INSTALLATION AND OPERATING INSTRUCTION FOR SURGE ARRESTERS TYPE PROXAR-IIIN AC

Protektel sp. z o.o.
PIŁSUDSKIEGO 92 str.
06-300 PRZASNYSZ
Tel./Fax. +48 29 752 57 84
www.protektel.pl
protektel@protektel.pl

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1. GENERAL INFORMATION

Dear customer, thank you for choosing our product - the surge arrester type PROXAR-IIIN 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-IIIN 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-IIIN AC can be supplied with the following equipment:

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

Dimensions of surge arrester are listed below:

3. TECHNICAL DATA

The nominal parameters are summarized in Table 1 below.

Arrester classification according to IEC 60099-4: 2015	SM(Station Medium)
Line discharge class according to IEC 60099-4: 2009	3
System voltage (Us)	3.6 – 245 kV
Rated voltage (Ur)	1.0 – 228 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	2.4 C
Rated thermal Energy Wth	11.0 kJ/kV Ur
Single impulse energy capability (impulse duration 2 ms – 4 ms)	5.9 kJ/kV Ur
Long duration current impulse, 2000 μs	1000 A
Short circuit rating	65 kA/0.2s
Service conditions:	
- ambient temperature	-45 °C do +60 °C*
- altitude up to	1000 m*
Mechanical data:	
- specified long-term load (SLL)	2500 Nm
- specified short-term load (SSL)	4000 Nm
- torsional strength	200 Nm
- vertical load	5 kN
Dane mechaniczne:[1)]	
- specified long-term load (SLL)	1800 Nm
- specified short-term load (SSL)	1200 Nm
- torsional strength	200 Nm
- vertical load	5 kN

*) for other values please contact with the manufacturer;

