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CONTENTS

01 | INTRODUCTION

DEAR CUSTOMER,

This user manual will give you a comprehensive overview of the use of the neodrives hub motor system Z20 RS.
When developing the system, we focused on maximum riding performance – no other system should give a smoother, more agile ride than the neodrives hub motor.

So just pedal away and enjoy your ride to the max!

We hope your ride with the neodrives Z20 RS hub motor is a real pleasure!

INTRO

01 | INTRODUCTION

01.1 | IMPORTANT NOTES

PLEASE OBSERVE!

In addition to this user manual, further documents are enclosed with your S-Pedelec. Please observe the instructions and notes contained therein. There is currently a legal obligation to wear a helmet when using an S-Pedelec.

INTENDED USE OF NEODRIVES COMPONENTS

The S-Pedelec with neodrives components, supplied by specialist dealers, is designed as a trekking or city bike for normal person transport on public roads.

Settings and repairs to the S-Pedelec and to individual components are considered intended use only if they are explained and permitted in this user manual, in the user manual of the S-Pedelec manufacturer, in the instructions of the component manufacturers or in other documents enclosed with the purchase of the S-Pedelec.

The manufacturer accepts no liability for damage caused negligently by misuse, improper maintenance, improper repairs or improper use. It is the responsibility of the rider to check the S-Pedelec as prescribed, to have any necessary work done on it and to use it responsibly. This user manual describes exclusively the use of the neodrives components attached to your S-Pedelec and is state-of-the-art at the time of printing. The manufacturer reserves the right to make changes resulting from the further development of mechanics, software or legal requirements.

The manufacturer regards the following cases as misuse of the neodrives components attached to your S-Pedelec:

- Use of the drive system contrary to the instructions and recommendations of this user manual
- Exceeding the technical performance limits defined in this user manual
- Technical modifications to the neodrives components
- Changes to the software of the neodrives components
- Unauthorised mounting or unauthorised use of neodrives components on bicycles or on any S-Pedelec other than the one supplied to you

The manufacturer declines any liability for damage resulting from misuse of the components. Before starting the journey, familiarise yourself with the safety and hazard notices in the individual chapters of these operating instructions and all other enclosed documents.

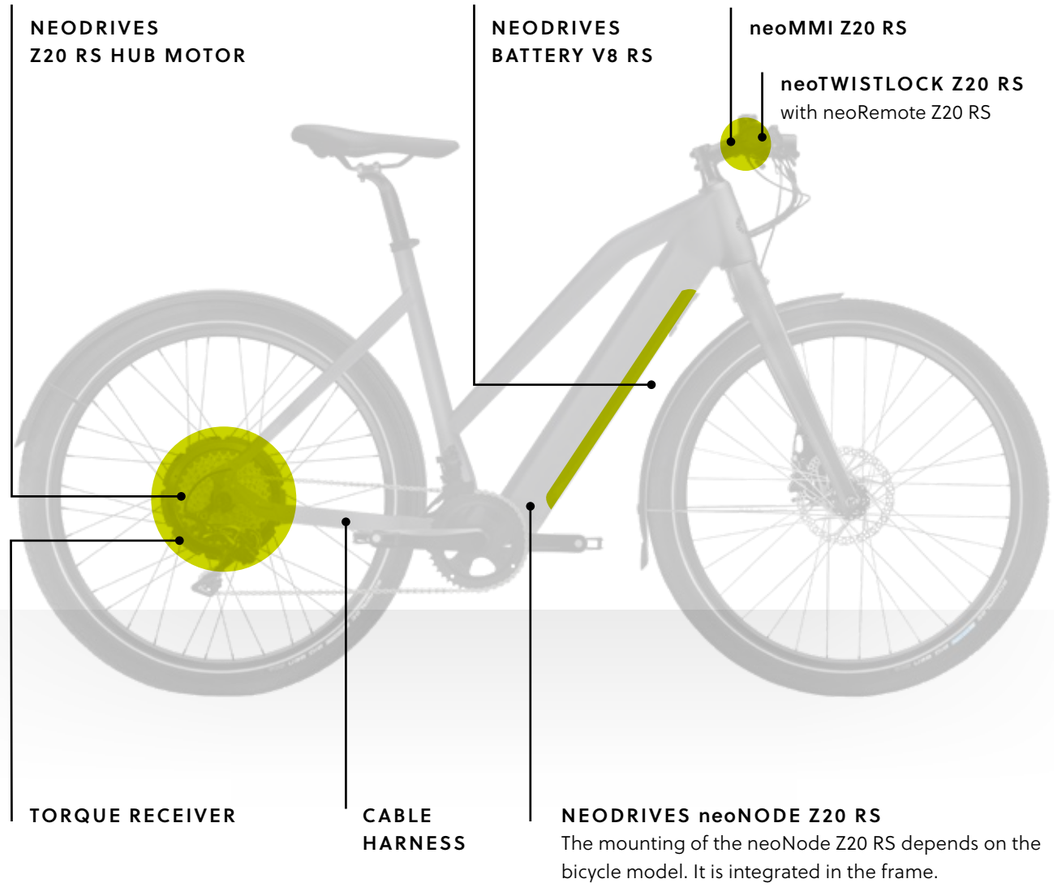
01.2 | PERMISSIBLE OPERATING CONDITIONS / LOCATIONS FOR USE

The neodrives components can be operated at temperatures of between -10°C and 60°C → see page 14. In addition, observe the information on permissible operating conditions in the operating instructions of the S-Pedelec manufacturer. Their restrictions of the permissible operating conditions (e.g. maximum climbing capability, maximum permissible obstacle height, maximum user weight) must also be observed when using the S-Pedelec! Observe the safety and hazard notices in the individual chapters of these operating instructions.

