

INSTALLATION AND OPERATING INSTRUCTION FOR SURGE ARRESTERS TYPE PROXAR IN AC



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1. GENERAL INFORMATION

Dear customer, thank you for choosing our product - the surge arrester type PROXAR-IN AC. Please read the operating instructions 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 instruction of arresters. If any problems that are not covered in this manual occurs, please contact with the manufacturer. The described type of surge arresters are designed to be installed by qualified personnel with the practice in the field of safety devices of high and medium voltage. This manual is prepared for such personnel and it is not a substitute for proper training and experience in installing 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-IN AC are single-phase devices, designed to work in the outdoor as well as indoor. The role of surge arresters is overvoltage protection by bringing it to the ground and reduction it. This allows other devices connected to the network are safely protected from the effects of each type of overvoltage.

The main part of a surge arrester is a stack of varistors made of metal oxides with an additive of other metal oxides which are characterized by high nonlinearity of voltage-current characteristic and stability of electric parameters during long standing operation at operating voltage.

The stack of varistors is placed in an insulating cage and closed in it from both sides with electrodes made of aluminium. The silicone housing is made with direct injection moulding and vulcanising on the surge arrester interior, which guarantees perfect tightness and mitigates the results of the short circuit current under emergency conditions – no chipping of the construction elements to the environment. Composite supporting construction of the surge arrester ensures appropriate mechanical strength.

3. TECHNICAL DATA

Arrester classification according to IEC 60099-4: 2015	DH (Distribution High)
Line discharge class according to IEC 60099-4: 2009	1
System voltage (Us)	3.6 – 36 kV
Rated voltage (Ur)	1.2 – 48 kV
Nominal discharge current I_n 8/20 μ s	10 kA
High current impulse I_{hc} 4/10 μ s	100 kA
Rated repetitive charge transfer rating Q_{rs}	0.4 C
Rated thermal charge Q_{th}	1.1 C
Long duration current impulse, 2000 μ s	325 A
Short circuit rating	31.5 kA/0.2s
Maximal level of partial discharges	≤ 5 pC
Service conditions:	
- ambient temperature	-45 °C do +60 °C*
- altitude up to	1000 m*
- frequency	48 – 62 Hz
Mechanical data:	
- specified long-term load (SLL)	210 Nm
- specified short-term load (SSL)	336 Nm
- torsional strength	50 Nm

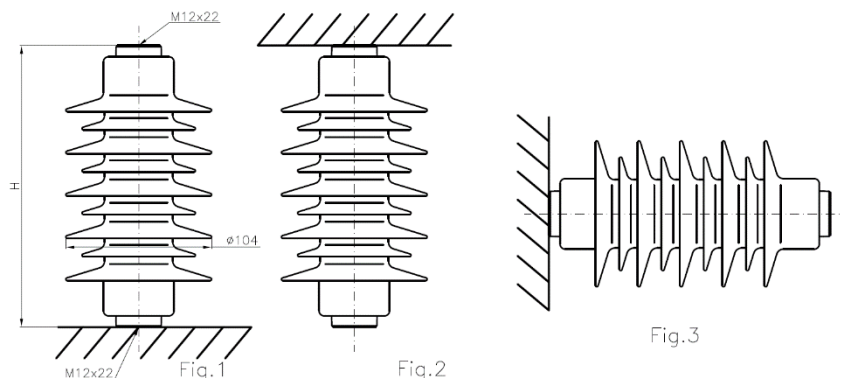
*) for higher parameters please contact with manufacturer

The nominal parameters are summarized in Table 1 below.

