



Original instructions



AVANTI

AVANTI SERVICE LIFT

User's Manual

Model Service Lift DOLPHIN A-V164



CERTIFICATE

EC Type Examination

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

Number of registration: 01/205/0869D/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) - (Zaragosa)
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:	Dolphin A
- max. load capacity:	240 kg / 2 persons
- net weight:	165 kg to 185 kg depending on the configuration
- traction hoist:	M508
- safety gear:	ASL508
- max. lifting height:	135 m to 180 m depending on the configuration (net weight)
- lifting speed:	18 m/min (50 Hz) or 21 m/min (60 Hz)
- Protection fences:	Swinging door or sliding door with interlock system
- Fence Interlock system:	Guard locking switch system or Trapped-key system
- Optional:	- Automatic send, call or send / call function - Roller guides

Modification D to the certificate 01/205/0869C/17 from 2017-09-11 - 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.: 17_076-1 from 2017-09-06 and is valid only duly considering the requirements mentioned in this document.

This certificate is valid until 2022-09-11

Cologne, 2019-02-28

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Certification body
Notified under No. 0035
certifier

Dipl.-Ing. Walter Ringhausen

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Precisely Right.

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Contents

	Page
1. Limited warranty.	5
2. Introduction.	6
2.1 Observations	6
2.2 Symbols	6
2.3 Cautions	7
2.4 Terms and definitions	7
3. Description	8
3.1 Purpose	8
3.2 Scope	8
3.3 Exclusions	8
3.4 Technical specifications	8
3.5 Dimensions	9
3.6 Components.	10
3.7 Traction system	12
3.8 Fall arrest device	12
3.9 Traction, safety and guiding wire ropes.	12
3.10 Main control box	13
3.11 User control box.	13
3.12 Bottom platform control box.	14
3.12.1 Send and call configuration	14
3.12.2 Automatic send configuration	14
3.13 Top platform control box.	14
3.13.1 Send and call configuration	14
3.14 Platform fences	14
3.14.1 Fences for Dolphin A-V164	14
3.14.1.1 Trapped key system	15
3.14.1.2 Guard locking system	15
3.15 Service lift door	16
3.15.1 Full sliding door.	16
3.16 Emergency top limit switch.	17
3.17 Top obstruction device	17
3.18 Bottom obstruction device	17
3.19 Manual descent system.	18
3.20 Fall arrest device	18
3.21 Overload limiter	18
3.22 Warning light	19
3.23 Acoustic buzzer.	19
3.24 Anchor points.	19
3.25 Internal light	19
3.26 Control cable management.	19
3.26.1 Trailing cable management system	19
3.26.2 Travelling cable	19
4. Instructions for use	20
4.1 Daily inspection	20
4.2 Prohibited uses	20
4.3 Operation from inside the cabin (manual)	20
4.4 Operation from outside the cabin (automatic send configuration)	20
4.4.1 Bottom platform	21
4.4.2 Top platform	21
4.5 Operation from the platform control boxes (send / call configuration)	21
4.6 Fall arrest device	21
4.7 Manual descent	21
4.8 After use instructions	21
4.9 Troubleshooting.	22
4.10 Out of service.	24
Appendix A: Inspection Log Sheet	25
Appendix B: Stomp-test Instruction	29



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 Product¹⁾ 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.

¹⁾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 25 years with an operating frequency of approximately 10h/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 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
Certified technician	Person who has received relevant training from Avanti or a qualified instructor associated with the intended work and who holds valid certification (current) for the task in question.
User	Person who has received relevant training associated with using the Avanti service lift and perform the corresponding daily inspections and who holds valid certification (current) for the task in question.
Manual descent (also: descent without electrical power supply)	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 Dolphin lift:

- *Dolphin A-V164 CE version.*



An EC type-examination by a Notified Body according to the Machinery Directive 2006/42/EC was performed

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 roller wire 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.

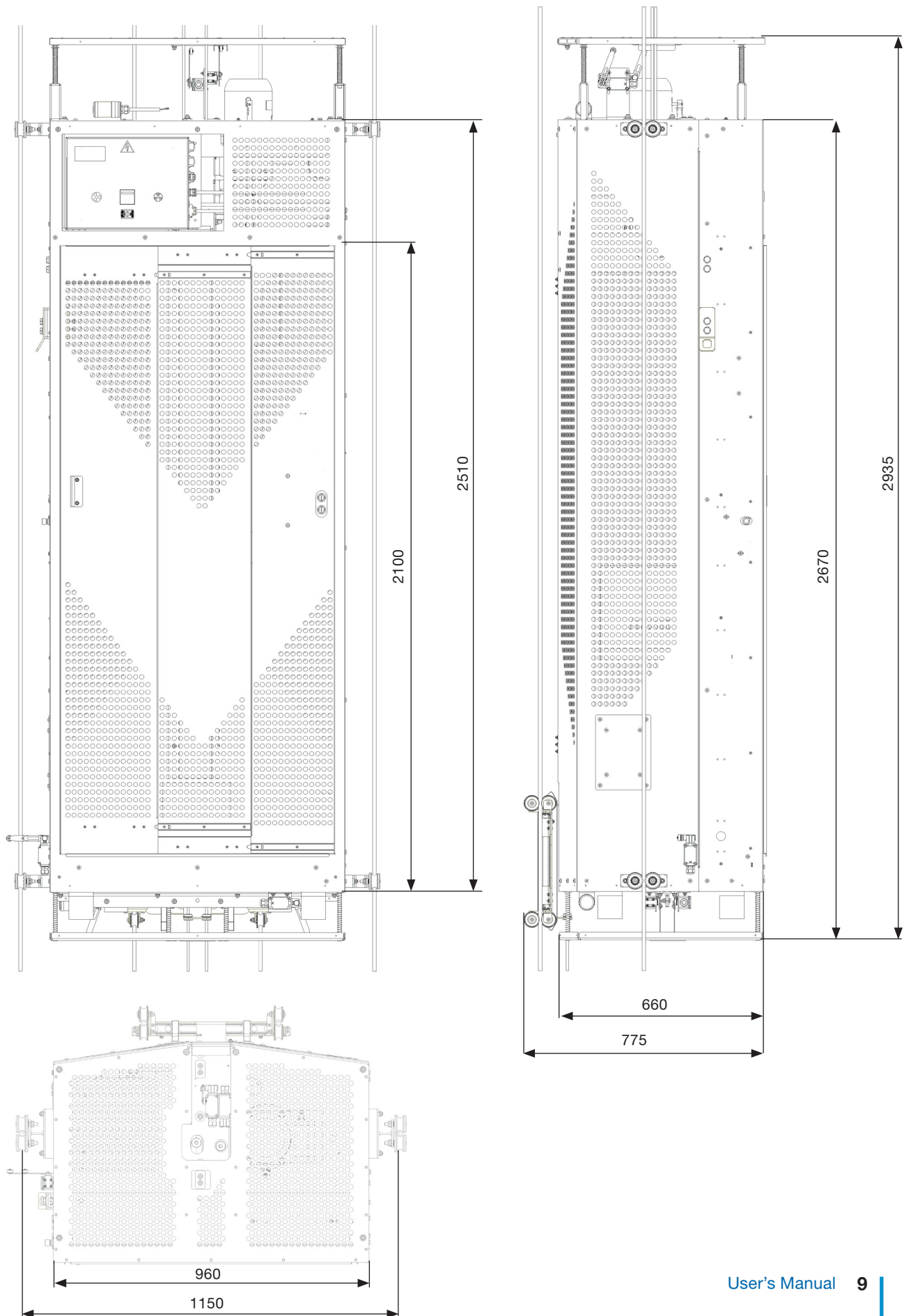
Service lift	Dolphin A-V164
Service lift weight	See note (1)
Service lift speed	18 m/min \pm 10% or 21,6 m/min \pm 10%
Working load limit / N° persons (max)	240 kg / 2 Persons
Operating temperature	-15°C to +60°C (5°F to +140°F)
Operating temperature (CCV)	-25°C to +40°C (-13°F to +104°F)
Survival temperature	-25°C to +80°C (-13°F to +176°F)
Max. Noise level	80 dB (A)
Wire rope fastenings	Shackle 2T form C with safety pin
Power supply	3 Phase 400V / 690V, 50Hz / 60Hz



