



## Original instructions



# AVANTI

### AVANTI SERVICE LIFT

AT00011925 - User's Manual: Appendix  
Model Service Lift SHARK L 02 Gamesa

# CE



# CERTIFICATE

## EC Type Examination

EC-Directive 2006/42/EC, Article 12, Section 3b  
Machinery

Number of registration: 01/205/0900C/19

Certification body for machinery NB0035  
at TÜV Rheinland Industrie Service GmbH  
herewith confirms for the company

**AVANTI WIND SYSTEMS TECHNOLOGY, S.L.**  
Calle Angeles (Los), Num. 88  
Pol. Industrial Centrovía  
50196 Muela (La) - (Zaragoza)  
Spain

the close conformity of the product

**Service lift inside wind turbine**

**with protection fences for service lift holes at landings  
and fence door interlock system**

### Technical data:

Type:	Shark L02
- max. load capacity:	240 kg / 2 persons
- max. weight lift:	186 kg
- traction hoist:	M508 or M608
- fall arrest device (FAD):	ASL508 or ASL608
- lifting speed:	18 m/min (50 Hz) or 21 m/min (60 Hz)
- triggering speed of FAD:	30 m/min or 40 m/min
- doors:	Sliding door standard (left or right)
- max. lifting height:	160 m
- control:	Standard (hold to run in the cabin + send unattended) and Send/Call with control in the platforms
- Protection fences:	Swinging doors or sliding doors with interlock system
- Fence interlock system:	Guard locking switch system or Trapped-key system

Modification C to the certificate 01/205/0900B/18 from 2018-07-22 - New address of the company

with the requirements according to annex I of Directive 2006/42/EC about machinery and amending the Directive 95/16/EC of the European Parliament and the Council from May 2006 for adaptation of legal and administration regulations of the member countries regarding safety of machinery.

The verification was proved by EC-type approval test, Test-Report- No.: 18\_044-1 from 2018-07-20 and is valid only duly considering the requirements mentioned in this document. The examination was realized on site in Zaragoza, Spain.

This certificate is valid until 2022-01-11

Cologne, 2019-02-28

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Certification body  
Notified under No. 0035  
certifier

Dipl.-Ing. Walter Ringhausen

 **TÜVRheinland®**  
Precisely Right.



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# 1. Limited Warranty

Avanti Wind Systems Technology, S.L. warrants that commencing from the date of shipment to the Customer and continuing for a period of the longer of 365 days thereafter, or the period set forth in the standard AVANTI warranty, the Product<sup>1)</sup> described in this Manual will be free from defects in material and workmanship under normal use and service when installed and operated in accordance with the provisions of this Manual.

This warranty is made only to the original user of the Product. The sole and exclusive remedy and the entire liability of Avanti under this limited warranty, shall be, at the option of Avanti, a replacement of the Product (including incidental and freight charges paid by the Customer) with a similar new or reconditioned Product of equivalent value, or a refund of the purchase price if the Product is returned to Avanti, freight and insurance prepaid. The obligations of Avanti are expressly conditioned upon return of the Product in strict accordance with the return procedures of Avanti.

This warranty does not apply if the Product (i) has been altered without the authorization of Avanti or its authorized representative; (ii) has not been installed, operated, repaired, or maintained in accordance with this Manual or other instructions from Avanti; (iii) has been subjected to abuse, neglect, casualty, or negligence; (iv) has been furnished by Avanti to Customer without charge; or (v) has been sold on an "AS-IS" basis.

Except as specifically set forth in this Limited Warranty,

ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, COURSE OF DEALING, LAW, USAGE OR TRADE PRACTICE ARE HEREBY EXCLUDED TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY AVANTI. IF, PURSUANT TO ANY APPLICABLE LAW, TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED AS PROVIDED IN THIS LIMITED WARRANTY, ANY IMPLIED WARRANTY IS LIMITED IN TIME TO THE SAME DURATION AS THE EXPRESS WARRANTY PERIOD SET FORTH ABOVE. BECAUSE SOME STATES DO NOT PERMIT LIMITATIONS ON THE DURATION OF IMPLIED WARRANTIES, THIS MAY NOT APPLY TO A GIVEN CUSTOMER. THIS LIMITED WARRANTY GIVES CUSTOMER SPECIFIC LEGAL RIGHTS, AND CUSTOMER MAY HAVE OTHER LEGAL RIGHTS UNDER APPLICABLE LAWS.

This disclaimer shall apply even if the express warranty fails of its essential purpose.

In any cases of dispute the English original shall be taken as authoritative.

<sup>1)</sup>Avanti service lift ("Product")

## 2. Introduction

### 2.1 Observations

**Only trained people may use this lift.**

This manual must be available to staff at all times during installation, maintenance and operation.

Additional copies are available from the manufacturer upon request.

This manual, including, but not limited to, measurements, procedures, components, descriptions, instructions, recommendations and requirements, is subject to change without prior notice. Please check Avanti website/manuals for the latest revisions of the manuals.

Any additional cost related to or arising from any changes in the manuals does not entitle Customer to any form of compensation or other legal remedies.



*The pictures and sketches in this manual may not reflect the product aesthetics, colours, arrangement precisely. This has no impact on the function or safety.*

### 2.2 Symbols

Symbol	Signal word	Meaning	Possible injury if not observed
--------	-------------	---------	---------------------------------

#### Safety instructions



**DANGER!**

IMMEDIATE or possibly imminent danger:

Death or severe injury!



**DANGER!**

IMMEDIATE or possibly imminent danger of hazardous voltage:

Death or severe injury!



**CAUTION!**

Potentially hazardous situation:

Light injury or material damage.

#### Additional instructions



**ATTENTION!**

Potentially dangerous situation:

Damage to equipment or workplace



**IMPORTANT!**

Useful tips for optimum working procedure

None



Reference to written specification/documentation

## 2.3 Cautions

Use and daily inspection of the service lift shall only be performed by person who has gone through the relevant training associated with the Avanti service lift use and daily inspection and is in possession of a valid (non expired) certificate for the task. Installation and maintenance of the service lift shall only be performed by Certified technicians.

Personnel must be at least 18 years of age. The staff must be familiar with the relevant accident prevention instructions and must have received proper training in these.

Personnel are obliged to read and understand this User's Manual.

Personnel shall wear PPE (safety helmet, full body harness, shock absorber, lanyard and slider) at all times.

A copy of the User's Manual must be handed out to the personnel and must always be available for reference.

If more than one person is entrusted with one of the above tasks, the employer shall appoint a supervisor in charge of the operation.

Self-locking nuts must be used at all times. The screw must extend from the nut by at least half of the thread diameter. The nut may not be used once it has become possible to loosen by hand!

If any damage or faults are found during operation, or if circumstances arise which may jeopardize safety: immediately interrupt the work in progress and notify the supervisor or employer!

All tests/repairs of electrical installations may only be performed by a certified technician.

All repairs to the traction, braking and supporting systems may only be performed by a certified technician.

If any supporting parts are repaired or replaced, the operational safety of the system must be tested and verified by a certified technician.

Only original fault-free parts may be used.

Use of non-original parts will render the manufacturer's warranty void and any type approval invalid. No modification, extension or reconstruction of the service lift is allowed without the manufacturer's prior written consent.

No warranty is provided against damage resulting from reconstruction or modification of equipment or use of non-original parts which are not approved by the manufacturer.

Service lift must be inspected by a certified technician before first use.

Service lift must be inspected at least once a year by a certified technician. In case of high operating frequency or severe conditions of use, more frequent inspection is required.

Service lift is designed for a lifetime of 20 years with an operating frequency of approximately 12.5 h/year (250 h in total).

Service lift may not be used by persons who are under the influence of alcohol or drugs which may jeopardize working safety.

The service lift shall also not be used in case of fire in the tower.

Service lift shall ONLY be used when the turbine is not generating power.

All wind farm site specific rules must be followed. Service lift shall not be used during inclement weather, including wind speeds over 25 m/s (55.5 mph).



*Avoid injury – follow all instructions!*



*Owner must verify the need for third party service lift inspections with the local authority and comply with the standards specified.*

## 2.4 Terms and definitions

Terms	Definitions
<b>Certified technician</b>	Person who has received relevant training from Avanti or a qualified instructor associated with the intended work and who possess valid certification (current) for the task in question.
<b>User</b>	Person who has received relevant training associated with using the Avanti service lift and carrying out the corresponding daily inspections and who possess valid certification (current) for the task in question.
<b>Manual descent (also: descent without electrical power supply)</b>	Action performed to descend the cabin at a controlled speed without electrical power, by releasing the traction system's electromagnetic brake manually.