Table 1

TYPE PROXAR-IN AC	Rated voltage Ur kV	Maximum operating voltage Uc kV	Residual voltage in [kV] pk at a specified impulse current							
			Wave 1/... µs	Wave 8/20 µs				Wave 30/60 µs		
			10kA kV	2.5kA kV	5kA kV	10kA kV	20kA kV	125A kV	250A kV	500A kV
1.2	1.2	1.0	3,55	2.8	2.9	3.2	3.5	2.3	2.3	2.4
2.2	2.2	1.8	6,49	5.0	5.4	5.9	6.5	4.2	4.3	4.5
2.5	2.5	2.0	7,38	5.7	6.1	6.8	7.4	4.7	4.9	5.1
3.0	3	2.4	8,85	6.9	7.4	8.1	8.8	5.7	5.9	6.1
4.0	4	3.2	11,68	9.2	9.8	10.8	11.8	7.6	7.8	8.2
5.0	5	4.0	14,60	11.5	12.3	13.5	14.7	9.5	9.8	10.2
6.0	6	4.8	17,52	13.8	14.7	16.2	17.7	11.4	11.7	12.2
7.0	7	5.6	20,44	16.1	17.2	18.9	20.6	13.3	13.7	14.3
8.0	8	6.4	23,29	18.4	19.7	21.6	23.5	15.2	15.7	16.3
9.0	9	7.2	26,20	20.7	22.1	24.3	26.5	17.1	17.6	18.3
10.0	10	8.0	29,11	23.0	24.6	27.0	29.4	19.0	19.6	20.4
11.0	11	8.8	32,02	25.2	27.0	29.7	32.4	20.8	21.5	22.4
12.0	12	9.6	34,93	27.5	29.5	32.4	35.3	22.7	23.5	24.5
13.0	13	10.4	37,84	29.8	31.9	35.1	38.3	24.6	25.4	26.5
14.0	14	11.2	40,75	32.1	34.4	37.8	41.2	26.5	27.4	28.5
15.0	15	12.0	43,67	34.4	36.9	40.5	44.1	28.4	29.4	30.6
16.0	16	12.8	46,58	36.7	39.3	43.2	47.1	30.3	31.3	32.6
17.0	17	13.6	49,49	39.0	41.8	45.9	50.0	32.2	33.3	34.7
18.0	18	14.4	52,40	41.3	44.2	48.6	53.0	34.1	35.2	36.7
19.0	19	15.2	55,31	43.6	46.7	51.3	55.9	36.0	37.2	38.7
20.0	20	16.0	58,22	45.9	49.1	54.0	58.9	37.9	39.2	40.8
21.0	21	16.8	61,13	48.2	51.6	56.7	61.8	39.8	41.1	42.8
22.0	22	17.6	64,04	50.5	54.1	59.4	64.7	41.7	43.1	44.8
23.0	23	18.4	66,95	52.8	56.5	62.1	67.7	43.6	45.0	46.9
24.0	24	19.2	69,86	55.1	59.0	64.8	70.6	45.5	47.0	48.9
25.0	25	20.0	72,78	57.4	61.4	67.5	73.6	47.4	48.9	51.0
26.0	26	20.8	75,69	59.7	63.9	70.2	76.5	49.3	50.9	53.0
27.0	27	21.6	78,60	62.0	66.3	72.9	79.5	51.2	52.9	55.0
28.0	28	22.4	81,51	64.3	68.8	75.6	82.4	53.1	54.8	57.1
29.0	29	23.2	84,42	66.6	71.3	78.3	85.3	55.0	56.8	59.1
30.0	30	24.0	87,33	68.9	73.7	81.0	88.3	56.9	58.7	61.2
33.0	33	26.4	96,06	75.7	81.1	89.1	97.1	62.5	64.6	67.3
36.0	36	28.8	104,80	82.6	88.5	97.2	105.9	68.2	70.5	73.4
39.0	39	31.2	113,53	89.5	95.8	105.3	114.8	73.9	76.3	79.5
42.0	42	33.6	122,26	96.4	103.2	113.4	123.6	79.6	82.2	85.6
44.0	44	35.2	128,10	101.0	108,1	118.8	129.4	83.4	86.1	89.7
45.0	45	36.0	131,00	103.3	110.6	121.5	132.4	85.3	88.1	91.7
48.0	48	38.4	139,73	110.2	117.9	129.6	141.2	91.0	94.0	97.8

There is a possibility of manufacturing surge arresters for different voltages that are not listed in the table.



