

Surge Arresters

UltraSIL Polymer-Housed VariSTAR Type UI Intermediate-Class Surge Arresters Installation and Maintenance Instructions

Service Information

S235-75-1

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⚠ CAUTION:

The UltraSIL Polymer-Housed VariSTAR Type UI Surge Arrester from Cooper Power Systems 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

UltraSIL Polymer-Housed VariSTAR Type UI Intermediate-Class 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 MOV disks. They are used for overvoltage protection of high voltage equipment, either indoors or outdoors. The arrester is designed and tested to the requirements set forth in IEEE Std C62.11™ standard.

⚠ 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 Cooper Power Systems sales representative.

Acceptance and Initial Inspection

The factory takes special precautions to ship 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 Cooper Power Systems or your local representative.

Identification

A nameplate attached to the base of each arrester indicates its catalog number, voltage rating, maximum continuous operating voltage (MCOV), rated frequency, pressure-relief current rating, class, reference to the type test standard, altitude range, serial number, and year of manufacture. Refer to Figure 1 for an example of a blank nameplate.

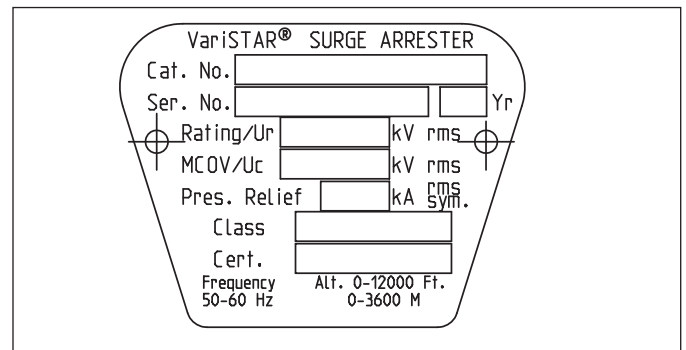


Figure 1. Detail of blank arrester nameplate.

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 9001:2008-Certified Quality Management System



SAFETY FOR LIFE



Cooper Power Systems 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 Cooper Power Systems 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, 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.

General Application Recommendations

Cooper Power systems application engineers are available to make specific application recommendations.

⚠ CAUTION:

Do not install arresters that have evidence of damage.

⚠ CAUTION:

Always handle surge arresters carefully. A damaged arrester may cause catastrophic failure upon energization.

INSTALLATION INSTRUCTIONS

ARRESTER INSTALLATION

UltraSIL Polymer-Housed VariSTAR Type UI Intermediate-Class Arresters are shipped assembled. Choose a permanent installation location so that the arresters will be installed as close as possible (electrically) 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. Figure 3 shows minimum phase-to-ground and minimum phase-to-phase clearances. See Table 1 and Figure 4 for standard arrester dimension and weight information.

Packaged Configurations

- Assembled arrester ready for installation.
- The line and ground terminal connectors are shipped unattached to the arrester, and should be assembled when the arrester is installed.

Detailed Assembly Instructions

STEP 1

After the arrester is in place and ready to be secured, the ground terminal connector should be placed so that the mounting hole found on the connector is directly over one of the three mounting slots on the base of the arrester.

STEP 2

The bolt (user supplied) used to secure the arrester is then run through the hole of the connector, the mounting slot, and the structure the arrester is attached to.

⚠ CAUTION:

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

STEP 3

Secure the arrester to the structure with the hex nuts (user supplied).

STEP 4

Position the line terminal connector on the top of the arrester. Secure the supplied lock washer and nut until tight.

NOTE: The recommended torque for securing the terminal connector to the arrester and for the terminal clamp hardware is 20-25 ft-lb, not to exceed 30 ft-lb.

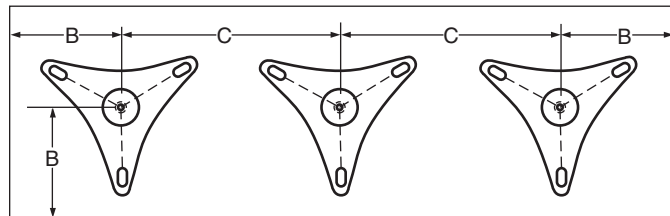


Figure 2.
Three-phase In-line mounting arrangement.

