



## **INSTALLATION AND OPERATING INSTRUCTION FOR SURGE ARRESTERS TYPE PROXAR-IIN AC**



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## 1. GENERAL INFORMATION

Dear customer, thank you for choosing our product - the surge arrester type PROXAR-IIN 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-IIN 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 stock 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 stock 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.

Surge arrester PROXAR-IIN AC can be supplied with the following equipment:

- Line terminal
- Base
- Insulating base (on demand)
- Ground terminal (on demand)
- Surge counter (on demand)

## 3. TECHNICAL DATA

Arrester classification according to EN 60099-4: 2014	SL(Station Low)
Line discharge class according to IEC 60099-4: 2009	2
System voltage (Us)	7.2 – 145 kV
Rated voltage (Ur)	6.0 – 144 kV
Nominal discharge current In 8/20 μs	10 kA
High current impulse Ihc 4/10 μs	100 kA
Rated repetitive charge transfer rating Qrs	1.6 C
Rated thermal Energy Wth	7.0 kJ/kV Ur
Single impulse energy capability (impulse duration 2 ms – 4 ms)	3,5 kJ/kV Ur
Long duration current impulse, 2000 μs	600 A
Short circuit rating	50 kA/0.2s
Service conditions:	
- ambient temperature	-40 °C do +60 °C*
- altitude up to	1000 m*
- frequency	48 – 62 Hz
Mechanical data:	
- specified long-term load (SLL)	1000 Nm
- specified short-term load (SSL)	1600 Nm
- torsional strength	300 Nm

\*) for higher parameters please contact with manufacturer

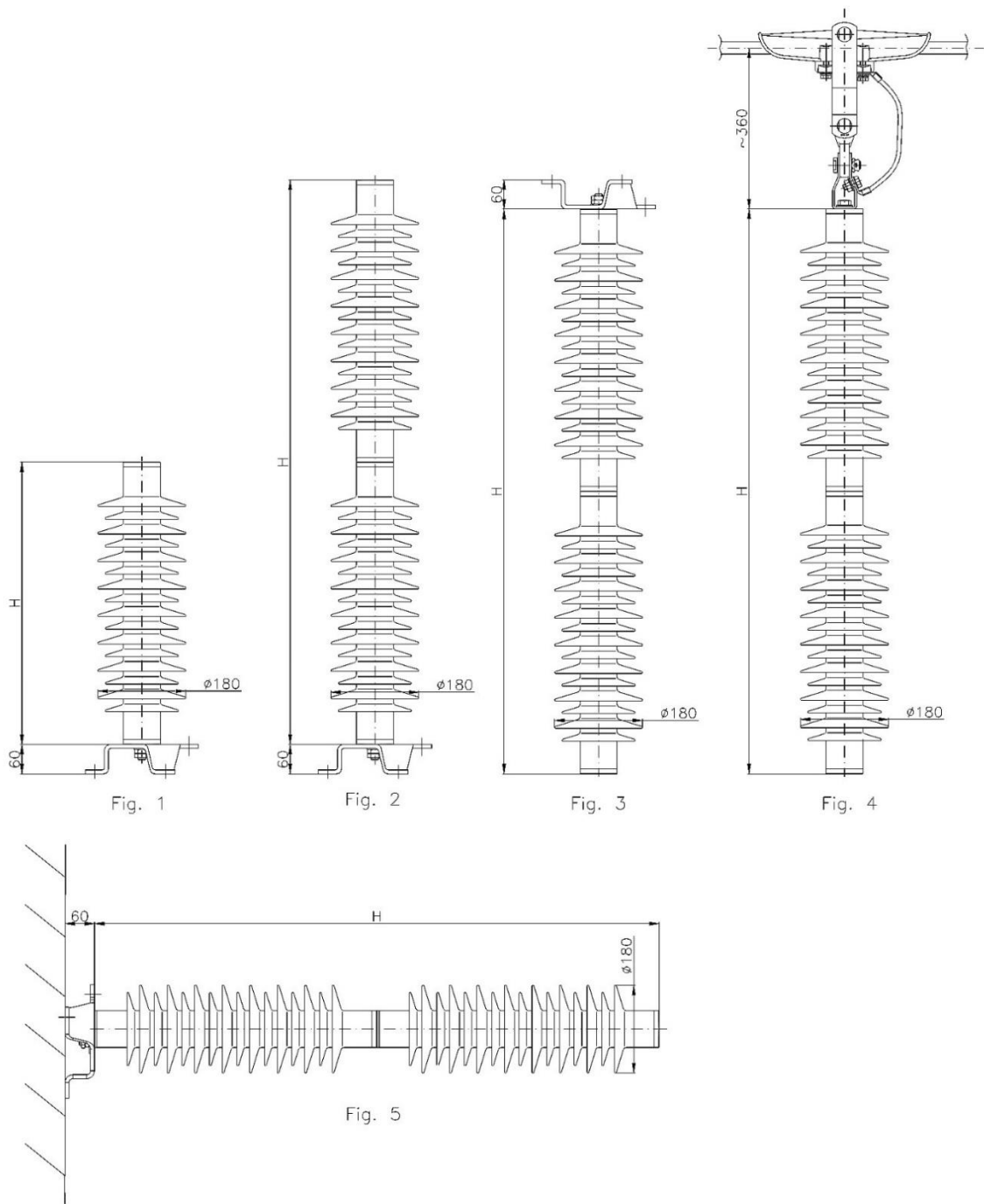
The nominal parameters are summarized in Table 1 below.

