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Three-Phase, Platform-Mounted Distribution Transformers



Platform-Mounted Distribution Transformers

Introduction

The equipment covered by these instructions should be operated and serviced only by competent technicians familiar with good safety practices. These instructions are written for such personnel and are not intended as a substitute for adequate training and experience in safe operating procedures for this type of equipment.

The platform-mounted transformer is designed for above-ground service and for outdoor mounting on a concrete pad or elevated between utility poles. The primary and secondary cables attach to the transformer from above.

DEH-40050

WARNINGS, CAUTIONS, AND NOTES AS USED IN THIS PUBLICATION

WARNINGS

Warning notices are used in this publication to emphasize that hazardous voltages, currents, or other conditions that could cause personal injury or death are present in this equipment or may be associated with its use.

Warning notices are also used for situations in which inattention or lack of equipment knowledge could cause either personal injury or damage to equipment.

CAUTIONS

Caution notices are used for situations in which equipment might be damaged if care is not taken.

NOTES

Notes call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described herein that are not present in all hardware and software systems. GE Industrial Systems assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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The following warning notes apply to the operation of this equipment. Failure to comply with these warnings may result in serious personal injury or damage to the equipment.

Tank Ground



WARNING: The first electrical connection made must be to ground the transformer tank. This connection is made from the tank ground pad to a permanent low-impedance ground. The tank ground must also be connected to the system ground. Failure to comply may result in serious personal injury or damage to the equipment.

External Electrical Connections



WARNING: Make only the connections and operate only at the voltages authorized by the diagrams and information on the transformer name plate. The available transformer neutrals should be connected to the system neutrals. Each lead and connection not in use should be insulated from ground and from all other leads and connections. Failure to comply may result in serious personal injury or damage to the equipment.

Tap Changer



WARNING: The tap changer must not be operated while the transformer is energized. Failure to comply may result in serious personal injury or damage to the equipment.

Lifting



WARNING: Use all the lifting lugs when lifting the transformer. Use proper spreaders to obtain a vertical lift. Do not use the radiators for lifting or jacking. Failure to comply may result in serious personal injury or damage to the equipment.

Venting



WARNING: Always release any possible pressure in the tank by carefully venting the pressure-relief valve before attempting to remove handhole covers or similar covers, including relief diaphragms and shipping covers (when used). Failure to comply may result in serious personal injury or damage to the equipment.

Oil Level



WARNING: Oil must be at the proper level before voltage is applied to the transformer. Failure to comply may result in serious personal injury or damage to the equipment.

Bushings



CAUTION: Remove all dirt and foreign material from all bushings before placing the unit in service. Do not operate beyond the manufacturer's rating.

Platform-Mounted Distribution Transformers

Chapter 2. Receiving, Handling, and Storage

2-1 Receiving

Immediately upon receipt of the equipment, and before putting it into service, inspect the transformer for any damage that may have occurred during shipment or storage. If rough handling is evident, file a damage claim with the transport company immediately and notify the nearest General Electric Sales Office promptly. Tighten any parts that may have loosened during shipment.

2-2 Handling



WARNING: Use all the lifting lugs when lifting the transformer. Use proper spreaders to obtain a vertical lift. Do not use the radiators for lifting or jacking. Failure to comply may result in serious personal injury or damage to the equipment.

Lifting lugs are provided for lifting the complete transformer. Jacking space is provided in the base of the transformer to facilitate lifting with jacks. The transformer must never be moved or lifted by placing jacks or tackle on the radiators, bushings, or other attachments. When using a fork lift to move the transformer, lift with the accessory side facing the fork lift with the shipping skid in place.

2-3 Storage

Transformers should be stored with the tank sealed and filled with oil to the proper level. The storage area should be a flat, dry surface and the transformer should be protected from mechanical damage.

3-1 Foundation

Concrete Pad Mounting

The only foundation necessary for the installation of a platform-mounted distribution transformer is a level concrete pad strong enough to support the weight. Channels are provided on the transformer base for bolting the transformer to the pad. Carefully lower the transformer to the pad with the unit level to avoid damage to the transformer.

Elevated Mounting

The mounting channels on the bottom of the platform transformer allow for elevated mounting of the transformer. When a platform transformer is mounted on an elevated platform, follow local codes for elevated mounting of transformers.

