




VariSTAR Type AZG4 Surge Arresters Installation and Maintenance Instructions

 Olean, NY USA		VariSTAR® SURGE ARRESTER		
		Cat. No.	AZG4	
		Ser. No.	<input type="text"/>	Year
		Rating	<input type="text"/> kV rms	
		MCOV/COV	<input type="text"/> kV rms	
		Pres Relief	63 <input type="text"/> kA _{sym} ^{rms}	
		Class	4/20 kA	
		Cert.	IEC 60099-4	
		<input type="text"/>		
Frequency 50-60 Hz			Alt. 0-12000 Ft. 0-3600 M	

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Safety for life



Eaton's Cooper Power series products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high-voltage lines and equipment and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with high voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury and equipment damage.

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.

VariSTAR Type AZG4 Surge Arresters Installation and Maintenance Instructions

CAUTION:

Eaton's Cooper Power series VariSTAR Type AZG4 Surge Arrester is designed to be operated in accordance with safe operating procedures. These instructions are not intended to supersede or replace proper safety and operating procedures. Read all instructions before installing the arrester.

Surge arresters should be installed and serviced only by personnel familiar with good safety practice and the handling of high voltage electrical equipment

Product information

Introduction

Eaton's Cooper Power series VariSTAR™ AZG4 Class 4, 20 kA Surge Arresters incorporate the latest in metal oxide varistor (MOV) technology. These arresters are totally gapless and are constructed of a single series column of 76 mm diameter MOV disks. The arrester is designed and tested exclusively to the requirements of the international standard IEC 60099-4 and is available in ratings for the overvoltage protection of high voltage systems through 400 kV.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional Information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your Eaton representative.

Initial inspection

The factory takes special precautions to ship the arresters in well-designed containers that reduce the possibility of damage, which may occur during transit. Carefully inspect each arrester for physical damage. In case of improper handling or shipping damage, immediately file a claim with the carrier and promptly notify Eaton or your local representative.

CAUTION:

Do not install arresters that have evidence of external damage.

Handling and storage

If the arrester is to be stored for an appreciable time before installation, provide a clean, dry storage area. Locate the arrester so as to minimize the possibility of physical damage.

Quality standards

ISO 9001 Certified Quality Management System

General application recommendations

Eaton's Cooper Power series product application engineers are available to make specific application recommendations.

Identification

A nameplate attached to the base casting of each VariSTAR Arrester indicates its catalog number, voltage rating (Ur), continuous operating voltage (Uc), rated frequency, pressure relief rated current, class, reference to the type test standard, altitude range, serial number, and year of manufacture.

For multiple unit arresters, a nameplate attached to the top casting of each unit indicates the catalog number and serial number of the complete arrester of which the unit forms a part. The unit nameplate also indicates the total number of units comprising the complete arrester and references the position of this unit in the complete assembly.

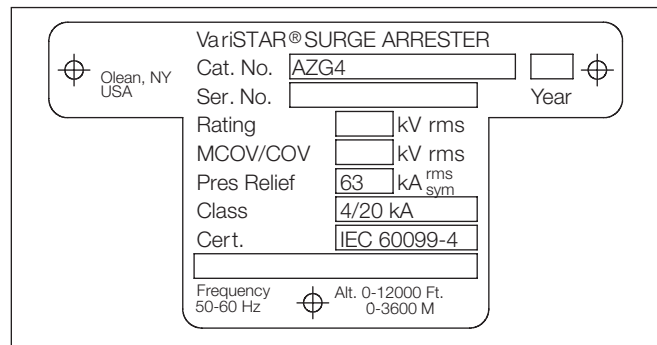


Figure 1. Unit Nameplate.

CAUTION:

Always handle surge arresters carefully. Dropping or jarring an arrester may cause serious damage to the porcelain and/or internal parts and may cause catastrophic failure upon energization.

Assembly

VariSTAR Type AZG4 Arresters rated 3- through 120 kV are shipped ready for installation. Assemble multiunit VariSTAR Type AZG4 Arresters in a series stack as indicated on the nameplate attached to the top casting of each unit. A grading ring is supplied for standard arresters rated 172 to 360 kV and some arresters of lower voltage rating having extra leakage housings. Grading ring assembly instructions are shown in Figure 8.

Choose a permanent location so that the arresters will be installed as (electrically) close as possible to the equipment being protected. Minimum clearance distances between

any line potential surface to an arrester and to any ground plane are listed in Table 1. Figures 2 and 3 show alternate mounting arrangements. See Table 1 and Figure 7 for standard arrester height and leakage distance information.

