



Motor-drive unit ETOS[®] TD

Operating Instructions

4489615/02 EN . OEM Control Box



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The product may have been altered since this document was published.

We reserve the right to change the technical data, design and scope of supply.

Generally the information provided and agreements made when processing the individual quotations and orders are binding.

The original operating instructions were written in German.



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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 Manufacturer

The product is manufactured by:

Maschinenfabrik Reinhausen GmbH

Falkensteinstraße 8
93059 Regensburg
Tel.: (+49) 9 41/40 90-0
E-mail: sales@reinhausen.com

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

1.2 Safekeeping

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

1.3 Notation conventions

1.3.1 Hazard communication system

Warnings in this technical file are displayed as follows.

1.3.1.1 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

1.3.1.2 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.

1.3.1.3 Signal words and pictograms

The following signal words are used:

Signal word	Definition
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates measures to be taken to prevent damage to property.

Table 1: Signal words in warning notices

Pictograms warn of dangers:

Pictogram	Definition
	Warning of a danger point
	Warning of dangerous electrical voltage
	Warning of combustible substances

Pictogram	Definition
	Warning of danger of tipping
	Warning of danger of crushing

Table 2: Pictograms used in warning notices

1.3.2 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.

1.3.3 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).

1.3.4 Typographic conventions

Typographic convention	Purpose	Example
UPPERCASE	Operating controls, switches	ON/OFF
[Brackets]	PC keyboard	[Ctrl] + [Alt]
Bold	Software operating controls	Press Continue button
...>...>...	Menu paths	Parameter > Control parameter
<i>Italics</i>	System messages, error messages, signals	<i>Function monitoring</i> alarm triggered
[▶ Number of pages]	Cross reference	[▶ Page 41].
<u>Dotted underscore</u>	Glossary entry, abbreviations, definitions, etc.	<u>Glossary entry</u> .

Table 3: Typographic conventions used in this technical file



2 Safety

- Read this technical file through 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.
- Read and 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 due to the function may arise in the event of improper use.

2.1 Appropriate use

The OEM Control Box is used to actuate the ETOS® TD motor-drive unit gear motor manually if the control cabinet is not yet installed and connected (e.g. for test tap-change operations at the transformer plant).

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 intended use:

- Only use the product for commissioning an on-load tap-changer using the ETOS® TD motor-drive unit.
- Only operate the product in accordance with this technical file and the agreed delivery conditions and technical data.
- Ensure that all necessary work is performed by qualified personnel only.
- Only use the equipment and special tools included in the scope of delivery for the intended purpose and in accordance with the specifications of this technical document.

2.2 Inappropriate use

Use is considered to be inappropriate if the product is used other than as described in the Appropriate use section. Please also note the following:

- Risk of explosion and fire from highly flammable or explosive gases, vapors, or dusts. Do not operate product in areas at risk of explosion.
- Risk of personal injury and damage to property from electric shock. Do not use product on an energized transformer.
- Unauthorized or inappropriate changes to the product may lead to personal injury, material damage, and operational faults. Only modify product following discussion with Maschinenfabrik Reinhausen GmbH.



2.3 Fundamental Safety Instructions

To prevent accidents, malfunctions 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.

- Replace the connecting cable immediately if it is damaged.
- Replace the control cable immediately if it is damaged.
- Regularly check the operational reliability of safety equipment.
- In case of operating faults, disconnect the device from the mains immediately.
 - Switch off the motor protective switch.
 - Unplug the control cable.
 - Unplug the connecting cable.

Explosion protection

Highly flammable or explosive gases, vapors and dusts can cause serious explosions and fire.

- Do not install or operate 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.
- Only operate the device in dry environments.

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.

2.4 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.

2.5 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.

Protective clothing	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.
Safety shoes	To protect against falling heavy objects and slipping on slippery surfaces.
Safety glasses	To protect the eyes from flying parts and splashing liquids.
Visor	To protect the face from flying parts and splashing liquids or other dangerous substances.
Hard hat	To protect against falling and flying parts and materials.



Hearing protection	To protect against hearing damage.
Protective gloves	To protect against mechanical, thermal, and electrical hazards.