Table 1. Technical data for surge arrester PROXAR-IIN AC

Typ PROXAR- IINAC	Rated voltage	Maximum operating voltage	TOV <sup>1)</sup>		Residual voltage in [kV] pk at a specified impulse current							
					Wave 1/... μs	Wave 8/20 μs				Wave 30/60 μs		
	Ur	Uc	1 s	10 s	10kA	2.5kA	5kA	10kA	20kA	250A	500A	1000A
	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV
6	6	4.8	6.9	6.6	17.7	13.6	14.1	15.4	17.1	11.7	12.0	12.6
7	7	5.6	8.1	7.7	19.8	15.1	15.7	17.2	19.1	13.1	13.4	14.1
8	8	6.4	9.2	8.8	22.6	17.3	18.0	19.6	21.8	14.9	15.3	16.1
9	9	7.2	10.4	9.9	25.4	19.4	20.2	22.1	24.5	16.8	17.2	18.1
10	10	8.0	11.5	11.0	28.2	21.6	22.5	24.6	27.3	18.7	19.2	20.1
11	11	8.8	12.7	12.1	31.1	23.8	24.7	27.0	30.0	20.5	21.1	22.1
12	12	9.6	13.8	13.2	33.9	25.9	27.0	29.5	32.7	22.4	23.0	24.2
13	13	10.4	15.0	14.3	36.7	28.1	29.2	31.9	35.4	24.3	24.9	26.2
14	14	11.2	16.1	15.4	39.5	30.2	31.5	34.4	38.2	26.1	26.8	28.2
15	15	12.0	17.3	16.5	42.4	32.4	33.7	36.8	40.9	28.0	28.7	30.2
16	16	12.8	18.4	17.6	45.2	34.6	35.9	39.3	43.6	29.9	30.6	32.2
17	17	13.6	19.6	18.7	48.0	36.7	38.2	41.7	46.3	31.7	32.6	34.2
18	18	14.4	20.7	19.8	50.8	38.9	40.4	44.2	49.1	33.6	34.5	36.2
19	19	15.2	21.9	20.9	53.6	41.1	42.7	46.7	51.8	35.5	36.4	38.3
20	20	16.0	23.0	22.0	56.5	43.2	44.9	49.1	54.5	37.3	38.3	40.3
21	21	16.8	24.2	23.1	59.3	45.4	47.2	51.6	57.2	39.2	40.2	42.3
22	22	17.6	25.3	24.2	62.1	47.5	49.4	54.0	60.0	41.1	42.1	44.3
23	23	18.4	26.5	25.3	64.9	49.7	51.7	56.5	62.7	42.9	44.0	46.3
24	24	19.2	27.6	26.4	67.8	51.9	53.9	58.9	65.4	44.8	46.0	48.3
25	25	20.0	28.8	27.5	70.6	54.0	56.2	61.4	68.1	46.7	47.9	50.3
26	26	20.8	29.9	28.6	73.4	56.2	58.4	63.8	70.9	48.5	49.8	52.3
27	27	21.6	31.1	29.7	76.2	58.3	60.7	66.3	73.6	50.4	51.7	54.4
28	28	22.4	32.2	30.8	79.1	60.5	62.9	68.7	76.3	52.2	53.6	56.4
29	29	23.2	33.4	31.9	81.9	62.7	65.2	71.2	79.0	54.1	55.5	58.4
30	30	24.0	34.5	33.0	84.7	64.8	67.4	73.7	81.8	56.0	57.5	60.4
33	33	26.4	38.0	36.3	93.2	71.3	74.1	81.0	89.9	61.6	63.2	66.4
36	36	28.8	41.4	39.6	101.6	77.8	80.9	88.4	98.1	67.2	68.9	72.5
39	39	31.2	44.9	42.9	110.1	84.3	87.6	95.8	106.3	72.8	74.7	78.5
42	42	33.6	48.3	46.2	118.6	90.7	94.4	103.1	114.5	78.4	80.4	84.6
45	45	36.0	51.8	49.5	127.1	97.2	101.1	110.5	122.6	84.0	86.2	90.6
48	48	38.4	55.2	52.8	135.5	103.7	107.8	117.9	130.8	89.6	91.9	96.6
51	51	41.0	58.7	56.1	144.0	110.2	114.6	125.2	139.0	95.2	97.7	102.7
54	54	43.0	62.1	59.4	161.0	123.2	128.1	140.0	155.4	106.4	109.2	114.8
60	60	48.0	69.0	66.0	179.4	137.3	142.7	156.0	173.2	118.6	121.7	127.9
66	66	53.0	75.9	72.6	196.7	150.5	156.5	171.0	189.8	130.0	133.4	140.2
72	72	58.0	82.8	79.2	215.1	164.6	171.1	187.0	207.6	142.1	145.9	153.3
84	84	67.0	96.6	92.4	250.7	191.8	199.5	218.0	242.0	165.7	170.0	178.8
90	90	72.0	103.5	99.0	269.1	205.9	214.1	234.0	259.7	177.8	182.5	191.9
92	92	73.6	105.5	100.9	273.5	209.3	217.6	237.8	264.0	180.8	185.5	195.0
96	96	77.0	110.4	105.6	286.4	219.1	227.8	249.0	276.4	189.2	194.2	204.2
102	102	82.0	117.3	112.2	304.8	233.2	242.5	265.0	294.2	201.4	206.7	217.3
108	108	86.0	124.2	118.8	322.0	246.4	256.2	280.0	310.8	212.8	218.4	229.6
120	120	96.0	138.0	132.0	357.7	273.7	284.6	311.0	345.2	236.4	242.6	255.0
132	132	106.0	151.8	145.2	393.3	301.0	312.9	342.0	379.6	259.9	266.8	280.4
138	138	111.0	158.7	151.8	411.7	315.0	327.6	358.0	397.4	272.1	279.2	293.6
144	144	115.0	165.6	158.4	429.0	328.2	341.3	373.0	414.0	283.5	290.9	305.9

