

# **ELETRAFI** SNC

## **TRASFORMATORI ELETTRICI**

### **OIL FILLED TRANSFORMER MANUAL**



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## **Purpose, scope and responsibilities**

The present document provides the necessary information for the correct transportation, installation and maintenance of the oil transformer. Moreover, safety instructions and requirements are reported in order to avoid any damage to the transformer or injury to any worker.

This installation, use and maintenance guide is valid for current operating transformers in outdoor or indoor conditions.

It is under customer operators responsibility the respect of the requirements and instructions reported in the present document. In case of any trouble, due to operations not compliant with the reported requirements, the transformer manufacturer shall not be responsible.

## **General Reference Standard**

All our production is assured by Quality System certified by CSQ in conformity with UNI EN ISO 9001:2000 standards

## **Safety indications**

A transformer is an electrical machine. It shall be installed, protected and used with respect to the requirements reported in the present document, to national and international standards and norms.

- Read carefully these instructions before lifting, moving and energizing the transformer
- All operations must be performed in a non energized status
- Do not energize the transformer before having connected the earth
- Do not enter the transformer operation area when the machine is in an energized status
- Do not remove any protection part when the machine is in an energized status

## **Operating conditions**

### **Indoor transformers**

The transformers should be mounted in dry indoor conditions where the ambient air is not significantly polluted by dust, smoke, corrosive cases, vapours or salt.

The transformers are designed for standard ambient temperature between  $-25\text{ }^{\circ}\text{C}$  and  $+40\text{ }^{\circ}\text{C}$ .

The altitude for use should be lower than 1000 m above the sea level. The transformers may be used also in higher or in lower ambient temperatures and higher altitudes when agreed upon with the manufacturer.

### **Outdoor transformers**

The transformers should be mounted in outdoor conditions where the ambient air may be polluted by dust, smoke, corrosive cases, vapours or salt.

The transformers are designed for standard ambient temperature between  $-25\text{ }^{\circ}\text{C}$  and  $+40\text{ }^{\circ}\text{C}$ .

The average value of the ambient temperature, measured over a period of 24 hours, should not exceed  $30\text{ }^{\circ}\text{C}$ .

The altitude for use should be lower than 1000 m above the sea level. The transformers may be used also in higher or in lower ambient temperatures and higher altitudes when agreed upon with the manufacturer.

## Transport and storage

The permissible transport and storage temperature is from  $-40\text{ }^{\circ}\text{C}$  to  $+70\text{ }^{\circ}\text{C}$ . The transformers are delivered in wooden boxes or fastened to a transport pallets .

The transformer is shipped ready for the energizing. No further works during the installation are required.

It is usually delivered full of oil: it must be carried in up-right position and any damage to the tank, porcelain bushing and valves must be avoided. In particular, do not use radiators and insulators as fixing points.

In case of any transportation damage on the transformer, please contact our technical department before the energizing. A photo report shall be issued and sent to our technical department for proper evaluation. Possible intervention and repair costs shall not be charged to the manufacturer.

In case of missing parts, the responsibility has to be undertaken by the vector. Define the list of the missing parts and send it to our technical department.

Any kind of moving of the transformer has to be made keeping it in up-right position and avoiding pushing or shakes.

During loading/unloading operations it is necessary to hook the transformer by means of pull ropes; the number of the ropes is the same of the lifting lugs on the transformer's cover.

Do not use short ropes: dangerous mechanical solicitations for tank welding should be generated by an unbalanced slinging.

Avoid dangerous collisions for transformer tank (full of oil), for the porcelain bushing and the accessories.

If the transformer is not immediately energized, it has to be stored according the following prescriptions:

- close all the possible flanges
- seal the oil conservator with the filling plug
- install the silicagel breather on the conservator

## Accessories and functionalities

### DGPT 2 / RIS



These products, despite their different name have the same functions and are normally provided with hermetic type oil integral filling transformer.

