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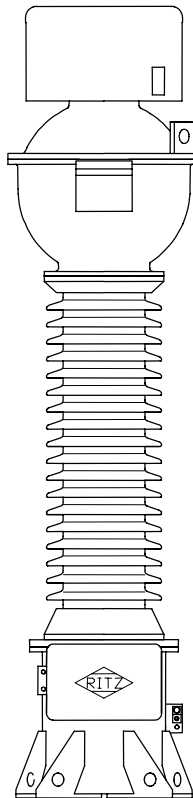
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# Instruction Book

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## COMBINED CURRENT/VOLTAGE TRANSFORMER

### KOTEF 72.5...362



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name: Hartmann

date: 11.04.2005

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revision:

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### **Read this instruction book before Installation and Operation of the unit.**

#### **\*\*\*\*WARNING\*\*\*\***

DE-ENERGIZED HIGH VOLTAGE EQUIPMENT MAY CONTAIN TRAPPED CHARGES

Read this instruction book before installation and operation of the unit.

**Never** work on High voltage equipment without first having short-circuited and grounded all terminals and metallic housings as the inherent capacitance may have electric charges with voltage at the lethal level. In addition, a ground rod should stay on the line terminal as long as people work on the unit. In the event an electrical test is to be performed, the person supervises the test will be held responsible for performing the test in a safe manner under the local / federal regulation. After the test, the ground rod should be put back to the line terminal until the unit is ready to be energized.

**Note:** To effectively discharge High voltage equipment do the following:

- (a) Put the ground rod onto the line terminal (Such action will short-circuit the entire unit and put the line terminal to the ground potential), and
- (b) Use another ground rod to attach to any intermediate metallic housing for duration of 10 -15 seconds to be certain that there is no residual electrical charge within the unit.



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### 1.0 GENERAL DESCRIPTION

- Head type design (current transformer part).
- Toroidal, low stray flux core design (current transformer part).
- Tank type design (voltage transformer part).
- Single coil design (voltage transformer part).
- Oil impregnated paper insulation.
- Hermetic sealing and oil expansion by metallic diaphragm assembly.
- High quality one-piece porcelain or composite insulator.
- In accordance with all national and international standards. This includes ANSI, IEC, AS, BS, CSA, NBN, OVE, SEN, SEV, VTE, VDE, and any special requirements.

### 2.0 DESIGN CRITERIA

#### 2.1 Current Transformer Cores

Up to 7 independent toroidal cores enclosed in a thick-walled aluminum alloy core housing. The housing, insulated with oil impregnated paper, is located inside the top assembly of the unit.

#### 2.2 Voltage Transformer Coil

Single coil and core located in a corrosion-proof aluminum tank at the lower part of the unit.

#### 2.3 Top Assembly

The head housing is made from corrosion-proof aluminum alloy. There are connection facilities for the lifting lugs and the primary terminals. The top assembly also contains and protects the metallic diaphragm assembly and the oil level indicator.

#### 2.4 Tank

The base tank is made of corrosion-proof aluminum. The core housing (CT-part) is connected to the base through a stem and a ground fault current carrying connection. Attached to it are a large terminal box, ground pad and oil sampling valve. For the location of the secondary terminals and the neutral end of the HV winding of the VT part (for example H2, N...) see schematic and nameplate.

#### 2.5 External Insulation

External insulation is provided by high quality one-piece porcelain with Portland cemented on hot dip galvanized gray iron flanges. The unit might have been provided with a composite insulator. In this case refer to the enclosed Technical Bulletin regarding special handling and cleaning requirements.



### 2.6 Active Part Insulation

The active part of the transformer is insulated by a vacuum impregnated oil/paper system. Degassed and filtered mineral oil is used and is heated before filling to provide maximum impregnation. It is an insulating oil with excellent aging stability and gas absorbing properties. It does not contain any Polychlorinated Biphenyl (PCB). If the hermetic seal other than during oil sampling is broken, contact the manufacturer immediately.

### 2.7 Hermetic Seal

The transformer is hermetically sealed by a stainless steel diaphragm assembly. The diaphragm assembly provides pressure compensation at temperature variation and allows the transformer to work virtually free of over-pressure. An oil level indicator is provided and is scaled to show the oil level over the operating range. It is visible from ground level behind a Plexiglas window in the top cover. The limit positions are marked by red stripes at the top and bottom. For details see attached sheet on oil level indicator positions.

