Original instructions

AVANTI SERVICE LIFT

45541256 - User's Manual: Appendix

Model Service Lift SHARK L with sliding door Gamesa

CERTIFICATE

EC-Type Examination

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

Number of registration: 01/205/0778D/16

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

AVANTI WIND SYSTEMS A/S
Rønnevangs Allé 6
DK- 3400 Hillerød
Denmark

the close conformity of the product

Service lift inside wind turbine Gamesa
including protection fences for service lift holes at landings
and fence door interlock system

Technical data:

Service lift:	**Shark L with sliding door**
- max. load capacity:	240 kg
- net weight:	110 kg
- traction hoist:	M508
- safety gear:	ASL508
- max. lifting height:	150 m
- lifting speed:	18 m/min
- protection fences:	Swinging or sliding door with interlock system
- fence interlock system:	Guard locking switch system or Trapped-key system
- optional features:	Send and/or call functions from platforms, Travelling cable pulley (instead of cable bin)

Modification D to the certificate 01/205/0778C/14 from 2014-07-25:
- Application of the standard EN 1808:2015

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.: 16_103-1 from 2016-10-17 and is valid only duly considering the requirements mentioned in this document. The examination was realized on site in Cologne.

This certificate is valid until 2018-12-31

TÜVRheinland® 0035 Notified Body

Certification body
Notified under No. 0035
certifier

Cologne, 2016-10-18

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Precisely Right.

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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.

Contents

1. Purpose

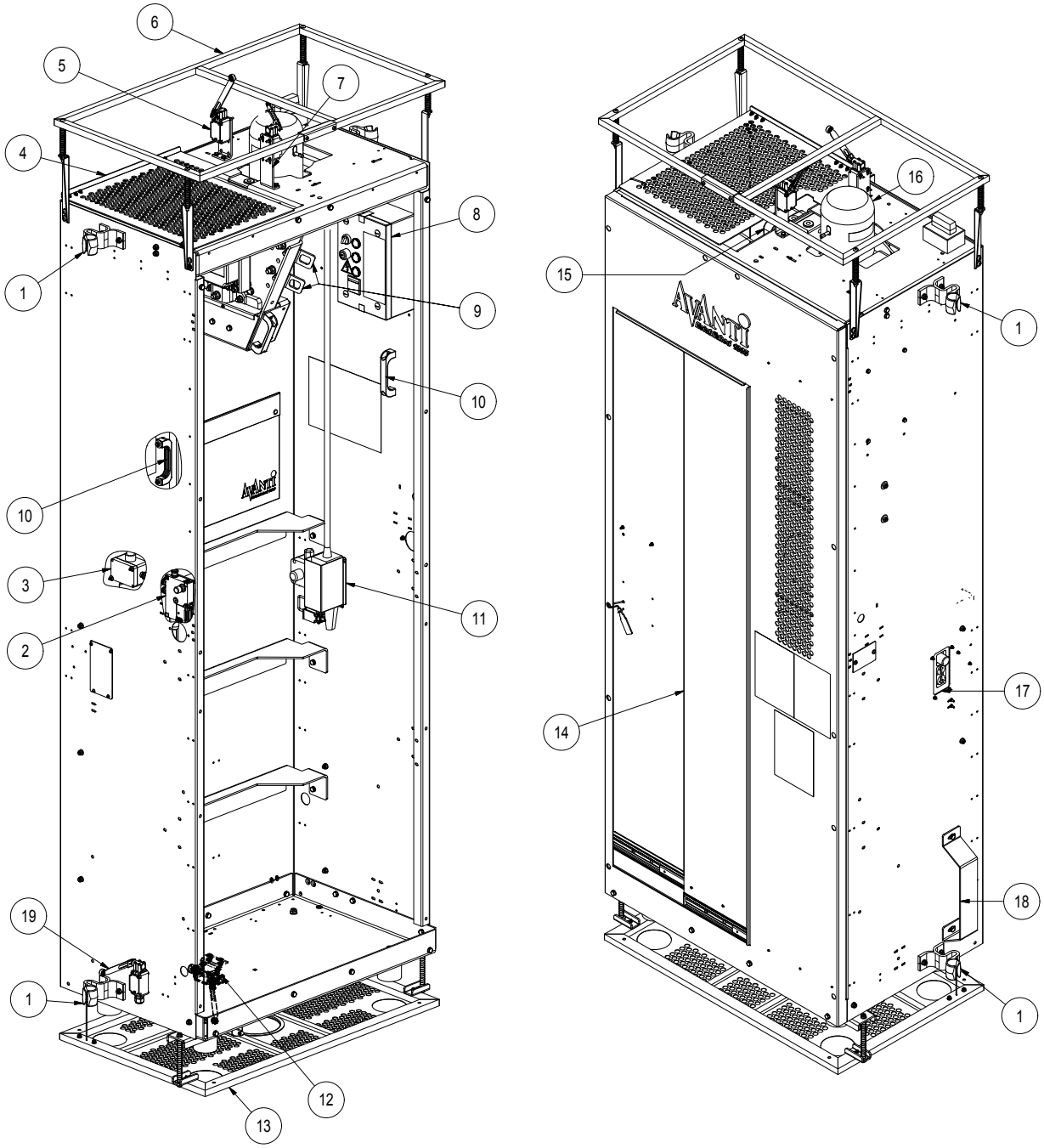
This Appendix serves as addition to the provided User´s, Installation and Maintenance Manual.
It clarifies some specifications of the Shark lift type provided for Gamesa
Consult the AVANTI User´s Manual and Installation Manual for further information.
Optionally, the lift can be equipped with send/call functions and a travelling cable pulley.

