



JSC "POLYMER-APPARAT"
St. Petersburg, Russian Federation

CESI

METAL-OXIDE SURGE ARRESTERS

PA-DM-101-12-03/I1D4C3

TECHNICAL MANUAL

TM 3414-E306-15207362-2025

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This manual lays out technical data on polymer encased metal-oxide surge arresters of PA-DM-101-12-03/I1D4C3 type.

1. Application

1.1. Metal-oxide surge arresters without gaps of PA-DM-101 type, further referred to as “arrester”, are intended for protection of electrical equipment AC of 48÷62 Hz frequency against switching and lightning overvoltage.

1.2. Arrester classification according to IEC 60099-4:2014 - **Distribution High.**

2. Design and working principle

2.1. Arrester is made as a stack of metal-oxide varistors (MOV), encapsulated in a polymer case with metal flanges.

2.2. Overall and mounting dimensions are presented in Appendix A.

2.3. The arrester working principle is based on the nonlinearity of volt-ampere diagram of zinc-oxide varistors. At operating voltage the value of active currents through varistors is less than milliamperes, but at overvoltage the ones rises up to hundreds and thousands of amperes.

3. Product Marking System:

Example of a product number: **PA-DM-101-12-03/I1D4C3**

PA - Manufacturer's trademark - "Polymer-Apparat";

DM - Distribution Medium (classification arrester according to JSC "Polymer-Apparat");

101 - Type of housing;

12 - Rated voltage, kV;

03 - High-voltage input (type 03);

/ - earthed terminal;

I1 - Insulation bracket (type I2);

D4 - Disconnector (type D4);

C3 - Flexible earthing conductor (type C3).

4. Operating environmental conditions

Operability of arresters is ensured under the following servicing conditions:

- Outdoor;
- Lower operating value of ambient temperature is -60°C ;
- Upper operating value of ambient temperature is $+55^{\circ}\text{C}$;
- Altitude above sea level is up to 1000 m.

5. Basic parameters and characteristics

5.1. The arrester complies with the specification: IEC 60099-4:2014. The main parameters and characteristics are presented in the Table 1 bellow.

Table 1

Parameter	Rated value
1. Rated voltage, kV	12
2. Continuous voltage of arrester (MCOV), kV (rms)	9.6
3. Nominal discharge current, A	10000
4. Residual voltage at 8/20 μs lightning impulse of current of amplitude (kV, no more than):	
5 κA	28.9
10 κA	30.7
20 κA	34.4
5. Residual voltage at 30/60 μs switching impulse of current of amplitude (kV, no more than):	
125 A	22.5
500 A	23.4
6. Residual voltage at 1/10 μs steep current impulse with amplitude 10000 A (kV, no more than)	33.5
7. Repetitive Charge Transfer Rating Q_{rs} , C	0.4
8. Thermal Charge Transfer Rating Q_{th} , C	1.1
9. High current impulse 4/10 μs , kA	100
10. Long Duration Current Impulse, A	300
11. Reference voltage (at reference current $I_{ref} = 1\text{ mA}$), kV, no less than	11.2

5.2. External insulation parameters:

- total lightning impulse 1.2/50 μ s withstand voltage, no less than 75 kV
- one-minute withstand voltage of 50 Hz wet, no less than 35 kV
- leakage distance, no less than 305 mm

