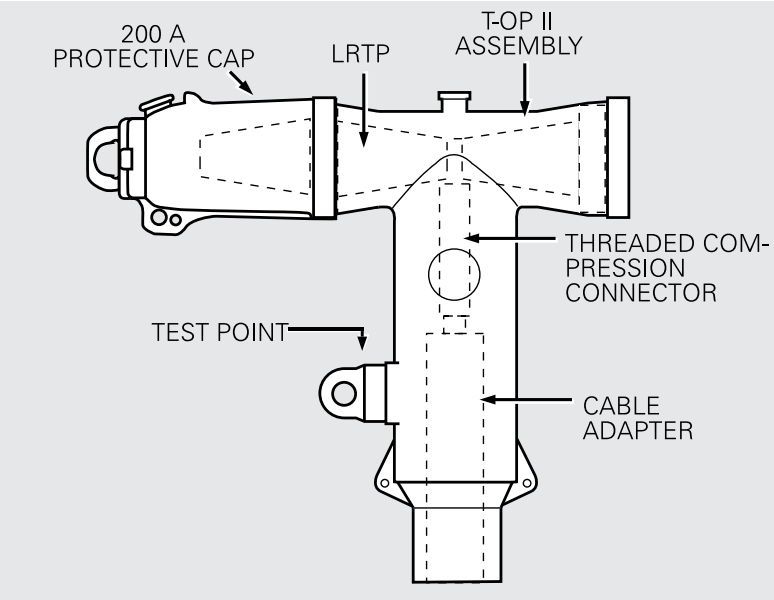
600 A 15/25 kV class T-OP II connector assembly installation instructions



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Contents

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, 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 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. 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 may result in death, severe personal injury, and equipment damage. G102.1

WARNING

Power distribution and transmission equipment must be 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

⚠ DANGER

All associated apparatus must be de-energized during any hands-on installation or maintenance.

⚠ WARNING

The 600 A T-OP II Connector System is designed to be operated in accordance with normal safe operating procedures. These instructions are not intended to supersede or replace existing safety and operating procedures. The elbow connector should be installed and serviced only by personnel familiar with good safety practices and the handling of high-voltage electrical equipment.

⚠ WARNING

Optional Capacitive Test Point Operating Instructions: Use only voltage indicating instruments specifically designed for test points. Use of conventional voltage sensing devices may provide false "No Voltage" indications.

The test point must be dry and free of contaminant's when checking for voltage. After indication is taken: clean, dry, and lubricate the test point cap with silicone grease and assemble to the test point.

The capacitive test point is not sufficiently accurate, nor is it intended for, actual voltage measurements or phasing operations.

A reading of no voltage from the test point should not be the only indication of a de-energized circuit obtained before touching the connector. Other procedures can include direct conductor voltage testing or grounding using a live-line tool.

Product information

Introduction

Eaton's Cooper Power series 600 A 15/25 kV Class T-OP II Deadbreak Connectors are used to terminate high-voltage underground cable on deadfront apparatus such as transformers, switches, and switchgear. They are fully shielded, submersible, and meet the requirements of IEEE Std 386™ standard – "Separable Insulated Connector Systems". Eaton's Cooper Power series 600 A Deadbreak Connectors are fully interchangeable with all other manufacturers that also certify compliance with IEEE Std 386™ standard. The T-OP II is rated for 900 A when used with all copper current carrying components.

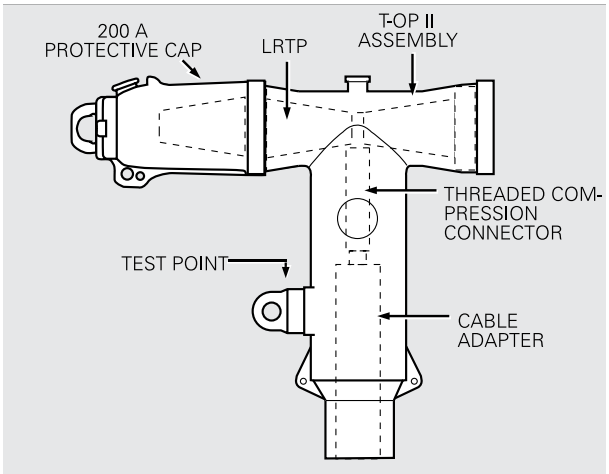

Figure 1. Line illustration of typical 15 kV T-OP II connector assembly

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. For additional information, contact your representative.