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

<sup>1)</sup>With prior energy 6 kJ/kV Ur



### Dimension drawings surge arresters type PROXAR-IIN AC

The drawings No 1 – 5 presents different system of assembling surge arresters. Drawings No 1 and 2 presents vertical system of assembling. Drawings No 3 presents reverse system of assembling surge arrester. Drawing No 4 presents suspension system of assembly line surge arrester. Drawings No 5 presents horizontal system of assembling surge arrester. For other ways of assembling surge arresters please contact with the manufacturer. Below the figures are presenting different options line and earth accessories available for use in surge arresters type PROXAR-IIN AC

Table 2. HOUSING DATA.

Typ PROXAR-IIN AC	Insulation withstand voltage of housing		Minimal distances		Creepage distance	Flash-over distance	Height H	Variant of drawing	Operating position	Housing number	Weight
	50 Hz wet (60s)	1.2/50µs dry	Distance between Arresters	Distance between arrester and the nearest grounded structure „a”							
			„b”	„a”							
kV	kV	mm	mm	mm	mm	mm	Fig.	Fig.	No	kg	
6	49	102	180	90	325	193	183	1	1, 3, 5	01	1.92
7			180	105							1.97
8			180	110							2.02
9			180	120							2.07
10			180	135							2.12
11	64	132	180	140	544	249	239	1	1, 3, 5	02	2.37
12			180	150							2.62
13			180	160							2.87
14			210	165							3.12
15			220	175							3.37
16	78	162	240	190	763	305	295	1	1, 3, 5	03	3.48
17			240	200							3.59
18			250	205							3.7
19			260	215							3.73
20			270	225							3.76
21			280	230							3.79
22			280	240							3.82
23	93	191	300	260	981	361	351	1	1, 3, 5	04	3.86
24			310	265							3.95
25			320	275							4.08
26			330	280							4.21
27			330	290							4.34
28			340	300							4.47
29			350	305							4.6
30	360	315	4.73								
33	107	221	400	355	1200	417	407	1	1, 3, 5	05	5.61
36			430	380							6.48
39	121	251	450	405	1418	473	463	1	1, 3, 5	06	6.89
42			470	430							7.25
45			500	455							7.61
48	136	280	530	485	1637	529	519	1	1, 3, 5	07	7.97
51			550	510							8.93
54	150	310	620	575	1856	585	575	1	1, 3, 5	08	9.89
60			670	625							10.85
66			800	760							11.66
72	180	370	830	785	2292	697	687	1	1, 3, 5,	09	12.52
84			950	905							13.38
90	300	620	1040	995	3712	1161	1150	2	2, 3, 4, 5	10	14.24
92			1060	1010							15.1
96			1090	1045							15.94
102			1140	1095							17.4
108			1190	1145							18.86
120			1330	1280							19.72
96			330	680							1090
102	1140	1095			22.1						
108	1190	1145			23.3						
120	1330	1280			24.5						
132	1430	1385			25.7						
120	360	740	1330	1280	4584	1385	1374	2	1, 2, 3, 4,	12	26.9
132			1430	1385							28.1
138			1480	1435							29.3
144			1530	1485							30.0

