

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



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1. GENERAL INFORMATION

Dear customer, thank you for choosing our product - the surge arrester type PROXAR-IVN 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 problems arise that are not covered in this manual, please contact with the manufacturer¹. 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.

2. DESCRIPTION OF THE PRODUCT

Surge arresters type PROXAR-IVN 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 tube made of glass-fibre and closed in it from both sides with electrodes made of aluminium. Proper electric connection between varistors and electrodes is enabled by appropriate clamp. The housing is made of silicone of very good electro-insulating properties (the housing is put on the inside of surge arrester during the process of direct vulcanisation of silicon).

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

- Line terminal
- Base
- Insulating base

3. TECHNICAL DATA

ELECTRICAL DATA

Line discharge class according to IEC 60099-4: 2014	SH (Station High)
Line discharge class according to IEC 60099-4: 2009	Class 4
System voltage (Um)	3 – 145 kV
Rated voltage (Ur)	1 – 144 kV
Rated discharge current In 8/20 μs	20 kA
High current impulse Ihc 4/10 μs	100 kA
Rated repetitive charge transfer rating Qrs	2.4 C
Rated thermal Energy Wth	12.0 kJ/kV Ur
Single impulse energy capability (impulse duration 2 ms – 4 ms)	6.0 kJ/kV Ur
Long duration current impulse, 2000 μs (based on Qrs)	1100 A
Short circuit rating	65 kA/0.2s
Working conditions:	
- ambient temperature	-50 °C to +60* °C
- altitude up to	1000* m
Mechanical data:	
- specified short-term load (SSL)	6000 Nm
- specified long-term load (SLL)	2400 Nm
- torsional moment	200 Nm
- tensile strength	5 kN
Mechanical data: ¹	
- specified short-term load (SSL)	1800 Nm
- specified long-term load (SLL)	1200 Nm
- torsional moment	200 Nm
- tensile strength	5 kN

*) for other values please contact with the manufacturer;

¹) Only applies to drawing and cover No.1

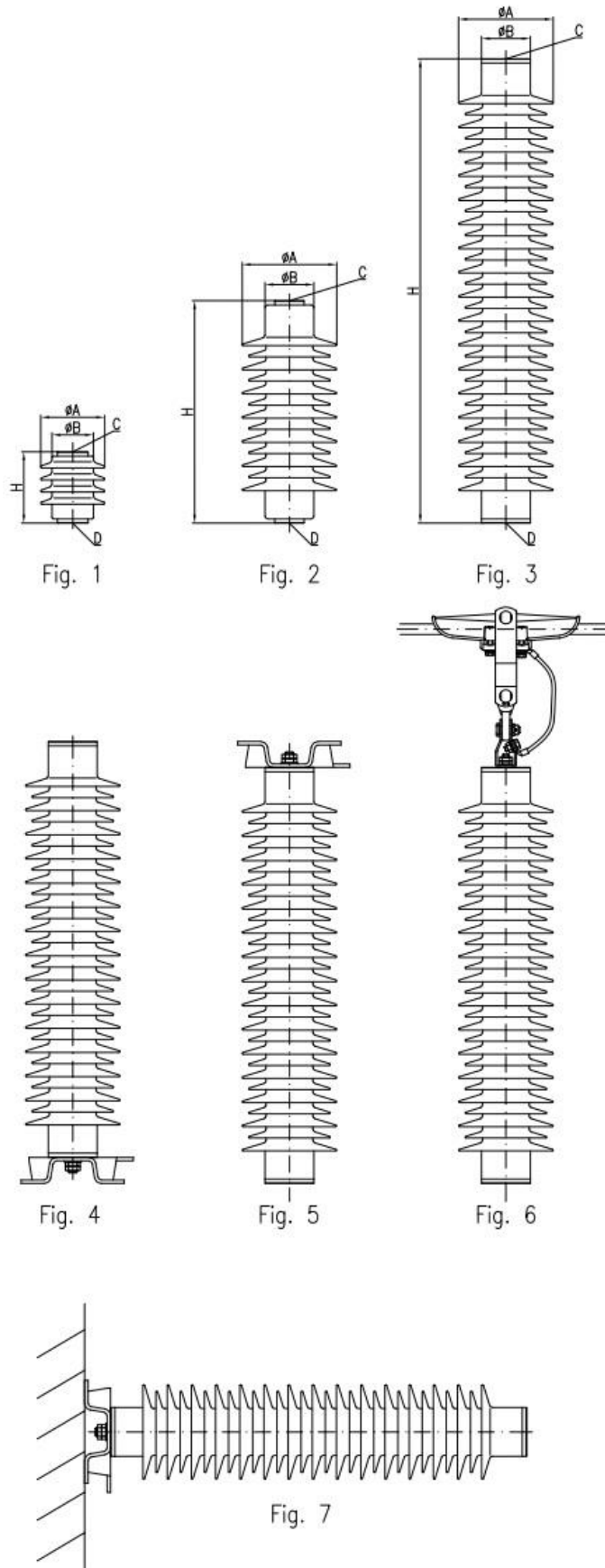
¹ Information details you will find on the cover of instruction.

