

RIM DRIVE TECHNOLOGY

Manual



Steerable POD

25-30-50kW

A pod that can be rotated to any horizontal angle.

Changes

| Version | Date | Changes |
|---------|------------|--|
| 1 | 12-12-2021 | Original. |
| 2 | 05-07-2022 | Revised format and tables. |
| 3 | 06-06-2023 | Expansion of information and new layout. |
| 4 | 11-08-2023 | Error codes |
| | | |
| | | |

Declaration of Conformity

| | |
|------------------------------|--|
| Company name manufacturer | Rim Drive Technology |
| Company address manufacturer | Wanraaij 33 6673 DM Andelst The Netherlands |
| Product type | Steerable POD motors |
| | |
| | |

Foreword

Dear customer,

We are delighted by the choice for our products. Our Steerable POD systems delivers high-performance by using rim drive technology and is highly efficient. These motors are perfect candidates for those who want to sail electric, as they have a streamlined design, are sustainable and functional. It has been designed and manufactured with an eye on convenience, environment friendly character, user-friendliness and safety. Before shipment, every motor is tested extensively by our test engineers.

Please take the time to read this operating manual carefully as to ensure safe and proper use of the motor. It is always our intention to improve RDT products, for any feedback please do not hesitate to contact us.

Please feel free to contact us with any product inquiries. We wish you all the best with our products.

Rim Drive Technology

Content

| | |
|--|----|
| Changes..... | 2 |
| Declaration of Conformity..... | 2 |
| Foreword..... | 3 |
| 1. General..... | 6 |
| 1.1 Using this user manual..... | 6 |
| 1.2 Pictograms..... | 6 |
| 1.3 Copyright..... | 6 |
| 1.4 Ensure..... | 7 |
| 1.5 Manufacturer details..... | 7 |
| 2. Security..... | 8 |
| 2.1 Appropriate use..... | 8 |
| 2.2 Requirements for operators..... | 8 |
| 2.3 Safety..... | 9 |
| 2.4 Personal Protective Equipment..... | 10 |
| 2.5 Maintenance/fault removal..... | 10 |
| 3. Technical data..... | 11 |
| 3.1 General data..... | 11 |
| 3.2 Electric control unit data..... | 12 |
| 4. Mounting..... | 13 |
| 5. Description..... | 14 |
| 5.1 General..... | 14 |
| 5.2. Construction..... | 14 |
| 6. Installation..... | 15 |
| 6.1 Hardware..... | 15 |
| 6.1.1 Motor controller..... | 15 |
| 6.1.2 Fuses..... | 15 |
| 6.2. Software..... | 15 |
| 6.2.1. Steering system..... | 15 |
| 6.3 Batteries..... | 15 |
| 7. Operation..... | 16 |
| 7.1 Preparation..... | 16 |
| 7.2 Operation..... | 16 |
| 7.3 Stop operation..... | 16 |
| 7.4 Use frequently..... | 16 |
| 8. Maintenance & cleaning..... | 17 |
| 8.1 Maintenance..... | 17 |
| 8.1.1 Replacement parts..... | 18 |
| 8.1.2 Corrosion protection..... | 18 |

8.2 Cleaning..... 18

8.3 Dismounting..... 18

9. Service..... 19

9.1. Service activities 19

9.2. Registration service claim 23

10. Disorders..... 25

10.1 Possible disorders 25

10.2 Error codes..... 26

11. Disposal and environment..... 27

11.1 Disposal of waste electrical and electronic equipment..... 27

11.2 Disposal of batteries..... 27

12. General conditions for warranty 28

12.1 Warranty and liability..... 28

12.2 Scope of warranty 28

12.3 Warranty process..... 29

12.4 Shipment..... 29

1. General

1.1 Using this user manual

Every person who is operating, servicing, maintaining or using the RDT rim drive must have read and understood this manual in detail. The manual provides important instructions for the safe and proper use of the RDT rim drive. After reading this user manual the owner/operator should have an understanding on how to

- Install the product
- Operate the product
- Avoid risks/hazards

Always store this manual close to the RDT rim drive. We advise to store the manual in a waterproof sealing.

The illustrations in this manual are for illustrative purposes only and are not relevant to the design details of the RDT rim drive.

1.2 Pictograms

The following pictograms are used in this manual:



Dangerous situation. If this warning is ignored, personal injury up to death or serious damage to the RDT rim drive may result.



Danger due to electric current. The work may only be carried out by a trained electrician



Danger of possible damage to the environment.



Note of useful advice on how to use the RDT rim drive.

1.3 Copyright

This is a confidential user manual. All documents are protected within the meaning of the Copy-right Act.

Disclosure and duplication of documents, including extracts, exploitation and communication of their contents are not permitted. Violations are punishable and oblige to pay damages. We reserve all rights of exercise of industrial property rights.

1.4 Ensure

For safe and pleasant operation and use of the rim drive, it is recommended to read this manual in full before installing or commissioning the RDT rim drive. The manufacturer is not liable for damages or improper functioning of the RDT rim drive as a result from failing to adhere to the operating instructions.

