

1ZSE 5492-154 en, Rev. 4

On-load tap-changers, type UZ

User's manual

Original instruction

The information provided in this document is intended to be general and does not cover all possible applications. Any specific application not covered should be referred directly to ABB or its authorized representative.

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Manufacturer's declaration

The manufacturer **ABB AB**
Components
SE-771 80 LUDVIKA
Sweden

Hereby declares that

The products On-load tap-changers, types **UZE** and **UZF**
with motor-drive mechanism, type **BUF 3**

comply with the following requirements:

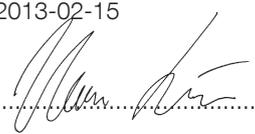
By design, the machine, considered as a component of a mineral oil filled power transformer, complies with the requirements of

- Machinery Directive 89/392/EEC (amended 91/368/EEC and 93/44/EEC) and 93/68/EEC (marking) provided that the installation and the electrical connection are correctly realized by the manufacturer of the transformer (e.g. in compliance with our Installation Instructions) and
- EMC Directive 89/336/EEC regarding the intrinsic characteristics to emission and immunity levels and
- Low Voltage Directive 73/23/EEC (modified by Directive 93/68/EEC) concerning the built-in motor and apparatus in the control circuits.

Certificate of Incorporation:

The machines above must not be put into service until the machinery into which they have been incorporated has been declared in conformity with the Machinery Directive.

Date 2013-02-15

Signed by 

Hans Linder

Title Manager Tap-Changers, Local Product Group Unit Components

Introduction

The UZ range of on-load tap-changers manufactured by ABB has been developed over many years to provide maximum reliability. The simple and rugged design gives a service life equal to the service life of the transformer. Minimum maintenance is required for trouble-free operation. The only parts requiring maintenance are contacts, that might need replacement during the service life, the insulating oil and the motor-drive mechanism.

The design allows ready access to all parts, making inspection and maintenance quick and simple.

The on-load tap-changer type UZE/UZF is placed in an oil-filled tank separated from the transformer tank. The motor-drive mechanism is attached to the side of the tap-changer tank.

Safety warnings

The following warnings and notes are used in the manual:



WARNING

WARNING indicates an imminently hazardous situation, which if not avoided will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING also indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation, which if not avoided may result in minor or moderate injury. It may also be used to alert of unsafe practices.

CAUTION may also indicate property-damage-only hazards.

Safety precautions



WARNING

Personnel operating and inspecting the tap-changer must have good knowledge of the apparatus and must be aware of the risks pointed out in this manual.

Personnel making electrical connections in the motor-drive mechanism have to be certified.



WARNING

Small amounts of explosive gases might come out from the breathing devices (dehydrating breather or one-way breather). Make sure that no open fire, hot surfaces or sparks occur in the immediate surroundings of the breathing devices.



WARNING

The tap-changer tank is filled with oil. The covers may be opened only by a specialist and after the transformer is taken out of service and the tap-changer is drained.



WARNING

The cover for access to conductors on top of the UZF tank may be opened only after draining the transformer's main tank.



CAUTION

After a trip from a supervisory device, an inspection must be made by a specialist. The tap-changer must be drained, opened and carefully investigated before the transformer is reenergized.

Operation



WARNING

The handcrank must not be inserted during electrical operation.



WARNING

If the tap-changer is not in the exact position and the handcrank is pulled out, the motor-drive mechanism will start and go to the exact position if the power supply is on.



WARNING

If a failure in power supply occurs during operation, the operation will be completed when the power returns.

- The position indicator shows the actual tap-position.
- The draghands show the max. and min. tap-position between which the tap-changer has been working since last resetting.
- The tap-change in progress indicator shows RED during operation and WHITE when the tap-changer is in position.
- For resetting of the emergency stop, turn the knob clockwise.
- The LOCAL/REMOTE switch. In position LOCAL the tap-changer can be operated by the RAISE/LOWER switch. In position LOCAL remote operation is rendered impossible. In position REMOTE the tap-changer is operated from the control room or by a voltage regulator. Local operation is not possible in remote position.
- In case of a failure in power supply for the motor-drive mechanism, it is possible to handcrank the tap-changer. Put the handcrank on the shaft. Crank in the desired direction as per the information plate above the shaft. 20 turns for a complete operation. Continue cranking until the tap-change in progress indicator shows white. When the handcrank is inserted, all electrical operations are rendered impossible.

- Thermostat for extra heater (option). We recommend a setting at +5 °C.
- Hygrostat for extra heater (option). We recommend a setting at approximately 60 %.
- Outlet (option) with earth fault protector.

Normally the tap-changer is controlled by a voltage regulator and no manual operation of the tap-changer and the motor-drive mechanism is needed.