⚠ CAUTION:

The values shown in Table 1 are the minimum clearances recommended by Eaton. These minimum clearances may be increased to meet local or system requirements for spacing of energized equipment. Safe operating practices must always be followed.

⚠ CAUTION:

Make electrical connections so that no mechanical stress is applied to the arrester.

Base or foundation mounting

Pier footings should extend below the frost line. Elevate the foundation sufficiently above the ground line for personnel safety and to prevent contamination from ground splash, drifting snow, floodwater, or other contaminating conditions. If the top of the foundation is not level, shims will be required for leveling. Layout mounting dimensions for the foundation are shown in Figure 6.

The base section (unit #1) shall be bolted to the foundation. Units #2, #3 and #4 (as applicable) shall be bolted in place, one unit at a time, until all arrester units and grading ring (if supplied) are assembled.

⚠ CAUTION:

The vent port in the base must be directed away from adjacent equipment to prevent ionized gases from damaging other equipment in the unlikely event of arrester failure.

Bracket or structure mounting

When bolting arresters directly to structures, or mounting brackets, make the assembly rigid enough to prevent mechanical failure.

Suspension mounting

Arresters rated through 168 kV can be suspension mounted. Either the top or bottom of suspension mounted arresters can be connected to the line as long as the sheds on the porcelain housings are not inverted. For additional information regarding suspension mounting, contact your Eaton factory representatives.

⚠ CAUTION:

To prevent strains on the arrester when suspension mounting, suspend it freely. Always make flexible connections to line and earth terminals.

Electrical connections

Install the arrester as close as possible (electrically) to the apparatus being protected. Line and earth connections must be short and direct. Make the earth connection to a solid, effective and permanent low resistance earth.

Note: Equipment protection will be improved by always interconnecting the arrester earth connections with the transformer tank and system neutral whenever possible.

The standard line terminal (Figure 4) and earth terminal (Figure 5) include connector clamps that accommodate 14-335 mm² stranded copper or aluminum conductor. This is equivalent to a maximum conductor diameter of 21 mm or 500 mcm.

The line and earth terminals allow the connector clamp to be positioned for vertical or horizontal conductor takeoff; in addition, they accommodate industry standard two- or four-hole connectors.

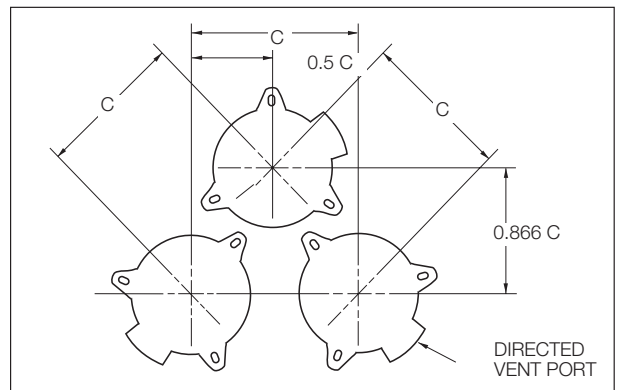


Figure 2. Three-phase triangular mounting.

Note: Refer to Table 1, page 7, for Dimension C.

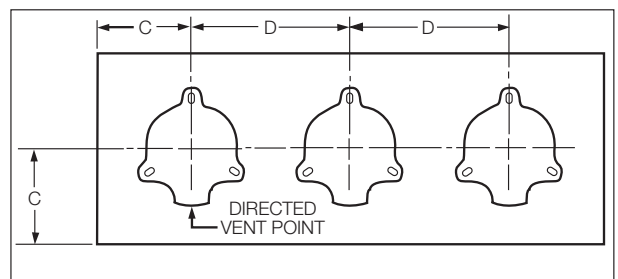


Figure 3. Three-phase in-line mounting.

Note: Refer to Table 1, page 7, for Dimensions B and C.

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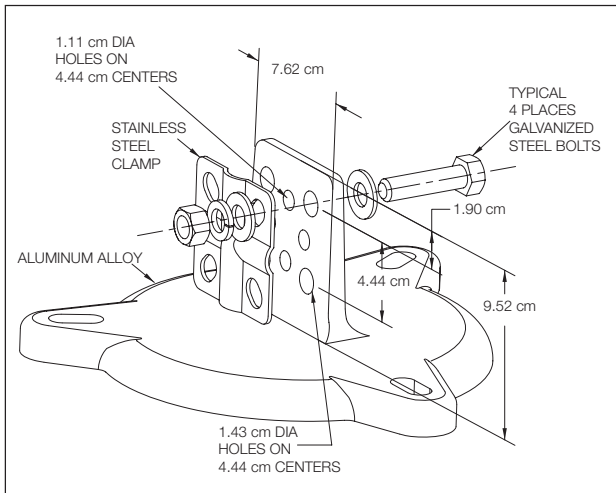


Figure 4. Line terminal cap.

