

**TOW BEFORE FLIGHT**



# AIRCRAFT TUG TF3



# OPERATING MANUAL

VERSION 20-02



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# 1. INTRODUCTION

## 1.1 YOUR AIRCRAFT TUG

The TowFLEXX TF3 is a product of long development and offers the best possible safety, economy and comfort when towing aircraft. It is up to you to maintain these characteristics for a long time and to use the resulting advantages.

This operating manual shows everything worth knowing about commissioning, towing with the TowFLEXX TF3 and maintenance. Inspection and maintenance work must be carried out regularly and with the operating materials and aids provided. Expert knowledge, special tools and measuring instruments are required for maintenance and repair work not described here. Please contact your dealer or the manufacturer. Maintenance may only be carried out by qualified and certified persons.

## 1.2 NOTES ON THE OPERATING INSTRUCTIONS

For safe operation of the aircraft tug, basic knowledge is required, which is learned and provided by these operating instructions. All information presented clearly and informatively. All chapters are numbered and the page numbers are marked.

As we are constantly advancing the further development of our aircraft tugs, we reserve the right to make changes in form, color, equipment and technology. Thus, from the content these operating instructions do not derive any claims to certain characteristics of the aircraft tug.

## 1.3 TARGET GROUP AND PREVIOUS KNOWLEDGE

These operating instructions are intended for all persons involved in the work process of towing aircraft and helicopters with the described aircraft tug. This includes the following groups of persons:

- end customer, user
- aircraft tug maintenance personnel
- dealer

The following knowledge is required for commissioning, installing and operating electric aircraft tugs:



- *Basic knowledge of mechanical and electrical engineering (according to training)*
- *Reading these operating instructions*

## 1.4 SCOPE OF DELIVERY

Always included:

- TowFLEXX TF3 aircraft tug
- Remote Control incl. charger and spare batteries
- Integrated charger incl. charging cable
- Operating Instructions

## 1.5 USE OF SYMBOLS IN SAFETY INSTRUCTIONS

This operating manual contains safety instructions with symbols that indicate possible hazards or residual risks. These safety instructions and symbols have the following meanings:



**Risk:** This safety note indicates the imminent danger to the life and health of persons! Failure to comply with these instructions can result in a health risk for life-threatening injuries and property damage.



**Attention:** This safety note indicates possible hazards due to electric current! Failure to comply with these instructions can result in a health risk for life-threatening injuries and property damage.



**Danger:** This safety note indicates possible hazard of crushing, which exists in exceptional cases. Failure to comply with these instructions can result in a health risk for life-threatening injuries and property damage.



**Note:** Note the Obligation to Read the Operating instructions!

## 1.6 SAFETY INSTRUCTIONS

These operating instructions contain safety instructions that point out possible hazards and thus enable safe operation of the electric aircraft tug. Please follow these safety instructions at all times!

In this section you will find general safety instructions which do not refer to any specific work step. Special instructions can be found in the specific sections.

### 1.6.1 GENERAL SAFETY INSTRUCTIONS



Before the aircraft tug is put into operation, it is imperative to read the operating instructions, understand them and make them available to other users!



Never open the motor control unit or other covers! There is a hazard due to electric current flowing.



The motor control unit may only be operated with the 24V DC nominal voltage which is specified on the type plate!



It must always be ensured that no connections or switches are damaged. It is prohibited to operate the aircraft tug with damaged components!



In the event of a malfunction (e.g. if the engine control unit continues to drive by itself, if a direction button is stuck) immediately activate the emergency stop switch on the radio remote control, or one of the two battery disconnect switches on the aircraft tug!



All electrical components must be protected from moisture, dripping and splashing water!



The electric aircraft tug may not be operated in a potentially explosive atmosphere!





When towing aircraft, there is a hazard of crushing. Care must therefore always be taken to ensure that no objects or persons are in the danger area and not reached into it.



Modifications or alterations to the engine control unit, operating elements, mechanics and switches are prohibited and result in the immediate void of warranty and damage claims!



This device may only be used by persons who have successfully completed training (whether in-house or by TowFLEXX personnel).

## 1.6.2 IMPORTANT SERVICE NOTE



Only original accessories are approved! These may only be installed by qualified service personnel! Otherwise, warranty and guarantee claims will be void!



Only cables with plug connections may be replaced by the user. Further modifications must be carried out by specialist companies or official TowFLEXX personnel.

## 1.7 STORAGE OF THE OPERATING INSTRUCTIONS

This manual must remain somewhere close to the aircraft tug accessible for all users at any time. You can download a digital copy via the following QR code:




## 1.8 COPYRIGHTS

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 +49 4445 988-144

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# 2. RISIK AND SECURITY STATEMENTS

## 2.1 INTENDED USE

The aircraft tug may only be used for its intended purpose. It is used to move aircraft via the nose wheel. The load capacity of the carrier must be taken into account (max. load).

Damaged or defective tugs may not be operated until they have been properly repaired. Safety switches, brackets and safety devices must not be removed or disabled. Specified settings must not be changed without the manufacturer's written consent.

## 2.2 USE UNDER EXTREME CONDITIONS

Using the aircraft tug under extreme conditions can lead to malfunctions and accidents.

- For operations under extreme conditions, especially in highly dusty or corrosion-causing environments, the aircraft tug requires special equipment and approval.
- Use in potentially explosive areas is not permitted.



- In case of storms (storm, lightning strike) the aircraft tug may not be operated outdoors or in endangered areas. Particular attention must be paid to the maximum crosswind component of the towed aircraft. Excessive crosswind loads can lead to loss of traction and thus to loss of control of the tug.

## 2.3 DANGER AREA

A danger zone is defined as the area in which persons are endangered by movements of the tug with and without the aircraft being towed. No persons may stay in the hazardous area of the tug. The manufacturer recommends a safety distance of at least 2 metres. In addition, the user must always keep his surroundings in view and be aware of other potential sources of danger.



***WARNING: Risk of accident/injury when staying in the danger area of the aircraft tug.***

## 2.4 SLOPE AND INCLINE

Incline and / or slope must not exceed the stated values on the dataplate and must have a sufficiently rough surface. At the top or bottom end, level and smooth transitions should prevent the tug from touching down or damaging it. Follow all applicable technical data per specific aircraft technical order.

Full traction can only be achieved on a flat surface. The higher the incline, the weaker the traction. Slopes and inclines affect the maximum towing capacity enormously. If the tug is operated continuously (for more than five minutes) on a slope, it may cause the main fuse to blow. This protects the electronics and does not damage the device.

The tug should not be operated in case of a too steep down grade, because under certain circumstances the braking force of the motors may not be sufficient anymore.



***WARNING! If slopes or inclines are ignored, there is danger to life. Your aircraft and tug could be damaged! Maximum towing capacity can only be granted on flat surfaces.***

The EU Directive 89/654/EEC (Minimum Requirements for Safety and Health at Work) in its current version must be complied with. For countries outside the EU, the national regulations apply.

## 2.5 ROUTES AND PARKING

Driveways must be adequately secured, leveled and free from objects. The driveways must be clearly visible to the operator. Guide rails of hangar gates, drainage channels or similar must be leveled in such a way that they can be driven over without shocks. Maximum area and point-loads must not be exceeded.

## 2.6 OBLIGATIONS OF THE OPERATOR

For the purposes of these operating instructions, an operator is any natural or legal person who uses the aircraft tug himself or is employed on his behalf. In special cases (e.g. leasing, rental), the operator is the person who, in accordance with the existing contractual agreements between the owner and operator of the aircraft tug, must carry out the mentioned operational duties.

The operator must ensure that the aircraft tug is only used for its intended purpose and that dangers of any kind to the life and health of the operator or third parties are avoided. In addition, the operator must ensure that the accident prevention regulations, other safety regulations and the operating, maintenance and repair guidelines are observed. The owner/operator must ensure that all operators have read and understood this operating manual.



***Failure to comply with this manual will void the warranty. The same applies if the customer and / or third parties have performed improper work on the tug without the manufacturer's consent.***

## 2.7 ATTACHMENTS OR ADDITIONAL EQUIPMENT

The installation or attachment of additional equipment to affect the functions of the aircraft tug, or to supplement the functions of the aircraft tug, is only permitted with the written approval of the manufacturer. If necessary, approval must be obtained from the local authorities. However, the approval of the local authorities does not replace the approval of the manufacturer.