Note: Refer to Table 1 for Dimensions "B" and "C".

⚠ CAUTION:

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

Mechanical Strength

The ultimate cantilever strength of the Type UI Intermediate-Class arrester is 10,000 in-lbs. The maximum recommended working load should not exceed 4,000 in-lbs.

In order to achieve rated cantilever strength use a 10" bolt circle mounting diameter and 0.5" hardened bolts with flat washers.

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, flood water, or other contaminating conditions. If the top of the foundation is not level, shims will be required for leveling. Layout mounting dimensions for the arrester mounting base are shown in Figure 3.

Bracket or Structure Mounting

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

Suspension Mounting

UltraSIL Polymer-Housed VariSTAR Type UI Intermediate-Class Arresters can be suspension-mounted through 108 kV. Either the top or bottom of suspension-mounted arresters can be connected to the line. It is important that the arrester is mounted so that the outer sheds of the housing are angled downward. For additional information regarding suspension mounting, contact your Cooper Power Systems factory representatives.

Horizontal Mounting

Type UI Intermediate-Class Arresters can be horizontal mounted.

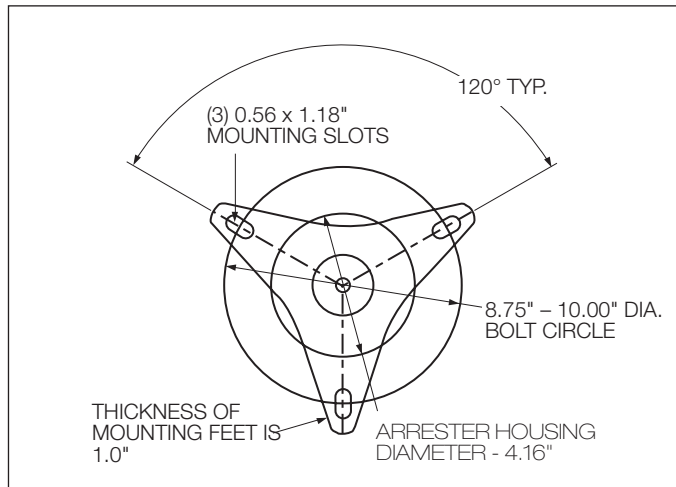


Figure 3.
Mounting base details.

ELECTRICAL CONNECTIONS

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

! CAUTION:

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

NOTE: Equipment protection will be improved by interconnecting the arvester ground connections with the transformer tank and system neutral whenever possible.

The standard line terminal can accommodate copper or aluminum conductors through 0.82" dia. (500MCM). The standard ground terminal can accommodate copper or aluminum conductors through 0.50" dia.

! 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 grounded.

MAINTENANCE

UltraSIL Polymer-Housed VariSTAR Type UI Intermediate-Class 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. Arresters must be spray washed evenly in order to avoid overheating. Do not use high pressure water. Keep line and ground connections tight.

! WARNING:

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

TABLE 1
Catalog Numbers, Dimensions, Weights, Spacing Requirements and Insulation Withstand Levels of UltraSIL Housed Intermediate-Class Arrester (Standard Configuration)