[1)] Only applies to drawing and cover No.1

Table 1

TYP PROXAR-IIIN AC	Rated voltage Ur	Maximum continious operating voltage Uc	TOV[2)]		Residual voltage in [kV] pk at a specified impulse current							
					Wave 1/… µs	Wave 8/20 µs				Wave 30/60 µs		
			1 s	10 s	10kA	2.5kA	5kA	10kA	20kA	0.25kA	0.5kA	1kA
	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV
1.0	1.0	0.8	1.2	1.1	4.2	2.2	2.3	2.4	2.6	1.9	2.0	2.0
1.2	1.2	1.0	1.4	1.3	4.7	2.6	2.7	2.9	3.1	2.3	2.3	2.4
1.5	1.5	1.2	1.7	1.7	5.5	3.2	3.4	3.6	3.9	2.8	2.9	3.0
1.7	1.7	1.4	2.0	1.9	6.0	3.7	3.8	4.1	4.4	3.2	3.3	3.5
2.0	2.0	1.6	2.3	2.2	6.8	4.3	4.5	4.8	5.2	3.8	3.9	4.1
2.2	2.2	1.8	2.5	2.4	7.3	4.7	5.0	5.3	5.7	4.2	4.3	4.5
2.5	2.5	2.0	2.9	2.8	8.1	5.4	5.6	6.0	6.5	4.7	4.9	5.1
2.7	2.7	2.2	3.1	3.0	8.6	5.8	6.1	6.5	7.0	5.1	5.3	5.5
3.0	3.0	2.4	3.5	3.3	9.4	6.5	6.8	7.2	7.8	5.7	5.9	6.1
3.2	3.2	2.6	3.7	3.5	9.9	6.9	7.2	7.7	8.3	6.0	6.2	6.5
3.5	3.5	2.8	4.0	3.9	10.6	7.5	7.9	8.4	9.1	6.6	6.8	7.1
3.7	3.7	3.0	4.3	4.1	11.2	8.0	8.3	8.9	9.6	7.0	7.2	7.5
4.0	4.0	3.2	4.6	4.4	11.9	8.6	9.0	9.6	10.4	7.6	7.8	8.1
4.5	4.5	3.6	5.2	5.0	13.2	9.7	10.1	10.8	11.7	8.5	8.8	9.1
5	5	4.0	5.8	5.5	14.5	10.8	11.3	12.0	13.0	9.5	9.8	10.2
6	6	4.8	6.9	6.6	17.1	12.9	13.5	14.4	15.6	11.3	11.7	12.2
7	7	5.6	8.1	7.7	19.6	15.1	15.8	16.8	18.2	13.2	13.7	14.2
8	8	6.4	9.2	8.8	22.2	17.2	18.0	19.2	20.8	15.1	15.6	16.2
9	9	7.2	10.4	9.9	24.8	19.4	20.3	21.6	23.4	17.0	17.6	18.3
10	10	8.0	11.5	11.0	27.4	21.5	22.5	24.0	26.0	18.9	19.5	20.3
11	11	8.8	12.7	12.1	30.6	23.7	24.8	26.4	28.6	20.8	21.5	22.3
12	12	9.6	13.8	13.2	33.2	25.8	27.0	28.8	31.2	22.7	23.4	24.4
13	13	10.4	15.0	14.3	35.8	28.0	29.3	31.2	33.8	24.6	25.4	26.4
14	14	11.2	16.1	15.4	38.3	30.1	31.5	33.6	36.4	26.5	27.3	28.4
15	15	12.0	17.3	16.5	40.9	32.3	33.8	36.0	39.0	28.4	29.3	30.5
16	16	12.8	18.4	17.6	44.0	34.4	36.0	38.4	41.6	30.2	31.2	32.5
17	17	13.6	19.6	18.7	46.6	36.6	38.3	40.8	44.2	32.1	33.2	34.5
18	18	14.4	20.7	19.8	49.2	38.7	40.5	43.2	46.8	34.0	35.1	36.5
19	19	15.2	21.9	20.9	51.7	40.9	42.8	45.6	49.4	35.9	37.1	38.6
20	20	16.0	23.0	22.0	54.3	43.0	45.0	48.0	52.0	37.8	39.0	40.6
21	21	16.8	24.2	23.1	56.9	45.2	47.3	50.4	54.6	39.7	41.0	42.6
22	22	17.6	25.3	24.2	59.5	47.3	49.5	52.8	57.2	41.6	42.9	44.7