Note: Line and earth terminals (suitable for copper or aluminum conductors up to 335 mm² (up to a maximum diameter of 20 mm)).

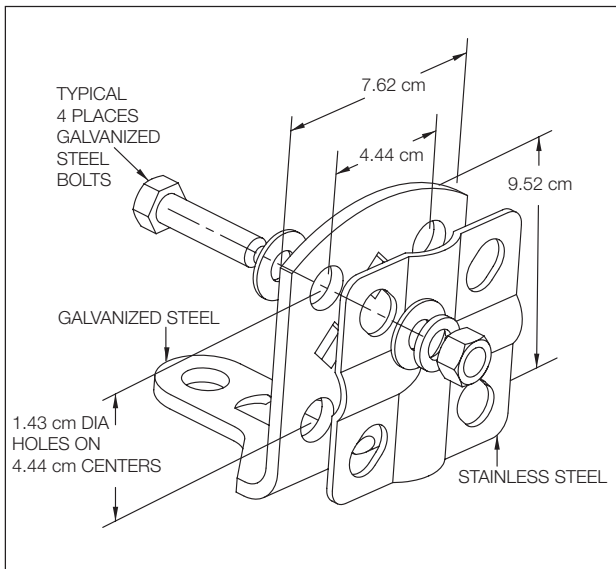


Figure 5. Earth terminal.

Note: Line and earth terminals (suitable for copper or aluminum conductors up to 335 mm² (up to a maximum diameter of 20 mm)).

Maintenance

WARNING

Before working on arresters, disconnect all line leads. Consider any part of an arrester dangerous when connected to the line, including a base not solidly earthed.

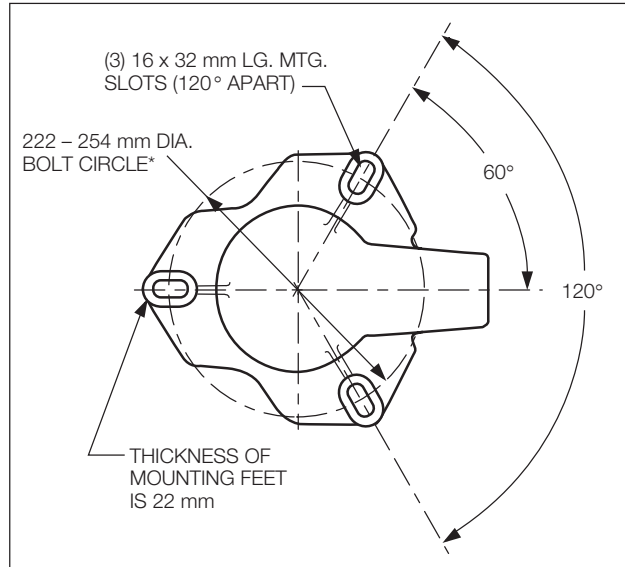


Figure 6. Base mounting details.

* To develop rated cantilever strength use 254 mm bolt circle mounting diameter and 12 mm hardened bolts and flat washers.

VariSTAR Type AZG4 Arresters require no special maintenance under normal conditions. If the arrester is installed in an area of severe contamination, keep the arrester housing clean by washing periodically. Keep line and earth connections tight.

WARNING

Arresters can be washed while energized provided standard live washing procedures are followed.