(1) Note: With all options: 185 kg. / Standard design: 175 kg.

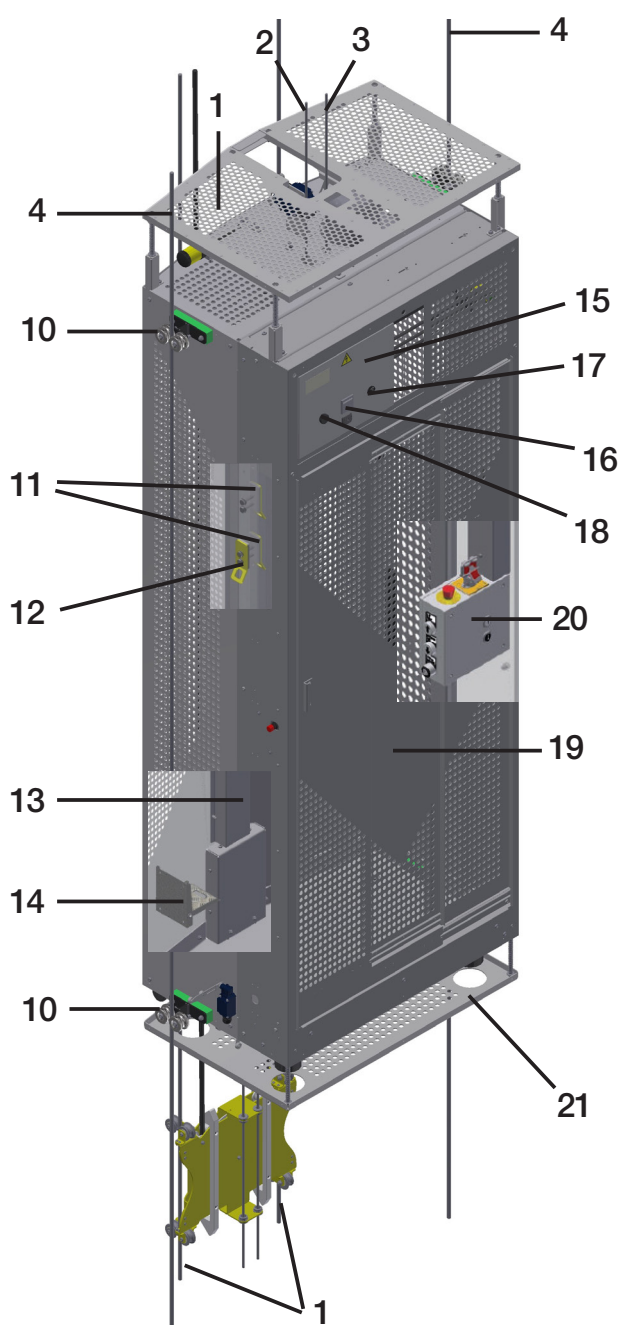


3.5 Dimensions

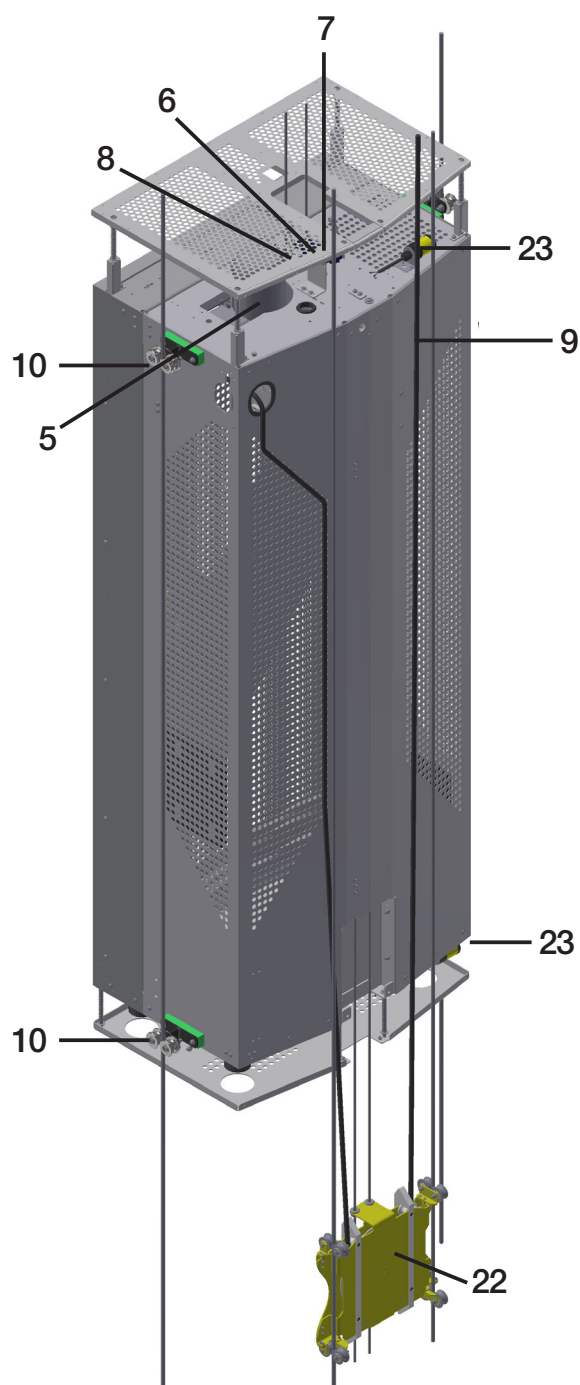


3.6 Components

3.6.1 Dolphin A-V164 (travelling cable)



- 1. Travelling cable pulley guiding wire rope (2x)
- 2. Safety wire rope
- 3. Traction wire rope
- 4. Guiding wire rope (2x)
- 5. Traction hoist
- 6. Top obstruction switch
- 7. Emergency top limit switch (S13)
- 8. Fall arrest device
- 9. Travelling cable
- 10. Wire rope guide (4x) (Roller wire guide)
- 11. Internal anchor point (2x)
- 12. External anchor point ¹⁾ (1x)