2. Description

2.1 Technical specifications

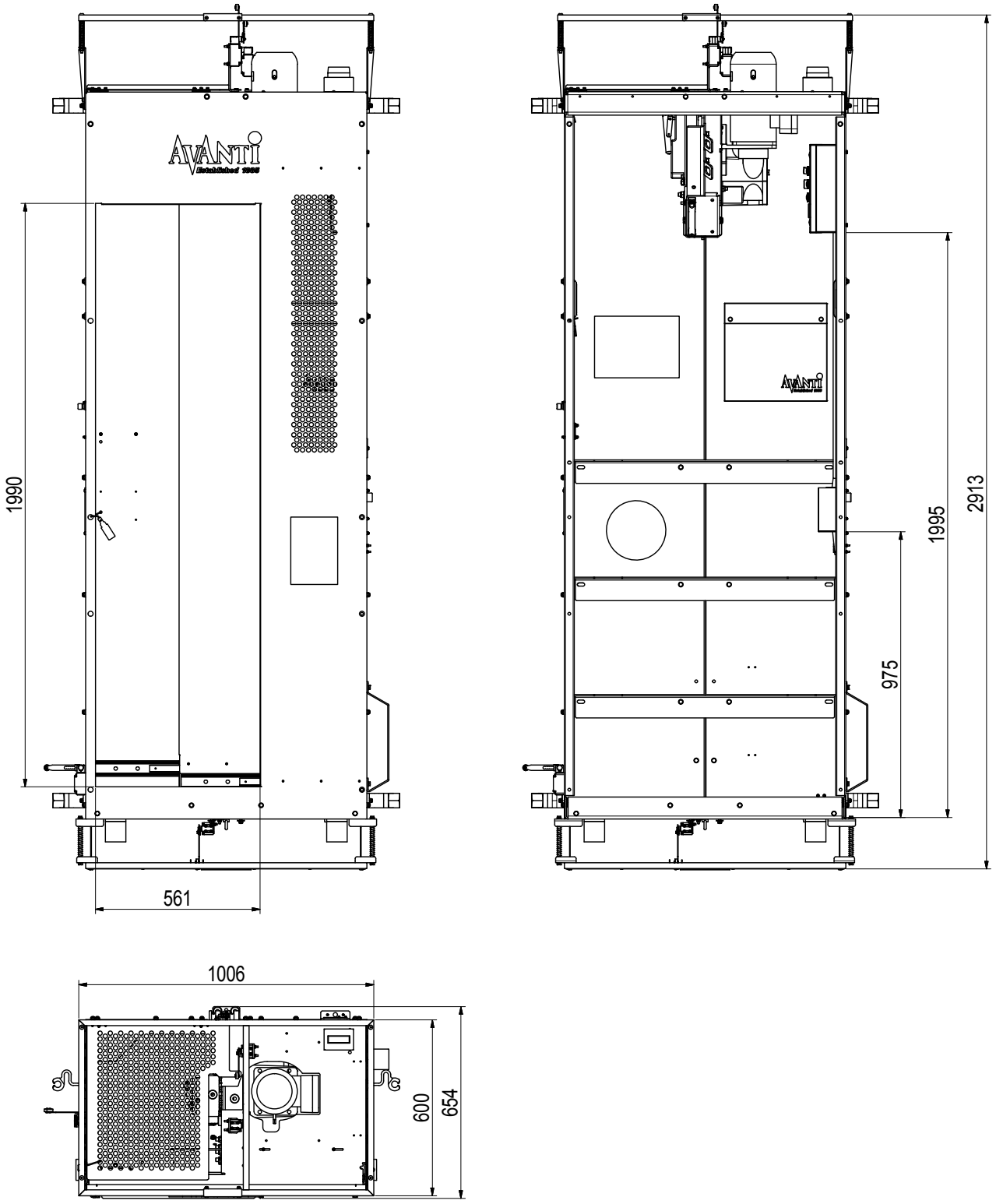
Shark L sliding door M508 service lift	
Cabin weight	110 Kg
Service lift speed	18 m/min
Working load limit / Nº persons (max)	240 Kg / 2 Persons
Operating temperature	-15ºC to +60ºC
Survival temperature	-25ºC to +80ºC
Max. noise level	75 dB (A)
Wire attachments	Shackle 2T form C with safety pin
Power supply	690V, 50Hz / 60Hz 400V, 50Hz / 60 Hz
Traction & safety wire ropes	
Diameter	8.4 mm
Breaking load limit (min.)	55 kN
Surface treatment	HDG
Mark / Feature	Blue string
Weight (approx.)	0.23 Kg / m
Guiding wire ropes	
Diameter	12 mm
Breaking load limit (min.)	55 kN
Surface treatment	HDG
Mark / Feature	None
Weight (approx.)	0.52 Kg / m
Power cable	
Type	4G1.5 (690V) 5G1.5 (400V)
Weight (approx.)	0.16 – 0.25 Kg/m
Hoist	
Power	1.5 kW
Working load limit	500 Kg

2.2 Service lift overview

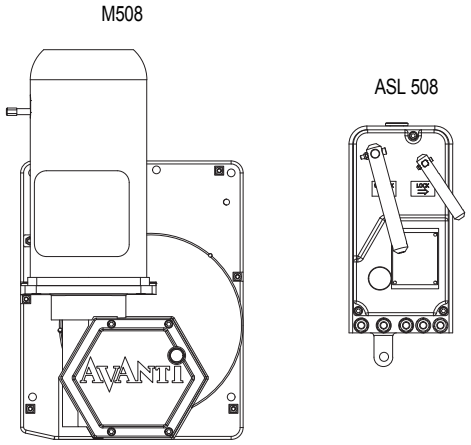


1. Wire guide
2. Guard locking switch (S19.3)
3. Trapped-key cabin switch
   Only for trapped-key configuration
4. Top hatch
5. Emergency top limit stop switch (S13)
6. Top safety stop
7. Top limit stop switch (S1)
8. Main control box
9. Anchor points
10. Handle
11. Pendant control holder
12. Bottom safety stop switch (S2)
13. Bottom safety stop
14. Sliding door
15. Fall arrest device (ASL508)
16. Traction hoist (M508)
17. External controls for automatic function
    (Standard configuration only)
18. Platform position plate
19. Platform position switch