3-2 Inspection

The transformer covered by this instruction is shipped ready for installation and will not require drying unless moisture has been allowed to accidentally enter during transit. It has been filled with oil at the factory to the 25° C liquid level and sealed. Check the level by reading the liquid-level gauge.



WARNING: Oil must be at the proper level before voltage is applied to the transformer. Failure to comply may result in serious personal injury or damage to the equipment.

3-3 External Electrical Connections



WARNING: The first electrical connection made must be to ground the transformer tank. This connection is made from the tank ground pad, shown in Figure 1, to a permanent low-impedance ground. The tank ground must also be connected to the system ground. Failure to comply may result in serious personal injury or damage to the equipment.

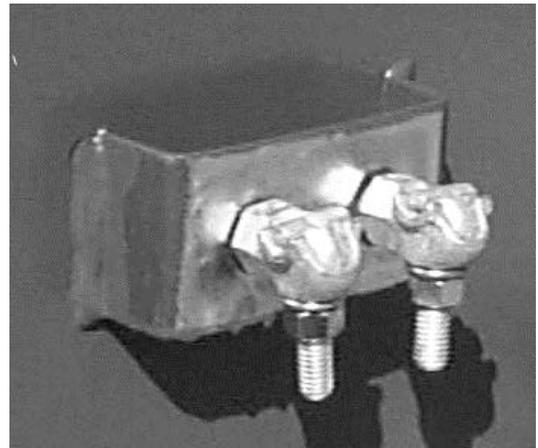


Figure 1. Ground pad on transformer.



WARNING: Make only the connections and operate only at the voltages authorized by the diagrams and information on the transformer name plate. The available transformer neutrals should be connected to the system neutrals. Each lead and connection not in use should be insulated from ground and from all other leads and connections. Failure to comply may result in serious personal injury or damage to the equipment.

Line connections must be made so that no undue strain is placed on the bushings. Refer to Table 1 for recommended minimum electrical clearances.

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Chapter 3. Installation

Rated Line-Line kV (max)	Bil kV	Test kV	Clearance Line-Ground (in.)	Clearance Line-Line (in.)	Barrier* Thickness (max in.)
1.2	30	10	1.24	1.24	none
5	60	19	2.00 2.50	2.50 3.00	0.156 none
8.6	75	26	3.20 3.50	3.50 4.00	0.156 none
15.5	95	34	3.20 5.00	4.00 5.50	0.156 none
25	125	40	4.20 5.70	4.70 6.00	0.156 none
35	125	40	5.50 7.00	6.50 7.50	0.188 none
25 or 35	150	50	9.00 7.50	10.00 8.50	none 0.250

* Barrier must be high-quality nonhygroscopic and track-resistant material.

Table 1. Recommended electrical clearances.

The transformer should be vented to the atmosphere before it is placed in service if it has been pressurized for leak tests or storage.



WARNING: Always release any pressure in the tank by carefully venting the pressure-relief valve before attempting to remove handhole covers or similar covers, including relief diaphragms and shipping covers (when used). Failure to comply may result in serious personal injury or damage to the equipment.

4-1 Operation above 3000 Feet

If a transformer is to be operated at 3000 feet or higher above sea level, the internal and external pressures must be equalized before the transformer is put into operation. To equalize pressures, carefully open the pressure-relief valve at approximately 25° C. Release the valve immediately.

Refer to ANSI C57.12.00.4 for information on how elevations above 3000 feet affect transformer ratings.

Platform-Mounted Distribution Transformers

Chapter 5. Operation

5-1 Service Conditions

Table 2 is a list of the normal operating conditions for the transformers covered by this guide. Refer to ANSI C57.12.00.4 for detailed information on operation in different service conditions.

Parameter	Operating Range
Weather temperature	-20° to 40 ° C
Maximum daily average temperature	35° C
Elevation	1000 m and below
Humidity	Daily average not to exceed 95%
Gage pressure	7 psig

Table 2. Operating conditions.

5-2 Load Operation

For continuous loading in standard ambient temperature, the total balanced load on a transformer should not exceed the name plate rating. Prolonged overloading may result in shortened transformer life (see ANSI C57.91). Voltage should be applied only to transformers filled to the correct level with insulating liquid.

5-3 Accessories

Thermometers (1/2 NPT)

A dial-type thermometer accessory, when supplied, is located in a 1/2-inch NPT well located under oil on the accessory side of the transformer. The thermometer dial, shown in Figure 2, reads from 0–160° C.