SCOPE OF DELIVERY

02 | SCOPE OF DELIVERY
NEODRIVES COMPONENTS

- neodrives hub motor Z20 RS
- neoNode Z20 RS (installed in the S-Pedelec)
- neoTwistlock Z20 RS and neoRemote Z20 RS (control element)
- neoMMI Z20 RS (LCD)
- Cable harness Z20 RS
- User manual



The neodrives Z20 RS drive system has only a few individual components.
NOTE: Example, the battery and its positioning may vary depending on the bike.

IMPORTANT:
The components of the new Z20 RS S-Pedelec drive system are not compatible with the components of the Z20 (E-Bike 25 ph) or its predecessor versions Z10/Z15, i.e. the system components cannot be interchanged.

02.1 | TECHNICAL DATA

GENERAL COMPONENTS

NEODRIVES HUB MOTOR

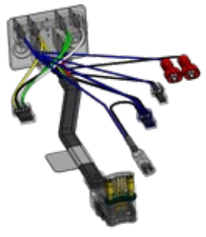
01.	Hub motor Z20 RS with stub axle
02.	neoMMI Z20 RS
03.	neoTwistlock Z20 RS – with neoRemote Z20 RS
04.	Torque receiver
05.	Z20 RS Cable harness, available in different lengths
06.	Installation kit for neoTwistlock Z20 RS
07.	Battery V8 Z20 RS
	Battery charger Z20 RS
	neoNode Z20 RS

01. Hub motor Z20 RS

02. neoMMI Z20 RS

03. neoTwistlock Z20 RS with neoRemote Z20 RS

04. Torque receiver (different designs)



05. Z20 RS cable harness (different designs)

06. Installation kit for neoTwistlock Z20 RS

07. Battery V8 Z20 RS

02.1.1 | DRIVE UNIT

DRIVE UNIT

Speed	45 km/h
Power rating peak	1200 Watt
Operating voltage	48 Volt
Nominal torque	12 Nm
Peak torque	40 Nm
Efficiency	> 85 % (incl. electronics)
Power electronics control system	Integrated in the wheel hub
Cassette hub	Conventional cassette, up to 11 speeds (Shimano MTB) or belt disk
Brake disc	From a diameter of 180 mm
Weight	approx. 4 kg

02.1 | TECHNICAL DATA

02.1.2 | LCD AND CONTROL UNIT (neoREMOTE Z20 RS AND neoTWISTLOCK Z20 RS)

neoREMOTE Z20 RS (CONTROL ELEMENT)

Buttons: Power, Set, Support-Level "+" and "–", 22.2 mm internal diameter, permanent cable

neoTWISTLOCK Z20 RS (MOUNTING PLATE)

Rocker arm mounting, angle adjustable in 15° increments
Weight (incl. cable and neoRemote Z20 RS) 55 g

LCD neoMMI Z20 RS

LCD control	Colour
Touchscreen	Rainproof and glove compatible
Softkeys	3 Softkeys: Back, Home, Menu
LCD size, resolution	2 inch, 240 x 320 Pixel
Dimensions without neo Twistlock (W x L x H)	48 mm x 64 mm x 19 mm
Internal memory	4 GB
Connectivity	Bluetooth
Interfaces	USB-C
Mechanical/electrical contacting	Twistlock, corrosion-protected contacts, spring-mounted
LCD type	TFT
LCD screen	Reinforced, non-reflecting Dragontrail glass
Waterproof	IP67
LCD 20c weight (removed)	54 g

02.1.3 | BATTERY

The neodrives Z20 RS hub motor is available in combination with the battery V8 Z20 RS, please observe the separate user manual for the battery.

V8

Type	Integrated battery
Battery type	Lithium-ion
Cell	INR18650 BMZ 35E
Nominal capacity	13.8 Ah
Voltage	48 V
Energy content	651 Wh
Range*	Assistance level 3: up to approx. 60 km Assistance level 5: up to approx. 40 km
Weight	approx. 4.2 kg
Charging	In the bicycle or removed from the bicycle
End-of-charge voltage	54.6 V
Battery charger	4 A
Protection class	IP X7
Operating ambient temperature	Discharging: -10 °C to +60 °C Charging: 0 °C to +50 °C

* The range will vary depending on the battery, the terrain as well as the prevailing ride conditions. With optimum riding conditions (for example, level terrain, a fully charged battery, ambient temperature of 20 °C, steady ride), a pedalling performance of 80 Watt, a speed of 39 km/h and a wheel circumference of 2280 mm (28 inches).

02.1.4 | TOTAL SYSTEM

NOTES

Operating temperature	-10 °C to +60° C Charging (incl. recuperation): 0 °C to +50 C°
Protection class	IPx4

We reserve the right to make changes in technology and design due to on-going further developments.

ONE MOTOR
WITH HIGH
EFFICIENCY

02.1.5 | FACTORS INFLUENCING THE REMAINING RANGE

The neodrives motor was designed for high performance and achieves an efficiency factor of approx. 87%. As this is a direct drive mechanism (no gears like on mid-drive motors for example), the losses are minimal.