2.3 Service lift dimensions

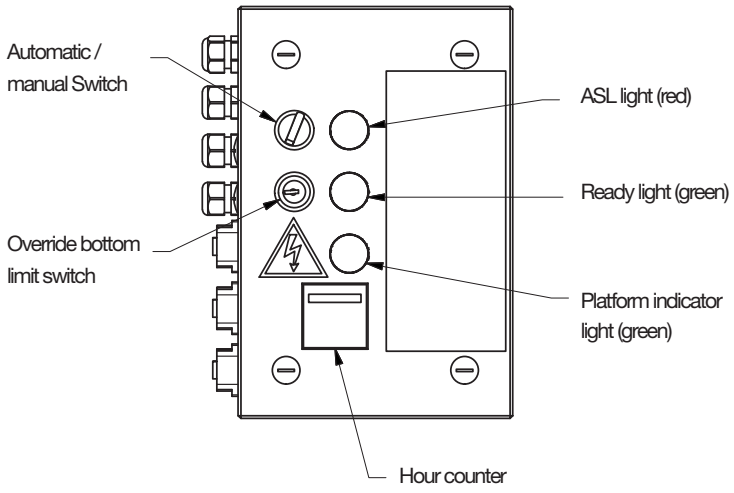


2.4 Traction hoist and fall arrest device

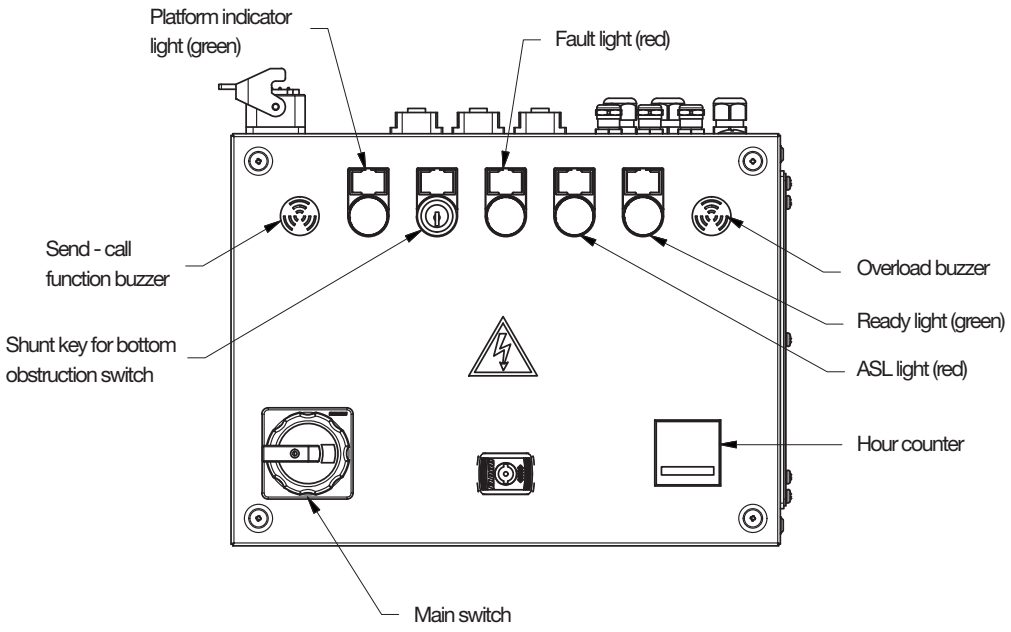


2.5 Main control box

2.5.1 Standard configuration

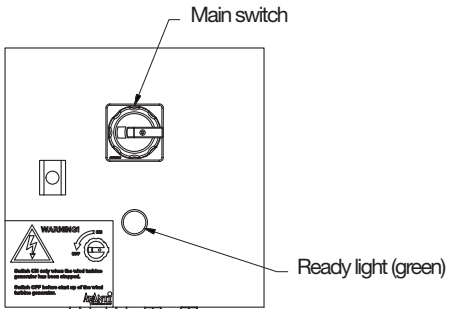


2.5.2 Send/call configuration



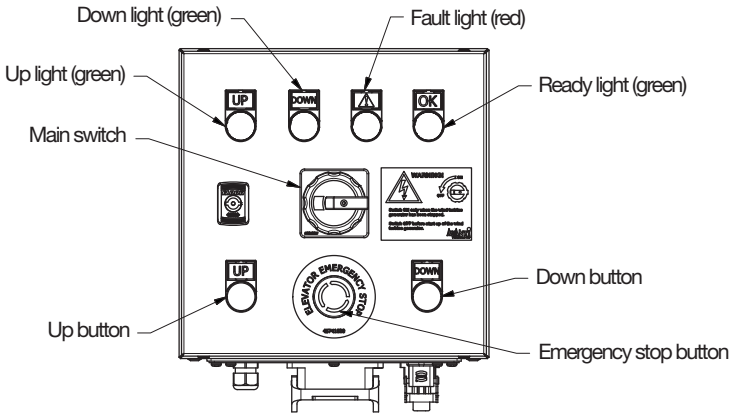
2.6 Bottom platform control box

2.6.1 Standard configuration



2.6.2 Configuración envío y llamada

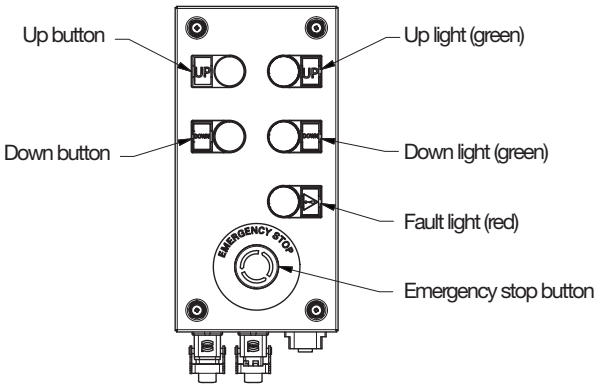
The send / call configuration incorporates a delayed response function and an acoustic buzzer on the cabin control box. This way, persons next to or inside the cabin lift are warned of the imminent service lift movement and can act accordingly.



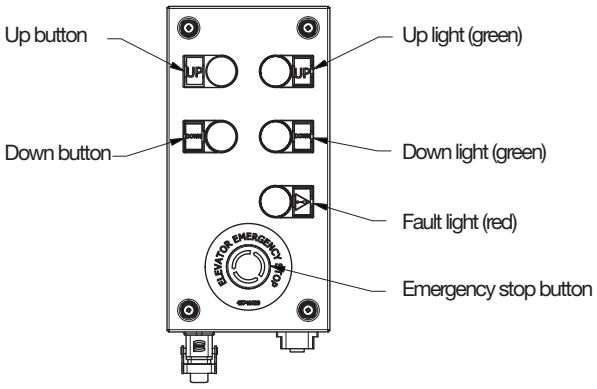
2.7 Intermediates and top platform control boxes