Additionally, please read/check the national regulations before the use of the RDT rim drive.

The warranty expires, for example, in the case of:

- Usage for another application than intended by the manufacturer or beyond the applications as described within this manual.
- Installation not in accordance with the manual
- Use of non-original spare parts and complementary products
- Maintenance/servicing by a non-authorized persons/company.
- Operating RDT rim drive outside the water
- Damage caused by journeys through overgrown waters (e.g. reeds) or too shallow waters.

1.5 Manufacturer details

Rim Drive Technology BV

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6673 DM
Andelst
The Netherlands

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info@rimdrivetechology.nl
www.rimdrivetechology.nl

2. Security

2.1 Appropriate use

In order to provide customers the perfect fit for their application we realized highly configurable products which can be used for the following applications: Leisure marine, commercial marine, unmanned surface vessel (UAV), and subsea. Any other type of application is not allowed without written permission by RDT.

Only power sources which have been approved by RDT should be used in combination with the RDT products.



Danger of destruction! When operating outside the water the RDT rim drive will be destroyed. Operate the RDT rim drive only in water.

The intended use also includes people who are servicing/maintaining or operating the RDT have read and understood this user manual. All procedures described in this user manual must be followed.

The manufacturer is not responsible for damages resulting from operation in a way which is not in accordance with this manual. The risk is exclusively for the user/operator.

2.2 Requirements for operators

Only persons who have the right licenses (according to national law) may use the RDT rim drive as a boat drive.



The required qualification can be found in the applicable national regulations and laws of the country in which the boat is used.

Repair work, follow-up and maintenance/service may only be carried out by persons with the appropriate training and qualifications by Rim Drive Technology.

Persons under the influence of drugs, alcohol or reacting drugs are not allowed to carry out work on the RDT rim drive or to operate it.

2.3 Safety

In addition to the information in this manual, observe the general legal and other binding regulations for accident prevention and environmental protection as well as basic health and safety regulations.

- Check if the RDT rim drive is in perfect condition before operating
- Turn on the RDT rim drive only when it is placed completely in water. This is the only way to avoid damage to the RDT rim drive.
- Never remove or change safety devices.
- Before use always inspect the RDT rim drive for (external) recognizable damage and defects. If any damage and/or defects are recognized they must be reported immediately to a RDT qualified service partner.
- Use only professional and qualified maintenance tools.
- After repairs/maintenance, reattach all dismantled protective devices and ensure proper functioning.
- Every operator is responsible to make sure that the RDT rim drive is only operated in perfect/non-damaged condition and that all applicable safety requirements and regulations are complied with.
- Never allow the boat to which the rim drive is mounted to be towed when the system is turned off.
- Make sure all national safety measurements are covered.

2.4 Personal Protective Equipment

Personal Protection Equipment

Personal Protective Equipment (PPE) is important because it protects workers from injuries and accidents. They ensure that employees can work safely. It is therefore important that employees use the correct personal protective equipment and maintain it correctly.

The need for PPEs is well proven and critical to your safety and practically mandatory when servicing a rim drive product. Always check local PPE requirements before boarding a vessel and/or commencing service.

As a Rim Drive Technology service engineer your PPE's should be:

- Be compliance with our work instructions
- Be compatible with any other equipment you use at the same time
- Be appropriate for the risks involved, and the task being performed, without itself leading to any significant increased risk (e.g. using gloves, hearing protectors, safety glasses..).
- Ensure that you always work with safe and approved resources such as machines, tools and devices.
- Take responsibility to stop unsafe activities and to intervene in unsafe situations.

What PPE's are recommended to bring when working with rim drive product?

- Eye protection (e.g. safety glasses)
- Ear plugs or hearing protection
- Proper fitting working cloths
- Life jacket / drowning protection (e.g. working outboard).
- Safety gloves (suitable for working with oil/glue)
- Safety shoes (toe cap and anti-slip)
- Other PPE's locally required.

2.5 Maintenance/fault removal

Check the deadlines for regular inspections specified in the user manual.

Use only the professional/qualified tools for maintenance/fault removal.



Danger from electric current! Incorrect work on the power supply may result in damage to the RDT rim drive. Work on the electrical equipment of the RDT rim drive may only be carried out by a certified electrician.

