

# Oil-filled, single-phase pad-mounted distribution transformers installation, operation and maintenance instructions

Supplemental instruction for underoil-mounted M.O.V. (metal oxide varistor) surge  
arresters



*Powering Business Worldwide*

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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 arc 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 an imminently hazardous situation which, if not avoided, will result in death or serious injury.

#### WARNING

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

#### CAUTION

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

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may 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 hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.**

G103.3

#### 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.**

G101.0

#### 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 can result in death, severe personal injury and equipment damage.**

G102.1

#### 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.**

G122.3

## Product information

### Introduction

*Service Information MN201002EN* contains information for distribution transformers with underoil-mounted M.O.V. (metal oxide varistor) surge arresters.

Refer to *Service Information MN201001EN, Oil-Filled, Single-Phase Pad-Mounted Distribution Transformers Installation, Operation, and Maintenance Instructions* for complete instructions regarding this equipment.

### Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before connecting 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. For additional information, contact your Eaton representative.

### Receiving

Immediately upon receipt of the equipment, examine it externally for any damage which may have occurred during shipment. It should not be necessary to inspect the transformer internally or examine the insulating liquid unless the unit has been damaged during shipment or storage. If injury or rough handling is evident, file a damage claim with the transportation company immediately, and notify Eaton representatives.

Tighten any external parts which may have worked loose during shipment.

This transformer has been carefully tested and inspected before shipment and is ready to install unless damage is evident as noted below.

### Quality standards

ISO 9001 Certified Quality Management System

## CAUTION

**Do not over-voltage test this transformer with the arrester connected in the circuit. Disconnect the arrester before over-voltage testing to prevent damaging the arrester.**

### Fuse application for underoil arrester

To limit the released energy to controlled level, the fault parameter must be limited as follows:

#### Single-Phase Pad-mounted Transformers

Arrester Rating (Duty Cycle)	(1) $I^2t$ (A <sup>2</sup> Sec)	(2) $I_{rms}$ Sym 1/2 Cycle	(3) $I_{rms}$ Sym 1 Cycle
10 kV	800,000	9800 A	7000 A
18 kV	400,000	7000	5000
27 kV	330,000	6300	4500

#### Single-Phase Pole-type Transformers

10 kV	300,000	6300 A	4500 A
18 kV	170,000	4500	3200
27 kV	110,000	3600	2500

If the available fault current exceeds the values shown in columns (2) and (3), current-limiting devices are recommended to limit  $I^2t$  to the values shown in column (1).

**Note:** Other accessories may release additional energy and should be given separate consideration.

### Transformer testing with an underoil arrester

**Overvoltage testing.** A surge arrester protects against transient voltage surges, but is not designed to protect against or withstand sustained power frequency overvoltages commonly experienced in electrical testing. For this reason, the arrester must not be connected during low frequency dielectric testing. If the arrester is inadvertently left connected during hipot or induced testing, the arrester blocks will be damaged. This damage may not be apparent and may not be detectable during the test. When the transformer is energized, the arrester could fail immediately, causing a fault inside the transformer tank. For this reason, it is imperative that measures be taken to assure that the arrester cannot be inadvertently left in the circuit during testing. A "CAUTION" label has been provided to alert operators of this information prior to testing of the transformer.

**Impulse testing.** During impulse testing, the arrester should likewise be disconnected. Impulse test voltage will be reduced by the arrester if the transformer is impulse tested with the arrester in the circuit, and the transformer will subsequently not be subjected to full test voltage. No damage to the arrester will occur under normal impulse test conditions.

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