2.7.1 Control boxes for S&C1

Intermediate platforms control box

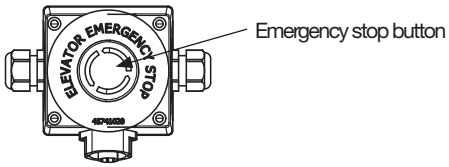


Top platform control box

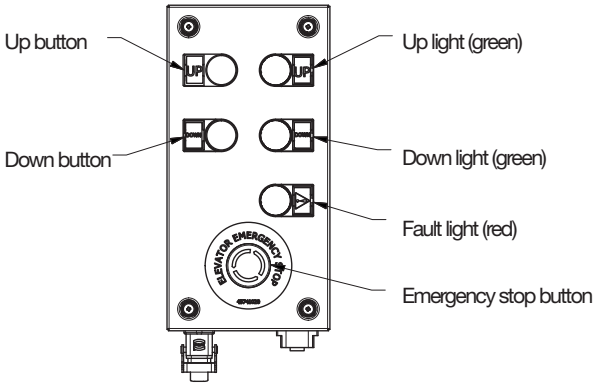


2.7.2 Control boxes for S&C2

Intermediate platforms control box



Top platform control box

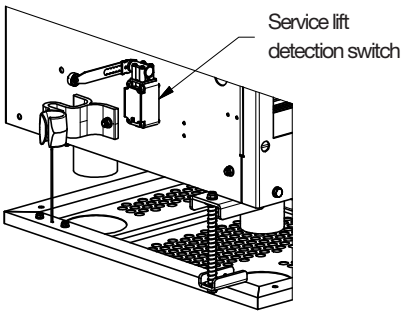


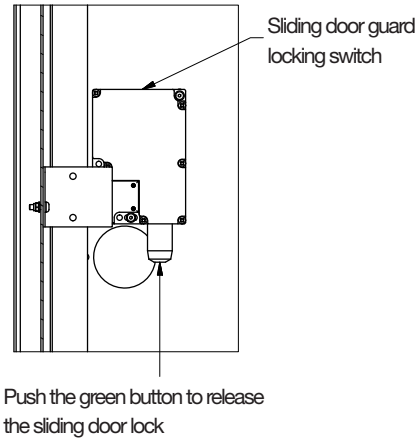
2.8 Service lift doors

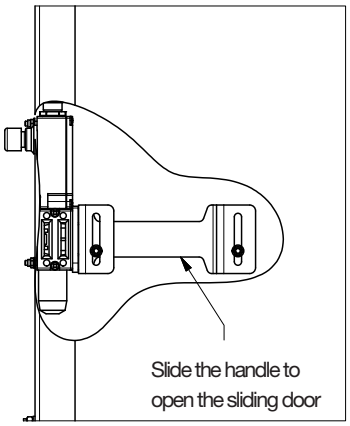
2.8.1 Normal use

The sliding door closes by pushing the actuator into the door guard locking switch. Once the cabin lift is located at a platform height, lift detection switch is activated and the sliding door can be opened unlocking the switch by pressing the guard lock green button. There is a handle fixed inside the lift's sliding door to help its opening. The lift electrical control is interrupted if the sliding door is not closed properly.

The cabin lift has a position platform indicator that turns ON a light on the cabin control box when the lift is positioned / located on the platform.





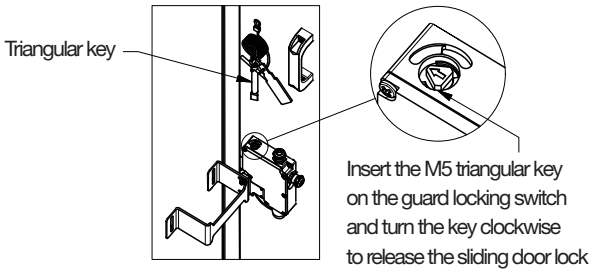


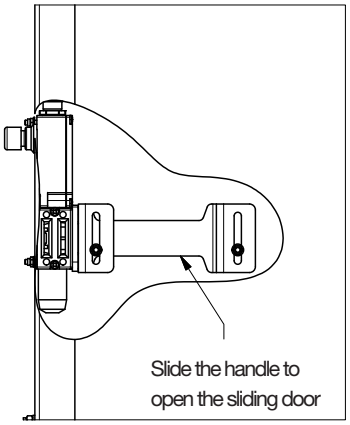
2.8.2 Emergency use

In case of emergency evacuation between platforms, the interlock unlocks by pressing the red emergency release button from outside the cabin or using a M5 triangular key from inside the cabin.

- **Inside the cabin**

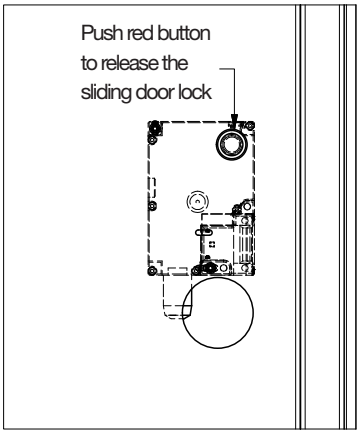
Use the M5 triangular key fixed inside the cabin's panel to open the sliding door.





- **Outside the cabin**

Push the red release button to open the sliding door.



2.9 Top safety stop

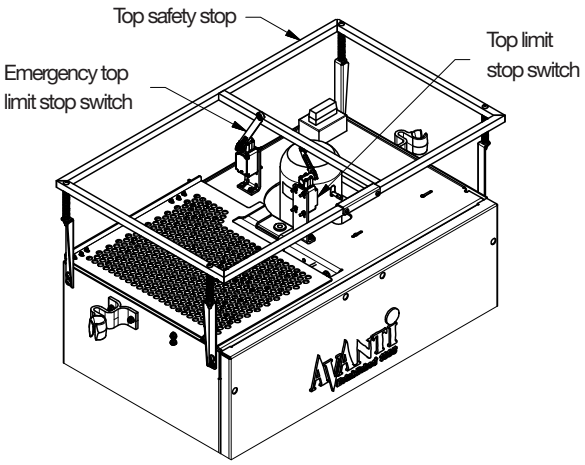
The top limit stop switch stops the cabin lift upwards travel if:

- The cabin lift encounters an obstacle. Downwards travel will be possible, for example, to remove the obstacle.

- The top limit stop switch is activated by the top stop end bar which is installed bellow the lift suspension beam to activate the top safety stop.

The emergency top limit stop switch deactivates the cabin lift electrical control if the top limit stop switch does not activate by the top safety stop. Lift manual descent travel is possible.

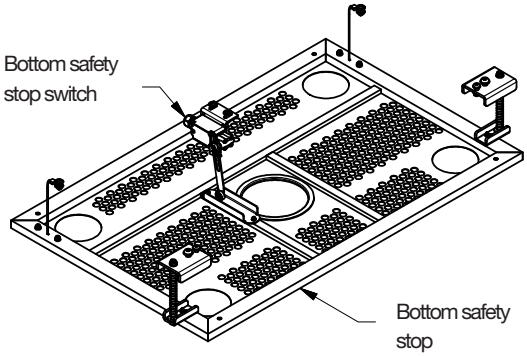
Consult the AVANTI User´s Manual and Installation Manual for further information.



2.10 Bottom safety stop

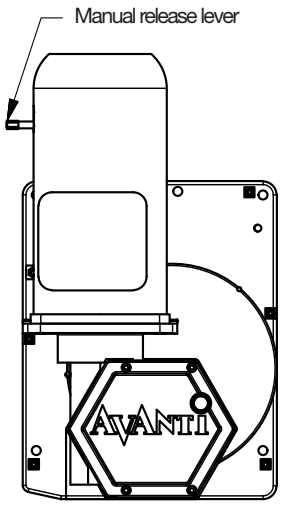
The bottom stop switch stops the lift downwards travel when the full covered bottom stop touches any obstacle or the bottom platform floor. Upwards lift travel is possible by using the pendant control, for instance, to remove the obstacle.

Consult the AVANTI User´s Manual and Installation Manual for further information.



2.11 Manual descent

The traction hoist has a lever to allow the manual release of the electromagnetic motor brake. Once the motor brake is released, the descending motor speed is controlled by the centrifugal brake which is installed between the motor shaft and the gear box.