# 3. Description

## 3.1 Purpose

The service lift purpose is to transport persons plus their tools and equipment to the most convenient height for performing work in wind turbine generators (WTG).

Its use is limited to authorized users. The access to the WTG and consequently to the service lift is controlled and forbidden to public access.

The service lift is used primarily to transport technicians, their tools and spare parts from the bottom platform (or lowest accessible point) to the top platform (or highest accessible point). It is also used to access intermediate platforms where inspection and service of WTG connecting bolts and other equipment is made.

## 3.2 Scope



This manual contains instructions for one version of the Shark lift:

- Shark L 02 CE, sliding door version.



The Shark L 02 CE version is EC certified to the Machinery Directive 2006/42/EC.

The product details are described along this manual. The product consists of:

- A service lift, which is formed by: a cabin, a traction system, a fall arrest device, a control system, and safety devices.
- A guiding system along the tower, which is formed by: a pair of steel guiding wire ropes, wire fixes attached to the tower, and guides on the service lift.

## 3.3 Exclusions

The service lift shall not be used outdoor or in potentially explosive atmospheres. The service lift is not designed to carry a person on its top. Unless otherwise agreed with Avanti, the wind turbine manufacturer is responsible of integrating the service lift and ensuring compliance with the essential health and safety requirements as stated on the 2006/42/EC Machinery Directive and the applicable harmonized standards following AVANTI's recommendations.

This will require supply of interface components, including but not limited to:

- Platform fences.
- Power supply protection.
- An evacuation way (e.g. ladder)

## 3.4 Technical specifications



A third party approval of the final integration might be required depending on the national regulations.

The wind turbine manufacturer shall also provide any additional relevant warning, instruction and / or training specific to the integration of the service lift necessary for its safe and correct installation.



Tower manufacturer's risk assessment shall include a service lift integration study.

Service lift	SHARK L 02 CE
Main door type	Full sliding door
Service lift speed	18 m/min ± 10 % (50Hz)
	21 m/min ± 10 % (60Hz)
Rated load	240 kg
Weight of lift (max.)	186 kg
Max. N° persons	2 Persons
Max. travelling height	(1)
Max. noise level	80 dB(A)
Power supply type	400 V (50/60 Hz) 3 Phase + N + PE
	690 V (50/60 Hz) 3 Phase + PE

(1) 120 m, for send/call configuration, and hoist M508 (500 kg).

(1) 160 m, for automatic send configuration, and hoist M508 (500 kg).

Operating temperature

-15°C - +60°C.

Survival temperature

-25°C - +80°C.

Low temperature kit is also available.

Operational temperature for low temperature kit

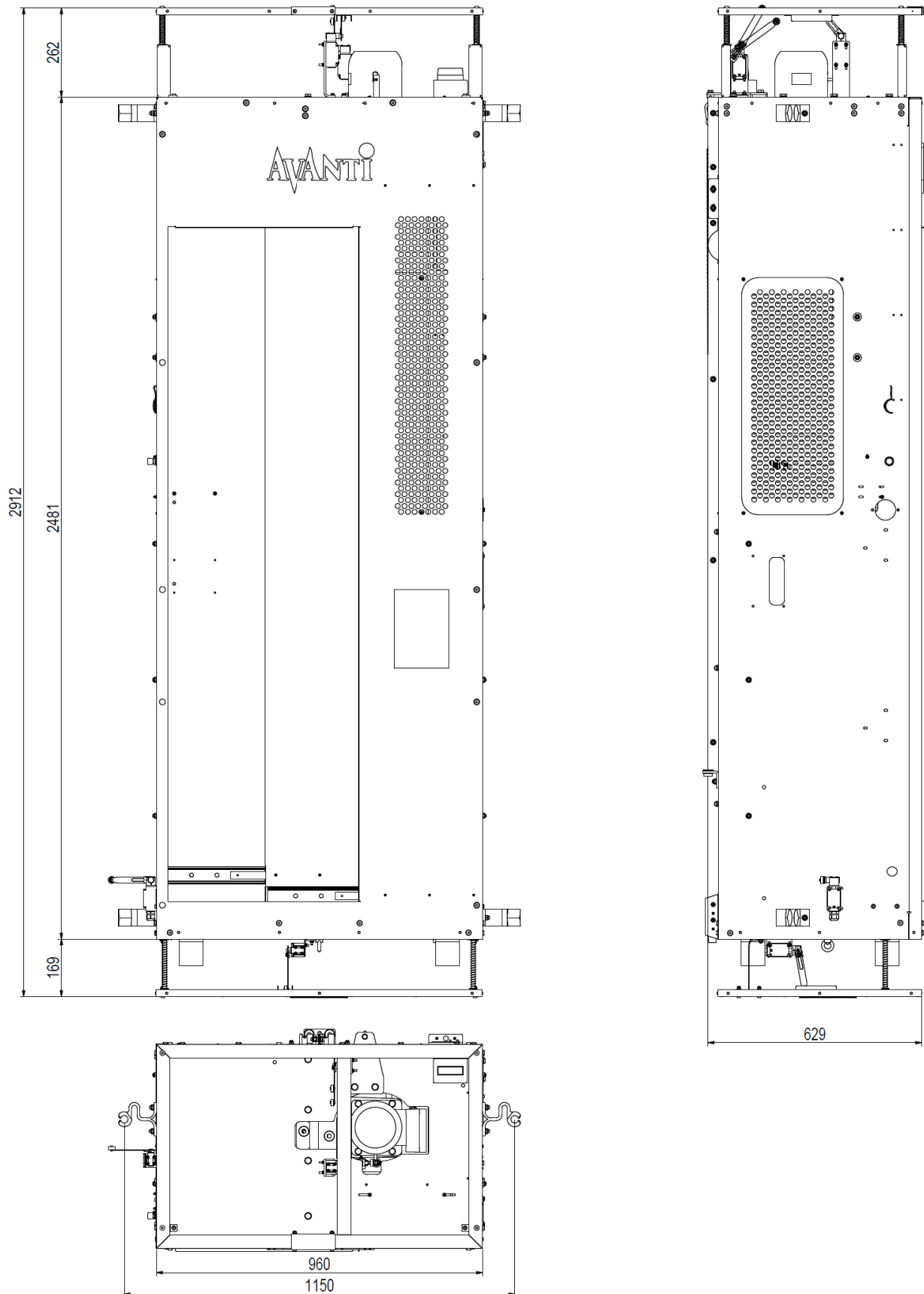
-25°C - +40°C.