## 2.8 IMPROPER USE

Any use for which the tug is not approved is the responsibility of the operator or driver and not the manufacturer. The following list is only an example and does not claim to be exhaustive. The tugs not approved for:



- Riding on the tug unless the tug is specially equipped for this purpose
- Use in fire or explosion-hazard areas unless it has special certification for this
- Exceeding the maximum capacity
- Exceeding the restricted speed at max towing



***DANGER: Improper use can result in serious injuries or even death.***

## 2.9 RESIDUAL RISKS

Despite observance of all listed safety instructions, certain residual risks can not be excluded. When operating the aircraft tug, maximum attention must be paid to the tug, environment and aircraft.

## 2.10 PROTECTIVE MEASURES

In order to prevent injuries, the operator must be equipped with sufficient protective clothing. In general, the operator must wear safety shoes when towing. If you are working on the apron in low light / no light condition you must also provide safety vests for every person involved in the operation.

If the above protective measures are not provided by the operator, the operator must refrain from operating the aircraft tug.

## 2.11 DRIVING PERMIT

The aircraft tug may only be used by persons who are trained by officially certified personnel and who have demonstrated to the operator or his agents their ability to tow aircraft and have subsequently been expressly assigned to operate the aircraft tug. If necessary, the national regulations must be observed.



***The manufacturer strongly recommends product training for all operators. Alternatively, a train the trainer program is available. For further questions please contact your dealer or the manufacturer.***

## **2.12 RIGHTS, OBLIGATIONS AND RULES OF CONDUCT**

The operator must be informed about his rights and obligations, instructed in the operation of the aircraft tow tug and familiarized with the contents of this operating manual.

## **2.13 PROHIBITION OF USE BY UNAUTHORIZED PERSONS**

The operator is responsible for the aircraft tug during the period of use. The operator must forbid unauthorized persons to drive or operate the tug. No persons are allowed to be transported on the TowFLEX equipment or support equipment being towed.

## **2.14 DAMAGE AND DEFECTS**

Damage and other defects to the aircraft tug or its attachments must be reported immediately to the supervisor. Tugs that are unsafe to operate (e.g. worn wheels or defective brakes) must not be used until they have been properly repaired.

## **2.15 REPAIRS AND MAINTENANCE**

The operator must not carry out any repairs or modifications to the aircraft tug without written authorisation and without special training. Under no circumstances may the operator disable or block safety devices or controls.

## **2.16 FIRE PROTECTION**

At no time escape routes or other fire protection equipment must be blocked by the aircraft tug or its attachments or accessories. Explosion-hazardous areas may not be entered and should be avoided at a safe distance.

There must be no flammable materials or sparking equipment within a distance of at least 2 metres to the aircraft tug parked for charging. The room must be ventilated and fire protection equipment must be provided in sufficient quantity.

The operator must ensure that sufficient fire protection. If necessary, additional fire protection must be provided on the tug. If there is any uncertainty, the responsible supervising authority will provide information.



***Risk of burns due to the use of unsuitable fire protection. In case of fire, reaction with battery acid may occur when extinguishing with water. This can lead to acid burns.***

***- Never extinguish burning batteries with water.***

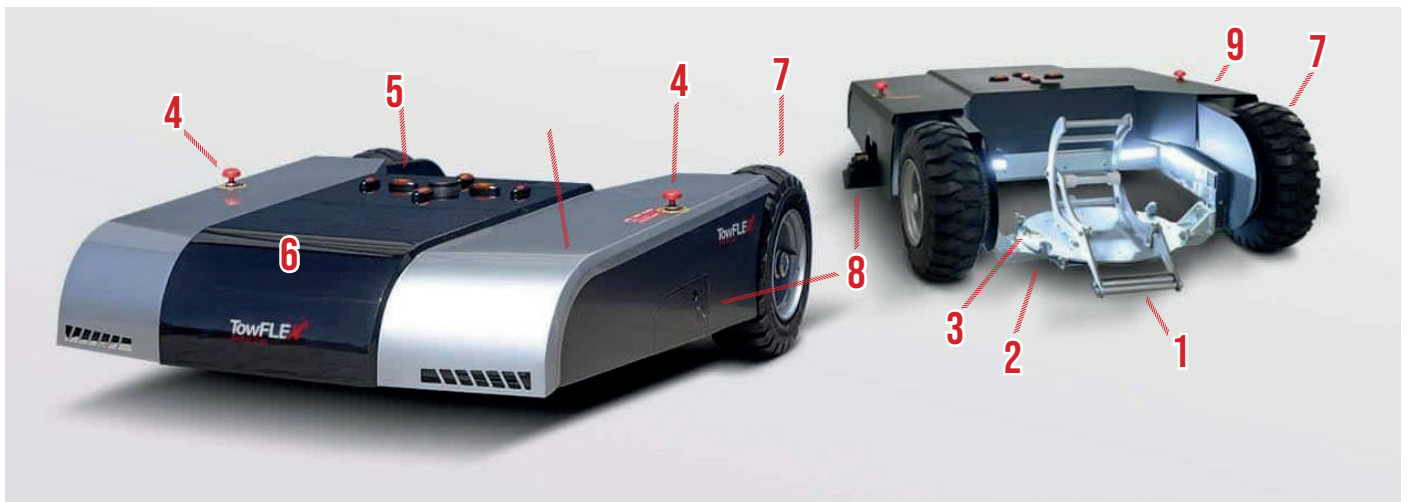
# 3. VEHICLE DESCRIPTION

## 3.1 APPLICATION

The TowFLEXX TF3 is an all-electric, towbarless aircraft tug designed for towing and manoeuvring aircraft.

The aircraft tug can be operated both in the hangar and on the apron and allows several towing operations per day, depending on the weight without intermediate charging. Weight restrictions and maximum capacities are indicated on the type plate.

## 3.2 ASSEMBLIES AND FUNCTIONS



1	Nose Wheel Mount
2	Turntable
3	Turntable locking Pin
4	Battery Disconnect Switch (e-Stop)
5	Direction Indicator- & Status-LEDs
6	Hinged Hood
7	Drive Wheels (air-filled)
8	Battery Charger (Tug)
9	Battery Charging Tray (Remote Control)





### 3.3 GENERAL VEHICLE DESCRIPTION

The frame of the aircraft tug is a steel construction and is finished with a surface coating, making it fully weatherproof. Two individually driven wheels together with the fixed castor make the aircraft tug extremely manoeuvrable so that it can be turned 360 degrees on the spot without any restrictions.

The charger and the remote control battery charger are located in the left side storage compartment. The right side storage compartment contains the socket for a ground power cable. All functions of the tug are electronic or mechanical. This means that the aircraft tug does not have any hydraulics at all.

### 3.4 DRIVE

Two 2.2kW 24 VAC motors serve as drive. By the flanged spur gear and the power transmission by chain drive we achieve the high required tractive forces. For optimal power transmission, two 18" air-filled tires are mounted as drive wheels.

### 3.5 LIGHTING

The lighting system includes:

- two front headlights
- two taillights
- Direction indicators and status LEDs
- Flashing- or rotating beacon (optional)

### 3.6 BRAKE

In general, the aircraft tug is braked via energy recovery. The motors work like generators and feed the batteries slightly with the regenerated energy. If this normal deceleration is not sufficient enough, the deceleration can be increased by an opposite control command.

When the vehicle is at a standstill or on slopes and inclines, the magnetic brake is engaged as soon as no driving command is given. It is released automatically as soon as a new driving command is executed.

### 3.7 NOSE WHEEL MOUNT

The nose wheel is moved onto the mount over a mechanical ramp. The wheel size is determined by the mount. This mount is assembled on a 360 degree turntable that allows to rotate the tug freely around the nose gear. The following mounts are currently available for the TF3:



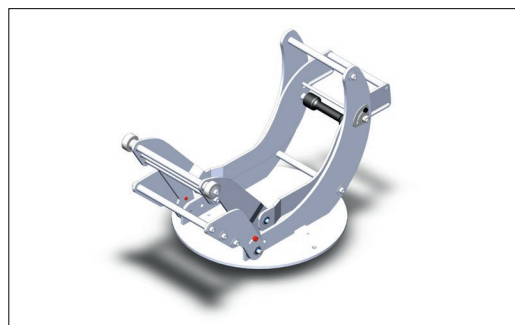
Mount 5"



Mount 6"



Mount „PC24“



Mount „King Air“



**WARNING:** *If the nose wheel mount is open, the lower end of the ramp should not touch the ground, but should hover a few centimetres above the ground. If this is not the case, first check the air pressure of the air-filled tires, otherwise contact the support!*

### 3.8 CONTROL UNIT

All electronic components and controls are located on one board. This allows easy maintenance and replacement in case of a defect or later modernization of the electronics.

The board can also be replaced with a few simple steps in order to incorporate any innovations in the control systems. This forms the heart of the aircraft tug.