- 13. Maintenance cover
- 14. Folding step
- 15. Main control box
- 16. Hour counter
- 17. Overload and delay buzzer
- 18. Manual descent buzzer
- 19. Full sliding door
- 20. User control box
- 21. Bottom obstruction device
- 22. Travelling cable pulley ²⁾
- 23. Warning light (2x) (Top and base)

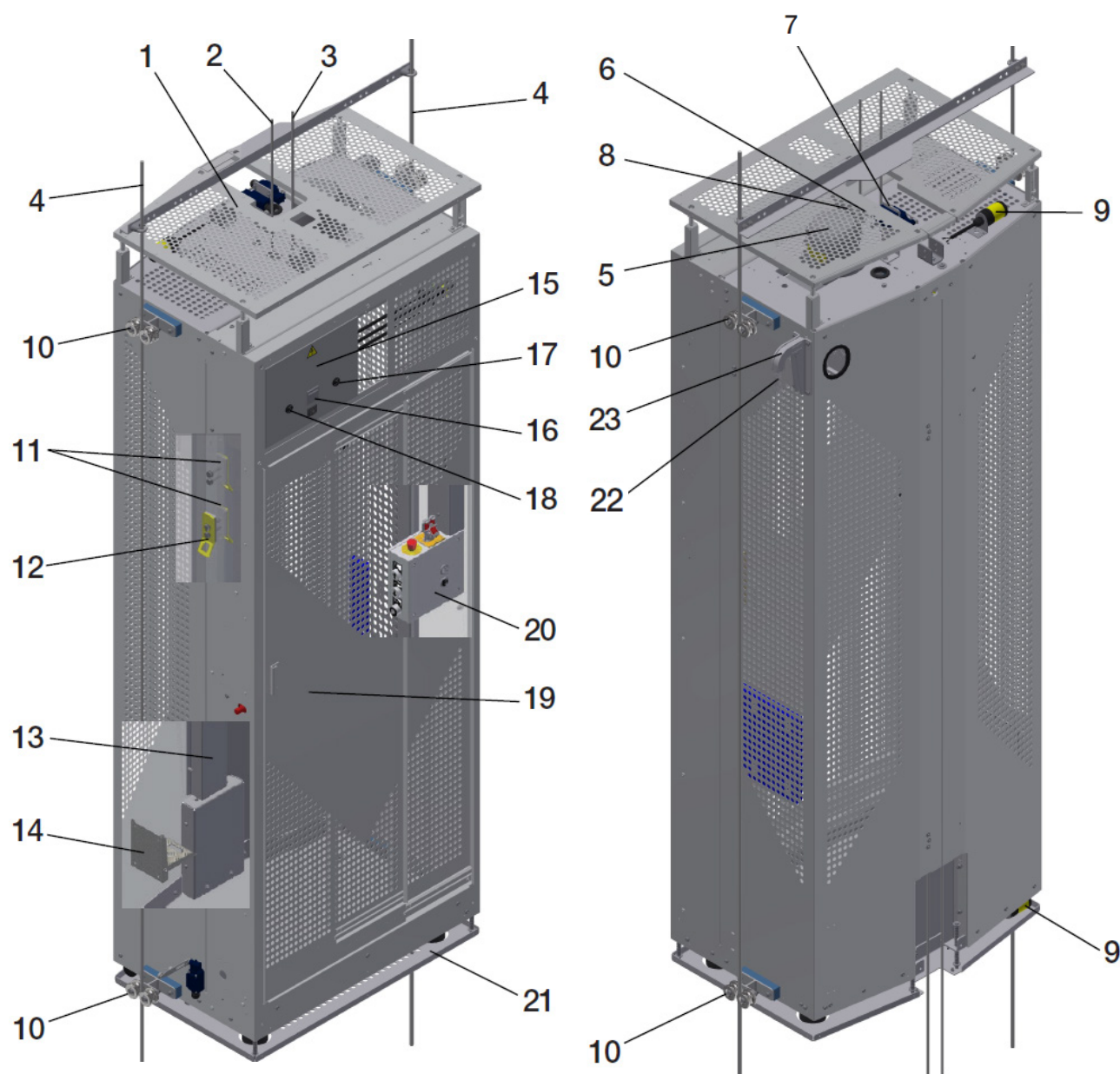


¹⁾ The external anchor point must only be used for evacuation / rescue operation.



²⁾ Optional feature for the automatic send configuration. Mandatory for send call configuration.

3.6.2 Dolphin A-V164 (trailing cable)



- 1. Top obstruction device
- 2. Safety wire rope
- 3. Traction wire rope
- 4. Guiding wire rope (2x)
- 5. Traction hoist
- 6. Top obstruction switch
- 7. Emergency top limit switch (S13)
- 8. Fall arrest device
- 9. Warning light (2x) (Top and base)
- 10. Wire rope guide (4x)
(Roller wire guide)
- 11. Internal anchor point (2x)
- 12. External anchor point ¹⁾ (1x)



¹⁾ The external anchor point must only be used for evacuation / rescue operation.

- 13. Maintenance cover
- 14. Folding step
- 15. Main control box
- 16. Hour counter
- 17. Overload and delay buzzer
- 18. Manual descent buzzer
- 19. Full sliding door
- 20. User control box
- 21. Bottom obstruction device
- 22. Cable stocking
- 23. Cable bracket



Traction system



Fall arrest device



3.7 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
Dolphin A-V164	M508/400V 50Hz	500	18	1.5	4.1	8.4	50
Dolphin A-V164	M508/690V 50Hz	500	18	1.5	2.3	8.4	50
Dolphin A-V164	M508/400V 60Hz	500	21.6	1.8	4.9	8.4	50
Dolphin A-V164	M508/690V 60Hz	500	21.6	1.8	2.8	8.4	50