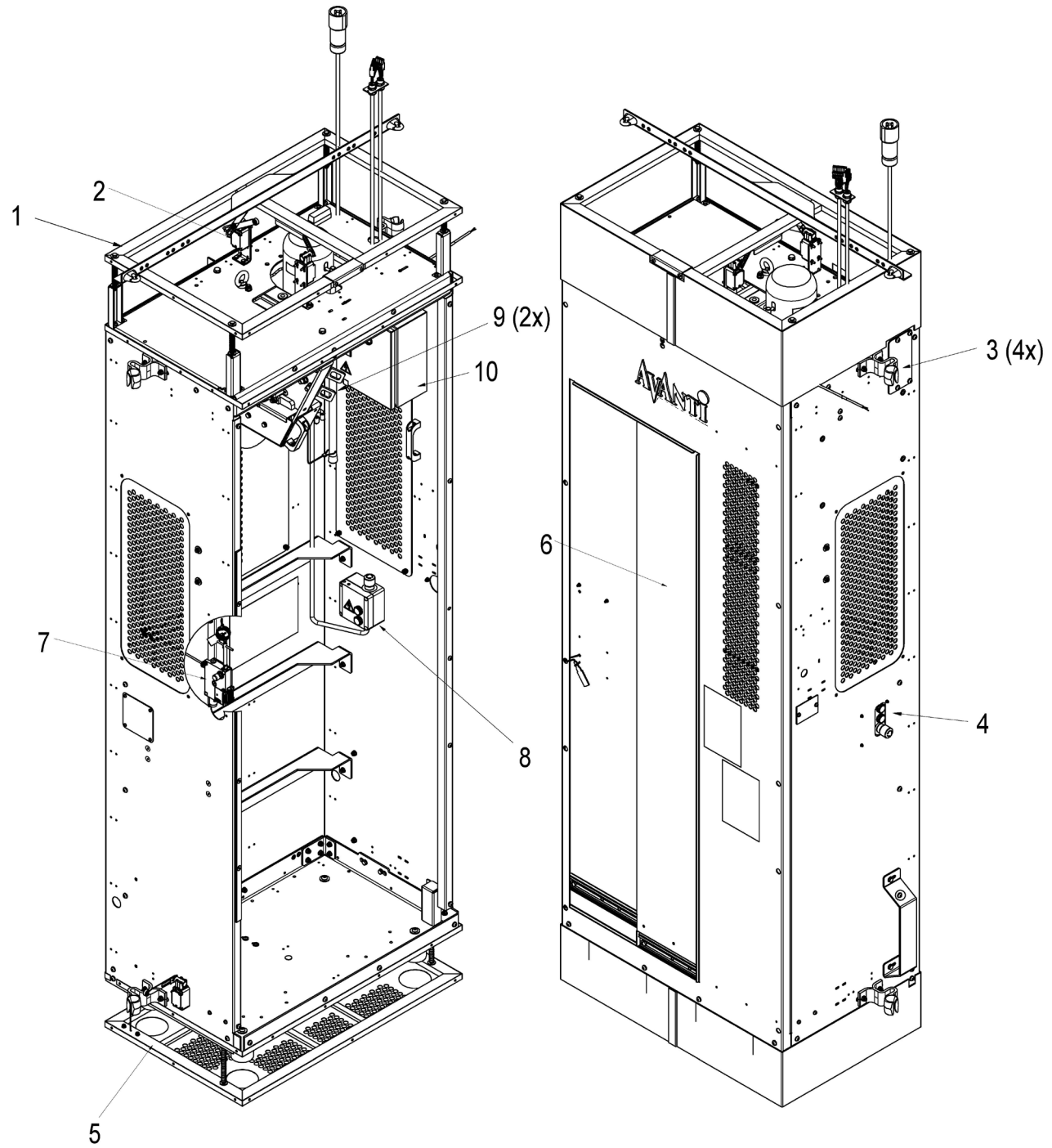
## 3.5 Dimensions

### 3.5.1 Dimensions of Shark L 02



## 3.6 Components

### 3.6.1 Components of Shark L 02



- 1.Top obstruction detection device
- 2.Emergency top limit switch
- 3.Wire rope guides (x4)
- 4.External controls for automatic function (automatic send configuration)
- 5.Bottom obstruction detection device

- 6.Door
- 7.Guard locking device
- 8.User control box
- 9.Anchor points (x2)
- 10.Main control box



### Traction system



### Fall arrest device



#### 3.6.2 Traction system

Service Lift	Hoist	Lifting capacity	Wire rope speed	Power	Rated current	Traction wire rope Ø	Unit weight approx.
Version	Traction system type	Kg	m/min	kW	A	mm	Kg
Shark L 02 CE	M508 / 400V 50Hz	500	18	1.5	4.1	8.4	50
Shark L 02 CE	M508 / 690V 50Hz	500	18	1.5	2.3	8.4	50
Shark L 02 CE	M508 / 400V 60Hz	500	21	1.8	4.9	8.4	50
Shark L 02 CE	M508 / 690V 60Hz	500	21	1.8	2.8	8.4	50

#### 3.6.3 Fall arrest device

Service Lift	Fall arrest device	Lifting capacity	Triggering speed	Safety wire rope Ø	Unit weight approx.
Version	Type	Kg (lbs)	m/min (ft/min)	mm	Kg (lbs)
Shark L 02 CE	ASL 508	500 (1100)	30 (100)	8.4	7 (15.4)

#### 3.6.4 Traction, safety and guiding wire ropes

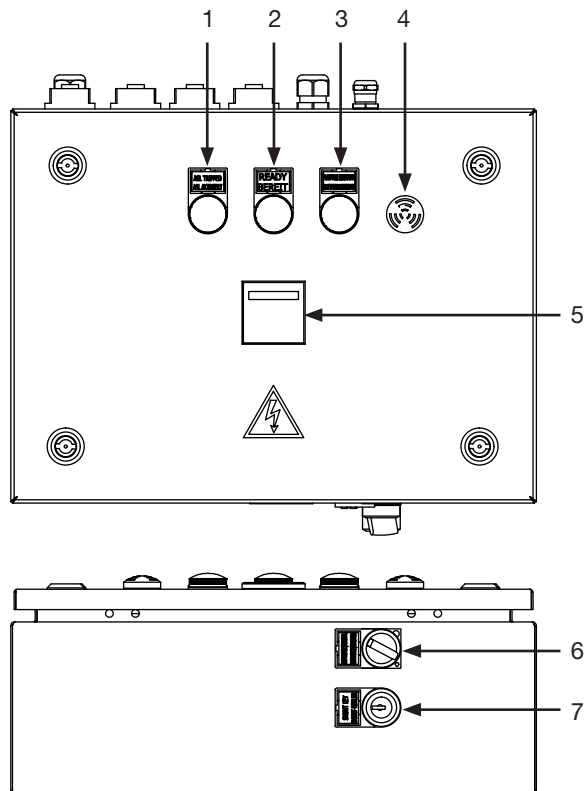
Service Lift Version	Wire rope type	Wire rope diameter	Surface Treatment	Mark/feature	Min. break resistance	Attached with
Shark L 02 CE	M508 / ASL 508	8.4 mm, 5x19	HDG	no	55 kN	2 t shackle
Shark L 02 CE	Guiding wire rope	12 mm	HDG	no	55 kN	2 t shackle





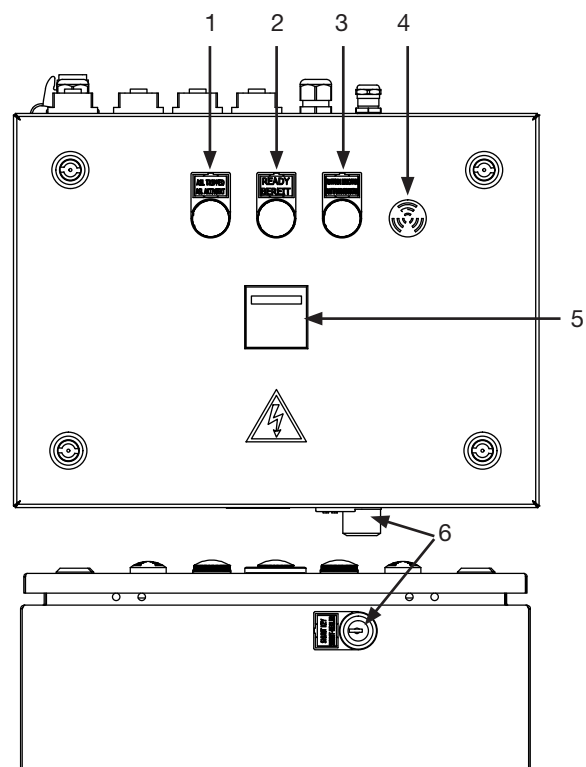
### 3.6.5 Main control box

#### 3.6.5.1 Automatic send configuration



1. Activated fall arrest device light (red)
2. Ready light (green)
3. Platform level light (green)
4. Overload and impending movement buzzer
5. Hour counter
6. Automatic / manual selector
7. Override switch for bottom obstruction detection device

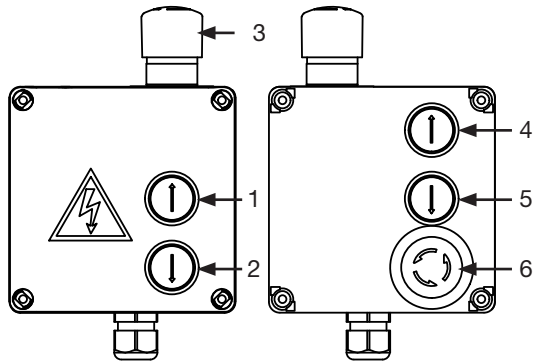
#### 3.6.5.2 Send/call configuration



1. Activated fall arrest device light (red)
2. Ready light (green)
3. Platform level light (green)
4. Overload and impending movement buzzer
5. Hour counter
6. Override switch for bottom obstruction detection device



### 3.6.6 User control box



1. UP button (internal)
2. DOWN button (internal)
3. Emergency-stop button (internal)
4. UP button (external)
5. DOWN button (external)
6. Emergency-stop button (external)

The automatic send configuration (activated by the external controls) incorporates a delayed response function and an acoustic buzzer on the main control box. This way, persons next to or inside the cabin are warned of imminent movement of service lift and can act accordingly.

The external controls are not included in case of send/call configuration.

All internal controls are Hold to run. The external controls are single press.

### 3.6.7 Bottom platform control box

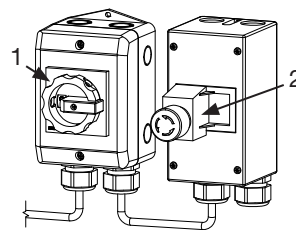
A control box is installed at the bottom platform. This control box has a main switch. Turn the switch to the OFF position to cut the power to the service lift. The main switch must be set to OFF when the lift is not in use, when leaving the wind turbine and while the wind turbine is running. It must be set to OFF before starting an electrical generator.

