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<td>11.3 2079960</td>
<td>50</td>
</tr>
<tr>
<td>11.4 2079985</td>
<td>51</td>
</tr>
<tr>
<td>11.5 2079996</td>
<td>52</td>
</tr>
<tr>
<td>11.6 2080031</td>
<td>53</td>
</tr>
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</tr>
</tbody>
</table>
1 Introduction

This technical file contains detailed descriptions on the safe and proper installation, connection, commissioning and monitoring of the product.

It also includes safety instructions and general information about the product.

This technical file is intended solely for specially trained and authorized personnel.

1.1 Validity

This technical file applies to the following versions of the oil filter unit:

- OF 100 DC – Oil filter unit with controller in the motor-drive unit with combined filter
- OF 100 DP – Oil filter unit with controller in the motor-drive unit with paper filter
- OF 100 SC – Oil filter unit with separate control cabinet with combined filter
- OF 100 SP – Oil filter unit with separate control cabinet with paper filter
- OF 100 NC – Oil filter unit with combined filter without controller
- OF 100 NP – Oil filter unit with paper filter without controller
- OF 100 S – Only controller in a separate control cabinet (without pump unit)

1.2 Manufacturer

The product is manufactured by:

Maschinenfabrik Reinhausen GmbH
Falkensteinstraße 8
93059 Regensburg, Germany
Tel.: (+49) 9 41/40 90-0
Fax: (+49) 9 41/40 90-7001
E-mail: sales@reinhausen.com

Further information on the product and copies of this technical file are available from this address if required.

1.3 Completeness

This technical file is incomplete without the supporting documents.

The following documents are considered supporting documents:

- Routine test report (included in the scope of delivery)
- Dimensional drawing (included in the scope of delivery)
- Technical data - General section (available on request)
1.4 Safekeeping

Keep this technical file and all supporting documents ready at hand and accessible for future use at all times.

1.5 Notation conventions

This section contains an overview of the symbols and textual emphasis used.

1.5.1 Hazard communication system

Warnings in this technical file are displayed as follows.

1.5.1.1 Warning relating to section

Warnings relating to sections refer to entire chapters or sections, sub-sections or several paragraphs within this technical file. Warnings relating to sections use the following format:

⚠️WARNING⚠️

Type of danger!

Source of the danger and outcome.

► Action

► Action

1.5.1.2 Embedded warning information

Embedded warnings refer to a particular part within a section. These warnings apply to smaller units of information than the warnings relating to sections. Embedded warnings use the following format:

⚠️DANGER⚠️

Instruction for avoiding a dangerous situation.

1.5.1.3 Signal words and pictograms

The following signal words are used:

<table>
<thead>
<tr>
<th>Signal word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER</td>
<td>Indicates a hazardous situation which, if not avoided, will result in death or serious injury.</td>
</tr>
<tr>
<td>WARNING</td>
<td>Indicates a hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</td>
</tr>
<tr>
<td>NOTICE</td>
<td>Indicates measures to be taken to prevent damage to property.</td>
</tr>
</tbody>
</table>

Table 1: Signal words in warning notices
1 Introduction

Pictograms warn of dangers:

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>Warning of a danger point</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warning of dangerous electrical voltage</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warning of combustible substances</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warning of danger of tipping</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Warning of danger of crushing</td>
</tr>
</tbody>
</table>

Table 2: Pictograms used in warning notices

1.5.2 Information system

Information is designed to simplify and improve understanding of particular procedures. In this technical file it is laid out as follows:

Important information.

1.5.3 Instruction system

This technical file contains single-step and multi-step instructions.

Single-step instructions

Instructions which consist of only a single process step are structured as follows:
Aim of action
✓ Requirements (optional).
► Step 1 of 1.
⇒ Result of step (optional).
⇒ Result of action (optional).

Multi-step instructions
Instructions which consist of several process steps are structured as follows:

Aim of action
✓ Requirements (optional).
1. Step 1.
⇒ Result of step (optional).
2. Step 2.
⇒ Result of step (optional).
⇒ Result of action (optional).
2 Safety

This technical file contains detailed descriptions on the safe and proper installation, connection, commissioning and monitoring of the product.

- Read this technical file through carefully to familiarize yourself with the product.
- This technical file is a part of the product.
- Read and observe the safety instructions provided in this chapter in particular.
- Observe the warnings in this technical file in order to avoid function-related dangers.
- The product is manufactured on the basis of state-of-the-art technology. Nevertheless, risks to life and limb for the user or impairment of the product and other material assets may arise in the event of improper use.

2.1 Appropriate use

The oil filter unit is exclusively used for cleaning or cleaning and drying the mineral insulating oil in on-load tap-changers and plunger coils. The product is designed solely for use in stationary industrial large-scale electrical energy systems and facilities. If used as intended and in compliance with the requirements and conditions specified in this technical file as well as the warning notices in this technical file and attached to the product, then the product does not present any danger to people, property or the environment. This applies throughout the service life of the product, from delivery, installation and operation to removal and disposal.

The following is considered appropriate use:

- Use the product only with the transformer specified in the order.
- Operate the product in accordance with this technical file, the agreed-upon delivery conditions and the technical data.
- Ensure that all necessary work is performed by qualified personnel only.
- Use the equipment and special tools supplied solely for the intended purpose and in accordance with the specifications of this technical file.
- The serial number of the oil filter unit must match that of the on-load tap-changer.
- It is essential that you use the combined filter cartridge if its use is prescribed by Maschinenfabrik Reinhausen GmbH in order to comply with certain dielectric properties of the insulating fluid.
- It is essential that you use the combined filter cartridge if the oil filter unit is installed in the oil cooling unit.
- Only use filter cartridges from Maschinenfabrik Reinhausen GmbH.
- The oil filter unit is a product for environment A. This product can cause undesired electromagnetic interferences in environment B. Take appropriate measures where necessary.
2.2 Fundamental safety instructions

To prevent accidents, disruptions and damage as well as unacceptable adverse effects on the environment, those responsible for transport, installation, operation, maintenance and disposal of the product or parts of the product must ensure the following:

Personal protective equipment

Loosely worn or unsuitable clothing increases the danger of becoming trapped or caught up in rotating parts and the danger of getting caught on protruding parts. This poses a danger to life and limb.

