

SPIDER AUTONOMOUS 2.0

operation manual

snt. Autonomous mowers.

Posouzeno Státní zkušebnou strojů a.s.



Státní zkušebna strojů a.s. www.statnizkusebna.cz

CE

operation manual

SPIDER AUTONOMOUS 2.0

The mower with
precision navigation

REV. 2_2023/09/01

autonomous spider

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1

List of Abbreviations

abbreviation	English meaning
A	SI unit of electric current—Ampere
Ah	Ampere-hour
bar	Metric unit of pressure
BT	Bluetooth
CO	Carbon monoxide
CZEPOS	Provides users of global navigation satellite systems the correction data for accurate positioning on the territory of the Czech Republic
dB	Decibel—unit for measuring sound intensity level
DGNSS	Differential Global Navigation Satellite System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HP	Unit of measurement of power—horsepower
kg	kilogram
km/h	Speed in kilometer per hour
kPa	Pascal is a unit of measurement of pressure. 1 000 Pa (kilopascal)
CST	GNSS RTK Correction Station
kW	SI unit of measurement of power—1000 watts (kilowatt)
LCD	Liquid crystal display
LED	Light emitting diode
Li-Ion	Lithium-Ion
LTE	Technology for high-speed data transmission in mobile networks
MHz	SI unit of measurement of frequency—1 000 000 Hz (megahertz)
mm/cm	Millimeter/Centimeter
Nm	Unit of measurement of torque—Newton meter
PC	Computer
RC	Remote control

abbreviation	English meaning
REC	Recording
RPM	Revolutions per minute
RTCM	Real-time correction message
RTK DATA	Machine receives correction data
RTK FIX	Machine knows its exact position
s	SI unit of measurement of time—second
SA	Spider Autonomous
SIM	An identification card used to identify a subscriber on a mobile network
SOS	Emergency situation
TEST	Testing
UHF	Ultra-high frequency
URL	Web address
V	Volt—voltage

2

Introduction

2.1 IMPORTANT

This machine places demands on the operator both in terms of operation and maintenance.

This USER MANUAL is a part of the machine. Always keep the manual available with the machine and, in case of transfer to another owner, pass on the manual as well.

This machine is intended for normal grass cutting use only. Any other use is contrary to the intended use of the machine. Strict compliance to the conditions of use, maintenance and repair as prescribed by the manufacturer is must to the proper operation of the machine.

Before using the machine, **EVERY** operator **MUST** attend practical training in mower operation, read this manual thoroughly and become properly familiar with all safety instructions, controlling the machine and maintenance instructions. The mower may be operated with other attachments intended for the mower, but the instructions given for each attachment must be followed.

It is essential to comply with all regulations relating to accident prevention, as well as all other generally accepted regulations relating to occupational safety and health and all applicable traffic rules and regulations.

The manufacturer disclaims responsibility for any modifications or changes made to the product that are not made and approved by the manufacturer. Furthermore, the manufacturer disclaims liability in the event of non-compliance with the user manual, as well as the consequences in the form of damage to property, health of the operator or other persons that may result from non-compliance.

This user manual contains instructions for safe operations in various places. If this instruction is included in the general text, it is highlighted by the following WARNING symbol:

It warns of the very likely risk of serious injury or danger to life if the appropriate instructions are not followed.

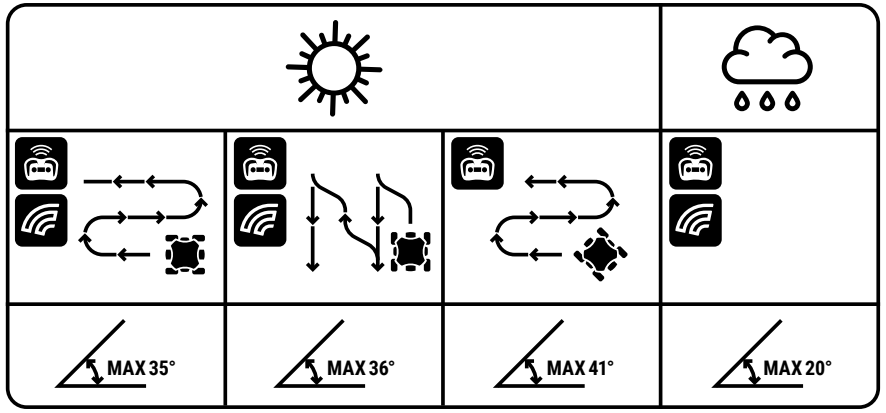
Other used symbols:

It provides useful information.

Links to the service video on the manufacturer's website.

2.2 USE OF THE MACHINE

The machine is designed for mowing grassland on flat or sloping terrain, with the option of autonomous or manual control. Any other use is contrary to the established method of use. **The maximum slope inclination** on which the machine may be used depends on the actual condition of the area to be mown and the mowing method.



Dry conditions

Cross-slope mowing (manually and autonomously): **Maximum slope 35°**
Mowing up and down the slope (manually and autonomously): **Maximum slope 36°**
Cross-cutting on the slope with the machine positioned diagonally (manually only): **Maximum slope 41°**

Wet conditions

For all surfaces and applications in manual or autonomous mode: **Maximum slope 20°**

The SPIDER AUTONOMOUS 2.0 is a product designed for **mulching grass in unmaintained or only occasionally mown areas**. The mower is operated by a single person via a remote control, which allows manual or autonomous control of the machine along a pre-calculated route in a given working area.
This machine may only be operated, repaired and maintained by authorized responsible person over 18 years of age, who is physically and mentally capable of doing so. Who has learned operational procedures for the correct and safe use and maintenance of the machine by means of this manual, and who has familiarized himself with the applicable regulations and principles of occupational safety and health when working with the SPIDER AUTONOMOUS 2.0 motorized mulching lawn mower.

When driving on a slope, the operator must carefully observe and evaluate the movements of the mower and the characteristics of the terrain, especially the current grip of the wheels on the ground. Pay attention to climatic conditions. The slope accessibility of the mower changes quickly on dry or wet grass. Soil characteristics also play a significant role. Adhesion to the ground will be much better on dry slopes and on hard ground.

2.3 PROHIBITED USE

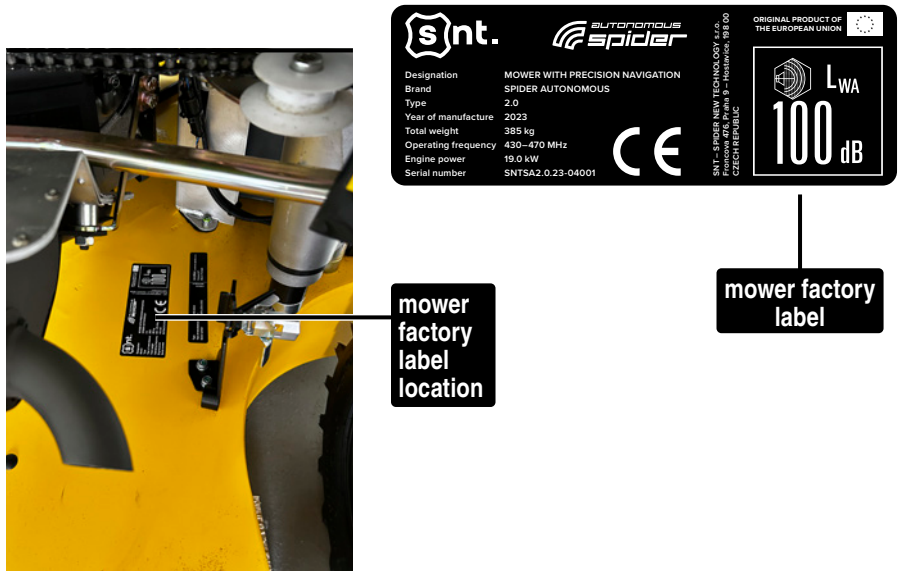
- The mower must not be used for any purpose other than that for which it is intended and which is described in chapter 2.2 *Use of the Machine*.
- The mower must not be used on surfaces that are contaminated with glass, stones, iron or other undesirable objects that can be ejected by the rotating blade or that can damage the mower when cutting.
- The mower must not be used on slopes exceeding 20° in wet, humid or foggy conditions where slope accessibility and mower stability are adversely affected by adhesion to the ground, regardless of the type of area being mowed.
- The mower must not be used in manual mode if people, children or animals are within 3 meters of the machine/mowing area.
- **The mower must not be operated in autonomous mode unless the following conditions are met: working in an enclosed, fenced area without the presence of other persons or working in an area marked by safety features (safety signs indicating that the machines are operating in autonomous mode or mobile fencing demarcating the working area).**
- **The mower must not be started in autonomous mode unless the operator has visual contact with the machine and the surrounding area is secured.**
- **Under no circumstances should the mower be used unless you have thoroughly familiarized yourself with the terrain beforehand, in particular the presence of undesirable uneven ground, bumps, stumps, areas of low load-bearing capacity, swamps, holes, etc.**
- The mower must not be used on slopes with a greater inclination than then specified in section 2.2 *Use of the Machine*.
- The mower must not be used as a towing or transport vehicle.
- It is strictly forbidden to drive the mower on public roads.

- It is strictly forbidden to increase the maximum speed or power of the engine beyond the limits specified by the manufacturer, and to make any other interventions in the design of the machine, the engine settings, or the settings of the control unit and navigation components. The manufacturer accepts no liability for damage or injury resulting from such interventions and modifications.
- It is strictly forbidden to use the machine after consuming alcohol or drugs affecting perception or other psychotropic or hallucinogenic substances.
- It is strictly forbidden to drive the mower into piles of sand, gravel and similar materials, stumps, stones, building elements or other obstacles that may cause the machine to become unstable.
- It is strictly forbidden to use the machine in low visibility (twilight, fog, heavy rain, etc.).

2.4 PRODUCT IDENTIFICATION

The machine can be identified by the serial number on the mower's factory label, which is located at the front of the machine near the exhaust.

The engine manufacturer has also placed its own factory label on the combustion engine.



2.5 GUIDELINES FOR THE DISPOSAL OF SCRAP PRODUCTS

If you consider that this machine has no longer any functional value and requires disposal, then you should take the following steps.

These guidelines should be applied in accordance with applicable health, safety and environmental legislation and with the assistance of approved local waste disposal and recycling facilities.

- Use the appropriate tools and personal protective equipment and follow technical instructions applicable to the machine.
- Remove and store properly:
  1. Batteries
  2. Fuel residues
  3. Oils
- Disassemble the machine structure in accordance with the instructions where possible. Particular attention should be paid to working with “hidden energy” inside the machine’s pressure elements or tension springs.
- Any component that could still serve as a used part or that can be repaired should be separated and returned to the appropriate center.
- Other used parts should be separated into material groups and taken for disposal and recycling in accordance with available facilities. It is usual to separate them into the following types:
  - Steel
  - Non-ferrous metals
    - Aluminium
    - Brass
    - Copper
  - Plastics
    - Identifiable
      - Recyclable
      - Non-recyclable
    - Unidentified
  - Rubber
  - Electrical and electronic components
- Items that cannot be economically categorized by material should be labeled as “General Waste”.
- Do not burn the waste.

Finally, update the machinery records and mark the machine as scrapped.

3

Safety Instructions

This safety symbol indicates an important safety message in this user manual.

If you see this symbol, always beware of possible injury, read the following messages carefully and inform other users.

3.1 SAFETY INSTRUCTIONS

- Do not interfere with the machine if it is raised and not adequately supported. The machine should be supported either underneath all 4 wheels or by a strong enough stand underneath the mowing deck.
- Transport the machine in a crate or a trailer.
- Carry out maintenance and tightening checks on bolted connections at regular intervals. The first check should take place after 10 hours of operation. Pay attention to the attachment of the mowing blades and the proper tightening of the bolts. Use a torque wrench and the prescribed tightening torque, see 12.23.
- Blade attachment hubs and bolts must not show signs of damage or wear. The bolts must be complete. The knives must be undamaged, evenly used and reasonably sharp. Tighten the bolts to the prescribed torque.
- When moving the machine in manual mode outside the working area, always switch off the cutting blades and set the maximum cutting height. This will prevent damage to the blades.
- Keep the product clean after use. Do not use gasoline or similar petroleum based products for cleaning.

- Do not reach under the mowing deck or under the covers with your hands or feet.
- If you are forced to reach under the machine, shut down the machine and wait until all rotating parts have stopped. **Wait untill the blades are fully stopped!!!** The running time depends on the condition and wear of the clutch. Ensure that the clutch is regularly serviced by a qualified workshop. The EMERGENCY STOP button must be in the OFF position before intervention.
- Wear sturdy, closed shoes and working clothes when operating the machine. Do not wear short trousers, light footwear or loose clothing, parts of which could be caught by the mower.
- It is strictly forbidden for the machine operator to wear loose clothing.
- Use a face shield to protect your face.
- Do not use the machine after consuming alcohol or drugs that affect perception.
- Always make sure that the mowing deck is switched off before starting the engine.
- When starting the engine or the mowing deck, stand well back from the machine to protect yourself from objects thrown accidentally and to be able to stop the machine in time in case of danger. Do not stand the possible path of the mower.
- When using the mower in manual mode, make sure that you can always see the machine clearly, that it is within range of the remote control and that you can recognize and react to dangerous situations in time. Do not abuse the maximum range of the remote control.
- When using the mower in autonomous mode, check the operating status of the mower using the app **mySpider** (my.spidernewtech.com) on a PC, laptop, tablet or phone.
- Observe all generally applicable safety regulations when using the mower.
- Only start working with the mower if the machine has not been damaged by a previous operation.
- Do not interfere with engine adjustments, especially the speed governor, and do not modify the exhaust.
- Do not operate the mower if you have less than 30 % fuel in the tank.
- Do not move the mower by dragging it with the towing device.
- The machine is intended for operators over 18 years of age who have been trained and familiarized with the machine and the instructions for use. The remote control (hereinafter referred to as “RC”) and the correction station (hereinafter referred to as “CST”) are considered as part of the machine.
- The user manual must be kept in a place that is permanently accessible to the machine operator and must be available to the operator at all times.
- Do not allow children or unauthorized persons to use the product.

- Before starting the machine, you must be familiar with all the symbols on the controls and indicators on the mower, RC and CST.
- Pay particular attention to stopping and switching off the engine and to emergency shutdown of the machine.
- Before using the mower on a slope, first check your ability to operate the mower on a sufficiently clear and spacious area. Learn how to perfectly control the movement on the surface, cutting around bushes, trees and other terrain features and obstacles.
- When operating and moving the mower on a slope in manual mode, always keep the engine speed set to maximum. When stopping the machine on a slope, turn the wheels perpendicular to the slope.
- When using or transporting the mower in manual mode, the operator must always have the mower in his/her field of vision. The maximum safe distance between the operator and the mower is 50 meters.
- When using the mower, please strictly observe the safety regulations in this manual, while respecting local rules and regulations for noise-emitting machines, especially when using near hospitals, spa facilities and other sensitive areas.
- The operator must pay particular attention to the area into which mulched grass can be ejected by the rotation of the blades. This area must not be entered by the operator, other persons, children or animals. Particular attention must be paid to protection against possible unwanted particle drift, especially when mowing uneven surfaces where the mowing deck may be deflected (by lifting one side of the machine) when crossing or climbing over terrain edges.
- The machine operator is responsible for any damage caused to third parties by the machine. The mower may be used to work on slopes with the gradients specified in chapter 2.2 *Use of the Machine*.
- Before you start mowing, remove all stones, pieces of wood, glass, wires, bones, branches and other foreign objects that could be crushed, thrown or could damage the mower.
- When using the mower, avoid obstacles, do not climb on elevated obstacles (stones, stumps, parts of buildings), do not drive near cliffs, ravines, unpaved ground or where there is a risk of the machine falling or tipping over.
- Pay attention to the power lines when working. Especially when in manual mode, the connection to the RC may be disturbed. In this case, the mower immediately switches off the combustion engine and stops all movements.
- If you use the machine near busy roads, make sure that the mower does not endanger people walking or driving by or their property by thrown objects. Choose an appropriate working procedure (see Chapter 10 *Operation procedures*).

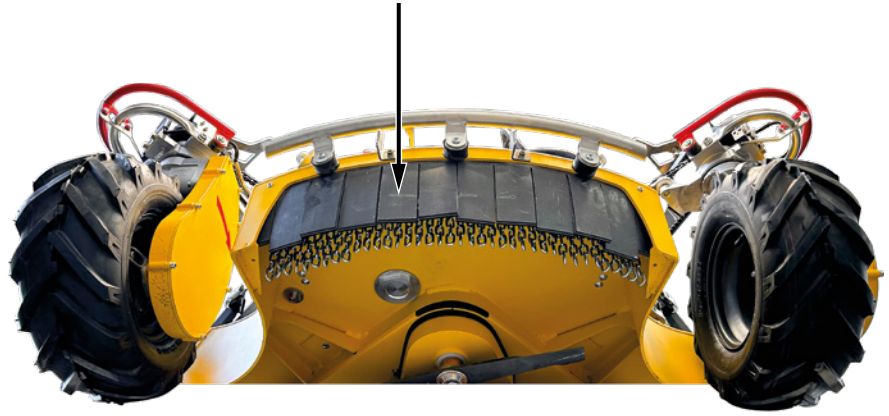
- The machine operator is responsible for the safety of persons entering and staying in the working area of the machine. If these persons enter the work area, stop work.
- The transport of persons, animals or loads on the mower is prohibited.
- Do not place any objects or tools on the mower.
- When using the mower—especially if it is windy—orient the operator's position so that exhaust fumes, dust or mulched grass are not blown towards the operator.
- In dusty environments, stop work and clean the machine and cooling surfaces to prevent overheating during operation. If necessary, clean the machine and its cooling surface several times during operation. The dust layer must not exceed 1 mm.
- Refuel only when the machine is switched off and the fuel tank is cool, preferably before starting work. Keep at least 30 % of the fuel in the tank of the mower. If you need to refuel while working, do not refuel in a hot tank or with a hot engine. Allow the machine to cool down.
- Before refueling, turn off the machine by pressing the EMERGENCY STOP button on the central control panel of the mower to the OFF position.
- Do not refuel while the engine is running.
- Do not start the engine if there is spilled fuel, open containers of fuel or other combustibles or flammable gases in the immediate vicinity of the mower.
- Do not refuel near an open flame.
- Do not expose/exhibit the machine near open flames or sources that emit heat.
- Do not touch parts of the machine that are hot when the machine is running or immediately after it has been stopped. This includes in particular the engine exhaust, metal parts of the hydraulic drive and metal parts of the combustion engine.
- Do not touch the high-voltage wire leading to the spark plug while the machine is running.
- After starting the engine, check the emergency shutdown function on the RC. Press the SOS/TEST button (for Autonomous and Perimeter mode) or the main switch/EMERGENCY STOP on the RC (for Manual mode) to verify its functionality. The machine must flash the LED strips on the machine's perimeter in red color (the red color is running around) in response to pressing the SOS/TEST button or the main switch/EMERGENCY STOP. This step is a prerequisite for Manual mode, Autonomous mode and Perimeter mode. Check this function at least once during the working shift, but always if you move the mower to a new working area.
- Before starting work, test the function of the emergency stop safety features on the mower.

- Never leave the machine unattended with the engine running.
- When the machine engine is running, do not put down the RC and do not touch or move any parts of the machine.
- When leaving the machine for a short period of time, always switch off the machine by pressing the red EMERGENCY STOP button on the central control panel of the mower to the OFF position and then remove the key to secure it against starting. Do not leave the RC with the mower, but in another properly secured location that is inaccessible to unauthorized persons.
- Only start the cutting blades just before starting to mow.
- Switch off the mowing deck, switch off the engine and press the red EMERGENCY STOP button on the central control panel of the mower to the OFF position and then remove the key whenever:
  - you clean the machine
  - removing debris from the cutting deck (grass or other objects).
  - you hit a foreign object and need to identify possible damage or repair it
  - the machine is vibrating unnaturally strong and the cause of the vibration needs to be determined
  - repairing the engine or other parts of the mower (also disconnect the cables from the spark plugs).
- When working, avoid brushes, concrete bases, bollards, stumps, random stones, curbs in flower beds and walkways, which must not come into contact with the blade. There is a risk of damage. Do not drive the mower into piles of sand, gravel and similar materials, stumps, stones. Pay close attention to isolated old stumps or stones or building elements that may cause instability of the machine. It is strictly forbidden to drive onto these obstacles.
- Only operate the machine in daylight or in sufficiently good artificial light when mowing in manual or Perimeter mode.
- Do not use the machine in Manual or Perimeter mode in low visibility conditions (twilight, fog, heavy rain, etc.).
- Do not leave the machine running in enclosed areas. Exhaust fumes contain CO, are harmful to human health and can cause death.
- Start the engine or leave it running only outside. If the engine of the machine is started or left running in an enclosed area, the exhaust gases must: be exhausted by extending the exhaust pipe of the machine outside the enclosed area, sufficient ventilation and fresh air supply must be provided to prevent the build-up of CO.
- Allow the mower engine and hydraulic drive to cool down properly before putting it in an enclosed area.
- Regularly remove combustible substances (dry grass, leaves) from the exhaust, engine, accumulator, mower belts and clutch.