The send and call configuration incorporates a delayed response function and an acoustic buzzer on the main control box. This way, persons next to or inside the cabin are warned of imminent movement of service lift and can act accordingly.

All controls are Hold to run.

#### 3.6.7.1 Automatic send configuration

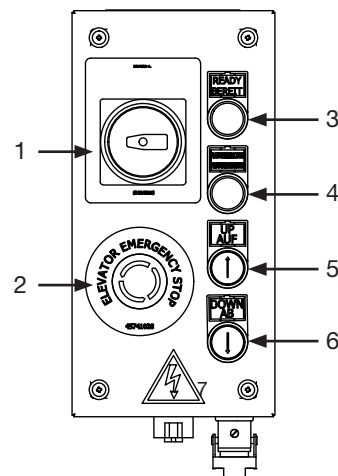
For automatic send configuration, the installation of a main switch box is optional.



1. Main switch
2. Emergency-stop button

For fence doors with trapped key

#### 3.6.7.2 Send/call configuration



1. Main switch
2. Emergency-stop button
3. Ready light (green)
4. Platform level light (green)
5. UP button
6. DOWN button

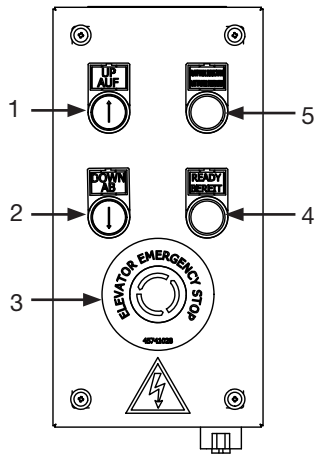


### 3.6.8 Top platform control box

A control box is installed at the top platform for send/call configuration.

All controls are Hold to run.

#### 3.6.8.1 Send/call configuration



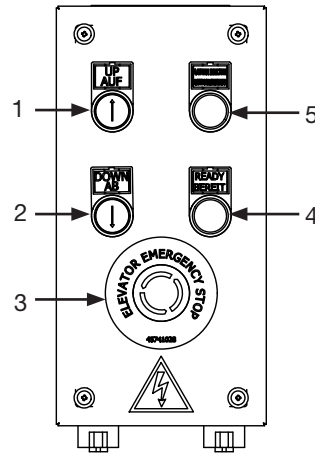
- 1. UP button
- 2. DOWN button
- 3. Emergency-stop button
- 4. Ready light (green)
- 5. Platform level light (green)

### 3.6.9 Intermediate platform control boxes

The control boxes could be installed at the intermediate platforms for send/call configuration.

#### 3.6.9.1 Send/call configuration

##### 3.6.9.1.1 Option 1

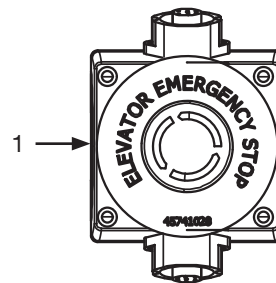


- 1. UP button
- 2. DOWN button
- 3. Emergency-stop button
- 4. Ready light (green)
- 5. Platform level light (green)

All controls are Hold to run.

##### 3.6.9.1.2 Option 2

There is also an option in send/call configuration, in which there are platform control boxes in the top and in the bottom platforms, and in the intermediate, are installed boxes just with emergency stop.



- 1. Emergency-stop button



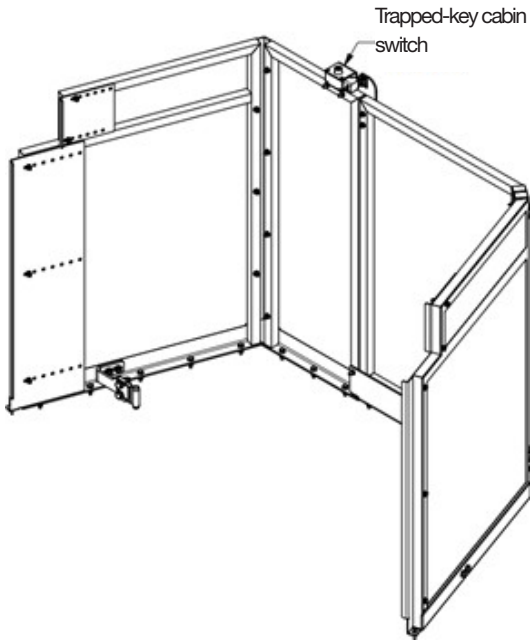
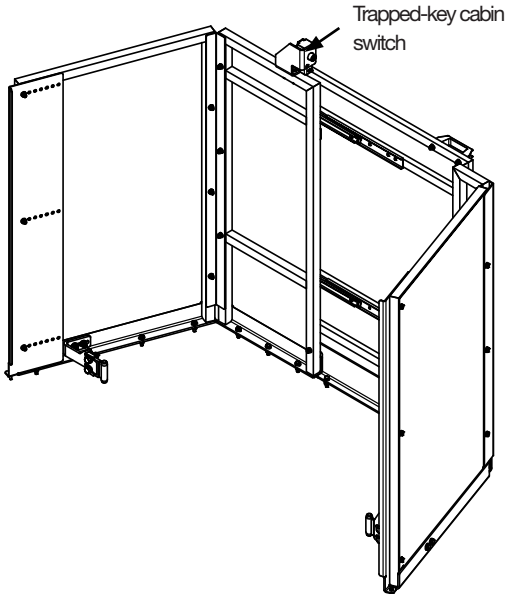
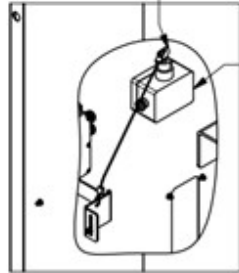
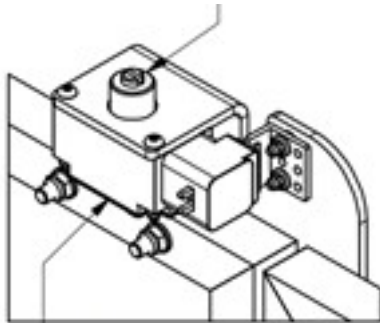
### 3.7 Fences door interlock system

#### 3.7.1 Fences with trapped-key system

The Trapped-key Interlock System is a security system which avoids using the AVANTI service lift if the platform fences are not properly closed and locked at any time, as well as opening a protected fence at any platform while the service lift is not correctly positioned on the platform, and switched off.

#### Use

Once the service lift is positioned at a platform height, control supply is interrupted by turning the trapped-key switch to OFF position, then the key can be removed from the trapped-key cabin switch and inserted in the trapped-key fence lock to open the platform fence door by turning it.

Swing door fence	
 <p style="text-align: center;">Trapped-key cabin switch</p>  <p style="text-align: center;">Trapped-key cabin switch</p>	<div style="background-color: #0070c0; color: white; text-align: center; padding: 5px;"><b>Use</b></div> <p style="text-align: center;">Remove the trapped-key from the trapped-key cabin switch</p>  <p style="text-align: center;">Trapped-key cabin switch</p> <div style="background-color: #0070c0; color: white; text-align: center; padding: 5px;"><b>Emergency use</b></div> <p style="text-align: center;">Insert the trapped-key in the trapped-key fence lock to release the fence door.</p>  <p style="text-align: center;">Trapped-key fence lock</p>





### 3.8 Service lift door

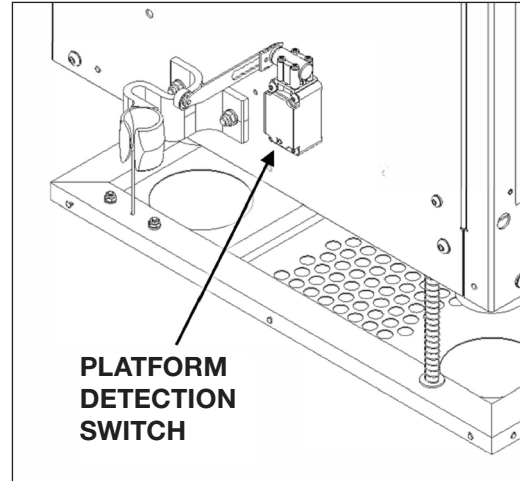
During normal use with the service lift plugged into the electric current, the sliding door is closed by pushing the actuator into the door guard locking device. The control is interrupted if the door is not closed properly.

When the cabin is located on a platform, the lift detection switch is activated and the sliding door can be opened. Inside the cabin there is a handle to help opening the sliding door.