5.3. The arresters insulation is tracking-erosion stable and resistant to moisture penetration.

5.4. Permissible horizontal stress – 300 N.

5.5. Seismic stability, MSK-64 number 9.

5.6. Partial discharges level in arrester at voltage $1.05 \times U_{cont}$ – no more than 10 pC.

5.7. TOV characteristics are presented in the Fig. 1 below.

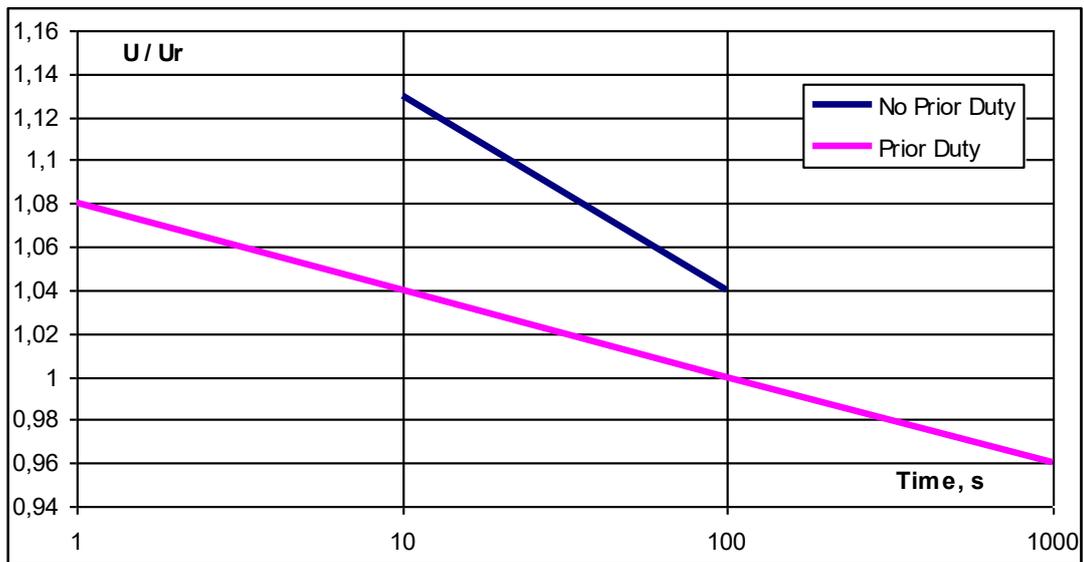


Fig. 1 TOV characteristics

6. Safety

6.1. Arresters are explosion-proof and withstand the following short-circuit currents without exploding:

- 20 kA (rms) during 0,2 c (no less than);
- 600 A (rms) during 2 c (no less than)

6.2. Arrester complies with the IEC 60099-4:2014.

7. Service life

Expected service life of arrester (with 0.98 no-failure probability) is 30+ years.

8. Standard Set and the Options

The delivery set is consisting of:

- Arrester;
- QC Test Certificate;
- Technical Manual (3 copies per type of arresters).

Arrester assembly consisting of:

- Metal-oxide surge arresters without gaps of PA-DM-101 type;
- High-voltage input type 03 - pin M10×45 - 1 pcs, nut M10 - 1 pcs., square washer Ø10 - 1 pcs., connect plate Ø10 - 1 pcs;
- Insulation bracket (type II 130 mm);
- Disconnecter (type D4);
- Flexible earthing conductor 25 mm², 0,5 m.

9. Marking

On the top flange of the arrester it is indicated:

- Manufacturer's trademark;
- Arrester type;
- MCOV, kV;
- Factory number;
- Production date.

10. Transportation

Transportation is carried out in the original container with the label:

- Glass;
- Not wet;
- Top.

11. Storage

Arresters should be kept in the original package. Storage shall be enclosed, no heating/cooling required in the range of temperature from -60⁰ C to +50⁰ C.

While warehousing and transporting the arresters should not be exposed to moisture, oil products, and acids, alkalis, gases and other volatile substances that may damage the polymer case.

Acceptance of the product should include inspection of the packaging integrity and compliance to the order.

12. Installation

12.1. Only qualified personnel familiar with this Technical Manual and safety rules shall be allowed to work with the arresters.

ATTENTION: *To avoid damage, arrester insulation must not be touched by any parts with hard sharp edges or cutting tools.*

12.2. Remove arrester from the packaging and ensure there is no visible damage that may have occurred during transportation.

12.3. Install the arrester following the diagram in the Appendix B.

12.4. Arresters earthing is carried out by a flexible copper conductor with cross-section of not less than 6 mm². The earthing conductor is connected by means of the earthing stud M10 placed at the bottom flange of the disconnector arrester.

13. Maintenance requirements

Maintenance of arresters is not provided.

Arrester isn't repairable. Repair manual is not provided.