3.8 Fall arrest device

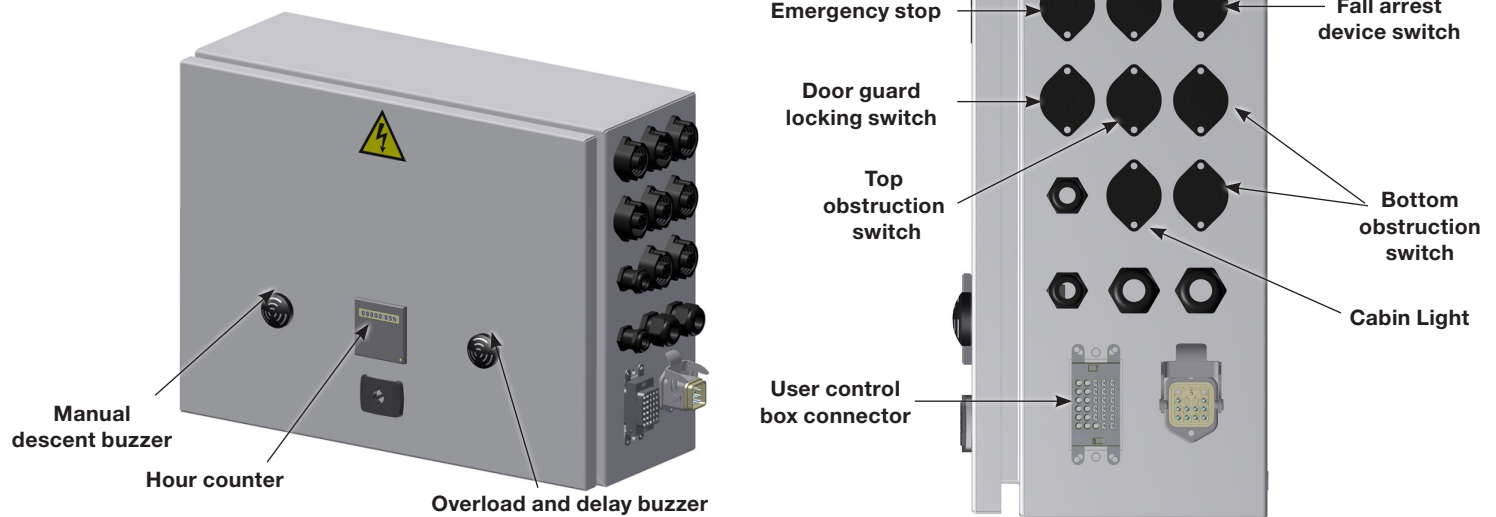
Service Lift	Fall arrest device	Lifting capacity	Triggering speed	Safety wire rope Ø	Unit weight approx.
Version	Type	Kg (lbs)	m/min (ft/min)	mm	Kg (lbs)
Dolphin A-V164	ASL 508	500 (1100)	30 (100)	8.4	7 (15.4)

3.9 Traction, safety and guiding wire ropes

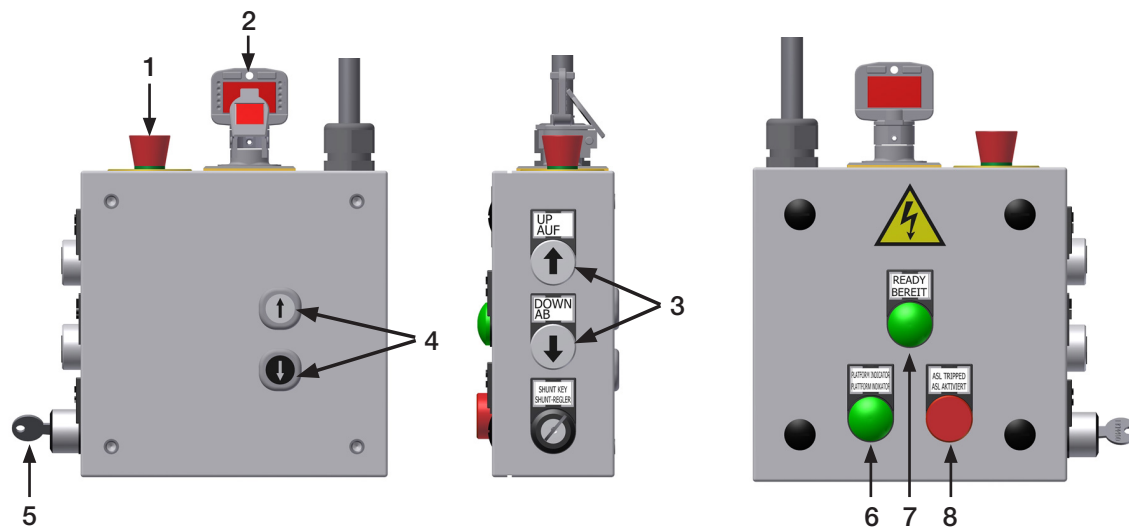
Service Lift Version	Wire rope type	Wire rope diameter	Surface Treatment	Mark/feature	Min. break resistance	Attached with
Dolphin A-V164	M508 / ASL 508	8.4 mm, 5x19	HDG	no	55 kN	2 t shackle
Dolphin A-V164	Guiding wire rope	12 mm	HDG	no	53 kN	2 t shackle



3.10 Main control box



3.11 User control box



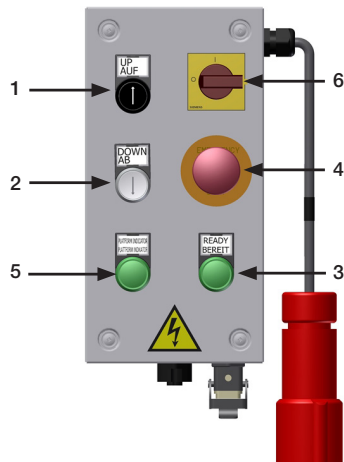
1. Emergency stop button. Press it to interrupt any control function. Pull to reset the control after necessary verifications.
2. Trapped key switch¹⁾. Insert and turn the key to the ON position to enable control of the lift. The key is now trapped and cannot be removed until it is turned back to the OFF position. Turn and remove the key to interrupt control of the lift. Then use the key to open the trapped key lock of the top platform fence.
3. UP/DOWN buttons (hold to run).
4. UP/DOWN buttons (automatic send). Press it to send the lift all the way to the top or bottom of the tower. The automatic DOWN button is only operational from the top platform and the automatic UP button is only operational from the bottom platform.
5. Bottom obstruction override switch.
6. Platform light (green).
7. OK light (green).
8. ASL light (red).

i ¹⁾Note: An interlock system (trapped key or guard locking) is mandatory for the CE versions if platform fences are equipped with doors.

3.12 Bottom platform control box

The control box is installed at the bottom platform fence. The 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.

3.12.1 Send and call configuration



1. UP button (hold to run)
2. DOWN button (hold to run)
3. OK light (green)
4. Emergency stop button
5. Platform level light (green)
6. Main switch

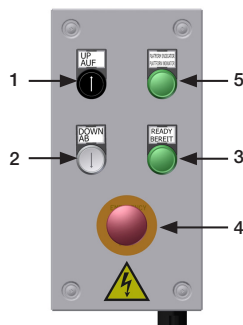
3.12.2 Automatic send configuration



1. Main switch

3.13 Top platform control box.

3.13.1 Send and call configuration



1. UP button (hold to run)
2. DOWN button (hold to run)
3. OK light (green)
4. Emergency stop button
5. Platform level light (green)

3.14 Platform fences

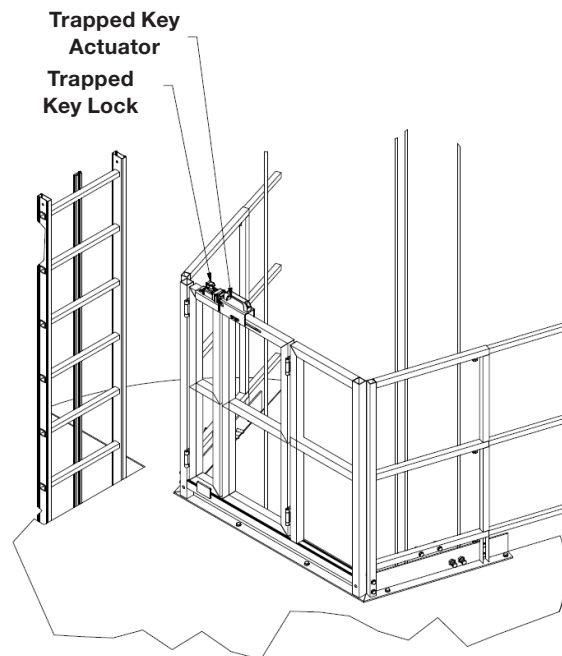
The platform holes shall be protected with platform fences. The platform fences consist of structures, with or without perforated sheets, of different geometries depending on the platforms where they are installed.