▪ Wear appropriate personal protective equipment such as a helmet, work gloves, etc. for the respective activity.
▪ Never wear damaged personal protective equipment.
▪ Never wear rings, necklaces, or other jewelry.
▪ If you have long hair, wear a hairnet.

Work area

Untidy and poorly lit work areas can lead to accidents.

▪ Keep the work area clean and tidy.
▪ Make sure that the work area is well lit.
▪ Observe the applicable laws for accident prevention in the relevant country.

Working during operation

The product may only be operated in a sound, operational condition. Otherwise it poses a danger to life and limb.

▪ Regularly check the operational reliability of safety equipment.
▪ Comply with the inspection work, maintenance work and maintenance intervals described in this technical file.

Explosion protection

Highly flammable or explosive gases, vapors and dusts can cause serious explosions and fire. This increases the danger to life and limb.

▪ Do not install, operate or perform maintenance work on the product in areas where a risk of explosion is present.

Safety markings

Warning signs and safety information plates are safety markings on the product. They are an important aspect of the safety concept.

▪ Observe all safety markings on the product.
▪ Make sure all safety markings on the product remain intact and legible.
▪ Replace safety markings that are damaged or missing.
Ambient conditions
To ensure reliable and safe operation, the product must only be operated under the ambient conditions specified in the technical data.

- Observe the specified operating conditions and requirements for the installation location.

Auxiliary materials and operating materials
Auxiliary materials and operating materials not approved by the manufacturer can lead to personal injury, damage to property and malfunctions of the product.

- For the on-load tap-changer oil compartment, only use insulating fluids that meet the requirements in accordance with IEC 60296.
- If approved by the transformer manufacturer, you can use alternative insulating fluids approved by Maschinenfabrik Reinhausen GmbH in the transformer tank.
- It is imperative that you consult with Maschinenfabrik Reinhausen GmbH because specific selector operating conditions apply to alternative insulating fluids.
- Only use conductive and grounded hoses, pipes, and pump equipment that are approved for flammable liquids.
- Only use lubricants and auxiliary materials approved by the manufacturer.
- Contact the manufacturer.

Modifications and conversions
Unauthorized or inappropriate changes to the product may lead to personal injury, material damage and operational faults.

- Only modify the product after consultation with the manufacturer.

Spare parts
Spare parts not approved by the manufacturer may lead to physical injury, damage to the product and operational faults.

- Only use spare parts approved by the manufacturer.
- Contact the manufacturer.

2.3 Personnel qualification
The person responsible for assembly, commissioning, operation, maintenance and inspection must ensure that the personnel are sufficiently qualified.
Electrically skilled person

The electrically skilled person has a technical qualification and therefore has the required knowledge and experience, and is also conversant with the applicable standards and regulations. The electrically skilled person is also proficient in the following:

▪ Can identify potential dangers independently and is able to avoid them.
▪ Is able to perform work on electrical systems.
▪ Is specially trained for the working environment in which (s)he works.
▪ Must satisfy the requirements of the applicable statutory regulations for accident prevention.

Electrically trained persons

An electrically trained person receives instruction and guidance from an electrically skilled person in relation to the tasks undertaken and the potential dangers in the event of inappropriate handling as well as the protective devices and safety measures. The electrically trained person works exclusively under the guidance and supervision of an electrically skilled person.

Operator

The operator uses and operates the product in line with this technical file. The operating company provides the operator with instruction and training on the specific tasks and the associated potential dangers arising from improper handling.

Technical Service

We strongly recommend having maintenance, repairs and retrofitting carried out by our Technical Service department. This ensures that all work is performed correctly. If maintenance is not carried out by our Technical Service department, please ensure that the personnel who carry out the maintenance are trained and authorized by Maschinenfabrik Reinhausen GmbH to carry out the work.

Authorized personnel

Authorized personnel are trained by Maschinenfabrik Reinhausen GmbH to carry out special maintenance.

2.4 Personal protective equipment

Personal protective equipment must be worn during work to minimize risks to health.

▪ Always wear the personal protective equipment required for the job at hand.
▪ Never wear damaged personal protective equipment.
▪ Observe information about personal protective equipment provided in the work area.
## Personal protective equipment to be worn at all times

<table>
<thead>
<tr>
<th><strong>Protective clothing</strong></th>
<th>Close-fitting work clothing with a low tearing strength, with tight sleeves and with no protruding parts. It mainly serves to protect the wearer against being caught by moving machine parts.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety shoes</strong></td>
<td>To protect against falling heavy objects and slipping on slippery surfaces.</td>
</tr>
</tbody>
</table>

## Special personal protective equipment for particular environments

<table>
<thead>
<tr>
<th><strong>Safety glasses</strong></th>
<th>To protect the eyes from flying parts and splashing liquids.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visor</strong></td>
<td>To protect the face from flying parts and splashing liquids or other dangerous substances.</td>
</tr>
<tr>
<td><strong>Hard hat</strong></td>
<td>To protect from falling and flying parts and materials.</td>
</tr>
<tr>
<td><strong>Hearing protection</strong></td>
<td>To protect from hearing damage.</td>
</tr>
<tr>
<td><strong>Protective gloves</strong></td>
<td>To protect from mechanical, thermal, and electrical hazards.</td>
</tr>
</tbody>
</table>
3 Product description

This chapter contains an overview of the design and function of the product.

3.1 Scope of delivery

The product is packaged with protection against moisture and is delivered as follows:

- Oil filter unit
- Filter cartridge
- Technical files

Please note the following:

- Check the shipment for completeness on the basis of the shipping documents.
- Store the parts in a dry place until installation
- The product must remain in its airtight, protective wrapping and may only be removed immediately before installation

3.2 Function description

The oil filter unit cleans (paper filter cartridge) or cleans and dries (combined filter cartridge) the insulating fluid of on-load tap-changers. The oil filter unit and on-load tap-changer head are connected to each other by pipes. After each on-load tap-change, the insulating fluid is treated in the oil filter unit and transported back into the on-load tap-changer. A factory-set minimum run time of the pump [►Section 9, Page 44] ensures the necessary circulation of the entire insulating fluid, thus preventing deposits in the filter system.
A necessary filter change is signaled by a pressure switch with signaling contact. A temperature-related and thus undesirable signal from the pressure switch can be suppressed on customer request. Further information on this is available in the section “Versions [▶ Section 3.3.2, Page 17].”