Acceptance and initial inspection

Each T-OP II Deadbreak Connector is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the connector and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of the T-OP II Deadbreak Connector to minimize the possibility of damage. If the connector is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Standards

ISO 9001 Certified Quality Management System

Installation instructions

Equipment required

- T-OP II Connector Assembly Kit including:
  - T-body
  - Cable Adapter
  - Coppertop Compression Connector with 15/16" threaded spade
  - Loadbreak Reducing Tap Plug (LRTP) and copper alloy extended length stud
  - 200 A Loadbreak Protective Cap (when furnished)
  - Silicone Lubricant
  - Instruction Sheets
- Tools
  - 5/16" Torque Tool (Catalog Number TQHD625)
  - 5/16" T-Wrench (Catalog Number TWRENCH)

Cable preparation

Note: If a non-Eaton Cooper Power series 600 A T-body is being used, use the stripback lengths given in the T-body kit, then proceed to Step 7 of these instructions.

Step 1

Train cable

- Position cable so that it is centered between apparatus bushing and parking pocket, parallel to apparatus frontplate.
- Provide adequate cable slack for cable movement between standoff bushing and apparatus bushing.
- Support cable as needed to maintain position.

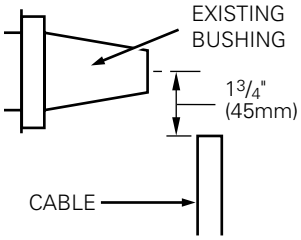

Figure 2. Line illustration for cable training

- Cut cable 1 3/4 inches (45 mm) from centerline of bushing. (Refer to Figure 2.)

Step 2

Cutbacks for concentric neutral cable

- If cable is not concentric neutral (metallic tape shielded, longitudinally corrugated, wire shielded, or UniShield®) use Eaton's Cooper Power series SA series adapter kit with the same cutback dimensions as concentric neutral below. If another manufacturer's metallic shield adapter is used, follow the cutback instructions in the shield adapter kit.
- Take care not to cut into the cable insulation.

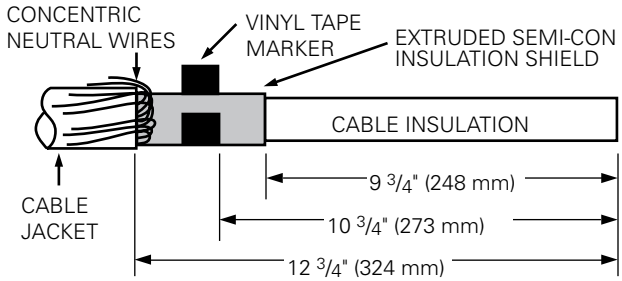

Figure 3. Cutback dimensions for concentric neutral cable

Step 3

Install CA625 cable adapter

- Cut a 45° chamfer into the end of the cable insulation.
- Clean the cable insulation wiping towards the semi-con insulation shield.
- Apply a thin coating of the supplied lubricant to the cable insulation and to the cable entrance of the cable adapter.
- Slide cable adapter onto the cable until the black portion of the adapter touches the vinyl tape marker.

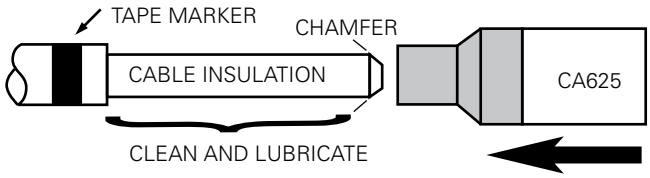

Figure 4. Install the cable adapter

Step 4

Cable insulation cutback

- There should be between 4 3/8" and 4 11/16" of exposed cable beyond the cable adapter. Cut the cable insulation even with the end of the cable adapter and remove the protruding cable insulation. Take care not to cut the cable adapter or nick the conductor.

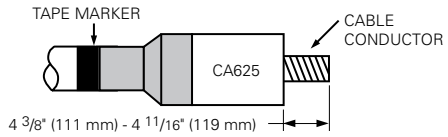

Figure 5. Remove cable insulation

Note: Alternate Insulation Removal Method
The use of certain insulation removal tools may require cutting the insulation back before installing the cable adapter. After removing the semi-conducting insulation shield, it is acceptable to first remove 4 1/2″ of insulation from the end of the cable. Then put a 1/8″ maximum chamfer in the insulation and install the cable adapter.