Inside the cabin there is a position platform indicator.

The green light is ON when the lift is positioned on the platform.

During emergency use, for example, power cut, need of evacuation or rescue, the door guard locking device can be unlocked by pushing Door Manual Release button from outside the cabin, or by using the triangular key from inside the cabin.



#### 3.8.1 Normal use



**DOOR  
GUARD  
LOCKING  
DEVICE**

**PUSH THE  
GREEN  
BUTTON TO  
OPEN THE  
DOOR**

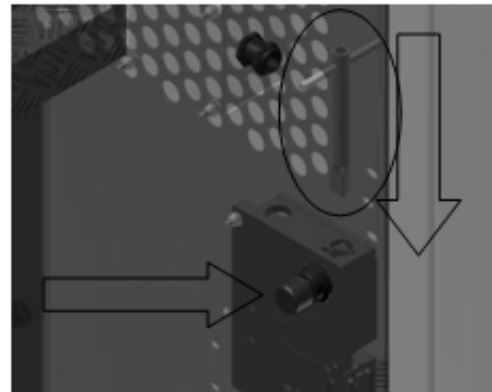


**SLIDE THIS HANDLE TO OPEN  
THE SLIDING DOOR**

#### 3.8.2 Emergency use

##### **INSIDE THE CABIN:**

Use triangular key fixed inside the cabin to open the door.



##### **OUTSIDE THE CABIN:**

Push red release button.







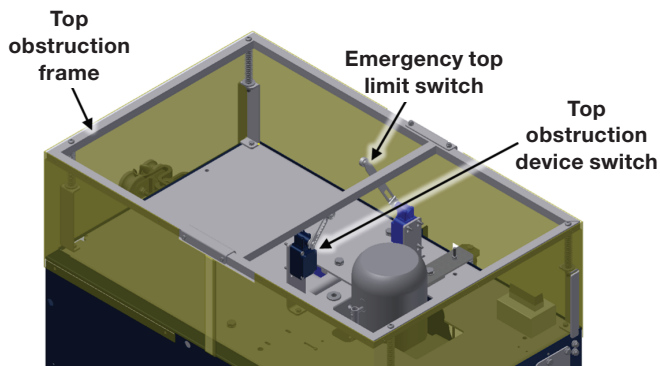
### 3.9 Emergency top limit switch

At the top of the cabin a top limit switch will stop ascent when activated. Descent will still be possible. A top limit device activating the top stop switch is installed below the traction wire rope fastenings. Emergency top limit switch interrupts the control if the top limit switch fails. Only manual descent is possible.



*When the top limit switch is engaged, press the DOWN button until the top limit switch is released*

*Do not use the service lift until the top limit switch fault has been rectified.*



### 3.11 Bottom obstruction device

The bottom obstruction switch stops descent if the service lift:

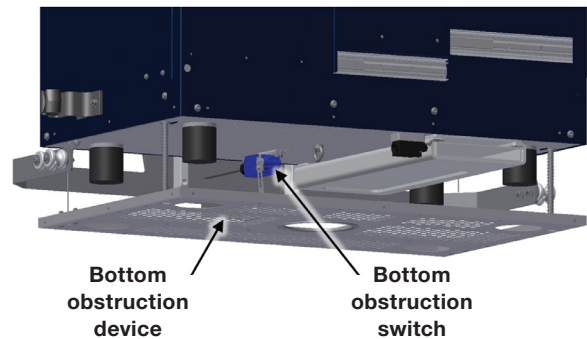
- encounters an obstacle
- touches the ground

Ascent will be possible, for instance to remove the obstacle.

In order to put the service lift on the ground, the functionality of the Bottom obstruction device can be bypassed with the bottom obstruction override switch in the user control box. To do so, turn the bottom obstruction override switch while pressing the DOWN button.



*Release the DOWN button as soon as the rubber bumpers hit the floor. Otherwise the lift or the installation may get damaged.*



### 3.10 Top obstruction device

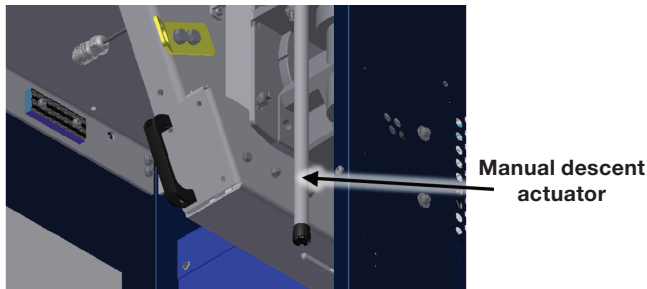
The top obstruction device switch stops ascent if the service lift:

- encounters an obstacle
- touches the top limit device

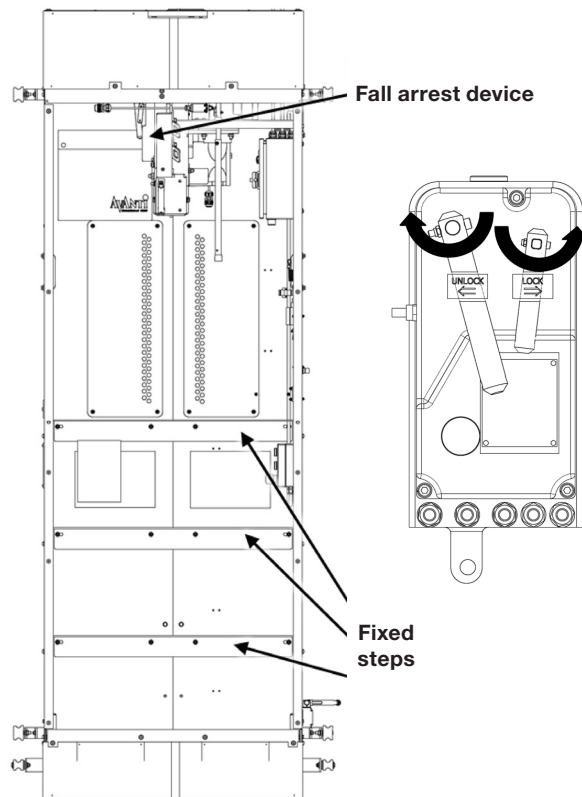
Descent will be possible, for instance to remove the obstacle.

### 3.12 Manual descent system

The service lift features a manual descent system that can be used in case of no power emergency situation. It is activated by pushing the manual descent actuator upwards. Push and hold the actuator upwards to release the motor brake. Push up the actuator completely to avoid excessive wear and overheating the electro - mechanic brake. The electromagnetic motor brake is then released. The service lift descends with a controlled speed limited by means of a centrifugal brake installed between the motor shaft and the gear box.



- Fixed steps are provided for access to the fall arrest device levers. The user must observe all safety precautions and check that the lift doors are closed before climbing on it.
- To engage the fall arrest device: Turn the stop lever counter clockwise.
- To release the fall arrest device: Turn the release lever clockwise.



### 3.13 Fall arrest device

The service lift is equipped with a fall arrest device which will be triggered in case of an overspeed condition. The speed of the safety wire rope passing through the device is continuously monitored, and the jaws are automatically closed in the event of sudden excessive speed.



*Tightness of safety wire rope must be frequently inspected to ensure full functionality of fall arrest device!*

This device protects the service lift against traction wire rope breakages or traction system failures. The fall arrest device can also be engaged or disengaged manually by pulling downwards knobs on the back of the lift, or by acting directly on the fall arrest device levers.



*BEFORE CLIMBING on steps, CHECK that required PFPEs are used, the cabin doors are closed and personnel is hooked to anchor points inside cabin*



*During manual descent, the door of the lift shall be kept closed.  
Do not extend body parts outside the cabin during travel.*



### 3.14 Overload limiter

A lifting force limiter is built into the wire rope traction system and will prevent upward travel in the event of overload. In case of overload, the lift's upward travel will be blocked, and a buzzer will sound in the user control box. The buzzer will stop only when the cause of the overload has been removed.

- Reduce the load to below the overload limit.
- Lower the lift until it is free of the obstacle and remove the obstacle before using the lift again



*On entering and starting the lift, the buzzer may sound briefly. This is due to temporary load peaks occurring as the lift takes off. The control box is designed not to activate the buzzer or stop the lift because of peak loads caused by the cabin swinging.*



*Attempting to run an overloaded lift is prohibited!*

### 3.15 Warning light

A set of warning lights is mounted on the top and at the base of the lift. The flashes warn that the lift is moving.

### 3.16 Acoustic buzzer

An audible signal is installed with a warning function.

In case of using the external user control box, or the platform control boxes, the operation will provide delay with sound warning the users of the imminent movement, so persons next to or inside the cabin are warned and can act accordingly.