Figure 1: Overview of oil filter unit
3.3 Setup/models

3.3.1 Design

Figure 2: Oil filter unit

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pressure switch</td>
</tr>
<tr>
<td>2</td>
<td>Return flange</td>
</tr>
<tr>
<td>3</td>
<td>Nameplate</td>
</tr>
<tr>
<td>4</td>
<td>Ground connection</td>
</tr>
<tr>
<td>5</td>
<td>Drain valve</td>
</tr>
<tr>
<td>6</td>
<td>Temperature switch (optional)</td>
</tr>
<tr>
<td>7</td>
<td>Feed flange</td>
</tr>
<tr>
<td>8</td>
<td>Oil filter unit</td>
</tr>
<tr>
<td>9</td>
<td>Lifting eye bolt</td>
</tr>
<tr>
<td>10</td>
<td>Manometer</td>
</tr>
</tbody>
</table>
### 3.3.2 Versions

The electrical controller of the oil filter unit is either integrated into the on-load tap-changer motor-drive unit or into a control cabinet. Depending on the desired behavior upon reaching a working pressure of 3.6 bar and depending on the voltage supply, the oil filter unit can be supplied with or without a temperature switch / rod-type thermostat.

<table>
<thead>
<tr>
<th>Temperature switch</th>
<th>Rod-type thermostat</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>–</td>
<td>–</td>
<td>A necessary filter change is signaled by a pressure switch and a signaling contact once a working pressure of 3.6 bar is reached, regardless of whether the increase in working pressure is caused by a contaminated filter or by an increased viscosity of the insulating fluid due to temperature.</td>
</tr>
<tr>
<td>For AC</td>
<td>For DC</td>
<td>If the temperature of the insulating fluid drops below 20 °C, the viscosity of the insulating fluid increases and, as a result, so does the working pressure. A necessary filter change is also signaled in this case when 3.6 bar is reached, even though the increase in working pressure is caused by the increased viscosity and not by a contaminated filter. This message is suppressed by a temperature switch with alternating current or by a rod-type thermostat with direct current.</td>
</tr>
<tr>
<td>–</td>
<td>For AC and DC</td>
<td>A rod-type thermostat installed in the base of the oil filter unit switches the oil filter unit to permanent operation as soon as the temperature of the insulating fluid falls below 0 °C. The oil filter unit remains in permanent operation until the temperature exceeds +5 °C.</td>
</tr>
</tbody>
</table>

Table 3: Possible versions

### 3.3.3 Controller

The electrical controller of the oil filter unit is either installed in the motor-drive unit or in a separate control cabinet.

**Controller in the motor-drive unit**

It is activated by a potential-free contact of the motor-drive unit. The run time is set in the factory using a time relay and can be switched to permanent operation using rotary switch S30.

The controller is equipped with electrical safety equipment. A motor protective switch with thermal and magnetic overload trip is fitted per pump unit.

**Controller integrated in separate control cabinet**

It is activated by a potential-free contact of the motor-drive unit.

The run time is set as follows:
- factory setting by time relay
- adjustable up to 24 hours by time switch
- can be switched to permanent operation using rotary switch S30
The controller is equipped with electrical safety equipment. A motor protective switch with thermal and magnetic overcurrent trip as well as a miniature circuit breaker for the control circuit are fitted per pump unit.

The electrical monitoring equipment in the control cabinet includes a 5-digit operating hours counter for recording the operating duration and a 6-digit pulse counter for recording the frequency with which the pump is switched on.

Heating is also fitted in the control cabinet.
## 3 Product description

<table>
<thead>
<tr>
<th>Code</th>
<th>Component</th>
<th>X1</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F37</td>
<td>Voltage arrester</td>
<td>X1</td>
<td>Connection terminal strip</td>
</tr>
<tr>
<td>1</td>
<td>Grounding screw</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4 Packaging, transport and storage

4.1 Packaging

The products are sometimes supplied with sealed packaging and sometimes in a dry state, depending on requirements.

Sealed packaging surrounds the packaged goods with plastic foil on all sides.

Products that have also been dried are identified by a yellow label on the sealed packaging. In the dry state, delivery is also possible in a transport container.

The information in the following sections should be applied as appropriate.

4.1.1 Suitability

**NOTICE**

Property damage due to incorrectly stacked crates!

Stacking the crates incorrectly can lead to damage to the packaged goods.

► The outer marking on the packaging states if, for example, the on-load tap-changer or selector has been packed upright. Never stack these crates.

► General rule: Do not stack crates above a height of 1.5 m.

► For other crates: Only stack up to 2 equally sized crates on top of one another.

The packaging is suitable to ensure undamaged and fully functional means of transportation in compliance with local transportation laws and regulations.

The packaged goods are packed in a sturdy crate. This crate ensures that, when in the intended transportation position, the packaged goods are stabilized to prevent impermissible changes in position, and that none of the parts touch the loading surface of the means of transport or touch the ground after unloading.

Sealed packaging surrounds the packaged goods with plastic foil on all sides. The packaged goods are protected from humidity using a desiccant. The plastic foil was bonded after the desiccant is added.
4.1.2 Markings

The packaging bears a signature with instructions for safe transport and correct storage. The following symbols apply to the shipment of non-hazardous goods. Adherence to these symbols is mandatory.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>☂️</td>
<td>Protect against moisture</td>
</tr>
<tr>
<td>➖</td>
<td>Top</td>
</tr>
<tr>
<td>🥀</td>
<td>Fragile</td>
</tr>
<tr>
<td>🤝</td>
<td>Attach lifting gear here</td>
</tr>
<tr>
<td>✅</td>
<td>Center of mass</td>
</tr>
</tbody>
</table>

Table 4: Shipping pictograms

4.2 Transportation, receipt and handling of shipments

⚠️ WARNING

Danger of death or severe injury!

Danger of death or serious injuries due to tipping or falling load.

- Only transport the crate when closed.
- Do not remove the securing material used in the crate during transport.
- If the product is delivered on a pallet, secure it sufficiently.
- Only trained and authorized persons may select the sling gear and secure the load.
- Do not walk under the suspended load.
- Use means of transport and lifting gear with a sufficient carrying capacity in accordance with the weight stated on the delivery slip.