14. Warranties

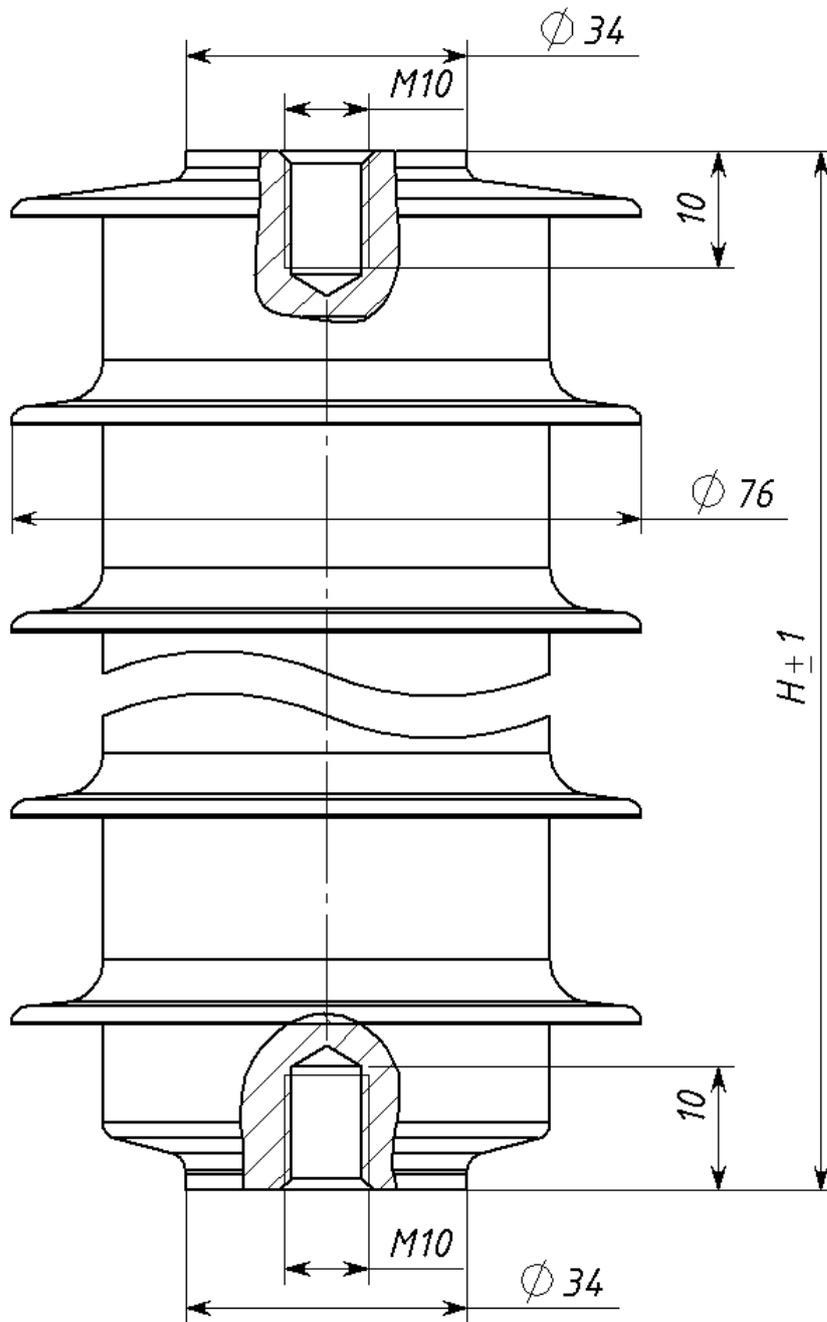
Manufacturer will replace failed arresters during 5 years from the date of commissioning but no later than 7 years from the date of shipment from manufacturer, provided that the failed arrester(s) was transported, handled, installed and operated in strict compliance with this Technical Manual.

15. Recycling

Arrester contains no hazardous and/or volatile materials that may affect humans or animals which may come in contact with them. Recycle in accordance with the local bylaws for metal and plastic industrial waste.

