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# Sachs RS-Motor

User Manual

Version 1.4

## Identification

### Product

Motor version: 48–250  
Model: Sachs RS–Motor V1.2 (ENG)  
Article number: MOT–000002  
Country of origin: Slovenia  
Mark:



### Manufacturer

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### Document

User Manual Sachs RS–Motor V1.4 (ENG)  
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Subject to change.

## Important Information about these Instructions

 <b>WARNING</b>
Read these instructions before installation. During installation and operation, the local regulations and the recognized rules of technology must be observed. Laymen are not allowed to install the motor.

### Purpose and Target Group

This document contains information on the safe and correct installation of the Sachs RS motor on a pedelec. It is intended for e–bike dealers.

### Structure of the Documentation

To install the battery and the control unit, please read the corresponding manuals.

### Safekeeping

Retain documents for future reference.

### Explanation of Signal Words

Signal Word	Meaning
 <b>WARNING</b>	Non–observance can lead to death or serious injury.
 <b>CAUTION</b>	Non–observance can lead to minor or moderate injury.
<b>NOTICE</b>	Non–observance can lead to material damage.
	Additional information.

Table 1: meaning of used signal words

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# 1 Safety

## 1.1 Safety Notes

### WARNING

Follow the safety instructions. Non-compliance can endanger the installer and persons in the vicinity.

### CAUTION

The installation of the motor must be carried out by qualified personnel who are trained in drive installation and who are aware of possible hazards and damage risks.

Only use original spare parts and tools.

The components must be installed as described in these instructions using the appropriate tools and protective measures.

To ensure correct operation of the motor, all components must be installed as described in these instructions.

Do not open the drive unit.

Disconnect the power supply (battery) before assembly and disassembly.

Only install components supplied with the motor or approved by the manufacturer.

### NOTICE

Do not use aggressive cleaning agents.

Ensure that there are no flammable materials in the assembly area.

Before connecting the cables, make sure that no water has collected in the plug connection.

Always use the tools recommended by the manufacturer and wear suitable protective clothing.

Always wear protective gloves when installing the drive unit.

Ensure that the battery and charger have been removed before connecting or installing any parts to the drive unit.

Always use a suitable tool, e.g. assembly tweezers, to remove connectors from the connection sockets.

The drive unit is a precision machine. Do not disassemble it or apply great force to it (e. g. do not hit it with a hammer). Since the crankshaft is directly connected to the inside of the e-bike motor, damage to the crankshaft can lead to malfunctions.

Do not modify or alter the engine.

Be prepared for strong acceleration at high assistance levels. For inexperienced riders there is a risk of falling.

Contact the manufacturer if you have any questions about installing the engine

# 2 Product Description

## 2.1 Important Product Information

### 2.1.1 Designated Use

The Sachs RS-Motor is a mid-mounted motor for pedelecs, designed to be mounted on a bracket specific to this motor.

The motor is intended for private use.

The cyclist must have a minimum fitness for cycling.

Please observe the laws and regulations of the state where the RS-Motor drive is used.

### 2.1.2 Properties

- High maximum torque
- Low weight
- High input torque sensitivity
- Excellent thermal properties
- High flexibility through peripheral connections

These characteristics make the engine ideal for e-mountain-bikes and e-cargobikes, where high torque and responsiveness are best used.

The motor has a torque sensor that measures the force applied by the cyclist. Based on this torque and the selected support level (1 to 4), the electric motor power is generated to support the cyclist.

The motor does not support under the following conditions:

- The power supply to the control unit is interrupted.
- You ride 25 km/h or faster.
- You do not pedal or use the pushing aid.
- The battery is empty.
- The support is switched off.
- The speed sensor is misaligned, defective or lost.

### 2.1.3 Conformity

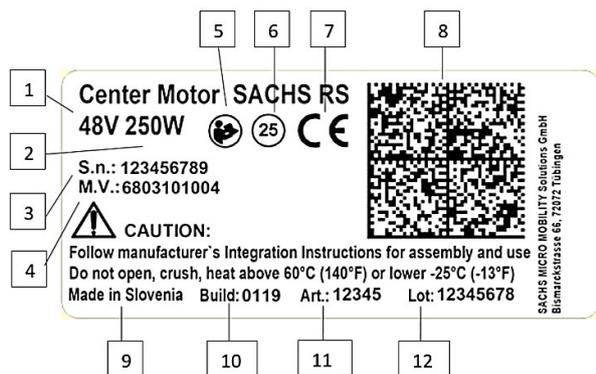
 The products comply with all EU directives and standards that apply to electric motor drives for e-bikes and pedelecs. The manufacturer has certificates and documents to prove conformity.