23	23	18.4	26.5	25.3	62.6	49.5	51.8	55.2	59.8	43.5	44.9	46.7
24	24	19.2	27.6	26.4	65.2	51.6	54.0	57.6	62.4	45.4	46.8	48.7
25	25	20.0	28.8	27.5	67.7	53.8	56.3	60.0	65.0	47.3	48.8	50.8
26	26	20.8	29.9	28.6	70.3	55.9	58.5	62.4	67.6	49.1	50.7	52.8
27	27	21.6	31.1	29.7	72.9	58.1	60.8	64.8	70.2	51.0	52.7	54.8
28	28	22.4	32.2	30.8	75.4	60.2	63.0	67.2	72.8	52.9	54.6	56.8
29	29	23.2	33.4	31.9	78.0	62.4	65.3	69.6	75.4	54.8	56.6	58.9
30	30	24.0	34.5	33.0	80.6	64.5	67.5	72.0	78.0	56.7	58.5	60.9
33	33	26.4	38.0	36.3	88.8	71.0	74.3	79.2	85.8	62.4	64.4	67.0
36	36	28.8	41.4	39.6	96.6	77.4	81.0	86.4	93.6	68.0	70.2	73.1
39	39	31.2	44.9	42.9	104.8	83.9	87.8	93.6	101.4	73.7	76.1	79.2
42	42	33.6	48.3	46.2	112.5	90.3	94.5	100.8	109.2	79.4	81.9	85.3
45	45	36.0	51.8	49.5	120.2	96.8	101.3	108.0	117.0	85.1	87.8	91.4
48	48	38.4	55.2	52.8	128.5	103.2	108.0	115.2	124.8	90.7	93.6	97.4
51	51	41.0	58.7	56.1	136.2	109.7	114.8	122.4	132.6	96.4	99.5	103.5
54	54	43.0	62.1	59.4	144	116	122	130	140	102	105	110
60	60	48.0	69.0	66.0	160	129	135	144	156	113	117	122
66	66	53.0	75.9	72.6	176	142	149	158	172	125	129	134
72	72	58.0	82.8	79.2	192	155	162	173	187	136	140	146
84	84	67.0	96.6	92.4	224	181	189	202	218	159	164	171
96	96	77.0	110.4	105.6	257	206	216	230	250	181	187	195
102	102	82.0	117.3	112.2	273	219	230	245	265	193	199	207
108	108	86.0	124.2	118.8	288	232	243	259	281	204	211	219
120	120	96.0	138.0	132.0	321	258	270	288	312	227	234	244
132	132	106.0	151.8	145.2	352	284	297	317	343	249	257	268
138	138	111.0	158.7	151.8	367	297	311	331	359	261	269	280
144	144	115.0	165.6	158.4	383	310	324	346	374	272	281	292
150	150	120.0	172,5	165,0	405	323	338	360	390	284	293	305
156	156	125.0	179,4	171,6	420	335	351	374	406	295	304	317
162	162	130.0	186,3	178,2	436	348	365	389	421	306	316	329
168	168	134.0	193,2	184,8	451	361	378	403	437	318	328	341
192	192	154.0	220,8	211,2	515	413	432	461	499	363	374	390
198	198	158.0	227,7	217,8	530	426	446	475	515	374	386	402
204	204	163.0	234,6	224,4	546	439	459	490	530	386	398	414
216	216	173.0	248,4	237,6	577	464	486	518	562	408	421	438
228	228	182.0	262,2	250,8	607	490	513	547	593	431	445	463