Dimension drawings surge arresters type PROXAR-IN AC

Tabela 2 Technical Housing Data

Type PROXAR-IN AC	Insulation withstand voltage of housing		Minimal distances		Height H	Creepage distance	Flash-over distance	Housing number	Weight
	50 Hz wet (60s)	1.2/50 μ s dry	Distance between arresters „b”	Distance between arrester and the nearest grounded structure „a”					
	kV	kV	mm	mm					
1.2	10	21	105	58	80	127	100	01	0.27
2.2			105	58					0.29
2.5			105	58					0.30
3.0			105	58					0.31
4.0	17	35	105	58	96	143	113	02	0.47
5.0			105	59					0.48
6.0			105	68					0.49
7.0	26	54	105	77	118	242	137	03	0.62
8.0			105	85					0.63
9.0			110	94					0.64
10.0	34	70	119	103	137	338	157	04	0.72
11.0			127	111					0.73
12.0			136	120					0.74
13.0	42	88	145	129	158	436	181	05	0.92
14.0			153	137					0.93
15.0			162	146					0.94
16.0	60	125	171	155	198	555	217	06	1.19
17.0			179	163					1.20
18.0			188	172					1.21
19.0			197	181					1.22
20.0			205	189					1.23
21.0			214	198					1.24
22.0			223	207					1.25
23.0	84	174	231	215	257	767	277	07	1.61
24.0			240	224					1.62
25.0			249	233					1.63
26.0			257	241					1.64
27.0			266	250					1.65
28.0			275	259					1.66
29.0			283	267					1.67
30.0	292	276	1.68						
33.0	105	218	318	302	308	972	331	08	2.00
36.0			344	328					2.04
39.0	130	270	370	354	368	1187	391	09	2.47
42.0			396	380					2.50
44.0			413	397					2.52
45.0			422	406					2.53
48.0			448	432					2.56

Note: It is possible to make a surge arrester in a different housing than the catalog version.