3.14.1 Fences for Dolphin A-V164

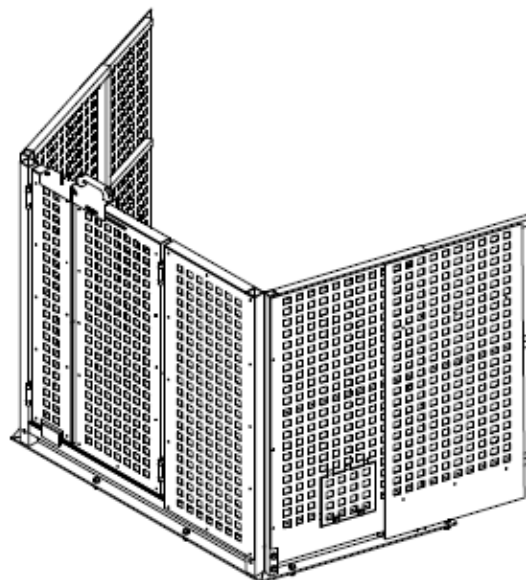
The platform fences shall conform to EN 14122-3. The following types of fences are possible as long as the following points are fulfilled:

1. The doors shall be monitored with an interlock system: either trapped key or guard locking.
2. The railing type fence is only possible if the service lift is equipped with a top obstruction device.

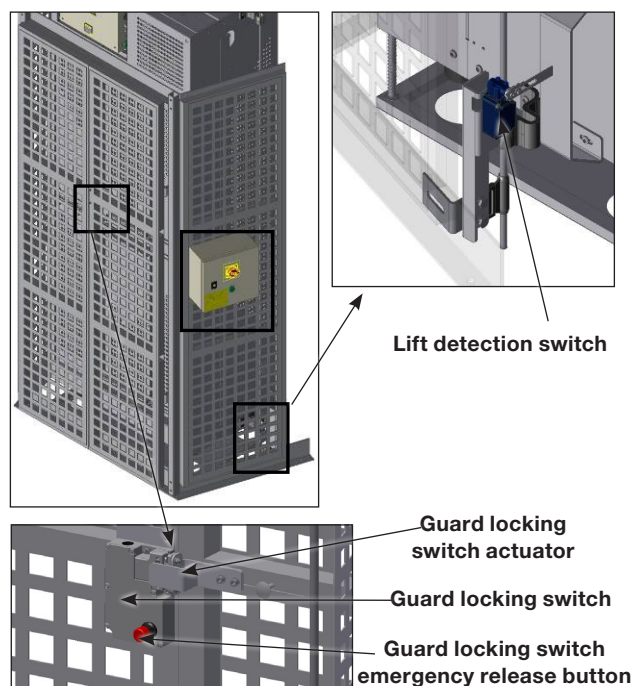
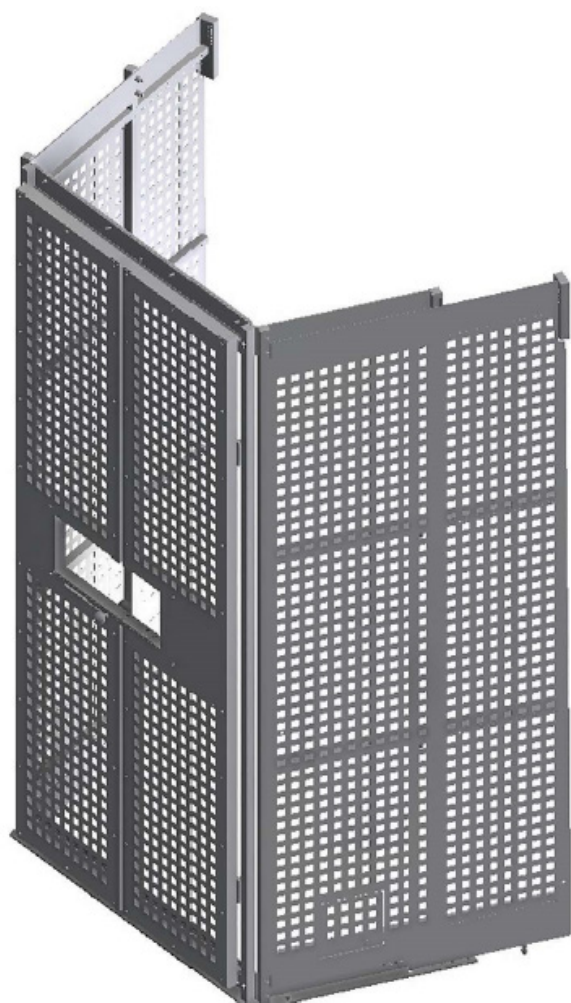
1. Railing type with door.



2. Perforated sheets with door.



3. Perforated sheet type of 2,4m high with door.



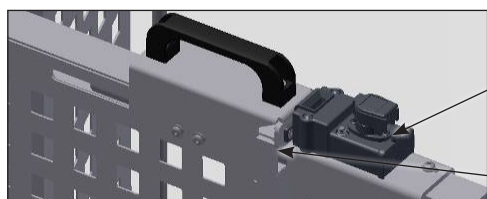
Use of the emergency manual release of fence doors during normal use is prohibited!



¹⁾Note: An interlock system (trapped key or guard locking) is mandatory for the CE versions if platform fences are equipped with doors.

3.14.1.1 Trapped key system ¹⁾

The platform fence door is fitted with a trapped key lock keeping the door locked while the service lift is not at the platform. The door can be unlocked by using the trapped key on the user control box and opening the trapped key lock. The key will get trapped until the door is closed and locked again.



Trapped key lock
Trapped key lock actuator

3.14.1.2 Guard locking system ¹⁾

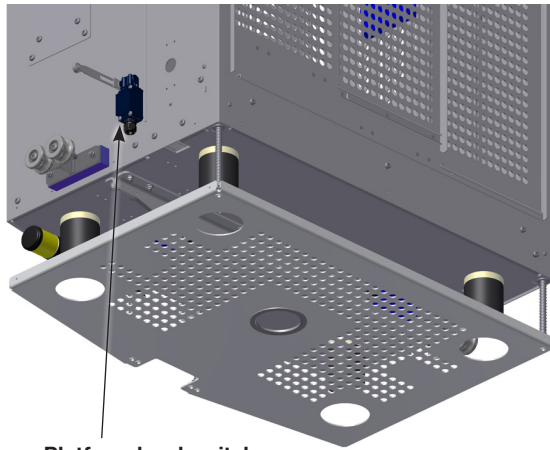
Optionally, the platform fence door can be fitted with an interlock system keeping the door locked while the service lift is not at the platform. The door is unlocked when the service lift is at the platform with the lift detection switch activated. The green light is ON when the door is closed.