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

[2)]With prior energy 11 kJ/kV Ur

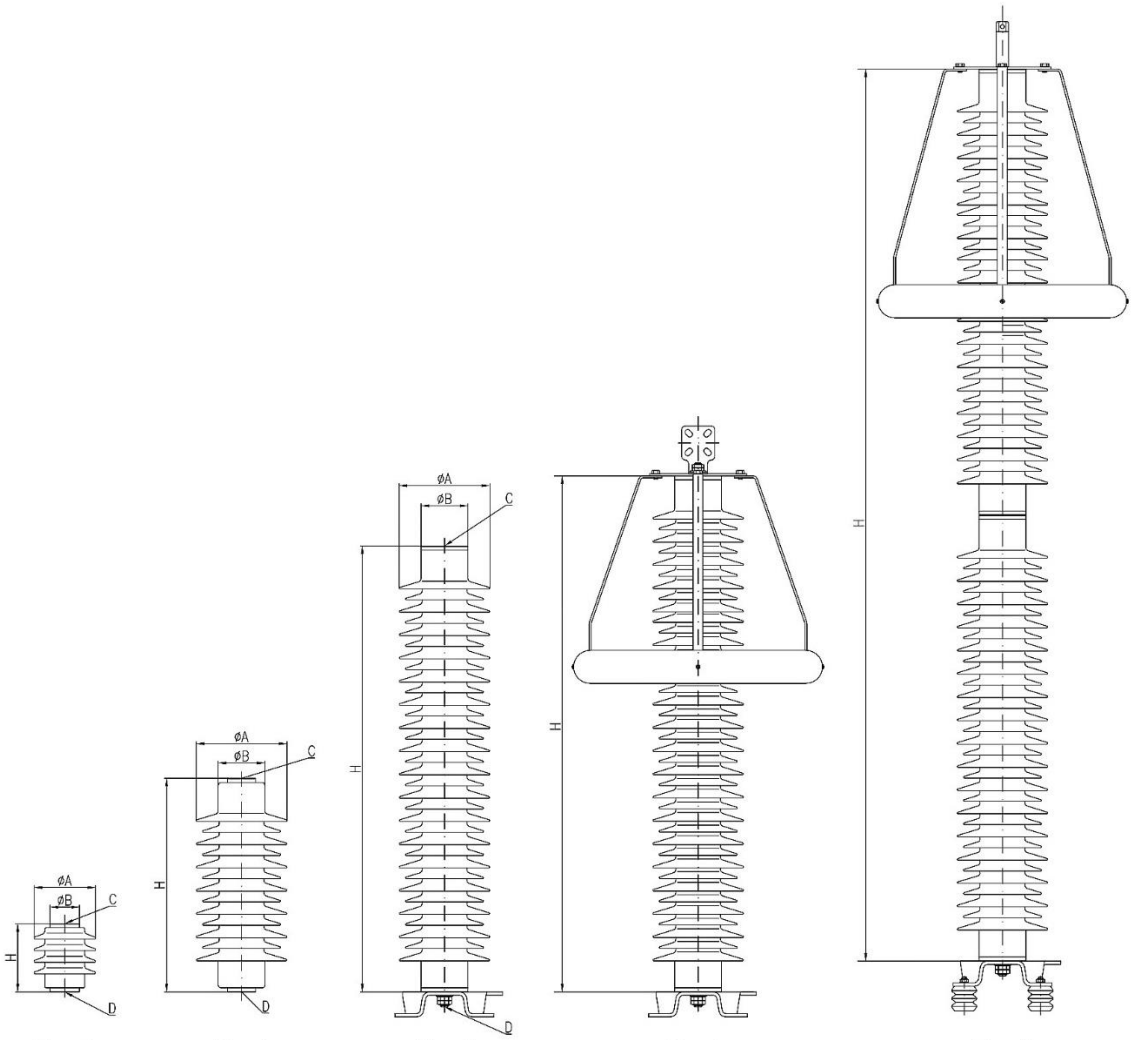


Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5

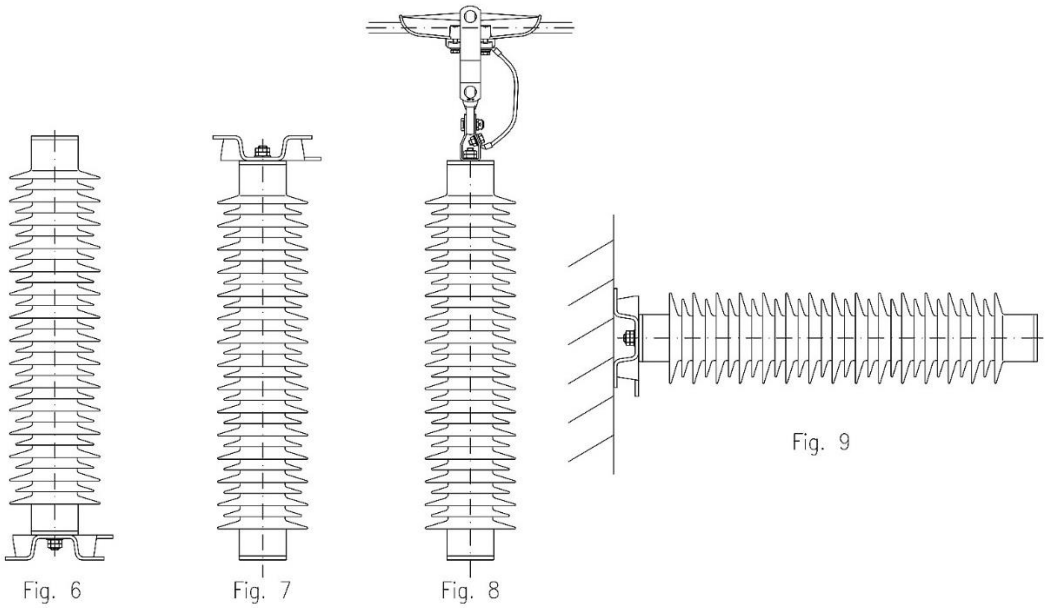


Fig. 6 Fig. 7 Fig. 8 Fig. 9

In the above figures show the configuration of the surge arresters housing (fig. 1; 2, 3, 4, 5). The drawings No 6 – 9 presents different system of assembling surge arresters. Drawings No 6 presents vertical system of assembling. Drawings No 7 presents reverse system of assembling surge arrester. Drawing No 8 presents suspension system of assembly line surge arrester. Drawings No 9 presents horizontal system of assembling. Below the figures are presenting different options line and earth accessories available for use in surge arrester type PROXAR-IIIN AC. For horizontal working configuration of surge arresters is this same option like for vertical working.

Table 2. HOUSING DATA.