Table 1. Technical data

TYPE PROXAR-IVN AC	Rated voltage Ur	Maximum continuous 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							
	kV	kV	1s	10s	20kA	5kA	10kA	20kA	40kA	500A	1kA	2kA
	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV	kV
1.0	1.0	0.8	1.1	1.1	4.3	2.3	2.4	2.6	2.8	2.0	2.1	2.2
1.2	1.2	1.0	1.3	1.3	4.8	2.7	2.9	3.1	3.4	2.4	2.5	2.6
1.5	1.5	1.2	1.7	1.6	5.6	3.4	3.6	3.9	4.2	3.0	3.1	3.2
1.7	1.7	1.4	1.9	1.8	6.2	3.9	4.1	4.4	4.8	3.5	3.5	3.7
2.0	2.0	1.6	2.2	2.1	7.0	4.6	4.8	5.2	5.6	4.1	4.2	4.3
2.2	2.2	1.8	2.4	2.4	7.5	5.0	5.3	5.7	6.2	4.5	4.6	4.7
2.5	2.5	2.0	2.8	2.7	8.3	5.7	6.0	6.5	7.0	5.1	5.2	5.4
2.7	2.7	2.2	3.0	2.9	8.8	6.2	6.5	7.0	7.6	5.5	5.6	5.8
3.0	3.0	2.4	3.3	3.2	9.6	6.8	7.2	7.8	8.4	6.1	6.2	6.5
3.2	3.2	2.6	3.6	3.4	10.2	7.3	7.7	8.3	9.0	6.5	6.7	6.9
3.5	3.5	2.8	3.9	3.7	11.0	8.0	8.4	9.1	9.8	7.1	7.3	7.5
3.7	3.7	3.0	4.1	4.0	11.5	8.4	8.9	9.6	10.4	7.5	7.7	8.0
4.0	4.0	3.2	4.4	4.3	12.3	9.1	9.6	10.4	11.2	8.1	8.3	8.6
4.5	4.5	3.6	5.0	4.8	13.6	10.3	10.8	11.7	12.6	9.1	9.4	9.7
5.0	5.0	4.0	5.6	5.4	15.0	11.4	12.0	13.0	14.0	10.2	10.4	10.8
6.0	6.0	4.8	6.7	6.4	17.6	13.7	14.4	15.5	16.8	12.2	12.5	12.9
7.0	7.0	5.6	7.8	7.5	20.3	16.0	16.8	18.1	19.6	14.2	14.6	15.1
8.0	8.0	6.4	8.9	8.6	22.9	18.2	19.2	20.7	22.4	16.2	16.6	17.2
9.0	9.0	7.2	10.0	9.6	25.6	20.5	21.6	23.3	25.2	18.3	18.7	19.4
10	10	8.0	11.1	10.7	28.3	22.8	24.0	25.9	28.0	20.3	20.8	21.5
11	11	8.8	12.2	11.8	31.6	25.1	26.4	28.5	30.8	22.3	22.9	23.7
12	12	9.6	13.3	12.8	34.3	27.4	28.8	31.1	33.6	24.4	25.0	25.8
13	13	10.4	14.4	13.9	36.9	29.6	31.2	33.7	36.4	26.4	27.0	28.0
14	14	11.2	15.5	15.0	39.6	31.9	33.6	36.3	39.2	28.4	29.1	30.1
15	15	12.0	16.7	16.1	42.3	34.2	36.0	38.9	42.0	30.5	31.2	32.3
16	16	12.8	17.8	17.1	45.5	36.5	38.4	41.4	44.8	32.5	33.3	34.4
17	17	13.6	18.9	18.2	48.1	38.8	40.8	44.0	47.6	34.5	35.4	36.6
18	18	14.4	20.0	19.3	50.8	41.0	43.2	46.6	50.4	36.5	37.4	38.7