3. Technical data

3.1 General data

| Model | Steerable POD | Steerable POD | Steerable POD | Steerable POD | Steerable POD | Steerable POD | Steerable POD | Steerable POD |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Type | 3.0 | 5.0 | 8.0 | 11.0 | 15.0 | 22.0 | 30.0 | 50.0 |
| Input voltage | 48 | 48 | 48 | 48 | 48 | TBA | 110 | 400 |
| Nominal power | 3 | 5 | 8 | 11 | 15 | 22 | 30 | 50 |
| Maximum RPM | 4.000 | 2.500 | 1.300 | 1.500 | 1.700 | TBA | 1000 | 1150 |
| Maximum temp. | 85°C | 85°C | 85°C | 85°C | 85°C | 85°C | 85°C | 85°C |
| Temp. sensor | PT1000 | PT1000 | PT1000 | PT1000 | PT1000 | PT1000 | PT1000 | PT1000 |
| Maximum depth | 5 meters | 5 meters | 5 meters | 5 meters | 5 meters | 5 meters | 5 meters | 5 meters |
| Motor controller | 48V 250A | 48V 250A | 48V 450A | 48V 600A | 48V 600A | TBA | 96V 600A | EC1200 |
| Length mc | 160 mm | 160 mm | 200 mm | 250 mm | 250 mm | TBA | 320 mm | 482 mm |
| Width mc | 200 mm | 200 mm | 200 mm | 200 mm | 200 mm | TBA | 200 mm | 109 mm |
| Height mc | 72 mm | 72 mm | 72 mm | 72 mm | 72 mm | TBA | 72 mm | 205 mm |
| Weight mc | 3.25 kg | 3.25 kg | 4.9 kg | 4.9 kg | 4.9 kg | TBA | 6.2 kg | 15 kg |

3.2 Electric control unit data

| Model | AZECU-L |
|-------------------------|---|
| Input voltage | 48V |
| Maximum input voltage | 60V |
| Peak current | 19.9A |
| Thermal protection | Yes |
| Lock | Mechanical lock |
| IP-class steering motor | IP65M |
| Rotation speed | Continuous rotation speed 15 rpm (without ramp up/ ramp down speed) |
| Rotation motor type | BLDC |
| Maximum torque | 400Nm at motor shaft |
| Temperature range | -30 to 40°C (derated) |
| Encoder type | Absolute |

Steering motor

The steering motor is controlled via an external FD124 Drive control unit. This drive control unit is configured to be used with a CANbus. Please see FD124 manual on the exact instructions on how to communicate and set up the control system. Ensure that the control system will start first, before any inputs or commands can be sent to the steering motor. Adding to this is ensure the system is fully functional before enabling control of the Rim Drive motor. Similarly check all controls before departing.



High torque availability please ensure that no parts can be damaged or items/clothing can be drawn between the gears.

4. Mounting

The Steerable POD system is not designed as a drop-in replacement and requires a little modification to the boat.

1. First prepare the area by clearing any obstacles and/or items.
2. Next make a hole of 133 mm for the lipseal housing to sit in. Level the surface. Make sure the lipseal housing is facing outwards.
3. Mount the gearbox with the provided brackets to the inside of the hull. make sure it is level and reinforced for the loads!
4. Slide the motor shaft through the bearing, double seal and the bearing of the box. Lube may help with sliding in the motor shaft without affecting the seals. Fix the motor shaft with the provided fastner ring with 8 holes on top and 4 on the side. As can be seen in figure 1. Use the included M10 bolts for securing the motor. Make sure the motor is facing forwards. Two of the bolts are flat on the bottom and should be inserted into the two holes within the motor tube.
5. Attach the large gear to the ring using 8x M10x45 to 40 Nm, verify the mechanical stop is directly opposite of the affixed stop of the box. As can be seen in figure 2.
6. Apply the grease using a brush to get the best coverage of the gear teeth.
7. When handling the greased gears please use appropriate chemical resistant gloves. Skin contact with the grease itself is not considered harmful, but there may be contaminants which are.
8. Please take precautions to avoid large leaks to the environment.
9. Put the lid on the box while ensuring the gears align. Fasten the box using the included sunken M8 bolts to 9Nm.
10. Fixate the lid fully using the included M8x16 cylinderhead bolts with DIN 127 spring locks and DIN 125 rings.
11. Seal the outer surface of the lipseal housing to ensure a full waterproof system.
12. Connect the motor wiring according to the provided wiring diagram and the steering motor according to FD124 manual. If you have not received the wiring diagram or manual, please contact Rim Drive Technology.
13. After installation, verify full operation of the system. See the steps below:
 1. Make sure the Rim Drive motor is in the water.
 2. Check that there are no leaks.
 3. Turn on the steering control system
 4. Verify the steering is fully functioning.
 5. Enable the motor controller to activate
 6. Test Rim Drive motor (in the water).



Figure 1: Fastner ring

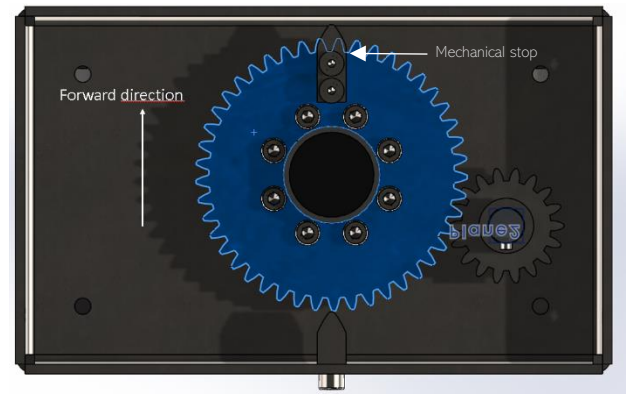


Figure 2 Mounting of driven gear



Danger of broken motor! When the motor is not installed in the right way there is risk for a broken motor and the sinking of the boat.