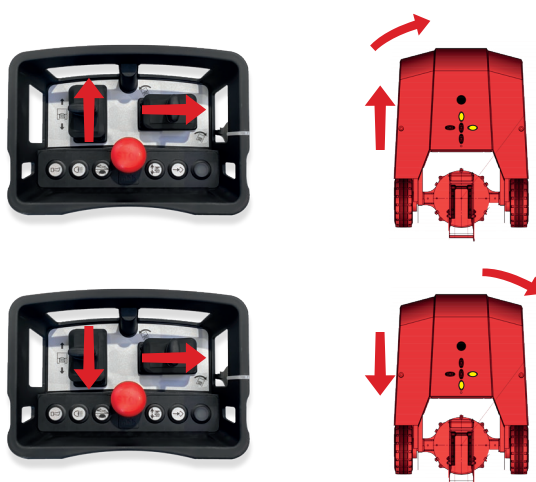


**WARNING: Work on the control unit may only be performed by TowFLEXX personnel. If any works are carried out without written confirmation from the manufacturer, all warranty claims will be voided!**

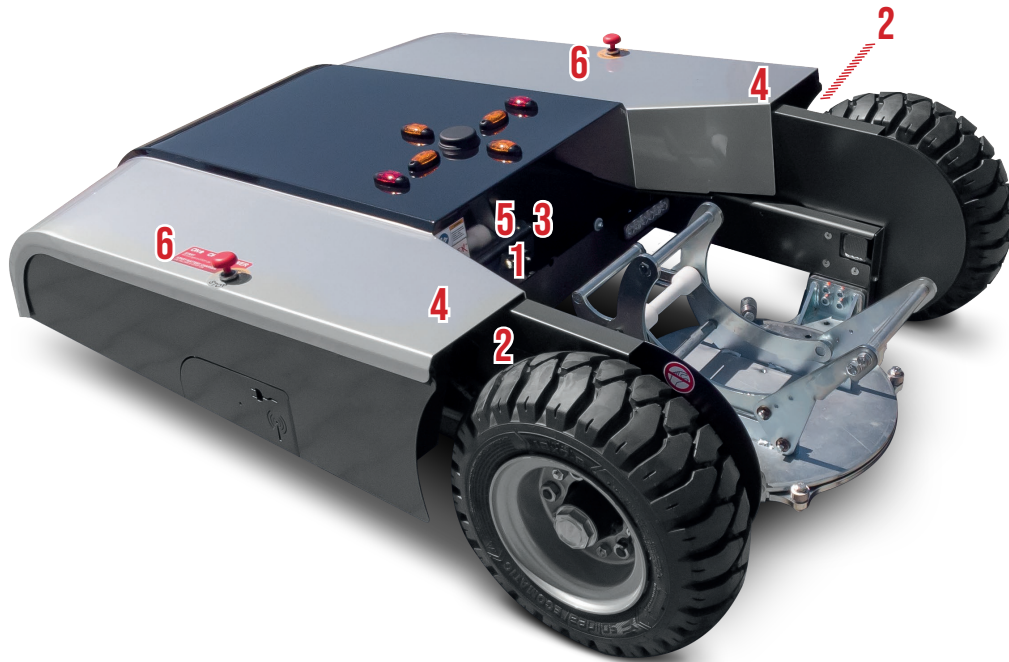
### 3.9 CONTROL STATEMENT

The aircraft tug is controlled by two differentially driven wheels. Together with a fixed castor in the front of the aircraft tug, this enables it to turn on the spot.

The directional indicators of the aircraft tug show the direction in which the nose of the tug is moving.



### 3.10 WARNING SIGNS AND TYPE PLATES



<b>TOWFLEX</b> Aircraft Tugs		Weight /kg _____
P/N _____	Weight /lbs _____	
S/N _____	Max. tow. cap. /kg _____	
MFD _____	Max. tow. cap. /lbs _____	
Bat. Type _____	Inspection _____	
Bat. Rating _____		
Manufactured at TowFLEX GmbH Wiesentropfen 56-56 D-49429 Vissbek		
CE		

<b>⚠ DANGER</b>		<b>⚠ DANGER</b>	<b>⚠ DANGER</b>		<b>⚠ DANGER</b>	<b>⚠ DANGER</b>		<b>⚠ DANGER</b>
Risque d'écrasement. Les pièces mobiles peuvent écraser et couper. Gardez les mains à distance. Déconnecter et verrouillage avant l'entretien.	Crush Hazard. Moving parts can crush and cut. Keep hands clear. Disconnect and lockout power before servicing.	Tension dangereuse à l'intérieur. Cet appareil doit être entretenu par du personnel formé uniquement.		Hazardous voltage inside. This unit is to be serviced by trained personnel only.	Conduire le véhicule uniquement sur des surfaces planes. Les pentes et les surfaces peuvent avoir une capacité de chargement maximale. Le déchargement de la capacité de chargement maximale peut entraîner un glissement qui peut entraîner de graves dommages, voire la mort.		Operate the aircraft tug only on levelled surfaces. Slopes and inclines can have a heavy effect on the maximum loading capacity. Exceeding the maximum loading capacity can result in slipping which can lead to serious damage or even death.	

<b>⚠ AVERTISSEMENT</b>		<b>⚠ WARNING</b>
Lisez et comprenez le manuel d'opération avant d'utiliser cet équipement.		Read and understand operator's manual before using this machine.
Le non-respect des instructions d'utilisation peut entraîner des blessures corporelles ou endommager l'équipement.		Failure to follow operating instructions could result in personal injury or damage to equipment.

<b>ON</b>	<b>OFF</b>	<b>POWER</b>
BATTERY CHARGER		
EMERGENCY STOP	EMERGENCY STOP	

1	Type Plate
2	Warning Sign - Danger - Crush Hazard
3	Warning Sign - Danger - Hazardous Voltage
4	Warning Sign - Danger - Operate on levelled Surfaces
5	Attention - Read Manual
6	Battery Disconnect Switch (eStop)



## 3.11 EC-DECLARATION OF CONFORMITY

### MANUFACTURER AND DISTRIBUTING COMPANY

Name: TowFLEXX GmbH  
Street: Wöstendöllen 95-96  
City: D-49429 Visbek  
Country: Deutschland  
Phone: +49 (0)4445-988144  
E-Mail: info@towflexx.com



Hereby declare that the device described below in the version we have placed on the requirements of the EC Directives listed below. In the event of a change or improper use not agreed with us, this declaration shall be invalid.

### DESIGNATION OF THE DEVICE

Towing tractor for aircraft, trailers or other non-self-propelled rolling devices.

Device-Type: TowFLEXX TF3 - Aircraft Tug up to 9.000kg towing capacity  
Identification No.: TF32001XX - ...

### APPLIED DIRECTIVES AND STANDARDS

Machinery Directive 2006/42 EG in the last Version, EMC Directive 2004/108 / EC in the latest version for industrial trucks implemented in the harmonized standard EN 12895, Applied standards and specifications: \*

DIN EN ISO 12100- (3/2011) Safety of machinery, general principles of design risk - division u.  
Risk reduction.