Step 5

Install compression connector

- Wire brush aluminum conductor and immediately press compression connector onto the cable until the conductor bottoms. Copper conductors do not need to be wire brushed.
- Rotate the connector so the spade eye faces the bushing.
- Crimp the connector using a tool and die combination on the chart packaged with the connector.
- Start crimping just below the first line from the spade end of the connector.
- Rotate each successive crimp working towards the cable adapter. Do not overlap crimps.
- Clean excess inhibitor from the compression connector and cable adapter surfaces.
- After crimping, the distance from the cable adapter to the end of the compression connector must be between 6 1/2″ and 7 1/4″.

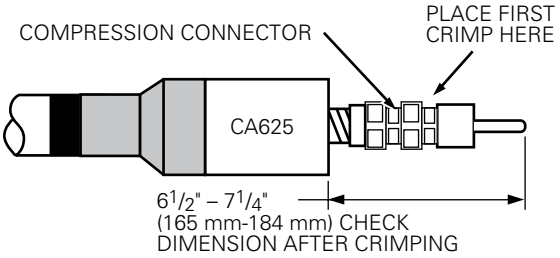

Figure 6. Install compression connector

Step 6

Install DT625 T-Body

- Lubricate entrance of T-body and outside of cable adapter.
- Push T-body onto cable adapter until the compression connector bottoms on the housing.
- If the cable adapter moved, reposition the adapter until it is flush with the tape marker as shown below.

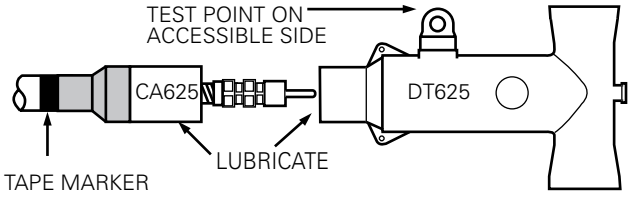

Figure 7. Install T-body

Step 7

Install LRTP into T-Body

- Clean and then lubricate the mating 600 A interface of the LRTP and T-body with the lubricant supplied.
- Remove and recycle the shipping cap from the 200 A LRTP interface and the thread protector from the alignment segment.
- Insert T-Wrench into throat of LRTP and thru rotating nut and engage alignment segment. (T-Wrench should not rotate without entire LRTP rotating.)
- Insert the 600 A alignment segment end of the LRTP into the side of T-body opposite the apparatus bushing. (Refer to Figure 8.)

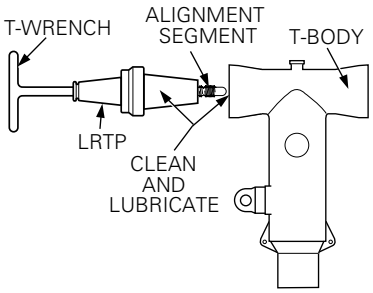

Figure 8. LRTP installation into T-body

- Carefully thread the alignment segment into the threads of compression connector by turning the T-Wrench clockwise until a positive stop is felt.
- Continue applying clockwise force to the T-Wrench until the pin connecting the alignment segment to the LRTP shears allowing the T-Wrench and alignment segment to rotate freely.

- Remove alignment segment by applying pressure to the T-Wrench to separate the alignment segment from the LRTP. Recycle the alignment segment.
- See Figure 9 for illustration of completed LRTP installation.

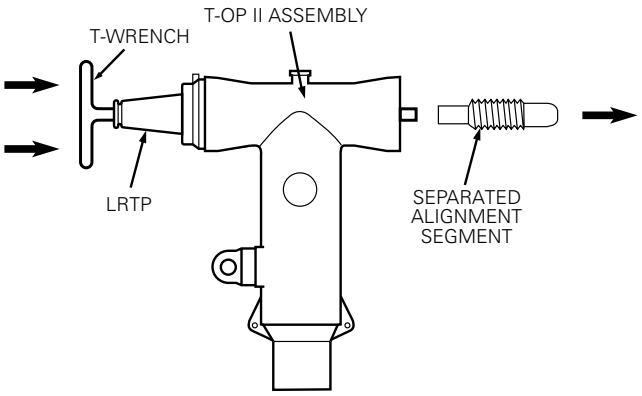

Figure 9. LRTP permanently installed into T-body forming the T-OP II assembly

Install T-OP II assembly onto apparatus bushing

Step 8

Install stud into apparatus bushing

- Ensure unit is de-energized.
- Thread the shorter threaded end of the T-OP II stud into the apparatus bushing until hand tight. (Refer to Figure 10).
- Engage the flats on the stud with a 1/2" wrench and thread the stud into the bushing an additional 1/4 revolution past hand tight.
- Remove any shavings that may have been raised during the threading procedure.