Typ PROXAR IIIN AC	Insulation withstand voltage of housing		Minimal distances		Dimensions						Variant of drawing	Operating position	No of housing	Weight
	50 Hz wet (60s)	1.2/50µs dry	Distance between Arresters „b"	Distance between arrester and the nearest grounded structure „a"	Creepage distance	Strike distance	H	A	B	C. D				
	kV	kV	mm	mm	mm	mm	mm	mm	mm	Fig.	Fig.	Fig.	No	kg
1.0	28	75	150	75	318	165	165	148	96	M12	1	6, 7, 9	01	2.4
1.2			150	75										2.5
1.5			150	75										2.6
1.7			150	75										2.6
2.0			150	75										2.7
2.2			150	75										2.7
2.5			150	75										2.8
2.7			150	75										2.8
3.0			150	75										2.9
3.2			150	75										2.9
3.5			150	75										3.0
3.7			150	75										3.1
4.0			150	75										3.2
4.5			150	75										3.3
5.0			150	85										3.5
6.0			150	95										3.7
7.0			150	95										3.9
8.0			150	100										4.1
9.0			150	110										4.3
10.0			150	115										4.5
11	81	152	220	165	528	247	235	219	113	M12	2	6, 7, 9	02	12.4
12			230	170										12.5
13			240	180										12.6
14			240	185										12.7
15			250	195										12.8
16	98	184	270	210	760	303	291	219	113	M20	2	6, 7, 9	03	13.6
17			280	215										13.7
18			280	225										13.8
19			290	235										13.9
20			300	240										14.0
21			310	250										14.1
22			310	255										14.2
23	116	216	330	275	992	359	347	219	113	M20	2	6, 7, 9	04	15.0
24			340	280										15.1
25			350	290										15.2
26			360	295										15.3
27			360	305										15.4
28			370	310										15.5
29			380	320										15.6
30			390	325										15.7
33	133	248	430	370	1225	415	403	219	113	M20	2	6, 7, 9	05	16.4
36			450	395										16.6
39	150	281	470	415	1457	471	459	219	113	M20	2	6, 7, 9	06	17.1
42			500	440										17.4
45			520	460										17.7
48	168	313	550	495	1689	527	515	219	113	M20	2	6, 7, 9	07	18.0
51			570	515										18.5
54	185	345	620	555	1741	583	571	219	113	M20	3	6, 7, 8, 9	08	20.0
60			660	600										20.5
66	219	410	740	680	2208	695	683	219	113	M20	3	6, 7, 8, 9	09	21.5
72			790	725										22.0
84	271	506	920	865	2905	837	851	219	113	M20	3	6, 7, 8, 9	10	23.0
96	306	571	1050	995	3369	975	963	219	113	M20	3	6, 7, 8, 9	11	25.5
102			1100	1040										26.0
108			1140	1085										26.5
96	340	635	1050	995	3834	1087	1075	219	113	M20	3	6, 7, 8, 9	12	27.5
102			1100	1040										29.5
108			1140	1085										30.0
120			1270	1215										30.5
132			1360	1305										31.5
138			1410	1350										32.0
120	392	732	1270	1215	4530	1255	1243	219	113	M20	3	6, 7, 8, 9	13	32.5
132			1360	1305										35.0
138			1410	1350										36.0
144			1450	1395										36.5

Typ PROXAR IIIN AC	Insulation withstand voltage of housing		Minimal distances		Dimensions						Variant of drawing	Operating position	No of housing	Weight
	50 Hz wet (60s)	1.2/50μs dry	Distance between Arresters „b"	Distance between arrester and the nearest grounded structure „a"	Creepage distance	Strike distance	H	A	B	C. D				
	kV	kV	mm	mm	mm	mm	mm	mm	mm	Fig.	Fig.	Fig.	No	kg
138	392	732	1940	1635	4530	751	1243	219	113	M20	4	6, 7, 9	14	43.5
144			1980	1680										44.0
150	491	916	2030	1725	5110	1034	1534	219	113	M20	5	6, 7, 9		44.5
156			2070	1770										45.0
162			2120	1820										45.5
168			2170	1865										46.0
138	525	981	1940	1635	5577	1146	1646	219	113	M20	5	6, 7, 9	15	45.0
144			1980	1680										45,5
150			2030	1725										46.0
156			2070	1770										46.5
162			2120	1820										47.0
168			2170	1865										47.5
192	612	1142	2270	1970	6738	1326	1926	219	113	M20	5	6, 7, 9	16	54.5
198			2320	2015										55.5
204			2360	2060										56.5
216			2460	2155										57.5
228			2550	2245										59.5
192	680	1270	2270	1970	7668	1550	2150	219	113	M20	5	6, 7, 9	17	62.5
198			2320	2015										63.5
204			2360	2060										64.5
216			2460	2155										65.5
228			2550	2245										67.5