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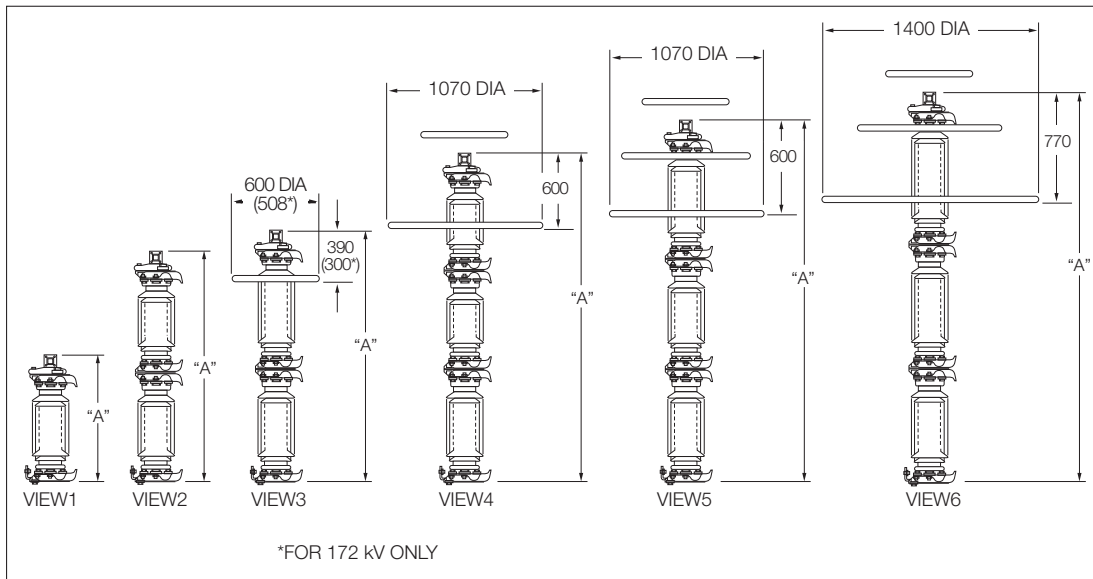


Figure 7. Dimensions of VariSTAR Type AZG4 Surge Arrester.

Note: Refer to Table 1, page 7, for Dimension A.

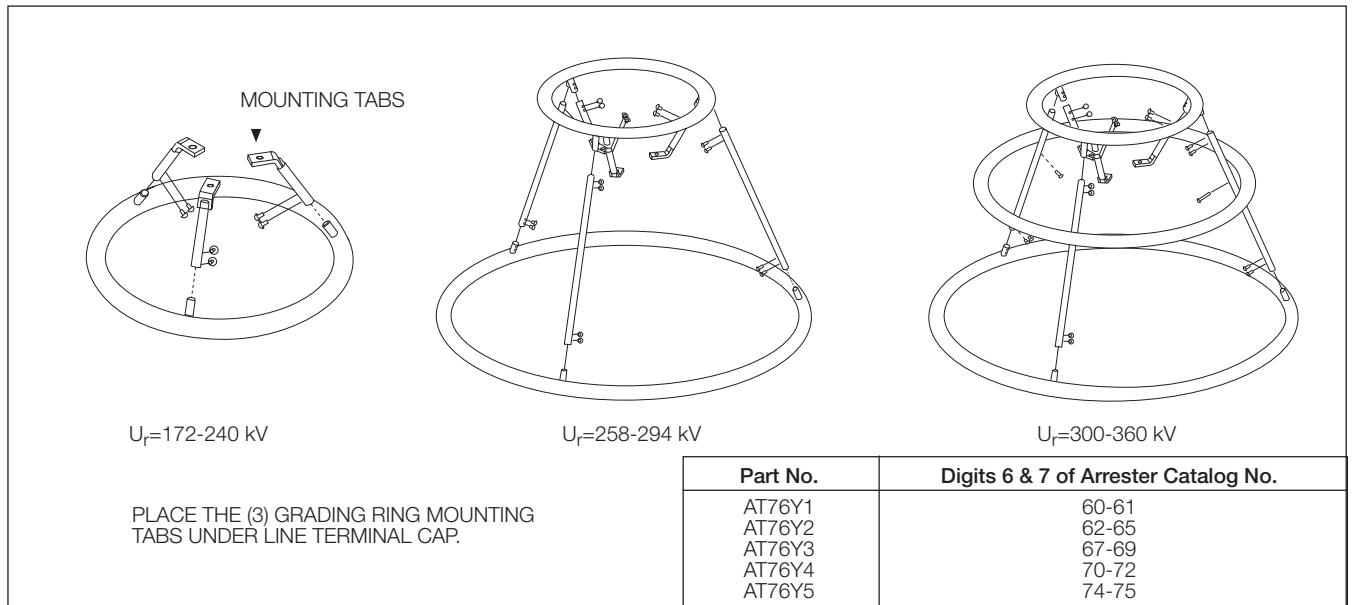


Figure 8. Grading ring assembly.

Note: Arresters with extra leakage housings may require grading rings in different voltage ratings.