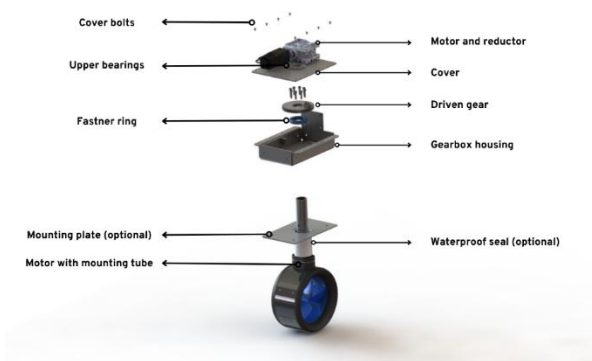
5. Description

5.1 General

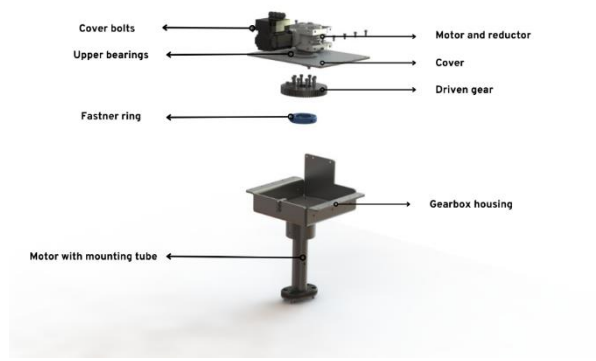
The RDT rim drive is a propulsion system for leisure boats. The installation location can be chosen by the client as long as it can be mounted securely and in accordance with this manual. In case of any questions, please contact a RDT or a RDT qualified service center.

The rim drives have been designed in such a way that the power supply can be provided by generators or battery packs.

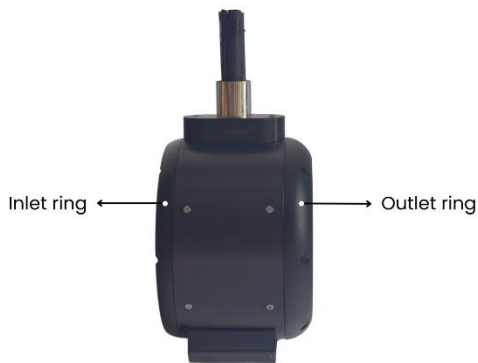
5.2. Construction



Components up to 15kW.



Components 25-30-50kW.



The connection of the RDT rim drive to the hull is depending on the location of connection.

A sticker is connected to each motor, it records the key data as per the EC machinery directive 2006/42/EC.

6. Installation

6.1 Hardware

For the installation always refer to a professional and trained company. The motor controller, batteries, throttle controls and other products shall only be installed as described by Rim Drive Technology.

No client, installation company, dealer or any other person/company is allowed to make any changes to the hardware/software.

All safety equipment like kill switches, fuses, relays, other type of safety products should be installed by a professional and trained company according regulation/law for the country within which the products are used.

When verifying the correct operation of the motor, ensure all DC connections are checked immediately after reaching full power. When performing this check directly after full power is applied, all connections should not be warm to the touch. If connections are hot to the touch, please reinstall the DC connections.

After 10 and after 50 hours of running the motor the mounting socket bolts have to be checked.

6.1.1 Motor controller

Depending on the choice of motor controller, a wiring schematic should be followed. Always contact RDT for the manual of the motor controller. The motor controller should be connected using shielded cables which are preferably located in stainless steel or aluminum tubing.

The motor controller manual should strictly be followed during the installation as to ensure a safe system.

6.1.2 Fuses

To ensure a safe system several fuse(s) have to be installed. RDT is not responsible for damage occurred by fuses which were not delivered by RDT.

6.2. Software

Rim Drive Technology provides software which is developed for the specified configuration. Nobody is allowed to make any changes to the software, except Rim Drive Technology.

6.2.1. Steering system

Rim Drive Technology has developed the system for the specified application. Proper operation has been ensured via testing, then the system is disassembled for shipping and installation.

6.3 Batteries

The motors could additionally be used as a generator. Make sure that the used configuration is suitable for this purpose. A reverse voltage can be applied to the system which might require consideration in certain applications.

7. Operation

7.1 Preparation

Ensure the following preparations have been carried out before operating the RDT products.
Unplug the cable/plug from the power supply.
Store the charging cable in a way which as to prevent damage or tripping.
Check the remaining capacity of the batteries.



Do not put the RDT rim drive into operation if the remaining battery capacity is $< 20\%$

7.2 Operation

Ensure the following preparations have been carried out before operating:

- Turn on the control system.
- Turn on the steering system
- Verify operation of the steering motor
- Turn on the power supply for the RDT rim drive.
- Ensure the motor can be put forwards and backwards without vibrations etc.
- Regularly check the remaining battery capacity during operation. Otherwise there is a risk of having no propulsion.