Table 4: Personal protective equipment

3 Product description

3.1 Scope of delivery

The OEM Control Box is packaged with protection against moisture and is delivered as follows:

- OEM Control Box
- Connecting lead
- Control cable
- Product documentation

Please note the following:

- ▶ Check the shipment for completeness using the shipping documents.

3.2 Function description

The OEM Control Box is used to actuate the ETOS® TD motor-drive unit gear motor manually if the control cabinet is not yet installed and connected (e.g. for test tap-change operations at the transformer plant).

3.3 Design

The OEM Control Box consists of the following components:

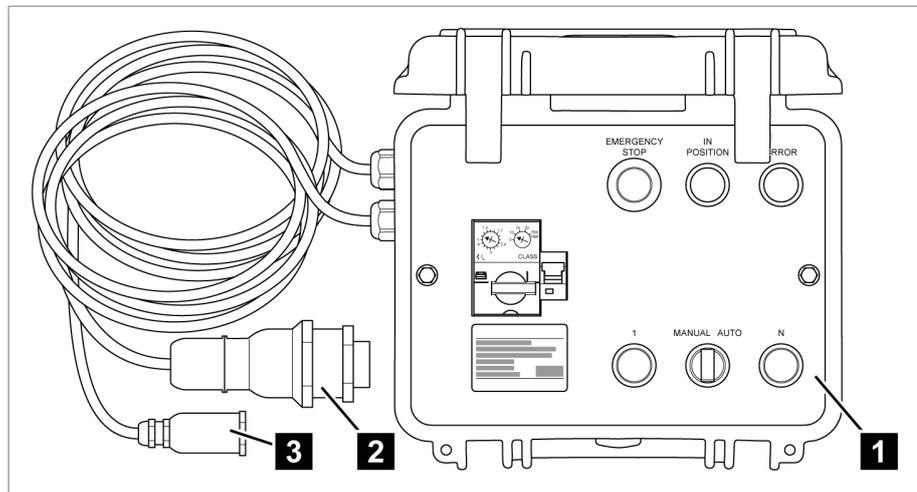


Figure 1: OEM Control Box

1 OEM Control Box

3 Control cable

2 Connecting lead



The OEM Control Box contains the following operating controls and display elements:

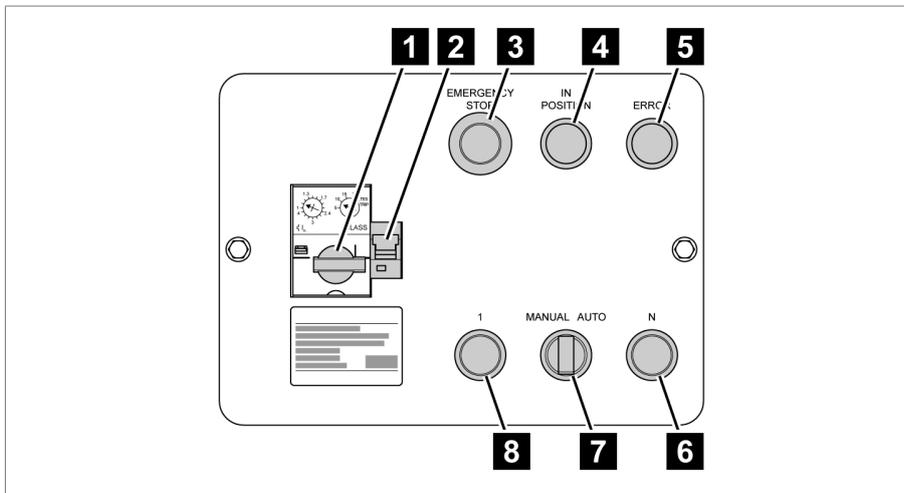


Figure 2: Operating elements

1 Motor protective switch	2 Miniature circuit breaker
3 EMERGENCY STOP switch	4 <i>IN POSITION</i> LED
5 <i>ERROR</i> LED	6 N key
7 MANUAL/AUTO switch	8 1 key

3.4 Nameplate

The nameplate with serial number is located on the operator panel.