### 3.17 Anchor points

The service lift is equipped with two anchor points inside the cabin. During operation personnel shall hook themselves up to the anchor points inside the cabin. In case of need of evacuation, the evacuation procedure must be observed.

### 3.18 Internal light

The service lift is equipped with a light inside the cabin.

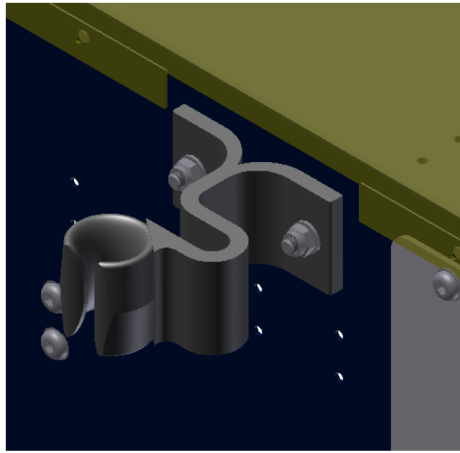
- Service and emergency light: when service lift is connected to power supply, this light illuminates at all times, and it is also battery packed in order to illuminate the inside of the cabin in case of a power failure (once charged).



### 3.19 Guiding system

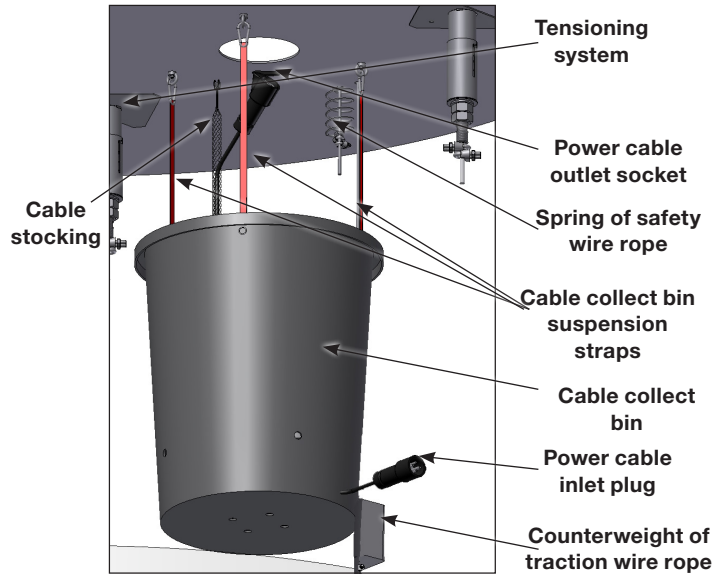
The service lift is guided along the guiding wire ropes by means of plastic wireguides or roller guides.

Standard plastic wireguides

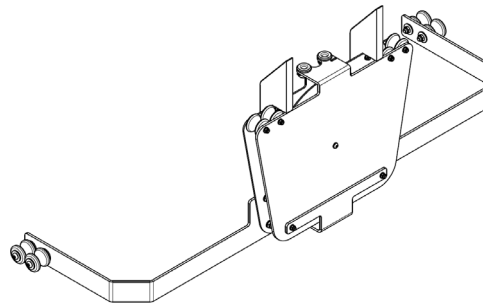


### 3.20 Control cable management

The control cable coils inside a bin placed under the cabin.

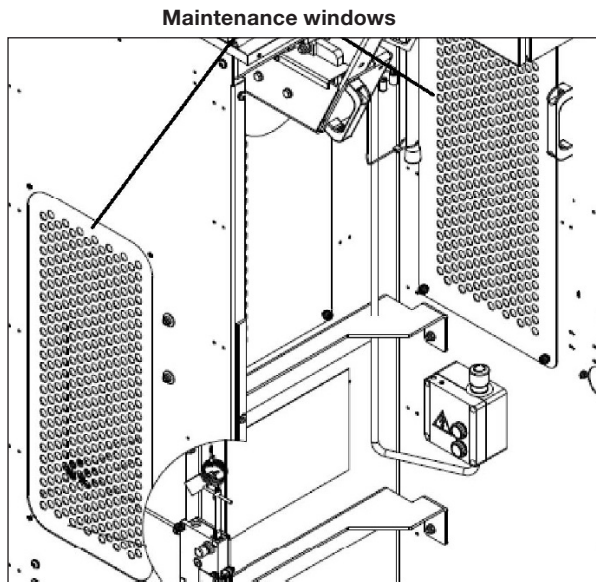


The travelling cable pulley straightens the cable at all possible positions of the service lift. It is installed instead of the cable bin. The travelling cable pulley is included as an optional feature for automatic send configuration, but mandatory for send/call configuration.

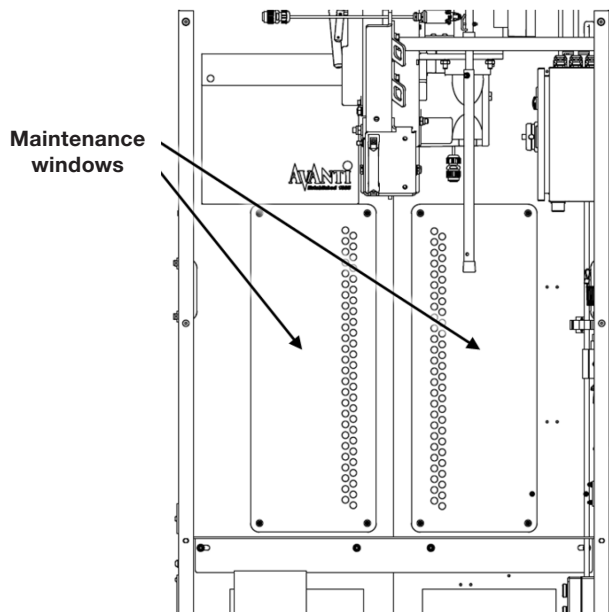


### 3.21 Maintenance windows

The cabin has two lateral windows that are removable to facilitate maintenance tasks on the tower from inside the lift.



The cabin has also two back windows that are removable to facilitate inspection and maintenance tasks of traction and safety wire ropes from inside the cabin.



*These windows shall be used only in special cases such as corrective maintenance and installation of tower components. These windows shall not be used for preventive or normal maintenance tasks.*



*During maintenance and/or installation tasks through these windows, the emergency stop of cabin control box must be always activated.*

### 3.22 Information signs and documents

The following documents, signs and labels are supplied with the service lift and shall always be available.

Location	Document
Cabin	Serial number plate
	Manuals
	Electrical diagram
	Quick guide
	Evacuation guide
	Mandatory use of PPE
	Maximum load / number of persons
Main control box	Manual release (internal and external)
	Electric hazard warning

## 4. Instructions for use

### 4.1 Daily inspection

#### Travel zone:

Ensure that there are no obstacles in the travel zone which may obstruct the travel of the service lift.

#### Service lift:

1. Check that the service lift components are mounted in accordance with the specifications and without any noticeable defects or missing components.

2. Check that the traction and safety wire ropes are not damaged or jammed.

3. Check that the safety devices are in place and working:

3.1 Main switch: Turn the main switch on the bottom platform control box to the OFF position. The green light must be OFF. The service lift must not run. Turn it ON, the light shall be ON.

3.2 Green light (Ready) – Service lift: Close and lock the bottom platform gallery door and the service lift door. Turn the trapped key to the ON position (if installed). The green light must be ON. It should not be possible to remove the trapped key unless it is switched OFF again.

3.3 Emergency stop button on the bottom platform: Press the emergency stop button located next to the main switch on the bottom platform. The service lift should not move UP/DOWN. Release the emergency stop button on the bottom platform.

3.4 Emergency stop button: Press the emergency stop button on the cabin control box. The service lift should not move UP / DOWN. Release the emergency stop and drive the lift UP approximately 1 meter.

3.5 Service lift door: Pull the door to open. The door should not open. Unlock the sliding door. The sliding door should open, the green light must be OFF and the lift must not move UP /DOWN. Close the sliding door and apply the lock to the sliding door.

3.6 Ascend lift electrically a few centimeters and observe centrifugal weight during this. Activate the fall arrest device by turning the lock lever counter clockwise. Press and hold the DOWN button of the cabin control box. The service lift should not descend. Try to perform manual descent and observe centrifugal weight during this. The FAD should hold the load (if not, leave the lift and tag it out). Ascend electrically again to unload the FAD. Unlock the fall arrest device by turning the unlock lever clockwise. There is an alternative method to check the FAD functionality, called 'Stomp Test'. The procedure is explained in the 'Stomp-test Instruction'.