Figure 2. Thermometer accessory.

Liquid-Level Gage

A liquid-level gage accessory, when supplied, is located in the low-voltage compartment. The gage dial, shown in Figure 3, reads over the range LO–25 C–HI.



Figure 3. Liquid-level gage accessory.

Pressure-Relief Device (1/4 NPT)

The pressure-relief device, shown in Figure 4, is located in the low-voltage compartment near the top of the tank. The automatic pressure-relief device relieves excessive internal tank pressure in the tank air space. The device opens at 8–12 psig and reseals at a positive pressure.

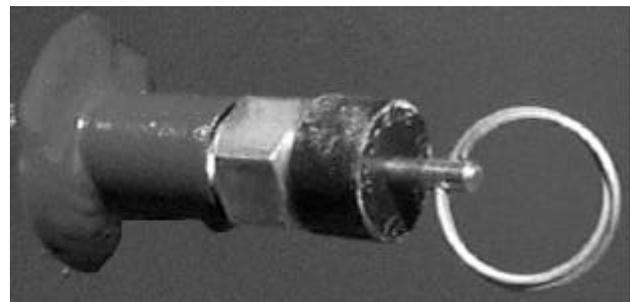


Figure 4. Pressure relief device.

Drain Valve with Sampler

The transformer is equipped with a fluid drain valve that can also be used to take oil samples. The drain valve with sampler is located on the accessory side in the lower-right corner.



WARNING: Deenergize the transformer before using the fluid drain valve to drain the transformer or to take an oil sample. Failure to comply may result in serious personal injury, death, or damage to the equipment.

5-4 High-Voltage Bushings

 **CAUTION:** Remove all dirt and foreign material from all bushings before placing the unit in service. Follow the manufacturer's instructions for installing separable insulated voltage connectors. Do not operate beyond the manufacturer's ratings.

The standard high-voltage bushing is made of porcelain (ANSI C57.12.22) and is provided with a two-hole blade up through 2500 kVA. The high-voltage bushing is shown in Figure 5.

The clamp-type terminals accommodate cables from #8 through 2/0.



Figure 5. High-voltage bushing.

5-5 Low-Voltage Bushings

 **CAUTION:** Remove all dirt and foreign material from all bushings before placing the unit in service. Follow the manufacturer's instructions for installing separable insulated voltage connectors. Do not operate beyond the manufacturer's ratings.

Figure 6 shows the typical four-hole bushing used for transformers rated at 50–500 kVA. For transformers rated higher than 500 kVA, the low-voltage bushings can be ordered with blade configurations and constructions to meet the customer and ampacity requirements



Figure 6. Typical low-voltage bushing.

5-6 Tap Changer Operation

The tap changer operating handle, shown in Figure 7, is located on the accessory side of the transformer. The operating handle can be operated by hand or hot stick. A locking screw and/or padlock provision prevent inadvertent operation of the switch. The tap changer is shipped connected for the rated name plate voltage.

 **WARNING:** Deenergize the transformer before operating the tap changer. Failure to comply may result in serious personal injury, death, or damage to the equipment.

Platform-Mounted Distribution Transformers

Chapter 5. Operation

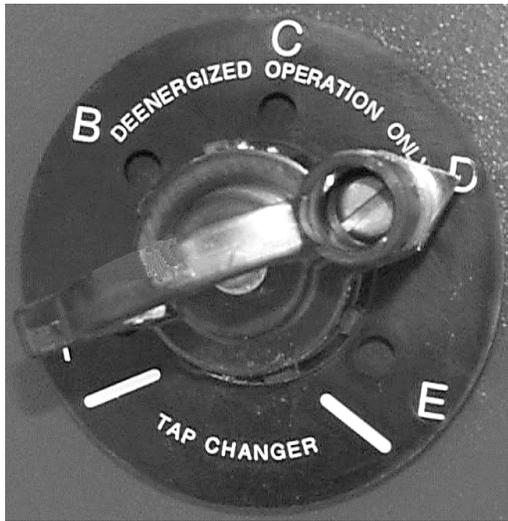


Figure 7. Tap changer.