- In manual mode, always operate the machine from a position where you have a perfect view of the entire work area and the mower. Always make sure that the mower cannot endanger the operator.
- When working in manual mode, change the work position as required so that you always have a perfect view of the mower.
- Never enter the area under or directly above the mower when it is working on a slope.
- In manual mode, choose an operator's position at a sufficient distance from the mower (maximum 50 meters) to be protected against foreign objects accidentally flying away from the mower.
- In manual mode, do not operate the mower unless you can see it (behind terrain obstacles, around the corner of a building, hidden in the grass, etc.)
- The CST must be placed in a specific location determined after measurement by the manufacturer, distributor or other SNT authorised personel. It must be secured against change of position, damage and misuse by an unauthorized person. The manufacturer, the mower distributor or the geodetic service accepts no liability for incorrect transmission of correction data caused by incorrect positioning or use of the CST.
- Before starting the mower in Autonomous mode, the operator must check that the route has been uploaded correctly in the app **mySpider** (my.spidernewtech.com).
- Before starting the Autonomous Mode, the operator must secure the machine surroundings and the entire work area.
- Before starting in Autonomous mode, the operator must have the mowing deck control lever in the off position.
- Before starting in Autonomous mode, the machine must be calibrated, must know its exact position "RTK FIX" and must receive correction data "RTK DATA" (see chapter 10 *Operation procedures*).
- Calibration of the machine must be carried out without the mowing deck switched on and the machine must know its exact "RTK FIX" position.
- If the mower stops during Autonomous Mode, it is the operator's obligation to check the condition of the machine before restarting it in the Autonomous Mode.

3.2 SAFETY MARKINGS

- Check the condition of the safety markings before putting the mower into operation. If the decals are missing or damaged, contact your dealer to have them reinstated on the machine. Familiarize yourself thoroughly with them. It is compulsory to place the stickers on the machine.
- Do not remove or damage the safety markings on the machine.
- Do not remove any covers or safety features from the machine. They are there for your protection.
- Do not use the machine with damaged or missing protective devices and covers.
- Always keep the machine and its accessories clean and in good working order.
- It is not permissible to carry out changes or interventions on the machine that are not approved by the manufacturer. Any change made to the machine may lead to a dangerous situations or injuries. If these instructions are not followed, the manufacturer is not liable for the machine and the warranty may be void.
- Always use a machine equipped with all cover elements.
- It is forbidden to use the machine without a properly fitted or damaged rubber mulching cover with chains.



4

Specification

4.1 SPECIFICATION

The SPIDER AUTONOMOUS 2.0 is a self-propelled machine with four-wheel drive, controlled by a remote control or driven autonomously using DGNSS (a global navigation satellite system that provides real-time differential corrections), inertial navigation and sensors. The unique four-wheel steering system gives the machine unparalleled maneuverability both on flat ground and on slopes. The machine construction is built up by the main platform on which the engine, tandem hydraulic pump, fuel tank and fuse box are mounted. This platform is hung on the wheel suspension through 4 sliding bars and a sliding frame. The hydraulic motors and electronic control units are mounted on this frame. The GPS, Data and Bluetooth antennas are mounted on the hood of the machine. The four blades, bearing boxes and clutch are mounted to the platform/mowing deck from the bottom. The electromagnetic clutch is inserted between the main drive pulley and the motor. The four blades of the mowing deck do not interevene with eachother but do overlap. The mowing deck encloses the blades from all sides. The blades are fixed, mounted between flanges and tightened by central bolts. The cutting deck is flexible on two sides in order to facilitate the intake and discharge of grass. A steel bumper above the rubber covers on the outside of the mower marks the safe distance from the blades. Travel is provided by four wheels mounted on the end portal gears. The wheels are driven by two hydraulic and driving motors with V-belts. Wheel steering is provided by an electric motor. Steering is regulated by the remote control via bluetooth or autonomously by the contol unit. The UHF frequency is used for emergency shut down and is completly disconnected from the other systems for safety.

parameter	unit	size/type/quantity
LENGTH×WIDTH×HEIGHT	mm	1640 × 1430 × 920
MOWING WIDTH	mm	1230
CUTTING HEIGHT	mm	70–120; 90–140
WEIGHT	kg	385
TRAVEL SPEED	km/h	0–8
MOWING MECHANISM		4 belt driven blades
LENGTH OF THE BLADE	mm	505
MOWING CLUTCH		electromagnetic with friction brake
HYDRAULIC FLUID PUMP		HYDRO-GEAR TL-SGGV-EGGV-1XHX PK-KNGG-6V1X-AXXX
HYDRO MOTOR DRIVE		M+S HYDRAULIC MR 50CDRS/4
DRIVE SYSTEM		4 × 4
RUNNING WHEELS	inch	16 × 6,5 with arrow pattern
ACCUMULATOR		12 V, 18 Ah, AGM
FUEL		petrol—natural 95
FUEL TANK CAPACITY	liter	16
ENGINE		air-cooled 4-stroke twin-cylinder Kawasaki FS730V EFI 25,5 HP
CYLINDER VOLUME	cm^3	726
POWER	kW	19,0
ENGINE SPEED	RPM	3050
IGNITION		Electronic
STARTER		Electric
FREQUENCY RANGE OF REMOTE CONTROL AND CORRECTION STATION	MHz	430.000–470.000

4.2 NOISE EMISSION

The mower emits the following noise:
Sound pressure level L_{WA} = 99.9 dB
Guaranteed Sound pressure level $L_{WA,G}$ = 101.0 dB

The measuring was carried out in conformity with ISO 3744.

Noise at the operator's station (ear):
L = 81.0 dB (A) Leq—Measured in the distance of 3 m from the machine according to EN 11 201.

4.3 DECLARATION OF CONFORMITY

ES/EU PROHLÁŠENÍ O SHODĚ (originál)
EC/EU declaration of conformity (the original)

Výrobce / *Manufacturer*:	**SNT- SPIDER NEW TECHNOLOGY s.r.o.**
Adresa / *Address*:	Froncova 476, Hostavice, 198 00 Praha 9
IČ / *ID*:	17332273
Jméno a adresa osoby pověřené sestavením technické dokumentace (podle 2006/42/ES, NV č. 176/2008 Sb.) a jméno a adresa osoby, která uchovává technickou dokumentaci (podle 2000/14/ES, NV č. 9/2002 Sb.)/ *Name and address of the person authorised to compile the technical file (according to 2006/42/EC) and the name and address of the person who keeps the technical documentation (according to 2000/14 / EC, NV No. 9/2002 Coll.)*:	**SNT- SPIDER NEW TECHNOLOGY s.r.o.,** Froncova 476, Hostavice, 198 00 Praha 9
Výrobek (stroj) – typ / *Product (Machine) – Type*:	**Sekačka s precizním ovládáním SPIDER Autonomous 2.0 typ 2SGS EFI** ***Mower with precision control SPIDER Autonomous 2.0 type 2SGS EFI***
Výrobní číslo / *Serial number*:	---
Popis / *Description*:	Dálkově řízený žací stroj s možností autonomního režimu, určený pro sečení a mulčování travnatých porostů na běžném i svažitém terénu. *Remote-controlled mower with the option of autonomous mode, designed for mowing and mulching grass on both normal and sloping terrain.*
Prohlašujeme, že strojní zařízení splňuje všechna příslušná ustanovení uvedených směrnic (NV) / *We declare that the machinery fulfils all the relevant provisions of the mentioned Directives (Government Provisions)*:	Směrnice 2006/42/ES, NV č. 176/2008 Sb. / *Directive 2006/42/EC.* Směrnice 2014/30/EU, NV č. 117/2016 Sb. / *Directive 2014/30/EU.* Směrnice 2000/14/ES, NV č. 9/2002 Sb. / *Directive 2000/14/ES.*
Harmonizované technické normy a technické normy použité k posouzení shody / *The harmonized technical standards and the technical standards applied to the conformity assessment*:	ČSN EN ISO 12100, ČSN EN ISO 5395-1, ČSN EN ISO 5395-2, ČSN EN ISO 18497, ČSN EN ISO 4413, ČSN EN ISO 13857, ČSN EN ISO 14982:2009, ČSN EN ISO 11201, ČSN EN ISO 3744.
Osoby zúčastněné na posouzení shody/ *Persons participating conformity assessment* :	Notifikovaná osoba č. 1016/ *Notified Body No. 1016.* Státní zkušebna strojů a.s., Třanovského 622/11, 163 04 Praha 6–Řepy, ČR / *The Government Testing Laboratory of Machines, Joint-stock company.* *Závěrečná zpráva č.:* 42 060
Použitý postup posouzení shody/ *Used conformity assessment procedure:*	Na základě směrnice 2000/14/ES, příloha VIII; NV č. 9/2002 Sb., příloha č.7. *On the basis of Directive 2000/14/EC, Annex VIII.*
Naměřená hladina akustického výkonu/ *Measured sound power level:*	L_{WA} = 99,9 dB
Garantovaná hladina akustického výkonu/ *Guaranteed sound power level:*	$L_{WA,G}$ = 101 dB

Poznámka: Veškeré předpisy byly použity ve znění jejich změn a doplňků platných v době vydání tohoto prohlášení bez jejich citování.
Note: All regulations were applied in wording of later amendments and modifications valid at the time of this declaration issue without any citation of them.

Místo a datum vydání / *Place and date of issue*: Praha 16.5.2023

Osoba zmocněná k podpisu za výrobce / *Signed by the person entitled to deal in the name of producer*:

Jméno / Ing. Vincenc Šopík
Name: Lubomír Dvořák MBA

Funkce / CEO
Grade: CEO

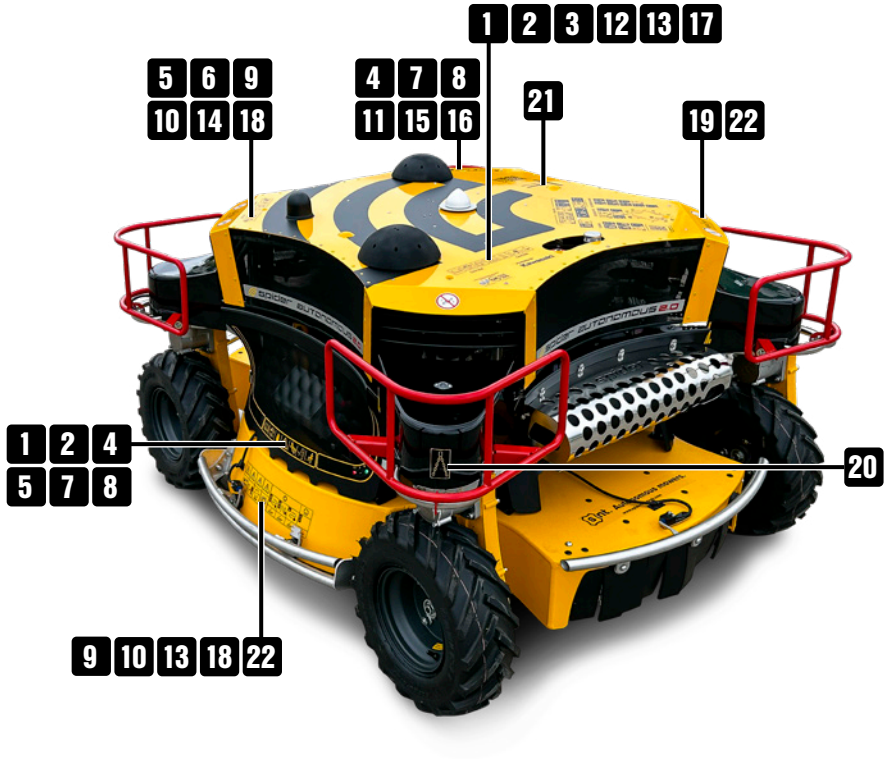
Podpis / *Signature*:

SNT - SPIDER NEW TECHNOLOGY s.r.o.
Froncova 476, 198 00 Praha
IČ: 17332273
DIČ: CZ17332273
www.spidernewtech.com

5

Safety Markings

Attention! This machine can be dangerous! Incorrect or careless use of the machine can result in damage, serious injury or even death. The safety warning signs explained in this chapter are located on important places on the machine and warn of possible dangers. Each individual symbol explains the nature of the danger. Understanding the meaning of these symbols and these dangers is a prerequisite for safe use of the product.



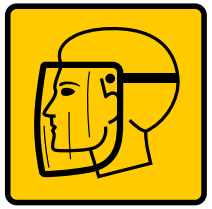
SAFETY WARNING



1 Before use please read user manual



2 When performing maintenance, repairs and interventions on the machine follow the operation manual, remove the key from the ignition



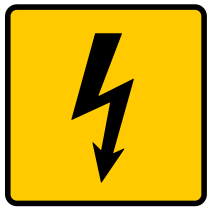
3 Use protective work equipment; eye protection



4 Attention, when replacing the mowing blades use hand protection



5 Attention, equipment uses hydraulic drive, risk of injury by spurting of hydraulic fluid



6 Attention, electric accumulator



7 Before starting the operation close all protective covers



8 Prohibition of transporting persons on the machine



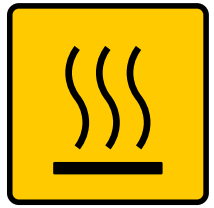
9 Attention, danger of injury of the upper/lower limbs by rotating knives



10 Attention, rotating parts after shutdown are decelerating

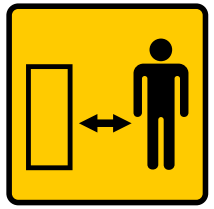


11 Attention, flammable substance, fire hazard



12 Danger of burns, hot parts

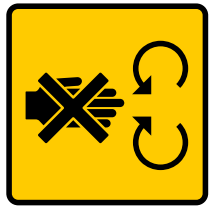
SAFETY WARNING



13 When the machine is moving, keep a safe distance



14 Attention, danger of being hit by an ejected object, keep a safe distance



15 Attention, rotating parts, danger of dragging or shearing, do not remove safety cover when the machine is running



16 Mower must not be cleaned by high pressure water



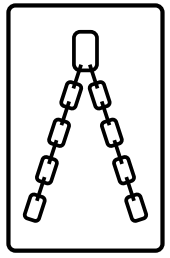
17 Danger of being run over by an autonomous or remotely controlled machine, secure the working area of the machine



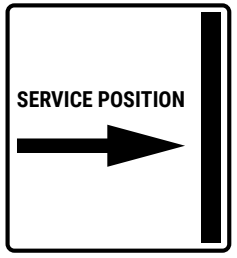
18 Attention, automatic start of the mowing deck during entry into Autonomous mode



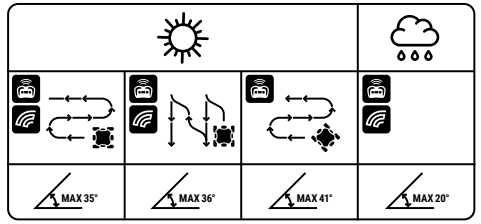
19 Never move on the slope in the area under the machine, or directly above it



20 Anchoring point for lifting



21 Machine tilt direction into service position (see chapter 5.1)



22 Maximum permissible slope inclination with regard to the type of use and climatic conditions (see chapter 2.2)

5.1 SERVICE POSITION

The service position is a special machine position (see picture below) that allows the operator to maintain the mowing deck. Always tilt the machine towards the fuel tank to prevent oil leakage into the air filter. The direction of tilt and machine position is indicated by the SERVICE POSITION safety symbol (arrow pointing to the side with the fuel tank).

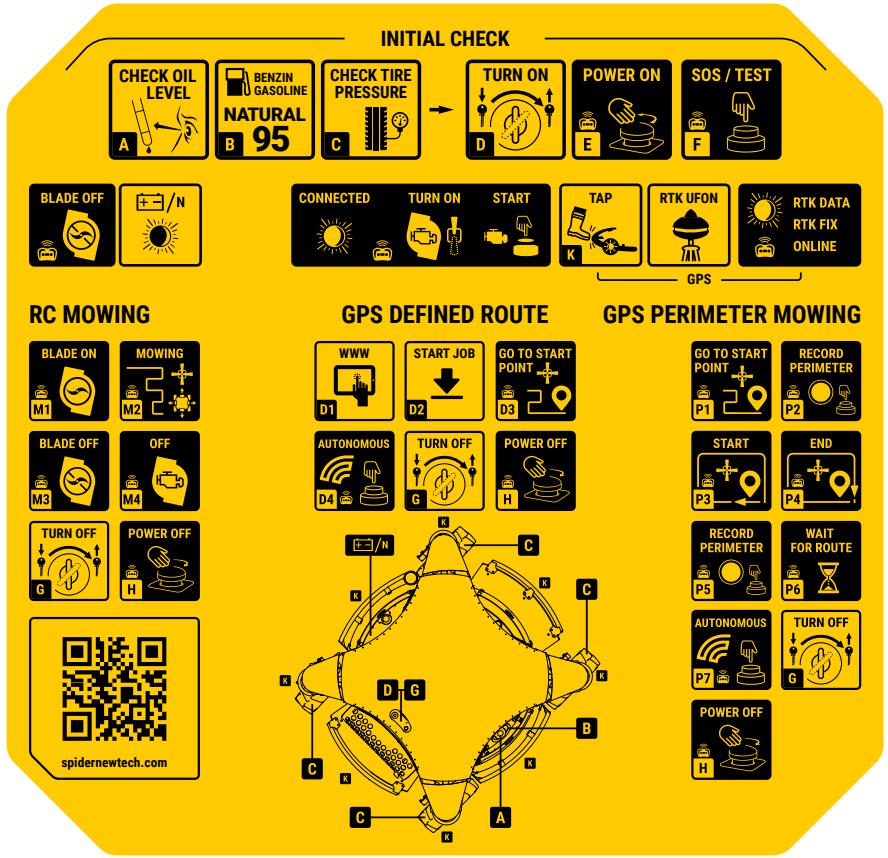


Before carrying out maintenance, it is the operator's responsibility to secure the machine against falling.

5.2 RECOMMENDED WORKING PROCEDURES

These pictograms provide basic information about working with the machine in different terrain conditions with three different modes of machine operation. It is always the operator's responsibility to choose the most suitable working method, especially with regard to safety. In any case, it is always necessary to follow the safety instructions and other instructions given in this user manual.

These pictograms are located on the top cover of the machine.



6

Controls and Accessories

6.1 REMOTE CONTROL SMAUT RCT01

The remote control (hereafter referred to as RC) not only conveys the operator's commands to the machine, but also informs the operator about the connected machine and its status. It directly controls the movement of the machine in manual mode and in the first phase of the Perimeter mode (marking an area to be mown). In particular, in autonomous mode and the second phase of Perimeter mode, it has the function of monitoring—by interfering to the controls on the RC, the autonomous operating mode is interrupted.

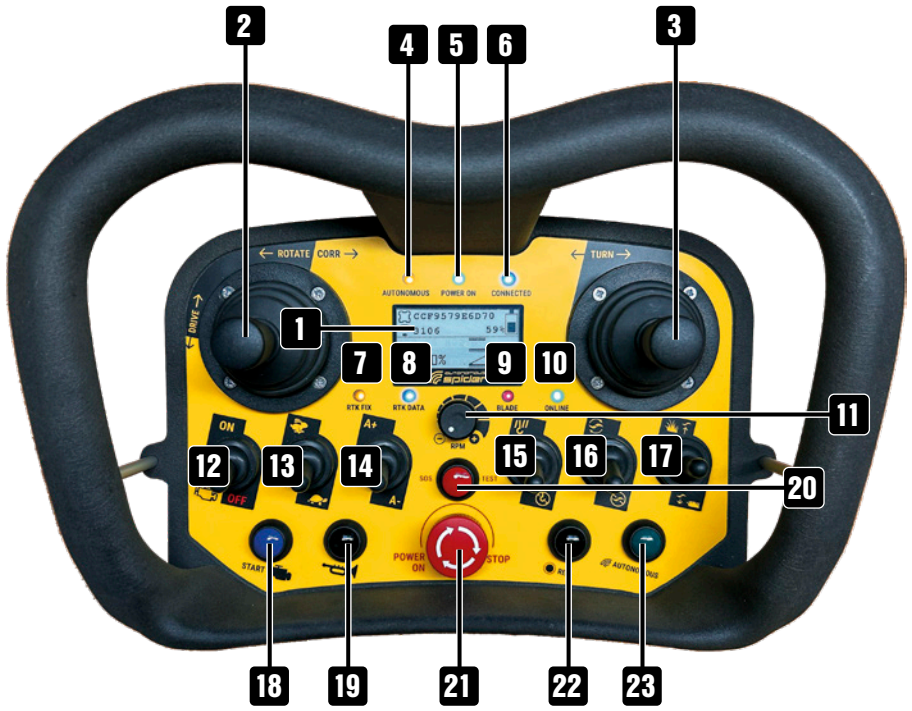
Connection to the machine is via Bluetooth or UHF transmitter.