### 2.8 Primary conductors

Short solid conductor bars made of electrical aluminum alloy or nickel plated copper ensure high thermal and dynamic withstand capability. Primary series and parallel connections with external links (for reconnection 1:2 or 1:2:4) or, if necessary, n-turn (more than (4) turns) designs can be provided. Please refer to nameplate/schematic for specific information.

### 2.9 Primary terminals

The primary terminals are made of electrical aluminum alloy or nickel plated copper. The primary terminals are directly connected to the conductor.

**Attention! Do not lift the unit at the primary terminals or remove the primary terminals!**

### 2.10 Secondary Terminal Box

The large aluminum alloy terminal box is provided with a cable access plate.

### 2.11 External Bolted Connections

All external bolts, nuts, and washers are stainless steel.

### 3.0 TRANSPORTATION INSTRUCTIONS

#### 3.1 Transportation

Transformers are shipped in horizontal position with the feet mounted to the crate/skid and the head resting on damping foam. A transport plate is attached to the base and faces up when in the transport position (FIG. 1).

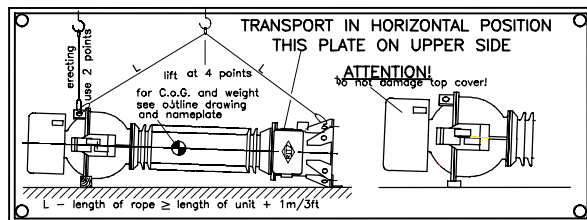


Figure 1

#### 3.2 Lifting & Movement

Refer to FIG. 1 for lifting instructions. Remove the mounting bolts at the feet prior to lifting the transformer out of the crate/skid. If using rigid shackles when lifting from the basetank feet, be sure they can move freely. If shackles bind, foot failure may occur. The transformer should be stood upright by using the lifting lugs as shown in FIG 2.

Special care should be taken to ensure stability during the lifting and movement. Refer to the crate marking for the center of gravity. Once the transformer is in the vertical position, it should be moved and mounted according to FIG. 3. Be careful not to tilt the unit such that the center of gravity moves beyond any of the four (4) matched slings. Use a safety tether. Remove the transport rail from the feet. Refer to the nameplate for weight. For storage over one (1) year, it is recommended that the transformer be stored in the upright position. If stored horizontally over this period of time the unit should stand up 24 hours before energizing. If stored horizontally, the transport plate must be on the upper side.

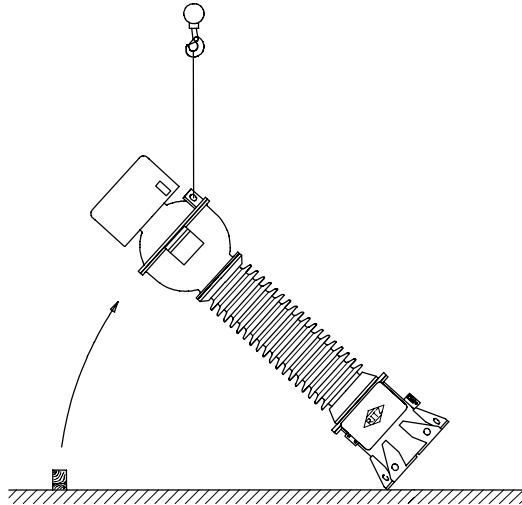


FIG 2

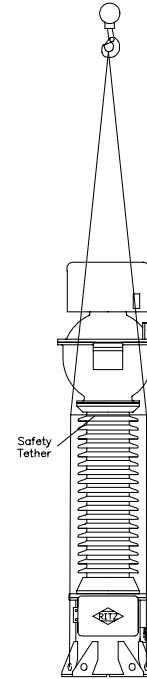


FIG 3

## 4.0 INSTALLATION AND CONNECTION

### 4.1 Mounting

The transformer should be mounted on a level surface with four (4) bolts.

### 4.2 Surface of External Connections (Primary Terminals, Grounding)

Clean all contact surfaces with acetone. If necessary, use Scotch Brite or fine sandpaper to ensure that the surfaces are smooth and clean. (Except plated surfaces like tin or nickel plating on aluminum or copper respective.) Do not use a wire brush to clean the aluminum surfaces. After cleaning, apply a thin coat of connection grease, Penetrox or equivalent, before making the connection.



### 4.3 Primary Terminals & Conductors

Torque bolts to required torque value (see Table 1). No gaps should be between any current carrying surfaces. It is extremely important that all bolts are torqued and all proper connections are made.

### 4.4 Secondary Terminals / Neutral Terminal

Each secondary winding can be grounded. The unit is shipped with the current each transformer secondary short circuited and connected to the secondary box ground, the voltage transformer part is open circuited and not grounded.