  
Axel Schickling  
CEO

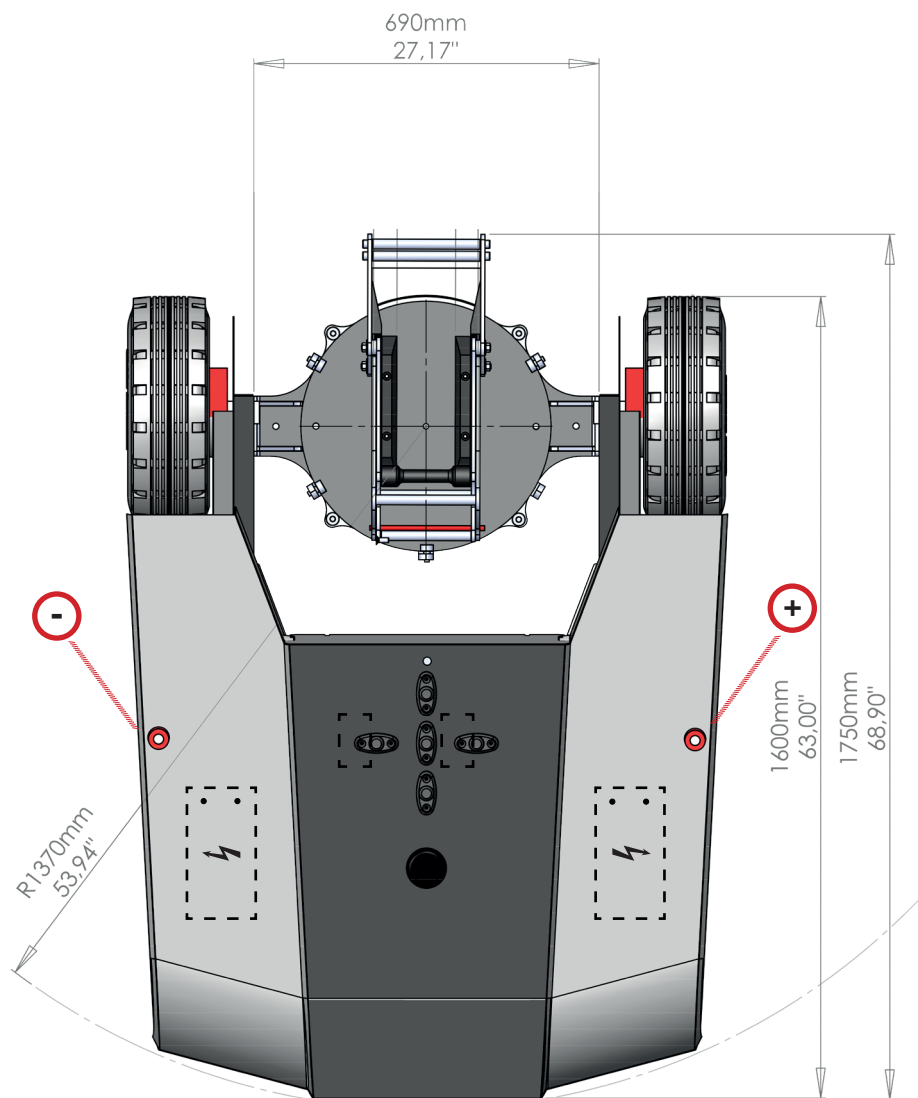
\* The valid version of the standards/specifications on the date of issue of this declaration always applies.

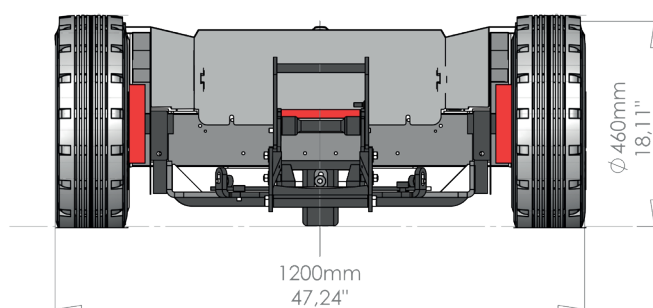
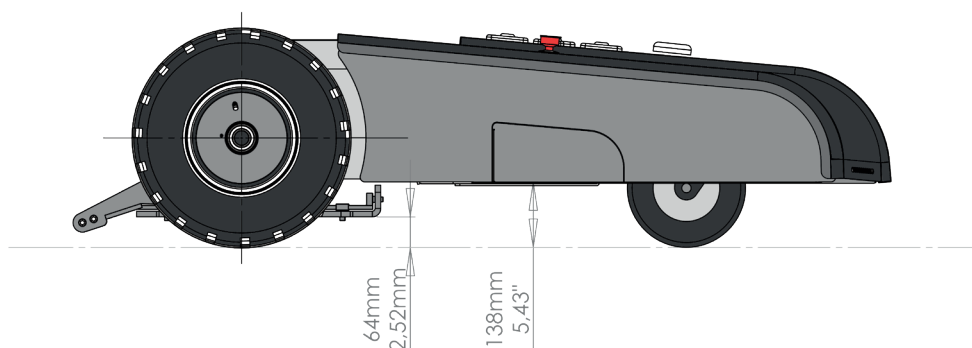
### 3.12 OTHER CERTIFICATIONS

- EN 292-1
- EN 292-2
- EN 60204-1
- EN 50178
- IEC 801 (2-4)
- EN 50142
- EN 55011
- EN 50081-2,
- EN 50082-2
- IEC 68-2 (-1, -2, -3, -6, -27)
- EN 60529
- EN 300-220-3 1.1.1
- EC Machinery Directive (89/392/EEC)
- EC Low Voltage Directive (73/23/EEC)
- EC Directive of Electromagnetic Compatibility (89/336/EEC)
- EC Directive R & TTE (99/5/EC)

### 3.13 TECHNICAL DATA

#### TOP VIEW



**BACK VIEW****SIDE VIEW**

Length	1.700 mm (66,93")
Width	1.200 mm (47,25")
Height	450 mm (17.72")
Wheelbase	1.050 mm (41,34") Antriebsräder, ein Stützrad in der Mitte
Ground Clearance	133 mm (5.24")
Turning Radius	1.400 mm (55.,12")
Shipping Weight incl. Batteries	360 kg (794 lbs)
Speed (not loaded)	6 km/h (3.83 mi/h)
Speed (loaded)	4 km/h (2.49 mi./h) (in slow mode)
Range in km (miles)	Ca. 8 km ( 5 mi.) (when used at intervals)
Battery Life	3 - 4 Tage (depending on the load; if used in intervals)
Operating Temperature	-15°C to +50°C (5°F to 122°F)
Operating Humidity	Max. 90% (Relative Humidity)

### 3.14 REMOTE CONTROL

Frequency Range	see radio remote control
Baud Rate	1,200 - 9,600 Baud (bit/sec)
Operating voltage	battery 7.2V
Power Consumption	0 - 100 mA
RF Power	< 10 mW ERP
Protection Class	IP 65
Operating Temperature	-20°C to +70°C (-4°F to 158°F)
Weight (without batteries)	1.000g / 2,2lbs
Dimensions (L x W x H)	247 x 139 x 117 mm (9,7" x 5,47" x 4,6")

### 3.15 ENERGY SUPPLY

The aircraft tug is solely powered by batteries. The system consists of two 12VDC maintenance-free, sealed lead-gel batteries. The batteries are charged by an integrated charger (115-230VAC connection)

### 3.16 CONNECTIONS

The aircraft tug has various connectors. The most important connectors for the operator are shown in the figures below:



Open the Side Lids via Foot Handle



Battery Chargers (Tug and RC Batteries)



GPU-Connector





### 3.17 GROUNDPOWER UNIT (GPU)

The TF3 has a ground power connection located behind the right side lid. However, the device cannot be used as a classic GPU, but should not exceed a maximum power of 50 amps. Please note that the batteries have a total power of 24V.



***WARNING: Do not start engines with the unit as this may damage the batteries.***

### 3.18 MAINTENANCE PRODUCTS

The maintenance products used in aircraft tugs are reduced to a minimum, thus minimising the risk of leaking operating materials:

- Helical Gear: Glygoyle 220 CLP VG 220
- Drive Chain: Interflon Lube EP+ Teflonspray

### 3.19 AMBIENT TEMPERATURE & WORKING ENVIRONMENT

With constant use under extreme temperature changes and condensing air humidity special equipment and approval is required for the aircraft tug. In order to ensure the best functionality, we recommend to use the equipment at the following temperature range:

**-20°C to +50°C / -4°F to +122°F**

In order to preserve a long durability of the device and the batteries, store it neither in very cold, nor in very warm outdoors. Working in rain and snow is no problem for the TF5, but even in these weather conditions, we recommend to store the unit in a protected place after use.

## 3.20 IMPACT ON THE ENVIRONMENT AND PERSONNEL

The manufacturer confirms compliance with the limits for electromagnetic interference and immunity, as well as the static electricity discharge test according to EN.



***WARNING: Interference with medical devices by non-ionizing radiation Electrical equipment of the aircraft tug that emits non-ionizing radiation (e.g. wireless data transmission) can interfere with the functions of medical devices (pacemakers, hearing aids, etc.) of the operator, as well as persons in the surrounding area, and lead to malfunctions.***

***It should be clarified with a doctor or the manufacturer of the medical device whether it can be used in the vicinity of the aircraft tug.***

# 4. OPERATION AND HANDLING

## 4.1 REMOTE CONTROL

The remote control of the aircraft tug is used to transmit any driving commands and other functions to the aircraft tug. Country-specific safety frequency is used.

Two joysticks are used to determine the direction of travel (forward/backward & left/right). Both can be operated independently of each other. All additional functions are located in the lower part of the radio remote control.

An EMERGENCY OFF switch is located centrally. This immediately interrupts the radio connection and the aircraft tug is immediately stopped with maximum braking power until standstill.