The RC is powered by a rechargeable Li-Ion cell type 21700 3.7 V / 4.9 Ah (battery). A fully charged battery is sufficient for a full day's operation of the RC, up to 20 hours. The RC is charged by using the supplied multiple charger (more about charging options in chapter 6.3 *Multiple Charger SMAUT CHR01*). The battery can be replaced by unscrewing the waterproof plug on the side of the RC. The battery is inserted into the battery port with the negative pole facing in (positive battery pole has to be against the plug).

The RC is equipped with a vibration unit which alerts the operator of important changes and alerts.

If the RC is tilted more than 90 degrees, when it is connected to the machine (blue CONNECTED LED is lit), a stop command is sent to the machine mowing and movement is stopped for protection of the operator, in any mode of operation.

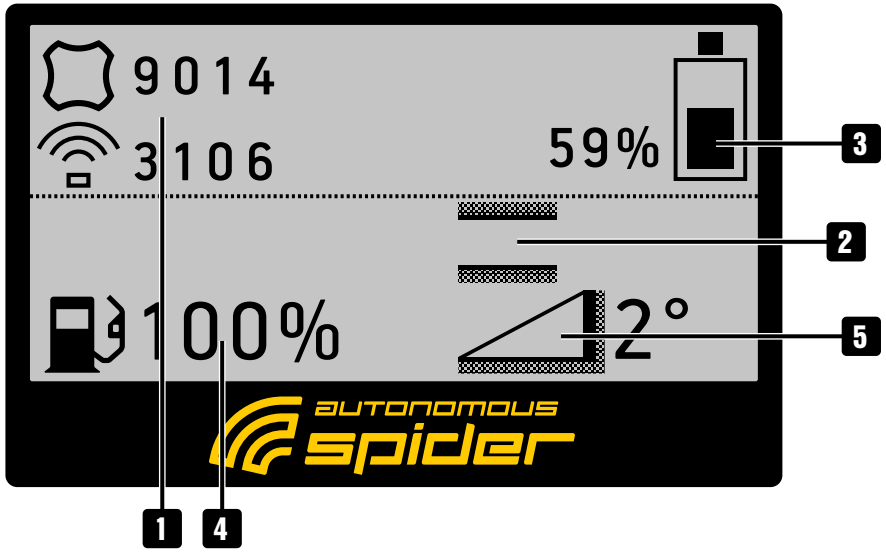
6.1.1 RCT01 CONTROLS



1. Display: shows information about the RC and its status, about the connected machine and its status (identification e.g. fuel status, inclination), and other data, see separate description.
2. Driving joystick: forward, reverse, left, right, skid steering.
3. Wheel steering joystick.
4. AUTONOMOUS LED: lights up when the machine is in Autonomous mode; flashes when the machine is in marking phase of the Perimeter mode (recording).
5. POWER ON LED: illuminates when the RC is switched on and charged; flashes when the battery is less than 30 % charged.
6. LED CONNECTED: lights up when the connection to the machine (mower) is established.

7. RTK FIX LED: lights up when the machine has accurate position data.
8. RTK DATA LED: lights up when the machine is receiving correction data.
9. LED BLADE: lights up when mowing is switched on.
10. LED ONLINE: lights up when the machine is connected to the server.
11. RPM potentiometer: controls engine speed in manual mode, driving speed in autonomous mode.
12. Engine lever: switches the engine ignition on and off (starting is separate).
13. Tortoise/Hare lever: sets the travel speed; hare is the normal operating speed, tortoise is a specially reduced the speed for precise maneuvering.
14. Lever A+/A-: not used.
15. Winch lever: not used.
16. Mower blade clutch lever: switches mowing blades on and off; if the lever is switched to the *on* position from a time. If the blades are turned off by the system, ie. engine shuts down due to an overload, the bumpers are hit. The clutch will have to be turned off and then turned on again.
17. Cutting height lever: by holding the lever up/down, the height of the cut is increased/decreased.
18. START button: hold to start the engine; repeat only after switching the engine lever off and on again.
19. Button with trumpet symbol (siren): sounds the machine's warning siren. Holding the siren button for 5 seconds displays the firmware version of the machine (must be Bluetooth connected and machine switched on).
20. SOS/TEST button: tests the emergency UHF shutdown channel of the RC; see chapter 10 *Operation Procedures*.
21. POWER ON/STOP button: when in off position (down) turning it will cause it to pop upwards thereby turning the RC on, pressing it turns the RC off.
22. REC button: triggers route recording for Perimeter mode; see separate chapter 10 *Operation Procedures*.
23. AUTONOMOUS button: switches the machine to Autonomous mode—see separate chapter 10 *Operation Procedures*.

6.1.2 DISPLAY



The LCD display shows information about the remote control and the connected machine.

- In the off state, the LCD is not updated (even after a full charge, for example), the remote control ID and the battery status at the time of switching off are displayed.
- RC informs after switching on about the progress of the connection with the machine via Bluetooth, displays the firmware version.
- RC displays the route name when you press Autonomous, when you enter autonomous mode and when you finish uploading a new route.
- **When the RC is connected to the machine the following information is shown as ilustrated in the picture above:**
  - **1** The remote control serial number and the serial number of the connected machine.
  - **2** Cutting height—only provides the information on reaching the upper or lower limit. In the picture, the condition when neither limit is reached is shown.
  - **3** RC battery status.
  - **4** Amount of fuel in the fuel tank.
  - **5** The inclination of the terrain on which the machine is currently located.

6.2 GNSS RTK CORRECTION STATION SMAUT CST01

The correction station (CST) provides the machine with position correction data (correction data) which enables the machine to determine its position with centimeter accuracy. Its functionality is a prerequisite for the machine to operate in Autonomous and Perimeter mode. The correction station must be located within a radius of 10 km from the mowing site. Ideally, it should be located directly at the mowing site.

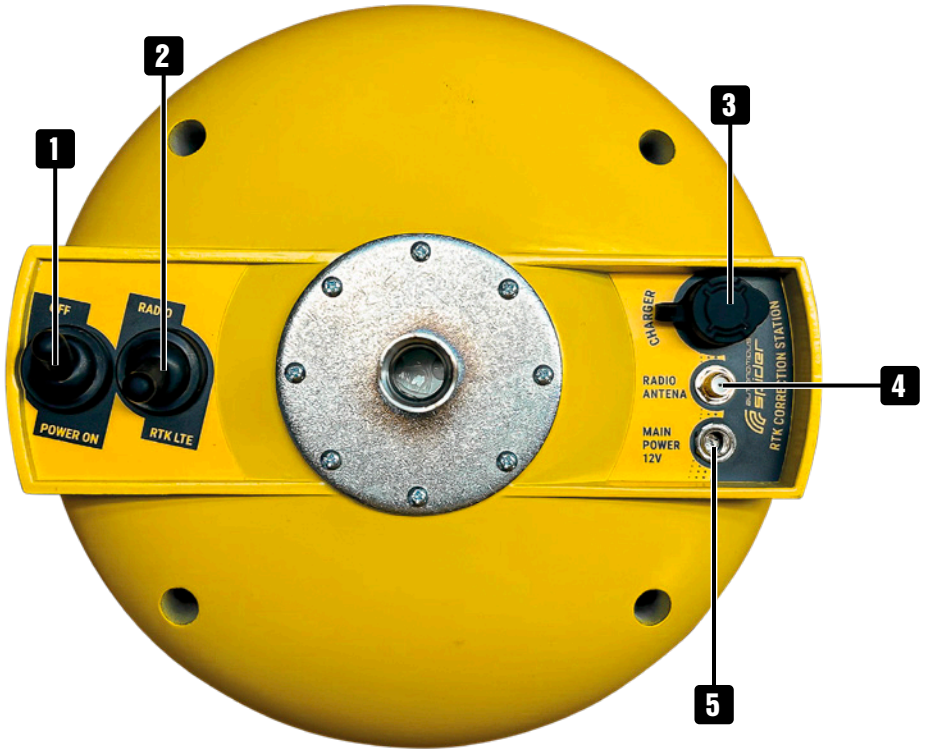
The CST includes an LTE modem with a SIM card supplied and managed by the manufacturer (similar to the machine itself). The LTE modem provides the connection to the server (e.g. position correction data, monitoring and diagnostic data are transmitted, updates firmware updates).

Correction data can be transferred to the machine in two ways:

- Using an LTE modem via the server
- Using a radio transmitter in the UHF band (UHF transmitter)

The CST is always used with the GNSS antenna facing up to the sky. It is typically placed on the supplied tripod or similar elevated location such as a fence post. The CST must be able to receive the signal of a sufficient number of satellites without interference. Therefore, the CST must be placed out of the signal shadow of buildings, trees, etc. and preferably in an elevated position to ensure a maximum view of the sky.





At the bottom of the CST you will find (see picture above)**:**

1 Main switch

2 Correction data sending method switch
- RADIO transmits in the UHF band (especially for locations without LTE coverage)
- in the RTK LTE position, it transmits through the built-in LTE modem

3 Charging and power connector for connection to the supplied multiple charger

4 Connector for UHF external antenna

5 Power connector for connection to a vehicle's 12 V socket (operation only, does not charge the built-in battery)

The CST has a memory for 640 coordinates (point table). These are geodetically accurate positions, which the CST is repeatedly placed on. This point table is updated and supplemented in cooperation with the manufacturer.

6.2.1 CST01 START-UP PROCEDURE

- Its exact position is being detected. This phase takes approximately 3 minutes.
- The exact position is compared with the stored points in the GPS points table. If such a point is found within a distance of 5 m, the CST assumes that it is located at the exact point found. If this is succesfull the CST will transmit the correction date to the machine(s) until terminated, the CST will transmit correction data.
- If a matching point is not found, the CST will attempt to obtain correction data to be more accurate by determining its own position from the local correction provider. For example, in the Czech Republic, this provider is the CZEPOS network. The prerequisite for the connection is an available LTE data connection. Using the correction data from the provider, the CST then refines its location. This phase takes approximately 2 minutes.
- When the position is sufficiently refined with the help of the correction provider, the start-up sequence of the CST is terminated and the transmission of the correction data starts until the operation is terminated.

The status of the CST—connection to the GSM network and position acquisition—is signaled by the CST by means of LEDs around its perimeter and acoustically. The light signals are repeated as long as the CST is in this state.

Meaning of individual light signals in approximate chronological order:

(final successful states in bold)

2 SHORT RED PULSES	GSM not connected
1 SHORT RED PULSE	GSM is connected but there is no data connection
1 SHORT ORANGE PULSE	GPS not loaded
1 SHORT GREEN PULSE	GPS position acquired
15 SHORT GREEN PULSES	GPS is in position refinement mode
1 LONG ORANGE PULSE	Position refinement complete
1 LONG GREEN PULSE	**Completed and position found in the points table**
15 SHORT ORANGE PULSES	Position was not identified with any point in the table, CST is attempting to refine its position using provider correction data
4 LONG GREEN PULSES	**Provider position refinement complete**

In case of success, i.e. finding a position in the table or refining its own position using the provider's correction data, the CST starts sending correction data.

From the moment the CST has a data connection, its current status is displayed in the app, see the separate chapter 11 *App mySpider*.

The meaning of acoustic signals is:

- 3 beeps descending when power is turned on
- 2 beeps on successful LTE data connection

The CST is powered by a built-in Li-Ion battery that provides power for all-day operation. The CST is charged by using the supplied multiple charger (more about charging options in the chapter 6.3 *Multiple Charger SMAUT CHR01*). The CST can be powered in the event of battery discharge using the supplied cable for 12 V vehicle sockets (one shared with the Multiple Charger).

6.3 MULTIPLE CHARGER SMAUT CHR01

Multiple charger provides wireless charging of RC, charges battery cells for RC in the socket and charges the CST by cable, both separately and simultaneously.

The multiple charger can be powered by the included AC adapter or by the included cable for a 12 V car socket (also used for the direct power supply of the CST).

Wireless charging is the most common way to charge the RC and is suitable for everyday use. The RC is simply placed on the charger (the cell from the RC does not need to be removed). LED indicator lights up during charging and goes off when the charging is completed. If the RC is not placed on the charging station, the indicator flashes with short pulses. Just before charging begins, the wireless charging LED flashes rapidly.

It is advisable to keep the replacement RC battery cell charged. It can be recharged in the charging socket of the multiple charger. The cell charging indicator is lit during the charging period. Once the cell is charged, the indicator will flash.

The CST is charged by cable, the CST charging LED indicator lights up during charging and goes off or flashes when charging is complete.

The charging time of each component is proportional to its discharge.

Fully discharged devices take time to charge as follows:

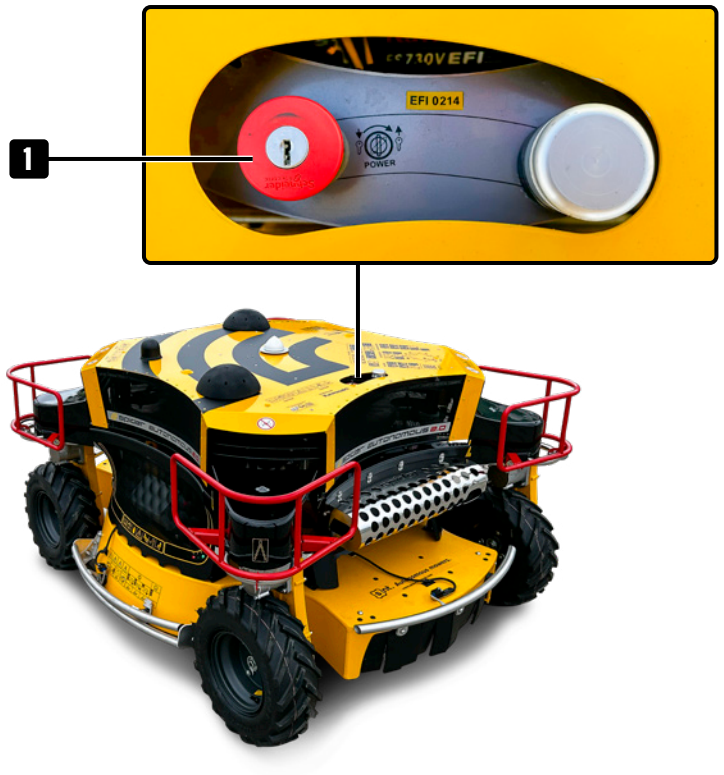
RCT01 wirelessly:	max 6 hours
Battery cell 21700:	max 6 hours
CST01:	max 8 hours

Note:
In the event of the CST battery is being discharged, the included cable for 12 V vehicle sockets can be used to power the CST directly.



6.4 CONTROLS ON THE MOWER

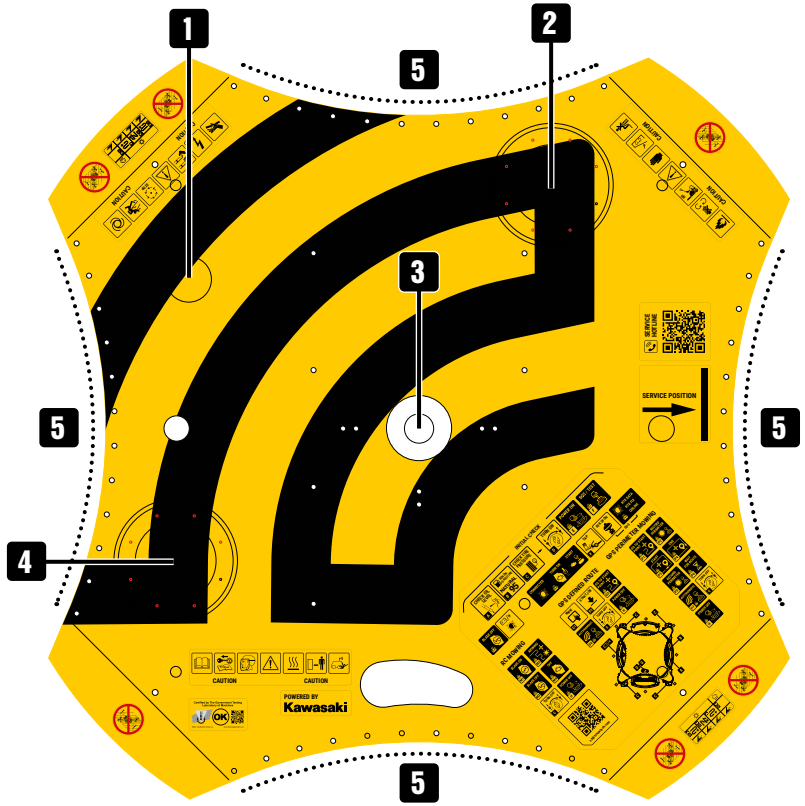
There is only an ON/OFF switch on the mower.



1 Lockable **EMERGENCY STOP button / Master switch**

7

Signaling of Electronic Components



On the hood/bonnet of the machine there are domes with radio and navigation components:

1 LTE antenna, which provides communication with the server (monitoring and diagnostic data, firmware updates, transmission of correction data).

2 It contains a UHF radio receiver that receives correction data. A red LED indicates the reception of correction data over UHF.

3 GNSS receiver.

4 RC dome—Bluetooth communicator and SOS button UHF receiver. Includes LED indication of RC connection:

- green: waiting for Bluetooth connection
- orange: BT modem is restarting
- blue: Bluetooth is connected
- red: triggered by pressing the SOS button on the RC, illuminated for 10 s

5 The perimeter of the top cover is equipped with a LED strip, which indicates the status of the machine by the color.

At startup, the machine signals the following:

1. Test of the LED strip, during the first 15 s after switching on the machine —white turning into color waves. After a successful test, the machine can be driven but cannot start the mowing deck. This condition can be used, for example, to move the machine to the working area.
2. Then the system is waiting for other subsystems to start, which is indicated by a yellow “snake” on a blue background, which normally lasts up to one minute after the machine starts.

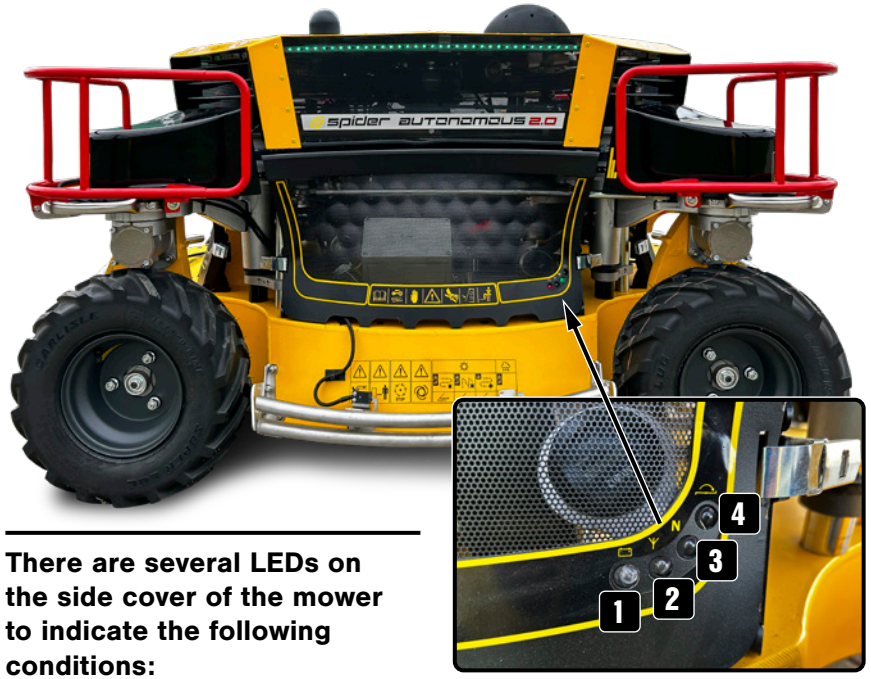
Other signals are related to the mode in which the machine is working.

- Manual mode is always indicated by a green flashing light. The blinking is long if the machine has an accurate position, i.e. it has a valid position determined by GNSS and is receiving position correction data. Conversely, the blinking is short if these conditions are not met. If the safety bumpers are activated, the machine’s LED strip will flash red with a yellow background.
  SUMMARY:
  Manual operation with RTK FIX: green flashing long
  — With mowing deck on: running green
  Manual operation without RTK FIX: green flashing short
  — With mowing deck on: running green, flashing

- The autonomous mode is terminated, among others, by pressing any safety bumper, which is signaled by the red LED strip with a yellow background (flashing) and the machine then switches to manual mode (green flashing).
- If the machine is on a slope with an inclination greater than 60 degrees, the motor will automatically shut down and the machine’s LED strip will flash rapidly in red. This is for the protection of persons in a situation where the machine could tip over.
- If the operator tilts the remote control more than 90 degrees, the machine will automatically stop, stop mowing and the machine’s LED strip will flash rapidly in red.
- The operator can stop the machine via the UHF emergency channel (SOS button) using the remote control, where the machine automatically stops and mowing deck stops. The machine indicates this condition by a rapid red flashing of the LED strip.
- In the first phase of Perimeter Mode (manual guidance of the machine around the area to be mown), the recording of this circuit is signaled:
  FIRST PHASE:
  Manual driving with RTK FIX: green and orange flashing long
  — With mowing deck on: running, alternating green and orange
  Manual driving without RTK FIX: green and orange flashing short
  — With mowing deck on: running, alternating green and orange, flashing
  PHASE TWO:
  See the Autonomous Mode signaling below.
- After successful entry into Autonomous Mode, the following states are signalled:
  Autonomous operation with RTK FIX: orange flashing long
  — With mowing deck on: running orange
  Autonomous operation without RTK FIX: orange flashing short
  — With mowing deck on: running orange, flashing
- If the conditions for entering Autonomous mode are not met (machine is not calibrated, start of route is too far away, etc.) the LED strip lights up orange with red edges.