In addition to oscillation stress, jolts must also be expected during transportation. In order to prevent possible damage, avoid dropping, tipping, knocking over and colliding with the product.

If a crate tips over, falls from a certain height (e.g. when slings tear) or is subject to an unbroken fall, damage must be expected regardless of the weight.

Every delivered shipment must be checked for the following by the recipient before acceptance (acknowledgment of receipt):

- Completeness based on the delivery slip
- External damage of any type

The checks must take place after unloading when the crate or transport container can be accessed from all sides.
Visible damage  If external transport damage is found upon receipt of the shipment, proceed as follows:

▪ Immediately record the identified transport damage in the shipping documents and have this countersigned by the carrier.

▪ In the event of severe damage, total loss or high damage costs, immediately notify the manufacturer and the relevant insurance company.

▪ After identifying damage, do not modify the condition of the shipment further and retain the packaging material until an inspection decision has been made by the transport company or the insurance company.

▪ Record the details of the damage immediately on site together with the carrier involved. This is essential for any claim for damages.

▪ Photograph damage to packaging and packaged goods. This also applies to signs of corrosion on the packaged goods due to moisture inside the packaging (rain, snow, condensation).

▪ **NOTICE!** If the product is delivered in sealed packaging, inspect this immediately. If the sealed packaging is damaged, do not under any circumstances install or commission the packaged goods. Either re-dry the dried packaged goods as per the operating instructions, or contact the manufacturer to agree on how to proceed. Failure to do so may result in damage to the packaged goods.

▪ Identify the damaged parts.

Hidden damage  When damages are not determined until unpacking after receipt of the shipment (hidden damage), proceed as follows:

▪ Make the party responsible for the damage liable as soon as possible by telephone and in writing, and prepare a damage report.

▪ Observe the time periods applicable to such actions in the respective country. Inquire about these in good time.

With hidden damage, it is very hard to make the transportation company (or other responsible party) liable. Any insurance claims for such damages can only be successful if relevant provisions are expressly included in the insurance terms and conditions.

4.3 Storage of shipments

**Packaged goods dried by Maschinenfabrik Reinhausen**

Upon receipt of the shipment, immediately remove the packaged goods dried by Maschinenfabrik Reinhausen from the sealed packaging and store air-tight in dry insulating fluid until used if the packaged goods were not supplied in insulating fluid.

**Non-dried packaged goods**

Do not store combined filter cartridges for longer than 4 years. Otherwise the trouble-free function of the oil filter unit cannot be guaranteed.
Non-dried packaged goods with functional sealed packaging can be stored outdoors when the following conditions are complied with.

When selecting and setting up the storage location, ensure the following:

▪ Protect stored goods against moisture (flooding, water from melting snow and ice), dirt, pests such as rats, mice, termites and so on, and against unauthorized access.
▪ Store the crates on timber beams and planks as a protection against rising damp and for better ventilation.
▪ Ensure sufficient carrying capacity of the ground.
▪ Keep entrance paths free.
▪ Check stored goods at regular intervals. Also take appropriate action after storms, heavy rain or snow and so on.

Protect the packaging foil from direct sunlight so that it does not disintegrate under the influence of UV rays, which would cause the packaging to lose its sealing function.

If the product is installed more than 6 months after delivery, suitable measures must be taken without delay. The following measures can be used:

▪ Correctly regenerate the drying agent and restore the sealed packaging.
▪ Unpack the packed goods and store in a suitable storage space (well ventilated, as dust-free as possible, humidity < 50% where possible).

4.4 Unpacking shipments and checking for transportation damages

▪ **NOTICE!** Transport the packaged crate to the place where installation will take place. Do not open the sealed packaging until just before installation. If this is not done, damage to the packaged goods may occur due to ineffectively sealed packaging.

▪ **WARNING!** When unpacking, check the condition of the packaged goods. Secure packaged goods in an upright crate from tipping out. If this is not done, the packaged goods may be damaged and serious injuries may result.

▪ Check completeness of supplementary parts on the basis of the delivery slip.
5 Mounting

Electric shock!
An energized transformer could cause death or serious injuries.
► Switch off transformer on high and low-voltage side.
► Lock transformer to prevent unintentional restart.
► Ensure that everything is de-energized.
► Visibly connect all transformer terminals to ground (grounding leads, grounding disconnectors) and short circuit them.
► Cover or cordon off adjacent energized parts.

Electric shock!
Working on the on-load tap-changer when on-load tap-changer components are energized can lead to death or serious injuries.
► De-energize all auxiliary circuits, such as the tap-change supervisory device, pressure relief device, pressure monitoring device.
► Make sure that everything is de-energized.

Damage to the oil filter unit!
The oil filter unit will become damaged if it is dried.
► Never dry the oil filter unit.

5.1 Attaching the oil filter unit and control cabinet to the transformer
This section describes how to attach the oil filter unit and control cabinet (if present) to the transformer.

Attaching the oil filter unit to the transformer

Damage to the oil filter unit!
Pipes that subject the oil filter unit to mechanical stress can damage the oil filter unit.
► Route and connect the pipes such that they do not subject the oil filter unit to any mechanical stress.
► Do not use the pipes as climbing aids.
1. Rinse the pipes with dry oil before attaching them. The insides of the pipes must be completely clean and free of rust, cinders, etc.
2. Attach 1 oil filter unit to the transformer tank per on-load tap-changer switching column. When doing so, observe the differences in height needed between the individual components. Ensure that there is an additional 0.6 m of clear space above the oil filter unit for changing the filter.

3. Mount 1 stop-cock (not included in the scope of delivery) each on the feed flange and return flange.

4. Connect pipes with a pipe diameter of 1" for feed and return to the oil filter unit and on-load tap-changer head. The pipe connections on the on-load tap-changer head are described in the on-load tap-changer installation and commissioning instructions.

**Attaching the control cabinet to the transformer**

- Attach the control cabinet to the transformer such that you can actuate control elements such as handles and push buttons at a height of 0.2…2 m above the floor space of the switchgear assembly.
5.2 Electrically connecting the oil filter unit and control cabinet

The electrical connection of the motor-drive unit is described in the motor-drive unit operating instructions.