3.15 Service lift door

3.15.1 Full sliding door

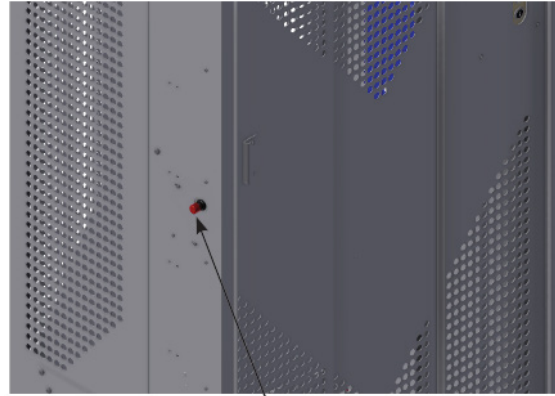
Main access to the cabin is done through the full sliding door installed on the front. The full sliding door opening dimensions are 2100 x 570 mm. It features a guard locking system that:

- Prevents service lift to travel if the door is open. This opening condition is monitored by the guard locking switch.
- Permits door to be opened only when service lift is levelled with a platform. This levelling condition is monitored by the platform level switch which is triggered by the safe zone plates located in each tower platform level.

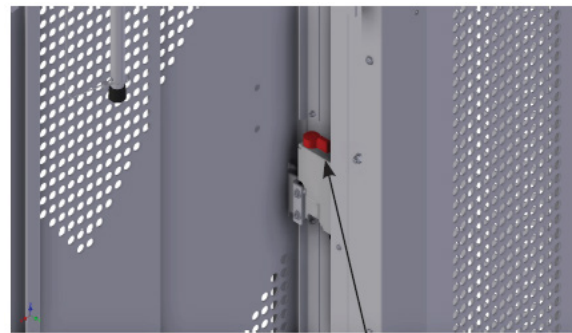


Platform level switch

It is possible to manually release guard locking system in order to open main door between platforms for maintenance tasks or installation of WTG parts.



External manual release button of guard locking switch



Internal manual release lever of guard locking switch



Use of the emergency manual release during normal use is prohibited!

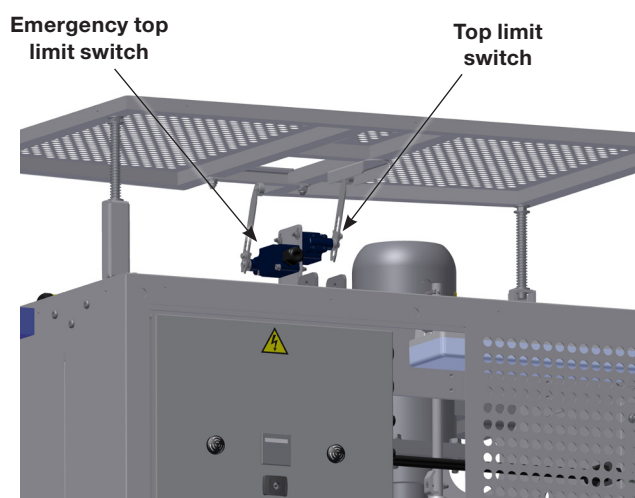
3.16 Emergency top limit switch

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. 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.



3.18 Bottom obstruction device

The bottom obstruction switch stops descent if the service lift:

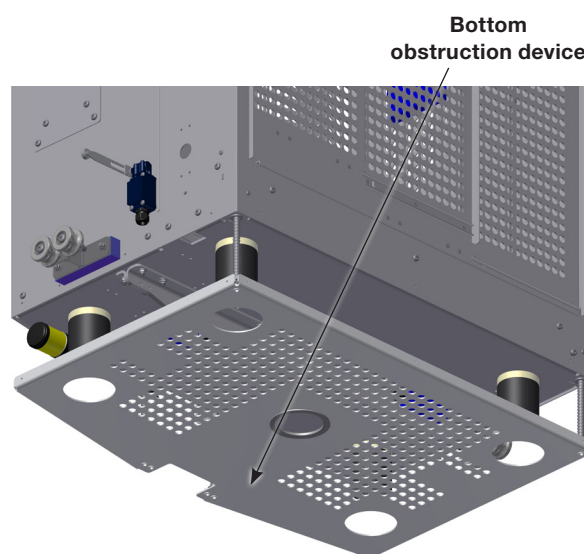
- encounters an obstacle
- touches the ground

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.

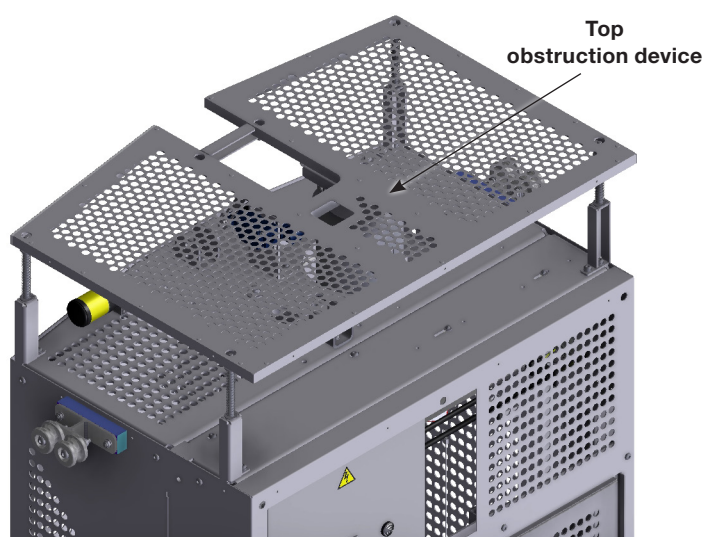


3.17 Top obstruction device

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

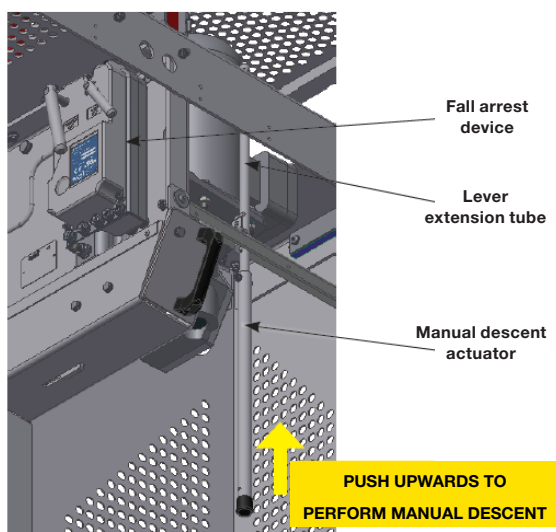
- encounters an obstacle
- touches the top limit device

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



3.19 Manual descent system

The service lift is provided with a lever allowing manual release of the electromagnetic motor brake. Once the motor brake is released, the service lift descends with a controlled speed limited by a centrifugal brake installed between the motor shaft and the gear box. The manual descent buzzer will sound while the service lift descends.