The machine includes a siren that sounds:

- Before starting the engine and serves as a warning to persons in the vicinity of the machine.
- Once the mower enters online mode in the user portal.
- After successfully uploading the map from the server.



There are several LEDs on the side cover of the mower to indicate the following conditions:

(see picture above)

1 Switch-on indicator—when the EMERGENCY STOP button on the top cover of the machine is released, the LED lights up green or red if the battery voltage is low. If the LED is red during operation, the battery charging has failed and it is necessary to stop the machine and have the fault professionally repaired.

2 Not used.

3 Illuminated green when the transmission is in the neutral position.

4 Mowing deck on indicator—lights up red when the mowing deck is on.

8

Safety Systems

8.1 SAFETY SYSTEMS

The product is controlled by a radio remote control with manual and autonomous control functions. This means that the operator does not have to be permanently present near the mower and cannot use the controls located directly on the mower. For the safety of the operator and other persons, the following table shows various situations and actions:

Machine operating safety systems:

Dangerous conditions	Security systems
OVERHEATED ENGINE	The machine is running slowly, with no speed control, no possibility to engage the clutch of the mowing deck and the beacon is flashing red
NON CRITICAL ENGINE ERROR *)	The machine is running slowly, with no speed control, no possibility to engage the clutch of the mowing deck and the beacon is flashing red
CRITICAL ENGINE ISSUE *)	Engine shuts down to prevent further damage

*) *The engine status is evaluated by the engine control unit.*

Safety systems in Manual mode:

Dangerous conditions	Security systems
MOWER IS OUT OF BT SIGNAL	The EMERGENCY STOP command is automatically generated
BT SIGNAL DAMAGE	The EMERGENCY STOP command is automatically generated
ROTATE THE RC (SLIP AND FALL) 90° AROUND	The EMERGENCY STOP command is automatically generated
EMERGENCY SITUATION —SWITCHING OFF WITH THE RC SWITCH-OFF BUTTON	The EMERGENCY STOP command is automatically generated
EMERGENCY SITUATION —SWITCHING OFF WITH THE SOS BUTTON	The EMERGENCY STOP command is automatically generated
EMERGENCY SITUATION —HITTING AN OBSTACLE (ACTIVATION OF SAFETY BUMPERS)	The STOP command is automatically generated, the joystick on the RC must be returned to the zero position
EMERGENCY SITUATION —MACHINE TILT EXCEEDS 60°	The EMERGENCY STOP command is automatically generated

Safety systems in Autonomous mode:

Dangerous conditions	Security systems
ROTATE THE RC (SLIP AND FALL) 90° AROUND WHEN THE RC IS PAIRED WITH THE MACHINE	The STOP command is automatically generated
EMERGENCY SITUATION —SWITCHING OFF WITH THE RC SWITCH-OFF BUTTON	The EMERGENCY STOP command is automatically generated
EMERGENCY SITUATION —SWITCHING OFF WITH THE SOS BUTTON	The EMERGENCY STOP command is automatically generated
EMERGENCY SITUATION —HITTING AN OBSTACLE (ACTIVATION OF BUMPERS)	The EMERGENCY STOP command is automatically generated
EMERGENCY SITUATION —MACHINE TILT EXCEEDS 60°	The EMERGENCY STOP command is automatically generated
WHEN RTCM DATA IS LOST	The STOP command is automatically generated after 30 s
WHEN GNSS SIGNAL IS LOST	The STOP command is automatically generated
THE OPERATOR MOVES A JOYSTICK LEVER ON THE RC	The STOP command is automatically generated

The EMERGENCY STOP command (automatic or manual) has the following effects:

1. The engine turns off
2. The travel is blocked
3. Fuel pump is switched off
4. The mowing deck switches off
5. Ignition is off

The STOP command (automatic or manual) has the following effects:

1. The machine stops
2. The mowing deck switches off

8.2 SAFETY BUMPERS

The safety bumper system is used to stop the machine immediately (STOP / EMERGENCY STOP depending on the mode of operation, see chapter 8.1) in case of a collision with an unknown obstacle and to protect persons. It consists of eight safety bumpers, which are installed around the entire machine so that it is protected at the 360° perimeter. The safety bumpers are mounted on silent blocks, and inductive sensors are used as sensors to activate them. To activate safety feature of the bumper a force greater then 100 newtons is needed. The position of the safety bumpers on the machine is shown in the figures below.



9

Machine Preparation

9.1 DELIVERY OF THE MACHINE TO THE USER

Operator training must take place before the operator starts using the machine.

Included in delivery:

- Slope mower SPIDER AUTONOMOUS 2.0
- Mower ignition key (2×)
- Gel accumulator (12 V)
- Remote control and 2 battery cells 21700
- Multiple charger SMAUT CHR01
- GNSS RTK correction station
- Instructions for use
- Spare parts list
- Declaration of conformity for the SPIDER AUTONOMOUS 2.0
- Access to the portal **mySpider** (my.spidernewtech.com)

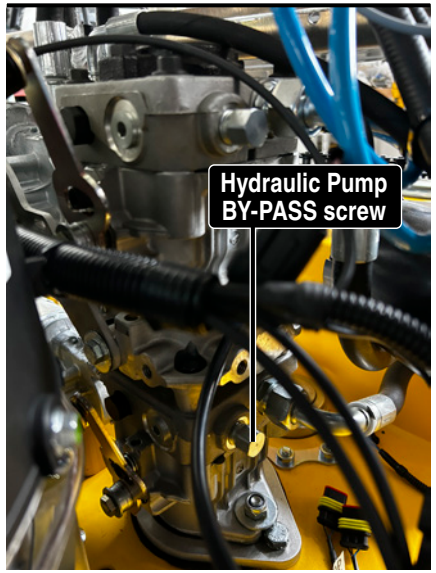
There may be insufficient amount of fuel in the fuel system on the first start and the start may need to be repeated several times. However, take no more than 3 seconds to start.
There must be a minimum of 20 seconds between starts.

9.2 HYDRAULIC PUMP BY-PASS

The by-pass is used to disable the hydraulic drive and to engage the fluid bypass for manual handling (without the engine on) of the machine on a flat surface. The by-pass should only be used when the hydraulic drive is inoperative and the machine cannot move by itself. For a normal hydraulic drive, it is absolutely necessary that both screws on the pump body are tightened. To operate the machine manually, loosen these screws by two turns and disengage the auxiliary brake.

The machine is also equipped with a By-pass auxiliary brake (see chapter 12.27 *Auxiliary Drive Brake*).





**Check both screws tightening before starting.
Their loosening will disable the hydraulic drive.**

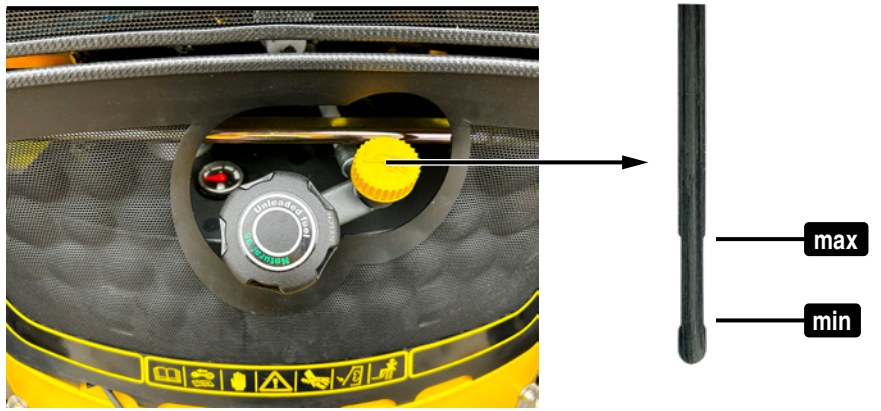
Improper tightening of both screws can cause undesirable behavior of the machine on the slope, the mower can run down the slope on its own.

9.3 CHECKING THE OIL LEVEL IN THE ENGINE

The oil level of a machine standing on a flat surface must be between the lines on the dipstick.

Check the oil level according to the engine manual as follows:

1. Place the machine on a flat surface.
2. Unscrew the dipstick (next to fuel tank funnel) and wipe off oil.
3. Insert the dipstick back into the filler neck all the way without screwing it in.
4. If the level is near or below the lower limit mark **[min]**, add the recommended oil up to the upper limit mark **[max]**.
5. Put the dipstick back in and screw the oil plug.



ATTENTION!

If the machine was running leave it standing for 15 minutes to cool down before checking or adding the engine oil.

WARNING:

Operating the engine with insufficient amount of oil can cause serious engine damage.

Check the oil level on a flat surface and with the engine switched off. Use only the oil recommended by the engine manufacturer.

9.4 CHECKING THE FLUID LEVEL IN THE HYDRAULIC SYSTEM

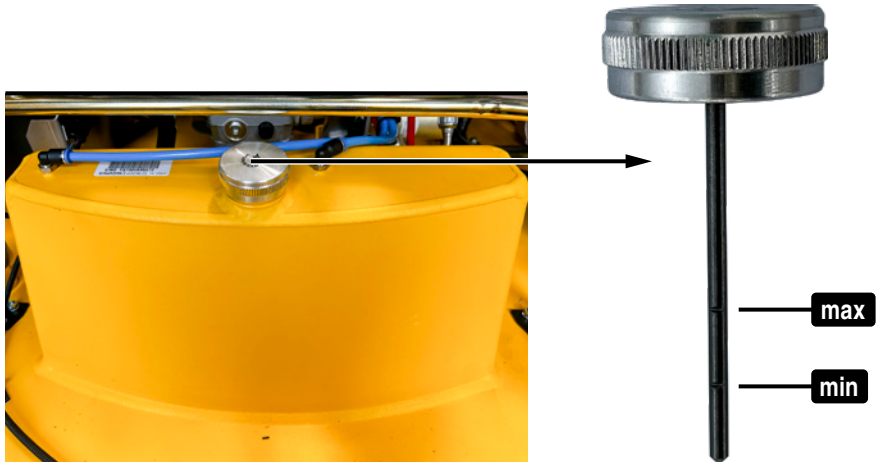
Make sure the fluid is cold before checking the fluid level.

Use the dipstick to check the height of the fluid level, which must be between the lines of the dipstick.

If the level is above this range, the fluid may overflow from the breather pipe in the tank when hot. If the level is below the lower limit, the hydraulic drive may be damaged or the mower may become uncontrollable when operating on a slope.

Refill with oil if necessary (Q8 AUTO 14).

After checking, screw in the oil reservoir plug properly.

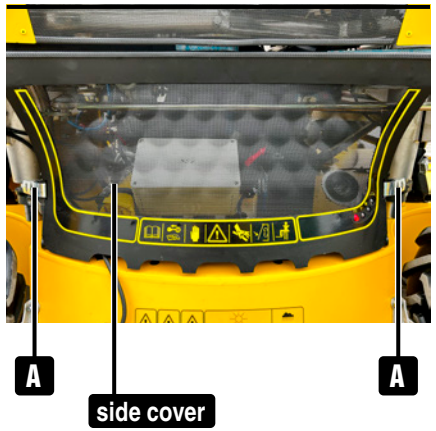


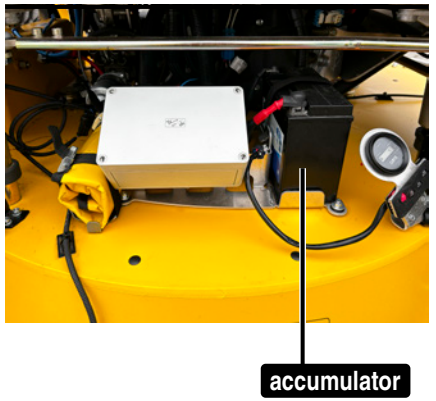
Clear debris from around the cap; unscrew the cap on the hydraulic oil tank on the side of the mower.

9.5 ACCUMULATOR PREPARATION

The SPIDER mower uses a gel accumulator type 6E12, 12 V, 18 Ah.

- Loosen the locking clips **[A]** and remove the side cover (see Figure).
- Insert the accumulator
- Attach the clamps according to the marked polarity. First **[+]** and then **[−]**.
- Secure the accumulator against movement with a tightening strap.
- Reattach the side cover.
- When disconnecting and removing the battery, do the opposite.





Do not fill the battery with electrolyte!

Dry design is used in the construction of the machine accumulator. In case of recharging, use the maximum charging current of 1.4 A.

Never start the mower when the battery charger is connected to the battery.

A SPECIAL CHARGER WITH OVER-GAS PROTECTION MUST BE USED FOR CHARGING.

WHEN CHARGING THE BATTERY, MAKE SURE THAT CABLES CONNECTING THE BATTERY TO THE MOWER ARE DISCONNECTED.

9.6 FUEL TANK

The tank is located on the mowing deck on the side of the mower. The tank is closed with a screw cap **[A]**.

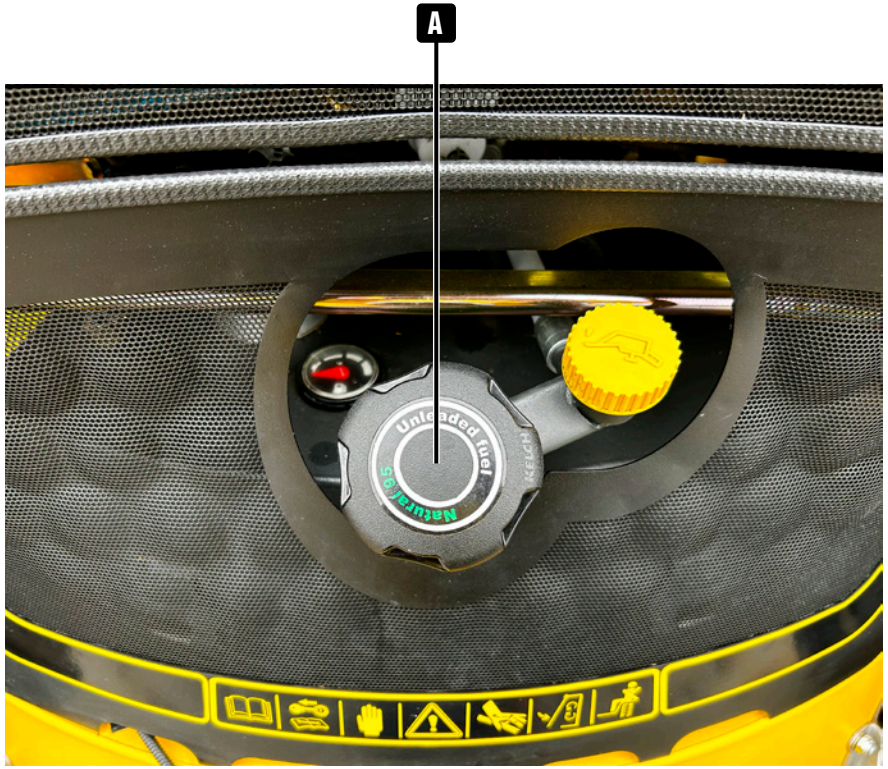
Always stop the engine before refueling. Do not smoke when handling fuel, do not approach with an open flame or source of sparks.

Use unleaded 95 octane gasoline without any additives as fuel. Defects and damage to the fuel system and engine of the machine caused by the use of incorrect, poor quality, old, contaminated fuel are the responsibility of the user and are not covered by the warranty.

Do not fill the tank near open flames or heat sources. When handling petrol do not smoke.

Do not open the tank if it is hot.

Do not fill or empty the tank in enclosed areas.



9.7 PREPARATION OF THE REMOTE CONTROL SMAUT RCT01

Insert the original Li-Ion battery type 21700 with built-in protection, 3,7 V / 4,9 Ah into the remote control. The battery status can be seen on the remote control display.

Discharge is signaled when the value reaches 30 %, the controller signals this state once by sound, vibration and the POWER ON LED flashes.

Move the mower to a safe place and change the RC battery.

9.8 RECHARGING THE BATTERY OF THE REMOTE CONTROL SMAUT RCT01

The wireless charging LED indicator lights up during charging and goes off when fully charged. If the RC is not placed in the charging station, the indicator flashes with short pulses.

To charge the battery:

- Remove the battery from the remote control and insert it into the CHR01 charger.
- Alternatively, place the RCT01 remote control on the CHR01 charger.
- When charging is complete, the LED will flash rapidly.

Leave the battery in the charger as needed (the charger monitors the battery status and does not overcharge the battery).

The transmitter (radio remote control and correction station) and receiver (receiver dome) have been adjusted and set up by the manufacturer. Do not interfere with these devices in any way. They are programmed to each other.

9.9 PREPARATION OF GNSS RTK CORRECTION STATION SMAUT CST01

The correction station provides the machine with correction data, thanks to which it enables the machine to determine its position with centimeter accuracy. Its functionality is a prerequisite for machine operation in Autonomous and Perimeter mode. The correction station must be located within a radius of 10 km from the mowing site. Ideally it should be located directly at the mowing site.

The CST must always be positioned with the GNSS antenna upwards to ensure signal reception from a sufficient number of satellites. It must be placed on the manufacturer's supplied tripod or mounted in an elevated position so that it does not fall and damage itself. An elevated position is understood to mean, for example, a fence post. It is necessary to ensure that the CST is not located in the signal shadow of trees, buildings, etc. with a maximum unobstructed view of the sky.

The CST is ready for operation by the manufacturer. It shall be placed either on a specific point (location) determined in cooperation between the user and the manufacturer. Alternatively, the machine operator must place the CST away from the working area (the CST must not interfere with the movement of the machine), the CST refines its position after start-up and then transmits correction data.

After starting, the CST must not be moved.
The user is obliged and responsible to secure the CST against movement, fall, damage or misuse by an unauthorized person.

9.10 RECHARGING THE BATTERY OF THE GNSS RTK CORRECTION STATION SMAUT CST01

The CST is charged using the CHR01 charger with the cable designed for CST01 charging, the CST charging LED indicator is on for the duration of the charge and goes off or flashes when charging is complete.

In the event that the CST battery is discharged, the included cable for 12 V vehicle sockets can be used to power the CST directly (not charge).

10

Operation Procedures

10.1 TRANSPORTATION OF THE MOWER

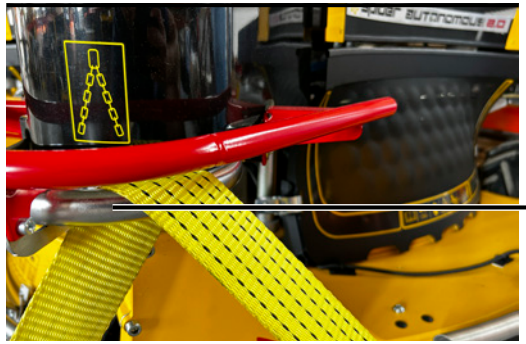
The mower is transported to the mowing site on a trailer specially designed for the SPIDER AUTONOMOUS 2.0 or other suitable means of transportation.

It is forbidden to transport the mower on its own on roads.

When entering/exiting the trailer, make sure that the edge—formed by the trailer floor and the ramps—does not create an obstacle for the mower. Raise the mowing deck to the highest possible level.

When loading, do not allow any person to stand by the ramps or under the hanging mower if it is being lifted. It may only be hung up on places marked by the chain symbol. The load capacity of the lashings must correspond to the weight of the machine as indicated on the machine productionplate.

When transporting the mower, make sure it is properly secured. Attach fastening devices to the eyes marked by the chain symbol on the mower.



10.2 MACHINE PREPARATION AND ENGINE START-UP

Procedure:

1. Check the oil level together with the amount of fuel in the fuel tank and that the tires are inflated correctly (3.0 bar, 43 PSI).
2. Unlock the EMERGENCY STOP lock button on the top cover of the machine body.
3. Check that both the battery light and the neutral light are green.
4. Switch on the remote control by turning/ pulling the main switch (EMERGENCY STOP) to the upper position. The POWER LED will light up.
5. Wait for Bluetooth connection between machine and RC.
   - The CONNECTED LED on the RC lights up.
   - At the same time, the LED light on the Bluetooth receiver dome of the machine changes from green to blue.
6. The mower deck must be switched off during starting—make sure that the mower deck control lever on the RC is in the off position. Otherwise, starting will NOT take place.
7. Switch the engine lever to the ON position on the RC.
8. Press the SOS/TEST button to verify its functionality. The machine must flash the LED strips on the machine's perimeter red in response to pressing the SOS/TEST button. This step is not required for Manual mode, but is a prerequisite for Autonomous and Perimeter modes.
9. Switch the engine lever to the OFF position and then back to the ON position on the RC.
10. Hold the START button until the machine starts, but no longer than 3 seconds. If necessary, repeat pressing the START button after a 20 s delay (the motor lever must be switched off and then back to on).