This instrument can provide the following functions: oil level control and display , inner

pressure indicator, oil temperature display and gas formation detector.

This instrument is usually equipped with the following values of setting:

- pressure 0,4 bar
- alarm temperature:  $100^{\circ}\text{C}$
- trip temperature:  $110^{\circ}\text{C}$

For connection instructions, start up and setting procedures please refer to the technical sheets within the product itself.

### Ceramic lead – in insulator

Ceramic lead – in insulators either MV or LV should not be exposed to transversal pushes.

When the transformer is connected to the electric system take care and avoid transversal strain throughout clamping the fixing cables' screws.

In case of insulator without connector flange, generally for MV side, in order to clasp the cable's terminal to the insulator, it is necessary to keep steady the lower compression nut to the higher insulator cap and support of the cable's terminal (lug).

Otherwise, in case of insulators with connector flange, usually for LV side, the connection between insulator and cable is performed by screws, positioned on the insulator flanges.

## Tap changer

The tap-changer is normally located on top of the transformer.

Any changes of the regulation of voltage must be handled only when the transformer is disconnected from network.

In order to adjust the voltage through the tap-changer, it is necessary to handle the extremity plug of the tap-changer control, turning it clockwise or counter-clockwise.

The different positions are defined by numbers reported on the plug of the tap-changer.

## Installation instructions

Safety instructions

- During installation, please refer to the national safety rules. The same rules and directives have to be applied and followed in case of any risk due to the presence of flammable or explosive substances.
- Always consider transformer as a part of the circuit to which it is connected, and do not touch the leads and terminals or other parts of the transformer unless they are known to be grounded.

## Transformer positioning

The transformer has to be set flat on a suitable basement.

If the transformer is installed in a cell, the minimum distance to be respected – between the transformer and the cell wall – results in 300 mm. If the transformer is positioned in a place containing another transformer, the minimum distance to be guaranteed between the two electrical machines results 1000 mm.

## Ventilation

The transformer shall be installed in an adequate environment, regarding the dimensions, where a correct cooling air flow for transformer wall is guaranteed. In fact, the correct design of the transformer environment is an essential requirement.

In case air flow is insufficient, the transformer will overheat with risk of damage and the intervention of thermal protection system.

If the room does not enable sufficient natural air exchange, it is necessary to install an air exhaust/circulation system to ensure sufficient air flow for cooling transformer.

Regarding the air flow, please consider 5 m<sup>3</sup>/min for every kWatt losses.

## Setting up

Before starting the transformer the following operations are required:

- Check the right position of the tap changer
- If a work in parallel is needed, before closing the connection, verify the right phases correspondence among the transformers

- Check the oil level and the good working of indicator level
- Check the gasket tightness and make sure there are no traces of oil losses
- Check the correct distance of the arching horns (where installed), according the specification previously described
- Check the connection of the different accessories
- Ground the transformer, connecting the suitable earthing terminal clamp to the earthing terminal
- Ensure the transformer with rollers against any movement

## Maintenance instructions

Every maintenance operation shall be performed when the transformer is disconnected from the electrical network.

The transformer cleanliness (by means of appropriate solvent) and its protection from polluting substances is a mandatory condition for its normal functioning.

Bushings and radiators shall be accurately cleaned once a year.

The daily instrumentation check allows the constant monitoring of the operative conditions and an immediate discover of any possible malfunctioning.

Oil temperature shall be monitored, because an increased temperature value could identify a possible failure or an inadequate ventilation condition in the room where the transformer is installed.

Oil temperature rise with respect to the environment temperature shall not exceed the design value: if this value is exceeded, it is necessary to improve the dissipation system.

## TORQUE SETTING

- |                   |             |             |  |  |  |
|-------------------|-------------|-------------|--|--|--|
| <b>Connection</b> | <b>side</b> | <b>H.V.</b> |  |  |  |
|-------------------|-------------|-------------|--|--|--|

VITI	M8	M10	M12	M14
coppia serraggio (kgm)	3	4,5	6	8

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