7.3 Stop operation

Ensure the following actions have been carried out when stopping the use of the RDT rim drive:

- Turn off the power supply for the RDT system.
- Connect the charging cable to the charger.
- Make sure that the charging cables are placed in a safe way as to prevent tripping or accidental damage.
- Verify no water has entered through the motor tube sealing.

7.4 Use frequently

The motor has to be used for a minimum of five hours every month.

8. Maintenance & cleaning

8.1 Maintenance

Have the RDT rim drive checked at least once a year by Rim Drive Technology or by an authorized specialist to check for perfect condition. If damage is discovered, it must be rectified immediately by a RDT service partner before operating. Do not use the RDT product when it is damaged.



Danger of destruction! Maintenance should only be performed by authorized personal/ service centers. Otherwise, errors may occur which can lead to the destruction of the rim drive. Rim Drive Technology accepts no liability for damages caused by improper maintenance.

| Maintenance level | Executor | Working hours | Time |
|---------------------|---------------------|---------------|------------|
| Maintenance level 1 | Client | 5 hours | Every run |
| Maintenance level 2 | Client | 100 hours | One year |
| Maintenance level 3 | RDT Service partner | 1.000 hours | Five years |

| Service task | Level 1 | Level 2 | Level 3 |
|--------------------------------------|--|--|--------------------------------------|
| Test functionality | Propeller turns forward Propeller turns reverse Motor is reacting fast | | |
| Cable connections | | Check for damage Visual check Check connectors | |
| Batteries and cables | | Visual check of cables Visual check of connectors Visual check of connections | |
| Anode | | Replacement | |
| Mechanical connection to hull | | Test and repair if necessary | |
| Water seal | | Check the steerable POD shaft seal If necessary apply additional grease or tighten the seal | Replace seal after significant wear. |
| Waterproofness | | | Visual check of complete motor |
| Full product test | | | Control propeller quality |

*The client is responsible to contact a RDT authorized service center for maintenance level 3.

8.1.1 Replacement parts

For information on spare parts and the installation of these parts, contact Rim Drive Technology or an authorized Service Partner. Only RDT spare parts may be used.

8.1.2 Corrosion protection

A high level of corrosion resistance is ensured by the design of the products and with the selection of the materials. All materials are classified as sea water resistant materials.

To reduce the chance of corrosion:

- Check the anode latest every 6 months. Change the anode every 12 months or after >50% of anode has been destroyed by environment.
- Regularly apply a suitable contact spray (e.g. Wet protect) to cable contacts, data sockets, and data plugs.
- The use of anti-fouling agent is forbidden.
- Only mount original RDT anodes to the rim drive motor. Otherwise no guarantees can be given.

8.2 Cleaning

Before starting turn off the power supply, as to prevent accidental activation during the cleaning process.



Injury! When the power supply is switched on, the rim drive may cause injuries to the limbs when cleaning the RDT rim drive.

The cleaning intervals depend on the area of application and the number of operating hours. At least, the rim drive must be cleaned once a year in fresh water.

In case of contaminated, salt water or with frequent use of the rim drive; the interval between cleaning should be shortened.



Only use fresh water for cleaning.

8.3 Dismounting

The client is not allowed to dismount, remove or disassemble any parts from the products. Examples of activities which are not allowed without written approval:

- Removal of mounting rings with bearings
- Removal of rotor housing
- Removal of cables
- Removal of mounting socket

9. Service

9.1. Service activities

Video instructions on the various service activities can be found in the digital training platform for our distributors.

Replacing a propeller

| Motor | Bolt type * | Allen wrench | Points of attention |
|------------|----------------|--------------|--|
| 3.0kW | DIN 7991 M4x8 | 2.5 | - Torque wrench: 1.5Nm - Use TIKAL TEFGEL |
| 5.0kW | DIN 7991 M5x8 | 3 | - Torque wrench: 2.5Nm - Use TIKAL TEFGEL |
| 8.0kW | DIN 7991 M5x12 | 3 | - Torque wrench: 2.5Nm - Use TIKAL TEFGEL |
| 11.0kW | DIN 7991 M5x12 | 3 | - Torque wrench: 2.5Nm - Use TIKAL TEFGEL |
| 15.0kW | DIN 7991 M5x12 | 3 | - Torque wrench: 2.5Nm - Use TIKAL TEFGEL |
| 22.0kW | TBA | TBA | TBA |
| 25/30/50kW | DIN 7991 M6x22 | 4 | - Torque wrench: 6Nm - Use TIKAL TEFGEL |