Maintenance schedule



CAUTION

To maintain the high reliability of the tap-changer it is important that the inspections and the overhauls be carried out at the interval stated on the rating plate.

Maintenance of the tap-changer consists of three major steps:

- Inspection to be carried out by site personal once a year (see below)
- Overhaul to be carried out by a specialist at intervals stated on the rating plate
- Contact replacement to be carried out by a specialist. The possible need for replacement is decided during overhaul.

A specialist is a service engineer from ABB or an authorized person trained by ABB for maintenance work on UZ tap-changers.

Inspection



CAUTION

Approval should be given by the site engineer in charge for inspection as well as for operating the tap-changer.

It is recommended to inspect the tap-changer once a year. This principally concerns the motor-drive mechanism and refers to a visual inspection inside the BUF 3 cabinet to check that nothing is loose, and that the heater is functioning.

In the motor-drive mechanism a counter registers every tap-change operation. During inspection the counter is read and noted. If possible, motor and counter are to be tested by operating one step and then back.

If the tap-changer has its own oil conservator, the breather and the oil level indicator on the oil conservator are to be checked according to the instructions from the transformer manufacturer.

The inspection is to be carried out while the transformer is in service.

On the conservator the following are to be checked:

- Oil level
- Breather

In the motor-drive mechanism the following items are to be checked:

- Motor and counter
- Emergency stop
- Heater
- Earth fault protector for the outlet (option)

If the tap-changer is equipped with an oil filter unit, the pressure drop over the filter is to be checked.

Required tools

The following equipment is required for the inspection:

- Set of screwdrivers
- Pen and note pad

Procedure



WARNING

Checking of the breather and the oil level must be carried out from ground level since the transformer is energized.

1. Checking of the breather



WARNING

The breathers and the tube from the conservator might contain explosive gases. No open fire, hot surfaces or sparks may be present when removing the breather.

If the oil conservator has a dehydrating breather, and more than half of the drying agent has changed colour, it must be dried or replaced. For drying see below. The drying agent normally starts to change colour from the bottom of the breather. If it has changed colour at the top, there is a leakage in the connections to the conservator. Locate the leakage and seal it.

If the breather has an oil trap, check the oil level.

To replace the drying agent, proceed as follows:

- Dismantle the breather and empty the agent.
- Replace with new drying agent. Alternatively, dry the old agent by placing it on a net and putting it in an oven, temperature approximately +100 °C (+212 °F), until it changes colour again.
- Fill the breather with drying agent. Clean the threads and apply sealing tape. Remount the breather.

2. Checking of the oil level

At +20 °C (68 °F), oil is filled to the level where the pointer of the oil level indicator points half-way between MIN. and MAX.

For other temperatures than +20 °C (68 °F), proceed as follows:

- For every 10 °C (18 °F) increase in temperature, adjust the oil level upwards a tenth of the scale range of the oil level indicator.
- For every 10 °C (18 °F) decrease in temperature, adjust the oil level downwards a tenth of the scale range of the oil level indicator.

3. Checking of the motor and the counter

Open the motor-drive cabinet door and turn the selector-switch to the LOCAL position. Then turn the control switch to the RAISE (LOWER) position.

Check that the motor works properly, the position indicator increases (decreases) one step, and the counter advances one step for each operation. Record the counter's value. The counter shows the number of operations run by the tap-changer (the overhaul schedule can be determined with the help of this information).

Turn the control switch to the LOWER (RAISE) position. Check that the motor also works properly in that direction, the position indicator decreases (increases) one step and the counter advances one step more.

Reset the draghands.

4. Checking of the emergency stop

Give a RAISE or LOWER impulse and after about one second press the emergency stop. The operation should be interrupted. Reset the emergency stop by turning the knob clockwise and set the protective motorswitch to ON. The started operation should now be completed. Operate back to service position.

5. Checking of the earth fault protector (option)

If the motor-drive mechanism is equipped with an outlet, the earth fault protector should be tested by pressing the test knob on the outlet.

6. Checking of the heater



WARNING

Before starting any work inside the motor-drive mechanism the auxiliary power must be switched off.

N. B. The motor, contactors and heating element may be energized from separate sources.

Disconnect the incoming auxiliary power.

Check by feeling with a finger on the protection plate that the heater has been functioning.

Reconnect the incoming auxiliary power.

Complete the inspection by turning the selector-switch to the REMOTE position and closing the cabinet door.

