

## INTRODUCTION

In this manual instructions are given for inspection, mounting, operation and maintenance of a TRAFRA dry-type vacuum impregnated transformer.

To ensure that the transformer functions satisfactorily, careful attention must be paid to these instructions.

The information given is in accordance with the product that has been supplied. However due to our policy of continuous research and development deviations in design may occur.

TRAFRA transformers have no modular construction so on-spot refitting of core or coils is strongly advised against.

All necessary information including the adjustment of taps are marked on the type plate.

## INSPECTION, MOUNTING AND MAINTENANCE

### INSPECTION

Before dispatch we load the truck very carefully but it is impossible to oversee the handling during the trip and unloading. Therefore we advise to examine the packed transformers on damage, dust and moisture. In case of doubt refuse acceptance of the transformer and send us a written or electronic message and - if possible - attach a photograph to prove this situation.

The time in which reclamations must be done is listed on the packing slip, however it is recommended to do this immediately. This way the carrier and then TRAFRA will be informed. Otherwise the damage compensation will not be recognized by the carrier.

### MOUNTING

Unwrap the plastic foil from the product and check if there are no parts of package left in or on the product. Remove pallet or wooden carriers before placing on spot. Be sure the transformer is clean (surface and cooling ducts) and free of condensation.

In case of delivered cabinet the ventilation-gaps on bottom as well as on top must stay in original form.

When placing the transformer/cabinet on the intended construction be sure to find the right placement. The front of the transformer cabinet is marked with a type plate and TRAFRA logo. The front yoke usually contains the primary terminal block.

Use the appropriate mechanical bolts for all connection holes. For torque information check specifications of used bolts.

**AT ALL TIMES TRANSFORMATORS NEED TO BE EARTHED BEFORE ANY WORK IS PERFORMED**

**WORK ON ACTIVE TRANSFORMERS IS NEVER PERMITTED**

Be sure that ambient temperature of the room does not exceed the temperature mentioned on the typeplate. For every 5°C higher room temperature the power should be derated by 10%. Also the room in which the product is installed must be ventilated properly. To obtain sufficient ventilation and have enough space for maintenance, the product must be placed at a sufficient distance from surrounding walls and apparatus. The transformer cabinet may be mounted at back, left – and rightside with respect to the free spaces listed hereunder in **Table 1**.

TABLE 1

	Front	Back	Sides	Lid	Front	Back	Sides	Lid
<b>Cooling</b>	70	70	50	150	50	50	10	50
<b>Maintenance</b>	1)	70	50	150	2)	10	10	100
		<b>Exchanging transformer IP00</b>			2)	10	10	3)

1) minimum depth of the transformer  
 2) minimum depth of the lid  
 3) minimum hoisting manoeuvrability with local crane, incl. required hoisting chains

## MAINTENANCE

Needless to mention once again:

**Maintenance of a transformer can only be performed when it is earthed and not active.**

Maintenance is limited to:

- Removal of dust or dirt in the coil and in the cooling ducts that could hamper the flow of cool air. A clean cloth and thin flexible hose can be used to clean the cooling ducts.
- Cleaning the visible surface.
- Removal of dust, dirt or salt deposits that would adversely affect the electrical insulation between the primary and secondary connections and the iron core.
- Checking the insulation between the primary coils and the core, secondary coils and the core, and between the primary and secondary coils mutually with a so-called Megger-test.
- Checking of the bolted electrical connections, especially when the transformer is subjected to mechanical vibrations or shock.
- Determination of the frequency at which maintenance needs to be carried out. This is dependent on the environmental conditions. If the effects are not known, it is advisable to carry out an inspection every half year. After some experience you can produce a suitable time schedule for maintenance.
- Making sure that after maintenance is carried out all connections are reconnected again carefully and all tools or materials are removed.

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## ELECTRICAL CONNECTIONS

See [www.trafa.nl/downloads](http://www.trafa.nl/downloads)

**Description, Instruction – Description – 30-02b – Drawing cabinet**

Top-, front and back panels are easy to remove.