| Arrester Rating (kV, rms) | Catalog Number | Minimum Figure 5 Dim. "A" (inches) | Figure 2 Dim. "B" Minimum Phase-to-Ground Clearance (inches) | Figure 2 Dim. "C" Minimum Phase-to-Phase Clearance (inches) | Creepage Distance (inches) | Insulation Withstand Voltages | | | Weight (lbs.) |
|---------------------------|----------------|------------------------------------|--|---|----------------------------|-------------------------------|---------------------------------|---------------------------------|---------------|
| | | | | | | 1.2/50 Impulse (kV, crest) | 60 Hz, dry 60 seconds (kV, rms) | 60 Hz, wet 10 seconds (kV, rms) | |
| 3 | UI003A | 6.1 | 5.2 | 9.7 | 12.2 | 105 | 67 | 44 | 11.4 |
| 6 | UI006A | 6.1 | 5.4 | 9.9 | 12.2 | 105 | 67 | 44 | 11.7 |
| 9 | UI009A | 7.7 | 5.8 | 10.3 | 16.2 | 130 | 86 | 59 | 12.9 |
| 10 | UI010A | 7.7 | 6.0 | 10.5 | 16.2 | 130 | 86 | 59 | 12.9 |
| 12 | UI012A | 9.2 | 6.5 | 11.0 | 20.3 | 149 | 102 | 68 | 14.1 |
| 15 | UI015A | 10.7 | 7.3 | 11.8 | 24.3 | 171 | 115 | 81 | 15.2 |
| 18 | UI018A | 10.7 | 8.3 | 12.8 | 24.3 | 171 | 115 | 81 | 15.6 |
| 21 | UI021A | 10.7 | 9.0 | 13.5 | 24.3 | 171 | 115 | 81 | 15.6 |
| 24 | UI024A | 12.3 | 9.2 | 13.7 | 28.4 | 193 | 126 | 93 | 16.7 |
| 27 | UI027A | 13.8 | 10.1 | 14.6 | 32.4 | 214 | 136 | 105 | 17.9 |
| 30 | UI030A | 15.4 | 11.0 | 15.5 | 36.5 | 236 | 144 | 117 | 19.1 |
| 33 | UI033A | 15.4 | 12.2 | 16.7 | 36.5 | 236 | 144 | 117 | 19.4 |
| 36 | UI036A | 15.4 | 12.8 | 17.3 | 36.5 | 236 | 144 | 117 | 19.4 |
| 39 | UI039A | 16.9 | 13.8 | 18.3 | 40.5 | 255 | 151 | 124 | 20.6 |
| 42 | UI042A | 18.4 | 14.7 | 19.2 | 44.6 | 279 | 158 | 142 | 21.8 |
| 45 | UI045A | 18.4 | 15.6 | 20.1 | 44.6 | 279 | 158 | 142 | 22.0 |
| 48 | UI048A | 21.5 | 16.6 | 21.1 | 52.7 | 322 | 173 | 166 | 24.1 |
| 54 | UI054A | 21.5 | 17.7 | 22.2 | 52.7 | 322 | 173 | 166 | 24.4 |
| 60 | UI060A | 24.6 | 19.9 | 24.4 | 60.8 | 366 | 192 | 190 | 26.8 |
| 66 | UI066A | 30.8 | 21.9 | 26.4 | 77.0 | 491 | 295 | 241 | 33.9 |
| 72 | UI072A | 32.3 | 23.4 | 27.9 | 81.0 | 510 | 302 | 248 | 35.0 |
| 78 | UI078A | 33.8 | 25.3 | 29.8 | 85.1 | 534 | 309 | 266 | 36.6 |
| 84 | UI084A | 36.9 | 27.5 | 32.0 | 93.2 | 580 | 323 | 296 | 38.9 |
| 90 | UI090A | 36.9 | 28.3 | 32.8 | 93.2 | 580 | 323 | 296 | 39.5 |
| 96 | UI096A | 38.5 | 30.5 | 35.0 | 97.2 | 602 | 330 | 308 | 40.7 |
| 108 | UI108A | 43.1 | 33.5 | 38.0 | 109.4 | 666 | 355 | 344 | 44.2 |

Note: Phase-to-phase clearances are expressed as minimum arrester centerline-to-centerline distances and are based upon arrester protective levels.