* Stainless steel 316

Installing mounting rings**

| Motor | Bolt type* | Allen wrench | Points of attention |
|-------|----------------|--------------|---|
| 0.5kW | DIN 7991 M3x16 | 2 | - Torque wrench: 0.75 Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |
| 3.0kW | DIN 7991 M3x20 | 2 | - Torque wrench: 0.75 Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |
| 5.0kW | DIN 7991 M4x20 | 2.5 | - Torque wrench: 1.5Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |

| | | | |
|-------------------|----------------|-----|---|
| 8.0kW | DIN 7991 M5x20 | 3 | - Torque wrench: 2.5Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |
| 11.0kW | DIN 7991 M5x20 | 3 | - Torque wrench: 2.5Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |
| 15.0kW | DIN 7991 M5x20 | 3 | - Torque wrench: 2.5Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |
| 22.0kW | TBA | TBA | TBA |
| 25/30/50kW | DIN 7991 M6x30 | 4 | - Torque wrench: 6Nm - Check that the rotor bearings are straight in the mounting ring bearings before tightening the bolts. - Use TIKAL TEFGEL |

* Stainless steel 316

**This part should only be done by a provided service center.

Replacing inlet / outlet ring

| Motor | Bolt type* | Allen wrench | Points of attention |
|-------------------|-------------------|---------------------|---|
| 0.5kW | DIN 912 M3x20 | 2.5 | - Torque wrench: 1.5 Nm - Use TIKAL TEFGEL |
| 3.0kW | DIN 912 M3x25 | 2.5 | - Torque wrench: 1.5 Nm - Use TIKAL TEFGEL |
| 5.0kW | DIN 912 M4x25 | 3 | - Torque wrench: 1.5Nm - Use TIKAL TEFGEL |
| 8.0kW | DIN 912 M5x25 | 3 | - Torque wrench: 5Nm - Use TIKAL TEFGEL |
| 11.0kW | DIN 912 M5x25 | 4 | - Torque wrench: 5Nm - Use TIKAL TEFGEL |
| 15.0kW | DIN 912 M5x25 | 4 | - Torque wrench: 5Nm - Use TIKAL TEFGEL |
| 22.0kW | TBA | TBA | TBA |
| 25/30/50kW | DIN 912 M6x40 | 5 | - Torque wrench: 12Nm - Use TIKAL TEFGEL |

* Stainless steel 316

Replacing anode

| Motor | Bolt type* | Allen wrench | Points of attention |
|-------------------|-------------------|---------------------|--|
| 0.5kW | DIN 7991 M3x12 | 2 | - Torque wrench: 0.75 Nm - Verplicht om bij ons anode te kopen. |
| 3.0kW | DIN 7991 M4x16 | 2.5 | - Torque wrench: 0.75 Nm - Use TIKAL TEFGEL |
| 5.0kW | DIN 7991 M4x20 | 2.5 | - Torque wrench: 1.5Nm - Use TIKAL TEFGEL |
| 8.0kW | DIN 7991 M5x20 | 3 | - Torque wrench: 2.5Nm - Use TIKAL TEFGEL |
| 11.0kW | DIN 7991 M5x20 | 3 | - Torque wrench: 2.5Nm - Use TIKAL TEFGEL |
| 15.0kW | DIN 7991 M5x16 | 3 | - Torque wrench: 2.5 Nm - Use TIKAL TEFGEL |
| 15.0k - F | DIN 7991 M5x20 | 3 | - Torque wrench: 2.5 Nm - Use TIKAL TEFGEL |
| 22.0kW | TBA | TBA | TBA |
| 25/30/50kW | DIN 7991 M6x30 | 4 | - Torque wrench: 6Nm - Use TIKAL TEFGEL |

* Stainless steel 316

Replacing a seal

| Motor | Items required | Points of attention |
|------------|---|---|
| 25/30/50kW | O-ring 111x3 O-ring 122x3 Lipseal 70x85x8 | The advised seal should have both a lipseal as well as a dust cover to prevent the ingress of particles into the seal area. |

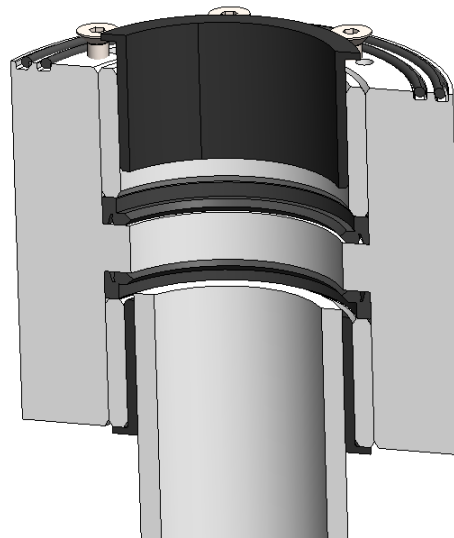


Figure 3: lipseal housing.

Replacing a bearing

| Motor | Items required | Points of attention |
|------------|----------------|---|
| 25/30/50kW | XFM-7075-40 | Ensure no damage has been inflicted during placement. |

9.2. Registration service claim

It is important for us that we meet your expectations. Each product has been produced and tested intensively before shipment to worldwide clients. If nevertheless a warranty claim should occur, it will be assessed with the aim of resolving the claim in a timely and effective manner.