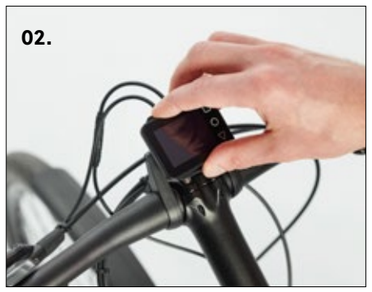
The range the rider is able to achieve depends on numerous factors. These are the main ones:

- Topography: Travelling on hilly terrain noticeably affects the battery more than travelling on flat terrain.
- Weather: On cold days the battery range can be 30-40% less than on warm days. Head wind also affects power consumption.
- Frequent acceleration/travelling at low speeds: Large amounts of power are needed to accelerate. Comparable with the high instantaneous fuel consumption occurring on a car when starting off.
- System weight: This factor is often underestimated. The weight of the rider and their belongings contribute considerably to the overall mass of the bike (different to a car).
- Rider's effort: the more effort the rider puts in, the longer the achievable range. It often helps to switch down 1-2 gears to increase the input force or the cadence.
- Tyre pressure: If the tyre pressure is too low, the friction between the tyre and the ground surface increases, potentially causing several percentage points to be lost.
- Air resistance: At high speeds (from 35 km/h), the air resistance increases disproportionally. Riding at medium speeds increases the range.
- Recuperation: Utilise the recuperation modes, e.g. when riding downhill, to increase the battery range.
- Cold conditions: If you store your battery in warmer rooms during winter, it will provide more power.

02.2 | STARTING THE SYSTEM

CONNECTING THE LCD WITH neoTWISTLOCK Z20 RS

01. neoTwistlock Z20 RS is mounted
02. Set the LCD at a 90° angle, turn clockwise to open it
03. Done

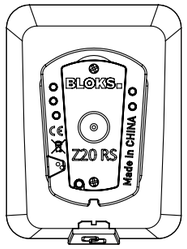


REMOVAL

Turn the LCD on the mounting plate clockwise through approx. 90°. This detaches the electrical connections and the LCD can be removed. The system (LCD + S-Pedelec) should be switched off prior to removal. However, there will be no damage if you mount or dismount the LCD while the S-Pedelec is switched on.

NOTES:
To protect your S-Pedelec from unwanted use by third parties or theft, the LCD should always be removed from the rocker arm when not in use.
However, removing the LCD is no substitute for safeguarding your S-Pedelec against theft, e.g. with a suitable bicycle lock.

Approx. 10 seconds after removal, the system turns off. The light, if switched on, also goes off after approx. 10 seconds. After removing the LCD, wait approx. 30 seconds before placing it back on. Otherwise, a successful system initialisation cannot be guaranteed.



The USB charging port is located in the lower part.

LCD FIXING BRACK ON THE neoTWISTLOCK Z20 RS

If required, you can attach the LCD to the neoTwistlock Z20 RS.
Use a 1.5 mm Allen key to do this.

SWITCHING ON

Press and hold the on/off button for one second. The neodrives logo will appear in one second and the light will switch on automatically. Wait until the trip screen appears. This can take up to 5 seconds.
It is not necessary to press the battery button beforehand.

System On/Off

SWITCHING OFF

Press and hold the on/off button for one second. The neodrives logo will appear in one second and the light will switch off automatically.

02.3 | neoREMOTE Z20 RS

The neo-Remote on the left-hand side of your S-Pedelec's rocker arm allows you to make settings to your S-Pedelec at any time, such as the degree of pedal assistance, without taking your hands off the rocker arm. The same applies to the horn function and the main beam and dipped beam function, which are activated or deactivated via the additional buttons on the rocker arm.

The light On/Off function is deactivated on the Z20 RS due to the regulations on the S-Pedelec. A separate switch, installed on the rocker arm, must be used to activate the main beam.

"+" BUTTON
- Increase the assistance level by pressing the button
- Activate the walk assist (4 km/h) by pressing and holding the button for 3 seconds

"-" BUTTON
- Decrease the assistance level
- Activate recuperation

"SET" BUTTON:
- Scroll through the LCD menu (neoMMI Z20 RS)

SYSTEM ON/OFF

LIGHT ON/OFF

02.3 | neoNODE Z20 RS

MAIN TASK

Communication interface between battery/motor and LCD. This is integrated in the down tube or in the vicinity of the bottom bracket or control tube. It is a small and robust plug for quick disassembly.

NOTE ON PLUG MOUNTING PLATE

If you have to open the two plugs of the cable leading from the neoTwistlock Z20 RS mounting plate to the frame, it is essential to observe the following instructions when assembling.

NOTES: The male plug of the mounting plate (see illustration above left) and the female plug on the connecting cable (see illustration above right) must be correctly aligned when joining. Both plugs are marked. Align the markings (see illustration in the middle) and carefully push the plugs together (see illustration below). If the plugs are not aligned correctly, they may be damaged during assembly.
When unplugging and plugging in, grip only the plugs, not the cable. Do not kink the cable when assembling the plugs to avoid damaging it!

CONNECTING A HEADLIGHT

The system provides a current output for e-bike lights. Only approved lights may be connected to the neodrives system. In addition, specific standards must be adhered to with the S-Pedelec. Only headlights that have been tested for the specific S-Pedelec by the bicycle manufacturer and approved by TÜV may be used.

Plug connection neoTWISTLOCK Z20 RS

IMPORTANT
Align markings prior to pressing together!

03 | neoMMI

03.1 | SOFTKEYS

The neoMMI Z20 RS is equipped with a 2-inch colour TFT LCD with 3 softkeys (keys on touch LCD). This LCD can be operated with the rocker arm unit neoRemote Z20 RS
(→ siehe Seite 18) as well as with the touchscreen of the LCD and the 3 softkeys.