**Attention:** **Do not leave any secondary windings of the current transformer part open - High Voltage!**  
**Do not short-circuit the secondary winding of the voltage transformer part!**  
**The neutral terminal of the voltage transformer part must be connected to ground prior to and during operation!**

Hardware Size		Torque in Nm		Torque in lb.●ft	
Metric	Imperial	A2-70 s/s steel	A2-80 s/s steel 8.8 c/s steel	A2-70 s/s steel	A2-80 s/s steel 8.8 c/s steel
M6	¼	5.4	8.2	4	6
M8	5/16	16	20	12	15
M10	3/8	34	41	25	30
M12	½	54	75	40	55
M16	5/8	122	190	90	140
M20	¾	184	380	135	280
M24	1	272	570	200	420

Table 1 - Torque Values

## 5.0 SECONDARY CONNECTIONS

A removable access plate is provided at the bottom of the secondary terminal box. Refer to the nameplate/schematic for specific information to the windings.



### 6.0 COMMISSIONING

- A) The transformer is shipped hermetically sealed and complete. No field testing is required unless the unit is damaged during shipment.
- B) Clean the insulator and inspect for any abnormalities. Be careful not to scratch the insulator while cleaning. Refer to the enclosed Technical Bulletin regarding special handling and cleaning requirements for composite insulators.
- C) Clean all external terminals (see 4.2).
- D) Check for oil leakage and confirm that the oil level indicator is inside the "GREEN" operating mark.
- E) Check for any stray wire or connections that would introduce a short-circuit into the transformer.
- F) Make sure that the neutral terminal of the voltage transformer part (H2, N ...) is connected to ground. Confirm all intended groundings.
- G) Confirm that the secondary circuit of the voltage transformer part is not shorted.
- H) Make sure that no secondary winding of the current transformer part is open circuited.
- I) Verify all connections are tight.
- J) After all above checks have been made, the transformer is ready for service.
- K) If any problems are encountered, contact:

**RITZ Instrument Transformers, Inc.**  
**One Ritz Avenue**  
**Waynesboro, GA 30830**  
**(706) 554-8800 FAX(706) 554-8808**  
**info@ritzusa.com**



### 7.0 MAINTENANCE

Besides regular cleaning of the transformer surface and especially the insulator, no routine maintenance is required on the transformers. However, the oil level indicator position should be checked regularly, along with visual inspections during the normal scheduled maintenance periods. It is good practice to compare the oil level indicator position of neighboring units. Also the inside of the terminal box and the ventilation screens should be checked for cleanliness. Refer to the attached procedure for oil sampling, if required.

### 8.0 APPENDIX

- Oil level indicator positions
- Oil Sampling Procedure
- Technical Bulletin for units with composite insulators (Handling and cleaning)
- MSDS sheets for mineral oil



# Technical Bulletin

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## OIL SAMPLING PROCEDURE

The transformer requires no oil maintenance. Thus, oil sampling is recommended only after unusual high electrical or thermal stress.

For each oil sample, the total oil quantity of oil which has been sampled (quantity of flushing oil + quantity of sample oil) must be carefully noted. There is **0.5 liters maximum** (per transformer) of oil available for sampling at time of delivery. Do **not** drain more oil if not advised otherwise by RITZ.

Oil sampling should only be carried out at ambient temperatures  $> +5^{\circ}\text{C}$ .

Note: (1) The position of the oil level indicator will show a difference at lower and upper temperature limits depending on the amount of oil taken when compared to those transformers which have not had oil samples taken.

(2) The oil sampling kit can be purchased from Ritz Instrument Transformers upon request.

(3) If any problems are encountered, contact:

**Ritz Instrument Transformers, Inc.**  
**One Ritz Avenue**  
**Waynesboro, Georgia 30830**  
**Telephone: (706) 554-8800**  
**Fax: (706) 554-8801**  
**E-mail Address: info@ritzusa.com**