For a flawless process we need your cooperation:

- Please complete this registration service claim form.
- Please provide a copy of your proof of purchase (invoice).
- Please send this form to: sales@rimdrivetechology.nl
- Please understand that we have to reject received products which the company was not notified of.
- Please ensure suitable, protected packaging.
- Please be advised that lithium batteries are designated as Dangerous Material. The dispatch of the battery with a transport company has to be organized according to the formalities for dangerous goods and packed in the original packaging.
- Please observe the warranty conditions as listed in the User Manual chapter 12.

Registration service claim

Contact details

| | |
|----------------------------|-----------------------------------|
| First Name: | Last name: |
| Address: | City, State, Zip Code / Postcode: |
| Country: | E-mail: |
| Telephone No. | Mobile No. |
| When existing: Customer ID | |

Details of claim

| | | |
|--|---|------------|
| Exact product name: | Article no. | Serial no. |
| Date of purchase: | Hours of use: | |
| Dealer where product was purchased: | Address of dealer: (City, State, Zip Code / Postcode, Country) | |
| Detailed description of problem (including error message) | | |
| Description of the products of the system that are included: | | |

10. Disorders

10.1 Possible disorders

Make sure that the power supply is switched off and is secured against activation.



Injury! When the power supply is switched on the rim drive may cause injuries to the user.

| Disorder | Possible cause | Fix |
|--|--|--|
| The rim drive is not running. | <p>The main switch is not turned on.</p> <p>The batteries are empty.</p> <p>The propeller is blocked.</p> <p>Connection/Wiring is not correct/bad.</p> <p>The motor controller gives an error.</p> | <p>Turn on the main switch.</p> <p>Charge the batteries.</p> <p>Check if the propeller is damaged.</p> <p>Check wiring and connections.</p> <p>Restart the system</p> |
| The batteries are not charging. | <p>The plug from the charging cable is not properly plugged into the land-side power supply.</p> <p>The land-side power supply is switched off.</p> <p>The batteries are defect.</p> | <p>Insert the plug correctly into the land-side power supply.</p> <p>Turn on the land-side power supply.</p> <p>Replace the defect batteries.</p> |
| The system is not steering | <p>The main switch is not turned on.</p> <p>The batteries are empty.</p> <p>Connection/Wiring is not correct/bad.</p> <p>The system gives an error.</p> <p>The steering is inaccurate</p> | <p>Turn on the main switch.</p> <p>Charge the batteries.</p> <p>Check wiring and connections.</p> <p>Restart the system</p> <p>Restart the system and let homing finish.</p> |

10.2 Error codes

The following table describe all the error codes that the controller will display. The presence of an error can be detected by means of a red led flashing on controller (number of flashes correspond to base error code). The error codes are divided in four different categories, based upon the severity of the faults.

| Base fault Code | Description |
|---|---|
| Controller warning faults – Reduces only performance – Fault will reset itself (if possible) | |
| 0 | No error |
| 1 | N/A |
| 2 | Voltage getting low |
| 3 | Inhibit drive/ BDI Cut / BLC via scan |
| 4 | Voltage getting high |
| 5 | Motor temperature high |
| 6 | Controller temperature high |
| 7 | Adjustment out of range |
| 8 | Default adjustment used |
| Drive error faults – Commences graceful neutral brake – Requires a neutral recycle action to reset fault | |
| 9 | Memory chip fault |
| 10 | Both forward and reverse inputs active |
| 11 | Ride-on: Seat switch not closed or timed out. Walkie: Tiller switch not closed |
| 12 | Power up sequence fault |
| 13 | Accelerator more than 50% at power up |
| 14 | Inching sequence faults |
| Soft error faults – Immediately stops pulsing – Requires a neutral recycle action to reset fault | |
| 15 | Supply voltage fault |
| 16 | N/A |
| 17 | Battery voltage too low |
| 18 | High sided mosfets short circuit |
| 19 | Motor stall protection |

| Hard error faults – immediately stops pulsing and open line contactor – Reset only by a key switch recycle | |
|---|--|
| 20 | Hardware over current detected |
| 21 | Contactor coil driver fault (e.g. short circuit) |
| 22 | Voltage is too high |
| 23 | Low sided mosfets short circuit in neutral |
| 24 | Hardware fail safe fault |
| 25 | Line contactor (e.g. short circuit) |
| 26 | Thermal shutdown fault (only for minimum pump speed fault) |
| 27 | Low sided mosfets short circuit during power up and before line contactor is closed. |
| 28 | Wire off detected |
| 29 | CAN node fault |
| 30 | Motor over speeding |
| 31 | Motor fault |
| 32 | Motor Module initialization error |
| 33 | Motor Module configuration inconsistency |
| 34 | Motor Module parameter inconsistency |
| 35 | Current sensor calibration fault |
| 36 | Controller temperature over 100 degree |
| 39 | Generic time out |
| 40 | System fault |

1 1. Disposal and environment

1 1.1 Disposal of waste electrical and electronic equipment

For customers in EU countries

RDT permits all clients to follow the European Directive 2012/19/EU relating to Waste Electrical and Electronic Equipment – WEEE, and to the corresponding national laws. The WEEE Directive forms the basis for handling waste electrical equipment across the whole of the EU. The RDT system is marked with the symbol of a crossed-out rubbish bin. Waste electrical and electronic equipment must not be disposed of as normal household waste, because this could allow entry of pollutants to the environment which have effects injurious to health on humans, animals, and plants, and which build up in the food chain and in the environment. In addition, valuable raw materials are lost in this way. Please therefore direct all waste equipment for separate collection in an environmentally friendly way.