There are 3 softkeys at the bottom of the TFT LCD. The functions of the buttons are, from left to right, "Back", "Home" and "Menu". The triangular "Back" button takes you back to the previous selection within the menus. The round "Home" button takes you to the main display. The main display is the starting point of the LCD, which has a total of 3 display modes.

The square "Menu" button opens and closes menus. You can make various settings in the menus. For example, you can specify whether the speed is displayed in kilometres per hour (km/h) or miles per hour (mph).

SOFTKEYS

1. Back	a) Within the menus, this takes you back to the previous selection, or alternatively press the "Set" button on the neoRemote Z20 RS b) Toggles between the 3 display modes
2. Home	Takes you to the main display
3. Menu	Opens and closes menus

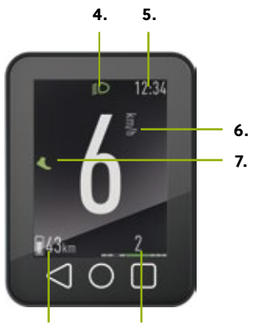
DISPLAY

03 | neoMMI

03.2 | DISPLAY TYPES

The LCD has 3 display modes: the main display, the power display and the trip display. Use the "Set" button on the neo-Remote Z20 RS rocker arm control → see chapter 2, to toggle between these displays. Press the "Home" button to return directly to the main display at any time.

Main display



Trip display

Power display

MAIN DISPLAY SCREEN

4. Headlight
5. Time
6. Speed
7. Walk assist
8. Assistance
9. Range

POWER DISPLAY SCREEN

12. Ratio
13. Kilocalories
14. Cadence

TRIP DISPLAY SCREEN

10. Distance
11. Trip time

MENU

To access the menu, please press the "Menu" button briefly.

MENU ITEM SELECTION

Trip > reset trip

Inspection

Settings
- Touchscreen
  - Inactive
  - Active
- Battery
  - Symbol
  - Percentage
  - Range
- Units
  - Metric
  - Imperial
- Language/ Time/Date
  - Set time
  - Set date

Select the desired menu item by tapping the display. This will take you to the sublevel you require.
To exit the menu, please press the "Menu" or "Home" button. This will take you to the main display.

HEADLIGHT

To comply with the legal requirements concerning the S-Pedelec, the headlight must be switched on at all times.

TRIP MENU ITEM

01. Tap the Trip menu item in the main menu. This will take you to sublevel 1, where the following menu items are displayed:

- Trip
  - Distance
  - Time
  - kcal

02. To reset the three values shown for distance, time and kcal to "0", tap "Reset".

03. To go back to the main menu, tap "Trip" at the top or press the "Menu" or "Back" button.

04. If you want to go straight back to the main display, press the "Home" button.

INSPECTION MENU

Tapping the "Inspection" menu item in the top level takes you to this menu item. The following items are displayed: the frame number, when the next inspection is due, how often the battery has been charged, and the total distance the S-Pedelec motor has covered so far. The odometer information cannot be reset to "0". The software versions of the individual components and their IDs are also displayed here). You can return to the top level of the menu by tapping either "Inspection" at the top or the "Back" button in the bottom left corner. Or you can leave the menus completely by tapping the round "Home" button in the middle at the bottom. This will take you to the main display →siehe Seite 22.

01. Tap the "Inspection" menu item in the main menu. This will take you to sublevel 1, where the following menu items are displayed:

- Inspection
  - Frame ID
  - Inspection
  - Use
  - Charge cycles
  - Odometer (this display cannot be reset to "0")
  - Software versions: This menu item shows you the firmware status of the components

To go back to the main menu, tap "Inspection" at the top or press the "Menu" or "Back" button.

02. If you want to go straight back to the main display, press the "Home" button.

You can see the firmware status of your components at a glance.

SETTINGS MENU ITEM

Tap the "Settings" menu item in the main menu. This will take you to sublevel 1 where the following menu items are displayed:

- Settings
  - Touchscreen
  - Battery
  - Units
  - Language
  - Time & date
  - Update

A software update temporarily stored on the neoMMI Z20 RS can be installed by tapping "Update". This will be uploaded to the S-Pedelec once the display is opened.

If the LCD shows an update from a retailer and this has not been activated, you can activate it yourself via this menu item. Depending on its size, an update can take up to 15 minutes to load. Do not turn the LCD from the neoTwistlock Z20 RS, do not switch it off via the neoRemote Z20 RS or the battery and do not remove the battery.

01. You can select and tap one of the 5 menus displayed. This will take you to the next sublevel.

02. To go back to the main menu, tap "Settings" at the top or press the "Menu" or "Back" button.

03. If you want to go straight back to the main display, press the "Home" button.

TOUCHSCREEN MENU

In this menu item, you can set whether the touchscreen should be active or inactive while riding. This can help prevent accidental operation during the ride.

SAFETY PRECAUTIONS
If you use the „Always active" setting to try and change a setting while riding, this may not only lead to operating errors, it can also distract you from your ride. This can have dangerous consequences – your safety comes first!

01. Tap "Touchscreen" in sublevel 1. This will take you to sublevel 2, where the following menu items are displayed:

- Touchscreen
  - Inactive
  - Always active

02. Select the desired menu item.

03. To go back to sublevel 1, tap "Touchscreen" at the top or press the "Back" button.

04. If you want to go straight back to the main display, press the "Home" button.

BATTERY MENU ITEM

In this menu item, you can set whether the battery's state of charge should be shown as a symbol or as a percentage and whether the range should be displayed. The range also varies in the menu depending on the assistance level selected.

Example: In level 5, the range is lower than in level 1
→ see page 30.