19	19	15.2	21.1	20.3	53.5	43.3	45.6	49.2	53.2	38.6	39.5	40.9
20	20	16.0	22.2	21.4	56.1	45.6	48.0	51.8	56.0	40.6	41.6	43.0
21	21	16.8	23.3	22.5	58.8	47.9	50.4	54.4	58.8	42.6	43.7	45.2
22	22	17.6	24.4	23.5	61.4	50.2	52.8	57.0	61.6	44.7	45.8	47.3
23	23	18.4	25.5	24.6	64.7	52.4	55.2	59.6	64.4	46.7	47.8	49.5
24	24	19.2	26.6	25.7	67.3	54.7	57.6	62.2	67.2	48.7	49.9	51.6
25	25	20.0	27.8	26.8	70.0	57.0	60.0	64.8	70.0	50.8	52.0	53.8
26	26	20.8	28.9	27.8	72.6	59.3	62.4	67.3	72.8	52.8	54.1	55.9
27	27	21.6	30.0	28.9	75.3	61.6	64.8	69.9	75.6	54.8	56.2	58.1
28	28	22.4	31.1	30.0	78.0	63.8	67.2	72.5	78.4	56.8	58.2	60.2
29	29	23.2	32.2	31.0	80.6	66.1	69.6	75.1	81.2	58.9	60.3	62.4
30	30	24.0	33.3	32.1	83.3	68.4	72.0	77.7	84.0	60.9	62.4	64.5
33	33	26.4	36.6	35.3	91.8	75.2	79.2	85.5	92.4	67.0	68.6	71.0
36	36	28.8	40.0	38.5	99.8	82.1	86.4	93.2	100.8	73.1	74.9	77.4
39	39	31.2	43.3	41.7	108.3	88.9	93.6	101.0	109.2	79.2	81.1	83.9
42	42	33.6	46.6	44.9	116.3	95.8	100.8	108.8	117.6	85.3	87.4	90.3
45	45	36.0	50.0	48.2	124.3	102.6	108.0	116.6	126.0	91.4	93.6	96.8
48	48	38.4	53.3	51.4	132.8	109.4	115.2	124.3	134.4	97.4	99.8	103.2
51	51	40.8	56.6	54.6	140.8	116.3	122.4	132.1	142.8	103.5	106.1	109.7
54	54	43	59.9	57.8	149	123	130	140	151.2	110	112	116
60	60	48	66.6	64.2	165	137	144	155	168.0	122	125	129
66	66	53	73.3	70.6	182	150	158	171	184.8	134	137	142
72	72	58	79.9	77.0	198	164	173	186	201.6	146	150	155
84	84	67	93.2	89.9	232	192	202	218	235.2	171	175	181
96	96	77	106.6	102.7	265	219	230	249	268.8	195	200	206
102	102	82	113.2	109.1	281	233	245	264	285.6	207	212	219
108	108	86	119.9	115.6	297	246	259	280	302.4	219	225	232
120	120	96	133.2	128.4	332	274	288	311	342	244	250	258
132	132	106	146.5	141.2	364	301	317	342	376	268	275	284
138	138	110	153.2	147.7	380	315	331	357	393	280	287	297
144	144	115	159.8	154.1	395	328	346	373	410	292	300	310