3.20 Fall arrest device

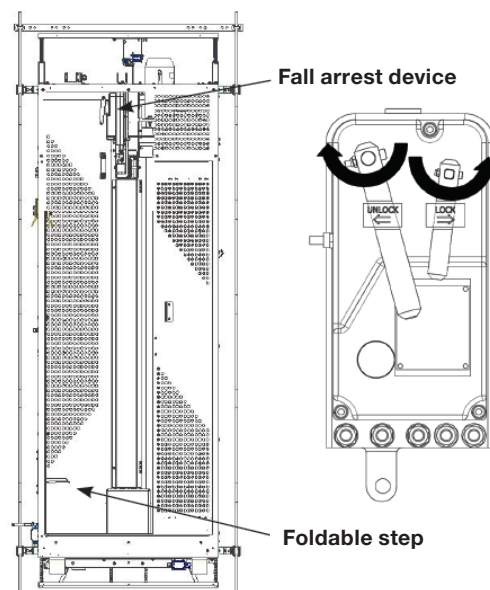
The service lift is equipped with a fall arrest device which will be triggered in case of an overspeed condition. The speed of the safety wire rope passing through the device is continuously monitored, and the jaws are automatically closed in the event of sudden excessive speed.



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 acting directly on the fall arrest device levers.

- A foldable step is 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.



BEFORE CLIMBING on foldable step, **CHECK** that required PPEs are used, both doors are closed and personnel is hooked to anchor points inside cabin

3.21 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 main control box. The buzzer will stop only when the cause of the overload has been removed.

- Reduce the load to below the overload limit.



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!



Performing a manual descent in case of an overloaded lift is prohibited!

3.22 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.

3.23 Acoustic buzzer

An optional audible signal can be installed with the same warning function.

3.24 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. There is an external anchor point ¹⁾ outside the cabin to facilitate the evacuation and rescue operations.



¹⁾ The external anchor point must only be used for evacuation / rescue operation.

3.25 Internal light

The service lift is equipped with a light inside the cabin. The light is on when the lift is powered, and it is also battery packed in order to illuminate the inside of the cabin in case of a power failure (once charged).

3.26 Control cable management

3.26.1 Trailing cable management system ¹⁾

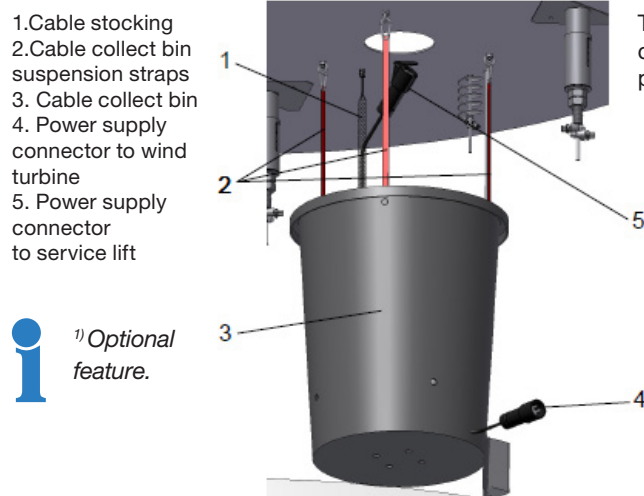
In the trailing cable management system the cabin pulls the cable during ascent uncoiling it from a cable collect bin.

The force of gravity coils the cable back into the cable collect bin during descent.

The cable is stored in a cable collect bin while the service lift is not in operation.

The cable hangs from the cabin by means of a cable stocking.

The cable collect bin is located below the bottom platform.



3.26.1.1 Guided trailing cable management system ²⁾

In the guided trailing cable management system the cabin pulls the cable during ascent uncoiling it from a cable collect bin.

Cable guides are installed on the platforms or brackets along the travel path to reduce the movement of the cable when the cabin is located above the cable guides.

The force of gravity coils the cable back into the cable collect bin during descent.

The cable is stored in a cable collect bin while the service lift is not in operation.

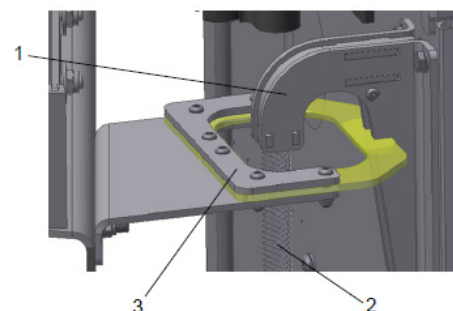
The cable hangs from the cabin by means of a cable stocking that rests on a cable bracket on the side of the cabin.

The cable collect bin is located below the bottom platform.

1. Cable bracket
2. Cable stocking
3. Cable guide



²⁾ Optional feature.

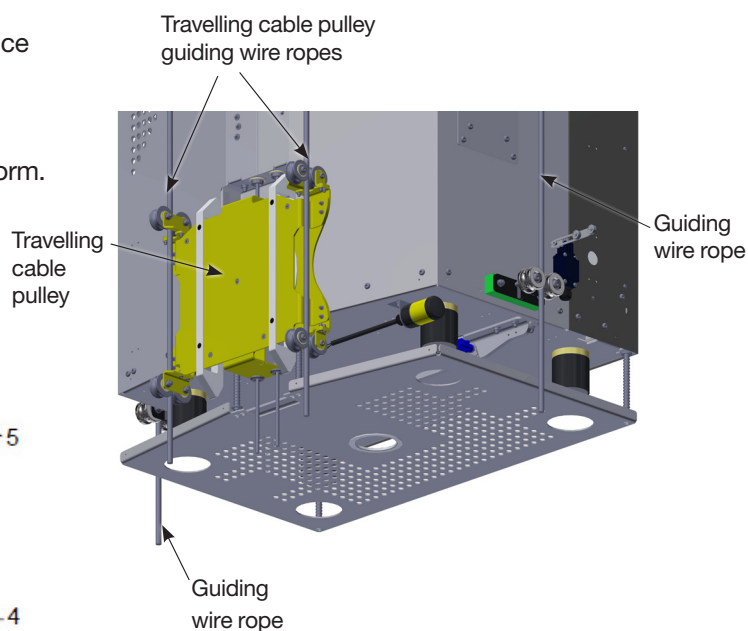


3.26.2 Travelling cable ³⁾

The travelling cable pulley straightens the cable at all possible positions of the service lift. The travelling cable pulley is mandatory for send/call configuration. The travelling cable pulley is guided on the traction and safety wire ropes and also on two additional guiding wire ropes. This way, the guiding of the pulley improves.



³⁾ Optional feature for the automatic send configuration. Mandatory for send call configuration.



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. 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: Press the emergency stop button on the user control box. The service lift should not move UP / DOWN. Release the emergency stop and drive the lift UP approximately 1 meter.
 - 3.4 Service lift door: Pull the door to open. The door should not open.
 - 3.5 Ascend lift electrically a few centimeters and observe centrifugal weight during this. Activate the fall arrest device by turning the lock lever counter clock wise. Press and hold the DOWN button of the user 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' Appendix.
 - 3.6 Perform a manual descent test for a meter. The lift should descend and the buzzer should sound.
 - 3.7 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.
 - 3.8 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.