Note: The distance shown in the LCD may vary from the actual range.

01. Tap the "Battery" item in sublevel 1. This will take you to sublevel 2, where the following menu items are displayed:

- Battery
  - Symbol
  - Percentage
  - Range

02. Select the desired menu item. A tick appears next to your selection.

03. To go back to sublevel 1, tap "Battery" at the top or press the "Back" button.

04. If you want to go straight back to the main display, press the "Menu" button.

UNITS MENU ITEM

In this menu, you can set whether you prefer metric units (kilometres per hour (km/h) and a 24-hour clock) or imperial units (miles per hour (mph) and a 12-hour clock) to be used in the LCD.

01. Tap the "Units" item in sublevel 1. This will take you to sublevel 2, where the following menu items are displayed:

- Units
  - Metric (kilometres per hour [km/h] and 24-hour clock)
  - Imperial (miles per hour [mph] and 12-hour clock)

02. Select the desired menu item. A tick appears next to your selection.

03. To go back to sublevel 1, tap "Units" at the top or press the "Back" button.

04. If you want to go straight back to the main display, press the "Home" button.

LANGUAGE MENU ITEM

In this menu item, you can set the language for the LCD. Six languages were available at the time of writing these instructions: English, German, French, Spanish, Italian and Dutch.

01. Tap "Language" in sublevel 1. This will take you to sublevel 2.

02. Select the desired menu item. A tick appears next to your selection.

03. To go back to sublevel 1, tap "Language" at the top or press the "Back" button.

04. If you want to go straight back to the main display, press the "Home" button.

TIME & DATE MENU ITEM

In this menu, you can set the time and date shown in the display.

01. Tap "Time & date" in sublevel 1. This will take you to sublevel 2.

- Time & date
  - Time
    - Hours
    - Minutes
  - Date
    - Month
    - Year

02. Tap "Time" or "Date". Sublevel 3 will appear.

03. Tap to determine which of the two fields is active. The active field has a white background with a light green border at the bottom, whereas inactive fields are light grey. The "Time" menu gives the options of hours and minutes, whilst the "Date" menu can be used to set the day, month and year.

04. You can select the required values using the "+" and "-" symbols at the bottom of the LCD.

05. To go back to sublevel 2, tap "Date" at the top or press the "Back" button.

06. If you want to go straight back to the main display, press the "Home" button.

Walk assist symbol

WALK ASSIST

When the walk assist is activated, the symbol appears in the LCD. To activate the walk assist, start moving the bike and hold the "+" button on the neoRemote Z20 RS for three seconds. Keep the "+" button pressed for as long as you wish to be assisted by the motor.

ASSISTANCE MODE AND RECUPERATION

01. Briefly press the "+/-" button to select the level of assistance you want or the level of recuperation you want to activate.

Activation of recuperation
Press the "-" button until the digits 1 and 2 appear in the LCD with an energy symbol.

Recuperation level 1: The motor recovers energy. 50% of the permissible recuperation power is generated.

Recuperation level 2: The motor recovers more energy. 100% of the permissible recuperation power is generated.

DISPLAY	ASSISTANCE	POWER CONSUMPTION
Assistance level 5	Assistance works at very high power	Very high
Assistance level 4	Assistance works at high power	High
Assistance level 3	Assistance works at medium power	Medium
Assistance level 2	Assistance works at low power	Low
Assistance level 1	Assistance works at very low power	Very low
0 (off)	No assistance	–
Recuperation level 1	No assistance	Energy recovery
Recuperation level 2	No assistance	Energy recovery

02. The motor will assist you according to the selected assistance level as long as you are pedalling. As soon as you stop pedalling or a speed of 45 km/h is reached, the motor will stop assisting you.

BATTERY

04 | BATTERY

04.1 | BATTERY LED DISPLAY/ BATTERY BUTTON

The position of the battery and therefore the visibility of the battery button depends on the model. It can be located on the top or bottom side of the down tube. You can use the battery button on the top of the battery to call up the following information or carry out the following actions:

01. Switching on the battery
02. Check the battery's state of charge
03. Setting the battery to "Deep sleep" mode
04. Waking the battery from "Deep sleep"

To ensure the display functions correctly, it may be necessary to disconnect the battery from the system beforehand (unplug the battery or remove it from its frame).

The battery UR V8 RS need not be wakened by pressing the battery button. Pressing the ON/Off button on the neoRemote Z20 RS is sufficient (siehe Seite 18). The system powers up after a few seconds (5 seconds), the light switches on and the start screen appears.

CHECKING THE CURRENT STATE OF CHARGE

Press the battery button briefly: the battery's state of charge will be displayed
(State of Charge)

- 5 LEDs lit: battery has 80-100% charge.
- 4 LEDs lit: battery has 60-80% charge.
- 3 LEDs lit: battery has 40-60% charge.
- 2 LEDs lit: battery has 20-40% charge.
- 1 LED lit: battery has 0-20% charge.
- 1 flashing LED: battery is flat.

04.2 | SWITCHING ON THE BATTERY

SETTING THE BATTERY TO "DEEP SLEEP" MODE

Keep the battery button pressed for more than 5 seconds:
The LEDs shut down one after the other 5-4-3-2-1-0. When the last LED has extinguished, keep the battery button pressed for another 2-3 seconds. Within the next 60 seconds, the battery goes into "Deep sleep" mode.

INFORMATION: The battery is automatically set to "Deep sleep" mode if not used (LCD switched off, battery button not pressed). In this state, the standby power consumption is reduced to a minimum, to allow prolonged storage periods without a great loss of capacity, for example.