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

²⁾With prior energy 12 kJ/kV Ur



In the above figures show the configuration of the surge arresters housing (fig. 1; 2, 3). The drawings No 4 – 7 presents different system of assembling surge arresters. Drawings No 4 presents vertical system of assembling. Drawings No 5 presents reverse system of assembling surge arrester. Drawing No 6 presents suspension system of assembly line surge arrester. Drawings No 7 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 AC. For horizontal working configuration of surge arresters is this same option like for vertical working.

Table 2 Technical data for housing

Typ PROXAR IVN 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	kV	mm	mm	mm	mm	mm	mm	mm	mm	Fig.	Fig.	No	kg
1.0	28	75	150	75	318	165	165	148	96	M12	1	4, 5, 7	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	83	154	220	160	528	247	235	219	113	M12	2	4, 5, 7	02	12.6
12			220	165										12.7
13			230	175										12.8
14			240	180										12.9
15			250	190										13.0
16	100	187	260	205	760	303	291	219	113	M20	2	4, 5, 7	03	13.9
17			270	210										14.0
18			280	220										14.1
19			280	225										14.2
20			290	235										14.3
21			300	240										14.4
22			310	250										14.5
23	118	219	320	265	992	359	347	219	113	M20	2	4, 5, 7	04	15.3
24			330	275										15.4
25			340	280										15.5
26			350	290										15.6
27			350	295										15.7
28			360	300										15.8
29			370	310										15.9
30			380	315										16.0
33	135	252	420	360	1225	415	403	219	113	M20	2	4, 5, 7	05	16.7
36			440	380										17.0
39	152	284	460	400	1457	471	459	219	113	M20	2	4, 5, 7	06	17.4
42			480	425										17.7
45			500	445										18.0
48	170	317	530	475	1689	527	515	219	113	M20	2	4, 5, 7	07	18.5
51			560	495										19.0
54	187	349	600	535	1741	583	571	219	113	M20	3	4, 5, 6, 7	08	20.5
60			640	580										21.0
66	222	414	720	655	2208	695	683	219	113	M20	3	4, 5, 6, 7	09	22.0
72			760	700										22.5
84	266	497	890	835	2905	837	851	219	113	M20	3	4, 5, 6, 7	10	24.0
96	309	577	1020	960	3369	975	963	219	113	M20	3	4, 5, 6, 7	11	26.0
102			1060	1005										26.5
108			1110	1045										27.0
96	344	642	1020	960	3834	1087	1075	219	113	M20	3	4, 5, 6, 7	12	30.0
102			1060	1005										30.5
108			1110	1045										31.0
120			1230	1170										32.0
132			1320	1255										33.0
138			1360	1300										34.0
120	396	739	1230	1170	4530	1255	1243	219	113	M20	3	4, 5, 6, 7	13	36.0
132			1320	1255										37.0
138			1360	1300										37.5
144			1400	1345										38.0