2.12 Fall arrest device

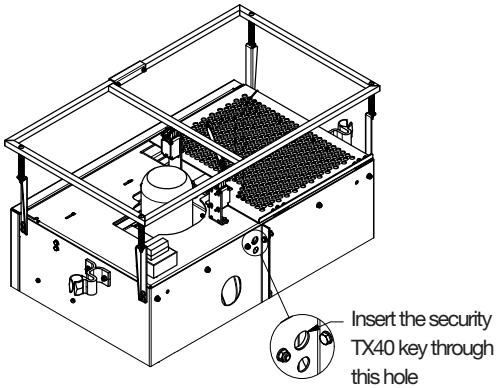
The service lift is equipped with an over speed safety gripping device which will be triggered in case of an over speed situation. The speed of the safety wire rope passing through the device is continuously monitored, and the jaws are automatically closed in the event of sudden excessive speed.

This protects the lift in case the traction wire rope or its attachment break, or in case of hoist failures.

2.13 Overload limiter

Check the AVANTI User´s Manual and the Installation Manual for detailed information. Verification and/or adjustment of the service lift overload limiter must be done only by qualified technicians instructed by AVANTI.
Required tools/material:
- Security TX40 key
- Ballast for applying the test load

To modify the lifting load limit proceed as follows:
1. Insert the security TX40 key in the adjustment screw.



2. Turn the overload adjustment tool:

- Clockwise to increase the lifting load limit.
- Counterclockwise to decrease the lifting load limit.

To adjust the lifting load limit proceed as follows:
1. Place the service lift on the lowest travel point.
2. Apply the Setup load (See table) depending on the tower height + 20 Kg

Lift travel (m)	Setup load (kg)	Overload test (kg)	⚠
60	287	495	
65	289		
70	292		
75	294		
80	296		
85	298		
90	301		
95	303		
100	305		
105	307		
110	310		
115	312		
120	314		
125	316		

3. Press the control box UP button. If the lift can go up reduce the overload limit until it is no longer possible to go UP, by means of the adjusting screw. Then turn the adjusting screw adding 1/4 turn more anticlockwise to reduce the trigger point.

4. Apply Setup load (removing the 20kg load). Press the UP button and verify that the lift can go up. If not, return to 3, until the lift is able to go UP with Setup load but it is not able to go UP with Setup load + 20 Kg

5. Apply Lift WLL and verify that the lift can complete a travel to the top of the WTG without triggering the overload limit. If it is not possible check setup load table and return to 3, otherwise continue with 6.

6. Go back to the lowest travel point and apply overload test load (SEE NOTE).

7. Press the control box UP button and verify the overload is triggered. If it is not triggered verify the test load and return to 2, otherwise continue with 8.

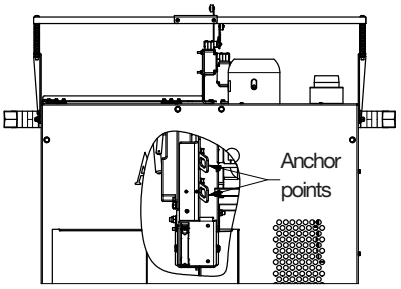
8. Remove the tools and the test load.

OVERLOAD TEST

NOTE
According to European Regulations (EN 1808 8.3.5.5) the overload device shall be triggered at or before reaching a load of 1.25 times the load capacity (OVERLOAD TEST), therefore the verification by a third party shall be carried out applying the test load of the table.

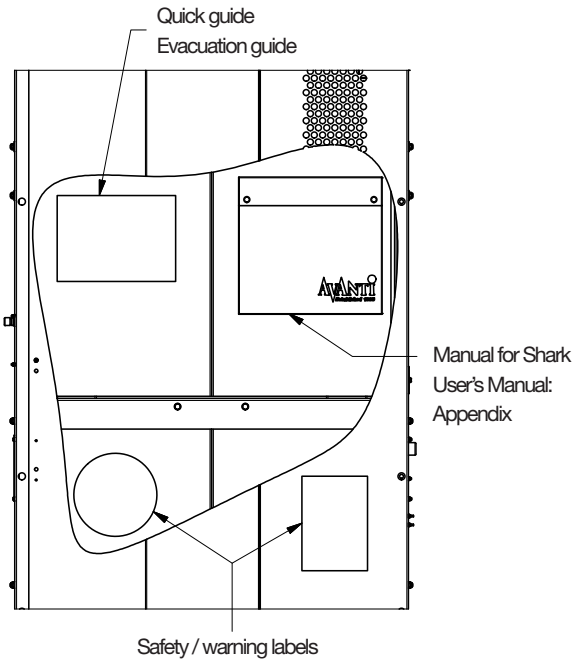
2.14 Other features

2.14.1 Anchor points



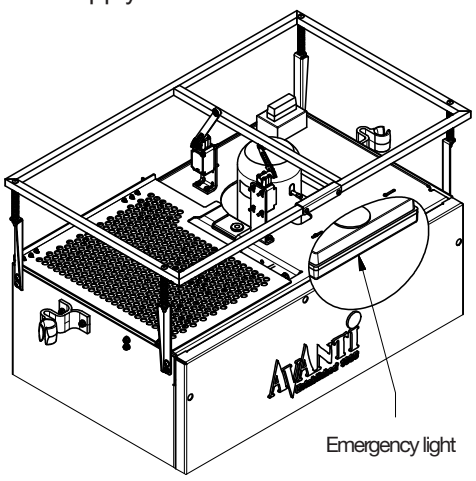
Maximum 1 person per anchor point

2.14.2 Service lift useful information and documentation



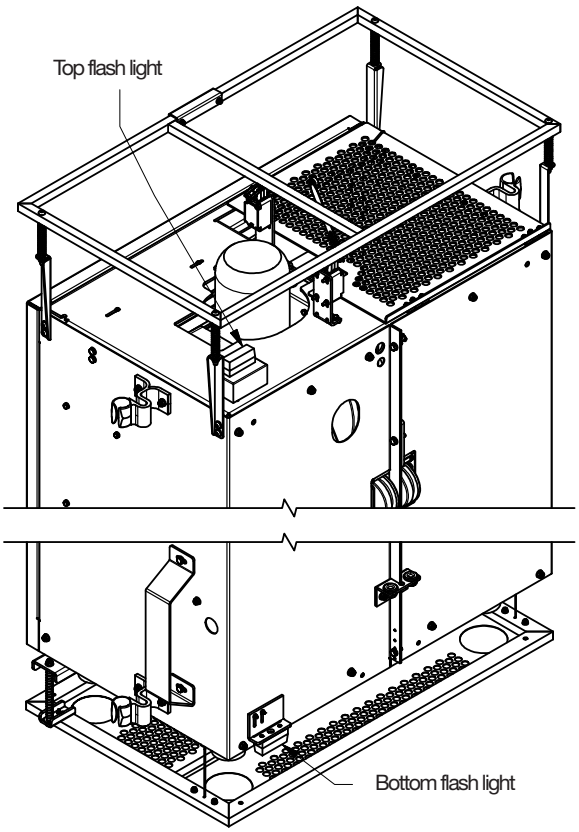
2.14.3 Emergency light

The service lift is equipped with an emergency light to provide illumination inside the cabin lift with and without electrical supply.



