

INSTRUCTIONS
GEI-21709

INSTRUCTIONS FOR INSTALLING AND OPERATING SMALL
KVA SIZE LIQUID FILLED TRIPLEX INDUCTION VOLTAGE
REGULATORS

APPARATUS DEPARTMENT
GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.

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INSTRUCTIONS FOR INSTALLING AND OPERATING
SMALL KVA SIZE LIQUID FILLED TRIPLEX INDUCTION VOLTAGE REGULATORS

THESE INSTRUCTIONS DO NOT PURPORT TO COVER ALL DETAILS OR VARIATIONS IN EQUIPMENT NOR TO PROVIDE FOR EVERY POSSIBLE CONTINGENCY TO BE MET IN CONNECTION WITH INSTALLATION, OPERATION, OR MAINTENANCE. SHOULD FURTHER INFORMATION BE DESIRED, OR SHOULD PARTICULAR PROBLEMS ARISE WHICH ARE NOT COVERED SUFFICIENTLY FOR THE PURCHASER'S PURPOSES, THE MATTER SHOULD BE REFERRED TO THE GENERAL ELECTRIC COMPANY.

This instruction covers liquid filled triplex induction voltage regulators composed of regulators similar in construction to the small Kva sizes of AIRS regulators shown in instructions GEH-1085 (copy attached).

The triplex regulator is composed of (3) single-phase regulators assembled on a common base with their worm shafts mechanically coupled together with double flexible joints and operated by one driving motor assembled on the middle unit.

The regulator is automatically operated by one set of controls assembled in a weatherproof cabinet on the front of the regulator tank.

The controls are similar to those covered in instruction GEH-1085.

The insulating liquid used in these regulators may be either transil oil or Pyranol.

INSTALLATION

The regulator should be installed in a location that has good ventilation. The support or foundation that the regulator is to rest on should be flat, level, and rigid. The base of the regulator is provided with holes in the corners for bolting to its support.

Before installing, the regulators should be carefully inspected for any damage that may have occurred in transit.

Take samples of the insulating liquid from the top and the bottom of the tank and have them tested. A regulator in which the tests of the liquid shows signs of moisture or has a dielectric strength of less than 30 KV should be dried and the insulating liquid filtered. Detail instructions, obtainable from the nearest General Electric Office, covers the recommended methods to be used for handling, testing and drying of transil oil and Pyranol.

The above instructions apply for any regulators that may have been idle for any length of time.

PRESSURE TESTS

All liquid filled regulators are pressure tested at the factory. When regulators are installed, they should be tested at five (5) pounds per square inch pressure. Use clean dry air or nitrogen introduced through the pressure test valve and hold for twelve (12) hours. If the pressure does not hold for this period of time, examine the gaskets, welds and fittings for leaks. Leaks above the liquid level may be detected by applying a solution of soap and glycerin to all joints and gasketed surfaces.

Synthetic rubber gaskets are used on these regulators. If it is necessary to replace the gaskets, follow the procedure outlined under "Gaskets" in the "Maintenance" section of this instruction.

CONTACT-MAKING VOLTMETER (Voltage Regulating Relay)

Follow the instructions in GEH-1085 for adjusting and operation of the contact-making voltmeter, pages 8, 9 and 11.

MOTOR CONTROL RELAY

Instructions covering the adjustment and operation of the motor-control relay are covered in GEH-1085, pages 10, 11 and 12.

MAINTENANCE

Keep the regulator and controls clean.

Insulating Liquid

Keep the insulating liquid at the proper level. When the liquid is so maintained, all parts of the mechanism that require lubrication will be immersed in the liquid and no further lubrication will be required. Instructions obtainable from the nearest General Electric Office covering the handling, testing and drying of transil oil and Pyranol should be followed.

Gaskets

Synthetic rubber gaskets are used throughout on these regulators. The top flange of the tank is fitted with a gasket cemented to the flange. The bushing gaskets are cemented to the bushing adapter in the tank wall.

If it is necessary to replace any of the gaskets, remove all trace of the gaskets and cement from gasketed surface. Use a synthetic rubber cement and follow the instructions of the cement manufacturer for cementing the new gasket in place. Use only gaskets of a synthetic rubber that has been approved for use in transil oil or Pyranol.

The control cabinet door is provided with a sponge rubber gasket. If it is necessary to replace this gasket, first scrape all of the old gasket and cement off of the gasket surface and clean with gasoline. Wipe the strips of sponge rubber with a cloth dampened in gasoline to remove the talc coating. Cement the new gasket in place with rubber cement following instructions of the manufacturer of the cement.

Contact-Making Voltmeter (Voltage Regulating Relay)

Instructions on the maintenance of the contact-making voltmeter are covered in GEH-1085, pages 16, 17 and 18.

Motor-Control Relay

Instructions on the maintenance of the motor-control relay are covered in GEH-1085, pages 18, 19, 20 and 21.

INTERNAL INSPECTION

To inspect the regulator internally, it will be necessary to remove the tank cover. The cover is held in place by a number of bolts bolted to the top flange of the tank. After the removal of the tank cover, the operating mechanism will be exposed and may be inspected.

For complete inspection of the interior, it will be necessary to remove the unit from the tank as follows:-

1. Set the regulator rotors in the neutral position as is indicated by the pointer on the position indicator.
2. Disconnect the flexible drive shaft from the position indicator shaft by holding the hex section of the coupling nearest to the flexible shaft and loosening the long hex nut, then pull apart.
3. Lower the insulating liquid below the bushing openings in the tank, and after disconnecting the lead connection on the bushings, remove the bushing from the tank wall.
4. Unbolt the cushion assemblies from the tank at each end and lift off the pins.
5. Disconnect the control leads from the terminals in the tank wall. The terminals on the leads and the outside of the tank wall are marked for identification in reassembling.