VariSTAR Type AZG4 Surge Arresters Installation and Maintenance Instructions

Table 1. Catalog Numbers and Dimensional Information for Standard Arresters. (Contact Eaton Representative for Catalog Numbers of Non-standard Arresters)

Ur Arrester Rating (kV rms)	Uc Arrester COV (kV rms)	Catalog Number	Dim A (mm)	Figure 7 View Number	Dimension B Minimum Phase-to-Earth Clearance (mm)	Dimension C Minimum Phase-to-Phase Clearance (mm)	Housing Leakage Distance (mm)	Arrester Mass (kg)
3	2.55	AZG4041G002003	471	1	163	308	234	19
6	5.10	AZG4041G005006	471	1	165	309	234	19
9	7.65	AZG4041G007009	471	1	173	317	234	20
10	8.40	AZG4042G008010	535	1	176	320	406	23
12	10.2	AZG4042G010012	535	1	186	330	406	24
15	12.7	AZG4042G012015	535	1	202	347	406	24
18	15.3	AZG4043G015018	630	1	223	367	665	28
21	17.0	AZG4043G017021	630	1	237	382	665	29
24	19.5	AZG4043G019024	630	1	241	385	665	30
27	22.0	AZG4044G022027	725	1	261	406	922	35
30	24.4	AZG4044G024030	725	1	282	426	922	35
33	27.5	AZG4044G027033	725	1	308	452	922	36
36	29.0	AZG4044G029036	725	1	320	465	922	36
39	31.5	AZG4045G031039	852	1	341	486	1267	43
42	34.0	AZG4045G034042	852	1	347	492	1267	43
45	36.5	AZG4045G036045	852	1	367	512	1267	44
48	39.0	AZG4045G039048	852	1	387	531	1267	44
54	42.0	AZG4046G042054	929	1	411	556	1646	52
60	48.0	AZG4046G048060	929	1	458	603	1646	53
66	53.0	AZG4047G053066	1002	1	496	641	1872	59
72	57.0	AZG4047G057072	1002	1	529	674	1872	59
78	62.0	AZG4048G062078	1219	1	568	712	2540	70
84	68.0	AZG4048G068084	1219	1	617	762	2540	72
90	70.0	AZG4048G070090	1219	1	634	778	2540	72
96	76.0	AZG4048G076096	1219	1	680	825	2540	73
108	84.0	AZG4049G084108	1436	1	743	888	3226	93
120	98.0	AZG4049G098120	1436	1	853	998	3226	96
132	106	AZG4052G106132	1817	2	919	1064	3518	110
138	111	AZG4052G111138	1817	2	960	1105	3518	111
144	115	AZG4053G115144	1890	2	991	1135	3744	117
162	130	AZG4054G130162	2034	2	1109	1253	4186	125
168	131	AZG4055G131168	2107	2	1117	1261	4412	130
172	140	AZG4061G140172	2116	3	1374	1704	4412	136
180	144	AZG4062G144180	2261	3	1407	1737	4872	150
192	152	AZG4062G152192	2261	3	1467	1797	4872	152
198	160	AZG4063G160198	2333	3	1533	1863	5098	158
204	165	AZG4064G165204	2550	3	1571	1902	5766	169
216	174	AZG4064G174216	2550	3	1646	1976	5766	171
228	182	AZG4065G182228	2768	3	1706	2036	6452	191
240	190	AZG4065G190240	2768	3	1772	2102	6452	193
258	209	AZG4067G209258	3149	4	2126	2659	6744	214
264	212	AZG4067G212264	3149	4	2151	2684	6744	214
276	220	AZG4069G220276	3366	4	2211	2745	7412	226
288	230	AZG4069G230288	3366	4	2293	2827	7412	228
294	235	AZG4070G235294	3438	5	2332	2865	7638	237
300	239	AZG4070G239300	3438	5	2365	2898	7638	238
312	245	AZG4071G245312	3583	5	2411	2945	8098	253
330	267	AZG4074G267330	3872	6	2750	3448	8992	274
336	269	AZG4074G269336	3872	6	2763	3462	8992	275
360	289	AZG4075G289360	4090	6	2925	3624	9677	297

Note:

1. Position #5 designates nameplate options: 0=English 1=Spanish 2=Portuguese
2. All arresters are available in grey (standard) or brown porcelain glaze. For brown glaze, substitute "B" for "G" in the eighth position of the catalog number.
3. Digits 6 and 7 housing designation may be modified for arresters requiring leakage distance other than the standard arresters shown. Extended leakage may require additional clearances for phase-to-phase and phase-to-earth. Contact your sales representative for this information.
4. Cantilever strength for ratings 3-48 kV=10,200 NM and for ratings 54-360 kV=13,550 NM. Maximum working load should not exceed 40% of this value.
5. Refer to Figure 7 for Dimension A.

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