When starting, do not stand close to the mower but keep a safe distance and do not stand in it's path.

10.3 SWITCHING OFF THE MACHINE

Procedure:

1. Always switch off the mowing deck on the remote control before switching off the engine **[16]**.
2. Do not switch off the engine immediately after mowing, leave it running for a while with the minimum speed to allow it to cool down.
3. Switch off the engine by switching the ignition switch **[12]** on the remote control and then press **POWER ON / STOP [21]** on the remote control.
4. Press the **EMERGENCY STOP** button **[1]** on the mower and remove the key.

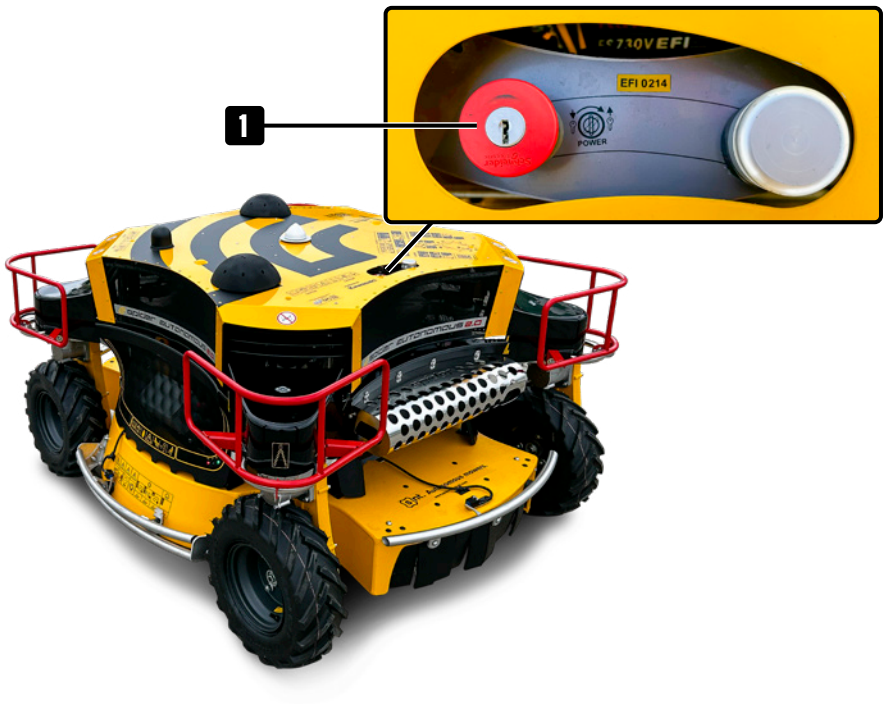


10.4 EMERGENCY MACHINE SHUTDOWN

Three red buttons are used for emergency machine shutdown. Two are located on the remote control and the third one on the mower body. All buttons have the same function.

Use the button on the remote control [20] in priority for emergency shutdown. Only use the button on the mower if the mower is stable and level, or if you are standing in the immediate vicinity of the machine and cannot be threatened by the machine.

The POWER ON / STOP and SOS/TEST buttons on the remote control [21] [20] and the EMERGENCY STOP button on the mower [1] should be used whenever the situation requires an emergency stop.



10.5 SWITCHING ON THE MOWING DECK

The mowing deck can only be switched on when the mower engine is running.

1. Set the maximum cutting height with the **[17]** control.
2. First increase the engine speed (RPM) by the potentiometer **[11]**, switch the mowing deck switch to the on position **[16]** and the mowing blades start.
3. Set the working cutting height using the cutting height control **[17]** on the RC.



Do not switch on the mowing deck in tall vegetation, there is a risk of damaging the clutch.

In this case, move the mower to a place without high grass and switch on the mower deck.

When switching on the blades, keep a safe distance, do not switch on the blades if there are other people in the working area of the mower. The blades may have dried mowing residue on them, which can be ejected by centrifugal force.

10.6 SWITCHING OFF THE MOWING DECK

Lower the RPM then switch the mowing deck switch to the OFF position **[16]**. If you are no longer mowing, set the maximum height of the mowing deck with the control **[17]** on the RC.



10.7 SETTING THE MOWING HEIGHT

The machine has variable mowing height adjustment. The mowing height can be adjusted as standard between 90 and 140 mm. The mowing height is adjusted via the **[17]** switch on the RC. Refer to the markings on the machine body for guidance.

For tall or wet vegetation, select a higher cutting position.

The lowest position is used when mowing flat and maintained areas.

When mowing unknown areas for the first time, we recommend mowing the area at a higher setting and then re-inspecting the area for unwanted items. It is recommended that further mowing be carried out after the mowed grass has dried up.

Set the mowing height on the machine as a guide, cut a few meters and check if the stubble height complies with your requirements.

The height of the stubble on a slope can vary considerably from the height of stubble on flat ground.

The switch [17] has 3 positions: up, down and the center position which holds the current height.

10.8 DRIVING THE MACHINE

The movement of the machine is controlled by a two-axis joystick **[2]** (forward, reverse, left, right, skid steering) and a single axis joystick **[3]** (steering wheels left and right). With combination of these two joysticks, you can control the movement of the machine. Depending on the joystick deflection, the machine gradually increases the speed or steers the wheels.



Drive the machine slowly so that you are able to react to the direction in which the mower is moving. The tyre's V-shaped pattern determines the direction in which the machine will move if the forward command is selected.

While moving slowly, move the control lever to the desired forward or reverse direction.

When changing the forward—reverse travel, hold the lever for a moment in the neutral position.

When moving the mower, the RPM setting must always be at maximum speed. Driving at idle or increased engine speed is strictly forbidden.

If the weather is cold, leave the engine running after starting for about 2 minutes to warm up the oil, and then you can start driving.

10.9 DRIVING SPEED OF THE MOWER

Always choose a suitable driving speed that allows a satisfactory mowing quality. When selecting the speed, progress from a lower to a higher speed, not the other way round. In sparse vegetation you can mow at a higher speed. The switch **[13]** is also used to control the speed range, which switches between higher (hare) and lower (tortoise) travel speed. Always select the lower speed range (tortoise) when starting work. Also select the lower speed range (NOT RPM) when you are mowing on slopes greater than 20° and on uneven terrain.

The higher speed corresponds to the range: 0–8 km/h
The lower speed corresponds to the range: 0–3 km/h



Never reduce the speed by reducing RPM! The speed is only changed by deflecting the joystick [2].

It is FORBIDDEN to drive the mower when switched to the hare symbol (higher speed) and switched on mowing deck on a slope greater than 20°.

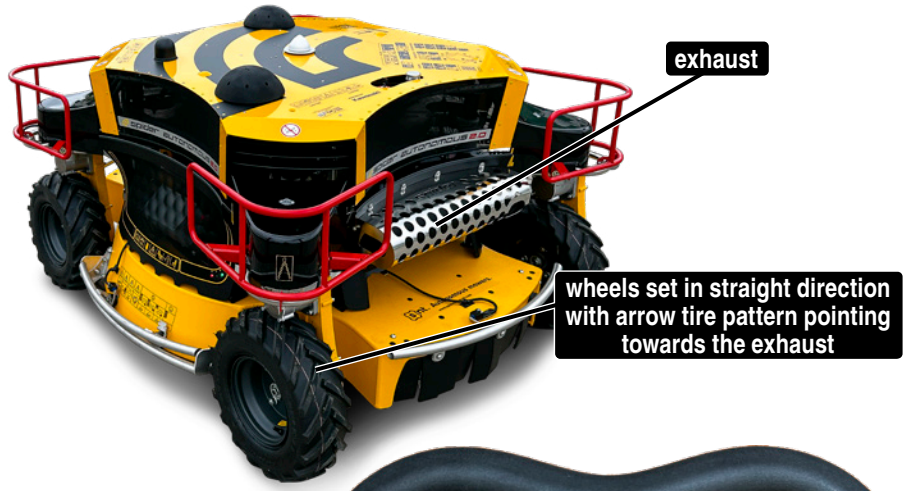
It is FORBIDDEN to switch the speed range during mowing. Stop the machine before selecting another speed range.

10.10 SKID STEERING

The SPIDER AUTONOMOUS 2.0 precision slope mower is equipped with skid steering function, which allows the machine to rotate in place around its vertical axis. The skid steering is performed by moving the left joystick to the left or right according to the operator's decision, provided that the wheels must be set in a straight direction (parallel to the machine's longitudinal axis, the wheel portals and the arrow tire pattern pointing towards the side where the exhaust is located, see pictures below). The right hand joystick must not be used during skid steering.

To turn the machine clockwise (to the right) it is necessary to:

- Turn the wheels in a straight direction (see picture below).
- Swing the left joystick lever **[2]** to the right.





10.11 SA 2.0 DRIVING MODES AND ADDITIONAL INFORMATION FOR OPERATIONAL PROCEDURES

10.11.1 MANUAL MODE

Manual mode is the default mode of machine control. The movement of the machine is directly controlled by the operator using the RC.

Procedure:

1. The machine must be started (see chapter 10.2 *Machine Preparation and Engine Start-Up*).
2. Engage the mowing deck as required by switching the mowing switch on the RC into the ON position.
3. Guide the machine using the RC joysticks.
4. Before turning off the engine, lower the RPM, switch off the mowing deck by returning the corresponding switch to the OFF position.
5. Switch the engine ignition switch to the OFF position.
6. Turn off the RC by pressing the POWER ON/STOP button on the RC.
7. Switch off the machine by pressing EMERGENCY STOP on the top cover of the machine's body.

10.11.2 CORRECTION DATA

To operate the machine in Autonomous mode and Perimeter mode, you need information about the exact position provided by the CST in the mowing area. The CST must be switched on and transmit correction data to the machine.

See chapter 6.2 *GNSS RTK Correction Station SMAUT CST01* and 9.9 *Preparation of GNSS RTK Correction Station SMAUT CST01*.

Before starting operation in Autonomous mode or in Perimeter mode, the user must check the charge status of the CST in the **mySpider** app (my.spidernewtech.com) to avoid discharging the CST during operation and loss of RTCM data. Check in the app the CST assigned to the machine you are using to avoid loss of RTCM data due to too remote location of the CST in case of using more than one correction station.

10.11.3 AUTONOMOUS MODE

The machine stores the last recorded mowing map in memory. It can be uploaded or changed via the **mySpider** (my.spidernewtech.com) web portal interface, see chapter 11 for more information.

The conditions for the machine to enter autonomous mode are:

- receiving correction data (RTK DATA diode on RC is lit)
- the machine knows its exact position (the RTK FIX diode on the RC is lit)
- the machine must be calibrated, calibration is done automatically by driving in manual mode or the machine will calibrate itself when pressing the AUTONOMOUS button. (If the machine is not calibrated, this status is indicated by an LED strip—orange with red edges. For calibration the machine must know its exact position, the RTK FIX LED on the RC is lit)
- a map of the mowing area is loaded in the machine and the starting point of the mowing is displayed to the user in the web app interface
- successful test of all safety bumpers

Procedure:

1. Move the machine in Manual mode near the starting point of the route and point the wheels in its direction.
2. Press and hold the AUTONOMOUS button to start the autonomous mode. The machine performs the following actions:
   - If the machine is not exactly at the starting point of the route of the loaded map, it will take a direct route to that point. It is therefore advisable to enter autonomous mode close to the starting point so that the machine can follow the route without risk.
   - The machine continues along the route until it reaches its end, where it stops.
3. During autonomous mowing mode, the operator **is required** to check the status and movement of the machine via the web portal interface **mySpider** (my.spidernewtech.com).
4. Switch the engine ignition switch to the OFF position.
5. Turn off the RC by pressing the POWER ON/STOP button on the RC.
6. Switch off the machine by pressing the EMERGENCY STOP button on the machine's body.

During autonomous calibration the machine will drive approximately five metres straight ahead, so ensure that it is not in front of any obstacles.

If any of the safety bumpers are activated during autonomous mode (after hitting an obstacle), the machine transitions into Manual mode and EMERGENCY STOP is activated. The operator is obliged to walk to the machine, check the machine, check its technical condition including the condition of an obstacle, arrange for the necessary remedy of damage, and then the operator may restart the engine. To return to autonomous mode, it is necessary to press and hold the AUTONOMOUS button again. The machine continues mowing at the nearest waypoint of the entire route.

If there are more possible paths in the immediate vicinity of the mower, then the mower choses the one which direction is the best coinciding with the direction of the machine's wheels at that particular moment (the mower will follow the arrow pattern of the wheels).

If the operator presses the AUTONOMOUS button three times in a row, the machine will connect to the nearest route in the direction of the wheels. The machine will then continue along the route in autonomous mode from the point of connection until the end of the route.

Perimeter mode has two phases:

- The first phase is similar to Manual mode, during which the operator drives the machine around the perimeter of the mowing area (the end of the route must be within 2 m from the start of the route). If there are any obstacles inside of the marked perimeter, then these obstacles (tree, bushes, benches, etc.) must be marked by using the interface of the **mySpider** web app (my.spidernewtech.com). Marking of an obstacle is done by driving the machine around the obstacle in Manual mode and saving the data about the obstacle. The server then automatically processes the data (mowing area map) for the second phase, which starts with the processed and stored mowing map in the machine.
- The second phase is started on the operator's command with the AUTONOMOUS button on the RC. Mowing of the defined working area is carried out in a similar way as in the Autonomous mode.

The conditions for the machine to enter the Perimeter mode are:
(see 10.11.3 plus the points listed below.)

- successful test of all safety bumpers
- connection of the machine via LTE modem to the server (ONLINE LED on RC is lit)
- correction data is received (RTK DATA LED is lit)
- the machine knows its exact position (FIX LED is lit)

Procedure:

1. Place the machine at the border of the mowing area.
2. Press and hold the REC button (3 sec) on the RC in order to put the machine into record mode. The AUTONOMOUS LED on the RC flashes from this moment until the end of the recording.
3. If there are obstacles inside the mowing area, the interface of the **mySpider** (my.spidernewtech.com) web app intuitively guides the operator step-by-step through the entire work mode.
4. Guide the machine with the remote control around the perimeter of the mowing area with 50 cm distance from obstacles until you return to the starting point (maximum 2 m deviation).
5. The machine must have a stable "RTK FIX" (stable GPS signal while receiving correction data). Otherwise, the recording is interrupted and the entire circumnavigation of the area must be performed again.

6. Press and hold the REC button again (3 s) to stop the recording AUTONOMOUS LED will stop flashing.
7. To mark obstacles, follow the same procedure as for marking the perimeter of the entire work area, see Perimeter mode in the web interface **mySpider** (my.spidernewtech.com).
8. When marking obstacles, guide the machine at a distance of 50 cm from the marked obstacle.
9. Wait for the route calculation, the machine will announce the completion by sounding the siren (or check the app).
10. Move the machine in Manual mode to the starting point of the route.
11. Start the autonomous mowing by holding the AUTONOMOUS button.
12. The machine finishes mowing and stops.
13. Switch the engine ignition switch to the OFF position.
14. Switch off the RC by pressing the POWER ON/STOP button on the RC.
15. Switch off the machine by pressing the EMERGENCY STOP button on the top cover of the machine body.

If any of the safety bumpers are compressed after an impact during the second part of the mode, see chapter 10.11.3.

In the case of mowing an area using Perimeter mode, it is possible to initiate this mode without using the web application interface **mySpider** (my.spidernewtech.com). If the area to be mown has any obstacles present, it is necessary to work from the start of the mode with the **mySpider** (my.spidernewtech.com) web app interface.

To generate the correct mowing map for machine operation in autonomous mode in the first phase of Perimeter mode it is necessary to drive around the perimeter of the selected mowing area with at least 50 cm distance from obstacles. During the marking of the selected area, the defining route must not cross itself!

10.12 DRIVING ON SLOPE

Driving on a slope in both Manual and Autonomous mode places a number of demands on the operator, as the operator must constantly evaluate information about the machine's movement on the slope and terrain characteristics. The grip of the wheels on the grass is particularly important, as well as the angle of inclination of the mower. Pay attention to climatic conditions. The slope accessibility of the mower will vary considerably on dry, damp and wet grass.

The mower can work on the slopes listed (see chapter 2.2 *Use of the Machine*) **provided that the ground (grass) is dry.**

If the grass is wet or damp, the maximum slope on which work is permitted is 20°.

Carefully review the working area. Assess the situation and practically test the possibilities and nature of the particular terrain. Do not leave anything to chance. If the mower loses its grip on the ground or if you lose control of it then stop mowing and reassess the conditions.

The mower wheels should be evenly inflated to 300 kPa (3.0 bar). They must not be under-inflated or over-inflated.

Preferably start your work in the Manual mode at the bottom of the slope and proceed to the top. This way you will usually be moving from less to more steep slopes, which will give you a better chance to evaluate the climbing ability and make the right decisions concerning further work. If you begin to mow steeper slopes first, it may happen that—due to adverse conditions—the mower will slip on the slope. Due to dynamic effects the mower may even roll over. The method of cutting from the top of the hill to the bottom should only be used exceptionally when the operator is in detail acquainted with the terrain.

If the lawnmower slides, do not try to stop it and do not approach it, especially not in the area underneath or directly above it.

In Autonomous Machine Mode, the operator is required to assess the condition of the mowed slope with regard to the generated route (mowing area map) and the climatic conditions.

Do not touch or approach the mower if the wheels are raised or the mower is tilted excessively or in an unstable position or has overturned. Make sure the blades are disengaged and wait untill it has stablized itself. Then carefully try moving the machine into a more stable position before going near to it. Preferably approach the machine from the sides or from the top.

Before operating on slopes, make sure that no one is below or above the mower or the working area. Do not endanger third persons by the movement of the mower.

Choose your operating position away from the area to which the mower may slide or to which the mowed grass may be thrown. The direction of the discharged grass may change while operating according to the driving direction of the mower.

Avoid when working on slopes:

- Sudden, abrupt steering intervention.
- Accelerating or braking abruptly up a slope, or suddenly changing direction of travel.
- High driving speeds.
- Driving at high speeds on uneven or rough ground.
- Variable adhesion (moving from sunny to shady areas, etc.).
- Driving over the mowed material.
- Reduction of speed.
- Stopping on a slope and switching off the engine.

10.13 STOPPING THE MOWER ON SLOPE

In case you are forced to stop the mower in Manual or Autonomous mode on a slope and carry out any intervention, interrupt work or shut down the engine, etc., turn the wheels perpendicular to the slope (parallel with the contour line of the slope).
This will prevent any possible movement of the mower on the slope.

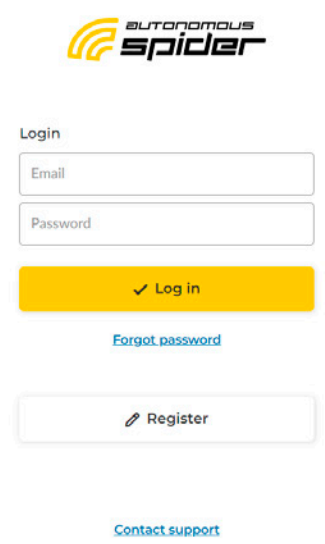
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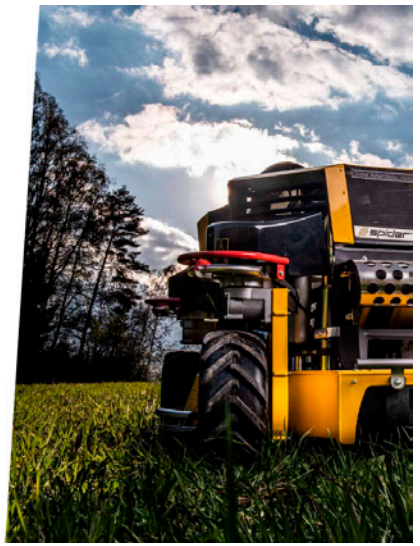
App mySpider

The portal provides the user (operator, management, etc.) with information about the machine status and is an integral part of the machine operation procedures for the operator. The use of the user portal is explained in the following steps. It is available at the URL **https://my.spidernewtech.com**.

11.1 LOGIN

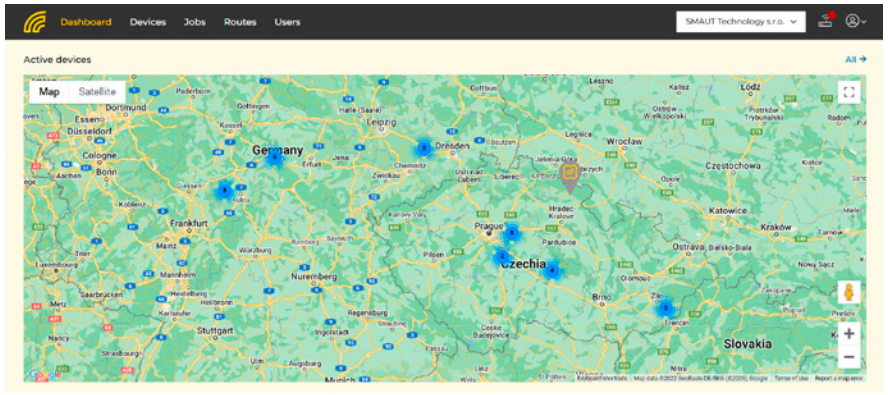
The user fills in his/her login details and signs into the portal.