The control cabinet may only be connected to circuits that are equipped with an external and all-pole isolating device as close to the control cabinet as possible so that it can be fully de-energized if required (service, maintenance etc.).

Furthermore, a control cabinet without its own overcurrent protective device may only be connected to circuits that are equipped with an external overcurrent protective device. The protective device must ensure protection against indirect touching. The protection recommended by Maschinenfabrik Reinhausen GmbH close to the control cabinet is 1.6 A C (3.0 A C is to be used in a heating circuit with additional heating and supply voltage < 127 V AC/DC). This is to be verified after installation by carrying out a measurement.

Suitable equipment includes isolating devices in accordance with IEC 60947-1 and IEC 60947-3 (e.g. circuit breakers). When selecting the circuit breaker type, the properties of the relevant circuits (voltage, maximum currents) must be observed. The following should also be noted during installation:

▪ It must be easy for the operator to access the isolating device
▪ The isolating device must be labeled for the device and circuits to be isolated
▪ The isolating device may not be a part of the power line
▪ The isolating device may not interrupt the main protective conductor

Unless specified otherwise, the connections for the supply circuits must have a conductor cross-section of at least 2.5 mm² (14 AWG). Check applicable standards and directives to ensure that the specified minimum cross-section of the supply line is sufficient.

The voltage supply for the control cabinet must be able to provide 5…7 times the nominal operating current of the motor-drive unit for one second.

A maximum voltage tolerance of -20…+10% of the nominal voltage must be observed to avoid damage to the control cabinet.

To electrically connect the oil filter unit and control cabinet, proceed as follows:

1. Switch off the voltage supply.
2. Secure the voltage supply to prevent an unintentional restart.
3. Ensure that everything is de-energized.
4. Visibly ground and short-circuit the oil filter unit and control cabinet.

5. Ground all flanges in the pipe system using 4 contact washers per flange with a threaded screw connection or using 8 contact washers per flange with push-through connections with a contact nut. The contact washers are locking devices and ensure a proper metallic contact.

6. Cover or cordon off adjacent energized parts.
7. Electrically connect the pressure switch 1 and temperature switch / rod-type thermostat 2 (if installed) in accordance with the connection diagram provided.
8. Remove the cover from the terminal box (3 bolts M6x20, wrench size 10) and connect the oil filter unit to the motor-drive unit or control cabinet in accordance with the connection diagram provided.

![Connection Diagram](image)

Figure 9: Oil filter unit voltage supply

9. Secure the cover with gasket (3 M6x20 bolts, wrench size 10, tightening torque 4 Nm).

10. Connect the control cabinet to the voltage supply in accordance with the connection diagram provided.

Checking electrical connection

**Electric shock!**

Danger of death due to live components in the device.

- Never touch live components when the device is energized.
- Only actuate the fuse, motor protective switch and rotary switch S30.

Once the oil filter unit has been electrically connected, check that the oil filter unit and controller function correctly:

1. Open the motor-drive unit or control cabinet and supply with voltage.
2. Engage motor protective switch.
3. Set rotary switch S30 to ON.
   - The oil filter unit starts up.
5 Mounting

4. Set rotary switch S30 to OFF.
   ⊳ The oil filter unit switches off.

5. Close the motor-drive unit or control cabinet.
   ⊳ The check has been completed.
6 Commissioning

6.1 Time switch

When using the integrated time switch (special version) the oil filter unit is also activated for a daily pump operating time of 2 hours, regardless of on-load tap-changer tap-change operations. The run time is preset at the factory to run from midnight to 2.00 a.m.

► Set the time switch to local time.

6.2 Inserting the filter cartridge and filling the oil filter unit with oil

**NOTICE**

**Damage to combined filter cartridge!**

The combined filter cartridge's drying agent is very hygroscopic. Moisture absorbed from the surrounding air will damage the combined filter cartridge.

► Only remove the combined filter cartridge from its transport container and install it in the pump unit immediately prior to commissioning the transformer.

**NOTICE**

**Damage to the oil filter unit!**

Some of the oil filter unit components are not vacuum proof.

► Keep stop-cocks closed during the entire oil filling procedure (vacuum creation and oil filling).

► Open stop-cocks after the oil filling procedure is completed.

The dielectric strength of the insulating fluid must be ≥ 60 kV/2.5 mm (measured in accordance with IEC 60156) and the water content must be ≤ 12 ppm (measured in accordance with IEC 60814).

1. Close the stop-cocks on the feed flange and return flange.
2. Fill the on-load tap-changer oil compartment and the feed pipe with insulating fluid.
3. Remove the return flange from the stop-cock.
4. Remove 6 bolts (M10, wrench size 17) and 2 lifting eye bolts (M10) from the oil filter unit cover.
5. Remove the cover with o-ring.
6. Remove the filter cartridge from the packaging.
7. Hook the filter cartridge into the receiving flange of the oil filter unit. The filter cartridge will be centered automatically by pressure when the cover is closed.
8. Fill the oil filter unit with insulating fluid.
9. Attach the cover with existing o-ring using 6 bolts (M10, wrench site 17, tightening torque 30 Nm) and 2 lifting eye bolts (M10, tightening torque 30 Nm).
10. Affix the return flange to the stop-cock.
11. Open the stop-cocks on the feed flange and return flange.
12. Fill the return pipe and the on-load tap-changer oil conservator with insulating fluid.
13. Vent the oil filter unit via the vent screw on the return flange.

![Return flange vent screw](image1)

Figure 10: Return flange vent screw

14. Remove the screw cap on air-vent valve E1 on the on-load tap-changer head cover.

![Screw cap](image2)

Figure 11: Screw cap
15. Use screwdriver to lift valve tappet on air-vent valve E1 and bleed on-load tap-changer head.

![Figure 12: Valve tappet](image)

16. Seal air-vent valve E1 with screw cap (tightening torque 10 Nm).

17. Vent the feed pipe connection (suction pipe connection) on the on-load tap-changer head.

![Figure 13: Feed pipe connection](image)

18. **WARNING!** Danger of explosion due to impermissible quantity of insulating fluid in the on-load tap-changer oil conservator. Ensure that the insulating fluid level in the oil conservator is between the “Minimum” and “Maximum” marks.