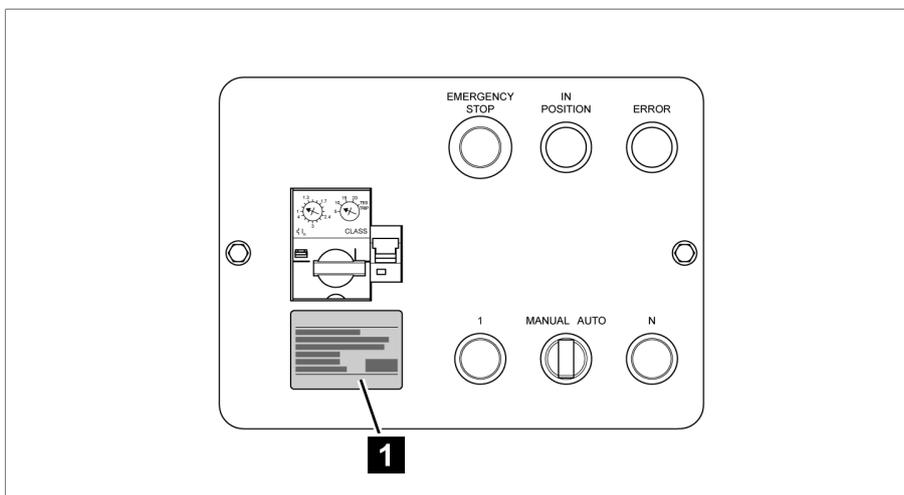


Figure 3: OEM Control Box nameplate

1 Nameplate

4 Packaging, transport and storage

4.1 Suitability, structure and production

The goods are packaged in a sturdy cardboard box. This ensures that the shipment is secure when in the intended transportation position and that none of its parts touch the loading surface of the means of transport or touch the ground after unloading.

4.2 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.

				
Protect against moisture	Top	Fragile	Attach lifting gear here	Center of mass

Table 5: Shipping pictograms

4.3 Transportation, receipt and handling of shipments

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 detected on receipt of the shipment, proceed as follows:

- Immediately record the transport damage found 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 sales department at Maschinenfabrik Reinhausen 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 onsite together with the carrier involved. This is essential for any claim for damages!
- If possible, 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).
- Be absolutely sure to also check the sealed packaging.

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.

4.4 Storage of shipments

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 box on timber beams and planks as protection against rising damp and for better ventilation.
- Check stored goods at regular intervals. Also take appropriate action after storms, heavy rain or snow and so on.

5 Installation and commissioning

This chapter describes how to correctly connect and commission the OEM Control Box.

▲ WARNING



Danger of death or severe injury!

An energized transformer and energized on-load tap-changer components can cause death or serious injuries during installation of the drive!

- ▶ Ensure the de-energized state of the transformer and on-load tap-changer components during installation of the drive.

You may only connect the OEM Control Box to circuits with an external over-current protection device and an isolating device with all poles disconnected so the equipment can be fully de-energized if required (service, maintenance etc.).

Suitable equipment includes isolating devices in accordance with IEC 60947-1 and IEC 60947-3 (e.g. circuit breakers). Observe the properties of the relevant circuits (voltage, maximum currents) when selecting the circuit breaker type. In addition, observe the following:

- It must be easy for the operator to access the isolating device
- The isolating device must be labeled for the device and the 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

You must fuse the power supply circuit with a C16A-type miniature circuit breaker.

To install and commission the OEM Control Box, proceed as follows:

1. Connect the control cable to the gear motor plug connector.
2. Connect the OEM Control Box to the power supply using the connecting cable.



The CEE plug for the OEM Control Box power supply is configured for a clockwise phase sequence.

3. Configure the motor protective switch in according to the rated current and tripping class of the gear motor. To do so, follow the table below.