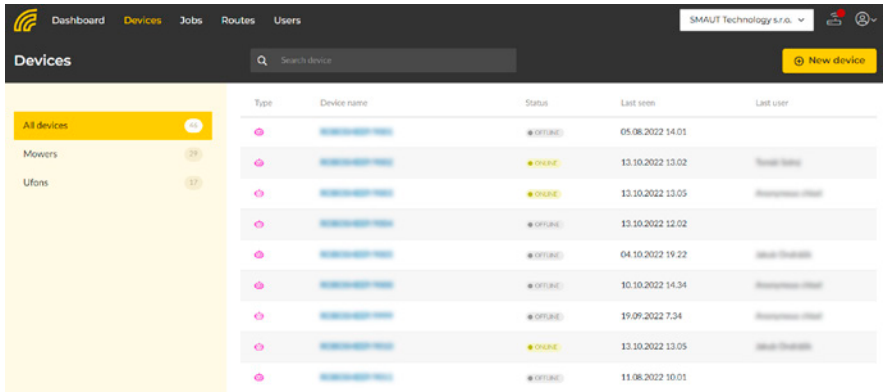


11.2 APP DESIGN

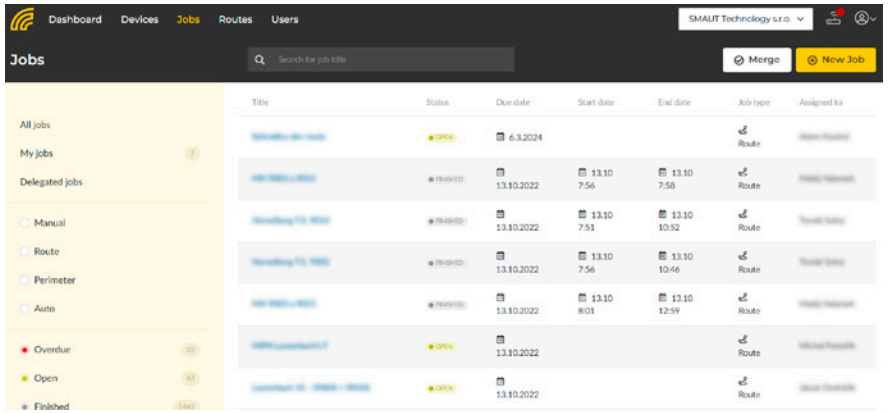
On the home page of the portal *(Dashboard)* the user can see the locations of the machines which are under the management of his/her company.



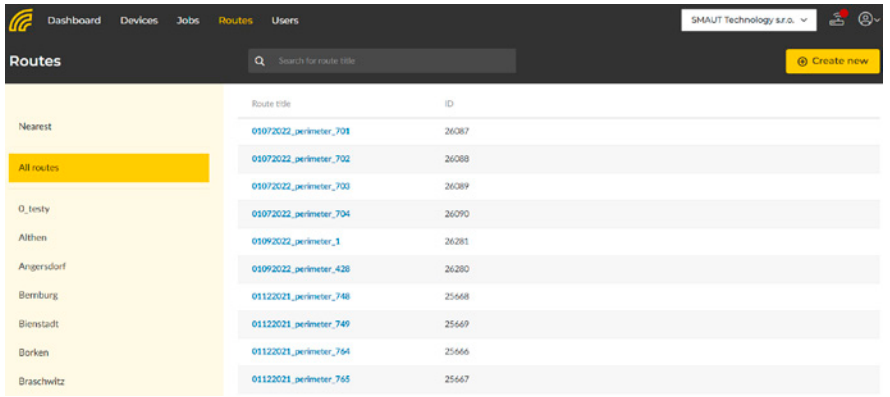
On the *Devices* (machines) tab, the user sees a list of machines and devices that belong to the management of his/her company.



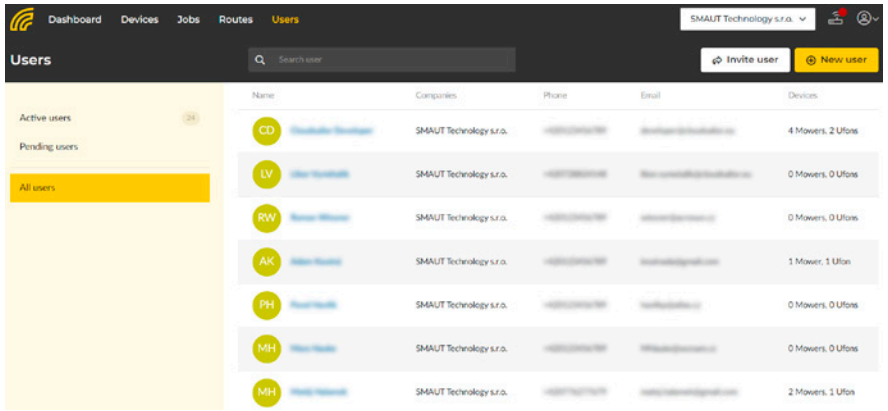
In the *Jobs* tab (the work of a specific operator on one specific working area), the user sees a list of active, terminated and inactive Jobs of each user of a given company. In this tab, the user can create or accept his designated Jobs according to his/her requirements or Manager's requirements. It is also possible to merge user's Jobs. For each Job the user can assign a specific machines and maps or it could be assigned to him/her by user with Manager rights. For more information see chapter 11.3 *Creating a Job*.



The *Routes* tab will show all user's routes designated for Autonomous mode and routes that have been created in Perimeter mode.



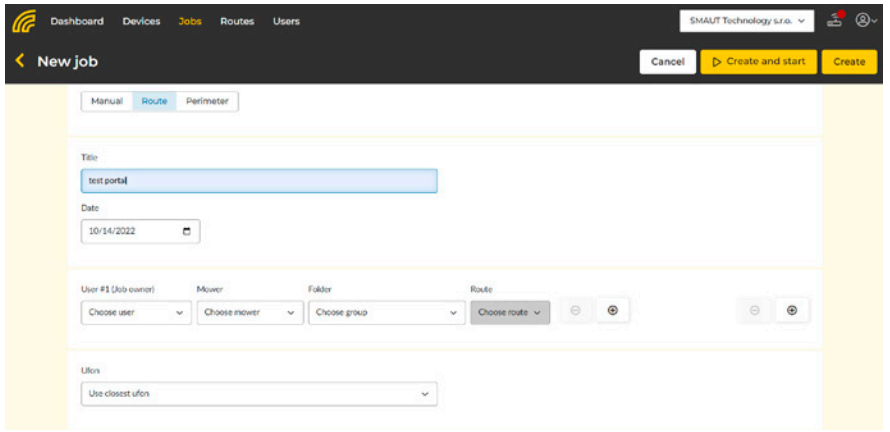
The *User* tab displays a list of all users of the company with their rights.



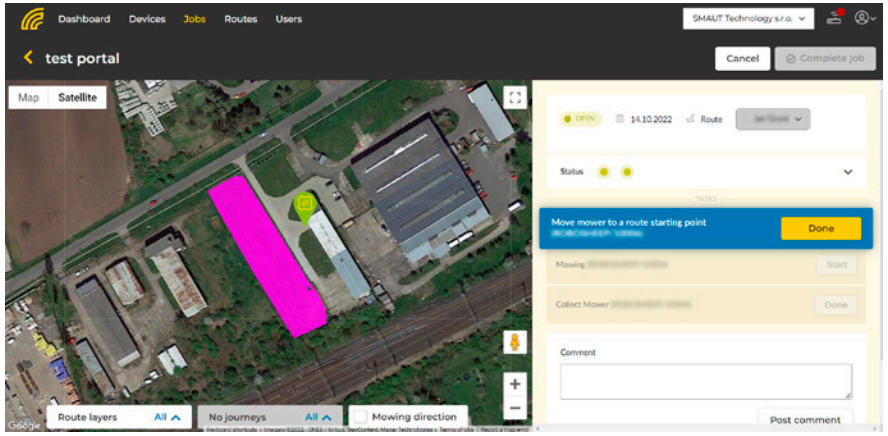
11.3 CREATING A JOB

To start working with the mower in Autonomous and Perimeter mode, it requires the operator to work with the user portal.

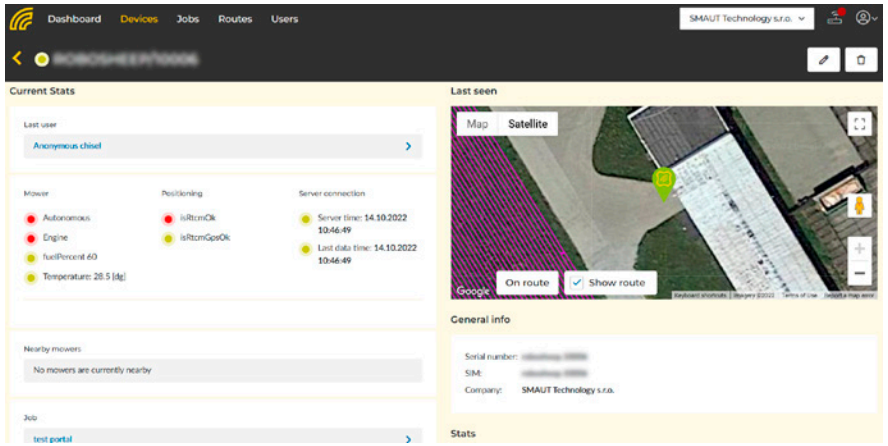
Before starting a job, the operator creates a Job in the *Jobs* tab by clicking on the *New Job* icon. Next, he/she fills in the name and determines in which mode *(Manual, Route, Perimeter)* the job will be performed according to the operator's needs. The operator then fills in the remaining fields and assigns the specific machine(s) he will be working with. Everything is very intuitive and the user is always guided by the portal. It is possible to merge some *Jobs* by clicking on the *Merge* icon and then selecting specific *Jobs*.



After filling in all the necessary data, the user creates the *Job* by clicking on the *Create* icon. At this point, the *Job* is saved and the job will not be started immediately. This function is suitable for the *Job* preparation. It will be traceable in the *Jobs* tab where you can click on it at any time to start the job. The user can also click on the icon *Create and start* and start the job immediately. The user must follow the sequence of tasks passed to the user by the portal as it is shown in the following figure.



The portal guides the user intuitively through the individual mowing processes required with the SPIDER AUTONOMOUS 2.0. On the map, the user can see the location of all machines and the correction station. If the user clicks on the mower on the map, a tab of the machine opens showing its status, the recorded route, its position on the map, see picture below. When the mowing is finished, the user clicks on the *Complete job* icon, which completes the *Job* and its progress can be traced in the *Jobs* tab.



12

Maintenance

12.1 MOWER MAINTENANCE PLAN

The below control tasks are carried out by the MACHINE USER	INTERVAL ACCORDING TO THE STATUS OF THE ENGINE HOUR COUNTER			
	daily before use	every 50 hours	every 200 hours	every 800 hours
VISUAL INSPECTION FOR OIL LEAKS IN THE ENGINE AND HYDRAULIC SYSTEMS	●		●	
LUBRICATION OF GUIDE RODS WITH GREASE (at least once per season)			●	
LUBRICATION OF OTHER LUBRICATION POINTS WITH SPRAY DRY LUBRICANT		●	●	
CHECKING THE HYDRAULIC FLUID LEVEL IN THE RESERVOIR	●		●	
CHECKING TIRE PRESSURE	●		●	
VISUALLY CHECK THE V-BELT TENSION	●		●	
VISUALLY CHECK THE TENSION OF THE STEERING CHAIN	●		●	
CHECK THE BATTERY CHARGE OF THE REMOTE CONTROL	●			

The below control tasks are carried out by the MACHINE USER

	INTERVAL ACCORDING TO THE STATUS OF THE ENGINE HOUR COUNTER			
	daily before use	every 50 hours	every 200 hours	every 800 hours
GNSS RTK CORRECTION STATION BATTERY CHARGE CHECK	●			
CHECKING THE BATTERY CHARGE OF THE MOWER	●			
CHECKING ELECTRICAL COMPONENTS AND SAFETY FEATURES (emergency shutdown, control, signal transmission, etc.)	●			
TIGHTENING OF BOLTS AND NUTS (visual check daily)			●	
BLADES DEFORMATION AND SHARPENING CHECK	●		●	
CHECKING THE TIGHTENING OF THE BLADES SCREWS	●			
CHANGING THE HYDRAULIC FLUID			● *)	
REPLACING THE HYDRAULIC FILTER			● *)	
FLUSH THE FUEL TANK, REPLACE THE VENT FILTER				●
REPLACE THE FUEL FILTER (replace more often in extremely dusty or dirty conditions)				●
CLEAN MACHINE COOLING SYSTEMS (engine, hydraulic pump)	●			
CLEAN THE ENTIRE MACHINE OF MOWING RESIDUES	●			
CHECK THE CABLES AND SENSORS OF THE SAFETY BUMPERS	●			
VISUAL INSPECTION OF HYDRAULIC HOSES, FUEL HOSES, WIRING AND POSSIBLE REPLACEMENT				●

*) *Then after 400 engine hours or a year, whichever time interval comes first.*

The below control tasks are carried out by the MACHINE USER

	INTERVAL ACCORDING TO THE STATUS OF THE ENGINE HOUR COUNTER			
	daily before use	every 50 hours	every 200 hours	every 800 hours
WHEEL ALIGNMENT CHECK AND ADJUSTMENT			●	
CHECKING, ADJUSTING AND TENSIONING THE CHAINS IN THE WHEEL SUSPENSION			●	
ADJUSTING THE BLADE DECELERATION			●	
CHECKING AND, IF NECESSARY, REPLACING DRIVE BELTS AND THE MOWING DECK BELT			●	
CHECKING AND CLEANING THE MOWER TRANSMISSION (belts, pulleys)		●		
CHECKING MACHINE SAFETY MARKINGS	●			
CHECKING THE MOWER DECK BEARINGS			●	
CHECKING THE HUB OF THE MOWER BLADES			●	
CHECKING THE CONDITION OF THE BRAKE LINING OF THE AUXILIARY BRAKE	●			
ADJUSTMENT OF THE AUXILIARY BRAKE BY A SPECIALIST WORKSHOP			●	

12.2 ENGINE MAINTENANCE PLAN

Kawasaki FS730V-EFI engine maintenance schedule:

MAINTENANCE: **(*)** Perform more frequently in dusty environments **(K)** Carried out by Kawasaki Authorized Service	INTERVAL ACCORDING TO THE STATUS OF THE ENGINE HOUR COUNTER			
	daily	every 100 hours	every 200 hours	every 300 hours
CHECK AND TOP UP THE ENGINE OIL	●			
CHECK FOR LOOSE AND MISSING BOLTS AND NUTS	●			
CHECK FOR OIL OR FUEL LEAKS	●			
CHECK AND CLEAN THE AIR INTAKE	●			
CLEAN THE AIR PRE-FILTER **(*)**	●			
CLEAN THE AIR FILTER **(*)**	●			
CLEAN DUST AND DIRT FROM CYLINDERS AND CYLINDER HEAD **(*)**		●		
TIGHTEN THE NUTS AND BOLTS		●		
CHANGE THE ENGINE OIL		●		
CLEAN AND ADJUST THE SPARK GAP ON THE SPARKPLUG		●		
CHANGE THE OIL FILTER		●		
REPLACE THE PAPER PART OF THE AIR CLEANER **(*)**			●	

MAINTENANCE: **(*)** Perform more frequently in dusty environments **(K)** Carried out by Kawasaki Authorized Service	INTERVAL ACCORDING TO THE STATUS OF THE ENGINE HOUR COUNTER			
	daily	every 100 hours	every 200 hours	every 300 hours
CLEAN THE COMBUSTION CHAMBER **(K)**				●
CHECK AND ADJUST VALVE CLEARANCE **(K)**				●
CLEAN AND WIPE THE VALVE SEATING SURFACE **(K)**				●

equipment check

exchange of elements

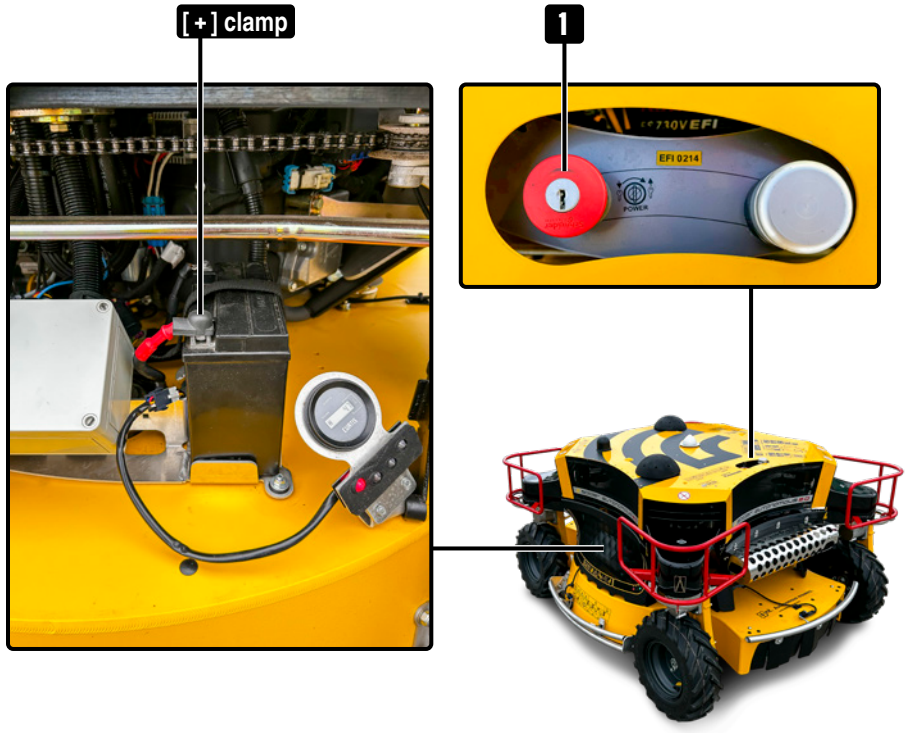
12.3 ENGINE MAINTENANCE

The following activities are considered as workshop maintenance and should only be carried out by trained persons.

Before starting any maintenance work on the mower, switch off the engine and allow it to cool down, switch off the RC and press the EMERGENCY STOP button [1] on the mower and remove the key.

To avoid the possibility of the engine starting unexpectedly, disconnect the **[+] clamp** on the battery.

The engine should only be repaired by an authorized dealer/service center with the appropriate tools, spare parts and expertise.

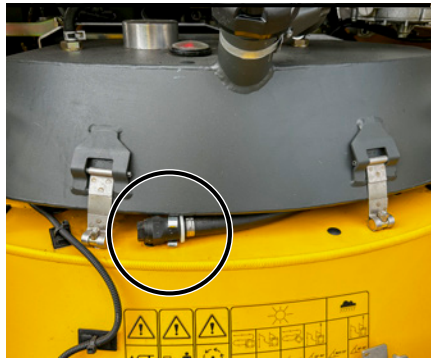


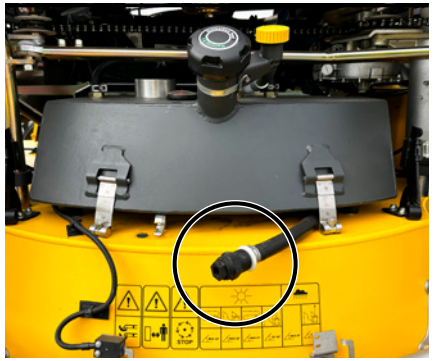
12.4 ENGINE OIL CHANGE

Observe the replacement interval according to the manufacturer's instructions —see 12.2 *Engine Maintenance Plan*.

Drain the oil while it is warm but not hot.

- Remove the side cover on the side of the fuel tank.
- Remove the drain hose from the holder.
- Unscrew the plug and place the hose in a prepared container and let the oil flow freely into container
- Screw the drain hose plug back in and clip the hose back into the holder.
- Add the required amount of engine oil.
- After starting the engine, check the oil level again and top up the oil if necessary.