6. Attach slings to the lifting assemblies on the top of the interior and raise it slowly out of the tank, guiding it so that it does not catch on the position indicator shaft on the block welded to the end tank walls.

Inspection may now be made of the assembled interior.

If complete disassembly is desired, disassemble as follows:-

1. Remove the position indicator shaft from one end unit and the limit switch from the other end unit. Also the motor and top cover as a unit from the middle unit. Remove the covers from the two end units.

2. Remove the screws that hold the worm supports to the top frames and draw toward the back of the regulator to disengage the worm from the worm gear and then toward the end to disengage the coupling between the regulators. The coupling is made in three sections, the middle section is loose and should remain with the supports of the end regulators. The complete disassembly of each unit can be made as instructed in GEH-1085 pages 22 and 23.

The regulators may be reassembled as covered in GEH-1085 pages 23, 24 and 25, except that before they are coupled together, each unit must be set in the exact electrical neutral position and left in that position until they are assembled in the tank and the position indicator coupled to its drive shaft.

To locate the electrical neutral position, each unit should be set in its approximate neutral mechanically and then a low reading ammeter connected across its secondary leads. With the primary excited from a 110 volt source, turn the regulator slowly until zero current is recorded on the ammeter. When this position is reached, be sure that this setting is not disturbed until the position indicator is coupled to its shaft after the regulator is tanked. It is recommended that the low reading ammeter is 0.5 amp full scale.

The interior should be tanked and the cushion assemblies bolted in place.

Set the position indicator pointer on the neutral position and couple it to its drive shaft.

Reassemble the low voltage leads to terminals in tank wall.

Reassemble the high voltage bushing to the tank and connect the regulator leads to the bushings.

Fill tank with its insulating liquid to its proper level and reassemble cover to tank and give pressure test to make sure that cover and bushings are sealed tight.

INSTRUCTIONS PYRANOL TRANSFORMERS

INSPECTION

Inspect the transformer for possible damage incurred during shipment. Pyranol transformers are always shipped filled with *Pyranol. Inspect for proper Pyranol level. A sample of Pyranol should be taken, preferably from the top, for dielectric test. If the dielectric strength, before placing in service, is below 30 kv, the Pyranol should be filtered. If there are indications that moisture has entered, the transformer should also be dried.

INSTALLATION

If the transformer is equipped with a diaphragm mounted in the side of the tank, the transformer should be so placed that the diaphragm is not facing an aisle or passageway.

When connecting bushings to the line or external circuit, sufficient flexibility in the connecting leads must be provided to avoid mechanical strains due to expansion or contraction which may break the porcelain. While the bushings will support a reasonable weight of connecting conductor, long spans or lengths of unsupported conductor should be avoided.

PRESSURE TEST

Pyranol transformers are designed to operate sealed and when installation is complete, the transformer should be subjected to an internal pressure of 5 lb per square inch using dry air or a dry gas such as nitrogen. If the pressure holds steady, the joints should be satisfactory. Leaks above the liquid level may be located by using a solution of soap and glycerin applied to the joints.

CONNECTIONS AND LEADS

Transformers are shipped connected for the highest voltage shown on the nameplate, unless otherwise specified.

Do not change connections on a transformer that is under excitation, nor make any connections that are not shown on the nameplate or diagram of connections.

Insulate leads not in use from ground and all other leads.

Permanently and effectively ground the tank by means of the grounding lug or screw provided for this purpose near the bottom of the tank unless prevented by special operating conditions.

OPERATION

A single-phase transformer which is suitable for wye operation on either the high-voltage or the low-voltage side may be so connected on either side, but not simultaneously on both sides, unless precautions are taken to suppress third harmonic voltages.

MAINTENANCE

Pyranol must be handled only in containers, pipes, all-metal hose, etc. which are free from oil, grease, pitch, or other foreign material, since these contaminate the liquid and decrease its non-flammable qualities.

Protect the transformer from overloads and overvoltages with suitable and approved protective devices properly located and connected. Refer to the nearest General Electric Sales Office for specific recommendations.

At regular intervals, the level of the transformer Pyranol should be checked and a sample of the Pyranol tested for dielectric strength. If, while in service, the Pyranol tests below 25 kv at room temperature, a filter press may be used to restore the dielectric strength to above 30 kv.

STORAGE

Before storing Pyranol transformers, they should be checked to be sure that the Pyranol is at the proper level. The storage room should be clean and dry and, when possible, without extreme temperature changes. Before placing a transformer in service from storage, follow the instructions given under "INSPECTION," particularly with regard to moisture.

RENEWAL PARTS

When ordering renewal parts, give the following information: a description of the part or parts desired and the rating and serial number taken from the nameplate on the transformer (the serial number may also be found on a fiber tag attached to the coil).

GENERAL

If a failure should occur in a Pyranol transformer, the nearest Sales Office of the General Electric Company should be notified immediately, giving the rating and serial number of the transformer.

More detailed information on the installation, operation, maintenance, protection, sampling, and filtering of Pyranol transformers may be obtained by consulting Instructions GEH-1093, or by application to the nearest Sales Office of the General Electric Company.

* Registered trade-mark for G-E askarel.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

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