WAKING THE BATTERY FROM "DEEP SLEEP"

After switching off the S-Pedelec and removing the charging plug, the battery goes into "Deep sleep" mode to reduce the standby power to a minimum. Press the battery button briefly to wake the battery up again. All 5 LEDs will light up, followed by a brief pause after which all LEDs will flash briefly three times. The battery is now operational again.

Only use the battery charger provided to charge the battery. Using an unsuitable battery charger may lead to malfunctions and reduce the battery's service life. There is also a risk that it may catch fire or explode.

Connect the plug on the battery charger to the mains first before connecting the battery.

04.3 | CHARGING AND STORING THE BATTERY

The battery can remain in the S-Pedelec while it is being charged. Alternatively, you can remove the battery and charge it outside the S-Pedelec.

Integrated battery UR-V8

CHARGING THE BATTERY

01. Connect the power cable to the battery charger and plug into a socket.

02. Connect the charging plug to the charger socket on the battery.

03. Turn the tumble switch on the battery charger to "On".

04. After approx. 5-10 seconds, the green LED on the battery charger flashes fast and steadily. If the LCD is connected to theS-Pedelec, it will turn on for a few seconds before automatically turning off again.

05. After approx. 5 seconds, the LEDs on the battery light up according to the following pattern:
- All 5 LEDs flash in turn: battery is charging, the state of charge is between 0 and 20 %.
- 1 LED is permanently lit, LED 2–5 flash in turn: battery is charging, the state of charge is between 20 and 40 %.
- 2 LEDs are permanently lit, LED 3–5 flash in turn: battery is charging, the state of charge is between 40 and 60 %.
- 3 LEDs are permanently lit, LED 4–5 flash in turn: battery is charging, the state of charge is between 60 and 80 %.
- 4 LEDs are permanently lit, LED 5 is flashing: battery is charging, the state of charge is between 80 and 100 %.

06. When the battery is fully charged, the battery charger switches off. The green LED on the battery charger lights up continuously and the LEDS on the battery extinguish.

07. The battery is automatically set to "Deep sleep" mode once the charging plug is disconnected. To "wake up" the battery, press the battery button once.

BATTERY CHARGER DISPLAY

- Green LED flashes approx. once per second: battery charging
- Green LED permanently lit: battery fully charged, charging process complete
- Green LED flashes briefly every 2 seconds: no battery connected, battery not charging
- Red LED flashes: charging fault. In case of a charging fault, please check for kinks in the cables and ensure that the plug is clean and fitted correctly. If the battery charger has a magnetic plug: check the magnetic plug on the battery charger and the magnetic socket on the battery for dirt from time to time and in case of problems during charging. Metal shavings and small parts such as washers can quickly gather there due to the magnet.
- Charging time: a complete charge (0 % – 100 %) lasts about 4 hours. The battery charger produces a charging current of 4 A on average. This means that over a complete charging cycle (completely flat battery to completely charged battery) it charges with 4 A on average.

STORING THE BATTERY

- When removing the battery, make sure it is stored in a dry place protected from foreign particles (e.g. metal shavings).
- The state of charge should be 50-80%.
- When the battery is in storage, check its state of charge every 3 months and charge to 80% when necessary.
- Do not expose the battery to any moisture (water, rainwater, snow, etc.) during storage!
- Store the battery in a cool, dry place where it is protected from damage and tampering.
- To ensure optimum battery service life, it should be stored at a temperature of 18 to 23°C and a humidity of 0 to 80%
→ siehe Seite 13.

04.4 | REMOVING AND INSERTING THE BATTERY

To release the battery, turn the key anticlockwise as far as it will go. Press the locking mechanism and remove the battery from the bottom tube.

ATTENTION: Make sure that the battery does not fall out; this will depend on how it is attached.

Turn the key back to its original position and remove it. If the key is left in the lock, it may break, e.g. when the crank is turned. You do not need the key to insert the battery. If the key is still in the lock, please remove it. Insert the battery and press down until you hear and feel it click into place.

Integrated battery V8 Z20 RS

KEY NUMBER

Prior to delivery of the S-Pedelec, please note the key numbers and the manufacturer, e.g. in the bike book or the user manual. Keys can be ordered directly from the key manufacturer using the key number. If the key number is not noted and both keys are lost, a new lock will have to be installed.

MOTOR

05 | MOTOR

05.1 | INSTALLATION AND REMOVAL OF THE REAR WHEEL

The drive wheel of your S-Pedelec can be removed from the bicycle frame at any time, for example, for cleaning purposes or in case of a flat tyre. Please proceed extremely carefully during removal and the subsequent assembly. Pay special attention to the instructions and specifications of the manufacturers of the various components attached to the wheel, in particular the brake disc.

REMOVING THE DRIVE WHEEL

Make a note of the cable routing and the fixing points of the cable ties before removing the drive wheel. First loosen and remove all cable ties that attach the cable coming from the motor, as well as cables and supply lines from other components to the bicycle frame.

01. Open the rim brake, if one is installed.

02. Shift to the smallest pinion if a derailleur is fitted.

03. Release the rear wheel from the frame while holding it firmly.

04. Now remove the torque receiver from the motor and pull the plug out of the motor.
You can now remove the rear wheel completely.

SAFETY PRECAUTIONS
Pay attention to the mounting position of the torque receiver. When refitting the wheel later, it must be reattached in exactly the same position as it was before it was removed.

MOUNTING THE DRIVE WHEEL

01. Ensure that all components attached to the wheel have been assembled in accordance with the manufacturer's instructions and specifications. This applies in particular to the brake and the gear shift. Then lift the rear wheel into the frame. Before you push it completely into the frame socket (dropout), insert the motor plug into the motor.