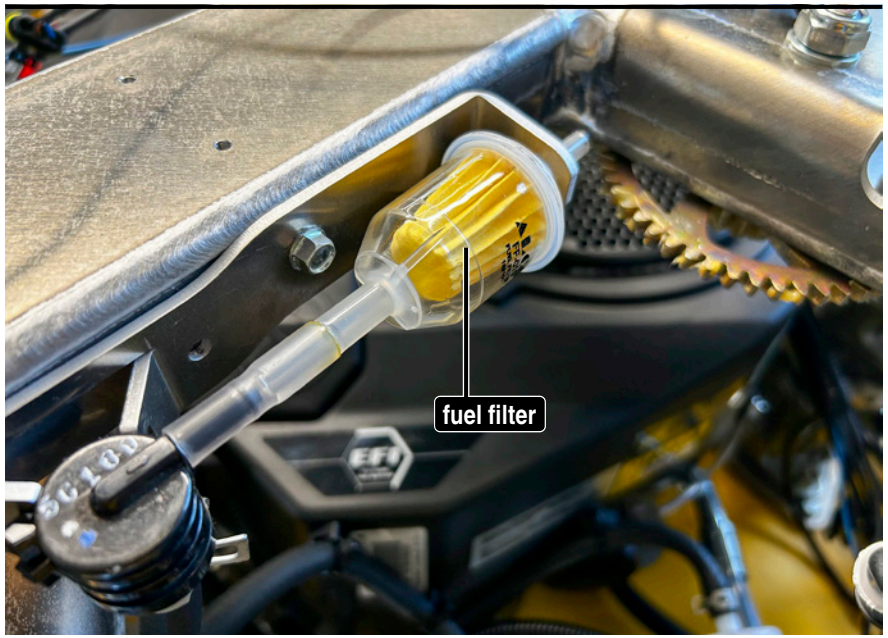


12.5 CLEANING THE FUEL TANK

During use, dirt can build up in the fuel tank. This can cause blockages in the fuel system when the mower is in operation.

The tank may only be emptied by draining the petrol, observing all safety precautions when handling the fuel.

The vent hose runs from the tank under the top of the mower, where it ends with a filter. You can tell if it is blocked by poor engine function or/and vacuum in the tank.



Do not smoke or handle open flames in the vicinity when working with petrol.

12.6 HYDRAULIC DRIVE MAINTENANCE

Maintenance of the hydraulic drive requires properly trained service personnel.

Routine maintenance should focus on checking hydraulic connections and bolts for leaks, replacing pressure hoses and topping up hydraulic fluid.

Maintenance of hydraulic parts must be carried out in a very clean workplace. Any dirt carried into the hydraulic circuit can cause a malfunction. If replacing any part, remove all contamination by rinsing it with cleaning fluid.

The hydraulic actuator must not operate without fluid or with insufficient amount of fluid, even for short periods of time.

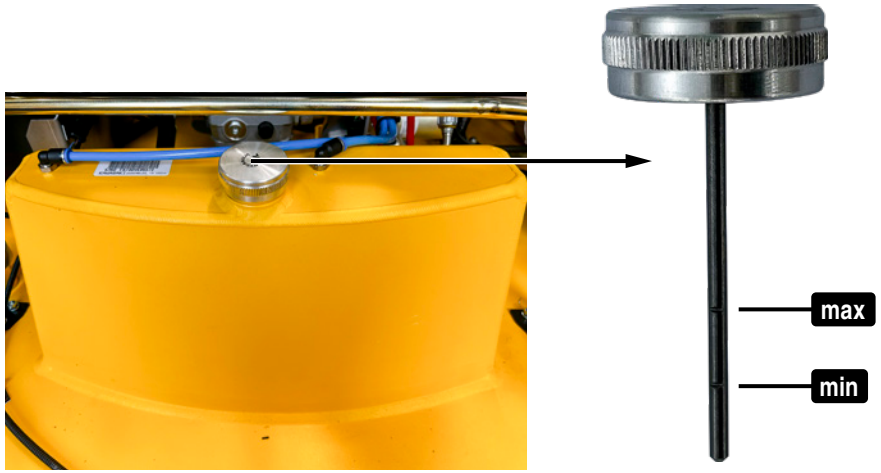
12.7 CHECKING AND TOPPING UP THE HYDRAULIC FLUID

Check the amount of hydraulic fluid in the hydraulic reservoir daily. Measure the hydraulic fluid level with the dipstick in the reservoir cap. The level must be between the lines. If you are working in extreme conditions, the hydraulic fluid level (at normal ambient temperature) must reach to the top line.

Check the hydraulic fluid level when the engine is off and the hydraulic fluid is cold.

If you are checking warm or hot hydraulic fluid, the level may be higher (and extend above the line) due to the volumetric expansion of the hydraulic fluid.

Do not overfill the hydraulic tank!!!



12.8 ADJUSTMENT OF THE NEUTRAL POSITION OF THE TRAVEL SERVOMOTOR

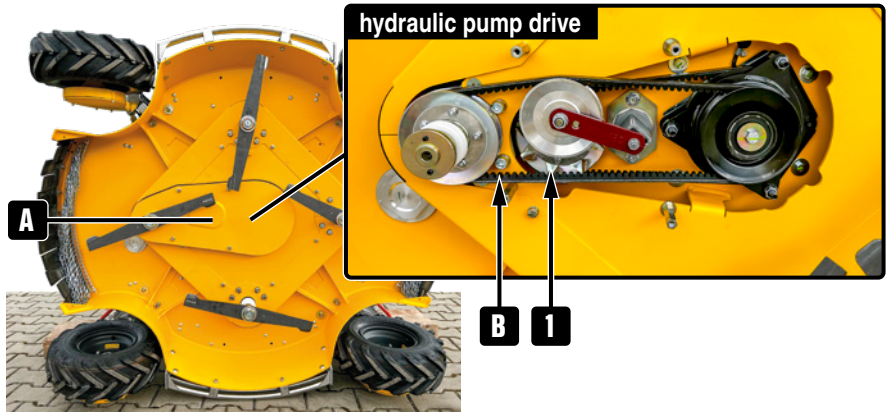
Have the manual adjustment of the neutral position carried out by an authorized service!

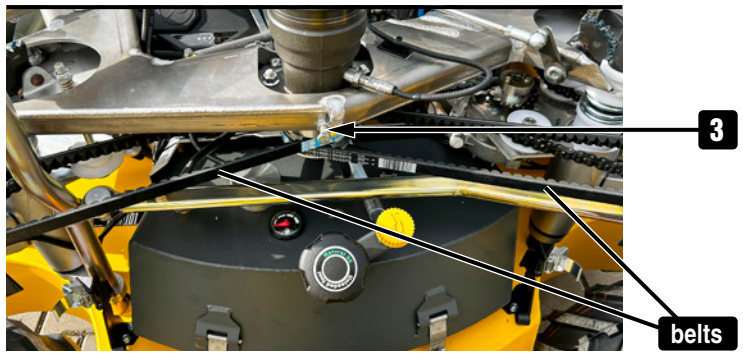
12.9 V-BELTS OF THE MOWING DECK DRIVE

Check the V-belts for wear and tension.

1) **Hydraulic pump drive**
   Located at the bottom of the deck inside the housing **[A]**. The V-belt is tensioned by a pulley. To tension the belt, the pulley is disassembled and an appropriate number of spacers are removed.
2) **Clutch belt**
   Located at the bottom of the deck inside the housing **[B]**. The V-belt is tensioned by a tensioner and pulley. To tension the belt, the pulley is disassembled and an appropriate number of spacers are removed.
3) **Travel wheels drive**

The V-belts are tension by shifting the hydraulic motors.





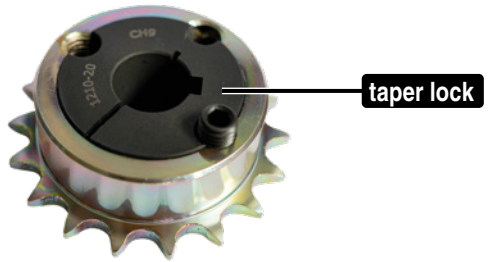
12.10 WHEEL GEOMETRY ADJUSTMENT

If you do not have the necessary equipment and experience, entrust this work to an authorized service.

1. Lift the mower (wheels above ground) and position the wheels into a straight direction.
2. Release the steering chain taper lock.
3. Place a straight lath to the wheel portal on the left side and to the tire disc on the right side and adjust the wheels so that they are parallel.
4. Tighten at least one screw of the taper lock (whichever is accessible). Do not turn the wheels unless you have tightened at least one screw.
5. This would distort the geometry!
6. After tightening one screw you can turn the wheels.
7. Tighter the second screw.
8. Check the geometry with a lath.
9. Step-by-step turn wheels and tighten both screws of the taper locks of all wheels until they are completely tightened (approx. 23 Nm).





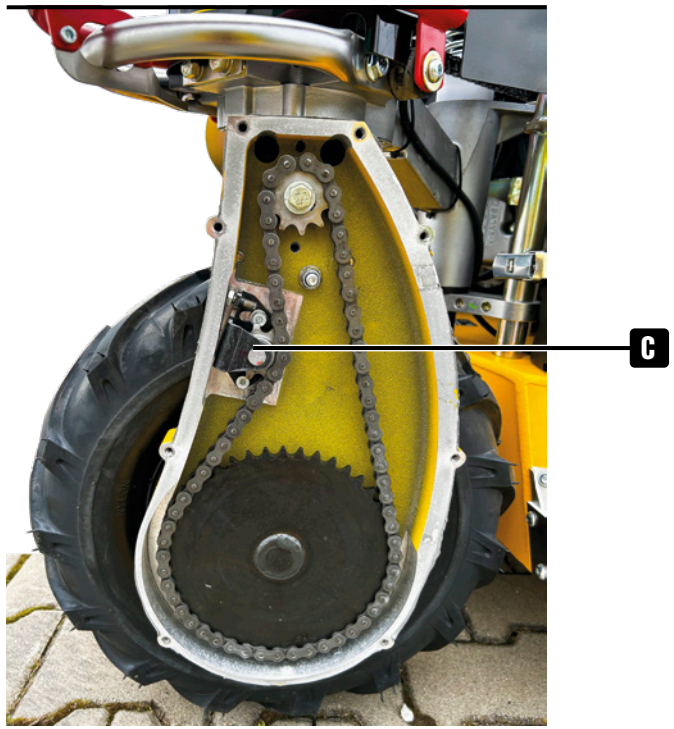


12.11 CHAIN CASE

If you do not possess necessary equipment and skills, have this work performed by an authorized service.

Remove the cover of the final gear drive. The cover is attached by bolts onto the sides. Adjust the chain tensioner **[C]** so the chain is properly tensioned. The tensioner can be shifted after loosening the fastening screws (see the figure). To tighten the chain, slightly unscrew the thrust bolt.

Do not tension the chain excessively. This could reduce the durability of the chain and the bearing. Lubricate the chain by spraying it with lubricating oil. Use a sufficient amount of silicone to seal the chain case.



12.12 MAINTENANCE OF ELETRICAL CIRCUITS, EQUIPMENT AND NAVIGATION COMPONENTS

Keep all parts of electric circuits clean, especially from oil products, dust sediments and dry grass. Replace conductors with damaged insulation. For replacement use only original conductors supplied by the manufacturer.

Entrust repairs of electrical circuits only to an authorized service.

The transmitter (radio remote control and correction station) and receiver (receiver dome) have been adjusted and set up by the manufacturer.
Do not interfere with these devices in any way.
They are programmed to each other.

12.13 ADJUSTING BLADE DECELERATION

The electromagnetic clutch is placed under the clutch cover **[A]** above the rotary blades. The clutch was adjusted by the manufacturer. When engaged the clutch transmits power onto the blades, when disengaged the brake stops the rotating blades. Do not change the clutch setting. If damage on this part of the machine should occur, always leave the repairing to an approved dealer. The maximum rundown time of the rotary blade was set to 5 seconds.

After finishing any work on the electromagnetic clutch, the cover must be returned to its original place and properly sealed to prevent the clutch from getting dirty.

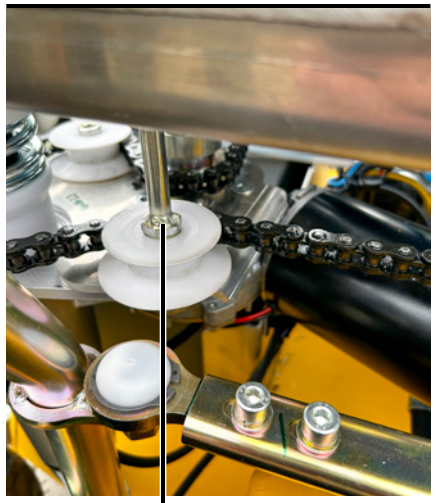


12.14 CHAINS

STEERING CHAINS

Check the wear and tension of the chain and the tensioning devices. The chain can be tightened by rotating the steering motor bracket after loosening two attachments bolts (see the figure).

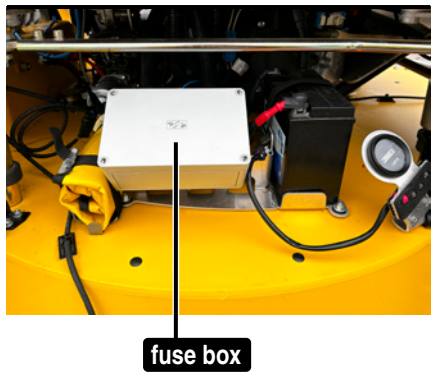




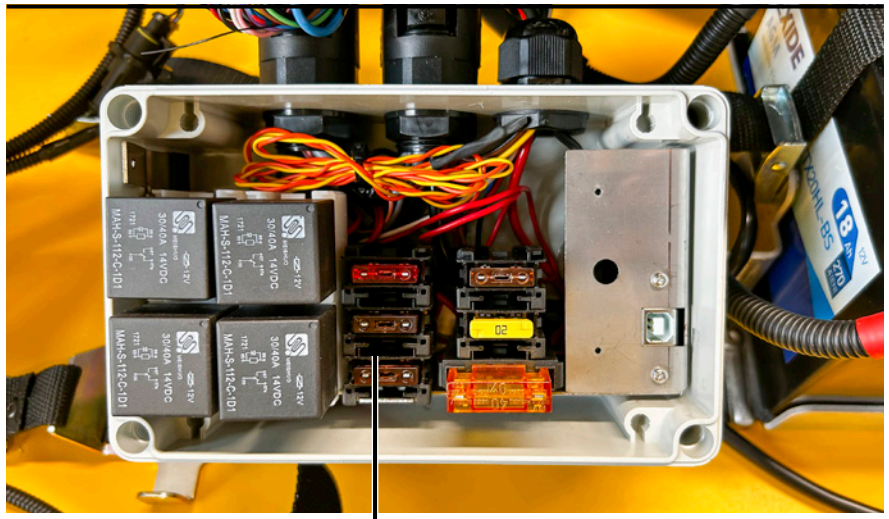
12.15 FUSES

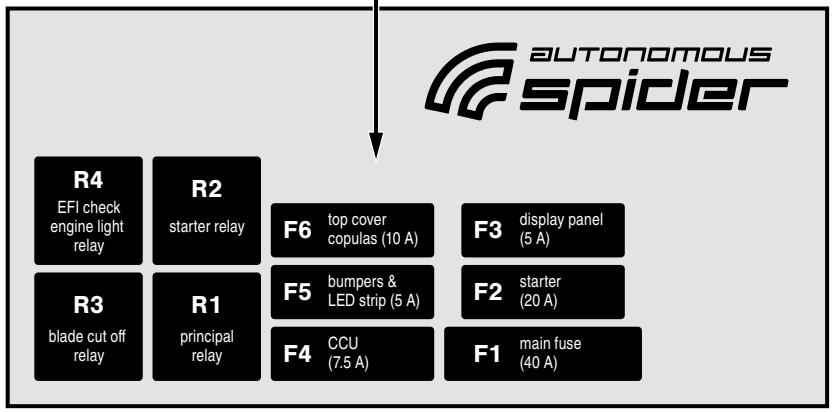
The fuse box is located in the space next to the battery. The fuse box houses the fuses for the individual circuits.

40 A parallel main circuit protection, steering servomotor
20 A starter coil, relay coils R3 and R4 (fault signaling)
10 A not connected (for future use)
7.5 A control unit
5 A indicator panel
5 A LED strip



Inside the machine between the engine and the alternator there is a 40 A charging fuse. Next to the engine there are engine injection fuses, which consists of a 10 A fuel pump fuse and a 2 A fuse of the engine control unit.





When changing fuses follow the electric current value for which the fuses are designed. Do not replace damaged fuses with fuses with a higher or lower electric current value. These could cause damage or even a fire in the mower!

12.16 MOWING BLADES

Check the state of cutting blades at regular intervals.

The blades:

- Must not show signs of damage such as twisted, bent or deformed parts of blades.
- Must be properly attached by the flange in the middle of blades.
- Must be sharp.
- The fastening bolts of the flange must not be damaged.

For proper and reliable functioning, the blades are statically balanced by the manufacturer. This balance must be preserved during the entire use of the blade. The blade must be statically balanced after each sharpening. To tighten the blade, use a torque wrench and a specified tightening torque of 100 Nm.



If the blades are damaged, it is prohibited to:
– Straighten them
– Heat them
– Weld them
– Ream them or otherwise change their construction.

When replacing worn-out parts follow these rules:

- The blade may only be sharpened within the permitted wear limit. Balancing must be carried out after sharpening.
- The blade cannot be repaired.
- When changing the blade, use new fastening bolts if the current ones show signs of damage. Only high-tensile steel bolts may be used for this purpose. **No other steel bolts are acceptable.**
- If the mowing mechanism vibrates when engaged, do not continue operating the mower, turn it off and contact your local dealer.
- To tighten bolts, use torque listed in the chart at the end of this chapter (see 12.23 *Torque Chart*).

Changing the mowing blades

1. Raise the mowing device to the transport position.
2. Stop the engine, switch off the RC and push the EMERGENCY button on the body of the mower.
3. Disconnect the spark plug and battery.
4. Lift one side of the mower until it leans against the handles on the other side. Always lift the mower on the fuel tank side to prevent oil entering the air filter.
5. Secure the lifted side against falling by supporting it.
6. Use gloves when changing the blades.
7. Loosen the fastening bolts. Remove the bolts and the washers. Be careful when removing the bolt, the blade may fall to the ground.
8. After the blade is replaced, fasten it by working in the reversed order.
9. Place the blade on the shaft with the raised ends of the blades pointing towards the bottom of the mowing deck.
10. Always check the screws when fitting the blades.
11. Check the fixing of the blades after assembly. Pay due attention to the first start-up of the mowing deck after changing the blades. Check for unknown noises, vibrations, etc.



Always lift the mower on the fuel tank side to prevent oil entering the air filter. Be aware of oil spills.

12.17 CHANGING THE WHEEL



Change the wheels on a level, firm surface.

1. Turn the wheel so that the tightening nuts are accessible from the outside.
2. Lift the mowing deck with the cutting heigt lever and place the spider stand underneath the mowing deck. Then lower the mowing deck this will lift the wheels in the air.
3. Stop the engine, remove the key from the ignition.
4. Secure the machine against movement.
5. Ensure the machine is safe & supported before working on it.
6. Loosen the wheel nuts, remove the wheel.
7. After repairing it, attach the wheel back in the reversed order.

Use suitable tools to unscrew the nuts.

12.18 TYRE PRESSURE



Keep the specified tyre pressure. Other values may unfavorably influence the driving characteristics especially on slopes. You may even lose control of the machine.

Recommended and max. tire pressure is 300 kPa / 3,0 bar / 43 PSI.

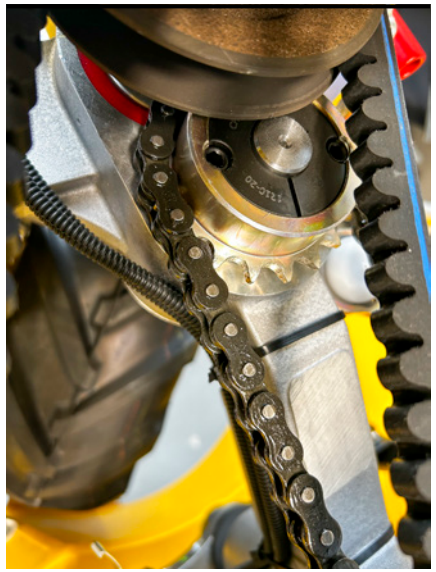
Exceeding the tyre pressure over 300 kPa (3 bar, 43 PSI) can damage the disc. Never inflate the tires below 250 kPa (2.5 bar, 36 PSI).

12.19 MOWING HEIGHT ADJUSTMENT MECHANISM

Keep the moving parts and the sliding bars clean, undamaged and without an excessive clearance. Maintain according to the table in chapter 12.1 *Mower Maintenance Plan*.

12.20 LUBRICATION

Use adequate amount of lubricant on parts, which are to be lubricated. Excessive lubricant tends to drop down and pollute both the machine and the environment. Insufficient amount requires frequent lubrications.



- Chain Spray Lubricant: **INTERFLON FIN LUBE TF**



- Lubricating grease: **Mobilgrease XHP 222**

12.21 CLEANING THE MACHINE

Cleaning the whole machine by a power washer or similar is not recommended. Water under pressure may penetrate inside electrical parts, air filter and cause malfunctions. The manufacturer recommends blowing out the dirt with high-pressure air. Do not use gasoline or other oil products for cleaning. Wipe other parts with tissue or brush.

12.22 CLEANING THE MOWING DECK

The mowing deck must be thoroughly cleaned after each use, especially the walls of the mowing deck. Cleaning should be done with a plastic scraper. Mower must not be washed using pressurized water or other high-pressure equipment.