3.7 Perform a manual descent test for a meter. The lift should descend.

3.8 Drive the service lift down until the Bottom obstruction device hits the bottom platform. The service lift should stop before the rubber bumpers hit the bottom platform. The service lift door and the fence door should be unlocked.

3.9 Top obstruction device: activate top stop by pressing it down. The service lift should not ascend until top obstruction device is released.

4. When the lift is at the top platform, check the wire rope fastenings.

5. Record the hour meter reading in the "Inspection Log Sheet" Appendix in User's manual.



*If any faults occur during work,*

- stop working,
- if required secure the workplace and
- rectify the fault!



*Make sure that nobody is exposed to danger below the service lift, for instance from falling parts.*

#### Cabin control from outside of the cabin- Automatic:

The automatic mode function is available from the control buttons outside of the cabin and at the platforms. It shall be checked as follows:

1. Turn the main control box selector to AUTOMATIC. Press the UP button on the control box. The lift should ascend.
2. Press the emergency stop button on the control box. The lift stops.
3. Pull the emergency stop button and press the DOWN button. The service lift should descend until the bottom obstruction device engages.



*The daily inspection must be recorded for future reference (filling in the "Inspection Log Sheet" Appendix in User's manual).*

### 4.2 Prohibited uses



*The consequences of not following below STOP prohibitions are extremely hazardous to the physical integrity of the users.*

When using the service lift it is prohibited to:

- Use the service lift beyond its intended purpose.
- Operate the service lift without following the safety warnings and operating instructions.
- Overload the service lift
- Try to repair machine components. Only Certified Technicians are allowed to perform service on the machine.
- To manipulate switches and safeties.
- To place objects on service lift roof.
- To travel on service lift roof.
- To use the emergency manual release of the guard locking of door lift during normal use.
- To disattach trapped key from wire rope.
- To have a second trapped key.





### 4.3 Operation from inside the cabin (manual)

When fence doors feature trapped key system:

1. Turn the main switch of the bottom platform control box to the ON position (if installed).
2. Open the cabin door, take the trapped key and open the bottom fence door.
3. Enter the service lift, close and lock the bottom fence door.
4. Turn the trapped key switch to ON, and close the cabin door.
5. Turn the the main control box selector to MANUAL (if installed).
6. To go up or down, press and hold the UP or DOWN button as needed.



*In the event of traction wire rope breaks or traction hoist fails, evacuate the service lift.*

*Before closing the lift door, ensure that your equipment (i.e.lanyards) do not get trapped/ tangled with the closing door and/or with surrounding elements.*

*To prevent the lanyards from tangling with surrounding elements, keep them properly attached to your body harness.*

*To prevent the lanyards from tangling with the moving service lift, do not get close to the hoistway.*

### 4.4 Operation from outside the cabin (automatic send)



*Transportation of people is forbidden if the operation is controlled from outside the service lift.*



#### 4.4.1 Bottom platform

When fence doors feature trapped key system:

1. Turn the main switch of the platform control box to the ON position (if installed).
2. Open the cabin door, take the trapped key and open the bottom fence door.
3. Turn the main control box selector to AUTOMATIC.
4. Exit the cabin, close and lock the bottom fence door.
5. Turn the trapped key switch to ON, and close the cabin door.
6. Press the external UP button.

#### 4.4.2 Top platform

When fence doors feature trapped key system:

1. Open the cabin door, take the trapped key and open the top fence door.
2. Turn the main control box selector to AUTOMATIC.
3. Exit the cabin, close and lock the top fence door.
4. Turn the trapped key switch to ON, and close the cabin door.
5. Press the external DOWN button.

### 4.5 Operation from the platform control boxes

When fence doors feature trapped key system:

1. Open the cabin door, take the trapped key and open the fence door.
2. Exit the cabin, close and lock the fence door.
3. Turn the trapped key switch to ON, and close the cabin door.
4. Press and hold the platform control box UP or DOWN button to ascend or descend the cabin.



*When the UP or DOWN button of a external control box (platform or cabin) is pressed , the response of the cabin is delayed. During this delay, an acoustic signal will sound. This way, any personnel in the surroundings are warned of the imminent movement of the service lift.*



*Transportation of people is forbidden if the operation is controlled from a platform control box.*



*Before closing the lift door, ensure that your equipment (i.e.lanyards) do not get trapped/ tangled with the closing door and/or with surrounding elements.*



*To prevent the lanyards from tangling with surrounding elements, keep them properly attached to your body harness.*



*To prevent the lanyards from tangling with the moving service lift, do not get close to the hoistway.*

## 4.6 Fall arrest device

If the fall arrest device engages simply disengage it by turning the "Unlock" lever clockwise until the fall arrest device is unlocked.

However, this is not possible if the safety wire rope is under tension. If this is the case:

1. Remove the load on the safety wire rope by pushing the UP button ascending the service lift a few centimetres.

2. Manually open the fall arrest device by turning the "Unlock" lever clockwise until the fall arrest device is unlocked.

In case of power failure and the fall arrest device is locked with the safety wire rope under tension evacuate the lift according to the evacuation procedure.



*The safety wire rope and the attachment between the fall arrest device and the service lift are exposed to dynamic loads when a fall is prevented. When the service lift has returned to the bottom platform, test the fall arrest device functionality. Replace any defective fall arrest device components and return them for repair to AVANTI. If the FAD damper has moved downwards, the FAD unit must be replaced by a certified technician.*

## 4.7 Manual descent

In case of power failure, a manual descent without power can be performed. To do so:

1. Verify that the fall arrest device is unlocked.
2. Check that there are no obstacles or persons in the travel zone.
3. Take the manual descent actuator from its holder and insert it on the lever extension tube.
4. Push the manual descent actuator upwards. The service lift will start descent.
5. To stop the manual descent, stop pushing upwards.
6. Every time that a whole tower height manual descent is performed, the system must be checked by an expert.



*During the manual descent, the door and windows/covers of the lift shall be kept closed.*



*Use the walkie-talkie to report about the manual descent.*

*During the manual descent, stop the service lift just before reaching the bottom platform floor. This way, the bottom obstruction device will not get damaged.*

## 4.8 Lateral removable windows

To open the windows:

1. Press the emergency stop button of the cabin control box.
2. Remove the lateral windows from the cabin lateral panels by unscrewing its riveted screws with a Torx screwdriver.

To close the windows:

1. Install the lateral windows by screwing its riveted screws back on the cabin lateral panels with a Torx screwdriver.
2. Press and turn the emergency stop button of the cabin control box.



*The lateral removable windows shall only be used by Certified Technicians.*

*The lateral removable windows shall only be used for maintenance tasks.*

## 4.9 Cabin maintenance covers

To open the covers:

1. Press the emergency stop button of the cabin control box.
2. Remove the covers from the cabin back panels by unscrewing its riveted screws with a Torx screwdriver.

To close the covers:

1. Install the maintenance covers by screwing its riveted screws on the cabin back panels with a Torx screwdriver.
2. Press and turn the emergency stop button of the cabin control box.



*The cabin maintenance covers shall only be used by Certified Technicians.*



*The cabin maintenance covers shall only be used for maintenance tasks.*



## 4.10 Troubleshooting

1. All tests and repairs to the electronic components should be performed by **certified technicians only!** The wiring diagram is placed in the power cabinet.

2. Repairs to the traction hoist, the fall arrest device and to the system's supporting components should be performed by **certified technicians only!**





Breakdown	Cause	Solution
<p>The service lift will <b>neither go up nor down!</b></p> 	 <b>DANGER!</b> <i>Attempting to use the lift will jeopardize work safety.</i>	
	<b>A1 The fixed EMERGENCY STOP button has been activated.</b> In the user control box or in any of the platform control boxes (bottom, top or intermediate platforms)	Deactivate the button in question by pulling it until it pops out.
	<b>A2 Wire rope loop</b> on traction hoist. Damaged or defective wire rope or wire rope outlet causes problems.	<b>Stop work immediately!</b> Ask the supplier or manufacturer for help.
	<b>A3 The fall arrest device is holding the service lift on the safety wire.</b> a) Lift wire rope breakage b) Hoist failure	a) + b) Evacuate the service lift according to the "Evacuation guide".
	<b>A4 The service lift is stuck on an obstacle.</b>	Carefully remove the obstacle. Test the operational safety of affected tower sections. Inform the supervisor.
	<b>A5 Power failure</b> a) Control not switched on or deactivated. b) Grid voltage interrupted. c) Supply between grid connection and control interrupted.	a) Turn EMERGENCY STOP button to the right until it is released. b) Find the cause and wait for the power to return. c) Test and if necessary repair the supply cable, fuses, and/or wiring from the control box.
	<b>A6 Safety switch is triggered</b> a) EMERGENCY top limit switch was pressed. b) <b>Door switch is not properly closed</b> or is defective.	a) Perform manual descent until the emergency top limit switch is released. b) Close the door and test the door switch.
	<b>A7 Protection switch on overheating</b> a) A phase is missing b) Motor is not cooling c) Voltage too high/low	a) Test/repair fuses, supply and connection. b) Clean the hood. c) Measure voltage and power consumption on the loaded motor. If voltage deviates from specifications, use cable with increased dimensions.
<b>A8 Brake does not open (no click on on/off)</b> a) Supply, braking coil or rectifier defective. b) Braking rotor closes.	a) Have an authorized person, repair/replace the supply, braking coil and rectifier. b) Return traction hoist for repair.	