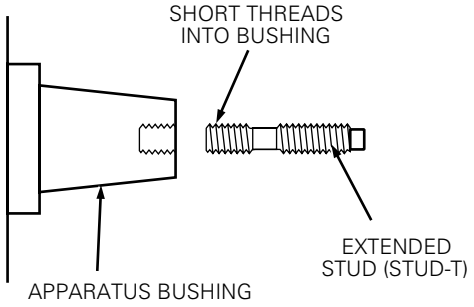

Figure 10. Line illustration of bushing stud installation

Step 9

Install the T-OP II assembly on the apparatus bushing

- Clean and lubricate mating interfaces of the apparatus bushing and T-body with the lubricant supplied.
- Push the T-OP II assembly onto the apparatus bushing until the extended length stud makes contact with the rotating nut in the LRTP.
- Insert the 5/16" torque tool into the 200 A tap and engage the rotating nut. (Refer to Figure 11.)
- Place a screwdriver or the T-wrench through the hotstick operating eye of the torque tool (live-line tools can be used to operate the T-OP II when de-energized) and tighten the T-OP II assembly until the tool ratchets. (20-25 ft.-lbs.)

Note: If 5/16" hex rod (HD625) is used with customer supplied torque wrench, thighten to 20-25 ft.-lbs.

- Remove torque tool.

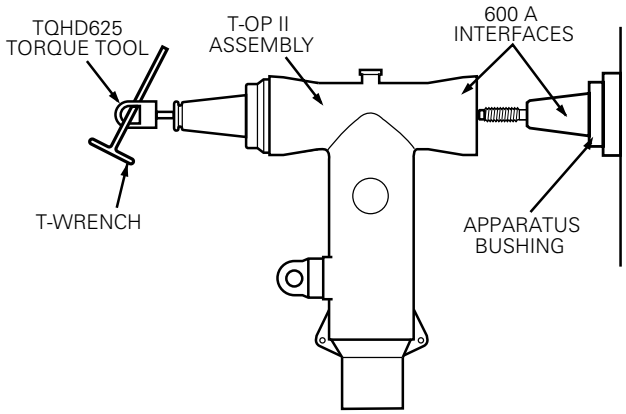

Figure 11. Installing the T-OP II assembly onto the apparatus bushing

Step 10

Cap the 200 a interface

- Clean and lubricate 200 A interface of LRTP and mating apparatus (i.e., protective cap, grounding elbow, M.O.V.E. arrester) with lubricant supplied. (Refer to Figure 12.)
- To cap interface, follow installation instructions supplied with the separable insulated connector used.

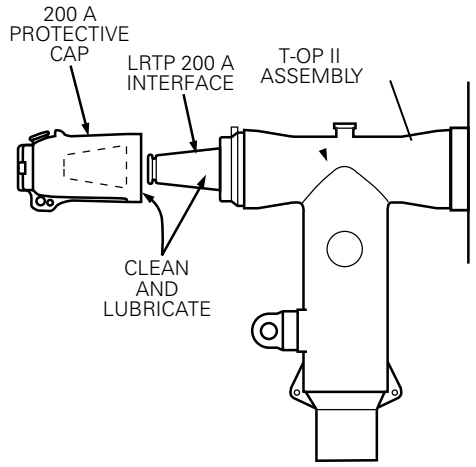

Figure 12. Line illustration of protective cap installation

Step 11

Ground system. (Refer to figure 13.)

- Connect tie-off tabs of LRTP and T-body with an uninsulated drain wire to cable concentric neutral wires and/or to common ground point.
- Connect 200 A apparatus (i.e., protective cap, grounding elbow, M.O.V.E. arrester) drain wire to common ground.

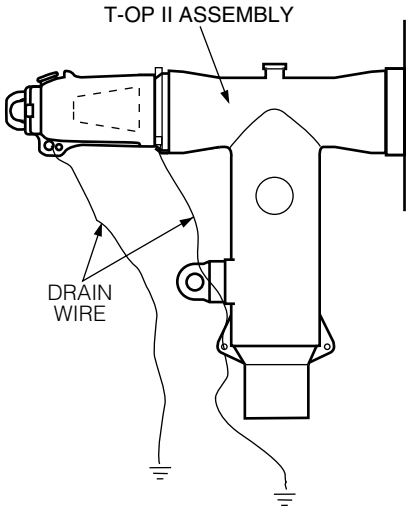

Figure 13. Line illustration of grounding

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