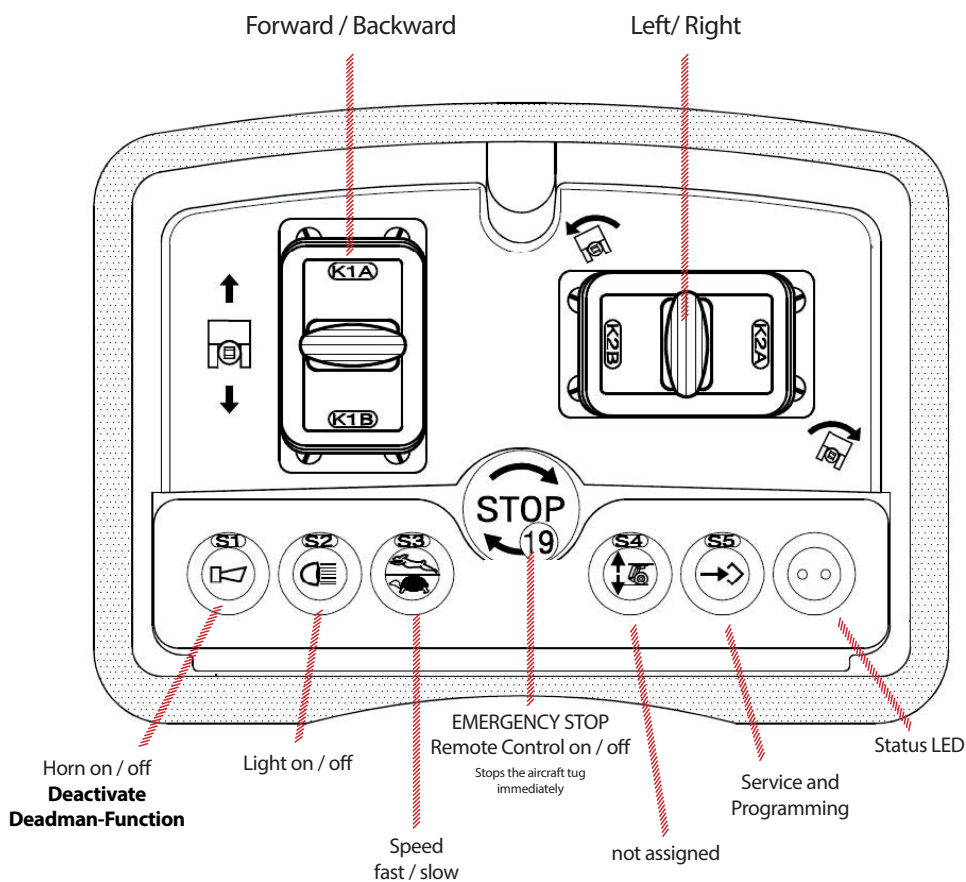


**If the EMERGENCY STOP switch is activated while driving, the aircraft tug is braked to a standstill with maximum braking power. There is an increased risk of accidents and injuries.**

- **Do not use the EMERGENCY OFF switch as a service brake.**
- **Only use the EMERGENCY OFF switch while driving in the event of danger.**



**When starting the aircraft tug, it has to be activated via the radio remote control (deadman switch). Driving commands are only activated after the „horn“-button is pressed once.**



## 4.2 TURNING THE REMOTE CONTROL ON AND OFF

To turn on the remote control, turn the emergency stop switch clockwise until it jumps up slightly. A small LED on the remote control will illuminate.



**Note: If it is foreseeable that the aircraft tug will not be used for more than 60 seconds, the remote control should be deactivated immediately!**

## 4.3 REMOTE CONTROL CHARGER AND BATTERY

A charger for the batteries of the remote control is located behind the side lid of the aircraft tug. The batteries are standard AA batteries with 1.900mAh.

The exchange batteries are charged while the aircraft tug is in operation. The side lid will be opened by a foot lever which is located on the underside of the lid.



Footswitch opens the Flap



Battery Charger for the RC Batteries

## 4.4 REMOVE BATTERIES

1. remove the bolt
2. open the lid
3. remove batteries



1. open the lid on the back



2. remove the two batteries

The batteries are inserted in the reverse order.



**Note: If the remote control is not used for a longer period of time, the batteries must be removed from the transmitter.**

## 4.5 SAFETY FUNCTION (DEAD MAN ´S MODE)

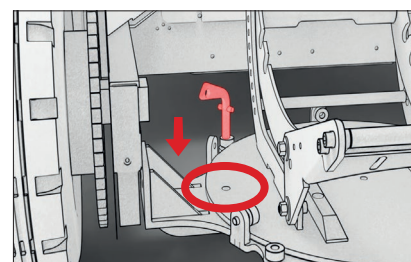
If no control pulse is transmitted for a period of 60 seconds, the remote control goes into safety mode. If this mode is activated, the aircraft tug responds to no command from the remote control, until the „Horn-Button“ is pressed once.



The horn deactivates the dead man's mode

## 4.6 LOCKING THE TURNTABLE

By default the turntable is freely rotating, but can be fixed with a bolt. The pin is located left of the nose wheel mount and is attached to a chain. Fixing the turntable is particularly recommended during aircraft pick-up, so the turntable cannot twist.



Safety Bold



***ATTENTION! An incorrectly closed or secured mount may cause the aircraft to slip out of the mount during towing! There is danger to life!***

## 4.7 BATTERY CHARGER OF THE AIRCRAFT TUG

A charger is integrated into the aircraft tug. It is located behind the left side storage compartment. The charger is powered by 100-240 VAC.

To start the charging process, plug the charging cable into an appropriate power supply. Then pull the battery disconnect switch on the left (in the driving direction) to start the charging process.



Battery Charger TF3



Start charging Process



***WARNING! When charging, the batteries emit a mixture of oxygen and hydrogen (oxyhydrogen gas). Gassing is a chemical process. This gas mixture is highly explosive and must not be ignited.***

- ***Connecting and disconnecting the charging cable of the battery charging station with the battery plug must only be carried out with the charging station and tug switched off.***
- ***Cable and plug connection must be checked for damages.***
- ***Ventilate the room in which the aircraft tug is charged sufficiently.***
- ***When handling batteries, do not smoke or use open flames.***
- ***In the area of the aircraft tug parked for charging no flammable substances must be stored or handled. Keep at least 2 meters distance.***
- ***Fire protection equipment must be provided.***
- ***The local safety regulations must be followed.***



**ATTENTION!** When the tug is not being used or charged, make sure that both battery disconnectors are deactivated (pressed). Otherwise there is a risk of the batteries becoming deeply discharged and irreparably damaged!

## 4.8 DIRECTION INDICATOR LIGHTS

On top of the aircraft tug there are direction indicators, which show the direction in which the tug is moving. The LEDs show the direction before the tug starts to move, if the joystick is pushed gently.

## 4.9 STATUS-LED

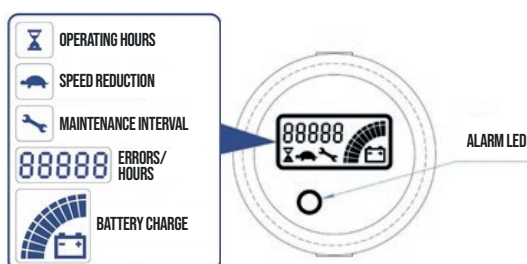
There are two status LEDs directly next to the direction indicator lights. The LED on the left in the direction of travel indicates that the aircraft tractor is ready for operation as soon as the power supply is switched on. After the radio connection has been established, this is indicated by the LED on the right in the direction of travel. If the aircraft tractor is switched off, none of the LEDs is illuminated.

## 4.10 MDI DISPLAY

The multifunction display shows the operating hours during normal operation. During the start-up sequence, the display first shows the software version of the drive control system.

If there is a malfunction in the aircraft tug, this is indicated by the red LED and an error code in the display.

The MDI display is located on the cover above the type plate.



Multi Functional Display



**On the MDI the operating hours of the aircraft tug are displayed. On delivery, up to 12 hours may already be shown on it, due to production processes and functional tests.**

## 5. COMMISSIONING

### 5.1 TURNING THE AIRCRAFT TUG ON AND OFF

#### SWITCH ON:

1. unlock both battery disconnecter switches by pulling them up.
2. unlock the emergency stop on the remote control by pulling and twisting it clockwise to activate the transmitter.
3. deactivate the dead man's mode on the remote control (horn button)

#### SWITCH OFF:

1. press both battery disconnect switches.
2. press the emergency stop on the remote control.



**ATTENTION!** When pressing the battery disconnect switches while driving, the aircraft tug stops with maximum braking power to standstill. There is an increased risk of accidents and injuries.

- Do not use the battery disconnect switches as a service brake.
- Only use the battery disconnect switches while driving in the event of danger.