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

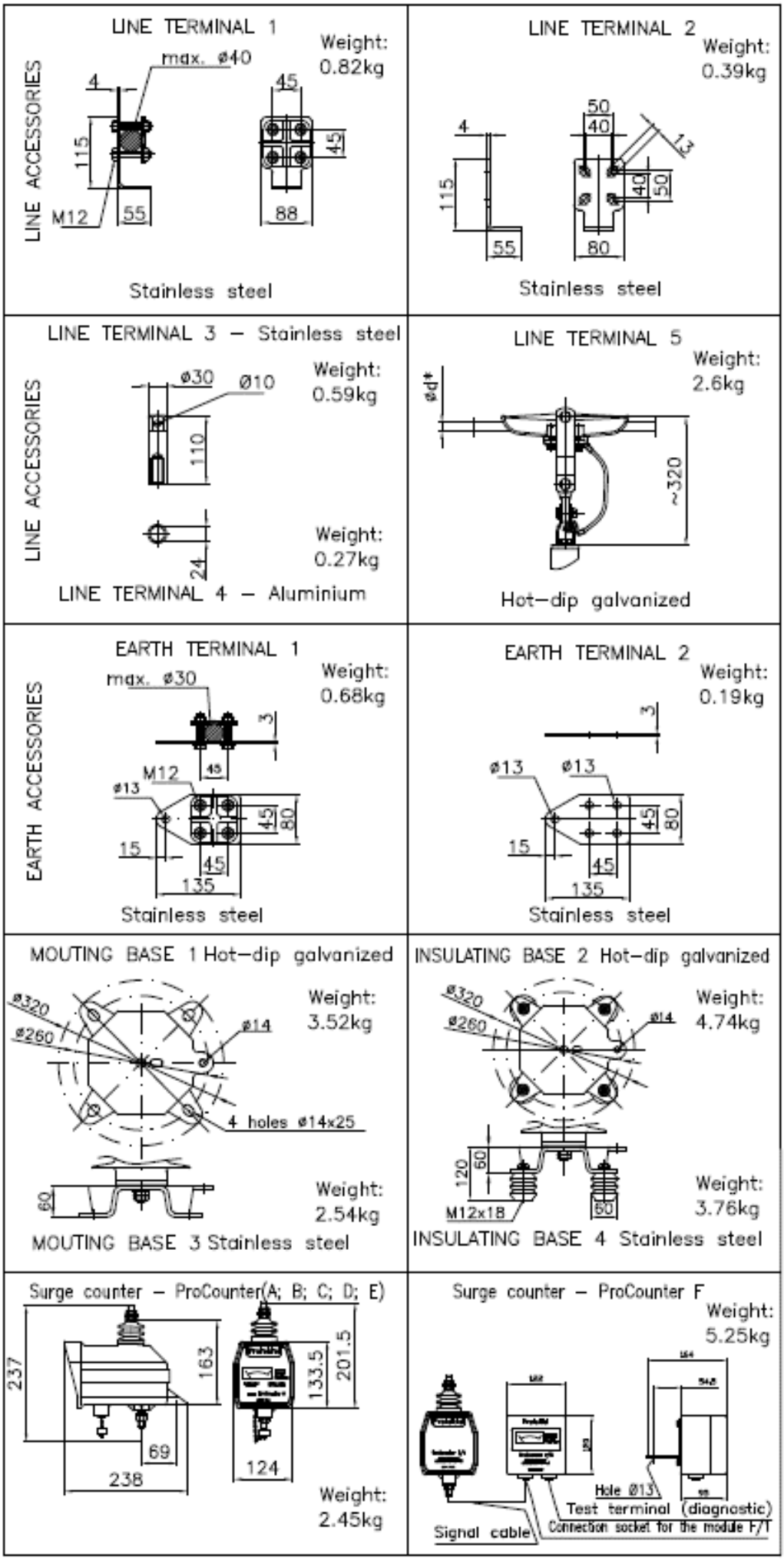


Fig.10. Equipment for surge arrester type PROXAR-IIIN AC

4. TRANSPORT, RECEIVING AND STORAGE

Surge arresters are delivered on pallets - for HV surge arresters or in strong cardboard packaging - for MV surge arresters. Clamps are packed separately for MV and HV arresters with a control ring. In HV surge arresters equipped with a control ring, the ring in question can be delivered unassembled in order to optimize the transport volume.

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

Store in a dry place, free from corrosive agents. Follow the instructions on the cartons. If the cartons are stored lying down, they can be stacked on top of each other up to a maximum of 3 layers. Surge arresters delivered on pallets should not be stacked

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, Ur - rated voltage, Uc - continuous operating voltage, type of voltage system AC – alternate current, In – nominal discharge current, etc.). If in doubt about the appropriate model, please consult with the manufacturer.