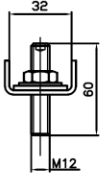
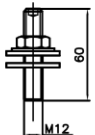
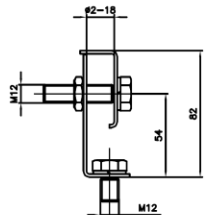
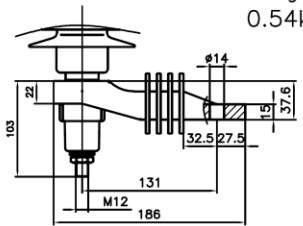
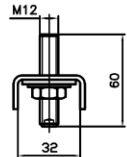
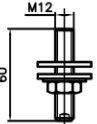
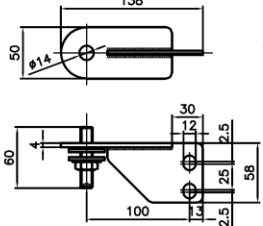
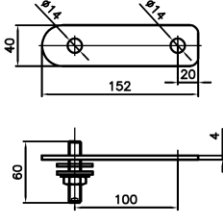
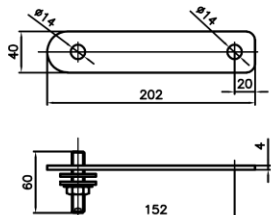
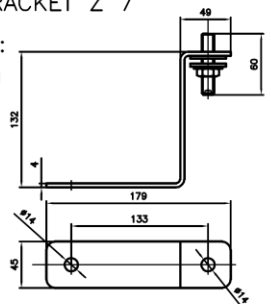
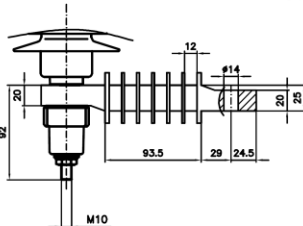
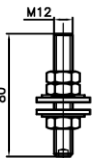
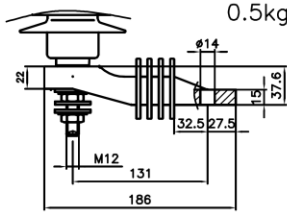
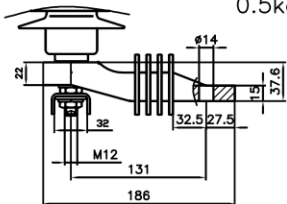
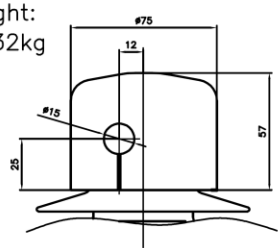
<p>LINE ACCESSORIES</p> <p>LINE TERMINAL 1</p> <p>Weight: 0.093kg</p>  <p>Stainless steel</p>	<p>LINE TERMINAL 2</p> <p>Weight: 0.063kg</p>  <p>Stainless steel</p>	<p>LINE TERMINAL 3</p> <p>Weight: 0.15kg</p>  <p>Stainless steel</p>
<p>EARTH ACCESSORIES</p> <p>INSULATING BRACKET WITH DISCONNECTOR 1 (Ur ≤ 30kV)</p> <p>Weight: 0.54kg</p>  <p>Stainless steel</p>	<p>EARTH TERMINAL 2</p> <p>Weight: 0.093kg</p>  <p>Stainless steel</p>	<p>EARTH TERMINAL 3</p> <p>Weight: 0.063kg</p>  <p>Stainless steel</p>
<p>EARTH ACCESSORIES</p> <p>VERTICAL SUPPORT 4</p> <p>Weight: 0.51kg</p>  <p>Hot-dip galvanized</p>	<p>HORIZONTAL SUPPORT 5</p> <p>Weight: 0.21kg</p>  <p>Hot-dip galvanized</p>	<p>HORIZONTAL SUPPORT 6</p> <p>Weight: 0.27kg</p>  <p>Hot-dip galvanized</p>
<p>EARTH ACCESSORIES</p> <p>BRACKET Z 7</p> <p>Weight: 0.48kg</p>  <p>Hot-dip galvanized</p>	<p>INSULATING BRACKET WITH DISCONNECTOR 8 (Ur > 30kV)</p> <p>Weight: 0.48kg</p>  <p>Hot-dip galvanized</p>	<p>EARTH TERMINAL 9</p> <p>Weight: 0.1kg</p>  <p>Stainless steel</p>
<p>INSULATING BRACKET A (Ur ≤ 30kV)</p> <p>Weight: 0.5kg</p>  <p>Stainless steel</p>	<p>INSULATING BRACKET B (Ur ≤ 30kV)</p> <p>Weight: 0.5kg</p>  <p>Stainless steel</p>	<p>ACCESSORIES</p> <p>ANTI-BIRD CAP 1</p> <p>Weight: 0.032kg</p>  <p>Stainless steel</p>

Fig.4. Equipment for surge arrester type PROXAR-IN AC

4. TRANSPORT, RECEIVING AND STORAGE

Surge arresters are supplied in strong cardboard carton packs or, for larger batches, additionally packed on a pallet. Accessories are packed separately.

Upon receipt, check the number and completeness of the surge arresters.

Store in a dry place, free of corrosive agents. Follow the instructions on the cartons. If the cartons are stored in a warehouse, they can be stacked one on top of the other up to a maximum of six layers in collective pack.

5. ASSEMBLY

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

Before final installation, check that the product is correct (type designation, U_r - rated voltage, U_c - continuous operating voltage, type of voltage system AC – alternate current, I_n – nominal discharge current, etc.). If in doubt about the appropriate model, please consult with the manufacturer.

Maximum torque on the screws are given in the attached assembly drawings. Typical assembly tools should be used for assembly.

