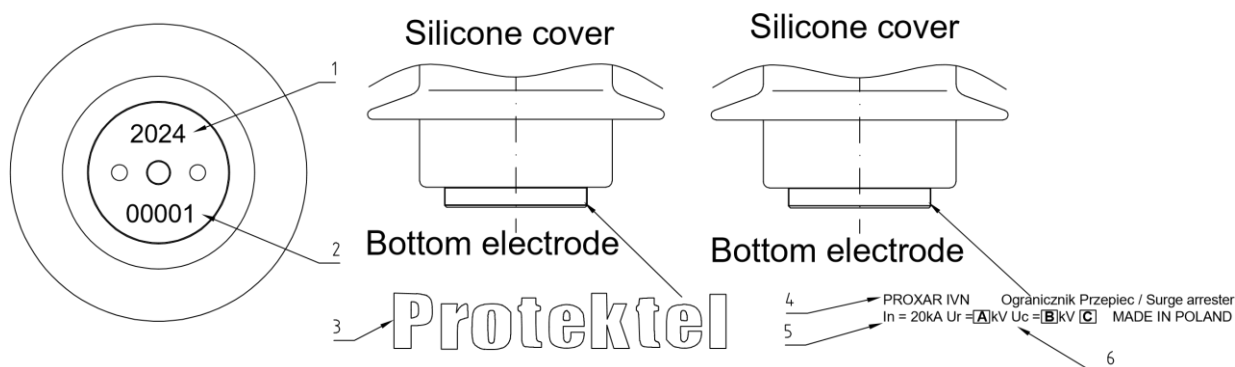


Figure 8. Nameplate for surge arrester type PROXAR-IVN DC

10. DISPOSAL OF WASTE PRODUCT - SCRAPPING

Surge arrester type PROXAR-IVN DC are environmentally friendly, but must be disposed of in accordance with local requirements in an environmentally friendly manner. Materials as far as possible should be recycled.

List of materials included in the arrester:

1. Silicone rubber
2. Aluminum
3. Ceramics - varistors based on zinc oxide
4. Aramide composite
5. Steel

The materials used for the production of the surge arresters does not pose a threat to human life and health.

11. AFTER-SALES SERVICE

In case the product is not delivered in good condition or would cause problems with the installation or during operation, please contact:

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ATTENTION

Note: The manufacturer reserves the right to change technical data or designee without prior notice.

PROXAR® is a registered trademark of the latest family of surge arresters made by Protektel