6.3 Function test

**DANGER**

**Electric shock!**

Danger of death due to live components in the device.

- Never touch live components when the device is energized.
- Only actuate the fuse, motor protective switch and rotary switch S30.
6 Commissioning

Once the filter cartridge has been installed, check the correct function of the oil filter unit:

1. Supply the motor-drive unit and control cabinet with voltage.
2. Switch on the motor-drive unit and control cabinet using the miniature circuit breakers and motor protective switch.
3. Set rotary switch S30 to ON.
   ⇒ The oil filter unit starts up.
4. Close the stop-cock on the return flange.
   ⇒ The pressure in the oil filter unit increases. If the pressure does not increase, check the phase sequence of the motor voltage at the connection of the oil filter unit: U-V-W, clockwise. In the event of a deviating phase sequence, the motor (3 AC) will not start due to the return stop in the anti-friction bearings.
   ⇒ When the pressure reaches 3.6 bar, the necessity for a filter change will be signaled by the pressure switch.
   ⇒ Once the final pressure of approx. 4.2 bar is reached, set rotary switch S30 to OFF. The oil filter unit no longer conveys insulating fluid.
5. Open the stop-cock on the return flange.
6. Switch the on-load tap-changer via the motor-drive unit.
   ⇒ The oil filter unit starts up. Leave the oil filter unit running for 10 min.
7. Disconnect the motor-drive unit and control cabinet from the supply voltage.
   ⇒ The oil filter unit switches off.
8. Vent the oil filter unit, on-load tap-changer head and pipe connection on the on-load tap-changer head.
9. Set rotary switch S30 to ON.
   ⇒ The oil filter unit starts up. Leave the oil filter unit running for 60 min.
   ⇒ The function test is complete.

6.4 Commissioning the transformer

The procedure when commissioning the transformer depends on the filter cartridge installed in the oil filter unit.

Commissioning the transformer – oil filter unit with paper filter cartridge

If the oil filter unit is equipped with a paper filter unit, no further steps for commissioning the transformer are necessary.

► Commission the transformer in accordance with the on-load tap-changer installation and commissioning instructions.
Commissioning the transformer – oil filter unit with combined filter cartridge

If the oil filter unit is equipped with a combined filter cartridge, you must check the dielectric strength and water content of the insulating fluid prior to commissioning the transformer. The limit values to be complied with as well as further commissioning information are described in the flowchart [▷ Section 11.7, Page 54] in the appendix.

To drain insulating fluid from the oil filter unit and check it, proceed as follows:

1. Switch on the motor-drive unit and control cabinet using the miniature circuit breakers and motor protective switch.
2. Switch the on-load tap-changer via the motor-drive unit.
   ▷ The oil filter unit starts up. Leave the oil filter unit running for either 30 or 60 min in accordance with the set minimum run time of the pump [▷ Section 9, Page 44].
3. Switch off the motor-drive unit and control cabinet using the miniature circuit breakers.
   ▷ The oil filter unit switches off.
4. 30 minutes after switching off the oil filter unit, remove the securing element and screw cap from the drain valve.
5. Carefully open the drain valve and remove insulating fluid.
6. **NOTICE!** Damage to the on-load tap-changer due to insufficient insulating fluid in the oil compartment. Close the drain valve, affix the securing element with warning sign to the drain valve and put the screw cap on.
7. Check the dielectric strength and water content of the insulating fluid in accordance with the flowchart [▷ Section 11.7, Page 54] and commission the transformer in accordance with the on-load tap-changer installation and commissioning instructions.
7 Inspecting and changing the filter cartridge

7.1 Inspection

Monitoring for the oil filter unit is limited to a visual inspection of the seal tightness and a check of the insulating fluid.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annually</td>
<td>Visual inspection</td>
</tr>
<tr>
<td></td>
<td>• Check the oil filter unit seal tightness</td>
</tr>
<tr>
<td></td>
<td>• Check the seal tightness of the pipes</td>
</tr>
<tr>
<td>Every 2 years</td>
<td>When using the combined filter cartridge:</td>
</tr>
<tr>
<td></td>
<td>Check the quality of the insulating fluid in accordance with the on-load tap-changer operating instructions. Change the combined filter cartridge [► Section 7.2, Page 37] when the value for water content or dielectric strength is not in compliance with that specified in the operating instructions.</td>
</tr>
</tbody>
</table>

Table 5: Inspection plan

7.2 Changing the filter cartridge

⚠️ DANGER

Electric shock!

An energized transformer could cause death or serious injuries.

► Switch off transformer on high and low-voltage side.
► Lock transformer to prevent unintentional restart.
► Ensure that everything is de-energized.
► Visibly connect all transformer terminals to ground (grounding leads, grounding disconnectors) and short circuit them.
► Cover or cordon off adjacent energized parts.

⚠️ DANGER

Electric shock!

Working on the on-load tap-changer when on-load tap-changer components are energized can lead to death or serious injuries.

► De-energize all auxiliary circuits, such as the tap-change supervisory device, pressure relief device, pressure monitoring device.
► Make sure that everything is de-energized.
7 Inspecting and changing the filter cartridge

**WARNING**

Danger of explosion!
Explosive gases in the oil compartment of the on-load tap-changer, transformer, pipe system, oil conservator and at the dehydrating breather opening can deflagrate or explode and result in severe injury or death.

► Ensure that there are no ignition sources such as naked flames, hot surfaces or sparks (e.g. caused by the build-up of static charge) in the transformer's immediate surroundings and that none occur.

► Do not operate any electrical devices (e.g. risk of sparks from impact wrench).

► Only use conductive and grounded hoses, pipes, and pump equipment that are approved for flammable liquids.

**CAUTION**

Risk of burns!
The insulating fluid, oil filter unit and pipes become hot during operation. If touched, there is a risk of burns.

► Always wear the personal protection equipment when changing the filter cartridge and draining the insulating fluid.

► Do not touch hot surfaces or insulating fluid.

**NOTICE**

Damage to combined filter cartridge!
The combined filter cartridge’s drying agent is very hygroscopic. Moisture absorbed from the surrounding air will damage the combined filter cartridge.

► Only remove the combined filter cartridge from its transport container and install it in the pump unit immediately prior to commissioning the transformer.