The connections of the transformer to the power supply and the load are already cleaned and supplied with the necessary bolts and nuts.

The torque required for the bolted electrical connections is a matter of experience.

For certain connections however, other torques are recommended in **Table 2**.

TABLE 2

terminal	Nominal Current (Amp)	Max. Voltage (Volt)	bolt	diameter (mm <sup>2</sup> )	min (Nm)	max (Nm)
UK 5N USLKG 5	32	800	M3	4	0,6	0,8
UK 6N	41	800	M4	6	1,5	1,8
UK10N	57	800	M4	10	1,5	1,8
UK16N USLKG16	76	800	M4	16	1,5	1,8
UK35N USLKG35	125	800	M6	35	3,2	3,7

terminal		Nominal Current (Amp)	Max. Voltage (Volt)	Cable lug copper bolt	Cable lug copper width (mm)	diameter min (mm <sup>2</sup> )	diameter max (mm <sup>2</sup> )	min (Nm)	max (Nm)
HV M6 /1	HV M6 /2	125	1000	M6	15	2,5	35	3	6
HV M8 /1	HV M8 /2	150	1000	M8	18	2,5	50	6	12
HV M10/1	HV M10/2	269	1000	M10	24	6	120	10	20
HV M12/1		269	1000	M12	24	10	120	14	31

Connections of primary and secondary cables must be done on the terminals marked with the corresponding voltages.

If the transformer has primary taps then the factory settings are by default on the rated voltage. The type plate mentions which connections need to be made to change the taps. Be sure all connections are in agreement with the voltage level of the power system and with the required voltage of the load. If the supply voltage is higher than the level corresponding to the set tapping position, higher no-load losses and higher noise levels will occur.

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## ISOLATION VALUES

The monitoring of isolation values during a prolonged period yields important information for preventive maintenance of electrical equipment, namely:

- Safety: the prevention of short-circuiting
- Cost reduction: the failure of important production machinery leads to production losses and extra repair costs

Reduced isolation is partly caused by aging of the isolation, but also by sudden damages. Influences of moist, dirt, corrosion, chemicals and vibrations contribute to the aging of isolating materials. The effects thereof can be documented with a so called Megger-test.

At the commissioning of the electrical installation of which the transformer is a part, a reference point can be measured for the isolation value(s). A diagram of this value compared to time offers an insight in the aging of the isolation. It should be noted that each time the same method of measuring should be used; the same connections, the same measuring equipment, etc.

The line of the diagram will reach the null-line in time. At that point the chance of failure will be greatest, because isolation with a value of null will not provide enough protection.

Normally the transformers of TRAFa have a life cycle of about 40 years. A typical curve of the isolation value is to be seen in Figure 1: A quick descent in the first few years followed by a moderate decline in the years after.

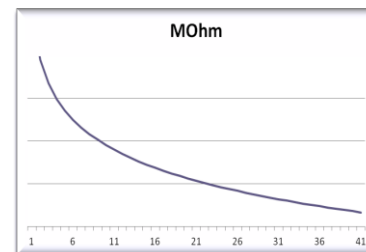


Figure 1

It is recommended to make note in the service-program what choice is made for the minimum isolation value at which revision or replacement should be considered.

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## HOISTING INSTRUCTION

Always transport the transformer vertically.

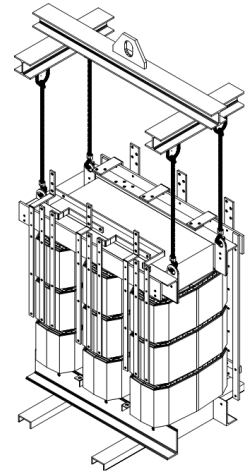
Remove the lid of the enclosure.

Hoist the transformer using the eyebolts of the transformer.

Alternatively hoist with fork lift truck at the bottom of the transformer.

For the weight see the type plate at front of the transformer and/or the enclosure.

**Do not use straps around the enclosure or the transformer to hoist!**



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