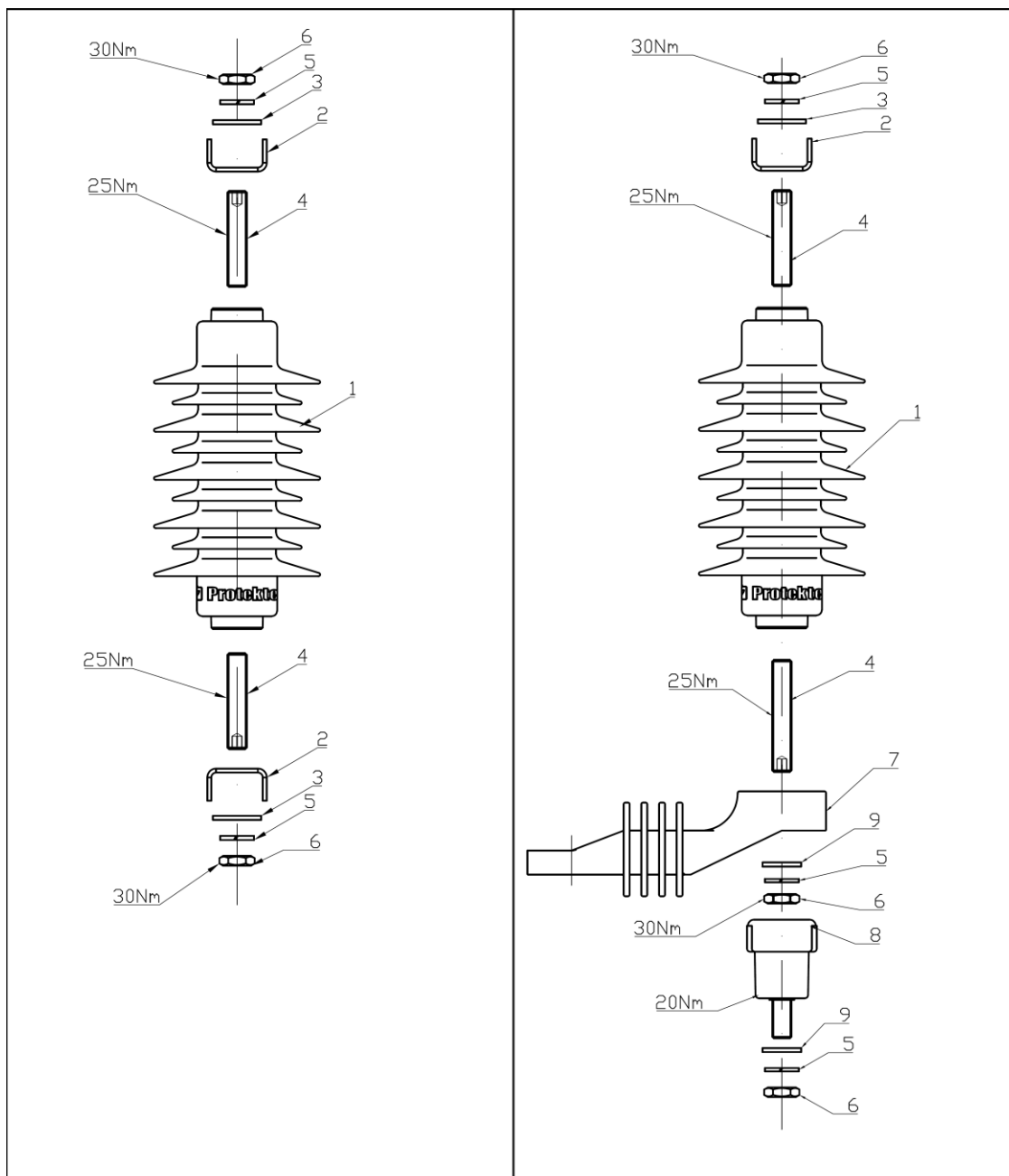


Fig. 5. Surge arrester with line terminal and earth terminal

Fig. 6. Surge arrester with insulating bracket with disconnector

Installation of the earth terminal (Fig.5): Insert the pos. 4 screw into the bottom electrode of the surge arrester, apply pos.2, before applying the terminal washer pos. 3 insert the wire or lug of the cable connecting the surge arrester with the earthed structure, apply the spring washer pos. 5 and tighten with the nut pos. 6 with the given moment. All other versions of earthing terminals, vertical support, horizontal support, Z-bracket, should be assembled in the same way as described above, taking into account minor differences resulting from the completion. The range of tightening moments of individual elements is the same as in the attached drawing No. 5.