**NOTICE**

Damage to the oil filter unit!
Damage to the oil filter unit due to worn securing elements and gaskets.

► When changing the filter cartridge, replace the lock tabs, locking washers, locknuts and gaskets with new securing elements and gaskets.

► Ensure that all screw connection points and screw elements are free of dirt, oil and grease.
7 Inspecting and changing the filter cartridge

Criteria for replacement
The criteria for replacing the filter cartridge depend on the filter cartridge used.

<table>
<thead>
<tr>
<th>Filter cartridge</th>
<th>Replacing filter cartridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper filter cartridge</td>
<td>Working pressure constantly at 3.6 bar or above during the factory-set minimum run time of the oil filter unit and temperature ≥ 20°C. The exact working pressure is set on the pressure switch by the manufacturer.</td>
</tr>
</tbody>
</table>
| Combined filter cartridge | - Working pressure constantly at 3.6 bar during the factory-set minimum run time of the oil filter unit and temperature ≥ 20 °C. The exact working pressure is set on the pressure switch by the manufacturer.  
  - or  
  - The value for water content or dielectric strength is not in compliance with that specified in the on-load tap-changer operating instructions. |

Table 6: Criteria for replacement

Changing the filter cartridge
1. Close the stop-cocks on the feed flange and return flange.
2. Position a container for capturing the insulating fluid (approx. 2 l) below the drain valve.
3. Remove the securing element with warning sign on the drain valve and drain approx. 2 liters of insulating fluid.
4. **NOTICE!** Damage to the on-load tap-changer due to insufficient insulating fluid in the oil compartment. Close the drain valve, affix the securing element with warning sign to the drain valve and put the screw cap on.

![Drain valve with securing element](image)

5. Remove the return flange from the stop-cock.
6. Remove 6 bolts (M10, wrench size 17) and 2 lifting eye bolts (M10) from the oil filter unit cover.
7. Remove the cover with o-ring.
8. Slowly pull the filter cartridge out of the oil filter unit using the handle.
9. **NOTICE!** The function of the filter cartridges will be impaired if they are stored for longer than 4 years. Remove the new Maschinenfabrik Reinhausen GmbH filter cartridge that has been stored for a maximum of 4 years from the packaging.
10. Hook the new filter cartridge with new o-ring into the receiving flange of the oil filter unit. The filter cartridge will be centered automatically by pressure when the cover is closed.
11. Fill the oil filter unit with insulating fluid.
12. Attach the cover with the new o-ring using 6 bolts (M10, wrench size 17, tightening torque 30 Nm) and 2 lifting eye bolts (M10, tightening torque 30 Nm).
13. Affix the return flange to the stop-cock.
14. Open the stop-cocks on the feed flange and return flange.
15. Vent the oil filter unit via the vent screw on the return flange.

16. Vent the on-load tap-changer head via air-vent valve E1.
17. Vent the feed pipe connection (suction pipe connection) on the on-load tap-changer head.
18. Perform function test [► Section 6.3, Page 34].

19. **WARNING!** Danger of explosion due to impermissible quantity of insulating fluid in the on-load tap-changer oil conservator. Ensure that the insulating fluid level in the oil conservator is between the “Minimum” and “Maximum” marks.

20. Commission the transformer [► Section 6.4, Page 35].
8 Disposal

A used oil filter must be disposed of in accordance with local environmental regulations.
## Technical data – standard version

<table>
<thead>
<tr>
<th>Oil filter unit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic material, exterior paint, version</strong></td>
<td>Steel, RAL 7033, outdoor version</td>
</tr>
<tr>
<td><strong>Dimensions (W x H x D)</strong></td>
<td>410 x 925 x 406 mm</td>
</tr>
<tr>
<td><strong>Weight (dry)</strong></td>
<td>Approx. 75 kg</td>
</tr>
<tr>
<td><strong>Filling quantity</strong></td>
<td>Approx. 35 L</td>
</tr>
<tr>
<td><strong>Manometer</strong></td>
<td>Display range 0…10 bar</td>
</tr>
<tr>
<td><strong>Pressure switch</strong></td>
<td>SPDT two-way switch</td>
</tr>
<tr>
<td></td>
<td>M16 (DIN 43650 A)</td>
</tr>
<tr>
<td></td>
<td>AC 15: 0.5 A, 250 V</td>
</tr>
<tr>
<td></td>
<td>DC 13: 12 W, 125 V</td>
</tr>
<tr>
<td><strong>Pump type</strong></td>
<td>Rotary pump</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>Approx. 65 L/min at 0.5 bar and 25 °C insulating fluid temperature</td>
</tr>
<tr>
<td><strong>Flow rate</strong></td>
<td>Approx. 35 L/min at 3.6 bar and 25 °C insulating fluid temperature</td>
</tr>
<tr>
<td><strong>Filter cartridge</strong></td>
<td>Paper filter cartridge or combined filter cartridge</td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td>Power: 1.1 W</td>
</tr>
<tr>
<td></td>
<td>Voltage: 3 AC 230/400 V (other voltages on request)</td>
</tr>
<tr>
<td></td>
<td>Nominal current: 4.10/2.35 A</td>
</tr>
<tr>
<td></td>
<td>Frequency: 50 Hz or 60 Hz</td>
</tr>
<tr>
<td></td>
<td>Synchronous speed: 3,000 rpm (50 Hz), 3,600 rpm (60 Hz)</td>
</tr>
<tr>
<td><strong>Rated voltage Un</strong></td>
<td>230/400 V</td>
</tr>
<tr>
<td><strong>Rated operating voltage Ue</strong></td>
<td>230/400 V</td>
</tr>
<tr>
<td><strong>Rated impulse voltage Uimp</strong></td>
<td>4 kV</td>
</tr>
<tr>
<td><strong>Rated insulation voltage Ui</strong></td>
<td>230/400 V</td>
</tr>
<tr>
<td><strong>Rated current of the switchgear assembly InA</strong></td>
<td>2.9 A</td>
</tr>
<tr>
<td><strong>Rated current of a circuit Inc</strong></td>
<td>2.9 A</td>
</tr>
<tr>
<td><strong>Rated current capacity Ipk</strong></td>
<td>25 kA</td>
</tr>
<tr>
<td><strong>Rated load factor RDF</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Ambient temperature in operation</strong></td>
<td>0 °C…+80 °C</td>
</tr>
<tr>
<td><strong>Temperature of the insulating fluid in operation</strong></td>
<td>0 °C…+115 °C</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-40 °C…+80 °C</td>
</tr>
<tr>
<td><strong>Factory-set minimum run time after an on-load tap-change</strong></td>
<td>OILTAP® V/M/MS: 30 min</td>
</tr>
<tr>
<td></td>
<td>OILTAP® R/RM/T: 60 min</td>
</tr>
<tr>
<td></td>
<td>OILTAP® G: 90 min</td>
</tr>
<tr>
<td><strong>Control cabinet</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Protection against foreign objects and water</strong></td>
<td>IP55</td>
</tr>
<tr>
<td><strong>Dimensions (W x H x D)</strong></td>
<td>400 x 600 x 210 mm</td>
</tr>
</tbody>
</table>
## 9 Technical data – standard version