For customers in other countries

RDT permits all clients to follow the European directive 2012/19/EU regarding waste electrical and electronic equipment. We recommend that the system is not discarded as normal household waste, rather this should be disposed of via separate collection in an environmentally friendly way. The applicable national laws may also prescribe this. Therefore, please ensure appropriate disposal of the system as per the regulations which apply in the country within which the rim drive is used.

1 1.2 Disposal of batteries

Remove spent batteries immediately, and comply with the following specific disposal information relating to batteries or battery systems:

For customers in EU countries

RDT permits all clients to follow the European directive 2006/66/EC regarding (spent) batteries, as well as to the corresponding national laws. Here the Battery Directive forms the basis for handling batteries throughout the EU. Our batteries are marked with the symbol of a crossed-out rubbish bin. Spent batteries must not be disposed of as normal household waste, because this could allow pollutants to enter the environment which could have effects injurious to health on humans, animals, and plants, and which build up in the food chain and in the environment. In addition, valuable raw materials are lost in this way. Please therefore dispose of the spent batteries exclusively via specially set-up collection points, the dealer, or the manufacturer. There is no charge for handing them in.

For customers in other countries

RDT permits all clients to follow the European directive 2006/66/EC regarding (spent) batteries. The batteries are marked with the symbol of a crossed-out rubbish bin. We recommend that the batteries are not discarded as normal household waste, rather this should be disposed of via separate collection. Your national laws may also prescribe this. Therefore, please ensure appropriate disposal of the batteries as per the regulations which apply in the country within which the rim drive is used.

12. General conditions for warranty

12.1 Warranty and liability

The statutory warranty runs for and includes all components of the RDT system. The client needs to activate the warranty within 30 days after delivery via our website: www.rimdrivetechology.nl

The warranty period starts from the day of delivery of the RDT system to the end customer.

12.2 Scope of warranty

Rim Drive Technology, Wanraaij 33, 6673 DM, Andelst guarantees the end customer of a RDT system, the product is free from material and manufacturing defects during the period of coverage defined below. Rim Drive Technology will indemnify the end customer for the costs of correction of a material or manufacturing defect. This indemnification obligation does not apply to any incidental costs caused by a warranty case or to any other financial detriment (e.g. costs for towing, telecommunication, accommodation, subsistence, loss of use, lost time, etc.).

The warranty terminates two years from the day of handover of the product to the end customer. Products used - even temporarily - for professional or official purposes are excluded from the two-year warranty. For these uses, the statutory warranty applies. The guarantee claim expires six months after the discovery of the defect.

Rim Drive Technology decides whether defective parts are repaired or replaced. Distributors and dealers who carry out repair work on Rim Drive Technology motors have no power to make legally binding statements on behalf of Rim Drive Technology.

Wearing parts and routine maintenance are excluded from the warranty.

Rim Drive Technology has the right to refuse warranty claims if:

- The warranty was not submitted correctly (especially failure to make contact before dispatching goods under complaint, absence of a fully completed warranty form and of proof of purchase; see warranty process).
- The product has been used in a manner contrary to instructions.
- The safety, operating, and care information in the instructions were not followed.
- Prescribed maintenance intervals were not complied with and documented.
- The purchased item was in any way converted, modified, or equipped with parts or accessory items which are not expressly authorized by Rim Drive Technology or which do not form part of recommended equipment.
- Previous maintenance or repairs were undertaken by companies not authorized by Rim Drive Technology, or parts other than original replacement parts were used. This applies unless the end customer can prove that the circumstances resulting in the refusal of the warranty claim have not encouraged the progress of the defect.
- The product has been used for other applications as described.

In addition to the claims arising from this warranty, the end customer has statutory warranty rights arising from his purchase contract with the relevant dealer; these are not restricted by this warranty.

12.3 Warranty process

It is a prerequisite that the warranty process described below is followed for the fulfilment of warranty claims.

For the problem-free handling of warranty cases, we request that the following instructions are complied with:

- In the event of a claim, please contact Rim Drive Technology. RDT will provide a return number.
- Should it be necessary to transport products to Rim Drive Technology premises, please note that inappropriate transport is not covered by guarantee or warranty.

For queries regarding the warranty process, we can be contacted by means of the details given in this manual.

12.4 Shipment

The client is responsible for shipment, costs and any damage or loss which are related to this shipment.

RIM DRIVE TECHNOLOGY



**Uncompromised
Electric Motors**

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