DIMENSIONS

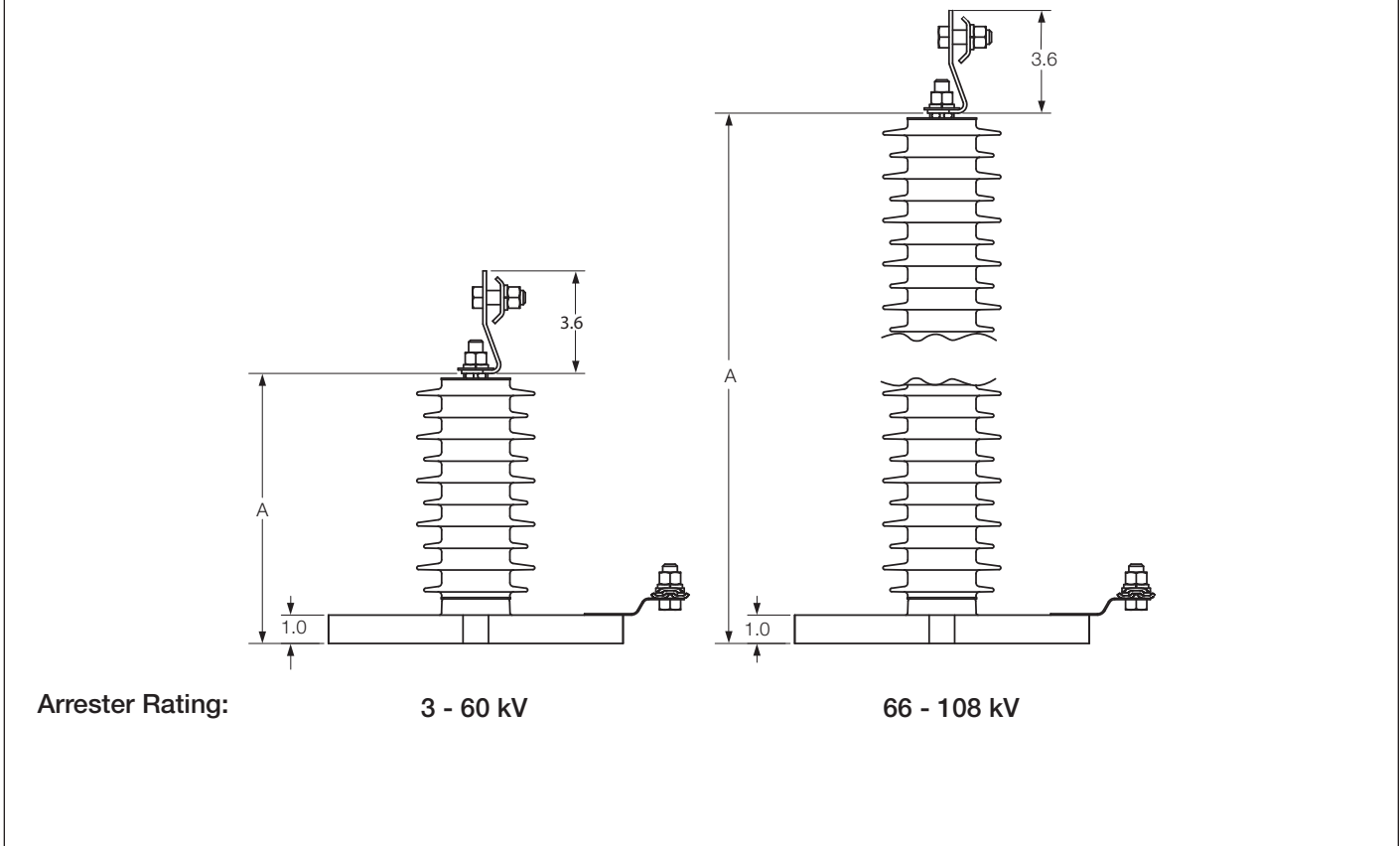


Figure 4.
Outline drawing of standard UltraSIL Polymer-Housed Type UI Intermediate-Class Arresters.

Notes:
Refer to Table 1 for dimension "A". Arresters shown with standard line terminal, option 3 and with standard ground terminal, option 1.
Outlines in Figure 4 represent standard arrester catalog numbers from 235-75. Outline dimensions will vary when optional housing codes are selected. Consult factory for more information.

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