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

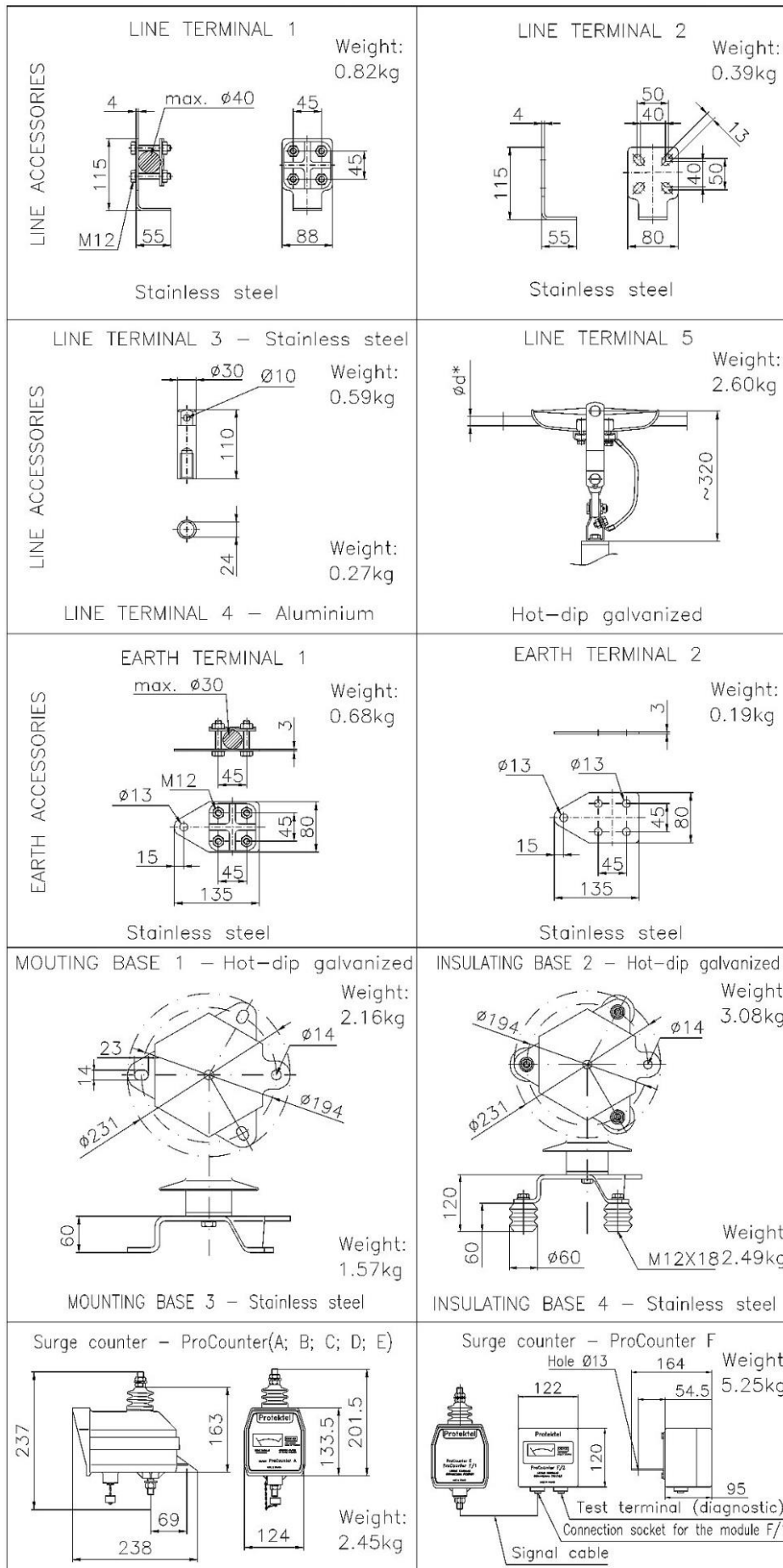


Fig.6. Dimension drawings line and earth accessories.

#### 4. TRANSPORT, RECEIVING AND STORAGE

Surge arresters are supplied in a strong, cardboard packs, which are packed in carton boxes. Terminals and base or other accessories are packed separately. Upon receipt, check number and completeness of 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 3 layers.

#### 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:

M12 – 25/50 Nm lower value is for grub screw with hexagonal socket.

M16 – 50/100 Nm lower value is for grub screw with hexagonal socket.

For mounting use typical tools and torque wrench.

Lifting of the surge arresters should be done with usage of the shackle or eyelet attaching to line terminal of arresters.

Mass of each type of arrester is listed in table 2.

Table 2 shows the recommended minimum distances that should be maintained by each arrester. These are the minimum distance between the axles of surge arrester and between the nearest grounded structure (see fig.7.).

The drawings No 1 – 5 presents different system of assembling surge arresters. Drawing No 1 and 2 present vertical system of assembling. Drawings No 3 presents reverse system of assembling surge arrester. Drawing No 4 presents suspension system of assembly surge arrester. Drawings No 5 presents horizontal system of assembling surge arrester.

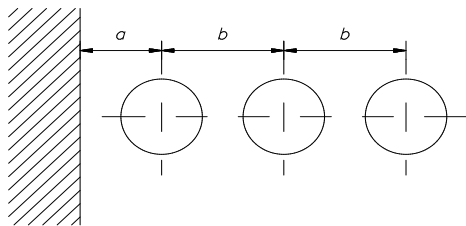


Fig. 7. Minimal distances of surge arresters.

#### 6. ELECTRICAL CONNECTIONS

It is recommended to install arresters as close as possible to the protected equipment, moreover, try to keep shortest possible cable connections with line and grounding for better protection of surge arresters. Minimum cross-section of connecting cables for surge arresters should be not smaller than recommended