APPENDIX A

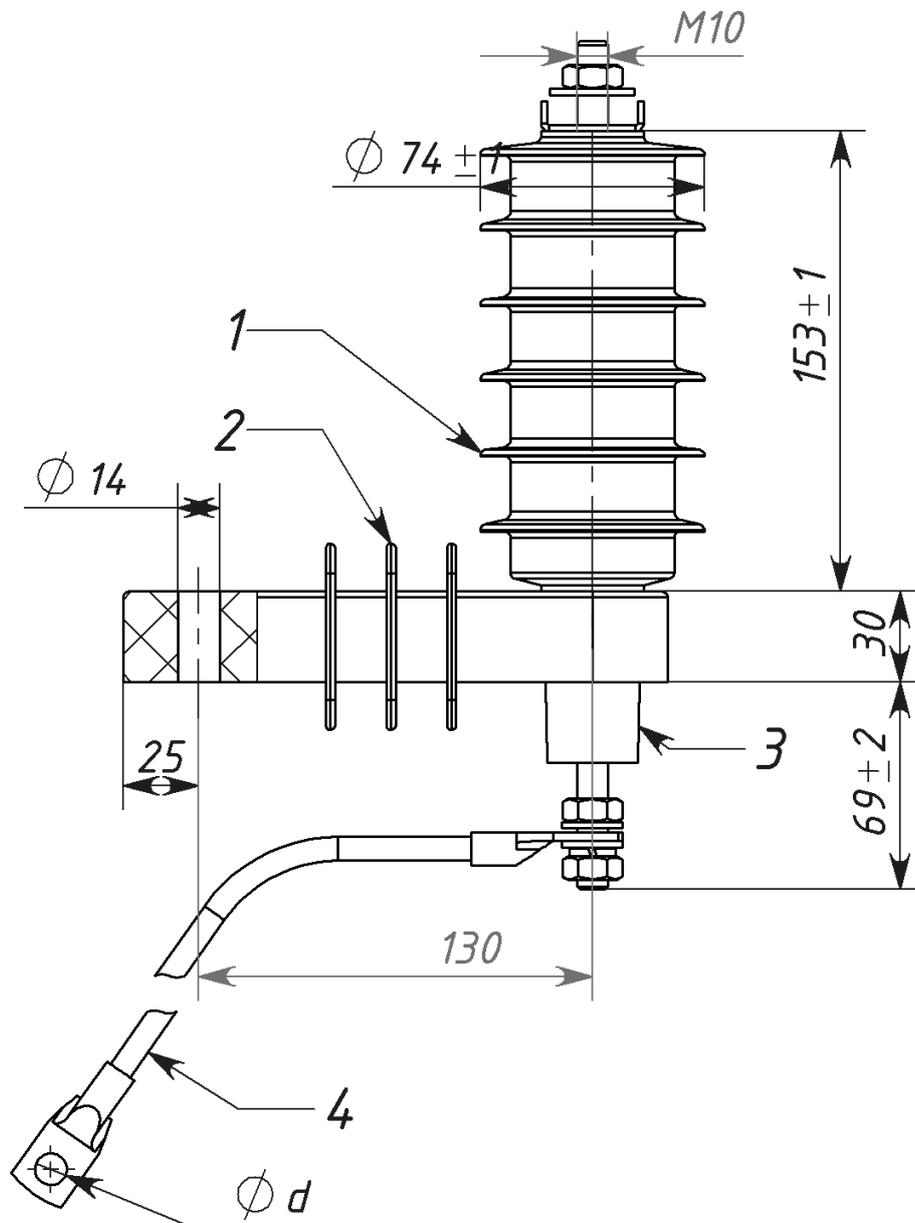
Outline and fitting dimensions and weight of arresters of PA- DM -101 type



Arrester height (H) – 153 ± 1 mm.

Arrester weight – 0.92 ± 0.05 kg.

APPENDIX B
Arrester Assembly

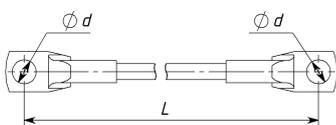


Arrester height (H) – 153 ± 2 mm.

Insulation bracket length (L1) – 130 ± 1 mm.

Conductor diameter (d) – 2...18 mm.

Earthing conductor:



Conductor 25 mm^2 (L) – 500 mm. d – 13 mm.