02. Place the torque receiver on the gearing.

03. Fasten the rear wheel using the stub axle/quick release skewer or axle nuts.

04. For screw axle: tighten the axle nuts in the following order:

- Tighten on the gear switch side first
- Then tighten on the brake side

The prescribed tightening torque of the two nuts is 35 Nm each. Also make sure that the washer is under the axle nut, otherwise there is a risk that the axle nut will come loose. If your wheels are equipped with quick release skewers or stub axles, observe the manufacturer's instructions for assembly and tightening torque. Finally, reattach all cables and supply lines to the bicycle frame with cable ties and carry out a final functional test.

SAFETY PRECAUTIONS
Before inserting the motor plug into the motor, check both the plug and socket for moisture.

Make sure that the cables are routed correctly. Incorrect routing may lead to the cable getting caught in the brake disc, the drive or the spokes, which could cause the wheel to block and result in a fall.

During all assembly work, always observe the instructions and specifications of the manufacturers of the various components attached to the wheel. This applies in particular to the brake, the gear shift, the stub axle and the quick release skewer.

Never mount the motor without the torque receiver. as this would result in a total loss (cable twisted off). In this case, all warranty and guarantee claims will lapse.

In addition to your repair tool, carry 5 cable ties with you so that any cables that come loose during a journey can be securely fixed again.

Always use the cassette originally installed by the bicycle manufacturer. Using other makes can result in impaired function or the cassette touching the rear end.

05.2 | RECUPERATION

In recuperation mode, the motor acts as a generator. Power is generated, and this is used to charge the battery. At the same time, a gentle bracking effect is created.
(Activating recuperation → siehe Seite 30).
The 2 recuperation stages can be activated only if the following points apply:

- Recuperation can be activated only in the speed range from 6 to 75 km/h. Recuperation cannot be activated below 6 km/h and at standstill.
- The battery temperature must be more than 0°C. Below 0°C, recuperation is automatically deactivated.
- If the battery exceeds the maximum charging temperature of 50 °C, the charging function of the battery will be deactivated and can no longer be recuperated. This function is enabled again as soon as the battery temperature falls below this level.
- The battery's state of charge is lower than 90 %: please note that the bracking due to the recuperation depends on the battery's state of charge. The lower the battery's state of charge, the stronger the perceived bracking.

05.3 | THERMAL MANAGEMENT

A combination of 3 temperature sensors, an intelligent software control and patented air circulation ensure optimal cooling of the motor. Ultimately, this means more power throughout a longer period.

ADVANTAGE: Protection against early performance reduction on long climbs or with high loads, resulting in longer support on hills, higher efficiency and lower battery consumption, since the motor is optimally cooled.

THEORY: Like all drive units, gearless wheel hub motors are also optimised for an operating point consisting of speed, load and power. Our S-Pedelec wheel hub motors are designed for operation in the speed range of between 20 km/h and 45 km/h and a driving power of 500 W. In this speed and power range, they achieve the highest efficiency and range, which means that the supplied electrical energy (from the battery) is optimally converted into drive energy. Whenever a motor is operated away from the optimum operating point, its efficiency decreases. As a result, the electrical energy is no longer optimally converted and part of the supplied energy is converted into heat. This reduces the range, and the heat has to be dissipated.

In neodrives motors, this heat dissipation is achieved via a large contact surface of the motor interior (stator carrier) to the dropout or rear end of the bicycle frame. In addition, cooling fins inside and outside the drive housing ensure the greatest possible heat exchange with the environment. Any heat that cannot be dissipated leads to self-heating of the drive motor.

The neodrives wheel hub motors monitor both the supplied energy and the temperatures generated in the motor. This avoids damage due to overheating caused by an overload situation. However, this leads to a reduction in the motor power available to the rider, to prevent overheating.

The higher the temperature rise in the motor, the lower the amount of drive power and assistance available. When the motor cools down, the energy supply rises again and the drive power increases.

IMPORTANT: The motor cannot be damaged by overheating. The regulation of the drive power as a function of the motor temperature is infinitely variable, so that assistance is always available, but the motor cannot be damaged by overheating.

GENERALLY: In daily practice, the outside temperature, the total weight, the slopes, the condition of the ground surface, the air pressure and the speed all play a role. These factors can lead to a temperature being reached which reduces performance or assistance. However, this does not mean a fault or failure of the drive unit. The ride can be continued with less assistance.

AN EXTREME EXAMPLE: A slope of >12 % over 500 metres in altitude, a total weight of 120 kg, maximum assistance level, a riding speed of < 10 km/h and a cadence of 60 rpm mean operation in an unfavourable range with low efficiency, a low range and high heat generation at the same time. This can result in a reduction of the drive power.

TIP: Ideally, by selecting a smaller gear with a higher cadence, a lower assistance level and/or after a short break (in which the drive unit can cool down again), you can continue your ride.

05 | MOTOR

NOTES

06 | NOTES AND TROUBLESHOOTING

06.1 | MAXIMUM AXLE LOAD

The maximum axle load of the motor is 120 kg.

06.2 | CLEANING

Never use benzine, thinner, acetone or similar substances for any cleaning process.
Likewise, do not use abrasive or aggressive cleaning agents.
Instead, only use commercially available cleaning agents and disinfectants (isopropanol) as used in the household.