cross-section for expected short-circuit current at the place of installation. The manufacturer recommends the wires line and ground terminal with min. of 70 mm<sup>2</sup> (Cu) and 120 mm<sup>2</sup> (Al). First of all, make sure to make a reliable grounding connection and then connect the surge arrester to the line. Line and ground terminals should be tightened with proper torque. All ground and line terminals are made of stainless steel so they can be used with aluminum and copper elements. 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 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-IIN AC does not require any particular maintenance. Periodic inspection, with the inspection of other devices operating in the installation of arresters is sufficient.

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.

If any routine controls are required, only one method is sufficient – the resistive component of the leakage current measurement. Special measurer should be used for this purpose. For purpose of actual measurement of leakage



current the surge counter “ProCounter A” can be used, it has leakage current measurer, diagnostic socket (for any special measurers) and counter as well.

### 9. IDENTIFICATION OF NAMEPLATE

The nameplate is shown below in Figure 8 Description of the symbols:

A – nominal voltage for example 96

B – continuous operating voltage for example 77

C – serial number, for example 0001/2014

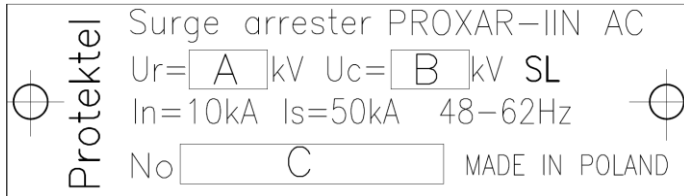


Fig.8. Nameplate for surge arrester type PROXAR-IIN AC

### 10. DISPOSAL OF WASTE PRODUCT

Surge arrester type PROXAR-IIN 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. Glass 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.**  
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**Poland**  
**Tel./Fax +48 029 7525784**  
**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