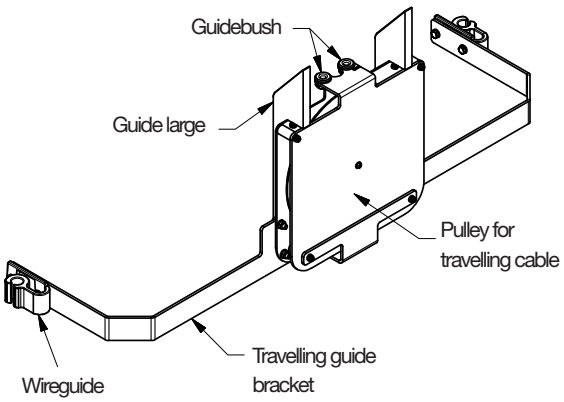
2.14.4 Yellow flash lights

The service lift is equipped with top and bottom warning lights that flashes when the cabin lift moves upwards or downwards.



2.14.5 Travelling cable pulley

The travelling cable pulley guides the service lift power supply cable approximately from the middle of the cabin's lift travel path to the cabin control box instead using the cable bin. The travelling cable pulley is included as an optional feature.



3. Fences Description

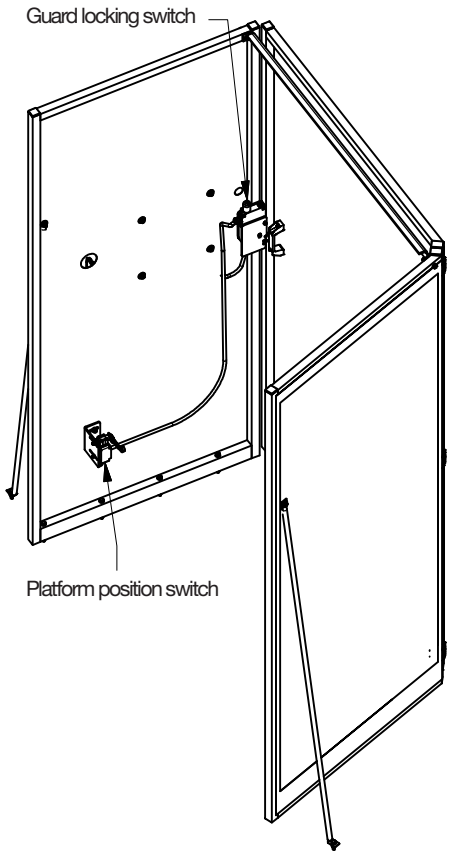
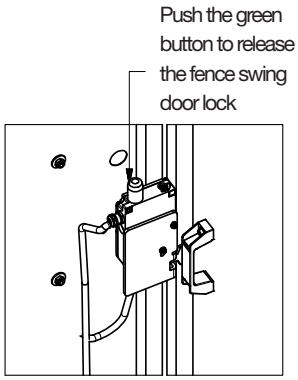
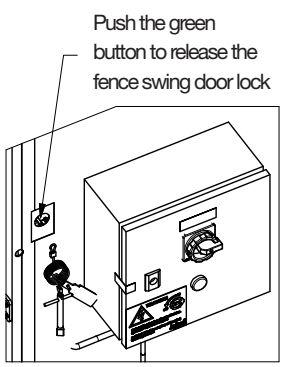
3.1 Fences with guard locking system

The Guard Locking System is used at each platform of the wind turbine generator. The service lift cannot operate until all the protected fences are closed and locked.

Normal use
The fences remain closed and locked until the service lift is stopped and properly positioned on the platform, actuating the position switch of the platform. In this position, the guard locking can be unlocked while pressing the guard locking switch green button.

Emergency use
For example, in the event of a power supply breakdown, the fence swing or sliding door can be unlocked by inserting the M5 triangular key on the guard locking switch and turning it clockwise.

3.1.1 Bottom platform fence

<table>
<tr><th colspan="3">Swing door fence</th></tr>
<tr><td rowspan="2"> 
</td><td>Inside the fence</td><td>Outside the fence</td></tr>
<tr><td>Normal use
 
</td><td>Normal use
 
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 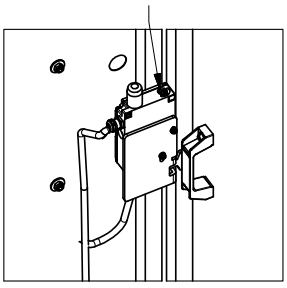
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 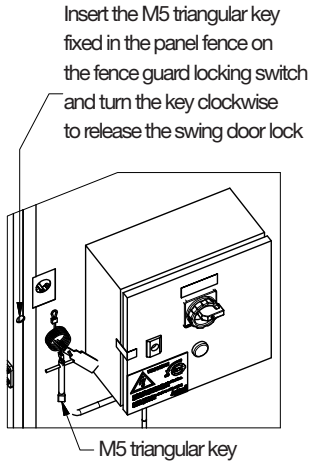
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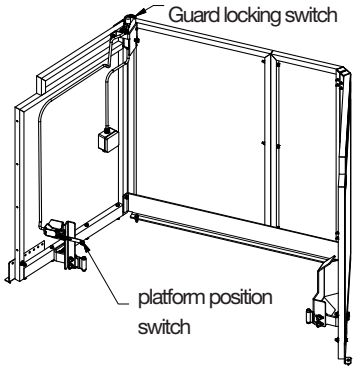
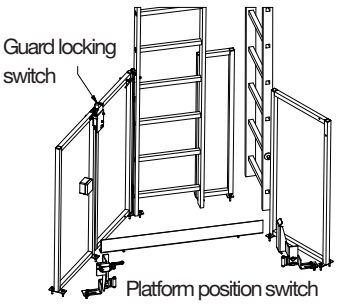
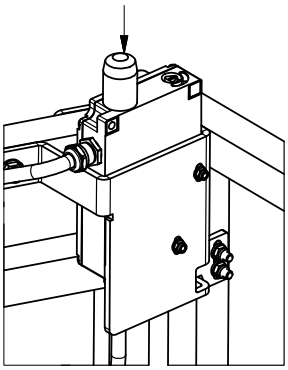
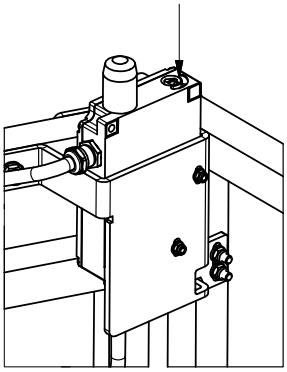
</table>