**ATTENTION!** There is a potential risk of accident due to a defective or inaccessible battery disconnect switch. In a dangerous situation the operator cannot stop the aircraft tug by pressing the battery disconnect switch in time.

- The function of the battery disconnect switch must not be interfered with by any objects.
- Immediately report any defects found on the battery disconnect switch to your supervisor.
- Mark and immobilise a defective aircraft tug.
- Do not operate a defective aircraft tug until the defect has been located and repaired.



**ATTENTION!** If the tug is not being used or charged, make sure that both battery disconnect switches are deactivated (pressed). Otherwise there is a risk to the batteries becoming deeply discharged and irreparably damaged!





## 5.2 PUSHING THE BATTERY DISCONNECT SWITCH

If one of the battery disconnect switches is pressed, all electrical functions are switched off. The aircraft tug is braked to a standstill immediately.

## 5.3 PULLING THE BATTERY DISCONNECT SWITCH

If both battery disconnectors are unlocked by pulling, all electrical functions will be switched on. The aircraft tug is ready for operation ( assuming the aircraft tug was ready for operation before the battery disconnectors were pressed).

## 5.4 TESTS AND ACTIONS BEFORE DAILY STARTUP



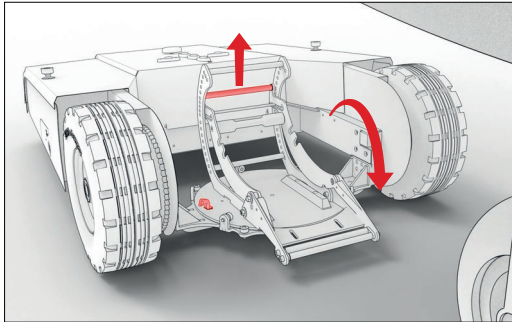
***Warning! Damage or other defects on the aircraft tug or attachment (optional equipment) may lead to accidents.***

***If damage or other defects are discovered on the aircraft tug or attachments (optional equipment) during the following checks, the aircraft tug must not be used until it has been properly repaired.***

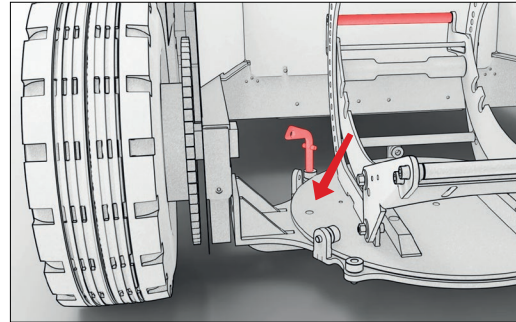
- ***Immediately report any defects found on the aircraft tug to the supervisor.***
  - ***Mark and immobilise a defective aircraft tug.***
  - ***Do not operate a defective aircraft tug until the defect has been located and repaired.***
- 
- Check the entire aircraft tug from the outside for damages and leaks.
  - Check wheels for damage.
  - Visual inspection of the drive chain.
  - Check driving directions with the remote control.
  - Check markings and plates for completeness and legibility (see marking points and type plates; page 20).
  - Check the indicator lights (direction and status LEDs)

## 5.5 PREPARING THE NOSE WHEEL MOUNT FOR CAPTURING

In order to pick up the aircraft, the mechanical ramp of the nose wheel mount must be brought into position. To lower the ramp, pull the lever at the rear of the mount (see picture).



Pull the handle at the rear to lower the ramp



Fix the turntable before picking up the aircraft



**ATTENTION!** When preparing the nose wheel mount there is hazard of crushing!



**Note:** For a safe operation with an airplane or helicopter, we recommend to fix the turntable with the provided safety bolt before the starting with the pick-up procedure.

## 5.6 CAPTURING AN AIRCRAFT

While picking up the aircraft with the aircraft tug, the aircraft must be secured either by chocks or the brakes of the aircraft. Depending on the type of aircraft, it can be picked up from the front or from the back.

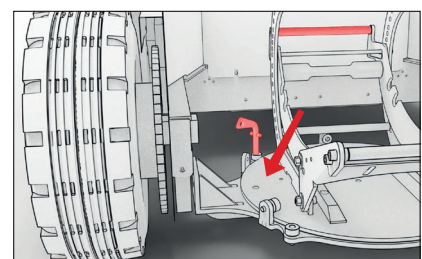


**ATTENTION!** Always make sure that no components such as flaps, sensors or antennas are in the way during the capturing process, otherwise irreparable damages may occur.

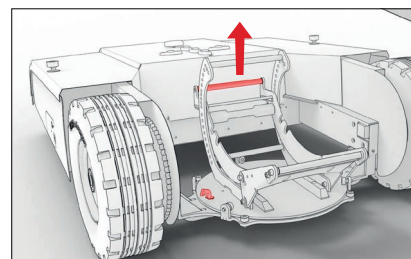
Before capturing, make sure that the aircraft tug is in slow operating mode (turtle) and that the turntable is secured with the safety bolt.



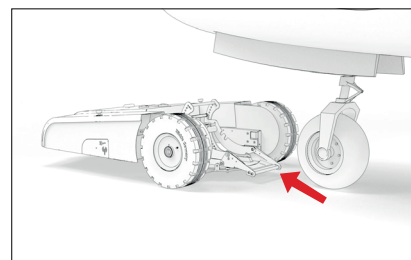
**ATTENTION!** If the aircraft tug is not in slow mode, there is a risk of causing damage to the nose wheel.



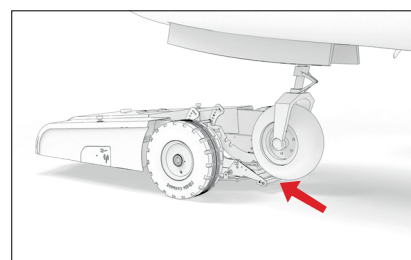
Open the nose wheel mount by pulling the handle at the rear of the cradle and lower the ramp.



Slowly move the aircraft tug to the nose wheel of the aircraft or helicopter. Make sure that the TF3 is aligned as straight as possible to the aircraft to ensure smooth pick-up.



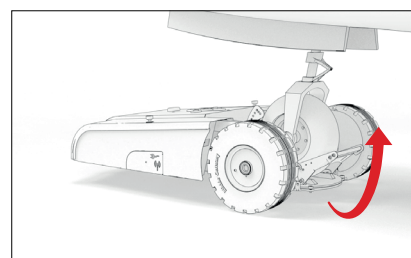
If the unit is correctly positioned in front of the nose wheel, move it slowly and carefully forward, so that the nose wheel can pass over the ramp into the cradle.



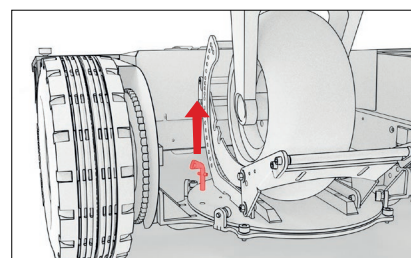
 **ATTENTION! Avoid fast and sudden movements at all costs.**

When the nose wheel is in the correct position, the the ramp will close automatically by the motion and weight of the aircraft or helicopter.

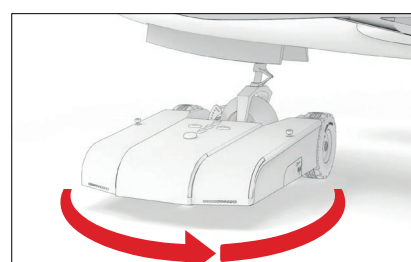
 **ATTENTION! Make sure that the ramp of the mount is engaged and and locked after closing it.**



The capturing process is completed. Now remove the safety bolt from the turntable as well as the chocks (if positioned on the main landing gear). If the brake of the aircraft is engage, disengage it before moving the tug.



Now the towing operation can be started. The tug can be rotated 360° around the nose wheel after removing the safety bolt from the turntable.



## 5.7 DURING OPERATION

While towing, there are a few points to take into account to prevent possible damage to the aircraft and the tug:

- Only use slow mode (turtle) while an aircraft is on the tug.
- When crossing gate rails, the aircraft tug should be positioned at a 90° angle to the rails if possible. In addition, the tractor should not be swung in during the crossing, otherwise the fixed rollers may get caught between the rails and damage may occur.
- The joysticks of the remote control should be used in gently. If the joysticks are fully pressed, the maximum control signal is given what means that the vehicle is accelerating with its maximum force. Conversely, this means that if the joysticks are released abruptly, the vehicle will be stopped immediately with full force.