Maximum torque on the screws:

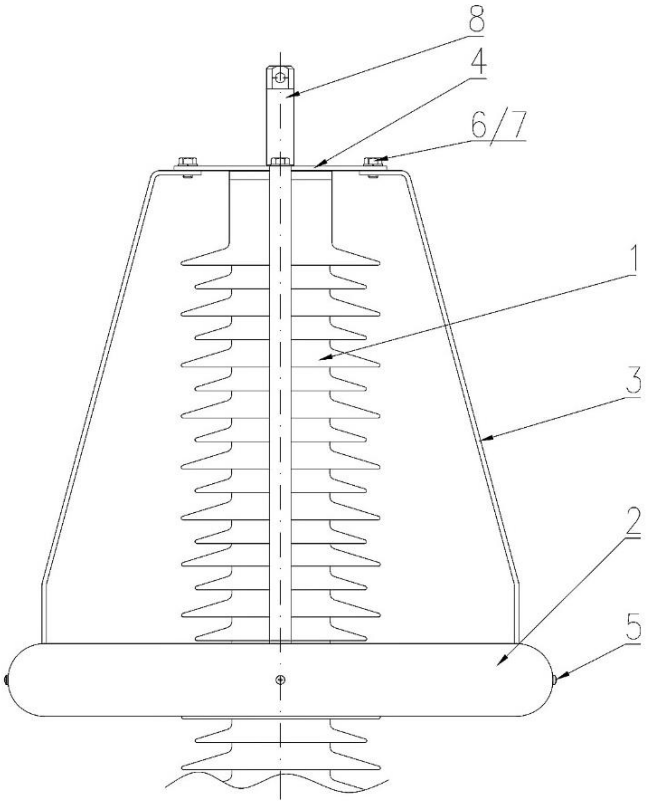
M6 – 6 Nm

M10 – 30 Nm

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.

M20 – 60/120 Nm lower value is for grub screw with hexagonal socket.



Typical assembly tools should be used for assembly.

The surge arresters must be lifted using shackles or eyelets screwed into the linear clamps of the surge arrester. Dimensions of individual surge arresters are given in table 2. In surge arresters equipped with a control ring, before mounting and connecting the line conductor, the ring assembly should be mounted on the upper electrode and the required line clamp should be tightened, which at the same time stabilizes the connection between the ring assembly and the arrester

1. Surge arrester module
2. Control ring
3. Bow
4. Bow handle
5. M6 screw fixing the bail with ring
6. Spring washer M10
7. M10 screw
8. Line clamp

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.11.).

The drawings No 1-5 presents general dimension of surge arresters. The drawings No 6 – 9 presents different system of assembling surge arresters.

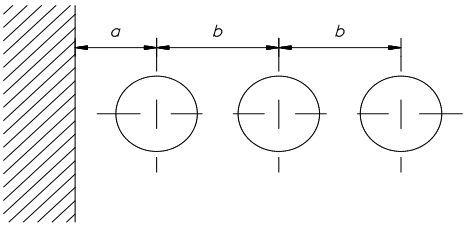


Fig. 11. Minimal distances of surge arresters.

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 95 mm^2 (Cu) and 150 mm^2 (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-IIIN 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 looks dirty, but this is 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 12 Description of the symbols:
A – nominal voltage for example 96
B – continuous operating voltage for example 77
C – serial number, for example 0001/2018

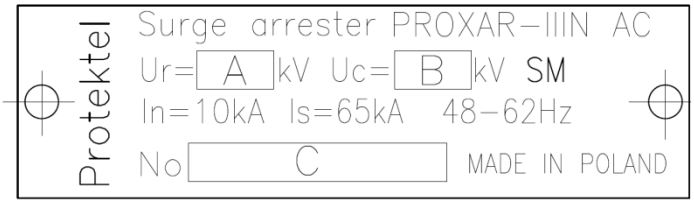


Fig.12. Nameplate for surge arrester type PROXAR-IIIN AC

10. DISPOSAL OF WASTE PRODUCT

Surge arrester type PROXAR-IIIN 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.
Piłsudskiego 92 str.
PL 06-300 Przasnysz
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