### Control cabinet

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>RAL 7033</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 10.5 kg</td>
</tr>
<tr>
<td>Voltage</td>
<td>AC 230 V</td>
</tr>
<tr>
<td>Heating</td>
<td>Voltage: AC 230 V, Power: 15 W</td>
</tr>
<tr>
<td>Ambient temperature in operation</td>
<td>-25 °C…+50 °C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40 °C…+70 °C</td>
</tr>
</tbody>
</table>

### Standard terminals in the control cabinet, manufacturer WAGO

<table>
<thead>
<tr>
<th>Type</th>
<th>Connection values</th>
<th>Width</th>
<th>Color</th>
<th>Terminal type</th>
</tr>
</thead>
<tbody>
<tr>
<td>880-901</td>
<td>0.08...4 mm²</td>
<td>5 mm</td>
<td>Gray</td>
<td>Line-up terminal</td>
</tr>
<tr>
<td>880-907</td>
<td>AWG 28...12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>800 V/25 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.08...4 mm²</td>
<td>5 mm</td>
<td>Gray/green</td>
<td>Grounding terminal</td>
</tr>
<tr>
<td></td>
<td>AWG 28...12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>800 V/25 A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standard terminals in the control cabinet, manufacturer Phoenix Contact

<table>
<thead>
<tr>
<th>Type</th>
<th>Connection values</th>
<th>Width</th>
<th>Color</th>
<th>Terminal type</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTTA 2,5</td>
<td>0.1...2.5 mm²</td>
<td>9 mm</td>
<td>Gray</td>
<td>Line-up terminal</td>
</tr>
<tr>
<td></td>
<td>AWG 22...14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>800 V/24 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTTA 6</td>
<td>0.1...6 mm²</td>
<td>11 mm</td>
<td>Gray</td>
<td>Line-up terminal</td>
</tr>
<tr>
<td></td>
<td>AWG 22...10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>800 V/41 A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standard terminals in the control cabinet, manufacturer Phoenix Contact

<table>
<thead>
<tr>
<th>Type</th>
<th>Connection values</th>
<th>Width</th>
<th>Color</th>
<th>Terminal type</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK 5 N</td>
<td>0.2...4 mm²</td>
<td>6.2 mm</td>
<td>Gray</td>
<td>Line-up terminal</td>
</tr>
<tr>
<td></td>
<td>AWG 24...10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>800 V/41 A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK 10 N</td>
<td>0.5...10 mm²</td>
<td>10.2 mm</td>
<td>Gray</td>
<td>Line-up terminal</td>
</tr>
<tr>
<td></td>
<td>AWG 20...6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>800 V/76 A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10 Special models

The control cabinet and the oil filter unit motor are available in various operating voltages on request.
11 Drawings
The filter cartridge (paper or combined filter) is supplied loose. The filter must not be installed until immediately before the commissioning of the transformer! Installation and changing of the filter according to installation drawing 711 075...

Control:
In the standard model, the control of the oil filter unit is integrated in the motor drive unit. The control of the special design is installed in a separate control cabinet.

Filter cartridge:
The filter cartridge is supplied loose. The filter must not be installed until immediately before the commissioning of the transformer! Installation and changing of the filter according to installation drawing 711 075...

Center of oil filter unit:

Off-center position dimensions of flange:

Temperature switch (for special design only):
Cable gland M16x15
Cable - Ø5…81

SHUT-OFF VALVES ARE NOT INCLUDED IN THE DELIVERY OF THE OIL FILTER UNIT. MR CAN SUPPLY SUCH VALVES ON REQUEST.

OIL FILTER UNIT OF 100
DIMENSION DRAWING

SED 1040034 000 05
8987187E

THE CONNECTING FLANGE IS SUPPLIED WITH AN O-RING. FLAT GASKET ø114xø40x2 TYPE "KLINGER-SIL C-400" IS ALSO PERMITTED.

O-RING
400854:00
(44,2 - 5,7  FP)

OIL FILTER UNIT OF 100
DIMENSION DRAWING

THE PIPE CONNECTION (Ø86942:) IS CONTINUOUSLY ADJUSTABLE IN AN ANGLE RANGE FROM 150° TO 225° AND FROM 315° TO 30°
11.7 Flow chart

Flow chart for commissioning the oil filter unit, changing the filter or after on-load tap-changer maintenance

The limit values for dielectric strength are listed in the operating instructions of the associated on-load tap-changer and must be observed.

- Fill new insulating fluid
  - Water content (H2O) < 12 ppm
  - Dielectric strength UD > 60 kV/2.5 mm

- Insert new combined filter cartridge

- Switch on oil filter unit

- Switch off oil filter unit after 1 hour of operation

- Analyze insulating fluid after another 30 min

- Let the oil filter unit run for 24 h, then analyze the insulating fluid again

- Let the oil filter unit run for 48 h, then analyze the insulating fluid again

- Take transformer out of service

- Allow transformer to run

- Analyze insulating fluid regularly in accordance with operating instructions.

- Let the oil filter unit run for 48 h, then analyze the insulating fluid again

- H2O > 30 ppm
- H2O < 30 ppm
- 10 ppm < H2O < 30 ppm
- 20 ppm < H2O < 30 ppm
- H2O > 20 ppm
- H2O < 10 ppm
- H2O > 10 ppm