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 only available from the control buttons outside of the cabin and shall be checked as follows (one technician inside the cabin/one technician outside):

1. 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.

4.2 Prohibited uses



The consequences of not following below 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 or fence doors during normal use.
- To disattach trapped key from wire rope.
- To have a second trapped key.



4.3 Operation from inside the cabin (manual)

1. Turn the main switch of the platform control box to the ON position.
2. Enter the service lift and close the bottom / top fence door.
3. Turn the trapped key switch ON.
4. To go up or down, push 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.

4.4 Operation from outside the cabin (automatic send configuration)



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





4.4.1 Bottom platform

1. Turn the main switch ON of the platform control box.
2. Close the bottom platform fence door.
3. Insert the trapped key inside the switch on the user control box and turn it ON.
4. Close the service lift door.
5. Press the UP button using the send tool.

4.4.2 Top platform

1. Close the top fence door.
2. Insert the trapped key in the switch of the user control box and turn it ON.
3. Close the service lift door.
4. Press the DOWN button.

4.5 Operation from the platform control boxes (send / call configuration)

1. Turn the trapped key switch to ON.
2. Close the door of the cabin and of the platform fence.
3. Press and hold the UP or DOWN button to ascend or descend the cabin.



4.4 and 4.5: When actuating UP or DOWN buttons, response of cabin is delayed for 5 seconds while the warning lights are flashing and an acoustic signal will sound, in order to warn personnel in the surroundings that cabin is going to move.



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.

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 and a buzzer will sound.
5. To stop the manual descent, stop pushing upwards.



During the manual descent, the door and hatches 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 After use instructions

1. Bring the service lift all the way down, until the bottom obstruction device stops the cabin.
2. When leaving the wind turbine, turn the main switch in the bottom platform box to the OFF position to cut the power to the service lift.



Before leaving the WTG, ensure the lift is positioned in the bottom platform.





Risk of material damage. Do not place the service lift on the rubber bumpers. The power cable and traction/safety wire ropes could get tangled in WTG internals.


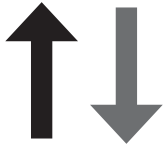



4.9 Troubleshooting

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 neither go up nor down!</p>  <p>DANGER! Attempting to use the lift will jeopardize work safety</p>	A1 The fixed EMERGENCY STOP button has been activated.	Reset the button in question by pulling or turning it
	A2 Wire rope loop on traction hoist. Damaged or defective wire rope or wire rope outlet causes problems.	Stop work immediately! Ask the supplier or manufacturer for help.
	A3 The fall arrest device is holding the service lift on the safety wire. a) Lift wire rope breakage b) Hoist failure	a) + b) Evacuate the service lift
	A4 The service lift is stuck on an obstacle.	Carefully remove the obstacle. Test the operational safety of affected tower sections. Inform the supervisor.
	A5 Power failure a) Main switch is OFF b) Grid voltage interrupted c) Supply between grid connection and control interrupted d) Phase control relay ¹⁾ tripped due to wrong phase sequence.  ¹⁾ Optional feature.	a) Turn the main switch ON 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. d) Check and correct phase lay at power supply
	A6 A safety switch is triggered: a) Emergency top limit switch is activated. b) Top and/or bottom sliding door is open.	a) Perform manual descent until the limit stop switch is released. b) Close the top and/or bottom sliding door.
	A7 Protection switch on overheating 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 motor cover. c) Measure voltage and power consumption on the loaded motor. If voltage deviates from specifications, use cable with increased dimensions.
	A8 Brake does not open (no click on on/off) a) Supply, braking coil or rectifier defective. b) Braking rotor closes.	a) Have a certified technician, repair/replace the supply, braking coil and rectifier. b) Return traction hoist for repair.
	A9 If trapped key system is provided: the trapped key is not present or the trapped key switch is in the OFF position.	Insert the key and turn it to the ON position
	A10 If guard locking system of fences is provided: the guard locking switch and/or interlock control box is defective.	Test / Repair defective components.



Breakdown	Cause	Solution
<p>Service lift goes down but not up</p> 	B1 The service lift is stuck on an obstacle.	Carefully move the service lift downwards and remove the obstacle. Test the operational safety of affected platform components. Inform the supervisor.
	B2 Service lift is overloaded (buzzer sounds).	Test and possibly reduce load until buzzer stops.
	B3 Top limit switch: a) Top limit switch is defective or not connected. b) Top limit switch is activated.	a) Test the top limit switch connection/function. Replace it if necessary. b) Descend the service lift until the top limit switch is released.
	B4 A phase is missing	Test fuses and power supply.
	B5 Fault in UP control circuit	Test and possibly repair connections, wiring and relays.
<p>Motor hums loudly or wire ropes squeak, but the lift can go both up and down.</p> 	C1 Wire ropes are dirty.  <i>Further use of lift may result in damage to the traction wire rope.</i>	If possible, immediately replace the traction hoist and return it for test/repair at AVANTI.
<p>Service lift will go up but not down!</p> 	D1 The service lift has encountered or is stuck on an obstacle.	Carefully take the service lift up and remove the obstacle. Test the operational safety of affected platform components. Inform the supervisor.
	D2 The fall arrest device is holding the service lift on the wire rope. 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. Open the fall arrest device by pressing the handle, and test its function. Functional test when the lift is back on the ground: Replace the hoist and fall arrest device and return them for testing.  DANGER! <i>A defective fall arrest device will threaten the safety of the service lift! Replace immediately!</i>



Breakdown	Cause	Solution
<p>Service lift will go up but not down!</p> 	D3 Fault in down controller circuit	Insert brake lever into the traction hoist and lower lift manually. Test, and if necessary have connections, wiring, and relays repaired.
	D4 Bottom stop switches: a) One or both of the bottom stop switches are defective or not connected. b) One or both of the bottom stop switches are activated.	a) Test the bottom stop switches connection/function. Replace if necessary. b) Descend service lift until one or both of the bottom stop switches are released.
	D5 The service lift is stuck on an obstacle below it.	a) Evacuate the service lift b) Inform the supervisor c) Check the Bottom obstruction device connection/function. Replace if necessary.
Lamp not lit although operation is normal	E A lamp is defective	Have an electrician replace it.
Service lift descends when UP button is pressed and ascends when DOWN button is pressed.	F If a phase control relay is not provided: two phases changed in the supply	Have an electrician switch the 2 phases in the plug.
Loud noise and / or smoke coming from hoist motor	G Brake closed or partially closed WARNING ! Damage of hoist brake leading to brake function lost	Stop work immediately! Call supervisor for advice and potential repair of hoist



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

4.10 Out of service

1. Securing the service lift:

Bring the service lift all the way down, until the bottom stop switch stops the cabin.



*Risk of material damage. Do not place the service lift on the rubber bumpers.
The power cable and traction/safety wire ropes could get tangled in WTG internals.*

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” and padlock as necessary. Contact the service technician for repair.



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