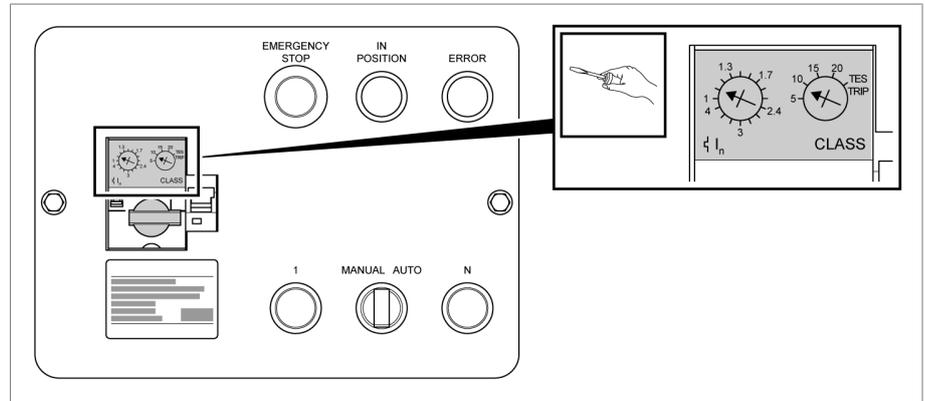


Figure 4: Configuring motor protective switch

Rated current and tripping class of the gear motor

Motor designation	I _n			CLASS
	380 V	400 V	440 V	
Gear motor M, R, VM, VR 50 Hz		1.0 A		10
Gear motor M, R, VM, VR 60 Hz		1.0 A		
Gear motor V, VV 50 Hz	1.4 A	1.4 A	1.8 A	
Gear motor V, VV 60 Hz	1.4 A	1.5 A	1.7 A	

Table 6: Rated current (I_n) and tripping class (CLASS) of the connected gear motor



6 Operation

You can control the ETOS® TD motor-drive unit gear motor using the OEM Control Box in 2 different operating modes:

- **MANUAL:** In MANUAL mode, the gear motor only runs as long as key 1 or N is pressed and held down. This allows you to move the gear motor incrementally.
- **AUTO:** In AUTO operating mode, the gear motor runs until the on-load tap-change operation is completely finished after pressing key 1 or N.

To activate the gear motor, proceed as follows:

1. Move the MANUAL/AUTO switch to the desired position to select the operating mode.
 2. Press or press and hold key 1 or key N to activate the gear motor according to the operating mode selected.
- ⇒ The gear motor runs. Then, if the gear motor is in a defined tap position, the *IN POSITION* LED lights up. Otherwise, the *ERROR* LED lights up.



7 Maintenance and care

The device is maintenance-free. You can clean the device's housing with a dry cloth.



8 Fault elimination

This section describes how to eliminate simple operating faults.

Characteristics/details	Cause	Remedy
No function in AUTO operating mode ▪ <i>ERROR</i> LED lights up	On-load tap-changer is in impermissible position	Bring the on-load tap-changer to a permissible position: 1. Select the MANUAL operating mode. 2. Press key 1 or key N to move the on-load tap-changer into a permissible position. When the tap changer is in a permissible position, the <i>IN POSITION</i> LED lights up.
No function	No voltage supply	Check the voltage supply.
	Miniature circuit breaker F14 triggered	Engage the miniature circuit breaker F14: 1. Remove the device from the grid. 2. Engage the miniature circuit breaker F14. 3. Connect the device. 4. Check function. If the fault remains: 1. Remove the device from the grid. 2. Contact Maschinenfabrik Reinhausen GmbH.
	Other errors	Contact Maschinenfabrik Reinhausen GmbH.

Table 7: Fault elimination

Other faults

In the event of faults that cannot be easily corrected on site, please inform your authorized MR representative or contact us directly:

Maschinenfabrik Reinhausen GmbH
Technical Service
Postfach 12 03 60
93025 Regensburg
Germany

Phone: (+49) 9 41/40 90-0
Fax: (+49) 9 41/40 90-7001

E-mail: service@reinhausen.com
Internet: www.reinhausen.com



9 Disposal

Observe the national requirements applicable in the country of use.



10 Technical data

Dimensions and weight

Dimensions (W x H x D)	265 x 315 x 198 mm
Weight	Approx. 5 kg

Table 8: Dimensions and weight

Electrical connection values

Voltage supply	400 V AC
Frequency	50/60 Hz
Power consumption	Approx. 4 A
Fuse	Miniature circuit breaker 1.6 A, type C Motor protective switch, depending on the setting of the gear motor nominal current

Table 9: Electrical connection values

Ambient conditions

Degree of protection	IP65 (if cover closed)
Operating temperature	5...40°C
Storage temperature	-20...+50°C

Table 10: Ambient conditions

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