3.1.2 Intermediate platforms and top platform fences

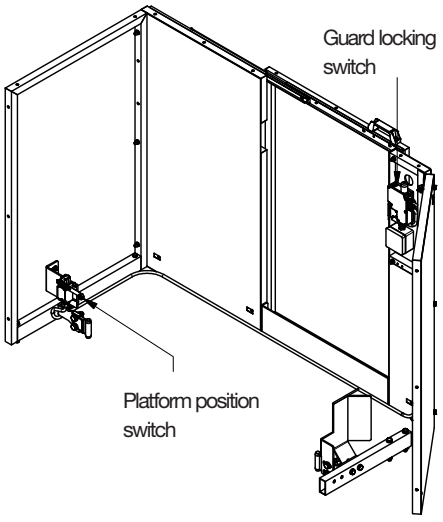
Swing door fence

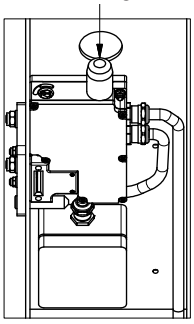
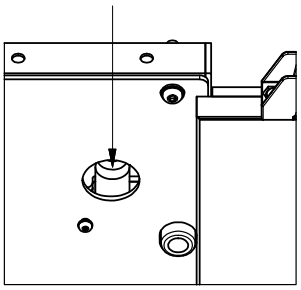
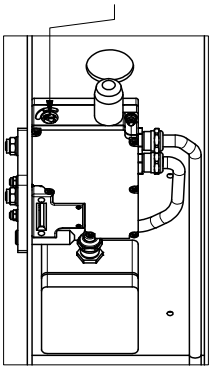
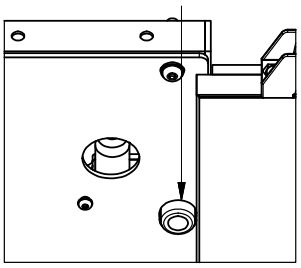




Normal use	Emergency use
Push the green button to release the swing door lock 	Insert the M5 triangular key fixed inside the cabin lift panel on the fence guard locking switch to release the swing door lock 

Sliding door fence



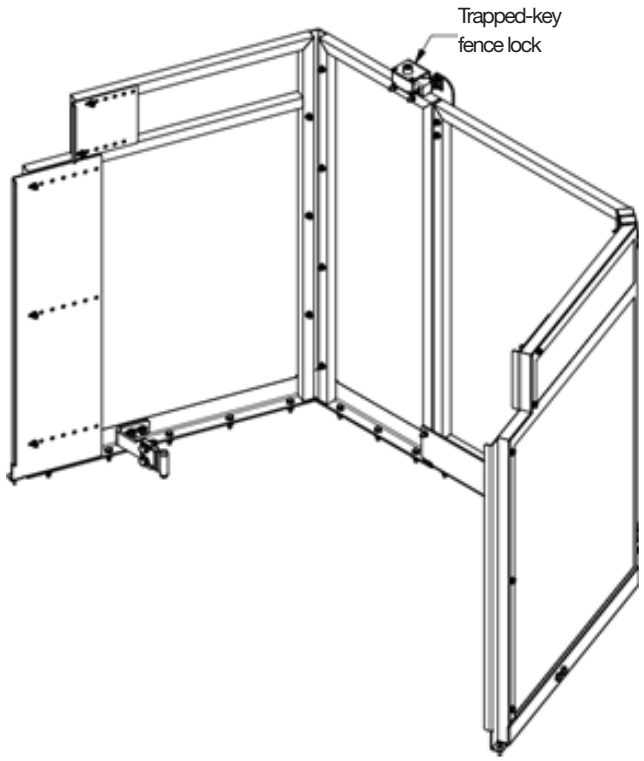
Inside the fence	Outside the fence
Normal use	**Normal use**
Push the green button to release the sliding door lock 	Push the green button to release the sliding door lock 
Emergency use	**Emergency use**
Insert the M5 triangular key fixed inside the cabin lift panel on the fence guard locking switch to release the sliding door lock 	Insert the M5 triangular key fixed inside the cabin lift panel on the fence guard locking switch to release the sliding door lock 

3.2 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.

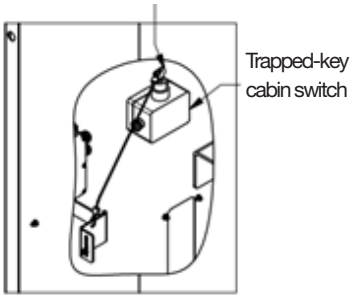
Use
Once the service lift is positioned at a platform height, control supply is interrupted by turning the trapped-key switch to OFF position, then the key can be removed from the trapped-key cabin switch and inserted in the trapped-key fence lock to open the platform fence door by turning it.

Swing door fence

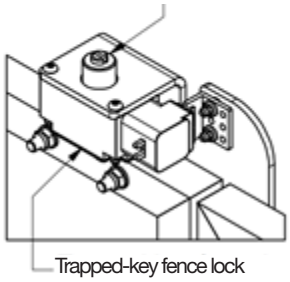


Use

Remove the trapped-key from the trapped-key cabin switch



Insert the trapped-key in the trapped-key fence lock to release the fence door.



4. Lift Operation

4.1 Normal operation

1. Turn the main switch of the bottom platform control box to the ON position.

2. Enter in the cabin`s service lift and close the sliding door.

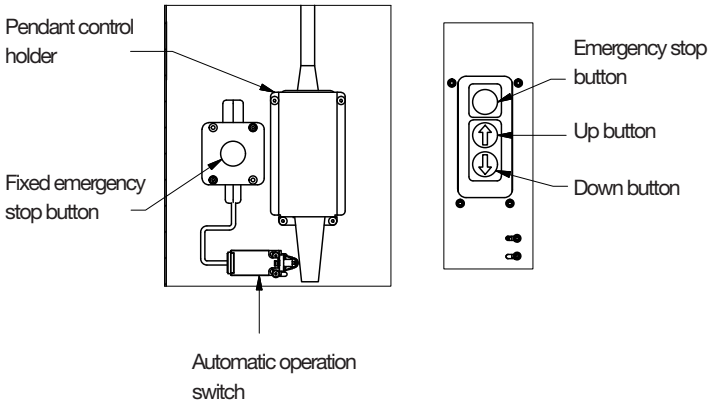
3. To move the cabin lift upwards or downwards, press and hold the UP or DOWN button as needed.

4.2 Automatic operation (for standard configuration)

1. Press the pendant control emergency stop button.

2. Turn the AUTOMATIC / MANUAL switch of the main control box to activate the automatic operation.

3. Put the pendant control inside the holder with the control buttons facing outside. It should engage the automatic operation switch.



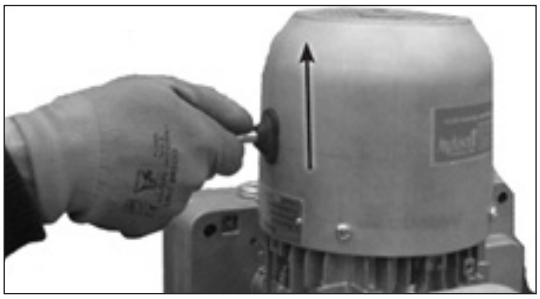
4. Exit from the cabin's lift and close the sliding door.