When cleaning the mowing deck, raise the mowing deck to the maximum mowing height and place the mower into the service position (see chapter 5.1 *Service Position*). Secure it against movement. When cleaning, check the condition of the blades at the same time. Preserve the abrasive parts with a preservative coating, especially if you won't be using the mower for a long time. Proper maintenance and care of the mowing deck increase the quality of work and the service life of your machine.

When cleaning, if you lift the mower, secure it against fall and movement, press the EMERGENCY STOP button on the machine, disconnect the battery and spark plug connector.

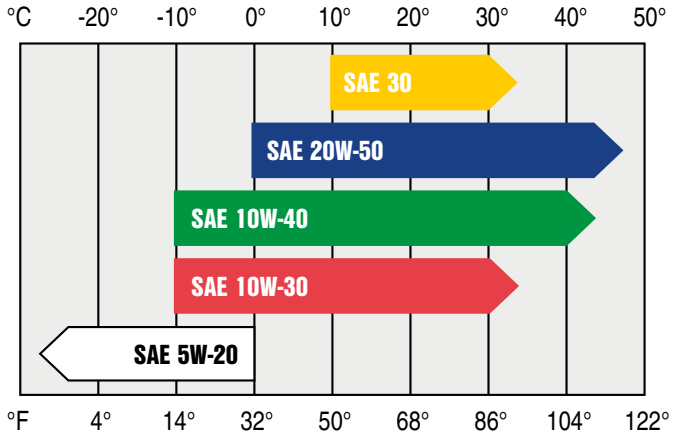
12.23 TORQUE CHART

CONNECTING BOLT	M6	M8	M10	M12	M14	M16	M20	Wheel nuts	Blade bolts
TIGHTENING TORQUE [Nm]	10	25	50	85	135	215	410	50	100

12.24 VISCOSITY OF ENGINE OILS

Oil requirements may vary depending on use in different seasons and different climate zones. The following table shows SAE values.

Table of SAE oil grades by outside temperature



We recommend using these oils:

- SAE 10W–40 API classification SF or higher

12.25 TECHNICAL PLATE

The technical plate provides information on mower fillings and basic information for machine maintenance. The technical plate is placed on the machine girder.

Type	AUTONOMOUS 2.0
Engine: Kawasaki FS 730V EFI	
Oil	10W40 / API SG
Quantity	2.1 l
Spark plugs	NGK BPR4ES
Fuel	Unleaded petrol
Hydrostatic system:	
Oil	Q8 AUTO 14
Quantity	8.5 l
Electronic system:	
Accumulator	12V/18Ah FBTX20L
Fuses	5A/7.5A/10A/20A/40A
Tires:	
Type	16 x 6.50 - 8
	max. 300kPa / 43 PSI
Lubrication:	
Chains	INTERFLON FIN LUBE TF
Sliding surfaces	INTERFLON FIN LUBE TF

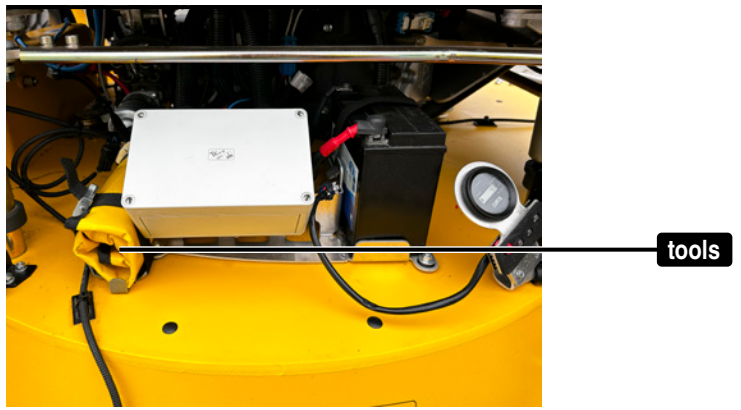
- COMBUSTION ENGINE
- ENGINE OIL
- OIL QUANTITY
- SPARK PLUG
- FUEL
- HYDROSTATIC SYSTEM
- HYDRAULIC FLUID
- FLUID QUANTITY
- ELECTRONIC SYSTEM
- ACCUMULATOR
- FUSES
- TIRES
- TYRE TYPE
- MAXIMUM PRESSURE
- LUBRICATION
- CHAINS
- SLIDDING SURFACES



12.26 TOOLS

SPIDER AUTONOMOUS 2.0 is equipped with a basic set of tools, which allow regular maintenance and basic servicing. The tools are placed behind the fuse box cover next to the fuse box (see figure below). The tool roll is also equipped with a pocked for the business card of your local authorized service.

list of tools	use
SPARK PLUG SPANNER 19, 21 mm	Spark plugs
SOCKET HEAD 19 mm	Change of mowing blades
SOCKET HEAD 17 mm	Change of wheels
SOCKET HEAD 15 mm	Tightening of drive belts
LEVER HANDLE	
FLAT SPANNER 10–13 mm	Tightening of drive belts
FLAT SPANNER 16–17 mm	By-pass, tightening of steering chain
HEX WRENCH IMBUS 5 mm	Wheel suspension
HEX WRENCH IMBUS 6 mm	Wheel suspension
HEX WRENCH IMBUS 8 mm	Tightening of steering chain
SCREWDRIVER FLAT TIP / CROSSHEAD	Fuse box
FUSES 40 A, 20 A, 10 A, 7.5 A, 5 A, 5 A	Fuse box



12.27 AUXILIARY DRIVE BRAKE

The machine is equipped with an auxiliary drive brake, which brakes the wheels in situations, when the pressure in the hydraulic circuit drops (engine shut down, air in the hydraulic circuit, result of using the EMERGENCY STOP buttons). The auxiliary drive brake works on the principle of a band brake, where the braking band brakes the pulley of the hydraulic motor and consequently also the wheels. The brake is controlled by a brake cylinder, which is connected to the filling circuit of the hydraulic pump. The braking effect will take place when the pressure in the hydraulic system drops. When the pressure in hydraulic system increases, the brake will be disengaged.

The brake includes a system, which allows the brake to be manually disengaged. If used together with the hydraulic by-pass, the machine can be moved without using its own drive (pushed, towed away). This system of moving may be used only when the hydraulic drive is not functional and the machine cannot use its own drive.

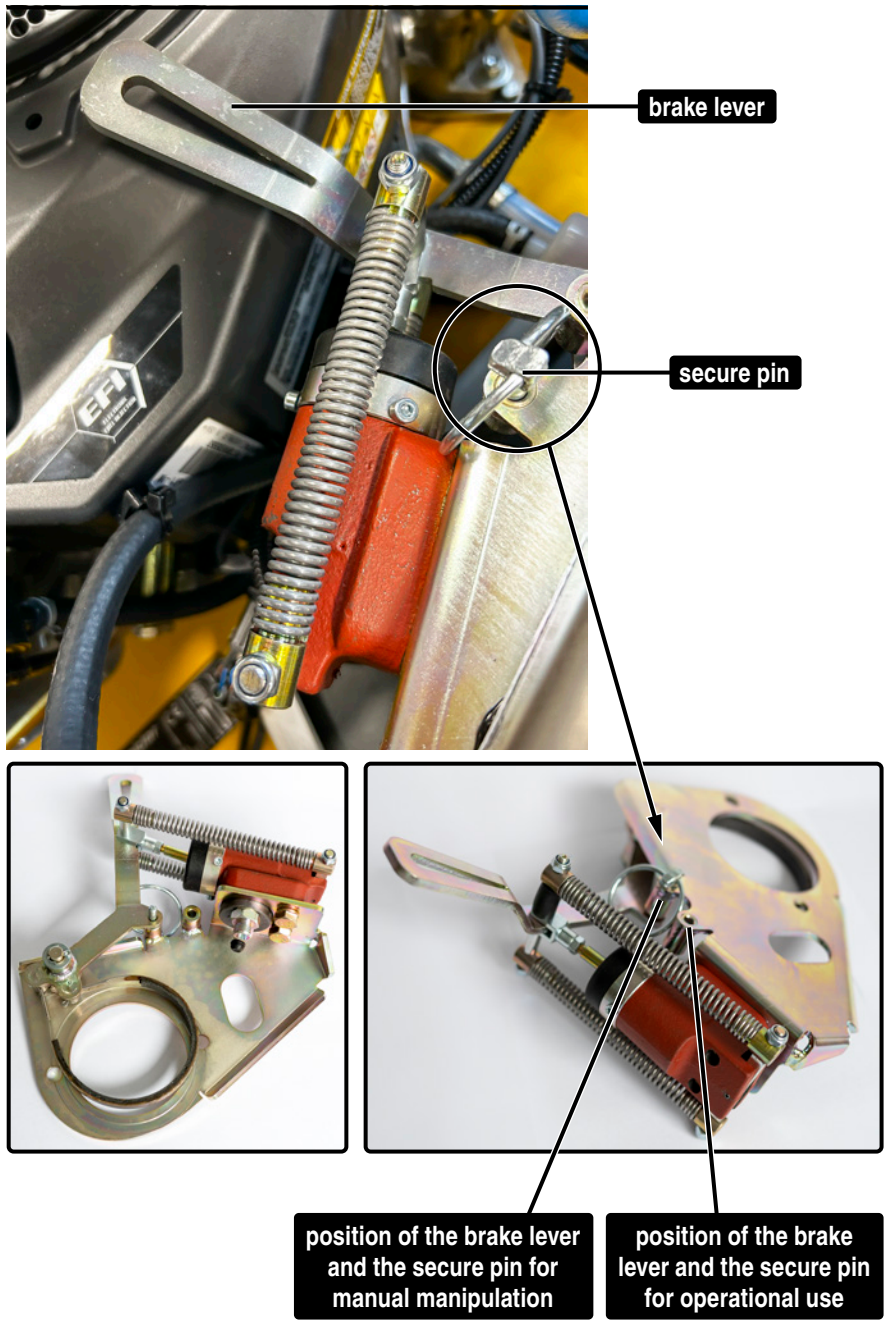
- For manual manipulation with the machine secure the brake lever by the secure pin.
- For normal operation if it absolutely necessary that the hydraulic by-pass screws on the hydraulic pump are tightened and the secure pin of the auxiliary brake released (see figure).

Before operation, make sure that the hydraulic pump by-pass screws are tightened and the secure pin of the auxiliary drive brake released.

Incorrect release of the auxiliary drive brake secure pin may lead to undesirable behavior of the machine on slopes, the machine may uncontrollably drive down the slope. Daily check the brake function especially when working on slopes.

If the lining gets thinner than 1 mm, replace it immediately. Have the brake adjusted by an authorized service/dealer (every 200 operating hours).

The auxiliary drive brake is designed only to brake the wheels during the drop of pressure in the hydraulic circuit and may not be used for securing the machine or parking on slopes.



12.28 ACCUMULATOR MAINTENANCE

The battery should be examined for cleanliness at regular intervals.

READ THE SAFETY INSTRUCTIONS!

Keep cell terminals and connectors free of dust and corrosion. Terminal corrosion may affect the performance of the battery and could present a safety hazard. Should corrosion be observed, disconnect the battery, unbolt and remove the connectors, and remove the corrosion by brushing the terminals and connectors with a dilute solution of baking soda and water (sodium bicarbonate). Reapply an anti-oxidizing grease before reconnecting and bolting the connectors. Always maintain proper records.

DO NOT UNDER ANY CIRCUMSTANCES REMOVE PRESSURE RELIEF VALVES AND NEVER ADD WATER.

How to store your battery

To ensure our batteries safely reach their maximum shelf life, the average annual storage temperature should be 15 °C. The short-term storage temperature must not exceed 25 °C or battery life may be affected.

1. Remove the battery from the vehicle.
2. Find a cool, dry place to keep your battery.
3. Make sure the battery is fully charged and recharge it approximately every two months.
4. Clean any corrosion on clamps which may affect the performance of the battery and could present a safety hazard. Remove the corrosion by brushing the clamps and connectors with a dilute solution of baking soda and water (sodium bicarbonate). Reapply an anti-oxidizing grease before reconnecting and bolting the connectors.

Testing a battery

The best and easiest way to test a battery is using a voltmeter or multimeter to measure the voltage. Once you know the exact voltage, use the table below to gauge the state of charge, if uncertain use a battery load tester to test the bateries load capacity.

Battery Testing Chart with Battery Status

Voltage		Charge	Status	Action Required
Freshpack	AGM			
>12,6 V	13 V	100 %		No action necessary
12,4 V	12,8 V	75 %		No action necessary
12,1 V	12,5 V	50 %		Battery needs to be charged
11,9 V	12,2 V	25 %		The battery must be recharged urgently
<11,9 V	< 12,0 V	0 %		Battery is no longer usable

Make sure the battery is charged.

To ensure that the battery can supply its stated starting power, it first needs to be fully charged. The recommended charging current is 10 % of nominal capacity in amperes (e.g. a 4 Ah battery requires a 0.4 A [Ampere] charging current). We recommend you to ensure that your battery is fully charged before use to ensure a long service life.

When charging make sure to use a suitable AGM/Gel battery charger. Do not use a lead/acid charger.

13

Faults and Exceptional Operating Conditions

failure	possible cause	remedy
RC CANNOT SWITCH ON	dead battery	replace the battery or charge the RC
	EMERGENCY/STOP button is defective	replace (performed by authorized service)
	the main board is not powered	check the main board power supply from the battery
JOYSTICKS, BUTTONS, POTENTIOMETER OR RC LEVERS DO NOT WORK	broken circuit	replace (performed by authorized service)
DISPLAY RC IS NOT FUNCTIONAL	broken circuit or damaged display	replace (performed by authorized service)
RC DOES NOT CONNECT TO THE MACHINE, EVEN AFTER FORCED BT PAIRING	BT module not working in RC or on the machine	replace (performed by authorized service)

failure	possible cause	remedy
THE MACHINE DOES NOT RESPOND TO PRESSING THE SOS/TEST BUTTON	the machine is not paired with the controller	functionality check and pairing will be performed by an authorized service
	SX module is broken	replace (performed by authorized service)
UNWANTED SAFETY BUMPER ACTIVATION	mechanical damage to the bumper or silentblock	replace
	incorrect adjustment of the bumper (switching rod is not in the middle of the switching sensor)	adjustment via silentblock attachment
	thick grass caught on the bumper	clean the bumpers and check their condition
NO SAFETY BUMPER ACTIVATION	mechanical damage to the bumper	replace
	the inductive sensor is not working	replace (performed by authorized service)
CST WILL NOT START	dead battery	charge CST
	the ON/OFF lever is defective	replace (performed by authorized service)
THE LEVERS ON THE CST ARE NOT FUNCTIONAL	broken circuit	replace (performed by authorized service)
CST IS NOT CONNECTED TO THE GSM NETWORK	weak GSM signal	switching off the CST and placing it in a place with a better signal
	faulty SIM card	replace (performed by authorized service)

failure	possible cause	remedy
CST HAS NOT FOUND ITS POSITION	the CST is located in a place with a poor view of the sky	switching off the CST and placing it in a place with an open view of the sky
	GNSS antenna is not working	replace (performed by authorized service)
	poor satellite coverage or poor atmospheric conditions	wait for conditions to improve
CST DOES NOT SEND RTCM DATA	hasn't found its location	see above
	RTCM data transmitter is not working	replace (performed by authorized service)
THE ENGINE WON'T START	discharged battery	recharge battery, check fuse
	disconnected battery	connect the clamps to the battery
	broken lines	check/replace wiring, check fuse
	the sparkplug doesn't spark	clean the spark plug
	clogged fuel filter	replace
	lack of fuel	refuel
	lack of oil in the engine	top up the oil to the specified level
	the mower does not have a BT connection to the RC	check the connection, approach the mower
	EMERGENCY STOP button on the mower pressed	disarm button

failure	possible cause	remedy
THE MOWER HAS INSUFFICIENT OR NO TRAVEL	lack of hydraulic fluid in the hydraulic circuit	fill up the hydraulic fluid and deaerate it properly
	overheated oil	clean the fan area, wait for the oil to cool down
	clogged hydraulic fluid filter	replace
	worn mechanical components of the hydraulic circuit	replace
THE MOWER DOES NOT GO UP THE SPECIFIED SLOPES	worn V-belts	replace
	insufficiently tensioned V-belts	tighten
	damaged hydraulic pump servomotor	replace
THE MOWER VIBRATES WHEN STARTED	bent blade carrier shaft	replace the shaft
	damaged or unbalanced blades	replace blades
	insufficiently fixed blades	replace the blade bolts and tighten them properly
	variously worn or damaged blades	replace
POOR MOWING QUALITY	overgrown, too tall grass	cut grass that is no more than 3 times higher than the set mowing height; we recommend cutting the grass, letting it dry and cutting it again
	dull/worn blade edge	sharpen or replace blades
	grass too wet	wait for the vegetation to dry out
	high driving speed	reduce speed

failure	possible cause	remedy
MOWED GRASS IS COLLECTED IN THE MOWER DECK	grass too wet	wait for the vegetation to dry out
THE MOWER DOES NOT ACCEPT THE ROUTE	the mower is not on a data connection (ONLINE)	location in a place with a better signal
	LTE antennas are not connected to the control unit	check and tighten the thread if necessary
	non-functioning GSM antenna	replace (performed by authorized service)
	faulty SIM card	replace (performed by authorized service)
THE MACHINE HAS NOT FOUND ITS POSITION	the CST is located in a place with a poor view of the sky	switching off the CST and placing it in a place with an open view of the sky
	GNSS antenna is not working	replace (performed by authorized service)
	poor satellite coverage or poor atmospheric conditions	wait for conditions to improve
THE MACHINE DOES NOT RECEIVE RTCM DATA	CST does not send RTCM data	see above
	the machine is in radio shadow	move the machine to a location with a better view of the CST
	RTCM data receiver is not working	replace (performed by authorized service)

failure	possible cause	remedy
THE MACHINE DOES NOT SWITCH FROM MANUAL MODE TO AUTONOMOUS MODE	CST is out of the set range of the station	move the station closer to the machine
		check on the portal if the CST closest to the machine is selected
	machine not calibrated	it is necessary to ride for at least 10 seconds in Manual mode, while the machine must know its exact position (RTK FIX)
	the route is outside the set distance from the starting point of the route	move the machine as close as possible to the starting point of the route in Manual mode
		check the correctness of the chosen route on the portal
THE MACHINE RUNS IN AUTONOMOUS MODE WITHOUT MOWING SWITCHED ON AND VERY SLOWLY (even if mowing is required by the operator)	the machine is in emergency mode	blow out the air filter, engine fins, central radiator and wait for the machine to cool down
THE MACHINE EXITS AUTONOMOUS MODE WITHOUT OPERATOR INTERVENTION	the machine got stuck in a rough terrain	check the machine status and move the machine in Manual mode
	non-functional wheel speed control	repaired by an authorized service center
THE MACHINE DOES NOT PROCESS THE PERIMETER RECORDING	the machine lost its exact position during recording (RTK FIX)	capturing the Perimeter border in places with better signal
	machine lost GSM network connection (ONLINE)	placing the machine in a location with a better signal

14

Post-Season Maintenance

After the end of the season or if the machine will not be used for more than 1 month, it is advisable to either drain the fuel tank or add fuel stabilizers.

If petrol remains in the tank without moving for more than one month, a sticky deposit can form which can adversely affect the entire fuel system and could cause poor engine function.

- Thoroughly clean the entire machine, especially the mowing deck.
- Replace defective and worn parts.
- Check all bolted connections. Tighten loose nuts and bolts.
- Lubricate all moving parts—the whole machine (according to the lubrication plan see chapter 12.1 *Mower Maintenance Plan*)
- Empty the fuel tank.
- Emptying should be carried out in the open air outside confined spaces, observing all safety regulations for handling explosive substances.
- Disconnect the ignition cable.
- Unscrew both plugs and pour a little oil into the bore of each cylinder (about 1 cm).
- Start the engine with a short start, without the spark plugs in.
- Screw the spark plug in lightly by hand. Do not plug the cable in again.
- Remove the battery from the machine and place it in a dry and warm place.
- Prevent unauthorized persons from accessing the machine.
- Protect the machine against the weather, but do not use leak-proof protection due to the possibility of increased corrosion.

15

Support for SPIDER AUTONOMOUS 2.0

15.1 WARRANTY CONDITIONS

For this product of the company SNT—SPIDER NEW TECHNOLOGY s.r.o. a guarantee is provided according to the addendum to the purchase contract. The warranty covers material defects and manufacturing defects, please follow our general terms and conditions (please see, *https://www.spidernewtech.com/support#warranty*). In case of questions regarding the network of our contractual partners, please contact us at the following contacts listed below. Service center address is listed below:

SNT — SPIDER NEW TECHNOLOGY s.r.o.
Street: Froncova 476
Zip code: 198 00
City: Praha 9 – Hostavice

spidernewtech.com
info@spidernewtech.com
HARDWARE support: +420 226 886 411
SOFTWARE support: +420 226 886 410

15.2 MAINTENANCE SUPPORT

Please follow our general terms and conditions that are part of the purchase contract. For maintenance support, please contact the dealer where you purchased the product or the appropriate authorized service. All information regarding the network of our contractual partners can be found at the contacts listed on the previous page.

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