CLEANING THE MOTOR

The motor of your S-Pedelec should be regularly cleaned of dirt, preferably with a dry brush or a damp (not wet) cloth. Do not carry out cleaning with running water, e.g. from a water hose or even a high-pressure cleaner. However, you can ride in the rain and on wet roads without any problems. Wait until the motor has cooled down before cleaning the motor.

Water penetrating the motor can damage it. When cleaning, always make sure that neither liquids nor moisture penetrate the motor. If the motor has been removed from the frame of the S-Pedelec, the plug of the motor and the socket of the cable to the battery pack must be checked for possible contamination and water deposits and cleaned before assembling.

CLEANING THE LCD

The LCD may be cleaned only with a damp cloth. Never use benzine, thinner, acetone or similar substances. Likewise, do not use abrasive or aggressive cleaning agents.

06.3 | TRANSPORT

The following instructions must be observed when transporting the S-Pedelec with a passenger car:

- Take appropriate measures to protect all components of your S-Pedelec from moisture and dirt.
- Remove the battery and LCD from the bicycle before fixing the S-Pedelec to the luggage rack of your car. This also reduces the weight that you have to lift, especially with a roof luggage rack system.

- Always transport the battery and the LCD inside your car.
- The LCD and battery should also be removed during transport inside the vehicle (e.g. in an estate) in order to avoid damage during loading and while driving.
- For carrier systems with bottom tube clamping, ensure that the battery attachment bar is not crushed/damaged when the clamping device is tightened.
- Make sure that cable ends cannot cause any damage to the S-Pedelec or your car during the journey.
- At the end of the journey, check all contacts of the S-Pedelec for possible foreign objects or moisture. To ensure safe operation, all plug connections in particular must be free of dirt and foreign bodies and completely dry.
- Never place your S-Pedelec on the side of the gear shift during transport, for example in the boot of a car. This could damage it.

06.4 | SAFETY PRECAUTIONS

SAFETY PRECAUTIONS
Do not permanently expose your S-Pedelec to strong sunlight when not in use. This would result in the motor and battery heating up and in extreme cases not being able to deliver full power. Plastic parts also age faster under intense sunlight.

The maximum speed (non-motor operation) of the system is 75 km/h. If this is exceeded, you will endanger, and in the worst case, damage the electronic components.

06.5 | FAULT SYMPTOMS AND POSSIBLE MEASURES

FAULT	TROUBLESHOOTING MEASURES
The system cannot be switched on (no indication in the LCD)	• Remove the battery from the holder, reinsert it and plug it in again if necessary. • Check the plugs, contact surfaces and contacts on the LCD and battery for contamination. Water and particles could accumulate and remain stubbornly adhered especially during the positioning of the charger socket on the bottom bracket. • Press the battery button so that the LEDs light up.
The battery cannot be charged	• Carefully check the battery charger plug and the battery socket for deposits. • The battery cannot be charged if the ambient temperature/battery temperature is <0 °C or >50 °C. Always charge the battery at room temperature. • Refer to the charging instructions, especially the fault codes, in the battery charger's user manual. • A fault is indicated if the middle LED of the battery flashes after the battery charger is plugged in. Press the Info button on the battery. If LEDs 2 and 4 light up, an overtemperature has occurred and the battery cannot be charged until its temperature drops. The battery can remain on the battery charger, charging commences when the battery has cooled down to charging temperature. It is safe to leave the battery in the battery charger during this period.
No motor assistance (LCD in operation, motor assistance not available)	• Remove the battery from the holder and reinsert it. If necessary, reconnect the plug. • Fully charge the battery once. • Turn the LCD down from the holder dock, wait about 1 minute, and then switch the system on again. • Check that all plugs are seated correctly and check all cables for cable breakage, e.g. due to severe kinking. • Does a fault indication appear on the LCD? If yes, please consult your specialist dealer if necessary. • Ask your specialist dealer check which assistance levels have been stored in the neoDiagnostics software tool. • Check the setting of the assistance levels via your neodrives app

FAULT	TROUBLESHOOTING MEASURES
Recuperation does not work	• Is the battery's state of charge > 90 %? The recuperation only functions if the battery's state of charge ≤ 90 %. • Is the current speed less than 6 km/h? Below 6 km/h, recuperation is automatically deactivated. • Is the current speed more than 75 km/h? No further recuperation takes place above 75 km/h. • If the battery exceeds the maximum charging temperature of 50 °C, the battery's charging function will be switched off and no further recuperation takes place. This function is enabled again as soon as the battery temperature falls below this charging temperature. • Is the ambient temperature < 0 °C? The battery cannot be charged below a cell temperature of 0°C, which also means that recuperation is not possible.
The motor does not deliver full power	• The motor may be in the high temperature range. Let the S-Pedelec cool down for about 10 minutes (in the shade) and then resume the ride. • As the battery voltage decreases, the performance and also the top speed drop slightly. When the battery is almost flat, the maximum speed may be 2-3 km/h below the level when riding with a fully charged battery.
Range appears too short	The range depends on: • Driving profile • Assistance mode • Tyre pressure • Riding style • Personal fitness level • Total weight • Outside temperature • Battery capacity • The distance selected • Smartphone charging via LCD If just one of these factors is not optimal, the range can be significantly less. Example: At an outdoor temperature of 0°C, the range can be reduced by 30-40%.
Battery key lost	Order a new key: We recommend that you note the key number on the sales or purchase receipt and store the enclosed security key in a safe place. You can use this number to reorder a replacement key if lost. Different keys and cylinders are installed according to the bike manufacturer and you will have to order replacements for these from the manufacturer concerned (Abus or Axa). If you no longer have the key number, the only option is to remove the lock. Contact your specialist dealer for more information.

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