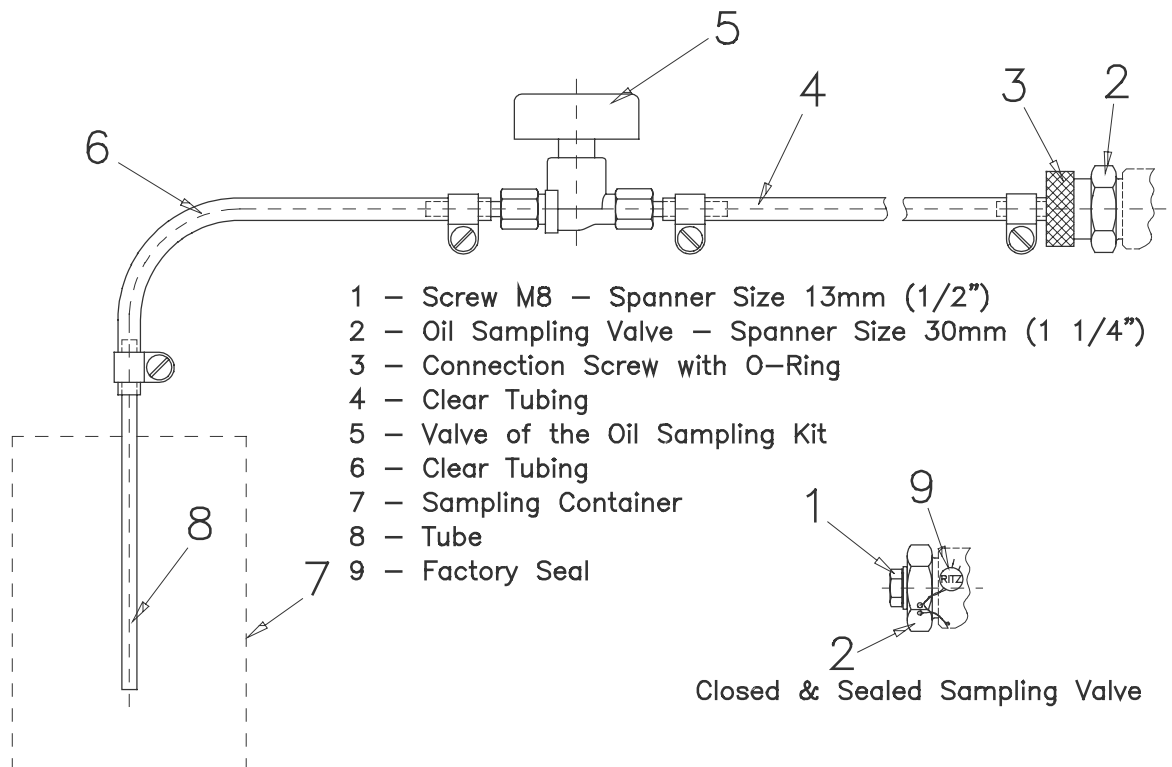
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		revised:	01. 5. 1997
		revision:	2
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### Oil Sampling Procedure

1. Unscrew and remove hexagonal bolt M8 (pos.1), spanner size 13mm from the oil sampling valve.



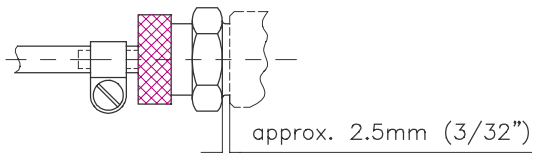
2. Screw in the connection screw (pos.3) and tighten hand-tight.

**CAUTION:** Steps 3 through 7 must be performed as specified. Failure to comply increases the chances of air bubbles entering the unit.

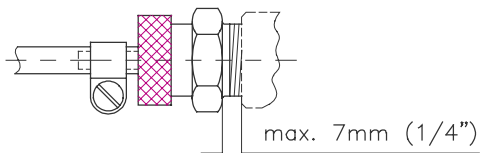
3. Adjust tap on oil sampling kit valve (pos.5) in open position (arrow must point in tube direction).
4. Slide oil collecting vessel (pos.7) over tube (pos.8).
5. Open sampling valve (pos.2) spanner size 30mm, by 2 to 3 turns, turning the oil sampling kit as well. (For first oil sampling, user must cut seal wire (pos.9) in order to open the sampling valve (pos. 2)).

6. Let oil drain off until no more bubbles appear in tube (pos.4), thus rinsing the tube.
7. Close tap (pos.5).

### Oil Sampling Valve

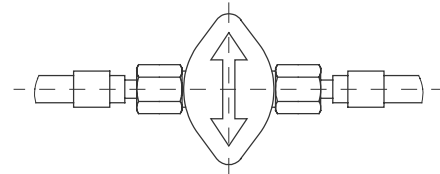


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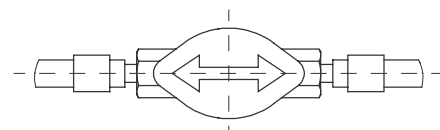


OPEN

### Oil Sampling Kit Valve



CLOSED



OPEN

8. Slide oil sample glass over the tube (pos.8) and drain amount of oil required by opening the tap (pos.5).
9. Upon completion of oil sampling, close tap (pos.5).
10. Take record of total quantity of oil sample (rinsing and sampling).
11. Close oil sampling valve (pos.2, spanner size 30mm) and tighten to 25 Nm (20 lb.●ft).
12. Remove oil sampling kit.
13. Screw in sealing screw (pos.1).
14. Remove any spilled oil.
15. After maximum 24 hours, check tightness on oil sampling valve.