Mounting method of the line terminal (fig.5): into the upper electrode of the surge arrester screw in the screw pos. 4 with the indicated moment, apply terminal pos. 2, before applying the terminal washer pos. 3 insert the wire or lug of the cable connecting the surge arrester with the protected object or line, apply the spring washer pos. 5 and tighten with the nut pos. 6 with the given moment. All other versions of line terminals should be made in the same way as described above, taking into account minor differences resulting from completion. The range of tightening moments of individual elements is identical to that of the attached figure 5.

The method of mounting the insulating bracket with the disconnecter (fig.6): insert the screw, item 4, into the bottom electrode, slide the bracket pos. 7 and washer pos. 9 and 5 then tighten the pos. 6 with the given moment. On the protruding screw pos. 4 screw the disconnecter pos. 8 with the given moment. Place the washer on the disconnecter terminal pos. 9 and mount the elastic wire with the ring lug (it is recommended to use flexible copper wires with anti-bird cap or without it), put on the spring washer pos. 5 and tighten the pos. 6 with the given moment, second the other end of the flexible wire connect to the grounded structure. Mounting method of the line terminal (Fig. 6): installation is the same as for drawing No. 5 with the difference that before connecting the cable connecting the surge arrester with the protected object / line on the cable, thread the insulation anti-bird cap through one of the holes to mount the line terminal put a cover on the protruding screw item 4.

Attention: always use a flexible connection to connect the bottom disconnecter terminal to the earthed structure, which, after the disconnecter is triggered, will allow the terminal to fall off and create a permanent insulation break, which will also be the indicator of the limiter activation / damage of surge arrester.

Lifting of surge arresters with, for example, shackles or eyelets screwed into the line terminals of surge arresters. Dimensions and weights (weight of the surge arrester without accessories) of individual surge arrester are given in table 2.

Table 2 lists the recommended minimum distances in overhead conditions and heights up to 1000 m above sea level, which should be maintained during installation of the arresters. These are the minimum distances between the axis of the surge arresters and between the axis of the surge arresters and the nearest grounded structure, see Fig. 7. Figures 1 - 3 show various assembly systems for the surge arrester. Figure 1 shows vertical assembly. Figure 2 shows the reverse assembly. Figure 3 shows horizontal assembly.

The assembly of surge arresters for horizontal operation is the same as for vertical installation.

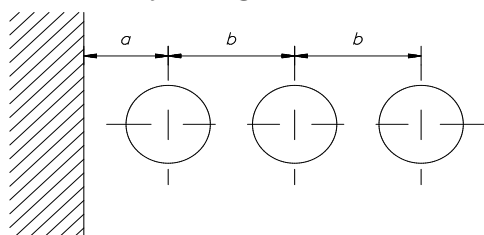


Fig. 7 Minimum mounting distances of surge arresters.

6. ELECTRICAL CONNECTIONS

It is recommended to install surge arresters as close as possible to the protected devices, in addition, the shortest possible connections with the work cable and ground for the better work of surge arrester. The minimum cross-section of the surge arrester connection cables should not be less than recommended for the expected short-circuit current at the place of installation. However, the manufacturer recommends connecting the line terminal and earth terminal with min. cross-section 16 mm² (Cu), 35 mm² (Al) and 50mm² steel. The maximum resistance of the ground structure for correct operation of the surge arrester in the installation location of the surge arrester should not exceed 10 [ohm].

The lower the earth resistance, the more effective the installed surge arrester.

First of all, it is necessary to ensure a reliable ground connection, and then connect the surge arrester to the line wire and turn on the line under voltage. The line terminals and earth terminals should be tightened with a suitable key with the appropriate strength torque.

All line terminals and earth terminals are adapted to work with aluminum as well as copper elements – terminals are made of stainless steel.

In the event that the surge arrester is installed under voltage, safety guidelines for this type of work must be strictly adhered to.