7. Checking of the oil filter unit (option)

If the tap-changer is equipped with an oil filter unit from ABB:

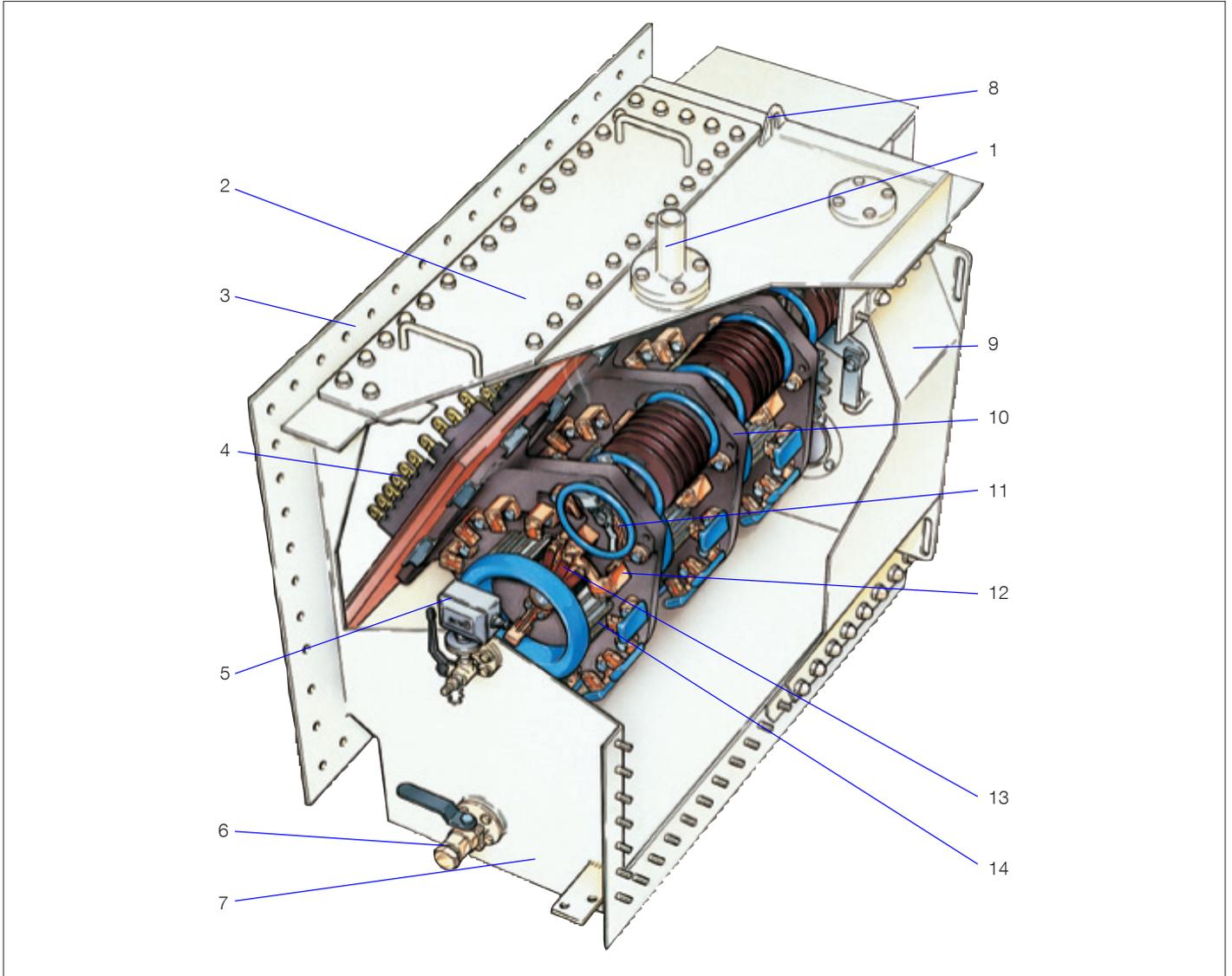
- Read the pressure gauge.
- Note the reading so the change from year to year can be seen.

If the pressure is 2.0 bar or more, or close to 2.0 bar, the filter insert should be replaced.

If moisture is suspected to have come into the tap-changer compartment, the filter insert should be replaced.