To change taps, use the following procedure:

1. **Deenergize the transformer.**
2. Back out the locking screw.
3. Using a hot stick or hand, pull out the spring-loaded handle, turning it to the desired position.
4. Allow the pointer to drop into the slotted index plate, between the corresponding alphabetic sections on the index plate.
5. Engage the locking screw.
6. If padlock security is required, place a padlock through the operating handle.

The transformer was thoroughly dried at the factory and filled with insulating oil to the correct level before shipping. Oil is generally the standard choice for outdoor applications where flash and fire points are not an issue.

The approximate flash point of oil is 149° C.

The correct level for the fluid at approximately 25° C is at the 25° C mark on the liquid-level gauge. When it is necessary to add to or refill the tank, the work should be done in a clean, dry room. The transformer should be filled with the same type of insulating fluid as originally installed at the factory. A fill provision is located on the cover and a drain is located on the accessory side of the transformer.

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Chapter 7. Maintenance

7-1 Internal Inspection



WARNING: Deenergize the transformer before attempting any internal inspection. Failure to comply may result in serious personal injury or damage to the equipment.



WARNING: Always release any pressure in the tank by carefully venting the pressure-relief valve before attempting to remove handhole covers or similar covers, including diaphragms and shipping covers (when used). Failure to comply may result in serious personal injury or damage to the equipment.

If the transformer must be opened for internal inspection, take proper precautions to prevent the entrance of moisture and other foreign matter into the transformer. Clean off the tank cover before removing the handhole cover.

For access, remove the handhole cover. Place the handhole gasket bolts and washers in storage for reuse. Examine the underside of the cover for signs of moisture. Look inside the transformer for broken leads and loose parts. If any bushings are damaged, repair or replace them through the handhole, as described below.

If internal damage is suspected, the following procedure is recommended.

1. Remove the tank cover, lower the liquid to the top of the core, and carefully inspect the interior to note if any damage has occurred.
2. Take an oil sample from the bottom of the tank. If moisture is found inside the tank, arrangements should be made to dry the transformer.
3. After inspection and any repairs, refill the unit with dry insulating liquid to the 25° C level. Fill very slowly in a vacuum chamber. Hold a partial vacuum on the unit (up to -3 psig) for four hours after refilling. Do not use the tank as a vacuum chamber.
 - a. If the unit cannot be filled under vacuum, fill it through the handhole, directing the flow of oil so that aeration of the liquid is prevented. For instance, direct a slow flow of the liquid against the upper tank wall.
 - b. If a vacuum is not available, the unit should be allowed to sit for at least 24 hours before it is tested or energized.

- c. Tilt the unit during filling to prevent entrapment of air in the coils and insulation.

7-2 Bushing Maintenance



WARNING: Deenergize the transformer before attempting bushing maintenance. Failure to comply may result in serious personal injury or damage to the equipment.

In most cases, the high-voltage bushings may be changed by removing the bushing hardware and carefully pulling the bushing out. Access to the internal lead allows it to be disconnected. Replace the bushing and carefully insert it back in its hole on the tank.

The low-voltage bushing may be replaced externally by removing the clamps and pulling the bushing out of its hole. The lead hardware may be removed and the bushing changed. Be sure to reinstall the hardware in the original sequence.

The gasket must be located so that it will seal properly and not be damaged during repair to the unit. The gasket and bushings may be reused if they are undamaged. After repairs have been completed, refill the unit with dry insulating liquid to the 25° C level, if necessary.

7-3 External Finish Maintenance

The condition of the transformer finish should be examined at regular intervals. If the finish is weathered, clean it thoroughly and refinish with a good grade of durable paint, as recommended by GE.

Complete instructions for sampling, testing, and drying oil and drying transformers, along with operating data and recommendations, can be obtained upon request to the nearest GE Sales Office.

8-1 When You Need Service

If you need service on products manufactured by GE Industrial Systems, a world-wide service organization is ready to serve you. Warranty administration, site-testing services, installation, system studies, maintenance, trouble-shooting, site repairs, and training seminars are provided by GE and the GE Factory Authorized Service Team. Shop repairs, reconditioning, or rebuilding of electrical apparatus are provided by members of the GE Factory Authorized Service Team in their shop or on your premises. Contact your GE Sales Office or a Factory Authorized Service Team member for full information about these services.

8-2 Renewal Parts

Orders for renewal parts may be placed by describing the part and giving the rating and serial number appearing on the name plate of the transformer.



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