5. Turn and pull the pendant control's emergency button to reset the cabin lift electrical control°

6. Press the "UP" or "DOWN" button to send the lift upwards or downwards respectively.

4.3 Manual descent (For emergency situation only)

1. Push the traction hoist manual release lever upwards to release the electromagnetic motor brake.



2. The cabin`s lift will descent at constant speed.

3. To stop the cabin's lift downwards movement, proceed to loosen the lever.

4.4 Send and call functions (send/ call configuration)

If the send/call functions are provided, follow the instructions below.

4.4.1 Operation from the bottom platform control box to send or call the service lift:
1. Check that the ready light is illuminated.
2. Check that the fault light is not illuminated.
3. Press and hold the UP or DOWN button.

4.4.2 Operation from the top platform control box to send or call the service lift
To send or call the service lift from the top platform control box:
1. Check that the fault light is not illuminated.
2. Press and hold the UP or DOWN button.

Coordinate send or call actions between personnel by means of walkie-talkies.

Transportation of persons is forbidden if the operation is controlled from the platforms.

4.5 Cautions

It is prohibited to manipulate switches and safeties.

Always use PPE (hand gloves, helmet, safety glasses, fall arrest equipment and safety boots).

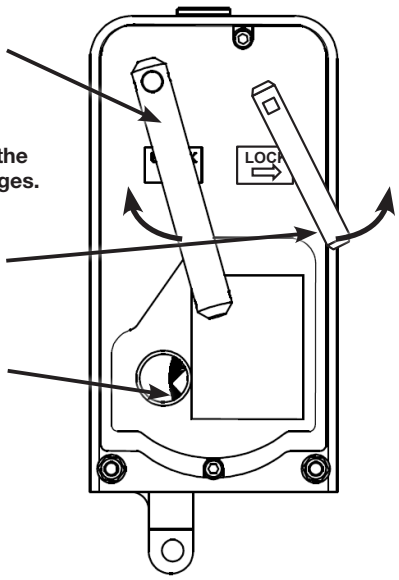
Always ensure that the walking way surfaces are dry and not slippery.

4.6 What to do if the fall arrest device engages?

Unlocking lever
To open the fall arrest device:
1. loosen the safety wire by taking the lift up.
2. Turn the lever as shown in the figure until the break disengages.

Locking lever
Turn the lever as shown in the figure to lock the fall arrest device.

Inspection window
Flywheel must run during lift operations.



5. Maintenance

Consult the AVANTI User´s Manual and Installation Manual for detailed information. (Maintenance Manual)

5.1 Send / call functions (send/call configuration)

If the send/call functions are provided, during the annual inspection, check that the send / call controls (UP & DOWN buttons, platform light, reset buttons/ligths, and emergency stop button) of the platform control boxes are fully functional.
To do so, proceed as explain below.

1. Press and hold the UP button on the control box – the service lift ascends with a delayed response.

2. Press the emergency stop button on the control box - the service lift stops.

3. Pull the emergency stop button and press and hold the DOWN button - the service lift descends with a delayed response.

5.2 Travelling cable pulley (send/call configuration)

If the travelling cable pulley is provided, during the annual inspection, check that the travelling cable pulley is in proper condition and mounted according to the manual. And that the cable stockings are properly mounted (so cable is not loaded at the cable plug).

5.3 Cautions

Personnel shall use a cable clamp or grip to manipulate wire ropes.

It is prohibited to work at different levels during maintenance tasks that involve risk of falling objects.

The maintenance tasks of electrical parts shall only be performed by qualified technicians.

Before the maintenance of electrical parts, personnel shall verify with the WTG responsible that the power supply is disconnected.

Before the maintenance of electrical parts, personnel shall the use electricity measuring tool.

Panels shall be removed to access confined spaces.

When replacing the traction hoist or the fall arrest device, personnel shall use a hand winch attachable to the ladder, slings and a 2 m ladder to stand on while the lift door is closed.

Replacing tasks of service lift parts shall be performed at the bottom platform.

The handling of big parts shall be performed with at least 2 persons.

During the daily inspection, check that platform level switch is not welded by trying to open the lift door when the lift has just left the bottom platform.

6. Installation

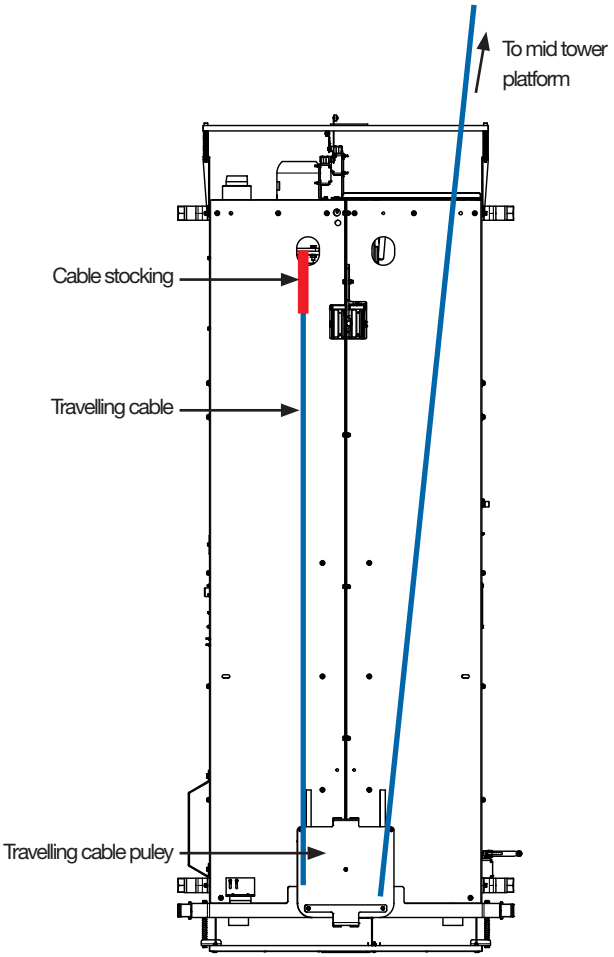
Consult the AVANTI User´s, Installation and Maintenance Manual for further information.

6.1 Send / call functions (send/call configuration)

If the send / call functions are provided, install the send / call control boxes on the platform fences and connect them according to electrical wiring diagram supplied into the guard locking bottom fence control box.

6.2 Travelling cable pulley (send/call configuration)

If the travelling cable pulley is provided:
1. Feed the wire ropes through the holes of the pulley.
2. Feed the travelling power supply cable through the pulley.
3. Feed the travelling power supply cable through the cable stocking and plug it to the service lift control box.



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The handling of big parts shall be performed with at least 2 persons.

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