

**OPERATING INSTRUCTIONS
AND MAINTENANCE NOTES ON
LIQUID TRANSFORMERS**

Ocrev srl

Via Oltre Agno 2 - 36070 Brogliano VI - ITALY

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1. TRANSPORT

The transformer is prepared by the manufacturer ready for operation, except for cases where some components like HV/LV cable box, cooling elements (radiators) and oil storage tanks, are disassembled to obtain the dimensions suitable for transport.

The components, disassembled for the aforesaid reasons, must be reassembled at the installation site, by very carefully following the instructions set out by the manufacturer.

2. LIFTING

Lifting can be done by using the appropriate eyebolts, remembering to use long enough cables so that H (see Fig. 1) is never less than L.

Always use all the existing rings and not only some of them.

Short lifting may also be done with hydraulic jacks, by applying suitable supporting plates under the crate.

In some cases a forklift may be used.

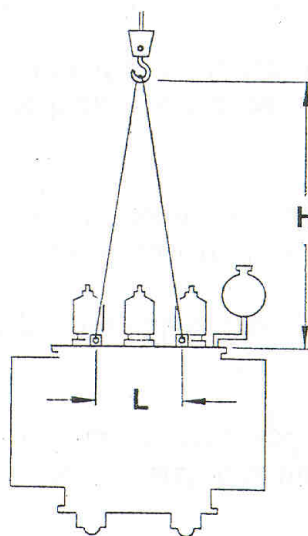


Fig. 1. An example of lifting

3. STORAGE

If the transformer is not installed after a reasonably short time, care must be taken. Before applying energy, carefully clean the transformer, by removing dust and other foreign particles and objects that may have deposited on the bushings or other parts of the cover because of the long storage period.

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4. ACCESSORIES

The transformer is usually fitted with the following accessories:

- bushings placed on the primary side,
- bushings placed on the secondary side,
- bi-directional rollers,
- lifting lugs,
- off-load tap changer for adjusting the transformer ratio,
- thermometer pockets,
- oil conservator (*),
- oil level indicator,
- Buchholz relay (*),
- silicagel breather (*),
- oil filling hole and plug (*),
- oil drain valve,
- earthing terminals,
- rating plate.

(*) only for breathing type

Depending on the client's requests the transformer may be fitted with particular accessories, each of which supplied with its specific description of operation attached to the accessory itself.

5. INSTALLATION AND START-UP

If not otherwise requested, the characteristics indicated on the rating plate of the transformer refer to installations of up to a maximum height of 1.000 m above sea level.

For correct thermal dispersal of the leaks, due to self-consumption of the transformer, there must be a minimum distance of 30 cm from the wall, between the cooling surfaces and the room walls, and 60 cm between one transformer and another, if there are more than one.

The room must be dimensioned to permit air circulation of 4÷5 m³/min. for each kW of losses. If this condition is not met there would be an anomalous increase in temperature compared to that calculated.

A normal environment may be considered as one where the temperature comes within the following values:

* minimum temperature	-25°C
* average annual temperature	20°C
* average daily temperature	30°C
* maximum temperature	40°C

Temperatures differing from those indicated will have to be studied to establish the causes.

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1) After the HV/LV cables have been connected, carried out by keeping count of the respective phase sequence, make sure, before applying energy, that the tap-changer is set to the desired transformer ratio;

2) Make sure that the silicagel breather has been mounted according to the following modalities:

- remove the hexagon plug
- let any oil that has entered into the pipe during transport drip out
- screw up the silicagel breather

(be careful not to open the drain plug of the oil conservator);

3) Check that the oil level in the oil conservator is set to 20°C;

4) For parallel operation with other transformers, the transformer must respect the following conditions:

- a) It must belong to the same vector group as the transformers to be used in parallel, according to the following table:

Three-phase transformer connections

0	Yy0	Dd0	Dz0
1	Yd1	Dy1	Yz1
5	Yd5	Dy5	Yz5
6	Yy6	Dd6	Dz6
11	Yd11	Dy11	Yz11
2		Dd2	Dz2
4		Dd4	Dz4
7	Yd7	Dy7	Yz7
8		Dd8	Dz8
10		Dd10	Dz10

- b) Identical value of 'Short-Circuit Current', with only the tolerance foreseen by the Standards, of the other transformers meant for parallel connection.

6. MAINTENANCE

Generally the transformer needs no particular expedients for maintenance. However, to ensure safe and reliable operation, it is best to check periodically, the frequency of which depends on the environmental and operation conditions:

- a) Check the oil level
- b) Check the oil temperature, which must never exceed environmental temperature by 60°C, considering an environmental temperature of 40°C
- c) After about a year's operation it is advisable to take a sample of oil and make it undergo a dielectric test.
The sample must be taken from the discharge valve at the bottom of the transformer, unless it is fitted with a special sampling valve.
- d) General cleaning from dust and other dirt that may have collected there, paying special attention to the bushings
- e) Check the sealing capacity of the gaskets

***** THE ABOVE-MENTIONED OPERATIONS MUST BE CARRIED OUT WITH THE TRANSFORMER CONNECTED TO GROUND AND NOT ENERGISED *****

7. ANOMALIES

ANOMALY	CAUSE	SOLUTION
High noise level	Undistributed load	Contact the manufacturer
Overheating	Overloading	Take the load back to the nominal values
	Insufficient air circulation	Check that the values found under the chapter "Installation and Start-up "