- Low Voltage Directive (2006/95/EC).  
Applied Standards: EN 60335-1:2012/AC:2014 and EN 60335-2-51:2003/A1:2008/A2:2012.
- EMC-Directive (2014/30/EU).  
Applied Standards from EN 15194:2017
- Machine Safety ISO EN 13849-1/2:2013, Performance Level PL-C
- Electric motor assisted wheels bikes – EPAC-bicycles EN 15194:2017 (at MOT-000002 for EPAC / pedelec)
- Rotating Electrical Machines – Part 1: Dimensioning and Operating Behaviour EN 60034-1:2010

After opening, modifying or changing the engine, the conformity with EU law is no longer guaranteed.

### 2.1.4 Label

This label is located on the upper side of the motor:



1. Nominal voltage
2. Nominal continuous power
3. Serial number
4. Internal engine version number
5. Read all safety notes and assembly instructions
6. Pedal support up to 25 km/h
7. CE-Mark
8. DataMatrix-Code with all IDs
9. Country of origin
10. Manufacture date (MMJJ)
11. Article number
12. Lot number

### 2.1.5 Guarantee Conditions

Any improper and inappropriate handling of the components of the electrical system can be dangerous and will invalidate the warranty.

The following measures on the motor will invalidate the warranty:

- improper handling
- improper servicing
- improper installation
- technical change
- unauthorized opening
- improper disassembly

The warranty also expires if the motor is

- willfully damaged;
- stored at below -25°C or above 60°C for days;
- installed with tools that have not been confirmed by the manufacturer;
- cleaned with high-pressure water cleaner;
- immersed in water or another liquid;
- overloaded (e. g. as equipment for other purposes);
- not installed as described in these instructions;
- used for public purposes such as rental or hire.

## 2.2 Technical Data

### 2.2.1 Performance Characteristics

SACHS RS	
Power (nominal / peak)	250 W / 700 W
Torque	112 N m (max.)

Voltage (nominal)	48 V
Battery voltage	54,6 V bis 39 V
Speed	25 km/h
Voltage light	6 V (2.0 A)
Additional device voltage	12 V (2.0 A)
Standby current	240,0 µA / 250 mA
6 V light output (switched)	2.0 A
6 V break light output (opt.)	0.2 A (opt.)

Lights	
Voltage	6 V
Power (max.):	12 W
Current	2 A

### 2.2.2 Communication

- CAN Bus (ZF Micro Mobility specific protocol)

### 2.2.3 Sensors

- Speed sensor: magnetic sensor on the rear wheel; tamper-proof
- Motor control: built-in cadence sensor and torque sensor

### 2.2.4 Settings

The motor is delivered with four preset support profiles. These can be personalized with the Sachs Service Tool (download at <https://service.sachsmicromobility.com>) via a CAN2USB adapter.

### 2.2.5 Dimensions and Weight

- Dimensions (mm): 135 x 224 x 96 (135 incl. shaft)
- Weight: appr. 3.7 kg

### 2.2.6 Power Supply

Charger: 100–240V AC

### 2.2.7 Protection Class

- IP 55

### 2.2.8 Thermal Properties of the Sachs RS-Motor

Environmental conditions for operation

- 10°C to 40°C
- 15% rel. to 90% rel. also condensation conditions
- 650 hPa to 1100 hPa

Environmental conditions for storage

- 25°C to 60°C
- 5% rel. to 98% rel. also condensation conditions
- 350 hPa bis 1100 hPa

Peak load operation of the motor

The peak torque of the Sachs RS is 112 N m. This high torque is used for fast acceleration and enables the user to climb steep slopes with little effort. At 60 rpm this torque corresponds to 700W of mechanical power.

Due to the necessary thermal control of the motor, the peak torque is available for a limited time. This time depends on the output temperature of the motor, the ambient temperature and the required power of the drive. Conformity is thus established.

#### Mid-range power limitation of the motor

An average maximum power is available between the short-term peak power and the long-term nominal power, which is continuously controlled. Higher ambient temperatures limit this medium-term motor torque and associated power. Riding with a higher cadence and pedal pressure leads to a higher power output of the engine and also to faster heating and subsequent regulation. The engine will maintain this mid-range power output for up to 40 minutes

#### Nominal power of the Sachs RS

The Sachs RS-Motor achieves its thermal equilibrium at the legally required mechanical rated output of 250 W.