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

7. DISASSEMBLY

When removing the arrester, the workers must be aware of the danger that the voltage on the bottom electrode can appear due to short circuit during damage of arrester. Due to this danger, the terminal from the line must be disconnected first. Same safety rules such as at the installation should be maintained.

8. SERVICE

Surge arresters type PROXAR-IN AC does not require any particular maintenance. Periodic inspection, with the inspection of other devices operating in the installation of arresters is sufficient. However the surge arresters which have a disconnecter requiring (during the periodic inspection) statements whether the cable connecting the

disconnecter's terminal was not rejected with a cable which can be evidence of overload the surge arrester and necessity of change for a new technically efficient.

Cleaning:

Cleaning of the insulating silicone housing of surge arresters is not required. The surface can look dirty, but this does not affect the work of surge arresters. If surge arresters are going to be washed the simple safety rules should be maintained but arresters can't be washed in high pressure (this can destroy the housing) and soft water without detergents should be used.

9. IDENTIFICATION OF NAMEPLATE

The nameplate is shown below in Figure 8 Description of the symbols (The designation of the rated data of the surge arrester is made using the micro-dot print method on the bottom 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 voltage of continuous operating voltage U_c in [kV]

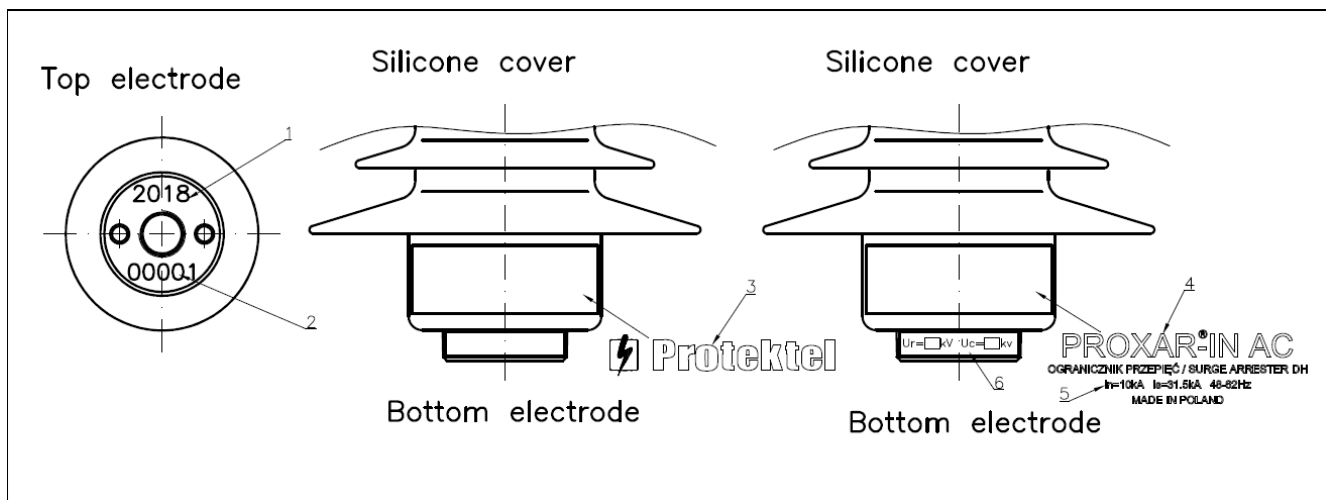


Fig.8. Place of marking PROXAR-IN AC

10. DISPOSAL OF WASTE PRODUCT

Surge arrester type PROXAR-IN AC 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. Aluminium
3. Ceramics - varistors based on zinc oxide
4. Aramide fiber bonded with adhesive
5. Steel - supporting structure

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:

Protektel Sp. z o.o.
Piłsudskiego 92 str.
06-300 Przasnysz
POLAND
Tel./Fax: (0)29 752 57 84
E-mail: protektel@protektel.pl
www.protektel.pl

ATTENTION

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

PROXAR® is a registered trademark newest family of surge arresters produced by Protektel.