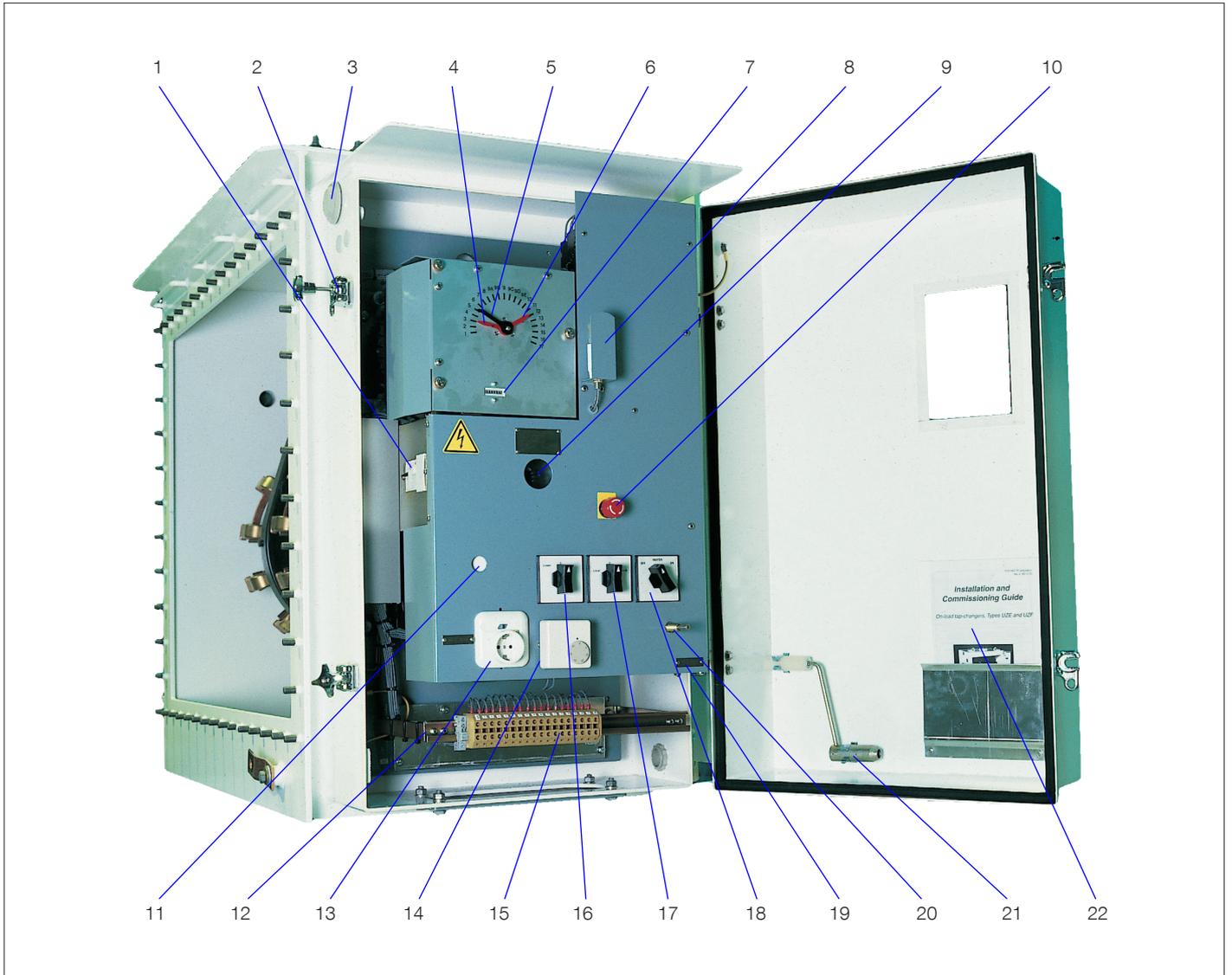
If a filter insert replacement is needed, call a specialist.

Also check for leakages. All leakages should be repaired!



Layout of on-load tap-changer, typ UZ (UZF shown).

- | | |
|---|---------------------------|
| 1. Connection to oil conservator | 8. Lifting eye |
| 2. Cover for access to conductors, UZF only | 9. Front cover |
| 3. Attachment flange to transformer tank | 10. Moulding |
| 4. Terminals for conductors | 11. Change-over selector |
| 5. Pressure relay | 12. Fixed contact |
| 6. Oil valve | 13. Moving contact system |
| 7. On-load tap-changer tank | 14. Transition resistor |



Cabinet layout of motor-drive mechanism, type BUF3.

- | | |
|--|--|
| 1. Protective motor switch | 13. (Option) Outlet with earth fault protector |
| 2. Locking device prepared for padlock | 14. (Option) Thermostat or hygrostat for extra heater 250 W |
| 3. Air vent | 15. Terminal blocks |
| 4. Draghand for min. position | 16. RAISE/LOWER switch |
| 5. Position indicator | 17. LOCAL/REMOTE switch
(Remote position for automatic operation) |
| 6. Draghand for max. position | 18. (Option) Switch for extra heater |
| 7. Counter | 19. Serial number |
| 8. Lamp (25 W socket E14) | 20. Door-operated switch for lamp |
| 9. Shaft for handcrank | 21. Handcrank |
| 10. Emergency stop | 22. Descriptions and circuit diagram |
| 11. Tap-change in progress indicator
(Red = in progress, White = in position) | |
| 12. Heater 50 W (+ Option 250 W) | |

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