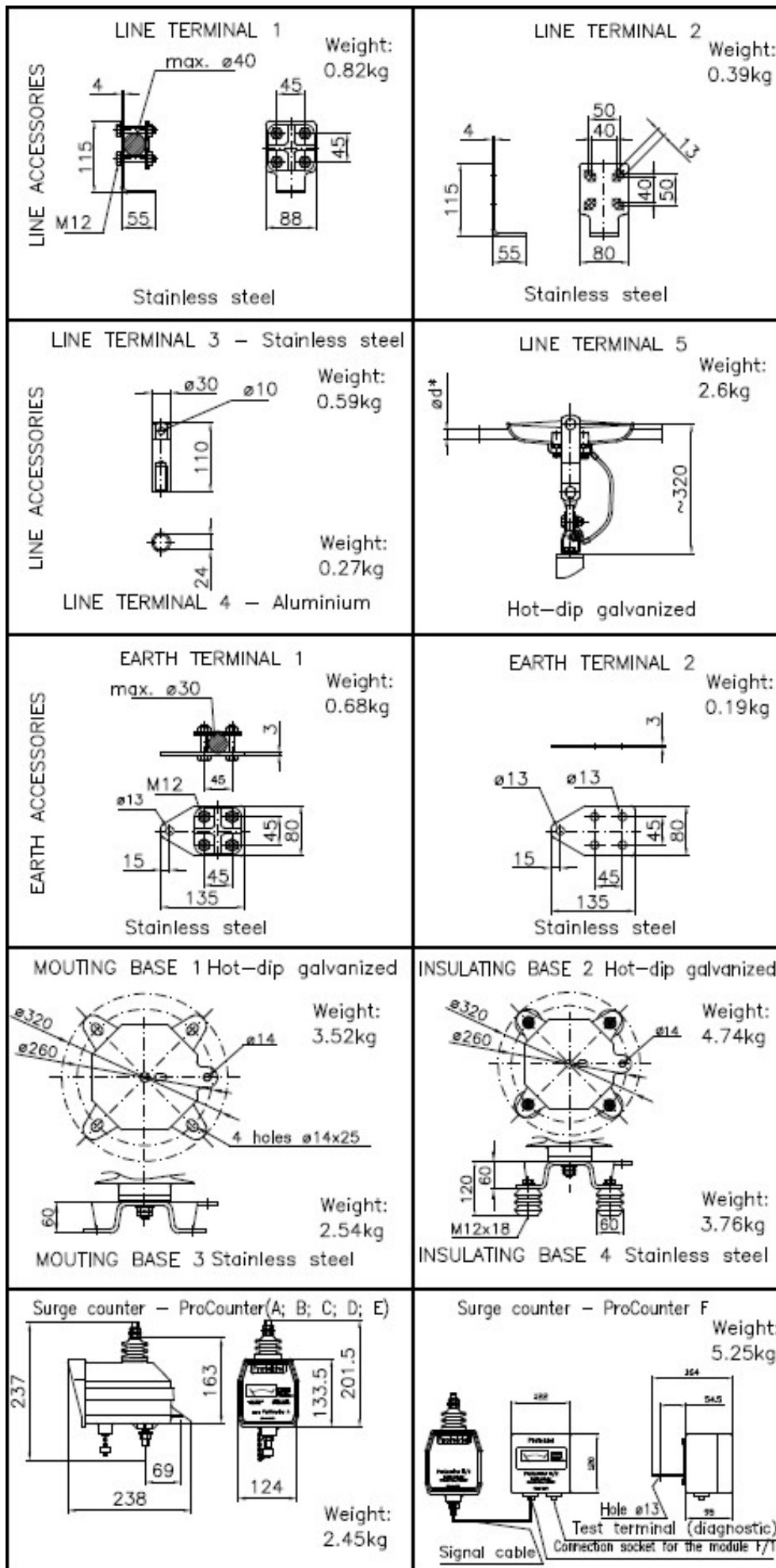


Fig.8. Dimension drawings line and earth accessories.

4. TRANSPORT, RECEIVING and STORAGE

Surge arresters are supplied in a strong, cardboard packs, which are packed in carton boxes and wooden boxes – for export. Terminals and base or other accessories are packed separately. Equipment is shown in Figure "line and earth accessories", which is always attached to each batch of surge arresters. 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 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's technical department.

The method of assembling and tightening torques of screw connections are shown in Figure "Figure mounting surge arresters type PROXAR-IVN AC", 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 (please see Table 3).

Table 3. Tightening torques of screw connections

Thread size	Location	Max. torque [Nm]
M12	Socket set screws	30
M12	Line terminals/base	50
M16	Socket set screws	50
M16	Line terminals	100
M20	Base	120

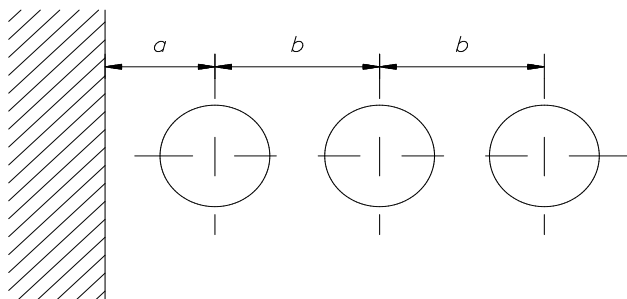


Fig. 9. Minimal mounting distances of surge arresters.

Table 2 and Figure No 9 show the recommended minimum distances that should be maintained during installation of arresters. These are the minimum distance between the axles of surge arrester and between the nearest grounded structure.

In the upper part of the surge arrester is located line terminal (please see line accessories), to connect the linear conductor Cu or Al. Arrester can be fitted with earth terminal (please see earth accessories). In the case of ground wire, the minimum cross-sections are the same as in the case of linear conductors. After that, you can apply metal banding tape. It is recommended to use the cables in isolation. Metal banding tape must be properly labeled according to the applicable regulations at the installation site.

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 ground 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 grounded structure and distance between surge arresters.

First of all, make sure to perform a reliable grounding 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.

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, make be sure that it is disconnected in an effective voltage applied to the terminal of arrester. Must reckon with the danger of the emergence of voltage on the electrode due to short circuit during damage of arrester. In view of this, the first must be disconnected terminal from the line. It is required that any disassembling work was done in a non-voltage protected system. When removing observe the same safety rules as the installation.

8. SERVICE

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

9. IDENTIFICATION OF NAMEPLATE

The nameplate is shown below in Figure 10 Description of the symbols (Description made by the micropoint method):

A – nominal voltage for example 15

B – continuous operating voltage for example 12

C – intended for AC system AC



Figure 10. Nameplate for surge arrester type PROXAR-IVN AC

10. DISPOSAL OF WASTE PRODUCT

Surge arrester type PROXAR-IVN 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:

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Note: 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