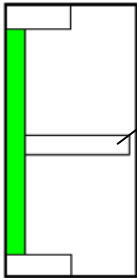
# Technical Bulletin

## OIL LEVEL INDICATOR POSITIONS

### Instrument Transformers

### Type: KOTEF / OSKF / OTEF

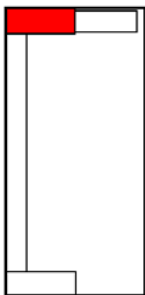
#### 1. GREEN ZONE



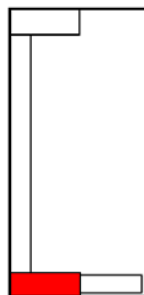
WHITE Level Indicator

If the level indicator is in the **GREEN ZONE**, the unit is functioning normally – virtually free of internal pressure.

#### 2. RED ZONES



If the level indicator is in the **UPPER RED ZONE**, the unit is under high internal pressure!



If the level indicator is in the **LOWER RED ZONE**, the unit is under low internal pressure!

If the indicator is in a **RED ZONE**, contact RITZ **IMMEDIATELY**:

**RITZ Instrument Transformers, Inc.**  
**One Ritz Avenue**  
**Waynesboro, GA 30830**  
**(706) 554-8800 FAX(706) 554-8808**

Note conditions such as over-voltage or oil leakage.

name: Rosin

date:

03. 15. 1998

revised:

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ident.-no.

**TB0052**

cc: Eng., Marketing



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# Technical Bulletin

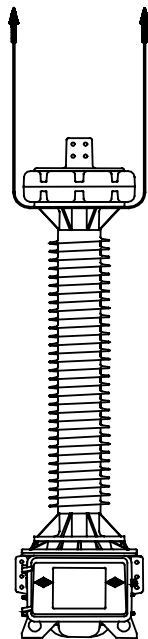
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## UNITS WITH COMPOSITE INSULATORS HANDLING AND CLEANING

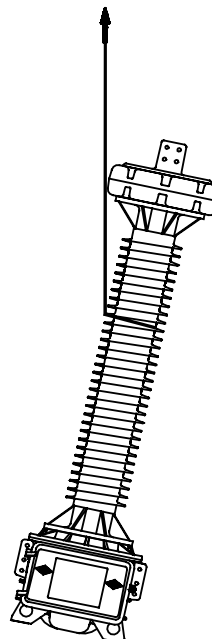
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Composite insulators comprise an internal glass fiber reinforced epoxy tube with joined aluminum flanges. The outside layer is coated with silicone rubber, which also forms the sheds. Below sketch shows a Capacitive Voltage Transformer (CVT) with composite insulator. Following guidelines apply to all Ritz high voltage units with composite insulators (e.g. Current Transformers – CT's, Voltage Transformers – VT's, Combined units – CT/VT's). The composite insulator shown is typical. Size, form and material may vary depending on the units supplied.

**CORRECT**



**INCORRECT**





## HANDLING

**CAUTION: Silicone sheds are subject to breakage and may tear from improper handling.**

To prevent damage to the silicone rubber sheds slings or straps of any nature must be placed around the flanges or the metal housing of the unit. Do not place any sling or strap on or between the sheds. Take special care when removing the crate and the packaging not to damage the insulator especially with sharp tools like pry bars, knives, razors or cutters. Do not hold on to the insulator when directing or climbing the unit.

## CLEANING

The phenomenon of hydrophobicity ensures that the silicone rubber keeps its water repelling properties even when aged and heavily polluted. Should cleaning be desired it can be performed as follows dependent on the degree of pollution:

Use a dry cotton cloth.

Moisten the cotton cloth with a

- detergent solution
- alcohol
- acetone or trichlorethylene (use conservatively)

If a detergent or solvent is used, rinse with water.

**The insulator can be pressure washed but do not let the jet stay on one area for any length of time.**

After cleaning with a detergent or solvent, wait for 24 hours before energizing to allow the silicone to recover its hydrophobicity.

## WARNING

Use solvents in a well ventilated area. Do not inhale the vapors and avoid skin contact. Do not use volatile fluids near an open flame. Handle and use protecting measures as described in the MSDS and as required by the National Laws on health and environment.