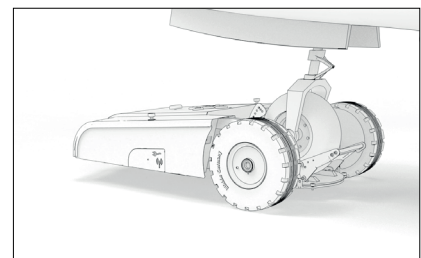


***ATTENTION! Always follow the instructions above, otherwise damage to the aircraft or the aircraft tug may occur.***

## 5.8 RELEASE THE AIRCRAFT

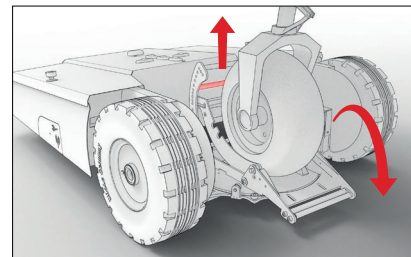
Releasing the aircraft is done in reverse order to capturing and aircraft (5.6 - Capturing an Aircraft). Before unloading, make sure that the aircraft is properly secured. Therefore the chocks must be positioned at the main landing gear and/or the parking brake of the airplane must be set.

Position the aircraft tractor parallel to the aircraft or helicopter as you did while capturing. In order to guarantee a safe release, we recommend to fix the turntable with the safety bolt. In any case, the tug should be in slow operating mode (turtle)!

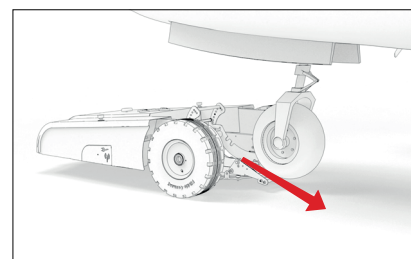




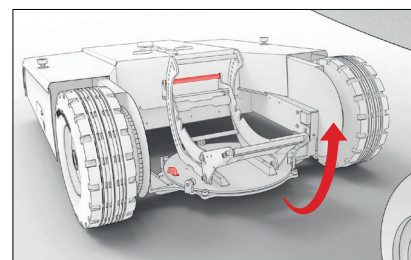
Unlock the mount's ramp using the handle at the back of the cradle and lower the ramp. If the handle is blocked, move the tug a slightly forward or backward (depending on the position) to reduce the pressure of the nose wheel on the mount.



When the ramp is lowered, move the aircraft tug slowly away from the aircraft using the remote control so that the nose wheel is removed from the tug over the ramp.



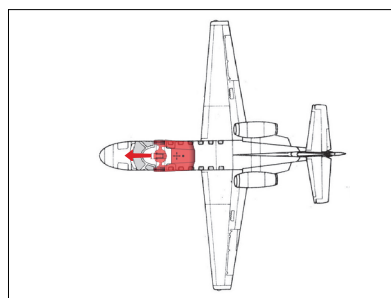
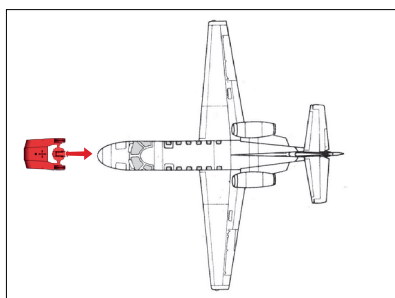
When the aircraft is completely unloaded and the aircraft tug is at a safe distance to the aircraft, fold back up the ramp.



***ATTENTION! Ferry rides should only be performed with the ramp folded up otherwise excessive wear due to friction is to be assumed!***

## 5.9 POSSIBILITIES OF NOSE WHEEL PICKUP

The aircraft tug offers two different ways to pick up the nose wheel of the aircraft. The graphic below shows you the different options.



***Attention! Before unloading always make sure that no components such as propellers, flaps, sensors or antennas are in the way.***

## 5.10 RELEASING THE MAGNETIC BRAKES

To prevent further movement or rolling away in the event of a transmission failure or other faults on the aircraft tug, the magnetic brake is automatically engaged as soon as there is no control signal given. In the event of a system failure, the brakes can be released manually.

Before applying this emergency procedure, the aircraft tug and the towed aircraft/helicopter should be adequately secured.

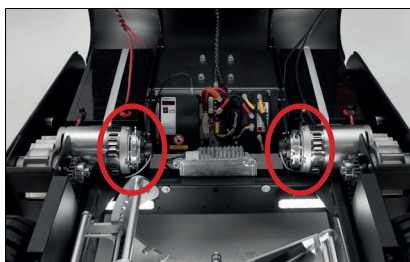


**CAUTION! Insufficient or missing securing may result in unwanted movements of the aircraft tug and the aircraft!**

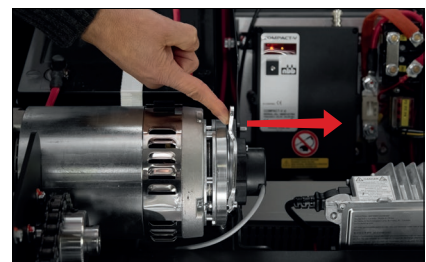
1. secure tug and aircraft adequately!
2. switch off the aircraft tug by pressing the two battery disconnect switches.
3. pull the marked levers on the motors to release the magnetic brakes. These levers should be fixed to start the transport.



Open the Cover



Position of the levers to release the brakes



Push the lever away from the motor to release



**WARNING! There is electric current flowing. This process requires special care. Not observing can lead to personal injury and damage to property!**



**ATTENTION: If the tug has to be repositioned in an emergency, the TowFLEX TF3 must not be towed or pulled without following the procedure for releasing the magnetic brakes. Alternatively, the tug MUST be repositioned by a suitable forklift truck and forklift operator! Failure to do so may result in damage to the equipment.**



## 6. MAINTENANCE

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 +1 (484) 662 3002 (24h)

 help@towflexx.com



***WARNING! Ignoring regular maintenance can lead to failure of the aircraft tug and is also a potential hazard for persons and operation.***

### 6.1 MAINTENANCE PLAN

The operating conditions of the aircraft tug have a considerable influence on the wear of components. The maintenance intervals specified in the following assume regular operation and normal operating conditions. In case of increased requirements such as heavy dust accumulation, strong temperature fluctuations or multi-shift operation, the intervals must be shortened accordingly.

The following maintenance checklist specifies the activities to be carried out and the time when they should be performed.

Assembly	Action	Interval
Batteries	• charge at least 1x per month	10h monthly
	• check the battery plug for damage, function and tightness	25h anually
Lighting	• Check the function of the lighting	50h anually
Wheels	• Check drive wheels for wear and damage	50h anually
	• Tighten the wheel nuts of the drive wheels (220Nm)	25h half-yearly
	• Check castors for wear and damage	50h anually
	• Air pressure of pneumatic tires (9 bar)	10h monthly
Turntable	• Lubricate flanged rollers	25h half-yearly
	• Folding mechanism and sitting of the ramp without load	25h half-yearly
	• Check bolts and screws	50h anually
Drive Chain	• Lubricate Drive Chain	25h half-yearly
	• Visual inspection and tension check	50h anually
Chassis & Assemblies	• Visual inspection	50h anually
	• Check bolts and screws	50h anually
	• Check readability and completeness of the labels	50h anually
Functional Check	• Functional test of all commands on the remote control	25h anually
	• Driving check	50h anually





# 7. REPAIR AND OVERHAUL

## 7.1 GENERAL INFORMATION

Repairs may only be carried out by trained personnel. Only original spare parts approved by the manufacturer must be used to ensure safe and reliable operation.



***WARNING! Any modification to the aircraft tug - especially to the safety equipment - is prohibited.***

## 7.2 REQUIREMENTS FOR STORAGE

If the aircraft tug is taken out of service for more than one month, it may only be stored in a frost-free and dry room. Carry out the following actions before, during and after decommissioning.

## 7.3 ACTIONS PRIOR TO DECOMMISSIONING

- Clean aircraft tug carefully
- Apply a thin layer of oil or grease to all mechanical parts that are not painted or galvanized.
- Charge the battery (see 4.7 - Battery Charger of the Aircraft Tug, page 30)

## 7.4 REQUIRED ACTIONS DURING DECOMMISSIONING



***Note: Self-discharge of the batteries can cause deep discharge. Deep discharging shortens the life of the battery considerably, or destroys them completely. The batteries should be charged at least once a month.***

## 7.5 TAKING THE AIRCRAFT TUG BACK INTO SERVICE

- Clean aircraft tug carefully
- Charge the batteries
- Carry out maintenance according to plan

## 7.6 WORKING ON THE ELECTRONICS

Work on the electrical system must only be carried out when it is de-energised. The condensers installed in the controller must be completely discharged. The condensers are completely discharged after approx. 10 minutes. Before starting the maintenance work on the electrical system:

- Work on the electrical system may only be carried out by qualified personnel, trained in electrical engineering.
- Before starting any work, take all precautions that are necessary to prevent an electrical accident.
- Parking the aircraft tug safely
- Disconnect the battery plug
- Take off rings, metal bracelets, etc.