#### Warming of the motor housing

The following conditions must be met so that the hottest part of the motor housing does not rise above 60 °C:

- The ambient temperature must be below 25 °C.
- The air movement around the engine must correspond to a driving speed of at least 10 km/h.
- Air can pass unhindered on or under the engine. (No underride protection is therefore better).

## 3 Operation

This chapter recommends contents for the operating instructions for the Sachs RS user.

### 3.1 Introduction

#### 3.1.1 Safety advice

Observe the safety instructions. Not following them could result in electric shock, fire and/or serious injury.

You must have at least a minimum physical condition for riding a bicycle.

If you are not used to riding an e-bike, start with the lowest assistance level to get feel for it. Starting with a high assistance level may lead to serious injury.

Do not open the drive unit. Only qualified personnel are allowed to open and repair the drive unit.

Do not use aggressive cleaners.

Do not modify or alter the drive unit. Especially, do not increase the power or speed of the drive system.

Worn components (e. g. chainring, chainring receptacle, pedals) must only be replaced with original spare parts or parts approved by the manufacturer.

To prevent the e-bike from unintentional activation during transport, storage or while working on it, remove the battery beforehand. (See battery operating instructions.)

Only use the push assistance when pushing the e-bike. (See Control unit operating instructions.)

When using the push assistance, make sure that the pedals do not turn against your legs.

At high temperatures above 25 °C or high stress (e. g. riding up hills, heavy load) the drive unit may become very hot. Avoid direct skin contact with the housing.

Only use batteries that are approved by the manufacturer.

Observe the national traffic rules and the national regulations concerning the use of e-bikes.

Observe the safety warnings and instructions in all of your e-bike's operating instructions.

#### 3.1.2 How does the drive unit work?

The drive unit assists your pedaling power as long as you are pedaling. It will not work if the battery is empty or the assistance level is switched off.

The drive unit interrupts the support when you go faster than 16 mph (25 km/h) or faster than 28 mph (45 km/h) with s-pedelects.



Sachs RS Pedelect and S-Pedelect drives are not compatible with each other. An s-pedelect also requires a licence.

### 3.2 Installation

#### 3.2.1 Adjusting the speed sensor

To guarantee the function of the system, the spoke magnet must pass the speed sensor at a distance of 0.2" to 0.4" (5 to 15 mm).

If the spoke magnet is in a wrong position, loosen the spoke magnet and fasten it in an appropriate position.

Observe the linear marking on the sensor housing, which should be aligned with the magnet.

### 3.3 Starting the system

#### Prerequisites

- The battery is securely placed in the holder and is sufficiently charged (see battery operating instructions).
- The control unit is installed correctly (see control unit operating instructions).
- The speed sensor is installed correctly (see 5.2.1).

#### Instruction

1. Switch on the control unit (see control unit operating instructions).
2. If the battery does not start up automatically, switch on the battery (see battery operating instructions).
3. Check that the preferred assist level is selected (see control unit operating instructions).

### 3.4 Switching off the system

Depending on your drive system there may be different options how to switch it off:

- Switch off the battery (see battery unit operating instructions).
- Switch off or remove the control unit (see control unit operating instructions).
- To save energy, most driving systems switch off automatically if they are not used for about 10 minutes (see control unit operating instructions).



Ensure that the packaging is disposed of in an environmentally friendly manner. Cardboard packaging must be disposed of separately for paper recycling. Plastic films and parts in the packaging must be collected separately for recycling.

### 3.5 Setting the assistance level

The drive unit supports four assist levels, which can be set with the control unit (see control unit operating instructions).

When the battery is empty or you choose no assistance level, you can use your e-bike as a normal bicycle.

### 3.6 Using the push assistance

Only use the push assistance when you push your e-bike.

For switching on and off the push assistance see control unit operating instructions.

### 3.7 Maintenance

The Sachs RS drive is maintenance-free and protected from water and dust. However, thick dust and dirt should be removed from the drive.

Do not use strong water jets when cleaning.

For maintenance of the vehicle battery please refer to the battery's manual.

## 4 Storage and Transport

- Handle with care.
- Store in a dry and dark area.
- Store the drive unit in its original packaging at  $-25^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$
- The storage area must be level and sturdy and protected from external influences.

## 5 Disposal

The drive unit and packaging must be disposed of and recycled in an environmentally friendly manner. Do not dispose of the drive unit in household waste.



In accordance with Directives 2012/19/EC and 2006/66/EC, electrical equipment and tools that are no longer in use as well as defective or used batteries must be disposed of and recycled separately in an environmentally sound manner.