**DANGER!**

*Unplug the power supply before opening the power cabinet.*






Breakdown	Cause	Solution
<p>The service lift will <b>neither go up nor down!</b></p> 	<p><b>A9 The key switch (if installed) ON/OFF has not been activated.</b></p>	<p>Turn the key to ON.</p>
	<p><b>A10 The main switch is in the OFF position.</b></p>	<p>Turn the main switch ON.</p>
	<p><b>A11 The product is stuck on an obstacle below it.</b></p>	<p>Evacuate the service lift</p> <ul style="list-style-type: none"> <li>- Inform the supervisor.</li> <li>- Check the bottom obstruction device connection/ function. Replace if necessary.</li> <li>- Check the slack rope sensor 1) connection/ function. Replace if necessary.</li> </ul> <p>1)Note: Optional feature.</p>
<p>Service lift goes <b>down but not up</b></p> 	<p> <i>Irresponsible behaviour jeopardizes system safety!</i></p> <p><b>B1 The service lift is stuck on an obstacle.</b></p>	<p>Carefully move the service lift downwards and remove the obstacle.</p> <p><b>Test the operational safety of affected platform components. Inform the supervisor.</b></p>
	<p><b>B2 Top obstruction switch:</b></p> <ul style="list-style-type: none"> <li>a) Top obstruction switch is defective or not connected properly.</li> <li>b) Top obstruction switch is activated.</li> </ul>	<ul style="list-style-type: none"> <li>a) Test the top obstruction switch connection/function. Replace if necessary.</li> <li>b) Move lift down until the top obstruction switch is released.</li> </ul>
	<p><b>B3 A phase is missing</b></p>	<p>Test fuses and power supply.</p>
	<p><b>B4 Fault in UP control circuit</b> in control box or traction system</p>	<p>Test and possibly repair connections, wiring and relays.</p>
	<p><b>B5 Service lift is overloaded (buzzer sounds).</b></p>	<p>Test and/or reduce load until buzzer stops.</p>
	<p><b>Motor hums loudly or wire ropes squeak, but the lift can go both up and down.</b></p>	<p><b>C1 Wire ropes dirty</b></p> <p> <b>WARNING!</b></p> <ul style="list-style-type: none"> <li>Further use of lift may result in damage to the wire rope traction.</li> </ul>


 **DANGER!**

Unplug the power supply before opening the power cabinet.





Breakdown	Cause	Solution
<p>Service lift will <b>go up but not down!</b></p> 	 <i>Irresponsible behaviour jeopardizes system safety!</i> <b>D1 The service lift has encountered or is stuck on an obstacle.</b>	Carefully take the service lift up and remove the obstacle. Test the operational safety of affected platform components. Inform the supervisor.
	<b>D2 The fall arrest device is holding the service lift on the wire rope.</b>  a) Excessive hoist speed b) Too low release speed on fall arrest device.	a) + b) Take the service lift upwards to relieve the safety wire rope. unlock the fall arrest device by turning the unlocking lever, and test its function.  <b>Functional test when the lift is back on the ground: Replace the hoist and fall arrest device and return them for testing.</b>
	 <i>A defective fall arrest device will threaten the safety of the service lift!</i>  <i>Replace immediately!</i>	
	<b>D3 Fault in down controller circuit</b> on traction system	Insert brake lever into the traction system and lower lift manually. Test, and if necessary have connections, wiring, and relays repaired.
	<b>D4 Bottom obstruction switch:</b> a) Bottom obstruction switch is defective or not connected properly. b) Bottom obstruction switch is activated.	a) Test the bottom obstruction switch connection/function. Replace if necessary. b) Move lift up until the bottom obstruction switch is released.
Button lamp not lit although operation is normal.	<b>E A lamp is defective</b>	Have an electrician replace it.
Hoist goes down when up button is pressed and up when down button is pressed.	<b>F Two phases changed in the supply.</b>	Have an electrician switch the 2 phases in the plug.
Loud noise and / or smoke coming from hoist motor	<b>G Brake closed or partially closed</b> <b>WARNING !</b> Damage of hoist brake leading to brake function lost	<b>Stop work immediately!</b> Call supervisor for advice and potential repair of hoist



**DANGER!**

*Unplug the power supply before opening the power cabinet.*



*If these steps do not identify the cause and rectify the fault: Consult a certified technician or contact the manufacturer.*

## 4.11 Out of service

### 1. Securing the service lift:

Bring the service lift all the way down, until the bottom obstruction device stops the cabin.

### 2. Turn off the main switch to prevent inadvertent operation of the lift:

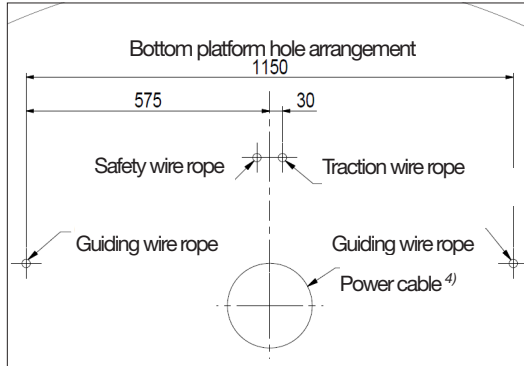
Turn the main switch to the OFF position – Power supply is now interrupted. Mark the lift “OUT OF SERVICE”. Contact the service technician for repair.



## 5. Installation

Consult the AVANTI Installation and Maintenance Manual for further information.

### 5.1 Guiding wire ropes (bottom platform)



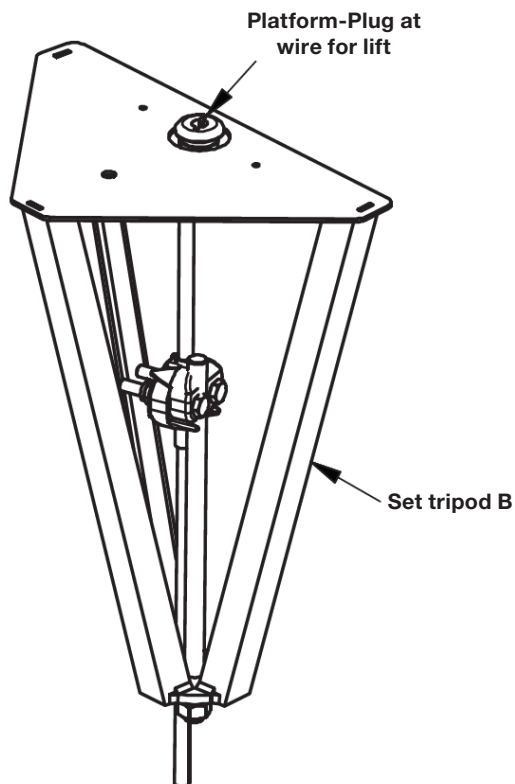
1) Feed the guiding wire ropes through the wire guides on the service lift.

2) Fit the correct number of wire rope fixes on the wire rope and feed through the wire rope guides. The wire rope fixes must be installed and adjusted during the first run.



<sup>4)</sup>Note: Power cable hole is only necessary when cable bin is installed.

3) Pull the guiding wire rope through the bottom platform and fasten it with the tensioning system.



4) Attach the wire ropes to the tensioner:

- Feed the wire ropes through the tensioning system.
- Attach the wire rope to the tensioning system using the wire rope grips to allow for the first run.
- Make a mark on the wire rope to ensure no sliding occurs at the wire rope grips and to use as a reference for checking stroke if necessary.

5) Perform final tension adjustment after first run:

- Tighten the wire rope grips bolts to 75 Nm. Tension the wire ropes by turning the supplied nut until the desired tension: 400 kg if tower height  $H < 100$  m, 500 kg if tower height is  $100 \text{ m} < H < 120$  m; if  $H > 120$  m please contact Avanti.
- Use the second nut to lock the assembly.





**30** AVANTI Service Lift for Wind Turbines





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