***WARNING! There is an increased risk of accidents due to electric current! Local and country-specific regulations must be followed!***

## 7.7 TIRES

The quality of the tires influences the stability and the handling of the aircraft tug. The TF3 has two air-filled drive wheels which influence the straight running of the tug. The air pressure should be checked at regular intervals. If there is a deviation from the target value of **9 bar per tire**, this must be corrected immediately, to guarantee a smooth operation.

In case of uneven wear, the stability of the tractor and the braking distance is increased.

- When changing wheels, ensure that the tug is not on an incline or slope
- Always replace wheels in pairs



***Warning! There is a risk of accidents when using tires that do not comply with the manufacturer's specifications.***

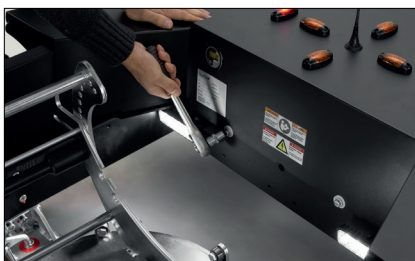


**Warning! The user must check the air pressure of the tires at regular intervals according to the maintenance schedule, otherwise the warranty will be void.**

## 7.8 BATTERY REPLACEMENT

In case of defective batteries, they can be replaced in a few easy steps. The following procedures should be followed:

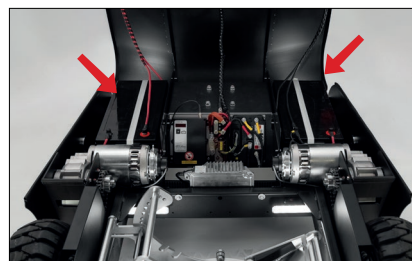
1. loosen the two bolts on the back of the cover, which are facing the nose wheel mount.
2. open the cover from the direction of the nose wheel mount to the front of the tug.
3. remove battery connections and bridges. Take care that no short circuit is caused.
4. remove the battery protection.
5. remove the battery by its handles.
6. insert a new battery.
8. perform steps 1-4 in reverse order. It is imperative that the polarity is correct.



Loose the Bolts



Open the Lid



Batteries Left and Right



**Tip: We recommend using a 13mm wrench to remove the batteries.**



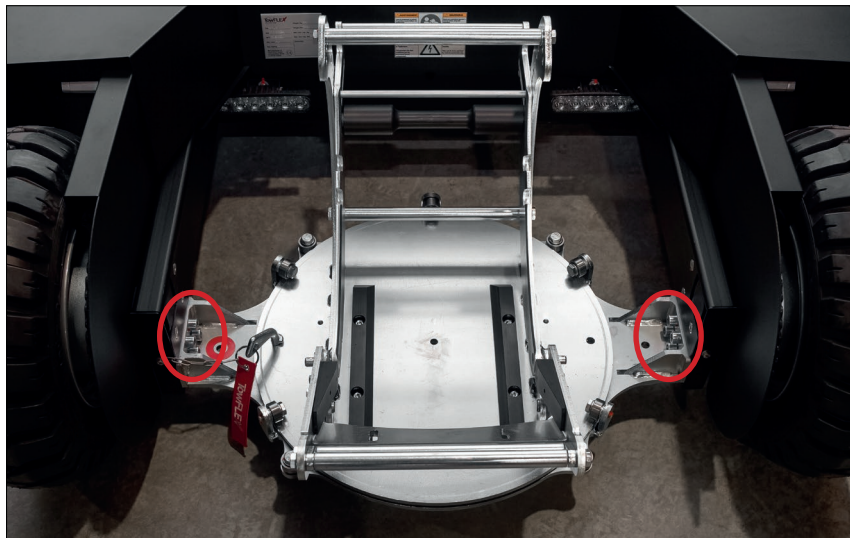
**Tip: We recommend to change the batteries with two people**



**Attention! Only batteries that have either been purchased from or approved by the manufacturer in writing may be used!**

## 7.9 NOSE WHEEL CRADLE REPLACEMENT

There are several reasons why a nose wheel mount needs to be replaced. One reason may be a defect, or a change of the aircraft, which has a different nose wheel size. In order to remove the mount and insert a new one, only 8 bolts have to be removed, which are marked in the following picture.



Attachment of the TF3 nose wheel mount

The installation of a new nose wheel mount is performed in reverse order. This principle is the same for all different types of mounts.



***Tip: We recommend a 17mm wrench (M10) for removing the mount.***



***Tip: For replacing the nose wheel mount, we recommend that a second person assists you.***

# 8. PACKAGING AND TRANSPORT

## 8.1 UNLOADING THE AIRCRAFT TUG

In order to provide the best possible protection for the aircraft tug during transport, it is stored in a reusable wooden transport box. The following steps are necessary to move the aircraft tug out of the transport box.



To remove the cover, all bolts on the upper side must be removed.



The lid can then be removed by two people.



Also loosen the bolts on the sides and then remove the crossbars which are located under the cover.



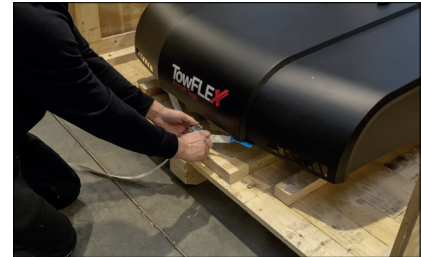
Now the bolts on the side of the front wall of the transport box can be removed.



The front wall can then be removed and put to the side.



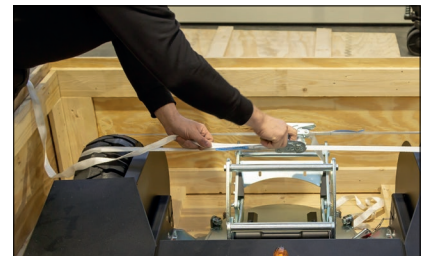
Inside the box, the tug is secured with several straps. First loosen and remove the straps on the front side.



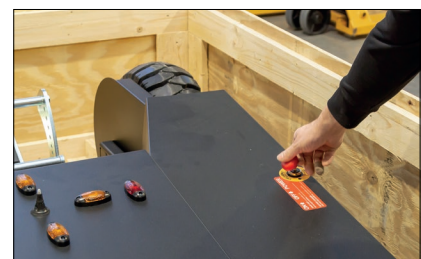
Make sure that after removing the front strap, the fixing piece is removed.



Now you can also loosen and remove the rear straps.



For reasons of transport safety, the caps of the battery disconnect switches are removed. To be able to start the tug, attach both caps to the battery disconnectors. Then pull them both up to activate the tug.



Then position the lid of the transport box at the front part of the box so that the lid serves as a ramp. The tug can then be carefully and slowly manoeuvred out of the transport box. If possible try to only to drive straight until the unit has left the box.





**ATTENTION! Use a forklift with sufficient capacity and fork length to transport the transport box. The box has the following specifications:**

**Weight: 630kg (1386lbs)**

**Dimensions: 1950mm (76,77") x 1720mm (67,71") x 730mm (28,74")**



**ATTENTION Only lift the transport box from the front side!**



**Note: Before driving the aircraft tug for the first time, the operator must have read the entire manual carefully and become familiar with its contents.**



**Tip: We recommend using a battery screw driver for unloading.**

## 9. DISPOSAL

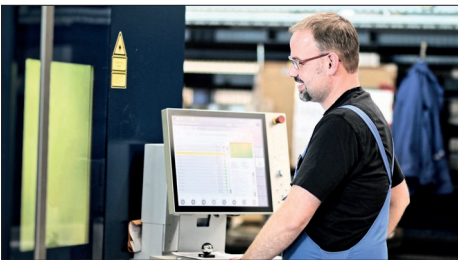
The final and proper decommissioning or disposal of the aircraft tug must be carried out in accordance with the applicable legal regulations of the country of use. In particular, the regulations for the disposal of batteries, operating materials, electronics and electrical equipment must be observed.

The aircraft tug may only be disassembled by trained personnel in accordance with the manufacturer's regulations and instructions.

**TOWFLEX**  
Aircraft Tugs



**TOWFLEX TF3 - UP TO 9.000KG / 20.000LBS MTOW**



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